A1 GENERAL INFORMATION

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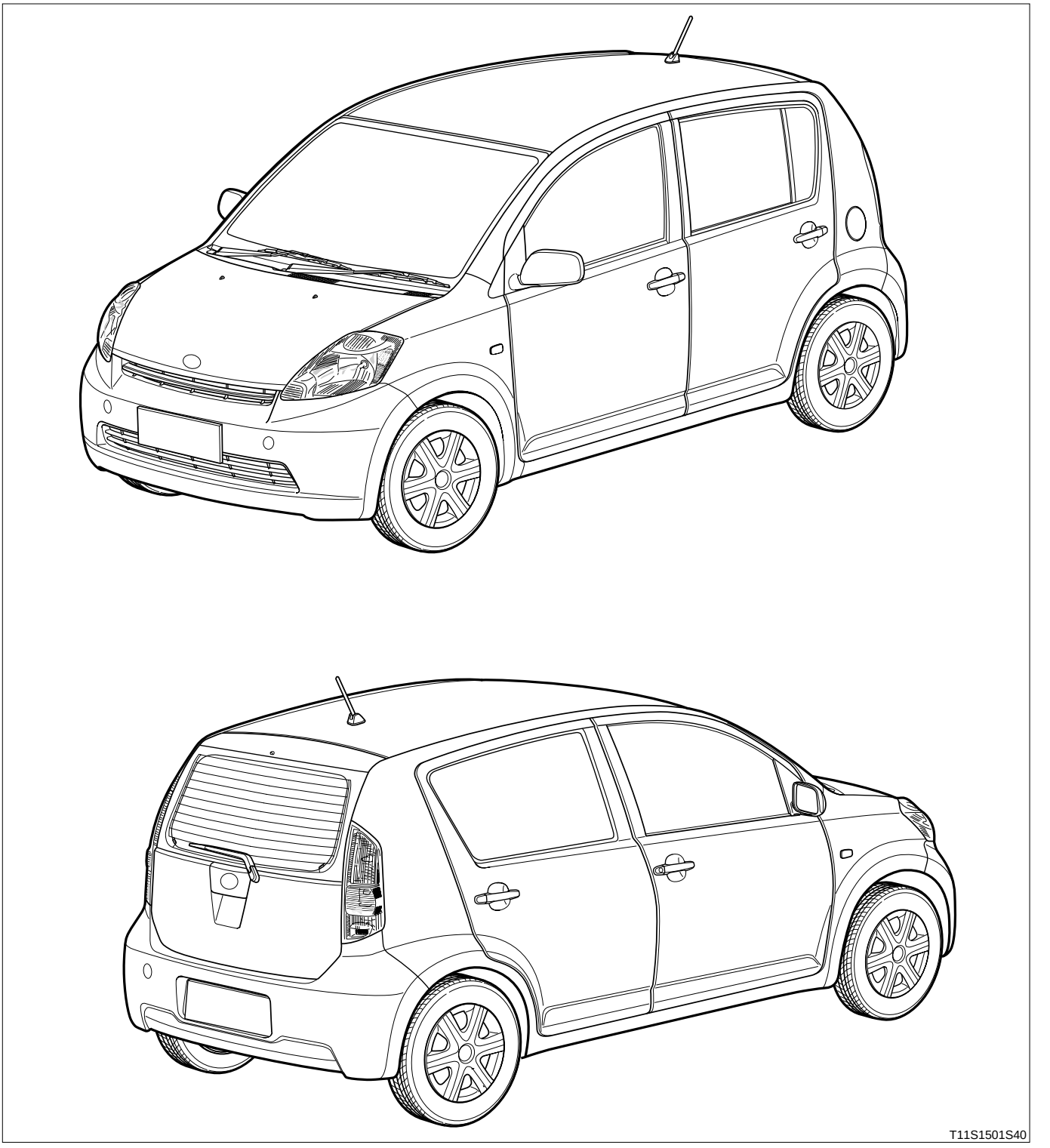
1 EXTERIOR, MODEL VARIATION, VEHICLE MODEL CODE

1-1 EXTERIOR



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1-2 MODEL VARIATION

1-2-1 GENERAL SPECIFICATIONS

Model code	Steering position	Engine	Drive	Transmission	Body type
M300RS−GMNE	RHD	1KR−FE	2WD	5M/T	5−door
M301RS−GMGE	RHD	K3−VE	2WD	5M/T	5−door
M301RS−GQGE	RHD	K3−VE	2WD	Electronic control 4A/T	5−door
M300LS−GMNE	LHD	1KR−FE	2WD	5M/T	5−door
M301LS−GMGE	LHD	K3−VE	2WD	5M/T	5−door
M301LS−GQGE	LHD	K3−VE	2WD	Electronic control 4A/T	5−door

1-2-2 EU SPECIFICATIONS

Model code	Steering position	Engine	Drive	Transmission	Body type
M300RS−GMNEW	RHD	1KR−FE	2WD	5M/T	5−door
M301RS−GMGEW	RHD	K3−VE	2WD	5M/T	5−door
M301RS−GQGEW	RHD	K3−VE	2WD	Electronic control 4A/T	5−door
M300LS−GMNEW	LHD	1KR−FE	2WD	5M/T	5−door
M301LS−GMGEW	LHD	K3−VE	2WD	5M/T	5−door
M301LS−GQGEW	LHD	K3−VE	2WD	Electronic control 4A/T	5−door

1-3 EXPLANATION OF VEHICLE MODEL CODE

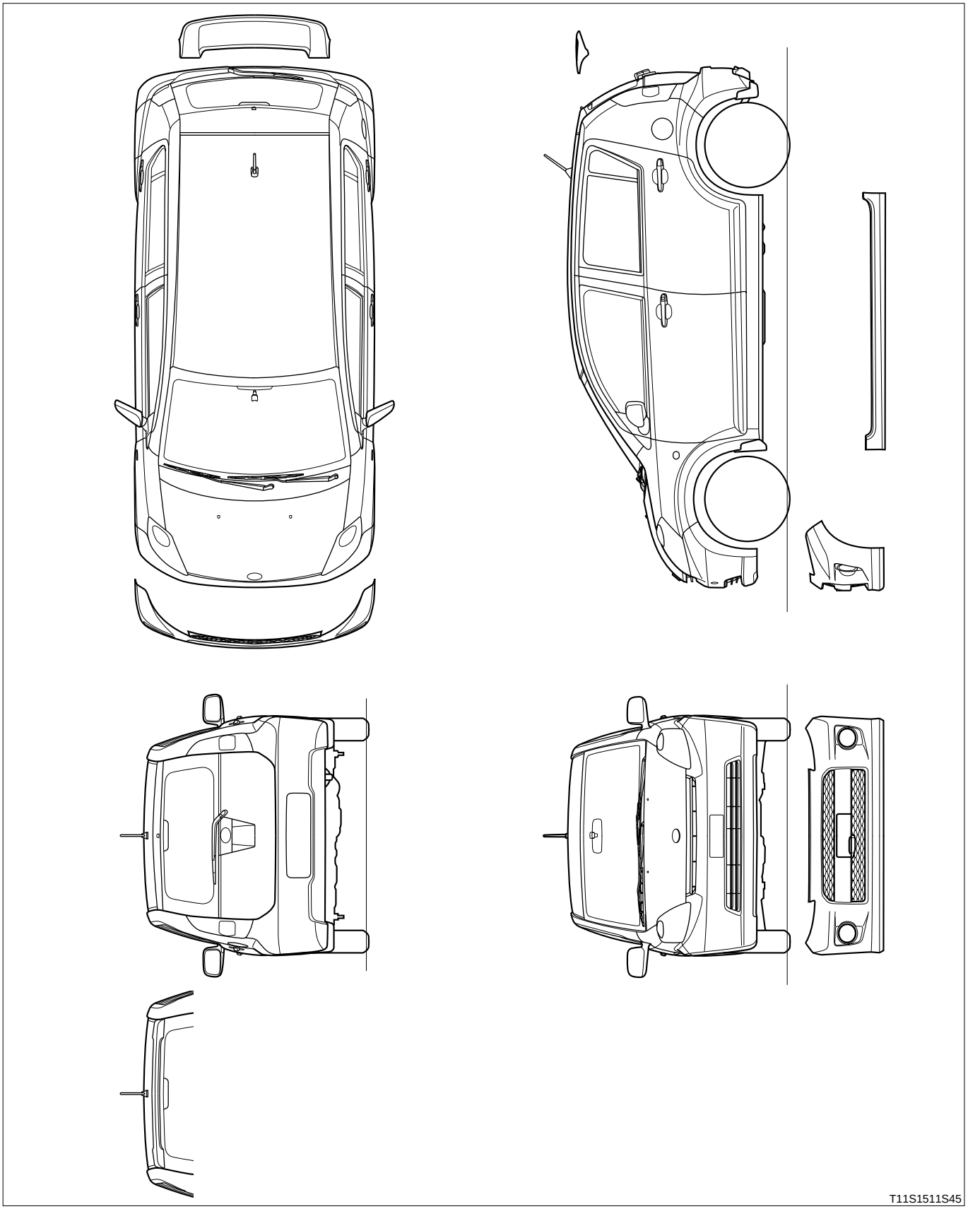
M 3 0 0 R S − G M N E W
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

①Model M3 : SIRION	②Drive 0 : 2WD
③Engine 0 : 1KR−FE 1 : K3−VE	④Steering L : LHD R : RHD
⑤Body type S : Sedan	⑥Door G : 5−door
⑦Transmission M : 5M/T Q : Electronic control 4A/T	⑧Grade N : STD(1.0L) G : STD(1.3L)
⑨Fuel system E : DOHC	⑩Market None : General W : EU / AUS

2 SPECIFICATIONS

Items				M300LS/M300RS		M301LS/M301RS			
				GMNE	GMNEW	GMGE	GQGE	GMGEW	GQGEW
		Engine		1KR−FE		K3−VE			
		Market		General	EU, AUS	General	General	EU, AUS	EU, AUS
		Drive		5M/T	5M/T	5M/T	E4A/T	5M/T	E4A/T
Overall length			mm	3600					
	With Aero Bumper		mm	−		3630			
Overall width			mm	1665					
Overall height			mm	1550					
Interior length			mm	1830					
Interior width			mm	1400					
Interior height			mm	1275					
Wheelbase			mm	2430					
Tread	13 " tire	Front	mm	1470		−			
		Rear	mm	1475		−			
	14 " tire	Front	mm	1460					
		Rear	mm	1465					
Minimum road clearance			mm	150					
Min Turning Radius	13 " tire		m	4.3 (Tire), 4.7 (Body)		−			
	14 " tire		m	4.7 (Tire), 5.1 (Body)					
Kerb weight			kg	875	890	925	940		955
Gross vehicle weight	General, EU		kg	1380	1390	1450			
	AUS		kg	−	1320	−		1380	
Seating capacity			persons	Front : 2, Rear : 3					
Engine type				1KR−FE		K3−VE			
Total displacement			cc	998		1298			
Bore × stroke			mm	71.0 × 84.0		72.00 × 79.70			
Max. output			kw/rpm	51.0/6000		64.0/6000			
Max. Torque			Nm/rpm	94.0/3600		120.0/3200			
Compression ratio				10.5±0.3		10±0.3			
Fuel system				EFI (Electronic fuel injection)					
Fuel tank capacity			Litres	40					
Clutch	5M/T			Dry single plate with diaphragm spring and mechanical actuation					
	4A/T			3-element, 1-stage, 2-phase					
Transmission	5M/T			Forward 5-speed, manual, all synchromesh					
	4A/T			Forward 4-speed full automatic					
Transmission gear ratio	1KR−FE	5M/T		1st:3.182, 2nd:1.842, 3rd:1.250, 4th:0.917, 5th:0.750, rev:3.143					
	K3−VE	5M/T		1st:3.182, 2nd:1.842, 3rd:1.250, 4th:0.865, 5th:0.750, rev:3.143					
		4A/T		1st:2.731, 2nd:1.526, 3rd:1.00, 4th:0.696, rev:2.290					
Final reduction gear ratio	1KR−FE	5M/T		4.500					
	K3−VE	5M/T		4.267					
		4A/T		4.032					
Steering type				Rack&Pinion					
Main brakes	Front			Disk brakes with booster					
	Rear			Drum brakes, leading and trailing					
Parking brake				Mechanically oprerating on rear wheels					
Suspension	Front			MacPherson struts with coil springs					
	Rear			Semi-independent torsion axle beam with coil springs					
Tires	13 " tire			155/80R13		−			
	14 " tire			175/65R14					
Trailer towing	without brake		kg	350					
	with brake		kg	750		1000			
Permissible roof rack load			kg	50					

3 VIEWS OF VEHICLE



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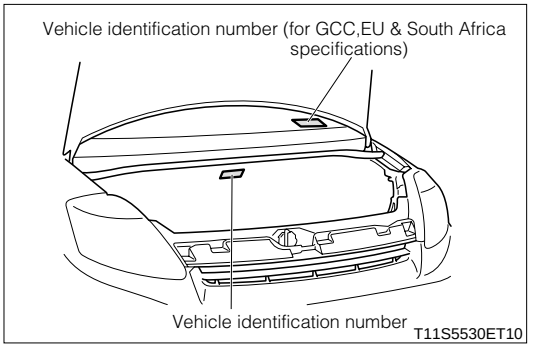
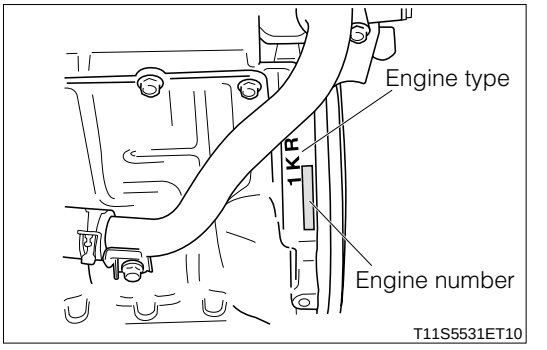
4 VEHICLE IDENTIFICATION

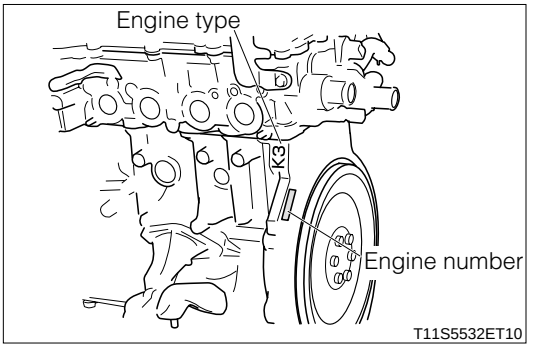
4-1 LOCATION

4-1-1 VEHICLE IDENTIFICATION NUMBER

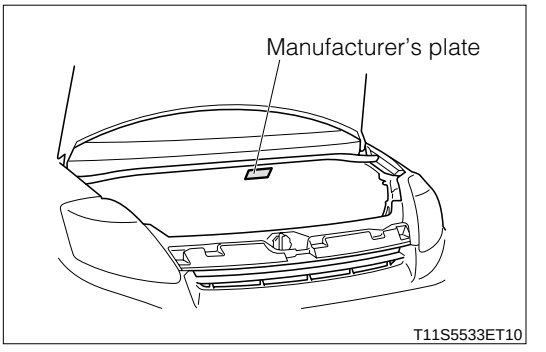


4-1-2 ENGINE TYPE AND ENGINE NUMBER





4-1-3 MANUFACTURER'S PLATE POSITION



5 ABBREVIATION CODES

ABBREVIATION CODE	ORIGINAL WORD	ABBREVIATION CODE	ORIGINAL WORD
2WD	Two Wheel Drive	LHD	Left Hand Drive
4WD	Four Wheel Drive	LIN	Local Interconnect Netwark
ABS	Anti-lock Brake System	LSPV	Load Sensing Proportioning Valve
ABV	Air Bypass Valve	LWR	Lower
A/C	Air Conditioner	MIL	Malfunction Indicator Lamp
ACC	Accessory	MP	Multipurpose
API	American Petroleum Institute	M/T	Manual Transmission
A/T	Automatic Transmission	N/A	Natural Aspiration
ATDC	After Top Dead Center	NOx	Nitrogen Oxides
ATF	Automatic Transmission Fluid	OPT	Option
Ay	Assembly	O/S	Over Size
BDC	Bottom Dead Center	PCV	Positive Crankcase Ventilation
BTDC	Before Top Dead Center	PR	Ply Rating
BVSV	Bimetal Vacuum Switching Valve	PTO	Power Take Off
CAN	Controller Area Network	RH	Right Hand
CD	Compact Disc	RHD	Right Hand Drive
CO	Carbon Monoxide	RR	Rear
DLC	Data Link Connector	S/A	Sub-Assembly
DLI	Distributor Less Ignition	SAE	Society of Automotive Engineers
DTC	Diagnostic Trouble Code	SRS	Supplemental Restraint System
DVVT	Dynamic Variable Valve Timing	SST	Special Service Tool
EBD	Electronic Brake force Distribution	STD	Standard
ECU	Electronic Control Unit	SW	Switch
EFI	Electronic Fuel Injection	T	Torque
EGR	Exhaust Gas Recirculation System	T/C	Turbocharger
EPS	Electronic controlled Power Steering	TDC	Top Dead Center
ESA	Electronic Spark Advance	UPR	Upper
EX	Exhaust	U/S	Under Size
F/L	Fusible Link	VCV	Vacuum Control Valve
FR	Front	VSV	Vacuum Switching Valve
GND	Ground	VTV	Vacuum Transmitting Valve
HC	Hydro Carbon	W/	With
IG	Ignition	WVTA	Whole Vehicle Type Approval
IN	Intake	Ⓑ	Bolt
ISC	Idle Speed Control	Ⓢ	Screw
ISO	International Organization for Standardization	Ⓝ	Nut
LCD	Liquid Crystal Display	Ⓦ	Washer
LED	Light Emitting Diode	Ⓒ	Clip
LH	Left Hand		

B1 ENGINE DESCRIPTION

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1KR
1 OUTLINE

On M 300 Series, a newly-designed Type 1KR-FE engine has been mounted transversely.
Type 1KR-FE engine is an in-line 3-cylinder water-cooled engine with a displacement of 0.996 liter that has been developed, aiming at excellent fuel economy, low noise level, low vibration, light weight and maintenance-free feature.
The vehicles mounted with Type 1KR engine have two different specifications, depending upon the applicable exhaust emission control standards, i.e. the general destination specification and EU destination specification. The general specification vehicles have complied with the exhaust emission control standard, ECE83-03 (the normally-called Euro2) through changing the EFI system specifications as well as the employment of the optimized control. etc. Moreover, the EU specification vehicles have complied with the exhaust emission control standard: EEC:2003/76/(70/220), EEC:R83-05 (the normally-called Euro4) through changing the EFI system specifications and employing the optimized control, etc, combined with the intelligent catalyst.
Furthermore, all the EU specification vehicles have achieved the fuel consumption standard 2004/3 (80/1268).

1.FEATURES

(1) LOW FUEL CONSUMPTION

The intake and exhaust efficiencies have been improved through the employment of a valve actuating mechanism with DOHC4 valves with a variable valve timing device and a longitudinal type straight intake port.
A higher compression ratio has been achieved through a compact combustion chamber and improved cooling around the combustion chamber. Also, the combustion efficiency has been improved.
The resistance related to the pistons has drastically been reduced through the employment of a reduced thrust load of piston due to the adoption of an offset crankshaft, the application of a new type resin coating to the pistons and reduced piston ring tensions.
The pumping loss has been reduced through the employment of DVVT equipment and the introduction of EGR gas in the medium and low loading ranges.

(2) LOW VIBRATION AND LOW NOISE LEVEL

The engine vibration has been reduced and joint rigidity has been improved by adopting a high rigidity aluminum block and a high rigidity aluminum oil pan.
The tapping noise and bending vibration have been reduced by employing a forged individually balanced crankshaft.
The engine mount vibration has been reduced by integrating the engine mount bracket with the chain cover.

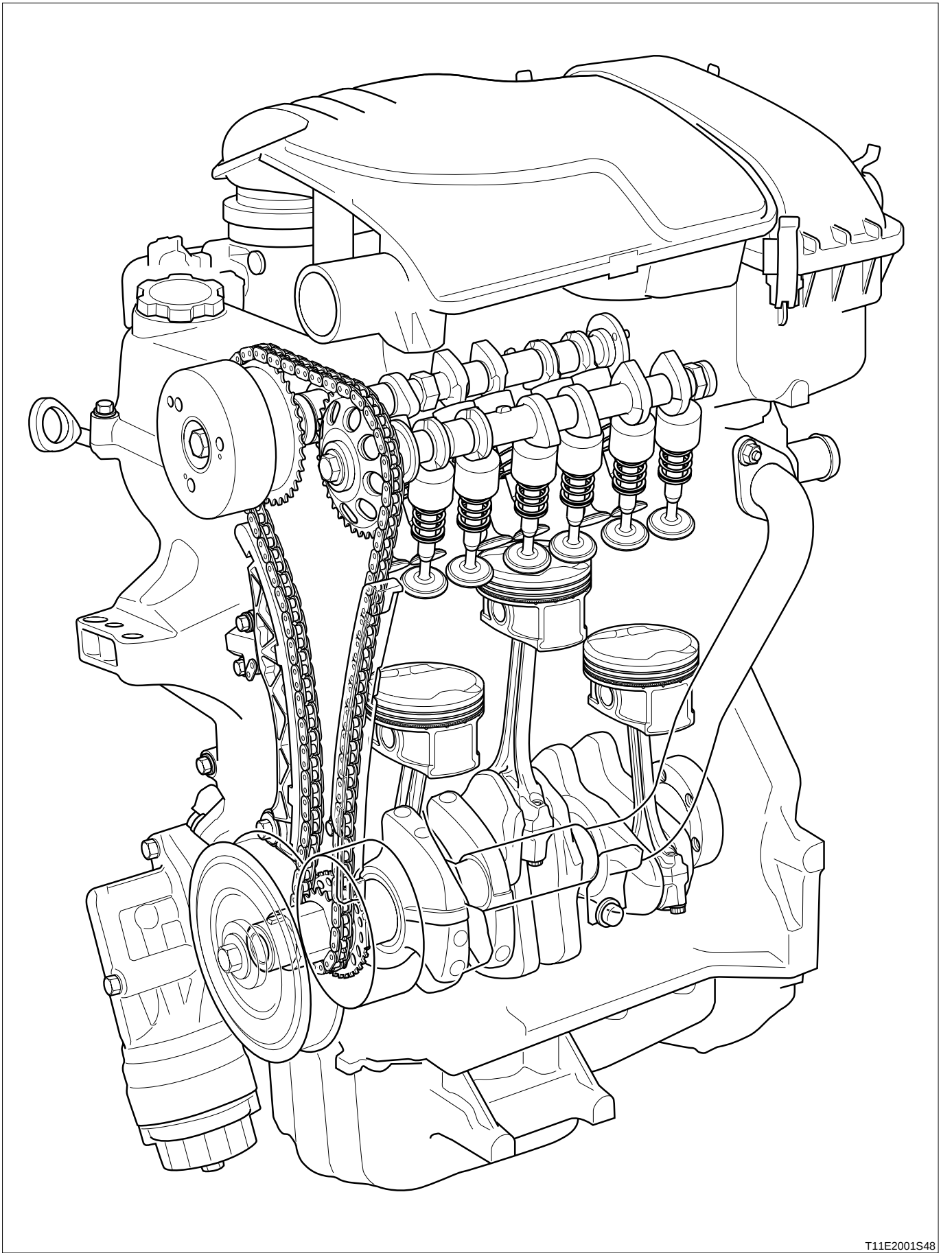
(3) COMPACT SIZE AND LIGHT WEIGHT

The cylinder head-related components have been designed compactly with reduced weight by employing a direct-tapping type DOHC.
The weight has been reduced by employing resin intake manifold, throttle body and head cover.

(4) MAINTENANCE

The maintenance-free feature has been achieved by employing a timing chain equipped with an auto tensioner.
The employment of an element replacement type oil filter has reduced the environmental load substance during the recycling period.

Engine perspective view



T11E2001S48

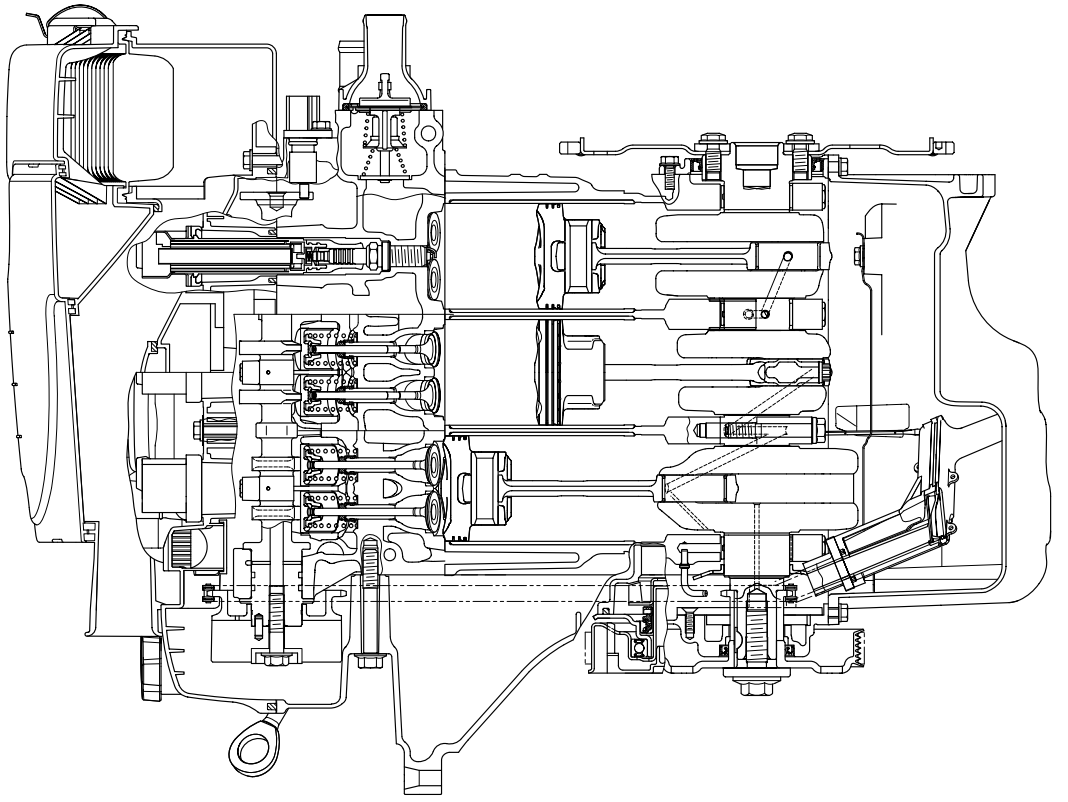
2 SPECIFICATIONS

Engine specificatons

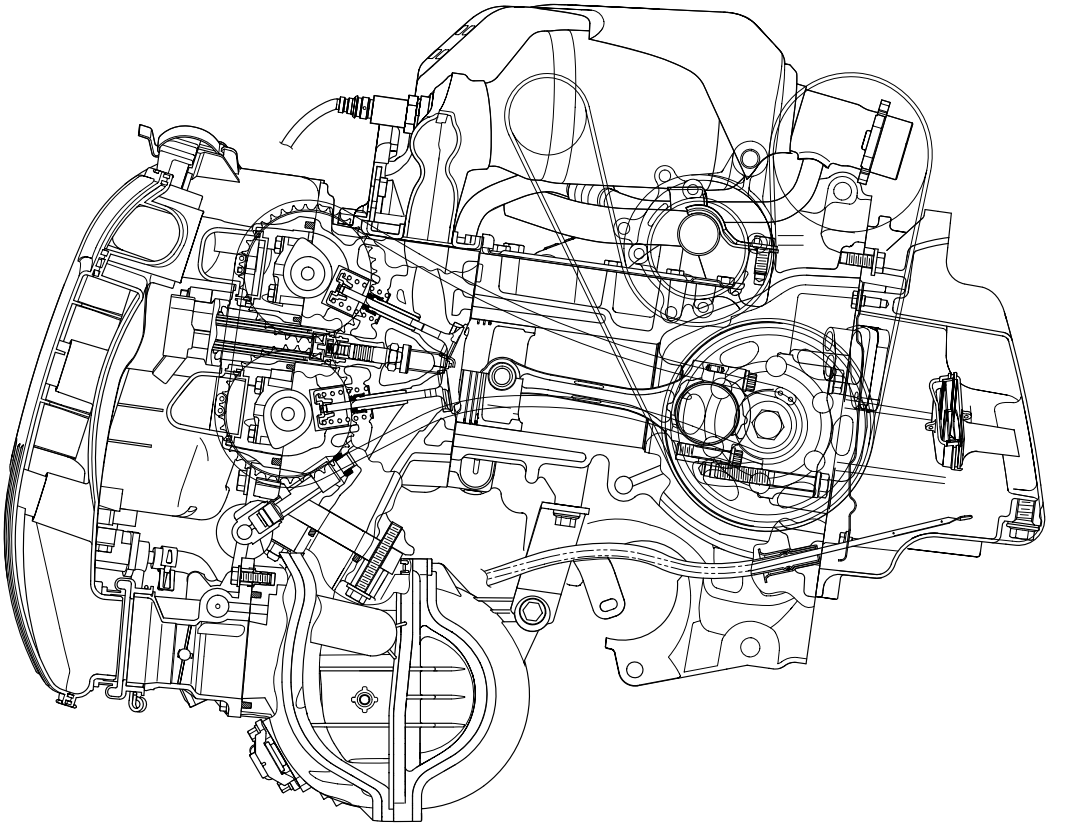
Engine type			TYPE 1KR-FE
Kind			Gasoline-fueled, water-cooled 4-cycle
Number of cylinders and arrangement			3-cylinder in line, transversely mounted
Valve mechanism			Chain driven, DOHC (IN2, EX2)
Combustion chamber			Pent roof
Intake and exhaust layout			Cross-flow type
Total displacement (cc)			998
Bore × Stroke (mm)			71.0×84
Compression ratio			10.5±0.3
Maximum output (kW) [rpm]			51.0/6000
Maximum torque (N·m) [rpm]			94.0/3600
Valve Timing	Intake	Open	40°-−5° BTDC
		Close	10°-55° ABDC
	Exhaust	Open	40° BBDC
		Close	2° ATDC
Fuel supplying device			Electronically controlled fuel injection system (EFI)
Ignition method			Full-transistorized DLI type battery ignition
Idle revolution speed			800±50
Lubricant used			SAE 0W-20 or 5W-30 API SG or higher

3 SECTIONAL VIEW

Engine cross-section view



<Longitudinal cross-section>



<Transverse cross-section>

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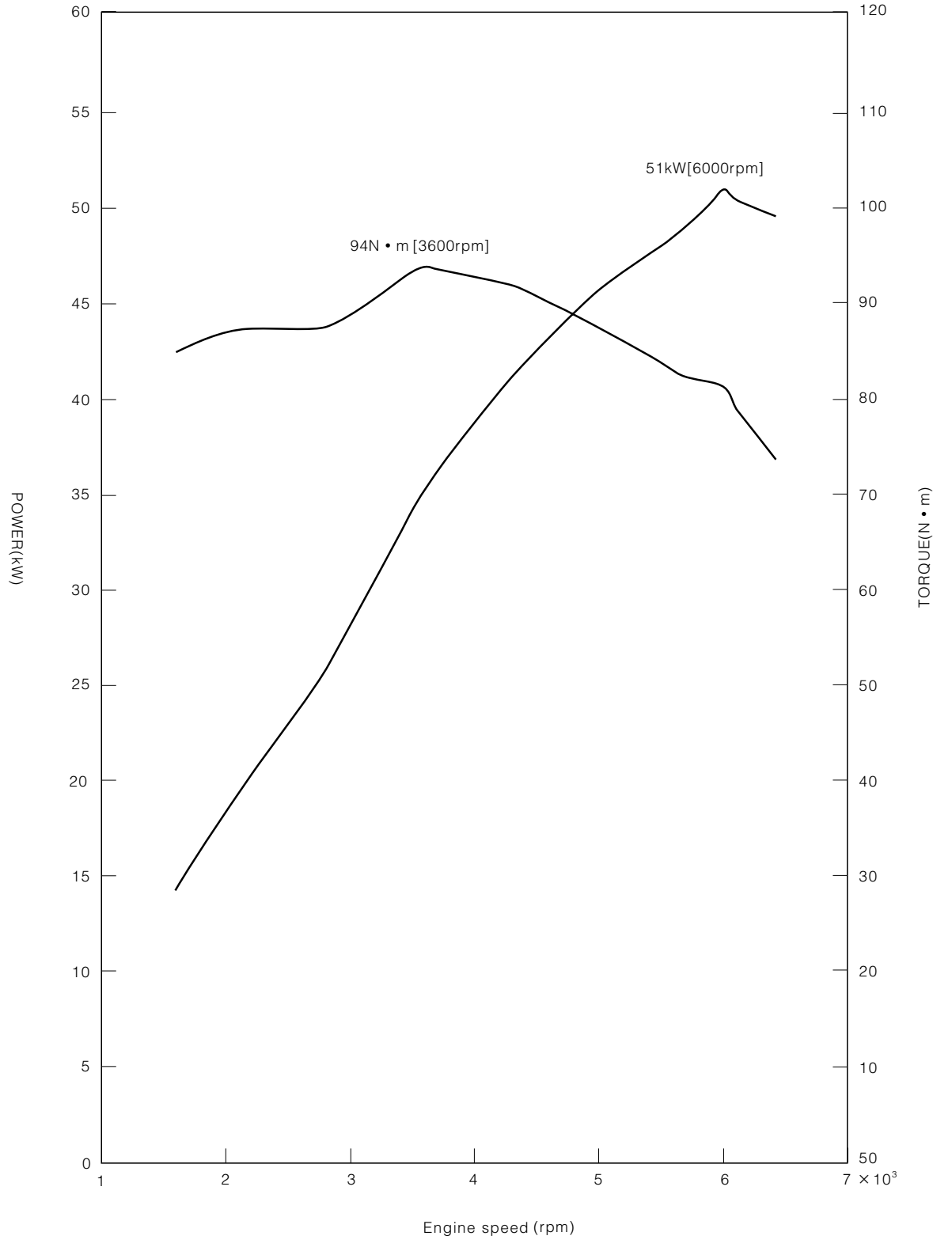
4 PERFORMANCE CURVE

Engine performance diagram



Type 1KR-FE Engine

T11E2007ES48

K3

1 OUTLINE

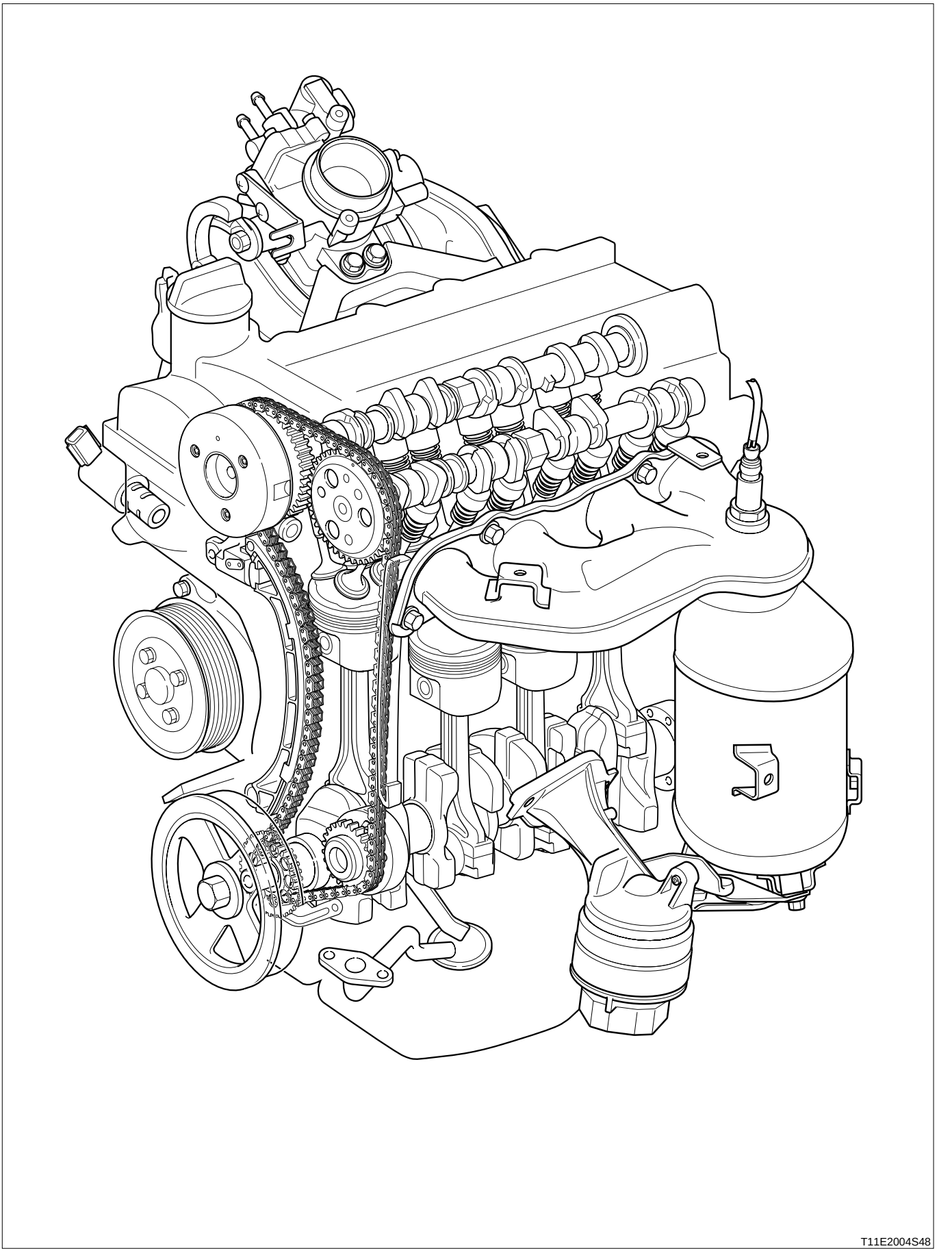
On M 301 Series, Type K3-VE engine has been mounted transversely.

On Type K3-VE engine, the chain cover is integral with the engine mount. This has contributed to a high rigidity and light weight as well as to reduced vibration and noise level.

The vehicles mounted with Type K3-VE engine have two different specifications, depending upon the applicable exhaust emission control standards, i.e. the general destination specification and EU specification. The general specification vehicles have complied with the exhaust emission control standard, ECE83-03 (normally-called Euro2) through changing the EFI system specifications as well as the employment of the optimized control. etc. Moreover, the EU specification vehicles have complied with the exhaust emission control standard: EEC:2003/76/(70/220), EEC:R83-05 (normally-called Euro4) through changing the EFI system specifications and employing the optimized control, etc, combined with the intelligent catalyst.

Furthermore, all the EU specification vehicles have achieved the fuel consumption standard 2004/3 (80/1268).

Engine perspective view



T11E2004S48

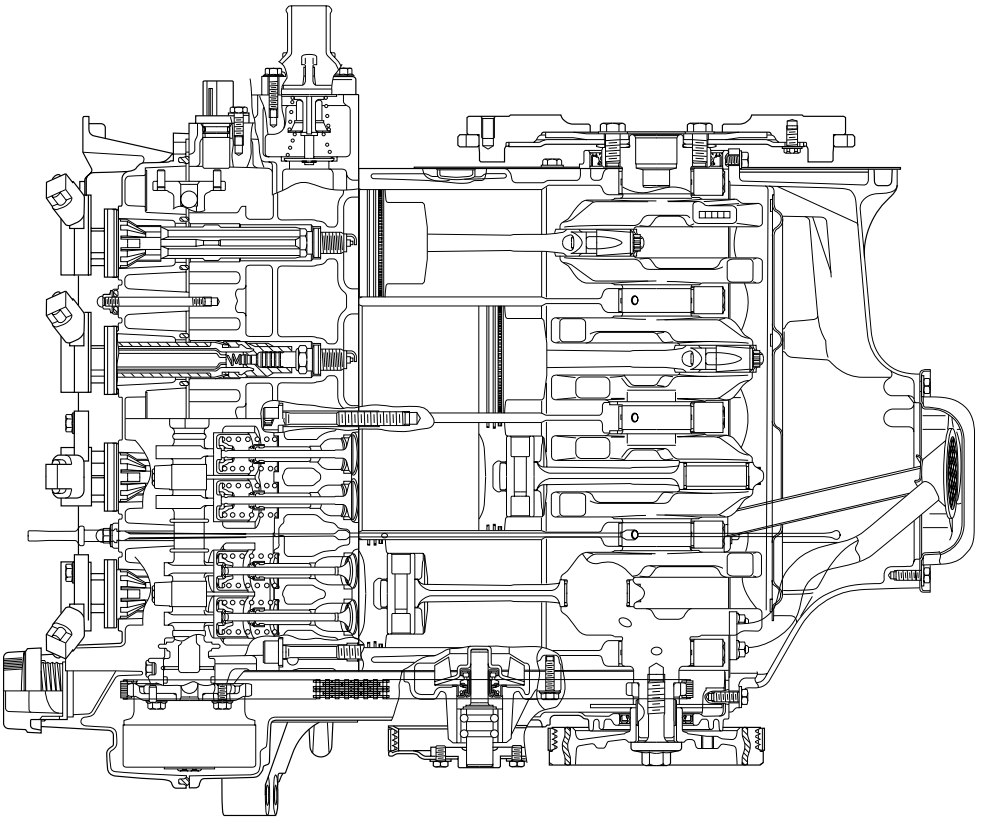
2 SPECIFICATIONS

Engine specifications

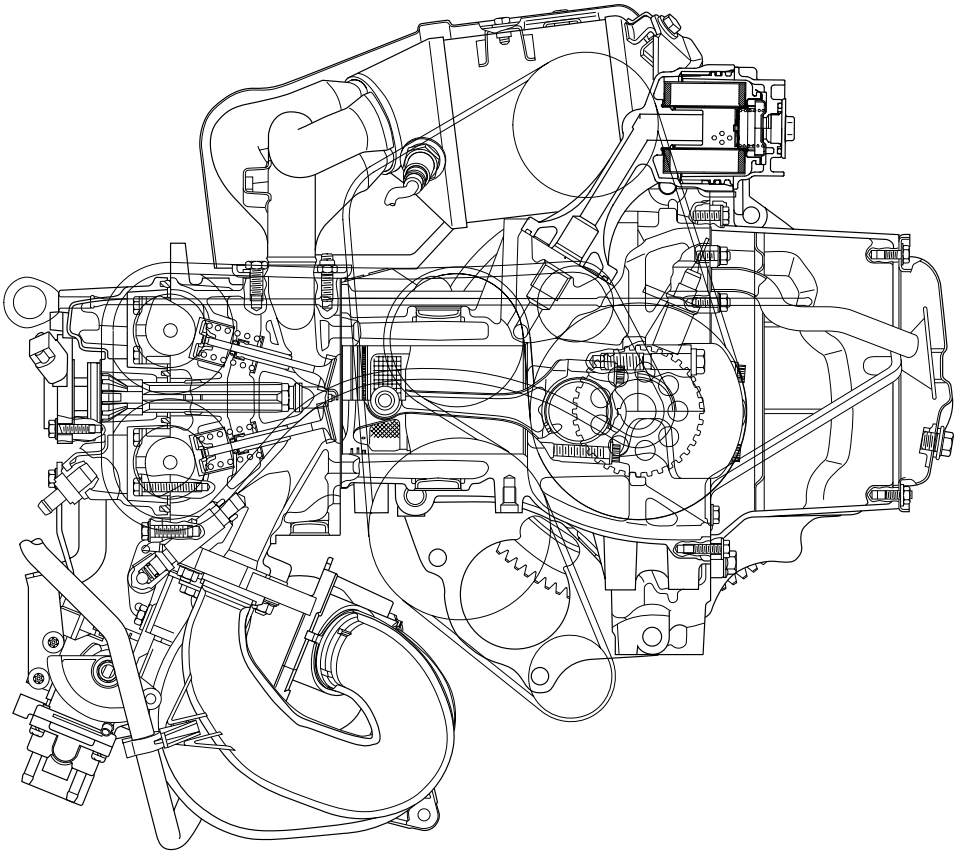
Engine type			TYPE K3-VE	
Kind			Gasoline-fueled, water-cooled 4-cycle	
Number of cylinders and arrangement			4-cylinder in line, transversely mounted	
Valve mechanism			Chain driven, DOHC (IN:2, EX:2)	
Combustion chamber			Pent roof	
Intake and exhaust layout			Cross-flow type	
Total displacement (cc)			1298	
Bore × Stroke (mm)			72.0×79.7	
Compression ratio			10±0.3	
Maximum output (kW) [rpm]			64.0/6000	
Maximum torque (N·m) [rpm]			120.0/3200	
Valve Timing	Intake	Open	30°-−12° BTDC	
		Close	10°-52° ABDC	
	Exhaust	Open	30° BBDC	
		Close	2° ATDC	
Fuel supplying device			Electronically controlled fuel injection system (EFI)	
Ignition method			Full-transistorized DLI type battery ignition	
Idle revolution speed			MT:650±50	AT:700±50
Lubricant used			SAE 5W-20 or 5W-30 API SG or higher	

3 SECTIONAL VIEW

Engine cross-section view



<Longitudinal cross-section>



<Transverse cross-section>

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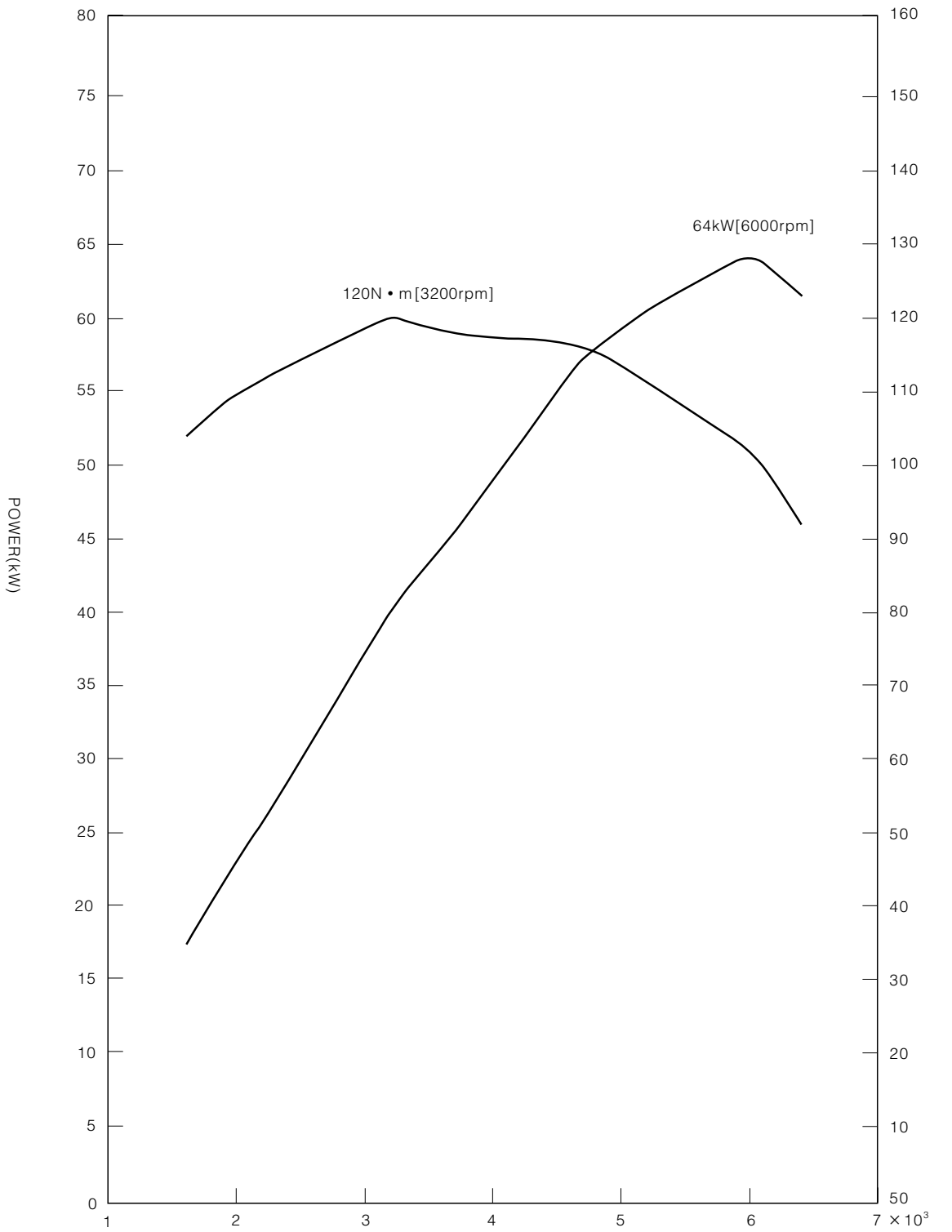
4 PERFORMANCE CURVE

Engine performance diagram



Type K3-VE Engine

T11E2008ES48

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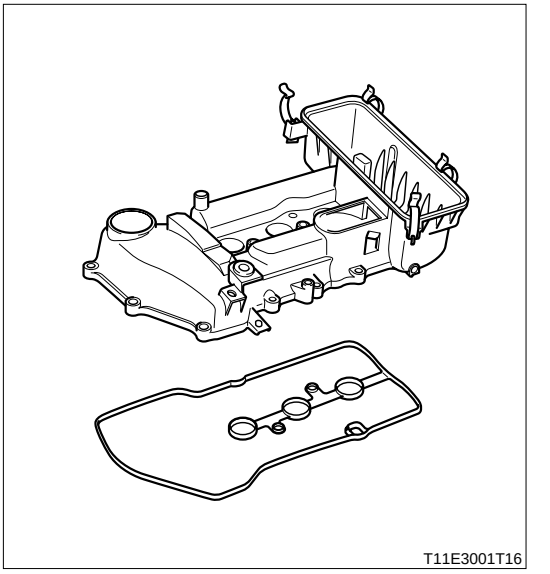
POWER TRAIN (1KR)
1 CONSTRUCTION AND OPERATION
1-1 CYLINDER HEAD COVER

In order to achieve a light weight, a resin cylinder head cover integral with the air cleaner case has been employed. The blow-by chamber and PCV chamber are provided. Furthermore, as for the cylinder head cover gasket, for easier servicing, the gasket for the outer periphery has been integrated with the gasket at the plug tube section.



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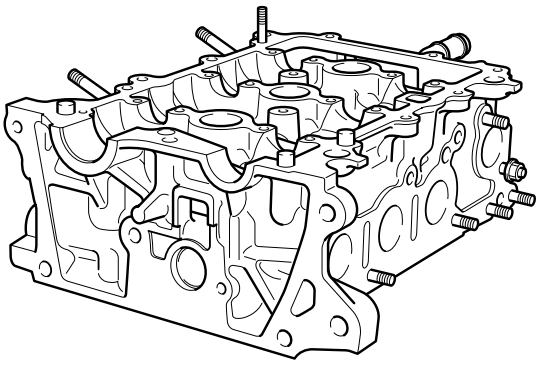
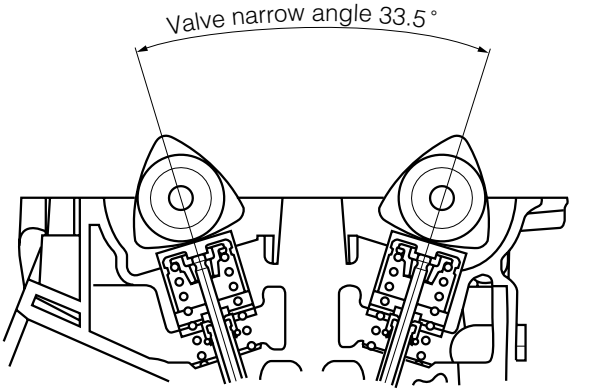
1-2 CYLINDER HEAD

A compact combustion chamber featuring an excellent S/V ratio has been employed and an oblique squish is adopted. Moreover, for improved knock limit, long reach plugs have been employed, thus conforming to the shape of the water jacket of the cylinder head. Furthermore, for enhanced combustion due to the generation of an optimum tumble in the combustion chamber, the shape of the intake port in the cylinder head has been optimized. In order to improve fuel consumption, a passage for EGR gas is provided at the rear of the cylinder head in such a way that it is in contact with the water jacket, thus lowering the EGR gas temperature.

For enhanced auxiliary resonance frequency characteristics, an alternator flange has been integrated.





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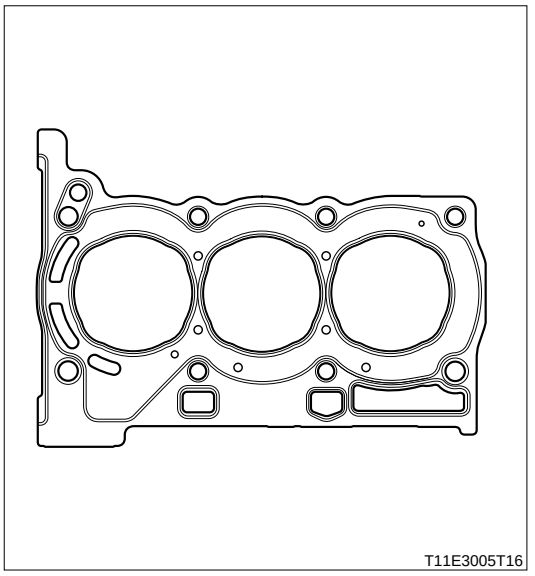
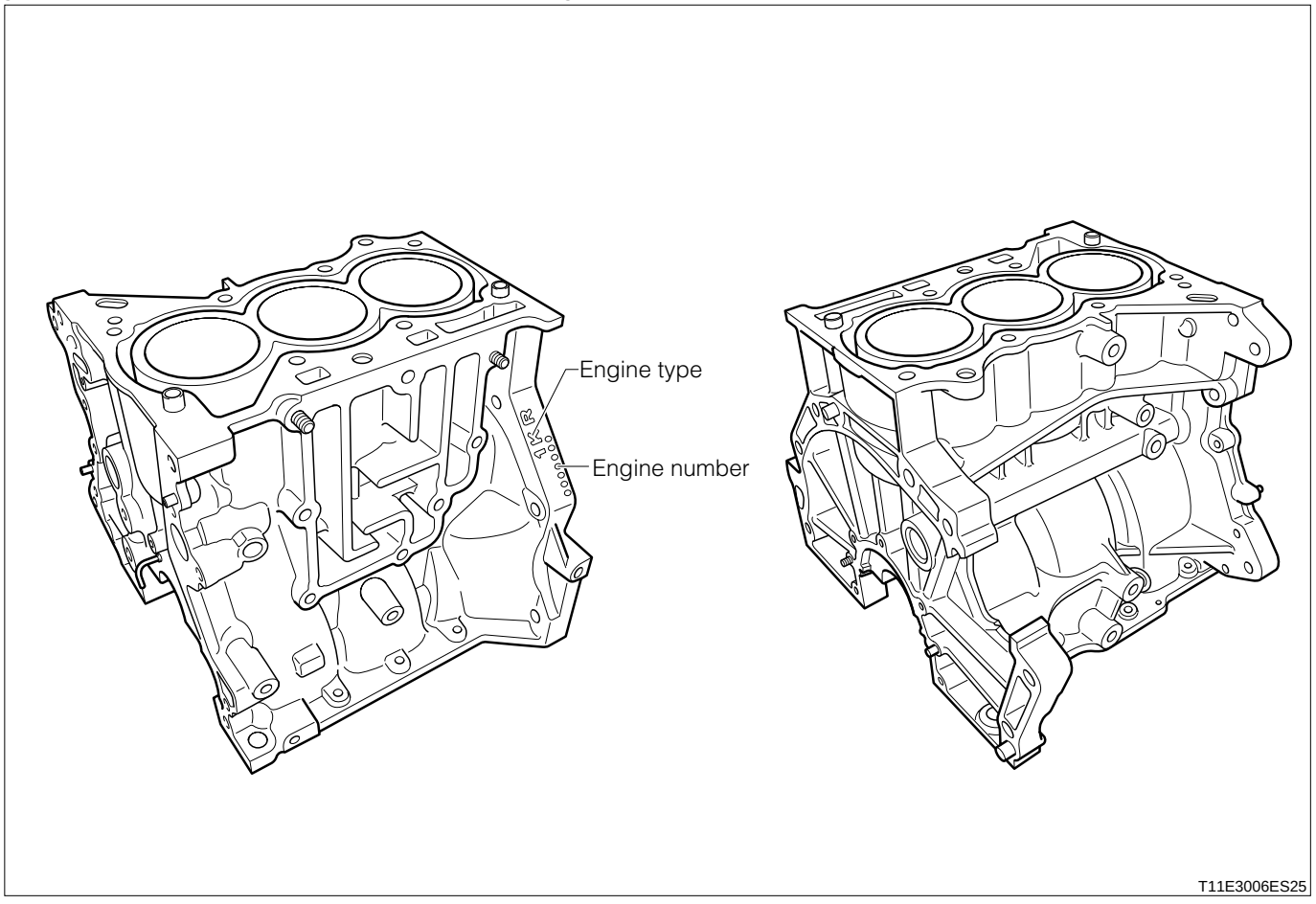
1-3 CYLINDER HEAD GASKET

A stainless cylinder head gasket is adopted. The surface of the gasket is coated with NBR rubber. For improved sealing ability, the bead shape at each section has been optimized, thus ensuring the surface pressure.

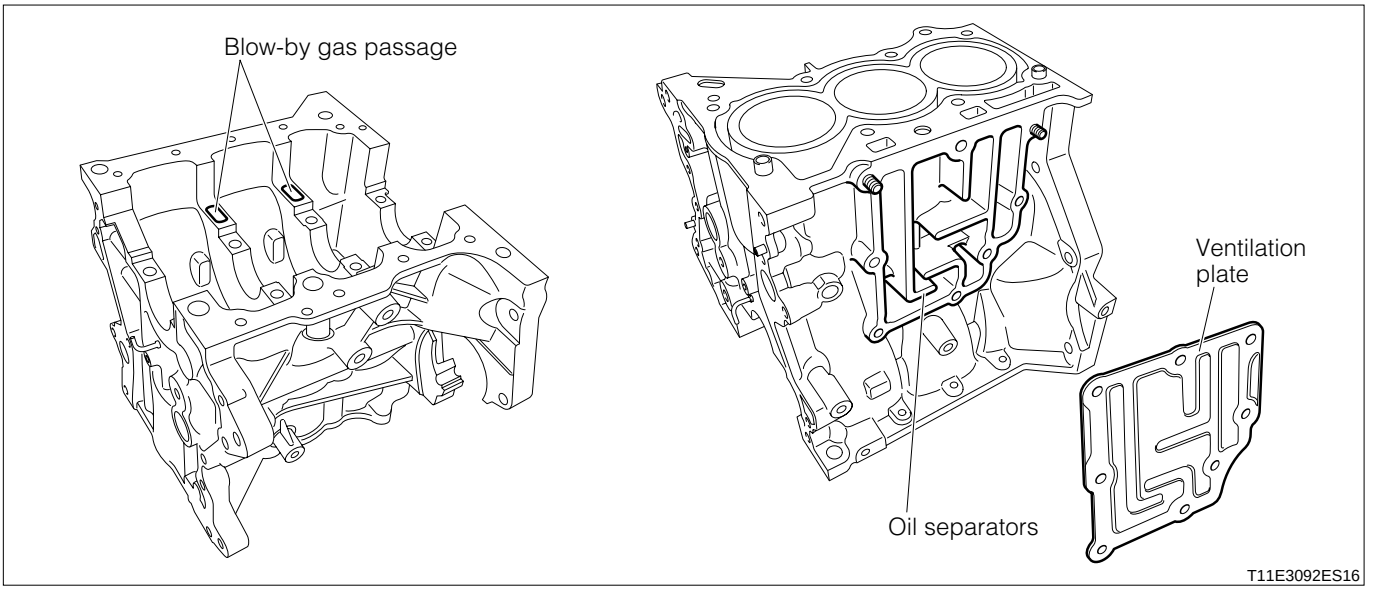


1-4 CYLINDER BLOCK

In order to achieve a lighter weight, an aluminum cylinder block has been employed, featuring a compact shape with a bore-to-bore distance of 7 mm. For reduced friction around the piston, the roundness of the bore has been improved by using a spiral liner. For enhanced rigidity, the starter flange has been integrated with the cylinder block, thus improving the joint of the chain cover.



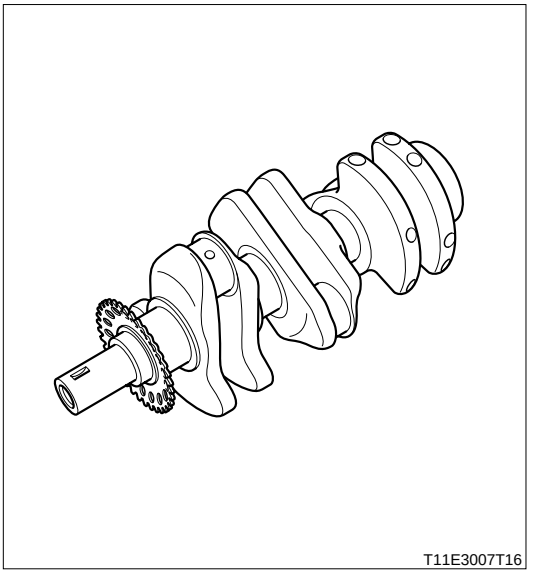
The oil separator is provided to the cylinder block in order to improve the ventilating ability in the crank case and to prevent oil deterioration.



1-5 CRANKSHAFT

For reduced tapping sound and bending vibration, forged (steel) individually balanced crankshaft has been employed. Furthermore, an offset crankshaft is adopted in which the crankshaft center is in offset position toward the cylinder bore center. As a result, the thrust load and friction have been reduced. Moreover, for enhanced heat efficiency, the piston speed has been changed between the compression stroke and the expansion stroke.

The crankshaft drives the oil pump built in the chain cover.

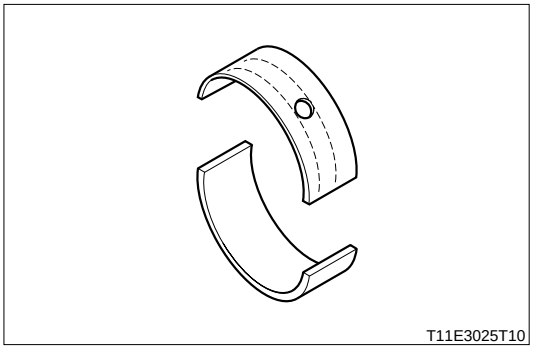


Specifications

Journal diameter(mm)	44.0 Dia.	
Journal width(mm)	#1J	17.5
	#2J	21.4
	#3J	21.8
	#4J	21.4
Crank pin diameter(mm)	40.0 Dia.	
Crank pin width(mm)	18.1	

1-6 CRANKSHAFT BEARING

For improved initial bedding-in and retention of oil, the striation treatment (referring to treatment in which linear treatment is made on the bearing sliding surface) has been made on the lining surface. Consequently, the oil clearance has been shortened and the metal tapping sound has been reduced. Moreover, the pawl for positioning has been abolished.



Crankshaft bearing specifications

Identification code	Bearing thickness (mm)
2	1.992−1.995
3	1.995−1.998
4	1.998−2.001
5	2.001−2.004

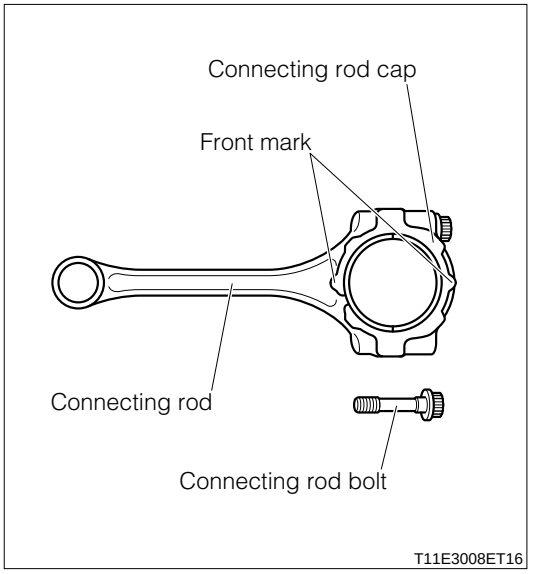
1-7 CONNECTING ROD

For lighter weight, the high-strength vanadium steel is employed.

For lighter weight and stabilized big end shape, the connecting rod bolt uses no nut and is tightened in the plastic area.

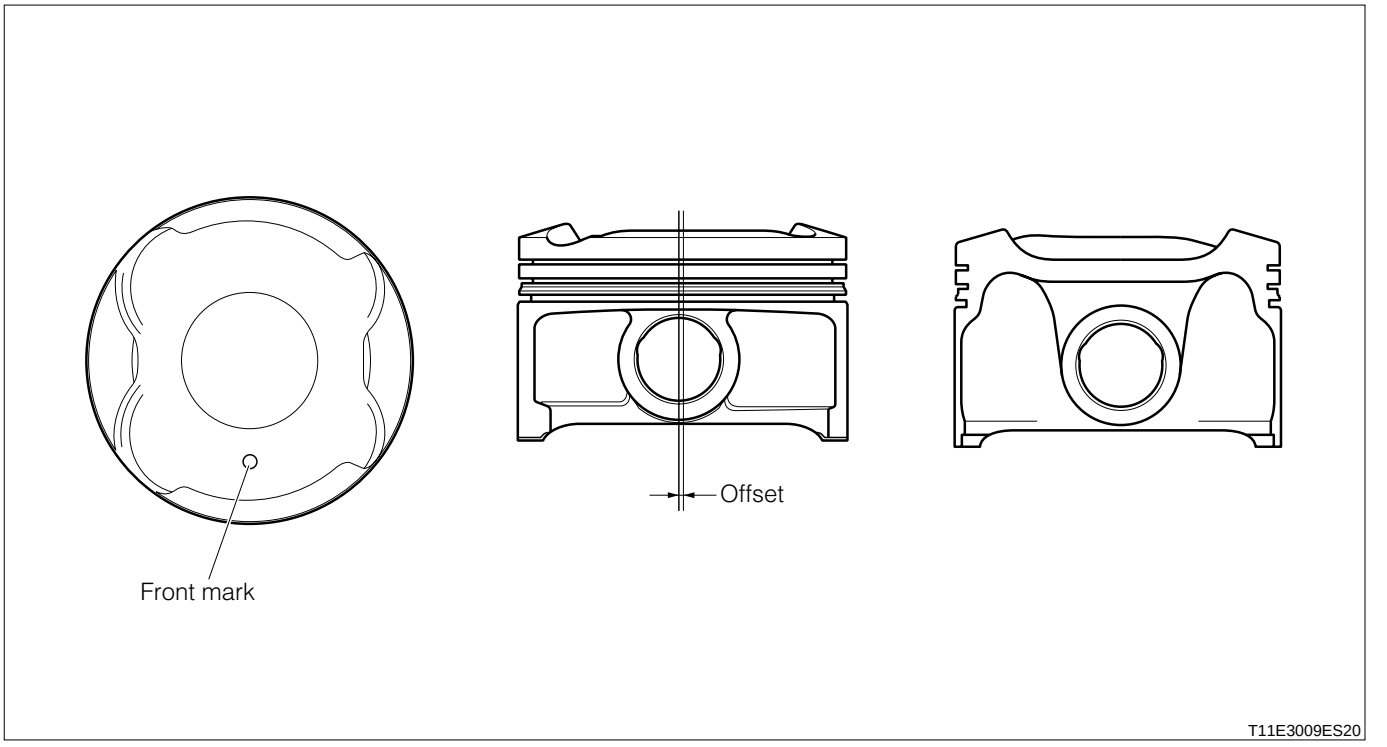
Specifications

Small end inner diameter (mm)	18.0 Dia.
Big end inner diameter (mm)	43.0 Dia.
Center-to-center distance of the big and small ends (mm)	140.88



1-8 PISTON

A new type resin coat is adopted. The external diameter size of the piston is available in one rank.



1-9 CONNECTING ROD BEARING

The bearing is selected for use in accordance with the big end diameter of the connecting rod.

Connecting rod bearing specifications

Identification code	Bearing thickness (mm)
1	1.492−1.495
2	1.495−1.498
3	1.498−1.501

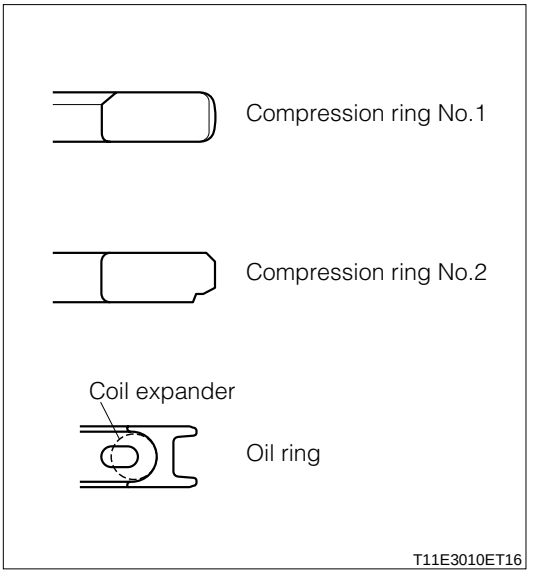
0

1-10 PISTON RING

For reduced friction and enhanced fuel consumption, a low-tension piston ring has been adopted.

Piston ring specifications

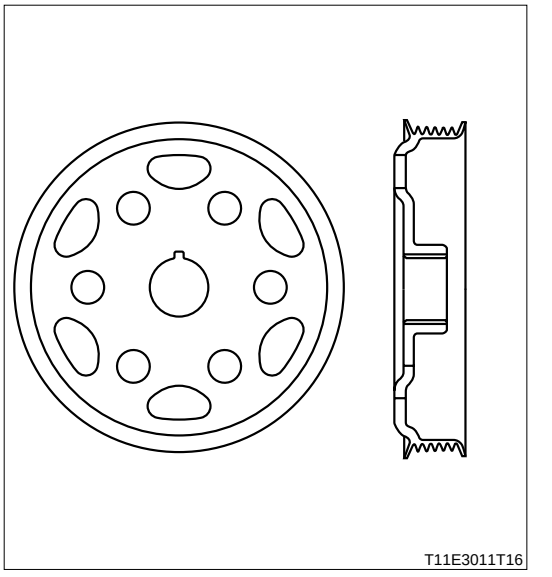
Compression ring No.1	Material	Steel
	Thickness (mm)	2.3
	Width (mm)	1.0
	Top surface code	T1
Compression ring No.2	Material	Steel
	Thickness (mm)	2.3
	Width (mm)	1.0
	Top surface code	T2
Oil ring	Material	Steel
	Thickness (mm)	1.65 (Combined thickness is 2.05)
	Width (mm)	1.5
	Top surface code	—



1-11 CRANKSHAFT PULLEY

A 6-groove pulley is adopted to correspond to the 6-rib belt. By achieving a lighter weight, the torsional resonance frequency characteristics of the crank system have been improved.

Moreover, the timing mark for checking the ignition timing is provided. A yellow paint is applied to the mark.



1-12 V BELT

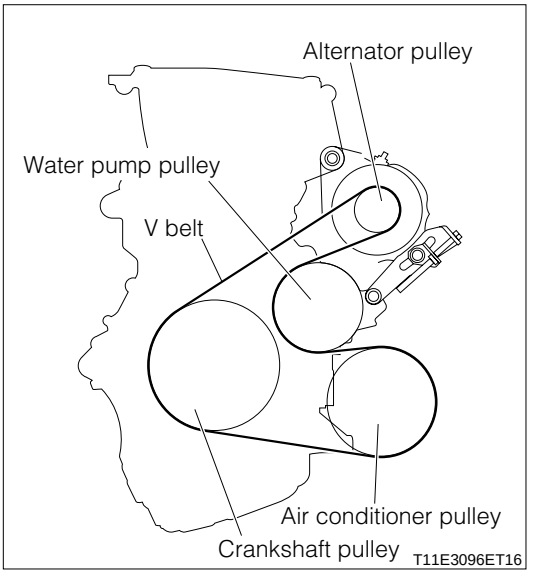
For easier servicing during the belt check and tension adjustment, the serpentine drive layout has been adopted, in which one belt drives the auxiliary machine.

Pulley specifications

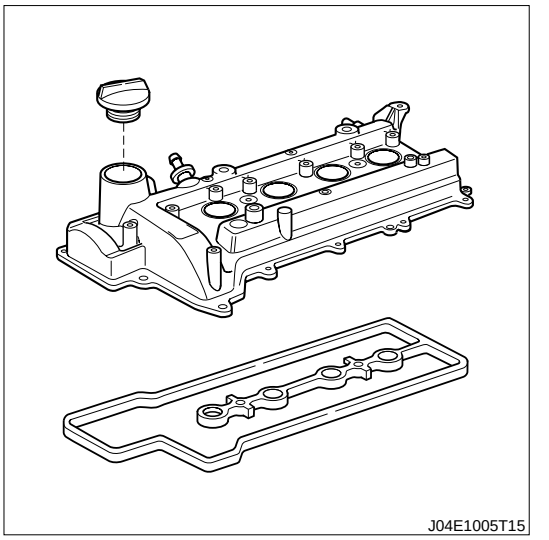
Pulley	Pulley diameter (mm)
Crankshaft	139 mm Dia.
Alternator	52.5 mm Dia.
Water pump	95 mm Dia.(Back face)
Air conditioner compressor	108 mm Dia.

Belt specifications

	Belt length (mm)	The number of ribs
with A/C	1200	6
without A/C	860	6



POWER TRAIN (K3)
1 CONSTRUCTION AND OPERATION
1-1 CYLINDER HEAD COVER



For reduced weight, a thin aluminum die cast (general wall thickness is 2mm) has been employed. The spark plug tube section is integrated with the head cover to simplify the structure.

For enhanced sealing performance, the installation is performed by tightening at the outer periphery section and center section. Constant dimension tightening is performed for the outer periphery.

Furthermore, as for the cylinder head cover gasket, for easier servicing, the gasket for the outer periphery has been integrated with the gasket at the plug tube section. As regards the material, a heat-proof acrylic rubber featuring an excellent heat-proof is adopted.

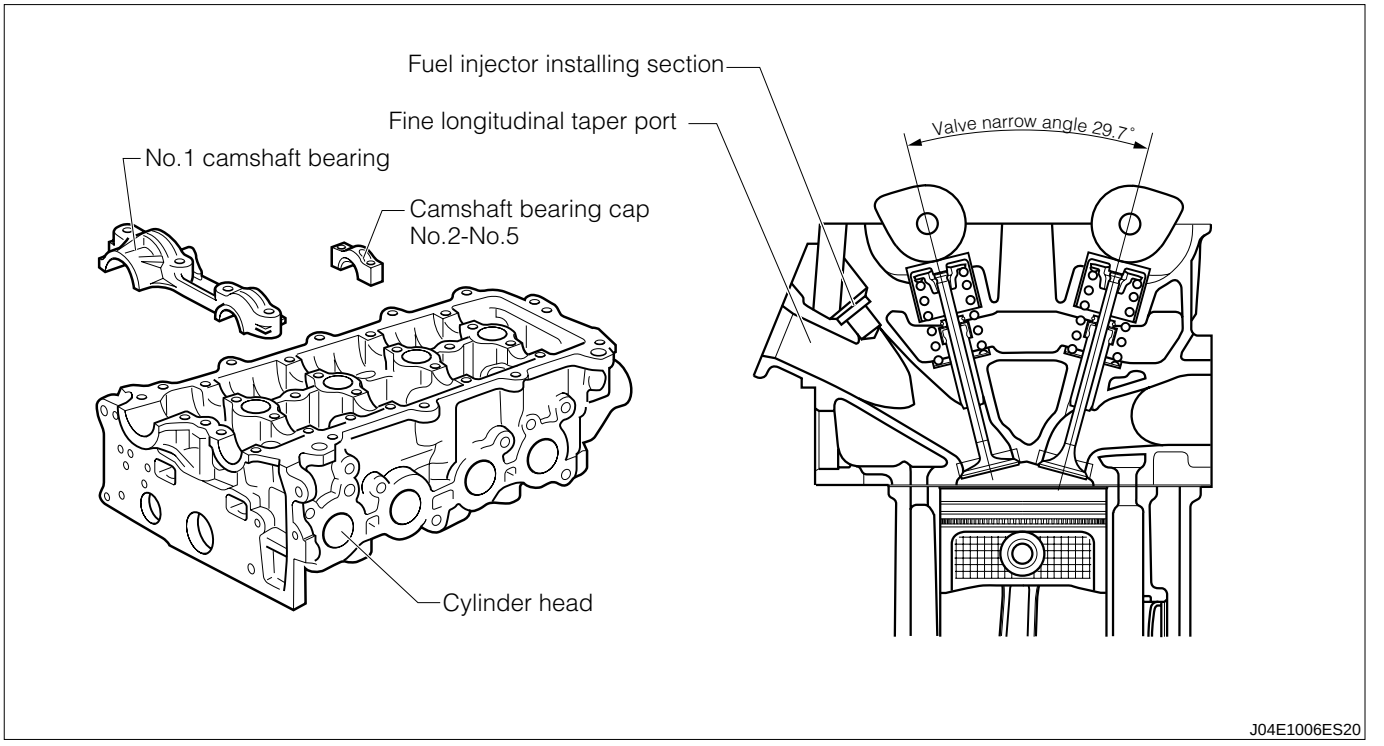
1-2 CYLINDER HEAD

For enhanced anti-knocking performance and combustion efficiency, a combustion chamber shape featuring an excellent S/V ratio has been employed.

The intake and discharge layout is of a cross flow type. A narrow longitudinal tapered port is adopted to improve the air intake efficiency.

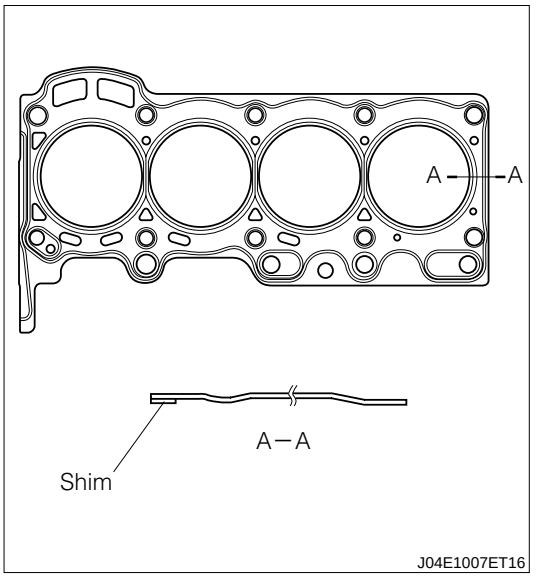
Moreover, the fuel injector is installed at the intake port of the cylinder head, thus preventing the fuel from adhering to the wall. Consequently, HC emission amount has been reduced.

As for the flow of cooling water in the cylinder head, the intake precedence cooling system is adopted, in which the water flows from the intake side. As a result, the intake temperature is lowered, thus improving the filling efficiency and anti-knocking ability.



1-3 CYLINDER HEAD GASKET

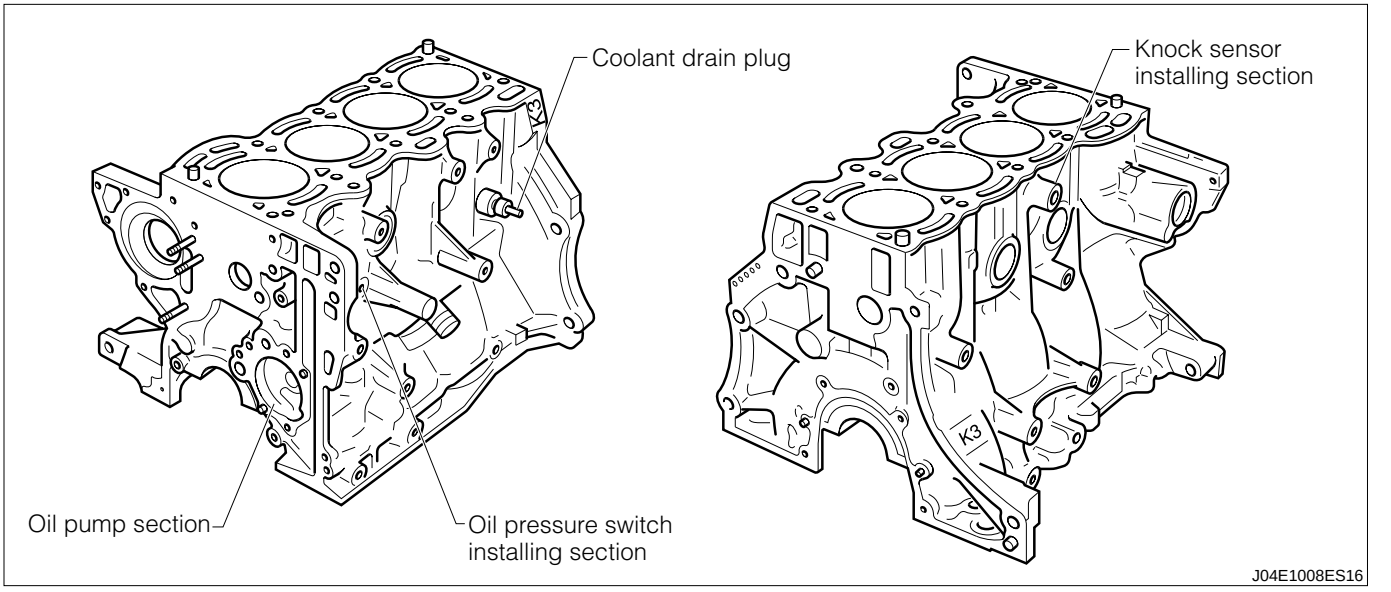
A metal single-layer type is adopted. A shim with seal surface width is welded by laser to the cylinder bore section. In this way, the surface pressure is stabilized, thus ensuring the sealing ability and durability.



1-4 CYLINDER BLOCK

For reduced weight and highly-rigid cylinder block, a high accuracy cast iron block with the cold box method (referring to a method to form a casting mold by chemical reaction or hardening reaction with catalytic gas at a normal temperature, not performing heat treatment for cast molding) has been adopted.
The Siamese water jacket construction has been adopted. Drilled passage process is added between the bores. In this way, durability has been ensured.
For lower fuel consumption, the bore center has been arranged (off-set) toward the exhaust side in relation to the center of crank shaft, thus reducing the transmission loss of the combustion pressure to the piston.
For reduced weight and compact design, parts have been integrated with or built in the block as much as possible.

- Vortex chamber of water pump and water passage to the pump
- Rotor chamber of the oil pump and the relief valve

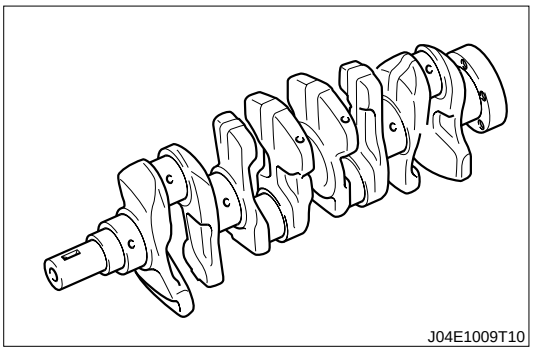


1-5 CRANKSHAFT

For higher strength and enhanced rigidity, steel is adopted. Eight balances are adopted to achieve low vibration.

Specifications

Journal diameter(mm)	46.0 Dia.
Journal width(mm)	21.8
Crank pin diameter(mm)	40.0 Dia.
Crank pin width(mm)	18

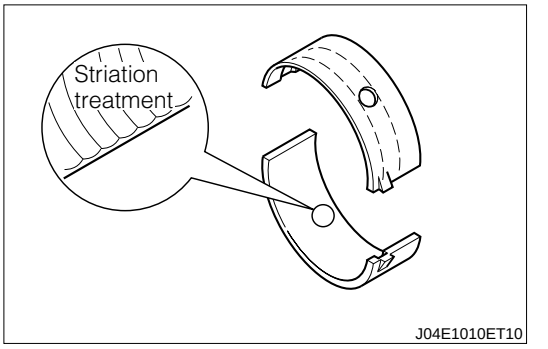

J04E1009T10

1-6 CRANKSHAFT BEARING

For improved initial bedding-in and retention of oil, the striation treatment (referring to treatment in which linear treatment is made on the bearing sliding surface) has been made on the lining surface. Consequently, the oil clearance has been shortened and the metal tapping sound has been reduced.

Crankshaft bearing specifications

Identification code	Bearing thickness (mm)
2	1.989−1.992
3	1.992−1.995
4	1.995−1.998
5	1.998−2.001



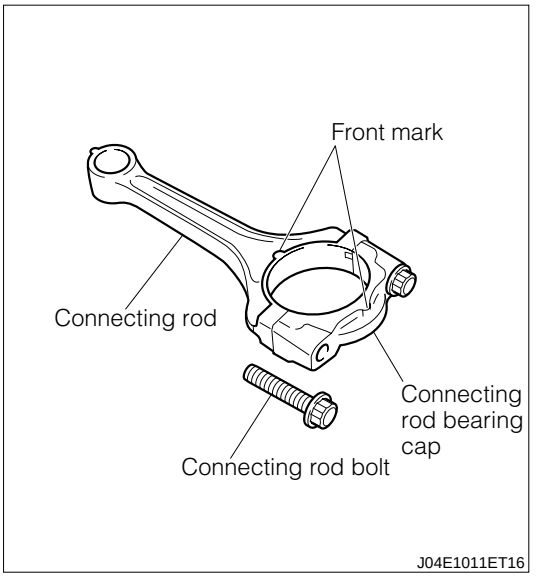
J04E1010ET10

1-7 CONNECTING ROD

For reduced weight, high-strength vanadium steel is adopted. Double shot (after coining, shot peening is conducted again to add residual stress) is performed on the surface to increase the surface hardness and to reduce weight further. Moreover, for reduced weight and friction loss, the small end, big end width and big end diameter have been downsized. For lighter weight and stabilized big end shape, the connecting rod uses no nut and is tightened in the plastic area.

Specifications

Small end inner diameter (mm)	18.0 Dia.
Big end inner diameter (mm)	43.0 Dia.
Center-to-center distance of the big and small ends (mm)	129.5



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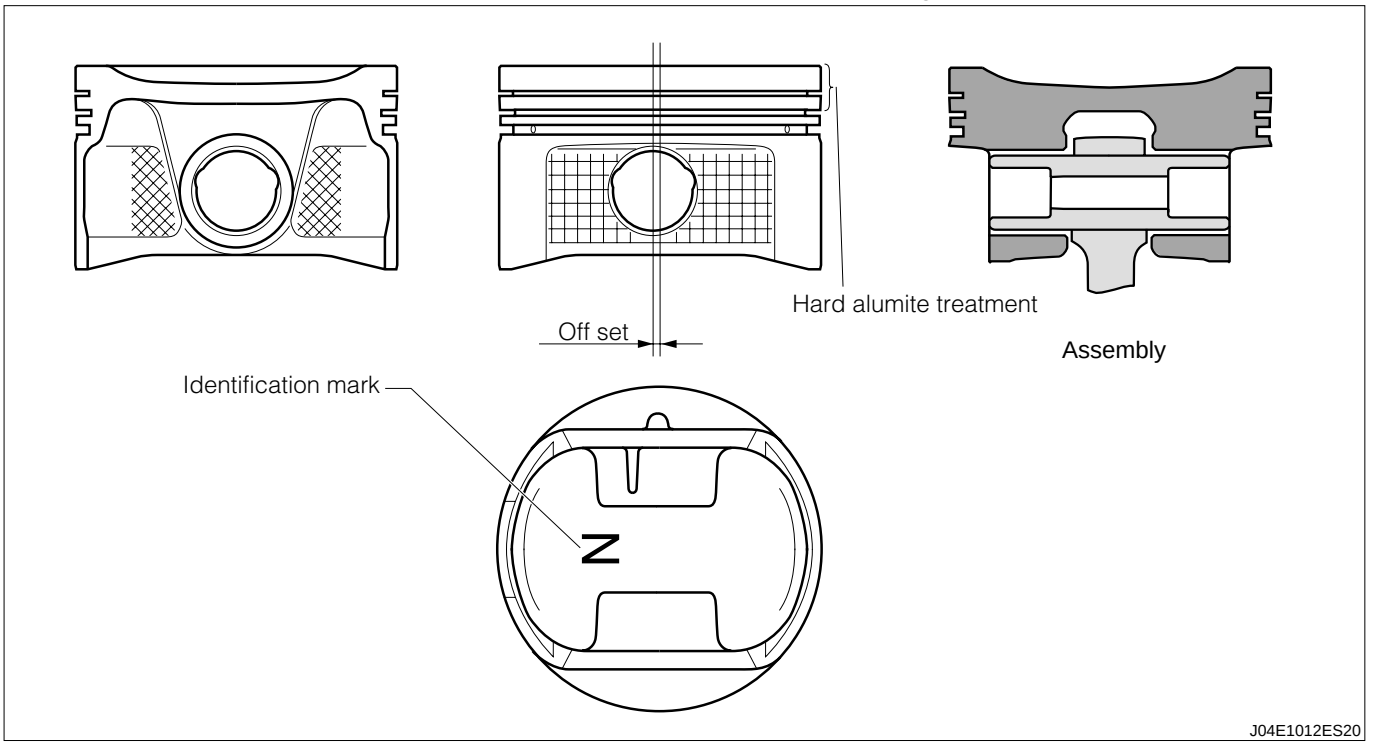
1-8 PISTON

For reduced weight and friction loss, the compression height has been shortened, and the narrow-width, short skirt has been employed. Moreover, the rigidity at the skirt section has been enhanced, thus making the rigidity of the entire piston uniform. As a result, the oil consumption has been reduced and the reliability has been improved. Furthermore, hard alumite treatment is performed to the upper side from the 2nd land in order to increase the abrasion resistance.

It is in the one rank due to the improvement of the processing accuracy of the piston and cylinder bore.

In order to achieve a lighter weight and higher rigidity, the total length of the piston pin has been shortened and the stepped pin shape has been employed. Connection with the connecting rod is the press-fit method in which the piston pin is fixed by press-fitting.

A mark (N) is provided to indicate that the piston is for Type K3-VE engine.



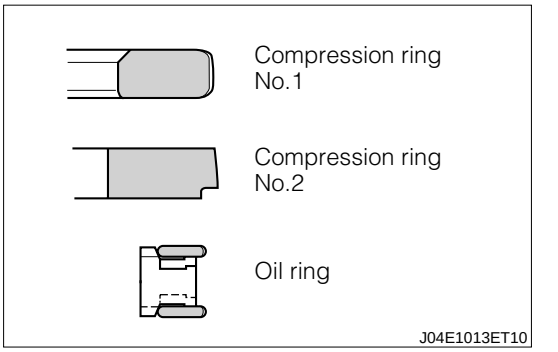
1-9 CONNECTING ROD BEARING

For improved durability and reliability, the striation treatment has been made on the lining surface.

It is in the one rank due to the improvement of the processing accuracy of the crankshaft and connecting rod.

1-10 PISTON RING

The thin B size ring is adopted to improve oil consumption performance.

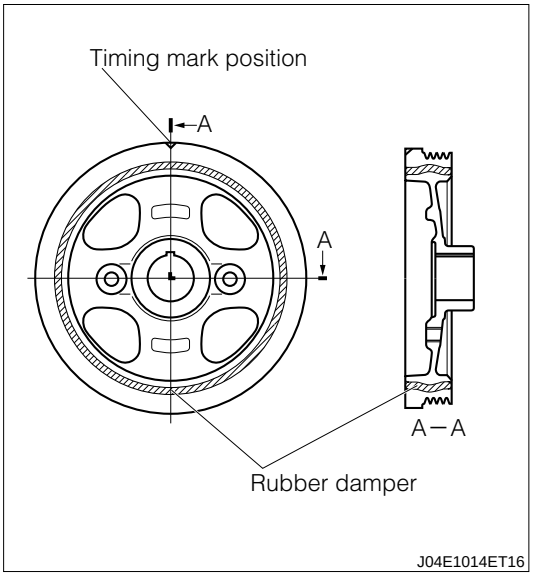


Piston ring specifications

Compression ring No.1	Material	Steel
	Thickness (mm)	2.6
	Width (mm)	1.2
	Top surface code	T
Compression ring No.2	Material	Cast iron
	Thickness (mm)	2.6
	Width (mm)	1.2
	Top surface code	T
Oil ring	Material	Steel
	Thickness (mm)	2.25
	Width (mm)	2.0
	Top surface code	–

1-11 CRANKSHAFT PULLEY

For reduced torsional vibration of the crankshaft, the crankshaft pulley has employed a cast iron with rubber damper. Moreover, a mark for checking the ignition timing is provided on the crank pulley side.



1-12 V BELT

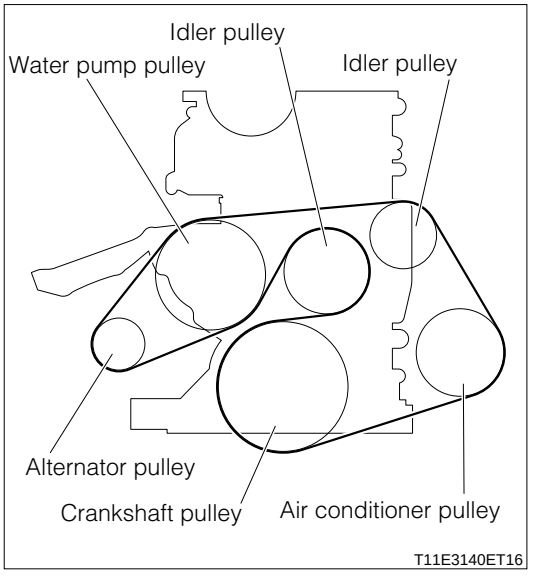
For easier servicing during the belt check and tension adjustment, the serpentine drive layout has been adopted, in which one belt drives the auxiliary machine. Moreover, for easier servicing, the belt tension adjustment has employed an alternator adjusting type.

Pulley specifications

Pulley	Pulley diameter (mm)
Crankshaft	139 mm Dia.
Alternator	55 mm Dia.
Water pump	116 mm Dia.
Air conditioner compressor	93 mm Dia.
Fixed idler (large)	88 mm Dia.
Idler (small)	70 mm Dia.

Belt specifications

	Belt length (mm)	The number of ribs
with A/C	1590	4
without A/C	1470	4

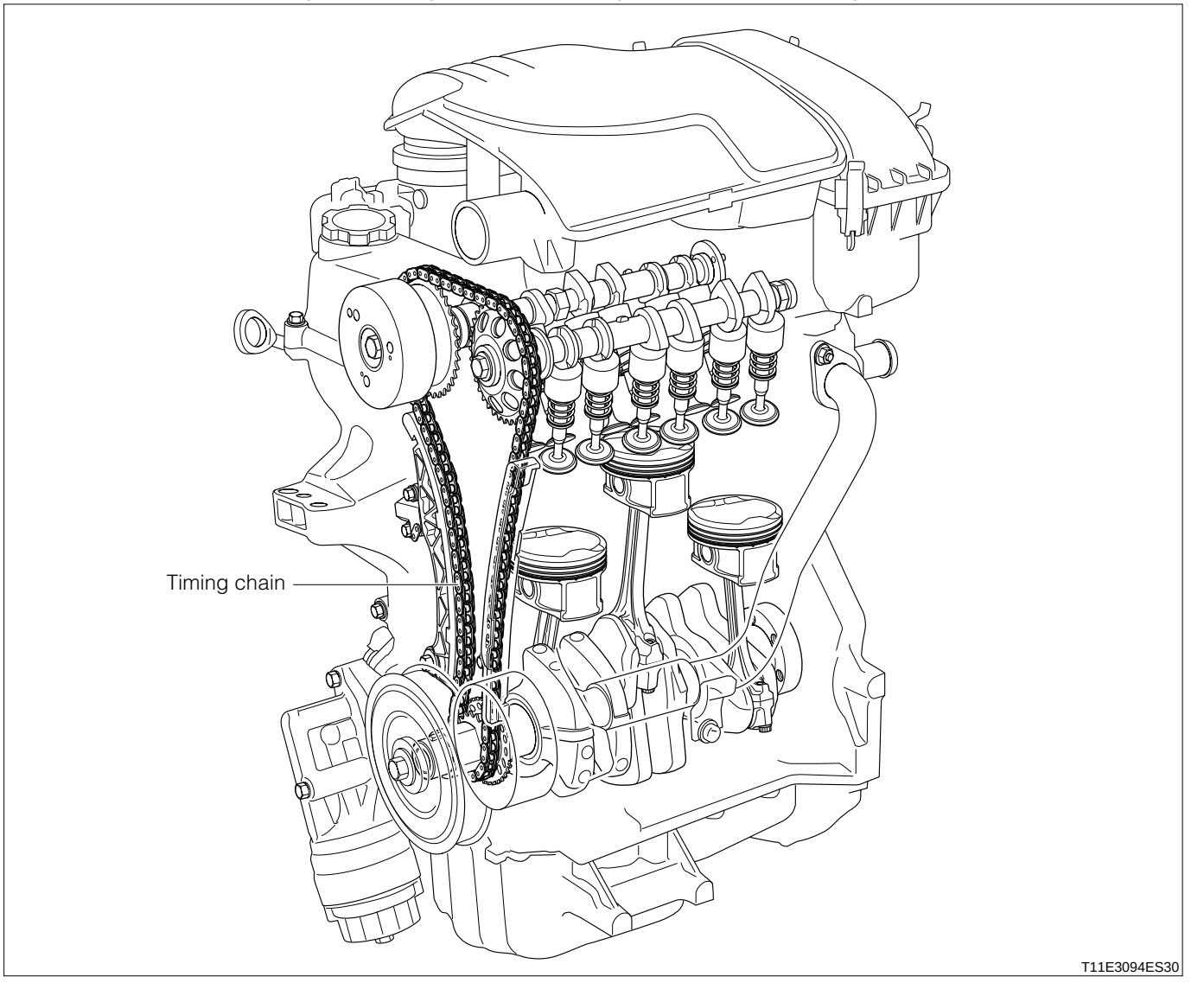


CAM, VALVE MECHANISM (1KR)

1 OUTLINE

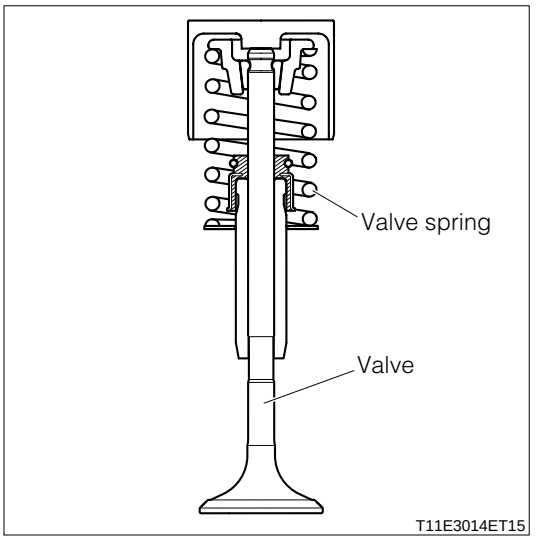
1-1 DESCRIPTION

A single stage chain is used, in which a single chain drives the intake and exhaust cam shafts.
Direct valve actuating, DOHC, 4-valve (two intake valves, two exhaust valves) has been employed. Also, DVVT (Dynamic Variable Valve Timing) mechanism has been adopted, in which the valve timing is controlled to an optimum timing according to the operating condition of the engine.



2 CONSTRUCTION AND OPERATION

2-1 VALVE AND VALVE SPRING



The valves have employed heat-resistant steel for both the intake side and exhaust side. The nitriding treatment has been performed for all surfaces (except the valve face section). Furthermore, for reduced mechanical loss, a smaller diameter of the stem section has been employed.

For the valve spring, special carbon steel for the valve spring has been used and it has undergone the shot peening. The common parts have been used for both the intake side and exhaust side and the valve spring has adopted a variable pitch spring featuring an excellent valve following-up characteristics. For reduced friction loss, the maximum load has been reduced by decreasing the equivalent mass of the valve system.

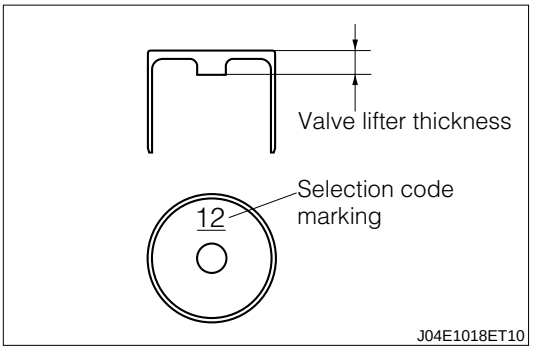
Valve specifications

	Intake valve	Exhaust valve
Overall length (mm)	88.39	89.11
Diameter of head section (mm)	27.5 Dia.	23.6 Dia.
Diameter of stem section (mm)	5 Dia.	5 Dia.

Valve spring specifications

Coil diameter (mm)	2.5 Dia.
Coil inner diameter (mm)	16.0
Total winding number	8.84
Free length (mm)	51.63

2-2 VALVE LIFTER AND VALVE ADJUSTING SHIM



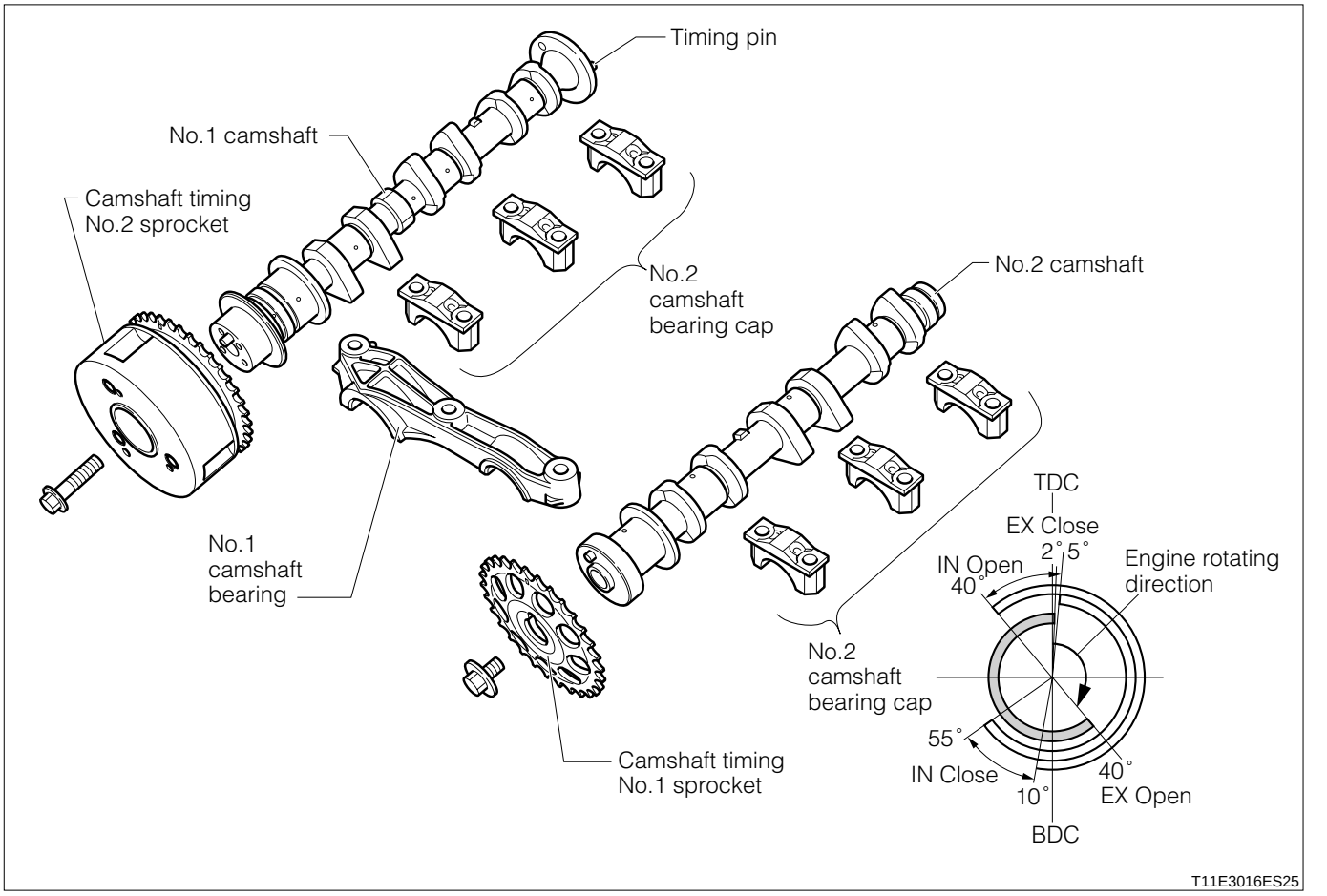
For reduced weight, shim-less lifters have been adopted. The valve clearance is adjusted by changing the surface thickness at the top of the lifter. The surface thickness at the top of the lifter comes in 29 kinds between 5.12 mm and 5.68 mm in increments of 0.02 mm. The lifter thickness is identified by the number stamped on the back of the lifter. The stamped number indicates the dimension of the top surface thickness below the decimal point.

2-3 CAMSHAFT

It is made of alloy cast iron. The camshaft No.1 (intake side) and camshaft No.2 (exhaust side) are hollow.

To obtain compact design of the cylinder head, the camshaft is driven by the chain.

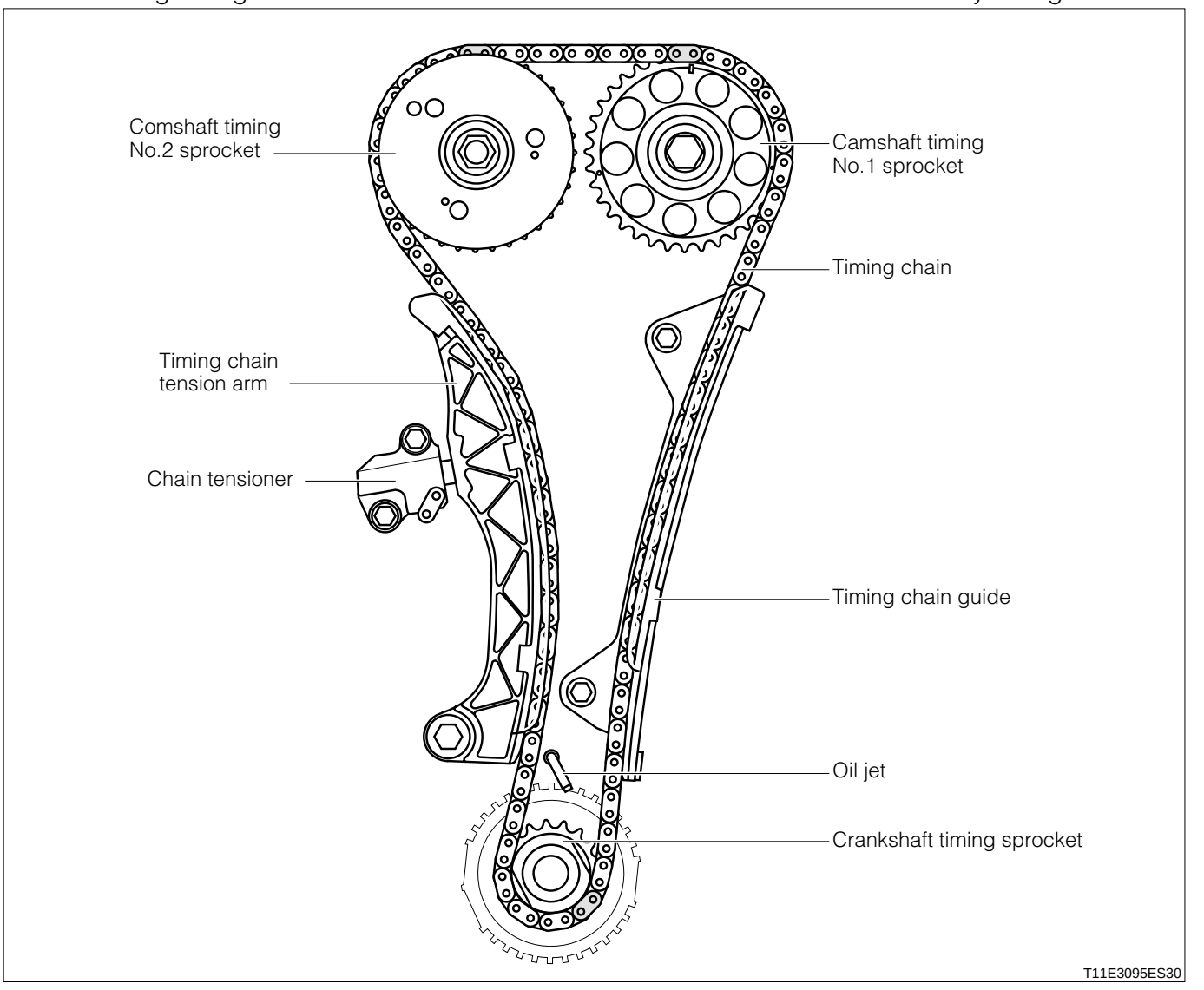
The DVVT controller integral with the sprocket is mounted to the front end of camshaft No.1. Also, the timing pins (3 pins) are mounted to the rear end to detect the cam position of the DVVT.



2-4 TIMING CHAIN MECHANISM

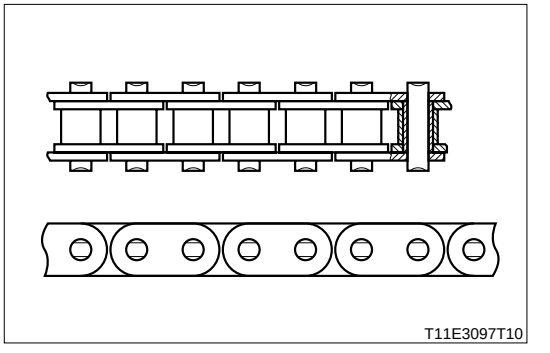
2-4-1 DESCRIPTION

This is the single-stage chain in which the intake and exhaust camshafts are driven by a single chain.



2-4-2 TIMING CHAIN

A roller chain with a pitch of 8.00 mm is adopted. As the marks for assembling the chain, a yellow mark plate and 2 orange mark plates are provided.

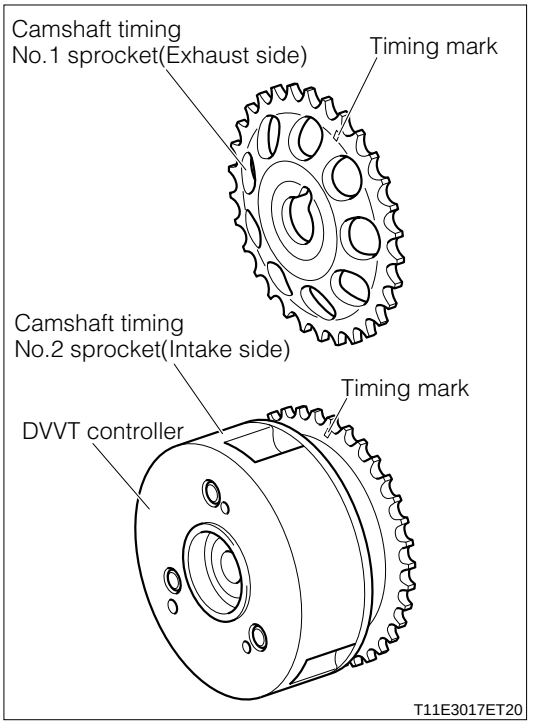


2-4-3 CAMSHAFT TIMING NO.1 SPROCKET,CAMSHAFT TIMING NO.2 SPROCKET

A timing mark is provided as a mating mark for assembling the timing chain.

Sprocket specifications

	Camshaft timing No.1 sprocket	Camshaft timing No.2 sprocket
Material	Hot-rolled steel	Sintered alloy
Tooth profile	Involute	Involute
Number of teeth	36	36
Pitch (mm)	8.00	8.00
Pitch circle diameter (mm)	91.98 Dia.	91.98 Dia.
Roller diameter (mm)	5.65	5.65
Width (mm)	4.2	4.2

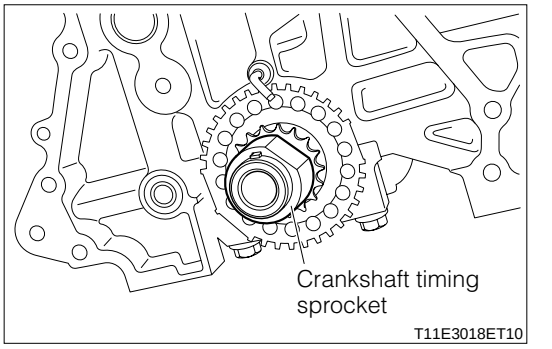


2-4-4 CRANKSHAFT TIMING SPROCKET

A timing mark is provided as a mating mark for assembling the timing chain.

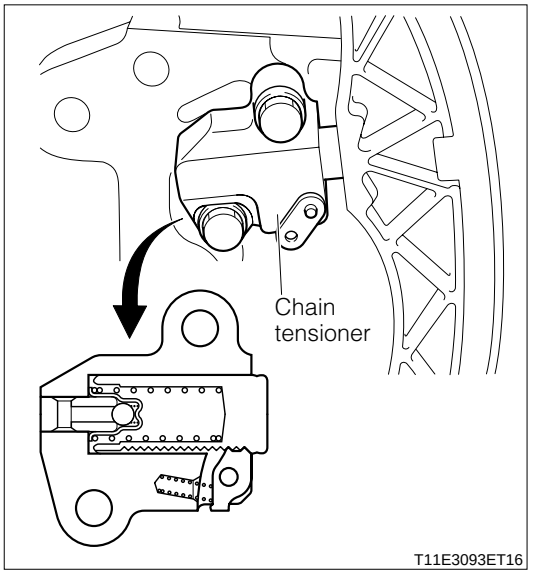
Crankshaft timing sprocket specifications

Material	Sintered alloy
Tooth profile	Involute
Number of teeth	18
Pitch (mm)	8.00
Pitch circle diameter (mm)	46.07 Dia.
Roller diameter (mm)	5.65
Width (mm)	4.2



2-4-5 CHAIN TENSIONER PLUNGER

In order to assure the durability and quietness, an optimum tension is always given to the timing chain, using the hydraulic pressure in combination with the spring force.
Moreover, the service holes have been provided on the timing chain cover, so that the initial setting can be performed for the ratchet mechanism during the servicing.

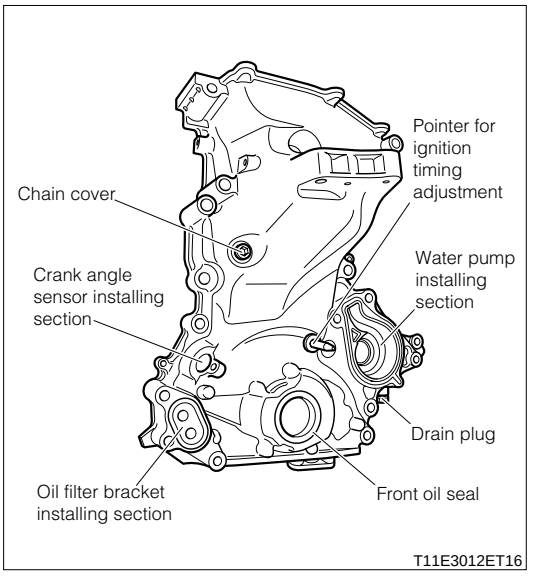


2-4-6 OIL JET

An oil jet is provided to lubricate the meshing section of the crank shaft timing sprocket and the chain.

2-4-7 TIMING CHAIN COVER

It is made of aluminum and incorporates an oil pump, and it is so constructed that the oil strainer, water pump, and oil filter bracket are mounted. Moreover, for reduced mount vibration, the mount bracket (right) has been integrated. Furthermore, service holes for adjusting the chain tension and pointers for adjusting the ignition timing are provided.



2-5 DVVT SYSTEM

2-5-1 DESCRIPTION

1.The DVVT (Dynamic Variable Valve Timing) capable of controlling the valve timing to an optimum condition at all times from the idling to the high-speed driving has been employed. Thus, low fuel consumption and high output have been achieved.

(1) During the idling period, mixture is prevented from passing through to exhaust gas by eliminating the valve overlap. As a result, fuel economy is enhanced.

(2) When the valve overlap is expanded, the inner EGR amount increases and the negative pressure in the intake manifold is reduced. Consequently, the pumping loss of the piston is reduced and fuel consumption enhances. Furthermore, by this inner EGR effect, inactive gas is inhaled again, thus lowering the combustion temperature. Consequently, NO_x emission is reduced. Moreover, since unburnt gas is combusted again, the HC emission is reduced.

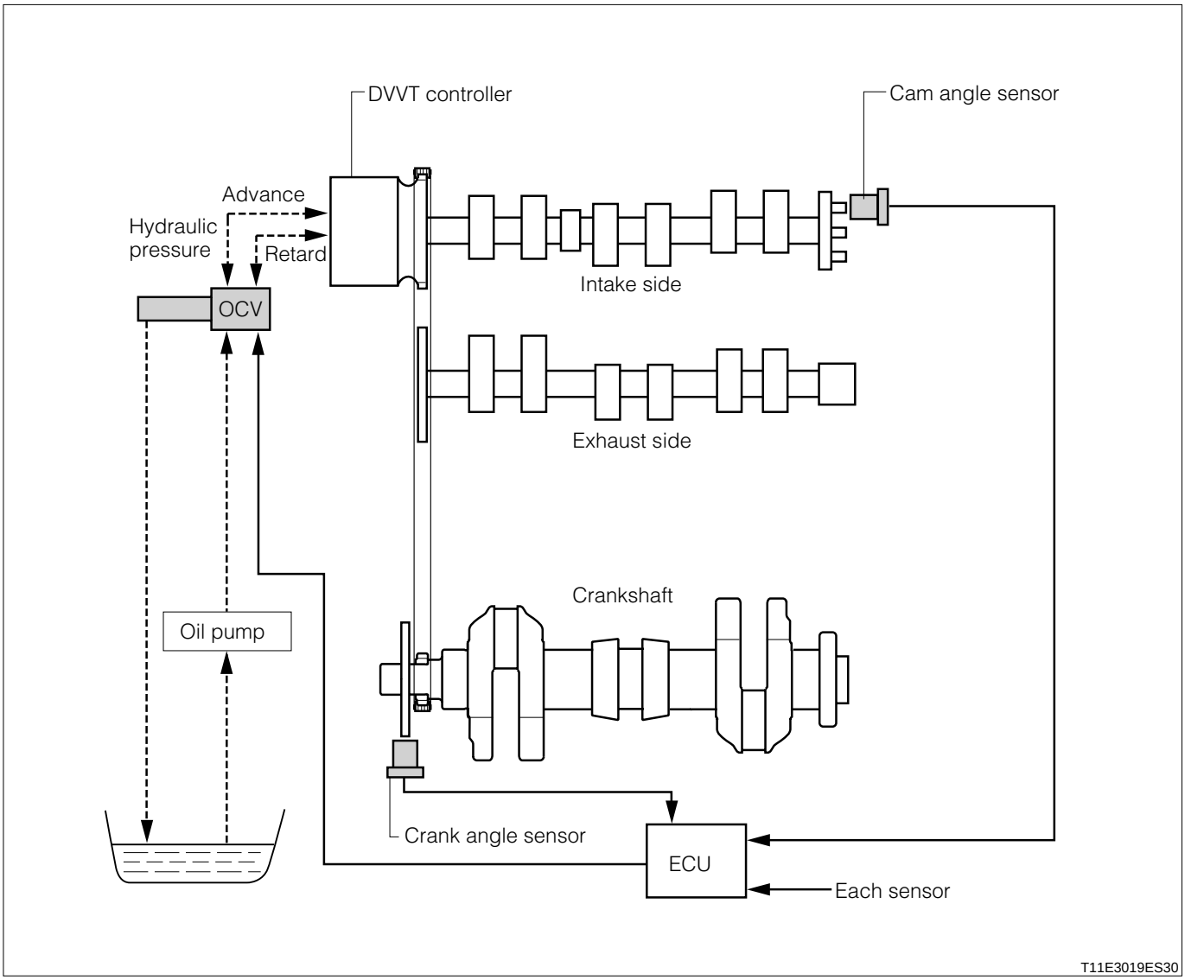
(3) In the high-load driving range, the output and torque are increased through the valve timing according to the required air amount.

2-5-2 SYSTEM

(1) Description

The engine control computer controls the OCV (oil control valve) according to the engine speed, pressure in the intake manifold, etc. In this way, the phase of the camshaft No.1 (intake side) is controlled to an optimum condition by applying the engine hydraulic pressure to the front and rear of the vane of the DVVT controller mounted to the camshaft No.1 (intake side).

(2) Schematic diagram



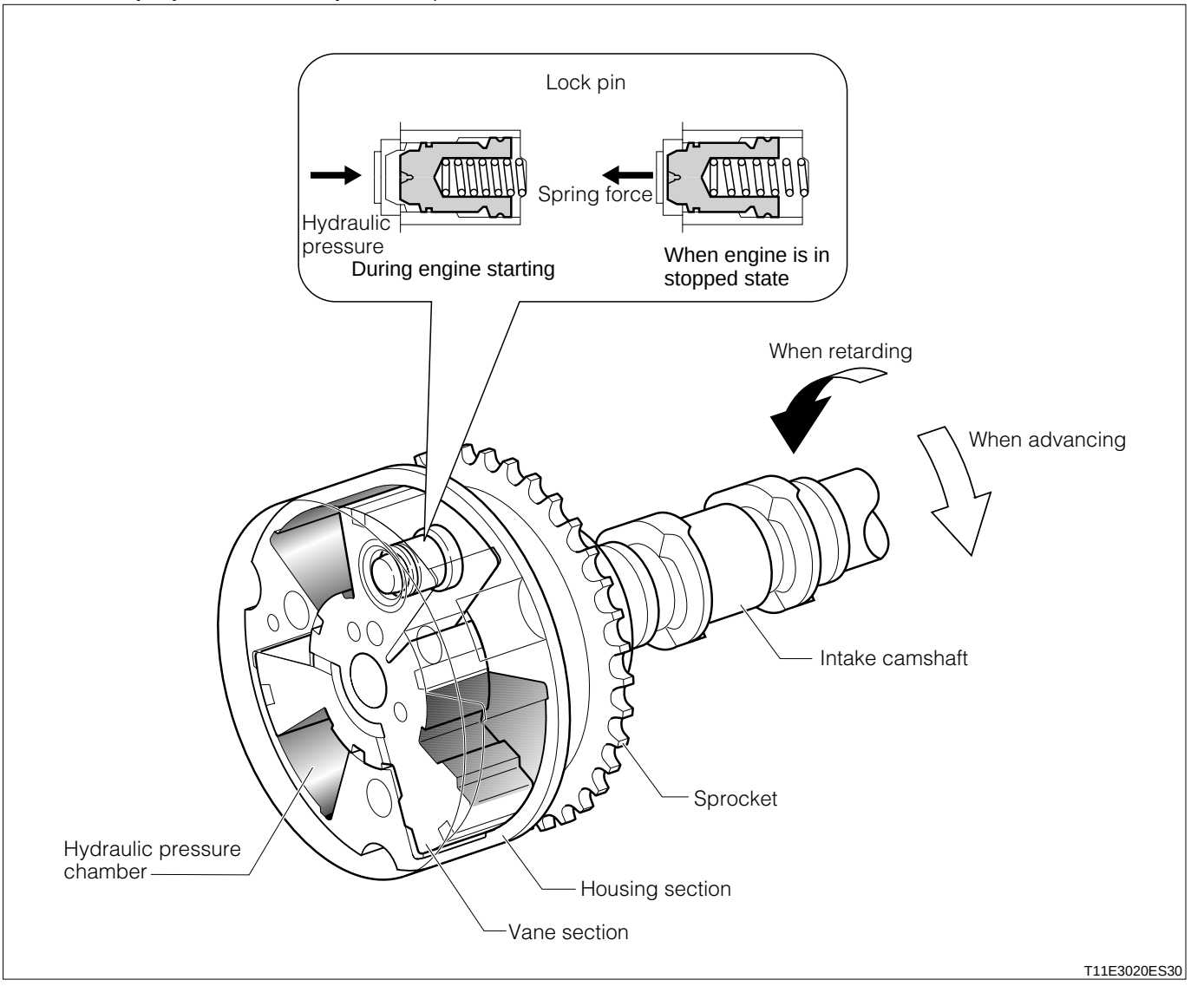
2-5-3 COMPONENTS

(1) DVVT Controller

It consists of the housing section secured on the sprocket driven by the timing chain and the vane section secured on the camshaft No.1 (intake side).

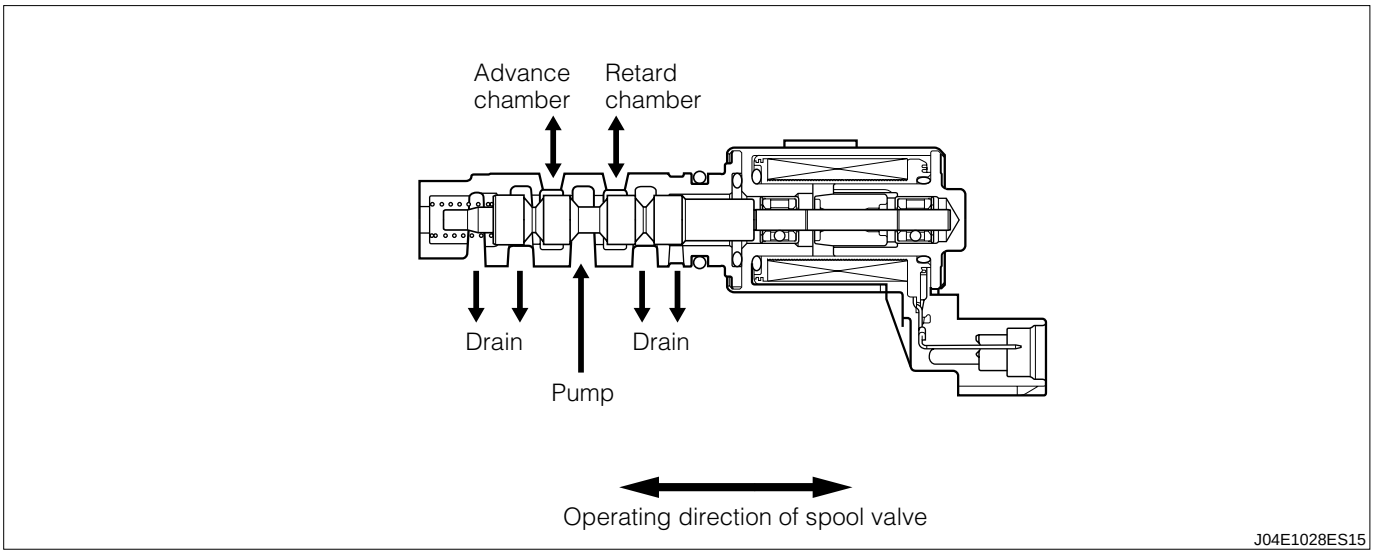
The vane section rotates in the circumference direction in relation to the housing by controlling the hydraulic pressure of the two hydraulic pressure chambers (advance chamber and retard chamber) consisting of the housing and vane. Thus, the phase of the camshaft No.1 is varied continuously. Consequently, the valve timing is controlled optimally.

During the engine starting period, the vane is pushed against the most retard angle side by the turning of the housing. Then, the vane is locked by the pin. After the engine has started, the pin will be released automatically by the control hydraulic pressure.



(2) OCV(Oil Control Valve)

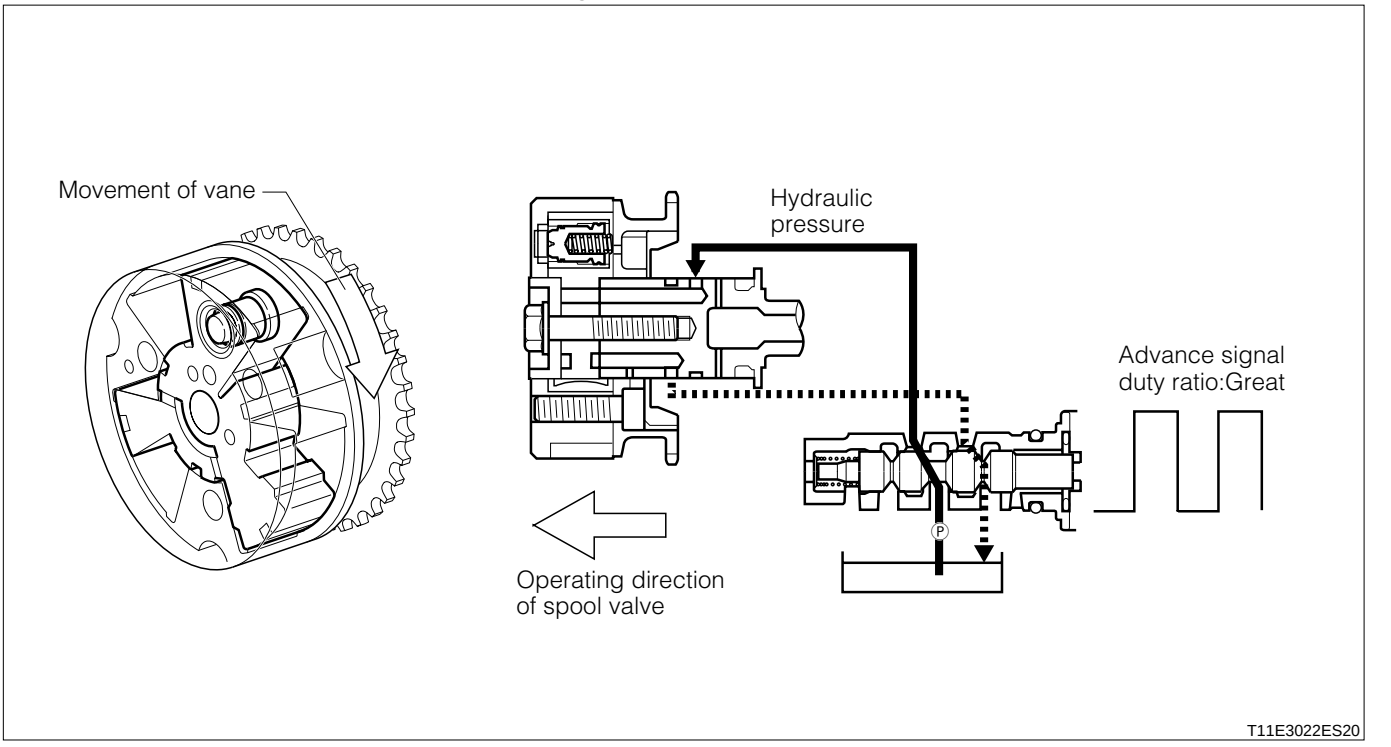
The spool valve position is moved by means of the duty signal from the engine control computer. Thus, the oil passage to the DVVT controller is switched.



2-5-4 OPERATION

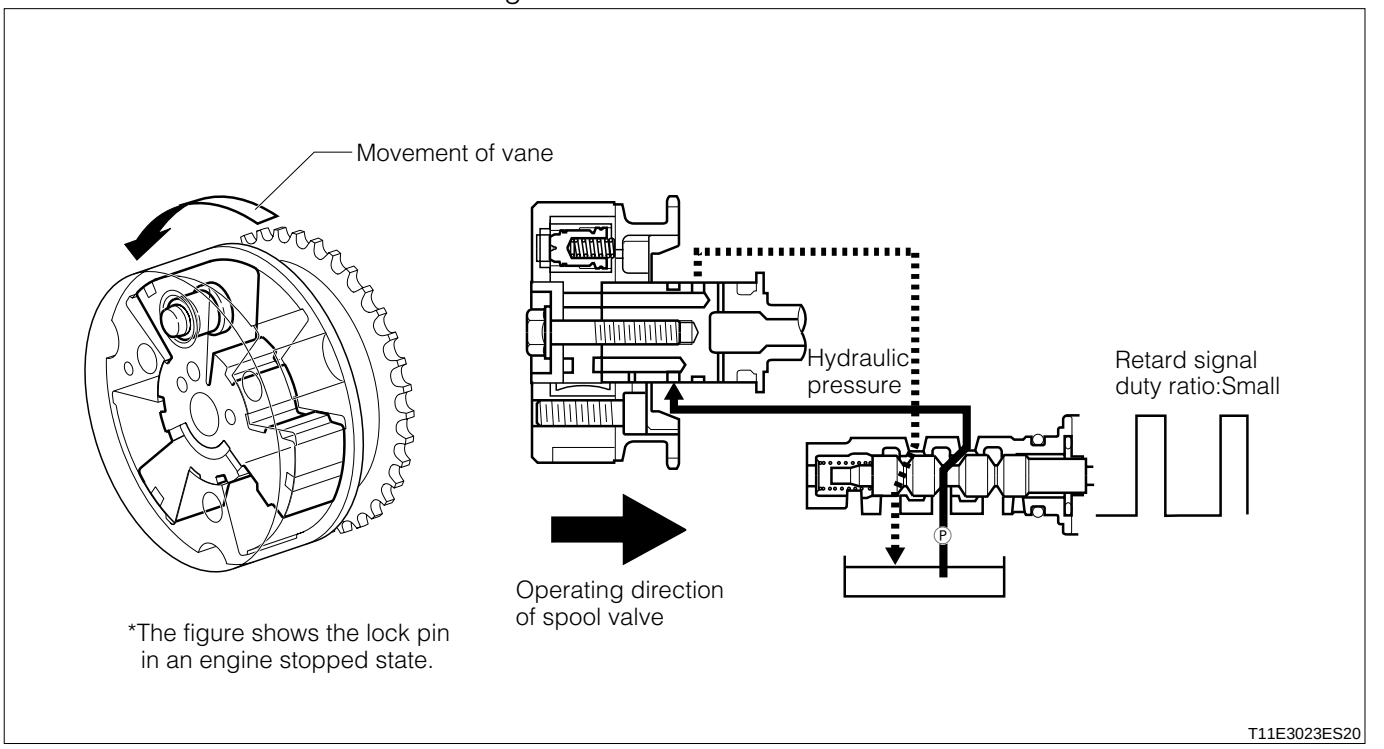
(1) Timing advance operation

The OCV operates by the signal sent from the engine control computer so that the engine hydraulic pressure may be applied to the vane chamber at the advance side. As a result, the camshaft No.1 is turned to the advance side in relation to the housing.



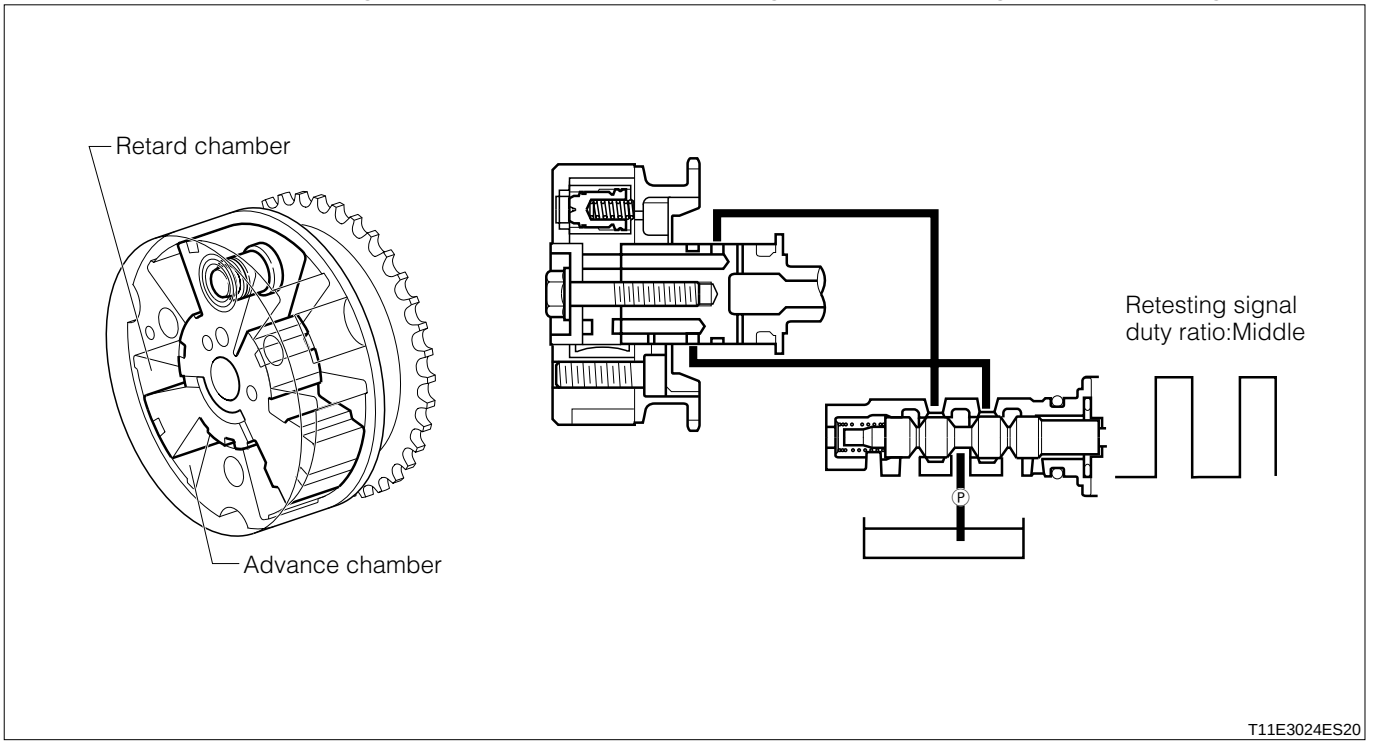
(2) Timing retard operation

The OCV operates by the signal sent from the engine control computer so that the engine hydraulic pressure may be applied to the vane chamber at the retard side. As a result, the camshaft No.1 is turned to the retard side in relation to the housing.



(3) Retention operation

After completion of the control of the target timing, the OCV shuts off the oil passages leading to the DVVT controller, unless the running condition of the vehicle changes, thus retaining the valve timing.



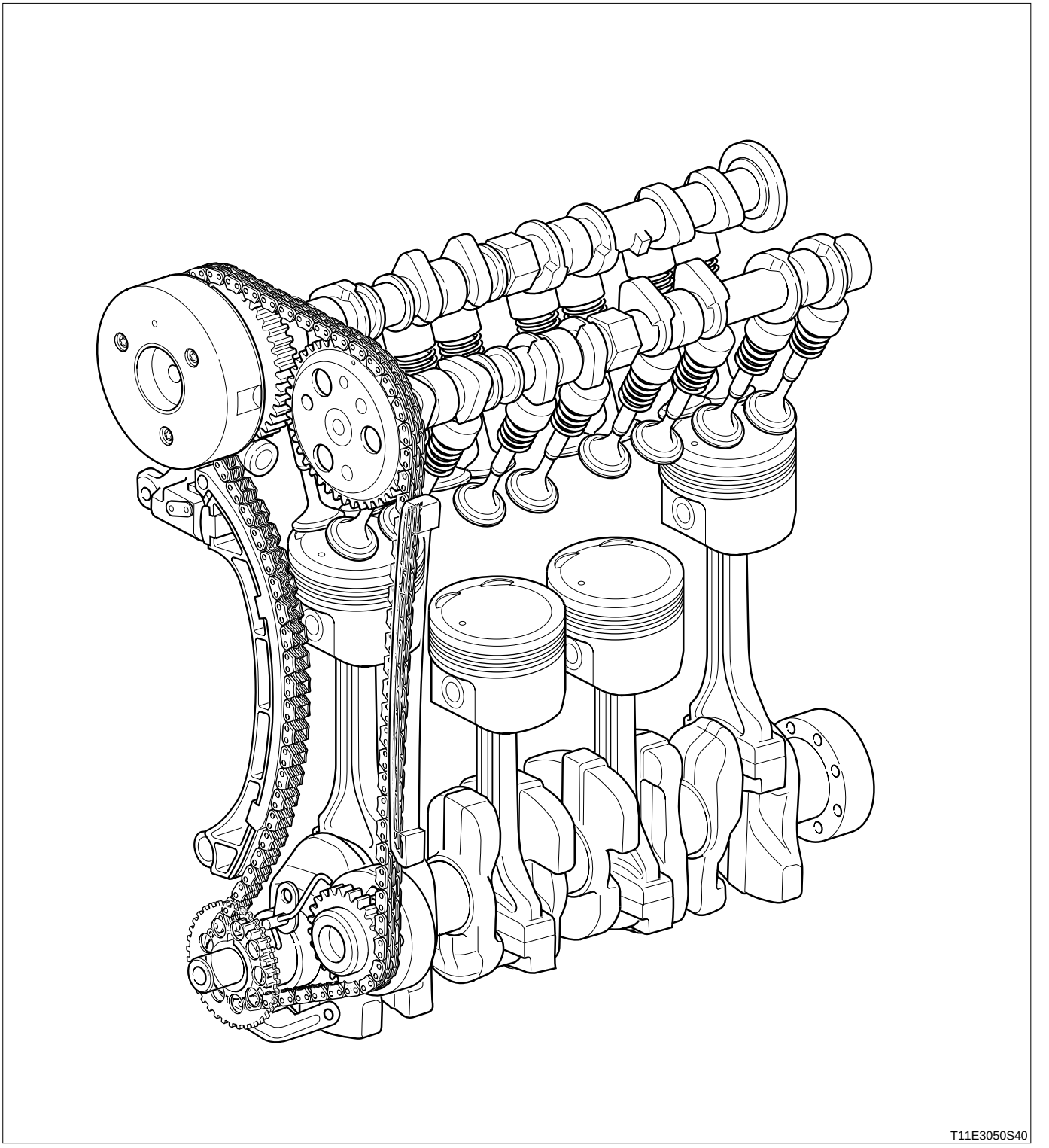
CAM, VALVE MECHANISM (K3)

1 OUTLINE

1-1 DESCRIPTION

A single stage chain is used, in which a single chain drives the intake and exhaust cam shafts and oil pump. Also, the overall length is shortened. Moreover, for reduced noise, a silent chain has been adopted for the chain to prevent tapping sound caused by the meshing of the chain.

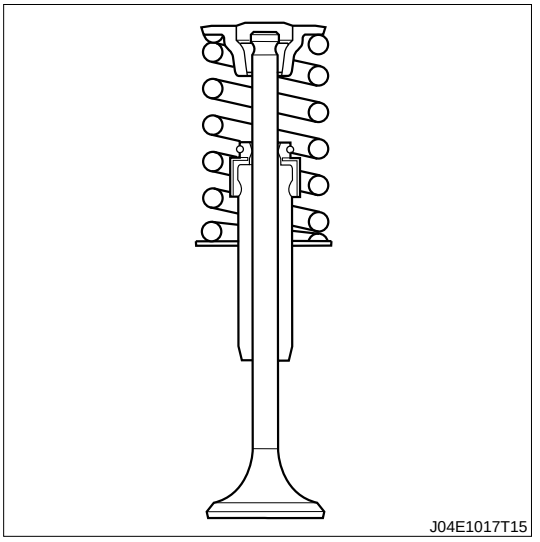
Direct valve actuating, DOHC, 4-valve (two intake valves, two exhaust valves) has been employed. Also, DVVT (Dynamic Variable Valve Timing) mechanism has been adopted, in which the valve timing is controlled to an optimum timing according to the operating condition of the engine.



T11E3050S40

2 CONSTRUCTION AND OPERATION

2-1 VALVE AND VALVE SPRING



The valves have employed heat-resistant steel for both the intake side and exhaust side. The nitriding treatment has been performed for all surfaces (except the valve face section). Furthermore, for reduced mechanical loss, a smaller diameter of the stem section has been employed.

For the valve spring, special carbon steel for the valve spring has been used and it has undergone the shot peening. The common parts have been used for both the intake side and exhaust side and the valve spring has adopted a variable pitch spring featuring an excellent valve following-up characteristics. For reduced friction loss, the maximum load has been reduced by decreasing the equivalent mass of the valve system.

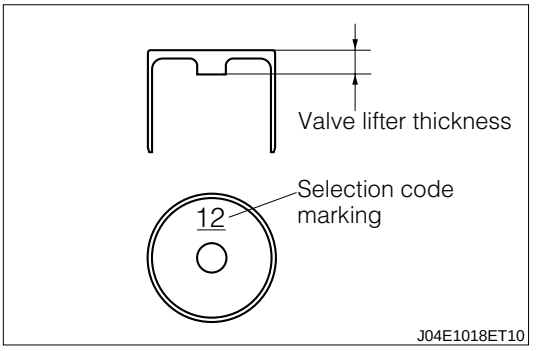
Valve specifications

	Intake Valve	Exhaust Valve
Overall length(mm)	88.15	89.10
Diameter of head section (mm)	26.0 Dia.	22.6 Dia.
Diameter of stem section (mm)	5.0 Dia.	5.0 Dia.

Two monufactures are furnishing each spring

Identification color	–	Orange
Coil outer diameter (mm)	22.9 Dia.	22.9 Dia.
Total winding number	9.16	9.16
Free length (mm)	45.55	45.53

2-2 VALVE LIFTER AND VALVE ADJUSTING SHIM



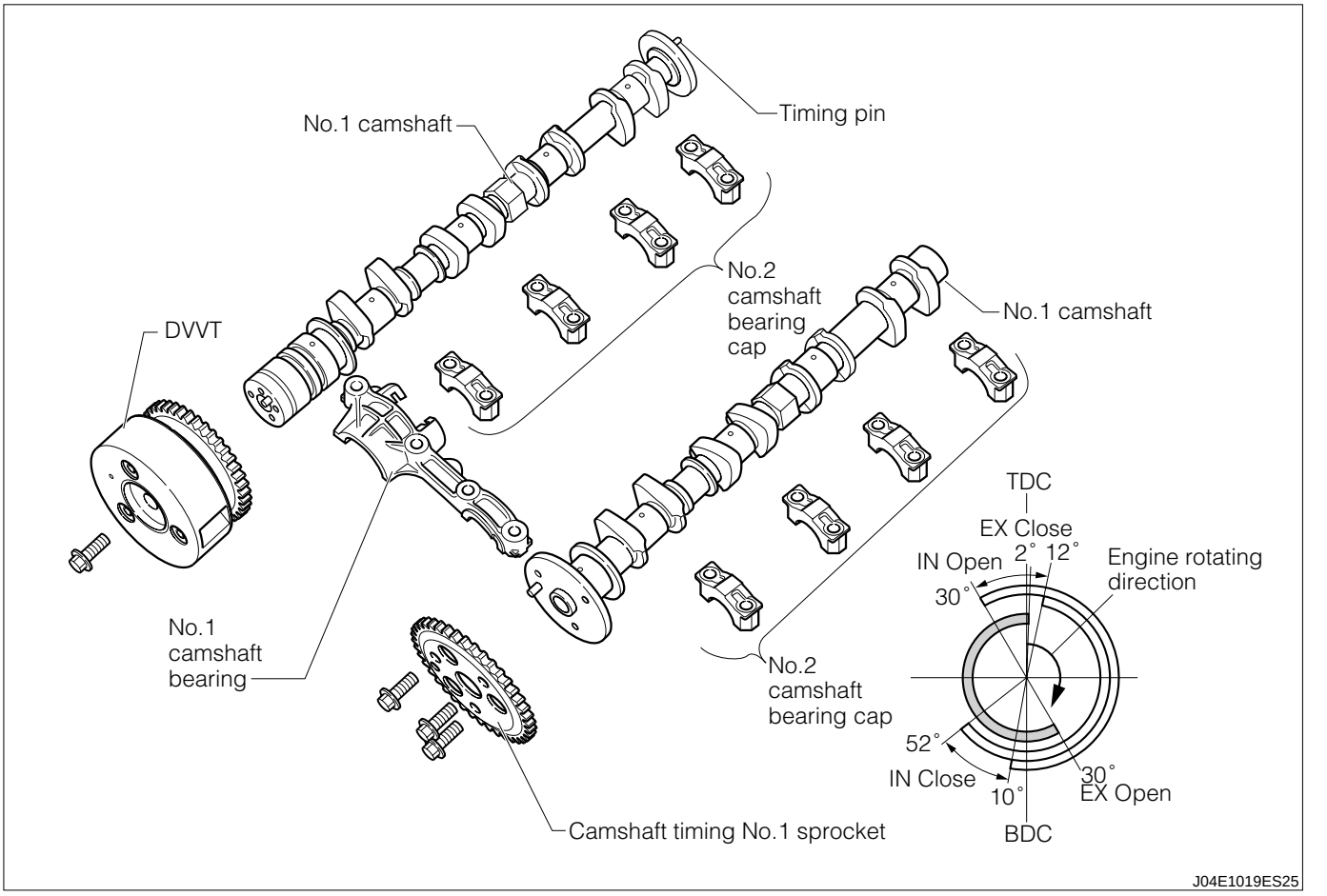
For reduced weight, shim-less lifters have been adopted. The valve clearance is adjusted by changing the surface thickness at the top of the lifter. The surface thickness at the top of the lifter comes in 29 kinds between 5.12 mm and 5.68 mm in increments of 0.02 mm. The lifter thickness is identified by the number stamped on the back of the lifter. The stamped number indicates the dimension of the top surface thickness below the decimal point.

2-3 CAMSHAFT

It is made of alloy cast iron. The camshaft No.1 (intake side) and camshaft No.2 (exhaust side) are hollow.

For compact design of the cylinder head, the camshaft is driven by the single-stage silent chain.

The DVVT controller integral with the sprocket is mounted to the front end of camshaft No.1. Also, the timing pins (3 pins) are mounted to the rear end to detect the cam position of the DVVT.

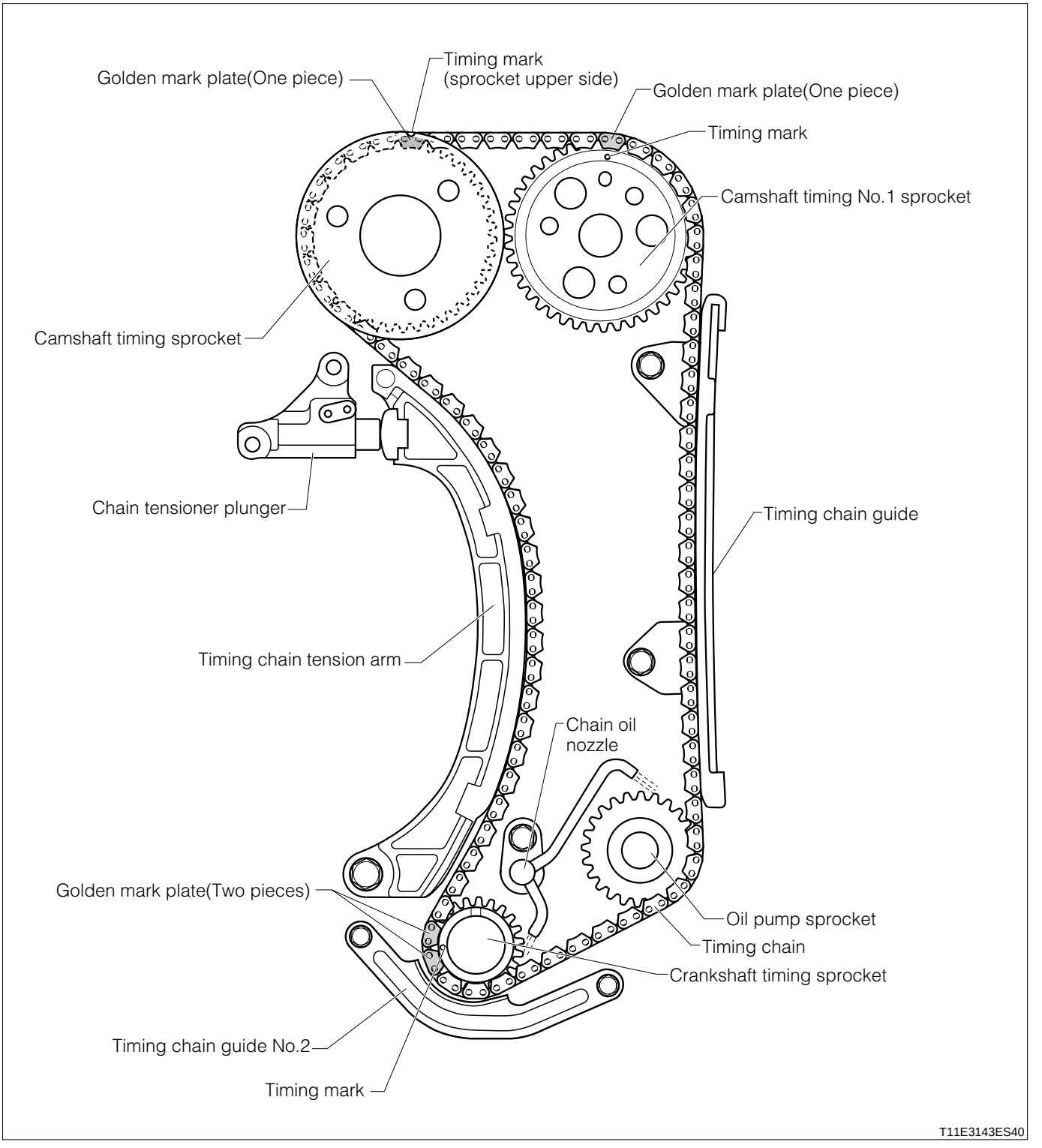


2-4 TIMING CHAIN MECHANISM

2-4-1 DESCRIPTION

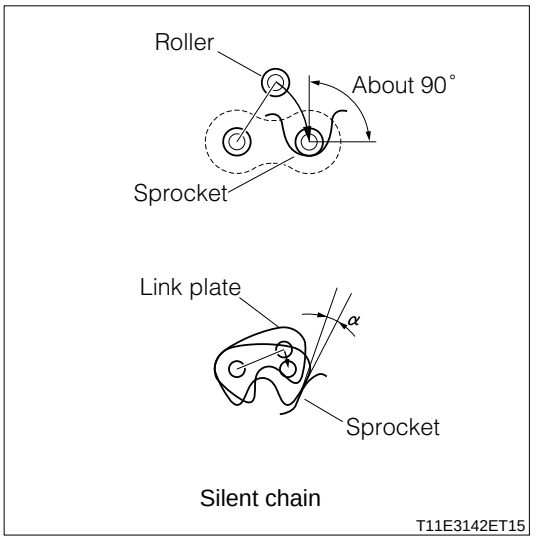
The camshaft is driven by the silent chain with a pitch of 6.35 mm. For reduced chain driving noise, the tooth shape of each sprocket has employed an involute shape. The oil pump is also driven by the same timing chain. Thus, the overall length of the engine has become shortened.

Furthermore, as a result of the employment of a chain, heat radiation from the timing chain cover becomes effective, thus lowering the oil temperature and enhancing the reliability.



2-4-2 TIMING CHAIN

The silent chain of 6.35 mm is adopted. Furthermore, a golden marking plate incorporated in the chain is provided as a mating mark to be used at the time of assembling the chain. In the case of the silent chain, the link plate meshes with the sprocket with an involute teeth profile, as if it is sliding-in, thereby resulting in a small impact force.

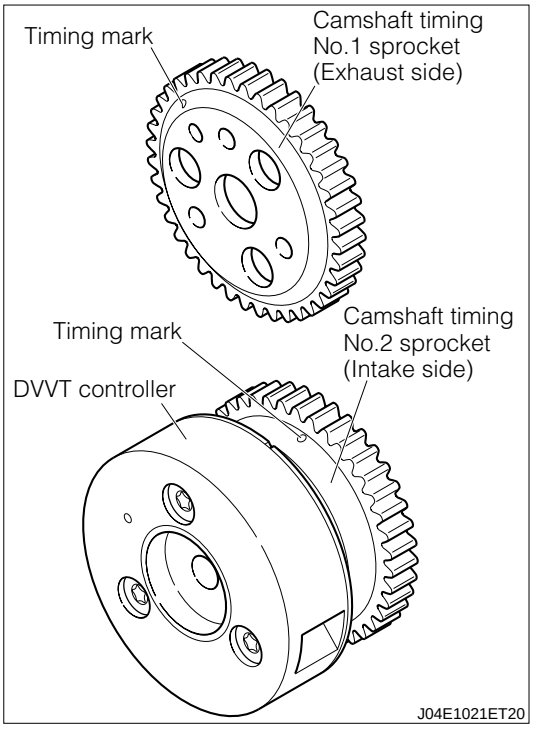


2-4-3 CAMSHAFUTO TAIMING NO.1 SPROCKET,CAMSHAFUTO TAIMING NO.2 SPROCKET

A timing mark is provided as a mating mark for assembling the timing chain.

Sprocket specifications

	Camshaft timing No.1 sprocket	Camshaft timing No.2 sprocket
Material	Sintered alloy	Sintered alloy
Surface treatment	Induction hardening and tempering	Induction hardening and tempering
Tooth profile	Involute	Involute
Number of teeth	42	42
Pitch (mm)	6.35	6.35
Pitch circle diameter (mm)	84.97 Dia.	84.97 Dia.
Tooth width (mm)	8.4	8.4

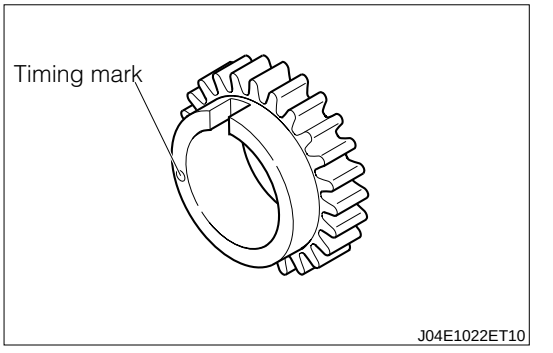


2-4-4 CRANKSHAFT TIMING SPROCKET

A timing mark is provided as a mating mark for assembling the timing chain.

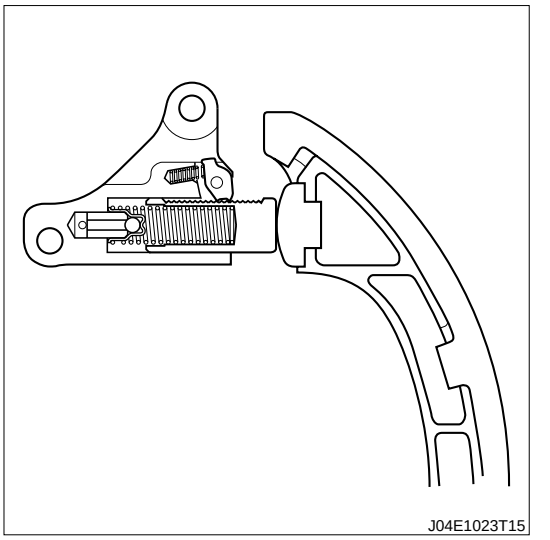
Crankshaft timing sprocket specifications

Material	Steel
Surface treatment	Induction hardening and tempering
Tooth profile	Involute
Number of teeth	21
Pitch (mm)	6.35
Pitch circle diameter (mm)	42.61 Dia.
Width (mm)	8.4



2-4-5 CHAIN TENSIONER PLUNGER

In order to assure the durability and quietness, an optimum tension is always given to the timing chain, using the hydraulic pressure in combination with the spring force.
Moreover, the service holes have been provided on the timing chain cover, so that the initial setting can be performed for the ratchet mechanism during the servicing.

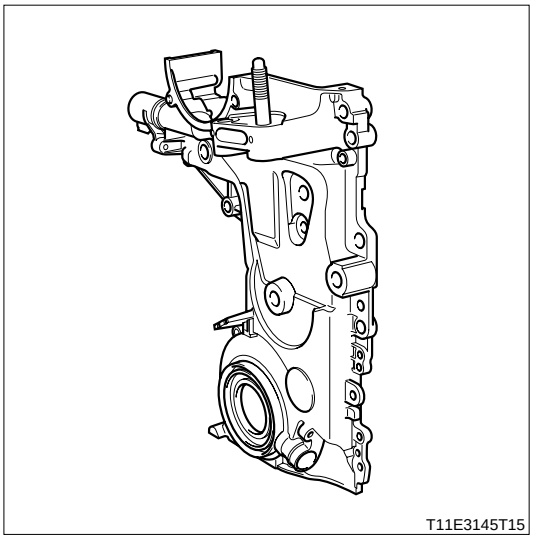

J04E1023T15

2-4-6 CHAIN OIL NOZZLE

For longer life and enhanced quietness, an oil jet for lubrication is provided, aiming at the crank sprocket and chain, where the contact pressure becomes the highest.

2-4-7 TIMING CHAIN COVER

For reduced weight, an aluminum die-cast with a thin stock thickness (general thickness 2 mm) has been employed. Furthermore, the mating surface between the cylinder head and cylinder block has employed the unmatching type which is advantageous to the casting porosity.
As regards the sealing section construction of the three-surface mating section of the cylinder head, cylinder block and timing chain cover, for enhanced sealing performance, liquid sealing material (FIPG) has been applied to the upper and lower surfaces of the cylinder head gasket so that the thermal expansion of each part may be absorbed.
An OCV is installed at the top end, thereby controlling the oil from the cylinder head and supplying oil to the DVVT.
Moreover, for reduced mount vibration, the mount bracket (right) has been integrated.


T11E3145T15

2-5 DVVT SYSTEM

2-5-1 DESCRIPTION

1.The DVVT (Dynamic Variable Valve Timing) capable of controlling the valve timing to an optimum condition at all times from the idling to the high-speed driving has been employed. Thus, low fuel consumption and high output have been achieved.

(1) D71AEKB02_0420

(2) In the medium-load driving range, the valve overlap is expanded, thus increasing the inner EGR amount. As a result, the negative pressure in the intake manifold is reduced. Consequently, the pumping loss of the piston is reduced and the fuel consumption enhances. Furthermore, by this inner EGR effect, inactive gas is inhaled again, thus lowering the combustion temperature. Consequently, NO_x emission is reduced. Furthermore, since unburnt gas is combusted again, the HC emission is reduced.

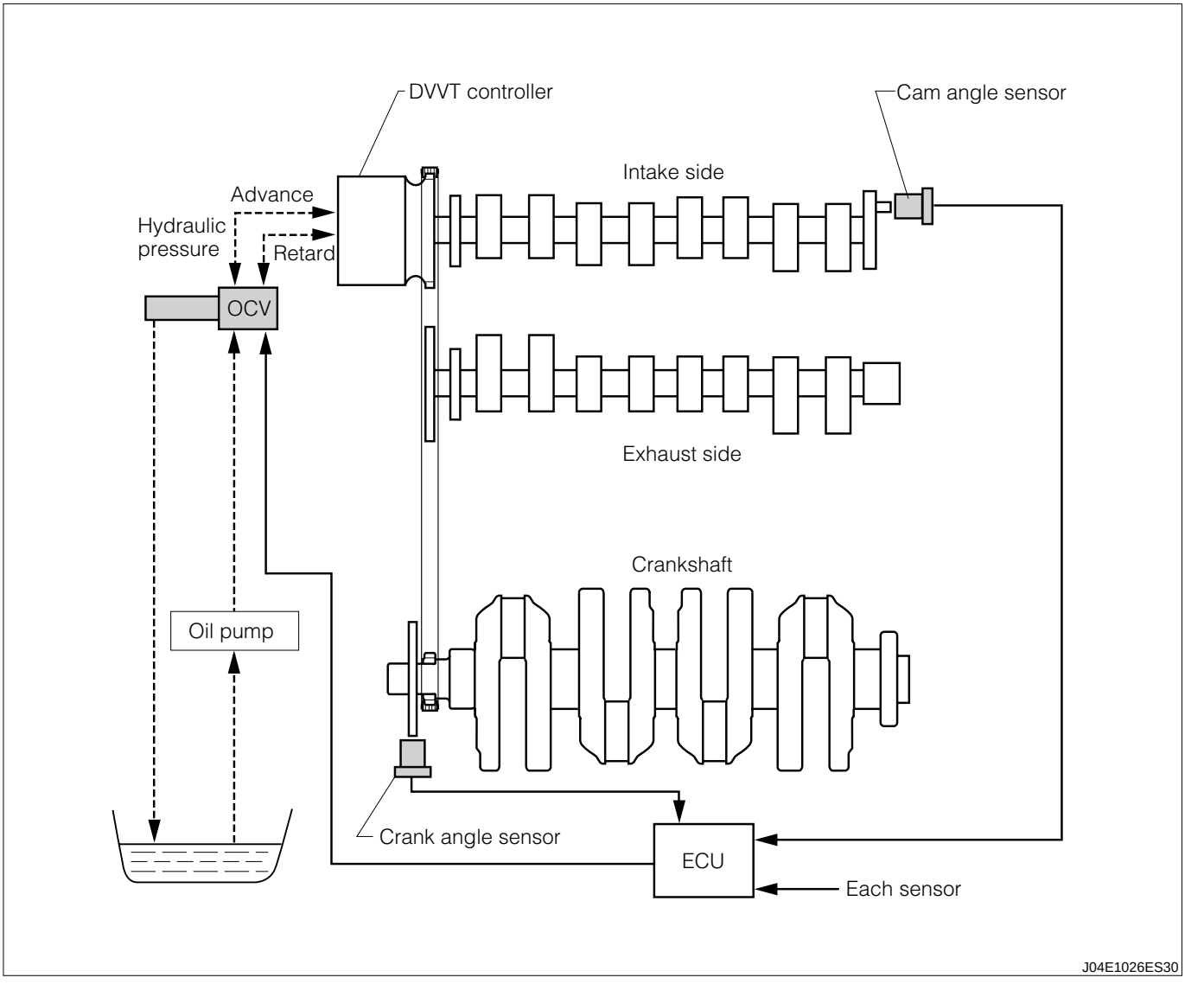
(3) In the high-load driving range, the output and torque are increased through the valve timing according to the required air amount.

2-5-2 SYSTEM

(1) Description

The engine control computer controls the OCV (oil control valve) according to the engine speed, pressure in the intake manifold, etc. In this way, the phase of the camshaft No.1 (intake side) is controlled to an optimum condition by applying the engine hydraulic pressure to the front and rear of the vane of the DVVT controller mounted to the camshaft No. 1 (intake side).

(2) Schematic diagram



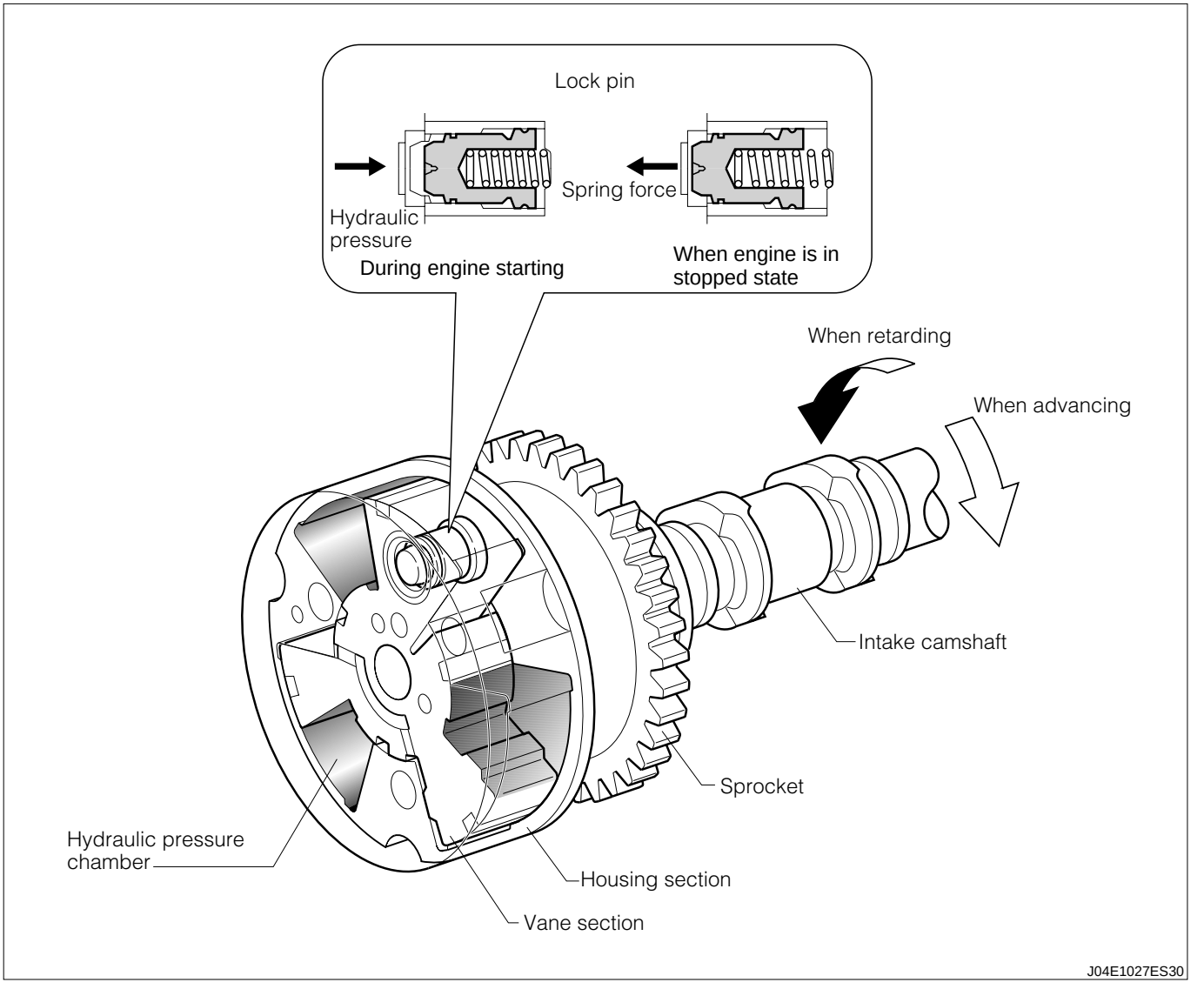
2-5-3 COMPONENTS

(1) DVVT Controller

It consists of the housing section secured on the sprocket driven by the timing chain and the vane section secured on the camshaft No.1 (intake side).

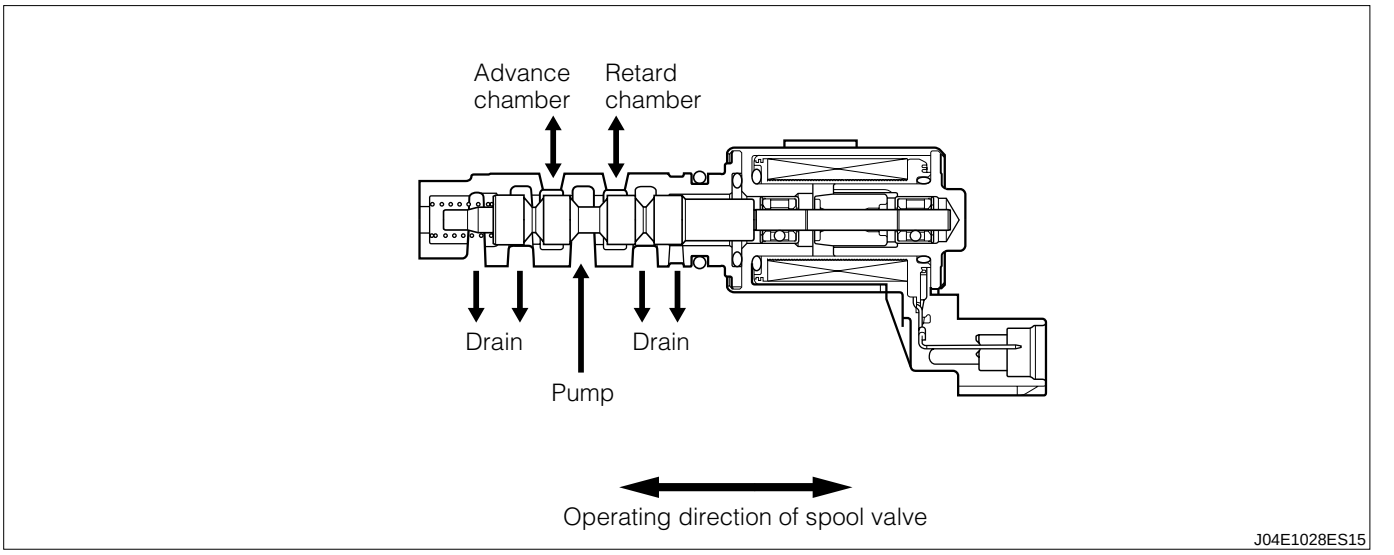
The vane section rotates in the circumference direction in relation to the housing by controlling the hydraulic pressure of the two hydraulic pressure chambers (advance chamber and retard chamber) consisting of the housing and vane. Thus, the phase of the camshaft No.1 is varied continuously. Consequently, the valve timing is controlled optimally.

During the engine starting period, the vane is pushed against the most retard angle side by the turning of the housing. Then, the vane is locked by the pin. After the engine has started, the pin will be released automatically by the control hydraulic pressure.



(2) OCV(Oil Controll Valve)

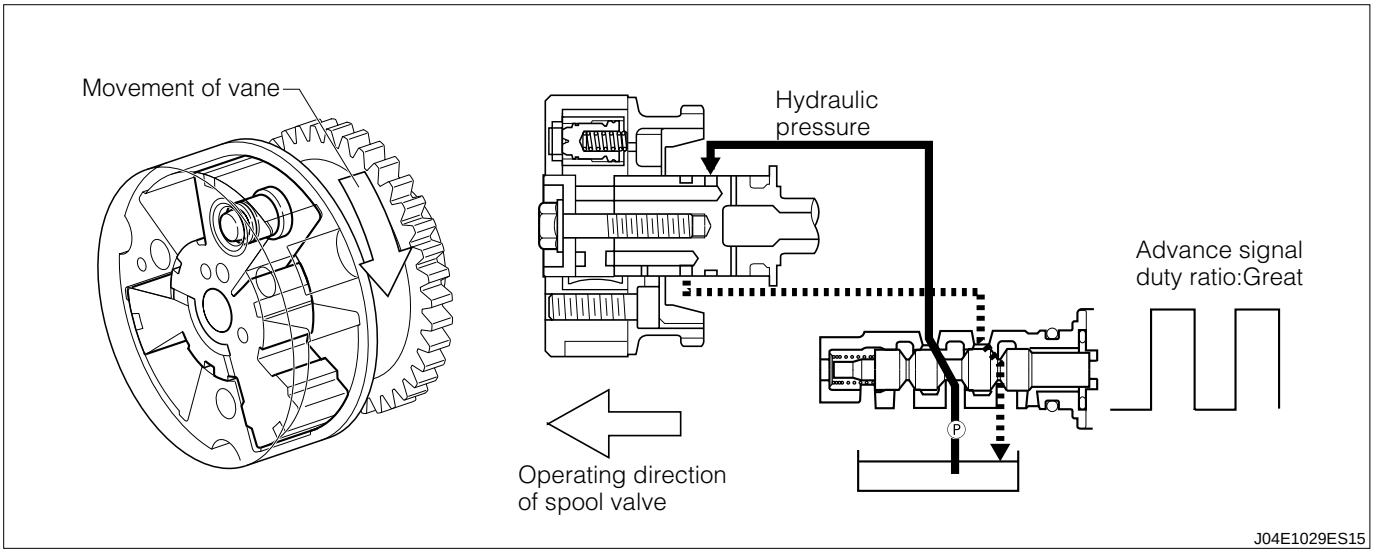
The spool valve position is moved by means of the duty signal from the engine control computer. Thus, the oil passage to the DVVT controller is switched.



2-5-4 OPERATION

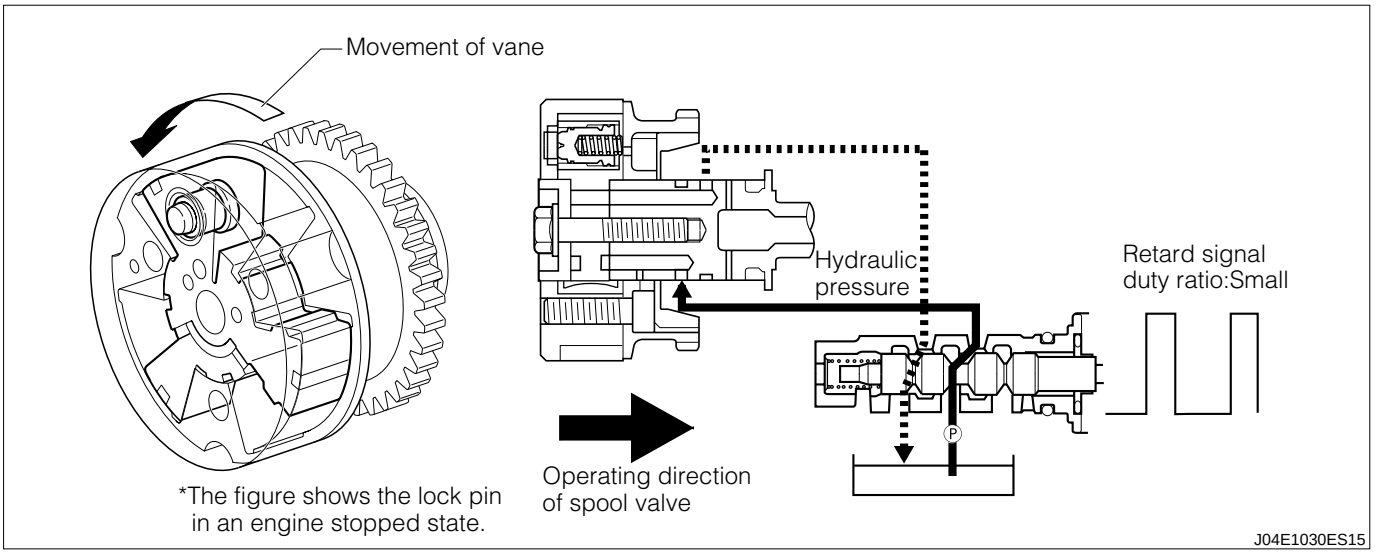
(1) Timing advance operation

The OCV operates by the signal sent from the engine control computer so that the engine hydraulic pressure may be applied to the vane chamber at the advance side. As a result, the camshaft No.1 is turned to the advance side in relation to the housing.



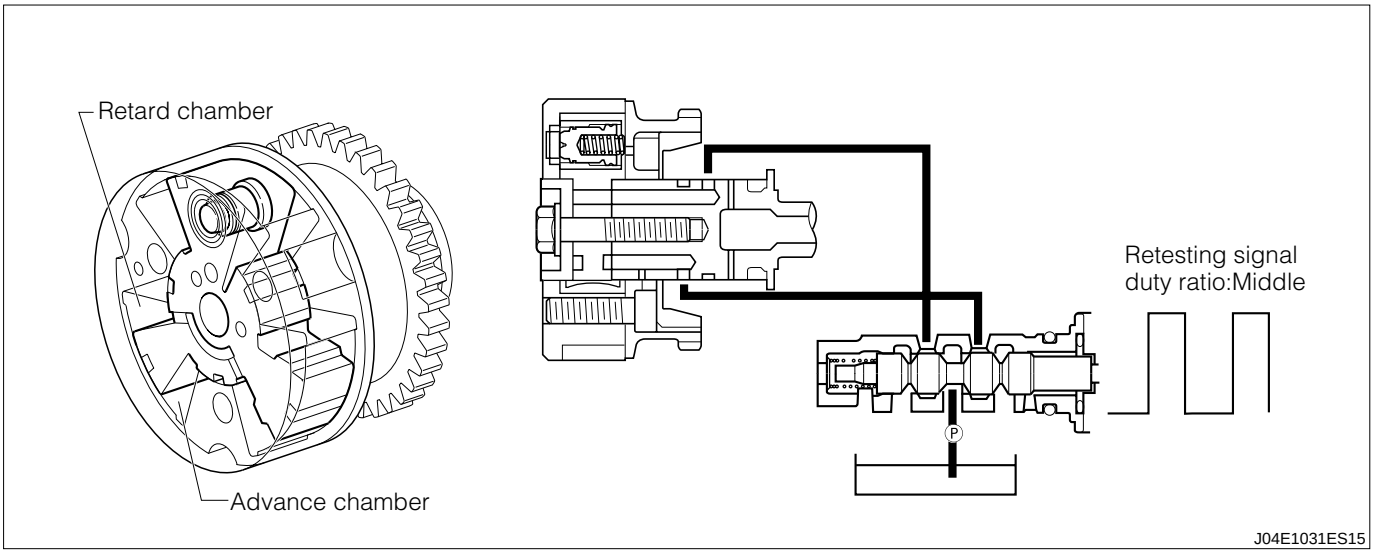
(2) Timing retard operation

The OCV operates by the signal sent from the engine control computer so that the engine hydraulic pressure may be applied to the vane chamber at the retard side. As a result, the camshaft No.1 is turned to the retard side in relation to the housing.



(3) Retention operation

After completion of the control of the target timing, the OCV shuts off the oil passages leading to the DVVT controller, unless the running condition of the vehicle changes, thus retaining the valve timing.



B3 INTAKE SYSTEM

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OUTLINE ---------- B3 - 1
DESCRIPTION---------- B3 - 1
CONSTRUCTION AND OPERATION ---- B3 - 1
AIR CLEANER ---------- B3 - 1
THROTTLE BODY ---------- B3 - 1
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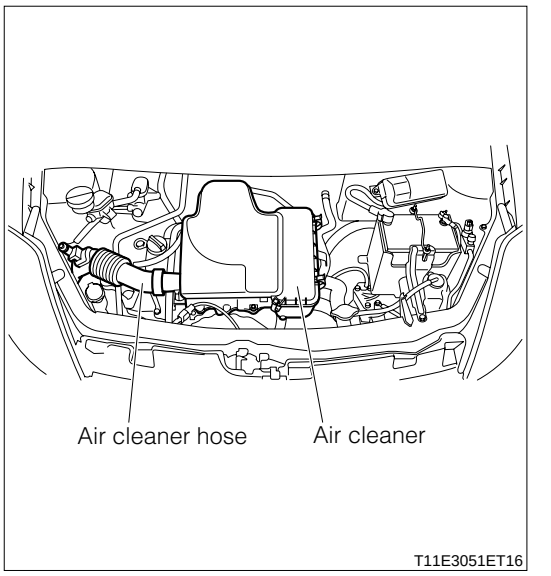
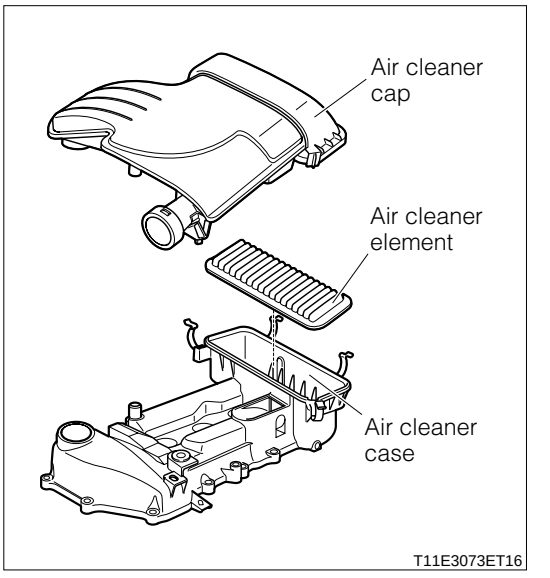
1KR
1 OUTLINE
1-1 DESCRIPTION

The air intake system consists of an air cleaner hose, air cleaner (integral with the cylinder head cover), throttle body, intake manifold and intake manifold insulator. The air cleaner is arranged directly above the engine, and the air cleaner and throttle body are mounted directly, thus reducing the air intake resistance and engine radiation noise.



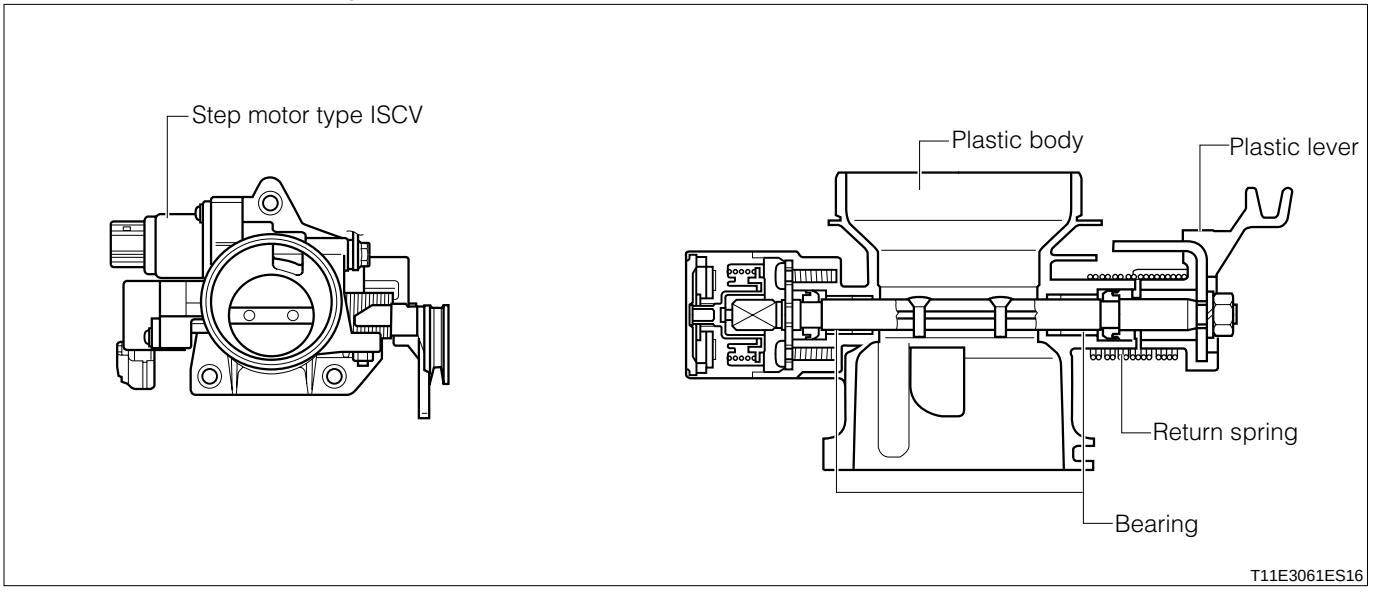
2 CONSTRUCTION AND OPERATION
2-1 AIR CLEANER

The resin cylinder head cover is integrated with the resin air cleaner case. Moreover, for reduced weight, the air cleaner cap integral with the cool air duct/engine cover is employed.



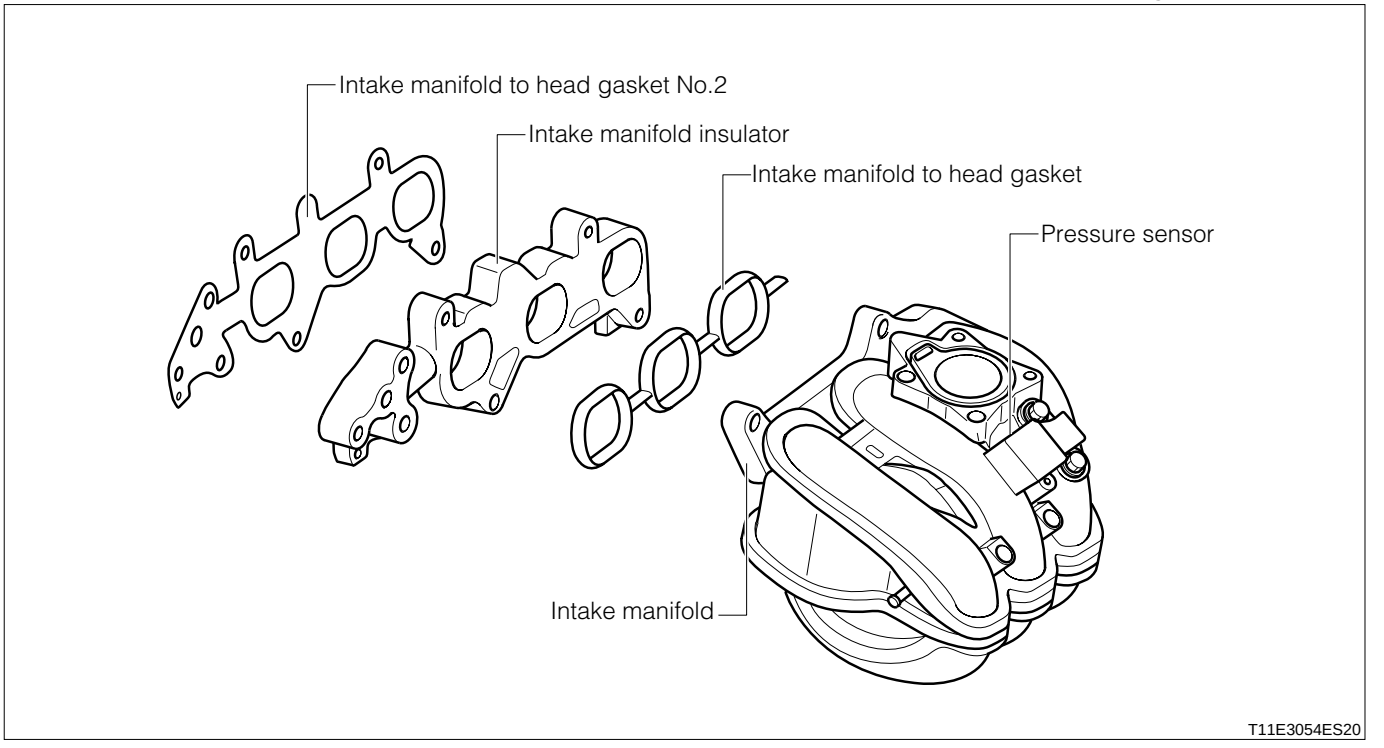
2-2 THROTTLE BODY

For reduced weight, a resin-made throttle body is adopted.
Moreover, for reduced weight, a stepper motor type is adopted for the ISCV.

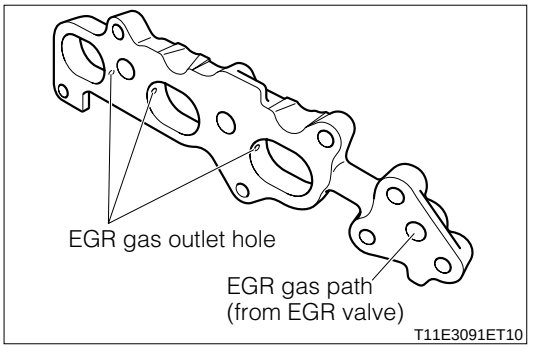


2-3 INTAKE MANIFOLD, INTAKE MANIFOLD INSULATOR, INTAKE MANIFOLD GASKET

An excellent roughness of the port inner surface obtained by a resin die form reduces the intake resistance, thus improving the volumetric efficiency. Furthermore, the intake air temperature is lowered by the employment of resin parts, thus enhancing the filling efficiency. Moreover, the manifold absolute pressure/intake air temperature integral type sensor, that is an integral sensor of the manifold absolute pressure sensor and the intake air temperature sensor, is installed to the intake manifold serge tank.



An EGR gas outlet hole to the each cylinder is provided to the aluminum intake manifold insulator that is mounted between the intake manifold and the cylinder head.

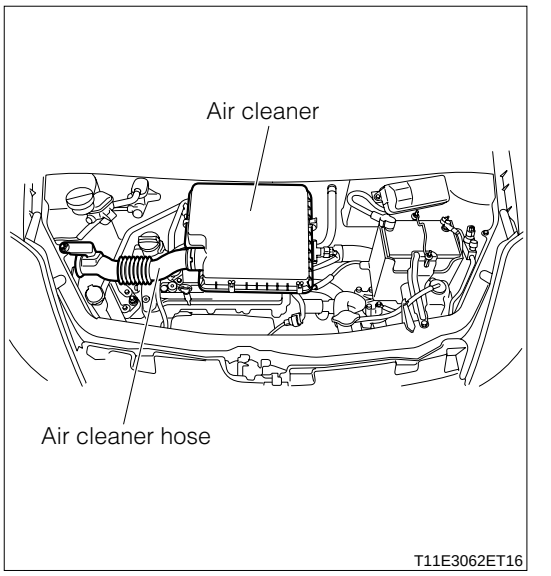


K3

1 OUTLINE

1-1 DESCRIPTION

The air intake system consists of an air cleaner hose No. 1, air cleaner, air connector, throttle body, and intake manifold. A resin-made long port is adopted for the intake manifold, thus improving the performance at medium and low speed.



2 CONSTRUCTION AND OPERATION

2-1 AIR CLEANER

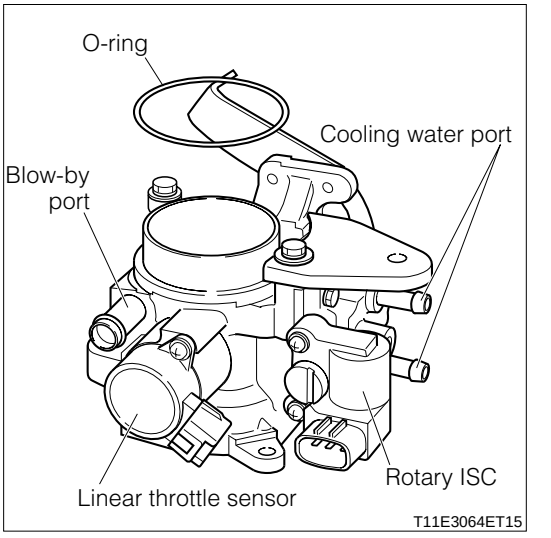
The air cleaner is made of plastic and its capacity is 4.1ℓ. The air cleaner No. 1 hose is integrated with the engine cover and the resonator to improve appearance and reduce engine noise.

2-2 THROTTLE BODY

The down draft type is adopted to the throttle body. It is directly mounted to the cylinder head via the bracket to reduce vibration and improve reliability.

The plastic throttle link, small size R-ISC, and small size throttle position sensor are adopted to realize weight saving.

The throttle link is nonlinear type. Sense of acceleration when starting has been improved.



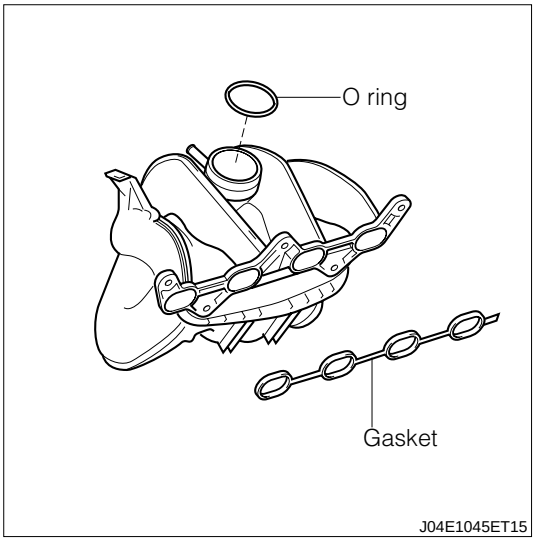
2-3 INTAKE MANIFOLD AND INTAKE MANIFOLD GASKET

Adoption of an assembling type plastic intake manifold has improved performance and realized weight saving.

By employing axial flow and equal length, the air intake to each cylinder has been made even, thus reducing the intake rambling noise.

The tapered long intake port makes the maximum use of the inertia supercharging effect to improve the torque in the low and medium speed.

Excellent port internal surface roughness obtained by plastic moulding has reduced the intake air resistance, resulting in an improve volumetric efficiency. Also, the reduced intake air temperature by employment of the plastic material has improved the charging efficiency.



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EXHAUST MANIFOLD AND
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EXHAUST PIPE ---------- B4 - 1
K3 ---------- B4 - 3
CONSTRUCTION AND OPERATION ---- B4 - 3
EXHAUST MANIFOLD AND
EXHAUST MANIFOLD GASKET ------- B4 - 3
EXHAUST PIPE ---------- B4 - 3

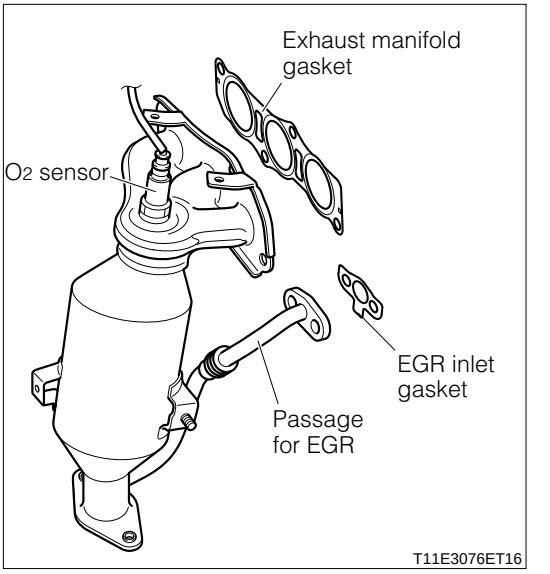
1KR
1 CONSTRUCTION AND OPERATION

1-1 EXHAUST MANIFOLD AND EXHAUST MANIFOLD GASKET

As for the exhaust manifold, thanks to the employment of the stainless steel pipe thin wall structure integrated with the catalyst, the heat capacity has been reduced, thus improving the warm-up performance to correspond to the exhaust emission standard.

A gas takeoff pipe for EGR is provided to circulate the exhaust gas to the intake side.

The exhaust manifold gasket is made of stainless steel.



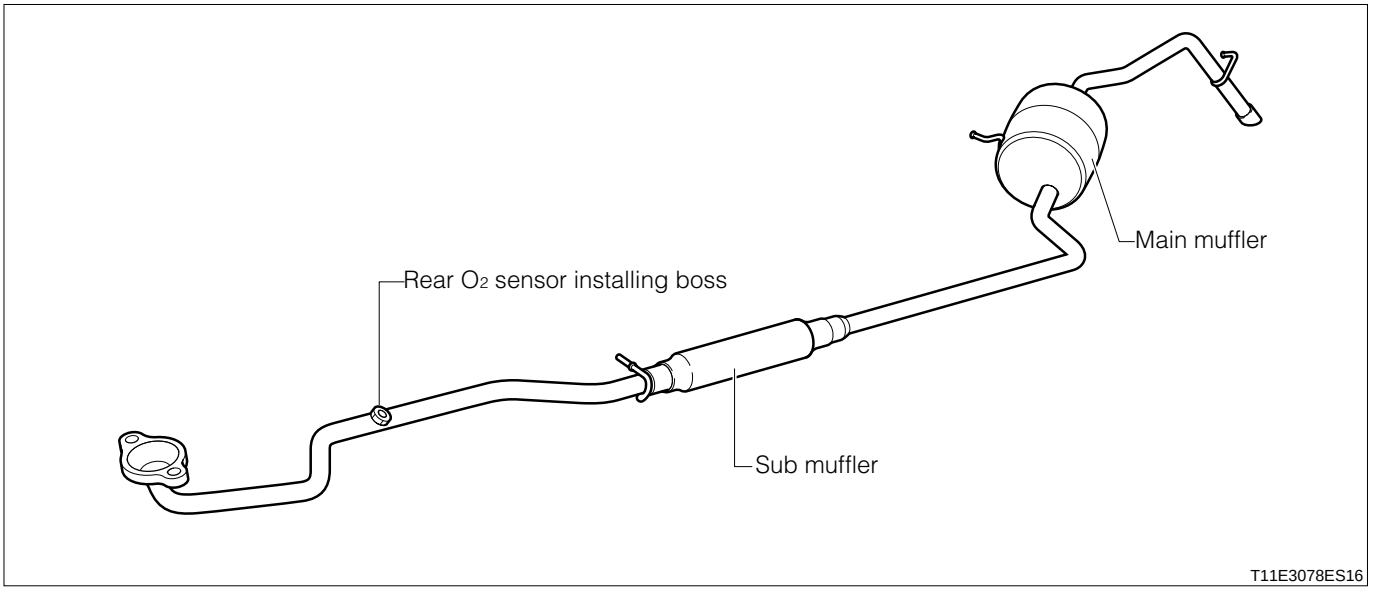
1-2 EXHAUST PIPE

1.EU spec.

The sub muffler and main muffler are integrated. The two-piece type laser welding muffler is adopted to the main muffler. The muffler capacity has been lessened by optimizing the muffler structure to realize weight saving. The rear O_2 sensor mounting boss is provided to the front of the sub muffler.

Muffler specifications

	Sub muffler	Main muffler
capacity (ℓ)	0.9	6.0

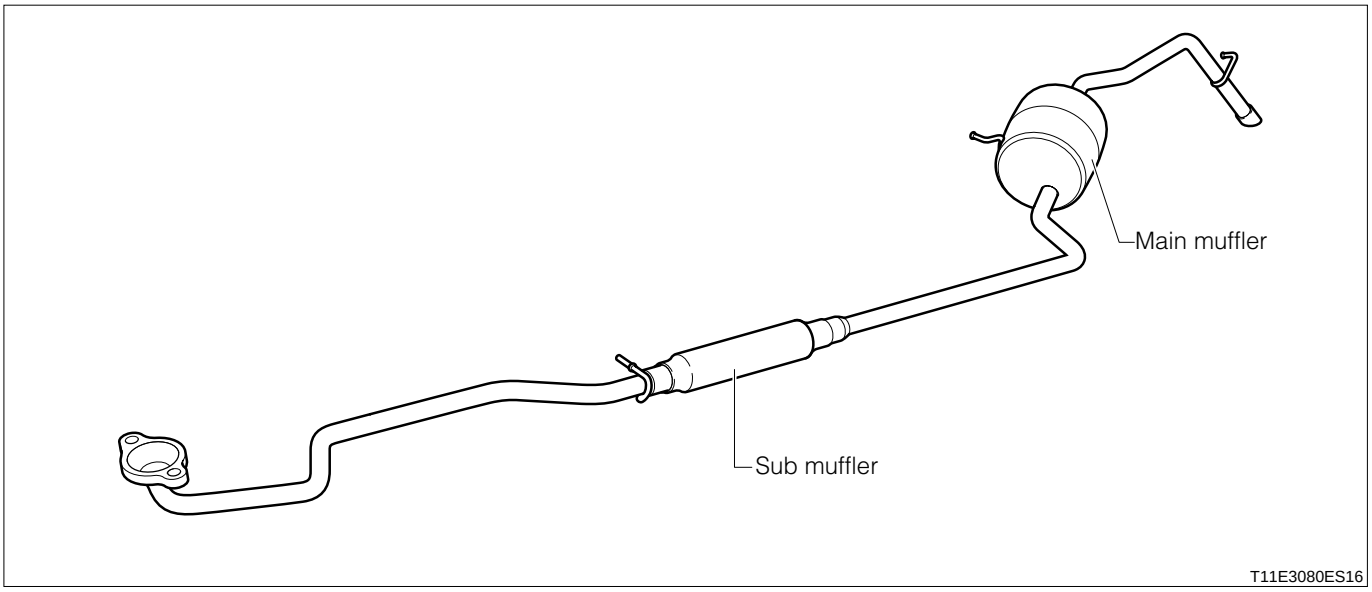


2.GENERAL spec.

The sub muffler and main muffler are integrated. The two-piece type laser welding muffler is adopted to the main muffler. The muffler capacity has been lessened by optimizing the muffler structure to realize weight saving.

Muffler specifications

	Sub muffler	Main muffler
capacity (ℓ)	0.9	6.0



K3
1 CONSTRUCTION AND OPERATION
1-1 EXHAUST MANIFOLD AND EXHAUST MANIFOLD GASKET

The exhaust manifold, made of stainless steel pipe, uses long branched exhaust pulses to improve the torque in the low and medium speed range.

Thanks to the employment of the stainless steel pipe thin wall structure integrated with the catalyst, the heat capacity has been reduced, thus improving the warm-up performance to correspond to the exhaust emission standard.

As for the exhaust manifold, thanks to the employment of the stainless steel thin wall structure integrated with the catalyst, the heat capacity has been reduced, thus improving the warm-up performance to correspond to the exhaust emission standard.

The exhaust manifold gasket is made of stainless steel.

T11E3087T15

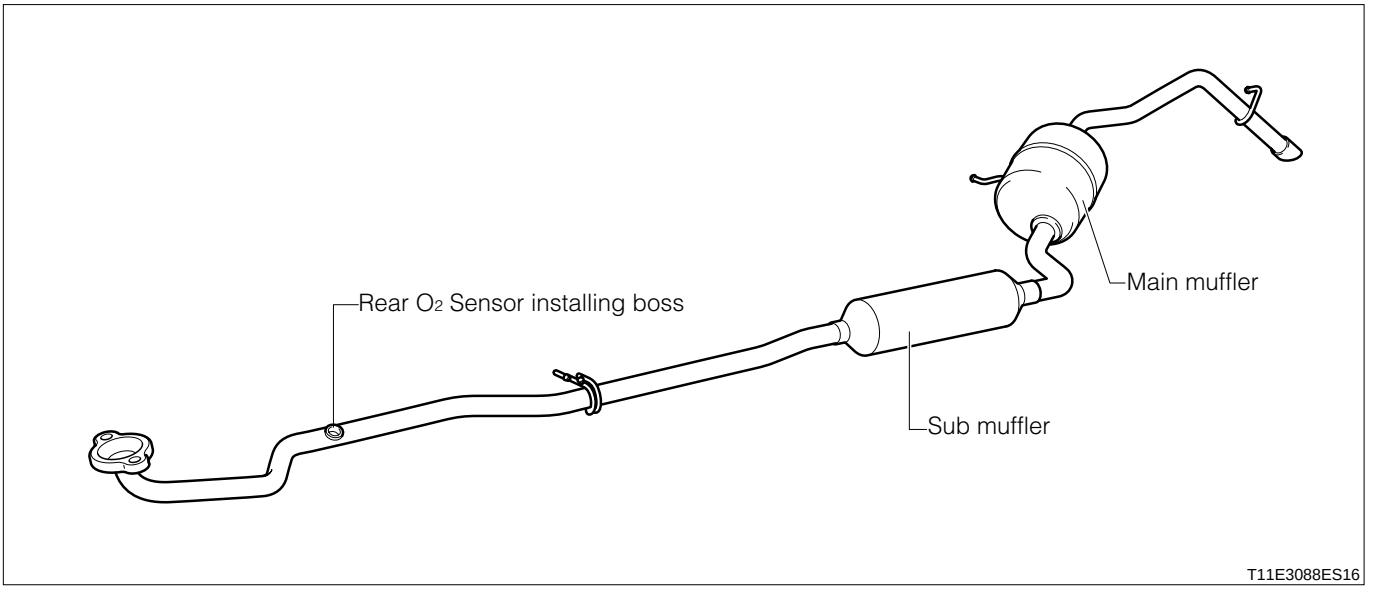
1-2 EXHAUST PIPE

1.EU spec.

The sub muffler and main muffler are integrated. The two-piece type laser welding muffler is adopted to the main muffler. The muffler capacity has been lessened by optimizing the muffler structure to realize weight saving. The rear O_2 sensor mounting boss is provided to the front of the sub muffler.

Muffler specifications

	Sub muffler	Main muffler
Muffler specifications	3.1	6.0



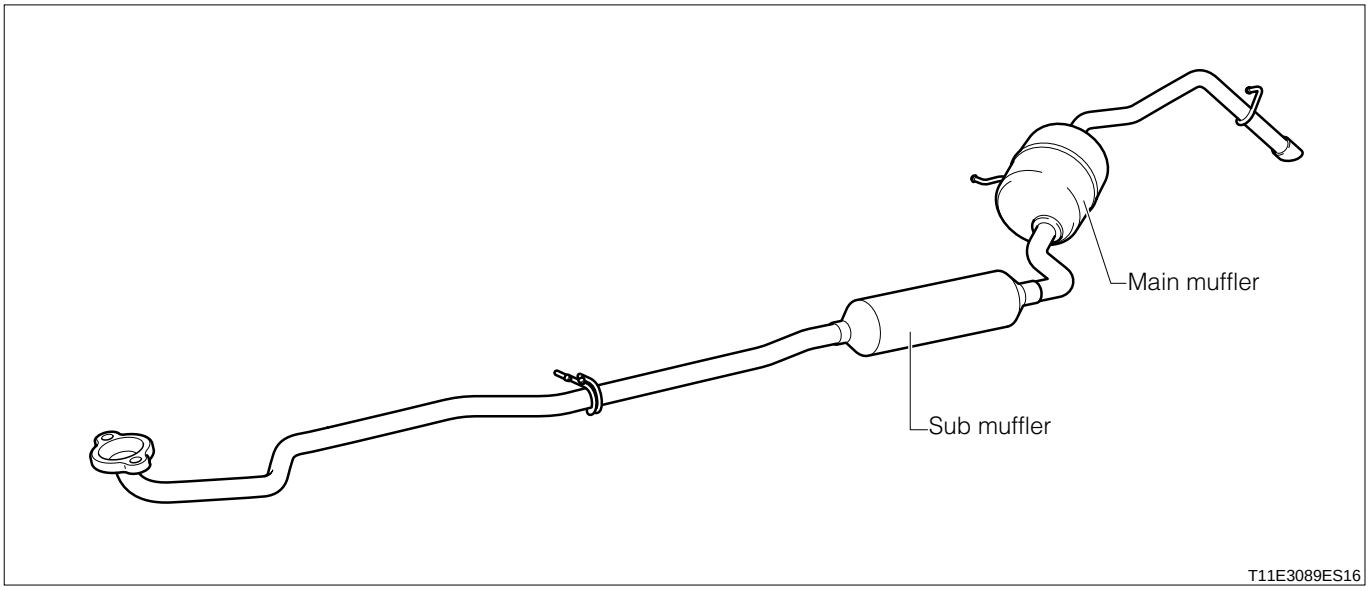
T11E3088ES16

2.GENERAL spec.

The sub muffler and main muffler are integrated. The two-piece type laser welding muffler is adopted to the main muffler. The muffler capacity has been lessened by optimizing the muffler structure to realize weight saving.

Muffler specifications

	Sub muffler	Main muffler
Muffler specifications	3.1	6.0



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CONSTRUCTION AND OPERATION ---- B5 - 2
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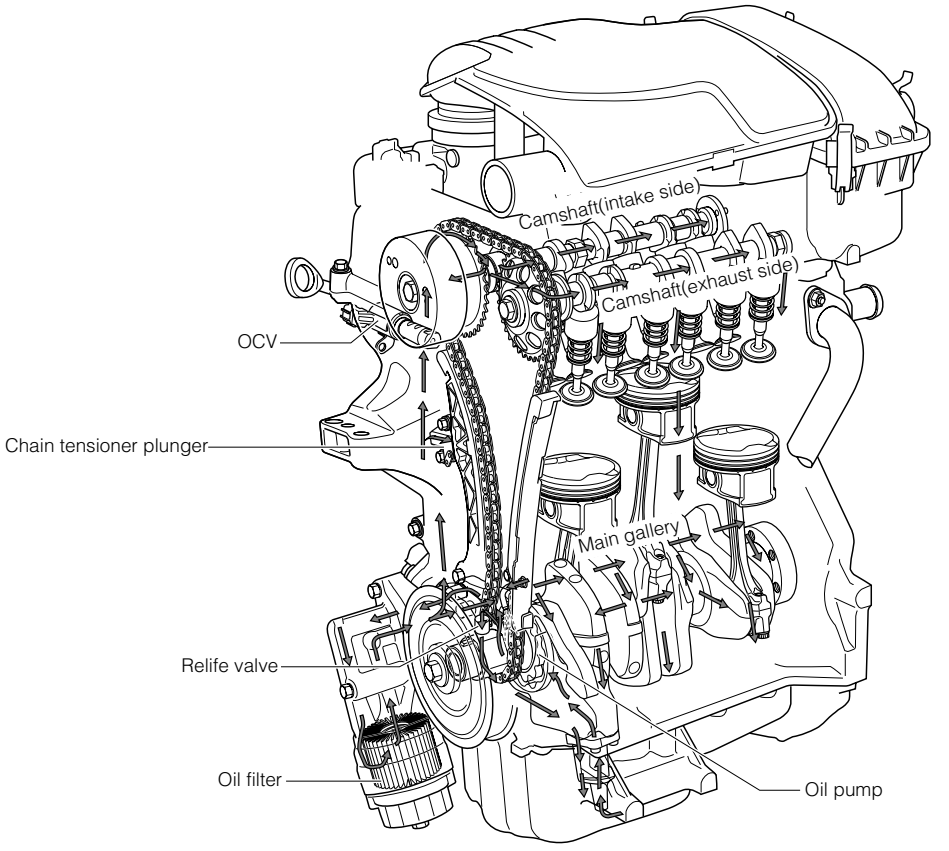
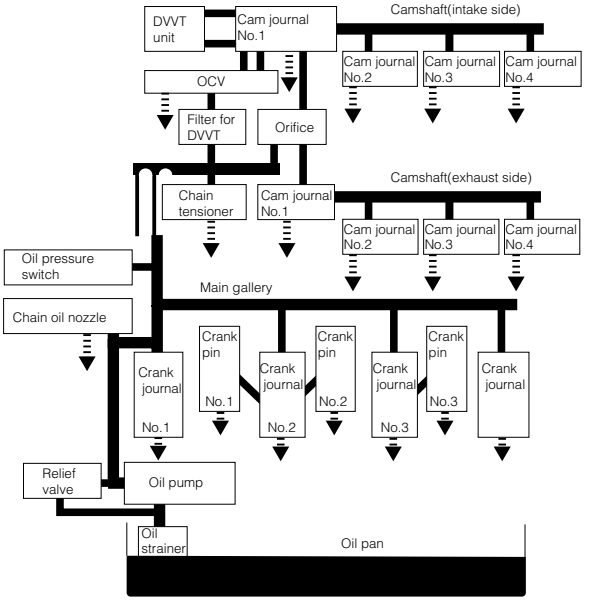
1KR
1 OUTLINE
1-1 DESCRIPTION
The lubrication method is a full pressure feeding filtering type. The oil stored in the oil pan is sucked up by the oil pump driven by the crankshaft, and filtered by the oil filter. Then the oil lubricates main gallery to crankshaft, around the piston, and the timing chain. On the other hand, the oil also lubricates the chain tension plunger, OCV of the cylinder head, DVVT, and the camshaft.
1-2 ENGINE INTERNAL LUBRICATION SYSTEM





T11E3111ES40

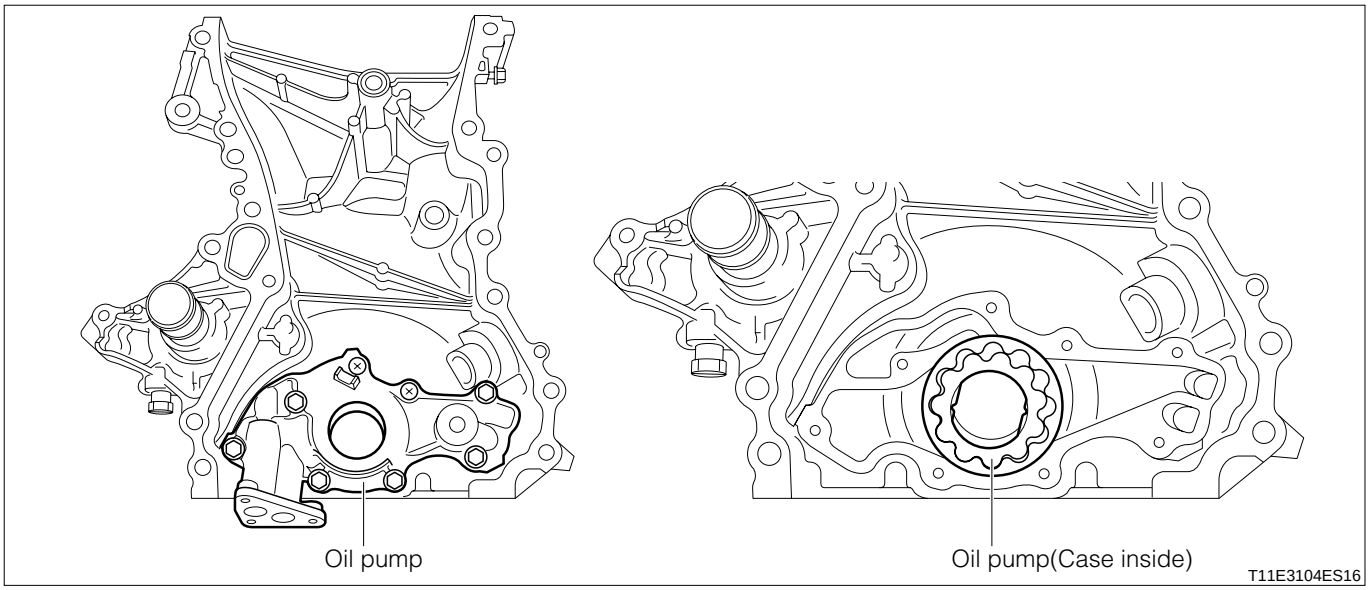
2 CONSTRUCTION AND OPERATION

2-1 OIL PUMP

A trochoid gear is adopted. The oil pump is built in the timing chain cover and driven by the crankshaft. Directly driven by the crankshaft, the auxiliary layout is downsized. The pressure loss of the oil path is reduced to optimize the discharge rate, resulting in the reduction of the mechanical loss and improved fuel consumption.

Oil pump specifications

Delivery output [at time of 6,000rpm/200kPa] (ℓ/min)	19.7 or more
Relief valve opening pressure at 3,000 rpm (kPa)	370

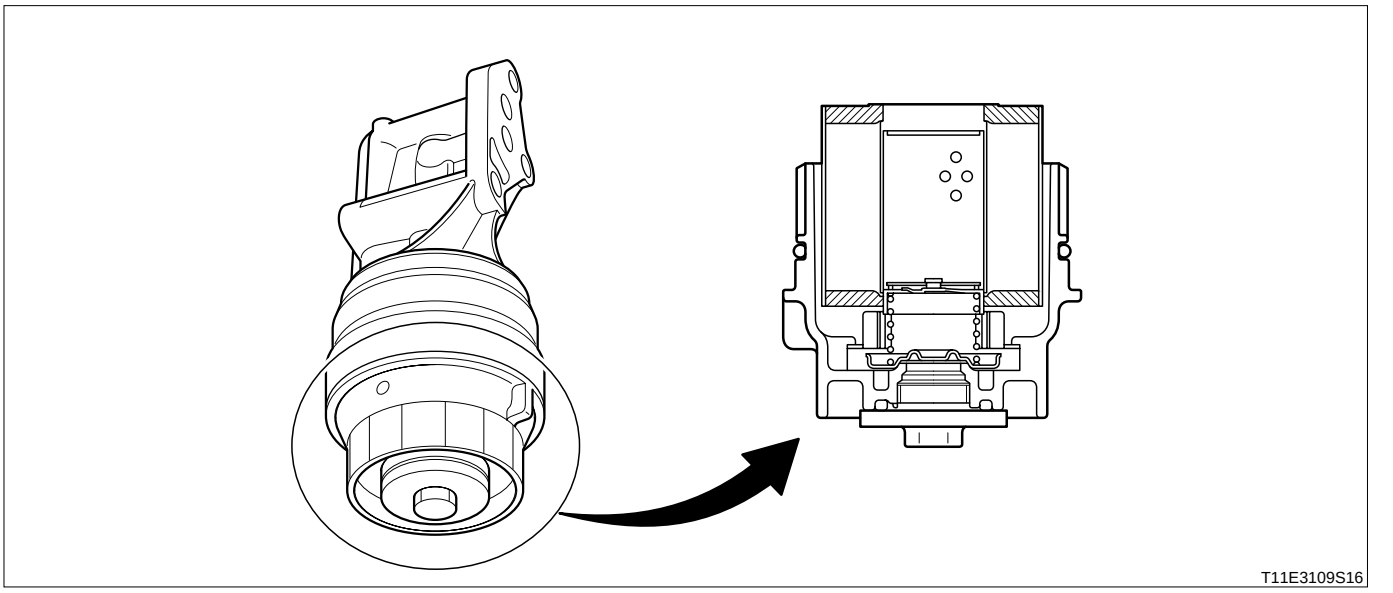


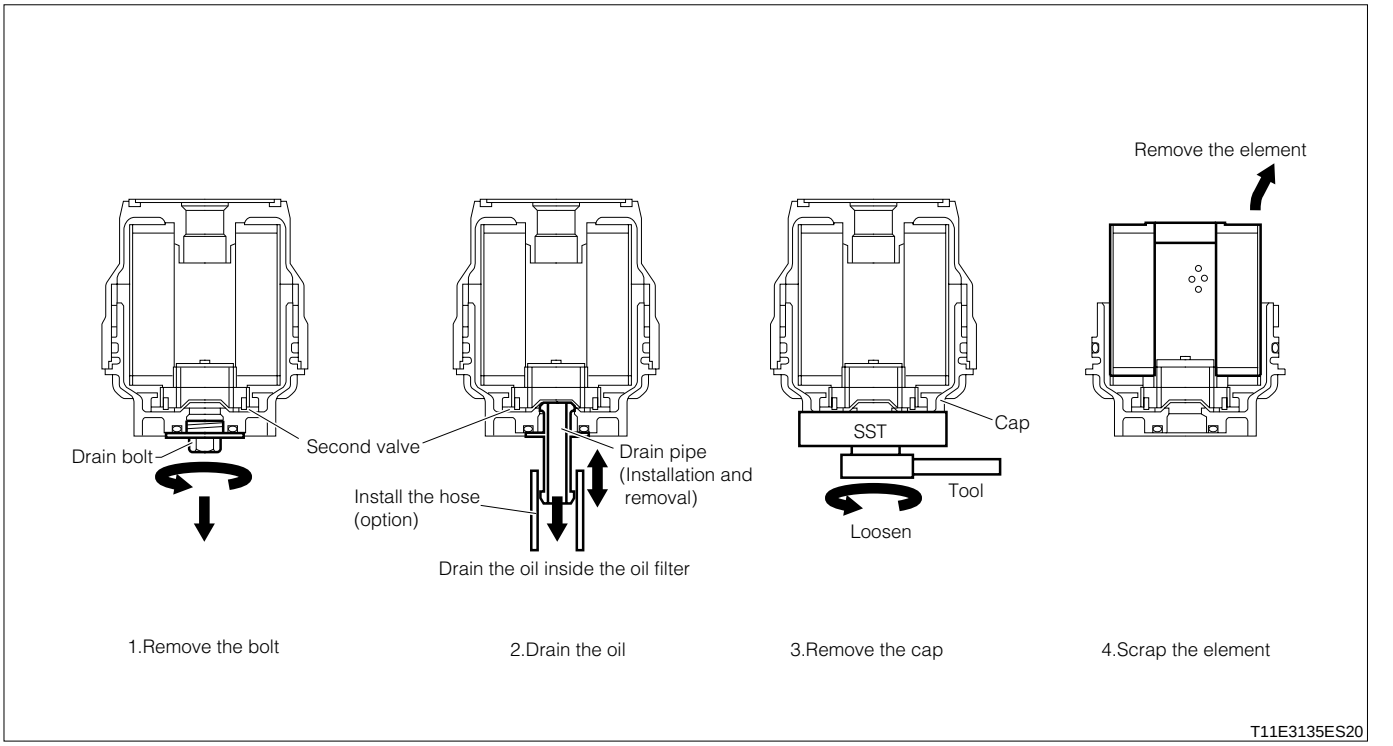
2-2 OIL FILTER AND OIL FILTER BRACKET

The element replacement type is adopted to be environment friendly. For easy operation, the structure is made so that the oil does not splash on the hands when replacing.

Oil filter specifications

Type	Full flow
Effective filtration area (cm^2)	630

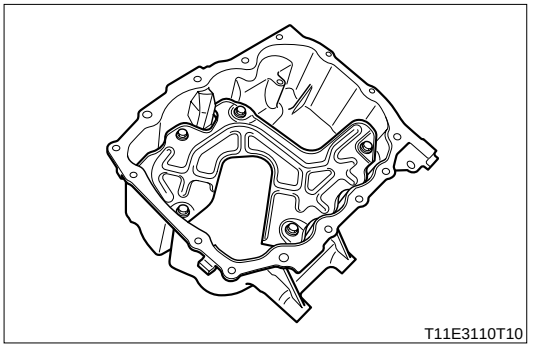




2-3 OIL PAN AND OIL STRAINER

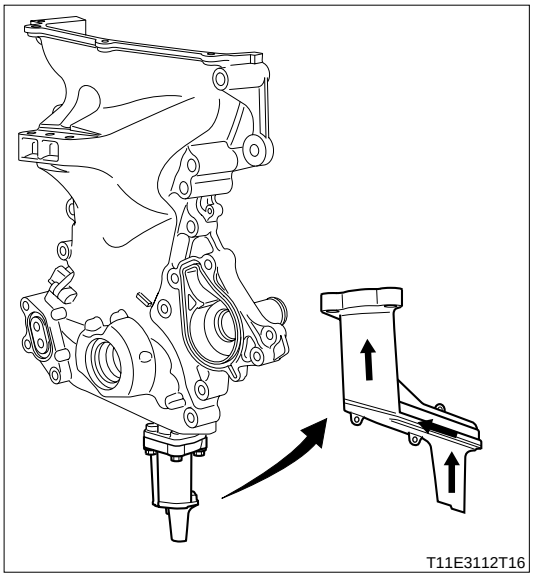
2-3-1 OIL PAN

By adopting high rigid aluminum oil pan and connecting with the transmission, joint rigidity of the power plant has been improved.


T11E3110T10

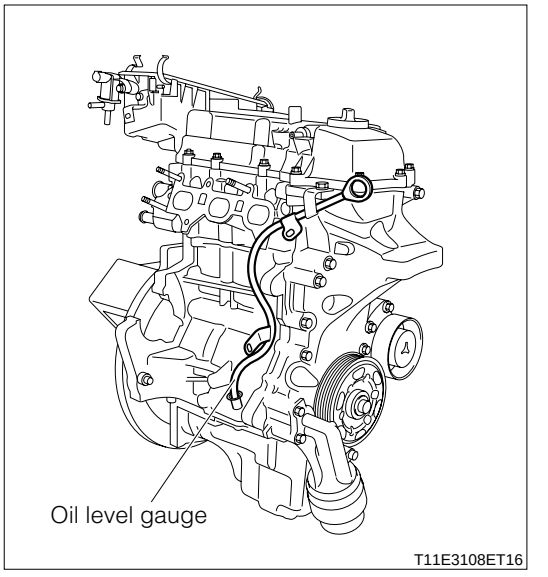
2-3-2 OIL STRAINER

Plastic oil strainer is adopted to realize weight saving. It is mounted to below the oil pump built in the timing chain cover.


T11E3112T16

2-4 OIL LEVEL GAUGE

The pipe for guide is taken out of the cylinder block. Mounting position is set to the front of the intake side.



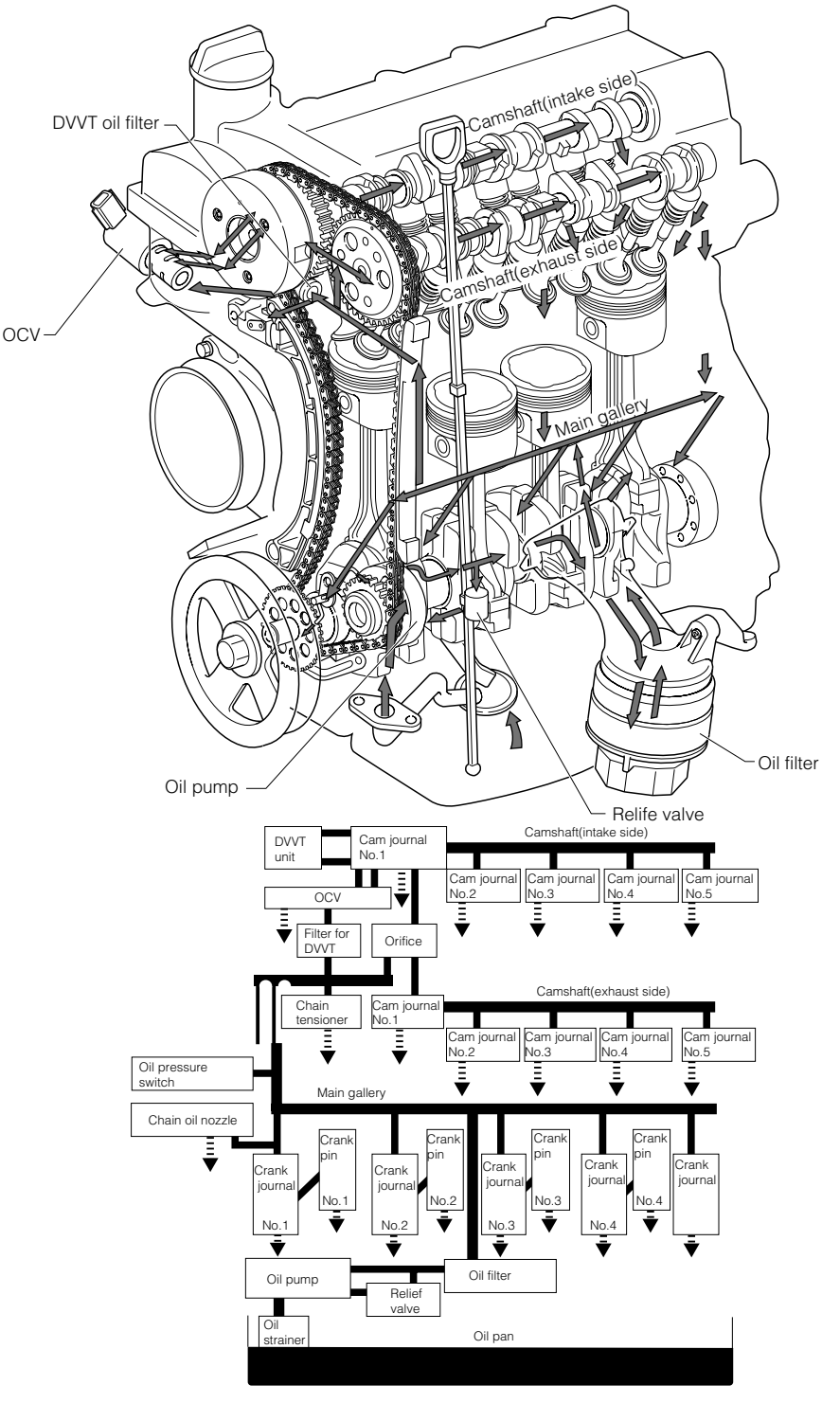
T11E3108ET16

2-5 ENGINE OIL

Engine oil specifications

Kind	SAE classification		0W−20 or 5W−30
	API classification		SG or higher
Capacity	Total capacity (ℓ)		3.4
	Oil pan capacity	FULL(ℓ)	3.0
		LOW(ℓ)	1.5
	Change capacity [FULL]	Except for filter (ℓ)	2.9
		Including filter (ℓ)	3.1

K3
1 OUTLINE
1-1 DESCRIPTION
The lubrication method is a full pressure feeding filtering type. The oil stored in the oil pan is sucked up by the oil pump driven by the timing chain, and filtered by the oil filter. Then the oil lubricates main gallery to the crankshaft, around the piston, and the timing chain. On the other hand, the oil also lubricates the cylinder head to the chain tension plunger, OCV, DVVT, and the camshaft via the orifice.
1-2 ENGINE INTERNAL LUBRICATION SYSTEM



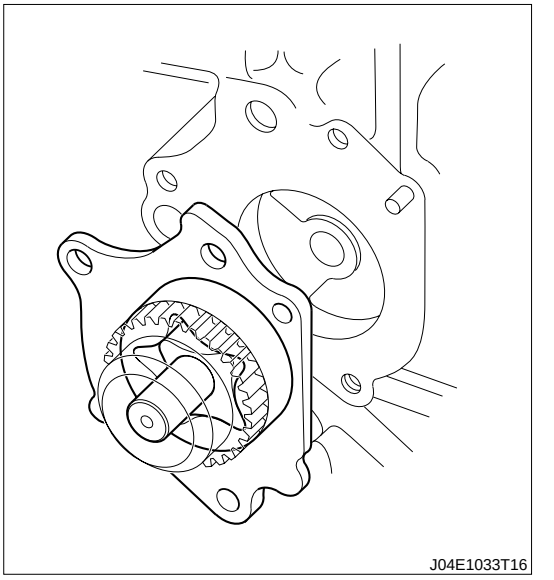
T11E3136ES40

2 CONSTRUCTION AND OPERATION

2-1 OIL PUMP

The rotor chamber and relief valve are provided in the cylinder block to create a simple structure and reduce the total length of the engine. Compact and highly efficient 4-lobe, 5-node trochoid gear system is adopted. The timing chain performs decelerating drive on the axis different from the crankshaft.

The inner relief method is employed, in which the oil level variation and air suction are restrained and the pump driving loss is reduced.



Oil pump specifications

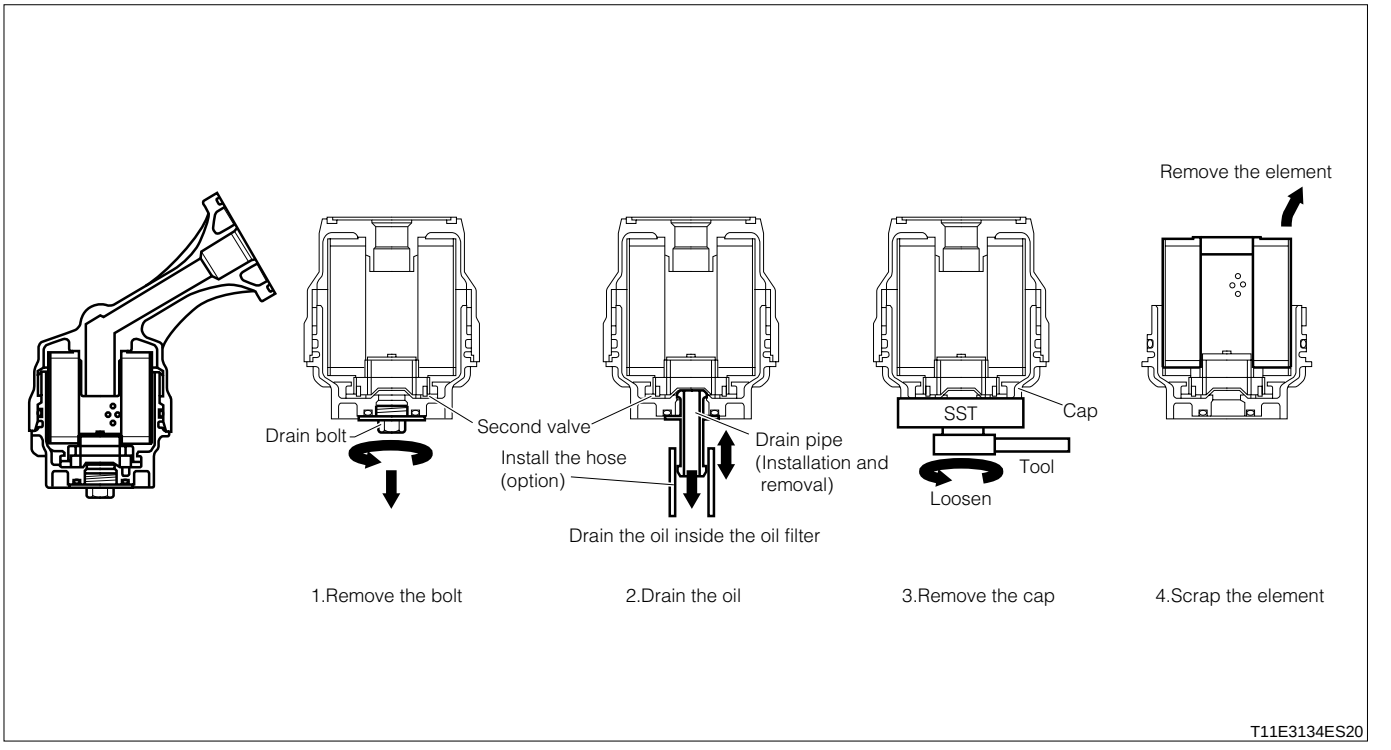
Delivery output [at time of 5,040rpm/290kPa] (ℓ/min)	32.6 or more
Relief valve opening pressure at 2,000 rpm (kPa)	490

2-2 OIL FILTER AND OIL FILTER BRACKET

The element replacement type is adopted to be environment friendly. For easy operation, the structure is made so that the oil does not splash on the hands when replacing.

Oil filter specifications

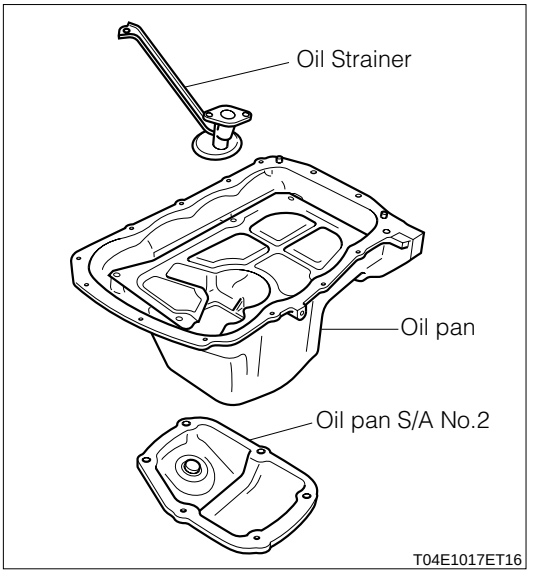
Type	Full flow
Effective filtration area (cm^2)	630



2-3 OIL PAN AND OIL STRAINER

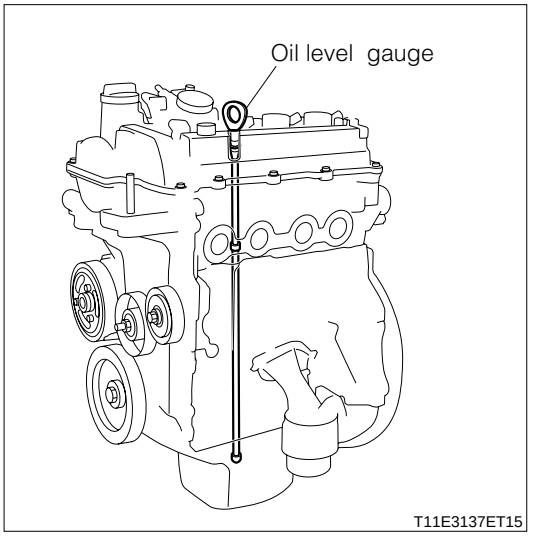
The employment of aluminum die-casting has increased the joint rigidity with the transmission, greatly reducing vibration and noise.

By adopting aluminum material, the shape can be formed more freely and the oil amount in the oil pan can be sufficiently assured. This has enhanced the reliability concerning oil deterioration and air suction when the vehicle is turning.



2-4 OIL LEVEL GAUGE

Mounting position is set to the cylinder head cover.



2-5 ENGINE OIL

Engine oil specifications

Kind	SAE classification		5W−20 or 5W−30
	API classification		SG or higher
Capacity	Total capacity (ℓ)		4.1
	Oil pan capacity	FULL(ℓ)	3.5
		LOW(ℓ)	2.0
	Change capacity [FULL]	Except for filter (ℓ)	3.3
		Including filter (ℓ)	3.6

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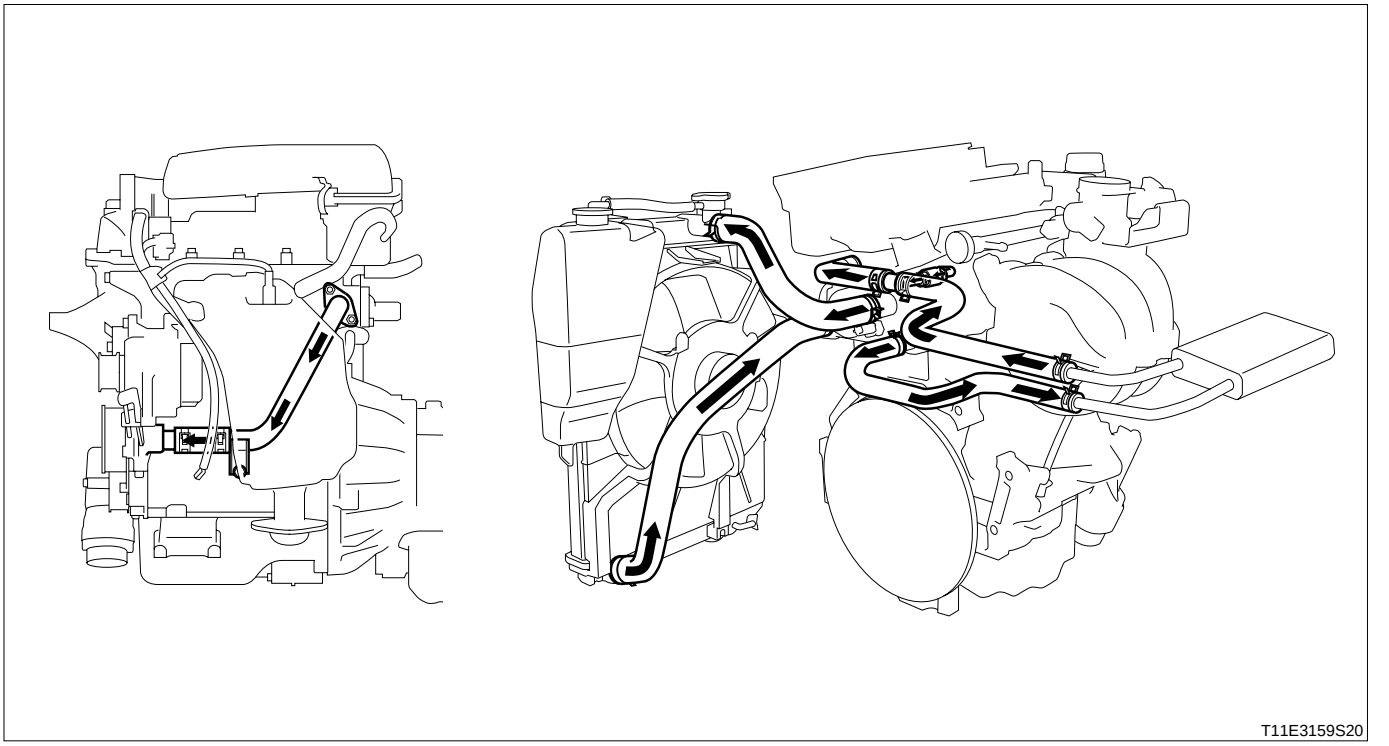
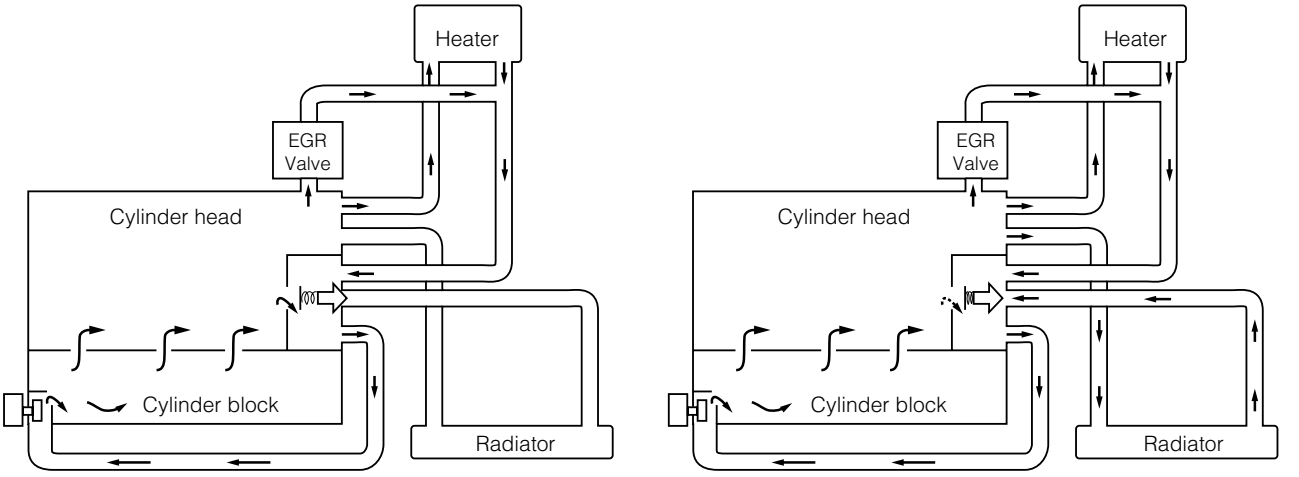
1KR
1 OUTLINE
1-1 DESCRIPTION
The cooling method is the water-cooled pressure forced circulation type. The thermostat with bypass valve is adopted to improve heater performance by feeding total volume when cooling the machine.
The cooing water is circulated from the cylinder head water jacket through the water bypass pipe of the external piping to the water pump.
The cooling water is also circulated to the stepper motor type EGR valve.
The drain cock is provided to the chain cover.
1-2 COOLING SYSTEM LAYOUT

T11E3159S20

1-3 SCHEMATIC DIAGRAM OF COOLING SYSTEM PASSAGE INSIDE ENGINE



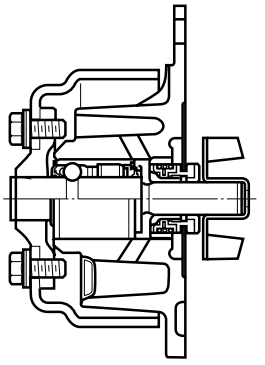
＜Before warming-up＞ ＜After warming-up＞

T11E3152ES20

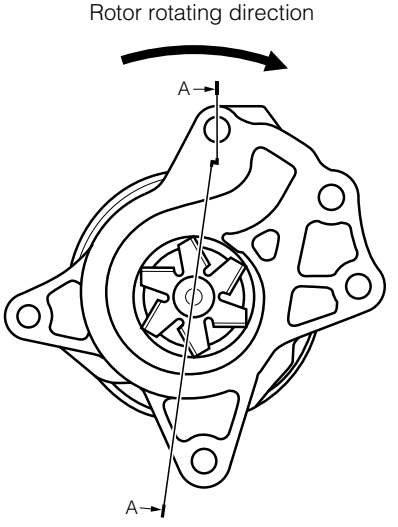
2 CONSTRUCTION AND OPERATION

2-1 WATER PUMP

A steel water pump is adopted. The swirl chamber is integrated with the chain cover.



Cross-section A－A

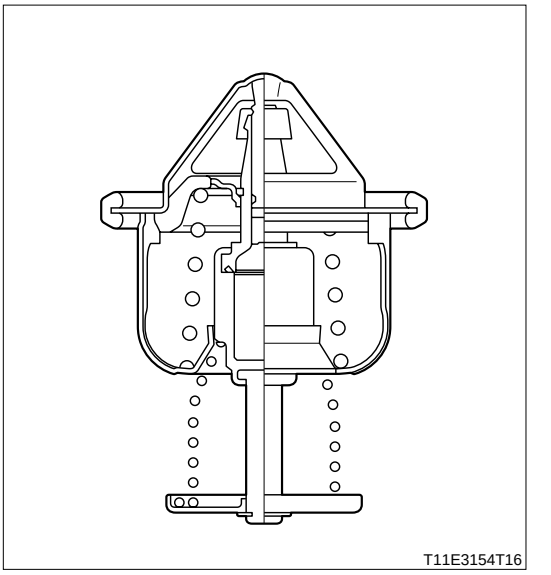


T11E3161ES16

2-2 THERMOSTAT

The thermostat with differential pressure regulating valve, that allows the bottom bypass by a differential pressure, is adopted.

When cold, both the thermostat and differential pressure regulating valve are closed, so the total volume flows to the heater. When the engine revolution speed becomes high and the amount of cooling water increases, the differential pressure regulating valve opens to allow bypassing. Even when warm, if the large amount of fluid flows, the differential pressure regulating valve opens to reduce cavitations.



Thermostat specifications

Installation position	Water inlet
Valve opening temperature (℃)	82±2.0
Full opening lift amount (mm)	8.5mm or more (at 95℃)

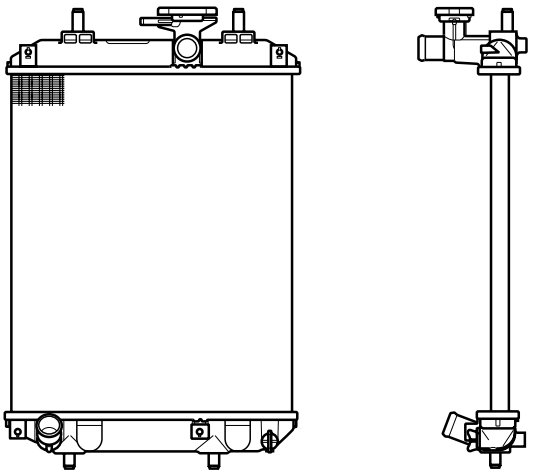
2-3 RADIATOR

A aluminum core radiator with plastic upper and lower tanks is employed to realize weight saving.

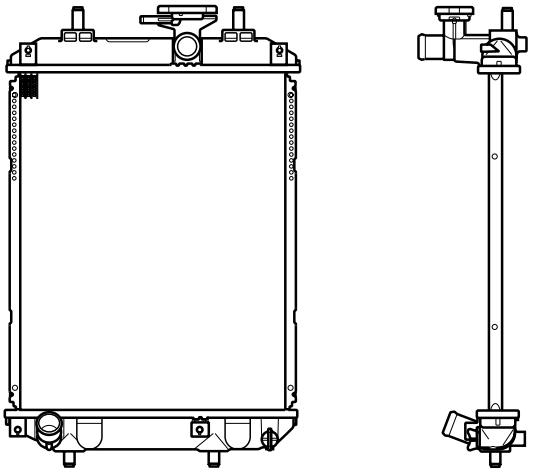
Radiator specifications

		EU,GENERAL spec.	AUS , TOROPICAL spec.
Radiator	Heat radiating rate (kW)	21.5	34.5
	Core type	EAR	NSR
	Core dimensions [width×height×depth](mm)	330.6×399.2×21	330.6×399.2×16
	Fin pitch	1.25	2.25
	Coolant capacity (ℓ)	0.95	0.98
Radiator cap opening pressure (kPa)		108	108

EU Spec.
GENERAL Spec.



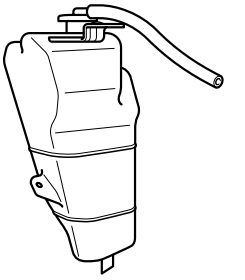
AUS Spec.
TROPICAL Spec.



T11E3162ES30

2-4 RESERVE TANK

The reserve tank is mounted to the fan shroud.



T11E3157T10

2-5 COOLANT

Coolant specifications

Diluting water			Tap water
Capacity (ℓ)	Total capacity (except reservoir tank)		3.3
	Reservoir tank capacity	FULL	0.6
		LOW	0.15

2-6 FORCED COOLING DEVICE

2-6-1 DESCRIPTION

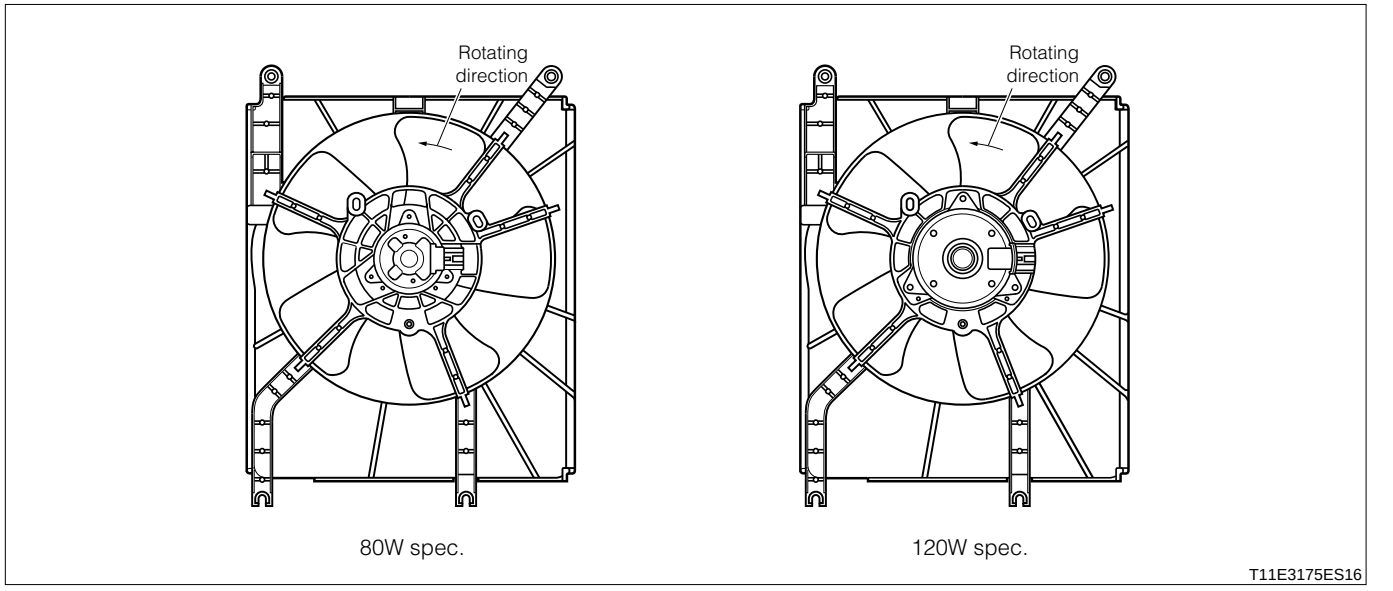
The radiator fan motor is controlled by the signal from the engine control computer.

2-6-2 RADIATOR FAN

A sucking type powered fan is adopted. The reserve tank is mounted to the fan shroud.

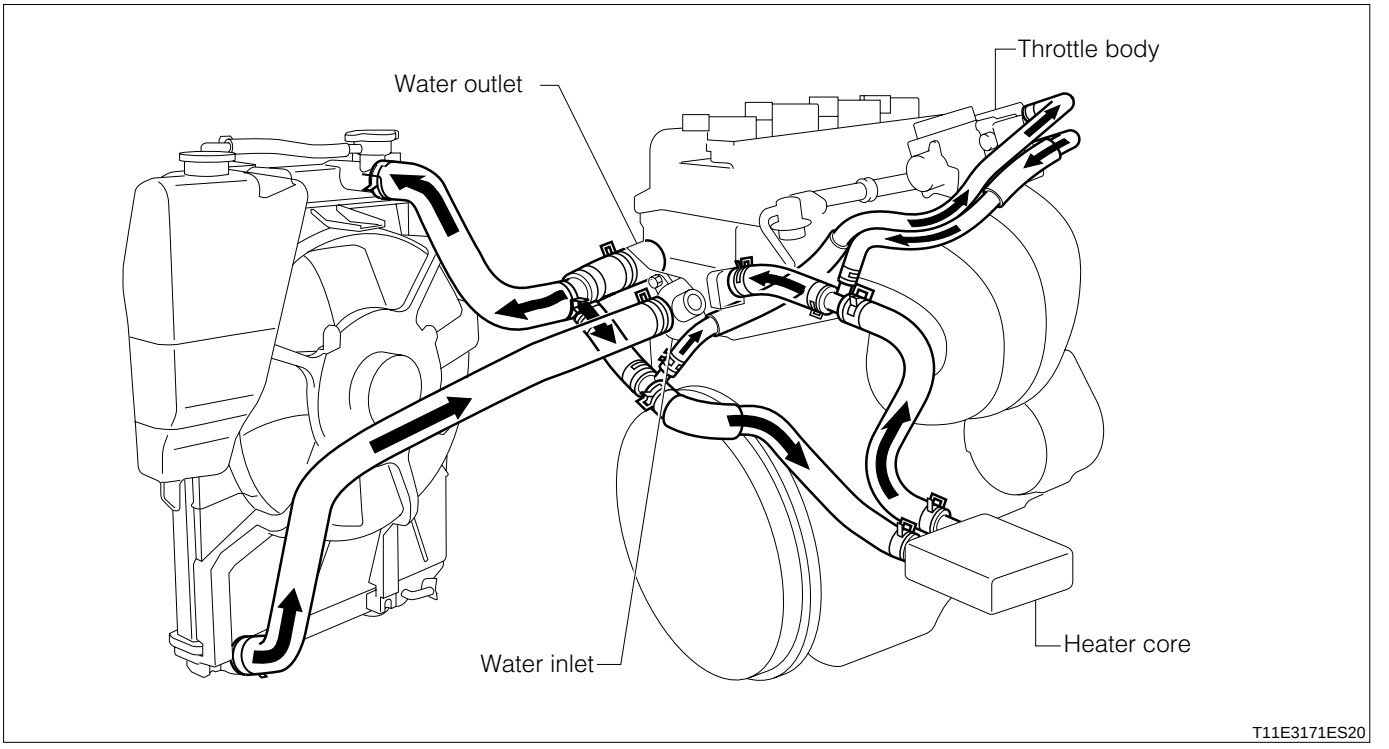
Radiator fan specifications

		EU,AUS , GENERAL spec.	TOROPICAL spec.
Motor	Type	Direct current ferrite	Direct current ferrite
	Rated voltage (V)	12	12
	Output(W)	80	120
Fan	Outer diameter(mm)	300 Dia.	300 Dia.
	Number of blades	5	5

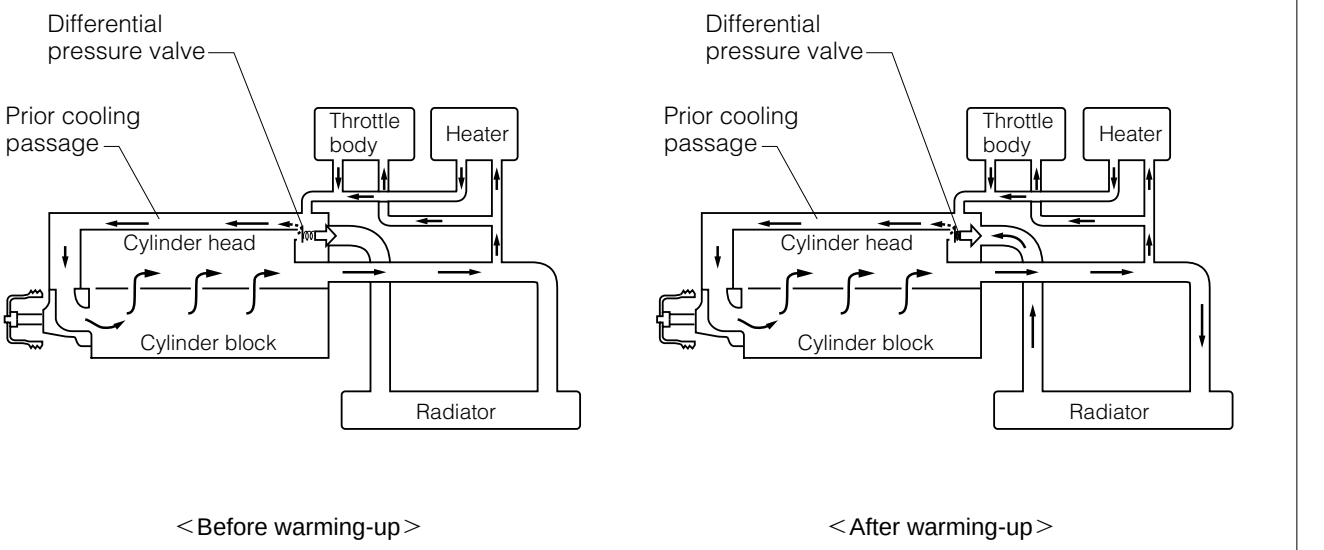


80W spec. 120W spec.

T11E3175ES16

K3
1 OUTLINE
1-1 DESCRIPTION
The cooling method is the water-cooled pressure forced circulation type. The thermostat with bypass valve is adopted to improve heater performance by feeding total volume when cooling the machine.
For improved performance, the cooling water returned from the radiator and cooled is fed first to the intake side of the cylinder head (intake precedence cooling method) to lower the temperature of the combustion chamber and intake port wall to improve anti-knocking ability.
For changing the cooling water, the air bleeding valve is provided to the cylinder head and the heater.
1-2 COOLING SYSTEM LAYOUT


1-3 SCHEMATIC DIAGRAM OF COOLING SYSTEM PASSAGE INSIDE ENGINE



＜Before warming-up＞ ＜After warming-up＞

T04E1020ES20

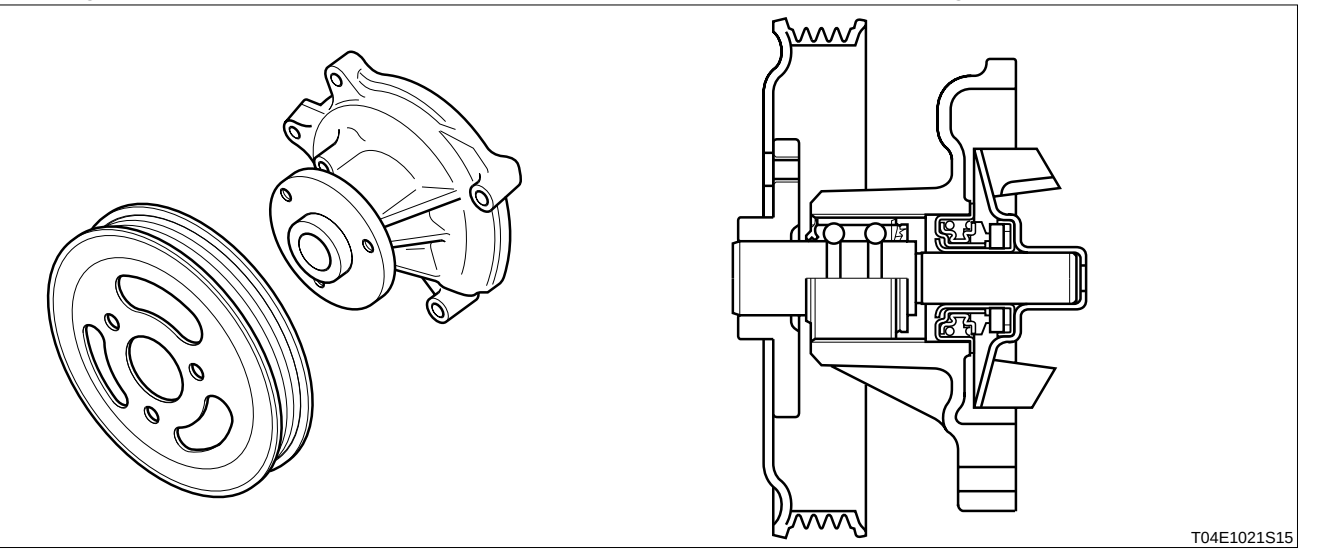
2 CONSTRUCTION AND OPERATION

2-1 WATER PUMP AND WATER PUMP PULLEY

A centrifugal water pump is adopted. For driving the pulley, the V ribbed belt contacts the upper and lower sections of the pulley, thus reducing the load to the bearing when excessive tension occurs.

SiC and sintered carbon are used for the mechanical seal of the water pump. Also, three-layer lip structure is adopted to the bearing to improve reliability.

The two-stage type water pump pulley drives the pulley for the power steering pump.

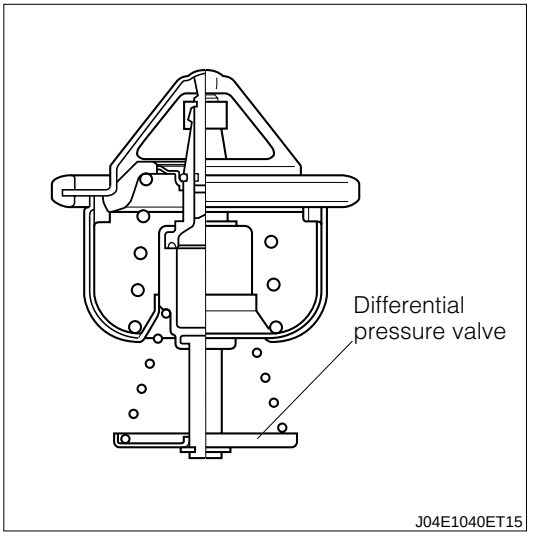


T04E1021S15

2-2 THERMOSTAT

The thermostat with differential pressure regulating valve, that allows the bottom bypass by a differential pressure, is adopted.

When cold, both the thermostat and the differential pressure regulating valve are closed, so the total volume flows to the heater. When the engine revolution speed becomes high and the amount of cooling water increases, the differential pressure regulating valve opens to allow bypassing to the intake precedence cooling path. Even when warm, if a large amount of fluid flows, the differential pressure regulating valve opens to reduce cavitations.



Thermostat specifications

Installation position	Water inlet
Valve opening temperature (℃)	80±2.0
Full opening lift amount (mm)	8.5mm or more (at 93℃)

2-3 RADIATOR

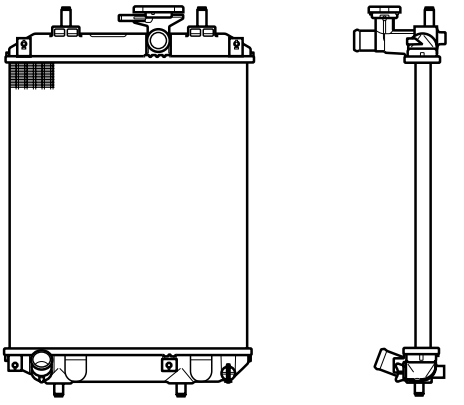
A aluminum core radiator with plastic upper and lower tanks is employed to realize weight saving.

Radiator specifications

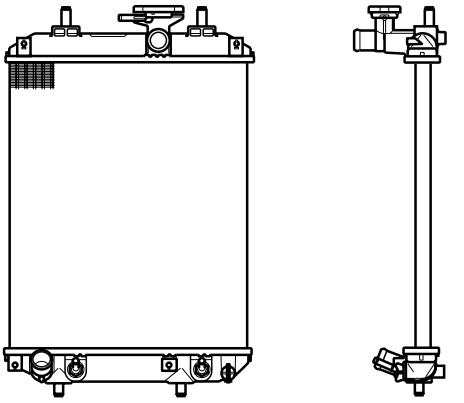
		EU spec.	GENERAL A/T spec.	AUS M/T, GENERAL M/T spec.	AUS A/T, TOROPICAL spec.
Radiator	Heat radiating rate (kW)	21.5	32.6	34.5	41.4
	Core type	EAR	NSR	NSR	NSR
	Core dimensions [width×height×depth](mm)	330.6×399.2×21	312.2×399.2×16	312.2×399.2×16	330.6×399.2×21
	Fin pitch	1.25	2.5	2.25	2.5
	Coolant capacity (ℓ)	A/T:0.92 M/T:0.95	0.95	0.98	1.15
Radiator cap opening pressure (kPa)		108	108	108	108
Oil cooler	Heat radiating rate (kW)	1.08	1.08	—	1.37
	Automatic fluid capacity (ℓ)	0.03	0.03	—	0.04

EU Spec.

M/T

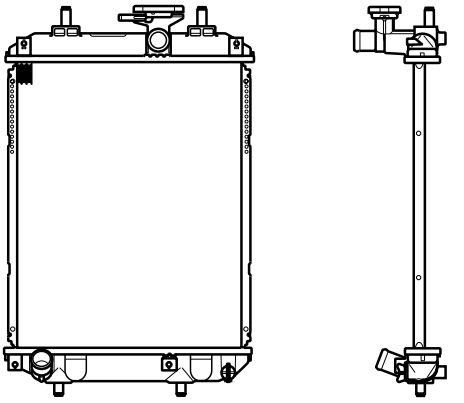


A/T

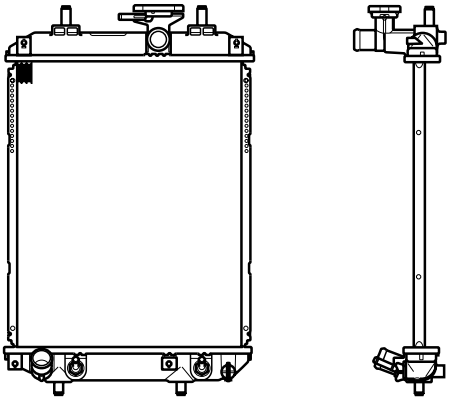


GENERAL Spec.

M/T

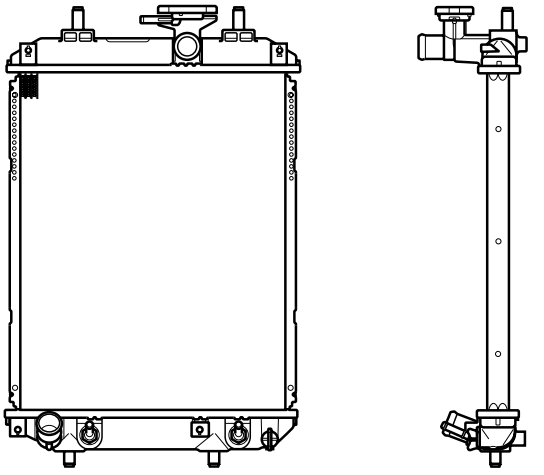


A/T



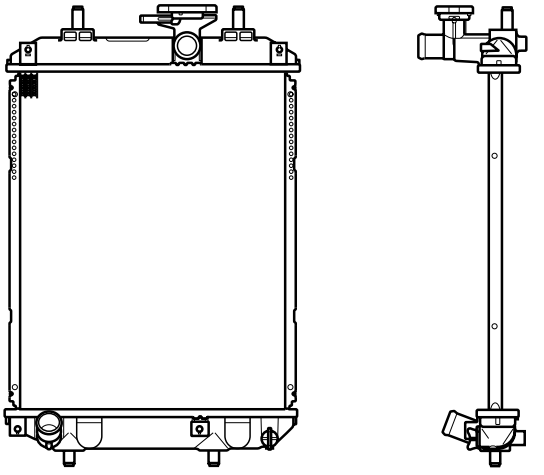
T11E3176ES45

TROPICAL Spec.

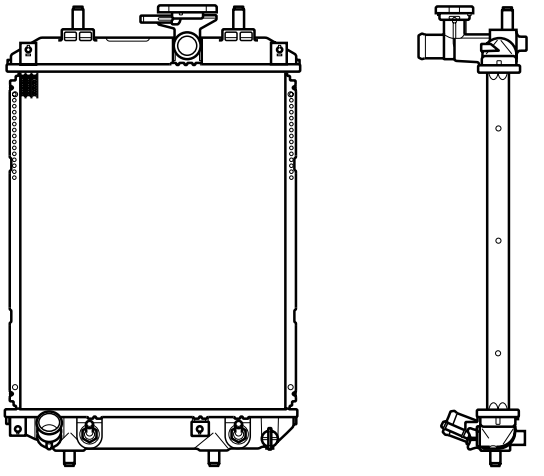


AUS Spec.

M/T



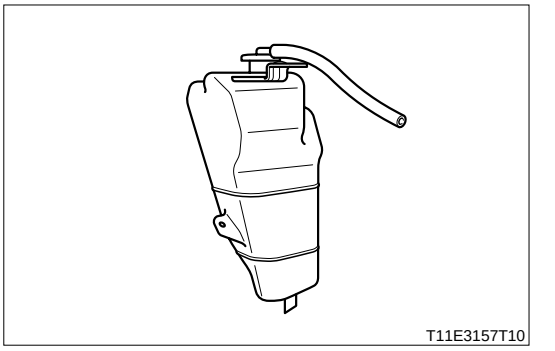
A/T



T11E3177ES45

2-4 RESERVE TANK

The reserve tank is mounted to the fan shroud.



2-5 COOLANT

Coolant specifications

Diluting water			Tap water
Capacity (ℓ)	Total capacity (except reservoir tank)		3.5
	Reservoir tank capacity	FULL	0.6
		LOW	0.15

2-6 FORCED COOLING DEVICE

2-6-1 DESCRIPTION

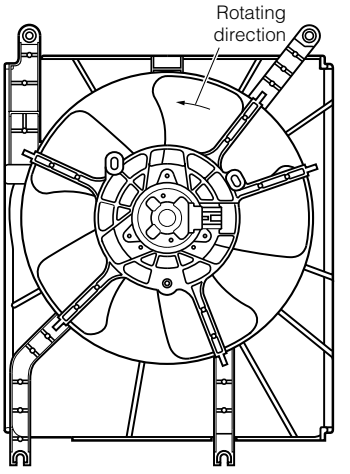
The radiator fan motor is controlled by the signal from the engine control computer.

2-6-2 RADIATOR FAN

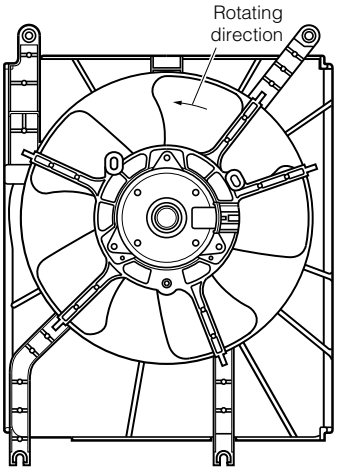
A sucking type powered fan is adopted. The reserve tank is mounted to the fan shroud.

Radiator fan specifications

		EU,AUS M/T, GENERAL spec.	AUS A/T, TOROPICAL spec.
Motor	Type	Direct current ferrite	Direct current ferrite
	Rated voltage (V)	12	12
	Output(W)	80	120
Fan	Outer diameter(mm)	300 Dia.	300 Dia.
	Number of blades	5	5



80W spec.



120W spec.

T11E3175ES16

TO INDEX TO NEXT SECTION

TO INDEX

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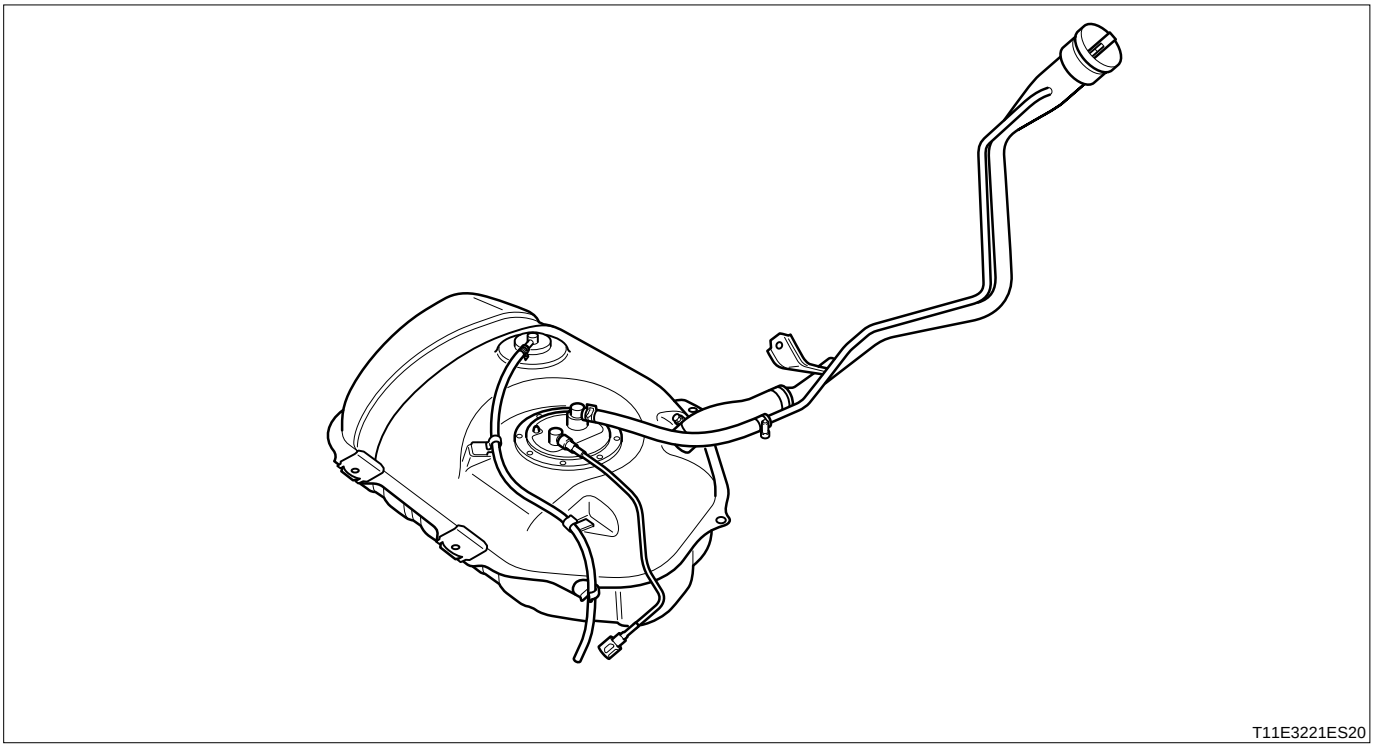
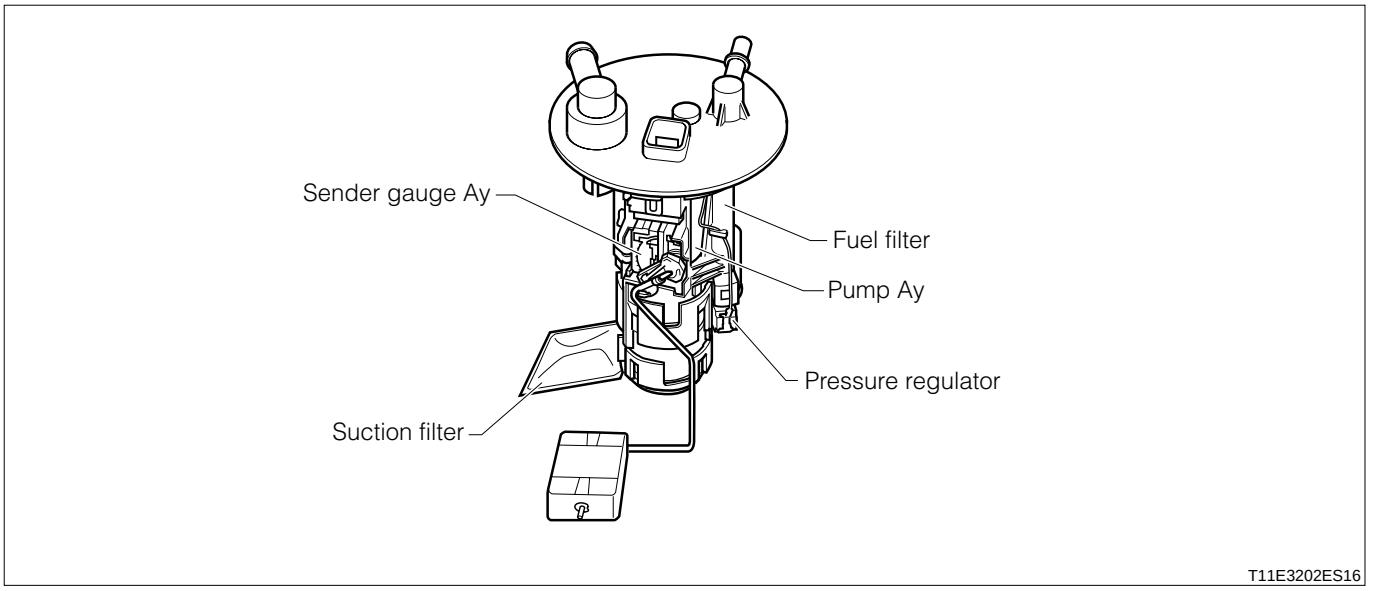
1KR
1 OUTLINE
1-1 DESCRIPTION
The EFI type fuel supply device employs the fuel returnless system. The fuel is injected to each intake port.
2 CONSTRUCTION AND OPERATION
2-1 FUEL TANK
In consideration of safety when the vehicle is overturned or fuel is filled, a cut-off valve is provided to prevent fuel from flowing out and a fuel check valve is provided in the fuel inlet.
Furthermore, the fuel inlet mounting section is located in the upper back of the fuel tank to consider safety when a rear end collision or side collision occurs.
The full capacity of the fuel tank is 40 ℓ.
Considering the environment, using lead and hexad chrome for material of the fuel tank has been discontinued. A recycle mark is set to improve dismantling.
The fuel can be drained through the service hole on the body that is above the fuel tank. The drain plug has been discontinued.



T11E3221ES20

2-2 FUEL PUMP

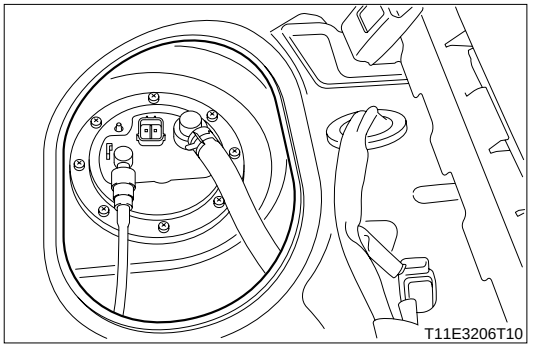
The fuel pressure regulator and high pressure filter are integrated with the fuel pump to return fuel in the fuel tank.
The fuel sender gauge is also integrated with the fuel pump.
The fuel pump is the in-tank type. A quick connector is adopted to connect with the fuel tube.



Fuel pump specifications

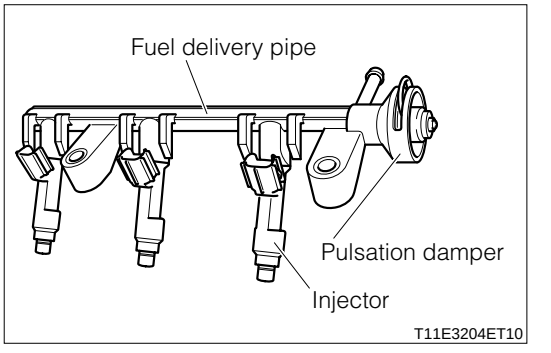
Discharge amount (ℓ/h) (Voltage 12V, discharge pressure 294 kPa)	46.5 or more

A service hole is provided at the rear floor of the vehicle for mounting and removing the fuel pump or draining fuel so that workability is improved.



2-3 FUEL DELIVERY PIPE

Due to adoption of the fuel returnless system, there is only a fuel inlet, but no outlet.
Plastic has been employed to realize weight saving.
A pulsation damper is provided to absorb fuel pulsation and improve accuracy of the fuel injection.

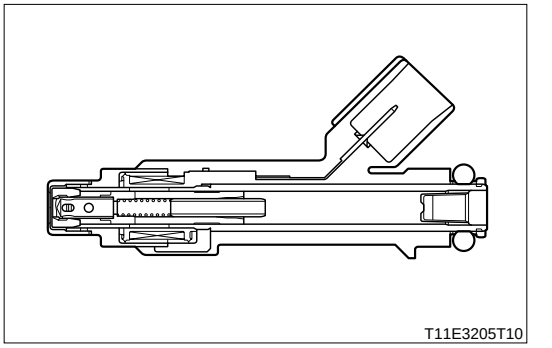


2-4 INJECTOR

The injector with 4 injection holes and injector hole diameter of 0.25mm, is adopted. By promoting atomization of fuel and reducing fuel stuck to the intake port, fuel consumption is improved and emission is reduced.

Injector specifications

Flow rate [fuel pressure 250kPa](cm^3/min)	185.0
Coil resistance [20℃](Ω)	12.0



2-5 FUEL CUT CONTROL SYSTEM

In order to prevent fuel leakage and fuel fire in the event of a vehicle collision, a safety mechanism is provided by which, upon receiving a signal from the air bag computer, the engine control computer forcibly stops the fuel pump.

K3

1 OUTLINE

1-1 DESCRIPTION

The EFI type fuel supply device employs the fuel returnless system.

2 CONSTRUCTION AND OPERATION

2-1 FUEL TANK

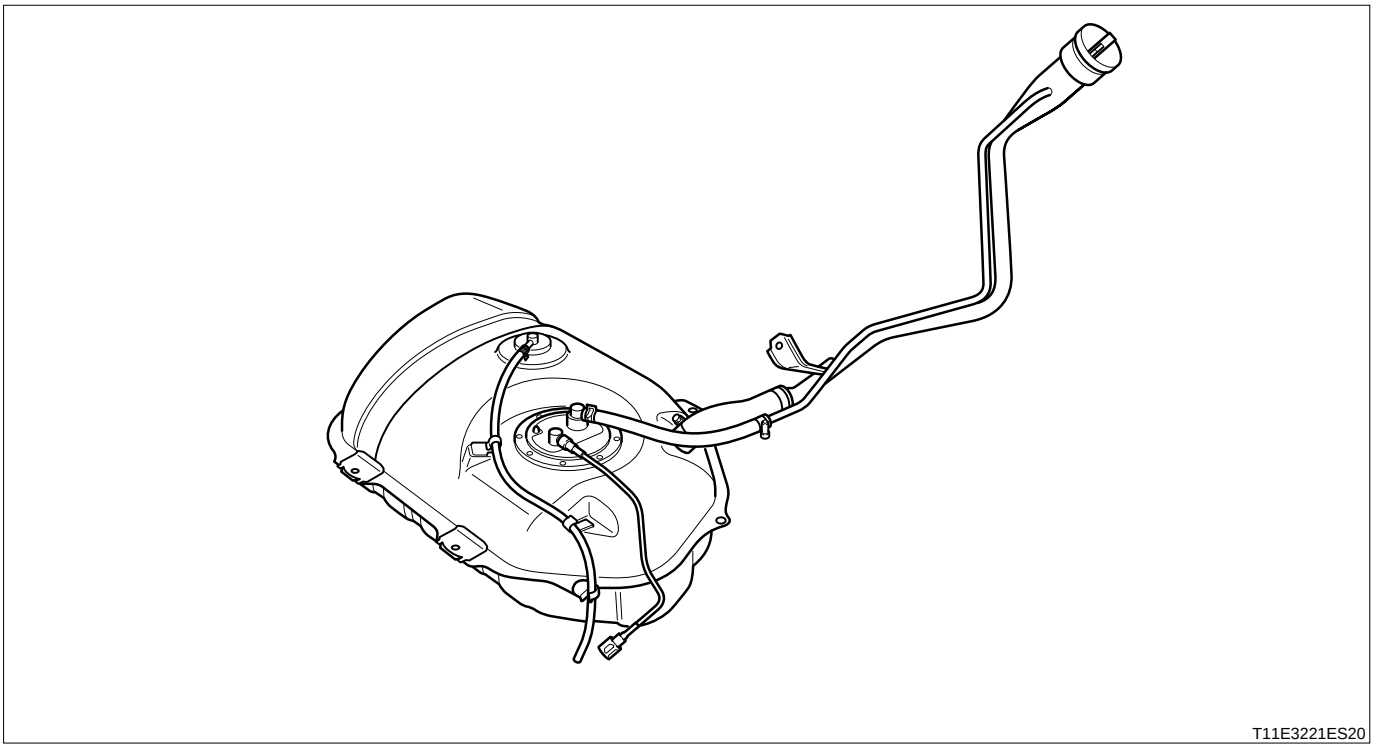
In consideration of safety when the vehicle is overturned or fuel is filled, a cut-off valve is provided to prevent fuel from flowing out and a fuel check valve is provided in the fuel inlet.

Furthermore, the fuel inlet mounting section is located in the upper back of the fuel tank to consider safety when a rear end collision or side collision occurs.

The full capacity of the fuel tank is 40 ℓ .

Considering the environment, using lead and hexad chrome for material of the fuel tank has been discontinued. A recycle mark is set to improve dismantling.

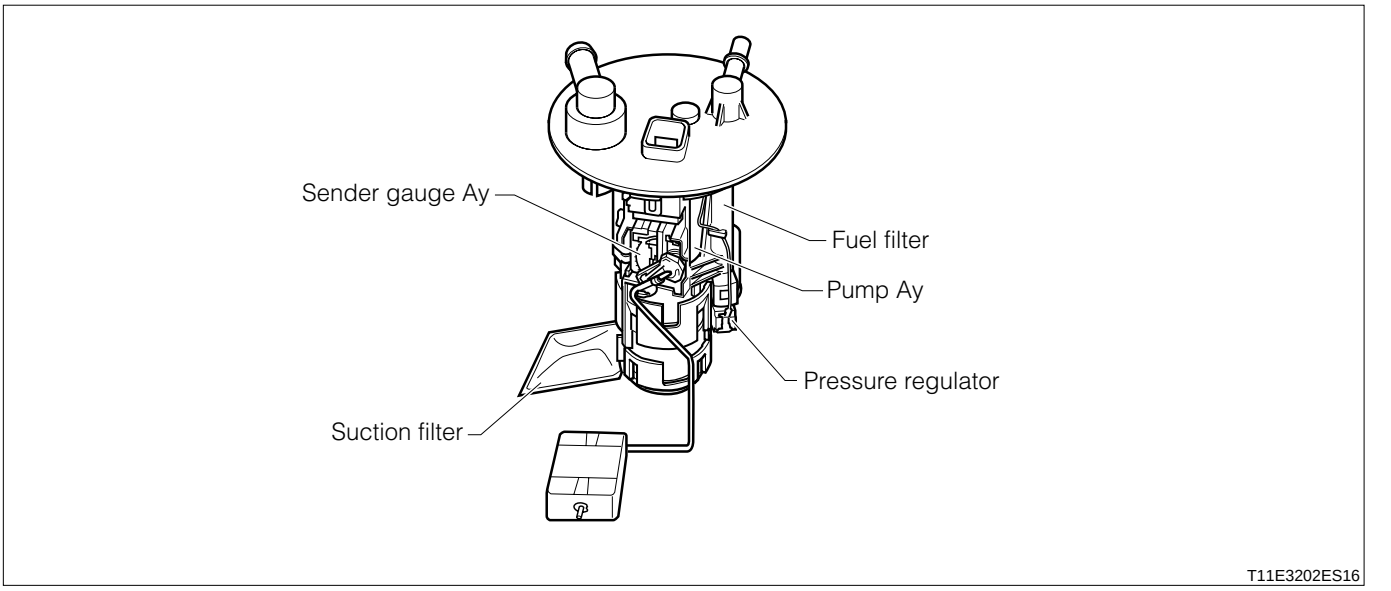
The fuel can be drained through the service hole on the body that is above the fuel tank. The drain plug has been discontinued.



T11E3221ES20

2-2 FUEL PUMP

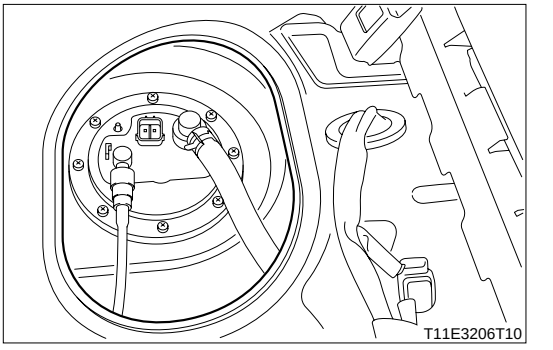
The fuel pressure regulator and high pressure filter are integrated with the fuel pump to return fuel in the fuel tank.
The fuel sender gauge is also integrated with the fuel pump.
The fuel pump is the in-tank type. A quick connector is adopted to connect with the fuel tube.



Fuel pump specifications

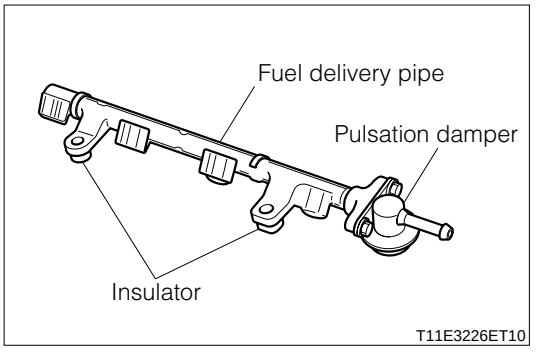
Discharge amount (ℓ/h) (Voltage 12V, discharge pressure 294 kPa)	46.5 or more

A service hole is provided at the rear floor of the vehicle for mounting and removing the fuel pump or draining fuel so that workability is improved.



2-3 FUEL DELIVERY PIPE

Due to adoption of the fuel returnless system, there is only a fuel inlet, but no outlet.
It is made of aluminum die-casting. The joint area with the fuel hose is of the flange O ring type.
A pulsation damper is provided to the joint section with the fuel hose to absorb fuel pulsation and improve accuracy of the fuel injection.

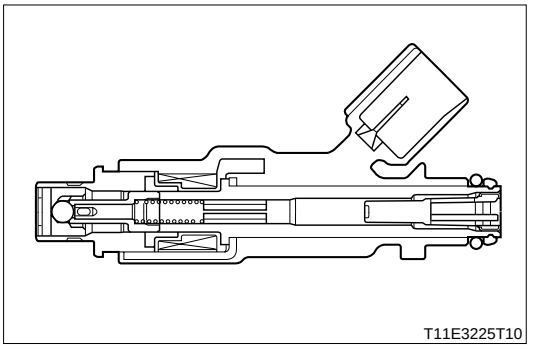


2-4 INJECTOR

A new type 4-hole injector is adopted to optimize the fuel injection characteristics.

Injector specifications

Flow rate [fuel pressure 250kPa](cm^3/min)	185.0
Coil resistance [20℃](Ω)	12.0



2-5 FUEL CUT CONTROL SYSTEM

In order to prevent fuel leakage and fuel fire in the event of a vehicle collision, a safety mechanism is provided by which, upon receiving a signal from the air bag computer, the engine control computer forcibly stops the fuel pump.

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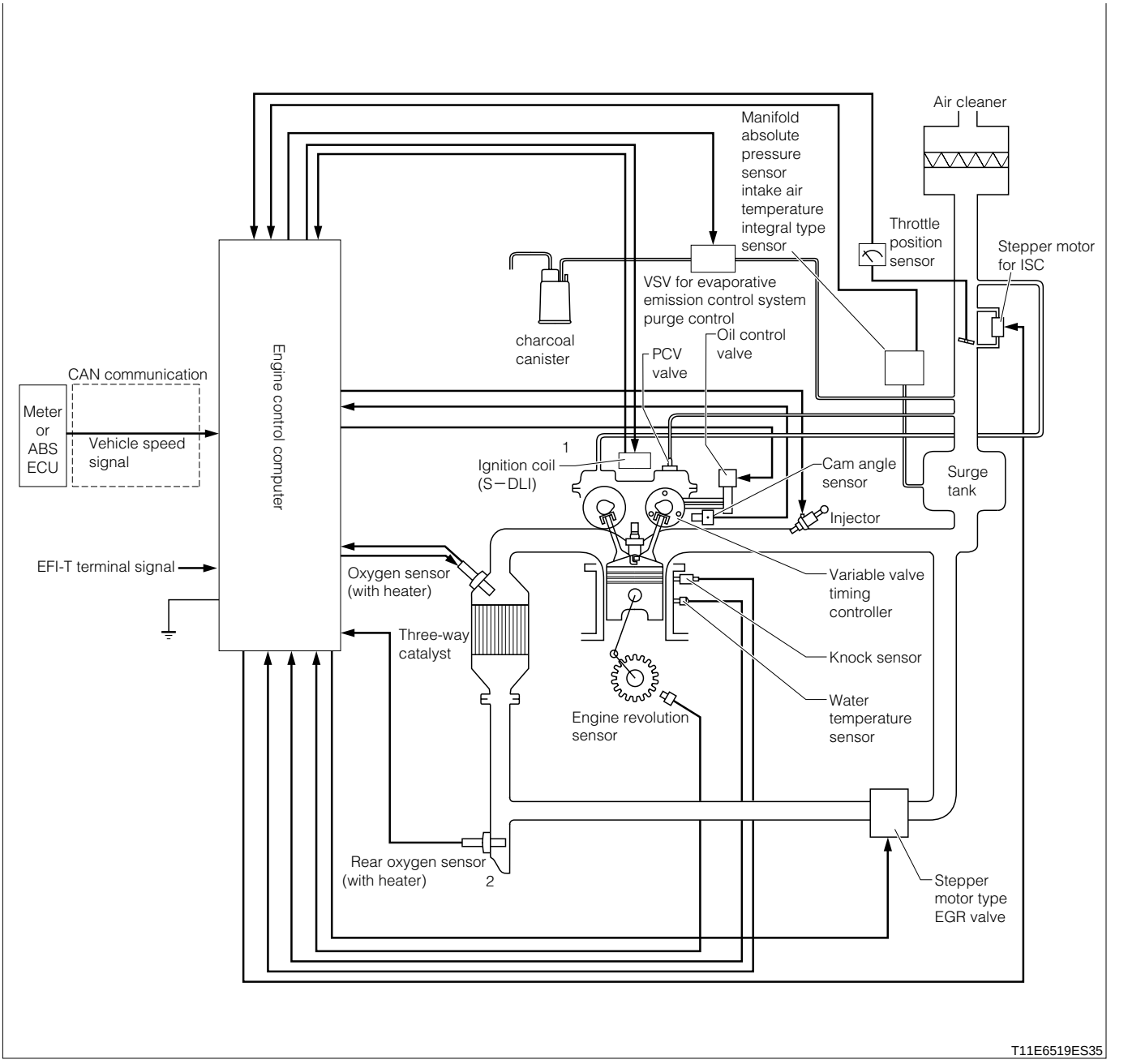
1KR
1 OUTLINE
1-1 DESCRIPTION

1.Engine control system of the 1KR− FE type engine uses the engine control computer to totally control the electronic fuel injection system (EFI), electronic spark advance (ESA), variable valve timing control, and idol speed control (ISC).
2.The system conducts serial communication with the following ECU's.
(1) Airbag ECU
(2) Immobilizer ECU (Immobilizer system-equipped vehicle only)
3.The system conducts CAN communication with the following ECU's.
(1) Meter ECU
(2) ABS ECU (ABS-equipped vehicle only)
4.The diagnostic (self-diagnosis) function and fail safe function are provided in the event of failure.

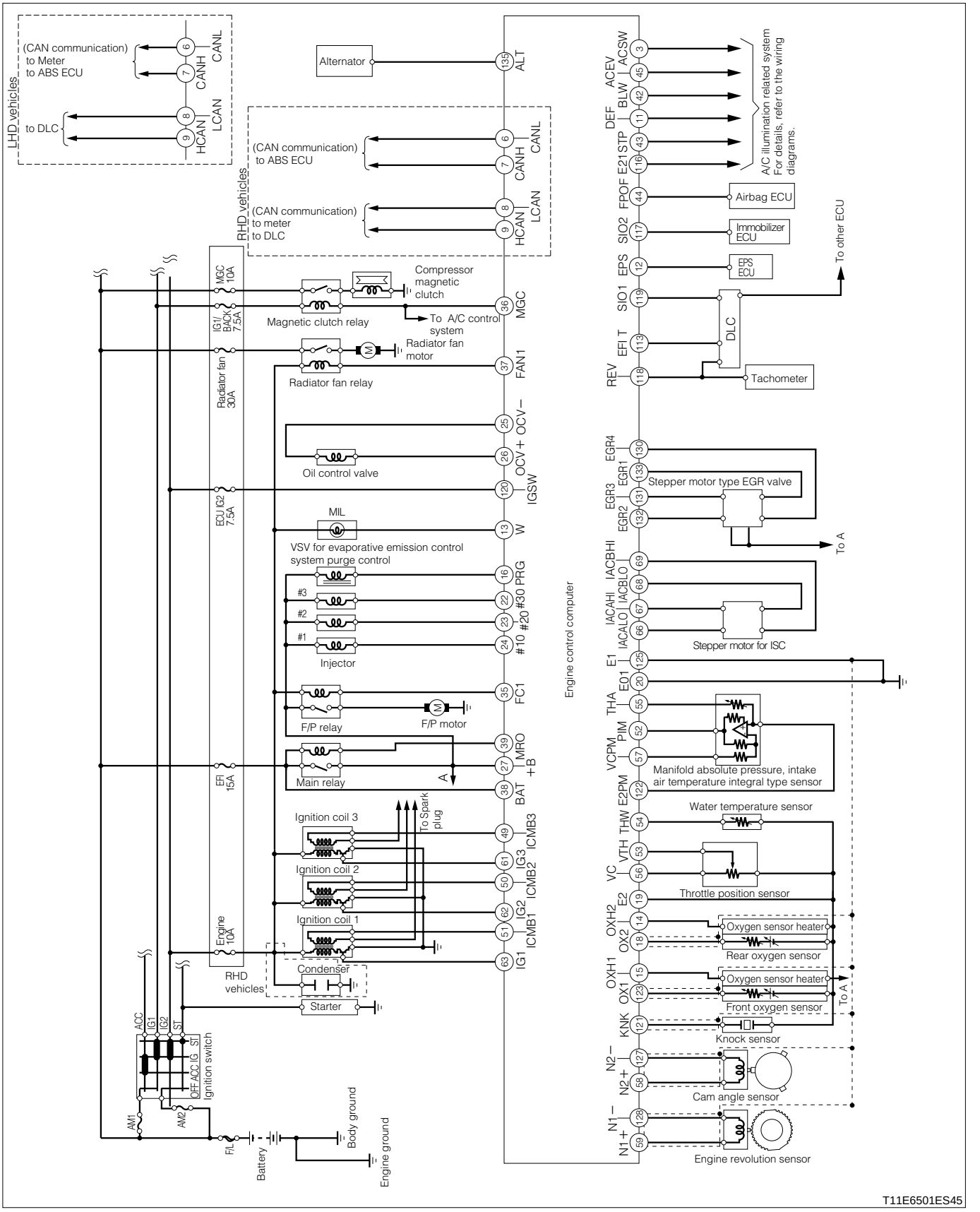
1-2 SYSTEM DRAWING



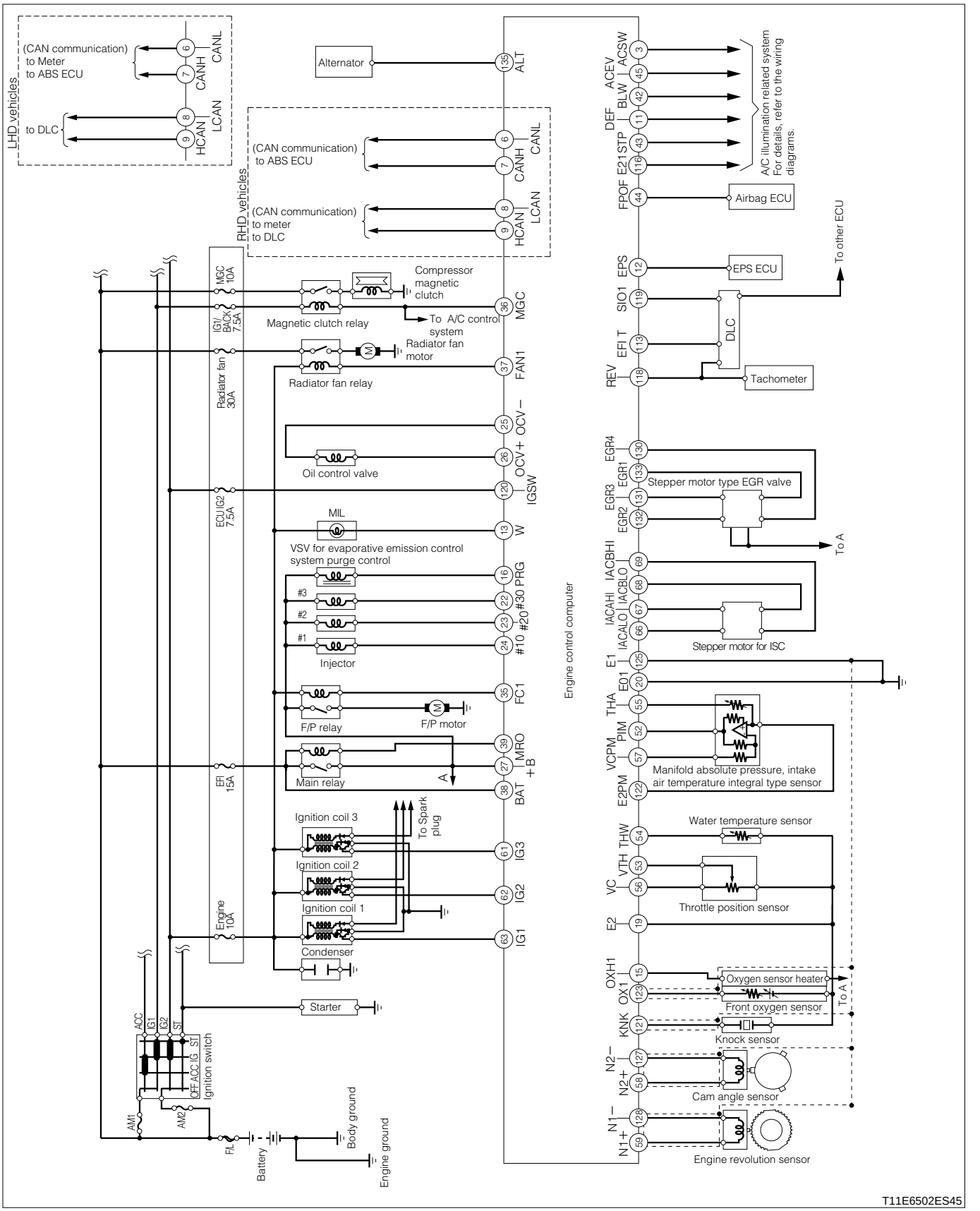
1: Ion current detection device built-in for only EU specifications
2: For only EU specifications

1-3 SYSTEM WIRING DIAGRAM

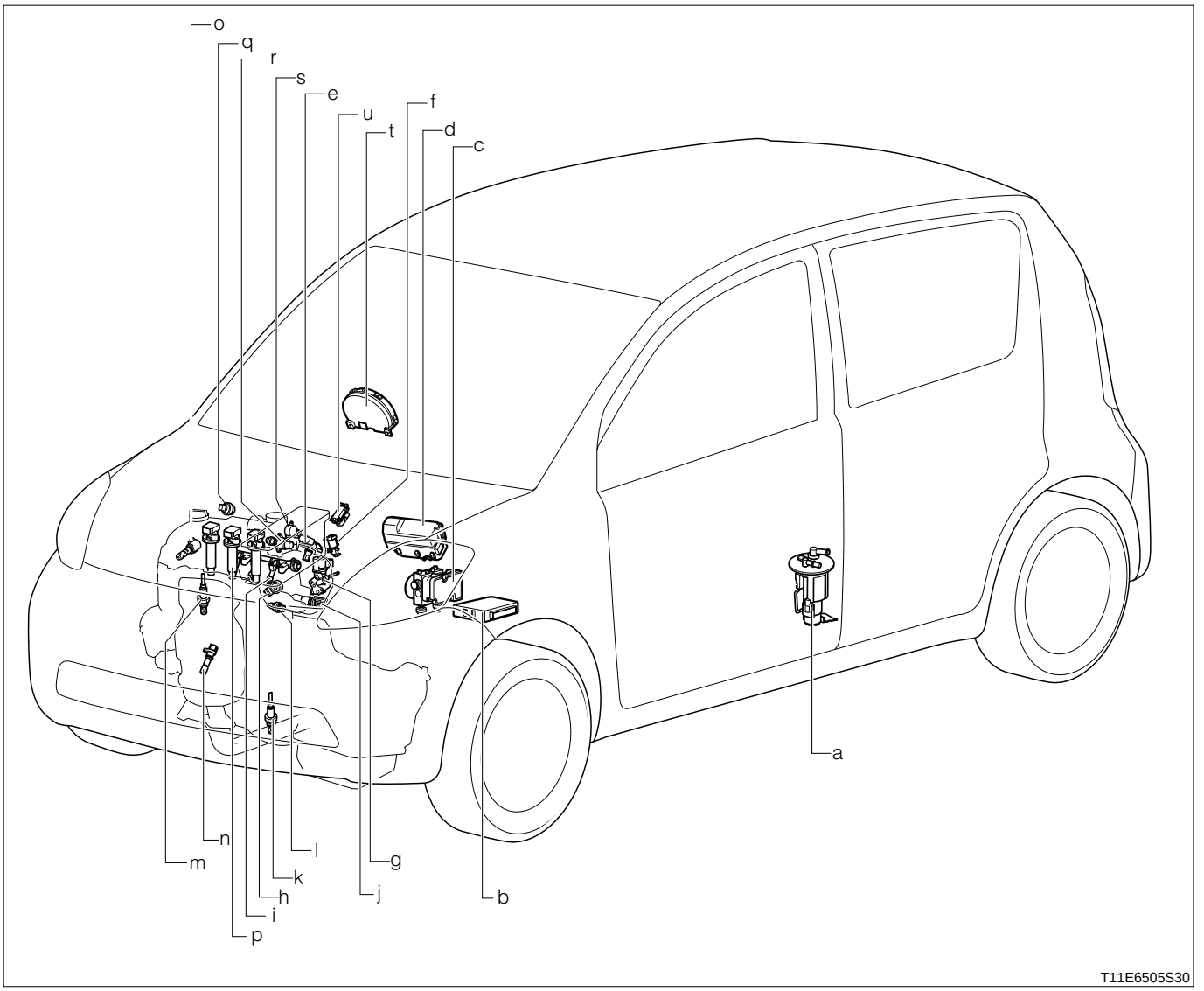
For EU Specifications



For general Specifications



1-4 LOCATION OF COMPONENTS



	Part name
a	Fuel pump
b	Engine control computer
c	ABS actuator (ABS-equipped vehicle only)
d	Relay block
e	Manifold absolute pressure/ intake air temperature integral type sensor
f	VSV for evaporative emission control system purge control
g	Stepper motor type EGR valve
h	Knock sensor
i	Injector
j	Cam angle sensor
k	Rear oxygen sensor (EU-specification vehicle only)
l	Engine water temperature sensor
m	Oxygen sensor
n	Engine revolution sensor
o	Oil control valve
p	Ignition coil
r	Stepper motor for ISC
s	Throttle position sensor
t	Combination meter
u	DLC

2 CONTROL

2-1 EFI SYSTEM

2-1-1 DESCRIPTION

The electronic fuel injection system detects the driving condition through sensor signals from the amount of intake air calculated from the intake manifold pressure and the engine speed. And it controls injection quantity (amount of time that the injector is energized) to ensure proper air-fuel ratio for the driving condition.

The electronic fuel injection system employs an intermittent injection that is synchronized with the engine revolution speed, performing independent injection for each cylinder.

As the fuel injection method, there are synchronous injection and asynchronous injection. The synchronous injection is an injection that is synchronized with the engine revolution signal. On the other hand, the asynchronous injection is an independent injection that is not synchronized with the engine revolution signal. This asynchronous injection takes place, for example, at the time of rapid acceleration.

Also, to protect the engine and catalyst, fuel cutting is performed according to the driving condition.

2-1-2 INJECTION SYSTEM

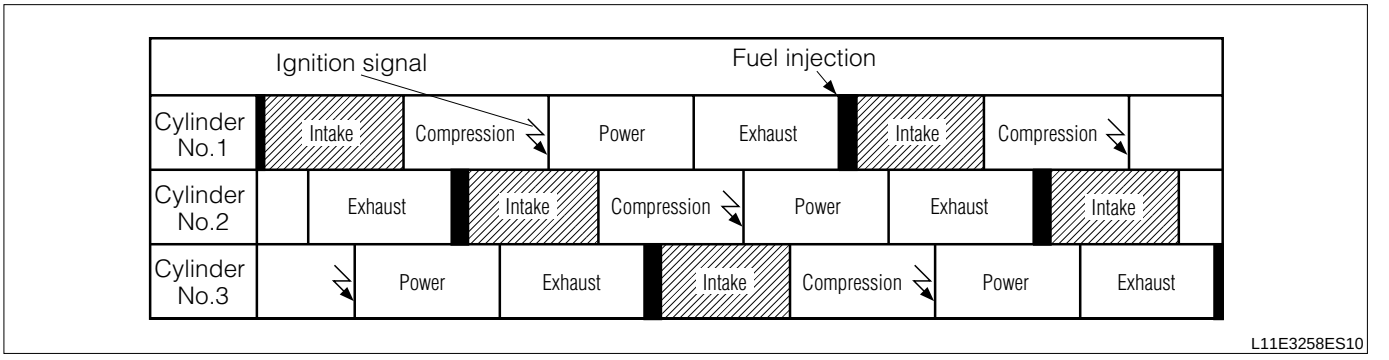
(1) Synchronous injection

The synchronous injection is an injection that is synchronized with the engine revolution signal. There are two methods for synchronous injection: One is the injection during starting period; and the other is the injection after starting period.

The judgment as to whether it is the starting period or after starting period is carried out, based on the engine revolution speed.

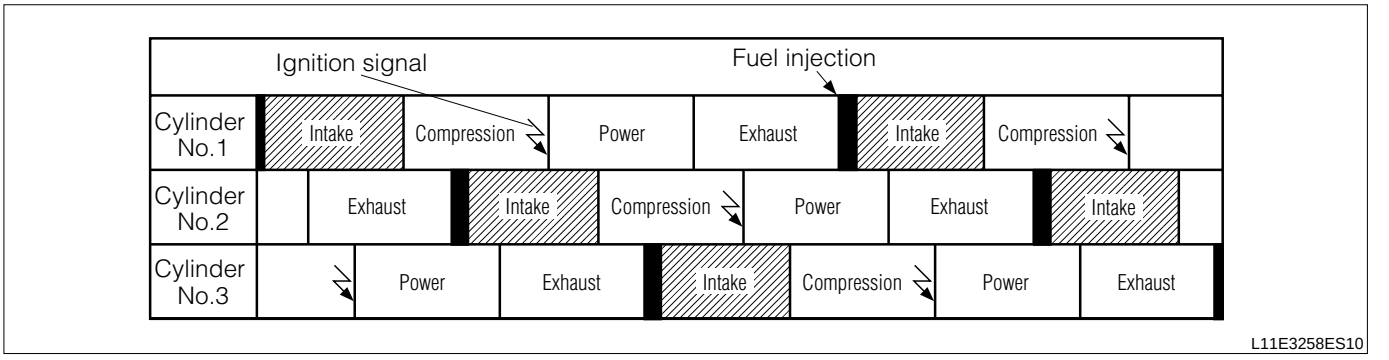
① Injection during starting period

A cylinder is identified based on the signal (cylinder identification signal) from the engine speed sensor. After the cylinder is identified, independent injection is performed in each cylinder in accordance with the information obtained from the sensor.



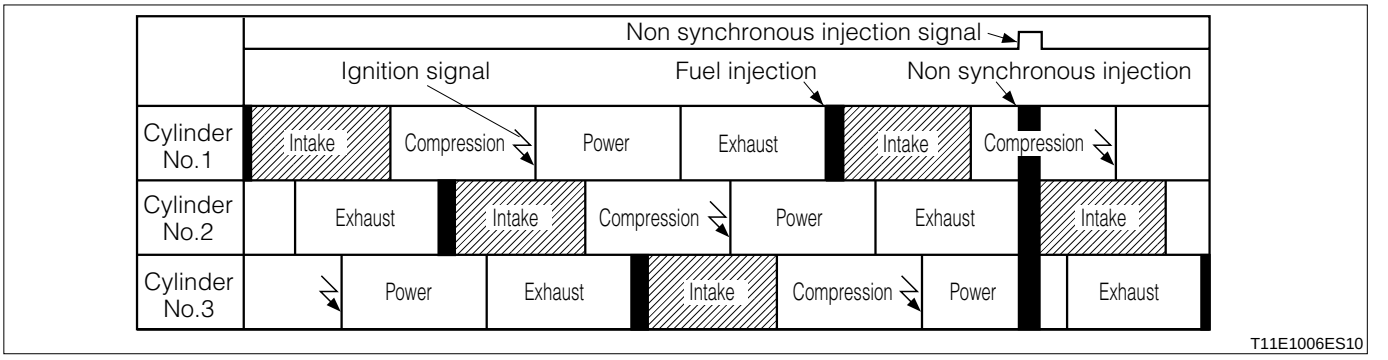
② Injection after starting period

Independent injection is performed, respectively, for each cylinder, based on the cylinder information by the revolution signal (N signal)



(2) Asynchronous injection

Injection is performed immediately when conditions are satisfied. The injection of this type occurs without synchronizing with the engine revolution signal.



2-1-3 DETERMINATION OF INJECTION AMOUNT (INJECTION TIME DURING SYNCHRONOUS INJECTION)

(1) Injection time during starting period

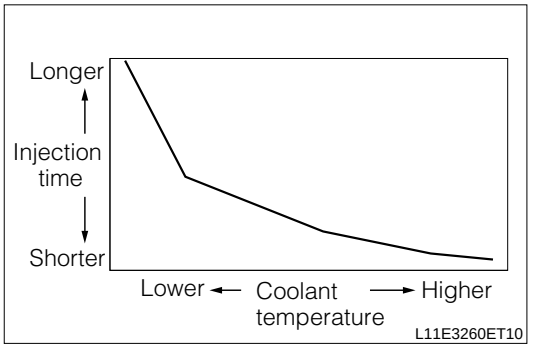
The injection time is determined by the basic injection time during starting period, which is determined by coolant temperatures, various compensation coefficients, and invalid injection time.

Injection time during starting period = Basic injection time during starting period × Various compensation coefficients + Invalid injection time

When the coolant temperature is below the set value, injection is performed into several injections.

① **Basic injection time during starting period**

The basic injection time is determined by the coolant temperature. When the engine is in a cold period, gasoline adhered to the intake valves and inner walls of the intake ports becomes difficult to evaporate. Therefore, the injection amount during cold period has been set to a greater value.



② **Coefficient of compensation for revolution speed during starting period**

When the coolant temperature is low, compensation suited for the engine speed is performed so that startability may be improved.

③ **Coefficient of compensation for atmospheric pressure during starting period**

Compensation suited for the atmospheric pressure is provided to improve startability.

④ **Coefficient of compensation for the number of injections during starting period**

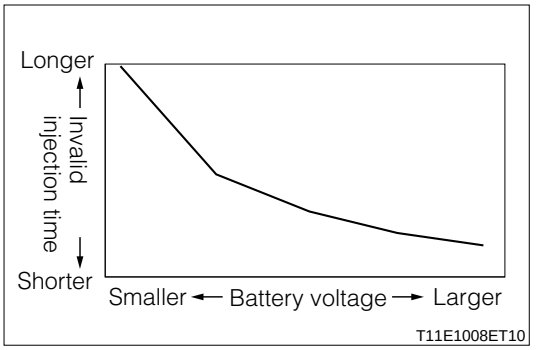
The number of injections during starting period is counted so that the injection time can be properly reduced based on the number of injections.

⑤ **Coefficient of intake air temperature compensation**

This coefficient is used to rectify the difference in the air density, which is caused by the difference in intake air temperatures.

⑥ Invalid injection time

The injector valve does not open at the moment of energizing and requires some time period for injection to start. This time period is referred to as invalid injection time. Invalid injection time will vary with the battery voltage, with a higher battery voltage resulting in a shorter invalid time, while a lower battery voltage resulting in a longer invalid time. For this reason, the injector energizing time is calculated by adding the invalid injection time, which is based on the constantly measured battery voltage, to the actual injection time.



(2) Injection time after starting period

The injection time is determined by the basic injection time after starting period, various compensations and invalid injection time.

Injection time after starting period = Various compensation time based on basic injection time after starting period + Invalid injection time

① Basic injection time after starting period

This is a time determined by the intake manifold pressure and engine revolution speed.

② Coefficient of intake air temperature compensation

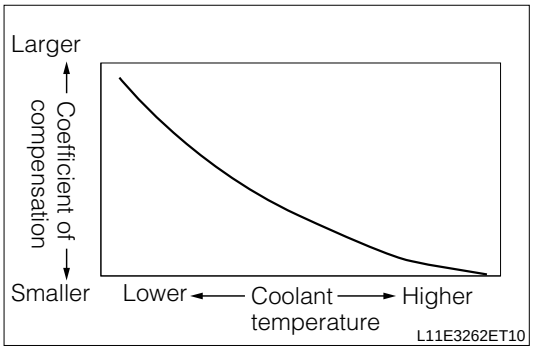
This coefficient rectifies the difference in the air density, caused by the difference in intake air temperatures.

③ Compensation coefficient during resuming period after fuel cut

The injection amount is reduced according to the reduced number of rotations during resuming period after fuel cut in order to improve drivability.

④ Coefficient of compensation for increase of engine warming-up

This is an increase compensation for the engine cold period determined by the coolant temperature. This compensation is carried out, until the warming-up is completed.



⑤ Coefficient of increase compensation after starting period

In order to achieve the stabilization of engine revolution speed immediately after the engine has started, the initial value for the coefficient of increase is determined according to the coolant temperature during the engine starting period. Then, the value is reduced at every time when the injection takes place after the engine starting.

⑥ Time of compensation for air-to-fuel ratio during transient time

This is for the compensation of the air-to-fuel ratio during transient time. This time is determined based on the coolant temperature, etc.

⑦ Coefficient of air-to-fuel ratio feedback compensation

Rich or lean condition in the air-fuel mixture is detected by the signal from the O_2 sensor and the rear O_2 sensor* during the engine running after warm-up. The injection quantity is adjusted accordingly so that the air-fuel ratio is controlled in the narrow range near the theoretical air-fuel ratio where the three-way catalyst exhibits high performance.

NOTE

- *: Rear O_2 sensor is for the EU-specification vehicle only.

⑧ Coefficient of power increase compensation

During a high load driving, the amount of injection is increased according to the intake manifold pressure and engine revolution speed.

⑨ Coefficient of compensation for increase after re-starting

The initial value is determined according to the coolant temperature at time of re-starting. The injection amount is reduced for each injection.

⑩ Coefficient of atmospheric pressure compensation

Compensation according to the atmospheric pressure is performed.

⑪ Idling stabilization compensation advance

During idling, the injection amount is compensated based on the engine revolution signal to stabilizing the revolution speed.

⑫ Water temperature compensation advance

During a high load, high revolution driving, the advance value is compensated according to the coolant temperature.

⑬ Coefficient of low-rotation compensation

The injection amount is increased during low-rotation period.

⑭ Compensation coefficient during knock feedback

Injection quantity is increased when the ignition timing is too retarded during knock feedback.

⑮ Invalid injection time

(See the section of the invalid injection time of the injection time during starting period.)

2-1-4 DETERMINATION OF INJECTION AMOUNT (INJECTION TIME DURING ASYNCHRONOUS INJECTION)

(1) Asynchronous injection during change in idle switch

When the throttle valve is changed from the closed state (idling condition) to the opened state, injection occurs once for all cylinders simultaneously for a certain length of time.

(2) Asynchronous injection during change in intake manifold pressure

Injection occurs once for all cylinders simultaneously for a certain length of time according to the increase ratio of the intake manifold pressure.

(3) Asynchronous injection during resuming period after fuel cutting

If the engine revolution speed drops drastically during the resuming period after fuel cutting, injection occurs for a certain length of time.

(4) Asynchronous injection when the air-conditioner is ON

When the air-conditioner is switched from OFF"→"ON"

(5) Asynchronous injection when the power steering is "ON".

When a request signal is sent from EPS ECU during steering wheel operation, injection occurs for a certain length of time.

2-1-5 FUEL CUTTING

(1) Fuel cutting during deceleration

When the engine revolution speed exceeds the specified value and the throttle valve is closed, fuel cut occurs.

(2) Fuel cutting during catalyst overheated period

Fuel is cut off according to the engine revolution speed and the intake manifold pressure, thus preventing the catalyst from overheating.

(3) Fuel cutting at high engine revolution speed

When the engine revolution speed exceeds the specified value, fuel cut occurs.

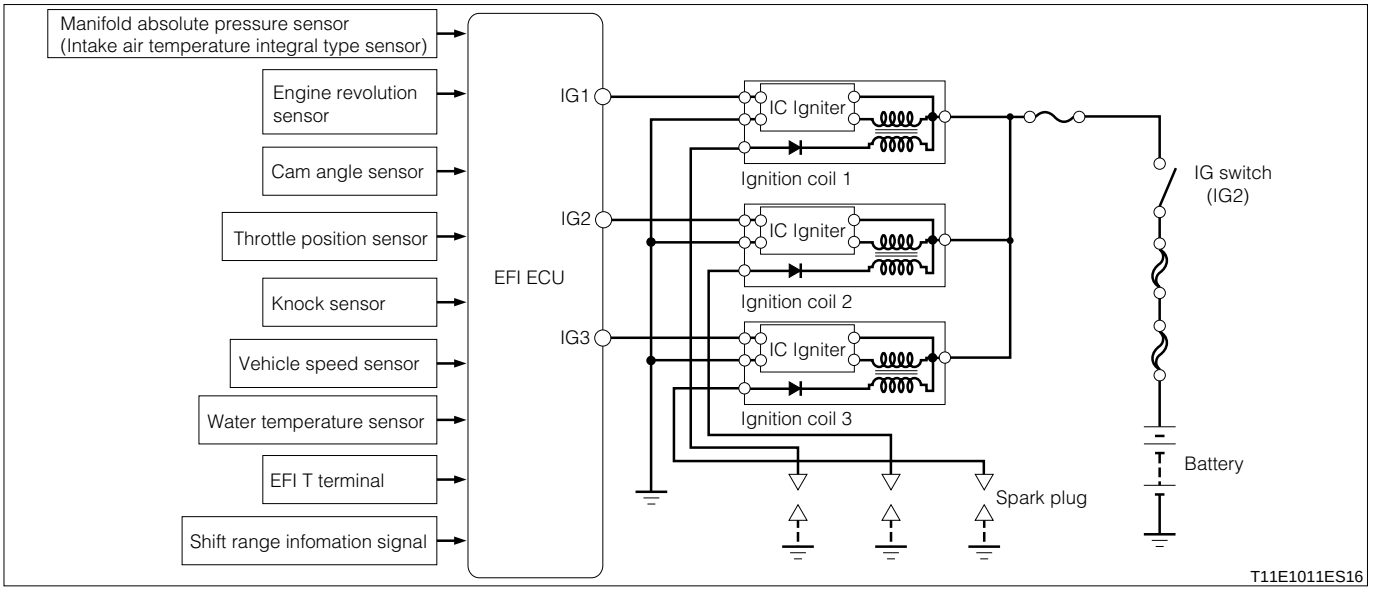
2-2 ELECTRONIC SPARK ADVANCE SYSTEM

2-2-1 DESCRIPTION

ESA (electronic spark advance system) uses the engine control computer to calculate and control the optimal ignition timing according to the engine conditions after the cylinder has been identified by the engine speed sensor signal.

In addition, the ion current combustion control system detects the ion current in the combustion chamber and controls ignition timing for optimal combustion.

The electronic spark advance system can be classified into two modes: One is a fixed spark advance synchronized with the engine revolution signal, and the other is a calculation spark advance determined by the engine revolution speed and intake manifold pressure.



2-2-2 DETERMINATION OF IGNITION TIMING

(1) Fixed advance

BTDC10˚ fixed spark advance synchronized with the engine revolution signal occurs during start-up or short circuit condition at the EFI-T terminal.

(2) Calculation advance

Under conditions other than the fixed advance, the ignition timing is determined by engine conditions, such as the intake manifold pressure and engine revolution speed.

Ignition timing advance = Basic advance ± Various compensation advances

① **Basic advance**

This is the ignition timing determined by the engine revolution speed and intake manifold pressure.

② **Water temperature compensation advance**

The advance value is compensated according to the coolant temperature.

③ **Idling stabilization compensation advance**

In cases where the idling speed drops during the idling period, the timing is advanced. Conversely, in cases where the idling speed rises, the timing is retarded.

④ **Transient compensation advance**

The advance value is compensated in accordance with sharp fluctuations of the intake manifold pressure during running.

⑤ **Control of energizing time**

Energizing time of the ignition coil is controlled in accordance with the engine revolution speed and power supply voltage to the ignition coil.

⑥ Knock compensation advance

When knocking is detected by the output signal of the knock sensor, ignition timing will retard immediately. When knocking does not occur for a given length of time, ignition timing will be advanced gradually until knocking occurs again. In this way the optimal ignition timing can be maintained at all times. Compensation value is limited to prevent adverse influence to the engine.

⑦ Acceleration surging compensation advance

The ignition timing advance is compensated when the intake manifold pressure changes beyond a set amount during acceleration at a low speed after the engine has warmed up.

⑧ Inner EGR compensation advance

The ignition timing advance is compensated according to the variable valve timing..

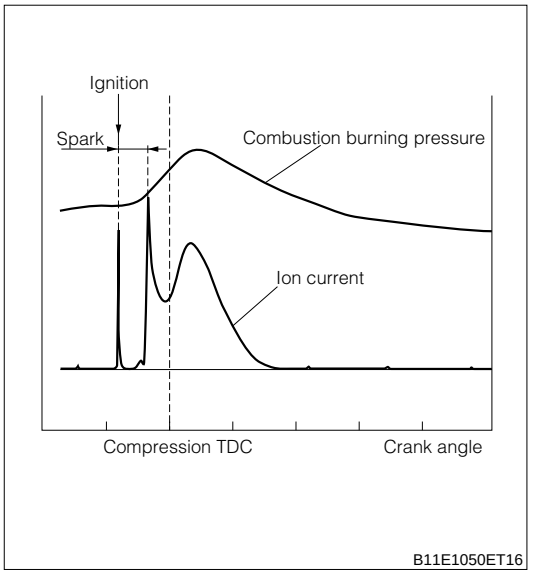
⑨ External EGR compensation advance

The ignition timing advance is compensated according to the amount of external EGR.

2-2-3 ION CURRENT COMBUSTION CONTROL SYSTEM

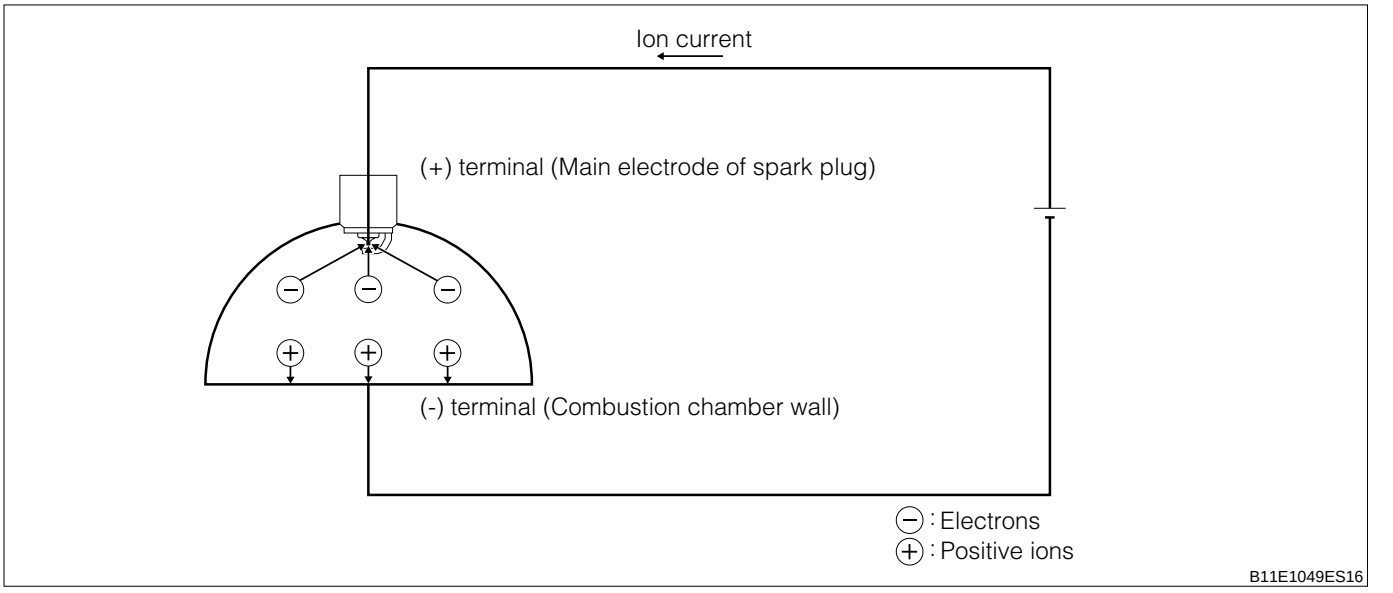
(1) DESCRIPTION

The engine control computer uses the spark plug to detect ion current generated during combustion burning, thereby detecting combustion burning condition in the cylinder.
This allows detection of misfire and combustion limit, thus controlling ignition timing for optimal combustion.



(2) Principle

1.Positive ions and electrons are generated in the flame during combustion.
2.When the charge voltage on the primary side of the ignition coil is applied to the main electrode of the spark plug after the arc discharge ignition, ion current will be produced in the flame.
3.The detected ion current, as being a minute output, is subject to noise. Therefore, ion current waveform is converted into a rectangular wave in the ion current detection circuit, which is built into the ignition coil, and the signal is sent to the engine control computer to determine combustion and misfire.
4.Ion current is not created when engine misfire occurs. Therefore, when the input voltage of the engine control computer falls below the standard value, it determines that misfire has occurred.

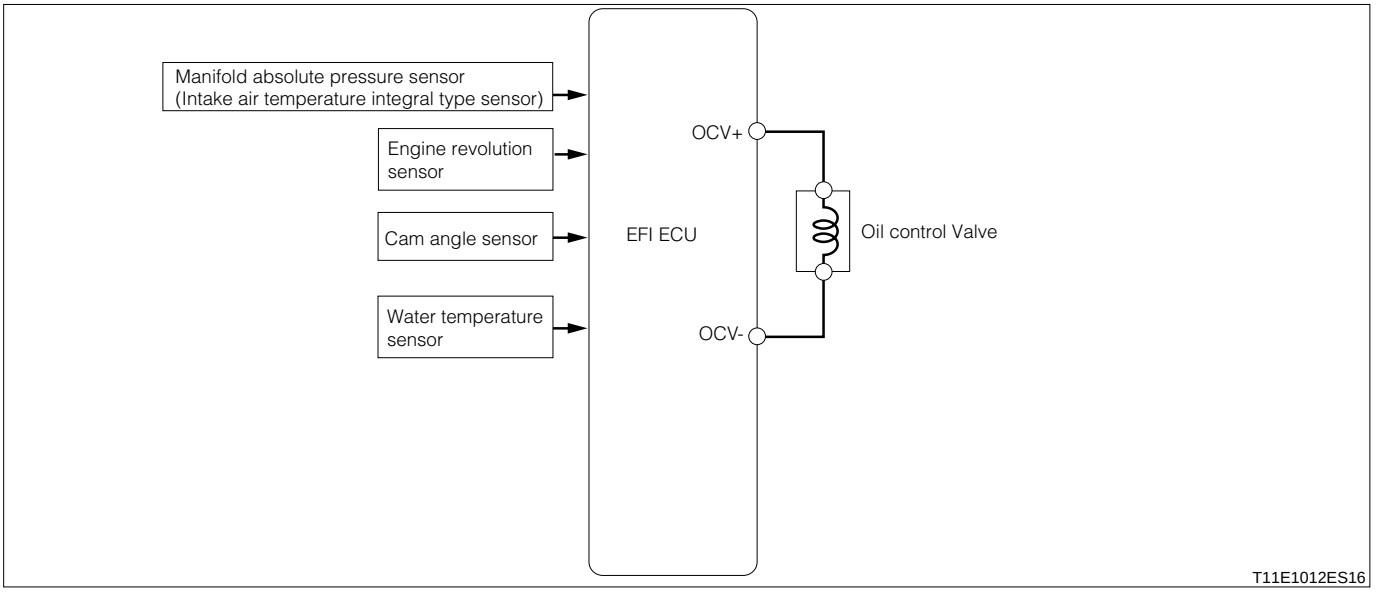


2-3 DYNAMIC VARIABLE VALVE TIMING CONTROL

2-3-1 DESCRIPTION

The engine control computer turns ON and OFF the oil control valve according to the signals from the manifold absolute pressure sensor, coolant temperature sensor and engine revolution speed so as to regulate the hydraulic pressure applied to the variable valve timing controller. This way, the opening/closing timing of the intake air valve can be controlled to the target timing. The opening/closing timing of the intake air valve is detected by the camshaft position sensor. Any deviation, when encountered, will be corrected.

The valve timing is controlled by the engine control computer in three control modes.



(1) Forced most-retarded angle mode

This is the mode that forces the No. 1 camshaft to rotate till maximum retard in the intake valve open/close timing . This mode is used to regulate the oil control valve when starting and when battery voltage falls below the set value.

(2) 0˚retention mode

The retention mode is used, when a target displacement is 0˚. (Refer to the following section on feedback mode for the target displacement angle.)

(3) Feedback mode

① Determination of target displacement angle

The target displacement angle is determined according to the throttle valve opening degree, intake manifold pressure, atmospheric pressure, engine revolution speed, and coolant temperature.

② Determination of oil control valve driving duty ratio

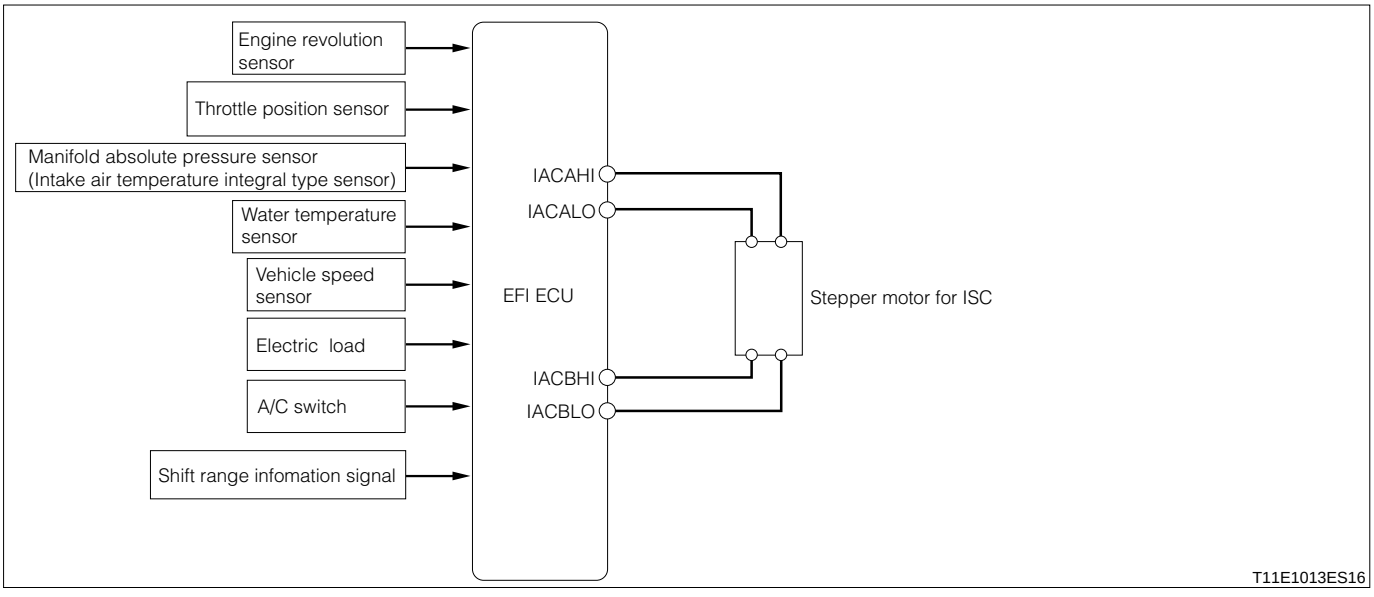
The duty ratio is determined based on the signal from the target displacement angle and camshaft position sensor according to the engine revolution speed and coolant temperatures.

2-4 IDLE SPEED CONTROL SYSTEM (ISC)

2-4-1 DESCRIPTION

The idle speed control (ISC) controls the engine idle speed to prevent engine stall that occurs due to the load applied to the engine during idling.

The engine control computer activates the ISC stepper motor by the signal sent from the sensors, which then controls the pass way area that bypasses the main passage, where the throttle valve is located, in order to control the intake air during idling.



2-4-2 DETERMINING AMOUNT OF DRIVE

The engine control computer determines the opening angle of the ISC valve by the signal from sensors and outputs the amount of drive to the ISC stepper motor based on the valve opening angle.

(1) Water temperature compensation amount

During the period from the engine starting through the end of warming-up, the opening degree of the ISC valve is compensated according to the coolant temperature.

(2) Compensation amount during starting period

During the engine starting period and for several seconds after the starting, the ISC valve is opened to increase intake air in order to improve the engine startability.

(3) Compensation amount for feedback

The opening angle of the ISC valve is changed according to the difference between the idle speed and the target revolution speed to achieve the target revolution speed.

(4) External load compensation amount

1. When changes occur in the air conditioner load, electric load, radiator fan load and so forth, the opening angle of the ISC valve changes according to respective loads, thereby controlling the engine revolution speed.
2. The engine revolution speed is controlled by the power steering load (when the steering wheel is operated with the vehicle in a stationary state) during idling period.

(5) Compensation amount by engine revolution load

The ISC valve opens once, and then gradually closes, in order to obtain better converge into the target revolution speed when the engine revolution speed drops.

(6) EGR compensation amount

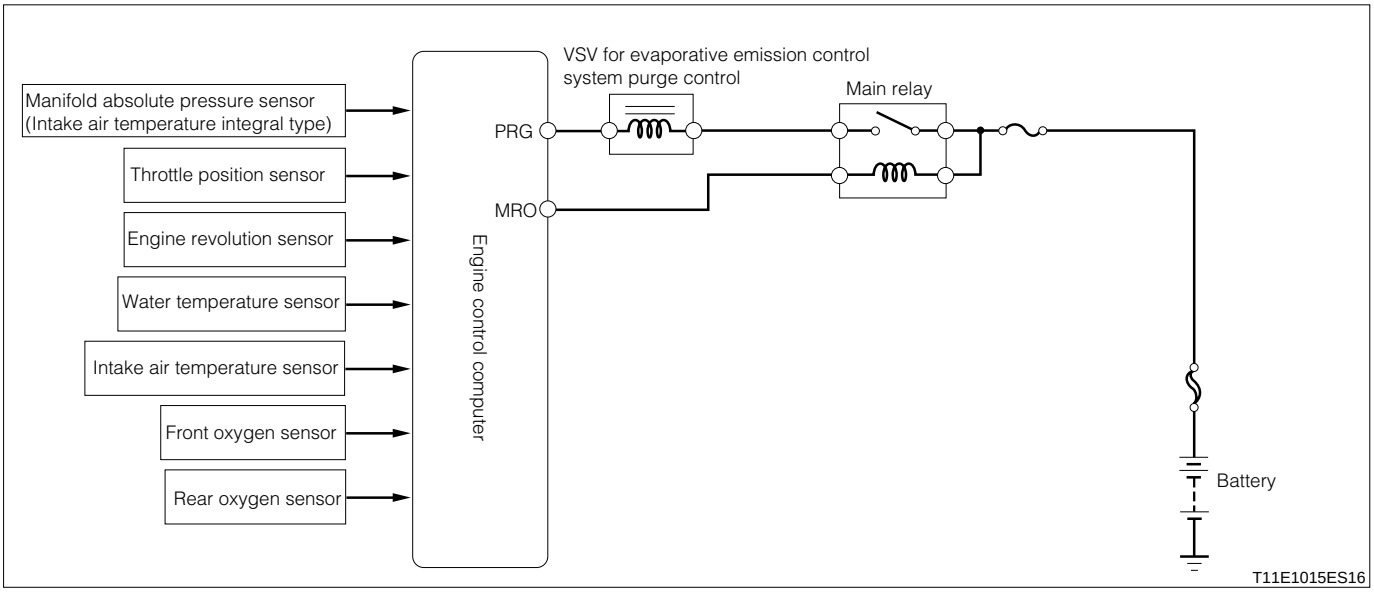
When the throttle valve closes suddenly, the ISC valve opens to allow new charge, thus increasing the quantity of air.

2-5 VSV CONTROL FOR EVAPORATOR PURGE

2-5-1 DESCRIPTION

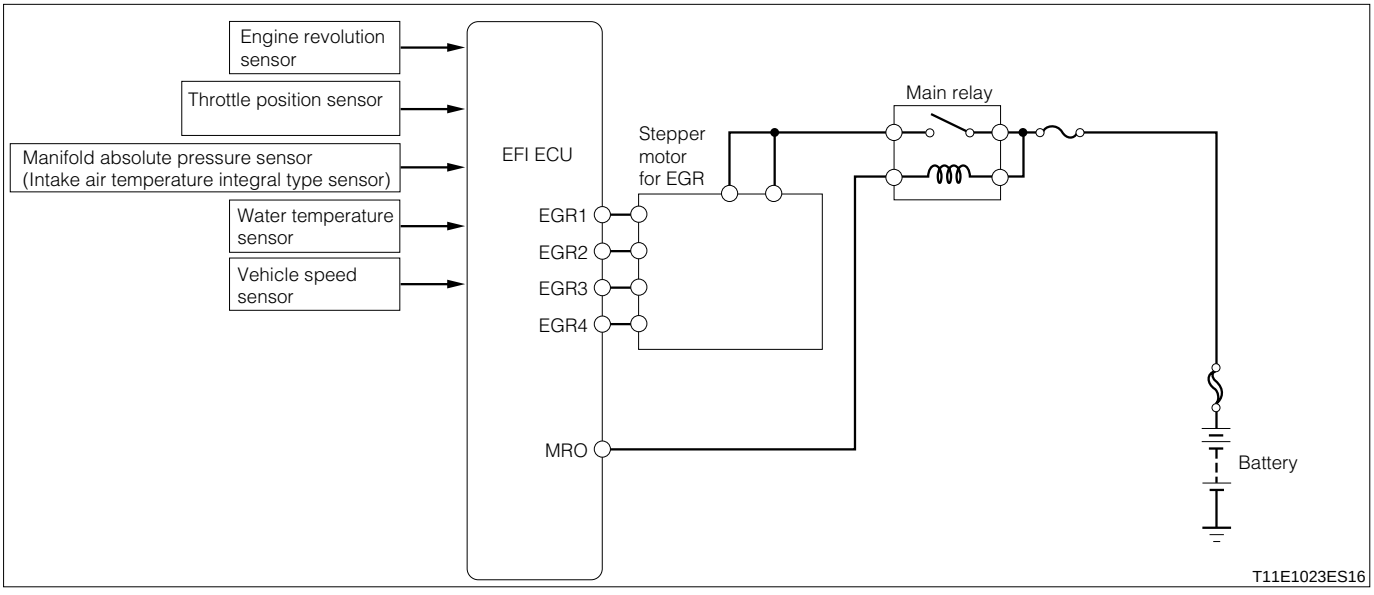
When all of the following conditions are satisfied, the engine control computer turns ON the VSV for evaporative emission purge (duty control), thus purging the fuel evaporative emissions to the combustion chamber.

1.After engine has warmed up
2.During the air-to-fuel ratio feedback
3.When the accelerator pedal is depressed:
4.When the engine control computer is not in a learning mode:



2-6 EGR STEPPER MOTOR CONTROL

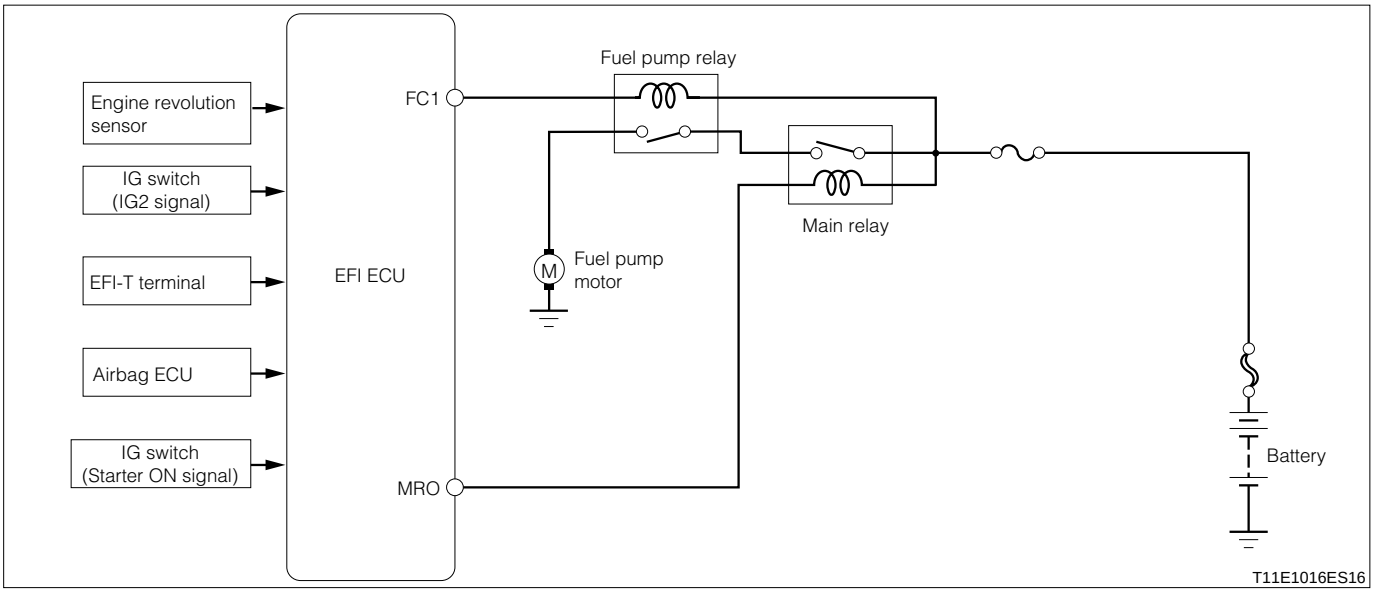
The engine control computer activates the EGR stepper motor according to the engine revolution speed, throttle position sensor, manifold absolute pressure sensor (with the intake air temperature sensor), and the coolant temperature sensor, thereby regulating the opening angle of the EGR valve to achieve an optimum amount of EGR.



2-7 FUEL PUMP CONTROL

When any of the following 4 conditions is satisfied, and no fuel pump stop signal is sent from the airbag ECU, the engine control computer will turn ON the fuel pump relay to activate the fuel pump.

1. For two seconds after the IG switch ON (with the terminal EFI-T turned OFF):
2. For eight seconds after the IG switch ON (with the terminal EFI-T turned ON):
3. After identifying the cylinder and for two seconds after the revolution signal is inputted (The pump is continued to be driven when the engine revolution speed is more than 20 rpm.):
4. Three seconds after starter is switched from OFF → ON



2-8 AIR CONDITIONER CUT CONTROL

2-8-1 DESCRIPTION

When the following conditions for the air conditioner cutting are satisfied, the engine control computer turns OFF the air conditioner relay and the compressor magnet clutch, thereby cutting the air conditioner.

(1) Air conditioner cut by coolant temperature

When the following conditions are satisfied, the air conditioner is cut.

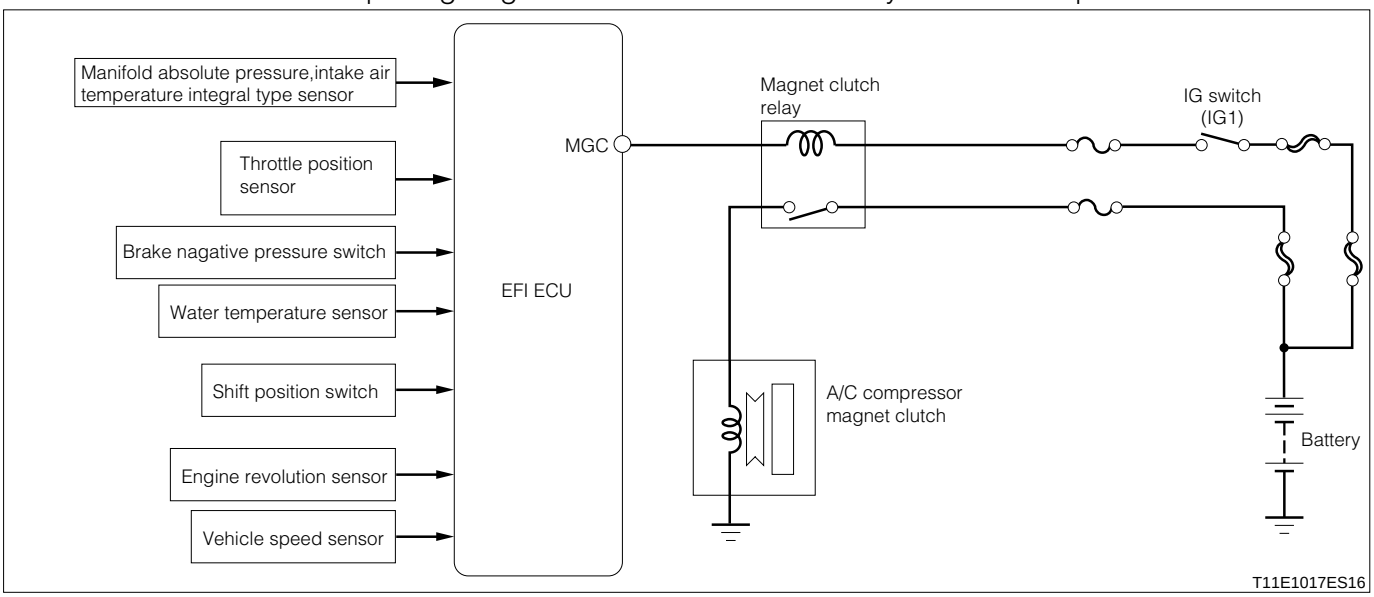
1.When the coolant temperature becomes above the set value:

(2) Air conditioner cut in running area

When at least one of the following conditions is satisfied, the air conditioner is cut.

1.When the throttle valve opening degree and the manifold absolute pressure exceed the set value:

2.When the throttle valve opening degree exceeds the set value by the vehicle speed:



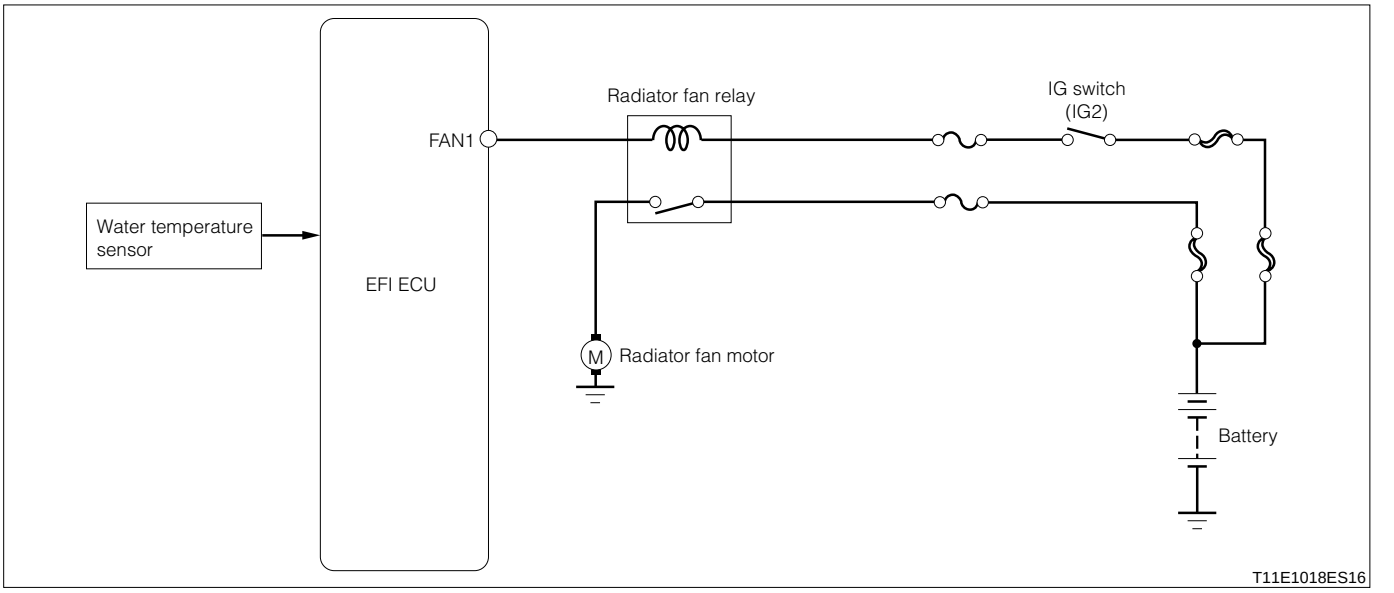
2-9 RADIATOR FAN MOTOR CONTROL

2-9-1 DESCRIPTION

When the preset condition is satisfied, the radiator fan relay is turned ON, and the radiator fan motor is operated. If not satisfied, the radiator fan relay is turned OFF.

NOTE

- When an abnormality occurs in the coolant temperature sensor system, the radiator fan motor rotates all the time by the fail-safe function.



2-10 AIR CONDITIONER IDLE-UP CONTROL

2-10-1 DESCRIPTION

When all of the following conditions are satisfied, the engine idle speed is increased.

1. When the air conditioner switch is ON:
2. When the blower switch is ON:
3. When the air conditioner cutting control is not performed:
4. When the air conditioner evaporator temperature exceeds the set value:

2-11 MAGNET CLUTCH CONTROL

2-11-1 DESCRIPTION

When all of the following conditions are satisfied, the magnet clutch is turned ON.

1. When the air conditioner idle-up control is performed:
2. When the engine revolution speed exceeds a certain value:

2-12 ALTERNATOR CONTROL

2-12-1 DESCRIPTION

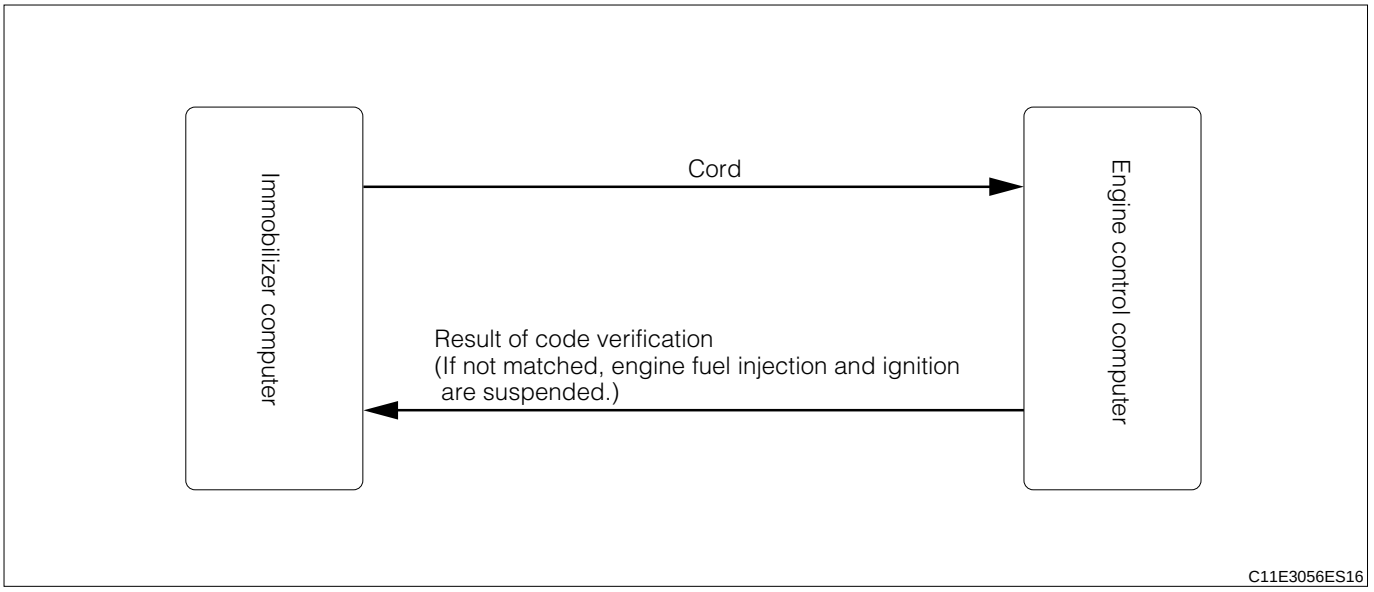
When the preset condition is satisfied, the alternator stops charging .

2-13 AIRBAG ECU COMMUNICATION

When the signal from the airbag ECU is received in the event of a collision, etc., the fuel pump relay is turned OFF, thus stopping the fuel pump.

2-14 IMMOBILIZER SYSTEM COMMUNICATION (IMMOBILIZER SYSTEM-EQUIPPED VEHICLE ONLY)

The engine control computer communicates with the immobilizer ECU for code verification. If the code does not match, fuel injection and ignition are stopped to prevent the engine from starting.



2-15 CAN COMMUNICATION

The engine control computer conducts CAN communication with the meter ECU and ABS ECU (ABS-equipped vehicle only). Multiple pieces of information and data are sent and received through a pair of communication wires (twisted pair wiring).

Refer to the section "CAN communication system" for the details of CAN communication.

Refer to Page L2-1.

2-16 DIAGNOSIS (SELF-DIAGNOSIS) FUNCTION

2-16-1 OUTLINE

(1) DESCRIPTION

In the diagnosis system, a computer memorizes any system which encounters abnormality in its output/input signal systems, and inform the driver of the abnormality by flashing or illuminating the malfunction indicator lamp (MIL, warning lamp) while the engine is running.

Since the memory of the diagnosis content is performed directly by the battery, the diagnosis content is memorized even if the IG switch is turned ACC or LOCK. For detailed information about the assignment of the diagnosis trouble code (DTC), the checking and erasing procedures for the DTC, refer to the EF section of the service manuals. The following shows the DTC the table showing failsafe functions, although these information is posted in the EF section of the service manuals.

(2) Instructions on use of this technical information book

This technical information book covers both the area where type certification is conducted based on the EC exhaust emission approval procedures, and other areas. However, the assignment of the diagnosis trouble codes and their reading are different between these two areas. Hence, observe the following instructions.

1. Use of DS-21 diagnosis tester or OBD II generic scan tool:
   (1) Areas where type certification are performed based on EC exhaust emission approval procedures: Use the 4-digit code (example, P0105) which is assigned according to the ISO standards.
   (2) You can use the 4-digit codes by using the DS-21 diagnosis tester or OBD II generic scan tool. Or you can also use two-digit codes (example, 31) without using such tester or tool. You can employ whichever convenient method.
2. The OBD II generic scan tool refers to a scan tool which complies with the ISO 14230 (KWP2000) format.
3. When the OBD II generic scan tool is used, all trouble codes (4-digit codes) can not be read out. It should be remembered that only trouble codes which have a zero after P, like P0XXX, can be read out.
4. The 2-digit codes are slightly inferior to the 4-digit codes in identifying the trouble sections.
5. The area where type certification is performed based on EC exhaust emission approval procedures is hereinafter referred to as the EU area.

2-16-2 FAIL-SAFE FUNCTION

When abnormality takes place in the signal from sensors, or malfunctions take place in the control of the oil control valve for the variable valve timing, conditions such as engine failure, catalyst overheating may result, if the control is continued as it is. To prevent this, the fail-safe function uses the values stored in the computer in order to control operations.

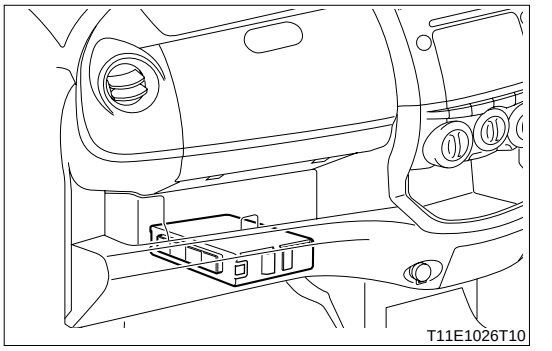
When the malfunction is remedied to the normal condition after an abnormality was detected, the fail-safe control will be released. However, the diagnosis result remains.

Fail safe specifications

Item	Fail-safe execution conditions	FAIL-SAFE SPECIFICATIONS
Manifold absolute pressure sensor signal system	When abnormality takes place in the signal from the manifold absolute pressure sensor:	The manifold absolute pressure is estimated by the throttle opening angle and the engine revolution speed. When abnormality occurs in the signal from the throttle position sensor, the signal from the manifold absolute pressure sensor is set to the constant value. If both the throttle opening angle and engine speed exceed their set values, the fuel is cut.
Ignition system	When malfunction takes place in the ignition signal:	Fuel injection is cut in the cylinder whose ignition signal is faulty.
Coolant temperature sensor system	When malfunction takes place in the signal from the coolant temperature sensor:	The signal from the coolant temperature sensor is set to a constant value.
Throttle position sensor system	When abnormality takes place in the signal from the throttle position sensor:	The signal from the throttle position sensor is set to a constant value.
A/C evaporator temperature sensor signal system	When malfunction takes place in the signal from the A/C evaporator temperature sensor:	The air conditioner will be cut.
Atmospheric pressure sensor circuit malfunction	When the signals from the atmospheric pressure sensor are not outputted continuously over a certain length of time after starting.	The signal from the atmospheric pressure sensor is set to a constant value.
Knock sensor signal system	When abnormality takes place in the signal from the knock sensor:	The ignition timing is retarded.
Intake air temperature sensor signal system	When malfunction takes place in the signal from the intake air temperature sensor:	The signal from the intake air temperature sensor is set to a constant value.
ISC stepper motor signal system	When malfunction takes place in the detection signal for the ISC stepper motor:	ISC control is stopped. Fuel is cut.
Oil control valve system	When malfunction takes place in the control voltage for the oil control valve:	Oil control valve energizing control is prohibited.
Camshaft position sensor system	When malfunction takes place in the signal from the camshaft position sensor:	The signal from the camshaft position sensor is set to a constant value.
Rear O_2 sensor system (EU-specification vehicle only)	When abnormality takes place in the signal from the rear O_2 sensor:	The feedback control is changed to open control.
Immobilizer communication system (Immobilizer system-equipped vehicle only)	When abnormality takes place in the communicates with the immobilizer ECU, code reference failed due to malfunction in the computer internals.	Fuel injection and ignition are stopped.
Stepper motor type EGR valve system	When abnormalities take place in the EGR gas flow: When open or short circuit occurs in the wiring to the EGR stepper motor:	After the EGR valve is fully closed, control of energizing the EGR stepper motor is stopped.

3 COMPONENTS

3-1 ENGINE CONTROL COMPUTER



The engine control computer is mounted under the glove box on the front passenger seat side, providing fuel injection control, electronic spark advance control, variable valve timing control, idol speed control, evaporator purge control, etc. The engine control computer communicates with other ECU's, outputs the operation status of the engine through EFI ECU, and inputs the signal from ECU's, providing various controls such as idle-up, fuel cut, and ignition stop.

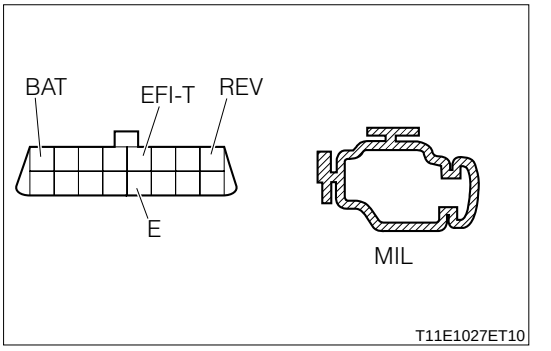
3-2 DLC

3-2-1 DESCRIPTION

The DLC is installed in front of the driver's seat (at the lower end of the instrument panel, on the driver's door side), providing the following checks.

(1) Indication of diagnosis

(2) Indication of O_2 sensor state



3-2-2 INDICATION OF DIAGNOSIS

When the terminal EFI T and E are shorted while the IG switch is ON, the engine check lamp inside the combination meter flashes to indicate the error code, starting with a smaller code. The error code is identified by the number of flashing, displayed repeatedly.

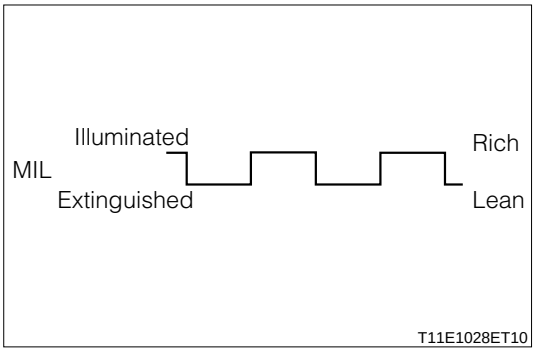
3-2-3 INDICATION OF O_2 SENSOR STATE

Short-circuit the terminal EFI T and E with the IG switch turned ON, maintain the engine speed above 2000rpm, and keep the brake pedal depressed. In this way, the output status of the O_2 sensor and feedback control can be checked by ON/OFF operations of the engine check lamp.

(No indication of the rear O_2 sensor state)

(1) Rich side: Lamp ON

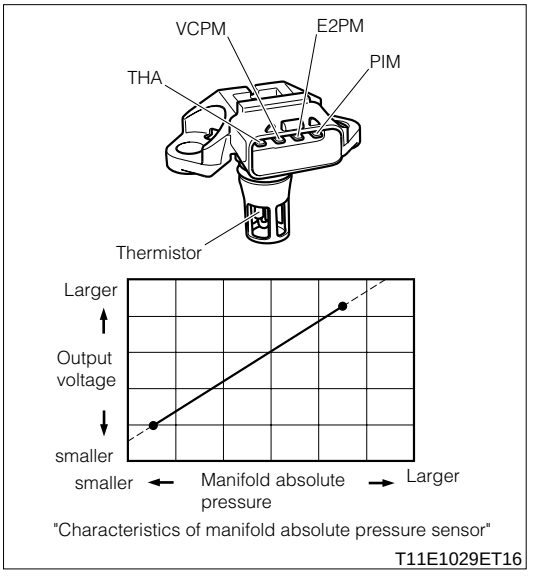
(2) Lean side: Lamp OFF



3-3 MANIFOLD ABSOLUTE PRESSURE / INTAKE AIR TEMPERATURE INTEGRATED SENSOR

The sensor is an integral type where the manifold absolute pressure sensor and the intake air temperature sensor are integrated.

The sensor is mounted on the intake manifold to detect the manifold absolute pressure in the intake manifold and intake air temperature. The manifold absolute pressure outputs are sent to the PIM terminal, and intake air temperature outputs are sent to the THA terminal through the thermistor, whose resistance changes with temperature.



Characteristics of intake air temperature sensor

Temperature [℃]	−30	−20	20	80	120
Resistance [kΩ]	-28.6	16.2	2.45	0.322	-0.117

NOTE

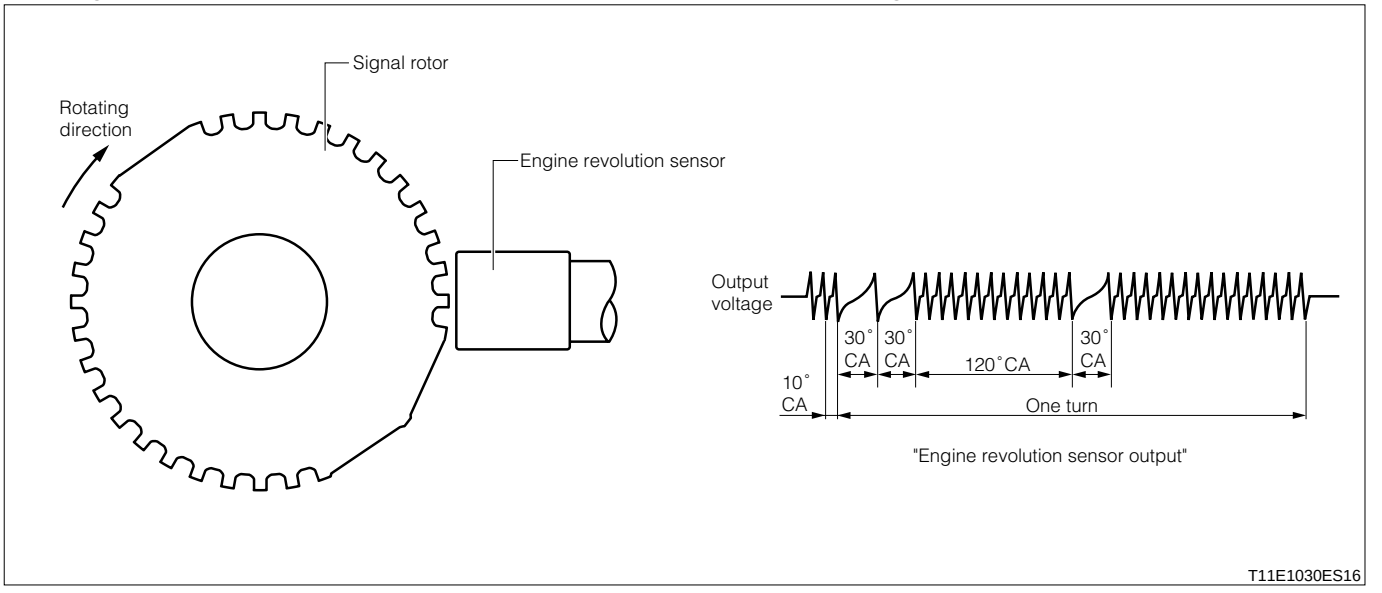
- Figures inside parentheses show reference values.

3-4 ENGINE SPEED SENSOR, SIGNAL ROTOR

The signal rotor is installed at the front of the crankshaft in order to detect the crank angle. The signal rotor has a projection for which the engine speed sensor is installed.

As the crankshaft turns, the air gap changes between the engine revolution sensor and the projection provided on the signal rotor, causing changes in the magnetic flux to generate a pulse.

The engine speed is calculated based on the interval of the pulses generated by this projection.

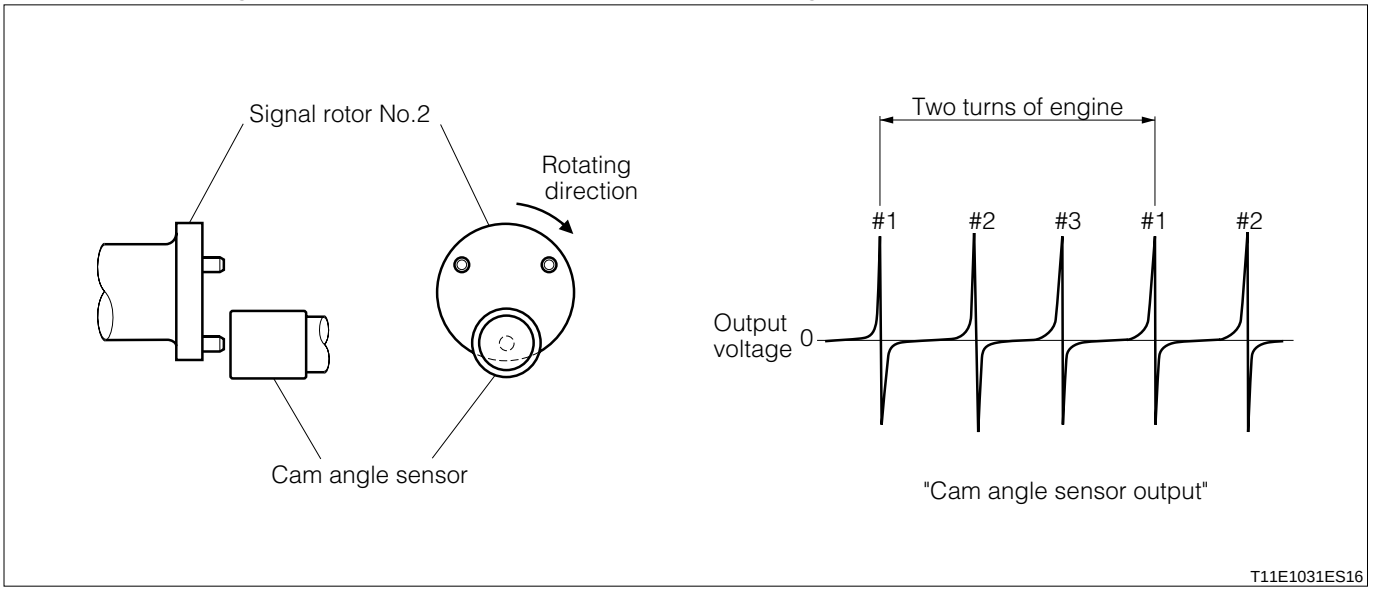


3-5 CAMSHAFT POSITION SENSOR AND SIGNAL ROTOR NO.2

A projection is provided at the rear of the No.1 camshaft to detect the phase of the No.1 camshaft and the crankshaft. The camshaft position sensor is mounted at the rear of the cylinder head.

When the No.1 camshaft makes a turn, the air gaps change between the camshaft position sensor and each of the three projections on the signal rotor No.2. As a result, the magnetic flux changes, and three pulses per turn are generated at the camshaft position sensor.

The phase of the No.1 camshaft and the crankshaft is detected by the signals from the camshaft position sensor and the engine speed sensor. The variable valve timing control is performed based on this phase.



3-6 COOLANT TEMPERATURE SENSOR

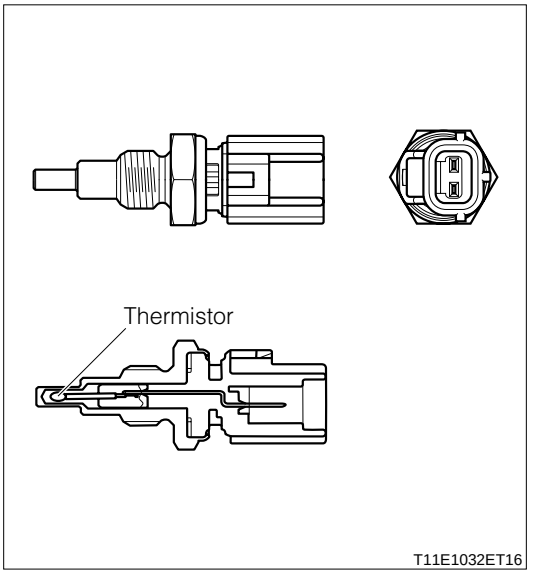
The coolant temperature sensor, mounted on the cylinder head, detects the coolant temperatures.

The sensor has a built-in thermistor, whose resistance changes with temperature. The input signals from the thermistor are sent to the engine control computer.

The coolant temperature gauge in the meter uses coolant temperature signals sent from the engine control computer through CAN communication.

Characteristics of coolant temperature sensor

Temperature [℃]	−20	20	80	110
Resistance [kΩ]	15.04	2.45	0.318	0.142



3-7 ATMOSPHERIC PRESSURE SENSOR (EU-SPECIFICATION VEHICLE ONLY)

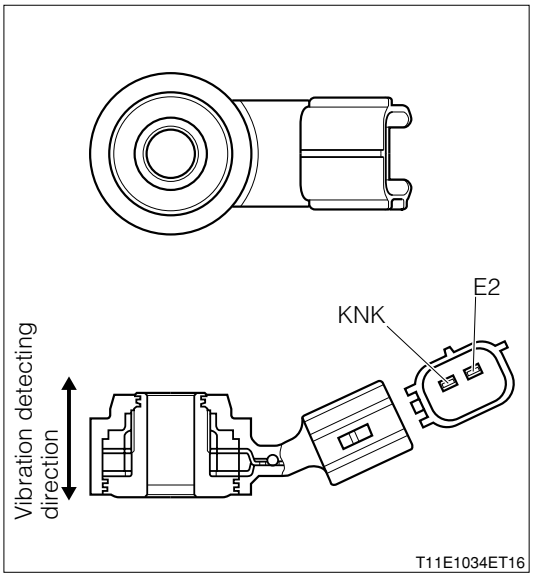
The atmospheric sensor is incorporated in the engine control computer. This sensor senses the atmospheric pressure, which is used for compensation of the fuel injection amount, etc.

3-8 KNOCK SENSOR

The knock sensor is mounted on the cylinder block and detects knocking indirectly from the vibration of the cylinder block that occurs by knocking.

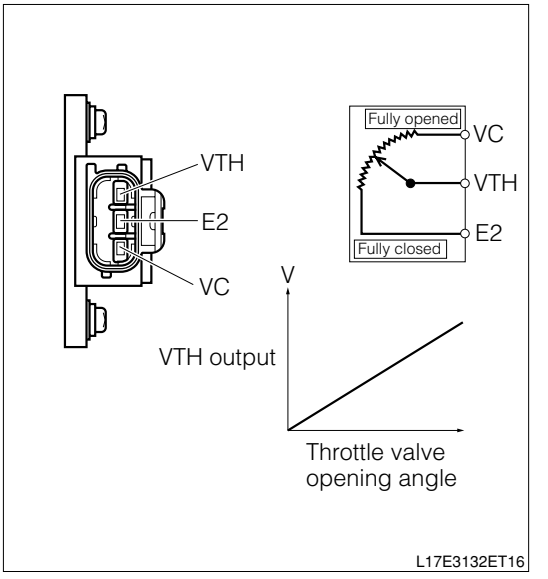
A piezoelectric element, which is built into the sensor, converts vibrations of the cylinder block into electric signals.

The non-resonance type knock sensor is used to improve accuracy in knock detection.



3-9 THROTTLE POSITION SENSOR

The sensor is installed to the throttle body and has a built-in potentiometer, which detects a throttle opening angle linearly.

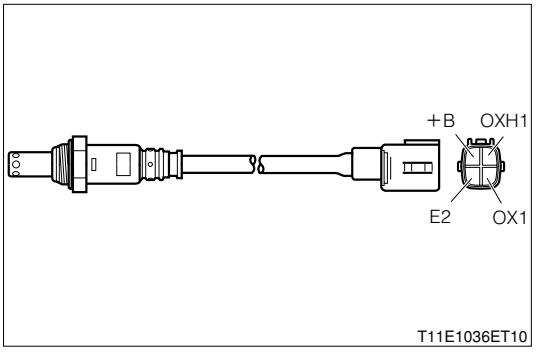


3-10 O_2 SENSOR

The sensor is installed to the exhaust manifold and detects the oxygen concentration in the exhaust emission by the amount of the electromotive force generated within the sensor. The lower the oxygen concentration, the greater the electromotive force gets, indicating that the air-to-fuel ratio is rich (rich condition).

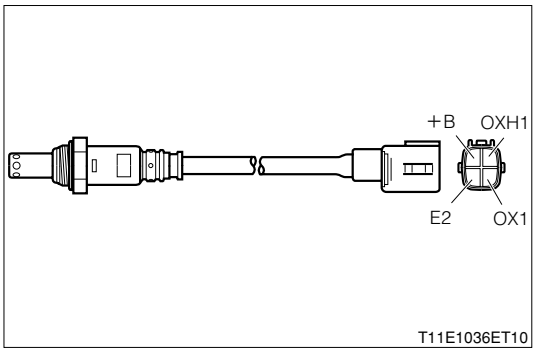
Based on this voltage, the engine control computer judges whether the current air-to-fuel ratio is greater or smaller than the stoichiometric ratio.

The sensor begins operating at about 300˚C or more. In order to activate the sensor sooner, a heater circuit is provided. This helps improve accuracy of the air-to-fuel ratio feedback control, thus reducing the exhaust emission.



3-11 REAR O_2 SENSOR (EU-SPECIFICATION VEHICLE ONLY)

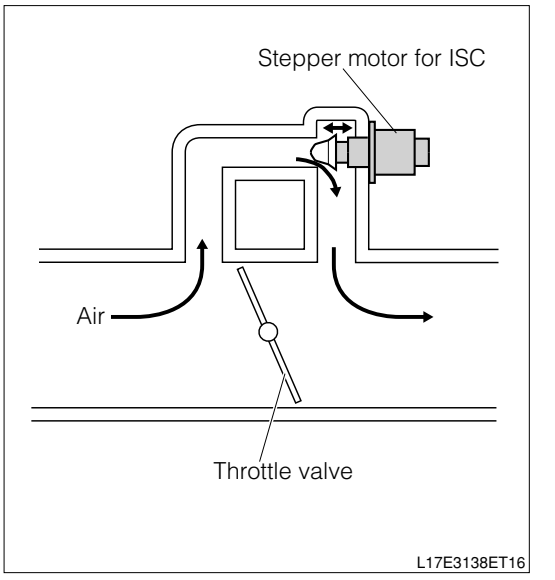
The sensor is installed to the exhaust front pipe. It detects the oxygen concentration in the exhaust emission after passing over the catalyst, by the amount of the electromotive force generated within the sensor. The lower the oxygen concentration, the greater the electromotive force gets.
Based on this voltage, the engine control computer judges whether the current air-to-fuel ratio is the target value or not, thus monitoring the oxygen sensor provided upstream.
The sensor begins operating at about 300˚C or more. In order to make the sensor operate more early, a heater circuit is provided.



T11E1036ET10

3-12 ISC STEPPER MOTOR

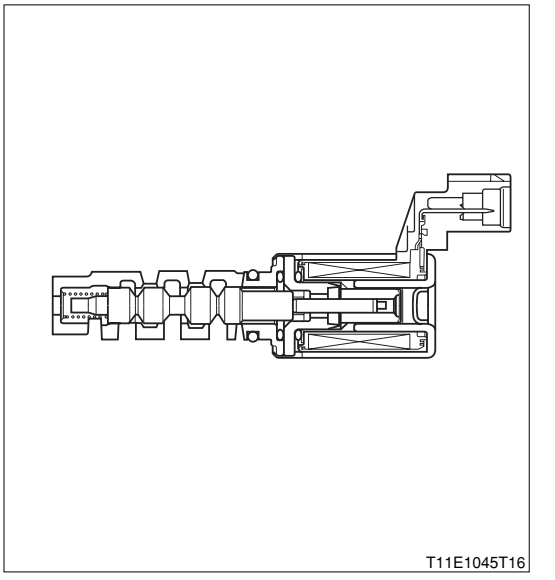
The engine control computer activates the stepper motor and controls the intake air during idling by changing the area of the pass way that bypasses the main passage, where the throttle valve is located.
The stepper motor is driven with 200 steps from the full-close to full-open position of the ISC valve, opening the valve in the reverse direction and closing in the forward direction.



L17E3138ET16

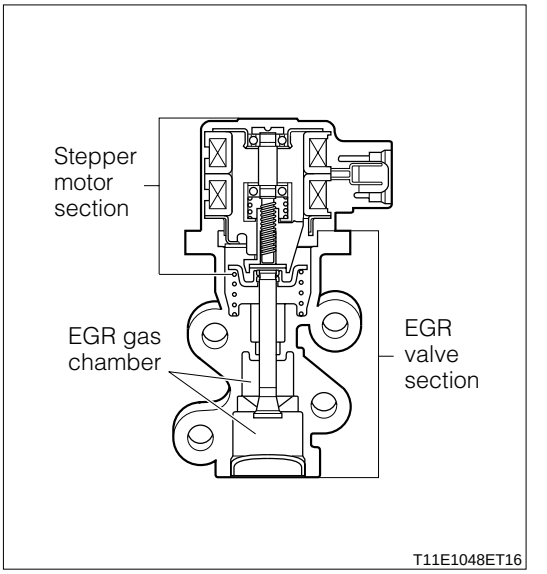
3-13 OIL CONTROL VALVE

The oil control valve turns ON and OFF according to the duty signal from the engine control computer so as to regulate the hydraulic pressure applied to the variable valve timing controller. This way, the opening/closing timing of the intake air valve can be controlled to the target timing.


T11E1045T16

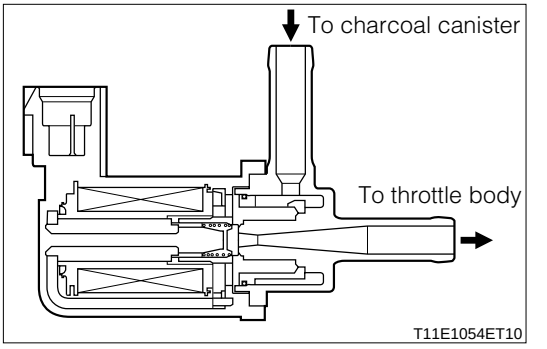
3-14 EGR STEPPER MOTOR

The EGR valve uses the stepper motor to regulate the opening angle of the EGR valve by means of the duty signal from the engine control computer, thereby controlling the amount of exhaust emission mixed with the intake air.



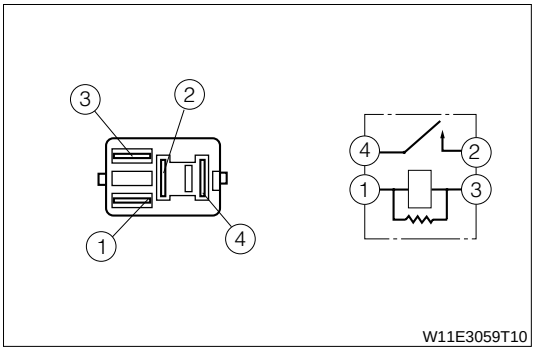
3-15 VSV FOR EVAPORATOR PURGE CONTROL

The amount of fuel evaporative emission that flows to the engine combustion chamber is controlled by the duty signal from the engine control computer.



3-16 MAIN RELAY, FUEL PUMP RELAY, RADIATOR FAN RELAY

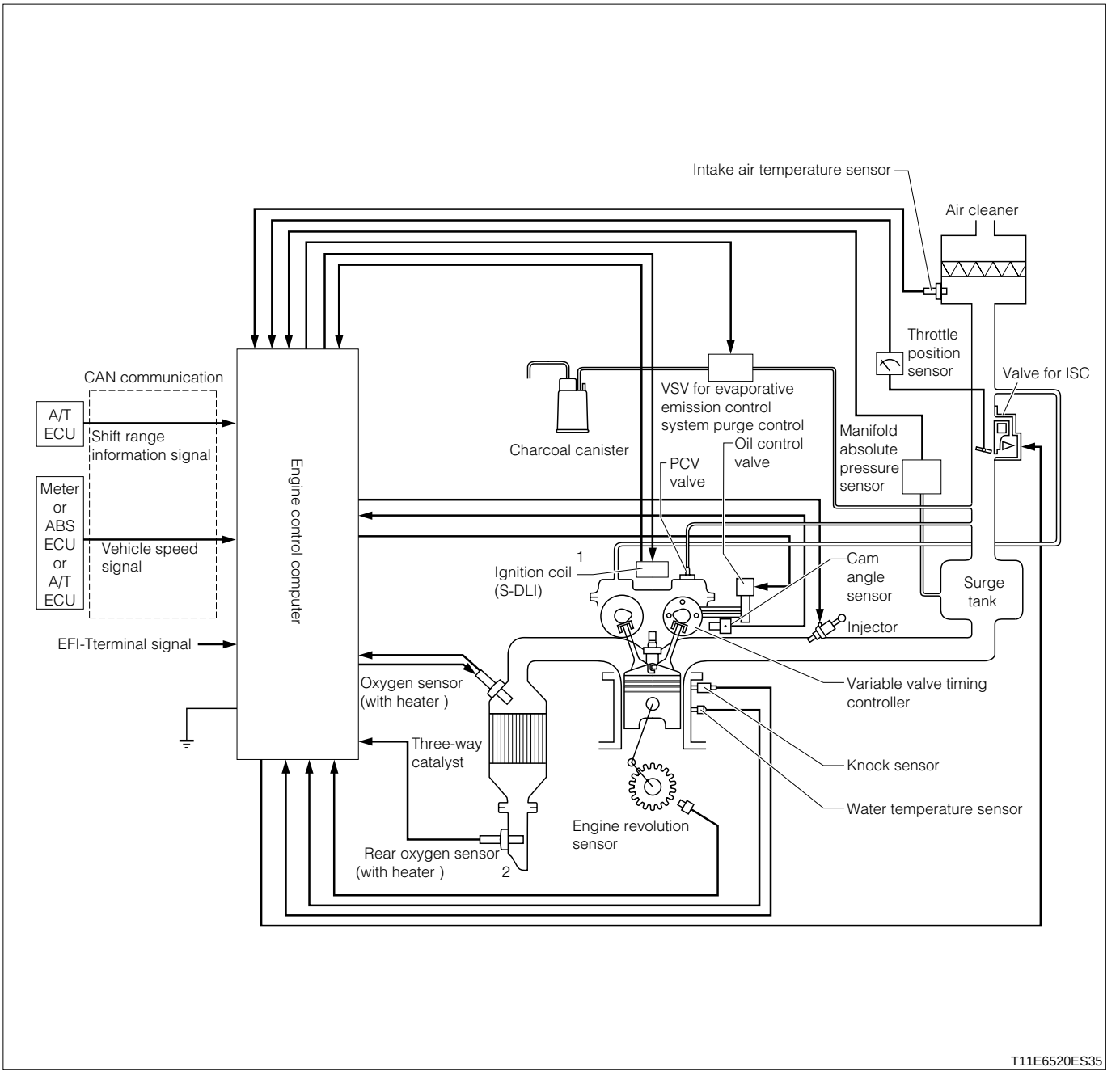
This is installed in the relay box of the engine compartment.
The main relay supplies power to the engine control computer when the IG switch is ON.
When the IG switch is ON, the fuel pump relay is activated by the signal from the engine control computer to supply power to the fuel pump.
When conditions to activate the radiator fan motor control are satisfied, the radiator fan relay is turned ON by the signal from the engine control compute to supply power to the radiator fan motor.



K3
1 OUTLINE
1-1 DESCRIPTION

1.The engine control system of the K3−VE type engine uses the engine control computer to totally control the electronic fuel injection system (EFI), electronic spark advance (ESA), variable valve timing control, and idol speed control (ISC).
2.The system conducts serial communication with the following ECU's.
(1) Airbag ECU
(2) Immobilizer ECU (Immobilizer system-equipped vehicle only)
3.The system conducts CAN communication with the following ECU's.
(1) Meter ECU
(2) A/T ECU (A/T vehicle only)
(3) ABS ECU (ABS-equipped vehicle only)
4.The diagnostic (self-diagnosis) function and fail safe function are provided in the event of failure.

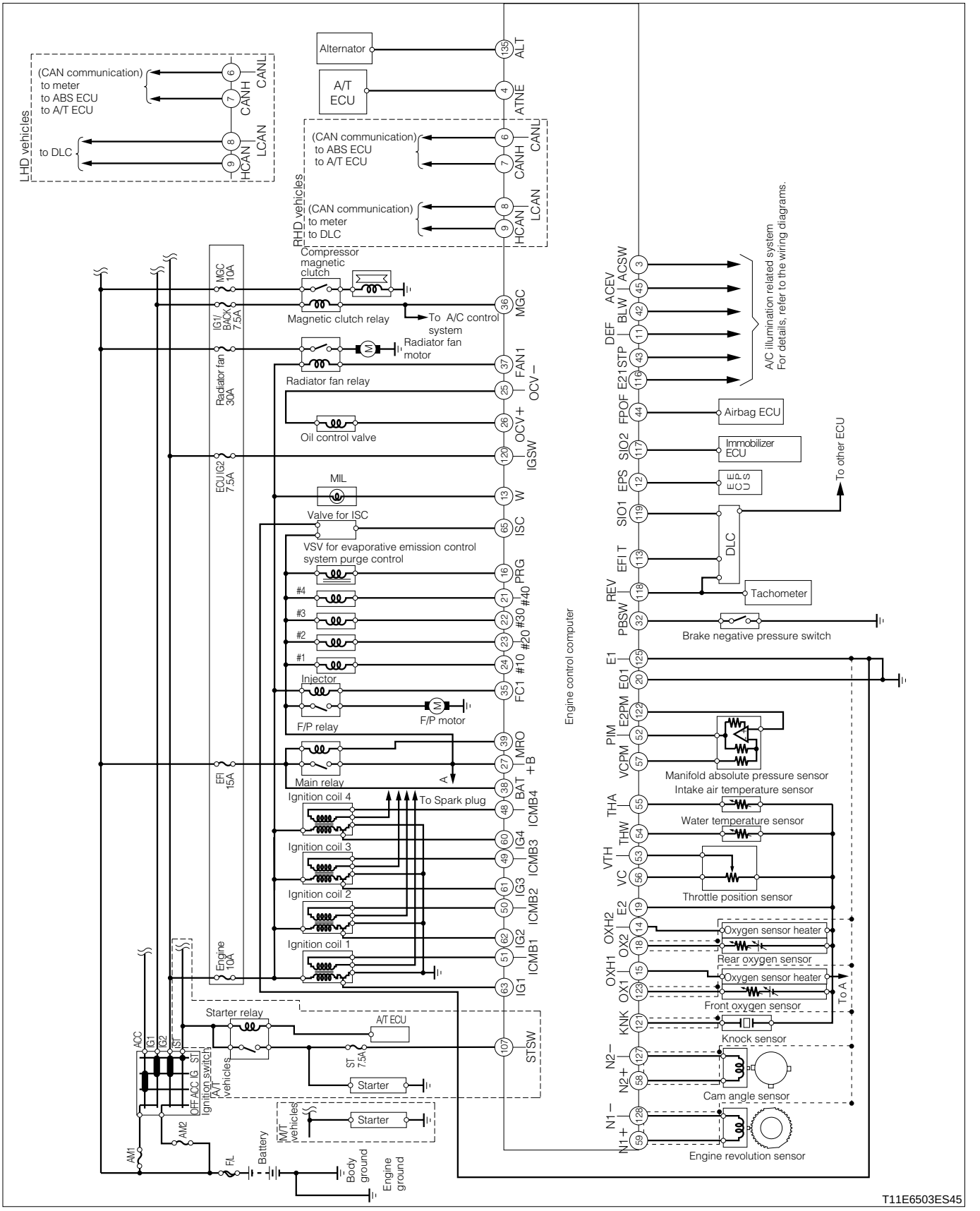
1-2 SYSTEM DRAWING



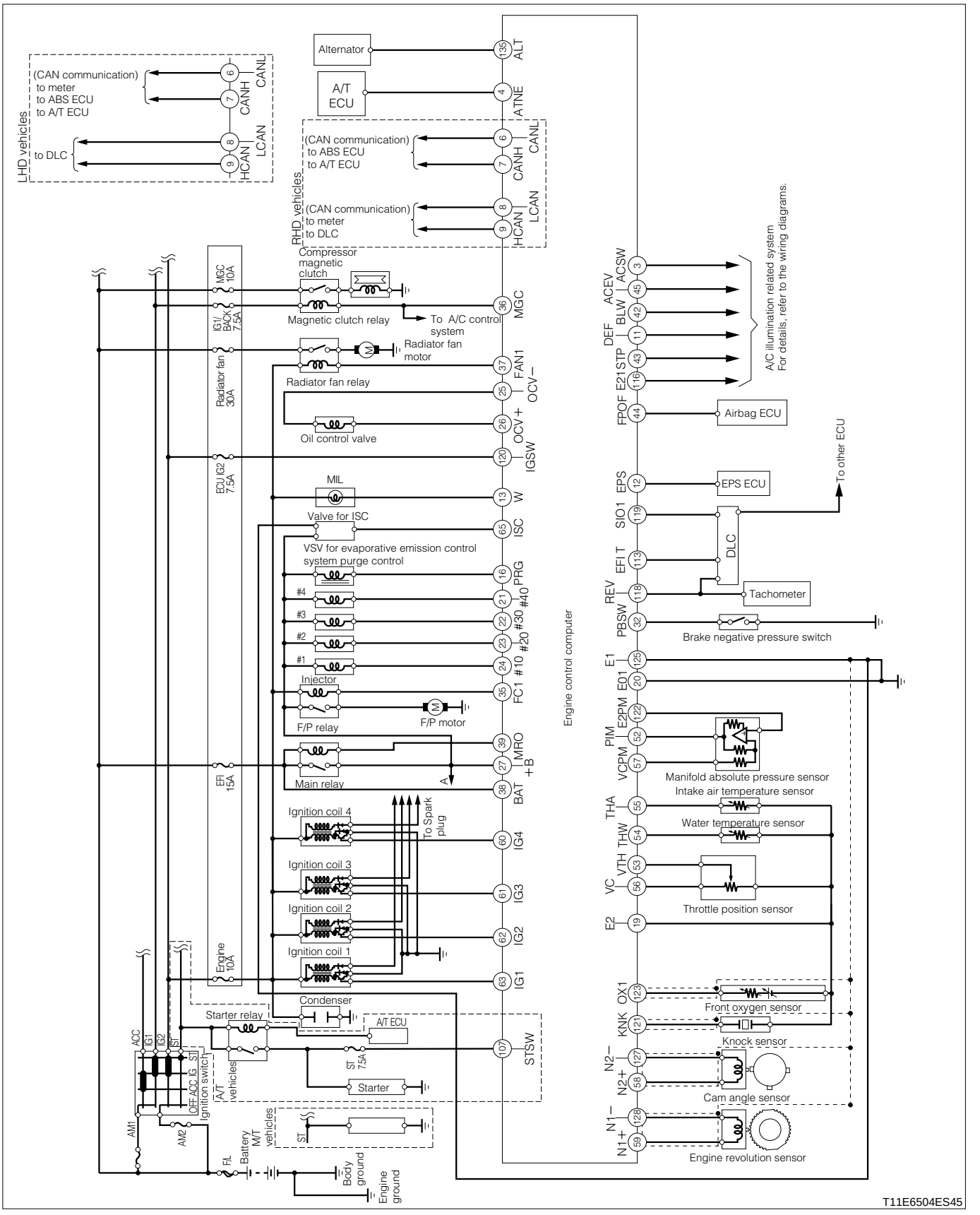
1: Ion current detection device built-in for only EU specifications
2: For only EU specifications

1-3 SYSTEM WIRING DIAGRAM

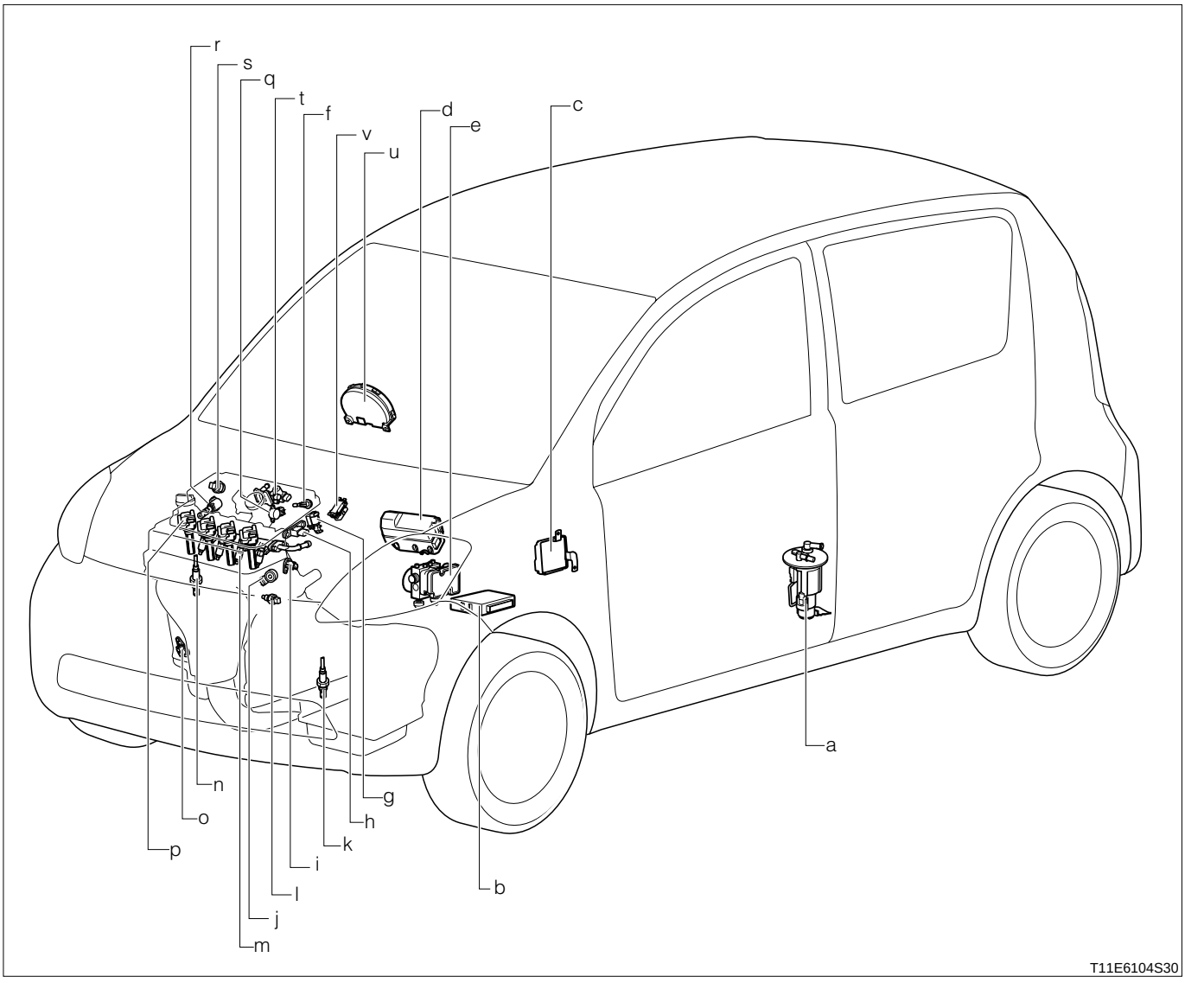
For EU Specifications



For general Specifications



1-4 LOCATION OF COMPONENTS



	Part name
a	Fuel pump
b	Engine control computer
c	Transmission control computer (A/T vehicle only)
d	Relay block
e	ABS actuator (ABS-equipped vehicles)
f	Intake air temperature sensor
g	VSV for evaporative emission control system purge control
h	Manifold absolute pressure sensor
i	Camshaft position sensor
j	Knock sensor
k	Rear oxygen sensor (EU-specification vehicle only)
l	Water temperature sensor
m	Injector
n	Oxygen sensor
o	Engine revolution sensor
p	Ignition coil
q	Throttle position sensor
r	Oil control valve
s	Brake negative pressure switch (A/T vehicle only)
t	Valve for ISC
u	Combination meter
v	DLC

2 CONTROL

2-1 EFI SYSTEM

2-1-1 DESCRIPTION

The electronic fuel injection system detects the driving condition through sensor signals based on the amount of intake air calculated from the intake manifold pressure and engine revolution speed. It controls injection quantity (amount of time that the injector is energized) to ensure the proper air-fuel ratio for the driving condition.

The electronic fuel injection system employs an intermittent injection that is synchronized with the engine revolution speed, performing independent injection for each cylinder.

As the fuel injection method, there are synchronous injection and asynchronous injection. The synchronous injection is an injection that is synchronized with the engine revolution signal. On the other hand, the asynchronous injection is an independent injection that is not synchronized with the engine revolution signal. This asynchronous injection takes place, for example, at the time of rapid acceleration.

Also, to protect the engine and catalyst, fuel cutting is performed according to the driving condition.

2-1-2 INJECTION SYSTEM

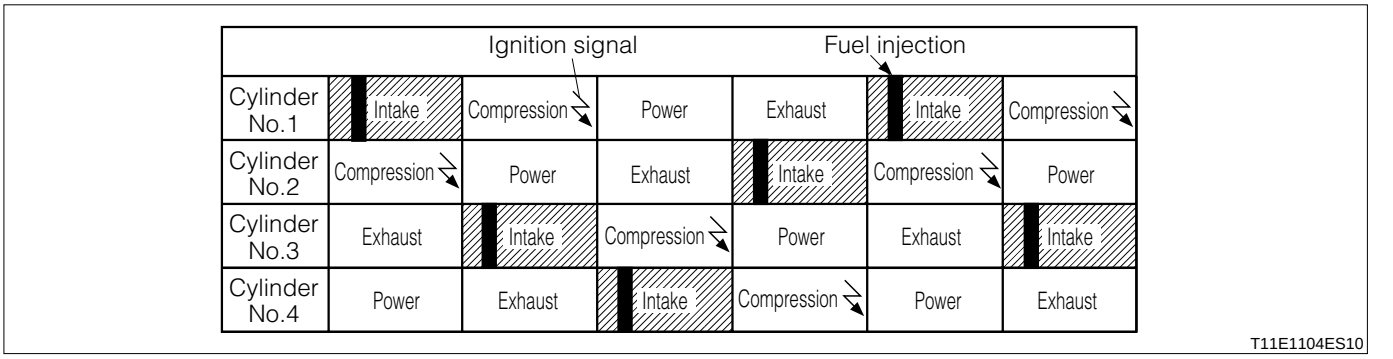
(1) Synchronous injection

The synchronous injection is an injection that is synchronized with the engine revolution signal. There are two methods for synchronous injection: One is the injection during starting period; and the other is the injection after starting period.

The judgment as to whether it is the starting period or after starting period is carried out, based on the engine revolution speed.

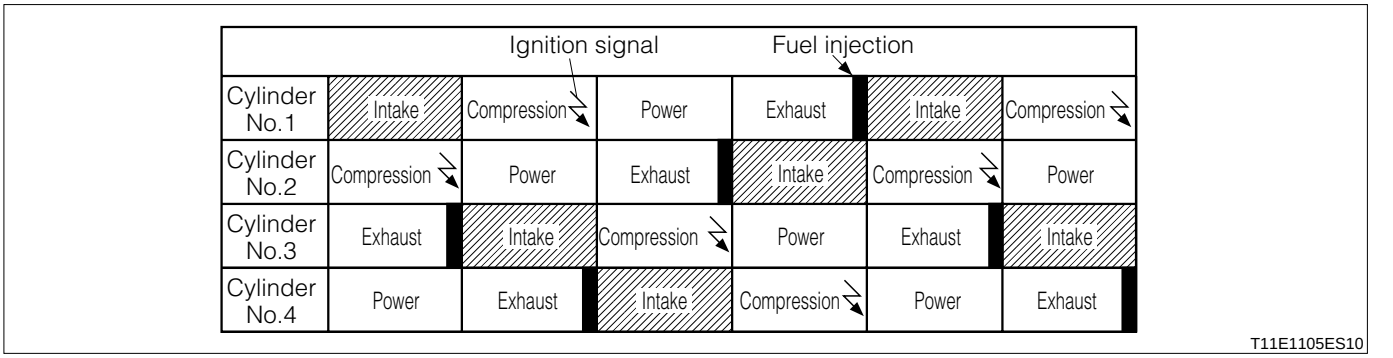
① Injection during starting period

A cylinder is identified based on the signal (cylinder identification signal) from the engine speed sensor. After the cylinder is identified, independent injection is performed in each cylinder in accordance with the information obtained from the sensor.



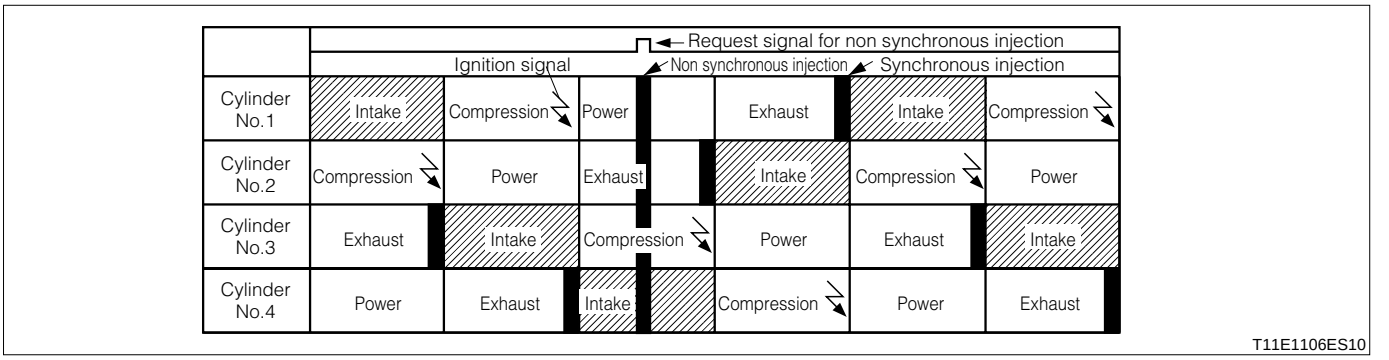
② Injection after starting period

Independent injection is performed, respectively, for each cylinder, based on the cylinder information by the revolution signal (N signal)



(2) Asynchronous injection

Injection is performed immediately when conditions are satisfied. The injection of this type occurs without synchronizing with the engine revolution signal.



2-1-3 DETERMINATION OF INJECTION AMOUNT (INJECTION TIME DURING SYNCHRONOUS INJECTION)

(1) Injection time during starting period

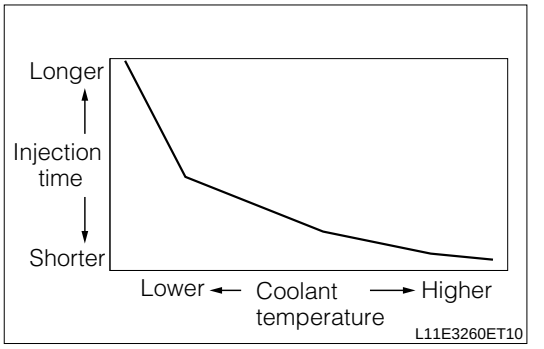
The injection time is determined by the basic injection time during starting period, which is determined by coolant temperatures, various compensation coefficients, and invalid injection time.

Injection time during starting period = Basic injection time during starting period × Various compensation coefficients + Invalid injection time

When the coolant temperature is below the set value, injection is performed into several injections.

① Basic injection time during starting period

The basic injection time is determined by the coolant temperature. When the engine is in a cold period, gasoline adhered to the intake valves and inner walls of the intake ports becomes difficult to evaporate. Therefore, the injection amount during cold period has been set to a greater value.



② Coefficient of compensation for revolution speed during starting period

When the coolant temperature is low, compensation suited for the engine speed is performed so that startability may be improved.

③ Coefficient of compensation for atmospheric pressure during starting period

Compensation suited for the atmospheric pressure is provided to improve startability.

④ Coefficient of compensation for the number of injections during starting period

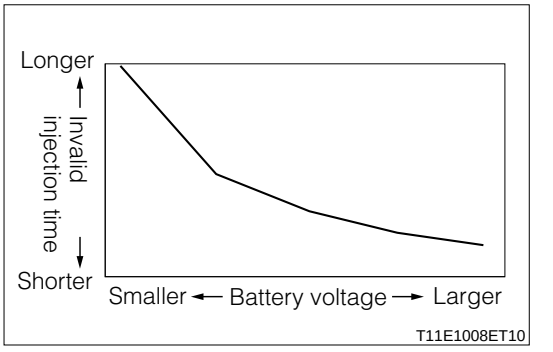
The number of injections during starting period is counted so that the injection time can be properly reduced based on the number of injections.

⑤ Coefficient of intake air temperature compensation

This coefficient is used to rectify the difference in the air density, which is caused by the difference in intake air temperatures.

⑥ **Invalid injection time**

The injector valve does not open at the moment of energizing and requires some time period for injection to start. This time period is referred to as invalid injection time. Invalid injection time will vary with the battery voltage, with a higher battery voltage resulting in a shorter invalid time, while a lower battery voltage resulting in a longer invalid time. For this reason, the injector energizing time is calculated by adding the invalid injection time, which is based on the constantly measured battery voltage, to the actual injection time.



(2) Injection time after starting period

The injection time is determined by the basic injection time after starting period, various compensations and invalid injection time.

Injection time after starting period = Various compensation time based on basic injection time after starting period + Invalid injection time

① **Basic injection time after starting period**

This is a time determined by the intake manifold pressure and engine revolution speed.

② **Coefficient of intake air temperature compensation**

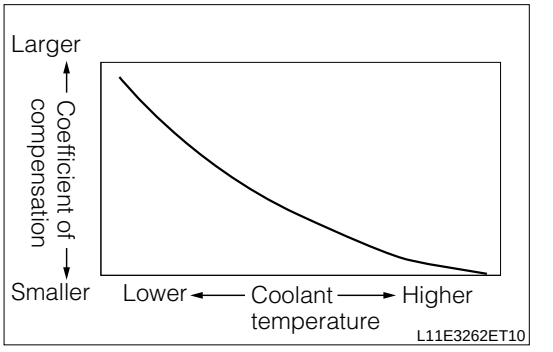
This coefficient rectifies the difference in the air density, caused by the difference in intake air temperatures.

③ **Compensation coefficient during resuming period after fuel cut**

The injection amount is reduced according to the reduced number of rotations during resuming period after fuel cut in order to improve drivability.

④ **Coefficient of compensation for increase of engine warming-up**

This is an increase compensation for the engine cold period determined by the coolant temperature. This compensation is carried out, until the warming-up is completed.



⑤ **Coefficient of increase compensation after starting period**

In order to achieve the stabilization of engine revolution speed immediately after the engine has started, the initial value for the coefficient of increase is determined according to the coolant temperature during the engine starting period. Then, the value is reduced at every time when the injection takes place after the engine starting.

⑥ **Time of compensation for air-to-fuel ratio during transient time**

This is for the compensation of the air-to-fuel ratio during transient time. This time is determined based on the coolant temperature, etc.

⑦ **Coefficient of air-to-fuel ratio feedback compensation**

Rich or lean condition in the air-fuel mixture is detected by the signal from the O_2 sensor and the rear O_2 sensor* during the engine running after warm-up. The injection quantity is adjusted accordingly so that the air-fuel ratio is controlled in the narrow range near the theoretical air-fuel ratio where the three-way catalyst exhibits high performance.

NOTE

- *: Rear O_2 sensor is for the EU-specification vehicle only.

⑧ Coefficient of power increase compensation

During a high load driving, the amount of injection is increased according to the intake manifold pressure and engine revolution speed.

⑨ Coefficient of compensation for increase after re-starting

The initial value is determined according to the coolant temperature at time of re-starting. The injection amount is reduced for each injection.

⑩ Coefficient of atmospheric pressure compensation

Compensation according to the atmospheric pressure is performed.

⑪ Idling stabilization compensation advance

During idling, the injection amount is compensated based on the engine revolution signal to stabilizing the revolution speed.

⑫ Water temperature compensation advance

During a high load, high revolution driving, the advance value is compensated according to the coolant temperature.

⑬ Coefficient of low-rotation compensation

The injection amount is increased during low-rotation period.

⑭ Compensation coefficient during knock feedback

Injection quantity is increased when the ignition timing is too retarded during knock feedback.

⑮ Invalid injection time

(See the section of the invalid injection time of the injection time during starting period.)

2-1-4 DETERMINATION OF INJECTION AMOUNT (INJECTION TIME DURING ASYNCHRONOUS INJECTION)

(1) Asynchronous injection during change in idle switch

When the throttle valve is changed from the closed state (idling condition) to the opened state, injection occurs once for all cylinders simultaneously for a certain length of time.

(2) Asynchronous injection during change in intake manifold pressure

Injection occurs once for all cylinders simultaneously for a certain length of time according to the increase ratio of the intake manifold pressure.

(3) Asynchronous injection during resuming period after fuel cutting

If the engine revolution speed drops drastically during the resuming period after fuel cutting, injection occurs for a certain length of time.

(4) Asynchronous injection when the air-conditioner is ON

When the air-conditioner is switched from OFF"→"ON"

(5) Asynchronous injection when the power steering is "ON".

When a request signal is sent from EPS ECU during steering wheel operation, injection occurs for a certain length of time.

2-1-5 FUEL CUTTING

(1) Fuel cutting during deceleration

When the engine revolution speed exceeds the specified value and the throttle valve is closed, fuel cut occurs.

(2) Fuel cutting during catalyst overheated period

Fuel is cut off according to the engine revolution speed and the intake manifold pressure, thus preventing the catalyst from overheating.

(3) Fuel cutting at high engine revolution speed

When the engine revolution speed exceeds the specified value, fuel cut occurs.

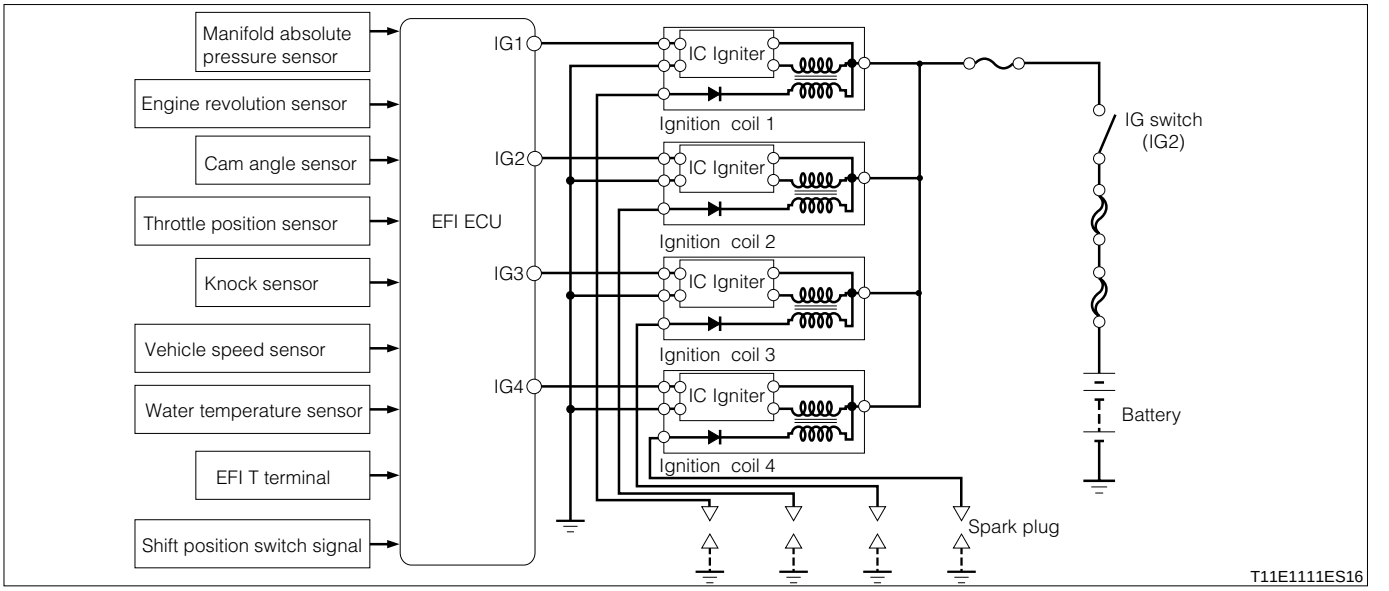
2-2 ELECTRONIC SPARK ADVANCE SYSTEM

2-2-1 DESCRIPTION

ESA (electronic spark advance system) uses the engine control computer to calculate and control the optimal ignition timing according to the engine conditions after the cylinder has been identified by the engine speed sensor signal.

In addition, the ion current combustion control system detects the ion current in the combustion chamber and controls ignition timing for optimal combustion.

The electronic spark advance system can be classified into two modes: One is a fixed spark advance synchronized with the engine revolution signal, and the other is a calculation spark advance determined by the engine revolution speed and intake manifold pressure.



2-2-2 DETERMINATION OF IGNITION TIMING

(1) Fixed advance

BTDC6˚ fixed spark advance synchronized with the engine revolution signal occurs during start-up or short circuit condition at the EFI-T terminal.

(2) Calculation advance

Under conditions other than the fixed advance, the ignition timing is determined by engine conditions, such as the intake manifold pressure and engine revolution speed.

Ignition timing advance = Basic advance ± Various compensation advances

① **Basic advance**

This is the ignition timing determined by the engine revolution speed and intake manifold pressure.

② **Water temperature compensation advance**

The advance value is compensated according to the coolant temperature.

③ **Idling stabilization compensation advance**

In cases where the idling speed drops during the idling period, the timing is advanced. Conversely, in cases where the idling speed rises, the timing is retarded.

④ **Transient compensation advance**

The advance value is compensated in accordance with sharp fluctuations of the intake manifold pressure during running.

⑤ **Torque reduction compensation advance (A/T vehicles only)**

In order to reduce shifting shocks, the ignition timing is retarded so as to reduce the engine torque when sharp acceleration is made from a low speed or when a shift is made from [P] or [N] range to other ranges.

⑥ **Control of energizing time**

The energizing time of the ignition coil is controlled in accordance with the engine revolution speed and power supply voltage to the ignition coil.

⑦ Knock compensation advance

When knocking is detected by the output signal of the knock sensor, ignition timing will retard immediately. When knocking does not occur for a given length of time, ignition timing will be advanced gradually until knocking occurs again. In this way the optimal ignition timing can be maintained at all times. Compensation value is limited to prevent adverse influence to the engine.

⑧ Acceleration surging compensation advance

The ignition timing advance is compensated when the intake manifold pressure changes beyond a set amount during acceleration at a low speed after the engine has warmed up.

⑨ Inner EGR compensation advance

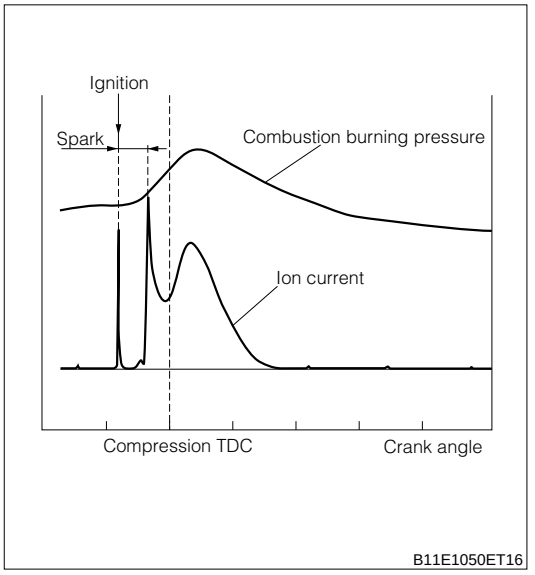
The ignition timing advance is compensated according to the variable valve timing..

2-2-3 ION CURRENT COMBUSTION CONTROL SYSTEM

(1) DESCRIPTION

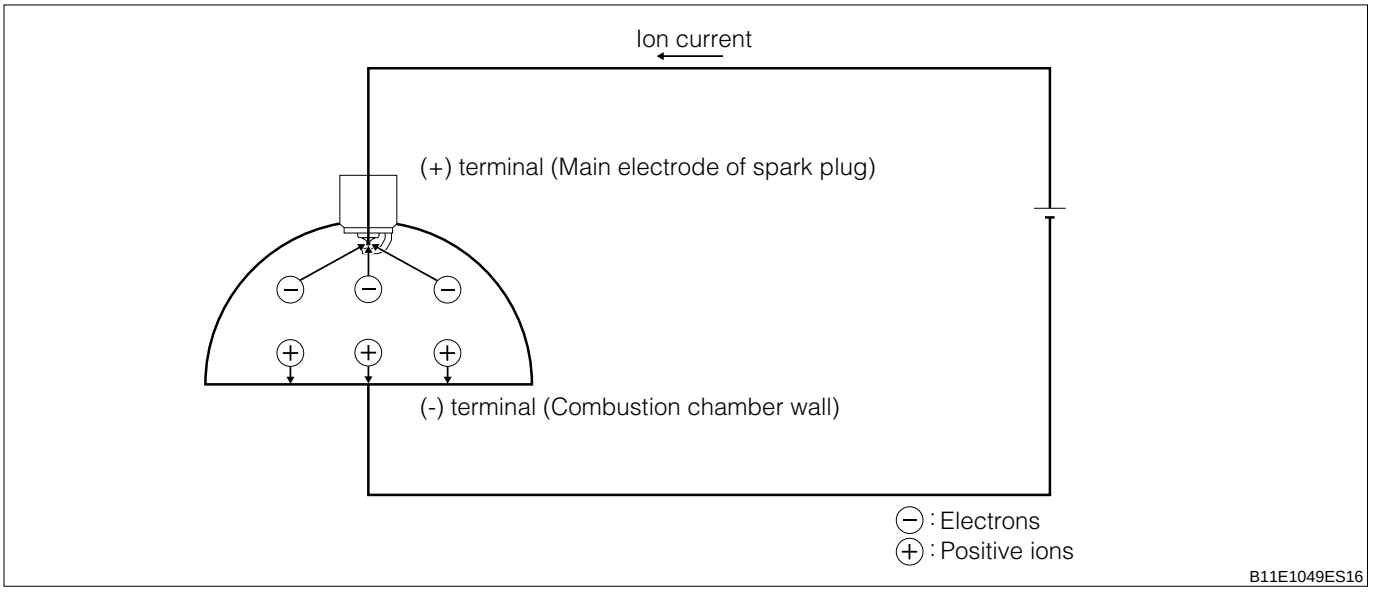
The engine control computer uses the spark plug to detect ion current generated during combustion burning, thereby detecting combustion burning condition in the cylinder.

This allows detection of misfire and combustion limit, thus controlling ignition timing for optimal combustion.



(2) Principle

1.Positive ions and electrons are generated in the flame during combustion.
2.When the charge voltage on the primary side of the ignition coil is applied to the main electrode of the spark plug after the arc discharge ignition, ion current will be produced in the flame.
3.The detected ion current, as being a minute output, is subject to noise. Therefore, ion current waveform is converted into a rectangular wave in the ion current detection circuit, which is built into the ignition coil, and the signal is sent to the engine control computer to determine combustion and misfire.
4.Ion current is not created when engine misfire occurs. Therefore, when the input voltage of the engine control computer falls below the standard value, it determines that misfire has occurred.

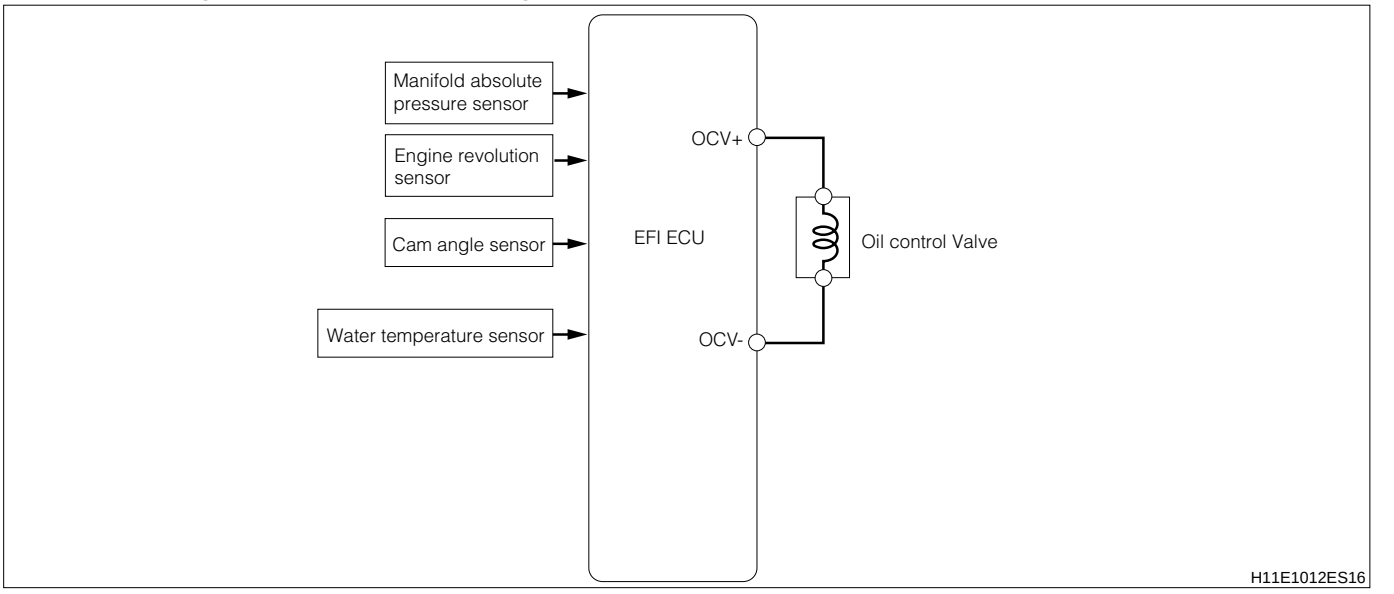


2-3 DYNAMIC VARIABLE VALVE TIMING CONTROL

2-3-1 DESCRIPTION

The engine control computer turns ON and OFF the oil control valve according to the signals from the manifold absolute pressure sensor, coolant temperature sensor and engine revolution speed so as to regulate the hydraulic pressure applied to the variable valve timing controller. This way, the opening/closing timing of the intake air valve can be controlled to the target timing. The opening/closing timing of the intake air valve is detected by the camshaft position sensor. Any deviation, when encountered, will be corrected.

The valve timing is controlled by the engine control computer in three control modes.



(1) Forced most-retarded angle mode

This is the mode that forces the No. 1 camshaft to rotate till maximum retard in the intake valve open/close timing . This mode is used to regulate the oil control valve when starting and when battery voltage falls below the set value.

(2) 0˚retention mode

The retention mode is used, when a target displacement is 0˚. (Refer to the following section on feedback mode for the target displacement angle.)

(3) Feedback mode

① Determination of target displacement angle

The target displacement angle is determined according to the throttle valve opening degree, intake manifold pressure, atmospheric pressure, engine revolution speed, and coolant temperature.

② Determination of oil control valve driving duty ratio

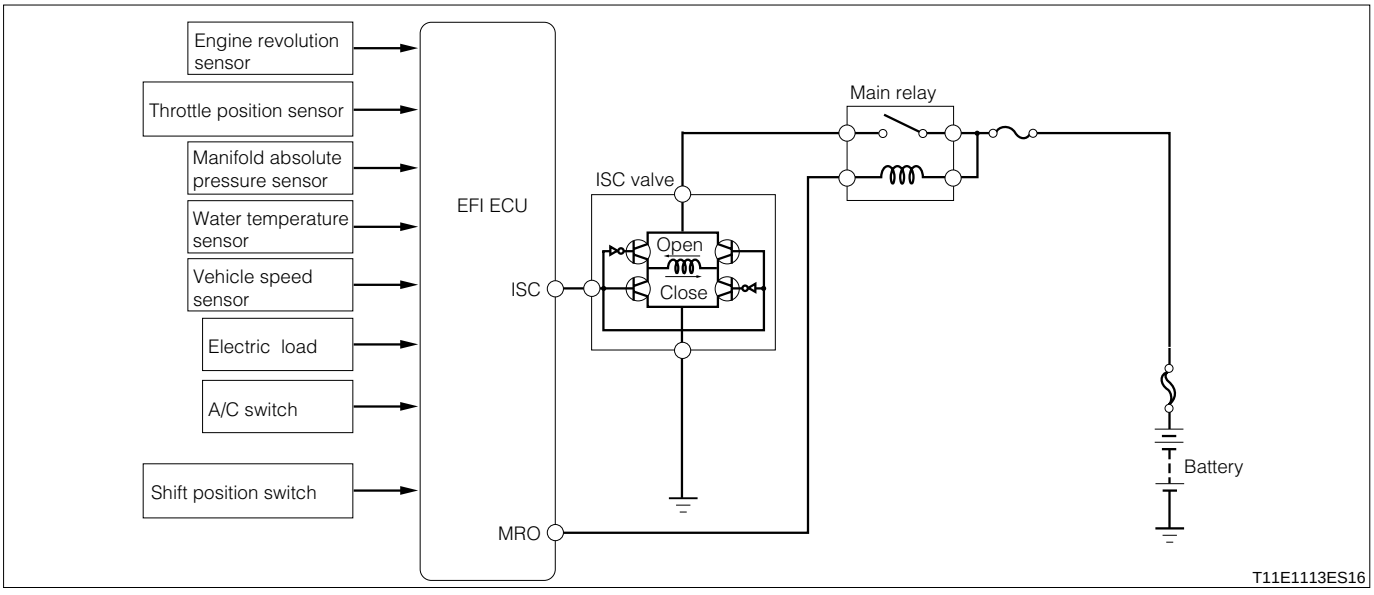
The duty ratio is determined based on the signal from the target displacement angle and camshaft position sensor according to the engine revolution speed and coolant temperatures.

2-4 IDLE SPEED CONTROL SYSTEM (ISC)

2-4-1 DESCRIPTION

The idle speed control (ISC) controls the engine idle speed to prevent engine stall that occurs due to the load applied to the engine during idling.

The engine control computer controls the ON/OFF duty ratio for energizing the ISC valve by the signal sent from the sensors. In this way, it controls the pass way area that bypasses the main passage, where the throttle valve is located, in order to control the intake air during idling.



2-4-2 DETERMINATION OF DRIVING DUTY RATIO

The engine control computer determines the opening angle of the ISC valve by the signal from sensors and outputs the duty ratio according to that opening to the ISC valve.

(1) Water temperature compensation amount

During the period from the engine starting through the end of warming-up, the duty ratio is compensated according to the coolant temperature.

(2) Compensation amount during starting period

During the engine starting period and for several seconds after the starting, the duty ratio is increased to increase intake air in order to improve the engine start ability.

(3) Compensation amount for feedback

The duty ratio changes according to the difference between the idle speed and the target revolution speed to achieve the target revolution speed.

(4) External load compensation amount

1. When changes occur in the air conditioner load, shift range load (A/T vehicle only), electric load, radiator fan load and so forth, the opening angle of the ISC valve changes according to respective loads, thereby controlling the engine revolution speed.
2. The engine revolution speed is controlled by the power steering load (when the steering wheel is operated with the vehicle in a stationary state) during idling period.

(5) Compensation amount by engine revolution load

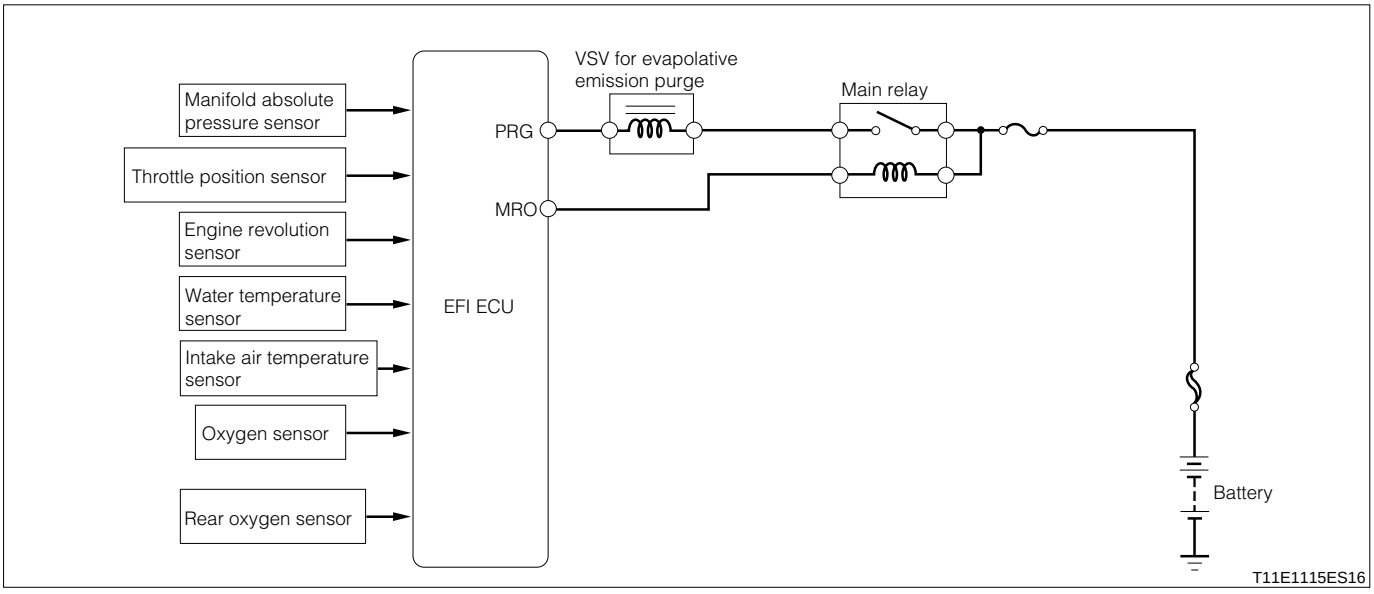
The duty ratio rises once, and then gradually drops, in order to obtain better converge into the target revolution speed when the engine revolution speed drops.

2-5 VSV CONTROL FOR EVAPORATOR PURGE

2-5-1 DESCRIPTION

When all of the following conditions are satisfied, the engine control computer turns ON the VSV for evaporative emission purge (duty control), thus purging the fuel evaporative emissions to the combustion chamber.

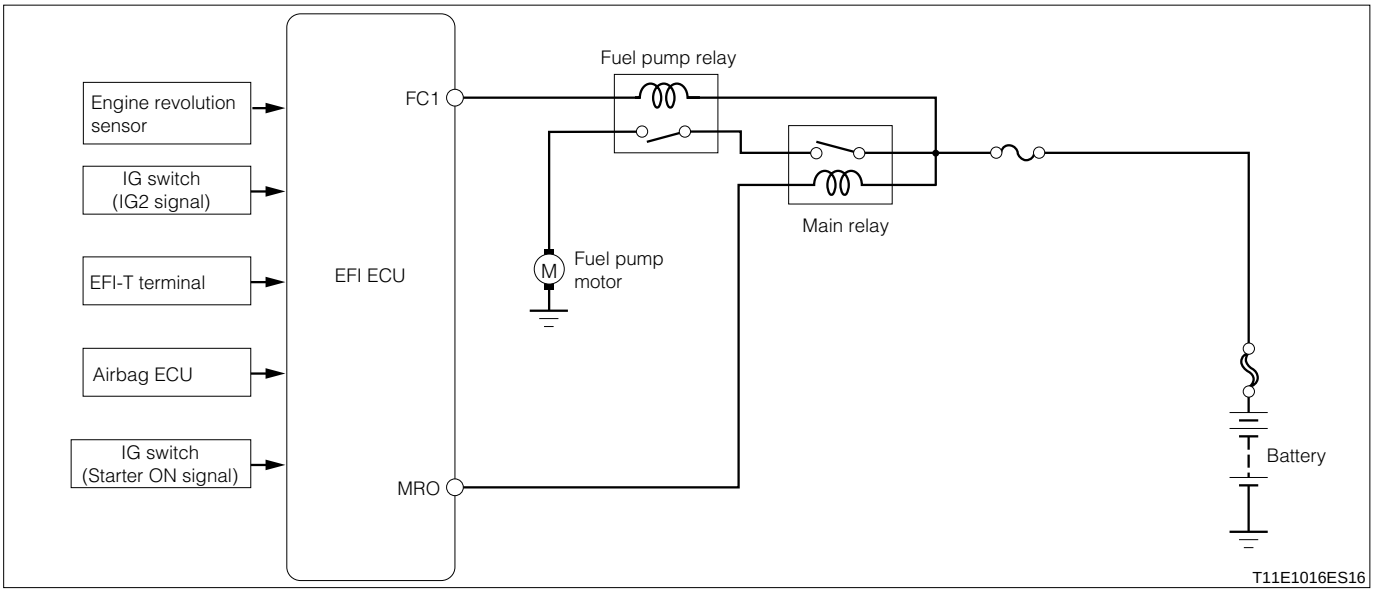
1.After engine has warmed up
2.During the air-to-fuel ratio feedback
3.When the accelerator pedal is depressed:
4.When the engine control computer is not in a learning mode:



2-6 FUEL PUMP CONTROL

When any of the following 4 conditions is satisfied, and no fuel pump stop signal is sent from the airbag ECU, the engine control computer will turn ON the fuel pump relay to activate the fuel pump.

1. For two seconds after the IG switch ON (with the terminal EFI-T turned OFF):
2. For eight seconds after the IG switch ON (with the terminal EFI-T turned ON):
3. After identifying the cylinder and for two seconds after the revolution signal is inputted (The pump is continued to be driven when the engine revolution speed is more than 20 rpm.):
4. Three seconds after starter is switched from OFF → ON



2-7 AIR CONDITIONER CUT CONTROL

2-7-1 DESCRIPTION

When the following conditions for the air conditioner cutting are satisfied, the engine control computer turns OFF the air conditioner relay and the compressor magnet clutch, thereby cutting the air conditioner.

(1) Air conditioner cut by coolant temperature

When the following conditions are satisfied, the air conditioner is cut.

1.When the coolant temperature becomes above the set value:

(2) Air conditioner cut in running area

When at least one of the following conditions is satisfied, the air conditioner is cut.

1.When the throttle valve opening degree and the manifold absolute pressure exceed the set value:

2.When the throttle valve opening degree exceeds the set value by the vehicle speed:

(3) Air conditioner cut when engine revolution speed drops (A/T vehicle only)

When all of the following conditions are satisfied, the air conditioner is cut.

1.When the engine revolution speed is the set value or less with the shift lever in a range other than P or N:

2.When the drop of the engine revolution speed exceeds the set value:

(4) Air conditioner cut during deceleration (A/T vehicle only)

When all of the following conditions are satisfied, the air conditioner is cut.

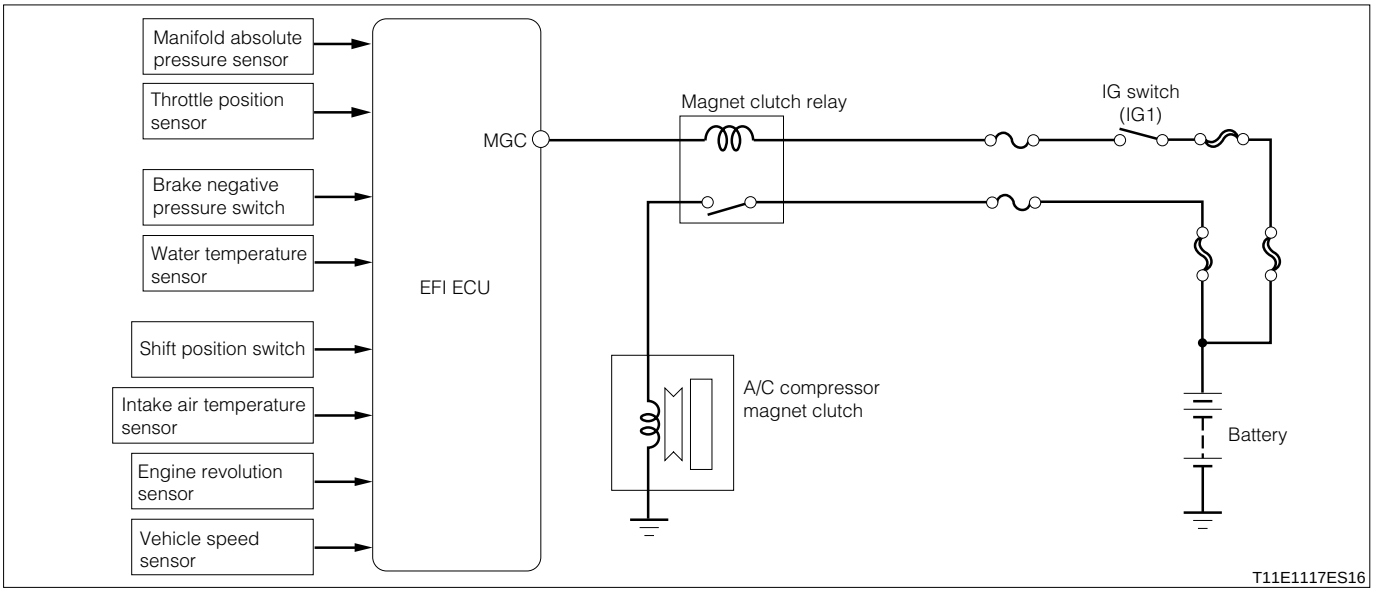
1.When the shift lever is in a range other than Ⓟ, Ⓝ:

2.When the idle switch is ON:

3.When the manifold absolute pressure due to engine revolution speed exceeds the set value:

4.When the vehicle speed is in the set range:

5.When the vehicle speed change exceeds the set value:



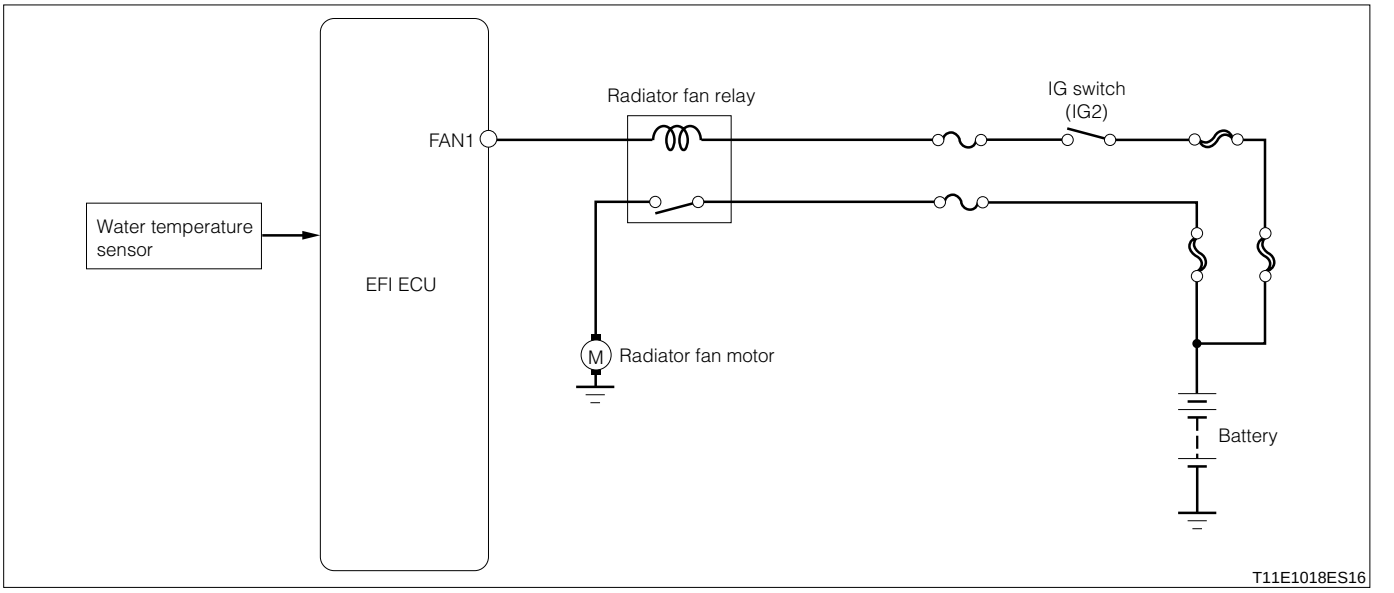
2-8 RADIATOR FAN MOTOR CONTROL

2-8-1 DESCRIPTION

When the preset condition is satisfied, the radiator fan relay is turned ON, and the radiator fan motor is operated. If not satisfied, the radiator fan relay is turned OFF.

NOTE

- When an abnormality occurs in the coolant temperature sensor system, the radiator fan motor rotates all the time by the fail-safe function.



2-9 AIR CONDITIONER IDLE-UP CONTROL

2-9-1 DESCRIPTION

When all of the following conditions are satisfied, the engine idle speed is increased.

1. When the air conditioner switch is ON:
2. When the blower switch is ON:
3. When the air conditioner cutting control is not performed:
4. When the air conditioner evaporator temperature exceeds the set value:

2-10 MAGNET CLUTCH CONTROL

2-10-1 DESCRIPTION

When all of the following conditions are satisfied, the magnet clutch is turned ON.

1. When the air conditioner idle-up control is performed:
2. When the engine revolution speed exceeds a certain value:

2-11 ALTERNATOR CONTROL

2-11-1 DESCRIPTION

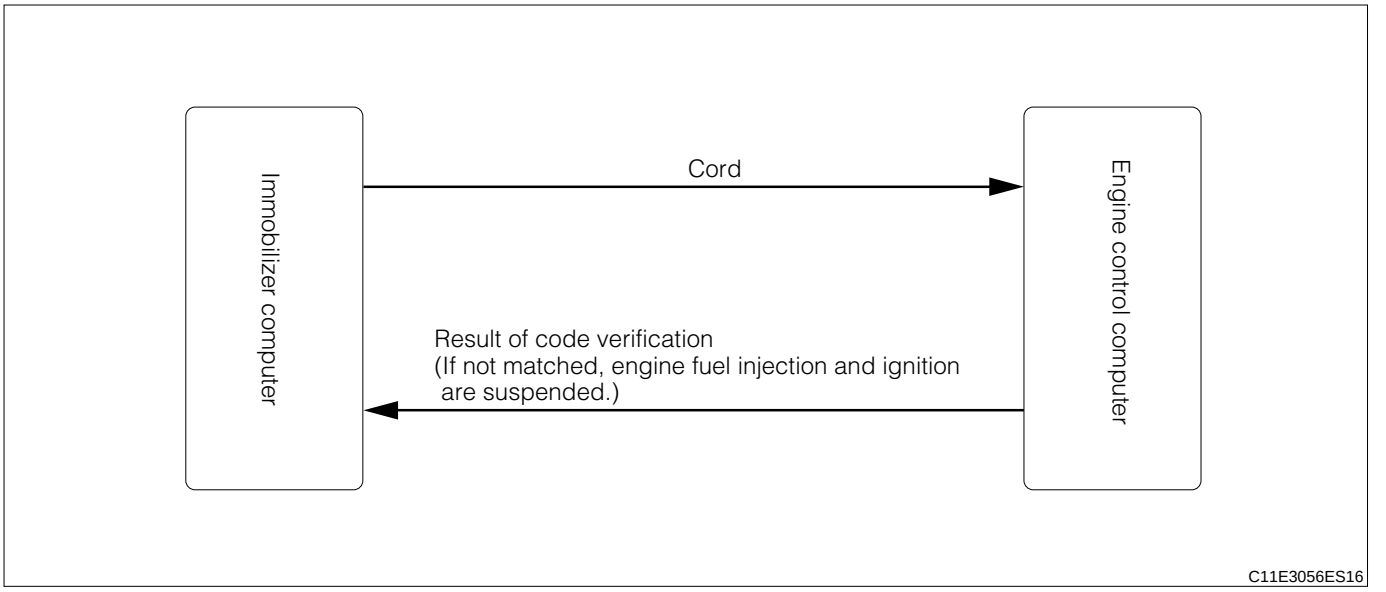
When the preset condition is satisfied, the alternator stops charging.

2-12 AIRBAG ECU COMMUNICATION

When the signal from the airbag ECU is received in the event of a collision, etc., the fuel pump relay is turned OFF, thus stopping the fuel pump.

2-13 IMMOBILIZER SYSTEM COMMUNICATION (IMMOBILIZER SYSTEM-EQUIPPED VEHICLE ONLY)

The engine control computer communicates with the immobilizer ECU for code verification. If the code does not match, fuel injection and ignition are stopped to prevent the engine from starting.



2-14 CAN COMMUNICATION

The engine control computer conducts CAN communication with the meter ECU, A/T ECU (A/T vehicle only) and ABS ECU (ABS-equipped vehicle only). Multiple pieces of information and data are sent and received through a pair of communication wires (twisted pair wiring).

Refer to the section "CAN communication system" for the details of CAN communication.

Refer to Page L2-1.

2-15 DIAGNOSIS (SELF-DIAGNOSIS) FUNCTION

2-15-1 OUTLINE

(1) DESCRIPTION

In the diagnosis system, a computer memorizes any system which encounters abnormality in its output/input signal systems, and inform the driver of the abnormality by flashing or illuminating the malfunction indicator lamp (MIL, warning lamp) while the engine is running.

Since the memory of the diagnosis content is performed directly by the battery, the diagnosis content is memorized even if the IG switch is turned ACC or LOCK. For detailed information about the assignment of the diagnosis trouble code (DTC), the checking and erasing procedures for the DTC, refer to the EF section of the service manuals. The following shows the DTC the table showing failsafe functions, although these information is posted in the EF section of the service manuals.

(2) Instructions on use of this technical information book

This technical information book covers both the area where type certification is conducted based on the EC exhaust emission approval procedures, and other areas. However, the assignment of the diagnosis trouble codes and their reading are different between these two areas. Hence, observe the following instructions.

1. Use of DS-21 diagnosis tester or OBD II generic scan tool:
   (1) Areas where type certification are performed based on EC exhaust emission approval procedures: Use the 4-digit code (example, P0105) which is assigned according to the ISO standards.
   (2) You can use the 4-digit codes by using the DS-21 diagnosis tester or OBD II generic scan tool. Or you can also use two-digit codes (example, 31) without using such tester or tool. You can employ whichever convenient method.
2. The OBD II generic scan tool refers to a scan tool which complies with the ISO 14230 (KWP2000) format.
3. When the OBD II generic scan tool is used, all trouble codes (4-digit codes) can not be read out. It should be remembered that only trouble codes which have a zero after P, like P0XXX, can be read out.
4. The 2-digit codes are slightly inferior to the 4-digit codes in identifying the trouble sections.
5. The area where type certification is performed based on EC exhaust emission approval procedures is hereinafter referred to as the EU area.

2-15-2 FAIL-SAFE FUNCTION

When abnormality takes place in the signal from sensors, or malfunctions take place in the control of the oil control valve for the variable valve timing, conditions such as engine failure, catalyst overheating may result, if the control is continued as it is. To prevent this, the fail-safe function uses the values stored in the computer in order to control operations.

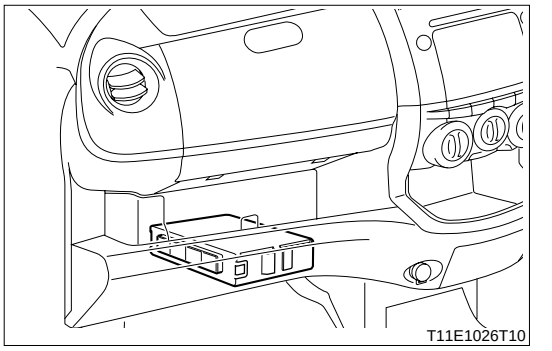
When the malfunction is remedied to the normal condition after an abnormality was detected, the fail-safe control will be released. However, the diagnosis result remains.

Fail safe specifications

Item	Fail-safe execution conditions	FAIL-SAFE SPECIFICATIONS
Manifold absolute pressure sensor signal system	When abnormality takes place in the signal from the manifold absolute pressure sensor:	The manifold absolute pressure is estimated by the throttle opening angle and the engine revolution speed. When abnormality occurs in the signal from the throttle position sensor, the signal from the manifold absolute pressure sensor is set to the constant value. If both the throttle opening angle and engine speed exceed their set values, the fuel is cut.
Ignition system	When malfunction takes place in the ignition signal:	Fuel injection is cut in the cylinder whose ignition signal is faulty.
Coolant temperature sensor system	When malfunction takes place in the signal from the coolant temperature sensor:	The signal from the coolant temperature sensor is set to a constant value.
Throttle position sensor system	When abnormality takes place in the signal from the throttle position sensor:	The signal from the throttle position sensor is set to a constant value.
A/C evaporator temperature sensor signal system	When malfunction takes place in the signal from the A/C evaporator temperature sensor:	The air conditioner will be cut.
Atmospheric pressure sensor circuit malfunction	When the signals from the atmospheric pressure sensor are not outputted continuously over a certain length of time after starting.	The signal from the atmospheric pressure sensor is set to a constant value.
Knock sensor signal system	When abnormality takes place in the signal from the knock sensor:	The ignition timing is retarded.
Intake air temperature sensor signal system	When malfunction takes place in the signal from the intake air temperature sensor:	The signal from the intake air temperature sensor is set to a constant value.
Oil control valve system	When malfunction takes place in the control voltage for the oil control valve:	Oil control valve energizing control is prohibited.
Camshaft position sensor system	When malfunction takes place in the signal from the camshaft position sensor:	The signal from the camshaft position sensor is set to a constant value.
Rear O_2 sensor system (EU-specification vehicle only)	When abnormality takes place in the signal from the rear O_2 sensor:	The feedback control is changed to open control.
Immobilizer communication system (Immobilizer system-equipped vehicle only)	When abnormality takes place in the communicates with the immobilizer ECU, code reference failed due to malfunction in the computer internals.	Fuel injection and ignition are stopped.

3 COMPONENTS

3-1 ENGINE CONTROL COMPUTER



The engine control computer is mounted under the glove box on the front passenger seat side, providing fuel injection control, electronic spark advance control, variable valve timing control, idol speed control, evaporator purge control, etc. The engine control computer communicates with other ECU's, outputs the operation status of the engine through EFI ECU, and inputs the signal from ECU's, providing various controls such as idle-up, fuel cut, and ignition stop.

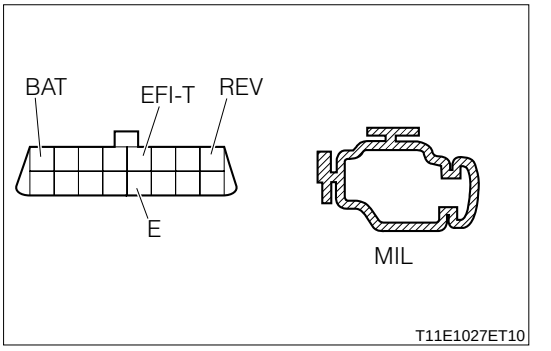
3-2 DLC

3-2-1 DESCRIPTION

The DLC is installed in front of the driver's seat (at the lower end of the instrument panel, on the driver's door side), providing the following checks.

(1) Indication of diagnosis

(2) Indication of O_2 sensor state



3-2-2 INDICATION OF DIAGNOSIS

When the terminal EFI T and E are shorted while the IG switch is ON, the engine check lamp inside the combination meter flashes to indicate the error code, starting with a smaller code. The error code is identified by the number of flashing, displayed repeatedly.

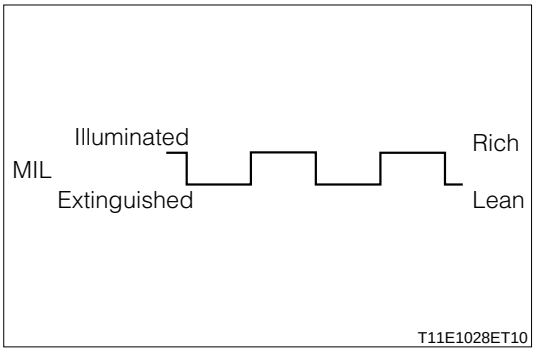
3-2-3 INDICATION OF O_2 SENSOR STATE

Short-circuit the terminal EFI T and E with the IG switch turned ON, maintain the engine speed above 2000rpm, and keep the brake pedal depressed. In this way, the output status of the O_2 sensor and feedback control can be checked by ON/OFF operations of the engine check lamp.

(No indication of the rear O_2 sensor state)

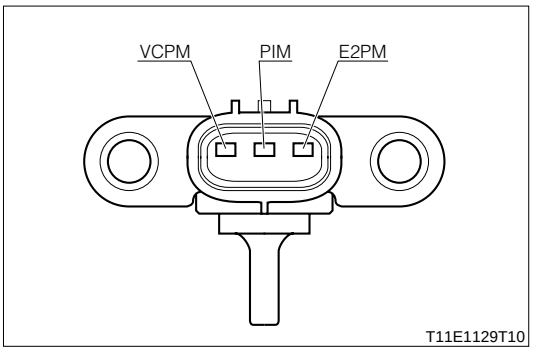
(1) Rich side: Lamp ON

(2) Lean side: Lamp OFF



3-3 MANIFOLD ABSOLUTE PRESSURE SENSOR

The manifold absolute pressure sensor is installed to the air cleaner to detect the manifold absolute pressure inside the intake manifold through the hose.

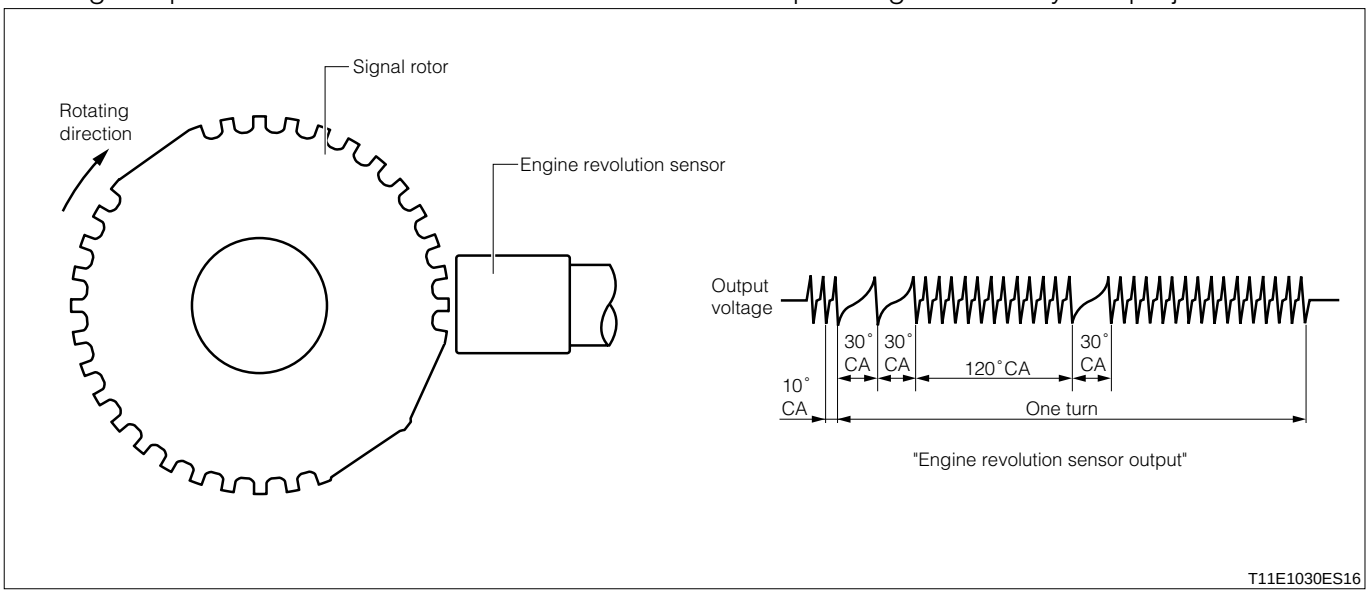


3-4 ENGINE SPEED SENSOR, SIGNAL ROTOR

The signal rotor is installed at the front of the crankshaft in order to detect the crank angle. The signal rotor has a projection for which the engine speed sensor is installed.

As the crankshaft turns, the air gap changes between the engine revolution sensor and the projection provided on the signal rotor, causing changes in the magnetic flux to generate a pulse.

The engine speed is calculated based on the interval of the pulses generated by this projection.

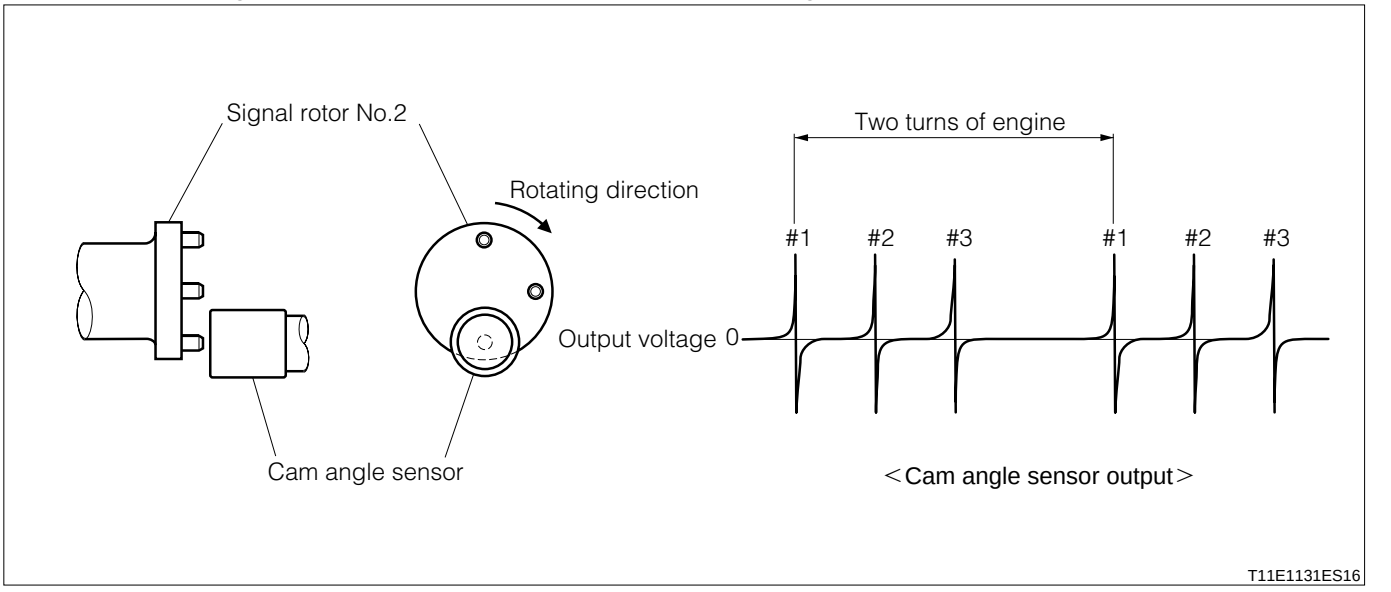


3-5 CAMSHAFT POSITION SENSOR AND SIGNAL ROTOR NO.2

A projection is provided at the rear of the No.1 camshaft to detect the phase of the No.1 camshaft and the crankshaft. The camshaft position sensor is mounted at the rear of the cylinder head.

When the No.1 camshaft makes a turn, the air gaps change between the camshaft position sensor and each of the three projections on the signal rotor No.2. As a result, the magnetic flux changes, and three pulses per turn are generated at the camshaft position sensor.

The phase of the No.1 camshaft and the crankshaft is detected by the signals from the camshaft position sensor and the engine speed sensor. The variable valve timing control is performed based on this phase.



3-6 COOLANT TEMPERATURE SENSOR

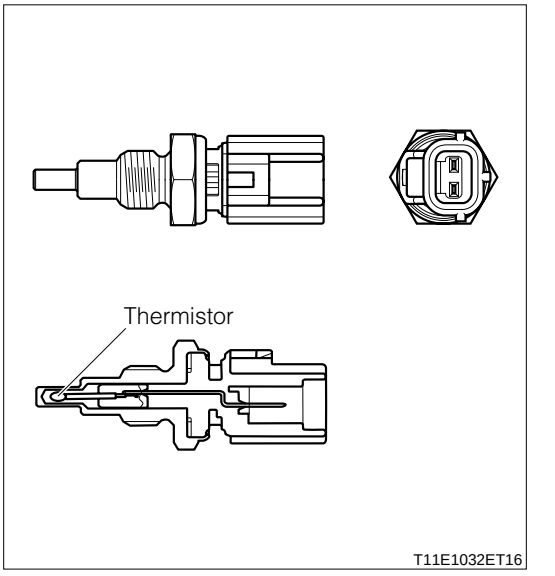
The coolant temperature sensor, mounted on the cylinder head, detects the coolant temperatures.

The sensor has a built-in thermistor, whose resistance changes with temperature. The input signals from the thermistor are sent to the engine control computer.

The coolant temperature gauge in the meter uses coolant temperature signals sent from the engine control computer through CAN communication.

Coolant temperature sensor

Temperature [℃]	−20	20	80	110
Resistance [kΩ]	15.04	2.45	0.318	0.142

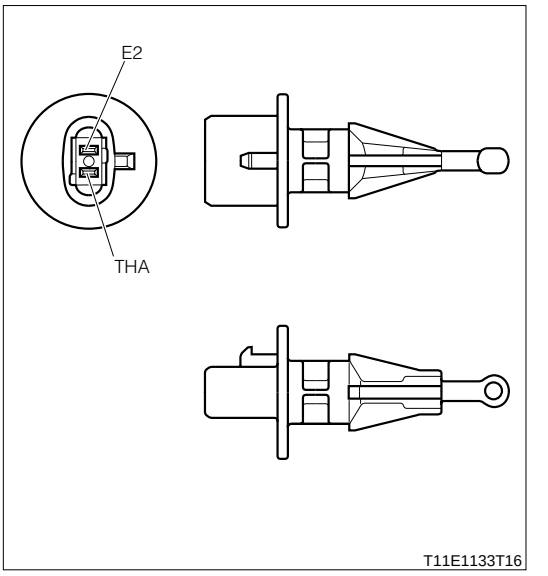


3-7 INTAKE AIR TEMPERATURE SENSOR

The intake air temperature sensor is installed on the clean side of the air cleaner to detect the intake air temperature.
The sensor has a built-in thermistor, whose resistance changes with temperature.

Intake air temperature sensor

Temperature [℃]	−30	−20	20	80	120
Resistance [kΩ]	-28.6	16.2	2.45	0.322	-0.117



NOTE

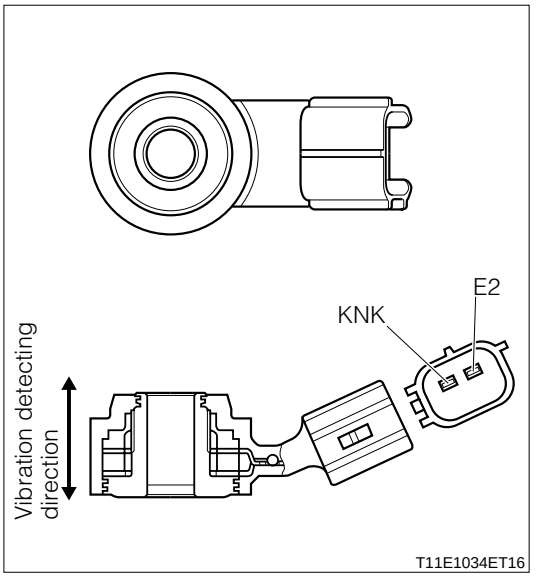
- Figures inside parentheses show reference values.

3-8 ATMOSPHERIC PRESSURE SENSOR (EU-SPECIFICATION VEHICLE ONLY)

The atmospheric sensor is incorporated in the engine control computer. This sensor senses the atmospheric pressure, which is used for compensation of the fuel injection amount, etc.

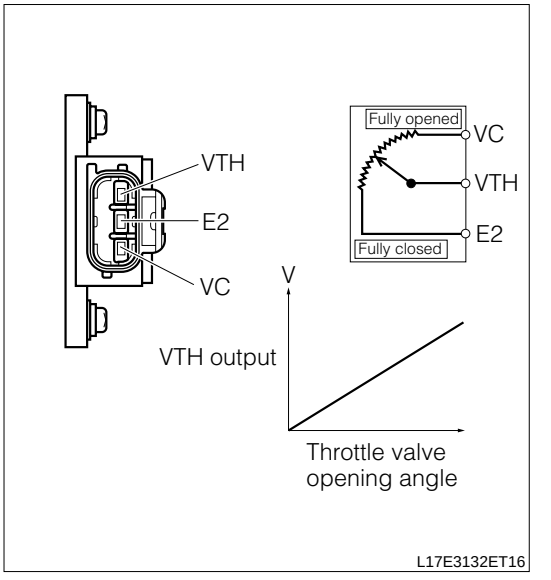
3-9 KNOCK SENSOR

The knock sensor is mounted on the cylinder block and detects knocking indirectly from the vibration of the cylinder block that occurs by knocking.
A piezoelectric element, which is built into the sensor, converts vibrations of the cylinder block into electric signals.
The non-resonance type knock sensor is used to improve accuracy in knock detection.



3-10 THROTTLE POSITION SENSOR

The sensor is installed to the throttle body and has a built-in potentiometer, which detects a throttle opening angle linearly.

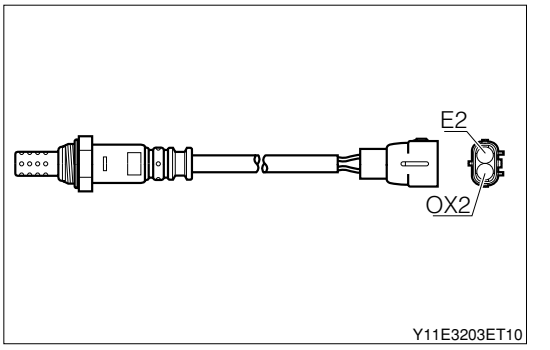


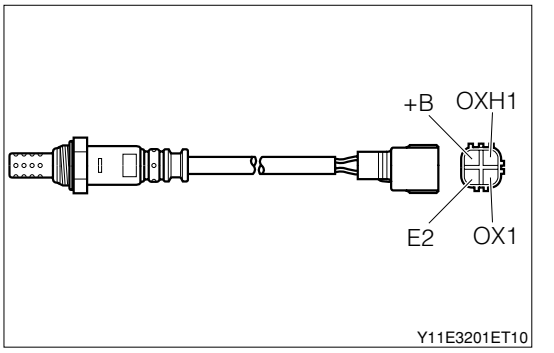
3-11 O_2 SENSOR

The sensor is installed to the exhaust manifold and detects the oxygen concentration in the exhaust emission by the amount of the electromotive force generated within the sensor. The lower the oxygen concentration, the greater the electromotive force gets, indicating that the air-to-fuel ratio is rich (rich condition).

Based on this voltage, the engine control computer judges whether the current air-to-fuel ratio is greater or smaller than the stoichiometric ratio.

The sensor begins operating at about 300˚C or more. In order to activate the sensor sooner, a heater circuit is provided for EU-specification vehicle. This helps improve accuracy of the air-to-fuel ratio feedback control, thus reducing the exhaust emission.



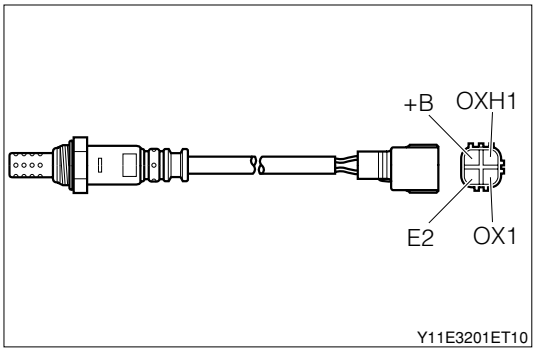


3-12 REAR O_2 SENSOR (EU-SPECIFICATION VEHICLE ONLY)

The sensor is installed to the exhaust front pipe. It detects the oxygen concentration in the exhaust emission after passing over the catalyst, by the amount of the electromotive force generated within the sensor. The lower the oxygen concentration, the greater the electromotive force gets.

Based on this voltage, the engine control computer judges whether the current air-to-fuel ratio is the target value or not, thus monitoring the oxygen sensor provided upstream.

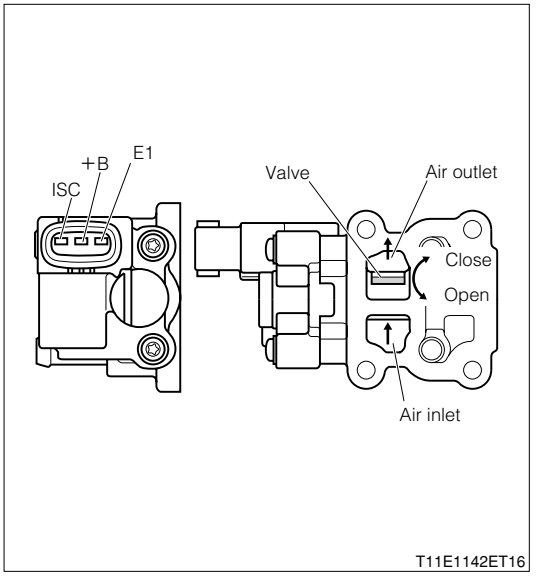
The sensor begins operating at about 300˚C or more. In order to make the sensor operate more early, a heater circuit is provided.



3-13 VALVE FOR ISC

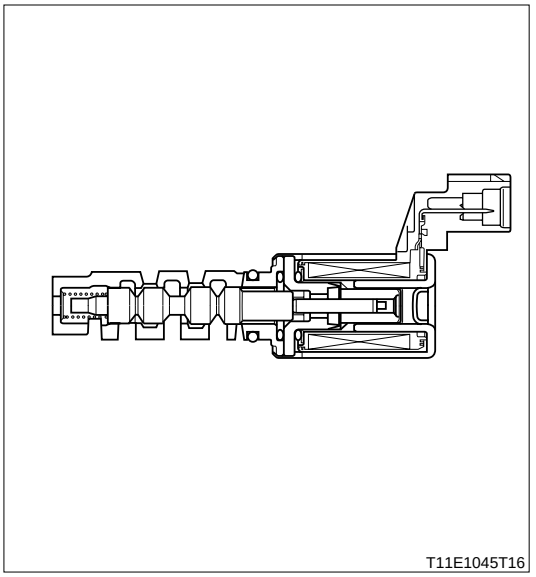
This is a rotary solenoid valve which controls the amount of air which bypasses the throttle valve by using the duty signal from the engine control computer.

The amount of air is determined by the ON/OFF time ratio (duty ratio) of the engine control computer signal.



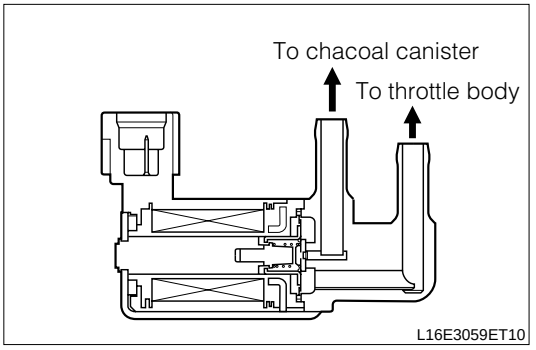
3-14 OIL CONTROL VALVE

The oil control valve turns ON and OFF according to the duty signal from the engine control computer so as to regulate the hydraulic pressure applied to the variable valve timing controller. This way, the opening/closing timing of the intake air valve can be controlled to the target timing.


T11E1045T16

3-15 VSV FOR EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL

The amount of fuel evaporative emission that flows to the engine combustion chamber is controlled by the duty signal from the engine control computer.



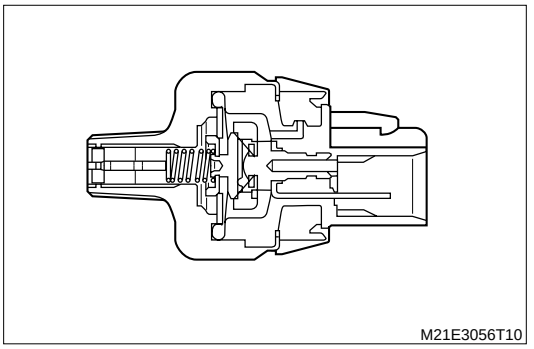
L16E3059ET10

3-16 BRAKE NEGATIVE-PRESSURE SWITCH(A/T VEHICLES ONLY)

The switch is installed to the brake booster and is switched ON when the pressure inside the brake booster exceeds the working pressure (atmospheric pressure side), so that the engine control computer performs the air-conditioner cutting control.

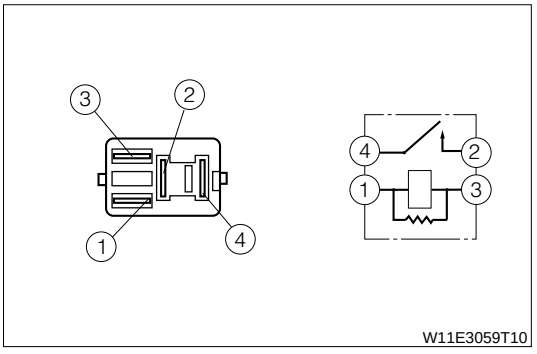
NOTE

- Working pressure: −34.6kPa{−260mmHg}


M21E3056T10

3-17 MAIN RELAY, FUEL PUMP RELAY, RADIATOR FAN RELAY

This is installed in the relay box of the engine compartment.
The main relay supplies power to the engine control computer when the IG switch is ON.
When the IG switch is ON, the fuel pump relay is activated by the signal from the engine control computer to supply power to the fuel pump.
When conditions to activate the radiator fan motor control are satisfied, the radiator fan relay is turned ON by the signal from the engine control computer to supply power to the radiator fan motor.



W11E3059T10

B9 EMISSION CONTROL SYSTEM

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1KR
1 OUTLINE
1-1 DESCRIPTION

1.The 1KR− FE type engine conforms to 1999/102-/EC (emission control, Step IV) specifications for EU, and to 1999/102-/EC (emission control, step Ⅲ) specifications for Australia and general destinations, by combining following equipment.
(1) Electronically controlled fuel injection system (EFI)
(2) Electronic spark advance system (ESA)
(3) Variable valve-timing control system
(4) Evaporative emission control system with electronically controlled purging system
(5) Electronically controlled exhaust gas recirculation system

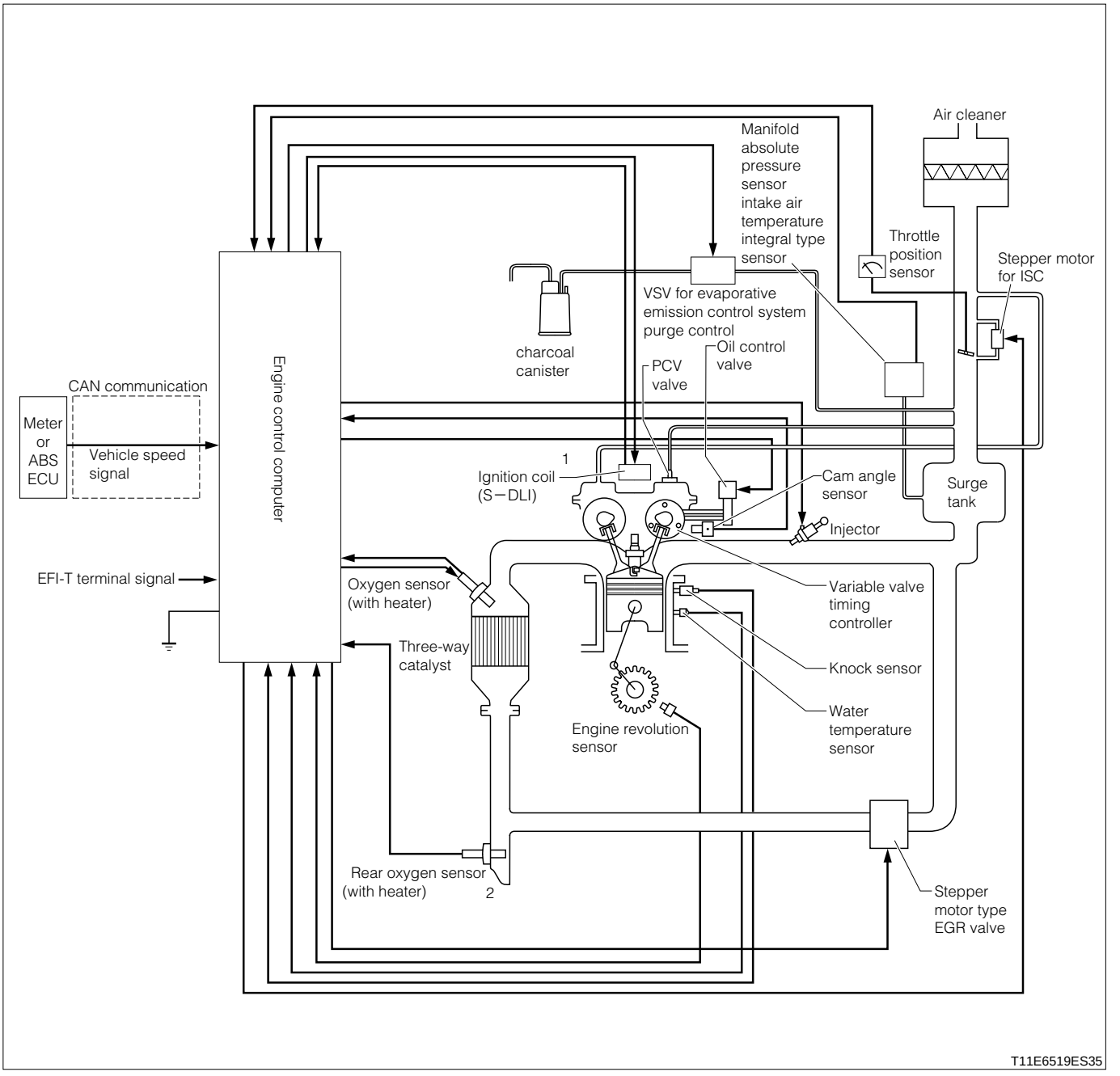
1-2 LIST OF EMISSION CONTROL DEVICES

Name of device	System of device	COMPONENTS	Purpose/function
Catalyst device	Three-way catalyst system	(1)Monolithic catalyst 0.849ℓ	·Reduction of CO, HC and NO_x
Air-fuel ratio control device	Electronic controlled fuel injection system	(1)Injector (2) Oxygen sensor (with heater) (3)Rear oxygen sensor (with heater)*1 (4)Computer for control (5)Operation control device Throttle position sensor, intake pipe pressure/intake air temperature integrated sensor, water temperature sensor, engine revolution sensor, atmospheric pressure sensor*1, stepper motor for ISC	·Reduction of CO, HC and NO_x (The air-fuel ratio of the mixture taken in the combustion chamber will be controlled approximately to the stoichiometric air-fuel ratio, thus enabling the three-way catalyst to fully exercise the purification performance.)
Ignition timing control device (For EU specifications)	Electronic controlled system	(1)Ignition coil (Ion current detection device built-in) (2)Computer for control (3)Operation control device Intake pipe pressure/intake air temperature integrated sensor, water temperature sensor, throttle position sensor, engine revolution sensor, cam angle sensor, knock sensor, injector	·Reduction of HC ·Reduction of NO_x (An appropriate ignition timing control is performed according to the operating conditions.)
Ignition timing control device (For General specifications)	Electronic controlled system	(1)Ignition coil (2)Computer for control (3)Operation control device Intake pipe pressure/intake air temperature integrated sensor, water temperature sensor, throttle position sensor, engine revolution sensor, cam angle sensor, knock sensor, injector	·Reduction of NO_x (An appropriate ignition timing control is performed according to the operating conditions.)
Deceleration control device		(1)Injector (2)Computer for control (3)Operation control device Throttle position sensor	·Reduction of CO and HC during deceleration ·Improvement of fuel consumption ·Prevention of catalyst heating (Fuel cut is carried out during deceleration by the control device.)
Evaporative emission control device	Canister type	(1)Charcoal canister 0.36 ℓ (2)VSV for evaporative emission control system purge control (3)Computer for control	·Emission control of fuel evaporative emission
Blow-by gas recirculation device	Closed type	(1)Ventilation hose (2)PCV valve	·Reduction of CO and HC (The blow-by gas will be burned again to prevent emission of CO and HC.)
Variable valve timing device		(1)Oil control valve Variable valve timing controller (3)Computer for control (4)Operation control device Engine revolution sensor, cam angle sensor, intake pipe pressure/intake air temperature integrated sensor, water temperature sensor, injector	·Reduction of NO_x (The NO_x is reduced by controlling the opening and closing of the intake valve to the appropriate timing according to the operating conditions.)

Exhaust gas recirculation device	Electronic controlled system	(1)Stepper motor type EGR valve (2)Computer for control (3)Operation control device Engine revolution sensor, water temperature sensor, intake pipe pressure/intake air temperature integrated sensor, throttle position sensor	·Reduction of NO_x (The NO_x in the exhaust gas is reduced by the external EGR effect.) ·Improvement of fuel consumption
On-board diagnosis device		Engine control computer, throttle position sensor, intake pipe pressure/intake air temperature integrated sensor, water temperature sensor, engine revolution sensor, cam angle sensor, oxygen sensor, oxygen sensor heater circuit, rear oxygen sensor*1, rear oxygen sensor heater circuit*1, oil control valve, atmospheric pressure sensor*1, ignition coil (ion current detection device built-in*1), fuel supply system, exhaust gas recirculation system, warning lamp	·Detection of failure of the emission control device

*1: For only EU specifications

1-3 SCHEMATIC DIAGRAM OF EXHAUST EMISSION PURIFICATION DEVICE



1: Ion current detection device built-in for only EU specifications
2: For only EU specifications

2 CONSTRUCTION AND OPERATION

2-1 CATALYST DEVICE

2-1-1 DESCRIPTION

The catalyst, made of ceramic, has gas passages called monolith which has grid cross-section with its surface covered with noble metal. This catalyst is mounted in the exhaust manifold so that harmful components of the exhaust gas can be removed as the exhaust gas passes through the passages.
The O_2 sensor is mounted downstream of the catalyst for EU specification vehicles to monitor degradation of the O_2 sensor mounted upstream of the catalyst, to prevent exhaust gas from deterioration.

2-2 AIR-TO-FUEL RATIO CONTROL DEVICE

2-2-1 DESCRIPTION

The air-to-fuel ratio is controlled by the electronically controlled fuel injection system so that the air to fuel ratio which is fit to the engine's operating conditions can be obtained and that high purification performance can be obtained in the catalyst device.

2-3 IGNITION TIMING CONTROL DEVICE

2-3-1 DESCRIPTION

The ignition timing is controlled by the electronic spark advance system so that the ignition timing may become fit to the engine operating conditions and that harmful emissions in the exhaust gas can be reduced.

2-4 CONTROL DEVICE DURING DECELERATION

2-4-1 DESCRIPTION

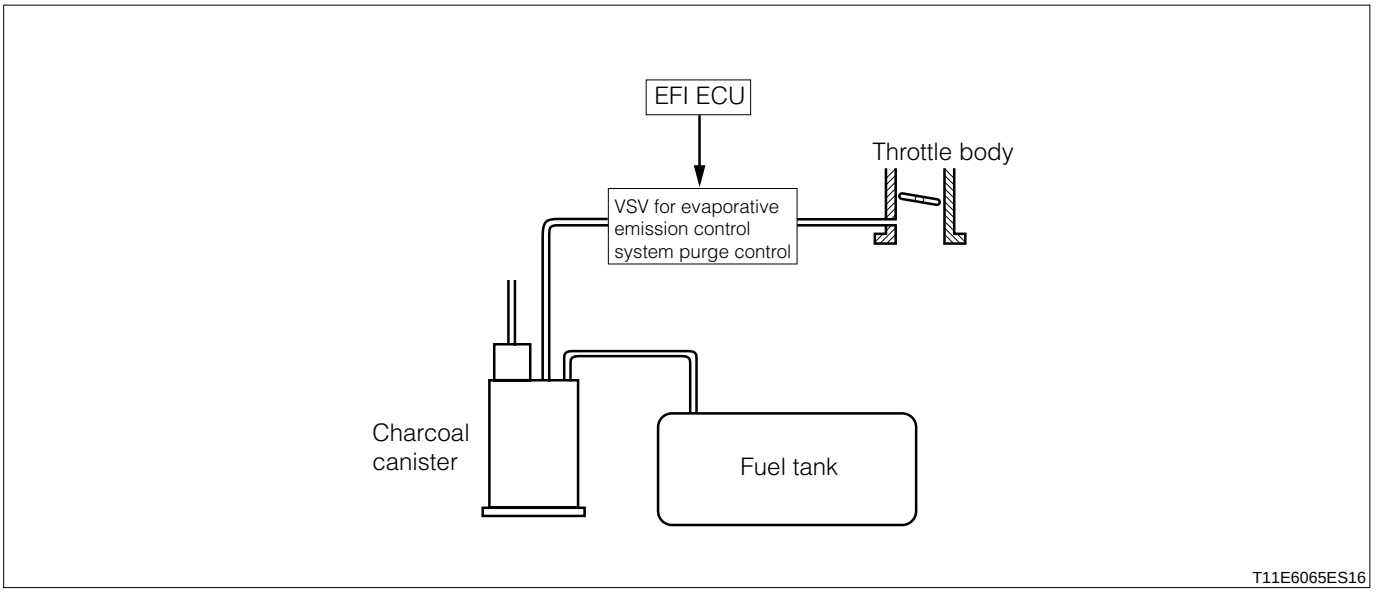
Deceleration fuel cut occurs when the throttle valve opening degree and engine speed fall into the fuel cut range in order to reduce unburnt components discharged when the throttle valve is closed during deceleration.

2-5 FUEL EVAPORATIVE EMISSION CONTROL DEVICE

2-5-1 CANISTER METHOD

(1) Description

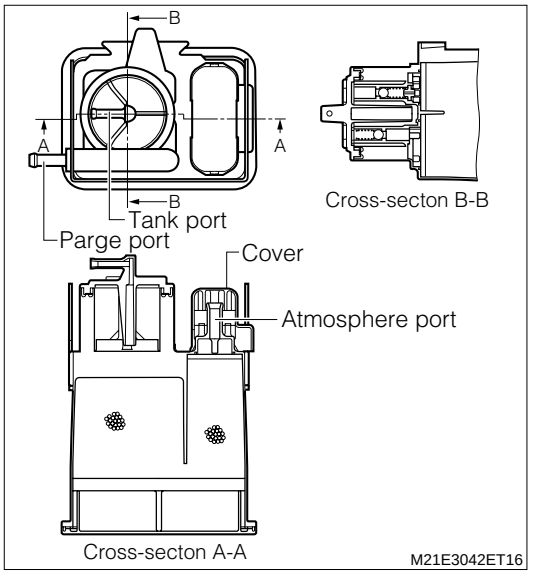
Fuel evaporative emissions generated inside the fuel tank are absorbed in the charcoal canister.
The adsorbed fuel evaporative emissions are sucked into the intake manifold and burned during engine operation.



(2) Components

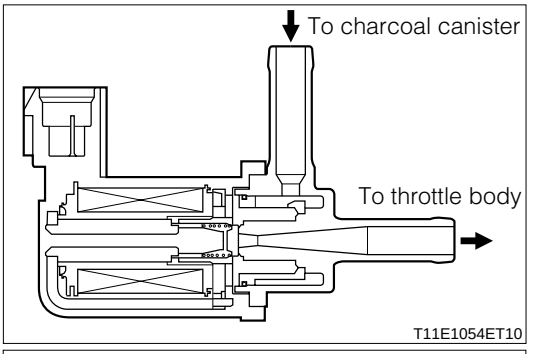
① Charcoal canister

The charcoal canister (capacity : 0.36 ℓ) is mounted on the vehicle left side dash in the engine compartment.



② Evaporator purge VSV

The purge amount of the evaporative emission gas to the intake manifold is controlled by the signal (duty ratio) sent from the engine control computer, which is calculated based on operation conditions of the engine, fuel evaporative emission concentration, etc.

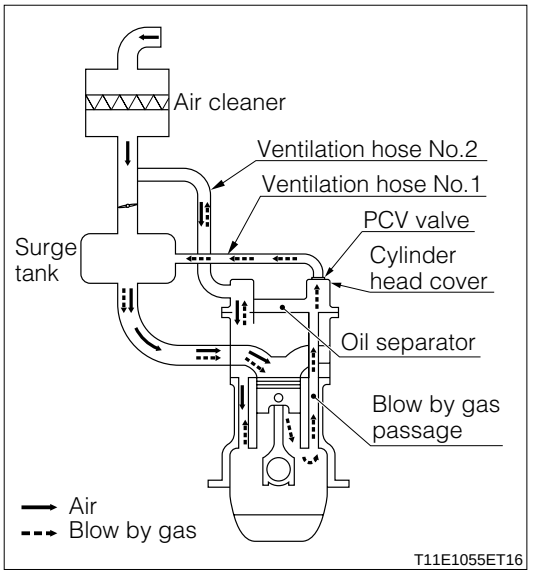


2-6 BLOW-BY GAS RECIRCULATION DEVICE

2-6-1 DESCRIPTION

The crank case ventilation system is employed, in which the blow-by gas inside the crank case flows through the blow-by gas passage of the cylinder block into the cylinder head cover side.

The oil separator is provided in the cylinder head cover and the cylinder block so that the blow-by gas is separated and enters into the combustion chamber for afterburning .



2-7 DYNAMIC VARIABLE TIMING DEVICE

2-7-1 DESCRIPTION

The open/close timing of the intake air valve is controlled to provide the intake air amount and internal EGR amount, etc. that are fit to the operating conditions, thereby reducing the exhaust emissions.

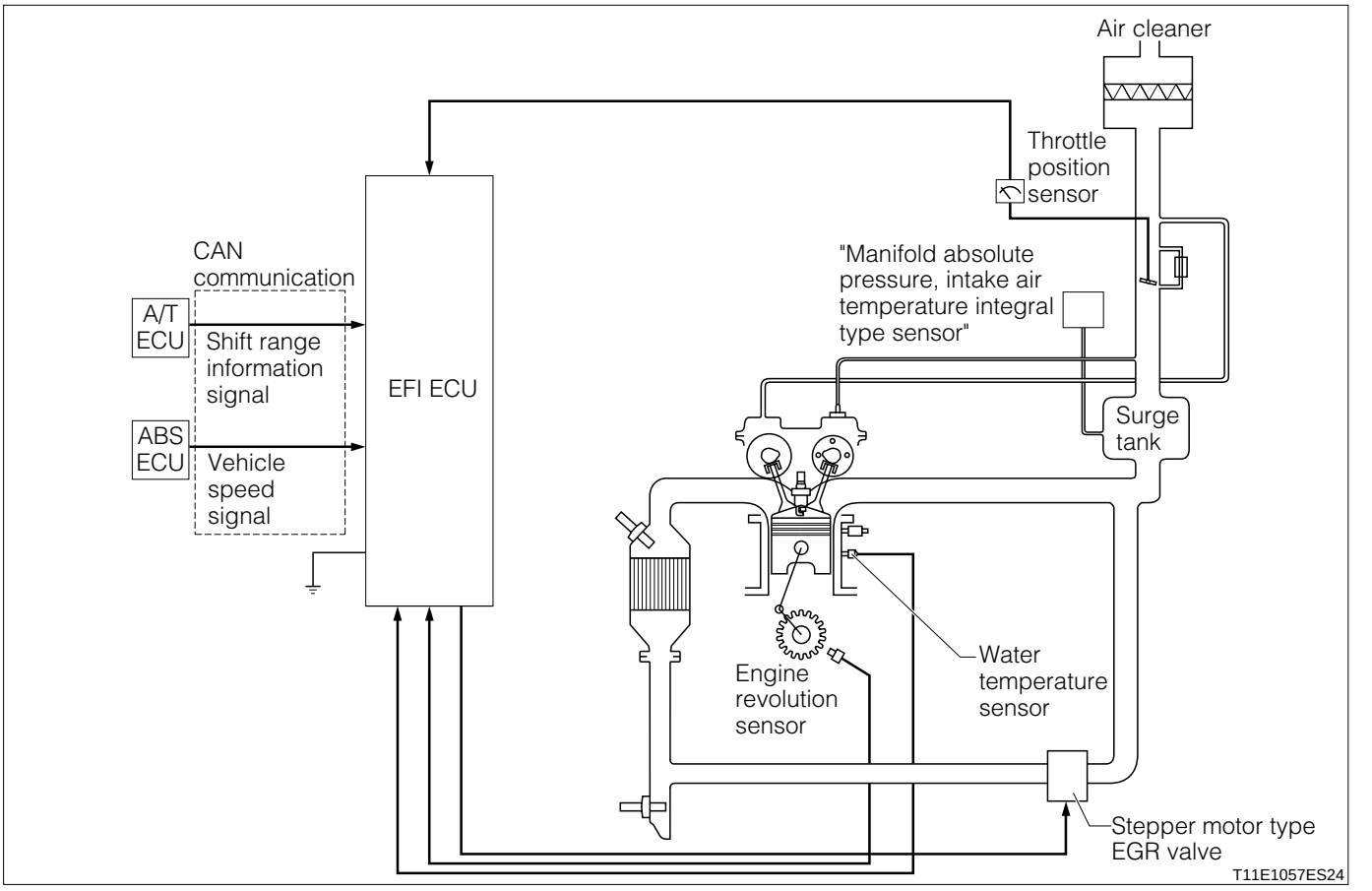
2-8

2-8-1 DESCRIPTION

The electronically controlled exhaust gas recirculation system is employed so that an optimum amount of the exhaust emissions that are adjusted according to the operating conditions can be circulated into the combustion chamber, thereby lowering the combustion temperature and reducing NO_X.

The circulated exhaust emissions are controlled by the stepper motor type EGR valve, and pass through the three-way catalyst. Then the emissions flow in the sequence of the cylinder head, EGR valve, and intake manifold insulator and enter the combustion chamber.

System diagram



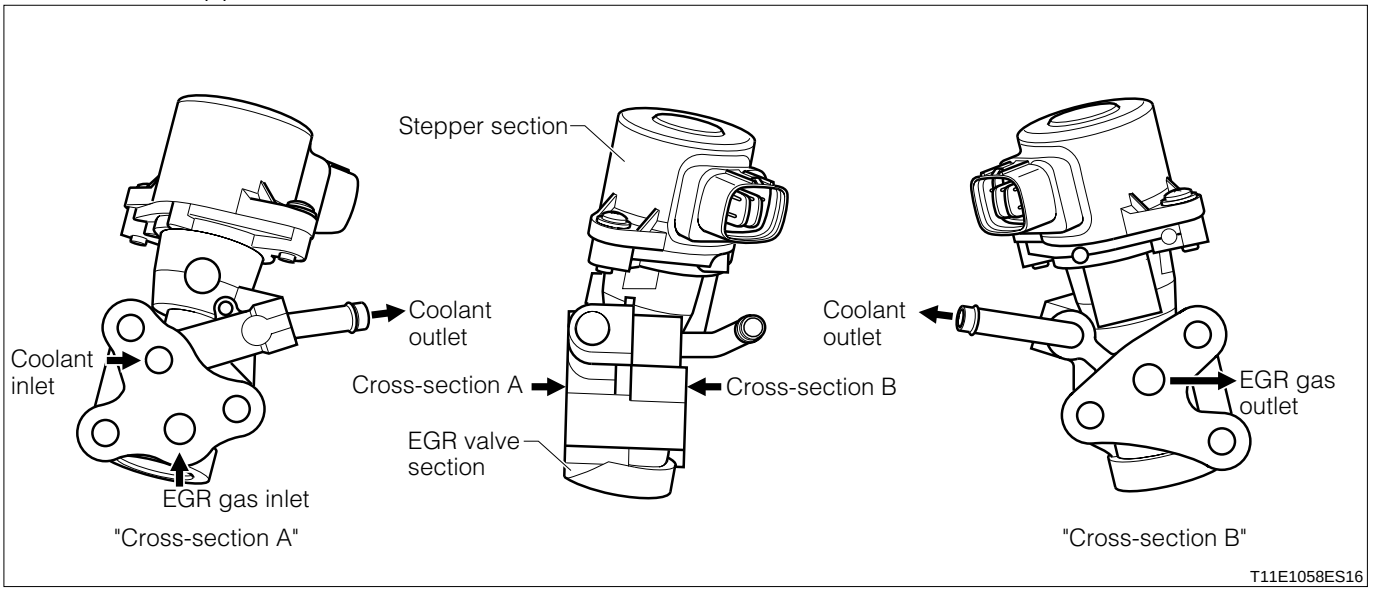
2-8-2 COMPONENTS

(1) Stepper motor type EGR valve

The stepper motor type EGR valve consists of the stepper motor and the EGR valve.

The EGR stepper motor controlled by the engine control computer drives the EGR valve and regulates the EGR valve opening degree. In this way, the exhaust emission amount mixed into the intake air can be controlled.

The coolant circulates through the stepper motor type EGR valve in order to cool the valve's sliding portion and the stepper motor.



K3
1 OUTLINE
1-1 DESCRIPTION

1.The K3−VE type engine has attained the 75% reduction level of the 2005 exhaustemission standard for gasoline-fueled passenger vehicles, bycombining the following equipment.
(1) Electronically controlled fuel injection system (EFI)
(2) Electronic spark advance system (ESA)
(3) Variable valve-timing control system
(4) Evaporative emission control system with electronically controlled purging system
(5) Intelligent catalyst (three-way catalyst) (EU specification vehicles only)

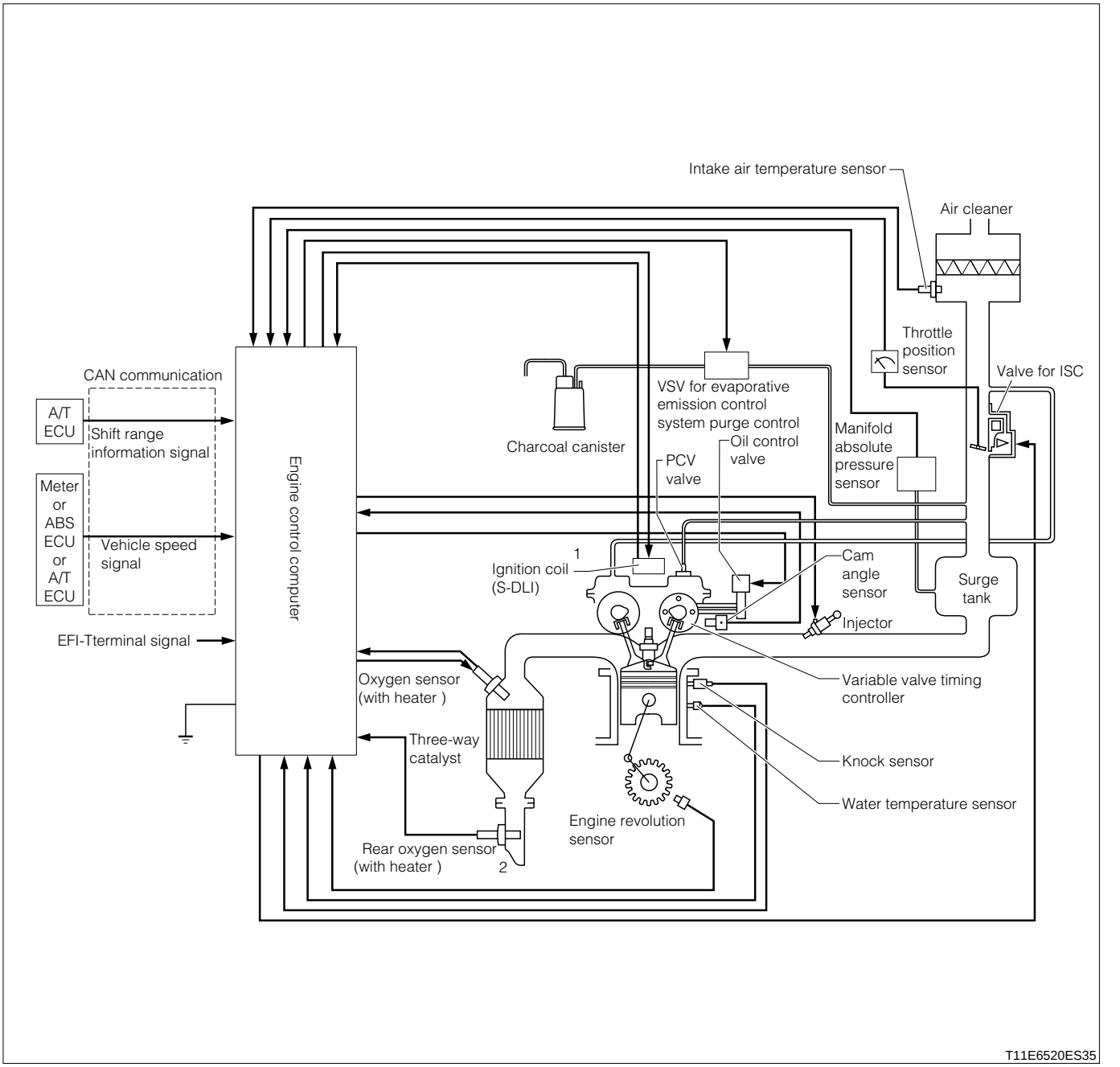
1-2 LIST OF EMISSION CONTROL DEVICES

Name of device	System of device	COMPONENTS	Purpose/function
Catalyst device	Three-way catalyst system	(1)Monolithic catalyst 1.152ℓ	·Reduction of CO, HC and NO_x
Air-fuel ratio control device	Electronic controlled fuel injection system	(1)Injector (2)Oxygen sensor (with heater[*1]) (3)Rear oxygen sensor (with heater)[*1] (4)Computer for control (5)Operation control device Throttle position sensor, intake pipe pressure sensor, water temperature sensor, intake air temperature sensor, engine revolution sensor, atmospheric pressure sensor[*1]	·Reduction of CO, HC and NO_x (The air-fuel ratio of the mixture taken in the combustion chamber will be controlled approximately to the stoichiometric air-fuel ratio, thus enabling the three-way catalyst to fully exercise the purification performance.)
Ignition timing control device (For EU specifications)	Electronic controlled system	(1)Ignition coil (Ion current detection device built-in) (2)Computer for control (3)Operation control device Intake pipe pressure sensor, water temperature sensor, throttle position sensor, engine revolution sensor, cam angle sensor knock sensor	·Reduction of HC ·Reduction of NO_x (An appropriate ignition timing control is performed according to the operating conditions.)
Ignition timing control device (For General specifications)	Electronic controlled system	(1)Ignition coil (2)Computer for control (3)Operation control device Intake pipe pressure sensor, water temperature sensor, throttle position sensor, engine revolution sensor, cam angle sensor knock sensor	·Reduction of NO_x (An appropriate ignition timing control is performed according to the operating conditions.)
Deceleration control device		(1)Injector (2)Computer for control (3)Operation control device Throttle position sensor, engine revolution sensor	·Reduction of CO and HC during deceleration ·Improvement of fuel consumption ·Prevention of catalyst heating (Fuel cut is carried out during deceleration by the control device.)
Evaporative emission control device	Canister type	(1)Charcoal canister 0.36 ℓ (2)VSV for evaporative emission control system purge control (3)Computer for control	·Emission control of fuel evaporative emission
Blow-by gas recirculation device	Closed type	(1)Ventilation hose (2)PCV valve	·Reduction of CO and HC (The blow-by gas will be burned again to prevent emission of CO and HC.)
Variable valve timing device		(1)Oil control valve Variable valve timing controller (3)Computer for control (4)Operation control device Engine revolution sensor, cam angle sensor, intake pipe pressure, water temperature sensor	·Reduction of NO_x (The NO_x is reduced by controlling the opening and closing of the intake valve to the appropriate timing according to the operating conditions.)

On-board diagnosis device		Engine control computer, throttle position sensor, intake pipe pressure sensor, intake air temperature sensor, water temperature sensor, engine revolution sensor, cam angle sensor, oxygen sensor, oxygen sensor heater circuit*1, rear oxygen sensor*1, rear oxygen sensor heater circuit*1, oil control valve, , atmospheric pressure sensor*1, ignition coil (Ion current detection device built-in), fuel supplying system, water pump	·Detection of failure of the emission control device

*1: For only EU specifications

1-3 SCHEMATIC DIAGRAM OF EXHAUST EMISSION PURIFICATION DEVICE



1: Ion current detection device built-in for only EU specifications

2: For only EU specifications

2 CONSTRUCTION AND OPERATION

2-1 CATALYST DEVICE

2-1-1 DESCRIPTION

The catalyst, made of ceramic, has gas passages called monolith which has grid cross-section with its surface covered with noble metal. This catalyst is mounted in the exhaust manifold so that harmful components of the exhaust gas can be removed as the exhaust gas passes through the passages.

The intelligent catalyst (three-way catalyst of platinum, rhodium and palladium) is provided to the EU specification vehicles. The rear O_2 sensor is mounted downstream of the catalyst to monitor the degradation of the O_2 sensor mounted upstream of the catalyst, to prevent exhaust gas from deterioration.

2-1-2 INTELLIGENT CATALYST (EU SPECIFICATION VEHICLES ONLY)

The exhaust emission purifying catalyst, which has a self-reproduction function of noble metals, is used to prevent the purification performance from lowering due to increased travel distance.

2-2 AIR-TO-FUEL RATIO CONTROL DEVICE

2-2-1 DESCRIPTION

The air-to-fuel ratio is controlled by the electronically controlled fuel injection system so that the air to fuel ratio which is fit to the engine's operating conditions can be obtained and that high purification performance can be obtained in the catalyst device.

2-3 IGNITION TIMING CONTROL DEVICE

2-3-1 DESCRIPTION

The ignition timing is controlled by the electronic spark advance system so that the ignition timing may become fit to the engine operating conditions and that harmful emissions in the exhaust gas can be reduced.

2-4 CONTROL DEVICE DURING DECELERATION

2-4-1 DESCRIPTION

Deceleration fuel cut occurs when the throttle valve opening degree and engine speed fall into the fuel cut range in order to reduce unburnt components discharged when the throttle valve is closed during deceleration.

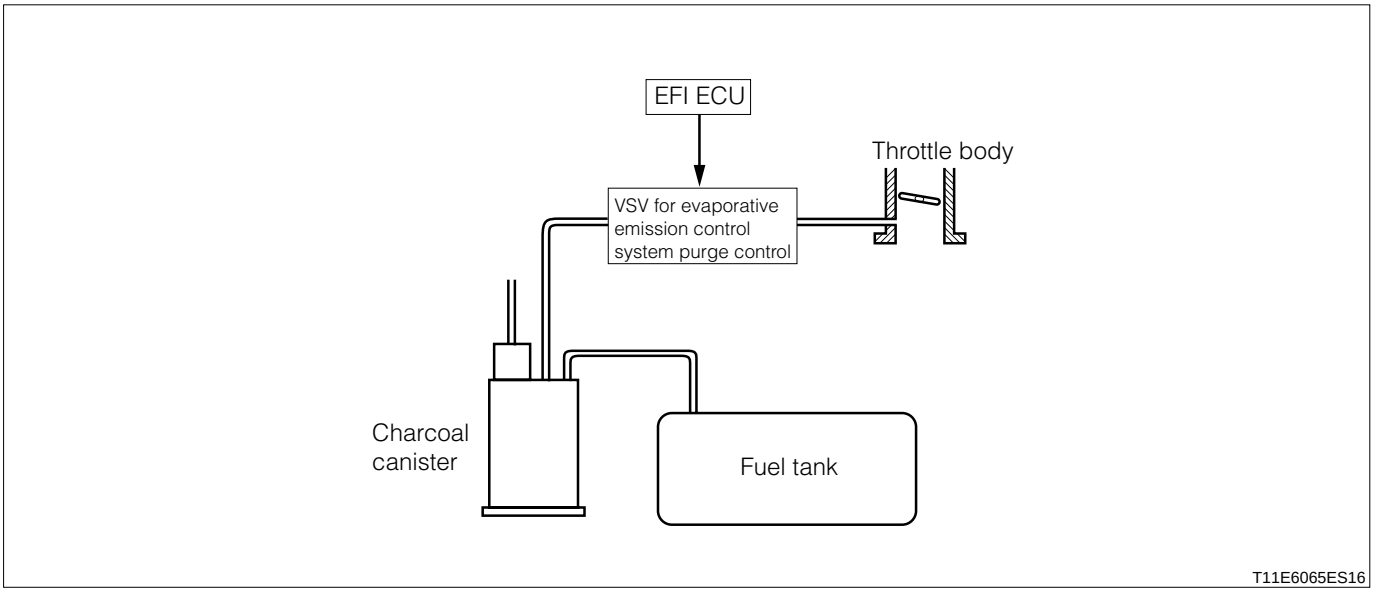
2-5 FUEL EVAPORATIVE EMISSION CONTROL DEVICE

2-5-1 CANISTER METHOD

(1) Description

Fuel evaporative emissions generated inside the fuel tank are absorbed in the charcoal canister.

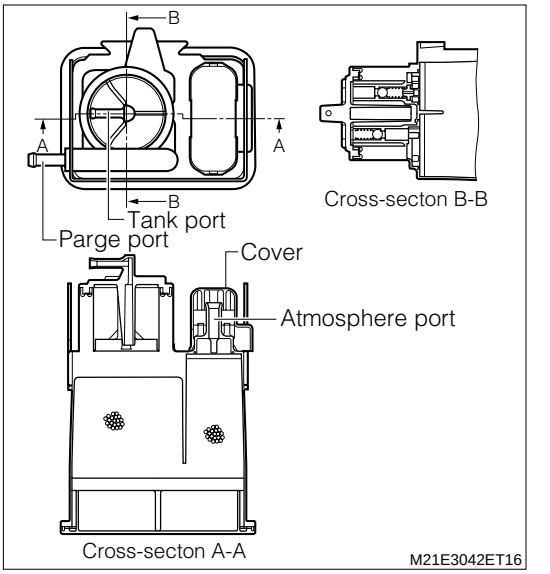
The adsorbed fuel evaporative emissions are sucked into the intake manifold and burned during engine operation.



(2) Components

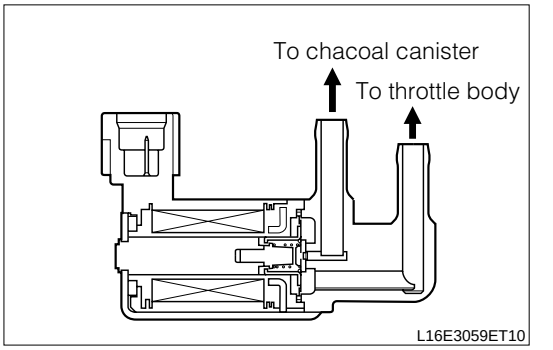
① Charcoal canister

The charcoal canister (capacity : 0.36 ℓ) is mounted on the vehicle left side dash in the engine compartment.



② Evaporator purge VSV

The purge amount of the evaporative emission gas to the intake manifold is controlled by the signal (duty ratio) sent from the engine control computer, which is calculated based on operation conditions of the engine, fuel evaporative emission concentration, etc.

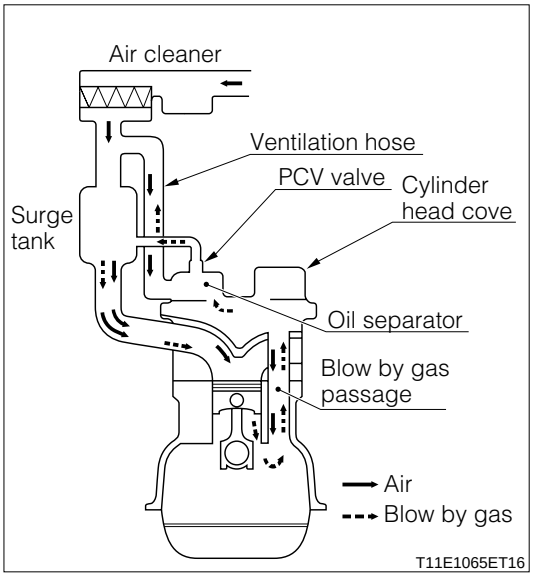


2-6 BLOW-BY GAS RECIRCULATION DEVICE

2-6-1 DESCRIPTION

The crank case ventilation system is employed, in which the blow-by gas inside the crank case flows through the blow-by gas passage of the cylinder block into the cylinder head cover side.

The oil separator chamber is provided in the cylinder head cover. Therefore, after the oil is separated from the blow-by gas, it enters the combustion chamber to be burned again.



2-7 DYNAMIC VARIABLE TIMING DEVICE

2-7-1 DESCRIPTION

The open/close timing of the intake air valve is controlled to provide the intake air amount and internal EGR amount, etc. that are fit to the operating conditions, thereby reducing the exhaust emissions.

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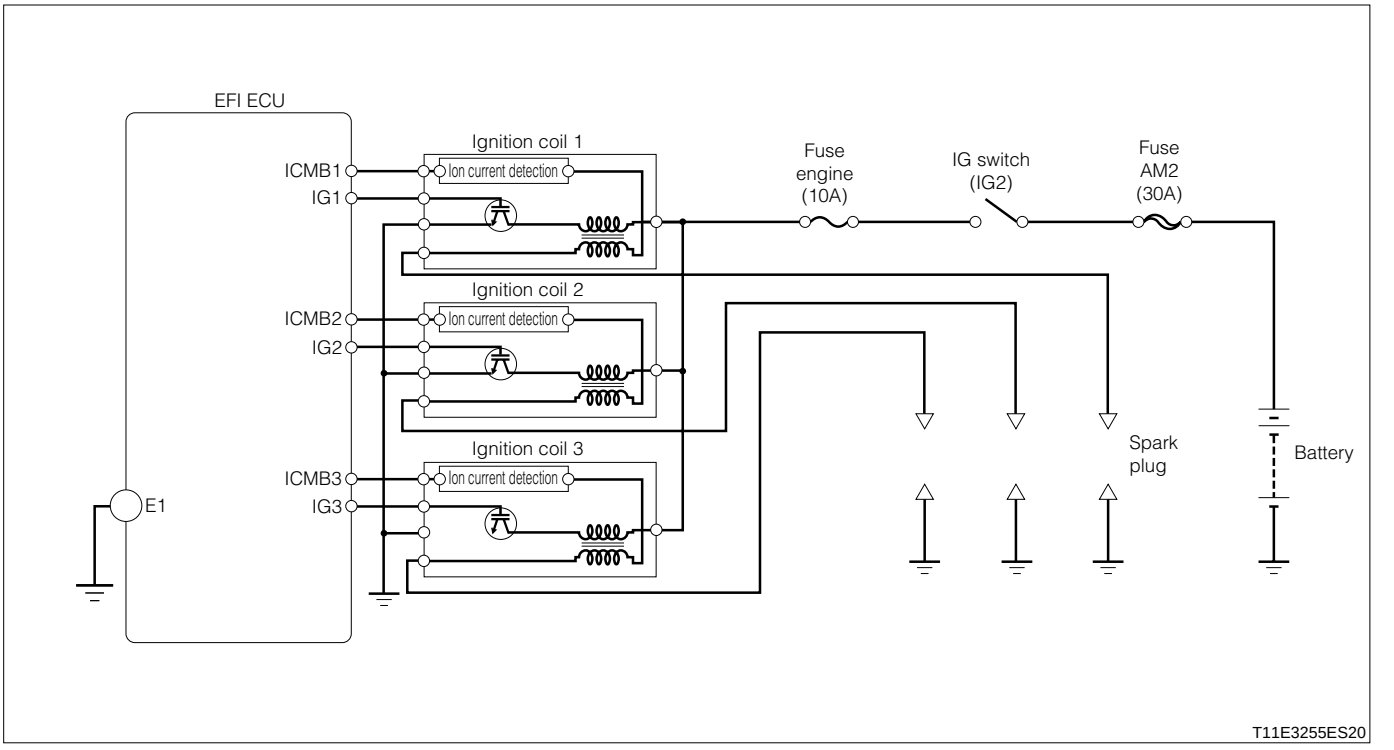
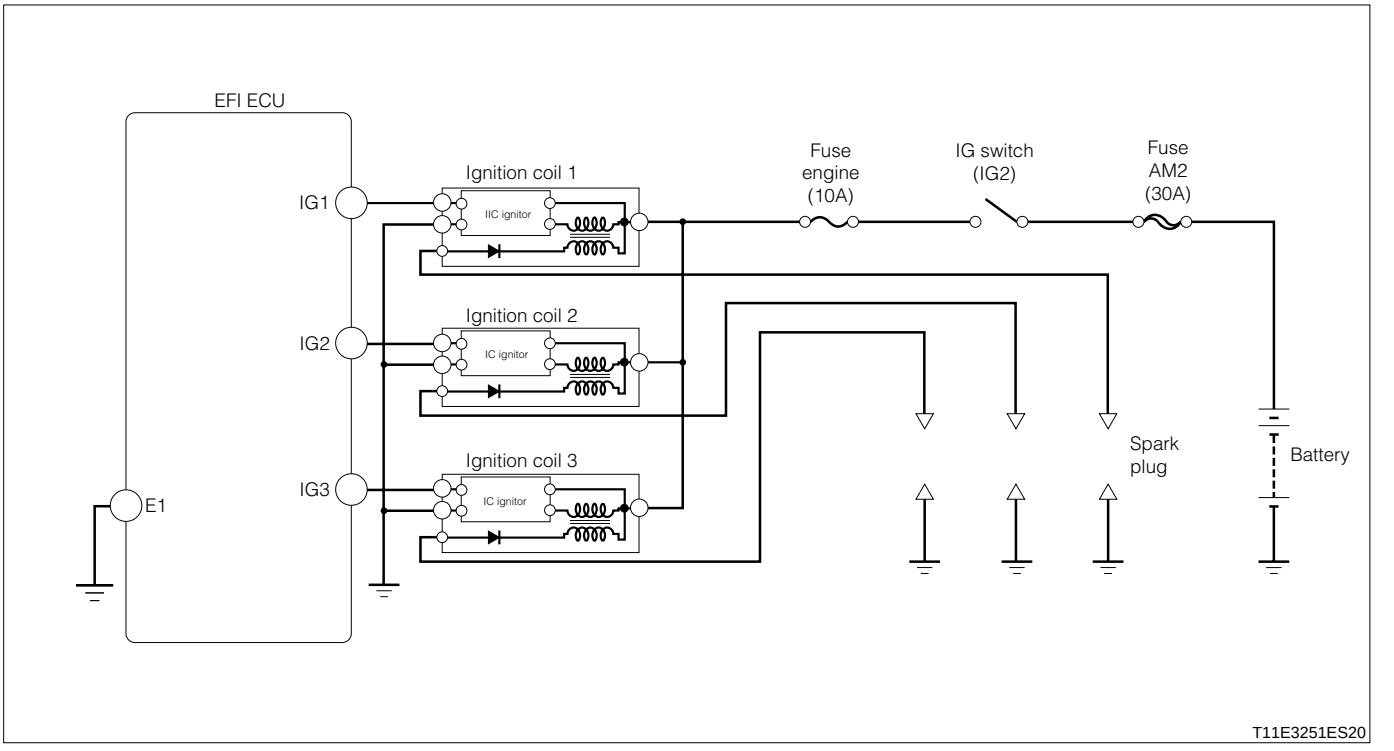
OUTLINE ---------- B10 - 4
DESCRIPTION ---------- B10 - 4
CONSTRUCTION AND OPERATION--- B10 - 5
SPARK PLUG ---------- B10 - 5
IGNITION COIL ---------- B10 - 5

1KR
1 OUTLINE
1-1 DESCRIPTION
The DLI (DistributorLess Ignition) system is adopted to improve ignition performance. In this DLI system, there is no distributor and the ignition coil is provided right above the spark plug. Therefore, there exists no ignition energy loss by distribution and the electric energy generated by the coil can be directly supplied. As a result, the best ignition condition can be assured at all times.

1-1-1 EU SPEC.



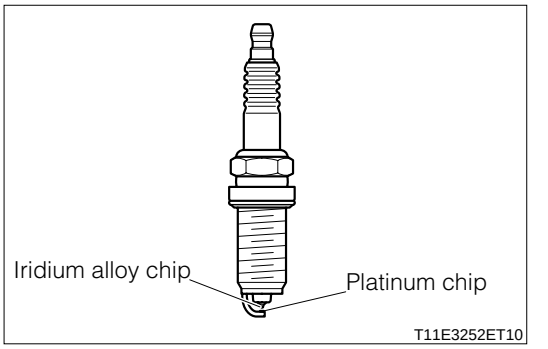
1-1-2 GENERAL SPEC.



2 CONSTRUCTION AND OPERATION

2-1 SPARK PLUG

An iridium plug with high ignition energy is adopted to improve output performance and clean emission gas. The long reach type is employed to comply with the water jacket shape of the cylinder head, thus improving anti-knocking ability.



Spark plug specifications

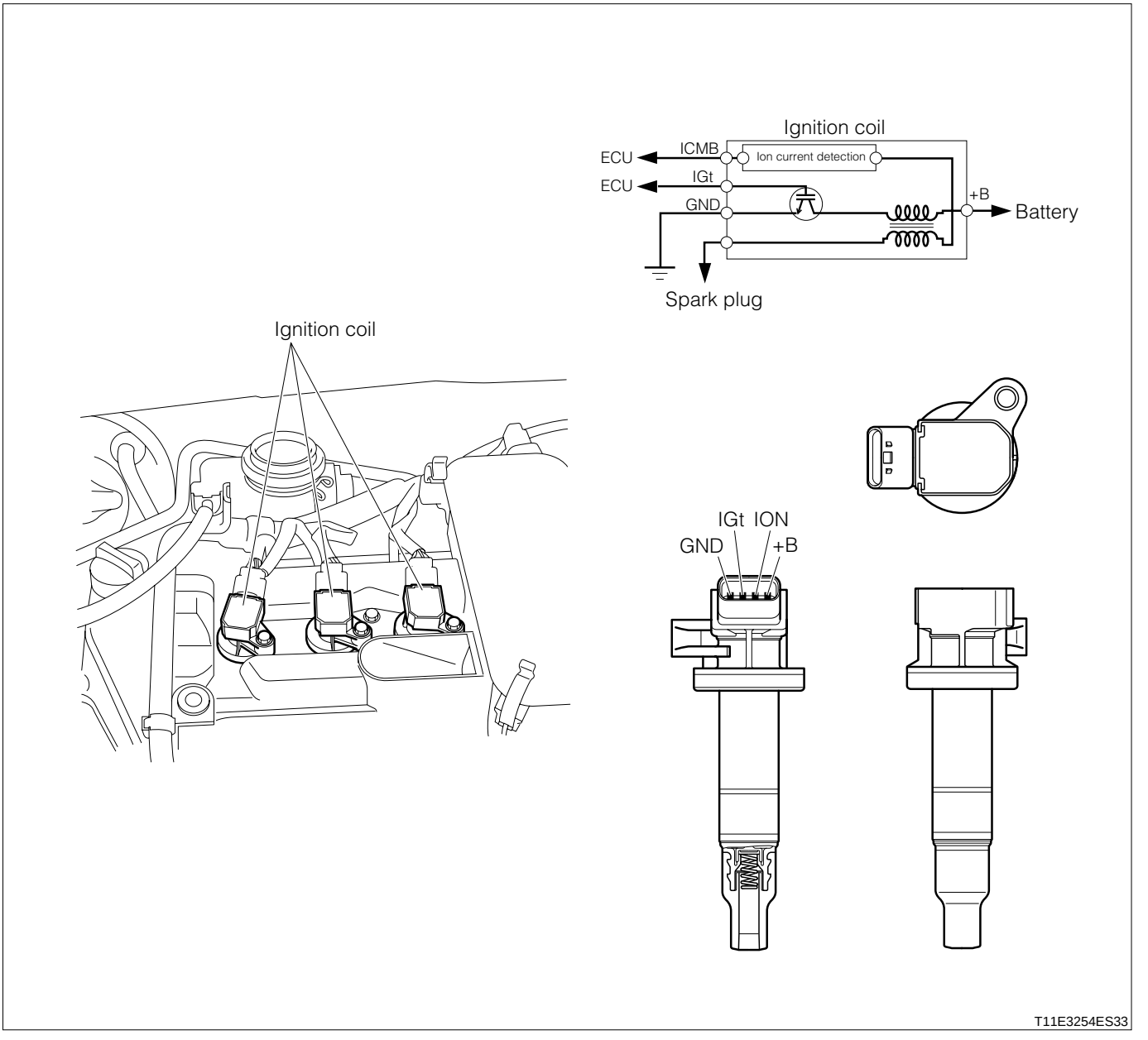
Type	SK20HR11	ILFR6C11
Electrode gap(mm)	1.0−1.1	1.0−1.1
Width across flats	16	16

2-2 IGNITION COIL

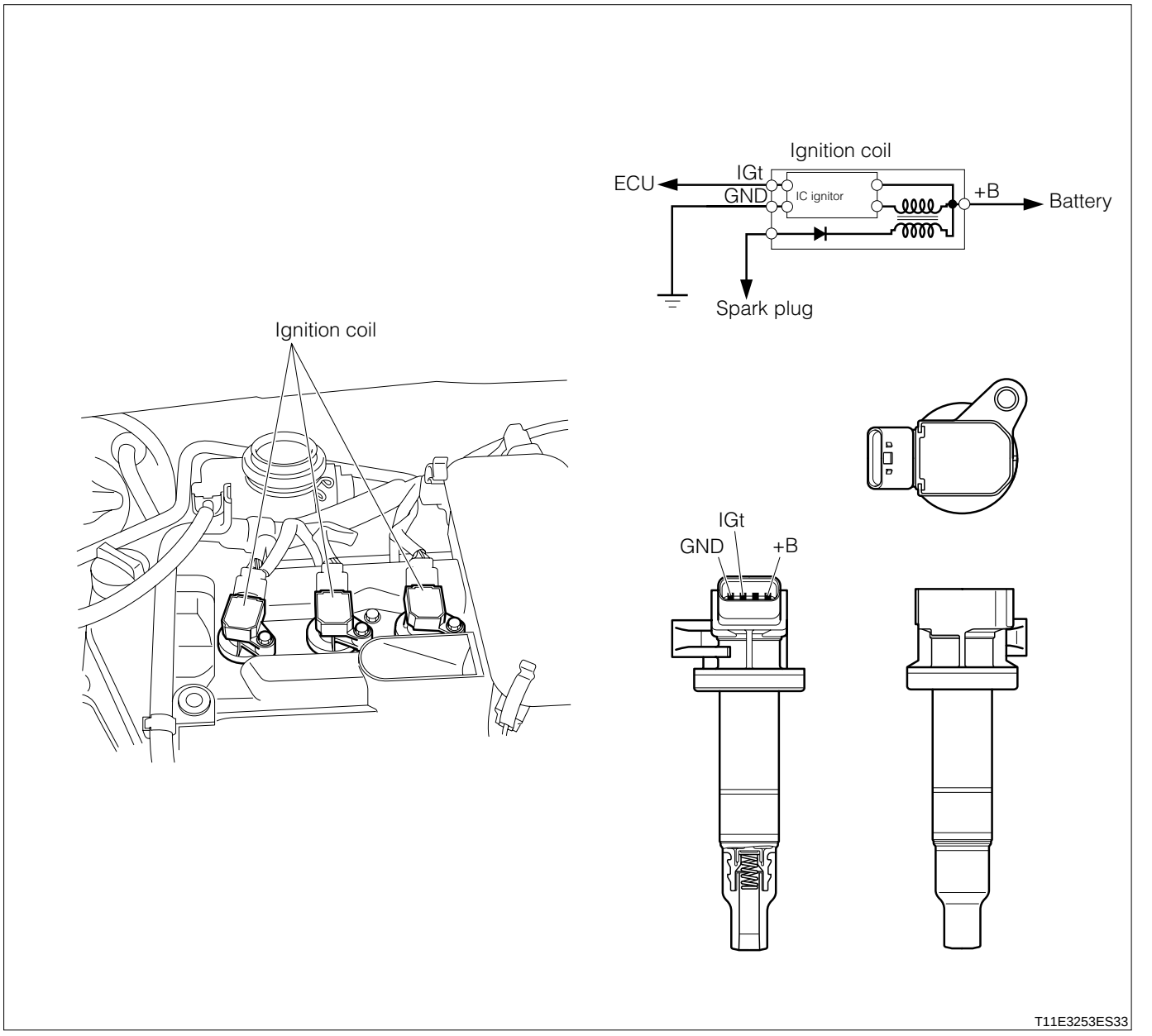
1.A small type ignition coil with built-in ignitor is adopted.

2.The mounting position is on the cylinder head cover that is right above the spark plug of each cylinder.

2-2-1 EU SPEC.

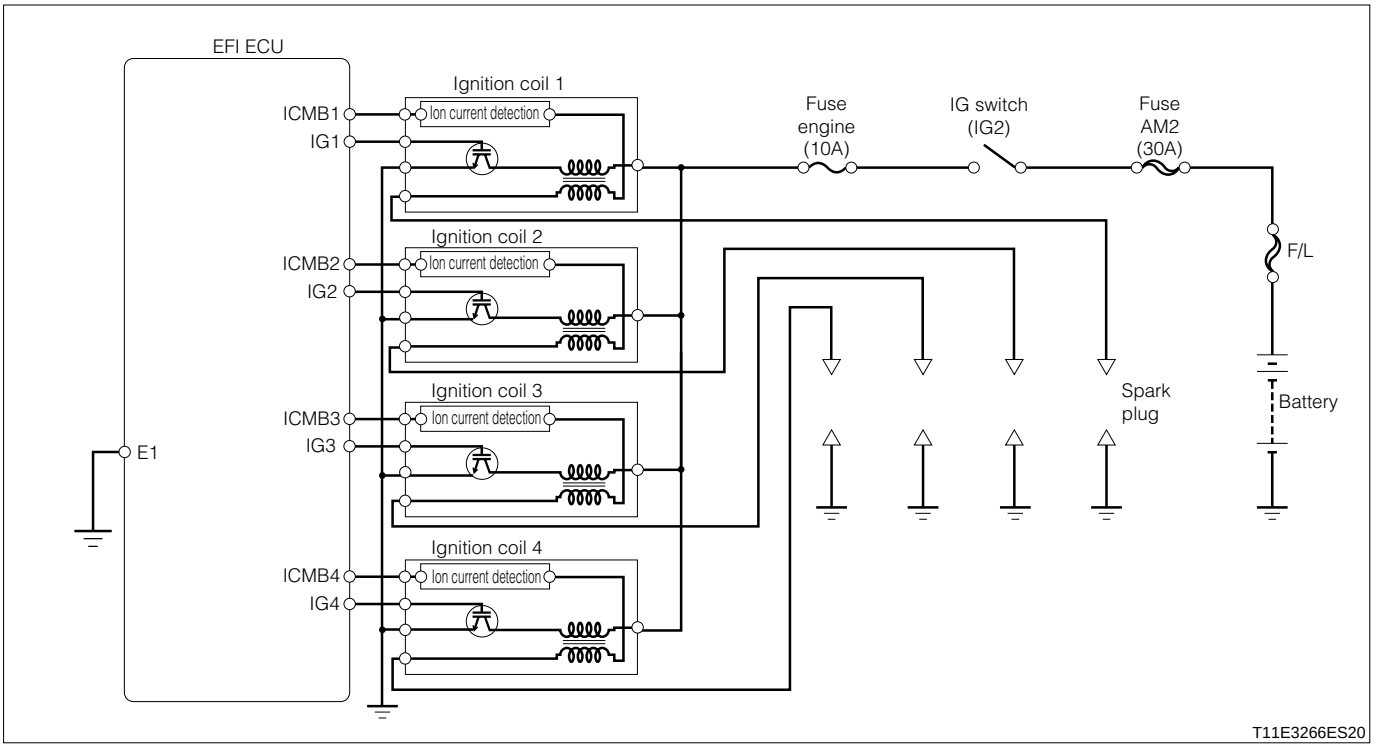


2-2-2 GENERAL SPEC.

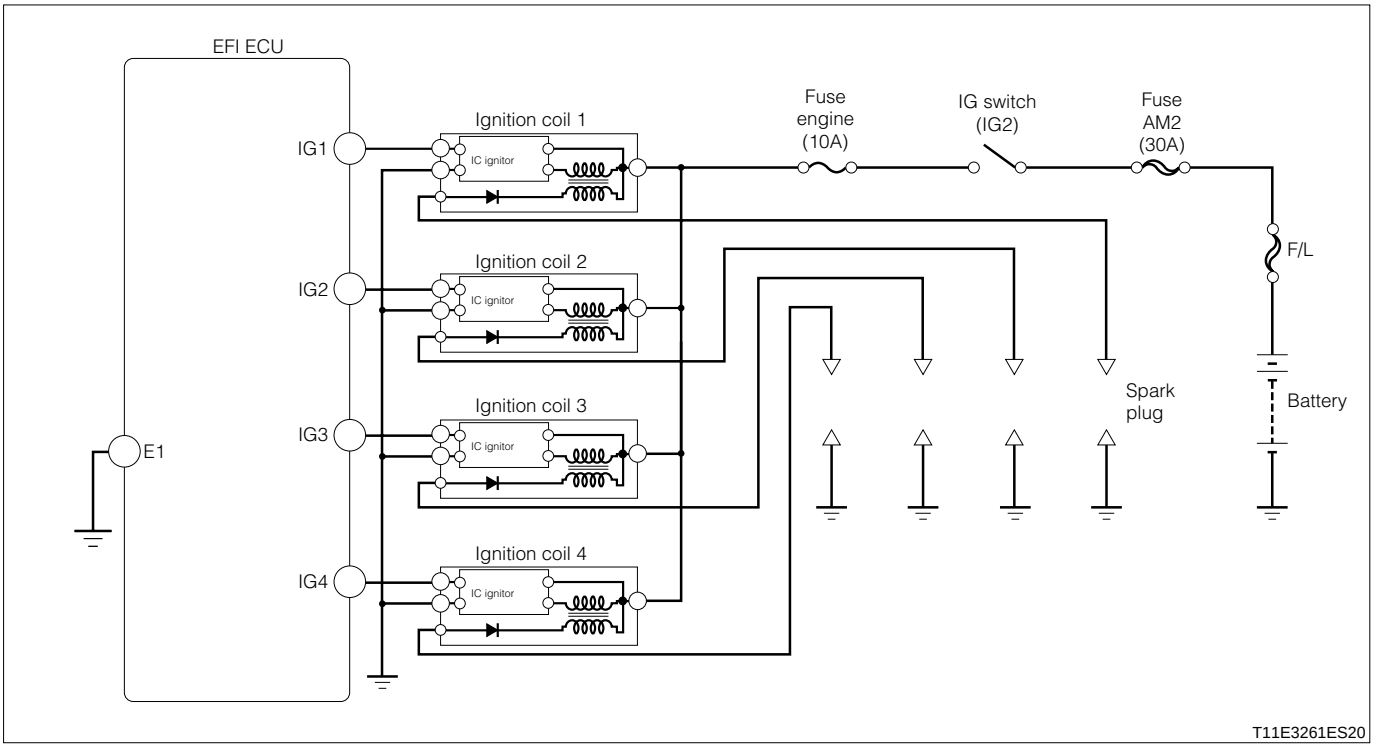


K3
1 OUTLINE
1-1 DESCRIPTION
The DLI (DistributorLess Ignition) system is adopted to improve ignition performance. In this DLI system, there is no distributor and the ignition coil is provided right above the spark plug. Therefore, there exists no ignition energy loss by distribution and the electric energy generated by the coil can be directly supplied. As a result, the best ignition condition can be assured at all times.

1-1-1 EU SPEC.



1-1-2 GENERAL SPEC.



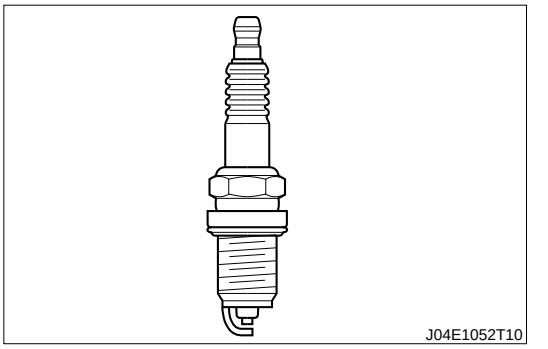
2 CONSTRUCTION AND OPERATION

2-1 SPARK PLUG

2-1-1 EU SPEC.

Spark plug specifications

Type	K20RU−11	BKR6EY−11
Electrode gap(mm)	1.0−1.1	1.0−1.1
Width across flats	16	16

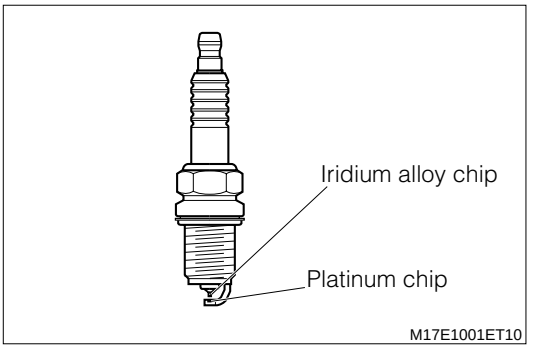


2-1-2 GENERAL SPEC.

An iridium plug with high ignition energy is adopted to improve output performance and clean emission gas.

Spark plug specifications

Type	SVK20RZ11	IFR6J11
Electrode gap(mm)	1.0−1.1	1.0−1.1
Width across flats	16	16

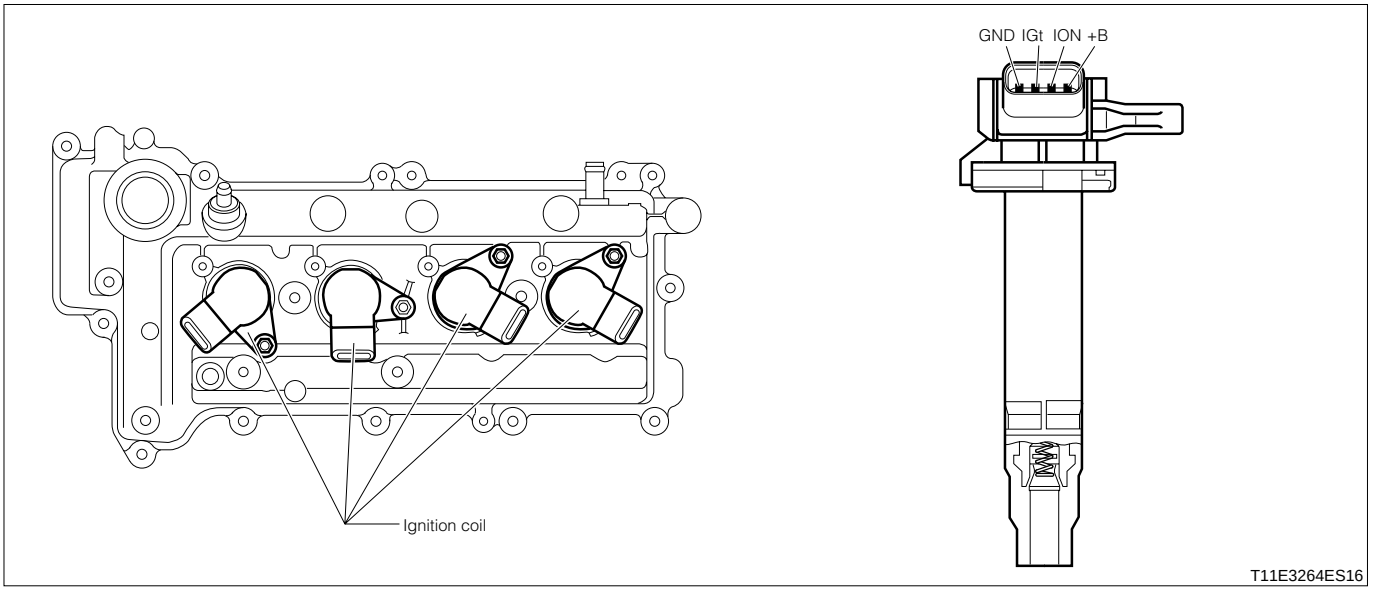


2-2 IGNITION COIL

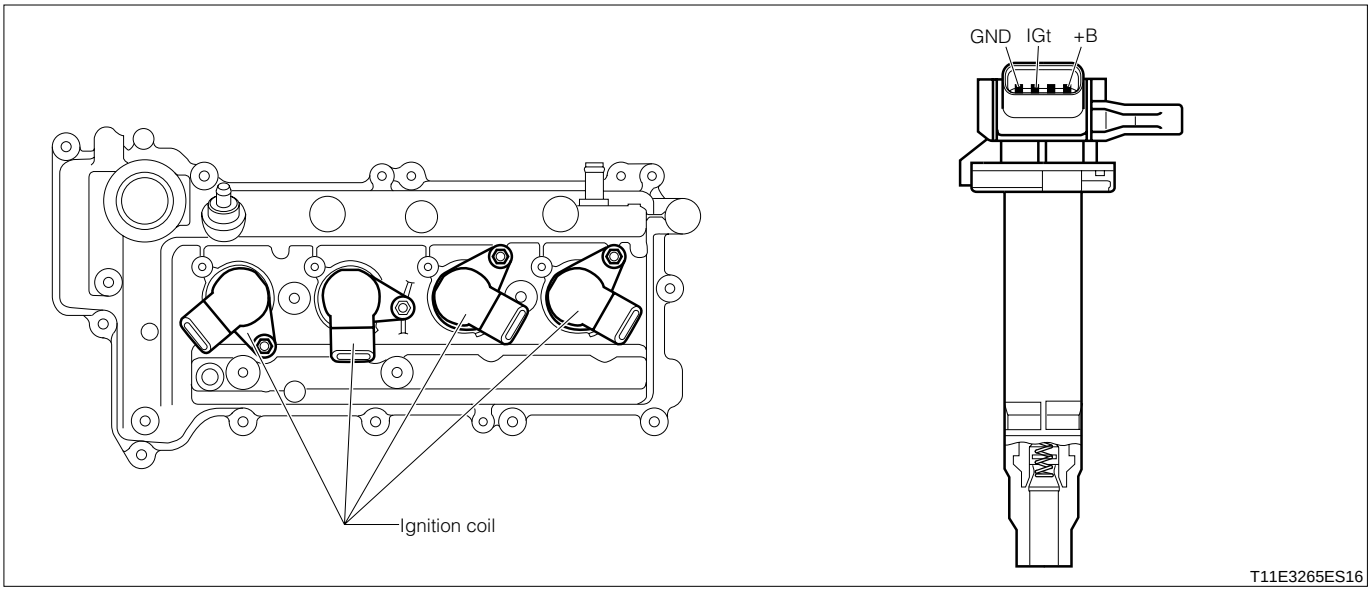
1.For improve ignition control and reliability, the stick type ignitor incorporated ignition coil has been employed.

2.The mounting position is on the cylinder head cover that is right above the spark plug of each cylinder.

2-2-1 EU SPEC.



2-2-2 GENERAL SPEC.



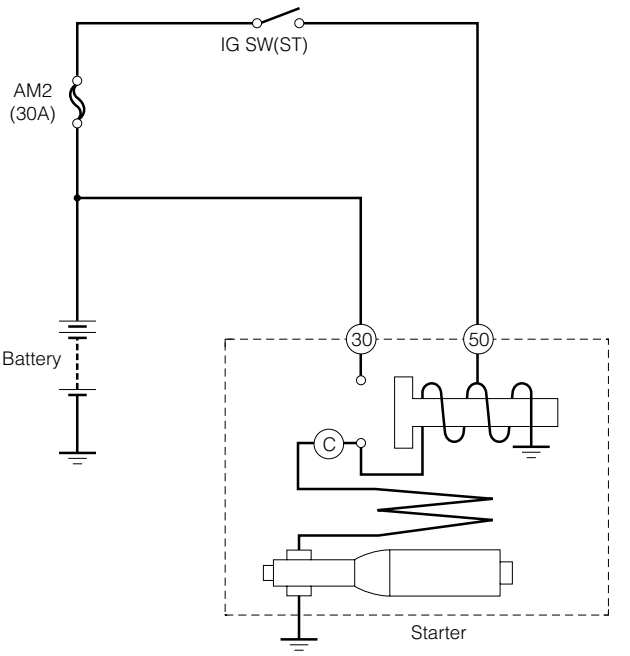
B11 STARTING SYSTEM/CHARGING SYSTEM

STARTING SYSTEM (1KR)---------- B11 - 1
OUTLINE---------- B11 - 1
CIRCUIT DIAGRAM---------- B11 - 1
CONSTRUCTION AND OPERATION--- B11 - 1
STARTER ---------- B11 - 1
STARTING SYSTEM (K3)---------- B11 - 2
OUTLINE---------- B11 - 2
CIRCUIT DIAGRAM---------- B11 - 2
CONSTRUCTION AND OPERATION--- B11 - 3
STARTER ---------- B11 - 3
CHARGING SYSTEM (1KR) ---------- B11 - 3
OUTLINE---------- B11 - 3
CIRCUIT DIAGRAM---------- B11 - 3
CONSTRUCTION AND OPERATION--- B11 - 3
ALTERNATOR ---------- B11 - 3
CHARGING SYSTEM (K3) ---------- B11 - 4
OUTLINE---------- B11 - 4
CIRCUIT DIAGRAM---------- B11 - 4
CONSTRUCTION AND OPERATION--- B11 - 4
ALTERNATOR ---------- B11 - 4

STARTING SYSTEM (1KR)

1 OUTLINE

1-1 CIRCUIT DIAGRAM



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2 CONSTRUCTION AND OPERATION

2-1 STARTER

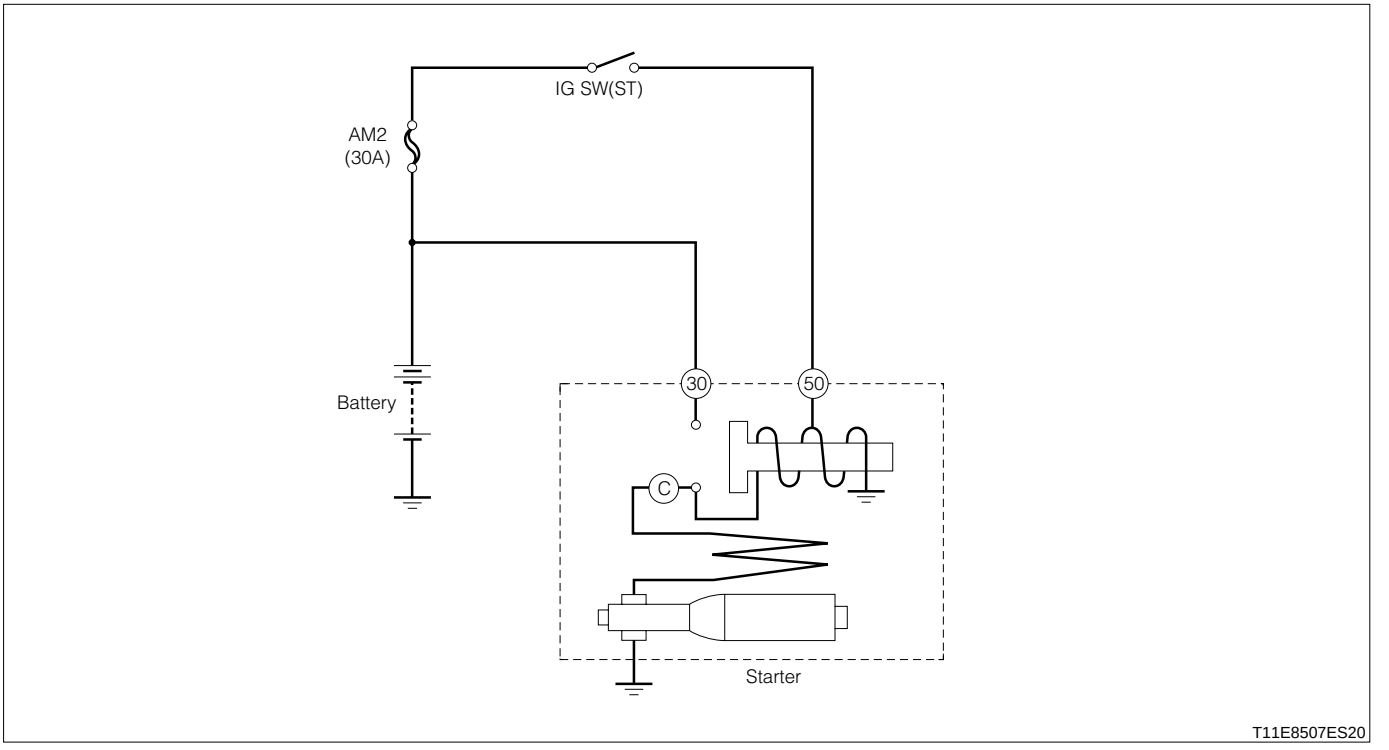
	Standard	Cold region
Rated output (kW)	0.7	1.0
Non-loaded characteristics	50 A or less [at time of 11.5 V] 6,000 rpm or more	90 A or less [at time of 11.5 V] 3,000 rpm or more
Number of pinion teeth	9	9
Rotating direction	Clockwise as viewed from pinion side	Clockwise as viewed from pinion side
Weight (kg)	3.25	3.15

STARTING SYSTEM (K3)

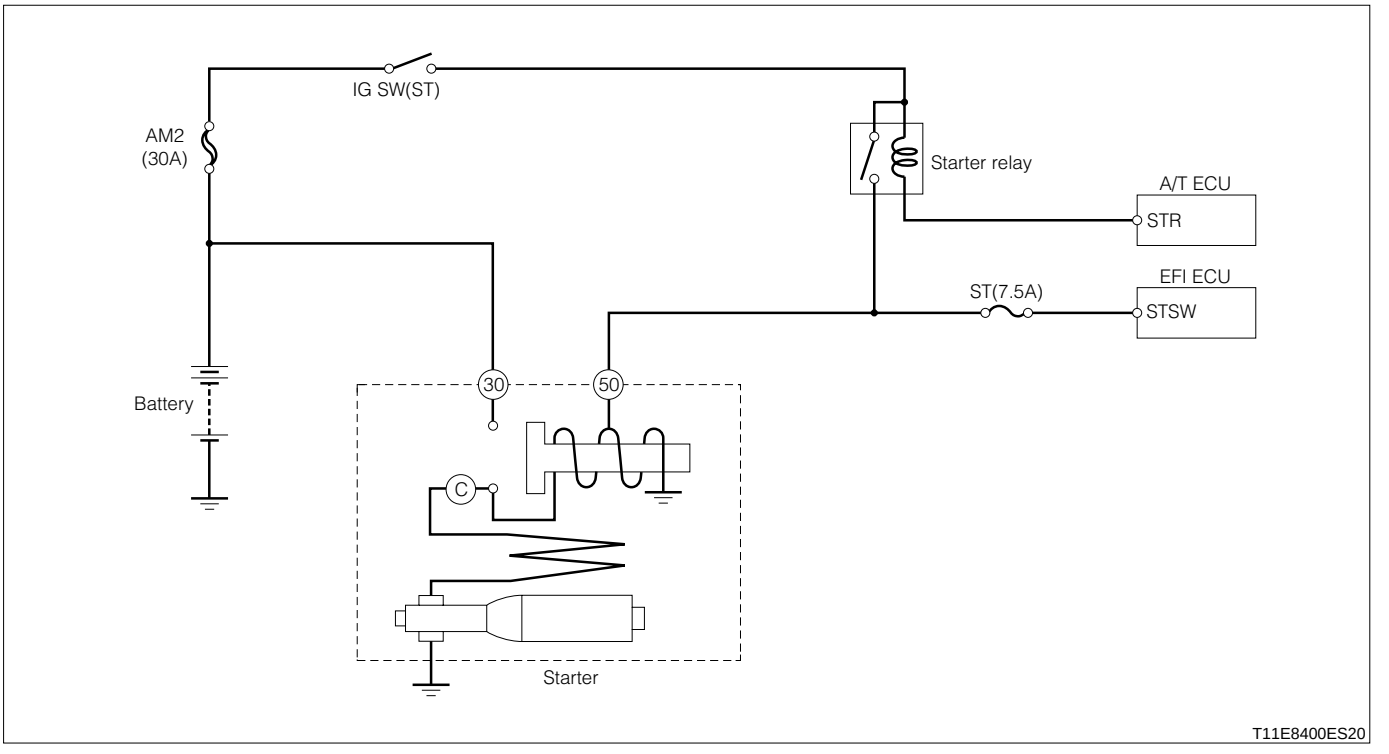
1 OUTLINE

1-1 CIRCUIT DIAGRAM

1-1-1 M/T VEHICLES



1-1-2 A/T VEHICLES



2 CONSTRUCTION AND OPERATION

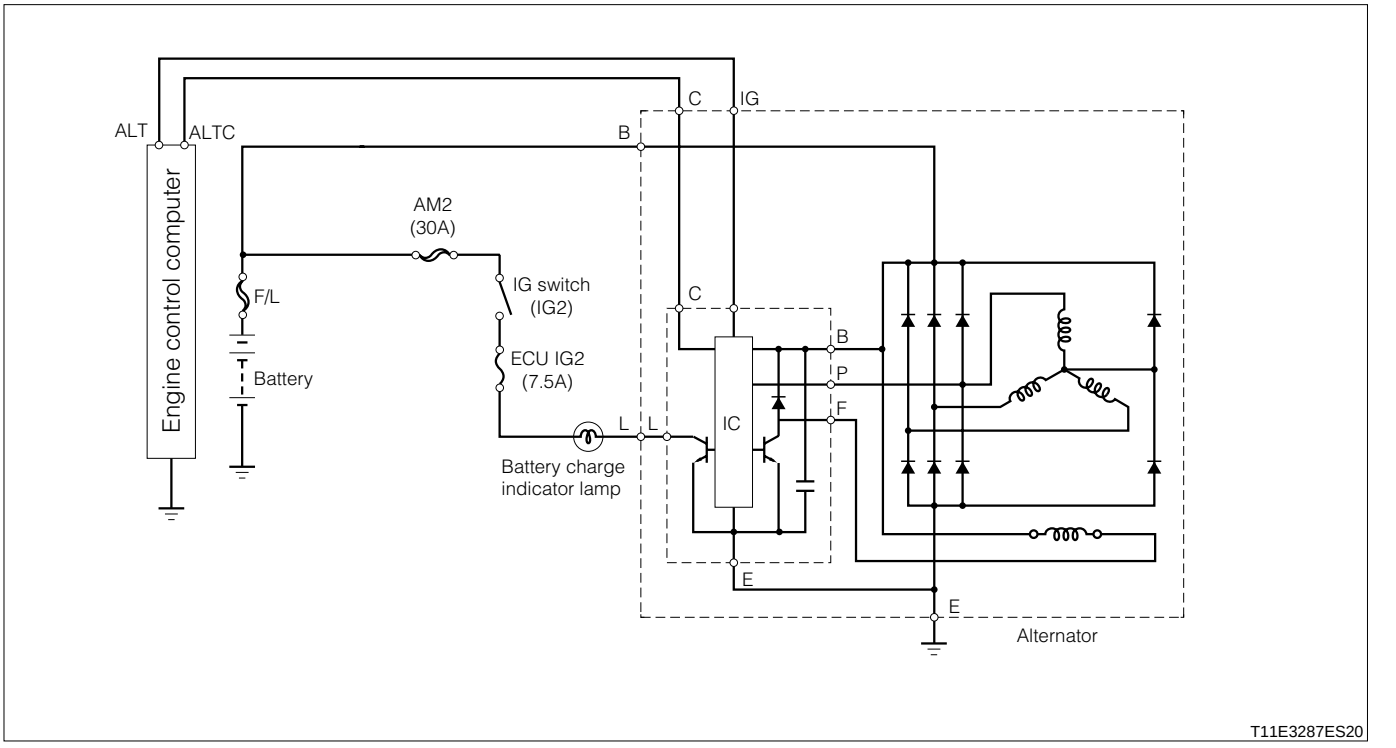
2-1 STARTER

	Standard	Cold region
Rated output (kW)	0.8	1.0
Non-loaded characteristics	50 A or less [at time of 11.5 V] 6,000 rpm or more	90 A or less [at time of 11.5 V] 3,000 rpm or more
Number of pinion teeth	8	8
Rotating direction	Clockwise as viewed from pinion side	Clockwise as viewed from pinion side
Weight (kg)	3.15	3.10

CHARGING SYSTEM (1KR)

1 OUTLINE

1-1 CIRCUIT DIAGRAM



2 CONSTRUCTION AND OPERATION

2-1 ALTERNATOR

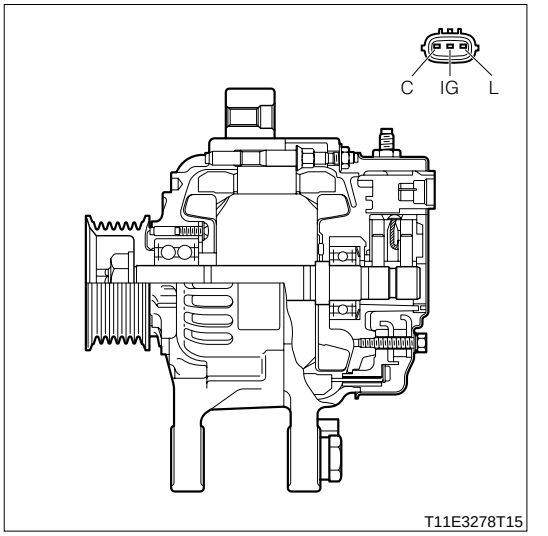
1.A small and light alternator with the built-in IC regulator and multi-step charging feature is adopted.

2.Use of the engine control computer makes it possible to conform to the control to switch the regulator adjusting voltage in 2 stages.

3.A six-groove pulley is adopted to correspond to the six-rib belt.

Alternator specifications

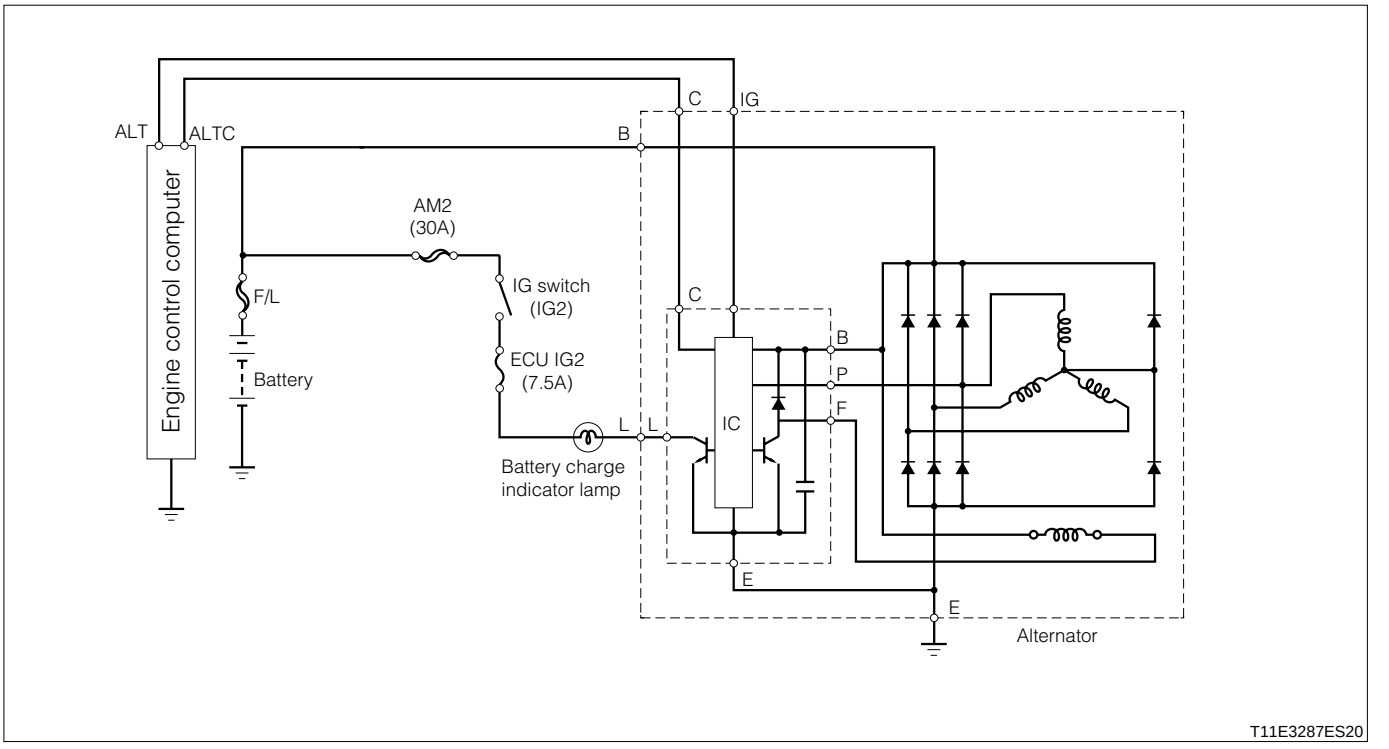
Rated voltage, maximum output (V−A)	12−65
Output characteristics [13.5 V,5,000 rpm] (A)	67.0 or more
Permissible maximum rotation speed (rpm)	18,000
Regulator regulation voltage [5,000rpm, 10A, 25−] (V)	Hi:14.2−14.8V Lo:12.5−13.1V
Rotating direction	Clockwise as viewed from pulley side
Pulley diameter (mm)	52.5 Dia.(Pulley outer diameter 57.7 mm Dia.)
Weight (kg)	3.30



CHARGING SYSTEM (K3)

1 OUTLINE

1-1 CIRCUIT DIAGRAM



2 CONSTRUCTION AND OPERATION

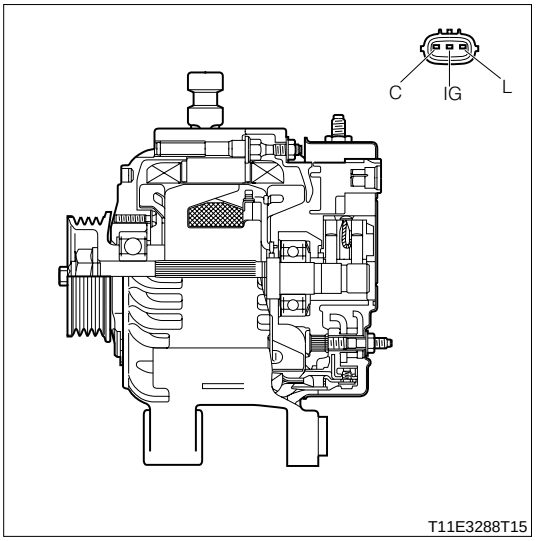
2-1 ALTERNATOR

1.A small and light alternator with the built-in IC regulator and multi-step charging feature is adopted.

2.Use of the engine control computer makes it possible to conform to the control to switch the regulator adjusting voltage in 2 stages.

Alternator specifications

Rated voltage, maximum output (V−A)	12−70
Output characteristics [13.5 V, 5,000 rpm] (A)	77.0 or more
Permissible maximum rotation speed (rpm)	18,000
Regulator regulation voltage [5,000rpm, 10A, 25℃] (V)	Hi:14.2−14.8V Lo:12.5−13.1V
Rotating direction	Clockwise as viewed from pulley side
Pulley diameter (mm)	55 Dia.
Weight (kg)	4.08



TO INDEX

B12 ENGINE MOUNTING

OUTLINE ---------- B12 - 1
DESCRIPTION ---------- B12 - 1
CONSTRUCTION AND OPERATION--- B12 - 3
RIGHT ENGINE MOUNTING INSULATOR---------- B12 - 3
LEFT ENGINE MOUNTING INSULATOR---------- B12 - 3
REAR ENGINE MOUNTING INSULATOR---------- B12 - 4

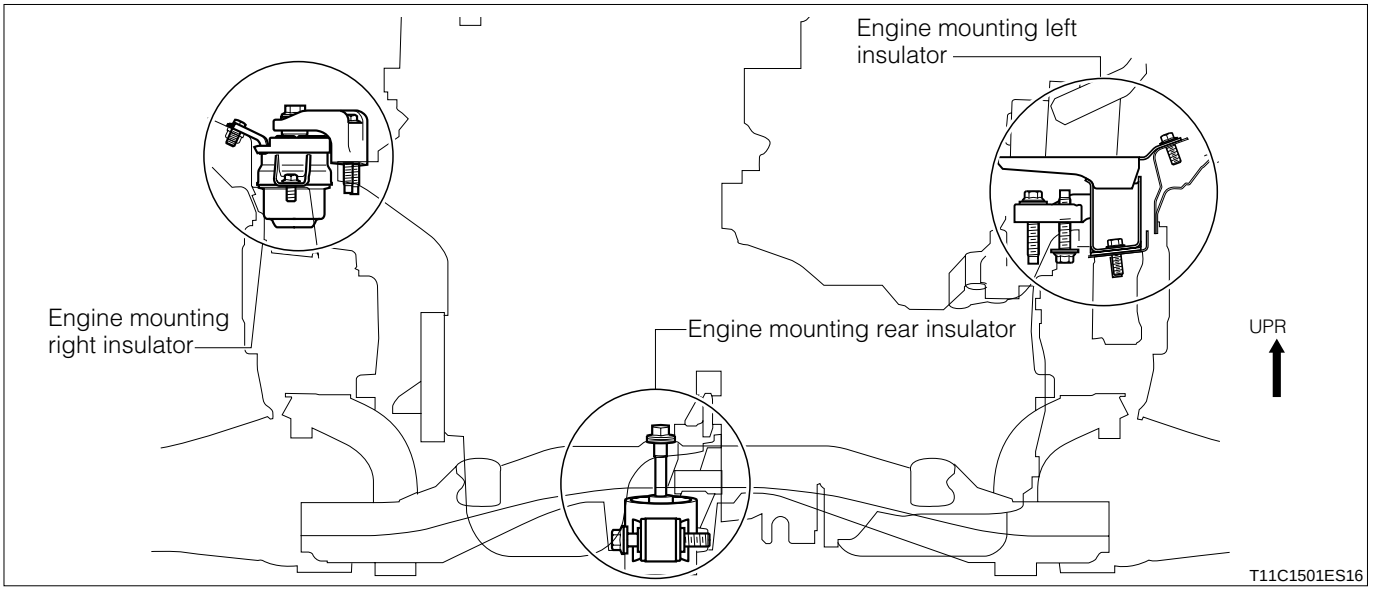
1 OUTLINE

1-1 DESCRIPTION

The engine mounting has employed a three-point supporting type on all models. Vibrations and noises have been reduced by taking the following measures.

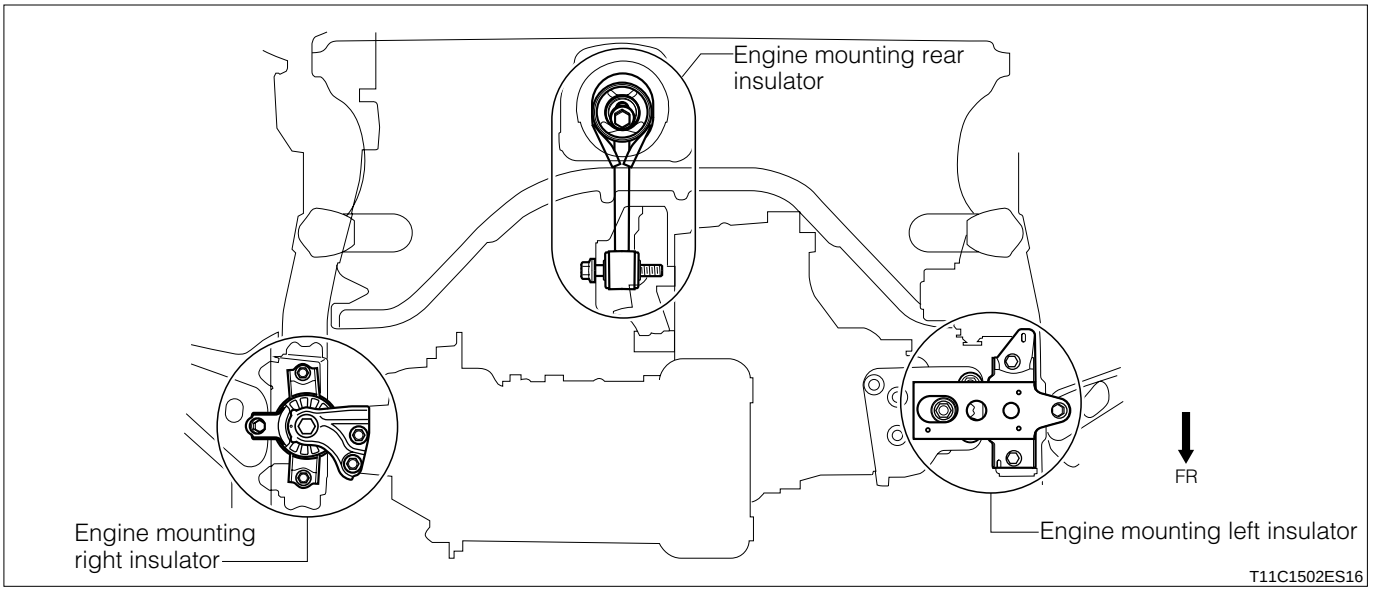
1. The engine mounting right insulator has employed a hydraulic damping mount on all models.
2. The engine mounting right insulator has the following three types given below.
   (1) The one for Type 1KR engine-mounted M/T vehicles
   (2) The one for Type K3 engine-mounted M/T vehicles
   (3) The one for Type K3 engine-mounted A/T vehicles
3. The engine mounting left insulator has the following two types given below.
   (1) The one for M/T vehicles
   (2) The one for A/T vehicles
4. The engine mounting rear insulator has employed a torque rod type.
5. The engine mounting rear insulator has the following two types given below.
   (1) The one for Type 1KR engine-mounted vehicles
   (2) The one for Type K3 engine-mounted vehicles

Engine mounting supporting position (Front side of vehicle)



The figure above shows the position for Type 1KR engine-mounted vehicles.

Engine mounting supporting position (Top of vehicle)

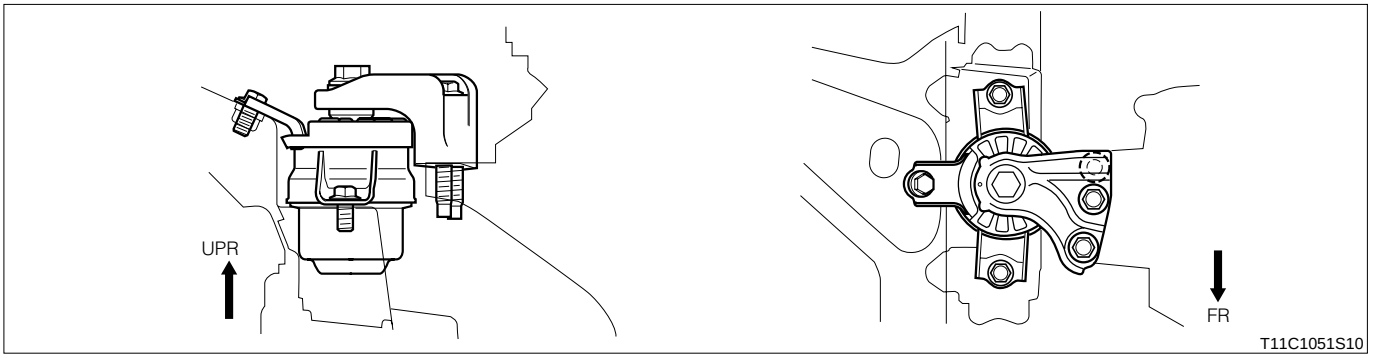


The figure above shows the position for Type 1KR engine-mounted vehicles.

2 CONSTRUCTION AND OPERATION

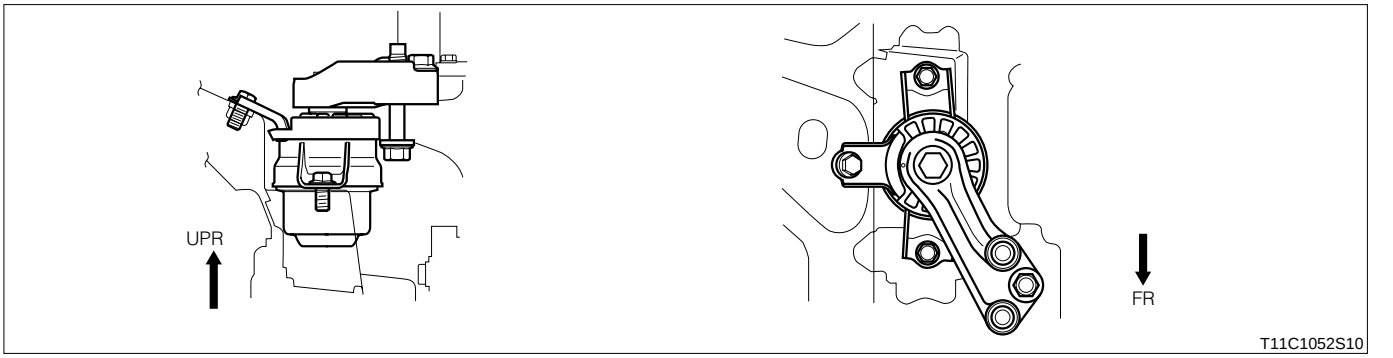
2-1 RIGHT ENGINE MOUNTING INSULATOR

Type 1KR engine-mounted vehicles



Left figure: Front side of vehicle; Right figure: Top of vehicle

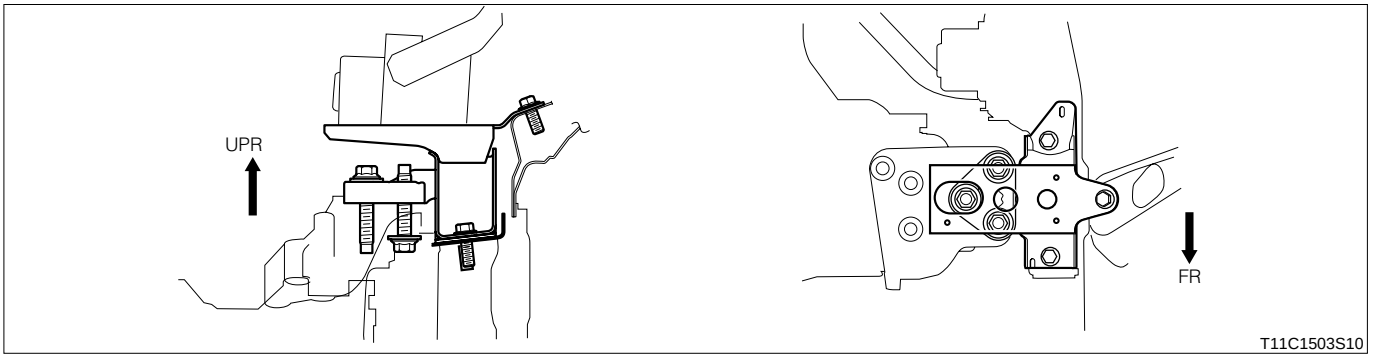
Type K3 engine-mounted vehicles



Left figure: Front side of vehicle; Right figure: Top of vehicle

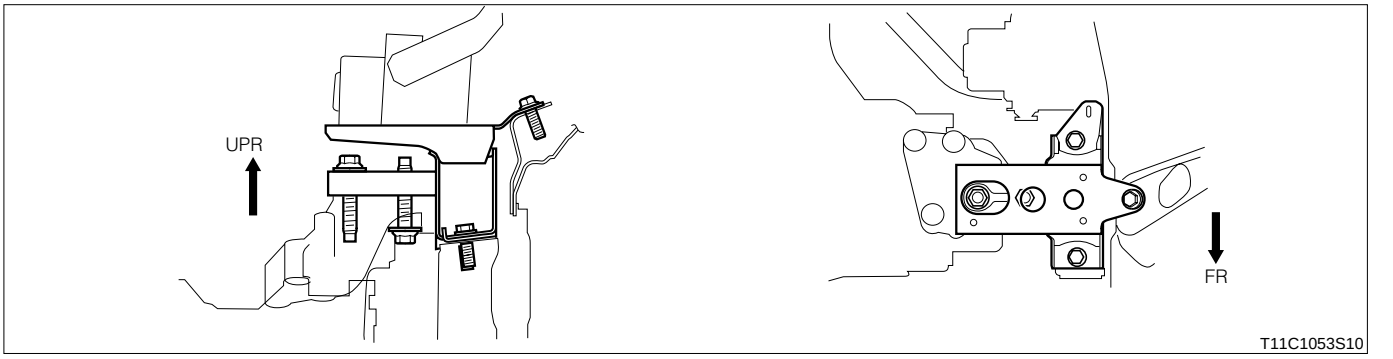
2-2 LEFT ENGINE MOUNTING INSULATOR

M/T vehicles



Left figure: Front side of vehicle; Right figure: Top of vehicle

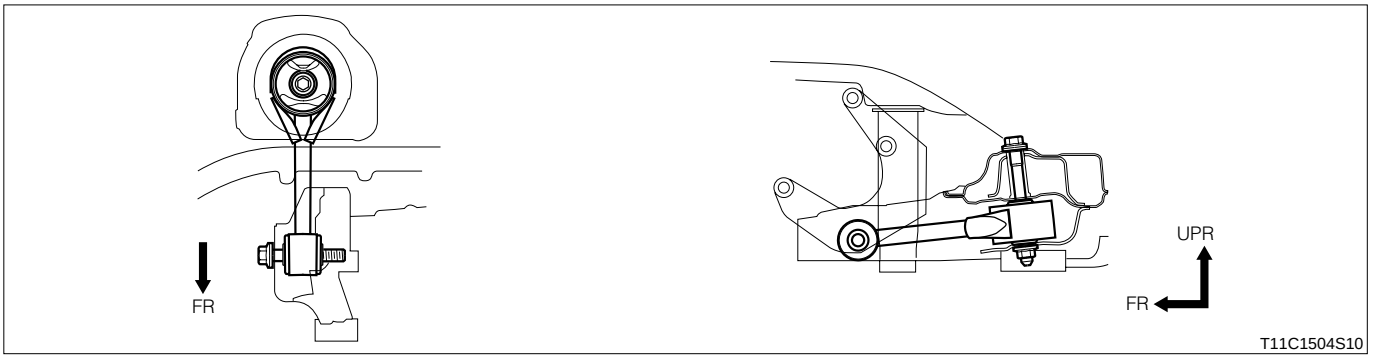
A/T vehicles



Left figure: Front side of vehicle; Right figure: Top of vehicle

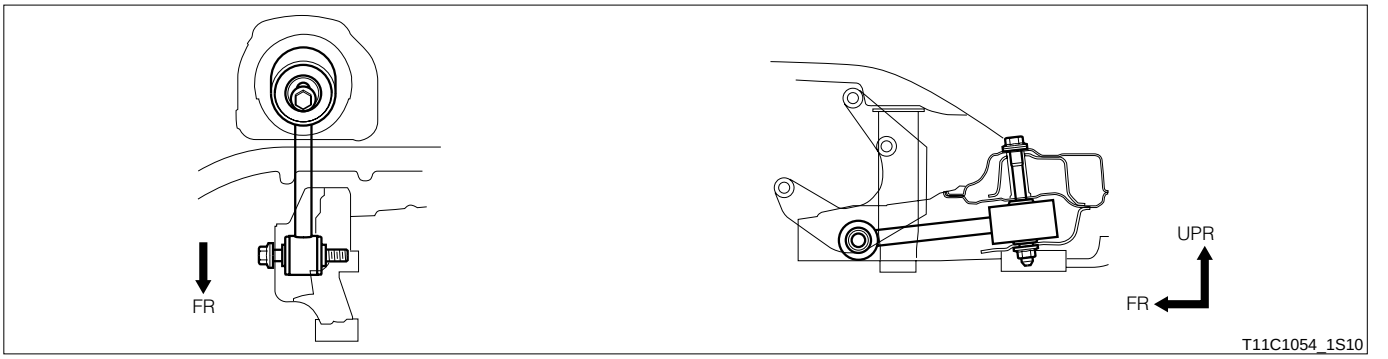
2-3 REAR ENGINE MOUNTING INSULATOR

M/T vehicles



Left figure: Top of vehicle; Right figure: Side of vehicle

A/T vehicles



Left figure: Top of vehicle; Right figure: Side of vehicle

TO INDEX

C1 FRONT SUSPENSION

OUTLINE ---------- C1 - 1
DESCRIPTION ---------- C1 - 1
SPECIFICATION ---------- C1 - 1
CONSTRUCTION AND OPERATION ---- C1 - 2
LOWER ARM ---------- C1 - 2
FRONT STABILIZER BAR ---------- C1 - 3
FRONT SUSPENSION MEMBER ------ C1 - 4

1 OUTLINE

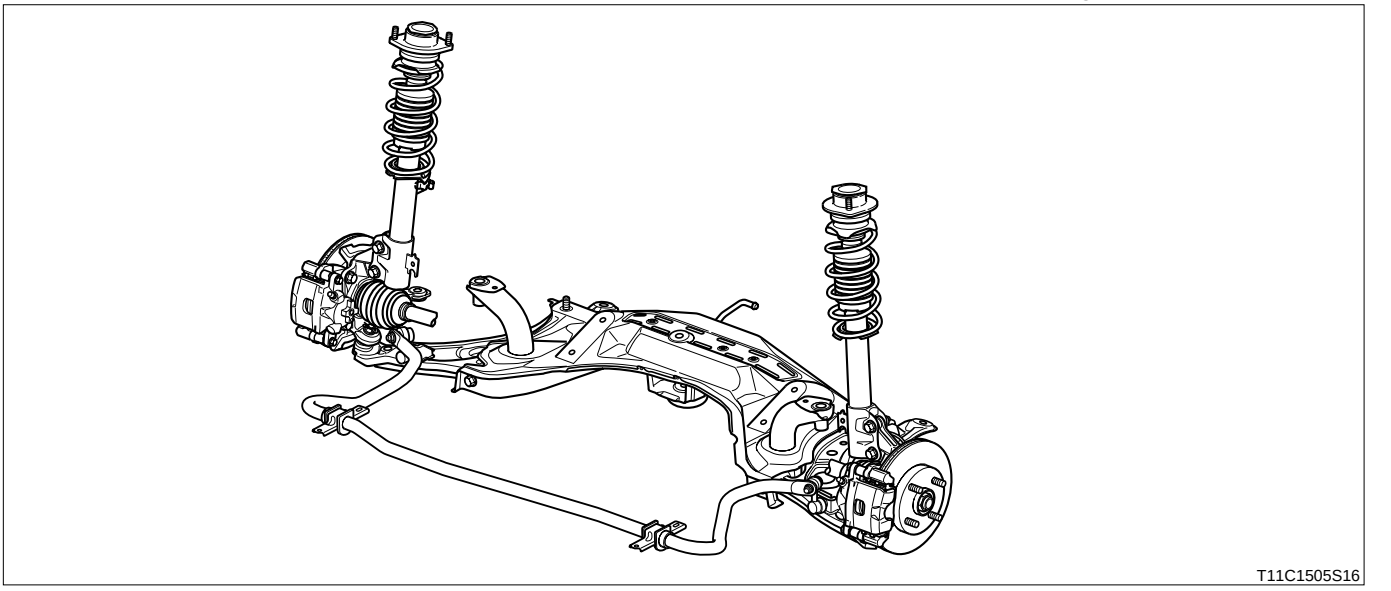
1-1 DESCRIPTION

1.The MacPherson strut type suspension with an L-shaped lower arm has been employed on all models.

2.Optimized suspension geometry successfully combines excellent drivability and maximum riding comfort.

3.The MacPherson strut type suspension with an L-shaped lower arm has been employed on all models.

4.Some specifications provide the front stabilizer bar, which offers sufficient roll rigidity.



T11C1505S16

1-2 SPECIFICATION

1-2-1 FRONT WHEEL ALIGNMENT SPECIFICATION

Vehicle model	M300RS	M300LS	M301RS	M301LS
Toe-in [mm]	0			
Camber angle	0˚			
Caster angle	3˚28´			
Kingpin angle	10˚36´			

2 CONSTRUCTION AND OPERATION

2-1 LOWER ARM

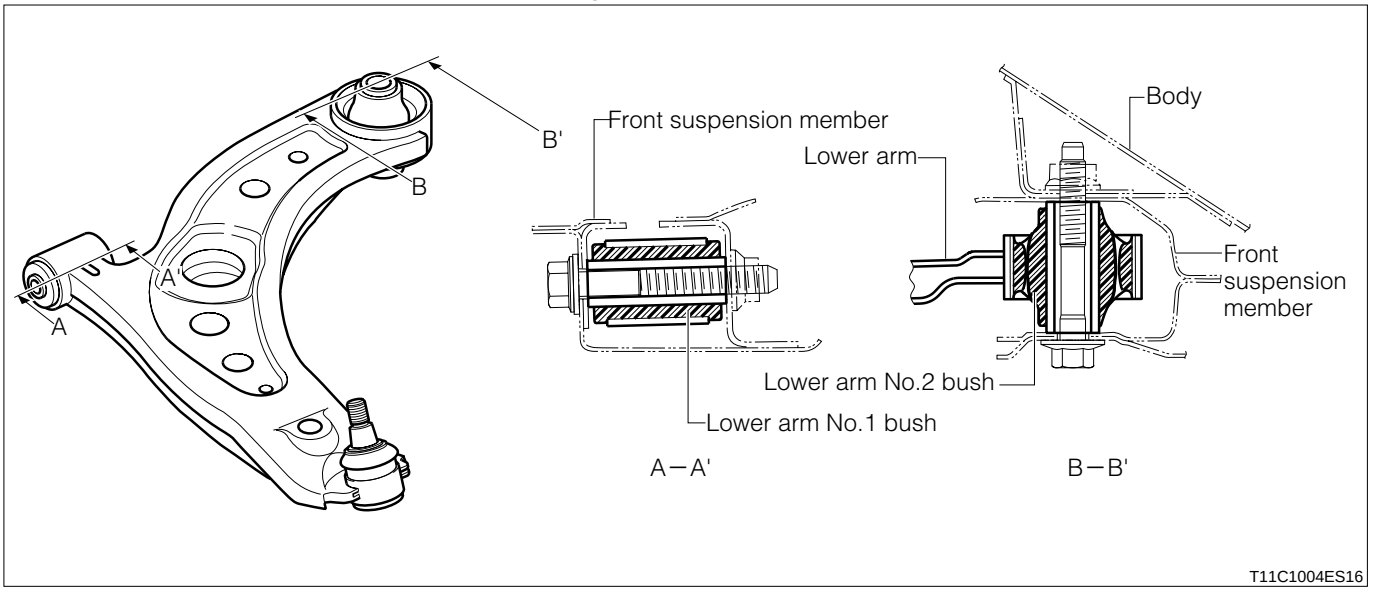
1.An L-shape lower arm has been adopted. Optimized arm shape successfully combines high and light-weight.

2.Optimized mounting location and characteristics of the lower arm bush offer optimum compliance characteristics, thereby combining riding comfort and steering feeling.

3.The bush No. 2 with a larger diameter has been employed. As a result, the compliance *1 at the front and rear sides has been increased, thus contributing to the improvement of harshness *2.

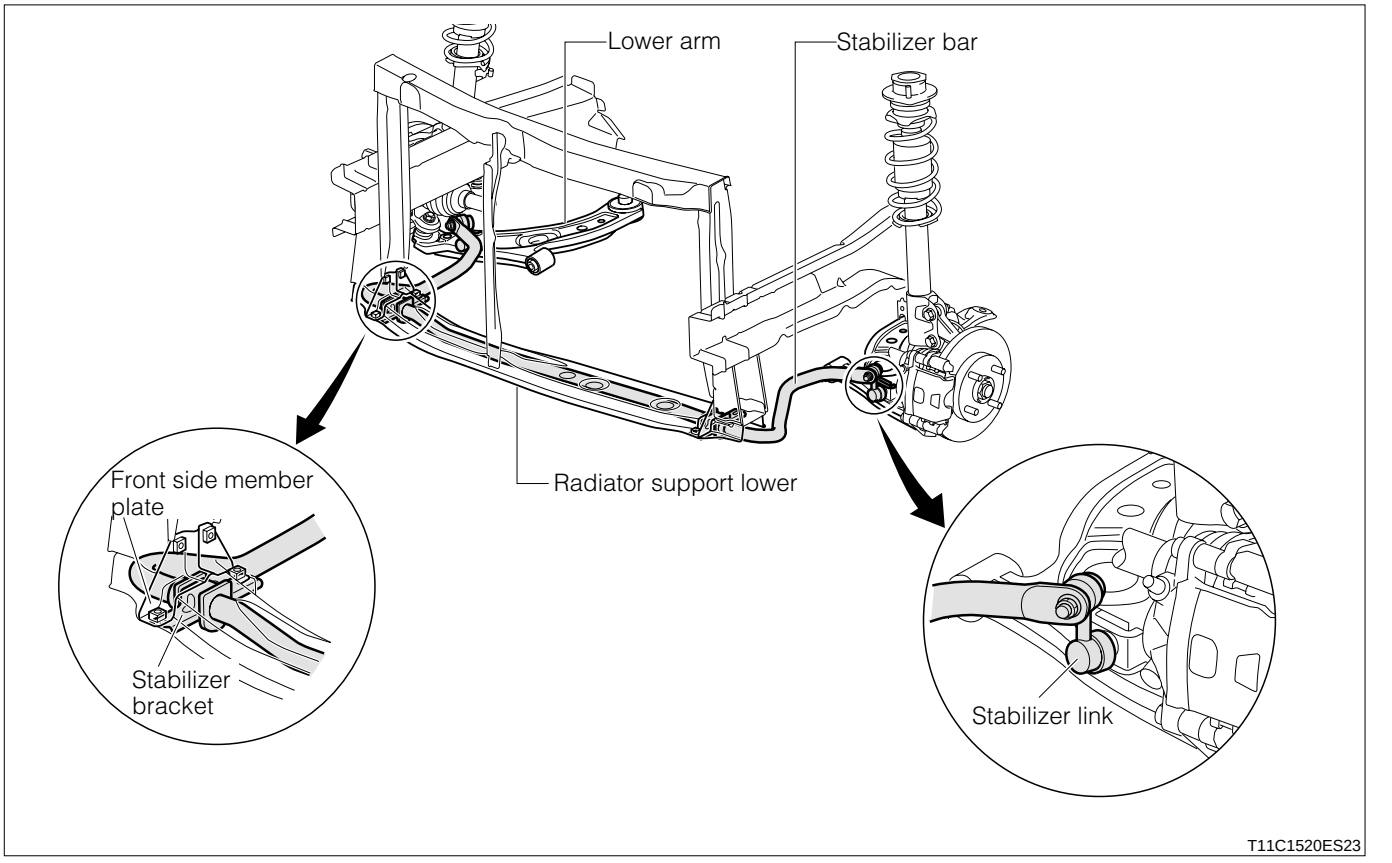
*1 Front and rear compliance: Moving amount of tire in a fore-and-aft direction

*2 Harshness: relates to a shock accompanied by sound transmitted from tires when driving on joints of the paved road, projections and steps of rough road surface, etc.

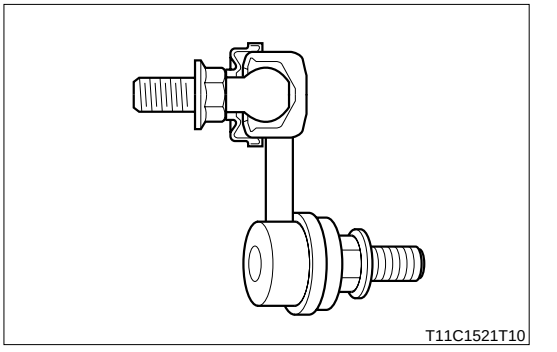


2-2 FRONT STABILIZER BAR

1.The stabilizer bar is installed to the radiator support lower and lower arm as indicated below.
(1) The radiator support lower side is installed in such a way that it is sandwiched between the front side member plate and stabilizer bracket.
(2) The lower arm side is installed through the stabilizer link.

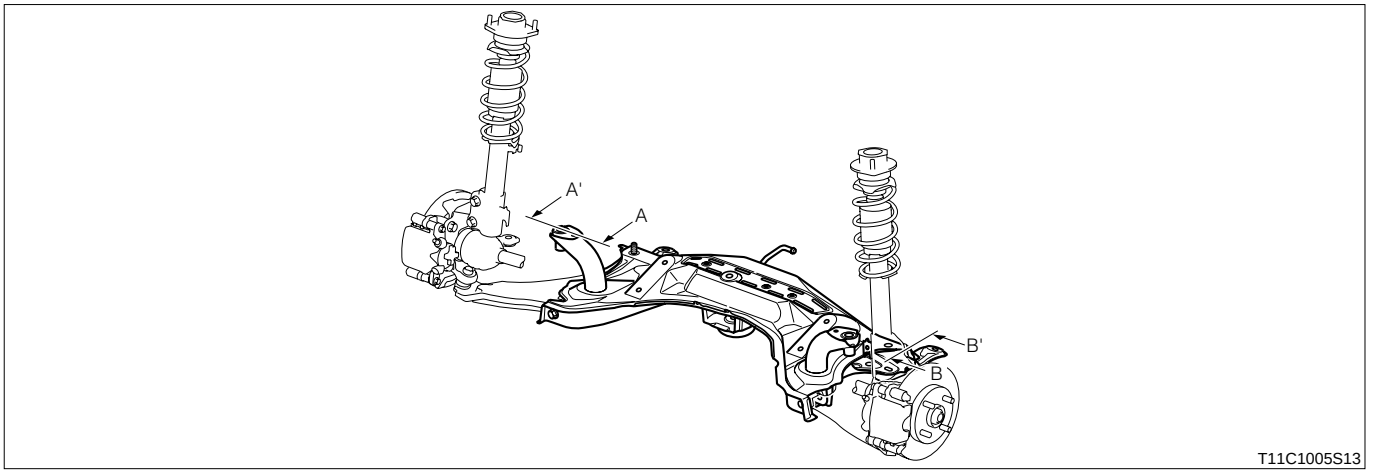


2.The stabilizer link employs the ball joint type, thus assuring the excellent response and rolling rigidity.

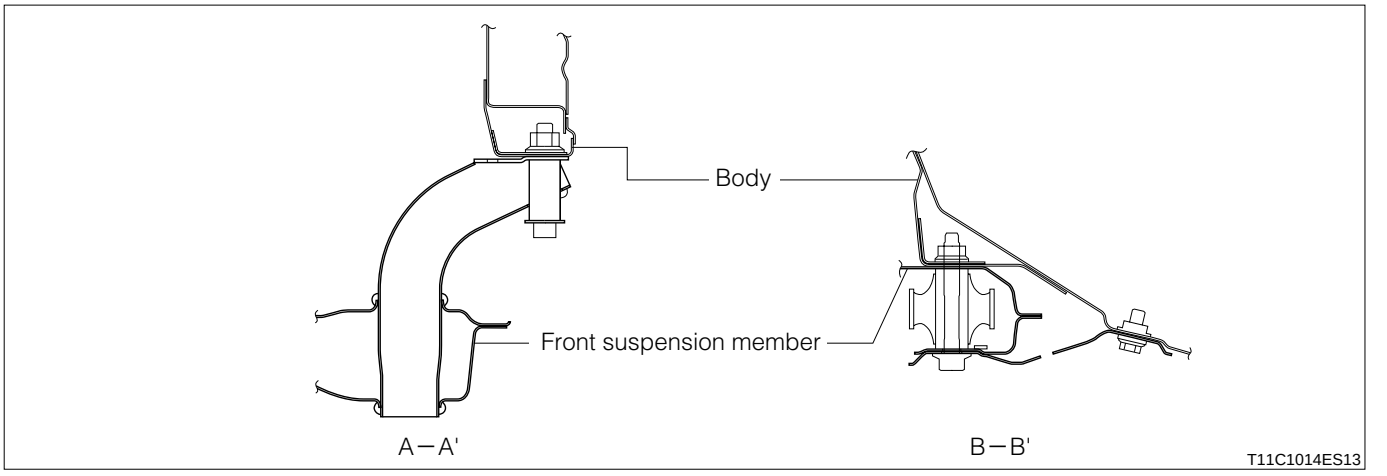


2-3 FRONT SUSPENSION MEMBER

1.An H-type front suspension member (frame) has been employed for the front frame, offering both light-weight and drivability.
2.To ensure higher rigidity as well as joint rigidity with the body, the press steel sheet has adopted pipe passing-through construction.
3.For reduced noise and enhanced rigidity of the suspension and steering, the lower arm and steering gear have been mounted on the front suspension member.



Cross-sectional view



TO INDEX

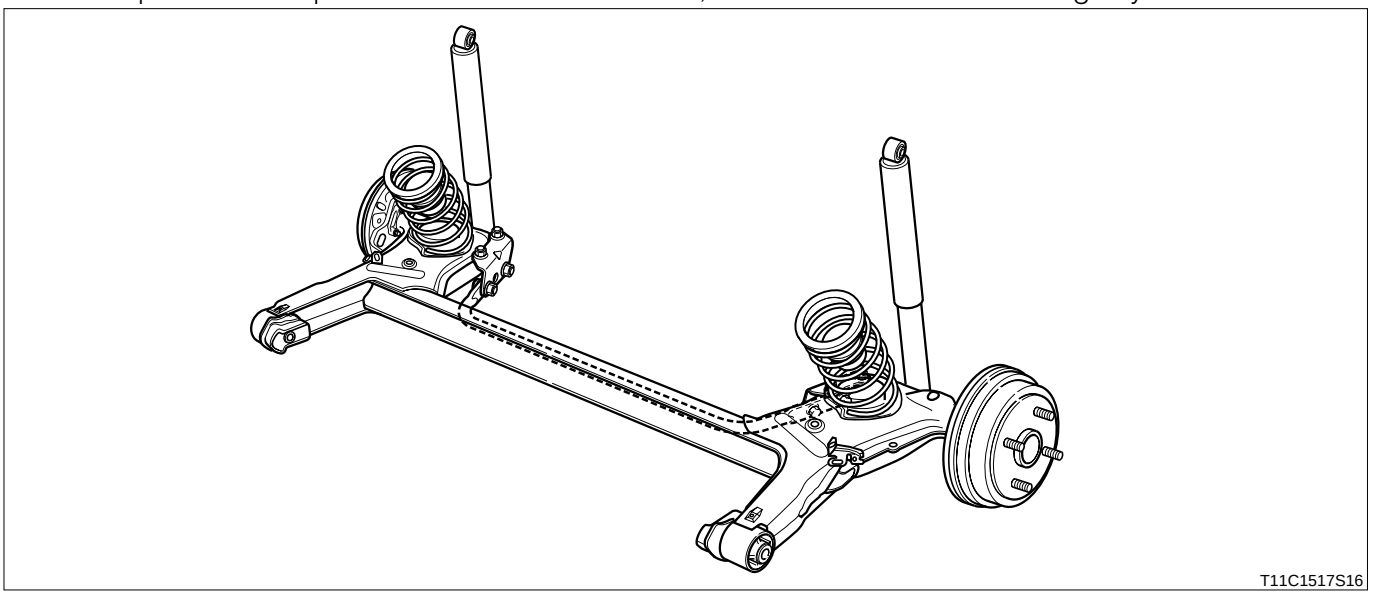
C2 REAR SUSPENSION

OUTLINE ---------- C2 - 1
DESCRIPTION ---------- C2 - 1
SPECIFICATION ---------- C2 - 1
CONSTRUCTION AND OPERATION ---- C2 - 2
TORSION BEAM TYPE
SUSPENSION ---------- C2 - 2

1 OUTLINE

1-1 DESCRIPTION

1.A trailing arm type suspension with torsion beam has been employed.
2.For assured excellent controllability and riding comfort, the trailing arm section employs a toe correct bush.
3.Some specifications provide the rear stabilizer bar, which offers sufficient roll rigidity.



1-2 SPECIFICATION

1-2-1 REAR WHEEL ALIGNMENT SPECIFICATIONS

Vehicle model	M300RS	M300LS	M301RS	M301LS
Toe-in [mm]	3			
Camber angle	−0˚45´			

2 CONSTRUCTION AND OPERATION

2-1 TORSION BEAM TYPE SUSPENSION

2-1-1 DESCRIPTION

This type of suspension is capable of containing changes in alignment which occur as a result of movements and input from the suspensions. Furthermore, for optimum strength and rigidity, a U-shaped beam and an open end arm have been adopted. For excellent driving stability and riding comfort, the bushing characteristics can vary, depending on the input direction of the suspension.

2-1-2 TOE-CORRECT BUSHING

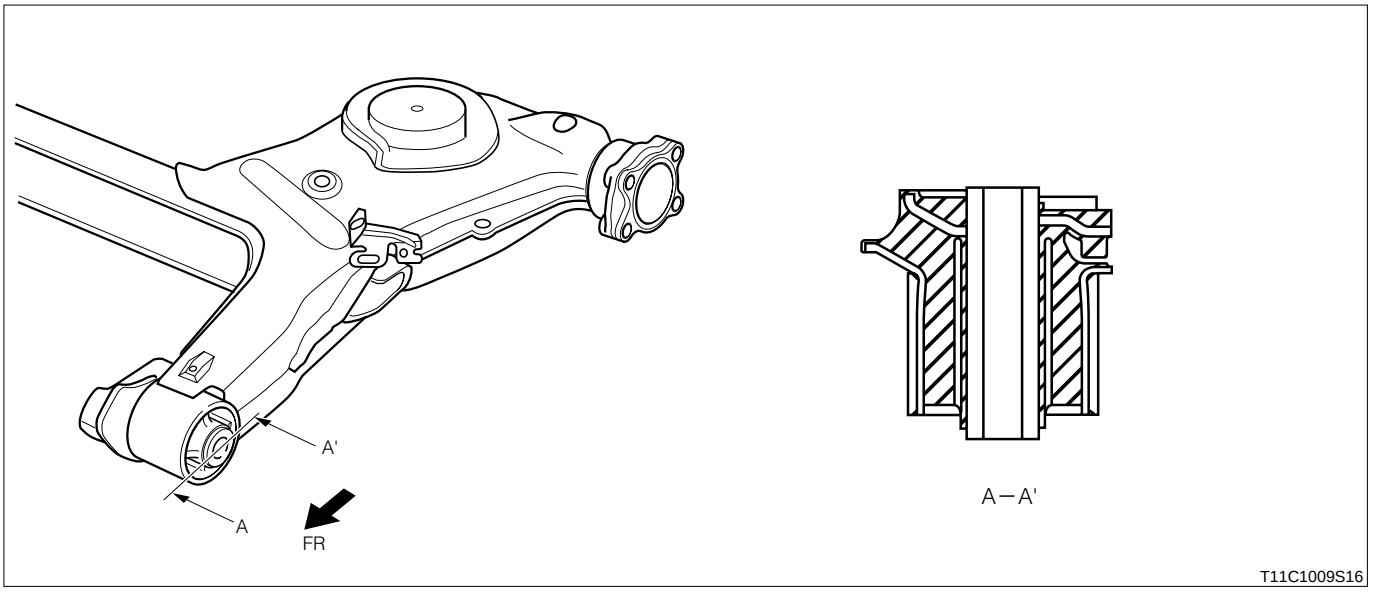
(1) Construction

With regard to the bushing construction in which the body and trailing arm have been joined, the setting has been made in such a way that the compliance *1 characteristics differ between the fore-and-aft direction and the right-and-left direction of the body.

Both excellent controllability and riding comfort have been achieved by generating a compliance steer *2, using deflection that occurs due to the longitudinal force and lateral force that are generated while the vehicle is cornering.

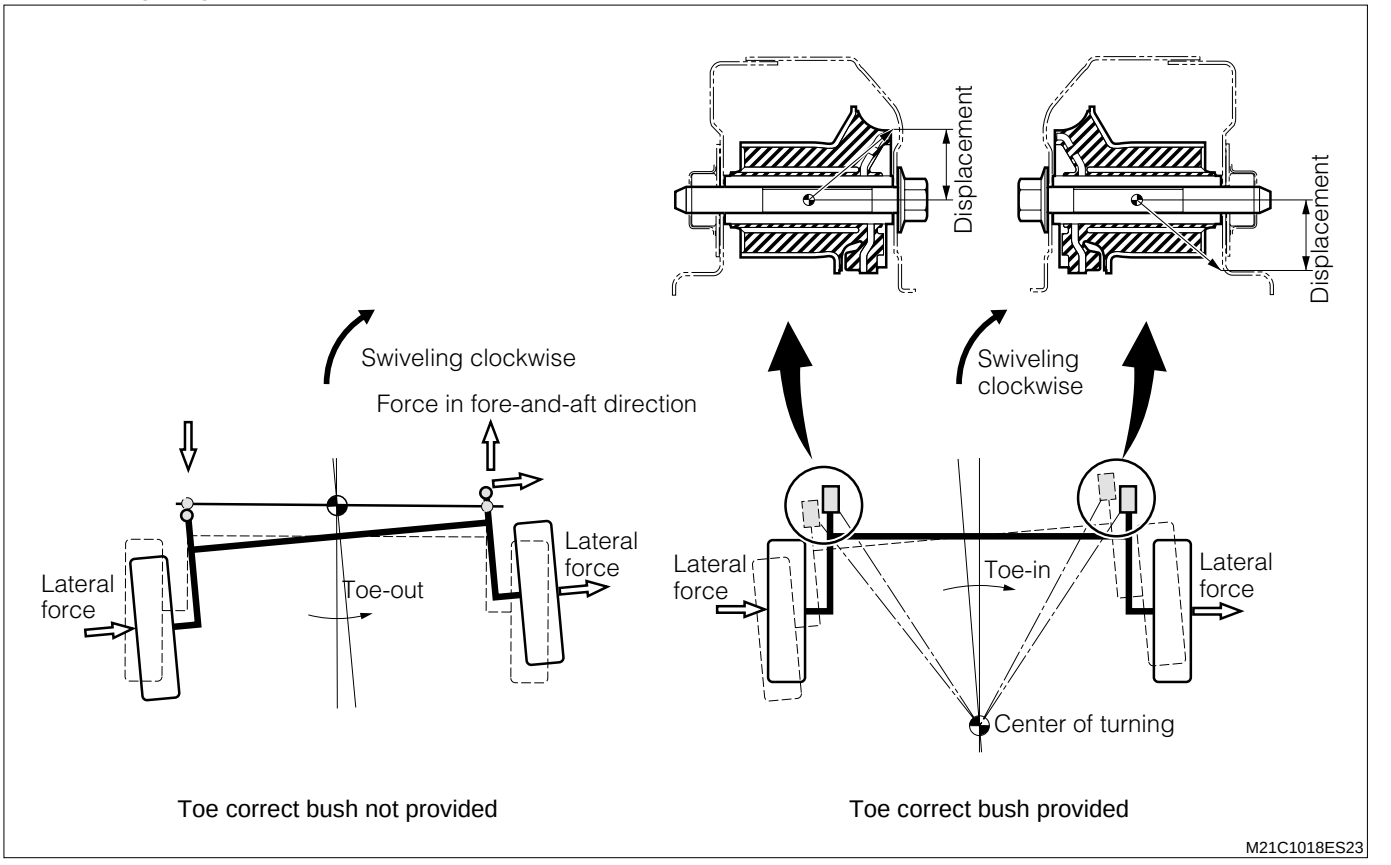
*1Compliance: This denotes flexibility of suspension

*2 Compliance steer: When longitudinal and lateral forces are applied to the ground contact section of the tire, this generates deflections at the arm and bush that constitute the suspension. These deflections alter the alignment, thus producing a steer angle and. As a result, the effect as if the steering wheel was turned is obtained.



(2) Operation

Due to the longitudinal force and lateral force of the vehicle body generated while the vehicle is turning, the bushing attached at the trailing arm will be deformed. At the right turning side, the right trailing arm will tend to move to the front side, whereas the left trailing arm will tend to move to the rear. As a whole, the trailing arm will turn in the same direction as the steering operation. Thus, a force is generated to correct the entire vehicle to the under steer side, using the longitudinal force and lateral force which occur, while the vehicle is turning, due to the shape of the bushing attached at the trailing arm. Consequently, the steering angle of the rear wheels is optimized.



TO INDEX

C3 WHEEL & TIRE

OUTLINE ---------- C3 - 1
SPECIFICATION ---------- C3 - 1
CONSTRUCTION AND OPERATION ---- C3 - 2
TIRE ---------- C3 - 2
DISC WHEEL ---------- C3 - 3

1 OUTLINE

1.The following tires and disc wheels given below have been employed.

(1) Tire having the size of 155/80R13 79S, and steel wheel having the size of 13×4.00B

(2) Tire having the size of 175/65R14 82S, and steel wheel and aluminum wheel having the size of 14×5.00J

(3) Tire having the size of 175/65R14 82T, and steel wheel and aluminum wheel having the size of 14×5.00J

2.As regards the tire and disc wheel to be mounted, their type differs depending on the specifications.

1-1 SPECIFICATION

1-1-1 TIRE & DISK WHEEL

RHD vehicles

			Vehicle model			
			M300RS		M301RS	
Type No	Tire size	Disc wheel	GMNE	GMNEW	GMGE GQGE	GMGEW GQGEW
No.1	155/80R13 79S	13×4.50B[Steel]	○	○	–	–
No.2	175/65R14 82T	14×5.00J[Steel]	○	○	○	○
No.3	175/65R14 82T	14×5.00J[Aluminum]	○	○	○	○
No.4	175/65R14 82S	14×5.00J[Steel]	–	○	–	○
No.5	175/65R14 82S	14×5.00J[Aluminum]	–	○	–	○

○: Provided –:Nor provided

LHD vehicles

			Vehicle model			
			M300LS		M301LS	
Type No	Disc wheel	Tire size	GMNE	GMNEW	GMGE GQGE	GMGEW GQGEW
No.1	155/80R13 79S	13×4.50B[Steel]	○	○	–	–
No.2	175/65R14 82T	14×5.00J[Steel]	○	○	○	○
No.3	175/65R14 82T	14×5.00J[Aluminum]	○	○	○	○

○: Provided –:Nor provided

1-1-2 SPARE TIRE

RHD vehicles

		Vehicle model			
		M300RS		M301RS	
Type No	Tire size	GMNE	GMNEW	GMGE GQGE	GMGEW GQGEW
No.1	T115/70D14	○	○	○	○
No.2	Standard tire	○	–	○	–

○: Provided –:Nor provided

LHD vehicles

		Vehicle model			
		M300LS		M301LS	
Type No	Tire size	GMNE	GMNEW	GMGE GQGE	GMGEW GQGEW
No.1	T115/70D14	○	○	○	○
No.2	Standard tire	○	–	○	–

○: Provided –:Nor provided

2 CONSTRUCTION AND OPERATION

2-1 TIRE

Table showing tire air inflation pressure

Vehicle model	Tire			
	Size	Air inflation pressure [kPa{kgf/cm^2}]		Depth of groove [mm]
		Front wheel	Rear wheel	
M300RS M301RS M300LS M301LS	155/80R13 79S	220{2.2}		1.6 or more
	175/65R14 82S			
	175/65R14 82T			

Table showing spare tire air inflation pressure

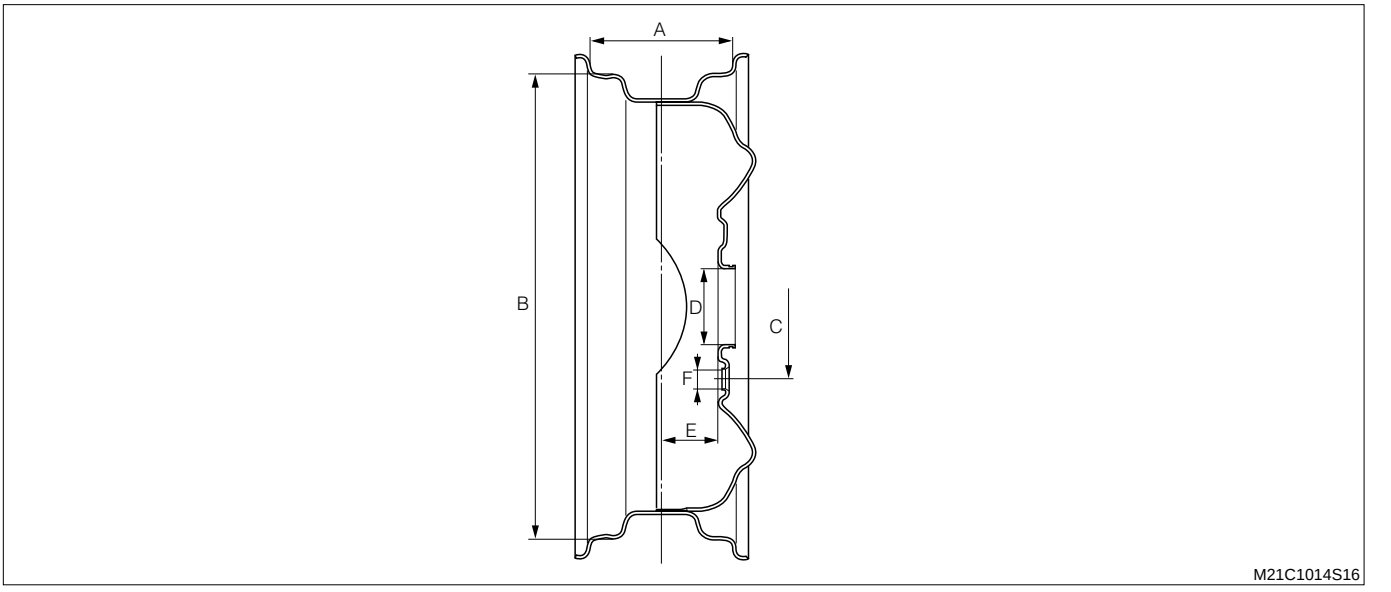
Vehicle model	Tire			
	Size	Air inflation pressure [kPa{kgf/cm^2}]		Depth of groove [mm]
		Front wheel	Rear wheel	
M300RS M301RS M300LS M301LS	T115/70D14	420{4.2}		1.6 or more

2-2 DISC WHEEL

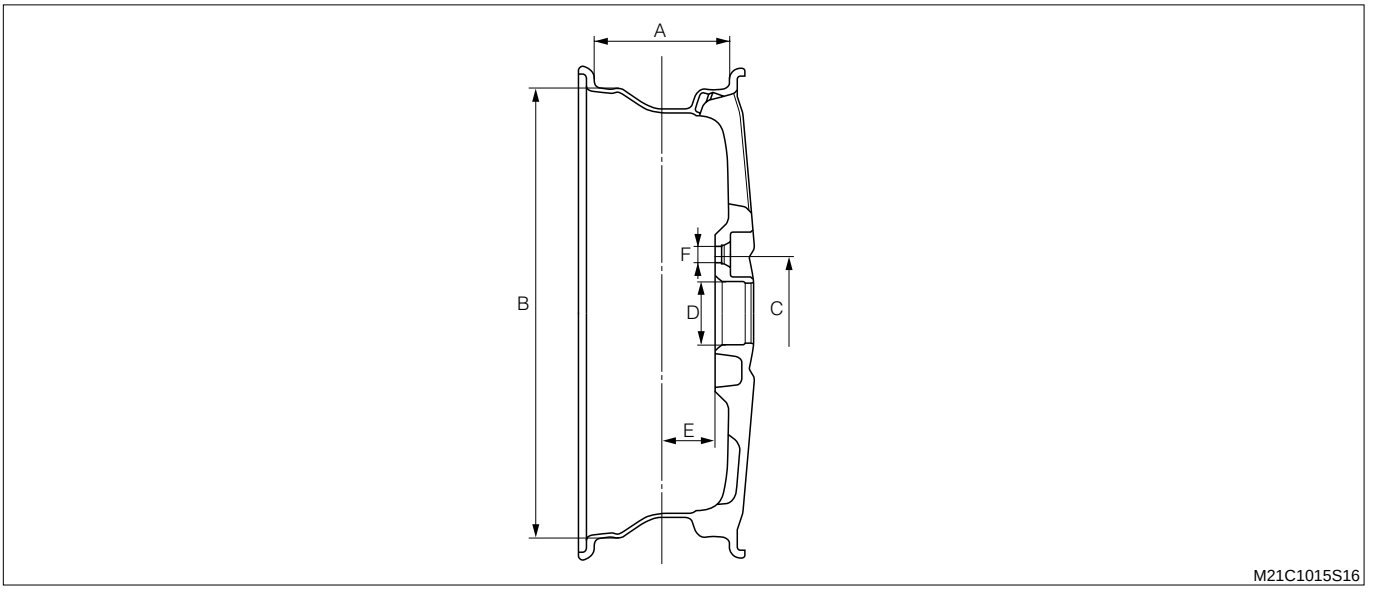
Table showing disc wheels

Wheel	Dimensions [mm]					
	A	B	C	D	E	F
	Rim width	Rim diameter	PCD	Hub hole diameter	Offset	Bolt hole diameter
13×4.50B[Steel]	114	329.4	100	54	35	14
14×5.00J[Steel]	127	354.8	100	54	40	14
14×5.00J[Aluminum]	127	354.8	100	54	40	13

Steel wheel



Aluminum wheel



TO INDEX

D2 PROPELLER SHAFT/AXLE

FRONT AXLE ---------- D2 - 1
OUTLINE ---------- D2 - 1
DESCRIPTION ---------- D2 - 1
SPECIFICATION ---------- D2 - 1
SECTIONAL VIEW ---------- D2 - 2
REAR AXLE ---------- D2 - 3
OUTLINE ---------- D2 - 3
DESCRIPTION ---------- D2 - 3

FRONT AXLE

1 OUTLINE

1-1 DESCRIPTION

1.As regards the front drive shaft, an undercut free type constant-velocity joint has been employed at the wheel side; and a tripod type constant-velocity joint at the differential side.Especially the joint at the wheel side has adopted a high-angle corresponding type joint .

The undercut free type constant-velocity joint at the wheel side mainly corresponds to the change in angle of the steering tires. Conversely, the tripod type joint at the differential side mainly corresponds to the change in length of the axle as a result of the movement of the suspension.

2.By employing such construction that the sensor rotor for ABS vehicles is installed at the hub side, it has become possible to use the same drive shaft for the ABS-equipped vehicles and non-ABS vehicles.

3.The joint at the wheel side of the front drive shaft has employed a resin boot.

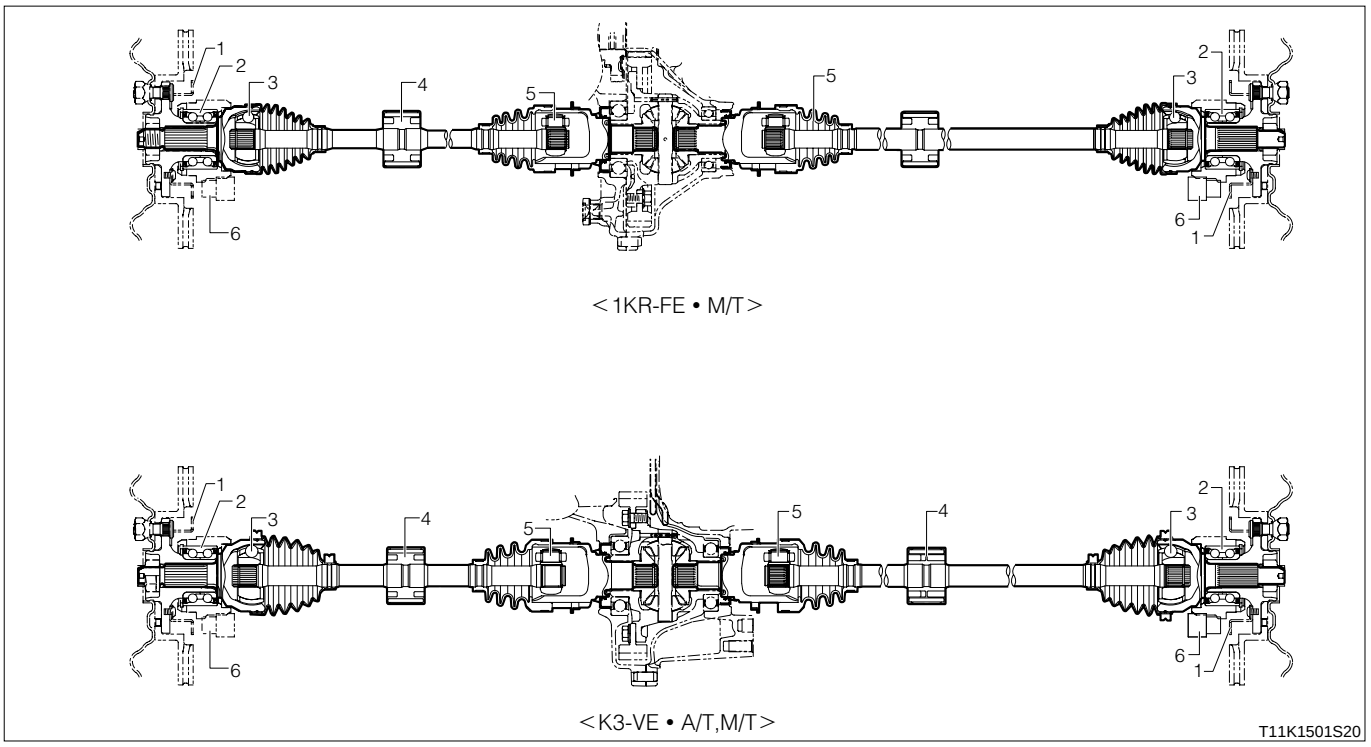
4.The wheel bearing has adopted an angular ball bearing that features excellent resistance to loads in the thrust direction and a less rolling resistance. This bearing is to be mounted on the hub.

1-2 SPECIFICATION

Specifications of front drive shaft

Drive method		2WD	
Engine type		1KR−FE	K3−VE
Joint type	Wheel side	Undercut free type	
	Differential side	Tripod type	
Distance between joints (mm)	RH	665.3	657.0
	LH	442.0	435.0
Diameter of intermediate shaft (mm)	RH	23.0 Dia. (with Dynamic Damper)	23.0 Dia. (with Dynamic Damper)
	LH	19.0 Dia. (with Dynamic Damper)	23.0 Dia. (with Dynamic Damper)

1-3 SECTIONAL VIEW



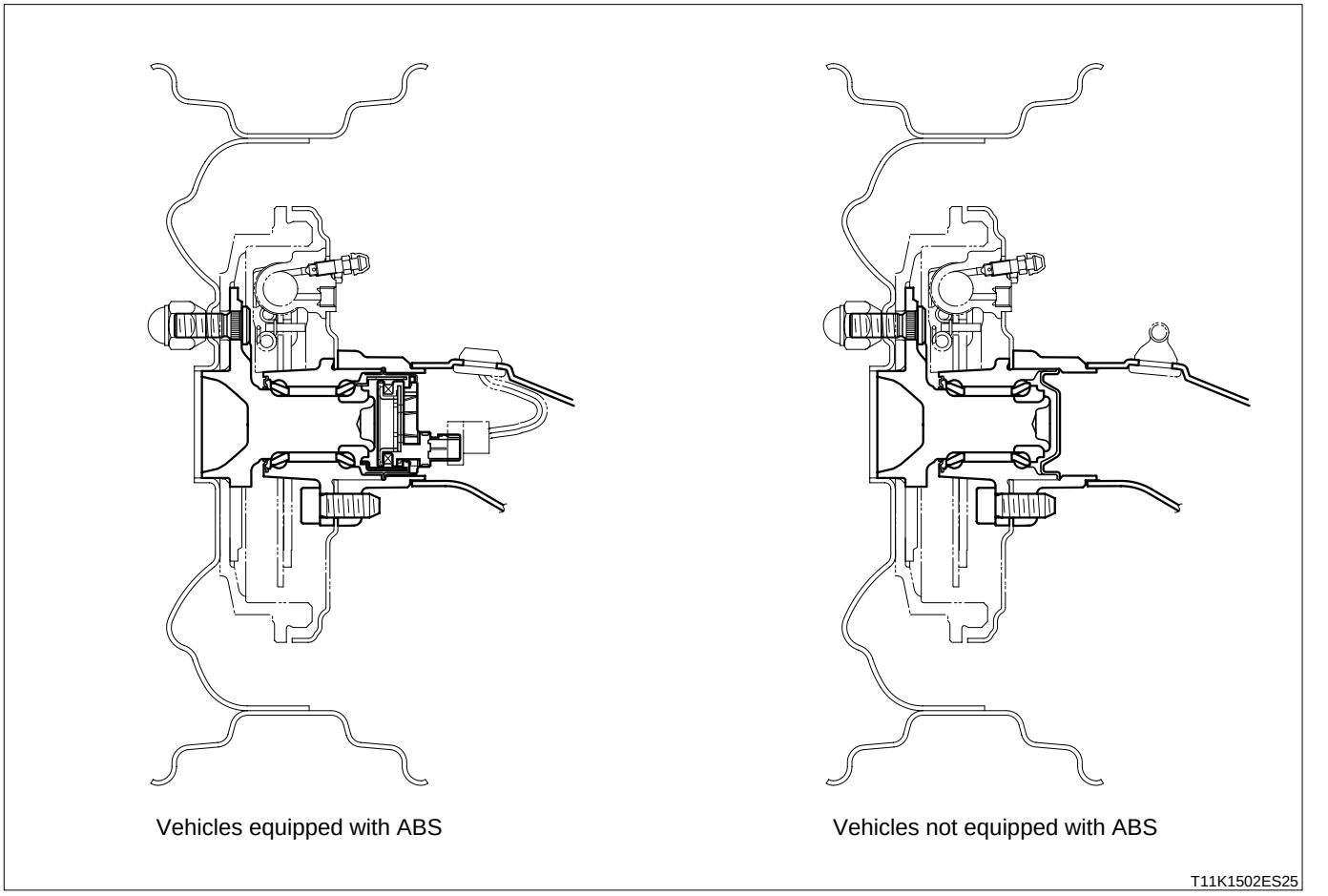
1	Sensor rotor(vehicles equipped with ABS)	4	Dynamic damper
2	Angular ball bealing	5	Tripod type constant-velocity joint
3	Undercut free type constant-velocity joint	6	Wheel speed sensor(vehicles equipped with ABS)

REAR AXLE

1 OUTLINE

1-1 DESCRIPTION

1. On 2WD vehicles equipped with ABS, an angular ball bearing has been employed in the same way as the front side. The hub, bearing, wheel speed sensor and sensor rotor have been integrated, thus making up a unit construction.
2. On 2WD vehicles not equipped with ABS, an angular ball bearing has been employed in the same way as the front side. The hub and bearing have been integrated, thus making up a unit construction.



Vehicles equipped with ABS

Vehicles not equipped with ABS

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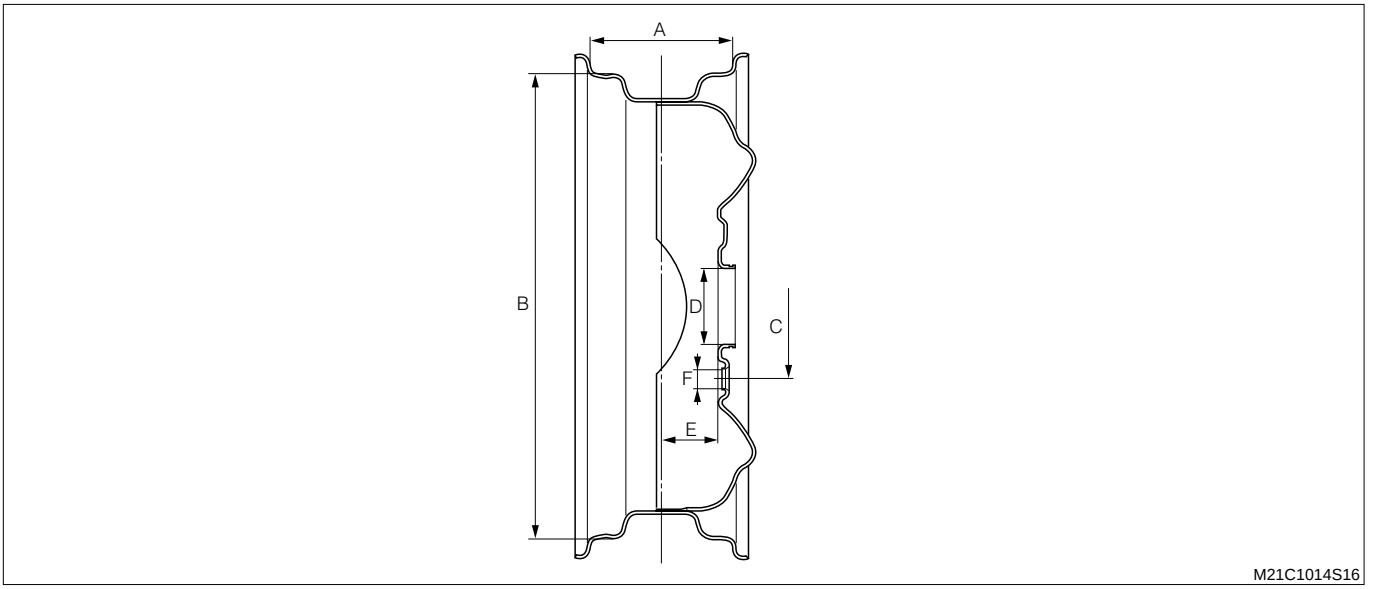
Steel wheel



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TO INDEX

E1 BRAKE

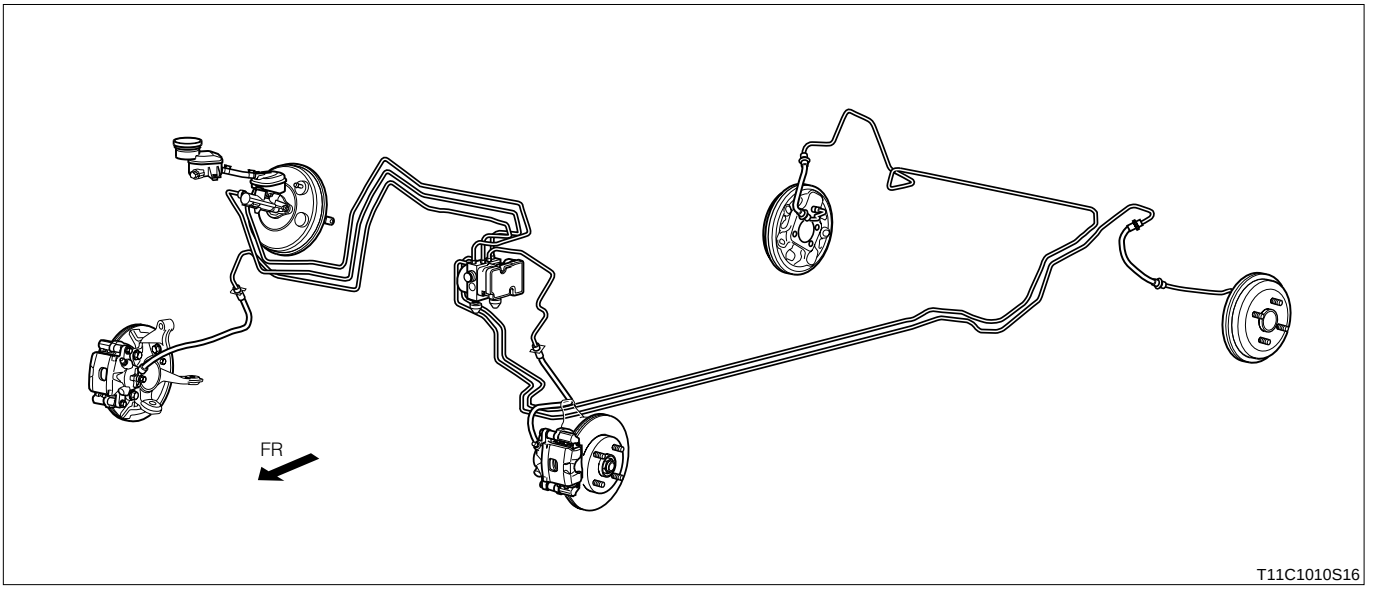
OUTLINE ---------- E1 - 1
DESCRIPTION ---------- E1 - 1
CONSTRUCTION AND OPERATION ---- E1 - 2
BRAKE PIPING ---------- E1 - 2
BRAKE MASTER CYLINDER ---------- E1 - 2
BRAKE BOOSTER ---------- E1 - 3
BRAKE PEDAL ---------- E1 - 7
FRONT BRAKE ---------- E1 - 8
REAR BRAKE ---------- E1 - 8
BRAKING FORCE CONTROL SYSTEM ---------- E1 - 8

1 OUTLINE

1-1 DESCRIPTION

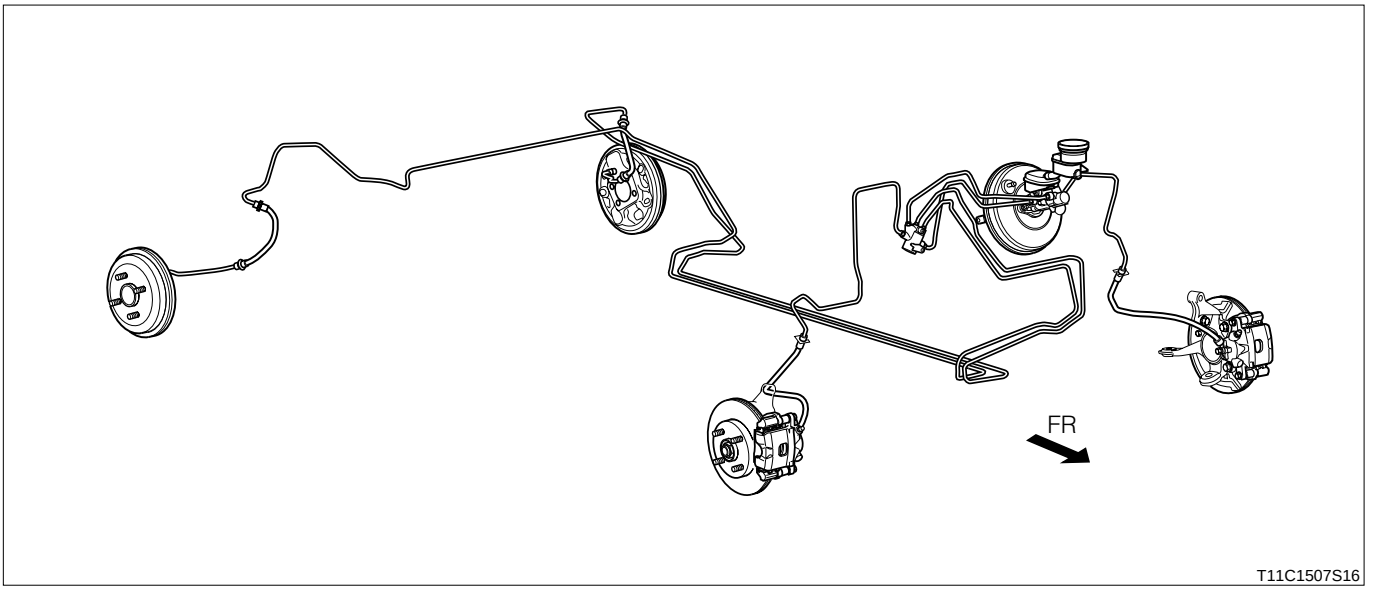
1.With regard to the brake mechanism, a disc brake has been employed at the front side, whereas a drum brake at the rear side.
2.On all models, the brake piping has employed a diagonal two-system piping (cross piping).
3.A separated-type brake reservoir tank is mounted.
4.The EBD control has been employed on ABS-equipped vehicles.

ABS-equipped vehicles



The illustration represents the RHD vehicle.

Vehicles not equipped with ABS



The illustration represents the LHD vehicle.

2 CONSTRUCTION AND OPERATION

2-1 BRAKE PIPING

2-1-1 DESCRIPTION

All vehicles have employed a diagonal dual brake piping (cross piping) so as to assure safety in the event that one brake system fails.

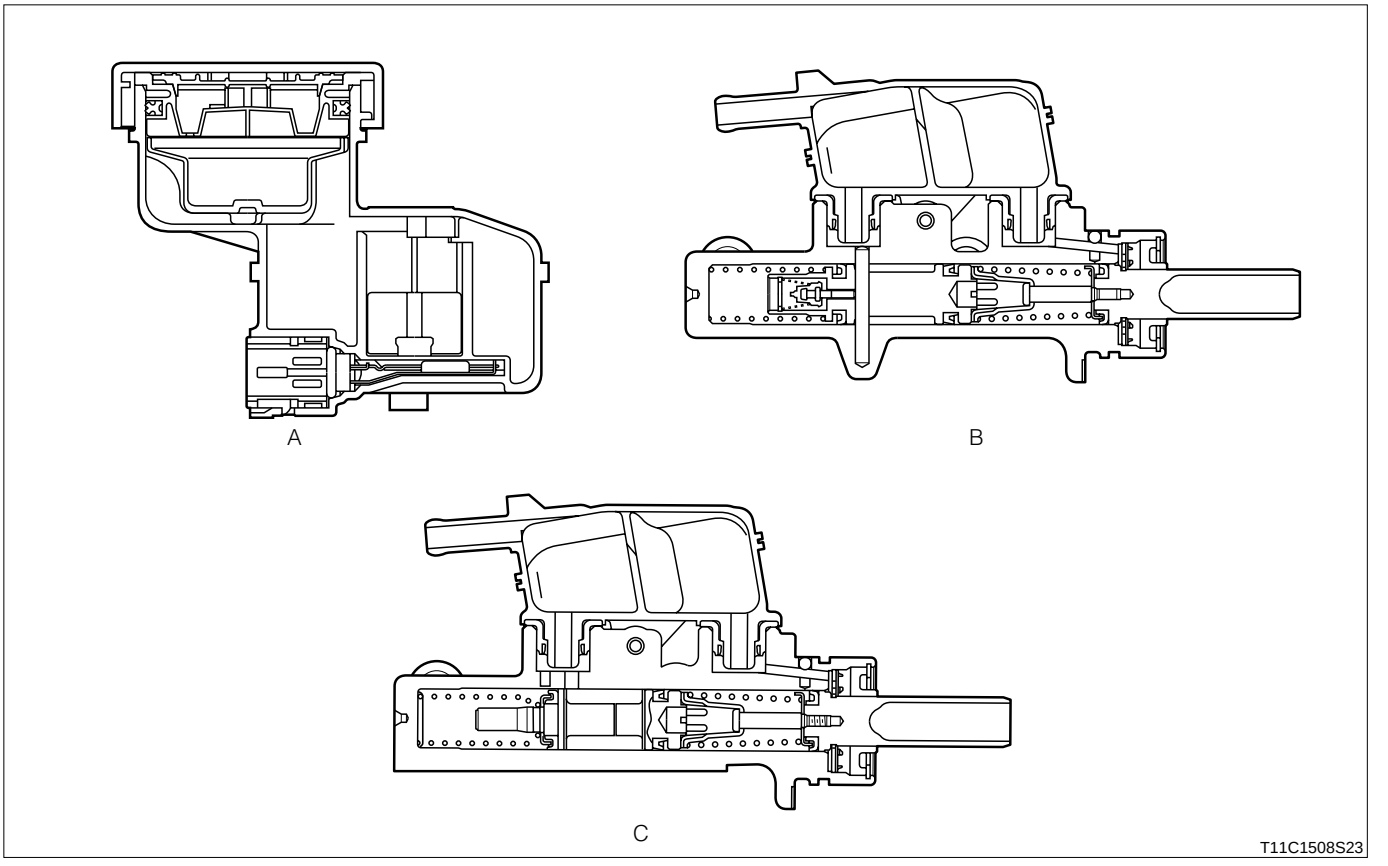
2-1-2 SPECIFICATIONS

	M300RS	M300LS	M301RS	M301LS
Operating system	Diagonal, dual circuit (cross piping)			

2-2 BRAKE MASTER CYLINDER

2-2-1 DESCRIPTION

1. On all models, the master cylinder has employed a tandem type. The master cylinder comes in the following three types, according to the port type and cylinder bore diameter.
   (1) Vehicles equipped with ABS: One-side center port type, cylinder bore diameter 19.0 mm
   (2) Vehicles equipped with ABS: One-side center port type, cylinder bore diameter 20.6 mm
   (3) Vehicles not equipped with ABS: Side port type, cylinder bore diameter 19.0 mm
2. All vehicles are equipped with the separated-type reservoir tank.



A in the figure: Reservoir tank
B in the figure: Master cylinder (Vehicles equipped with ABS)
C in the figure: Master cylinder (Vehicles not equipped with ABS)

2-2-2 SPECIFICATIONS

RHD vehicles

	M300RS	M301RS	M300RS	M301RS
	Vehicle equipped with ABS		Vehicle not equipped with ABS	
Type	Tandem center port (One side)		Tandem (Side port)	
Diameter [mm]	19.0			

LHD vehicles

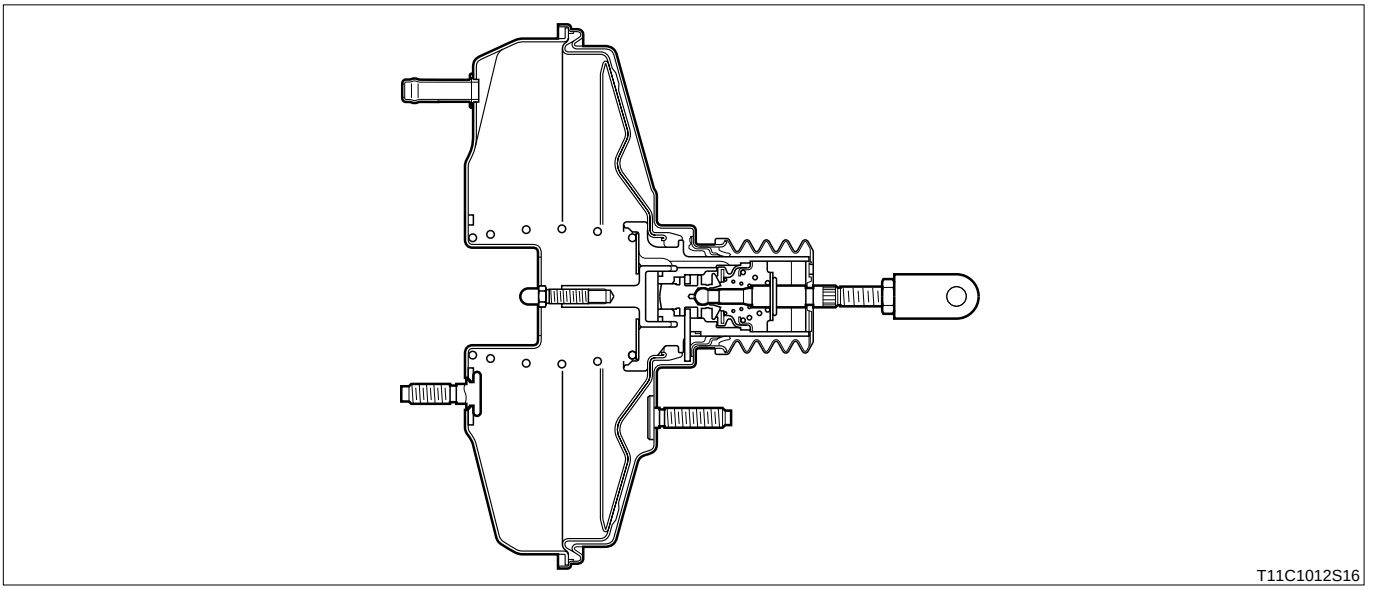
	M300LS			M301LS		
	GMNE GMNEW		GMNEW	GMGE GQGE GQGEW	GMGE GMGEW GQGE GQGEW	GMGEW GQGEW
	Vehicle equipped with ABS	Vehicle not equipped with ABS	Vehicle equipped with ABS	Vehicle equipped with ABS	Vehicle not equipped with ABS	Vehicle equipped with ABS
Type	Tandem center port (One side)	Tandem (Side port)	Tandem center port (One side)	←	Tandem (Side port)	Tandem center port (One side)
Diameter [mm]	19.0	←	20.6	19.0	←	20.6

2-3 BRAKE BOOSTER

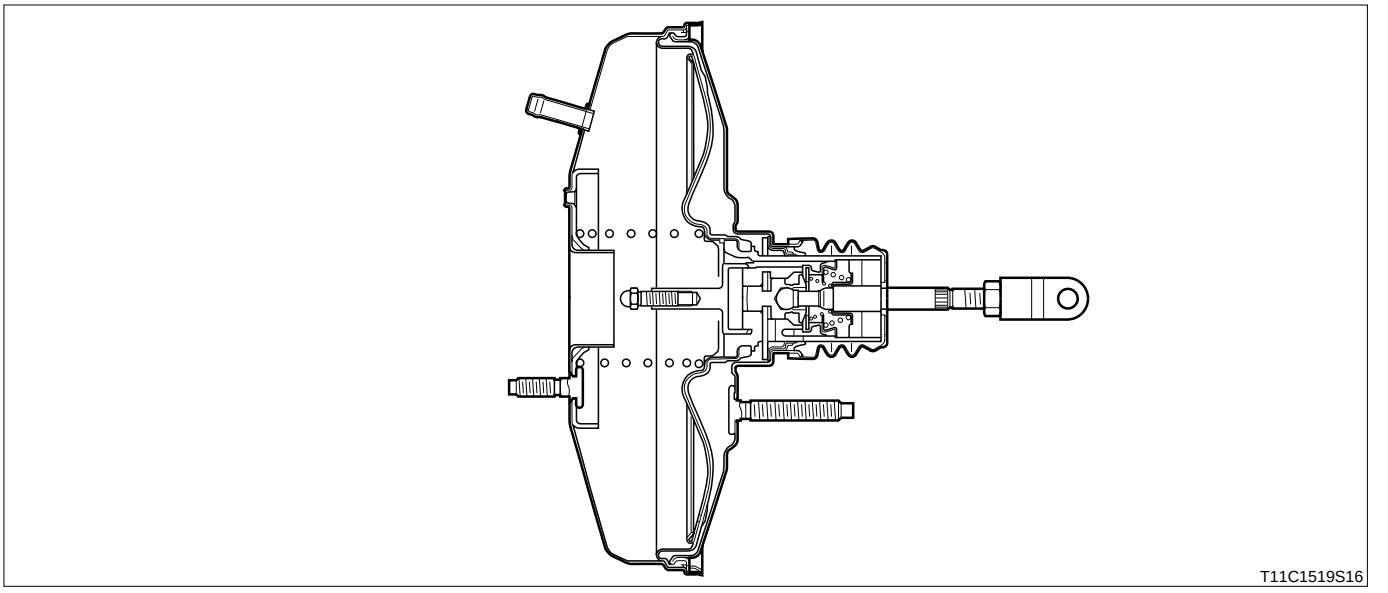
2-3-1 DESCRIPTION

1.The brake booster employs the vacuum boosting type on all models. The brake booster comes in two kinds according to the size.
  (1) 8-inch single type
  (2) 9-inch single type
2.For an enhanced brake performance at the time of emergency hard braking, a brake assist mechanism has been provided on vehicles equipped with ABS (except those equipped with a 9-inch brake booster).
3.A brake negative pressure switch has been installed on A/T vehicles (except those equipped with a 9-inch brake booster).

8-inch brake booster



9-inch brake booster



2-3-2 SPECIFICATIONS

RHD vehicles

	M300RS	M301RS	M300RS	M301RS
	Vehicle equipped with ABS		Vehicle not equipped with ABS	
Type	Vacuum boosting type (with the brake assist mechanism)		Vacuum boosting type	
Size [Inch]	8			

LHD vehicles

	M300LS			M301LS		
	GMNE GMNEW		GMNEW	GMGE GQGE GQGEW	GMGE GMGEW GQGE GQGEW	GMGEW GQGEW
	Vehicle equipped with ABS	Vehicle not equipped with ABS	Vehicle equipped with ABS	Vehicle equipped with ABS	Vehicle not equipped with ABS	Vehicle equipped with ABS
Type	Vacuum boosting type (with the brake assist mechanism)	Vacuum boosting type	←	Vacuum boosting type (with the brake assist mechanism)	Vacuum boosting type	←
Size [Inch]	8	←	9	8	←	9

2-3-3 BRAKE ASSIST MECHANISM

(1) Description

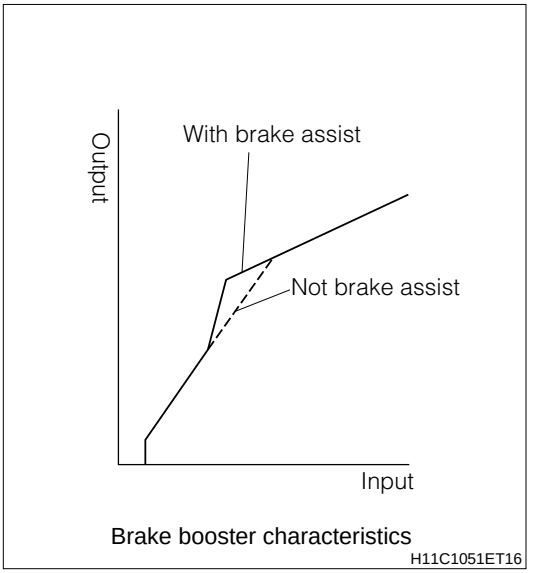
During emergency braking situations, a panicked driver will step on a brake pedal quickly; however the brake pedal may not be depressed hard enough. Or even if the brake pedal is depressed hard, it may be difficult for the driver to keep stepping hard on the brake.

In this case, the vehicle may not be allowed to exert its brake performance fully.

The brake booster equipped with a brake assist mechanism is a system that increases the assist to the braking force by the brake booster after the brake pedal depressing force exceeds a certain value, thereby enhancing brake performance, including ABS, at the time of emergency.

CAUTION

- The brake assist mechanism is not a mechanism which is capable of performing braking beyond the brake performance that the vehicle is designed to have or beyond the tire performance. Full attention should be paid during driving.
- The brake assist mechanism functions only when the brake pedal is depressed strongly during an emergency braking period. The driver will not feel any difference during the normal braking.



Brake booster characteristics

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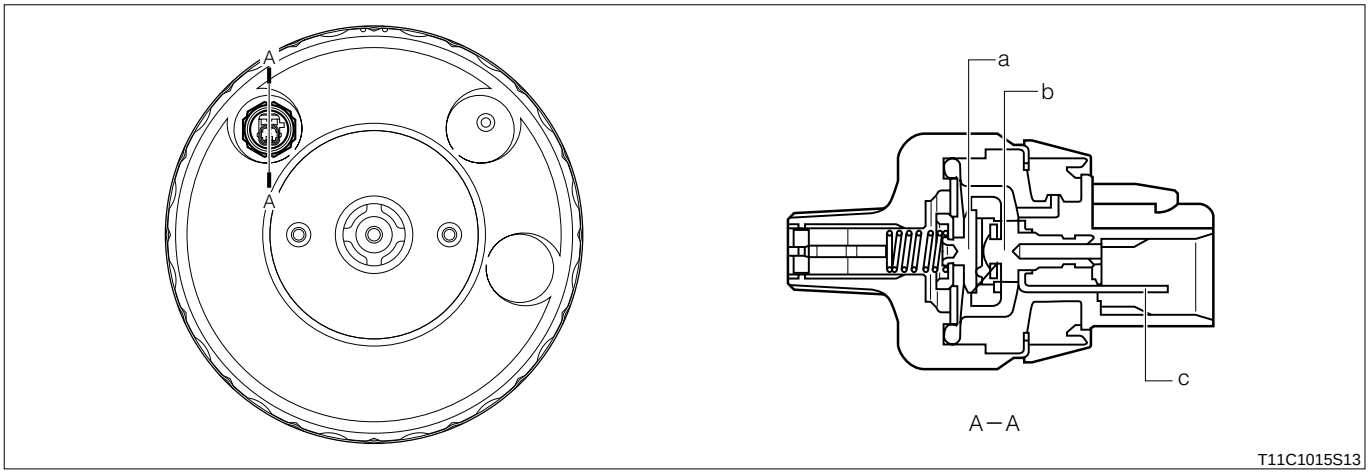
2-3-4 BRAKE VACUUM SWITCH

(1) Description

The brake vacuum switch reduces changes in negative pressure in the brake booster when the air-conditioner is ON to provide more stabilized performance of the brake servo.

(2) Operation



a	Contact point A
b	Contact point B
c	Terminal

1. When the pressure inside the brake booster is below the working pressure of the brake vacuum switch, the points of contact A and B are separated.
2. When the pressure in the brake booster increases (exceeding the working pressure of the brake vacuum switch), the point of contact A moves toward the point of contact B until it touches the point B, thereby providing body earth to the terminal.
3. The signal input is sent to the EFI ECU and the air-conditioner cutting is controlled on the EFI ECU side.

2-4 BRAKE PEDAL

2-4-1 DESCRIPTION

All vehicles are equipped with a backward movement preventing mechanism of the brake pedal in order to enhance passive safety.

2-4-2 BACKWARD MOVEMENT PREVENTING MECHANISM

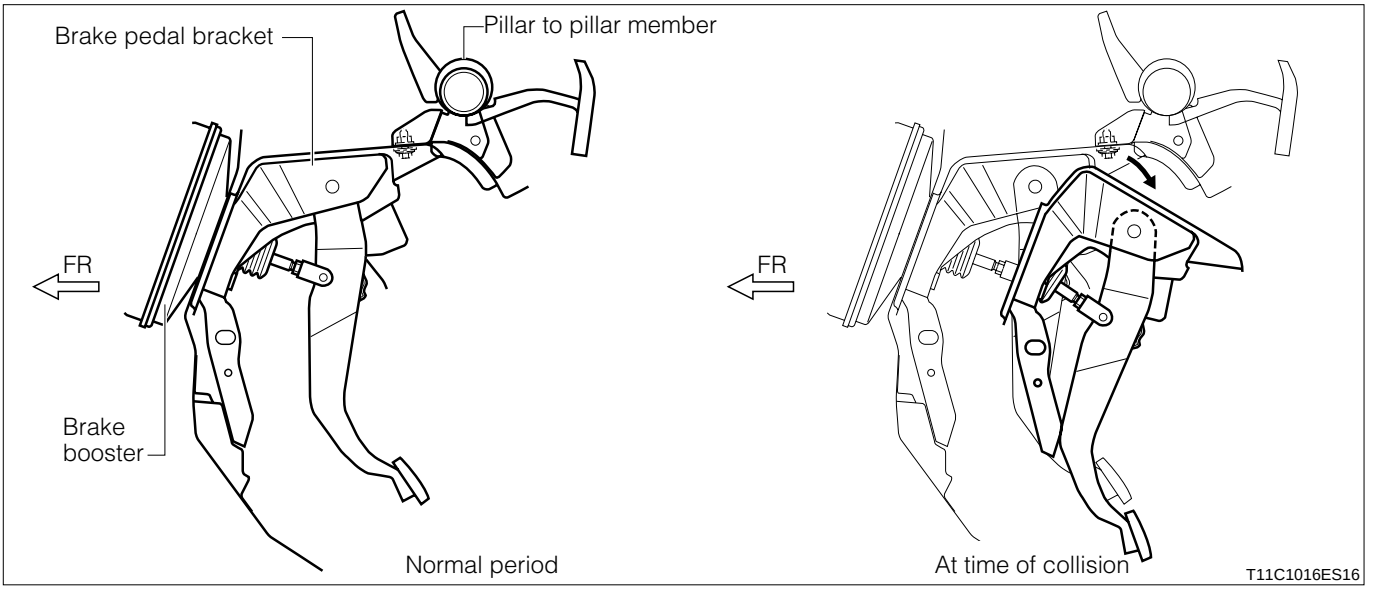
(1) Description

When an impact is applied from the front section of the vehicle body at the time of an accident, etc., and thus the brake master cylinder is pushed toward the vehicle interior, the brake pedal moves toward the rear side of the vehicle via the push rod of the brake booster. In this way, there is the possibility that the driver may be injured.

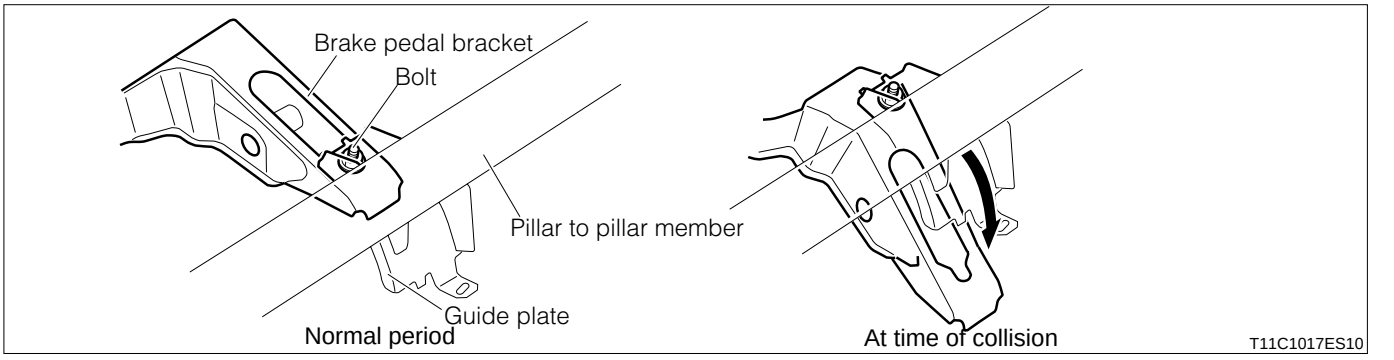
In order to prevent the brake pedal from moving backward, the backward movement preventing mechanism of the brake pedal has been employed on the brake pedal bracket and pillar-to-pillar member.

(2) Operation

1. When an impact is applied from the front section of the vehicle body at the time of an accident, etc., and thus the brake master cylinder is pushed toward the vehicle interior due to the backward movement of the engine itself, the brake booster pushes the brake pedal bracket.
2. The impact from the brake pedal bracket will disengage the pillar-to-pillar member, causing the brake pedal bracket to bend.



3. The brake pedal bracket moves by sliding toward the rear lower side of the vehicle over the guide plate on the pillar-to-pillar member.
4. This operation moves the brake pedal depressing surface toward the vehicle front lower side, thereby preventing the brake pedal from moving backward.



2-5 FRONT BRAKE

2-5-1 DESCRIPTION

1.The ventilated disc brake is employed on all models. The disc brake comes in two kinds according to the size.
(1) 13-inch ventilated disc brake (front disc 234mm dai)
(2) 14-inch ventilated disc brake (front disc 246mm dai)
2.The brake pad audible wear indicator is mounted on the brake pad inside the vehicle which provides an audible alarm if the pad remaining amount is reduced.

2-5-2 SPECIFICATIONS

	M300RS	M300LS	M301RS	M301LS	M301LS
	GMNE GMNEW	GMNE GMNEW	GMGE GMGEW GQGE GQGEW	GMGE GMGEW GQGE GQGEW	GMGEW GQGEW
Type	13 inch ventilated disk				14 inch ventilated disk
Cylinder diameter [mm]	51.1				51.1
Rotor outer diameter [mm]	234				246
Rotor thickness [mm]	16				17
Pad area [cm^2/piece]	30				35

2-6 REAR BRAKE

2-6-1 DESCRIPTION

1.All vehicles are equipped with the leading-trailing type drum brake.

2-6-2 SPECIFICATIONS

	M300RS	M300LS	M301RS	M301LS
Type	Drum (Leading trailing)			
Cylinder diameter [mm]	17.4			
Drum inner diameter [mm]	180			
Lining area [cm^2/piece]	43			

2-7 BRAKING FORCE CONTROL SYSTEM

2-7-1 DESCRIPTION

1.The EBD control has been employed on ABS-equipped vehicles. The braking force distribution between the front and rear wheels is electronically controlled ideally according to changes in the loading state and the load transfer due to deceleration, etc.
2.On vehicles not equipped with ABS, a mechanical type proportioning valve has been employed.

2-7-2 SPECIFICATIONS

	Vehicle equipped with ABS	Vehicle not equipped with ABS
Type	ABS with EBD control	Proportioning valve

TO INDEX

E2 PARKING BRAKE

OUTLINE ---------- E2 - 1
OUTLINE ---------- E2 - 1
SPECIFICATIONS ---------- E2 - 1

1 OUTLINE

1-1 OUTLINE

1.On all models, the parking brake has employed a leading trailing rear two-wheel braking type, that is shared in common with the rear brake.

2.On all models, the center lever type has been employed.

1-2 SPECIFICATIONS

	M300RS	M300LS	M301RS	M301LS
Type	Mechanical type wheel braking			
Type	Manual type			

TO INDEX

E3 BRAKE CONTROL

ABS ---------- E3 - 1
OUTLINE ---------- E3 - 1
DESCRIPTION ---------- E3 - 1
SYSTEM DRAWING ---------- E3 - 2
SYSTEM WIRING DIAGRAM ---------- E3 - 3
LOCATION OF COMPONENTS ---------- E3 - 4
CONTROL ---------- E3 - 5
BASIC PRINCIPLE ---------- E3 - 5
FLUID PRESSURE CONTROL ---------- E3 - 7
CAN COMMUNICATION ---------- E3 - 10
INITIAL CHECK FUNCTION ---------- E3 - 10
DIAGNOSIS ---------- E3 - 10
TEST MODE FUNCTION ---------- E3 - 11
FAL-SAFE FUNCTION ---------- E3 - 12
COMPONENTS ---------- E3 - 14
WHEEL SPEED SENSOR & SENSOR ROTOR ---------- E3 - 14
ABS ACTUATOR ---------- E3 - 15
WARNING LAMP ---------- E3 - 16
STOP LAMP SWITCH ---------- E3 - 16

ABS

1 OUTLINE

1-1 DESCRIPTION

1.The ABS with EBD control has been adopted.

(1) The ABS is a brake system designed to prevent the wheels from slipping, which is caused by wheel lock-up during hard braking or driving on a slippery road covered with snow, etc. It is also used to achieve maximum braking performance in every driving situation in order to maintain stable vehicle posture and steering control.

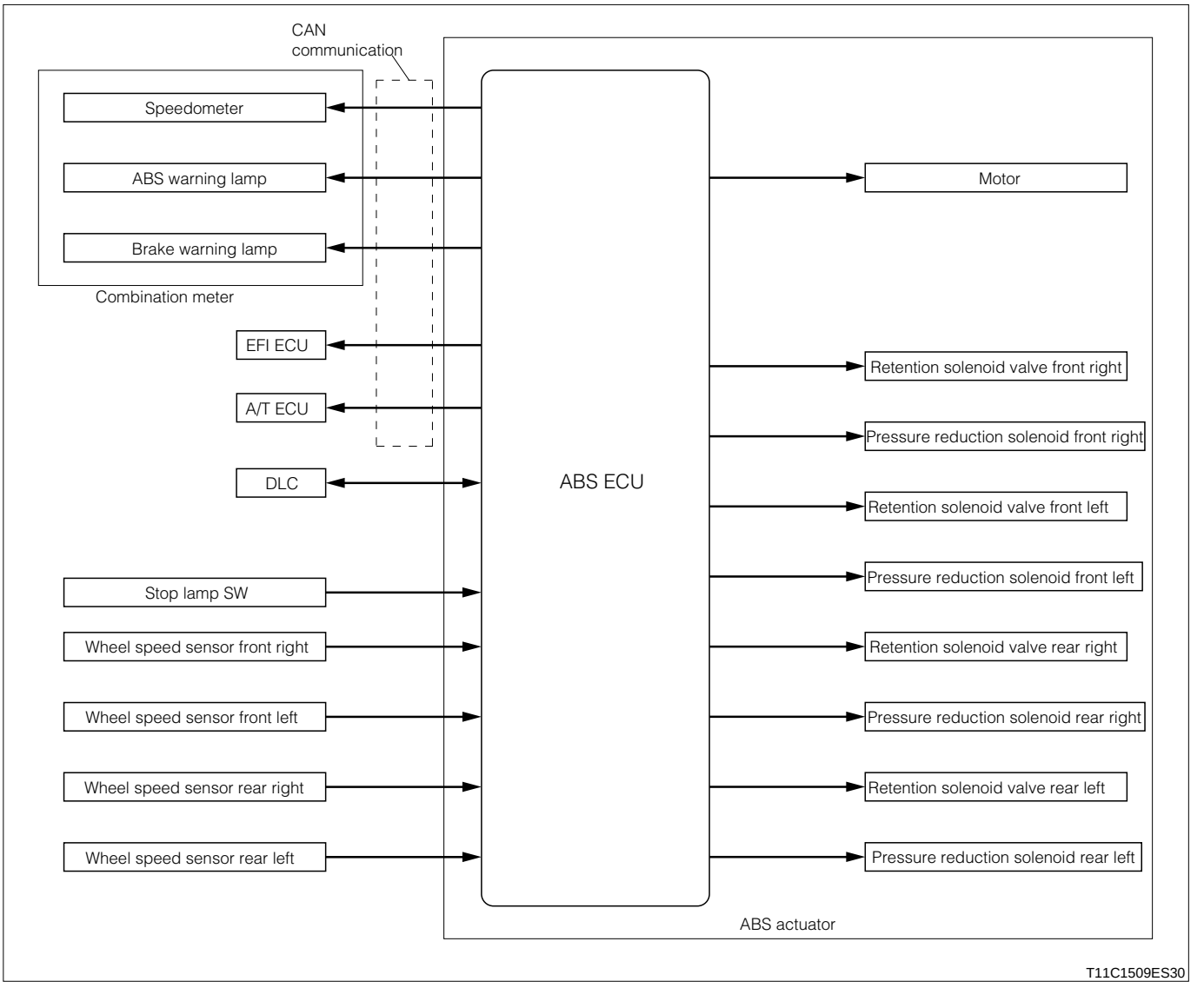
(2) The ABS with EBD control is the system that controls the distribution of brake forces between the front and rear wheels in addition to ABS. The brake forces between the front and rear wheels are properly adjusted in accordance with the load movements due to changes in load conditions, deceleration, etc. Also the ABS with EBD controls the distribution of braking forces between the left and right wheels, helping to maintain the vehicle stability during braking while the vehicle is turning.

2.When a fault occurs, the warning lamp lights up by the fail safe function, letting the driver know that there is a malfunction, while. Also, the diagnosis (self-diagnosis) function lets the operator know where that malfunction is occurring.

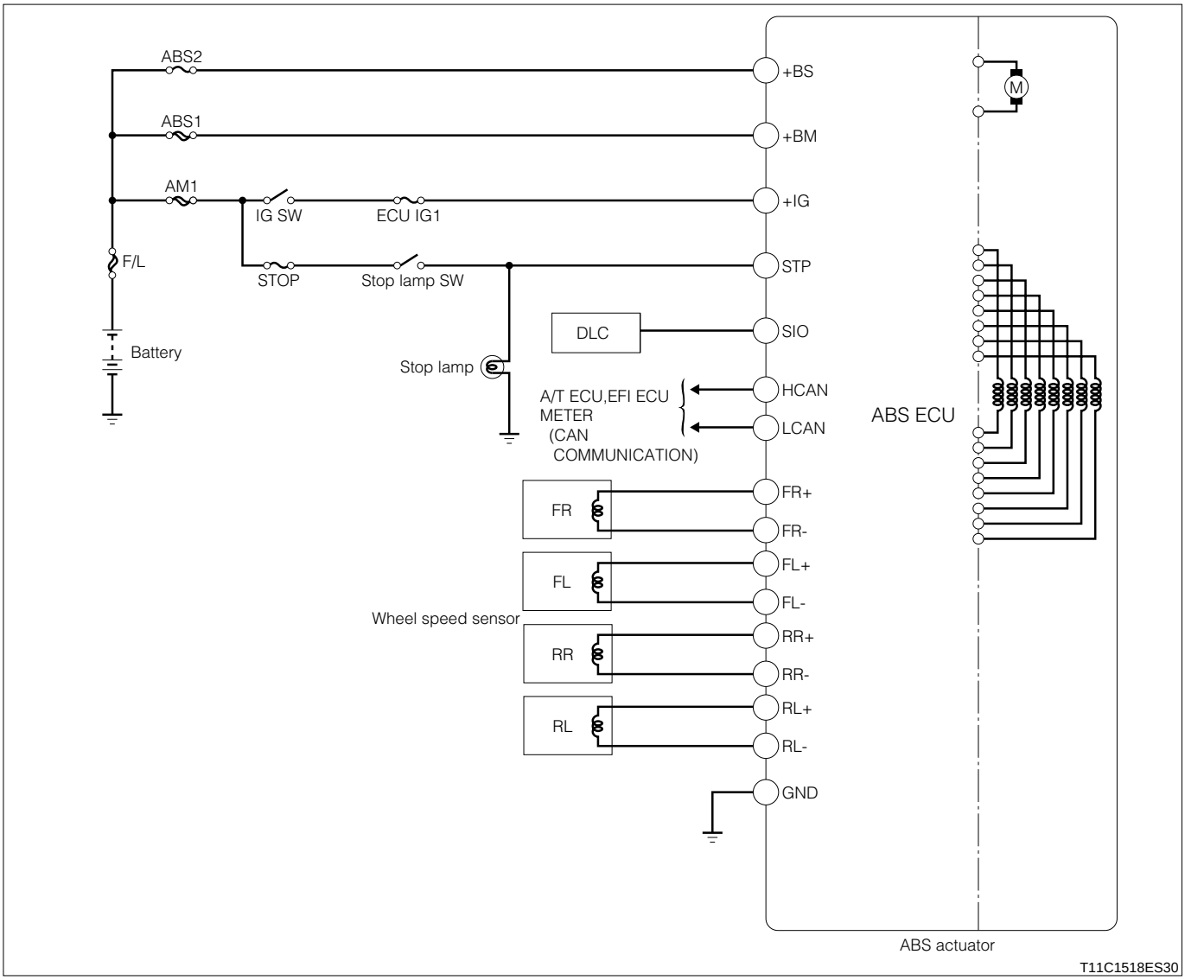
3.The ABS ECU uses CAN communication to communicate with the meter ECU, A/T ECU, and EFI ECU. Refer to the section "CAN communication system" for details.

Refer to Page L2-1.

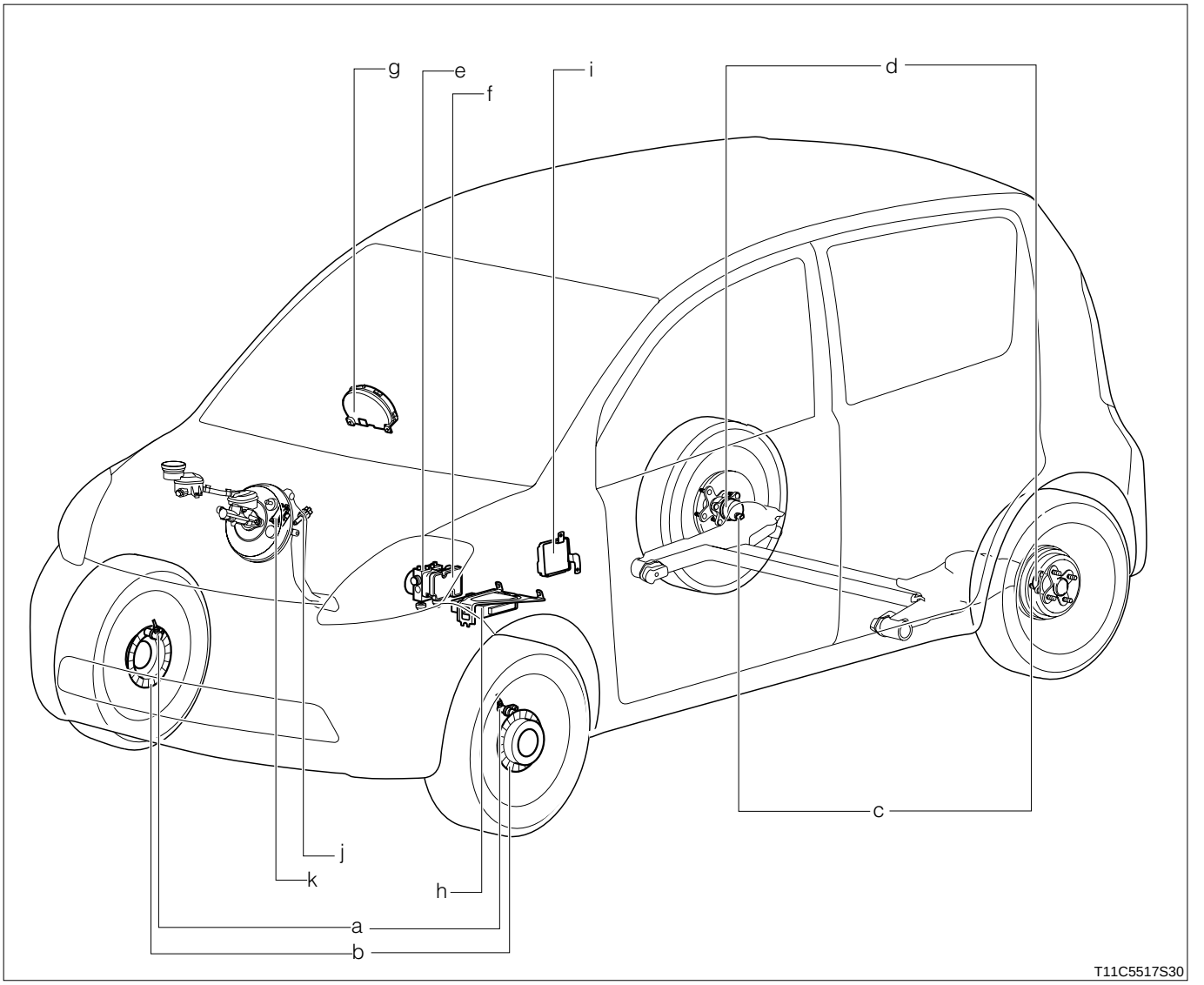
1-2 SYSTEM DRAWING



1-3 SYSTEM WIRING DIAGRAM



1-4 LOCATION OF COMPONENTS



a	Front wheel speed sensor
b	Front wheel speed sensor rotor
c	Rear wheel speed sensor
d	Rear wheel speed sensor rotor
e	ABS actuator
f	ABS ECU
g	Combination meter (ABS warning lamp, brake warning lamp, LCD)
h	EFI ECU
i	A/T ECU
j	Stop lamp switch
k	DLC

2 CONTROL

2-1 BASIC PRINCIPLE

When the brake is depressed, the wheel speed will drop below the vehicle speed, causing slippage between wheels and the road surface. The magnitude of this slippage is called slip rate, which is calculated using the formula below.

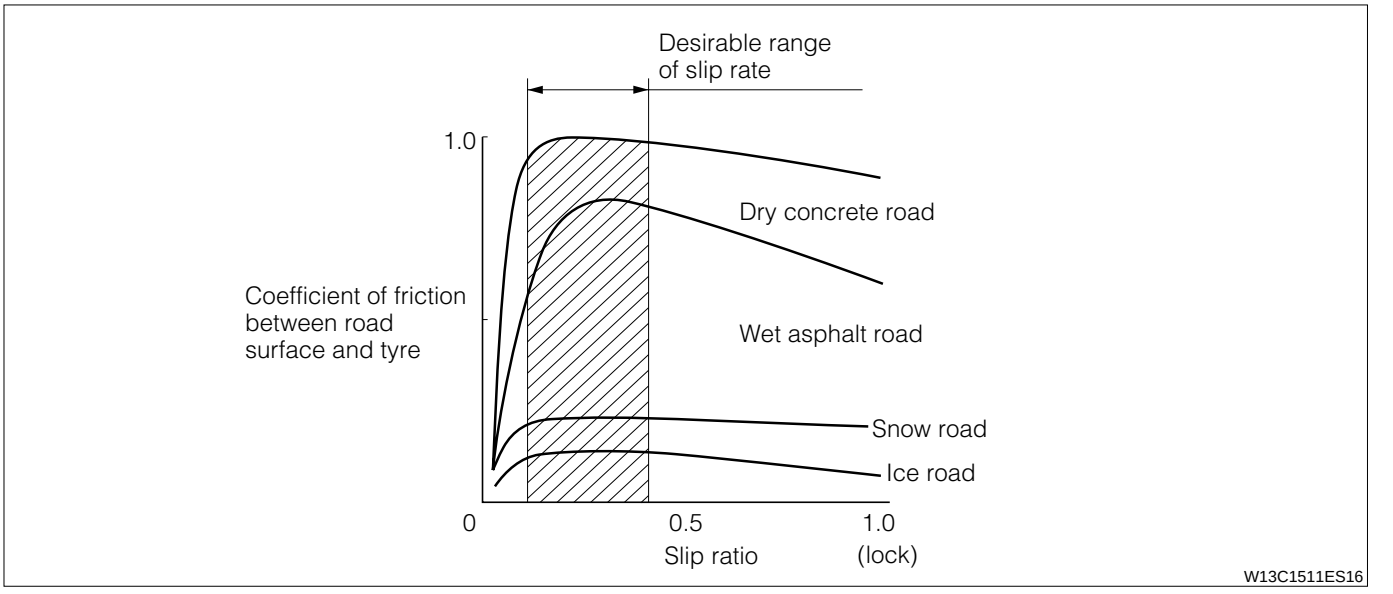
Slip ratio = (vehicle speed − wheel speed) / vehicle speed

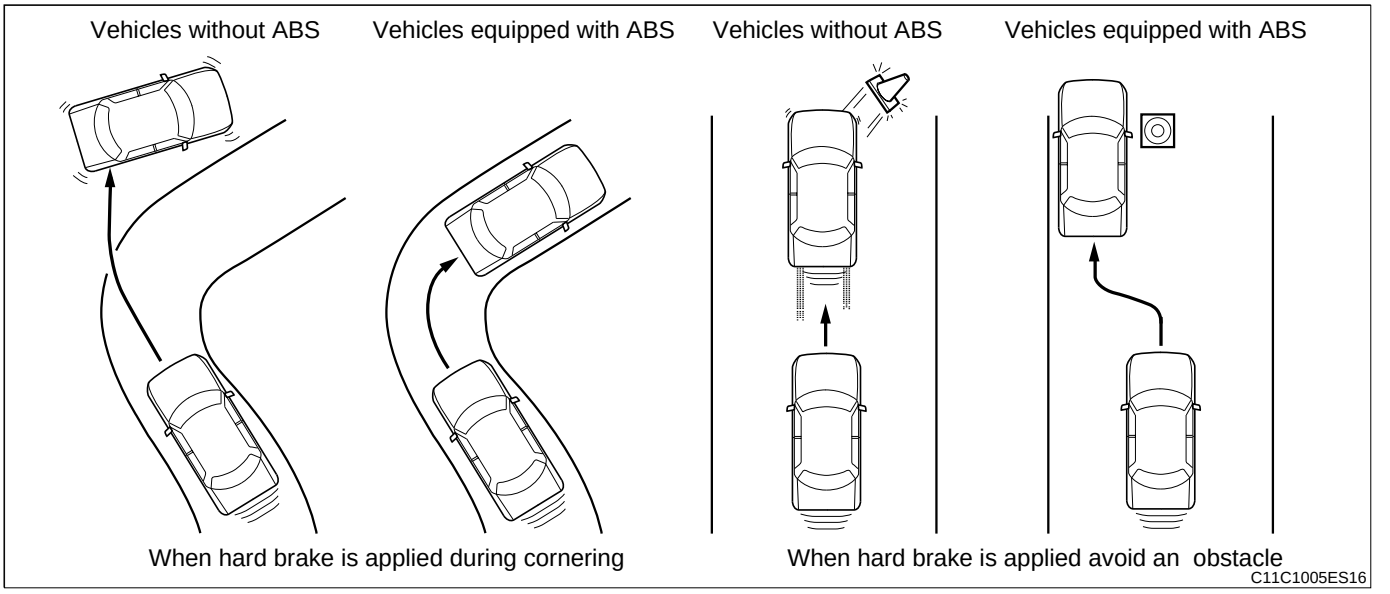
Normally, the friction coefficient between a tire and a road surface reaches the peak at the slip ratio of 0.1−0.3, with the braking effort also reaching the maximum. The value falls below the maximum when the wheels are locked.

The cornering force generated by tires when the vehicle is turning reaches the peak when the slip ratio is "0". The cornering force decreases as the slip ratio increases, reaching the minimum force during locking (slip ratio 1.0).

When steering with the front wheels being locked, the direction of the front wheels change, but they only slip on the road surface without causing any change in vehicle's direction. When the rear wheels are locked, if an external force, such as a change in the coefficient of friction of the road surface, is applied, the rear wheels start to skid, causing the vehicle slip laterally.

The ABS controls the ABS actuator based on the signal from each wheel speed sensor so that the wheel slip ratio can be constantly maintained in the high slip region of the friction coefficient by increasing, holding, or reducing the brake fluid pressure applied to each wheel, in order to maintain stable vehicle posture and directional control during deceleration.

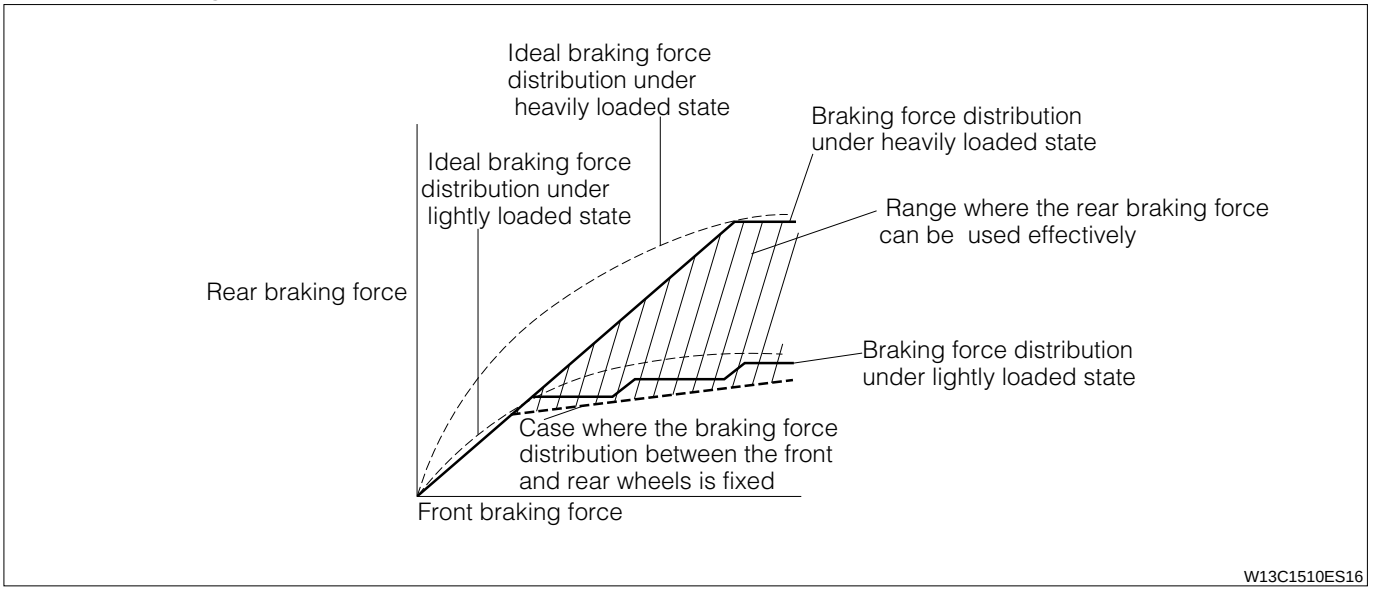




2-1-1 CONTROL OF BRAKING FORCE DISTRIBUTION BETWEEN FRONT AND REAR

The brake force distribution control between the front and rear wheels has achieved optimum distribution of braking force between the front and rear wheels in response to the driving conditions with a view to obtaining the excellent braking performance.

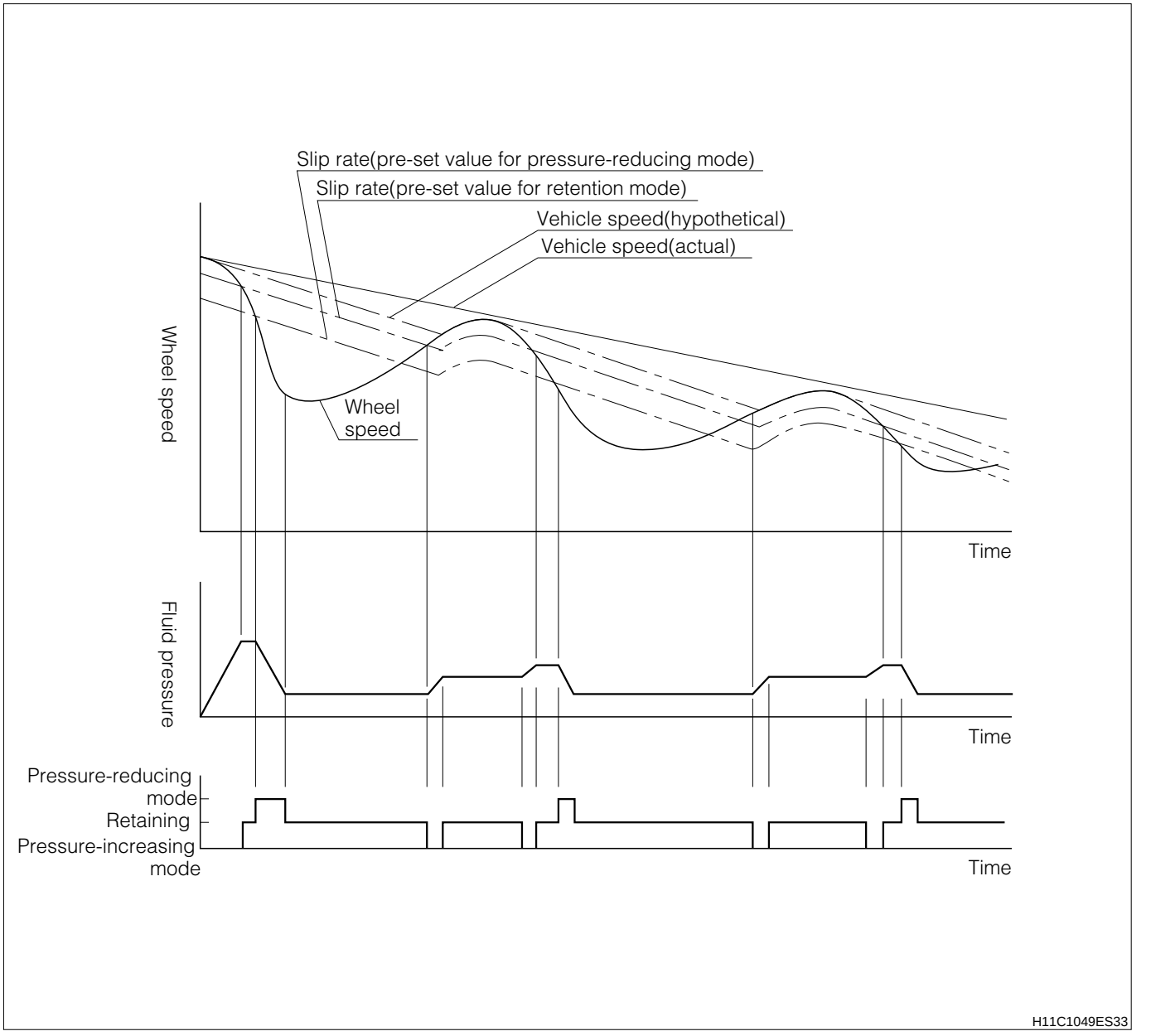
This allows the braking force of the rear wheels to function effectively responsive to changes in load condition or deceleration, thereby reducing braking effort especially during loading conditions to ensure excellent braking performance.



2-2 FLUID PRESSURE CONTROL

2-2-1 BASIC CONTROL

The ABS ECU calculates the speed and deceleration rate (magnitude of the drop in wheel speed) for each wheel based on the signal from the wheel speed sensor, and estimates the vehicle speed and the wheel slip rate. Based on the calculations, the ABS ECU controls the solenoid valve inside the ABS actuator by increasing/holding/reducing the brake fluid hydraulic pressure for each wheel, thus controlling the brake fluid pressure applied to the wheel cylinder so that the optimal vehicle speed and wheel slip rate can be maintained.



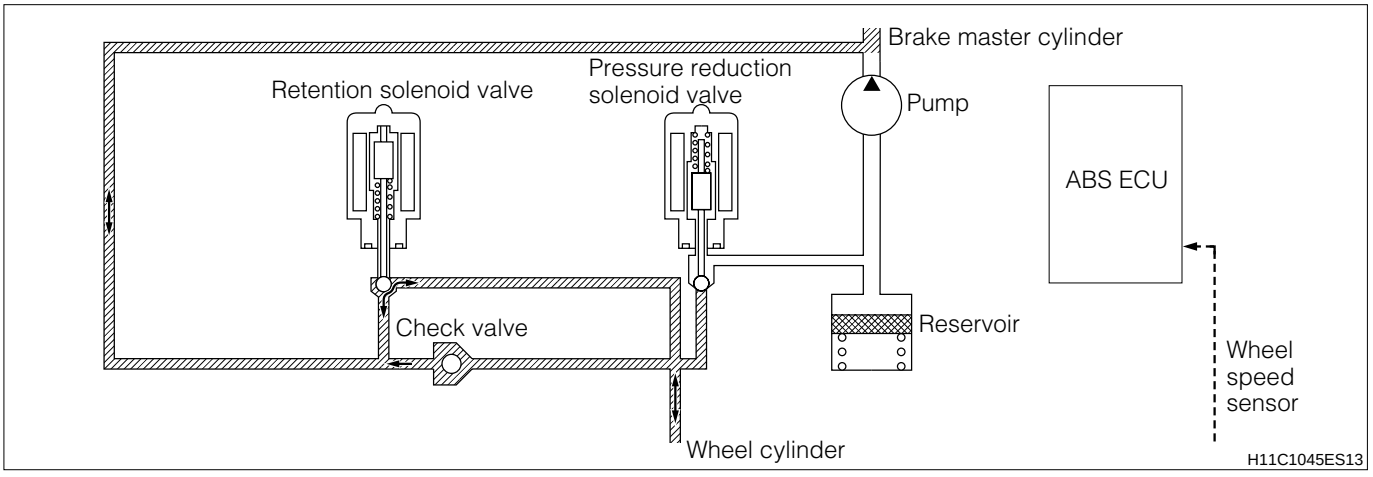
2-2-2 ABS OPERATION

The ABS hydraulic system consists of four systems; right front wheel, left front wheel, right rear wheel, left rear wheel.

The following explanation is about the operation of only one system of the front wheel. The other systems work in the same way.

(1) During normal braking(During ABS non-operation)

1. Because the signal from the ABS ECU is not inputted, the solenoid valve will not be energized, causing the retention solenoid valve to open, while the pressure-reducing solenoid valve to close.
2. When the brake pedal is depressed in this state, the brake fluid pressure from the master cylinder will increase, pumping the brake fluid through the retention solenoid valve into the wheel cylinder.
3. At this time, the pump is not activated. When the brake pedal is released, the brake fluid in the wheel cylinder flows through the retention solenoid valve and check valve, and returns to the master cylinder.



(2) During hard braking(during ABS operation)

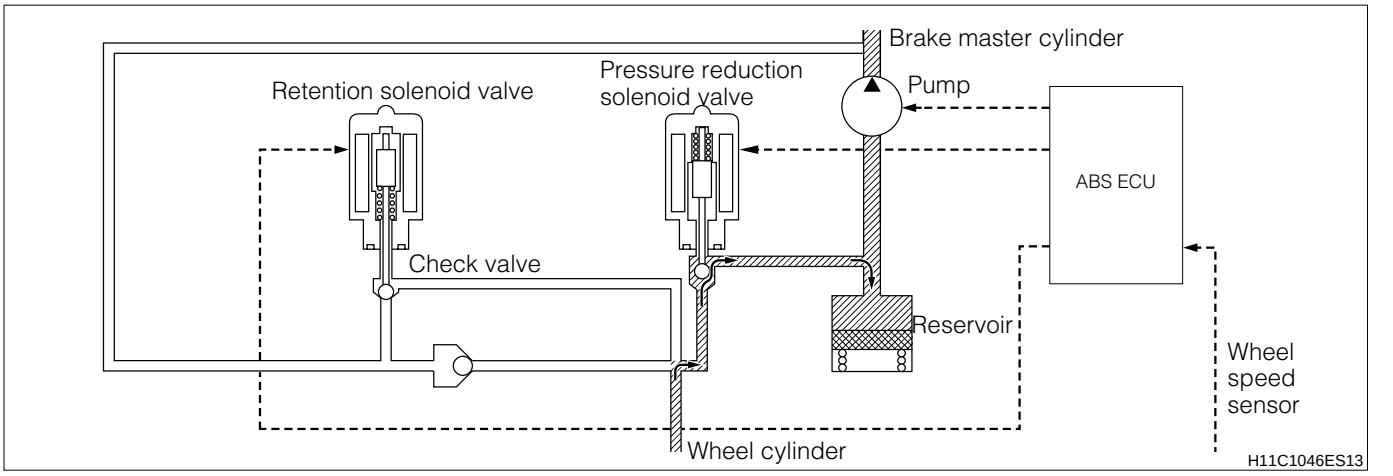
ABS control operation

During ABS operation	Pressure - reduction	Retention	Pressure - increasing
Retention solenoid valve	ON (Closed)	ON (Closed)	OFF (Open)
Pressure reduction solenoid valve	ON (Open)	OFF (Closed)	OFF (Closed)
Hydraulic pressure of the wheel cylinder	Releases hydraulic pressure.	Retains hydraulic pressure.	Applies hydraulic pressure.

The words in parentheses indicate open/close status of the solenoid valve.

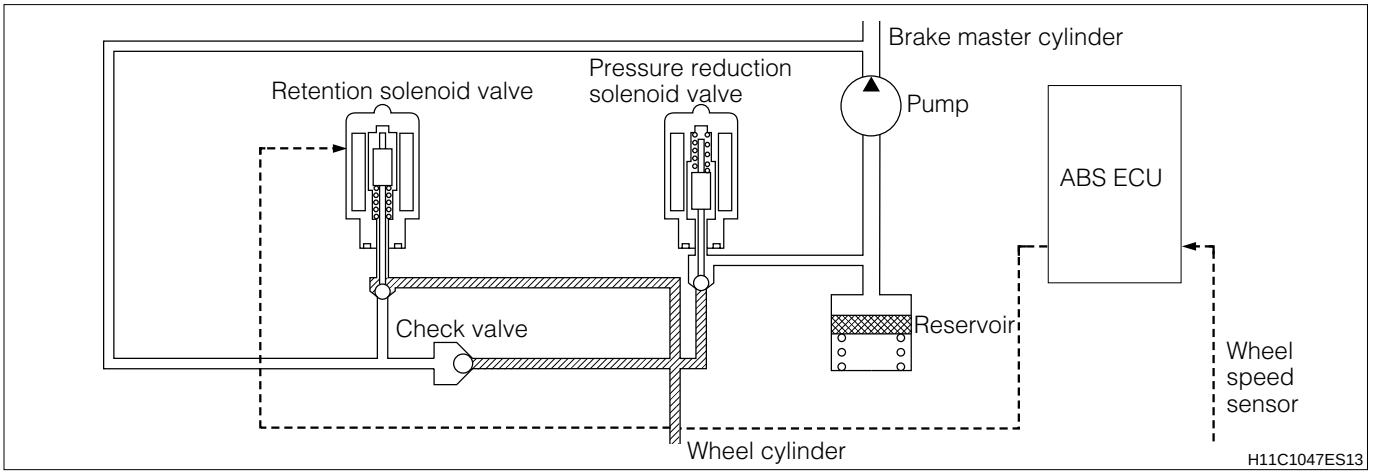
① **Pressure - reduction**

1.The ABS ECU sends a signal to the solenoid valve to activate each solenoid valve.
2.The brake fluid passes through the pressure reduction solenoid valve and flows into the reservoir, thereby reducing the hydraulic pressure.
3.During the ABS operation, the pump is activated to flush the brake fluid that collects in the reservoir back to the master cylinder.
4.The rate of fluid pressure reduction is controlled by repetition of the pressure reduction mode and the retention mode, which is described below.



② **Retention**

1.The ABS ECU sends a signal only to the retention solenoid valve, which shuts off the brake fluid passage.
2.The brake fluid pressure of the wheel cylinder is maintained.

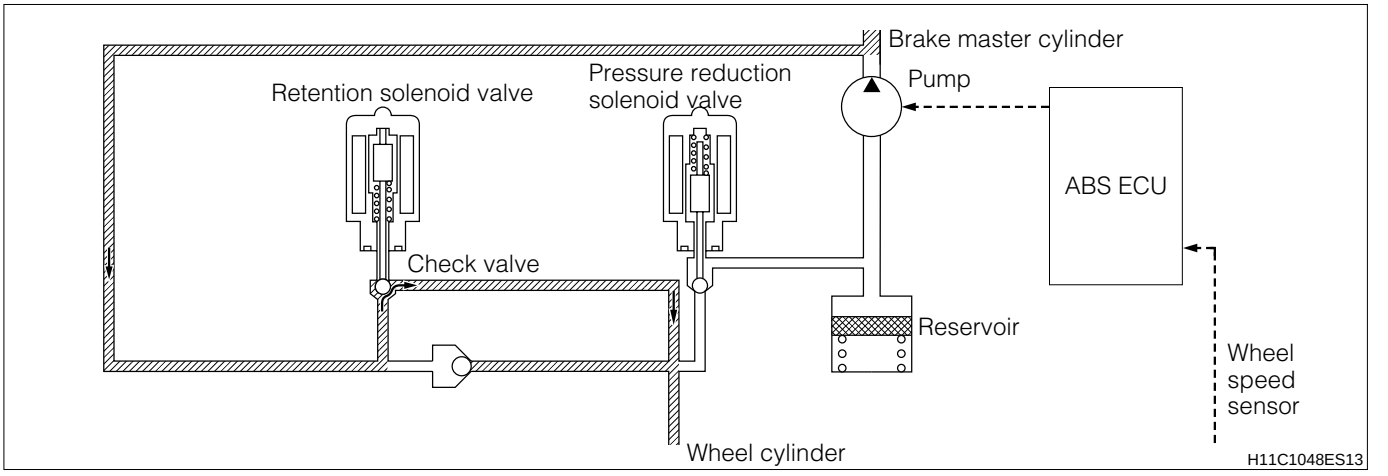


③ **Pressure - increasing**

1.The ABS ECU does not send a signal to the solenoid valve. The brake fluid is sent to the wheel cylinder, causing the fluid pressure to increase.

2.When the reservoir has some remaining brake fluid, the pump is activated to send the brake fluid in the reservoir back to the master cylinder.

3.The rate of fluid pressure increase is controlled by repetition of the pressure increase mode and the retention mode, which is described above.



2-3 CAN COMMUNICATION

1.The ABS ECU performs CAN communication with the meter ECU, A/T ECU, and EFI ECU, transmitting and receiving multiple pieces of information via a pair of communication wires (twisted pair wire). Refer to the section "CAN communication system" for details.

Refer to Page L2-1.

2-4 INITIAL CHECK FUNCTION

2-4-1 LAMP CIRCUIT

When the IG SW is turned ON, the ABS ECU will light up the ABS warning lamp and brake warning lamp for approx. 3 seconds, and check the lamp circuit.

2-4-2 DRIVING OF ACTUATOR

When the vehicle is started with the IG SW turned ON and the stop lamp switch turned OFF, the ABS ECU will check the motor operation inside the ABS actuator.

NOTE

- Although the operating sound of the motor and other components is generated from the engine compartment during the initial check of the actuator, that is not a sign of malfunction.

2-5 DIAGNOSIS

2-5-1 DESCRIPTION

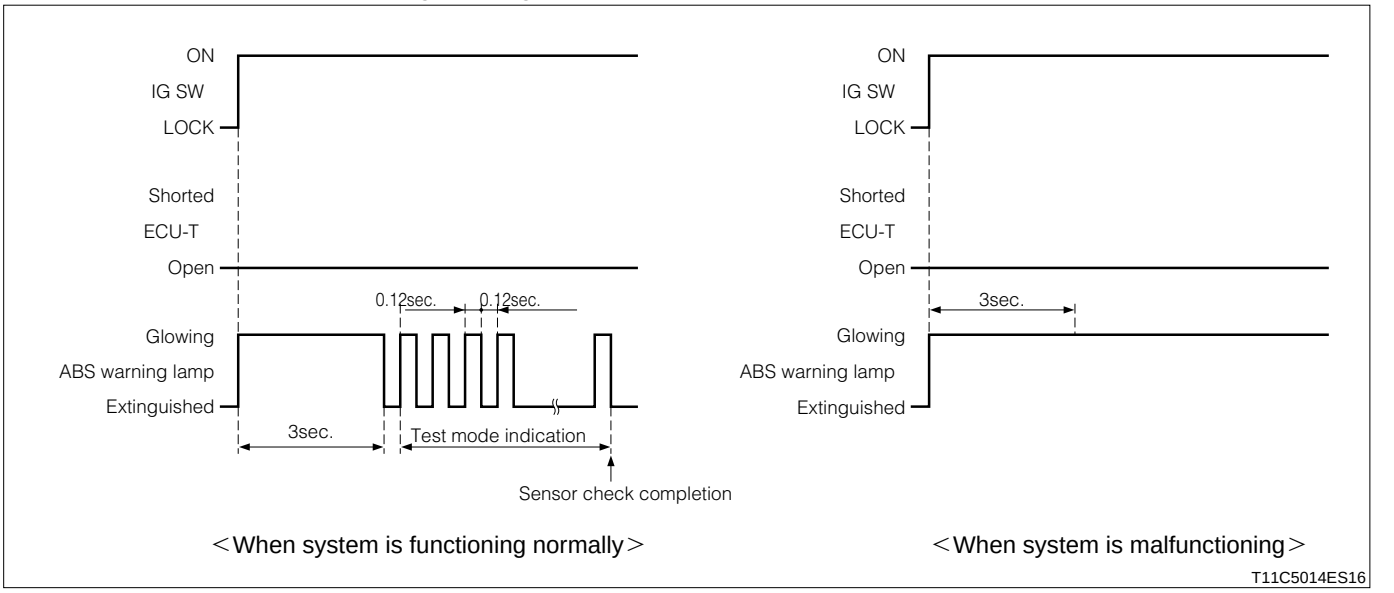
Diagnosis literally means {{}} failure diagnosis ″, which provides the function that allows the ECU to notify an operator of the fault that has occurred in the input and output system. The ECU stores faulty conditions when a fault occurs. The information is stored in the nonvolatile (EEPROM), therefore the diagnosis result will be stored even when the power supply is shut down.

Refer to the service manual for the details of diagnosis.

2-6 TEST MODE FUNCTION

2-6-1 DESCRIPTION

1. The ABS has a test mode function that checks the output value from each sensor to determine if the sensor is functioning properly, in addition to the diagnosis function that checks failure, open circuit, short-circuit, etc. of the system components.
2. The test mode is executed in any of the following cases.
   (1) Immediately after the abnormality code is erased by brake pedal operation.
   (2) When the IG SW is turned ON for the first time after the new ABS actuator is installed.
3. The test mode checks the following items. It also detects any faulty output value of each sensor, and deformation, missing teeth, etc. of the wheel speed sensor rotor.
   (1) Output voltage of wheel speed sensor
   (2) Output interval of wheel speed sensor
4. During the test mode, the ABS warning lamp flashes. When the checks of each sensor are completed properly, the ABS warning lamp goes out.



2-6-2 CHECK ITEMS

1.When the mode is switched to the test mode, first the ABS ECU memorizes all test mode codes automatically.

2.When the vehicle is driven straight at speeds of 4 km/h−7 km/h, the ABS ECU will check the wheel speed sensor and erase the test mode code previously stored when the ABS ECU has verified that no fault is present.

3.When the vehicle is driven straight at speeds of 10km/h−40km/h for 5 seconds, or driven straight until the vehicle speed becomes above 40 km/h, the ABS ECU will check the signal cycle of each wheel speed sensor, and erase the test mode code previously stored when the ABS ECU has verified that no fault is present.

Check system	Code No.		Check items	Checking condition
	2-digit	4-digit		
Wheel speed sensor Output voltage	81	C1271	RH front wheel speed sensor output voltage fault	Runs straight ahead at a vehicle speed of 4km/h−7km/h.
	82	C1272	LH front wheel speed sensor output voltage fault	
	83	C1273	RH rear wheel speed sensor output voltage fault	
	84	C1274	LH rear wheel speed sensor output voltage fault	
Wheel speed sensor Output interval	85	C1275	RH front wheel speed sensor output cycle fault	Runs straight ahead for five seconds or more at a vehicle speed of 10km/h−40km/h. Or driving the vehicle straight through at the speeds above 40 km/h.
	86	C1276	LH front wheel speed sensor output cycle fault	
	87	C1277	RH rear wheel speed sensor output cycle fault	
	88	C1278	LH rear wheel speed sensor output cycle fault	

2-7 FALE-SAFE FUNCTION

1.This is a function by which control takes place so that the system may not malfunction even if any abnormality is found in the input/output signal system.

2.When the fail-safe operates, the ABS warning lamp and brake warning lamp inside the combination meter go on as follows, thus telling the driver of the abnormality. Also, the system control will be prohibited.

(1) In cases where an abnormality which makes the ABS inoperative takes place, the ABS warning lamp goes on. Thus, the ABS control is prohibited.

(2) In addition, in cases where an abnormality which makes the EBD inoperative takes place, the ABS warning lamp and brake warning lamp go on at the same time. Thus, the EBD control is prohibited.

LIST OF FAIL-SAFE CONTROL FUNCTIONS

System diagnosed	Diagnosis items	Warning indication (Provided: ○, Not-provided:×)		Fail safe	
		ABS	Brake	Contents of control	Conditions of control release
Solenoid relay	Open wire / Short circuit	○	○	·Prohibition of EBD control ·Prohibition of ABS control	Control will be deactivated, when the IG SW is turned from LOCK to ON after returning to the normal state.
Power supply system	Voltage increase/ drop	○	×/○*1	·Prohibition of EBD control ·Prohibition of ABS control	Releasing after the normal condition has been restored
Wheel speed sensor front right	Open wire / Short circuit	○	×*2	·2 wheels or more EBD control is prohibited. ·Prohibition of ABS control	Control will be deactivated, when the IG SW is turned from LOCK to ON after returning to the normal state.
Wheel speed sensor front left	Open wire / Short circuit	○	×*2		
Wheel speed sensor rear right	Open wire / Short circuit	○	×*2		
Wheel speed sensor rear left	Open wire / Short circuit	○	×*2		
Wheel speed sensor front right	Cycle fault	○	×*2	·2 wheels or more EBD control is prohibited. ·Prohibition of ABS control	After returning to the normal state, turn the IG SW from LOCK to ON. If the outputs of the wheel sensors at all four wheels are found normal during the driving, the control will be deactivated.
Wheel speed sensor front left	Cycle fault	○	×*2		
Wheel speed sensor rear right	Cycle fault	○	×*2		
Wheel speed sensor rear left	Cycle fault	○	×*2		
Wheel speed sensor rotor	Teeth missing	○	×*2		
Pump	No-rotation fault	○	×	·Prohibition of ABS control	Released if the initial check confirms the normal operation when the IG SW is set from LOCK to ON.
Retention or pressure-reduction solenoid front RH	Abnormal	○	○	·Prohibition of EBD control ·Prohibition of ABS control	Control will be deactivated, when the IG SW is turned from LOCK to ON after returning to the normal state.
Retention or pressure-reduction solenoid front LH	Abnormal	○	○		
Retention or pressure-reduction solenoid rear RH	Abnormal	○	○		
Retention or pressure-reduction solenoid rear LH	Abnormal	○	○		
ABS ECU	ECU internal error	○	○	· Prohibition of EBD control · Prohibition of ABS control	Control will be deactivated, when the IG SW is turned from LOCK to ON after returning to the normal state.

*1:When the voltage rises: "○", When the voltage drops:"×"
*2:When failure occurred on two or more wheels: "○"

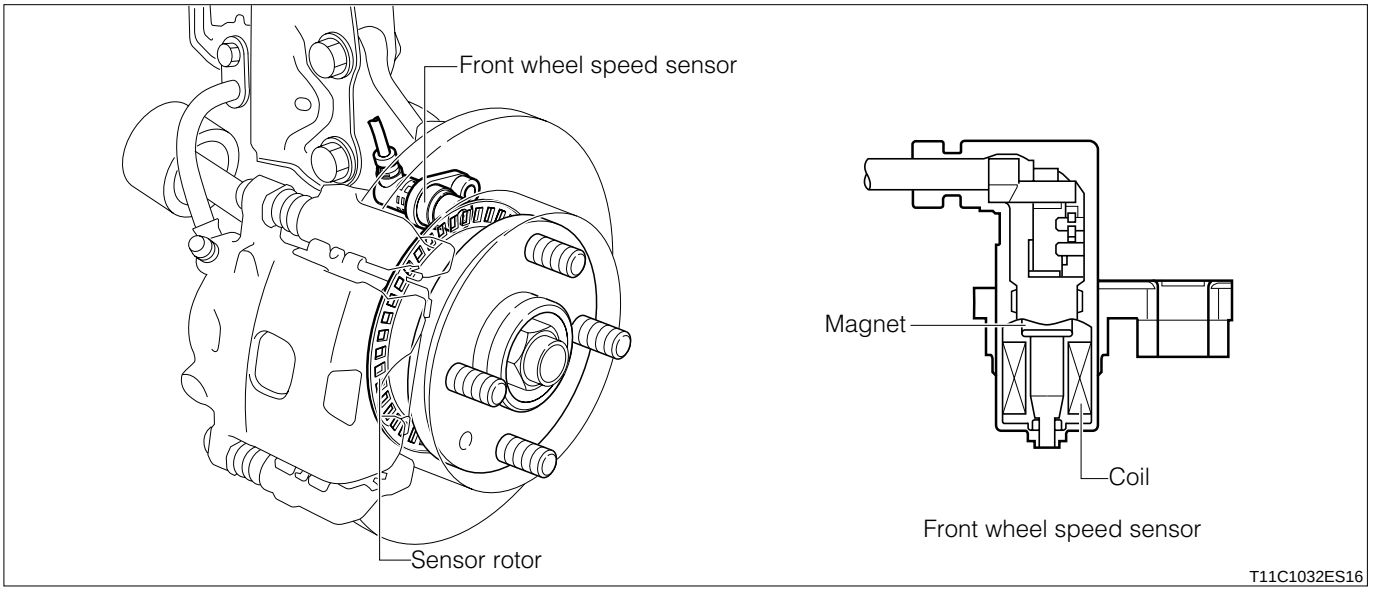
3 COMPONENTS

3-1 WHEEL SPEED SENSOR & SENSOR ROTOR

The wheel speed sensor consists of a magnet and a coil. When the sensor rotor rotates, magnetic flux that flows through the coil of the wheel speed sensor will change, generating alternating voltage in the coil. The frequency of this alternating voltage changes in proportion to the wheel rotation speed. By detecting this frequency, the vehicle speed is determined.

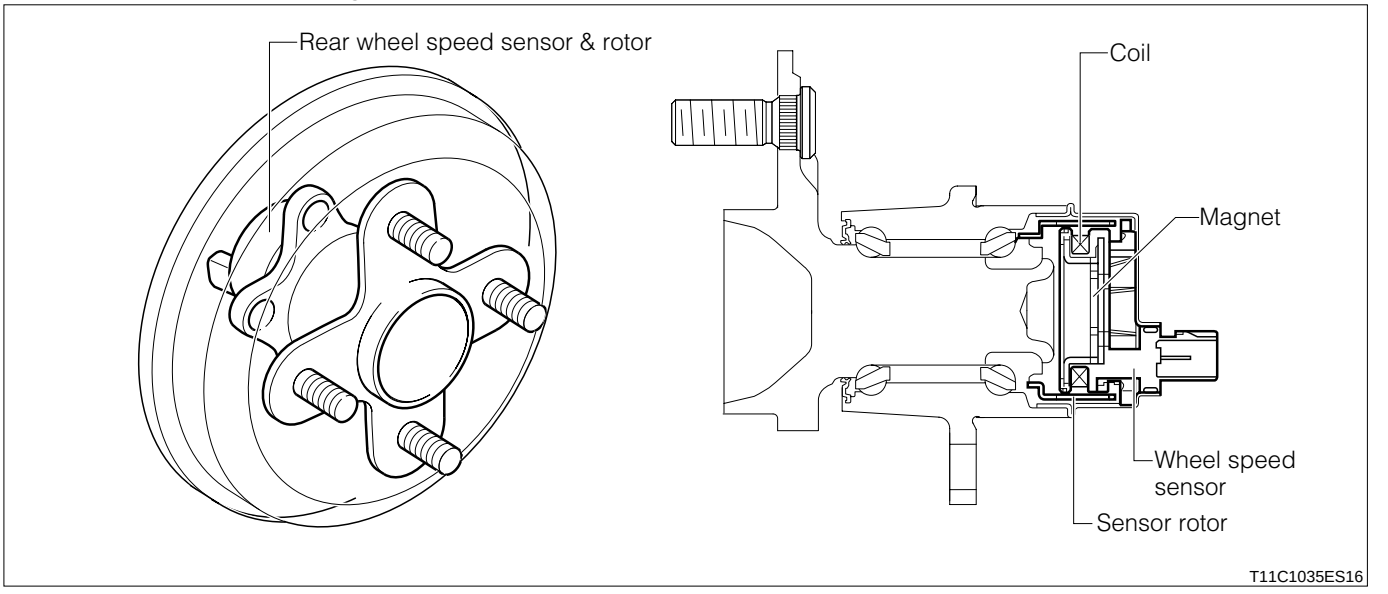
3-1-1 FRONT

These are installed to the right and left steering knuckles, and the sensor rotor is mounted on the front axle hub.



3-1-2 REAR

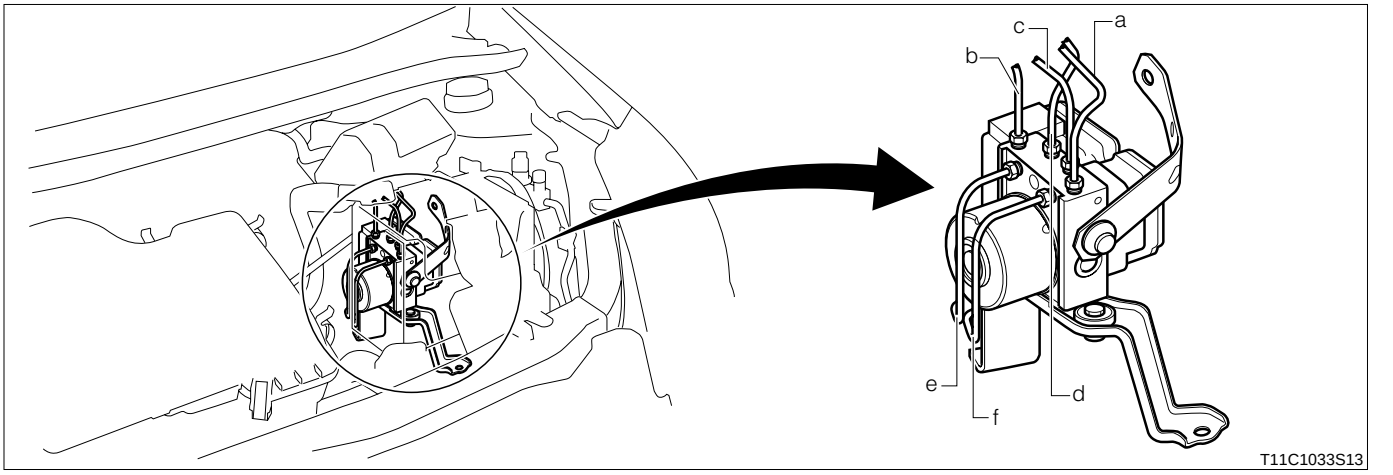
The rear axle and hub integrated type has been employed.



3-2 ABS ACTUATOR

ABS actuator, which consists of the ABS ECU, solenoid valve, pump, a motor, etc., controls fluid pressure that is applied to the wheel brakes during ABS control.

It is installed at the back of the battery in the engine compartment.

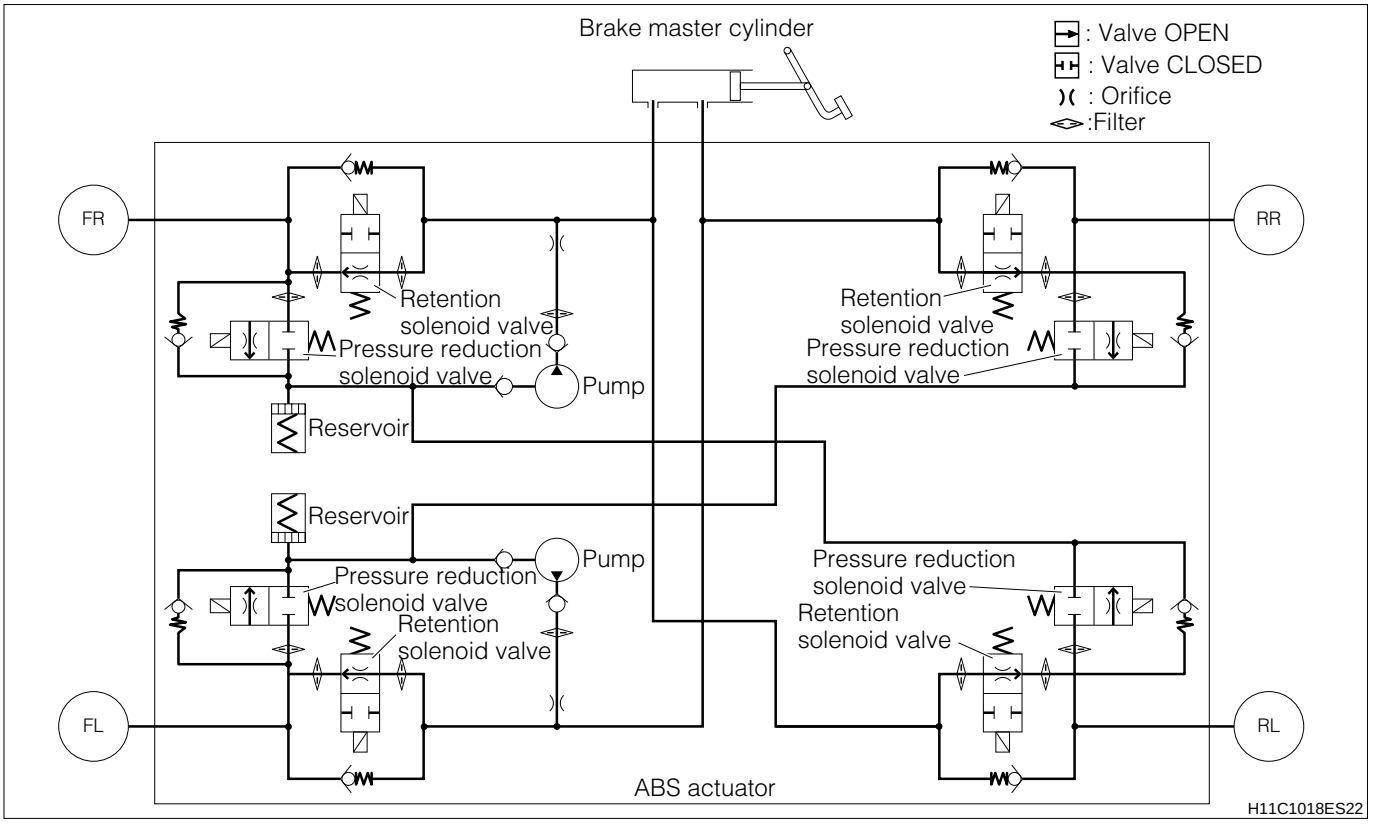


The illustration shows the RHD vehicle.

Brake pipe is connected to:

a	Master cylinder (primary side)
b	Master cylinder (secondary side)
c	Front brake RH
d	Front brake LH
e	Rear brake RH
f	Rear brake LH

3-2-1 ABS ACTUATOR FLUID PRESSURE CIRCUIT



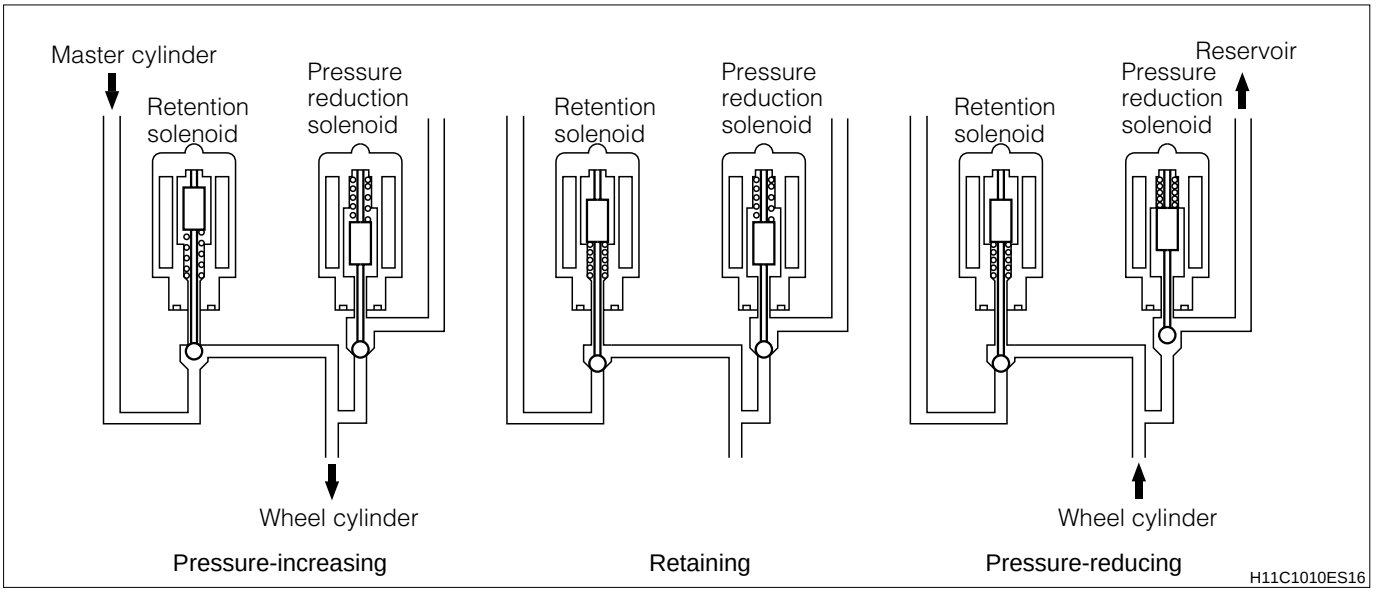
3-2-2 SOLENOID VALVE

Based on the signals from the ABS ECU, the electric current flowing into the coil is changed and the plunger is moved up and down so as to open/close the valve.

(1) The retention solenoid valve is normally open. However, it is closed upon receiving a signal from the ECU.

(2) Conversely, the pressure-reducing solenoid valve is normally closed. However, it opens upon receiving a signal from the ECU.

(3) Through the combination of this movement, the brake fluid pressure circuit can be switched into three modes of the pressure-increasing mode, retention mode, and pressure-reducing mode.



Solenoid valve operation

	Pressure - increasing	Retention	Pressure - reduction
Retention solenoid valve	OFF (Open)	ON (Closed)	ON (Closed)
Pressure reduction solenoid valve	OFF (Closed)	OFF (Closed)	ON (Open)

The words in parenthesis indicate open/close status of the solenoid.

3-2-3 RESERVOIR

1. This temporarily stores the brake fluid from the wheel cylinder, when each solenoid valve is under the pressure reduction mode.
2. When the passage between the wheel cylinder and the reservoir opens in the pressure reduction mode, the brake fluid from the wheel cylinder flows into the reservoir, by overcoming the spring force of the reservoir and pushing down the piston.

3-2-4 PUMP

It is driven by the motor, and it sends the brake fluid, which is stored in the reservoir in the pressure reduction mode, back to the master cylinder.

3-2-5 ABS ECU

This estimates the control status of the wheel by the signal from each wheel sensor, and controls the solenoid valve and the pump motor to prevent the wheel from getting locked. Also, it constantly monitors the system. When a fault is detected, it lights up the warning lamp and executes the fail safe function.

3-3 WARNING LAMP

1.An ABS warning lamp and brake warning lamp are mounted inside the combination meter. When the system is normal, the lamp lights up for about 3 seconds after the IG SW is turned on to check the lamp, and then turned off.

2.When a malfunctions occurs in the system, the ABS warning lamp and the brake warning lamp will remain illuminated.

3-3-1 BRAKE WARNING LAMP

1.When an error condition occurs and the EBD is inoperative, this lamp as well as the ABS warning lamp light up.

2.The lamp lights up when the parking brake SW or the brake fluid level SW is ON.
Refer to Page J3-12.

3-3-2 ABS WARNING LAMP

When malfunction occurs in the ABS, the lamp will remain illuminated. Also a diagnosis code is output.
Refer to Page J3-12.

3-4 STOP LAMP SWITCH

1.This is mounted at the base of the brake pedal.

2.This detects the brake pedal status. It turns ON when the brake pedal is depressed, and turns OFF when the brake pedal is released.

TO INDEX

F1 CLUTCH

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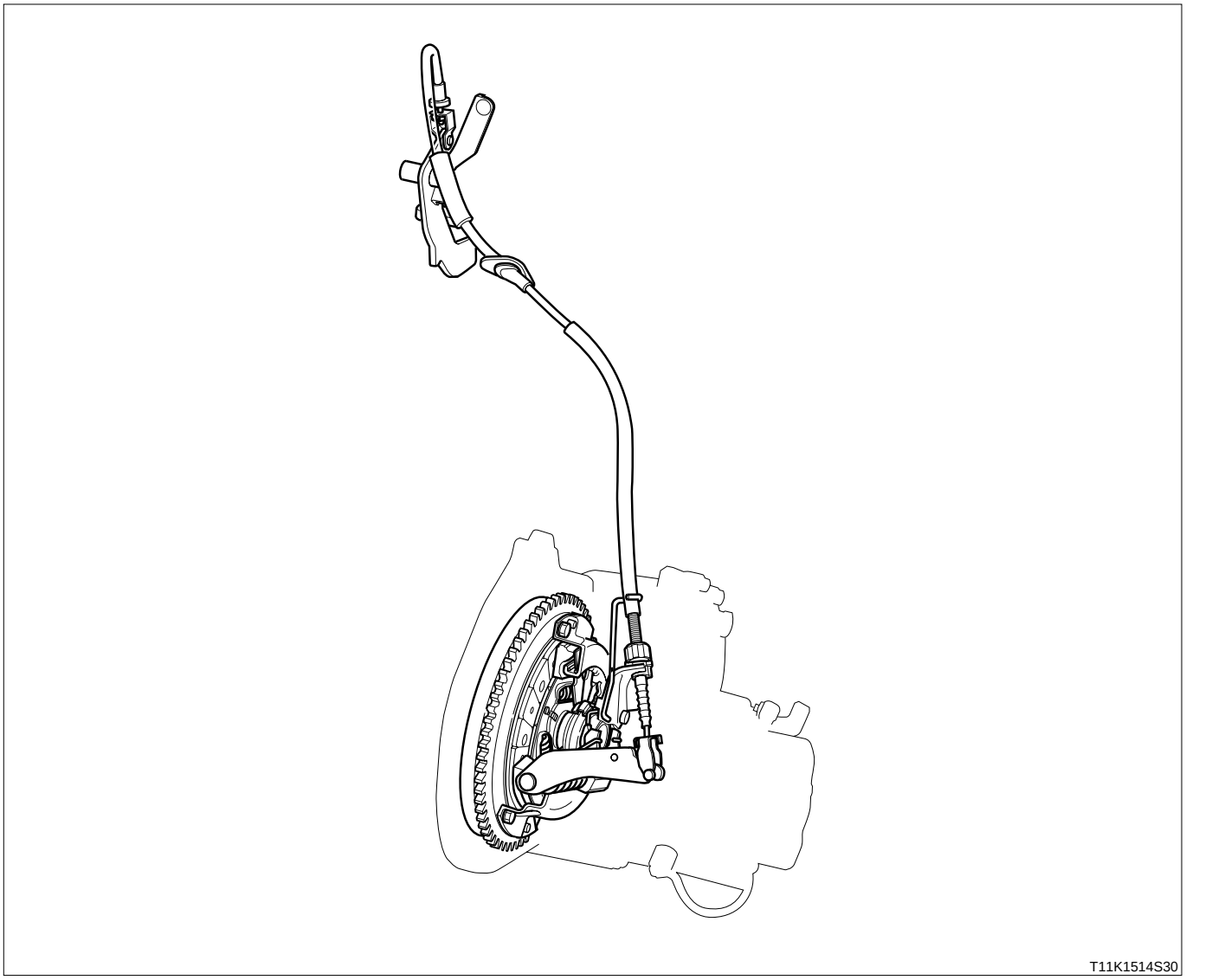
DESCRIPTION ---------- F1 - 1
SPECIFICATION ---------- F1 - 1
CONSTRUCTION AND OPERATION ---- F1 - 2
CLUTCH COVER ---------- F1 - 2
CLUTCH DISC ---------- F1 - 2
CLUTCH RELEASE BEARING ---------- F1 - 3

1 OUTLINE

1-1 DESCRIPTION

1.The clutch mechanism is of a dry, single-plate, diaphragm spring type. The control mechanism has employed a mechanical type that is actuated by a cable.

2.The release mechanism has employed a rotational type.



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1-2 SPECIFICATION

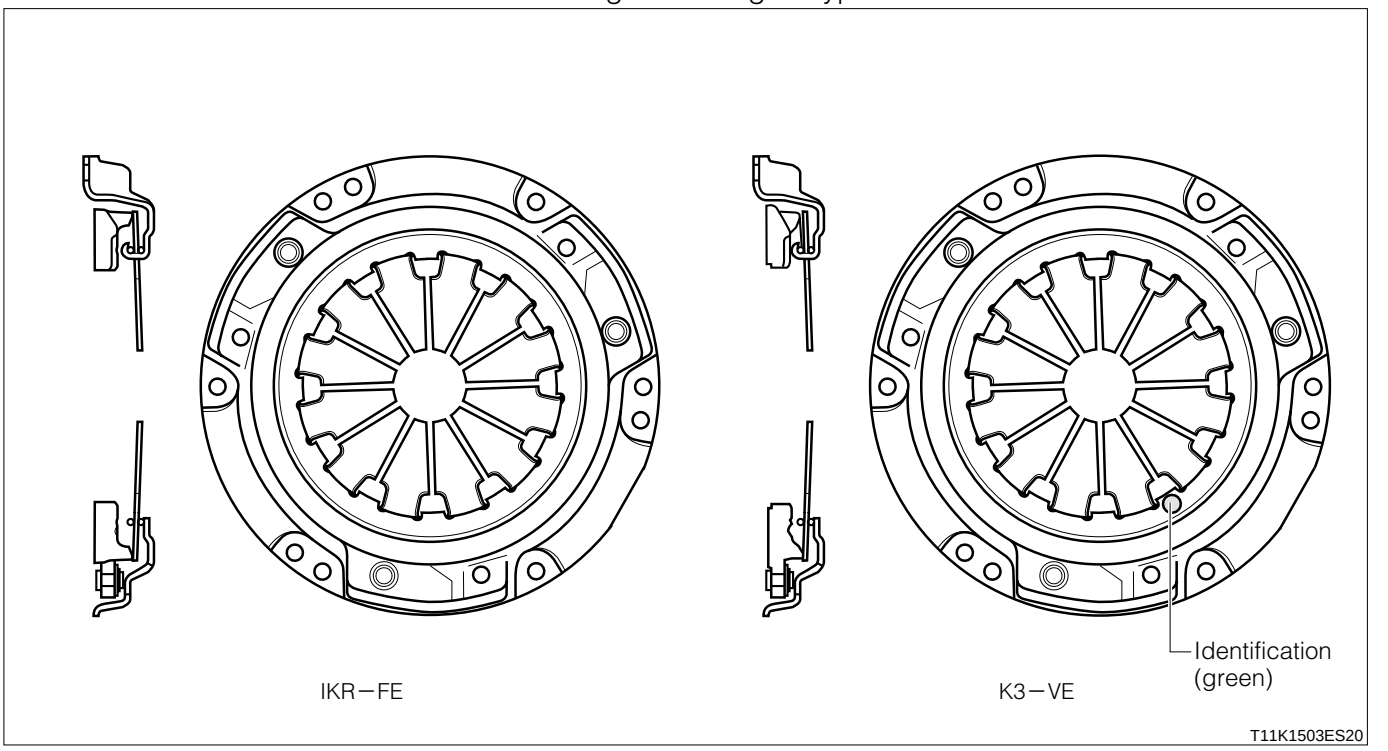
Specification table of clutch

Engine type		1KR−FE	K3−VE
Clutch type		Dry·Single - plate, Diaphragm spring	←
Clutch operation method		Mechanical type	←
Manufacturer		EXEDY	←
Clutch cover	Pressure plate size (mm)	186 Dia.×122 Dia.	192 Dia.×130 Dia.
	Identification (color)	Not provided	Green
Clutch disc	Outer dia.×Inner dia. (mm)	180 Dia.×125 Dia.	190 Dia.×132 Dia.
	Material	Semi-mold	←
	Identification (color)	Not provided	Green

2 CONSTRUCTION AND OPERATION

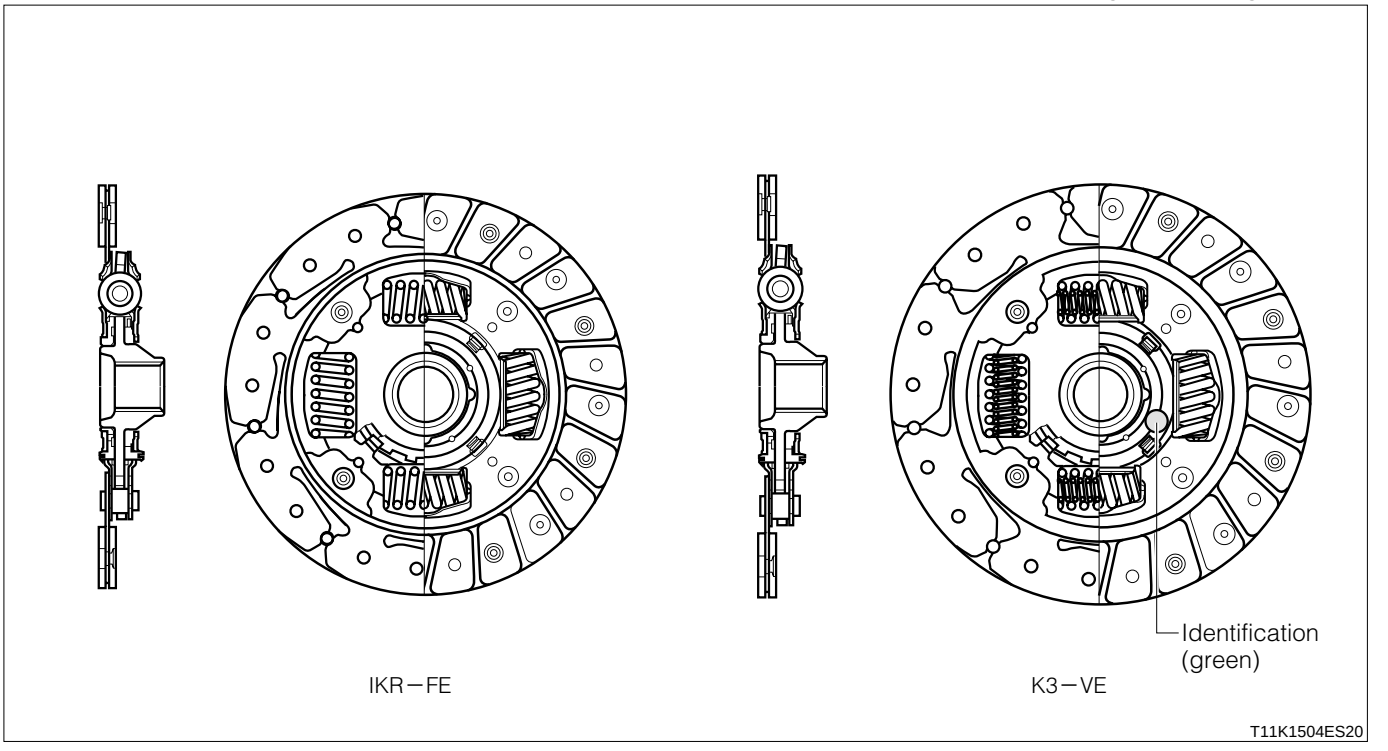
2-1 CLUTCH COVER

The clutch cover comes in two kinds according to the engine type.



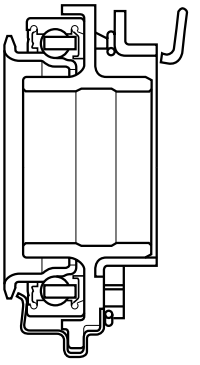
2-2 CLUTCH DISC

As is the case with the clutch cover, the clutch disc also comes in two kinds according to the engine type.



2-3 CLUTCH RELEASE BEARING

The clutch release bearing has employed a grease-sealed, automatic self-aligning radial ball bearing.



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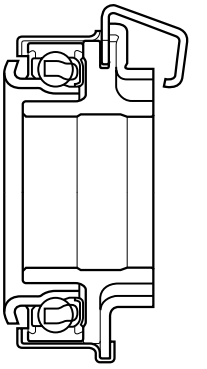

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TO INDEX

F2 MANUAL TRANSMISSION/MANUAL TRANSAXLE

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POWER TRAIN MECHANISM ---------- F2 - 3
SHIFT AND SELECT MECHANISM ---- F2 - 5
LUBRICATION MECHANISM ---------- F2 - 9
CASE AND COVER ---------- F2 - 10
CONTROL MECHANISM ---------- F2 - 11

1 OUTLINE

1-1 DESCRIPTION

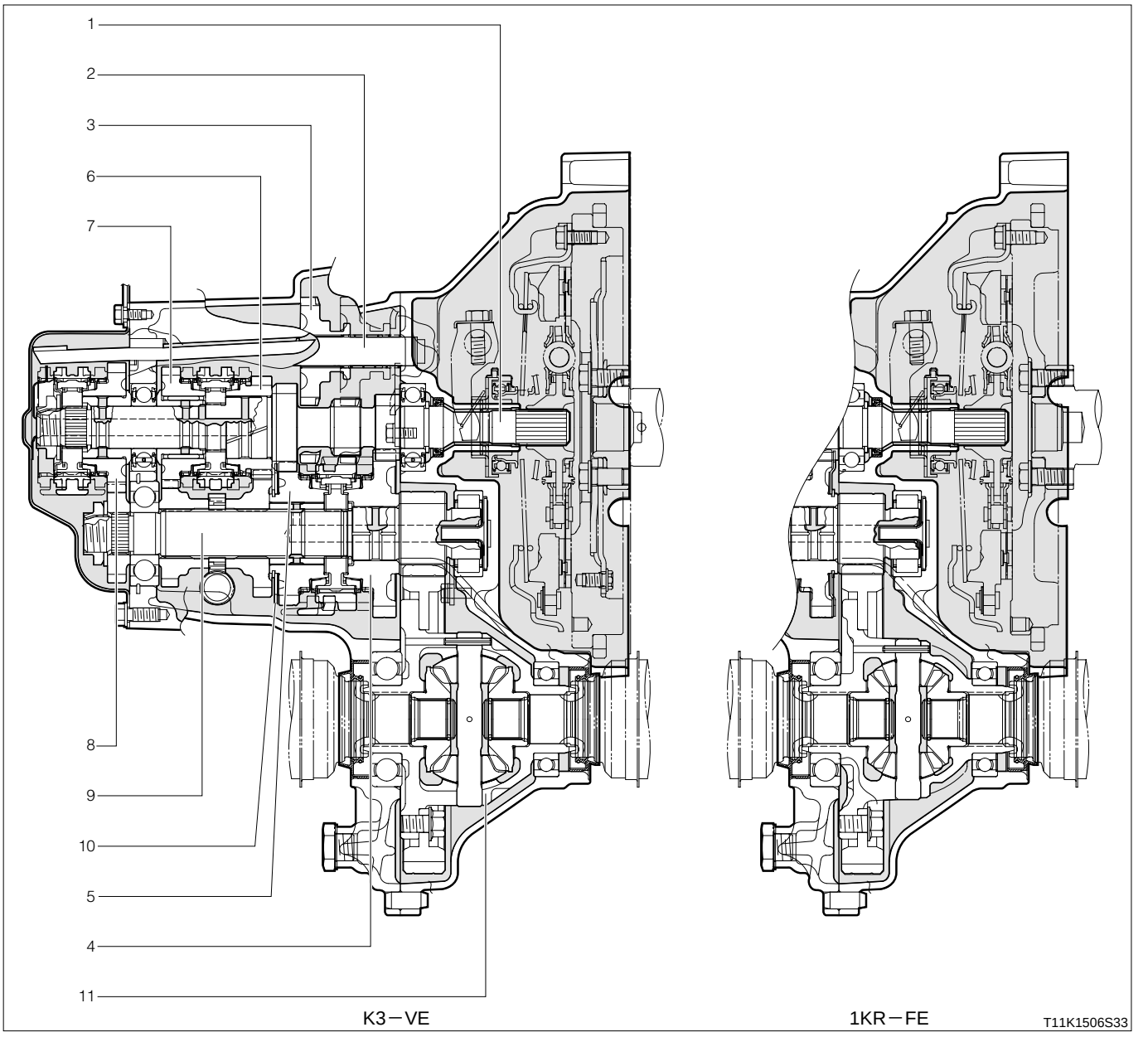
Vehicles with Type 1KR−FE engine are equipped with Type M5H−B3 manual transaxle, whereas vehicles with Type K3−VE engine are provided with Type M5H−C1 manual transaxle.

1-2 SPECIFICATION

Specifications table of manual transaxle

Driving method		2WD	←
Engine type		1KR−FE	K3−VE
Transaxle type		M5H−B3	M5H−C1
Transaxle identification code (label)		951	952
Gear ratio	1st	3.182	←
	2nd	1.842	←
	3rd	1.25	←
	4th	0.917	0.865
	5th	0.75	←
	Reverse	3.143	←
Final reduction gear ratio		4.500	4.267
Lubrication fluid	Nomenclature	Transmission gear oil SAE75W−85 or 75W−90 (API classification GL−3 or GL−4)	←
	Capacity	2.25ℓ	←

1-3 SECTIONAL VIEW



1	Input shaft	7	4th gear
2	Reverse idler gear shaft	8	5th gear
3	Reverse idler gear	9	Output shaft
4	1st gear	10	Sub-gear
5	2nd gear	11	Differential
6	3rd gear		

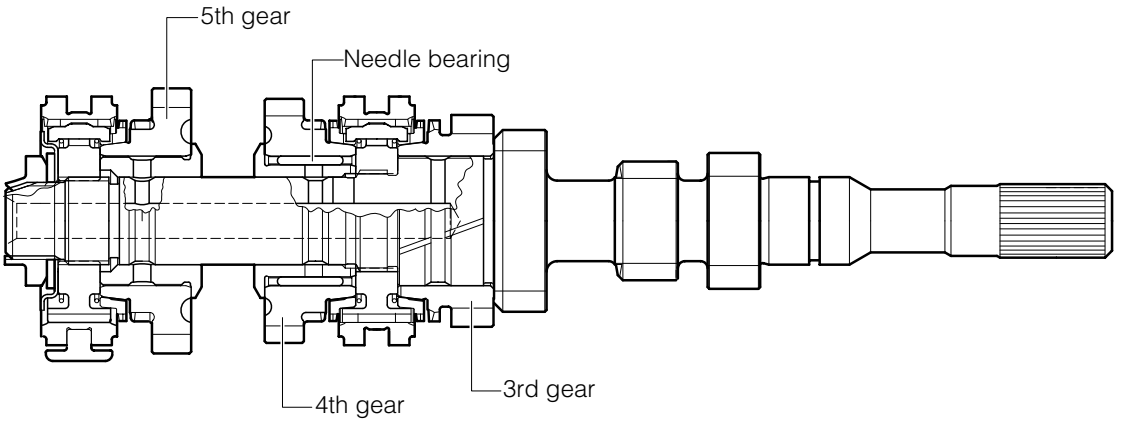
2 CONSTRUCTION AND OPERATION

2-1 POWER TRAIN MECHANISM

2-1-1 INPUT SHAFT

1.The input shaft transmits the power inputted from the clutch disc to the output shaft. The input shaft is incorporated in a case by means of the radial ball bearing.

2.The 3rd gear, 4th gear and 5th gear are incorporated on the input shaft. The bearing for the 4th gear employs needle bearings.



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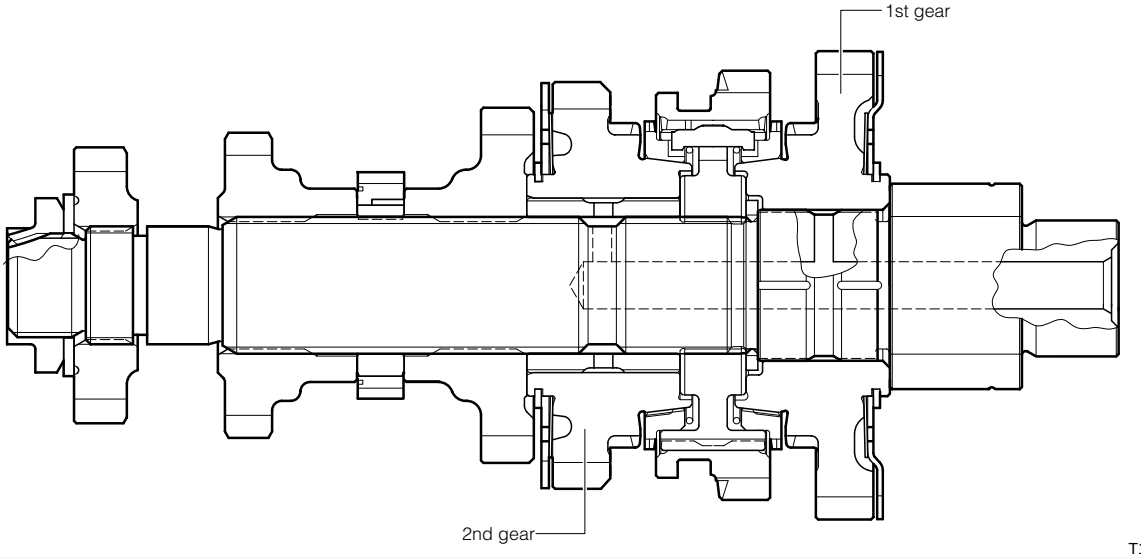
2-1-2 OUTPUT SHAFT

1.The output shaft transmits the power inputted from the input shaft to the differential. The output shaft is also incorporated in a case as the input shaft is so incorporated.

2.The 1st gear and 2nd gears are incorporated on the output shaft.

3.A sub gear is provided for the 1st gear of the transaxle for the K3−VE engine and each of the 1st gear and 2nd gear of the transaxle for the 1KR−FE engine in order to prevent generation of rattling noise during idling.



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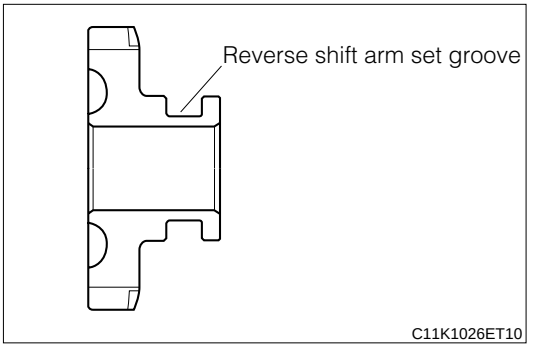
2-1-3 REVERSE IDLER GEAR

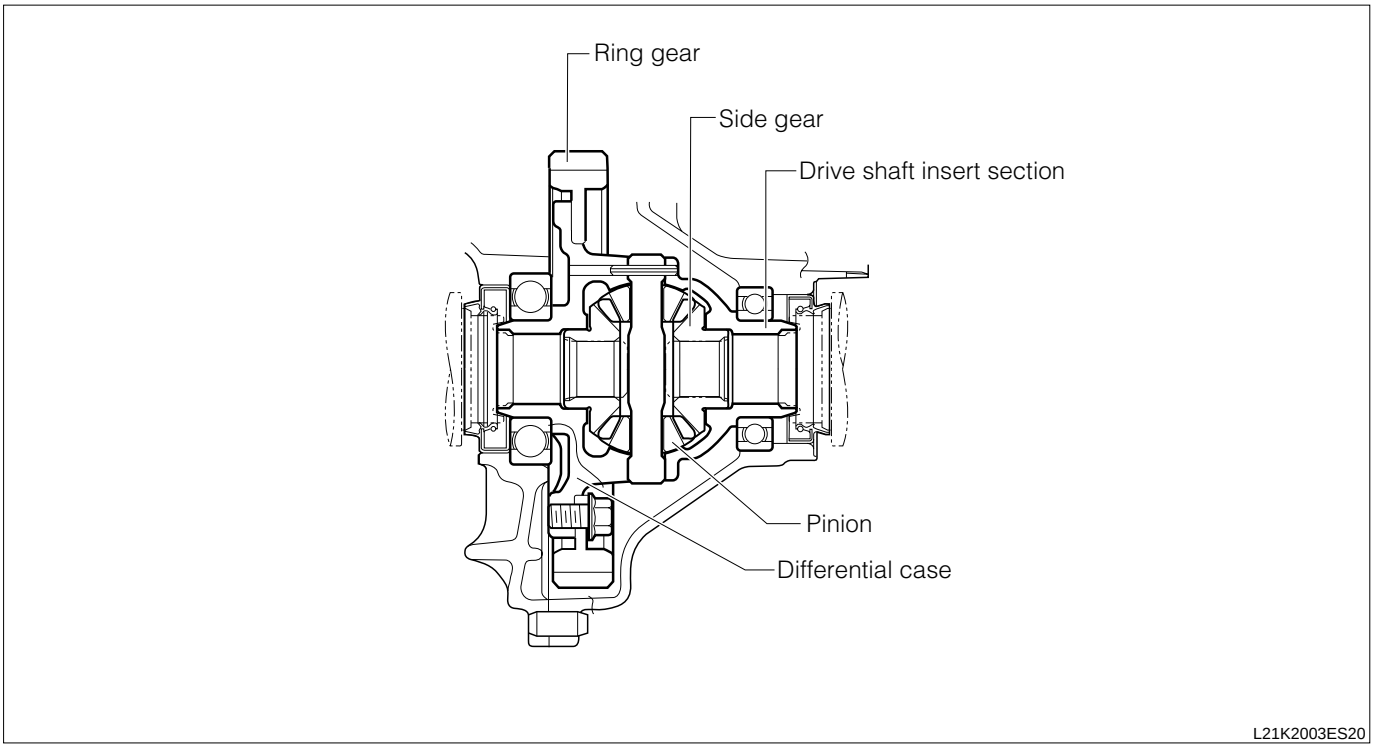
1.The reverse idler gear is installed to the reverse idler gear shaft through a bush.

2.The reverse idler gear has a groove for setting the reverse shift arm. By means of the arm operation, engagement with the reverse gear of the input shaft and output shaft takes place.



2-1-4 DIFFERENTIAL

1.The differential case transmits power from the output shaft to the drive shaft. The differential case is composed of two side gears, two pinions, a differential case, etc.



2-2 SHIFT AND SELECT MECHANISM

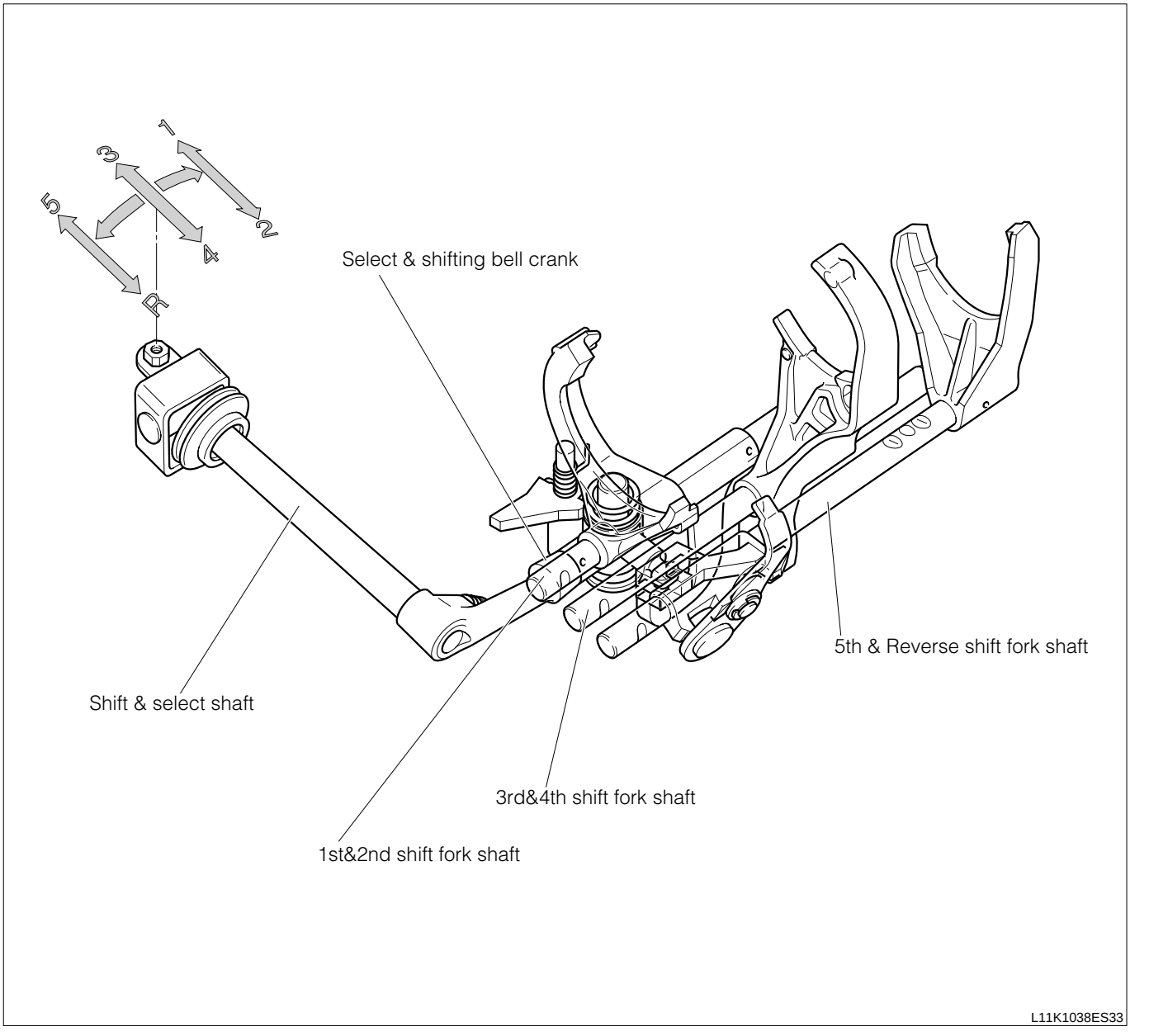
2-2-1 DESCRIPTION

1.The shift & select mechanism adopts the remote control floor shift method that uses three shift fork shafts.

2.The shift & select shaft is connected with the shift & select shaft rod of the control mechanism.

3.When the select operation is performed, the shift & select rod turns in a right-and-left direction. This movement is transmitted through the shift & select shaft into the select & shifting bell crank. As a result, the select & shifting bell crank moves in an up-and-down direction. Meanwhile, when the shift operation is performed, the shift & select rod moves in a fore-and-aft direction. Then, the select & shifting bell crank turns, and the corresponding shift fork shaft slides in a fore-and-aft direction. Hence, the sleeve moves.

4.Furthermore, the shift & select mechanism is provided with a double-engagement preventing mechanism that prevents shifting into two or more gears at the same time. Moreover, the shift & select mechanism is provided with a reverse mis-shift preventing mechanism that prevents gear shifting from being made from the 5th gear directly to the reverse gear during running.

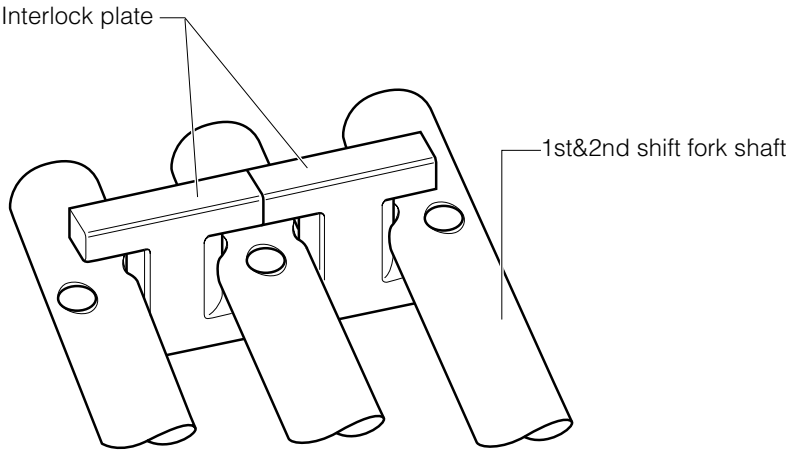


2-2-2 DOUBLE-ENGAGEMENT PREVENTING MECHANISM

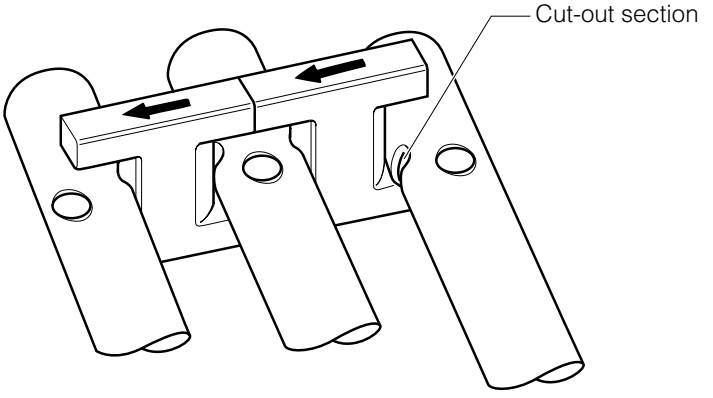
(1) Construction and operation

1.The double-engagement preventing mechanism is composed of two interlock plates.

2.When the 1st & 2nd shift fork shaft slides from the neutral condition to the axial direction, the interlock plate that was in the cutout section of the 1st & 2nd shift fork shaft is pushed out. Then, the cutout section of the 3rd & 4th shift fork shaft is pushed. Furthermore, as a result of this operation, another interlock plate pushes the cutout section of the 5th & reverse shift fork shaft at the same time. Consequently, the 3rd & 4th and 5th & reverse shift fork shafts are locked, thus preventing double-engagement.



At time of neutral position



At time of shifting to 2nd gear

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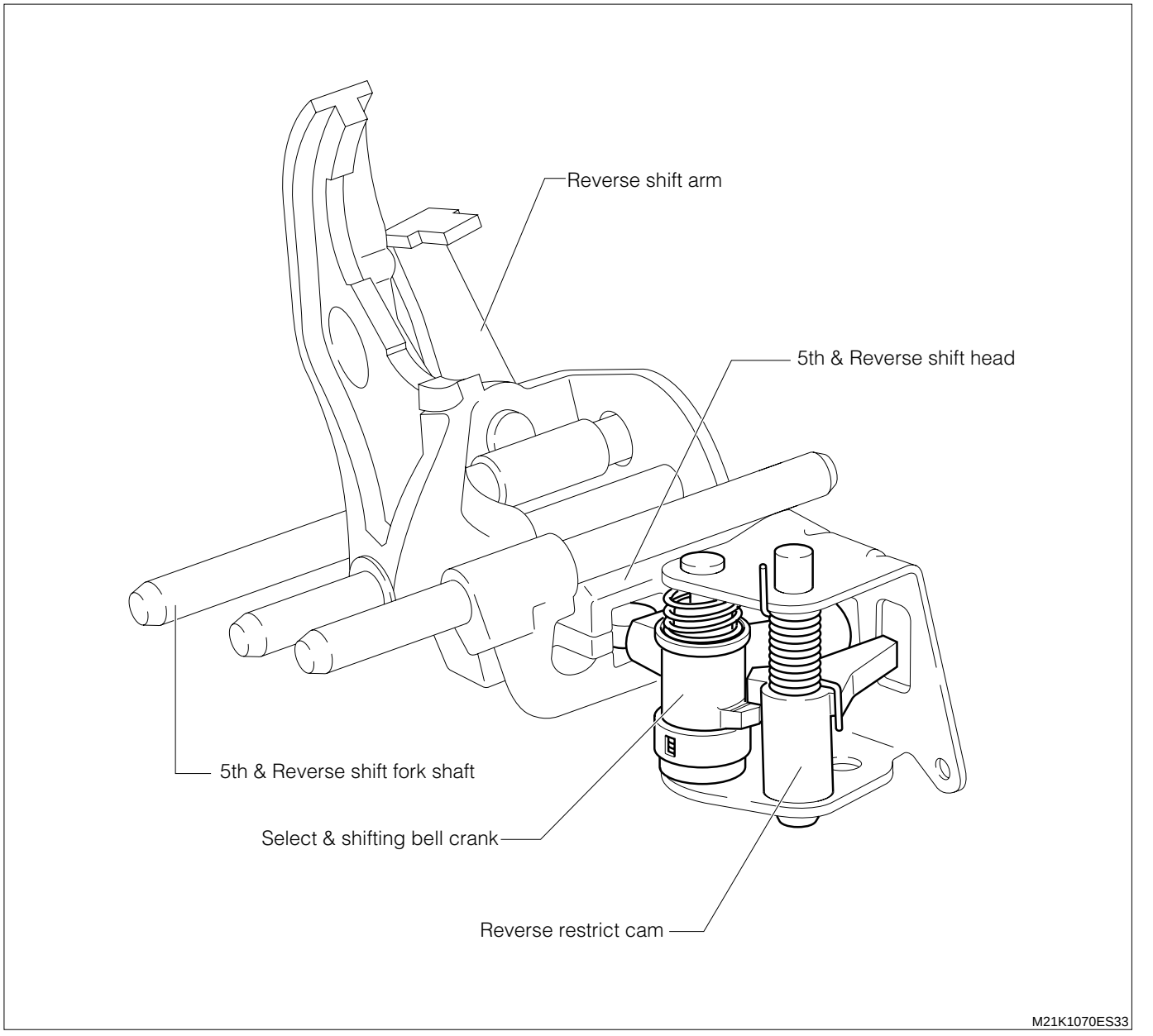
2-2-3 REVERSE MISS-SHIFT PREVENTING MECHANISM

(1) Construction

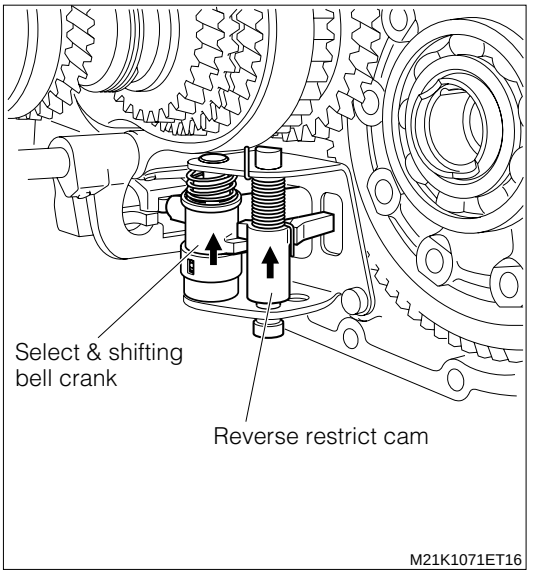
The reverse mis-shift preventing mechanism is composed of a select & shifting bell crank, a reverse restrict cam, a 5th & reverse shift fork shaft, and a 5th & reverse shift head.



(2) Operation

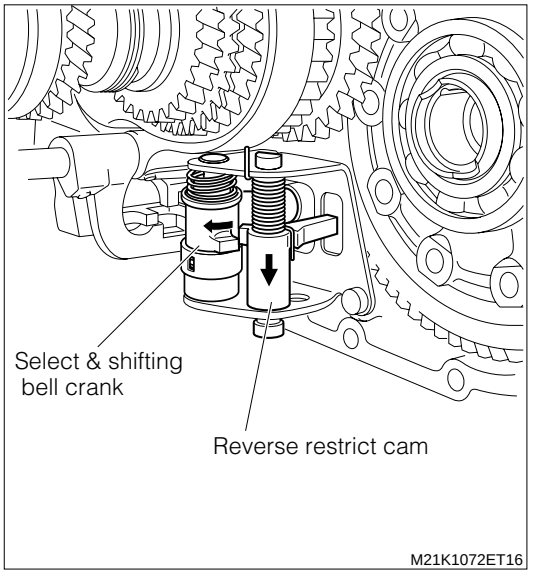
① **When selecting 5th gear**

When selection is made in the 5th or reverse direction, the select & shifting bell crank pushes the reverse restrict cam upward.



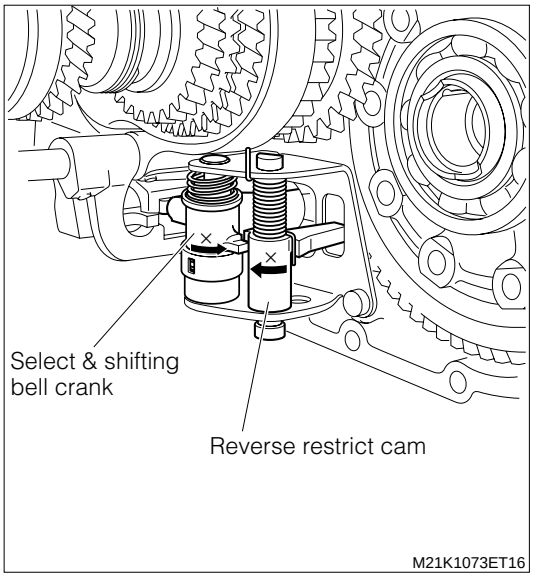
② **When shifting to 5th gear**

When shifting is made to 5th gear, the select & shifting bell crank is disengaged from the reverse restrict cam. As a result, the reverse restrict cam is returned by the spring.



③ **At time of shifting from 5th gear to reverse gear**

When an attempt is made to perform shifting from the 5th gear directly to the reverse gear, the select & shifting bell crank contacts with the reverse restrict cam. The reverse restrict cam can turn only until its lever section comes in contact with the hole end of the select & shifting bell crank support. Therefore, the bell crank also is unable to turn any further. Consequently, mis-shifting from the 5th gear directly to the reverse gear can be prevented.

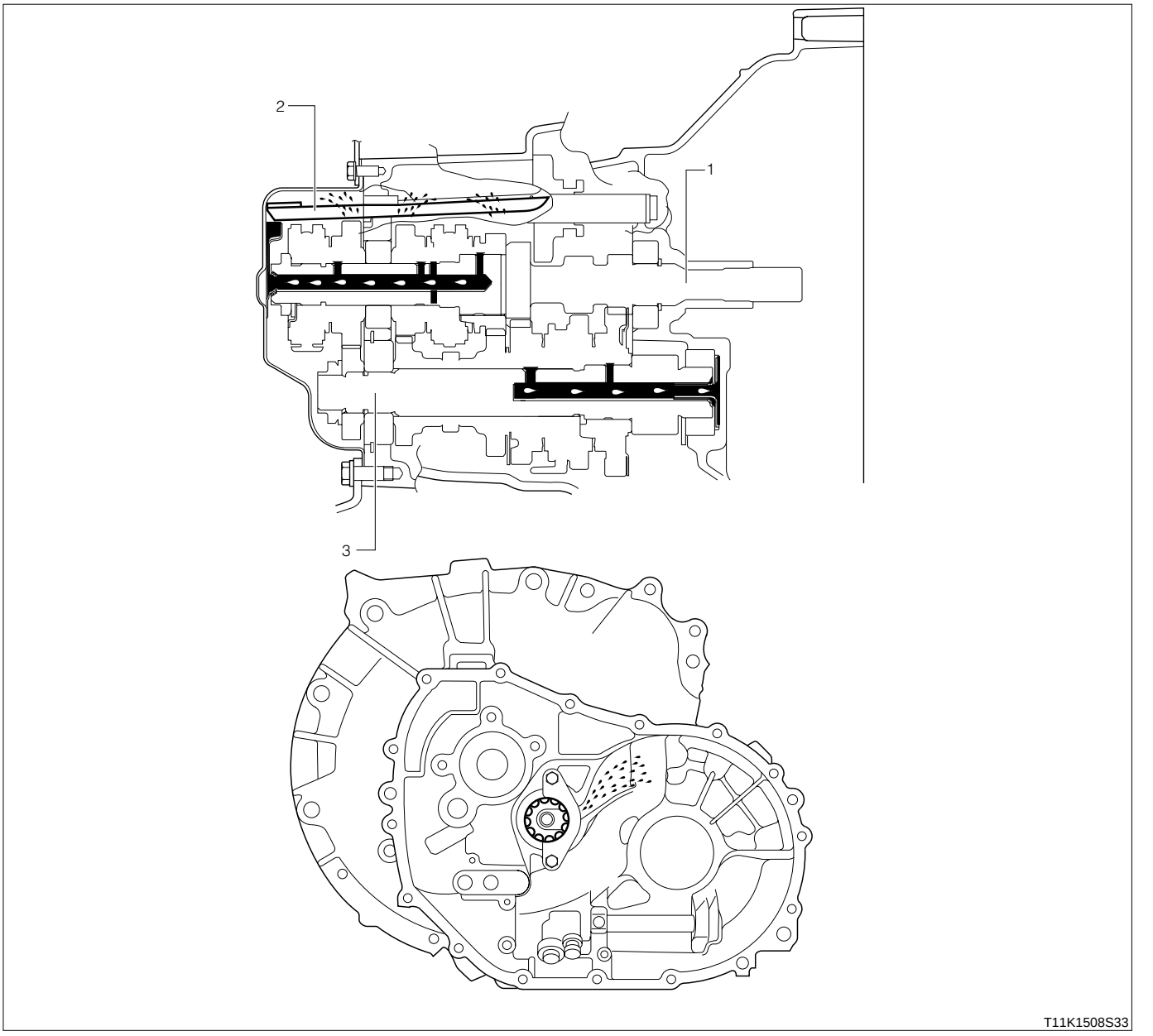


2-3 LUBRICATION MECHANISM

2-3-1 DESCRIPTION

The oil lubrication uses the shaft center lubricating method that features excellent lubricating efficiency. The oil brought up by the ring gear goes through the center of the output shaft, and lubricates the 1st gear, 2nd gear and synchronizer ring.

Furthermore, the oil brought up by the gear on the output shaft goes through the oil guide pipe and the center of the input shaft. Then, the oil lubricates the 3rd gear, 4th gear, 5th gear and synchronizer ring.

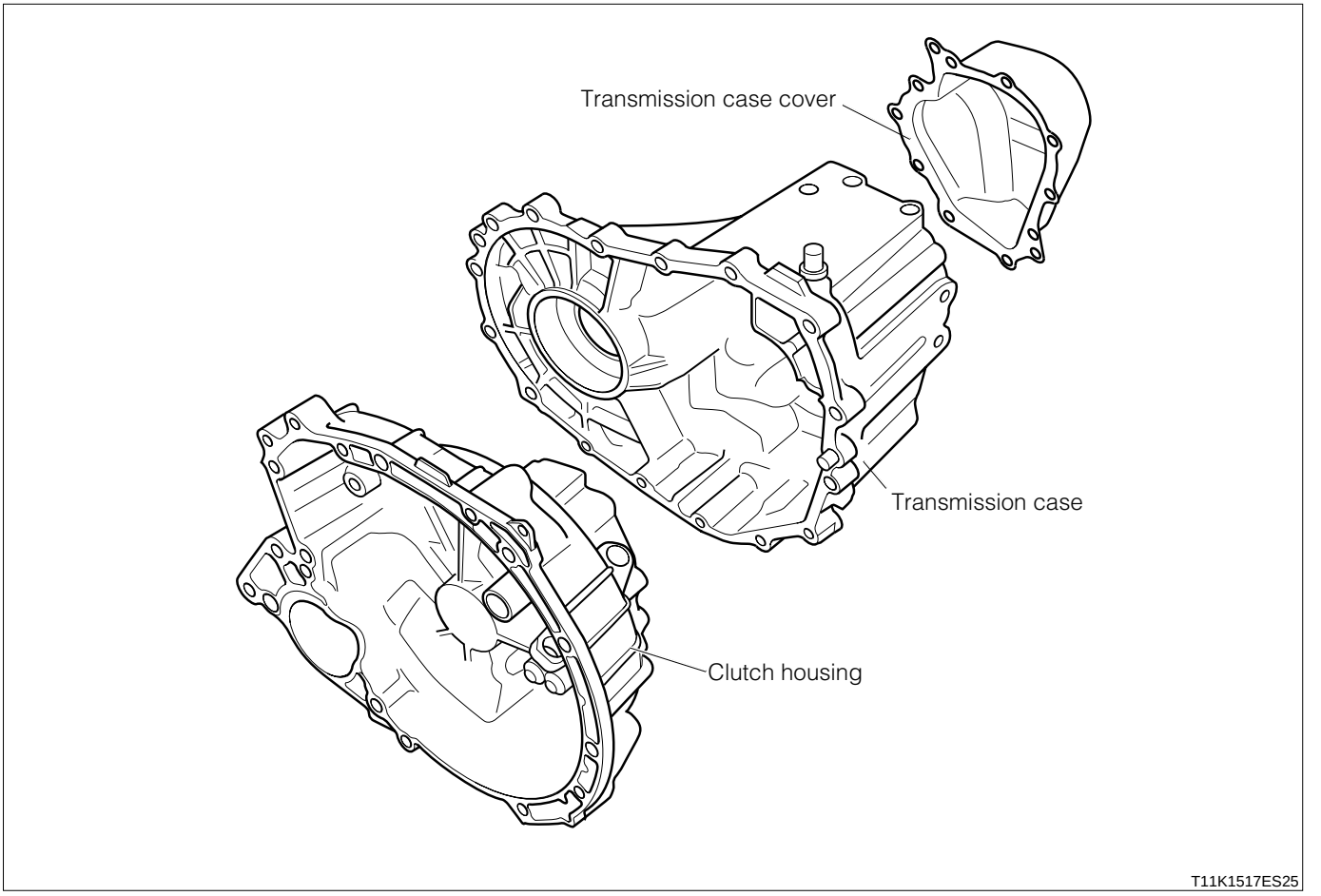


1	Input shaft	3	Output shaft
2	Oil guide pipe		

2-4 CASE AND COVER

1.The transaxle transmission case can be separated crosswise, and is composed of three portions: a clutch housing, a transmission case, and a transmission case cover.

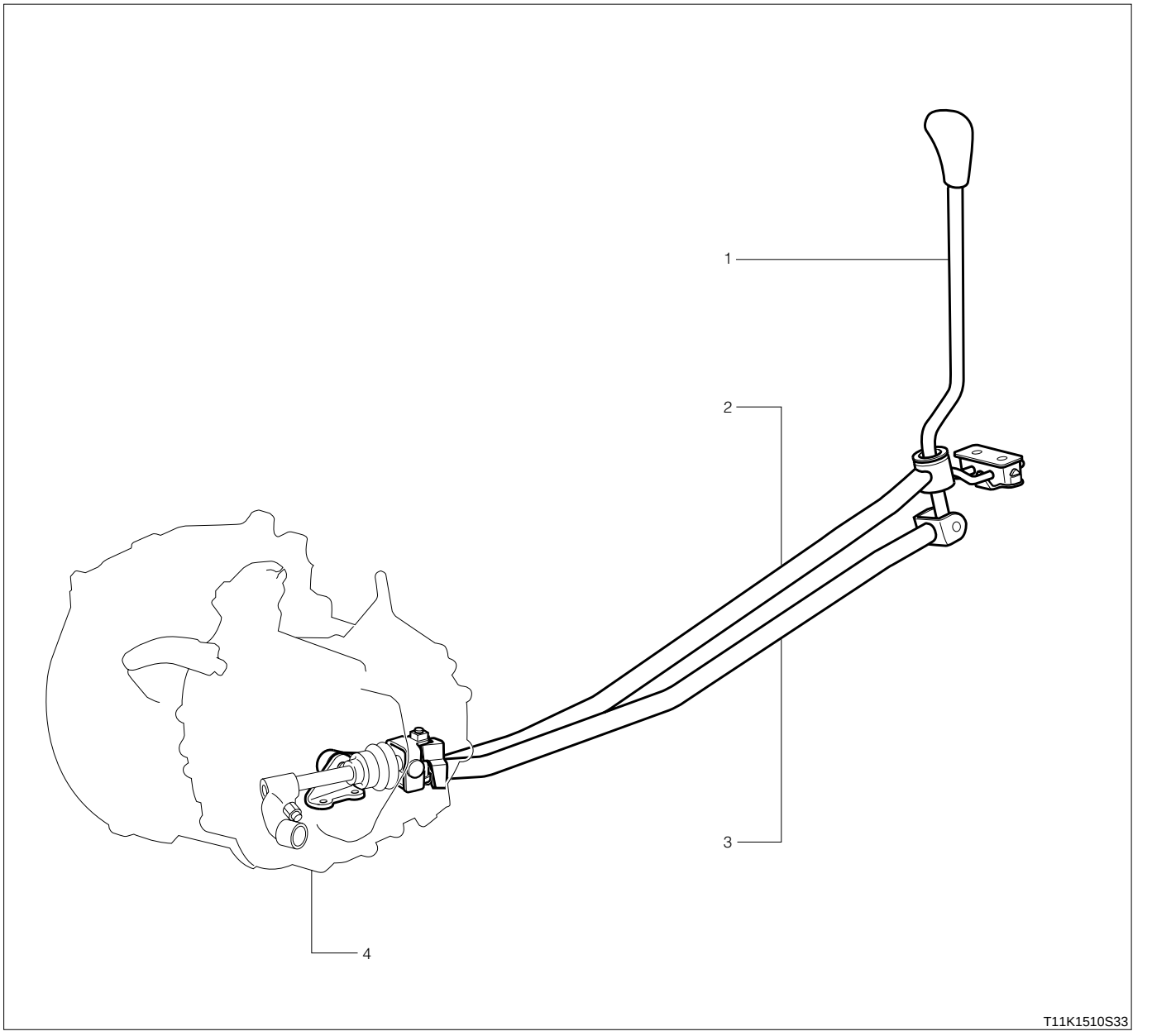
2.To achieve a lightweight and compact design, the clutch housing and transmission case are made of aluminum alloy, whereas the transmission case cover is made of sheet metal.



2-5 CONTROL MECHANISM

2-5-1 DESCRIPTION

The control mechanism has employed a two-division type by means of the shift & select rod and the extension rod.



1	Shift lever	3	Shift & select rod
2	Extension rod	4	Transaxle

TO INDEX

F3 AUTOMATIC TRANSMISSION/AUTOMATIC TRANSAXLE

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HYDRAULIC CONTROL SYSTEM ---- F3 - 11
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SHIFT CONTROL MECHANISM ------ F3 - 15

A4B
1 OUTLINE
1-1 DESCRIPTION

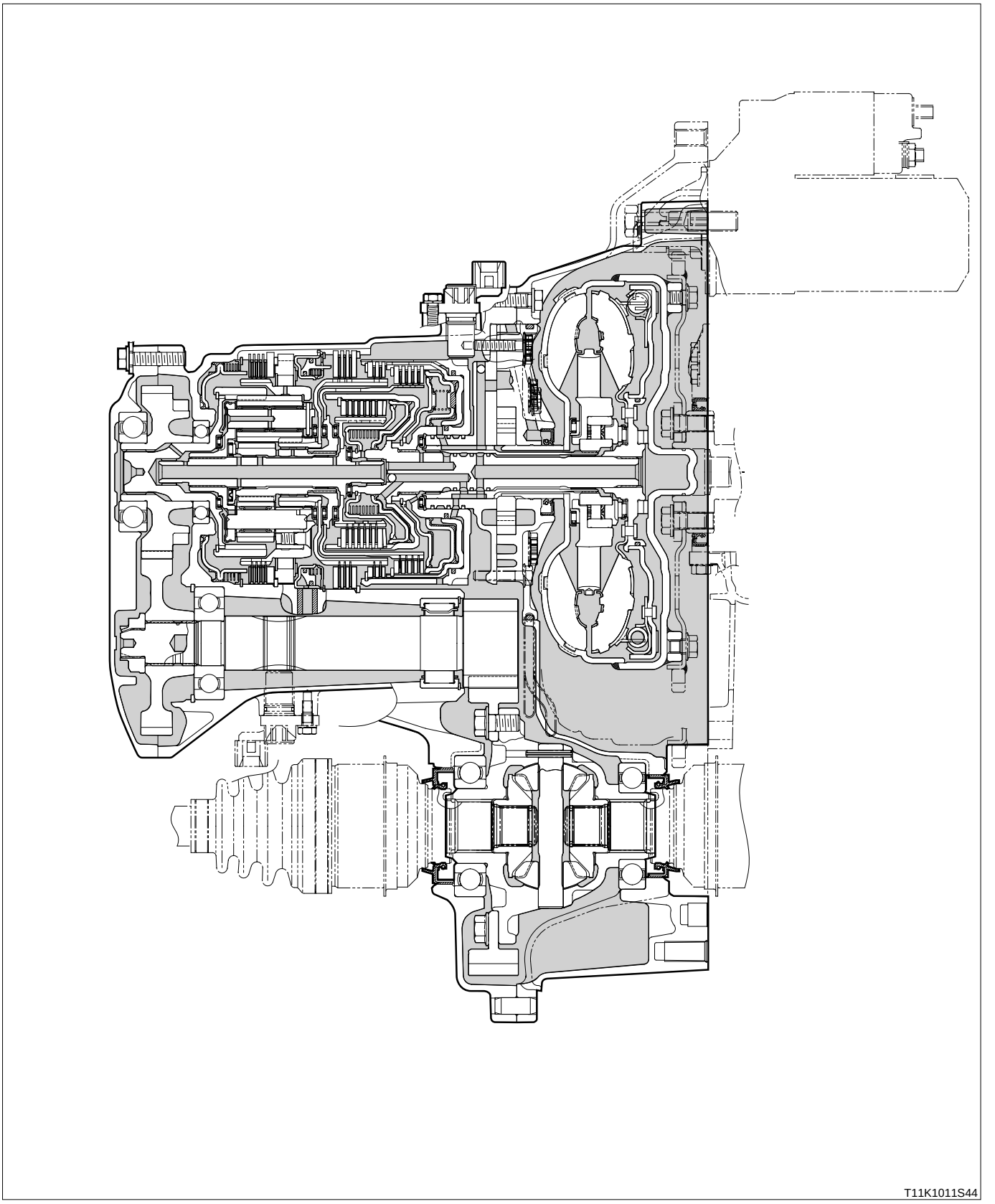
1.An automatic transaxle has been employed, which is of Type A4B－D electronic hydraulically-controlled planetary gear.In order to achieve a high transmitting efficiency and smooth gear shifting characteristics featuring a good response,this automatic transaxle has employed a direct pressure control for shifting control elements,high-level electronic control.

1-2 SPECIFICATION

Specifications of automatic transaxle

Driving method		2WD
Engine type		K3－VE
Transaxle type		A4B－D
Transaxle identification code (label)		8NN
Torque converter type		Three-element, one-stage, two-phase type(with lockup mechanism)
Stall torque ratio		2.0
Torque converter identification paint (reference)		Blue
Automatic gear shift		Four forward speeds, One reverse speed
Gear ratio	1st	2.731
	2nd	1.526
	3rd	1.000
	4th	0.696
	Reverse	2.290
Final reduction gear ratio		4.032
Number of planetary gear teeth	Front planetary sun gear	31
	Planetary long pinion	20
	Rear planetary sun gear	26
	Planetary short pinion	19
	Planetary ring gear	71
Shift control method		Electronic hydraulic pressure controlled planetary gear method
Shift control element		Wet type multiple clutch disc : 3sets Wet type multiple brake disc : 2sets One way clutch : 1set
Manual control pattern		P － R － N－ D－ 2－ L(with O/D OFF switch)
Lubrication fluid	Name	Dexron ® Ⅲ or Ⅱ
	Capacity ℓ	5.0
Oil cooling system		Water-cooled (radiator built-in type)

1-3 SECTIONAL VIEW



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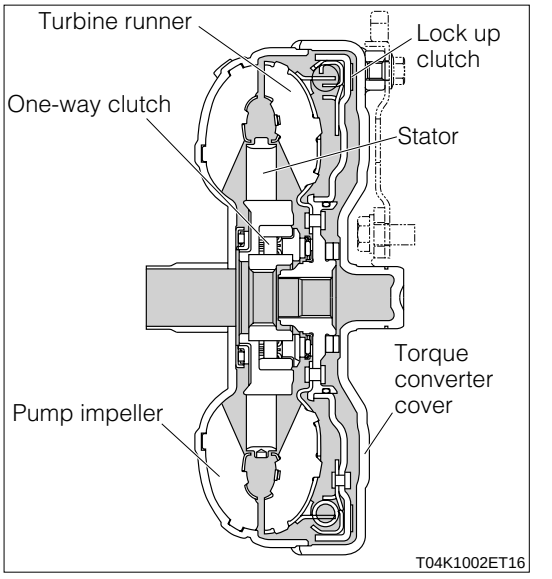
2 CONSTRUCTION AND OPERATION

2-1 TORQUE CONVERTER

2-1-1 OUTLINE

The torque converter has employed a three-elemennt, single-stage, two-phase type with lockup mechanism.

The torque converter is composed of a torque converter cover to which the drive plate is attached a pump impeller integral with the torque converter cover, an input shaft at the transmission side a turbine runner which is fit with the spline , a stator, a one-way clutch which supports the stator, a lock-up cluch and so forth.



2-1-2 LOCKUP MECHANISM

(1) Outline

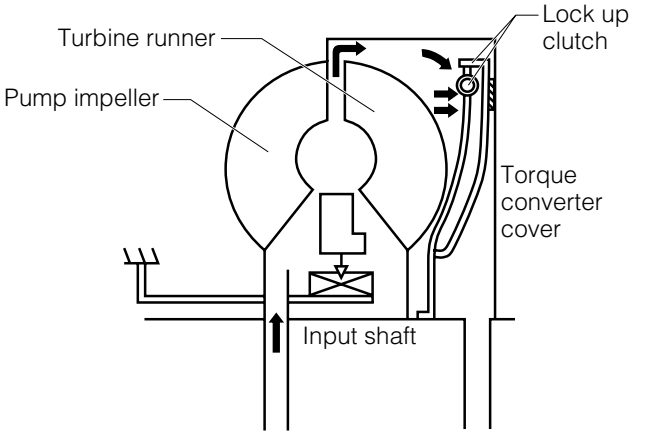
The lockup mechanism is a mechanism which provides a mechanical cluch between the torque converter cover and the turbine runner, thus connecting the pump impeller directly with the turbine runner.

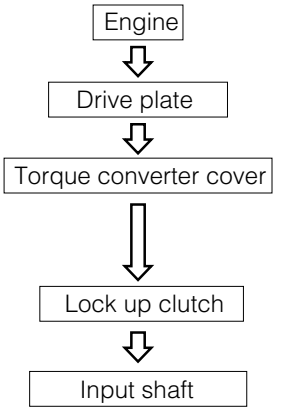
Refer to Page F5-7.

(2) When lockup clutch is operating

When the lockup clutch is operating, the transmission control computer controls the hydraulic pressure control mechanism so as to switch the fluid flow to the lockup clutch section in the torque converter, as shown in the figure below.

Consequently, the lockup clutch is pushed against the torque converter cover owing to the difference in hydraulic pressure between the right and the left sides.As a result,the lockup clutch rotates as a unit integral with the cover.





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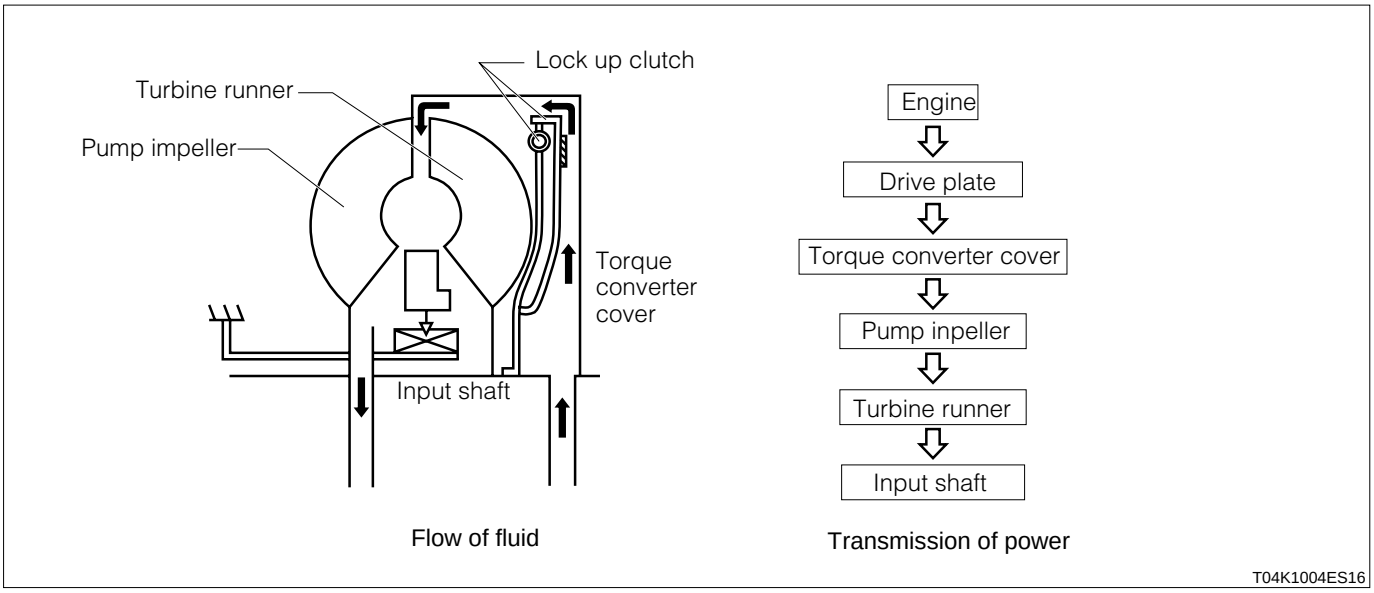
(3) When lockup clutch is not operating

When the lockup clutch is not operating, the transmission control computer controls the hydraulic pressure control mechanism so as to switch the fluid flow to the lockup clutch section in the torque converter, as shown in the figure below.

Hence, the lockup clutch is separated from the torque converter cover, thus transmitting the power as a normal torque converter.



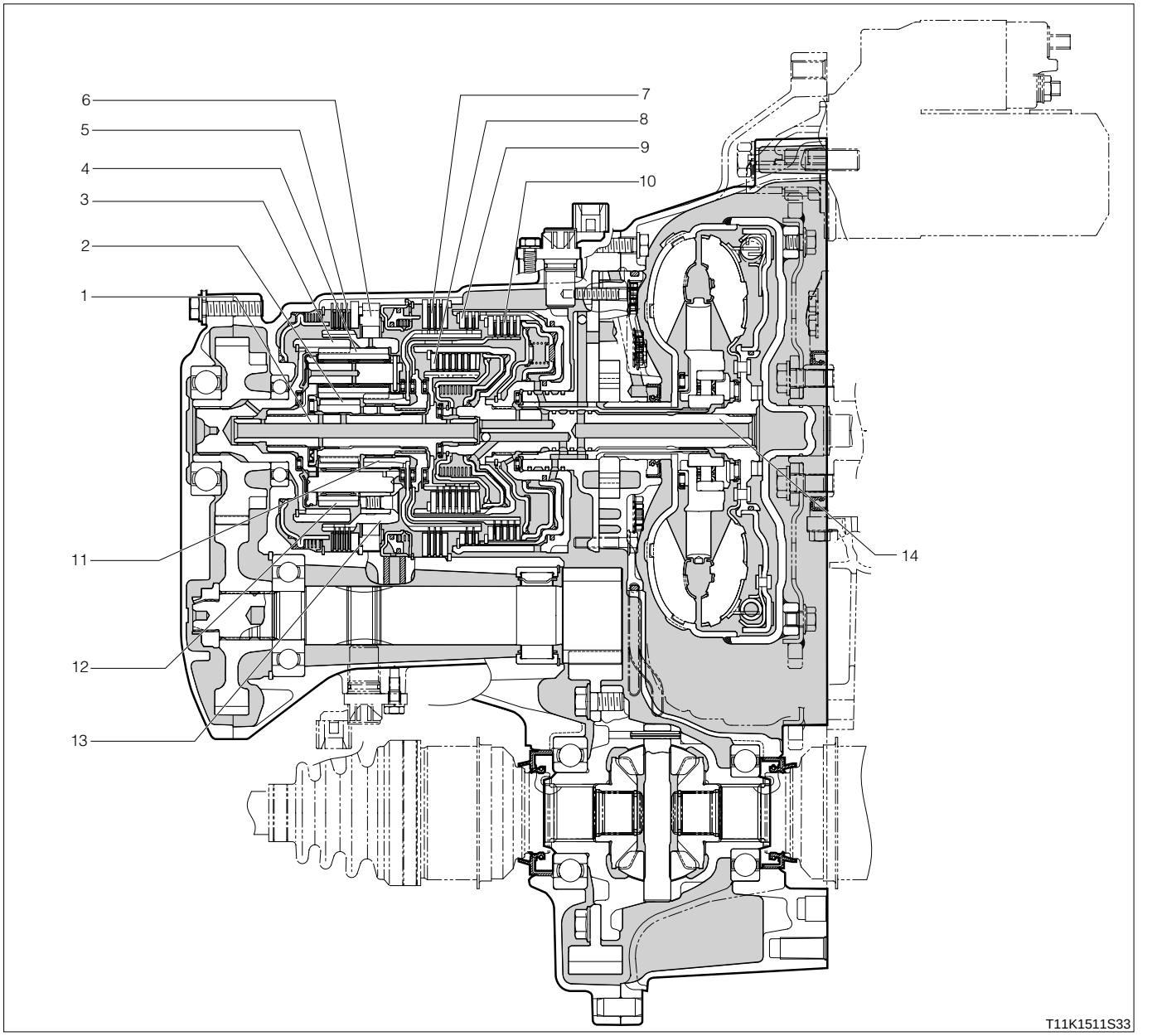
2-2 POWER TRAIN MECHANISM

2-2-1 DESCRIPTION

1.In the power train mechanism, the power transmitted from the engine to the input shaft of the transmission through the torque converter is transmitted from various clutches and brakes to the planetary gear. In this way, gear shifting takes place.

2.In order to achieve a compact size,the power train system has employed a Ravigneaux planetary gear.

3.For high precision hydraulic pressure control for the shifting control elements,the clutch piston has employed a centrifugal hydraulic pressure canceller.



1	Intermediate shaft	8	Rear clutch (C3)
2	Rear planetary sun gear	9	Reverse clutch (C1)
3	Planetary ring gear	10	Forward clutch (C2)
4	Planetary long pinion	11	Front planetary sun gear
5	1st& reverse break (B2)	12	Planetary short pinion
6	One-way clutch	13	Planetary carrier
7	2nd&4th break (B1)	14	Input shaft

2-2-2 PLANETARY GEAR

The Ravigneaux type planetary gear consists of the front planetary sun gear, rear planetary sun gear, planetary short pinion, planetary long pinion, planetary carrier, planetary ring gear, etc.

2-2-3 SHIFT CONTROL ELEMENT

(1) Description

1. The shifting control elements are composed of the three kinds of wet type multiple clutches, namely the reverse clutch (C1), forward clutch (C2) and rear clutch (C3); the two kinds of wet type multiple brakes, namely the 2nd & 4th brake (B1) and 1st & reverse brake (B2); and the one-way clutch (F).
2. In order to achieve precise hydraulic pressure control and smooth gearshift characteristics, a centrifugal hydraulic pressure canceller is provided for each clutch piston of the reverse clutch (C1), forward clutch (C2) and rear clutch (C3).
3. The following table shows functions of each gearshift control element.

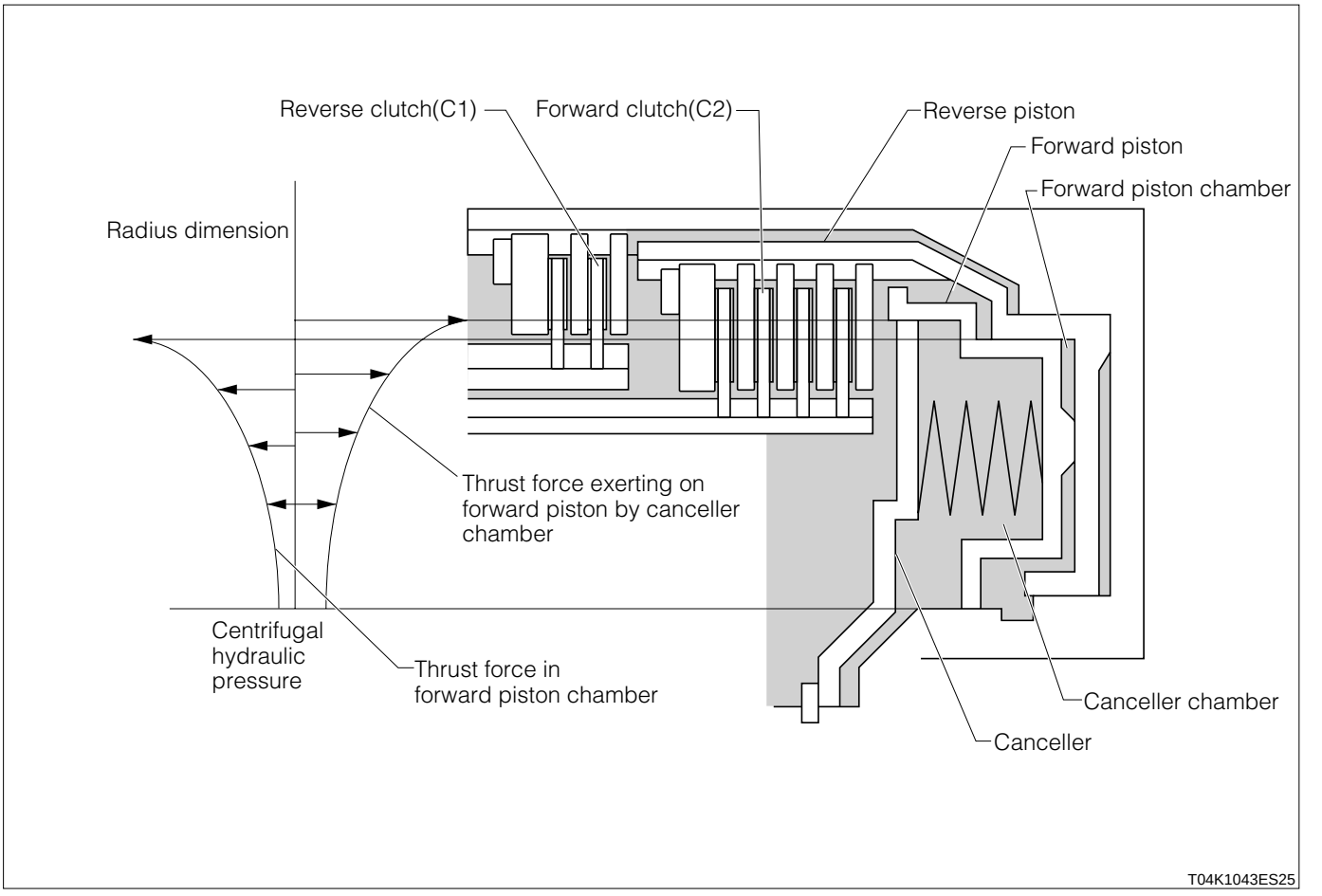
Function of each shift control element

Shift control element		FUNCTION
C1	Reverse clutch	The input shaft and front planetary sun gear are connected.
C2	Forward clutch	The input shaft and rear planetary sun gear are connected.
C3	Rear clutch	The input shaft and intermediate shaft (→ planetary carrier) are connected.
B1	2nd&4th break	The front planetary sun gear is locked.
B2	1st& reverse break	The rotation of the planetary carrier is locked.
F	One-way clutch	The counterclockwise rotation of the planetary carrier is locked.

(2) Centrifugal hydraulic canceller

As is the case with the reverse clutch and forward clutch, centrifugal hydraulic pressure of oil due to the rotation is applied to the piston that operates the clutch provided at the rotating section. Therefore, even when no hydraulic pressure is applied, the piston is operated by thrust force caused by the centrifugal hydraulic pressure. In this way, there are cases where shifting shocks occur.

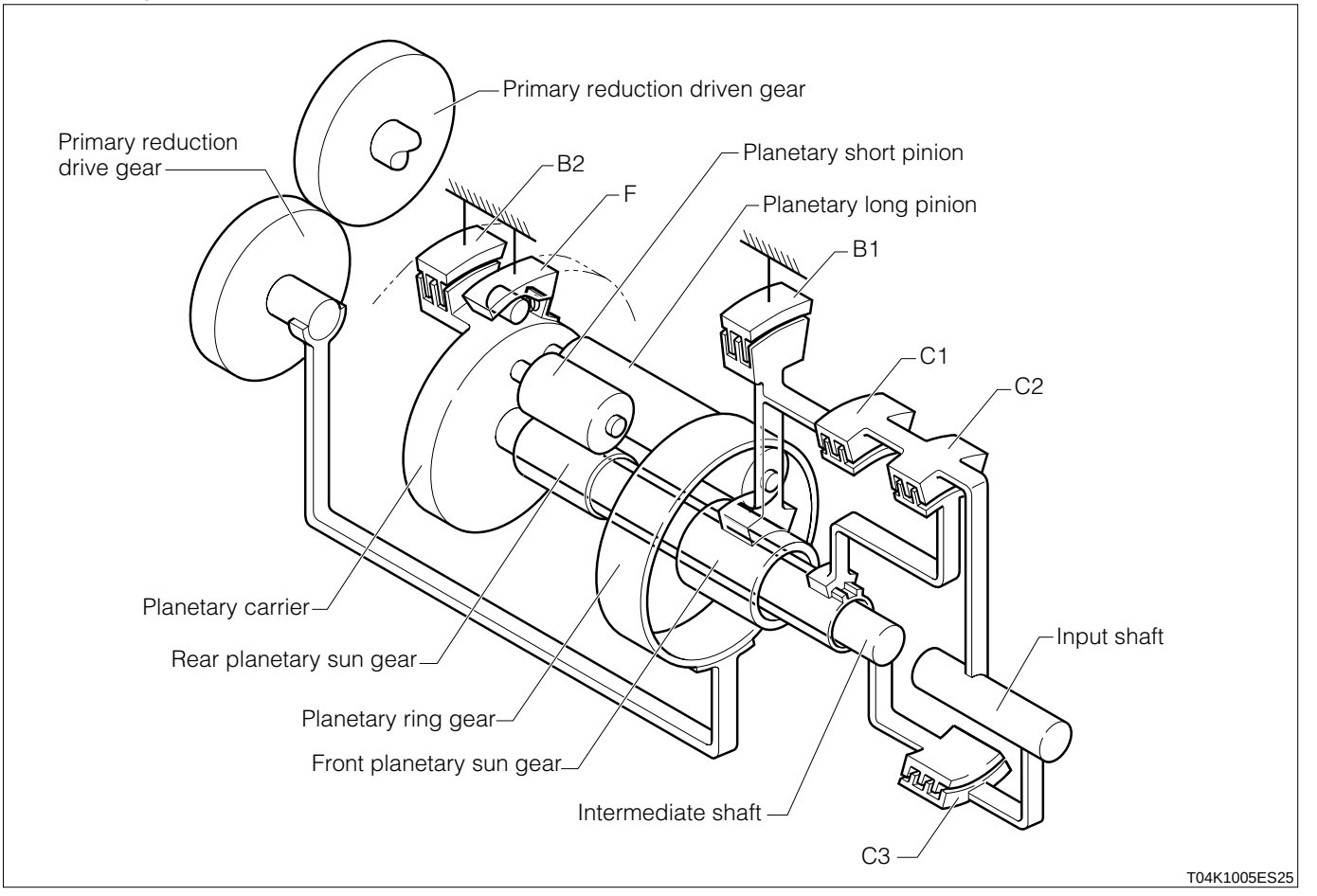
On this automatic transaxle, a cancel chamber is provided on each clutch piston of the reverse clutch (C1), forward clutch (C2) and rear clutch (C3), facing against the clutch hydraulic pressure chamber, as indicated in the figure below. Thus, in the centrifugal hydraulic canceller, the centrifugal hydraulic pressure which is generated at the clutch hydraulic pressure chamber is counteracted by the centrifugal hydraulic pressure which is generated at the cancel chamber. In this way, it becomes possible to attain precise timing control for engagement and disengagement without being affected by the centrifugal hydraulic pressure in the entire revolution zone. Consequently, smooth shifting characteristics have been realized.



2-2-4 POWER TRAIN ROUTE

(1) Description

With regard to power flow, there are the following three input routes. One is a route in which power flows from the input shaft via the C1 clutch to the front planetary sun gear. Another is a route in which power flows via the C2 clutch to the rear planetary sun gear. The other is a route in which power flows via the C3 clutch to the intermediate shaft (→ planetary carrier). As for the power output, there is one route in which power is transmitted from the planetary ring gear to the primary reduction drive gear and primary reduction driven gear.



Furthermore, the following table shows the functions of each shift control element according to each shift gear.

Table showing function of shift control element

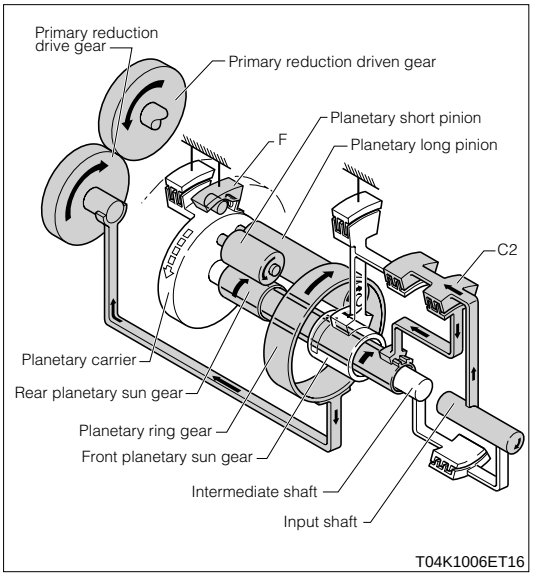
Gear position	C1	C2	C3	B1	B2	F
Reverse	○				○	
Neutral						
1st(Ⓓ·2)		○				○
2nd		○		○		
3rd		○	○			
4th			○	○		
1st(Ⓛ)		○			○	○

(2) Ⓓ·2 range 1st (without engine brake)

In the 1st gear of the Ⓓ·2 range, the forward clutch (C2) and one-way clutch operate. As a result, the reduction drive gear rotates clockwise at a gear ratio of 2.730.

As indicated in the figure on the right, the forward clutch (C2) is operating. Therefore, the turning force of the input shaft is transmitted directly to the rear planetary sun gear. Furthermore, a counterclockwise turning force is transmitted to the planetary short pinion.

On the other hand, the planetary long pinion, which is meshed with the planetary short pinion, receives a clockwise turning force, thus causing the planetary carrier to rotate counterclockwise. However, since the planetary carrier cannot rotate due to the operation of the one-way clutch (F), the planetary ring gear receives a clockwise turning force, thus causing the reduction drive gear to rotate clockwise.

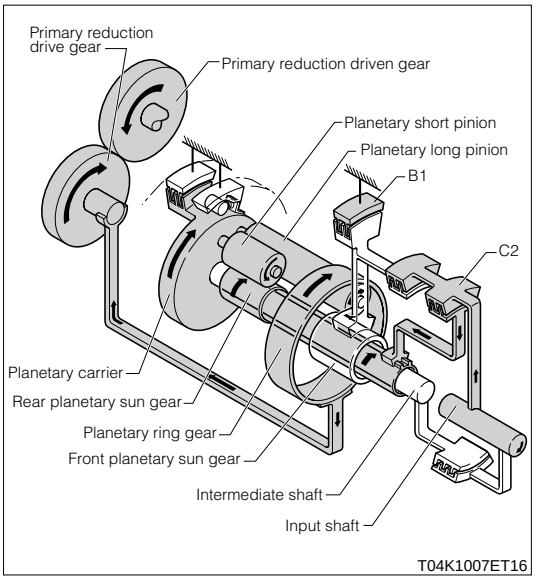


(3) 2nd

In the 2nd gear, the forward clutch (C2) and 2nd & 4th brake (B1) operate. As a result, the reduction drive gear rotates clockwise at a gear ratio of 1.526.

As indicated in the figure on the right, the forward clutch (C2) is operating. Therefore, the turning force of the input shaft is transmitted directly to the rear planetary sun gear. Furthermore, a counterclockwise turning force is transmitted to the planetary short pinion.

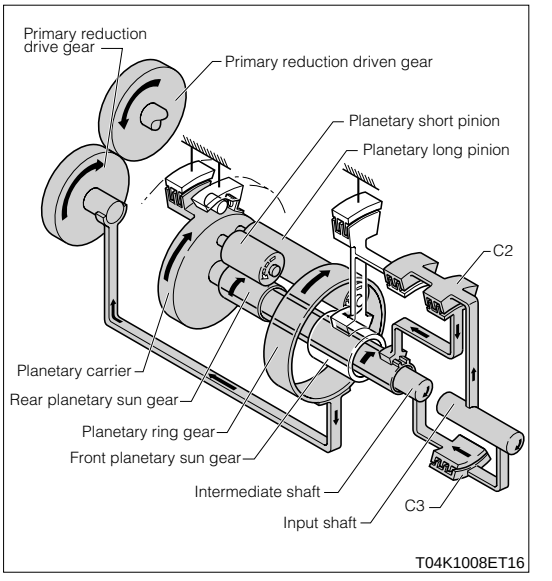
On the other hand, the front planetary sun gear is locked by the 2nd & 4th brake (B1). Consequently, the planetary long pinion, which is meshed with the planetary short pinion, receives a clockwise turning force and walks around the front planetary sun gear clockwise, while turning on its axis. Thus, a clockwise turning force is transmitted to the planetary ring gear. Next, the turning force of the planetary ring gear transmits a clockwise turning force to the reduction drive gear.



(4) 3rd

In the 3rd gear, the forward clutch (C2) and rear clutch (C3) operate. As a result, the reduction drive gear rotates clockwise at a gear ratio of 1.000.

As indicated in the figure on the right, the forward clutch (C2) and rear clutch (C3) are operating. Therefore, the input shaft, rear planetary sun and planetary carrier will turn in the same direction. Hence, the planetary short pinion and planetary long pinion will be locked. Consequently, the planetary ring gear receives a clockwise turning force and transmits a clockwise turning force to the reduction drive gear.



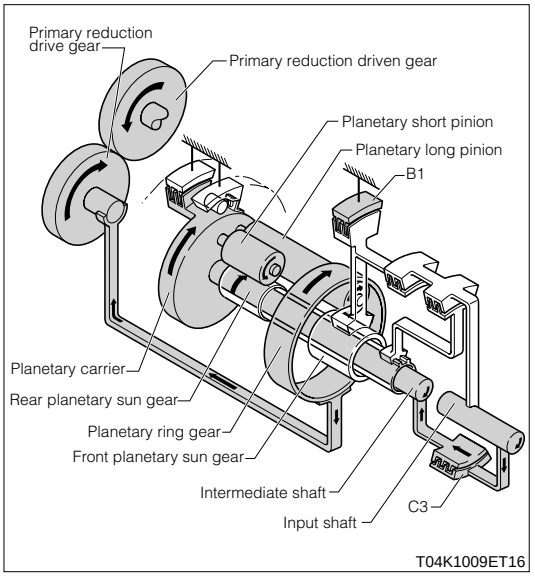
(5) 4th

In the 4th gear, the rear clutch (C3) and 2nd & 4th brake (B1) operate. As a result, the reduction drive gear rotates clockwise at a gear ratio of 0.696.

As indicated in the figure on the right, the rear clutch is operating. Therefore, the turning force of the input shaft is transmitted directly to the intermediate shaft, thus transmitting a clockwise turning force to the planetary carrier.

On the other hand, the front planetary sun gear is locked by the 2nd & 4th brake (B1). Consequently, the planetary long pinion, which is supported by the planetary carrier, receives a clockwise turning force and walks around the front planetary sun gear, while turning on its axis. Thus, the planetary ring gear is turned clockwise.

Next, the turning force of the planetary ring gear transmits a clockwise turning force to the reduction drive gear.



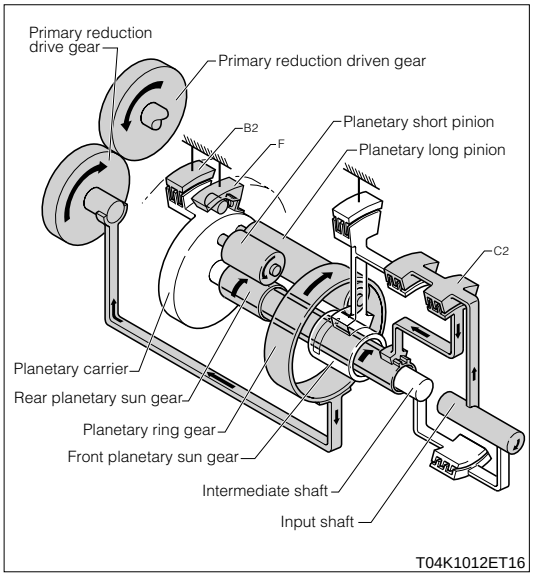
(6) [L] range 1st (with engine brake)

Rotation is transmitted in the same way as with the 1st gear ([D]·[2]) described above. However, the 1st & reverse brake (B2) prevents the planetary carrier from being turned clockwise during the engine braking period.

In other words, when the 1st gear ([D]·[2]) is driven, the counterclockwise turning of the planetary carrier is locked by the action of the one-way clutch (F), thereby transmitting the turning force to the planetary ring gear.

However, during the engine braking period, a reverse force is applied and the one-way clutch (F) is not working, thus causing the planetary carrier to idle.

In the case of the 1st gear of the [L] range, when the 1st & reverse brake (B2) is applied, the planetary carrier is fixed. In this way, it becomes possible to perform the engine braking.

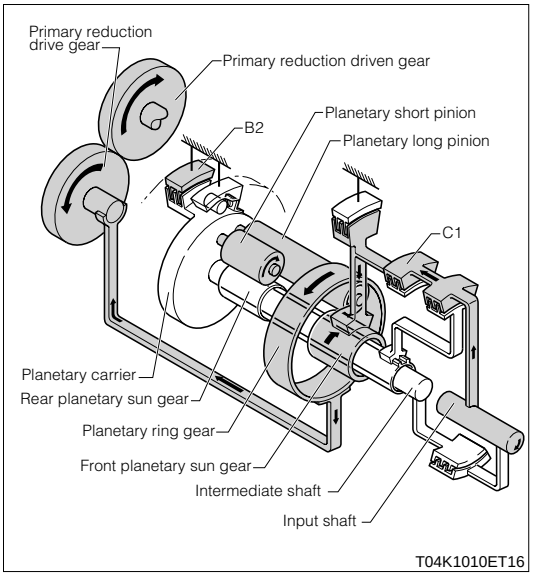


(7) [R] range

In the case of the [R] range, the reverse clutch (C1) and 1st & reverse brake (B2) are applied, and the reverse gear is set. As a result, the reduction drive gear rotates counterclockwise at a gear ratio of 2.290.

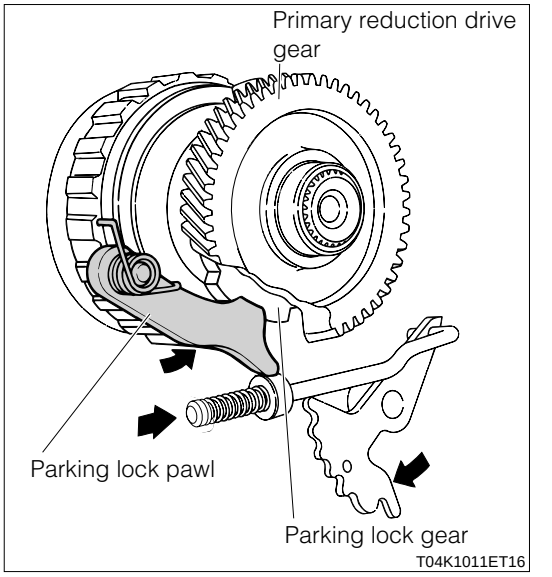
Since the reverse clutch (C1) operates, as shown in the figure on the right, the turning force of the input shaft is transmitted directly to the front planetary sun gear.

On the other hand, the planetary carrier is locked due to the action of the 1st & reverse brake (B2). Hence, the clockwise turning force transmitted to the front planetary sun gear will cause the planetary long pinion to turn on its axis counterclockwise, thus transmitting the counterclockwise turning force to the planetary ring gear. Therefore, the reduction drive gear, which is connected to the planetary ring gear, will rotate counterclockwise.



(8) Ⓟrange

When shifted to the Ⓟ range, the parking cam is pushed out through the parking rod. As a result, the parking cam pushes up the parking lock pawl. Consequently, the parking lock pawl is engaged with the parking lock gear and it becomes locked.



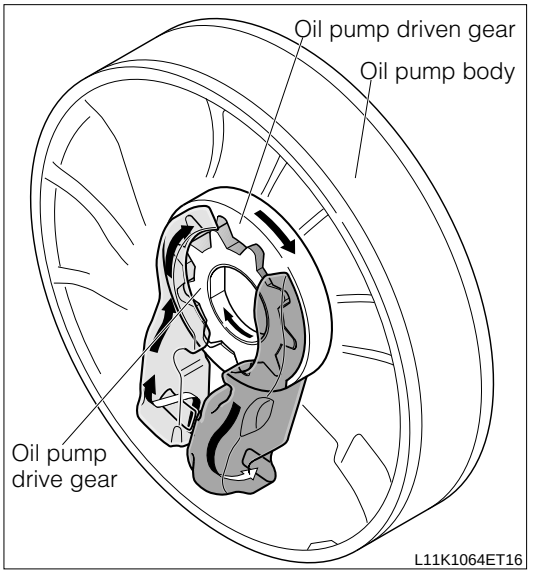
2-3 HYDRAULIC CONTROL SYSTEM

2-3-1 DESCRIPTION

1. Using the hydraulic pressure created by the oil pump, the hydraulic control system regulates and switches the hydraulic pressures acting on each gear shifting control element of the power train system according to the running conditions, and lubricates each part inside the transmission.
2. The hydraulic control system consists of an oil pump which generates hydraulic pressure and a valve body which controls the hydraulic pressure acting on each gear shifting control element, using the hydraulic pressure.
3. The control system has employed a direct pressure control to control directly the hydraulic pressure by the solenoid valve + control valve provided for each gear shifting control element (clutch and brake). As a result, it becomes possible to control precisely the pressure at the disengagement side and engagement side during the transient period of gear shifting (clutch-to-clutch control). Consequently, good response and smooth shift feeling have been achieved.

2-3-2 OIL PUMP

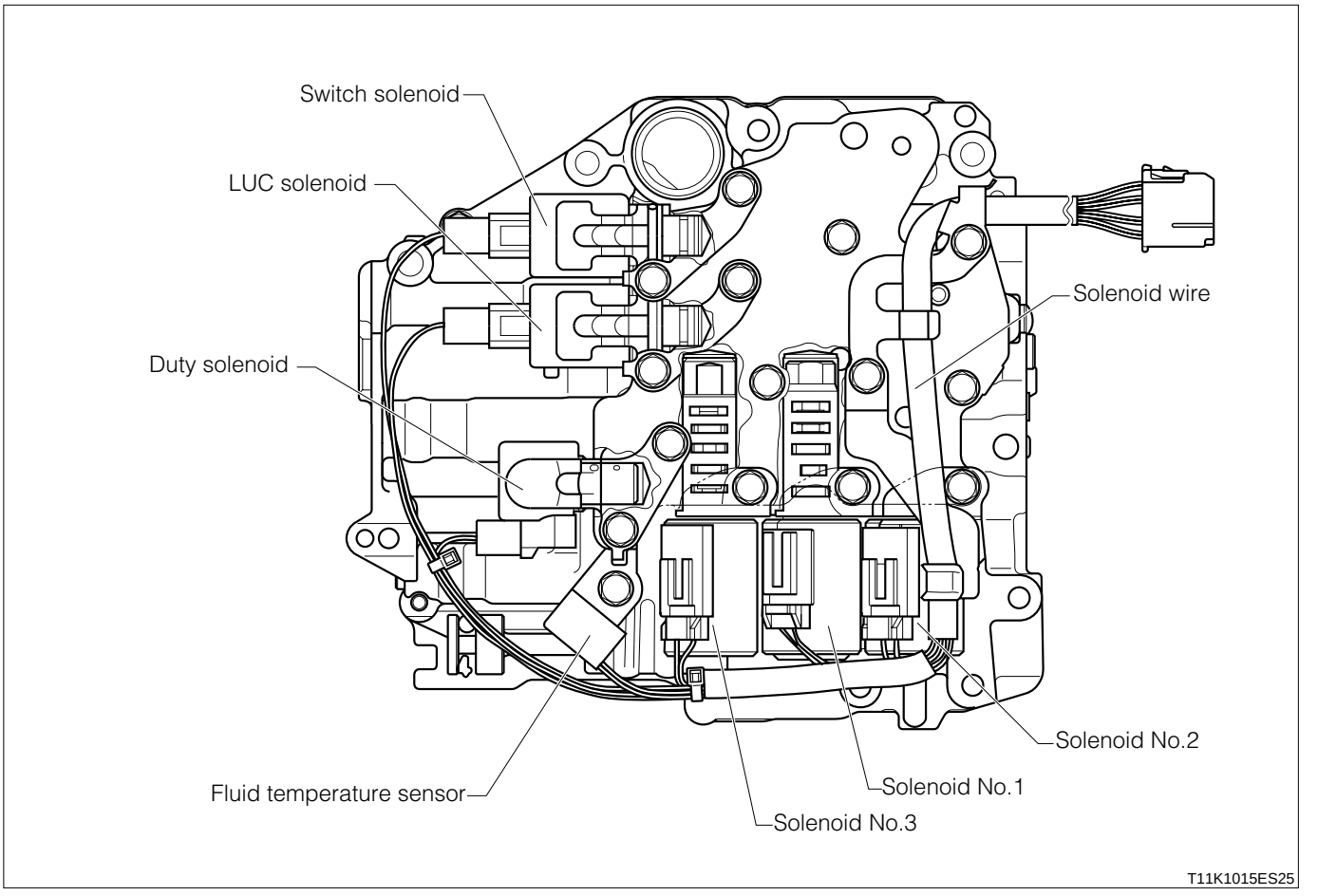
1. For enhanced efficiency, the oil pump has employed a crescentless type.
2. In the crescentless type, the crescent has been abolished and a small-sized driven gear has been employed. Consequently, the load during the oil pump driving period has been reduced.
3. The oil pump consists of an oil pump body, oil pump drive gear and oil pump driven gear. The oil pump drive gear is driven by the torque converter, thus driving the oil pump driven gear. Consequently, automatic transmission oil is sent to the hydraulic pressure control system in a pressurized condition.



2-3-3 VALVE BODY

(1) Description

The valve body is provided at the lower section of the transaxle case. The valve body consists of the following components: A regulator valve, which regulates the pressure generated at the oil pump to the line pressure; various solenoid valves, which convert the hydraulic pressure and switch the fluid passage based on the electric signal from the transmission control computer; control valve, which controls the hydraulic pressure applied to each gear shifting control element by the hydraulic pressure from the solenoid valve; and various valves, which switch the fluid passage by the line pressure.



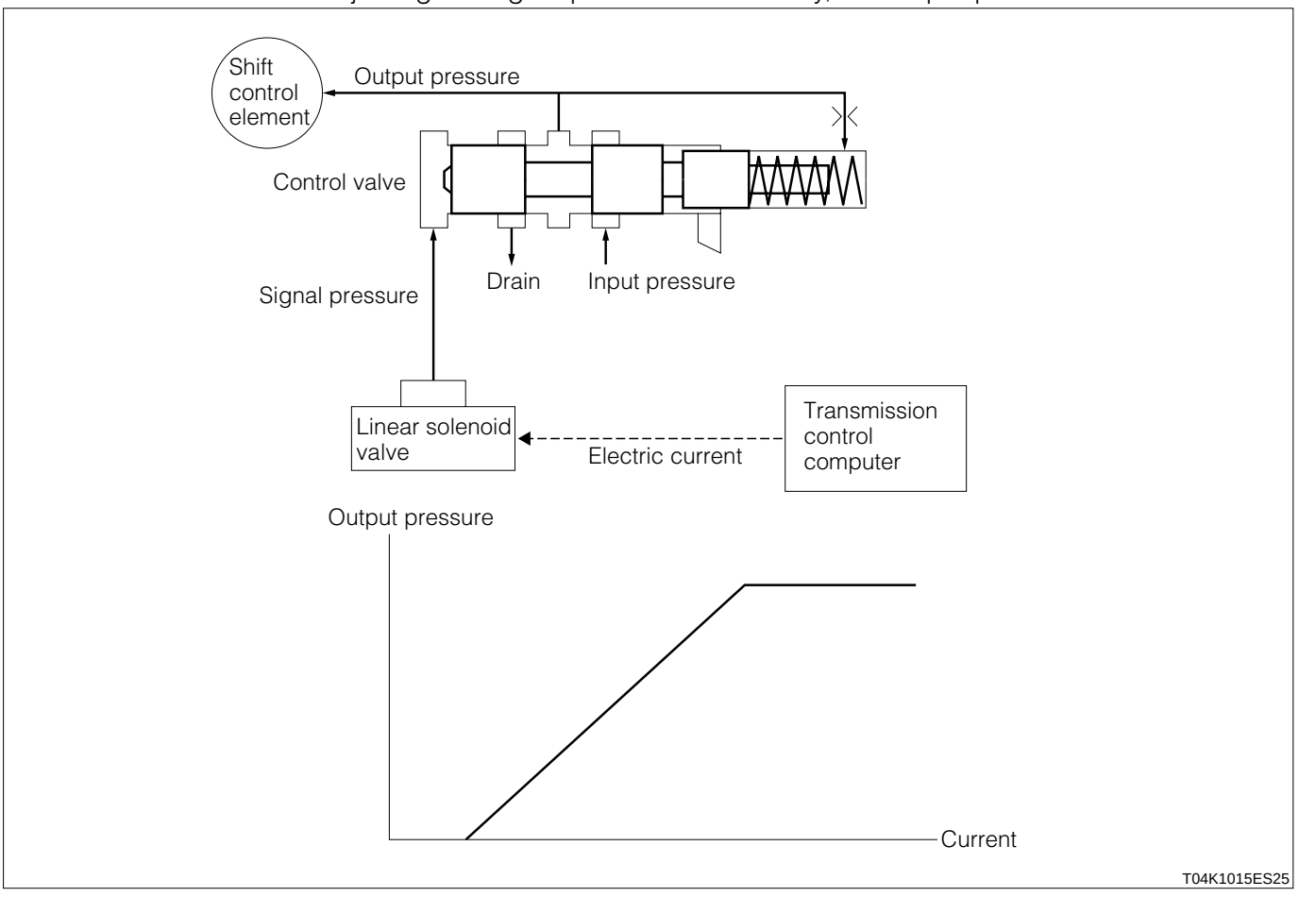
Functions of each solenoid valve

Nomenclature	FUNCTION
Solenoid No.1	Controlling oil pressure of B1 berak
Solenoid No.2	Controlling oil pressure of C2 clutch
Solenoid No.3	Controlling oil pressure of C3 clutch and B2 berak Controlling line pressure
Duty Solenoid	Controlling oil pressure of lock-up clutch
LUC Solenoid	Changing lock-up reley valve
Switch Solenoid	Changing solenoid reley valve

(2) Direct pressure control

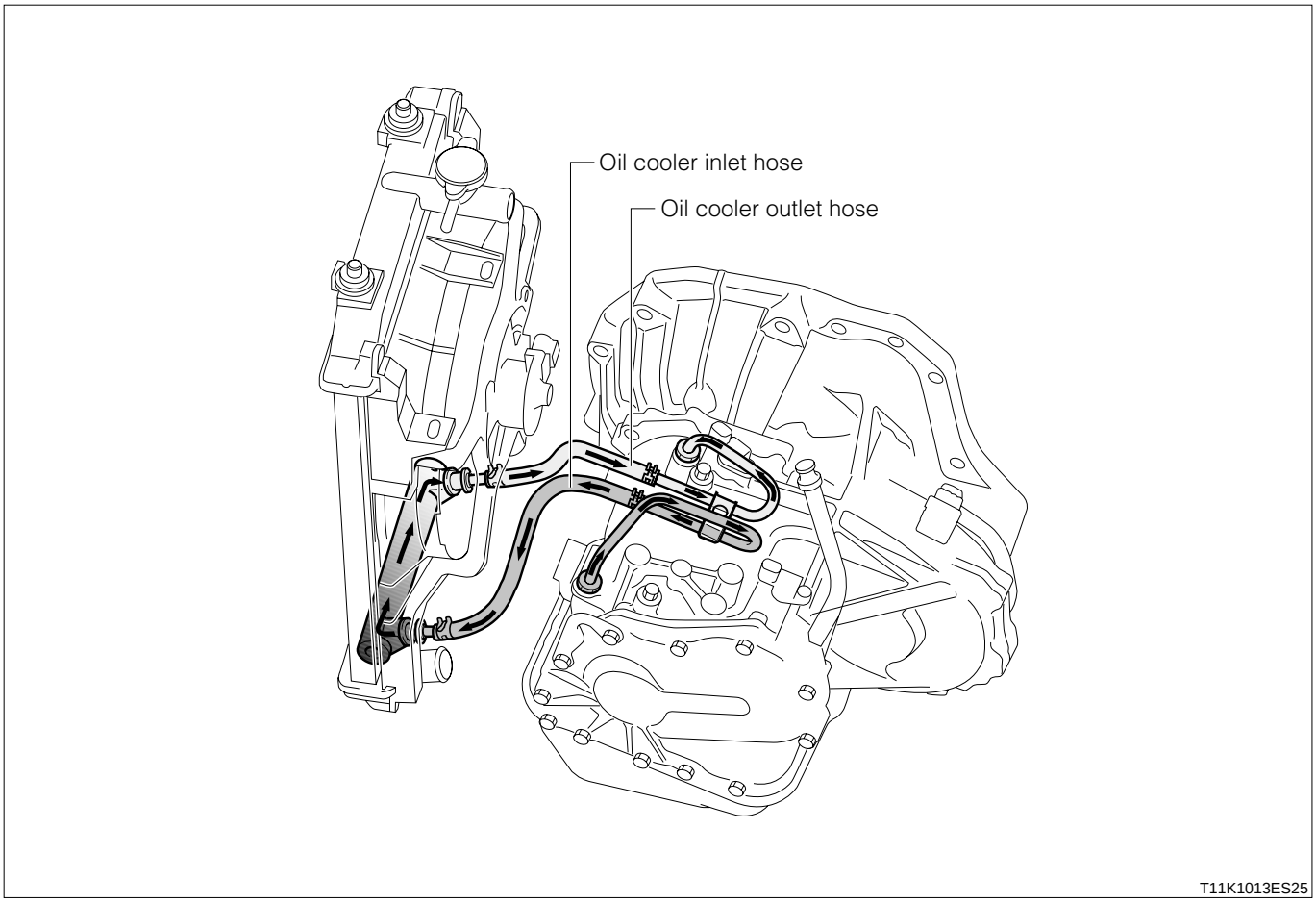
In the valve body of this automatic transaxle, each gearshift control element of B1, B2, C2 and C3 as well as each control valve are connected directly. Hence, the control valve controls the hydraulic pressure of each gear shifting control element and performs gear shifting. Furthermore, a linear solenoid valve, which generates a signal pressure to be applied to the control valve, is connected to each control valve, respectively.

The transmission control computer controls the hydraulic pressure by controlling the electric current of the linear solenoid valve and adjusting the signal pressure. In this way, the output pressure is controlled.



2-4 COOLING SYSTEM

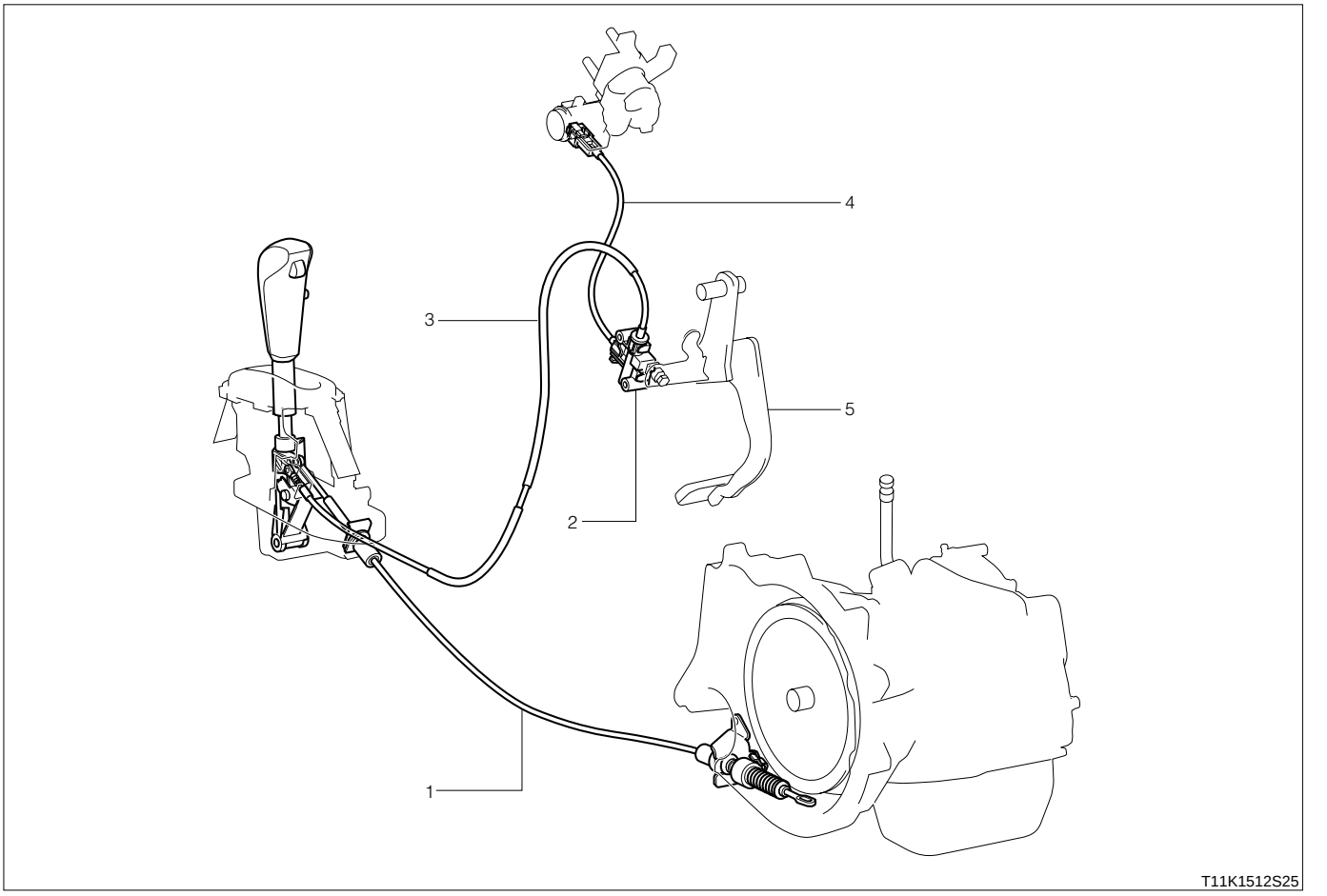
The automatic transmission fluid is cooled by the oil cooler incorporated in the radiator.



2-5 SHIFT CONTROL MECHANISM

2-5-1 DESCRIPTION

1.A six-position type (Ⓟ·Ⓡ·Ⓝ·Ⓓ·2·Ⓛ+O/D) floor shift has been employed.
2.The shift control mechanism has employed a remote control type by the push-pull cable.
3.The shift lock mechanism with key interlock has adopted a mechanical type, in which the shift locking and key interlock operation are controlled by means of the cable. (specification for Taiwan only)



1	Control cable	4	Key lock cable
2	Lock mechanism	5	Break pedal
3	Shift lock cable		

2-5-2 SHIFT LOCK MECHANISM

The shift lock mechanism is a mechanism which prevents the shift lever from moving from the Ⓟ range to any other position, unless the brake pedal is depressed (the brake pedal "ON") and the ignition key is set to the "ACC" or "ON" position.

(1) When the brake pedal is "OFF" or the ignition key is set to the "LOCK" position:

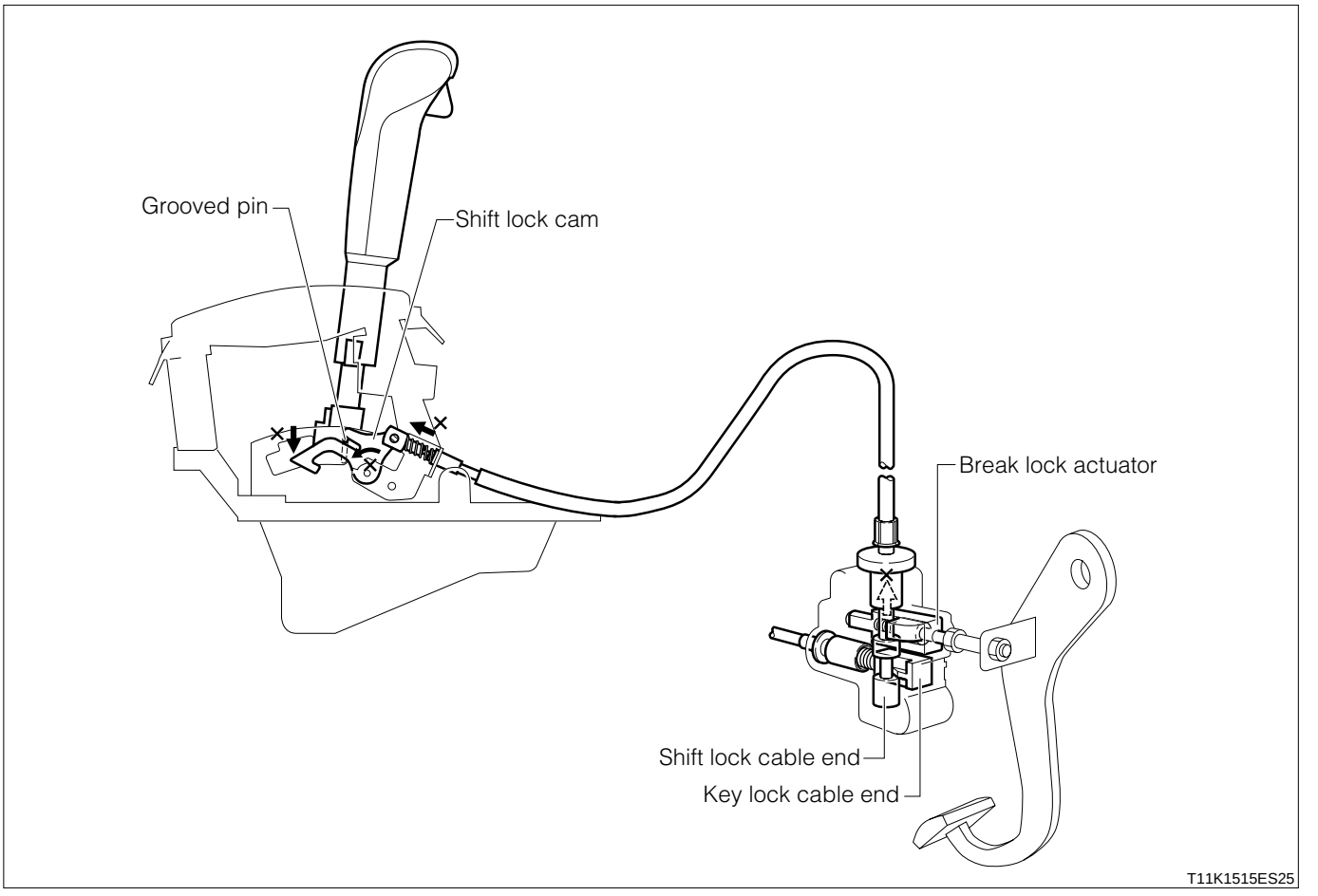
When the shift lever is shifted to the Ⓟ range, the shift lock cable end is located at the position indicated in the figure.

When the brake pedal is "OFF," the brake lock actuator is pushed toward the left side by the brake pedal. Therefore, the protruding section of the brake lock actuator locks the upward movement of the shift lock cable end.

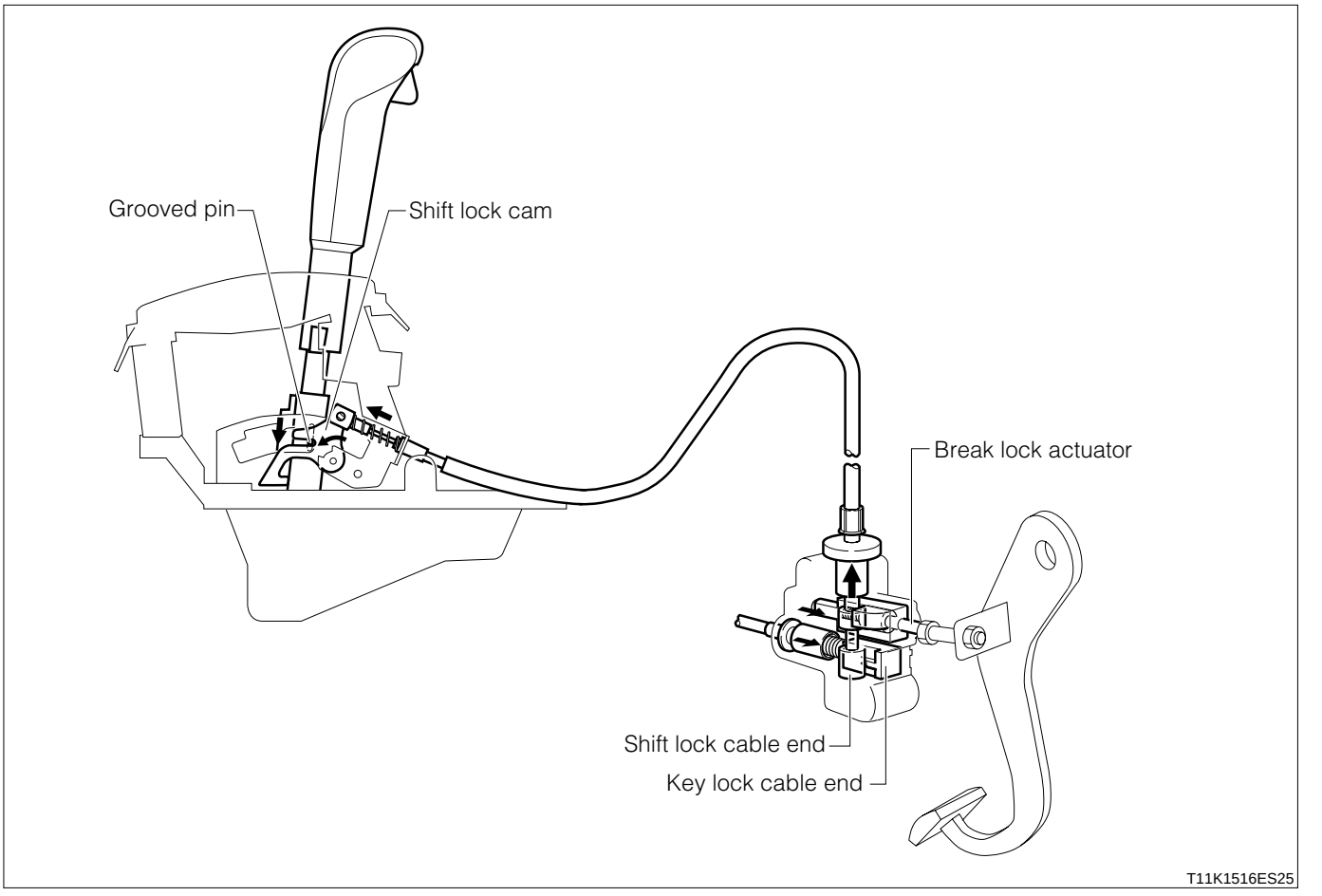
When the ignition key is set to the "LOCK" position, the key lock cable end is pulled and moved to the ignition switch side (the left side in the figure). (Refer to the section under "Key Interlock.") As a result, the protruding section of the key lock cable end locks the upward movement of the shift lock cable end.

The shift lock cable is connected to the shift lock cam which rotates, interlocking with the sliding of the grooved pin (which unlocks the shift lever by sliding downward, interlocking with the button) for unlocking the shift lever.

Therefore, when the shift lock cable is locked, the shift lever cannot be moved to any other range except the Ⓟ range.



(2) When the brake pedal is "ON" and the ignition key is set to the "ACC" or "ON" position:
When the brake pedal becomes "ON," the brake lock actuator jumps out due to the force of the spring (it moves toward the right side in the figure). As a result, the shift lock cable end is unlocked.
When the ignition key is turned from the "LOCK" position to the "ACC" or "ON" position, the key lock cable becomes free (Refer to the section under "Key Interlock."). As a result, the key lock cable moves due to the force of the spring (it moves toward the right side in the figure), thus unlocking the shift lock cable end. Consequently, the shift lock cable becomes free, thus enabling the shift lever to move to a range other than the Ⓟ range.



2-5-3 KEY INTERLOCK MECHANISM

The key interlock mechanism is a mechanism which prevents the ignition key from turning to the "LOCK" position when the shift lever is set to a position other than the Ⓟ range. As a result, the key cannot be pulled out.

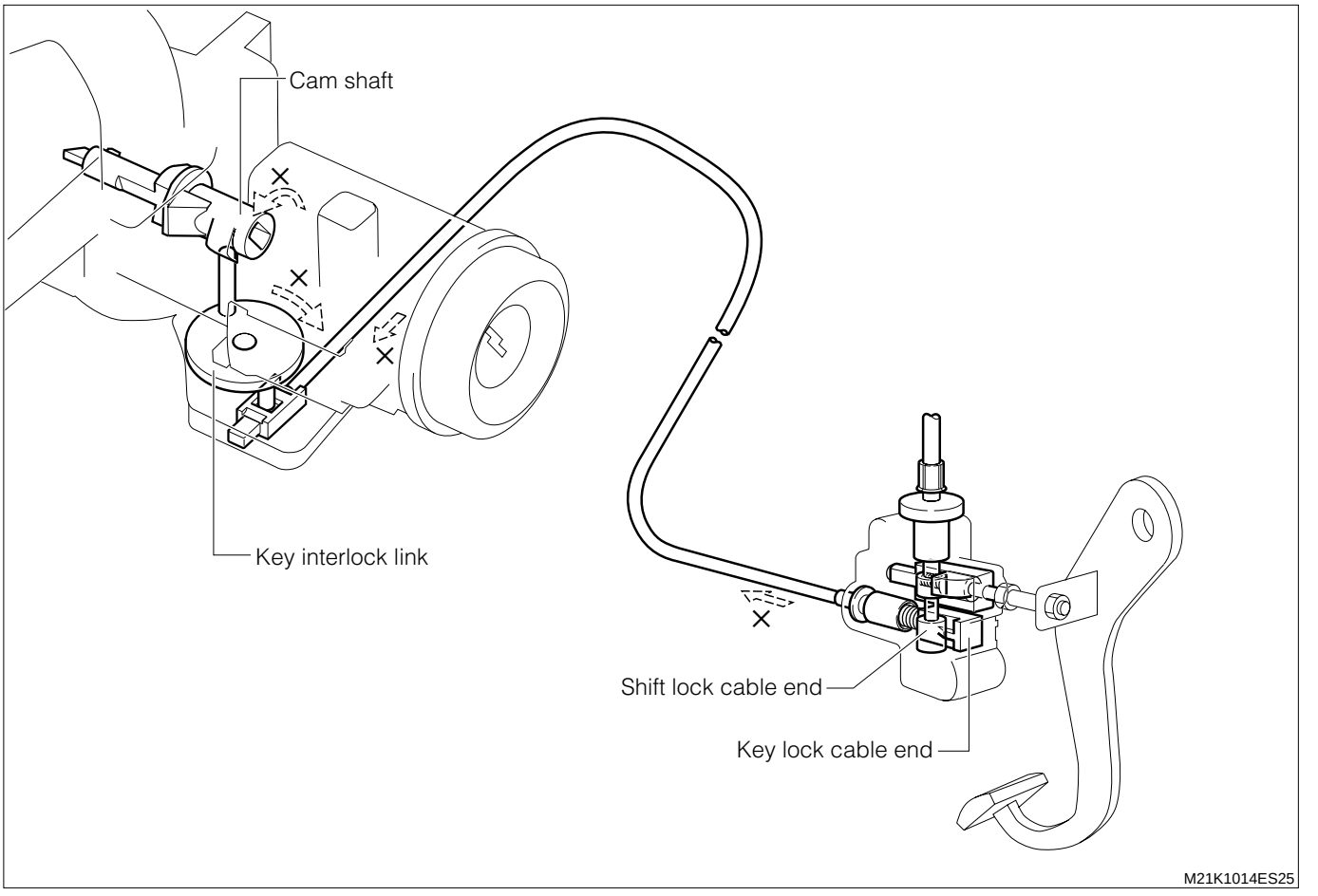
(1) When the shift lever is shifted to a position other than the Ⓟ range:

When the shift lever is shifted to a position other than the Ⓟ range, the shift lock cable end is located at a position indicated in the figure.

The key lock cable end is locked by the shift lock cable end so that it cannot move to the ignition switch side (the left side in the figure).

The key lock cable is connected to the key interlock link of the key cylinder. The key interlock link will rotate by the operation of the camshaft when the ignition key is turned to the "LOCK" position.

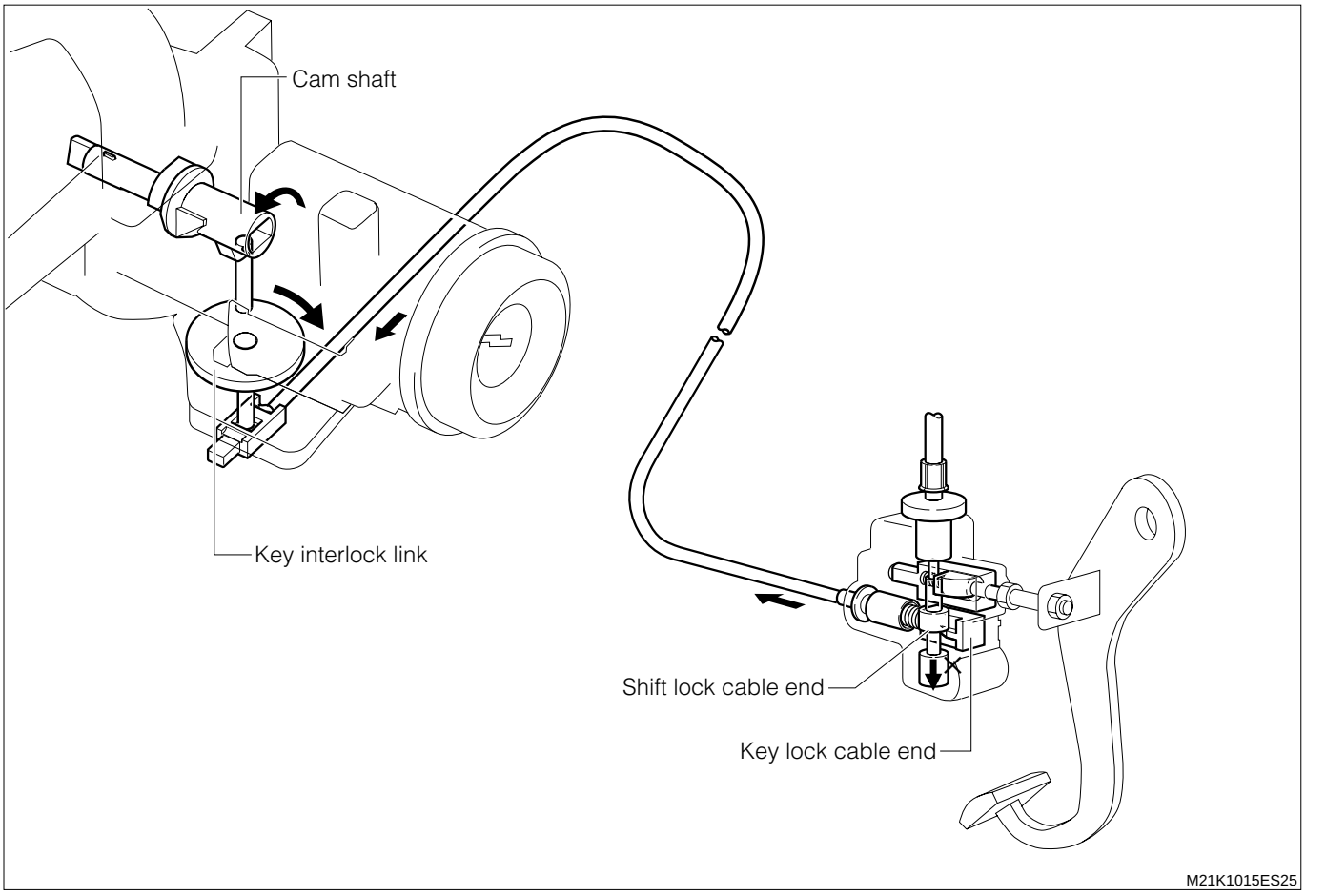
Consequently, when the key lock cable is locked, the key interlock link cannot rotate. As a result, the key cannot be turned to the "LOCK" position.



(2) When the shift lever is shifted to the Ⓟ range:

When the shift lever is shifted to the Ⓟ range (with the shift lever button not pushed), the shift lock cable end moves downward, thus unlocking the key lock cable end.

Consequently, the key lock cable becomes free (movable), enabling the key interlock link to rotate. As a result, the ignition key can be turned to the "LOCK" position.



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AUTOMATIC TRANSAXLE (A4B)

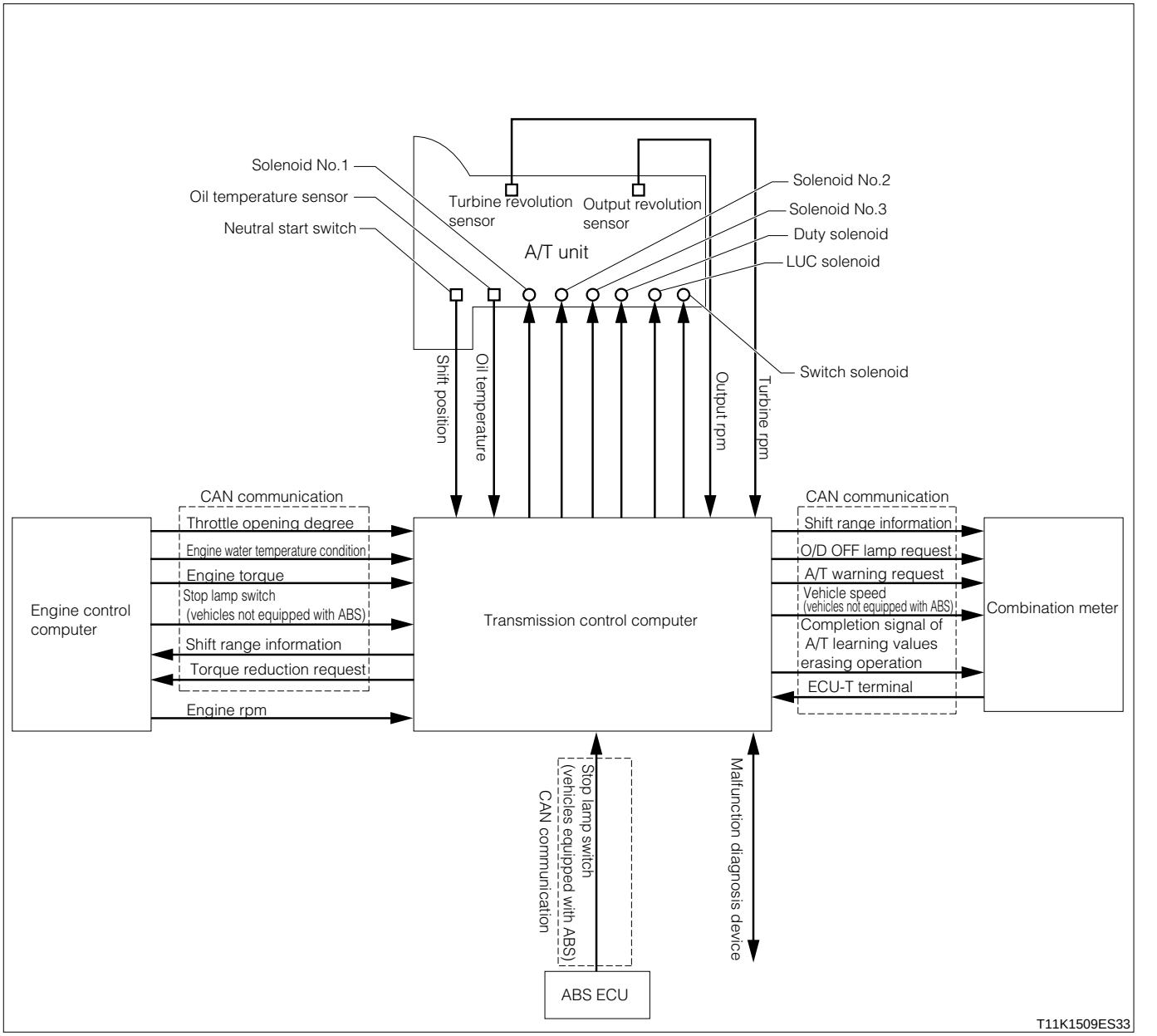
1 OUTLINE

1-1 DESCRIPTION

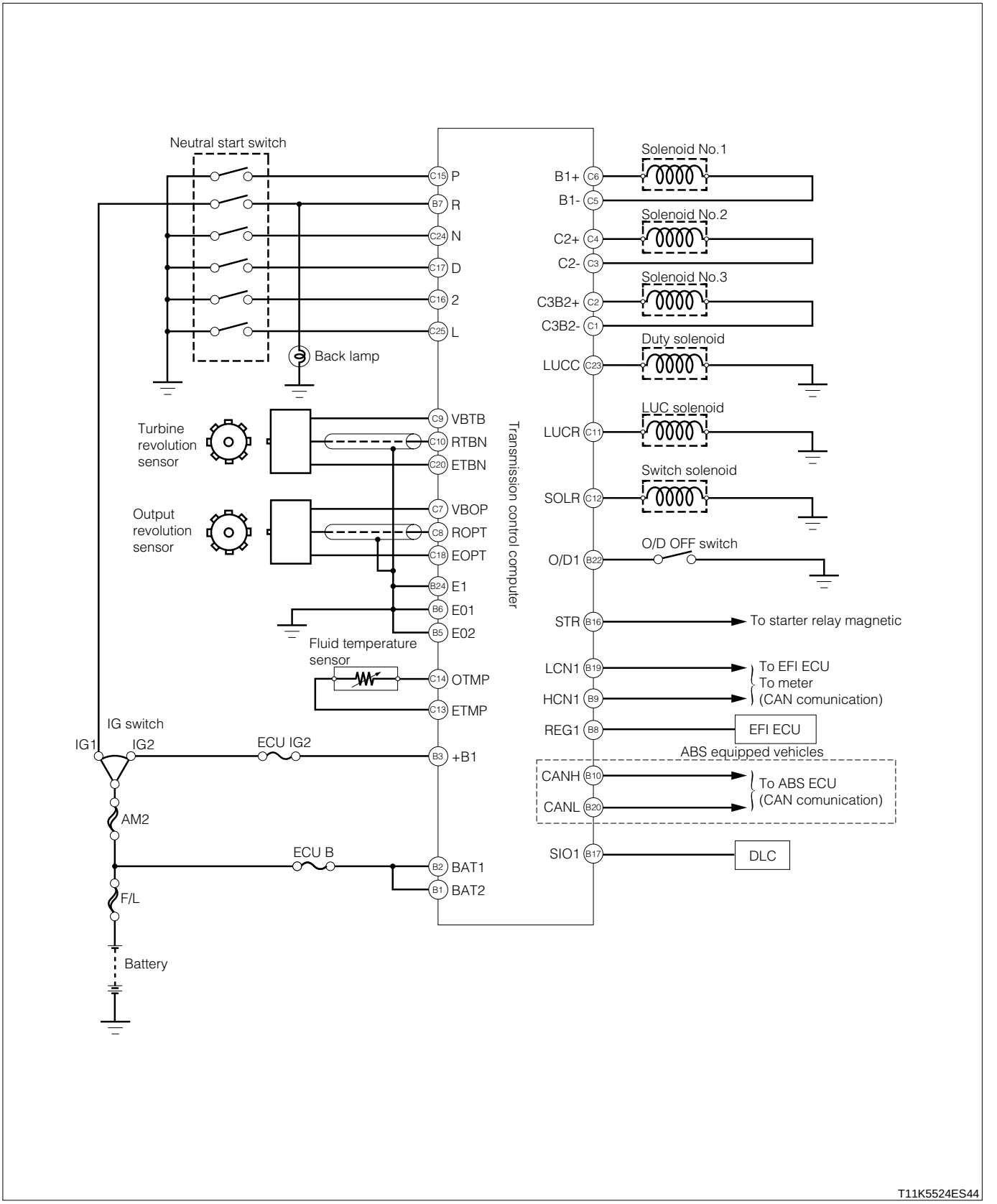
1.The transmission control system consists of the transmission control computer, sensors, switches, solenoid valves, etc. The transmission control system performs the gear shift control, clutch-to-clutch control, lockup control, etc.

2.For cases where the system encounters abnormality, there provided are the diagnosis function that informs the driver or mechanics of the abnormality and the failsafe function that assures the minimum running performance and system protection. Furthermore, for improved serviceability, the system is compatible with the diagnostic tester (DS−21).

1-2 SYSTEM DRAWING

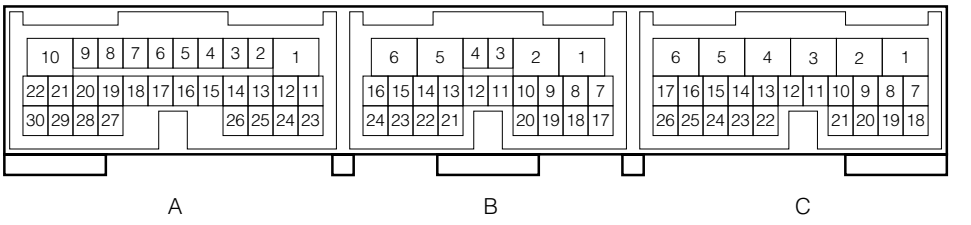


1-3 SYSTEM WIRING DIAGRAM



T11K5524ES44

Transmission control computer terminal name



T11K5006S10

1.Connectors A

This connector is not used.

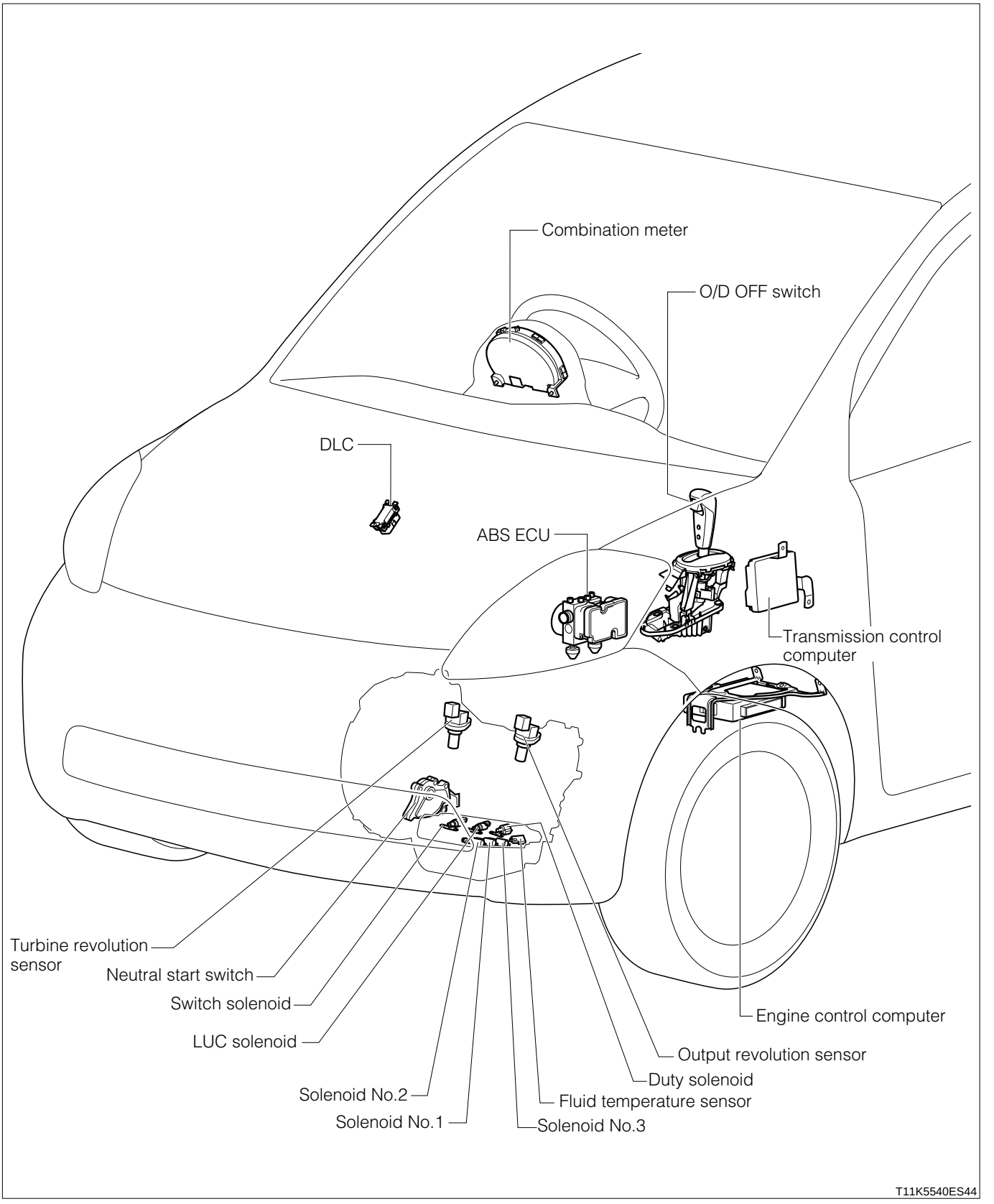
2.Connectors B

Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
1	BAT2	Backup power supply	13	—	—
2	BAT1	Backup power supply	14	—	—
3	+B1	ECU power supply	15	—	—
4	—	—	16	STR	Starter relay output circuit
5	E02	A/T power system earth	17	SIO1	Diagnostic tester communication
6	E01	A/T power system earth	18	—	—
7	R	Neutral start switch (R)	19	LCN1	CAN communication LO (1)
8	REG1	Engine revolution speed	20	CANL	CAN communication LO (2)
9	HCN1	CAN communication HI (1)	21	—	—
10	CANH	CAN communication HI (2)	22	O/D1	O/D OFF switch
11	—	—	23	—	—
12	—	—	24	E1	Sensor earth

3.Connectors C

Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
1	C3B2−	Solenoid No.3 (−)	14	OTMP	Fluid temperature sensor
2	C3B2+	Solenoid No.3 (+)	15	P	Neutral start switch (P)
3	C2−	Solenoid No.2 (−)	16	2	Neutral start switch (2)
4	C2+	Solenoid No.2 (+)	17	D	Neutral start switch (D)
5	B1−	Solenoid No.1 (−)	18	EOPT	Output revolution sensor earth
6	B1+	Solenoid No.1 (+)	19	—	—
7	VBOP	Output revolution sensor power supply	20	ETBN	Turbine revolution sensor earth
8	ROPT	Output revolution sensor	21	—	—
9	VBTB	Turbine revolution sensor power supply	22	—	—
10	RTBN	Turbine revolution sensor	23	LUCC	Duty solenoid
11	LUCR	LUC solenoid	24	N	Neutral start switch (N)
12	SOLR	Switch solenoid	25	L	Neutral start switch (L)
13	ETMP	Fluid temperature sensor	26	—	—

1-4 LOCATION OF COMPONENTS



2 CONTROL

2-1 RESTRICTIONS ON GEARSHIFTS

2-1-1 DESCRIPTION

1.The transmission control computer determines the optimum gear position and lockup ON/OFF according to the driving condition based on the signals from each sensor and drives each solenoid valve so as to perform gear shifting and lockup control.

2.The gear shifting pattern for each shift range and mode is as follows.

Gear shift and lockup pattern

Gear shift mode		Automatic gear shifting mode
Ⓓ	O/D ON	1⇄2⇄[3]⇄[4]
	O/D OFF	1⇄2⇄[3]←(4)
②		1⇄2←(3)←(4)
Ⓛ		1←(2)←(3)←(4)

·The brackets [ ] indicates that the lockup operation is possible. However, no operation takes place with the transmission fluid temperature is low.

· The parentheses ( ) indicates the low gear inhibitor control during a high-speed running.

2-1-2 DETERMINATION OF GEAR POSITION AND LOCKUP ON/OFF

(1) Automatic gear shifting mode

1.When the shift lever is at the Ⓓ, ② or Ⓛ range, the transmission control computer judges that the mode is the automatic shifting mode and determines the gear position and lock up ON/OFF according to the vehicle speed and throttle opening degree signal, based on the selected gear shift diagram.

2.

(2) Control of prohibition of low speed gear during high speed running

If a request of downshift is received due to the change in the shift range when running at a high speed, the current gear position is retained until the vehicle speed reaches below the set vehicle speed in order to prevent the engine from rotating at an excessively high speed.

(3) Rereverse inhibitor control

In order to avoid danger if the shifting is mistakenly made to Ⓡ range while running forward, the gear position is kept in the neutral position until the speed becomes below the set vehicle speed.

(4) Restrictions on gear shifting during low temperature

When the transmission oil temperature is still low immediately after the vehicle starts running at the time when the temperature is very low, the following restriction is provided for the gear shifting.

Restrictions on gear shifting during low temperature

Transmission oil temperature	Restrictions on gearshifts
Below −10℃	Shift to 3rd is prohibited.
Below 10℃	Shift to 4th is prohibited.

2-1-3 RESTRICTIONS ON GEARSHIFTS

(1) Description

Based on the current gear shift range and the target gear shift range that has been determined, the transmission control computer controls each solenoid valve of such solenoids as the solenoid No.1, solenoid No.2, solenoid No.3, duty solenoid, LUC solenoid and switch solenoid.

The operating condition of each solenoid valve at each gearshift range is as follows.

Solenoid operating table

	Solenoid No.1	Solenoid No.2	Solenoid No.3	Duty Solenoid	LUC solenoid	Switch solenoid
Ⓟrange neutral	×	○	○	○	×	○
Neutral	×	○	○	×	×	○
Reverse	×	○	× 2	×	×	○ 3
4th	○	○	× 2	× 1	× 1	×
3rd	×	×	× 2	× 1	× 1	×
2nd	○	×	○	×	×	○
1st(Ⓓ·②)	×	× 6	○	× 4	×	○ 5
1st(Ⓛ)	×	×	× 6	○	×	○
Remarks	○ = Energized condition, × = Not-energized condition 1: Lockup control condition after engagement○ 2: Line pressure-regulating condition after engagement○ 3: Line pressure-regulating condition after engagement× 4: During line pressure control when vehicle is parked with shift lever placed in D range○ 5: During line pressure control when vehicle is parked with shift lever placed in D range× 6: The control state when the vehicle is stopped is ○.					

(2) Clutch-to-clutch control

For smooth and good responding gearshift, the hydraulic pressures at the disengaging side clutch (brake) and the engaging side clutch (brake) are finely controlled at the same time during the gear shifting transient period, thus preventing the engine from racing and the planetary gear from being interlocked during the gear shifting transient period.

The transmission control computer performs the feedback control for the solenoid valve of the clutches (brakes) at the engaging side and disengaging side based on the engine torque information from the engine control computer and the transmission oil temperature so that the change in the turbine rotation speed may become the target change rate. In this way, the torque fluctuation of the output shaft can be made ideal.

By learning the hydraulic pressure at time of engagement according to the changes of the engine and transmission that occur as the time elapses, the control is automatically compensated, thus preventing changes in shift feeling that take place as the time elapses.

Refer to Page F3-13.

2-2 LOCKUP CONTROL

2-2-1 DESCRIPTION

By directly connecting the lockup clutch completely at the high speed vehicle zone, slipping of the torque converter is eliminated, thus increasing the transmission efficiency.
The ON/OFF of the lockup clutch is performed by controlling the LUC solenoid and duty solenoid.
When the lockup clutch is turned ON, the LUC solenoid is turned ON first. Then, the duty solenoid is controlled, and the hydraulic pressure at the disengagement side is controlled. In this way, the transmission torque capacity of the lockup clutch is controlled at the specified time gradient, thus preventing shocks at the time of actuation.
When the lockup clutch is turned OFF, the hydraulic pressure is applied gradually to the disengagement side by controlling the duty solenoid. When the lockup clutch is turned OFF, the LUC solenoid is turned OFF.

Refer to Page F3-3.

Lockup operation gearshift range

		1st	2nd	3rd	4th
Ⓓrange	Direct connecting control	×	×	○	○

○ = Operative, × = Inoperative

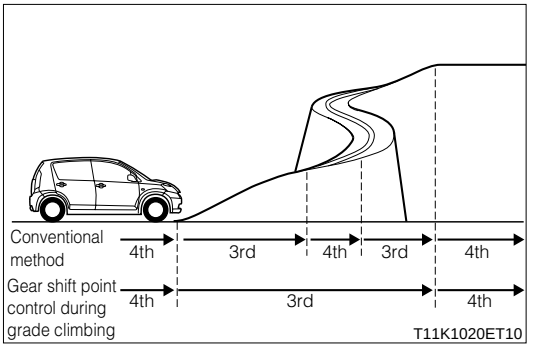
Solenoid operating condition

Lock up clutch	LUC solenoid	Duty solenoid
At time of OFF	×	×
At time of OFF⇄ON (Transient period)	○	◇
At time of ON (Direct connection control)	○	○

○ = Completely-energized condition, ◇ = During duty control, × = Not-energized condition

2-3 UPHILL GEAR SHIFT CONTROL

1. The uphill gear shift control performs control over the upshift to the 4th gear and switching of the lockup zone when driving on the uphill road which has up and down gradients. Thus, comfort driving can be possible during uphill driving without sacrificing fuel economy during running at a flat area.
2. The uphill driving is detected by comparing the vehicle acceleration on the flat road, which is obtained from the throttle opening degree, vehicle speed and gear range, with the actual acceleration obtained from the vehicle speed. If the uphill driving is detected, a gearshift to the 4th gear is prohibited and the lockup zone is switched. This removes frequent gear shifting between the 3rd gear and 4th gear, thus realizing smooth and comfort driving.
3. In order to give priority to the driver's will, the uphill gear shift control is performed only when the shift range is at the Ⓓ range and the O/D is turned ON.



2-4 ELECTRONIC LINE PRESSURE CONTROL

1.For improved fuel consumption, the load of the oil pump is reduced by regulating the line pressure at the time of the 3rd, 4th and reverse gears (after completion of gear shifting) and when the vehicle stops with the shift lever placed in the Ⓓ range.

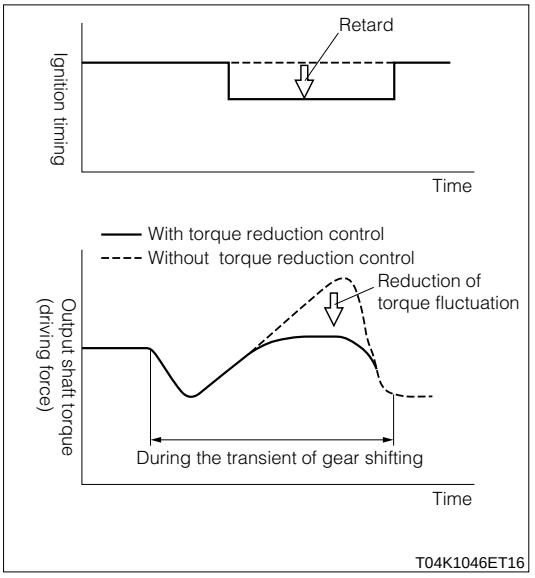
2.At the time of the 3rd, 4th and reverse gears (after completion of gear shifting), the line pressure is regulated according to the turbine torque. Moreover, the line pressure is regulated by the solenoid No. 3.

3.When the vehicle is parked with the shift lever placed in the Ⓓ range, the line pressure drops. Moreover, the drop in the line pressure will be achieved by turning ON the duty solenoid (duty ratio 100%) and turning OFF the switch solenoid.

2-5 TORQUE REDUCTION CONTROL

In order to reduce the fluctuation of the output shaft torque during gearshifts and reduce gear shifting shocks, the engine output torque is temporarily reduced by retarding the engine ignition timing during the gear shifting transient period, thus allowing the gearshift control elements (clutches and brakes) in the transmission to engage smoothly.

The engine timing is retarded when the transmission control computer outputs the torque reduction request signal to the engine control computer.



2-6 SQUIRT CONTROL

When starting off, if the shift lever is switched from Ⓝ range to Ⓓ (Ⓒ, Ⓛ) range with the accelerator fully closed and brake applied, a gearshift to the 2nd gear (N→2nd→1st) is temporarily made, thus avoiding sudden torque change and preventing the vehicle body from moving downward.

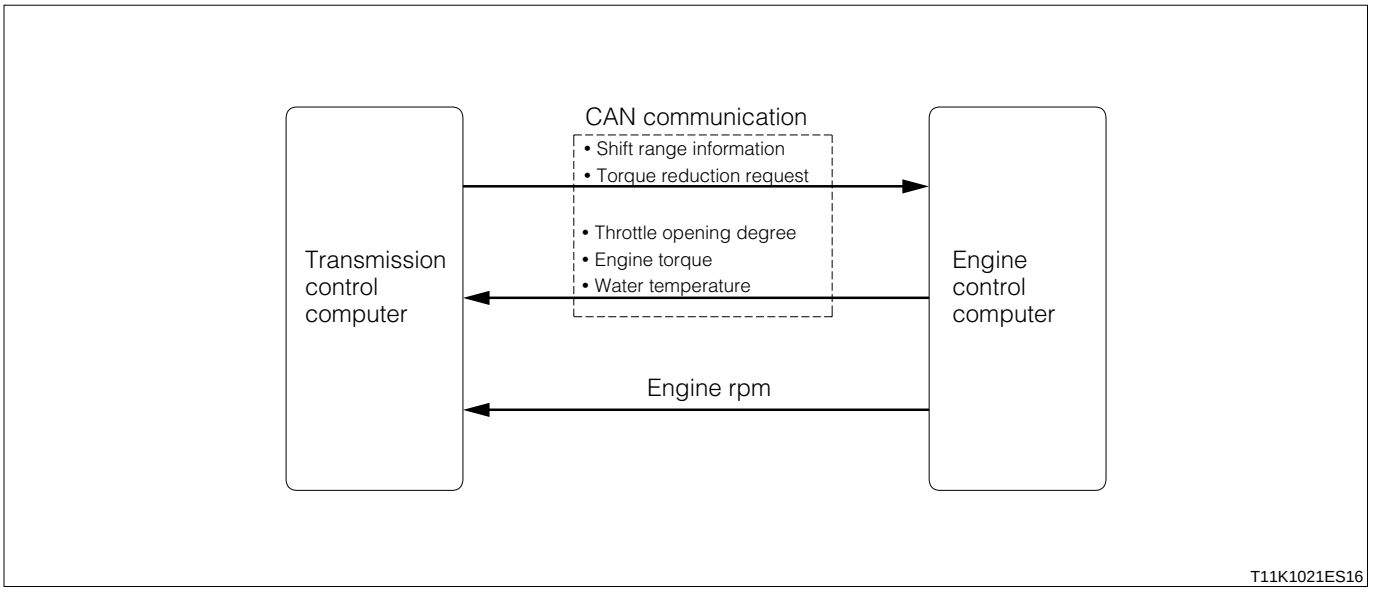
2-7 COMMUNICATION WITH ENGINE CONTROL COMPUTER

1.The transmission control computer performs communication with the engine control computer by means of two CAN communication lines and one serial communication line.

2.With regard to the input/output information by the CAN communication, refer to the section under "CAN communication."

Refer to Page F5-9.

3.The input information by the serial communication includes the engine revolution speed signal.



2-8 CAN COMMUNICATION

1.The transmission control computer performs input/output of some signals by means of the CAN communication for the engine control computer, ABS ECU and combination meter. The transmission control computer sends and receives the information and data for plural items by means of a pair of communication line (twist pair line).

For the details of the CAN communication, refer to the section under "CAN communication system".

Refer to Page L2-1.

2.The input information by the CAN communication with the engine control computer includes the throttle opening degree signal, engine torque signal, engine water temperature condition (warm up condition) signal, and stop lamp switch signal (only vehicles without ABS). The output information includes the shift range information signal, torque reduction request signal, and vehicle speed signal (only vehicles without ABS).

3.As regards the input information by the CAN communication with the ABS ECU, there is information, such as the stop lamp switch signal.

4.The input information by the CAN communication with the combination meter includes the ECU—T terminal signal, etc. The output information includes the shift range information signal, O/D OFF lamp request signal, A/T warning request signal and A/T learning value deletion completion signal.

5.As for the list of principle CAN communication signals, refer to the section under "Communication data of CAN communication system."

Refer to Page L2-10.

2-9 DIAGNOSIS (ONBOARD DIAGNOSIS FUNCTION)

2-9-1 DESCRIPTION

This trouble diagnosis function informs the inspector of abnormality items by means of a computer if abnormality occurs in the input/output sections of the system. The diagnosis items have 25 items, including six solenoid checking items that are done during the normal state. If abnormality takes place, the computer memorizes abnormality items. This memorizing is done directly by the battery power. Therefore, even if the IG switch is set to the ACC or LOCK position, the diagnosis result remains memorized. If abnormality takes place in the important items during running, a warning function will inform the driver of the abnormality.

CAUTION

- Certain items only are not memorized.

2-10 FAIL-SAFE FUNCTION

This is the function which performs controlling to keep the best possible running ability even if abnormality takes place in the input/output signal system of the transmission control computer.
When the system has resumed the normal state after detecting abnormality once, the failsafe function is released, but the diagnosis result remains. (except certain codes)
The warning lamp (O/D OFF lamp) is made to flash while the failsafe function is operating. (except certain functions)

Fail-safe specifications

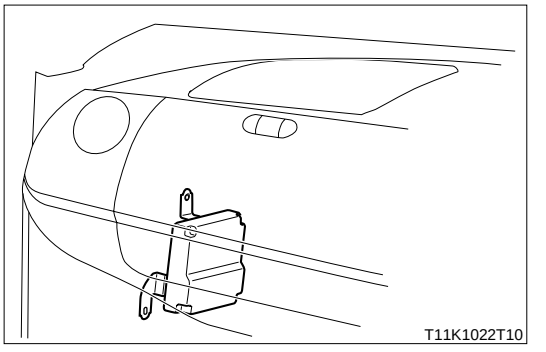
Contents of malfunctions	Contents of fail-safe control	Failsafe control release condition
Battery system power supply abnormality	The gear is fixed to the 3rd gear after malfunction is detected.	After resuming the normal state, released when the IG SW is set once to ACC or LOCK position.
Sensor system power supply abnormality	The gear is fixed to the 3rd gear after malfunction is detected.	After resuming the normal state, released when the IG SW is set once to ACC or LOCK position.
Abnormal engine torque	· The engine torque is set to a constant value. · When a malfunction is detected, a gearshift to the 3rd gear takes place. Then, gear shifting between the 1st — 3rd gears take place according to the vehicle speed and throttle opening angle.	After resuming the normal state, released at the vehicle speed of 0 km/h in P or N range.
No turbine rotation input	The gear is fixed to the 3rd gear when malfunction is detected. Then, 1—3 gearshift is performed depending upon the vehicle speed and throttle opening degree.	After resuming the normal state, released at the vehicle speed of 0 km/h in P or N range.
Open circuit and short circuit of oil temperature sensor circuit	The gear is fixed to the 3rd gear when malfunction is detected. Then, 1—3 gearshift is performed depending upon the vehicle speed and throttle opening degree.	After resuming the normal state, released at the vehicle speed of 0 km/h in P or N range.
Throttle sensor abnormality	· The throttle opening angle is set to a constant value. · When a malfunction is detected, a gearshift to the 3rd gear takes place. Then, gear shifting between the 1st — 3rd gears take place according to the vehicle speed.	After resuming the normal state, released at the vehicle speed of 0 km/h in P or N range.
No output rotation input	· When the sensor system is malfunctioning, the gear is set to the one employed at the time of the malfunction detection. Then, when the vehicle stops once, the gear is set to the 1st gear. · When the A/T main body is malfunctioning, the gear is set to the 1st gear.	· When the sensor system is malfunctioning, after it returns to the normal condition, the releasing will take place when the vehicle speed drops to 0 km/h with the shift lever placed in the P or N range. · When the A/T main body is malfunctioning, after it returns to the normal condition, the releasing will take place when the IG SW is set to the "ACC" or "LOCK" position once.
Neutral start switch no input	The normal gear shift control is performed with the shift position set to D range.	The fail-safe function is released when the system returns to the normal condition.
Neutral start switch multiplex input	The normal gear shift control is performed with the shift position set to D range.	The fail-safe function is released when the system returns to the normal condition.

Open wire and short circuit of solenoid No.1 circuit	· The energizing to the solenoid judged to be malfunctioning will be prohibited. · At the time of short circuit, a gearshift to the 3rd gear will take place. Then, gear shifting between the 1st — 3rd gears take place according to the vehicle speed and throttle opening angle, using the normal solenoid. However, in the case of short circuit of the No. 3 solenoid and switch solenoid, the gear will be set to the 3rd gear. · In the case of open wire and when plural solenoids are malfunctioning, the gear will be set to the 3rd gear.	After resuming the normal state, released when the IG SW is set once to ACC or LOCK position.
Open wire and short circuit of solenoid No.2 circuit		
Open wire and short circuit of solenoid No.3 circuit		
Open wire and short circuit of duty solenoid circuit		
Open wire and short circuit of LUC solenoid circuit		
Open wire and short circuit of switch solenoid circuit		
The lockup rotation speed does not match.	The lockup is prohibited.	After resuming the normal state, released at the vehicle speed of 0 km/h in P or N range.
Abnormal signal receiving of communication line with EFI	· The throttle opening angle and engine torque are set to constant values. · When a malfunction is detected, a gearshift to the 3rd gear takes place. Then, gear shifting between the 1st — 3rd gears take place according to the vehicle speed.	After resuming the normal state, released at the vehicle speed of 0 km/h in P or N range.
Abnormal signal sending of communication line with EFI	· The throttle opening angle and engine torque are set to constant values. · When a malfunction is detected, a gearshift to the 3rd gear takes place. Then, gear shifting between the 1st — 3rd gears take place according to the vehicle speed.	After resuming the normal state, released at the vehicle speed of 0 km/h in P or N range.
No engine rotation input	The gear is fixed to the 3rd gear when malfunction is detected. Then, 1—3 gearshift is performed depending upon the vehicle speed and throttle opening degree.	After resuming the normal state, released at the vehicle speed of 0 km/h in P or N range.

3 COMPONENTS

3-1 TRANSMISSION CONTROL COMPUTER

The transmission control computer is located at the front pillar lower inner panel at the front passenger seat side.



3-2 TURBINE REVOLUTION SENSOR , OUTPUT REVOLUTION SENSOR

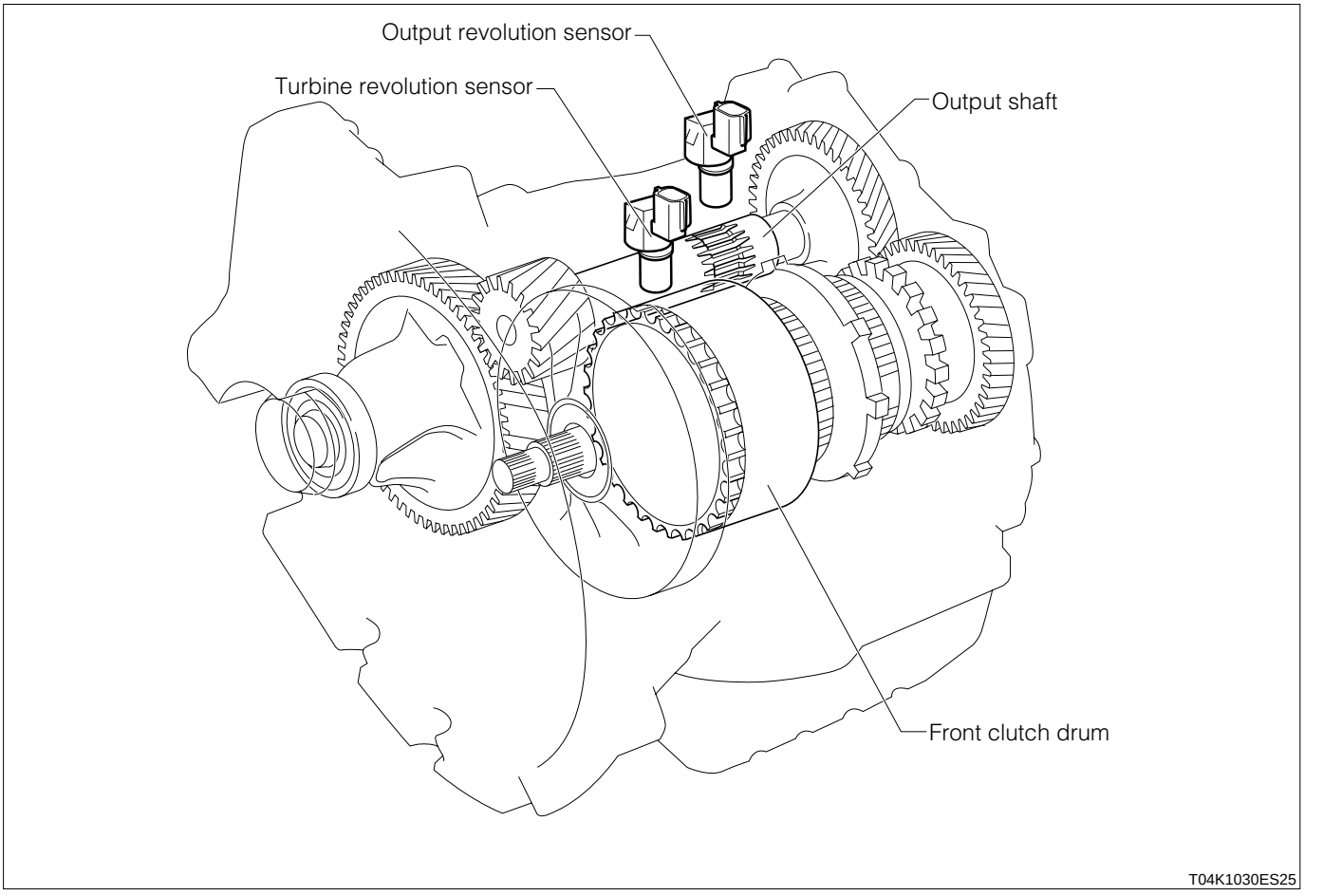
3-2-1 DESCRIPTION

The turbine revolution sensor and output revolution sensor are installed at the upper section of the transaxle case.

The revolution sensor employs the magnetic type revolution sensor which utilizes the Hall element, thus making it possible to detect the rotation speed accurately.

The turbine revolution sensor detects the rotation speed of the front clutch drum (number of sensor rotor teeth: 30).

The output revolution sensor detects the rotation speed of the output shaft (number of sensor rotor teeth: 20).

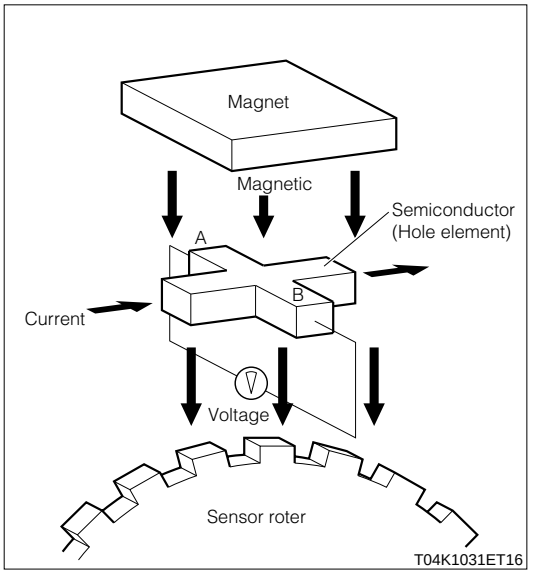


3-2-2 OPERATING PRINCIPLE

The revolution sensor consists of the Hall element and magnet and has a built-in processing circuit.

The Hall element has such characteristics that a voltage is produced in a direction perpendicular to the current and magnetic field (AB in the figure) when a magnetic field in the vertical direction is applied with the current flowing. The produced voltage is proportional to the magnitude of the magnetic field.

The revolution sensor uses this characteristics. Because of the change in magnetic field = change in voltage that is caused by the rotation of the sensor rotor, the transistor in the processing circuit is turned ON and OFF, thus outputting rotation signals (square waves).



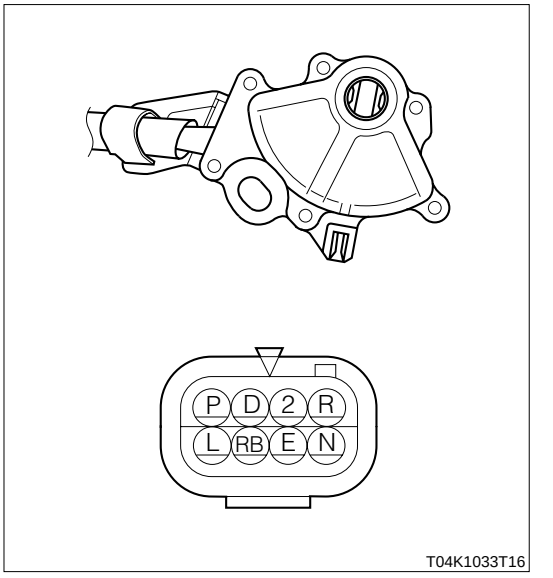
3-3 ENGINE REVOLUTION SPEED SIGNAL

The engine rotation signal is inputted from the engine control computer to the transmission control computer. The signal waveforms are square waves. Six pulses are emitted per engine rotation.

3-4 NEUTRAL START SWITCH

The neutral start switch, which is provided at the transaxle case, detects the shift lever position (P·R·N·D·2·L).

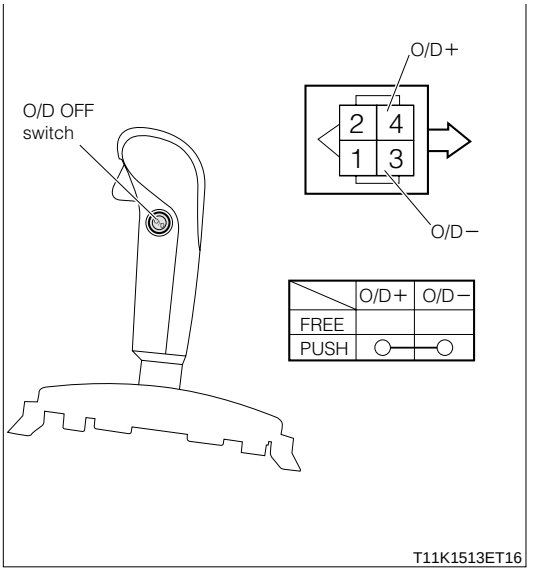
Through the indication at the LCD (liquid crystal display) of the combination meter, the current shift lever position is indicated to the driver.



3-5 O/D OFF SWITCH

The O/D OFF switch is provided at the shift lever knob section.

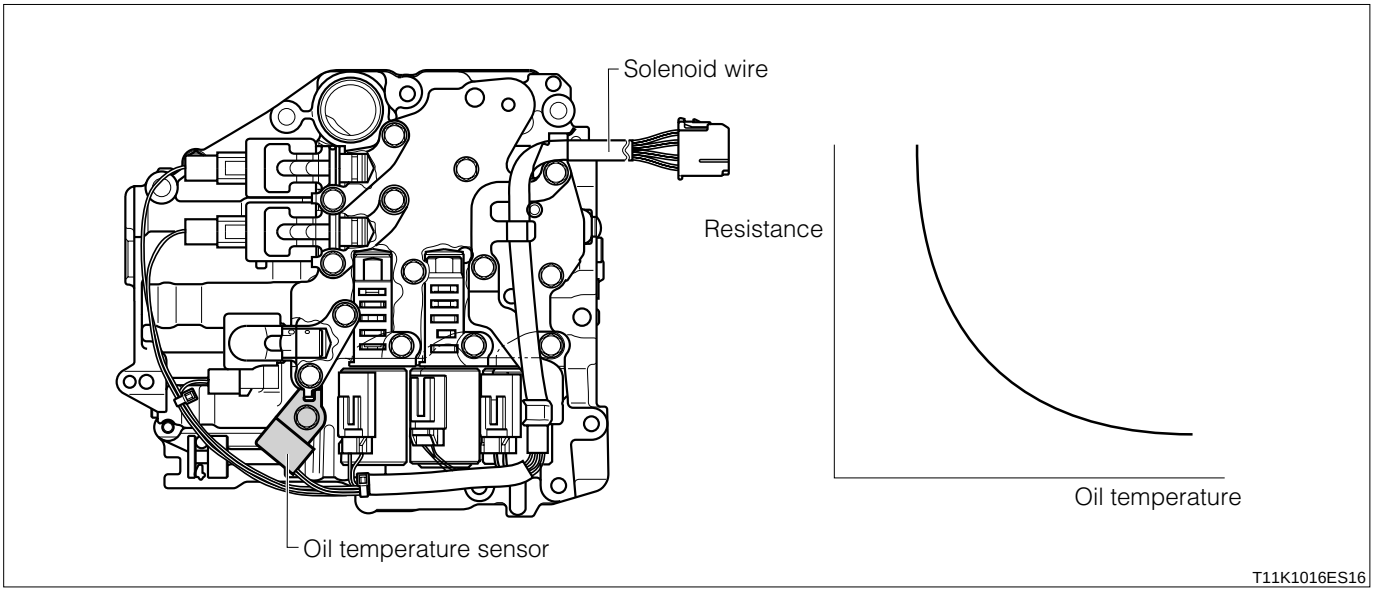
This switch is a pushbutton switch which is turned ON only when it is pressed. Every time it is turned ON, the state changes between the O/D OFF and O/D ON.



3-6 OIL TEMPERATURE SENSOR

The oil temperature sensor is provided at the lower section of the valve body. This sensor senses the transmission oil temperature.

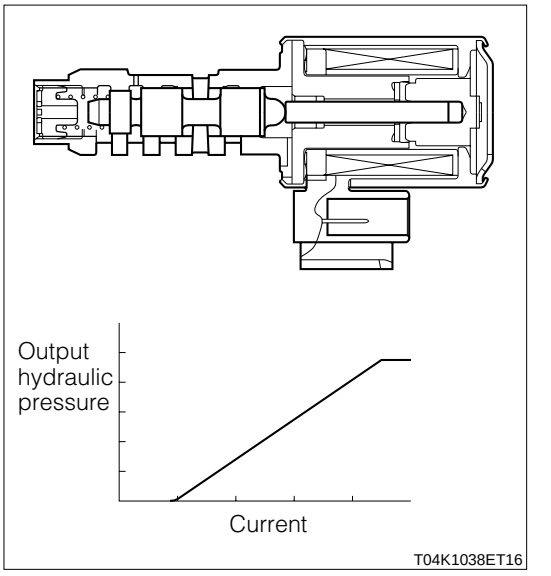
The hydraulic temperature sensor is integral with the solenoid wire.



3-7 SOLENOID NO.1

The solenoid No.1 is a linear type solenoid valve in which the solenoid section is integral with the pressure regulating valve. The plunger at the solenoid section pushes the pressure regulating valve to provide a hydraulic pressure which is proportional to the magnitude of the current.

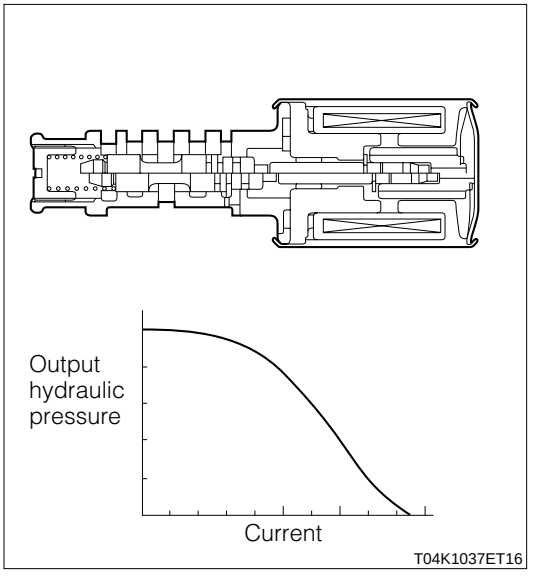
The hydraulic pressure characteristics are the normal close type (the output hydraulic pressure is zero when the current is zero).



3-8 SOLENOID NO.2 , SOLENOID NO.3

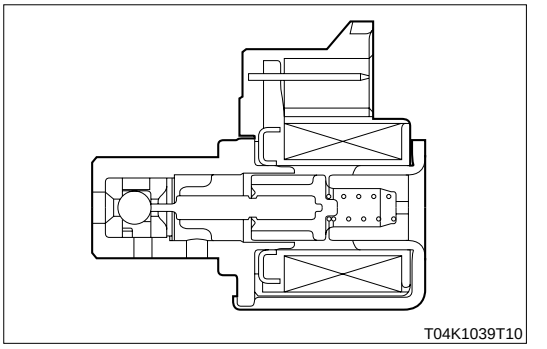
The solenoid No.2 and solenoid No.3 are linear type solenoid valves in which the solenoid section is integral with the pressure regulating valve. The plunger at the solenoid section pushes the pressure regulating valve to provide a hydraulic pressure which is proportional to the magnitude of the current.

The hydraulic pressure characteristics are the normal open type (the output hydraulic pressure is the maximum when the current is zero).



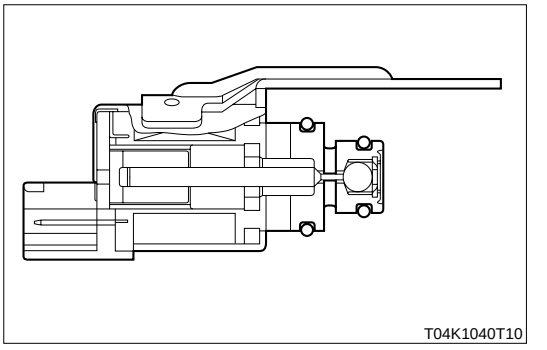
3-9 DUTY SOLENOID

The duty solenoid is a duty type solenoid valve which opens/closes the oil passage by means of the duty signal, thus regulating the pressure.


T04K1039T10

3-10 LUC SOLENOID , SWITCH SOLENOID

Using the three-way ON/OFF switch solenoid valve, the LUC solenoid and switch solenoid open the oil passage to apply the hydraulic pressure when the voltage is turned ON. When the voltage is turned OFF, they close the oil passage and release the hydraulic pressure that has been applied.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FOREWORD

To assist you in your service activities, this manual explains the main characteristics of the model M300, in particular providing a technical explanation of the construction and operation of new mechanisms and new technology used.

All information used in this technical information was in effect at time when the technical information was printed. However, the specifications and procedures may be revised owing to continuing improvements in design without advance notice and without incurring any obligation to us.

Published in November, 2004

REFERENCE

MANUAL NAME	MANUAL NO.	PUBLISHED
Service Manual SIRION	No.9890	November, 2004

No. 9402

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DAIHATSU MOTOR CO., LTD.

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SPECIFICATIONS ---------- G1 - 1
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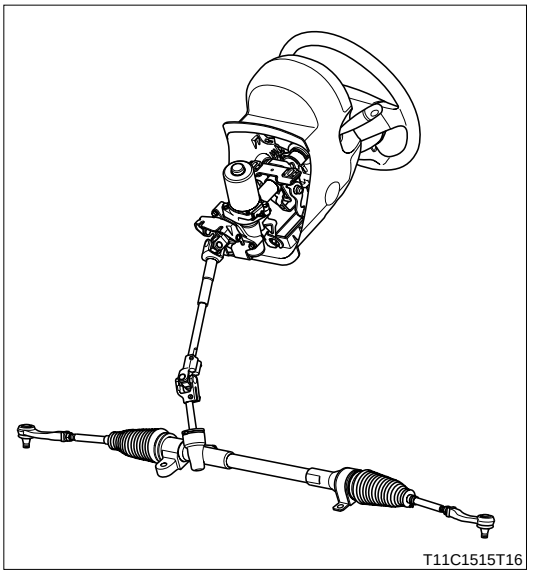
STEERING GEAR ---------- G1 - 3

1 OUTLINE

1-1 DESCRIPTION

1.All vehicles employ an electric power steering (EPS).
2.A steering wheel with a built-in SRS airbag has been adopted as standard equipment on all models. For enhanced safety of occupants in the event of vehicle collision, etc., an impact absorption construction is employed on the steering column shaft and intermediate shaft.
3.All vehicles employ a tilt steering. Using this system, the driver can set the steering wheel to their desired position.



1-2 SPECIFICATIONS

1-2-1 STEERING SPECIFICATION

RHD vehicles

Vehicle model	M300RS	M301RS
Power steering	Electric	
Provided or not provided with tilt steering	Provided	
Number of lock-to-lock turns	3.8*1 3.5*2	3.5
Front wheel turning angle (inside)	45˚42´*1 40˚00´*2	40˚00´
Front wheel turning angle (outside)	37˚00´*1 33˚48´*2	33˚48´
Minimum turning radius [m]	4.3*1 4.7*2	4.7

*1: Vehicles equipped with 13-inch tire *2: Vehicles equipped with 14-inch tire

LHD vehicles

Vehicle model	M300LS	M301LS
Power steering	Electric	
Provided or not provided with tilt steering	Provided	
Number of lock-to-lock turns	3.8*1 3.5*2	3.5
Front wheel turning angle (inside)	45˚42´*1 40˚00´*2	40˚00´
Front wheel turning angle (outside)	37˚00´*1 33˚48´*2	33˚48´
Minimum turning radius [m]	4.3*1 4.7*2	4.7

*1: Vehicles equipped with 13-inch tire *2: Vehicles equipped with 14-inch tire

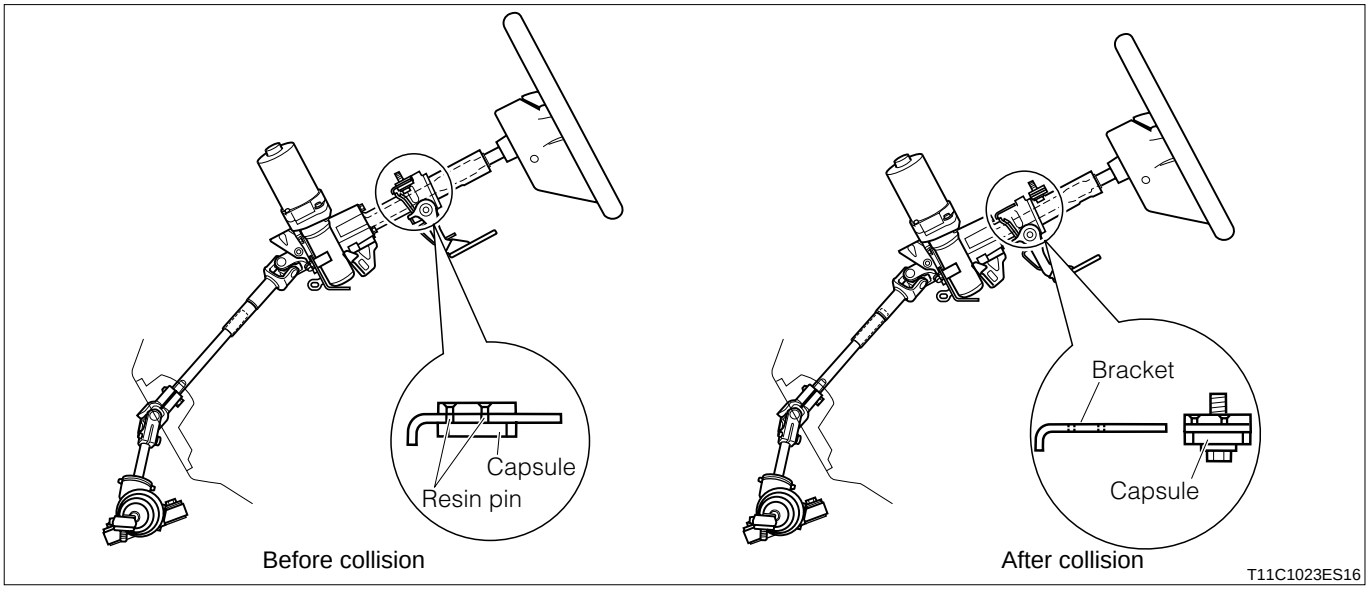
1-3 STEERING COLUMN

1-3-1 DESCRIPTION

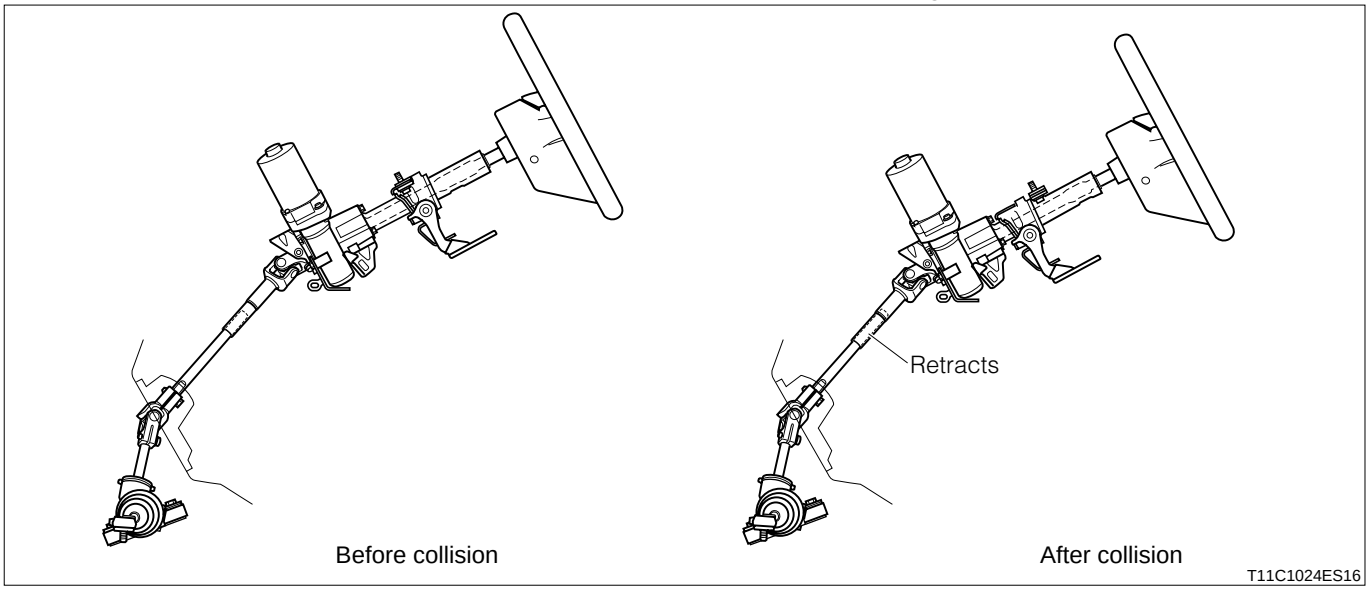
All vehicles employ a tilt mechanism and a impact absorption construction.

1-3-2 IMPACT ABSORPTION CONSTRUCTION

1. The upper and lower sections of the steering main shaft are joined by a serration section. As regards the steering column, the inner tube has been press-fitted to the outer side.
2. When the impact is transmitted to the steering column, the steering column tube at the inner side flares open the outer side, while shrinking. Thus, the steering main shaft shrinks while it receives the sliding resistance at the serration fitting section. In this way the impact is absorbed.
3. In addition to the above, the impact absorption construction employs a breakaway method for the collision (secondary collision) of the occupant against the steering wheel.
4. A flange is provided on the upper section of the steering column tube for attaching the steering column to the vehicle. A plastic capsule is attached to the flange by a plastic pin. When an impact is applied to the steering column, the plastic pin breaks and the plastic capsule is detached from the flange.Thus, the impact is absorbed as the steering column cover and the steering main shaft slide and shrink.

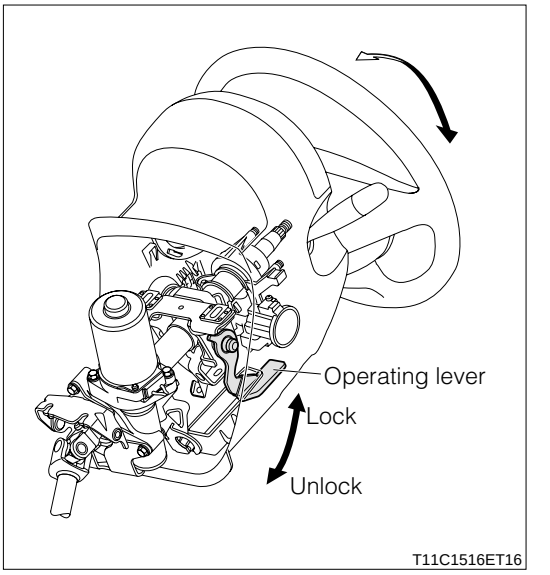


5. The upper and lower sections of the intermediate shaft are joined by a serration section.
6. In the event of impact, the shrinking takes place with the sliding resistance at the serration fitting section. This mechanism thus restrains the displacement of the steering column.



1-3-3 TILT MECHANISM

This is a mechanism which allows the steering wheel position to be adjusted up and down. The locking and unlocking operation is performed by means of the lever on the left-hand side of the steering column.



1-4 STEERING GEAR

1-4-1 DESCRIPTION

All vehicles employ a rack and pinion steering gear.

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G2 POWER STEERING

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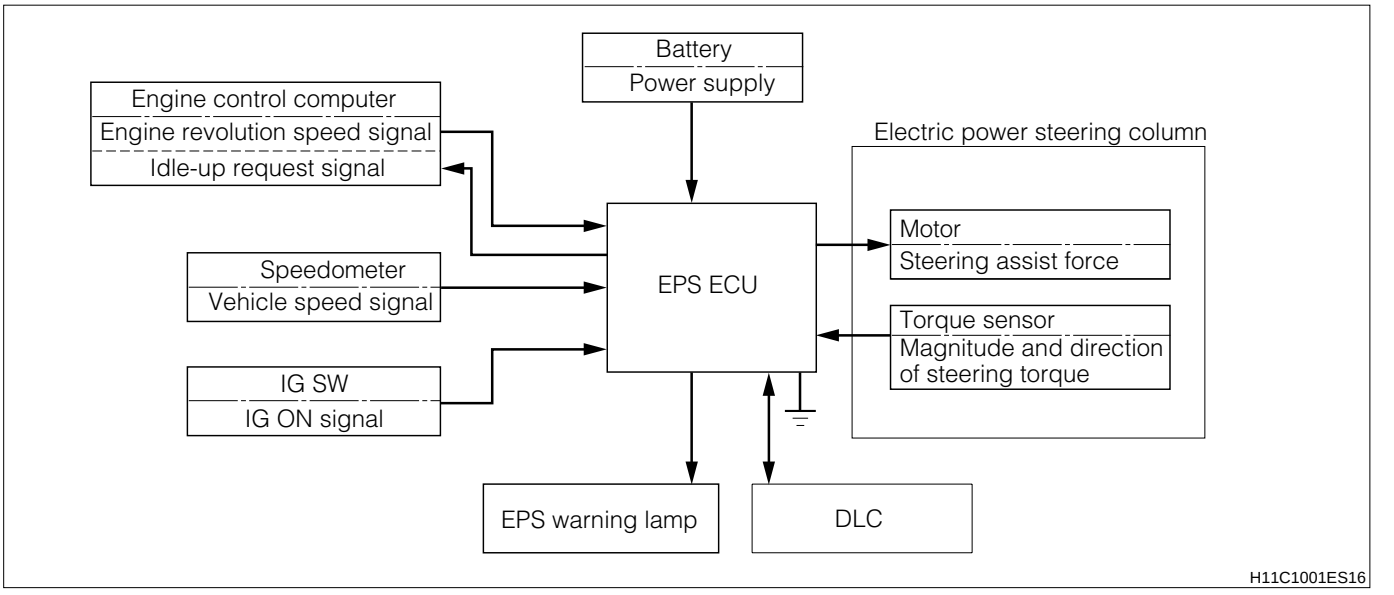
EPS WARNING LAMP ---------- G2 - 9

ELECTRIC POWER STEERING

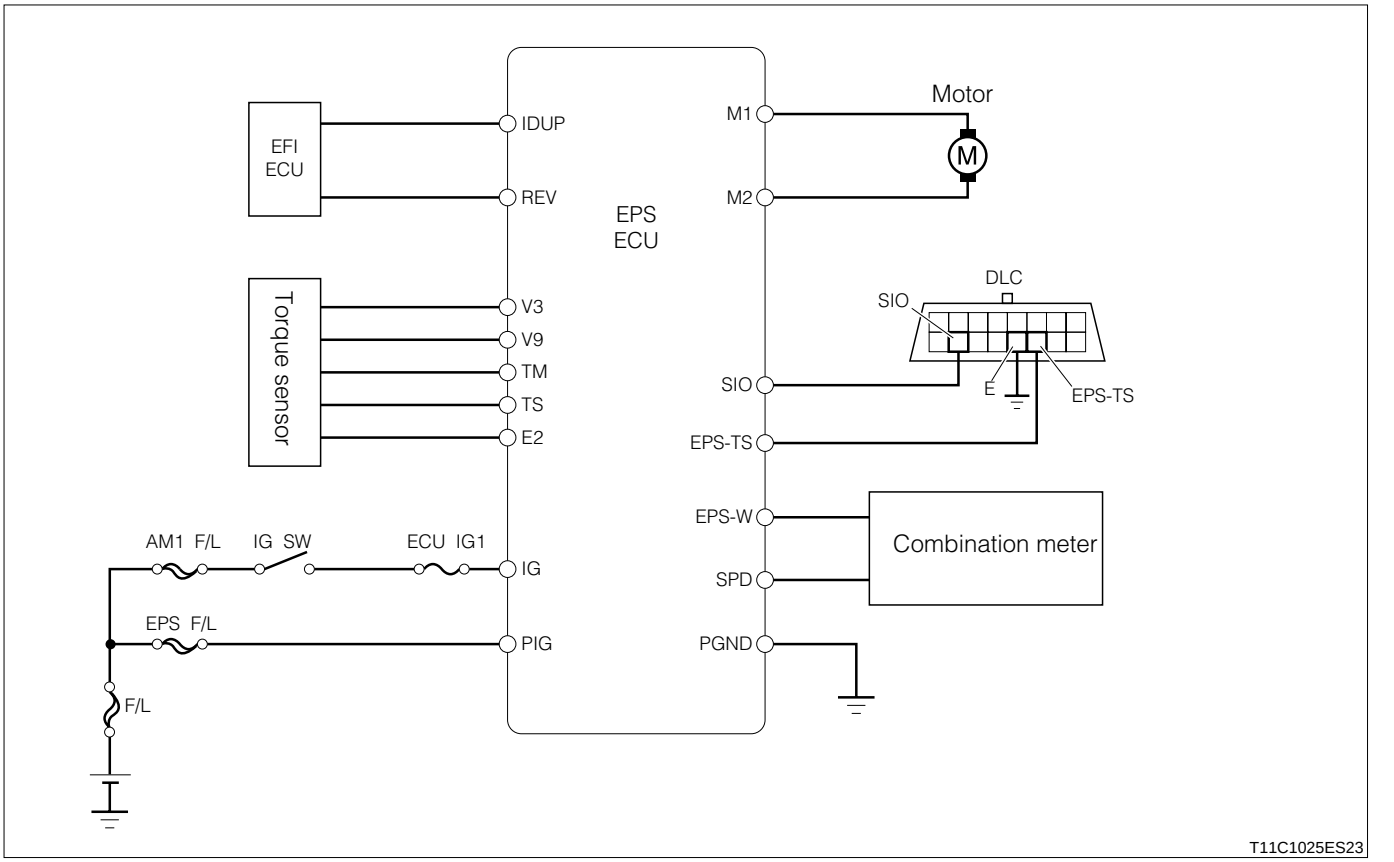
1 OUTLINE

1.A vehicle speed-responding type electric power steering (EPS), featuring a good response and straight-line vehicle stability, has been employed in all vehicles. This power steering can provide a lighter steering effort while the steering wheel is turned when the vehicle is stationary or is running at low speeds, and an appropriately heavy steering effort when the vehicle is running at medium or high speeds.

1-1 SYSTEM DRAWING

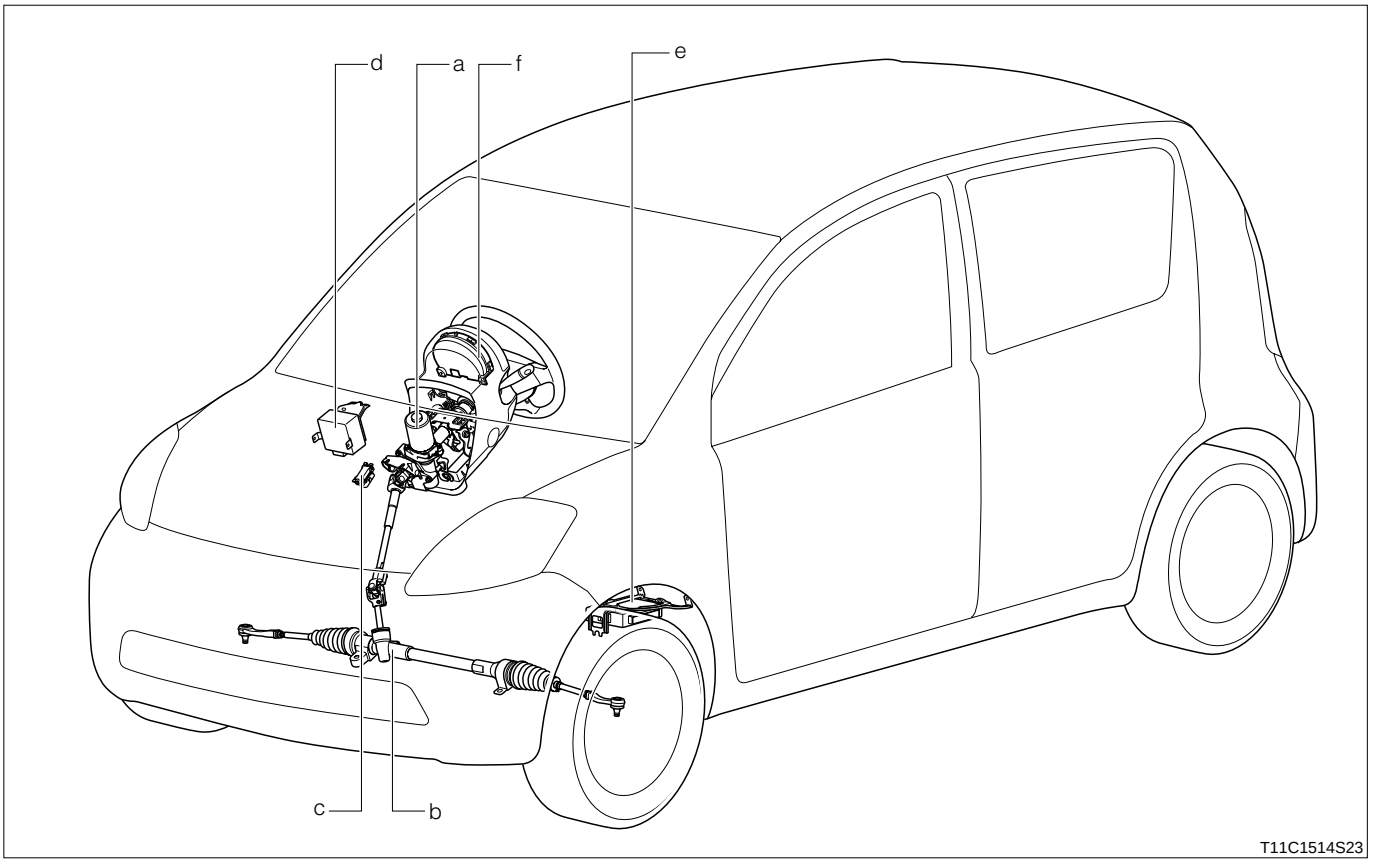


1-2 SYSTEM WIRING DIAGRAM

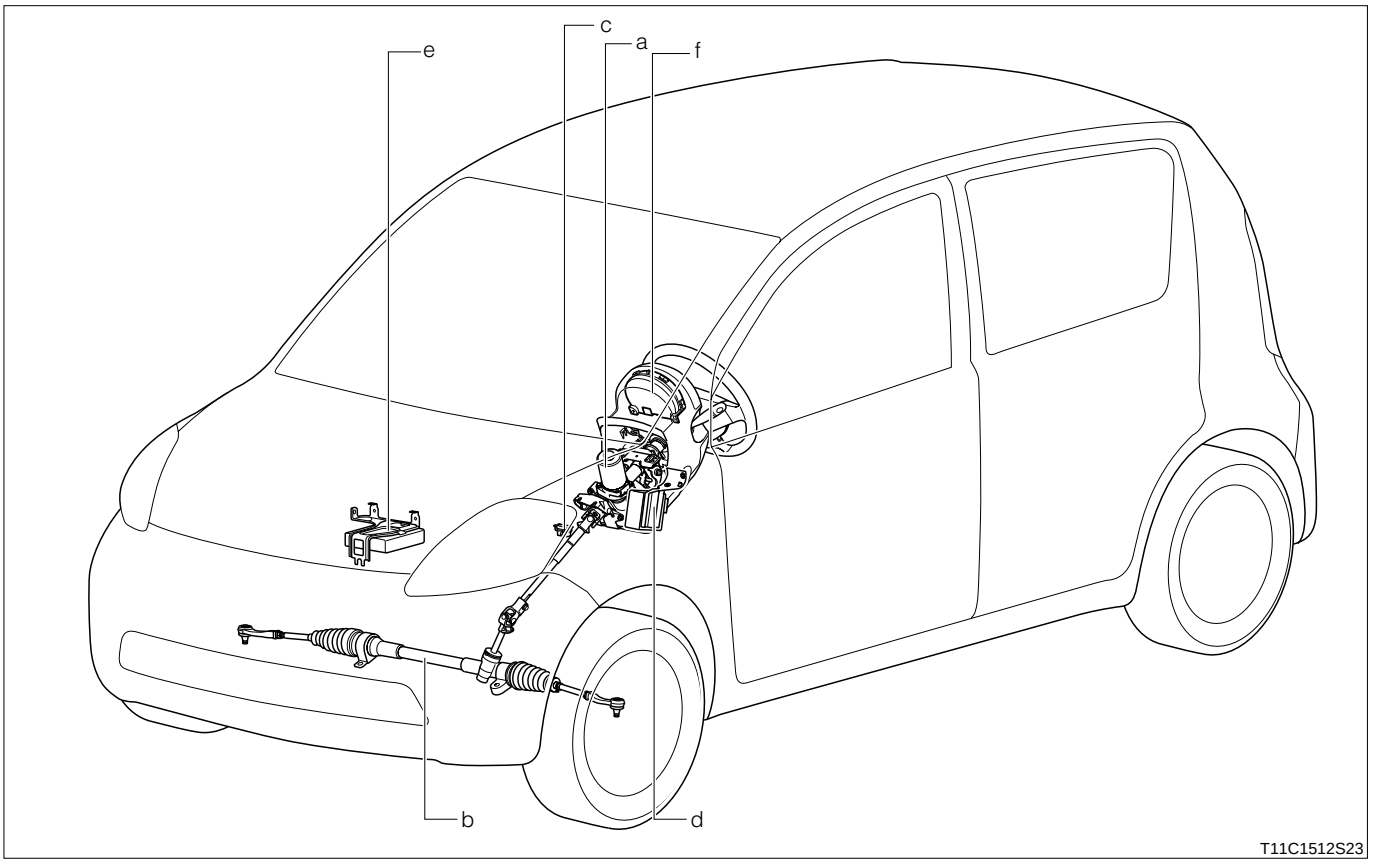


1-3 LOCATION OF COMPONENTS

RHD vehicles



LHD vehicles



a	Steering column
b	Steering gear
c	DLC
d	EPS ECU
e	EFI ECU
f	Combination meter (warning lamp, speedometer)

2 CONTROL

2-1 BASIC THEORY

The power steering is assisted by the following method. The motor, provided at the center of the steering column, drives the steering shaft. The steering effort is assisted by transmitting this driving force to the steering rack. Furthermore, the EPS ECU controls the assisting direction and assisting force to optimum values, based on the signals sent from the vehicle speed sensors, torque sensors, and EFI ECU.

2-2 ASSIST CONTOL

The EPS ECU calculates an optimum assisting force each time, based on the vehicle speed signal from the vehicle speed sensors, steering force and steering direction from the torque sensors. In this way, the output signal to the motor is controlled.

2-3 DIAGNOSIS

2-3-1 DESCRIPTION

Diagnosis means is a function in which the ECU informs the inspector of abnormal items if any abnormality exists in the input/output system. When an abnormality takes place, the ECU memorizes the abnormal item. Moreover, this memory function is written into a non-volatile ROM(EEPROM) so that the diagnosis results will remain in the memory even if the power is switched off.

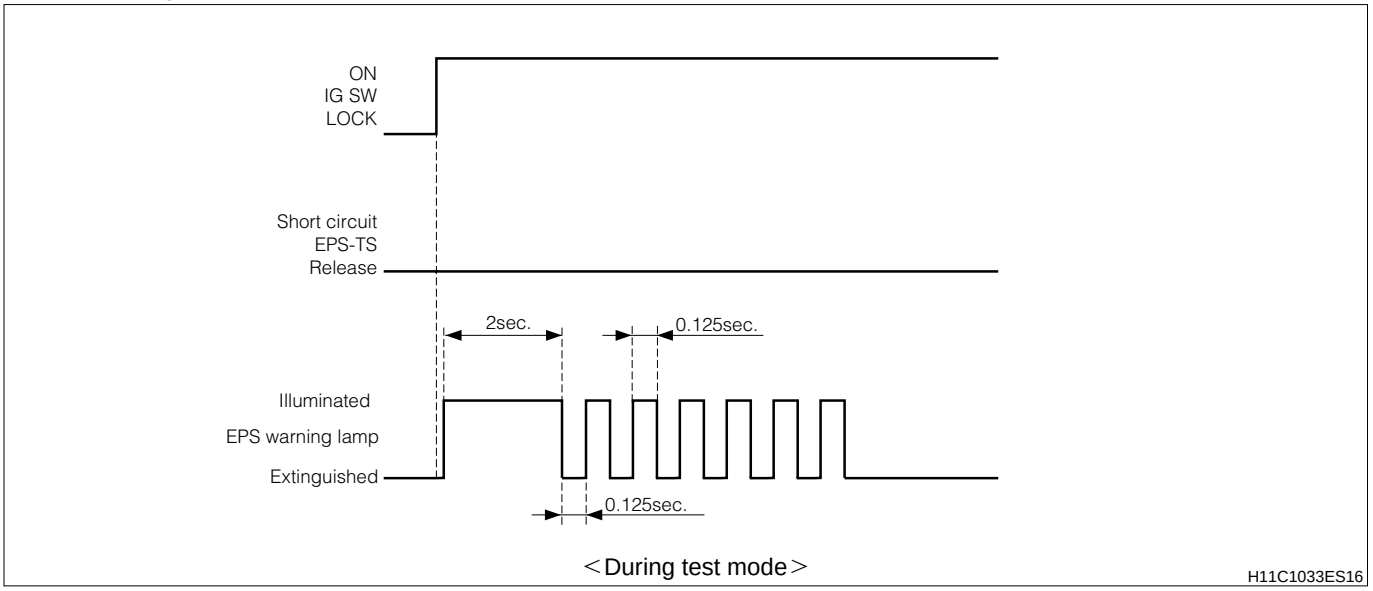
Please refer to the repair manual for more detail of the diagnosis.

2-4 TEST MODE FUNCTION(SENSOR CHECK FUNCTION)

1.The test mode function (sensor check function) evaluates whether the sensor and signal systems are functioning normally or not by checking the output of the vehicle speed sensor signal and engine revolution speed signal. Thus, this function informs the inspection worker of the results by making the EPS warning lamp flash.

2.The test mode is performed when an elimination operation by the DLC is performed. The test mode code is memorized.

3.When the test mode is set, the EPS ECU causes a warning lamp to flash, thus indicating that the test mode is set. Next, the engine is started. The EPS warning lamp goes out and the test mode codes are automatically erased when each signal output has been judged to be {{}}normal″ after the vehicle has run at a speed of 20 km/h or more for at least 2 seconds. When the check results reveal an abnormality or no test can be carried out because the check conditions were not satisfied, the EPS warning lamp will continue to flash. In this case, the test mode code will not be erased. Return the IG SW to the "LOCK" position once and check/repair the vehicle speed sensor signal system and the engine speed signal system.



Test mode code table

Code No.		Test mode	
2-digit	4-digit	Check system	Releasing conditions
71	C1571	Vehicle speed signal	The meter vehicle speed signal is above 20 km/h for over 2 seconds.
73	C1573	Engine revolution speed signal	The engine revolution speed signal continues above 360rpm for over 2 seconds

2-5 FAIL-SAFE FUNCTION

1. This is a function to perform the control so that the steer ability may not be lost even when an abnormality is encountered in the input/output signal system.
2. During the fail-safe operation, the EPS warning lamp inside the combination meter goes on, thus informing the driver of the abnormality. At the same time, the following control takes place.
3. When an abnormality was detected once, the diagnosis code for it remains memorized even if the system returns to the normal condition, the fail-safe function is released and the normal assisting condition has been restored.

List of fail-safe control functions

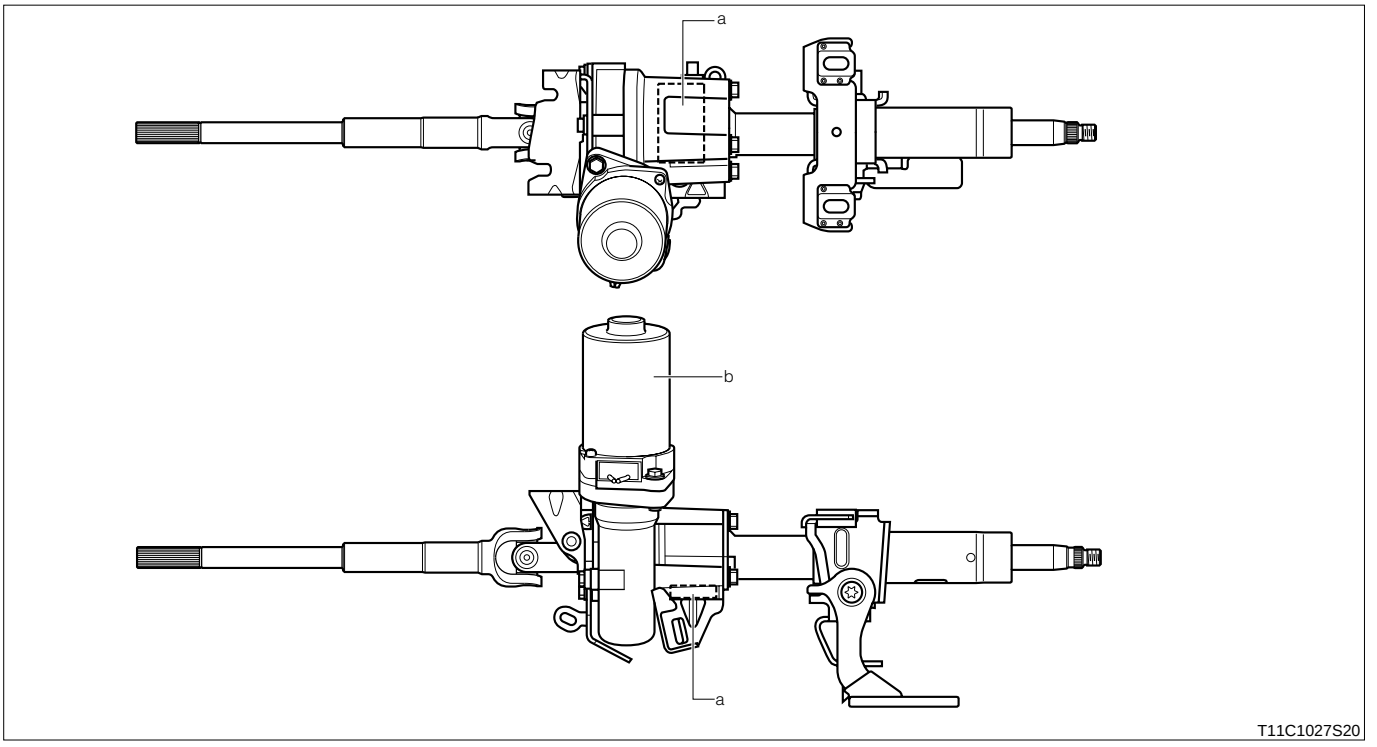
System diagnosed	Contents of diagnosis	Fail-safe	
		Contents of control	Control Release Conditions
Main torque sensor	Open wire, short circuit, poor sensor characteristics	Stopping of assistance	Released if IG SW is switched once from LOCK to ON after resuming the normal operation.
Sub torque sensor	Open wire, short circuit, poor sensor characteristics		
Torque sensor	Excessive difference between output value of main sensor and output value of sub-sensor		
Torque sensor	Abnormality of 9V power supply voltage of sensor		
Motor	Overcurrent		
Motor	Open wire between both terminals of the motor		
Motor	Short circuit, low voltage or overvoltage across both terminals of the motor		
EPS ECU	Malfunctioning of CPU in ECU		
EPS ECU	Abnormality of ECU inner circuit		
EPS ECU	Abnormality of temperature sensor inside ECU	Assistance continues.	The fail-safe function is released when the system returns to the normal condition.
EPS ECU	Abnormality of non-volatile ROM inside ECU		Released if IG SW is switched once from LOCK to ON after resuming the normal operation.
Vehicle speed signal (When stopped)	·Open wire or short circuit ·Vehicle speed sensor malfunctioning		The fail-safe function is released when the system returns to the normal condition.
Engine revolution speed signal	·Engine revolution (REV) signal missing ·Open wire, short circuit		
Power supply	Abnormal rise in battery voltage	Stopping of assistance	
Power supply	·Battery voltage abnormally dropped ·PIG power supply voltage abnormally dropped		
Power supply	Malfunctioning of power supply relay in ECU		Released if IG SW is switched once from LOCK to ON after resuming the normal operation.
EPS ECU	Malfunctioning of motor relay in ECU		

3 COMPONENTS

3-1 ELECTRIC POWER STEERING COLUMN ASSEMBLY

3-1-1 DESCRIPTION

1.The electric power steering column Ay has the following functions in addition to the functions of a normal steering column.
(1) Torque sensor for measuring rotating torque of steering shaft
(2) Motor for assisting the steering effort by moving the steering shaft, etc.



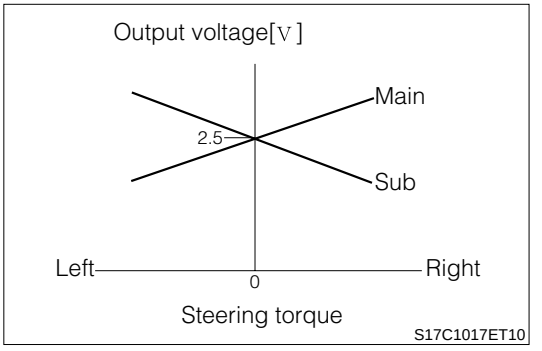
a	Torque sensor
b	Motor

3-1-2 CONSTRUCTION AND OPERATION

(1) Torque sensor

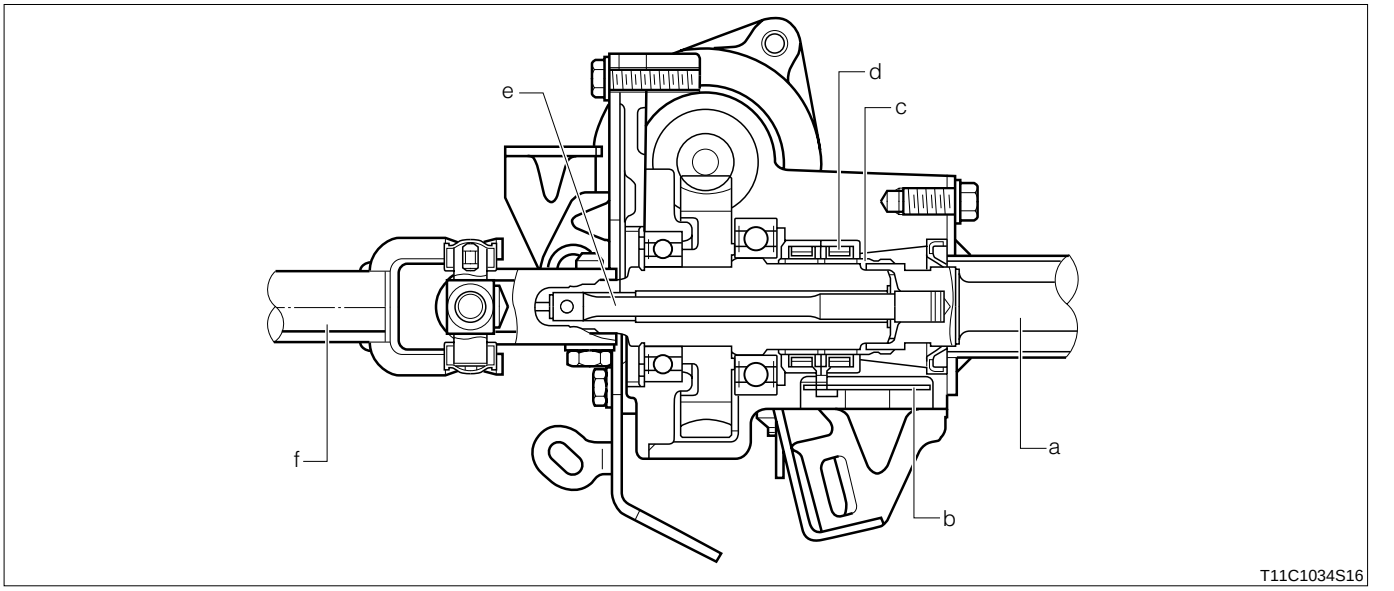
① Output characteristics

1.The output signals of the torque sensor consist of two torque signals, i.e. those from double circuits of a main circuit and a sub circuit.
2.When there is no rotating torque applied to the steering (neutral position), the output values of the main and sub are 2.5V, respectively.
3.The torque signal changes when a rotating torque is generated due to the steering operation. When the steering wheel is turned to the right, the main output voltage increases from 2.5V and the sub output voltage decreases from 2.5V.
4.The voltage change is outputted to the EPS ECU as a steering signal.



② Construction

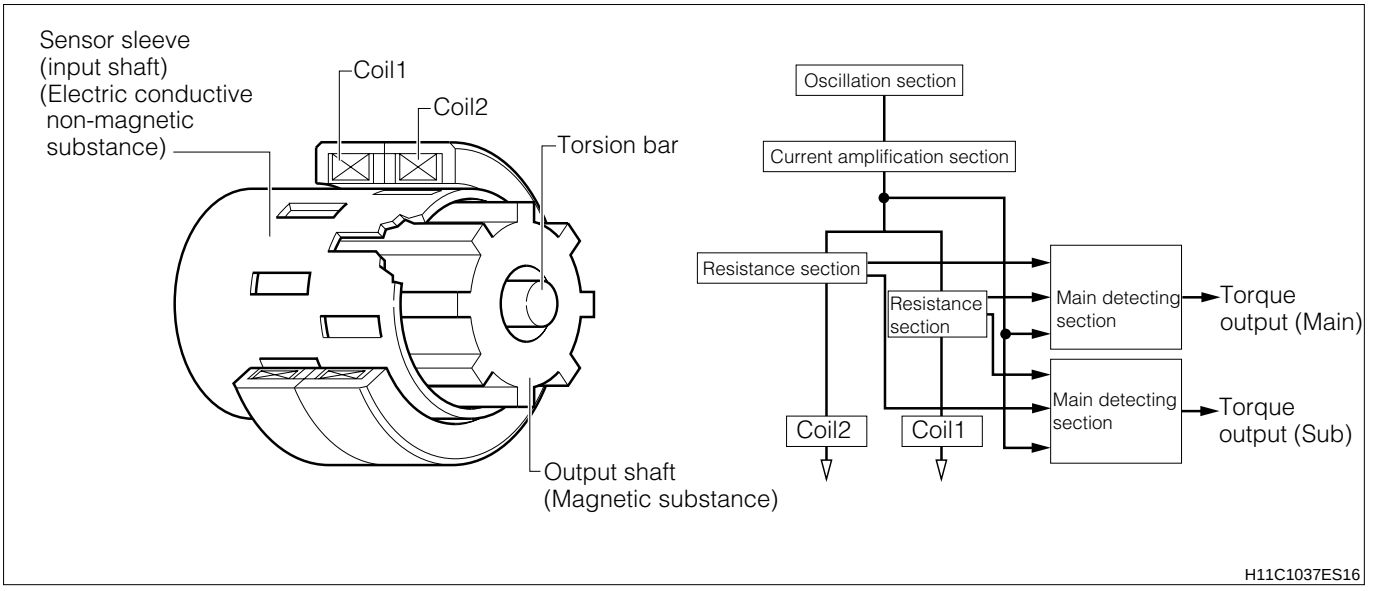
1. The input from the steering wheel is inputted to the input shaft. The input shaft and output shaft are connected by means of the torsion bar. When the output shaft is difficult to turn because the reaction force of the road surface is great, a difference in rotation occurs between the input shaft and the output shaft. Consequently, the torsion bar is twisted.
2. The sensor sleeve provided with a slit is secured on the input shaft. Also, a spline groove is provided on the output shaft.
3. The change in torque is detected from the twisted about of the torsion bar by this and by the two coils fitted to the column tube and also by the detection circuit.



a	Input shaft
b	Torque sensor
c	Sensor sleeve
d	Coil
e	Torsion bar
f	Output shaft

③ Operation

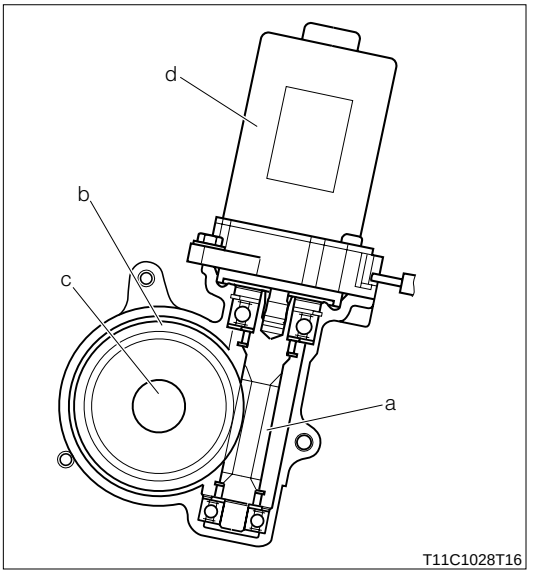
1.When the torsion bar is twisted by the input from the steering wheel, a difference in rotation occurs between the input shaft and the output shaft.
2.The change in facing area is caused by the difference in rotation between the slit of the sensor sleeve secured on the input shaft and the groove on the output shaft.
3.The change of the facing area becomes the change in magnetic flux density between the slit and the groove. As a result, the inductance of the energized coil (self-induced voltage) changes and this change is taken out as a voltage signal.
4.The voltage signal that has been obtained is input into the detection circuit. Thus, the twisted amount of the torsion bar is output as the change in torque.



(2) Motor

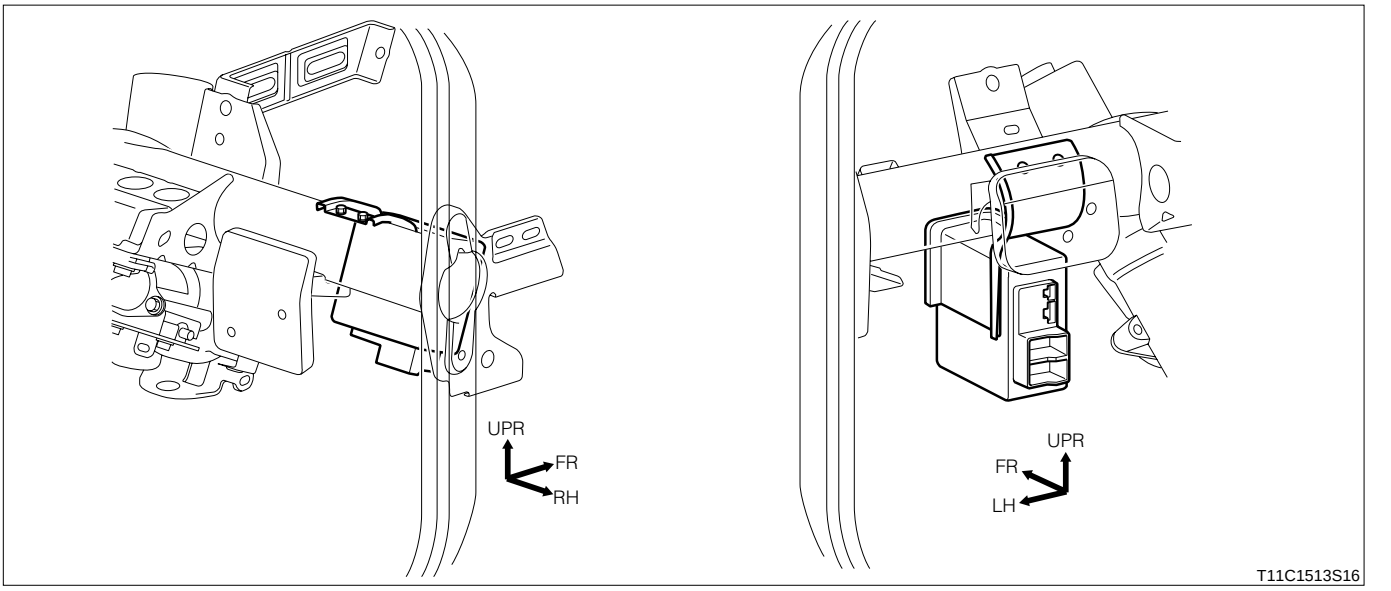
The torque due to the motor rotation is generated by a signal from the EPS ECU. Its speed is slowed by the worm gear and is transmitted to the output shaft.

a	Worm gear
b	Worm wheel gear
c	Worm wheel shaft
d	Motor



(3) EPS ECU

1.It is installed on the pillar-to-pillar member on the driver's seat side.



Left figure: RHD vehicle; Right figure: LHD vehicle

2.The assisting force is determined from the output values from the vehicle speed sensor and torque sensor. In this way, the direction and amount of the current sent to the motor is regulated.

3.The system is always monitored. If any abnormality is detected, the EPS warning lamp goes on and the fail-safe function is executed.

3-2 SPEEDOMETER

The speedometer receives a vehicle speed signal from the ABS ECU and calculates the vehicle speed. The vehicle speed signal outputted from the speedometer is inputted into the EPS ECU.

3-3 EFI ECU

3-3-1 ENGINE REVOLUTION SPEED SIGNAL

The signal (pulse signal) from the EFI ECU is inputted into the EPS ECU.

3-3-2 IDLE-UP REQUEST SIGNAL

In order to prevent the engine revolution speed from fluctuating (especially prevent the idle speed from dropping) due to excessive consuming power of the EPS system, an ON/OFF signal is outputted to the EFI ECU when the motor current exceeds a certain value.

3-4 EPS WARNING LAMP

1.The EPS warning lamp is provided in the combination meter. The following functions are provided:

(1) When the system is running normally, the lamp goes on when the IG SW is turned on and, after a lapse of two seconds, it will go out.

NOTE

- Even if the engine starts immediately after the IG SW has been turned on, the lamp goes on for about 2 seconds for an initial check.

(2) When the system is encountered with an abnormality, the lamp remains illuminated at all time or the lamp will not go on even if the IG SW is turned on.

(3) Output of diagnosis code

Refer to Page J3-12.

TO INDEX

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CONTROL ---------- H1 - 7
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1 OUTLINE

1-1 DESCRIPTION

The following *equipment is provided to assure enhanced safety in the event of an accident which may affect the passengers' lives seriously.

*: The side airbag, curtain shield airbag, three-point type ELR seat belt with RH/LH pretensioner + force limiter mechanism are equipped or not equipped depending upon the specifications.

1.Driver's seat airbag, front passenger seat airbag

(1) This occupant protection system is activated in the event of a frontal collision in order to soften the shock on the occupant, which is an added function to the seatbelt protection. The front airbag sensor and the sensor in the airbag ECU detect an impact by the frontal collision, and if the impact exceeds a predetermined value, the airbags accommodated in the steering wheel pad and the instrument panel will deploy immediately to reduce impacts to the heads and faces of the front seat passengers.

2.Side airbag

(1) This is an occupant protection system that is activated in the event of a side collision to reduce impacts to the occupant. The side airbag sensor detects a side impact caused by the side collision, and if the impact exceeds a predetermined value, the airbag mounted inside the seatback on the side of impact will deploy immediately to provide protection for the chest of the occupant.

3.Curtain shield airbag (to be equipped concurrently with the side airbag)

(1) This is an occupant protection system that is activated in the event of a side collision to reduce impacts to the occupant. The side airbag rear sensor detect a side impact, and if the impact exceeds a predetermined value, the airbag extending from the front pillar to the roof side rail on the side of the impact will deploy immediately to reduce impacts to the heads of the front and back seat passengers.

4.Three-point ELR seatbelts with the RH/LH pretensioner and the force limiter mechanism

(1) The pre-tensioner is activated along with the airbag in the event of a collision, which instantly winds the seatbelts to hold the occupants.

(2) After the pretensioner mechanism has operated, the force limiter mechanism extends the belt when a certain load is applied to the seat belt, thus reducing impacts to the chest of a passenger.

1-2 PRECAUTION

1-2-1 ITEMS TO BE OBSERVED FOR SYSTEM

1.The airbag system properly functions when the occupants wear the seatbelts correctly in correct riding posture.

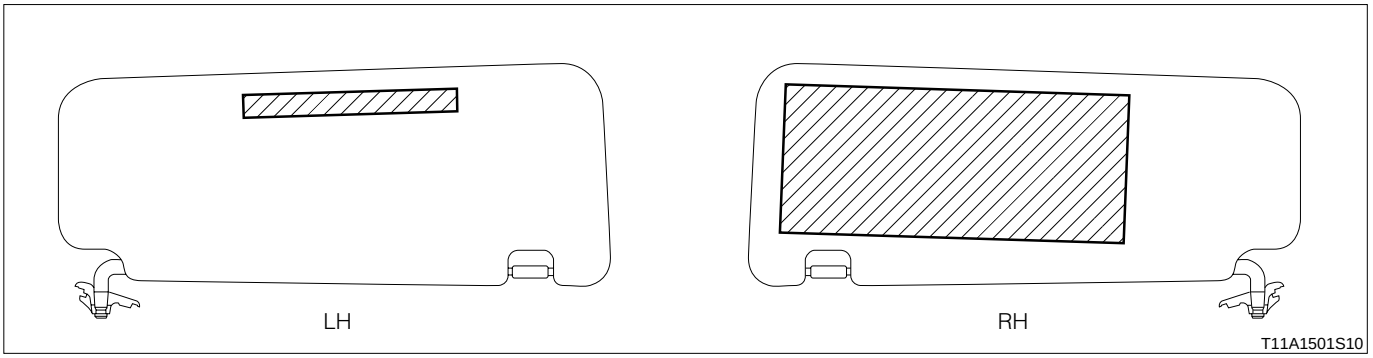
2.To ensure proper operation of the airbag system, do not apply any stickers or place a cover on the airbag deployment zones.

3.Do not place any objects over the airbag deployment zones. Failure to observe this caution pauses risk of injuries to the occupants due to airbag deployment.

4.The airbag system may not be activated in cases where the airbag warning lamp remains lit, or the airbag warning lamp does not light up after the IG SW is turned ON even if the sensor has detected the impact. The system must be checked.

1-2-2 CAUTION PLATE FOR USERS

Caution plates for users are installed to the sun visors for both the driver and front passenger seats.

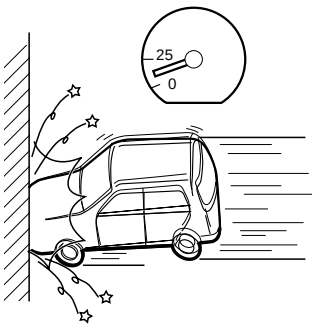


The illustration represents the RHD vehicle.

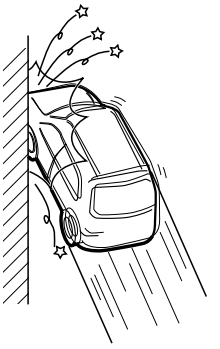
1-2-3 ITEMS TO BE OBSERVED IN CASE OF NON-OPERATION

Under certain conditions given below, the airbag system may not be activated due to the structure of the sensor, and the operation determination requirements of the airbag ECU.

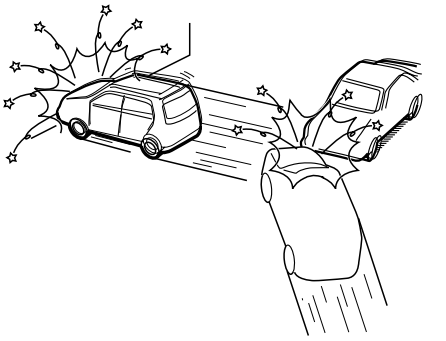
Driver's seat, front passenger seat airbag & seatbelts with the pretensioner + force limiter



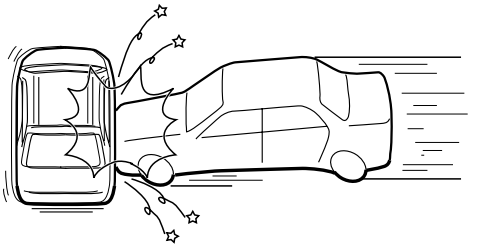
Cases where a vehicle has collided at a vehicle speed of 25 km/h or less



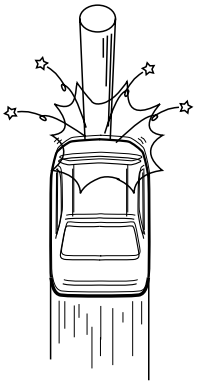
Cases where a vehicle has collided at an angle exceeding approx. 30˚ at the front side



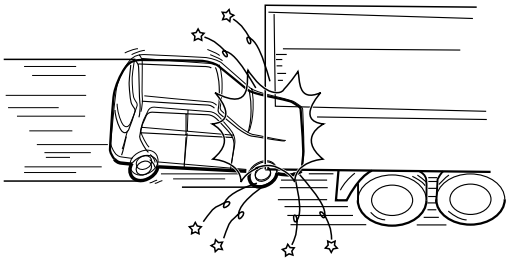
Cases where the vehicle collides after the airbag has deployed once



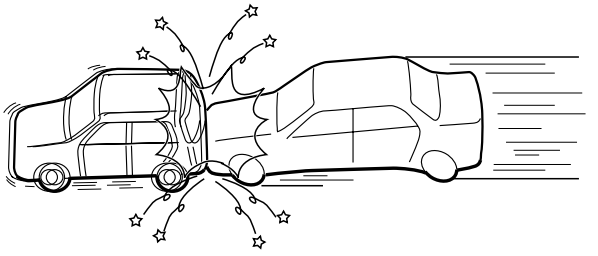
Lateral collision



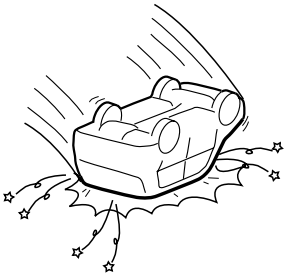
Cases where the vehicle collides against a pole, etc.



Cases where the vehicle dives into under the loading platform of trucks, etc.



Case of rear-end collision

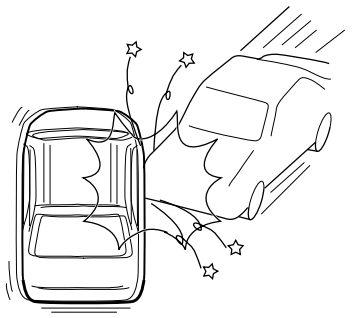


Case of turn-over and roll-over

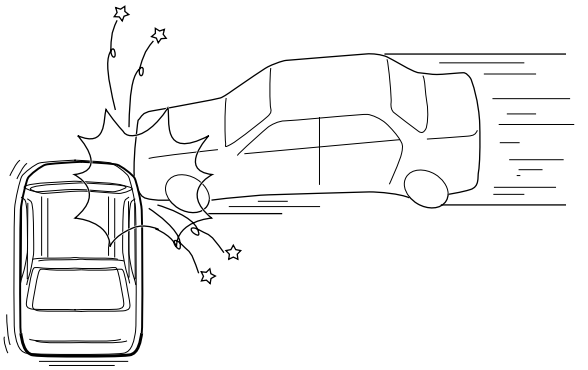
T11A1022ES33

The airbag ECU and the front airbag sensor determine whether the airbag should be deployed based on the impact from the front at time of a collision. Therefore, the airbag may not be deployed in cases where the magnitude of the frontal impact is small despite the massive damage to the vehicle, or the vehicle body has absorbed the impact.

Curtain shield airbag & side airbag



Cases where a vehicle has collided diagonally



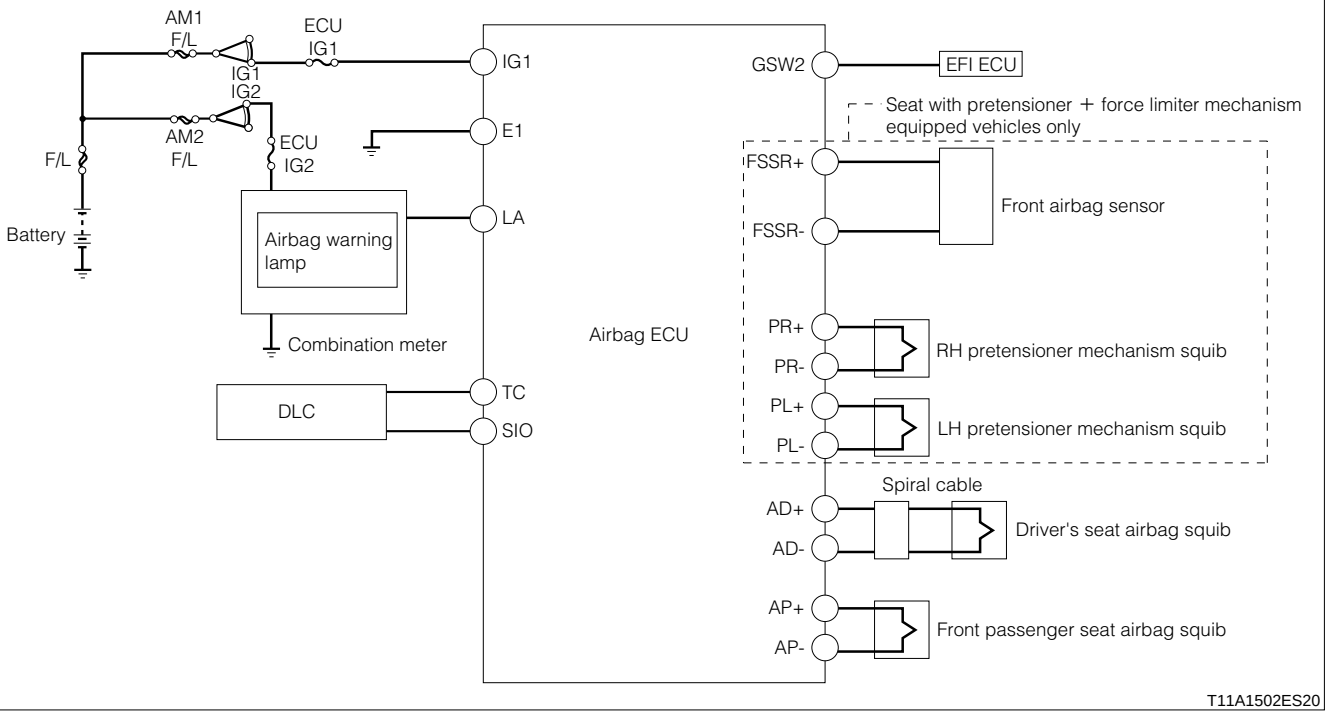
Cases where a vehicle has collided at a section except the passenger compartment

T04A1004ES16

The side airbag sensor and the side airbag rear sensor determine whether the airbag should be deployed based on the impact from the side at time of a collision. Therefore, the airbag may not be deployed in cases where the magnitude of the side impact is small despite the massive damage to the vehicle, or the vehicle body has absorbed the impact.

1-3 SYSTEM WIRING DIAGRAM

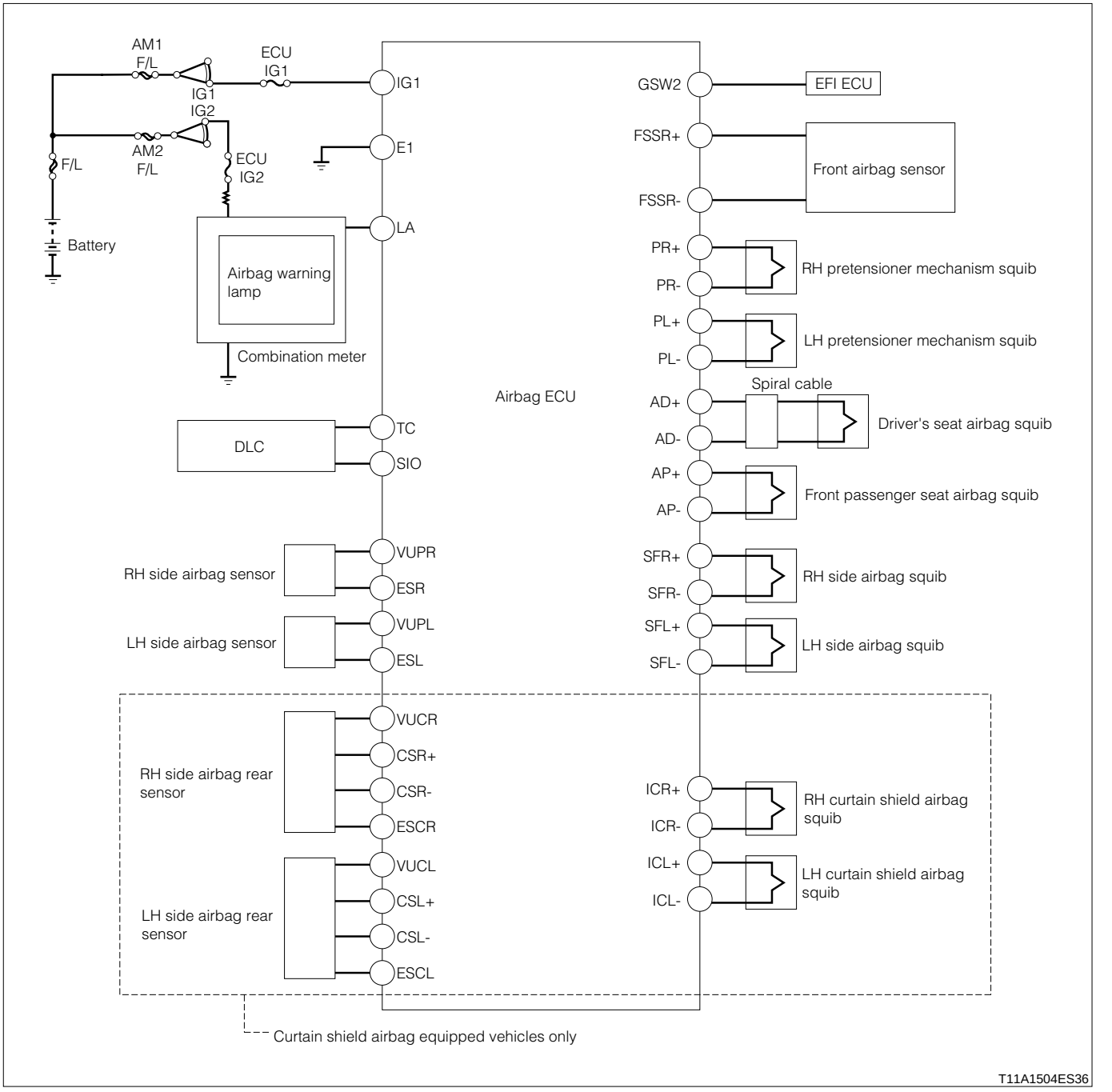
Vehicles without the curtain shield airbag & side airbag



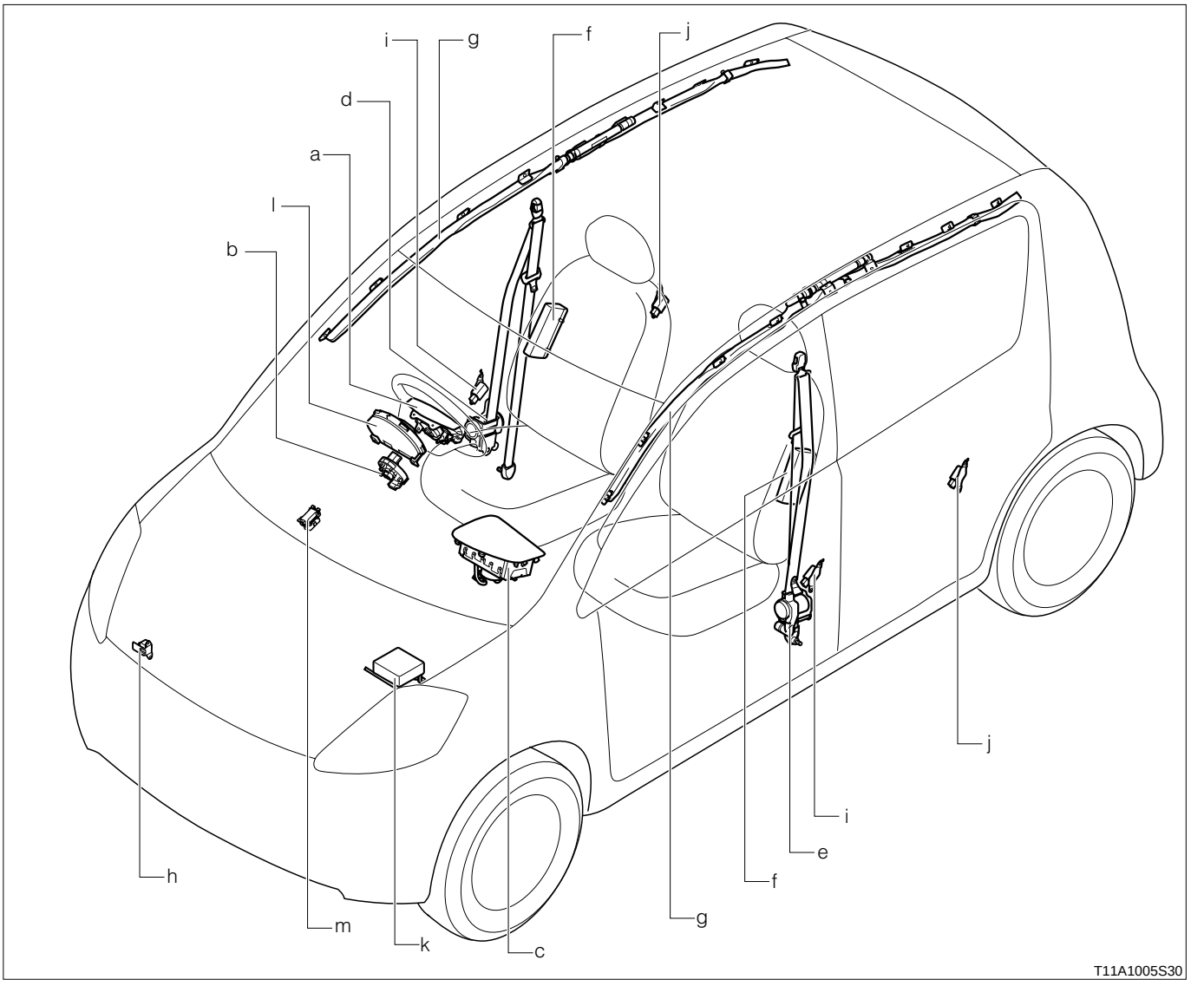
T11A1502ES20

H1–5

Vehicles with the curtain shield airbag & side airbag



1-4 LOCATION OF COMPONENTS



		Vehicles with the airbags at the driver's seat and front passenger seat		Vehicles with the side airbag	Vehicles with the curtain shield airbag & side airbag
		Vehicles with RH, LH pretensioner + force limiter mechanism equipped seat belt	Vehicles without RH, LH pretensioner + force limiter mechanism equipped seat belt		
a	Driver's seat airbag	○	○	○	○
b	Spiral cable	○	○	○	○
c	Front passenger-side airbag	○	○	○	○
d	Seatbelts with the RH pretensioner and the force limiter mechanism	○	–	○	○
e	Seatbelts with the LH pretensioner and the force limiter mechanism	○	–	○	○
f	Side airbag RH/LH	–	–	○	○
g	Curtain Shield Airbag RH/LH	–	–	–	○
h	Front Airbag Sensor	○	–	○	○
i	Side Airbag Sensor RH/LH	–	–	○	○
j	Side airbag rear sensor RH/LH	–	–	–	○
k	Airbag ECU	○	○	○	○
l	Combination Meter (air bag warning lamp)	○	○	○	○
m	DLC	○	○	○	○

○: Provided –: Not provided

2 CONTROL

2-1 OPERATION

2-1-1 DRIVER'S SEAT, FRONT PASSENGER SEAT AIRBAG & SEATBELTS WITH THE PRETENTIONER + FORCE LIMITER

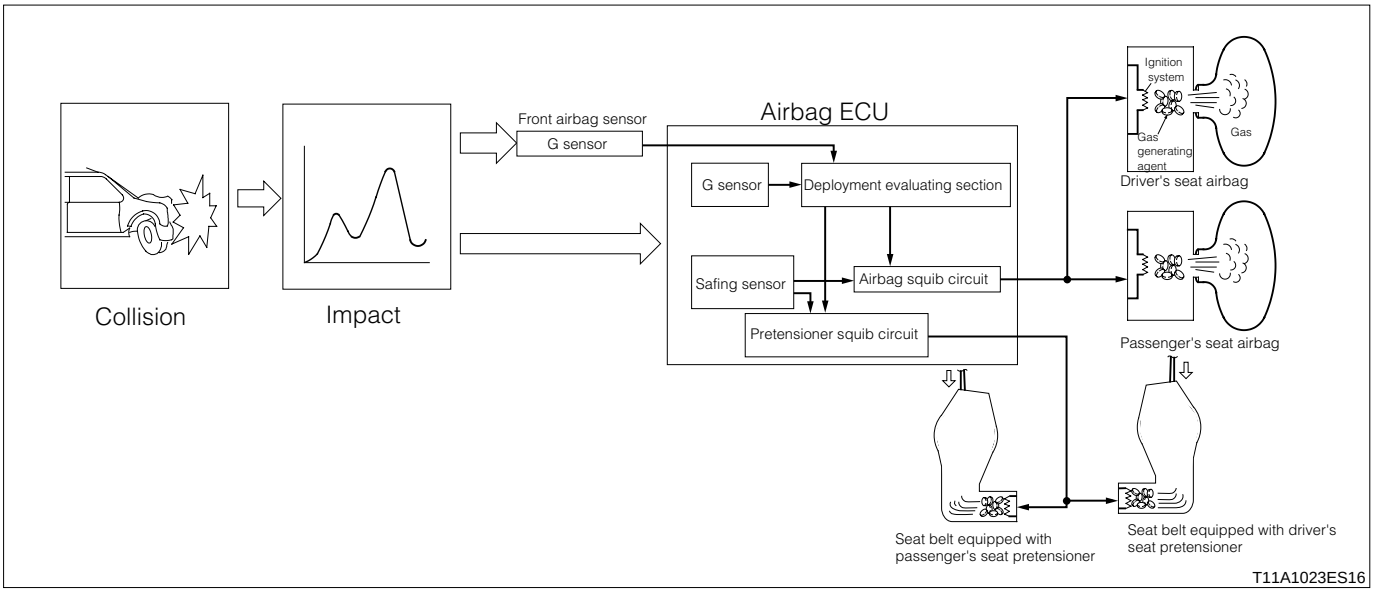
1.When an impact from the front of the vehicle is applied, the G sensor in the front airbag sensor, the safing sensor in the airbag ECU, and the G sensor will detect the impact.
   (1) The G sensor in the front airbag sensor and the safing sensor in the airbag ECU are turned ON when the vehicle experiences a certain level of deceleration due to the collision impact.
   (2) The G sensor mounted in the airbag ECU transmits a G waveform to the airbag ECU.
2.The output of the front airbag sensor and the G waveform of the G sensor in the airbag ECU determine whether or not the airbag should be activated.

NOTE

- The airbag ECU judges that a collision has occurred, when the value calculated according to the predetermined formula exceeds a set value.

3.When the safing sensor is turned ON, and the airbag ECU judges that a collision has occurred, current flows through the pretensioner ignition circuit and the airbag ignition circuit to deploy the airbag.

Operation process



2-1-2 SIDE AIRBAG

1.When an impact from the side of the vehicle is applied, the G sensor in the side airbag sensor and the safing sensor in the airbag ECU will detect the impact.

(1) The side airbag sensor transmits a G waveform generated by the G sensor in the sensor to the operation determination section.

(2) The operation determination section uses a G waveform to determine whether to activate.

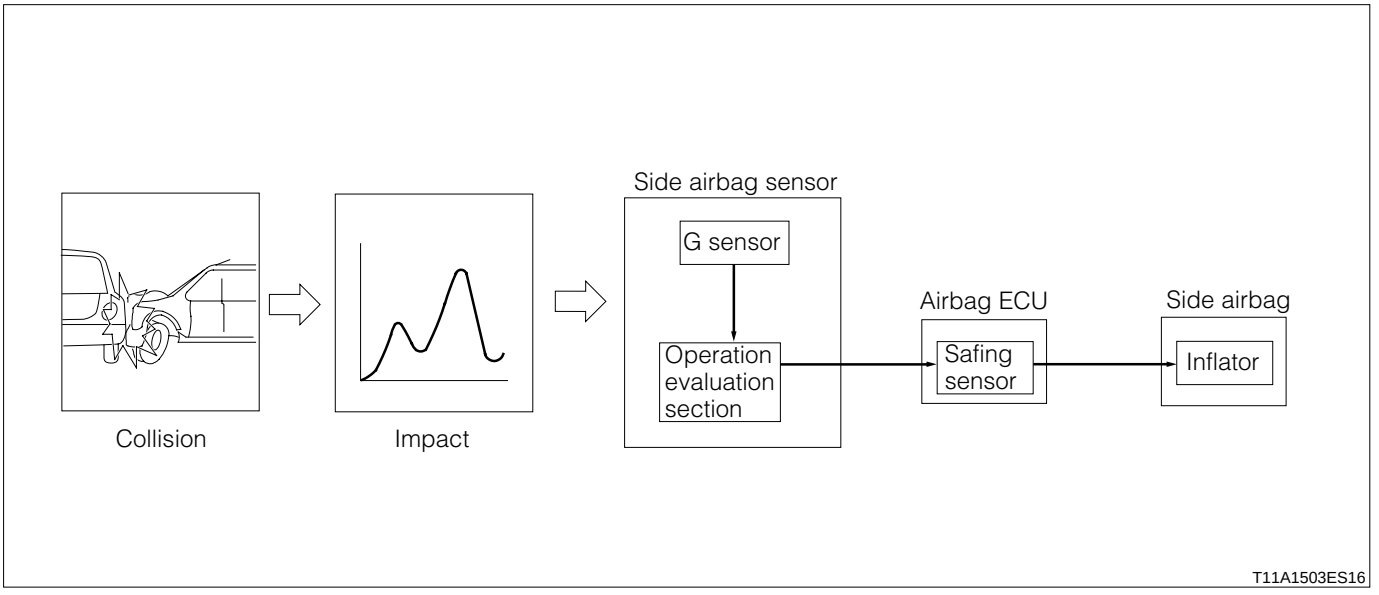
NOTE

- The side airbag sensor judges that a collision has occurred when the value calculated according to the predetermined formula exceeds a set value.

2.The safing sensor mounted in the airbag ECU is turned ON when the vehicle experiences a certain level of deceleration.

3.When the safing sensor in the airbag ECU is turned ON, and the side airbag sensor judges that a collision has occurred, current flows through the side airbag ignition circuit to deploy the airbag.

Operation process



2-1-3 CURTAIN SHIELD AIRBAG & SIDE AIRBAG

(1) Side airbag

Refer to Page H1-8.

(2) Curtain Shield Airbag

1.When an impact from the side of the vehicle is applied, the G sensor and safing sensor mounted in the side airbag rear sensor will detect the impact.
   (1) The G waveform of the G sensor mounted in the sensor is outputted to the operation determination section.
   (2) The operation determination section uses a G waveform to determine whether to activate.
   (3) The safing sensor mounted in the sensor is turned ON when the vehicle experiences a certain level of deceleration.

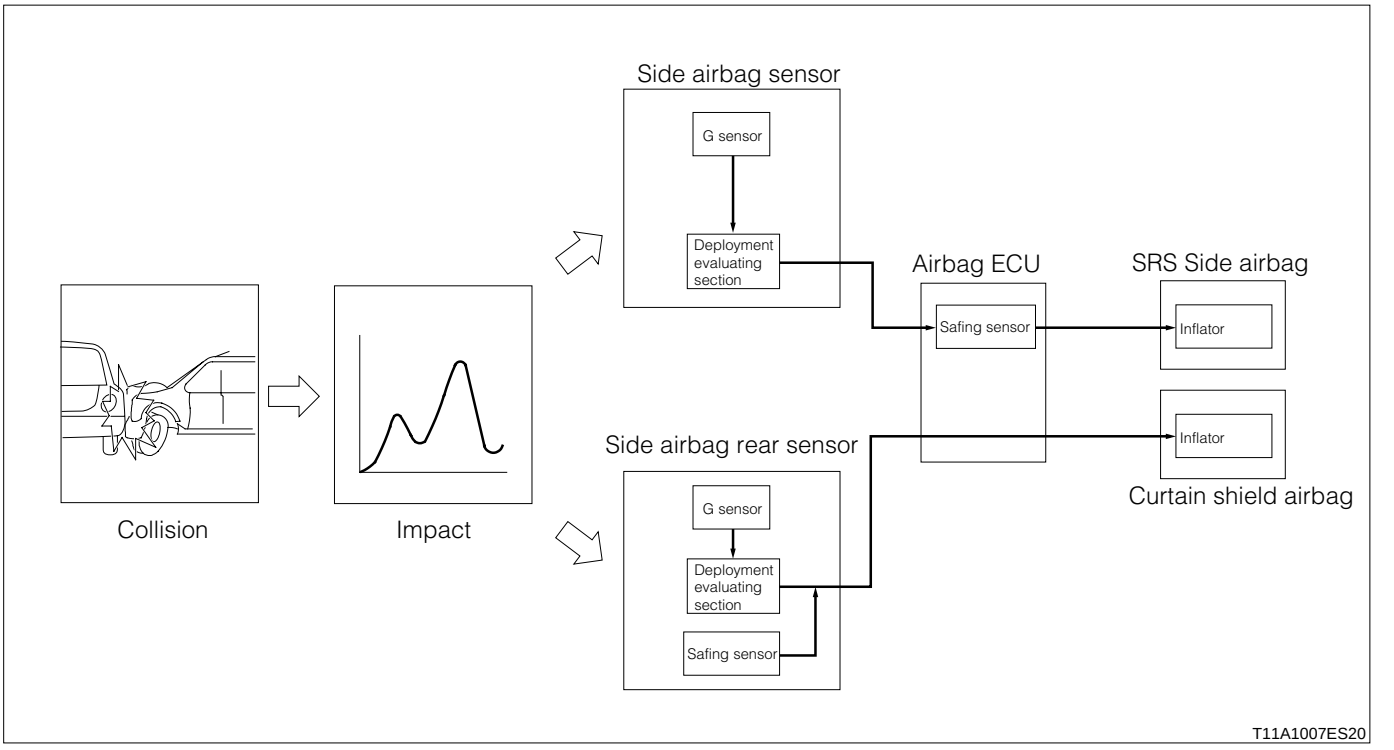
NOTE

- The side airbag rear sensor judges that a collision has occurred when the value calculated according to the predetermined formula exceeds a set value.

2.When the side airbag rear sensor judges that a collision has occurred and the safing sensor mounted in the sensor is turned ON, current flows into the curtain shield airbag ignition circuit to deploy the airbag.

3.When the side airbag is activated, the curtain shield airbag will be activated, in addition to the above components.

Operation process



Even if the side airbag rear sensor detests the impact, the side airbag will not be deployed.

2-2 DIAGNOSIS FUNCTION (SELF-DIAGNOSIS FUNCTION)

2-2-1 DESCRIPTION

1.Diagnosis literally means {{}} failure diagnosis ″, which provides the function that allows the airbag ECU to notify an operator of the fault that has occurred in the input and output system. The airbag ECU stores faulty conditions when a fault occurs. The information is stored in the nonvolatile ROM (EEP-ROM), therefore the diagnosis result will be stored even when a power supply is shut down.
As for the details of the diagnosis, refer to the service manual.

2.In the airbag system, by using the diagnosis mode function that uses the diagnosis tester (DS- 21/DS-Ⅱ), you can choose between the normal mode and test mode. When the test mode is selected, the detection sensitivity of diagnosis will be increased.

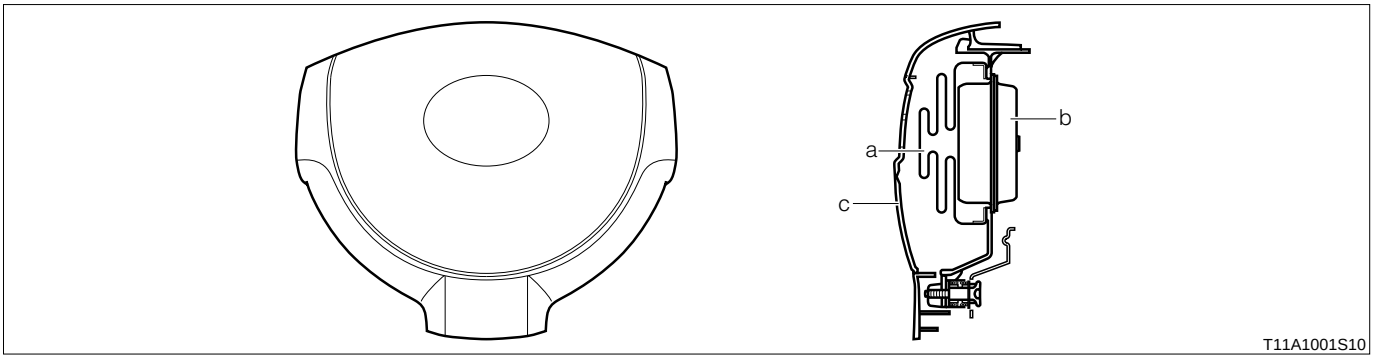
(1) Refer to the diagnosis code list in the service manual for the diagnosis codes which correspond to each test mode.

3 COMPONENTS

3-1 SRS AIRBAG AT DRIVER'S SEAT SIDE

3-1-1 DESCRIPTION

Consists of a bag, an inflator, a steering wheel pad, etc. All of these main components are located in the steering wheel.



a	BAG
b	Inflator
c	Steering Wheel Pad

3-1-2 BAG

The gas filled in the bag instantly breaks a thin portion of the steering center pad to deploy the airbag. The airbag absorbs the impact on the occupant's head and discharges gas from the two air outlets on the back of the airbag to soften the impact to the occupant.

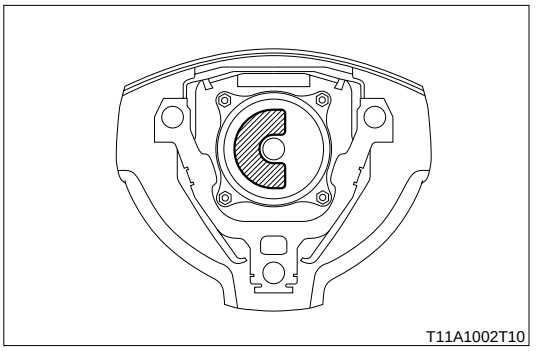
3-1-3 INFLATOR

1.The inflator consists of a squib, propagating agent, gas generating agent, etc. The gas generating agent is the source to generate nitrogen gas to deploy the airbag in the event of a collision. The inflator has a tightly-sealed structure.

2.When the squib is energized due to the deceleration caused by a collision, the filament located inside the squib will be heated.Consequently, the firing agent is ignited.Then, the flame propagates to the propagating agent and gas generating agent in an extremely short length of time. Thus, a great amount of nitrogen gas is generated from the gas generating agent.Nitrogen gas passes through the filter to be cooled down and to remove burnt debris. Thus, the bag is filled with gas.

3-1-4 CAUTION PLATE

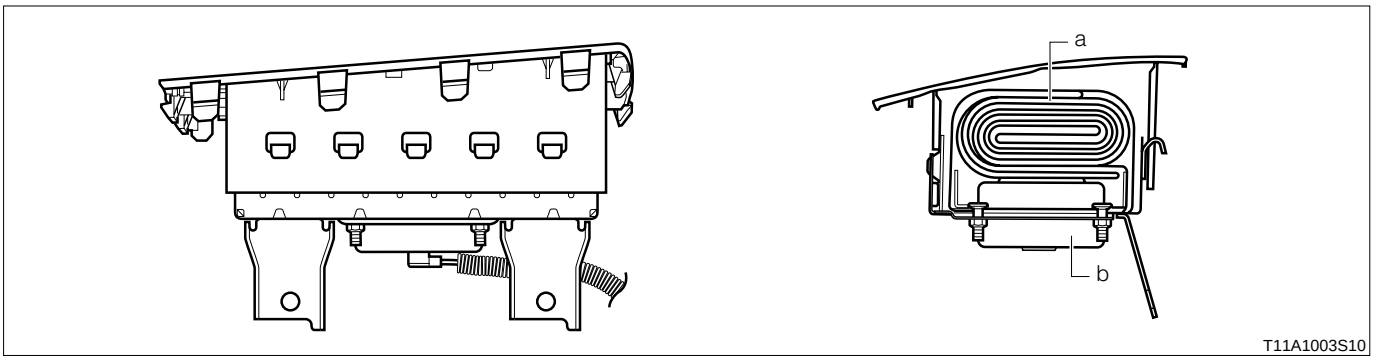
A caution plate is placed at the location shown in the figure.



3-2 SRS AIRBAG AT FRONT PASSENGER SEAT SIDE

3-2-1 DESCRIPTION

Consists of a bag, an inflator, etc. All of these main components are located in the airbag.



a	BAG
b	Inflator

3-2-2 BAG

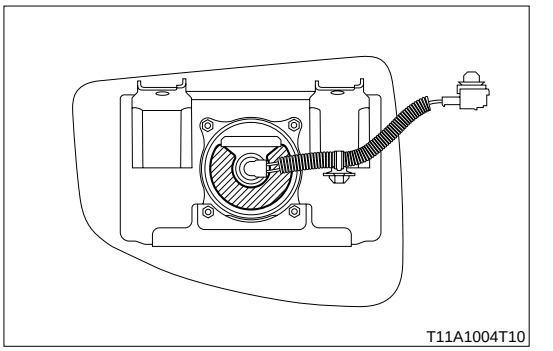
The bag deploys momentarily when the gas filled in the bag ruptures the bag protective cloth provided at the upper surface of the SRS airbag at the front passenger seat side, and the retainer and instrument panel are cracked in an H-shape. After impacts to the head of the front passenger has been sustained, the gas is released through the discharge port provided both at the right and left sides of the back side of the bag. Consequently, the impacts to the front passenger are alleviated.

3-2-3 INFLATOR

1. The inflator consists of a squib, propagating agent, gas generating agent, etc. The gas generating agent is the source to generate nitrogen gas to deploy the airbag in the event of a collision. The inflator has a tightly-sealed structure.
2. When the squib is energized due to the deceleration caused by a collision, the filament located inside the squib will be heated.Consequently, the firing agent is ignited.Then, the flame propagates to the propagating agent and gas generating agent in an extremely short length of time. Thus, a great amount of nitrogen gas is generated from the gas generating agent.Nitrogen gas passes through the filter to be cooled down and to remove burnt debris.
   Thus, the bag is filled with gas.

3-2-4 CAUTION PLATE

A caution plate is placed at the location shown in the figure.



3-3 SEATBELTS WITH THE PRETENSIONER AND THE FORCE LIMITER

3-3-1 DESCRIPTION

1.Seatbelts with the pretensioner＋ force limiter are mounted to the driver and front passenger seats.

3-3-2 CONSTRUCTION

1.The pretensioner mechanism consists of a generator gas, cartridge base, piston, pinion, roller, sleeve, etc.

2.The force limiter mechanism consists of an torsion shaft, etc.

3-3-3 PRETENSIONER MECHANISM

1.This mechanism is activated simultaneously with the airbag by the ignition signal from the airbag ECU in the event of a collision. This mechanism rewinds a certain amount of the seatbelts to hold occupants in position earlier and faster .

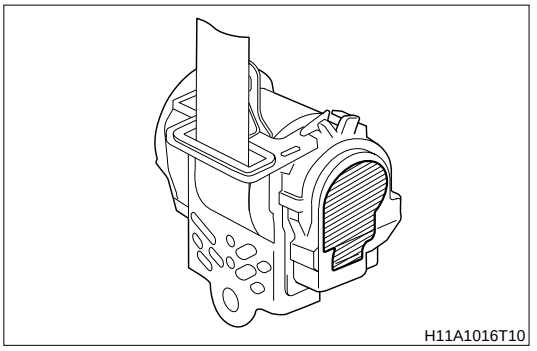
2.The system activates even when the seatbelts are not worn.

3-3-4 FORCE LIMITER MECHANISM

When the tension of the seatbelt exceeds a predetermined value in the event of a collision, the system loosens the seatbelt while maintaining a constant tension on the belt in order to protect the occupants from excessive forces.

3-3-5 CAUTION PLATE

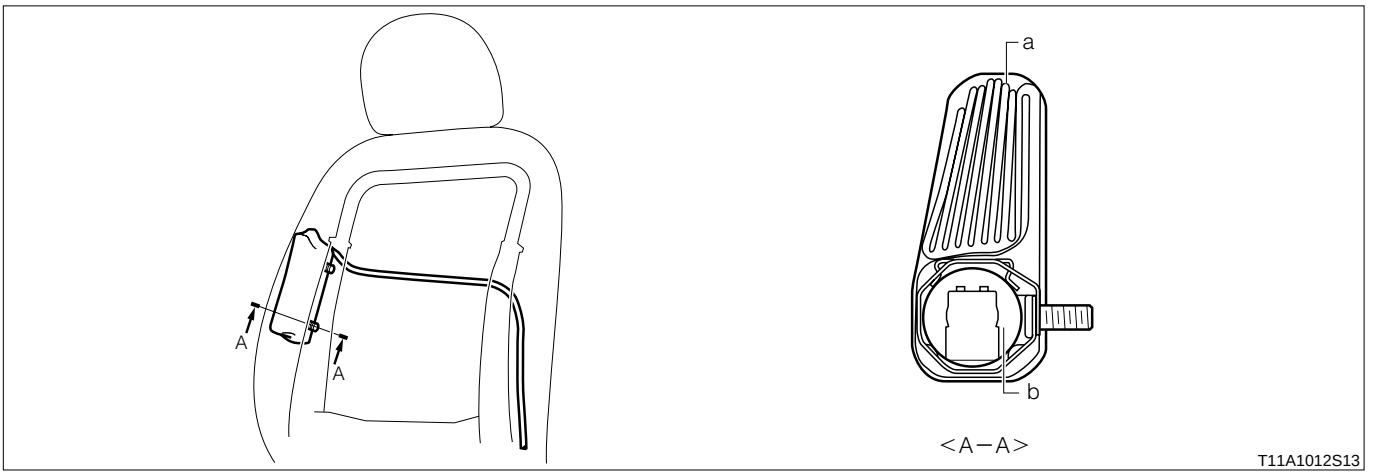
A caution plate is placed at the location shown in the figure.



3-4 SIDE AIRBAG

3-4-1 DESCRIPTION

Consists of a bag, an inflator, etc. All of these main components are located in the seat back.



a	BAG
b	Inflator

3-4-2 BAG

The bag deploys momentarily when the gas filled in the bag ruptures the sewed section of the seatback. After impacts to the chest of the passenger has been sustained, the gas is released through the opening section for the wire harness installation at the rear edge of the airbag. Consequently, the impacts to the passenger are alleviated.

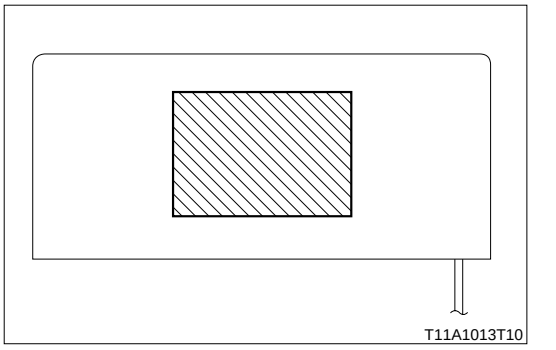
3-4-3 INFLATOR

The inflator consists of an ignition equipment, heating agent, and the pressure container that holds compression gas, etc. The inflator has a tightly-sealed structure.

When the squib device is energized by the deceleration in the event of a collision, the squib device is ignited. As a result, the heating agent is burnt, thus generating gas. Because of this gas, the pressure of the compressed gas inside the pressure container rises. Consequently, the bulkhead is broken by this pressure, thus discharging gas into the bag.

3-4-4 CAUTION PLATE

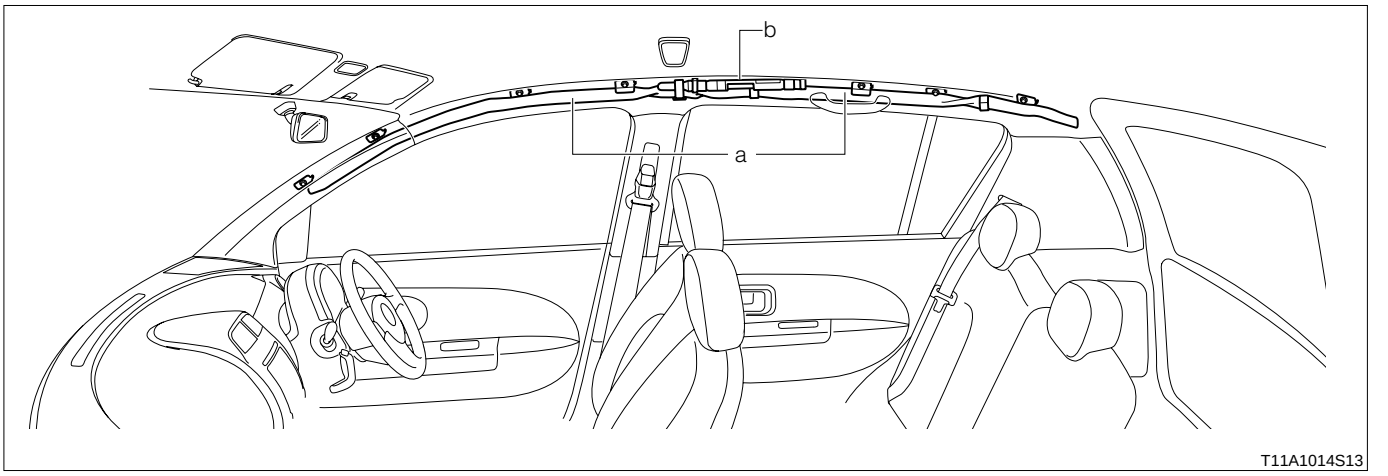
A caution plate is placed at the location shown in the figure.



3-5 CURTAIN SHIELD AIRBAG

3-5-1 DESCRIPTION

Consists of a bag, an inflator, etc. All of these main components are located in the area between the front pillar and the central section of the roof side.



a	BAG
b	Inflator

3-5-2 BAG

The gas filled in the bag instantly breaks the front pillar garnish and the roof head lining to deploy the airbag. The airbag absorbs the impact on the occupant's head and reduces the impact to the occupant by discharging gas from the seams of the bag.

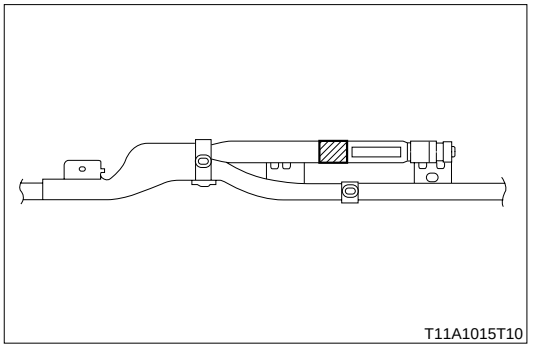
3-5-3 INFLATOR

The inflator consists of an ignition equipment, heating agent, and the pressure container that holds compression gas, etc. The inflator has a tightly-sealed structure.

When the squib device is energized by the deceleration in the event of a collision, the squib device is ignited. As a result, the heating agent is burnt, thus generating gas. Because of this gas, the pressure of the compressed gas inside the pressure container rises. Consequently, the bulkhead is broken by this pressure, thus discharging gas into the bag.

3-5-4 CAUTION PLATE

A caution plate is placed at the location shown in the figure.

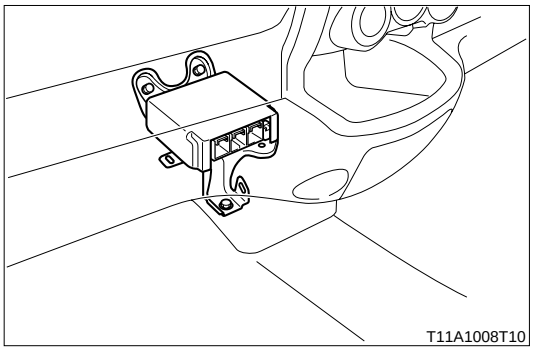


3-6 AIRBAG ECU

3-6-1 DESCRIPTION

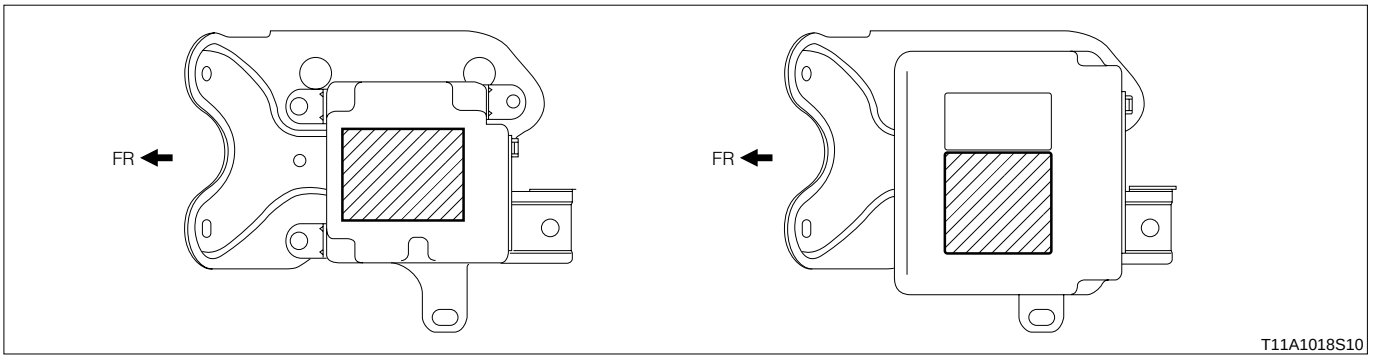
1.Consists of a G sensor, safing sensor, back-up power supply, diagnostic circuit, etc. The system is designed to provide highly reliable construction so that one failure will not lead to catastrophic failure of the entire system.

2.The G sensor in the airbag ECU also functions as a sensor for the fuel cut system. The airbag ECU constantly communicates with EFI ECU.



3-6-2 CAUTION PLATE

A caution plate is placed at the location shown in the figure.

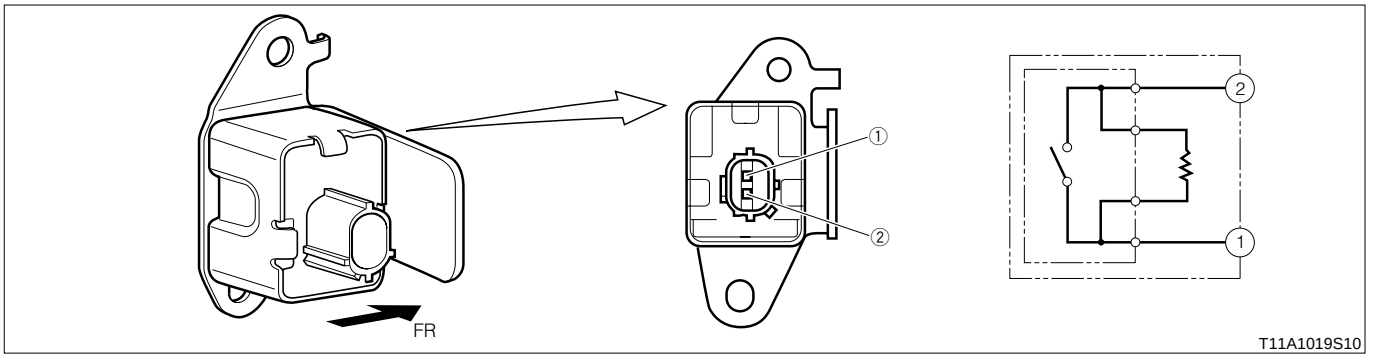


Left: Vehicle without side airbag Right: Vehicle with side airbag

3-7 FRONT AIRBAG SENSOR

3-7-1 OUTLINE

It is installed at the front side of the vehicle at the driver's seat side (on the side of the side member), which consists of the G sensor, etc.



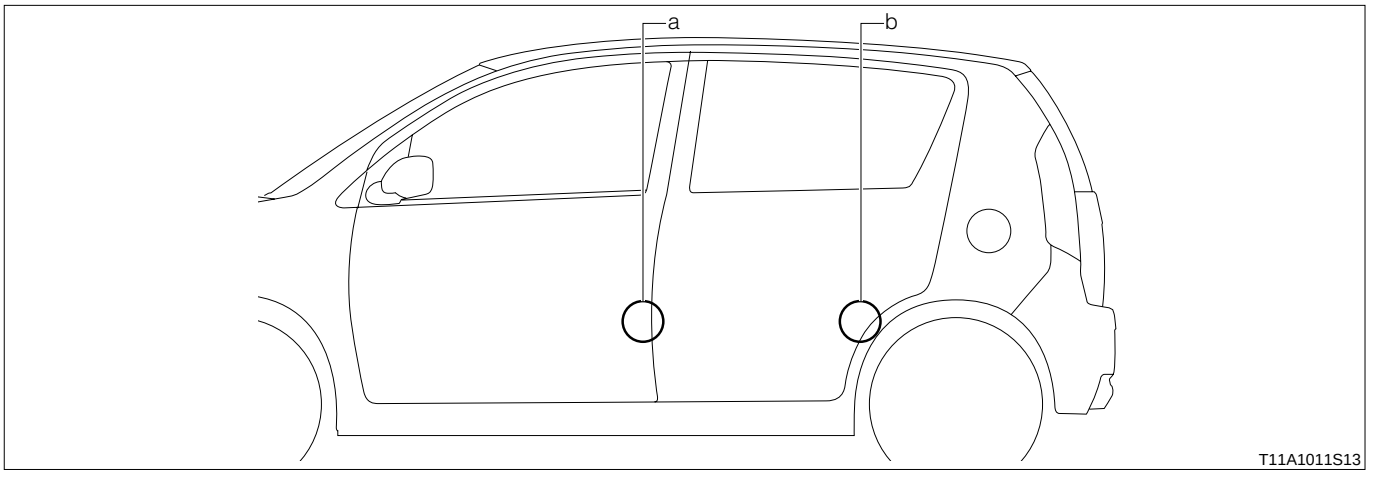
Left: External view Right: Circuit diagram

3-8 SIDE AIRBAG SENSOR & SIDE AIRBAG REAR SENSOR

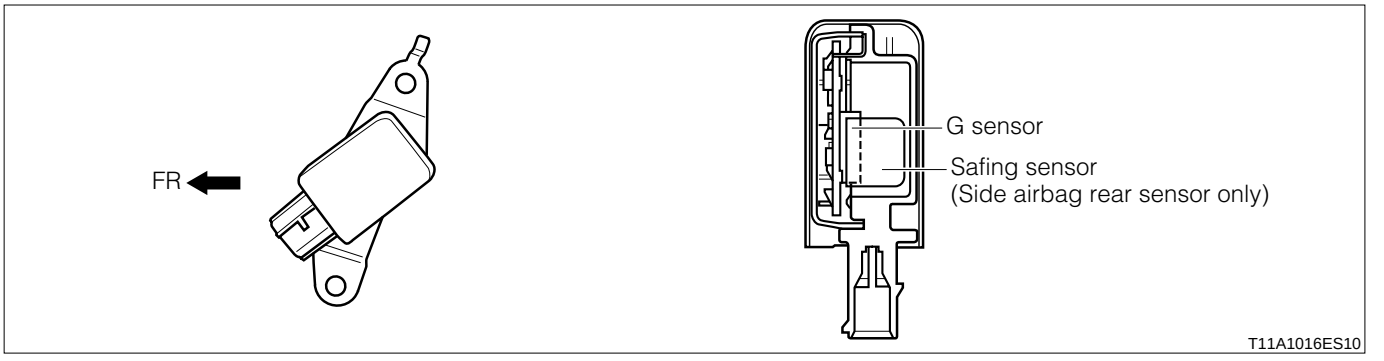
3-8-1 DESCRIPTION

1. The side airbag sensor is installed in the lower part of the center pillar RH/LH. The side airbag sensor consists of a semiconductor G sensor, a collision determination circuit, a communication circuit, etc., and transmits an ignition signal from the side airbag and the curtain shield airbag to the airbag ECU.
2. The side airbag rear sensor is installed in the quarter wheel house. The side airbag rear sensor consists of a semiconductor G sensor, a safing sensor, a collision detection circuit, a communication circuit, etc., and transmits an ignition signal from the curtain shield airbag to the airbag ECU.

Side airbag sensor & side airbag rear sensor mounting locations

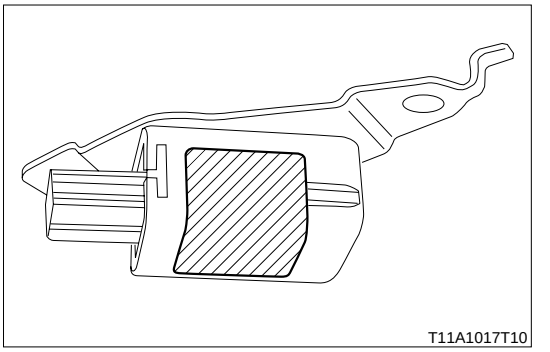


a	Side airbag sensor
b	Side airbag rear sensor



3-8-2 CAUTION PLATE

A caution plate is placed at the location shown in the figure.



3-9 SPIRAL CABLE

3-9-1 DESCRIPTION

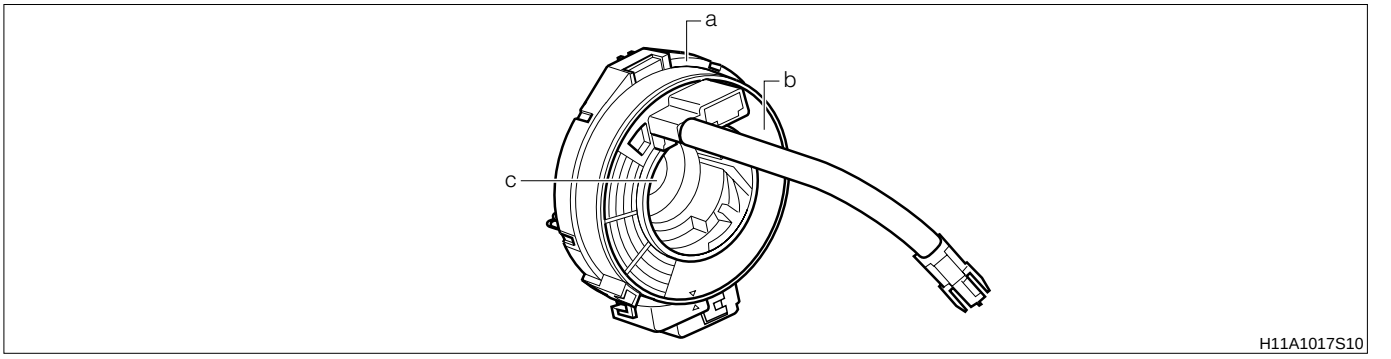
1.The non-contact point type spiral cable is used for wiring connection extending from the cowl wire harness to the driver's seat airbag.

2.The structure provides one-touch snap-on installation.

3-9-2 CONSTRUCTION

1.Consists of a rotator, case, cable, bearing, canceling cam, etc. They are integrated by engagement of the projection in the steering wheel with the groove in the canceling cam. When the steering wheel turns, the rotator turns together with the canceling cam.

2.The cable is folded in half and rolled in the case through the bearing. The rotator is given some allowance for three turns both to the right and the left from the neutral position.



a	Case
b	Rotator
c	Cancel cam

3-10 AIRBAG WARNING LAMP

Airbag warning lamp is installed in the combination meter, with the following functions provided.

(1) When the system is normal, the lamp lights up for approx. 6 seconds after the IG SW is turned on, and then turned off.

(2) When a malfunction occurs in the system, the lamp remains unlit without continuous lighting or lighting for 6 seconds.

(3) After the system started operation, the lamp remains blinking.

(4) Diagnosis code is outputted.

Refer to Page J3-12.

I1 BODY

OUTLINE ---------- I1 - 1
CONSTRUCTION AND OPERATION ----- I1 - 2
SAFETY PERFORMANCE ---------- I1 - 2
BODY SHELL ---------- I1 - 5
AERODYNAMIC PERFORMANCE ----- I1 - 7
OTHER BODY CONSTRUCTION ------- I1 - 7

1 OUTLINE

1.The vehicle features compatibility body frame structure to enhance passive safety, offering protection in all directions in a collision with a vehicle weighing more.

NOTE

- Compatibility body: This refers to the body structure that is designed to pursue compatibility in a collision between two vehicles of different weights and offer optimum protection for both vehicles, through an improvement in passive safety for the lighter vehicle and a reduction in aggressiveness of the heavier vehicle.

2.The vehicle features Total Advanced Function "TAF" to secure cabin space for survival in the event of a collision and to protect the occupants. "TAF" meets the Japan's passive safety standard (50 km/h frontal, side, and rear collisions) and the European passive safety standard (40% offset frontal collision at 56 km/h, side collision at 50 km/h). Moreover, Daihatsu Motor sets up our own stricter target levels to provide a highest level of protection for occupants in this class of the vehicles.

NOTE

- "TAF"(Total Advanced Function body) refers to a collision safety body that has been evolved totally.

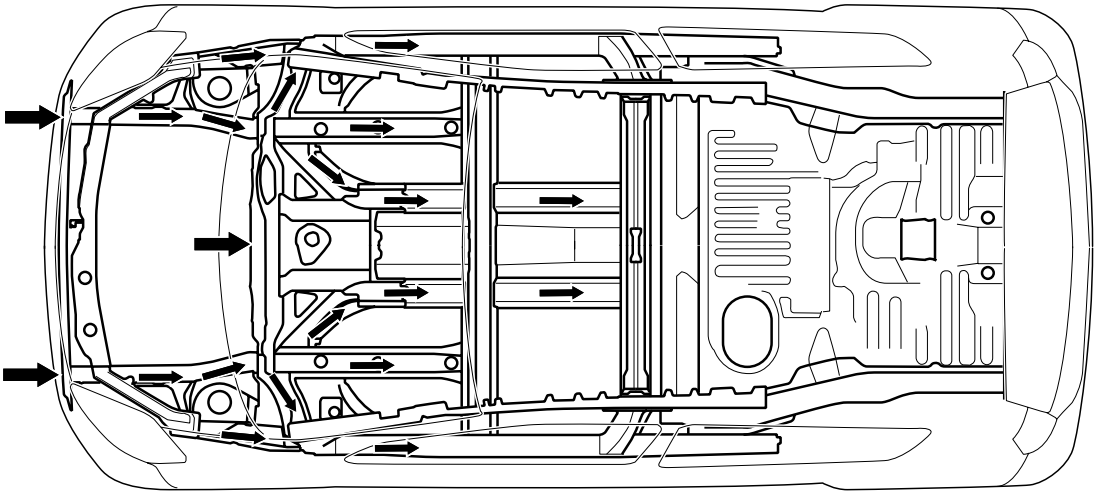
3.High-tension steel sheets have been employed on principal structure, thereby realizing a body that features light weight and high rigidity.

2 CONSTRUCTION AND OPERATION

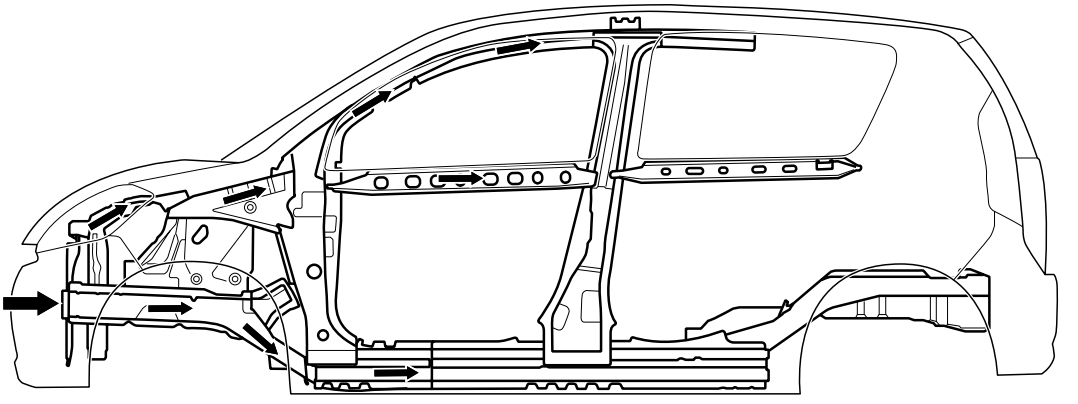
2-1 SAFETY PERFORMANCE

2-1-1 FRONT ENERGY ABSORPTION CONSTRUCTION

The vehicle features body frame structure that efficiently dissipates energy in a frontal impact from the front side member front to the front side member rear, front body pillar, locker panel, side door belt line, etc., to secure cabin space for occupant protection.



<Top view>

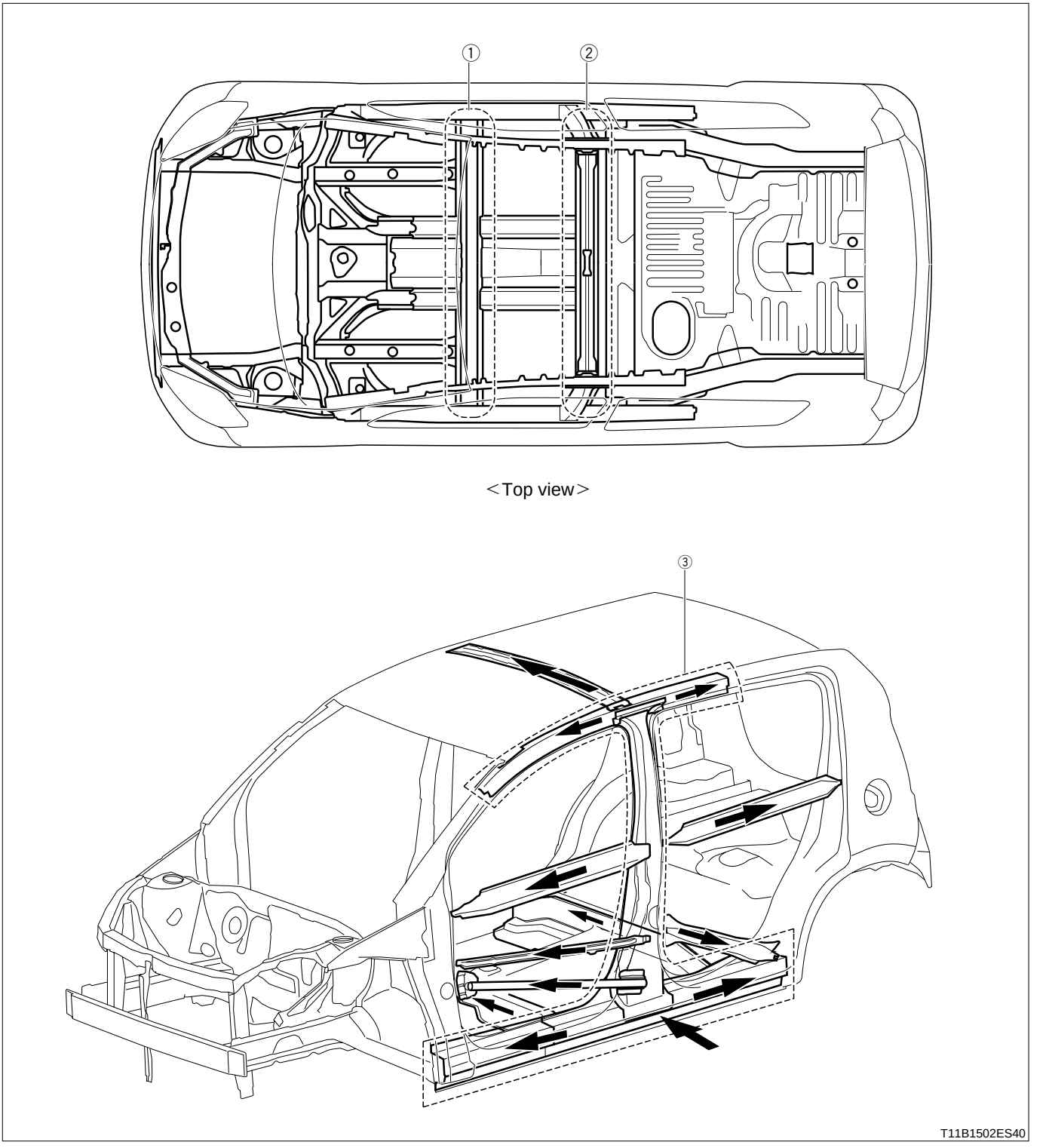


<Side view>

T11B1001ES45

2-1-2 SIDE ENERGY ABSORPTION CONSTRUCTION

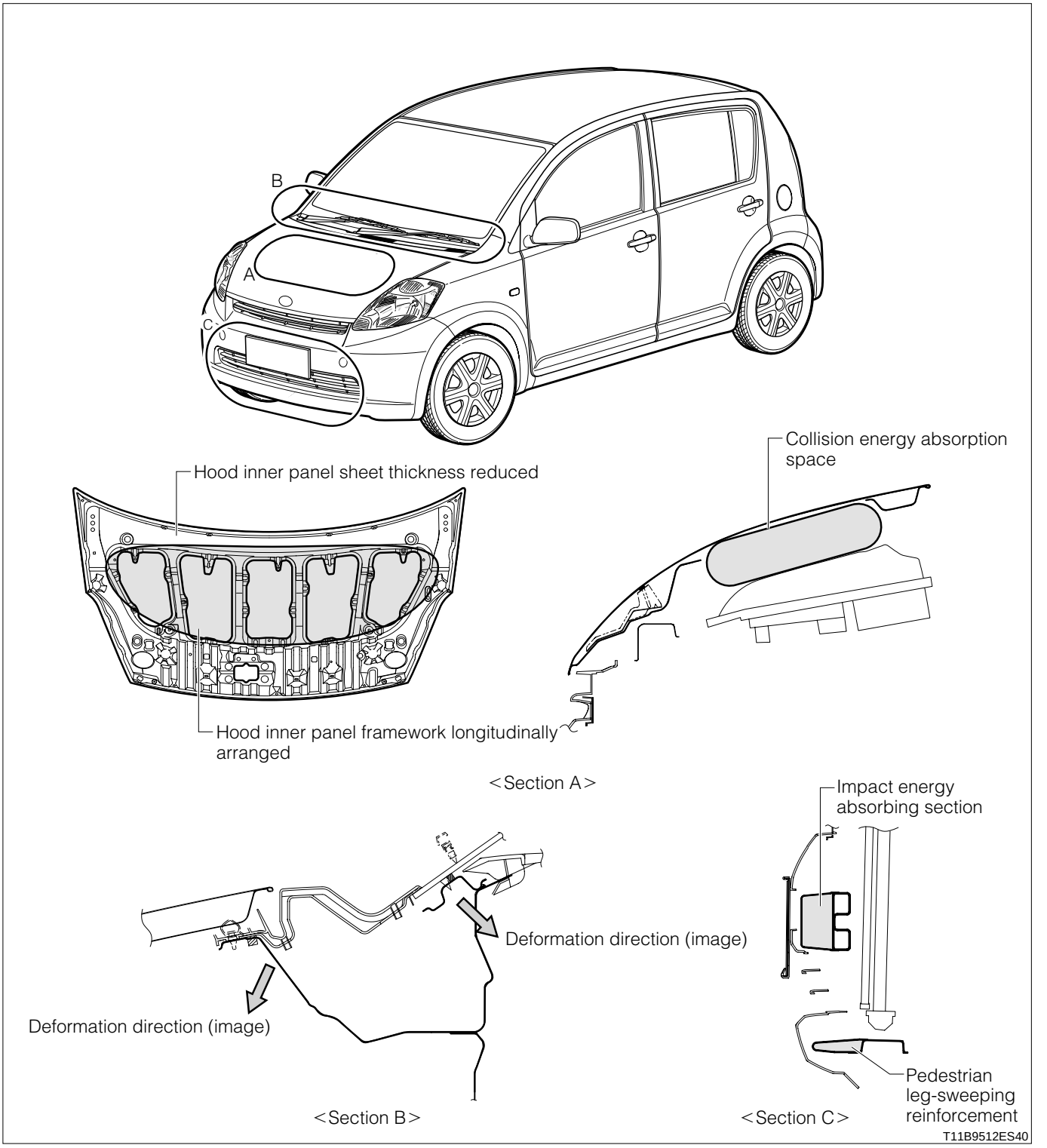
The collision energy from the side can be dispersed effectively to the center body pillars, roof side rails and locker panels. Consequently, the passenger compartment space for protecting occupants has been assured.



①	The front seat body mounting area (the joint section of the front floor cross member to the front floor tunnel, and the joint section of the front floor cross member to the rocker inner panel) has been reinforced in order to secure the cabin space for survival of the occupants in the event of a collision.
②	The rear floor cross member has been straightened to absorb side impact forces.
③	The bearing forces of the rocker panel, center pillar, and roof side rail are optimized to reduce the amount of body deformation and to secure survival space for occupants.

2-1-3 PEDESTRIAN INJURY REDUCTION BODY CONSTRUCTION

1.The vehicle features body structure to reduce the injuries to pedestrians in the event of a collision involving a pedestrian.
2.Regarding the hood panel, the thickness of the inner panel is reduced and the frame is arranged longitudinally, while allowing space to the components in the engine compartment so that the injuries to pedestrians can be reduced.
3.A crushable structure has been adopted for the cowl panel to reduce the injuries to pedestrians.
4.In order to reduce injury to the pedestrian legs, an impact energy absorbing section is provided on the upper reinforcement of the front bumper of certain specifications and a pedestrian leg-sweeping reinforcement is provided at the lower section.



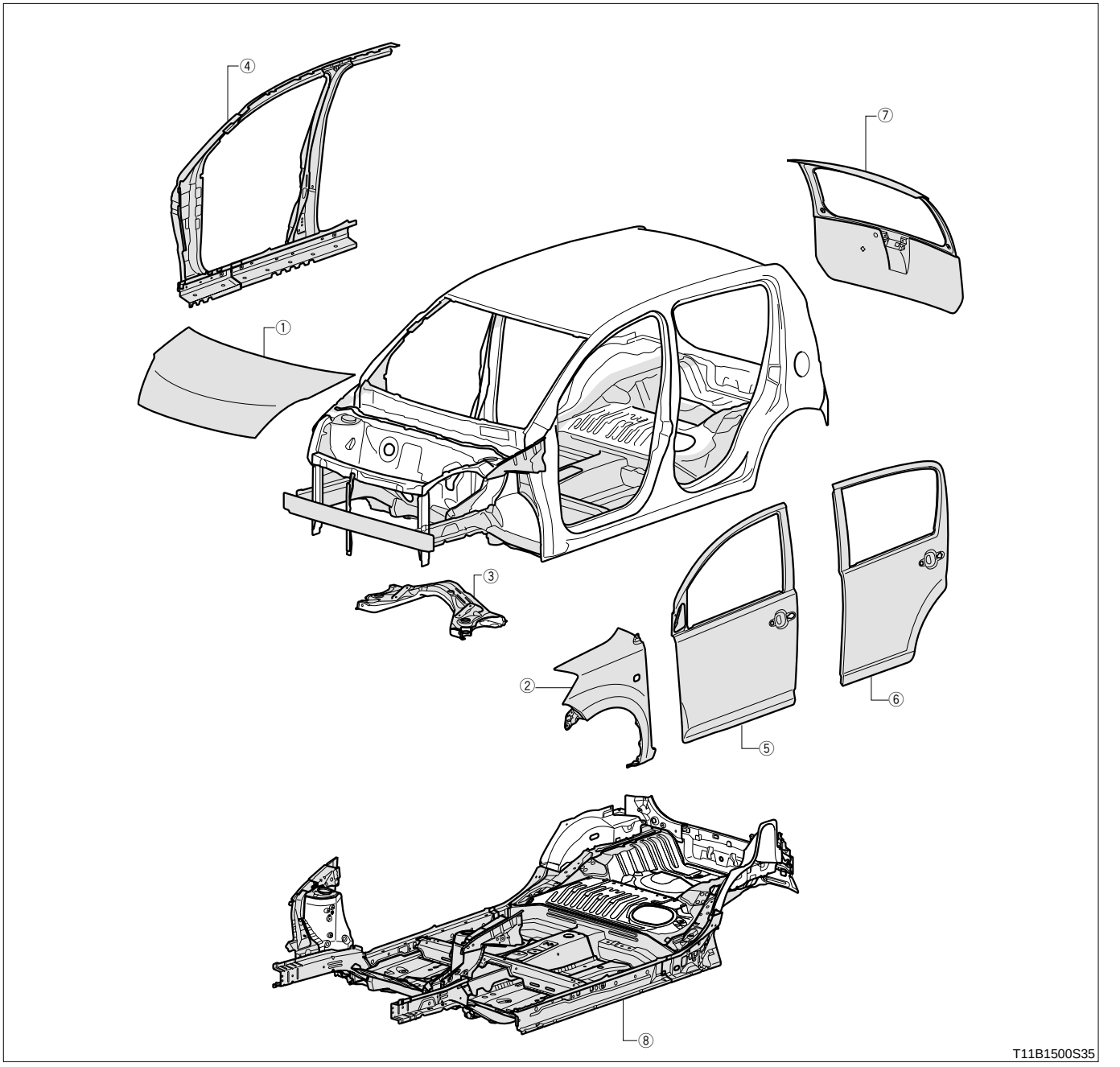
2-2 BODY SHELL

2-2-1 PARTS WHERE HIGH-TENSILE STEEL SHEETS ARE USED

High-tension steel sheets that features light weight and dent-resistance for local external forces have been employed at various sections so that weight reduction and high rigidity may be attained.

NOTE

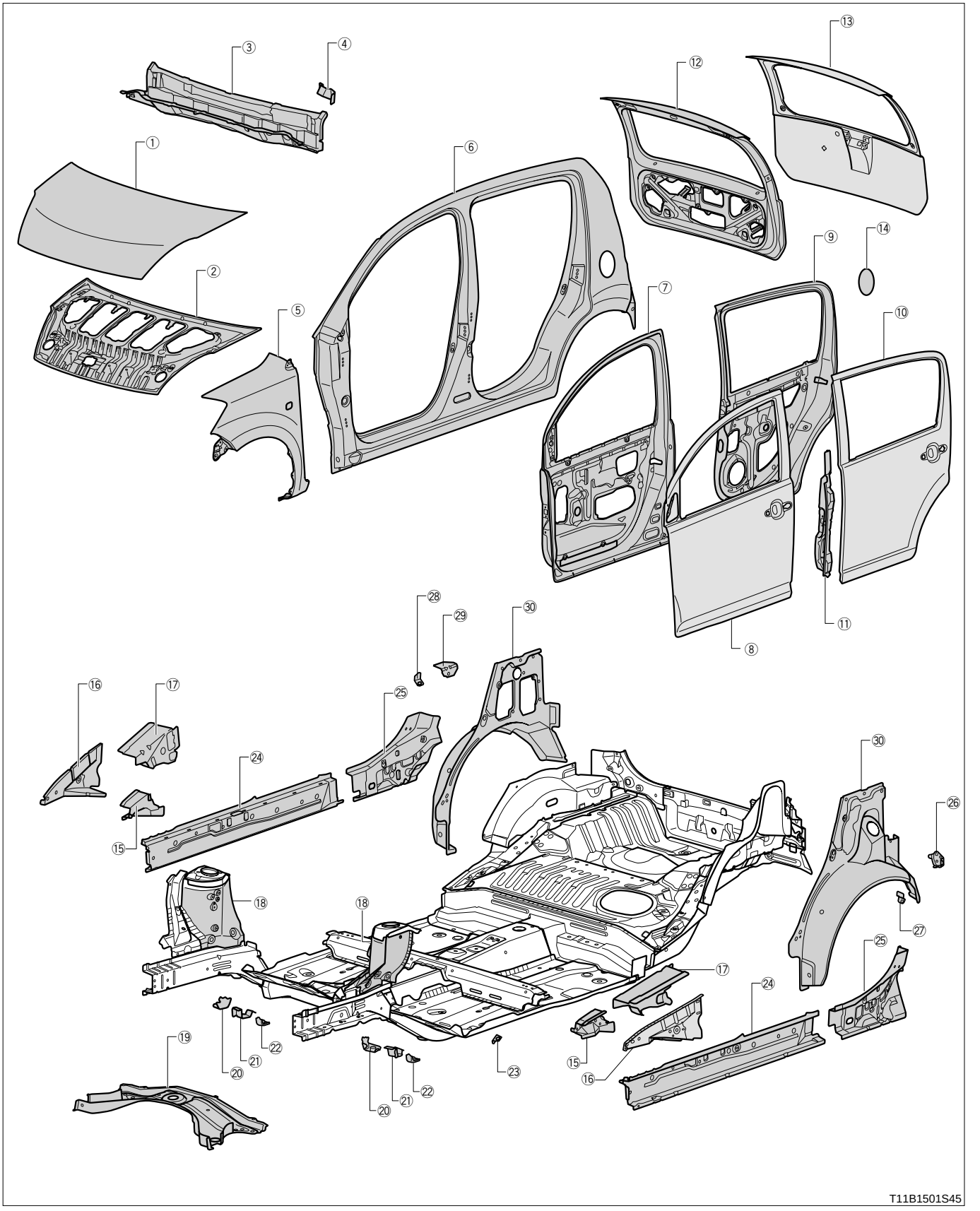
- Dent-resistance properties: When external forces (e.g. finger pressure during door opening or closing periods or flying stones) are locally applied to outer panels of motor vehicles, very small dents may be formed (Dentability). Properties that have resistance to these dents are called dent-resistance properties.



	Applicable components		Applicable components
①	Hood panel	⑤	Front door outside panel RH/LH
②	Front fender panel	⑥	Rear door outside panel RH/LH
③	Suspension Member	⑦	Back door outside panel
④	Reinforcement around front door	⑧	Front floor side member

2-2-2 PARTS WHERE ANTI-RUST STEEL SHEETS ARE USED

For better anti-rust effect, the corrosion-resistant steel plate has been adopted for components that require more stringent conditions concerning rust formation.



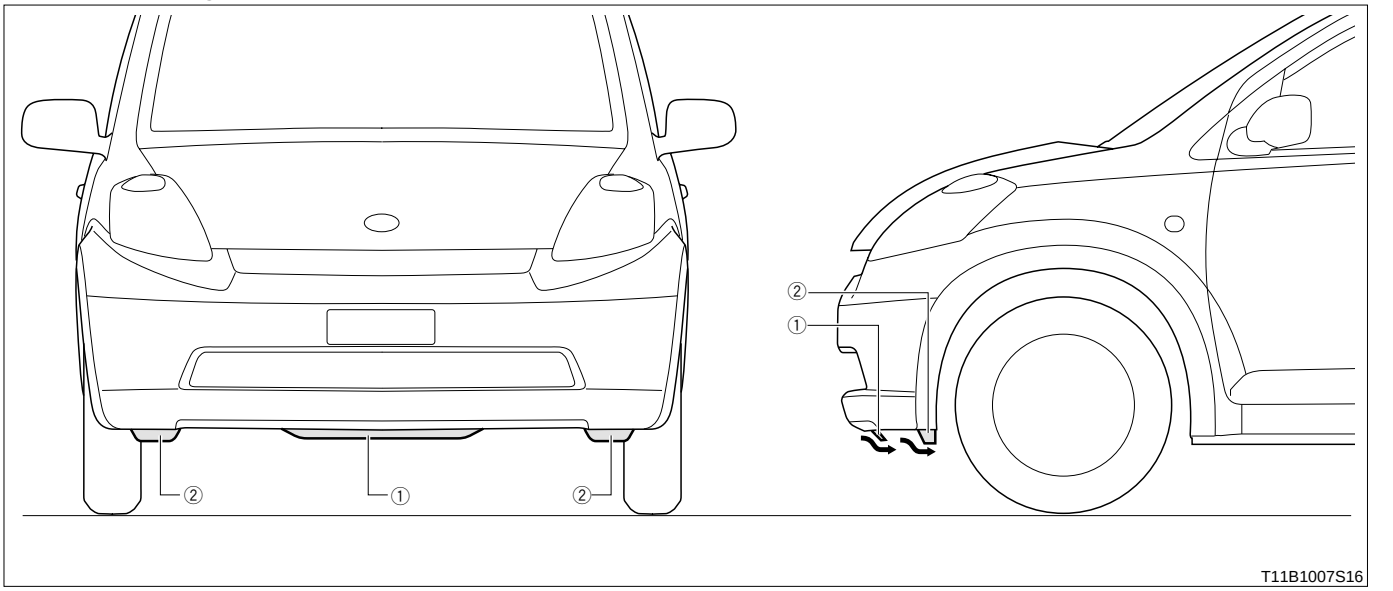
	Part name		Part name
①	Hood panel	⑯	Cowl top side panel RH/LH
②	Hood inner panel	⑰	Cowl top side inner panel RH/LH
③	Cowl top inner panel	⑱	Front fender apron RH/LH
④	Wiper shaft side retainer	⑲	Front suspension lower
⑤	Front fender panel RH/LH	⑳	Brake actuator mounting reinforcement No.1 RH/LH
⑥	Side outer panel RH/LH	㉑	Front suspension member mounting bracket RH/LH
⑦	Front door inside panel RH/LH	㉒	Suspension member spacer reinforcement RH/LH
⑧	Front door outside panel RH/LH	㉓	Flexible hose bracket No.1
⑨	Rear door inside panel RH/LH	㉔	Floor side inner member RH/LH
⑩	Rear door outside panel RH/LH	㉕	Floor side inner rear member RH/LH
⑪	Rear door hinge side panel RH/LH	㉖	Parking brake cable guide bracket No.2 LH
⑫	Back door inside panel	㉗	Parking brake cable guide bracket No.4
⑬	Back door outside panel	㉘	Floor brake hose rear bracket RH
⑭	Fuel filler opening outer lid	㉙	Rear absorber mounting reinforcement
⑮	Front apron to cowl side upper member RH/LH	㉚	Quarter inner panel lower RH/LH

2-3 AERODYNAMIC PERFORMANCE

2-3-1 UNDERBODY AIR FLOW REGULATING ITEM

1.As for the front bumper of the aero-bumper equipped vehicles, its front end has been lowered to rectify the air stream under the floor so that the air resistance may be reduced.

2.The front bumper for the vehicle equipped with the standard bumper features the lip spoiler shape while lowering the front end to control under floor air stream and help reduce air resistance. (Figure below ①) Also the fender liner for the vehicle equipped with the standard-bumper features the spats-like shape at the front end lower to control air stream in front of the tires and help reduce air flow into the tires. (Figure below ②)

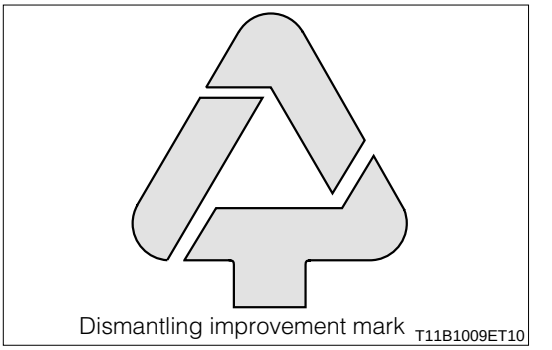


T11B1007S16

2-4 OTHER BODY CONSTRUCTION

2-4-1 MARK FACILITATING DISASSEMBLY

Dismantling improvement markings are placed on the large-sized parts such as the front bumper, door trim, deck side trim, and instrument panel. These markings help identify what to be removed and improve disassembly workability. This way, our efforts toward recycling can be expected to attract more attention from users.



Dismantling improvement mark T11B1009ET10

TO INDEX TO NEXT SECTION

I2 EXTERIOR/INTERIOR

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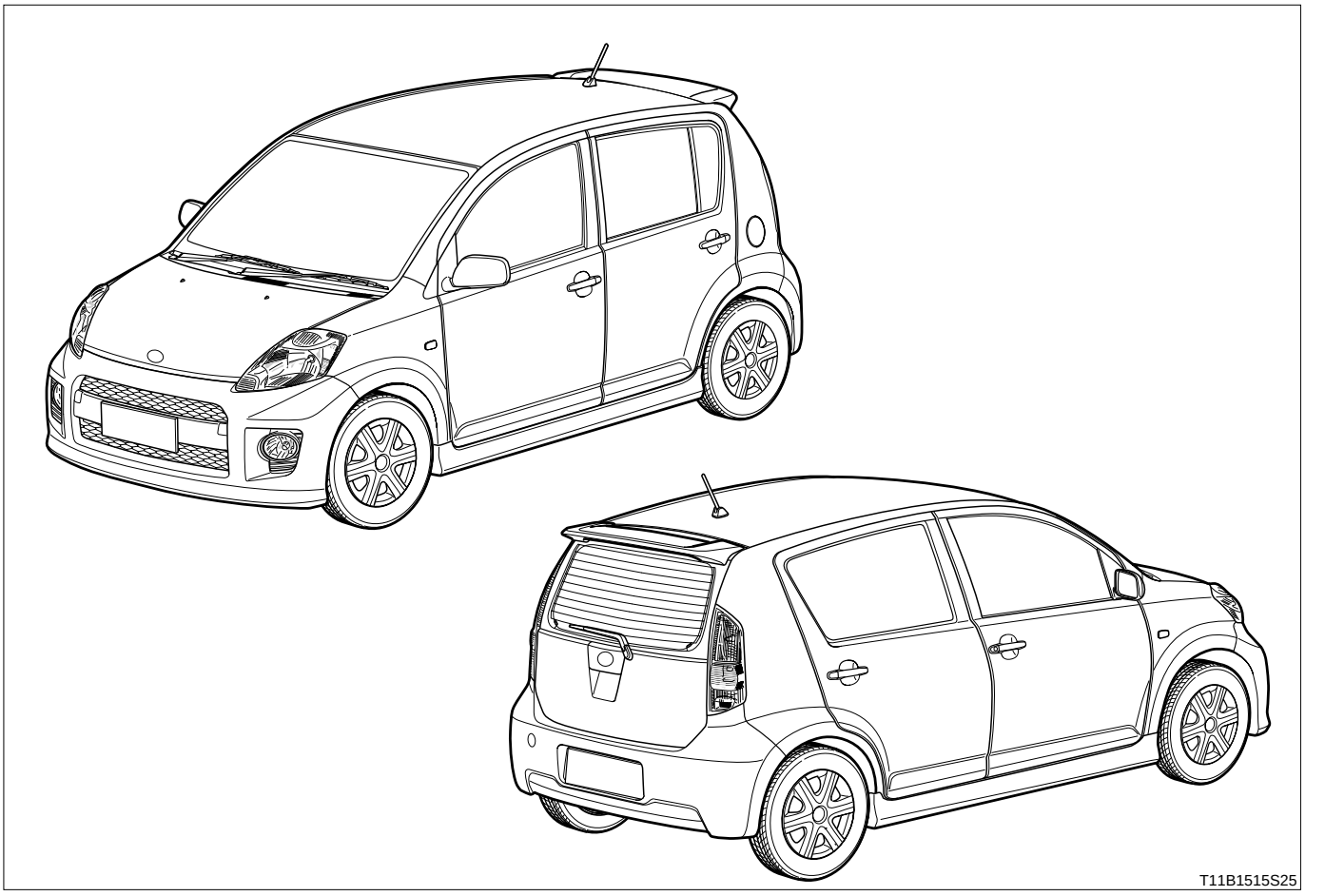
OUTLINE ---------- I2 - 1
CONSTRUCTION AND OPERATION ----- I2 - 2
BODY COLOR ---------- I2 - 2
INTERIOR ---------- I2 - 3
OUTLINE ---------- I2 - 3
CONSTRUCTION AND OPERATION ----- I2 - 4
INSTRUMENT PANEL ---------- I2 - 4
DOOR TRIM ---------- I2 - 6
SEAT ---------- I2 - 6
SEAT BELT ---------- I2 - 10

EXTERIOR

1 OUTLINE

1. An impression of a big cabin is given with a new image featuring a very short nose and short overhang.
2. In addition to the short overhang, an overwhelming robustness and a feeling of realism are expressed by the flare shape having a feeling of oneness with the bumper, emphasizing the wide tread.
3. The aero specification vehicle in which a large-sized aero bumper, etc. is equipped has been provided.
4. Taking into consideration comfortable use of the rear seats and for easier entry/exit of passengers, the rear doors employ a door which opens as widely as approx. 80 degrees.



T11B1515S25

The illustration represents a major example.

2 CONSTRUCTION AND OPERATION

2-1 BODY COLOR

2-1-1 DESCRIPTION

There are a total of ten colors for the body outer panel color, including the new Daihatsu colors B57, G40 and R43.

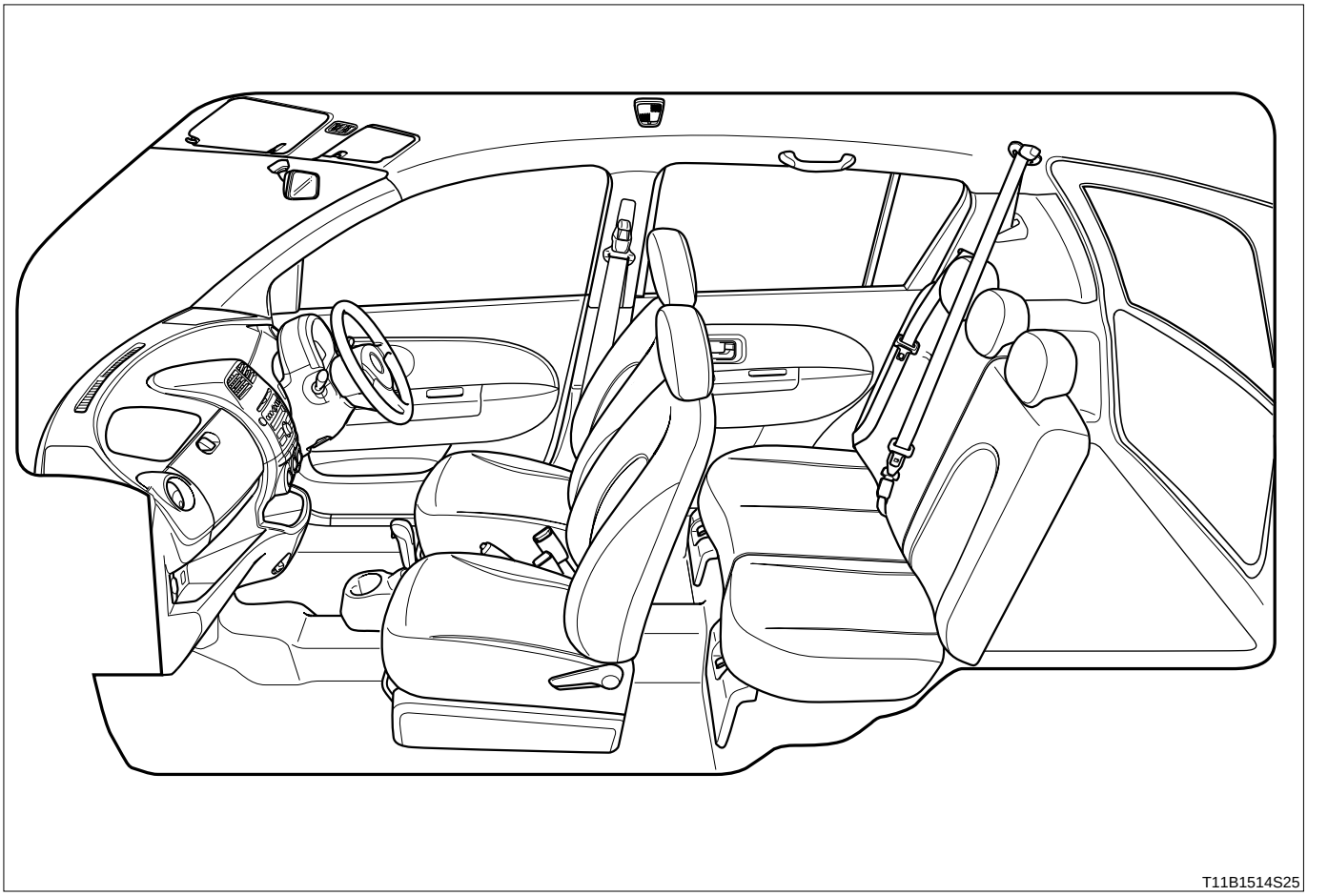
2-1-2 COLOR NO.

Color No.	Color Name
B42	Dark blue mica metallic
B57	Mint blue metallic opal
G40	Lime green metallic
R40	Shining red
R43	Cassis pink metallic
S28	Bright silver metallic
T17	Champagne metallic opal
W09	White
W16	Pearl white I
X07	Black mica metallic

INTERIOR

1 OUTLINE

1.A simple, clean, lively, smart life-partner has been created.
2.The large round extending from the instrument panel to the door trim creates an impression of a spacious vehicle interior and an open feeling.
3.The three-point type ELR-VW seat belt is provided on the rear central seat on some specifications.
4.A headrest is provided at the center of the rear seat of some specifications.



T11B1514S25

The illustration represents a major example.

2 CONSTRUCTION AND OPERATION

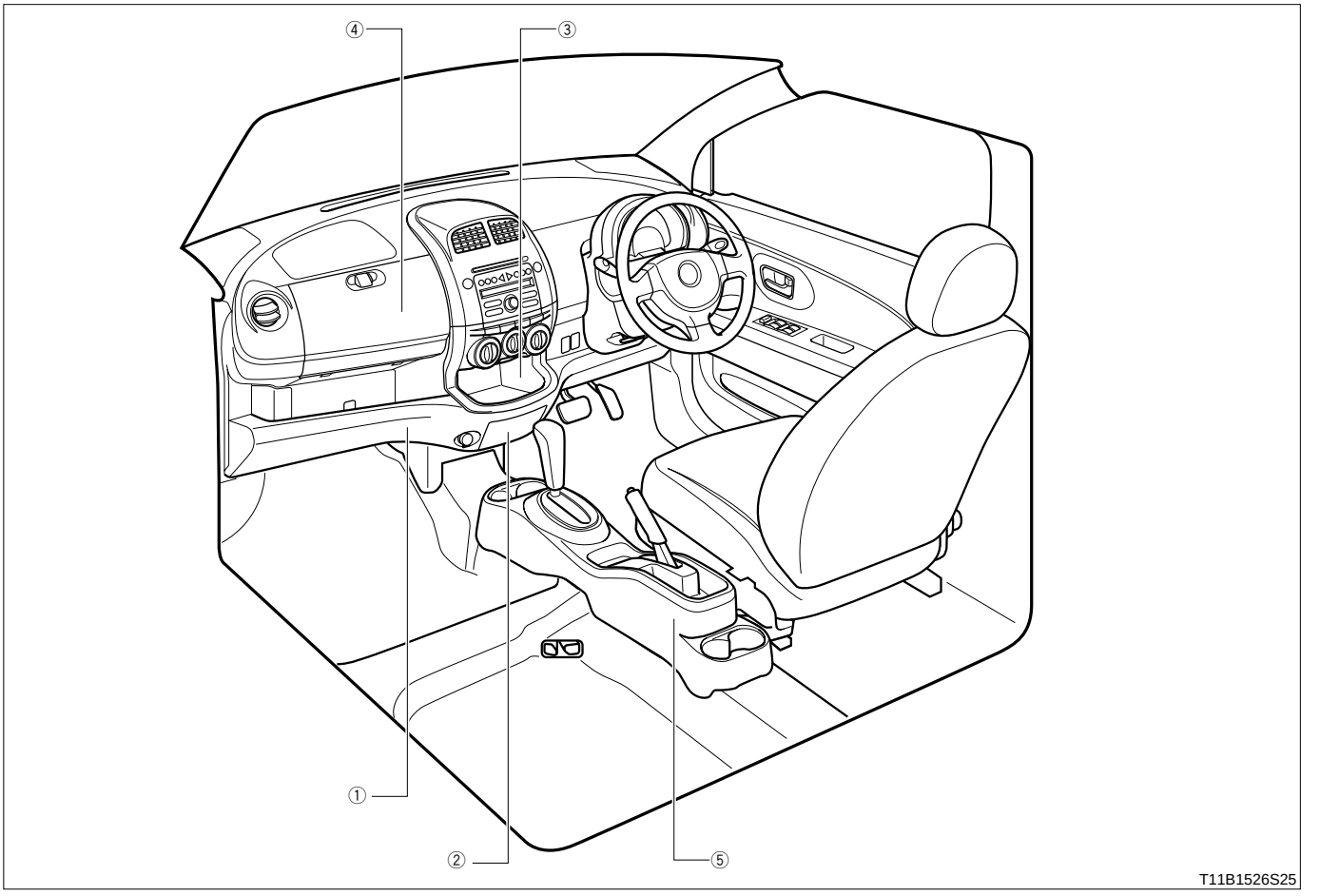
2-1 INSTRUMENT PANEL

2-1-1 DESCRIPTION

1.The instrument panel is made up of two sections of upper side and lower side, highlighting a two-tone color. The upper section employs a simple and natural design, whereas the lower section features a highly functional stile as a utility space.

2.The upper section has a dimpled grainy finish to improve the feeling of the material.

3.For enhanced storage spaces, a lot of storage space is provided, starting with the multi tray, center lower box, upper-and-lower divided glove box and the wide free rack.



T11B1526S25

The illustration represents a major example.

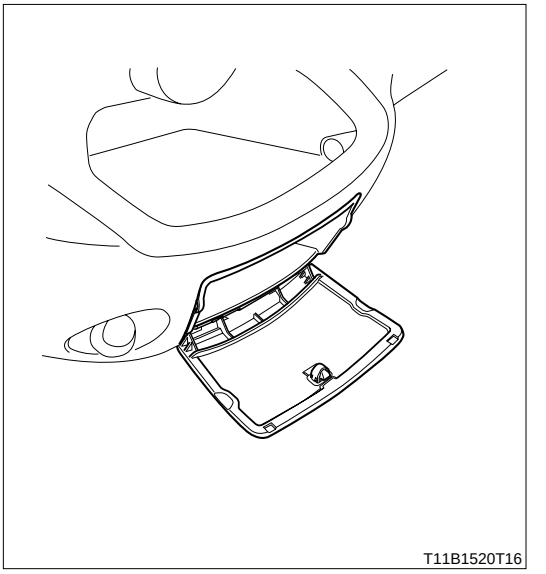
①	Wide free rack
②	Utility box
③	Multi tray
④	Upper-and-lower divided glove box
⑤	Console box

2-1-2 WIDE FREE RACK

For improved convenience, a wide free rack is provided at the lower part of the glove box.

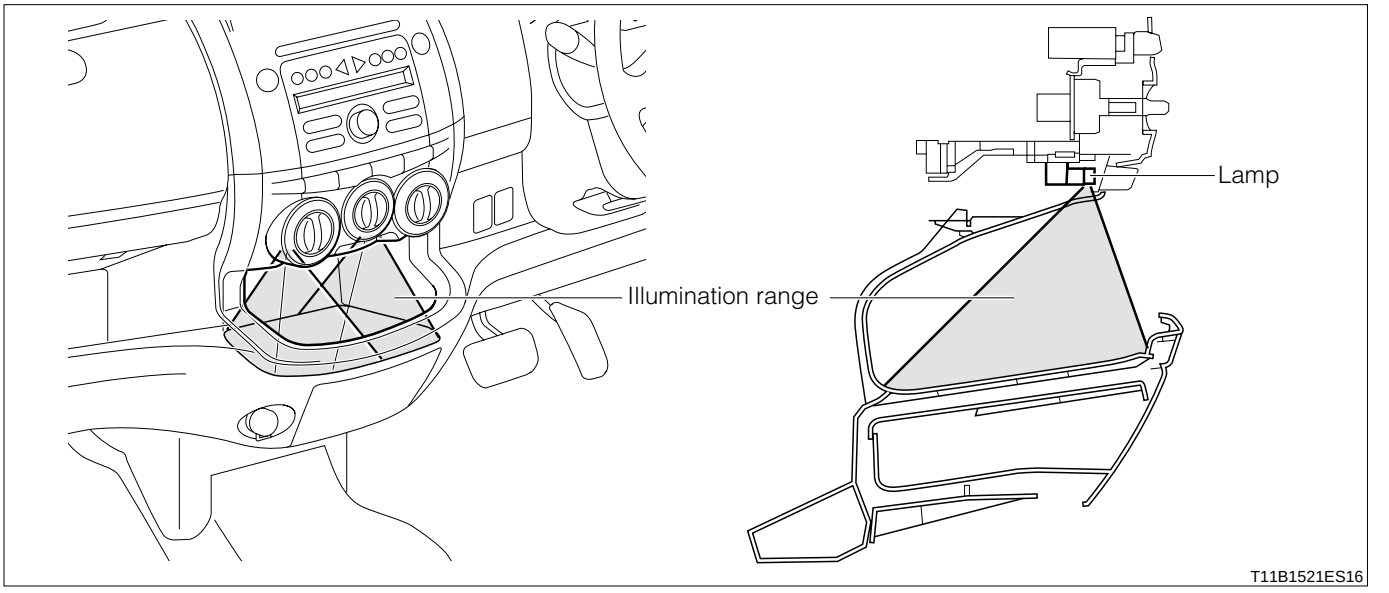
2-1-3 UTILITY BOX

For improved convenience, a utility box has been provided at the center cluster lower section (just below the multi-tray).



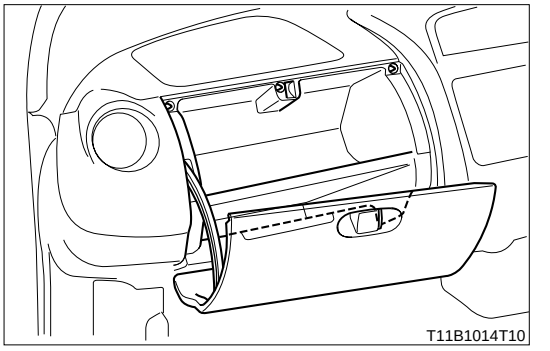
2-1-4 MULTI-TRAY

For improved convenience, a multi-tray with a night-illumination is provided at the lower section of the center cluster.



2-1-5 UPPER-AND-LOWER DIVIDED GLOVE BOX

For improved convenience, the glove box storage section is divided into two levels of an upper section and a lower section.

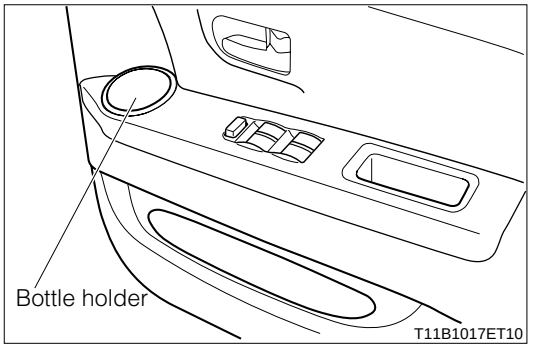


2-1-6 CONSOLE BOX

For improved convenience, a console box is provided between the front seats, which can serve as a bottle holder for the front seat·rear seat.

2-2 DOOR TRIM

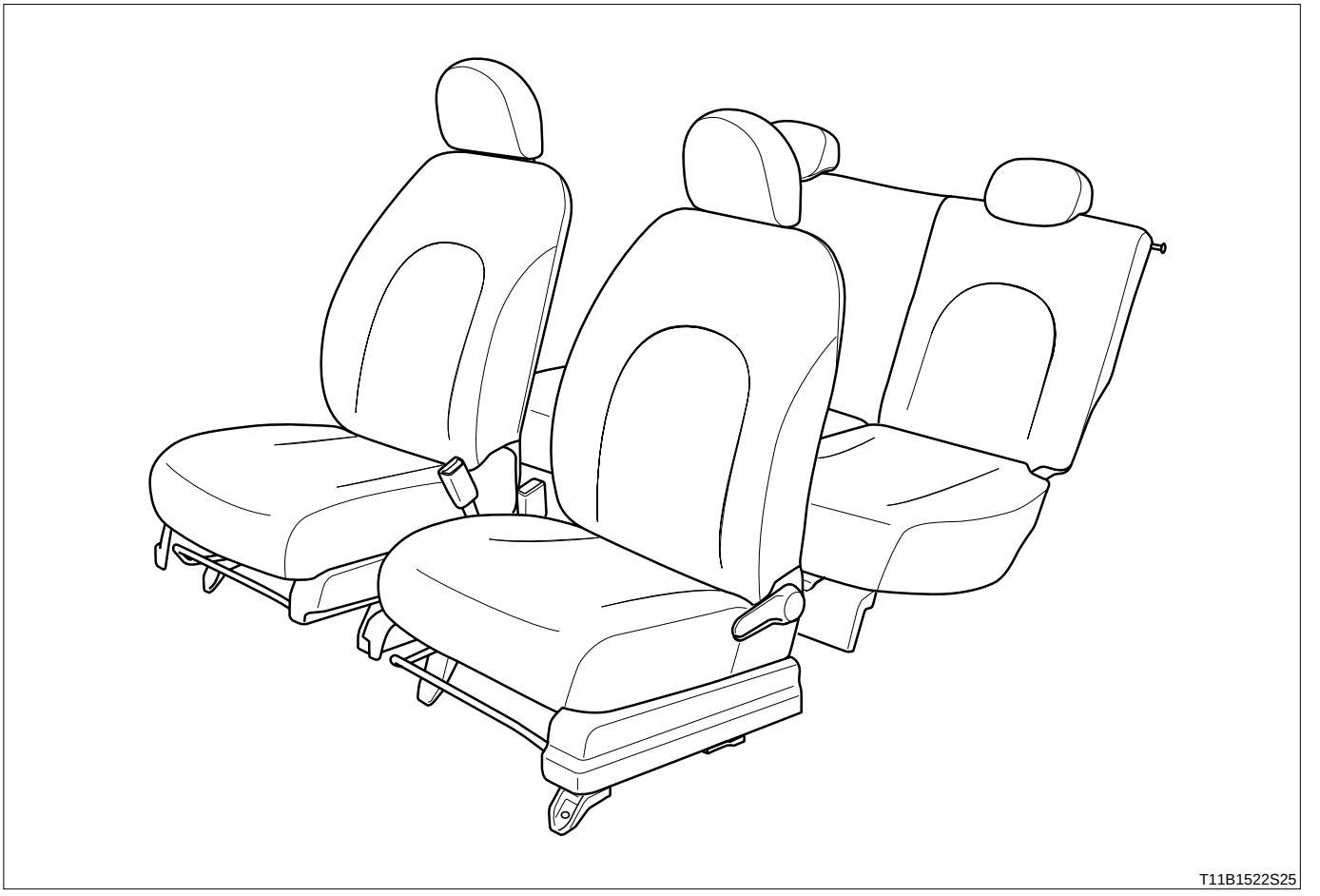
For improved convenience, a bottle holder is provided in the front door trim.



2-3 SEAT

2-3-1 DESCRIPTION

1.In order to achieve a light, stylish design, a simple and natural shape is employed.
2.For easier access from the front seat to the rear seat, the shoulder section of the seatback of the front seats has been rounded off.
3.All vehicles have employed a 6:4 dividing rear seats with a reclining mechanism, capable of the flat luggage mode and long cushion mode.
4.The ISOFIX bar for securing child seat and anchor bracket are provided at the rear seat of some specifications.

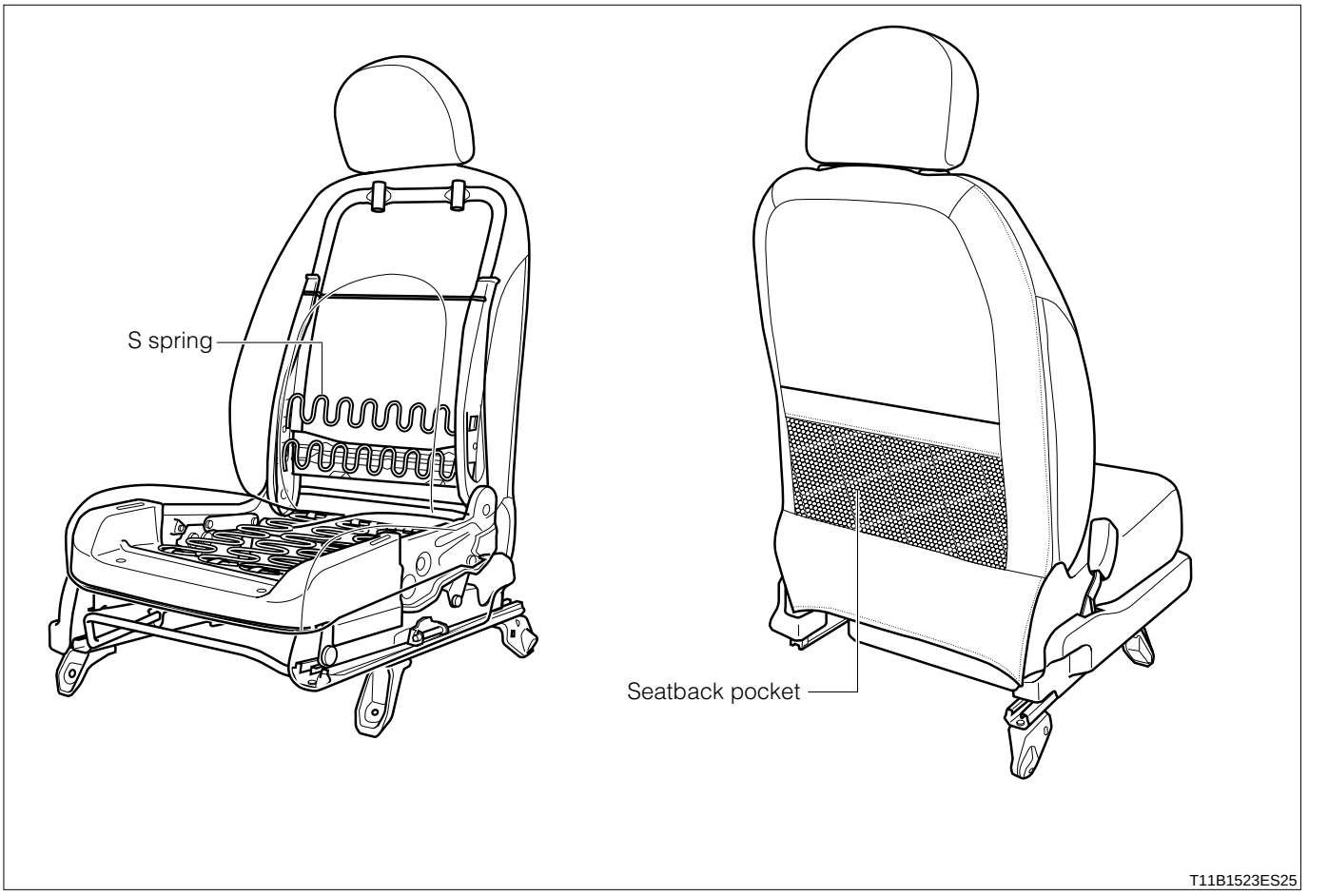


2-3-2 FRONT SEAT

(1) Seatback pocket

1.For enhanced absorption of the cushion vibration, the cushion support mechanism is of an S-spring construction.

2.A seatback pocket is provided on the back of the passenger seat, depending on the specifications.



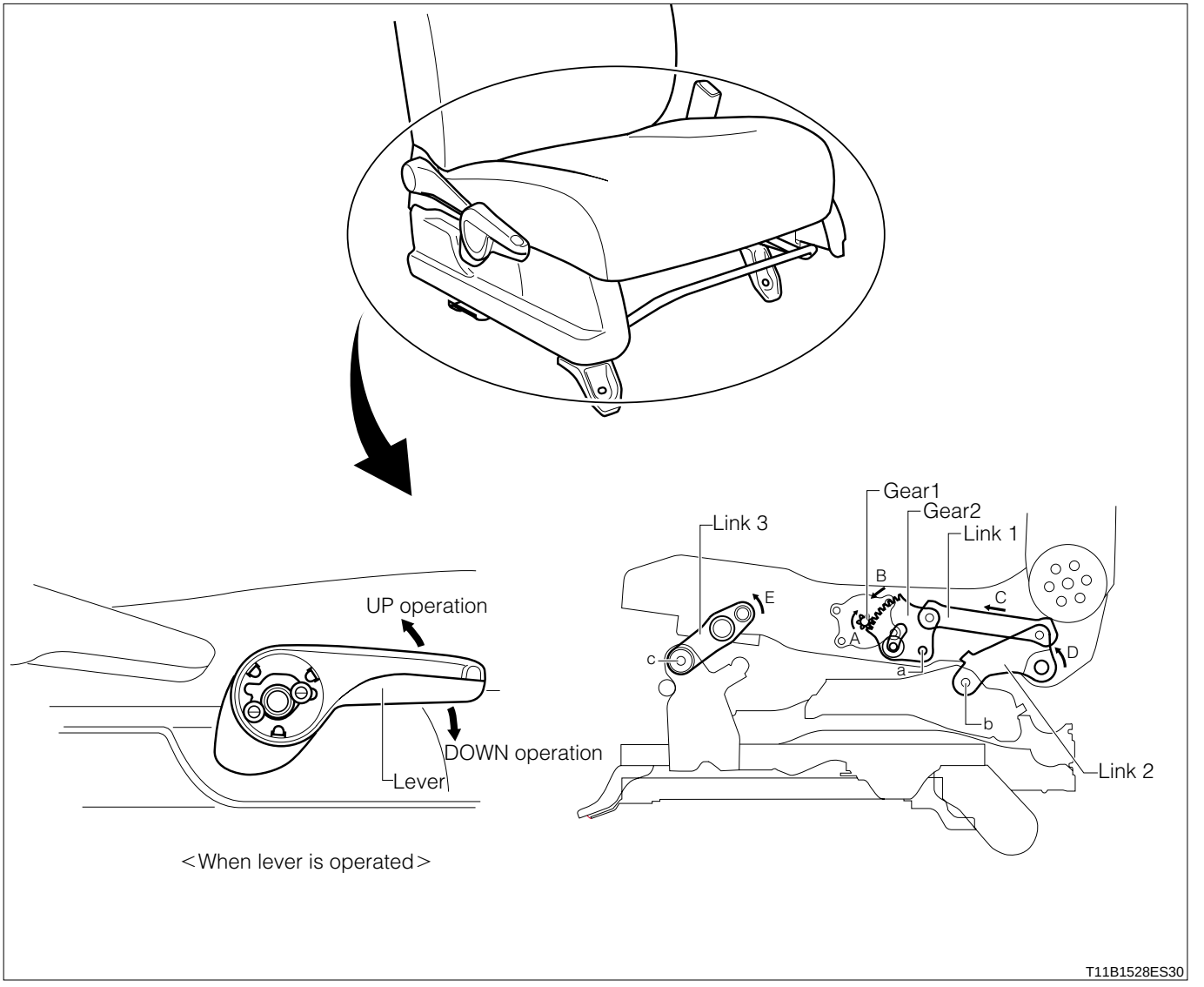
(2) Driver's seat lifter

1.When the seat is to be raised, set the lever on the driver's seat cushion side to the UP side. Thus, in interlocking with this operation, the gear 1 turns in the direction of the arrow A and the gear 2 turns in the direction of the arrow B about the fulcrum a.

2.The gear 2 is provided with the link 1. As a result of the turning of the gear 2 in the direction of the arrow B, the link 1 moves in the direction of C, and the link 2 turns in the direction of the arrow D about the fulcrum b.

3.When the link 2 turns in the direction of the arrow D, thus lifting the rear edge of the seat, the link 3 turns in the direction of the arrow E about the fulcrum C. Consequently, the whole seat is lifted up.

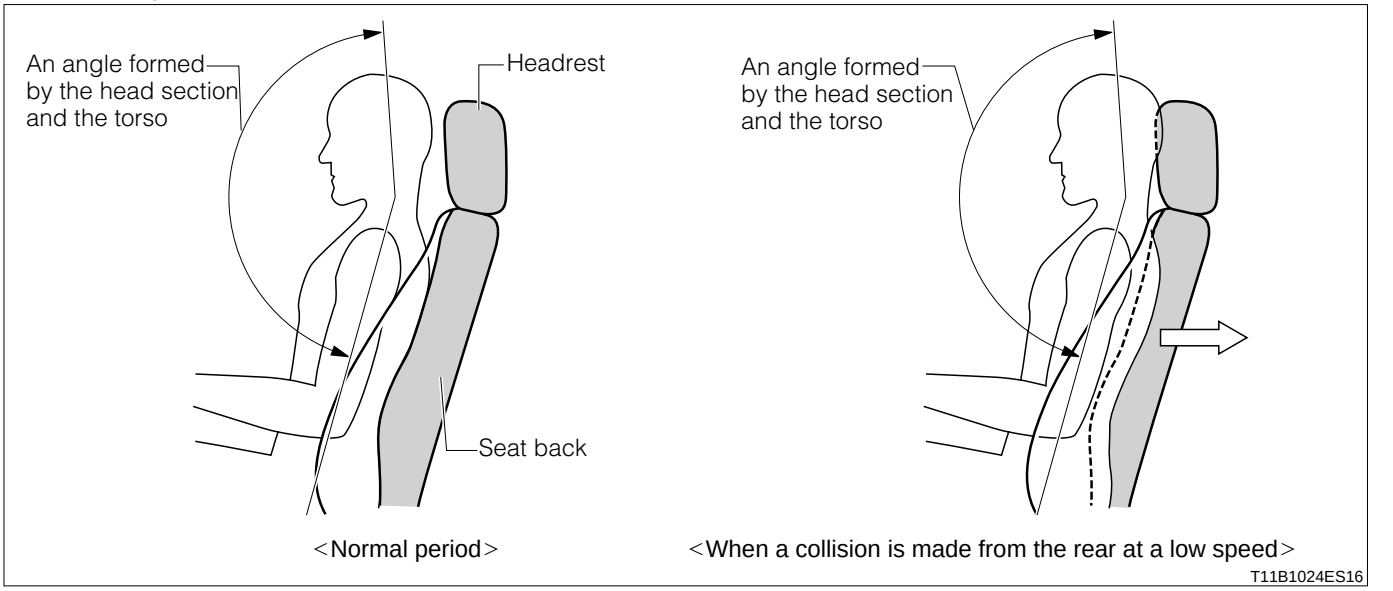
4.When the seat is lowered, set the leaver to the DOWN side. Thus, the respective gears and links operate in the reverse order of the UP operation.



T11B1528ES30

(3) WIL (Whiplash Injury Lessening) concept seat

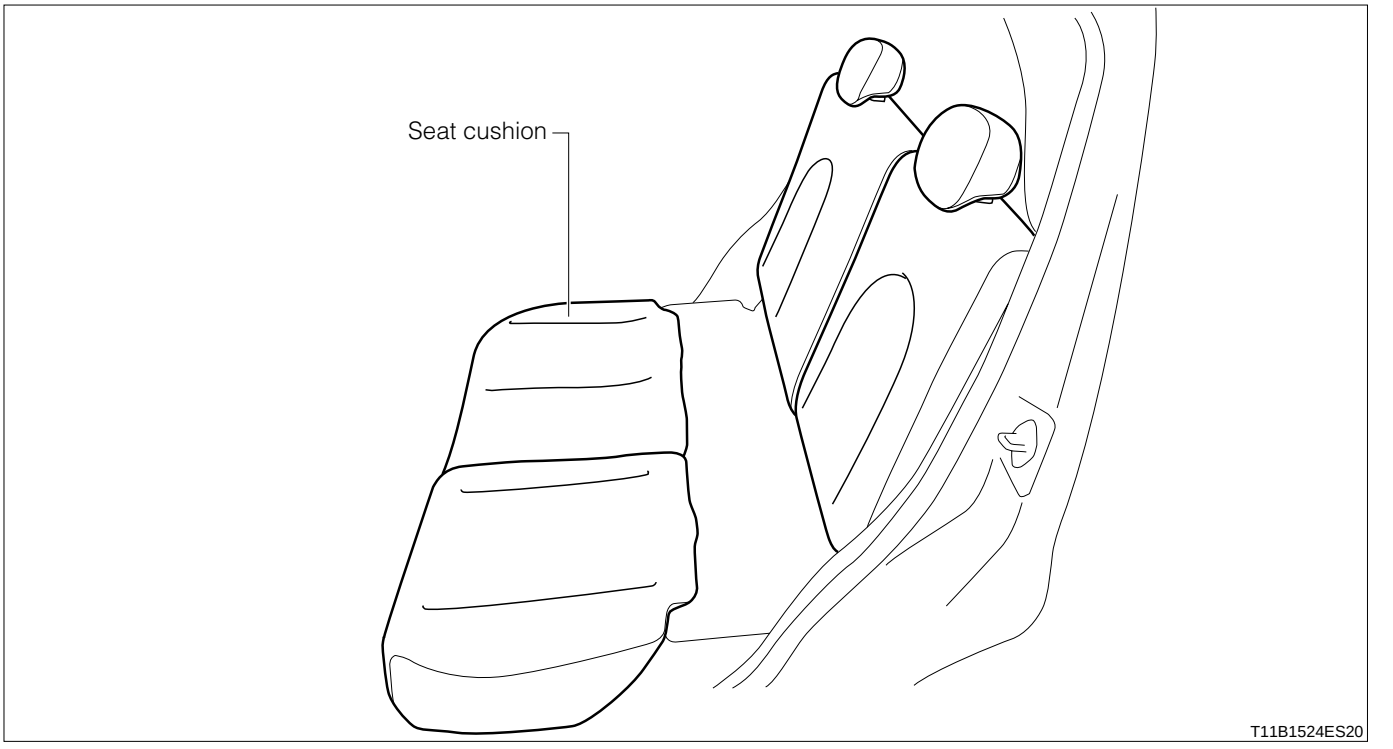
A WIL concept seat supports and holds the angle of the head and body of an occupant so that the relative movement of the body and head is prevented as much as possible, thus reducing the impact to the neck, during a low speed rear-end collision.



2-3-3 REAR SEAT

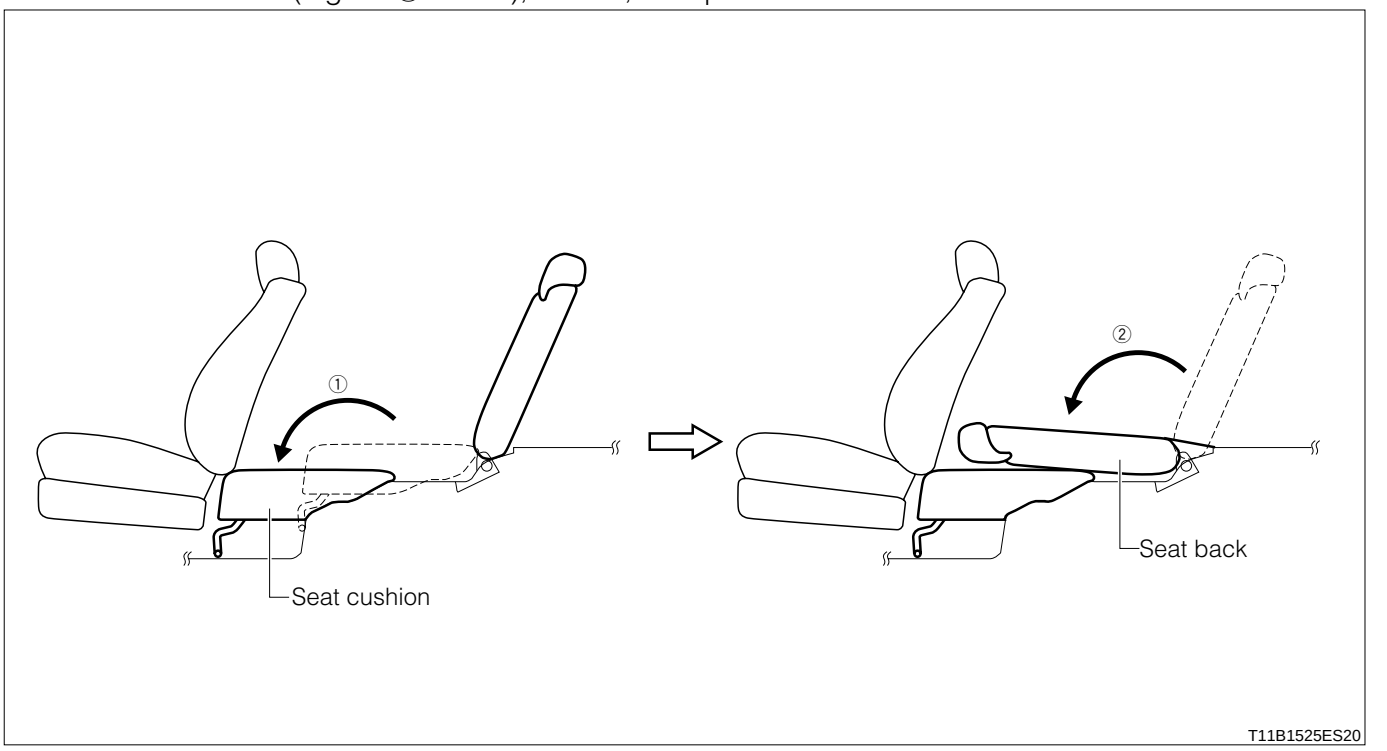
(1) Long cushion mode rear seat

When the rear seat cushions are moved in a front/lower direction, an almost flat space is realized.



(2) Flat luggage mode

When the passenger seat is set to the long cushion mode (Figure ① below) and the seatback of the rear seat is folded forward (Figure ② below), a wide, flat space is realized.



2-4 SEAT BELT

2-4-1 DESCRIPTION

1.The driver's seat and passenger seat are provided with seat belts with pretensioner + force limiter mechanism.

2.The three-point type ELR−VW seat belt is provided on the rear central seat on some specifications.

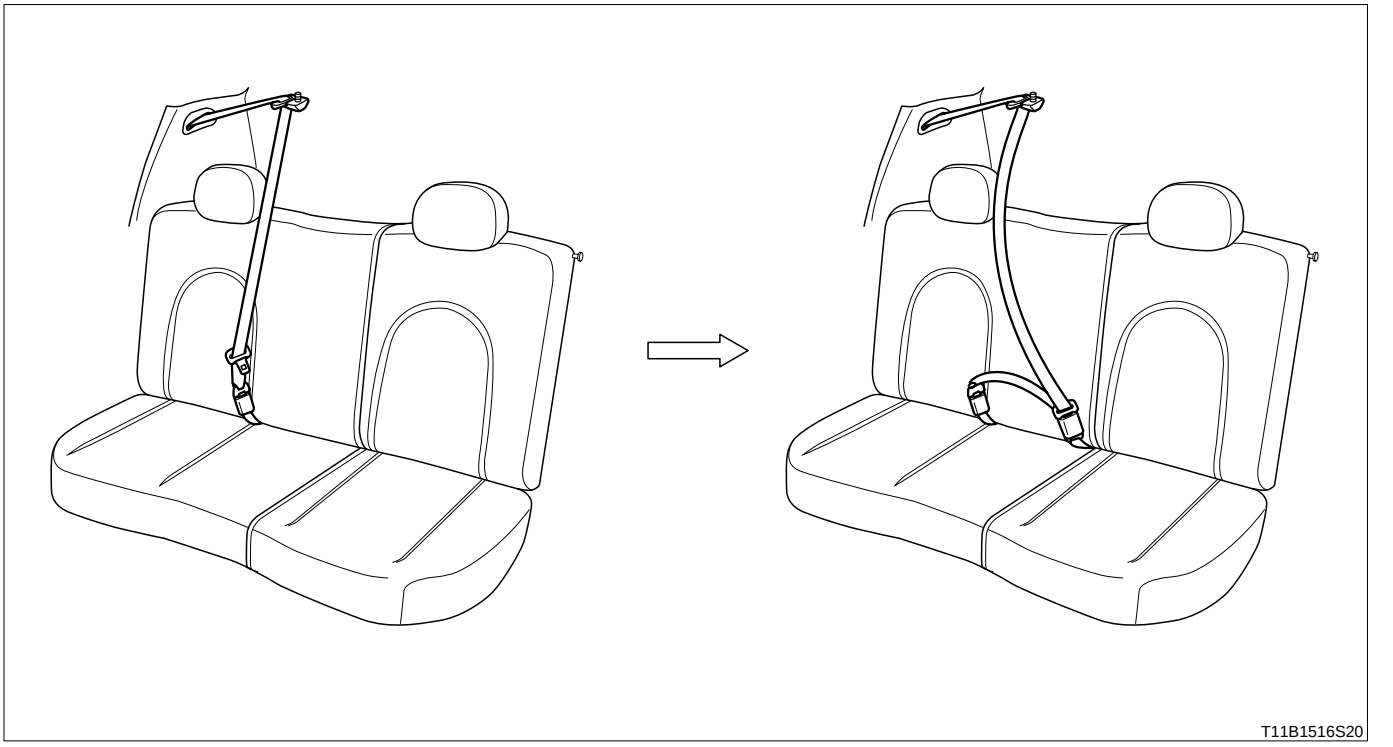
	3-point type ELR−VW	Pretensioner mechanism+ Force limiter mechanism	ELR−ALR
Front seat (Driver's seat, front passenger's seat)	○	○	−
Rear seat(RH, LH)	−	−	○
Rear seat(CTR)	○	−	−

NOTE

- For details of the seat belt with pretensioner mechanism + force limiter mechanism, refer to the section under <H1.SRS airbag>.
- ELR−VW (Emergency Locking Retractor − Vehicle + Webbing)Emergency locking retractor − double sensing type: This type responds to both the vehicle acceleration and belt pulling acceleration.
- ALR (Automatic Locking Retractor): This mechanism is locked at any position automatically by the locking mechanism when the seat belt is extended and fastened.

2-4-2 CENTRAL SEAT BELT ON REAR SEAT

1.The three-point type ELR-VW seat belt is provided on the rear central seat on some specifications.
2.When the seatback of the rear seat is folded forward, insert the key into the right side buckle of the center seat belt of the rear seat so as to remove the plate.



T11B1516S20

I3 WINDSHIELD WINDOWGLASS/MIRROR

CONSTRUCTION AND OPERATION ----- I3 - 1
GLASS ----------- I3 - 1
POWER WINDOW ----------- I3 - 2
OUTER REARVIEW MIRROR ---------- I3 - 4

1 CONSTRUCTION AND OPERATION

1-1 GLASS

1-1-1 OUTLINE

UV cut glass which reduces the ultraviolet transmission is employed for the windshield glass and front door glass.

1-1-2 GLASS SPECIFICATIONS

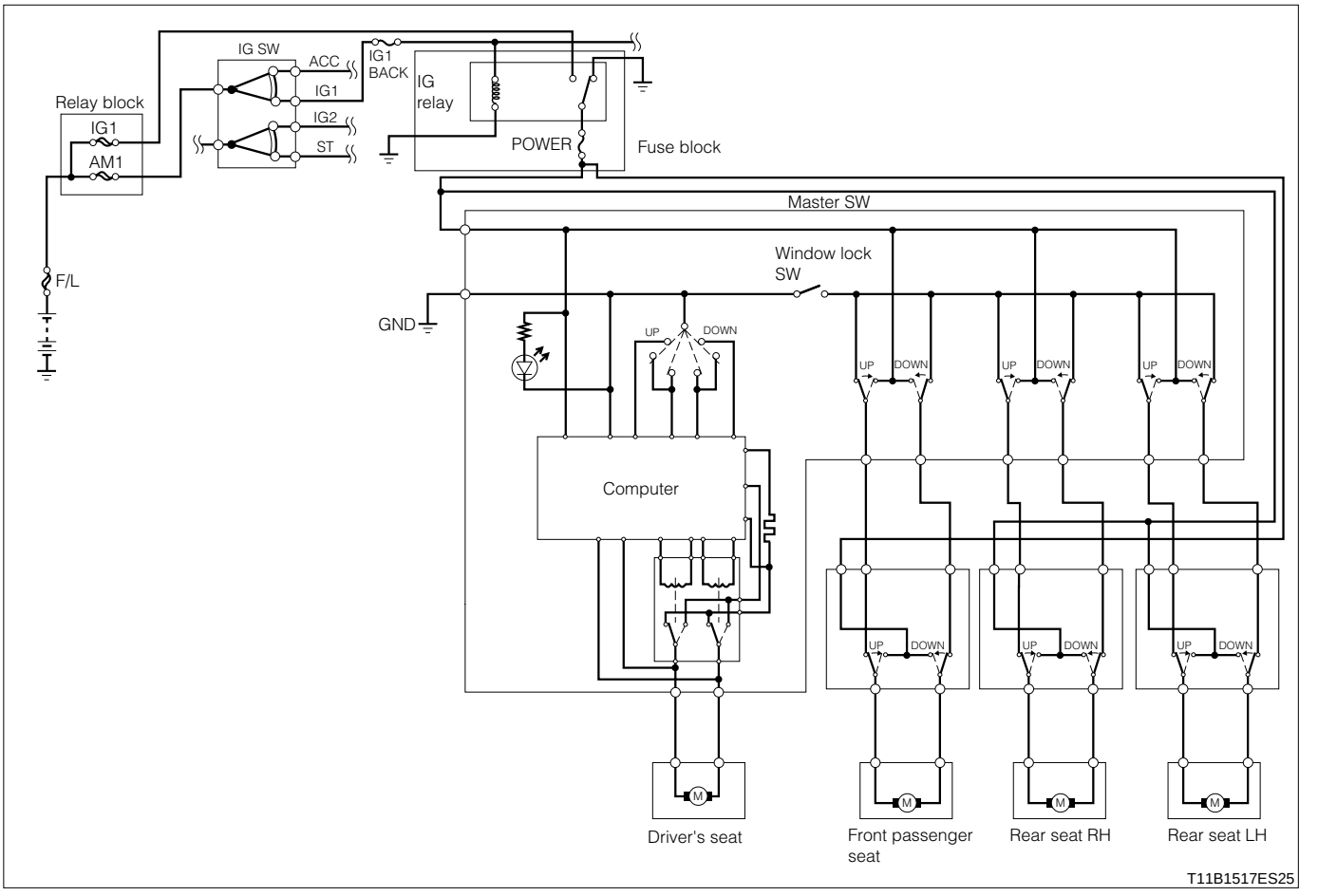
Measuring point	Installation method	Type	Sheet thickness (mm)	Visible light transmission rate (%)	Ultraviolet light transmission rate Reference value(%)
Windshield glass	Adhesion	Heat absorbing laminated glass (Green + UV-filtering)	4.7	78.3	Approx. 0
Front door glass	—	Heat absorbing toughened glass (Green + UV-filtering)	3.1	75.4	Approx. 10
Rear door glass	—	Heat absorbing toughened glass (Green)	3.1	82.2	Approx. 40
Rear door quarter glass	—	Heat absorbing toughened glass (Green)	3.1	82.2	Approx. 40
back door glass	Adhesion	Heat absorbing toughened glass (Green)	3.1	82.0	Approx. 30

1-2 POWER WINDOW

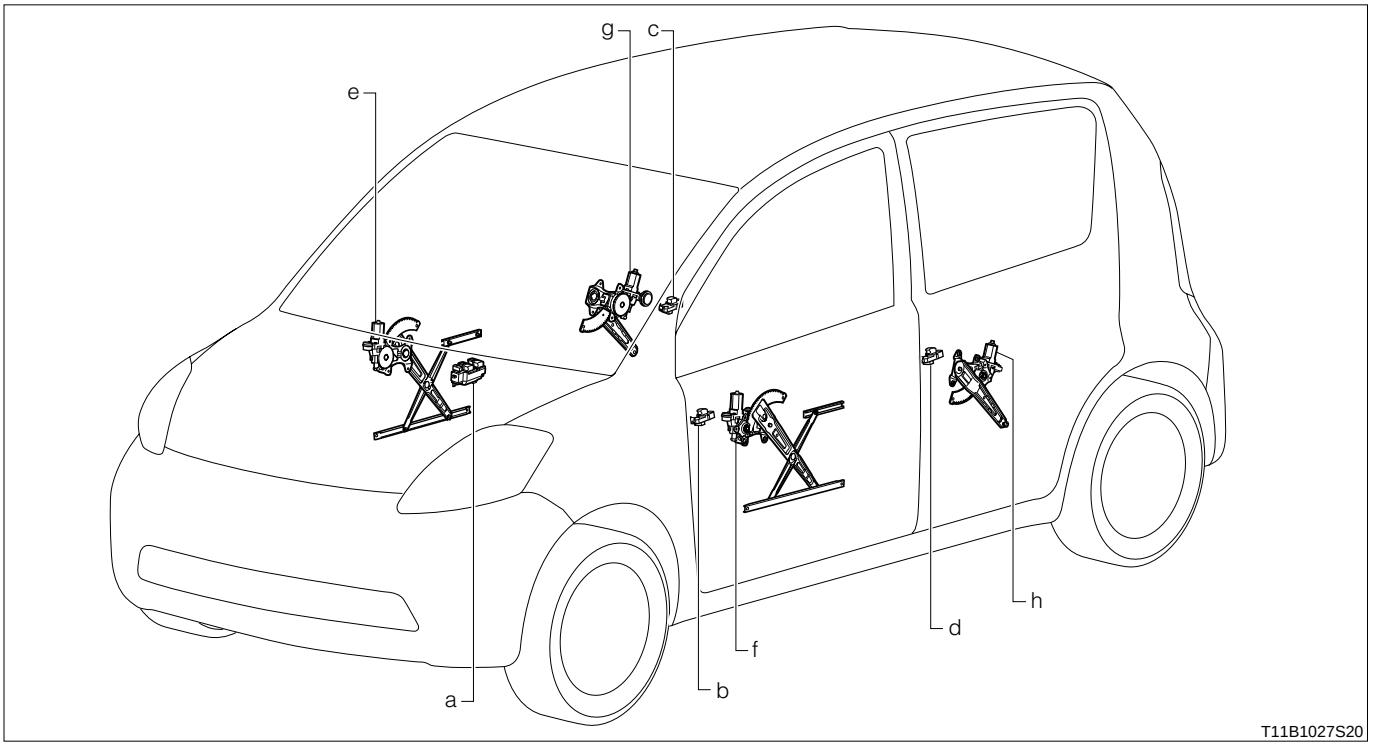
1-2-1 OUTLINE

1.The power window is provided on all the models.
2.The auto down function is provided on the power window of the driver's seat door.
3.Lighting has been added to the driver's seat door power window switch to improve convenience.

1-2-2 SYSTEM WIRING DIAGRAM



1-2-3 LOCATION OF COMPONENTS



The illustration represents the RHD vehicle.

a	Power window master switch
b	Front door power window switch
c	Rear door power window switch RH
d	Rear door power window switch LH
e	Front door regulator motor RH
f	Front door regulator motor LH
g	Rear door regulator motor RH
h	Rear door regulator motor LH

1-2-4 SWITCH ILLUMINATION FUNCTION

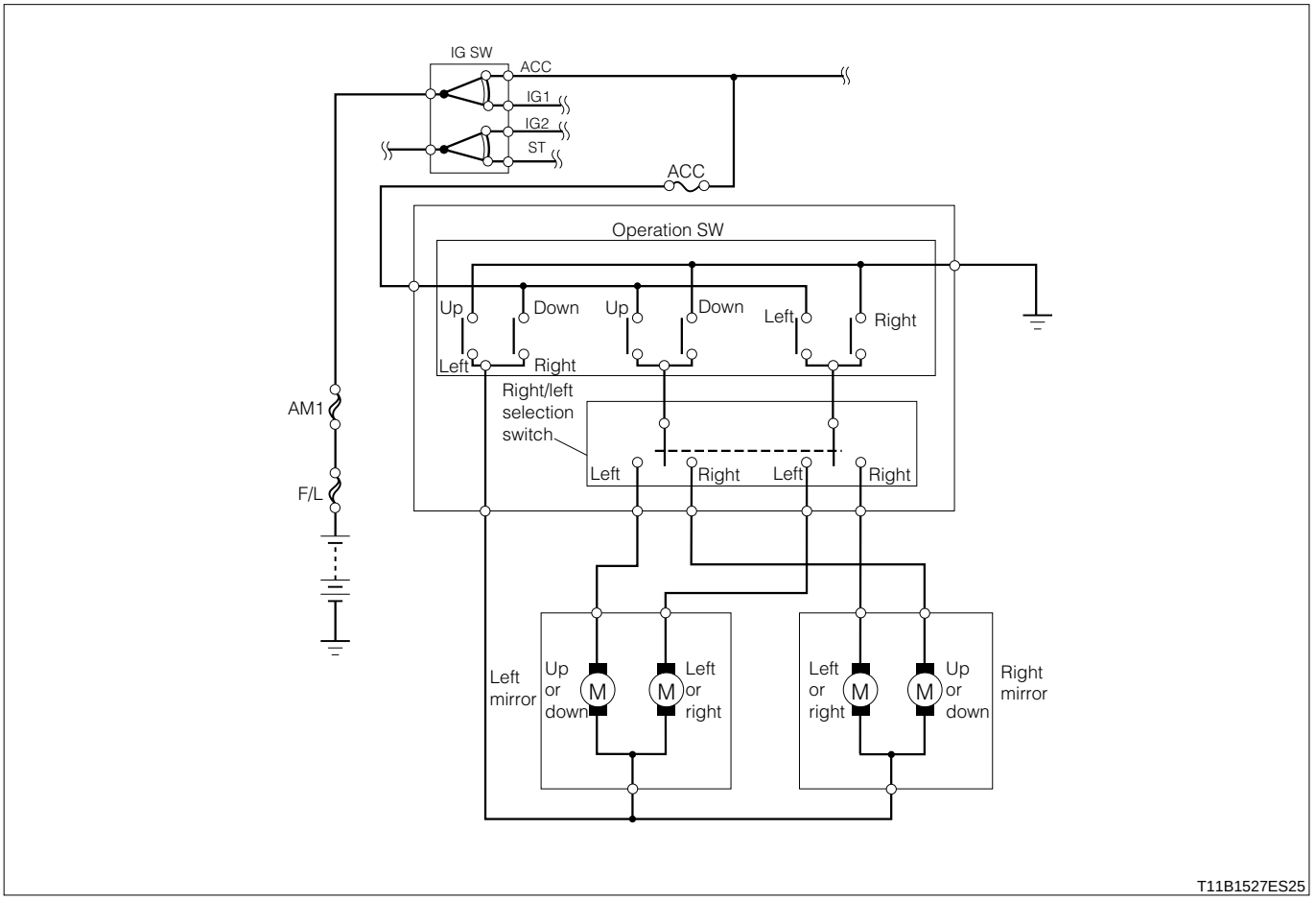
With the ignition switch turned "ON", turn on the driver's seat door power window switch.

1-3 OUTER REARVIEW MIRROR

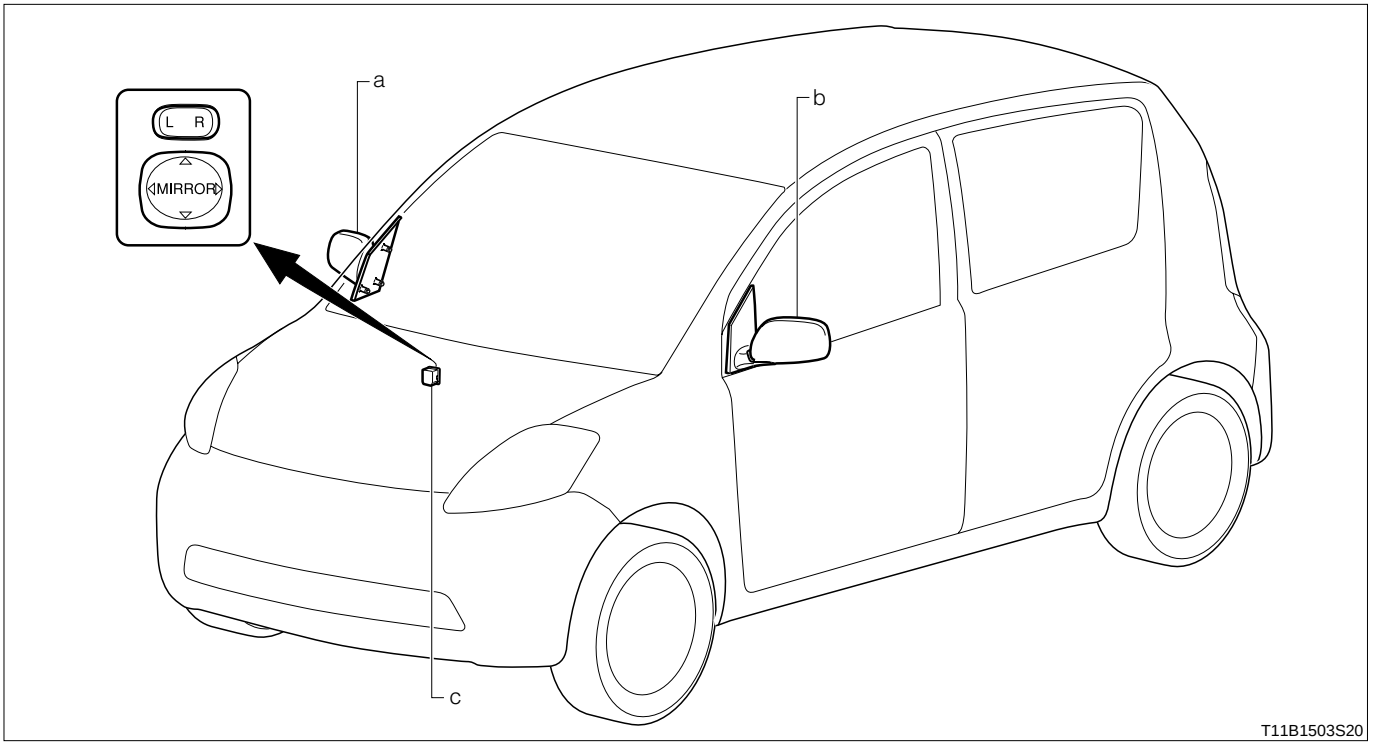
1-3-1 OUTLINE

The mirror surface movable type outer rear view mirror is provided on some specifications. Since the mirror surface section and cover can be removed, they can be replaced individually.

1-3-2 SYSTEM WIRING DIAGRAM



1-3-3 LOCATION OF COMPONENTS



The illustration represents the RHD vehicle.

a	Outer rearview mirror RH
b	Outer rearview mirror LH
c	Outer mirror switch

I4 DOOR LOCK & THEFT DETERRENT

DOOR LOCK SYSTEM ---------- I4 - 1
OUTLINE ---------- I4 - 1
POWER DOOR LOCK SYSTEM ---------- I4 - 1
OUTLINE ---------- I4 - 1
DESCRIPTION ---------- I4 - 1
SYSTEM DRAWING ---------- I4 - 1
SYSTEM WIRING DIAGRAM ---------- I4 - 2
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CONTROL ---------- I4 - 5
KEY LOCKING PREVENTION SYSTEM ---------- I4 - 5
WAKE-UP/SLEEP FUNCTION ---------- I4 - 5
COMPONENTS ---------- I4 - 5
BODY INTEGRATED CONTROLLER (ITC) ---------- I4 - 5
COMBINATION METER ---------- I4 - 5
KEY-LESS ENTRY SYSTEM ---------- I4 - 6
OUTLINE ---------- I4 - 6
DESCRIPTION ---------- I4 - 6
SYSTEM DRAWING ---------- I4 - 6
SYSTEM WIRING DIAGRAM ---------- I4 - 7
LOCATION OF COMPONENTS ---------- I4 - 9
CONTROL ---------- I4 - 10
BASIC FUNCTION ---------- I4 - 10
AUTOMATIC LOCKING FUNCTION -- I4 - 10
AJAR DOOR PREVENTING FUNCTION ---------- I4 - 10
KEY REMAINING REMINDER FUNCTION ---------- I4 - 10
ANSWER BACK FUNCTION ---------- I4 - 10
WAKE-UP/SLEEP FUNCTION ---------- I4 - 10
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TRANSMITTER ---------- I4 - 11
KEYLESS RECEIVER ---------- I4 - 11
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TURN SIGNAL LAMP ---------- I4 - 12
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TRANSPONDER COMMUNICATION CONTROL ---------- I4 - 17
EFI ECU COMMUNICATION CONTROL ---------- I4 - 17
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IMMOBILIZER COIL ---------- I4 - 18
EFI ECU ---------- I4 - 19
COMBINATION METER ---------- I4 - 19

DOOR LOCK SYSTEM

1 OUTLINE

1.The power door lock is provided on all the models.
Refer to Page I4-1.

2.The LIN communication system is employed in a part of the door lock system circuit.
3.The body integrated controller (ITC) is directly attached to the fuse block.
4.The radio wave type keyless entry system is provided on some specifications. The "LOCK" and "UNLOCK" operations for the front doors, rear doors and back door can be performed by the remote control operation.
Refer to Page I4-6.

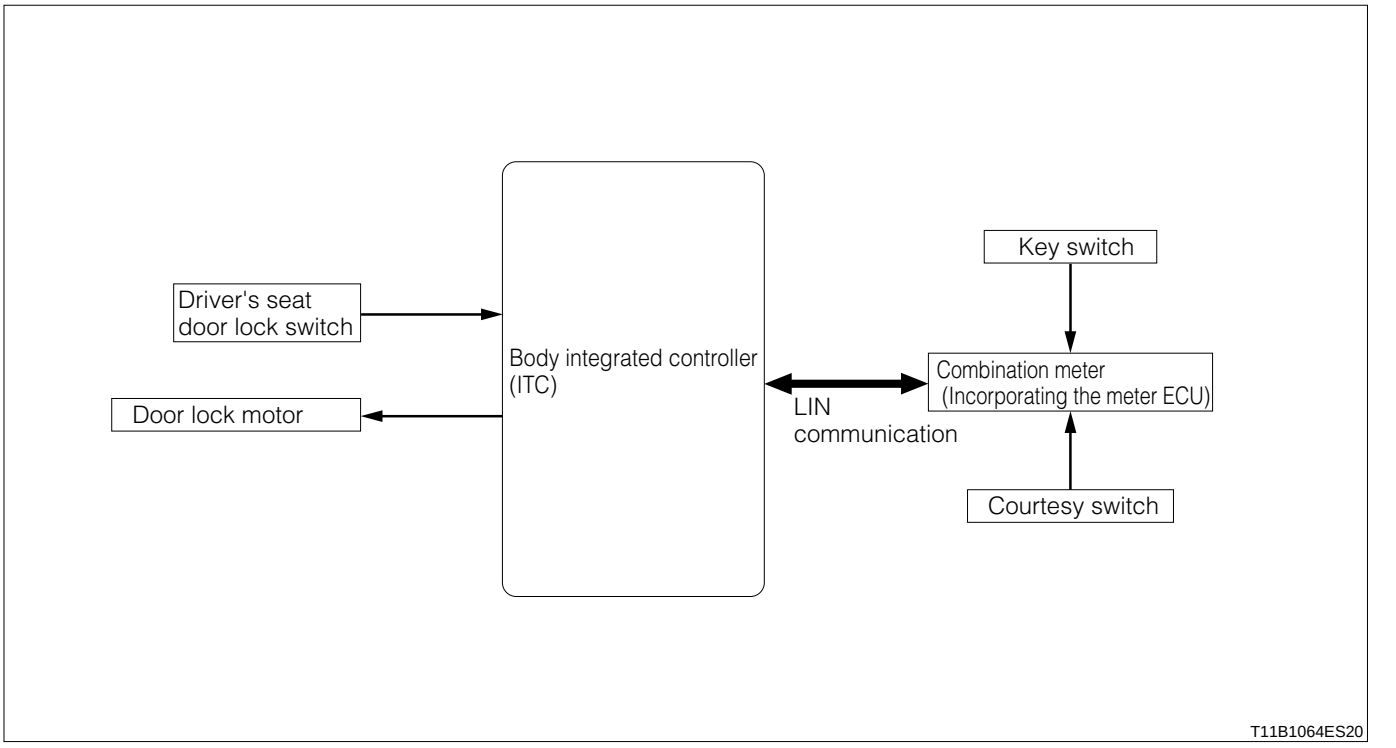
POWER DOOR LOCK SYSTEM

1 OUTLINE

1-1 DESCRIPTION

1.The power door lock is fitted to all vehicles as standard. The front passenger seat door, right and left rear doors and back door can be locked and unlocked interlocking with the lock lever at the driver's seat door or the key cylinder operation.
2.The LIN communication system is employed in a part of the system circuit.

1-2 SYSTEM DRAWING

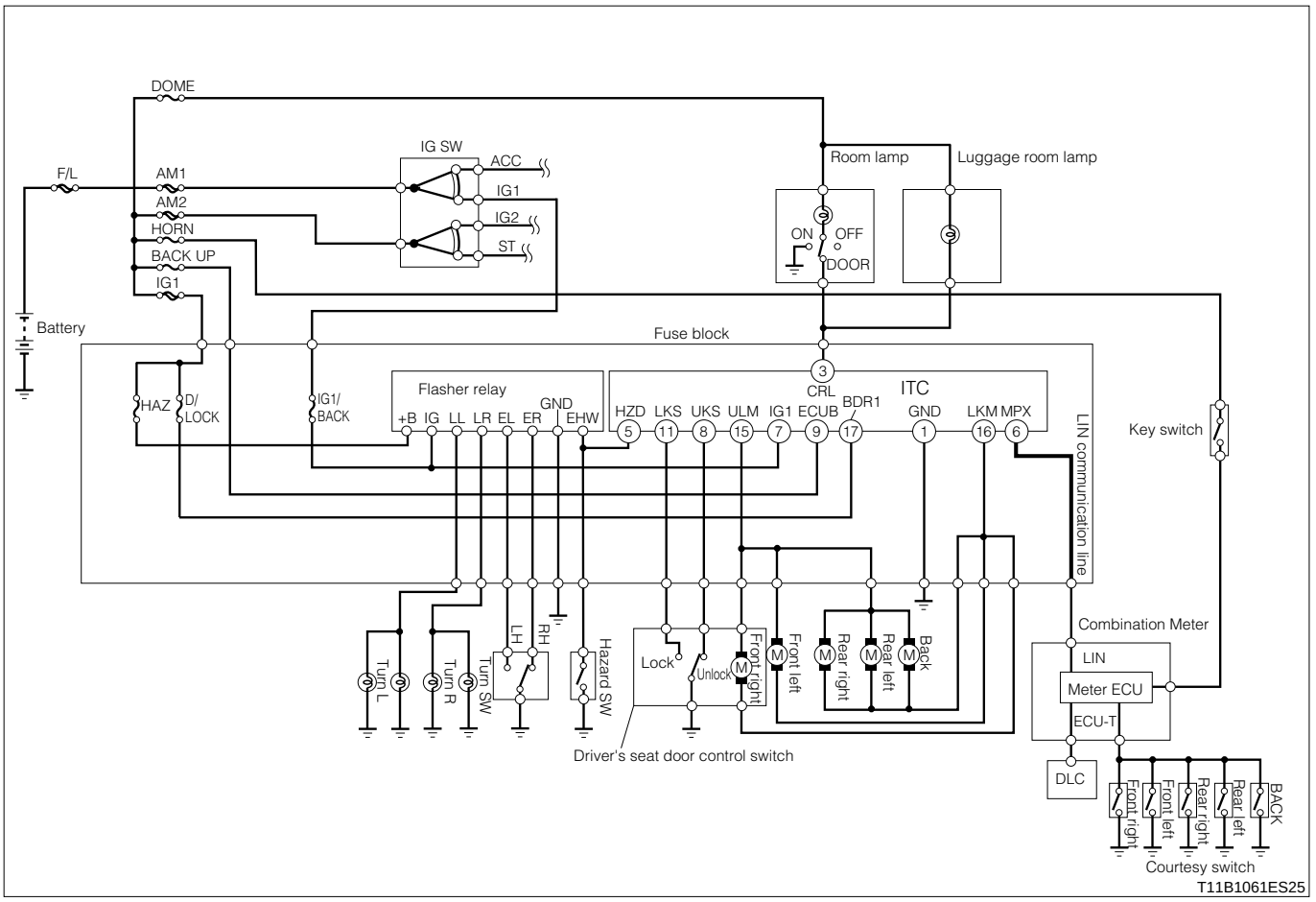


Contents of multiplex communication control

Sending	Receiving	Nomenclature of signals	Contents of control
Meter ECU	ITC	Signal of terminal ECU-T	ECU-T terminal check control
ITC	Meter ECU	Sleep non-permission signal	Sleep (low current mode) transfer prohibition *1

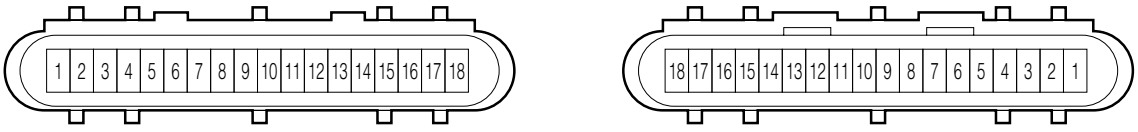
*1
Refer to Page I4-5.

1-3 SYSTEM WIRING DIAGRAM



T11B1061ES25

Computer connector terminal arrangement diagram



ITC

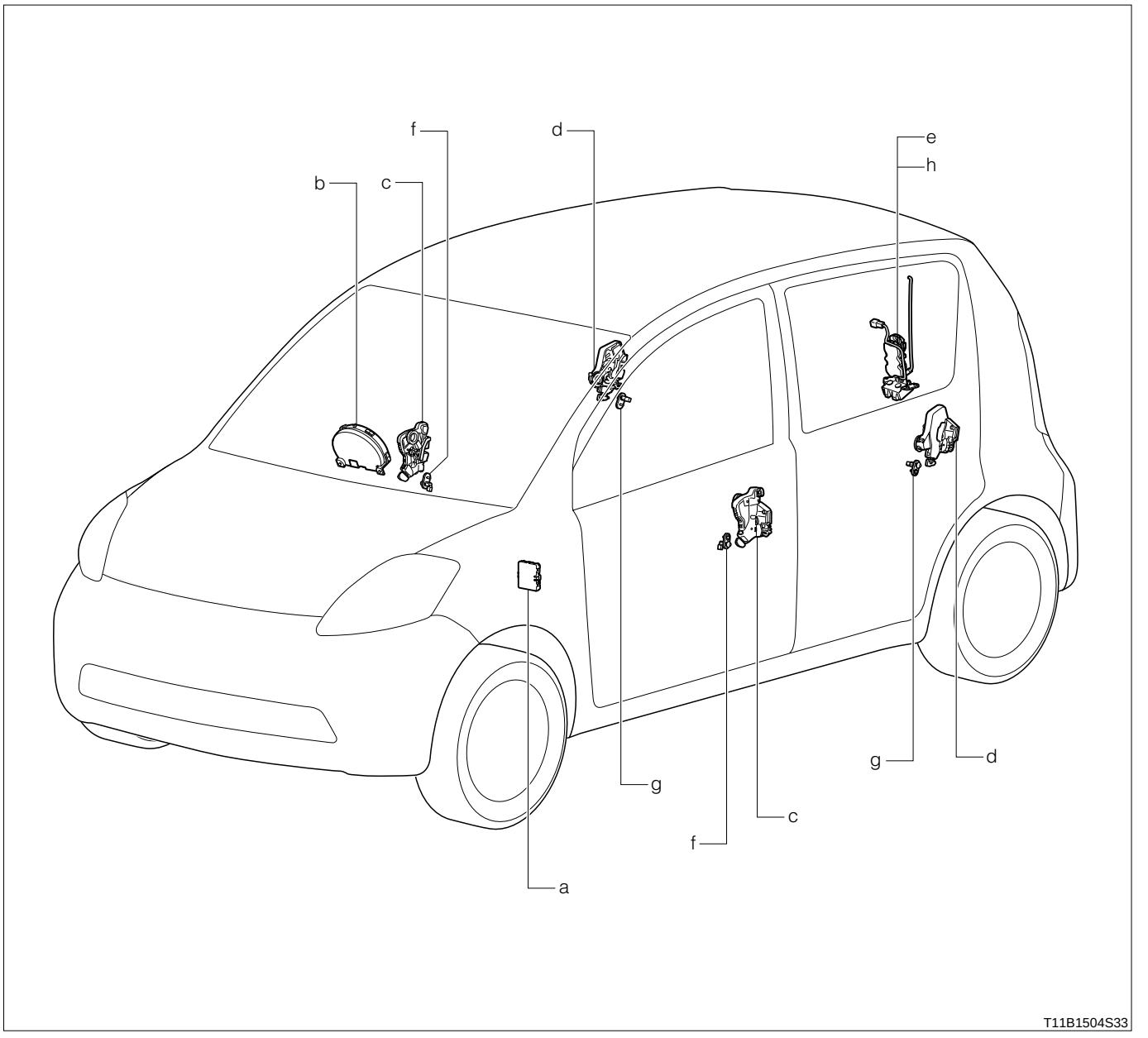
ITC (fuse block side)

M21B5015ES10

Body integrated controller (ITC) terminal name

Terminal No.	Terminal code	Terminal name
1	GND	Earth
2	–	–
3	CRL	Room lamp driving output
4	–	–
5	HZD	Hazard lamp driving output
6	MPX	LIN communication input/output
7	IG1	ECU power supply
8	UKS	Door control unlock side switch input
9	ECU B	ECU power supply
10	–	–
11	LKS	Door control lock side switch input
12	–	–
13	–	–
14	–	–
15	ULM	Door lock motor unlock side output
16	LKM	Door lock motor lock side output
17	BDR1	Power supply
18	–	–

1-4 LOCATION OF COMPONENTS



T11B1504S33

a	Body integrated controller (ITC)
b	Meter ECU
c	Front door lock motor
d	Rear door lock motor
e	Back door lock motor
f	Front door courtesy switch
g	Rear door courtesy switch
h	Back door courtesy switch

2 CONTROL

2-1 KEY LOCKING PREVENTION SYSTEM

1.When all of the following conditions are met, after the door locking procedure has been completed, the door locks are immediately unlocked, thus preventing the key from being locked in.
(1) The key is inserted into the ignition key cylinder. (Key switch is "ON".)
(2) Any of the doors are open. (Courtesy switch is "ON".)
(3) When the driver's seat door lock knob is switched from "UNLOCK" to "LOCK". (Driver's seat door control switch is switched from "UNLOCK" to "LOCK".)

2.When all of the following conditions are met and 1 second has elapsed, the door locks are unlocked thus preventing the key from being locked in.
(1) The key is inserted into the ignition key cylinder. (Key switch is "ON".)
(2) The ignition switch is set to "ACC" or "LOCK".
(3) The driver's seat door lock knob is at the "LOCK". (Driver's seat door control switch is set to "LOCK".)
(4) Any door is open. →All doors are closed. (Courtesy switch is switched from "ON" to "OFF".)

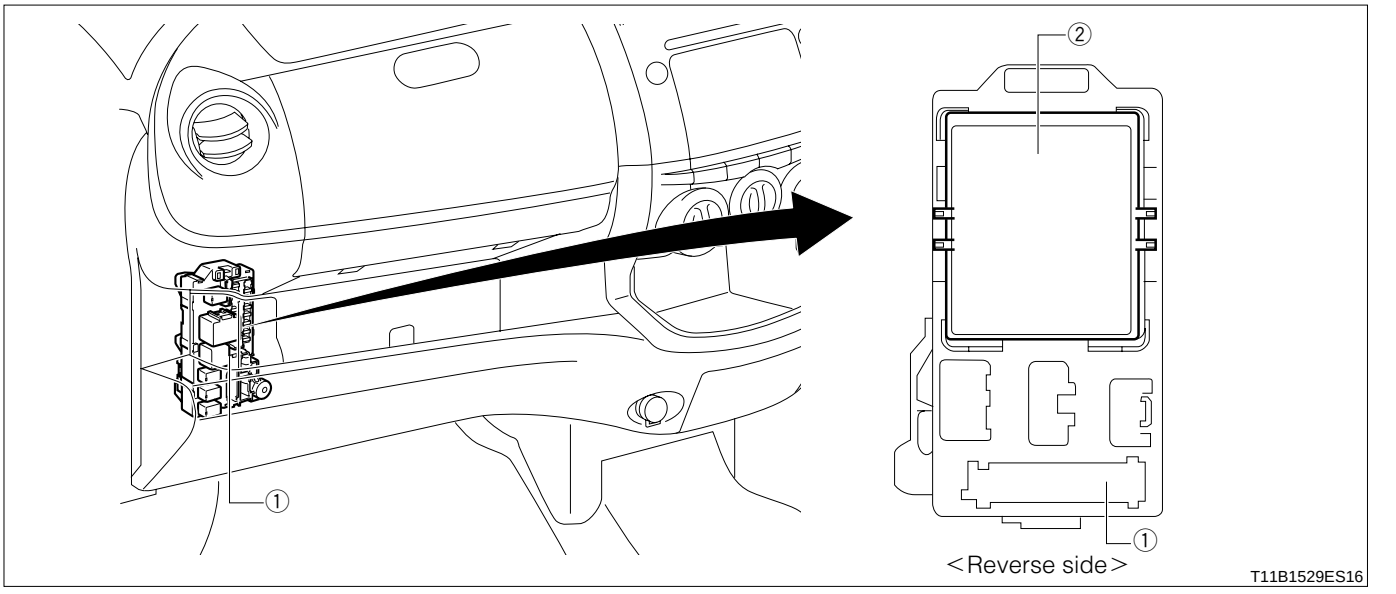
2-2 WAKE-UP/SLEEP FUNCTION

The body integrated controller has a wake-up/sleep function in order to reduce the current used when the ignition is switched to "ACC" or "LOCK".

3 COMPONENTS

3-1 BODY INTEGRATED CONTROLLER (ITC)

1.It is attached to the reverse side of the fuse block on the lower left hand side of the instrument panel.
2.The ITC receives a signal from the driver's seat door lock switch and controls the power door lock motor.



①	Fuse block
②	Body integrated controller (ITC)

3-2 COMBINATION METER

Signals, such as the ECU-T terminal signal, are sent over the LIN communication line to the ITC from the meter ECU in the combination meter.

KEY-LESS ENTRY SYSTEM

1 OUTLINE

1-1 DESCRIPTION

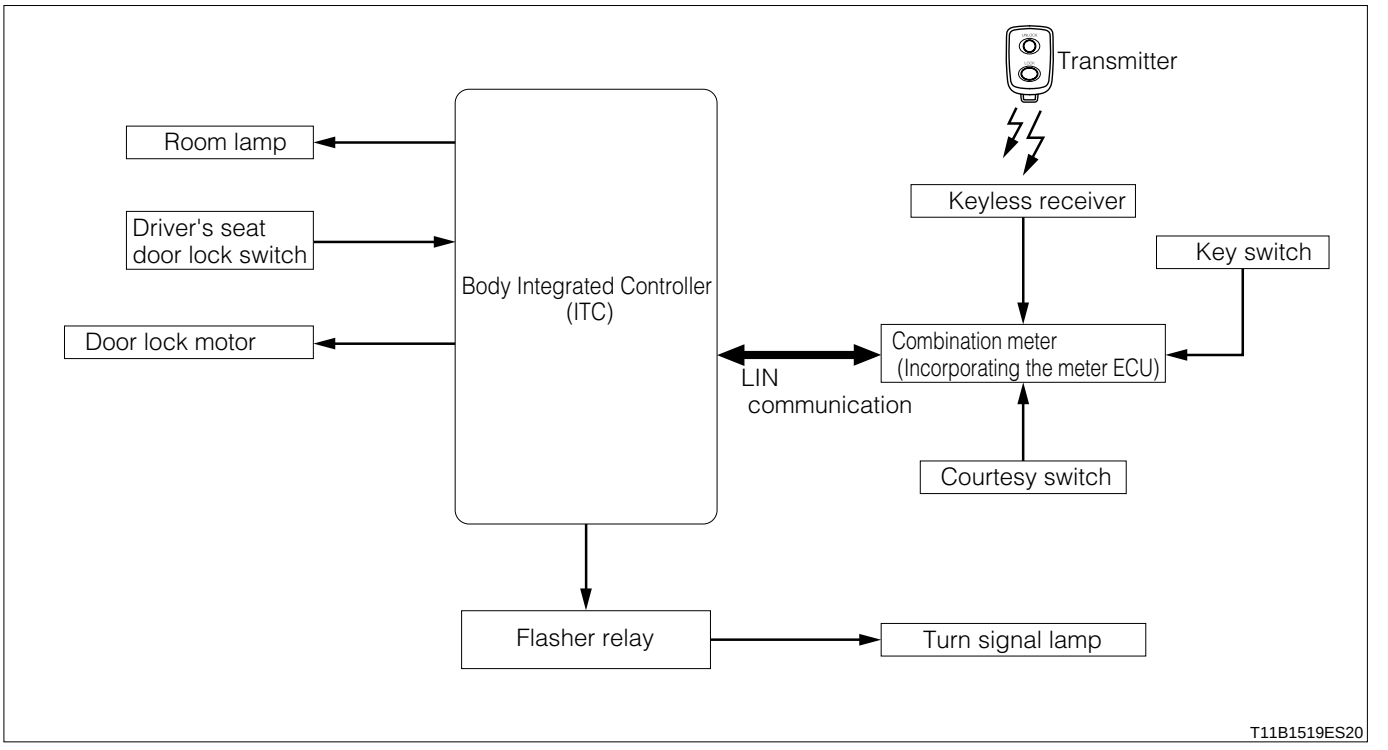
1.The radio wave type keyless entry system is provided on some specifications. The "LOCK" and "UNLOCK" operations for the front doors, rear doors and back door can be performed by the remote control operation.

2.The remote control of locking all the doors is possible by pushing the switch of the transmitter which is apart from the key, thus sending weak waves.

3.The operation range of remote control is approx. 3 meters in radius from the center of the vehicle. However, the range might be reduced or the function could be disabled due to the battery drain, strong radio wave or noise. Also the operation range might be affected by the shape of the vehicle.

4.The LIN communication system is employed in a part of the system circuit.

1-2 SYSTEM DRAWING



Contents of LIN communication control

Sending	Receiving	Signal Nomenclature	Contents of control
Meter ECU	ITC	Keyless door lock signal	Door lock, answer back control
		Keyless door unlock signal	Door unlock, answer back control
		Key switch signal	Key locked in prevention control
		Door courtesy switch signal	Room lamp control *1
ITC	Meter ECU	Sleep non-permission signal	Sleep (low current mode) transfer prohibition *2

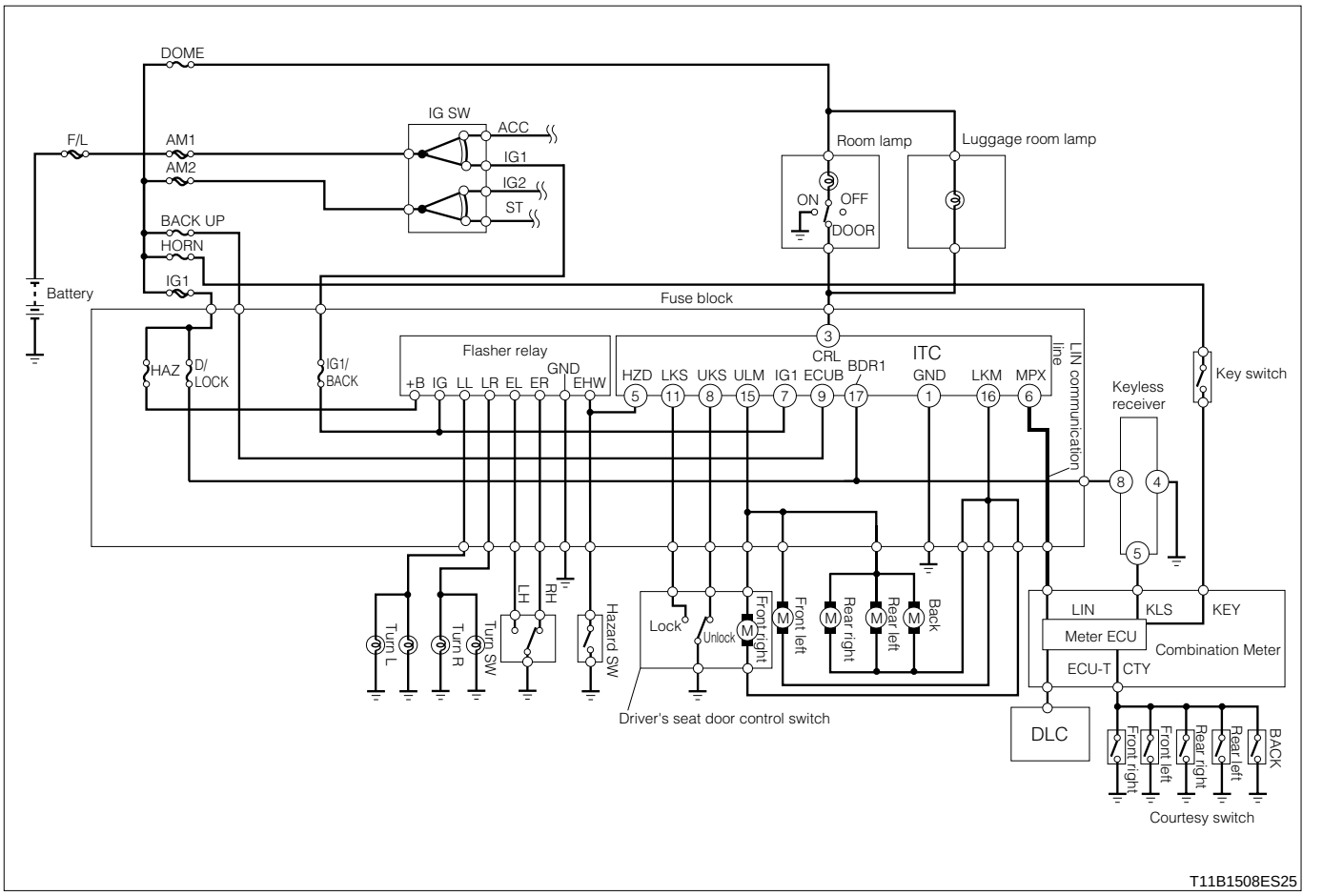
*1

Refer to Page J1-10.

*2

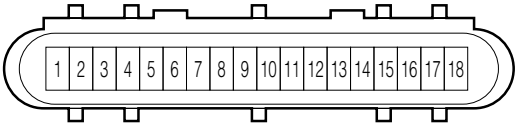
Refer to Page I4-5.

1-3 SYSTEM WIRING DIAGRAM

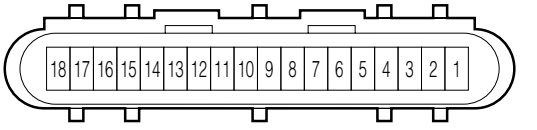


T11B1508ES25

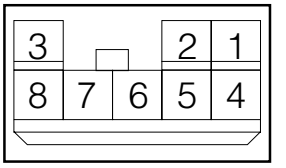
Computer connector terminal arrangement diagram



ITC



ITC fuse block side



Keyless reciever

T11B8511ES16

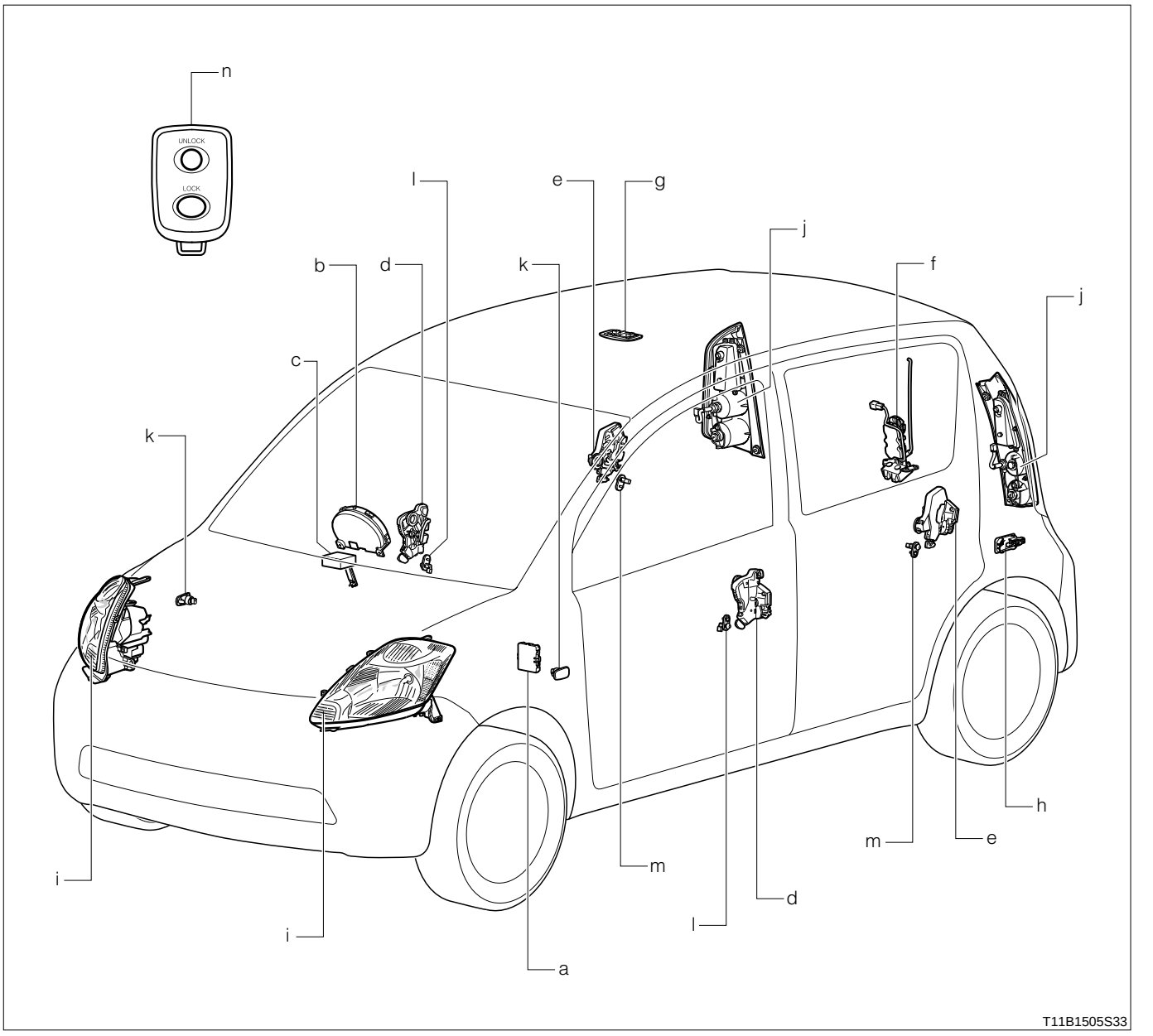
Body integrated controller (ITC) terminal name

Terminal No.	Terminal code	Terminal name
1	GND	Earth
2	—	—
3	CRL	Room lamp driving output
4	—	—
5	HZD	Hazard lamp driving output
6	MPX	LIN communication input / output
7	IG1	ECU power supply
8	UKS	Door control unlock side switch input
9	ECU B	ECU power supply
10	—	—
11	LKS	Door control lock side switch input
12	—	—
13	—	—
14	—	—
15	ULM	Door lock motor unlock side output
16	LKM	Door lock motor lock side output
17	BDR1	Power supply
18	—	—

Receiver connector terminal name

Terminal No.	Terminal code	Terminal name
1	—	—
2	—	—
3	—	—
4	GND	Earth
5	SIG	Keyless signal output
6	—	—
7	—	—
8	+B	Receiver power supply

1-4 LOCATION OF COMPONENTS



a	Body integrated controller (ITC)
b	Meter ECU
c	Keyless receiver
d	Front door lock motor
e	Rear door lock motor
f	Back door lock motor
g	Room lamp
h	Luggage room lamp
i	Front turn signal lamp
j	Rear turn signal lamp
k	Side turn signal lamp
l	Front door courtesy switch
m	Rear door courtesy switch
n	Transmitter

2 CONTROL

2-1 BASIC FUNCTION

1.When the electric wave sent from the transmitter is received, all the doors either unlock or lock.

(1) The receiver picks up the identity code (faint electrical wave) sent from the transmitter.

(2) The receiver checks the incoming identity code against the registered identity code and if they are in agreement it sends an "LOCK" or "UNLOCK" activation request signal.

(3) The activation request signal from the receiver is sent from the meter ECU over the LIN communication line to the ITC.

(4) The ITC receives an activation request from the meter ECU and controls the door locks, hazard lamps and the room lamp.

2-2 AUTOMATIC LOCKING FUNCTION

If all the doors have been unlocked by the remote control by the transmitter, but none of them are physically opened within 30 seconds, all the doors will automatically lock.

2-3 AJAR DOOR PREVENTING FUNCTION

Remote control is disabled if any of the doors is open or ajar. (when courtesy switch is "ON".)

2-4 KEY REMAINING REMINDER FUNCTION

If the key is in the ignition key cylinder, the remote control will not have any effect.

2-5 ANSWER BACK FUNCTION

When door locks are remotely operated by the transmitter, the hazard lamps and room lamp answer back. The room lamp answers back only when the switch is set to the door interlocking position.

Answer back function

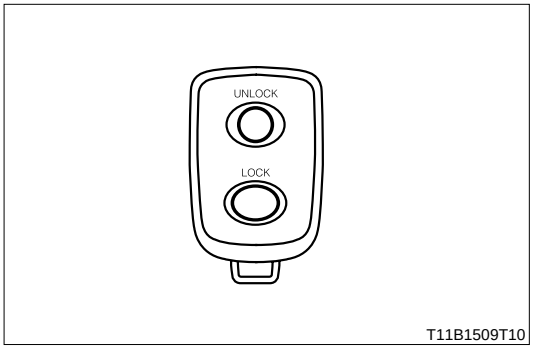
Operating conditions	Section	Answer back
At time of locking	Room lamp	Illuminates after about 3 seconds of dimming
	Luggage room lamp	
	Hazard lamp	Flashing one time
At time of unlocking	Room lamp	Illuminates for approx. 15 seconds
	Luggage room lamp	
	Hazard lamp	Flashing twice

2-6 WAKE-UP/SLEEP FUNCTION

The body integrated controller has a wake-up/sleep function in order to reduce the current used when the ignition is switched to "ACC" or "LOCK".

3 COMPONENTS

3-1 TRANSMITTER

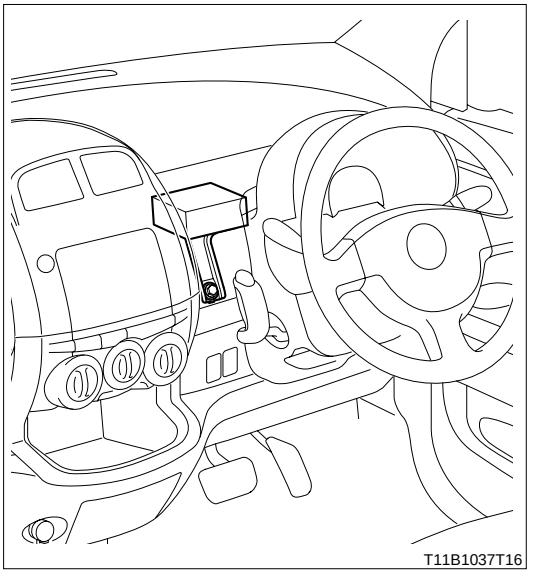


1.The transmitter is a key holder type with a "LOCK" switch and an "UNLOCK" switch.
2.When the signal sending switch is operated, the identifying code by weak radio waves is sent. There are 2^{40} kinds of identifying codes, which differ from transmitter to transmitter.
3.Expected life of the imbedded button battery should be 2 years when used ten times a day (one time refers to one unlock and one lock operations).The button battery can be replaced.

NOTE

- Button battery type: CR1616 3V

3-2 KEYLESS RECEIVER

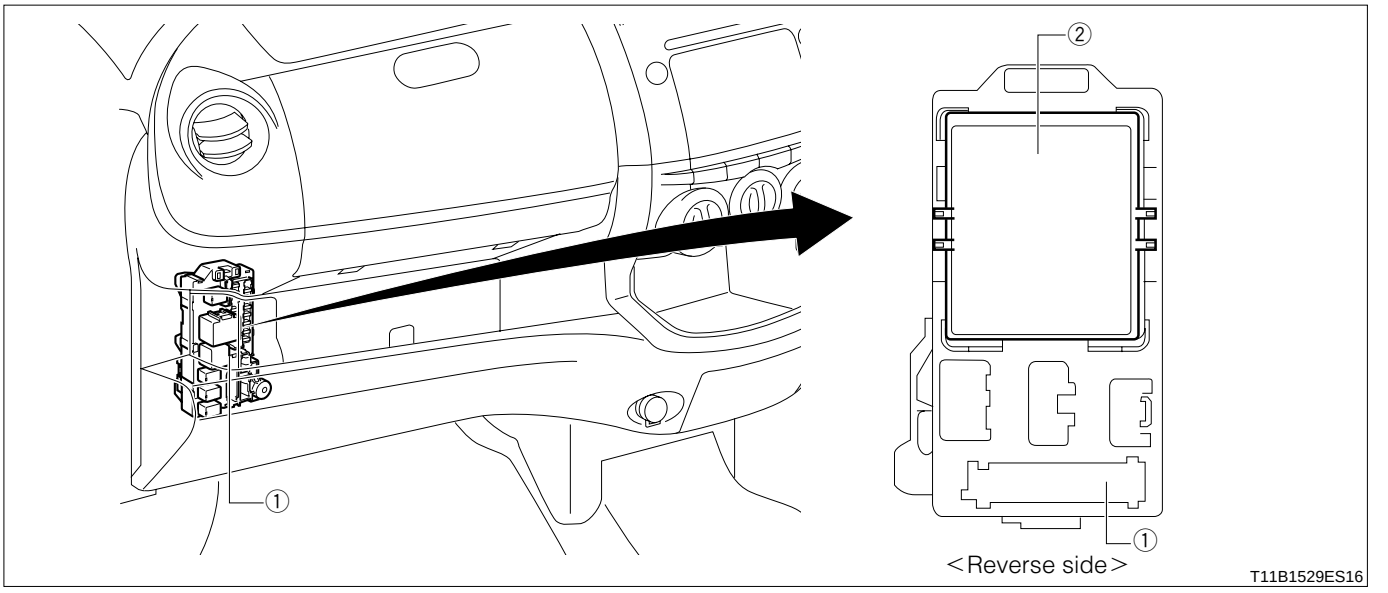


1.When the incoming identity code (faint electrical wave) from the transmitter is received, if it is in agreement with the registered identity code in the receiver, an "LOCK" or "UNLOCK" activation request signal is sent to the meter ECU.
2.Up to two identification codes can be stored, which means two transmitters can be used.
3.When the new transmitter is registered, any previously registered identification codes stored in the receiver will be completely cleared, therefore the codes need to be re-registered.
4.Even if the battery is removed, stored identification codes are not cleared.

3-3 BODY INTEGRATED CONTROLLER(ITC)

1.It is fitted to the reverse-side of the fuse block which is located on the lower left-hand side of the instrument panel.

2.Upon receiving the "LOCK"/"UNLOCK" activation request signals from the meter ECU over the LIN communication line, all the doors are locked or unlocked and other functions are performed.



①	Fuse block
②	Body integrated controller (ITC)

3-4 COMBINATION METER

The meter ECU is built-in and it communicates with the ITC over the LIN communication line.

3-5 COURTESY SWITCH

The open/close status signal of each door is sent via the meter ECU to the ITC.

3-6 ROOM LAMP

Refer to Page J1-10.

3-7 TURN SIGNAL LAMP

Refer to Page J1-7.

IMMOBILIZER SYSTEM

1 OUTLINE

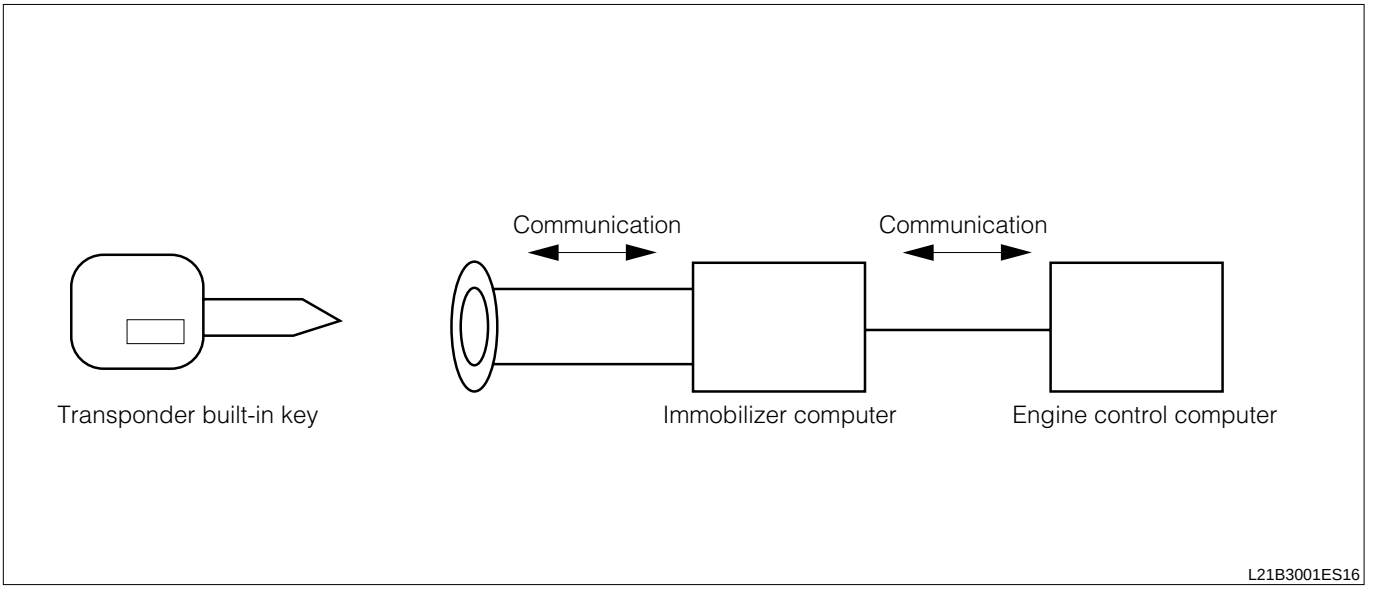
1-1 DESCRIPTION

1.The immobilizer system is provided on some specifications.
2.The immobilizer system prohibits the unauthorized start of the engine, thus enhancing the security.
3.It becomes possible to start the engine when the ID code registered in the immobilizer ECU is matched with the ID code memorized in the key.
4.When the immobilizer system is in the operating condition, the indicator in the combination meter flashes.

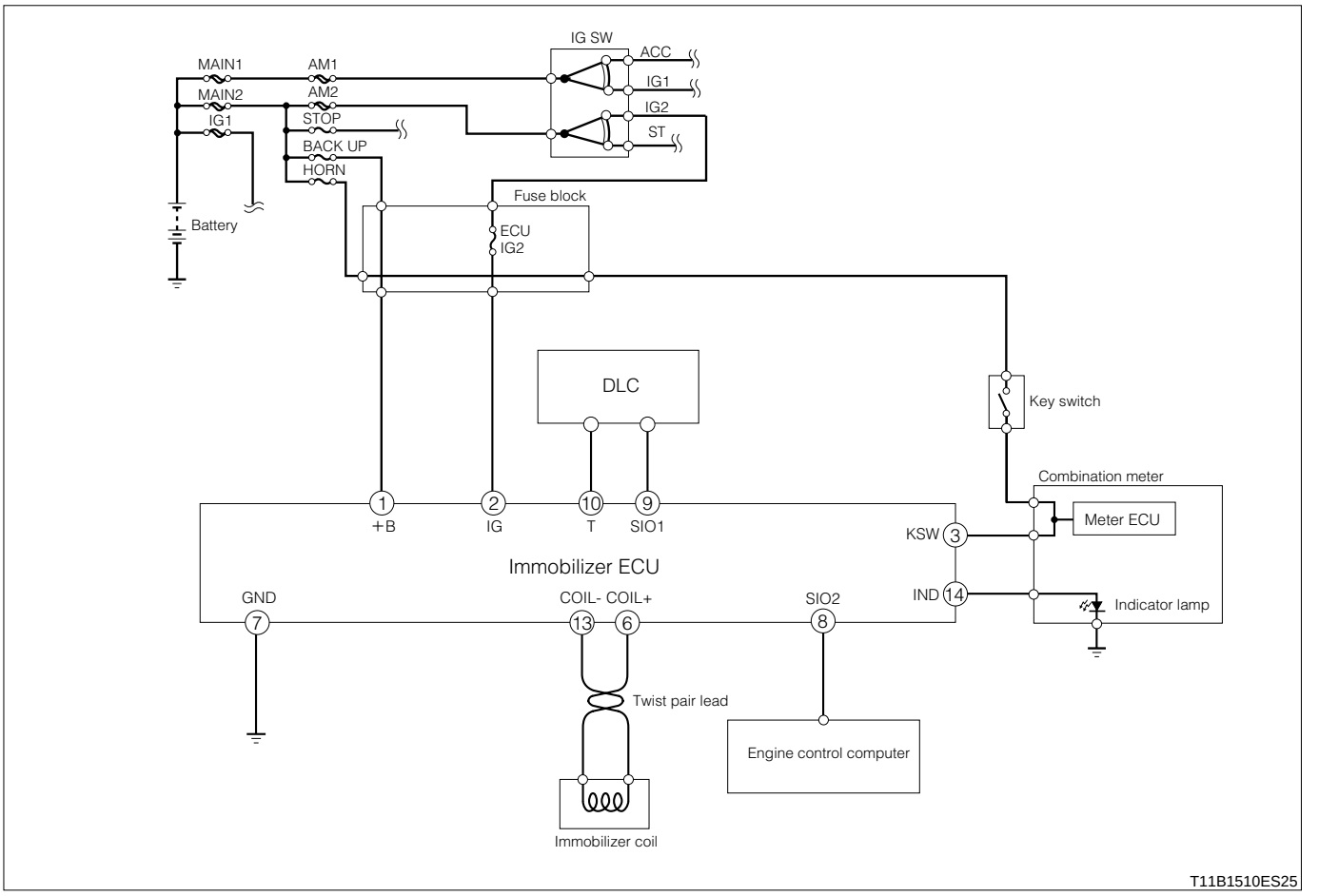
1-2 NOTES ON IMMOBILIZER SYSTEM

1.In the case of the ignition key for the immobilizer equipped vehicles, there are cases where correct communication with the immobilizer ECU is impossible, thus not allowing the engine to start.
(1) When the grip section of the key is in contact with a metal object.
(2) When the key is close to or in contact with the key (Which incorporates a signal transmitter) for the immobilizer system of another vehicle.
2.Do not put the ignition key in ultrasonic cleaners, etc.

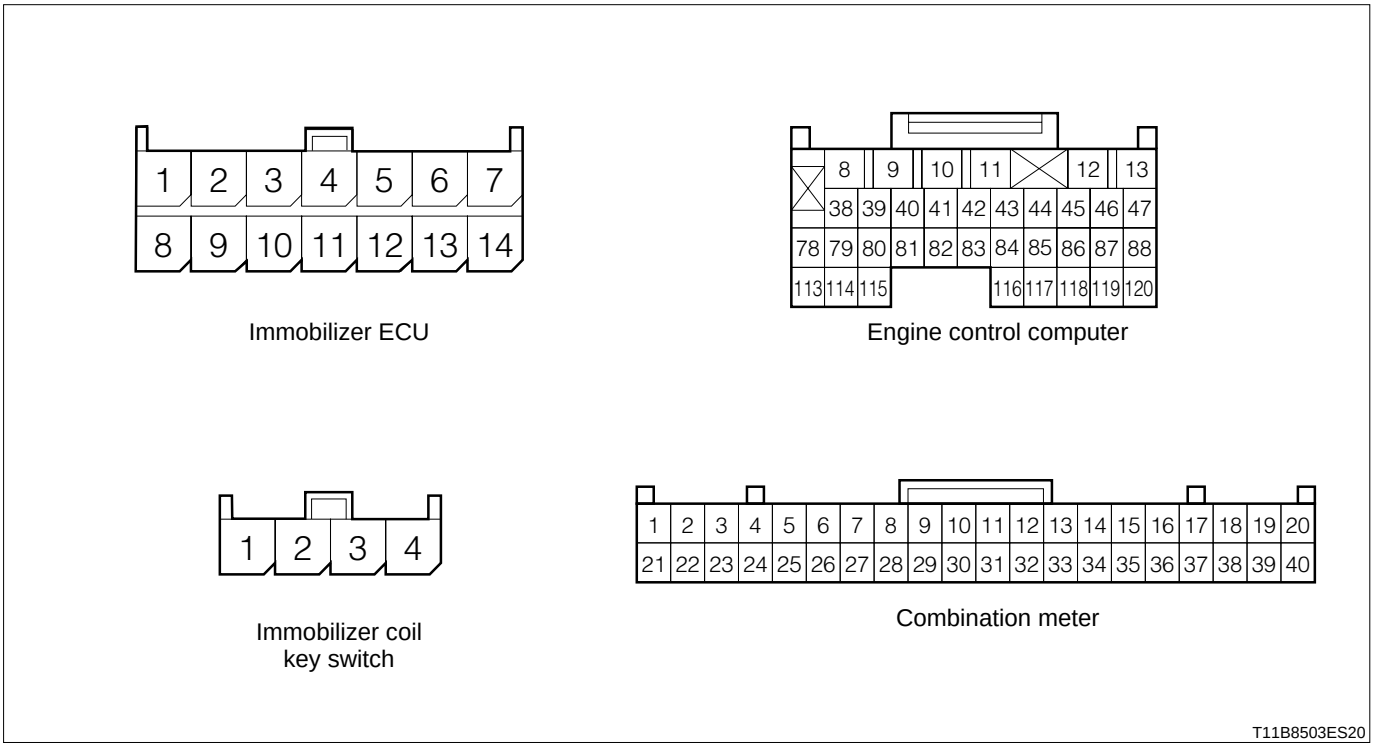
1-3 SYSTEM DRAWING



1-4 SYSTEM WIRING DIAGRAM



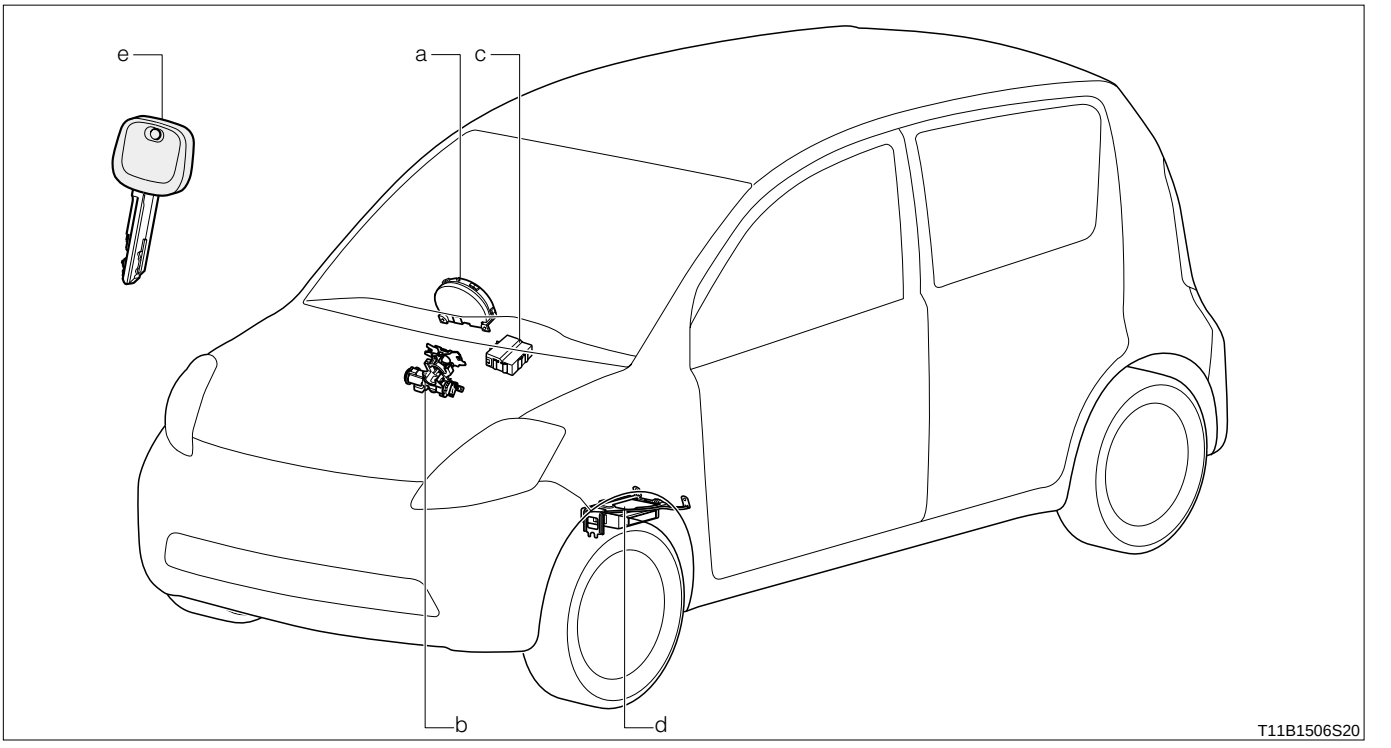
Computer connector terminal arrangement diagram



Immobilizer ECU terminal name

Terminal No.	Terminal code	Terminal name
1	+B	ECU power supply
2	IG	Ignition switch power supply
3	KSW	Key switch
4	–	–
5	–	–
6	COIL+	Transponder communication
7	GND	Earth
8	SIO2	Immobilizer communication
9	SIO1	Diagnostic tester communication
10	T	Diagnostic tester communication
11	–	–
12	–	–
13	COIL–	Transponder communication
14	IND	Security indicator

1-5 LOCATION OF COMPONENTS

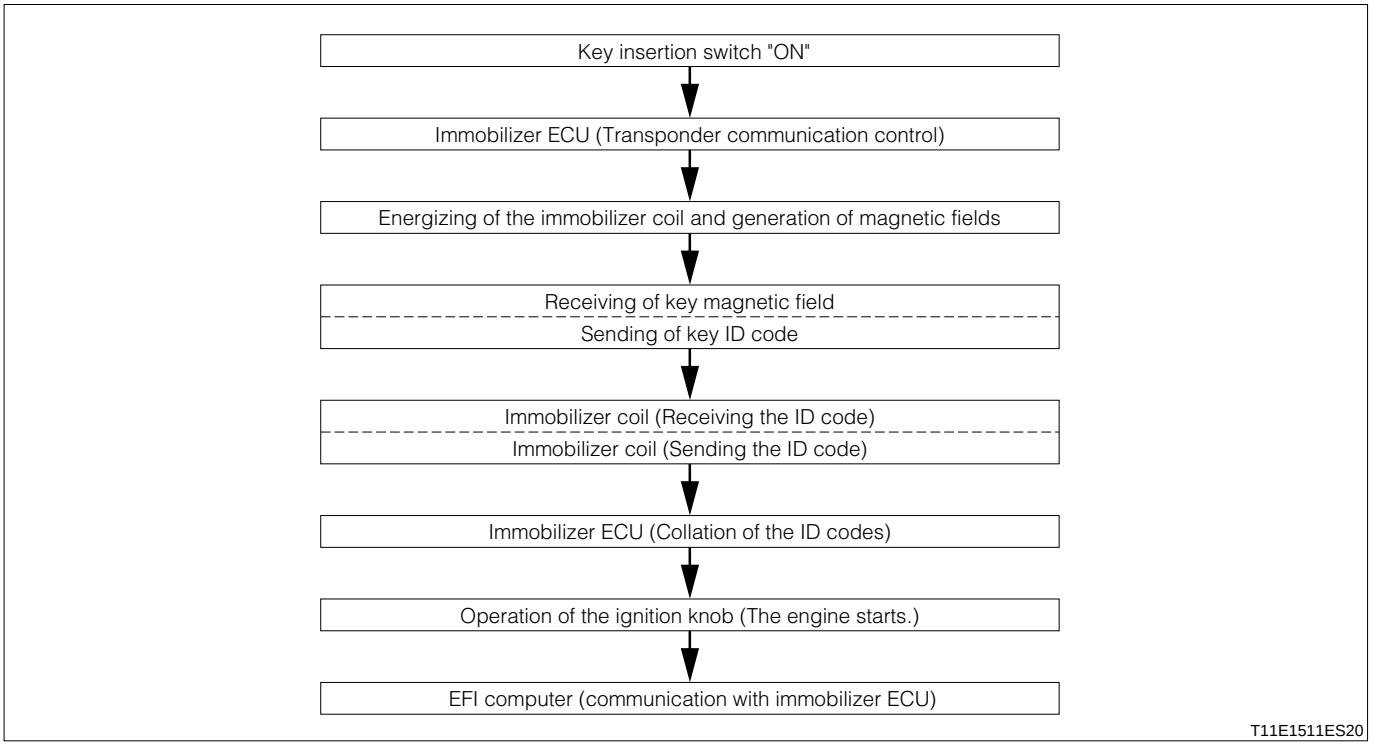


a	Combination meter
b	Steering column upper W/switch bracket
c	Immobilizer ECU
d	EFI ECU
e	Transponder

2 CONTROL

2-1 BRIEF DESCRIPTION OF OPERATION

1.The key switch is turned "ON", when the key is inserted into the ignition cylinder.
2.The immobilizer ECU energizes the immobilizer coil. As a result, a magnetic field is generated in the coil.
3.When the transponder (chip) incorporated in the key receives the magnetic field of the coil, the ID code memorized in the chip is transmitted.
4.The ID code is received by the immobilizer coil and sent to the immobilizer ECU.
5.The immobilizer ECU performs the collation of the transmitted ID code and the registered ID code. When the codes are matched, the communication with the EFI ECU is permitted. ("UNSET" condition.) (In cases where the collation of the codes is not performed correctly, the communication with the EFI ECU remains prohibited. ("SET" condition.) (Therefore, even if the ignition switch is turned "ON", the communication with the EFI ECU will not be started.)
6.When the ignition switch is turned "ON" by turning the ignition knob, the collation of the code with the EFI ECU is carried out.
7.If the collation of the codes is correct, the engine is started by turning the ignition knob to the "START" position.



2-2 IMMOBILIZER SYSTEM CONTROL

2-2-1 IMMOBILIZER SYSTEM OPERATING CONDITION

When the following conditions are satisfied, the immobilizer system is set to the operating condition (communication with the EFI ECU prohibited).

(1) The key switch is "OFF" as well as the ignition switch is at "LOCK" or "ACC" position.
(2) Thirty seconds have passed after the key switch is "ON", and the ignition switch is changed from "ON"→"LOCK" or "ACC" position.

2-2-2 IMMOBILIZER SYSTEM RELEASED CONDITION

When the following conditions are satisfied, the immobilizer system is set to the released condition (communication with the EFI ECU allowed).

(1) When the ID code stored in the key and the ID code stored in the immobilizer ECU match.

2-3 TRANSPONDER COMMUNICATION CONTROL

2-3-1 TRANSPONDER COMMUNICATION STARTING CONDITION

If any of the following conditions is met, the transponder communication (Check of the ID code of the key) starts.

(1) In the immobilizer system "SET" condition, the key switch is "OFF"→"ON".
(2) In the immobilizer system "SET" condition, the ignition switch is changed from "LOCK" or "ACC" position→"ON".
(3) In the immobilizer system "SET" condition, the key switch is "ON" and the ignition switch is changed from "ON"→"LOCK" or "ACC" position.
(4) In the immobilizer system "SET" condition, the key switch is turned "ON" or the ignition switch is turned "ON" after the ECU power "ON" reset is released.

2-3-2 TRANSPONDER COMMUNICATION FINISHING CONDITION

When any of the following conditions is satisfied, the transponder communication (key ID code verification) is finished.

(1) The key switch is "OFF" as well as the ignition switch is at "LOCK" or "ACC" position.
(2) Three seconds has passed after the key switch is turned from "OFF"→"ON"
(3) Three seconds has passed after the ignition switch is turned from "OFF"→"ON"
(4) Three seconds has passed after the key switch is turned "ON" and the ignition switch is turned from "OFF"→"ON"
(5) The ID code registered in the immobilizer ECU matches the ID code memorized in the key.
(6) After an ID code not registered in the immobilizer ECU has been received three times and the key ID has been read properly

2-4 EFI ECU COMMUNICATION CONTROL

2-4-1 EFI ECU COMMUNICATION STARTING CONDITION

When the immobilizer system has been released and the ignition switch is set to "LOCK", or set from "ACC"→"ON", the immobilizer ECU communicates with the EFI ECU.

2-4-2 EFI ECU COMMUNICATION FINISHING CONDITION

If any of the following conditions is met, the immobilizer ECU will inhibit communication with the EFI ECU.

(1) During communicating with the EFI ECU, the ignition switch is changed from "ON"→"LOCK" or "ACC" position.
(2) Immobilizer system "SET" status
(3) Communication with the EFI ECU is complete.

2-5 DIAGNOSIS

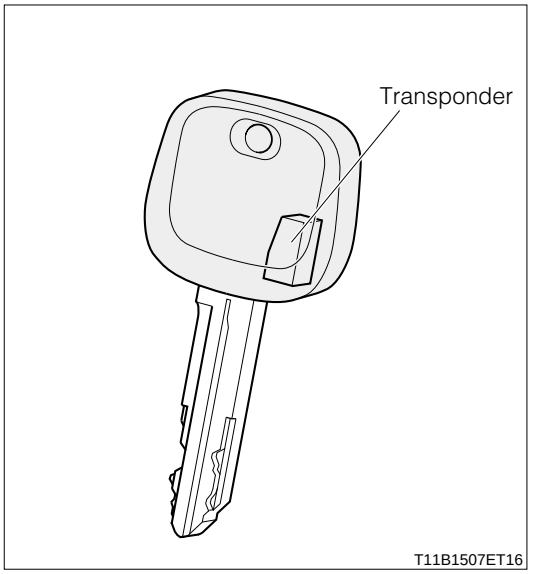
2-5-1 DESCRIPTION

The diagnosis means "Trouble diagnosis". In cases where an abnormality exists in the input/output system, the computer inside the sensor unit informs the check operator of the abnormal items.
For the details of the diagnosis, refer to the repair manual.

3 COMPONENTS

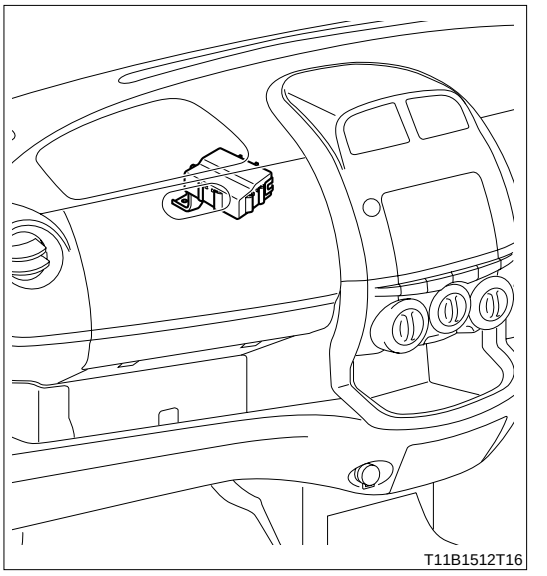
3-1 IGNITION KEY

A transponder (Chip) is incorporated in the grip section of the ignition key. Upon receiving the magnetic field generated by the immobilizer coil, this chip sends the ID code. Moreover, the ID code differs, depending on the ignition key.



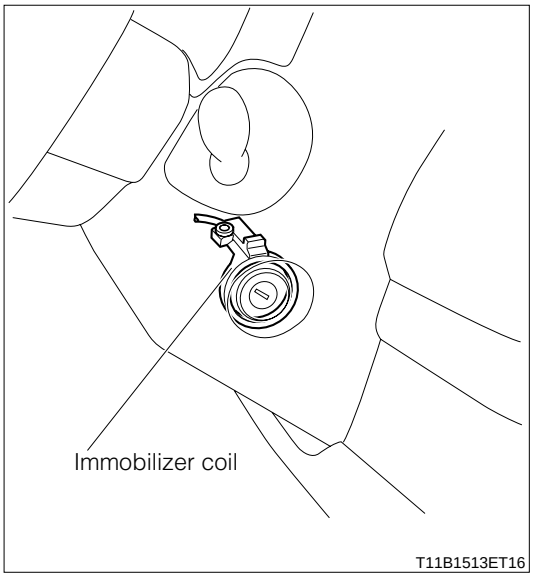
3-2 IMMOBILIZER ECU

1. The immobilizer coil is energized and the transponder communication is performed. Furthermore, the collation of ID codes is carried out with the EFI ECU.
2. It is possible to register up to four keys. Even when the battery is disconnected, the memory of ID codes of the registered key will not be lost



3-3 IMMOBILIZER COIL

When electric current flows into the immobilizer coil due to the immobilizer ECU control, a magnetic field is generated and the ID code is received from the key.

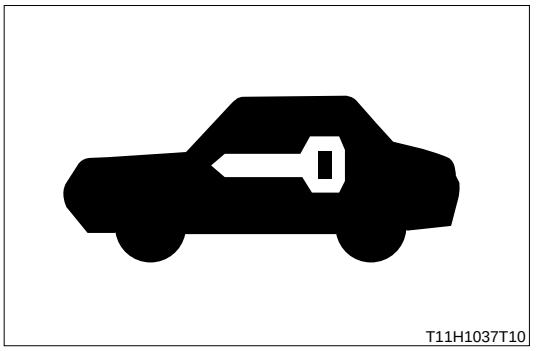


3-4 EFI ECU

The ID code is collated by the signal from the immobilizer ECU, thus controlling the injection of fuel.

3-5 COMBINATION METER

When the immobilizer system is in the operating condition, the indicator in the combination meter flashes.


T11H1037T10

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	EMISSION CONTROL SYSTEM	B9
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FRONT FOG LAMP---------- J1 - 6
REAR FOG LAMP---------- J1 - 6
TURN SIGNAL AND HAZARD LAMP-- J1 - 7
STOP LAMP ---------- J1 - 8
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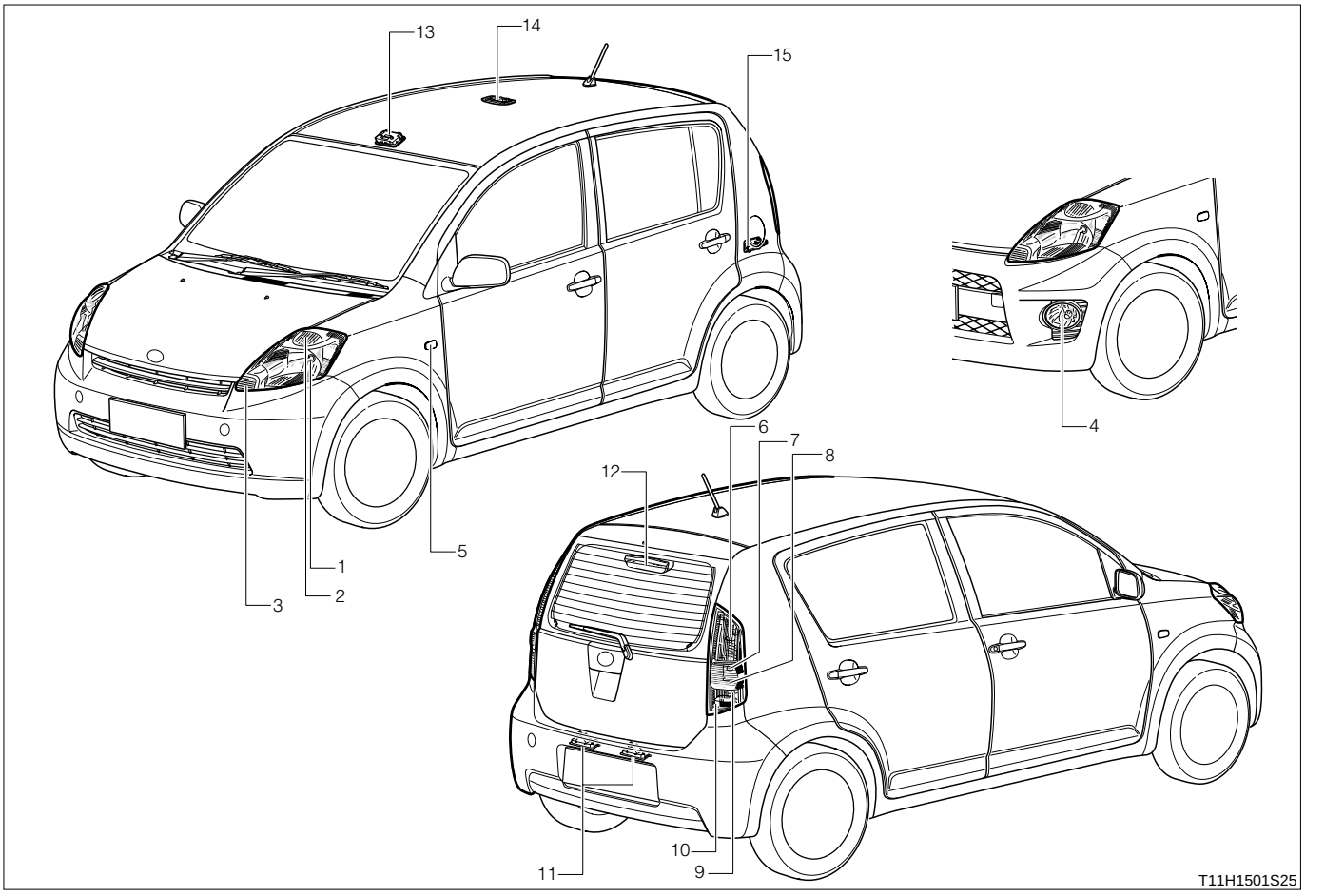
1 OUTLINE

1. Two-headlamp type halogen headlamps have been selected.
2. For the headlamps, unconventional multi-reflector type that has enhanced the photometric performance has been employed.
3. The manual headlamp leveling mechanism is provided on some specifications.
4. An excellent appearance has been achieved by employing clear lenses for outer lenses of the front, side and rear turn signal lamps. In addition to the employment of the clear lens, amber bulbs have been employed for the front, and rear turn signal lamps and amber caps for the interior of the side turn signal lamps.
5. High-mount stop lamps equipped on the back door have been set in some specifications.
6. An excellent appearance has been achieved by employing clear lenses for the outer lenses of the rear combination lamp.
7. The rear fog lamp has been set in some specifications and is provided in the driver seat side rear combination lamp.



Specification table

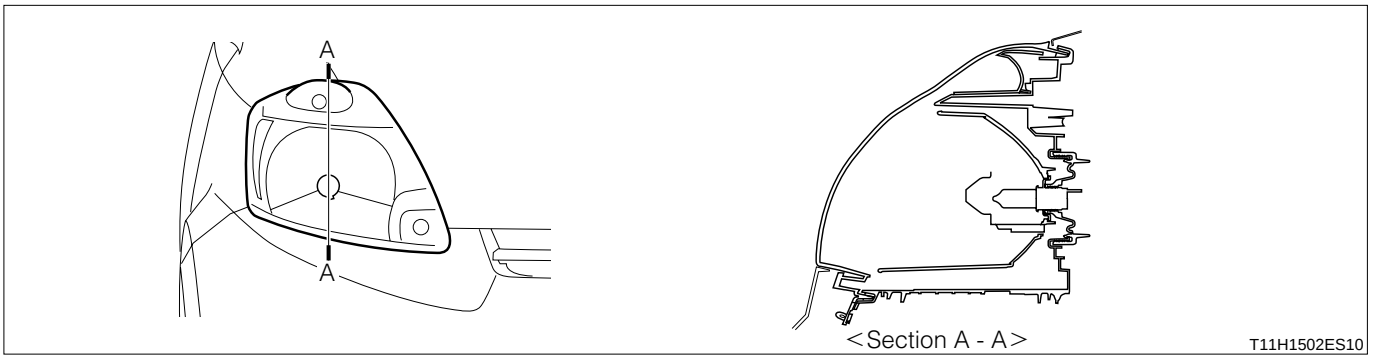
No.	Nomenclature	Category	Capacity (W)
1	Headlamp	H4	60/55
2	Clearance lamp	T10	5
3	Front turn signal lamp	S25 (Amber)	21
4	Front fog lamp	HB4	51
5	Side turn signal lamp	T10	5
6	Tail and stop lamp	T20	21/5
7	Rear turn signal lamp	T20 (Amber)	21
8	Backup lamp	T16	16
9	Rear fog lamp	T20	21
10	Reflex reflector	—	—
11	License plate lamp	T10	5
12	High-mount stop lamp	T16	16
13	Front map lamp	—	8
14	Room lamp	—	8
15	Luggage room lamp	—	5

2 CONSTRUCTION AND OPERATION

2-1 HEADLAMP

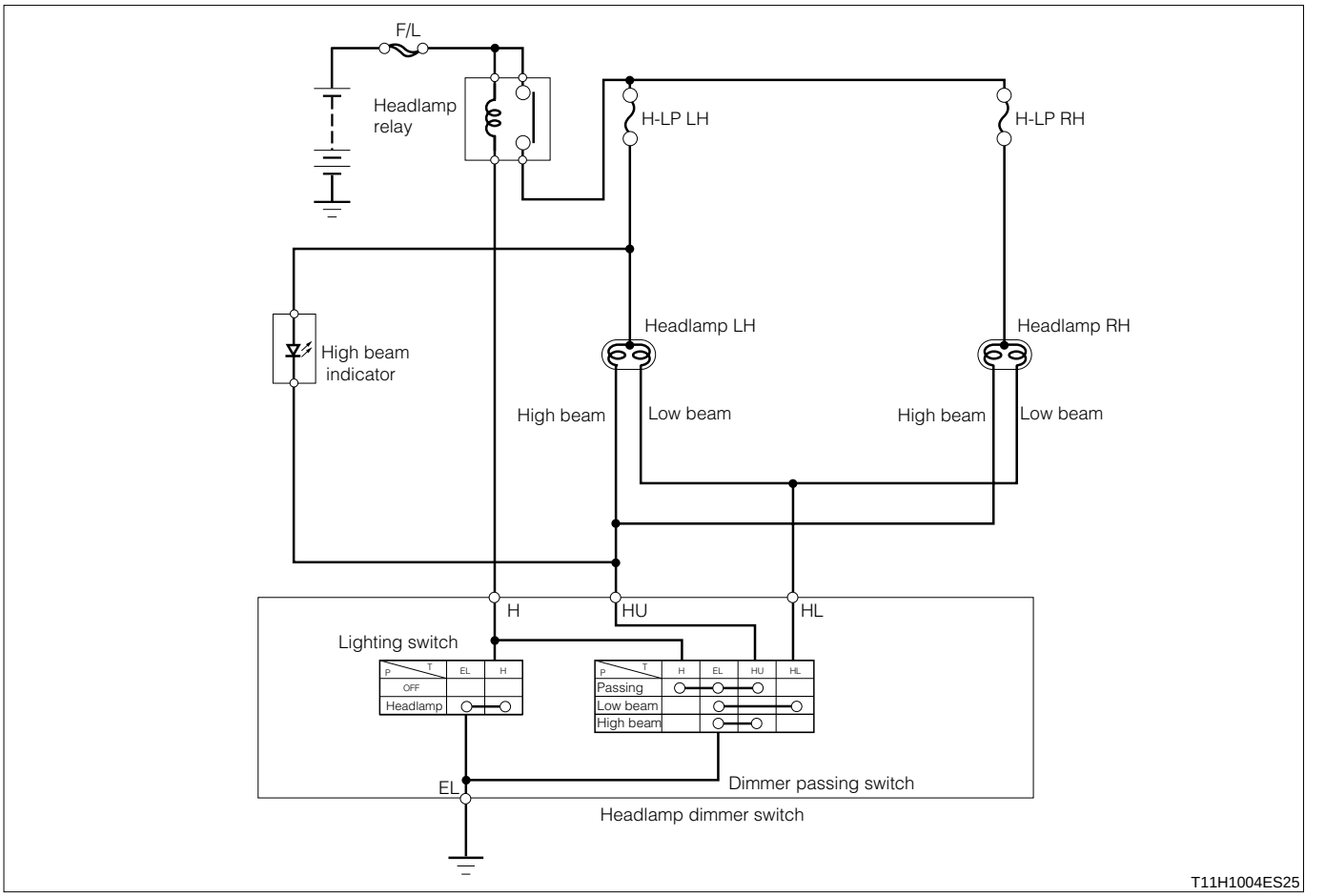
2-1-1 DESCRIPTION

1.Two-headlamp type halogen headlamps have been selected.
2.The multi-reflector type that has enhanced the photometric performance has been employed.
3.A combination lamp that has integrated the front turn signal lamp and the clearance lamp has been employed.
4.The manual headlamp leveling mechanism is provided on some specifications.

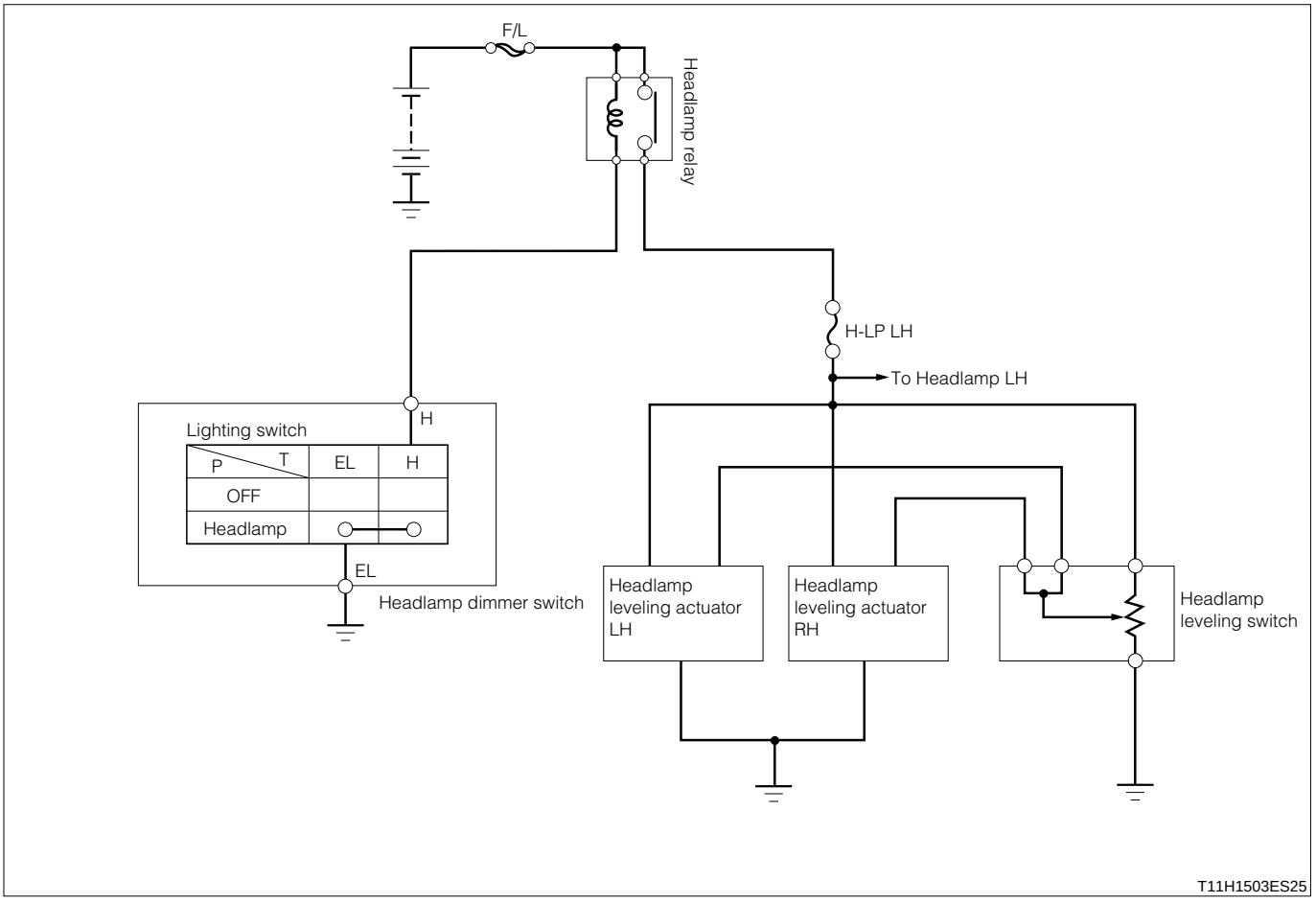


2-1-2 SYSTEM WIRING DIAGRAM

(1) Headlamp

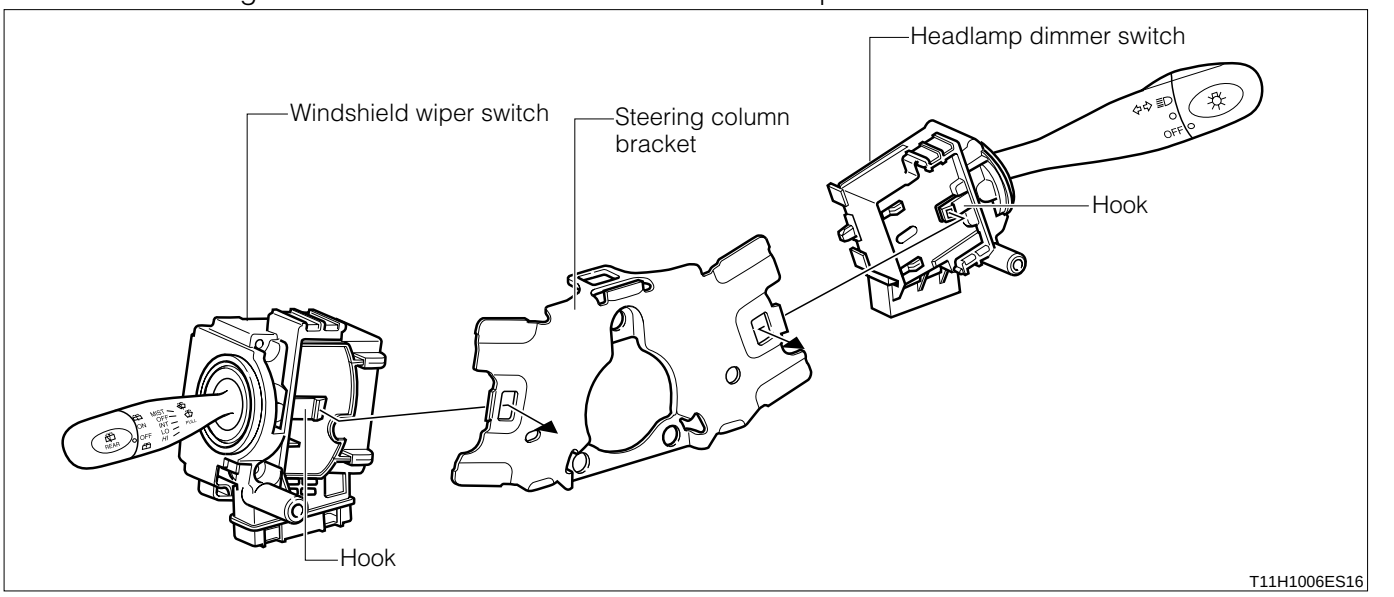


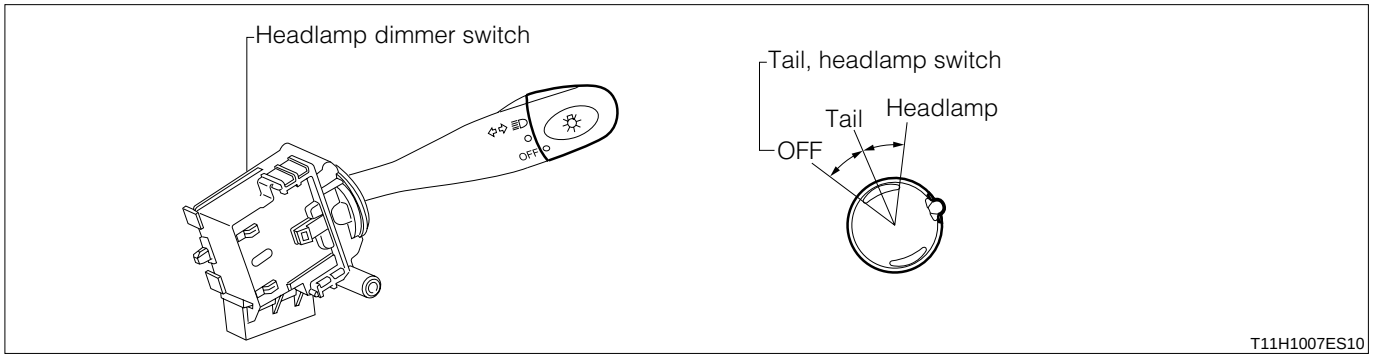
(2) Manual headlamp leveling mechanism



2-1-3 HEADLAMP DIMMER SWITCH

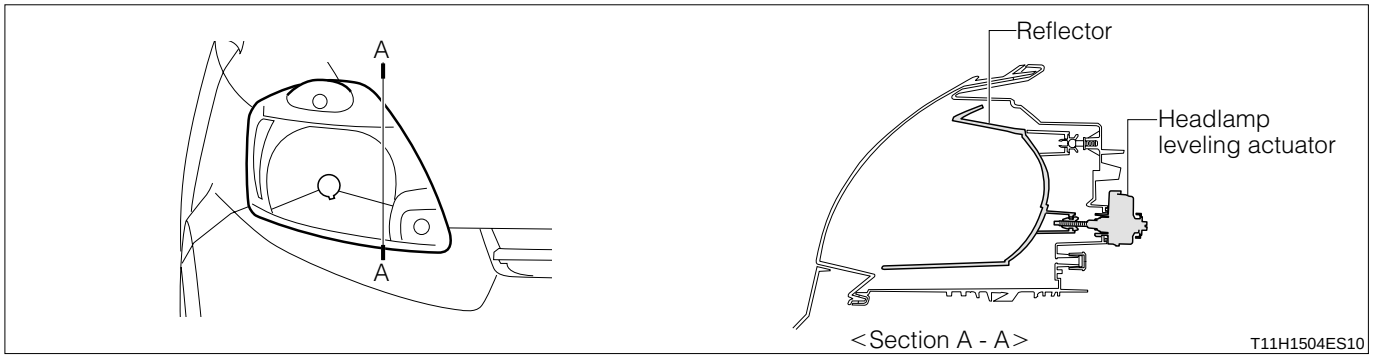
1.Replacement of the headlamp dimmer switch has been made possible without removing the steering wheel by positioning the headlamp dimmer switch and the windshield wiper switch independently.
2.A mechanism in which the headlamp dimmer switch is directly fixed to the steering column bracket with a hook has been employed. This has enhanced serviceability.
3.A turn canceling mechanism has been built in the headlamp dimmer switch.





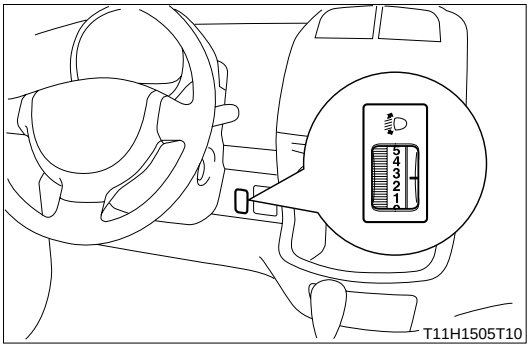
2-1-4 MANUAL HEADLAMP LEVELING MECHANISM

1.Some specifications employ the manual headlamp leveling mechanism whereby the vertical direction of the photometric axis can be adjusted from the vehicle interior as the vehicle posture changes due to a loaded state. This mechanism can help avoiding dazzling the coming vehicles and vehicles running ahead.
2.Depending upon the state signal of the headlamp leveling switch in the vehicle interior (the highest direction in the level 0, the lowest direction in the level 5), the headlamp leveling actuator is driven. Thus, the reflector direction is changed vertically so as to adjust the photometric axis.
3.The headlamp leveling actuator is provided at the rear of the headlamp.



2-1-5 HEADLAMP LEVELING SWITCH

It is installed at the side of the steering column.

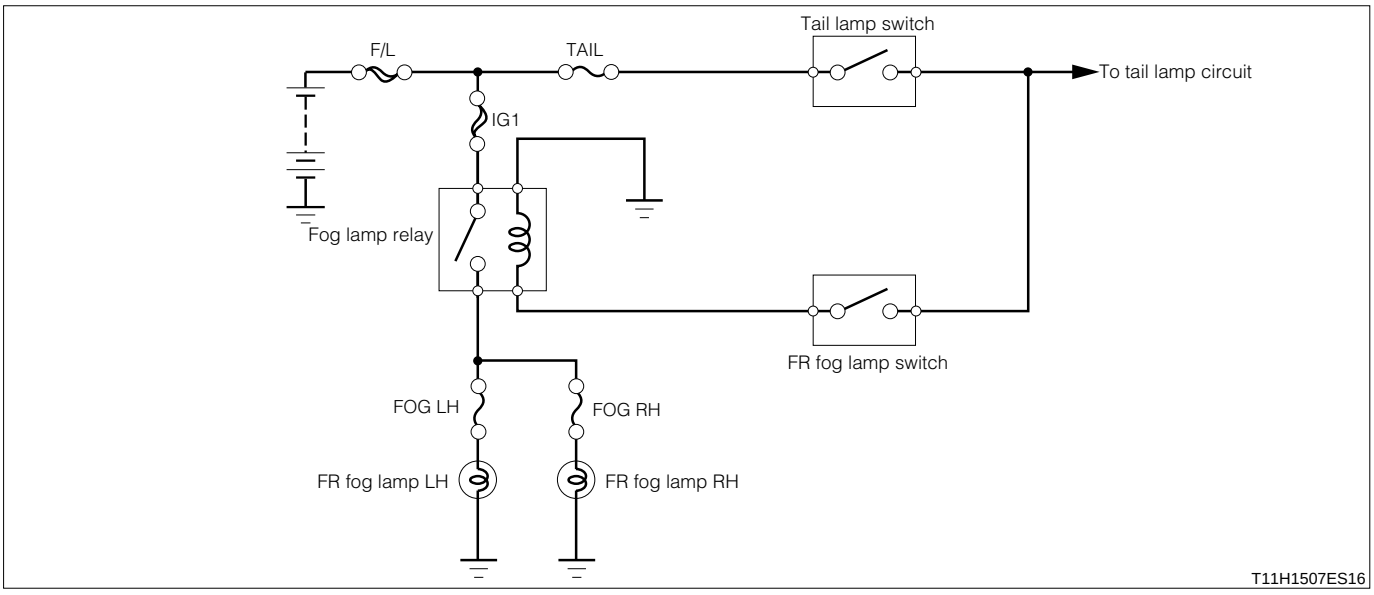


2-2 FRONT FOG LAMP

2-2-1 DESCRIPTION

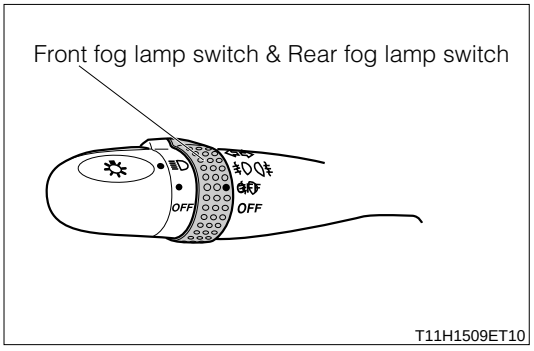
The round shaped front fog lamp is provided on some specifications.

2-2-2 SYSTEM WIRING DIAGRAM



2-2-3 FRONT FOG LAMP SWITCH

For easy operation, this switch has been integrated with the headlamp dimmer switch.

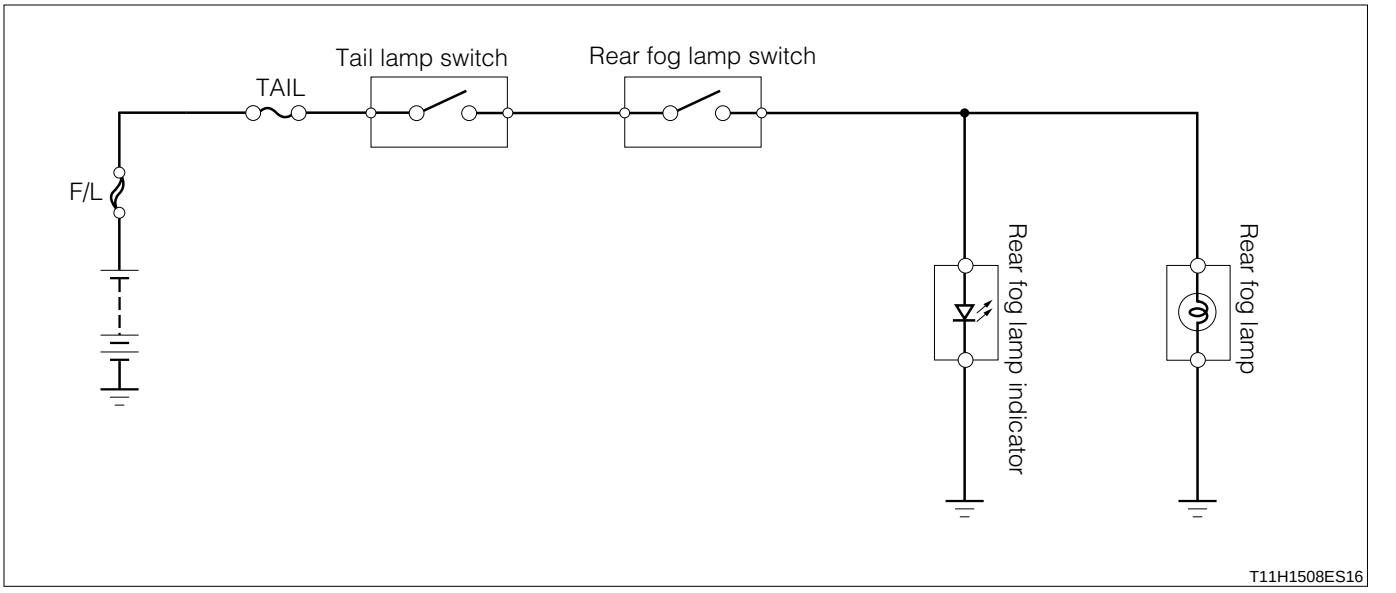


2-3 REAR FOG LAMP

2-3-1 DESCRIPTION

The rear fog lamp has been set in some specifications and is built in the driver seat side rear combination lamp.

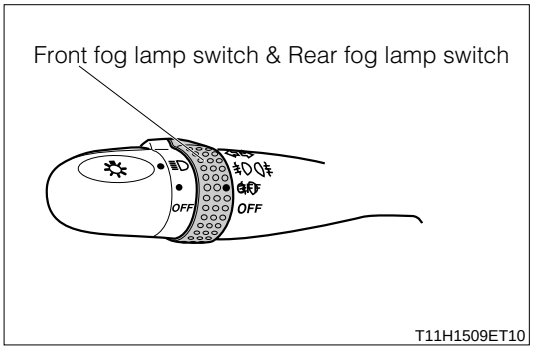
2-3-2 SYSTEM WIRING DIAGRAM



The rear fog lamp switch can be turned ON only when the headlamp or front fog lamp is illuminated.

2-3-3 REAR FOG LAMP SWITCH

For easy operation, this switch has been integrated with the headlamp dimmer switch.



2-4 TURN SIGNAL AND HAZARD LAMP

2-4-1 DESCRIPTION

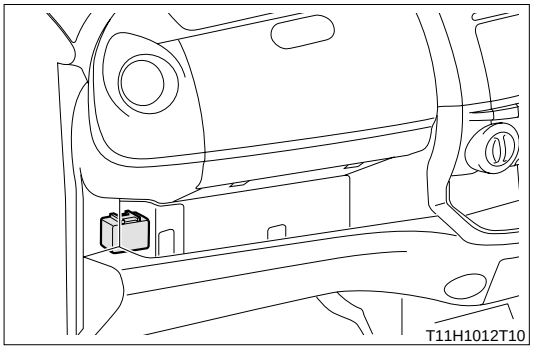
1.The front turn signal lamp has been built in the combination headlamp.
2.Other than its primary usage, the hazard lamp serves as an answer back function for the keyless entry system*.

*

Refer to Page I4-6.

2-4-2 HAZARD SWITCH

1.The switch has employed a push type that incorporates night illumination.
2.For easier operation, it is provided at the central section of the heater control panel.

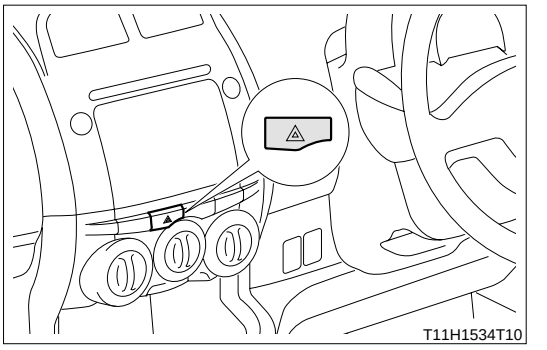


2-4-3 FLASHER RELAY

This is of an insertion type into the fuse block.

Specification table

Number of flashing during normal operation	85±10 (times/minute)
Number of flashing when one lamp is burnt out	140 - 250 (times/minute)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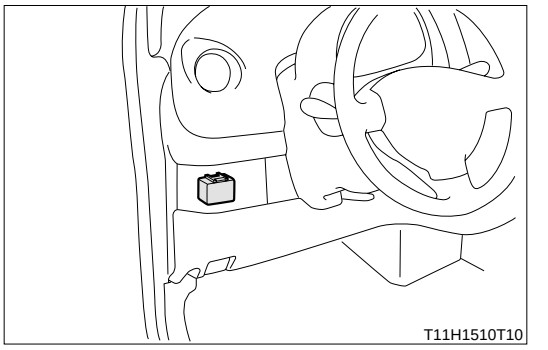
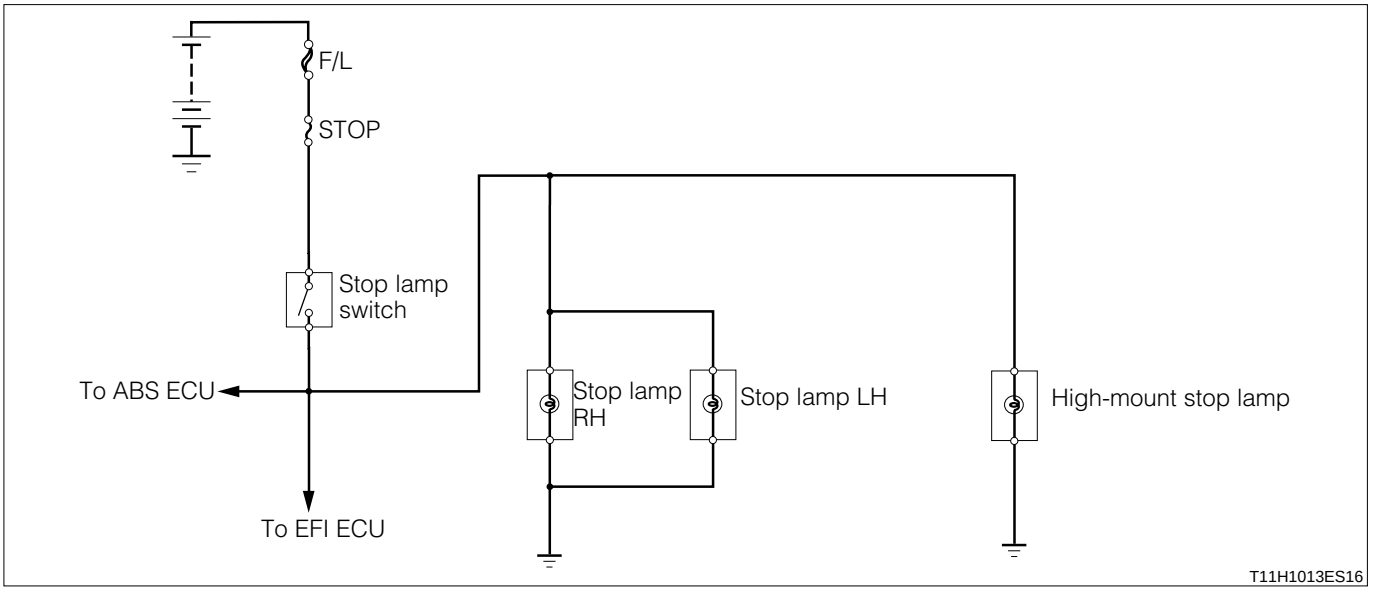

T11H1510T10

2-5 STOP LAMP

2-5-1 DESCRIPTION

A high-mount stop lamp equipped on the back door has been set in some specifications.

2-5-2 SYSTEM WIRING DIAGRAM



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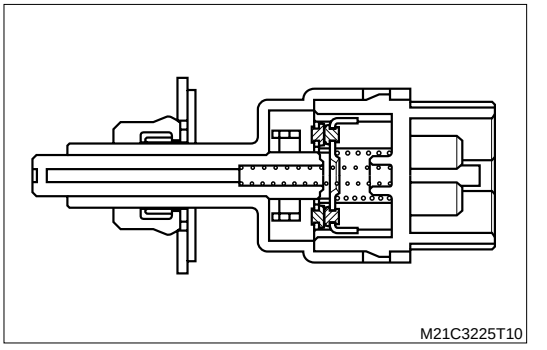
2-5-3 STOP LAMP SWITCH

1.The stop lamp switch is installed in the upper part of the brake pedal and it detects that the brake pedal is depressed.

2.It becomes "ON" when the brake pedal is depressed.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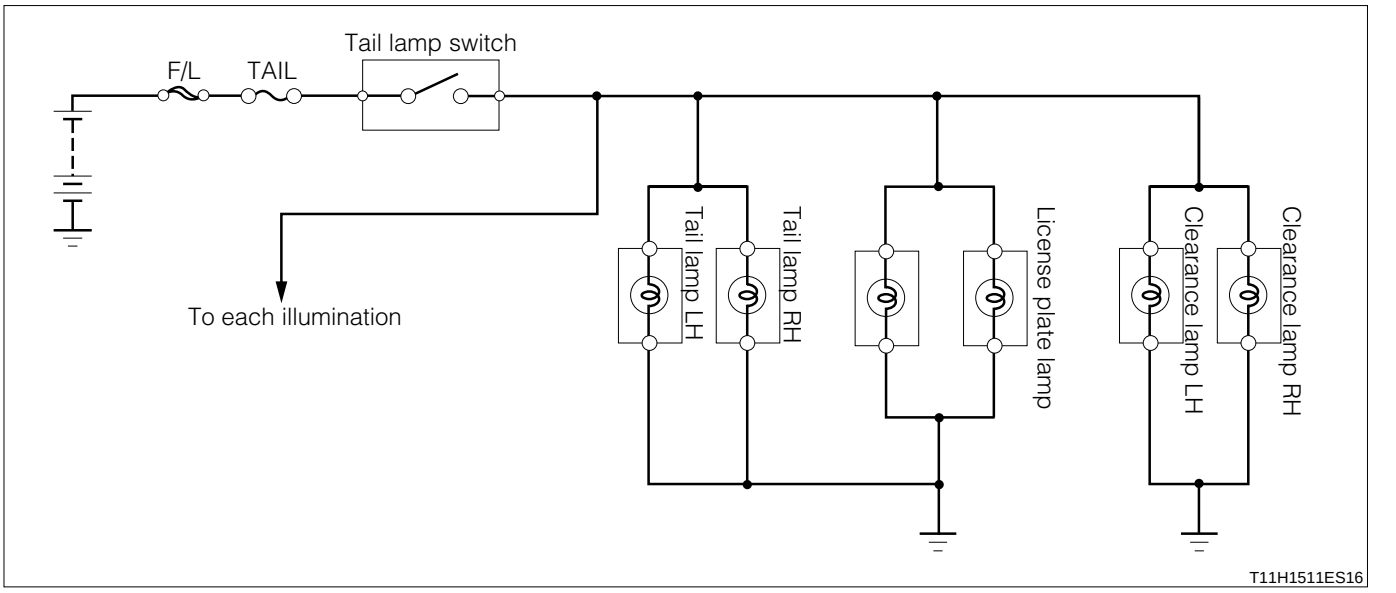
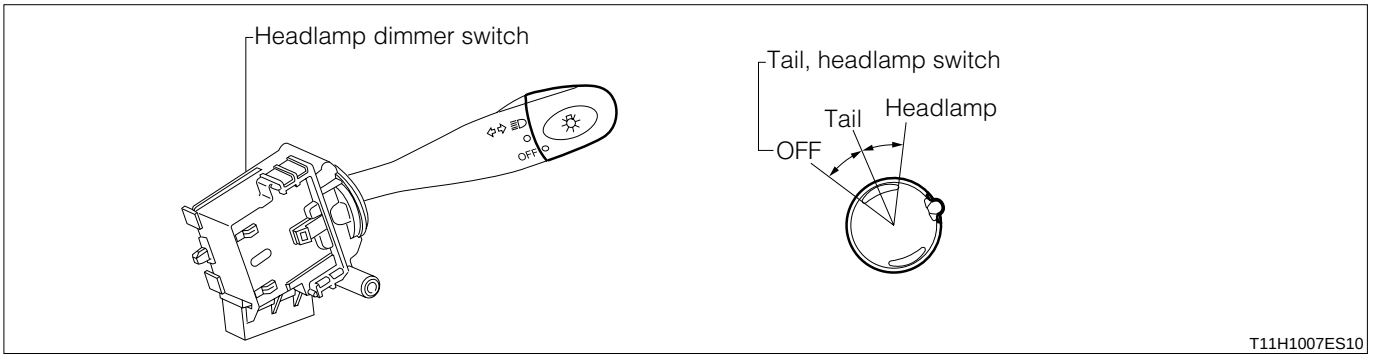
2-6 TAIL LAMP & ILLUMINATION

2-6-1 SYSTEM WIRING DIAGRAM



2-6-2 TAIL LAMP SWITCH

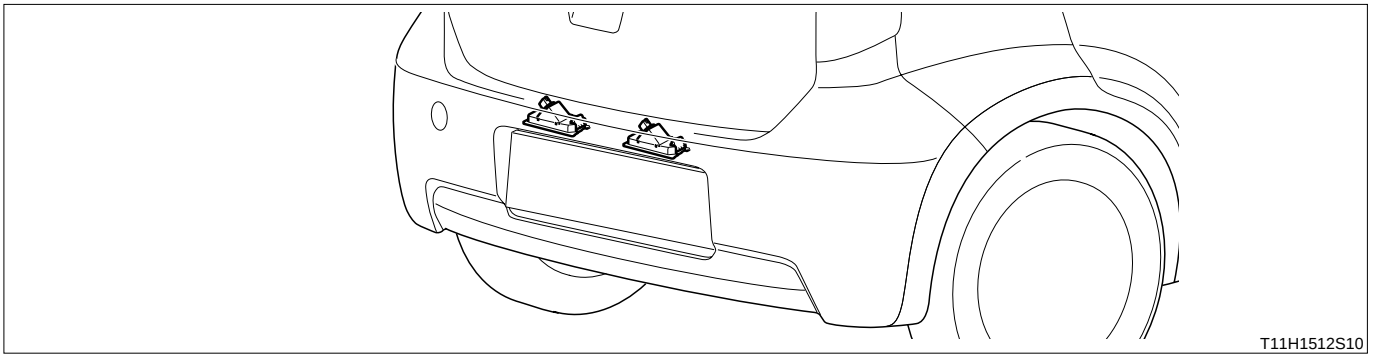
It is positioned in the headlamp dimmer switch.



2-6-3 LICENSE PLATE LAMP

1.The installation position of the license plate lamp is at the back door and the downward illumination type has been employed.

2.A two-lamp type has been employed for the lamps.

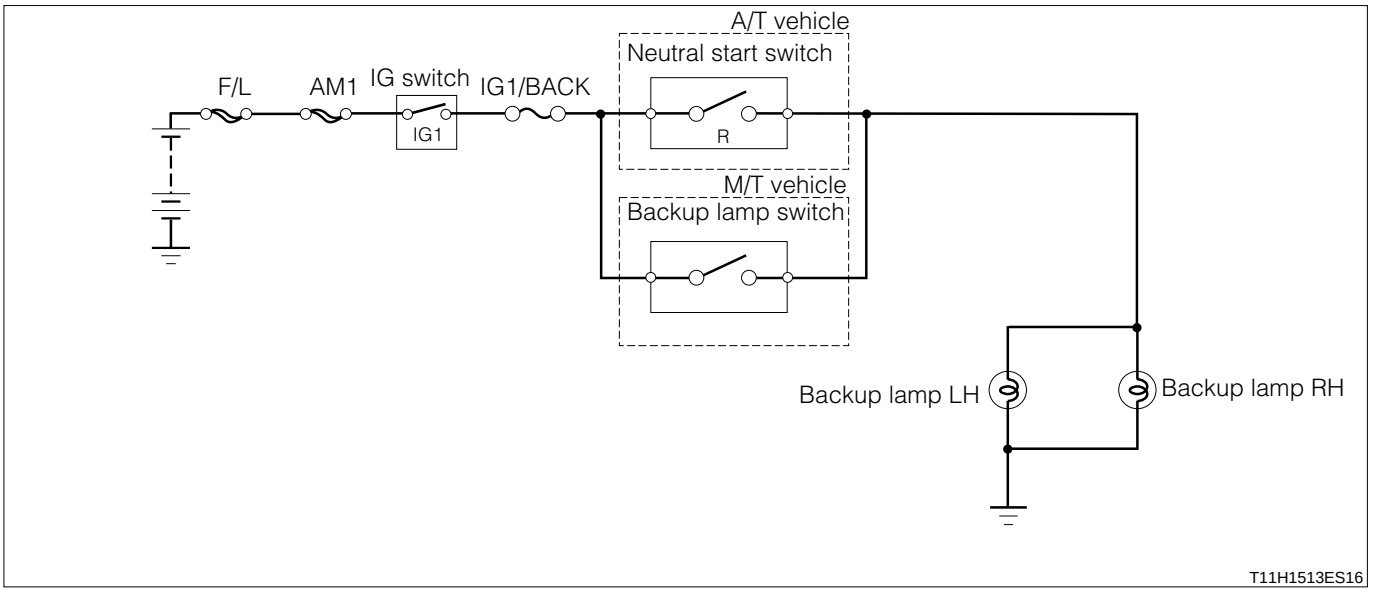


2-6-4 MULTI-TRAY ILLUMINATION

Refer to Page I2-5.

2-7 BACKUP LAMP

2-7-1 SYSTEM WIRING DIAGRAM



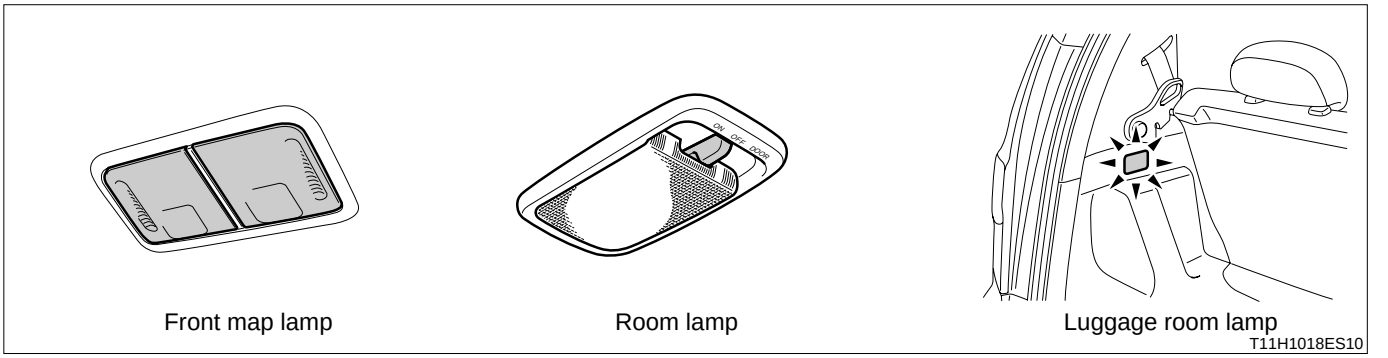
2-8 ROOM LAMP

2-8-1 DESCRIPTION

1.As for the interior lighting, the front map lamp, room lamp and luggage room lamp have been employed for all models.

2.The convenience has been enhanced by employing a room lamp timer function for the room lamp and luggage room lamp.

3.Other than its primary usage, the room lamp and the luggage room lamp serve as an answer back function for the keyless entry system*.

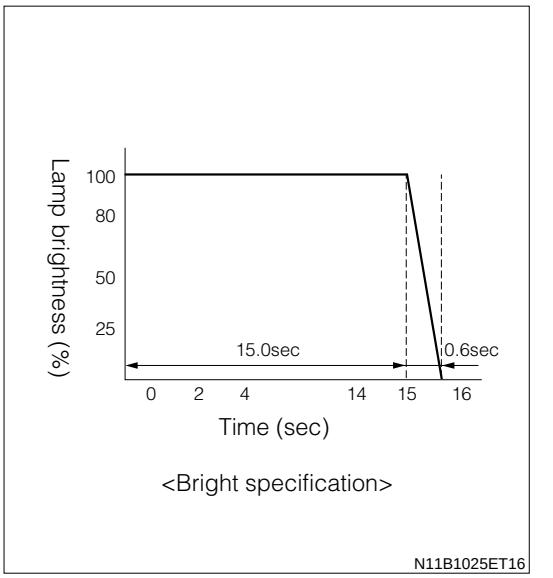


*

Refer to Page I4-6.

2-8-2 ROOM LAMP TIMER FUNCTION

1.When the following conditions are met, the room lamp and the luggage room lamp are lighted for 15 seconds and then fade away.
(1) Either of the door opened→all doors closed



2.When all of the following conditions are met, the room lamp and the luggage room lamp are lighted for 15 seconds and then fade away.
(1) IG switch "OFF"
(2) All doors closed (courtesy switch "OFF")
(3) Driver seat door lock (door control switch) "LOCK"→"UNLOCK"

3.If the driver seat door lock (door control switch) is changed to "LOCK" while the lamp is lighted under the room lamp timer control, the light is dimmed to 50% of when it is lighted and then is faded away three seconds later.

4.When the IG switch becomes "ON" during the room lamp timer control, it is faded away immediately.

2-8-3 BATTERY OVER-DISCHARGE PREVENTIVE FUNCTION

1.When all of the following conditions are met continuously for 10 minutes, the room lamp and the luggage room lamp are turned off.
(1) IG switch "OFF"
(2) Either of the door opened (courtesy switch "ON")

2.When either of the following conditions are met, the battery over-discharge preventive function is released.
(1) IG switch "ON"
(2) All doors closed (courtesy switch "OFF")

2-8-4 ROOM LAMP LIGHTING FUNCTION AT TIME OF KEY REMOVAL

1.When all of the following conditions are met, the room lamp and the luggage room lamp are lighted for 15 seconds.
(1) All doors closed (courtesy switch "OFF")
(2) Elapse of 200ms or more since the recovery from sleep mode (low current mode) of ITC
(3) Key switch "ON" (inserted)→"OFF" (not inserted)

2.When the IG switch becomes "ON", it fades away immediately.

NOTE

- After 10 minutes or more have passed since the IG switch has been "OFF", if the key switch changes from "ON" (inserted)→"OFF" (not inserted), the room lamp lighting mechanism at time of key removal does not take control.

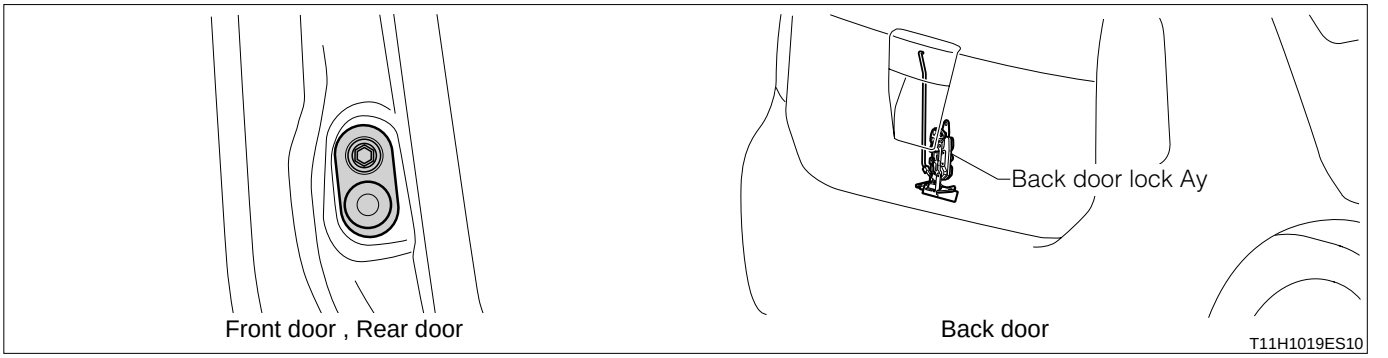
CAUTION

- When other room lamp control conditions are met while the room lamp lighting control at time of key removal is in operation, it makes transition to the other control.

2-8-5 COURTESY SWITCH

For the courtesy switches on the front door and the rear door, a shape that has the main body switch section and the cushion section integrated has been employed with the aim of enhancing the waterproofing property. This switch directly connects the main body and the connector.

Additionally, as for the back door, the back door lock Ay serves for the courtesy switch function.



TO INDEX

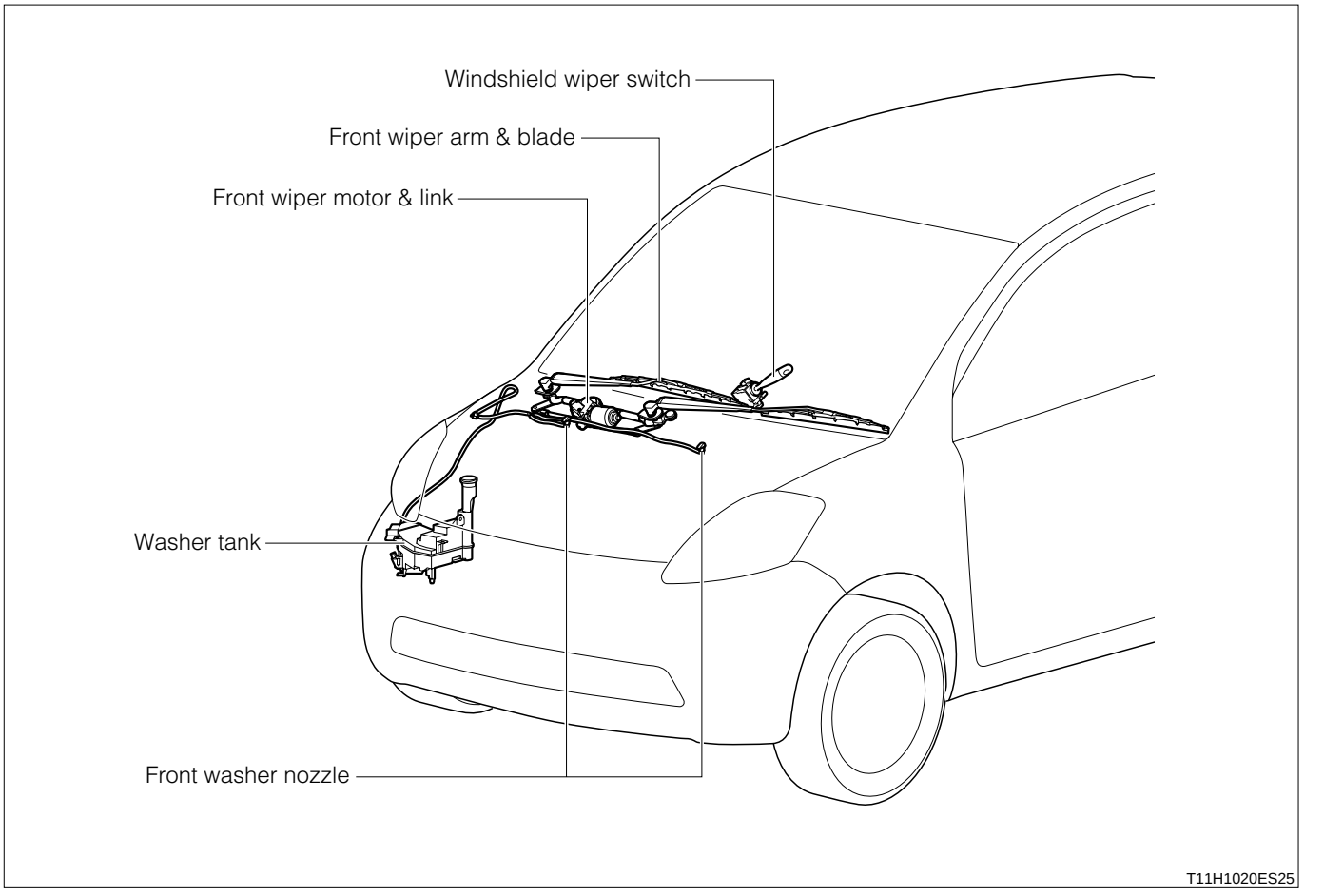
J2 WIPER & WASHER

OUTLINE---------- J2 - 1
DESCRIPTION ---------- J2 - 1
SYSTEM WIRING DIAGRAM ---------- J2 - 3
CONSTRUCTION AND OPERATION----- J2 - 5
FRONT WIPER---------- J2 - 5
REAR WIPER---------- J2 - 8
WASHER---------- J2 - 9

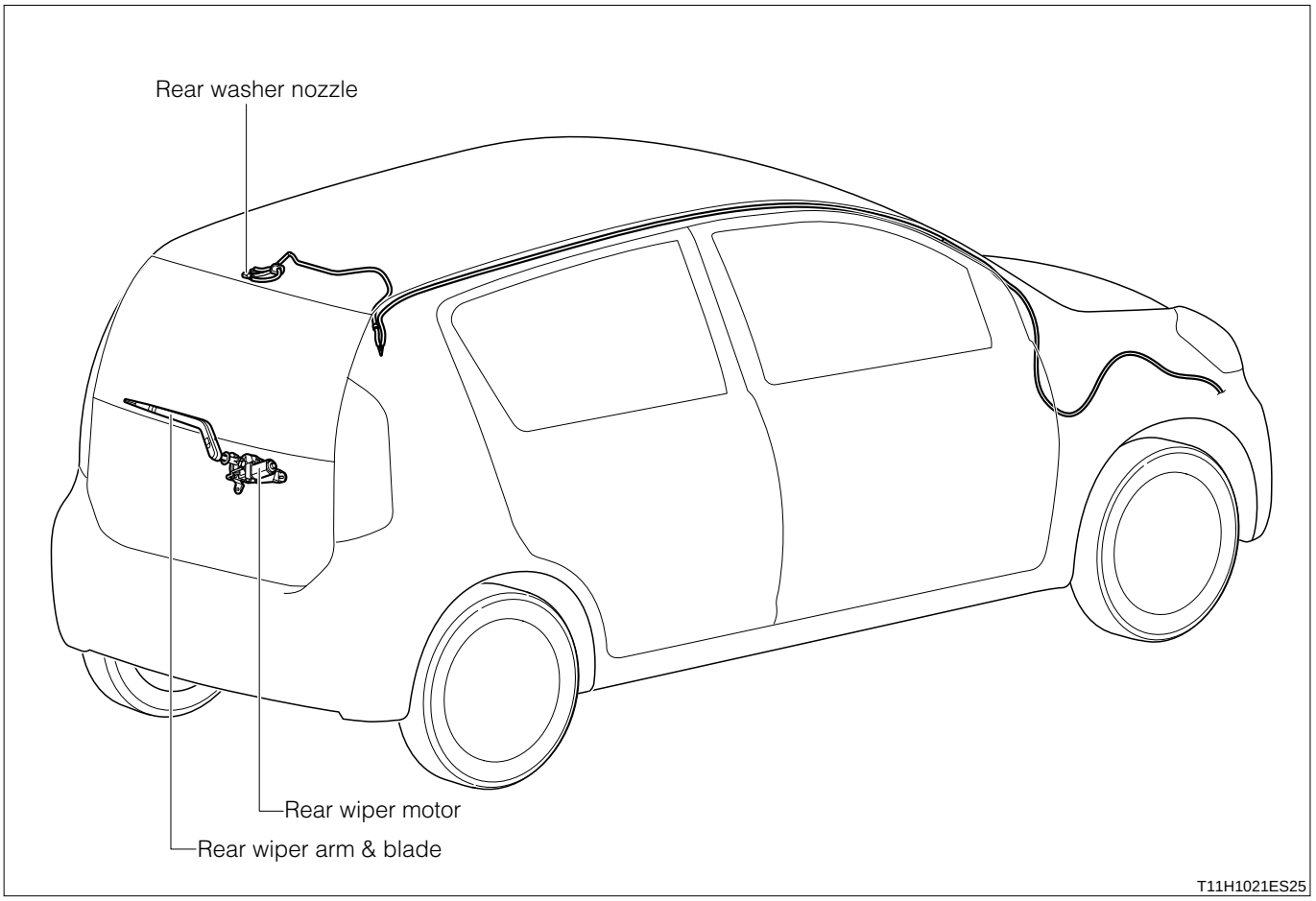
1 OUTLINE

1-1 DESCRIPTION

1.Improvements have been made in the downward field of view and the interior appearance of the arm by positioning the front wiper system lower than the previous model.
2.The appearance and the workability when replacing the blade has been improved by employing the U-hook type for the tightening of the front wiper arm and the front wiper blade.
3.The frame integrated module type has been employed for the installation structure of the front wiper motor and the front wiper link. As a result, the system rigidity has been enhanced, thus reducing the wiper operation sound as well as the variation of the wiper sweep angle.
4.Careful consideration has been made for the protection of pedestrians by employing a pivot section breaking structure for the front passenger seat side wiper.
5.The rear wiper which has a plastic arm and blade has been provided on some specifications.
6.Two 1-hole type washer nozzles have been set in the front and one 1-hole type washer nozzle has been set in the rear side.

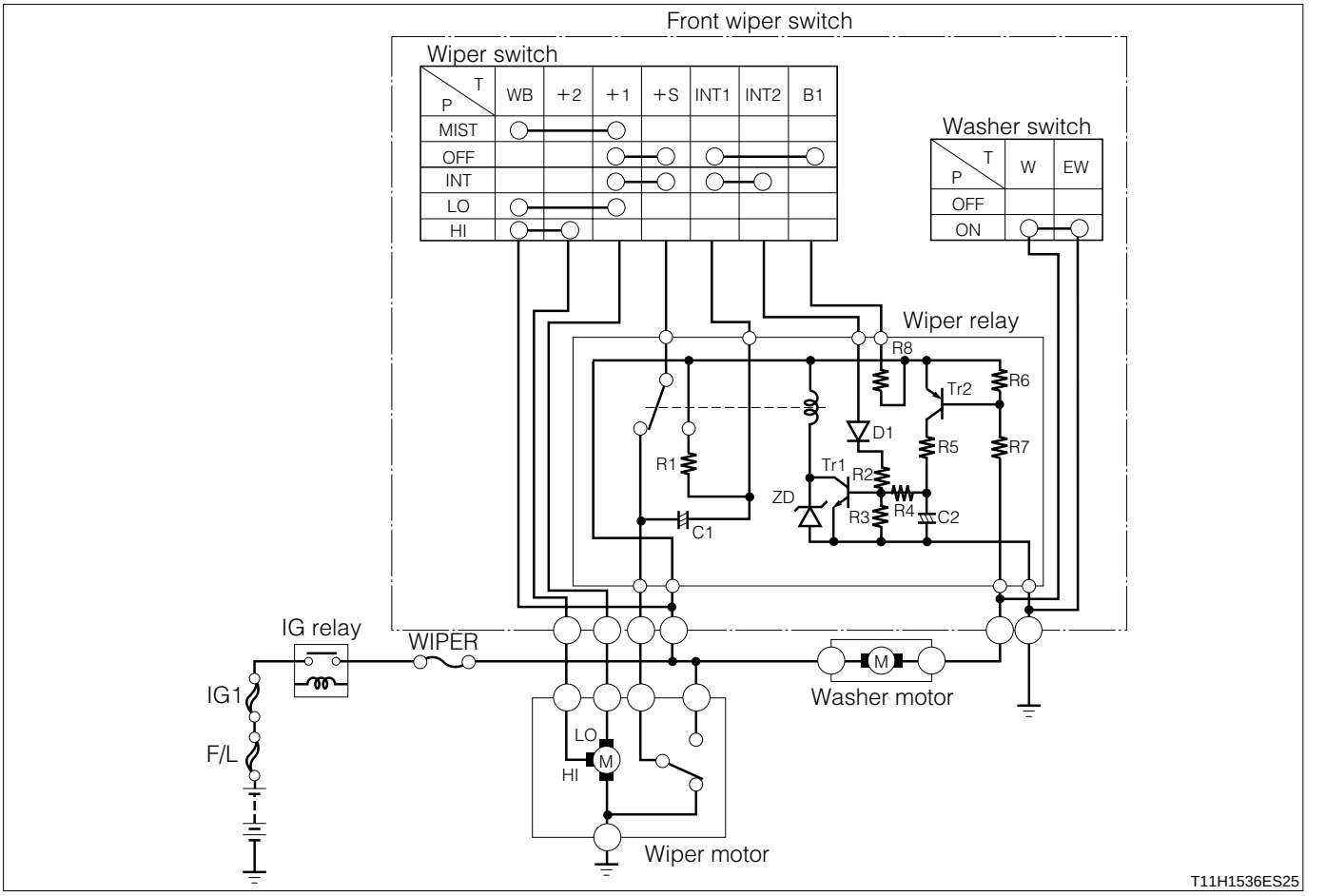


The illustration represents the RHD vehicle.

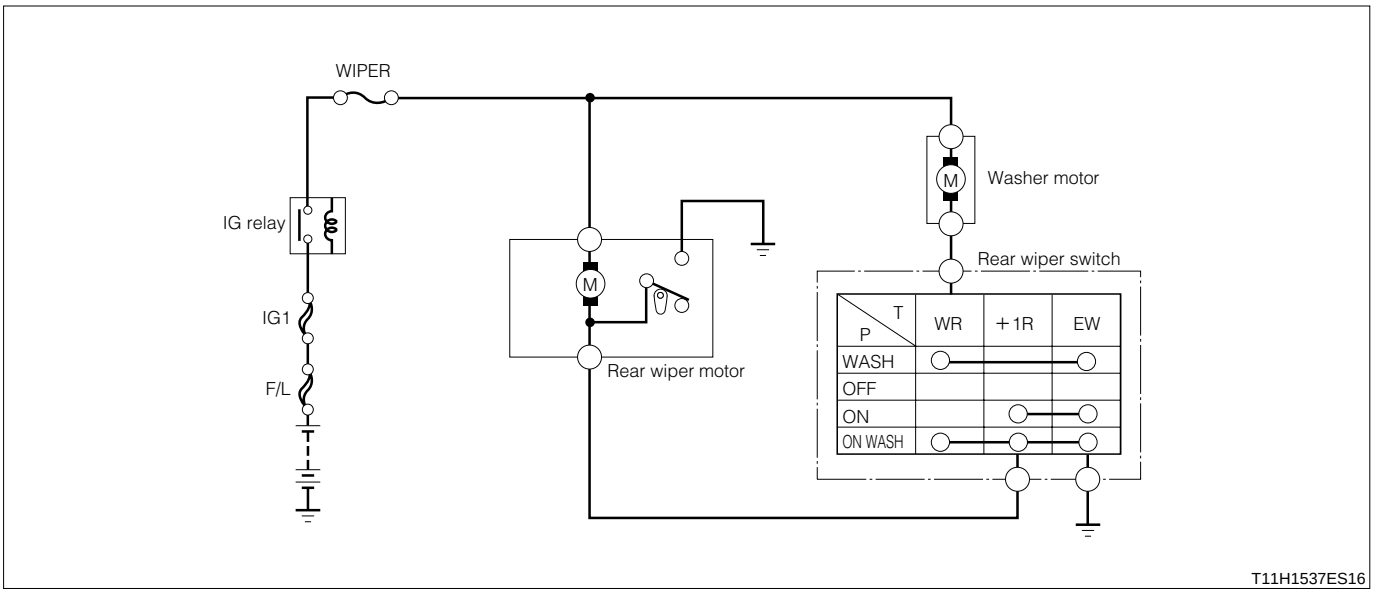


1-2 SYSTEM WIRING DIAGRAM

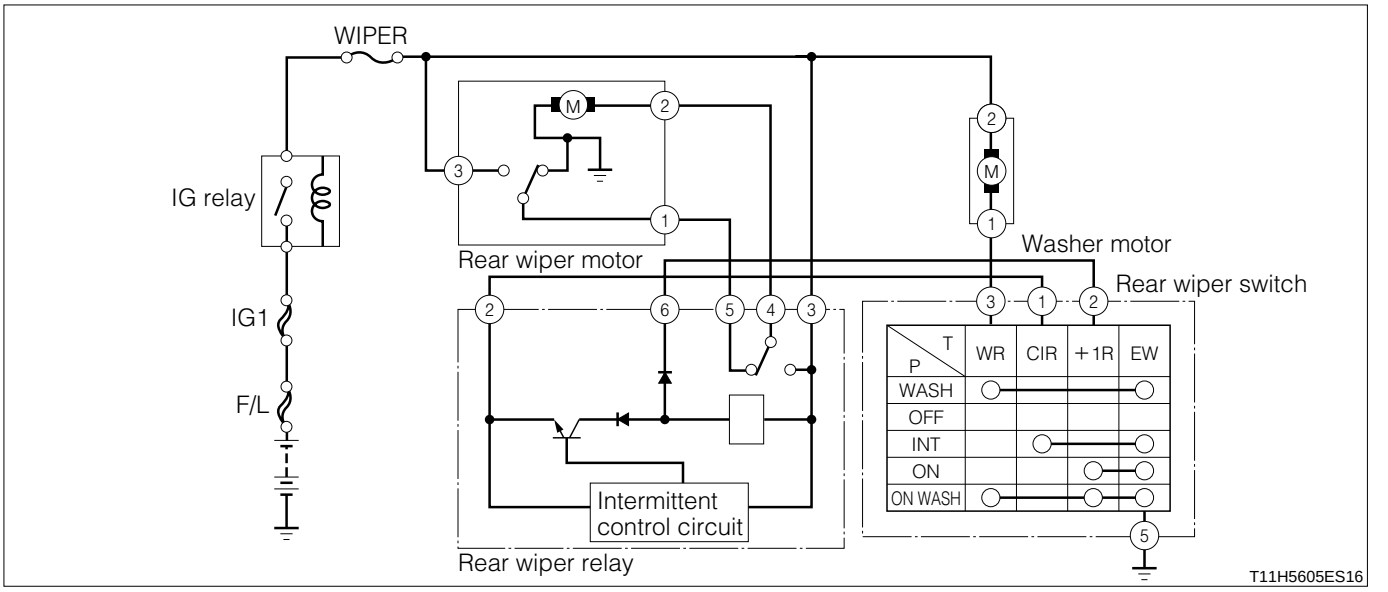
1-2-1 FRONT WIPER & WASHER



1-2-2 REAR WIPER & WASHER (VEHICLES WITHOUT INTERMITTENT FUNCTION)



1-2-3 REAR WIPER & WASHER (VEHICLES WITH INTERMITTENT FUNCTION)



2 CONSTRUCTION AND OPERATION

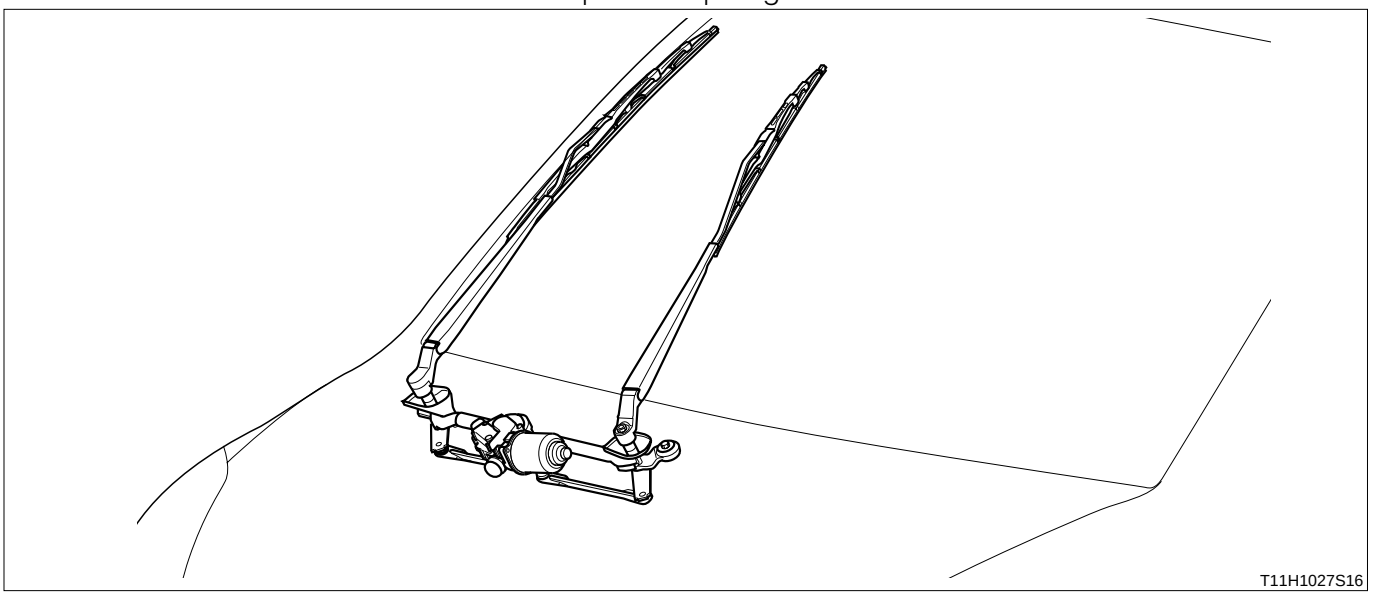
2-1 FRONT WIPER

2-1-1 DESCRIPTION

1.The module type wiper motor & link has been employed for the front wiper.
2.Careful consideration has been made for the protection of pedestrians by employing a breaking structure for the front passenger seat side pivot section.

2-1-2 FRONT WIPER MOTOR AND LINK

The frame integrated module type has been employed for the installation structure of the front wiper motor and the front wiper link. As a result, the system rigidity has been enhanced, thus reducing the wiper operation sound as well as the variation of the wiper sweep angle.



2-1-3 FRONT WIPER MOTOR

For the front wiper motor, a motor with rated voltage of 12V and rated torque of 18N·m has been employed for all models.

Specification table

Rated voltage (V)	12
Rated torque (N·m)	18

2-1-4 FRONT WIPER ARM & BLADE

Specification table

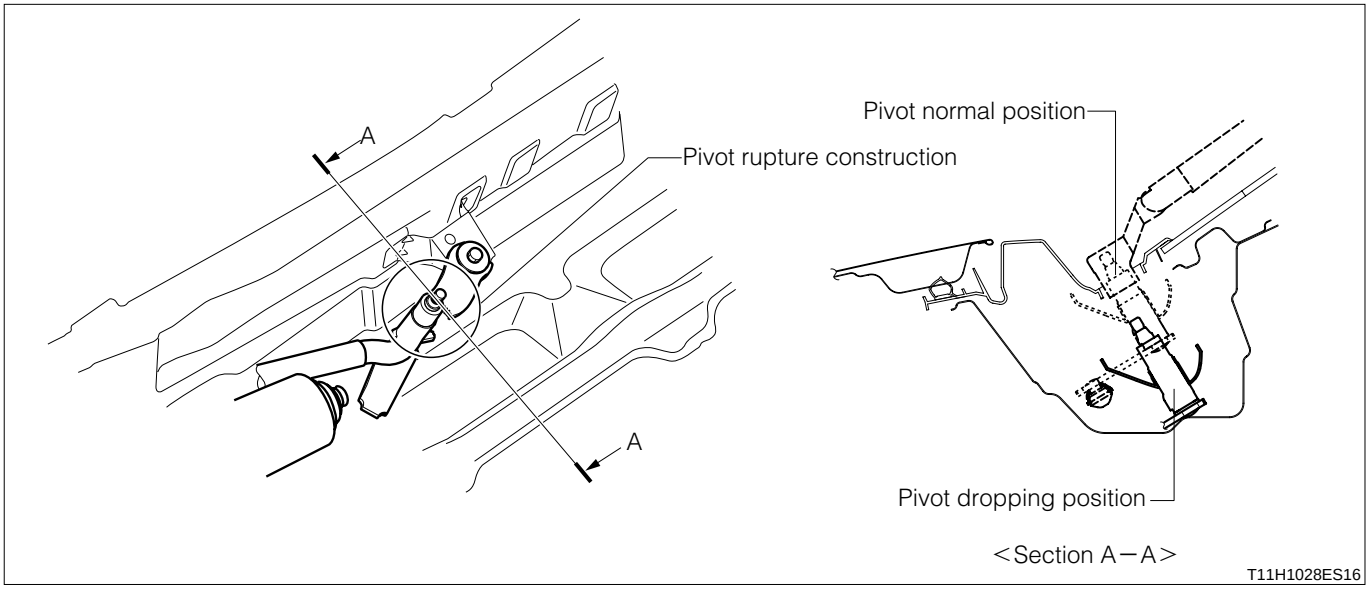
Driver seat side front wiper blade length (mm)	500
Front passenger seat side front wiper blade length (mm)	400

2-1-5 FRONT WIPER LINK

1.Careful consideration has been made for the protection of pedestrians by employing the pivot section breaking structure for the front passenger seat side wiper.

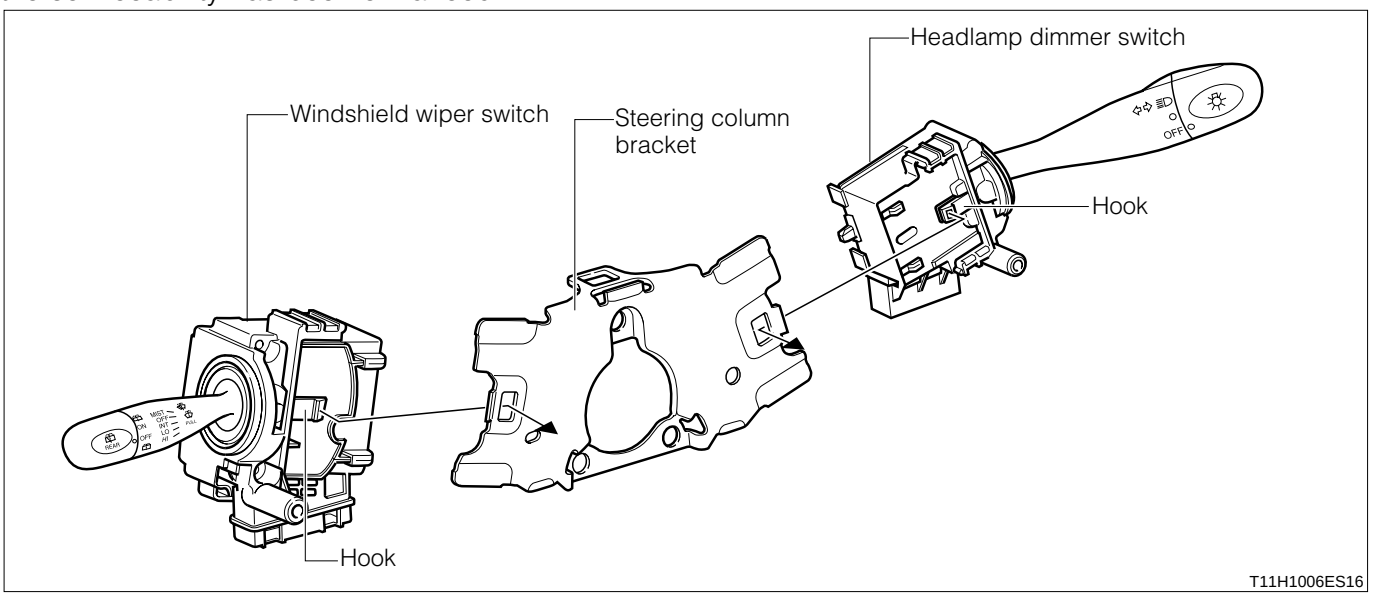
2.A structure in which it is difficult for the head of the pedestrian to hit the base of the wiper directly has been employed by positioning the hood higher than the base of the wiper.

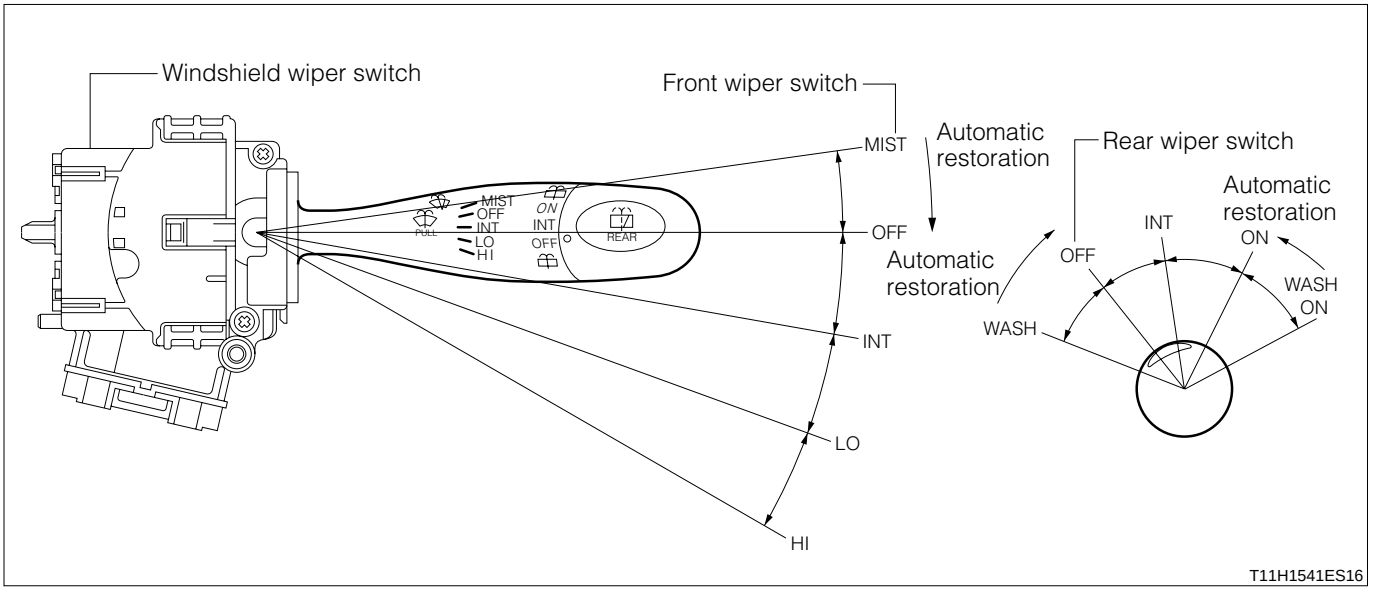
3.Even in the event that the vehicle and the pedestrian collide and the pedestrian hit the base of the wiper, the pivot shaft falls off downward and reduces the impact by the breaking of the pivot section due to the impact.



2-1-6 WINDSHIELD WIPER SWITCH

By positioning the headlamp dimmer switch and the windshield wiper switch independently, replacement of the windshield wiper switch has been made possible without removing the steering wheel. In this way, the serviceability has been enhanced.





2-2 REAR WIPER

2-2-1 DESCRIPTION

Individual replacement of the rear wiper blade has been made possible by letting the rear wiper arm and the blade have separate body structure made of resin.

2-2-2 REAR WIPER MOTOR

The rear wiper motor is common for all models.

Specification table

Rated voltage (V)	12
Rated torque (N·m)	7

2-2-3 REAR WIPER ARM & BLADE

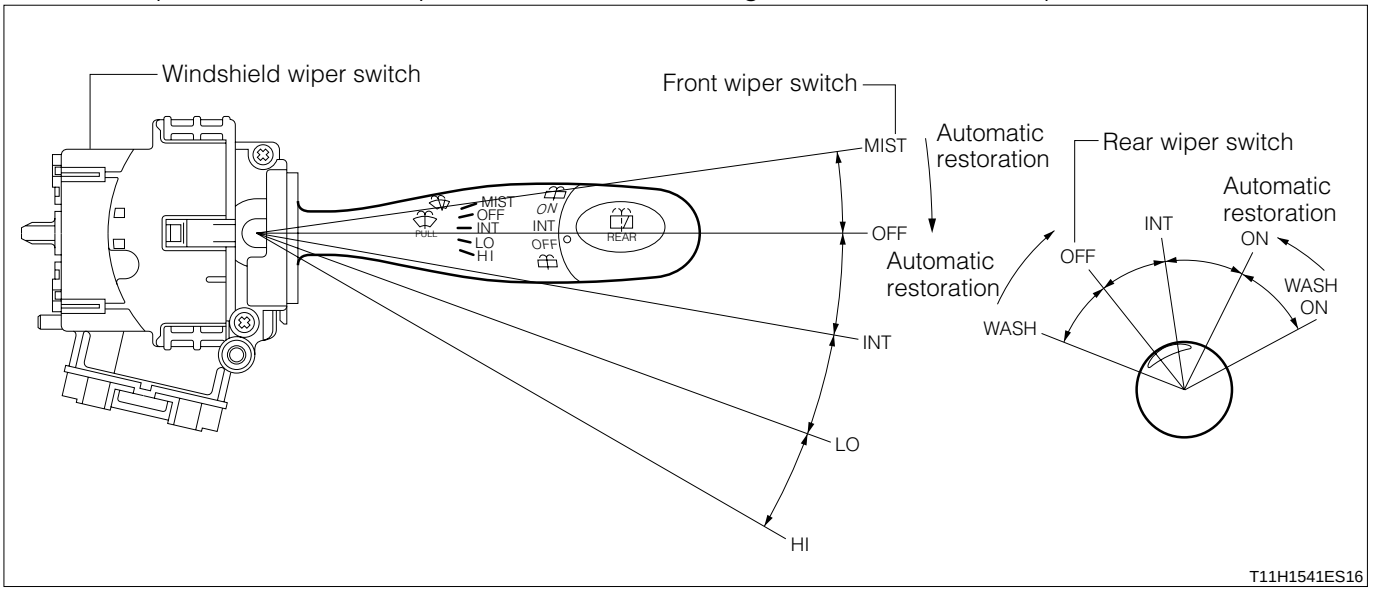
1. Individual replacement of the rear wiper blade has been made possible by letting the rear wiper arm and the rear wiper blade have separate body structure made of resin.
2. The rear wiper arm and the rear wiper blade have the specification common for all models.

Specification table

Rear wiper blade length (mm)	350

2-2-4 REAR WIPER SWITCH

For easier operation, the rear wiper switch has been integrated with the front wiper switch.



2-3 WASHER

2-3-1 WASHER TANK & PUMP

1.The washer tank has been positioned below the right headlamp.

2.A wash tank of 2.0ℓ and pump have been employed for all models.

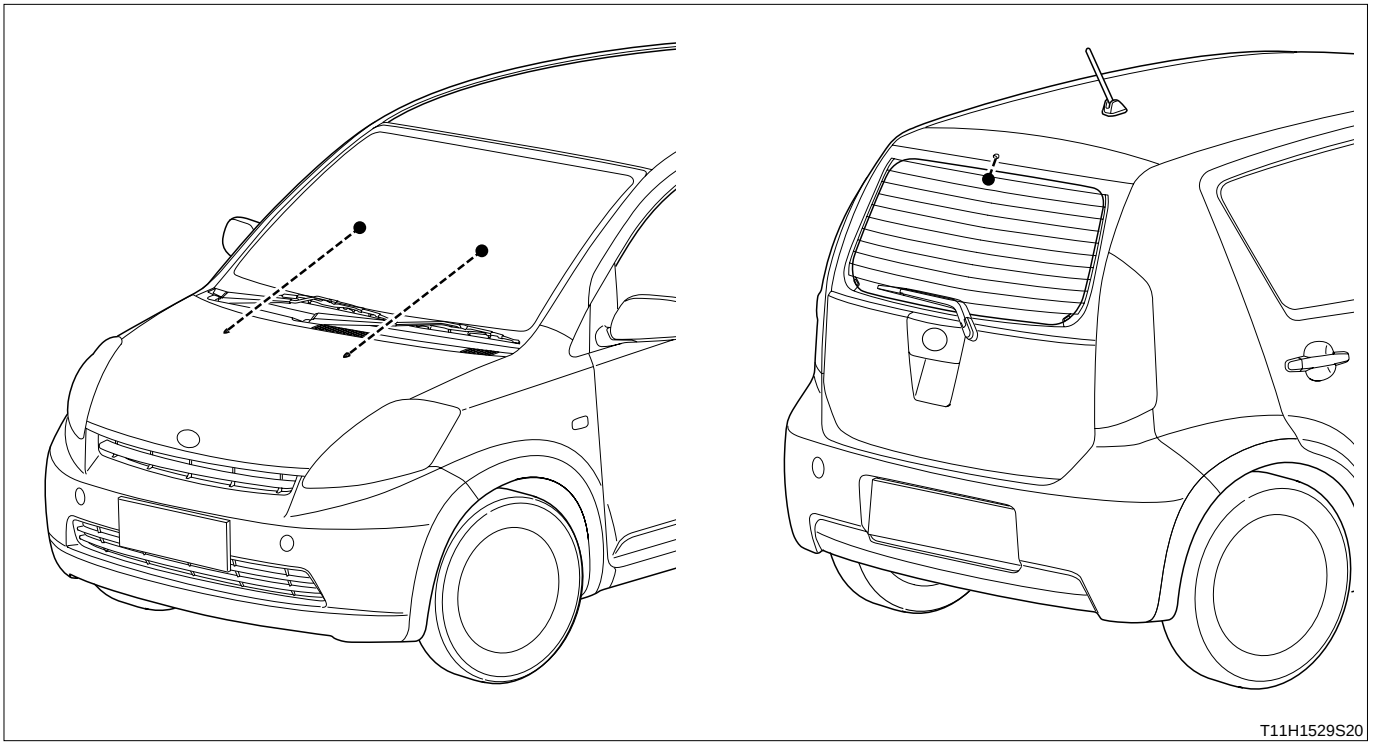
Specification table

Tank capacity (ℓ)	2.0
Rated voltage (V)	12
Current when in use (A)	Not to exceed 2.0
Pump injection pressure (kPa)	150±30
Injection flow rate (ℓ/minute)	1.1 or more

2-3-2 WASHER NOZZLE

1.Two 1-hole type washer nozzle has been set in the front and one 1-hole type washer nozzle has been set in the rear side.

2.A stable cleaning performance during high speed driving has been achieved by setting two washer nozzles in the front.



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TO INDEX

J3 METER

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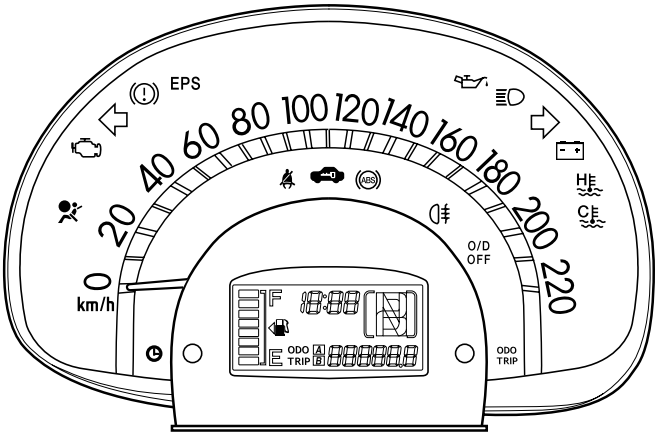
CONSTRUCTION AND OPERATION----- J3 - 7
SPEEDOMETER---------- J3 - 7
TACHOMETER---------- J3 - 9
ODOMETER TRIP METER ---------- J3 - 9
FUEL GAUGE---------- J3 - 10
WARNING / INDICATOR---------- J3 - 11
WARNING BUZZER---------- J3 - 16
CLOCK---------- J3 - 16
WATER TEMPERATURE INDICATION FUNCTION ---------- J3 - 17
CAN COMMUNICATION---------- J3 - 18
LIN COMMUNICATION---------- J3 - 18
DIAGNOSIS (ONBOARD DIAGNOSIS FUNCTION)---------- J3 - 19
FAIL-SAFE FUNCTION---------- J3 - 19

1 OUTLINE

1-1 DESCRIPTION

1.The designing and legibility have been enhanced by positioning the meter on the upper part of the steering column.
2.Legibility and visibility have been enhanced by employing the letter size which provides comprehensibility and easy reading.
3.As for the odometer · trip meter, electric type odometer · trip meter equipped with a twin trip meter has been employed.
4.A tachometer is available on some Specifications. The tachometer is separate from the combination meter and is positioned on the upper part of the instrument panel.
5.For some of the communications of the meter and other ECU, multiplex communication of CAN (Controller Area Network) and LIN (Local Interconnect Network) has been employed.
6.A clock is set within the meter.
7.An excellent visibility is achieved by indicating fuel gauge, odometer · trip meter, shift position indicator and clock in LCD (Liquid Crystal Display).
8.A multi-buzzer that makes a buzzer sound while various warnings are given such as when the key is remaining in the key cylinder, or when reversing has been employed and is built in the meter.
9.Fuel level warning function has been employed for all models.
10.Power saving and long lasting features have been promoted by employing LED for all lightings such as the dial plate and the indicator lamps.

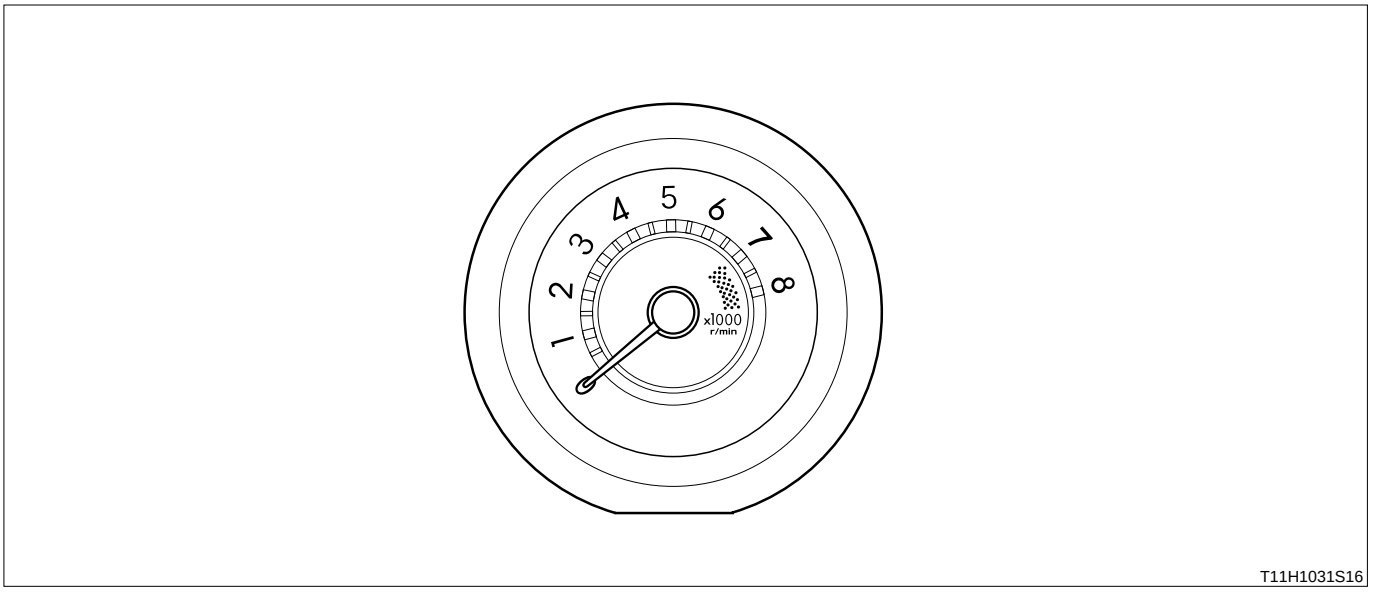
Combination meter



T11H1526S16

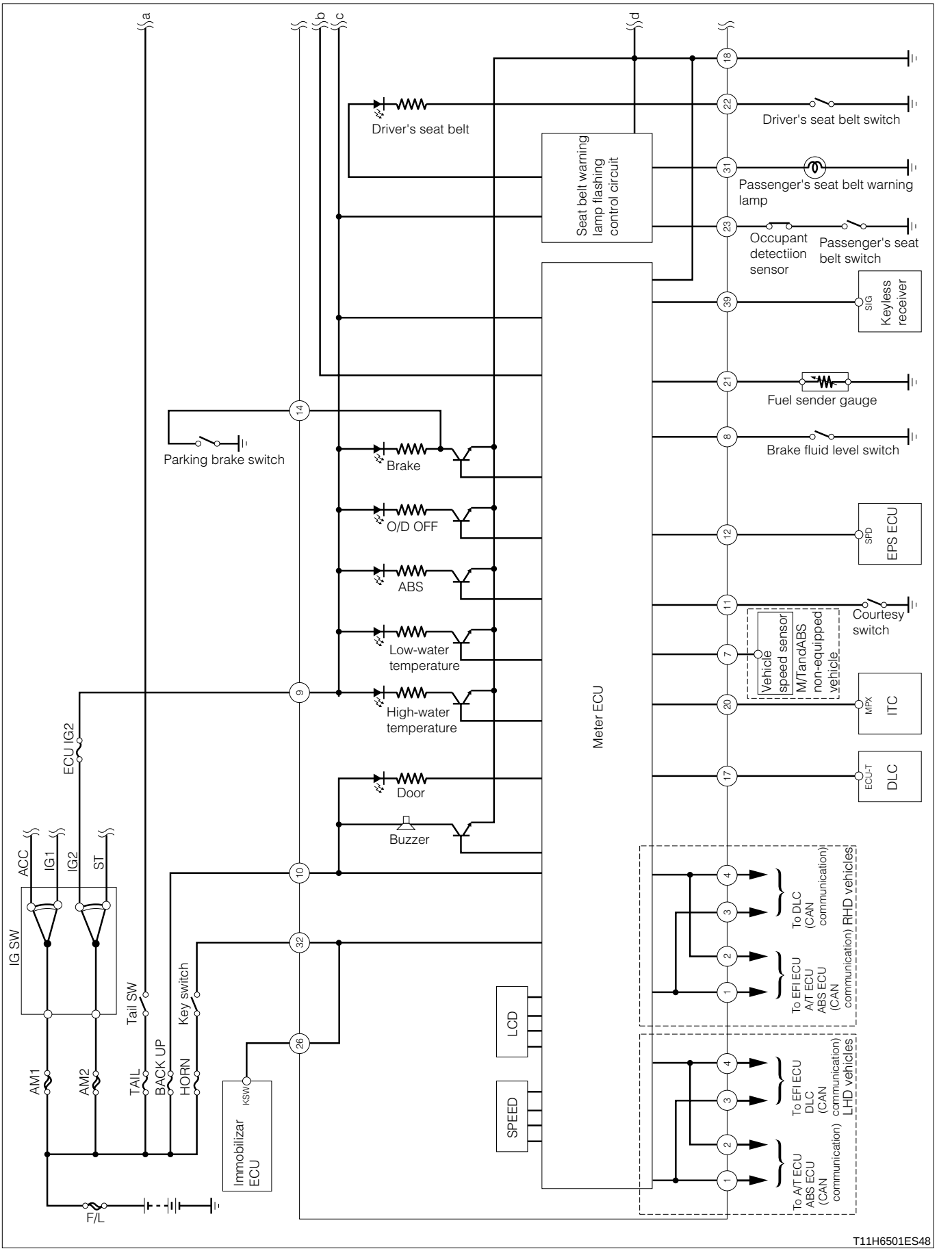
The illustration represents a major example.

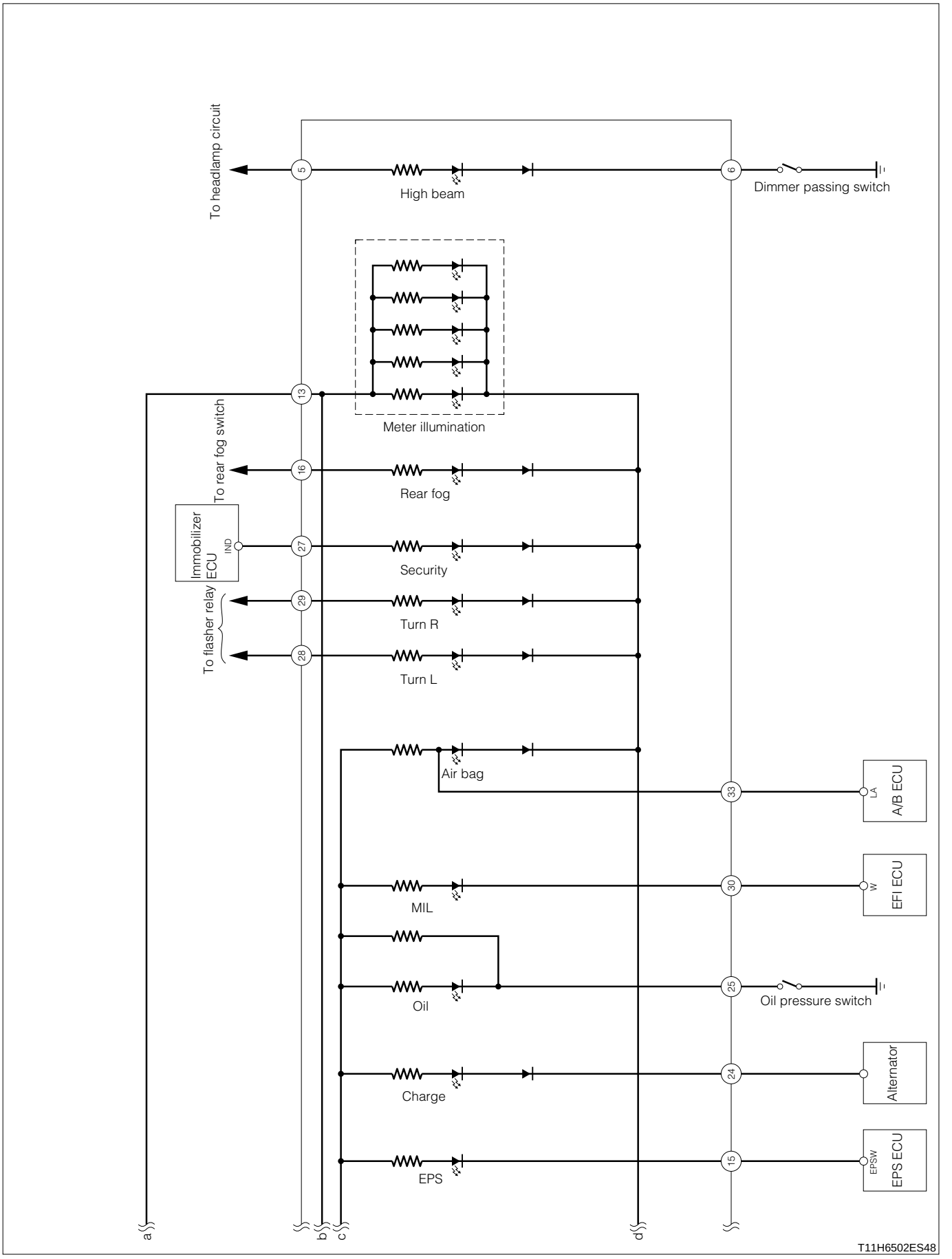
Tachometer



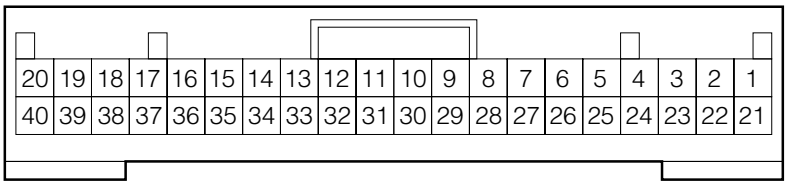
1-2 SYSTEM WIRING DIAGRAM

1-2-1 COMBINATION METER




To headlamp circuit
5
High beam
6
Dimmer passing switch
13
Meter illumination
To rear fog switch
16
Rear fog
Immobilizer ECU
IND
27
Security
To flasher relay
29
Turn R
28
Turn L
Air bag
33
LA
A/B ECU
MIL
30
W
EFI ECU
Oil
25
Oil pressure switch
Charge
24
Alternator
EPS
15
EPSW
EPS ECU
a
b
c
d
T11H6502ES48

Arrangement of meter terminal

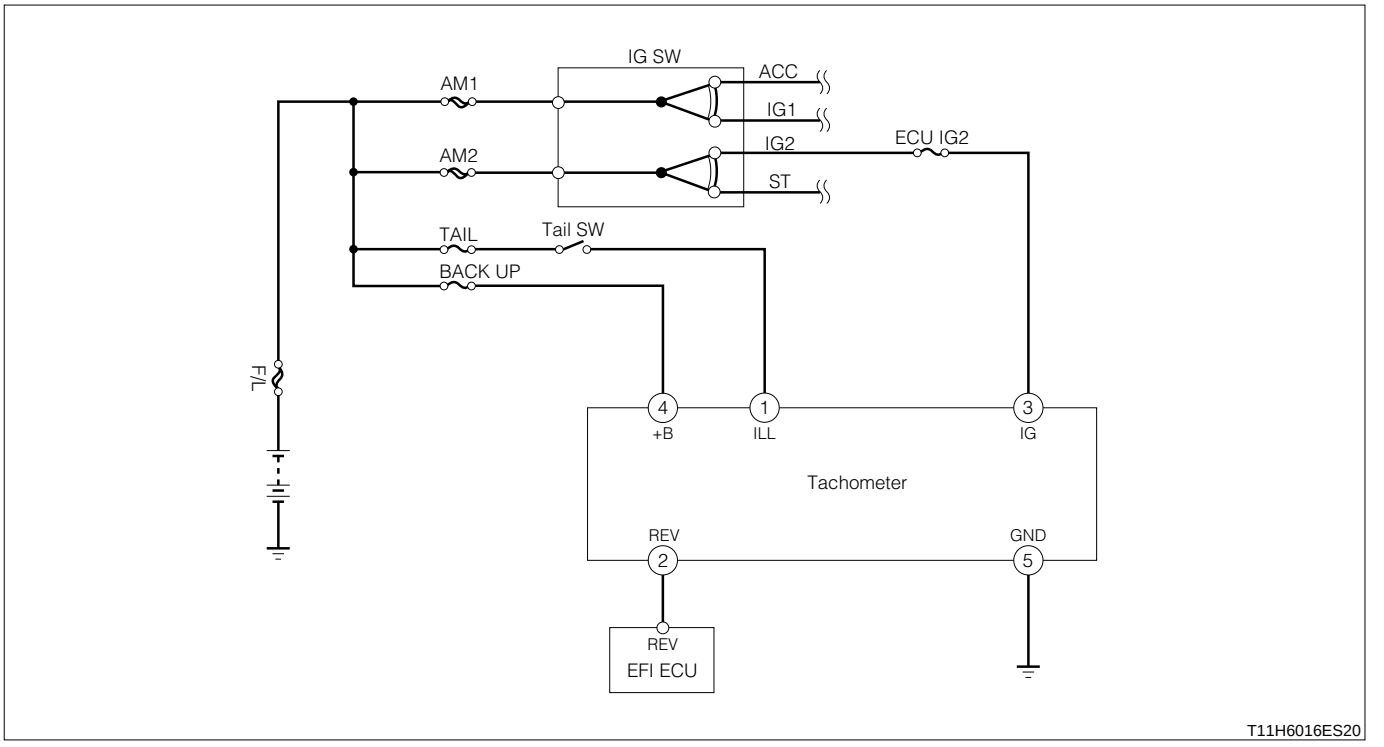


T11H6013S10

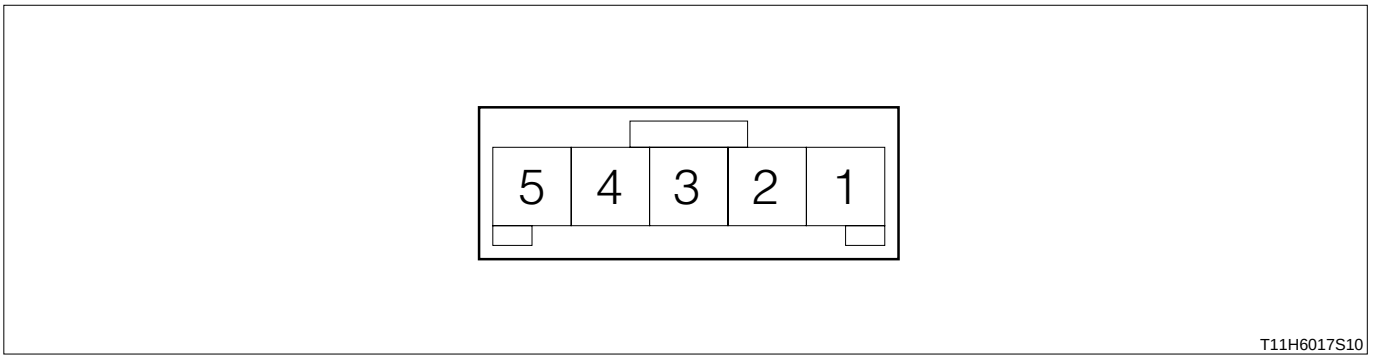
Meter terminal name

Terminal No.	Terminal code	Terminal name
1	CANH	CAN communication HI (1)
2	CANL	CAN communication LO (1)
3	HCAN	CAN communication HI (2)
4	LCAN	CAN communication LO (2)
5	BEAM+	High beam +
6	BEAM−	High beam −
7	SPD	Input of vehicle speed signal
8	BRK	Input of brake fluid signal
9	IG2	IG power supply
10	+B	+B power supply
11	DOOR	Input of courtesy switch signal
12	SPOUT	Output of vehicle speed signal
13	TAIL	Illumination +
14	PKBSW	Parking brake
15	EPS	EPS
16	RR-FOG	Rear fog lamp
17	ECU-T	ECU-T terminal signal input
18	GND	Earth
19	—	—
20	LIN	LIN communication input/output
21	FUEL	Input of fuel signal
22	D-BELT	Seat belt at driver's seat side
23	P-BELT	Front passenger seat side seat belt signal input
24	CHG	Charge
25	OIL	Oil
26	KEY2	Output of key switch signal
27	SEC	Security
28	TURNL	Turn LH
29	TURNR	Turn RH
30	MIL	MIL
31	P-BELOUT	Front passenger seat side seat belt signal output
32	KEY	Input of key switch signal
33	A/B	Airbag
34	—	—
35	—	—
36	—	—
37	—	—
38	—	—
39	KLS	Keyless receiver signal input
40	—	—

1-2-2 TACHOMETER



Arrangement of tachometer terminal



Tachometer terminal name

Terminal No.	Terminal code	Terminal name
1	ILL	Illumination
2	REV	Input of engine revolution speed signal
3	IG	IG power supply
4	+B	+B power supply
5	GND	Earth

2 CONSTRUCTION AND OPERATION

2-1 SPEEDOMETER

2-1-1 DESCRIPTION

1.For the speedometers, the electric type has been employed for all models.

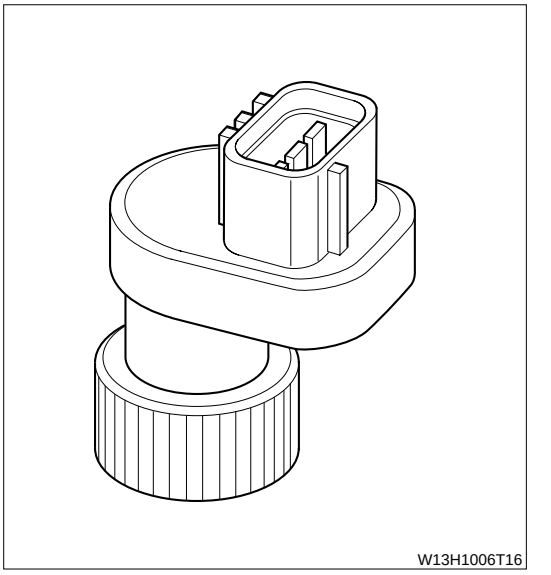
2-1-2 SPECIFICATIONS

Indication	Function
Indication range: 0 - 220 km/h 0 - 140 MPH At increments of 10 km/h At increments of 10 MPH	Electric type (pointer: stepper motor type) Vehicle speed signal source: ABS ECU [ABS-equipped vehicles] A/T ECU [A/T vehicles without ABS] Vehicle speed sensor (MRE type) [M/T vehicles without ABS] Meter output vehicle speed pulse: 4 pulse/rev (42.47 Hz [at 60 km/h]) 4 pulse/rev (68.33 Hz [at 60 MPH]) The vehicle speed is indicated by inputting the vehicle speed signal from the ABS ECU over the CAN communication and processing the signal at the meter ECU. (ABS-equipped vehicles) The vehicle speed is indicated by inputting the vehicle speed signal from the A/T ECU over the CAN communication and processing the signal at the meter ECU. (A/T vehicles without ABS) The vehicle speed is indicated by inputting the vehicle speed signal from the vehicle speed sensor (MRE type) and processing the signal at the meter ECU. (M/T vehicles without ABS)

2-1-3 VEHICLE SPEED SENSOR (MRE TYPE)

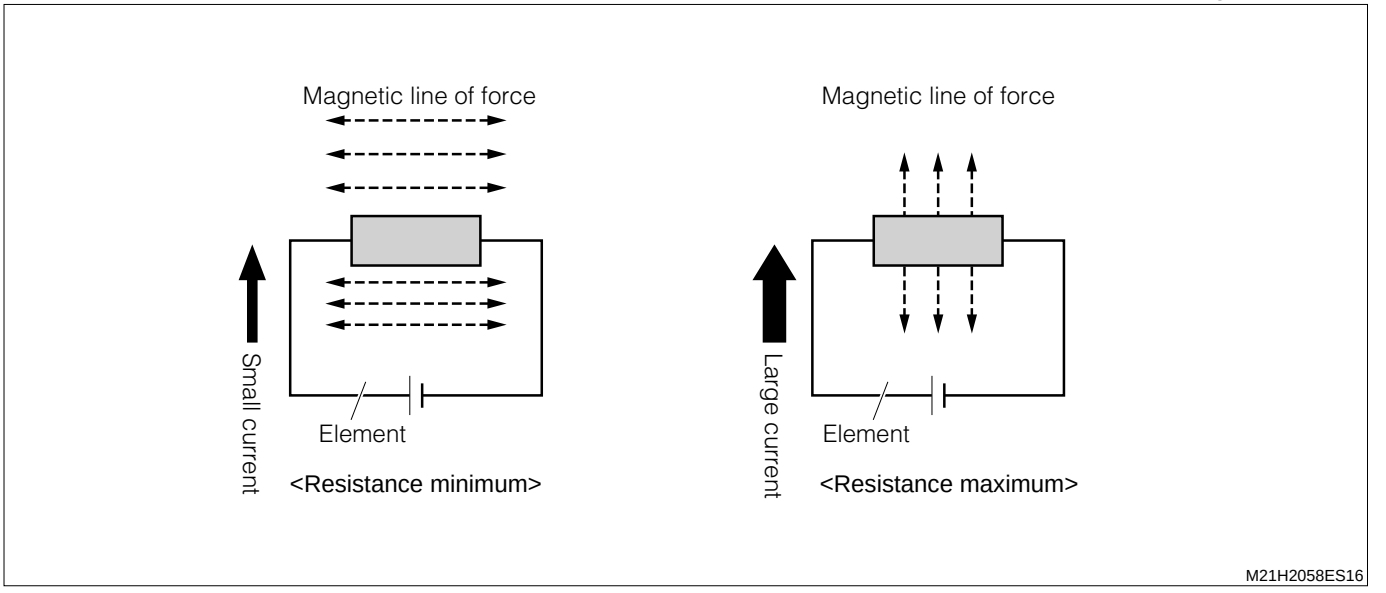
(1) Description

1.A MRE type (MRE: Magnetic Resistance Element) vehicle speed sensor has been set in the ABS non-installed M/T vehicle as the vehicle speed signal detection sensor.
2.The vehicle speed sensor is installed to the transaxle.
3.The vehicle speed is detected by the rotating gear of the vehicle speed sensor.

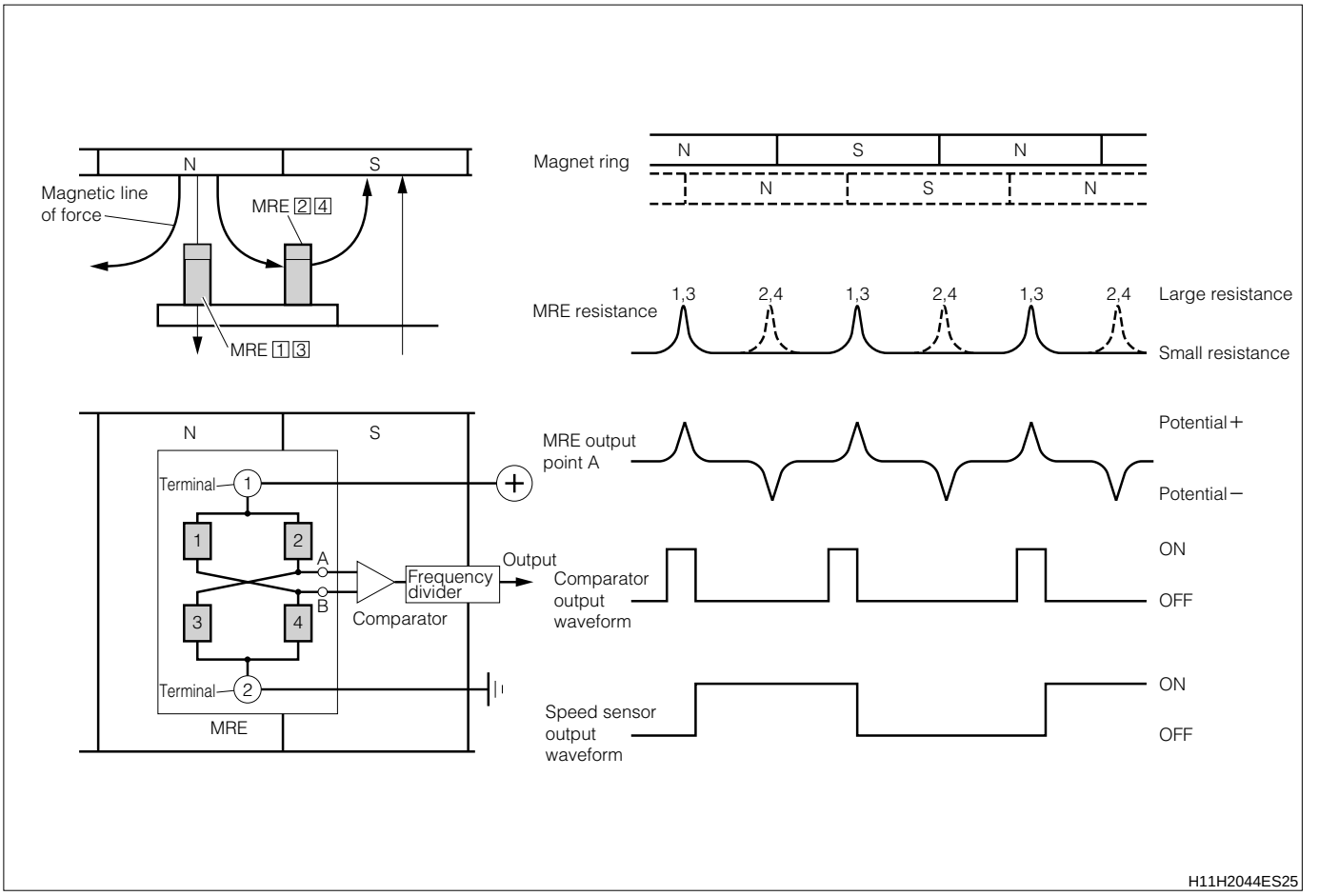


(2) Construction and operation

1.The resistance of the MRE becomes maximum when the direction of the electric current flowing in the element becomes parallel to the direction of the line of magnetic force. Conversely, the resistance becomes minimum when the electric current intersects with the direction of the line of magnetic force.



2.The direction of the line of magnetic force is determined by the rotation of the magnetized eight-pole magnet in the magnet ring. The MRE output becomes an eight-cycle alternating waveform per rotation of the magnet ring. The comparator converts these waveforms into eight-pulse short waveforms and the divider transforms them into four cycles. Finally, it will be outputted to the combination meter.



2-2 TACHOMETER

2-2-1 DESCRIPTION

1.A tachometer is available in some Specifications.

2.The revolution signal detected by the engine revolution speed sensor and converted by the EFI ECU is inputted. Then the tachometer counts the pulse signals and performs calculation and finally indicates the engine revolution speed.

2-2-2 SPECIFICATIONS

Indication	Function
Indication range: 0 - 8400 rpm (Red zone: 6800 - 8400 rpm)	Electric type (pointer: stepper motor type) Revolution signal source: EFI ECU Number of input pulses: 2pulse/rev (100 Hz at 3000 rpm) The pulse signal from the EFI ECU is inputted. Then, the tachometer counts the pulse signals and performs calculation and finally indicates the engine revolution speed.

2-3 ODOMETER TRIP METER

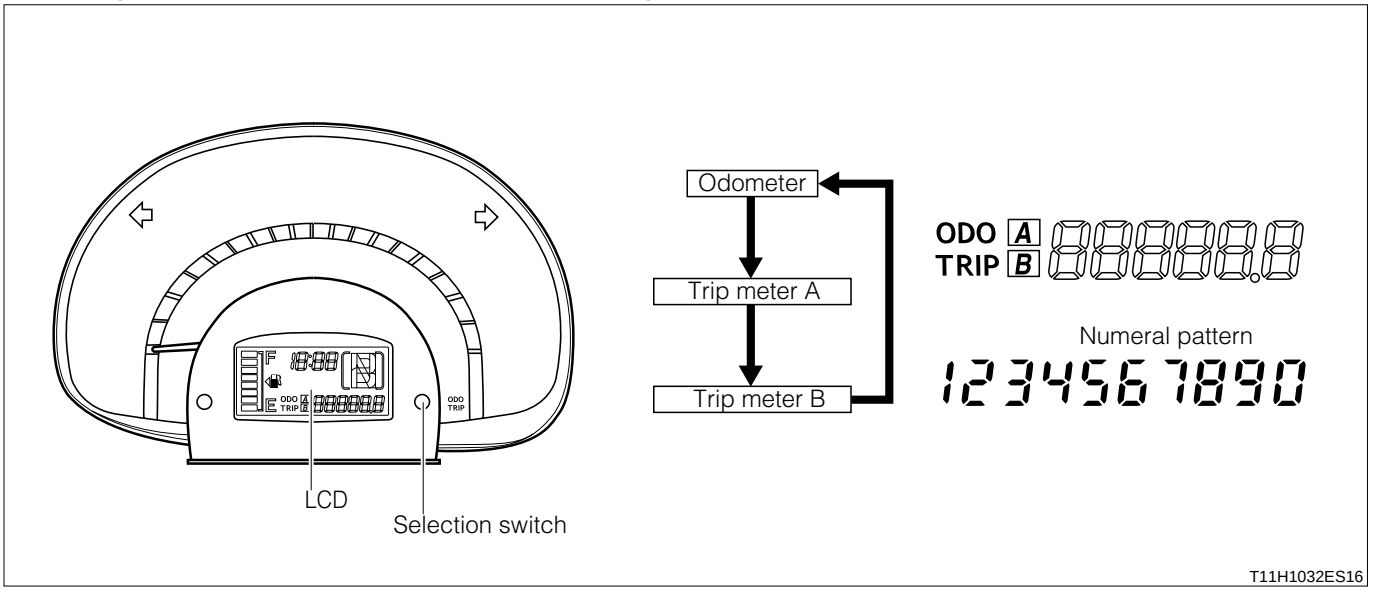
2-3-1 DESCRIPTION

1.An excellent visibility is achieved by employing an odometer · trip meter with LCD (Liquid Crystal Display) indication.

2.As for the odometer · trip meter, an electric type odometer · trip meter equipped with a twin trip meter has been employed.

3.The changing of each mode is done by pressing the selection switch at the right of the speedometer. Indications are made in the order of odometer→trip meterA→trip meter B→odometer.

4.The figure of the trip meter is reset by pressing the selection switch for more than about one second.



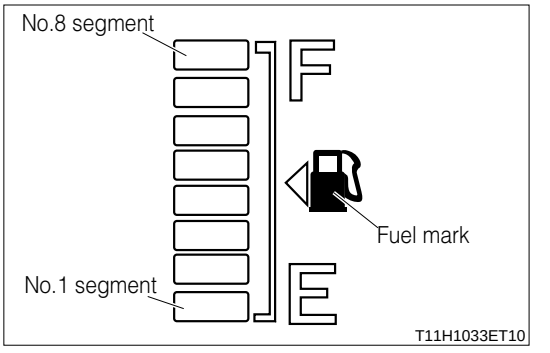
2-3-2 SPECIFICATIONS

Indication	Function
Digital indication by LCD Indication range: Odometer: 0 - 999999 km 0 - 999999 MILE Trip meter A · B: 0 - 9999.9 km 0 - 9999.9 MILE	LCD type Mileage signal source: ABS ECU [ABS-equipped vehicles] A/T ECU [A/T vehicles without ABS] Vehicle speed sensor (MRE type) [M/T vehicles without ABS] The running distance is indicated by inputting the running distance signal from the ABS ECU over the CAN communication and processing the signal at the meter ECU. (ABS-equipped vehicles) The running distance is indicated by inputting the running distance signal from the A/T ECU over the CAN communication and processing the signal at the meter ECU. (A/T vehicles without ABS) The running distance is indicated by inputting the running distance signal from the vehicle speed sensor (MRE type) and processing the signal at the meter ECU. (M/T vehicles without ABS) The backward moving distance is also added. By pressing the selection switch, indications are made in the order of odometer→trip meter A →trip meter B. By pressing the selection switch for more than about one second, the figure of the trip meter is reset.

2-4 FUEL GAUGE

2-4-1 DESCRIPTION

1. An excellent visibility is achieved by indicating fuel gauge in LCD (Liquid Crystal Display).
2. The meter ECU calculates the accurate fuel level by calculating the average data of a certain period of time based on the level signal from the fuel sender gauge.
3. The Fuel gauge indicates the fuel level by turning on/off of the eight segments in the bar graph.



2-4-2 SPECIFICATIONS

Indication	Function
Digital indication by LCD (Liquid Crystal Display) Indicated by 8 segment bar graph. Indication range: E - F	The fuel level is indicated by inputting the fuel sender gauge voltage and calculating at the meter ECU. No.1 segment (bottom position) blinks when No.2 segment is turned off (when fuel level is about 6ℓ).

2-4-3 FUEL LEVEL INDICATION FUNCTION

The meter ECU indicates the corresponding LCD segments by calculating the average data of a certain period of time based on the level signal from the fuel sender gauge.

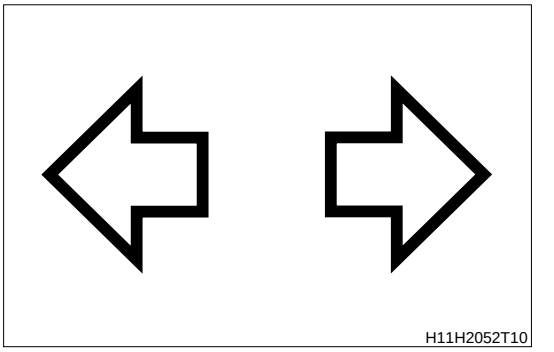
2-4-4 FUEL LEVEL WARNING FUNCTION

The driver is warned by the No.1 segment (bottom position) blinking when No.2 segment is turned off (when the fuel level is about 6ℓ).

2-5 WARNING / INDICATOR

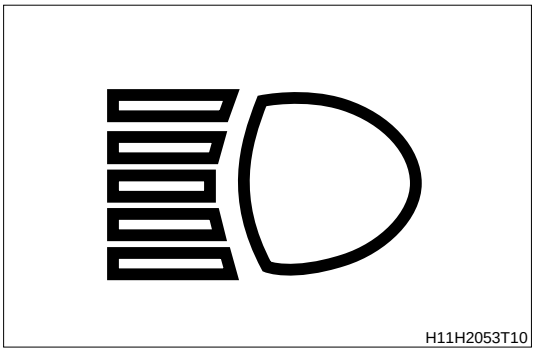
2-5-1 TURN

1.A turn indicator has been set in the meter.
2.It blinks when the turn signal switch and the hazard switch are "ON".


H11H2052T10

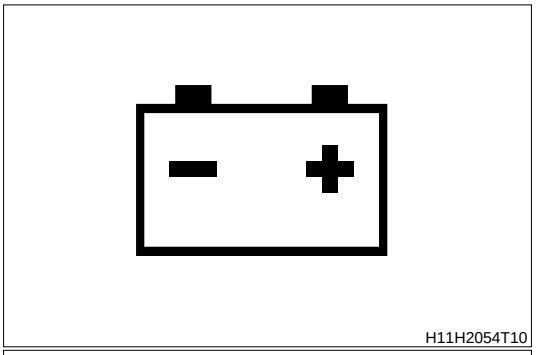
2-5-2 HIGH-BEAM

1.A high-beam indicator is set in the meter.
2.It is lighted when the headlamp is set at high-beam or passing.


H11H2053T10

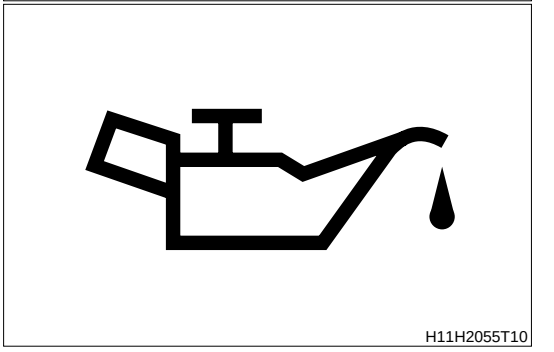
2-5-3 CHARGE

1.A charge warning lamp is set in the meter.
2.If the charging system is normal, it is lighted when the IG switch is turned "ON" and is turned off when the engine is started.
3.It is constantly lighted when there is an abnormality in the system.


H11H2054T10

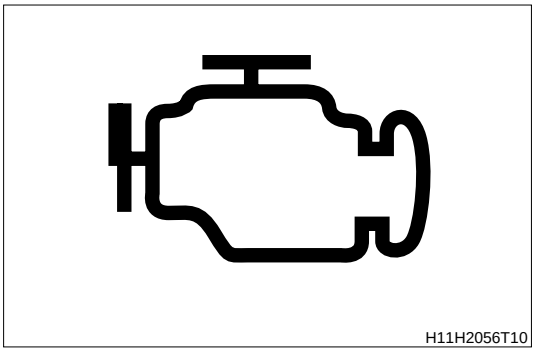
2-5-4 OIL

1.An oil warning lamp has been set in the meter.
2.It is lighted when the oil pressure switch is "ON" and is turned off when the engine is started.
3.It is constantly lighted when the oil pressure is low.


H11H2055T10

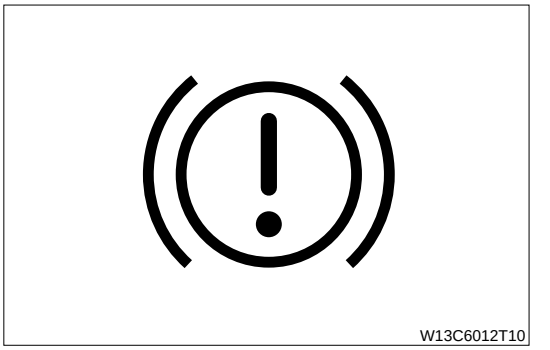
2-5-5 MIL

1.If the engine control system is normal, it is lighted when the IG switch is turned "ON" and is turned off when the engine is started.
2.It is constantly lighted when there is an abnormality in the system.
3.The diagnosis code of the engine control system is outputted.


H11H2056T10

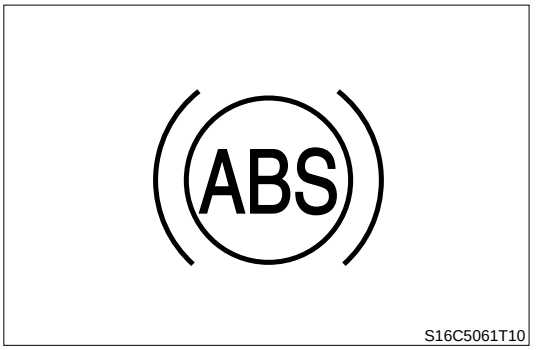
2-5-6 BRAKE

1.A brake warning lamp has been set in the meter.
2.If the system is normal, it is lighted when the IG switch is turned "ON" and is turned off three seconds later under the condition in which the parking brake is not operating.
3.It is lighted when the parking brake switch or the brake fluid level switch is "ON".
4.It is constantly lighted when there is an abnormality in the ABS.


W13C6012T10

2-5-7 ABS

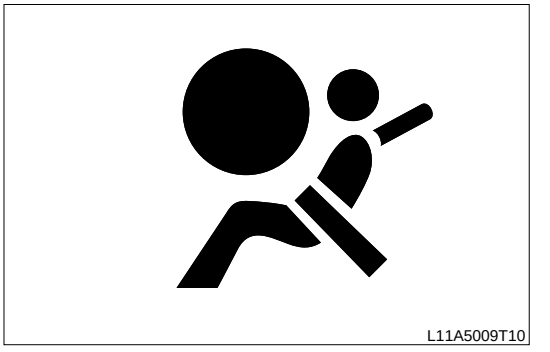
1.An ABS warning lamp has been set in the meter.
2.If the system is normal, it is lighted when the IG switch is turned "ON" and is turned off about three seconds later.
3.It is constantly lighted when there is an abnormality in the system.
4.The diagnosis code of the ABS is outputted.



S16C5061T10

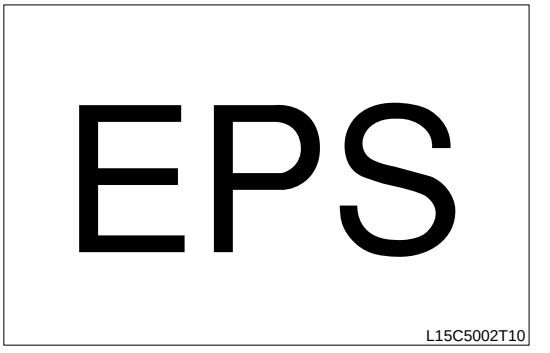
2-5-8 AIRBAG

1.An airbag warning lamp has been set in the meter.
2.If the system is normal, it is lighted when the IG switch is turned "ON" and is turned off about six seconds later.
3.It is constantly lighted when there is an abnormality in the system.
4.The diagnosis code of the airbag system is outputted.


L11A5009T10

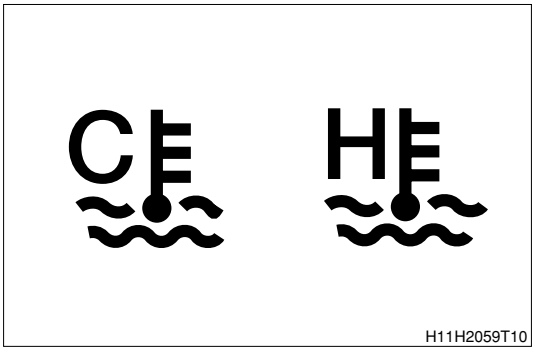
2-5-9 EPS

1.An EPS warning lamp has been set in the meter.
2.If the system is normal, it is lighted when the IG switch is turned "ON" and is turned off two seconds later.
3.It is constantly lighted when there is an abnormality in the system.
4.The diagnosis code of the EPS system is outputted.



L15C5002T10

2-5-10 HIGH WATER TEMPERATURE/LOW WATER TEMPERATURE



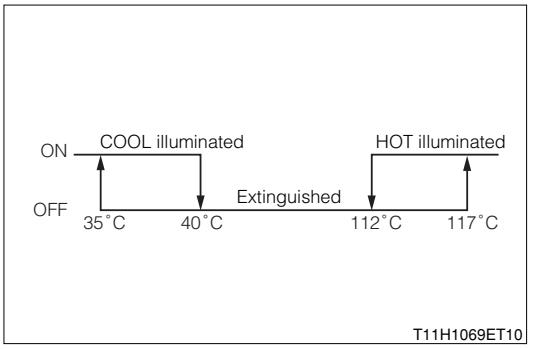
H11H2059T10

1. A high water temperature warning lamp and low water temperature indicator lamp have been set in the meter.
2. If the system is normal, the high temperature warning lamp and low temperature indicator lamp are lighted when the IG switch is turned "ON" and are turned off about three seconds later under the condition in which the water temperature is neither high or low.

NOTE

- Even if the IG switch is turned "ON" when the engine water temperature is low, the high water temperature warning lamp is lighted for about three seconds for initial check. In that case, the low water temperature indicator lamp is also lighted and will continue to be lighted after three seconds until the engine water temperature becomes high.

3. The high water temperature warning lamp blinks when the water temperature is about 117˚C or above and is turned off when it is about 112˚C or below.
4. The low water temperature indicator lamp is lighted when the water temperature is about 35˚C or below and is turned off when it is about 40˚C or above.



T11H1069ET10

2-5-11 SEAT BELT

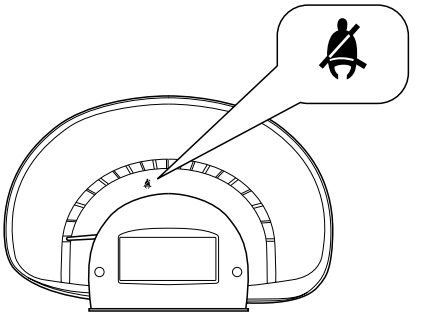
(1) Description

1.A blinking type seat belt warning lamps have been set to the driver seat and the passenger seat according to the specifications. As for the position of the warning lamp, the one of the driver seat is set in the meter and the other for the passenger seat is set in the air conditioner control panel.

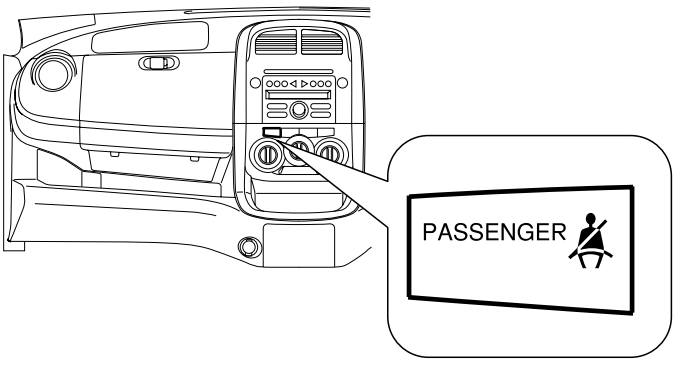
2.The driver seat belt warning lamp blinks if the seat belt is not fastened on the driver seat.

3.As for the front passenger seat belt warning lamp, it blinks if the seat belt is not fastened on the front passenger seat when there is somebody seated on the passenger seat.

4.A passenger detection sensor which detects if the passenger is seated or not has been set below the skin of the front passenger seat cushion.



Driver's seat belt warning



Front passenger seat belt warning

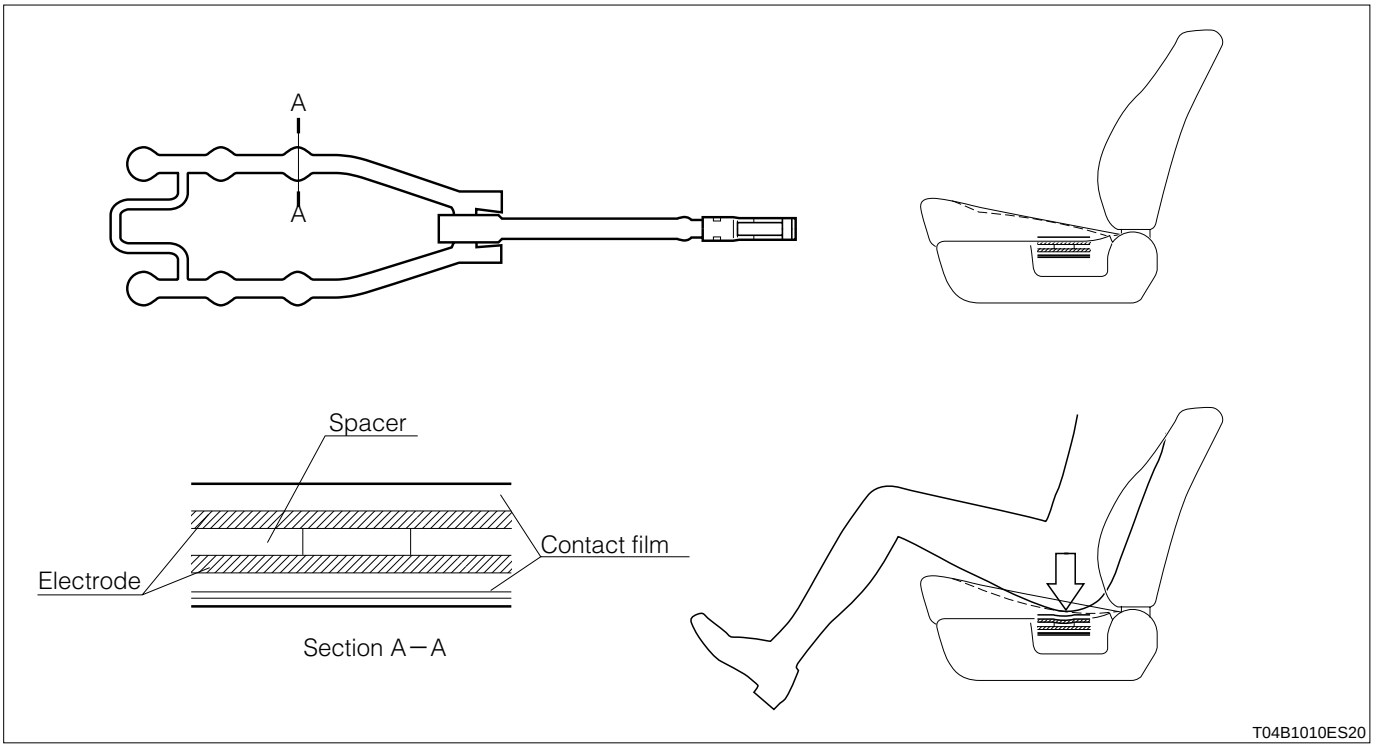
T11H1034ES16

(2) Passenger detection sensor structure

When the IG switch is "ON" and a passenger seats on the front passenger seat, the electrodes of the sensor have contact and let the warning lamp blink. Then, when the passenger seat belt is fastened, the seat belt switch is turned "OFF" and the warning lamp is turned off.

NOTE

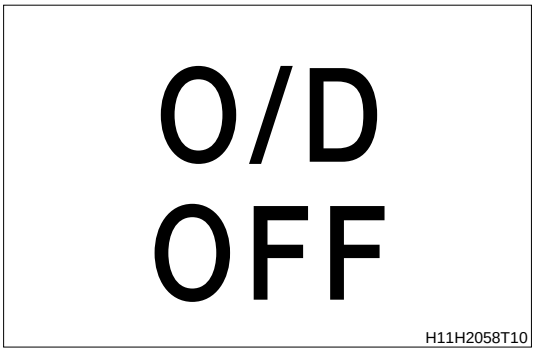
- If a load above a certain level is applied to the seat cushion such as in the case of placing luggage on the passenger seat cushion, the sensor may detect this.



T04B1010ES20

2-5-12 O/D OFF

1.An O/D OFF indicator has been set in the meter.
2.It is lighted when the O/D is "OFF".
3.It blinks when there is an abnormality in the transmission control system.
4.The diagnosis code of the transmission control system is outputted.



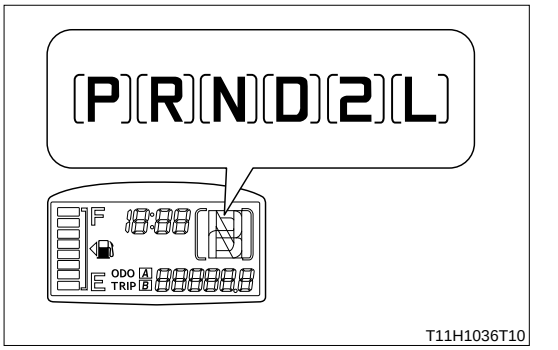
H11H2058T10

2-5-13 SHIFT POSITION

1.A shift position indicator has been set in the LCD of the meter.
2.The present shift position is indicated.

NOTE

- The frame indication blinks corresponding to the buzzer interval during R range indication.



T11H1036T10

2-5-14 SECURITY

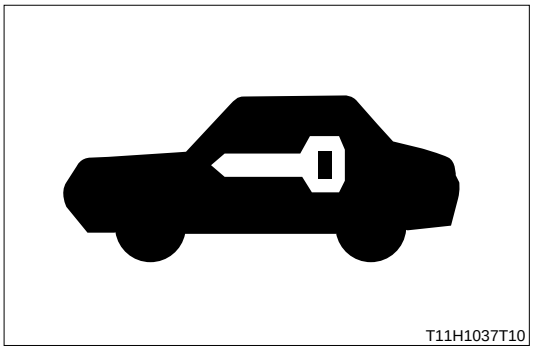
1.A security indicator has been set in the meter.

NOTE

- Please refer to the pages of the immobilizer system for details concerning lighting conditions.

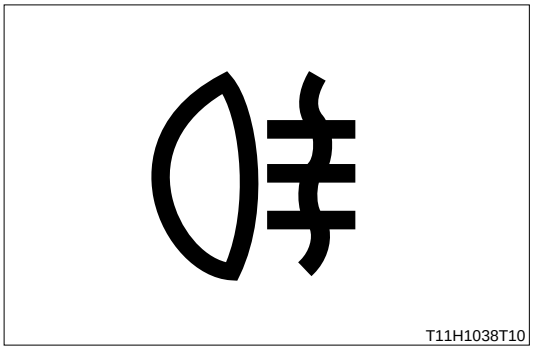
Refer to Page I4-13.

2.The diagnosis code of the immobilizer system is outputted.


T11H1037T10

2-5-15 REAR FOG LAMP

1.A rear fog lamp indicator has been set in the meter.
2.It is lighted when the rear fog lamp is lighted.


T11H1038T10

2-6 WARNING BUZZER

2-6-1 DESCRIPTION

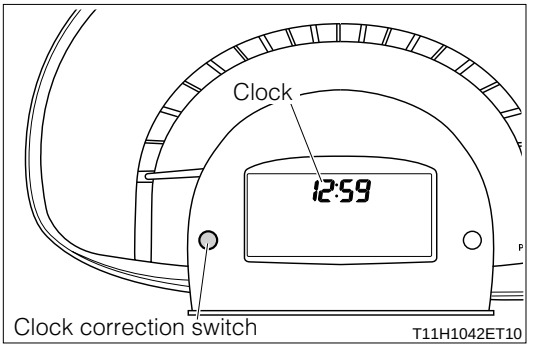
1.A multi-buzzer is employed and incorporated in the meter. This multi-buzzer sounds while various warnings are given such as when the key is remaining in the key cylinder, or when the reverse gear is selected.

2-6-2 SPECIFICATIONS

Category	Function
Key remaining in key cylinder Light remaining to be illuminated Reverse Seat belt remaining (Europe specification) Vehicle speed warning (Some specifications)	Warnings and abnormalities of each system are notified by sound.

2-7 CLOCK

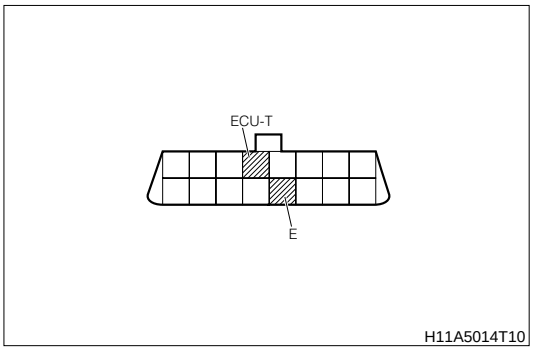
1.A digital clock by LCD (Liquid Crystal Display) indication has been employed.
2.An excellent usability has been achieved by setting the installation position in the meter.
3.A clock adjusting switch to adjust the time has been set on the left side of the clock.



T11H1042ET10

2-8 WATER TEMPERATURE INDICATION FUNCTION

2-8-1 DESCRIPTION

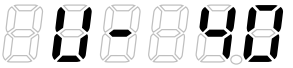


1.The water temperature may be indicated on LCD (Liquid Crystal Display) by the following procedures.
(1) Turn "ON" the IG switch.
(2) Short the terminal ECU-T and terminal E of the DLC.
(3) Press on the selection switch for about a second.

CAUTION

- If the vehicle is driven with the terminal ECU-T ad terminal E of the DLC in the above (2) short-circuited, the figures on the liquid crystal display will remain to indicate the water temperature until the vehicle speed is above 8km/h and thus the odometer · trip meter cannot be seen. Please remove the short circuit between the terminal ECU-T and terminal E when the operation is finished.

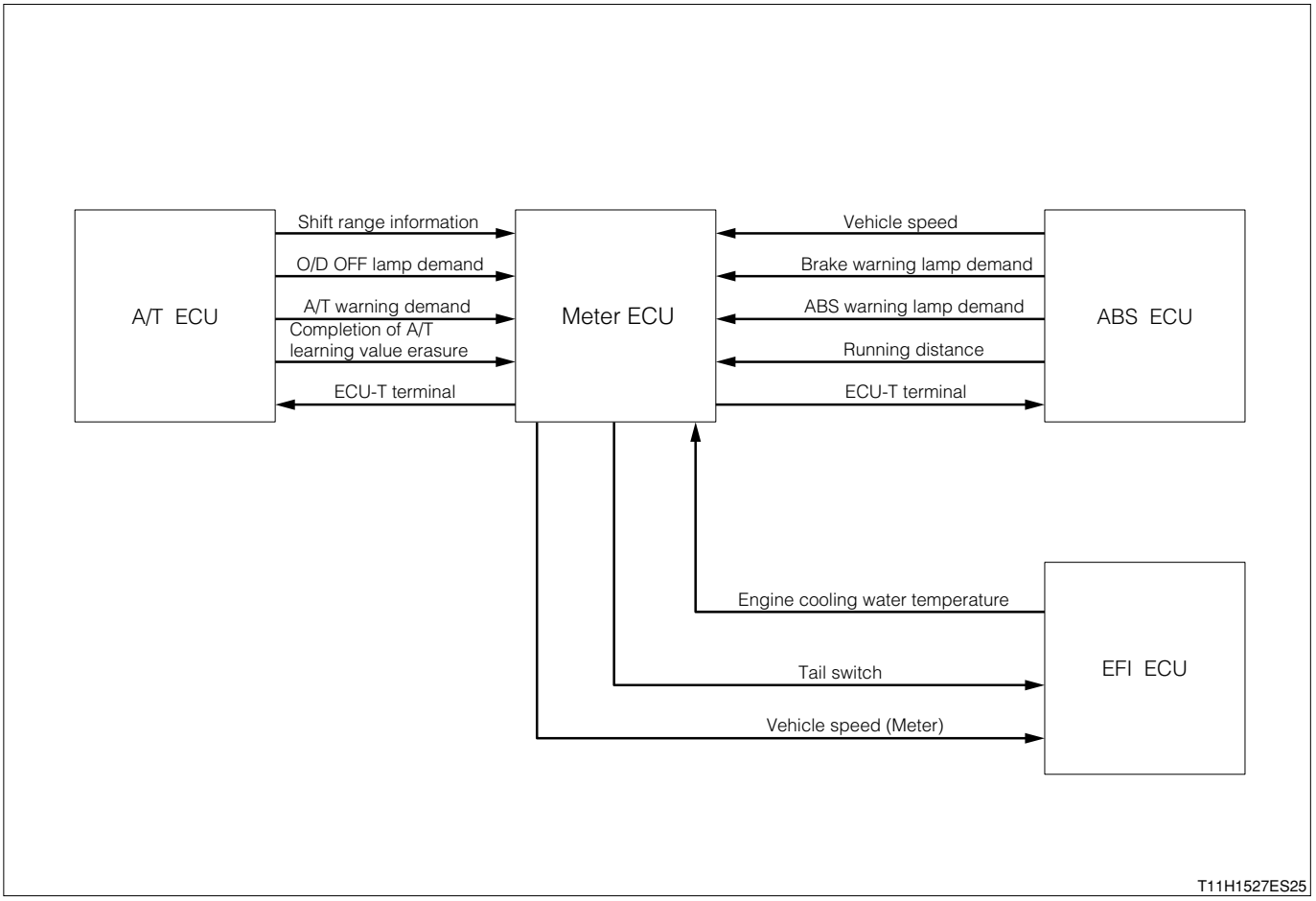
2.The temperature indicated on the LCD (Liquid Crystal Display) is from 40□ to 130□ with 1□ intervals.

Water temperature	40˚C or less	108˚C	130˚C or more
Indication example			

T11H1040ES10

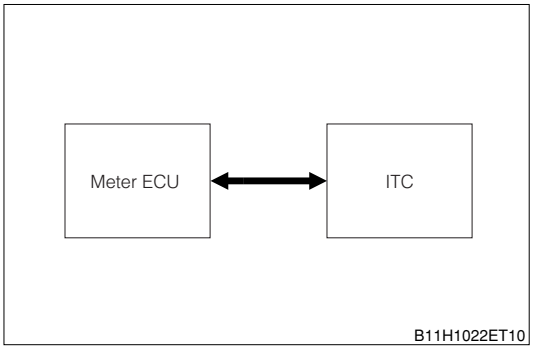
2-9 CAN COMMUNICATION

For the meter ECU in the meter, CAN communication is employed for some of the communications with other ECU's.
Please refer to the pages of the CAN communication system for the CAN communication.
Refer to Page L2-1.



2-10 LIN COMMUNICATION

For the meter ECU in the meter, the LIN communication is employed for some of the communications with other ECU's. Please refer to the pages of the LIN communication system for the LIN communication.
Refer to Page L2-13.



Contents of meter ECU communication (LIN communication)

Nomenclature of signals	Meter ECU		Applicable ECU
	Receiving	Sending	
ITC sleep refusal	○	–	ITC
Request of keyless door lock	–	○	ITC
Request of keyless door unlock	–	○	ITC
Key switch	–	○	ITC
Terminal ECU-T	–	○	ITC
Door courtesy switch	–	○	ITC

2-11 DIAGNOSIS (ONBOARD DIAGNOSIS FUNCTION)

This is a function whereby the ECU informs the inspection operator of the abnormal items when there has been a failure in the system. When failure takes place, the ECU memorizes the abnormal item.
Please refer to the repair manual for details concerning the diagnosis.

2-12 FAIL-SAFE FUNCTION

When an abnormality takes place in each function, the meter shifts to the fail mode and carries out the processes as in the following.

List of fail mode

Function	Abnormality item	Process when failure takes place
Speedometer	Vehicle speed signal (CAN) communication disabled	Indicates 0km/h
	Abnormality in the meter	Indicates 0km/h
Odometer	Vehicle speed signal (CAN) communication disabled	Does not integrate mileage
	Abnormality in the meter	· Does not integrate mileage · Indicates "ODO" on the LCD. · Blinks indication of integrated mileage figure ·The running distance is measured in the unit of km. Either of the above is done.
Trip meter	Vehicle mileage signal (CAN) communication disabled	Does not integrate mileage
	Abnormality in the meter	· Blinks indication of integrated mileage figure ·The running distance is measured in the unit of km. Either of the above is done.
Fuel gauge	Signal analog / digital conversion error	Turns off of all segments until the IG switch is turned "ON" again.
Shift position indicator	Multiple receiving of shift range information signal (CAN)	Turns off of the shift position indication and blinking of the frame indication only
	Shift range information signal (CAN) communication disabled	Turns off of the shift position indication and blinking of the frame indication only
High water temperature warning lamp/ Low water temperature indicator lamp	Engine water temperature signal (CAN) communication disabled	High water temperature warning lamp extinguished Low water temperature indicator lamp blinking
O/D OFF indicator	O/D OFF lamp request signal (CAN) communication disabled	Indicator extinguished
	A/T warning request signal (CAN) communication disabled	Indicator extinguished
Brake warning lamp	Brake warning lamp request signal (CAN) communication disabled	Lamp illuminated
ABS warning lamp	ABS warning lamp request signal (CAN) communication disabled	Lamp illuminated
Reverse warning buzzer	Multiple receiving of shift range information signal (CAN)	Buzzer sound stopped

TO INDEX

J4 AUDIO & VISUAL SYSTEM

CONSTRUCTION AND OPERATION----- J4 - 1
AUDIO SYSTEM---------- J4 - 1

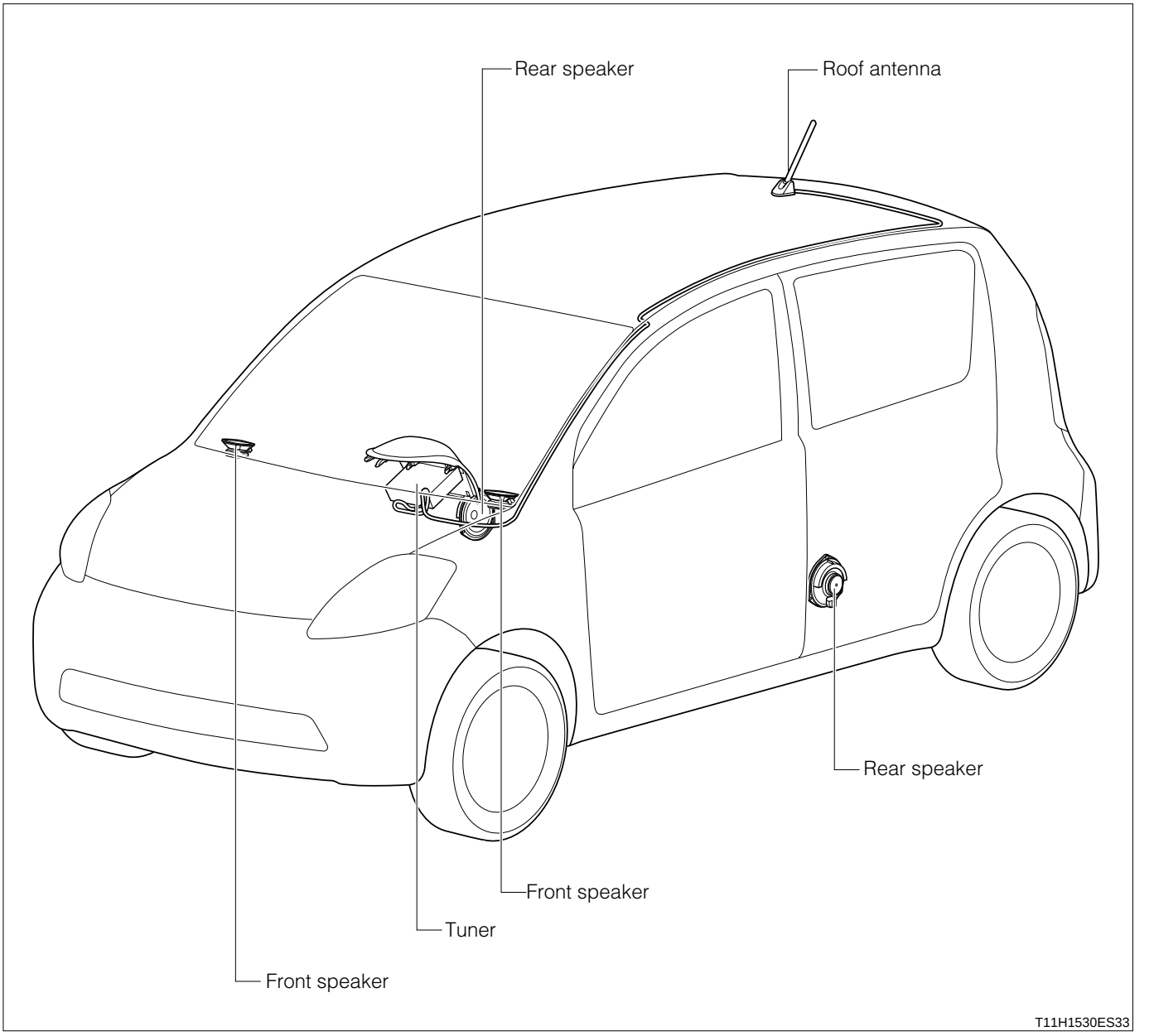
1 CONSTRUCTION AND OPERATION

1-1 AUDIO SYSTEM

1-1-1 DESCRIPTION

1.As for the speakers, 10cm front speakers or 10cm front speakers & 16 cm rear speakers are available according to the specifications.

2.As for the radio antenna, roof antennas have been employed for all models.

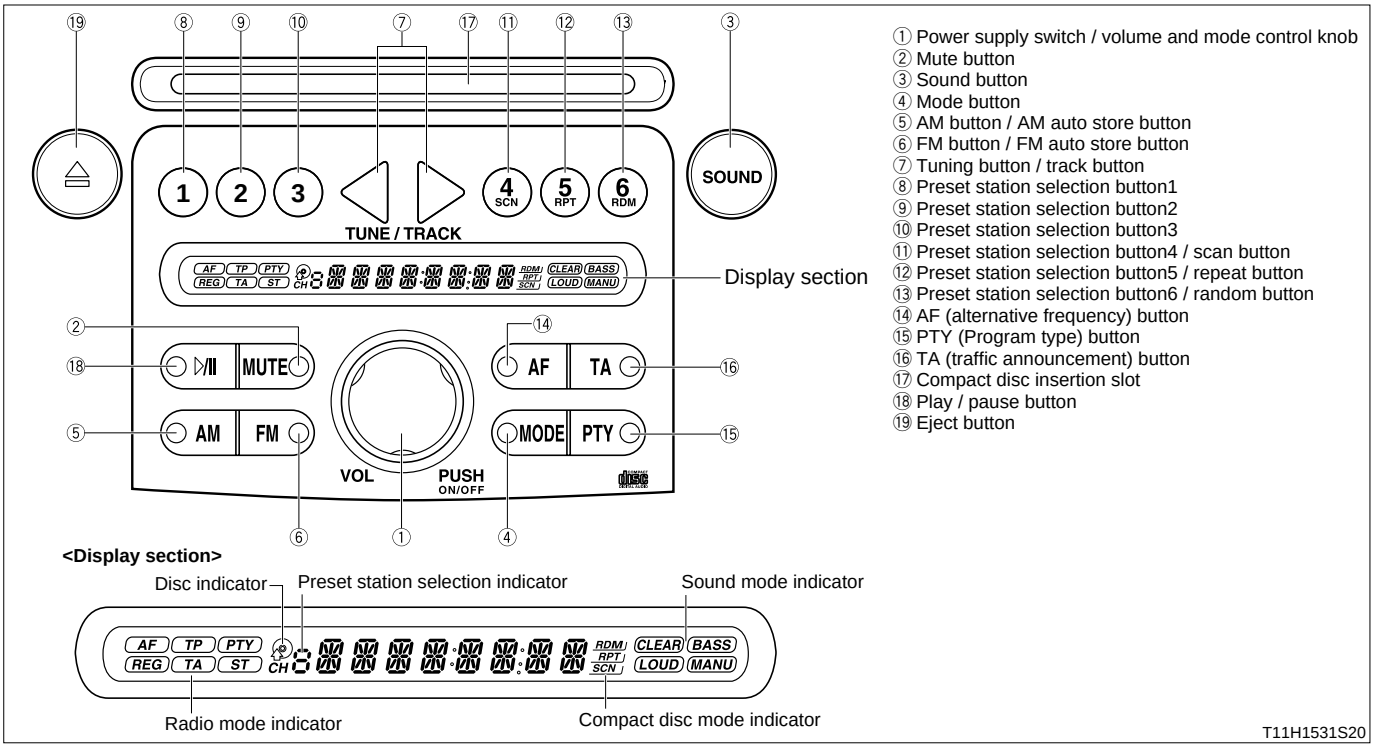


The illustration represents a typical example.

1-1-2 TUNER

1.An AM/FM radio with compact disc player employing a surface design which has a single surface with the center cluster is available in some specifications. The AM/FM radio with compact disc player has only buttons that are needed indispensably. For improved operation and easy reading, large indicating letters are employed.

2.For improved operation and easy reading, the mounting position has been set to the upper part of the instrument panel.



T11H1531S20

1-1-3 SPEAKER

1.As for the speakers, 10cm front speakers or 10cm front speakers & 16 cm rear speakers are available according to the specifications.

2.The front speakers have been set on either side at the upper side of the instrument panel.

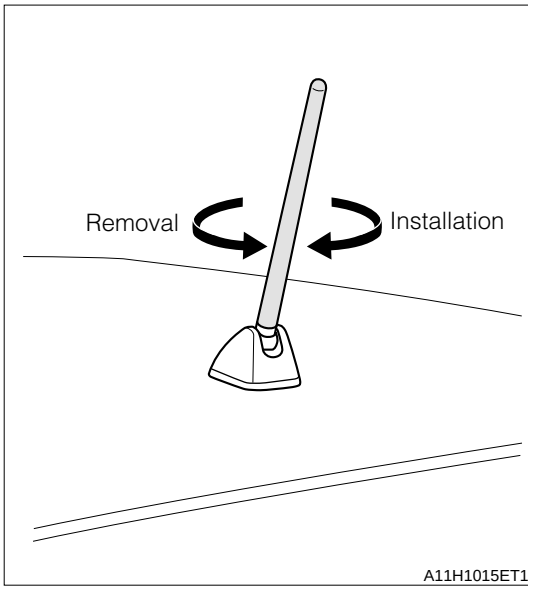
3.The rear speakers have been set on the bottom section of the door panels on either side.

Specification table

Applicable place	Front	Rear
Size (cm)	10	16
Rated input (W)	12	15
Momentary maximum input (W)	35	35
Impedance (Ω)	6±0.9	4±0.6
Output sound pressure level	85±3	85.5±3
Minimum resonance frequency (Hz)	95±19	90±18

1-1-4 RADIO ANTENNA

A roof antenna has been employed. As for this antenna, it is movable (in 180 degrees) in the backward and forward direction and its pole is detachable. Installation and removal may be done by turning the pole of the antenna.



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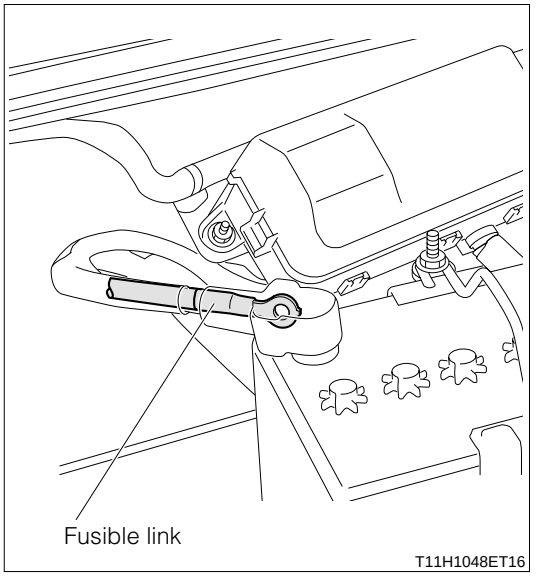
J5 WIRING

CONSTRUCTION AND OPERATION----- J5 - 1
FUSIBLE LINK---------- J5 - 1
BATTERY ---------- J5 - 1
SIDE JUNCTION BLOCK ---------- J5 - 1
FUSE BLOCK---------- J5 - 2
RELAY BLOCK ---------- J5 - 2

1 CONSTRUCTION AND OPERATION

1-1 FUSIBLE LINK

The wire type fusible link is provided at the side of the battery.



1-2 BATTERY

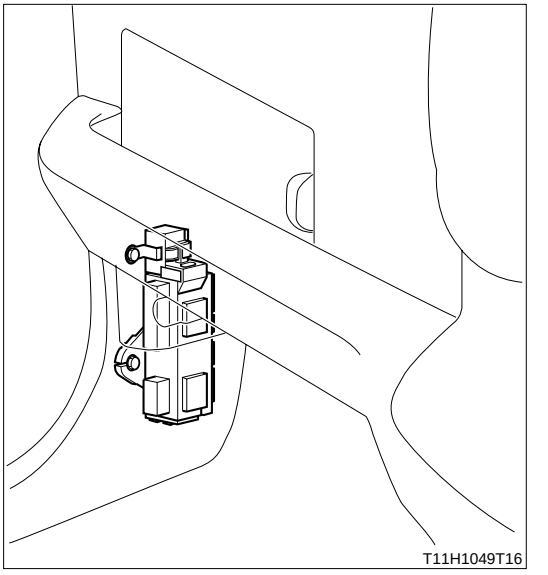
1. Two kinds of the batteries shown below have been provided.
2. The battery is provided at the left side of the engine compartment.

Specification table

Standard vehicle	40B19L
Cold region specification vehicle	44B20L

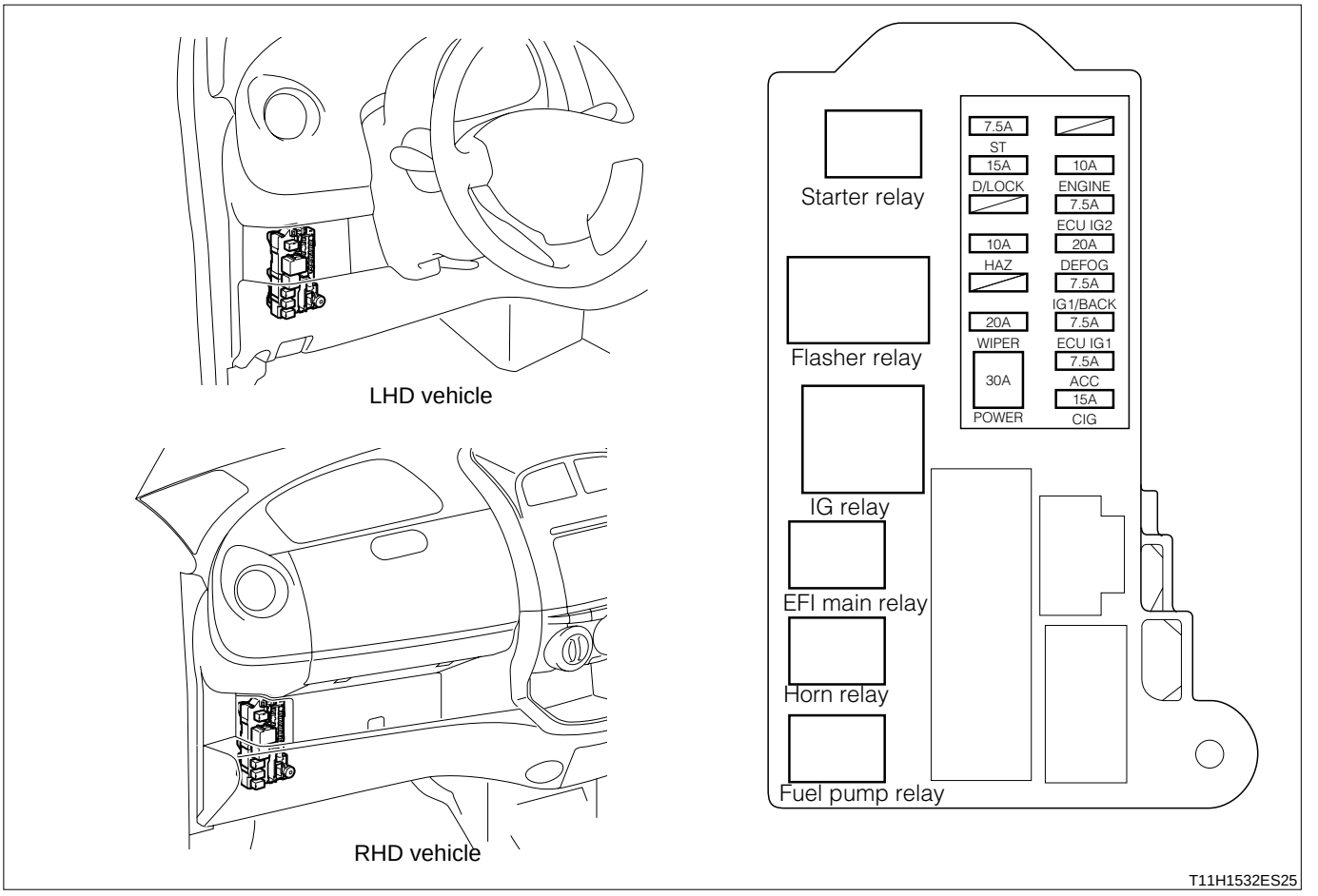
1-3 SIDE JUNCTION BLOCK

1. The side junction block integrates junction connectors that internally connect the wirings.
2. Use of the side junction block has made it possible to reduce the number of the junction connectors, thus simplifying wirings.
3. The side junction block is located at the foot area of the front left seat at the vehicle outer side.



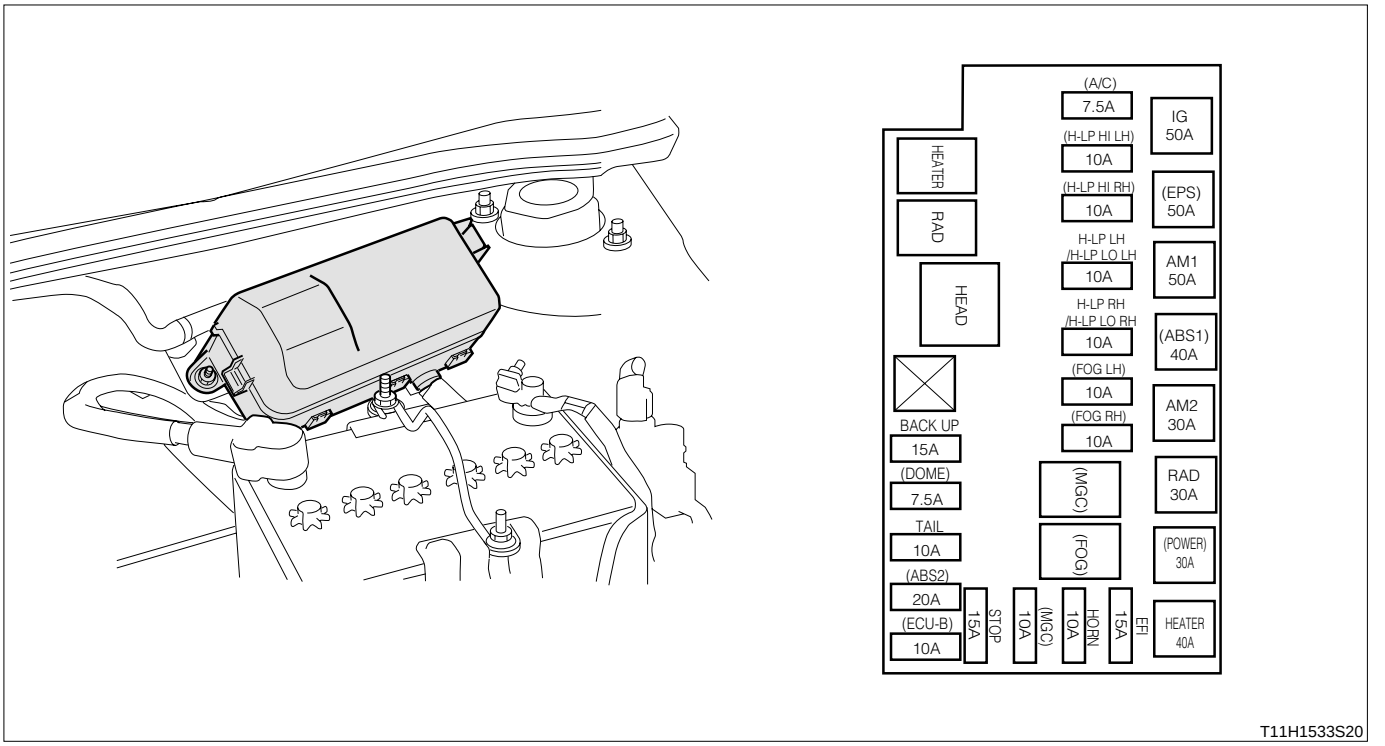
1-4 FUSE BLOCK

The fuse block is located at the left side of the instrument panel.



1-5 RELAY BLOCK

The relay block is located at the rear of the battery.



TO INDEX TO NEXT SECTION

TO INDEX

J6 OTHER ELECTRICAL PARTS

CONSTRUCTION AND OPERATION----- J6 - 1
HORN---------- J6 - 1
REAR WINDOW DEFOGGER ---------- J6 - 1
POWER OUTLET---------- J6 - 1
CIGARETTE LIGHTER---------- J6 - 2

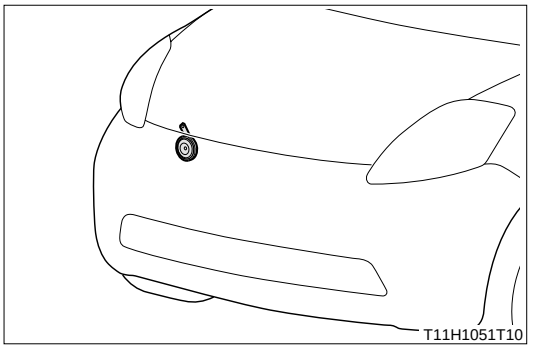
1 CONSTRUCTION AND OPERATION

1-1 HORN

The horn has employed the flat type high-pitch horn which features a compact design and light weight.

Specification table

Rated voltage (V)	12
Operating current (A)	3.0±1
Sound pressure level (dB)	113
Basic frequency (Hz)	420

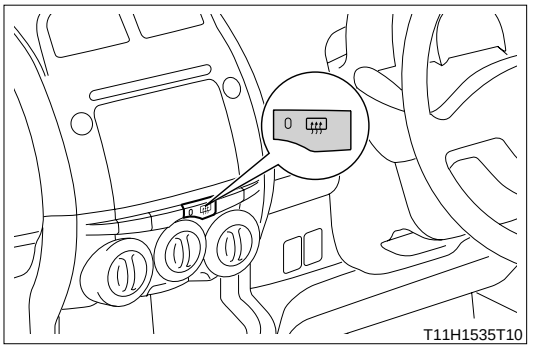


1-2 REAR WINDOW DEFOGGER

1. The rear window defogger is provided on all models.
2. The switch is provided inside the air conditioner control panel.
3. When the switch is turned ON, the operation indicating lamp provided at the switch illuminates.

Specification table

Number of wires	12
Rated voltage (V)	12
Consumption power (W)	93

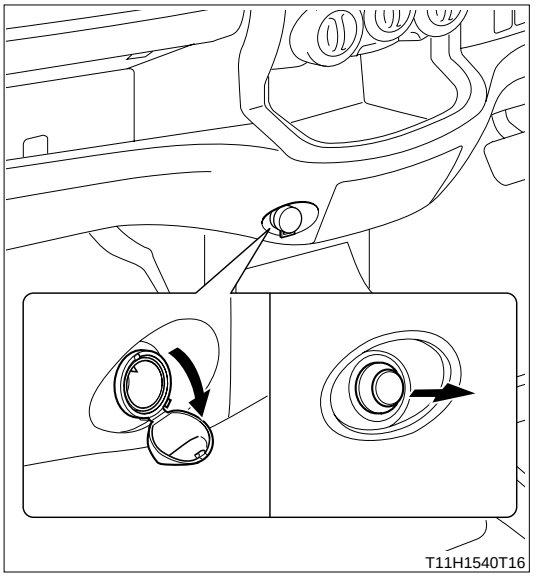


1-3 POWER OUTLET

1. The power outlet which can provide power to DC12V electric appliances is provided according to the specifications.
2. The installing location is at the central/lower section of the instrument panel.

Specification table

Rated voltage (V)	12
Maximum power capacity (W)	120
Maximum current (A)	10



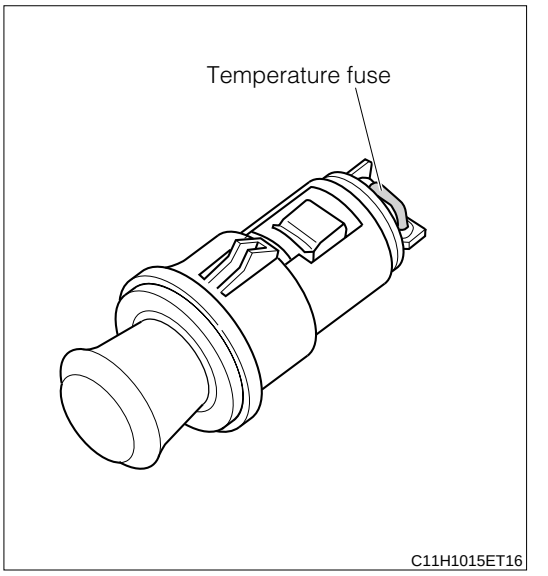
1-4 CIGARETTE LIGHTER

1.The cigarette lighter is provided according to the specifications.

2.The cigarette lighter body is provided with a temperature fuse. This fuse is melt down if current continues to flow to the cigarette lighter due to abnormality.

Specifications table

Rated voltage (V)	12
Maximum current (A)	less than 10
Temperature fuse melt time (sec)	90 - 145



TO INDEX

K1 HEATER & AIR CONDITIONER

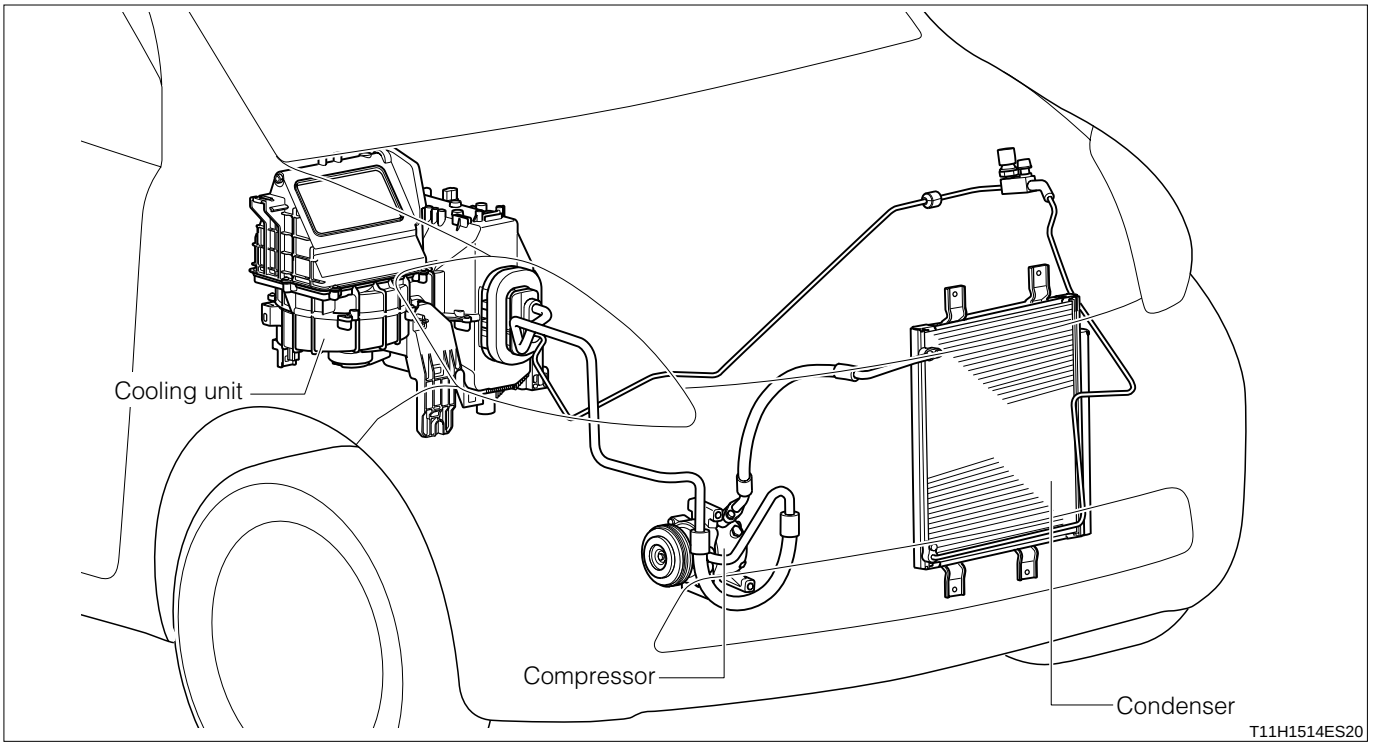
HEATER AND AIR CONDITIONER ---------- K1 - 1
OUTLINE ---------- K1 - 1
CONSTRUCTION AND OPERATION ---- K1 - 4
REFRIGERANT ---------- K1 - 4
DISCHARGE PORT ---------- K1 - 4
CONTROL PANEL ---------- K1 - 5
HEATER CORE ---------- K1 - 5
EVAPORATOR ---------- K1 - 6
COMPRESSOR ---------- K1 - 6
CONDENSER ---------- K1 - 6
MANUAL AIR CONDITIONER SYSTEM ---- K1 - 7
OUTLINE ---------- K1 - 7
SYSTEM WIRING DIAGRAM ---------- K1 - 7
LOCATION OF COMPONENTS --------- K1 - 9
LOCATION OF COMPONENTS ------- K1 - 11
CONTROL ---------- K1 - 13
AIR CONDITIONER CONTROL BY ENGINE CONTROL COMPUTER ---- K1 - 13
COMPONENTS ---------- K1 - 14
ENGINE CONTROL COMPUTER ---- K1 - 14
BLOWER RESISTOR ---------- K1 - 14
PRESSURE SWITCH ---------- K1 - 14
EVAPORATOR TEMPERATURE SENSOR ---------- K1 - 15
CONTROL PANEL ---------- K1 - 15

HEATER AND AIR CONDITIONER

1 OUTLINE

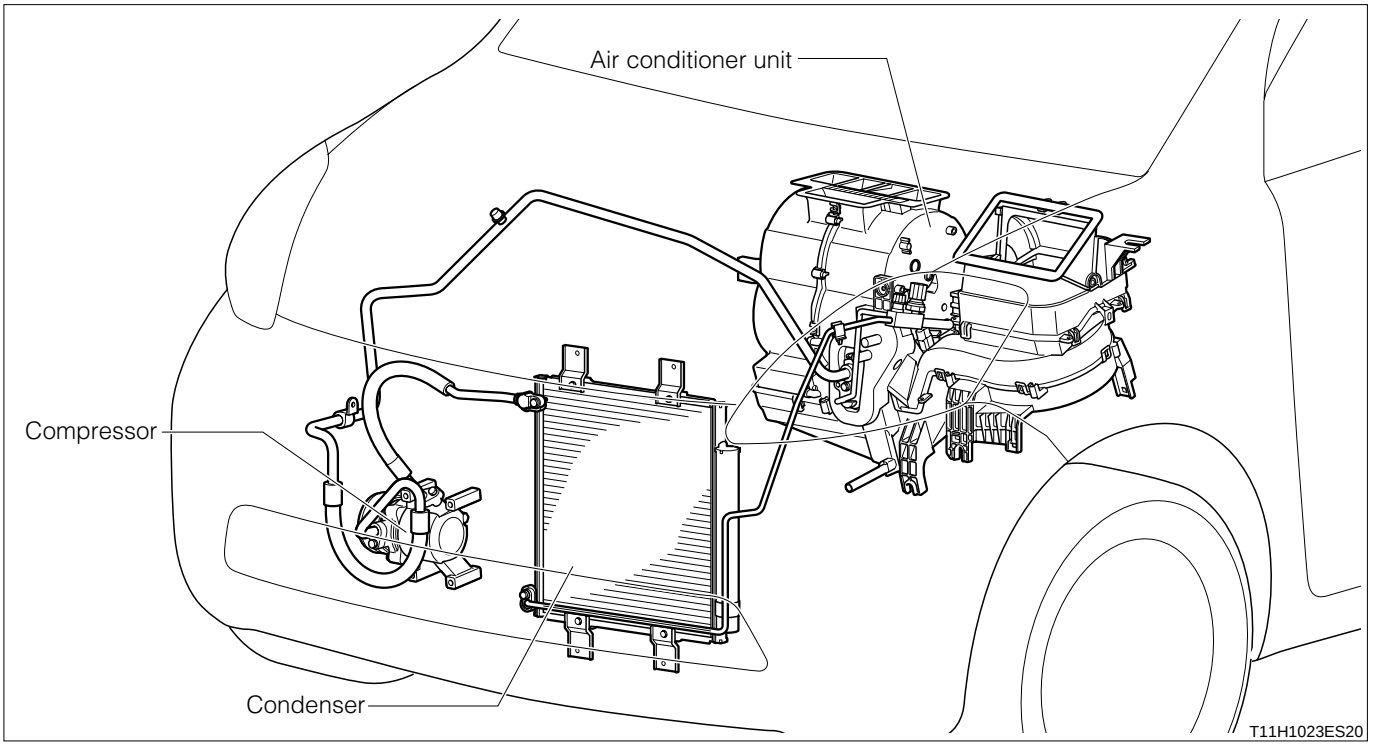
1.Some specifications have an air conditioner with manual controls.
2.A Three-dial control panel has been set.
3.The evaporator employs a small, lightweight type RS Evaporator (RS: Revolutionary Super Slim) which improves the evaporator's heat exchange efficiency when the air conditioner is running.
4.The heater core employs a small, lightweight SFA heater core Ⅱ (SFA: straight flow aluminum) which should give superior heat transmission performance when the system is heating.
5.The refrigerant HFC-134a (R-134a) that contains no chlorine has been adopted as the air conditioner refrigerant, taking into consideration the need to prevent ozone layer depletion.

Front section (LHD vehicle)



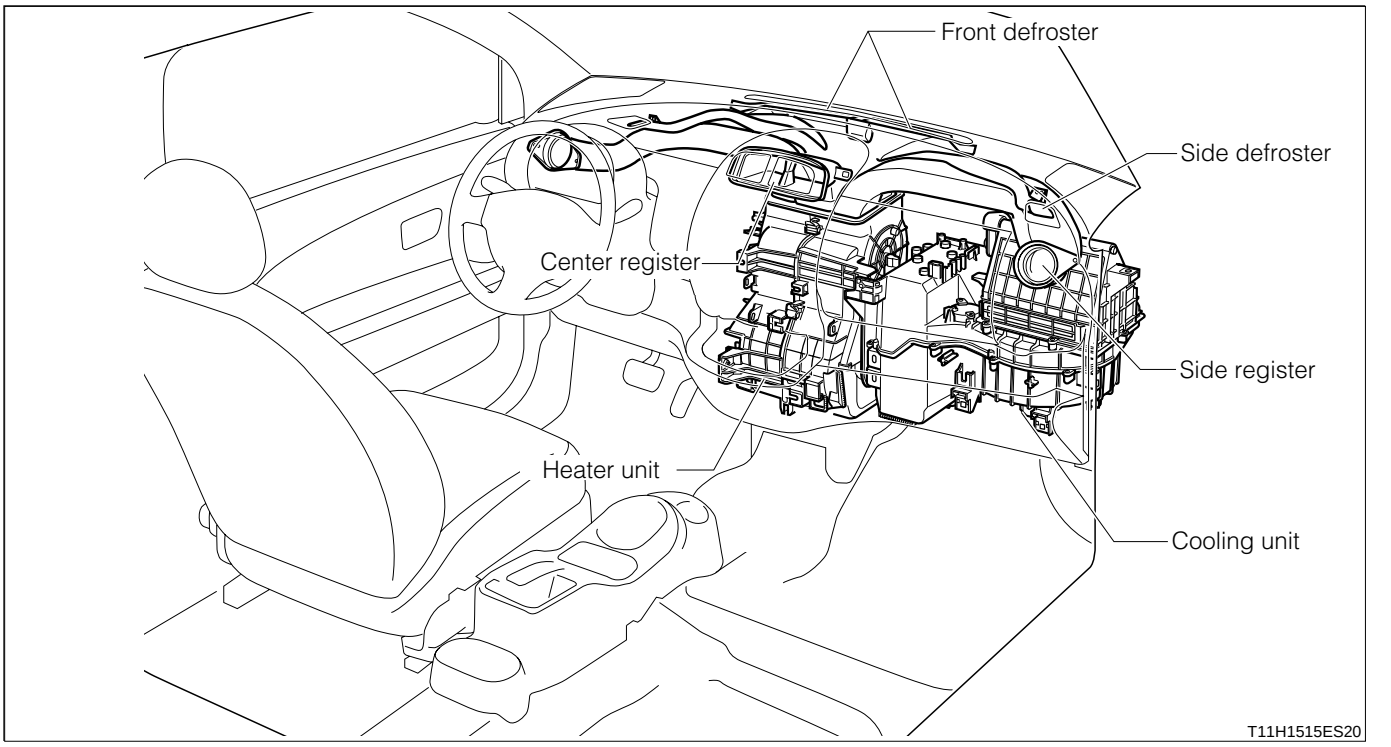
The illustration shows a typical example.

Front section (RHD vehicle)



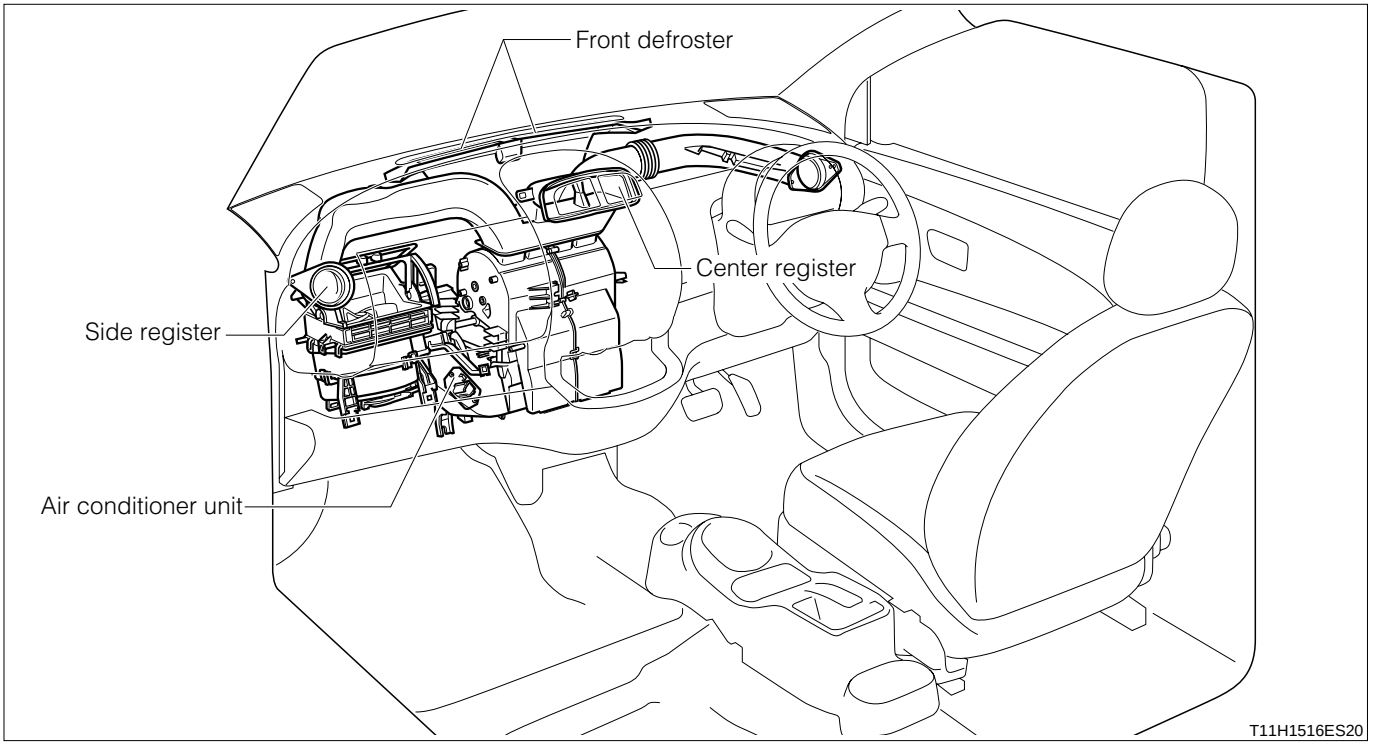
The illustration shows a typical example.

Instrument panel section (LHD vehicle)



The illustration shows a typical example.

Instrument panel section (RHD vehicle)



The illustration shows a typical example.

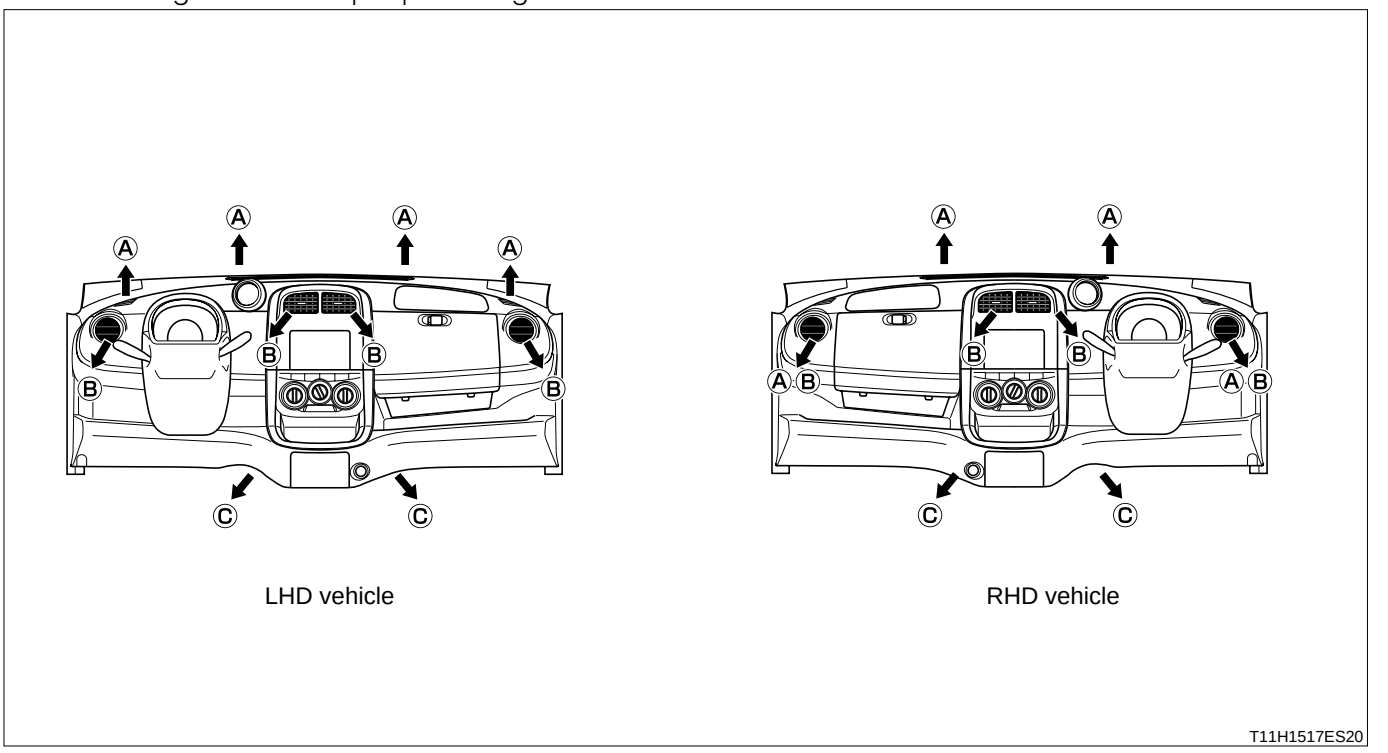
2 CONSTRUCTION AND OPERATION

2-1 REFRIGERANT

The refrigerant HFC-134a (R-134a) that contains no chlorine has been adopted as the air conditioner refrigerant, taking into consideration the prevention of deletion of ozone layer.

2-2 DISCHARGE PORT

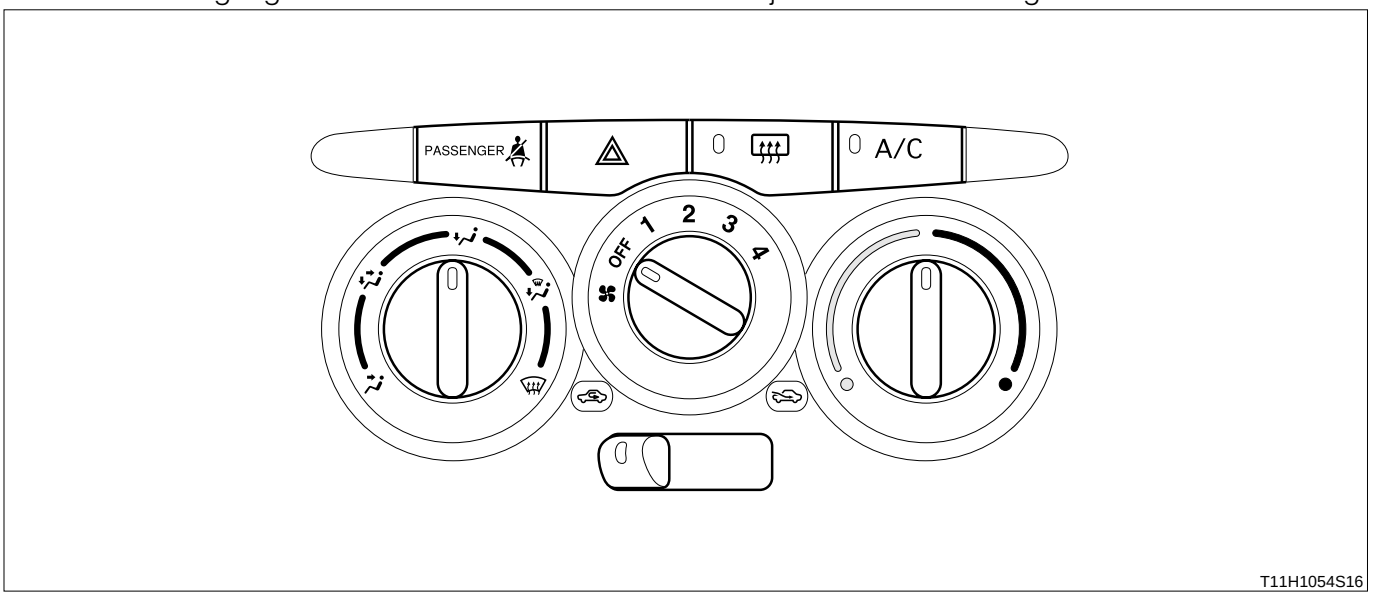
The air outlets are located in the center of the instrument panel, on both side-sections, on the defroster and on the leg sections of people sitting in front seats.



Air outlets according to mode

2-3 CONTROL PANEL

A three-dial type control panel is employed. The dial pointer adopts night illumination to assure easy operation and reading night time. The blower switch can be adjusted over four stages.

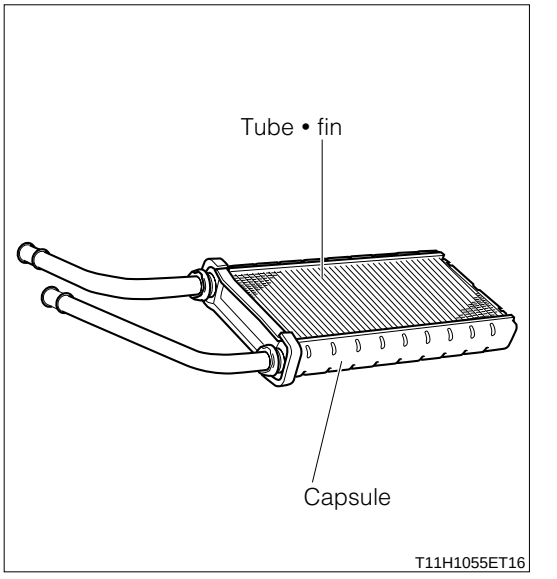


The illustration shows a typical example.

2-4 HEATER CORE

The heater core employs a small, lightweight SFA heater core Ⅱ (SFA: straight flow aluminum).

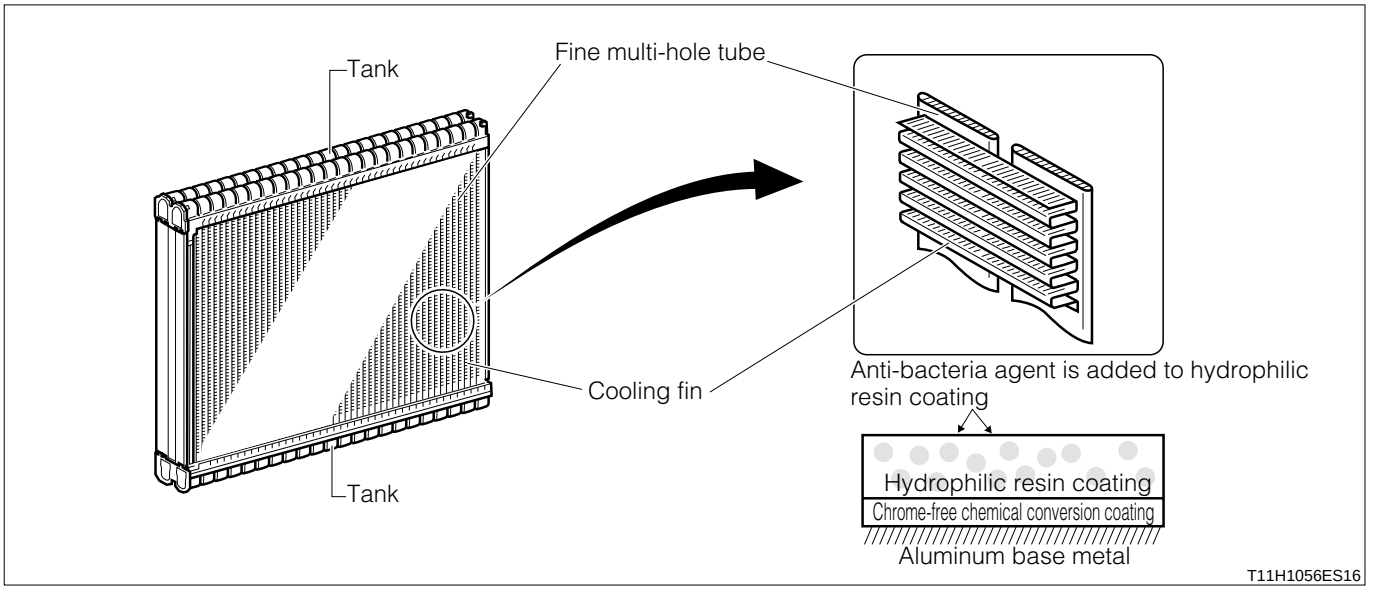
The SFA heater core Ⅱ is more compact than conventional SFA heater cores because of the reduction in tank width and height/miniaturization of the core (core area expansion). This has achieved increased air flow, noise reduction, and an improvement in heating capacity. The SFA heater core Ⅱ is constructed from tubes, fins and capsules and the result has been that by flattening the tubes the heat transfer rate has been improved as well as producing a lightweight, small size heater. Further, the use of aluminum makes the heater more environmentally friendly.



2-5 EVAPORATOR

The evaporator employs a small, lightweight type RS Evaporator (RS: Revolutionary Super Slim).

The RS evaporator consists of a tank, tubes and cooling fins. Thanks to the press molding of the tube, minute flow paths have been formed and this leads to improved heat transfer capability and very thin dimensions. Further, the RS evaporator has improved heat transfer due to the reduced fin height, tube thickness, and fin pitch, and the unit is much reduced in size and weight due to the reduced stock thickness of the core material. The evaporator is coated with a hydrophilic plastic film which contains anti-bacteria agent to control the breeding of germs and bacteria which can lead to unpleasant smells. In consideration of the environment the surface treatment is chrome-free.



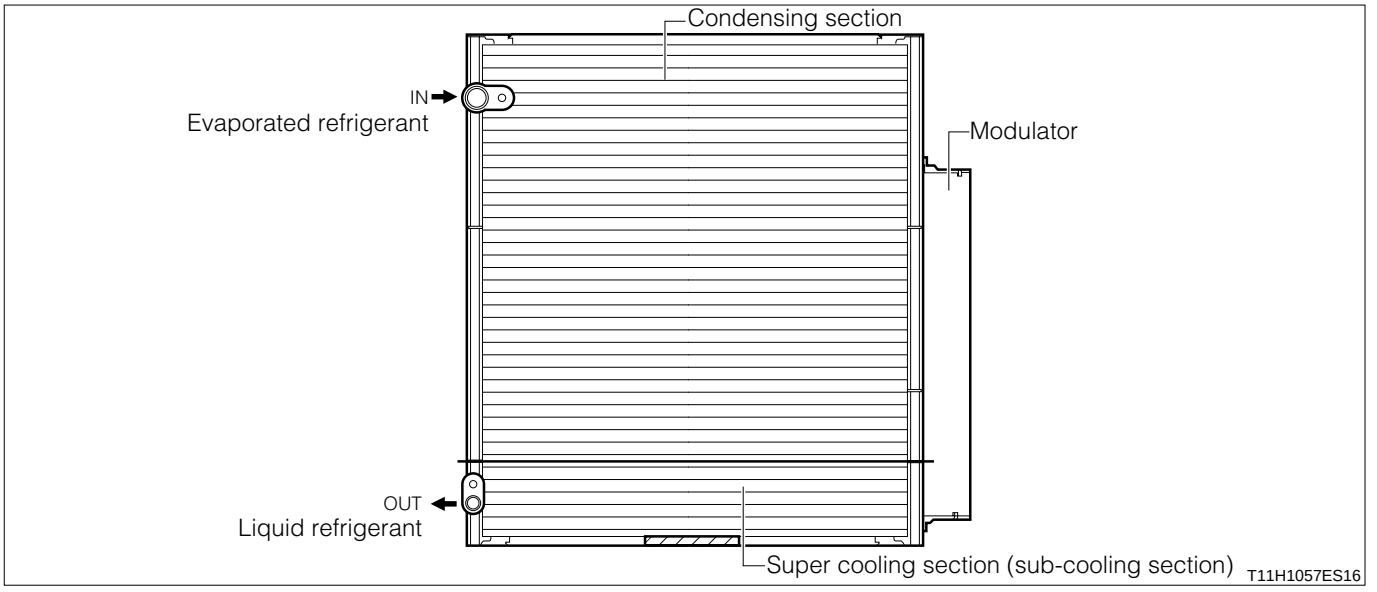
2-6 COMPRESSOR

Vane type compressor is employed.

2-7 CONDENSER

A new type of sub cooling condenser is used which has improved performance with its miniaturized core and an increased effective surface area, compared with the conventional ones. Inside the sub cooling condenser are provided the condensing section, the modulator and the over cooling section (sub cooling section). The refrigerant vapor goes through a 2-stage condensation process which lead to nearly 100% liquidizing.

Further, the modulator separates the gas and liquid.

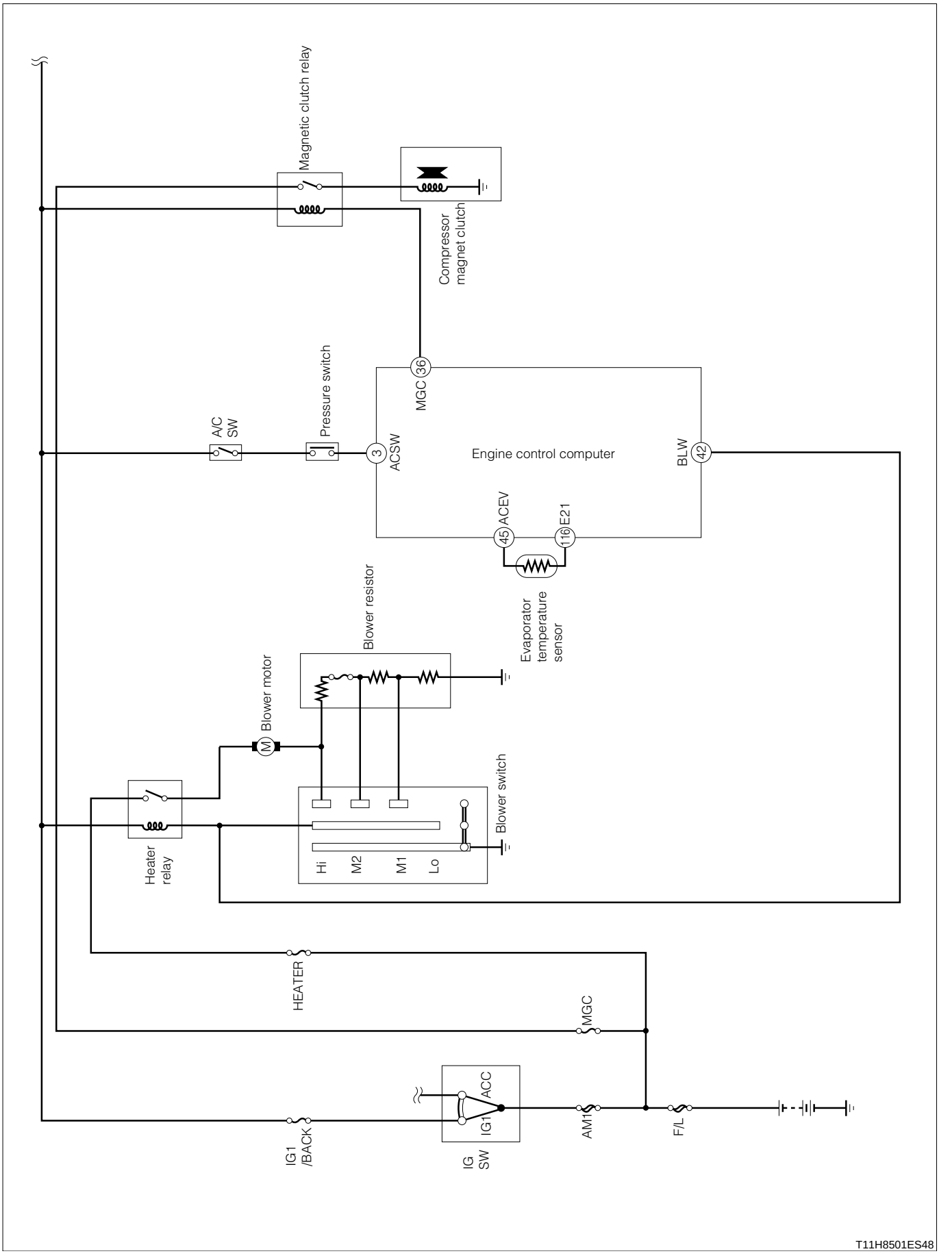


The illustration shows a typical example.

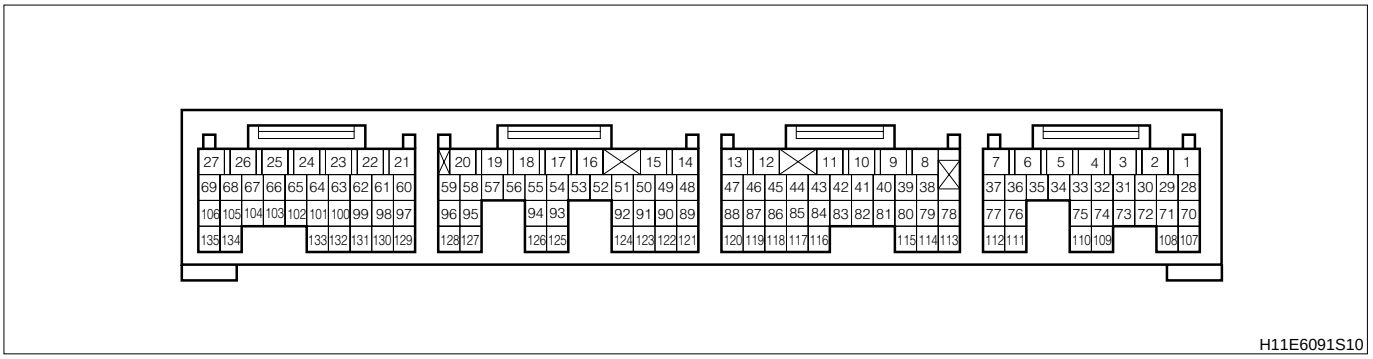
MANUAL AIR CONDITIONER SYSTEM

1 OUTLINE

1-1 SYSTEM WIRING DIAGRAM



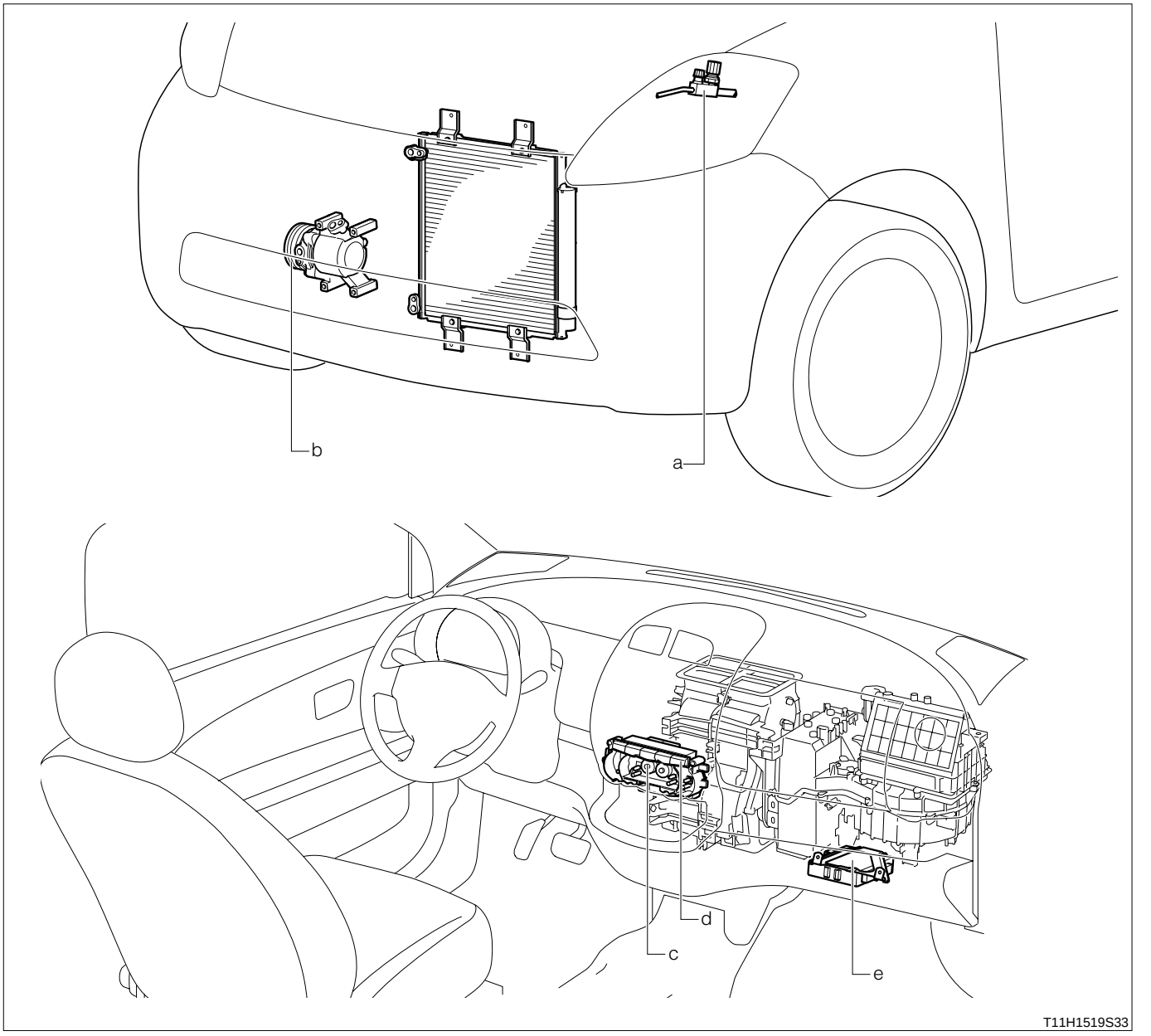
Arrangement of ECU terminal



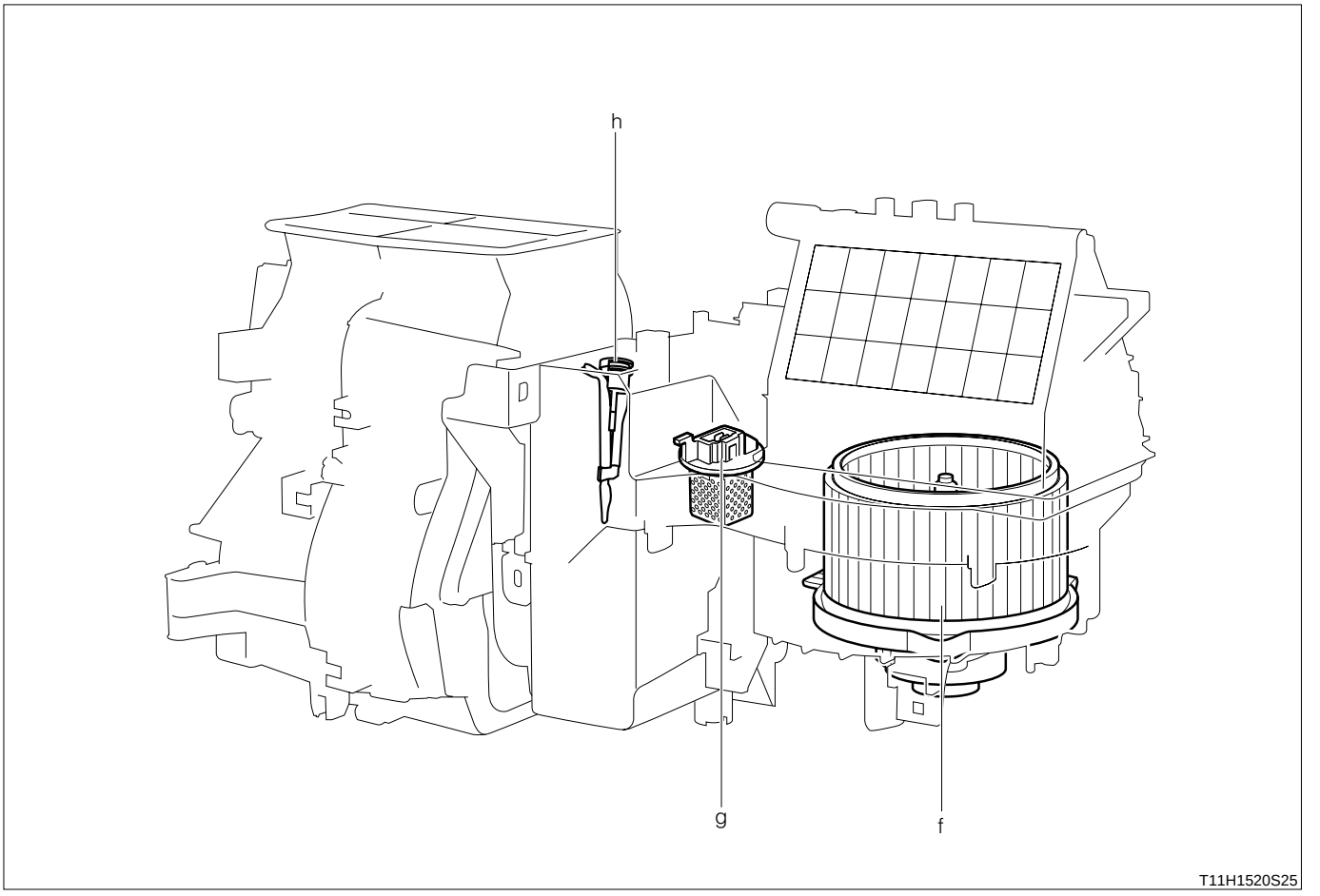
Engine Control Computer terminal name

Terminal No.	Terminal code	Terminal name
3	ACSW	A/C switch input
36	MGC	Magnet clutch drive output
42	BLW	Heater blower operation input
45	ACEV	Evaporator temperature sensor input
116	E21	Sensor earth

1-2 LOCATION OF COMPONENTS

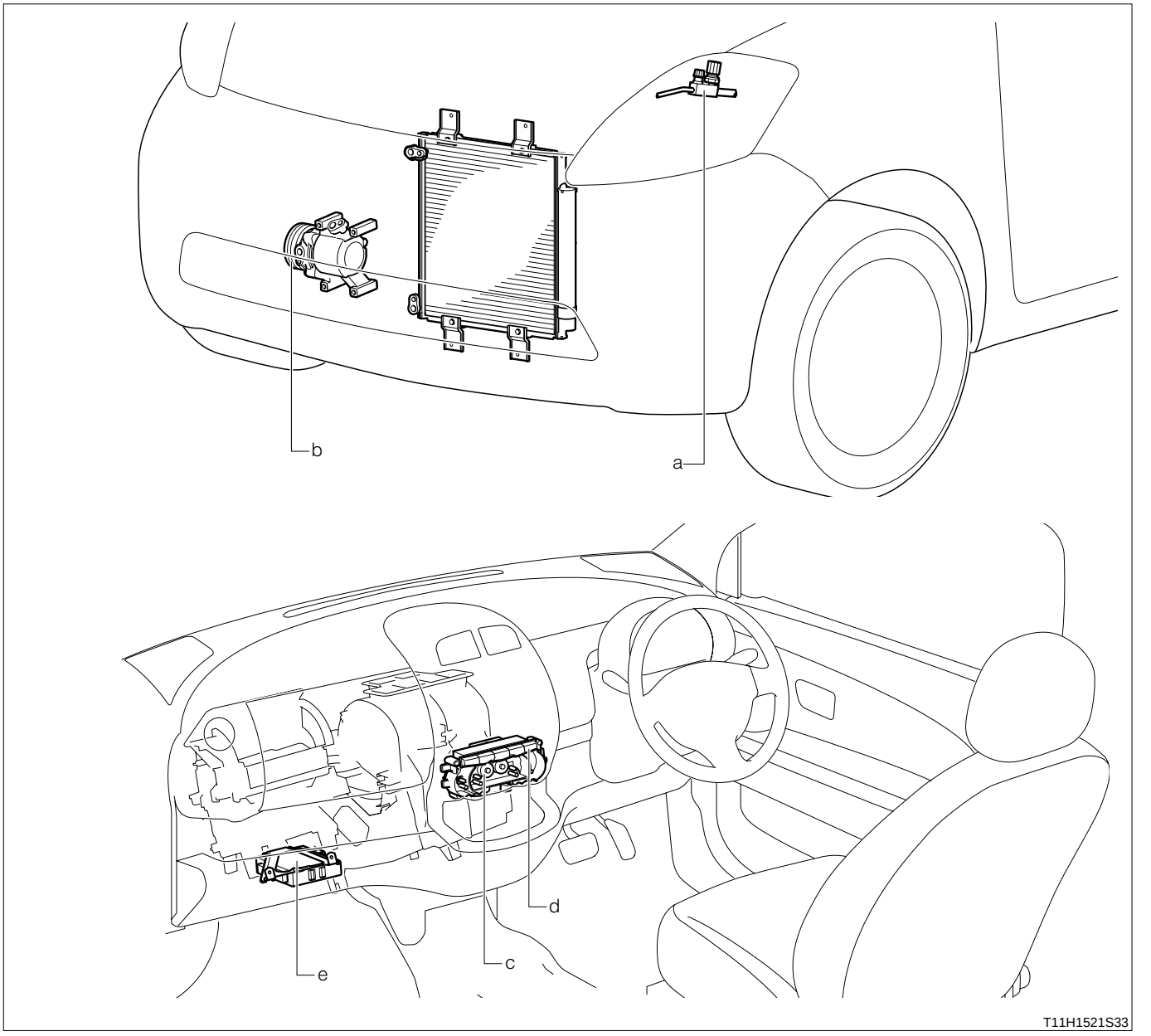


a	Pressure switch
b	Compressor magnet clutch
c	Blower switch
d	A/C switch
e	Engine control computer

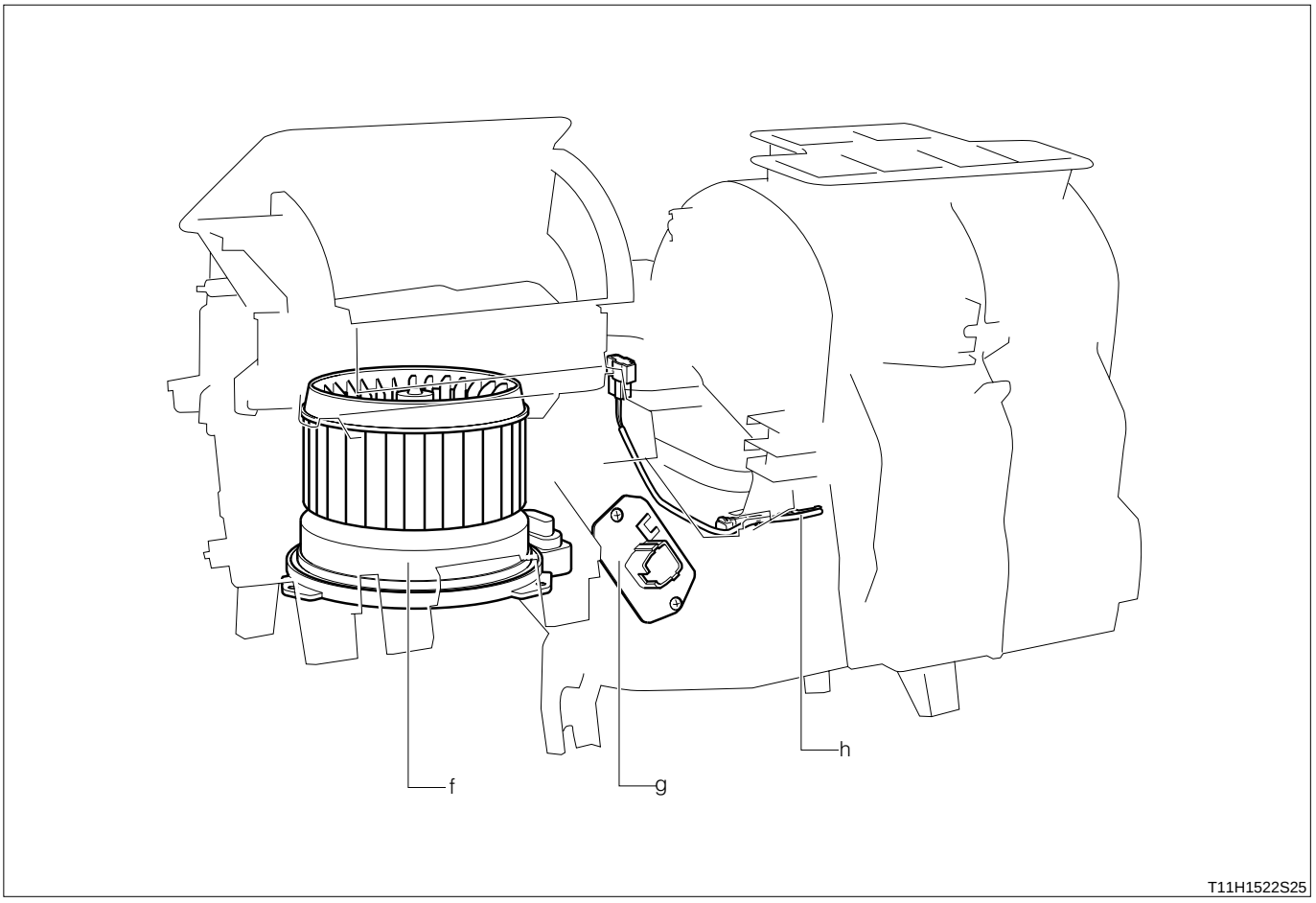


f	Blower motor
g	Blower resistor
h	Evaporator temperature sensor

1-3 LOCATION OF COMPONENTS



a	Pressure switch
b	Compressor magnet clutch
c	Blower switch
d	A/C switch
e	Engine control computer



f	Blower motor
g	Blower resistor
h	Evaporator temperature sensor

2 CONTROL

2-1 AIR CONDITIONER CONTROL BY ENGINE CONTROL COMPUTER

2-1-1 AIR CONDITIONER CUT CONTROL

Type 1KR-FE engine mounted vehicles

Refer to Page B8-16.

Type K3-VE engine mounted vehicles

Refer to Page B8-44.

2-1-2 RADIATOR FAN MOTOR CONTROL

Type 1KR-FE engine mounted vehicles

Refer to Page B8-17.

Type K3-VE engine mounted vehicles

Refer to Page B8-45.

2-1-3 AIR CONDITIONER IDLE-UP CONTROL

Type 1KR-FE engine mounted vehicles

Refer to Page B8-17.

Type K3-VE engine mounted vehicles

Refer to Page B8-45.

2-1-4 MAGNETIC CLUTCH CONTROL

Type 1KR-FE engine mounted vehicles

Refer to Page B8-17.

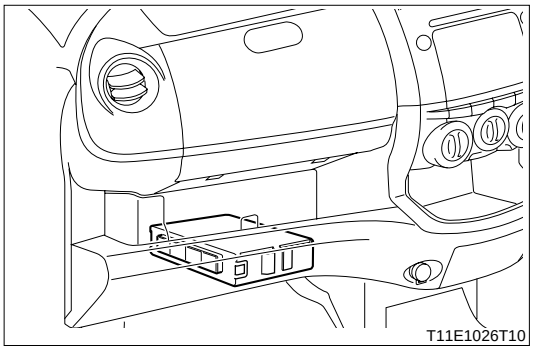
Type K3-VE engine mounted vehicles

Refer to Page B8-45.

3 COMPONENTS

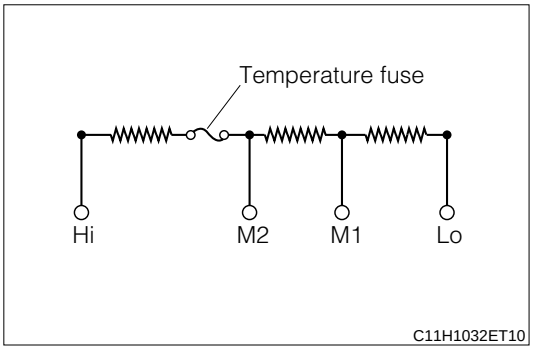
3-1 ENGINE CONTROL COMPUTER

This is attached below the air conditioning unit. It controls the compressor magnetic clutch ON/OFF function depending on the state of the A/C switch, vehicle conditions and each sensor's input.



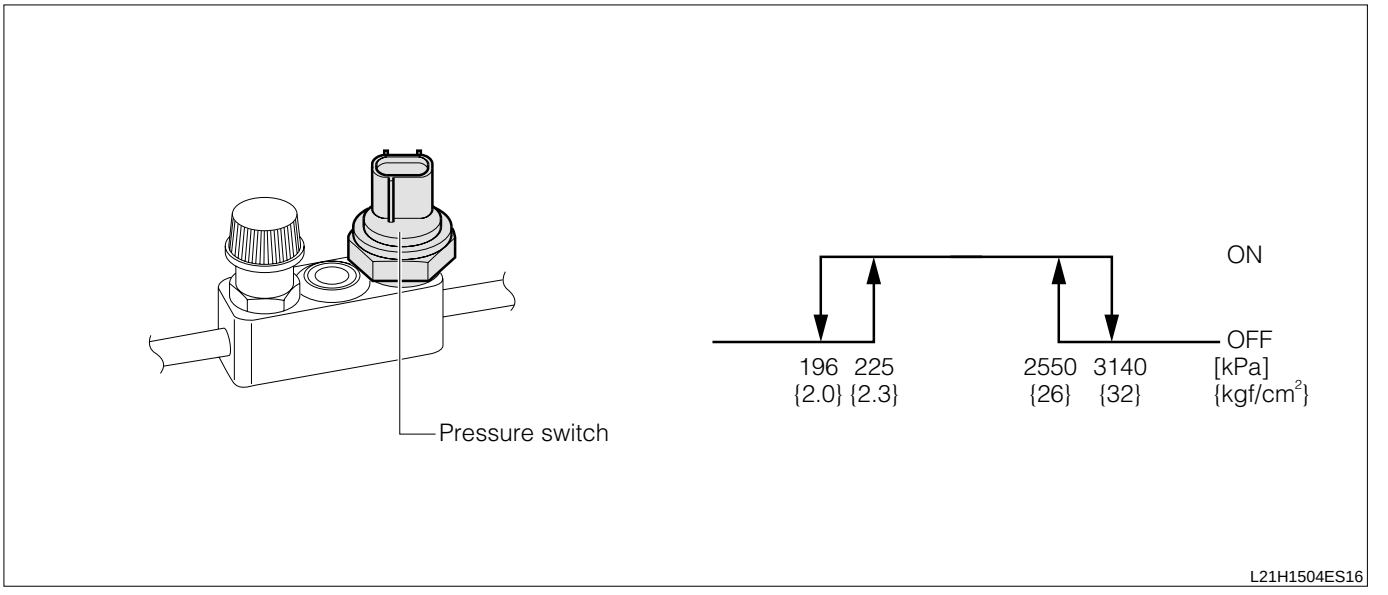
3-2 BLOWER RESISTOR

The blower resistor controls the speed of the blower motor. A temperature fuse is fitted. The mounting location is on the air conditioning unit.



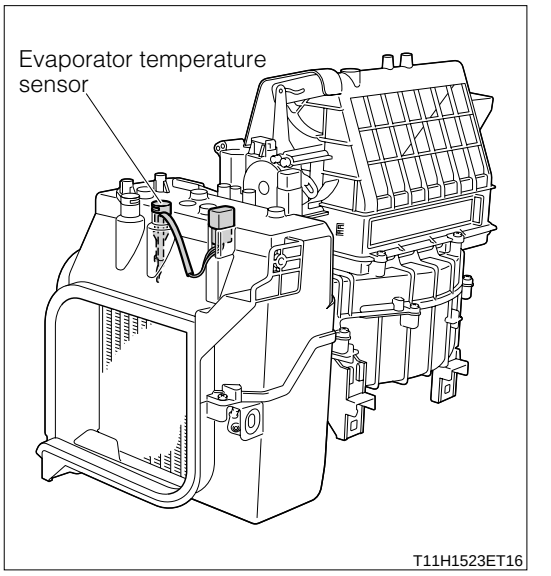
3-3 PRESSURE SWITCH

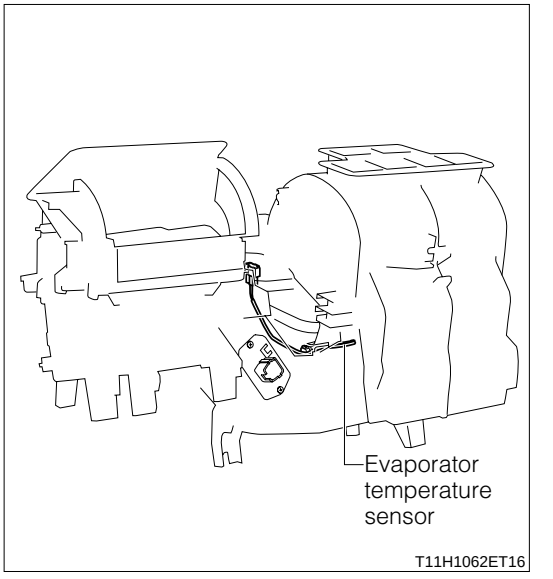
A pressure switch, which corresponds to abnormal pressure variation inside the liquid tube, is provided inside the liquid tube. When the pressure inside the liquid tube becomes excessively high or low, the wire between the A/C switch and the engine control computer is interrupted, thus stopping the rotation of the compressor.



3-4 EVAPORATOR TEMPERATURE SENSOR

This sensor detects the air temperature at a point immediately downstream of the evaporator as a change in resistance. Thus, the outputted value is sent to the engine control computer.





3-5 CONTROL PANEL

Refer to Page K1-5.

L2 MULTIPLEX COMMUNICATION SYSTEM

CAN COMMUNICATION SYSTEM ---------- L2 - 1
OUTLINE ---------- L2 - 1
DESCRIPTION ---------- L2 - 1
SYSTEM DRAWING ---------- L2 - 1
SYSTEM WIRING DIAGRAM ---------- L2 - 3
LOCATION OF COMPONENTS --------- L2 - 8
CONTROL ---------- L2 - 9
COMMUNICATION CONTROL ---------- L2 - 9
COMMUNICATION PROTOCOL ------ L2 - 10
COMMUNICATION DATA ---------- L2 - 10
DIAGNOSIS (SELF-DIAGNOSIS) FUNCTION ---------- L2 - 11
FAIL-SAFE CONTROL ---------- L2 - 11
COMPONENTS ---------- L2 - 12
DLC ---------- L2 - 12
TERMINATING RESISTANCE --------- L2 - 12
LIN COMMUNICATION SYSTEM ---------- L2 - 13
OUTLINE ---------- L2 - 13
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SYSTEM DRAWING ---------- L2 - 13
SYSTEM WIRING DIAGRAM ---------- L2 - 14
LOCATION OF COMPONENTS ------- L2 - 16
CONTROL ---------- L2 - 17
COMMUNICATION CONTROL -------- L2 - 17
WAKE-UP/SLEEP FUNCTION --------- L2 - 17
LIN COMMUNICATION PROTOCOL (COMMUNICATION REGULATION) -- L2 - 18
DIAGNOSIS (ONBOARD DIAGNOSIS FUNCTION) ---------- L2 - 18
FAIL-SAFE FUNCTION ---------- L2 - 18

CAN COMMUNICATION SYSTEM

1 OUTLINE

1-1 DESCRIPTION

1.A CAN[Å•g,DK_MÅ§] communication system which controls data relating to the power train at a higher speed is used in all vehicles.

2.The CAN system sends over a single communications line (twisted pair cable) multiple items of information and data which have been converted into digital form by a communication circuit.
This system reduces the number of the wiring harnesses and the size of the electronic control system for the systems that connect the input side (sensors, switches, etc.), the control units and the output side (display lamps, etc.).

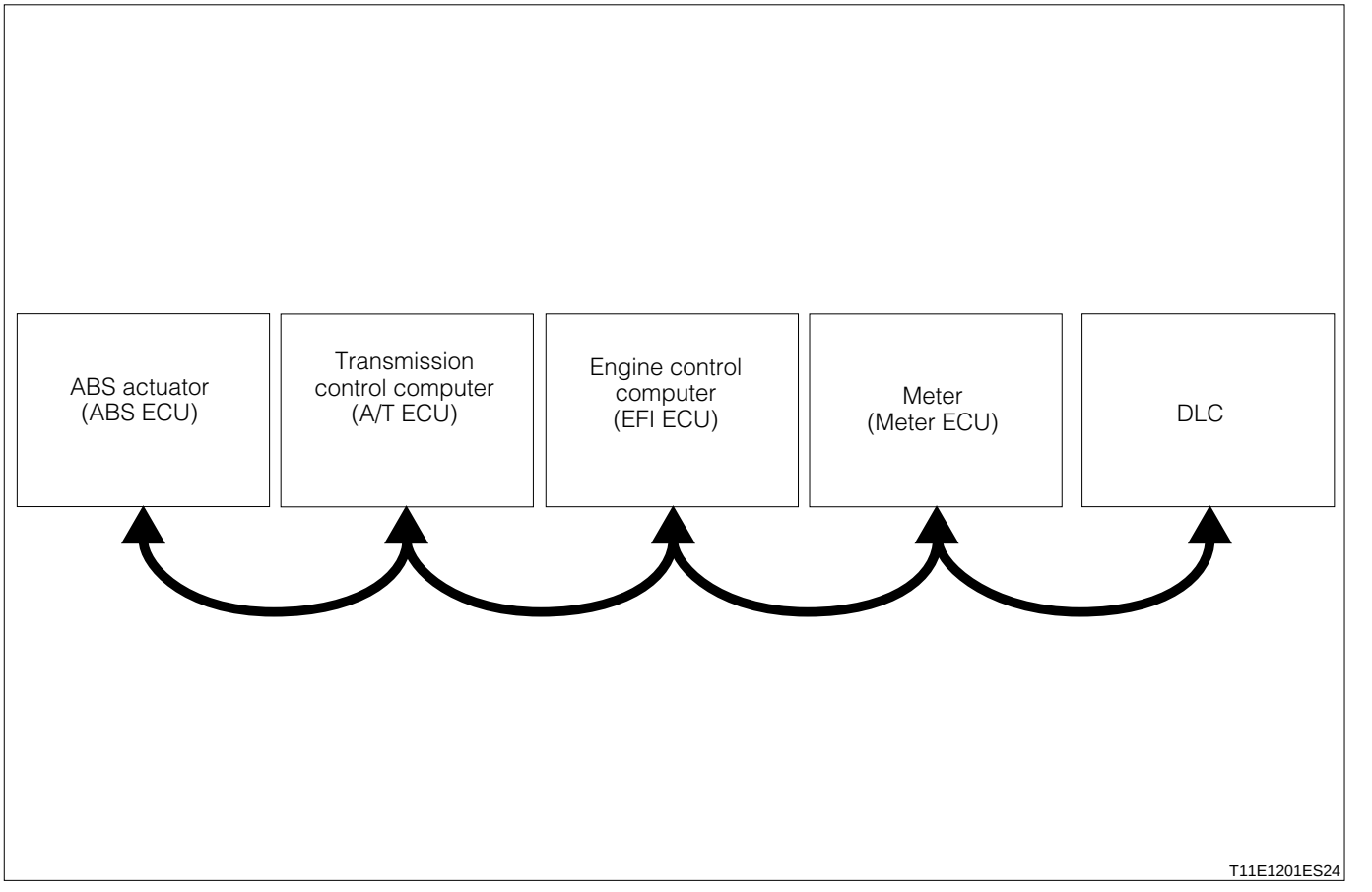
3.The CAN communication system in use is a daisy chain type network with several computers connected to a pair of communication lines.

NOTE

- 1:CAN stands for Controller Area Network. It is the serial communication based on the ISO standard (ISO011898).

1-2 SYSTEM DRAWING

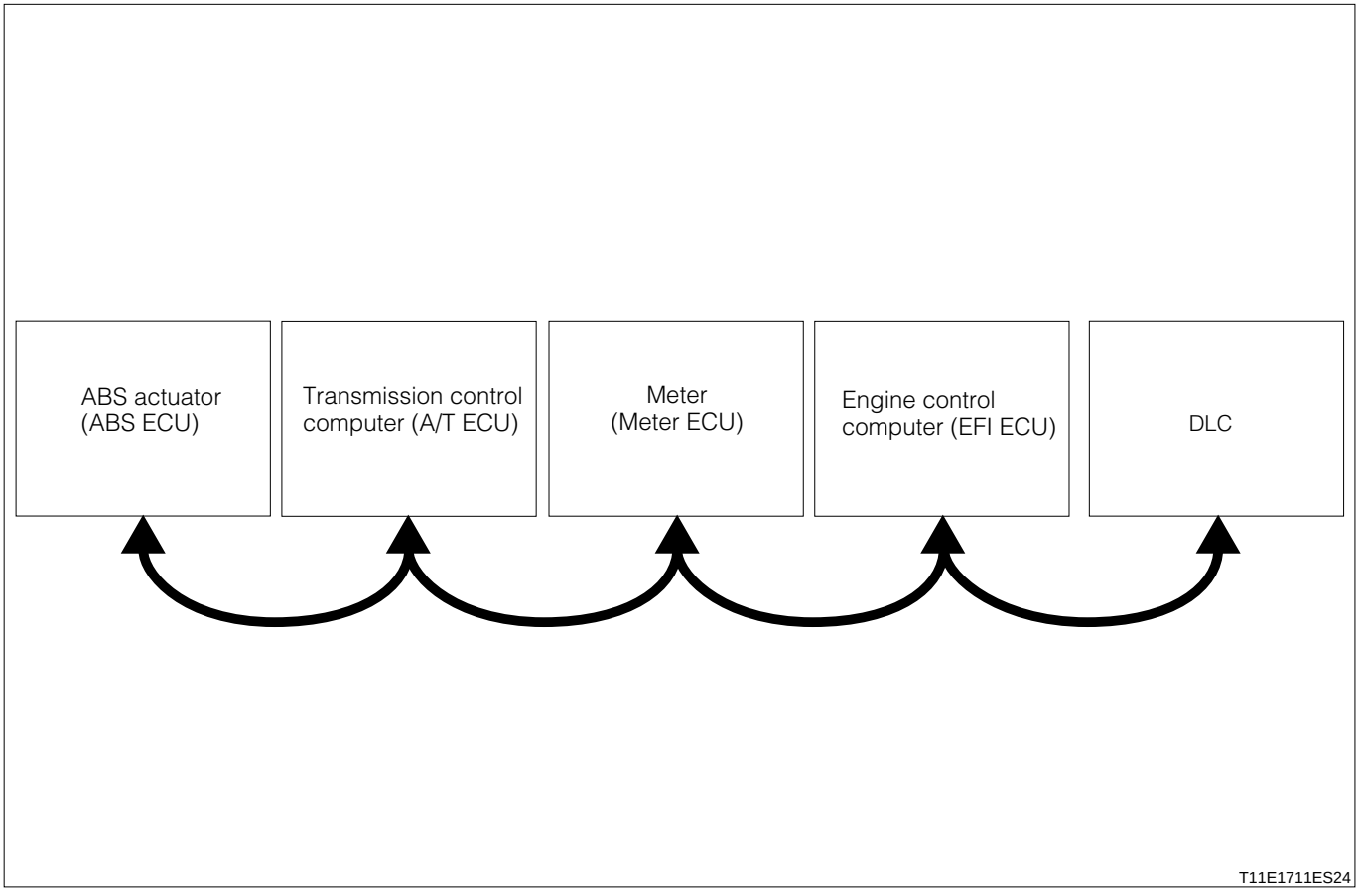
1-2-1 RHD VEHICLES



CAN communication connection system (RHD vehicles)

			ABS ECU	A/T ECU	EFI ECU	Meter ECU	DLC	Name of CAN communication system type
1KR	M/T	Vehicles not equipped with ABS	–	–	○	○	○	Type 1
		ABS-equipped vehicles	○	–	○	○	○	Type 2
K3	M/T	Vehicles not equipped with ABS	–	–	○	○	○	Type 1
		ABS-equipped vehicles	○	–	○	○	○	Type 2
	A/T	Vehicles not equipped with ABS	–	○	○	○	○	Type 3
		ABS-equipped vehicles	○	○	○	○	○	Type 4

1-2-2 LHD VEHICLES



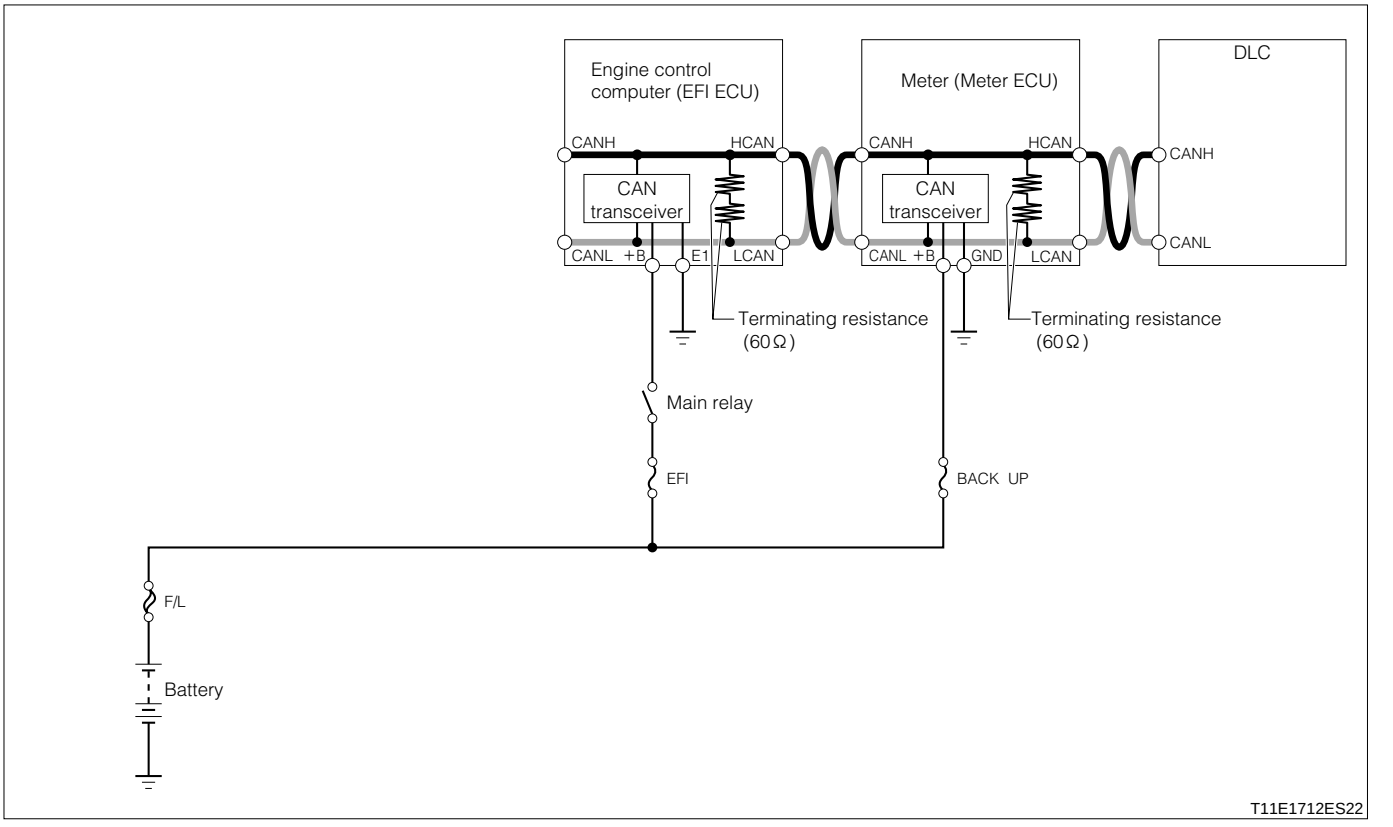
CAN communication connection system (LHD vehicles)

			ABS ECU	A/T ECU	Meter ECU	EFI ECU	DLC	Name of CAN communication system type
1KR	M/T	Vehicles not equipped with ABS	–	–	○	○	○	Type 5
		ABS-equipped vehicles	○	–	○	○	○	Type 6
K3	M/T	Vehicles not equipped with ABS	–	–	○	○	○	Type 5
		ABS-equipped vehicles	○	–	○	○	○	Type 6
	A/T	Vehicles not equipped with ABS	–	○	○	○	○	Type 7
		ABS-equipped vehicles	○	○	○	○	○	Type 8

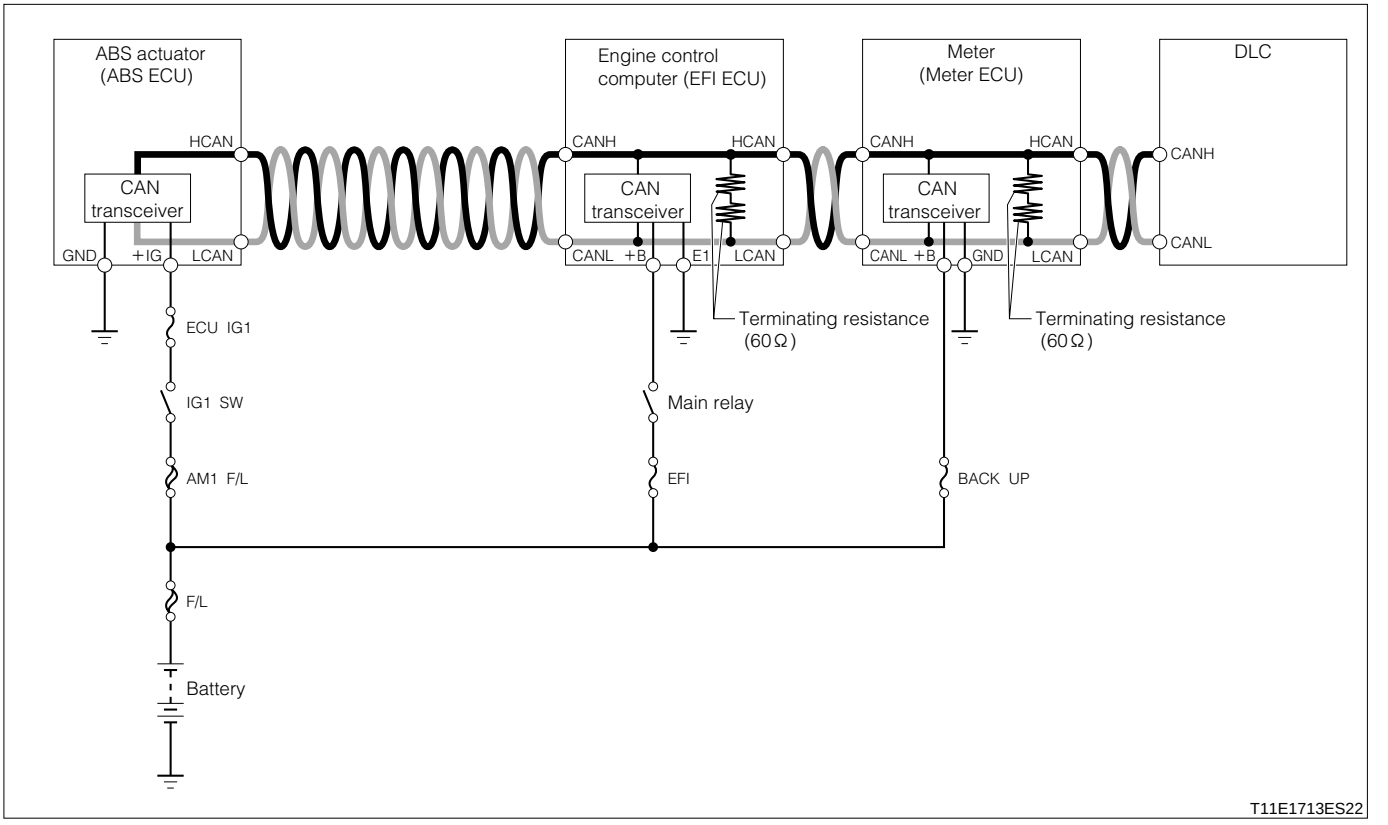
1-3 SYSTEM WIRING DIAGRAM

1-3-1 RHD VEHICLES

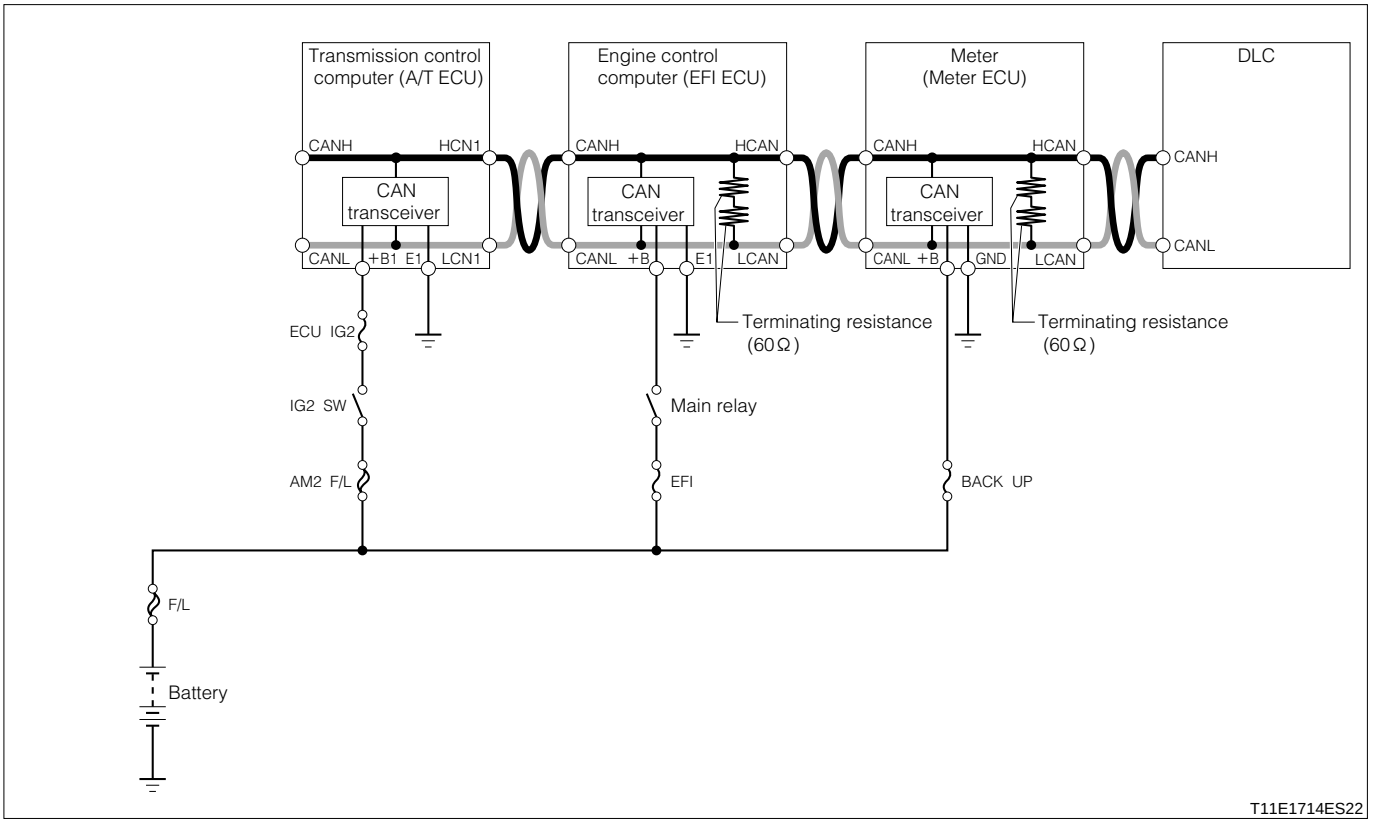
(1) Type 1



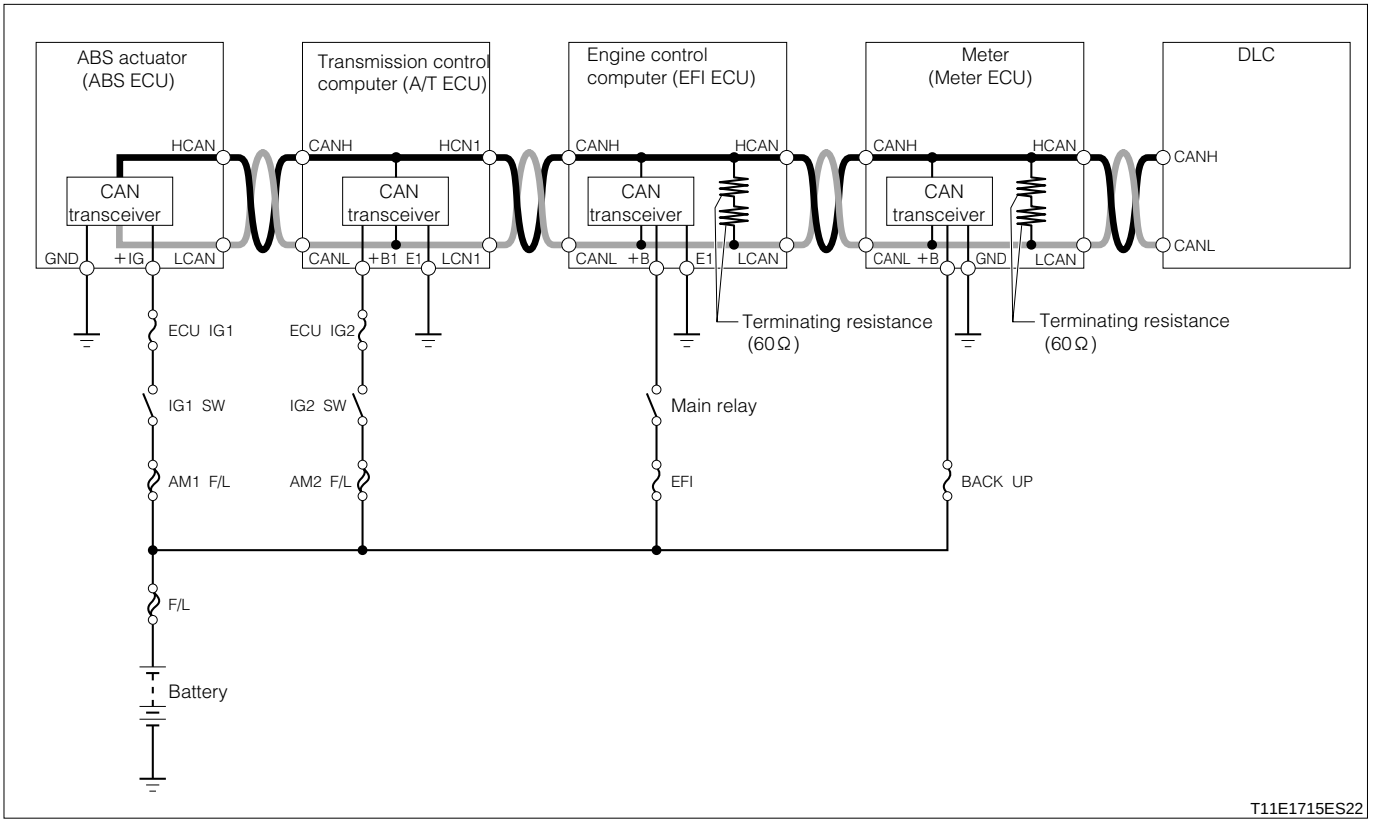
(2) Type 2



(3) Type 3

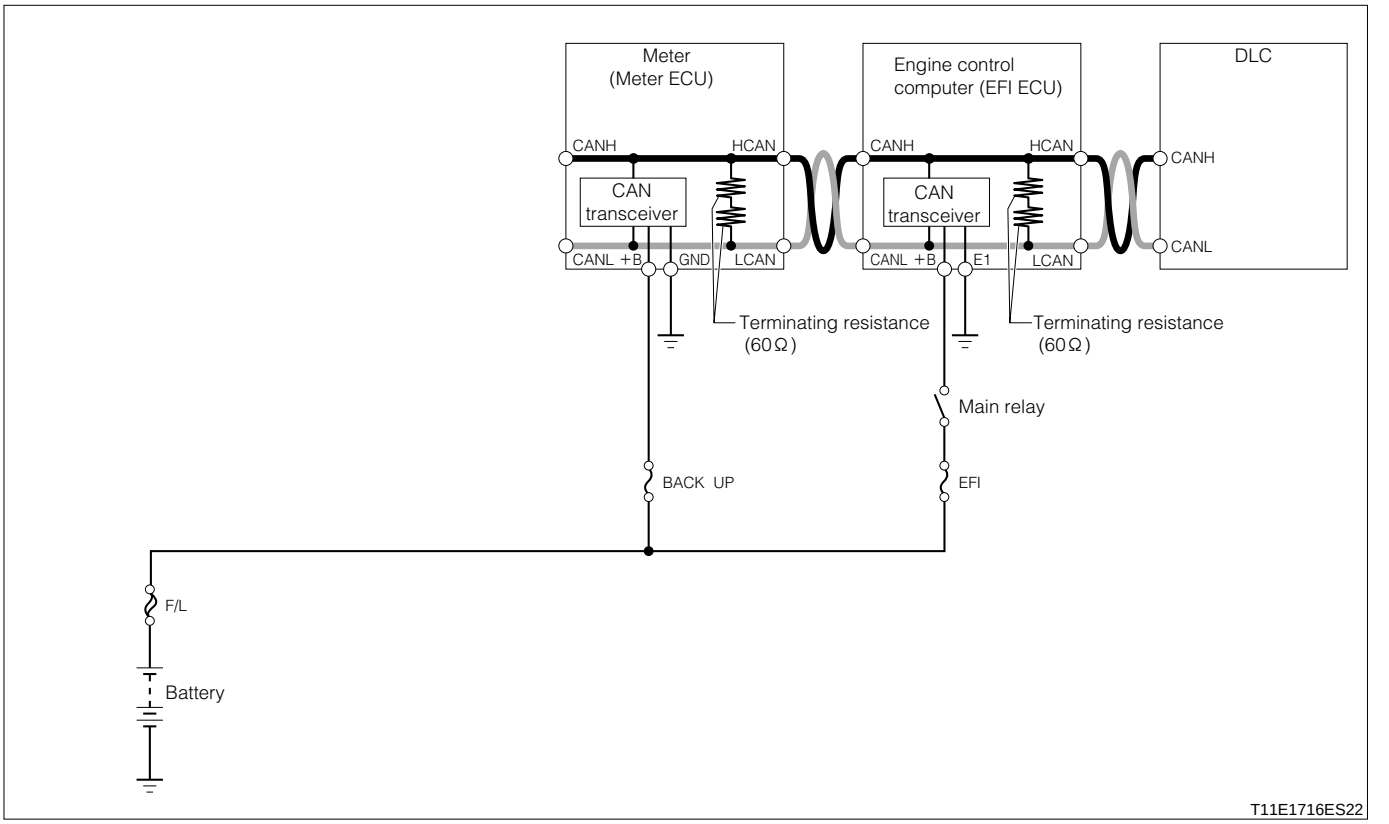


(4) Type 4

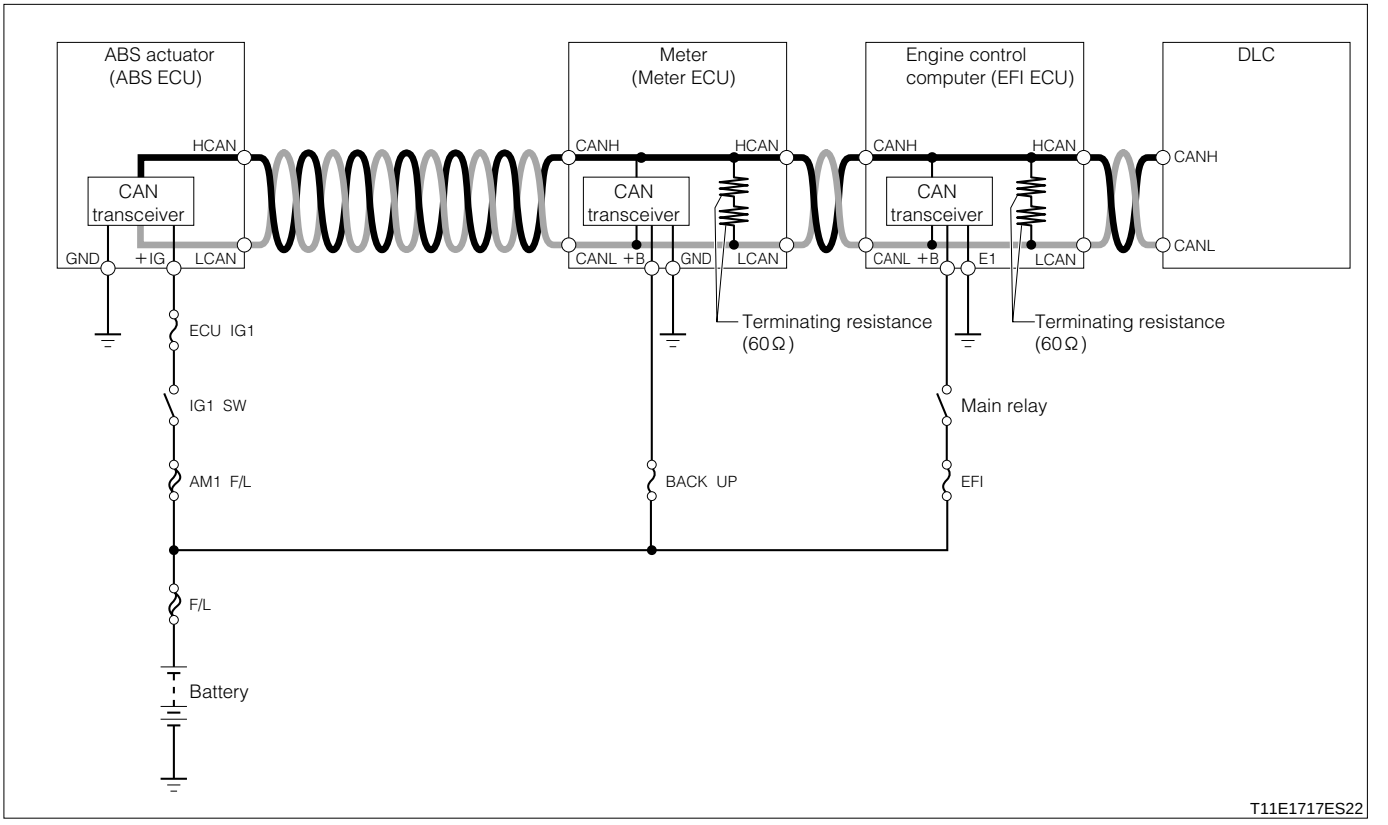


1-3-2 LHD VEHICLES

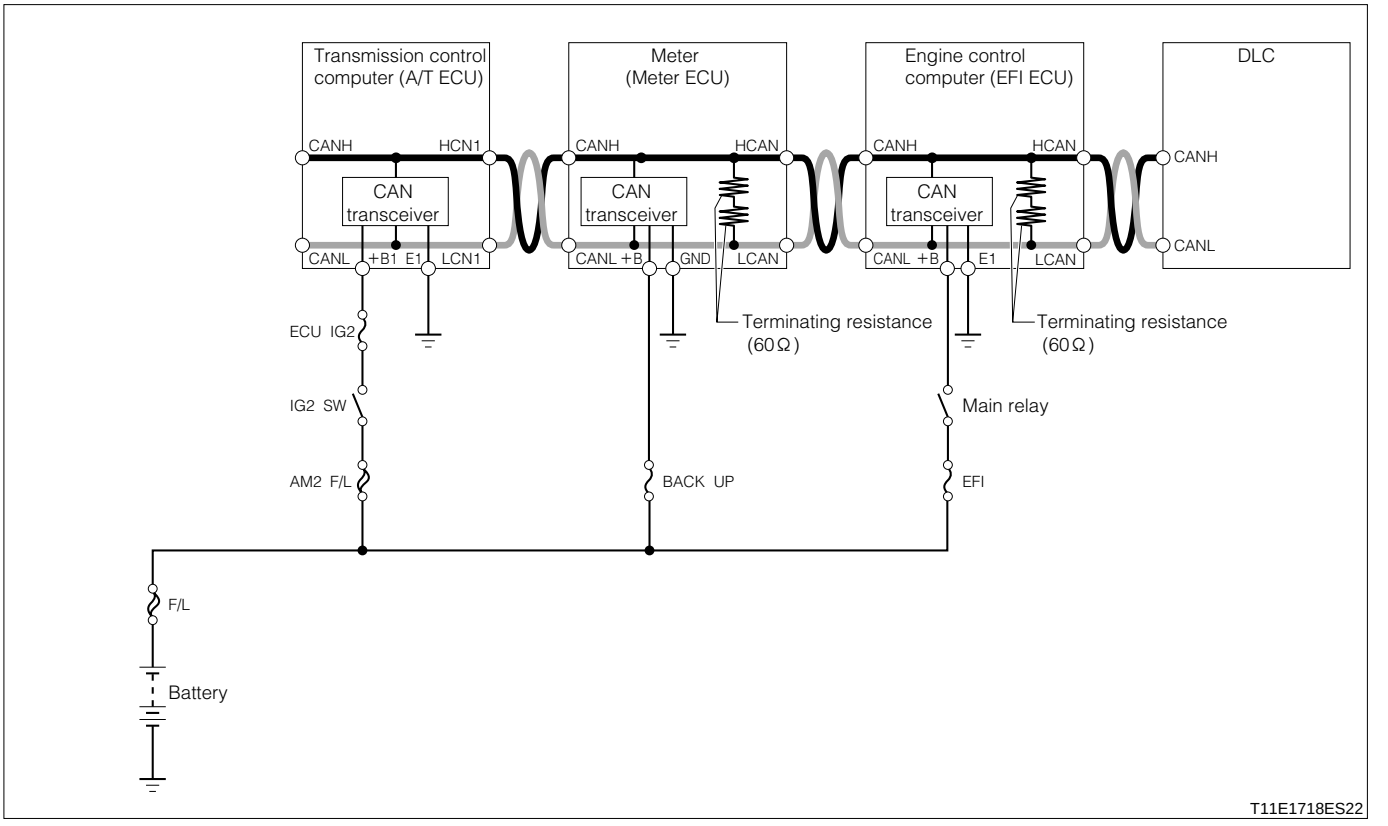
(1) Type 5



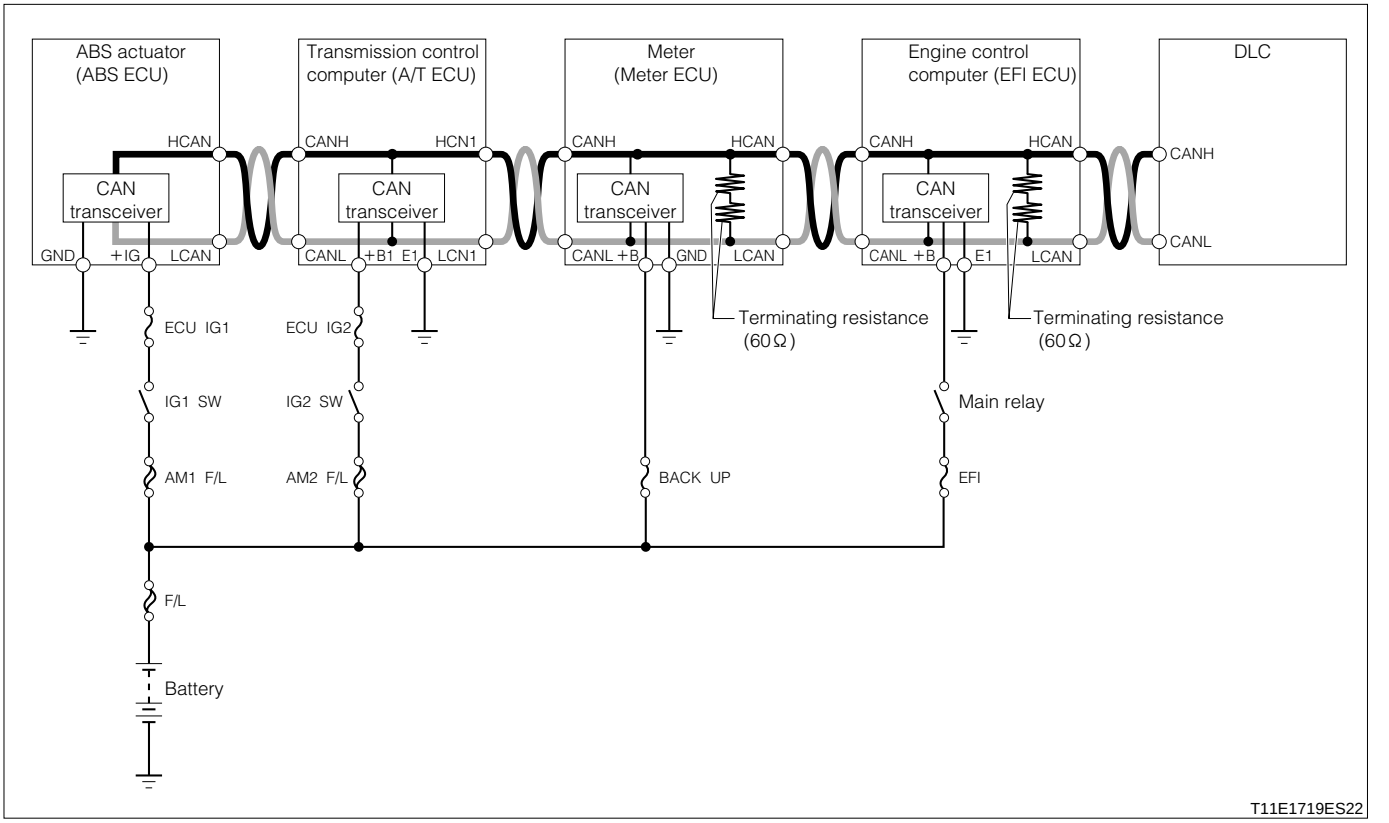
(2) Type 6



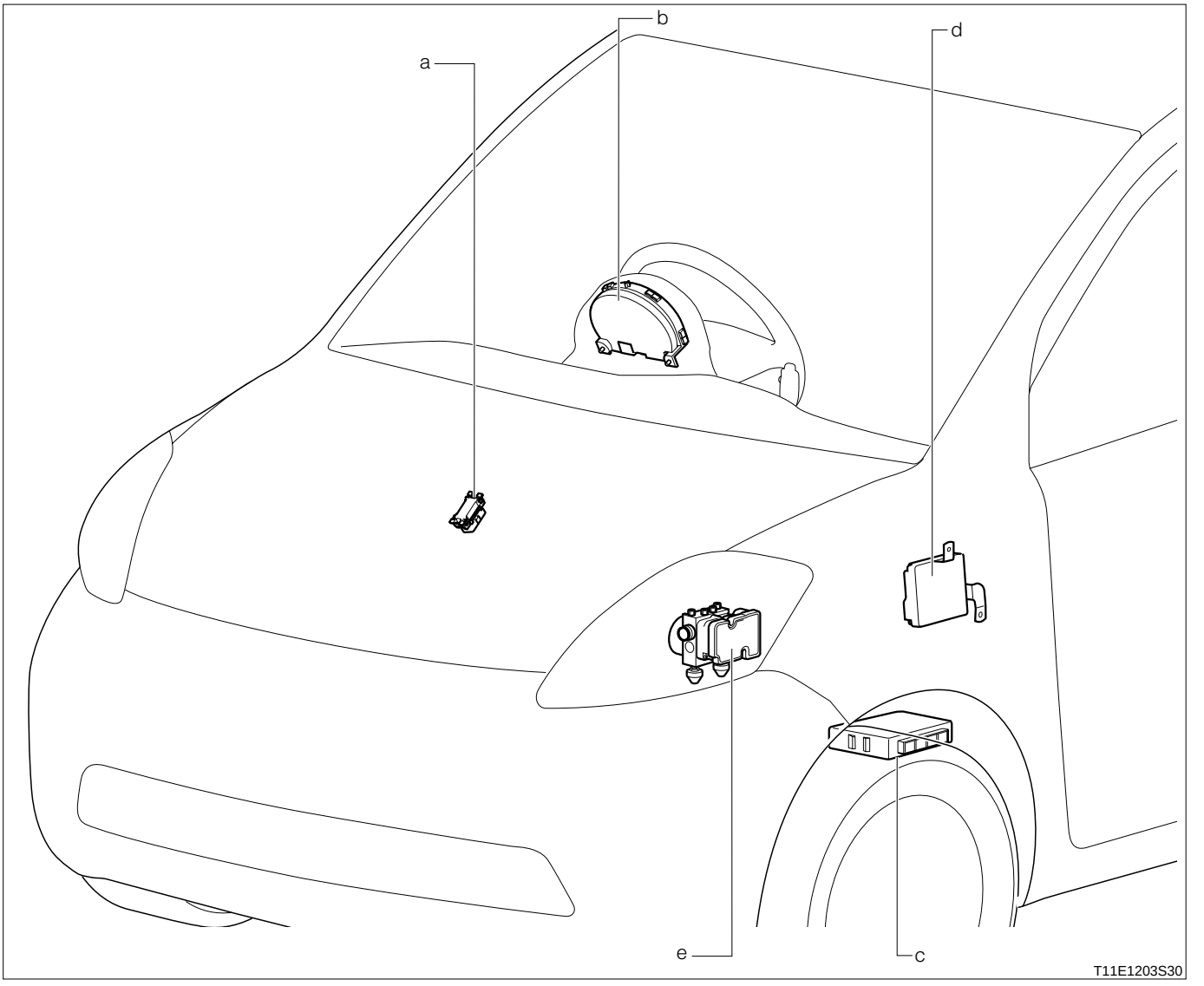
(3) Type 7



(4) Type 8


ABS actuator
(ABS ECU)
Transmission control
computer (A/T ECU)
Meter
(Meter ECU)
Engine control
computer (EFI ECU)
DLC
HCAN
CANH
HCN1
CANH
HCAN
CANH
HCAN
CANH
CANL
CAN
transceiver
CAN
transceiver
CAN
transceiver
CAN
transceiver
GND
+IG
LCAN
CANL
+B1
E1
LCN1
CANL
+B
GND
LCAN
CANL
+B
E1
LCAN
Terminating resistance
(60Ω)
Terminating resistance
(60Ω)
ECU IG1
ECU IG2
IG1 SW
IG2 SW
Main relay
AM1 F/L
AM2 F/L
BACK UP
EFI
F/L
Battery
T11E1719ES22

1-4 LOCATION OF COMPONENTS



The illustration show a right-hand drive vehicle.

	Part name
a	DLC
b	Meter (meter ECU)
c	Engine control computer (EFI ECU)
d	Transmission control computer (A/T ECU)
e	ABS actuator (ABS ECU)

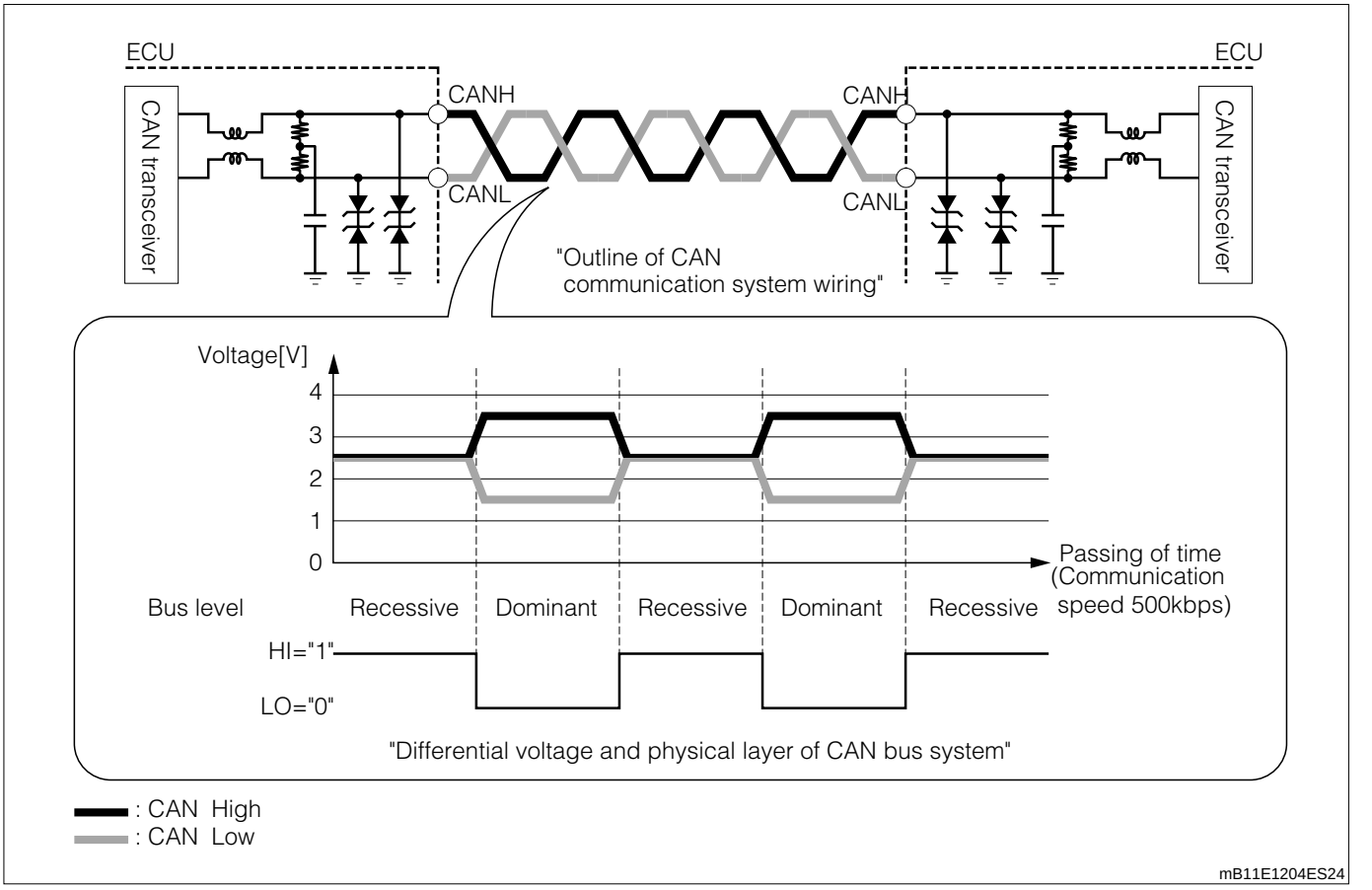
2 CONTROL

2-1 COMMUNICATION CONTROL

1. A CAN communication system has two communication lines (bus) acting as a pair and the bus level Å•g,DK_MÅ§Å•g,DK_MÅ§ is determined by the voltage differential between them. The two lines are called CAN high (CANH) and CAN low (CANL) respectively. Data is transmitted at the rate of 500kbps Å•g,DK_MÅ§ as a digital signal according to the CAN dedicated communication protocol.

NOTE

- 2: The bus level has a dominant level and a recessive level. CAN communication system logic deems dominant to be ″0″ and recessive to be ″1″.
- 3: The signal rate of data transmission is expressed in bits per second (bps). ″500kbps″ means that 500,000 bits of data are transmitted per second.



2-2 COMMUNICATION PROTOCOL

1.The CAN communication system is a multiplex systems in which all the ECU's in the network use a pair of communication lines (bus). Any of the ECU's can transmit data if the CAN bus is in an idol (open) state. Therefore, each ECU performs the communication according to the common communication protocol so that the communication can be done smoothly and securely.

2. Under CAN communication protocol all the ECU's share a common pair of communication lines and have the right to start transmitting data. CSMA/CD (Carrier Sense Multiple Access / Collision Detection) Å•g,DK_MÅ§ is the protocol used for sending data to the communication line.

NOTE

- 4: CSMA/CD stands for Carrier Sense Multiple Access with Collision Detection. It is a communication access protocol where ECU's check the status of the communication line (carrier) and only if there is no other data flowing will they start to send data of their own. Further, in addition to this, if a collision of data is detected (i.e. with data that has been transmitted by another ECU at the same time), the offending ECU will wait for a fixed period of time and then resend the data.

3.ECU's start to transmit data when other data is not flowing in the CAN bus, but if two or more ECU's start to transmit data simultaneously then the priority of the data is determined by the ID which the transmitted data itself contains.

2-3 COMMUNICATION DATA

2-3-1 TYPE 1, TYPE 5

CAN communication signal

Nomenclature of signals	Applicable ECU	
	EFI ECU	Meter ECU
Engine coolant temperature	●	○
Vehicle speed	○	●
Tail switch	○	●

●: signal sending, ○:signal receiving

2-3-2 TYPE 2, TYPE 6

CAN communication signal

Nomenclature of signals	Applicable ECU		
	EFI ECU	ABS ECU	Meter ECU
Engine coolant temperature	●	–	○
Stop lamp switch	–	●	–
Vehicle speed	○	●	○
Brake warning lamp request	–	●	○
ABS warning lamp request	–	●	○
Running distance	–	●	○
ECU-T terminal	–	○	●
Tail switch	○	–	●

●: signal sending, ○:signal receiving

2-3-3 TYPE 3, TYPE 7

CAN communication signal

Nomenclature of signals	Applicable ECU		
	EFI ECU	A/T ECU	Meter ECU
Throttle opening degree	●	○	–
Engine torque	●	○	–
Water temperature state	●	○	–
Engine coolant temperature	●	○	○
Request of deletion of MIL-related malfunction codes in A/T	●	○	–
Completion of deletion of MIL-related malfunction codes in A/T	○	●	–
Torque reduction request	○	●	–
Shift range information	○	●	○
O/D OFF lamp request	–	●	○
A/T warning request	–	●	○
A/T learning value erasure completion	–	●	○
Vehicle speed	○	●	○
ECU-T terminal	–	○	●
Tail switch	○	–	●

●: signal sending, ○:signal receiving

2-3-4 TYPE 4, TYPE 8

CAN communication signal

Nomenclature of signals	Applicable ECU			
	EFI ECU	A/T ECU	ABS ECU	Meter ECU
Throttle opening degree	●	○	–	–
Engine torque	●	○	–	–
Water temperature state	●	○	–	–
Engine coolant temperature	●	○	–	○
Request of deletion of MIL-related malfunction codes in A/T	●	○	–	–
Completion of deletion of MIL-related malfunction codes in A/T	○	●	–	–
Torque reduction request	○	●	–	–
Shift range information	○	●	–	○
O/D OFF lamp request	–	●	–	○
A/T warning request	–	●	–	○
A/T learning value erasure completion	–	●	–	○
Stop lamp switch	–	○	●	–
Vehicle speed	○	○	●	○
Brake warning lamp request	–	–	●	○
ABS warning lamp request	–	–	●	○
Running distance	–	–	●	○
ECU-T terminal	–	○	○	●
Tail switch	○	–	–	●

●: signal sending, ○:signal receiving

2-4 DIAGNOSIS (SELF-DIAGNOSIS) FUNCTION

Diagnostics means failure diagnosis. This is a function by which if there are any abnormalities in the input signal the ECU will inform a mechanic/technician of the abnormal item.

CAN communication failure diagnosis sets up a separate diagnosis code for each ECU which constitutes the CAN.

Please refer to the repair/maintenance manual for details of the failure diagnosis function.

2-5 FAIL-SAFE CONTROL

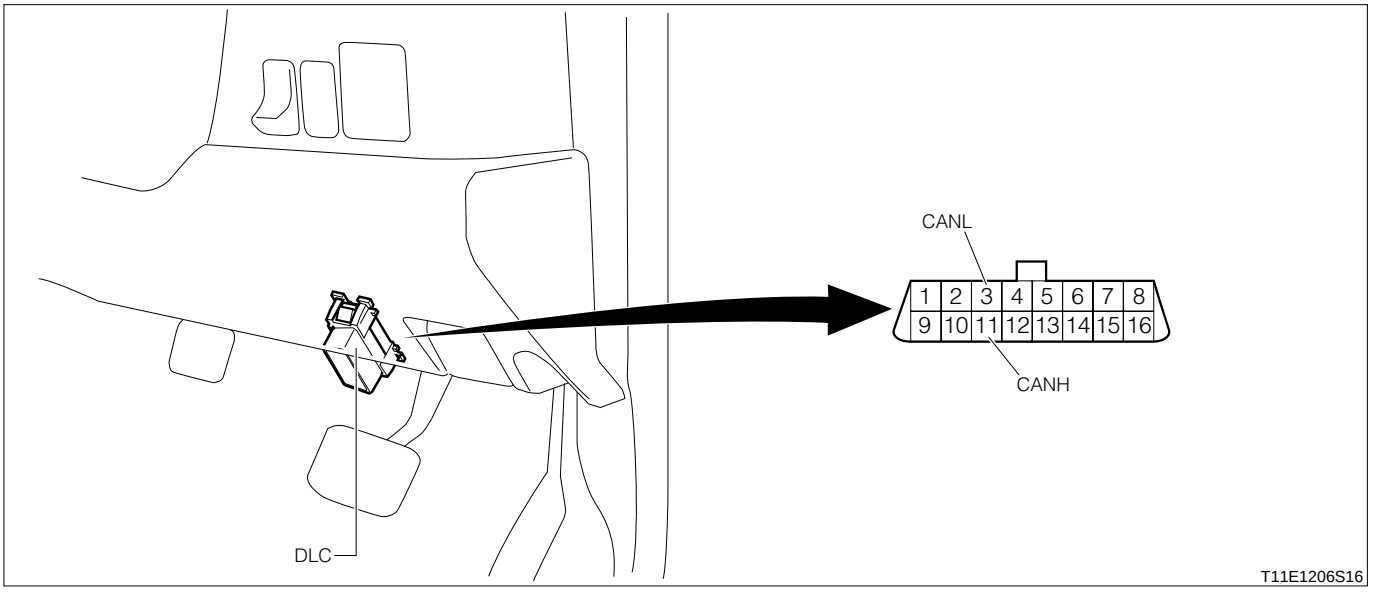
If the CAN communication system continues operating in the event of abnormalities such as open wires or short circuits in the CAN communication line and communication abnormality between ECU's, there may be the possibility that the abnormalities may effect the control of each system. Under these circumstances each ECU will come under the control of a preset internal control system.

For details of the fail-safe controls please refer to the item of each system which makes up the CAN.

3 COMPONENTS

3-1 DLC

A DLC (Data Link Connector) is installed forward of the driver's seat (lower portion of the instrument panel, driver's seat door side).
CANH and CANL terminals have been added to the DLC with the adoption of a CAN communication system.



3-2 TERMINATING RESISTANCE

The terminating resistance is located in the combination meter and in the engine control computer.
As the terminating resistance, there are two 60 Ω resistors in series. As a result, the differential voltage can be judged from the loop connected network.

LIN COMMUNICATION SYSTEM

1 OUTLINE

1-1 DESCRIPTION

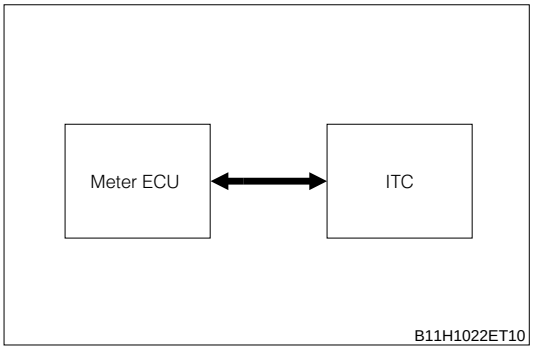
1.All vehicles are equipped with LIN communication (LIN: Local Interconnect Network) *.
2.The LIN communication consists of the meter ECU and ITC.
3.Multiplex communication is a system in which plural ECU's are connected to a single communication line to provide mutual data exchange. This has made it possible to integrate the system and prevent the number of wires from increasing when a function is added.
4.Controls actually taking place in the multiplex communications are the wake-up/sleep controls, system controls by applicable ECU and so forth.
5.A diagnosis function is provided that will inform the operator of any abnormality of the system. Also, fail-safe functions are provided that will assure the minimum functions for each ECU and protect the systems when abnormal communications occur between the ECUs.
6.The communication method employs a single master system in which the meter ECU controls the sleep (low current mode), wake-up (standby mode), etc. of the communication applicable ECU.

NOTE

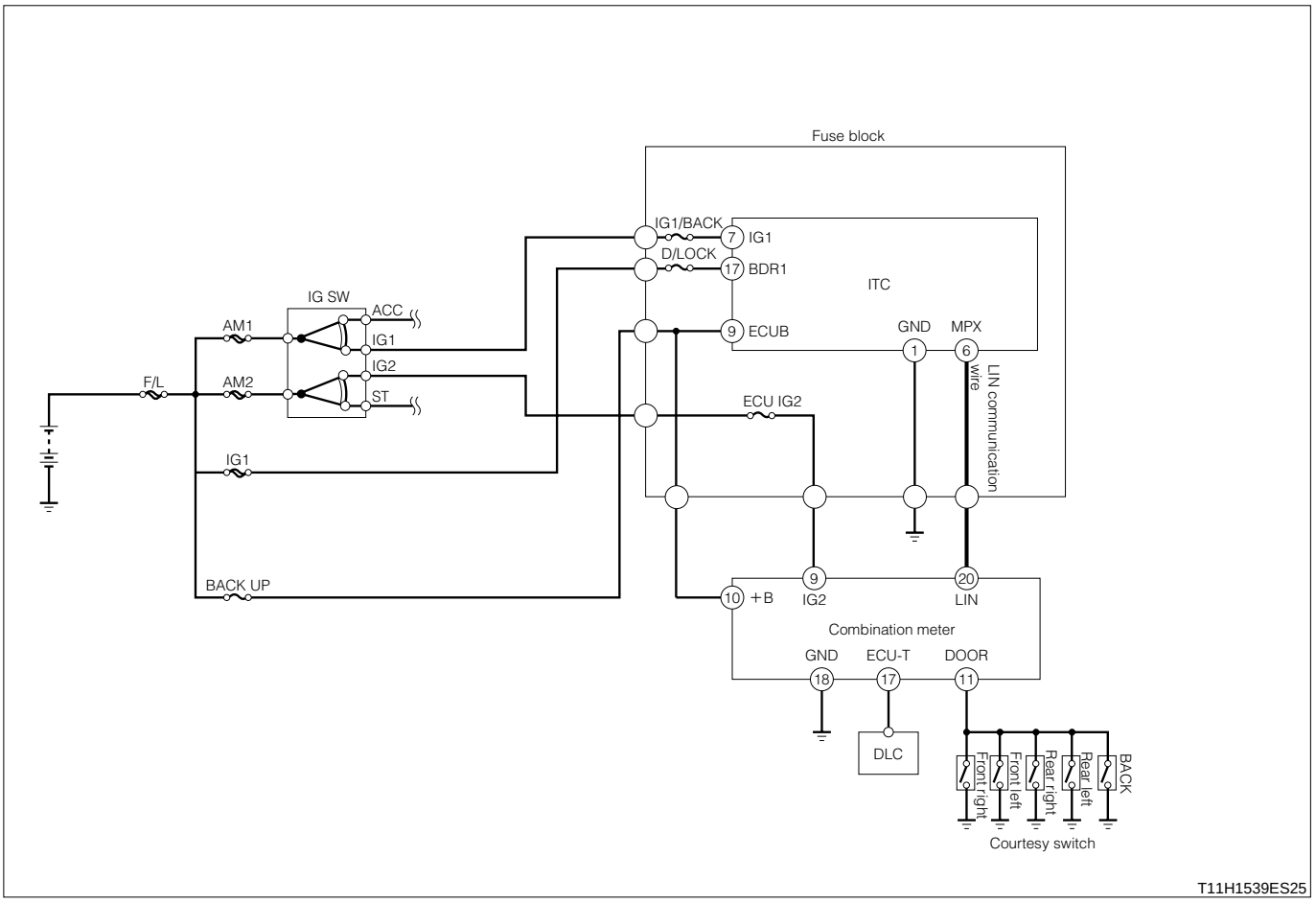
- *: The LIN communication is a multiplex communication network mainly intended for the data communications between the body-related control ECUs.

1-2 SYSTEM DRAWING

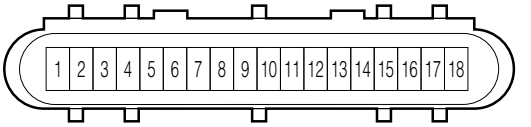
The LIN communication consists of the meter ECU and ITC.



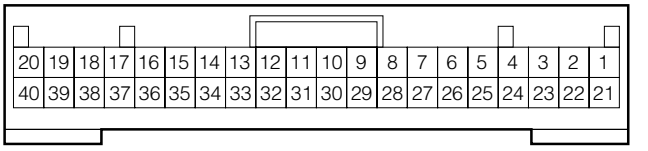
1-3 SYSTEM WIRING DIAGRAM



Arrangement of ECU terminal



ITC



Combination meter

T11H9502ES20

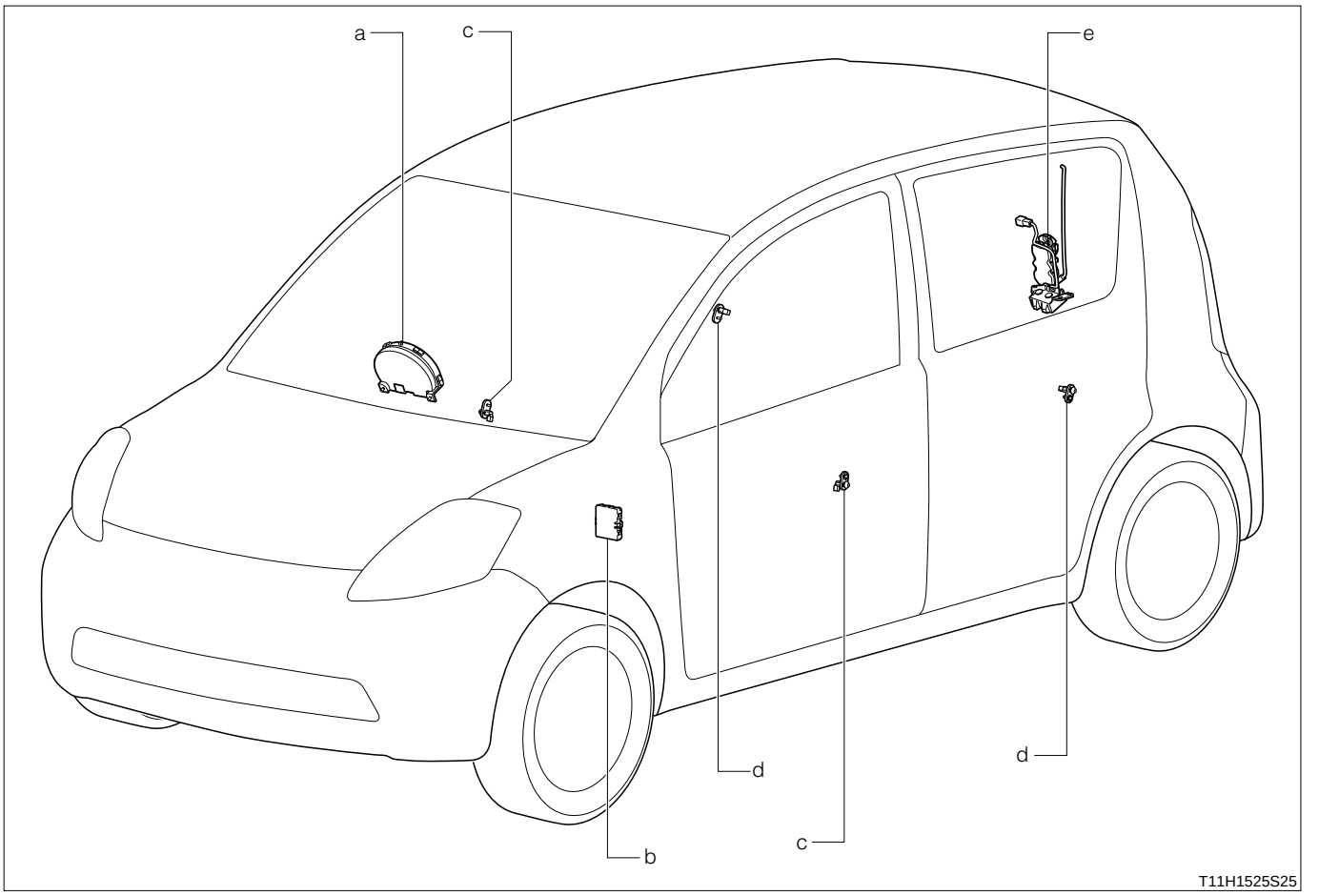
Meter terminal name (Multiplex communication system)

Terminal No.	Terminal code	Terminal name
9	IG2	IG power supply
10	+B	+B power supply
11	DOOR	Input of courtesy switch signal
17	ECU-T	ECU-T terminal signal input
18	GND	Earth
20	LIN	LIN communication input/output

ITC terminal name (Multiplex communication system)

Terminal No.	Terminal code	Terminal name
1	GND	Earth
6	MPX	Multiple communication input/output
7	IG1	ECU power supply
9	ECU B	ECU power supply
17	BDR1	Power supply

1-4 LOCATION OF COMPONENTS



The illustration represents the RHD vehicle. In the case of the LHD vehicle, the combination meter is located at the left side.

a	Meter ECU (inside the combination meter)
b	ITC
c	Front door courtesy switch
d	Rear door courtesy switch
e	Back door courtesy switch (inside the back door lock Ay)

2 CONTROL

2-1 COMMUNICATION CONTROL

2-1-1 DESCRIPTION

The meter ECU controls the following items.

1. Evaluation of presence/non-presence of ECU
2. Communication start informing control
3. Wake-up/sleep control

2-1-2 EVALUATION OF PRESENCE/NON-PRESENCE OF ECU

The meter ECU detects the presence of the ECU every time the battery power supply is turned on.

1. When the LIN communication applicable ECU is not connected to the meter ECU, or when it does not respond to the meter ECU due to failure, etc. of the LIN communication applicable ECU, the meter ECU transmits a command to other ECUs that have been judged to be present to perform such communication control that is to be carried out when the ECU that has made no response is not mounted (Evaluation of ECU non-presence).
2. The meter ECU, after detecting the presence of the ECU, continues to monitor ECU connecting status at constant intervals.
3. When the LIN communication applicable ECU responds properly to the meter ECU during the ECU presence/non-presence evaluation, or when the ECU that has made no response returns to the normal condition and makes a proper response after the ECU has been judged not to be present, the meter ECU transmits a command to other LIN communication applicable ECUs to perform such communication control that is to be carried out when the ECU that has made a response is mounted (Evaluation of ECU presence).

2-1-3 COMMUNICATION START CONTROL

The communication start is always started from the meter ECU. The signal of communication start is transmitted to other ECU.

2-1-4 WAKE-UP/SLEEP CONTROL

When transferring to the sleep (the low current mode), or transferring from the sleep (the low current mode) to the wake-up (the standby mode), the meter ECU transmits a transfer start command to the other LIN communication applicable ECUs, thereby transferring to the wake-up/sleep control.

2-2 WAKE-UP/SLEEP FUNCTION

2-2-1 DESCRIPTION

The LIN communication system is equipped with a wake-up/sleep function to reduce the current used when the IG switch is in the ACC and LOCK positions.

2-2-2 CONDITIONS FOR REALIZING SLEEP

When the following conditions 1 and 2, or the condition 3 is satisfied, the meter ECU sends a sleep command to each ECU, thus transferring to the sleep state (the low current mode).

1. The IG switch is set to the ACC position or the LOCK position.
2. The meter ECU received the information that the control of each ECU is complete, and the control of the meter itself is complete.
3. Ten minutes have passed after the IG switch was set to the ACC position or the LOCK position, with the door open (the battery discharging prevention function).

2-2-3 CONDITIONS FOR REALIZING WAKE-UP

When either of the following conditions is satisfied, the meter ECU sends a wake-up command to each ECU, thus transferring to the wake-up state (the standby mode).

1. Cases where there is a change in the data to be communicated at each ECU, and the ECU transmits a wake-up (the standby mode) signal to the meter ECU.
2. Cases where the IG switch is turned from the ACC or LOCK position to the ON position.
3. Immediately after connecting a battery.

2-3 LIN COMMUNICATION PROTOCOL (COMMUNICATION REGULATION)

1.The LIN communication system is a two-way interactive time-division multiplexing communication system, where all ECUs that make up the network can send and receive data by delaying the timing for using a communication line in order to share a single communication line. Each ECU, therefore, communicates according to the common communication protocol (communication regulation) to ensure smooth and reliable communication.

2.The data used by the LIN communication system consist of digital signals that include information such as ID to identify each ECU (node ID) and contents of communication data.

3.In order for all ECUs to be able to communicate by sharing a single communication line, based on the specified transmission time schedule, the single master system is employed as a communication regulation for the communication line, in which the meter ECU controls the communication timing, sleep (the low current mode) and wake-up (the standby mode), etc. of the communication applicable ECU.

2-4 DIAGNOSIS (ONBOARD DIAGNOSIS FUNCTION)

This is a function whereby the ECU informs the inspection operator of the abnormal items when there has been a failure in the system. When failure takes place, the ECU memorizes the abnormal item.
Please refer to the repair manual for details concerning the diagnosis.

2-5 FAIL-SAFE FUNCTION

When communication remains unestablished between the applicable ECU and the meter ECU for a certain length of time, the predetermined control is performed by transferring to the fail-safe mode.

Conditions of each system during the fail-safe mode

Applicable ECU	Condition
ITC	·The keyless operation will not take place. ·The room lamp control will not take place. *: The power door locking operates normally.

CAUTION

- When the meter ECU transfers to the fail-safe mode, the ITC, being unable to communicate with the meter ECU, will transfer to the fail-safe mode.

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MAIN POINTS OF INSPECTION --------- A-1
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NECESSITY OF CHECK PRIOR TO VEHICLE DELIVERY TO USER ---------- A-1
REPORT OF INSPECTION RESULTS----- A-1

1 PURPOSE OF THIS MANUAL

This manual has been prepared to help the distributors or dealers perform the PDI (Pre-Delivery Inspection) properly and promptly. This manual mainly describes the PDI operations (including inspection items, procedures and methods) to be conducted by servicemen as they perform the inspection for new vehicles.

Be sure to read this manual carefully and perform the PDI according to the instructions given below.

1-1 WHAT IS PDI?

In the PDI (Pre-Delivery Inspection), the distributors or dealers check to see if vehicles are in the proper conditions as new vehicles, and if functional parts or each section of the vehicle functions properly.

1-2 MAIN POINTS OF INSPECTION

The inspection covers all the items that can be checked visually or by hand.

1. Visual inspection and hand inspection
   (1) Paint condition
   (2) Scratches
   (3) Rust
   (4) Mud
   (5) Discoloration
   (6) Deformation
   (7) Installing condition
2. Functional check
   (1) Check to see if the part functions properly.
   (2) Check to see if the part functions smoothly.
   (3) Check to see if there is any abnormal noise or vibration.

If any problem is found as to the check items above, take necessary measures before the vehicle is delivered to the user.

1-3 IMPORTANCE OF BEING VERSED IN OWNER'S MANUAL

The equipment and functions differ, depending upon models. Even in the same model, the equipment and functions differ depending upon grades and destinations. Since this manual has been prepared for vehicles for all destinations, the PDI operations for general mechanisms and equipment are described. Moreover, some of the illustrations in this manual may show vehicles that are different from the vehicle that you are checking, as this manual covers all the models.Therefore, to perform the PDI perfectly, the servicemen must read the owner's manual carefully and be well versed in the basic mechanisms and functions of the vehicle and equipment that is going to be checked.

1-4 NECESSITY OF CHECK PRIOR TO VEHICLE DELIVERY TO USER

During the period between the completion of the PDI and the vehicle delivery to users, the vehicles are subject to various conditions when they are exhibited in a show room, stored in a warehouse or installed with optional equipment. During this period, the vehicle may be damaged in some ways. It is, therefore, imperative to perform an inspection prior to deliver to users, according to the section "VEHICLE DELIVERY INSPECTION ITEMS."

1-5 REPORT OF INSPECTION RESULTS

In order to incessantly improve the quality of new vehicles, please send the Field Technical Report to DMC through the distributor when you encounter some problems that occur frequently due to poor quality of vehicles shipped from the factory.

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1 OPERATION PRIOR TO CHECK

1-1 ARTICLES TO BE PREPARED

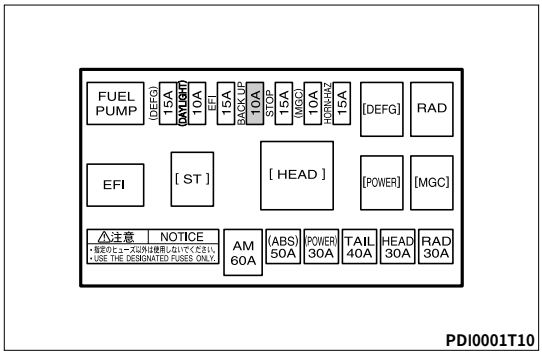
1. Prepare the following instruments, covers and so forth indicated below.
   (1) Battery hydrometer
   (2) Voltmeter
   (3) Tire pressure gauge
   (4) Seat cover
   (5) Fender cover
   (6) Floor cover

1-2 FUSE INSTALLATION

1. Install the fuse prior to the check.

NOTE

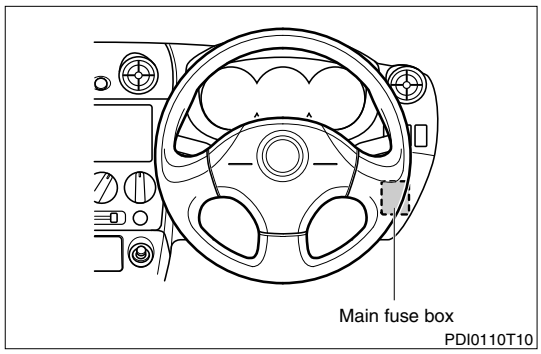
- The fuse to be installed is the backup fuse inside the relay box.



PDI0001T10

CAUTION

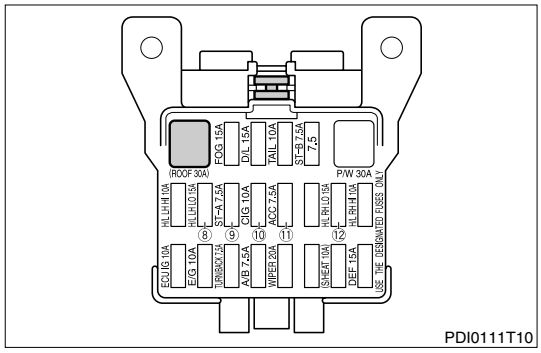
- In case of the vehicle equipped with the Active Top, the roof fuse (30A) has been removed from the main fuse box. Make sure to install the roof fuse to the main fuse box before PDI.



PDI0110T10

NOTE

- The roof fuse (30A) that has been removed is stored in the ashtray.



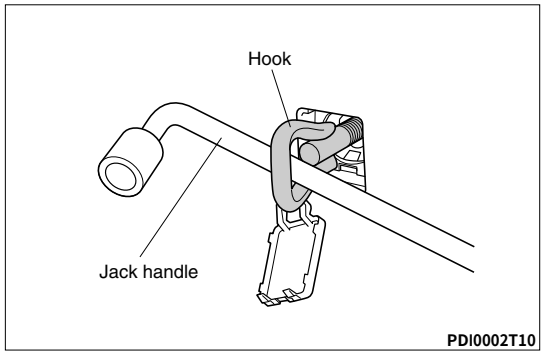
PDI0111T10

1-3 REMOVAL OF TOWING HOOK

1. Remove the towing hook from the front bumper.
2. Install the whole cover on the bumper.

NOTE

- Discard the removed hook.

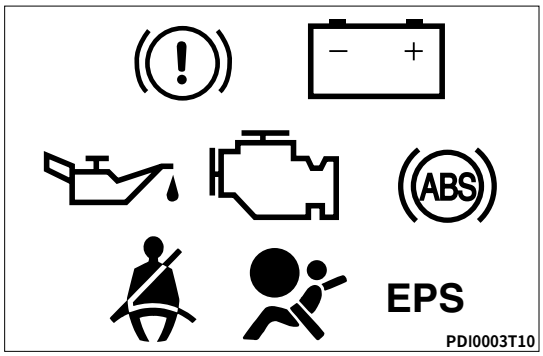


PDI0002T10

2 CHECK FROM OUTSIDE OF VEHICLE

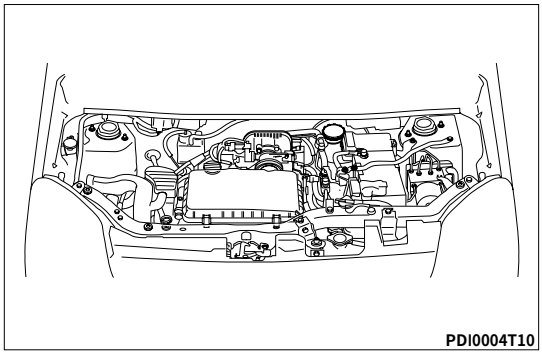
2-1 WARNING LIGHTS, BUZZER

1. Turn ON the ignition switch. Ensure that the warning lamp goes on and it goes out when the engine has started.
2. Check the buzzer for operation.



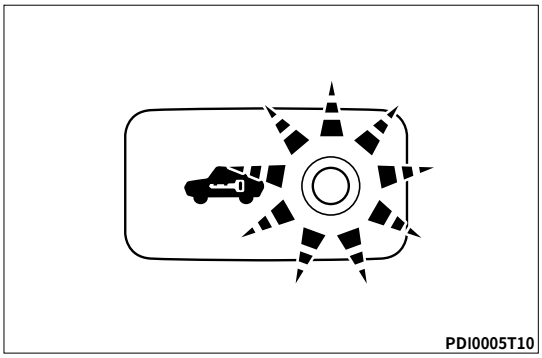
2-2 ENGINE OPERATION DURING WARMING-UP PERIOD WHEN COLD

1. Check that the engine runs smoothly.
   (1) Startability of engine
   (2) Abnormal noise, vibration
   (3) Rough idling



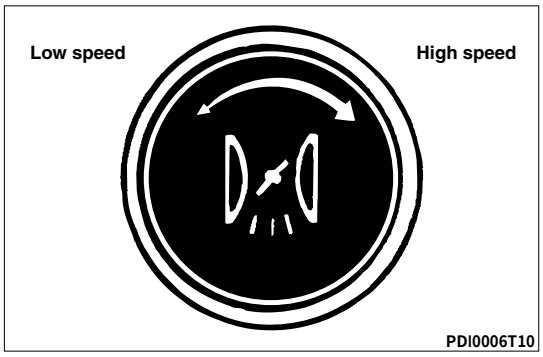
2-3 ENGINE IMMOBILIZER SYSTEM

1. When the ignition key is not inserted into the ignition switch, check that the immobilizer indicator is flashing. (Indicator-equipped vehicle)
2. Check that the engine can start, using any ignition key (master key or sub-key)..
3. When the ignition key is inserted into the ignition switch, check that the immobilizer indicator goes out. (Indicator-equipped vehicle) .



2-4 THROTTLE KNOB (For diesel)

1. Check that the engine speed increases or decreases through the operation of the throttle knob. .



2-5 LAMPS, ELECTRICAL DEVICES

CAUTION

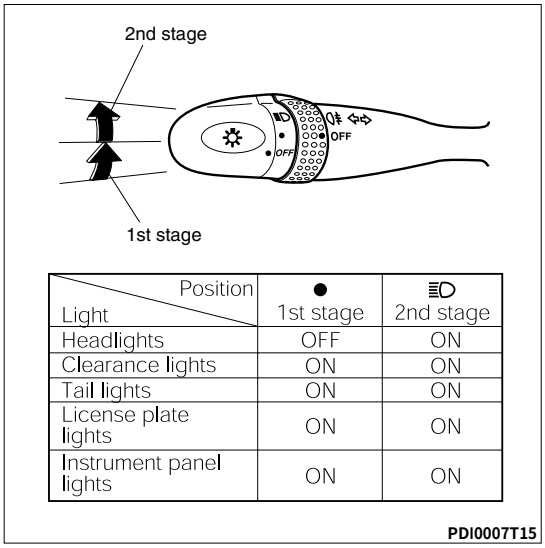
- When the electrical devices are checked, keep the engine running so that the battery may not become dead.

NOTE

- When you check the lamps, use a mirror or perform the check together with other person.

2-5-1 HEAD LIGHTS, FOG LIGHTS AND INSTRUMENT PANEL LIGHTS

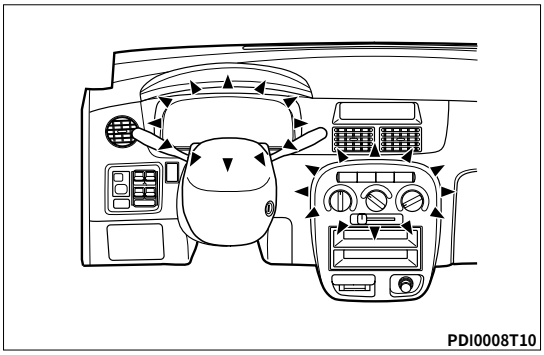
1. When the switches for the headlights and fog lights are turned ON, make sure that the headlights, fog lights and clearance lights are illuminated.



Position / Light	● 1st stage	≣D 2nd stage
Headlights	OFF	ON
Clearance lights	ON	ON
Tail lights	ON	ON
License plate lights	ON	ON
Instrument panel lights	ON	ON

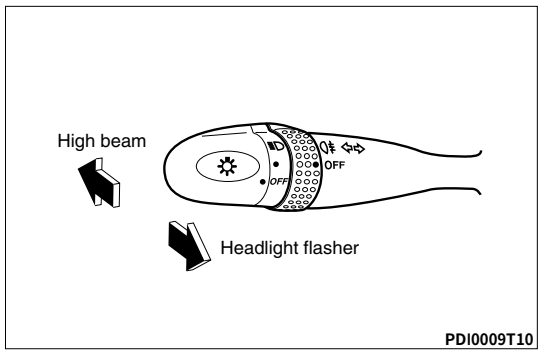
PDI0007T15

2. When the headlights are turned ON, check that the instrument panel lights (combination meter, heater panel, radio, and so forth) are illuminated.



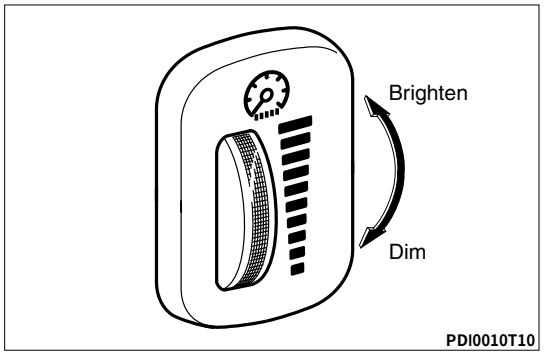
PDI0008T10

3. When the headlight switch is set to the high beam position, check that the indicator is illuminated.
4. On the daytime running light specification vehicles, check that the headlights and tail lights are illuminated automatically when the engine is started.



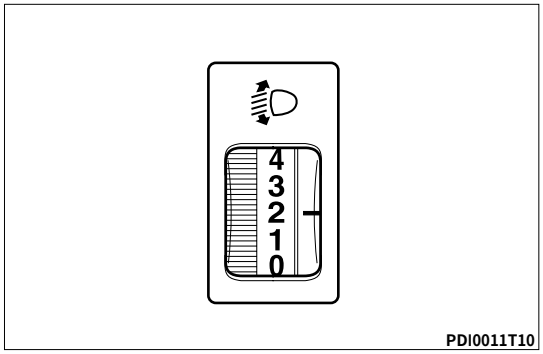
PDI0009T10

5. Check that the brightness of the instrument panel light varies when the instrument panel light control switch is turned.



PDI0010T10

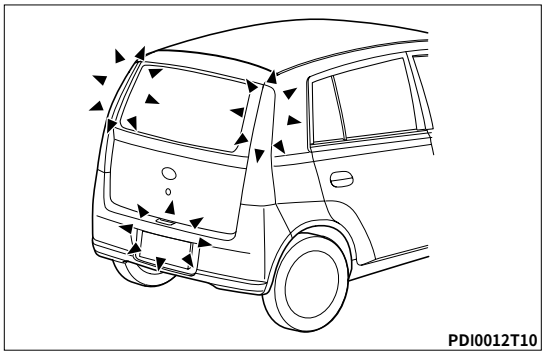
6. Check that the headlight leveling control system is functioning.



PDI0011T10

2-5-2 TAIL LIGHTS, LICENSE PLATE LIGHTS AND REAR FOG LIGHTS

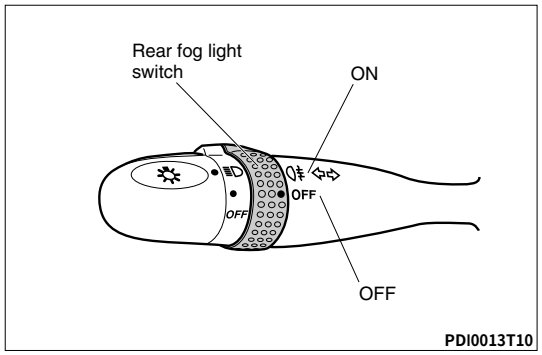
1. When the headlights are turned ON, check that the tail light and license plate lights are illuminated.


PDI0012T10

2. When the rear fog light switch is turned ON, check that the rear fog lights and indicator are illuminated.

NOTE

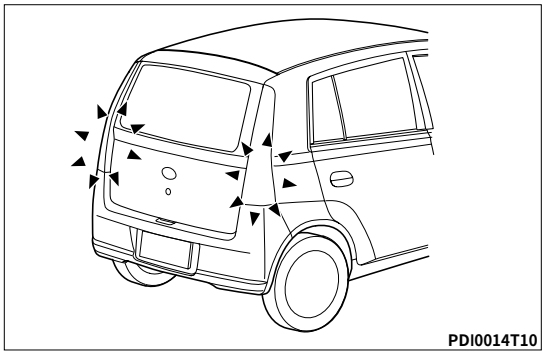
- When the headlights are turned ON, the rear fog lights are illuminated.



PDI0013T10

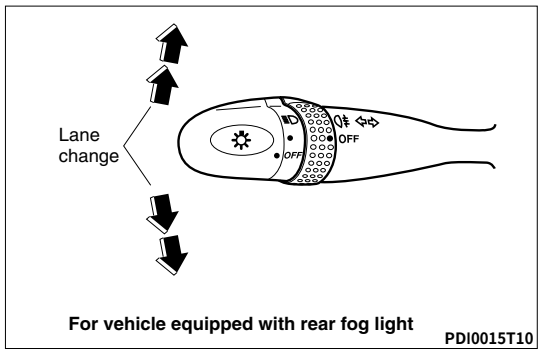
2-5-3 STOP LIGHTS, BACK-UP LIGHTS

1. When the brake pedal is depressed, check the stop light is illuminated.
2. When the shift lever is shifted to the reverse position, check that the back-up light is illuminated.


PDI0014T10

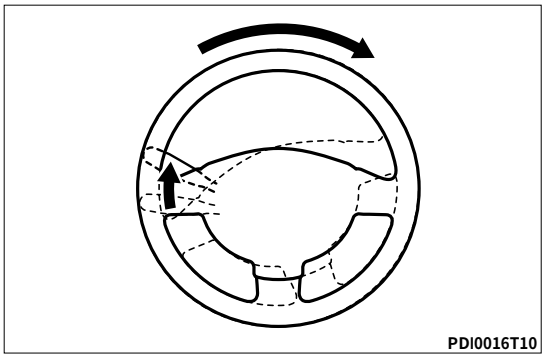
2-5-4 TURN SIGNAL LIGHTS, HAZARD WARNING SIGNAL LIGHTS AND HORN

1. Check that the turn signal light control lever is functioning properly.
2. Check the turn lights and indicator are flashing.

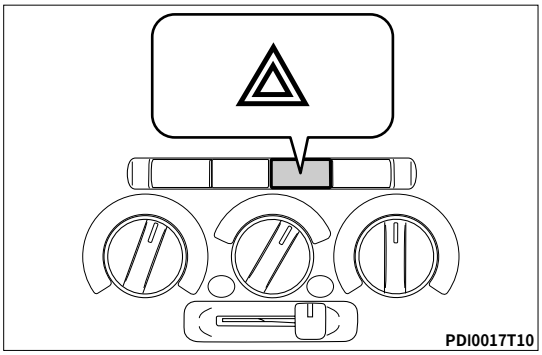


For vehicle equipped with rear fog light
PDI0015T10

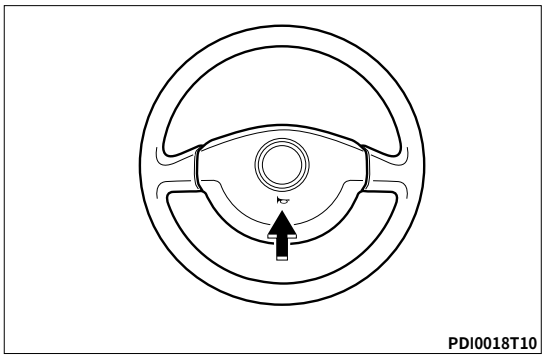
3. When the steering wheel is turned, check that the canceller of the turn signal light control lever is functioning properly.


PDI0016T10

4. When the hazard warning signal switch is turned ON, check that the turn signal lights and indicator are flashing.

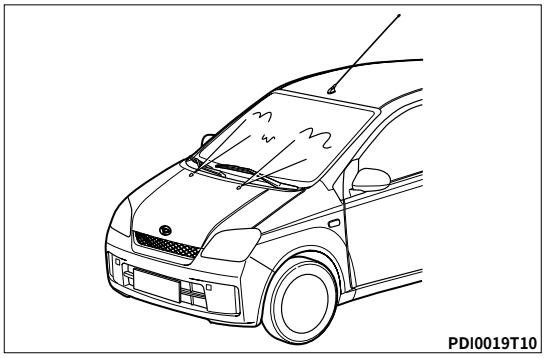

PDI0017T10

5. Check that the horn is functioning.

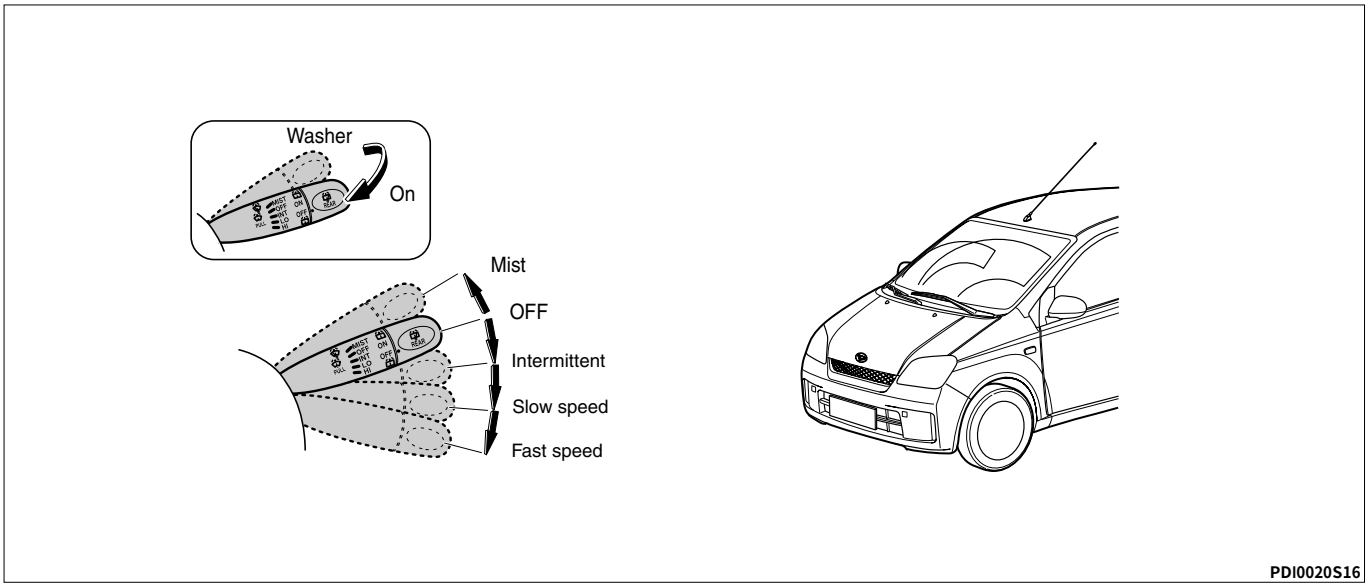

PDI0018T10

2-5-5 **WIPERS, WASHER (FRONT AND REAR)**

1. Check that the washer fluid is squirted properly on the front windshield (or the rear window glass).

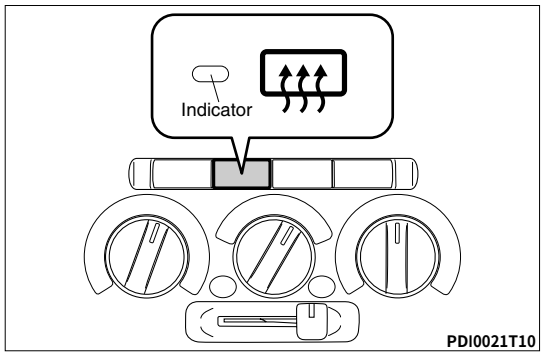

PDI0019T10

2. Check the wiper for proper operation (intermittent, low speed, high speed, demist).
3. Check that the wiper blades wipe off thoroughly.
4. Check that there are no abnormal noise when the wiper is functioning.
5. Check that the wiper arm is not contacting with the outer molding section of the windshield.

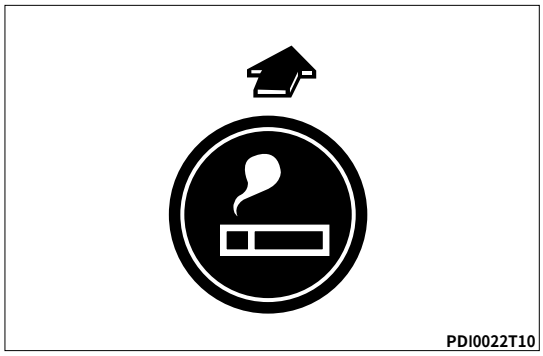


2-5-6 REAR WINDOW DEFOGGER, CIGARETTE LIGHTER

1. When the rear window defogger switch is pushed in, check that indicator light of the switch is illuminated.

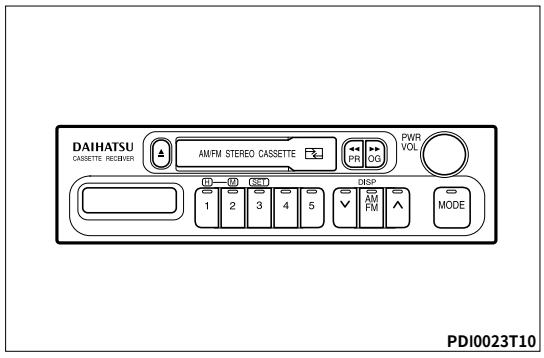


2. When the cigarette lighter is pushed in, the light will pop out automatically and the coil is red-heated.



2-5-7 AUDIO, CLOCK

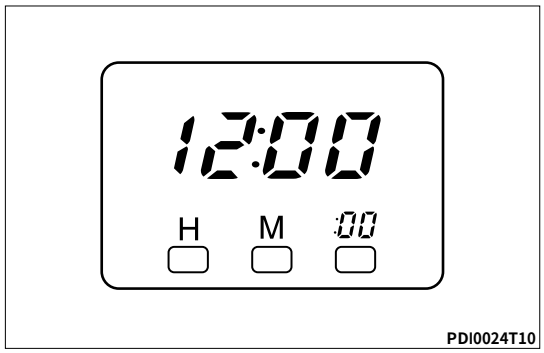
1. When the power volume switch is turned ON, check that it is functioning properly.
2. Set the frequency of the radio to each channel.
3. Check the cassette tape player for operation.



4. Check that the clock is functioning properly and set it to the correct time.

NOTE

- For the operating method, refer to the owner's manual.

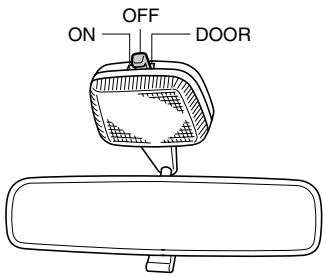


PDI0024T10

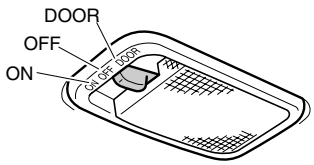
2-5-8 **INTERIOR LIGHTS**

1. Check the interior lights given below.
   (1) Dome light
   (2) Room light
   (3) Others

Room light



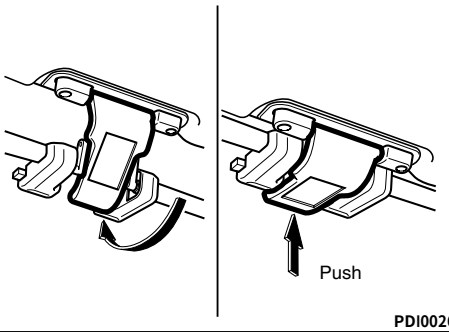
Dome light



PDI0025T20

2-5-9 **SUN ROOF**

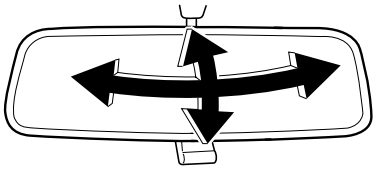
1. Check that the sunroof opens/closes properly. Also, check that it can be locked positively.



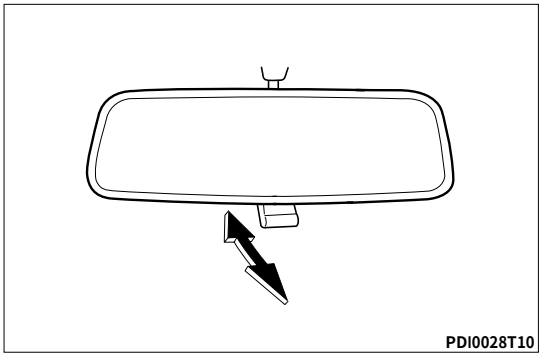
PDI0026T10

2-6 **MIRROR S**

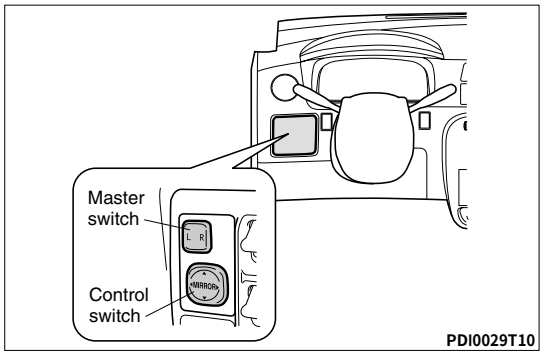
1. Check that the interior mirror can be adjusted smoothly.


PDI0027T10

2. When the day/night change lever is operated, check that the glare from the rear lights is reduced. (For night side)


PDI0028T10

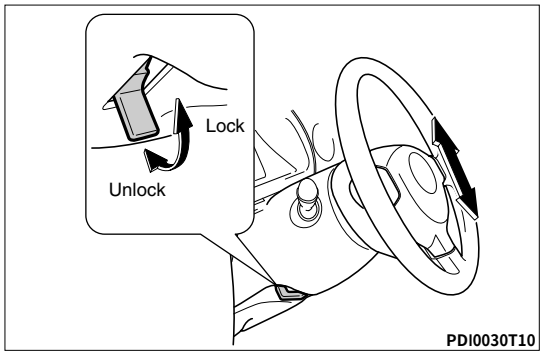
3. Check that the interior mirror can be adjusted smoothly.
4. When the external mirror is functioning, check that there is no abnormal noise.



PDI0029T10

2-7 **TILT STEERING**

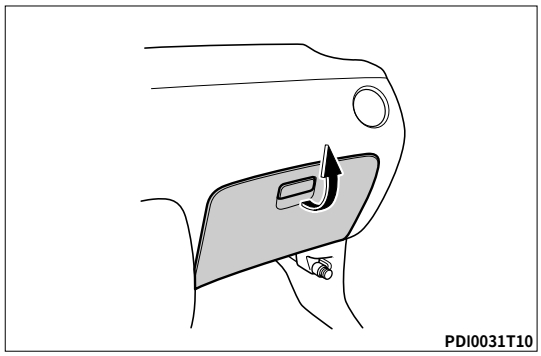
1. Check that the tilt steering moves smoothly and it can be secured positively at any position.



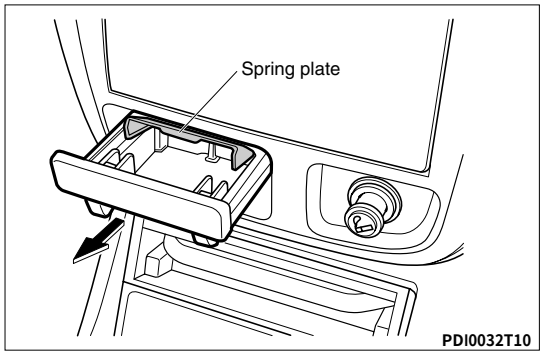
PDI0030T10

2-8 **GLOVE BOX, ASHTRAY**

1. Check that the glove compartment door can open or close smoothly.


PDI0031T10

2. Check that the ash tray can open or close smoothly.



PDI0032T10

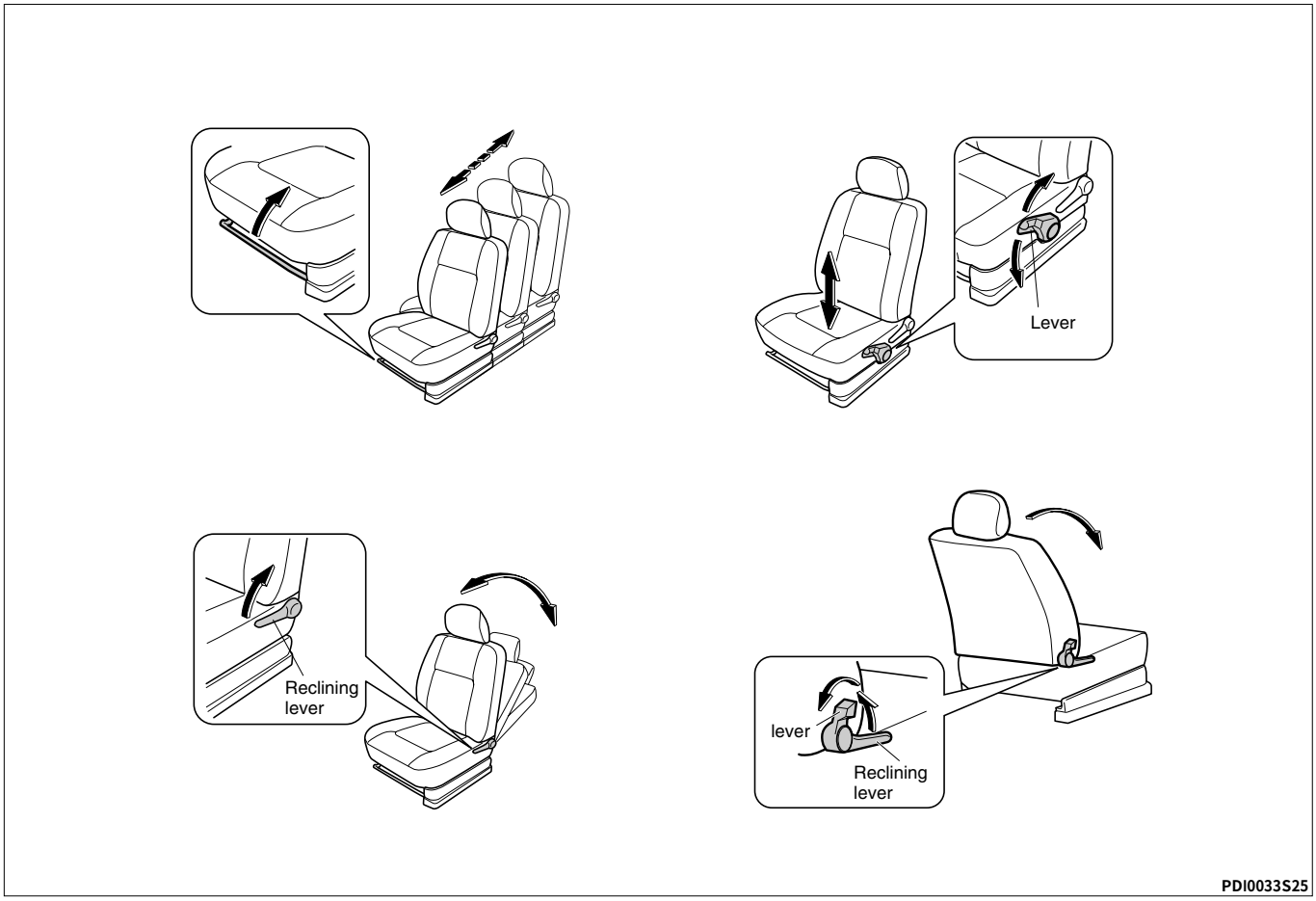
2-9 **SEAT, SEAT BELT**

1. Check that the seat slide and reclining can function smoothly, folding/removal can be carried out properly, and can be locked at any position.
   (1) ·Driver's seat

·Adjustment of seat slide
·Adjustment of reclining
·Adjustment of seat lifter
·Adjustment of headrest

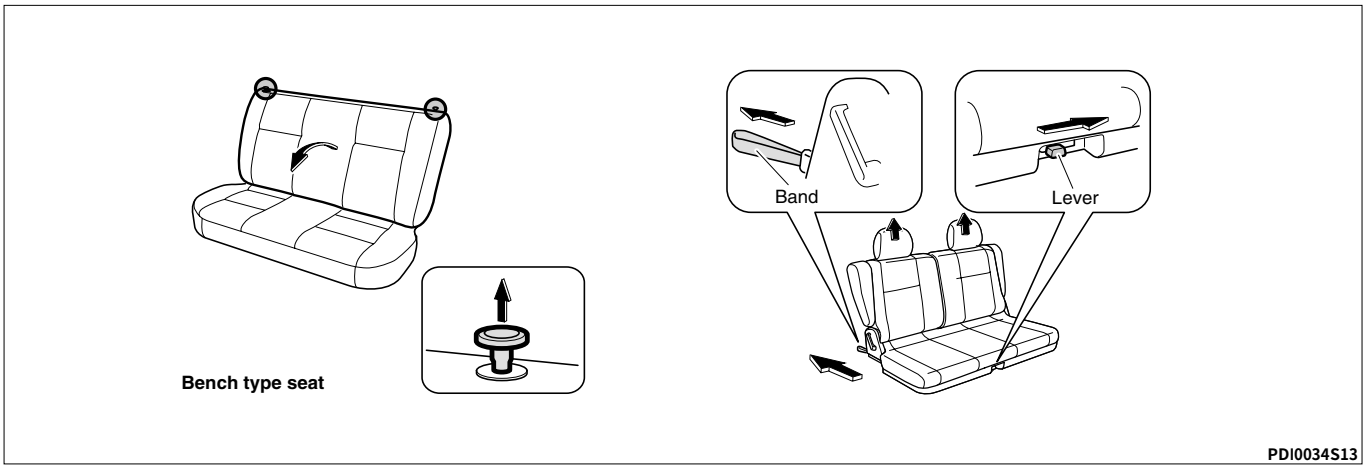
   (2) Passenger's seat

·Adjustment of seat slide
·Adjustment of reclining
·Walk-in mechanism
·Adjustment of headrest

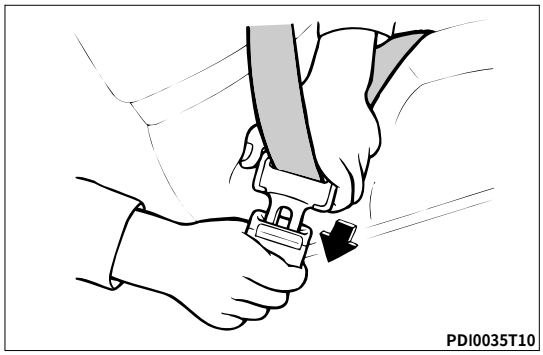


(3) Rear seat

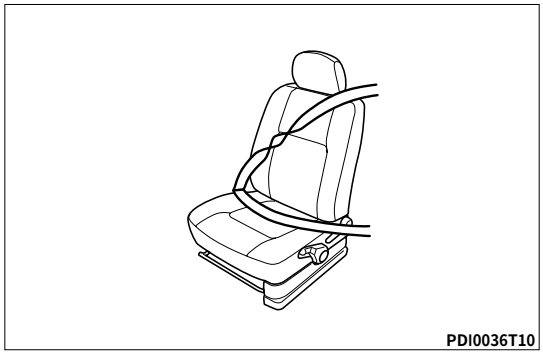
- Adjustment of seat slide
- Adjustment of reclining
- Adjustment of headrest
- Folding mechanism or removal



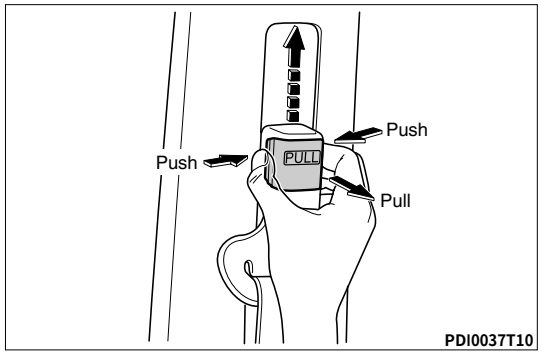
2. Check the seat belts for appearance. Also, check that they function smoothly.
   (1) Check that there are no twist, smear or damage.



   (2) Check that there is no binding while the belt is pulled out or retracted.
   (3) Check that the belt is locked securely and released smoothly.



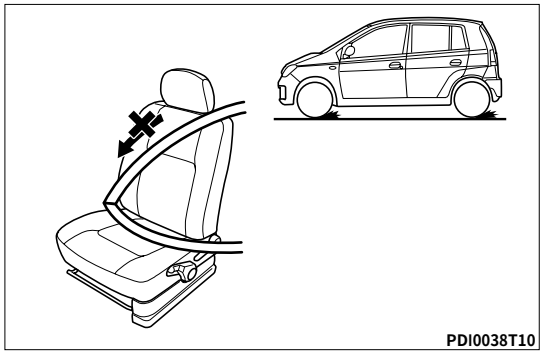
3. Check that the adjustable shoulder anchor can function smoothly and can be locked securely.



4. Check that the belt is locked securely when hard braking is applied.

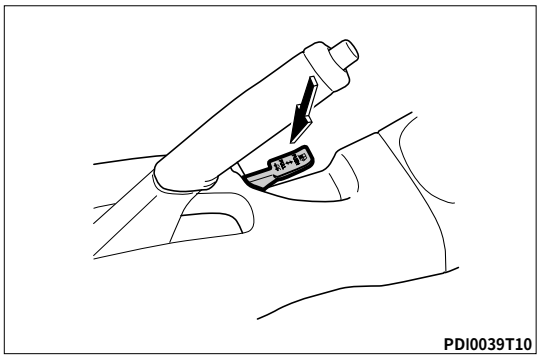
NOTE

- This check is conducted during road test.


PDI0038T10

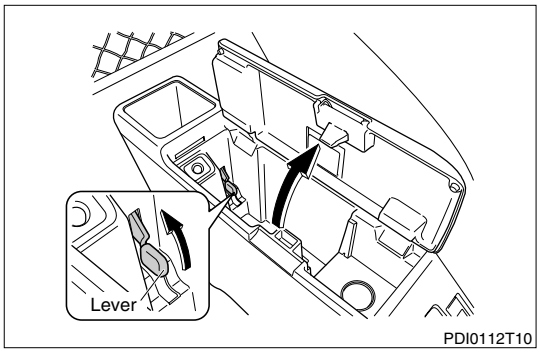
2-10 FUEL LID, BACK DOOR OPENER AND HOOD LOCK HANDLE

1. Check that the fuel lid can be opened smoothly, using the opener or the key.


PDI0039T10

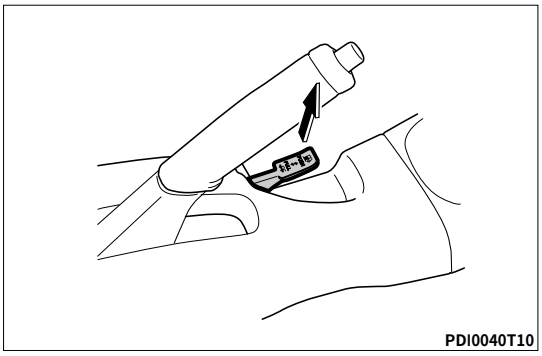
NOTE

- In case of COPEN, the fuel lid opener located inside the console box.



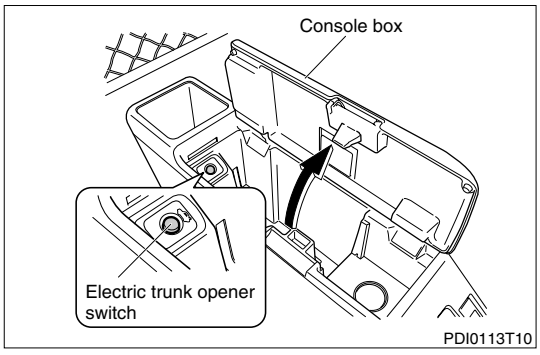
PDI0112T10

2. Check that the back door can be opened smoothly, using the opener or the key.


PDI0040T10

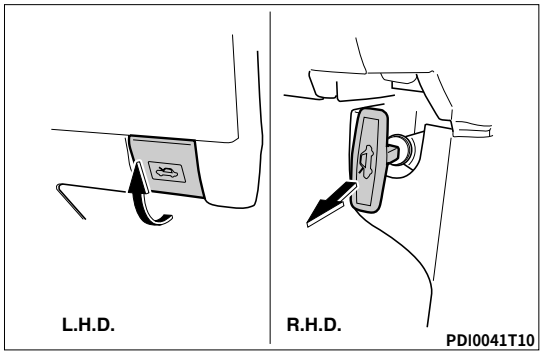
NOTE

- In case of COPEN, the trunk opener switch located inside the console box.



PDI0113T10

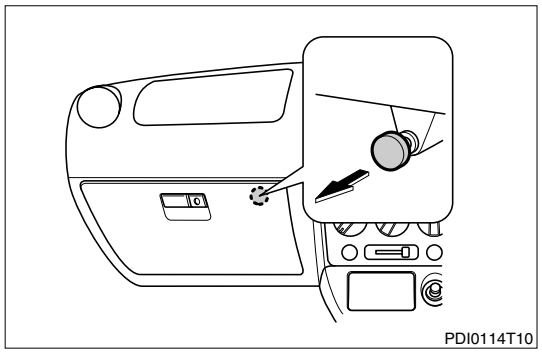
3. When the hood lock handle is pulled, check that the engine hood pops up smoothly.



NOTE

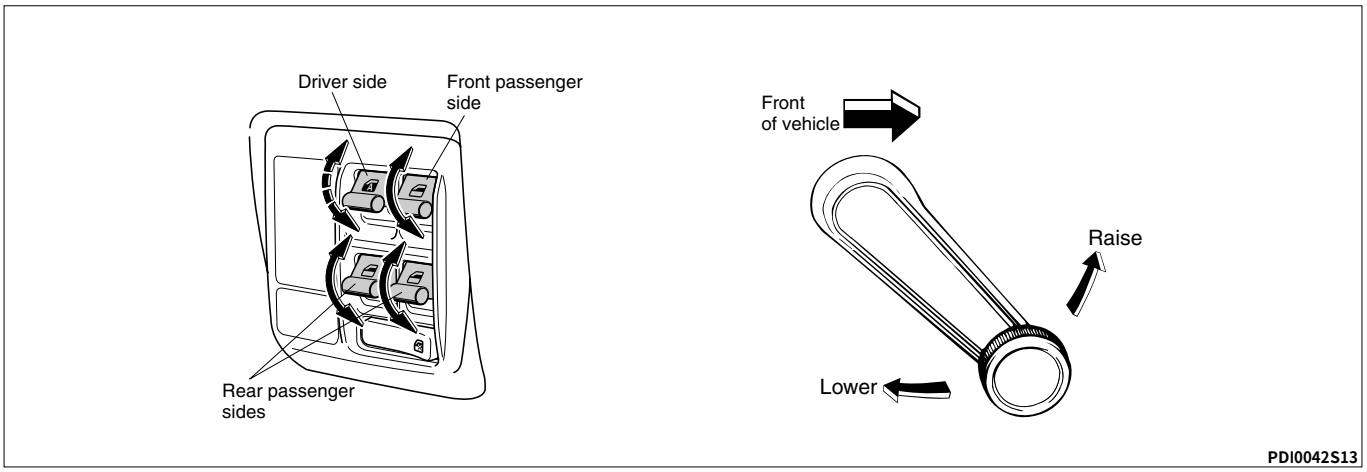
- In case of COPEN, the hood lock handle located inside the console box.

4. Check that the auxiliary catch is working so that the hood may not be raised.
5. When the hood is closed by pushing the hood's edge by hand, check that the hood is locked firmly.

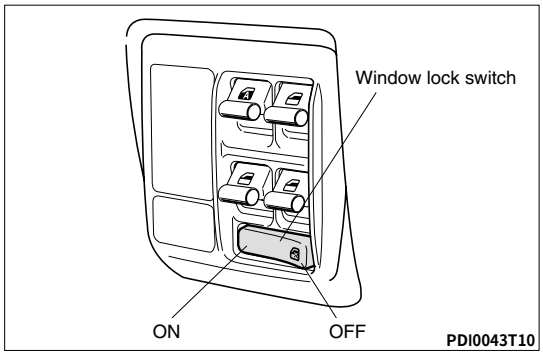


2-11 WINDOWS

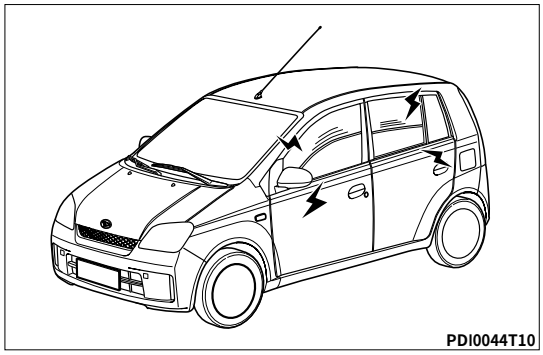
1. Check that the window of each door can be opened or closed smoothly by using the power window switch or the regulator.



2. Check that the window lock switch is functioning properly.



3. Check that no abnormal noise is emitted while the window is being opened or closed.

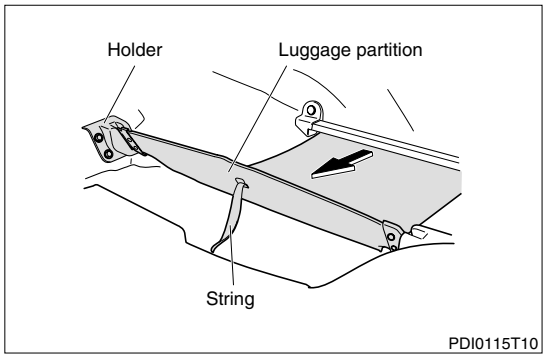

PDI0044T10

2-12 ACTIVE TOP

1. Check that the Active Top can be opened or closed smoothly by using the opening/closing switch.

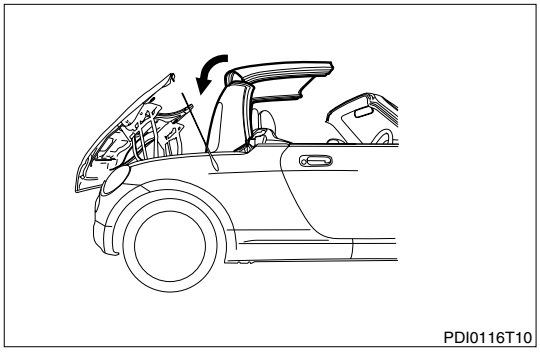
CAUTION

- Before the Active Top is opened, make sure to pull out the luggage partition inside the trunk and attach it to the specified position. The Active Top mechanism wil not operate, unless the aforesaid operations have been performed.



PDI0115T10

2. Check that the operation indicating light illuminates while the Active Top is being opened or closed.
3. Check that no abnormal noise or abnolmal vibration is emitted while the Active Top is being opened or closed.


PDI0116T10

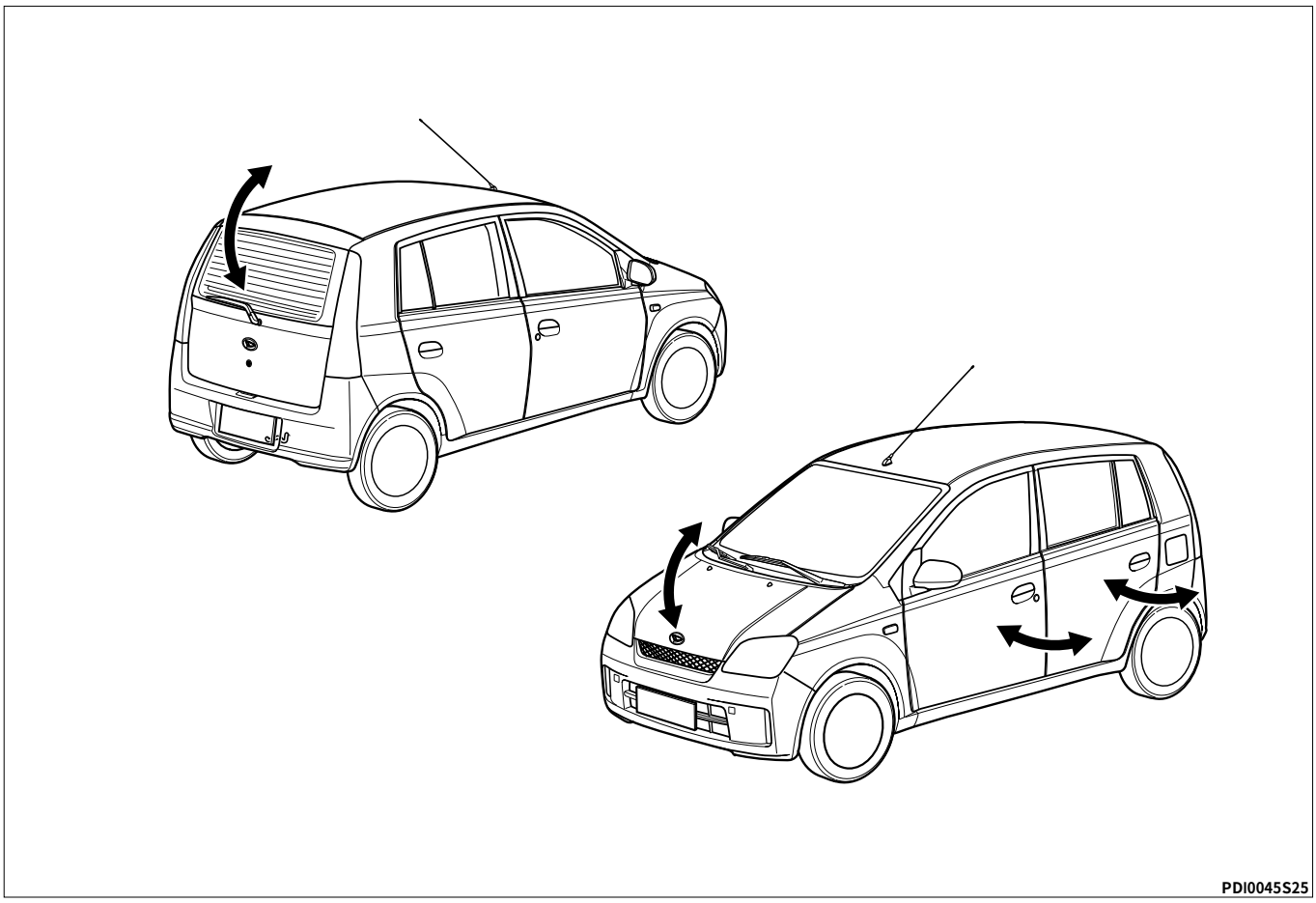
2-13 DOORS, DOOR LOCK

2-13-1 DOORS

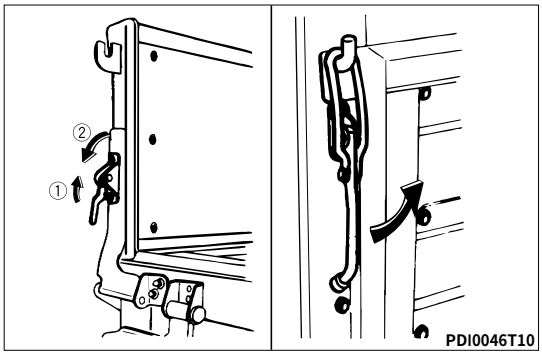
1. Check that all doors can be opened or closed smoothly.
   (1) Front and rear doors
   (2) Back door or trank lid
   (3) Engine hood
   (4) Slide door
   (5) Deck gate

NOTE

- Check that the trunk lid closes automatically when the trunk is incompletely locked, in case of the vehicle is equipped the easy closer mechanism.



2. Check that the locks of the rear and side gate are functioning smoothly and they can be locked firmly.

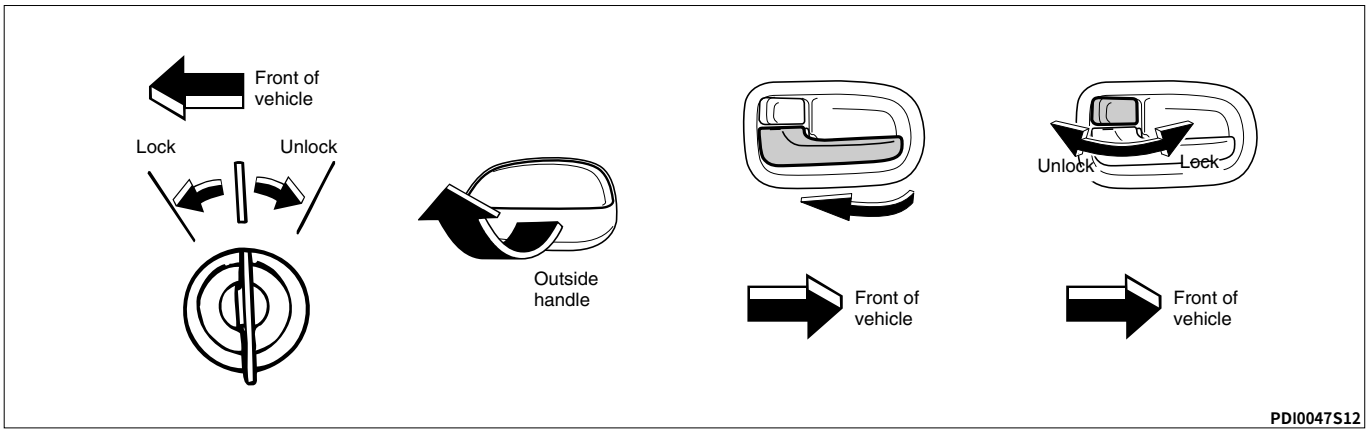


2-13-2 MANUAL DOOR LOCK

NOTE

- When the operation of the door lock is checked, make sure that all windows be opened and the ignition key is not left inside the vehicle.

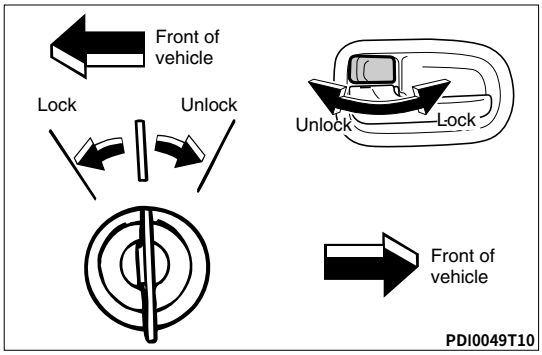
1. Check that the doors can be opened or closed by using the inside and outside handles.



2. Check that the door will not open when the lock button is set to the lock position.
3. Check that the front and back doors can be locked or unlocked, using the key.

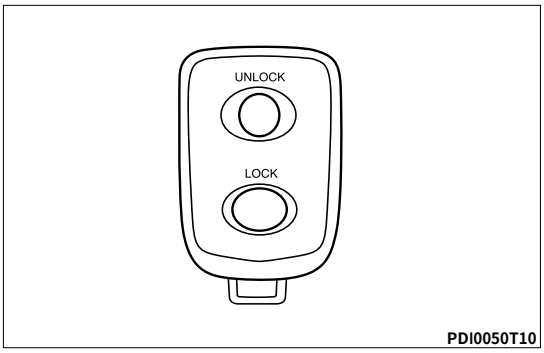
2-13-3 **POWER DOOR LOCK**

1. Check that the power door lock system is functioning properly.
   (1) Check that all doors can be locked or unlocked, using the key.
   (2) Check that all doors can be locked or unlocked, using the lock button at the driver's seat side.



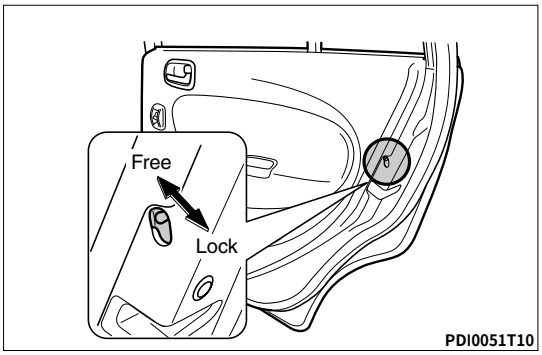
2-13-4 **KEYLESS ENTRY SYSTEM**

1. Check that the keyless entry system is functioning properly.



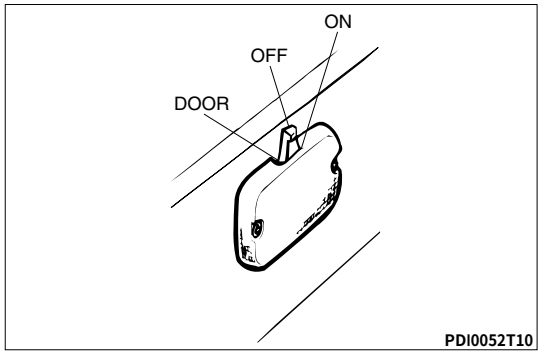
2-14 **CHILD SAFETY**

1. When the child safety knob is set to the lock position, check that the rear door can not be opened by means of the door handle inside the vehicle, and that the door can be opened by means of the door handle outside the vehicle.



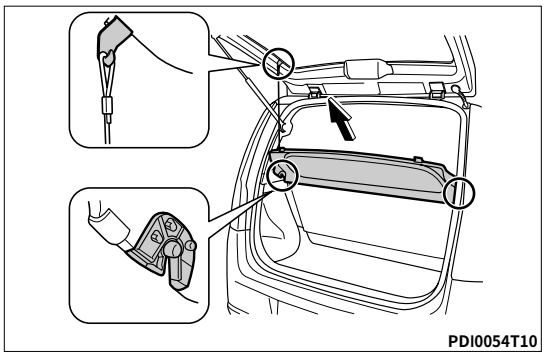
2-15 LUGGAGE ROOM LIGHT

1. When the back door is opened, check that the luggage room light is illuminated.



2-16 LUGGAGE ROOM TRIM AND FLOOR MAT

1. Visually or by hand check that the trim and floor mat of the luggage room are fitted properly in place.
2. Check that the rear package tray can move without any binding.



2-17 SPARE TIRE PRESSURE AND INSTALLATION

1. Check that the air inflation pressure complies with the specified value. Adjust, as required.

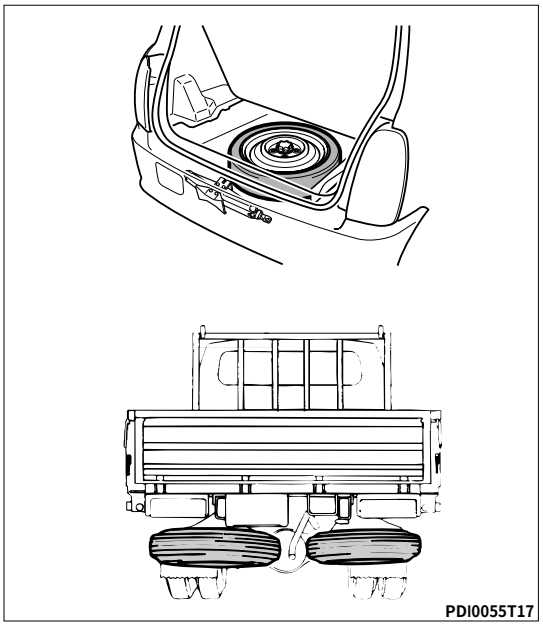
NOTE

- For the adjustment, refer to the Owner's Manual.

2. Check that the spare tire is secured at the specified position firmly.

NOTE

- For details, refer to the Owner's Manual.

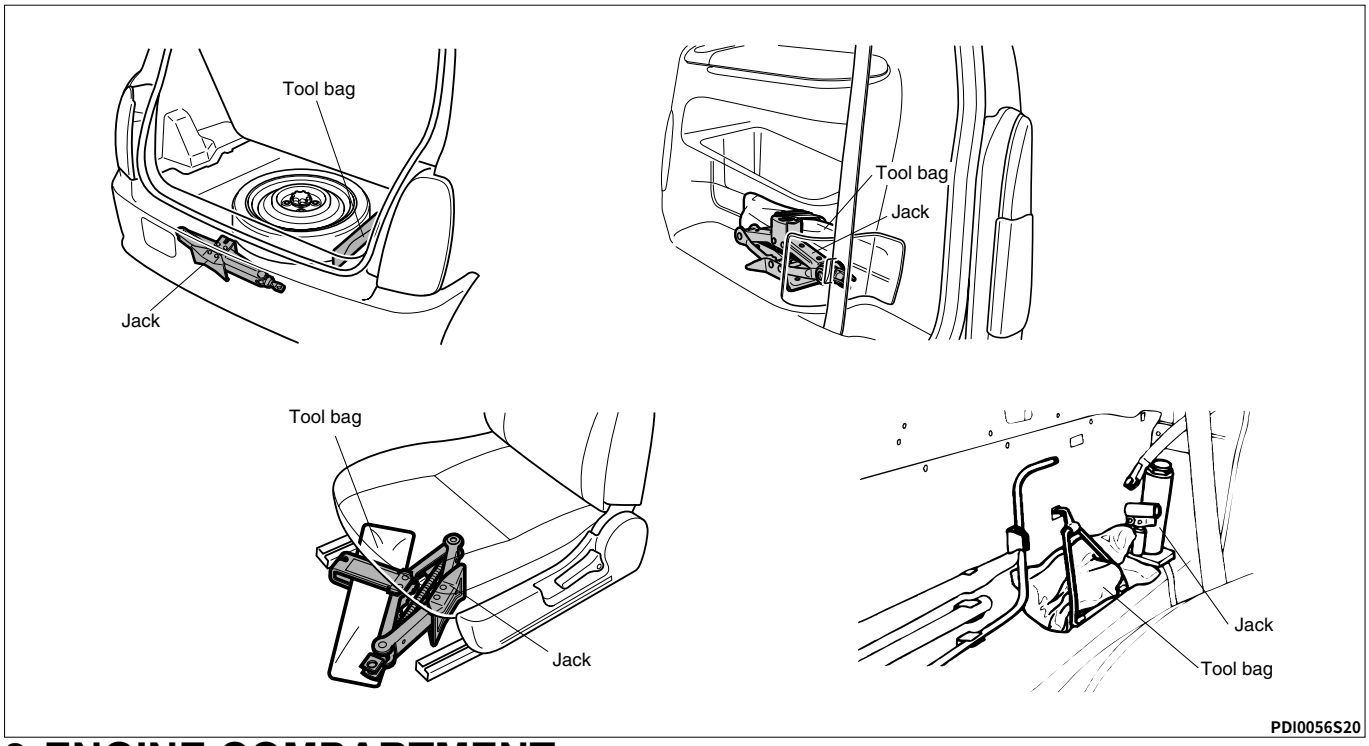


2-18 JACK AND TOOL INSTALLATION

1. Check that the jack and tools are accommodated at the specified positions.

NOTE

- For details, refer to the Owner's Manual.



3 ENGINE COMPARTMENT

CAUTION

- Make sure to use covers so as to prevent the painting finish surface from being scratched.

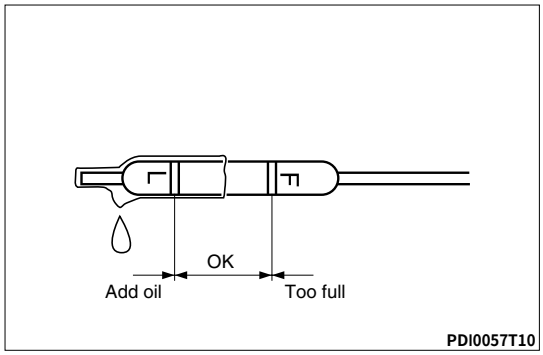
3-1 OIL AND FLUID LEVEL

NOTE

- When the oil or fluid levels are significantly low, perform leak check. Replenish the oil or fluid, as required.

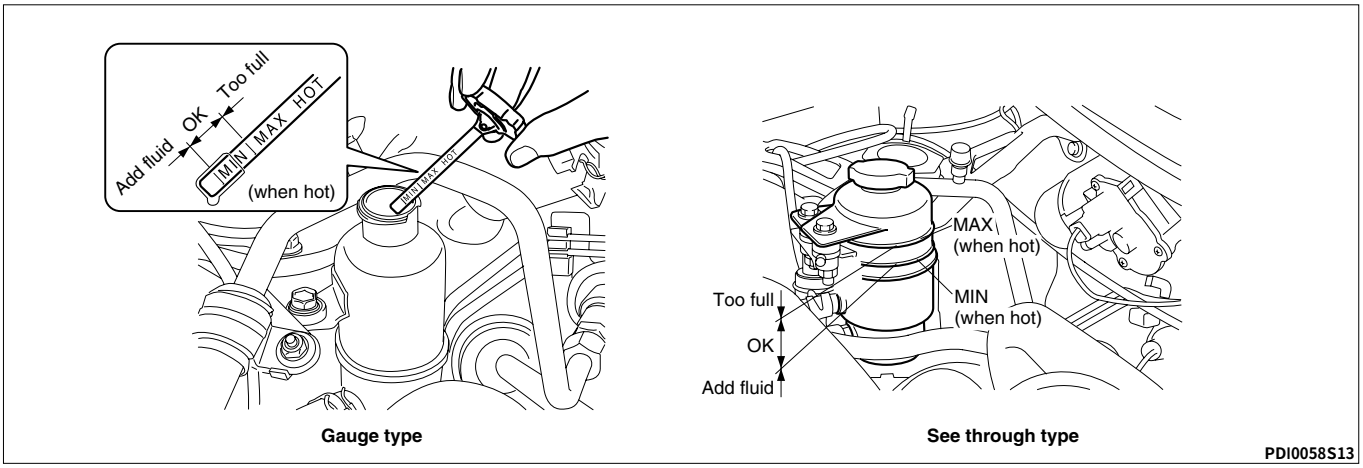
3-1-1 ENGINE OIL

1. After warming up the engine, stop the engine and leave it for five minutes. Check the oil level.
2. Check that the oil contains no dirt or impurity.



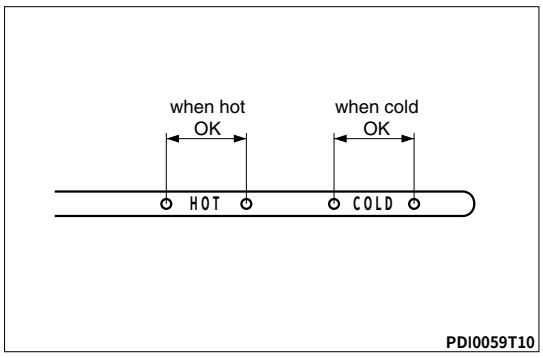
3-1-2 **POWER STEERING FLUID**

1. Check the fluid level of the reservoir tank.
   (1) Read the scale of the HOT range when the fluid is hot (60 − 80˚C) .
   (2) Read the scale of the COLD range when the fluid is cold (10 − 30˚C).



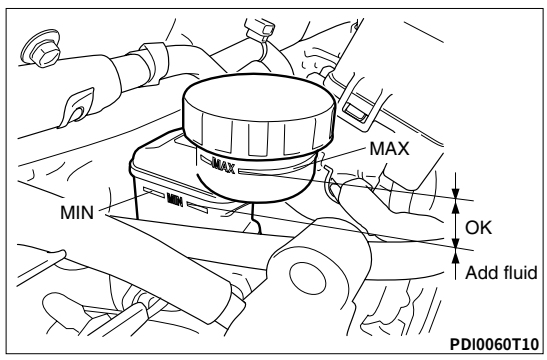
3-1-3 **AUTOMATIC TRANSMISSION FLUID**

1. Check the fluid level.
   (1) Park the vehicle on a level floor. Fully apply the parking brake.
   (2) Run the engine at idling speed. With the brake pedal depressed firmly, move the shift lever from "P" to "L". Then, return the shift lever to the "P" range.
   (3) After shifting to the "P" range, check the fluid level with the engine running at idling speed.
   (4) If the fluid level is below the COLD range, recheck the fluid level after the running test.
   (5) If the fluid level is below the HOT range, replenish the fluid.



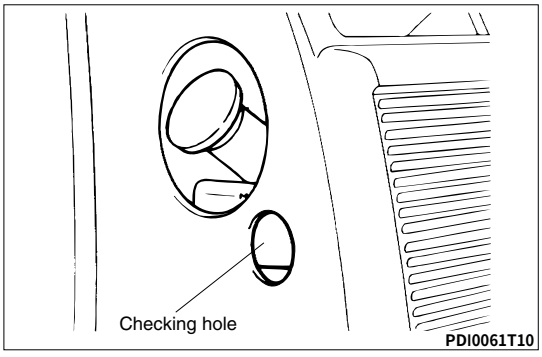
3-1-4 **BRAKE AND CLUTCH FLUID**

1. Visually check the fluid level of the reservoir tank.



NOTE

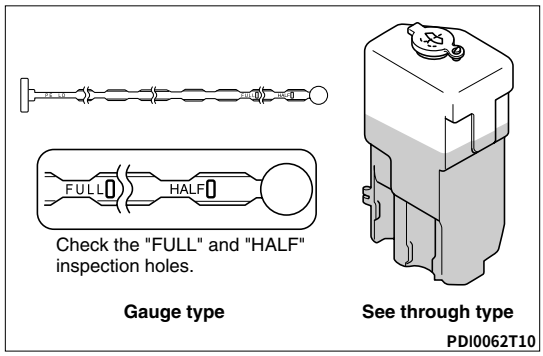
- When the reservoir tank is located inside the vehicle interior, this check should be conducted at the time of the "Check from Outside of Vehicle."



3-1-5 **WASHER FLUID AND COOLANT**

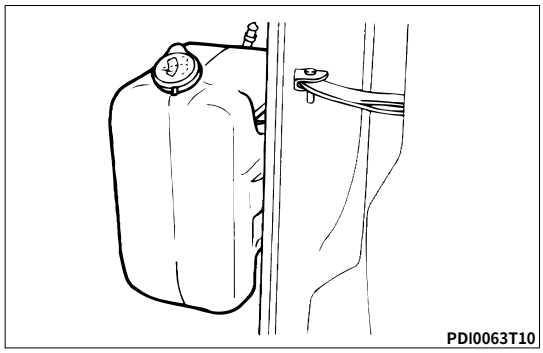
(1) **WASHER FLUID**

1. Check the fluid level of the washer tank.



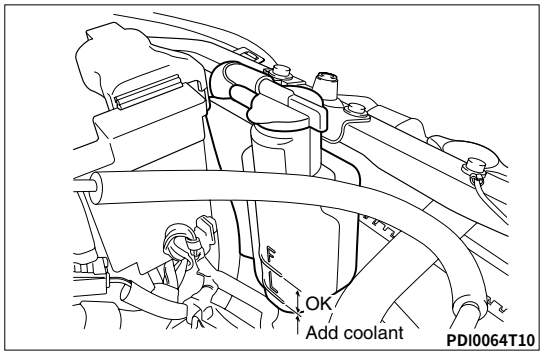
NOTE

- When the washer tank is located inside the vehicle interior, this check should be conducted at the time of the "Check from Outside of Vehicle."



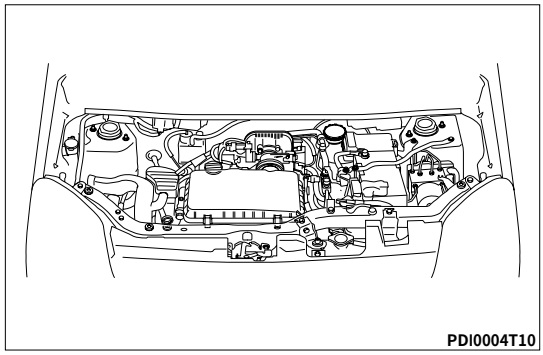
(2) **COOLANT**

1. Visually check the fluid level of the reservoir tank.



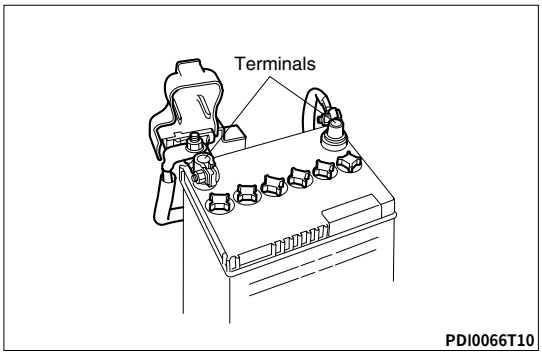
3-2 **FUEL, OIL, COOLANT OR OTHERS FLUID LEAK**

1. Visually check the connections of hoses, pipes for slackness.
2. If there are any leakage in the fuel, oil and cooling systems, repair the leakage.
   (1) Engine
   (2) Power steering related pipes and hoses
   (3) Brake related pipes and hoses
   (4) Hydraulic clutch related pipes and hoses
   (5) Radiator and hoses
   (6) Pipes and hoses of the fuel system



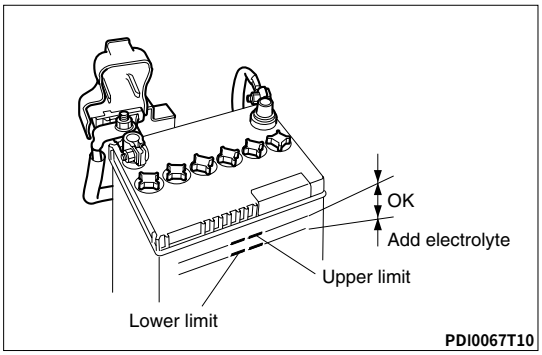
3-3 **BATTERY TERMINAL TIGHTNESS**

1. Check that the cables are connected securely to the battery terminals. Also, check that they are clamped correctly.



3-4 BATTERY ELECTROLYTE AND CHARGE LEVEL

1. Check the battery electrolyte level.

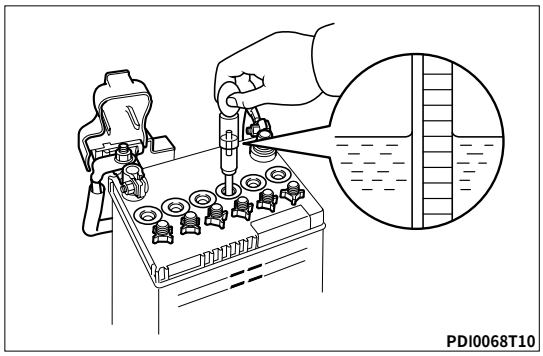


2. Check the battery charging state, based on the specific gravity or the voltage.
   (1) Measure the specific gravity, using a hydrometer.

NOTE

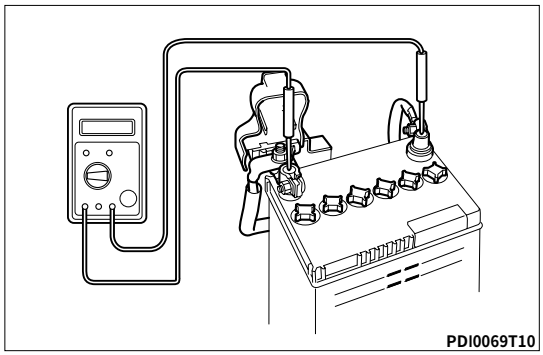
- Perform the check for all cells. If the gravity is less than 1.27 at 20˚C, recharge the battery.

   (2) Measure the voltage, using a tester.



NOTE

- If the voltage is 12.2V or less, recharge the battery.

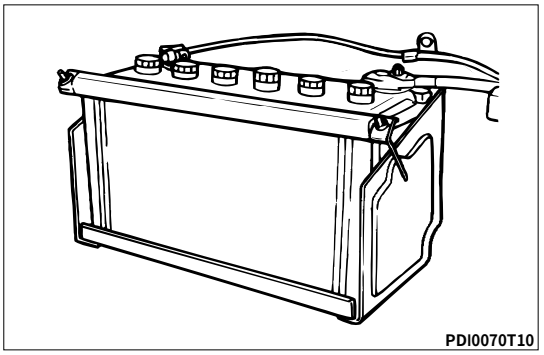


CAUTION

- Before the voltage is measured, pull out the ignition key and turn OFF the switches of all electric devices. Leave the systems under this state for at least 60 seconds so as to remove the surface electric charge. When you want to run the engine prior to the voltage measurement, leave the engine in a stopped state at least 20 minutes after stopping the engine. In this way, you can remove the surface electric charge.

NOTE

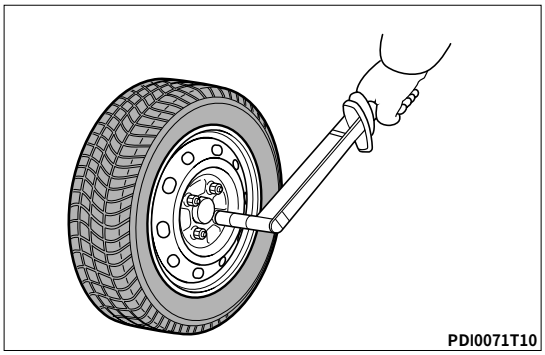
- When the battery is not located inside the engine compartment, this check should be conducted at the time of the "Check from Outside of Vehicle."



4 UNDER VEHICLE

4-1 WHEEL HUB NUT TORQUE

1. Check that the hub nuts of all wheels are tightened to the specified torque, using a torque wrench.

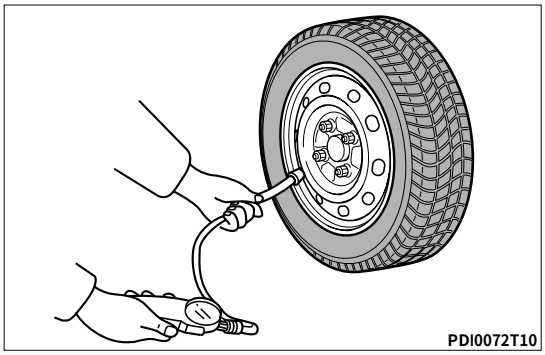


4-2 TIRE PRESSURE

1. Adjust the air pressure to the specified value, using a pressure gauge.

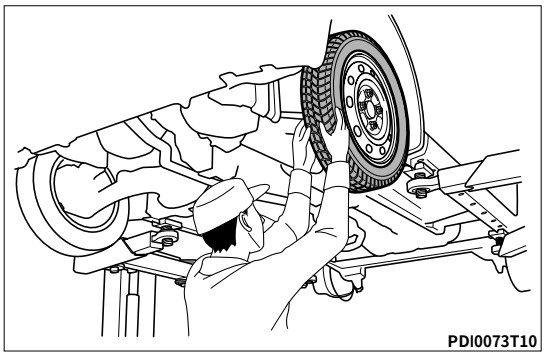
NOTE

- Perform the check while cold.



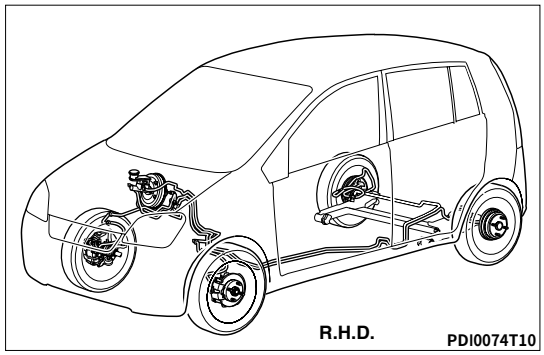
4-3 TIRE DEFICIENCY, DAMAGE

1. Check that all tires exhibit no deficiency or damage.

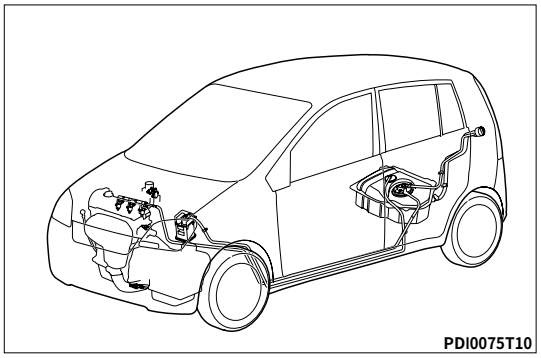


4-4 FUEL, OIL, COOLANT OR OTHERS FLUID LEAK

1. Visually check the fuel, oil and cooling systems for leakage.
   (1) Brake pipe line

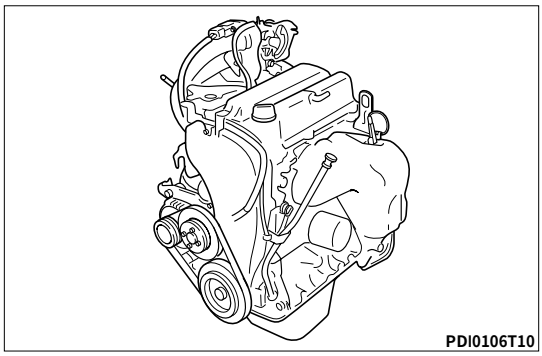


   (2) Fuel pipe line



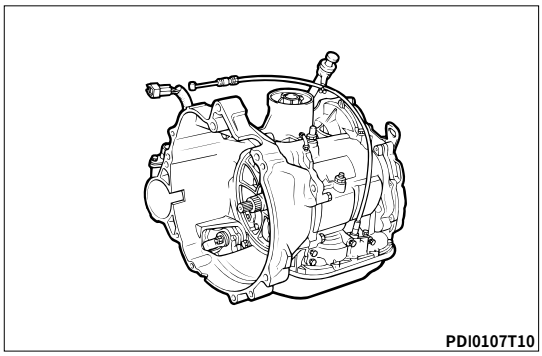
   (3) Engine

· Cylinder head cover, oil pan, drain plug
· Oil pump cover



(4) Transmission

· Mating surface with engine
· Mating surface with case
· Driveshaft oil seal section
· Filler plug, drain plug
· Oil cooler piping



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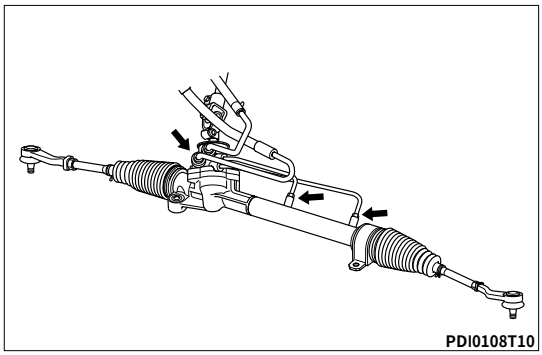
(5) Steering gear

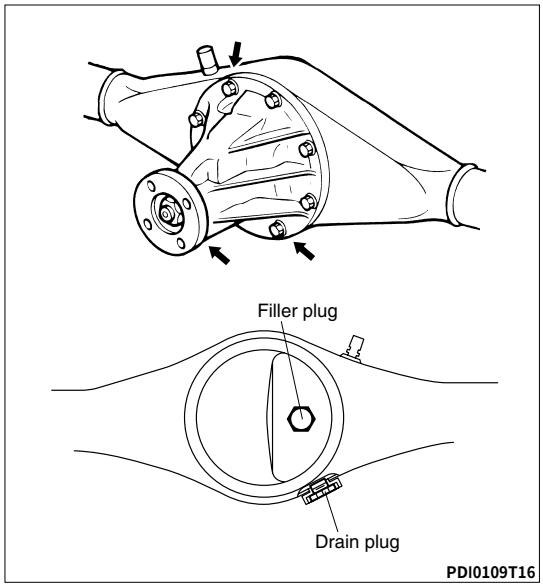
· Oil tube installing section



PDI0108T10

(6) Differential

· Front oil seal section
· Mating surface with case
· Filler plug, drain plug



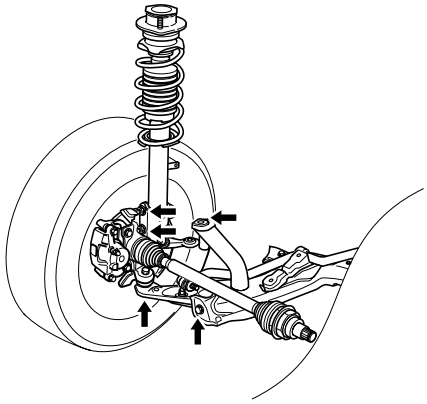
PDI0109T16

4-5 TIGHTNESS OF BOLTS AND NUTS ON CHASSIS AND POWER TRAIN

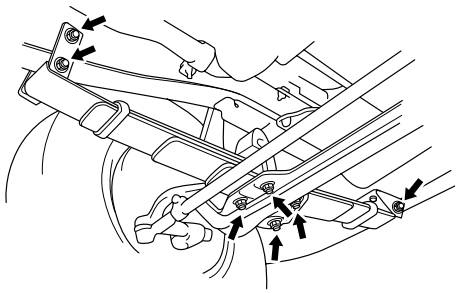
1. Check the tightening state of the bolts and nuts related to the chassis and power train system.

SUSPENSION

FRONT

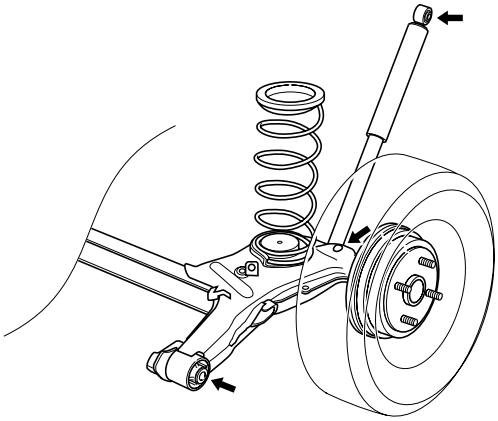


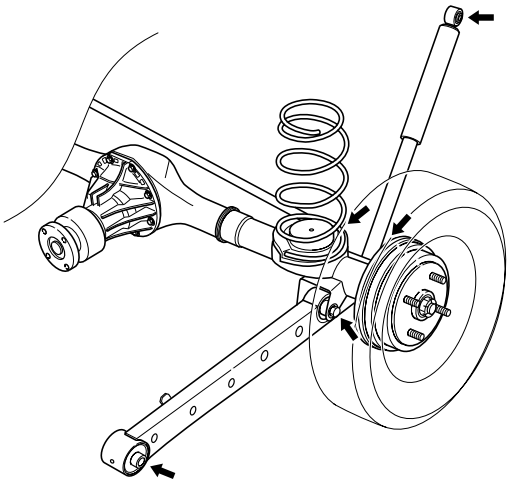
Mac Pherson strut type



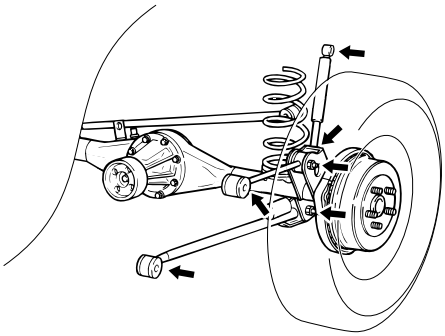
Leaf spring rigid type

REAR

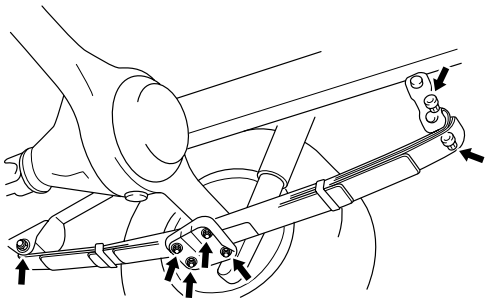




3-Link type

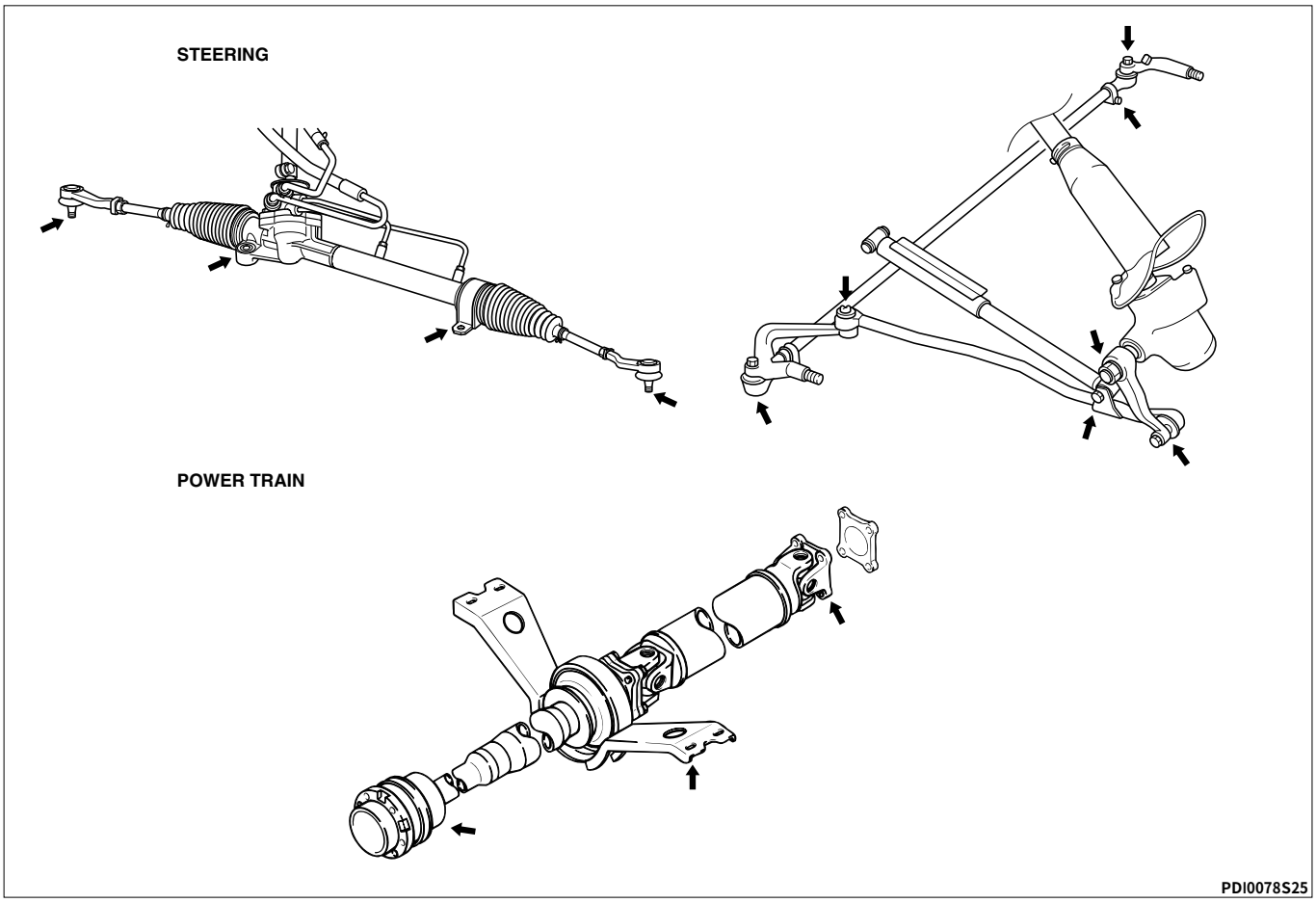


5-Link type



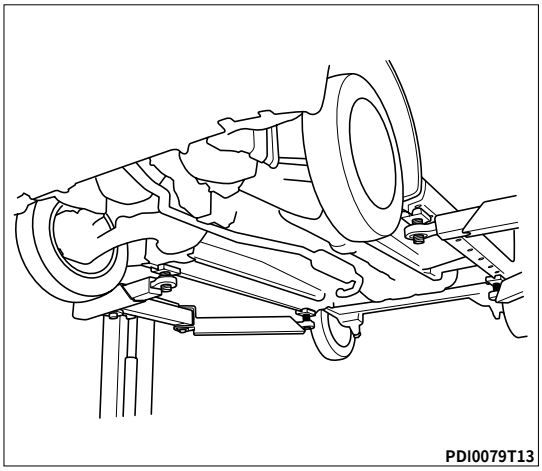
Leaf spring rigid type

PDI0077S40



4-6 UNDER VEHICLE CONDITION FOR DAMAGE, RUST, ETC

1. Visually or by hand check that the floor panels, exhaust pipes, etc. exhibit no damage or rust.
2. Visually or by hand check the pipes, cables, boots, etc. for connecting state or damage.
   (1) Brake pipe, hose, protector
   (2) Fuel pipe, hose, protector
   (3) Boot related to steering link
   (4) Drive shaft boot
   (5) Parking brake cable



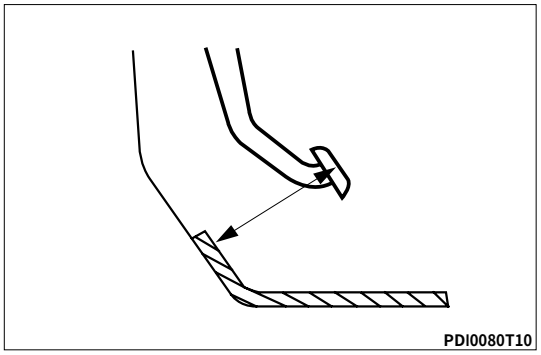
5 ROAD TEST

CAUTION

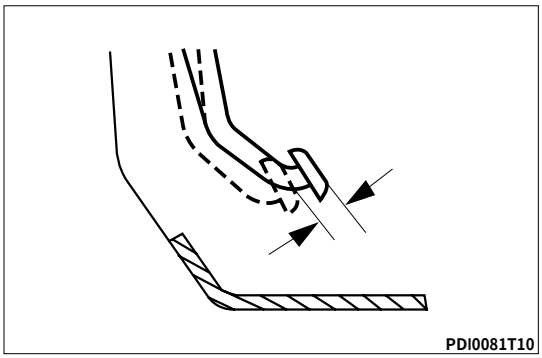
- Prior to test, apply protective covers to the seat and carpet.

5-1 PEDAL HEIGHT, FREE PLAY, RESERVE TRAVEL

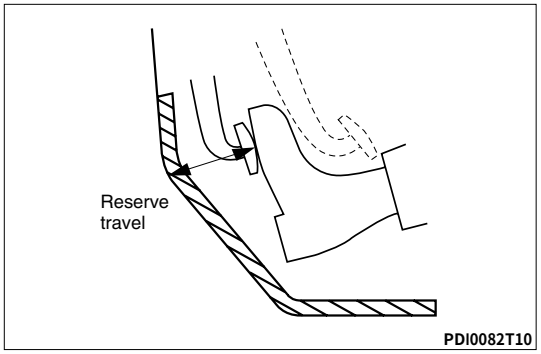
1. Check the heights of the brake and clutch pedals.
   NOTE
   - For the checking method, refer to the service manual.


PDI0080T10

2. Check the pedal free travel.
   NOTE
   - For the checking method, refer to the service manual.


PDI0081T10

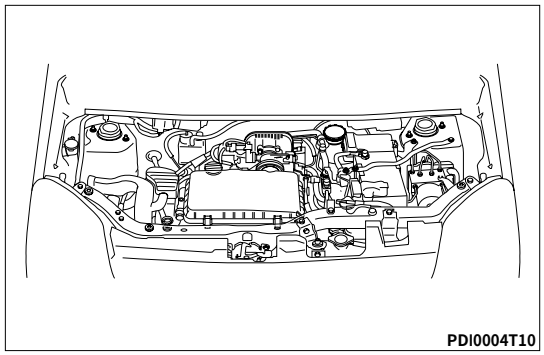
3. Check the reserve travel of the brake pedal.
   NOTE
   - For the checking method, refer to the service manual.



PDI0082T10

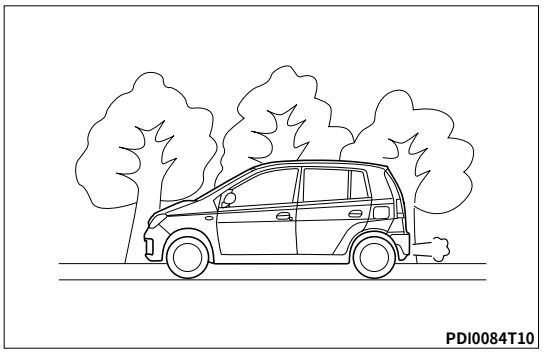
5-2 ENGINE OPERATION WHEN HOT, OR AFTER WARMING-UP PERIOD

1. Check that the engine is running smoothly when hot (the time during which the water temperature has reached a normal state).
   (1) Abnormal noise, vibration
   (2) Rough idling


PDI0004T10

5-3 ENGINE PERFORMANCE, DRIVABILITY

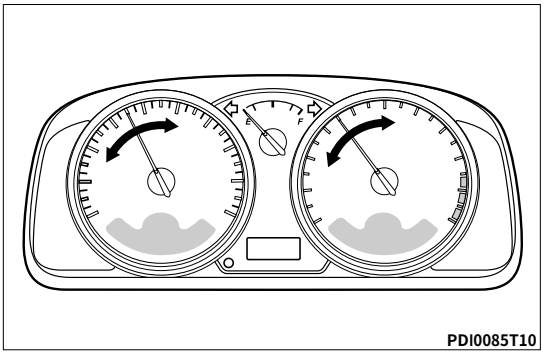
1. Check the engine power under various running states, such as acceleration, deceleration and low-speed running.
2. Check that the engine is running without any trouble and responses smoothly.


PDI0084T10

5-4 COMBINATION METER

5-4-1 METERS, GAUGES (SPEEDOMETER, TACHOMETER, WATER TEMPERATURE METER)

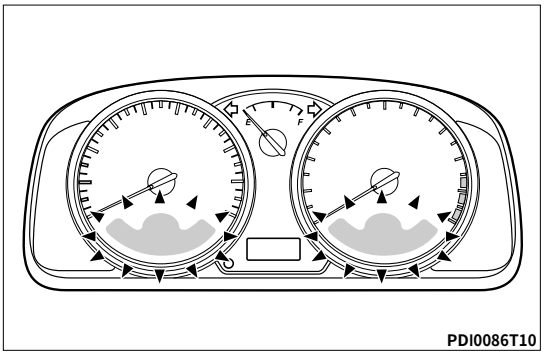
1. Check that the meters and gauges are operating normally and the pointers are moving smoothly.



PDI0085T10

5-4-2 INDICATION LIGHTS

1. Check the each indicator is illuminated properly.

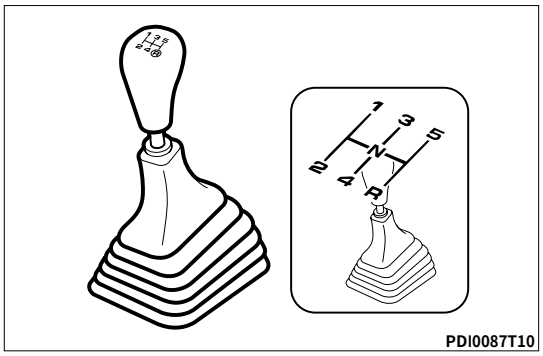


PDI0086T10

5-5 CLUTCH, TRANSMISSION AND TRANSFER

5-5-1 MANUAL TRANSMISSION

1. Ensure that the clutch can be disengaged normally and there is no chattering or abnormal noise.
2. Check that the shift lever can be shifted smoothly.



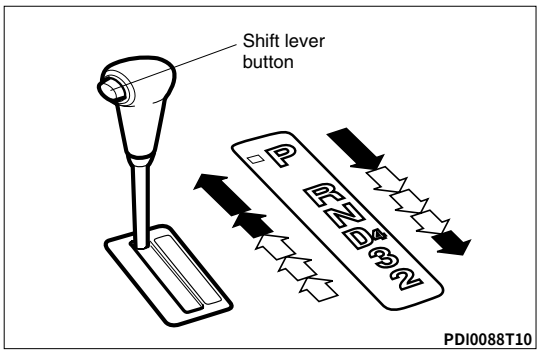
PDI0087T10

5-5-2 AUTOMATIC TRANSMISSION

1. Check that the engine will not start except the "P" or "N" range.
2. Check that the upshift and downshift can be made normally.

NOTE

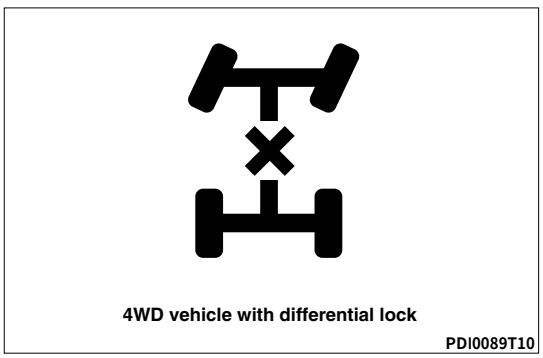
- For details, refer to the Owner's Manual.



PDI0088T10

5-5-3 TRANSFER

1. Check that the indicator is illuminated properly.

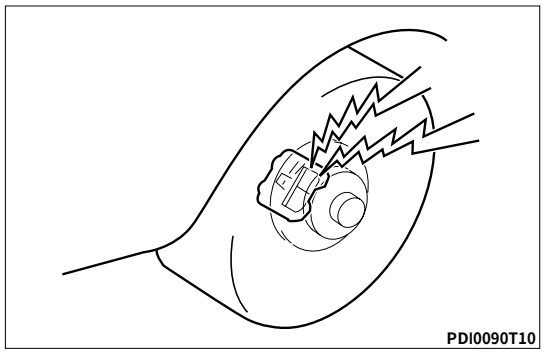


4WD vehicle with differential lock

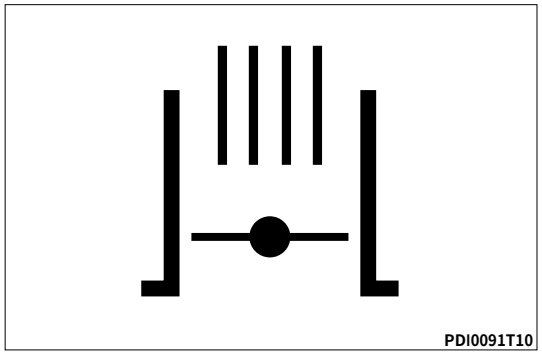
PDI0089T10

5-6 **BRAKE, PARKING BRAKE**

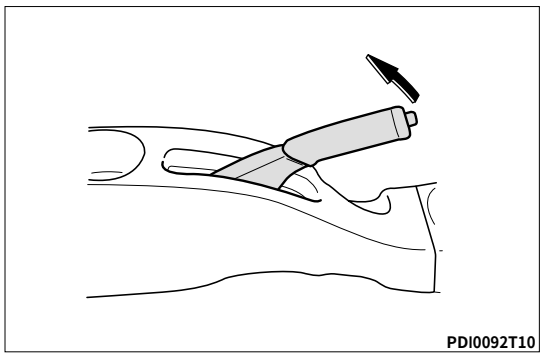
1. Check the brake for effective operation. Also, check that there is no unequal braking or squeaking noise.


PDI0090T10

2. Check the exhaust brake. (for diesel engine)
   (1) Check the operation of the indicator light.
   (2) Check the operation of the exhaust brake.

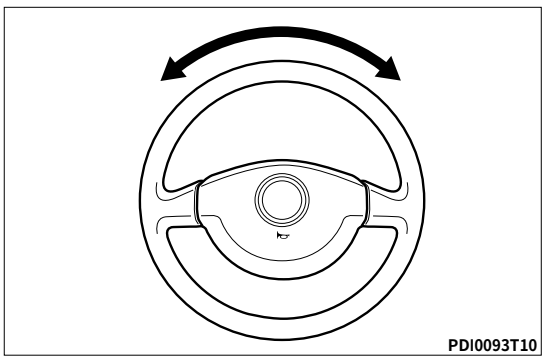

PDI0091T10

3. Check the parking brake.
   (1) Check the operation of the warning light.
   (2) Check the pulling amount of the parking brake.

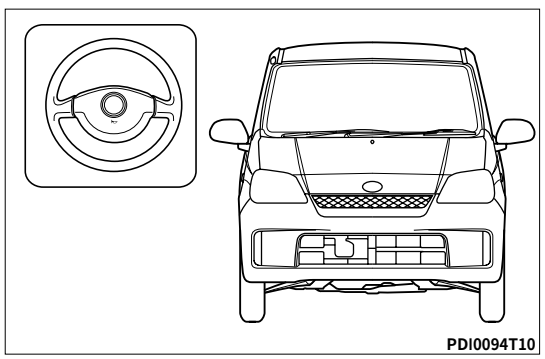

PDI0092T10

5-7 **STEERING**

1. Check that it turns lightly and there is no abnormal noise.

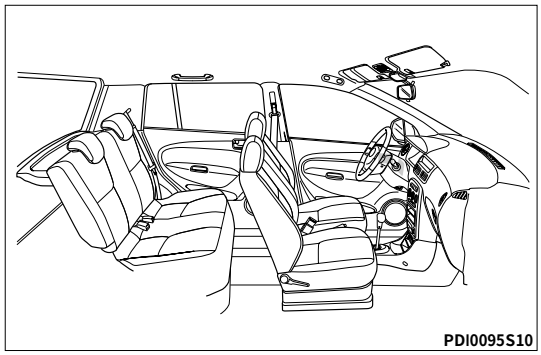

PDI0093T10

2. When the vehicle is running straight on a flat road, check that the steering wheel directs straight.
3. Run the vehicle on a flat road. Check that the vehicle has running straight.

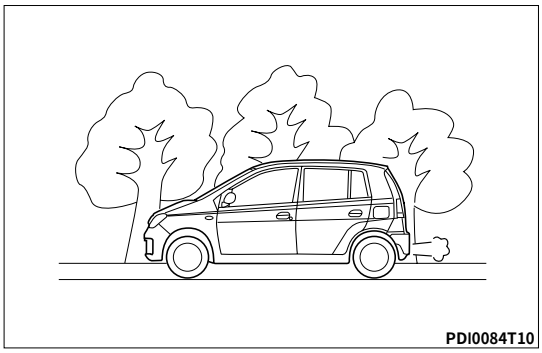

PDI0094T10

5-8 ABNORMAL NOISE, VIBRATION

1. Check that there is no squeaking or rattling noise.
   (1) Instrument panel
   (2) Door
   (3) Trim
   (4) Others

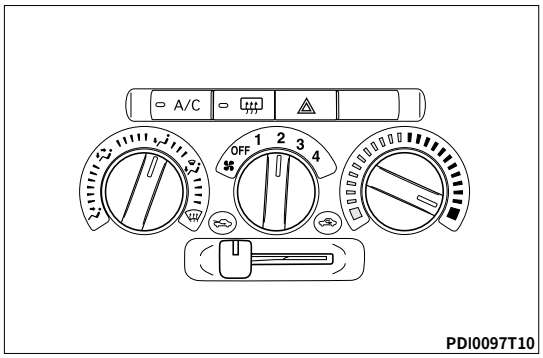

PDI0095S10

2. Check for abnormal noise or vibration during vehicle running.
   (1) Related to power train (engine, transmission, differential, drive shaft and so forth)
   (2) Wind noise


PDI0084T10

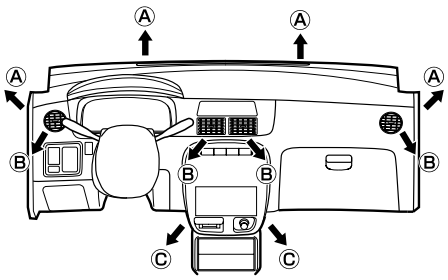
5-9 HEATER, AIR CONDITIONER

1. Check that the respective controls are functioning smoothly.
   (1) Temperature control dial
   (2) Blower fan switch
   (3) Air outlet control dial
   (4) Air conditioner switch
   (5) Air intake control lever



PDI0097T10

2. Check that the outlet port air changes according to the dial position of the air outlet control dial.



Dial position					
Air outlet	Ⓑ	Ⓑ Ⓒ	Ⓒ (Ⓐ)	Ⓐ Ⓒ	Ⓐ

PDI0098S14

6 FINAL CHECK, CLEANING

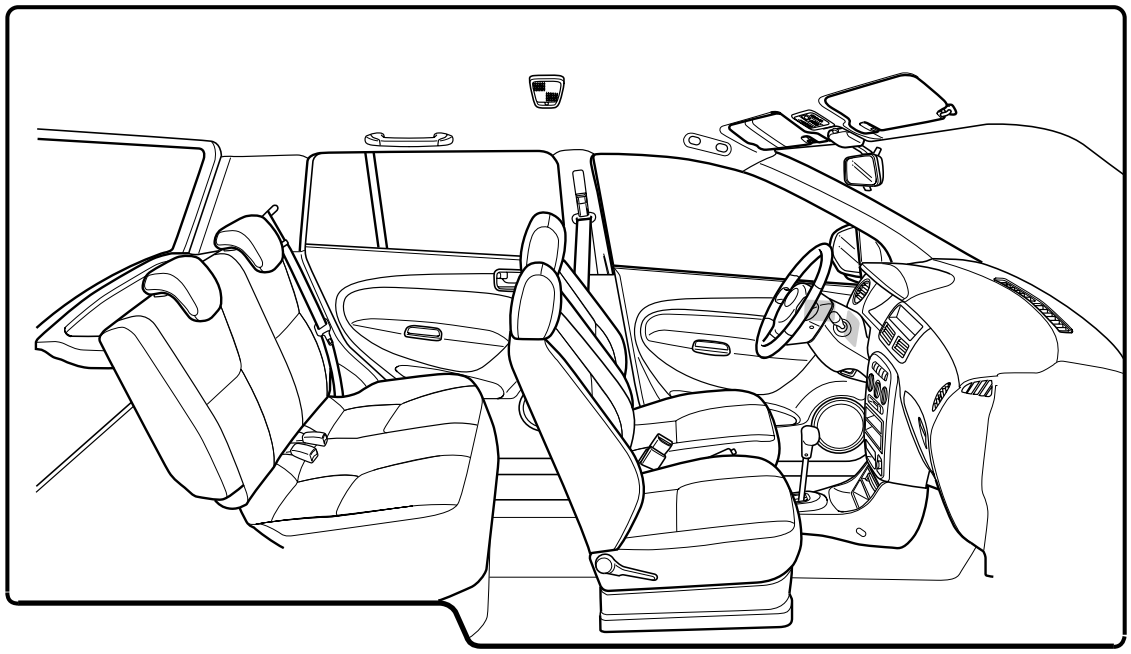
6-1 REMOVAL OF UNNECESSARY LABEL, TAG AND STICKER

NOTE

- Remove protective covers immediately before the delivery.

6-2 VISUAL CHECK O INTERIOR PARTS OF INSTALLATION STATE, DAMAGE OR SMEAR

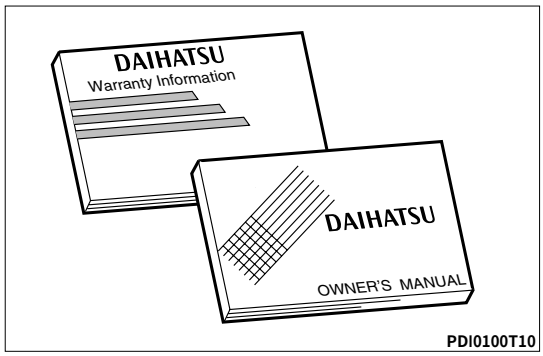
1. Visually or by hand check the appearance of the interior parts.
   (1) Smear
   (2) Scratch
   (3) Damage
   (4) Installation state



PDI0099S25

6-3 OWNER'S MANUAL/WARRANTY INFORMATION BOOK

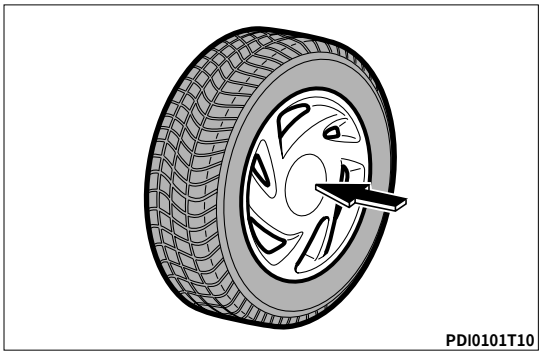
1. Check that the glove compartment contains the following articles given below.
   (1) Owner's Manual
   (2) Warranty Information Book



PDI0100T10

6-4 FACTORY INSTALLATION PARTS

1. Install wheel caps and center caps.



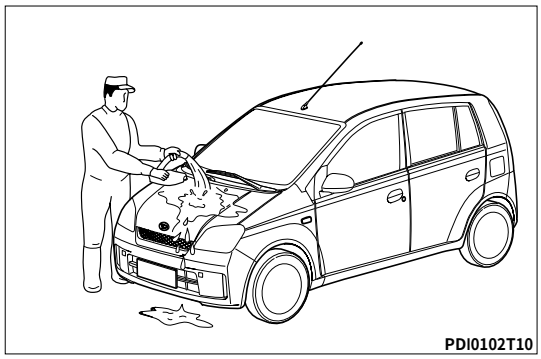
PDI0101T10

6-5 CAR WASH, CLEANING

1. Clean the body exterior and interior.

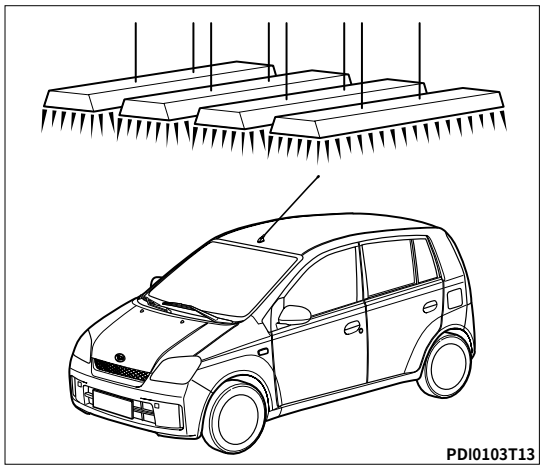
NOTE

- Washing hands is recommended.



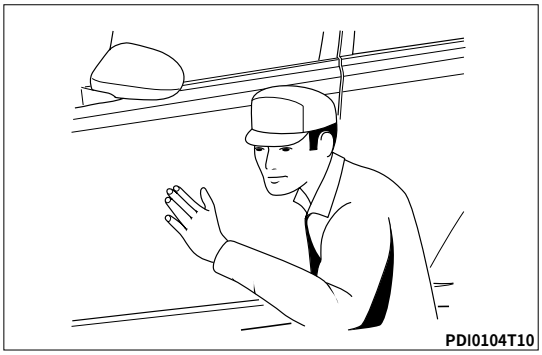
6-6 SCRATCH, SPINOSE PAINTING, DAMAGE ETC. OF PAINTING FINISH SURFACE

1. Apply light in such a way that the body upper surface or side surface may receive brightness of 800 lux or more.
2. Visually or by hand check each panel.
   (1) Scratch
   (2) Dent
   (3) Smear



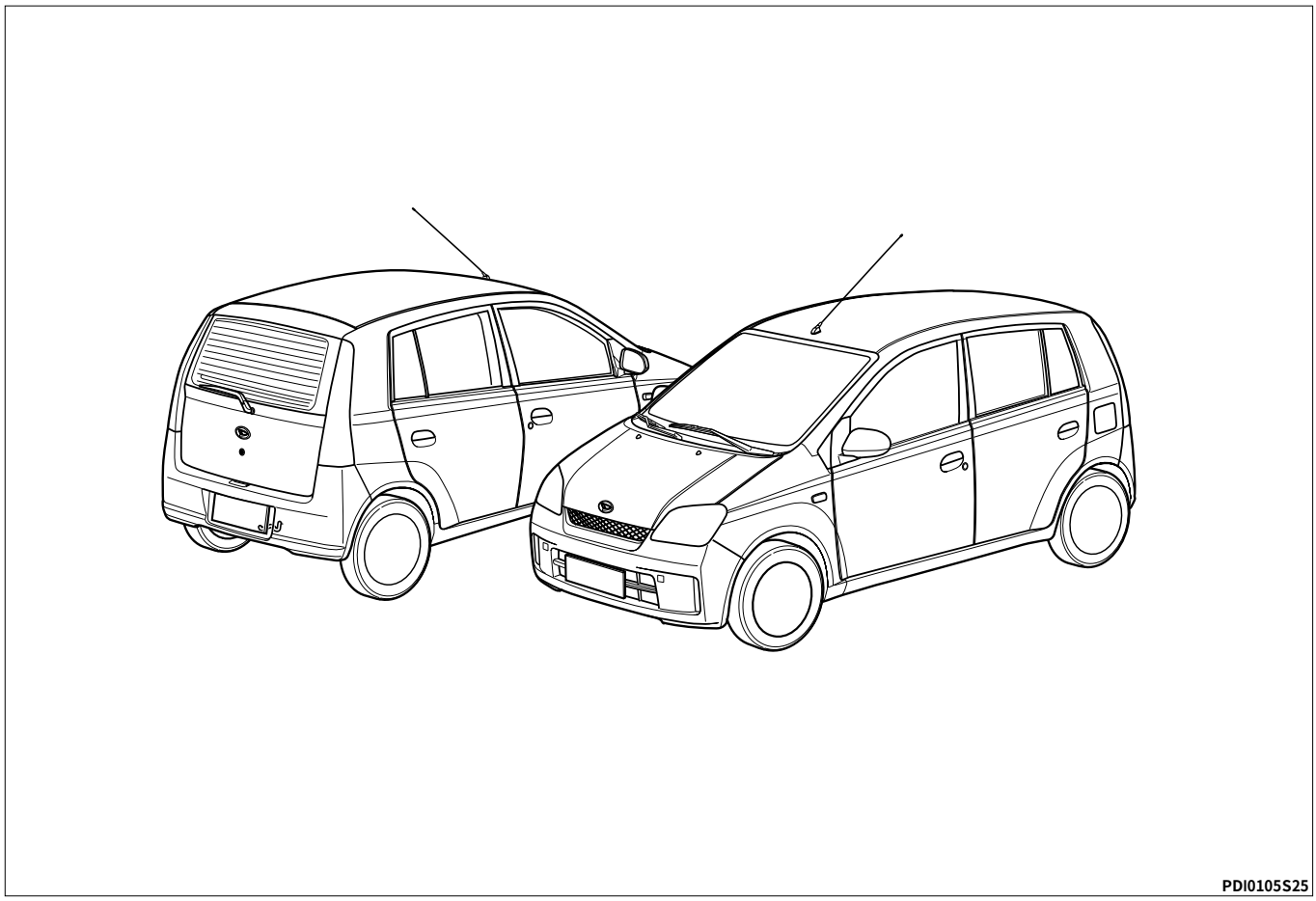
NOTE

- Damage of the panel may be detected easily when viewed diagonally.



6-7 EXTERIOR PARTS

1. Visually or by hand check all exterior parts.



(1) Scratch
(2) Moulding, bumper's damage, floating, looseness

7 VEHICLE DELIVERY INSPECTION

8 CHECK

1. Installation of fuse
2. Washer fluid level
3. Engine startability (battery charging state)

NOTE

- When the vehicle is stored for more than one month, check the specific gravity of battery.

4. Setting of radio and clock
5. Smear and scores of interior appointments
6. Scores and rust of exterior appointments
7. Deformation and deficiency of tire
8. Dealer-installation parts
9. Articles to be mounted on vehicle (jack, tools, manuals, and so forth)

8-1 PREPARATION FOR VEHICLE DELIVERY

1. Removal of the following parts given below
   (1) Door edge protector
   (2) Protection covers, etc. of seat and door trim
   (3) Step cover
2. Cleaning of vehicle interior

Check that any related parts become deteriorated after PDI.

FOREWORD

This is a revised version of the Daihatsu PDI (Pre-Delivery Inspection) manual in which the PDI items of those functions peculiar to the Copen are described in line with the introduction of the Copen to the market.

In as much as the contents of this manual can apply to all destination specifications and all models, including the options, it is unnecessary to carry out the checks for all equipment and functions that are posted in this manual.

When you perform the PDI operations, please refer to the relevant owners' manual and service manual, as required, so as to confirm the specifications of the vehicle on which you are now working.

Revision 1: Published in September, 2003

No. 9807

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DAIHATSU MOTOR CO., LTD.

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B. PRE-DELIVERLY INSPECTION B

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1 IMPORTANT SAFETY NOTICE

1-1 GENERAL DESCRIPTION

1. The vehicle is a machine comprising a great number of parts. Basically speaking, the vehicle is potentially hazard. However, one can handle it safely if he has the required knowledge.
2. Correct service methods and repair procedures are very vital for assuring not only the safety and reliability of a vehicle, but also the safety of service personnel concerned.
3. The methods and procedures contained in this manual describe in a general way the techniques which the manufacturer has recommended. Thus, they will contribute to ensuring the reliability of the products. The contents of the servicing operations come in a wide variety of ways. Moreover, techniques, tools and parts necessary for each operation are different widely from each other.
4. This manual does not cover all details of techniques, procedures, parts, tools and handling instructions which are necessary for these operations, for such coverage is impossible. Hence, any one who obtains this manual is expected first to make his responsible selection as to techniques, tools and parts which are necessary for servicing the vehicle concerned properly. Furthermore, he must assume responsibility for his actions in connection with his own safety.
5. Therefore, one should not perform any service if he is not capable of making responsible selection and/or if he can not understand the contents herein described, for this manual has been prepared for experienced service personnel.

1-2 WARNINGS, CAUTIONS AND NOTES

1. All these symbols have their specific purposes, respectively.

WARNING

- This symbol means that there is the possibility of personal injury of the operator himself or the nearby workers if the operator fails to follow the operating procedure prescribed in this manual.

CAUTION

- This symbol means that there is the possibility of damage to the component being repaired if the operator fails to follow the operating procedure prescribed in this manual.

NOTE

- To accomplish the operation in an efficient manner, additional instructions concerning the operation are given in this section.

1-3 GENERAL WARNINGS

1-3-1 WARNING OVER THE WHOLE SERVICE OPERATIONS

1. Always wear safety glasses for eye protection.
2. Use safety stands whenever a procedure requires you to be under the vehicle.
3. Be sure that the ignition switch is always in the OFF position, unless otherwise required by the procedure.
4. Set the parking brake when working on the vehicle.
5. Operate the engine only in a well−ventilated area to avoid the danger of carbon monoxide.
6. Keep yourself and your clothing away from moving parts, when the engine is running, especially from the fan and belts.
7. To prevent serious burns, avoid contact with hot metal parts such as the radiator, exhaust manifold, tail pipe, catalytic converter and muffler.
8. Do not smoke while working on a vehicle.
9. To avoid injury, always remove rings, watches, loose hanging jewelry, and loose clothing before beginning to work on a vehicle.
10. Keep hands and other objects clear of the radiator fan blades! The electric cooling fan is mounted on the radiator and can start to operate anytime by a rise in coolant temperature or turning ON of the air conditioner switch in the case of vehicles equipped with an air conditioner. The electric cooling fan is also mounted on the condenser for air conditioner and starts to operate anytime when the air conditioner switch is turned ON. For this reason care should be taken to ensure that the electric cooling fan motor is completely disconnected when working under the hood.

2 HOW TO USE THIS MANUAL

2-1 ARTICLES TO BE PREPARED

When SST, tool, measuring instrument, a sort of fat and oil to be prepared before operation are necessary, those are described by compiling in the table as preparation tools at the beginning of each item.
However, the general tools, jacks, fixtures as considered being equipped always at the service shop are usually omitted.

2-2 REMOVAL AND INSTALLATION PROCEDURES

1. Block diagrams are posted so as to show the installed state of each part.
2. The application of a sort of fat and oil and sealer are instructed in the figure with arrow. And the indication of a tightening torque and non−reusable parts are also described. The explanation of each code is posted below the block diagram concerned.
3. The removal and installation (Disassembling and assembling) procedure list is shown just beneath of components figure.
   The removal (Disassembling) procedure, the installation (Assembling) procedure and parts name are described in the sequence from left side of list. And the alphabet written before a part name links with alphabet in the figure.
4. In principle, reverse the removal (Or disassembly) procedure to install (Or assemble) the parts.

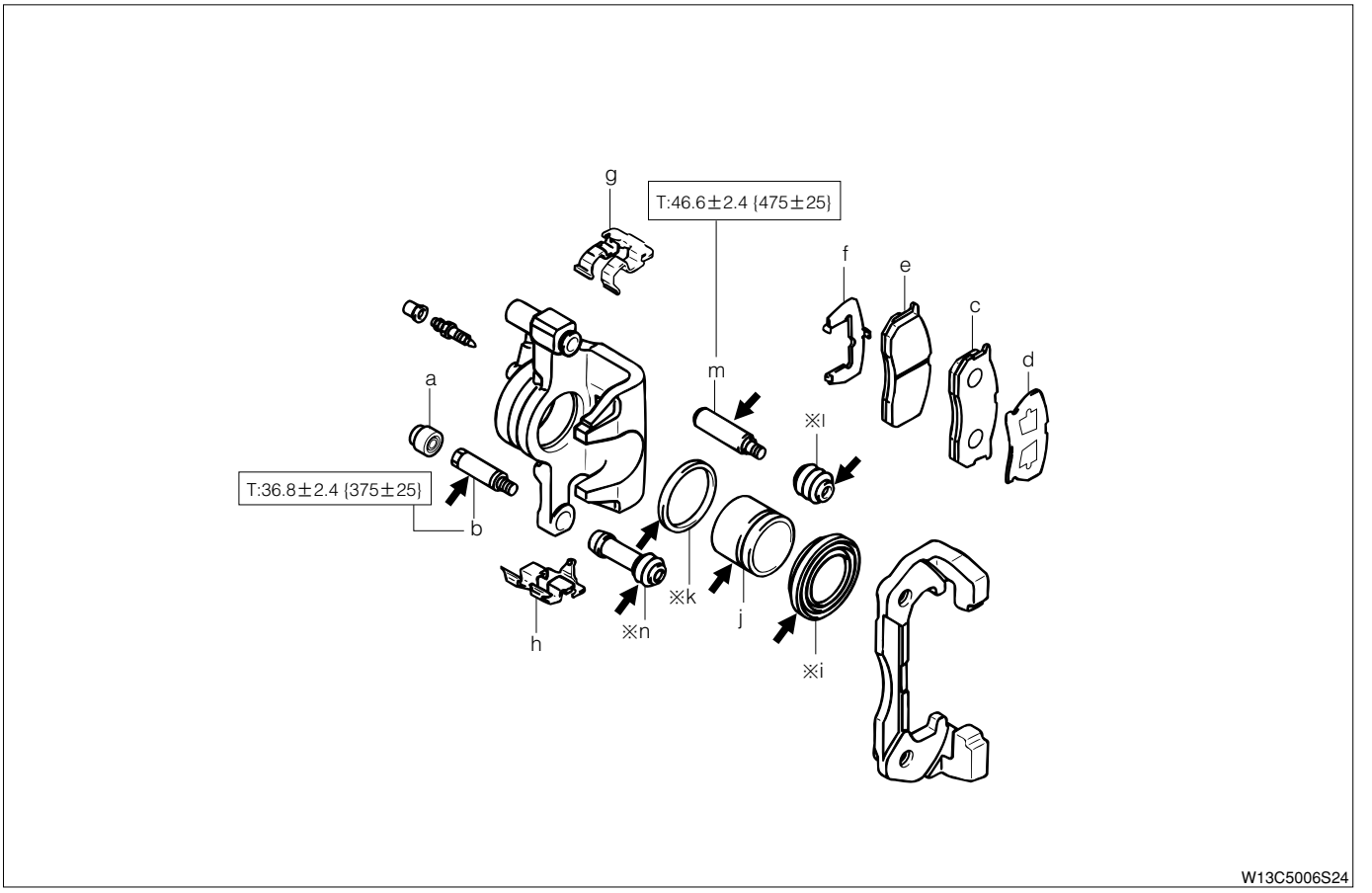
NOTE

- Only in cases where the installation (Or assembly) can not be carried out by reversing the removal (Or disassembly) procedure, the installation (Or assembly) procedure is provided.

5. In cases where a special procedure is required for the operation, a marking "▼▲" is provided in front of the removal (Or disassembly) procedure. Furthermore, explanation is given in the "Main points of Removal (Disassembly)" or the "Main points of Installation (Assembly)."
   The marking "▼"shows that there are the "Main points of Removal (Disassembly)," whereas "▲" shows that there are the "Main points of Installation (Assembly)."

2-2-1 ENTRY EXAMPLE

(1) Components



➡ : Rubber grease
※: Non−reusable part
Unit:N·m{kgf·cm}

(2) Disassembly and assembly procedures

	1	a	Cap, cylinder slide pin	8	h	Plate, disc brake pad guide
	2	b	Pin, cylinder slide, No.1	9	i	Boot, cylinder
▲	3	c	Pad, disc brake, No.2	▼ 10	j	Piston, disc brake
	4	d	Shim, anti squeal, No.1	11	k	Seal, piston
▲	5	e	Pad, disc brake w/ indicator. No.1	12	l	Boot, pin
	6	f	Shim, anti squeal, No.1	13	m	Pin, cylinder slide, No.1
	7	g	Plate, disc brake pad guide	14	n	Bush, cylinder slide

2-3 DESCRIPTION OF SERVICE STANDARD VALUE

The necessary service standard value for inspection and service operation are described with bold letter in the text as standard and allowable limit. The details of terms are described in the section for definition of terms.

2-4 CONTENTS NOT DESCRIBED IN THIS MANUAL

The description of the next elemental operation may omit in this service manual, but please perform in an actual operation.

1.Jacking operation and lifting operation
2.Cleaning and cleansing of removed parts to perform at need
3.Visual inspection

2-5 DEFINITIONS OF TERMS

SPECIFIED VALUE	This mark shows the standard value at the time of the check or adjustment.
ALLOWABLE LIMIT	This mark shows the maximum or minimum value at the time of the check or adjustment.
DEVIATION	This value refers to the difference between the maximum clearance and the minimum clearance.
WARNING	This symbol means that there is the possibility of personal injury of the operator himself or the nearby workers if the operator fails to follow the operating procedure prescribed in this manual.
CAUTION	This symbol means that there is the possibility of damage to the component being repaired if the operator fails to follow the operating procedure prescribed in this manual.
NOTE	Supplementary explanation which facilitates the operation is posted separately from the explanation. Because of difficulties in measurements to determine specified values, there may be cases where the specified values for simple measurement methods are indicated if malfunctions are unlikely to take place actually.

3 ABBREVIATION CODES

The abbreviation codes that appear in this manual stand for the following, respectively.

ABBREVIATION CODE	ORIGINAL WORD	ABBREVIATION CODE	ORIGINAL WORD
2WD	Two Wheel Drive	LHD	Left Hand Drive
4WD	Four Wheel Drive	LIN	Local Interconnect Network
ABS	Anti-lock Brake System	LSPV	Load Sensing Proportioning Valve
ABV	Air Bypass Valve	LWR	Lower
A/C	Air Conditioner	MIL	Malfunction Indicator Lamp
ACC	Accessory	MP	Multipurpose
API	American Petroleum Institute	M/T	Manual Transmission
A/T	Automatic Transmission	N/A	Natural Aspiration
ATDC	After Top Dead Center	NOx	Nitrogen Oxides
ATF	Automatic Transmission Fluid	OPT	Option
Ay	Assembly	O/S	Over Size
BDC	Bottom Dead Center	PCV	Positive Crankcase Ventilation
BTDC	Before Top Dead Center	PR	Ply Rating
BVSV	Bimetal Vacuum Switching Valve	PTO	Power Take Off
CAN	Controller Area Network	RH	Right Hand
CD	Compact Disc	RHD	Right Hand Drive
CO	Carbon Monoxide	RR	Rear
DLC	Data Link Connector	S/A	Sub-Assembly
DLI	Distributor Less Ignition	SAE	Society of Automotive Engineers
DTC	Diagnostic Trouble Code	SRS	Supplemental Restraint System
DVVT	Dynamic Variable Valve Timing	SST	Special Service Tool
EBD	Electronic Brake force Distribution	STD	Standard
ECU	Electronic Control Unit	SW	Switch
EFI	Electronic Fuel Injection	T	Torque
EGR	Exhaust Gas Recirculation System	T/C	Turbocharger
EPS	Electronic controlled Power Steering	TDC	Top Dead Center
ESA	Electronic Spark Advance	UPR	Upper
EX	Exhaust	U/S	Under Size
F/L	Fusible Link	VCV	Vacuum Control Valve
FR	Front	VSV	Vacuum Switching Valve
GND	Ground	VTV	Vacuum Transmitting Valve
HC	Hydro Carbon	W/	With
IG	Ignition	WVTA	Whole Vehicle Type Approval
IN	Intake	Ⓑ	Bolt
ISC	Idle Speed Control	Ⓢ	Screw
ISO	International Organization for Standardization	Ⓝ	Nut
LCD	Liquid Crystal Display	Ⓦ	Washer
LED	Light Emitting Diode	Ⓒ	Clip
LH	Left Hand		

4 HOW TO GRASP SPECIFIED TIGHTENING TORQUE FOR GENERAL STANDARD BOLT AND NUT

4-1 DETERMINING PROCEDURE FOR TIGHTENING TORQUE FOR GENERAL STANDARD BOLTS AND NUTS

4-1-1 DETERMINING PROCEDURE FOR TIGHTENING TORQUE FOR BOLTS

Determine the strength division of bolts, based on the table below.

Then, obtain the value, based on the tightening torque table.

4-1-2 DETERMINING PROCEDURE FOR TIGHTENING TORQUE FOR NUTS

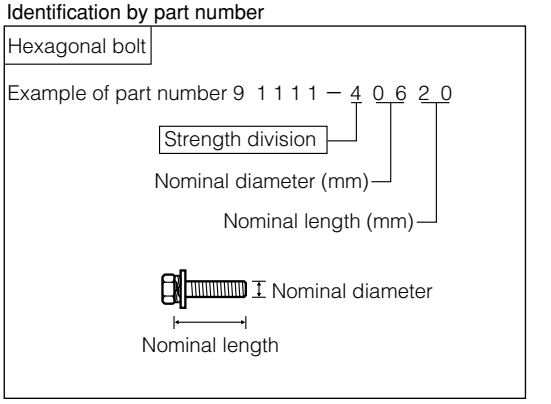
Determine with the aforesaid method, based on the mating bolt.

4-1-3 IDENTIFICATION

Identification of strength division by checking bolts themselves

Classification (Strength division)	Shape of head (how to know strength division)	
	Bolt without collar	Bolt with collar
4 T		
5 T		—
6 T	— —	
7 T		—

Identification by part number



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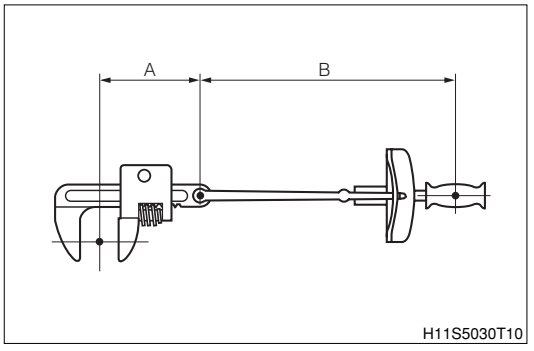
4-1-4 TIGHTENING TORQUE TABLE FOR GENERAL STANDARD BOLTS

Strength divisin	Nominal diameter (mm)	Pitch (mm)	Standard tightening torque (N·m{kgf·cm})	
			Bolt without collar	Bolt with collar
4 T	6	1.0	5.4 {55}	5.9 {60}
	8	1.25	13 {130}	14 {145}
	10	1.25	25 {260}	28 {290}
	12	1.25	47 {480}	53 {540}
	14	1.5	74 {760}	83 {850}
	16	1.5	113 {1150}	—
5 T	6	1.0	6.4 {65}	—
	8	1.25	16 {160}	—
	10	1.25	32 {330}	—
	12	1.25	59 {600}	—
	14	1.5	91 {930}	—
	16	1.5	137 {1400}	—
6 T	6	1.0	7.8 {80}	8.8 {90}
	8	1.25	19 {195}	20.5 {210}
	10	1.25	39 {400}	43 {440}
	12	1.25	72 {730}	79 {810}
	14	1.5	109 {1100}	123 {1250}
7 T	6	1.0	11 {110}	12 {120}
	8	1.25	25 {260}	28 {290}
	10	1.25	52 {530}	58 {590}
	12	1.25	95 {970}	103 {1050}
	14	1.5	147 {1500}	167 {1700}
	16	1.5	225 {2300}	—

4-1-5 WHEN AN EXTENSION TOOL IS USED

1. When tightening with the SST or a tool connected to the torque wrench for a drive-end extension, a higher tightening torque will result, if tightened until the reading on the torque wrench indicates the specified torque.
2. This manual contains specified torques only. When using the SST or an extension tool, the torque wrench reading must be computed using the following formula.
3. Calculation formula: $T' = T \times B / (A + B)$

Codes	Meaning	Unit
T′	Torque wrench reading	N·m{kgf·cm}
T	Specified tightening torque	N·m{kgf·cm}
A	Length of the SST or a tool	cm
B	Torque wrench length	cm



5 UNIT

As for the units, the SI units (International unit system) have been posted. (The hitherto−employed units, too, are posted.)

Example: 33.25±13.25N·m{340±135kgf·cm}

5-1 NEW UNIT BECAUSE OF THE INTRODUCTION OF THE SI UNIT

1.SI unit is the international unit system established by aiming to proceed the communication in technology smoothly by unifying the former unit system which were different internationally each other into one value by one unit. The specification value is described in accordance with SI unit system in this service manual.

ITEM	SI unit	Conventional units	Conversion table
Force	N	kgf	1kgf = 9.80665 N
Torque	N·m	kgf·cm	1kgf·cm = 0.0980665 N·m
Pressure	kPa	kgf/cm2	1kgf/ cm2 = 98.0665 kPa
		mmHg	1mmHg = 0.133322 kPa
Spring constant	N/mm	kgf/mm	1kgf/mm = 9.80665 N/mm
Volume	ℓ	cc	1000cc = 1ℓ
Power	kW	PS	1PS = 0.735499 kW

5-2 PREFIX USED IN SI UNIT

The following are typical prefixes used in SI Unit (10 to the power of n).

M (mega)	10^{6}
k (kilo)	10^{3}
h (hecto)	10^{2}
da (deca)	10^{1}
d (deci)	$10^{-1}=0.1$
c (centi)	$10^{-2}=0.01$
m (milli)	$10^{-3}=0.001$
μ (micro)	$10^{-6}=0.000001$

6 GENERAL SERVICE INSTRUCTION

6-1 JACK UP OR LIFT UP

1.When only front section or rear section of a vehicle is jacked up, be sure to place chocks at the wheels so as to insure safe operations

2.When the vehicle has been jacked up, be sure to support the vehicle at the specified section using the safety stands.

3.When the vehicle has been lifted up, be sure to set the cradle of the lift at the specified location, and lift it up. And after the jacking up, ensure to apply the protective safety device.
And after the jacking up, ensure to apply the protective safety device.

6-2 INSTALLATION AND REMOVAL OF BATTERY TERMINAL

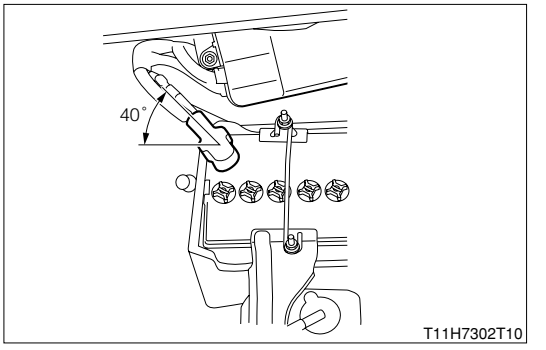
1.Disconnect the battery negative (-) terminal prior to repairing the electrical system, mounting/dismounting the engine, etc.

2.When connecting/disconnecting the battery terminal, turn the IG switch to OFF (LOCK position), and loosen the terminal nut completely. Do not pry the battery terminal off.

3.When the battery terminal is removed, clock, radio setup and the memory of diagnosis will be erased.Record the contents of the memory before disconnecting the battery terminal so that it can be restored as required after the work is complete.

4.When connecting the battery terminal, connect the positive (+) terminal first so that that the terminal wire will be placed in the marked area of the illustration, and tighten to the specified torque.

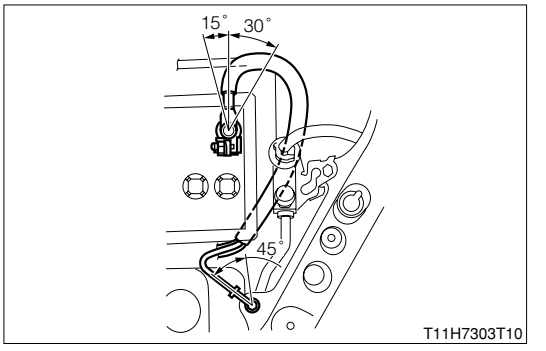
TIGHTENING TORQUE: 6.35±1.45N·m
{65±15kgf·cm}



5.When connecting the battery negative (-) terminal, connect the terminal so that that the terminal wire will be placed in the marked area of the illustration, and tighten to the specified torque.

TIGHTENING TORQUE: 6.35±1.45N·m
{65±15kgf·cm}

6.Securely install the cover, etc. on the terminal after work is complete.



6-3 CONNECTING/DISCONNECTING THE EARTH

1.When the earth was removed, check that the earth is securely in place and then turn ON the IG switch.

6-4 REPAIRING OF FUEL SYSTEM

1.Do not work near open flames.

2.Be certain to place a suitable container, a cloth, etc. under the connected section of the fuel line before disconnecting the fuel line.

3.Before the fuel line is disconnected, be sure to release the inner pressure of the fuel tank by detaching the fuel filler cap.

4.Be sure to prevent the fuel from splashing with a cloth or the like, when the union bolt or other connected section of the fuel line is loosened or slackened.

5.Tighten each connecting section to the specified torque.

6.Attach the specified clips to each connecting section.

6-5 USE OF THE SST

1.Utilize the SST (Special tool) effectively in order to improve efficiency and accuracy of work operation.

6-6 REMOVAL, DISASSEMBLY

1.In case for the operation at the complicate place, the stamping and mating mark shall be put at the place where there is no influence to the function, so that the assembling operation becomes easy.
2.At every time when each parts are removed, check the condition when it was assembled , deformation, breakage, roughness and existence of scratch .
3.Arrange the removed parts in order, and divide them to the parts to replace and parts to reuse .
4.Each parts to be reused shall be performed enough cleaning and cleansing operation.

6-7 CHECK AND MEASUREMENT OF PARTS

1.As regards those parts to be used again, perform thorough checks and measurements, as required.

6-8 INSTALLATION, ASSEMBLING

1.Assemble the good parts with correct procedure following the specified standard (Value for the adjusting , tightening torque).
2.Use the genuine parts when replace the parts.
3.Ensure to apply the seal packing and grease by a place.
4.Ensure to use new packing, gasket or the like, cotter pin etc.
5.When use the seal bolt, apply the specified liquid gasket and seal lock agent on.
6.As for bolts and nuts, use the specified ones. Unless otherwise specified, the side for which the torque is indicated should be tightened to the specified torque, using a torque wrench. If there is no means to prevent the turning at the opposite side, be sure to prevent turning with box wrenches, spanners or the like.

6-9 ADJUSTMENT, OPERATION CONFIRMATION

1.Adjust with the specified service standard value by using the gauge and the tester.

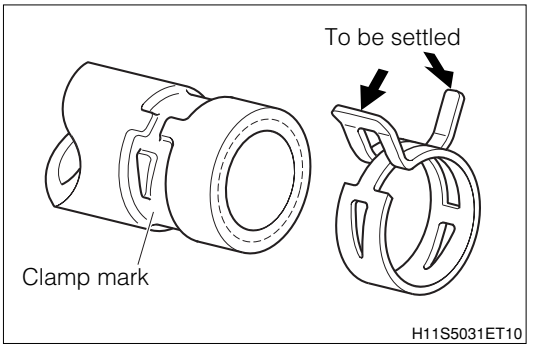
6-10 HANDLING OF HOSE OR THE LIKE

1.Check the plug depth and clamp position before removing the hose.
2.When re-using the hose, install the clamps so that they match the clamp marks remaining on the hose.

CAUTION

- Replace the clamps if they are deformed or flattened.
- Replace the hose a new one if the hose has a loose fitting with the joint.

3.Ensure that the spring type clamp is properly seated after installation.
4.Ensure to insert the fuel hose, water hose or the like without coming out or leakage.
5.Be careful that fuel shall not splash on the parts near by when remove the fuel hose. (Deep care shall be paid for engine mount rubber or the like, as there may be possibility to get material deterioration for liquid of gasoline series.)



6-11 TOUCH UP

1.When removed the bolt or the like during body fitting operation and others, the scratch of the paint finishing surface on the body and bolt shall be repaired by the body color.

7 SUPPORTING POINTS FOR JACKS AND SAFETY STANDS

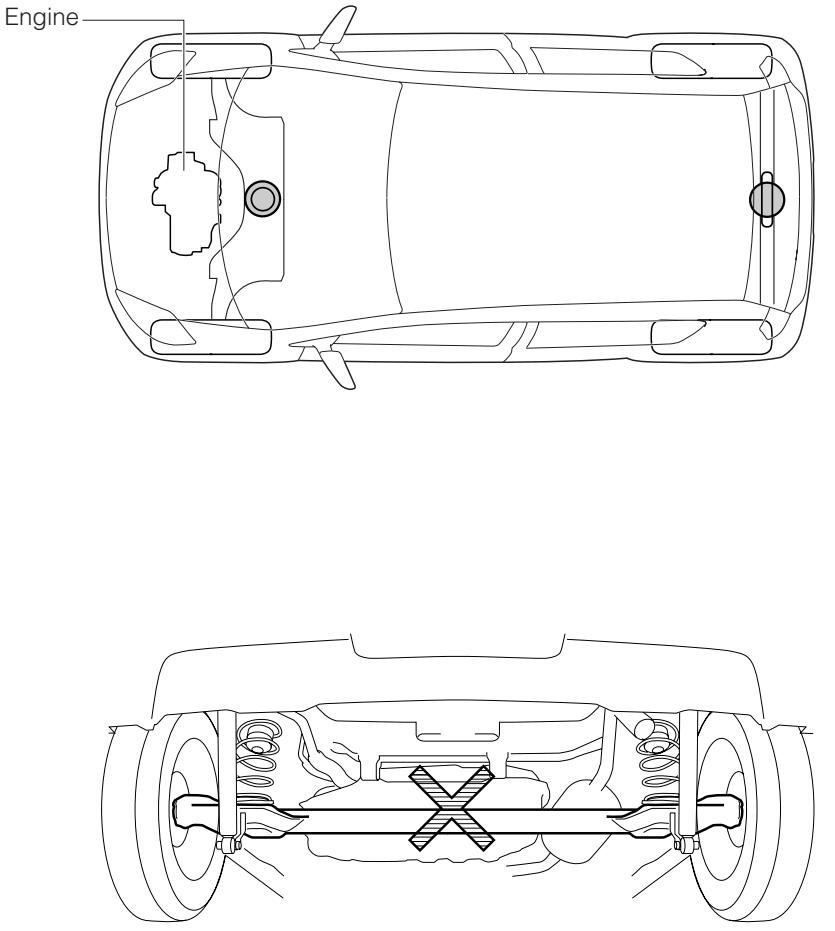
● Jack supporting point

Front side: Front suspension member center protruding section

Rear side: Rear floor cross member center section

CAUTION

- Do not jack up the rear suspension center beam portion.
  Deformation and/or damage to the beam might cause controllability problems.



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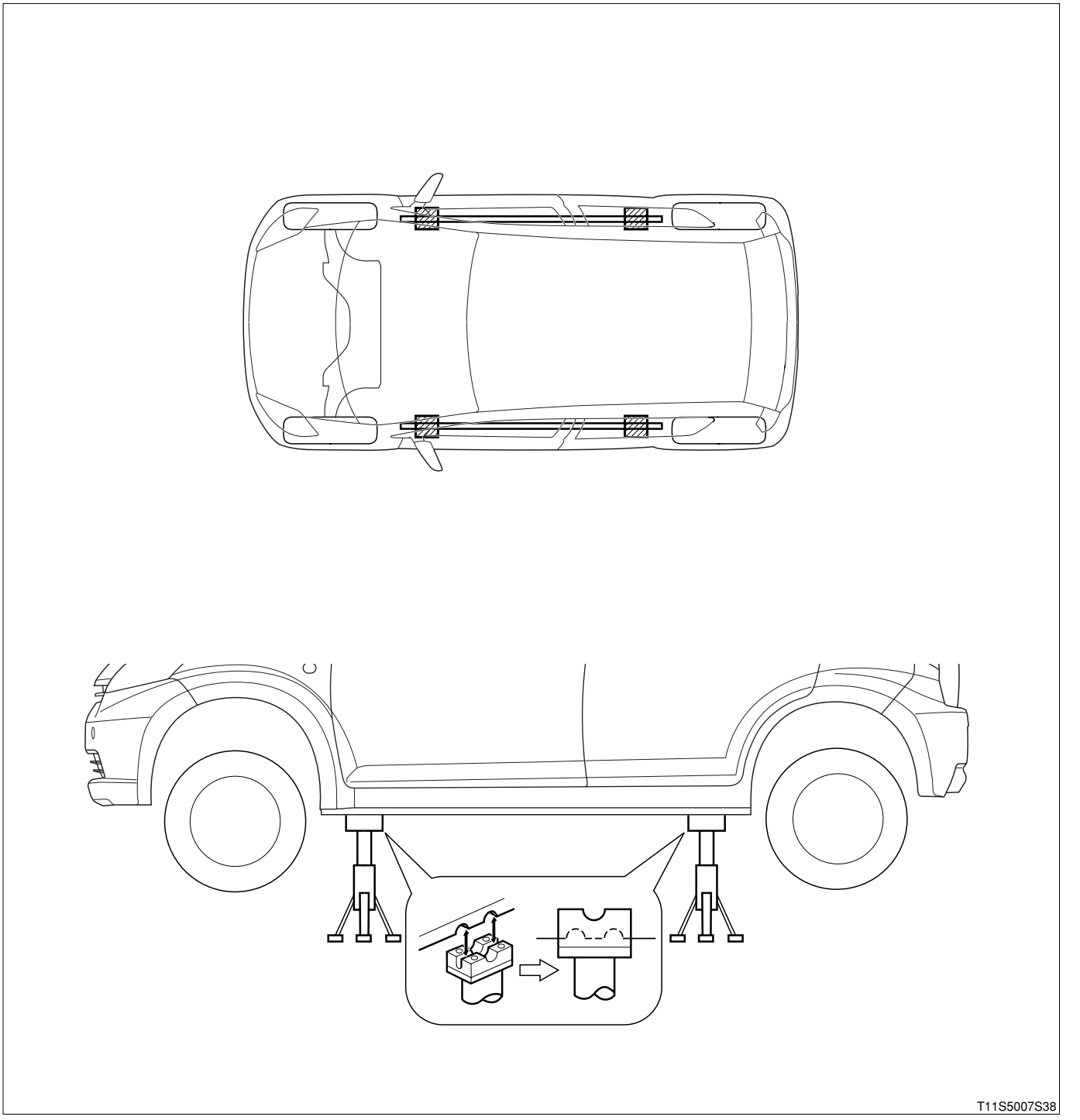
● Rigid rack supporting points

Support 4 locations, namely front, rear, right and left as shown in the illustration below.

CAUTION

- The spot welded reinforcement plate provides adequate strength to the supporting points. Therefore, do not support the vehicle at points other than these supporting points.



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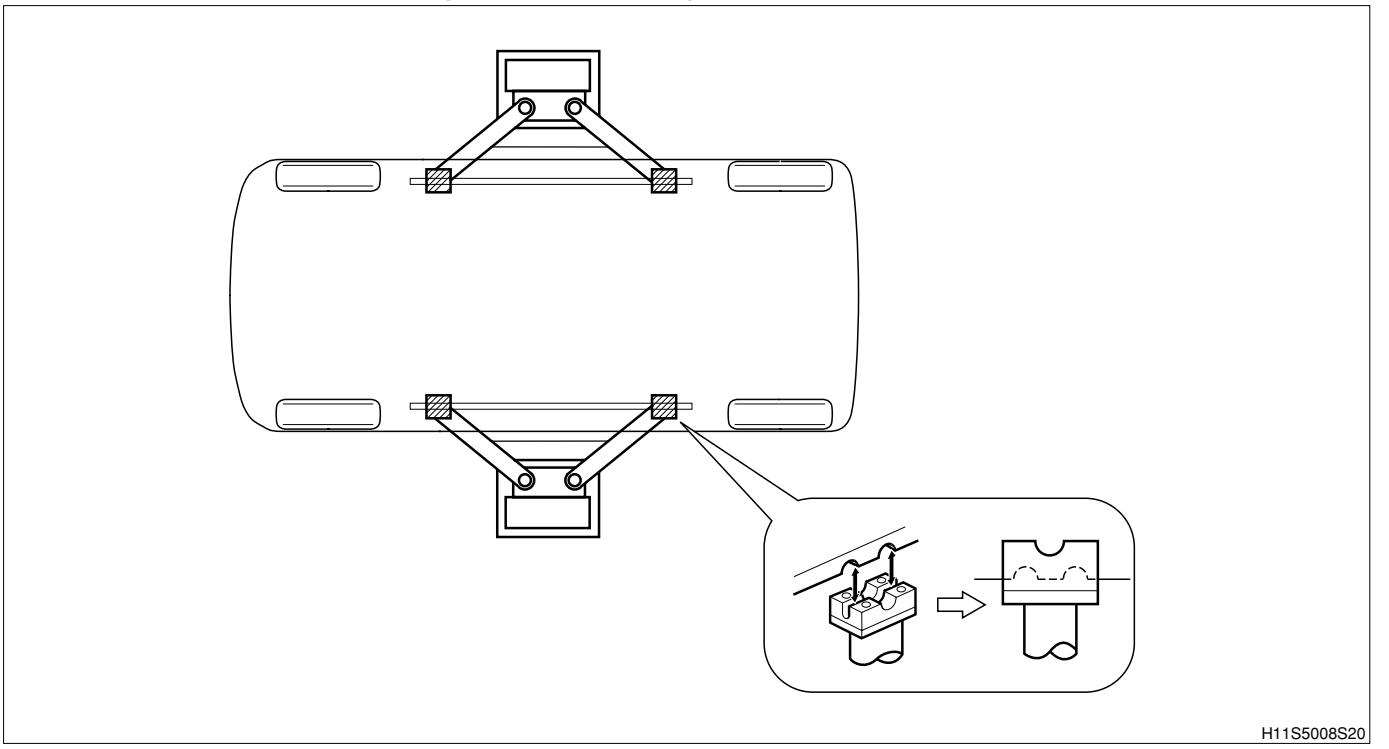
8 SUPPORTING POINTS OF LIFTS

● Swing Arm Type

Match the lift supports with the rigid rack supporting points.



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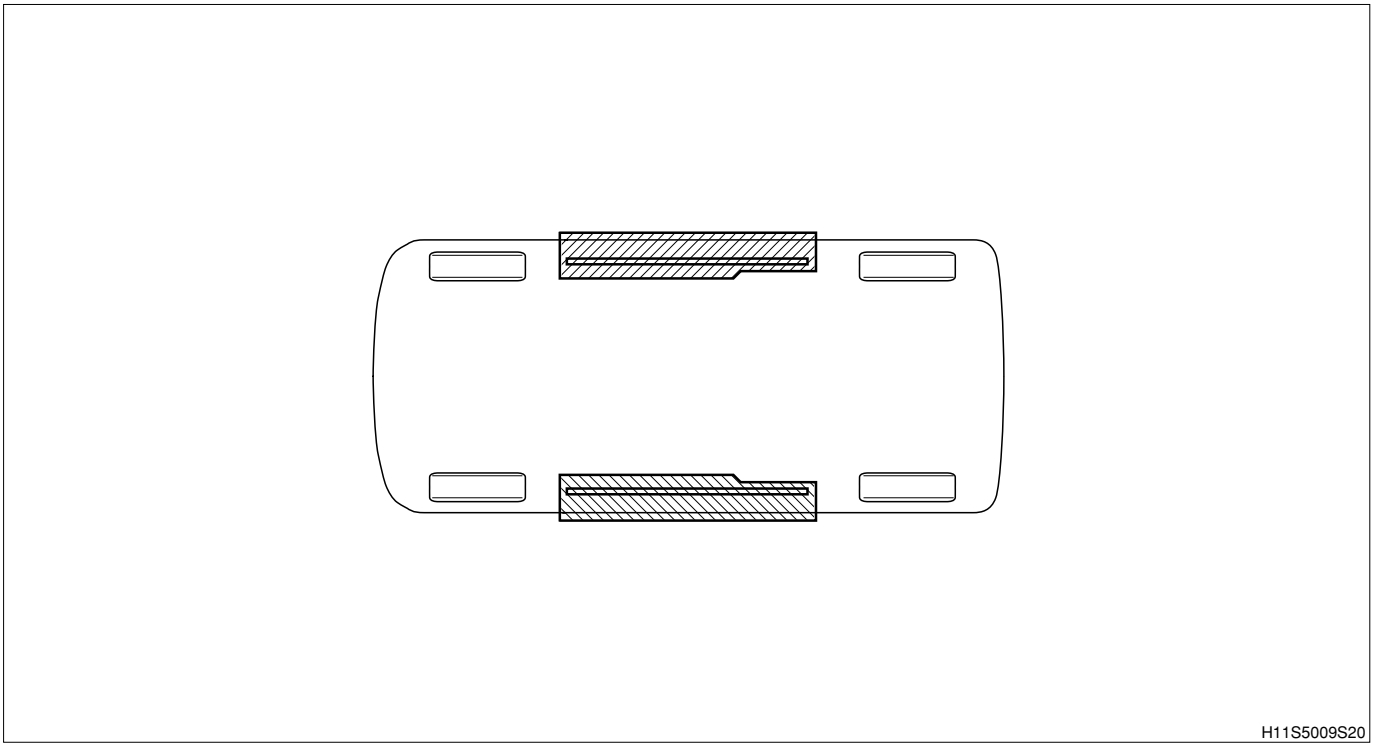
● Plate type

Drive the vehicle onto the center of the right and left supports.

Since the front part is heavier, lift up the vehicle at the front wherever possible.



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9 TOWING INSTRUCTIONS

1.Be certain to transfer the vehicle by using the flat deck truck when the running system and/or driving system seems to be abnormal.

2.Do not tow with the rope for an automatic transmission vehicle.

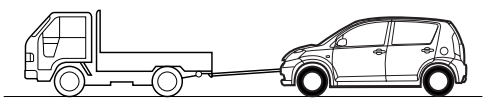
9-1 TOWING WITH ROPE (ONLY FOR EMERGENCY)

Release parking brake, and turn IG switch to ACC position, and then put the shift lever into neutral range.

CAUTION

- Do not tow with the rope for an automatic transmission vehicle.
- Do not tow with the rope when the running system and/or driving system seems to be abnormal.
- When drive with engine stopping, brake efficiency become less due to no functioning of the brake servo system. Depress the brake pedal more powerfully than the usual.

Towing by means of a rope



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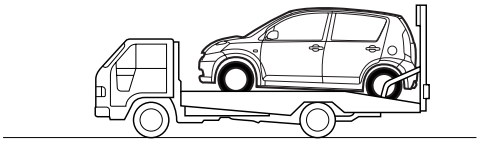
9-2 USING FLAT BED TRUCK

1.Transfer the vehicle with applying parking brake and fixing the vehicle firmly.

Transport on a track



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9-3 WHEEL LIFT TYPE

CAUTION

- Do not allow anyone to be in the vehicle being towed.

9-3-1 TO TOW WITH REAR WHEELS ON GROUND

1.Release the parking brake.

9-3-2 TO TOW WITH FRONT WHEELS ON GROUND

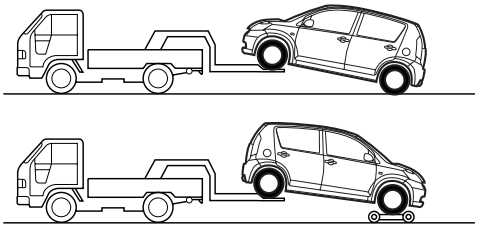
1.Use a towing dolly.

2.If a towing dolly is not available, and turn IG switch to ACC position, and then put the shift lever into neutral range (For manual transmission vehicle).

CAUTION

- For an automatic transmission vehicle, be sure to always use a towing dolly.

Wheel lift type



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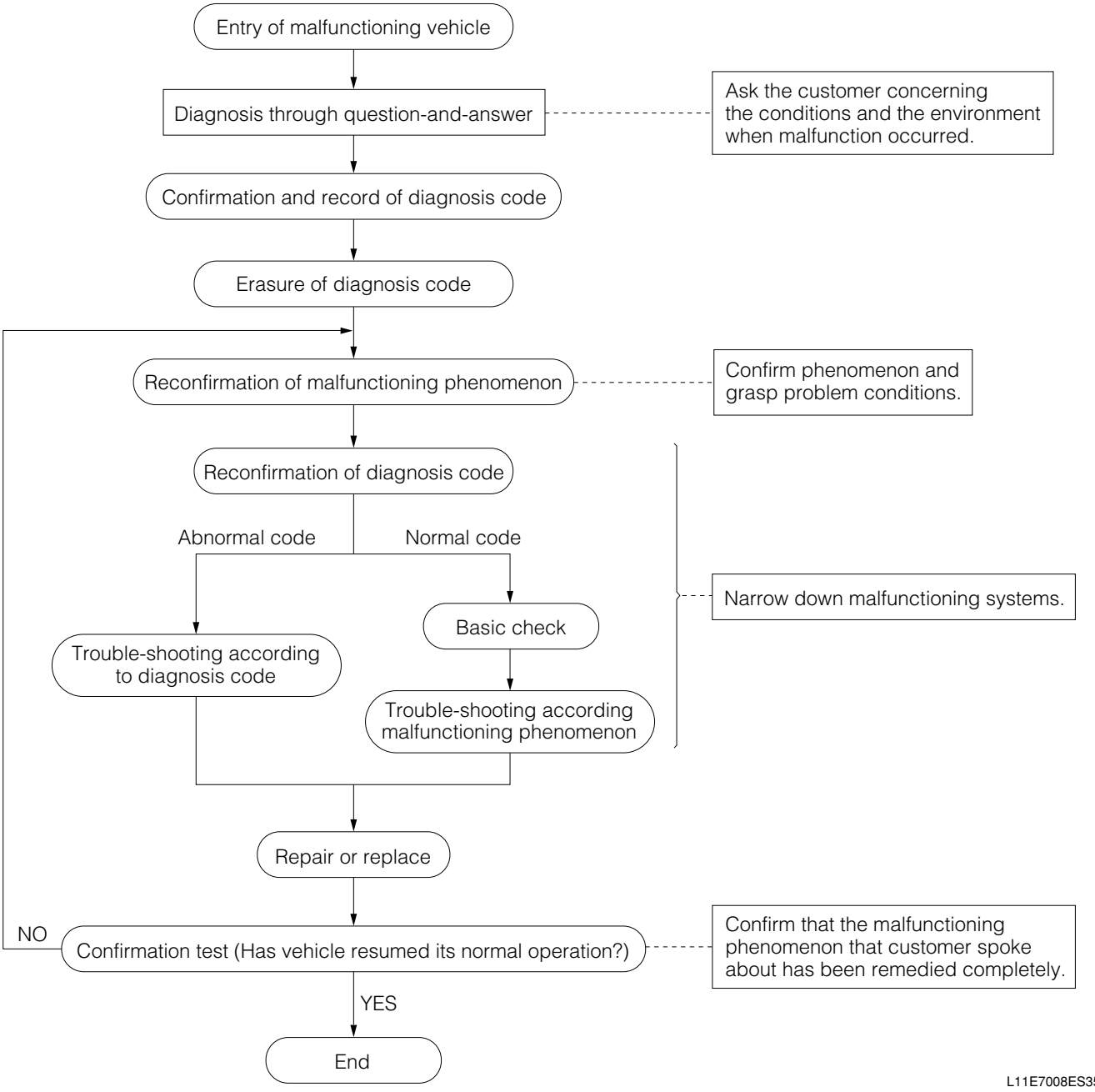
10 DIAGNOSTICS INSTRUCTIONS

10-1 HOW TO PROCEED DIAGNOSIS

1.Each electronic control system equipped on the vehicle is an important clue at performing trouble shooting. Also this system has self−diagnosis function to inspect the malfunction portion which occurred in corresponding system, and battery back up (The function that power source for diagnosis code memory is supplied even if IG switch is OFF) is equipped for self−diagnosis function of electronic control system with, and is designed so that diagnosis code is memorized to each system. As the function of diagnosis code memory is different by each system, perform the confirmation / elimination of code memory according to the right operation procedure after confirming equipped diagnosis code memory function.



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10-1-1 SYMPTOM CONFIRMATION

1.When conducting a trouble shooting, the operator cannot pinpoint the cause for the malfunction, unless he actually confirms the phenomenon. For this purpose, it is indispensable to reproduce the malfunctioning phenomenon by creating conditions and environments that are similar to those where the malfunction actually took place, based on the information obtained through the inquiry with the customer. As for phenomena which cannot be reproduced easily, it is necessary to produce running conditions that are close to those when the malfunction took place (Road surface condition, weather condition, and driving condition), based on the information obtained through the inquiry with the customer. To this end, it is of great importance to try to reproduce the malfunction persistently by applying external factors, such as vibration (Moving wire harnesses and relays by hand), heat (Applying hot air), and water (Applying moisture). Furthermore, while the malfunction phenomenon is being reproduced, it is essential to check diagnosis codes indicated before and after the confirmation of the malfunction phenomenon. Checking whether the code that was indicated before the confirmation is outputted or not is also an important step for confirming the malfunction phenomenon.

10-1-2 CUSTOMER PROBLEM ANALYSIS

1.For the vehicle which malfunctions occurred, confirm first the malfunction phenomenon, and study the cause and then eliminate the cause. There is possibility that the vehicle does not return to normal condition even if perform many operation without study of cause. An asking about problems is to gather the information from the customer before confirming the malfunction phenomenon, and become an important clue when attempt to reproduce the malfunction. When perform the asking about problem, it is necessary to focus to the items relating to said malfunctions so that information attained with an asking about problems becomes useful reference of trouble shooting.

10-1-3 HOW TO REPRODUCE

The following shows how to reproduce the malfunction phenomenon hard to reproduce with the vehicle stopped by applying external factors (Vibration, heat, water, etc.).

(1) Vibration method (When it is presumed that failure occurs due to vibration)

① Harness

Check to see if malfunction takes place by lightly swinging the wire harness vertically and laterally.

CAUTION

- In the case of harnesses, focus on checking the neck of the connector, a fulcrum of vibration, body pass-through section.

② Connector

Lightly swing the connector vertically and laterally.

(2) Hot/cold temperature method (When it is presumed that failure occurs at hot/cold temperatures)

With a hair dryer or refrigerant, heat or cool the parts of the system thought to be responsible for the malfunction. See if the malfunction is reproduced.

CAUTION

- When heating, do not heat the part beyond +60°C (Temperature at which the part can be touched by hand).
- Do not open the cover for the sensor, ECU, etc. to directly heat or cool the electronic components.

(3) Water spray method (When it is presumed that failure occurs on rainy or humid days)

Apply water to the vehicle and see if the malfunction takes place.

CAUTION

- Do not apply water directly to electronic parts.

NOTE

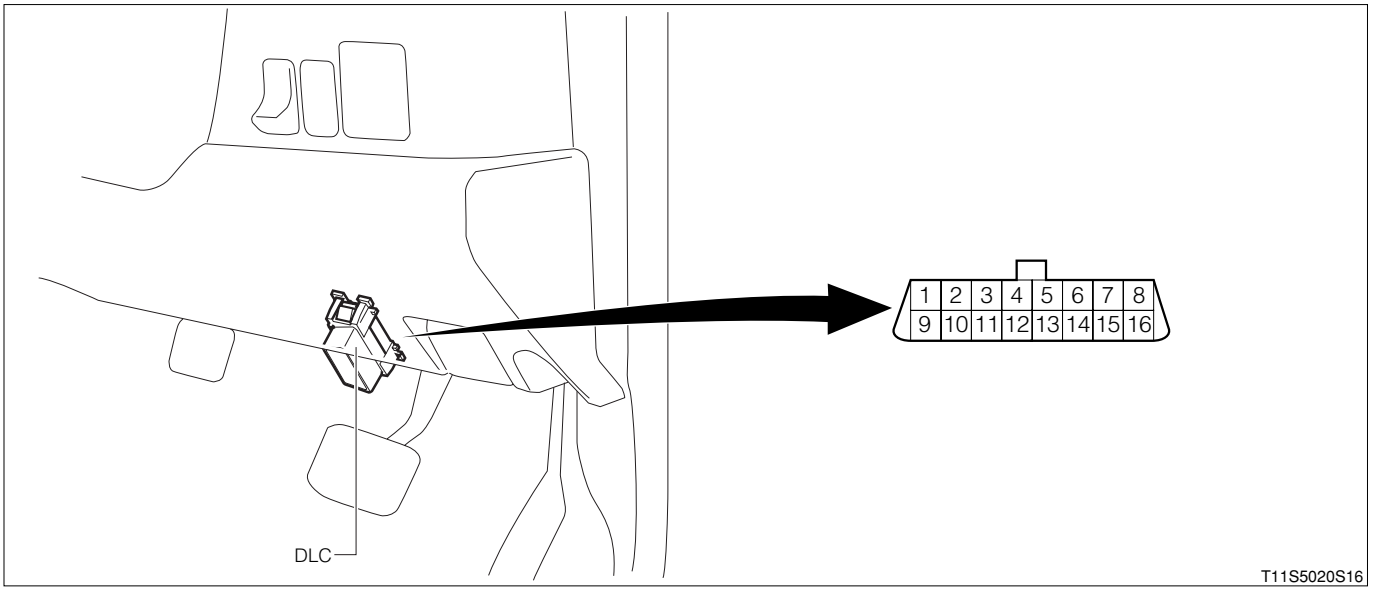
- If rain leak takes place inside the vehicle, the rainwater may go along the harness, entering the inside of the parts. This should be kept in mind especially when the vehicle has had rain leak before.

(4) Others (When it is presumed that failure occurs due to excess electrical load)

Increase the electric load by operating the electric parts, such as the heater blower, headlamps, and rear defogger. See if the malfunction takes place.

11 DATA LINK CONNECTOR

11-1 ARRANGEMENT OF DLC TERMINAL



Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
1	BAT	Battery power supply	9	—	—
2	—	—	10	SIO	DS-21 communication
3	CANL	CAN communication LO	11	CANH	CAN communication HI
4	ECU-T	ECU-T check terminal	12	E	Signal earth
5	EFI-T	EFI-T check terminal	13	E	Body earth
6	—	—	14	EPS-TS	EPS-TS check terminal
7	—	—	15	—	—
8	REV	Engine revolution speed signal	16	—	—

11-2 HOW TO SHORT-CIRCUIT THE DLC

Connect the engine control system inspection wire (SST:09991−87404− 000).

Use the short-circuit terminal (SST:09991−87403−000) and engine speed sensing terminal (SST:09991−87402− 000) to perform system check for each system.

11-3 HOW TO SHORT-CIRCUIT USING THE SST.

1.Diagnostic code output of the engine control system
· · · · ·Short circuit between 5 (EFI-T) - 13(E)
2.Oxygen sensor operation check of the engine control system
· · · · ·Short circuit between 5 (EFI-T) - 13(E)
3.Engine speed check of the engine control system
· · · · ·Measure between 8(REV) and the body earth.
4.Diagnostic code output of the electric power steering
· · · · ·Short circuit between 14 (EPS-TS) - 13(E), and release the short circuit.
5.Diagnostic code output of the A/T control system
· · · · ·Short circuit between 4 (ECU-T) - 13(E).
6.Diagnostic code output of the ABS system
· · · · ·Short circuit between 4 (ECU-T) - 13(E).
7.Diagnostic code output of the SRS airbag system
· · · · ·Short circuit between 4 (ECU-T) - 13(E)
8.Operation check of the ITC computer and the hazard lamp system
· · · · ·Short circuit between 4 (ECU-T) - 13(E).
9.Diagnostic code output of the immobilizer system
· · · · ·Short circuit between 4 (ECU-T) - 13(E).
10.Diagnostic code output of the CAN communication system
· · · · ·Short circuit between 4 (ECU-T) - 13(E).
11.Diagnostic code output of the LIN communication system
· · · · ·Short circuit between 4 (ECU-T) - 13(E)
12.Diagnostic code output of the meter system
· · · · ·Short circuit between 4 (ECU-T) - 13(E).

11-4 HOW TO CONNECT WITH THE DIAGNOSIS TESTER(DS-21/DS-Ⅱ)

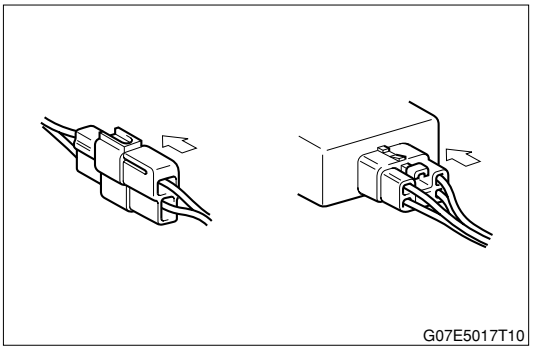
Connect the engine control system inspection wire (SST:09991－87404－ 000).

NOTE

- A terminal to communicate with the diagnosis tester (DS-21/DS-Ⅱ) is installed to the DLC (Vehicles side).

12 INSTRUCTIONS FOR SYSTEM INSPECTION

12-1 HANDLING INSTRUCTION OF CONNECTOR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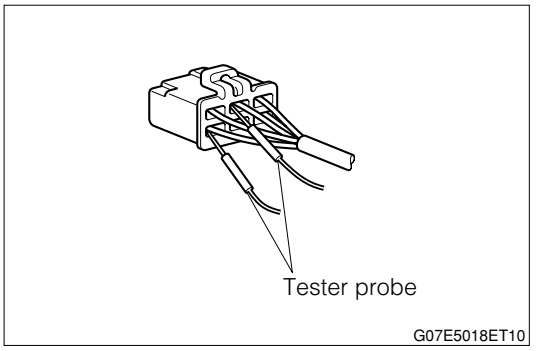
1. Connection or disconnection of the connector and each terminal shall be performed basically after the removal of negative terminal of the battery.
   However, there may be the case that diagnosis code is erased when remove the negative terminal of battery, so confirm the diagnosis code first before the removal of battery negative terminal when need to confirm.
2. When disconnecting connectors, be sure to hold the connector itself with the connector unlocked.
   Never pull harnesses. When connecting connectors, be sure to positively insert the connectors, until you hear a clicking sound and the lock is engaged.
3. When inserting tester probes into a connector, insert them from the rear side of the connector.



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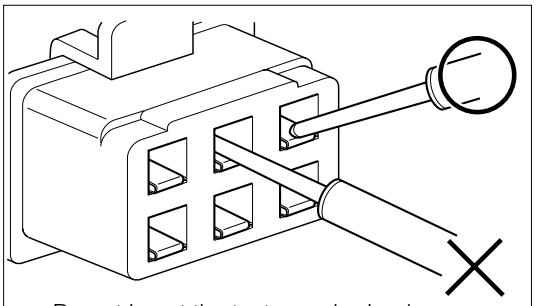
4. For water−proof connectors which cannot be accessed from behind, take good care not to deform the connector terminals.
5. Never touch the terminal of connector directly by hand.
6. When a tester probe is applied to a terminal to which voltage is applied, care must be exercised so that two tester probes may not come in contact with each other so that short circuit may not take place.


Do not insert the tester probe in place.
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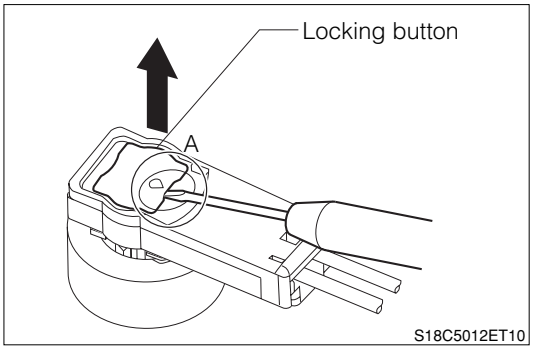
12-2 CONNECTOR REMOVAL/INSTALLATION PROCEDURE

12-2-1 CONNECTOR WITH LOCKING BUTTON

(1) Type 1

① Points of removal

1. Insert a flat screwdriver with a thin forward end (Approx. 2 mm wide) into the locking button at the point A. Raise the locking button, utilizing lever principle, until you hear a clicking sound, thus unlocking the connector.



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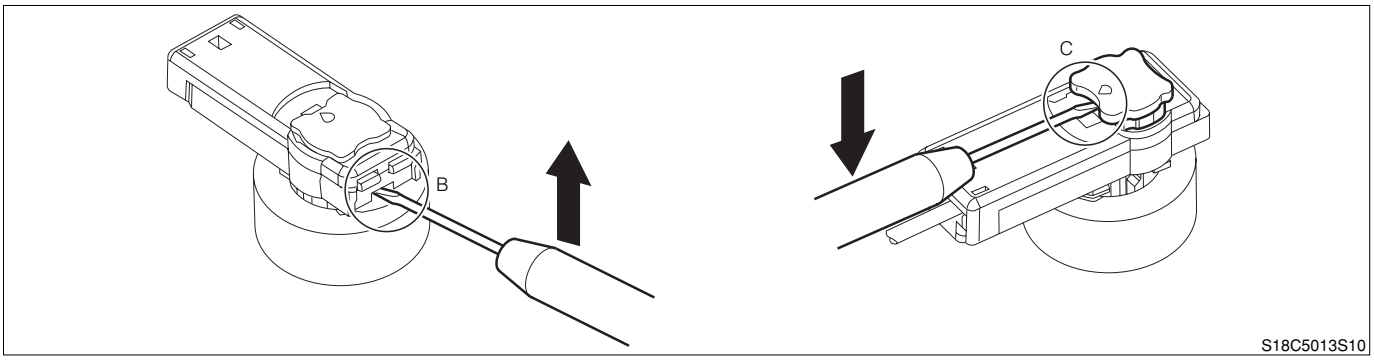
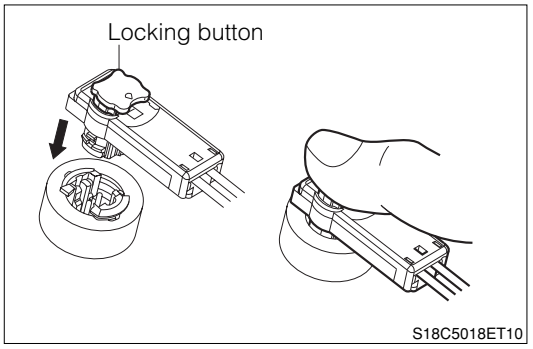
2.Insert a flat screwdriver with a thin forward end (Approx. 2 mm wide) at the point B or C. Pry the point with the screwdriver in the arrow direction, utilizing lever principle, thus removing the connector.



② **Points of installation**

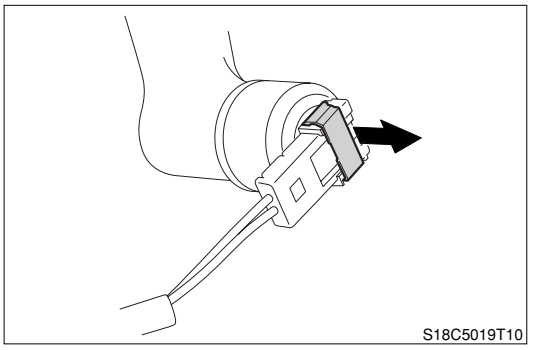
1.Insert the connector firmly as far as it goes. Push and lock the connector, until the locking button clicks.



(2) Type 2

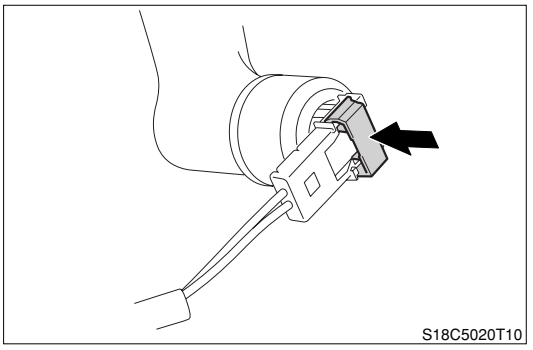
① **Points of removal**

1.With a flat screwdriver with a thin forward end, pull out the locking button in the arrow direction, thus unlocking the lock. Then, remove the connector.



② **Points of installation**

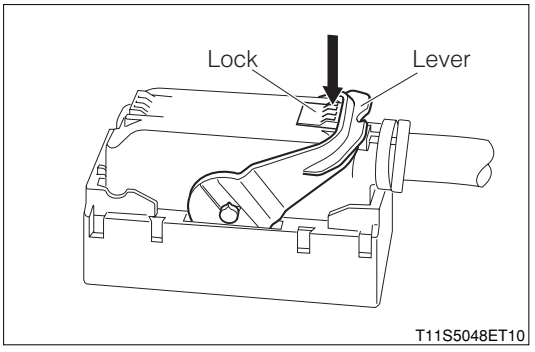
1.Insert the connector firmly as as far as it goes. Push and lock the connector, until the locking button clicks.



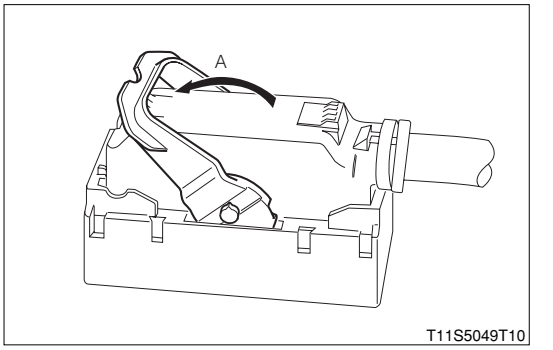
12-2-2 CONNECTOR WITH LEVER LOCK

(1) Points of removal

1.Push the lock of the lever section in the arrow direction, thus unlocking the lock.



2.Turn the lever securely in the direction A to remove the connector.



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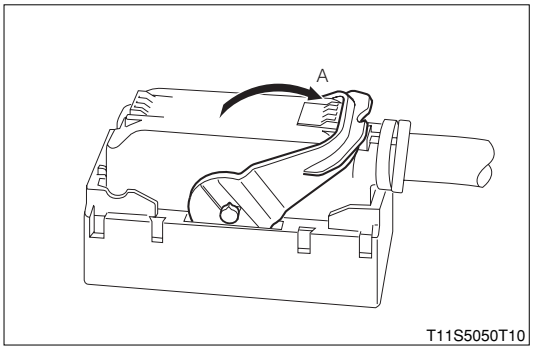
(2) Points of installation

1.Insert the connector to the mating side. Turn the lever in the direction A to lock the connector.



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12-3 CHECK PROCEDURE OF WIRE HARNESS AND CONNECTOR

Perform the inspection of wire harness and connector portion in the distinctive system inspection in accordance with next points.

12-3-1 CONTINUITY INSPECTION

1.Remove the connector of corresponding harness on both ends.

2.Measure the electrical resistance between corresponding terminals of connector on both end.

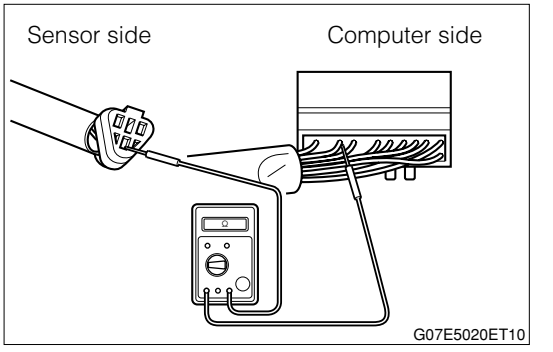
SPECIFIED VALUE: Not more than 1Ω

CAUTION

- Measure the electrical resistance while shaking wire harness in top and down and right and left lightly.

NOTE

- In case of open circuit, as it is seldom that open circuit happen in central part of wiring harness, and most of part the open circuit happen are connector area. Particularly, check the connector of the sensor portion carefully.



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12-3-2 SHORT CIRCUIT INSPECTION

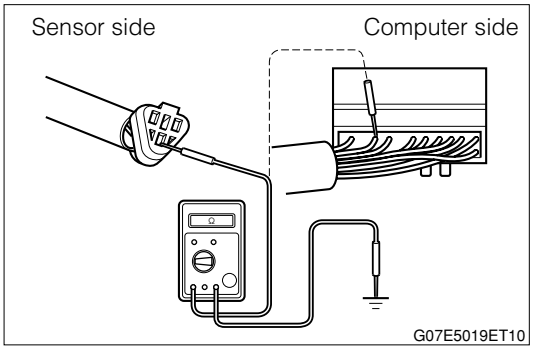
1.Remove the connector of corresponding harness on both end.

2.Measure the electrical resistance between corresponding terminal of connector and body earth connecting. In addition to above, perform the inspection with the connector of each side.

SPECIFIED VALUE: Not less than 1MΩ

CAUTION

- Measure the electrical resistance while shaking wire harness in top and down, and right and left lightly.



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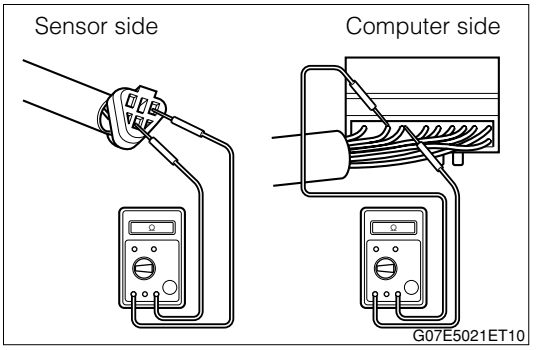
3.Measure electrical resistance between terminals in same connector with the connector of corresponding terminal (Except between each power supply lines or earth lines). In addition to above, perform the inspection at the connector of both sides.

SPECIFIED VALUE: Not less than 1MΩ

CAUTION

- There may be short circuits due to wiring in the vehicle compartment which is pinched by the body or faulty clamps.

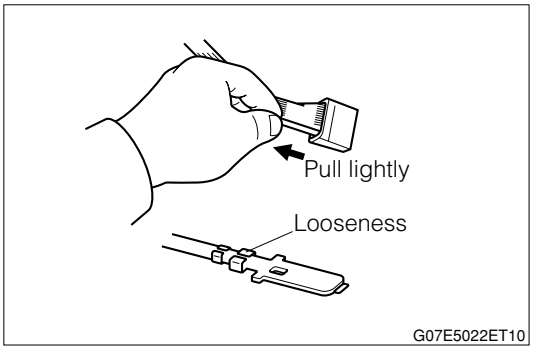


12-3-3 VISUAL INSPECTION, CONTACT FORCE INSPECTION

1.Remove the connector of corresponding harness on both end .

2.Check visually the rust generation or mixing of the foreign material at connector terminal portion.

3.Check whether there are looseness, damage at the staking portion and check coming out from the coupler by pulling the wire harness lightly .



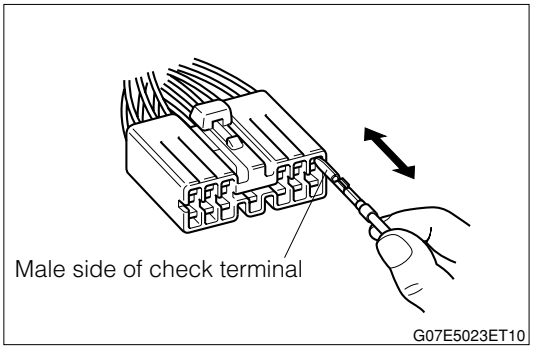
4.Prepare the same male terminal as that of the connector terminal. Insert it into the female terminal and check the pulling force.

The terminal having a smaller pulling force, compared with other terminals, may cause poor contact.

CAUTION

- If the terminal section has rust formation, admission of foreign matters or poor contact pressure between the male terminal and the female terminal, the contact condition may change by disconnecting and reconnecting the connector once, thus resulting in No malfunction.

  Therefore, if the check of the wire harness and connector reveals that there is no malfunction, confirm the malfunction phenomenon. At this time, if no malfunction phenomenon is reproduced, most likely the poor contact between the male terminal and the female terminal was causing the malfunction.



12-4 CIRCUIT INSPECTION OF COMPUTER UNIT

Perform computer unit circuit inspection. If it is malfunction, repair the corresponding connector, circuit, and if normal, change the computer unit.

1.Visual check of connector portion, contact force inspection
Check the connector of computer unit according to visual check and the contact force check point described in former page.
2.Computer unit earth connecting inspection
Remove the connector of computer unit, and then measure the applied voltage between each power source terminal, each earth connector and body earth connecting.
SPECIFIED VALUE: Voltage of each power supply terminal

CAUTION
- At the computer unit circuit check, there may be cases when the malfunction disappears by removing and installing the connectors, due to change of contact condition. Accordingly, when the result of computer unit circuit check is normal, judge that computer unit is malfunctioned after confirming the malfunction again by connecting the computer unit connector.

12-5 HANDLING INSTRUCTION OF SYSTEM

1.The computer unit, sensors, etc. are precision parts. Be very careful not to give strong impacts to those parts during the installation and removal. Never use those parts which impacts have been given (For example, in case where the parts were dropped on the floor).
2.When the test is carried out on rainy day or the vehicle is washed, care must be exercised so that no water may be admitted and the computer unit, connectors, sensors, actuators, etc. may not get wet.
3.In cases where the computer unit was judged to be malfunctioning and the vehicle has been remedied by replacing it, install the removed computer unit (Which has been judged to be malfunctioning) again to confirm that the original malfunction is reproduced. Then the computer unit can be finally judged to have been malfunctioning.

13 INSTRUCTIONS FOR RADIO INSTALLATION

CAUTION
- For those motor vehicles equipped with a mobile communication system, such as a bidirectional wireless telephone and cellular phone, be sure to observe the following precautionary measures.

1.Install the antenna as far away as possible from electronic control system.
2.As the electromagnetic wave is radiated from antenna feeder, set the antenna feeder within the distance at least not less than 300 mm apart from computer unit and ECU harness. Do not arrange both line in parallel for long distance.
3.Never bind the antenna feeder together with the engine harness with binding tape.
4.Regulate the antenna and the feeder to get rid of radio interference.
5.Never install a strong mobile communication system (Exceeding 10 kW).

14 HANDLING INSTRUCTIONS ON CATALYTIC CONVERTER-EQUIPPED VEHICLES

1.Use only unleaded gasoline to catalytic converter—equipped vehicles.
2.Utmost care must be paid as to the following points, for the catalyst will be damaged if a large amount of unburned gasoline flows into the catalytic converter.
(1) Do not operate the engine with the fuel in the fuel tank almost empty.
(2) The spark jump test must be limited to cases where such test is absolutely necessary. Also, be sure to finish the test in the shortest possible time.
(3) The spark check of the spark plug and engine compression pressure measurement must be performed with the fuel pump relay and injector connector disconnected and fuel injection stopped.
3.Do not dispose the waste catalyst along with parts contaminated with gasoline or oil.

15 PRECAUTION FOR VEHICLES EQUIPPED WITH SRS AIRBAG AND SEAT BELT PRETENSIONER

15-1 INSTRUCTIONS FOR SERVICE OPERATION

Be sure to perform the service operation for the vehicle equipped with the airbag and seat belt pretensioner according to the correct procedure and method, otherwise, the airbag or pretensioner may occur the malfunction and lead serious accidents during the service operation.Be sure to perform the service operation according to the correct procedure and method described in this manual.

15-1-1 DISCONNECTING THE POWER SUPPLY

1.Check the diagnosis code, and then disconnect the battery negative (-) terminal with the IG switch in LOCK position. Wait for 60 seconds to start work operation.

(1) The SRS airbag system is provided with a backup condenser (For the squib). Therefore, allow approx. 60 seconds for the backup condenser to discharge after the battery negative (-) terminal is removed. (Natural discharge)

(2) If work is started within 60 seconds, the air bag and the pretensioner may be activated.

(3) The memory of some systems will be erased when the battery negative (-) terminal is removed. Therefore, record memory contents of each system, as required, and input them after the work operation is complete.

2.Turn the IG switch to LOCK and connect the battery negative (-) terminal.

15-1-2 PRECAUTION PRIOR TO SERVICE OPERATION

1.For electrical checks, ensure that a digital circuit tester is used that meets the following standard.

WARNING

- If the tester to be used exceeds the specified value, the airbag and the pretensioner may be activated or damaged.

SPECIFIED VALUE: About 50 mA (0.05A) or less

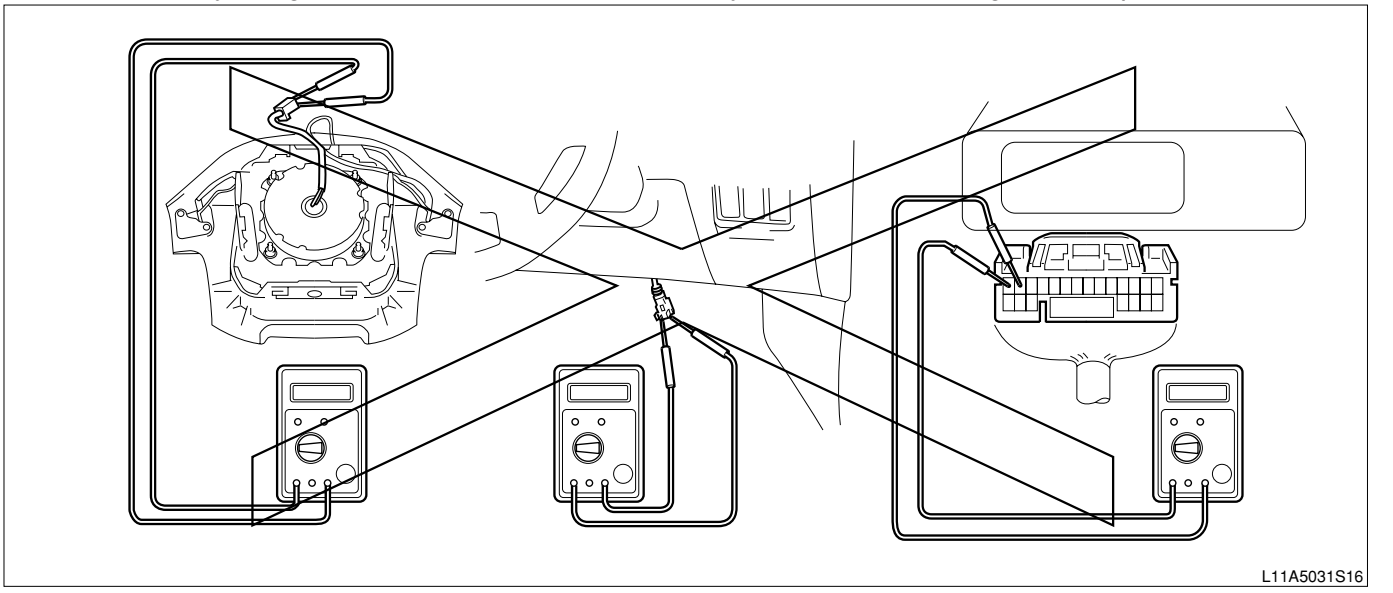
NOTE

- Always measure the current value of the tester to be used before starting work operation to ensure that the tester satisfies the specified value.
- When performing the current measurement for the tester, use the minimum range of the resistance (Ω).

2.When any of the components is removed from the air bag system (Including disconnection of the connector), ensure that the connector is removed in advance so that no accident will be caused inadvertently.
3.Follow instructions given on the label. Replace a stained or damaged label with a new one.
4.Never disassemble.
5.If the part has been dropped or exhibits a crack, dent or chips, replace with a new part.
6.Never use the parts from other vehicles. Always install a new part for replacement.
7.Do not expose parts directly to high temperatures or fire.
8.Even if the airbag and/or the pretensioner have not been activated in a collision, always perform diagnostic checks.
9.Do not apply grease. Prevent detergent, oil, water, etc. from adhering. If this happens, wipe it off immediately with dry cloth.
10.Store in places which are less likely to be exposed to electrical noise, and are not exposed to high temperatures (85°C or higher atmospheric temperatures), or high humidity.
11.Ensure that the airbag is activated with the SST, when the vehicle or the single part is discarded.
12.Never measure the resistance of the air bag components.

WARNING

- This is very dangerous, for the tester's current may activate the air bag and the pretensioner.



15-1-3 CAUTIONS WHEN DISCARDING THE AIR BAG AND THE PRETENSIONER

(1) Before deployment

1.Never scrap the system before activated and deployed.
2.The activation and deployment should be performed at an outdoor flat place where safety can be ensured. Avoid performing this operation in a residential area whenever possible.
3.Since the activating and deploying sound is fairly large, inform persons in the vicinity of the event before those devices are activated.
4.Use the SST and keep at least 5m away from the airbag and the pretensioner to perform a deployment operation.
5.Static electricity may activate deployment. Therefore touch steel frame, vehicle body, etc. that creates earth with bare hands to remove static electricity.
6.During deployment operation, carefully prevent the deployment side from facing down.

(2) After operation

1.The temperatures of some portions exceed a few hundred °C. Therefore, leave them at least 30 minutes after they are deployed.
2.Do not splash water.
3.Wear dust protective goggles and gloves during operation.
4.Place in a clear durable plastic bag and seal the bag to be scrapped.
5.After completion of the operation, be sure to wash your hands with water.

15-1-4 CAUTION TIPS FOR BODY REPAIR AND PAINT

1.When repairing components located close to the airbag system, ensure that the system will not be exposed to a strong hammering shock or high heat.
2.When using an electric welder, remove the air bag system before starting work.
3.When the system is expected to be exposed to a shock or high heat, remove the components from the airbag system before starting work.
4.When coating near the airbag system components is to be dried, ensure that temperature will not exceed 85°C.
5.If the airbag system components have external damage or deformation, replace with new ones.

15-1-5 CASES WHERE THE AIRBAG AND THE PRETENSIONER NEED CHECKING

1.When the vehicle is damaged in a collision, including cases where no deployment or activation has occurred
2.When the diagnostic code is outputted:

15-1-6 CAUTIONS FOR THE AIRBAG AND THE PRETENSIONER

When temporarily placing the airbag during repair work, ensure that the deployment side faces upward. Do not put something on the airbag or lay one airbag on another.

WARNING

- If the airbag should be deployed with the metal side facing upward, a serious accident may result.

15-1-7 CAUTIONS FOR SPIRAL CABLE

When the spiral cable is installed, or the steering wheel is installed/removed, be sure to perform centering.

CAUTION

- If the steering wheel is operated without centering, the spiral cable may be cut.

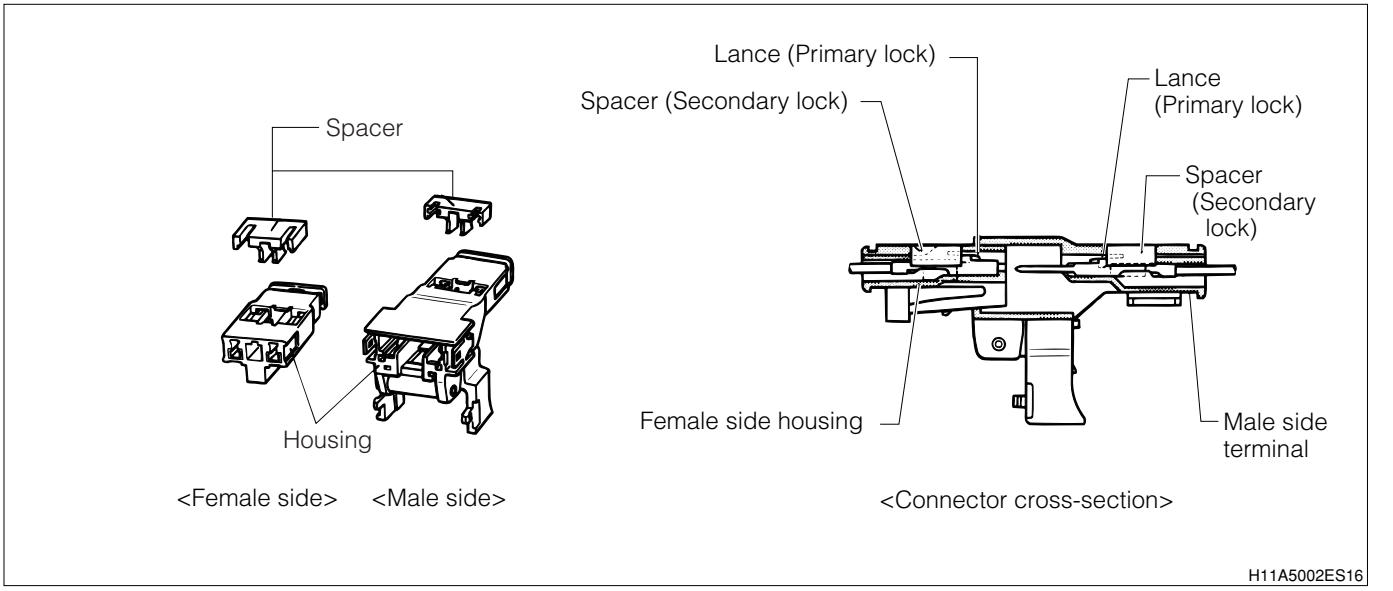
15-1-8 CAUTIONS FOR WIRE HARNESS AND CONNECTOR

All the connectors and the dedicated branch harnesses of the airbag system are colored in yellow, with the exception of exposed portions in the engine compartment. These connectors are special and require special care in handling in order to prevent any damage.

(1) Connector mechanism

① Terminal double lock mechanism

1.The mechanism provides better gripping force of the terminal so as to prevent the terminal from falling.
2.The connector has a two-piece construction consisting of a housing and a spacer, which doubly secures the terminal with the use of the lance (Primary lock) and the spacer (Secondary lock).

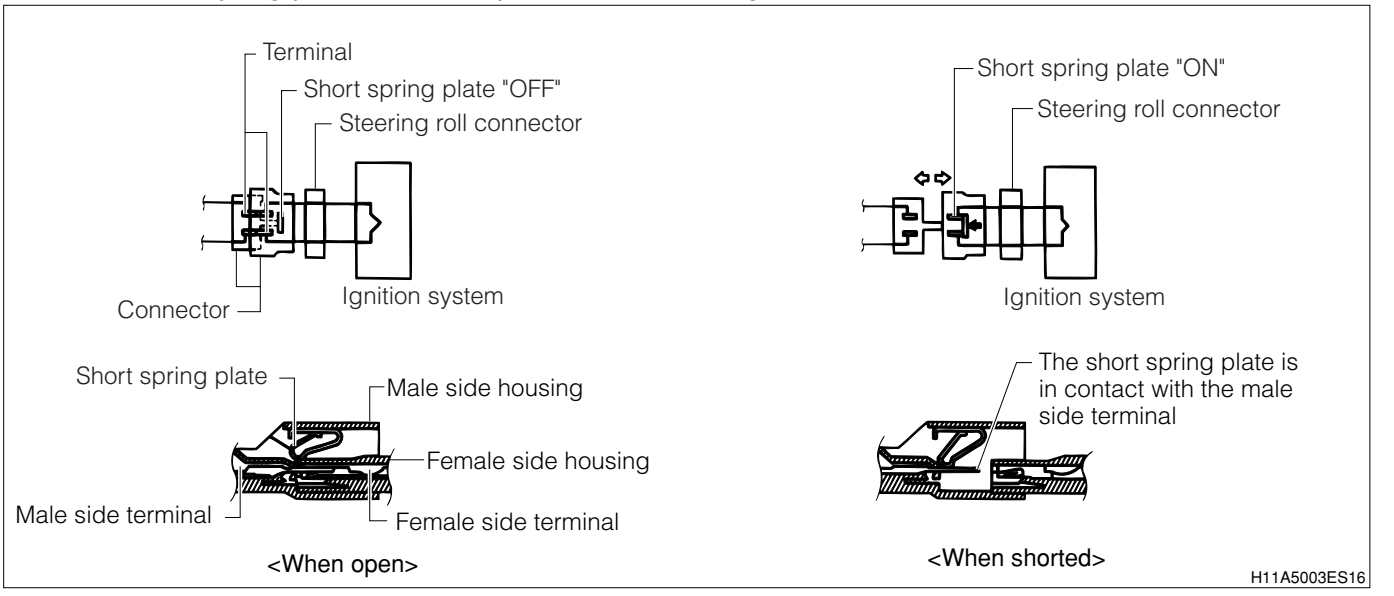


② Terminal short mechanism

1.The mechanism that automatically creates a short-circuit between the terminal on power supply side of the airbag and the terminal on the earth side, when the connector is removed.
2.The short spring plate is installed inside the connector, which creates a closed circuit on the airbag side (Potential difference between the terminals is not created), thereby preventing wrong operation during servicing.

CAUTION

- When checking the harness, the terminal's short-circuit mechanism might lead to incorrect diagnosis, such as a short-circuit condition between the harnesses. When checking the harness, insert the airbag deployment SST (Part number: 09082-87710-000, 09082-00760-000) into the connector to be checked, and check the harness while the SST is connected. If this checking finds faulty condition in the harness, insert an insulator between the short spring plate and the terminal, or remove the short spring plate, and then proceed to checking.

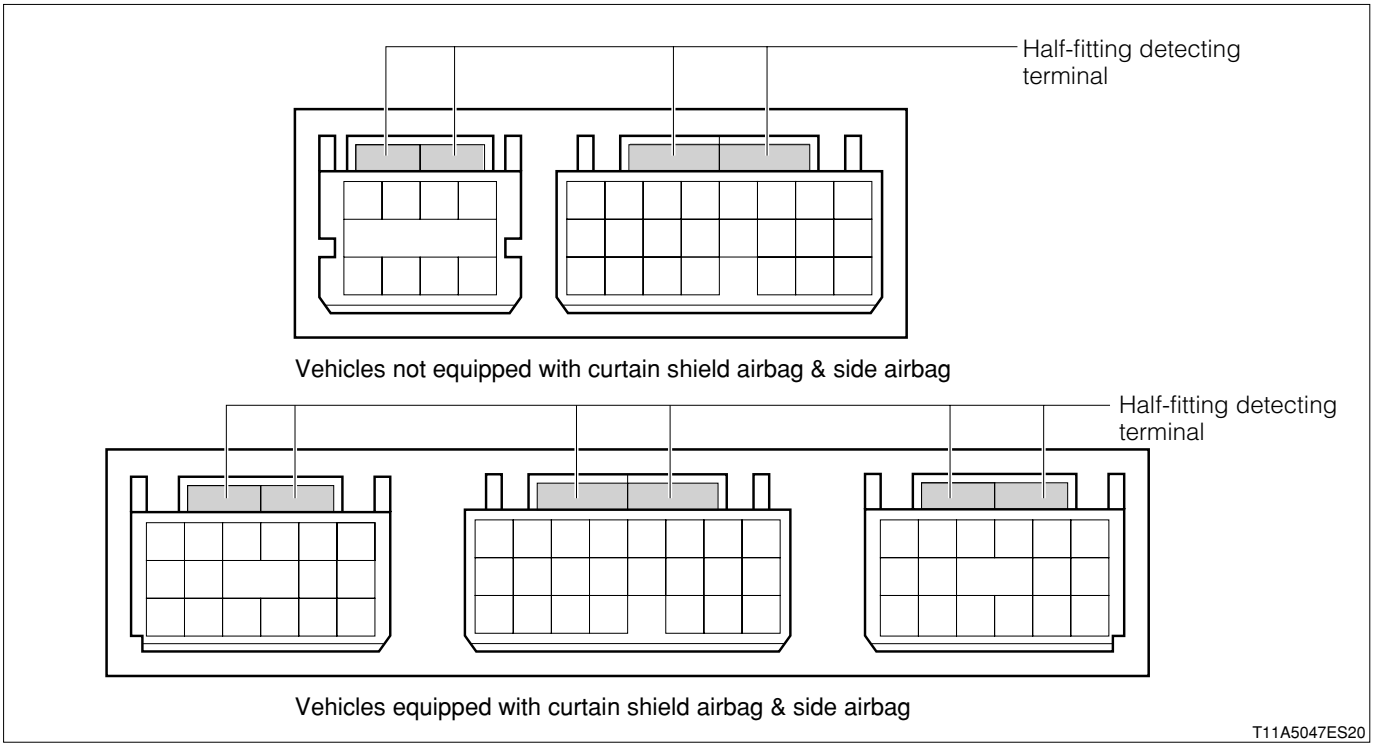


③ Half fit detecting mechanism

1.This is a mechanism which detects whether the airbag ECU is firmly connected with the vehicle side harness connector.

2.When the IG SW is turned ON with the connector half-fit, the airbag warning lamp will remain illuminated.

3.When the airbag system is normal and the connector is firmly connected, the airbag warning lamp is turned off.



16 VEHICLE IDENTIFICATION

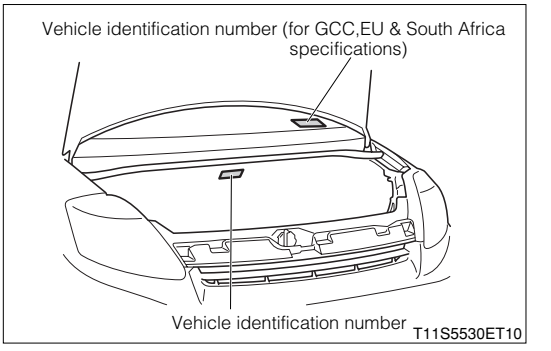
16-1 BODY COLOR CODE

Body color name	Color code
White	W09
Silver metallic	S28
Black mica metallic	X07
Red	R40
Medium coral metallic	R43
Champagne metallic opal	T17
Lime green metallic	G40
Dark blue mica metallic	B42
Light blue metallic opal	B57

Body color name	Daihatsu	AKZO	DUPONT	GLASURIT	NEXA AUTO COLOR	SPIES HECKER	STANDOX	SHERWIN WILLIAMS
White	W09	DAHW09	K9344	DAI-W09	XM48	16461	W09	–
Silver metallic	S28	DAHS28	P6815	DAI-S28	2DFMB	88345	S28	–
Black mica metallic	X07	DAHX07	X1233	DAI-X07	4AFDB	747769	X07	70951
Red	R40	DAHR40	P6814	DAI-R40	2DFLB	88346	R40	–
Medium coral metallic	R43	DAHR43	X1503	DAI-R43	4RYGB	750146	R43	70947
Champagne metallic opal	T17	DAHT17	P9633	DAI-T17	2LJXB	100456	T17	–
Lime green metallic	G40	DAHG40	X1502	DAI-G40	4RYFB	750145	G40	70942
Dark blue mica metallic	B42	DAHB42	F7984	DAI-B42	MXR2B	56568	B42	–
Light blue metallic opal	B57	DAHB57	X1501	DAI-B57	4RYEB	750144	B57	70941

16-2 VEHICLE IDENTIFICATION NUMBER

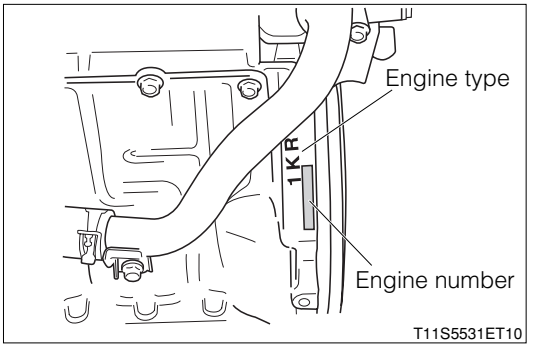
1. The vehicle identification number is stamped on the position as shown in the illustration.



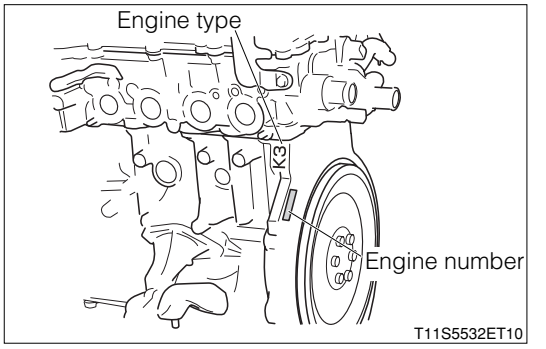
16-3 ENGINE TYPE AND ENGINE NUMBER

1. The engine type and engine number are given on the places as shown in the illustration.

1KR engine

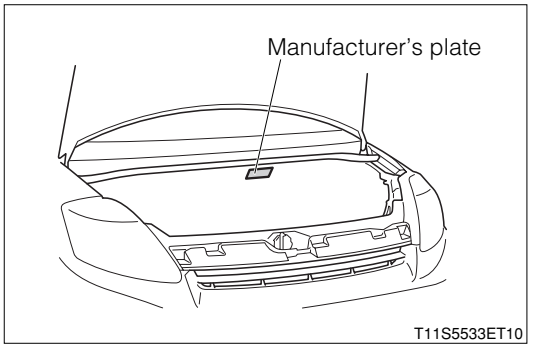


K3 engine



16-4 MANUFACTURER'S PLATE POSITION

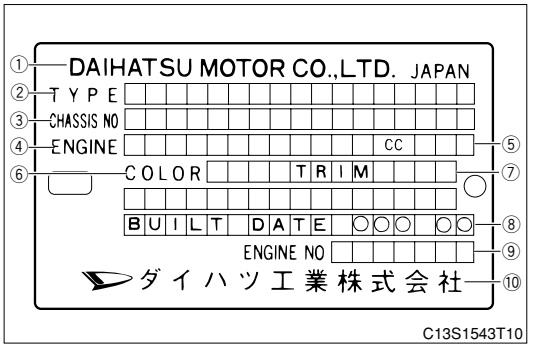
1.The manufacturer's plate is given on the place as shown in the illustration.



16-4-1 CONTENTS OF MANUFACTURER'S PLATE

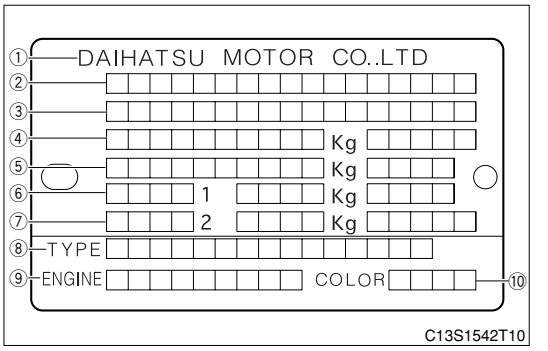
(1) General, Australia,GCC and South Africa specifications

No.	Contents of indication
①	Manufacturer's name, Country
②	Vehicle model
③	Vehicle identification number
④	Engine type
⑤	Engine displacement
⑥	Body colors
⑦	Trim code
⑧	Production month−year (Only for Aus spec.)
⑨	Engine number
⑩	Manufacturer's name in Japanese



(2) EU and Algeria specifications

No.	Contents of indication
①	Manufacturer's name
②	Authorized number of WVTA
③	Vehicle identification number
④	Gross vehicle weight
⑤	Gross combination weight
⑥	Maximum permissible front axle weight
⑦	Maximum permissible rear axle weight
⑧	Vehicle model
⑨	Engine type
⑩	Body colors



16-5 CERTIFICATION REGULATION PLATE POSITION

1.The certification regulation plate is given on the place as shown in the illustration.

16-5-1 CONTENTS OF CERTIFICATION REGULATION PLATE

(1) GCC specifications

No.	Contents of indication
①	Manufacturer's name, Country
②	Production month−year
③	GVM
④	GAW
⑤	GAW FR
⑥	GAW RR
⑦	Statement of conformity with Gulf Standards
⑧	Vehicle identification number
⑨	Vehicle category

TO INDEX

A2 MAINTENANCE

MAINTENANCE REQUIREMENTS ------- A2 - 1
MAINTENANCE SCHEDULE ---------- A2 - 2
SEVERE DRIVING CONDITION ---------- A2 - 4

1 MAINTENANCE REQUIREMENTS

1. The scheduled maintenance service is important to ensure trouble-free, safe and economical driving. Failure to perform the scheduled maintenance may cause an accident or serious damage.
2. If you conduct the periodical maintenance, Daihatsu car owners may reduce the chance of accidents or car problems. Furthermore, it becomes possible for you to find at an earlier stage malfunctions which may lead to serious damages. Consequently, potential vehicle damage can be prevented or the degree of the damage can be minimized.
3. Therefore, all of the persons who are concerned with servicing the Daihatsu vehicles should offer the periodical maintenance service to Daihatsu car owners in order that they may be protected from accidents or unexpected problems.
4. To prevent malfunctions in advance, however, conducting the periodical maintenance service only is insufficient. It is essential that owners themselves perform maintenance, such as the pre-starting check described in the owner's manual, so that the vehicle exhibits no abnormal change or phenomenon. Hence, please explain to owners about the necessity of maintenance performed by them.
5. However, malfunction may occur on those vehicles which are always checked by their owners. For instance, if a part instructed to be replaced periodically should be used beyond the replacement intervals and the life of the part has expired, there are cases where malfunction occurs suddenly despite the fact that no malfunction had taken place until yesterday. To prevent such malfunction in advance, be sure to replace parts recommended to be replaced periodically at the specified replacement intervals.
6. This section describes those items of the scheduled maintenance service recommended by the Daihatsu and their intervals. Be sure to observe the maintenance schedule.

2 MAINTENANCE SCHEDULE

1.For improved maintenance, the maintenance schedule has been simplified.

NOTE

- Perform the periodical maintenance at the specified mileage or the time whichever comes first, unless otherwise specified.

2.Continue to perform the periodical maintenance after 90,000 km (54,000 miles) at the same intervals as before 90,000 km.

3.If the vehicle should be operated under severe driving conditions, operated occasionally, operated in dusty areas, repeating short trip, operated under extremely cold climate and/or on salted roads, it is necessary to perform some maintenance items more frequently than the regular maintenance schedule.

4.This maintenance schedule has been prepared based on requirements mentioned in the owner's manual which are to be performed by the Daihatsu owner thoroughly.

○.....Check or inspect ●.....Change or replace

Section	Item		What to do / Inspection interval							
				×1000 km	15	30	45	60	75	90
				×1000 miles	9	18	27	36	45	54
				Years	1	2	3	4	5	6
Engine	Air cleaner element		Cleaning Check ● Damage Change		○	○	●	○	○	●
	Engine oil & oil filter		Change (Use API SH or higher*1)		●	●	●	●	●	●
	Fuel line & connections (Including fuel hoses)		Check ● Crack ● Tightness ● Leakage ● Damage			○		○		○
	Coolant (Long life coolant)		Change		Every 2 years					
	Drive belt (Alternator, water pump, power steering)		Check ● Tension ● Crack ● Damage		○	○	○	○	○	○
	Spark Plug	except for iridium plug	Clean & check ● Condition ● Gap ● Damage			○		○		○
		for iridium plug	Change		Every 90,000km(54,000 miles)					
Exhaust emission control system	Charcoal canister		Check ● Function ● Damage				○			○
	Evaporative emission hoses		Change		Every 8 years					
	Exhaust pipe & muffler mounting		Check ● Tightness ● Damage			○		○		○

*1: Replace every 12,000 km / 1 year, whichever comes first when API SG multi grade oil is used.

○.....Check or inspect ●.....Change or replace

Section	Item	What to do / Inspection interval							
			×1000 km	15	30	45	60	75	90
			×1000 miles	9	18	27	36	45	54
			Years	1	2	3	4	5	6
Power transmitting system	Clutch	Check ● Free travel ● Reserve travel ● Damage		○	○	○	○	○	○
	Manual transmission	Check & Change ● Oil			○		○		●
	Automatic transmission	Check & Change ● Fluid				○			●
	Automatic transmission Oil cooler hose	Check ● Crack, scratch, cut, twist and swelling				○			○
	Propeller shaft	Check ● Tightness ● Rattle ● Damage			○		○		○
	Drive shaft boots	Check ● Damage			○		○		○
Suspension system	Suspension arm (Front) Control arm (Rear) Dust boots Spring Stabilizer	Check ● Tightness ● Rattle ● Damage			○		○		○
Steering system	Steering linkage Gear box Dust boots	Check ● Free play (Steering wheel) ● Tightness ● Rattle ● Damage			○		○		○
	Wheel alignment	Check ● Toe-in				○			○
Brake system	Brake pedal & parking brake	Check ● Free play (Brake pedal) ● Reserve travel (Brake pedal) ● Working travel (Parking brake) ● Tightness ● Rattle ● Damage			○		○		○
	Disc & disc pad	Check ● Wear ● Damage		○	○	○	○	○	○
	Brake hose, tube and P & B valve	Check ● Leakage (Fluid level, connection) ● Loose clamp ● Damage			○		○		○
	Brake fluid	Change		Every 2 years					
	Brake drum & lining	Check ● Wear ● Damage			○		○		○
	Master & wheel cylinder	Check ● Leakage			○		○		○
Chassis & body	Wheel hub nut, other bolts & nuts	Check ● Tightness		○	○	○	○	○	○

3 SEVERE DRIVING CONDITION

Severe driving conditions

1: Pulling a trailer
2: Repeated short trips
3: Driving on rough roads
4: Driving dusty roads
5: Driving in extremely cold climate and/or on salted roads

○.....Check or inspect ●.....Change or replace

Section	Item	What to do / Inspection interval												
			×1000 km	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90
			×1000 miles	4.5	9	13.5	18	22.5	27	31.5	36	40.5	45	49.5	54
			Years	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Engine	Air cleaner element	Cleaning Check ● Damage Change		○:Every 5,000 km (3,000 miles) ●:Every 15,000km (9,000 miles) / 1 year										
	Engine oil & oil filter	Change (Use API SH or higher*1)		●	●	●	●	●	●	●	●	●	●	●	●
	Timing belt	Change		Every 50,000 km (30,000 miles)										
Exhaust emission control system	Exhaust pipe & muffler mounting	Check ● Tightness ● Damage			○		○		○		○		○		○
Power transmit-ting system	Automatic transmission	Change ● Fluid							●						●
Steering system	Steering linkage Gear box Dust boots	Check ● Free play (Steering wheel) ● Tightness ● Rattle ● Damage			○		○		○		○		○		○
Brake system	Disc & disc pad	Check ● Wear ● Damage		○	○	○	○	○	○	○	○	○	○	○	○
	Brake drum & lining	Check ● Wear ● Damage			○		○		○		○		○		○

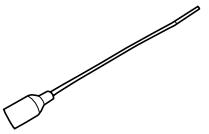
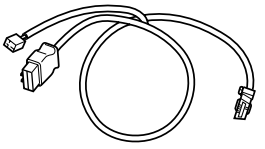
*1: Replace every 5,000km/0.5 year, whichever comes first when API SG multi grade oil is used.

B1 ENGINE

1KR ---------- B1 - 1
ENGINE---------- B1 - 1
ARTICLES TO BE PREPARED --------- B1 - 1
BASIC CHECK AND ADJUSTMENT -- B1 - 2
K3---------- B1 - 18
ENGINE---------- B1 - 18
ARTICLES TO BE PREPARED-------- B1 - 18
BASIC CHECK AND ADJUSTMENT- B1 - 19

■ 1KR
1 ENGINE
1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09991-87402-000	Wire,tacho-pulse pick up
	09991-87403-000	Wire,diagnosis check
	09991-87404-000 (09991-87401-000)	Wire,engine control system inspection

Instrument

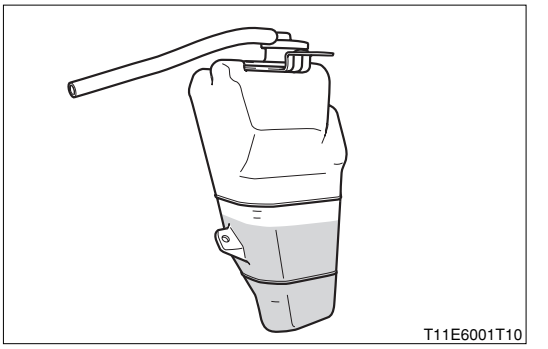
Radiator cap tester,Radiator cap tester adapter,MityVac,Belt tension gauge,Compression gauge,Tachometer,Timing light,Torque wrench,Micrometer,Thickness gauge,Voltage tester,Sound scope,,Plug gap gauge

1-2 BASIC CHECK AND ADJUSTMENT

1-2-1 CHECK OF COOLING WATER LEVEL AND WATER LEAKAGE

(1) Water level

1.Check that the cooling water level is between the upper limit (FULL) and the lower limit (LOW) of the reservoir tank.


T11E6001T10

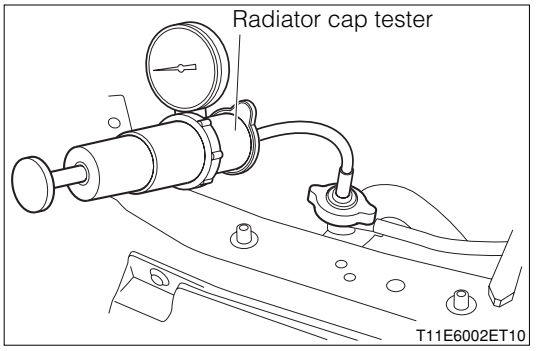
(2) Water leakage

1.With the engine idling, visually check that there is no water leakage from the radiator, radiator hose, water pump, water bypass pipe, water bypass hose, heater hose, etc. Moreover, apply pressure, using a radiator cap tester. Under this condition, check that no water leakage is present.

SPECIFIED VALUE: Specified value for check
122.7kPa {1.25kgf/cm^2}

NOTE

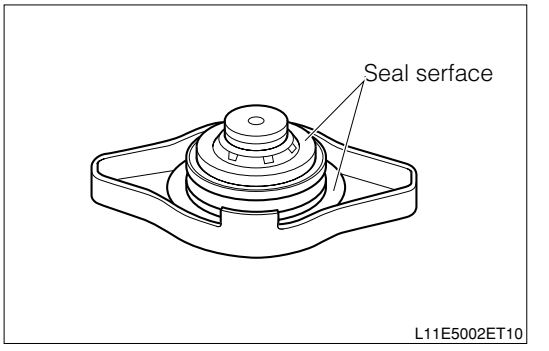
- There may be a small amount of cooling water leaking from the vapor hole and the drain hole of the water pump. However, this is not an abnormality.



T11E6002ET10

(3) Function check of radiator cap

1.Remove the radiator cap. Then, visually check the valve seat surface for smear and damage. Also, move the negative pressure valve by your hand and check that it opens and closes.



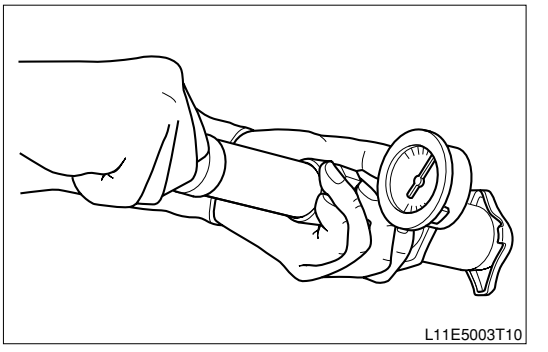
L11E5002ET10

2.Check the valve opening pressure of the cap, using a radiator cap tester.

SPECIFIED VALUE: 108.0±14.7kPa{1.1±0.15kgf/cm^2}

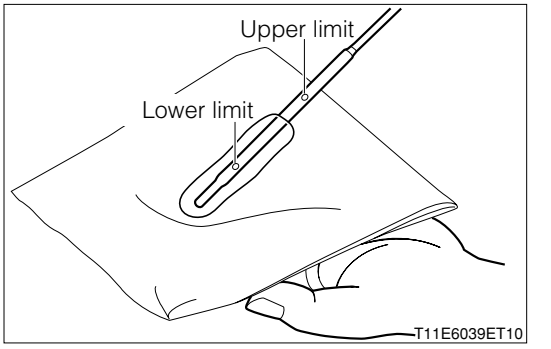
CAUTION

- Liberally apply water to the cap seal surface before the installation to the tester.


L11E5003T10

1-2-2 CHECK OF ENGINE OIL LEVEL

1.Stop the engine. Perform the check on a level place.
2.Pull out the oil level gauge. Wipe out the oil adhered to the gauge and insert it again.
3.Check that the oil level is between the lower limit (L) and the upper limit (F).
4.Check the condition of smear and that there is no white turbidity in the engine oil by observing the oil adhered to the oil level gauge.

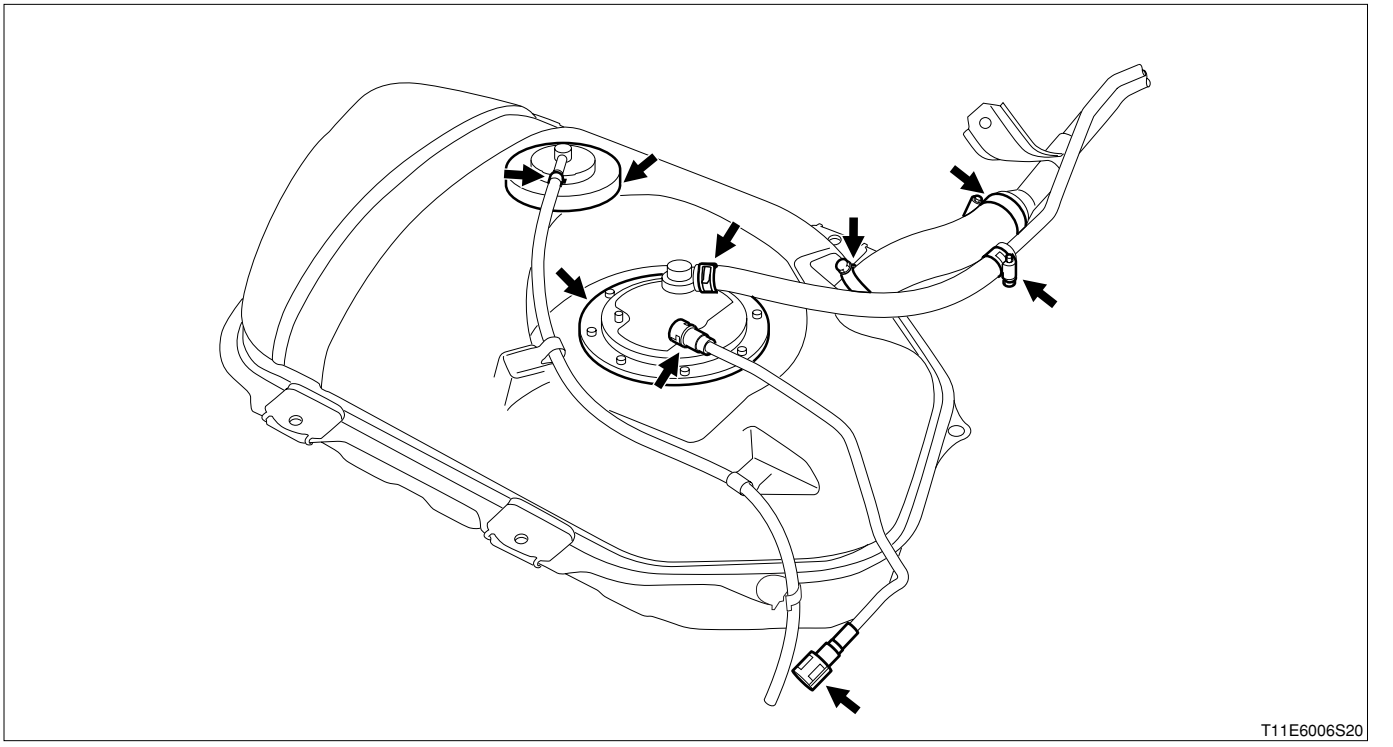


1-2-3 ENGINE OIL LEAKAGE CHECK

1.Visually check that there is no oil leakage from the cylinder head cover, oil pan and drain plug.

1-2-4 FUEL LEAKAGE CHECK

1.Visually check the fuel tank main body, fuel pump, hoses and pipes for fuel leakage.
2.Visually check that there is no crack and damage in the fuel hoses and pipes. Also, check that the installation of the clamp for each hose and pipe is not loosened.



1-2-5 CONDITION OF AIR CLEANER ELEMENT

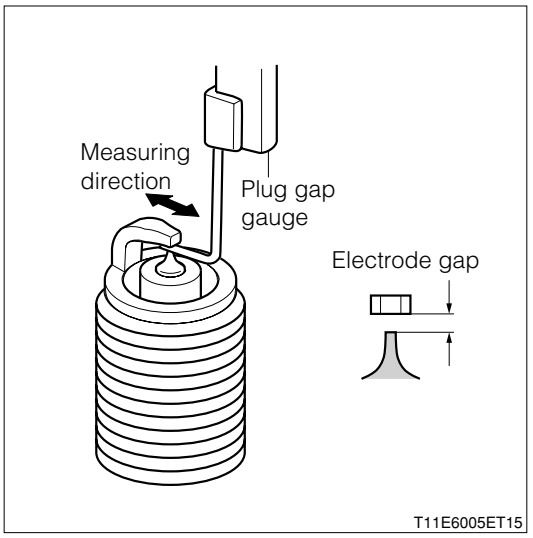
1.Remove the air cleaner element. Then, visually check that there is no smear, clog or damage.
2.In cases where the air cleaner element exhibits smear or clog, clean by blowing compressed air.

1-2-6 CHECK OF SPARK PLUG

1.Ensure that the designated plugs are used. Also, check that the plug exhibits no smoldering and the plug is not burnt excessively. Check to see if the gap between the electrodes is normal.

WARNING

- Be very careful not to get scalded, for the spark plug is very hot.



Spark plug specifications

	Vehicle mounted with Type 1KR-FE engine	
Manufacturer	DENSO	NGK
Type	SK20HR11	ILFR6C11
Kind	Iridium	Iridium
Electrode gap (mm)	1.0 - 1.1	1.0 - 1.1

1-2-7 CHECK AND ADJUSTMENT OF TENSION (DEFLECTION AMOUNT) OF V-BELT FOR ALTERNATOR

(1) Check

1.Check the V-ribbed belt for cracks, deterioration and significant wear.

2.Check the tension of the V-ribbed belt, using a belt tension gauge.

NOTE

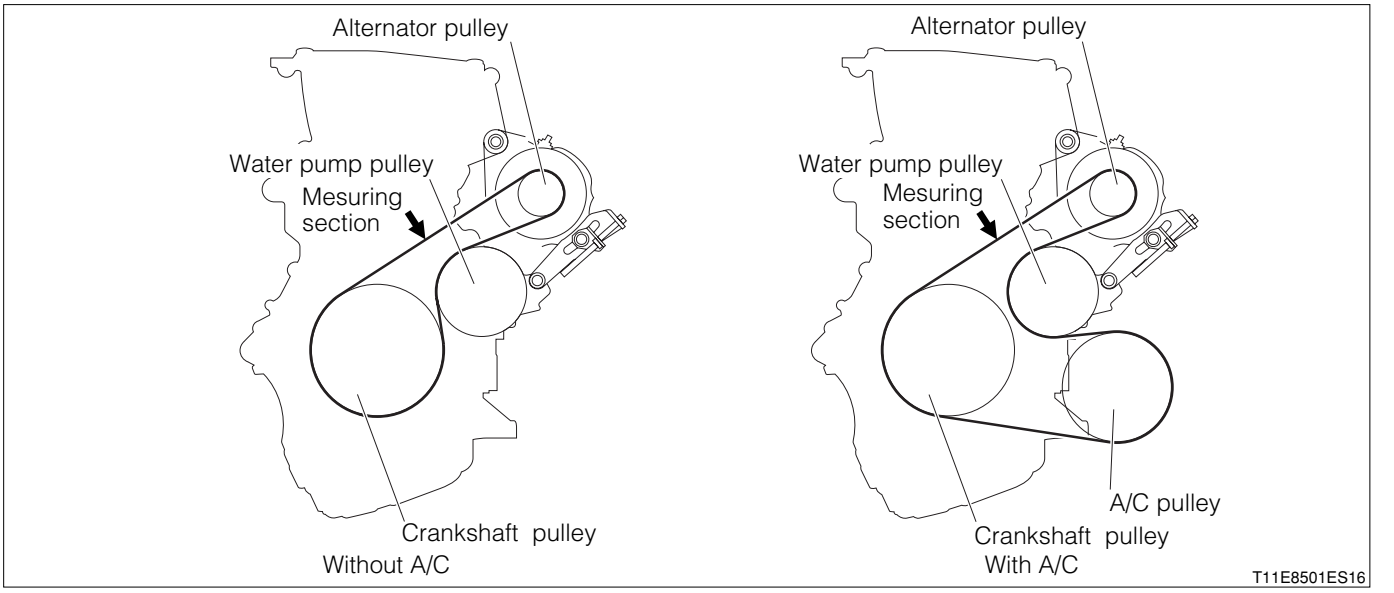
- The check can be performed by measuring the deflection amount of the V-belt.

Specified value

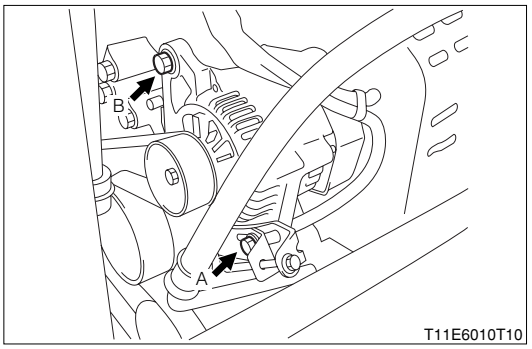
	When a new part is installed	During inspection
Tension value (N{kgf})	780±98{79.6±10.2}	490±100{50±10.2}
Deflection amount (mm) (Pushing force 100N{10.2kgf})	5.8-7.0	8.0-11.0

NOTE

- When checking the deflection amount of the belt, push a point between the alternator pulley and the crankshaft pulley with a force of 100 N (10.2 kgf). Under this condition, measure the deflection amount.
- In cases where the tension is measured after the belt has been assembled, the measurement should be performed after cranking two turns.
- When the belt is replaced with a new one, the belt tension should be adjusted to the mid-value of the specified value for "When a new part is installed."
- If the engine has once started, the belt tension should be adjusted to the mid-value of the specified value for "During inspection."



(2) Adjustment



1.Loosen the bolts (B) for retaining the alternator.
2.Loosen the bolts (A) for retaining the adjusting bar.
3.After loosening, lightly tighten the bolts (A) by hand.
4.Adjust the tension by turning the adjusting bolt of the adjusting bar.
5.Tighten the bolts (A) for retaining the adjusting bar.
6.Tighten the bolts (B) for retaining the alternator
TIGHTENING TORQUE: Bolt A
34.0±6.8N·m
{347±69kgf·cm}
Bolt B
54.0±10.8N·m
{551±110kgf·cm}
7.Confirm the belt tension.

1-2-8 CHECK AND ADJUSTMENT OF VALVE CLEARANCE

(1) Specified value

		Valve clearance (mm)	
Vehicle mounted with Type 1KR-FE engine	IN	During cold period	$0.18^{+0.055}_{-0.035}$
	EX		$0.31^{+0.055}_{-0.035}$

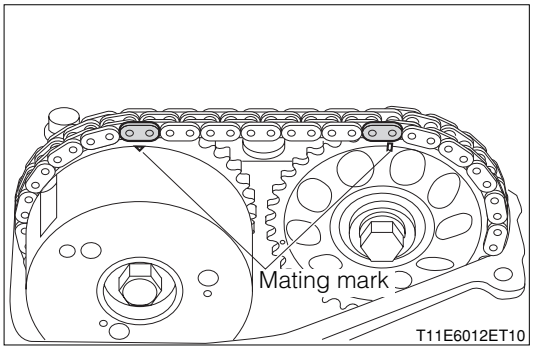
(2) Check

NOTE

- For the removal and installation procedures of each part, refer to the section under "Removal and Installation of Camshaft."

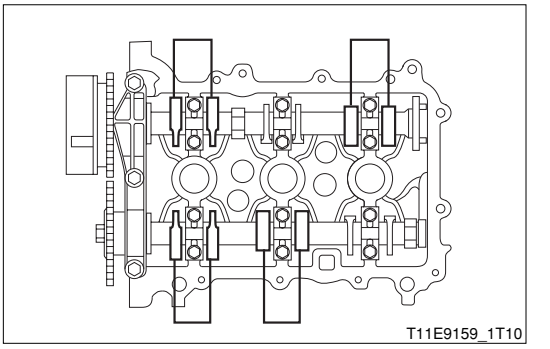
Refer to Page B2-11.

1. Remove the cylinder head cover.
2. Turn the crankshaft in the normal direction, until the timing mark of the crankshaft pulley is aligned with the indicator of the timing chain cover.
3. Ensure that the mating marks at the top of the drive gear and driven gear of the camshaft are aligned with each other. If they are not aligned, make one more turn so that the mating marks are aligned.



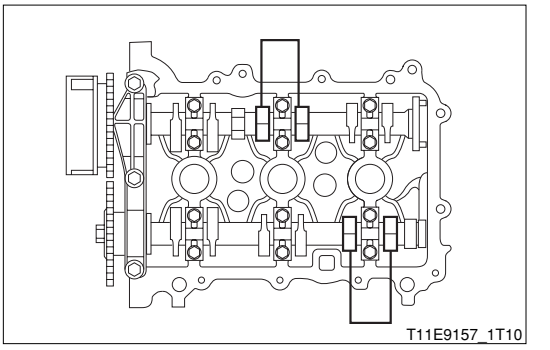
4. Using a thickness gauge, check the valve clearances shown in the right figure.

Cylinder No.1		Cylinder No.2		Cylinder No.3	
IN	EX	IN	EX	IN	EX
○	○	–	○	○	–



5. Turn the crankshaft once so that the cylinder No.1 comes to the exhaust top dead center. Then, check the valve clearance at a position indicated in the figure on the right.

Cylinder No.1		Cylinder No.2		Cylinder No.3	
IN	EX	IN	EX	IN	EX
–	–	○	–	–	○



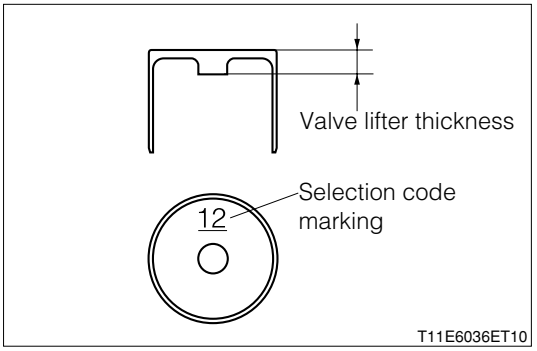
6. If the clearance deviates from the specified value, replace the shim in the following procedure and adjust it to the specified value.

NOTE

- Record the position of the valve where the clearance deviates from the specification, as well as the their measurement results.

(1) Remove the camshafts No.1 and No.2.
Refer to Page B2-11.

(2) Using a micrometer, measure the thickness of the shim that has been removed.
(3) Select the shim, using the following formula given below, so that the valve clearance becomes the specified value.



Intake Valve
(Thickness of shim to be selected)
= (Thickness of removed shim) + [(Measured clearance) − 0.18 mm]
Exhaust Valve
(Thickness of shim to be selected)
= (Thickness of removed shim) + [(Measured clearance) − 0.31 mm]

Shim thickness (mm)

No.	Shim thickness (mm)	No.	Shim thickness (mm)	No.	Shim thickness (mm)	No.	Shim thickness (mm)
12	5.120	28	5.280	44	5.440	60	5.600
14	5.140	30	5.300	46	5.460	62	5.620
16	5.160	32	5.320	48	5.480	64	5.640
18	5.180	34	5.340	50	5.500	66	5.660
20	5.200	36	5.360	52	5.520	68	5.680
22	5.220	38	5.380	54	5.540	—	—
24	5.240	40	5.400	56	5.560	—	—
26	5.260	42	5.420	58	5.580	—	—

(4) Apply engine oil to the circumference of the selected valve lifter. Insert it into the lifter hole.
LUBRICANT: Engine oil

CAUTION
- After insertion, ensure that the valve lifter turns smoothly.

(5) Assemble the camshafts No.1 and No.2.
Refer to Page B2-11.

7.Install the cylinder head cover.

1-2-9 STARTING CONDITION OF THE ENGINE AND ABNORMAL NOISE

1.When starting the engine, check that it starts up immediately without any abnormal noise and rotates smoothly.

1-2-10 COMPRESSION CHECK

1.Warm up the engine.
2.Turn the IG switch to the "LOCK" position.
3.Remove all of the IG coils and spark plugs.
4.Remove the fuel pump relay.
5.Remove all of the connectors of the injector.

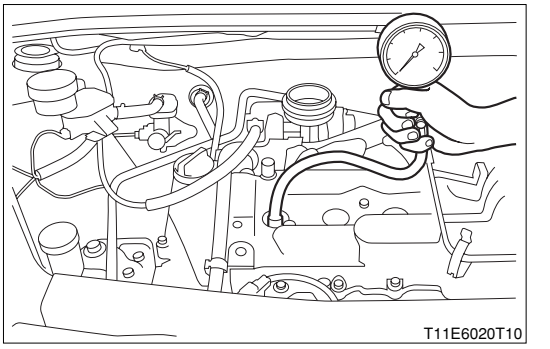
CAUTION
- Shutdown the fuel injection by performing the operations of Steps 4 and 5 above, thus preventing the catalyst from being damaged by unburned gas, etc.

6.Install the compression gauge.

7.Fully open the throttle valve and turn the starter. At this time, measure the compression pressure.

SPECIFIED VALUE: 400 rpm, Difference between cylinders within 147 kPa{1.5kgf/cm²}

	Vehicle mounted with Type 1KR-FE engine
Specified value (kPa{kgf/cm²})	1422{14.5}
Limit value (kPa{kgf/cm²})	1079{11.0}



CAUTION

- Be sure to use a fully-charged battery. The measurement should be carried out in the shortest possible time.

1-2-11 CHECK OF IGNITION TIMING

1.Install an engine tachometer to the terminal "REV" of the DLC, using the SST.

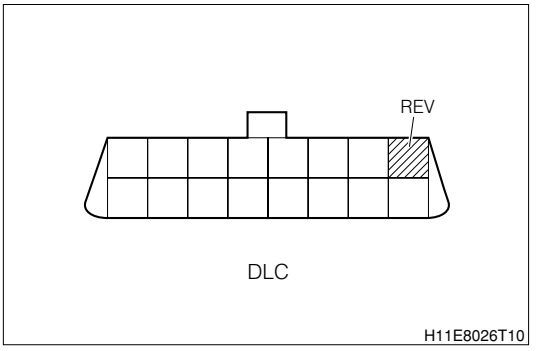
SST: 09991-87402-000
09991-87404-000

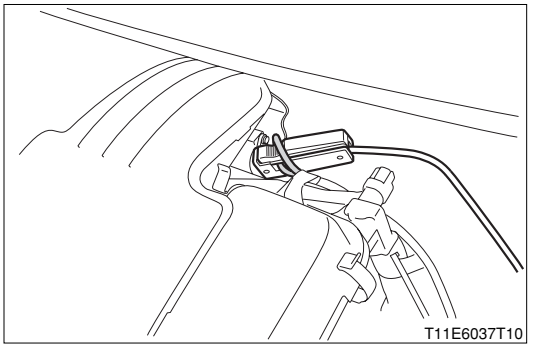
NOTE

- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

2.Warm up the engine (Until the fan motor makes one turn).

3.Install the clip of a timing light at a position indicated in the figure.





4.Short the terminals "EFI-T" and "E" of the DLC, using the SST.

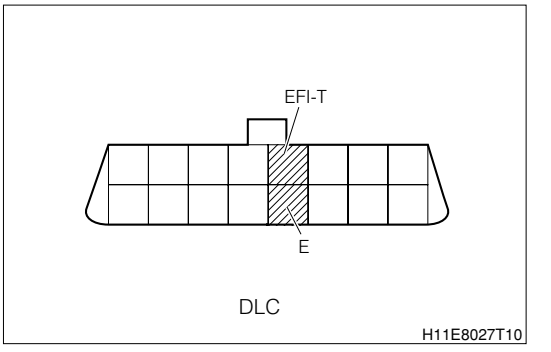
SST: 09991-87403-000
09991-87404-000

CAUTION

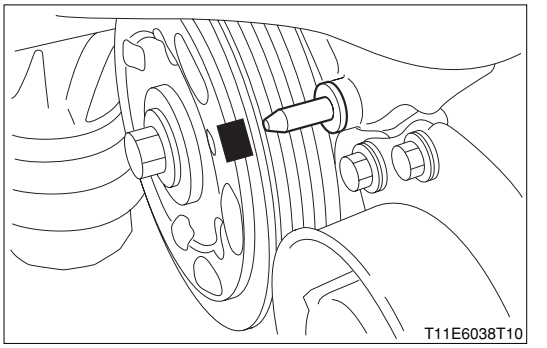
- Be sure to short the correct terminals. If wrong terminals are shorted, it will lead to malfunction.

NOTE

- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.



5.Check the ignition timing.
SPECIFIED VALUE: 10 degrees ± 2 degrees(BTDC)
NOTE
- If the reference pin of the timing chain cover is in the range of the painted section of the crankshaft pulley, then the injection timing is at the specified value.
- The specified value is given as a guide for the inspection. No adjustment is required.
- Engine revolution speed
  800^{+100}_{-50} rpm(M/T)

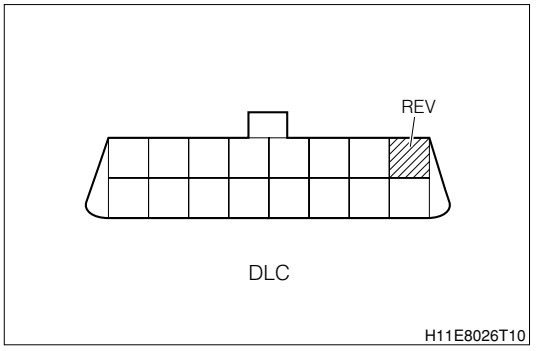

T11E6038T10

6.Release the short of the DLC.
7.Raise the engine revolution speed. At this time, ensure that the ignition timing advances.

1-2-12 CHECK OF IDLE SPEED

CAUTION
- Be sure to mount an air cleaner.
- Warm up the engine.
- Do not apply electric load (Headlamp, etc.).
- Turn "OFF" the air conditioner.(Air conditioner-equipped vehicles)
- Perform the measurement with the shift position in the P or N range.
- The inspection should be carried out under a condition where each vacuum pipe is not disconnected and exhibits no rupture, etc.

1.Install an engine tachometer to the terminal "REV" of the DLC, using the SST.
SST: 09991-87402-000
09991-87404-000
NOTE
- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.



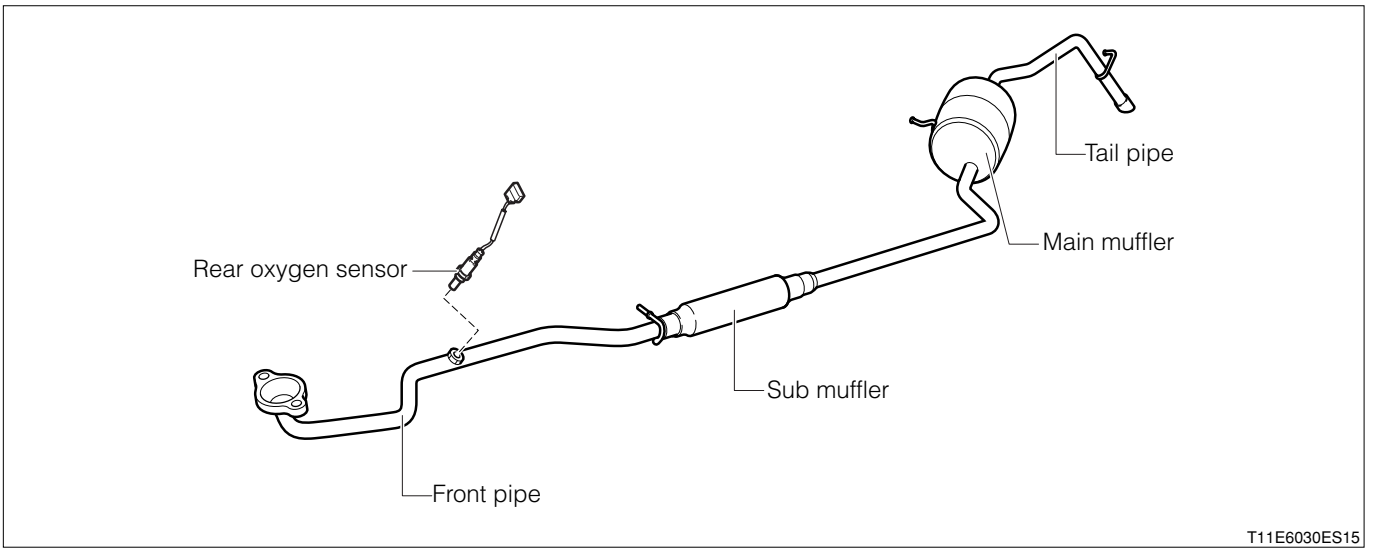
H11E8026T10

2.Check that the idle speed is within the specified value.
SPECIFIED VALUE: 800^{+100}_{-50} rpm(M/T)
NOTE
- It is not necessary to adjust the idle speed because of the ISC.

1-2-13 CONDITION OF LOW SPEED AND ACCELERATION

1.When the engine is accelerated gradually from idling while conducting the running test, check that the revolution rises smoothly without any binding of the accelerator pedal and any abnormality, such as engine stall and knocking.

1-2-14 INSTALLATION CONDITION OF EXHAUST PIPE AND MUFFLER



1.Check that the installation section and the connecting section of the exhaust pipe exhibit no looseness by moving them using a tool or by hand.
2.Check to see if the bolts and nuts securing the exhaust pipe are tightened to the specified torque, using a torque wrench, etc.
3.Check the hanger of the support for deterioration, damage and installation conditions.
4.Check the exhaust pipe for damage and corrosion.
5.Check to see if the exhaust pipe are liable to come in contact with other parts.
6.Start the engine. Check that no exhaust gas is leaking from the connecting section, etc.

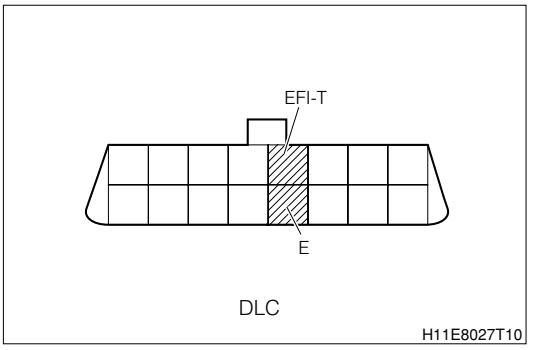
1-2-15 FUNCTION CHECK OF EXHAUST PIPE AND MUFFLER

1.Change the engine speed. At this time, check that there is no abnormality in the noise-reduction function of the muffler.

1-2-16 O_2 SENSOR FEEDBACK CONTROL CHECK

1.Warm up the engine.
2.Keep the engine speed at more than 2500 rpm for two minutes, thus warming up the O_2 sensor.

3.Short the terminals "EFI-T" and "E" of the check connector, using the SST.
SST: 09991-87402-000
09991-87403-000
09991-87404-000



CAUTION
- Be sure to short the correct terminals. If wrong terminals are shorted, it will lead to malfunction.

NOTE
- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

4.Maintain the engine speed above 2000 rpm and depress the brake pedal.
5.Check the condition of the engine check lamp.
SPECIFIED VALUE: Flashing
(Confirmation of O_2 sensor feedback)
6.Short the terminals "EFI-T" and "E" of the DLC, using the SST. Then, confirm that the diagnosis codes No.25 and No.26 are not memorized. (Confirmation of learning value A/F)
SST: 09991-87403-000
09991-87404-000

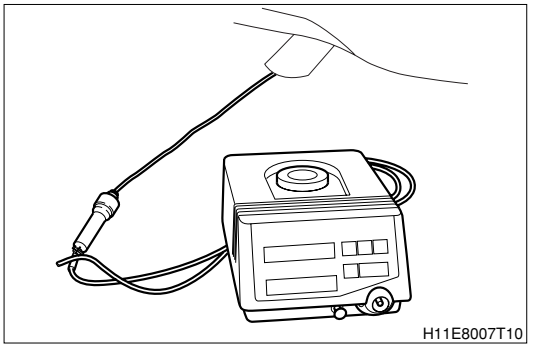
1-2-17 CONDITION OF EXHAUST

1.Warm up the engine.
2.Ensure that the idling speed is at the specified value.
Refer to Page B1-9

3.Visually check that the color of the exhaust gas is not white or black smoke.

1-2-18 CHECK OF CO AND HC CONCENTRATIONS

1.Warm up the engine.
2.Check the CO and HC concentrations during idling, using a measuring instrument.
SPECIFIED VALUE: 0.2% or less (CO concentration)
200 ppm or less (HC concentration)



NOTE
- The specified values above are given as a guide for the inspection. No adjustment is required.

1-2-19 IDLE-UP CHECK

CAUTION
- Be sure to mount an air cleaner.
- Warm up the engine.
- Perform the measurement with the shift position in P or N range.
- The inspection should be carried out under a condition where each vacuum pipe is not disconnected and exhibits no rupture, etc.

(1) Check of air conditioner idle-up

1.Install an engine tachometer to the terminal "REV" of the DLC, using the SST.
SST: 09991-87402-000
09991-87404-000

NOTE

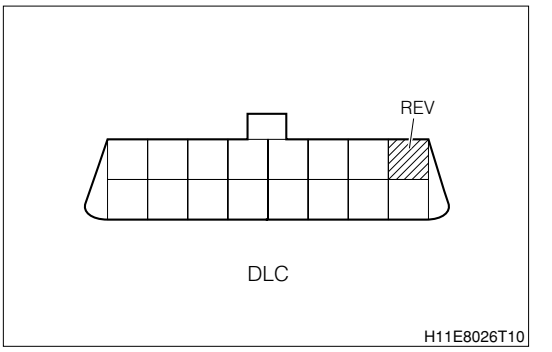
- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

2.Warm up the engine.

3.Check whether the engine speed is within the specified value when the air conditioner switch is turned "ON" during idling.
SPECIFIED VALUE: 950^{+100}_{-50} rpm(M/T)

NOTE

- The engine revolution speed above is given as a guide for the inspection. No adjustment is required.



(2) Electric load idle-up check

1.Install an engine tachometer to the terminal "REV" of the DLC, using the SST.
SST: 09991-87402-000
09991-87404-000

NOTE

- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

2.Warm up the engine.

3.Check whether the engine speed is within the specified value when the defogger switch, blower switch and headlamp switch are turned "ON"
SPECIFIED VALUE: 800±50rpm(M/T)

NOTE

- The engine revolution speed above is given as a guide for the inspection. No adjustment is required.

1-2-20 CHARCOAL CANISTER CHECK

(1) RHD vehicles

1.Check the charcoal canister for damage, such as dents.

2.With a MityVac connected, carry out continuity check and airtightness check for the check valve.

(1) Continuity check of tank port→atmosphere port

Apply a positive pressure of 5.9kPa (0.05 kgf/cm^2) to the tank port with the purge port plugged (e.g. with your fingers).

SPECIFIED VALUE: Air continuity exists between the tank port and the atmosphere port.

(2) Continuity check of atmosphere port→tank port

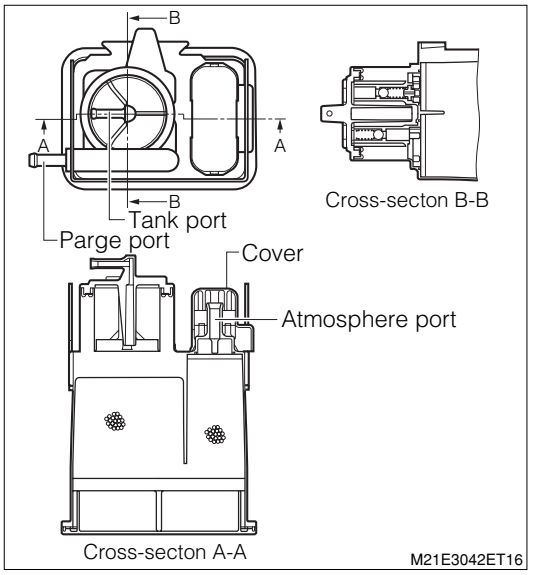
Apply a negative pressure of 2.9kPa (0.03 kgf/cm^2) to the tank port with the purge port plugged (e.g. with your fingers).

SPECIFIED VALUE: Air continuity exists between the atmosphere port and the tank port.

(3) Continuity check of atmosphere port→purge port

Apply a positive or negative pressure of 1kPa (0.01 kgf/cm^2) to the purge port with the tank port plugged (e.g. with your fingers) to allow air to flow.

SPECIFIED VALUE: There is no rise in the pressure.



(2) LHD vehicles

1.Check the charcoal canister for damage, such as dents.

2.With a MityVac connected, carry out continuity check and airtightness check for the check valve.

(1) Continuity check of tank port→atmosphere port

Apply a positive pressure of 5.9kPa (0.05 kgf/cm^2) to the tank port with the purge port plugged (e.g. with your fingers).

SPECIFIED VALUE: Air continuity exists between the tank port and the atmosphere port.

(2) Continuity check of atmosphere port→tank port

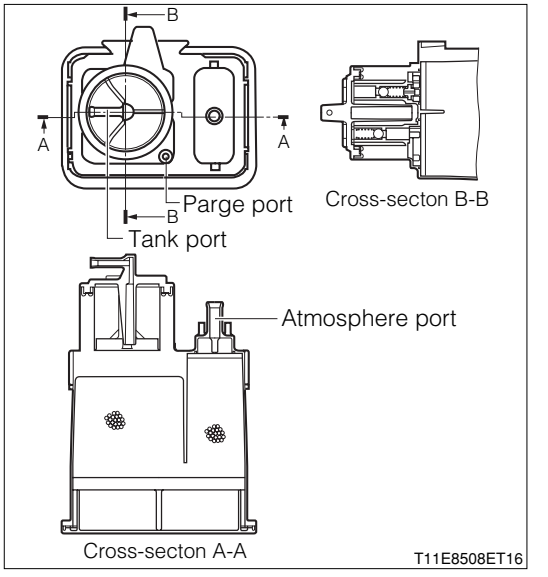
Apply a negative pressure of 2.9kPa (0.03 kgf/cm^2) to the tank port with the purge port plugged (e.g. with your fingers).

SPECIFIED VALUE: Air continuity exists between the atmosphere port and the tank port.

(3) Continuity check of atmosphere port→purge port

Apply a positive or negative pressure of 1kPa (0.01 kgf/cm^2) to the purge port with the tank port plugged (e.g. with your fingers) to allow air to flow.

SPECIFIED VALUE: There is no rise in the pressure.



1-2-21 DAMAGE CHECK OF PIPINGS OF FUEL EVAPORATIVE EMISSION CONTROL SYSTEM

1.Check the hoses and pipes for damage.

1-2-22 DAMAGE CHECK OF PIPINGS OF BLOW-BY GAS RECIRCULATION SYSTEM

1.Check the ventilation hoses for cracks, damages and clogs.
2.Perform the following checks for the PCV valve.
(1) Start the engine.
(2) With the engine idling, ensure that the operation sound is emitted as the hose on the intake manifold side of the PCV valve is pinched and released.

1-2-23 INSTALLATION CONDITION DAMAGE OF CATALYST DEVICE

1.Check that the installation of the main body of the exhaust emission control device, such as the catalyst, exhibits no looseness, using a wrench or the like.
2.Visually check the catalyst main body for damage. (This check may be omitted if there are no deformation or damage on the heat shield plate.)

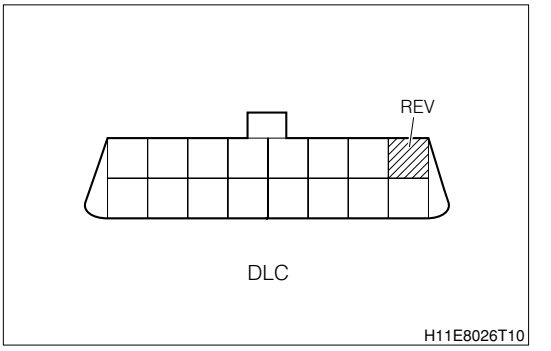
1-2-24 FUNCTION CHECK OF CONTROL SYSTEM DURING DECELERATION

1.Install an engine tachometer to the terminal "REV" of the DLC, using the SST.
SST: 09991-87402-000
09991-87404-000

CAUTION

- When the SST (Engine control system inspection wire) is not used, the operation should be carried out with the DLC taken off from the bracket. After completion of the operation, be certain to install the DLC to the bracket.

2.Warm up the engine.
3.Confirm the operation sound of the injector with a sound scope or a screwdriver.
4.Raise the engine speed to 3000 rpm.
5.Return the throttle lever. At this time, ensure that the operation sound of the injector stops for a moment and is emitted again.



1-2-25 EXHAUST GAS RECIRCULATION SYSTEM CHECK

1.Short the terminals "EFI-T" and "E" of the DLC, using the SST. Then, confirm that the diagnosis code No.79 is not memorized.
SST: 09991-87403-000
09991-87404-000

NOTE

- The engine control computer judges whether the exhaust gas recirculation system is normal or not under the following conditions.
- After the engine has warmed-up completely, fully close the accelerator pedal from the constant-speed running at 60 km/h to decelerate for 5 seconds or more by engine brake. After the IG switch is turned "OFF" for more than 10 seconds, once again perform the running and decelerating under the same conditions.

2.Ensure that there are no cracks, damages and leakage in the EGR-related pipings.
3.Ensure that there is no looseness or leakage in the installation of the stepper motor for the EGR.
4.Confirm the operation of the stepper motor for the EGR, following the procedure given below.
(1) Release the short of the DLC.
(2) Remove the fuel pump relay.
(3) Disconnect the connector of the injector.

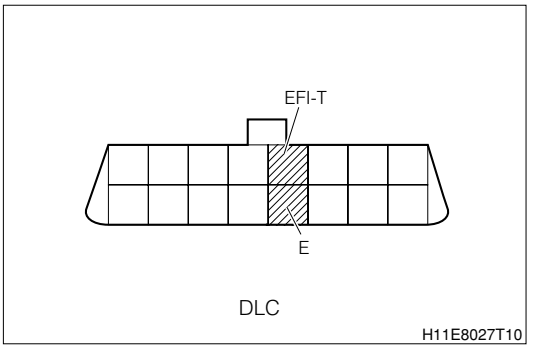
CAUTION

- Shutdown the fuel injection by performing the operations of Steps (2) and (3) above, thus preventing the catalyst from being damaged by unburned gas, etc.

(4) Crank the engine.
(5) Ensure that the stepper motor for the EGR is operating when cranking, using a sound scope or a long screwdriver.

WARNING

- Be very careful not to get scalded, since the temperature of the valve section of the stepper motor for the EGR is very high.



1-2-26 CHECK OF EXHAUST GAS PURIFICATION SYSTEM

(1) Check of onboard type diagnostic tester

① Check of engine check lamp

1.Confirm the engine check lamp condition with the IG switch turned ON.

2.Check the diagnosis code.

Refer to Page B8-33.

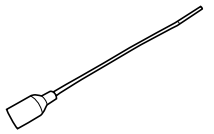
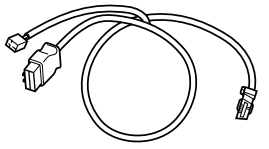
3.If the abnormality code is outputted, perform the trouble shooting for the abnormality code.

NOTE

- If an abnormality code is outputted although the engine check lamp is not presently illuminating, it is assumed that abnormalities, such as poor contact, took place at the harness, connector, etc. but they are functioning properly now. Therefore, as a precautionary measure, perform the trouble shooting for the outputted abnormality code.

■ K3
1 ENGINE
1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09991-87402-000	Wire,tacho-pulse pick up
	09991-87403-000	Wire,diagnosis check
	09991-87404-000 (09991-87401-000)	Wire,engine control system inspection

Instrument

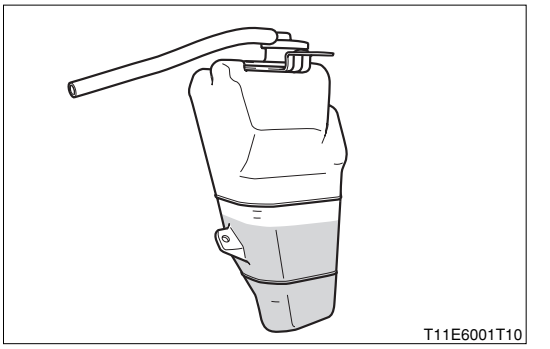
Belt tension gauge,Radiator cap tester,Radiator cap tester adapter,MityVac,Compression gauge,Timing light,Torque wrench,Micrometer,Thickness gauge,Sound scope,Voltage tester,,Plug gap gauge,Tachometer

1-2 BASIC CHECK AND ADJUSTMENT

1-2-1 CHECK OF COOLING WATER LEVEL AND WATER LEAKAGE

(1) Water level

1.Check that the cooling water level is between the upper limit (FULL) and the lower limit (LOW) of the reservoir tank.

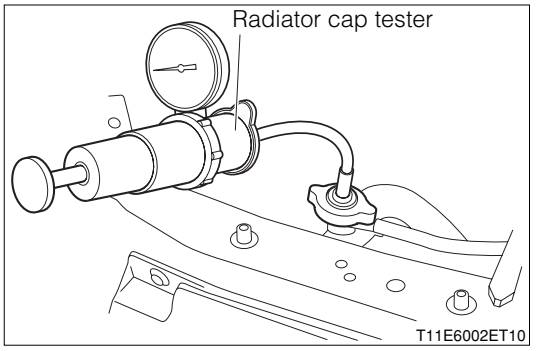

T11E6001T10

(2) Water leakage

1.With the engine idling, visually check that there is no water leakage from the radiator, radiator hose, heater hose, water pump, heater hose, etc.

Moreover, apply pressure, using a radiator cap tester. Under this condition, check that no water leakage is present.

SPECIFIED VALUE: Specified value for check
122.7kPa {1.25kgf/cm²}



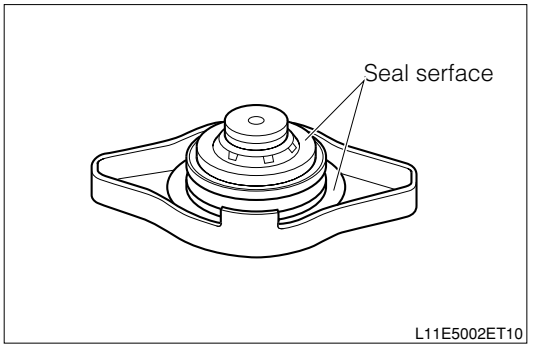
T11E6002ET10

NOTE

- There may be a small amount of water leaking from the vapor hole and the drain hole of the water pump. However, this is not an abnormality.

(3) Function check of radiator cap

1.Remove the radiator cap. Then, visually check the valve seat surface for smear and damage. Also, move the negative pressure valve by your hand and check that it opens and closes.



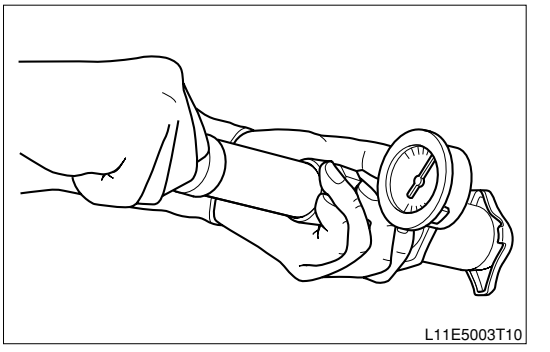
L11E5002ET10

2.Check the valve opening pressure of the cap, using a radiator cap tester.

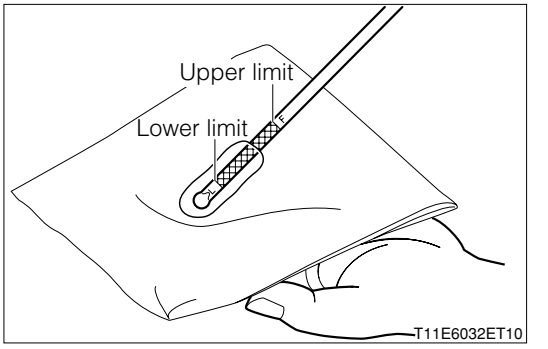
SPECIFIED VALUE: 108.0±14.7kPa{1.1±0.15kgf/cm²}

CAUTION

- Liberally apply water to the cap seal surface before the installation to the tester.


L11E5003T10

1-2-2 CHECK OF ENGINE OIL LEVEL



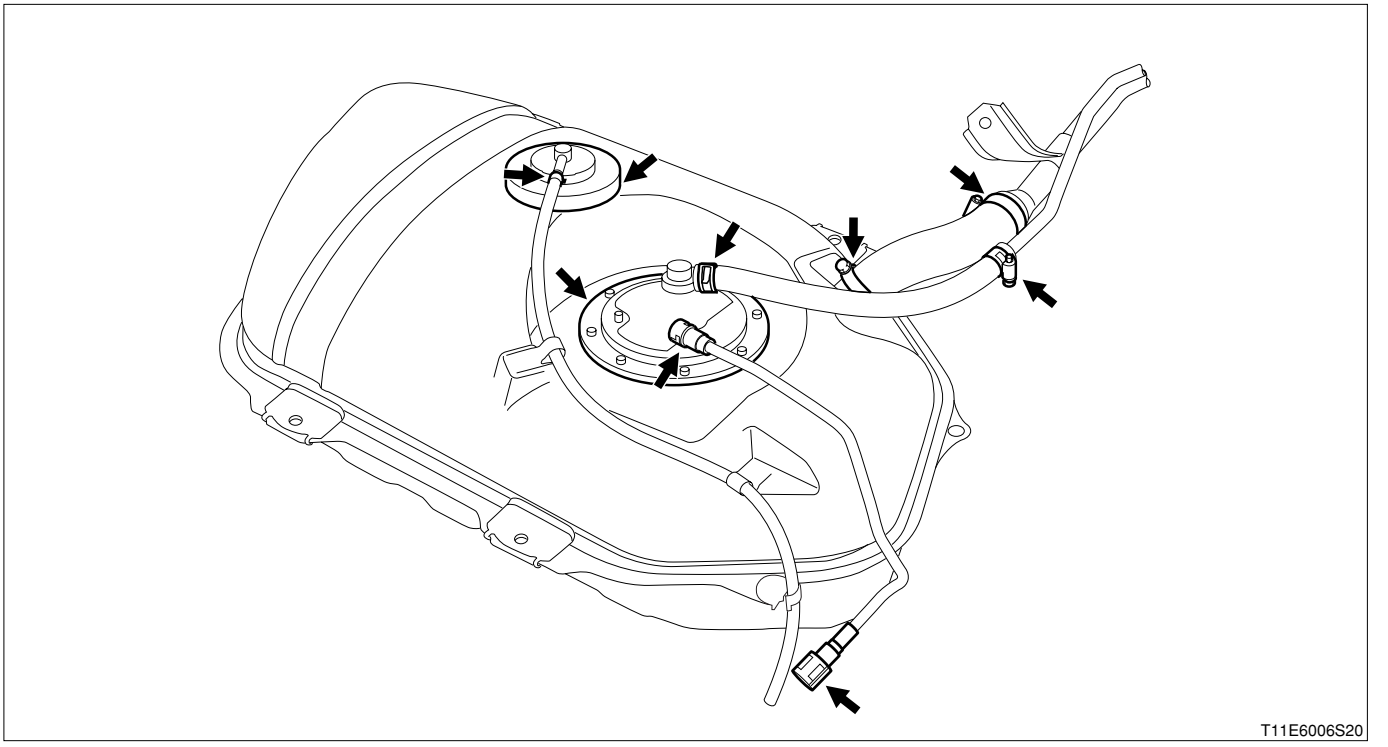
1.Stop the engine. Perform the check on a level place.
2.Pull out the oil level gauge. Wipe out the oil adhered to the gauge and insert it again.
3.Check that the oil level is between the lower limit (L) and the upper limit (F).
4.Check the condition of smear and that there is no white turbidity in the engine oil by observing the oil adhered to the oil level gauge.

1-2-3 ENGINE OIL LEAKAGE CHECK

1.Visually check that there is no oil leakage from the cylinder head cover, oil pan and drain plug.

1-2-4 FUEL LEAKAGE CHECK

1.Visually check the fuel tank main body, fuel pump, hoses and pipes for fuel leakage.
2.Visually check that there is no crack or damage in the fuel hoses and pipes. Also, check that the installation of the clamp for each hose and pipe is not loosened.



1-2-5 CONDITION OF AIR CLEANER ELEMENT

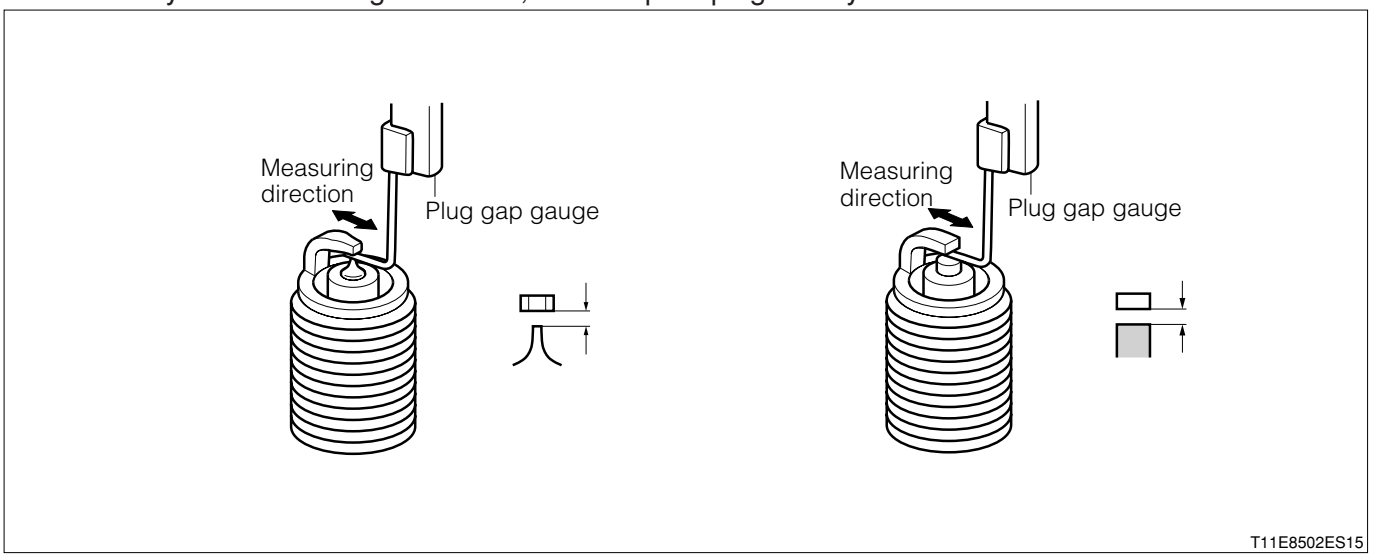
1.Remove the air cleaner element. Then, visually check that there is no smear, clog or damage.
2.In cases where the air cleaner element exhibits smear or clog, clean by blowing compressed air.

1-2-6 CHECK OF SPARK PLUG

1.Ensure that the designated plugs are used. Also, check that the plug exhibits no smoldering and the plug is not burnt excessively. Check to see if the gap between the electrodes is normal.

WARNING

- Be very careful not to get scalded, for the spark plug is very hot.



Spark plug specifications

	GEN SPC		EU,AUS SPC	
Manufacturer	DENSO	NGK	DENSO	NGK
Type	SVK20RZ11	IFR6J11	K20R-U11	BKR6EY-11
Kind	Iridium	Iridium	Standard	Standard
Electrode gap (mm)	1.0 - 1.1	1.0 - 1.1	1.0 - 1.1	1.0 - 1.1

1-2-7 CHECK AND ADJUSTMENT OF TENSION (DEFLECTION AMOUNT) OF V-BELT FOR ALTERNATOR

(1) Check

1.Check the V-ribbed belt for cracks, deterioration and significant wear.

2.Check the tension of the V-ribbed belt, using a belt tension gauge.

NOTE

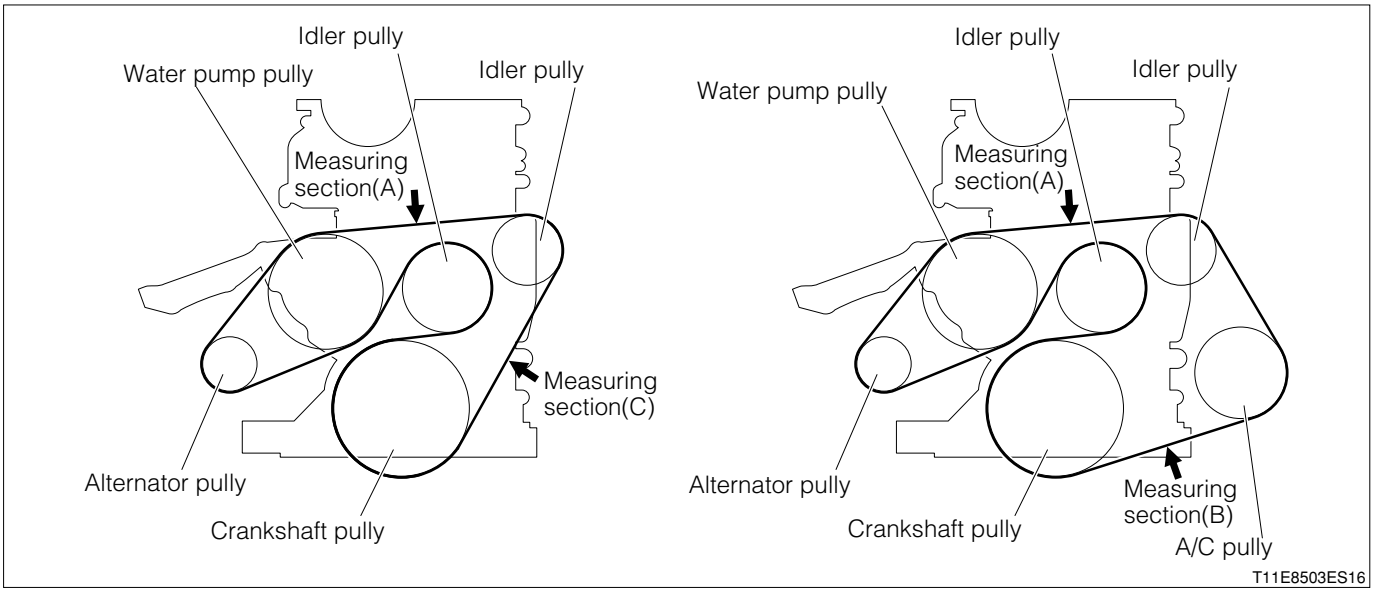
- The check can be performed by measuring the deflection amount of the V-belt.

Specified value

	When a new part is installed	During inspection
Tension value (N{kgf})	590±100{60±10.2}	390±{40±10.2}
Deflection amount (mm) (Pushing force 100N{10.2kgf})	6.5 - 7.5	8.5 - 10.0

NOTE

- When checking the deflection amount of the belt, push a point between the water pump pulley and alternator pulley or crankshaft pulley and A/C pulley with a force of 100 N (10.2 kgf). Under this condition, neasure the deflection amount.
- In cases where the tension is measured after the belt has been assembled, the measurement should be performed after cranking two turns.
- When the belt is replaced with a new one, the belt tension should be adjusted to the mid-value of the specified value for "When a new part is installed."
- As regards the belt that has been used for more than five minutes, ensure that the belt tension conforms to the specified value for "During inspection."
- When the belt that has been used for more than five minutes is assembled, the belt tension should be adjusted to the mid-value of the specified value for "During inspection."

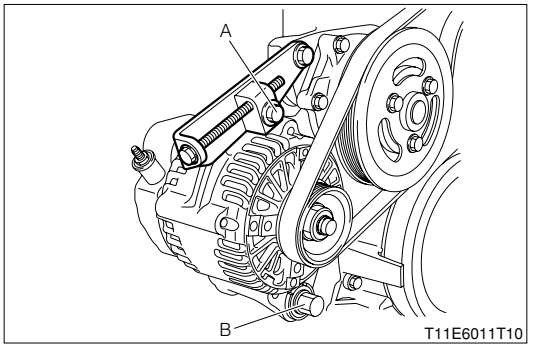


(2) Adjustment

1.Loosen the bolts (B) for retaining the alternator.

2.Loosen the bolts (A) for retaining the adjusting bar.

3.After loosening, lightly tighten the bolts (A) by hand.
4.Adjust the tension by turning the adjusting bolt of the adjusting bar.
5.Tighten the bolts (A) for retaining the adjusting bar.
6.Tighten the bolts (B) for retaining the alternator
TIGHTENING TORQUE: Bolt A
19.0±3.8N·m
{190±38kgf·cm}
Bolt B
44.0±8.8N·m
{450±90kgf·cm}



7.Confirm the belt tension.

1-2-8 CHECK AND ADJUSTMENT OF VALVE CLEARANCE

(1) Specified value

		Valve clearance (mm)	
Vehicle mounted with Type K3-VE engine	IN	During cold period	$0.18^{+0.055}_{-0.035}$
	EX		$0.31^{+0.055}_{-0.035}$

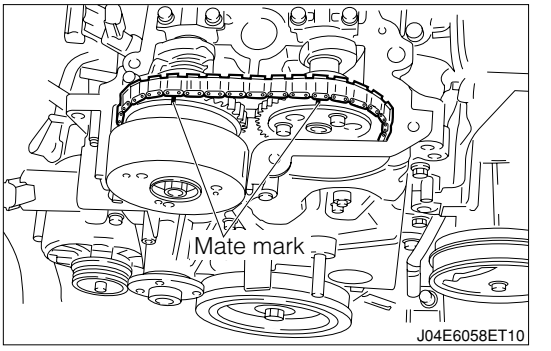
(2) Check

NOTE

- For the removal and installation procedures of each part, refer to the section under "Removal and Installation of Camshaft."

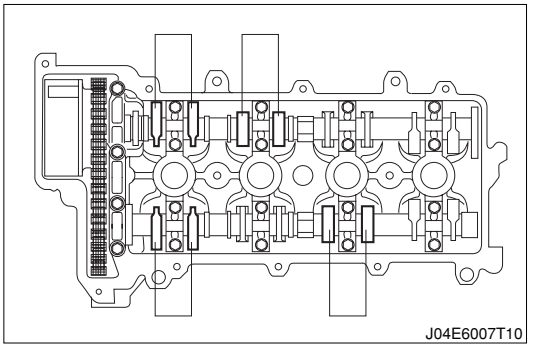
Refer to Page B2-41.

1.Remove the cylinder head cover.
2.Turn the crankshaft in the normal direction, until the timing mark of the crankshaft pulley is aligned with the indicator of the timing chain cover.
3.Ensure that the mating marks at the top of the drive gear and driven gear of the camshaft are aligned with each other. If they are not aligned, make one more turn so that the mating marks are aligned.

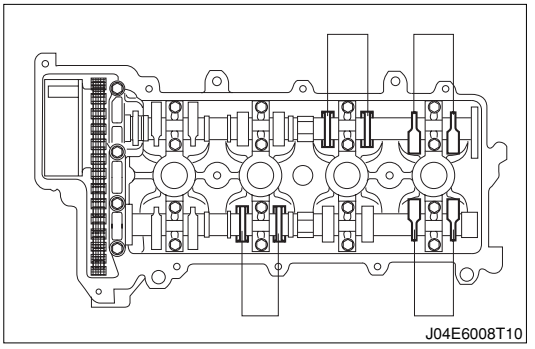


4.Using a thickness gauge, check the valve clearances shown in the right figure.

Cylinder No.1		Cylinder No.2		Cylinder No.3		Cylinder No.4	
IN	EX	IN	EX	IN	EX	IN	EX
○	○	○	–	–	○	–	–



5.Turn the crankshaft once so that the cylinder No.1 comes to the exhaust top dead center. Then, check the valve clearance at a position indicated in the figure on the right.



Cylinder No.1		Cylinder No.2		Cylinder No.3		Cylinder No.4	
IN	EX	IN	EX	IN	EX	IN	EX
–	–	–	○	○	–	○	○

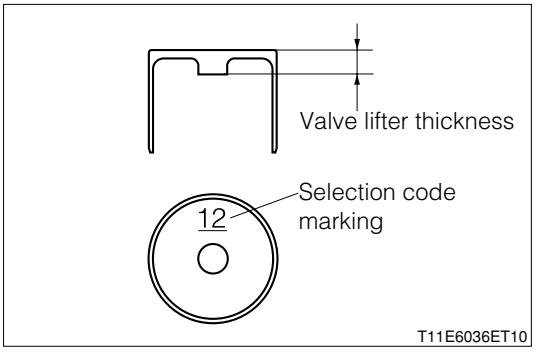
6.If the clearance deviates from the specified value, replace the shim in the following procedure and adjust it to the specified value.

NOTE

- Record the position of the valve where the clearance deviates from the specification, as well as the their measurement results.

(1) Remove the camshafts No.1 and No.2.
Refer to Page B2-41.

(2) Using a micrometer, measure the thickness of the shim that has been removed.



(3) Select the shim, using the following formula given below, so that the valve clearance becomes the specified value.

Intake Valve
(Thickness of shim to be selected)
= (Thickness of removed shim) + [(Measured clearance) − 0.18 mm]
Exhaust Valve
(Thickness of shim to be selected)
= (Thickness of removed shim) + [(Measured clearance) − 0.31 mm]

Shim thickness (mm)

No.	Shim thickness (mm)	No.	Shim thickness (mm)	No.	Shim thickness (mm)	No.	Shim thickness (mm)
12	5.120	28	5.280	44	5.440	60	5.600
14	5.140	30	5.300	46	5.460	62	5.620
16	5.160	32	5.320	48	5.480	64	5.640
18	5.180	34	5.340	50	5.500	66	5.660
20	5.200	36	5.360	52	5.520	68	5.680
22	5.220	38	5.380	54	5.540	–	–
24	5.240	40	5.400	56	5.560	–	–
26	5.260	42	5.420	58	5.580	–	–

(4) Apply engine oil to the circumference of the selected valve lifter. Insert it into the lifter hole.
LUBRICANT: Engine oil

CAUTION

- After insertion, ensure that the valve lifter turns smoothly.

(5) Assemble the camshafts No.1 and No.2.
Refer to Page B2-41

7.Install the cylinder head cover.

1-2-9 STARTING CONDITION OF THE ENGINE AND ABNORMAL NOISE

1.When starting the engine, check that it starts up immediately without any abnormal noise and rotates

smoothly.

1-2-10 COMPRESSION CHECK

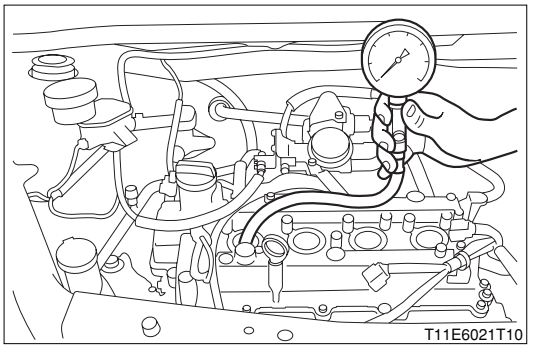
1.Warm up the engine.
2.Turn the IG switch to the "LOCK" position.
3.Remove all of the IG coils and spark plugs.
4.Remove the fuel pump relay.
5.Remove all of the connectors of the injector.

CAUTION

- Shutdown the fuel injection by performing the operations of Steps 4 and 5 above, thus preventing the catalyst from being damaged by unburned gas, etc.

6.Install the compression gauge.
7.Fully open the throttle valve and turn the starter. At this time, measure the compression pressure.
SPECIFIED VALUE: 330 rpm, Difference between cylinders within 147 kPa {1.5kgf/cm²}

	Vehicle mounted with Type K3-VE engine
Specified value (kPa{kgf/cm²})	1470{15.0}
Limit value (kPa{kgf/cm²})	1078{11.0}


T11E6021T10

CAUTION

- Be sure to use a fully-charged battery. The measurement should be carried out in the shortest possible time.

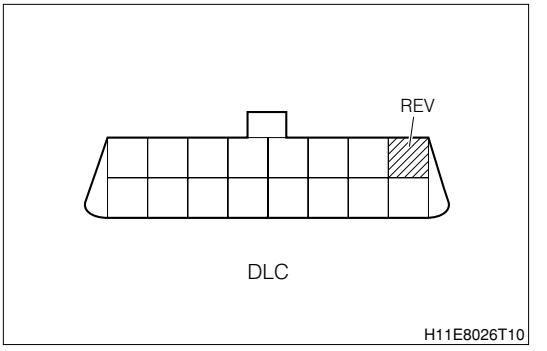
1-2-11 CHECK OF IGNITION TIMING

1.Install an engine tachometer to the terminal "REV" of the DLC, using the SST.
SST: 09991-87402-000
09991-87404-000

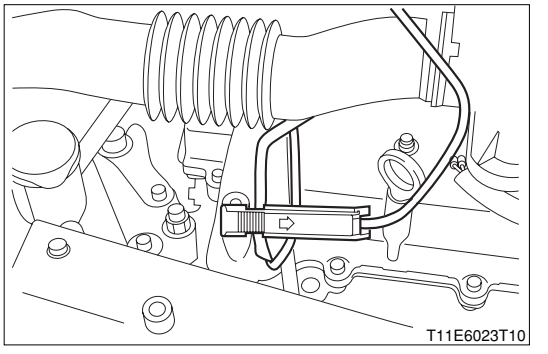
NOTE

- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

2.Warm up the engine (Until the fan motor makes one turn).
3.Install the clip of a timing light at a position indicated in the figure.



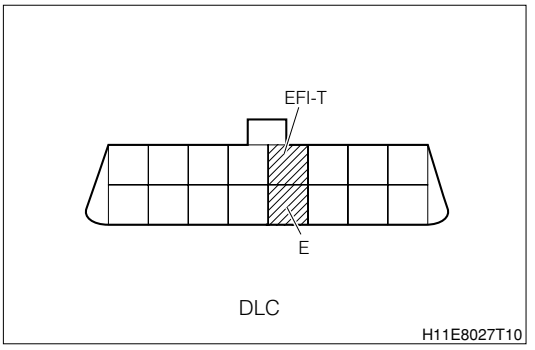
H11E8026T10


T11E6023T10

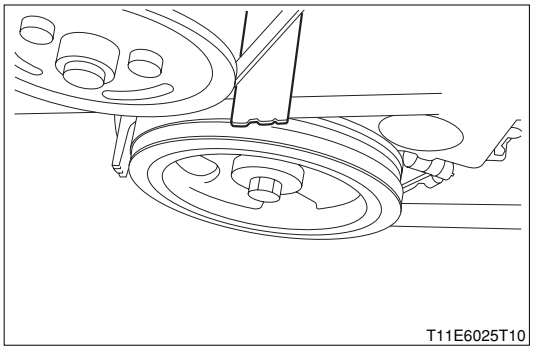
4.Short the terminals "EFI-T" and "E" of the DLC, using the SST.
SST: 09991-87403-000
09991-87404-000

CAUTION
- Be sure to short the correct terminals. If wrong terminals are shorted, it will lead to malfunction.

NOTE
- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

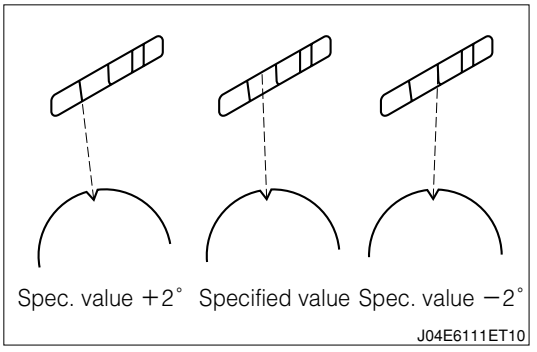


5.Check the ignition timing.
SPECIFIED VALUE: 6 degrees ± 2 degrees(BTDC)



NOTE
- The specified value is given as a guide for the inspection. No adjustment is required.
- Engine revolution speed
  700^{+100}_{-50} rpm(A/T)
  650^{+100}_{-50} rpm(M/T)

6.Release the short of the DLC.
7.Raise the engine revolution speed. At this time, ensure that the ignition timing advances.



1-2-12 CHECK OF IDLE SPEED

CAUTION
- Be sure to mount an air cleaner.
- Warm up the engine.
- Do not apply electric load (Headlamp, etc.).
- Turn "OFF" the air conditioner.(Air conditioner-equipped vehicles)

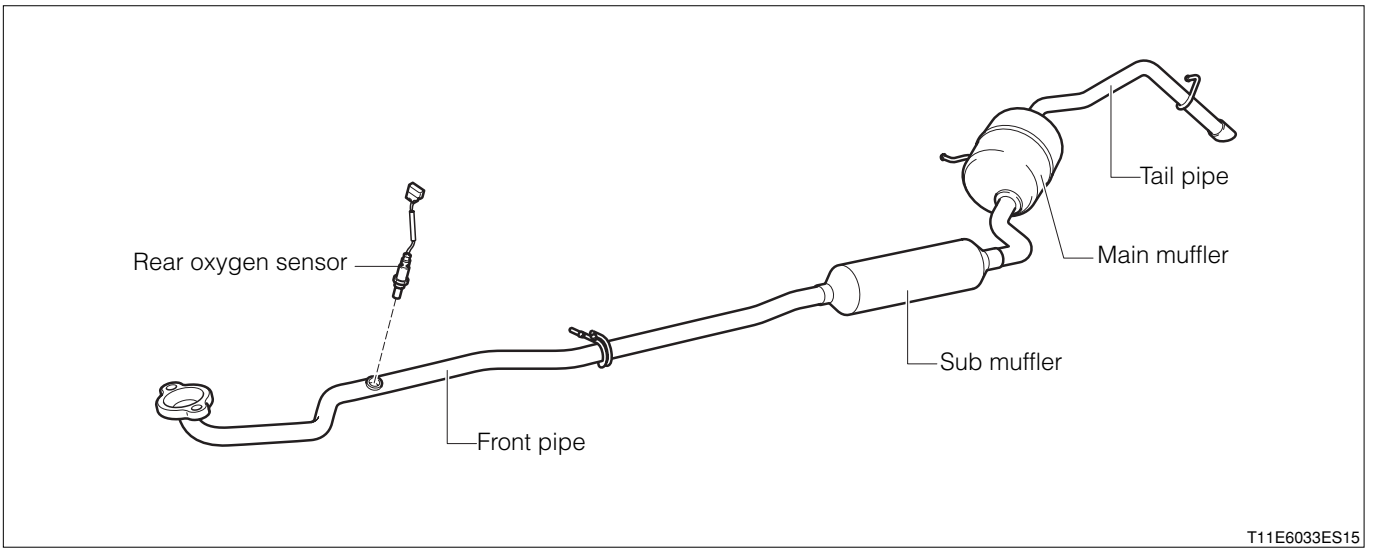
1.Check that the idle speed is within the specified value.
SPECIFIED VALUE: 700^{+100}_{-50} rpm(A/T)
650^{+100}_{-50} rpm(M/T)

NOTE
- It is not necessary to adjust the idle speed because of the ISC.

1-2-13 CONDITION OF LOW SPEED AND ACCELERATION

1.When the engine is accelerated gradually from idling while conducting the running test, check that the revolution rises smoothly without any binding of the accelerator pedal and any abnormality, such as engine stall and knocking.

1-2-14 INSTALLATION CONDITION OF EXHAUST PIPE AND MUFFLER



1.Check that the installation section and the connecting section of the exhaust pipe exhibit no looseness by moving them using a tool or by hand.
2.Check to see if the bolts and nuts securing the exhaust pipe are tightened to the specified torque, using a torque wrench, etc.
3.Check the hanger of the support for deterioration, damage and installation conditions.
4.Check the exhaust pipe for damages and corrosion.
5.Check to see if the exhaust pipe are liable to come in contact with other parts.
6.Start the engine. Check that no exhaust gas is leaking from the connecting section, etc.

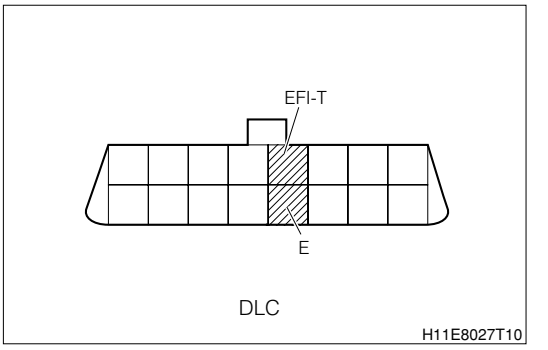
1-2-15 FUNCTION CHECK OF EXHAUST PIPE AND MUFFLER

1.Change the engine speed. At this time, check that there is no abnormality in the noise-reduction function of the muffler.

1-2-16 O_2 SENSOR FEEDBACK CONTROL CHECK

1.Warm up the engine.
2.Keep the engine speed at more than 2500 rpm for two minutes, thus warming up the O_2 sensor.

3.Short the terminals "EFI-T" and "E" of the check connector, using the SST.
SST: 09991-87402-000
09991-87403-000
09991-87404-000



CAUTION
- Be sure to short the correct terminals. If wrong terminals are shorted, it will lead to malfunction.

NOTE
- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

4.Maintain the engine speed above 2000 rpm and depress the brake pedal.
5.Check the condition of the engine check lamp.
SPECIFIED VALUE: Flashing
(Confirmation of O_2 sensor feedback)
6.Short the terminals "EFI-T" and "E" of the DLC, using the SST. Then, confirm that the diagnosis codes No.25 and No.26 are not memorized. (Confirmation of learning value A/F)
SST: 09991-87403-000
09991-87404-000

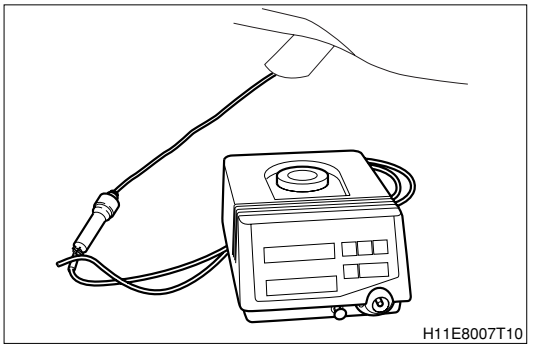
1-2-17 CONDITION OF EXHAUST

1.Warm up the engine.
2.Ensure that the idling speed is at the specified value.
Refer to Page B1-25.

3.Visually check that the color of the exhaust gas is not white or black smoke.

1-2-18 CHECK OF CO AND HC CONCENTRATIONS

1.Warm up the engine.
2.Check the CO and HC concentrations during idling, using a measuring instrument.
SPECIFIED VALUE: 0.2% or less (CO concentration)
200 ppm or less (HC concentration)



NOTE
- The specified values above are given as a guide for the inspection. No adjustment is required.

1-2-19 IDLE-UP CHECK

CAUTION
- Be sure to mount an air cleaner.
- Warm up the engine.
- Perform the measurement with the shift position in P or N range.
- The inspection should be carried out under a condition where each vacuum pipe is not disconnected and exhibits no rupture, etc.

(1) Check of air conditioner idle-up

1.Install an engine tachometer to the terminal "REV" of the DLC, using the SST.
SST: 09991-87402-000
09991-87404-000

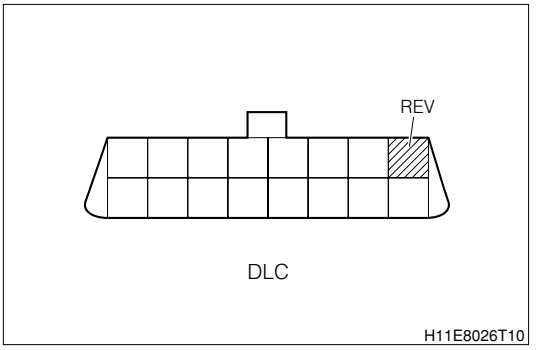
NOTE

- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

2.Warm up the engine.
3.Check whether the engine speed is within the specified value when the air conditioner switch is turned "ON" during idling.
SPECIFIED VALUE: 900^{+100}_{-50} rpm(A/T)
850^{+100}_{-50} rpm(M/T)

NOTE

- The engine revolution speed above is given as a guide for the inspection. No adjustment is required.



(2) Electric load idle-up check

1.Install an engine tachometer to the terminal "REV" of the DLC, using the SST.
SST: 09991-87402-000
09991-87404-000

NOTE

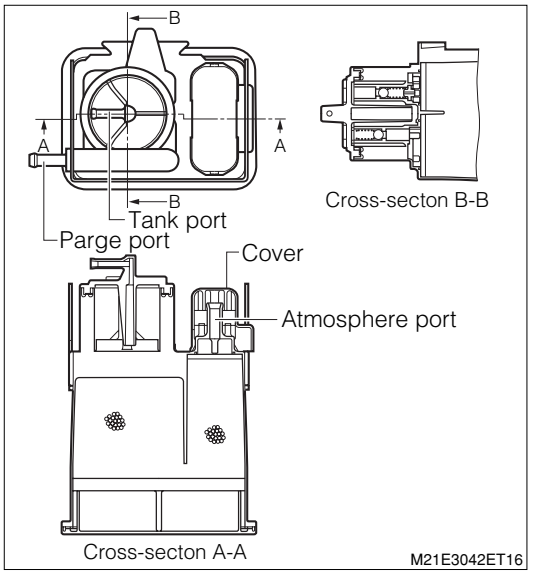
- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

2.Warm up the engine.
3.Check whether the engine speed is within the specified value when the defogger switch, blower switch and headlamp switch are turned "ON"
SPECIFIED VALUE: 700±50rpm(A/T)
650±50rpm(M/T)
(No significant drop)

NOTE

- The engine revolution speed above is given as a guide for the inspection. No adjustment is required.

1-2-20 CHARCOAL CANISTER CHECK



(1) RHD vehicles

1.Check the charcoal canister for damage, such as dents.

2.With a MityVac connected, carry out continuity check and airtightness check for the check valve.

(1) Continuity check of tank port→atmosphere port

Apply a positive pressure of 5.9kPa (0.05 kgf/cm^2) to the tank port with the purge port plugged (e.g. with your fingers).

SPECIFIED VALUE: Air continuity exists between the tank port and the atmosphere port.

(2) Continuity check of atmosphere port→tank port

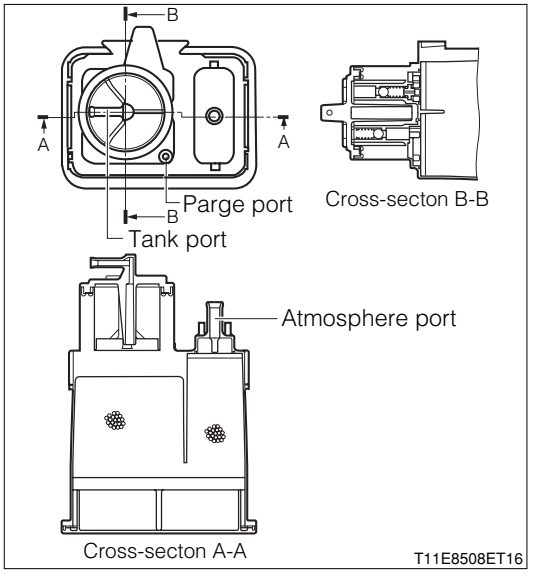
Apply a negative pressure of 2.9kPa (0.03 kgf/cm^2) to the tank port with the purge port plugged (e.g. with your fingers).

SPECIFIED VALUE: Air continuity exists between the atmosphere port and the tank port.

(3) Continuity check of atmosphere port→purge port

Apply a positive or negative pressure of 1kPa (0.01 kgf/cm^2) to the purge port with the tank port plugged (e.g. with your fingers) to allow air to flow.

SPECIFIED VALUE: There is no rise in the pressure.



(2) LHD vehicles

1.Check the charcoal canister for damage, such as dents.

2.With a MityVac connected, carry out continuity check and airtightness check for the check valve.

(1) Continuity check of tank port→atmosphere port

Apply a positive pressure of 5.9kPa (0.05 kgf/cm^2) to the tank port with the purge port plugged (e.g. with your fingers).

SPECIFIED VALUE: Air continuity exists between the tank port and the atmosphere port.

(2) Continuity check of atmosphere port→tank port

Apply a negative pressure of 2.9kPa (0.03 kgf/cm^2) to the tank port with the purge port plugged (e.g. with your fingers).

SPECIFIED VALUE: Air continuity exists between the atmosphere port and the tank port.

(3) Continuity check of atmosphere port→purge port

Apply a positive or negative pressure of 1kPa (0.01 kgf/cm^2) to the purge port with the tank port plugged (e.g. with your fingers) to allow air to flow.

SPECIFIED VALUE: There is no rise in the pressure.

1-2-21 DAMAGE CHECK OF PIPINGS OF FUEL EVAPORATIVE EMISSION CONTROL SYSTEM

1.Check the hoses and pipes for damage.

1-2-22 DAMAGE CHECK OF PIPINGS OF BLOW-BY GAS RECIRCULATION SYSTEM

1.Check the ventilation hoses for cracks, damages and clogs.
2.Perform the following checks for the PCV valve.
(1) Start the engine.
(2) With the engine idling, ensure that the operation sound is emitted as the hose on the intake manifold side of the PCV valve is pinched and released.

1-2-23 INSTALLATION CONDITION DAMAGE OF CATALYST DEVICE

1.Check that the installation of the main body of the exhaust emission control device, such as the catalyst, exhibits no looseness, using a wrench or the like.
2.Visually check the catalyst main body for damage. (This check may be omitted if there are no deformation or damage on the heat shield plate.)

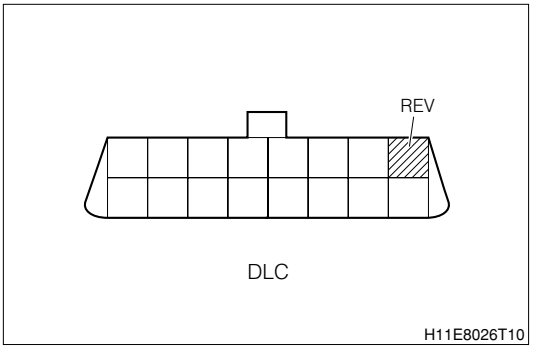
1-2-24 FUNCTION CHECK OF CONTROL SYSTEM DURING DECELERATION

1.Install an engine tachometer to the terminal "REV" of the DLC, using the SST.
SST: 09991-87404-000
09991-87402-000

CAUTION

- When the SST (Engine control system inspection wire) is not used, the operation should be carried out with the DLC taken off from the bracket. After completion of the operation, be certain to install the DLC to the bracket.

2.Warm up the engine.
3.Confirm the operation sound of the injector with a sound scope or a screwdriver.
4.Raise the engine speed to 3000 rpm.
5.Return the throttle lever. At this time, ensure that the operation sound of the injector stops for a moment and is emitted again.



1-2-25 CHECK OF EXHAUST GAS PURIFICATION SYSTEM

(1) Check of onboard type diagnostic tester

① Check of engine check lamp

1.Confirm the engine check lamp condition with the IG switch turned ON.
2.Check the diagnosis code.
Refer to Page B8-33.

3.If the abnormality code is outputted, perform the trouble shooting for the abnormality code.

NOTE

- If an abnormality code is outputted although the engine check lamp is not presently illuminating, it is assumed that abnormalities, such as poor contact, took place at the harness, connector, etc. but they are functioning properly now. Therefore, as a precautionary measure, perform the trouble shooting for the outputted abnormality code.

B2 ENGINE MECHANICAL

1KR ---------- B2 - 1
CYLINDER HEAD GASKET ---------- B2 - 1
REMOVAL AND INSTALLATION-------- B2 - 1
TIMING CHAIN ---------- B2 - 5
REMOVAL AND INSTALLATION-------- B2 - 5
CAMSHAFT ---------- B2 - 11
REMOVAL AND INSTALLATION ------ B2 - 11
ENGINE ASSY ---------- B2 - 21
REMOVAL AND INSTALLATION ------ B2 - 21
K3---------- B2 - 30
CYLINDER HEAD GASKET ---------- B2 - 30
REMOVAL AND INSTALLATION ------ B2 - 30
TIMING CHAIN---------- B2 - 35
REMOVAL AND INSTALLATION ------ B2 - 35
CAMSHAFT ---------- B2 - 41
REMOVAL AND INSTALLATION ------ B2 - 41
ENGINE ASSY ---------- B2 - 49
REMOVAL AND INSTALLATION ------ B2 - 49

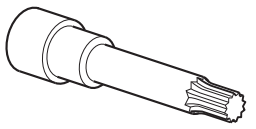
■ 1KR
1 CYLINDER HEAD GASKET
1-1 REMOVAL AND INSTALLATION

WARNING

- No fire should be brought near when servicing the fuel system.
- When removing the fuel hose, prevent the fuel from splashing.
- When the coolant is hot, do not remove the radiator cap, drain plug or water hose.

1-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09043-97401-000	Wrench,double hexagon

Instrument

Torque wrench

Lubricant,adhesive,others

Engine oil

1-1-2 OPERATION BEFORE REMOVAL

1.Drain the engine oil.
Refer to Page B5-3.

2.Drain the coolant.

3.Remove the engine Ay.
Refer to Page B2-21.

4.Remove the air cleaner hose No.1.
Refer to Page B3-1.

5.Remove the air cleaner Ay W/element.
Refer to Page B3-1.

6.Remove the exhaust manifold stay.
Refer to Page B4-1.

7.Remove the oil pan Ay.
Refer to Page B5-9.

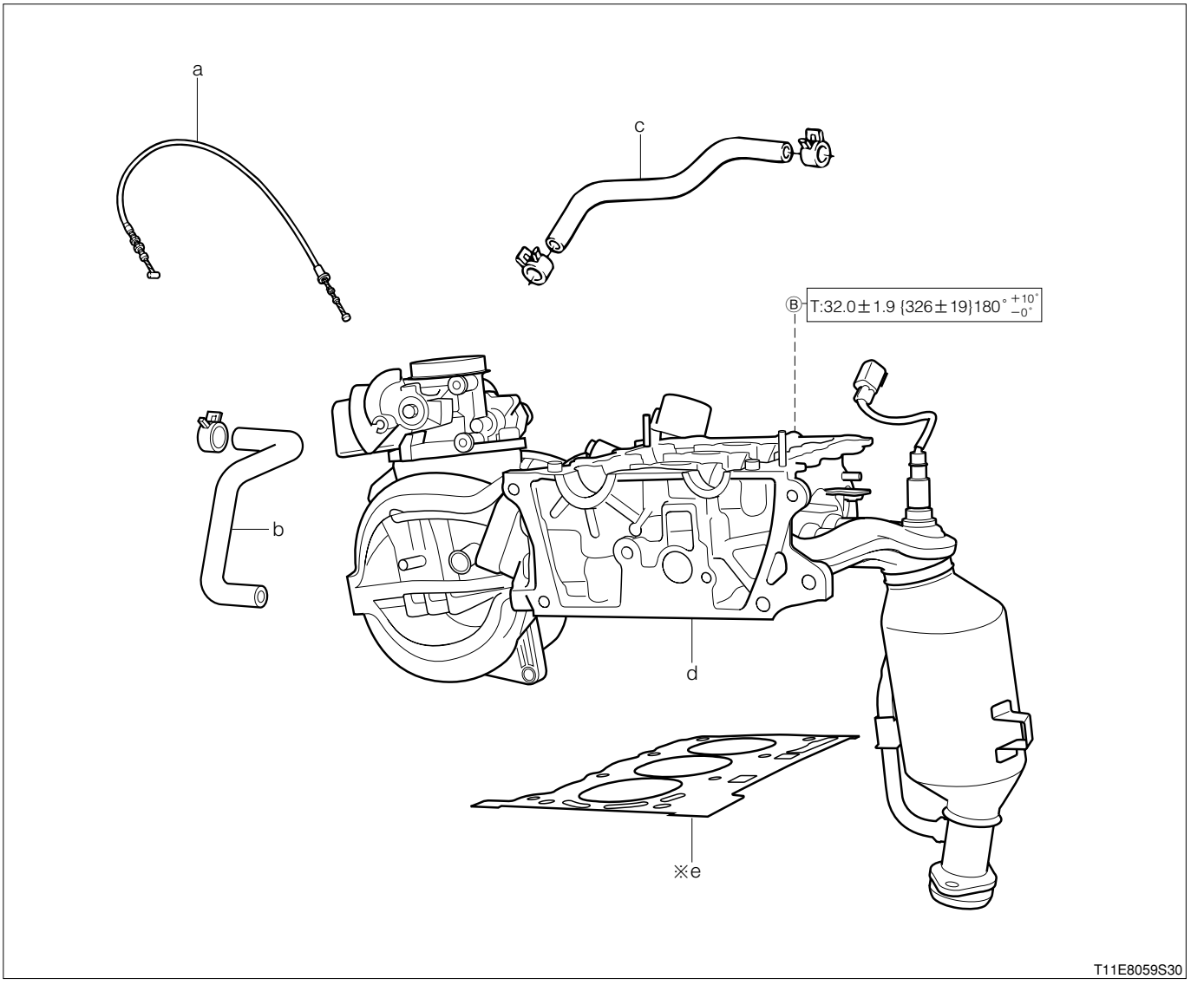
8.Remove the timing chain Ay.
Refer to Page B2-5.

9.Remove the camshaft Ay.
Refer to Page B2-11.

10.Remove each connector, clamp and hose.

1-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) Removal and installation procedures

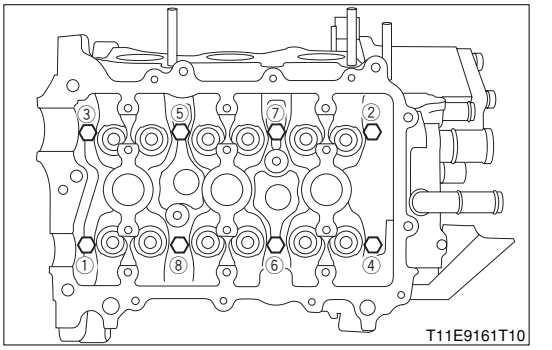
- ▲ 1 a Cable Ay, accelerator control
- ▲ 2 b Hose, booster vacuum
- 3 c Hose, water No.1
- ▼ ▲ 4 d Cylinder head Ay (With intake manifold & exhaust manifold)
- ▲ 5 e Gasket, cylinder head

1-1-4 POINTS OF REMOVAL

(1) Head Ay, cylinder

1.Remove the head Ay together with the intake manifold Ay and the exhaust manifold converter S/A by removing the attaching bolts in the sequence shown in the right figure, using the SST.

SST: 09043-97401-000



1-1-5 POINTS OF INSTALLATION

CAUTION

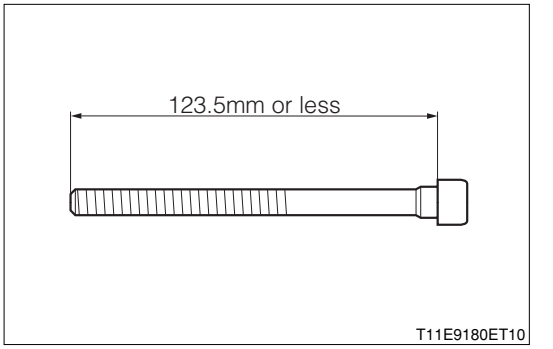
- Never use fire during the work.
- Wear safety goggles during the cleaning so as to protect your eyes.

(1) Head Ay, cylinder/Gasket cylinder head

1.Install the gasket to head Ay.

(1) Measure the nominal length of the cylinder head bolt shown in the figure on the right. Replace any cylinder head bolt if it is beyond the application limits.

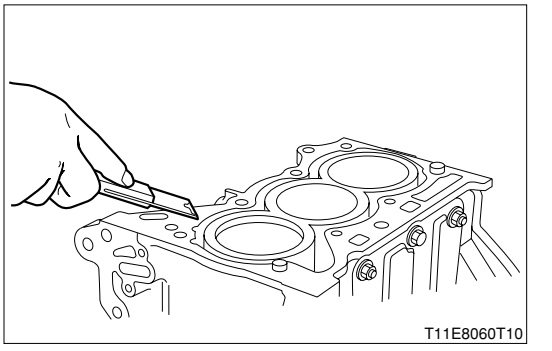
ALLOWABLE LIMIT: 123.5mm



(2) Clean the gasket mounting surface of the cylinder block Ay and cylinder head Ay and completely remove foreign objects, oil, etc., using a scraper.

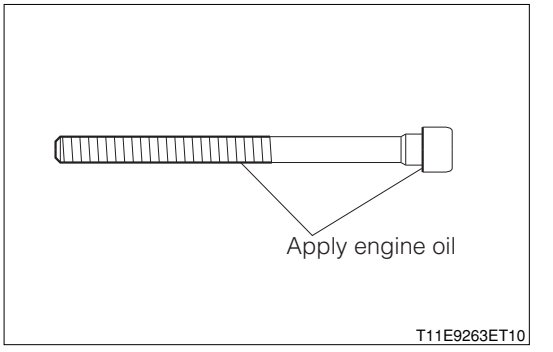
CAUTION

- Be very careful not to allow scraping debris of the gasket to fall into the water jacket and oil hole. Remove when dropped.



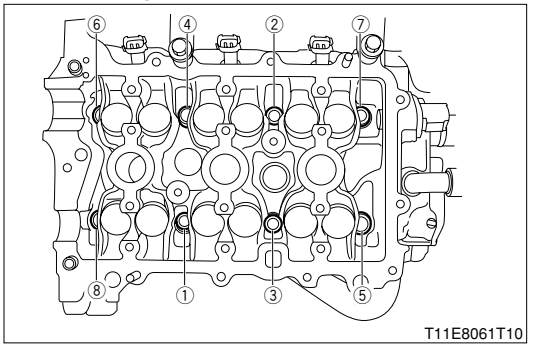
(3) Mount a plate washer to the head Ay. Apply engine oil to the threaded portion of the bolts and seating surface on the bolt side. Then, perform the assembling operations.

LUBRICANT: Engine oil



(4) To assemble the cylinder head Ay, tighten the bolts over 2 or 3 stages in the sequence shown in the figure on the right, using the SST. Then, tighten them to the specified torque.

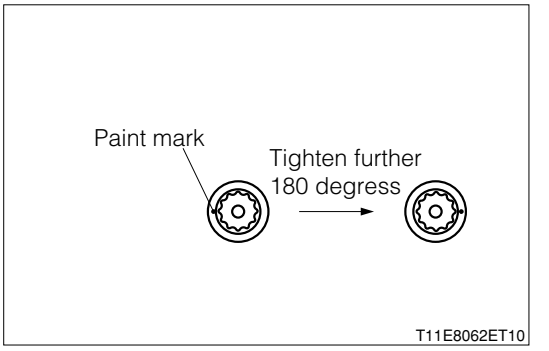
SST: 09043-97401-000



(5) After tightening to the specified torque, retighten them 180^{+10}_{-0} degrees in the same sequence.

NOTE

- It is recommended to put a paint mark on the top of the head bolts in the same direction. After tightening 180 degrees in the sequence above, ensure that all the bolt marks, which have been turned 180 degrees, are facing the same direction.



(2) Hose, booster vacuum

1.Install the vacuum booster hose.
Refer to Page E1-36.

(3) Cable Ay, accelerator control

1.Install the accelerator control Cable Ay.
Refer to Page B3-3.

1-1-6 OPERATION AFTER INSTALLATION

1.Install each connector, clamp and hose.
2.Install the camshaft Ay.
Refer to Page B2-11.

3.Install the timing chain Ay.
Refer to Page B2-5.

4.Install the oil pan Ay.
Refer to Page B5-9.

5.Install the exhaust manifold stay.
Refer to Page B3-9.

6.Install the air cleaner Ay W/element.
Refer to Page B3-1.

7.Install the air cleaner hose No.1.
Refer to Page B3-1.

8.Install the engine Ay.
Refer to Page B2-21.

9.Replenish the engine oil.
Refer to Page B5-3.

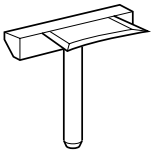
10.Replenish the coolant.
11.Check for any leakage of oil, coolant water and fuel. Perform the engine tune-up.
Refer to Page B1-1.

2 TIMING CHAIN

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09223-87202-000	Replacer,crankshaft front oil seal
	09032-00100-000	Cutter,oil pan seal

Hexagonal rod wrench(Width across flats:2.5mm)

Instrument

Torque wrench

Lubricant,adhesive,others

Engine oil,Three Bond1207B,Three Bond1207C

2-1-2 OPERATION BEFORE REMOVAL

1.Drain the engine oil.
Refer to Page B5-3.

2.Remove the air cleaner Ay W/element.
Refer to Page B3-1.

3.Remove the engine Ay.
Refer to Page B2-21.

4.Remove the water pump Ay.
Refer to Page B6-3.

5.Remove the coil Ay, W/ignitor.
Refer to Page B10-2.

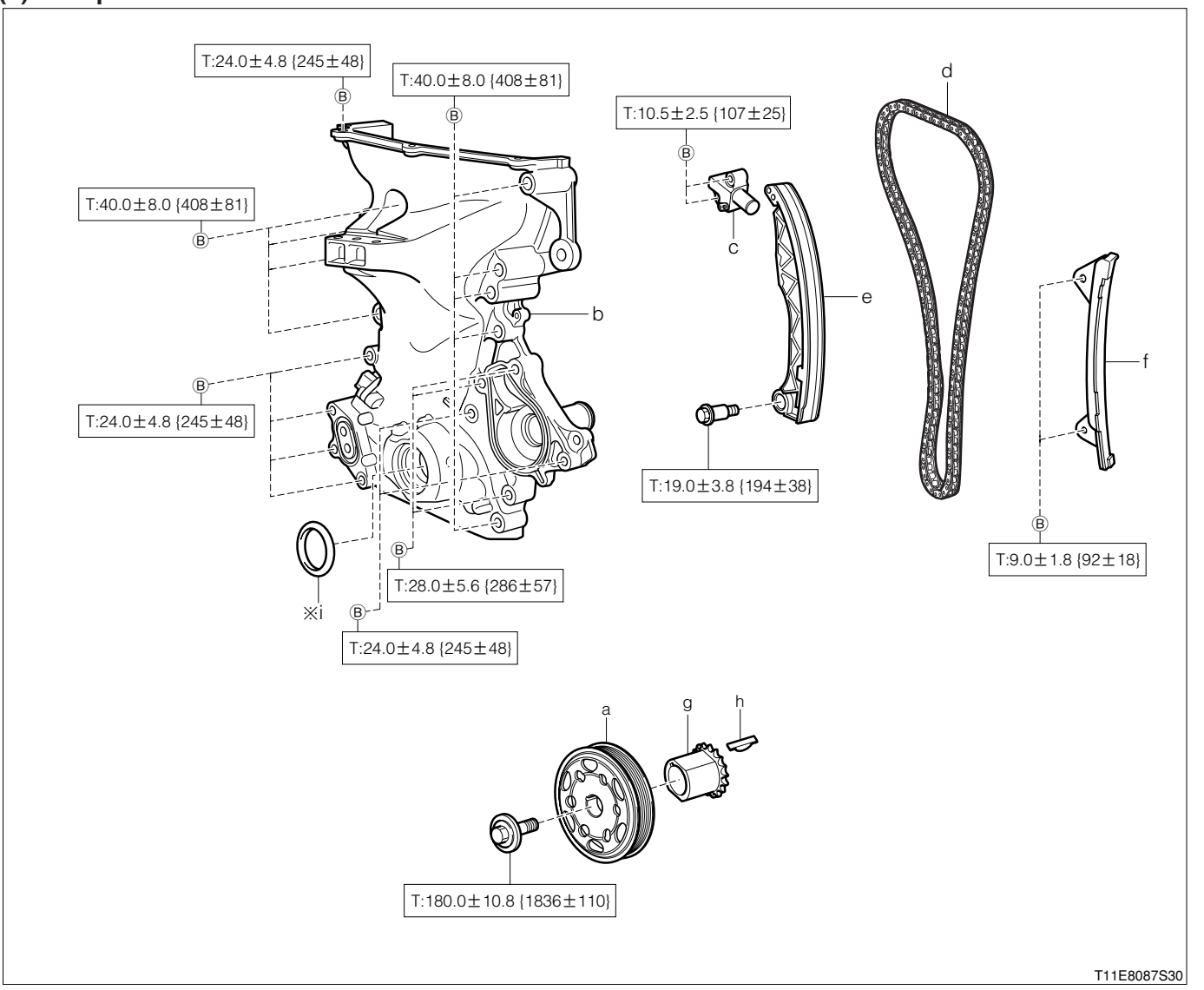
6.Remove the cylinder head cover.
Refer to Page B2-11.

7.Remove the oil filter Ay W/bracket.
Refer to Page B5-9.

8.Remove the oil pan Ay.
Refer to Page B5-9.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts
Unit:N·m{kgf·cm}

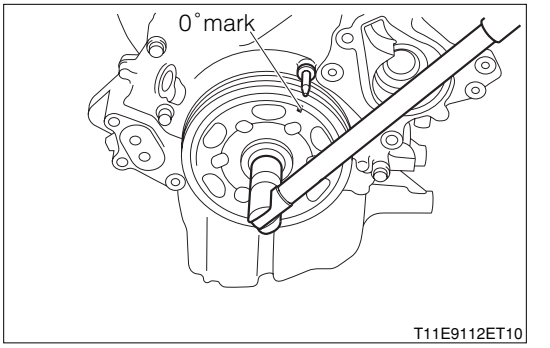
(2) Removal and installation procedures

▼		1	a	Pulley Ay, crankshaft
▼	▲	2	b	Cover Ay, timing gear
	▲	3	c	Tensioner S/A, Timing chain
▼	▲	4	d	Chain, timing
		5	e	Arm, timing chain tension
		6	f	Guide, timing chain
		7	g	Sprocket, crankshaft timing
		8	h	Key, woodruff
	▲	9	i	Seal, type T oil

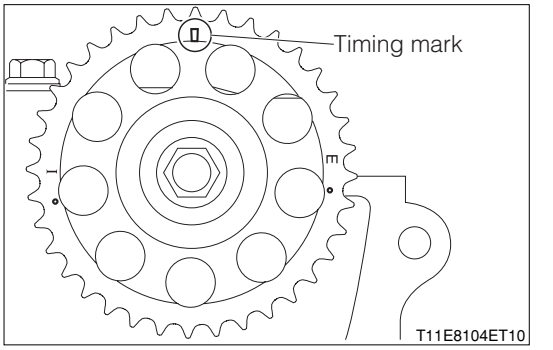
2-1-4 POINTS OF REMOVAL

(1) Pulley Ay, crankshaft

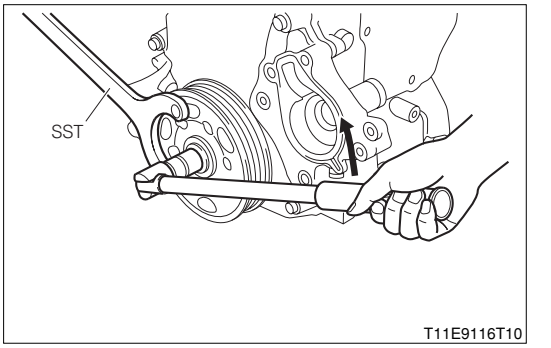
1.Turn the pulley Ay in the normal direction, until the timing mark (0 degrees) of the pulley Ay is aligned with the timing pointer of the timing chain cover Ay. (Set the No.1cylinder to the top dead center under the compression stroke.)



2.Ensure that the timing mark of the camshaft timing sprocket is at the top position.
If the timing mark is not at the top position, turn the pulley Ay once so that the timing mark comes to the top position. (Set the No.1cylinder to the top dead center under the compression stroke.)



3.While preventing rotation, using the SST, remove the pulley Ay.
SST: 09278-87201-000

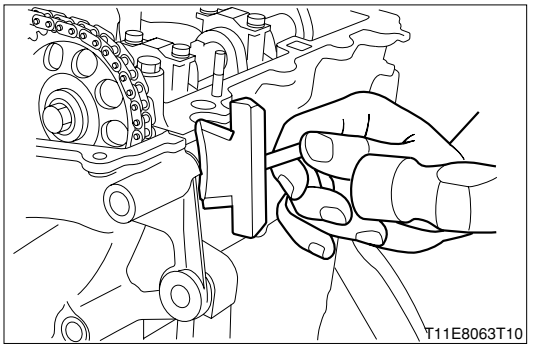


(2) Cover Ay, timing chain

1.Remove the attaching bolts and nuts of the cover Ay.
2.Remove the cover Ay by inserting the SST between the cover Ay and the cylinder head Ay.
SST: 09032-00100-000

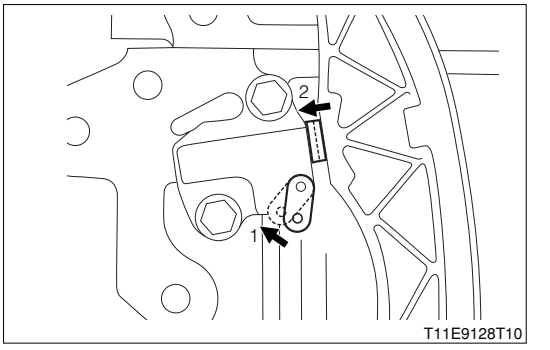
CAUTION

- Be very careful not to scratch the joint surface.

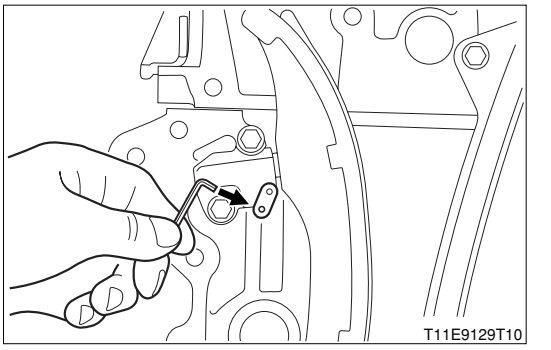


(3) Chain, timing

1.With the lock released by moving the stopper plate of the timing chain tensioner S/A clockwise, insert a plunger as far as it will go.



2.With the plunger locked, insert a hexagonal wrench into the hole of the stopper plate and the lower part of the timing chain tensioner S/A. (The plunger will be locked.)
TOOL: Hexagon rod wrench (Width across flats: 2.5mm)
3.Remove the timing chain tensioner S/A by removing the bolts and nuts.
4.Remove the chain.



2-1-5 POINTS OF INSTALLATION

(1) Seal, type T oil

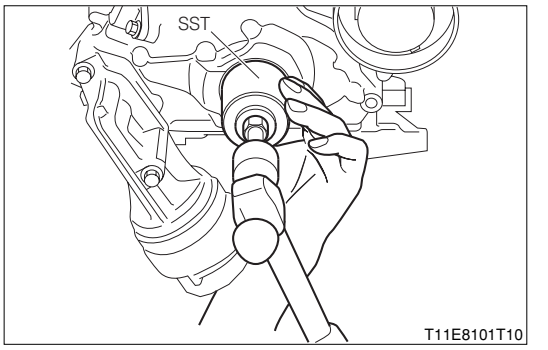
1.Install the seal to the timing chain cover Ay in the sequence shown below.

(1) Apply engine oil to the lip section of the seal.

(2) Drive the seal vertically, using the SST.

SPECIFIED VALUE: Press-fitting amount
Protruding amount from end surface of timing chain cover Ay
Within 0.5mm
Press-fitting depth from end surface of timing chain cover Ay
Within 1mm

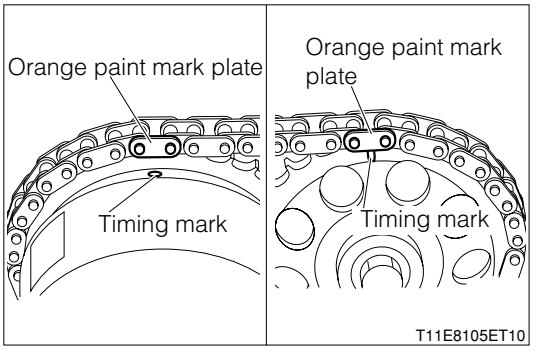
SST: 09223-87202-000



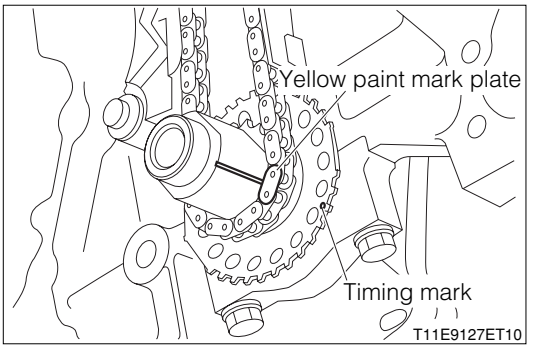
(2) Chain, timing

1.Install the timing chain tension arm and timing chain guide.

2.During the installation, align the two orange mark plates of the chain with the timing mark of the camshaft timing sprocket as shown in the figure.

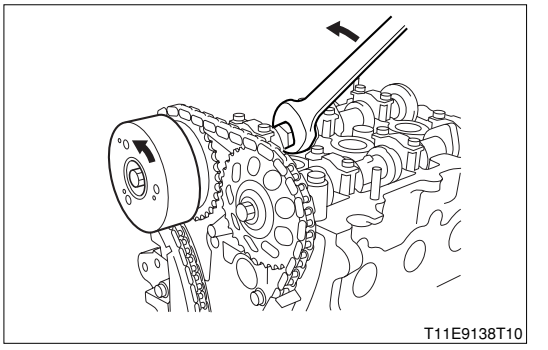


3.During the installation, align the yellow mark plate of the chain with the timing mark of the crankshaft timing sprocket.

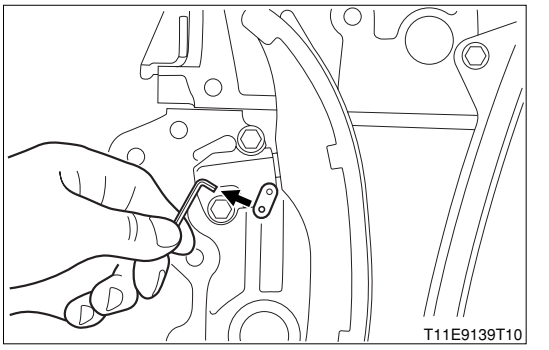


(3) Tensioner S/A, timing chain

1.Slightly turn the camshaft counterclockwise (Reverse rotation), using the hexagonal section of the camshaft, so as to give a slack to the chain at the tensioner side. Under this state, install the tensioner.



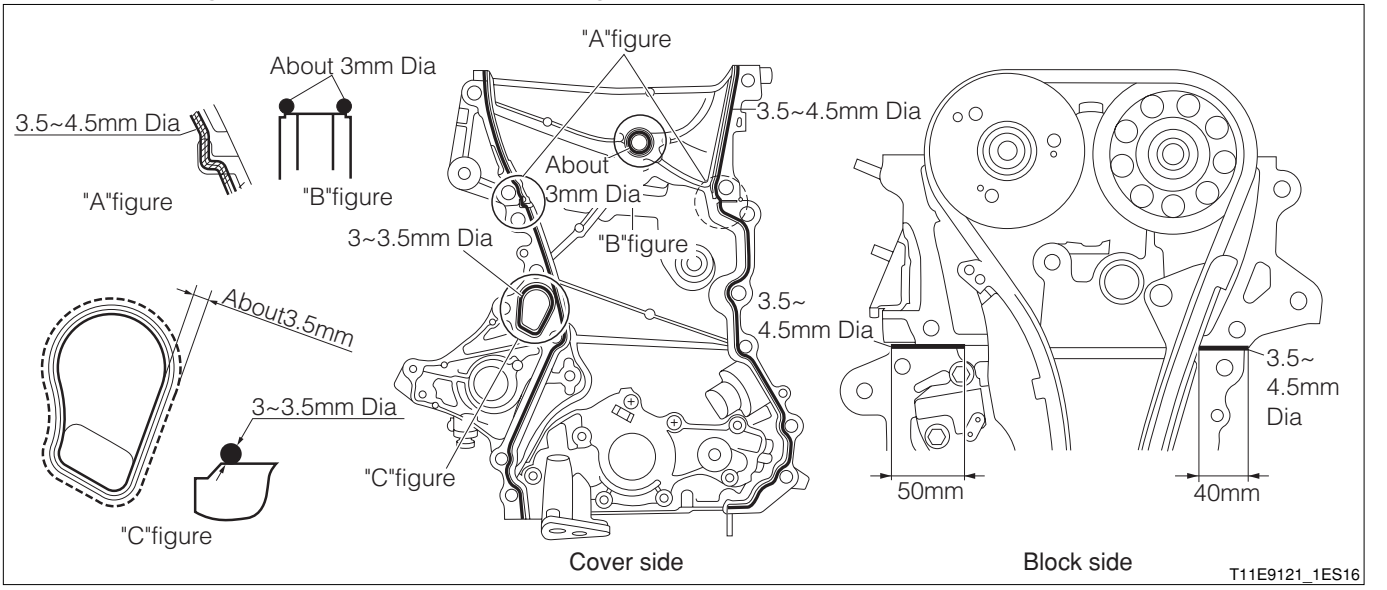
2.Pull out the hexagonal rod wrench of the tensioner and turn the crankshaft two turns to move the chain tensioner Ay.



(4) Cover Ay, timing chain

1.Assemble the timing chain cover gasket to the cover Ay.

2.Apply liquid gasket to the position in the figure and install the cover Ay.



ADHESIVE: Three Bond1207C / Apply to the points in the figure C at the cover side as shown in the figure.

ADHESIVE: Three Bond1207B / Apply to the points in the figures A and B at the cover side as shown in the figure and at the block side.

CAUTION

- Completely remove foreign matters and oil from the installation surface.
- Perform the assembling within three minutes after application of the liquid gasket.

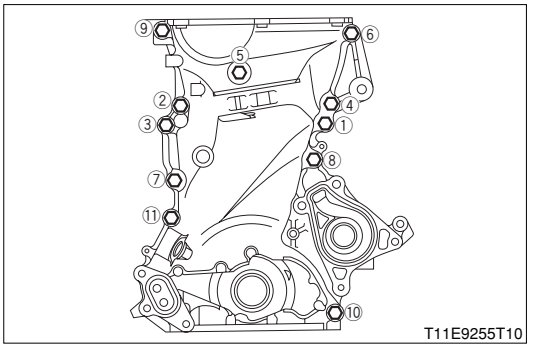
3.Tighten the bolts in the sequence shown in the figure.

CAUTION

- Perform the assembling within three minutes after application of the liquid gasket.

(1) Wipe off any liquid gasket that has oozed out.

SPECIFIED VALUE: Permissible oozing amount: within 1.5mm



2-1-6 OPERATION AFTER INSTALLATION

1.Install the oil pan Ay.
Refer to Page B5-9.

2.Install the oil filter Ay W/bracket.
Refer to Page B5-9.

3.Install the cylinder head cover.
Refer to Page B2-11.

4.Install the coil Ay, W/ignitor.
Refer to Page B10-2.

5.Install the water pump Ay.
Refer to Page B6-3.

6.Install the engine Ay.
Refer to Page B2-21.

7.Install the air cleaner Ay W/element.
Refer to Page B3-1.

8.Replenish the coolant.
9.Replenish the engine oil.
Refer to Page B5-3.

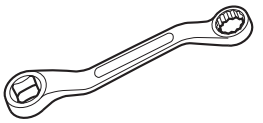
10.Check for any leakage of oil, coolant water and fuel. Perform the engine tune-up.
Refer to Page B1-1.

3 CAMSHAFT

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09249-B1010-000	Adaptor,torque wrench

Tool

Hexagonal rod wrench(Width across flats:2.5mm),Hexagon wrench (Width across flats : 10mm)

Instrument

Torque wrench

Lubricant,adhesive,others

Engine oil,Three Bond1324,Three Bond1207B

3-1-2 OPERATION BEFORE REMOVAL

1.Remove the negative (-) terminal of the battery.
Refer to Page J5-3.

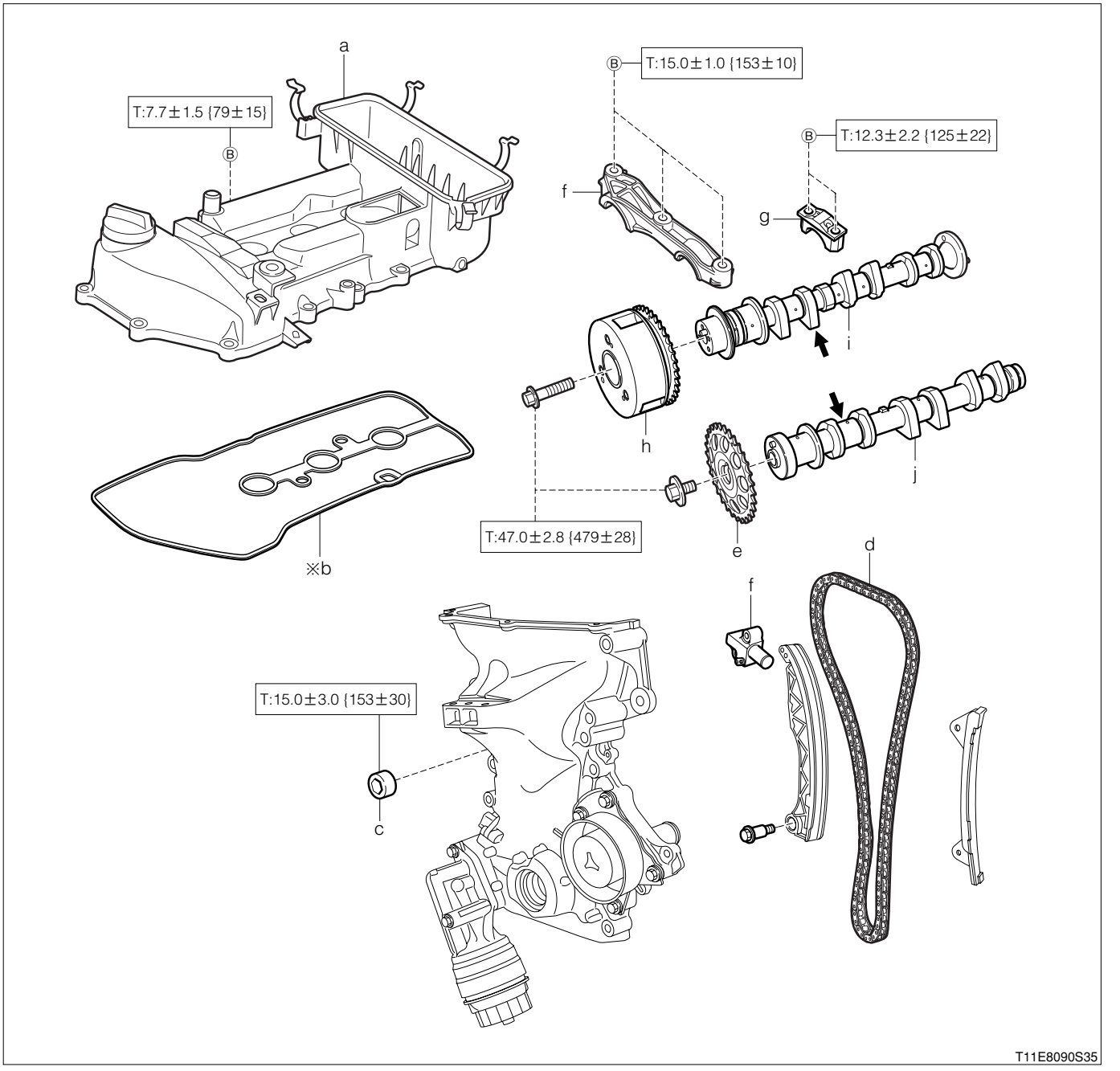
2.Remove the air cleaner Ay W/element.
Refer to Page B3-1.

3.Remove the V-ribbed belt
Refer to Page B1-5.

4.Remove the coil Ay, W/ignitor.
Refer to Page B10-2.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



➡: Engine oil
Unit: N·m{kgf·cm}
※: Non-reusable parts

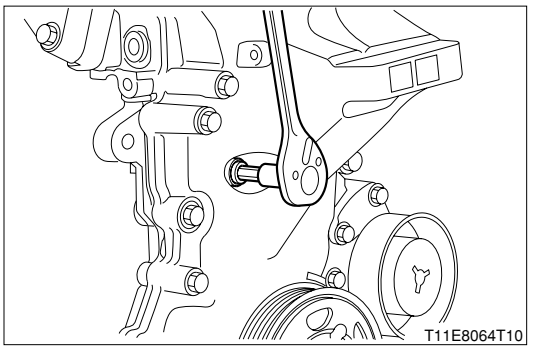
(2) Removal and installation procedures

- ▲ 1 a Cover, cylinder head
- 2 b Gasket, cylinder head cover
- ▼ ▲ 3 c Plug, service hole screw
- ▲ 4 d Chain, timing
- ▼ ▲ 5 e Sprocket, camshaft timing
- ▼ ▲ 6 f Cap, camshaft bearing No.1
- ▼ ▲ 7 g Cap, camshaft bearing No.2
- ▲ 8 h Sprocket Ay, camshaft timing (DVVT controller)
- ▼ ▲ 9 i Camshaft Ay,No.1
- ▼ ▲ 10 j Camshaft Ay No.2

3-1-4 POINTS OF REMOVAL

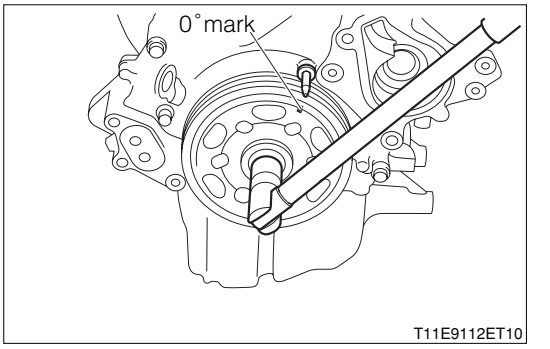
(1) Plug, service hole screw

1.Remove the plugs, using a hexagon wrench.
TOOL: Hexagon wrench (Width across flats : 10mm)

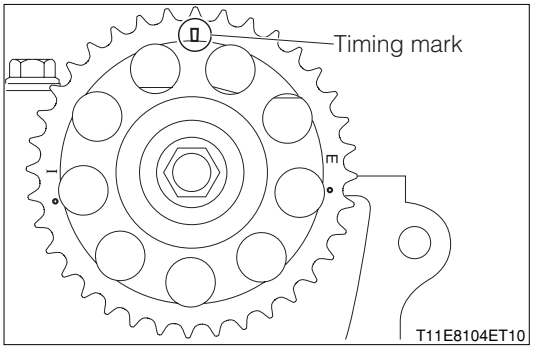


(2) Sprocket, camshaft timing

1.Turn the pulley Ay in the normal direction, until the timing mark (0 degrees) of the pulley Ay is aligned with the timing pointer of the timing chain cover Ay. (Set the No.1cylinder to the top dead center under the compression stroke.)



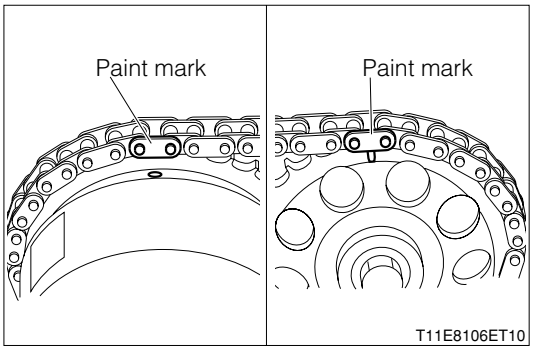
2.Ensure that the sprocket is at the top position.
If the timing mark is not at the top position, turn the pulley Ay once so that the timing mark comes to the top position. (Set the No.1cylinder to the top dead center under the compression stroke.)



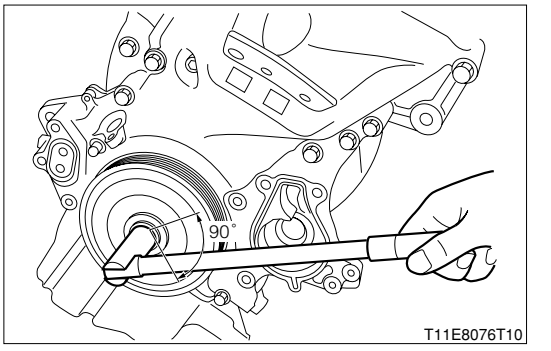
3.Put a paint mark on each plate of the timing chain that is aligned with the mating marks of the sprocket and camshaft timing sprocket Ay (DVVT controller).

NOTE

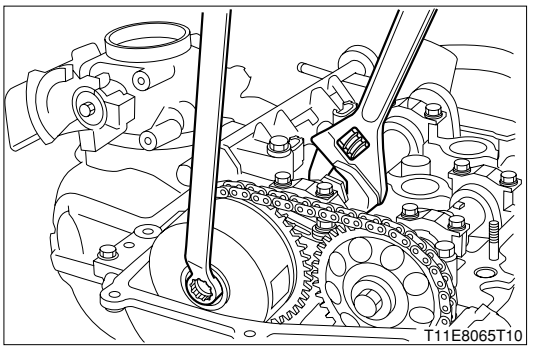
- The timing chain has two orange mark plates and one yellow mark plate. Therefore, in cases where the orange mark plates are aligned with the cam sprocket side and the yellow mark plate with the crankshaft side, the above operation is not required.



4.Turn the crankshaft 90 degrees (Crank angle) in the engine rotation direction from the top dead center under the compression stroke of the cylinder No.1 so that the lifted valve will not interfere with the piston when removing the camshaft Ay.



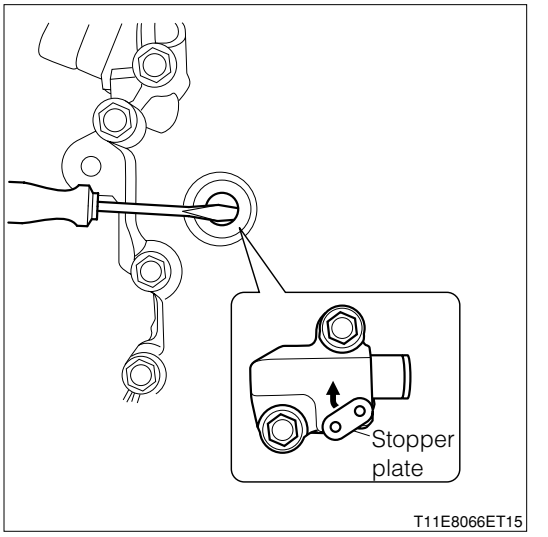
5.Loosen the attaching bolts of the sprocket Ay using the hexagonal section provided for servicing of the camshaft.



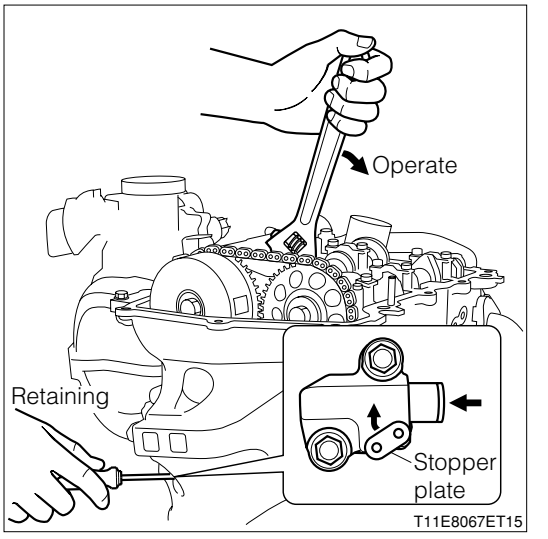
6.Move the stopper plate of the timing chain tensioner S/A from the plug in the clockwise direction, using a flat screwdriver. Then, maintain the released condition.

NOTE

- By this operation, the plunger of the timing chain tensioner S/A will be unlocked.
- If any difficulty is encountered in releasing the lock of the stopper plate, slightly turn it in a right-and-left direction, using the hexagonal section provided for servicing of the camshaft Ay.



7.Slightly turn the camshaft Ay clockwise (Normal direction), using the hexagonal section provided for servicing of the camshaft Ay, so that the timing chain pushes the plunger section of the timing chain tensioner S/A.



8.While maintaining the above condition, remove the flat screwdriver from the plug and insert a hexagonal wrench into the hole of the stopper plate.

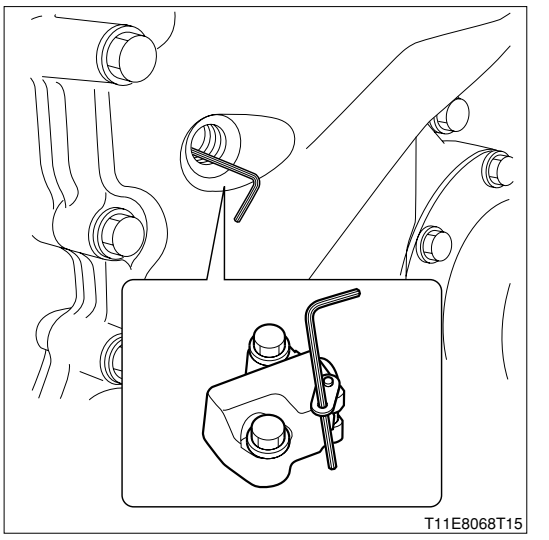
TOOL: Hexagonal rod wrench(Width across flats:2.5mm)

CAUTION

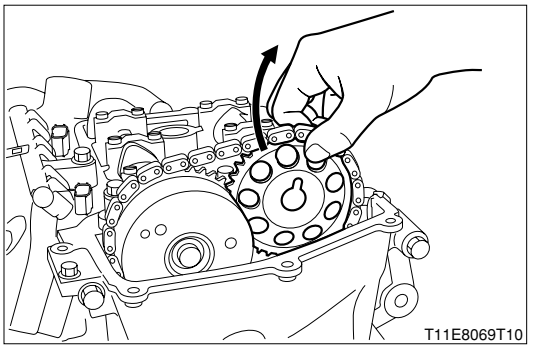
- Maintain the camshaft Ay using the hexagonal section for servicing.
- Secure the hexagonal wrench so that it would not come out by means of a tape or the like.

NOTE

- By this operation, the plunger of the timing chain tensioner S/A will be held in a pushed state.

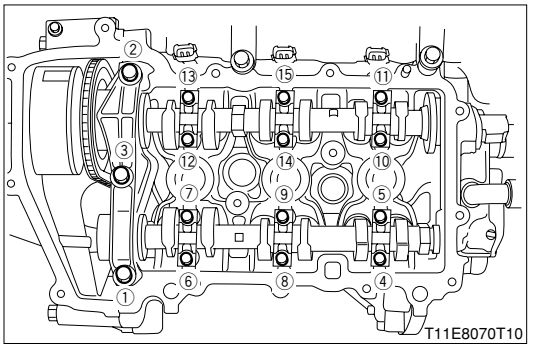


9.Remove the sprocket from the No.2 camshaft Ay.



(3) Camshaft bearing No.1/No.2 caps

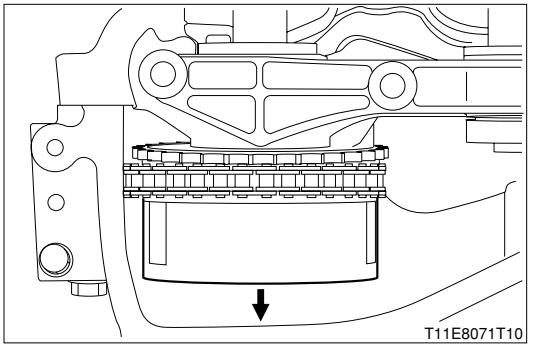
1.Remove the bolts in the sequence shown in the right figure.



2.Remove the camshaft bearing cap No.1/No.2.

(1) Slide the camshaft timing sprocket to the engine front side until the camshaft bearing No.1 cap is pulled out.

(2) Remove the camshaft bearing cap No.1/No.2.

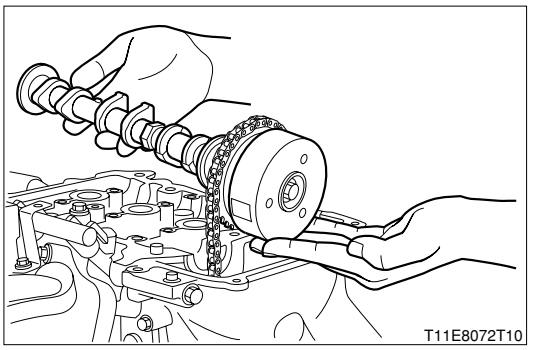


(4) Camshaft Ay,No.1/No.2

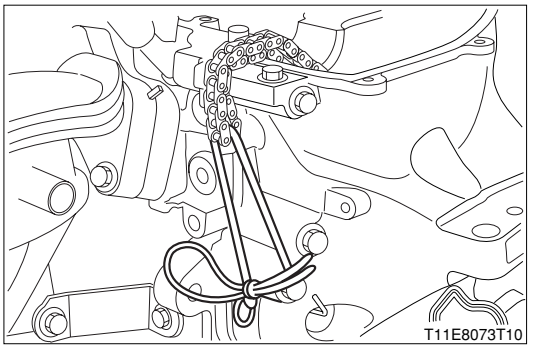
1.Remove the camshaft Ay,No.1/No.2.

NOTE

- Remove the No.1 camshaft Ay together with the camshaft timing sprocket.
- Also, during the installation, temporarily assemble the camshaft timing sprocket to the No.1 camshaft Ay.



2.After removing the camshaft Ay, hold the timing chain by a cord, etc. so that it would not fall.



3-1-5 INSPECTION

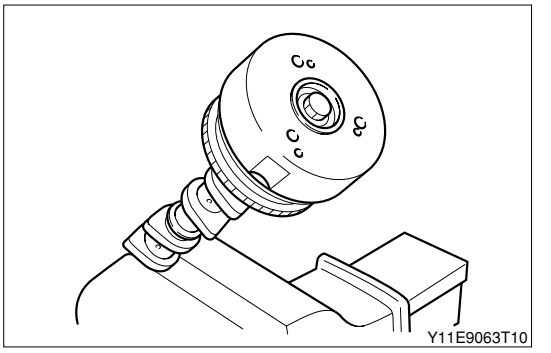
(1) Check of camshaft timing sprocket Ay

CAUTION

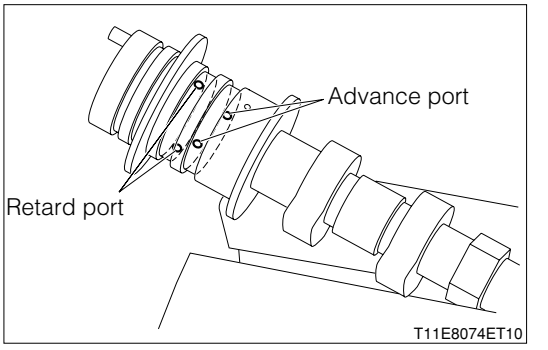
- Do not disassemble the camshaft timing sprocket Ay (DVVT controller).

1.Secure the hexagonal section provided for servicing the No.1 camshaft assembly to a vice.

2.Install the camshaft timing sprocket Ay and tighten the attaching bolts to the specified torque.



3.Hold one of the two advanced timing side ports (The figure on the right) of the No.1 camshaft Ay with your fingers or block the advanced timing side port by a tape, etc.



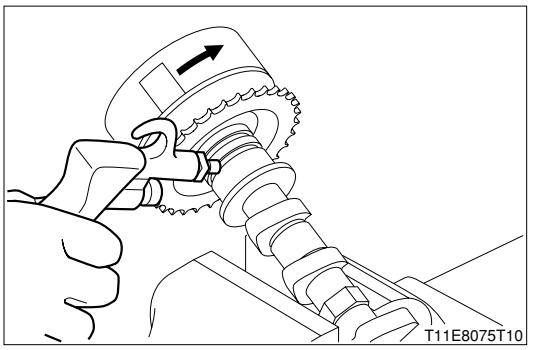
4.Using an air tool, apply air pressure through another port at the timing advance side.

CAUTION

- Care must be exercised as to splashing oil.

NOTE

- The most retard timing lock is disengaged.



5.At this time, ensure that the most retard timing angle lock of the camshaft timing sprocket Ay is disengaged and the camshaft timing sprocket Ay can be freely moved by the hand without any binding in the range of about 30 degrees.

CAUTION

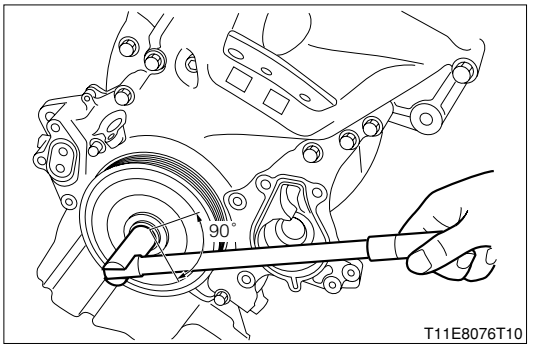
- The camshaft timing sprocket Ay is locked when it comes at the most retard angle position.

6.After the inspection, lock the camshaft timing sprocket Ay at the most retard timing position.

3-1-6 POINTS OF INSTALLATION

(1) Camshaft Ay,No.1/No.2

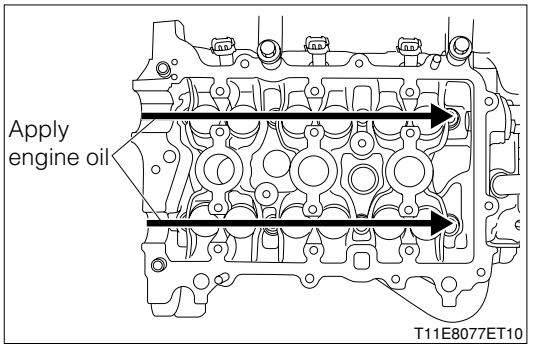
1.Turn the crankshaft about 90 degrees (Crank angle) in the engine rotation direction from the top dead center under the compression stroke of the cylinder No.1 so that the lifted valve will not interfere with the piston when installing the camshaft.



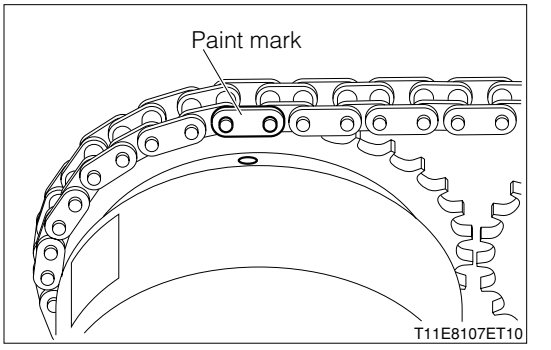
2.Install the camshaft Ay,No.1/No.2.

(1) Apply engine oil to each of cam sections of the camshaft Ay, journal sections of the cylinder head Ay and the top of the valve lifter.

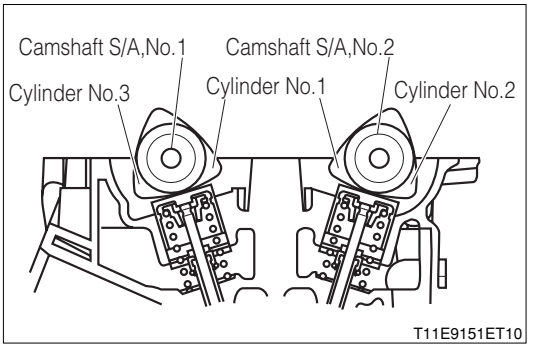
LUBRICANT: Engine oil



(2) Perform the installation in such a way that the timing mark of the camshaft timing sprocket Ay (DVVT controller) and the paint mark of the timing chain are aligned with the timing mark that has been applied during the removal operation.



(3) Set the No.1 camshaft Ay so that the cam noses of the No.1 cylinder and No.3 cylinder may press the valve lifters.
Set the No.2 camshaft Ay so that the cam noses of the No.1 cylinder and No.2 cylinder may press the valve lifters.

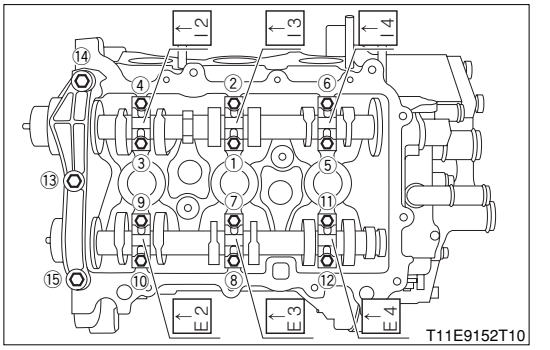


NOTE

- The timing mark of the camshaft timing sprocket and the camshaft timing sprocket Ay (DVVT controller) would come to the top position.

(2) Cap, camshaft bearing No.1/No.2

1.Set the camshaft bearing No.1/No.2 caps. Then, tighten the attaching bolts to the specified torque in the sequence shown in the right figure.



CAUTION

- The front marks (Arrow marks) indicated on the top of camshaft bearing No.1/No.2 caps are facing towards the engine front side.
- Refer to the following table for the installation positions of the stamped No.'s indicated on the top of the camshaft bearing No.1/No.2 caps.

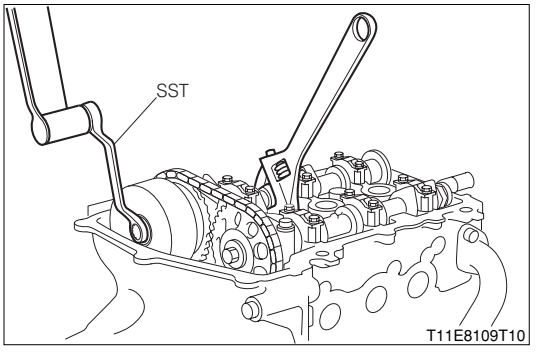
Installation positions of camshaft bearing No.2 cap

Stamping No.	Installation position	
	Intake/exhaust	Cylinder No.
I2	Intake side	Cylinder No.1
I3		Cylinder No.2
I4		Cylinder No.3
E2	Exhaust side	Cylinder No.1
E3		Cylinder No.2
E4		Cylinder No.3

(3) Sprocket Ay, camshaft timing (DVVT controller)

1.Tighten the sprocket Ay attaching bolts, by means of the SST, using the hexagonal section provided for servicing of the No.1 camshaft Ay,

SST: 09249-B1010-000



NOTE

- To perform the tightening operation by extending the overall length, using a torque wrench in combination with the SST, determine the torque wrench readings by using the calculation formula.

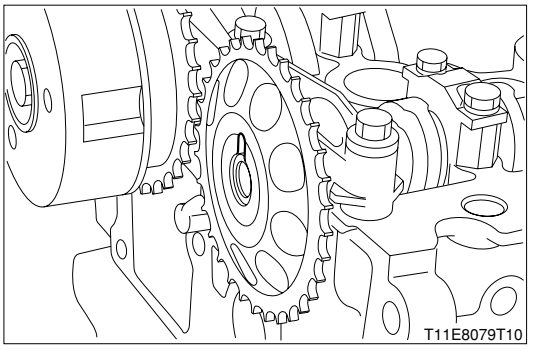
Refer to Page A1-8.

(4) Sprocket, camshaft timing

1.Perform the assembling in such a way that the knock pin of the No.2 camshaft Ay would fit into the groove.

NOTE

- The mating mark of the gears would face exactly upward.

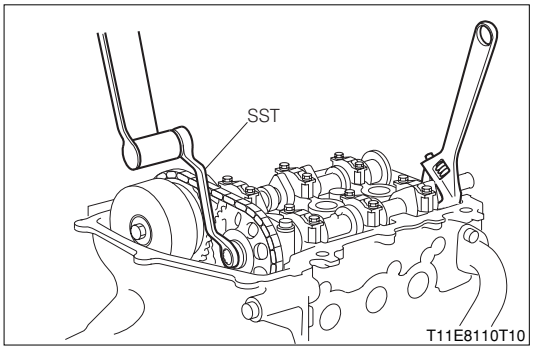


2.Tighten the sprocket attaching bolts by means of the SST, using the hexagonal section provided for servicing of the No.2 camshaft Ay.
SST: 09249-B1010-000

NOTE

- To perform the tightening operation by extending the overall length, using a torque wrench in combination with the SST, determine the torque wrench readings by using the calculation formula.

Refer to Page A1-8.



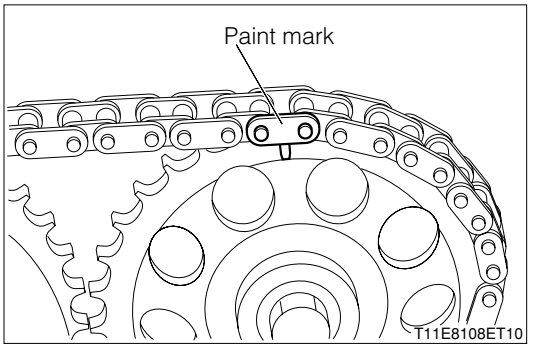
(5) Chain, timing

1.Perform the installation in such a way that the timing mark of the camshaft timing sprocket Ay and the paint mark of the timing chain are aligned with the timing mark that has been applied during the removal operation.

2.Pull out the hexagonal wrench from the timing chain tensioner S/A.

NOTE

- Slightly turn the camshaft Ay counterclockwise (Reverse rotation), using the hexagonal section provided for servicing of the camshaft Ay, so as to give a slack to the chain at the timing chain tensioner S/A side. Under this state, remove the hexagonal wrench.



(6) Plug, service hole screw

1.Clean the plugs and the bolt holes of the timing chain cover Ay. Then, apply liquid gasket to the threaded portion of the plugs before the installation.
ADHESIVE: Three Bond1324
TOOL: Hexagon wrench (Width across flats : 10mm)

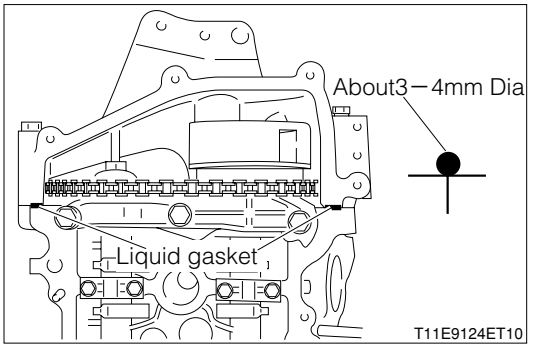
(7) Cover, cylinder head

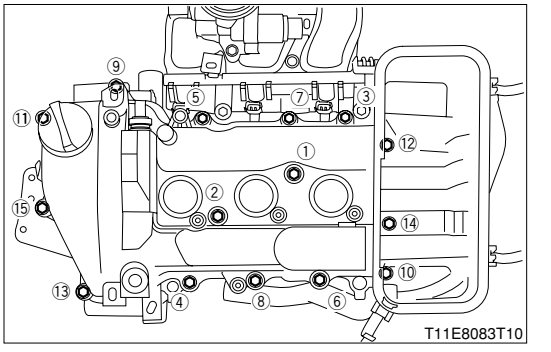
1.Clean the cylinder head cover, cylinder head Ay and timing chain cover Ay.

2.Insert the cylinder head cover gasket to the gasket groove and central boss of the coil Ay with ignitor.

3.Apply liquid gasket to the mating surfaces of the cylinder head Ay and the timing chain cover Ay, as shown in the figure.
The guide of the application amount is about 3.5±0.5mm Dia.
ADHESIVE: Three Bond1207B

4.The cover Ay attaching bolts should be assembled in the sequence shown in the right figure within three minutes after application of the liquid gasket.
After tightening all bolts to the specified torque, ensure again that the bolts ① and ② are tightened to the specified torque.





3-1-7 OPERATION AFTER INSTALLATION

1.Install the coil Ay, W/ignitor.
Refer to Page B10-2.

2.Install the V-ribbed belt and adjust the tension.
Refer to Page B1-5.

3.Install the air cleaner Ay W/element.
Refer to Page B3-1.

4.Connect the negative (-) terminal of the battery.
Refer to Page J5-3.

5.Check for any leakage of oil, coolant water and fuel. Perform the engine tune-up.
Refer to Page B1-1.

4 ENGINE ASSY

4-1 REMOVAL AND INSTALLATION

WARNING

- No fire should be brought near when servicing the fuel system.
- When removing the fuel hose, prevent the fuel from splashing.
- When the coolant is hot, do not remove the radiator cap, drain plug or water hose.
- When the oil is hot, do not remove the drain plug or oil cooler hose.

4-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

Engine hanger No.1 (Replacement parts),Engine hanger No.2 (Replacement parts),Engine hanger attaching bolt (Replacement parts),Wooden block

4-1-2 OPERATION BEFORE REMOVAL

1.Remove the fuel pressure.
Refer to Page B7-1.

2.Remove the battery and battery carrier.
Refer to Page J5-3.

3.Disconnect the engine wire from the fuel injection computer Ay, and pull it into the engine compartment.
4.Disconnect the hose leading to the charcoal canister Ay.
(1) RHD vehicles
Refer to Page B9-1.

(2) LHD vehicles
Refer to Page B9-2.

5.Disconnect the vacuum hose Ay from the brake booster Ay.
Refer to Page E1-36.

6.Disconnect the accelerator control cable Ay at the throttle body side.
7.Remove the front bumper cover.
Refer to Page I2-2.

8.Remove the front bumper reinforcement S/A and hood lock support.
Refer to Page I1-1.

9.Remove the air cleaner cap S/A and air cleaner No.1 hose.
Refer to Page B3-1.

10.Remove the wheel disc. (Front)
Refer to Page C3-3.

11.Remove the engine undercover RH and engine undercover LH.
12.Drain the coolant.
13.Disconnect the water hose No.1 and water hose No.2 from the heater radiator Ay.
Refer to Page K1-11.

14.Remove the radiator Ay together with the oil cooler hose.
Refer to Page B6-5.

CAUTION
- Suspend the cooler condenser Ay on the vehicle side, using a cord, etc., without cutting its piping.

15.Rmove the front exhaust pipe Ay.
Refer to Page B4-3.

16.Remove the V-ribbed belt
Refer to Page B1-5.

17.Remove the front drive shaft Ay RH and front drive shaft Ay LH.
Refer to Page D2-8.

18.Disconnect the transmission control cable Ay from the transaxle.
Refer to Page F3-34.

19.Remove the floor shift ay, transmission.
Refer to Page F2-15.

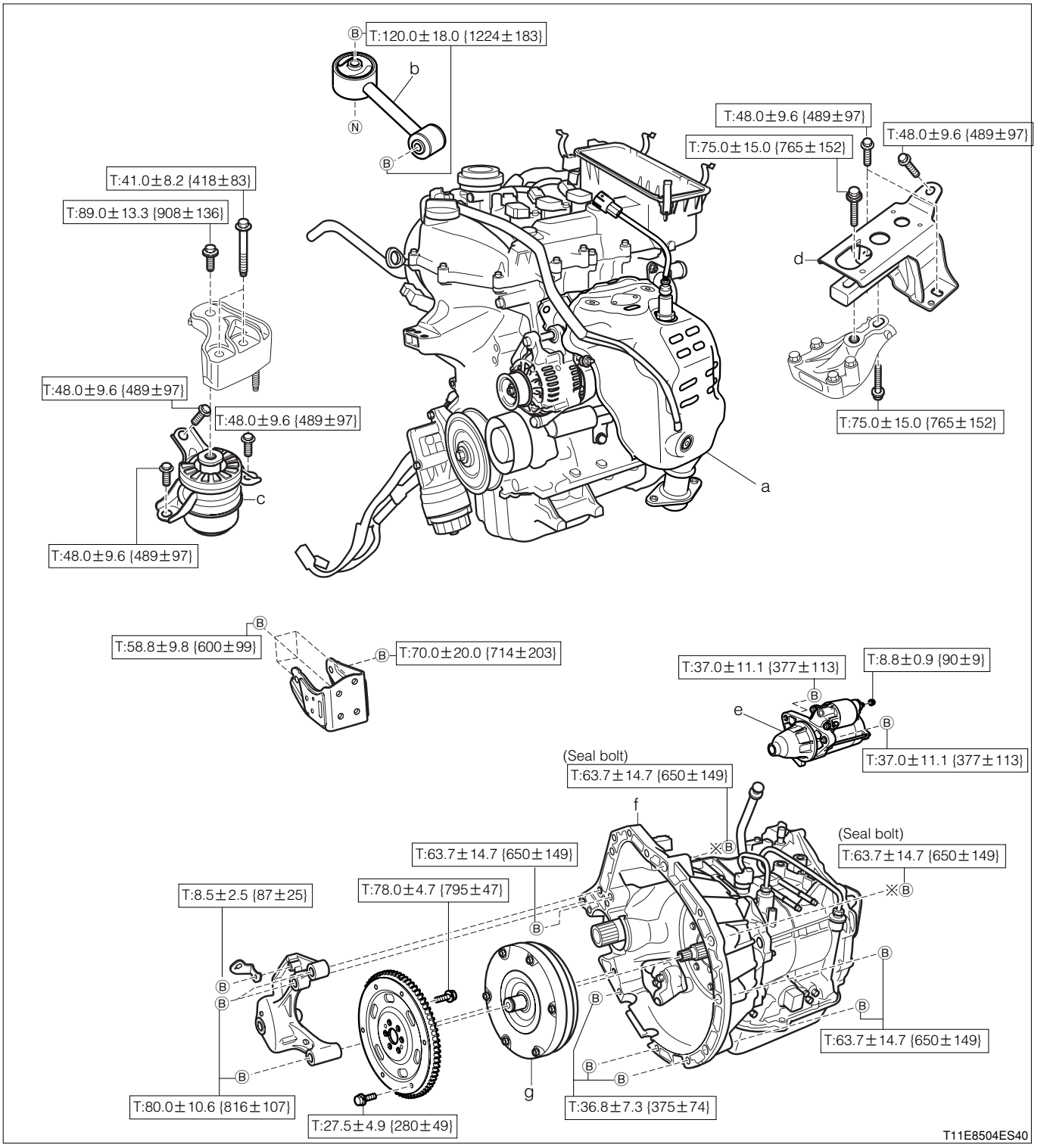
20.Disconnect the fuel hose from the fuel delivery pipe Ay.
Refer to Page B7-11.

21.Remove the compreessor Ay W/magnet clutch.
Refer to Page K1-22.

(1) Remove the compressor Ay by removing the attaching bolts of the compressor Ay without disconnecting its piping.
(2) Suspend the compressor Ay on the vehicle side, using a cord, etc.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts

Unit:N·m{kgf·cm}

Illust : automatic transaxle Ay

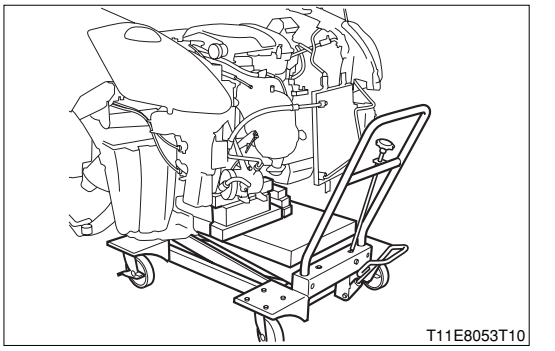
(2) Removal and installation procedures

▼ ▲ 1 a Engine Ay, w/transaxle Ay, automatic
▼ ▲ 2 b Rod S/A, engine mounting control
▼ ▲ 3 c Insulator S/A, engine mounting, RH
▼ ▲ 4 d Insulator S/A, engine mounting, LH
▼ ▲ 5 e Starter Ay
▼ ▲ 6 f Transfer Ay
▼ ▲ 7 g Converter Ay, torque

4-1-4 POINTS OF REMOVAL

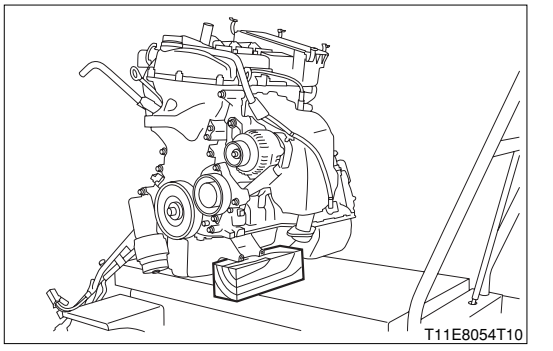
(1) Engine Ay,W/ transaxle Ay(A/T,M/T)

1.Set the engine lifter at the position shown in the figure.


T11E8053T10

2.With wooden blocks or the like, support the engine assembly transaxle assembly(A/T,M/T) in such a way that their balance is well kept.
(1) Put a wooden piece, etc. on the installation position of the compressor Ay with magnet clutch on the left side of the engine block Ay.

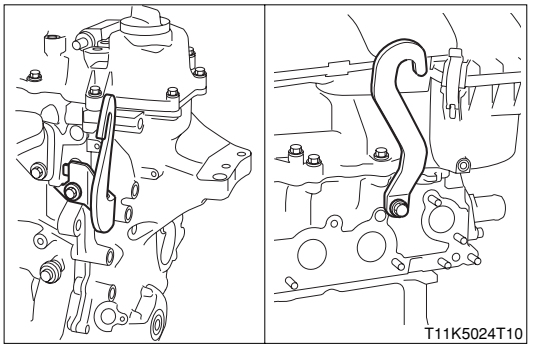
CAUTION
- Do not apply wooden blocks to the crankshaft pulley.


T11E8054T10

3.Install the engine hanger in the position shown in the right figure.

NOTE
- The engine hangers No.1 and No.2 and bolts with washers are supplied parts.

TIGHTENING TORQUE: 28.0±8.4N·m
{286±85kgf·cm}


T11K5024T10

(2) Rod S/A, engine mounting control. (2WD vehicles)

1.Remove the Rod S/A.
Refer to Page B12-7.

(3) Rod S/A, engine mounting control.

1.Remove the Rod S/A.
Refer to Page B12-7.

(4) Insulator S/A, engine mounting, RH

1.Remove the insulator S/A.
Refer to Page B12-1.

CAUTION
- Make sure that the engine assembly is supported in a well balanced way during the removal.

(5) Insulator S/A, engine mounting, LH

1.Remove the insulator S/A.
Refer to Page B12-4.

CAUTION

- Make sure that the engine assembly is supported in a well balanced way during the removal.

(6) Engine Ay, W/ transaxle Ay(A/T,M/T)

1.By operating the engine lifter, remove the engine assembly with the transaxle assembly installed to it.

CAUTION

- Make sure that no connectors or hoses are left connected or that they are not interfering with other parts during the removal.
- Perform the removal in such a way that it would not interfere with the suspension lower arm S/A and the parts in the engine compartment.

NOTE

- When no engine lifter is used, move the vehicle side (Two-post lift, etc.) up and down to perform the following operations.

(7) Starter Ay

1.Remove the starter Ay
Refer to Page B11-2.

(8) Transaxle Ay(A/T,M/T)

1.Remove the transaxle Ay from the engine Ay.
Refer to Page F3-12.

(9) Converter Ay, torque

1.Remove the torque converter Ay.
Refer to Page F3-12.

4-1-5 POINTS OF INSTALLATION

(1) Converter Ay, torque

1.Install the torque converter Ay.
Refer to Page F3-12.

(2) Transaxle Ay(A/T,M/T)

1.Install the transaxle Ay to the engine Ay.
Refer to Page F3-12.

(3) Starter Ay

1.Install the starter Ay.
Refer to Page B11-2.

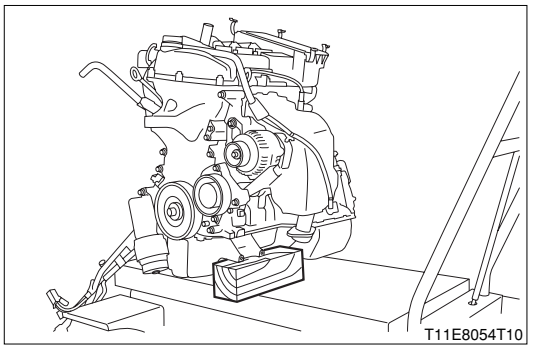
(4) Engine Ay, W/ transaxle Ay(A/T,M/T)

1.Support the engine Ay with the transaxle Ay, using wooden blocks, etc., in a such a way that their balance is well kept.

(1) Put a wooden piece, etc. on the installation position of the compressor Ay with magnet clutch on the left side of the engine.

CAUTION

- Do not apply wooden blocks to the crankshaft pulley.



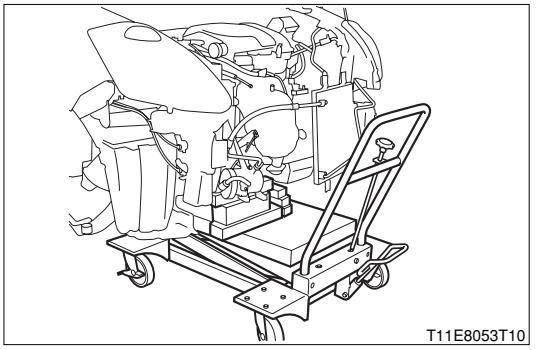
2.By operating the engine lifter, lift the engine assembly together with the transaxle assembly to the vehicle mounting position.

NOTE

- When no engine lifter is used, move the vehicle side (Two-post lift, etc.) up and down to perform the following operations.

CAUTION

- Perform the installation in such a way that it would not interfere with the suspension lower arm S/A and the parts in the engine compartment.



(5) Insulator S/A, engine mounting, LH

1.Install the insulator S/A.
Refer to Page B12-4.

(6) Insulator S/A, engine mounting, RH

1.Install the insulator S/A.
Refer to Page B12-1.

(7) Rod S/A, engine mounting control. (2WD vehicles)

1.Install the Rod S/A.
Refer to Page B12-7.

(8) Rod S/A, engine mounting control.

1.Install the Rod S/A.
Refer to Page B12-7.

(9) Engine Ay, W/transaxle Ay, automatic

1.Install each harness, connector and clamp.
2.Route the engine wire in the vehicle interior to connect it to the fuel injection computer Ay.
3.Install the earth wires of the engine section and transaxle case section.

(10) Engine Ay, W/ transaxle Ay(A/T,M/T)

1.Install each harness, connector and clamp.
2.Route the engine wire in the vehicle interior to connect it to the fuel injection computer Ay.
3.Install the earth wires of the engine section and transaxle case section.

4-1-6 OPERATION AFTER INSTALLATION

1.Install the compressor assembly. Adjust the V-belt tension.
Refer to Page K1-22.

2.Install the transmission control cable Ay to the transaxle.
Refer to Page F3-34.

3.Install the front drive shaft Ay RH and front drive shaft Ay LH.
Refer to Page D2-8.

4.Install the front exhaust pipe Ay.
Refer to Page B4-3.

5.Install the radiator Ay together with the oil cooler hose to the vehicle.
Refer to Page B6-5.

6.Connect the fuel hose to the fuel delivery pipe Ay.
Refer to Page B7-11.

7.Connect the water hose No.1 and water hose No.2 to the heater radiator Ay.
Refer to Page K1-11.

Refer to Page K1-19.

8.Install the engine undercover RH and engine undercover LH.
9.Install the wheel disc. (Front)
Refer to Page C3-3.

10.Install the air cleaner cap S/A and air cleaner hose No.1.
Refer to Page B3-1.

11.Install the front bumper reinforcement S/A and hood lock support.
Refer to Page I1-1.

12.Install the front bumper cover.
Refer to Page I2-2.

13.Remove the floor shift ay, transmission.
Refer to Page F2-15.

14.Install the accelerator control cable Ay to the throttle body Ay.
Refer to Page B3-3.

15.Install the brake booster Ay to the vacuum hose Ay.
Refer to Page E1-36.

16.Connect the hose leading to the charcoal canister Ay.
(1) RHD vehicles
Refer to Page B9-1.

(2) LHD vehicles
Refer to Page B9-2.

17.Connect the harness wire at the vehicle side and the engine side.
18.Install the battery and battery carrier.
Refer to Page J5-3.

19.Fill cooling water.
20.Remove the engine hanger.
21.Check for any leakage of oil, coolant water and fuel. Perform the engine tune-up.
Refer to Page B1-1.

■ K3
1 CYLINDER HEAD GASKET
1-1 REMOVAL AND INSTALLATION

WARNING

- No fire should be brought near when servicing the fuel system.
- When removing the fuel hose, prevent the fuel from splashing.
- When the coolant is hot, do not remove the radiator cap, drain plug or water hose.

1-1-1 ARTICLES TO BE PREPARED

Tool

Hexagon wrench (Width across flats : 8mm)

Instrument

Torque wrench

Lubricant,adhesive,others

Engine oil,Three Bond1207B

1-1-2 OPERATION BEFORE REMOVAL

1.Drain the engine oil.
Refer to Page B5-14.

2.Drain the coolant.

3.Remove the engine Ay.
Refer to Page B2-49.

4.Remove the hose, air cleaner No.1.
Refer to Page B3-9.

5.Remove the air cleaner Ay W/element.
Refer to Page B3-9.

6.Remove the exhaust manifold stay.
Refer to Page B4-4.

7.Remove the oil pan Ay.
Refer to Page B5-22.

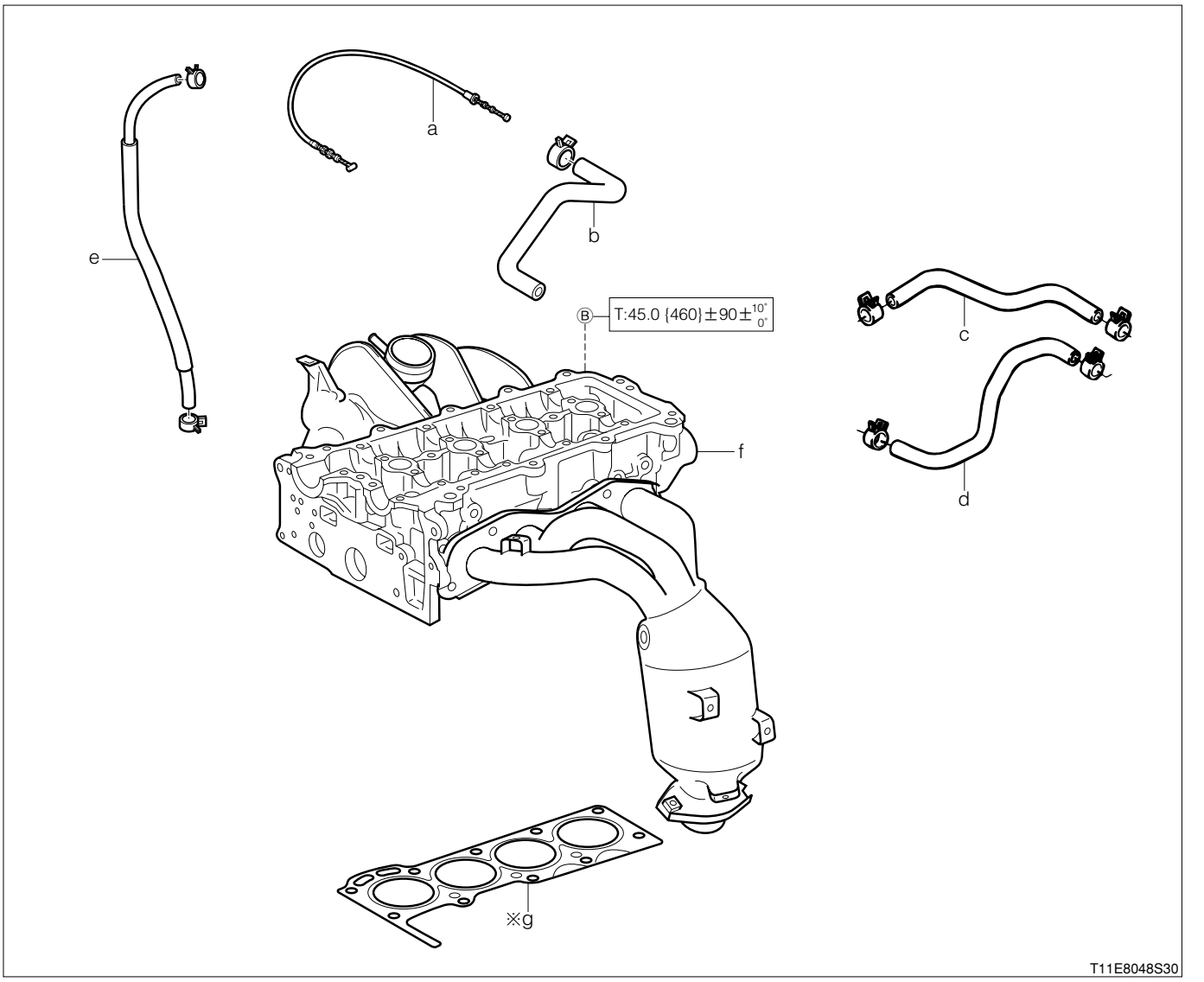
8.Remove the timing chain Ay.
Refer to Page B2-35.

9.Remove the camshaft Ay.
Refer to Page B2-41.

10.Remove each connector, clamp and hose.

1-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts
Unit:N·m{kgf·cm}

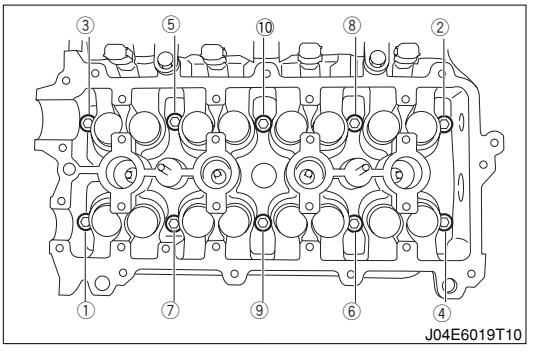
(2) Removal and installation procedures

- ▲ 1 a Cable Ay, accelerator control
- 2 b Hose, booster vacuum
- 3 c Hose, water No.1
- 4 d Hose, water No.2
- 5 e Hose, fuel
- ▼ ▲ 6 f Cylinder head Ay (With intake manifold & exhaust manifold)
- ▲ 7 g Gasket, cylinder head

1-1-4 POINTS OF REMOVAL

(1) Head Ay, cylinder

1.Remove head Ay together with the intake manifold Ay and the exhaust manifold Ay by removing the attaching bolts in the sequence shown in the right figure.



1-1-5 POINTS OF INSTALLATION

CAUTION

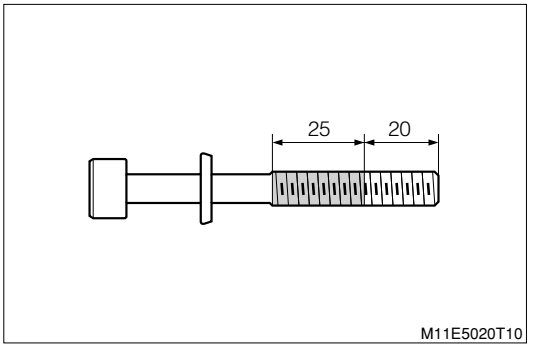
- Never use fire during the work.
- Wear safety goggles during the cleaning so as to protect your eyes.

(1) Head Ay, cylinder/gasket cylinder head

1.Install the gasket to head Ay.

(1) Measure the diameter of the threaded portion at several points of the shaded sections of the cylinder head bolt, as shown in the right figure, using a micrometer. Replace the cylinder head bolt if it is beyond the application limits.

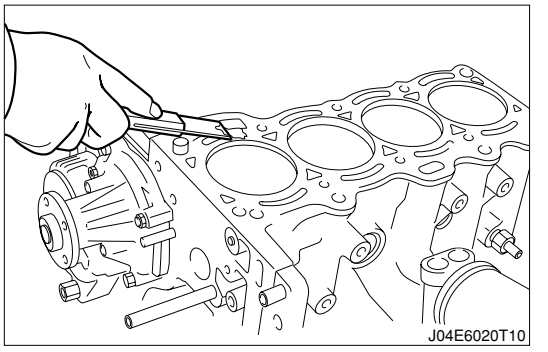
ALLOWABLE LIMIT: 8.75mm



(2) Clean the gasket mounting surface of the cylinder block Ay and head Ay, using a scraper. Completely remove foreign objects, oil, etc.

CAUTION

- Be very careful not to allow scraping debris of the gasket to fall into the water jacket and oil hole. Remove when dropped.

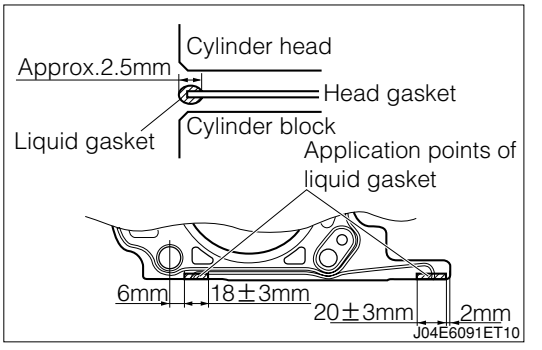


(3) Apply liquid gasket, following the procedures in the right figure. Then, set the head Ay.

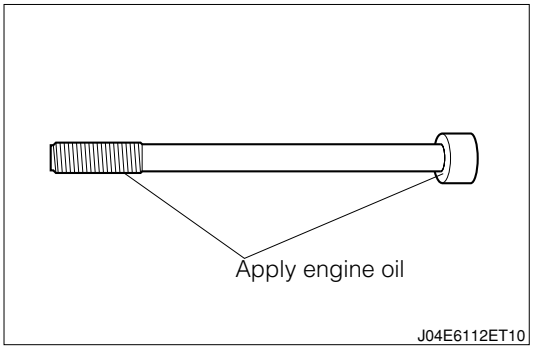
CAUTION

- Assemble the head Ay within 15 minutes after application of the liquid gasket.
- Care must be exercised so that the valve lifter will not drop off from the head Ay.

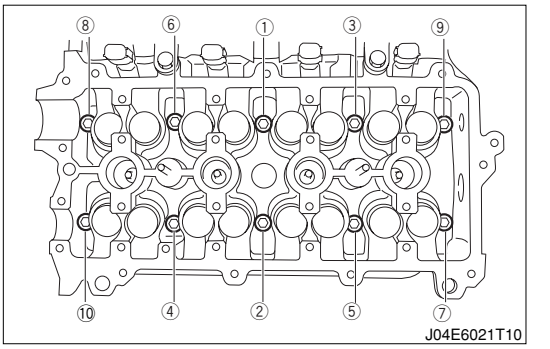
ADHESIVE: Three Bond1207B



(4) Assemble a plate washer to the head Ay. Then, apply engine oil to the threaded portion of the bolts and seating surface on the bolt side. Then, perform the assembling operations.



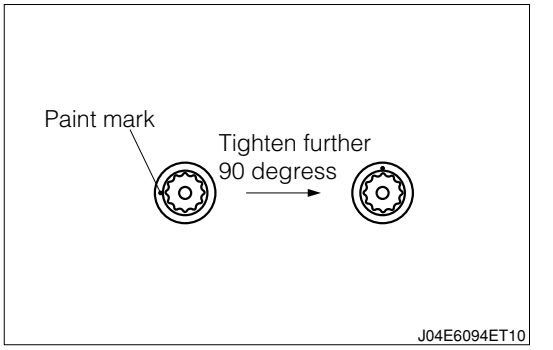
(5) To assemble the cylinder head Ay, tighten the bolts over 2 or 3 stages in the sequence shown in the diagram on the right. Then, tighten them to the specified torque.



(6) After tightening to the specified torque, retighten them 90^{+10}_{-0} degrees in the same sequence.

NOTE

- It is recommended to put a paint mark on the top of the head bolts in the same direction. After tightening 90 degrees in the sequence above, ensure that all the bolt marks, which have been turned 90 degrees, are facing the same direction.



(2) Cable Ay, accelerator control

1.Install the accelerator control Cable Ay.
Refer to Page B3-11.

1-1-6 OPERATION AFTER INSTALLATION

1.Install each connector, clamp and hose.
2.Install the camshaft Ay.
Refer to Page B2-41.

3.Install the timing chain Ay.
Refer to Page B2-35.

4.Install the oil pan Ay.
Refer to Page B5-22.

5.Install the exhaust manifold stay.
Refer to Page B4-4.

6.Install the air cleaner Ay W/element.
Refer to Page B3-9.

7.Install the hose, air cleaner No.1.
Refer to Page B3-9.

8.Install the engine Ay.
Refer to Page B2-49.

9.Replenish the engine oil.
Refer to Page B5-14.

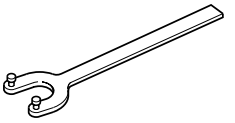
10.Replenish the coolant.
11.Check for any leakage of oil, coolant water and fuel. Perform the engine tune-up.
Refer to Page B1-17.

2 TIMING CHAIN

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09278-87201-000	Tool,timing belt pulley holding
	09223-87202-000	Replacer,crankshaft front oil seal

Tool

Hexagonal rod wrench(Width across flats:2.5mm)

Instrument

Torque wrench

Lubricant,adhesive,others

Engine oil,Three Bond1207B

2-1-2 OPERATION BEFORE REMOVAL

1.Drain the engine oil.
Refer to Page B5-14.

2.Remove the air cleaner Ay W/element.
Refer to Page B3-9.

3.Remove the engine Ay.
Refer to Page B2-49.

4.Remove the water pump pully.
Refer to Page B6-11.

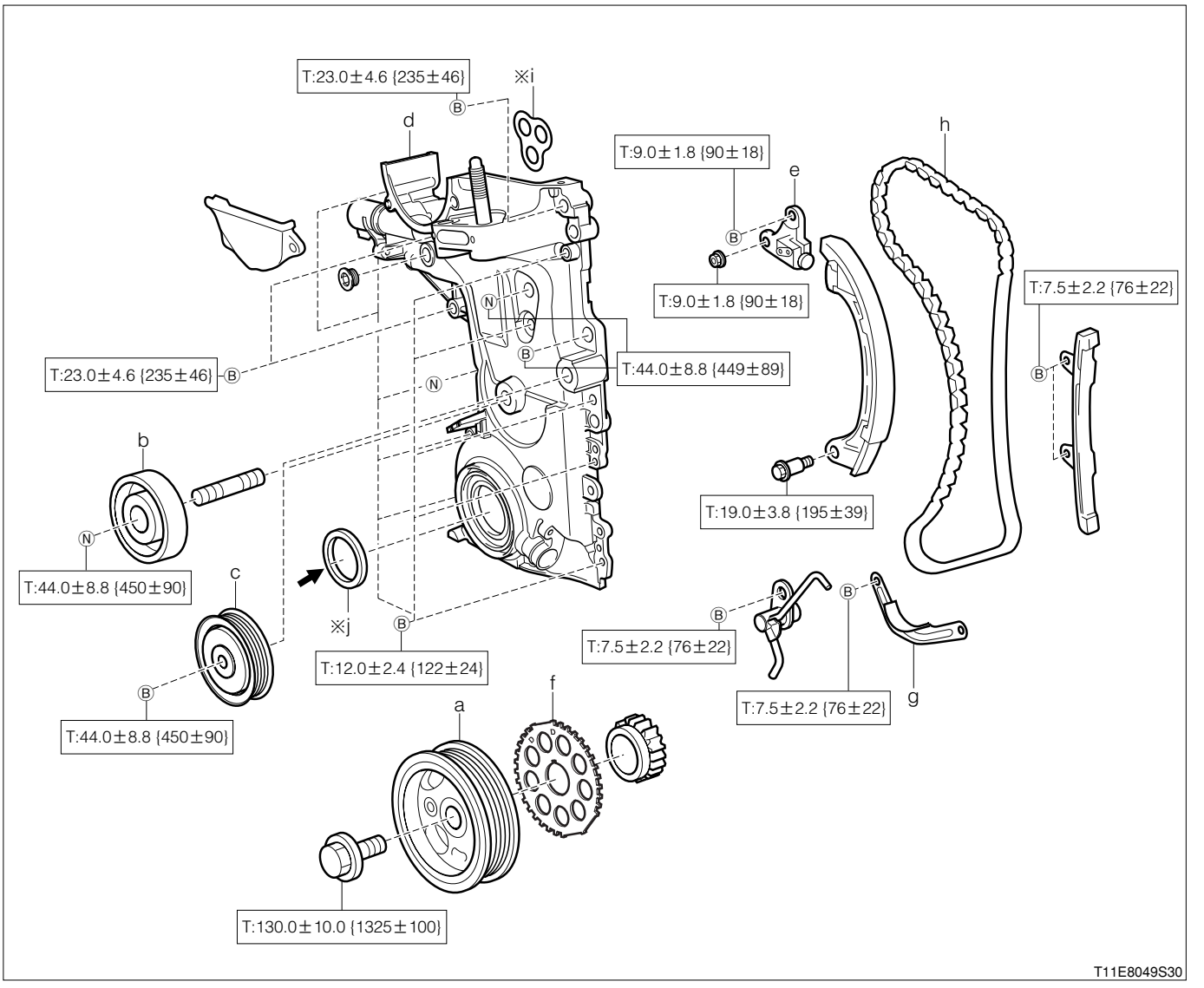
5.Remove the coil Ay, W/ignitor.
Refer to Page B10-6.

6.Remove the cylinder head cover.
Refer to Page B2-41.

7.Remove the oil pan Ay.
Refer to Page B5-22.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



➡: Engine oil
Unit: N·m{kgf·cm}
※: Non-reusable parts

(2) Removal and installation procedures

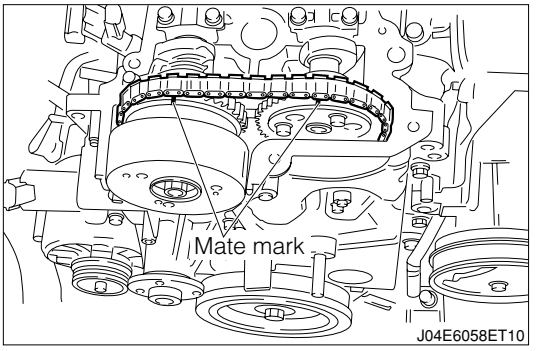
▼ 1 a Pulley Ay, crankshaft
▲ 2 b Pulley S/A idler No.1
▲ 3 c Pulley Ay, idler
▲ 4 d Cover Ay, timing gear
5 e Tensioner S/A, Timing chain
▲ 6 f Plate, crank angle sensor
7 g Guide, timing chain No.2
▼ ▲ 8 h Chain, timing
9 i Gasket, timing chain cover
▲ 10 j Seal, type T oil

2-1-4 POINTS OF REMOVAL

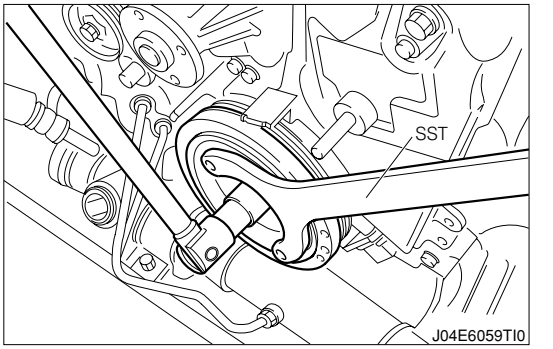
(1) Pulley Ay, crankshaft

1.Turn the pulley Ay in the normal direction, until the timing mark of the pulley Ay is aligned with the indicator of the timing chain cover Ay. (Set the No.1cylinder to the top dead center.)

2.Ensure that the mating mark of the camshaft timing sprocket is at the top position. If it is not at the top position, turn the crankshaft S/A once so that it comes to the top position. (Set the No.1cylinder to the top dead center under the compression stroke.)

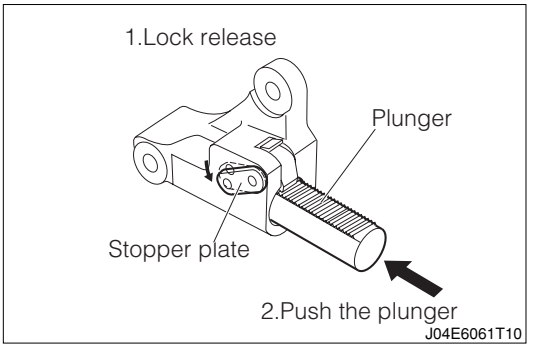


3.While preventing rotation, using the SST, remove the pulley Ay.
SST: 09278-87201-000

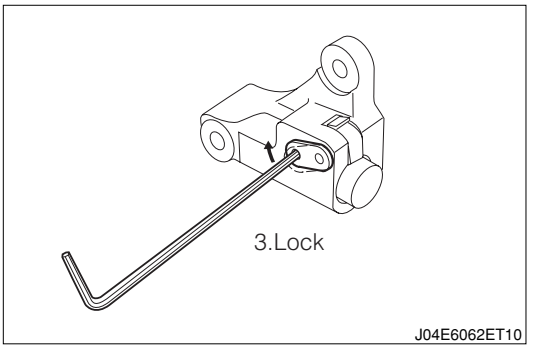


(2) Chain, timing

1.Move the stopper plate of the timing chain tensioner S/A downward and push in the plunger as far as it will go with the lock released.



2.With the plunger locked, align the stopper plate and the hole of the timing chain tensioner S/A and insert a hexagonal wrench. (The plunger will be locked.)
TOOL: Hexagonal rod wrench(Width across flats:2.5mm)
3.Remove the timing chain tensioner S/A by removing the bolts and nuts.
4.Remove the chain.



2-1-5 POINTS OF INSTALLATION

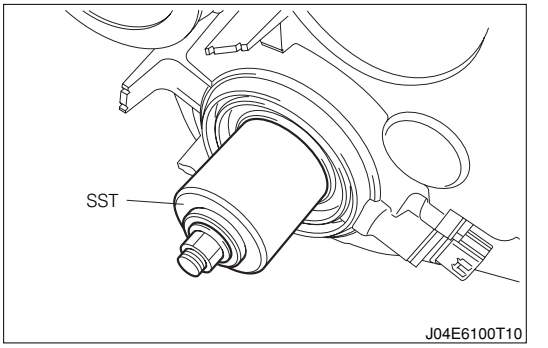
(1) Seal, type T oil

1.Install the seal to the timing chain cover Ay, following the procedure given below.
(1) Apply engine oil to the lip section of the seal.

(2) Press-fit the seal vertically, using the SST and bolts.

SPECIFIED VALUE: Press-fitting amount
Protruding amount from end surface of timing chain cover Ay
Within 0.5mm
Press-fitting depth from end surface of timing chain cover Ay
Within 1mm

SST: 09223-87202-000



(2) Chain, timing

1.Install the chain while aligning the mark plate (Gold) of the chain with the mating mark, as shown in the right figure.

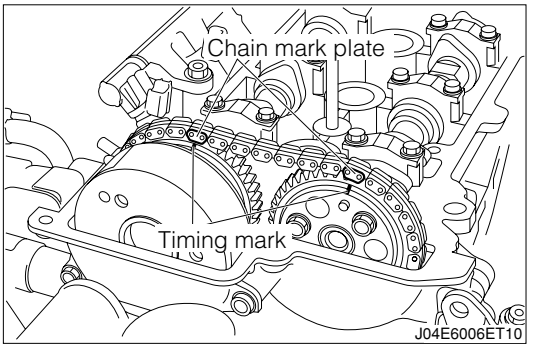
2.Install the timing chain tensioner S/A.

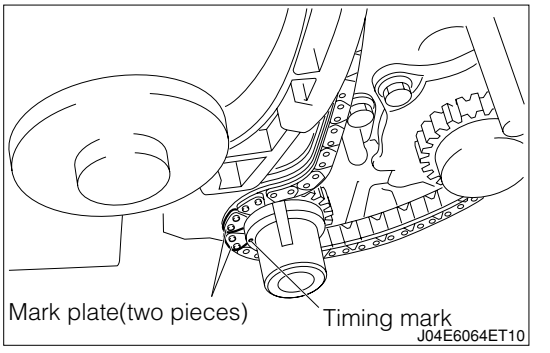
(1) Slightly turn the camshaft Ay counterclockwise (Reverse direction), using the hexagonal section of the camshaft Ay, so as to give a slack to the chain at the timing chain tensioner S/A side. Under this state, install the timing chain tensioner S/A.

(2) Pull out the hexagonal wrench of the timing chain tensioner S/A.

NOTE

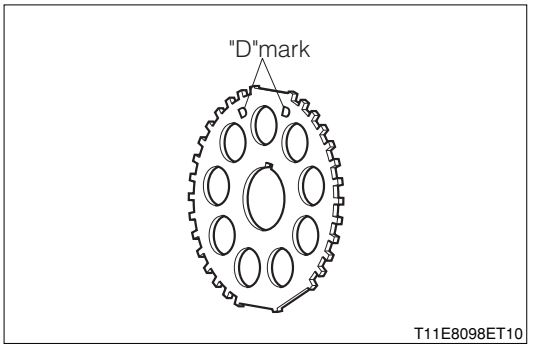
- Tension is applied on the chain.





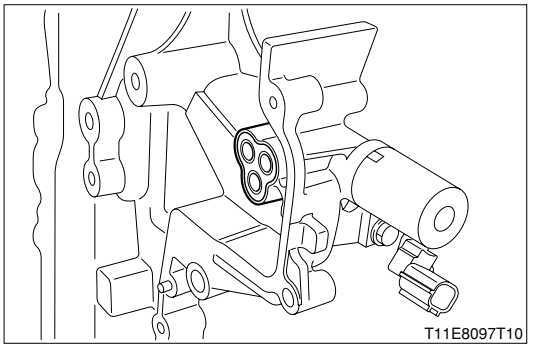
(3) Plate, crank angle sensor

1.Install the plate in such a way that the D mark will come to the front.

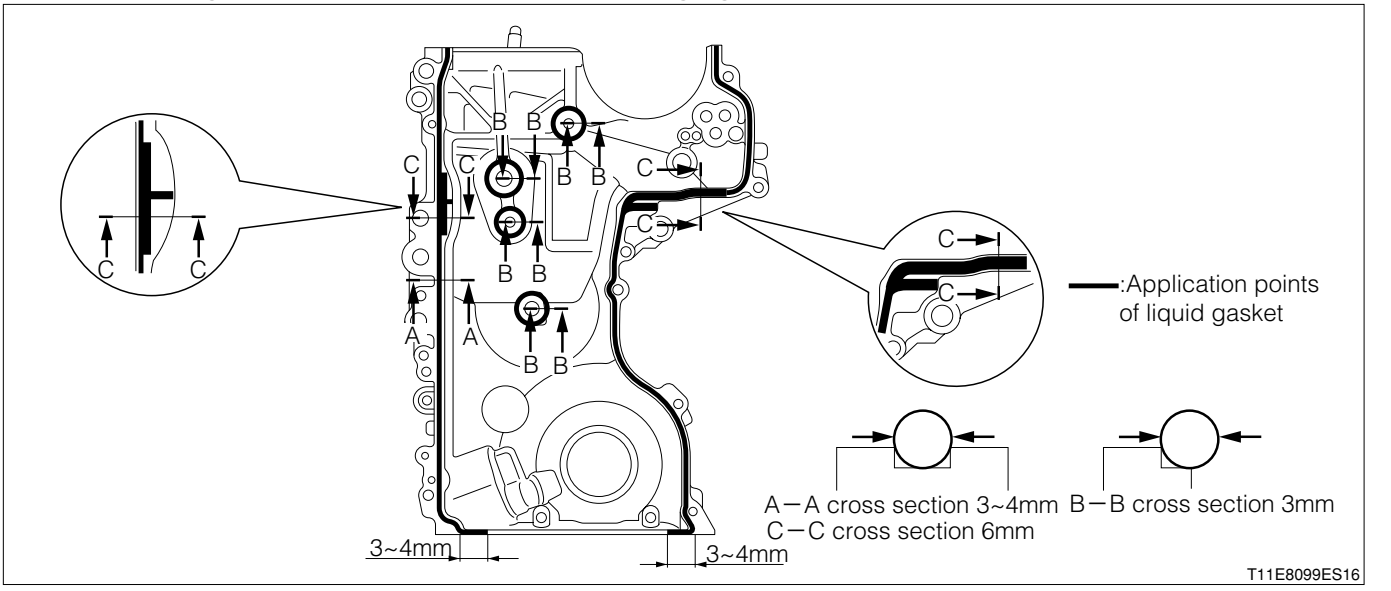


(4) Cover Ay, timing chain

1.Assemble the timing chain cover gasket to the cover.



2.Apply liquid gasket to the position in the following figure and install the cover Ay.



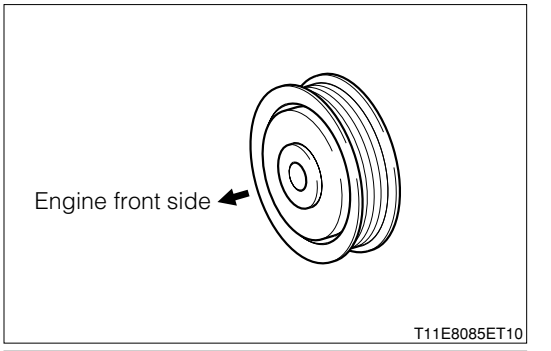
ADHESIVE: Three Bond1207B

CAUTION

- Completely remove foreign matters and oil off from the installation surface.
- Perform the assembling within three minutes after application of the liquid gasket.

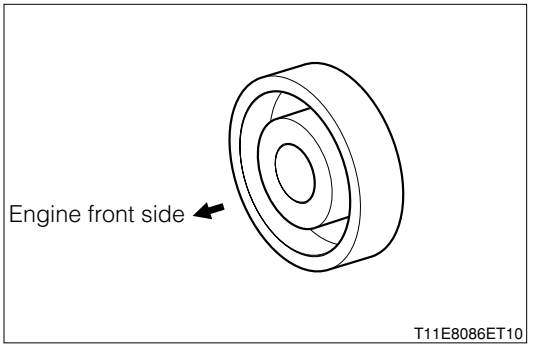
(5) Pulley Ay, idler

1.Assemble the pulley Ay in such a way that the side at which the dust seal (Silver plate) is provided comes to the outside of the engine.



(6) Pulley S/A idler No.1

1.Assemble the pulley S/A in such a way that the recessed section comes to the outside of the engine.



2-1-6 OPERATION AFTER INSTALLATION

1.Install the oil pan Ay.
Refer to Page B5-22.

2.Install the cylinder head cover Ay.
Refer to Page B2-35.

3.Install the coil Ay, W/ignitor.
Refer to Page B10-6.

4.Install the water pump pully.
Refer to Page B6-11.

5.Install the engine Ay.
Refer to Page B2-49.

6.Install the air cleaner Ay W/element.
Refer to Page B3-9.

7.Replenish the coolant.
8.Replenish the engine oil.
Refer to Page B5-14.

9.Check for any leakage of oil, coolant water and fuel. Perform the engine tune-up.
Refer to Page B1-17.

3 CAMSHAFT

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

Tool

Hexagonal rod wrench(Width across flats:2.5mm),Hexagon wrench (Width across flats : 10mm)

Instrument

Torque wrench

Lubricant,adhesive,others

Engine oil,Three Bond1324,Three Bond1207B

3-1-2 OPERATION BEFORE REMOVAL

1.Remove the negative (-) terminal of the battery.
Refer to Page J5-3.

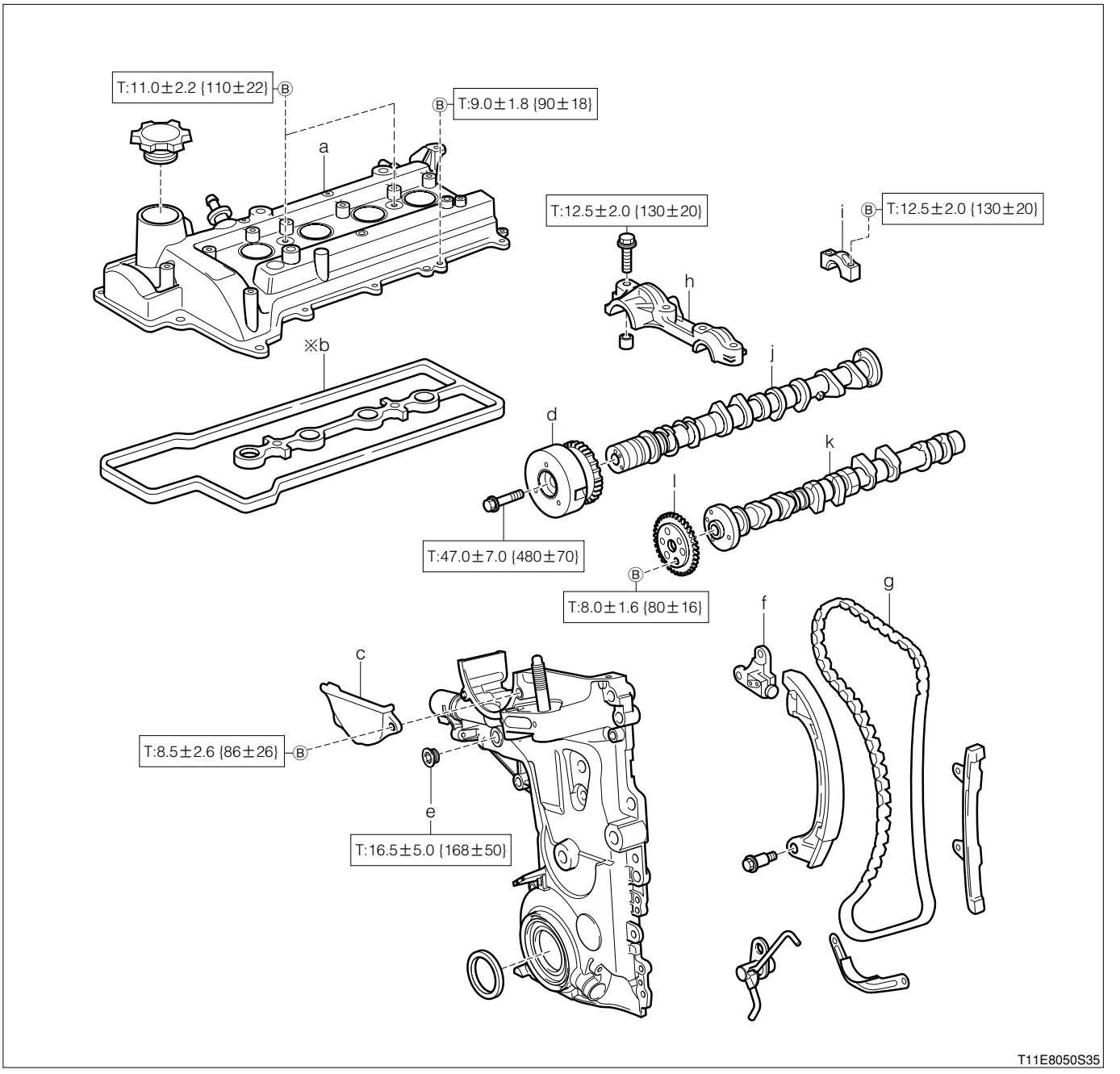
2.Remove the air cleaner Ay W/element.
Refer to Page B3-9.

3.Remove the V-ribbed belt
Refer to Page B1-21.

4.Remove the coil Ay, W/ignitor.
Refer to Page B10-6.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) Removal and installation procedures

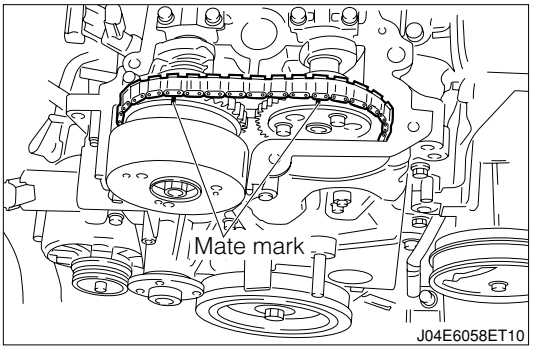
- ▲ 1 a Cover, cylinder head
- 2 b Gasket, cylinder head cover
- 3 c Cover, timing chain No.2
- ▼ ▲ 4 d Sprocket, camshaft timing
- ▼ ▲ 5 e Plug, service hole screw
- 6 f Tensioner S/A, timing chain
- ▲ 7 g Chain, timing
- ▼ ▲ 8 h Cap, camshaft bearing No.1
- ▼ ▲ 9 i Cap, camshaft bearing No.2
- ▲ 10 j Camshaft Ay,No.1
- ▲ 11 k Camshaft Ay No.2
- 12 l Sprocket, camshaft timing

3-1-4 POINTS OF REMOVAL

(1) Sprocket, camshaft timing

1.Turn the crankshaft Ay in the normal direction, until the timing mark of the crankshaft pulley Ay is aligned with the indicator of the timing chain cover Ay. (Set the No.1cylinder to the top dead center.)

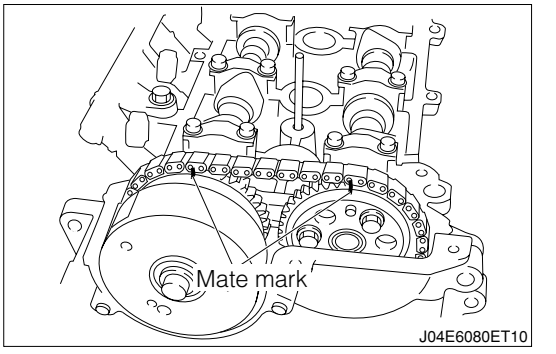
2.Ensure that the timing mark of the sprocket is at the top position. If it is not at the top position, turn the crankshaft Ay once so that it comes to the top position. (Set the No.1cylinder to the top dead center under the compression stroke.)



3.Put a paint mark on each plate of the timing chain that is aligned with the mating marks of the sprocket and camshaft timing sprocket.

NOTE

- The timing chain is assembled with gold mark plates at three places. When the gold mark plates and the mating marks of each of the timing sprocket and timing gear are aligned with each other, the above operation is not required.



4.Turn the crankshaft 90 degrees (Crank angle) in the engine rotation direction from the top dead center under the compression stroke of the cylinder No.1 so that the lifted valve will not interfere with the piston when removing the camshaft Ay.

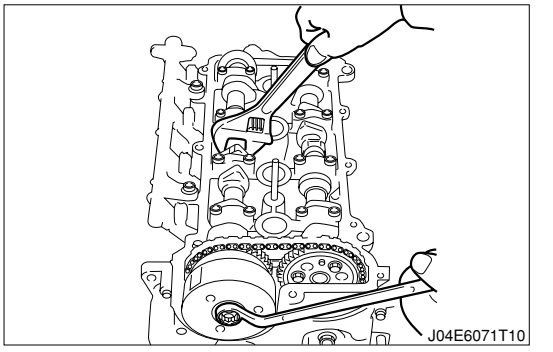
5.Loosen the sprocket attaching bolts, using the hexagonal section provided for servicing of the camshaft.

CAUTION

- Here, just loosen the bolts and do not remove the bolts and sprocket.

NOTE

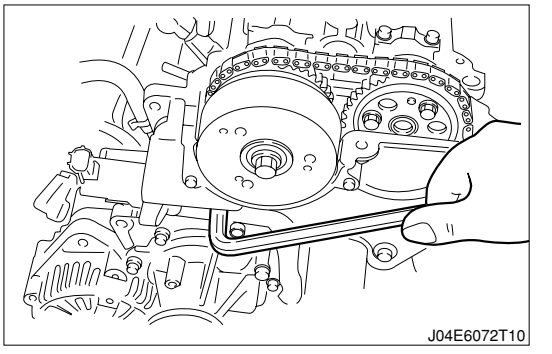
- The timing chain and sprocket will interfere with each other if the bolts are loosened after the timing chain has been removed. Therefore, loosen the bolts in advance.



(2) Plug, service hole screw

1.Remove the plugs using a hexagon wrench.

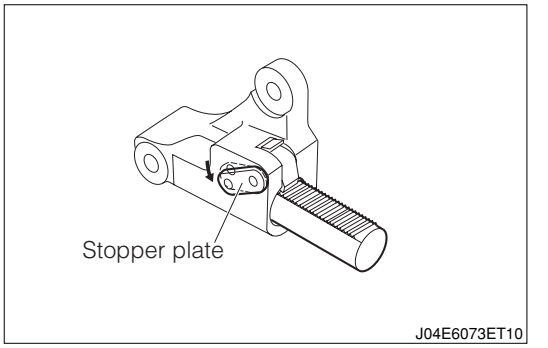
TOOL: Hexagon wrench (Width across flats : 10mm)



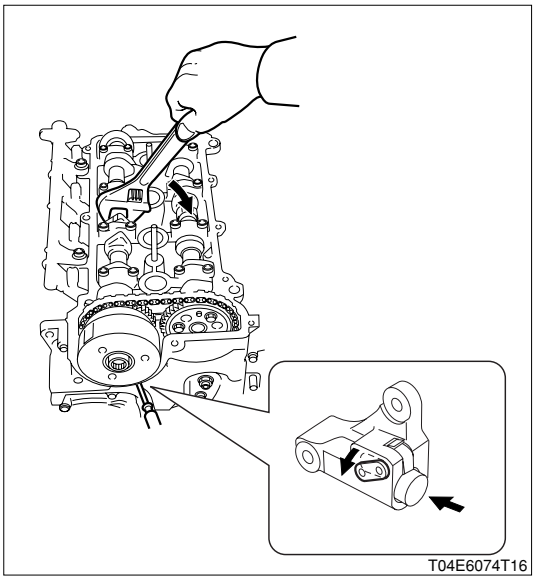
2.Move the stopper plate of the timing chain tensioner S/A downward from the service hose screw plug, using a flat screwdriver. Then, maintain the released condition.

NOTE

- By this operation, the plunger of the timing chain tensioner S/A will be unlocked.
- If any difficulty is encountered in releasing the lock of the stopper plate, slightly turn it in a right-and-left direction, using the hexagonal section provided for servicing of the camshaft Ay.



3.Slightly turn the camshaft Ay clockwise (Normal direction), using the hexagonal section provided for servicing of the camshaft Ay, so that the timing chain pushes the plunger section of the timing chain tensioner S/A.



4.While maintaining the above condition, remove the flat screwdriver from the plug and align the stopper plate with the hole of the timing chain tensioner S/A. Then, insert a hexagonal wrench.

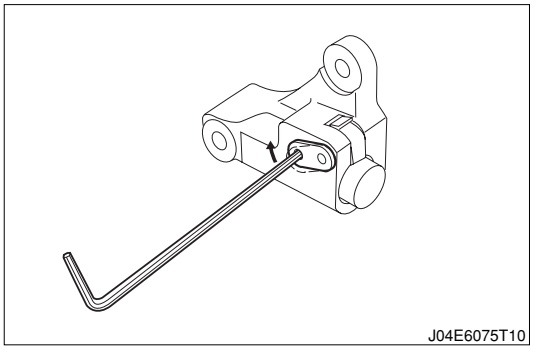
TOOL: Hexagonal rod wrench(Width across flats:2.5mm)

CAUTION

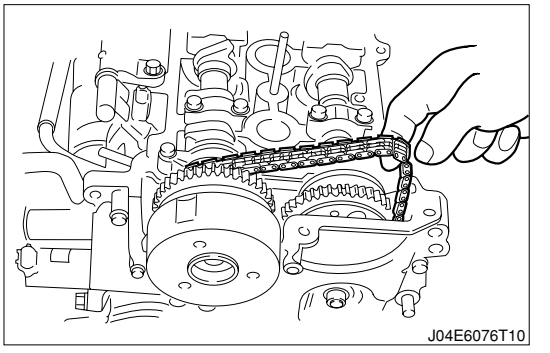
- Maintain the camshaft Ay using the hexagonal section for servicing.
- Secure the hexagonal wrench so that it would not come out by means of a tape or the like.

NOTE

- By this operation, the plunger of the timing chain tensioner S/A will be held in a pushed state.

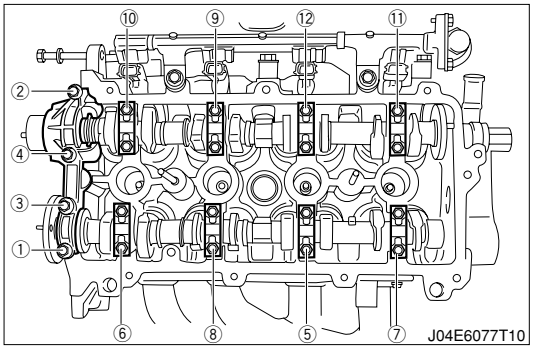


5.Remove the timing chain from the camshaft timing sprocket.



(3) Camshaft bearing No.1/No.2 caps

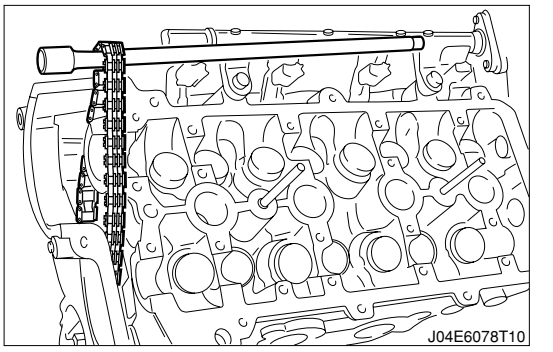
1.Remove the bolts in the sequence shown in the right figure and remove the camshaft bearing No.1/No.2 caps.



NOTE

- The bolts of the camshaft bearing cap No.2 may be removed from either side.
- When the removal of either the camshaft Ay No.1 or No.2 is needed, first remove the camshaft bearing cap No.1 attaching bolts in the sequence of ①-④. Then, remove the camshaft bearing cap No.2 of the camshaft Ay that needs to be removed in the sequence shown in the figure.

2.After the removal of the camshaft Ay, hold the timing chain by inserting a rod, etc. so that the timing chain will not fall.



3-1-5 INSPECTION

(1) Camshaft timing sprocket check

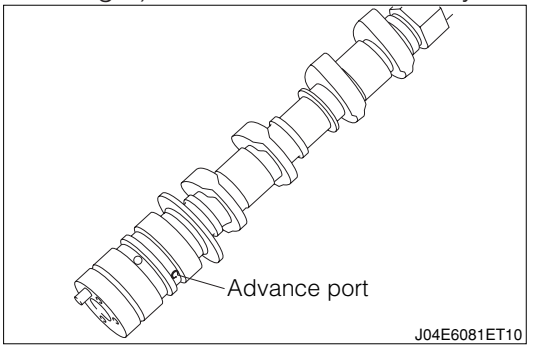
CAUTION

- Do not disassemble the camshaft timing sprocket (DVVT controller).

1.Secure the hexagonal section provided for servicing the No.1 camshaft assembly to a vice.

2.Temporarily tighten the attaching bolts of the camshaft timing sprocket.

3.Hold one of the two advanced timing side ports (The figure on the right) of the No.1 camshaft Ay with your fingers or block the advanced timing side port by a tape, etc.



4.Apply air pressure to the other advanced timing side port using air tools.

CAUTION

- Care must be exercised as to splashing oil.

NOTE

- The most retard timing lock is disengaged.

5.At this time, ensure that the most retard timing angle lock of the camshaft timing sprocket is disengaged and the camshaft timing sprocket can be freely moved by the hand without any binding in the range of about 30 degrees.

CAUTION

- The camshaft timing sprocket is locked when it comes at the most retard angle position.

6.After the inspection, lock the camshaft timing sprocket at the most retard timing position. Then, remove the bolts and camshaft timing sprocket.

3-1-6 POINTS OF INSTALLATION

(1) Camshaft Ay,No.1/No.2

1.Turn the crankshaft about 90 degrees (Crank angle) in the engine rotation direction from the top dead center under the compression stroke of the cylinder No.1 so that the lifted valve will not interfere with the piston when installing the camshaft.

2.Install the camshaft Ay,No.1/No.2.

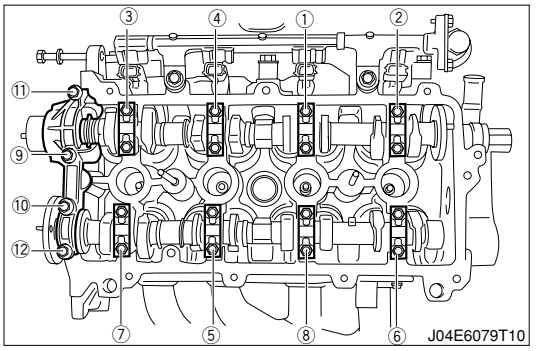
(1) Apply engine oil to each of the cam sections of the camshaft Ay, journal sections of the cylinder head Ay and the top of the valve lifter.

LUBRICANT: Engine oil

(2) Set the No.1 camshaft Ay so that the cam noses of the No.3 cylinder and No.4 cylinder may press the valve lifters. Also, set the No.2 camshaft Ay so that the cam noses of the No.2 cylinder and No.4 cylinder may press the valve lifters.

(2) Cap, camshaft bearing No.1/No.2

1.Set the camshaft bearing No.1/No.2 caps and tighten the attaching bolts to the specified torque in the sequence shown in the right figure.



CAUTION

- The front marks (Arrow marks) indicated on the top of the camshaft bearing No.1/No.2 caps are facing towards the engine front side.
- Refer to the following table for the installation positions of the stamped No.'s indicated on the top of the camshaft bearing No.1/No.2 caps.

Installation positions of camshaft bearing No.1/No.2 caps

Stamping No.	Installation position	
	Intake/exhaust	Cylinder No.
I1	Intake side	Cylinder No.1
I2		Cylinder No.2
I3		Cylinder No.3
I4		Cylinder No.4
E1	Exhaust side	Cylinder No.1
E2		Cylinder No.2
E3		Cylinder No.3
E4		Cylinder No.4

(3) Sprocket, camshaft timing

1.Install the sprocket. (DVVT controller)

(1) Apply engine oil to the installation surface with the No.1 camshaft Ay.

LUBRICANT: Engine oil

(2) Perform the insertion in such a way that the knock pin on the forward end of the No.1 camshaft Ay will fit into the knock hole of the sprocket.

CAUTION

- After the insertion, slightly turn the sprocket to ensure that the knock has been fitted securely.
- It should be noted that the seal section of the end surface of the sprocket may be scratched if the sprocket is turned while it is strongly pressed under a condition that the knock is not fitted.

(4) Chain, timing

1.Install the chain.

NOTE

- Perform the installation in such a way that the mating mark of the camshaft timing sprocket is aligned with the mating mark applied during the removal of the chain.

NOTE

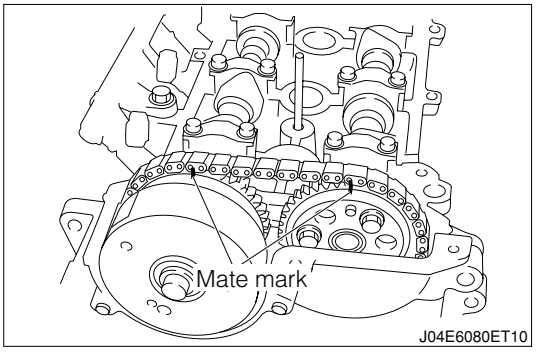
- Install the chain to either of the camshaft Ay in advance. Turn it in a right-and-left direction, using the hexagonal section provided for servicing of the camshaft Ay, so that the mating mark of the other camshaft timing sprocket is aligned with the mating mark of the chain.

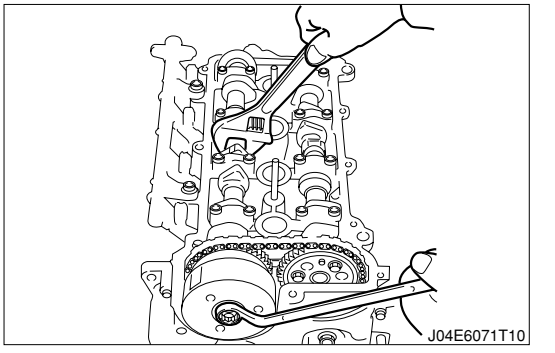
(1) Pull out the hexagonal wrench from the timing chain tensioner S/A.

NOTE

- Slightly turn the camshaft Ay counterclockwise (Reverse rotation), using the hexagonal section provided for servicing of the camshaft Ay, so as to give a slack to the chain at the timing chain tensioner side. Under this state, pull out the hexagonal wrench.

(2) Tighten the camshaft timing sprocket attaching bolts to the specified torque, using the hexagonal section provided for servicing of the camshaft Ay.





(5) Plug, service hole screw

1.Clean the plugs and the bolt holes of the timing chain cover Ay. Then, apply liquid gasket to the threaded portion of the plugs and perform the installation.

ADHESIVE: Three Bond1324

TIGHTENING TORQUE: 16.5±4.9 N·m{170±50kgf·cm}

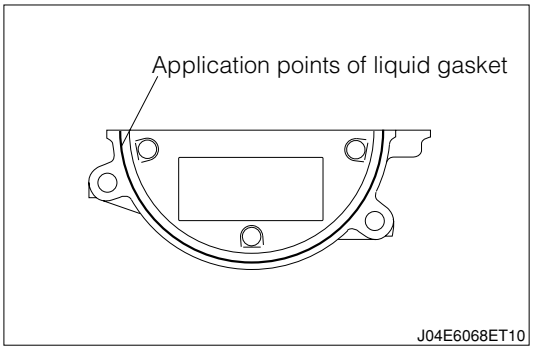
TOOL: Hexagon wrench (Width across flats : 10mm)

2.Apply liquid gasket to the position in the right figure and install timing chain No.2 cover.

ADHESIVE: Three Bond1207B

CAUTION

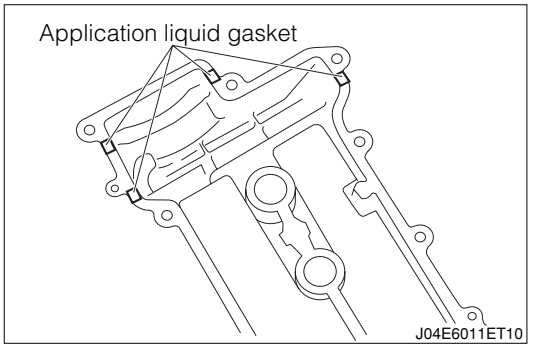
- Completely remove foreign matters and oil off from the installation surface.
- Perform the installation within three minutes after application of the liquid gasket.



(6) Cover, cylinder head

1.Set the cylinder head cover gasket in the gasket groove of the cover and insert the cylinder head cover gasket to the center boss.
SPECIFIED VALUE: Inserting amount 2−5mm

2.Apply liquid gasket to the cylinder head cover gasket at the positions shown in the right figure. The guide of the application amount is about 5 mm Dia. × 2mm in height.
ADHESIVE: Three Bond1207B

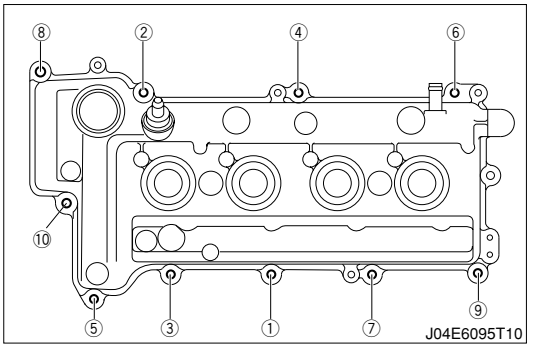


3.Assemble the cover attaching bolts in the sequence shown in the right figure.

4.Install the cover attaching nuts (Two sections) with a seal washer interposed.

CAUTION

- Install the seal washer with the white color facing upwards.



3-1-7 OPERATION AFTER INSTALLATION

1.Install the coil Ay, W/ignitor.
Refer to Page B10-6.

2.Install the V-ribbed belt and adjust the tension.
Refer to Page B1-22.

3.Install the air cleaner Ay W/element.
Refer to Page B3-9.

4.Connect the negative (-) terminal of the battery.
Refer to Page J5-3.

4 ENGINE ASSY

4-1 REMOVAL AND INSTALLATION

WARNING

- No fire should be brought near when servicing the fuel system.
- When removing the fuel hose, prevent the fuel from splashing.
- When the coolant is hot, do not remove the radiator cap, drain plug or water hose.
- When the oil is hot, do not remove the drain plug or oil cooler hose.

4-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

Engine hanger No.1 (Replacement parts),Engine hanger No.2 (Replacement parts),Engine hanger attaching bolt (Replacement parts),Wooden block

4-1-2 OPERATION BEFORE REMOVAL

1.Remove the fuel pressure.
Refer to Page B7-13.

2.Remove the battery and battery carrier.
Refer to Page J5-3.

3.Disconnect the engine wire from the fuel injection computer Ay, and pull it into the engine compartment.
4.Disconnect the hose leading to the charcoal canister Ay.
(1) RHD vehicles
Refer to Page B9-1.

(2) LHD vehicles
Refer to Page B9-2.

5.Disconnect the vacuum hose Ay from the brake booster Ay.
Refer to Page E1-36.

6.Disconnect the accelerator control cable Ay at the throttle body side.
7.Remove the front bumper cover.
Refer to Page I2-2.

8.Install the front bumper reinforcement S/A and hood lock support.
Refer to Page I1-1.

9.Remove the air cleaner cap S/A and air cleaner No.1 hose.
Refer to Page B3-9.

10.Remove the wheel disc. (Front)
Refer to Page C3-3.

11.Remove the engine undercover RH and engine undercover LH.
12.Drain the coolant.
13.Disconnect the water hose No.1 and water hose No.2 from the heater radiator Ay.
Refer to Page K1-11.

14.Remove the radiator Ay together with the oil cooler hose.
Refer to Page B6-13.

CAUTION
- Suspend the cooler condenser Ay on the vehicle side, using a cord, etc., without cutting its piping.

15.Rmove the front exhaust pipe Ay.
Refer to Page B4-6.

16.Remove the V-ribbed belt
Refer to Page B1-22.

17.Remove the front drive shaft Ay RH and front drive shaft Ay LH.
Refer to Page D2-8.

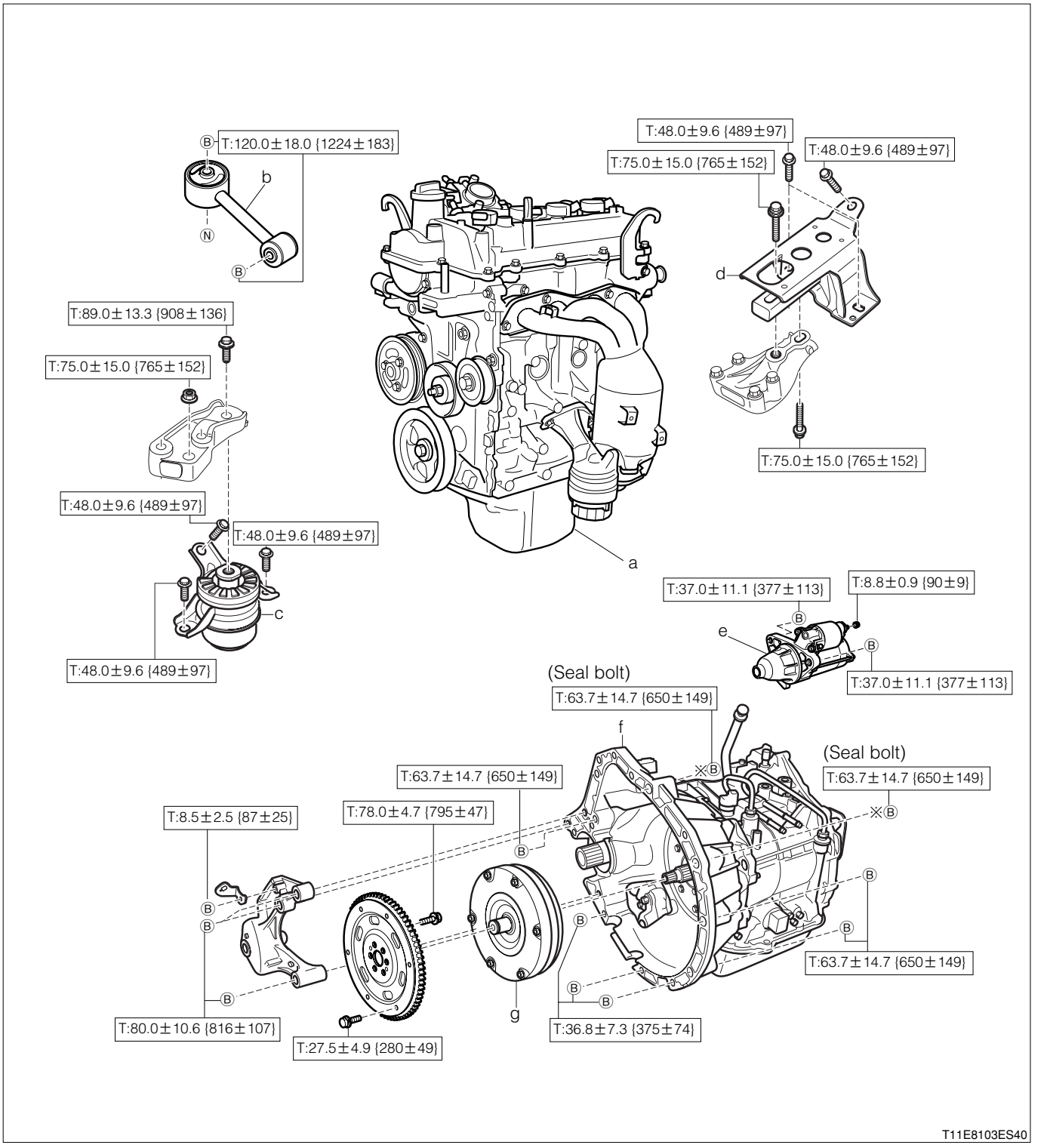
18.Disconnect the transmission control cable Ay from the transaxle.
Refer to Page F3-34.

19.Disconnect the fuel hose from the fuel delivery pipe Ay.
Refer to Page B7-23.

20.Remove the compreessor Ay W/magnet clutch.
(1) Remove the compressor Ay by removing the attaching bolts of the compressor Ay without disconnecting its piping.
(2) Suspend the compressor Ay on the vehicle side, using a cord, etc.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts

Unit:N·m{kgf·cm}

Illust : automatic transaxle Ay

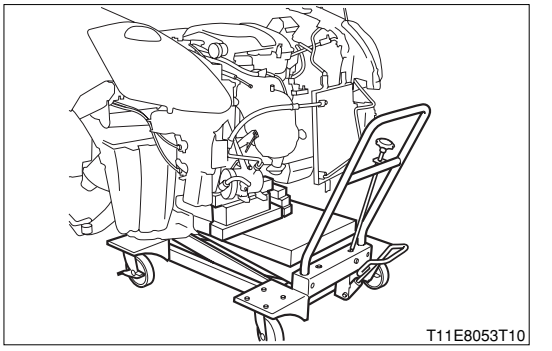
(2) Removal and installation procedures

▼ ▲ 1 a Engine Ay, W/transaxle Ay(A/T,M/T)
▼ ▲ 2 b Rod S/A, engine mounting control.
▼ ▲ 3 c Insulator S/A, engine mounting, RH
▼ ▲ 4 d Insulator S/A, engine mounting, LH
▼ ▲ 5 e Starter Ay
▼ ▲ 6 f Transaxle Ay, automatic
▼ ▲ 7 g Converter Ay, torque

4-1-4 POINTS OF REMOVAL

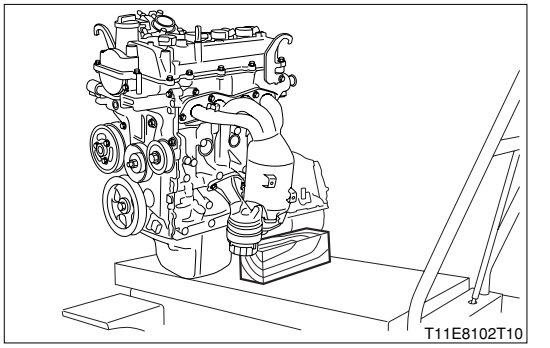
(1) Engine Ay, W/ transaxle Ay(A/T,M/T)

1.Set the engine lifter at the position shown in the figure.


T11E8053T10

2.With wooden blocks or the like, support the engine assembly W/transaxle assembly(A/T,M/T) in such a way that their balance is well kept.
(1) Put a wooden piece, etc. on the installation position of the compressor Ay with magnet clutch on the left side of the engine block Ay.

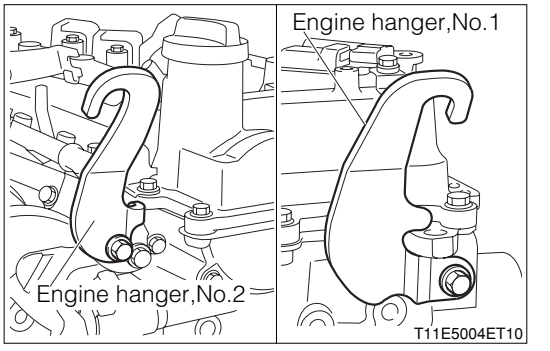
CAUTION
- Do not apply wooden blocks to the crankshaft pulley.


T11E8102T10

3.Install the engine hanger in the position shown in the right figure.

NOTE
- The engine hangers No.1 and No.2 and bolts with washers are supplied parts.

TIGHTENING TORQUE: 24.0±4.8 N·m{245±49kgf·cm}



T11E5004ET10

(2) Rod S/A, engine mounting control.

1.Remove the Rod S/A.
Refer to Page B12-7.

(3) Insulator S/A, engine mounting, RH

1.Remove the insulator S/A.
Refer to Page B12-1.

CAUTION
- Make sure that the engine Ay is supported in a well balanced way during the removal.

(4) Insulator S/A, engine mounting, LH

1.Remove the insulator S/A.
Refer to Page B12-4.

CAUTION

- Make sure that the engine Ay is supported in a well balanced way during the removal.

(5) Engine Ay, W/ transaxle Ay(A/T,M/T)

1.By operating an engine lifter, remove the engine Ay from the vehicle with the transaxle Ay installed to it.

CAUTION

- Perform the removal, making sure that no connectors or hoses are left connected or that they are not interfering with other parts.
- Perform the removal, while exercising care so that it would not interfere with the suspension lower arm S/A and the parts in the engine compartment.

NOTE

- When no engine lifter is used, move the vehicle side (Two-post lift, etc.) up and down to perform the following operations.

(6) Starter Ay

1.Remove the starter Ay
Refer to Page B11-8.

(7) Transaxle Ay(A/T,M/T)

1.Remove the transaxle Ay from the engine Ay.
Refer to Page F3-12.

(8) Converter Ay, torque

1.Remove the torque converter Ay.
Refer to Page F3-12.

4-1-5 POINTS OF INSTALLATION

(1) Converter Ay, torque

1.Install the torque converter Ay.
Refer to Page F3-12.

(2) Transaxle Ay(A/T,M/T)

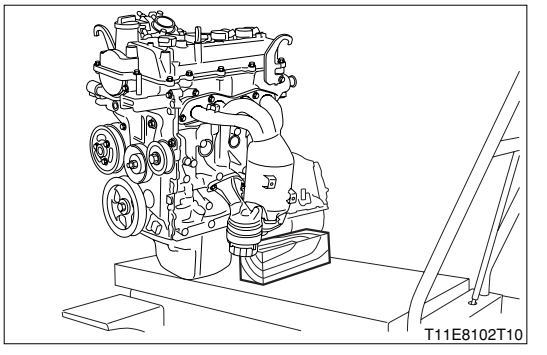
1.Install the transaxle Ay to the engine Ay.
Refer to Page F3-12.

(3) Engine Ay,W/transaxle Ay(A/T,M/T)

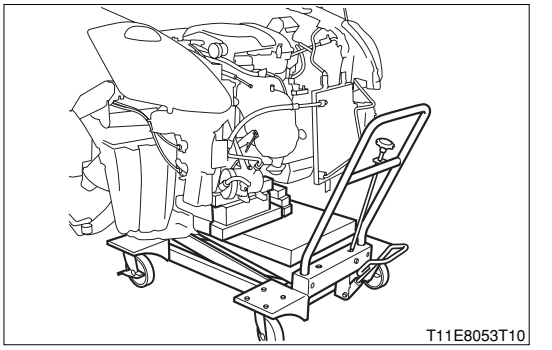
1.Support the engine Ay with the transaxle Ay, using wooden blocks, etc., in a such a way that their balance is well kept.
(1) Put a wooden piece, etc. on the installation position of the compressor Ay with magnet clutch on the left side of the engine.

CAUTION

- Do not apply wooden blocks to the crankshaft pulley.



2.By operating the engine lifter, lift the engine assembly together with the transaxle assembly to the vehicle mounting position.



NOTE

- When no engine lifter is used, move the vehicle side (Two-post lift, etc.) up and down to perform the following operations.

CAUTION

- Perform the installation in such a way that it would not interfere with the suspension lower arm S/A and the parts in the engine compartment

(4) Starter Ay

1.Install the starter Ay.
Refer to Page B11-8.

(5) Insulator S/A, engine mounting, LH

1.Install the insulator S/A.
Refer to Page B12-4.

(6) Insulator S/A, engine mounting, RH

1.Install the insulator S/A.
Refer to Page B12-1.

(7) Rod S/A, engine mounting control. (2WD vehicles)

1.Install the Rod S/A.
Refer to Page B12-7.

(8) Engine Ay,W/transaxle Ay(A/T,M/T)

1.Install each harness, connector and clamp.
2.Route the engine wire in the vehicle interior to connect it to the fuel injection computer Ay.
3.Install the earth wires of the engine section and transaxle case section.

4-1-6 OPERATION AFTER INSTALLATION

1.Install the compressor assembly. Adjust the V-belt tension.
Refer to Page K1-22.

2.Install the front suspension crossmember S/A.
Refer to Page C1-17.

3.Install the compreessor Ay W/magnet clutch.
Refer to Page K1-22.

4.Install the transmission control cable Ay to the transaxle.
Refer to Page F3-34.

5.Install the front drive shaft Ay RH and front drive shaft Ay LH.
Refer to Page D2-8.

6.Install the front exhaust pipe Ay.
Refer to Page B4-6.

7.Install the radiator Ay together with the oil cooler hose to the vehicle.
Refer to Page B6-13.

8.Connect the fuel hose to the fuel delivery pipe Ay.
Refer to Page B7-23.

9.Connect the water hose No.1 and water hose No.2 to the heater radiator Ay.
Refer to Page K1-11.

Refer to Page K1-19.

10.Install the engine undercover RH and engine undercover LH.
11.Install the wheel disc. (Front)
Refer to Page C3-3.

12.Install the air cleaner cap S/A and air cleaner hose No.1.
Refer to Page B3-9.

13.Install the front bumper reinforcement S/A and hood lock support.
Refer to Page I1-1.

14.Install the front bumper cover.
Refer to Page I2-2.

15.Install the accelerator control cable Ay to the throttle body Ay.
Refer to Page B3-11.

16.Install the brake booster Ay to the vacuum hose Ay.
Refer to Page E1-36.

17.Connect the hose leading to the charcoal canister Ay.
(1) RHD vehicles
Refer to Page B9-1.

(2) LHD vehicles
Refer to Page B9-2.

18.Connect the harness wire at the vehicle side and the engine side.
19.Install the battery and the battery carrier.
Refer to Page J5-3.

20.Fill cooling water.
21.Remove the engine hanger.
22.Check for any leakage of oil, coolant water and fuel. Perform the engine tune-up.
Refer to Page B1-17.

TO INDEX

B3 INTAKE SYSTEM

1KR ---------- B3 - 1
AIR CLEANER ---------- B3 - 1
REMOVAL AND INSTALLATION-------- B3 - 1
THROTTLE BODY---------- B3 - 3
REMOVAL AND INSTALLATION-------- B3 - 3
INTAKE MANIFOLD GASKET ---------- B3 - 5
REMOVAL AND INSTALLATION-------- B3 - 5
K3 ---------- B3 - 9
AIR CLEANER ---------- B3 - 9
REMOVAL AND INSTALLATION-------- B3 - 9
THROTTLE BODY ---------- B3 - 11
REMOVAL AND INSTALLATION ------ B3 - 11
INTAKE MANIFOLD GASKET ---------- B3 - 14
REMOVAL AND INSTALLATION ------ B3 - 14

■ 1KR
1 AIR CLEANER
1-1 REMOVAL AND INSTALLATION
1-1-1 ARTICLES TO BE PREPARED

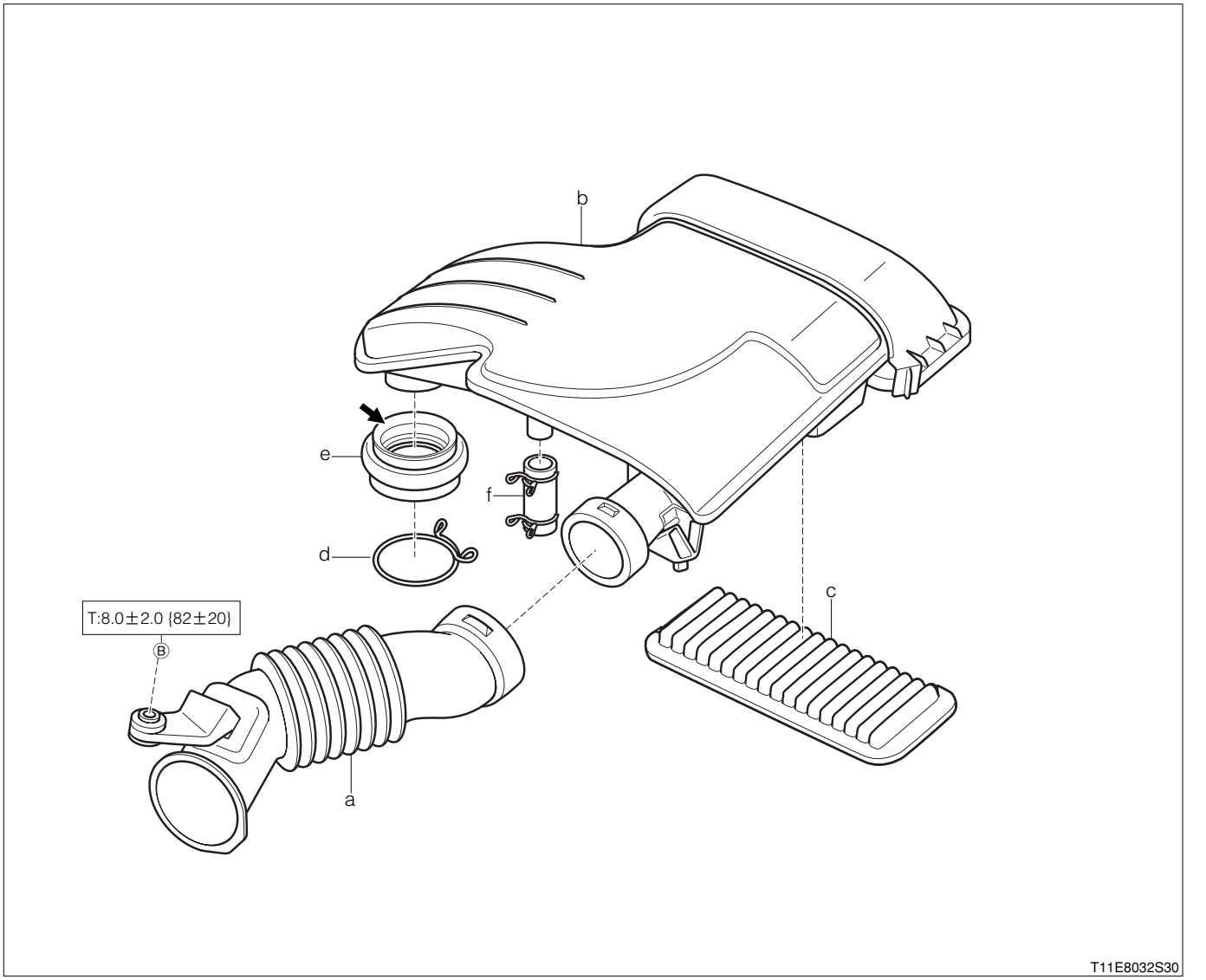
Instrument

Torque wrench

Lubricant,adhesive,others

Engine oil

1-1-2 REMOVAL AND INSTALLATION PROCEDURES
(1) Components



➡: Engine oil
Unit: N·m{kgf·cm}

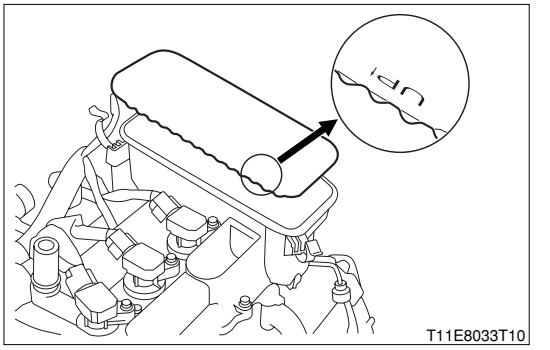
(2) Removal and installation procedures

▲ 1 a Hose, air cleaner No.1
▲ 2 b Cap S/A, air cleaner
▲ 3 c Element S/A, air cleaner filter
4 d Clamp
5 e Support air cleaner cap
6 f Hose, ventilation No.2

1-1-3 POINTS OF INSTALLATION

(1) Element S/A, air cleaner filter

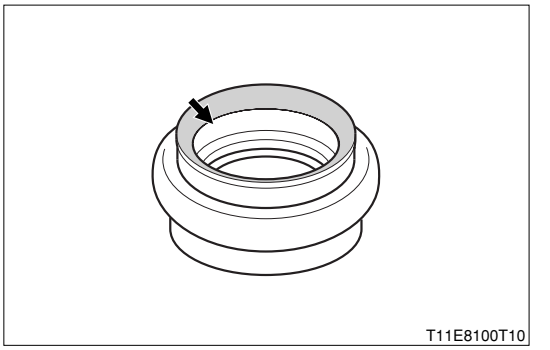
1.Install the element S/A to the cylinder head cover Ay in the direction shown in the figure.



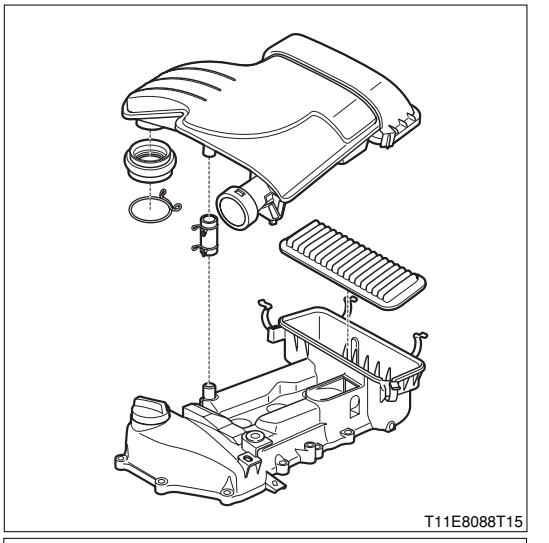
T11E8033T10

(2) Support, air cleaner cap

1.Apply engine oil to the air support.
LUBRICANT: Engine oil

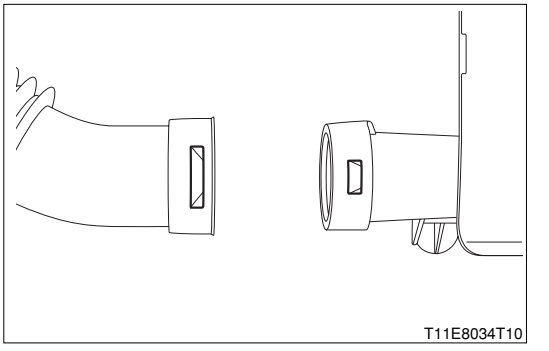

T11E8100T10

2.Assemble the clip to the ventilation No.2 hose in such a way that the clip faces toward the right side of the vehicle.
3.Assemble the ventilation hose No.2, to which the clip has been installed, to the cylinder head cover Ay.
4.Press in the air cleaner cap support to the ventilation hose No.2 and the cap S/A to the grommet of the cylinder head cover Ay.
5.Assemble the clip to the support in such a way that the clamp faces toward the left side of the vehicle.


T11E8088T15

(3) Hose, air cleaner No.1

1.Fit the protruding section of the air cleaner inlet seal to the recessed section of the hose.
2.Install the radiator support S/A with bolts.


T11E8034T10

2 THROTTLE BODY

2-1 REMOVAL AND INSTALLATION

WARNING

- Make sure that no foreign matter is admitted into the throttle body Ay and intake manifold Ay during the operation.

2-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

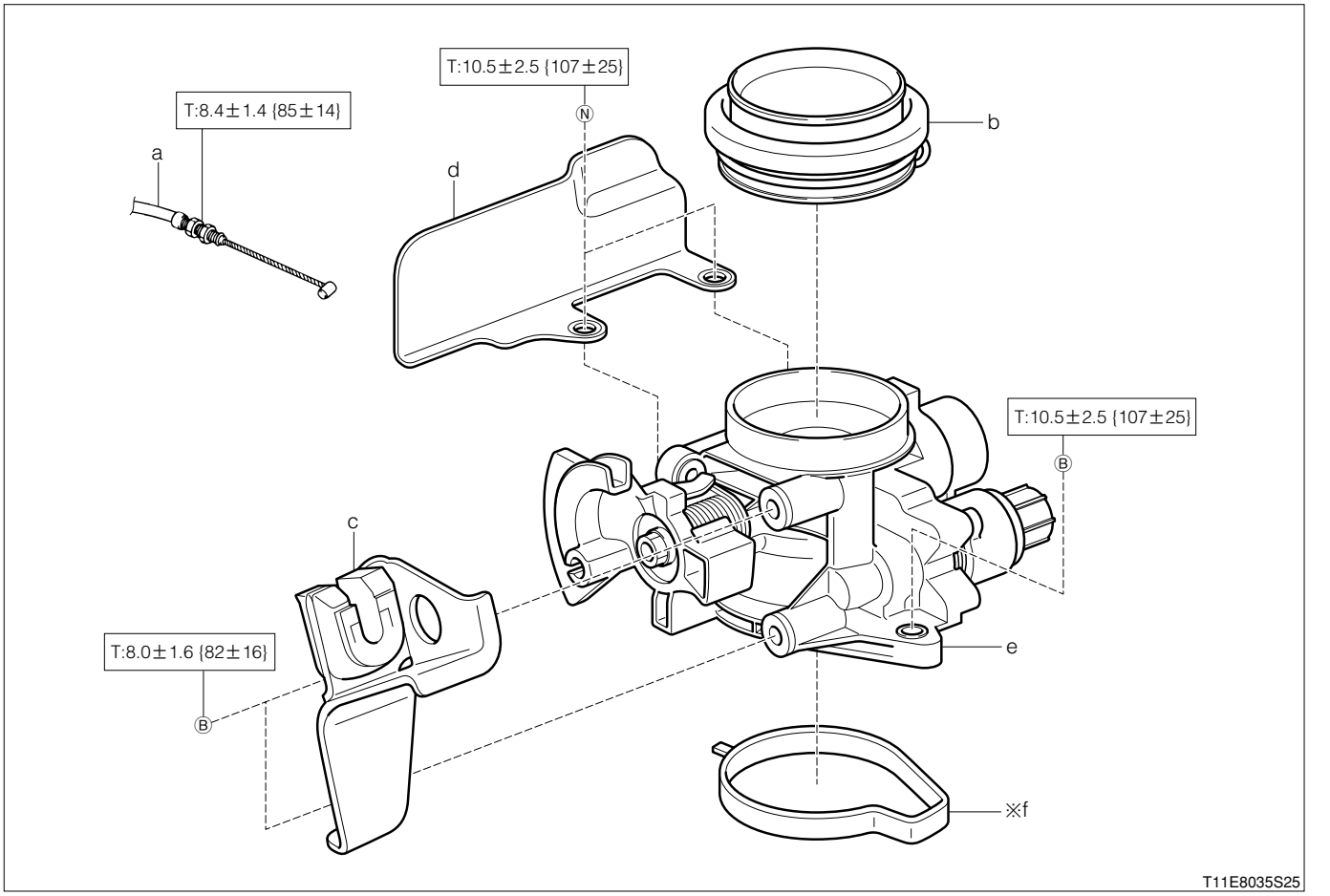
2-1-2 OPERATION BEFORE REMOVAL

1.Remove the air cleaner hose No.1.
Refer to Page B3-1.

2.Remove the air cleaner filter element S/A and air cleaner cap S/A.
Refer to Page B3-1.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) Removal and installation procedures

▲ 1 a Cable Ay, accelerator control (Throttle body side)
▲ 2 b Support air cleaner cap
3 c Bracket, accelerator control cable
4 d Bracket, throttle body
▲ 5 e Body Ay, throttle
6 f Gasket, throttle body

2-1-4 INSPECTION

(1) Body Ay, throttle

1.Perform the following checks for the throttle body Ay.
(1) There shall be no excessive play at the throttle shaft.
(2) Each port should not be clogged.
(3) The throttle valve should open or close smoothly.
(4) There should be no gap between the stop screw and the lever when the throttle valve is located at the fully-opened position.

2-1-5 POINTS OF INSTALLATION

(1) Body Ay, throttle

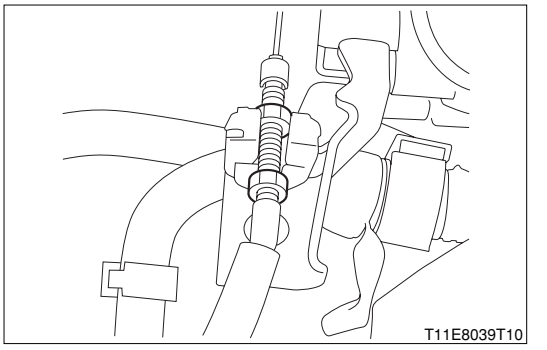
1.Clean the installation surface of the throttle body Ay and intake manifold Ay and install the throttle body Ay gasket.

(2) Support air cleaner cap

1.Assemble the throttle body Ay to the air cleaner cap support with the clip facing to the right of the vehicle.

(3) Cable Ay, accelerator control (Throttle body side)

1.Install the cable Ay. After adjusting the play of the accelerator pedal, tighten the nuts to the specified torque.
SPECIFIED VALUE: 1 - 5mm(Play of accelerator pedal: Depressing surface)
TIGHTENING TORQUE: 8.4±1.4 N·m {85±14 kgf·cm}


T11E8039T10

2-1-6 OPERATION AFTER INSTALLATION

1.Install the air cleaner filter element S/A and air cleaner cap S/A.
Refer to Page B3-1.

2.Install the air cleaner hose No.1.
Refer to Page B3-1.

3.Perform the adjustment tune-up.
Refer to Page B1-1.

3 INTAKE MANIFOLD GASKET

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

3-1-2 OPERATION BEFORE REMOVAL

WARNING

- Do not remove the radiator cap or drain plug, water hose when the coolant is hot.

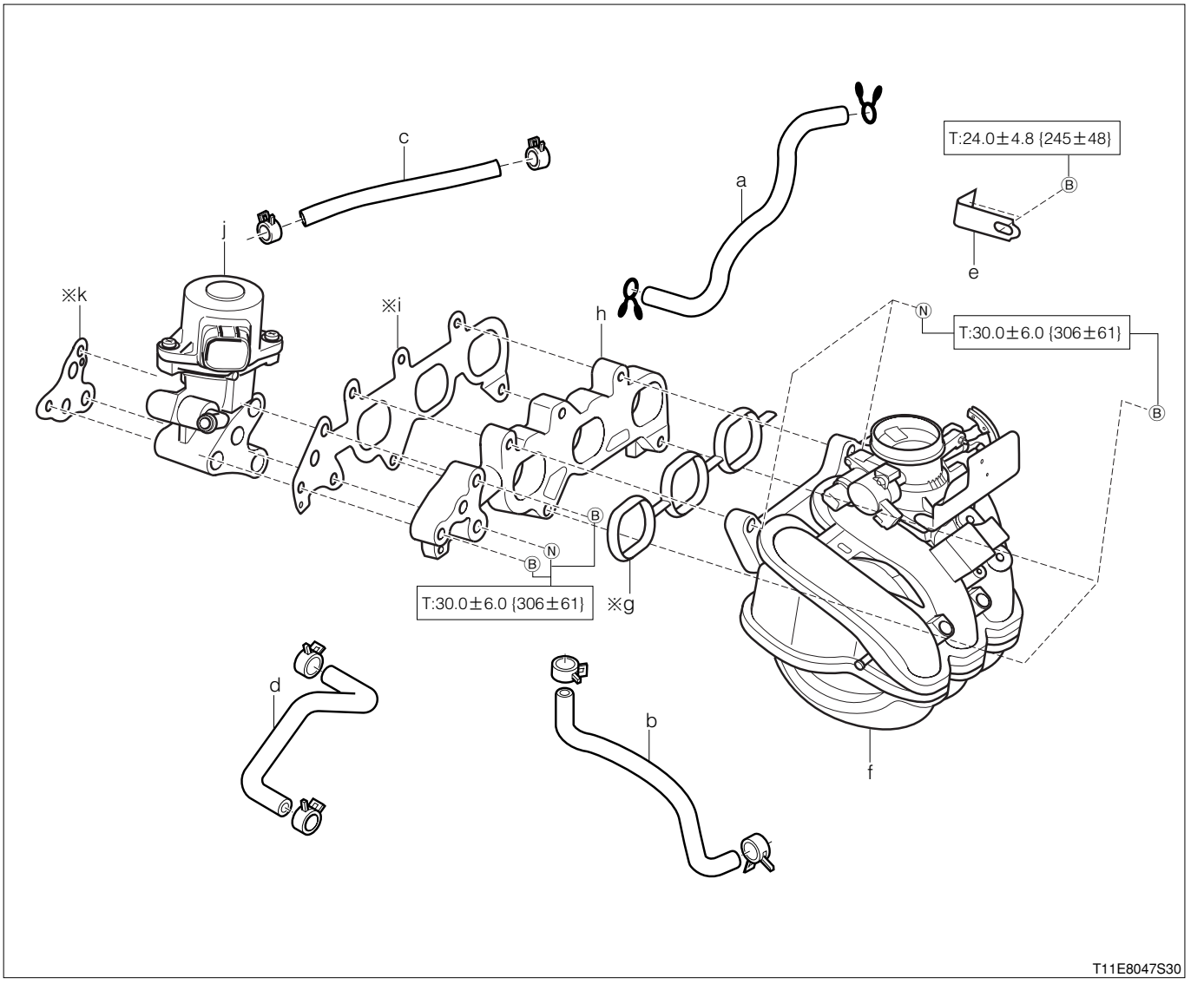
1.Drain the coolant.
2.Remove the air cleaner hose No.1.
Refer to Page B3-1.

3.Remove the air cleaner filter element S/A and air cleaner cap S/A.
Refer to Page B3-1.

4.Remove the throttle body Ay.
Refer to Page B3-3.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts
Unit:N·m{kgf·cm}

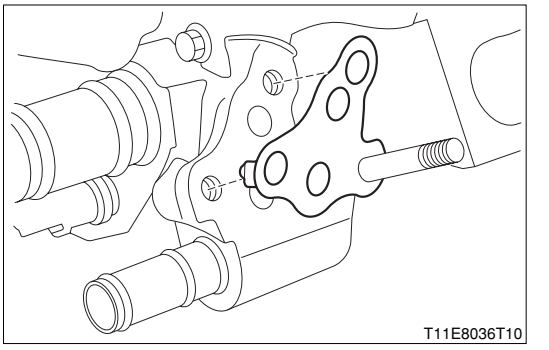
(2) Removal and installation procedures

1 a Hose, ventilation No.1 (For intake manifold - head cover/PCV)
▲ 2 b Hose, fuel evaporative feed No.2
3 c Hose, water (For EGR valve)
4 d Hose Ay, vacuum (For brake booster)
5 e Stay, intake manifold
▲ 6 f Manifold Ay, intake
7 g Gasket, intake manifold to head
▲ 8 h Insulator, intake manifold No.1
▲ 9 i Gasket, intake manifold to head No.2
▲ 10 j Valve Ay, EGR No.1
▲ 11 k Gasket, EGR valve

3-1-4 POINTS OF INSTALLATION

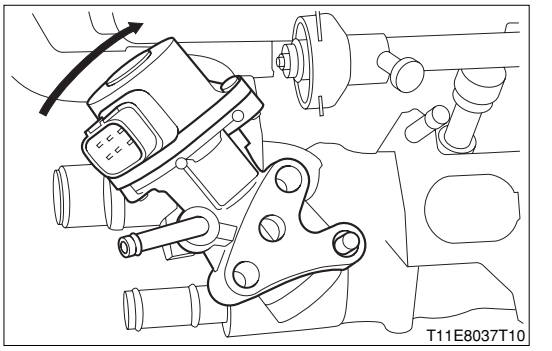
(1) Gasket, EGR valve

1.Clean the installation surface of the No.1 EGR valve Ay and cylinder head Ay.
2.Install the gasket to the cylinder head Ay.



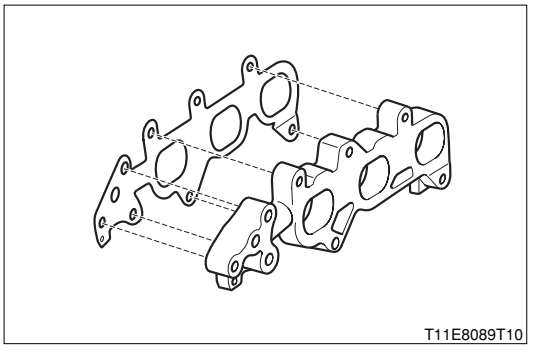
(2) Valve Ay, EGR No.1

1.Insert the valve Ay, while turning it in the arrow direction, being very careful not to allow it to interfere with the cylinder head cover Ay. Then, temporarily install the valve Ay to the cylinder head Ay.



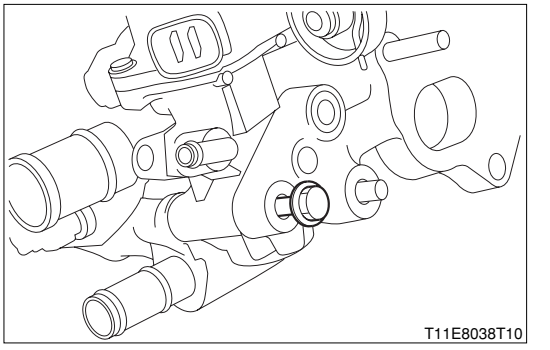
(3) Intake manifold-to-head No.2 gasket, intake manifold No.1 insulator

1.Clean the gasket installation surface of the cylinder head Ay and intake manifold Ay.
2.Install the intake manifold No.1 to the cylinder head Ay with an insulator interposed.

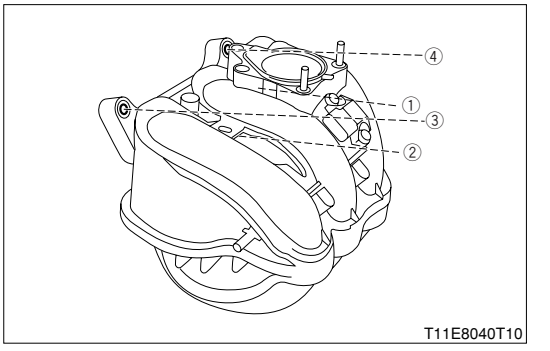


(4) Manifold Ay, intake

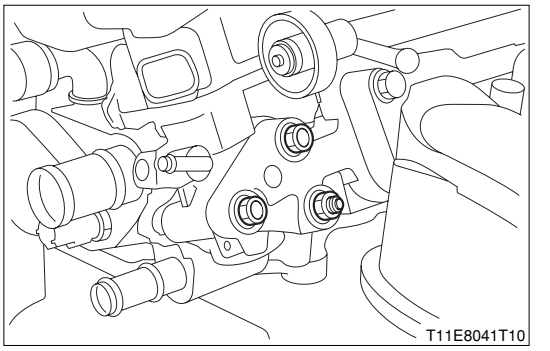
1.Temporarily tighten the No.1 EGR valve Ay with the bolts shown in the figure.



2.Install the manifold Ay and tighten the bolts and nuts in the sequence shown in the right figure.



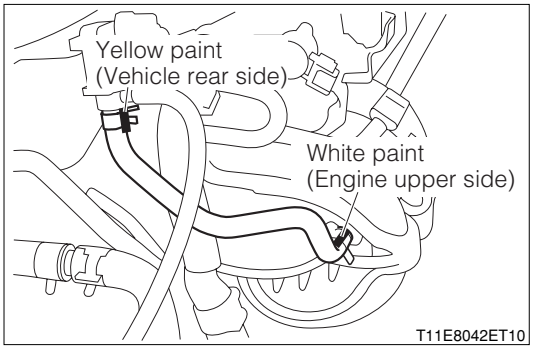
3.Tighten the EGR valve Ay No.1 .



(5) Hose, fuel evaporative feed No.2

1.Assemble the hose as shown in the figure.

2.Perform the assembling in such a way that the clamp on the VSV side faces the rear of the vehicle and the clamp on the manifold side faces the lower side of the vehicle.



3-1-5 OPERATION AFTER INSTALLATION

1.Install the throttle body Ay.
Refer to Page B3-3.

2.Install the air cleaner filter element S/A and air cleaner cap S/A.
Refer to Page B3-1.

3.Install the air cleaner hose No.1.
Refer to Page B3-1.

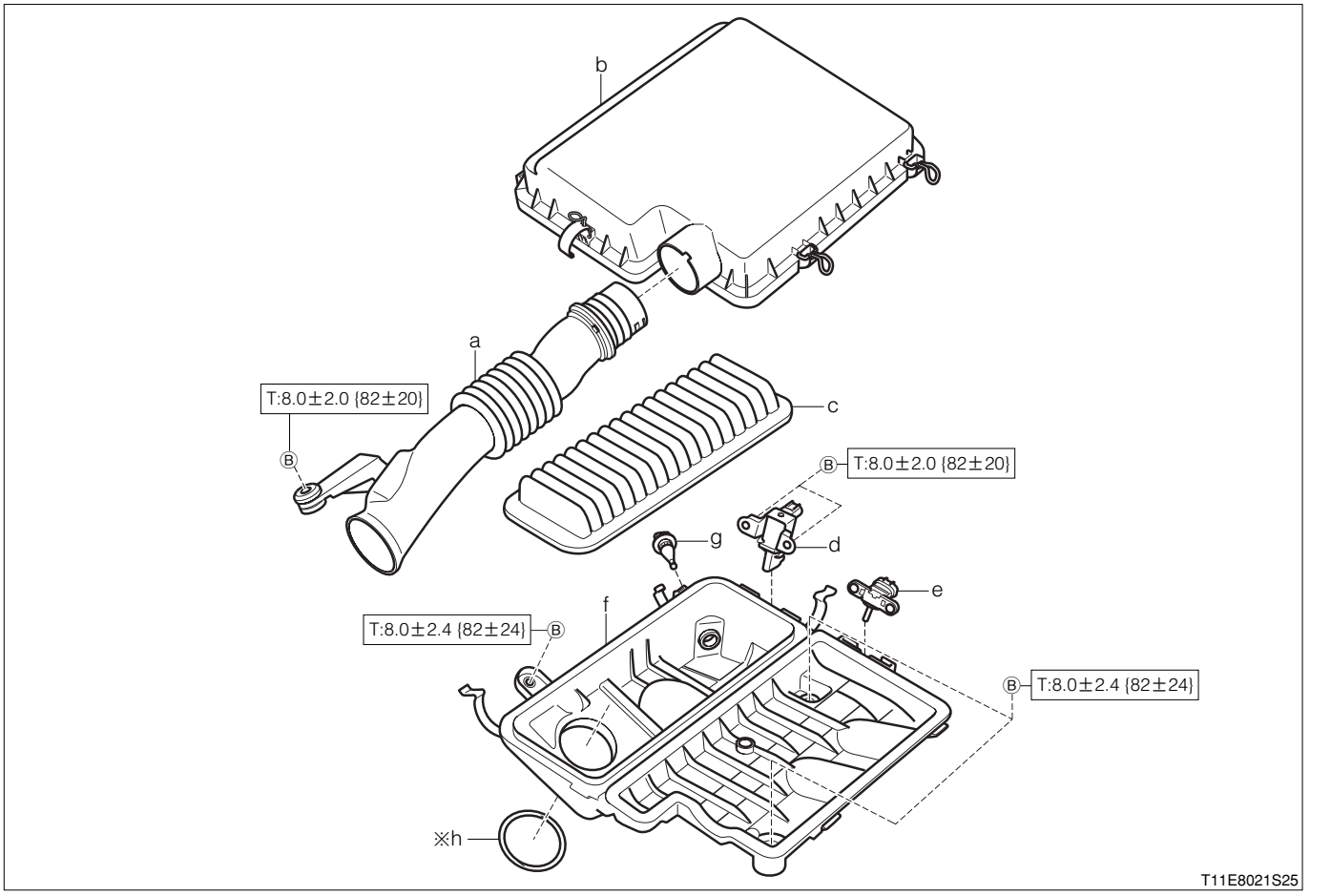
4.Replenish coolant and perform water leakage check.
Refer to Page B1-2.

■ K3
1 AIR CLEANER
1-1 REMOVAL AND INSTALLATION
1-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

1-1-2 REMOVAL AND INSTALLATION PROCEDURES
(1) Components



※:Non - reusable parts
Unit:N·m{kgf·cm}

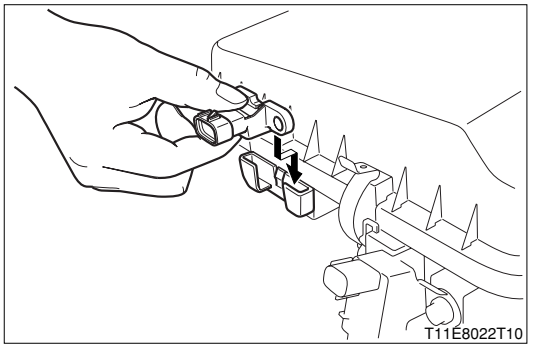
(2) Removal and installation procedures

▲ 1 a Hose, air cleaner No.1
2 b Cap S/A, air cleaner
▲ 3 c Element S/A, air cleaner filter
▲ 4 d Vacuum switching valve Ay (for purging)
▲ 5 e Sensor, vacuum
6 f Case S/A, air cleaner
7 g Sensor, thermo
8 h Ring, O

1-1-3 POINTS OF INSTALLATION

(1) Sensor, vacuum

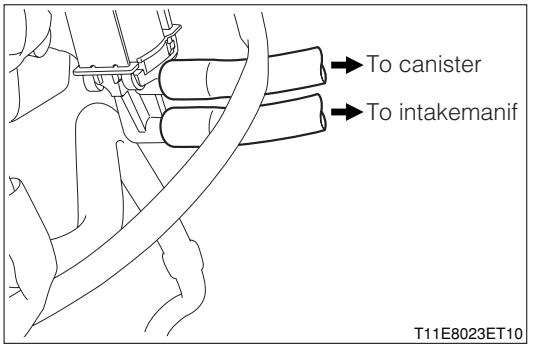
1.Insert the sensor Ay to the installation section of the air cleaner case S/A from above.



(2) Vacuum switching valve Ay (for purging)

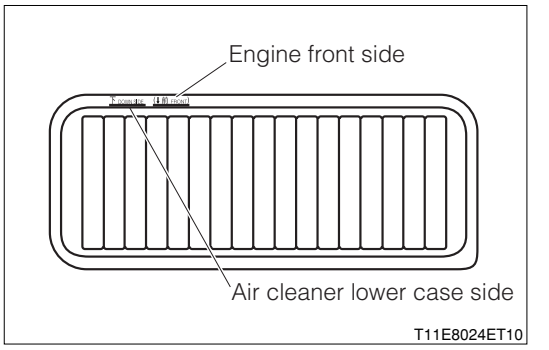
1.Install the valve Ay.

2.Assemble the charcoal canister No.1 hose and charcoal canister No.2 hose to the vacuum switching valve Ay (For purging), as shown in the figure.



(3) Element S/A, air cleaner filter

1.Install the element S/A to the air cleaner case S/A in the direction shown in the figure.

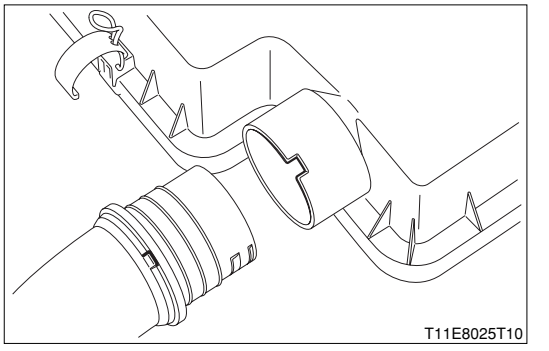


(4) Hose, air cleaner No.1

1.Insert the protrusion of the hose into the inside while aligning it with the cut-out section at the inlet of the air cleaner cap S/A.

2.Perform the insertion securely, until the stopper is engaged.

3.Install the radiator support S/A with bolts.



2 THROTTLE BODY

2-1 REMOVAL AND INSTALLATION

WARNING

- Do not remove the water hose when the coolant is hot.
- Make sure that no foreign matter is admitted into the throttle body Ay and intake manifold Ay during the operation.

2-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

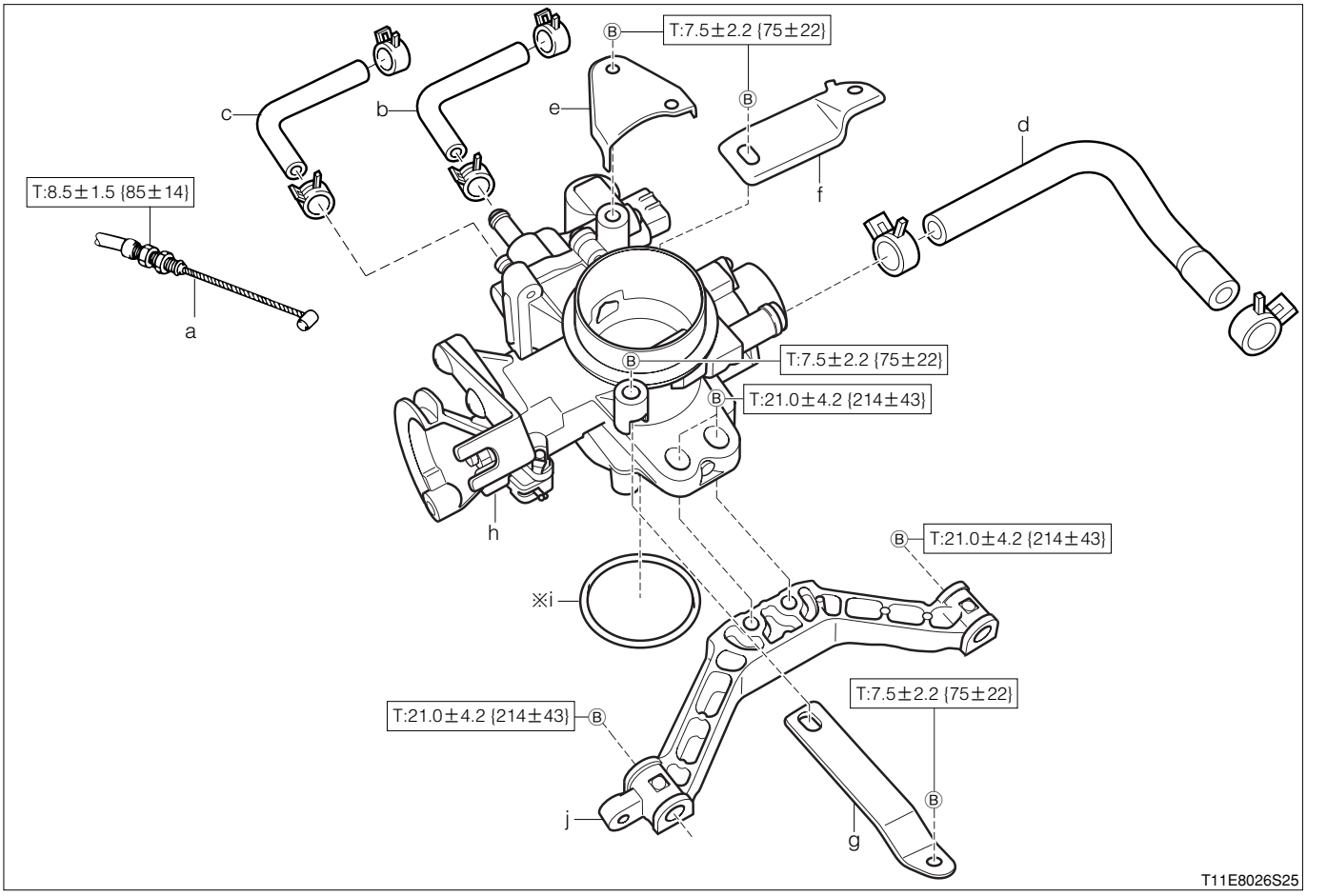
2-1-2 OPERATION BEFORE REMOVAL

1.Drain the coolant.
2.Remove the air cleaner hose No.1.
Refer to Page B3-9.

3.Remove the cleaner Ay, air W/element
Refer to Page B3-9.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) Removal and installation procedures

▲ 1 a Cable Ay, accelerator control (Throttle body side)
2 b Hose, water
▲ 3 c Hose, water by-pass, No.1
▲ 4 d Hose, ventilation No.2
5 e Bracket, air cleaner
6 f Stay, throttle body
▲ 7 g Barcket, throttle body No.2
▲ 8 h Body Ay, throttle
9 i Ring, O
10 j Bracket, throttle body

2-1-4 INSPECTION

(1) Body Ay, throttle

1.Perform the following checks for the throttle body Ay.
(1) There should be no excessive play in the throttle shaft.
(2) Each port should not be clogged.
(3) The throttle valve should open or close smoothly.
(4) There should be no gap between the stop screw and the lever when the throttle valve is located at the fully-opened position.

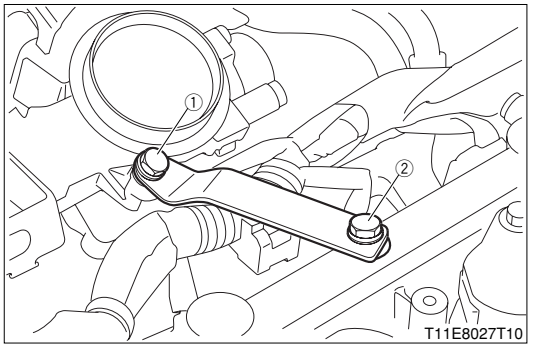
2-1-5 POINTS OF INSTALLATION

(1) Body Ay, throttle

1.Clean the installation surface of the body Ay and intake manifold Ay and install an O-ring.

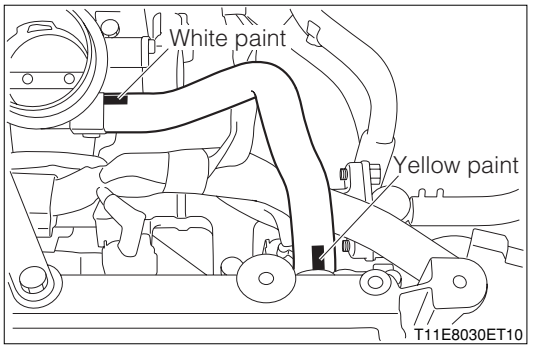
(2) Barcket, throttle body No.2

1.Temporarily tighten the bolt ①.
2.Fully tighten in the sequence of the bolt ② and bolt ①.



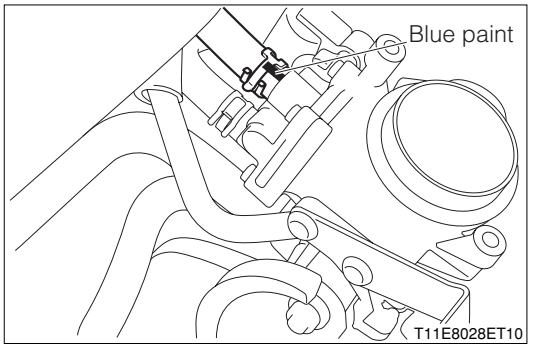
(3) Hose, ventilation No.2

1.Perform the installation so that the paint on the hose would come to the top position.



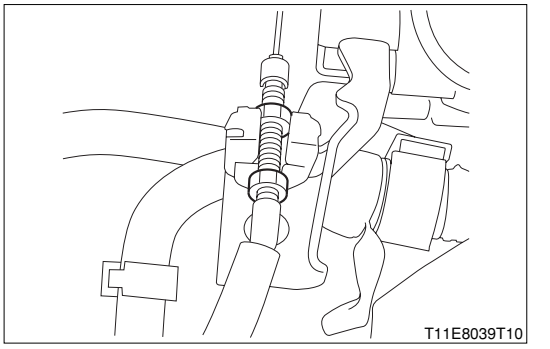
(4) Hose, water by-pass, No.1

1.Perform the installation so that the paint on the hose would come to the top position.



(5) Cable Ay, accelerator control (Throttle body side)

1.Install the cable Ay. After adjusting the play of the accelerator pedal, tighten the nuts to the specified torque.
SPECIFIED VALUE: 1 - 5mm(Play of accelerator pedal: Depressing surface)
TIGHTENING TORQUE: 8.5±1.5 N·m {85±14 kgf·cm}



2-1-6 OPERATION AFTER INSTALLATION

1.Install the air cleaner Ay W/element.
Refer to Page B3-9.

2.Install the hose, air cleaner No.1.
Refer to Page B3-9.

3.Replenish coolant and perform water leakage check.
Refer to Page B3-15.

3 INTAKE MANIFOLD GASKET

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

3-1-2 OPERATION BEFORE REMOVAL

WARNING

- Do not remove the radiator cap or drain plug, water hose when the coolant is hot.

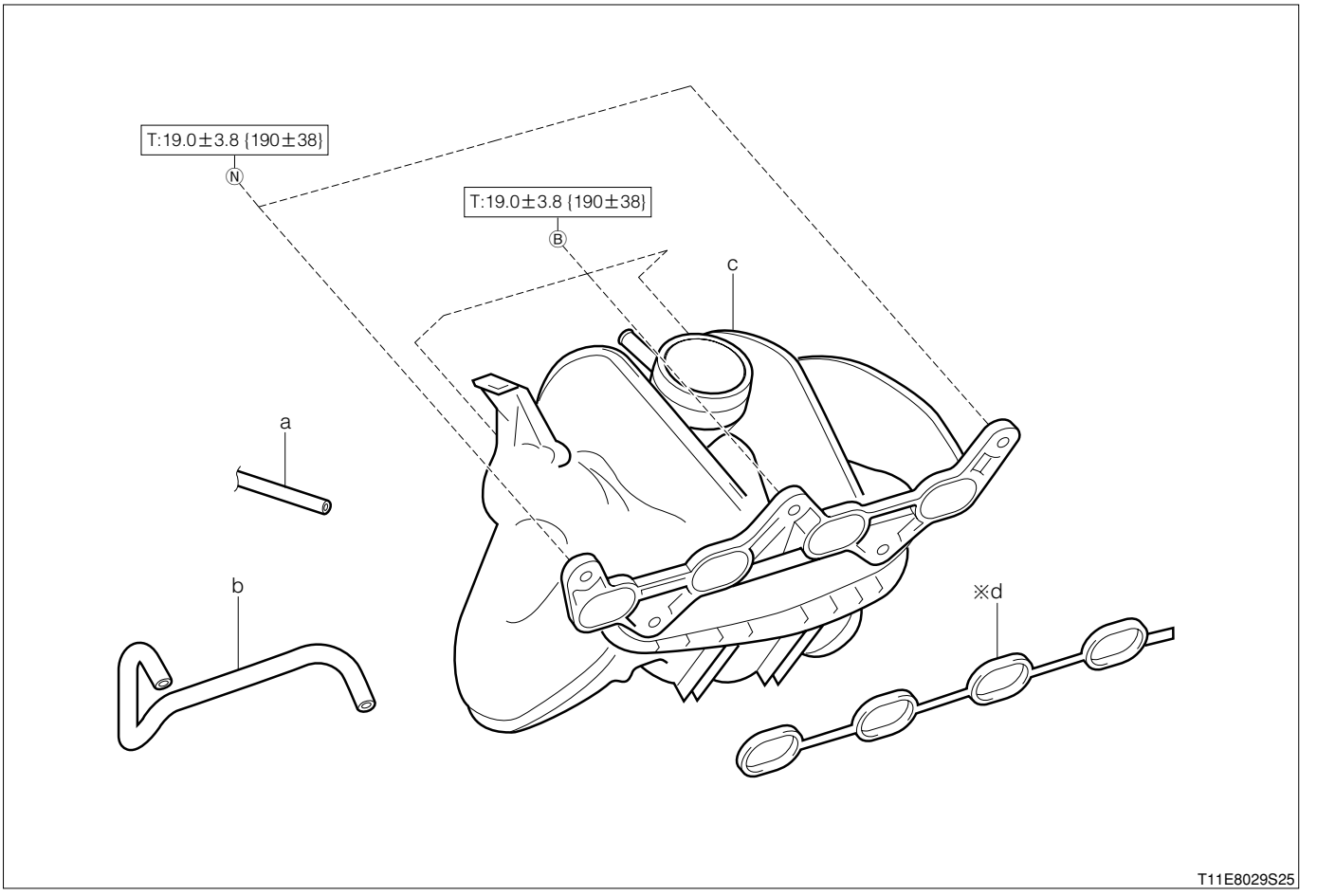
1.Remove the air cleaner hose No.1.
Refer to Page B3-9.

2.Remove the cleaner Ay, air W/element
Refer to Page B3-9.

3.Remove the throttle body Ay.
Refer to Page B3-11.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts
Unit:N·m{kgf·cm}

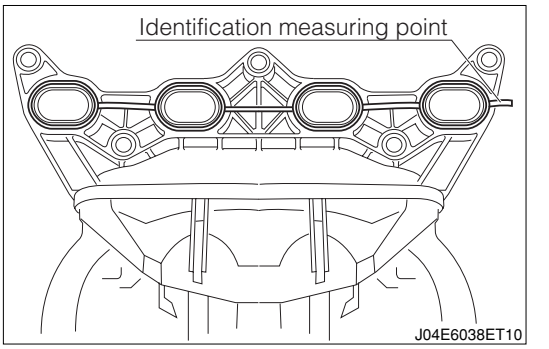
(2) Removal and installation procedures

▲ 1 a Ventilation hose (For intake manifold - head cover/PCV)
2 b Vacuum hose S/A (Intake manifold - vacuum sensor)
▲ 3 c Manifold Ay, intake
▲ 4 d Gasket, intake manifold to head

3-1-4 POINTS OF INSTALLATION

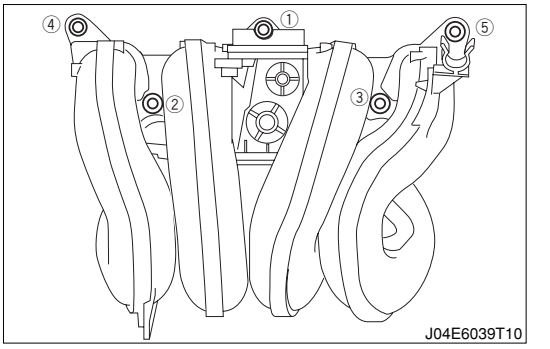
(1) Gasket, intake manifold to head

1.Clean the gasket installation surface of the cylinder head Ay and intake manifold Ay.
2.Install the gasket to the intake manifold Ay so that the identification section of the gasket would come to the position shown in the figure.



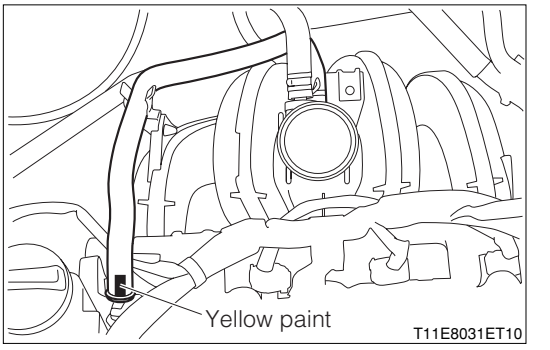
(2) Manifold Ay, intake

1.Install the manifold Ay and tighten the bolts and nuts in the sequence shown in the right figure.



(3) Hose, ventilation

1.Perform the installation so that the paint on the hose would come to the top position.



3-1-5 OPERATION AFTER INSTALLATION

1.Install the throttle body Ay.
Refer to Page B3-11.

2.Install the air cleaner Ay W/element.
Refer to Page B3-9.

3.Install the air cleaner hose No.1.
Refer to Page B3-9.

TO INDEX

B4 EXHAUST SYSTEM

1KR ---------- B4 - 1
EXHAUST MANIFOLD GASKET ---------- B4 - 1
REMOVAL AND INSTALLATION-------- B4 - 1
EXHAUST PIPE ---------- B4 - 3
REMOVAL AND INSTALLATION-------- B4 - 3
K3 ---------- B4 - 4
EXHAUST MANIFOLD GASKET ---------- B4 - 4
REMOVAL AND INSTALLATION-------- B4 - 4
EXHAUST PIPE ---------- B4 - 6
REMOVAL AND INSTALLATION-------- B4 - 6

■ 1KR
1 EXHAUST MANIFOLD GASKET
1-1 REMOVAL AND INSTALLATION

WARNING

- Do not carry out the operation while the exhaust manifold converter S/A is still hot.

1-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

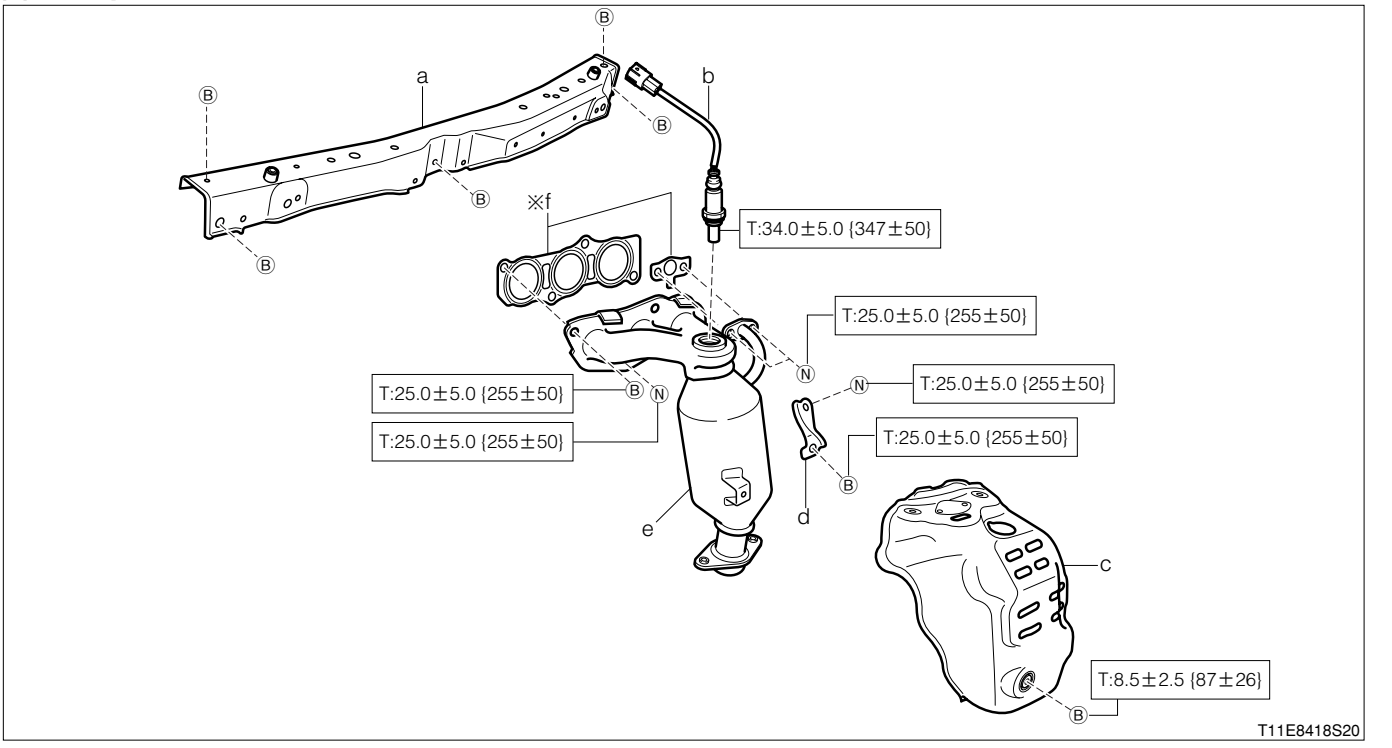
1-1-2 OPERATION BEFORE REMOVAL

1.Remove the front bumper cover.
Refer to Page I2-2.

2.Remove the front exhaust pipe Ay.
Refer to Page B4-3.

1-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) Removal and installation procedures

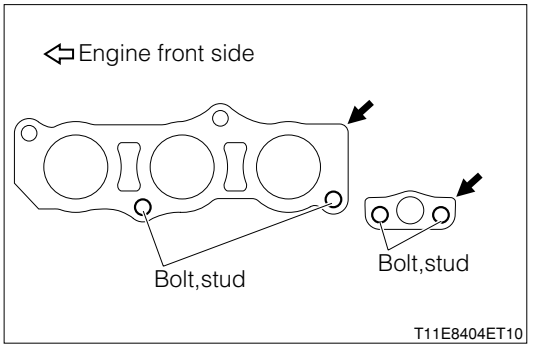
1 a Radiator support upper
2 b Sensor, oxygen
3 c Insulator, exhaust manifold heat
4 d Stay, exhaust manifold
▲ 5 e Converter S/A, exhaust manifold
▲ 6 f Gasket, exhaust manifold to head

1-1-4 POINTS OF INSTALLATION

(1) Gasket, exhaust manifold to head

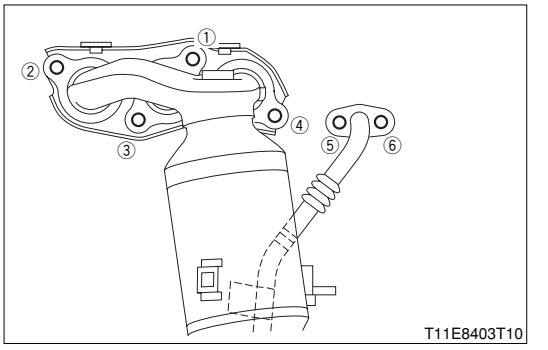
1.Clean the gasket installation surfaces of the cylinder head and exhaust manifold converter S/A.

2.Perform the installation so that the arrow section will come to the right upper side facing towards the installation surface of the cylinder head Ay.



(2) Converter S/A, exhaust manifold

1.Tighten the attaching bolts and nuts of the converter S/A in the sequence shown in the right figure.



1-1-5 OPERATION AFTER INSTALLATION

1.Install the front exhaust pipe Ay.
Refer to Page B4-3.

2.Install the front bumper cover.
Refer to Page I2-2.

2 EXHAUST PIPE

2-1 REMOVAL AND INSTALLATION

WARNING

- Do not carry out the operation while the front exhaust pipe Ay is still hot.

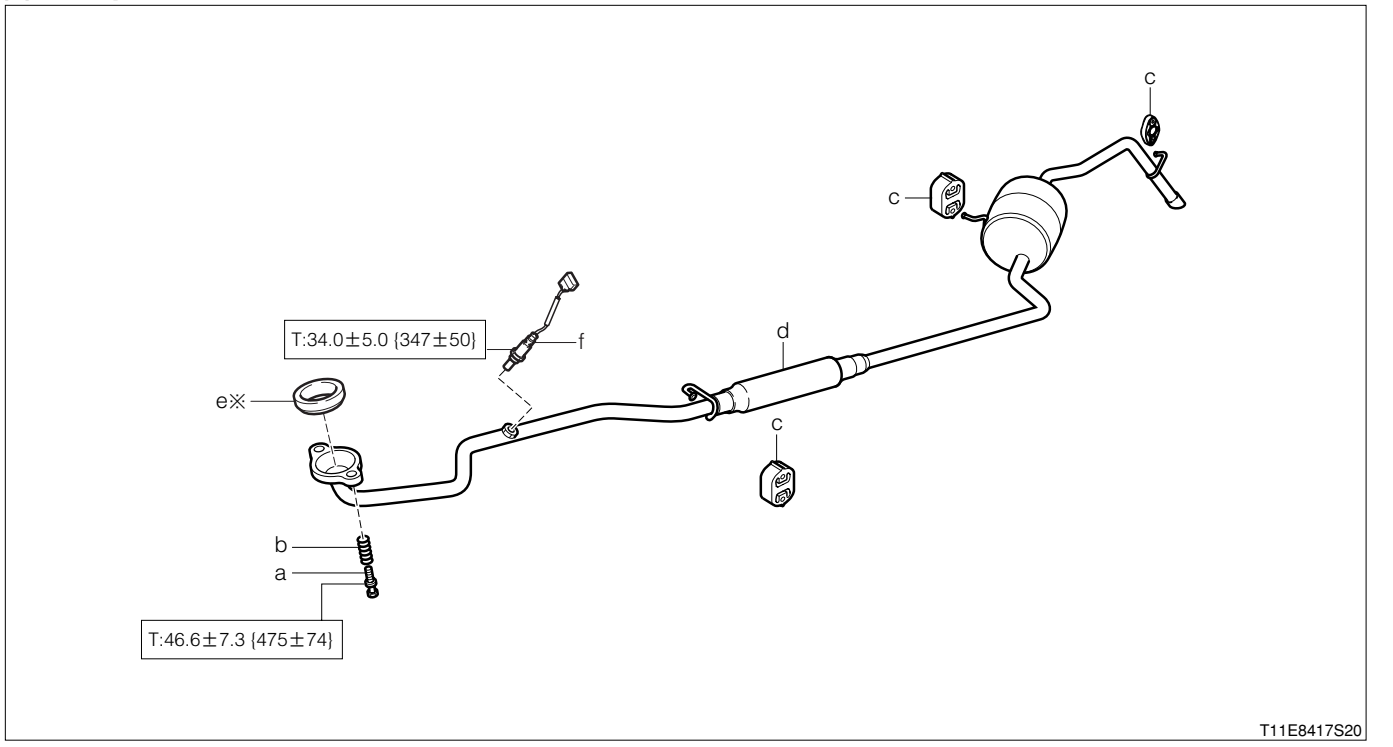
2-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

2-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts

Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Bolt, exhaust pipe support
2 b Spring, exhaust manifold
3 c Support, muffler, No.2
4 d Pipe Ay, exhaust, front
5 e Gasket, exhaust pipe
6 f Sensor, oxygen

■ K3
1 EXHAUST MANIFOLD GASKET
1-1 REMOVAL AND INSTALLATION

WARNING

- Do not carry out the operation while the exhaust manifold Ay is still hot.

1-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

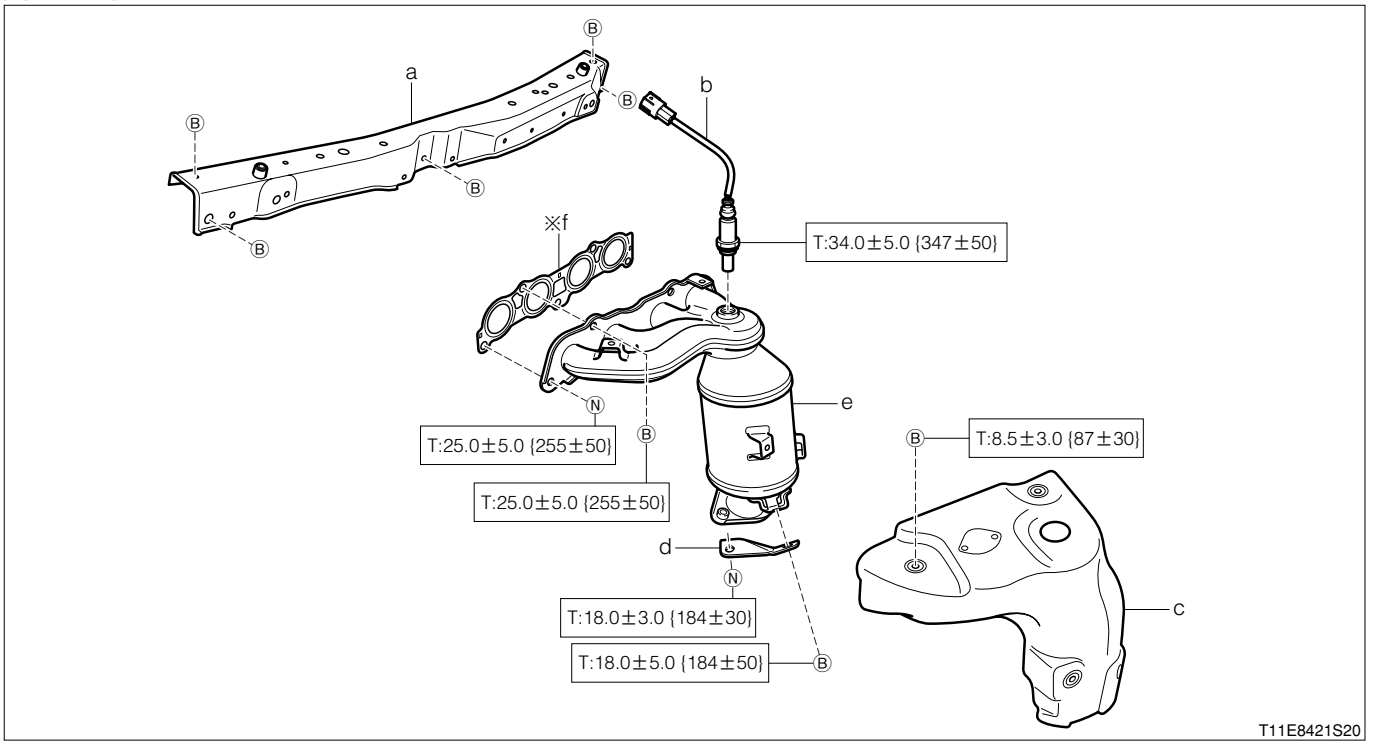
1-1-2 OPERATION BEFORE REMOVAL

1.Remove the front bumper cover.
Refer to Page I2-2.

2.Remove the front exhaust pipe Ay.
Refer to Page B4-6.

1-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) Removal and installation procedures

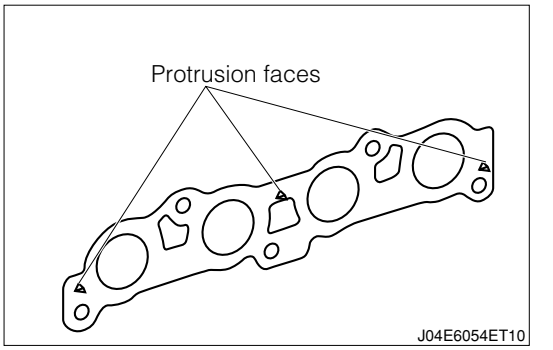
1 a Radiator support upper
2 b Sensor, oxygen
3 c Insulator, exhaust manifold heat
4 d Stay, exhaust manifold
▲ 5 e Manifold Ay, exhaust
▲ 6 f Gasket, exhaust manifold to head

1-1-4 POINTS OF INSTALLATION

(1) Gasket, exhaust manifold to head

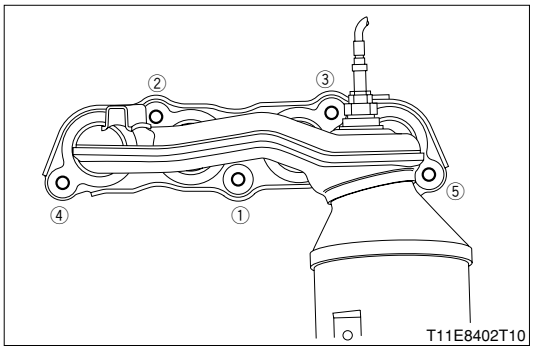
1.Clean the gasket installation surfaces of the cylinder head and exhaust manifold.

2.Install the gasket in such a way that the protruding section will face the cylinder head Ay side.



(2) Manifold Ay, exhaust

1.Tighten the attaching bolts and nuts of the manifold Ay in the sequence shown in the right figure.



1-1-5 OPERATION AFTER INSTALLATION

1.Install the front exhaust pipe Ay.
Refer to Page B4-6.

2.Install the front bumper cover.
Refer to Page I2-2.

2 EXHAUST PIPE

2-1 REMOVAL AND INSTALLATION

WARNING

- Do not carry out the operation while the front exhaust pipe Ay is still hot.

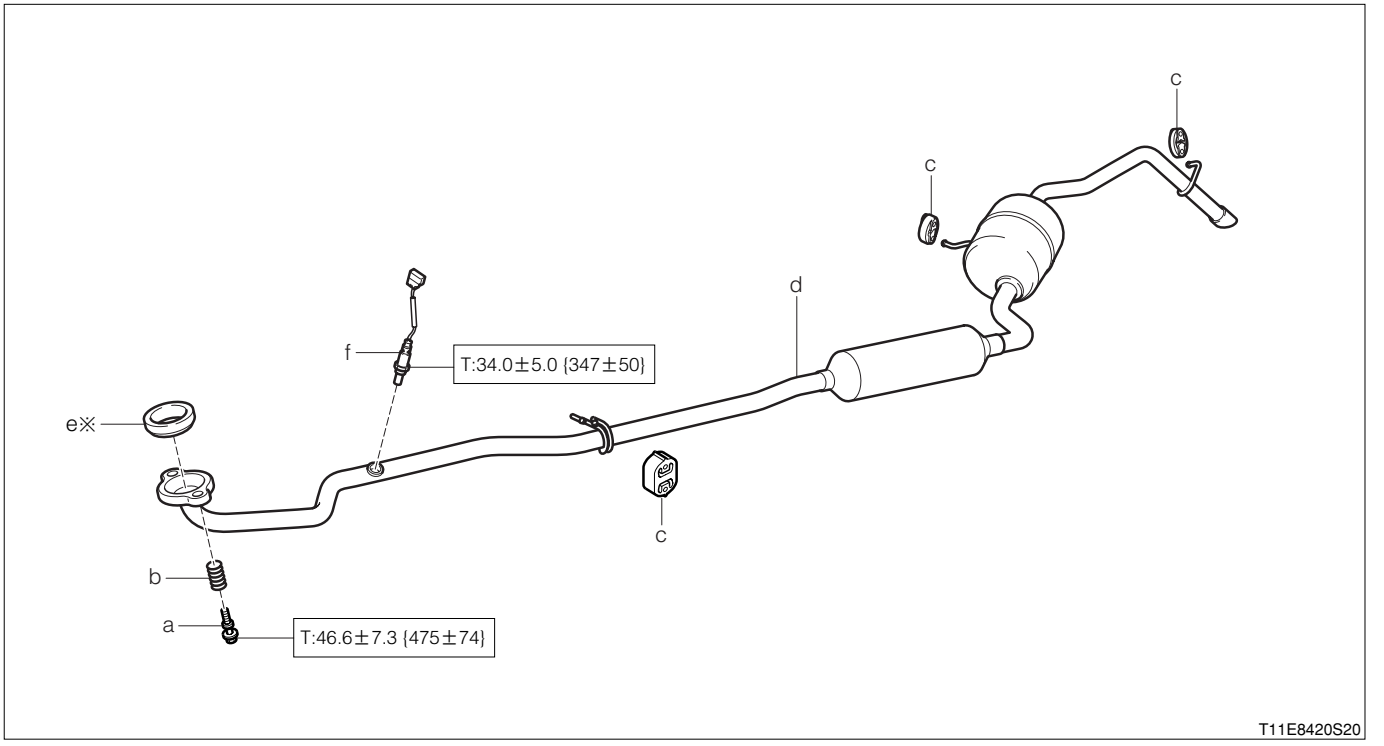
2-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

2-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts

Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Bolt, exhaust pipe support
2 b Spring, exhaust manifold
3 c Support, muffler, No.2
4 d Pipe Ay, exhaust, front
5 e Gasket, exhaust pipe
6 f Sensor, oxygen

TO INDEX

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REMOVAL AND INSTALLATION ------ B5 - 21
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REMOVAL AND INSTALLATION ------ B5 - 23

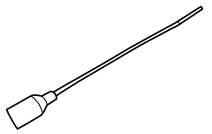
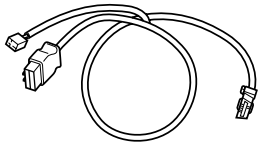
■ 1KR
1 LUBRICATION SYSTEM
1-1 FUNCTION CHECK
WARNING

- Never carry out the operation while the engine and engine oil are still hot, for there are hazard potentials for getting scald.

1-2 ARTICLES TO BE PREPARED
Instrument

Tachometer,Oil pressure gauge,Torque wrench

SST

Shape	Part No.	Part name
	09991-87402-000	Wire,tacho-pulse pick up
	09991-87404-000 (09991-87401-000)	Wire,engine control system inspection

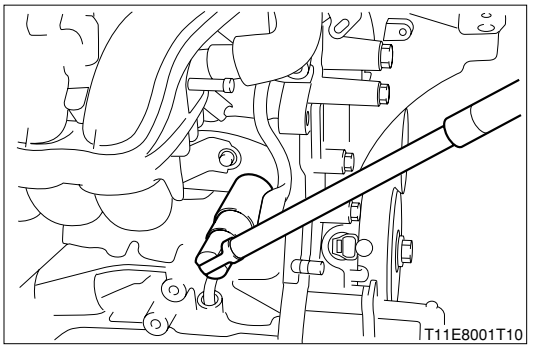
Lubricant,adhesive,others

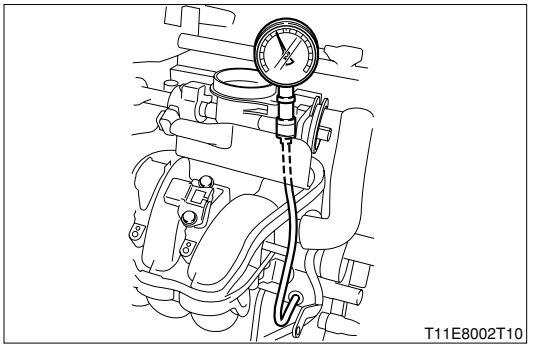
Three Bond1104

1-2-1 OIL PRESSURE
1.Check the engine oil amount.
Refer to Page B1-3.

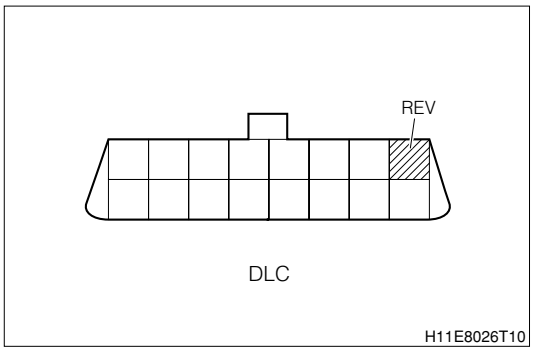
2.Remove the engine oil pressure switch.
(1) Disconnect the connector for the engine oil pressure switch.
(2) Remove the engine oil pressure switch.

3.Install the oil pressure gauge (Thread diameter PT1/8).





4.Install the engine tachometer.
(1) Install an engine tachometer to the terminal REV of the DLC, using the SST.
SST: 09991-87402-000
09991-87404-000
5.Warm up the engine.
6.Measure the engine oil pressure.
7.Start the engine and measure the pressure at each engine speed.
SPECIFIED VALUE: At 750rpm
30kPa or more
{0.3kgf/cm^2 or more}
At 3000rpm
200kPa or more
{2.0kg/cm^2 or more}
8.Remove the oil pressure gauge (Thread diameter PT1/8).
9.Install the engine oil pressure switch.
(1) Clean the threaded portion of the oil pressure switch and switch attaching section of the cylinder block.
(2) Apply sealing material to the threaded portion of the oil pressure switch.
ADHESIVE: Three Bond1104
(3) Install the oil pressure switch.
TIGHTENING TORQUE: 15±4.5N·m
{153±46kgf·cm}
(4) Connect the connector for the engine oil pressure switch.
10.Remove the engine tachometer.
11.Start the engine and check the engine oil pressure switch attaching section for oil leakage.



2 ENGINE OIL

2-1 REPLACEMENT

WARNING

- Never carry out the operation while the engine and engine oil are still hot, for there are hazard potentials for getting scald.

2-1-1 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

Engine oil 0W−20(API Grade SG or higher),Engine oil 5W−30(API Grade SG or higher)

2-1-2 REPLACING PROCEDURE

1.Remove the oil filler cap.
2.Drain the engine oil by removing the drain plug of the oil pan.
3.Install the drain plug with a new gasket interposed.
TIGHTENING TORQUE: 29.5±5.9N·m{301±60kgf·cm}

4.Fill engine oil.

NOTE

- About 3.1ℓ (With oil filter)

LUBRICANT: Engine oil 0W–20(API Grade SG or higher)
Engine oil 5W–30(API Grade SG or higher)

5.Install the oil filler cap.
6.Ensure that there is no oil leakage by operating the engine for three minutes or more.
7.Check the oil level.
Refer to Page B1-3.

3 OIL FILTER

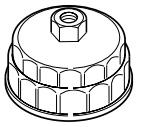
3-1 REPLACEMENT

WARNING

- Never carry out the operation while the engine and engine oil are still hot, for there are hazard potentials for getting scald.

3-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09228-87201-000	Wrench oil filter

Lubricant,adhesive,others

Vinyl hose,Engine oil

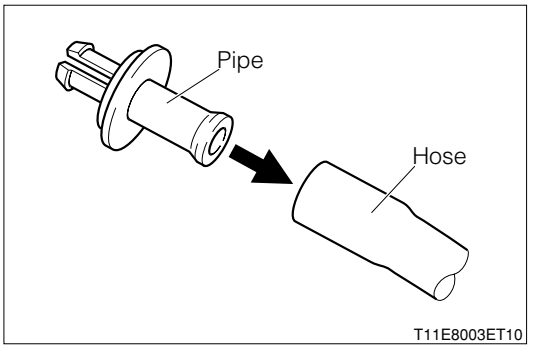
3-1-2 REPLACEMENT PROCEDURE

1.Remove the oil filter element.

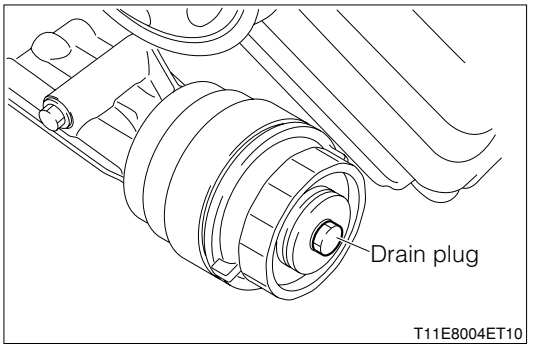
(1) Connect the hose to the supplied drain pipes.

NOTE

- Use a 15mm hose.



(2) Remove the oil filter drain plug.



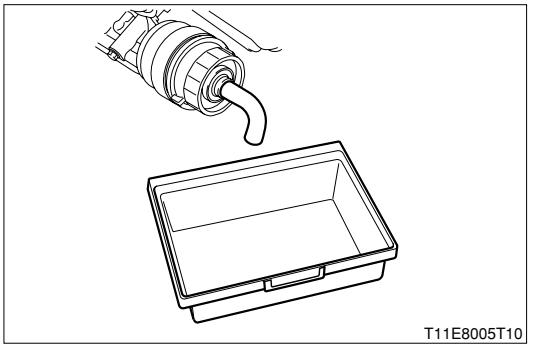
(3) Insert the pipes with the hose attached.

CAUTION

- Insert the hose under a condition that the O-ring (For drain plugs) is attached to the oil filter cap side.

NOTE

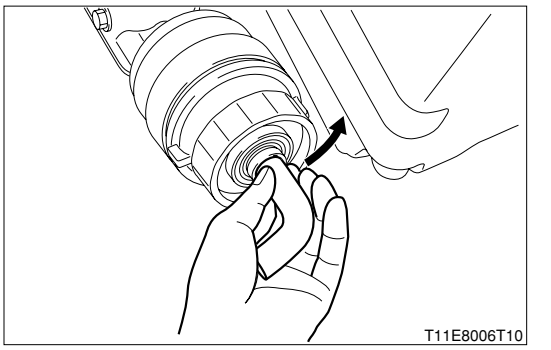
- Since the oil will be drained through the hose, put the hose end to a tray in advance.



(4) Ensure that the oil has been drained. Then, remove the pipe and O-ring (For drain plugs).

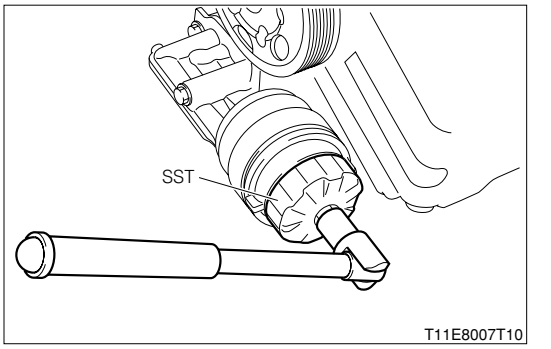
CAUTION

- During the removal, be sure to bend the pipe to the side.



(5) Remove the oil filter cap, using the SST.

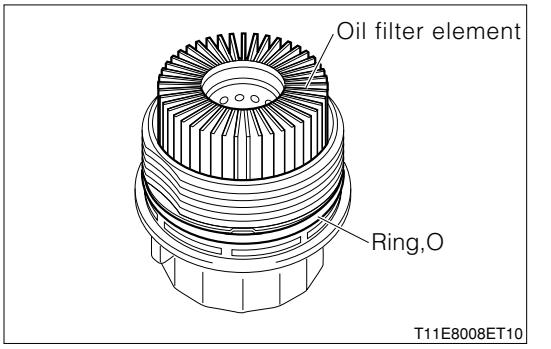
SST: 09228-87201-000



(6) Remove the oil filter element and O-ring (For caps) from the oil filter cap.

CAUTION

- To avoid scratching the O-ring groove, remove the O-ring (For caps) by hand without using any tools.



2.Install the oil filter element.

(1) Clean the inside section, threaded portion and O-ring groove section of the oil filter cap, using brake cleaner.

(2) Apply a small amount of engine oil to a new O-ring (For caps) and install the oil filter cap.

LUBRICANT: Engine oil

CAUTION

- Install the oil filter cap, being very careful not to damage the O-ring.

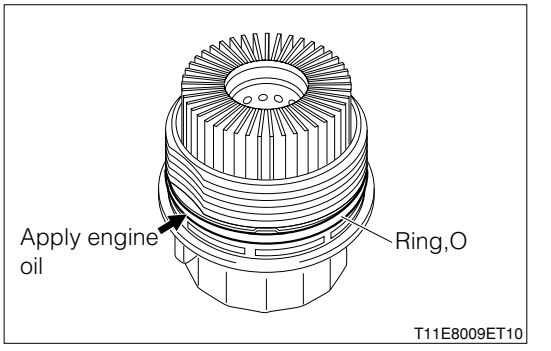
(3) Set a new oil filter element to the oil filter cap.

(4) Remove any smear or foreign matters from the installation surface and inside section on the engine side.

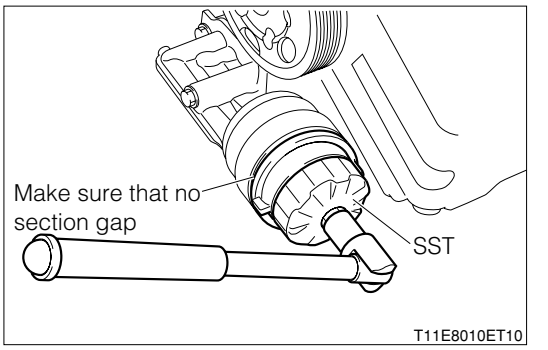
(5) Again, apply a small amount of engine oil to the O-ring (For caps) and install the oil filter cap.

CAUTION

- Care must be exercised so that the O-ring (For caps) may not be caught-in.

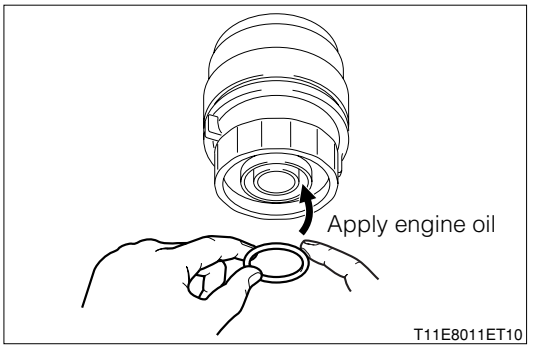


(6) Tighten the oil filter cap, using the SST.
SST: 09228-87201-000
TIGHTENING TORQUE: 25.0±5.0N·m
{255±51kgf·cm}



CAUTION
- After tightening the oil filter cap, ensure that there is no gap.

(7) Apply a small amount of engine oil to a new O-ring (For drain plugs) and install it to the oil filter cap.
(8) Remove the smear and foreign matters from the installation surface.
(9) Install the oil filter drain plug to the oil filter cap.
TIGHTENING TORQUE: 12.5±2.5N·m
{128±26kgf·cm}



CAUTION
- Care must be exercised so that the O-ring (For caps) may not be caught-in.

3.Replenish engine oil.
Refer to Page B5-3.

4.Oil leakage check
(1) Start the engine. Ensure that there is no oil leakage form the joint sections of the oil filter cap and oil filter drain plugs.

4 OIL PUMP

4-1 REPLACEMENT

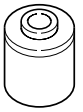
1.The oil pump is built in the timing chain cover Ay. Therefore, replace the timing chain cover Ay at the time of the replacement.
Refer to Page B2-5.

5 CRANKSHAFT FRONT OIL SEAL

5-1 REMOVAL AND INSTALLATION

5-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09223-87202-000	Replacer,crankshaft front oil seal

Instrument

Torque wrench

Lubricant,adhesive,others

Engine oil

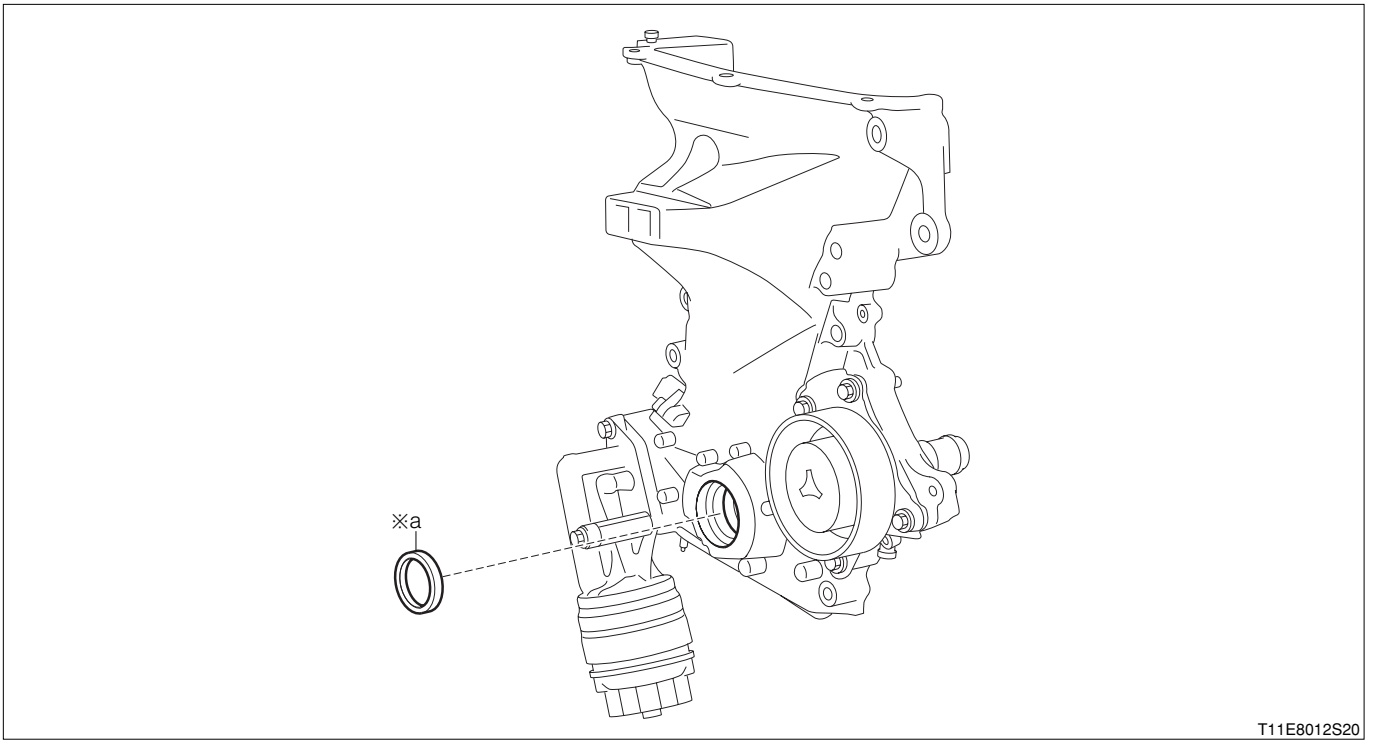
5-1-2 OPERATION BEFORE REMOVAL

1.Drain the engine oil.
Refer to Page B5-3.

2.Remove the crankshaft pulley Ay.
Refer to Page B2-5.

5-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts

(2) Removal and installation procedures

▼ ▲ 1 a Seal, type T oil

5-1-4 POINTS OF REMOVAL

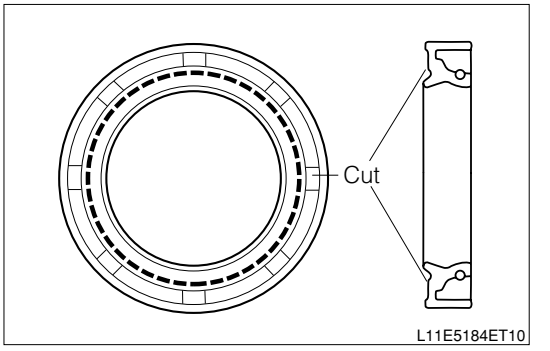
(1) Seal, type T oil

1.Cut the lip section of the seal by a cutter, etc. Then, remove the seal by prying it by a screwdriver, etc.

CAUTION

- Wind the screwdriver with a tape, etc. to prevent the surroundings from being damaged.

2.After removing the seal, ensure that there is no scratch on the chamfering section of the crankshaft Ay. (If there is any scratch, repair it with sand paper #400.)



5-1-5 POINTS OF INSTALLATION

(1) Seal, type T oil

1.Install the seal, following the procedure given below.

(1) Apply engine oil to the lip section of the seal.

LUBRICANT: Engine oil

(2) Drive in the seal vertically, using the SST.

SPECIFIED VALUE: Press-fitting amount

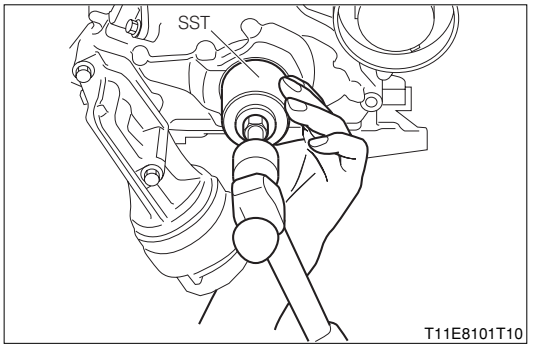
Protruding amount from end surface of chain cover Ay

Within 0.5mm

Press-fitting depth from end surface of chain cover Ay

Within 1mm

SST: 09223-87202-000



5-1-6 OPERATION AFTER INSTALLATION

1.Install the crankshaft pulley Ay.

Refer to Page B2-5.

2.Fill engine oil.

Refer to Page B5-3.

3.Start the engine and ensure that there is no oil leakage from the type T oil seal.

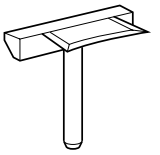
6 OIL PAN

6-1 REMOVAL AND INSTALLATION

WARNING

- Never carry out the operation while the engine and engine oil are still hot, for there are hazard potentials for getting scald.

SST

Shape	Part No.	Part name
	09032-00100-000	Cutter,oil pan seal

Instrument

Torque wrench

Lubricant,adhesive,others

Three Bond1280E,Engine oil

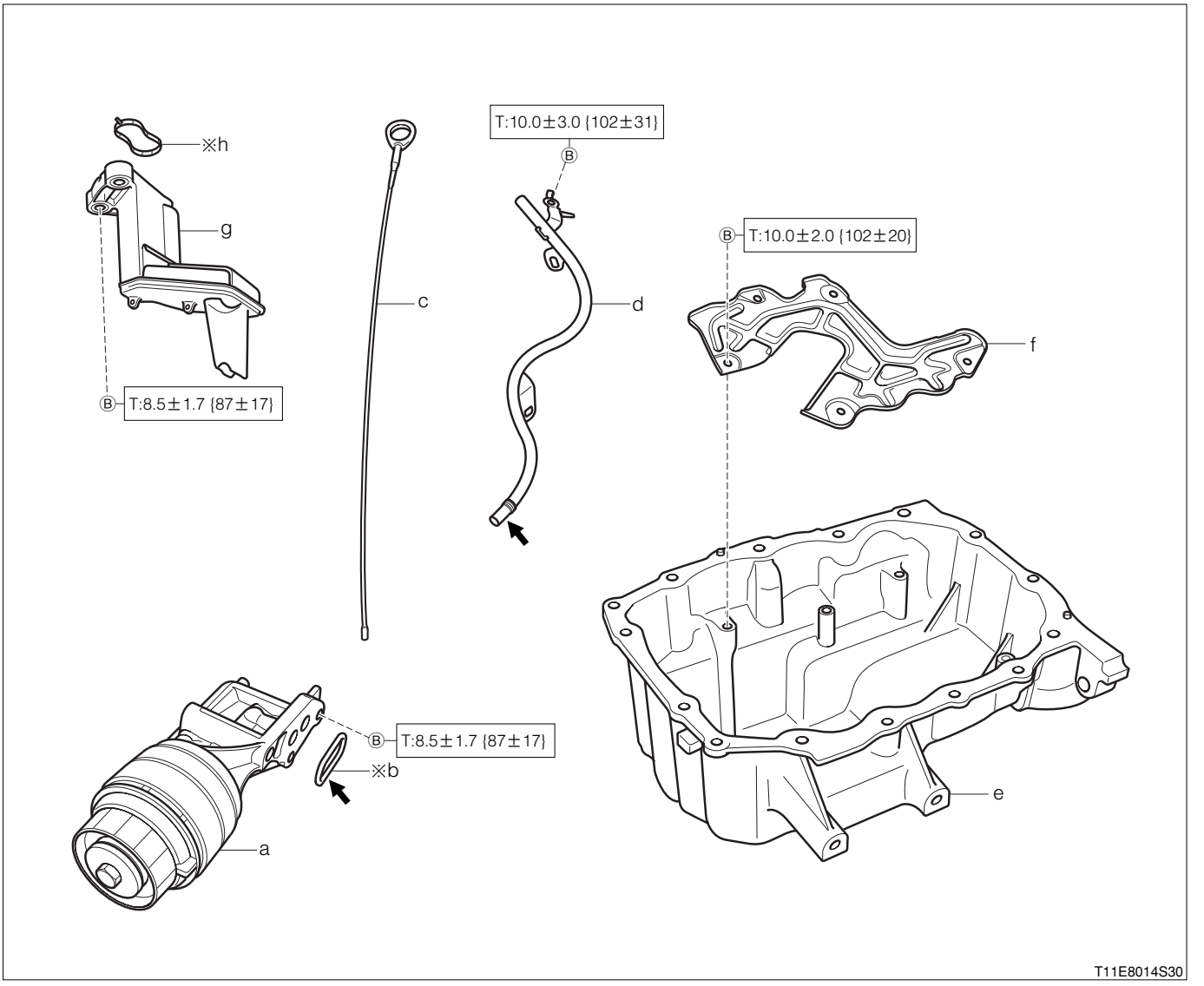
6-1-1 OPERATION BEFORE REMOVAL

1.Drain the engine oil by removing the drain plug and gasket.
Refer to Page B5-3.

2.Remove the front exhaust pipe Ay.
Refer to Page B4-3.

6-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



➡: Engine oil
Unit: N·m{kgf·cm}
※: Non-reusable parts

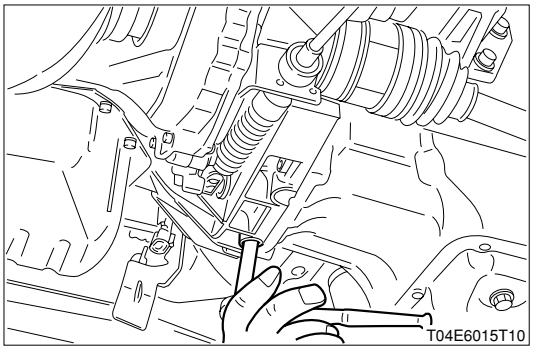
(2) Removal and installation procedures

1 a Oil filter Ay with bracket
2 b Gasket, oil filter
3 c Gauge Ay, oil level
4 d Guide, oil level gage
▼ ▲ 5 e Pan S/A, oil
6 f Plate, oil pan baffle
7 g Strainer S/A, oil
8 h Gasket, oil strainer

6-1-3 POINTS OF REMOVAL

(1) Pan S/A, oil

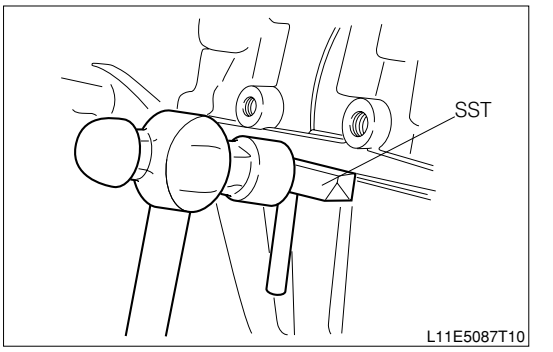
1.Remove the attaching nuts on the back section of the pan S/A from the service hole at the lower side of the transmission.
2.Remove the attaching bolts and nuts of the pan S/A.



3.Remove the oil pan S/A by inserting the SST between the pan S/A and the cylinder block Ay.
SST: 09032-00100-000

CAUTION

- Be very careful not to scratch the joint surface.
- Be very careful not to deform the flange section.



6-1-4 POINTS OF INSTALLATION

(1) Pan S/A, oil

1.Clean the pan installation surface of the cylinder block Ay.
2.Apply liquid gasket to the pan S/A at the bold-line section in the figure.

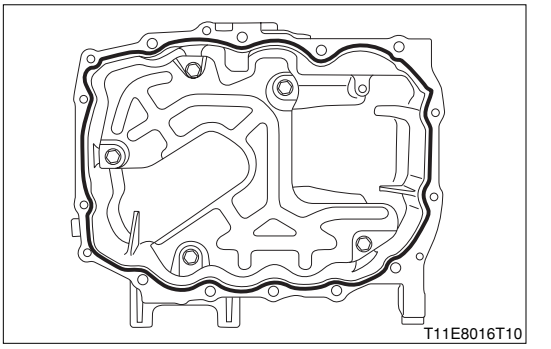
NOTE

- The guide of the diameter of the liquid gasket is 3.5±0.5mm Dia.

ADHESIVE: Three Bond1280E

CAUTION

- Application of the gasket should be started and finished at the seal surface with the block on either the intake side or the exhaust side. Be sure to avoid the seal surface with the chain cover on the front and back of the engine and oil seal retainer.



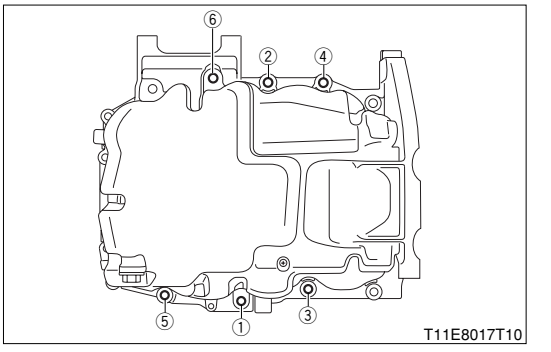
3.Install the pan S/A to the cylinder block Ay in the sequence show in the figure.

NOTE

- As for the tightening of the remaining sections, it may be done in any order.

CAUTION

- Perform the assembling within three minutes of application of the gasket. Moreover, perform the tightening within 15 minutes.



6-1-5 OPERATION AFTER INSTALLATION

1.Install the front exhaust pipe Ay.
Refer to Page B4-3.

2.Replenish engine oil.
Refer to Page B5-3.

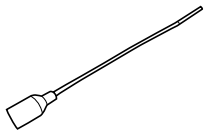
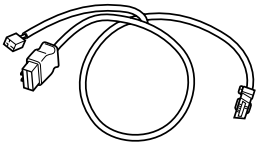
3.Start the engine. Ensure that there is no oil leakage form the joint sections of the oil pan S/A and oil filter Ay with brackets.

■ K3
1 LUBRICATION SYSTEM
1-1 FUNCTION CHECK
WARNING
- Never carry out the operation while the engine and engine oil are still hot, for there are hazard potentials for getting scald.

1-2 ARTICLES TO BE PREPARED
Instrument

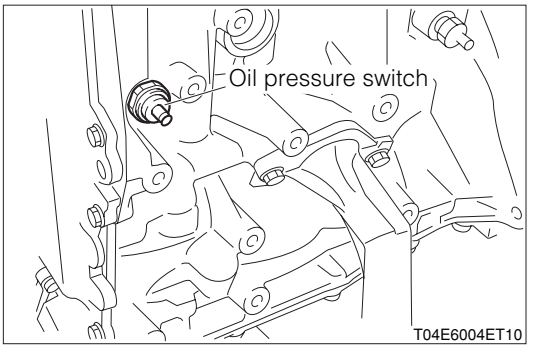
Tachometer,Oil pressure gauge,Torque wrench

SST

Shape	Part No.	Part name
	09991-87402-000	Wire,tacho-pulse pick up
	09991-87404-000 (09991-87401-000)	Wire,engine control system inspection

Lubricant,adhesive,others

Three Bond1104

1-2-1 OIL PRESSURE


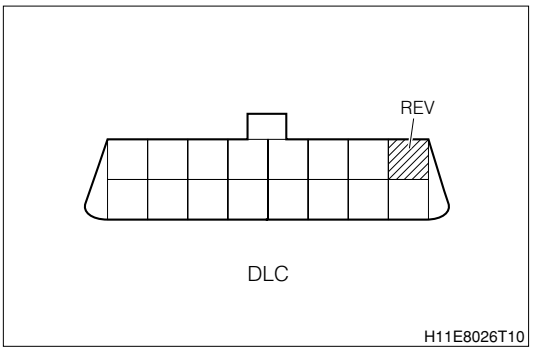
1.Check the engine oil amount.
Refer to Page B1-20.

2.Remove the front bumper cover.
Refer to Page I2-2.

3.Remove the engine oil pressure switch.
(1) Disconnect the connector for the engine oil pressure switch.
(2) Remove the engine oil pressure switch.

4.Install the oil pressure gauge (Thread diameter PT1/8).

5.Install the engine tachometer.
(1) Install an engine tachometer to the terminal REV of the DLC, using the SST.
SST: 09991-87402-000
09991-87404-000
6.Warm up the engine.
7.Measure the engine oil pressure.
8.Start the engine and measure the pressure at each engine speed.
SPECIFIED VALUE: At 750rpm
39kPa or more
{0.4kgf/cm^2 or more}
At 3000rpm
225kPa or more
{2.3kg/cm^2 or more}
9.Remove the oil pressure gauge (Thread diameter PT1/8).
10.Install the engine oil pressure switch.
(1) Clean the threaded portion of the oil pressure switch and the switch section of the cylinder block.
(2) Apply sealing material to the threaded portion of the oil pressure switch.
ADHESIVE: Three Bond1104
(3) Install the oil pressure switch.
TIGHTENING TORQUE: 15±4.5N·m
{153±46kgf·cm}
(4) Connect the connector for the engine oil pressure switch.
11.Remove the engine tachometer.
12.Install the front bumper cover.
Refer to Page I2-2.



13.Start the engine and check the engine oil pressure switch attaching section for oil leakage.

2 ENGINE OIL

2-1 REPLACEMENT

WARNING

- Never carry out the operation while the engine and engine oil are still hot, for there are hazard potentials for getting scald.

2-1-1 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

Engine oil 5W−20(API Grade SG or higher),Engine oil 5W−30(API Grade SG or higher)

2-1-2 REPLACING PROCEDURE

1.Remove the oil filler cap.
2.Drain the engine oil by removing the drain plug of the oil pan.
3.Install the drain plug with a new gasket interposed.
TIGHTENING TORQUE: 29.5±5.9N·m{301±60kgf·cm}

4.Fill engine oil.

NOTE

- About 3.6 ℓ. (With oil filter)

LUBRICANT: Engine oil 5W–20(API Grade SG or higher)
Engine oil 5W–30(API Grade SG or higher)

5.Install the oil filler cap.
6.Ensure that there is no oil leakage by operating the engine for three minutes or more.
7.Check the oil level.
Refer to Page B1-20.

3 OIL FILTER

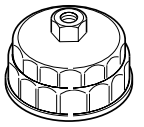
3-1 REPLACEMENT

WARNING

- Never carry out the operation while the engine and engine oil are still hot, for there are hazard potentials for getting scald.

3-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09228-87201-000	Wrench oil filter

Lubricant,adhesive,others

Engine oil 5W−30(API Grade SG or higher),Vinyl hose

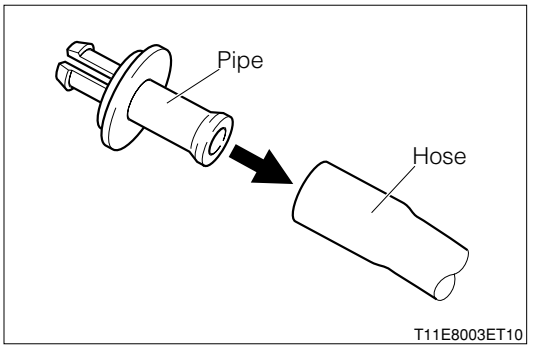
3-1-2 REPLACEMENT PROCEDURE

1.Remove the oil filter element.

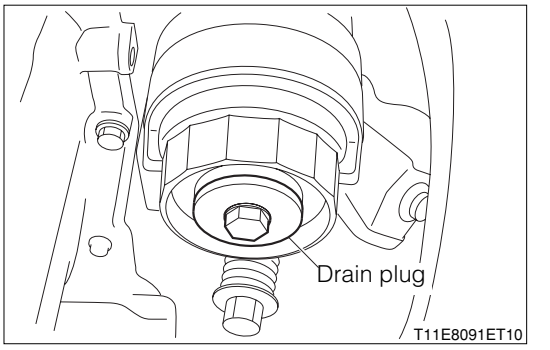
(1) Connect the hose to the supplied drain pipes.

NOTE

- Use a 15mm Dia. hose.



(2) Remove the oil filter drain plug.



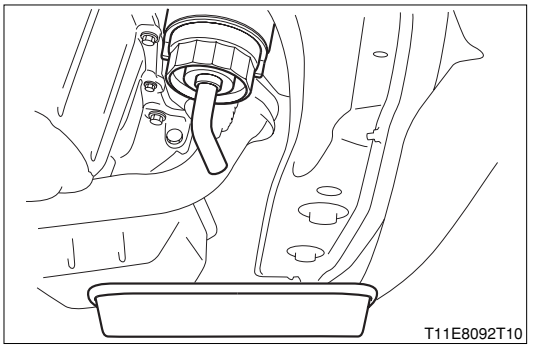
(3) Insert the pipes with the hose attached.

CAUTION

- Insert the hose under a condition that the O-ring (For drain plugs) is attached to the oil filter cap side.

NOTE

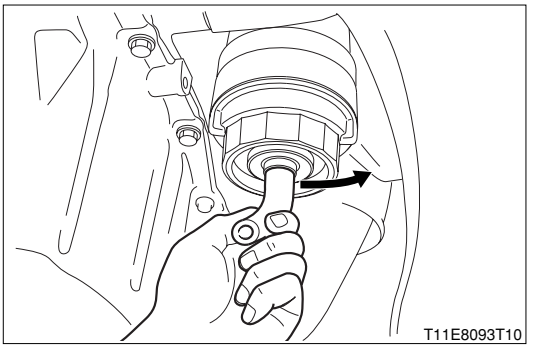
- Since the oil will be drained through the hose, put the hose end to a tray in advance.



(4) Ensure that the oil has been drained. Then, remove the pipe and O-ring (For drain plugs).

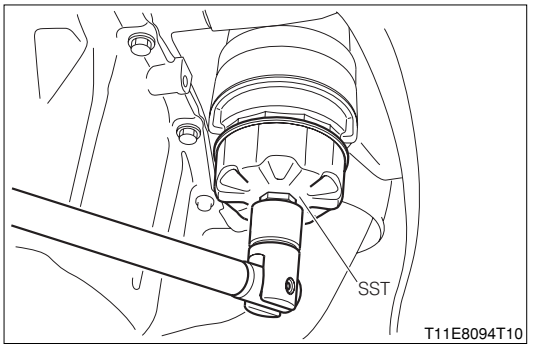
CAUTION

- During the removal, be sure to bend the pipe to the side.



(5) Remove the oil filter cap, using the SST.

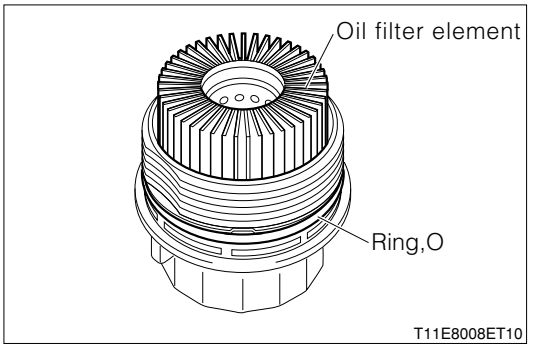
SST: 09228-87201-000



(6) Remove the oil filter element and O-ring (For caps) from the oil filter cap.

CAUTION

- To avoid scratching the O-ring groove, remove the O-ring (for caps) by hand without using any tools.



2.Install the oil filter element.

(1) Clean the inside section, threaded portion and O-ring groove section of the oil filter cap, using brake cleaner.

(2) Apply a small amount of engine oil to a new O-ring (For caps) and install the oil filter cap.

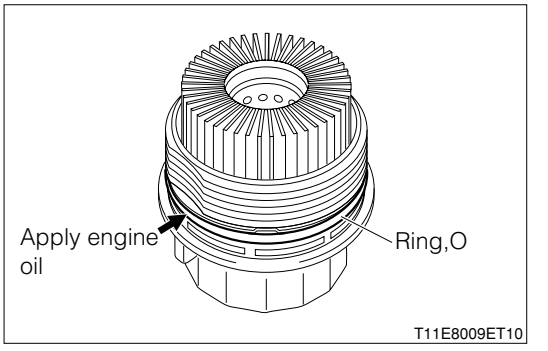
(3) Set a new oil filter element to the oil filter cap.

(4) Remove any smear or foreign matters from the installation surface and inside section on the engine side.

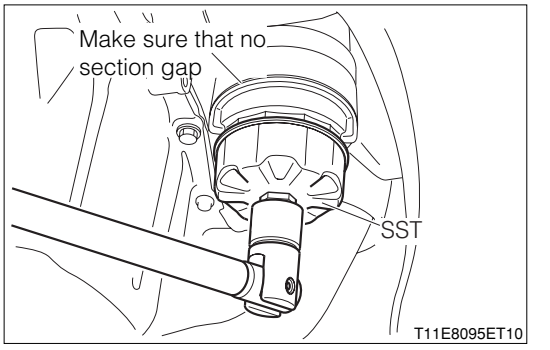
(5) Again, apply a small amount of engine oil to the O-ring (For caps) and install the oil filter cap.

CAUTION

- Care must be exercised so that the O-ring (For caps) may not be caught-in.

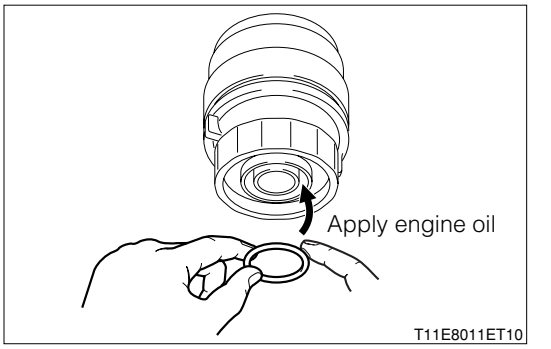


(6) Tighten the oil filter cap, using the SST.
SST: 09228-87201-000
TIGHTENING TORQUE: 25.0±5.0N·m
{255±51kgf·cm}



CAUTION
- After tightening the oil filter cap, ensure that there is no gap.

(7) Apply a small amount of engine oil to a new O-ring (For drain plugs) and install it to the oil filter cap.
LUBRICANT: Engine oil



CAUTION
- Install the oil filter cap, being very careful not to damage the O-ring.

(8) Remove the smear and foreign matters from the installation surface.
(9) Install the oil filter drain plug to the oil filter cap.
TIGHTENING TORQUE: 12.5±2.5N·m
{128±26kgf·cm}

CAUTION
- Care must be exercised so that the O-ring (For caps) may not be caught-in.

3.Replenish engine oil.
Refer to Page B5-14.

4.Perform the oil leakage check.
(1) Start the engine and ensure that there is no oil leakage from the joint section of the oil filter cap and oil filter drain plug.

4 OIL PUMP

4-1 REMOVAL AND INSTALLATION

WARNING

- Never carry out the operation while the engine and engine oil are still hot, for there are hazard potentials for getting scald.

4-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

Engine oil

4-1-2 OPERATION BEFORE REMOVAL

1.Drain the engine oil.
Refer to Page B5-14.

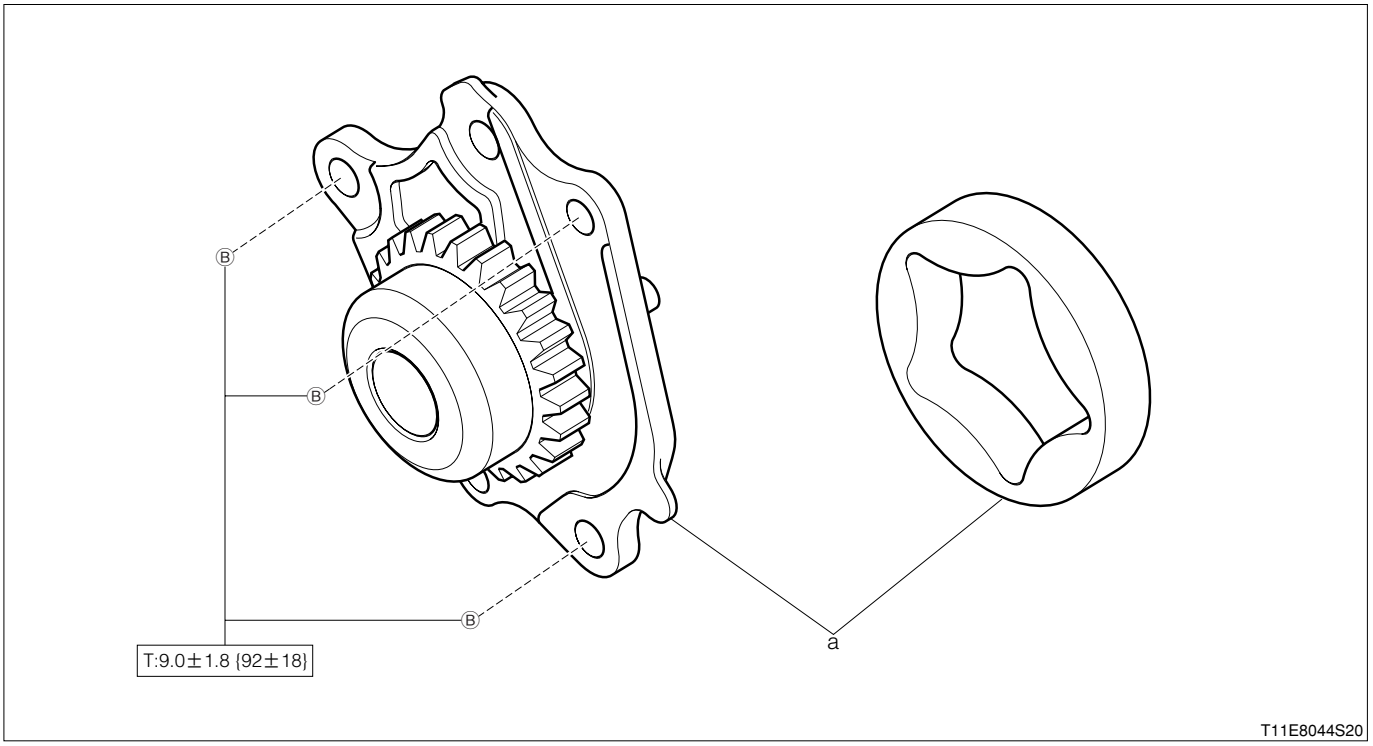
2.Remove the engine Ay.
Refer to Page B2-21.

3.Remove the water pump pulley.
Refer to Page B6-11.

4.Remove the timing chan S/A.
Refer to Page B2-35.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

▼ ▲ 1 a Pump Ay, oil

4-1-4 POINTS OF REMOVAL

(1) Pump Ay, oil

1.Remove the pump Ay.

CAUTION

- Since the outer rotor (Oil pump driven rotor) is not fixed to the oil pump Ay, be careful not to drop it during the removal and installation operations.

4-1-5 POINTS OF INSTALLATION

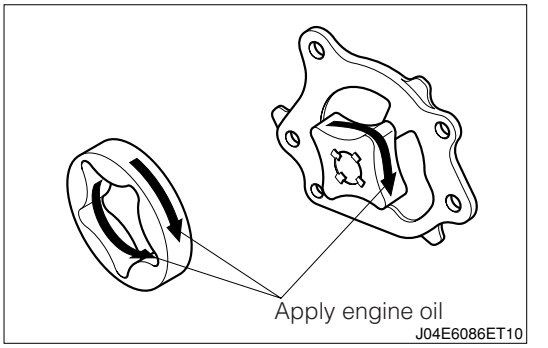
(1) Pump Ay, oil

1.Apply engine oil to the sections shown in the figure before the assembling operations.

2.After completion of the assembling, turn the sprocket more than one turn so that the oil may be bedded-in. Also, ensure that it rotates smoothly.

3.Ensure that no foreign matter is caught-in. Then, install the pump Ay.

LUBRICANT: Engine oil



4-1-6 OPERATION AFTER INSTALLATION

1.install the timing chan S/A.

Refer to Page B2-35.

2.Install the water pump pulley.

Refer to Page B6-11.

3.Install the engine Ay.

Refer to Page B2-21.

4.Fill engine oil.

Refer to Page B5-14.

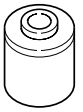
5.Start the engine. Ensure that there is no oil leakage from the joint section of the type T oil seal and the timing chain cover assembly.

5 CRANKSHAFT FRONT OIL SEAL

5-1 REMOVAL AND INSTALLATION

5-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09223-87202-000	Replacer,crankshaft front oil seal

Instrument

Torque wrench

Lubricant,adhesive,others

Engine oil 5W−30(API Grade SG or higher)

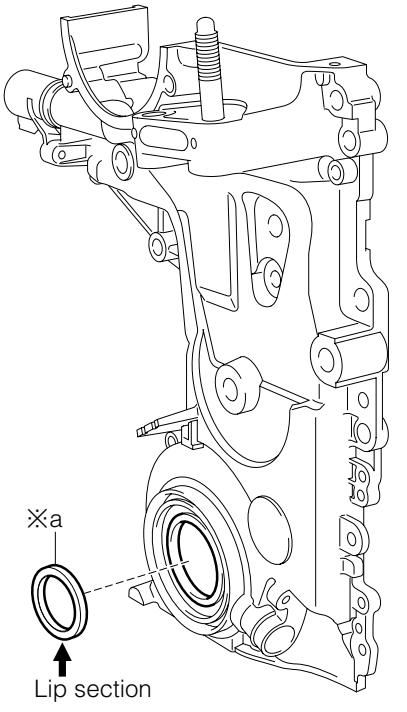
5-1-2 OPERATION BEFORE REMOVAL

1.Drain the engine oil.
Refer to Page B5-14.

2.Remove the crankshaft pulley Ay.
Refer to Page B2-36.

5-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



T11E8018ES20

➡: Engine oil
※: Non-reusable parts

(2) Removal and installation procedures

▼ ▲ 1 a Seal, type T oil

5-1-4 POINTS OF REMOVAL

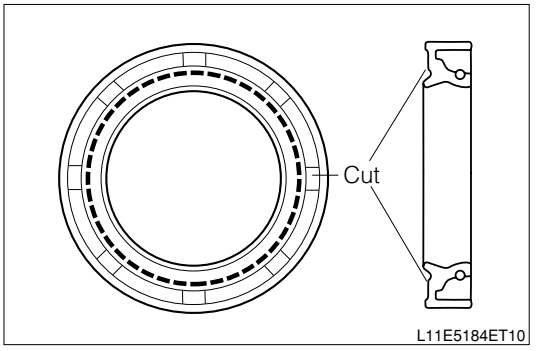
(1) Seal, type T oil

1.Cut the lip section of the seal by a cutter, etc. Then, remove the seal by prying it by a screwdriver, etc.

CAUTION

- Wind the screwdriver with a tape, etc. to prevent the surroundings from being damaged.

2.After removing the seal, ensure that there is no scratch on the chamfering section of the crankshaft Ay. (If there is any scratch, repair it with sand paper #400.)



5-1-5 POINTS OF INSTALLATION

(1) Seal, type T oil

1.Install the seal, following the procedure given below.

(1) Apply engine oil to the lip section of the seal.

LUBRICANT: Engine oil

(2) Press-fit the seal vertically, using the SST and bolts.

SPECIFIED VALUE: Press-fitting amount

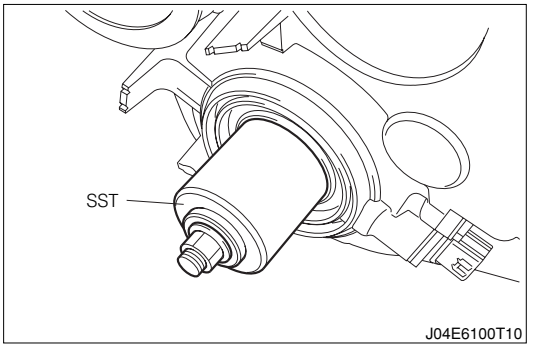
Protruding amount from end surface of timing chain cover Ay

Within 0.5mm

Press-fitting depth from end surface of timing chain cover Ay

Within 1mm

SST: 09223-87202-000



5-1-6 OPERATION AFTER INSTALLATION

1.Install the crankshaft pulley Ay.

Refer to Page B2-36.

2.Fill engine oil.

Refer to Page B5-14.

3.Start the engine and ensure that there is no oil leakage from the type T oil seal.

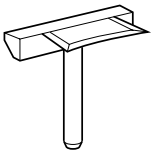
6 OIL PAN

6-1 REMOVAL AND INSTALLATION

WARNING

- Never carry out the operation while the engine and engine oil are still hot, for there are hazard potentials for getting scald.

SST

Shape	Part No.	Part name
	09032-00100-000	Cutter,oil pan seal

Instrument

Torque wrench

Lubricant,adhesive,others

Three Bond1280E,Engine oil

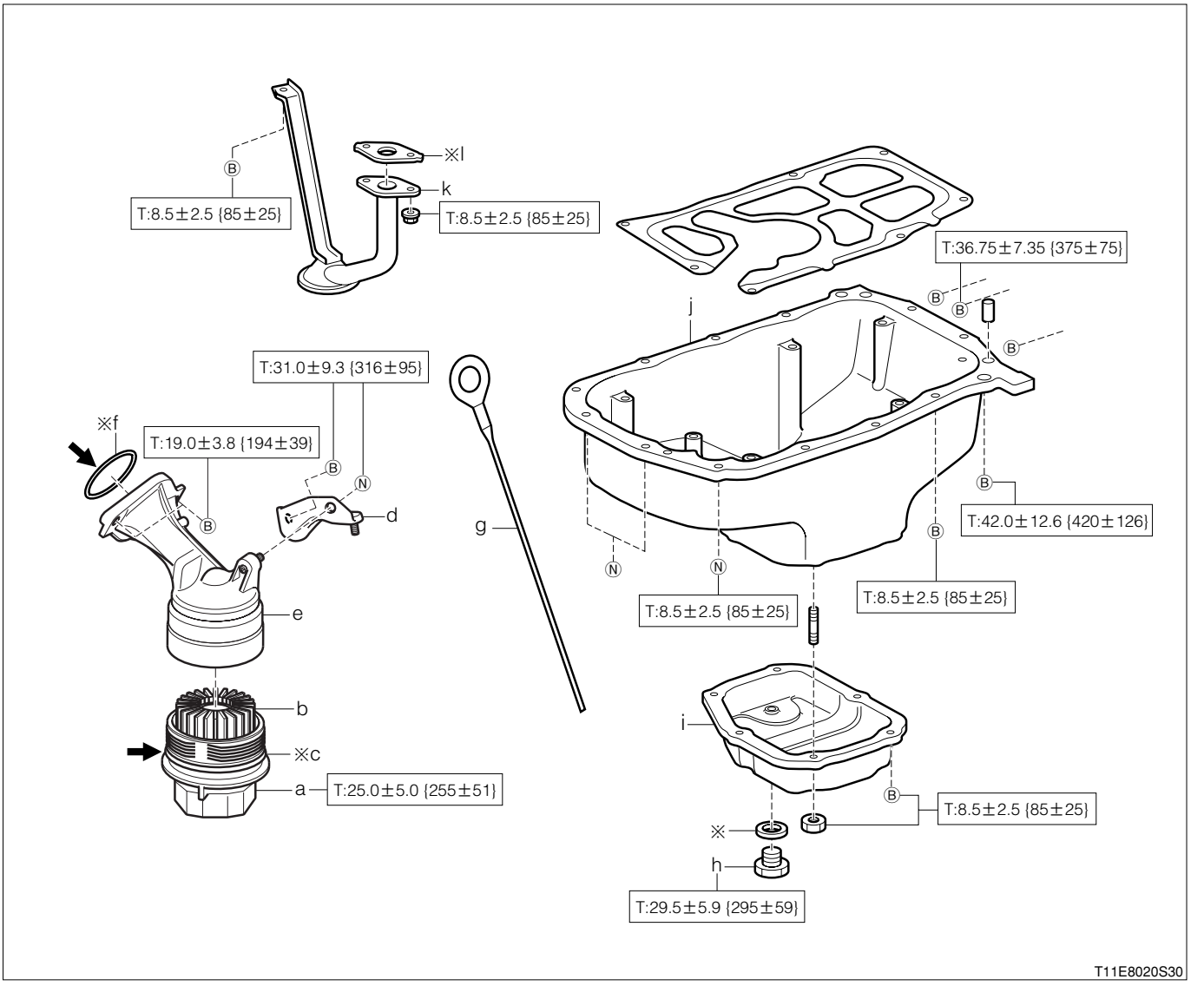
6-1-1 OPERATION BEFORE REMOVAL

1.Drain the engine oil.
Refer to Page B5-14.

2.Remove the front exhaust pipe Ay.
Refer to Page B4-6.

6-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



➡: Engine
Unit: N·m{kgf·cm}
※Non-reusable parts

(2) Removal and installation procedures

▲ 1 a Bracket, oil filter No.1
2 b Element, S/A oil filter
3 c Gasket, oil filter cap
4 d Bracket, oil filter No.1
5 b Oil filter Ay with bracket
6 e Gasket, oil filter case
7 f Gasket, oil filter case bracket
8 g Gauge Ay, oil level
9 h Plug, oil drain
▼ ▲ 10 i Pan S/A, oil No.2
▼ ▲ 11 j Pan S/A, oil
12 k Strainer S/A, oil
13 l Gasket, oil strainer

6-1-3 POINTS OF REMOVAL

(1) Pan S/A, oil No.2

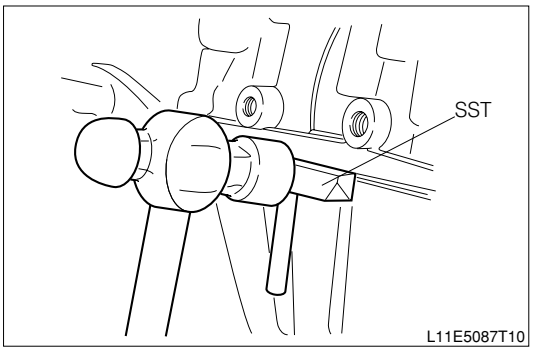
1.Remove the attaching bolts and nuts of the oil pan S/A No.2.

2.Remove the oil pan S/A No.2 by inserting the SST between the oil pan S/A No.2 and the oil pan S/A.

SST: 09032-00100-000

CAUTION

- Be very careful not to scratch the joint surface.
- Be very careful not to deform the flange section.



(2) Pan S/A, oil

1.Remove the attaching nuts on the back section of the oil pan S/A from the service hole at the lower side of the transmission.

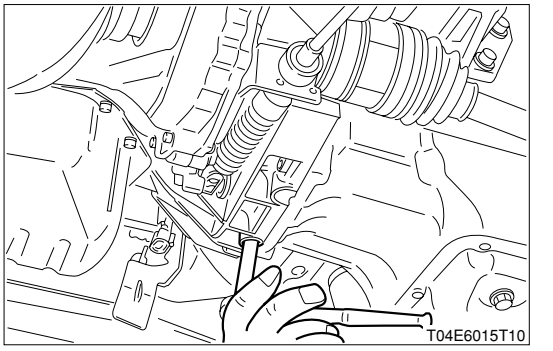
2.Remove the attaching bolts and nuts of the oil pan S/A.

3.Remove the oil pan S/A by inserting the SST between the oil pan S/A and the cylinder block Ay.

SST: 09032-00100-000

CAUTION

- Be very careful not to scratch the joint surface.
- Be very careful not to deform the flange section.



6-1-4 POINTS OF INSTALLATION

(1) Pan S/A, oil

CAUTION

- If any difficulty is encountered in flattening due to significant deformation, replace with a new one.

1.Clean the oil pan S/A installation surface of the cylinder block Ay.

2.Apply liquid gasket to the oil pan S/A at the bold-line section in the figure. Then, assemble it to the cylinder block Ay.

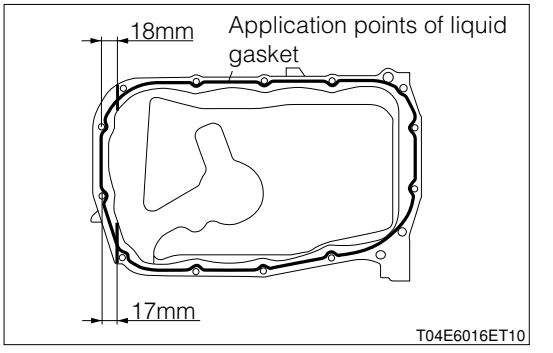
NOTE

- The guide of the diameter of the liquid gasket is 3.5±0.5mm Dia.

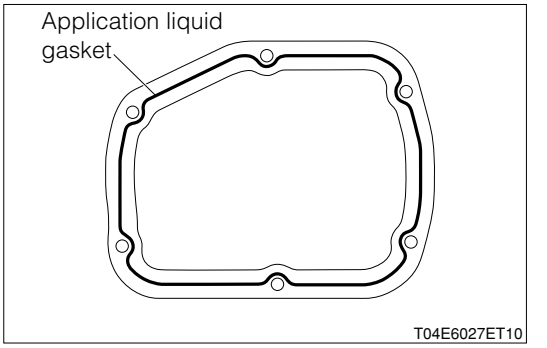
ADHESIVE: Three Bond1280E

CAUTION

- Application of the gasket should be started and finished at the seal surface with the block on either the intake side or the exhaust side. Be sure to avoid the seal surface with the chain cover on the front and back of the engine and oil seal retainer.
- Perform the assembling within three minutes of application of the gasket. Moreover, perform the tightening within 15 minutes.



(2) Pan S/A, oil No.2



1.Install the Oil pan S/A No.2.

CAUTION

- If the flange section has been deformed, flatten it by tapping it lightly with a hammer.
- If any difficulty is encountered in flattening due to significant deformation, replace with a new one.

(1) Clean the gasket adhered to the installation surface on the oil pan side and oil pan No.2 side with a scraper, etc. Ensure that there is no oil and the like adhered to it.

(2) Apply liquid gasket without any missing portion, as shown in the right figure. Then, perform the assembling.

NOTE

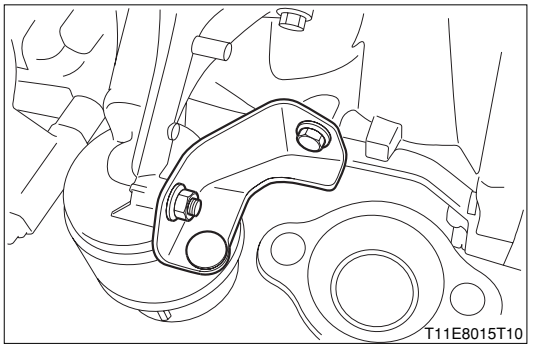
- The guide of the diameter of the gasket is 3.5±0.5mm Dia.

ADHESIVE: Three Bond1208E

CAUTION

- Perform the assembling within three minutes of application of the gasket. Moreover, perform the tightening within 15 minutes.

(3) Bracket, oil filter No.1



1.Temporarily tighten the nuts shown in the figure until the bracket becomes flush with the oil filter Ay with brackets.

2.While pressing the brackets against the cylinder block Ay, tighten the bolts shown in the figure.

3.Fully tighten the nuts that have been temporarily tightened.

6-1-5 OPERATION AFTER INSTALLATION

1.Install the front exhaust pipe Ay.
Refer to Page B4-6.

2.Fill engine oil.
Refer to Page B5-14.

3.Start the engine. Ensure that there is no oil leakage from the joint sections of the oil pan S/A and oil filter Ay with brackets.

TO INDEX

B6 COOLING SYSTEM

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REMOVAL AND INSTALLATION ------ B6 - 11
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REMOVAL AND INSTALLATION ------ B6 - 13

■ 1KR
1 THERMOSTAT
1-1 REMOVAL AND INSTALLATION

WARNING

- Do not remove the radiator cap or drain plug when the coolant is hot.

1-1-1 ARTICLES TO BE PREPARED

Instrument

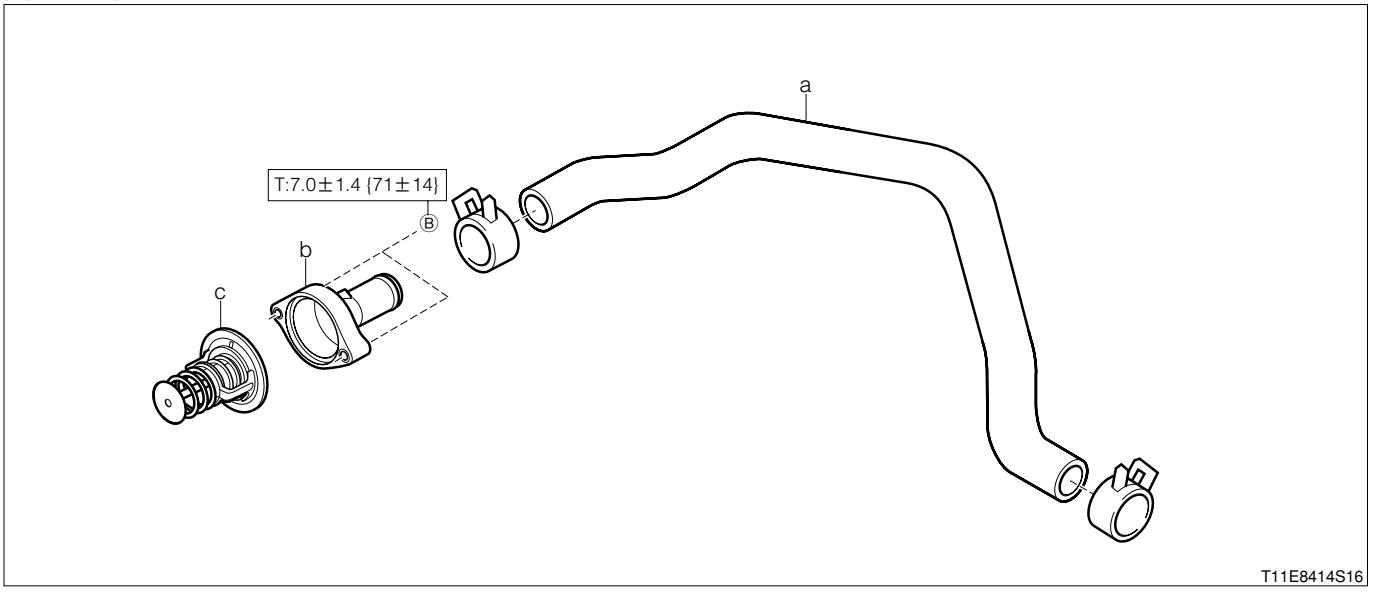
Torque wrench

1-1-2 OPERATION BEFORE REMOVAL

1.Drain the coolant.

1-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

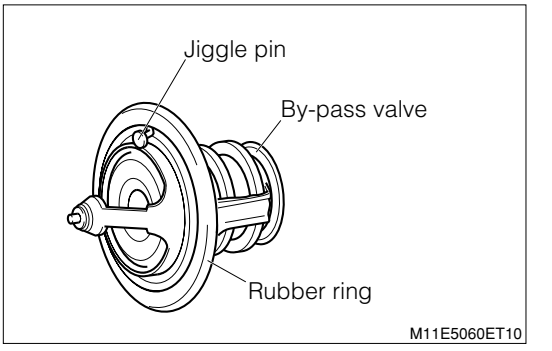
(2) Removal and installation procedures

1 a Hose,radiator No.2
▲ 2 b Inlet, water
▲ 3 c Thermostat

1-1-4 INSPECTION

(1) Visual inspection

1.With the valve closed completely at a room temperature (20°C), ensure that the spring has a play.
2.Check the rubber ring for damage.
3.Check if the bypass valve and jiggle pin move smoothly.



(2) Open valve temperature check

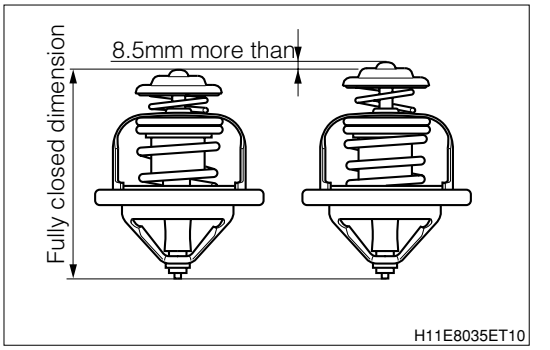
1.Measure the fully-closed dimensions before heating.

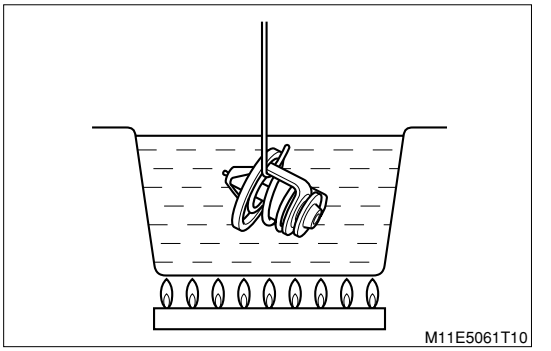
2.Put the thermostat in water and raise the water temperature gradually. Measure the temperature at the point when the valve starts to open.

SPECIFIED VALUE: 82±2.0°C

3.Further raise the temperature and pull out the thermostat at 95°C or above. Quickly measure the lift amount of the bypass valve.

SPECIFIED VALUE: 8.5mm or more





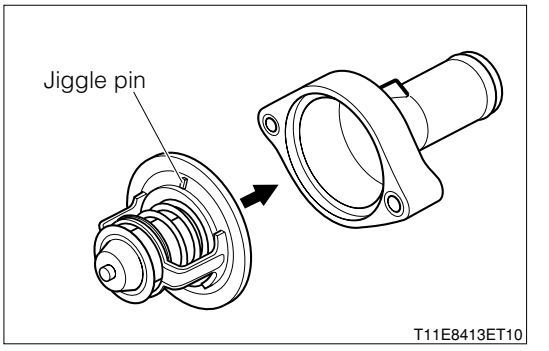
1-1-5 POINTS OF INSTALLATION

(1) Thermostat, water inlet

1.Assemble the thermostat to the water inlet as shown in the right figure.

CAUTION

- Assemble the water inlet to the cylinder head so that the jiggle pin of the thermostat will come to the upper side.



1-1-6 OPERATION AFTER INSTALLATION

1.Fill coolant and perform the water leakage check.

Refer to Page B1-2.

2 WATER PUMP

2-1 REMOVAL AND INSTALLATION

Instrument

Torque wrench

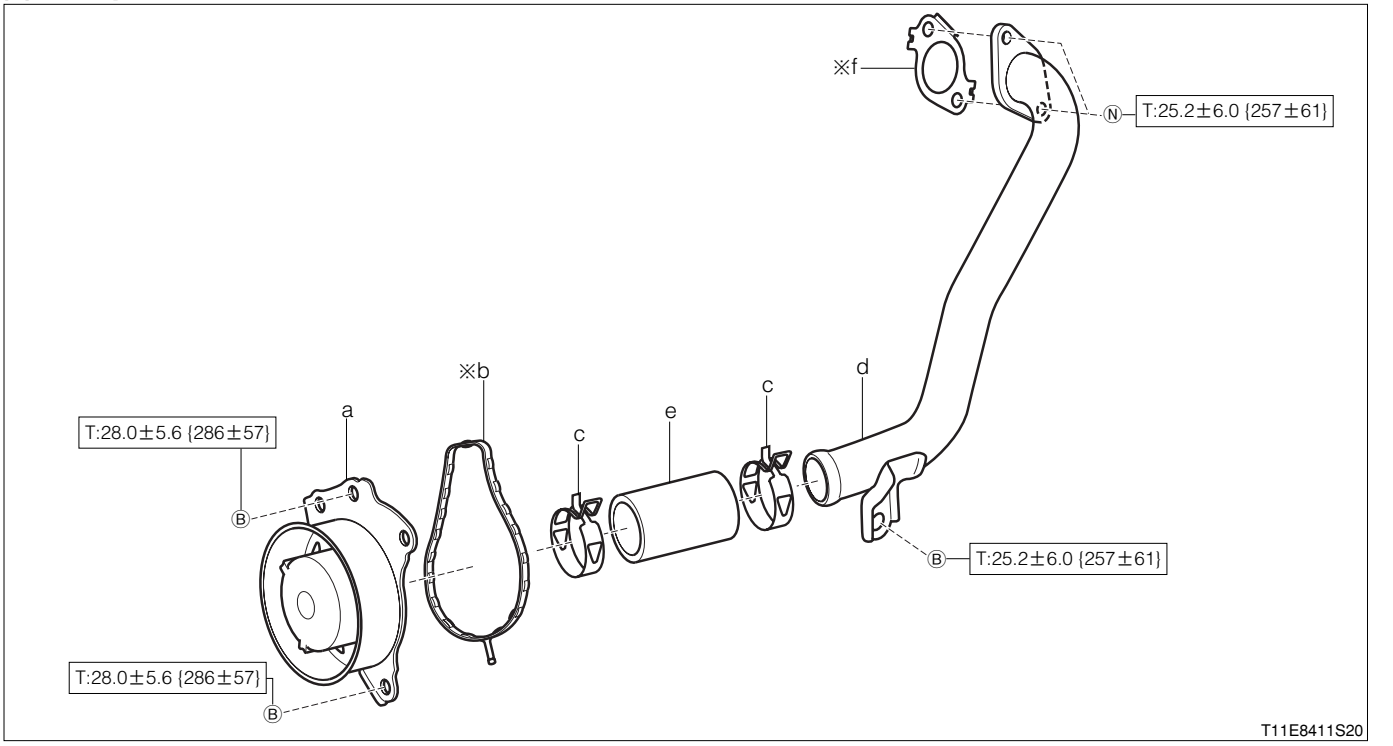
2-1-1 OPERATION BEFORE REMOVAL

1.Remove the disc wheel. (Front)
2.Remove the engine under cover.
3.Drain the coolant.
4.Remove the exhaust manifold converter S/A. (Only when removing and installing the water bypass pipe)
Refer to Page B4-1.

5.Remove the V-ribbed belt

2-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) Removal and installation procedures

▲ 1 a Pump Ay, water
2 b Gasket, water pump
3 c Clip
▲ 4 d Pipe, water by-pass
5 e Hose, water by-pass
▲ 6 f Gasket

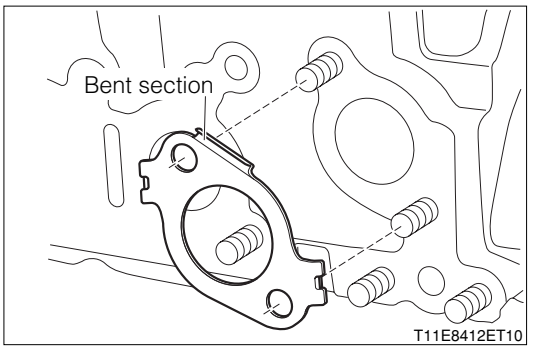
2-1-3 INSPECTION

1.Check if the pulley rotates smoothly by turning it with hand.
2.Check the blades of the pump Ay for deformation and wear.

2-1-4 POINTS OF INSTALLATION

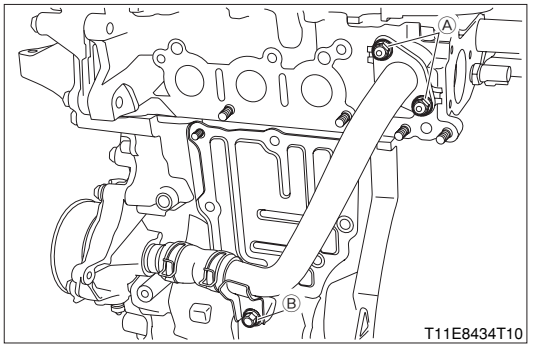
(1) Gasket

1.Install the gasket as shown in the right figure.



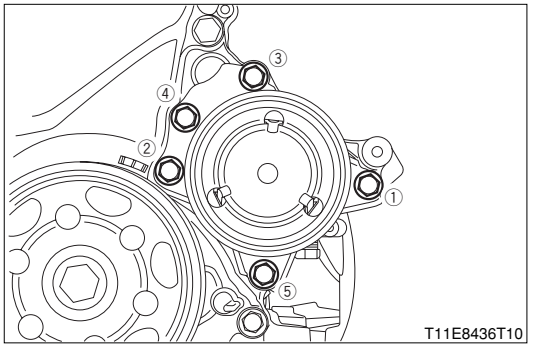
(2) Pipe, water by-pass

1.Temporarily tighten the bolt Ⓑ to set the stay to the block.
2.After tightening the nut Ⓐ, connect the pipe by tightening the bolt Ⓑ.



(3) Pump Ay, water

1.Clean the installation section of the pump Ay. Then, install the water pump gasket.
2.Install the pump Ay by tightening the bolts in the sequence shown in the right figure.



2-1-5 OPERATION AFTER INSTALLATION

1.Install the V-ribbed belt and adjust the belt tension.
Refer to Page B1-5.

2.Install the exhaust manifold converter S/A. (Only when removing or installing the water bypass pipe)
Refer to Page B4-1.

3.Install the engine under cover.
4.Install the disc wheel. (Front)
5.Fill coolant and perform the water leakage check.
Refer to Page B1-2.

3 RADIATOR

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

3-1-2 OPERATION BEFORE REMOVAL

WARNING

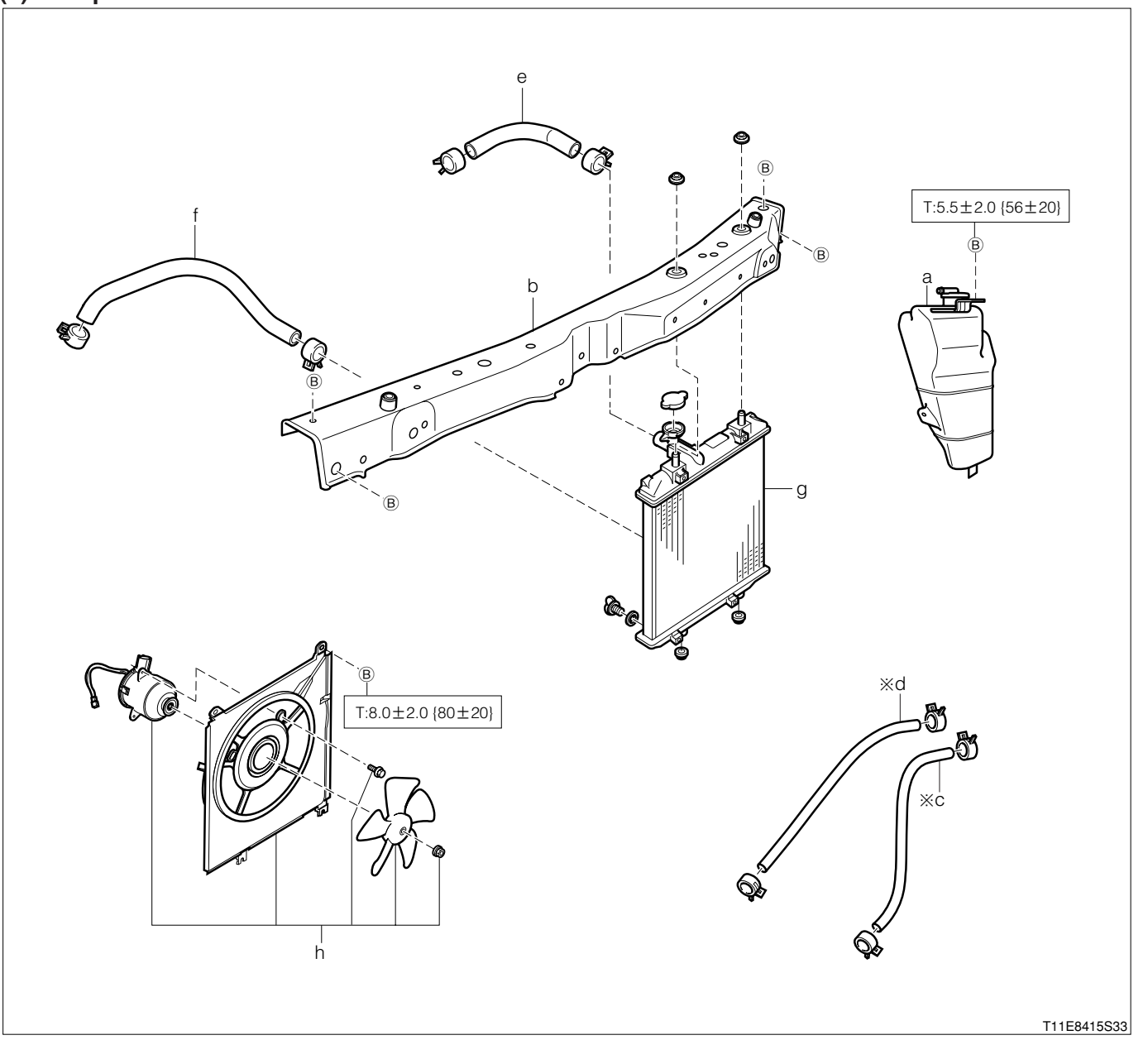
- Do not remove the radiator cap or drain plug when the coolant is hot.

1. Drain the coolant.
2. Drain the transaxle oil.
3. Disconnect the negative (-) terminal of the battery.
4. Remove the front bumper cover.

Refer to Page I2-2.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Tank Ay, radiator reserve
2 b Radiator support upper
▲ 3 c Hose, oil cooler inlet(A/T)
▲ 4 d Hose, oil cooler outlet(A/T)
▲ 5 e Hose, radiator No.1
▲ 6 f Hose,radiator No.2
▼ ▲ 7 g Radiator Ay
▲ 8 h Fan Ay, w/motor

3-1-4 POINTS OF REMOVAL

(1) Radiator Ay

1.Disconnect the connector for the fan Ay with motor.
2.Remove the radiator Ay together with the fan Ay with motor

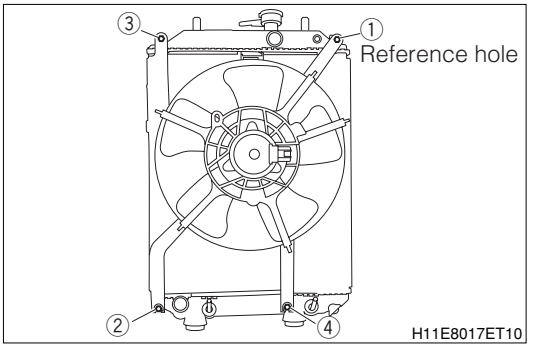
CAUTION

- Be careful not to scratch or damage the fin when removing the radiator Ay.

3-1-5 POINTS OF INSTALLATION

(1) Fan Ay, w/motor

1.Install the fan Ay to the radiator Ay.
2.Temporarily tighten the bolt to the reference hole 1.
3.Tighten the bolts ②→③→④→① to the specified torque.

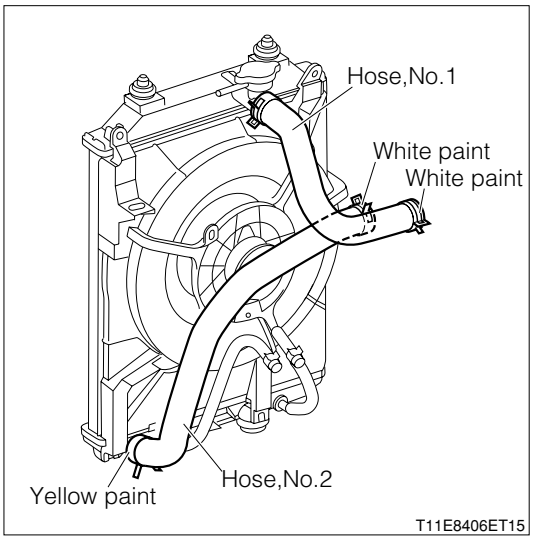


(2) Radiator hose No.1, radiator hose No.2 (Radiator side)

1.Connect the hose No.1 at the radiator side to the radiator Ay.
At this time, perform the installation in a such way that the tab of the clamp would face left of the vehicle.
2.Connect the hose No.2 at the radiator side to the radiator Ay so that its identification paint would face downward of the vehicle.
At this time, perform the installation in a such way that the tab of the clamp would face downward of the vehicle.

Identification mark

Hose,No.1(Radiator side)	Not provided
Hose,No.2(Radiator side)	Yellow



(3) Radiator Ay

1.Install the radiator Ay to the vehicle.

CAUTION

- Be very careful not to allow the vehicle harness to come in contact with the core (Including the tank staked section). (Water leakage will be caused by electro-corrosion.)
- Be careful not to scratch or damage the fin when removing the radiator Ay.

(4) Radiator hose No.1, radiator hose No.2 (Engine side)

1.Connect the hose No.1 at the engine side so that its identification paint would face upward of the vehicle.
At this time, perform the installation in a such way that the tab of the clamp would face upward of the vehicle.
2.Connect the hose No.2 at the engine side so that its identification paint would face upward of the vehicle.
At this time, perform the installation in such a way that the tab of the clamp would not interfere with the EGR valve and heater hose.

Identification mark

Hose,No.1(Engine side)	White
Hose,No.2(Engine side)	White

(5) Hose, oil cooler inlet and Hose, oil cooler outlet

Refer to Page F3-21.

3-1-6 OPERATION AFTER INSTALLATION

1.Install the front bumper cover.
Refer to Page I2-2.

2.Connect the negative (-) terminal of the battery.
3.Fill coolant and perform the water leakage check.
Refer to Page B1-2.

4.Replenish transaxle oil. After the engine has warmed up, check the fluid level.

■ K3
1 THERMOSTAT
1-1 REMOVAL AND INSTALLATION

WARNING

- Do not remove the radiator cap or drain plug when the coolant is hot.

1-1-1 ARTICLES TO BE PREPARED

Instrument

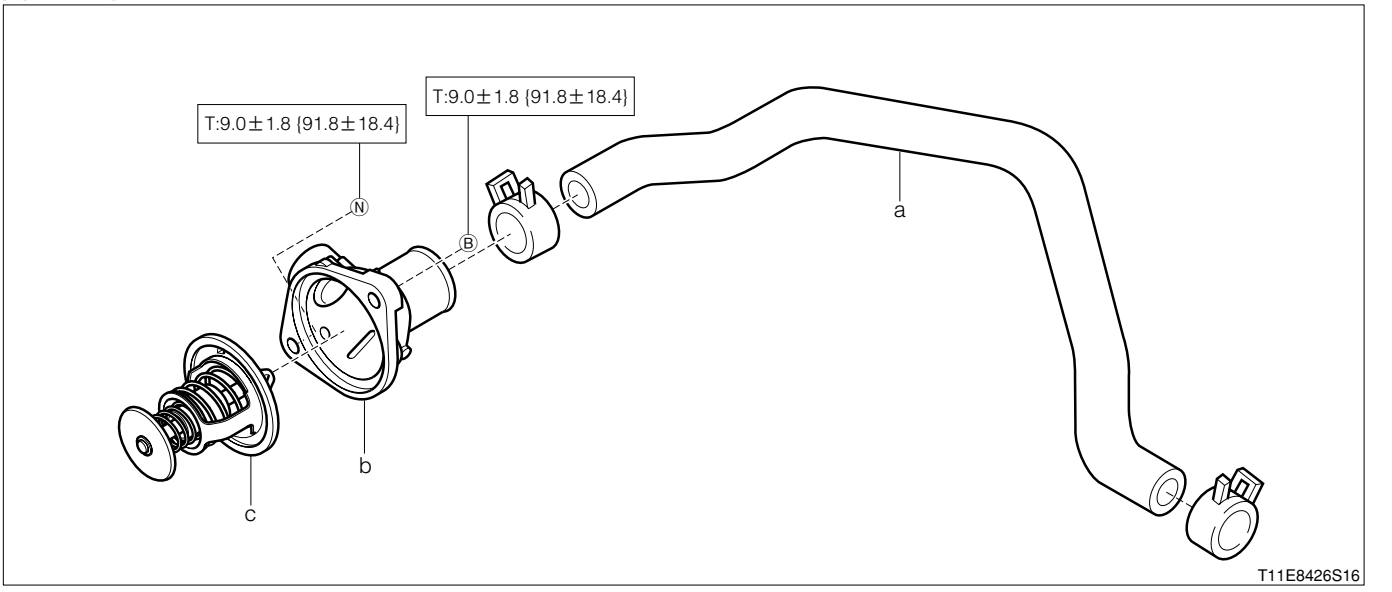
Torque wrench

1-1-2 OPERATION BEFORE REMOVAL

1.Drain the coolant.

1-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

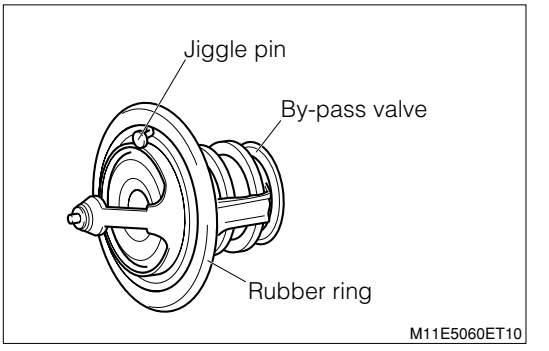
(2) Removal and installation procedures

1 a Hose,radiator No.2
▲ 2 b Inlet, water
▲ 3 c Thermostat

1-1-4 INSPECTION

(1) Visual inspection

1.With the valve closed completely at a room temperature (20°C), ensure that the spring has a play.
2.Check the rubber ring for damage.
3.Check if the bypass valve and jiggle pin move smoothly.



(2) Open valve temperature check

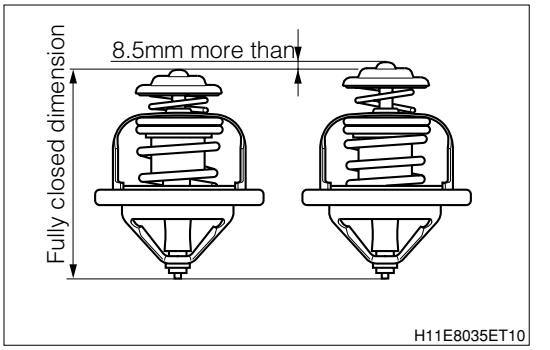
1.Measure the fully-closed dimensions before heating.

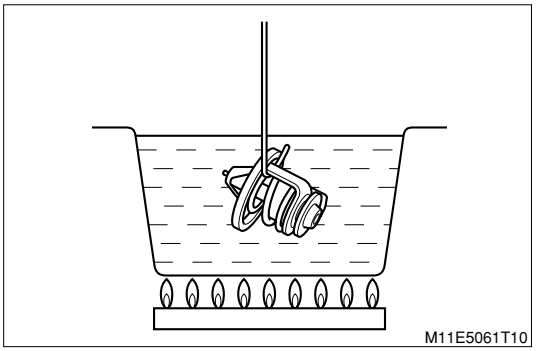
2.Put the thermostat in water and raise the water temperature gradually. Measure the temperature at the point when the valve starts to open.

SPECIFIED VALUE: 80±2°C

3.Further raise the temperature and pull out the thermostat at 93°C or above. Quickly measure the lift amount of the bypass valve.

SPECIFIED VALUE: 8.5mm or more





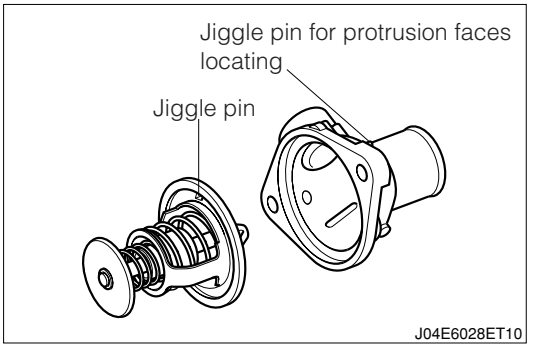
1-1-5 POINTS OF INSTALLATION

(1) Thermostat, water inlet

1.Assemble the thermostat to the water inlet as shown in the right figure.

CAUTION

- Assemble the water inlet to the cylinder head so that the jiggle pin of the thermostat will come to the upper side.



1-1-6 OPERATION AFTER INSTALLATION

1.Fill coolant and perform the water leakage check.

Refer to Page B1-18.

2 WATER PUMP

2-1 REMOVAL AND INSTALLATION

Instrument

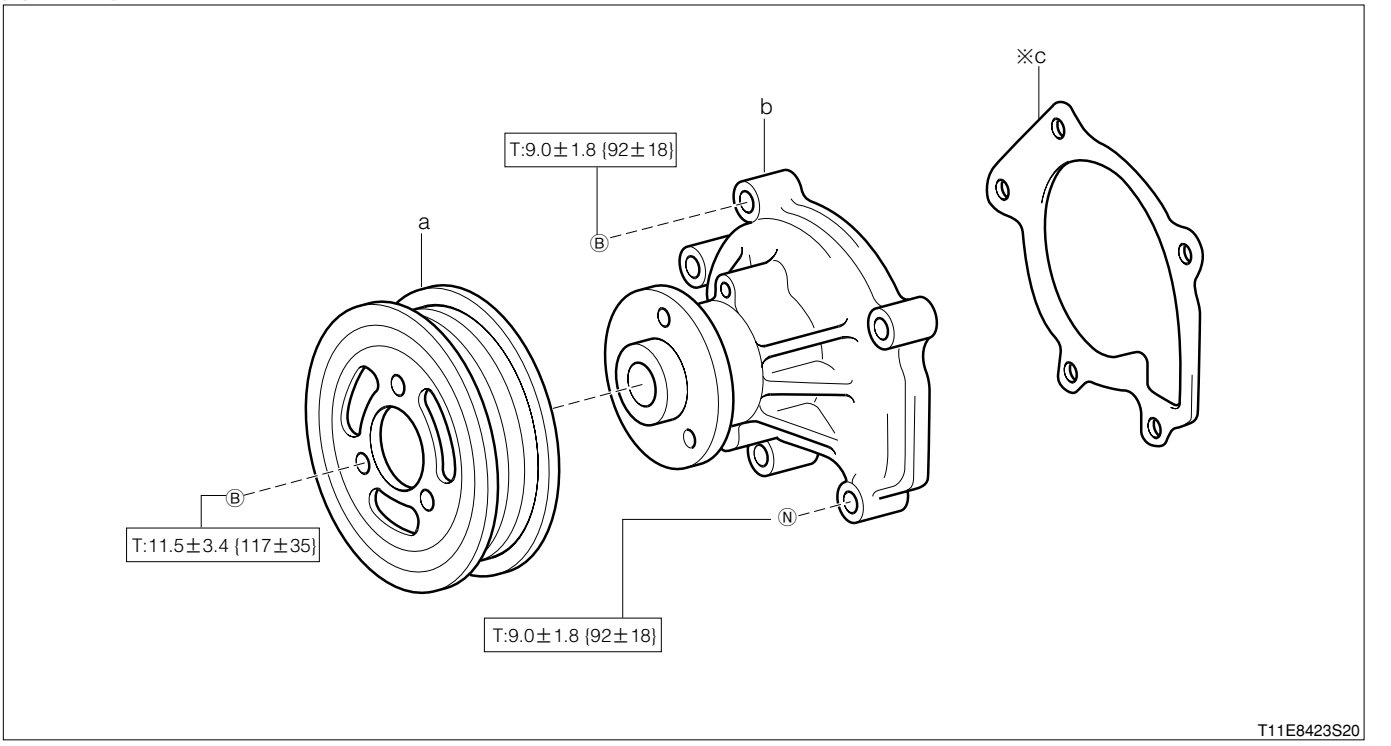
Torque wrench

2-1-1 OPERATION BEFORE REMOVAL

1.Remove the disc wheel. (Front)
2.Remove the engine under cover.
3.Drain the coolant.
4.Remove the V-ribbed belt

2-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) Removal and installation procedures

▼ ▲ 1 a Pulley, water pump
▲ 2 b Pump Ay, water
3 c Gasket, water pump

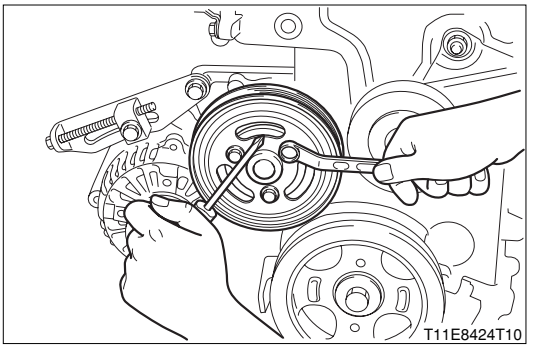
2-1-3 INSPECTION

1.Check if the rotor rotates smoothly by turning it with hand.
2.Check the blades of the pump Ay for deformation and wear.

2-1-4 POINTS OF REMOVAL

(1) Pulley, water pump

1.While preventing rotation, with a screwdriver or the like, as shown in the right figure, remove the pulley.



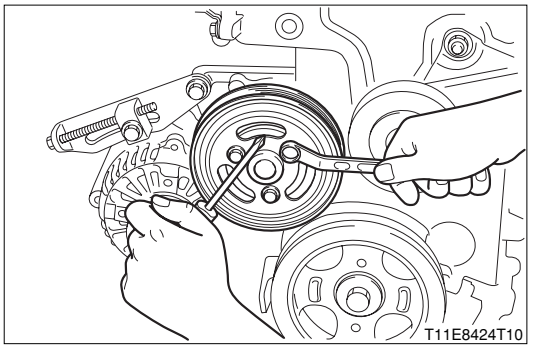
2-1-5 POINTS OF INSTALLATION

(1) Pump Ay, water

1.Clean the installation section of the pump Ay.
2.Install the pump Ay with a water pump gasket interposed.

(2) Pulley, water pump

1.While preventing rotation, with a screwdriver or the like, as shown in the right figure, install the pulley.



2-1-6 OPERATION AFTER INSTALLATION

1.Install the V-ribbed belt and adjust the tension.
Refer to Page B1-21.

2.Install the engine under cover.
3.Install the disc wheel. (Front)
4.Fill coolant and perform the water leakage check.
Refer to Page B1-18.

3 RADIATOR

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

3-1-2 OPERATION BEFORE REMOVAL

WARNING

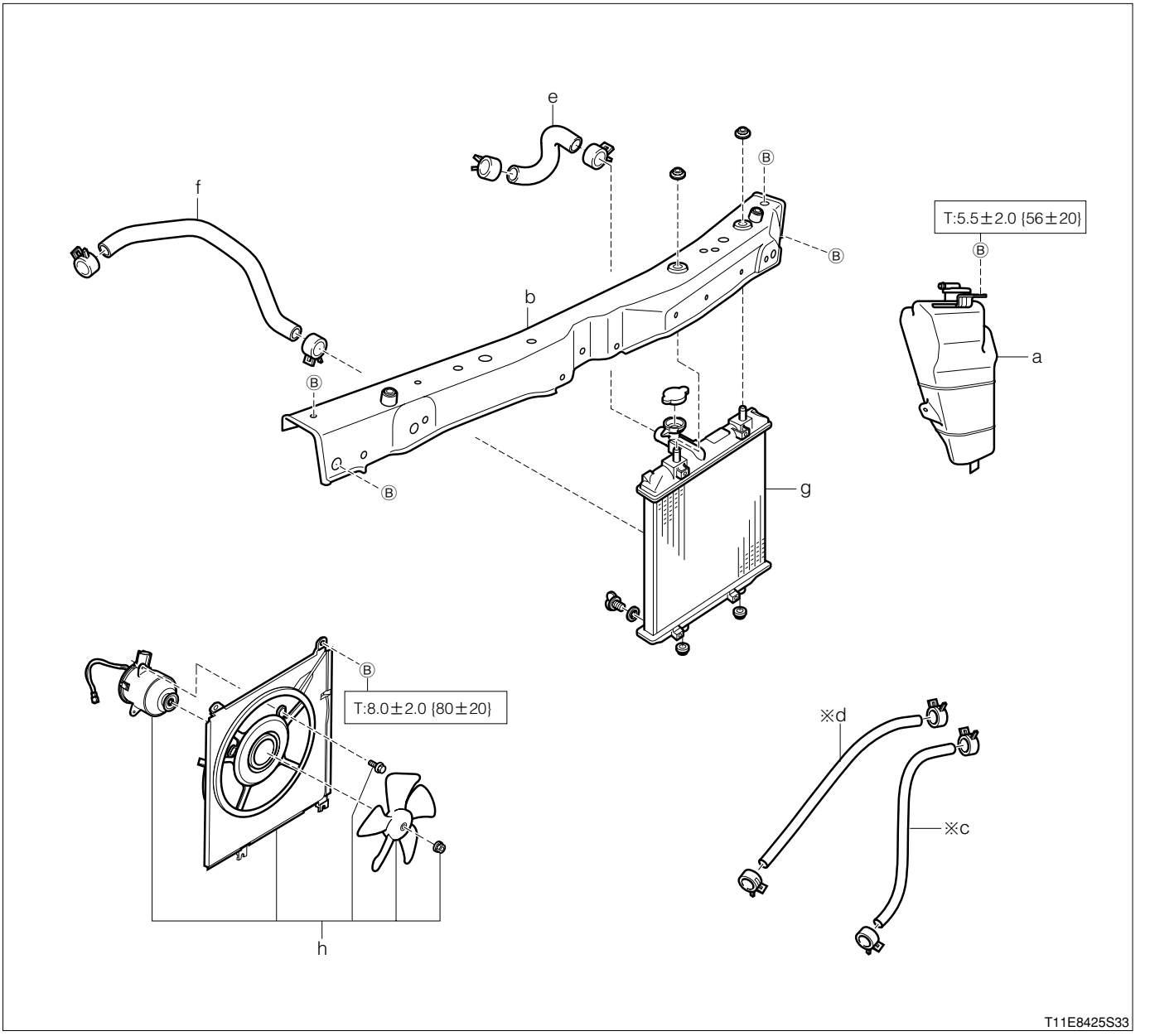
- Do not remove the radiator cap or drain plug when the coolant is hot.

1. Drain the coolant.
2. Drain the transaxle oil.
3. Disconnect the negative (-) terminal of the battery.
4. Remove the front bumper cover.

Refer to Page I2-2.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Tank Ay, radiator reserve
2 b Radiator support upper
▲ 3 c Hose, oil cooler inlet(A/T)
▲ 4 d Hose, oil cooler outlet(A/T)
▲ 5 e Hose, radiator No.1
▲ 6 f Hose,radiator No.2
▼ ▲ 7 g Radiator Ay
▲ 8 h Fan Ay, w/motor

3-1-4 POINTS OF REMOVAL

(1) Radiator Ay

1.Remove the connector for the fan Ay with motor.
2.Remove the radiator Ay together with the fan Ay with motor

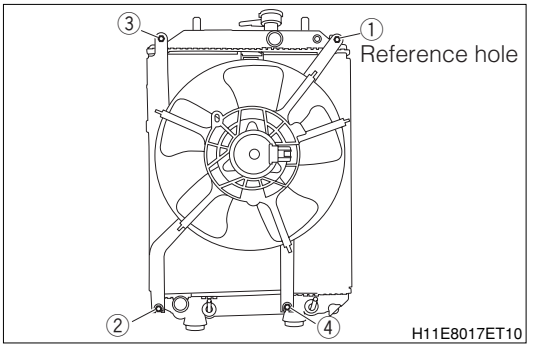
CAUTION

- Be careful not to scratch or damage the fin when removing the radiator Ay.

3-1-5 POINTS OF INSTALLATION

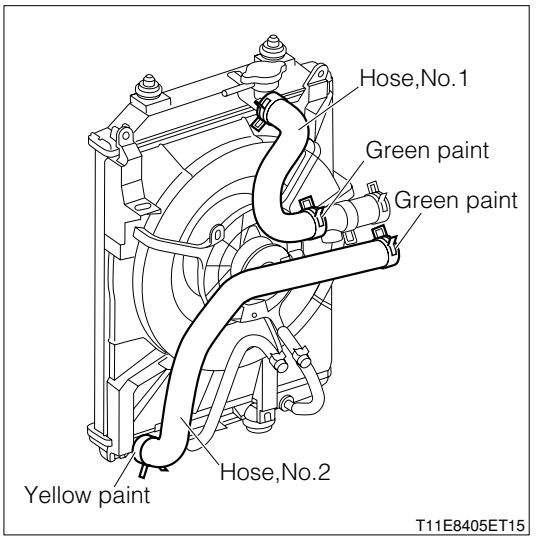
(1) Fan Ay, w/motor

1.Install the fan Ay to the radiator Ay.
2.Temporarily tighten the bolt to the reference hole 1.
3.Tighten the bolts ②→③→④→① to the specified torque.



(2) Radiator hose No.1, radiator hose No.2 (Radiator side)

1.Connect the hose No.1 at the radiator side to the radiator Ay.
At this time, perform the installation in a such way that the tab of the clamp would face left of the vehicle.
2.Connect the hose No.2 at the radiator side to the radiator Ay so that its identification paint would face downward of the vehicle.
At this time, perform the installation in a such way that the tab of the clamp would face downward of the vehicle.



Identification mark

Hose,No.1(Radiator side)	Not provided
Hose,No.2(Radiator side)	Yellow

(3) Radiator Ay

1.Install the radiator Ay to the vehicle.

CAUTION

- Be very careful not to allow the vehicle harness to come in contact with the core (Including the tank staked section). (Water leakage will be caused by electro-corrosion.)
- Be careful not to scratch or damage the fin when removing the radiator Ay.

(4) Radiator hose No.1, radiator hose No.2 (Engine side)

1.Connect the hose No.1 at the engine side so that its identification paint would face upward of the vehicle.
At this time, perform the installation in a such way that the tab of the clamp would face upward of the vehicle.
2.Connect the hose No.2 at the engine side so that its identification paint would face upward of the vehicle.
At this time, perform the installation in a such way that the tab of the clamp would face upward of the vehicle.

Identification mark

Hose,No.1(Engine side)	Green
Hose,No.2(Engine side)	Green

(5) Hose, oil cooler inlet and hose, oil cooler outlet

Refer to Page F3-21.

3-1-6 OPERATION AFTER INSTALLATION

1.Install the front bumper cover.
Refer to Page I2-2.

2.Connect the negative (-) terminal of the battery.
3.Fill coolant and perform the water leakage check.
Refer to Page B1-18.

4.Replenish transaxle oil. After the engine has warmed up, check the fluid level.

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■ 1KR
1 FUEL SYSTEM
1-1 INSTRUCTIONS FOR SERVICE OPERATION

WARNING

- Never allow a fire to be brought near the jobsite during the operation.
- Be sure to take a precautionary measure to prevent fuel from being splashed.

1-1-1 FUEL PRESSURE REMOVAL OPERATION

1. When you perform operations for the fuel system, remove the fuel pressure, following the procedure given below.
   (1) Turn OFF the IG switch.
   (2) Remove the fuel pump relay.
   (3) Start the engine. Keep on running the engine, until the engine stops naturally.
   (4) Turn OFF the IG switch. Install the fuel pump relay.

CAUTION

- Care must be exercised, for there is a residual pressure in the fuel line.

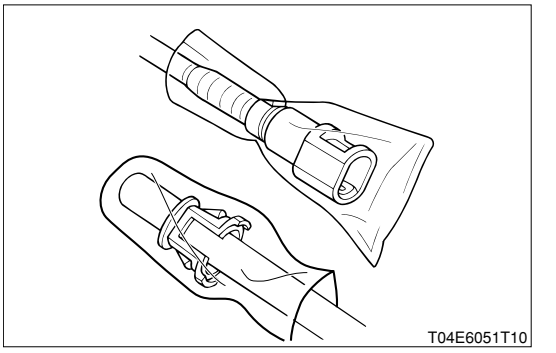
2 FUEL SUCTION TUBE

2-1 REMOVAL AND INSTALLATION

WARNING

- Never allow a fire to be brought near the jobsite during the operation.
- Be sure to take a precautionary measure to prevent fuel from being splashed.

2-1-1 POINTS OF REMOVAL


T04E6051T10

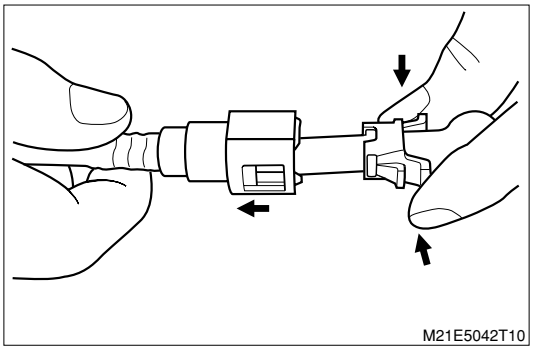
CAUTION

- When mud etc. gets to the tube, clean it prior to the removal.
- Make sure to perform the operation by hand without using any tools so that no scratch may be made to the tube etc.
- If there is a seizure between the connector and the tube, push and pull back with the retainer held by hand. Pull out the tube from the connector after they can move freely.
- Cover the disconnected tubes and connectors with a plastic bag etc. so that they may not be scratched or no foreign matter be admitted.

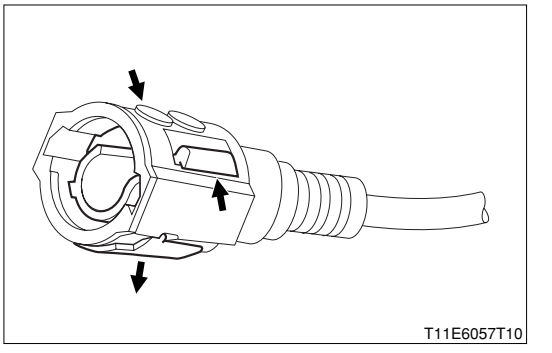
1.As for the fuel pump side, hold both ends of the retainer. Pull out the connector with the lock in an unlocked state.

CAUTION

- When the retainer is removed from the tube, be sure to replace it by a new retainer, for the retainer is a non-reusable part.


M21E5042T10

2.As for the body tube side, release the lock and pull out the connector by pressing down the retainer, while pushing the protruding section of the retainer.


T11E6057T10

2-1-2 POINTS OF INSTALLATION

1.With the connector aligned with the axis of the mate fuel pipe, push in the retainer until a clicking sound ′ occurs.

If the connection is very stiff, apply a small quantity of new engine oil to the tip-end of the pipe.

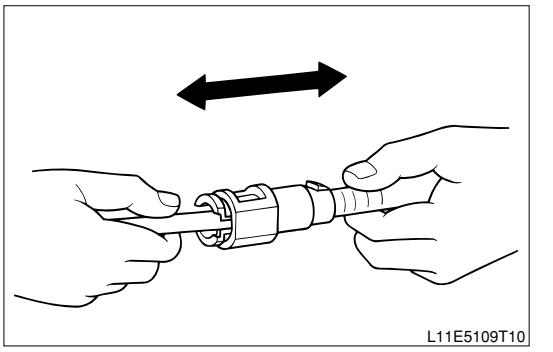
CAUTION

- Make sure that no scratch or foreign article gets to the pipe connecting section.

Retainer color

Fuel pump side	White
Body tube side	Orange

2.After completion of the assembly, pull the connector and the mate fuel pipe so as to ensure that they are connected securely.



2-1-3 OPERATION AFTER INSTALLATION

1.With the fuel pressure applied, check the fuel system for leakage.

2-2 REPLACEMENT

2-2-1 REPLACEMENT PROCEDURE

1.Remove the connector and the mate fuel pipe, following the aforesaid procedure. As for the fuel pump side, remove the retainer from the pump.

2.With the connecter aligned with the axis of the corresponding fuel pipe, push in the connector securely, until you hear a sound of the retainer.

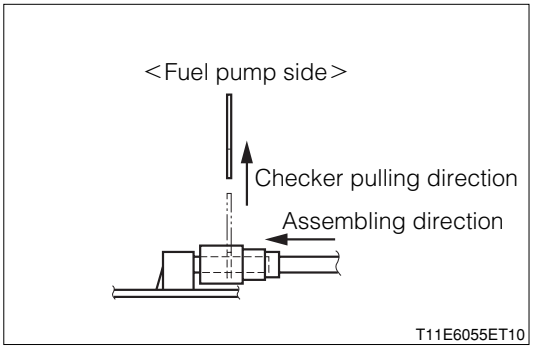
3.Pull out the checker in the vertical direction in relation to the assembled direction.

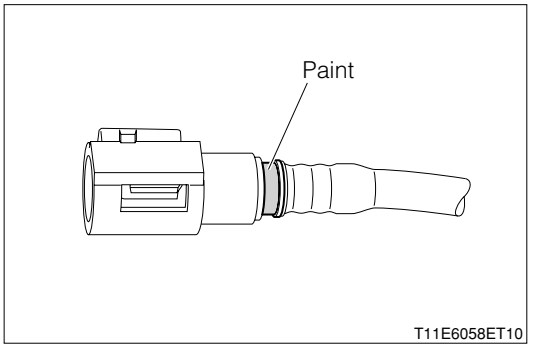
Checker color

Fuel pump side	Red

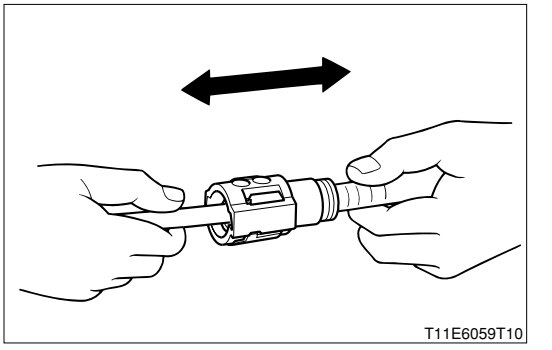
Tube identification paint

2WD vehicle	Not provided





4.After completion of the assembly, pull the connector and the mate fuel pipe so as to ensure that they are connected securely.



2-2-2 OPERATION AFTER REPLACEMENT

1.With the fuel pressure applied, check the fuel system for leakage.

3 FUEL TANK

3-1 REMOVAL AND INSTALLATION

WARNING

- Never allow a fire to be brought near the jobsite during the operation.
- Be sure to take a precautionary measure to prevent fuel from being splashed.

3-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

3-1-2 OPERATION BEFORE REMOVAL

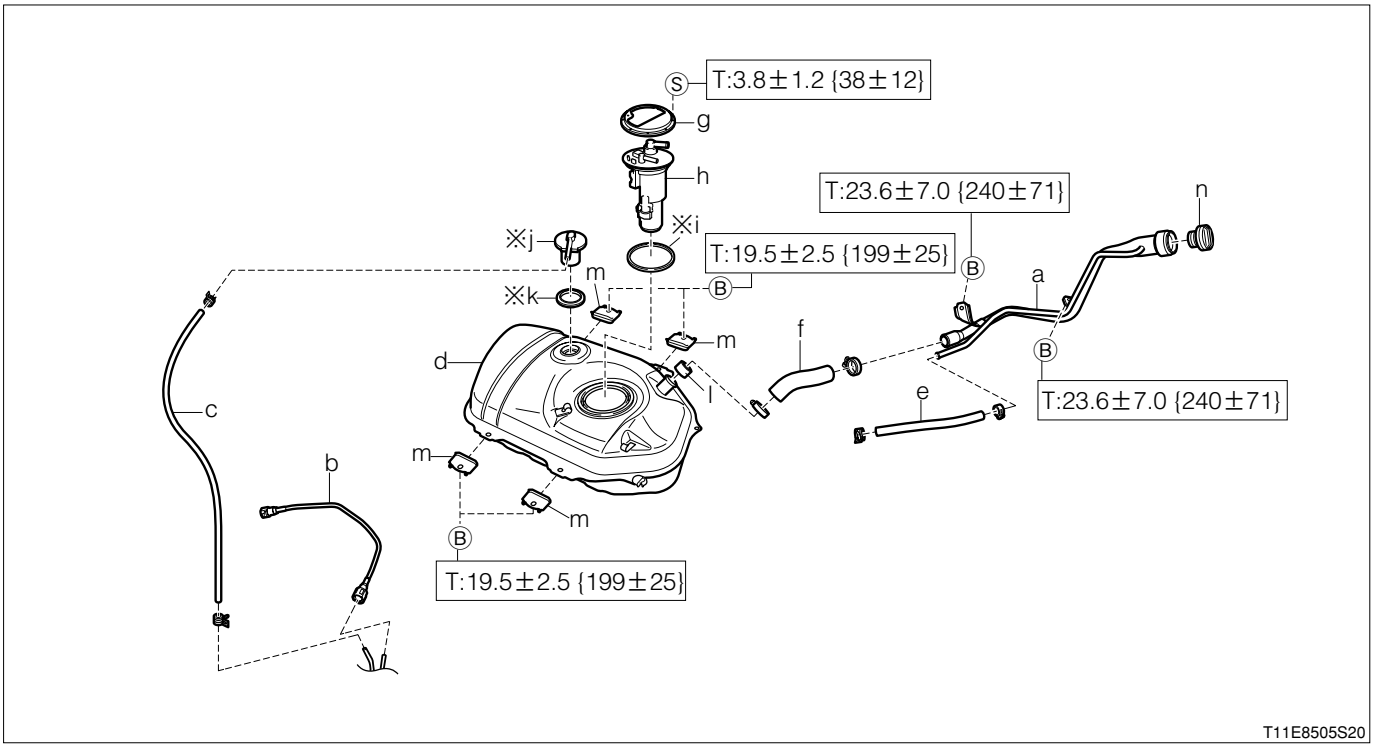
1.Remove the fuel pressure.
Refer to Page B7-1.

2.Disconnect the battery negative (-) terminal.

3.Remove the pressure inside the fuel tank by removing the fuel filler cap.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts

Unit:N·m{kgf·cm}

(2) Removal and installation procedures

		1	a	Pipe S/A, fuel inlet, upper
▼	▲	2	b	Tube S/A, fuel suction (Floor tube side)
	▲	3	c	Hose, fuel (Floor tube side)
▼	▲	4	d	Tank S/A, fuel
	▲	5	e	Hose, fuel tank breather (In 1 et side)
	▲	6	f	Hose,fuel tank to filler pipe (Inret side)
	▲	7	f	Hose,fuel tank to filler pipe (Tank Ay side)
	▲	8	e	Hose, fuel tank breather (Pump Ay side)
▼	▲	9	b	Tube S/A, fuel suction (Fuel pump side)
	▲	10	c	Hose, fuel (Valve Ay side)
	▲	11	g	Bracket, fuel pump No.1
	▲	12	h	Pump Ay, fuel w/motor & bracket
	▲	13	i	Gasket, fuel pump
▼	▲	14	j	Valve Ay, fuel cut off
▼	▲	15	k	Gasket, fuel tank breather tube
	▲	16	l	Valve S/A, fuel tank filler check
		17	m	Reinforcement, fuel tank flange,No.1
		18	n	Cap Ay, fuel tank

3-1-4 POINTS OF REMOVAL

(1) Tube S/A, fuel suction (Floor tube side)

1.Remove the fuel suction tube S/A.
Refer to Page B7-2.

(2) Tank S/A, fuel

1.Remove the fuel tank S/A attaching bolts.
2.Make a gap between the fuel tank S/A and the body by lowering the fuel tank S/A slightly. Proceed to remove the fuel pump connector and harness clamp.
3.Remove the fuel tank S/A.

(3) Tube S/A, fuel suction (Fuel pump side)

1.Remove the fuel suction tube S/A.
Refer to Page B7-2.

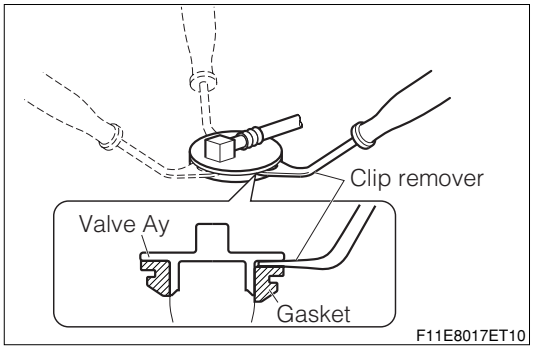
(4) Gasket, fuel tank breather tube, Valve Ay, fuel cut off

1.Insert the clip remover into between the valve Ay and the gasket, and gradually push up the valve Ay to remove the valve Ay.

CAUTION

- Since the fuel cut-off valve Ay is made of resin, forcible removal and installation may often break the valve Ay. Therefore, perform the operation carefully to assure the sealing performance.

2.Remove the gasket.



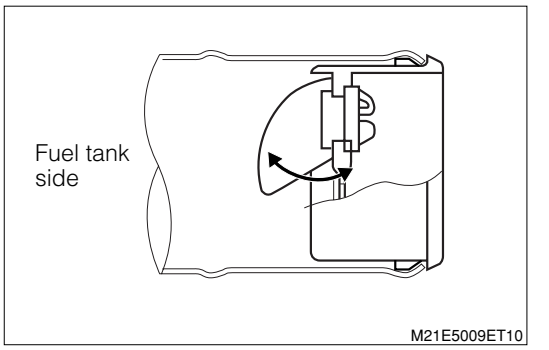
3-1-5 POINTS OF INSTALLATION

(1) Valve S/A, fuel tank check

1.Install the fuel tank filler check valve S/A in the direction shown in the right figure.

CAUTION

- The insertion should be made securely until the pawl rides over the spool.
- After completion of the assembly, ensure that the valve opens or closed smoothly.



(2) Gasket, fuel tank breather tube, Valve Ay, fuel cut off

1.Assemble the new gasket to the fuel tank Ay.

2.Insert the new valve Ay in such a way that the port faces to the direction indicated in the right figure.

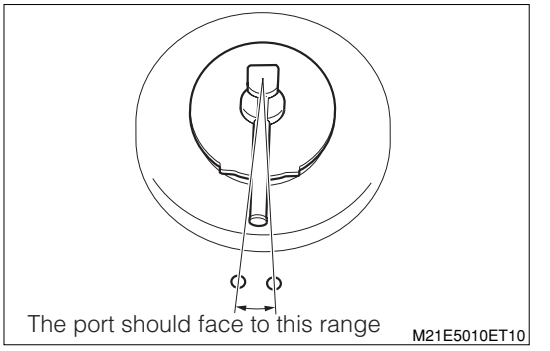
CAUTION

- Do not deform the fuel tank by applying an undue force during the press-fitting.
- Be sure to use the new valve Ay and gasket.

NOTE

- It is permissible to use white kerosene as a lubricant. However, do not submerge the valve main body in it.

3.Ensure that the insertion has been made to such an extent that the flange section of the valve Ay firmly contacts the gasket without any gap.



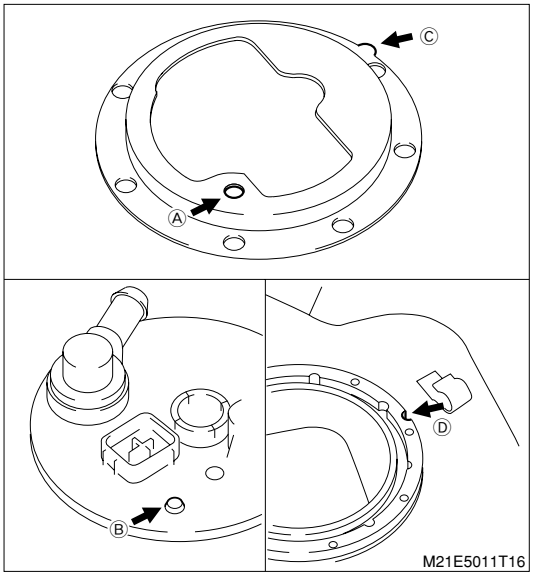
(3) Gasket, fuel pump, pump Ay, fuel W/ motor&bracket, bracket, fuel pump, No.1

1.Install the fuel pump Ay.

(1) Install the fuel pump to the fuel tank with a new fuel pump gasket interposed.

(2) Install the fuel pump bracket with the fuel pump bracket hole (Ⓐ) aligned with the fuel pump's projected point (Ⓑ) and the fuel pump bracket and fuel tank mate marks (Ⓒ and Ⓓ) aligned with each other.

(3) Tighten the fuel pump bracket to the specified torque.

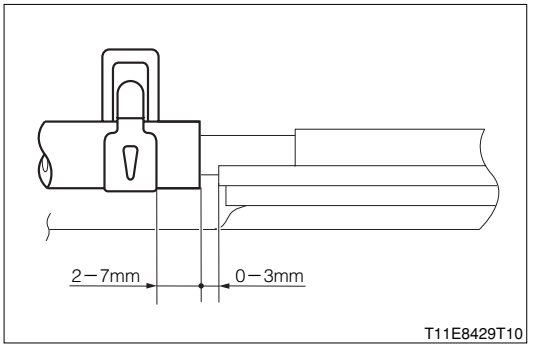


(4) Hose, fuel (Valve Ay side)

1.Install the hose in such a way that the side having no mark comes to the fuel cut off valve Ay side.

CAUTION

- Install the hose as indicated in the right figure.



(5) Tube S/A, fuel suction (Fuel pump side)

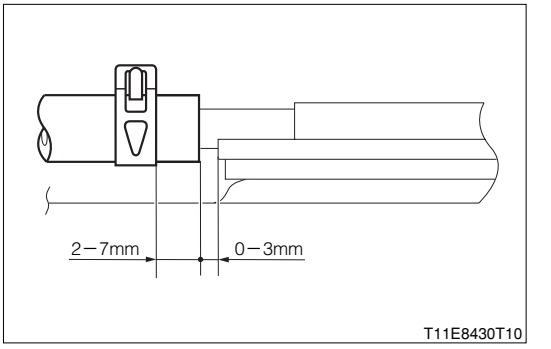
1.Install the tube S/A to the fuel pump Ay.
Refer to Page B7-2.

(6) Hose, fuel tank breather (Pump Ay side)

1.Install the hose to the fuel pump Ay.

CAUTION

- Install the hose as indicated in the right figure.



(7) Hose,fuel tank to filler pipe (Tank Ay side)

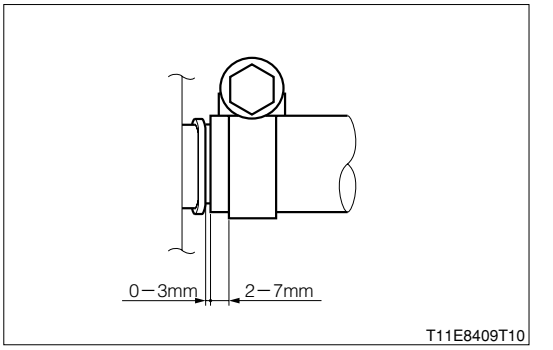
1.Connect the hose to the fuel tank Ay in such a way that the marking side of the hose faces upward.

CAUTION

- Install the hose, as indicated in the right figure.

Identification mark

2WD vehicle	Yellow

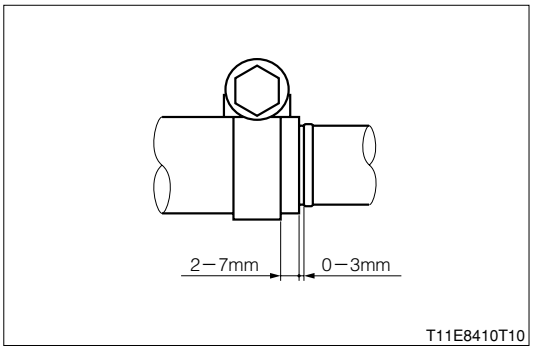


(8) Hose, fuel tank to filler pipe (Inret side)

1.Connect the hose at the inlet side to the fuel inlet upper pipe S/A.

CAUTION

- Install the hose, as indicated in the right figure.

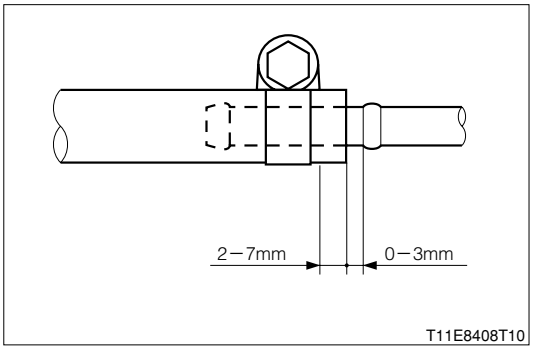


(9) Hose, Fuel tank breather (Inlet side)

1.Connect the hose at the inlet side to the fuel inlet upper pipe S/A.

CAUTION

- Install the hose, as indicated in the right figure.



(10) Tank S/A, fuel

1.Install the fuel tank S/A.

(1) With the fuel tank being brought toward the body side, install the fuel pump connector and harness clamps.

(2) Install the fuel tank. Tighten the bolts to the specified torque.

(11) Hose, fuel (Floor tube side)

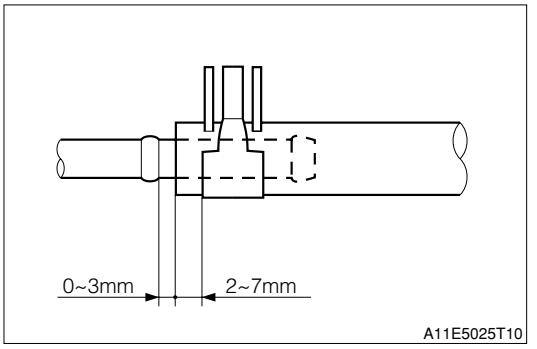
1.Install the hose in such a way that the side having a mark comes to the floor tube side.

CAUTION

- Install the hose, as indicated in the right figure.

Identification mark

2WD vehicle	Yellow



(12) Fuel suction tube S/A (Floor tube side)

1.Install the tube S/A at the floor tube side.

Refer to Page B7-2.

3-1-6 OPERATION AFTER INSTALLATION

1.Remove the cap Ay, fuel tank.
2.Install the battery negative (-) terminal.
3.Turn the IG switch to the ON position.
4.Check the fuel system for leakage with the fuel pressure applied.

4 FUEL PUMP

4-1 REMOVAL AND INSTALLATION

WARNING

- Never allow a fire to be brought near the jobsite during the operation.
- Be sure to take a precautionary measure to prevent fuel from being splashed.

4-1-1 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

Butyl tape

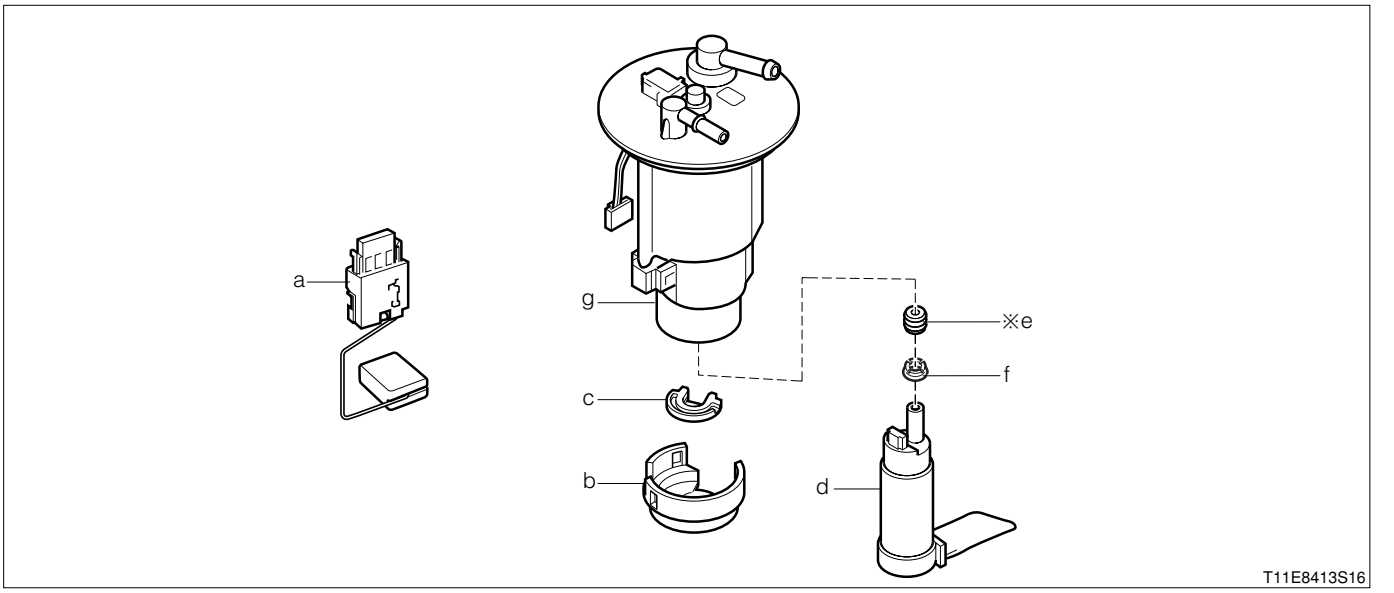
4-1-2 OPERATION BEFORE REMOVAL

1.Remove the carpet Ay, floor front, board, rear floor, front Rh.
Refer to Page I2-57.

2.Remove the cover , rear floor service hole. Then, disconnect the connector.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non-reusable parts

(2) Removal and installation procedures

▼ 1 a Gage Ay, fuel sender
2 b Bracket
3 c Cushion
▼ ▲ 4 d Pump Ay, fuel W/filter
5 e Grommet, fuel
6 f Spacer
7 g Filter Ay, fuel W/flange

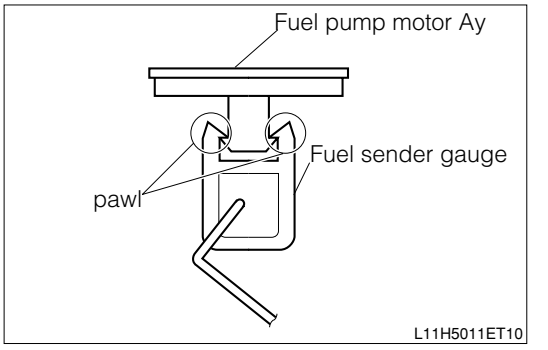
NOTE

- As for the five parts of b bracket, c cushion, e grommet, f spacer and g filter Ay, fuel, W/flange, they are available as the fuel filter kit.

4-1-4 POINTS OF REMOVAL

(1) Fuel sender gage

1.Remove the fuel sender gauge Ay, while opening the two claw sections of the gauge with your finger and pushing them downward.



(2) Pump Ay, fuel W/filter

1.Disconnect the connector of the pump section.
2.Remove the fuel pump Ay W/filter.

4-1-5 POINTS OF INSTALLATION

(1) Pump Ay, fuel W/filter

1.Install the spacer and fuel grommet to the pump Ay.

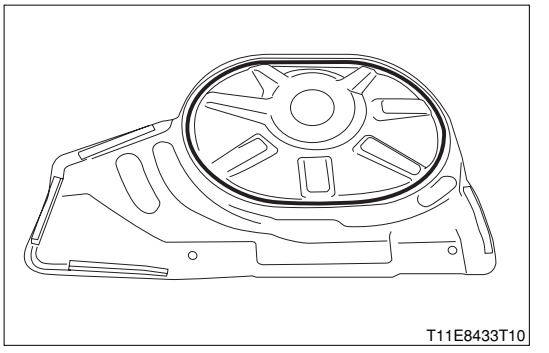
CAUTION

- Never reuse the grommet, fuel

2.Install the pump Ay to the fuel filter Ay with flange.
3.Install the connector of the pump section.
4.Install the fuel pump Ay with motor & bracket to the fuel tank Ay.
Refer to Page B7-6.

4-1-6 OPERATION AFTER INSTALLATION

1.Start the engine. Visually check whether there is oil leaking from the fuel pump, hoses and pipes.
2.Affix a butyl tape to the position shown in the right figure.
3.Connect the connector and install the rear floor service hole cover.
4.Install the carpet Ay, floor front, board, rear floor, front Rh.
Refer to Page I2-57.



5 INJECTOR

WARNING

- Never allow a fire to be brought near the jobsite during the operation.
- Be sure to take a precautionary measure to prevent fuel from being splashed.

5-1 REMOVAL AND INSTALLATION

5-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

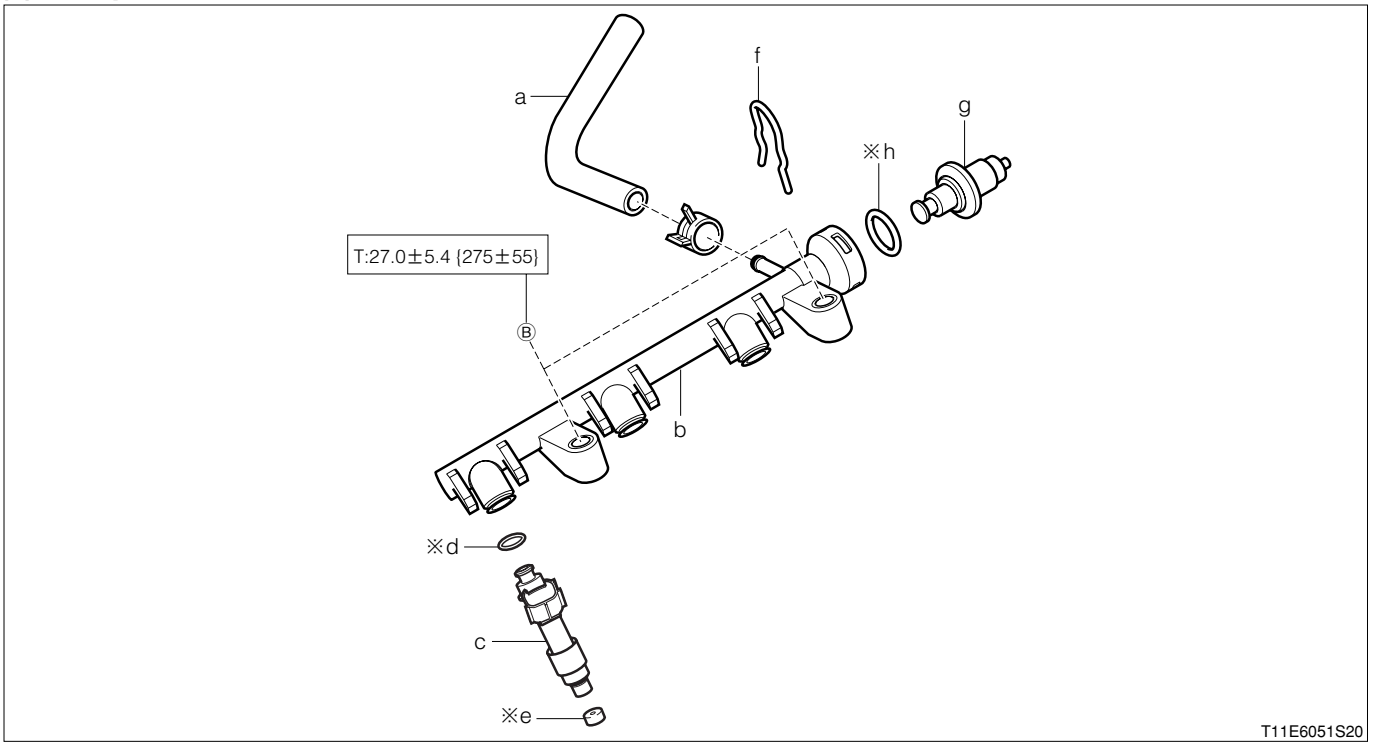
5-1-2 OPERATION BEFORE REMOVAL

1.Remove the fuel pressure.
Refer to Page B7-1.

2.Disconnect the battery negative (-) terminal.
3.Remove the case, air cleaner.
Refer to Page B3-1.

5-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non-reusable parts
Unit:N·m{kgf·cm}

(2) Removal and installation procedures

▲ 1 a Hose, fuel
▲ 2 b Pipe, fuel delivery
▲ 3 c Injector Ay
4 d Ring, O
5 e Insulator, injector vibration
6 f Holder, fuel pressure regulator
7 g Damper Ay, fuel pressure pulsation
8 h Ring, O

5-1-4 INSPECTION

1.Perform the unit inspection of the injector.
Refer to Page B8-223.

5-1-5 POINTS OF INSTALLATION

(1) Injector, Pipe Ay, fuel delivery

1.With the connector of the injector directed toward the external direction of the cylinder head, install the injector, fuel delivery pipe to the cylinder head.

CAUTION

- When installing the delivery pipe, care must be exercised to ensure that no damage is made to the O-rings and grommets.

2.After completion of the assembly, turn the injector by hand. Ensure that the injector turns smoothly.

CAUTION

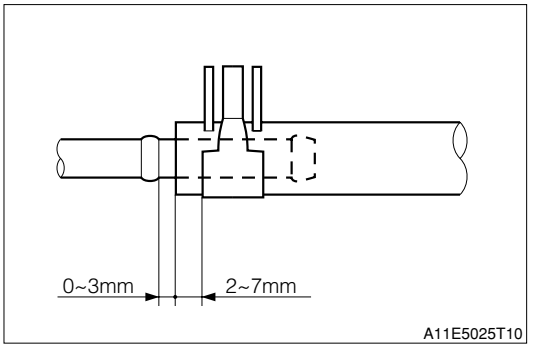
- After the confirmation, ensure that the connector of the injector has not been assembled in a turned state (Not inclined).

(2) Hose, fuel

1.Connect the hose to the fuel delivery pipe.

CAUTION

- Install the hose, as indicated in the right figure.



5-1-6 OPERATION AFTER INSTALLATION

1.Install the case, air cleaner.
Refer to Page B3-1.

2.Install the battery negative (-) terminal.
3.Turn the IG switch to the ON position.
4.Check the fuel system for leakage with the fuel pressure applied.

■ K3

1 FUEL SYSTEM

1-1 INSTRUCTIONS FOR SERVICE OPERATION

WARNING

- Never allow a fire to be brought near the jobsite during the operation.
- Be sure to take a precautionary measure to prevent fuel from being splashed.

1-1-1 FUEL PRESSURE REMOVAL OPERATION

1. When you perform operations for the fuel system, remove the fuel pressure, following the procedure given below.
   (1) Turn OFF the IG switch.
   (2) Remove the fuel pump relay.
   (3) Start the engine. Keep on running the engine, until the engine stops naturally.
   (4) Turn OFF the IG switch. Install the fuel pump relay.

CAUTION

- Care must be exercised, for there is a residual pressure in the fuel line.

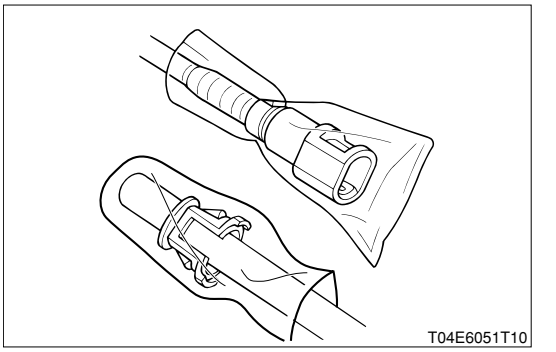
2 FUEL SUCTION TUBE

2-1 REMOVAL AND INSTALLATION

WARNING

- Never allow a fire to be brought near the jobsite during the operation.
- Be sure to take a precautionary measure to prevent fuel from being splashed.

2-1-1 POINTS OF REMOVAL


T04E6051T10

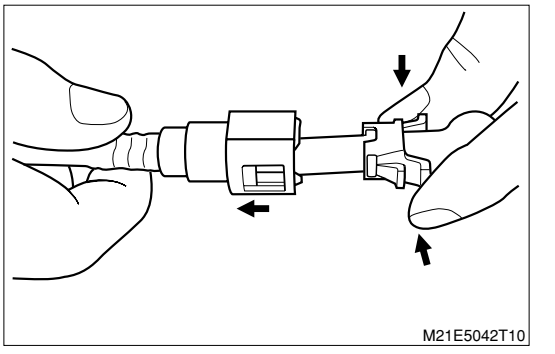
CAUTION

- When mud etc. gets to the tube, clean it prior to the removal.
- Make sure to perform the operation by hand without using any tools so that no scratch may be made to the tube etc.
- If there is a seizure between the connector and the tube, push and pull back with the retainer held by hand. Pull out the tube from the connector after they can move freely.
- Cover the disconnected tubes and connectors with a plastic bag etc. so that they may not be scratched or no foreign matter be admitted.

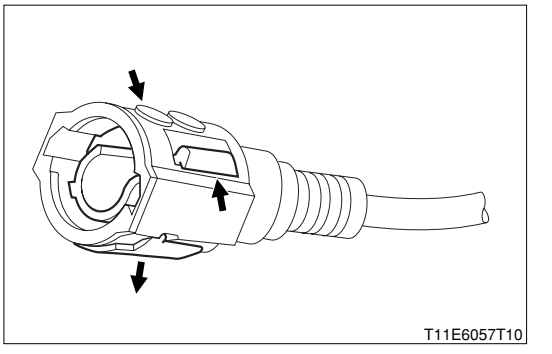
1.As for the fuel pump side, hold both ends of the retainer. Pull out the connector with the lock in an unlocked state.

CAUTION

- When the retainer is removed from the tube, be sure to replace it by a new retainer, for the retainer is a non-reusable part.


M21E5042T10

2.As for the body tube side, release the lock and pull out the connector by pressing down the retainer, while pushing the protruding section of the retainer.


T11E6057T10

2-1-2 POINTS OF INSTALLATION

1.With the connector aligned with the axis of the mate fuel pipe, push in the retainer until a clicking sound ′ occurs.

If the connection is very stiff, apply a small quantity of new engine oil to the tip-end of the pipe.

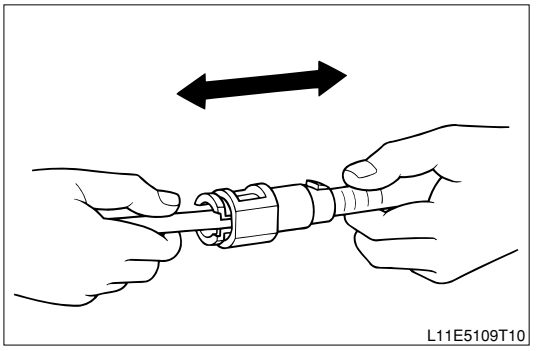
CAUTION

- Make sure that no scratch or foreign article gets to the pipe connecting section.

Retainer color

Fuel pump side	White
Body tube side	Orange

2.After completion of the assembly, pull the connector and the mate fuel pipe so as to ensure that they are connected securely.



2-1-3 OPERATION AFTER INSTALLATION

1.With the fuel pressure applied, check the fuel system for leakage.

2-2 REPLACEMENT

2-2-1 REPLACEMENT PROCEDURE

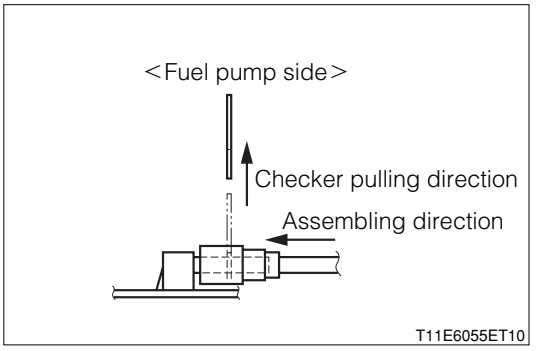
1.Remove the connector and the mate fuel pipe, following the aforesaid procedure. As for the fuel pump side, remove the retainer from the pump.

2.With the connecter aligned with the axis of the corresponding fuel pipe, push in the connector securely, until you hear a sound of the retainer.

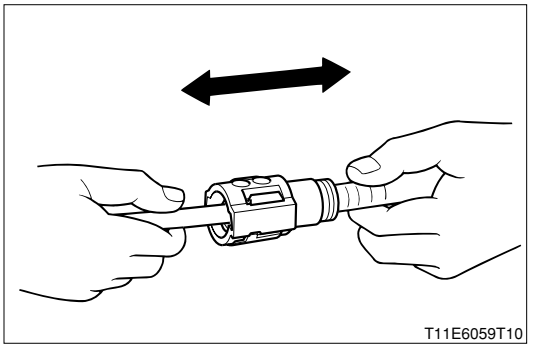
3.With the connector aligned with the axis of the mate fuel pipe, push in the retainer until a clicking sound ′ occurs. Then, pull out the checker.

Checker color

Fuel pump side	Red



4.After completion of the assembly, pull the connector and the mate fuel pipe so as to ensure that they are connected securely.



2-2-2 OPERATION AFTER REPLACEMENT

1.With the fuel pressure applied, check the fuel system for leakage.

3 FUEL TANK

3-1 REMOVAL AND INSTALLATION

WARNING

- Never allow a fire to be brought near the jobsite during the operation.
- Be sure to take a precautionary measure to prevent fuel from being splashed.

3-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

3-1-2 OPERATION BEFORE REMOVAL

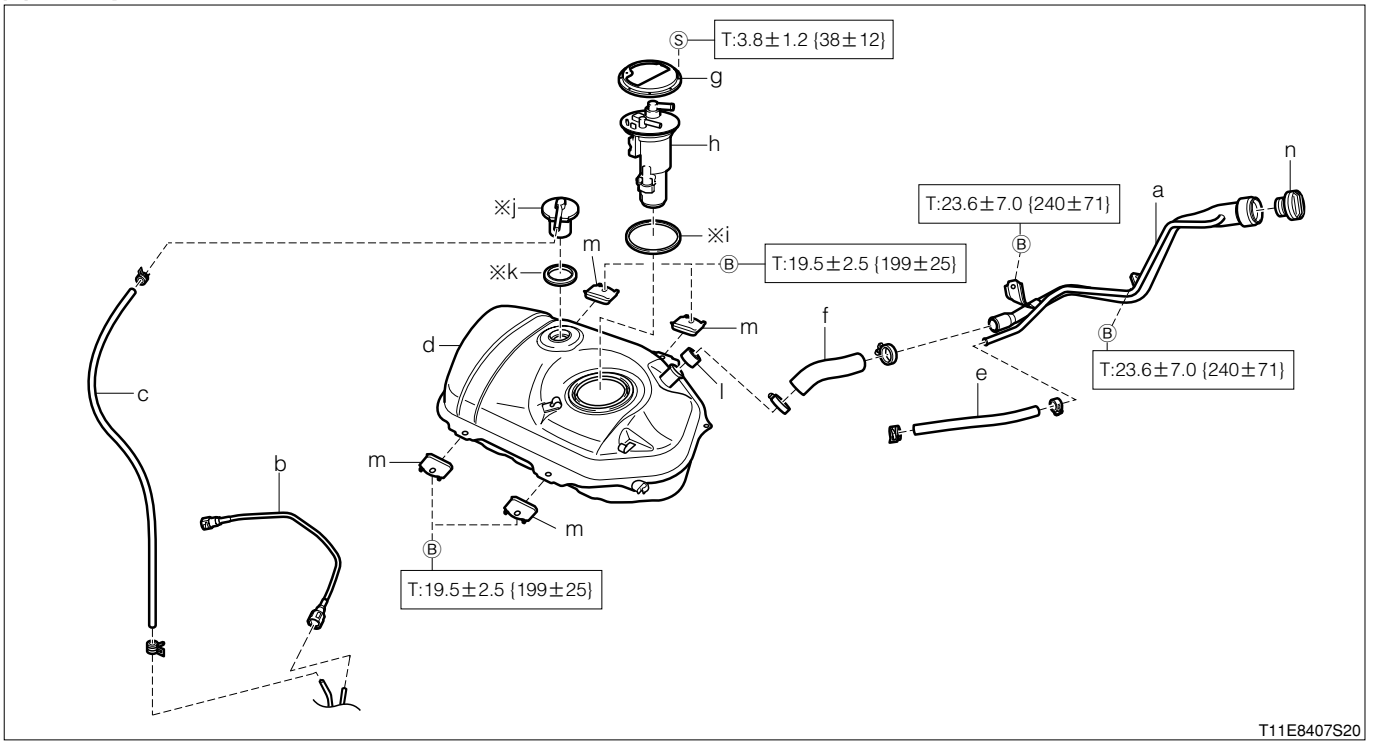
1.Remove the fuel pressure.
Refer to Page B7-13.

2.Disconnect the battery negative (-) terminal.

3.Remove the pressure inside the fuel tank by removing the fuel filler cap.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts

Unit:N·m{kgf·cm}

(2) Removal and installation procedures

	1	a	Pipe S/A, fuel inlet, upper
▼ ▲	2	b	Tube S/A, fuel suction (Floor tube side)
▲	3	c	Hose, fuel (Floor tube side)
▼ ▲	4	d	Tank S/A, fuel
▲	5	e	Hose, fuel tank breather (In 1 et side)
▲	6	f	Hose,fuel tank to filler pipe (Inlet side)
▲	7	f	Hose,fuel tank to filler pipe (Tank Ay side)
▲	8	e	Hose, fuel tank breather (Pump Ay side)
▼ ▲	9	b	Tube S/A, fuel suction (Fuel pump side)
▲	10	c	Hose, fuel (Valve Ay side)
▲	11	g	Bracket, fuel pump No.1
▲	12	h	Pump Ay, fuel W/motor & bracket
▲	13	i	Gasket, fuel pump
▼ ▲	14	j	Valve Ay, fuel cut off
▼ ▲	15	k	Gasket, fuel tank breather tube
▲	16	l	Valve S/A, fuel tank filler check
	17	m	Reinforcement, fuel tank flange,No.1
	18	n	Cap Ay, fuel tank

3-1-4 POINTS OF REMOVAL

(1) Tube S/A, fuel suction (Floor tube side)

1.Remove the fuel suction tube S/A.
Refer to Page B7-14.

(2) Tank S/A, fuel

1.Remove the fuel tank S/A attaching bolts.
2.Make a gap between the fuel tank S/A and the body by lowering the fuel tank S/A slightly. Proceed to remove the fuel pump connector and harness clamp.
3.Remove the fuel tank S/A.

(3) Tube S/A, fuel suction (Fuel pump side)

1.Remove the fuel suction tube S/A.
Refer to Page B7-14.

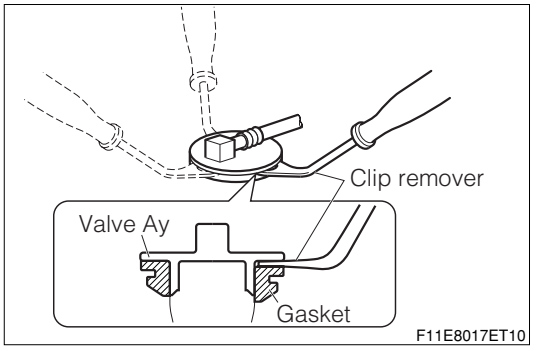
(4) Gasket, fuel tank breather tube, Valve Ay, fuel cut off

1.Insert the clip remover into between the valve Ay and the gasket, and gradually push up the valve Ay to remove the valve Ay.

CAUTION

- Since the fuel cut-off valve Ay is made of resin, forcible removal and installation may often break the valve Ay. Therefore, perform the operation carefully to assure the sealing performance.

2.Remove the gasket.



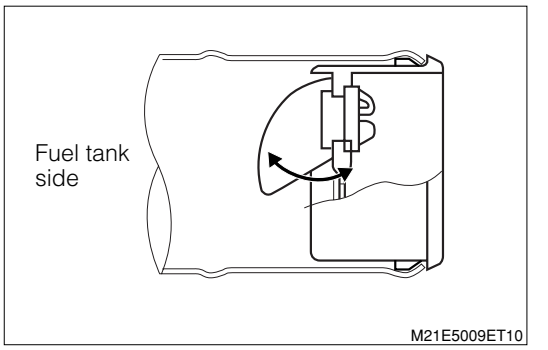
3-1-5 POINTS OF INSTALLATION

(1) Valve S/A, fuel tank filler check

1.Install the fuel tank filler check valve S/A in the direction shown in the right figure.

CAUTION

- The insertion should be made securely until the pawl rides over the spool.
- After completion of the assembly, ensure that the valve opens or closed smoothly.



(2) Gasket, fuel tank breather tube, valve Ay, fuel cut off

1.Assemble the new gasket to the fuel tank Ay.

2.Insert the new valve Ay in such a way that the port faces to the direction indicated in the right figure.

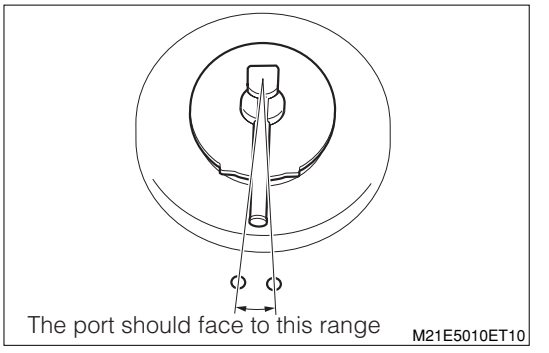
CAUTION

- Do not deform the fuel tank by applying an undue force during the press-fitting.
- Be sure to use the new valve Ay and gasket.

NOTE

- It is permissible to use white kerosene as a lubricant. However, do not submerge the valve main body in it.

3.Ensure that the insertion has been made to such an extent that the flange section of the valve Ay firmly contacts the gasket without any gap.



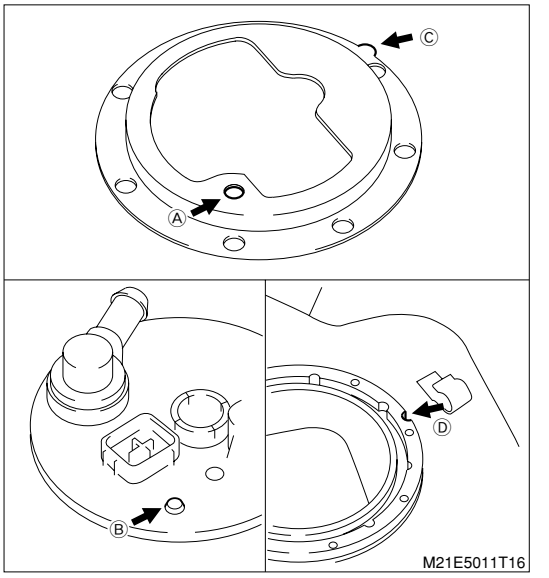
(3) Gasket, fuel pump, pump Ay, fuel W/ motor&bracket, bracket, fuel pump, No.1

1.Install the fuel pump Ay.

(1) Install the fuel pump to the fuel tank with a new fuel pump gasket interposed.

(2) Install the fuel pump bracket with the fuel pump bracket hole (Ⓐ) aligned with the fuel pump's projected point (Ⓑ) and the fuel pump bracket and fuel tank mate marks (Ⓒ and Ⓓ) aligned with each other.

(3) Tighten the fuel pump bracket to the specified torque.

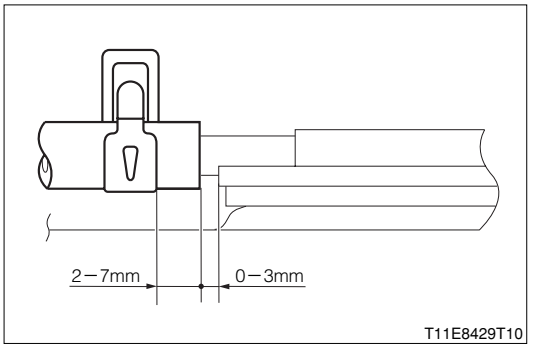


(4) Hose, fuel (Valve Ay side)

1.Install the hose in such a way that the side having no mark comes to the fuel cut off valve Ay side.

CAUTION

- Install the hose as indicated in the right figure.



(5) Tube S/A, fuel suction (Fuel pump side)

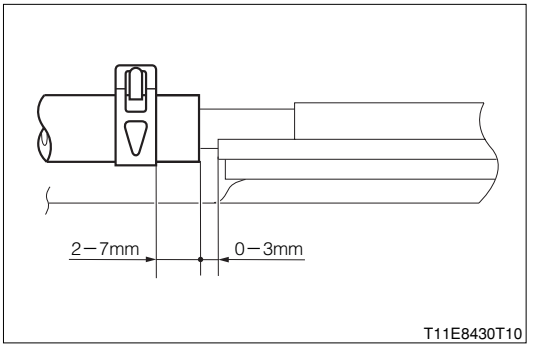
1.Install the tube S/A to the fuel pump Ay.
Refer to Page B7-14.

(6) Hose, fuel tank breather (Pump Ay side)

1.Connect the hose to fuel pump Ay.

CAUTION

- Install the hose as indicated in the right figure.



(7) Hose,fuel tank to filler pipe (Tank Ay side)

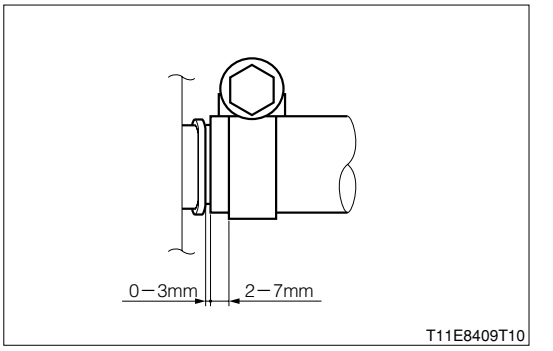
1.Connect the hose to the fuel tank Ay in such a way that the marking side of the hose faces upward.

CAUTION

- Install the hose, as indicated in the right figure.

Identification mark

2WD vehicle	Yellow

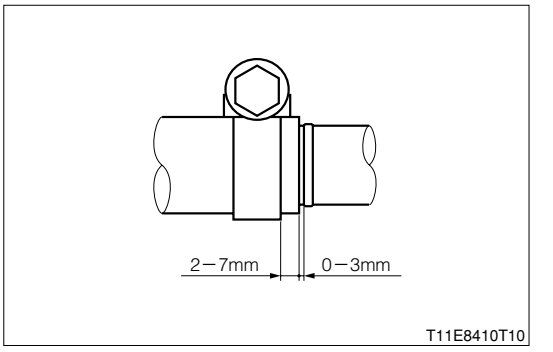


(8) Hose,fuel tank to filler pipe (Inret side)

1.Connect the hose at the inlet side to the fuel inlet upper pipe S/A.

CAUTION

- Install the hose, as indicated in the right figure.

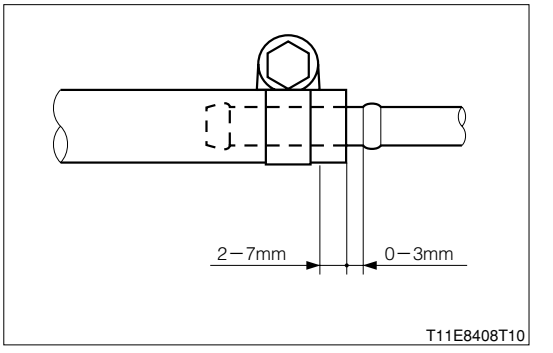


(9) Hose, fuel tank breather (Inlet side)

1.Connect the hose at the inlet side to the fuel inlet upper pipe S/A.

CAUTION

- Install the hose, as indicated in the right figure.



(10) Tank S/A, fuel

1.Install the fuel tank S/A.

(1) With the fuel tank being brought toward the body side, install the fuel pump connector and harness clamps.

(2) Install the fuel tank. Tighten the bolts to the specified torque.

(11) Hose, fuel (Floor tube side)

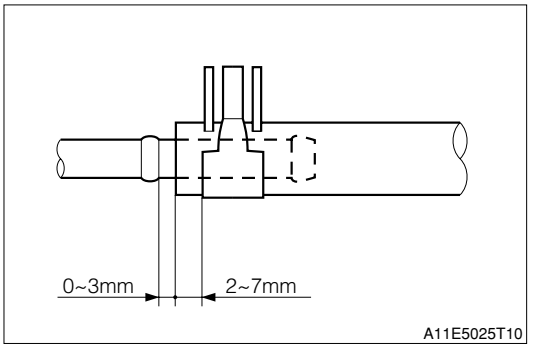
1.Install the hose in such a way that the side having a mark comes to the floor tube side.

CAUTION

- Install the hose, as indicated in the right figure.

Identification mark

2WD vehicle	Yellow



(12) Tube S/A, fuel sction (Floor tube side)

1.Install the tube S/A at the floor tube side.

Refer to Page B7-14.

3-1-6 OPERATION AFTER INSTALLATION

1.Remove the cap Ay, fuel tank.
2.Install the battery negative (-) terminal.
3.Turn the IG switch to the ON position.
4.Check the fuel system for leakage with the fuel pressure applied.

4 FUEL PUMP

4-1 REMOVAL AND INSTALLATION

WARNING

- Never allow a fire to be brought near the jobsite during the operation.
- Be sure to take a precautionary measure to prevent fuel from being splashed.

4-1-1 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

Butyl tape

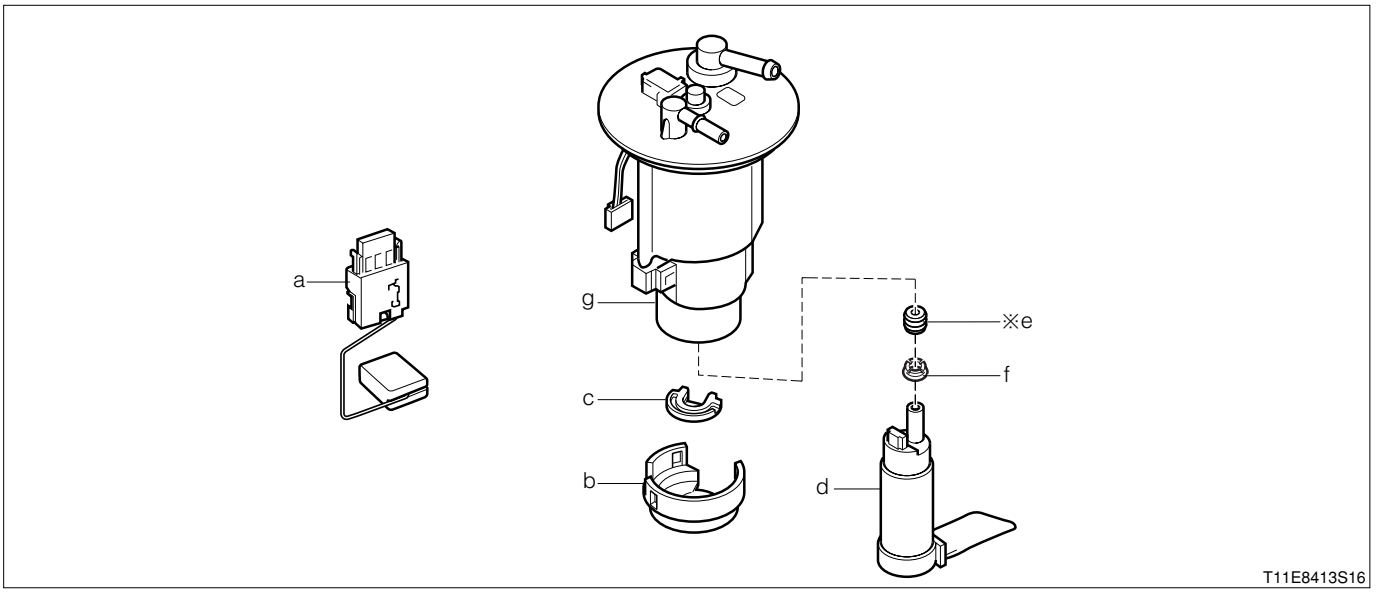
4-1-2 OPERATION BEFORE REMOVAL

1.Remove the carpet Ay, floor front, board, rear floor, front Rh.
Refer to Page I2-57.

2.Remove the cover , rear floor service hole. Then, disconnect the connector.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non-reusable parts

(2) Removal and installation procedures

▼ 1 a Gage Ay, fuel sender
2 b Bracket
3 c Cushion
▼ ▲ 4 d Pump Ay, fuel W/filter
5 e Grommet, fuel
6 f Spacer
7 g Filter Ay, fuel W/flange

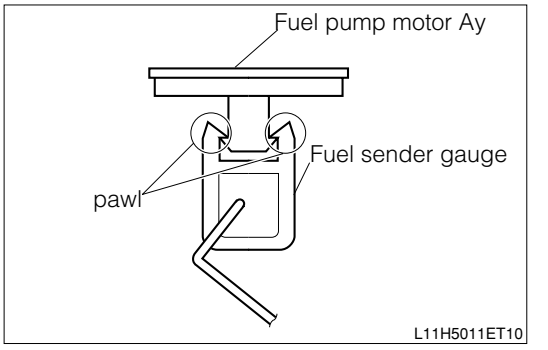
NOTE

- As for the five parts of b bracket, c cushion, e grommet, f spacer and g filter Ay, fuel, W/flange, they are available as the fuel filter kit.

4-1-4 POINTS OF REMOVAL

(1) Gage Ay, fuel sender

1.Remove the fuel sender gauge Ay, while opening the two claw sections of the gauge with your finger and pushing them downward.



(2) Pump Ay, fuel W/filter

1.Disconnect the connector of the pump section.
2.Remove the fuel pump Ay W/filter.

4-1-5 POINTS OF INSTALLATION

(1) Pump Ay, fuel w/filter

1.Install the spacer and fuel grommet to the pump Ay.

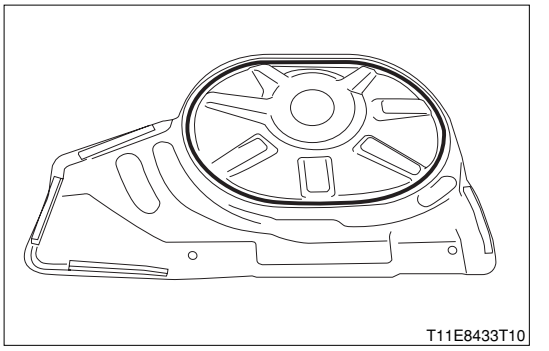
CAUTION

- Never reuse the grommet, fuel

2.Install the pump Ay to the fuel filter Ay with flange.
3.Install the connector of the pump section.
4.Install the fuel pump Ay with motor & bracket to the fuel tank Ay.
Refer to Page B7-18.

4-1-6 OPERATION AFTER INSTALLATION

1.Start the engine. Visually check whether there is oil leaking from the fuel pump, hoses and pipes.
2.Affix a butyl tape to the position shown in the right figure.
3.Connect the connector and install the rear floor service hole cover.
4.Install the carpet Ay, floor front, board, rear floor, front RH.
Refer to Page I2-57.



5 INJECTOR

WARNING

- Never allow a fire to be brought near the jobsite during the operation.
- Be sure to take a precautionary measure to prevent fuel from being splashed.

5-1 REMOVAL AND INSTALLATION

5-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

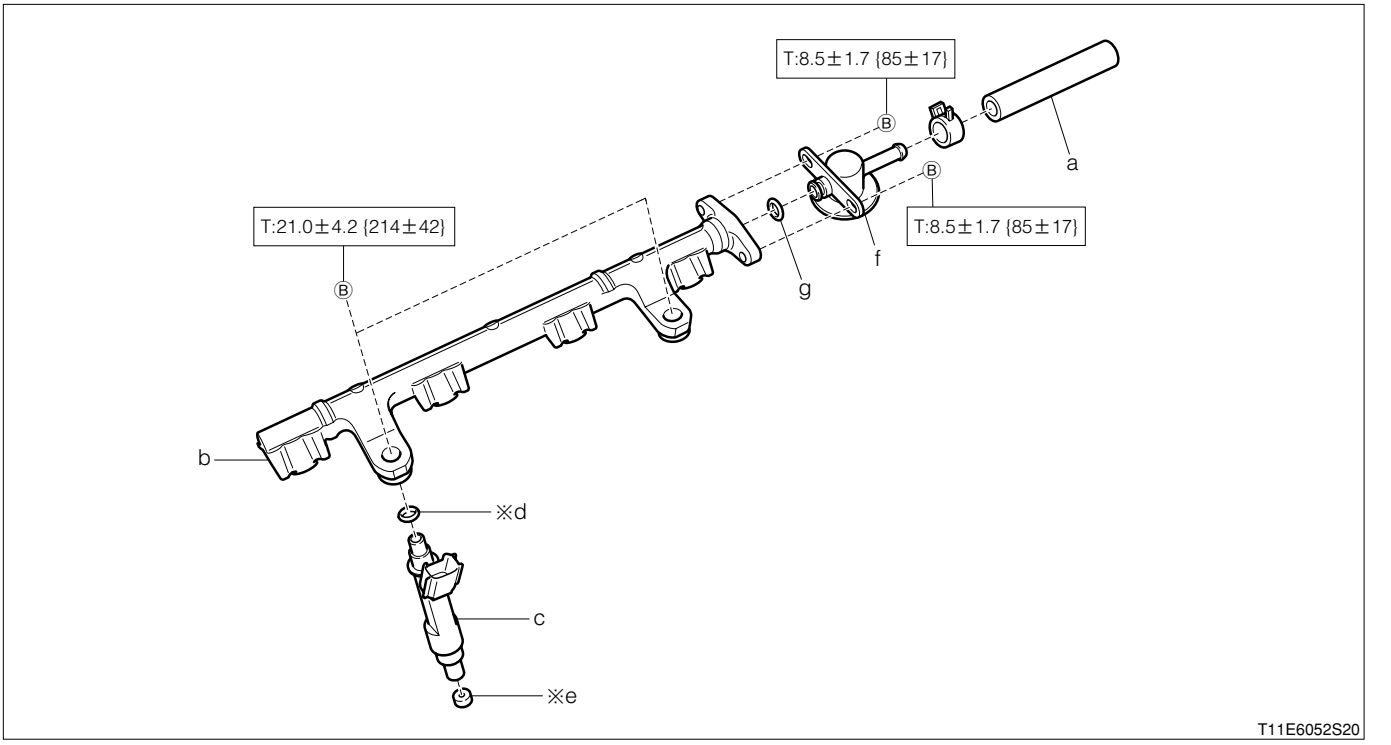
5-1-2 OPERATION BEFORE REMOVAL

1.Remove the fuel pressure.
Refer to Page B7-13.

2.Disconnect the battery negative (-) terminal.
3.Remove the case, air cleaner.
Refer to Page B3-9.

5-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non-reusable parts
Unit:N·m{kgf·cm}

(2) Removal and installation procedures

▲ 1 a Hose, fuel
▲ 2 b Pipe, fuel delivery
▲ 3 c Injector Ay
4 d Ring, O
5 e Insulator, injector vibration
6 f Pipe S/A, fuel
7 g Damper Ay, fuel pressure pulsation

5-1-4 INSPECTION

1.Perform the unit check of the injector.
Refer to Page B8-471.

5-1-5 POINTS OF INSTALLATION

(1) Injector, pipe Ay, fuel delivery

1.With the connector of the injector directed toward the external direction of the cylinder head, install the injector, fuel delivery pipe to the cylinder head.

CAUTION

- When installing the delivery pipe, care must be exercised to ensure that no damage is made to the O-rings and grommets.

2.After completion of the assembly, turn the injector by hand. Ensure that the injector turns smoothly.

CAUTION

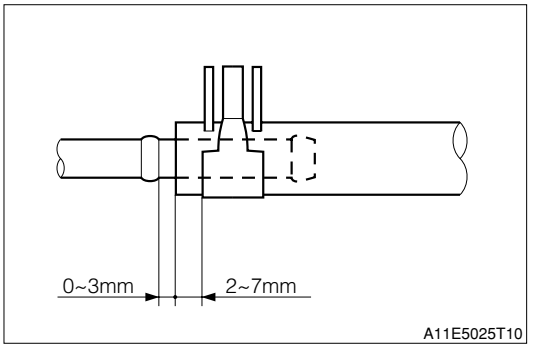
- After the confirmation, ensure that the connector of the injector has not been assembled in a turned state (Not inclined).

(2) Hose, fuel

1.Connect the hose to the fuel pressure pulsation damper Ay in such a way that the marking side of the hose faces upward.

CAUTION

- Install the hose, as indicated in the right figure.



5-1-6 OPERATION AFTER INSTALLATION

1.Install the case, air cleaner.
Refer to Page B3-9.

2.Install the battery negative (-) terminal.
3.Turn the IG switch to the ON position.
4.Check the fuel system for leakage with the fuel pressure applied.

B8 ENGINE CONTROL SYSTEM

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ENGINE CONTROL COMPUTER ---------- B8 - 1
REMOVAL AND INSTALLATION ---------- B8 - 1
ENGINE REVOLUTION SENSOR ---------- B8 - 3
REMOVAL AND INSTALLATION ---------- B8 - 3
CAMSHAFT POSITION SENSOR ---------- B8 - 4
REMOVAL AND INSTALLATION ---------- B8 - 4
KNOCK SENSOR ---------- B8 - 5
REMOVAL AND INSTALLATION ---------- B8 - 5
ENGINE COOLANT TEMPERATURE SENSOR ---------- B8 - 7
REMOVAL AND INSTALLATION ---------- B8 - 7
OIL CONTROL VALVE ---------- B8 - 9
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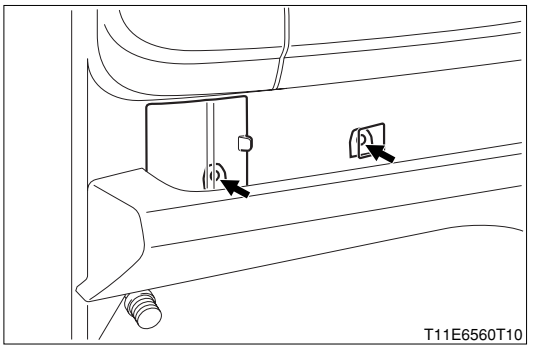
■ 1KR
1 ENGINE CONTROL COMPUTER
1-1 REMOVAL AND INSTALLATION
1-1-1 OPERATION BEFORE REMOVAL

1.Disconnect the negative (-) terminal of the battery.
2.Remove the No.1 instrument panel under cover.
3.Remove the fuse box opening cover and lower instrument cover.

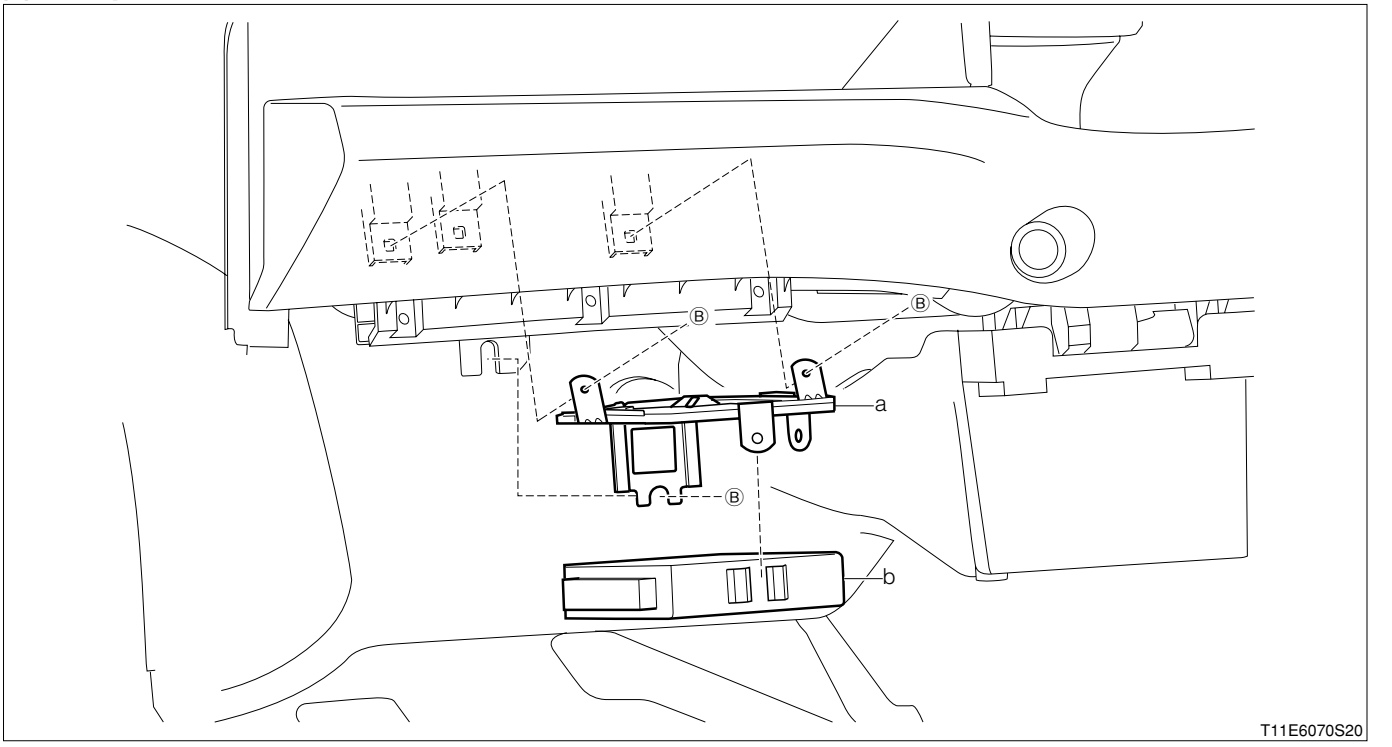
NOTE

- There are bolts fixing the EFI ECU in the back of the removed cover.

4.Remove the connector of the fuel injection computer Ay.



1-1-2 REMOVAL AND INSTALLATION PROCEDURES
(1) Components



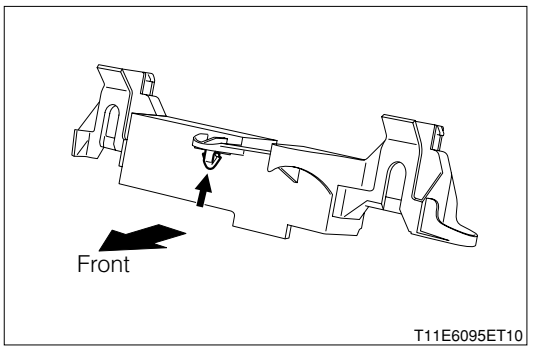
(2) Removeal and installation procedures

1 a Bracket, computer
▲ 2 b Computer Ay, fuel injection

1-1-3 POINTS OF INSTALLATION

(1) Computer Ay, fuel injection

1.Decide the installation position of the fuel injection computer Ay with the temporary maintaining clip on the vehicle side and install the bolts.



1-1-4 OPERATION AFTER INSTALLATION

1.Connect the connector to the fuel injection computer Ay.
2.Install the fuse box opening cover and lower instrument cover.
3.Install the No.1 instrument panel under cover.
4.Connect the negative (-) terminal of the battery.

2 ENGINE REVOLUTION SENSOR

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

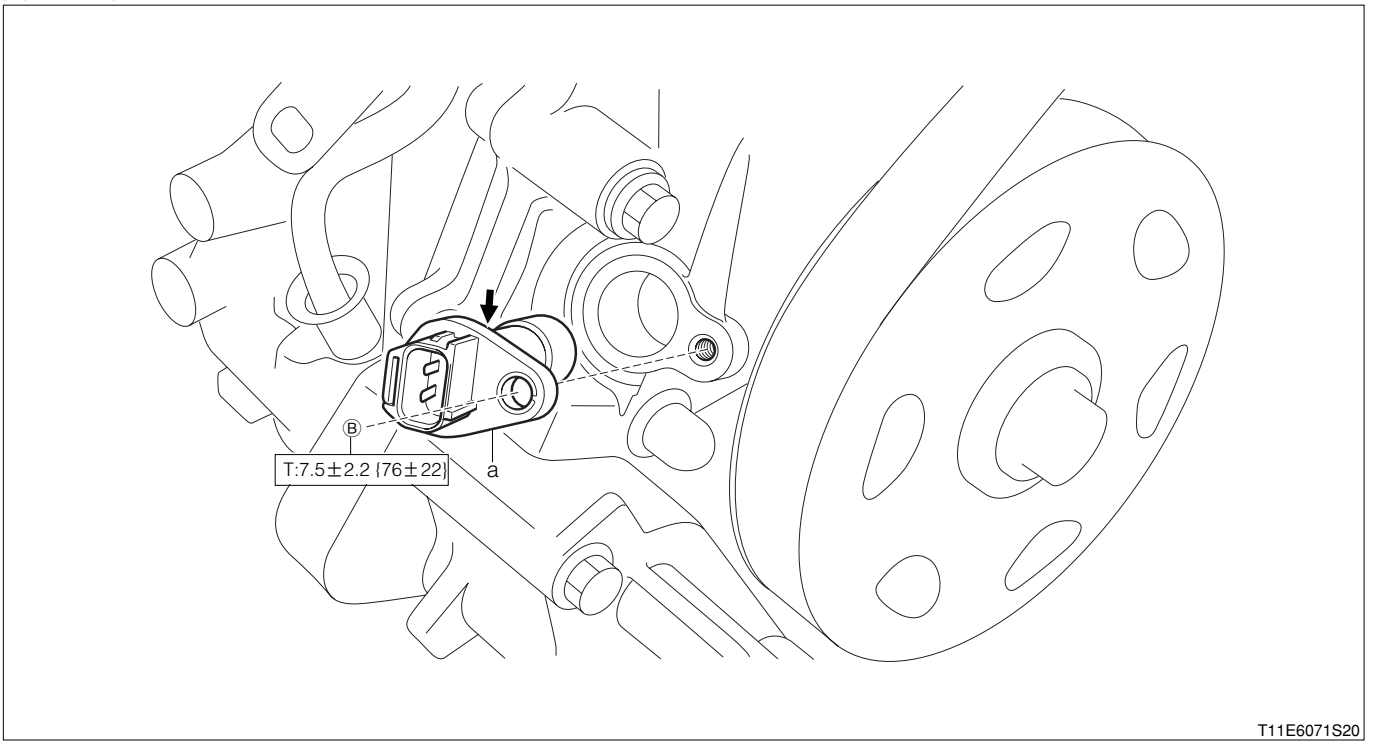
Engine oil

2-1-2 OPERATION BEFORE REMOVAL

1.Disconnect the negative (-) terminal of the battery.
2.Remove the connector of the crank position sensor Ay.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



➡:Engine oil
Unit: N·m{kgf·cm}

(2) Removeal and installation procedures

▲ 1 a Sensor Ay, crank position

2-1-4 POINTS OF INSTALLATION

(1) Sensor Ay, crank position

1.Apply engine oil to the O-ring of the sensor Ay.
LUBRICANT: Engine oil

2-1-5 OPERATION AFTER INSTALLATION

1.Connect the connector of the crank position sensor Ay.
2.Connect the negative (-) terminal of the battery.

3 CAMSHAFT POSITION SENSOR

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

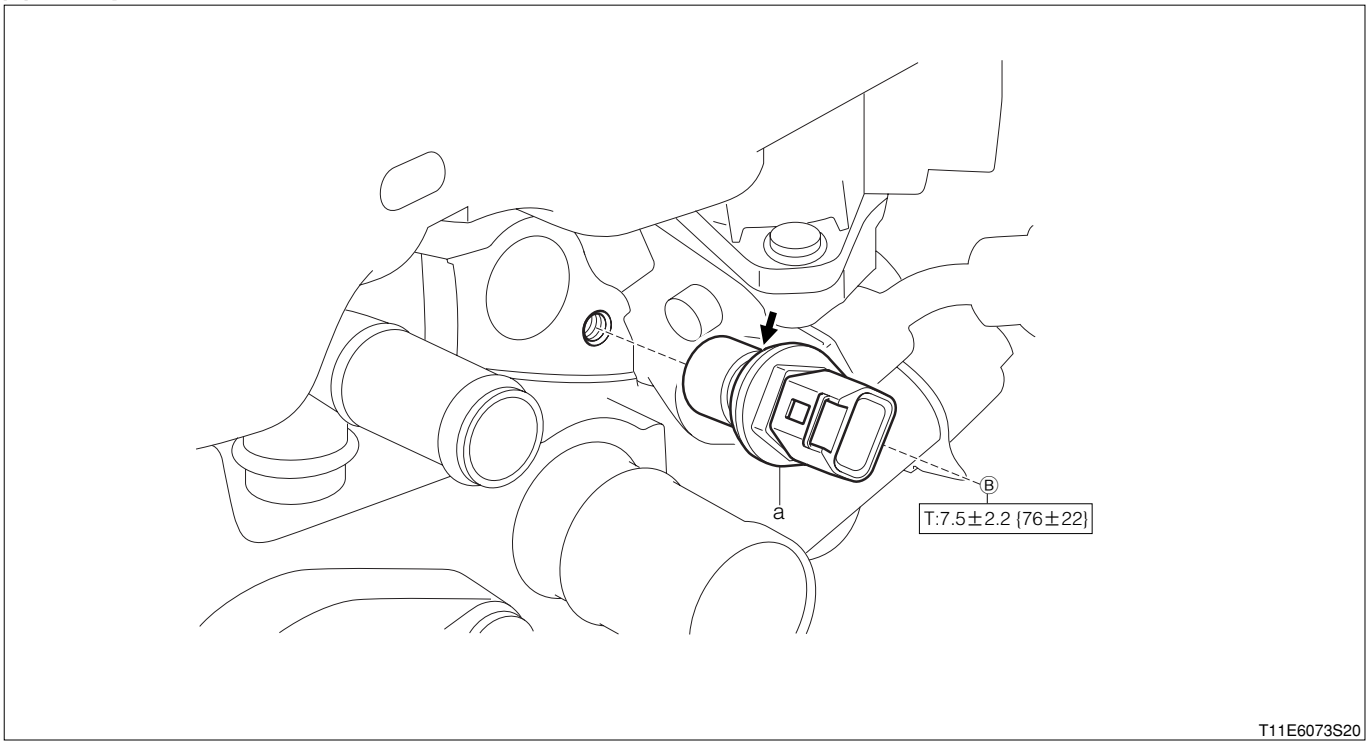
Engine oil

3-1-2 OPERATION BEFORE REMOVAL

1.Disconnect the negative (-) terminal of the battery.
2.Remove the connector of the cam position sensor Ay.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



➡:Engine oil
Unit: N·m{kgf·cm}

(2) Removeal and installation procedures

▲ 1 a Sensor Ay, cam position

3-1-4 POINTS OF INSTALLATION

(1) Sensor Ay, cam position

1.Apply engine oil to the O-ring of the sensor Ay.
LUBRICANT: Engine oil

3-1-5 OPERATION AFTER INSTALLATION

1.Connect the connector of the cam position sensor Ay.
2.Connect the negative (-) terminal of the battery.

4 KNOCK SENSOR

4-1 REMOVAL AND INSTALLATION

4-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

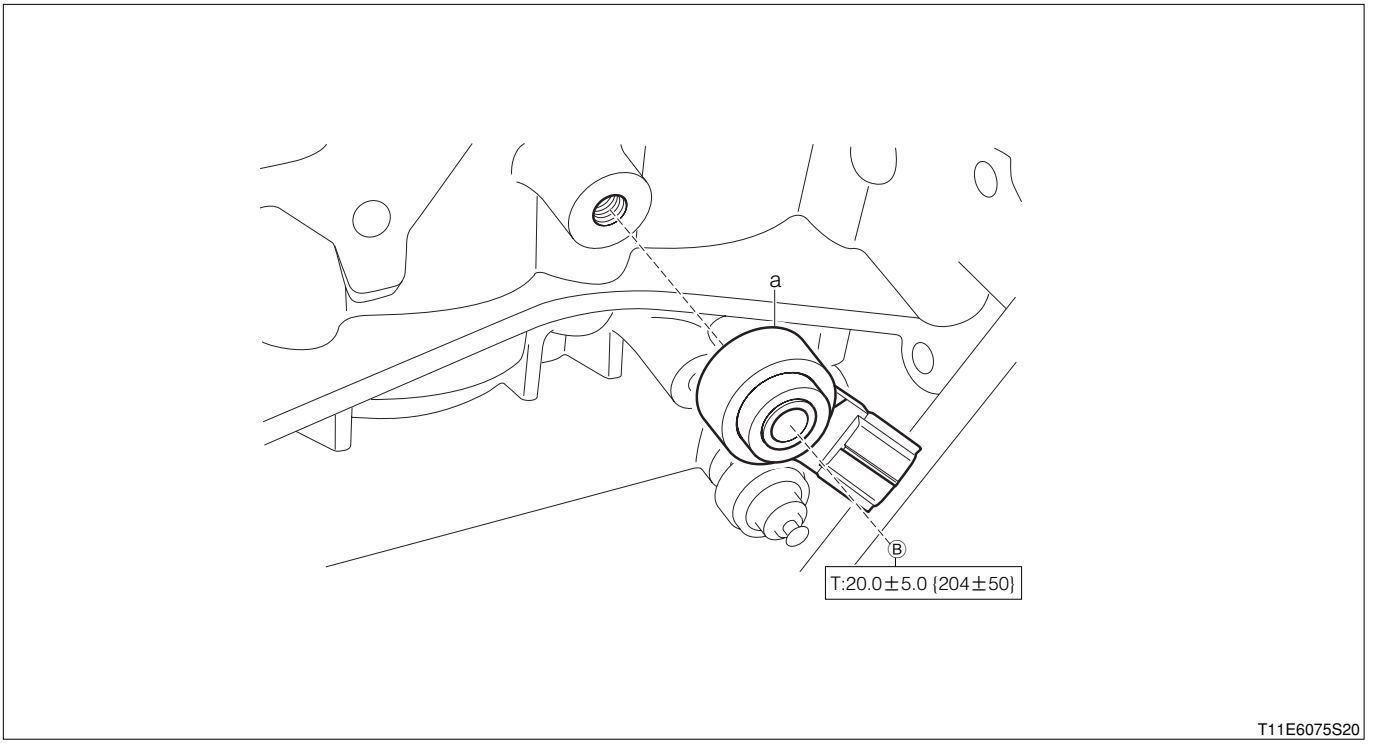
4-1-2 OPERATION BEFORE REMOVAL

1.Disconnect the negative (-) terminal of the battery.
2.Remove the intake manifold Ay.
Refer to Page B3-5.

3.Remove the knock control sensor.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

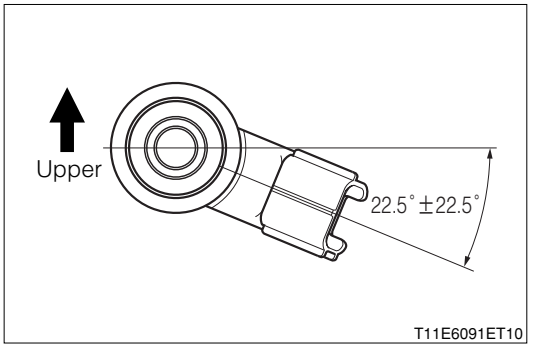
(2) Removeal and installation procedures

▲ 1 a Sensor, knock control

4-1-4 POINTS OF INSTALLATION

(1) Sensor, knock control

1.When installing the sensor to the engine Ay, install within the position shown in the figure.



4-1-5 OPERATION AFTER INSTALLATION

1.Connect the connector of the knock control sensor.
2.Install the intake manifold Ay.
Refer to Page B3-5.

3.Connect the negative (-) terminal of the battery.

5 ENGINE COOLANT TEMPERATURE SENSOR

5-1 REMOVAL AND INSTALLATION

5-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

5-1-2 OPERATION BEFORE REMOVAL

1.Disconnect the negative (-) terminal of the battery.
2.Drain the cooling water.

NOTE

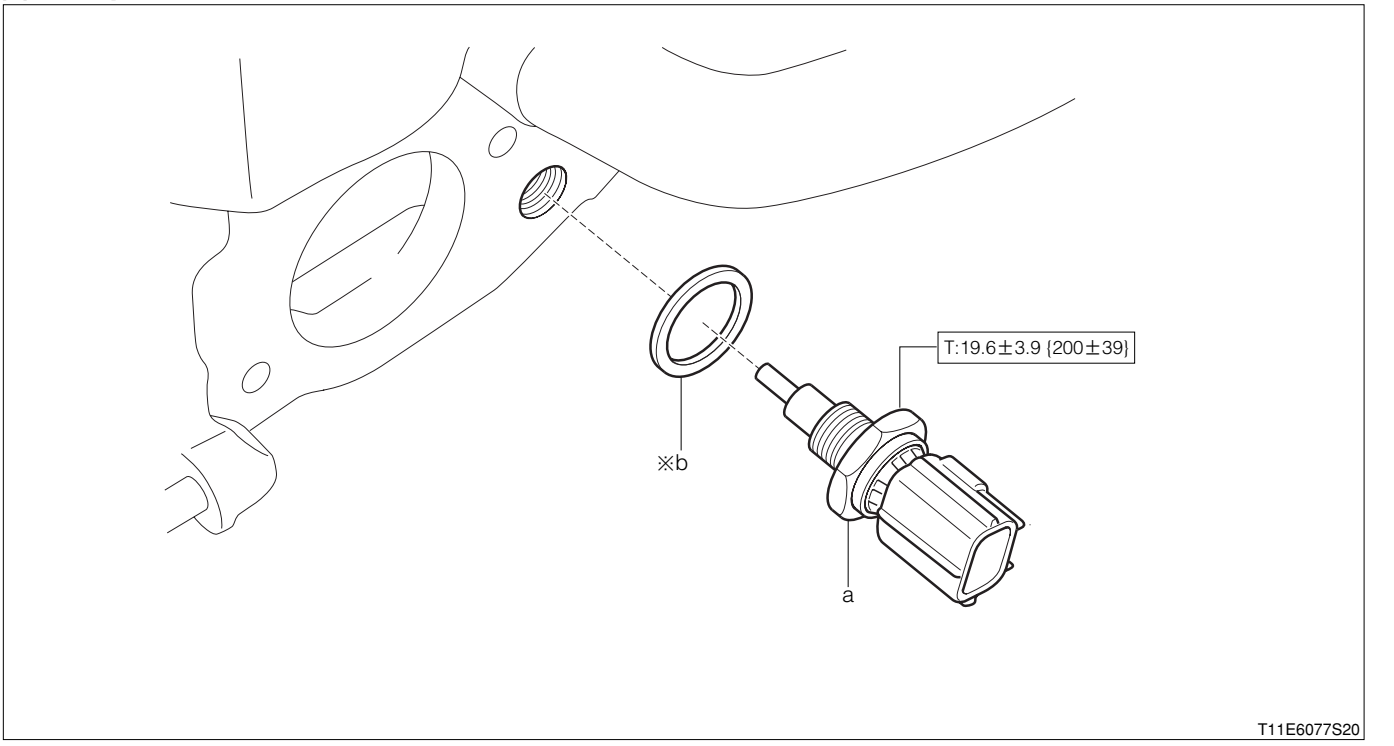
- Drain some amount of coolant from the water inlet so that it would not leak.

3.Remove the No.1 radiator hose (Engine side).
4.Remove water inlet.
Refer to Page B6-1.

5.Remove the connector of the water temperature sensor.

5-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※: Non-reusable parts
Unit: N·m {kgf·cm}

(2) Removeal and installation procedures

1 a Sensor, water temperature
2 b Gasket

5-1-4 OPERATION AFTER INSTALLATION

1.Connect the connector of the water temperature sensor.
2.Install the No.1 radiator hose (Engine side).
3.Install the water inlet.
Refer to Page B6-1.

4.Fill cooling water.
5.Connect the negative (-) terminal of the battery.
6.Start the engine and perform air-bleeding of the coolant.
7.Stop the engine and check for coolant leakage.

6 OIL CONTROL VALVE

6-1 REMOVAL AND INSTALLATION

6-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

Engine oil

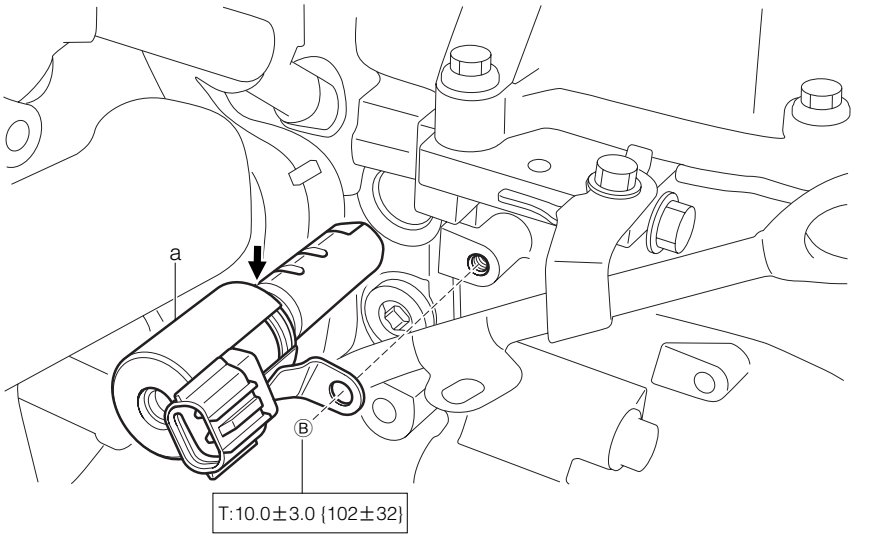
6-1-2 OPERATION BEFORE REMOVAL

1.Disconnect the negative (-) terminal of the battery.
2.Remove the air cleaner case S/A.
Refer to Page B3-1.

3.Remove the ventilation hose Ay.
4.Remove the connector of the cam timing oil control valve Ay.

6-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



T11E6081S20

➡:Engine oil
Unit: N·m{kgf·cm}

(2) Removeal and installation procedures

▲ 1 a Cam timing oil control valve Ay

6-1-4 POINTS OF INSTALLATION

(1) Cam timing oil control valve Ay

1.Apply engine oil to the O-ring of the valve Ay.
LUBRICANT: Engine oil

6-1-5 OPERATION AFTER INSTALLATION

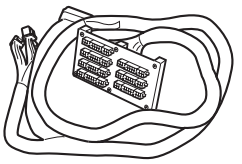
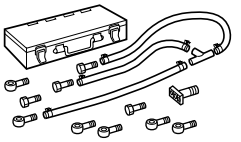
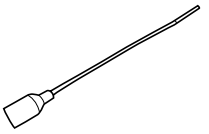
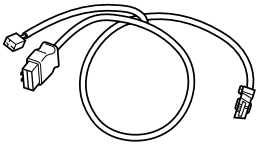
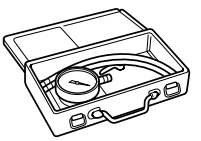
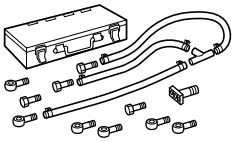
1.Connect the connector of the cam timing oil control valve Ay.
2.Install the ventilation hose Ay.
3.Install the air cleaner case S/A.
Refer to Page B3-1.

4.Connect the negative (-) terminal of the battery.

7 ENGINE CONTROL SYSTEM

7-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09842-97209-000	Sub-harness,EFI computer check
	09268-41047-000 (09268-41045-000)	Tool set,injection measuring
	09842-30070-000	Wire,EFI inspection
	09991-87402-000	Wire,tacho-pulse pick up
	09991-87403-000	Wire,diagnosis check
	09991-87404-000 (09991-87401-000)	Wire,engine control system inspection
	09991-87301-000	Set,Diagnosis tester
	09965-97230-000 (09965-97207-000)	Trouble-Shooting program card
	09268-87701-000	Gauge,EFI fuel pressure
	09268-87702-000	Tool set,measuring

Instrument

Tachometer,Timing light,Compression gauge,Sound scope,Electrical Tester,Oscillo scope

WARNING

- If the vehicle is driven with the SST (EFI computer check sub harness, etc.) connected there is a possibility of causing malfunction and may be very dangerous. Therefore, remove it without fail before running.

7-2 HANDLING INSTRUCTIONS OF CONTROL SYSTEM

7-2-1 INSTRUCTIONS ON USE OF THIS SERVICE MANUAL

1.This service manual has been compiled in such a way that the manual may be used both in regions where the type certification is implemented based on the EU exhaust emission approval, and other regions.

2.Hence, with regard to the assignment, reading, erasing of diagnostic trouble codes and those steps of checks, repairs and confirmation, the service manual contains the procedures for both cases: One is a procedure that uses the diagnosis tester (DS-21/DS-Ⅱ) or the OBD Ⅱ generic scan tool, and the other is a procedure that does not use this tester or tool.

Therefore, the following instructions given below must be observed.

3.About Use of diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ Generic Scan Tool

(1) Regions where type certification is implemented based on EC exhaust emission approval: Make sure to use the diagnosis tester (DS-21/DS-Ⅱ) or the OBD Ⅱ generic scan tool.

(2) Other regions: You may use or not use the diagnosis tester (DS-21/DS-Ⅱ) or the OBD Ⅱ generic scan tool. You may perform the operation, employing whichever method that will be easier to you.

4.Instructions to be followed concerning Diagnosis Trouble Codes

Diagnosis trouble codes, such as P0105/31 (Four-digit code/two-digit code) are posted additionally.

(1) Regions where type certification is implemented based on EC exhaust emission approval

Make sure to use only four-digit trouble codes (E.G.P0105) whose have been assigned according to the ISO regulations.

(2) Other regions:

You may perform the operation using the four-digit code, employing the diagnosis tester (DS-21/DS-Ⅱ) or the OBD Ⅱ generic scan tool. Or you may perform the operation using the two-digit codes (E.G.31), without the use of the tester or tool. You may perform the operation, employing whichever method that will be easier to you.

Or you may perform the operation using the two-digit codes (E.G.31), without the use of the tester or tool.

You may perform the operation, employing whichever method that will be easier to you.

NOTE

- The OBD Ⅱ generic scan tool means a scan tool complying with the ISO 14230 (KWP2000) format.
- In cases where the OBD Ⅱ generic scan tool is employed, not all diagnostic trouble codes (Four-digit codes) can be read out. It should be noted that only those diagnostic trouble codes in which "zero" follows after "P", for example, P0XXX, can be read out.
- The accuracy of the two-digit codes in diagnosing malfunctioning components is slightly inferior to that of the four-digit codes.
- Hereinafter, those regions where the type certification is implemented based on the EU exhaust emission approval, is referred to as the "EU specifications".

7-2-2 PRECAUTIONARY MEASURES DURING TROUBLE-SHOOTING

1.Before the diagnosis information memorized in the EFI ECU memory is confirmed, never disconnect the connector from the EFI ECU, the battery negative (-) terminal, the EFI ECU earth wire from the engine, or the main fuse.

2.The diagnosis information memorized in the EFI ECU memory can be erased by using the diagnosis tester (DS-21/DS-Ⅱ) or the OBD-II generic scan tool in the same way as the check. Therefore, before using the tester, read its instruction manual so as to understand the functions furnished and how to use it.

3.Priority in trouble-shooting

(1) If the priority in trouble-shooting for a number of diagnostic trouble codes is given in the concerned DTC flow chart, make sure to follow the priority.

(2) If not given, follow the priority given below and perform the trouble-shooting for each diagnostic trouble code (DTC).

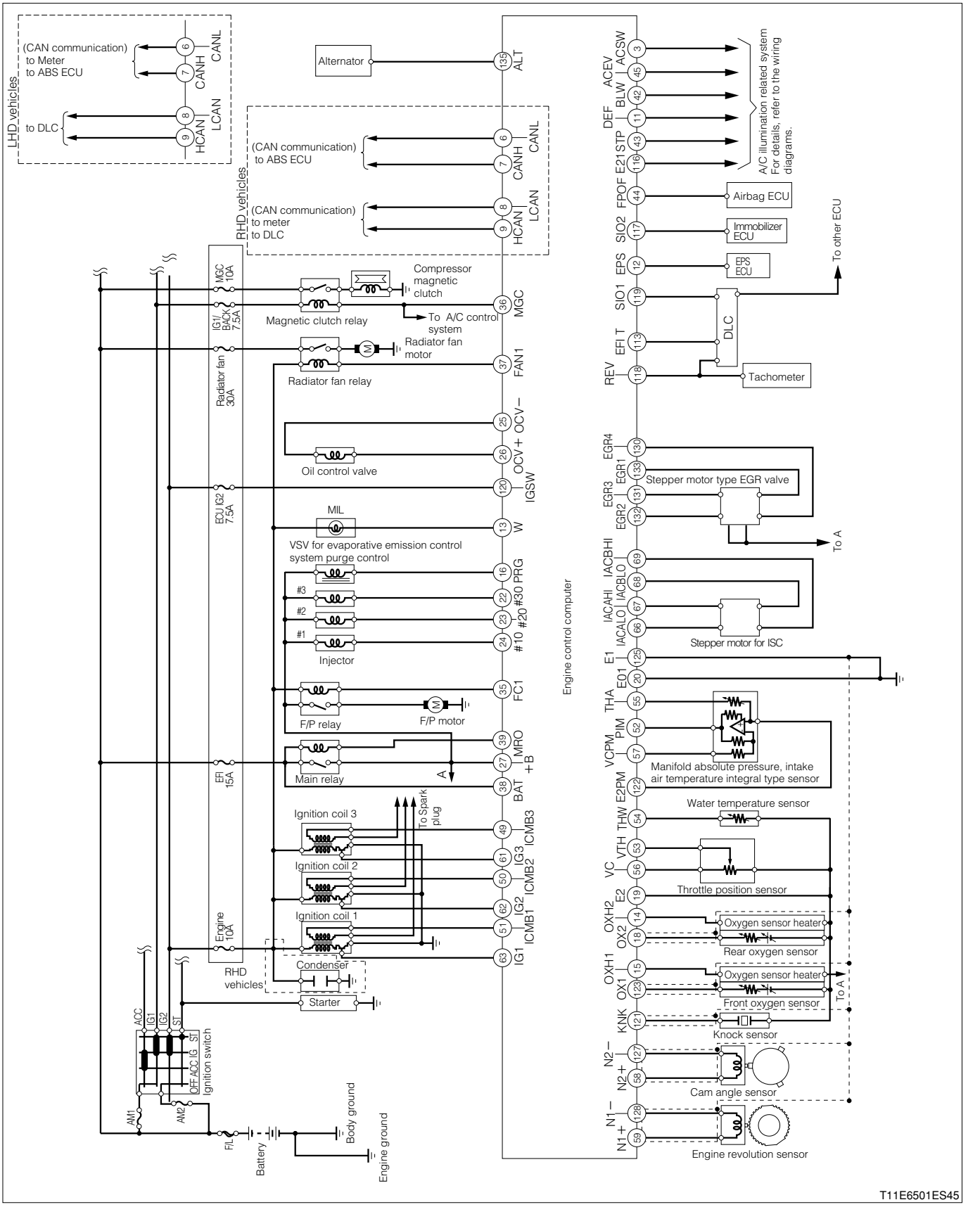
(1) DTC other than DTC P0171/25, DTC P0172/26 (Too lean/too rich in fuel system), and DTC 0300/17, DTC P0301-P0303/17 (Misfire found)

(2) DTC P0171/25, DTC P0172/26 (Too lean/too rich in fuel system)

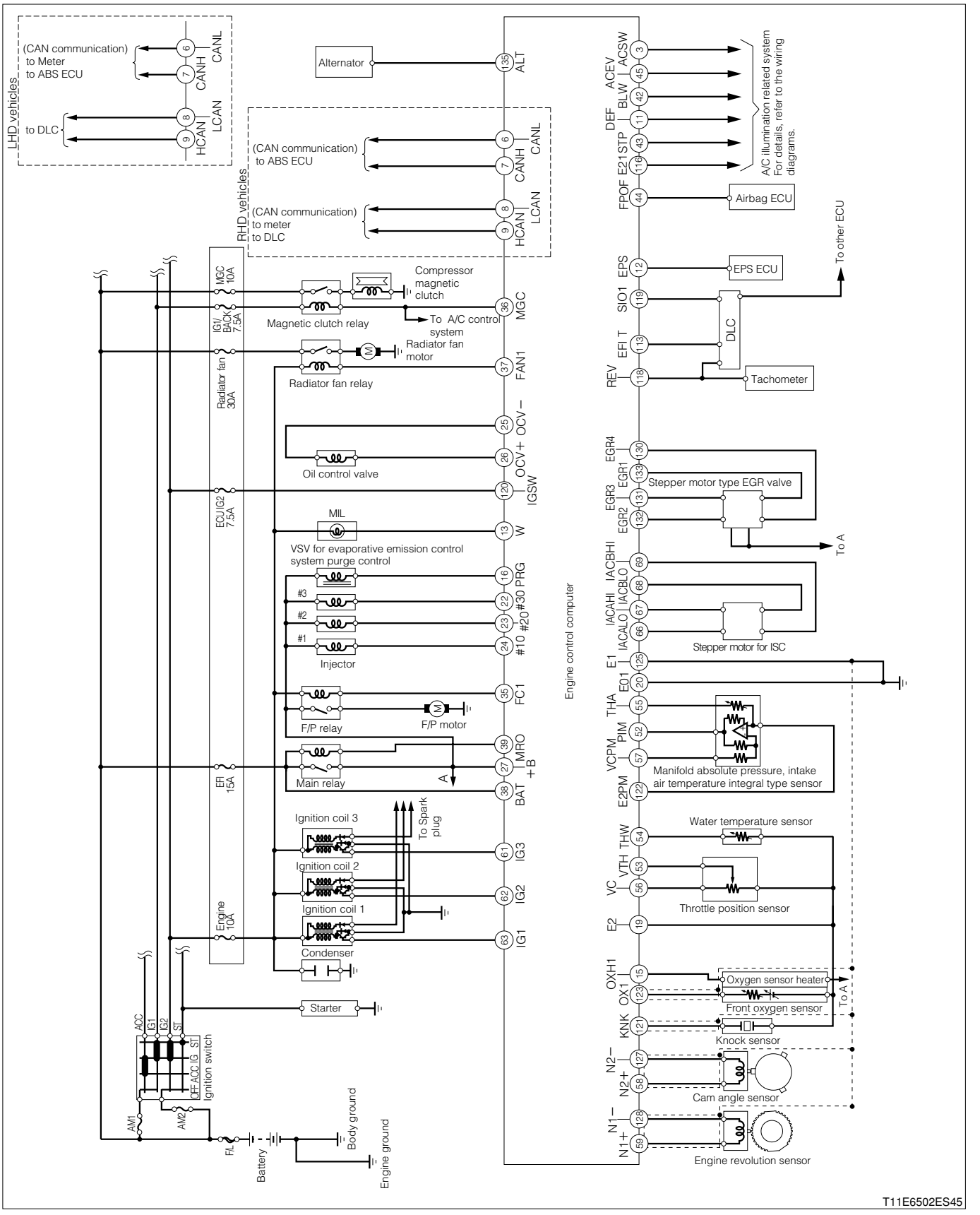
(3) DTC 0300/17, DTC P0301-P0304/17 (Misfire found)

7-3 SYSTEM WIRING DIAGRAM

7-3-1 FOR EU SPECIFICATIONS



7-3-2 FOR GENERAL SPECIFICATIONS



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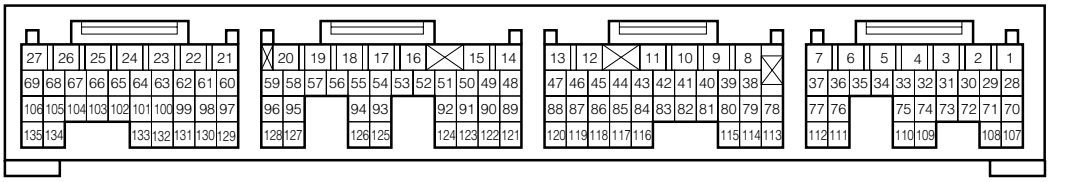
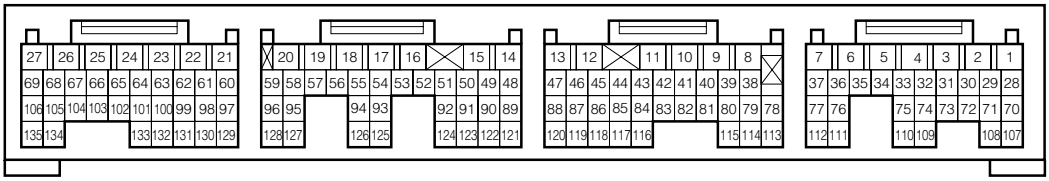
7-4 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS

(1) For EU specifications



H11E6091S10

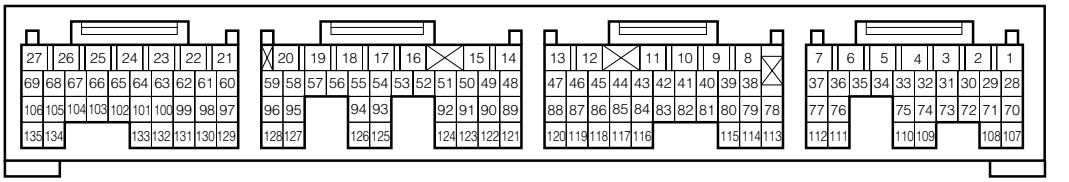
Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
1	—	—	31	—	—
2	—	—	32	PBSW	Brake negative pressure switch
3	ACSW	Air conditioner switch	33	—	—
4	—	—	34	—	—
5	—	—	35	FC1	Fuel pump relay driving
6	CANL	CAN communication LO (1)	36	MGC	Magnetic clutch relay driving
7	CANH	CAN communication HI (1)	37	FAN1	Radiator fan relay driving
8	LCAN	CAN communication LO (2)	38	BAT	Backup power supply
9	HCAN	CAN communication HI (2)	39	MRO	Main relay driving
10	—	—	40	—	—
11	DEF	Defogger signal	41	—	—
12	EPS	EPS ECU	42	BLW	Heater blower signal
13	W	Engine check lamp	43	STP	Stop lamp signal
14	OXH2	Rear oxygen sensor heater	44	FPOF	Airbag fuel pump OFF request signal
15	OXH1	Front oxygen sensor heater	45	ACEV	Air conditioner evaporator temperature sensor
16	PRG	VSV for evaporative emission control system purge control	46	—	—
17	—	—	47	—	—
18	OX2	Rear oxygen sensor signal	48	—	—
19	E2	Sensor system earth	49	ICMB3	Ion current combustion control signal (#3)
20	E01	Power system earth	50	ICMB2	Ion current combustion control signal (#2)
21	—	—	51	ICMB1	Ion current combustion control signal (#1)
22	#30	Injector (#3)	52	PIM	Manifold absolute pressure sensor
23	#20	Injector (#2)	53	VTH	Throttle position sensor
24	#10	Injector (#1)	54	THW	Engine water temperature sensor
25	OCV−	Oil control valve driving (+)	55	THA	Intake air temperature sensor
26	OCV+	Oil control valve driving (+)	56	VC	Sensor power supply
27	+B	EFI ECU power supply	57	VCPM	Sensor power supply (Exclusively for manifold absolute pressure sensor)
28	—	—	58	N2+	Cam angle sensor(+)
29	—	—	59	N1+	Engine revolution sensor(+)
30	—	—	60	—	—



H11E6091S10

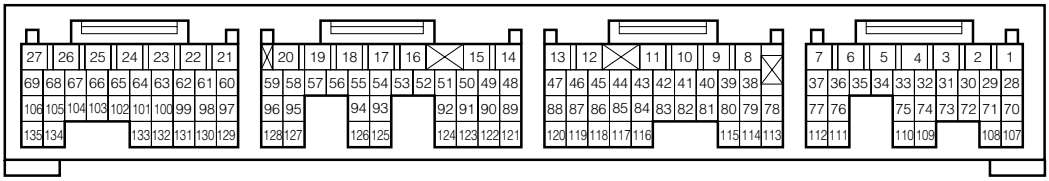
Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
61	IG3	Ignition coil (#3)	99	—	—
62	IG2	Ignition coil (#2)	100	—	—
63	IG1	Ignition coil (#1)	101	—	—
64	—	—	102	—	—
65	—	—	103	—	—
66	IACALO	Stepper motor 1 for ISC	104	—	—
67	IACAHI	Stepper motor 2 for ISC	105	—	—
68	IACBLO	Stepper motor 3 for ISC	106	—	—
69	IACBHI	Stepper motor 4 for ISC	107	STSW	Starter switch
70	—	—	108	—	—
71	—	—	109	—	—
72	—	—	110	—	—
73	—	—	111	—	—
74	—	—	112	—	—
75	—	—	113	EFI T	EFI-T check terminal
76	—	—	114	—	—
77	—	—	115	—	—
78	—	—	116	E21	Body sensor earth
79	—	—	117	SIO2	Immobilizer communication
80	—	—	118	REV	DLC (REV terminal)
81	—	—	119	SIO1	DLC (Diagnostic device)
82	—	—	120	IGSW	Ignition switch
83	—	—	121	KNK	Knock sensor
84	—	—	122	E2PM	Sensor earth (Exclusively for manifold absolute pressure sensor)
85	—	—	123	OX1	Front oxygen sensor
86	—	—	124	—	—
87	—	—	125	E1	Calculation system earth
88	—	—	126	—	—
89	—	—	127	N2−	Cam angle sensor(−)
90	—	—	128	N1−	Engine revolution sensor(−)
91	—	—	129	—	—
92	—	—	130	EGR4	Stepper motor type EGR valve 4
93	—	—	131	EGR3	Stepper motor type EGR valve 3
94	—	—	132	EGR2	Stepper motor type EGR valve 2
95	—	—	133	EGR1	Stepper motor type EGR valve 1
96	—	—	134	ALTC	Alternator voltage control output
97	—	—	135	ALT	Alternator cut control output
98	—	—			

(2) For general specifications



H11E6091S10

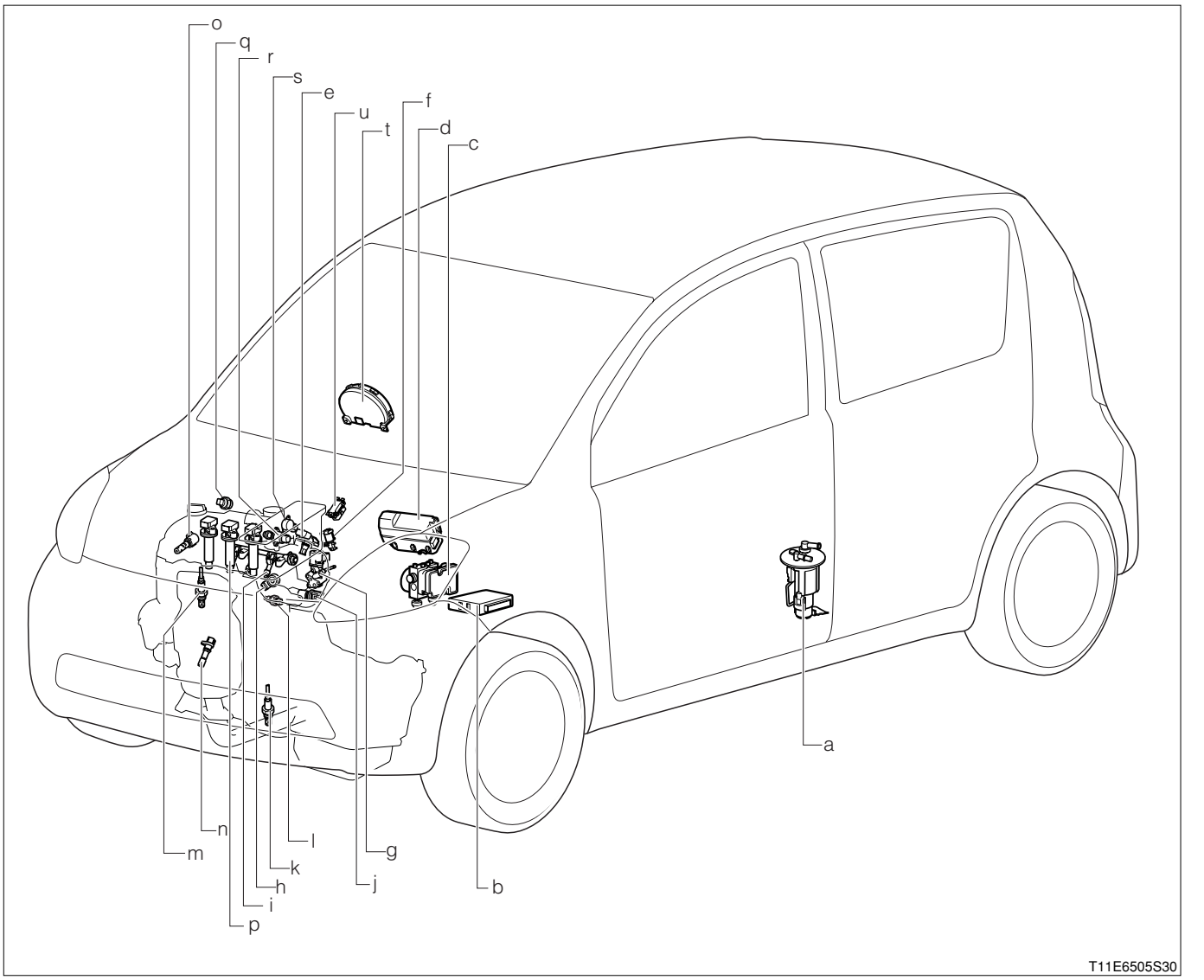
Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
1	—	—	31	—	—
2	—	—	32	PBSW	Brake negative pressure switch
3	ACSW	Air conditioner switch	33	—	—
4	—	—	34	—	—
5	—	—	35	FC1	Fuel pump relay driving
6	CANL	CAN communication LO (1)	36	MGC	Magnetic clutch relay driving
7	CANH	CAN communication HI (1)	37	FAN1	Radiator fan relay driving
8	LCAN	CAN communication LO (2)	38	BAT	Backup power supply
9	HCAN	CAN communication HI (2)	39	MRO	Main relay driving
10	—	—	40	—	—
11	DEF	Defogger signal	41	—	—
12	EPS	EPS ECU	42	BLW	Heater blower signal
13	W	Engine check lamp	43	STP	Stop lamp signal
14	—	—	44	FPOF	Airbag fuel pump OFF request signal
15	OXH1	Front oxygen sensor heater	45	ACEV	Air conditioner evaporator temperature sensor
16	PRG	VSV for evaporative emission control system purge control	46	—	—
17	—	—	47	—	—
18	—	—	48	—	—
19	E2	Sensor system earth	49	—	—
20	E01	Power system earth	50	—	—
21	—	—	51	—	—
22	#30	Injector (#3)	52	PIM	Manifold absolute pressure sensor
23	#20	Injector (#2)	53	VTH	Throttle position sensor
24	#10	Injector (#1)	54	THW	Engine water temperature sensor
25	OCV−	Oil control valve driving (−)	55	THA	Intake air temperature sensor
26	OCV+		56	VC	Sensor power supply
27	+B	EFI ECU power supply	57	VCPM	Sensor power supply (Exclusively for manifold absolute pressure sensor)
28	—	—	58	N2+	Cam angle sensor(+)
29	—	—	59	N1+	Engine revolution sensor(+)
30	—	—	60	—	—



H11E6091S10

Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
61	IG3	Ignition coil (#3)	99	—	—
62	IG2	Ignition coil (#2)	100	—	—
63	IG1	Ignition coil (#1)	101	—	—
64	—	—	102	—	—
65	—	—	103	—	—
66	IACALO	Stepper motor 1 for ISC	104	—	—
67	IACAHI	Stepper motor 2 for ISC	105	—	—
68	IACBLO	Stepper motor 3 for ISC	106	—	—
69	IACBHI	Stepper motor 4 for ISC	107	STSW	Starter switch
70	—	—	108	—	—
71	—	—	109	—	—
72	—	—	110	—	—
73	—	—	111	—	—
74	—	—	112	—	—
75	—	—	113	EFI T	EFI-T check terminal
76	—	—	114	—	—
77	—	—	115	—	—
78	—	—	116	E21	Body sensor earth
79	—	—	117	SIO2	Immobilizer communication
80	—	—	118	REV	DLC (REV terminal)
81	—	—	119	SIO1	DLC (Diagnostic device)
82	—	—	120	IGSW	Ignition switch
83	—	—	121	KNK	Knock sensor
84	—	—	122	E2PM	Sensor earth (Exclusively for manifold absolute pressure sensor)
85	—	—	123	OX1	Oxygen sensor
86	—	—	124	PST	Hydraulic power steering switch
87	—	—	125	E1	Calculation system earth
88	—	—	126	—	—
89	—	—	127	N2−	Cam angle sensor(−)
90	—	—	128	N1−	Engine revolution sensor(−)
91	—	—	129	—	—
92	—	—	130	EGR4	Stepper motor type EGR valve 4
93	—	—	131	EGR3	Stepper motor type EGR valve 3
94	—	—	132	EGR2	Stepper motor type EGR valve 2
95	—	—	133	EGR1	Stepper motor type EGR valve 1
96	—	—	134	ALTC	Alternator voltage control output
97	—	—	135	ALT	Alternator cut control output
98	—	—			

7-5 LOCATION OF COMPONENTS



	Part name
a	Fuel pump
b	Engine control computer
c	ABS actuator
d	Relay block
e	Manifold absolute pressure/ intake air temperature integral type sensor
f	VSV for evaporative emission control system purge control
g	Stepper motor type EGR valve
h	Knock sensor
i	Injector
j	Cam angle sensor
k	Rear oxygen sensor
l	Engine water temperature sensor
m	Oxygen sensor
n	Engine revolution sensor
o	Oil control valve
p	Ignition coil
q	Brake negative pressure switch
r	Stepper motor for ISC
s	Throttle position sensor
t	Combination meter
u	DLC

7-6 HOW TO PROCEED WITH TROUBLE SHOOTING

7-6-1 GENERAL INFORMATION

1.The engine and engine control system of this vehicle are controlled by the EFI ECU. Furthermore, the vehicle is provided with the on-board diagnosis system.
Therefore, when any abnormality takes place in the input/output systems (Sensors, actuators, harnesses, connectors, etc.) of the engine control system, the EFI ECU memorizes the system concerned and informs the driver by making the malfunction indicator lamp (MIL) illuminate or flash.

2.Also the malfunction is informed to the operator by means of the malfunction indicator lamp (MIL). When trouble-shooting the engine, it is imperative for you to get the general idea of the onboard diagnostic system, and fully understand the precautionary measures in trouble-shooting, the items diagnostic system, and fully understand the precautionary measures in trouble-shooting, the items to be observed and how to use testers.

3.Then, conduct the trouble-shooting following the flow chart that indicates the correct procedure for the engine troubleshooting.

(1) On-board diagnostic system of vehicles for EU specifications

1.The vehicles for Europe have the following functions that comply with the 1999/102/EC (Generally called Euro-OBD) standards.

2.When the ignition switch is turned "ON", the malfunction indicator lamp (MIL) goes on. When no malfunction has been detected, the lamp will go out after the engine has started. (Check for a blown bulb)

3.While the engine is running, if the EFI ECU detects any malfunction in the emission control system/components that will affect the emissions from the vehicle, or in the power train control components, or if any malfunction is detected in the EFI ECU itself, the EFI ECU illuminates or flashes the MIL (Only when misfire is detected which will damage the catalyst). Then, the EFI ECU memorizes the malfunction area. (DTC by ISO15031-6/SAEJ2012)

4. If that malfunction will not occur in three successive running, the MIL is automatically turned off. However, the DTC will be recorded in the EFI ECU memory.

NOTE

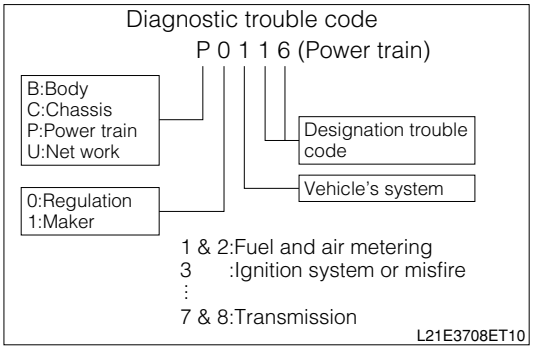
- The MIL is illuminated only by the malfunction that affects the emissions from the vehicle. (Only items bearing a circle ("○" mark) in the MIL column.)

DTC No.	De	Malfunction evaluation method	MIL
P0105/31	Manifold pressure pressure	1 trip	!
P0110/43	Intake air malfunction	1 trip	!
P0115/42	Engine co malfunction	1 trip	!
P0116/42	Engine coo circuit mance	2 trip	!
P0120/41	Throttle/P switch "A"	1 trip	!

L21E3706ET10

5.It is possible to read out various data from the engine ECU by connecting the OBD Ⅱ generic scan tool which complies with the ISO 14230 format or diagnosis tester (DS-21/DS-Ⅱ) to the DLC of the vehicle. You can perform trouble-shooting efficiently by checking these data (DTC, freeze-frame data, current data, oxygen sensor monitor data, etc.).

6.The DTC is composed of the ISO standard code (Specified by ISO 15031-6) and the manufacturer's designation code. The ISO standard code should be set pursuant to the ISO. On the other hand, the manufacturer's designation code can be freely set forth by the manufacturer within a specified limit.

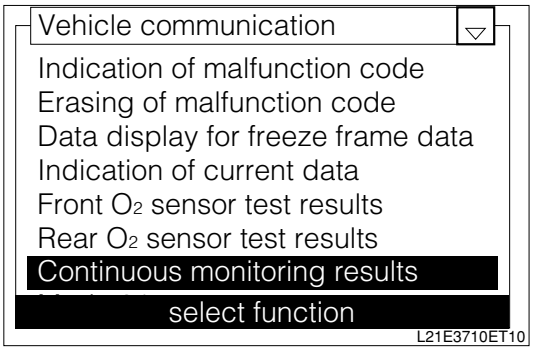


7.Many DTC have a two trip detection logic which assures avoidance of wrong detection and functions only when a malfunction is surely occurring. However, another diagnosis mode is provided, in which only a one-time final confirmation test is necessary for a service mechanic to confirm that the malfunction has been completely remedied after the repair.

DTC No.	De	Malfunction evaluation method	MIL
P0141/24	Oxygen sens malfunction	2 trip	!
P0171/25	Fuel trim (Air-fuel malfunction	2 trip	!
P0172/26	Fuel trim (Air-fuel malfunction	2 trip	!

L21E3709ET10

(1) In case DS-21 or OBD Ⅱ generic scan tool, the "Continuous monitoring results" of "Vehicle communication in CARB mode" must be selected.



L21E3710ET10

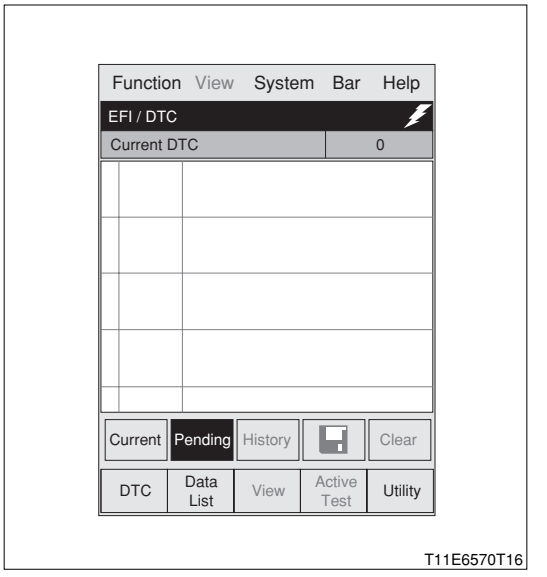
(2) In the case of the DS-II diagnosis tester, select the "Pending"of "DTC" in CARB mode.

8.When a malfunction is detected, the engine and running conditions at that moment are memorized as a freeze-frame data in the EFI ECU memory.

9.Two trip detection logic

When a malfunction is detected for the first time, that malfunction is temporarily memorized in the engine ECU memory. (First running). If the same malfunction is detected again during the second running, the MIL is illuminated and the DTC is determined. (Second running).

(However, the ignition switch should be turned off between the first running and the second running.)



T11E6570T16

(2) On-board diagnostic system of vehicles for other regions

1.When the ignition switch is turned "ON", the MIL goes on. When no malfunction has been detected, the lamp will go out after the engine has started. (Check for a blown bulb)

While the engine is running, if the ECU detects any malfunction in the engine control system/components, or if any malfunction is detected in the EFI ECU itself, the EFI ECU illuminates the MIL.

2.In addition to the illumination of the MIL, the corresponding diagnostic trouble code (DTC) is memorized in the engine ECU memory. When the malfunction has been remedied or the system returns to its normal state, the MIL automatically goes out. However, the DTC remains memorized in the engine ECU memory.

3.It is possible to read out various data from the engine ECU by connecting the diagnosis tester (DS-21/DS-Ⅱ) to the DLC of the vehicle. You can perform trouble-shooting accurately and efficiently by checking these data (DTC, freeze-frame data, current data, oxygen sensor monitor data, etc). Only when diagnosis tester (DS-21/DS-Ⅱ) is used.

4.The DTC (Diagnostic trouble code) is set to a four-digit code in accordance with ISO standard. Furthermore, the conventional two-digit code is also provided. The four-digit code can be read out by the diagnosis tester (DS-21/DS-Ⅱ). The two-digit code has been set forth by the DMC itself. This code can be read by observing the flashing pattern of the MIL.

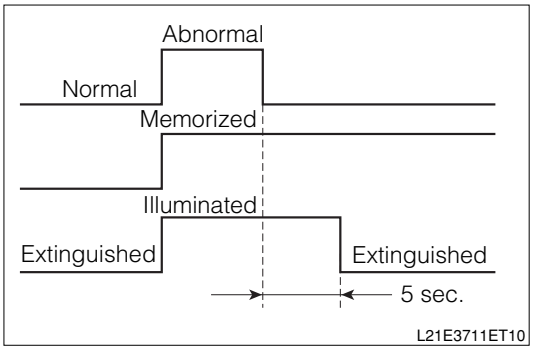
5.Some DTC have a two trip detection logic which assures avoidance of wrong detection and functions only when a malfunction is surely taking place.

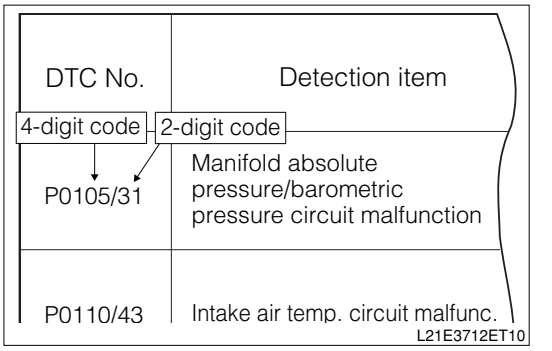
6.When a malfunction is detected, the engine and running conditions at that moment are memorized as a freeze-frame data in the EFI ECU memory.

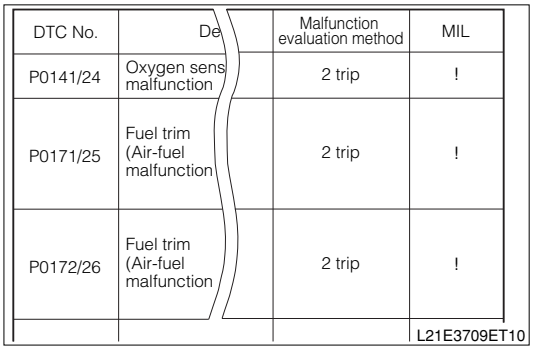
7.Two trip detection logic

When a malfunction is initially detected, that malfunction is temporarily memorized in the engine ECU memory. (First running) If the same malfunction is detected again during the second running, the MIL is illuminated and the DTC is determined. (Second running)

(However, the ignition switch should be turned off between the first running and the second running.)

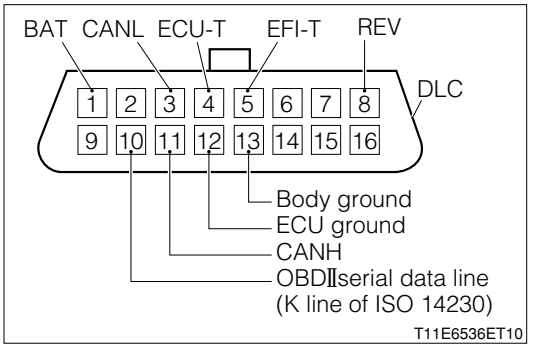






7-6-2 DLC, COMMON DESTINATIONS

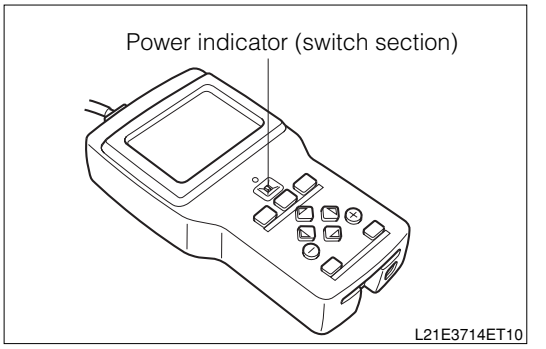
1.The vehicle engine ECU uses the ISO14230 (Euro-OBD) protocol. As regards the position, connector shape and pin arrangement, the DLC is in accordance with the ISO 15031-3 (SAEJ1962) and has complied with the ISO14230 format. The OBD Ⅱ serial data line (K line of ISO14230) is used for the OBD Ⅱ generic scan tool or the diagnosis tester (DS-21/DS-Ⅱ) in order to communicate with the ECU.



NOTE

- With the cable of the diagnosis tester (DS-21/DS-Ⅱ) connected to the DLC through the SST, turn "ON" the ignition switch. If the power indicator of the tester will not go on, conduct the following checks and repair any malfunctioning parts.

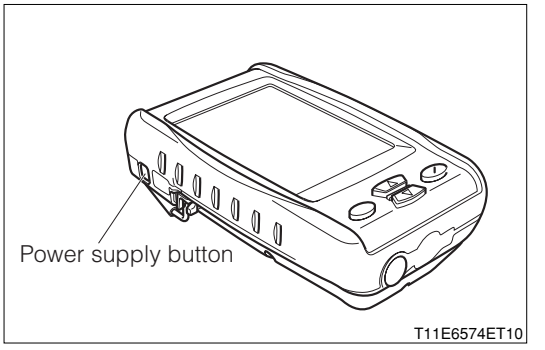
SST: 09991-87404-000



NOTE

- With the cable of the DS-Ⅱ diagnosis tester connected to the DLC, turn ON the IG switch. If the tester does not function, perform the following checks and repair the faulty parts.

(1) Connect the diagnosis tester (DS-21/DS-Ⅱ) to another vehicle.
(2) Turn "ON" the ignition switch.



7-6-3 CONNECTING PROCEDURE FOR SST (EFI COMPUTER CHECK SUB-HARNESS)

1.When the EFI ECU terminal voltage is measured with the EFI ECU connector connected to the engine ECU, connect the SST, following the procedure given below.

NOTE

- The terminal number of the SST connector is the same as the EFI ECU connector.

2.Turn "LOCK" the ignition switch. Disconnect the battery negative (-) terminal with the ignition switch turned "LOCK".

NOTE

- Be sure to memorize the diagnostic trouble code before disconnecting the battery negative (-) terminal. Otherwise, the diagnostic trouble code(s) will be erased by disconnecting the battery negative (-) terminal.

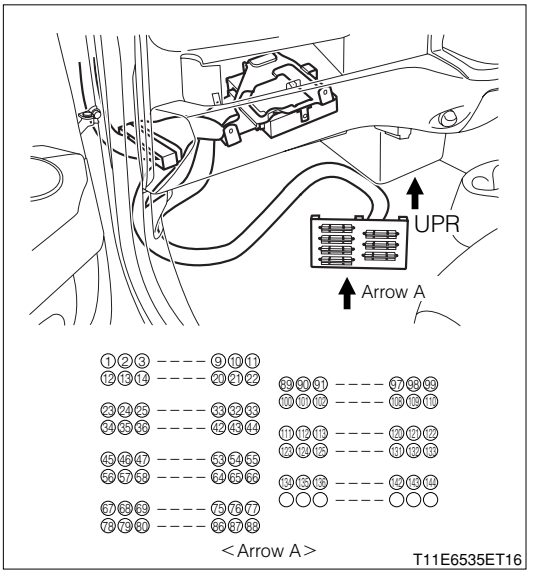
3.Remove the No.1 instrument panel under cover.
4.Remove the fuse box opening cover and lower instrument cover.
5.Connect the following SST between the wire harness connectors and the EFI ECU connectors.

SST: 09842-97209-000

6.Reconnect the battery negative (-) terminal.

CAUTION

- When disconnecting or reconnecting the EFI ECU connectors, be sure to disconnect the battery negative (-) terminal with the ignition switch and all accessory switches in the off state.
- When installing a new battery, care must be exercised not to mistake the battery polarity. Failure to observe this caution could cause EFI ECU malfunction.
- Before using the SST, be sure to check to see if short circuit or open wire exists between the terminals of the SST.



7-6-4 TROUBLE-SHOOTING PROCEDURE

(1) Discription

1. The engine control system is equipped with diagnosis functions whose are capable of diagnosing malfunctioning sections. These functions give important clues in trouble-shooting. The flow chart on the next page shows how to proceed with trouble-shooting by using these diagnosis functions.
   The flow chart shows how the diagnostic trouble code check can be used effectively. Moreover, when its results are fully reviewed, you can determine whether you are going to do the trouble-shooting according to diagnostic trouble codes or the trouble-shooting according to malfunctioning phenomena.
   The diagnosis of this system is equipped with a battery back-up function (A function which supplies power for diagnosis memory even if the ignition switch is turned "LOCK".)

NOTE

- When no diagnosis tester (DS-21/DS-Ⅱ) or OBD-II generic scan tool is used, the DTC or freeze-frame data in the flow chart can not be read out.

Σ>1. Bringing malfunctioning vehicle in garage

▼Go to Σ>2.

Σ>2. Diagnosis through interview

1.Thoroughly obtain information from the customer concerning the conditions, environment and phenomena in which the malfunction took place.

▼Go to Σ>0.

Σ>3. Normal operation confirmation of diagnosis code indication of LCD in meter.

1.Short-circuit the terminals 4(ECU-T) and 13(E) of the DLC, using SST.

SST: 09991-87403-000
09991-87404-000

2.Ensure that the LCD in the meter indicates the diagnosis codes (Including the normal codes).

SPECIFIED VALUE: Will indicate

NOTE

- It is also fine when codes other than the CAN related ones are outputted.

▼If it is OK, proceed to Σ>4.

▼When it is NG, perform the following checks for the meter and if there is no problem, replace the meter.

(1) Check of harness for meter - DLC and DLC - body earth

(2) Meter power supply system and earth system check

Σ>4. Confirmation of diagnosis code of LCD in meter (CAN-related)

1.Ensure that the CAN related diagnosis code (Code 0051 - 0053) is not indicated in the LCD in the meter.

SPECIFIED VALUE: Code 0051- 0053 are not indicated.

▼If it is OK, proceed to Σ>5.

▼When it is NG, refer to the section of CAN communication system.

Refer to Page L2-1.

Σ>5. Confirmation and record of engine check lamp condition

1.Confirm and record the lighting of the engine check lamp when turning "ON" the IG switch and after starting the engine.

	When IG switch is "ON"	After starting the engine	Judgment
Engine check lamp	Illuminated	Extinguished	a
	Illuminated	Illuminated	b
	Extinguished	Extinguished	c

▼In case of a, go to Σ>6.

▼In case of b, go to Σ>6.

▼In case of c, perform the following operations and if there is no problem, replace the meter.

(1) Harness and connector check between battery and meter

(2) Harness and connector check between meter and EFI ECU

(3) EFI ECU power supply system and earth system check

Σ>6. Confirmation and recording of diagnosis code

1.Short-circuit the terminals 5(EFI-T) and 13(E) of DLC, using the SST.
SST: 09991-87403-000
09991-87404-000

2.Confirm and record the diagnosis code outputted from the engine check lamp in the meter.
NOTE
- If the data during malfunctioning may be confirmed by the diagnosis system, record the data during malfunctioning before canceling the diagnosis code.

▼Go to Σ>7.

Σ>7. Malfunction phenomena confirmation

1.Confirm the malfunction phenomena and confirm the abnormal situation.
▼Go to Σ>8.

Σ>8. Erasure of diagnosis code

1.Erase the diagnosis code.
▼Go to Σ>9.

Σ>9. Confirmation of reproduction of malfunction phenomena

1.Confirm whether the malfunction phenomena can be reproduced.
▼If the malfunction phenomena can be reproduced, proceed to Σ>10.
▼If the malfunction phenomena cannot be reproduced, proceed to Σ>11.

Σ>10. Reconfirmation of diagnosis code

1.Perform reconfirmation of the diagnosis code.
▼If an abnormality code is outputted, proceed to Σ>12.
▼If a normal code is outputted, proceed to Σ>11.

Σ>11. Basic check

1.Perform basic checks.
Refer to Page B8-40.

▼Go to Σ>13.

Σ>12. Trouble-shooting check according to diagnosis code

1.Perform trouble-shooting concerning the diagnosis code outputted.
Refer to Page B8-63.

▼Go to Σ>14.

Σ>13. Trouble-shooting according to malfunction phenomena.

1.Estimate the cause for the malfunction phenomenon and perform trouble-shooting.
Refer to Page B8-58.

▼Go to Σ>14.

Σ>14. Canceling method of diagnosis

1.Cancel the diagnosis code.
▼Go to Σ>15.

Σ>15. Confirmation and recording of diagnosis code

1.Confirm and record the diagnosis code.

▼If a normal code is outputted, proceed to Σ>16.

▼If an abnormal code is outputted, go back to Σ>7 and perform the checks again.

Σ>16. Confirmation test

1.Ensure that the malfunction phenomena claimed by the customer concerning the vehicle has been completely solved and that it has been recovered to the normal.

▼If it is OK, finish the trouble shooting.

▼If it is NG, go back to Σ>3 and perform the checks again.

7-7 INQUIRY

1. In your attempt to remove the causes for a malfunction of the vehicle, you will not able to remove the causes unless you actually confirm the malfunctioning phenomenon. No matter how long you continue operations, the vehicle may not resume the normal state unless you confirm the malfunctioning phenomenon. The inquiry with the customer is a vital information collecting activity which is to be conducted previous to the confirmation of malfunctioning phenomenon.
2. This inquiry will provide you with an important clue in an effort to reproduce the malfunctioning phenomenon. Furthermore, the information obtained by the inquiry can be referred to during the trouble-shooting. Hence, instead of making general questions, it is necessary to focus your questions on the items related to the malfunction.
3. The main points of the inquiry given below are the most important points in analyzing the malfunction. In some cases, the information about malfunctions whose took place in the past and about the history of previous repairs, which seem to have nothing to do with the current malfunction, may prove to be helpful in solving the malfunction.
   Hence, it is important to obtain as much information as possible and keep them accurately in mind as reference information when trouble-shooting the malfunctioning phenomenon.

7-7-1 DIAGNOSIS BY INTERVIEW SHEET FOR ENGINE CONTROL SYSTEM

[INQUIRY SHEET]

Inquiry sheet					
Name of customer		Vehicle model	Engine - N/A, T/C, S/C, carburetor, EFI, LPG	Transmission - 4M/T, 5M/T, 2WD, 4WD 2A/T, 3A/T, 4A/T	
Details of vehicle	Frame No.	Registration date · ·	Date of malfunction · ·	Running distance km	
	Equipment:				
	[Sex] of customer (driver) Male Female	[Age] Approx.	[Occupation]	[Places where vehicle is mainly used] Urban district/suburb/seacoast/mountain/others	[Parking place] Outdoor/indoor
Symptom	Poor starting	• No initial explosion takes place. • Explosion is incomplete although initial explosion takes place • Hard starting (cold engine, hot engine, always) • No cranking takes place. • Other ( )			
	Faulty idling	• Fast idling ineffective • Idling speed too low • Idling speed too high • Idling unstable (cold engine, hot engine, always) • Other ( )			
	Poor drive-ability	• Hesitation (during start, during acceleration, during deceleration, during a certain period) • Knocking • Backfire • Lack of power • Poor acceleration • Poor blow • Other ( )			
	Engine stall	• During idling (during warming up, after warming up) • At time of starting • During running ( ) • Immediately after vehicle stops (Re-start possible, Re-start impossible) • Under loaded state (Air conditioner, electric load, power steering) • Other ( )			
From when malfunction has started?		• Since vehicle was purchased as a new car • Recently (since what year/ month)			
Frequency of occurrence		• At all times • Under a certain condition ( ) • Sometimes			
Meteorological conditions	Weather	• At all times • Fine • Cloudy • Rain • Snow • Other ( )			
	Temperature	• Temperature (about ˚C) (Spring, summer, autumn, winter)			
Engine condition		• When cold • After warming-up • During warming-up (Water temperature about °C)			
Road		• Urban district • Suburb • Highway • Mountainous road (Uphill, downhill)			
Driving conditions		• No relation • During racing under no load • During running (Vehicle speed: km/h, Engine speed: rpm, MT Which gear?) • During turn (right curve, left curve)			
Other situations					

State of malfunction indicator lamp (MIL)	• Illuminated or flashing at all times • Illuminated or flashing sometimes • Will not go on.	
Indication of DTC • Reading out by using OBDⅡ generic scan tool or DS-21 diagnosis tester • Reading-out of MIL flashing pattern by shorting terminal T	During checking	• Normal • Malfunction code ( )
	2nd time	• Normal • Malfunction code ( )

7-8 CONFIRMATION, RECORD AND ERASURE OF DIAGNOSIS CODE

7-8-1 CHECKING METHOD OF DIAGNOSIS

1.Prior to the check, check the malfunction indicator lamp (MIL), following the procedure given below.

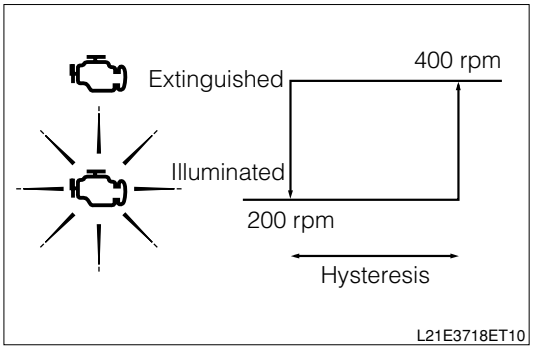
2. Check of malfunction indicator lamp

(1) Ensure that the malfunction indicator lamp goes on when the ignition switch is turned "ON", but with the engine not running.

NOTE

- If the malfunction indicator lamp (MIL) fails to go on, perform the trouble-shooting for the combination meter.

(2) Ensure that the malfunction indicator lamp goes out when the engine starts. If the lamp remains illuminated or is flashing, the diagnosis system is detecting a malfunction. Therefore, a DTC is memorized in the EFI ECU. If no DTC is memorized in the EFI ECU, perform the trouble-shooting for the malfunction indicator lamp circuit.



(1) Check of DTC, using DS-21 diagnosis tester:

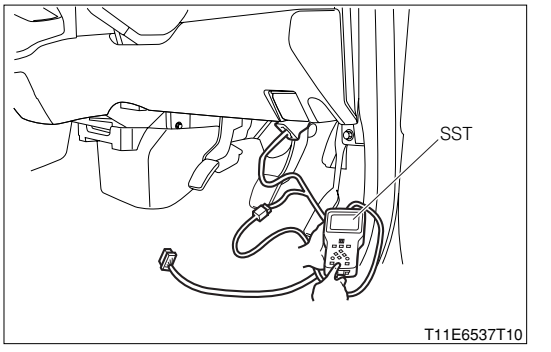
1.Prepare the DS-21 diagnosis tester.

2.Connect the DS-21 diagnosis tester to the DLC located at the lower section of the instrument panel on the driver's seat side. At this time, the DS-21 tester should be connected to the DLC with the following SST interposed.

SST: 09991-87404-000

NOTE

- When DS-21 diagnosis tester is used, refer the instruction manual for tester.



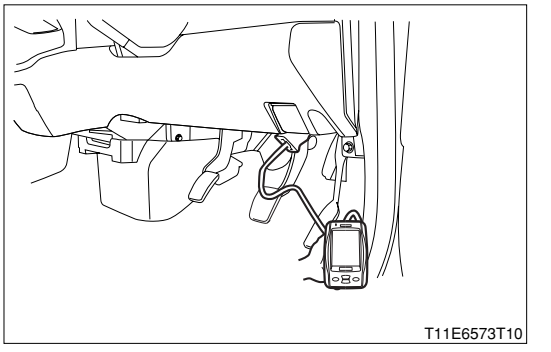
(2) Check of DTC, using DS-Ⅱ diagnosis tester or OBD Ⅱ generic scan tool

1.Prepare the DS-Ⅱ diagnosis tester or OBD Ⅱ generic scan tool.

2.Connect the DS-Ⅱ diagnosis tester or the OBD Ⅱ generic tester directly to the DLC located at the lower section of the instrument panel on the driver's seat side.

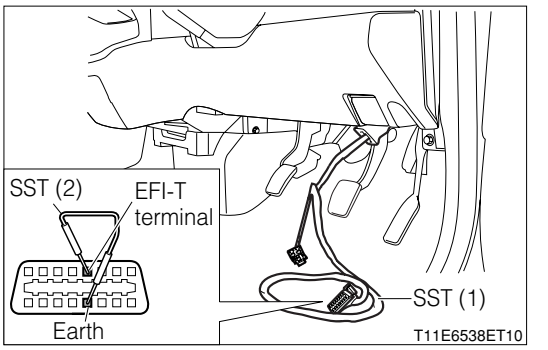
NOTE

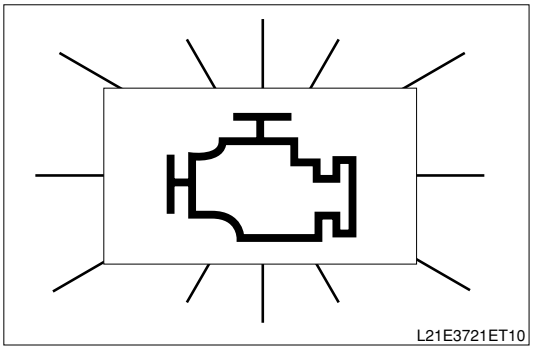
- When DS-Ⅱ diagnosis tester or OBD-Ⅱ generic scan tool is used, refer the instruction manual for each tester.



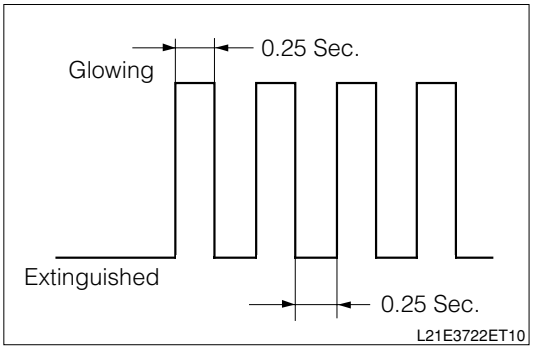
(3) Check of DTC without using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool

1. With the ignition switch turned "LOCK", connect the following SST to the DLC located at the lower section of the instrument panel on the driver's seat side.
   SST: 09991-87404-000(1)
2. Short circuit the DLC terminals 5 (EFI-T) and 13 (E), using the SST.
   SST: 09991-87403-000(2)
3. Turn the ignition switch to the "ON" position. At this time, be careful not to start the engine.
4. Read out the diagnostic trouble code (DTC) by observing the flashing number of the malfunction indicator lamp.

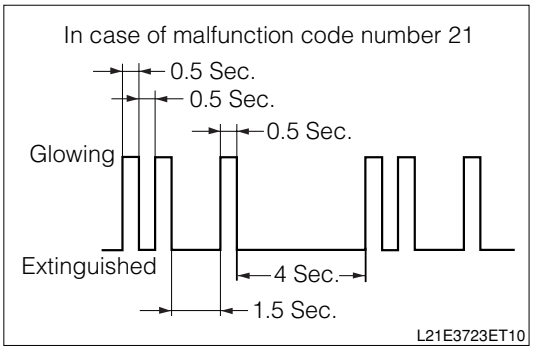




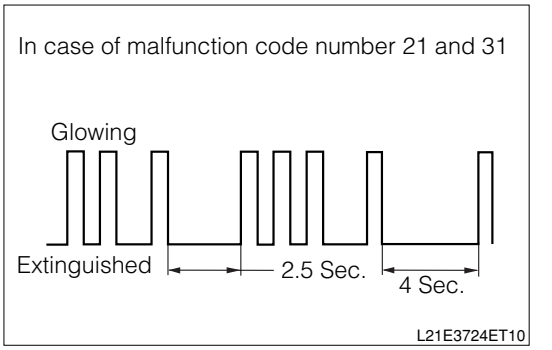
5. The illustration shows an example of the flashing pattern of the normal code. The malfunction indicator lamp glows for 0.25 second, right after the ignition switch has been turned "ON". After a lapse of 0.25 second, the malfunction indicator lamp again glows for 0.25 second. Then, this pattern will be repeated.



6. The illustration shows an example of the flashing pattern of the code No. 21. The diagnostic trouble code is composed of two digits. These two numbers are indicated by blinking of the malfunction indicator lamp. Four seconds after the ignition switch has been turned "ON", the malfunction indicator lamp indicates first the number of the tens digit of the diagnostic trouble code by glowing the same times as the number. The lamp glows for 0.5 second each time and then it is extinguished for 0.5 second. After a pause of 1.5 seconds, the lamp indicates the number of the units digit of the diagnostic trouble code by glowing the same times as the number. The lamp glows for 0.5 second each time and then it is extinguished for 0.5 second. Then, this pattern will be repeated after a pause of 4 seconds.



7.The illustration shows an example of the flashing pattern of the codes No. 21 and 31. In cases where plural malfunction codes have been detected, the two-digit diagnostic trouble codes are indicated in the sequence of the code number, starting from a smaller number. Each diagnostic trouble code is indicated in the above described pattern. A pause of 2.5 seconds occurs between the outputs of respective diagnostic trouble codes, thus separating one from the others. After all of the plural diagnostic trouble codes that have been detected are indicated, the malfunction indicator lamp is extinguished for four seconds. Then, the detected plural diagnostic trouble codes will be indicated again.



8.For the details of malfunctions, refer to the diagnosis code chart.

9.After completion of the check, disconnect the jump wire and turn "LOCK" the ignition switch. Then, disconnect the SST from the DLC.

NOTE

- In cases where plural malfunction codes have been detected, the indication will be made progressively, starting from the smaller number to the larger number.
- In cases where the diagnosis tester (DS-21/DS-Ⅱ) or the OBD Ⅱ generic scan tool is not used, it is impossible to take a reading of unidentified two-trip DTC from the SST connector.
- When malfunctioning phenomena are to be reproduced without using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool, follow the procedure given below to detect the DTC.

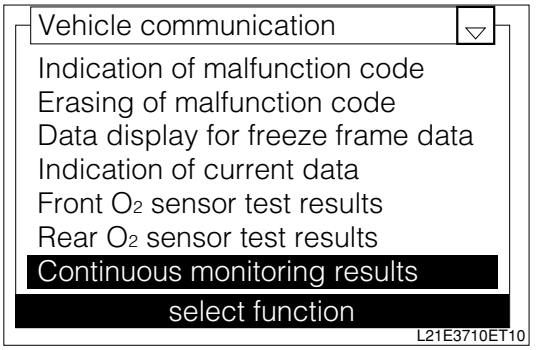
(1) It is assumed that two trip detection logic is used for the DTC detection.
(2) Therefore, after a malfunctioning phenomenon is first reproduced, turn "LOCK" the ignition switch.
(3) Then, repeat the same reproduction procedure once again.
(4) When the malfunction is reproduced again, the malfunction indicator lamp goes on and the DTC is memorized in the engine ECU.

NOTE

- The diagnosis codes are for reading out use.

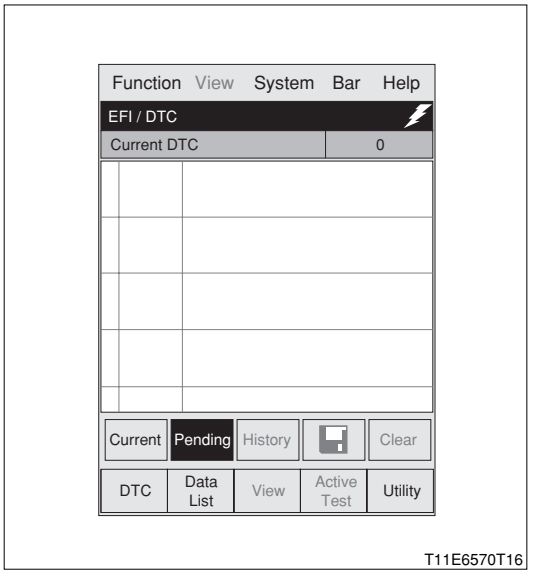
NOTE

- When malfunctioning phenomena are to be reproduced with the DS-21 diagnosis tester or OBD Ⅱ generic scan tool connected to the DLC, the "Continuous monitoring results" function can be used. (In the case of the diagnosis tester (DS-21/DS-Ⅱ), select the "Continuous monitoring results" of the "Vehicle communication" in CARB mode.) This function makes it possible to indicate the DTC when the malfunctioning phenomenon is first reproduced. (Request of onboard monitoring test results of ISO 15031-5 Continuous monitoring system.)



NOTE

- In the case of the DS-Ⅱ diagnosis tester, select the "Pending"of "DTC" in CARB mode.



7-8-2 CANCELING METHOD OF DIAGNOSIS

1.The DTC and freeze-frame data can be erased through the following methods.

(1) The diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool is used to erase the DTC. (For the operating procedure, refer to the instruction manual.)

(2) The power supply to the EFI ECU is shut off to erase the DTC without using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. (Disconnect the battery negative (-) terminal or detach the EFI fuse.)

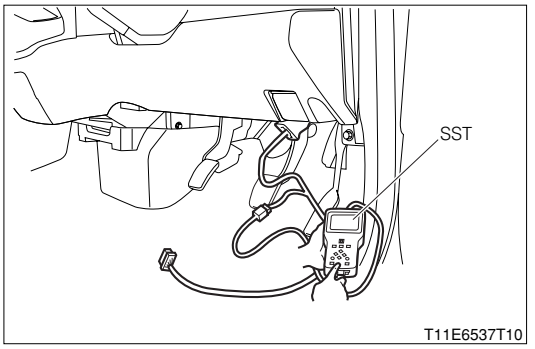
(1) When DS-21 diagnosis is used:

1.In the same way as the check of DTC, connect the diagnosis tester (DS-21/DS-Ⅱ) to the DLC with the following SST interposed.

SST: 09991-87404-000

NOTE

- When DS-21 diagnosis tester is used, refer the instruction manual for tester.

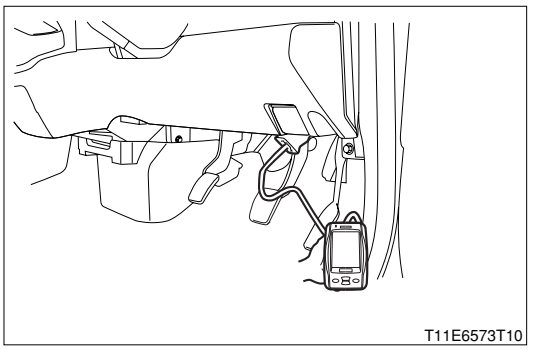


(2) When DS-21 diagnosis tester or OBD Ⅱ generic scan tool is used:

1.In the same way as the check of DTC, connect the DS-Ⅱ diagnosis tester or the OBD Ⅱ generic scan tool directly to the DLC.

NOTE

- When DS-Ⅱ diagnosis tester or OBD Ⅱ generic scan tool is used, refer the instruction manual for each tester.


T11E6573T10

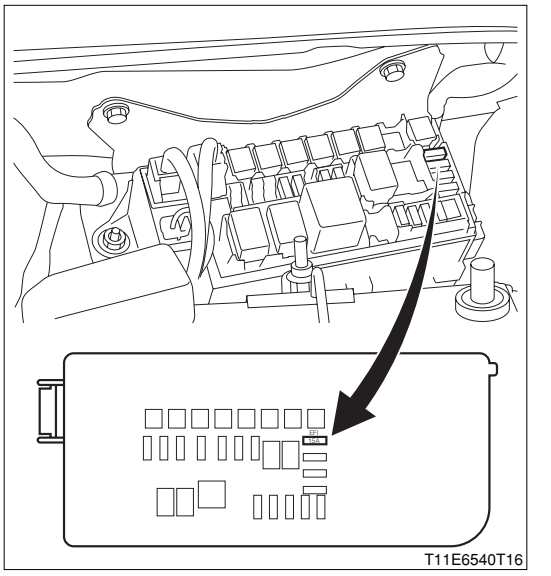
(3) When diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool is not used:

1.Erasure by disconnecting EFI fuse

To erase the diagnostic trouble codes (DTC) memorized in the ECU after malfunctions have been repaired, disconnect the EFI fuse from the relay block for at least 60 seconds with the ignition switch turned "LOCK". (When ambient temperature is about 20°C.)

NOTE

- It is possible to complete this erasing for approximately 60 seconds. In some cases, however, it may take longer. Furthermore, the erasing can be made by disconnecting the circuit, such as the battery power supply and fusible link. In cases where the battery negative (-) terminal is to be disconnected, record the radio channels in advance. After completion of the operation, set the radio channels the same as before.
- In cases where the same malfunction (DTC) cannot be detected again during the 40 cycles of the engine warming-up, the DTC and freeze-frame data will be automatically erased from the ECU memory. (Only in the case of vehicles with EU specifications)
- Warming-up cycle
- The warming-up cycle refers to a driving cycle that sufficiently allows the water temperature to rise by at least 22°C above the temperature at the time of engine starting and to reach at least 70°C.
- Driving cycle
- The driving cycle consists of the engine starting and engine stopping.


T11E6540T16

7-9 SYMPTOM CONFIRMATION

7-9-1 CONFIRMATION OF REPRODUCTION OF MALFUNCTIONING PHENOMENA

1. In the course of trouble-shooting, the operator can not pinpoint the cause for the malfunction unless he confirms the phenomenon. For this purpose, it is indispensable to reproduce the malfunctioning phenomenon by creating conditions and environments that are similar to those customer.
2. As for phenomena whose can not be reproduced easily, it is necessary to produce running conditions that are similar to those when the malfunction occurred (Road surface condition, weather condition, driving condition). For this end, it is of great importance to try to reproduce the conditions that are similar to those when the malfunction occurred (Road surface condition, weather relays by hand), heat (applying hot air) and water (Applying moisture).
3. Vibration, heat or moisture can constitute causes for malfunction that are difficult to reproduce.
4. Therefore, with the vehicle in a stationary state, you can perform the following malfunction reproduction simulation tests given below.
   Moreover, if you presume a section (Part) which can cause a malfunction and connect a tester, etc. to that section so as to confirm the malfunctioning phenomenon, you can also achieve a function to that section so as to confirm the malfunctioning phenomenon, you can also achieve a function evaluation of that section (Part).

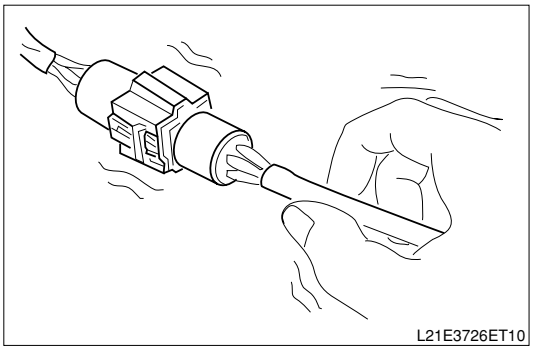
(1) Malfunction reproduction simulation test methods

① Vibration method:

1. When vibration is thought to be the main cause

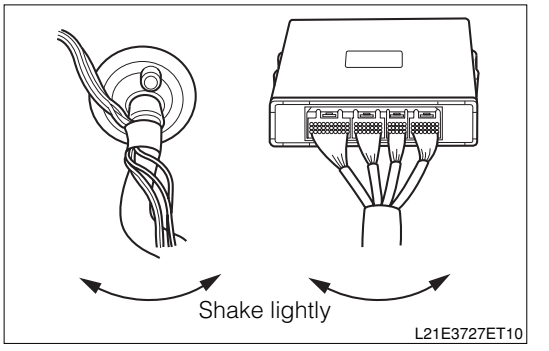
(1) Connector

Lightly shake the connector vertically and laterally.



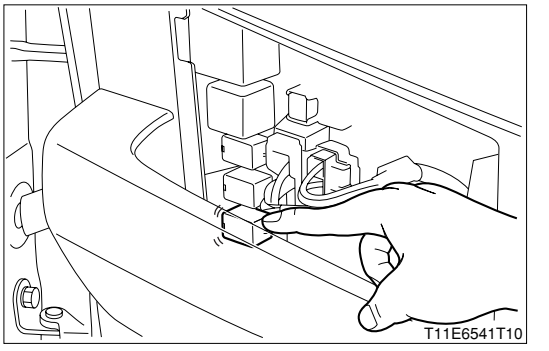
(2) Wire harness

Lightly shake the wire harness vertically and laterally. The points to be checked are connector joints, the vibrating point and the section where the wire harness is passing through the body.



(3) Parts, sensors

With your finger, apply light vibrations to a part of the sensor which is presumed to be the cause for the malfunction. Check to see if the malfunction is reproduced.



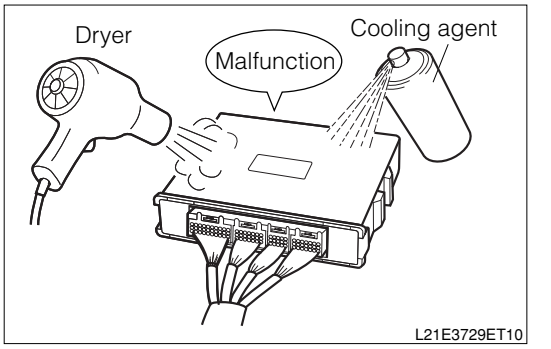
NOTE

- Be careful not to apply too strong vibration to a relay, for it can cause an open wire in the relay.

② **Cool/hot method:**

1.When a suspected section is likely causing the malfunction when it is cold or hot.

(1) Heat a component which is presumed to be causing the malfunction by using a dryer or the like. Check to see if the malfunction occurs.



CAUTION

- Do not heat the section beyond 60℃. (Temperature limit to assure that no damage be made to the component.)
- Do not directly heat the parts inside the ECU.

③ **Water applying method:**

1.When the malfunction is believed to occur on rainy days or under humid conditions. Apply water to the vehicle. Check to see if the malfunction occurs.

NOTE

- Never apply water directly to the engine compartment. By applying water to the front of the radiator, you can indirectly change the temperature and humidity.
- Never apply water directly to the electronic parts.
- If rain leaks into the vehicle compartment, rain may get into the inside of the ECU through the wire harnesses. If the vehicle has experienced any rain leakage before, utmost attention must be paid in respect to this point.

7-9-2 RECHECK AND MAKING RECORD OF DTC/FREEZE-FRAME DATA

1.By checking the DTC/freeze-frame data after confirming the reproduction of the malfunctioning phenomenon, it is possible to judge whether the system related to the DTC that was indicated before confirmation of the reproduction is now functioning properly or not. Then, you are to proceed to one of the following three steps.

(1) When a DTC was indicated at the time of checking the DTC and the same DTC is indicated after the confirmation of reproduction of the malfunction, it indicates that the malfunction is still persisting in the diagnosis circuit. Proceed to the trouble-shooting according codes.

(2) When no abnormal code is indicated, although the occurrence of malfunction was observed during the confirmation of reproduction of malfunction, a malfunction other than those related to the diagnosis system is likely taking place. Proceed to the trouble-shooting according to malfunctioning phenomena.

(3) When no malfunction is observed during the confirmation of reproduction of malfunction, and the normal code is indicated at the check of the DTC, it is presumed that an abnormality, such as poor contacts at the harnesses and connectors, occurred in the past, but now they are functioning properly. Check the harnesses and connectors of those systems related to the DTC that was indicated before the confirmation of reproduction of the malfunctioning phenomenon.

7-10 BASIC CHECK

7-10-1 BASIC ENGINE CHECK FLOW CHART

1.When the ECU is detecting no DTC during the reproduction test of malfunctioning phenomena and when no abnormality is found by the visual inspection, it is necessary to progressively perform the trouble-shooting for circuits which are most likely causing the malfunctions.

2.In many cases, sections causing malfunctions can be narrowed down quickly and effectively by performing the basic engine check indicated in the following flow chart. Therefore, it is very important to perform this check for the engine trouble-shooting.

(1) Basic engine check

Σ>1. Check the battery voltage.

1.Is the battery voltage 11 V or more with the engine in a stopped state?

▼If it is OK, go to Σ>2.

▼If it is NG, charge the battery or replace it.

Σ>2. Check the engine cranking.

1.Does the engine crank?

▼If it is OK, go to Σ>3.

▼If it is NG, go to "Matrix Table for Trouble-Shooting According to Malfunctioning Phenomena".

Refer to Page B8-58.

Σ>3. Check the engine starting.

1.Does the engine start?

▼If it is OK, go to Σ>4.

▼If it is NG, go to Σ>6.

Σ>4. Check the engine idle speed.

1.Warm up the engine, until the engine water temperature reaches 90℃ or more.

2.Turn "LOCK" all electric load switches (Including A/C switch).

3.Set the transmission to neutral.

4.When the DS-21 diagnosis tester is used:

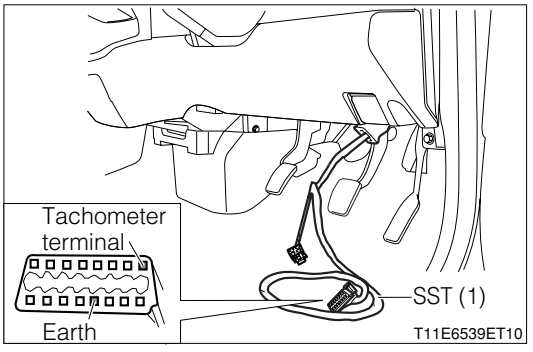
(1) Connect the DS-21 tester to the DLC with the SST interposed.

SST: 09991-87404-000

5.When the DS-Ⅱ diagnosis tester or OBD Ⅱ generic scan tool is used:

(1) Connect the DS-Ⅱ diagnosis tester or OBD Ⅱ generic scan tool to the DLC directly.

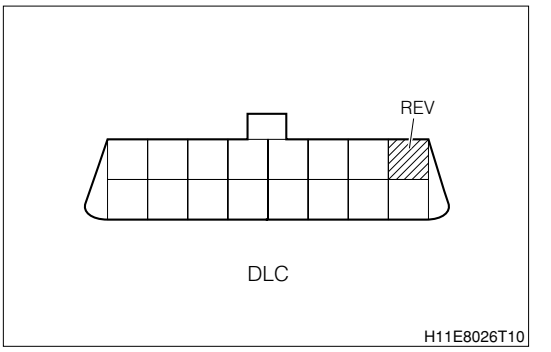
6.Check the engine idle speed.



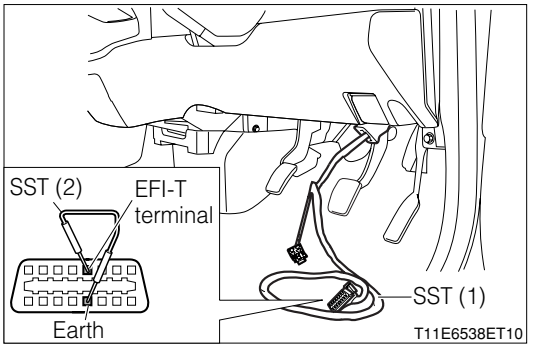
7.When the diagnosis tester (DS-21/DS-Ⅱ) or general-purpose tester is not used, connect a tachometer to the Tachometer terminal.
(1) Install an engine tachometer to the terminal "REV" of the DLC, using the SST.
SST: 09991-87402-000
09991-87404-000

NOTE
- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

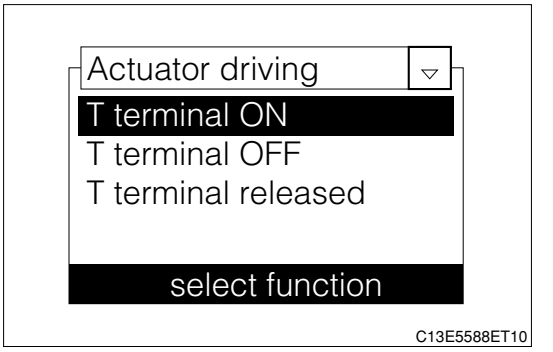
SPECIFIED VALUE: 800^{+100}_{-50} rpm
▼If it is OK, go to Σ>5.
▼If it is NG, go to "Matrix Table for Trouble-Shooting According to Malfunctioning Phenomena".
Refer to Page B8-58.



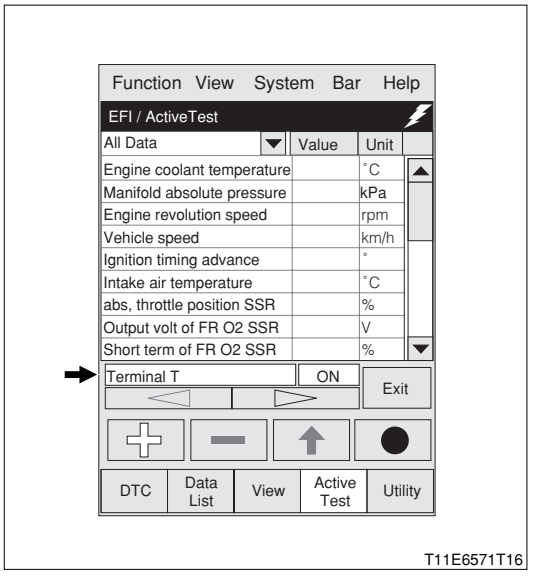
Σ>5. Check the ignition timing.
1.When the diagnosis tester (DS-21/DS-Ⅱ) is not used:
(1) Connect the terminal T of the SST connector to the earth terminal, using a jump wire.
SST: 09991-87404-000(1)
09991-87403-000(2)



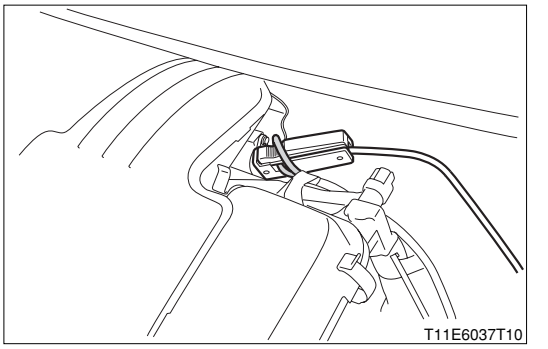
2.When the DS-21 diagnosis tester is used:
(1) Select the "Engine adjustment" on the course menu so as to connect the EFI- T terminal.



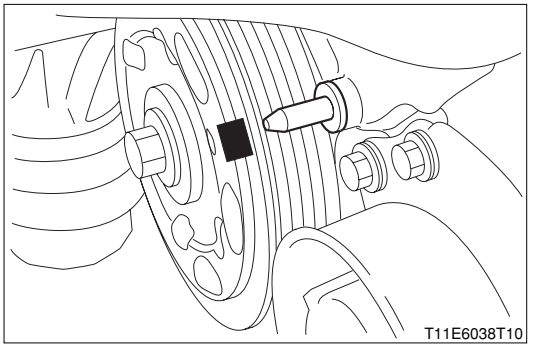
3.When the DS-Ⅱ diagnosis tester is used:
(1) Select the "Terminal T" of "Active Test" so as to connect the EFI-T terminal.



4.Attach the clip of the timing light to the wire harness for timing light connection wire.



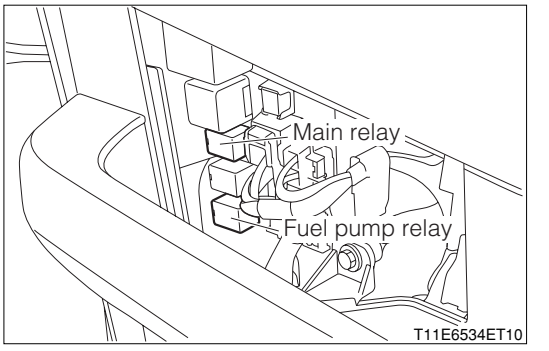
5.Is the timing mark of the crankshaft within a range of the indicator for ignition timing check provided on the timing chain cover?
SPECIFIED VALUE: 10 degrees±2 degrees (BTDC)
6.Are the check results OK?
▼If it is OK, go to "Matrix Table for Trouble-Shooting According to Malfunctioning Phenomena".
Refer to Page B8-58.



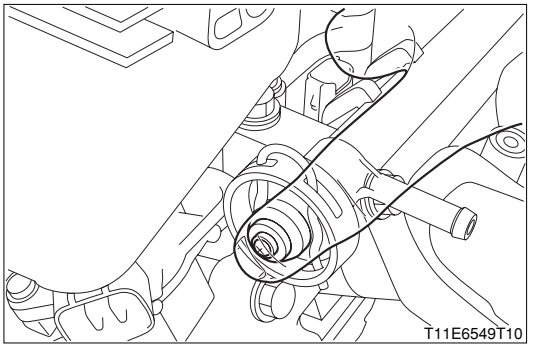
▼If it is NG, check the timing chain for wrong assembling. Also, check the plunger protruding amount of the tensioner.

Σ>6. Fuel pressure check (Simple check).

1.When DS-21 diagnosis tester or DS-Ⅱdiagnosis tester is not used:
(1) Ensure that the fuel tank is filled with sufficient fuel.



(2) Remove the fuel pump relay and connect a jump wire, as indicated in the illustration.
SST: 09991-87403-000
(3) Ensure that the IG switch is turned "ON" and the pulsation damper exhibits pulsation.



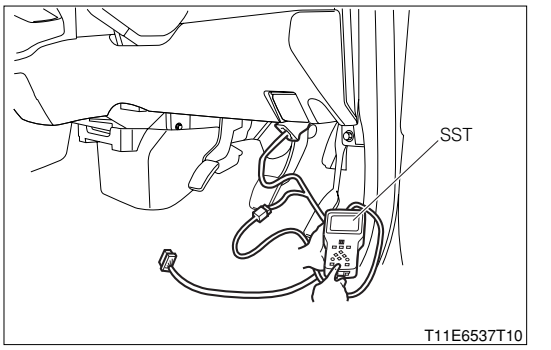
2.When DS-21 diagnosis tester is used:

(1) Connect the DS-21 diagnosis tester to the DLC with the SST interposed.

SST: 09991-87404-000

(2) Turn "ON" the ignition switch. Then, select the "Fuel pump" of the "Actuator driving" among the individual functions so as to drive the fuel pump.

(3) Does the pulsation damper exhibit pulsation?



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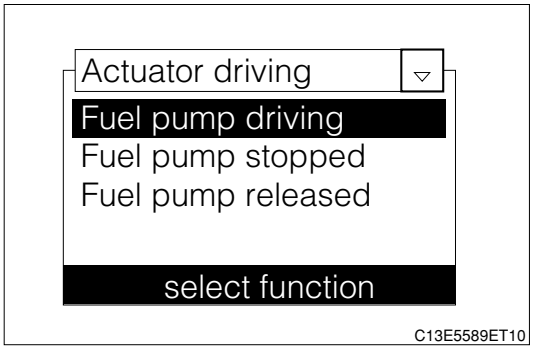


C13E5589ET10

3.When DS-Ⅱ diagnosis tester is used:

(1) Connect the DS-II diagnosis tester to the DLC.

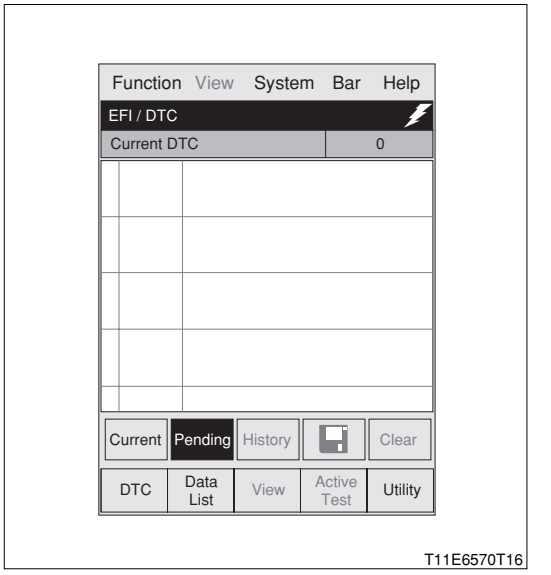
(2) Turn "ON" the ignition switch. Then, select the "Fuel Pump" of the "Actuator driving" so as to drive the fuel pump.

(3) Does the pulsation damper exhibit pulsation?

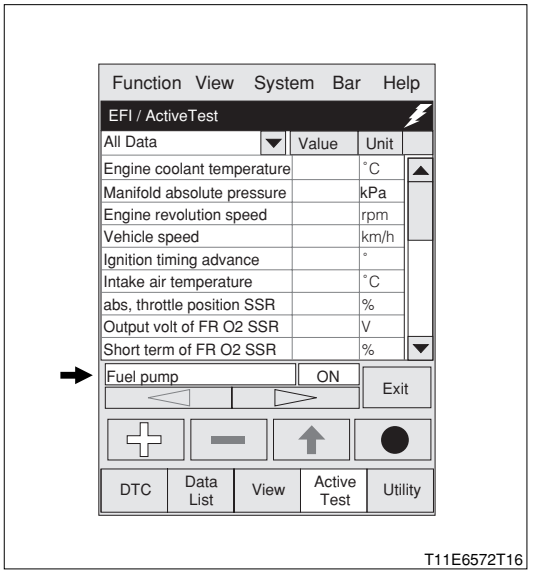
▼If it is OK, go to ▷7.

▼If it is NG, go to "Check of Fuel Pump and F/P Regulator".

Refer to Page B8-202.

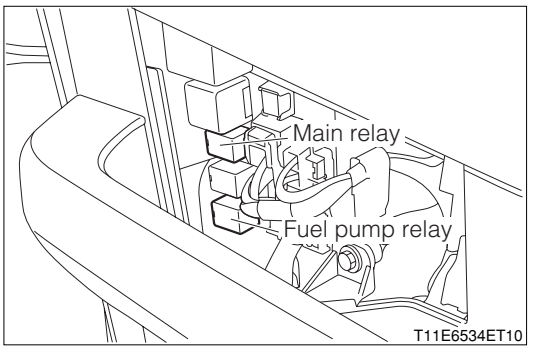


T11E6570T16



T11E6572T16

Σ7. Spark check.



1.Remove the fuel pump relay from the relay block.
2.Remove the ignition coils and spark plugs (All cylinders #1, 2, 3).
3.Disconnect the fuel pump relay
4.Disconnect the connector of the injector.

CAUTION

- Stop the fuel injection by the operations at Steps 3 and 4 above so as to prevent the catalyst from being damaged by unburnt gas, etc.
- When there is no fuel, the injector injection must be avoided wherever possible, as this may damage the injector.

5.Install the spark plug to the ignition coil. Connect the ignition coil connector to the ignition coil.
6.Ground the spark plug.
7.Crank the engine. At this time, check to see if each spark plug sparks.
8.Are sparks jumping?

▼If it is OK, go to Σ8.
▼If it is NG, go to Check of ignition System.

Σ8. Confirmation of operation of fuel injector.

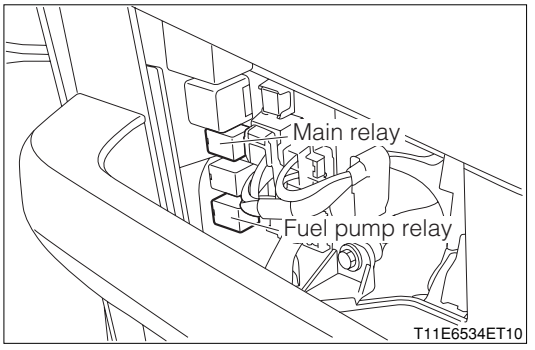
1.Install the spark plugs, ignition coils and fuel pump relay. Connect the connector of the ignition coil.
2.Using a sound scope, check each injector for operation sound while the engine is being cranked or idling.
3.Can you hear operator sound of all injectors?

▼If it is OK, go to Σ9.
▼If it is NG, go to "Check of Fuel Injector Circuit".

Refer to Page B8-202.

Σ9. Inspection of compression pressure.

1.Warm up the engine.
2.With the IG switch turned "LOCK", remove all of the ignition coils and spark plugs.
3.Temporarily remove the main relay and fuel pump relay.



4.Insert a compression gauge into the spark plug hole.
5.Depress the accelerator pedal fully.
6.While cranking the engine, measure the compression pressure.
7.Repeat the steps 4, 5 and 6 to perform the measurement for all cylinders.

NOTE

- Be sure to use a fully-charged battery. Also the measurement should be performed in the shortest possible length of time.

8.Are the check results OK?

▼If it is OK, go to Σ10.
▼If it is NG, perform the checks, referring to the section ENGINE MECHANICAL.

Σ>10. Inspection of idle CO and HC concentrations.

1.Warm up the engine completely.

NOTE

- Warm up the engine, until the fan motor starts to operate.

2.Measure CO and HC concentrations at idle speed.

SPECIFIED VALUE:

CO concentration	Not to exceed 0.2 %
HC concentration	Not to exceed 200 ppm

3.Are the check results OK?

▼If it is OK, go to "Matrix Table for Trouble-Shooting According to Malfunctioning Phenomena".
Refer to Page B8-58.

▼If it is NG, perform the checks, referring to the section ENGINE MECHANICAL.

(2) Check of wire harnesses and connectors

1.Check of open wire

This is caused by detached wire harness, poor contact inside the connector, detached connector terminal, and so forth.

NOTE

- The wires are rarely cut at the center. In most cases, an open wire occurs at the connectors. Particularly, the connectors of the sensor and actuator should be checked very carefully.
- Poor contact is caused by rust formation at the connector terminal, foreign substances adhered to the terminal, or drop in the contact pressure between the male and female terminals of the connector.
- Simply disconnect the connector once, and then, reconnect it. It may change the contacting condition, thus returning to the normal operation. Hence, if no abnormality was found when the wire harness and connector were checked during the trouble-shooting, and if the malfunction ceases to exist after completion of the checks, then the wire harness or connector was most likely causing the malfunction.

2.Check of short circuit

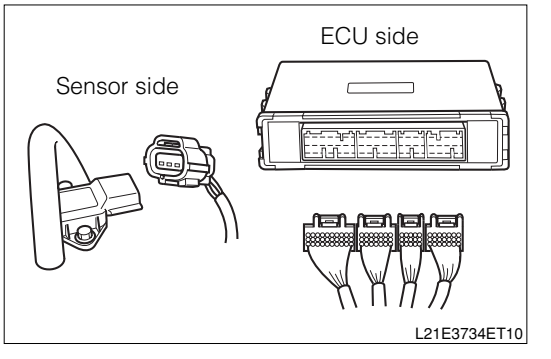
This is caused by a short circuit between the wire harness and the body ground or by an internal short circuit of the switches, etc.

NOTE

- If a short circuit is present between the wire harness and the body ground, thoroughly check to see if the wire harness is caught in the body, if the wire is rubbed and the insulator section is ruptured, thus contacting other parts, and if the wire is clamped properly.

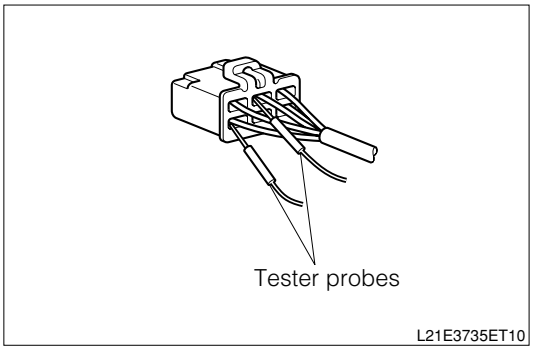
3.Continuity check (Check for open wire)

(1) Disconnect the connector on both sides of the EFI ECU and sensor.



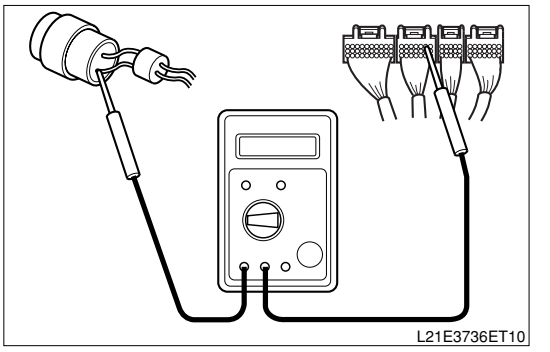
(2) Measure the resistance between the relevant terminals of the connector.

SPECIFIED VALUE: Resistance: 1 Ω or less



NOTE

- Lightly shake the wire harness in a longitudinal direction as well as in a horizontal direction when the resistance is measured.
- In the case of non-waterproof connectors, the test probe should be inserted into the connector from each wire harness side.
- In cases where the waterproof connector is checked without removing the waterproof rubber, be very careful not to deform the connector terminal when applying the test probes.

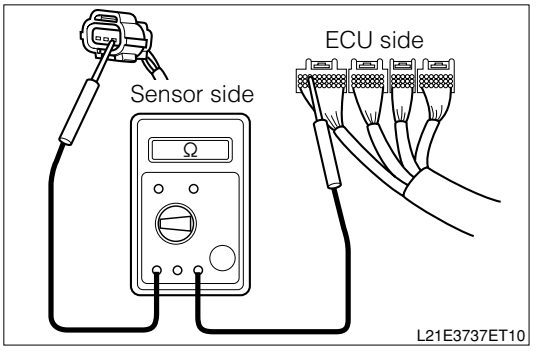


4.Continuity check (Check for short circuit)

(1) Disconnect the connector on both sides.

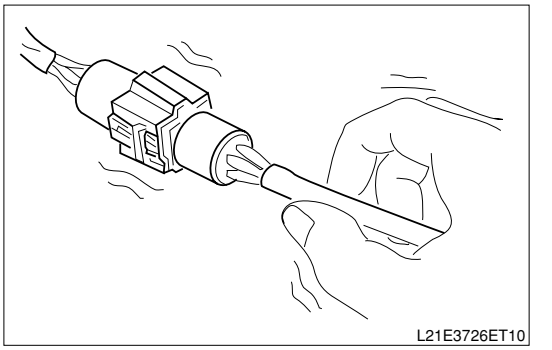
(2) Measure the resistance between the relevant terminal of the connector and the body ground. Moreover, be sure to check for the connectors on both sides.

SPECIFIED VALUE: Resistance:1 MΩ or more



NOTE

- Lightly shake the wire harness in a longitudinal direction as well as in a horizontal direction when the resistance is measured.



5.Check of EFI ECU and its circuit

(1) The EFI ECU and its circuit can be checked by measuring the voltage and resistance at the EFI ECU connector. In order to narrow down the cause further after the cause has been decided to a certain system, it is imperative to measure the voltage and resistance of the external route of the EFI ECU.

(2) The measurement of the voltage and resistance is conducted during the system check, following the procedure given below.

CAUTION

- The EFI ECU cannot be checked by itself. Never connect a voltmeter or an ohmmeter to the EFI ECU with the connector disconnected from the EFI ECU.
- When conducting the continuity test or measuring the resistance, turn "LOCK" the ignition switch once. Then, disconnect the connector at the EFI ECU.

6.Voltage check

(1) Installation of SST

First, install the SST between the engine ECU and the vehicle harness.

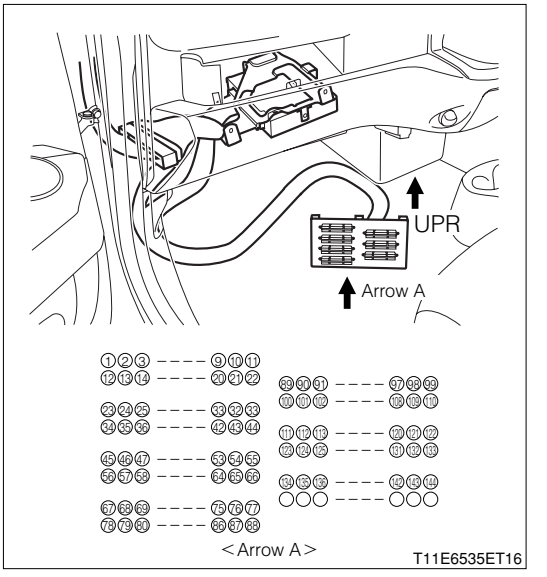
For the installation procedure, refer to the section under.

(2) Measure the voltages between the respective terminals of the SST connectors.

(3) Check to see if the measured values conform to the specification in accordance with the following table "Characteristics of ECU Output".

NOTE

- Make sure that the battery voltage is 11 V or more with the ignition switch turned "ON", for each terminal voltage is affected by the battery voltage.



7.Resistance check

(1) Installation of SST

First, install the SST between the engine ECU and the vehicle harness. However, the SST connector at the ECU side should not be connected.

For the installation procedure, refer to the section under "Connecting Procedure for SST".

(2) Measure the resistances between the respective terminals.

(3) Check to see if the measured resistances conform to the specification in accordance with the following table "Standard Resistances".

NOTE

- Make sure that the ignition switch is turned "LOCK" during the measurement.
- The following table shows the resistance at the time when the temperature of parts is 20°C.

STANDARD RESISTANCES

System to be checked	Terminals	Circuit	Standard resistance
Front oxygen sensor system	15 (OXH1) - 27 (+B)	Front oxygen sensor and main relay	6.7 - 7.7 Ω
Rear oxygen sensor system	14 (OXH2) - 27 (+B)	Rear oxygen sensor and main relay	11.7 - 14.5 Ω
Engine revolution sensor system	59 (N1+) - 128 (N1−)	Engine revolution sensor system	1850 - 2450 Ω
Camshaft position sensor system	58(N2+) - 127(N2−)	Camshaft position sensor system	1850 - 2450 Ω
Injector system	24 (#10) - 27 (+B)	No.1 - 3 fuel injector	11.6 - 12.4 Ω
	23 (#20) - 27 (+B)		
	22 (#30) - 27 (+B)		
VSV for evaporative emission control system purge control system	16 (PRG) - 27 (+B)	Evaporative emission purge control valve	30 - 34 Ω
Ground system	125 (E1) - Body ground	Ground	10 Ω or less
	19 (E2) - Body ground		
	122 (E2PM) - Body ground		
	116 (E21) - Body ground		

7-10-2 CHECK AND REPAIR BY CHART ACCORDING TO DTC

(1) Scan tool data (ECU DATA)

1.The following data values given below are representative values obtained under the "normal condition".

However, there are cases where the system is functioning normally even if the measured value is different from the values listed here. Therefore, no judgment as to whether any malfunction is occurring or not should be made only on the basis of these data under the "normal condition".

NOTE

- The data monitor value may vary significantly, depending on slight difference in the measurement, difference in the measurement environment, deterioration due to passage of time in the vehicle, and so forth. Therefore, it is difficult to indicate the definite reference values. Hence, there are cases where malfunctions are occurring even when the measured value is within the reference value.
- With regard to minor phenomenon, such as hesitation and rough idling, it is necessary to make total evaluation, based on all the data monitor items, by sampling the data of the vehicle of the same type under the same conditions and comparing them.
- In the case of the OBD Ⅱ generic scan tool, it is possible to take a reading of the values with an ※ mark in the following table.
- When checking the data under a condition where the engine is "idling" or "racing", the shift lever should be placed in the "neutral", the A/C switch should be turned "OFF", and all accessory switches should be turned "OFF".

Items specified by CARB

	DS-21 diagnosis tester display	Signal name	Vehicle condition	Reference values under normal condition
※1	FUEL SYSTEM	FSYS	At idle speed after warming up	O2
※2	CALC LOAD	LOAD	At idle speed after warming up	1.7 - 2.2 %
			At 2500 rpm with no load after warming up	5.0 - 6.3 %
※3	COOLANT TEMP	ECT	Cold start - Warming up running	Value should be rising gradually
			When engine has warmed up completely	80 - 102°C
			During fail-safe function (At time of starting)	20°C
			During fail-safe function (After starting)	80°C
※4	SHORT FT	SHRT	At idle speed after warming up	−20 - 20 %
※5	LONG FT	LONG	At idle speed after warming up	−16 - +16 %
※6	ENGINE SPEED	RPM	When engine is running at constant speed	There should be no remarkable variation
			At idle speed after warming up	750 - 900 rpm
※7	VEHICLE SPEED	VS	During running (Compared with speedometer)	There should be no remarkable variation
※8	IGN ADVANCE	ITA	At idle speed after warming up	−5 - 15°
			When idle switch is "OFF"	Changes should be made according to running conditions
※9	INTAKE AIR TEMP	IAT	When engine is running	Changes should be made according to running conditions
※10	MAIN ABS PRESS	MAP	When ignition switch is "ON"	80 - 110 kPa
			At idle speed after warming up	21 - 48 kPa
			During fail-safe function	34 - 72 kPa
※11	THROTTLE POS	TP	When acceleration pedal is operate	Changes should be made according to pedal operation
※12	OXYGEN SENSOR S1	O_2FP	At idle speed after warming up	−5 - +5 %
		O_2FV		0.0 - 1.0 V
※13	OXYGEN SENSOR S2	O_2RP	When engine is running at 2000 rpm, for 3 minutes or longer after warming up.	20 - 77 %
		O_2RV		0.1 - 0.9 V
※14	MIL ON RUN DIST	DWM	When there is no DTC	0 km

Items specified by DMC

	diagnosis tester (DS-21/DS-Ⅱ) display	Signal name	Vehicle condition	Reference values under normal condition
1	BATTERY VOLTAGE	BAT	When engine is running at 5000 rpm (25˚C)	Approx. 14 V
2	ELECTRIC LOAD	DSW	When light, heater blower, defogger or radiator fan is "ON"	OFF→ON
3	AIR CONDITIONING	AC	When air conditioner switch is set to "ON"	OFF→ON
4	CTP SWITCH	IDL	When throttle valve is switched from fully closed state to opened state	ON→OFF
5	INJ PULSE WIDTH	TAU	Cold start - Warming up running	Value should be decreasing gradually
			At idle speed after warming up	1.2 - 1.8 ms
6	ISC DUTY RATIO	ISC	When ignition switch is "ON"	0%
			Cold start - Warming up running	Value should be decreasing gradually
			At idle speed after warming up	5 - 15 %
			When air conditioner switch is set to "ON"	20 - 60 %
			When light, heater blower or defogger is "ON"	7 - 19 %
			At idle speed after warming up	2 - 14%
7	ACTUAL DIS ANGLE OF IN CAM	VT	During vehicle running	The value changes, depending on driving conditions.
			At idle speed after warming up	0℃A
8	TARGET DISP ANGLE OF IN CAM	VTT	During vehicle running	The value changes, depending on driving conditions.

NOTE

- The items with a (※) mark is provided only for the EU specifications. Therefore, in the case of the non-EU specification vehicles, no indication will be made.

(2) DTC chart specifications

1.The parameters indicated in the table may vary, depending upon the system types and specifications. This applies to vehicles for all destinations.

For details of the checking of each code, refer to the DTC chart for each code.

Codes specified by ISO/SAE

DTC No.	Diagnosis Items	Diagnosis contents	Malfunction evaluation method	Warning indication
P0105/31	Manifold absolute pressure/barometric pressure circuit malfunction	When abnormality takes place in the signal from the intake manifold pressure/intake temperature integrated sensor (Manifold absolute pressure sensor section) circuit: ·Malfunction of the sensor, or open wire or short circuit in the intake manifold pressure/intake temperature integrated sensor (Manifold absolute pressure sensor section) circuit.	1 trip	○
P0110/43	Intake air temperature sensor circuit malfunction	When malfunction takes place in the signal from the intake manifold pressure/intake temperature integrated sensor (Intake air temperature sensor section): ·Malfunction of the sensor, or open wire or short circuit in intake manifold pressure/intake temperature integrated sensor (Intake air temperature sensor section) circuit.	1 trip	○
P0115/42	Engine coolant temperature sensor circuit malfunction	When abnormality takes place in the signal from the engine coolant temperature sensor: ·Malfunction of the sensor, or open wire or short circuit in engine coolant temperature sensor circuit.	1 trip	○
P0120/41	Throttle/pedal position sensor/switch	When abnormality takes place in the signal from throttle/pedal position sensor: ·Malfunction of the sensor, or open wire or short circuit in throttle/pedal position sensor/switch circuit.	1 trip	○
P0130/21	Oxygen sensor circuit malfunction (Bank 1 sensor 1)	When abnormalities take place two times consecutively in the signal from the oxygen sensor: ·Malfunction of the sensor, or open wire or short circuit in oxygen sensor circuit.	2 trip	○
P0135/23※1	Oxygen sensor heater circuit malfunction (Bank1 sensor1).	When abnormalities take place in the signal from the oxygen sensor heater: ·Open wire or short circuit in oxygen sensor heater circuit.	2 trip	○
P0136/22	Rear oxygen sensor circuit malfunction (Bank 1 sensor 2)	When abnormalities take place two times consecutively in the signal from the rear oxygen sensor: ·Malfunction of the sensor, or open wire or short in the rear oxygen sensor circuit.	2 trip	○
P0141/24※1	Oxygen sensor heater circuit malfunction (Bank 1 sensor 2)	When abnormalities take place in the signal from the oxygen sensor heater: ·Open wire or short circuit in oxygen sensor heater circuit.	2 trip	○
P0171/25	Fuel trim system too lean (Air-fuel ratio lean malfunction, bank 1)	When the air-to-fuel ratio deviates two times consecutively to the lean side due to abnormality of the fuel trim system: ·Abnormal combustion pressure, malfunctioning injector or oxygen sensor	2 trip	○

DTC No.	Diagnosis Items	Diagnosis contents	Malfunction evaluation method	Warning indication
P0172/26	Fuel trim system too rich (Air-fuel ratio rich malfunction, bank 1)	When the air-to-fuel ratio deviates two times consecutively to the rich side due to abnormality of the fuel trim system: ·Abnormal combustion pressure, malfunctioning injector or oxygen sensor	2 trip	○
P0350/16※2	Ignition system circuit malfunction	When the ignition signal is not inputted continually.	1trip	○
P0300/17※1	Random/multiple cylinder misfire detected	When malfunction takes place in the signal from the Ion current combustion control system	2 trip	MIL flashing during misfire detection.
P0301/17※1 P0302/17※1 P0303/17※1	Misfire detected Cylinder 1 Cylinder 2 Cylinder 3			○
P0325/18	Knock sensor 1 circuit malfunction	When malfunction takes place in the signal from the knock sensor: ·Malfunction of the sensor, or open wire or short circuit in the signal system	1 trip	—
P0335/13	Engine revolution sensor circuit malfunction	When malfunction takes place in the signal from the engine revolution sensor: ·Malfunction of the sensor, or open wire or short circuit in engine revolution sensor circuit.	1 trip	○
P0340/14	Camshaft position sensor circuit malfunction	When malfunction takes place in the signal from the camshaft position sensor. ·Malfunction of the sensor, or open wire or short-circuit in the sensor circuit.	1 trip	○
P0401/79	Stepper motor type EGR valve system malfunction (Function)	When abnormalities take place in the flow rate of EGR gas:	2 trip	○
P0403/79	Stepper motor type EGR valve system malfunction (Open wire)	When abnormalities take place in the stepper motor type EGR valve detection signal: ·Open wire or short circuit in the signal system	2 trip	○
P0443/76	Evaporative emission control system purge control valve circuit malfunction	When malfunction takes place in the detection signal of the evaporative emission control system purge control valve: ·Open wire or short circuit in evaporative emission control system purge control circuit.	2 trip	○
P500/52	Vehicle speed sensor circuit malfunction	When malfunction takes place in the signal from the vehicle speed sensor. ·Sensor malfunction, open wire or short circuit of the signal system	1 trip	○
P0505/71	Idle control system malfunction	When malfunction takes in the signal from the valve for ISC. ·Open wire or short in valve for ISC circuit	1 trip	○

NOTE

- 1 trip: 1 trip detection logic
- 2 trip: 2 trip detection logic
- MIL: Malfunction indicator lamp
- When the "O" mark is shown in the MIL column, the lamp will go on for that DTC number, but when the "—" mark is shown, the lamp will not go on for that DTC number. Therefore, it is possible to read out the DTC number by using the diagnosis tester (DS-21/DS-Ⅱ). As for the DTC number bearing the mark, the MIL will go on except the EU specifications.
- DTC number with ※1 mark: For EU specifications
- DTC number with ※2 mark: For general specifications

Codes specified by DMC

DTC No.	Diagnosis Items	Diagnosis contents	Malfunction evaluation method	Warning indication
P0535/44	A/C evaporator temperature sensor circuit malfunction	When malfunction takes place in the signal from the A/C evaporator temperature sensor. ·Malfunction of the sensor, or open wire or short circuit in A/C evaporator temperature sensor circuit.	1 trip	—
P1105/32※1	Atmospheric pressure sensor circuit malfunction	When the signals from the atmospheric pressure sensor are not outputted continuously over a certain length of time after starting.	1 trip	○
P1300/36※1	Ion current combustion control system malfunction	When malfunction takes place in the signal from Ion current combustion control system.	2 trip	○
P1346/75	Variable valve timing control system (valve timing)	When abnormalities take place two times consecutively in the valve timing control. ·Deviation of camshaft drive and driven gears	1 trip	○
P1349/73	Variable valve timing control system (advanced timing/retarded timing)	When abnormalities take place two times consecutively in the valve timing control. ·Oil control valve abnormality, admission of foreign matters in the oil passage	1 trip	○
P1510/54	Starter signal system malfunction	When abnormalities take place in the signal from the starter. ·Open wire or short circuit in the signal system	1 trip	○
P1600/83	Immobilizer signal circuit malfunction	When abnormality occur in the wring and reading-out of the rolling codes into/from the immobilizer ECU during immobilizer communication.	1 trip	—
P1601/81	Immobilizer signal malfunction	When the rolling codes can not be exchanged between the EFI ECU and the immobilizer ECU or the rolling codes are not matched.	1 trip	—
P1656/74	Oil control valve control system malfunction	When malfunction takes place in the control voltage for the oil control valve.	1 trip	○
U0121/86	ABS communication failure	When the communication signal from the ABS actuator cannot be received: ·Open wire or short circuit between EFI ECU and ABS actuator.	1 trip	○
U0156/87	Combination meter communication failure	When the communication signal from the combination meter cannot be received: ·Open wire or short circuit between EFI ECU and combination meter	1 trip	○
U1002/88	Communication history error	When there is no communication establishment history with all the CAN communication making-up ECU. ·Open wire, etc. in the wiring of the CAN communication terminal of the EFI ECU.	1 trip	○

NOTE

- 1 trip: 1 trip detection logic
- 2 trip: 2 trip detection logic
- MIL: Malfunction indicator lamp
- When the "O" mark is shown in the MIL column, the lamp will go on for that DTC number, but when the "—" mark is shown, the lamp will not go on for that DTC No. Therefore, it is possible to read out the DTC No. by using the diagnosis tester (DS-21/DS-Ⅱ). As for the DTC No. bearing the mark, the MIL will go on except the EU specifications.
- DTC No. with ※1 mark: For EU specifications

(3) Fail-safe function

1.When any of the following DTC has been detected, the EFI ECU enters the fail-safe mode in order to make it possible for the vehicle to drive for evacuation and to ensure safety. When the malfunction is remedied to a normal condition, the fail-safe control will be released.

2. However, the diagnosis results will remain memorized. Hence, it is necessary to determine whether the malfunction still persists or not.

Fail-safe specifications

Detected item	Fail-safe operation	Fail-specifications
Manifold absolute pressure sensor signal system	When abnormality takes place in the signal from the intake manifold pressure/intake temperature integrated sensor (Intake manifold pressure section) :	·The pressure estimated by the throttle opening and engine revolution speed is set as the intake manifold pressure. If the signal from the throttle position sensor is also faulty, the signal from the intake manifold pressure/intake temperature integrated sensor is set at a constant value. ·If both the throttle opening angle and engine revolution speed exceed their set values, the fuel is cut.
Ignition system	When malfunction takes place in the ignition signal:	The fuel injection of the cylinder in which abnormality is taking place in the ignition signal is cut.
Water temperature sensor signal system	When malfunction takes place in the signal from the water temperature sensor:	The signal from the water temperature sensor is set to a constant value.
Throttle position sensor signal system	When malfunction takes place in the signal from the throttle position sensor:	The signal from the throttle position sensor is set to a constant value.
A/C evaporator temperature sensor signal system	When malfunction takes place in the signal from the A/C evaporator temperature sensor.	The air conditioner will be cut.
Atmospheric pressure sensor circuit malfunction	When malfunction takes place in the signal from the atmospheric pressure sensor:	The signal from the atmospheric pressure sensor is set to a constant value.
Knock sensor system	When abnormality takes place in the signal from the knock sensor circuit	The ignition timing is retarded.
Intake air temperature sensor signal system	When malfunction takes place in the signal from the intake manifold pressure/intake temperature integrated sensor (Intake air temperature sennsor section):	The signal from the intake manifold pressure/intake temperature integrated sensor (Intake temperature sensor) is set to a constant value.
Stepper motor system for ISC	When malfunction signal takes place in the stepper motor for ISC:	·The energizing control to the stepper motor for ISC is cut off. ·The fuel injection is cut off.
Oil control valve system	When malfunction takes place in the oil control valve control voltage.	Oil control valve energizing control is prohibited.
Rear oxygen sensor system	When malfunction takes place in the signal from the rear oxygen sensor:	The feedback control is turned to open control.
Stepper motor type EGR valve system	When malfunction takes place in the flow rate of EGR gas. ·When the wiring to the stepper motor for EGR is disconnected or shorted.	The energizing control of the stepper motor for EGR is cancelled after the EGR valve is brought to a fully shut condition.
Immobilizer signal circuit malfunction	·When abnormality occur in the wring and reading-out of the rolling codes into/from the immobilizer ECU during immobilizer communication. ·When the rolling codes can not be exchanged between the EFI ECU and immobilizer ECU or rolling codes are not mached.	Prohibition of fuel injection and ignition.

7-11 TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA

7-11-1 DESCRIPTION

1. Here, checking procedures when there is no abnormal code indication of the diagnosis but there is a malfunction taking place are described.
2. As for the trouble shooting according to the malfunction phenomena, first organize the contents of the diagnosis by interview, basic check and EFI ECU circuit check results. Then, narrow down and decide the check priority of the possible causes by cross-checking it with the list of possible causes according to malfunction phenomena. On that basis, perform trouble shooting sequentially for each system and parts by following the directions provided in the list.

WARNING

- If the vehicle is driven with the SST (EFI computer check sub harness, etc.) connected, there is a possibility of causing malfunction and may be very dangerous. Therefore, remove it without fail.

NOTE

- When performing checks for each component, make sure to check the harness and connectors that are connected to it.
- As for the reason why no malfunction is detected by diagnosis even when the malfunction phenomena is reproduced, it is possible that there is a malfunction taking place out of the range of the code output conditions of the diagnosis, or there is a malfunction taking place out of the diagnosis circuit.

7-11-2 LIST OF POSSIBLE CAUSES ACCORDING TO MALFUNCTION PHENOMENA

(1) Poor startability

Malfunction phenomena		Possible causes		
		System	Components	Malfunction mode
No initial explosion		Power supply system	EFI ECU power supply circuit	Open wire and short circuit
			Ignition switch	Will not turn "ON"
			Main relay	
		Engine earth system	Engine earth※	Open wire, defective earth
		Fuel system	Fuel pump relay	Will not turn "ON"
			Fuel line, Fuel filter	Clogging
			Injector	Will not inject, constant injection
			Fuel pump	Will not operate
		Ignition system	Engine fuse※	Fuse melt down
			Ignition coil	Will not generate sparks
			Spark plug	
			Ignition timing	Deviated
		Control system	Engine revolution sensor	"NE signal" is not outputted.
			Camshaft position sensor	Defective output signal
There is initial explosion but no complete explosion.		Fuel system	Fuel pump relay	Will not turn "ON"
			Fuel line, Fuel filter	Clogging
			Injector	Leakage, Will not inject, constant injection
			Fuel pump	Will not operate
		Ignition system	Spark plug	Misfire
		Intake system	Air hoses, etc.	Leakage
		Control system	Intake manifold pressure/intake temperature integrated sensor	Characteristics deviated, open wire, short circuit
			Water temperature sensor	
			Engine revolution sensor	Defective output signal
			Camshaft position sensor	
			Oil control valve	Malfunction
			Stepper motor type EGR valve	Defective closing
Hard to start	During cold period	Intake system	Throttle body	Defective opening, does not open
		Control system	Water temperature sensor	Characteristics deviated, open wire, short circuit
	During hot period	Fuel system	Injector	Leakage
		Intake system	Stepper motor for ISC	Defective opening, will not open
	At all times	Fuel system	Fuel pump relay	Will not turn "ON"
			Fuel line, Fuel filter	Clogging
			Injector	Leakage
		Ignition system	Spark plug	No smoldering
		Intake system	Stepper motor for ISC	Defective opening
		Control system	Stepper motor type EGR valve	Defective closing

※: If the IG switch is turned "ON" under the condition of defective grounding of the engine earth connection (Between the 125 (E1) connection earth and the engine block), the "ENGINE fuse (10A)" can melt down.

(2) Idling malfunction

Malfunction phenomena	Possible causes		
	System	Components	Malfunction mode
Fast idle not working	Intake system	Stepper motor for ISC	Defective opening, will not open
	Control system	Water temperature sensor	Open wire and short circuit
Idling speed is high.	Intake system	Air hoses, etc.	Leakage
		Throttle body	Defective closing
		Stepper motor for ISC	Constantly open
	Control system	Intake manifold pressure/intake temperature integrated sensor	Characteristics deviated, open wire, short circuit
		Water temperature sensor	
		Throttle position sensor	Characteristics deviated
		Defogger switch	Constantly "ON"
		Stop lamp switch	
		Heater blower signal	
Idling speed is low.	Intake system	Air hoses, etc.	Clogging
		Throttle body	
	Control system	Intake manifold pressure/intake temperature integrated sensor	Characteristics deviated
		Water temperature sensor	
		Defogger switch	Will not turn "ON"
		Stop lamp switch	
		Heater blower signal	
When idling hunting takes place.	Intake system	Air hoses, etc.	Leakage
		Throttle body	
		Stepper motor for ISC	Constantly open
	Control system	Intake manifold pressure/intake temperature integrated sensor	Characteristics deviated
		Camshaft position sensor	Defective output signal
		Oil control valve	Malfunction
Unstable idling	Fuel system	Injector	Leakage, Will not inject
		Fuel pump	Malfunction
	Intake system	Throttle body	Suction
	Ignition system	Ignition coil	Poor connection
		Spark plug	Misfire
	Control system	Intake manifold pressure/intake temperature integrated sensor	Malfunction, poor connection
		Oxygen sensor	Malfunction, poor connection
		Stepper motor type EGR valve	Defective closing

(3) Engine stall

Malfunction phenomena	Possible causes		
	System	Components	Malfunction mode
The engine stalls after a while from starting.	Fuel system	Fuel pump relay	Will not turn "ON"
		Fuel line, fuel filter	Clogging
		Fuel pump	Will not operate
	Control system	Water temperature sensor	Characteristics deviated
		Camshaft position sensor	Defective output signal
		Oil control valve	Malfunction
		Stepper motor type EGR valve	Defective closing
The engine stalls when pressing on the accelerator.	Control system	Intake manifold pressure/intake temperature integrated sensor	Characteristics deviated
		Water temperature sensor	
		Camshaft position sensor	Defective output signal
		Oil control valve	
The engine stalls when releasing the accelerator.	Intake system	Throttle body	Malfunction
	Control system	Intake manifold pressure/intake temperature integrated sensor	Characteristics deviated
		Stepper motor type EGR valve	Defective closing
When the air conditioner is turned "ON"	Intake system	Stepper motor for ISC	Constantly closed
The engine stalls but can be restarted.	Power supply system	EFI ECU power supply circuit	Poor connection
		Ignition switch	
		Main relay	
	Intake system	Stepper motor for ISC	Constantly closed
	Ignition system	Ignition coil	Poor connection
	Control system	Intake manifold pressure/intake temperature integrated sensor	Poor connection
		Engine revolution sensor	
		Stepper motor type EGR valve	Malfunction

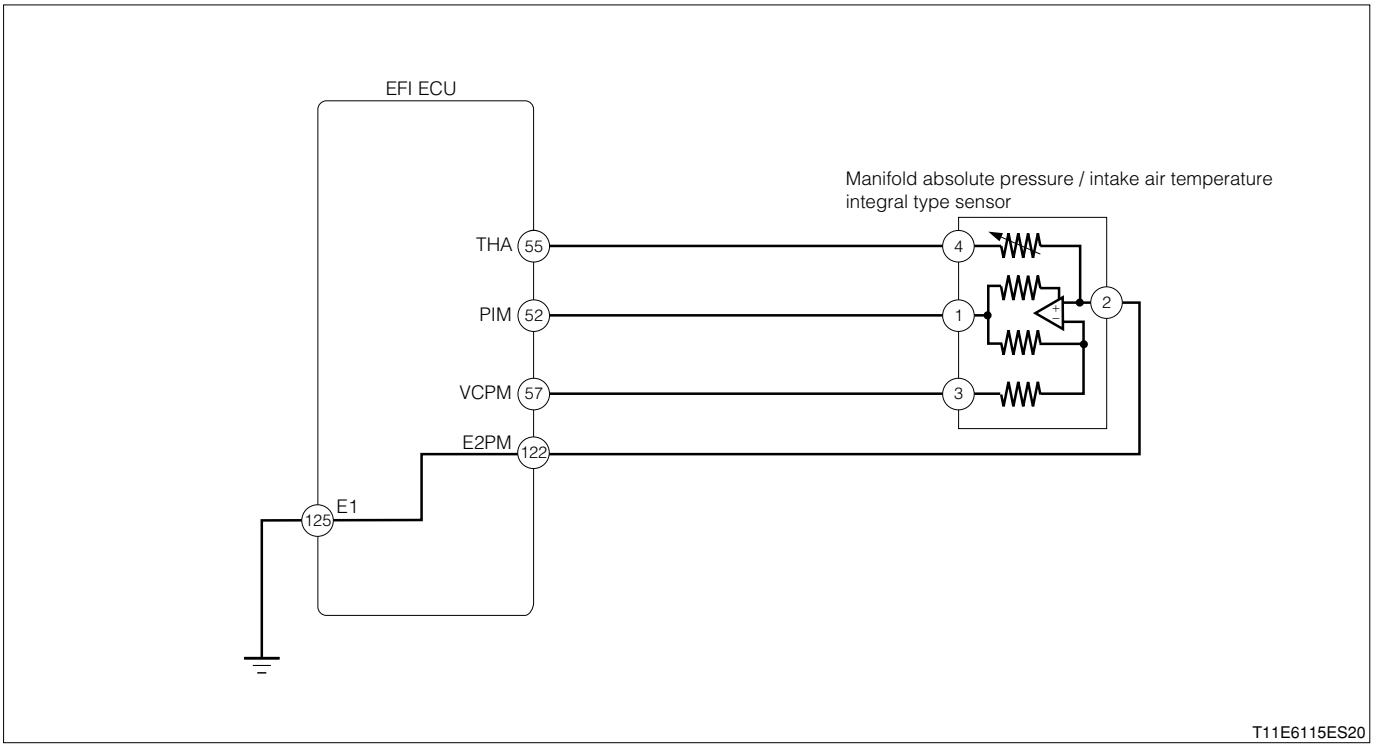
(4) Defective running

Malfunction phenomena	Possible causes		
	System	Components	Malfunction mode
Hesitation takes place when acceler-ating.	Fuel system	Fuel line, fuel filter	Clogging
		Injector	Flow rate decrease
		Fuel pump	
	Ignition system	Ignition coil	Ignition missing
		Spark plug	Misfire
		Ignition timing	Deviated
	Control system	Intake manifold pressure/intake temperature integrated sensor	Characteristics deviated, open wire, short circuit
		Water temperature sensor	
		Throttle position sensor	
		Knock sensor	Open wire and short circuit
		Stepper motor type EGR valve	Malfunction
Back fire, after fire	Fuel system	Injector	Flow rate decrease
	Ignition system	Ignition coil	Poor connection
		Spark plug	Misfire
		Ignition timing	Deviated
	Control system	Intake manifold pressure/intake temperature integrated sensor	Malfunction
		Water temperature sensor	Characteristics deviated
		Camshaft position sensor	Defective output signal
		Oil control valve	Malfunction
		Stepper motor type EGR valve	
Insufficient output	Fuel system	Fuel line, fuel filter	Fuel pressure will not rise.
		Injector	Flow rate decrease
		Fuel pump	Fuel pressure will not rise.
	Ignition system	Spark plug	Misfire
	Control system	Intake manifold pressure/intake temperature integrated sensor	Characteristics deviated, open wire, short circuit
		Water temperature sensor	
		Throttle position sensor	Characteristics deviated
		Camshaft position sensor	Defective output signal
		Oil control valve	Malfunction
		Stepper motor type EGR valve	
Emits black smoke.	Fuel system	Injector	Constant injection
	Control system	Intake manifold pressure/intake temperature integrated sensor	Characteristics deviated, open wire, short circuit
		Water temperature sensor	Characteristics deviated
		Throttle position sensor	
Hunting takes place while running.	Fuel system	Fuel line, fuel filter	Clogging
		Injector	Malfunction
	Ignition system	Ignition coil	Poor connection
	Control system	Throttle position sensor	Characteristics deviated
		Camshaft position sensor	Defective output signal
		Oil control valve	Malfunction
Abnormal knocking takes place.	Control system	Intake manifold pressure/intake temperature integrated sensor	Characteristics deviated, open wire, short circuit
		Throttle position sensor	Characteristics deviated
		Knock sensor	Characteristics deviated, open wire, short circuit
		Stepper motor type EGR valve	Malfunction

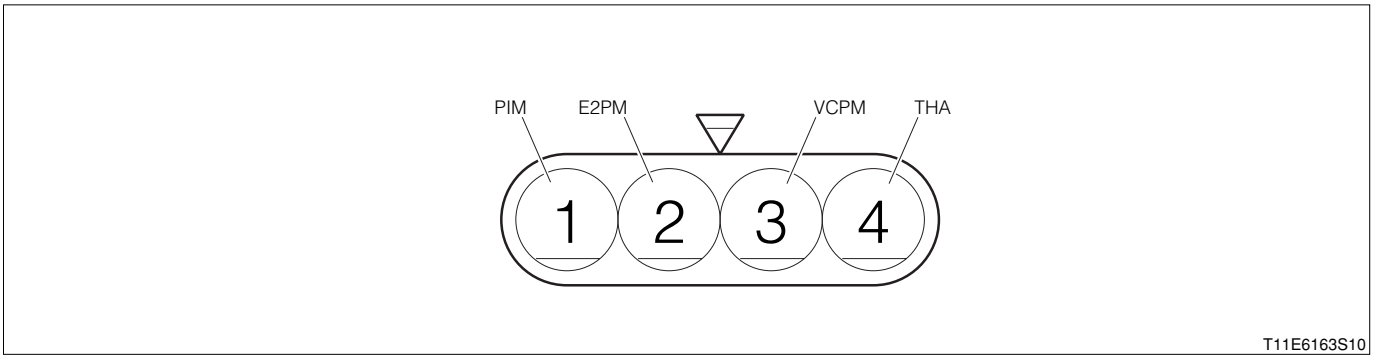
7-12 TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE

7-12-1 DTC NO.P0105/31 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT MALFUNCTION

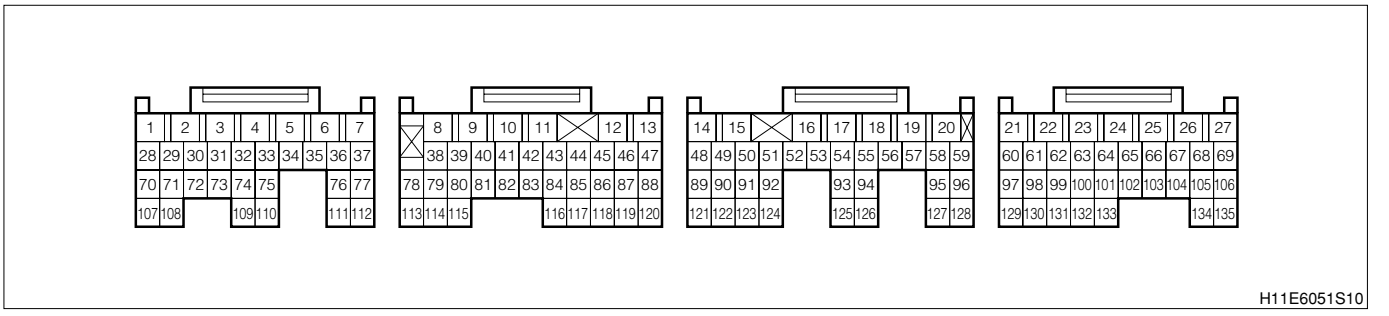
(1) System diagram



Manifold absolute pressure/intake air temperature integral type sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1.The manifold absolute pressure sensor detects the intake manifold pressure as a voltage.

2.Since the Manifold absolute pressure, intake air temperature integral type sensor (Manifold absolute pressure sensor section) does not use the atmospheric pressure as a criterion, but senses the absolute pressure inside the intake manifold (The pressure in proportion to the present absolute vacuum 0), it is not influenced by fluctuations in the atmospheric pressure due to high altitude and other factors. This permits it to control the air-fuel ratio at the proper level under all conditions.

(3) Diagnosis code output conditions

1.When the signals from the manifold absolute pressure/intake air temperature integral type sensor (Manifold absolute pressure sensor section) are not outputted continuously over a certain length of time:

NOTE

- After confirming DTC P0105/31, use the OBD Ⅱ generic scan tool or diagnosis tester (DS-21/DS-Ⅱ) to confirm the "Manifold abs. pressure" from "CURRENT DATA".
- If the ECU detects DTC P0105/31, it operates the fail-safe function, keeping the ignition timing and injection volume constant and making it possible to drive the vehicle.

(4) Trouble area

1.Open wire or short circuit in manifold absolute pressure sensor circuit

2.Manifold absolute pressure, intake air temperature integral type sensor (Manifold absolute pressure section) sensor

3.EFI ECU

(5) Checking points

1.Are the signals from the manifold absolute pressure/intake air temperature integral type sensor (Manifold absolute pressure sensor section) inputted to the EFI?

2.Is the harness between the manifold absolute pressure/intake air temperature integral type sensor (Manifold absolute pressure sensor section) and the EFI ECU normal?

3.Is the power supply voltage of the manifold absolute pressure/intake air temperature integral type sensor (Manifold absolute pressure sensor section) normal?

4.Is the output of the manifold absolute pressure/intake air temperature integral type sensor (Manifold absolute pressure sensor section) normal?

(6) Inspection procedure

① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

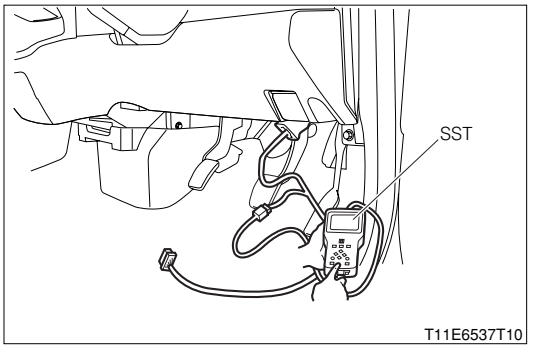
Σ1. Check of output value of sensor.

1.The IG switch turned "LOCK".

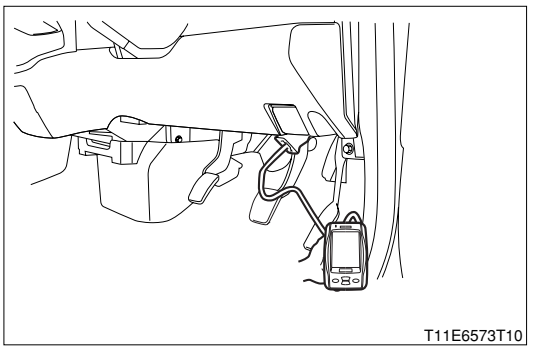
2.Diagnosis tester connect the DLC.

(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.


T11E6573T10

3.After turning "ON" the IG switch, turn "ON" the main switch of the tester.
4.Read the "Manifold abs. pressure" value of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.
SPECIFIED VALUE: Atmospheric pressure (Approx. 100 kPa)

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, go to ∑>2.

∑>2. Check of voltage of manifold absolute pressure/intake air temperature integral type sensor
1.Remove the manifold absolute pressure/intake air temperature integral type sensor connector.
2.With the IG switch turned "ON", measure the voltage between the following terminals given below.
(1) Between the sensor connection vehicle harness side connector 3 (VCPM) and the sensor connection vehicle harness side connector 2 (E2PM)
SPECIFIED VALUE: 4.5 - 5.5V

NOTE
• If no voltage appears, check the EFI ECU power supply circuit.

▼If it is OK, go to ∑>3.
▼If it is NG, check the EFI ECU circuit.

∑>3. Check of manifold absolute pressure/intake air temperature integral type sensor unit
1.Check the manifold absolute pressure/intake air temperature integral type sensor unit.
Refer to Page B8-220.

2.Are the check result OK?
▼If it is OK, go to ∑>4.
▼If it is NG, replace the manifold absolute pressure/intake air temperature integral type sensor

Σ4. Check of wire harness continuity

1.After turning "OFF" the main switch of the tester, turn "LOCK" the IG switch.

2.Check the continuity between the following terminals given below.

(1) Between the sensor connection vehicle harness side connector 1 (PIM) and the EFI ECU connection vehicle harness side connector 52 (PIM)

(2) Between the sensor connection vehicle harness side connector 2 (E2PM) and the EFI ECU connection vehicle harness side connector 122 (E2PM)

(3) Between the sensor connection vehicle harness side connector 3 (VCPM) and the EFI ECU connection vehicle harness side connector 57 (VCPM)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, replace the Manifold absolute pressure, intake air temperature integral type sensor.

▼If it is NG, repair or replace the harness or connector.

② When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

Σ1. EFI ECU signal check

1.Connect the SST.
SST: 09842-97209-000

2.Perform voltage measurements between the following terminals when the IG switch is "ON".
(1) Between SST 52 (PIM) - 122 (E2PM)
SPECIFIED VALUE: 3.1 - 4.1 V(Room temperature)

▼If it is OK, check the EFI ECU circuit.
▼If it is NG, proceed to Σ2.

Σ2. Check of wire harness continuity

1.Perform continuity check between each of the following terminals.
(1) Between sensor connection vehicle harness side connector 1 (PIM) - ECU connection vehicle harness side connector 52 (PIM)
(2) Between sensor connection vehicle harness side connector 2 (E2PM) - ECU connection vehicle harness side connector 122 (E2PM)
(3) Between sensor connection vehicle harness side connector 3 (VCPM) - ECU connection vehicle harness side connector 57 (VCPM)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ3.
▼If it is NG, repair the harness and connectors.

Σ3. Intake manifold pressure/intake temperature integrated sensor voltage check

1.Remove the connector of the intake manifold pressure/intake temperature integrated sensor.
2.Perform voltage measurement between the following terminals when the IG switch is "ON".
(1) Between sensor connection vehicle harness side connector 3 (VCPM) - sensor connection vehicle harness side connector 2 (E2PM)
SPECIFIED VALUE: 4.5 - 5.5V

▼If it is OK, proceed to Σ4.
▼If it is NG, check the EFI ECU circuit.
Refer to Page A1-24.

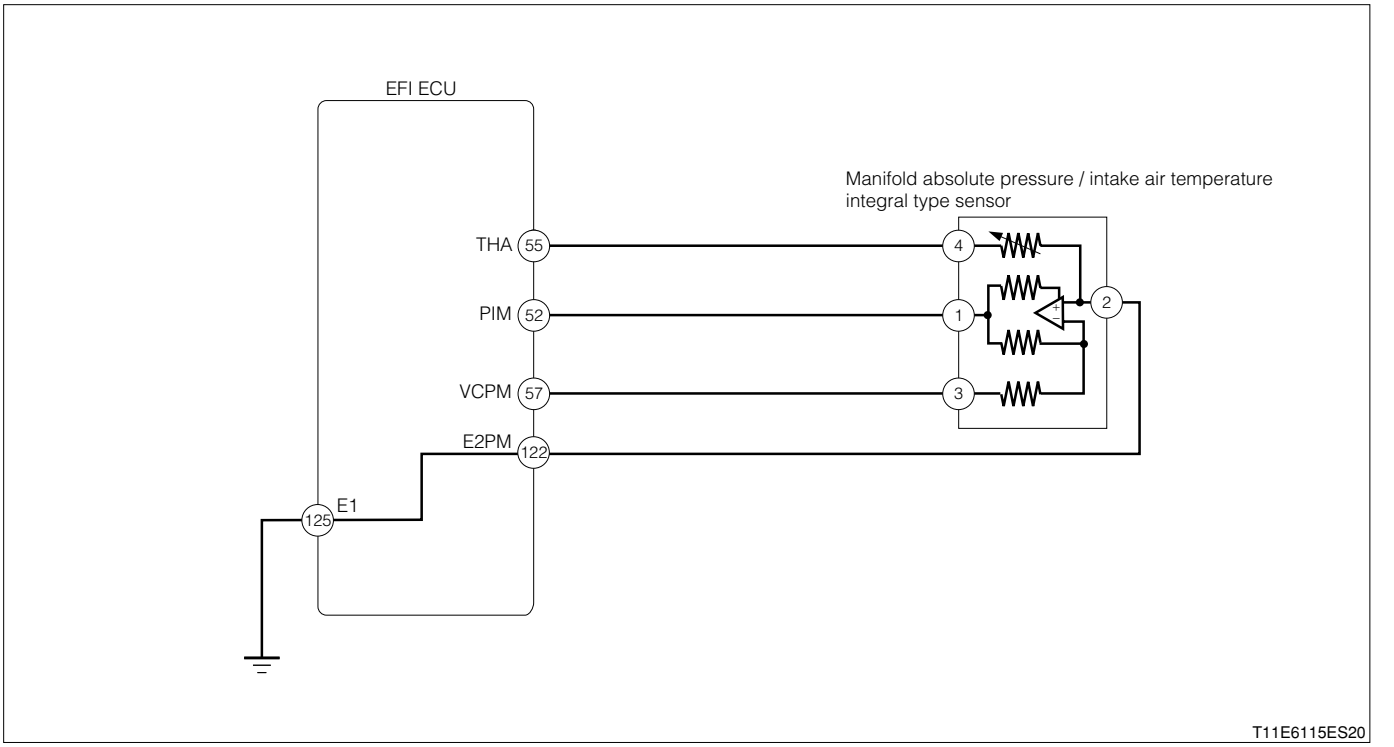
Σ4. Intake manifold pressure/intake temperature integrated sensor unit check

1.Perform unit check of the intake manifold pressure/intake temperature integrated sensor.
Refer to Page B8-220.

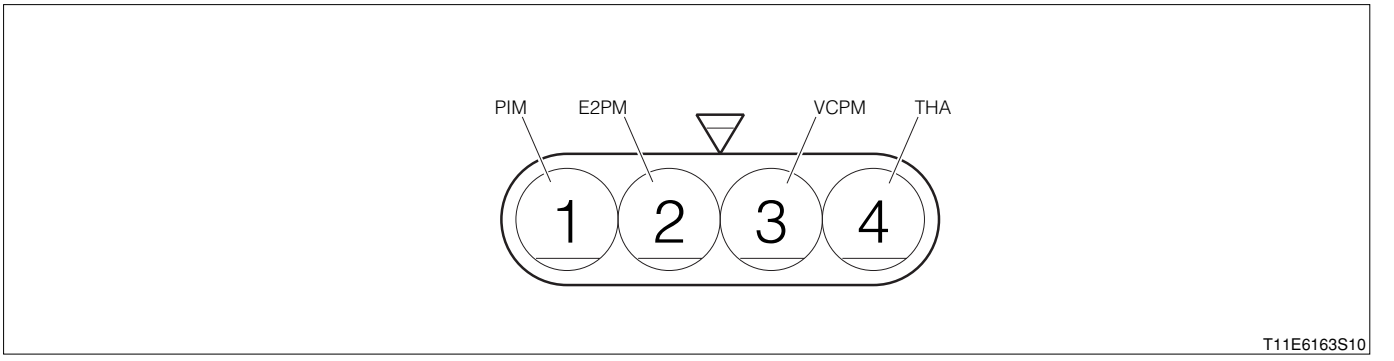
2.Are the check result OK?
▼If it is OK, check the connecting condition of each connector.
▼If it is NG, replace the intake manifold pressure/intake temperature integrated sensor.

7-12-2 DTC NO.P0110/43 INTAKE AIR TEMPERATURE (IAT) SENSOR CIRCUIT MALFUNCTION

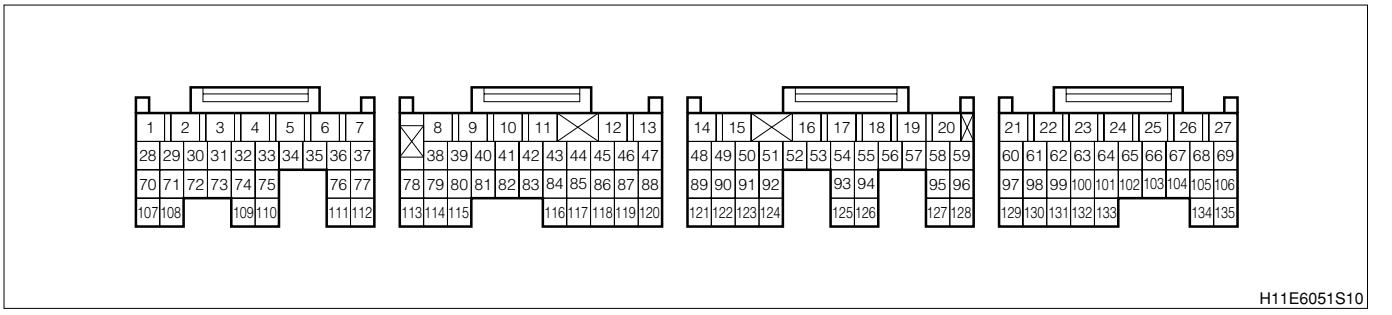
(1) System diagram



Manifold absolute pressure/intake air temperature integral type sensor connection vehicle harness side connector

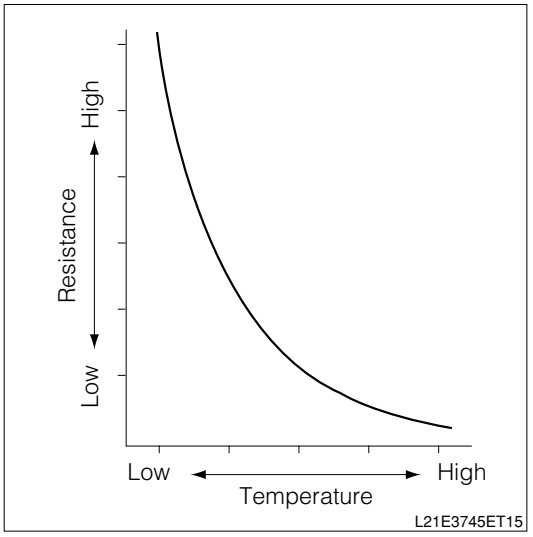


EFI ECU connection vehicle harness side connector



(2) Circuit description

1.The Manifold absolute pressure, intake air temperature integral type sensor (Intake air temperature sensor section), which detects the intake air temperature, is located at the intake manifold. A thermistor built in the sensor changes the resistance value according to the intake air temperature. The lower the intake air temperature, the greater the thermistor resistance value, and the higher the manifold absolute pressure, intake air temperature integral type sensor (Intake air temperature sensor section), the lower the thermistor resistance value. When the resistance value of the manifold absolute pressure, intake air temperature integral type sensor (Intake air temperature sensor section) changes in accordance with changes in the intake air temperature, the potential at terminal THA also changes. Based on this signal, the EFI ECU increases the fuel injection volume to improve driveability during cold engine operation.



(3) Diagnosis code output conditions

1.When the signals from the manifold absolute pressure/intake air temperature integral type sensor (Intake air temperature sensor section) are not outputted continuously after starting over a certain length of time:

(4) Trouble area

1.Open wire or short circuit in the Manifold absolute pressure, intake air temperature integral type sensor (Intake air temperature sensor section) circuit

2.Manifold absolute pressure, intake air temperature integral type sensor (Intake air temperature sensor section)

3.EFI ECU

(5) Checking points

1.Are the signals from the intake manifold pressure/intake air temperature integral type sensor (Intake air temperature sensor section) inputted to the EFI ECU?

2.Is the harness between the manifold absolute pressure/intake air temperature integral type sensor (Manifold absolute pressure sensor section) and the EFI ECU normal?

3.Is the output of the manifold absolute pressure/intake air temperature integral type sensor (Intake air temperature sensor section) normal?

(6) Inspection procedure

① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

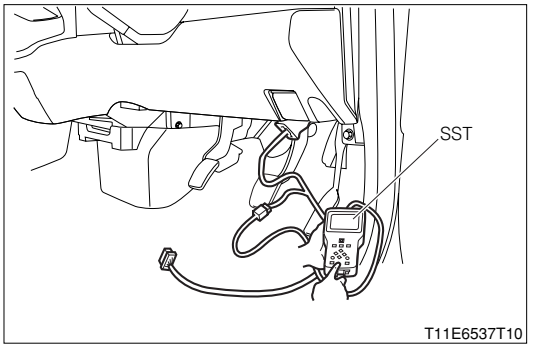
Σ>1. Check of sensor output value.

1.The IG switch turned "LOCK".

2.Connect the diagnosis tester to DLC.

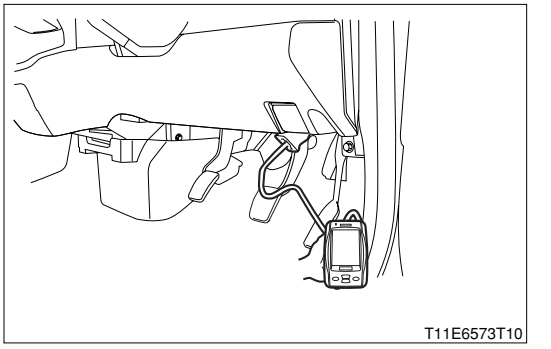
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.

(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.After turning "ON" the IG switch, Turn "ON" the main switch of the tester.

4.Read the "Intake air temperature" of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.

SPECIFIED VALUE: Measured ambient temperature

▼If it is OK, check the EFI ECU circuit.

Refer to Page A1-24.

▼If it is NG, go to Σ>2.

Σ>2. Confirmation of IAT sensor output value.

1.Read the "Intake air temperature" of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.

▼When −40°C, go to Σ>3.

▼When 140°C or above, go to Σ>5.

Σ>3. Check of open wire in harness or inside EFI ECU (1).

1.After turning "OFF" the main switch of the tester, turn "LOCK" the IG switch.

2.Remove the manifold absolute pressure/intake air temperature integral type sensor connector.

3.Short circuit between the following terminals given below, using SST.

SST: 09991-87103-000

(1) Between the sensor connection vehicle harness side connector 4 (THA) and the sensor connection vehicle harness side connector 2 (E2PM)

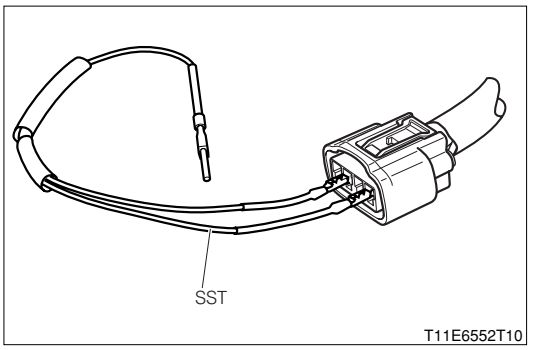
4.After turning "ON" the IG switch, turn "ON" the main switch of the tester. Read the "Intake air temperature" of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.
SPECIFIED VALUE: 140°C or above

▼If it is OK, carry out the following operations given below.

(1) Check the connector or the connection state of the terminal of the manifold absolute pressure/intake air temperature integral type sensor.

(2) If there is no abnormality, replace the manifold absolute pressure/intake air temperature integral type sensor.

▼If it is NG, go to Σ>4.



Σ>4. Check of open wire in harness or inside EFI ECU (2).

1.After turning "OFF" the main switch of the tester, turn "LOCK" the IG switch.
2.Set the SST (Sub-harness).
SST: 09842-97209-000

3.Release the short circuit of the connector of the manifold absolute pressure/intake air temperature integral type sensor.
4.Short circuit between the following terminals given below.
(1) Between SST 55 (THA) and 122 (E2PM)
5.After turning "ON" the IG switch, turn "ON" the main switch of the tester. Read the "Intake air temperature" of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.
SPECIFIED VALUE: 140°C or above

▼If it is OK, the harness between the manifold absolute pressure, intake air temperature integral type sensor (Intake air temperature sensor section) and the EFI ECU is open. Repair or replace the harness.

▼If it is NG, check the ECU connector or terminal for connecting condition. If they are satisfactory, replace the EFI ECU.

Refer to Page B8-1.

Σ>5. Check of short in harness or inside EFI ECU (1).

1.After turning "OFF" the main switch of the tester, turn "LOCK" the IG switch.
2.Disconnect the connector of the manifold absolute pressure, intake air temperature integral type sensor.
3.After turning "ON" the IG switch, turn "ON" the main switch of the tester.
4.Read the "Intake air temperature " of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.
SPECIFIED VALUE: −40°C

▼If it is OK, replace the manifold absolute pressure, intake air temperature integral type sensor.

▼If it is NG, go to Σ>6.

∑>6. Check of short in harness or inside EFI ECU (2).

1.Perform continuity check between each of the following terminals.

(1) Between sensor connection vehicle harness side connector 2 (E2PM) - ECU connection vehicle harness side connector 122 (E2PM)

(2) Between sensor connection vehicle harness side connector 4 (THA) - ECU connection vehicle harness side connector 55 (THA)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, repair or replace the harness or connector.

▼If it is NG, check or replace the EFI ECU.

② When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

Σ>1. EFI ECU voltage check

1.Connect the SST.
SST: 09842-97209-000

2.Perform voltage measurement between the following terminals when the IG switch is "ON".
(1) Between SST 55 (THA) - 122 (E2PM)
SPECIFIED VALUE: 0.15 V - 4.85 V (Changes according to the intake temperature)

▼If it is OK, check the EFI ECU circuit.
▼If it is NG, proceed to Σ>2.

Σ>2. Check of wire harness continuity

1.Perform continuity check between each of the following terminals.
(1) Between sensor connection vehicle harness side connector 2 (E2PM) - ECU connection vehicle harness side connector 122 (E2PM)
(2) Between sensor connection vehicle harness side connector 4 (THA) - ECU connection vehicle harness side connector 55 (THA)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ>3.
▼If it is NG, repair the harness and connectors.

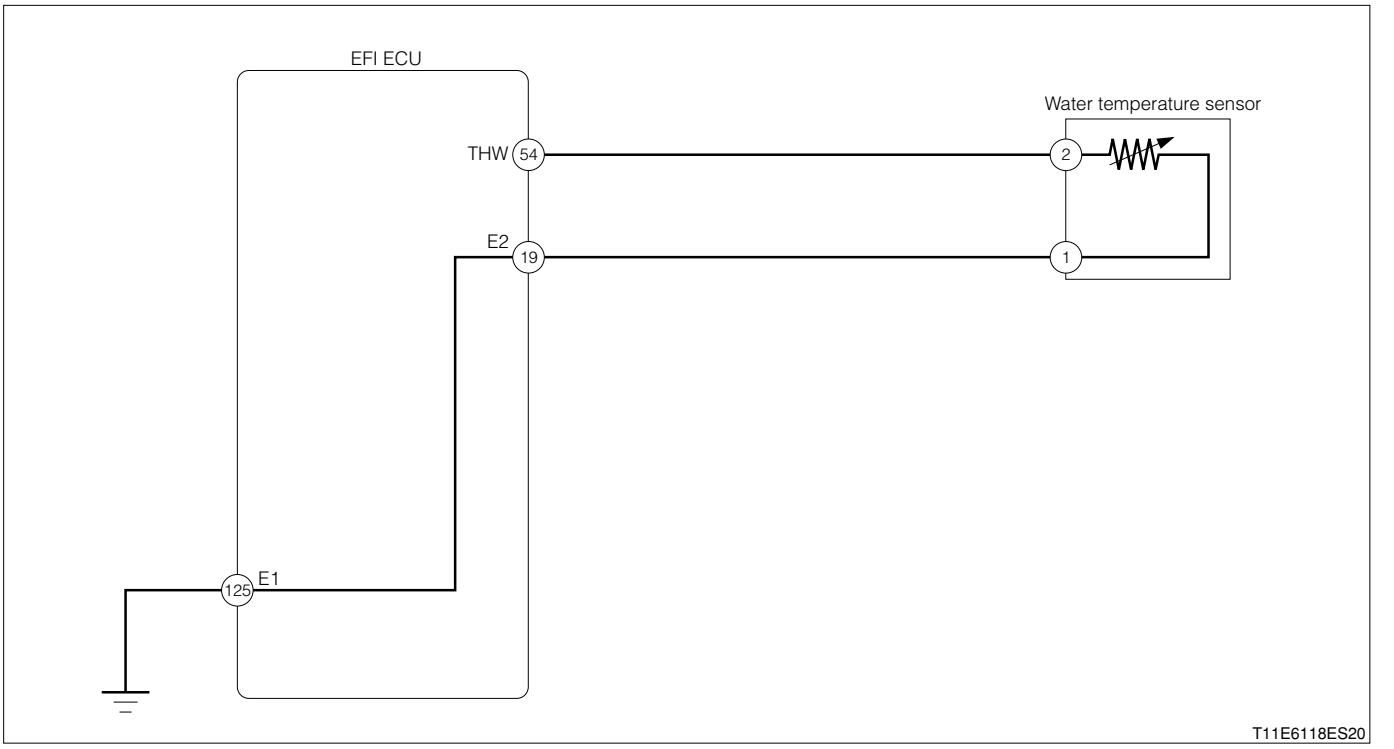
Σ>3. Intake manifold pressure/intake temperature integrated sensor unit check

1.Perform unit check of the intake manifold pressure/intake temperature integrated sensor.
Refer to Page B8-220.

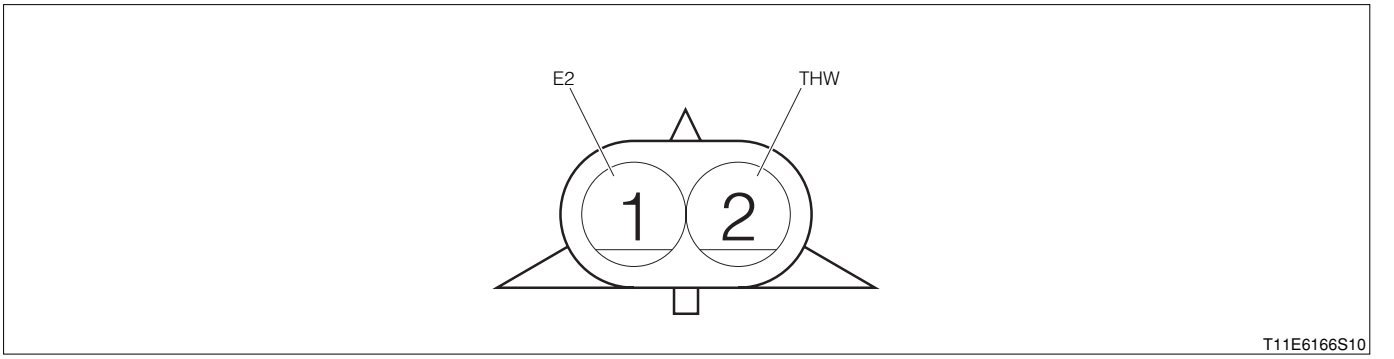
2.Are the check result OK?
▼If it is OK, check the connecting condition of each connector.
▼If it is NG, replace the intake manifold pressure/intake temperature integrated sensor.

7-12-3 DTC NO.P0115/42 ENGINE COOLANT TEMPERATURE SENSOR (ECT) CIRCUIT MALFUNCTION

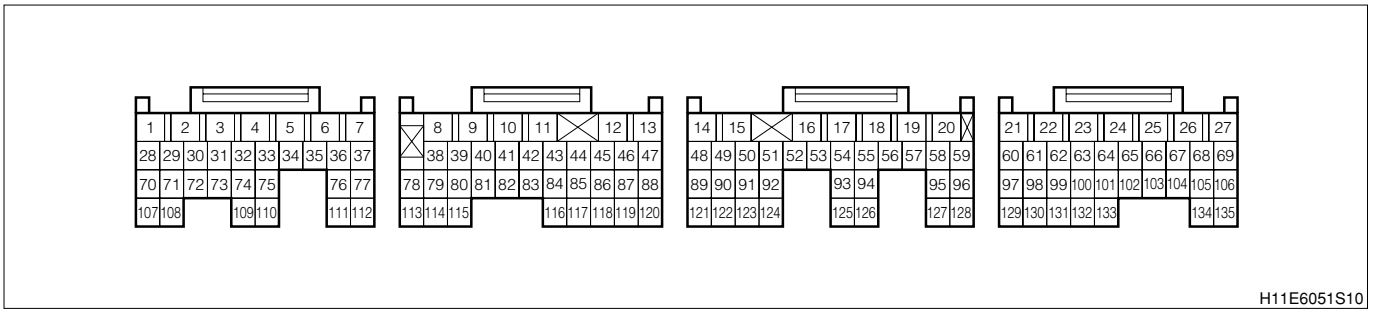
(1) System diagram



Water temperature sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1.A thermistor built into the engine coolant temperature sensor changes the resistance valve according to the engine coolant temperature. The structure of the sensor and connection to the EFI ECU is the same as in the DTC P0110/43 (Intake air temparature sensor circuit malfunction).

(3) Diagnosis code output conditions

1.When the signals from the water temperature sensor are not outputted continuously after starting over a certain length of time:

(4) Trouble area

1.Open wire or short circuit in the engine coolant temperature sensor circuit
2.Engine coolant temperature sensor
3.EFI ECU

(5) Checking points

1.Are the signals from the water temperature sensor inputted to the EFI ECU?
2.Is the harness between the water temperature sensor and the EFI ECU normal?
3.Is the output of the water temperature sensor normal?

(6) Inspection procedure

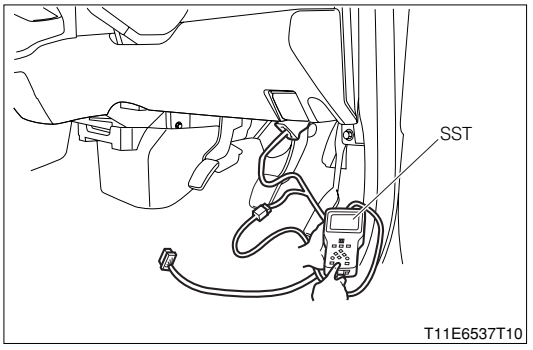
① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

NOTE

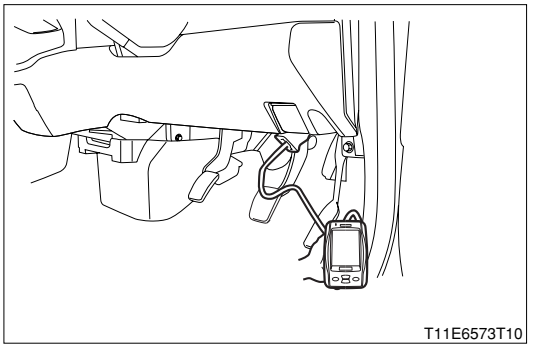
- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

Σ>1. Check of output value of sensor.

1.The IG switch turned "LOCK".
2.Connect the diagnosis tester to DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.After turning "ON" the IG switch, turn "ON" the main switch of the tester.
4.Read the "Engine coolant temperature" of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.
SPECIFIED VALUE: The same as the actual engine cooling water temperature

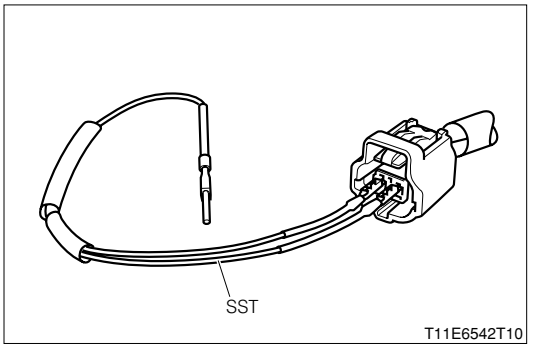
▼If it is OK, check the EFI ECU circuit.
▼If it is NG, go to Σ>2.

Σ>2. Confirmation of sensor output value.

1.Read the "Engine coolant temperature" of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.
▼When −40°C, go to Σ>3.
▼When 140°C or above, go to Σ>5.

Σ3. Check of open wire in harness or inside EFI ECU (1).

1.After turning "OFF" the main switch of the tester, turn "LOCK" the IG switch.
2.Disconnect the connector of the engine coolant temperature sensor.
3.Short circuit between the following terminals given below, using SST.
(1) Between the water temperature sensor connection vehicle harness side connector 1 (E2) and the water temperature sensor connection vehicle harness side connector 2 (THW)
SST: 09991-87103-000
4.After turning "ON" the IG switch, turn "ON" the main switch of the tester.
5.Read the "Engine coolant temperature" of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.
SPECIFIED VALUE: 140°C or above.



▼If it is OK, check the engine coolant temperature sensor sensor connector or terminal for connecting condition. If they are satisfactory, replace the engine coolant temperature sensor sensor.
Refer to Page B8-7.

▼If it is NG, go to Σ4.

Σ4. Check of open wire in harness or inside EFI ECU (2).

1.After turning "OFF" the main switch of the tester, turn "LOCK" the IG switch.
2.Set the SST (Sub-harness).
SST: 09842-97209-000
3.Disconnect the jump wire from the engine coolant temperature sensor sensor connector.
4.Short circuit between the following terminals given below.
(1) Between SST 54 (THW) and 19 (E2)
5.After turning "ON" the IG switch, turn "ON" the main switch of the tester.
6.Read the "Engine coolant temperature" of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.
SPECIFIED VALUE: 140°C or above?

▼If it is OK, the harness between the engine coolant temperature sensor sensor and the EFI ECU is open. Repair or replace the harness.
▼If it is NG, check the EFI ECU connector and terminal for connecting condition. If they are satisfactory, replace the EFI ECU.
Refer to Page B8-1.

Σ>5. Check of short in harness or inside EFI ECU (1).

1.After turning "OFF" the main switch of the tester, turn "LOCK" the IG switch.
2.Disconnect the connector of the engine coolant temperature sensor sensor.
3.After turning "ON" the IG switch, turn "ON" the main switch of the tester.
4.Read the "Engine coolant temperature" of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.
SPECIFIED VALUE: −40°C

▼If it is OK, replace the engine coolant temperature sensor.
Refer to Page B8-7.

▼If it is NG, go to Σ>6.

Σ>6. Check of short in harness or inside EFI ECU (2).

1.Perform continuity check between each of the following terminals.
(1) Between sensor connection vehicle harness side connector 1 (E2) - ECU connection vehicle harness side connector 19 (E2)
(2) Between sensor connection vehicle harness side connector 2 (THW) - ECU connection vehicle harness side connector 54 (THW)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, repair or replace the harness or connector.
▼If it is NG, check or replace the EFI ECU.

② **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

Σ>1. EFI ECU signal check

1.Connect the SST.
SST: 09842-97209-000

2.Perform voltage measurement between the following terminals when the IG switch is "ON".
(1) Between SST 54 (THW) - 19 (E2)
SPECIFIED VALUE: 0.15 V - 4.85 V(Changes according to the water temperature)

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, proceed to Σ>2.

Σ>2. Check of wire harness continuity

1.Perform continuity check between each of the following terminals.
(1) Between sensor connection vehicle harness side connector 1 (E2) - ECU connection vehicle harness side connector 19 (E2)
(2) Between sensor connection vehicle harness side connector 2 (THW) - ECU connection vehicle harness side connector 54 (THW)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ>3.
▼If it is NG, repair the harness and connectors.

⊿3. Water temperature sensor unit check

1.Perform unit check of the water temperature sensor.
Refer to Page B8-221.

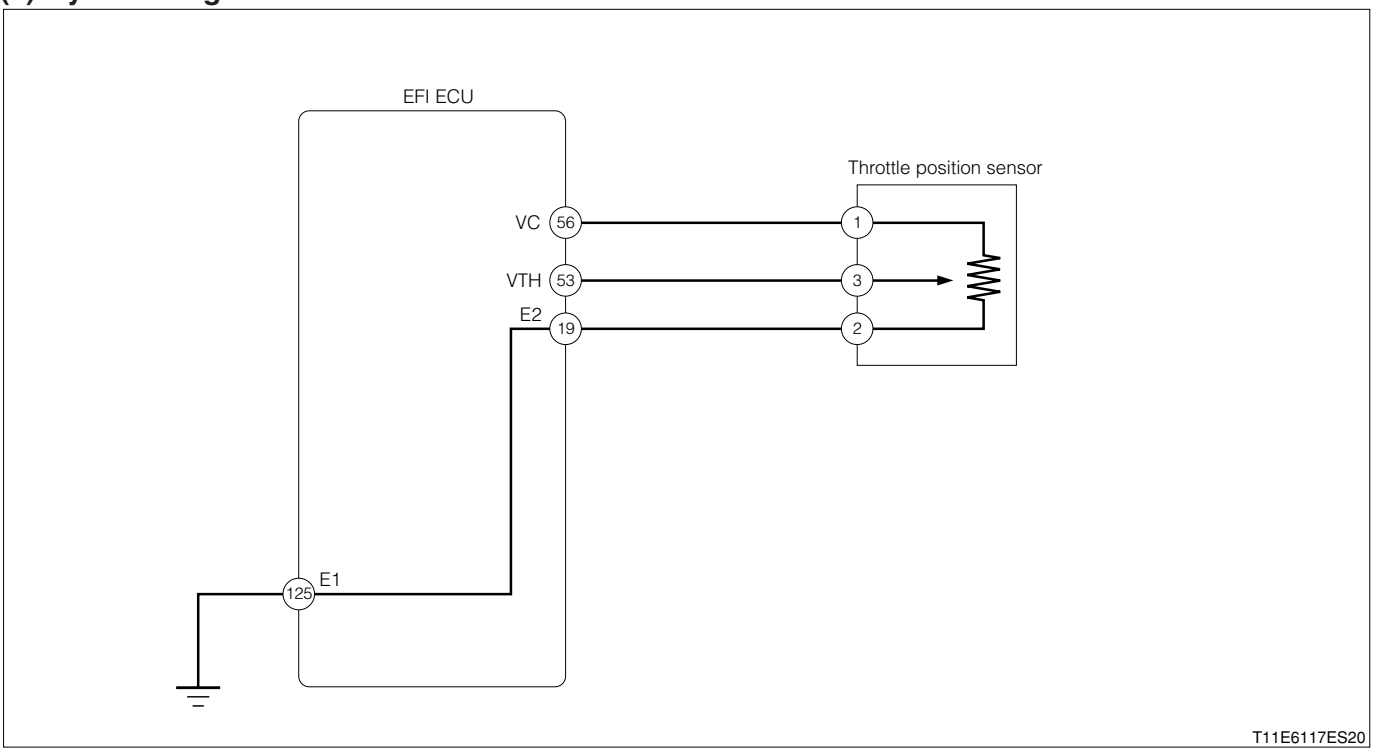
2.Are the check result OK?

▼If it is OK, check the connecting condition of each connector.

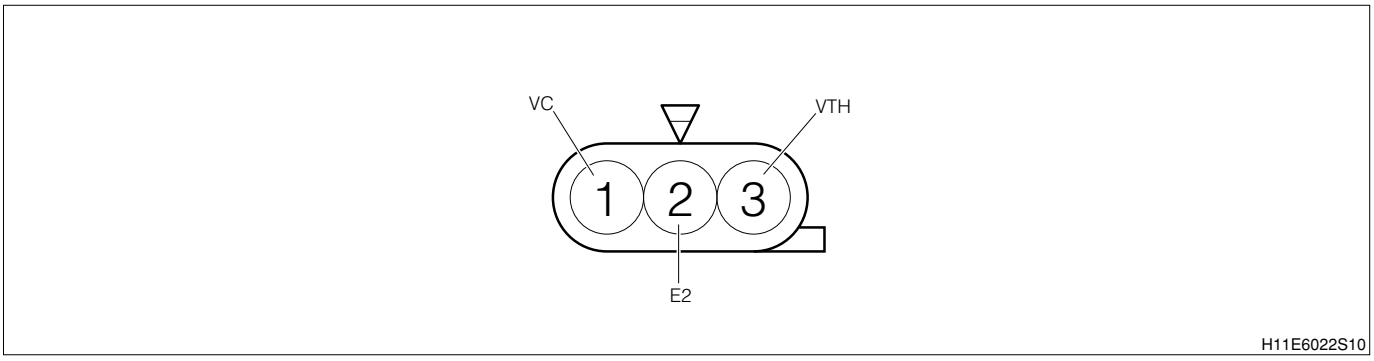
▼If it is NG, replace the water temperature sensor.
Refer to Page B8-7.

7-12-4 DTC NO.P0120/41 THROTTLE/PEDAL POSITION SENSOR

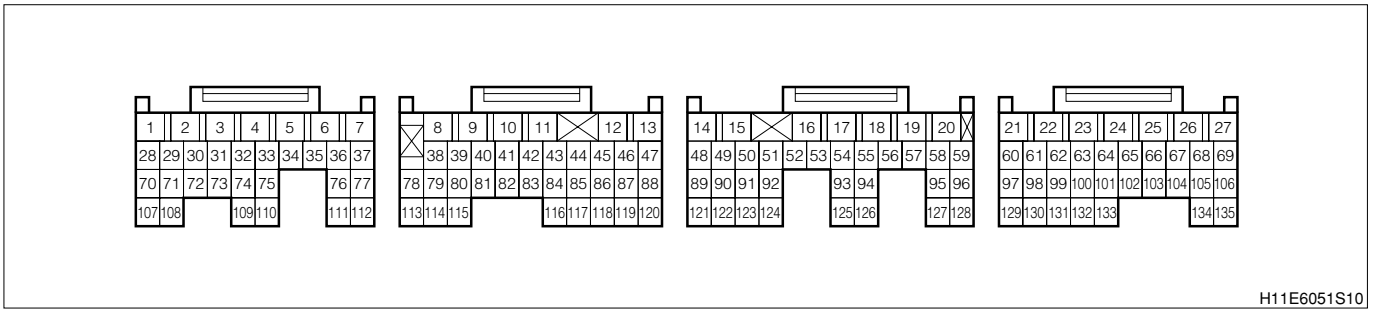
(1) System diagram



Throttle position sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1. The throttle position sensor is mounted in the throttle body and detects the throttle valve opening angle. When the throttle valve is fully closed, a voltage of approximately 0.4 - 0.8 V is applied to terminal VTH of the EFI ECU. The voltage applied to the terminals VTH of the EFI ECU increases in proportion to the opening angle of the throttle valve and becomes approximately 3.5 - 5.0 V when the throttle valve is fully opened. The EFI ECU judges the vehicle driving conditions from these signals input from terminal VTH, uses them as one of the conditions for deciding the air-fuel ratio correction, power increase correction and fuel-cut control etc.

(3) Diagnosis code output conditions

1.When the signals from the throttle position are not outputted continuously after starting over a certain length of time.

(4) Trouble area

1.Open wire or short circuit in the throttle position sensor circuit.
2.Throttle position sensor
3.EFI ECU

(5) Checking points

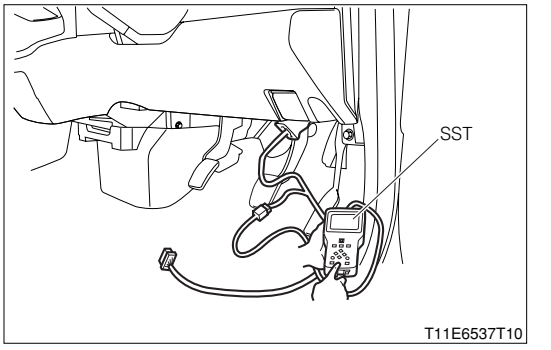
1.Are the signals from the throttle position sensor inputted to the EFI ECU?
2.Is the harness between the throttle position sensor and the EFI ECU normal?
3.Is the power supply voltage of the throttle position sensor normal?
4.Is the output of the throttle position sensor normal?

(6) Inspection procedure

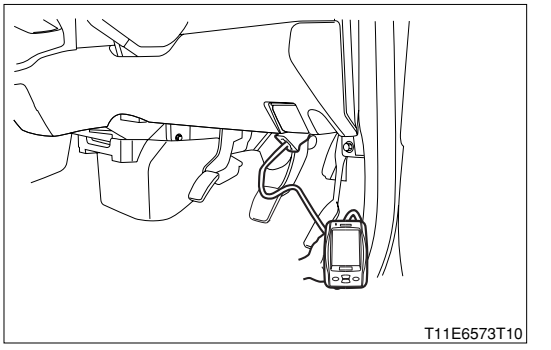
① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

Σ>1. Check of output value of sensor.

1.The IG switch turned "LOCK".
2.Connect the diagnosis tester to DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.After turning "ON" the IG switch, turn "ON" the main switch of the tester.
4.Read the "Abs. throttle position SSR" of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.

Throttle valve	Throttle valve opening [%]
Fully closed	0.0
Fully open	100.0

5.Are the check results OK?
▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, go to Σ>2.

Σ2. Check of power supply voltage.

1.After turning "OFF" the main switch of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool, turn "LOCK" the IG switch.
2.Disconnect the connector of the throttle position sensor.
3.With the IG switch turned "ON", measure the voltage between the following terminals given below.
(1) Between the throttle position sensor connection vehicle harness side connector 1 (VC) and the body earth
SPECIFIED VALUE: 4.5 - 5.5V

4.Is the voltage within the specified value?
▼If it is OK, go to Σ3.
▼If it is NG, go to Σ5.

Σ3. Check of linear throttle sensor.

Refer to Page B8-222.

1.Are the check results OK?
▼If it is OK, go to Σ4.
▼If it is NG, replace the throttle body Ay.
Refer to Page B3-3.

Σ4. Check of input signal.

1.Set the SST (Sub-harness).
SST: 09842-97209-000

2.The IG switch turned "ON".
3.Measure the voltage between the SST connector 53 (VTH) and 19 (E2) under the following condition given below.

Throttle valve	Specified value [V]
Fully closed	0.4 - 0.8
Fully open	3.2 - 5.0

4.Is the measured value within the specified value?
▼If it is OK, check or replace the EFI ECU.
▼If it is NG, check between the following terminals for open wire or short.
(1) Between the EFI ECU and the throttle position sensor (VTH line)

∑>5. Check of power supply voltage ECU side.

1.Turn "LOCK" the IG switch.
2.Set the SST (Sub-harness).
SST: 09842-97209-000

3.The IG switch turned "ON".
4.Check the voltage between the following terminals given below.
(1) Between SST 56 (VC) and 19 (E2)
SPECIFIED VALUE: 4.5 - 5.5V

5.Is the measured value within the specified value?

NOTE

- If no voltage appears, check the EFI ECU power supply circuit.

▼If it is OK, check between the following terminals for open wire or short.
(1) Between the EFI ECU and the throttle position sensor (VC line)
▼If it is NG, check or replace the EFI ECU.

② When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

Σ>1. EFI ECU signal check

1.Connect the SST.
SST: 09842-97209-000

2.Turn the IG switch to the "ON" position.
3.Perform voltage measurements between the following terminals.
(1) Between SST 56(VC) - 19 (E2)
(2) Between SST 53(VTH) - 19 (E2)
SPECIFIED VALUE:

Measuring terminals	Specified value
56(VC) - 19(E2)	4.5 - 5.5V
53(VTH) - 19(E2)	It increases in proportion to the throttle opening in the range of 0.2V - 4.8V when the throttle lever is fully opened from the fully closed state.

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, proceed to Σ>2.

Σ>2. Check of wire harness continuity

1.Perform continuity check between each of the following terminals.
(1) Between sensor connection vehicle harness side connector 1 (VC) - ECU connection vehicle harness side connector 56 (VC)
(2) Between sensor connection vehicle harness side connector 2 (E2) - ECU connection vehicle harness side connector 19 (E2)
(3) Between sensor connection vehicle harness side connector 3 (VTH) - ECU connection vehicle harness side connector 53 (VTH)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ>3.
▼If it is NG, repair the harness and connectors.

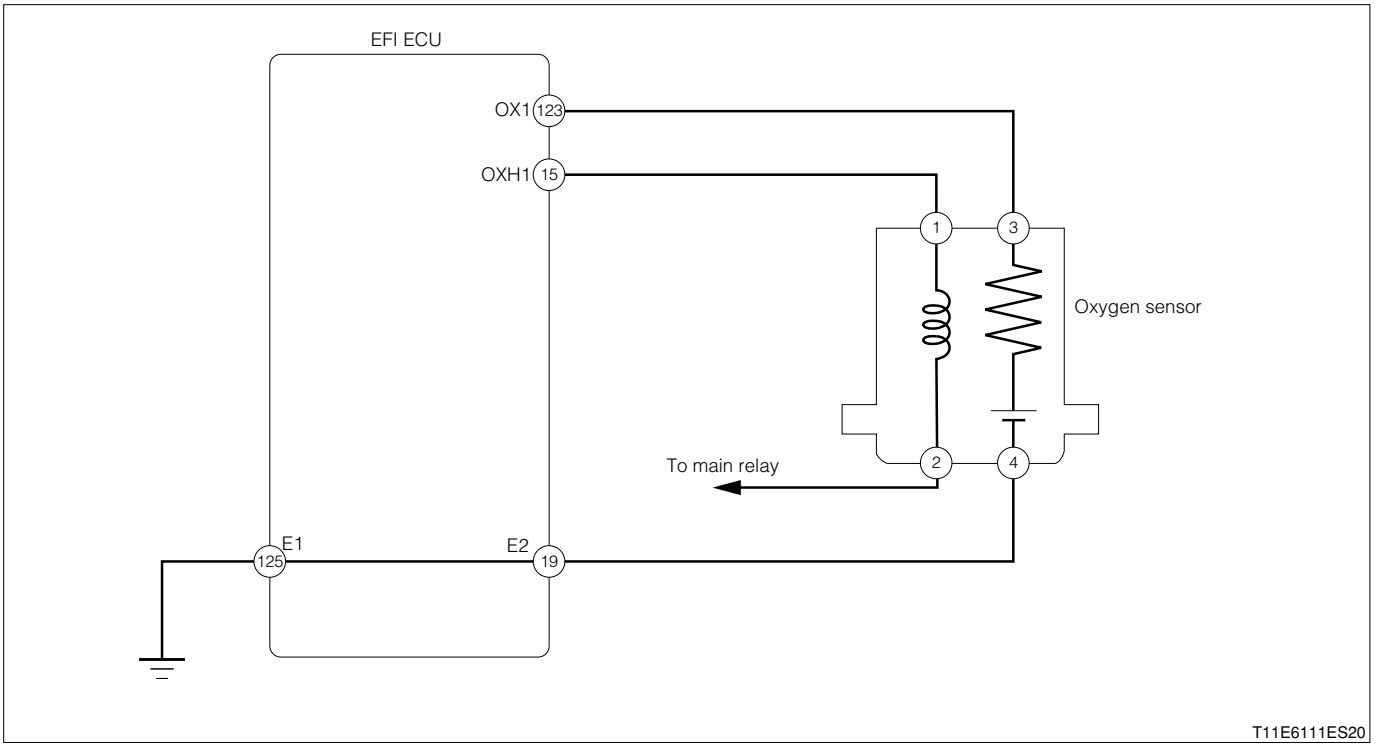
Σ>3. Throttle position sensor unit check

1.Perform unit check of the throttle position sensor.
Refer to Page B8-222.

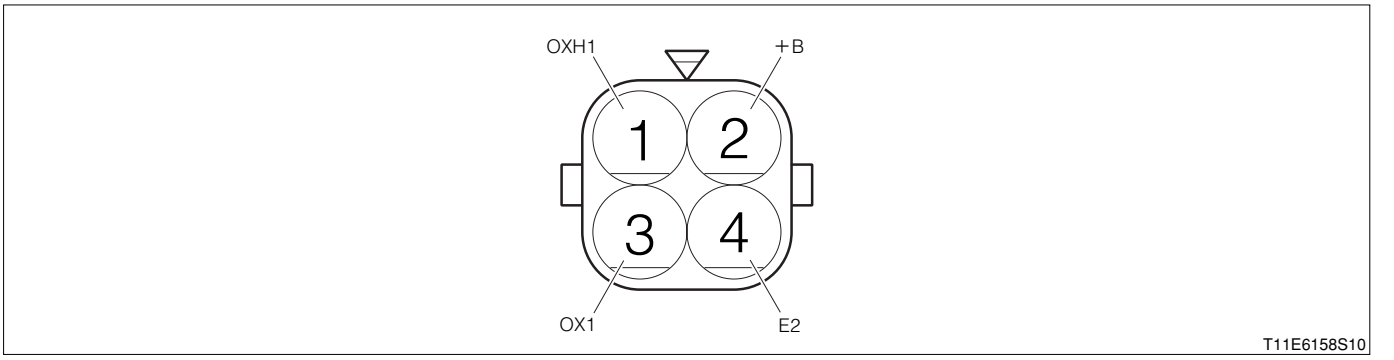
2.Are the check result OK?
▼If it is OK, check the connecting condition of each connector.
▼If it is NG, replace the throttle body Ay.
Refer to Page B3-3.

7-12-5 DTC NO.P0130/21 OXYGEN SENSOR CIRCUIT MALFUNCTION (BANK 1 SENSOR 1)

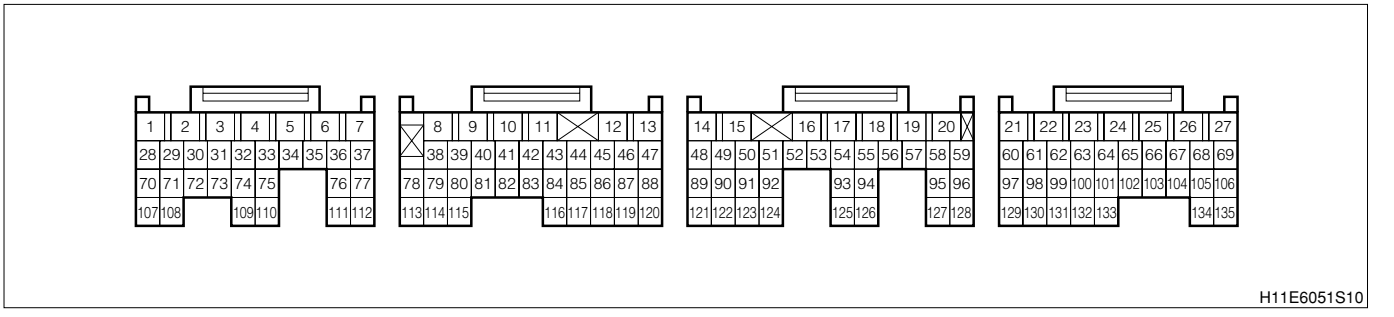
(1) System diagram



Oxygen sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1. The front oxygen sensor (Bank 1, sensor 1) detects the concentration of oxygen contained in the exhaust gas according to the magnitude of the electromotive force that is being generated in itself. When the air-to-fuel ratio becomes richer than the stoichiometric ratio, a greater electromotive force (Approx. 1 volt) is applied to the EFI ECU. Conversely, when the ratio becomes leaner than the stoichiometric ratio, a smaller electromotive force (Approx. 0 volt) is applied to the EFI ECU. In this way, the EFI ECU determines whether the air-to-fuel ratio is rich or lean. Based on this evaluation, the injection time is controlled.

(3) Diagnosis code output conditions

1.When no rich signal is sent even once from the oxygen sensor even if the condition continues in which the engine revolution speed is more than 3000 rpm and the power increase compensation is continued over the specified value after the engine warming-up

(4) Trouble area

1.Air induction system
2.Fuel pressure
3.Injector
4.Open wire or short circuit in the oxygen sensor circuit
5.Oxygen sensor
6.EFI ECU

(5) Checking points

NOTE

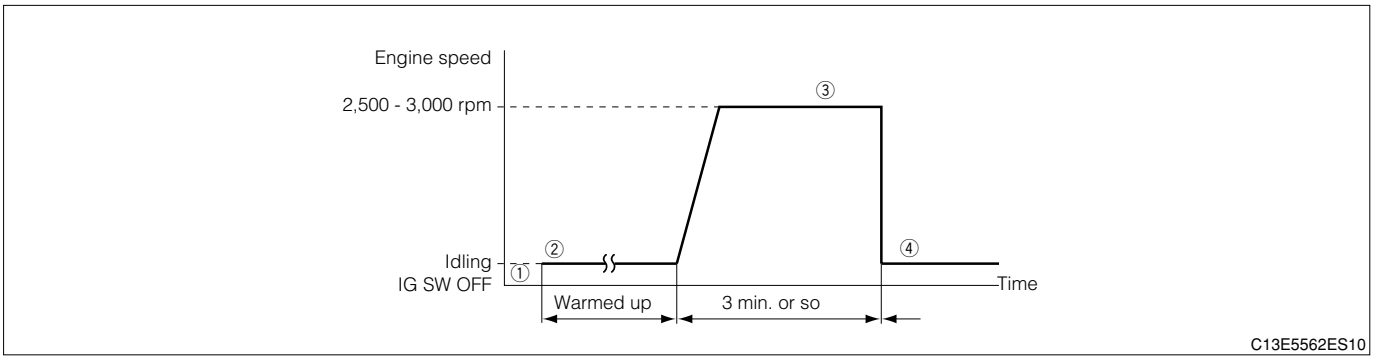
- When this code is outputted concurrently with another code, carry out the check for that code first.

1.Is the signal from the oxygen sensor inputted to the EFI ECU?
2.Is the harness between the oxygen sensor and the EFI ECU normal?
3.Is the output of the oxygen sensor correct? (If there are no causes for "Lean A/F" (The oxygen concentration in the exhaust gas is too high), the oxygen sensor is judged as defective.)
4.Check the oxygen sensor heater system for open wire or short.

NOTE

- Sensor 1 means a sensor which is located near the engine block.
- Using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool, confirm the output voltage of the oxygen sensor (Bank 1, sensor 1) from the current data. If the output voltage of the oxygen sensor (Bank 1, sensor 1) is 0.1 V or less, most likely the circuit of the oxygen sensor (Bank 1, sensor 1) is open or shorted.

Confirmation engine racing pattern (For EU specifications)



(1) Step ①; Using the DS-21, with the IG switch turned "LOCK", connect the DS-21 diagnosis tester to DLC through the SST. Turn "ON" the IG switch and the main switch of the tester. Set the tester to the "Continuous monitoring results" of the CARB mode.

SST: 09991-87404-000

(2) Step ①; Using DS-Ⅱ, with the IG switch turned "LOCK", connect the DS-Ⅱ diagnosis tester to DLC. Turn "ON" the IG switch and the main switch of the tester. Set the tester to the "Continuous monitoring results" of the CARB mode.

(3) Step ②; Start the engine. Keep on warming the engine for more than five minutes until the engine cooling water temperature reaches 90°C or above.

(4) Step ③; Race the engine for about three minutes at 2500 to 3000 rpm.

(5) Step ④; After one minute of idling, press the F1 key of the tester. Check to see if the DTC P0130/21 is outputted.

NOTE

- If the condition in this test is not strictly followed, detection of the malfunction will not be possible.
- If you do not have the diagnosis tester (DS-21/DS-Ⅱ), turn the ignition switch "LOCK" after performing steps ② to ④, then perform steps ② to ④ again.

(6) Inspection procedure

① **When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

Σ>1. Check of DTC.

1.Check other codes (Those other than DTC P0130/21) outputted?

▼If an output is made, proceed to the trouble shooting for the outputted code concerned.

▼If no output is made, proceed to Σ>2.

Σ>2. Wiring harness check

1.With the IG switch turned "LOCK", set the SST (Sub-harness). However, the SST connectors at the EFI ECU side should remain disconnected.

SST: 09842-97209-000

2.Disconnect the oxygen sensor connector.

3.Check the harness and connector between the following terminals for open wire and short.

(1) Between the sensor connection vehicle harness side connector 3 (OX1) and SST 123 (OX1)

SPECIFIED VALUE: Continuity exists.

(2) Between the sensor connection vehicle harness side connector 3 (OX1) and the body earth

SPECIFIED VALUE: No continuity exists

4.Are the check results for open wire and short OK?

▼If it is OK, go to Σ>3.

▼If it is NG, repair or replace the harness or connector.

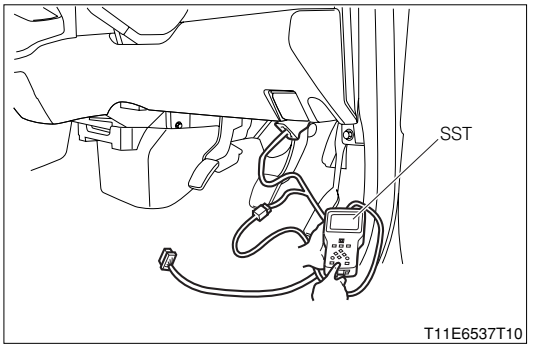
Σ>3. Check of output voltage of sensor.

1.Connect the oxygen sensor and SST connectors, respectively.

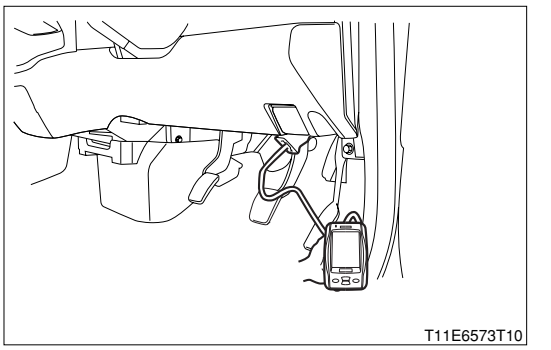
2.Connect the diagnosis tester to DLC.

(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

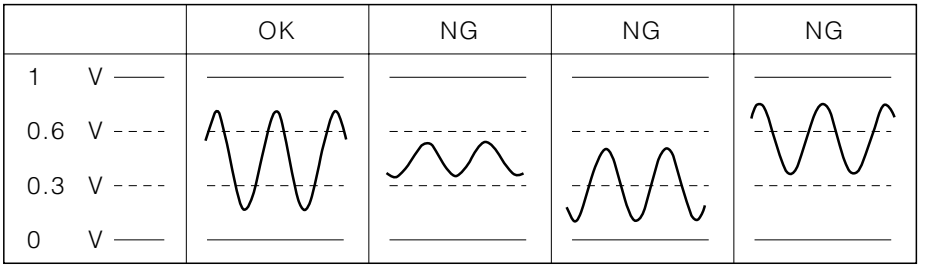
SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.


T11E6573T10

3.Turn "ON" the main switch of the tester.
4.Warm up the engine at 2500 rpm for about 90 seconds.
5.Check the output voltage of oxygen sensor during idling.
SPECIFIED VALUE: The voltage varies repeatedly between a range from a voltage below 0.3 V and to a voltage above 0.6 V. (See the diagram below.)



C13E5555S10

6.Are the check results OK?
▼If it is OK, in the case of the EU specification vehicles, go to Σ>10.
▼If it is OK, in the case of the general specification vehicles, go to Σ>11.
▼If it is NG, in the case of the EU specification vehicles, proceed to Σ>4.
▼If it is NG, in the case of the general specification vehicles, proceed to Σ>5.

Σ>4. Check of misfire.
1.Check to see if any misfire is occurring by monitoring the DTC and data list.
2.Are the check results OK?
▼If it is OK, go to Σ>5.
▼If it is NG, perform troubleshooting for misfire. (Go to troubleshooting of DTC P0300/17, P0301 - 0304/17.)
Refer to Page B8-161.

Σ>5. Check of air induction system.
1.Check the following items given below:
(1) Check of the engine oil level gauge, oil filler cap and PCV hose for disconnection.
(2) Check of parts of the air induction system between the cylinder head and the throttle body for disconnection, looseness, or cracks.
2.Are the check results OK?
▼If it is OK, go to Σ>6.
▼If it is NG, repair or replace the induction system.

Σ6. Check of fuel pressure.

1.Check the fuel pressure.
Refer to Page B8-219.

2.Are the check results OK?
▼If it is OK, go to Σ7.
▼If it is NG, check and repair fuel pump, fuel pipe line and filter.

Σ7. Check of injector injection.

1.Check the injector unit.
Refer to Page B8-224.

2.Are the check results OK?
▼If it is OK, go to Σ8.
▼If it is NG, replace the injector.
Refer to Page B7-11.

Σ8. Check of gas leakage of exhaust system.

1.Check that there is no gas leakage in the exhaust gas-related system.
Refer to Page B1-10.

2.Are the check results OK?
▼If it is OK, go to Σ9.
▼If it is NG, repair or replace the defective point.

Σ9. Check of output voltage of sensor.

1.Warm up engine completely.
2.Disconnect the connector of the oxygen sensor with IG switch turned "LOCK".
3.Disconnect the oxygen sensor connector.
4.Connect a voltmeter to the connector terminal of oxygen sensor.
5.Hold the engine racing speed for 3 minutes at 2000 rpm. At this time, ensure that the reading of the volt meter is within the specified value.
SPECIFIED VALUE: The voltmeter exhibits an output voltage of 0.2 V or more at least one time.

6.Are the check results OK?
▼If it is OK, check or replace the EFI ECU.
▼If it is NG, replace the oxygen sensor. (Bank 1, sensor 1)
Refer to Page B4-1.

Σ10. Perform confirmation engine racing pattern.

1.Again conduct the check of engine racing pattern.
2.Confirm whether Code No. P0133/21has been outputted again.
▼If it is OK, check or replace the EFI ECU.
▼If it is NG, go to Σ11.

11. The past situation of vehicles operation is investigated.

1.Confirm the past vehicle running situation.

2.Did the vehicle run out of fuel in the past?

▼If it is YES, DTC P0130/21 is caused by running out of fuel.

▼If it is NO, check the EFI ECU circuit.

Refer to Page A1-24.

② **When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

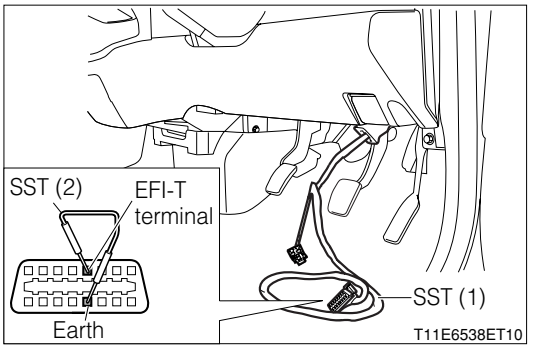
Σ1. Oxygen sensor feedback control check

1.Start the engine.

2.Activate the oxygen sensor by maintaining the engine at 3000rpm for four minutes.

3.Connect the SST and short- circuit the EFI-T terminal.

SST: 09991-87404-000(1)
09991-87403-000(2)



4.Maintain the engine revolution speed at 2000rpm or more and step on the brake pedal.

5.Check if the engine check lamp in the meter blinks.

SPECIFIED VALUE: It blinks.

NOTE

- The blinking interval will change by the condition of activation of the oxygen sensor.

▼If it is OK, the oxygen sensor system is normal.

▼If it is NG, proceed to Σ2.

Σ2. Oxygen sensor signal check

1.Connect the SST.

SST: 09842-97209-000

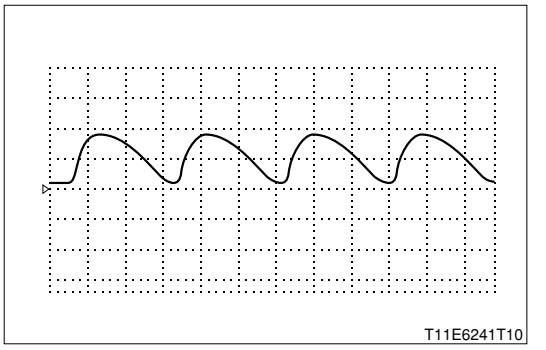
2.Activate the oxygen sensor by maintaining the engine at 3000rpm for four minutes.

3.Perform output check between the following terminals using an oscilloscope.

(1) Between SST 123 (OX1) - SST 125 (E1)

Time axis	200ms / DIV
Voltage axis	500mV / DIV
Measuring condition	Air conditioner "OFF", no electric load, maintaining 3000rpm

Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".



NOTE

- The waveform cannot be specified, but ensure that a waveform as in the right figure (One such example) shows up.

4.Confirm the following points.

(1) The waveform is showing up with the oxygen sensor activated.

(2) The waveform 0 ⇄ 1V is showing up.

NOTE

- As for the oxygen sensor signal, the correct output cannot be confirmed without using the oscilloscope.

▼If it is OK, proceed to Σ3.

▼If it is NG, replace the oxygen sensor.

Refer to Page B4-1.

Σ>3. Check of wire harness continuity

1.Perform continuity check between each of the following terminals.

(1) Between sensor connection vehicle side connector 3 (OX1) - ECU connection vehicle harness connection side connector 123 (OX1)

(2) Between sensor connection vehicle side connector 4 (E2) - ECU connection vehicle harness connection side connector 19 (E2)

▼If it is OK, replace the EFI ECU.

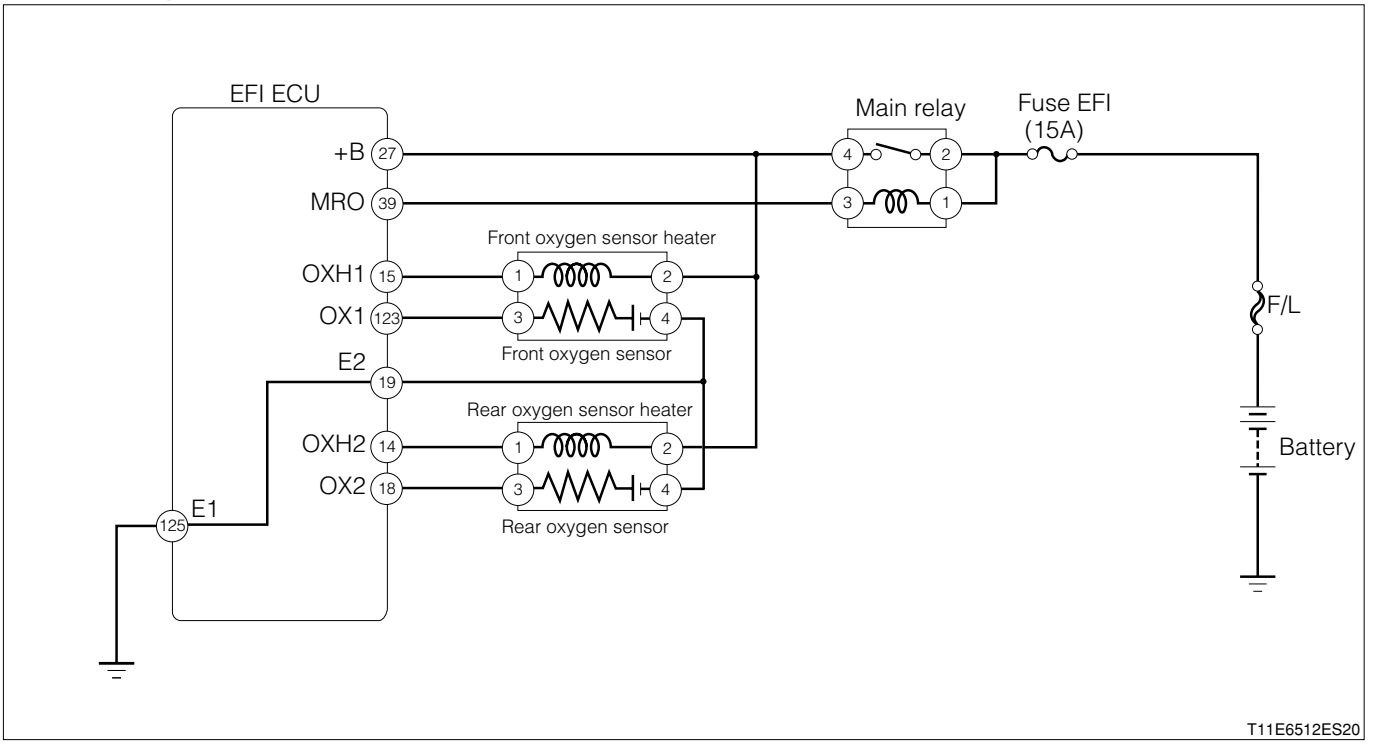
Refer to Page B8-1.

▼If it is NG, perform checking or repairing of the harness of the defective sections.

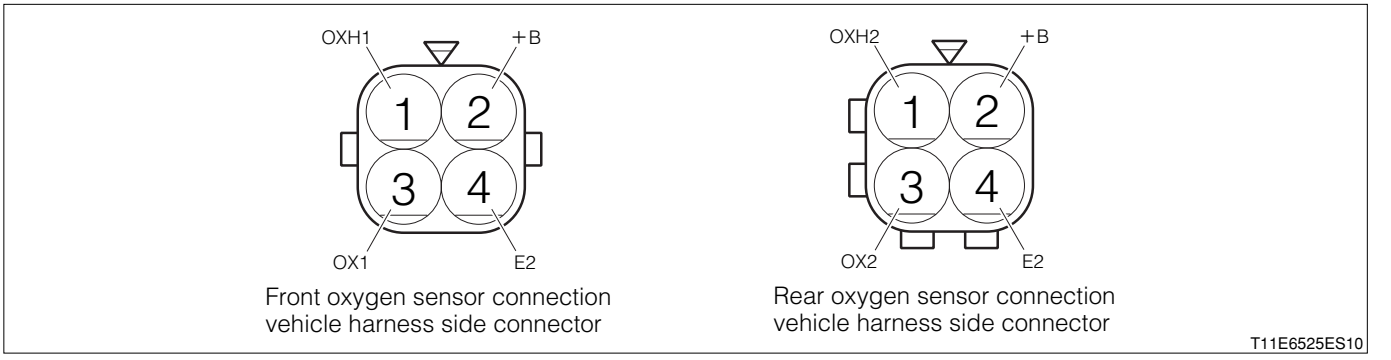
7-12-6 DTC NO.P0135/23 OXYGEN SENSOR HEATER CIRCUIT MALFUNCTION DTC NO.P0141/24 REAR OXYGEN SENSOR HEATER CIRCUIT MALFUNCTION

(1) System diagram

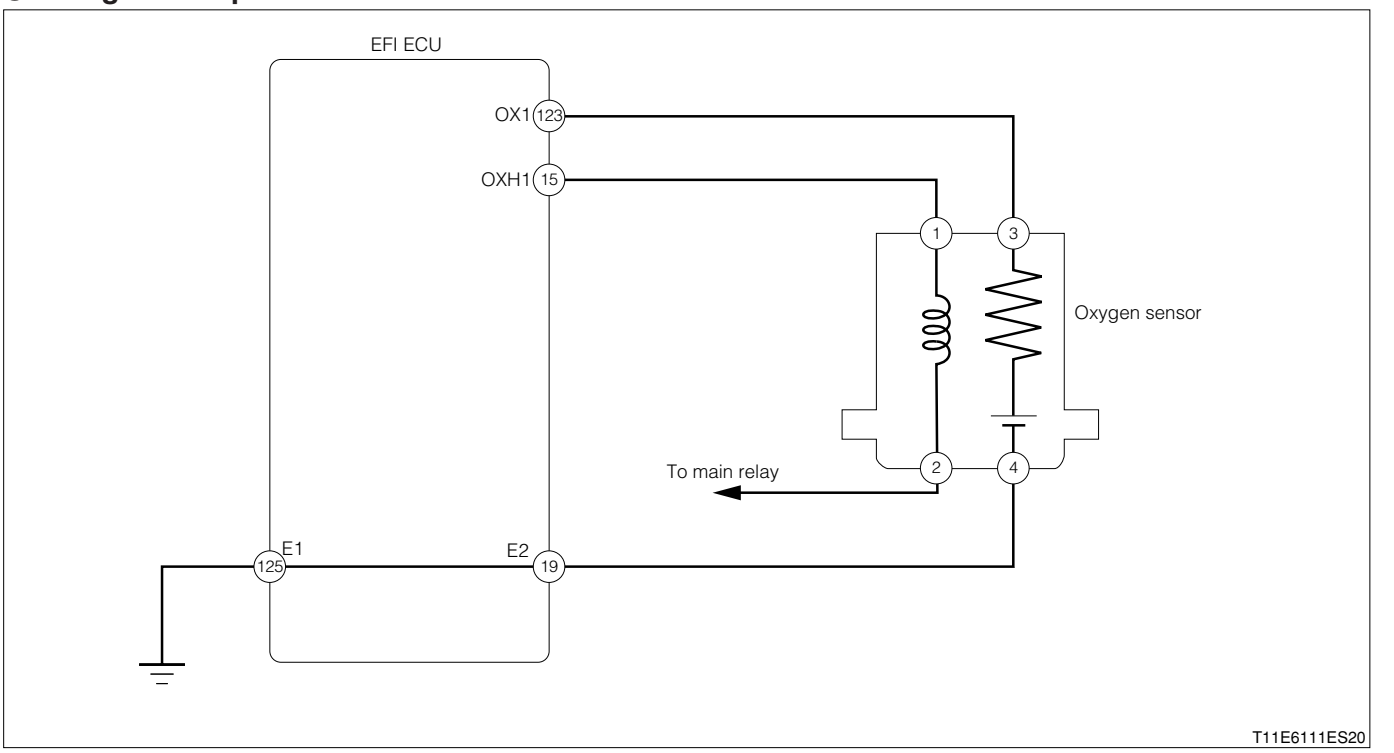
① For EU specifications



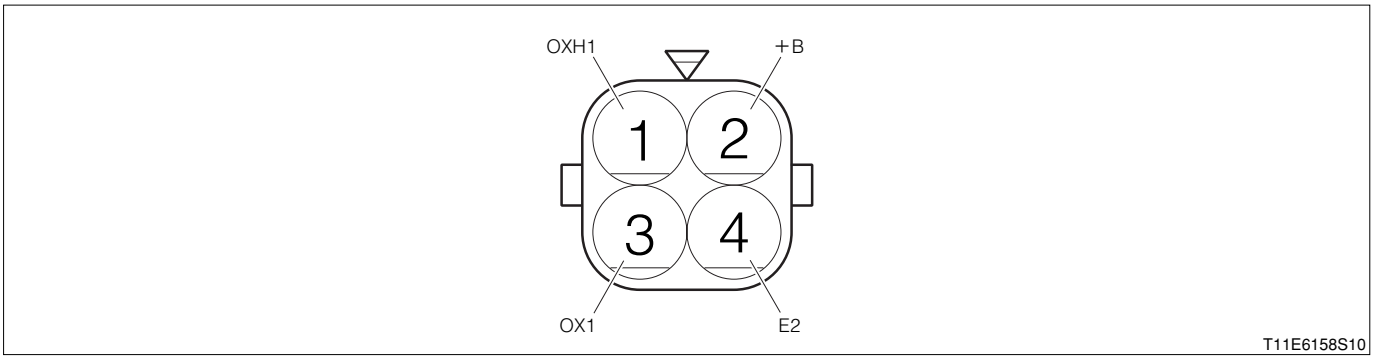
Oxygen sensor connection vehicle harness side connector



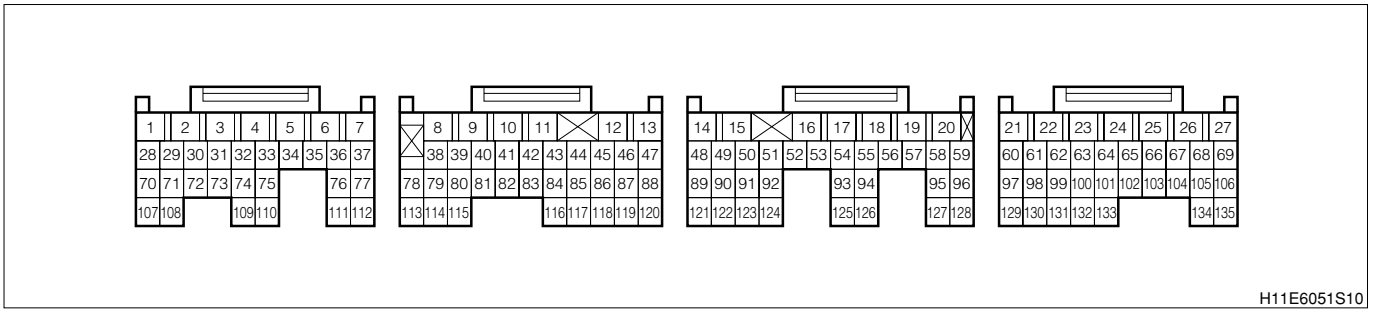
② **For general specifications**



Oxygen sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Diagnosis code output conditions

1.When an open wire or short is present in the oxygen sensor heater system,

(3) Trouble area

1.Open wire or short circuit for the oxygen sensor heater circuit
2.Oxygen sensor heater
3.EFI ECU

(4) Checking points

NOTE

- When this code is outputted concurrently with another code, carry out the check for that code first.

1.Is the signal from the oxygen sensor inputted to the EFI ECU?
2.Is the harness between the oxygen sensor and the EFI ECU normal?
3.Is the output of the oxygen sensor correct? (If there are no causes for "Lean A/F" (The oxygen concentration in the exhaust gas is too high), the oxygen sensor is judged as defective.)
4.Check the oxygen sensor heater system for open wire or short.

(5) Inspection procedure

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

Σ>1. Check of output voltage of ECU.

1.Set the SST (Sub-harness).
SST: 09842-97209-000

2.Conduct the voltage measurement between the next terminals under the following conditions given below.
(1) Between SST 15 (OXH1) and the body earth
(2) Between SST 14 (OXH2) and the body earth

	Measurement conditions	
	IG switch "ON"	After engine started
Front Oxygen sensor heater	Battery voltage	Below 1.0 V/ Immediately after
Rear Oxygen sensor heater.	Battery voltage	Below 1.0 V/After more than 3 minutes

3.Are the check results OK?
▼If it is OK, check or replace the EFI ECU.
▼If it is NG, go to Σ>2.

Σ>2. Unit check of oxygen sensor.

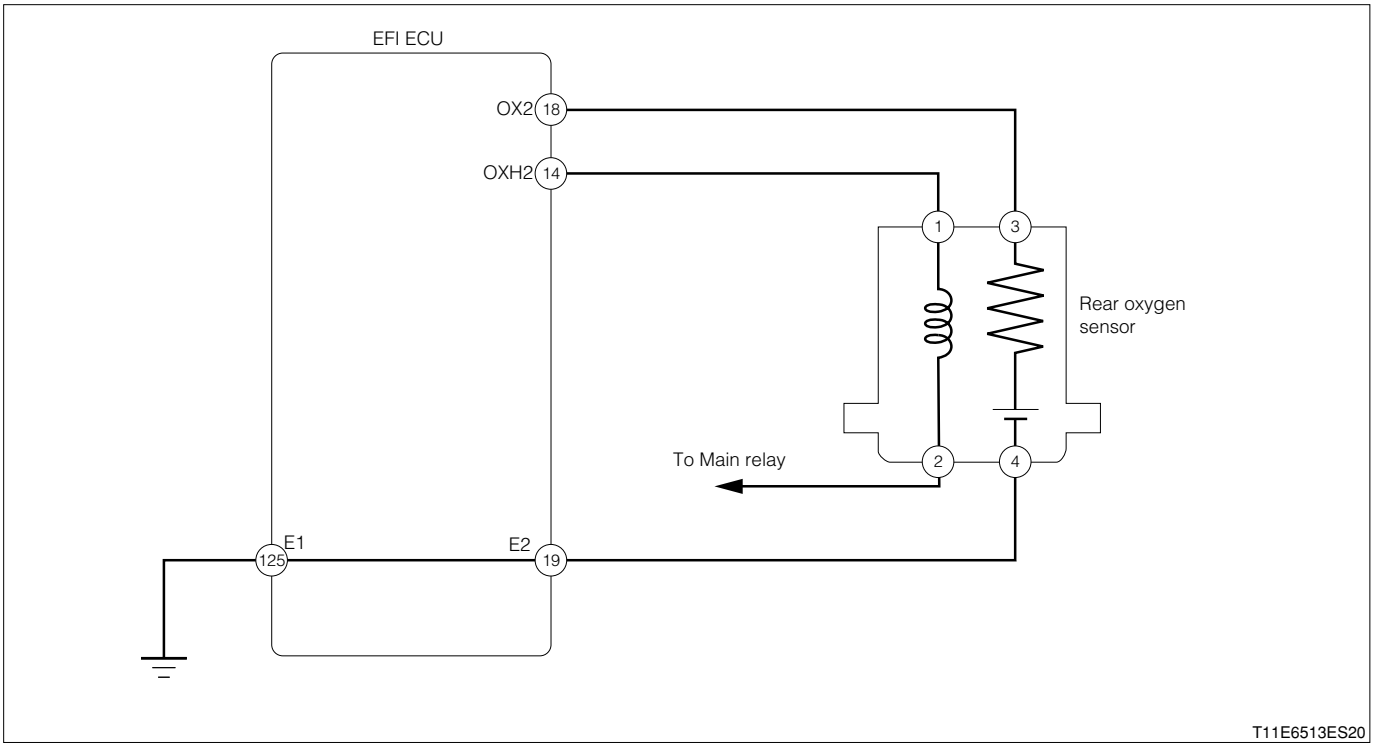
1.Check the front and rear oxygen sensor heater units.
(1) Front oxygen sensor
Refer to Page B8-221.

(2) Rear oxygen sensor
Refer to Page B8-222.

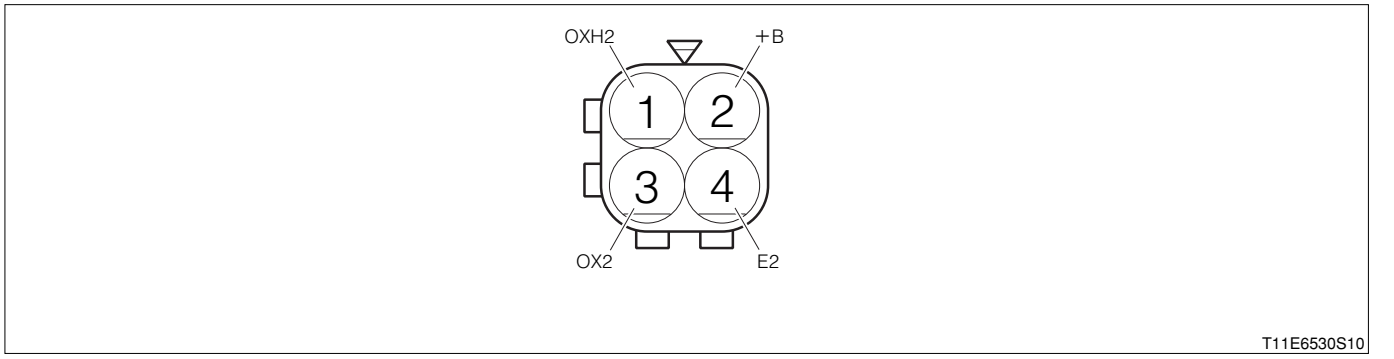
2. Are the unit check results OK?
▼If it is OK, check the harness and connector between the following terminals for open wire and short.
(1) Between the main relay and the EFI ECU
(2) Between the front oxygen sensor and the EFI ECU
(3) Between the rear oxygen sensor and the EFI ECU
▼If it is NG, replace the defective oxygen sensor.

7-12-7 DTC NO.P0136/22 REAR OXYGEN SENSOR CIRCUIT MALFUNCTION (BANK 1 SENSOR 2)

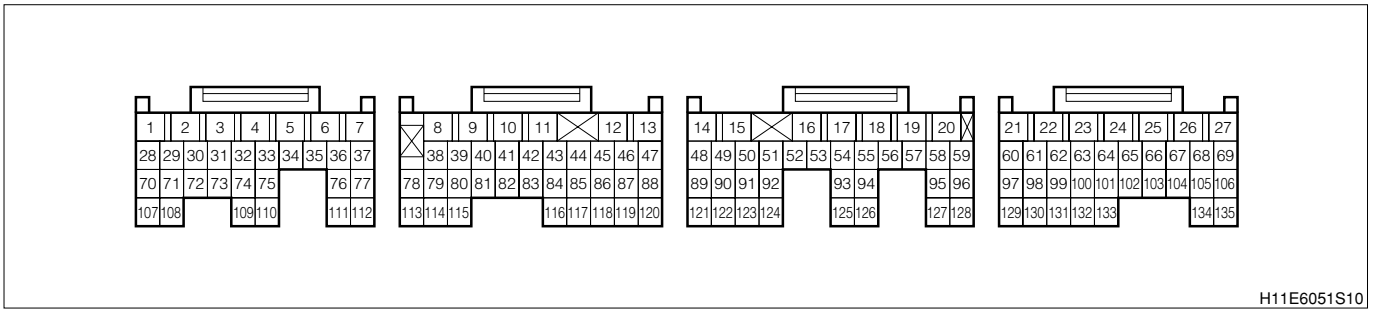
(1) System diagram



Rear oxygen sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1.Refer to DTC P0130/21 (Oxygen sensor circuit malfunction (Bank 1 sensor 1)).

(3) Trouble area

1.Open wire or short circuit in the rear oxygen sensor circuit
2.Rear oxygen sensor
3.EFI ECU

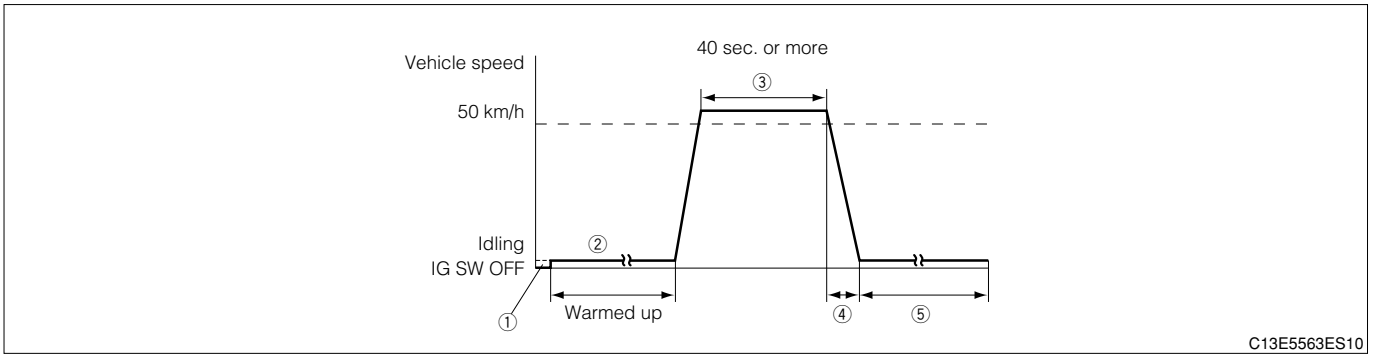
(4) Checking points

NOTE

- When this code is outputted concurrently with another code, carry out the check for that code first.

1.Is the signal from the rear oxygen sensor inputted to the EFI ECU?
2.Is the harness between the rear oxygen sensor and the EFI ECU normal?
3.Is the output of the rear oxygen sensor normal?

Confirmation driving pattern



(1) Step ①; Using DS-21, with the IG switch turned "LOCK", connect the DS-21 diagnosis tester to DLC through the SST. Turn "ON" the IG switch and the main switch of the tester. Set the tester to the "Continuous monitoring results" of the CARB mode.

SST: 09991-87404-000

(2) Step ①; Using DS-Ⅱ, with the IG switch turned "LOCK", connect the DS-Ⅱ diagnosis tester to DLC. Turn "ON" the IG switch and the main switch of the tester. Set the tester to the "Continuous monitoring results" of the CARB mode.
(3) Step ②; Start the engine. With all switch turned "OFF", keep on warming the engine for more than five minutes until the engine coolant temperature reaches 90℃ or above.
(4) Step ③; Accelerate the vehicle until the vehicle speed reaches 50 km/h or more in the 1st → 2nd gear. Keep on running the vehicle at that speed for at least 40 seconds.
(5) Step ④; Under this condition, release the foot off from the accelerator pedal so as to decelerate the vehicle. Maintain the idling state.
(6) Step ⑤; After one minute of idling, press the F1 key of the tester. Check to see if the DTC P0130/21 is outputted.

NOTE

- If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.
- If you do not have diagnosis tester (DS-21/DS-Ⅱ), turn the ignition switch "LOCK" after performing steps ② to ④, then perform steps ② to ④ again.

(5) Inspection procedure

① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

Σ>1. Check of DTC.

1.Are other codes (Those other than DTC P0136/22) outputted?

▼If the output is made, proceed to the Item of the relevant diagnosis code.

▼If no output is made, proceed to Σ>2.

Σ>2. Wiring harness check

1.The IG switch turned "LOCK".

2.Set the SST (Sub-harness). However, the SST connectors at the ECU side should remain disconnected.

SST: 09842-97209-000

3.Disconnect the oxygen sensor connector.

4.Check the harness and connector for open wire or short.

(1) Between the oxygen sensor connection vehicle harness side connector1 (OX2) and SST 18 (OX2)

SPECIFIED VALUE: Continuity exists.

(2) Between the oxygen sensor connection vehicle harness side connector1 (OX2) and the body earth

SPECIFIED VALUE: No continuity exists

5.Are the check results for open wire and short OK?

▼If it is OK, go to Σ>3.

▼If it is NG, repair or replace the harness or connector.

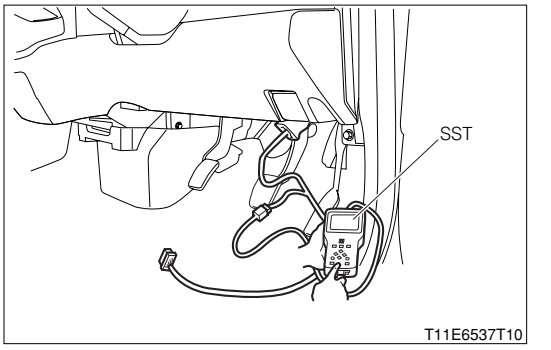
Σ>3. Check of output voltage of sensor.

1.Connect the rear oxygen sensor and SST connectors, respectively.

2.Connect the diagnosis tester to DLC.

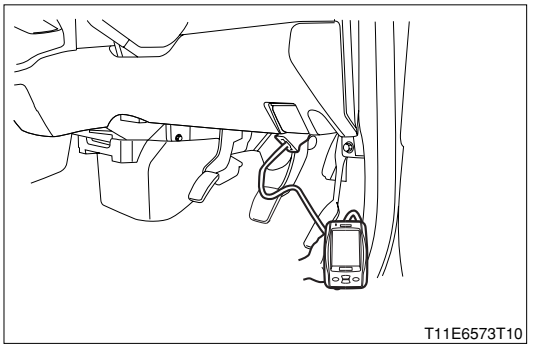
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.

(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.Warm up the engine.
4.Turn "ON" the main switch of the tester.
5.Race the engine at 4000 rpm for three minutes by depressing the accelerator pedal.
6.Under the condition of step 5, release the foot off from the accelerator pedal so as to allow the engine to idle.
7.Read the output voltage of the oxygen sensor between Steps 5 to 6.
SPECIFIED VALUE: The voltage should become 0.4 V or below and 0.55 V or more, respectively, at least one time.

8.Are the check results OK?
▼If it is OK, check the EFI ECU circuit.
▼If it is NG, go to Σ>4.

Σ>4. Check of output voltage of sensor.
1.Warm up engine completely.
2.IG switch turned "LOCK".
3.Disconnect the connector of the rear oxygen sensor.
4.Connect a voltmeter to the connector terminal of oxygen sensor.
5.Hold the engine racing speed for 5 minutes at 2000 rpm. At this time, ensure that the reading of the volt meter is within the specified value.
SPECIFIED VALUE: The voltmeter exhibits an output voltage of 0.2 V or more at least one time?

6.Are the check results OK?
▼If it is OK, check or replace the EFI ECU.
▼If it is NG, replace the oxygen sensor. (Bank 1, sensor 2)

② **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**
Σ>1. Check of wire harness continuity
1.Perform continuity check between each of the following terminals.
(1) Between sensor connection vehicle harness side connector 1 (OX2) - ECU connection vehicle harness side connector 18 (OX2)
(2) Between sensor connection vehicle harness side connector 2 (E2) - ECU connection vehicle harness side connector 19 (E2)
▼If it is OK, proceed to Σ>2.
▼If it is NG, repair the harness and connectors.

Σ>2. Rear oxygen sensor continuity check
1.Perform continuity check between each of the following terminals.
(1) Between rear oxygen sensor side connector 1 (OX2) - rear oxygen sensor body
(2) Between rear oxygen sensor side connector 2 (E2) - rear oxygen sensor body
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>3.
▼If it is NG, replace the rear oxygen sensor.
Refer to Page B4-3.

Σ3. Rear oxygen sensor signal check

1.Stop the vehicle.
2.Continue racing of 2000rpm or above for about five minutes from the state in which the rear oxygen sensor is cooled.
3.Perform output voltage measurements of the rear oxygen sensor during this time (Between the rear oxygen sensor side terminals).
SPECIFIED VALUE: It becomes 0 V(During cold period) → 0.65 V or above (When detecting rich state after warm-up).

4.Stop the engine and perform the output voltage measurements between the following terminals.
(1) Between rear oxygen sensor side connector 1 (OX2) - rear oxygen sensor side connector 2 (E2)
SPECIFIED VALUE: 0.55V or less.

NOTE

- Measure them under the condition in which the rear oxygen sensor is detecting oxygen (Lean condition).

▼If it is OK, proceed to Σ4.
▼If it is NG, replace the rear oxygen sensor.
Refer to Page B4-3.

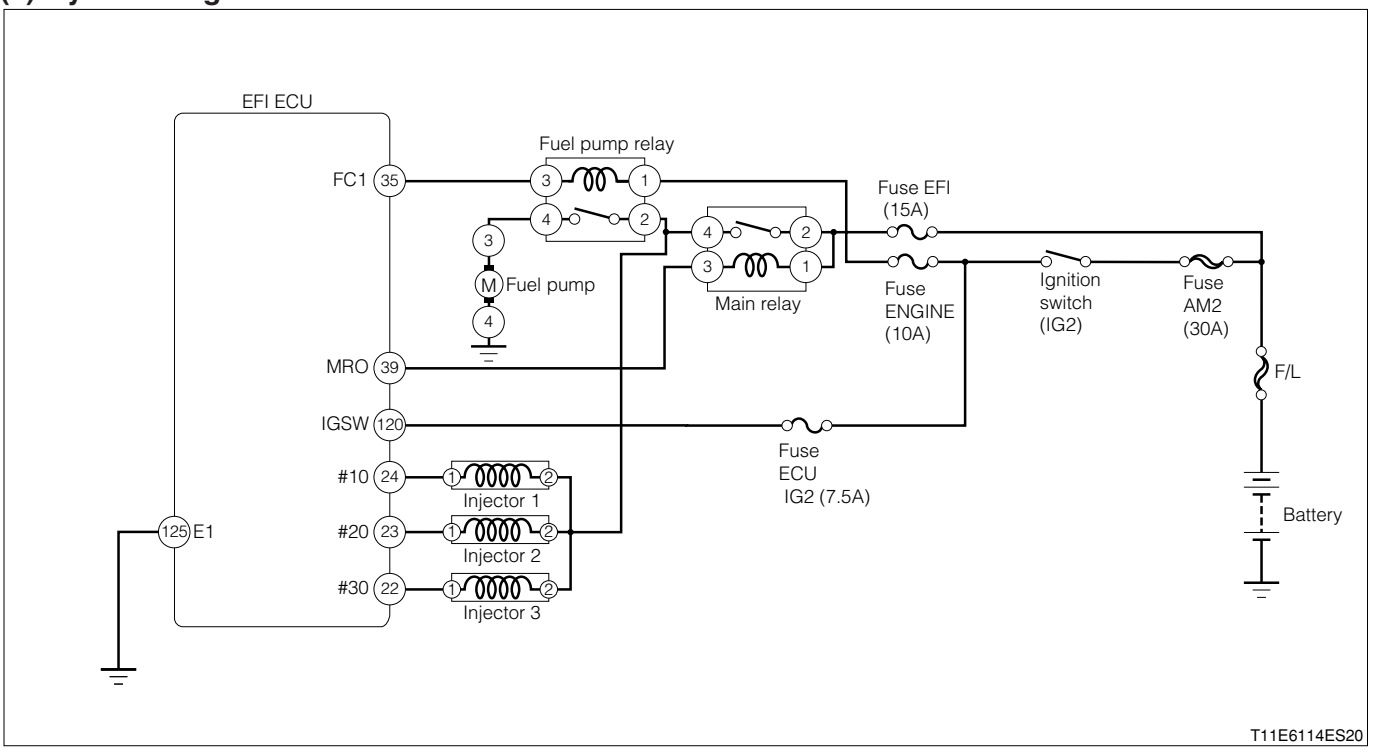
Σ4. Rear oxygen sensor unit check

1.Perform unit check of the rear oxygen sensor.
Refer to Page B8-222.

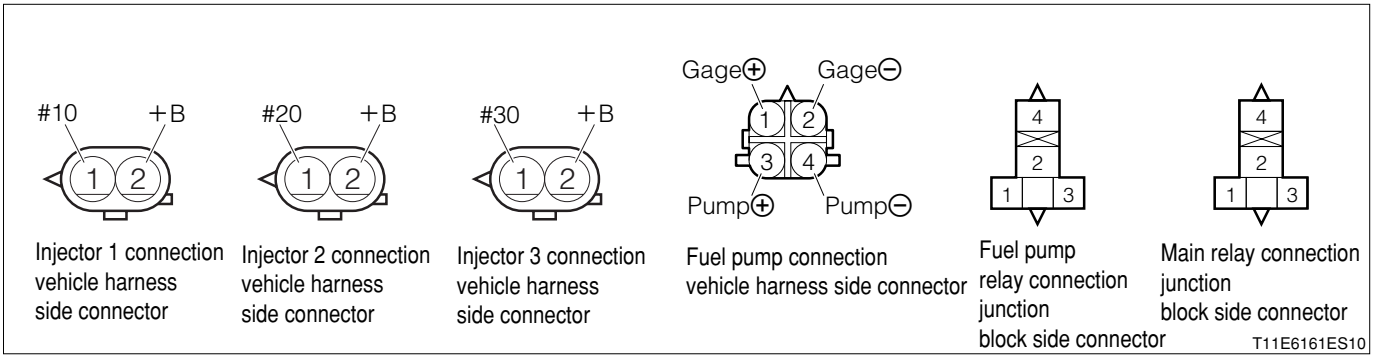
▼If it is OK, check the oxygen sensor system.
▼If it is NG, replace the rear oxygen sensor.
Refer to Page B4-3.

7-12-8 DTC NO.P0171/25 FUEL TRIM SYSTEM TOO LEAN (AIR-FUEL RATIO LEAN MALFUNCTION, BANK 1)
DTC NO.P0172/26 FUEL TRIM SYSTEM TOO RICH (AIR-FUEL RATIO RICH MALFUNCTION, BANK 1)

(1) System diagram



Each unit, relay, etc. connection vehicle harness side connector



Injector 1 connection vehicle harness side connector

Injector 2 connection vehicle harness side connector

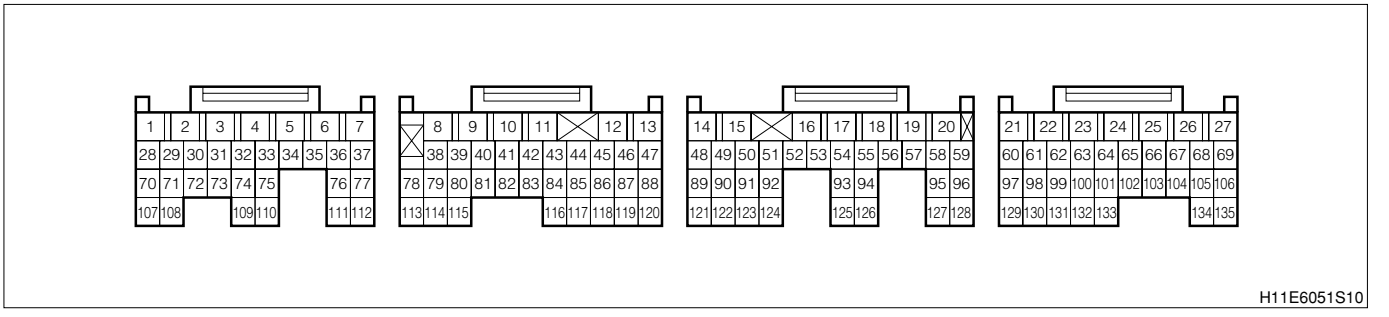
Injector 3 connection vehicle harness side connector

Fuel pump connection vehicle harness side connector

Fuel pump relay connection junction block side connector

Main relay connection junction block side connector

EFI ECU connection vehicle harness side connector



(2) Circuit description

1.The fuel trim means the feedback compensation value that will compensate the basic injection time. The fuel trim comes in two kinds: the short-term fuel trim and the long-term fuel trim.

2.The short-term fuel trim is a short-term fuel compensation to be carried out to maintain the air-to-fuel ratio at the stoichiometric air-to-fuel ratio. The signal from the oxygen sensor indicates whether the current air-to-fuel ratio is rich or lean than the stoichiometric air-to-fuel ratio. Hence, if the air-to-fuel ratio is rich, the fuel injection amount will be reduced. Conversely, if the air-to-fuel ratio is lean, the fuel injection amount will be increased.

3.The long-term fuel trim is overall fuel compensation over a long period of time in order to compensate a continues deviation of the short-term fuel trim from the central value, which will be caused by the engines inherent characteristics, the wear due to operation over a long period of time and the change in operational environment.

(3) Diagnosis code No.P0171/25 output conditions

1.The correction coefficient is stuck to the one side (Lean state of air fuel ratio) during the air fuel ratio feedback period

(4) Diagnosis code No.P0172/26 output conditions

1.The correction coefficient is stuck to the one side (Rich state of air fuel ratio) during the air fuel ratio feedback period

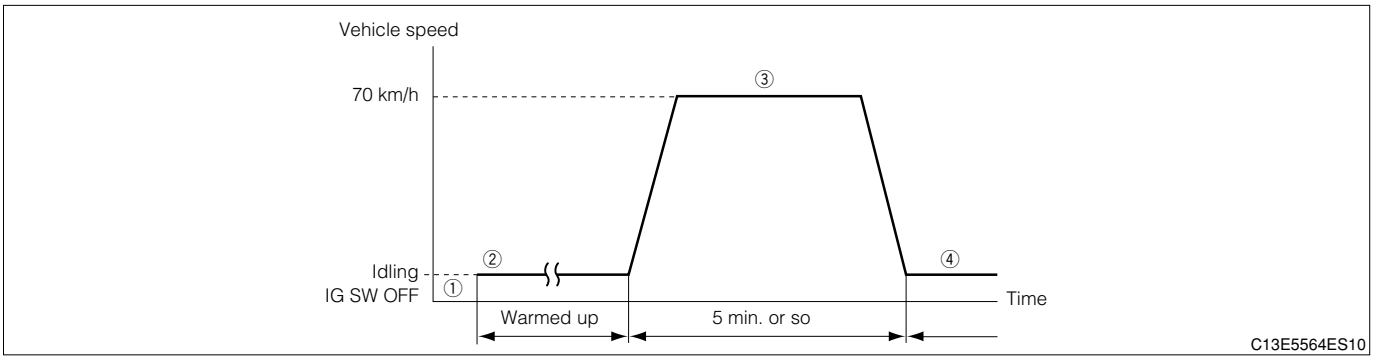
(5) Trouble area

1.Open wire or short circuit in the oxygen sensor circuit
2.Oxygen sensor
3.Engine coolant temperature sensor sensor
4.Evaporative emission purge VSV
5.EFI ECU

(6) Checking points

1.Is the fuel pressure normal?
2.Is the injector normal?
3.Is the oxygen sensor normal?

Confirmation driving pattern (For EU specifications)



(1) Step ①; Using DS-21, with the IG switch turned "LOCK", connect the DS-21 diagnosis tester to DLC through the SST. Turn "ON" the IG switch and the main switch of the tester. Set the tester to the "Continuous monitoring results" of the CARB mode.

SST: 09991-87404-000

(2) Step ①; Using DS-Ⅱ, with the IG switch turned "LOCK", connect the DS-Ⅱ diagnosis tester to DLC through the SST. Turn "ON" the IG switch and the main switch of the tester. Set the tester to the "Continuous monitoring results" of the CARB mode.

(3) Step ②; Start the engine. Keep on warming the engine for more than five minutes until the engine cooling water temperature reaches 90°C or above.

(4) Step ③; Run the vehicle for more than five minutes at a speed of 70 km/h with the gear selected to the 5th gear.

(5) Step ④; After one minute of idling, press the F1 key of the tester. Check to see if the DTC P0171/0172 is detected.

NOTE

- If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.
- If you do not have diagnosis tester (DS-21/DS-Ⅱ), turn the ignition switch "LOCK" after performing steps ② to ④, then perform steps ② to ④ again.

(7) Inspection procedure

① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

Σ>1. Check of DTC.

1.Check other codes (Those other than DTC P0171/25 or P0172/26) outputted?

▼If the output is made, proceed to the Item of the relevant diagnosis code.

▼If no output is made, proceed to Σ>2.

Σ2. Check of air induction system.

1.Check the following items given below.

(1) Check of the engine oil level gauge, oil filler cap and PCV hose for disconnection.

(2) Check of parts of the air induction system between the cylinder head and the throttle body for disconnection, looseness, or cracks.

▼If it is OK, go to Σ3.

▼If it is NG, repair or replace the induction system.

Σ3. Check of injector injection.

1.Check the injector unit.

Refer to Page B8-224.

2.Are the check results OK?

▼If it is OK, go to Σ4.

▼If it is NG, replace the injector.

Refer to Page B7-11.

Σ4. Check of purge VSV for EVAP.

1.Perform the unit check of the VSV for evaporative emission purge.

Refer to Page B8-225.

2.Are the check results OK?

▼If it is OK, go to Σ5.

▼If it is NG, replace the purge VSV for EVAP.

Σ5. Check of engine cooling coolant temperature sensor.

1.Perform the unit check of the water temperature sensor.

Refer to Page B8-221.

2.Are the check results OK?

▼If it is OK, go to Σ6.

▼If it is NG, replace the engine cooling coolant temperature sensor.

Refer to Page B8-7.

Σ6. Manifold absolute pressure/intake air temperature integral type sensor unit check

1.Perform the unit check of the manifold absolute pressure/intake air temperature integral type sensor (Intake manifold pressure sensor section).

Refer to Page B8-220.

2.Are the check results OK?

▼If it is OK, go to Σ7.

▼If it is NG, replace the manifold absolute pressure/intake air temperature integral type sensor.

Σ7. Check of fuel pressure.

1.Check the fuel pressure.

Refer to Page B8-229.

2.Are the check results OK?

▼If it is OK, go to Σ8.

▼If it is NG, check and repair fuel pump, fuel pipe line and filter.

Σ>8. Check of gas leakage of exhaust system.

1.Check the exhaust gas leakage.
Refer to Page B1-10.

2.Are the check results OK?
▼If it is OK, go to Σ>9.
▼If it is NG, repair or replace the defective point.

Σ>9. Wiring harness check

1.IG switch turned "LOCK".
2.Set the SST (Sub-harness). However, the SST connectors at the ECU side should remain disconnected.
SST: 09842-97209-000

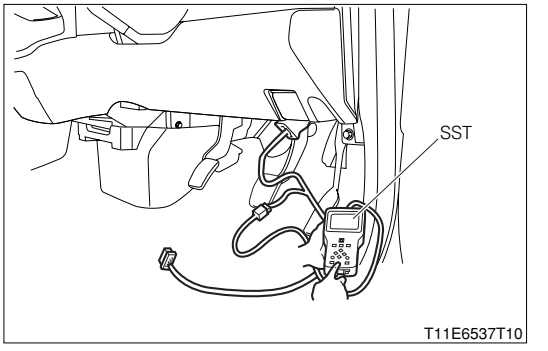
3.Disconnect the oxygen sensor connector.
4.Check the harness and connector for open wire or short.
(1) Between the oxygen sensor connection vehicle harness side connector3 (OX1) and SST 123 (OX1)
SPECIFIED VALUE: Continuity exists.

(2) Between the oxygen sensor connection vehicle harness side connector 3 (OX1) and the body earth
SPECIFIED VALUE: No continuity exists

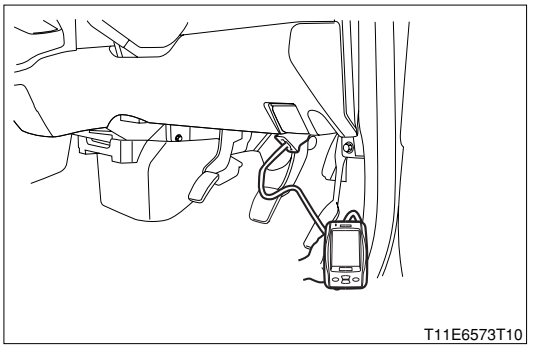
5.Are the check results for open wire and short OK?
▼If it is OK, go to Σ>10.
▼If it is NG, repair or replace the harness or connector.

Σ>10. Check of output voltage of sensor.

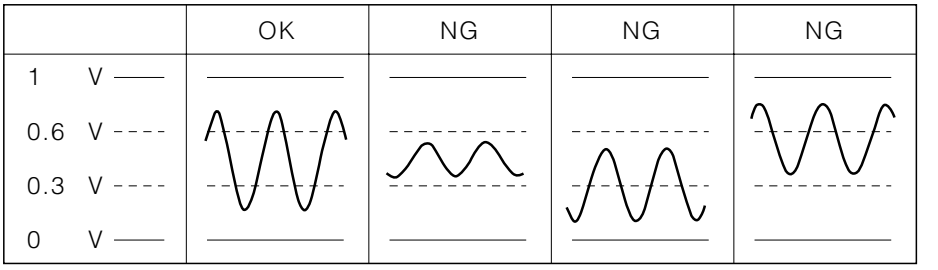
1.Connect the oxygen sensor and SST connectors, respectively.
2.Connect the diagnosis tester to DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.Warm up the engine at 2500 rpm for about 90 seconds.
4.Turn "ON" the main switch of the tester.
5.Read the output voltage of oxygen sensor during idling.
SPECIFIED VALUE: The voltage varies repeatedly between a range from a voltage below 0.3 V and to a voltage above 0.6 V. (See the diagram below.)



C13E5555S10

6.Are the check results OK?
▼If it is OK, go to Σ>12.
▼If it is NG, go to Σ>11.

Σ>11. Check of output voltage of sensor.
1.Warm up engine completely.
2.IG switch turned "LOCK".
3.Disconnect the connector of the oxygen sensor.
4.Connect a voltmeter to the connector terminal of oxygen sensor.
5.Hold the engine racing speed for 3 minutes at 2000 rpm.
6.At this time, ensure that the reading of the volt meter is within the specified value.
SPECIFIED VALUE: The voltmeter exhibits an output voltage of 0.2 V or more at least one time?

7.Are the check results OK?
▼If it is OK, check or replace the EFI ECU.
▼If it is NG, replace the oxygen sensor. (Bank 1, sensor 1)

Σ>12. Perform confirmation driving pattern.
1.Perform the confirmation running pattern.
2.Is there DTC P0171/25 or P0172/26 being output again?
▼If the output is made, check or replace the EFI ECU.
▼If the output is made, proceed to Σ>13.

Σ>13. The past situation of vehicles operation is investigated.
1.Did the vehicle run out of fuel in the past?
▼If erected, the diagnosis code No.P0171/25 is caused by running out of fuel.
▼If not erected, check the EFI ECU circuit.

② When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

Σ>1. Oxygen sensor system check

1.Perform checking of the oxygen sensor system.
Refer to Page B8-84.

▼If it is OK, proceed to Σ>2.
▼If it is NG, repair the oxygen sensor system.

Σ>2. Fuel pressure check

1.Perform fuel pressure check.
Refer to Page B8-219.

▼If it is OK, proceed to Σ>3.
▼If it is NG, check and repair the following portions.
(1) Fuel pump system
(2) Fuel line

Σ>3. Injector system check

1.Perform checking of the injector system.
Refer to Page B8-209.

▼If it is OK, proceed to Σ>4.
▼If it is NG, repair the injector system.

Σ>4. Spark plug unit check

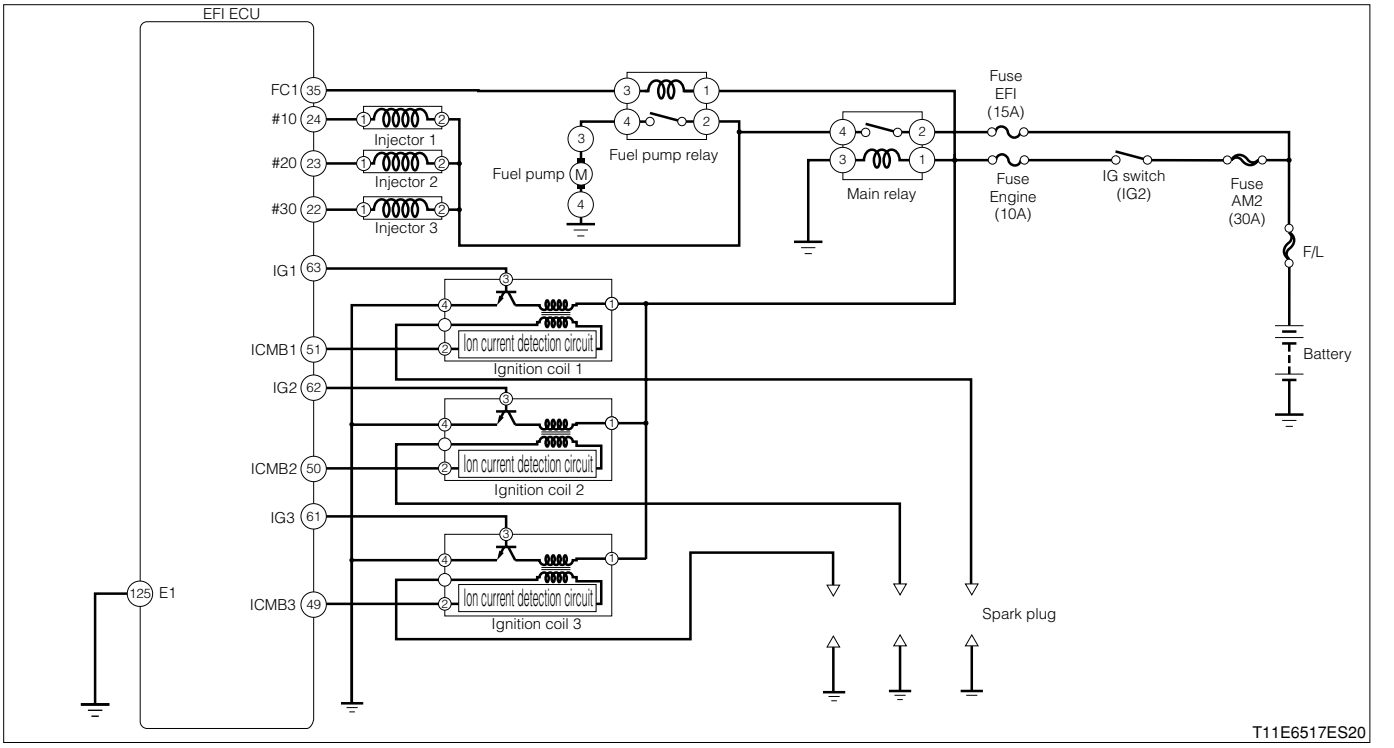
1.Perform unit check of the spark plug.
Refer to Page B8-223.

▼If it is OK, replace the EFI ECU.
Refer to Page B8-1.

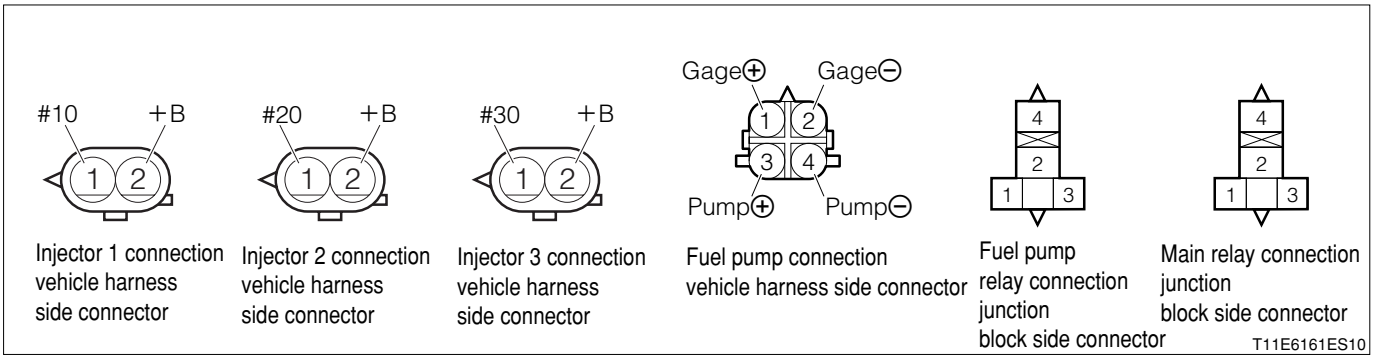
▼If it is NG, replace the spark plug.
Refer to Page B10-2.

7-12-9 DTC NO.P0300/17 RANDOM/MULTIPLE CYLINDER MISFIRE DETECTED
DTC NO.P0301/17 MISFIRE DETECTED (CYLINDER 1)
DTC NO.P0302/17 MISFIRE DETECTED (CYLINDER 2)
DTC NO.P0303/17 MISFIRE DETECTED (CYLINDER 3)

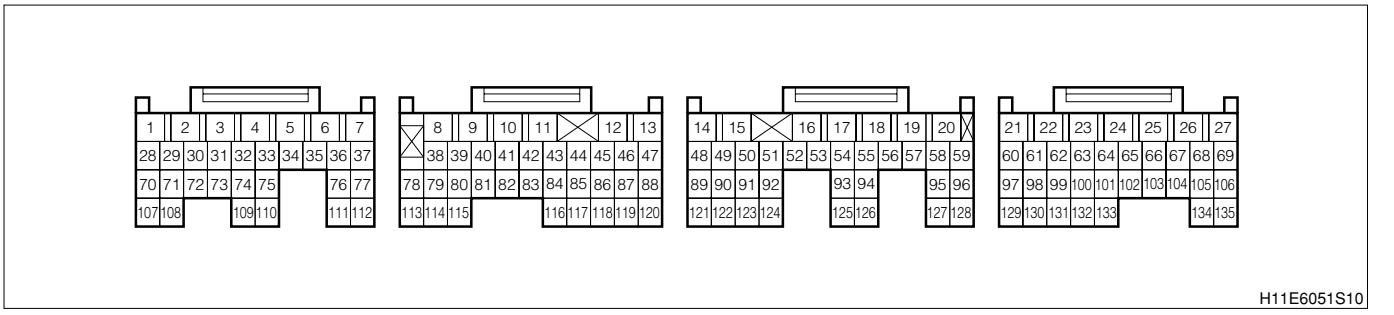
(1) System diagram



Each unit, relay, etc. connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

① **Misfire:**

1.The igniter unit detects the ion current that flows in proportion to the combustion pressure. This ion current is converted into a voltage, which will be inputted to the ECU. If the voltage value is below a certain value, the EFI ECU evaluate it as a misfire and counts its occurrence numbers.

2.When the misfire rate becomes or exceeds a number that indicates deteriorated engine conditions, this state will cause the malfunction indicator lamp (MIL) to be illuminated. If such a misfire is occurring whose misfire rate is high enough that the driving condition will most likely cause the catalyst to be overheated, the malfunction indicator lamp (MIL) will flash.

(3) Diagnosis code output conditions

① **P0300/17:**

1.Misfiring of random/multiple cylinders is detected during any particular 400 or 2000 ignitions.

② **P0301/17, P0302/17, P0303/17:**

1.For any particular 400 ignitions for engine, misfire is detected which can cause catalyst overheating. (This causes MIL to blink.)

2.For any particular 2000 ignitions for engine, misfire is detected which can cause deterioration in emissions.

NOTE

- When the 2 or more codes for a misfiring cylinder are recorded repeatedly but no random/multiply cylinder misfire code is recorded, it indicates that the misfire were detected and recorded at different times.

(4) Trouble area

1.Open wire/short circuit for the ignition system circuit
2.Open wire/short circuit for the ion system circuit
3.Injector
4.Fuel pressure
5.Combustion pressure
6.Manifold absolute pressure/ intake air temperature integral type sensor
7.Engine coolant temperature sensor
8.EFI ECU

(5) Points Of Inspection

1.Is the signal from the ignition coils (Igniter section) inputted to the ECU proper ?
2.Does the ignition coils (Igniter) operate proper ?
3.Is the harness between the injector and the ECU proper ?
4.Does the injector operate proper ?
5.Is the harness between the engine coolant temperature sensor sensor and the ECU proper ?
6.Is the output of the water temperature sensor normal?

(6) Inspection procedure

NOTE

- In order to memorize DTC of misfire, it is necessary to drive around MISFIRE RPM, MISFIRE LOAD in the data list for the following period of time.

Confirmation driving pattern

Engine speed	Time
Idling	3 minutes 30 seconds or more
1000 rpm	3 minutes or more
2000 rpm	1 minutes 30 seconds or more
3000 rpm	1 minutes or more

NOTE

- If it is the case that any DTC besides misfire is memorized simultaneously, first perform the troubleshooting for them.

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.
- When the vehicle is brought to the workshop and the misfire is not occurred, misfire can be confirmed by reproducing the condition of freeze frame data. Also, after finishing the repair, confirm that there is no misfire. (See the confirmation driving pattern)

① **When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

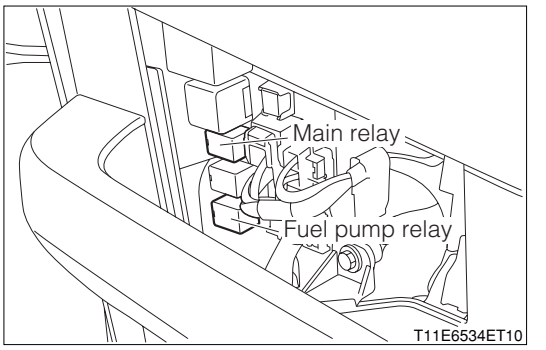
Σ>1. Visual check of inside of engine compartment.

1.Check the connecting conditions of the wire harnesses and connectors.
2.Check the vacuum hoses, purge hoses, fuel hoses and pipes for disconnection and breakage.
3.Are the check results OK?

▼If it is OK, go to Σ>2.

▼If it is NG, repair or replace the defective point. Ensure that there is no misfiring. (Refer to the confirmation of the running pattern.)

Σ>2. Check of spark plug and spark of misfiring cylinder.



1.Warm up the engine.
2.Turn the IG switch to "LOCK".
3.Remove the fuel pump relay.
4.Let the engine idle and wait until it stops by itself.
5.Turn the IG switch to "LOCK".
6.Remove the connector of the injector.

CAUTION

- Stop the fuel injection through the above operation and prevent damaging the catalyst by the unburned gas.

7.Remove the ignition coils and spark plugs (Misfire cylinders).
8.Install the spark plug to the ignition coil.
9.Ground the spark plug.
10.Crank the engine at this time, check to see if the spark plug sparks.
11.Are sparks jumping?

▼If it is OK, go to Σ>3.
▼If it is NG, perform the following operation.
(1) Replace the spark plug
(2) Check the ignition system and ion system.

CAUTION

- Do not use any spark plugs other than those designated.

Σ>3. Check of output signal of injector of misfiring cylinder.

1.With the IG switch turned "LOCK", perform restoration.
2.Set the SST.
SST: 09842-97209-000

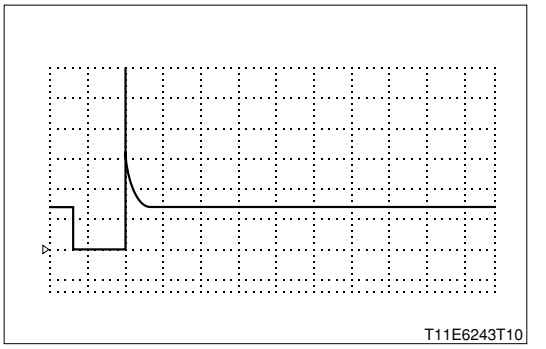
3.IG switch turned "ON".
4.As for the harness between the following terminals, measure the injector voltage of the cylinder where the misfiring is occurring.
(1) Between SST 24 (#10) and the body earth
(2) Between SST 23 (#20) and the body earth
(3) Between SST 22 (#30) and the body earth
SPECIFIED VALUE: Battery voltage

5.Observation of injector waveform with oscilloscope (Reference).
6.As for the harness between the following terminals, check the respective oscillographic waveform during the idling.
(1) Between SST 24 (#10) and SST 125 (E1)
(2) Between SST 23 (#20) and SST 125 (E1)
(3) Between SST 22 (#30) and SST 125 (E1)

7.As an example, in case of the following measuring range and measuring conditions, it will be as in the right figure.

Time axis	2ms / DIV
Voltage axis	10V / DIV
Measuring condition	When air conditioner is "OFF" with no electric load and while idling

Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".



NOTE

- The waveform cannot be specified, but confirm that a waveform as in the right figure (One such example) shows up

8.Confirm the following points.
(1) The voltage changes from the battery voltage to 0V while fuel injection.

9.Are the check results OK?
▼If it is OK, go to Σ>6.
▼If it is NG, go to Σ>4.

Σ>4. Unit check of injector of misfiring cylinder.

1.Turn "LOCK" the IG switch.
2.Disconnect the injector connector of the misfiring cylinder.
3.Measure the resistance between the injector terminals (Injector side).
SPECIFIED VALUE: 12 Ω at 20°C

4.Are the unit check results OK?
▼If it is OK, go to Σ>5.
▼If it is NG, replace the injector.

Σ>5. Wiring harness check

1.IG switch turned "LOCK".
2.Disconnect the SST connectors from the EFI ECU.
3.Check the harness and connector for open wire.
(1) Between the injector 1 connection vehicle harness side connector 1 (#10) and the EFI ECU connection vehicle harness side connector 24 (#10)
(2) Between the injector 2 connection vehicle harness side connector 1 (#20) and the EFI ECU connection vehicle harness side connector 23 (#20)
(3) Between the injector 3 connection vehicle harness side connector 1 (#30) and the EFI ECU connection vehicle harness side connector 22 (#30)
SPECIFIED VALUE: Continuity exists.

4.Check the harness and connector for short.
(1) Between the injector 1 connection vehicle harness side connector 1 (#10) and the body earth
(2) Between the injector 2 connection vehicle harness side connector 1 (#20) and the body earth
(3) Between the injector 3 connection vehicle harness side connector 1 (#30) and the body earth
SPECIFIED VALUE: No continuity exists

5.Are the check results for open wire and short OK?
▼If it is OK, check the EFI ECU circuit.
▼If it is NG, repair or replace the harness or connector.

Σ>6. Check of ion system.

1.Perform the trouble shooting for the code No.P1300/36.
Refer to Page B8-161.

2.Are the check results OK?
▼If it is OK, go to Σ>7.
▼If it is NG, repair or replace the defective point.

Σ>7. Check of fuel pressure.

1.Check the fuel pressure.
Refer to Page B8-219.

2.Are the check results OK?
▼If it is OK, go to Σ>8.
▼If it is NG, Check and repair the fuel pump, pressure regulator, fuel pipe line and filter.

Σ>8. Check of injector injection.

1.Check the injector unit.
Refer to Page B8-224.

2.Are the check results OK?
▼If it is OK, go to Σ>9.
▼If it is NG, replace the injector.

Σ>9. Manifold absolute pressure/intake air temperature integral type sensor unit check

1.Perform the unit check of the manifold absolute pressure/intake air temperature integral type sensor (Manifold absolute pressure sensor section).
Refer to Page B8-220.

2.Are the check results OK?
▼If it is OK, go to Σ>10.
▼If it is NG, replace the manifold absolute pressure, intake air temperature integral type sensor.

Σ>10. Water temperature sensor unit check

1.Perform the unit check of the water temperature sensor.
Refer to Page B8-221.

2.Are the check results OK?
▼If it is OK, perform the following checks given below.
(1) Compression pressure
Refer to Page B1-7.

(2) Valve clearance
Refer to Page B1-6.

▼If it is NG, replace the engine coolant temperature sensor.
Refer to Page B8-7.

② **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

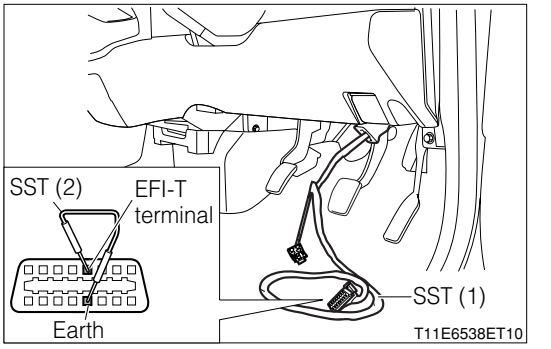
Σ>1. Diagnosis code check

1.Use the SST to short-circuit DLC terminals between 5(EFI-T) - 13(E).
SST: 09991-87404-000(1)
09991-87403-000(2)

2.Check whether the diagnosis code other than Code No.36 is outputted or not.
SPECIFIED VALUE: No output.

▼If it is OK, go to Σ>2.

▼In the case of NG, first check and repair a condition that caused the diagnosis code output.



Σ>2. Unit check of spark plug

1.Check whether the designated spark plug is used. (See Engine Turning-up section for spark plug specifications.)
Refer to Page B1-4.

2.Perform the unit check of the spark plug
Refer to Page B8-223.

▼If it is OK, go to Σ>3.

▼If it is NG, clean or replace the spark plug. If a designated spark plug is not used, replace the spark plug with the designated spark plug.

Σ>3. Spark check

WARNING

- There is a hazard potential for sparks are generated. Do not place combustible materials in the vicinity.

1.Warm up the engine.
2.Set the IG switch to "LOCK".
3.Remove the fuel pump relay.
4.Idle the engine and wait until the engine stops by itself.
5.Set the IG switch to "LOCK".
6.Remove all the connectors from the injector.

CAUTION

- Operations described above will stop fuel injection, thus preventing damage to the catalyst due to non-burned gas etc.

7.Remove the spark plug and install it to the ignition coil to earth the plug.
8.Check whether the spark plug generates sparks during cranking.
SPECIFIED VALUE: Sparks are generated.

▼If it is OK, go to Σ>8.

▼If it is NG, go to Σ>4.

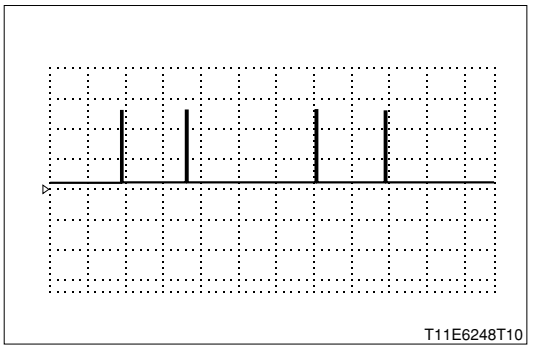
Σ4. EFI ECU signal check (1)

1.Connect the SST.
SST: 09842-97209-000

2.Completely warm up the engine.
3.When the engine is in the starting condition, check an output waveform of an ignition signal between the following terminals using an oscilloscope.
(1) Between SST 63 (IG1) - SST 125 (E1)
(2) Between SST 62 (IG2) - SST 125 (E1)
(3) Between SST 61 (IG3) - SST 125 (E1)

Time axis	100ms / DIV
Voltage axis	2V / DIV
Condition	Air-conditioner "OFF", no electrical load, idling

Air-conditioner "OFF": Set the air-conditioner switch (ACSW), blower switch (BLW), and magnet clutch (MGC) to "OFF".



NOTE
- Check that the waveform shown in the figure [Example] is displayed.

4.Check the following points.
(1) The pulse of 0 ⇄ 5V is generated.
(2) The waveform cycle is shortened as the engine speed increases.

NOTE
- The ignition signal can not be judged correctly if an oscilloscope is not used.

▼If it is OK, go to Σ5.
▼If it is NG, check the EFI ECU circuit.
Refer to Page A1-24.

Σ5. Wire harness continuity check (1)

1.Check continuity between the following terminals.
(1) Between ignition coil 1connection vehicle harness side connector 3(IG1) - ECU connection vehicle harness side connector 63(IG1)
(2) Between ignition coil 2 connection vehicle harness side connector 3(IG2) - ECU connection vehicle harness side connector 62(IG2)
(3) Between ignition coil 3 connection vehicle harness side connector 3(IG3) - ECU connection vehicle harness side connector 61(IG3)
SPECIFIED VALUE: Continuity exists

▼If it is OK, go to Σ6.
▼If it is NG, repair or replace the faulty harness.

Σ6. Ignition coil voltage check

1.Measure the voltage between the following terminals when the IG switch is "ON".
(1) Between each ignition coil connection vehicle harness side connector 1(+B) - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, go to Σ7.
▼In the case of NG, repair or replace the harness between the following terminals.
(2) Each ignition coil - battery

⊿7. Wire harness continuity check (2)

1.Check continuity between the following terminals.

(1) Between each ignition coil connection vehicle harness side connector 4(E1) - ECU connection vehicle harness side connector 125(E1)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, replace the ignition coil.

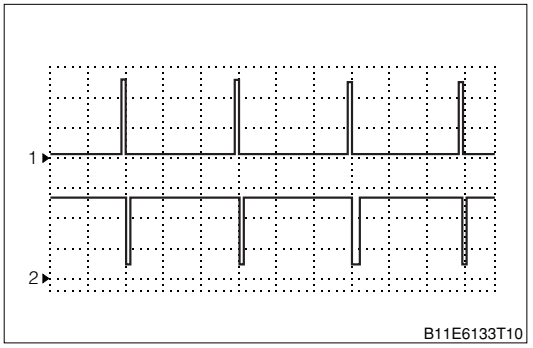
Refer to Page B10-2.

▼In the case of NG, repair or replace the faulty harness.

∑8. EFI ECU signal check (2)

1.Completely warm up the engine.

2.While idling, check each cylinder for output waveforms of the ignition signal (1▶) and ion current combustion control signal (2▶), using an oscilloscope, respectively.



	Channel	+ side measuring terminal	− side measuring terminal
Cylinder No.1	1▶	63 (IG1)	125 (E1)
	2▶	51 (ICMB1)	125 (E1)
Cylinder No.2	1▶	62 (IG2)	125 (E1)
	2▶	50 (ICMB2)	125 (E1)
Cylinder No.3	1▶	61 (IG3)	125 (E1)
	2▶	49 (ICMB3)	125 (E1)

Time axis	50ms / DIV
Voltage axis	2V / DIV
Condition	Water temperature is 80℃ or more: air conditioner is "ON": Electric load exists: during air conditioner idle up rotation

Air conditioner is "ON": Condition where all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "ON".

Electric load exists: Conditions where the headlight (H/L) and Defogger (DEF) are both "ON".

Air conditioner idle up rotation:950^{+50}_{-150} rpm

NOTE

- Check that waveforms like those in the figure (One example) is produced.

3.Check the following points.

(1) According to the output waveform of the ignition signal (Channel 1▶), the output waveform of the ion current combustion control signal (Channel 2▶) has been produced.

(2) The waveform of 5 ⇄ 0V has been produced.

NOTE

- Correct evaluation cannot be made for the ignition signals and ion current combustion control signals, unless you use an oscilloscope.

	Waveform (Channel 2▶) state
a	Normal
b	Clamped at 0V.
c	Clamped at 5V.
d	Clamped to the battery voltage.
e	Waveform is unstable※.

※: According to the output waveform of the ignition signal (Channel 1 ▶), the output waveform of the ion current combustion control signal (Channel 2▶) has not been produced.

▼In the case of "a", go to ∑9.

▼In the case of "b" go to ∑11.

▼In the case of "c" go to ∑13.

▼In the case of "d" go to ∑12.

▼In the case of "e" go to ∑16.

Σ9. EFI ECU signal check (3)

1.Retain the measurement conditions in Σ8.

2.Under the following conditions, check each cylinder for output waveforms of the ion current combustion control signal, using an oscilloscope.

(1) Raise the engine revolution speed slowly from the idle state to 4000 rpm. Then, close the throttle opening quickly.

SPECIFIED VALUE: No waveform is outputted while fuel is cut.

▼If it is OK, replace the EFI ECU.

Refer to Page B8-1z.

▼If it is NG, go to Σ10.

Σ10. Fuel cut operation check

1.Check the output state between the following terminals using an oscilloscope.

(1) Between SST 24 (#10) - SST 125 (E1)

(2) Between SST 23(#20) - SST 125(E1)

(3) Between SST 22(#30) - SST 125(E1)

2.Check the operating sound of the injector using a sound scope when the fuel cut is active.

NOTE

- Check operating sound, while checking the output waveform to the injector using an oscilloscope.

SPECIFIED VALUE: The operating sound of the injector stops when the fuel cut is active.

▼If it is OK, replace the ignition coil.

Refer to Page B10-2.

▼In the case of NG, perform unit check of the injector.

Refer to Page B8-224.

Σ11. Check of wire harness for short-circuit (1)

1.Check continuity of the cylinder whose waveform is clamped at 0V.

(1) Between ignition coil 1 connection vehicle harness side connector 2(ICMB1) - body earth

(2) Between ignition coil 2 connection vehicle harness side connector 2(ICMB2) - body earth

(3) Between ignition coil 3 connection vehicle harness side connector 2(ICMB3) - body earth

SPECIFIED VALUE: No continuity exists

▼If it is OK, replace the ignition coil.

Refer to Page B10-2.

▼In the case of NG, repair the faulty section.

Σ>12. Check of wire harness for short-circuit (2)

1.Check continuity of the cylinder whose waveform is clamped to the battery voltage.

(1) Between ignition coil 1 connection vehicle harness side connector 2 (ICMB1) - battery positive (+) terminal

(2) Between ignition coil 2 connection vehicle harness side connector 2 (ICMB2) - battery positive (+) terminal

(3) Between ignition coil 3 connection vehicle harness side connector 2 (ICMB3) - battery positive (+) terminal

SPECIFIED VALUE: No continuity exists

▼If it is OK, replace the ignition coil.

Refer to Page B10-2.

▼In the case of NG, repair or replace the faulty component.

Σ>13. Check of wire harness for open wire

1.Check continuity of the cylinder whose waveform is clamped at 5V.

(1) Between ignition coil 1connection vehicle harness side connector 2 (ICMB1) - EFI ECU connection vehicle harness side connector 51 (ICMB1)

(2) Between ignition coil 2 connection vehicle harness side connector 2 (ICMB2) - EFI ECU connection vehicle harness side connector 50 (ICMB2)

(3) Between ignition coil 3 connection vehicle harness side connector 2 (ICMB3) - EFI ECU connection vehicle harness side connector 49 (ICMB3)

SPECIFIED VALUE: Continuity exists

▼If it is OK, go to Σ>14.

▼In the case of NG, repair or replace the faulty component.

Σ>14. Check of short-circuit between the wire harnesses

1.Check whether the cylinder, whose waveform is clamped at 5V, is short-circuited to the power wire of the sensor system.

NOTE

- The power supply for the sensor system is 5V.

(1) Between ignition coil 1 connection vehicle harness side connector 2 (ICMB1) - body earth

(2) Between ignition coil 2 connection vehicle harness side connector 2 (ICMB2) - body earth

(3) Between ignition coil 3 connection vehicle harness side connector 2 (ICMB3) - body earth

SPECIFIED VALUE: 0V

▼If it is OK, replace the ignition coil and go to Σ>15.

Refer to Page B10-2.

▼In the case of NG, repair or replace the faulty component.

Σ>15. EFI ECU signal recheck (1)

1.Recheck the cylinder, whose waveform is clamped at 5V, under the Σ>8) conditions.

2.Check that the output waveform of the ion current combustion control signal (Channel 2▶) is not clamped at 5V.

SPECIFIED VALUE: The output waveform (Channel 2▶) is not clamped at 5V.

▼If it is OK, finish the troubleshooting.

▼In the case of NG, misfire may have occurred. Identify the cause of the misfire and repair.

Σ>16. Harness, connector check

1.When the following actions are taken to the cylinder whose waveform is unstable , check whether the waveform will change or not.

(1) Lightly shake the connector vertically and laterally.

(2) Lightly shake the wire harness vertically and laterally.

SPECIFIED VALUE: There is no change in the waveform.

2.Perform the following checks.

(1) Connector fitting condition

(2) Loose connection of the connector and the terminal.

SPECIFIED VALUE: No fault.

▼If it is OK, replace the ignition coil and go to Σ>17.

Refer to Page B10-2.

▼In the case of NG, repair or replace the faulty component.

Σ>17. EFI ECU signal recheck (2)

1.Recheck the cylinder, whose waveform is unstable, under the Σ>8) conditions.

2.Check that the output waveform of the ion current combustion control signal (Channel 2▶) is outputted stably.

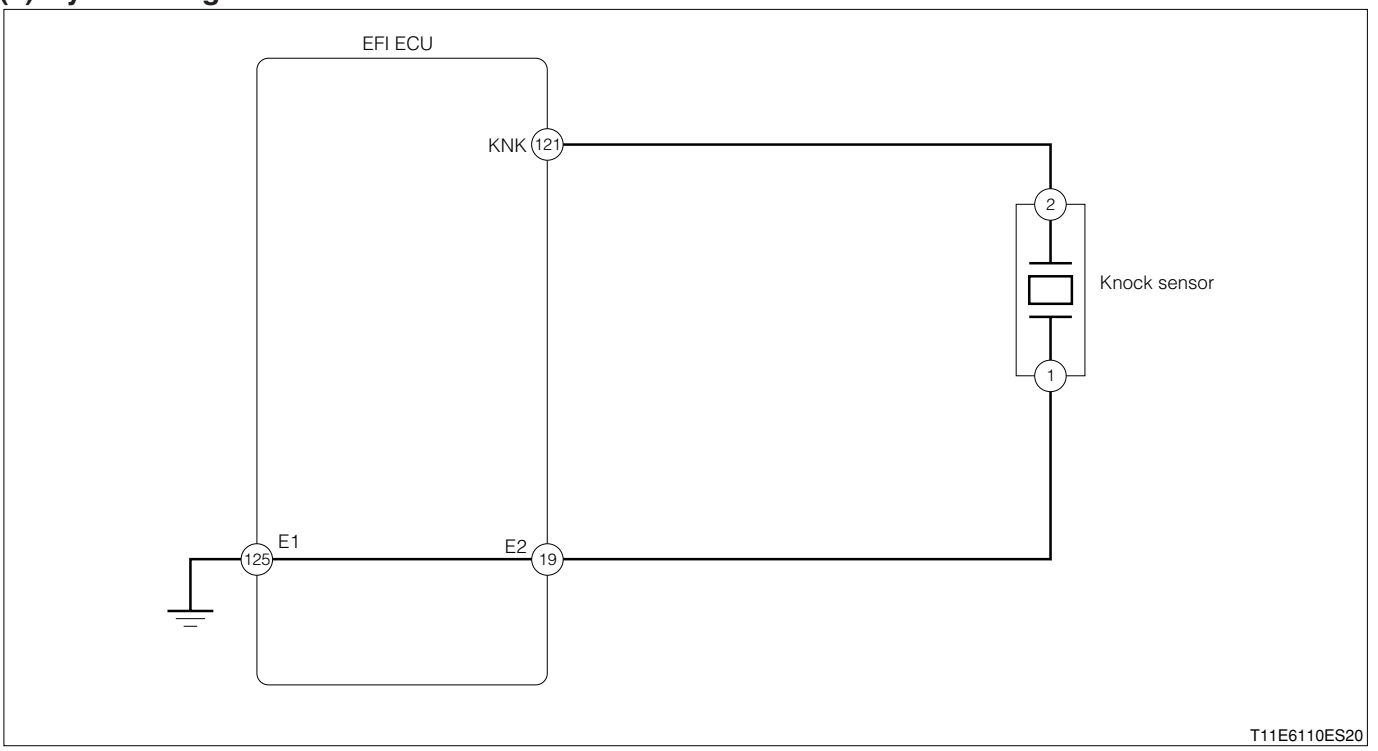
SPECIFIED VALUE: The output waveform (Channel 2▶) is outputted stably.

▼If it is OK, finish the troubleshooting.

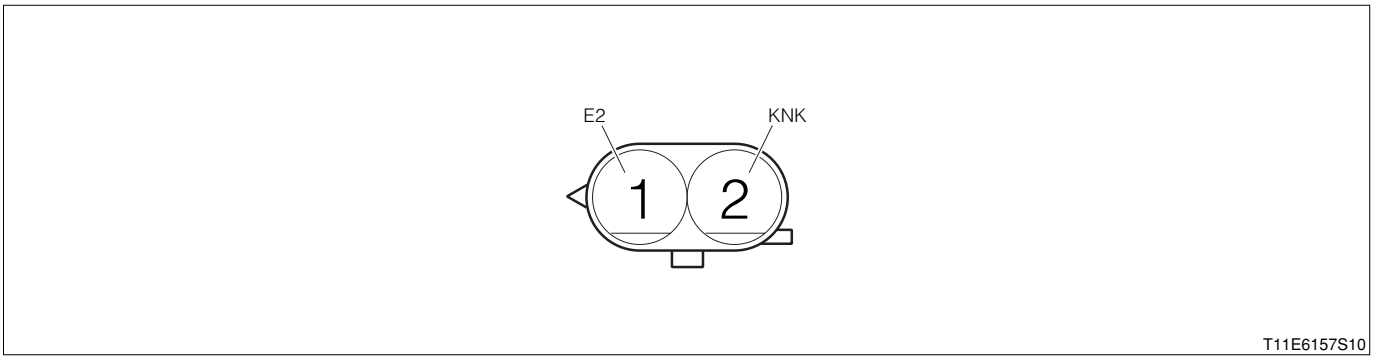
▼In the case of NG, combustion instability may have occurred. Identify the cause of the combustion instability and repair.

7-12-10 DTC NO.P0325/18 KNOCK SENSOR 1 CIRCUIT MALFUNCTION

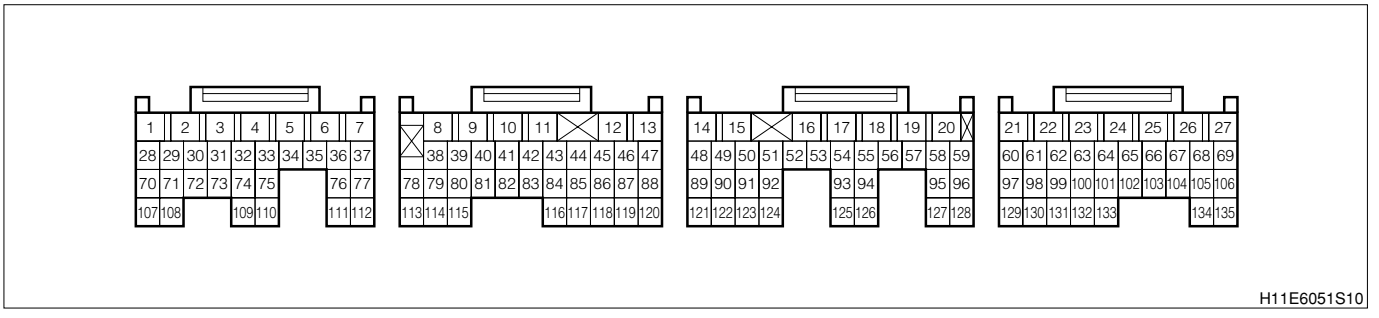
(1) System diagram



Knock sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1. The knock sensor is installed at the cylinder block. The knock sensor detects the occurrence of knocking indirectly from the cylinder block vibration that is caused by the knocking.
2. The knock sensor incorporates a piezo element, whereby the vibration inside the cylinder block is converted to an electric signal.

(3) Diagnosis code output conditions

1. When the signals from the knock sensor are not outputted continuously after starting over a certain length of time.

(4) Trouble area

1.Open wire or short circuit for knock sensor system circuit
2.Knock sensor
3.EFI ECU

(5) Checking points

1.Is the signal from the knock sensor inputted to the EFI ECU?
2.Is the harness between the knock sensor and the EFI ECU normal?
3.Is the output of the knock sensor normal?

(6) Inspection procedure

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

Σ>1. Check of continuity of knock sensor circuit.

1.IG switch turned "LOCK".
2.Set the SST (Sub-harness). However, the SST connector should remain disconnected from the EFI ECU connector.
SST: 09842-97209-000

3.Measure the resistance between the following terminals.
(1) Between SST 121 (KNK) and 19 (E2)
SPECIFIED VALUE: 200±80kΩ

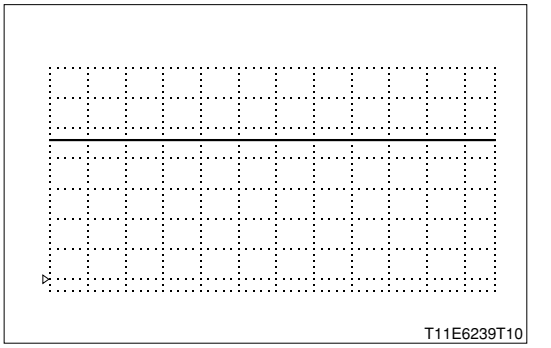
4.Are the unit check results OK?
▼If it is OK, go to Σ>2.
▼If it is NG, replace the knock sensor.

Σ>2. EFI ECU signal check

1.Connect the EFI ECU side SST connector.
2.Start the engine
3.Perform output check between the following terminals using an oscilloscope.
(1) Between SST 121 (KNK) and 19 (E2)

Time axis	50μs / DIV
Voltage axis	500mV / DIV
Measuring condition	When air conditioner is "OFF" with no electric load and while racing

Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".

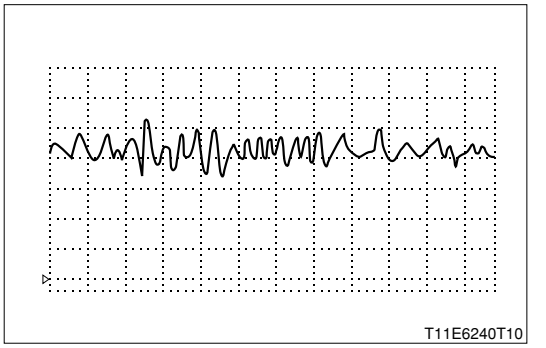


NOTE

- The waveform cannot be specified, but ensure that a waveform as in the right figure (One such example) shows up.

Time axis	50μs / DIV
Voltage axis	500mV / DIV
Measuring condition	When air conditioner is "OFF" with no electric load and while racing

Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".



NOTE

- The waveform cannot be specified, but ensure that a waveform as in the right figure (One such example) shows up.

4.Is each of the waveform outputted when idling and when racing?

▼If it is OK, check the EFI ECU circuit.

▼If it is NG, proceed to Σ>3.

Σ>3. Wiring harness check

1.Check the harness and connector between the EFI ECU and the knock sensor for open wire or short.

(1) Between the knock sensor connection vehicle harness side connector 2 (KNK) and the EFI ECU connection vehicle harness side connector 121 (KNK)

(2) Between the knock sensor connection vehicle harness side connector 1 (E2) and the EFI ECU connection vehicle harness side connector 19 (E2)

SPECIFIED VALUE: Continuity exists.

(3) Between the knock sensor connection vehicle harness side connector 2 (KNK) and the body earth

(4) Between the knock sensor connection vehicle harness side connector 1 (E2) and the body earth

SPECIFIED VALUE: No continuity exists

2.Are the check results for open wire and short OK?

▼If it is OK, go to Σ>4.

▼If it is NG, repair or replace the harness or connector.

Σ>4. Unit check the knock sensor.

1.Perform the unit check of the knock sensor.

Refer to Page B8-222.

▼If it is OK, go to Σ>4.

▼If it is NG, check the EFI ECU circuit.

Refer to Page A1-24.

Σ>5. Check the installation of the knock sensor.

1.Check the knock sensor for installing condition (E.G. looseness, installation angle).

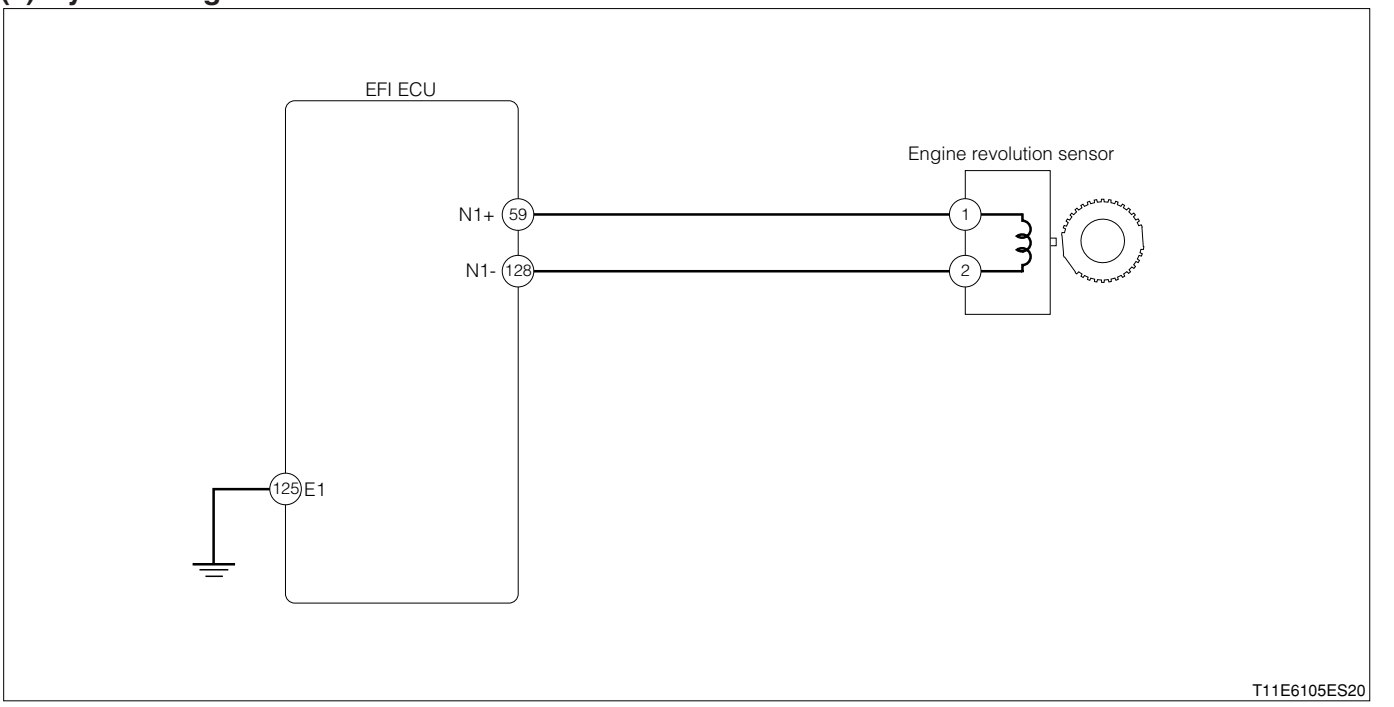
2.Are the check results OK?

▼If it is OK, check or replace the EFI ECU.

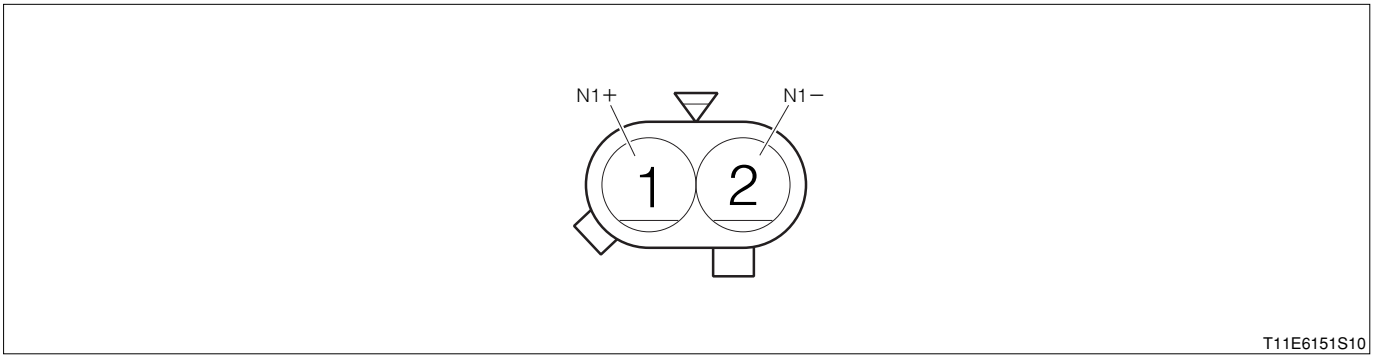
▼If it is NG, tighten the knock sensor.

7-12-11 DTC NO.P0335/13 ENGINE REVOLUTION SENSOR CIRCUIT MALFUNCTION

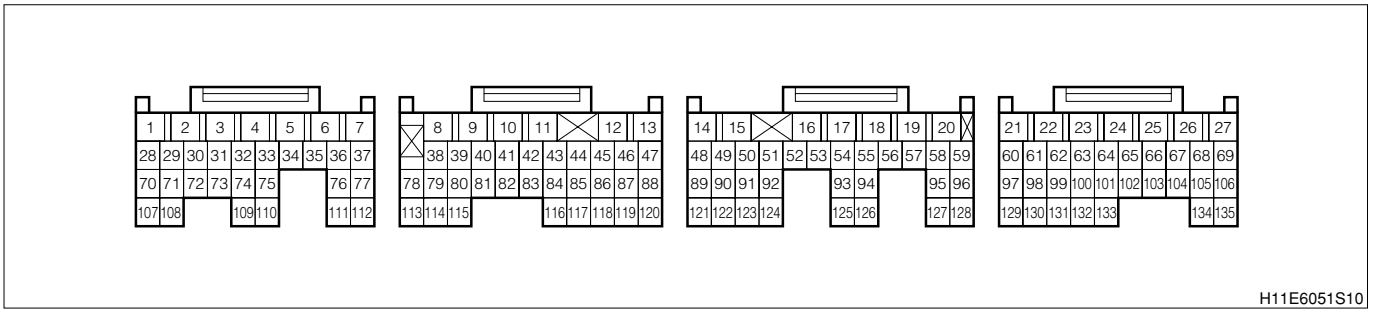
(1) System diagram



Engine revolution sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1. The signal rotor is installed at the front side of the crankshaft so as to detect the crank angle.Furthermore, a pickup coil (Engine revolution sensor) is provided in relation to the projection of this signal rotor.
2. When the crankshaft turns, the air gap between the signal rotor projection and the engine revolution sensor varies and pulses are generated. The engine revolution is calculated based on the intervals of these pulses.

(3) Diagnosis code output conditions

1. No revolution signal is inputted, even once, while the cranking is continued for several seconds.

(4) Trouble area

1.Open wire or short circuit for engine revolution sensor system circuit
2.Engine revolution sensor
3.EFI ECU

(5) Checking points

1.Is the signal from the engine revolution sensor inputted to the EFI ECU?
2.Is the harness between the engine revolution sensor and the EFI ECU normal?
3.Is the output of the engine revolution sensor normal?

(6) Inspection procedure

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

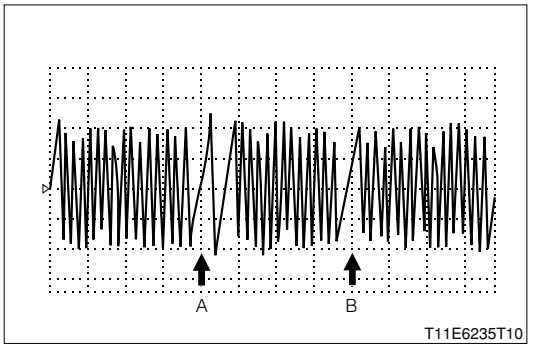
Σ1. EFI ECU signal check

1.Connect the SST.
SST: 09842-97209-000

2.Perform the output check between the following terminals using an oscilloscope.
(1) Between SST 59 (N1＋) - 128 (N1－)
SPECIFIED VALUE:

Time axis	10ms /DIV
Voltage axis	2V / DIV
Measuring condition	When air conditioner is "OFF" with no electric load and while idling

When air conditioner is "OFF" with no electric load and while idling



NOTE

- The waveform cannot be specified, but ensure that a waveform as in the right figure (One such example) shows up.

3.Confirm the following points.
(1) Each of the cylinder distinguishing signals (A) and (B) is coming out.
(2) The wave period becomes shorter as the engine revolution speed rises.

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, proceed to Σ2.

Σ2. Check of wire harness continuity

1.Perform continuity checks between each of the following terminals.

(1) Between sensor connection vehicle harness side connector 1 (N1＋) - ECU connection vehicle harness side connector 59 (N－)

(2) Between sensor connection vehicle harness side connector 2 (N1－) - ECU connection vehicle harness side connector 128 (N－)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ3.

▼If it is NG, repair the harness and connectors.

Σ3. Engine rev sensor unit check

1.Perform unit check of the engine rev sensor.

Refer to Page B8-220.

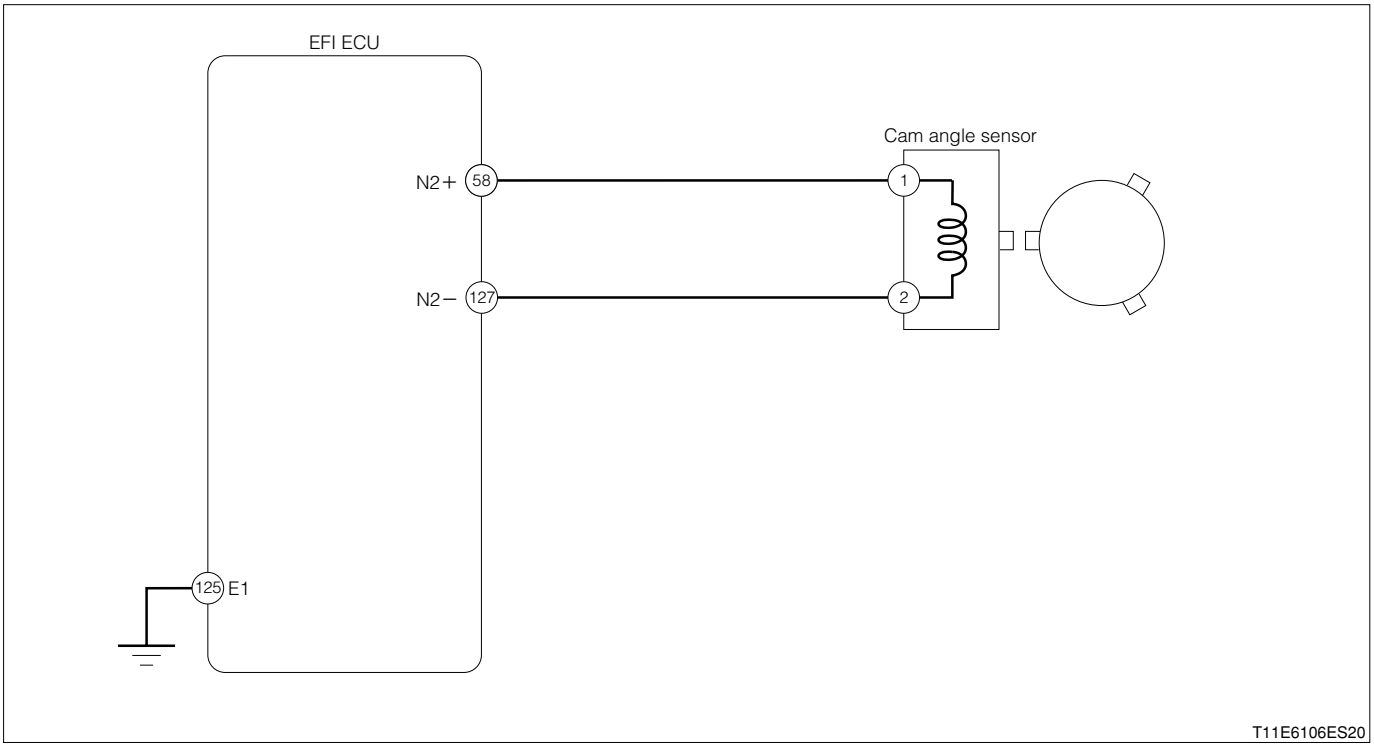
▼If it is OK, check the connecting condition of each connector.

▼If it is NG, replace the engine rev sensor.

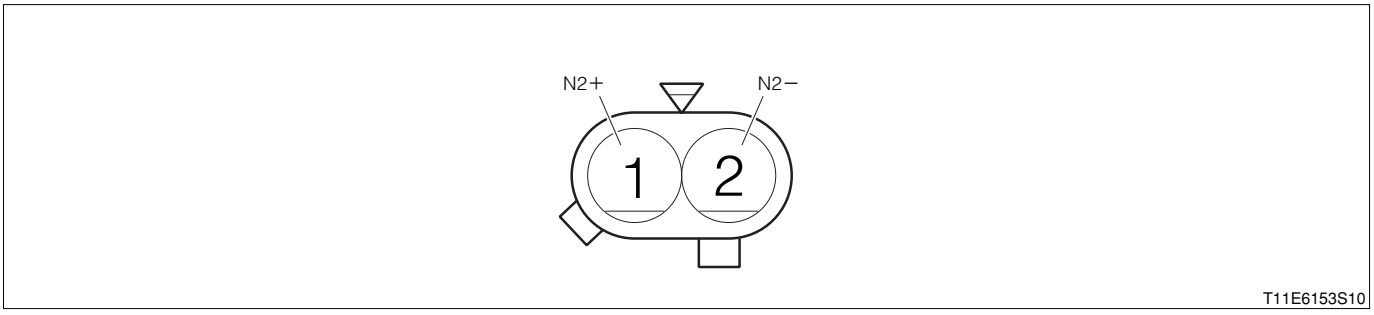
Refer to Page B8-3.

7-12-12 DTC NO.P0340/14 CAMSHAFT POSITION SENSOR CIRCUIT MALFUNCTION

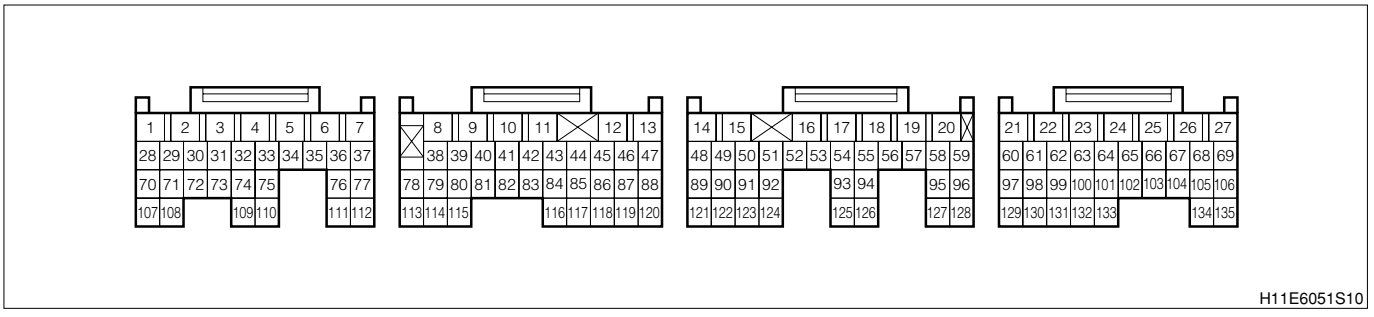
(1) System diagram



Cam angle sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1.The cam angle sensor consists of a signal rotor and a pickup coil. The signal rotor is mounted to the intake side camshaft, using three teeth. As for the NE signal, three signals are outputted per one revolution of the engine. The phases of the camshaft and crankshaft are detected based on the signal from the cam angle sensor and the signal from the engine revolution sensor. Based on these phases, the variable valve timing is controlled.

(3) Diagnosis code output conditions

1.When the signal from the cam angle sensor is not outputted over a certain length of time after the starting,

(4) Trouble area

1.Open wire or short circuit for Camshaft angle sensor system circuit
2.Camshaft angle sensor
3.EFI ECU

(5) Checking points

1.Is the signal from the cam angle sensor inputted to the EFI ECU?
2.Is the harness between the cam angle sensor and the EFI ECU normal?
3.Is the output of the cam angle sensor normal?

(6) Inspection procedure

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

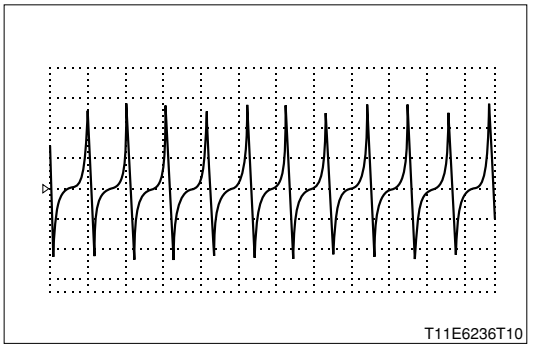
Σ>1. EFI ECU signal check

1.Connect the SST.
SST: 09842-97209-000

2.Perform output check between the following terminals using an oscilloscope.
(1) Between SST 58 (N2+) - 127 (N2−)
SPECIFIED VALUE:

Time axis	50ms /DIV
Voltage axis	1V / DIV
Measuring condition	When air conditioner is "OFF" with no electric load and while idling

Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".



NOTE

- The waveform cannot be specified, but ensure that a waveform as in the right figure (one such example) shows up.

3.Confirm the following points.
(1) Periodic wave is showing up.
(2) The wave period becomes shorter as the engine revolution speed rises.

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, proceed to Σ>2.

Σ>2. Check of wire harness continuity

1.Perform continuity checks between each of the terminals.
(1) Between sensor connection vehicle harness side connector 1 (N2+) - ECU connection vehicle harness side connector 58 (N2+)
(2) Between sensor connection vehicle harness side connector 2 (N2−) - ECU connection vehicle harness side connector 127 (N2−)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ>3.
▼If it is NG, repair the harness and connectors.

⊿3. Camshaft position sensor unit check

1.Perform unit check of the camshaft position sensor.

Refer to Page B8-220.

▼If it is OK, check the connecting condition of each connector.

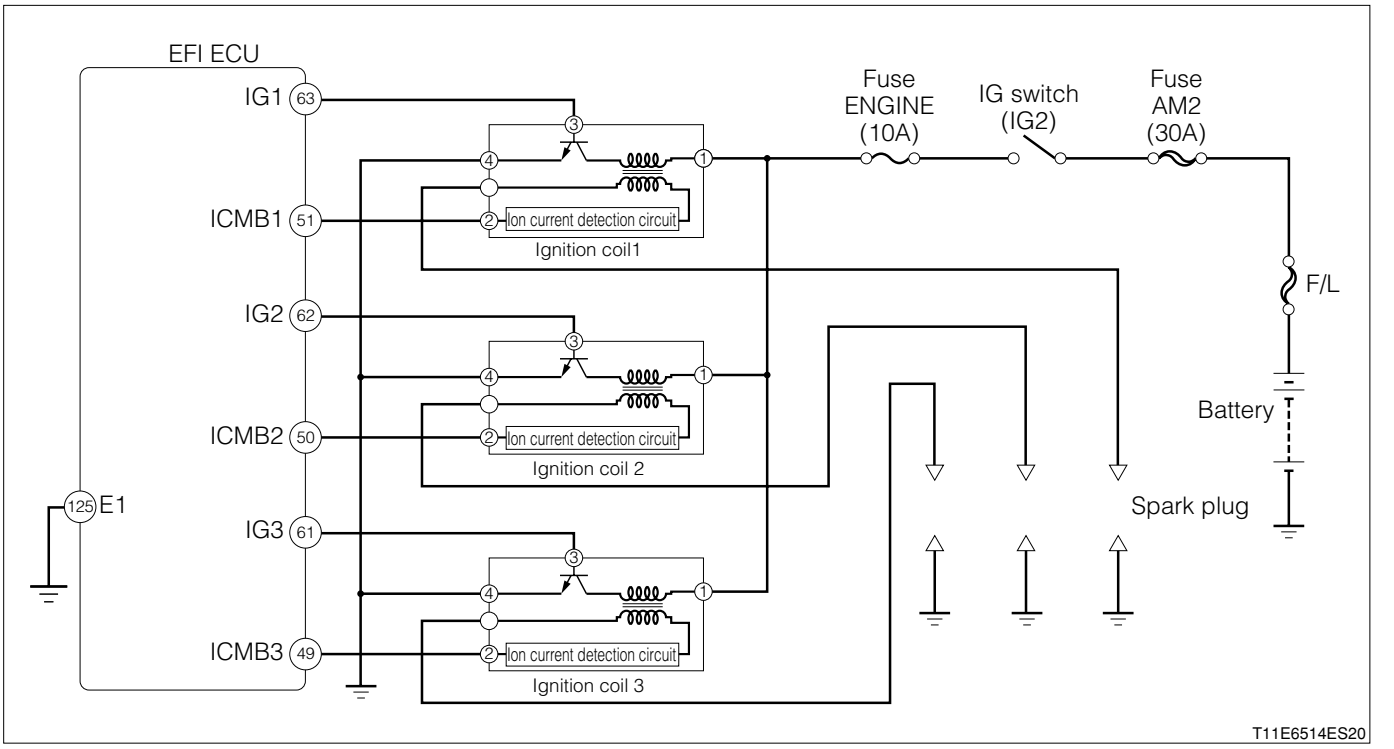
▼If it is NG, replace the camshaft position sensor.

Refer to Page B8-4.

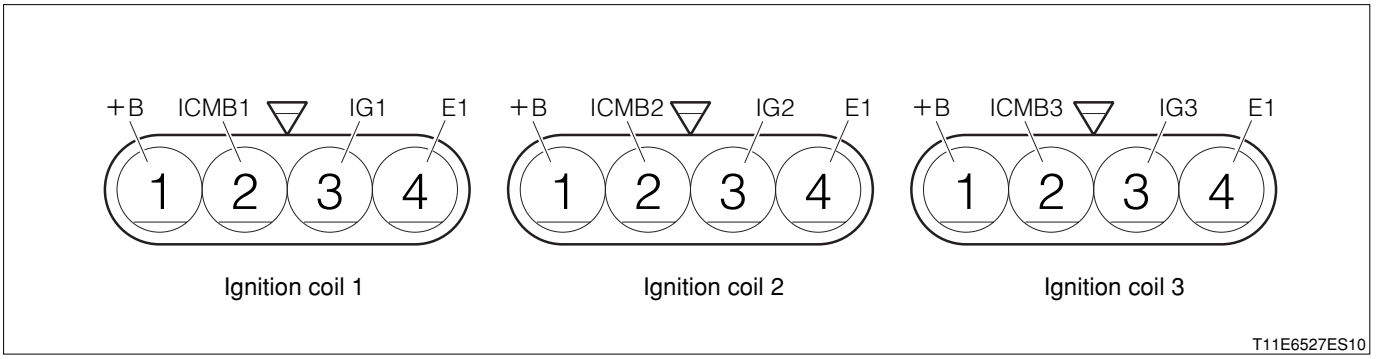
7-12-13 DTC NO.P0350/16 IGNITION SYSTEM CIRCUIT MALFUNCTION

(1) System diagram

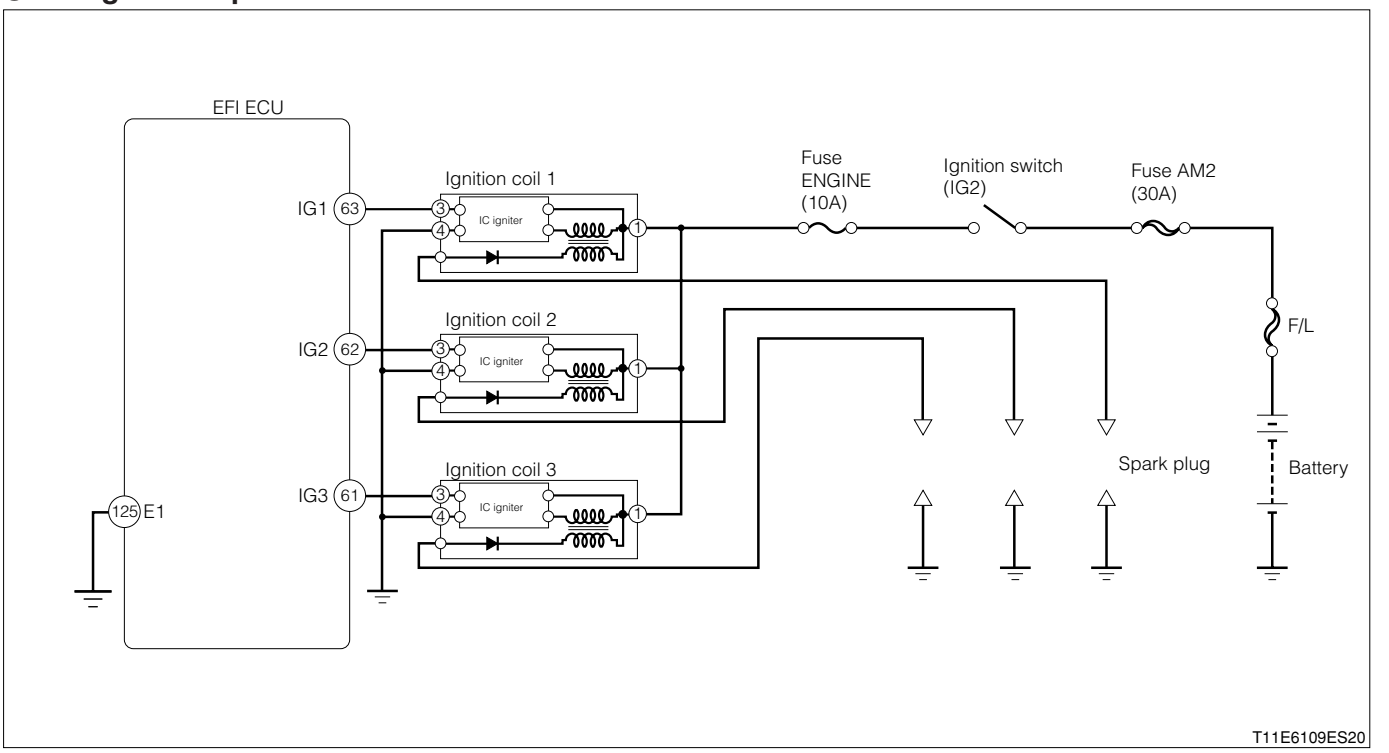
① For EU specifications



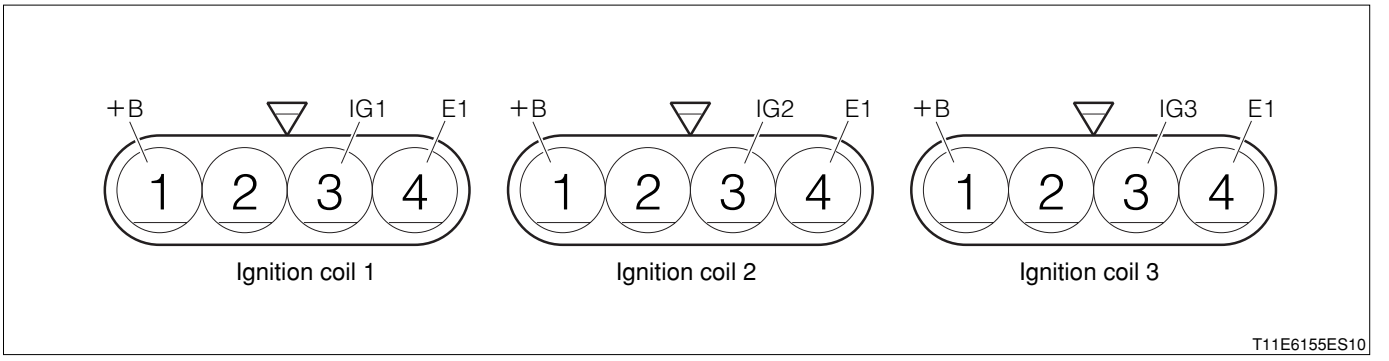
Ignition coil connection vehicle harness side connector



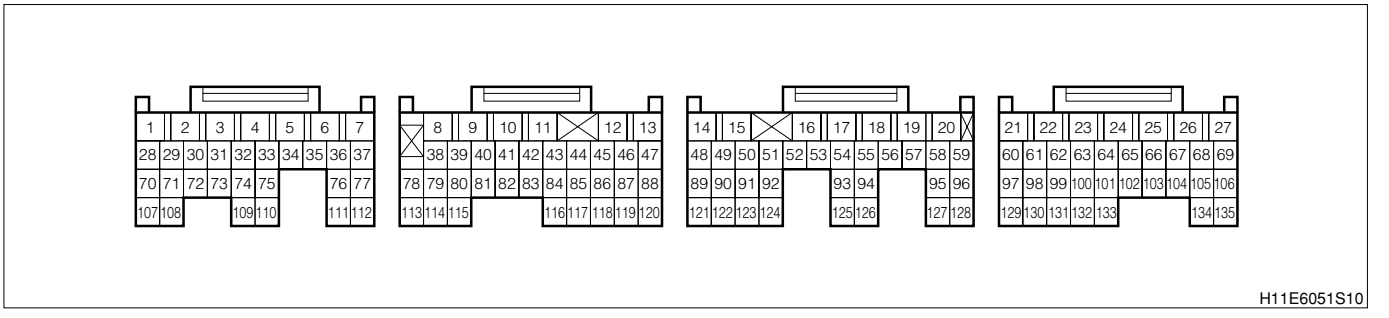
② **For general specifications**



Ignition coil connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1.A DLI (DistributorLess Ignition) system has been employed.

2.The DLI system has no distributor. Furthermore, the ignition coil is located just above the spark plug. Consequently, there is no ignition energy loss due to the electricity distribution, thus making it possible to directly furnish the electric energy induced at the coil. Therefore, an optimum ignition condition can be obtained at all times.

(3) Diagnosis code output conditions

1.When the ignition signal is not outputted consistently for a certain length of time after starting:

(4) Trouble area

1.Open wire/short circuit for the ignition system circuit
2.Ignition coil
3.Battery
4.EFI ECU

(5) Checking points

1.Is the power supply voltage of the ignition coil normal?
2.Is the harness between the ignition coil and EFI ECU normal?
3.Is the sparks of the spark plug proper?

(6) Inspection procedure

Σ>1. Spark check

1.Warm up the engine.
2.Turn the IG switch to "LOCK".
3.Remove the fuel pump relay.
4.Let the engine idle and wait until it stops by itself.
5.Turn the IG switch to "LOCK".
6.Remove the connector of the injector.

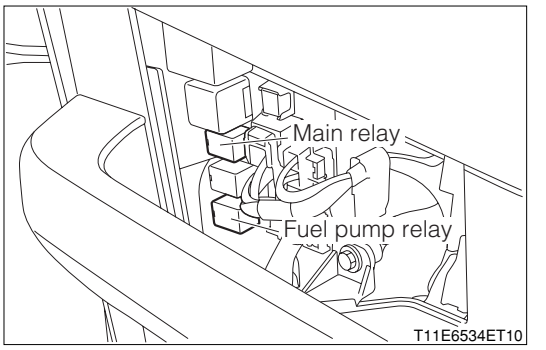
CAUTION

- Stop the fuel injection through the above operation and prevent damaging the catalyst by the unburned gas.

7.Remove the spark plug and earth it by attaching it to the ignition coil.
8.When cranking, check if the sparks are flying in the spark plugs.

SPECIFIED VALUE: The sparks are generated.

▼If it is OK, the ignition system is normal.
▼If it is NG, proceed to Σ>2.



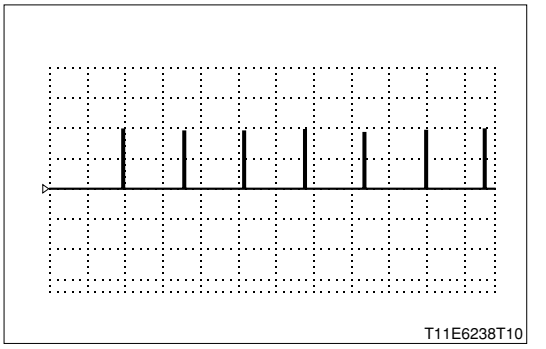
Σ>2. EFI ECU signal check

1.Connect the SST.
SST: 09842-97209-000

2.With the engine started, check the output waveform of the ignition signal between each of the following terminals using an oscilloscope.
(1) Between SST 63 (IG1) - SST 125 (E1)
(2) Between SST 62 (IG2) - SST 125 (E1)

(3) Between SST 61 (IG3) - SST 125 (E1)

Time axis	100ms / DIV
Voltage axis	2V / DIV
Measuring condition	When air conditioner is "OFF" with no electric load and while idling



Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".

NOTE

- The waveform cannot be specified, but ensure that a waveform as in the right figure (One such example) shows up.

3.Confirm the following points.

(1) The pulse 0 ⇄ 4V is generated.

(2) The wave period becomes shorter as the engine revolution speed rises.

NOTE

- Correct judgment cannot be made concerning the ignition signal without using the oscilloscope.

▼If it is OK, proceed to ∑3.

▼If it is NG, check the EFI ECU circuit.

Refer to Page A1-24.

∑3. Ignition coil voltage check

1.Measure the voltage between the following terminals when the IG switch is "ON".

(1) Between each ignition coil connection vehicle harness side connector 1 (+B) - body earth

SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to ∑4.

▼If it is NG, repair or replace the harness between the following terminals.

(2) Between each ignition coil - battery

∑4. Wire harness continuity check (1)

1.Perform continuity checks between each of the following terminals.

(1) Between ignition coil 1 connection vehicle harness side connector 3 (IG1) - ECU connection vehicle harness side connector 63 (IG1)

(2) Between ignition coil 2 connection vehicle harness side connector 3 (IG2) - ECU connection vehicle harness side connector 62 (IG2)

(3) Between ignition coil 3 connection vehicle harness side connector 3 (IG3) - ECU connection vehicle harness side connector 61 (IG3)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to ∑5.

▼If it is NG, repair or replace the harness of the defective sections.

∑>5. Check of wire harness continuity (2)

1.Perform continuity checks for each of the following terminals

(1) Between each ignition coil connection vehicle harness side connector 4 (E1) - ECU connection vehicle harness side connector 125 (E1)

SPECIFIED VALUE: Continuity exists.

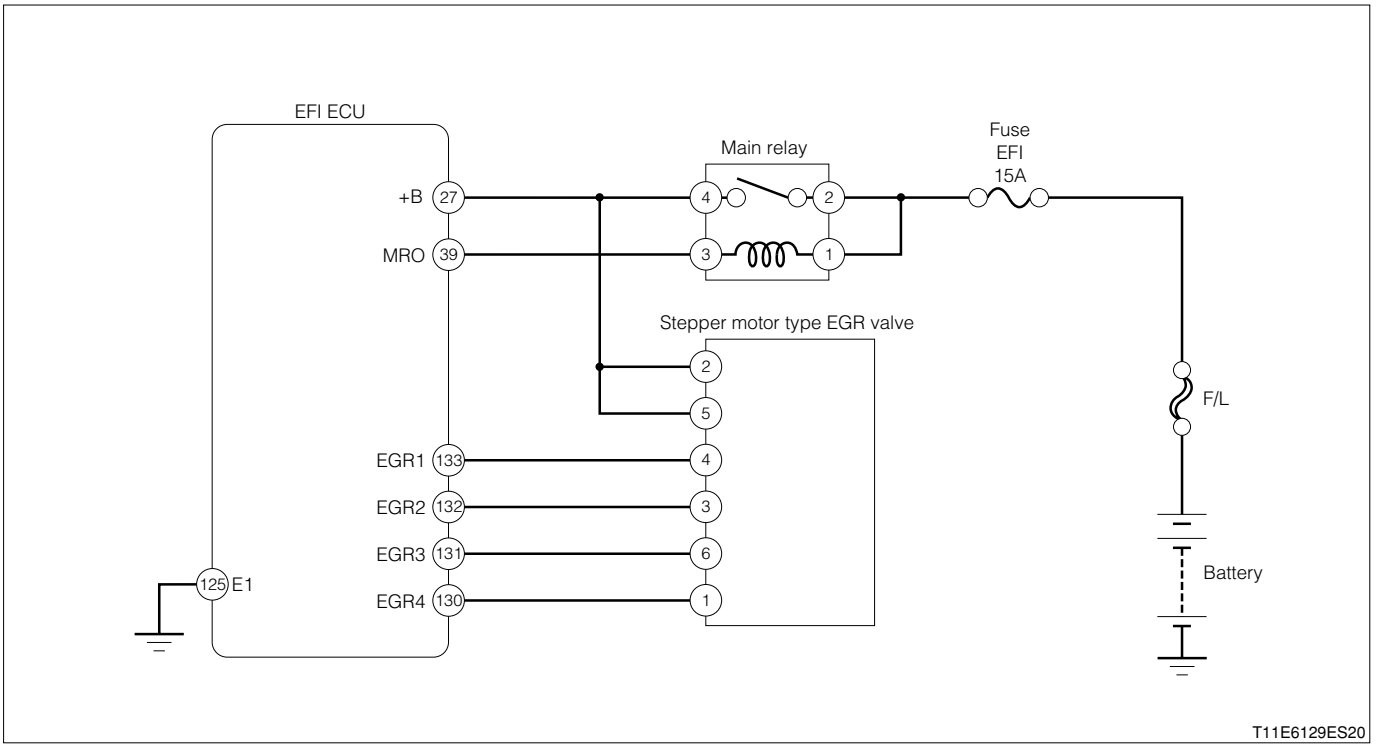
▼If it is OK, replace the ignition coil.

Refer to Page B10-2.

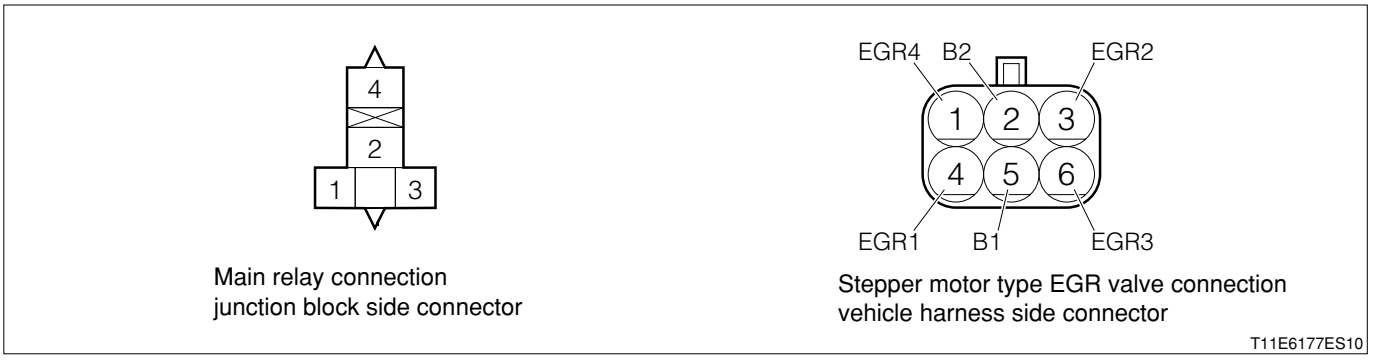
▼If it is NG, repair or replace the harness of the defective sections.

7-12-14 DTC NO.P0401/79 STEPPER MOTOR TYPE EGR VALVE SYSTEM MALFUNCTION (FUNCTION)DTC NO.P0401/79 STEPPER MOTOR TYPE EGR VALVE SYSTEM MALFUNCTION (OPEN WIRE)

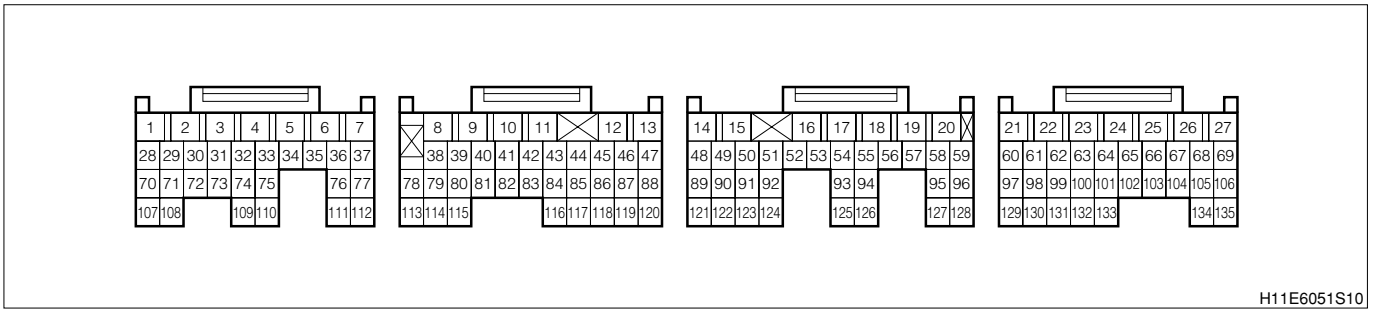
(1) System diagram



Stepper motor type EGR valve connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1.According to the engine revolution speed and signals from the throttle position sensor, manifold absolute pressure/intake air temperature integral type sensor (The manifold absolute pressure sensor section) and water temperature sensor, the EFI ECU drives the stepper motor for EGR to determine the optimum quantity of EGR by controlling the opening of the EGR valve.

(3) No.0401/79 output conditions

1.When a flow rate abnormality of EGR gas occurs after starting
2.When an abnormality occurs in the EGR gas flow rate

(4) No.0403/79 output conditions

1.When open wire or shot occurs in the stepper motor for EGR

(5) Checking points

1.Is the stepper motor for EGR operating normally?
2.Is the harness between the stepper motor for EGR and the EFI ECU normal?

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

Σ>1. EGR piping check

1.Check the piping for EGR for any crack, damage or deformation.
SPECIFIED VALUE: There are no cracks and damages.

▼If it is OK, proceed to Σ>2.
▼If it is NG, repair or replace the defective sections.

Σ>2. Assembling check of stepper motor type EGR valve

1.Check if any EGR gas is leaking from the joint of the stepper motor type EGR valve and the cylinder head.
SPECIFIED VALUE: There are no leakage.

▼If it is OK, proceed to Σ>3.
▼If it is NG, repair or replace the defective sections.

Σ>3. Stepper motor for EGR operation check

1.Remove the fuel pump relay.
2.Remove the connector of the injector.

CAUTION

- Stop the fuel injection through the above operations 1 and 2 and prevent damaging the catalyst by the unburned gas.

3.Crank the engine.
4.Confirm whether the stepper motor for EGR is operating using a sound scope or a long screwdriver.
SPECIFIED VALUE: It is operating.

▼If it is OK, proceed to Σ>8.
▼If it is NG, proceed to Σ>4.

Σ>4. Connection condition check of each connector

1.Check the connecting conditions of each connector.
SPECIFIED VALUE: There are none that is half fit or pulled out.

▼If it is OK, proceed to Σ>5.
▼If it is NG, repair the connector of the defective section.

Σ5. Stepper motor for EGR voltage check

1.Remove the connector of the stepper motor for EGR.
2.Perform voltage measurement between the following terminals when the IG switch is "ON".
(1) Between stepper motor for EGR connection vehicle harness side connector 2 (B2) - body earth
(2) Between stepper motor for EGR connection vehicle harness side connector 5 (B1) - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to Σ6.
▼If it is NG, perform checking or repairing of the harness and relay between the following terminals.
(3) Between battery - stepper motor for EGR

Σ6. Wire harness continuity check

1.Perform continuity check between each of the following terminals.
(1) Between ECU connection vehicle harness side connector 133 (EGR1) - stepper motor for EGR connection vehicle harness side connector 4 (EGR1)
(2) Between ECU connection vehicle harness side connector 132 (EGR2) - stepper motor for EGR connection vehicle harness side connector 3 (EGR2)
(3) Between ECU connection vehicle harness side connector 131 (EGR3) - stepper motor for EGR connection vehicle harness side connector 6 (EGR3)
(4) Between ECU connection vehicle harness side connector 130 (EGR4) - stepper motor for EGR connection vehicle harness side connector 1 (EGR4)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ7.
▼If it is NG, repair or replace the harness and the connectors.

Σ7. Stepper motor type EGR valve unit check (1)

1.Perform unit check for the stepper motor section of the stepper motor type EGR valve.
Refer to Page B8-226.

▼If it is OK, proceed to Σ8.
▼If it is NG, replace the stepper motor type EGR valve.
Refer to Page B3-5.

Σ8. EGR gas passage check

1.Check the passageway of the EGR gas for clogging.
SPECIFIED VALUE: There is no clogging.

▼If it is OK, proceed to Σ9.
▼If it is NG, repair the defective section of the EGR gas passage.

Σ9. Stepper motor type EGR valve unit check (2)

1.Perform unit check for the valve section of the stepper motor type EGR valve.
Refer to Page B8-226.

▼If it is OK, proceed to Σ10.
▼If it is NG, replace the stepper motor type EGR valve.
Refer to Page B3-5.

10. EGR valve removal and installation check

1.Remove the stepper motor type EGR valve and the intake manifold No.1 insulator.
Refer to Page B3-5.

2.Check the EGR valve and the intake manifold No.1 insulator for any clogging and damages.

CAUTION

- Be careful not to touch the valve section by tools when removing any foreign matters.

NOTE

- Especially check the passage of the EGR gas.

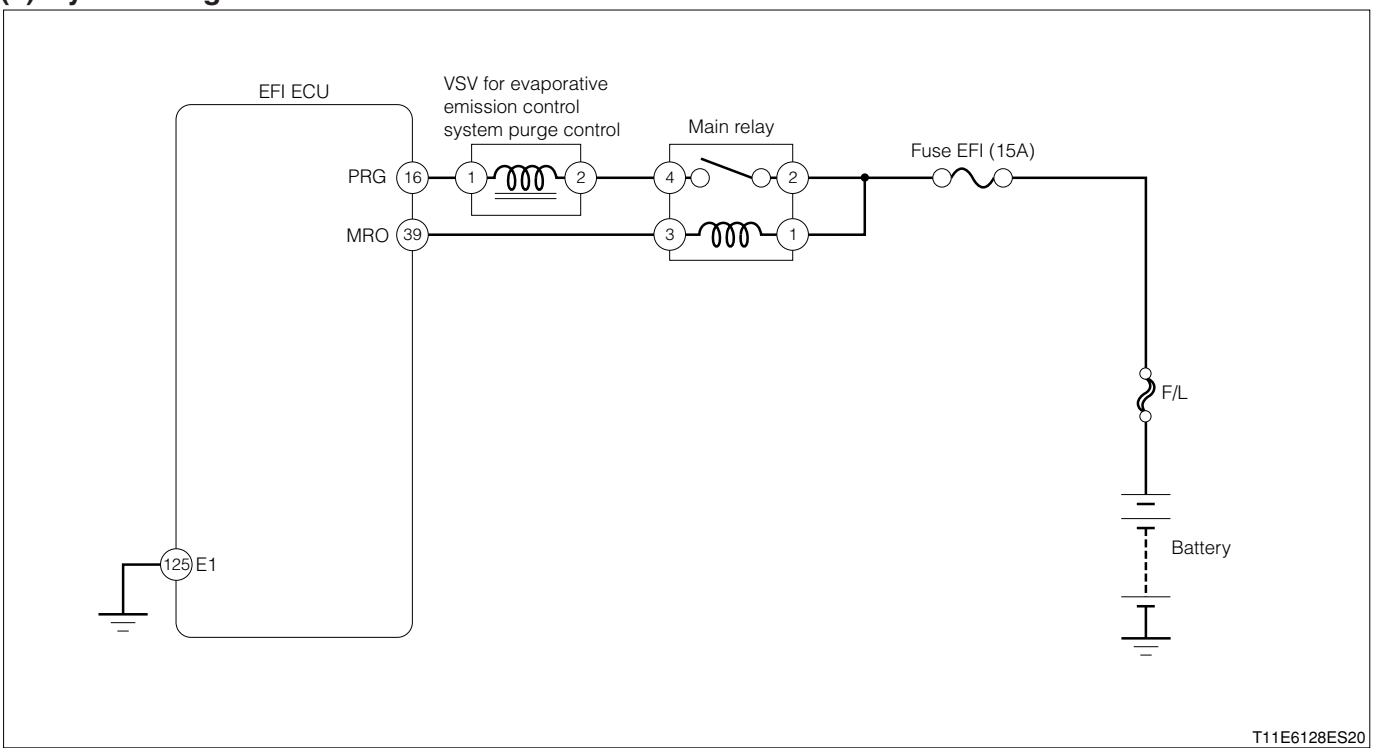
SPECIFIED VALUE: There are no clogging and damage.

▼If it is OK, perform checking of the EFI ECU circuit.
Refer to Page A1-24.

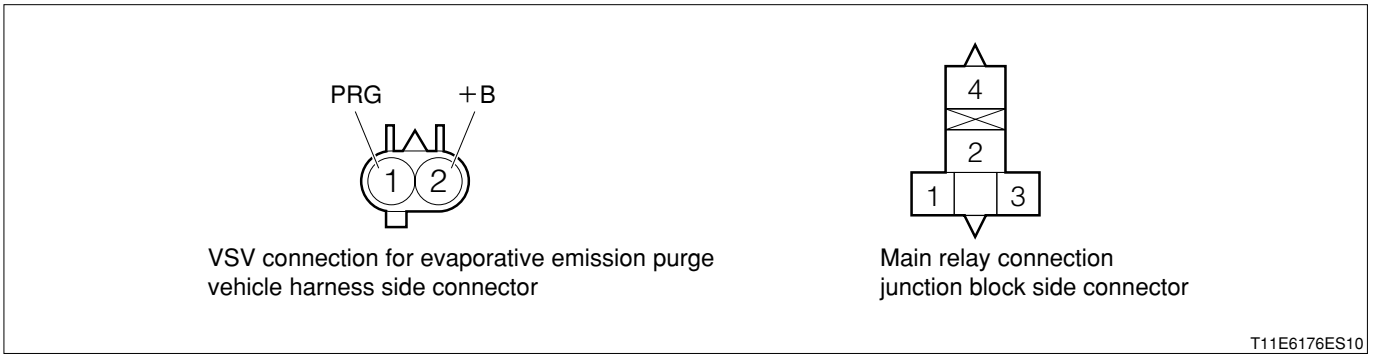
▼If it is NG, replace the defective sections.

7-12-15 DTC NO.P0443/76 VSV FOR EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL

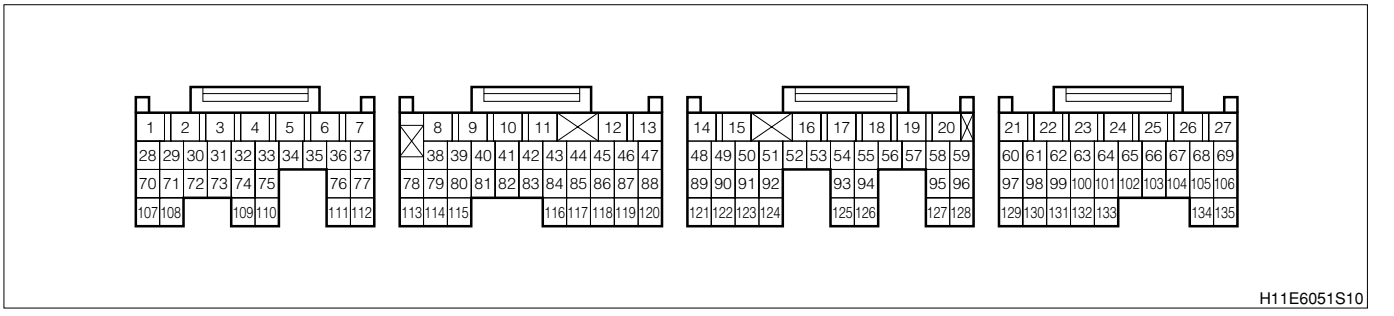
(1) System diagram



Each unit, etc. connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1.When the execution conditions for the evaporative emission purging are met, the EFI ECU performs the duty control for the VSV for evaporative emission purging and purges the evaporative emissions into the combustion chamber.

(3) Diagnosis code output conditions

1.When the detection signal of the VSV for evaporative emission purge is not turned "ON" or "OFF"

(4) Trouble area

1.VSV for evaporative emission control system purge control (Purge VSV for EVAP)
2.Open wire or short circuit for the evaporative emission purge VSV control system circuit
3.EFI ECU

(5) Checking points

1.Is the harness between the VSV for evaporative emission purge and the EFI ECU normal?
2.Is the control signal of the VSV for evaporative emission purge outputted from the EFI ECU normally?
3.Is the VSV for evaporative emission purge operating normally?

(6) Inspection procedure

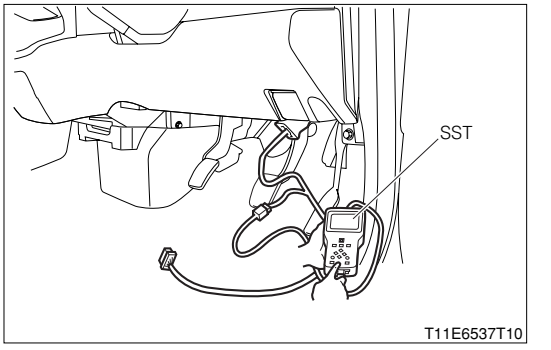
NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

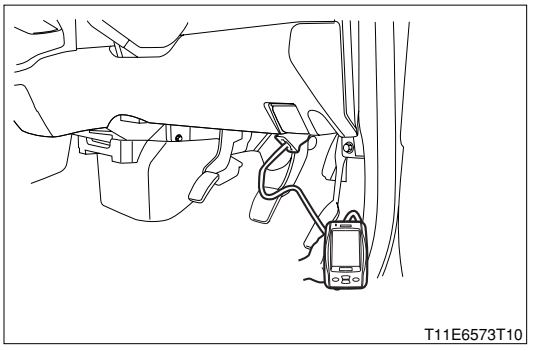
① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

Σ>1. Operation check of Purge VSV for EVAP.

1.IG switch turned "LOCK".
2.Connect the diagnosis tester to DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



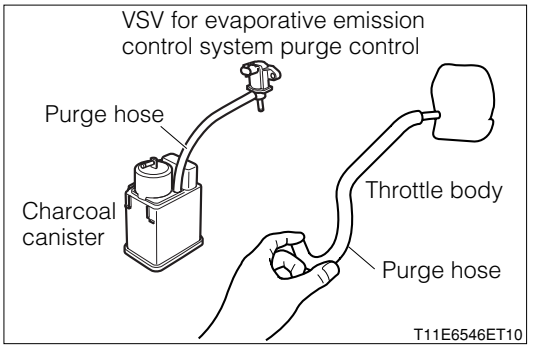
3.Disconnect the hose going to the purge VSV for EVAP from the charcoal canister.
4.Turn "ON" the IG switch, and turn "ON" the main switch of the tester.
5.Erase the DTC.
6.Confirmation of operation of the purge VSV for EVAP.
(1) DS-21: Select the "Purge VSV" of the "Actuator driving".
(2) DS-Ⅱ: Select the "Purge VSV" of the "Active test".

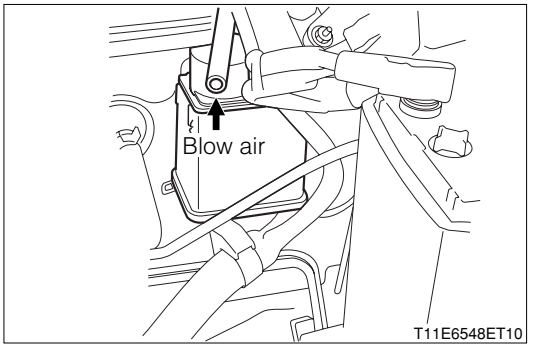
7.When executing "ON" and "OFF" check the operation of the VSV for purging.
SPECIFIED VALUE:

VSV "OFF"	No air continuity should exist when air is blown into the hose.
VSV "ON"	Air continuity should exist when air is blown into the hose.

8.Are the check results OK?
▼If it is OK, check the EFI ECU circuit.
▼If it is OK, go to Σ>2.

Σ>2. Check of purge hose and passage.
1.Execute the "VSV "Release" so as to return the purge VSV for EVAP to the original operating state.
2.Start the engine and keep the engine racing.
3.Disconnect the hose going from the purge VSV for EVAP to the intake manifold.
4.Apply your finger to the disconnected hose. Ensure that a negative pressure is applied.
SPECIFIED VALUE: Negative pressure should be applied.
5.Check the hose for connecting state, leakage, restriction, bending and deterioration.
6.Are the check results OK?
▼If it is OK, go to Σ>3.
▼If it is NG, clean, repair or replace.





Σ>3. Check of power supply voltage of Purge VSV for EVAP.
1.Turn "OFF" the main switch of the tester. Turn "LOCK" the IG switch.
2.Disconnect the purge VSV for EVAP connector.
3.With the IG switch turned "ON", measure the voltage between the following terminals given below.
(1) Between the VSV for evaporative emission purge connection vehicle harness side connector 2 (+B) and the body earth
SPECIFIED VALUE: Battery voltage

4.Are the check results OK?
▼If it is OK, go to Σ>4.
▼If it is NG, check the harness and connector between the VSV for purging and the battery, and the main relay for open wire or short. Repair or replace, as required.

Σ>4. Wiring harness check

1.IG switch turned "LOCK".

2.Check the harness and connector between the following terminals for open wire and short.

(1) Is the control signal of the VSV for evaporative emission purge outputted from the EFI ECU normally?

SPECIFIED VALUE: Continuity exists.

(2) Between the VSV for evaporative emission purge connection vehicle harness side connector 2 (PRG) and the body earth

SPECIFIED VALUE: No continuity exists

3.Are the check results for open wire and short OK?

▼If it is OK, go to Σ>5.

▼If it is NG, repair or replace the harness or connector.

Σ>5. Unit check of purge VSV for EVAP.

1.Perform the unit check of the VSV for evaporative emission purge.

Refer to Page B8-225.

2.Are the unit check results OK?

▼If it is OK, check the EFI ECU circuit.

Refer to Page A1-24.

▼If it is NG, replace the purge VSV for EVAP.

② **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

Σ>1. Evaporative emission purge hose check

1.Check if there are any evaporative emission purge hoses pulled out or damaged

SPECIFIED VALUE: There are none pulled out nor damaged.

▼If it is OK, proceed to Σ>2.

▼If it is NG, repair or replace the hose.

Σ>2. VSV for evaporative emission control system purge control voltage check

1.Remove the connector of the VSV for evaporative emission control system purge control.

2.Perform voltage measurement between the following terminals when the IG switch is "ON".

(1) Between VSV for evaporative emission control system purge control vehicle harness side connector 2 (+B) - body earth

SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to Σ>3.

▼If it is NG, perform checking or repairing of the harness and relay between the following terminals.

(2) Between battery - VSV for evaporative emission control system purge control

Σ>3. Check of wire harness continuity

1.Perform continuity check between each of the following terminals.

(1) Between ECU connection vehicle harness side connector 16 (PRG) - VSV for evaporative emission control system purge control side connector 1 (PRG)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ>4.

▼If it is NG, repair the harness and the connectors.

Σ>4. VSV for evaporative emission control system purge control unit check

1.Perform unit check of the VSV for evaporative emission control system purge control.

Refer to Page B8-225.

▼If it is OK, proceed to Σ>5.

▼If it is NG, replace the VSV for evaporative emission control system purge control.

Σ>5. Connection condition check of each connector

1.Check the connecting conditions of each connector.

SPECIFIED VALUE: There are none that is half fit or pulled out.

▼If it is OK, check the EFI ECU circuit.

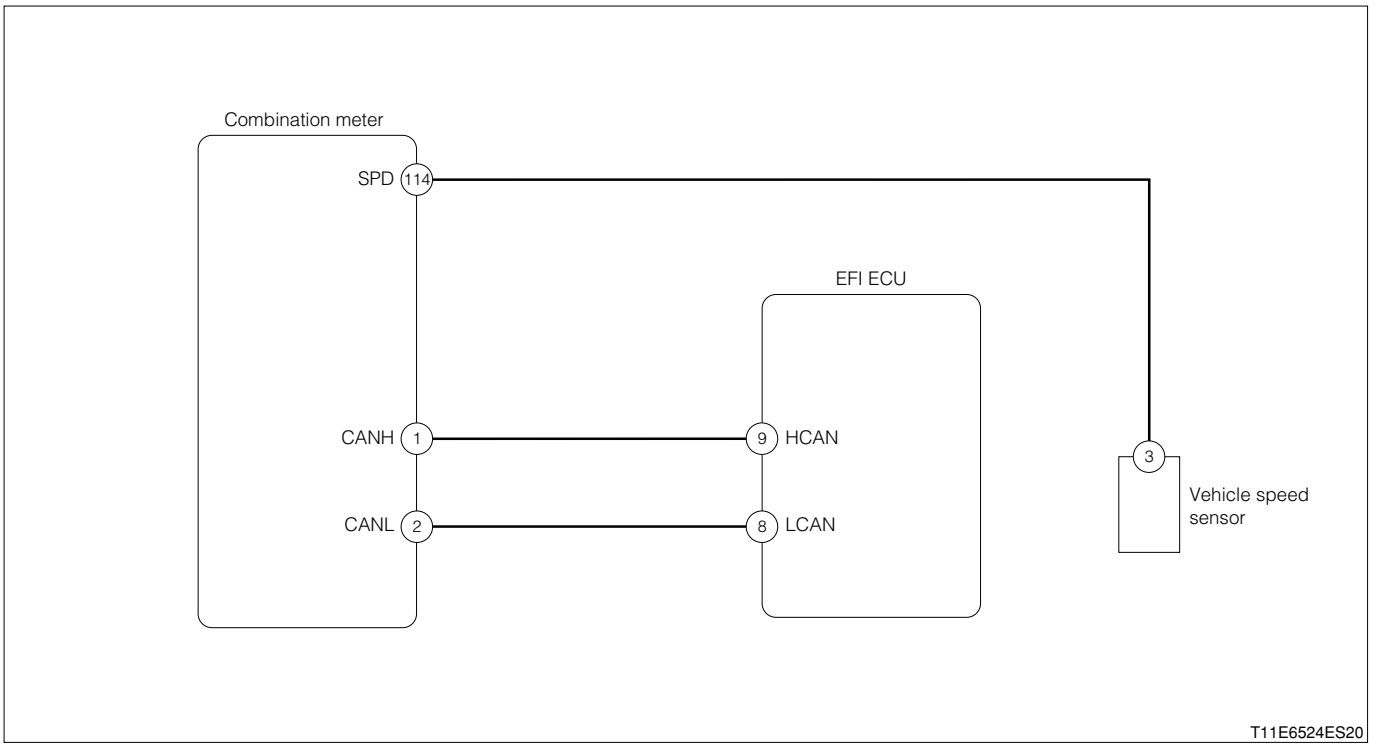
Refer to Page A1-24.

▼If it is NG, repair the connector of the defective section.

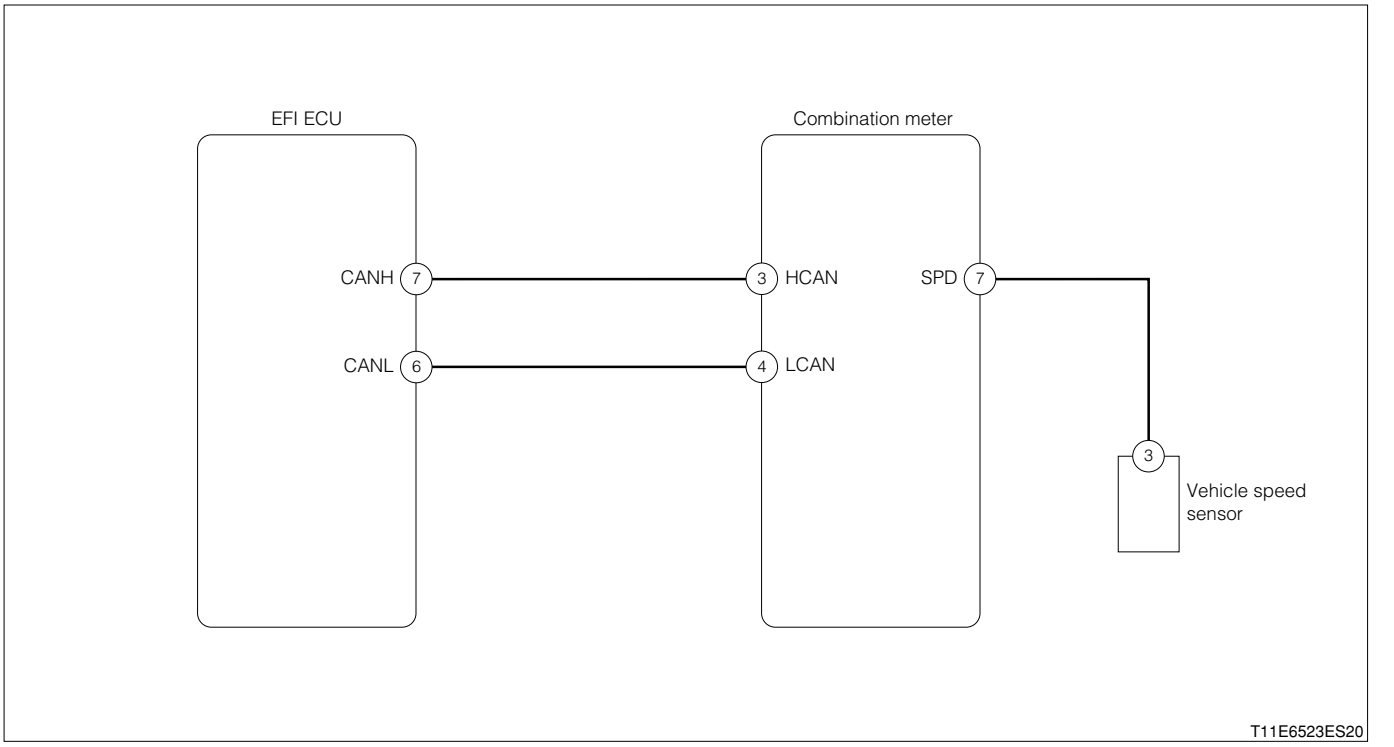
7-12-16 DTC NO.P0500/52 VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION

(1) System diagram

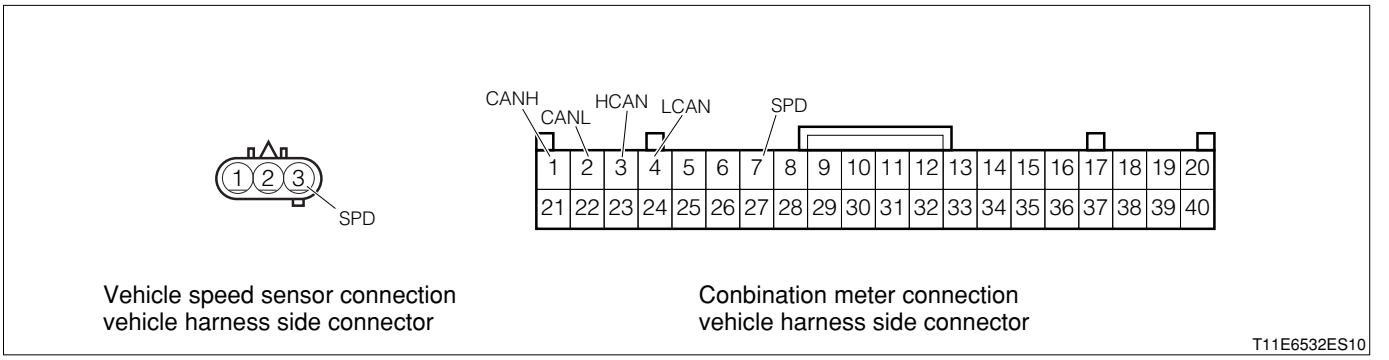
RHD vehicles



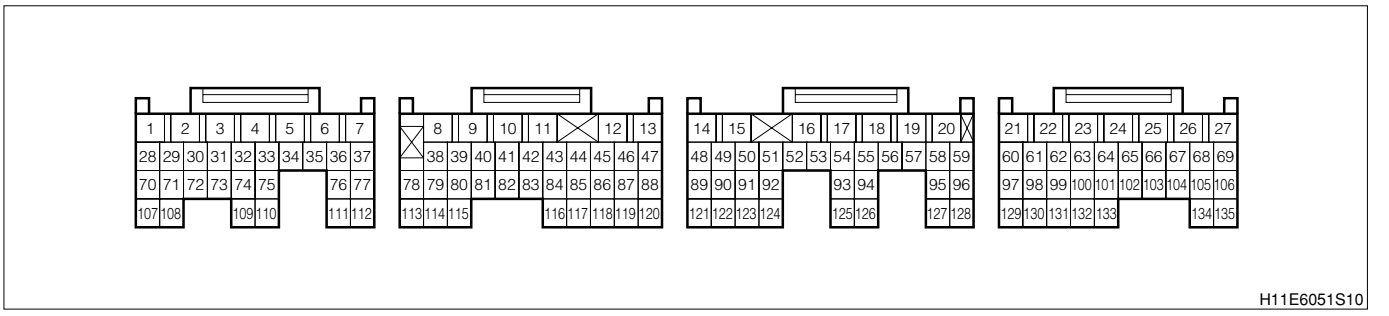
LHD vehicles



Each unit, relays connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Diagnosis code output conditions

1.When no vehicle speed signal is inputted from the combination meter

(3) Checking points

1.Is the vehicle speed signal inputted to the combination meter?
2.Is the combination meter normal?
3.Is the CAN line normal?
4.Is the harness between the vehicle speed sensor and the combination meter normal?
5.Is the vehicle speed sensor normal?

① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

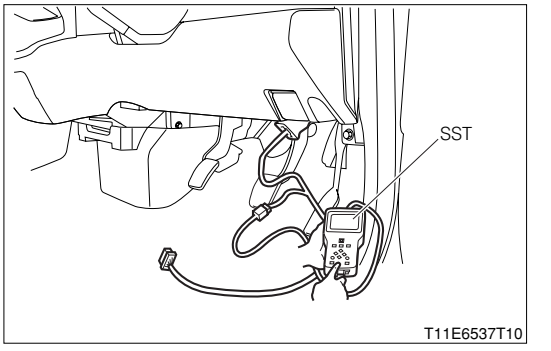
Σ>1. CAN communication basic check

1.Perform basic check of the CAN communication.
Refer to Page L2-14.

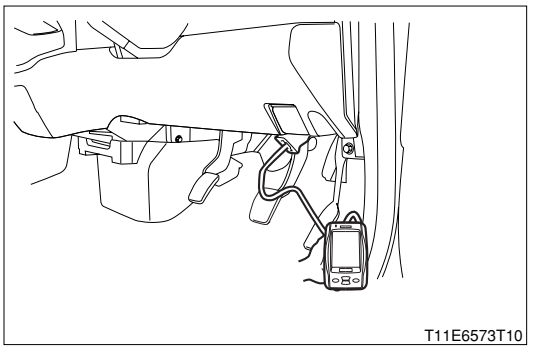
▼If it is OK, proceed to Σ>2.
▼If NG, repair the faulty section and go to Σ>2.

Σ>2. Vehicle speed signal check

1.The IG switch turned "LOCK".
2.Connect the diagnosis tester to DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.


T11E6573T10

3.After turning "ON" the IG switch, Turn "ON" the main switch of the tester.
4.Read the "Vehicle speed" of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.
5.Check to see if the normal vehicle speed is indicated on the tool.
SPECIFIED VALUE: The normal vehicle speed is indicated.

▼If it is OK, proceed to Σ>3.
▼If it is NG and the vehicle is a RHD vehicle, go to Σ>4.
▼If it is NG and the vehicle is a LHD vehicle, go to Σ>6.

Σ>3. Combination meter operation check
1.Check to see if the speedometer of the combination meter functions properly.
SPECIFIED VALUE: The normal vehicle speed is indicated.

▼If it is OK, perform the operations in the following order.
(1) Erase the diagnosis code and check the state for a while.
(2) If the diagnosis code is once again outputted, replace the EFI ECU.
▼If it is NG, proceed to Σ>8.

Σ>4. CAN line open wire check (RHD vehicles)
1.Turn the IG switch to "LOCK".
2.Remove all connectors of the EFI ECU.
3.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 8 (LCAN) - EFI ECU connection vehicle harness side connector 9 (HCAN)
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>5.
▼If it is NG, repair the defective point.

Σ>5. CAN line short circuit check check (RHD vehicles)
1.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 8 (LCAN) - battery positive terminal
(2) Between ABS actuator connection vehicle harness side connector 19 (LCAN) - battery positive terminal
(3) Between EFI ECU connection vehicle harness side connector 8 (LCAN) - body earth
(4) Between EFI ECU connection vehicle harness side connector 9 (HCAN) - body earth
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>8.
▼If it is NG, repair the defective point.

Σ>6. CAN line open wire check (LHD vehicles)

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the EFI ECU.
3.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)

SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>7.
▼If it is NG, repair the defective point.

Σ>7. CAN line short circuit check check (LHD vehicles)

1.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - battery positive terminal
(2) Between ABS actuator connection vehicle harness side connector 7 (CANH) - battery positive terminal
(3) Between EFI ECU connection vehicle harness side connector 6 (CANL) - body earth
(4) Between EFI ECU connection vehicle harness side connector 7 (CANH) - body earth

SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>8.
▼If it is NG, repair the defective point.

Σ>8. Combination meter input signal check

1.Check the vehicle speed input signal to the combination meter.
Refer to Page J3-1.

▼If it is OK, replace the combination meter and go to Σ>2.
▼If it is NG, proceed to Σ>9.

Σ>9. Check of wire harness continuity

1.Perform the continuity check between the following terminals.
(1) Combination meter vehicle harness side connector 7 (SPD) - Vehicle speed sensor vehicle harness side connector 3 (SPD)

▼If it is OK, replace the vehicle speed sensor.
▼If it is NG, repair the defective point.

② **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

Σ1. CAN communication basic check

1.Perform basic check of the CAN communication.
Refer to Page L2-14.

▼If it is OK, proceed to Σ2.
▼If NG, repair the faulty section and go to Σ2.

Σ2. Combination meter operation check

1.Check to see if the speedometer of the combination meter functions properly.
SPECIFIED VALUE: The normal vehicle speed is indicated.

▼If it is OK and the vehicle is a RHD vehicle, go to Σ3.
▼If it is OK and the vehicle is a LHD vehicle, go to Σ5.
▼If it is NG, proceed to Σ7.

Σ3. CAN line open wire check (RHD vehicles)

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the EFI ECU.
3.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 8 (LCAN) - EFI ECU connection vehicle harness side connector 9 (HCAN)
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ4.
▼If it is NG, repair the defective point.

Σ4. CAN line short circuit check check (RHD vehicles)

1.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 8 (LCAN) - battery positive terminal
(2) Between ABS actuator connection vehicle harness side connector 19 (LCAN) - battery positive terminal
(3) Between EFI ECU connection vehicle harness side connector 8 (LCAN) - body earth
(4) Between EFI ECU connection vehicle harness side connector 9 (HCAN) - body earth
SPECIFIED VALUE: No continuity exists.

▼If it is OK, perform the operations in the following order.
(1) Erase the diagnosis code and check the state for a while.
(2) If the diagnosis code is once again outputted, replace the EFI ECU.
▼If it is NG, repair the defective point.

Σ>5. CAN line open wire check (LHD vehicles)

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the EFI ECU.
3.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)

SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>6.
▼If it is NG, repair the defective point.

Σ>6. CAN line short circuit check check (LHD vehicles)

1.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - battery positive terminal
(2) Between EFI ECU connection vehicle harness side connector 7 (CANH) - battery positive terminal
(3) Between EFI ECU connection vehicle harness side connector 6 (CANL) - body earth
(4) Between EFI ECU connection vehicle harness side connector 7 (CANH) - body earth

SPECIFIED VALUE: No continuity exists.

▼If it is OK, perform the operations in the following order.
(1) Erase the diagnosis code and check the state for a while.
(2) If the diagnosis code is once again outputted, replace the EFI ECU.
▼If it is NG, repair the defective point.

Σ>7. Combination meter input signal check

1.Check the vehicle speed input signal to the combination meter.
Refer to Page J3-1.

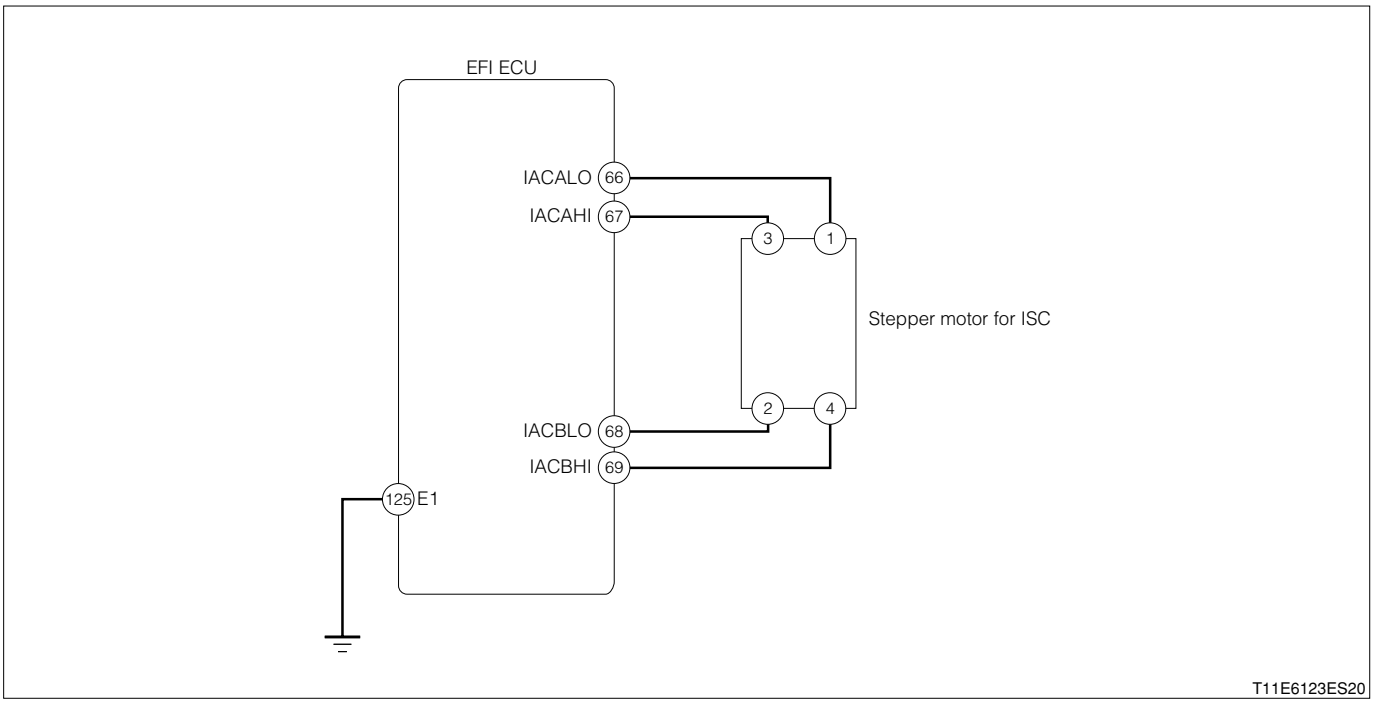
▼If it is OK, replace the combination meter and go to Σ>2.
▼If it is NG, proceed to Σ>8.

Σ>8. Check of wire harness continuity

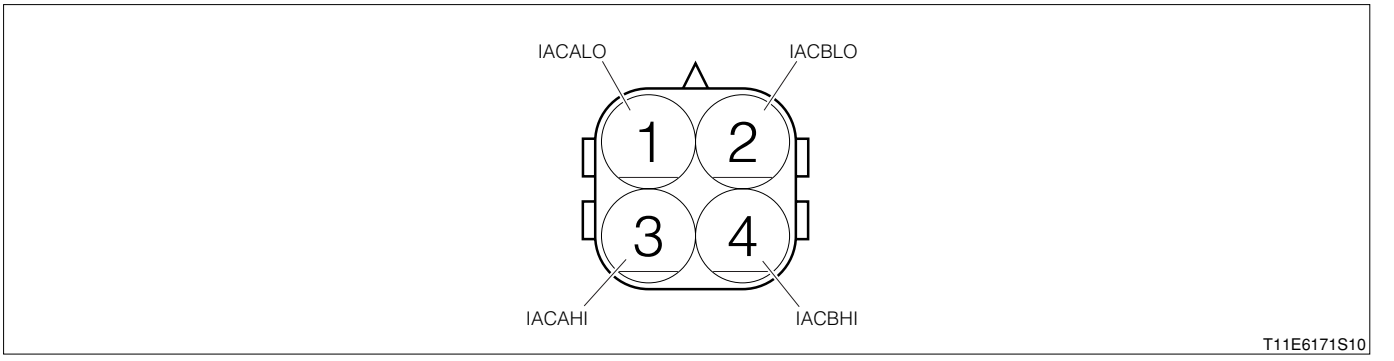
1.Perform the continuity check between the following terminals.
(1) Combination meter vehicle harness side connector 7 (SPD) - Vehicle speed sensor vehicle harness side connector 3 (SPD)
▼If it is OK, replace the vehicle speed sensor.
▼If it is NG, repair the defective point.

7-12-17 DTC NO.P0505/71 IDLE CONTROL SYSTEM MALFUNCTION

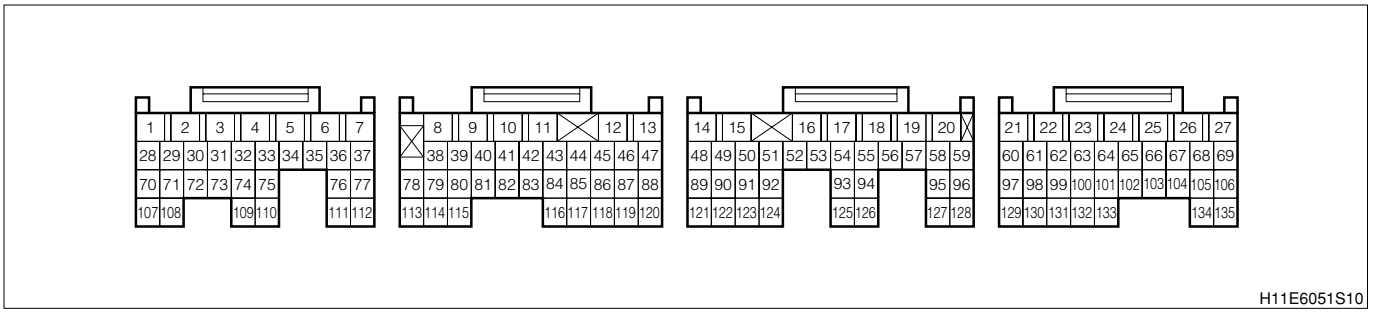
(1) System diagram



Stepper motor for ISC connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1. The EFI ECU drives the stepper motor for ISC, thereby changing the passage area that bypasses the main passage where the throttle valve exists. As a result, the air volume being sucked during the idling is controlled.
2. The stepper motor for ISC performs a driving over 200 steps from the fully-closed position to the fully-opened position. The bypass passage is opened in the reverse direction, while the bypass passage is closed in the forward direction.

(3) Diagnosis code output conditions

1. When the signals are deviated from the specified range continuously over a certain length of time,

(4) Trouble area

1.Open wire or short circuit for ISC system circuit
2.Stepper motor for ISC
3.EFI ECU

(5) Checking points

1.Is the harness between the stepper motor for ISC and the EFI ECU normal?
2.Is the stepper motor for ISC operating normally?

(6) Inspection procedure

① **When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

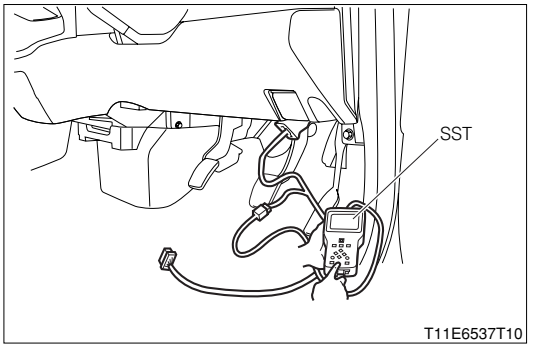
Σ>1. Check of idle speed

1.Is the engine revolution speed high during cold period and does it get lower as the warm-up proceeds and maintain idling speed?
SPECIFIED VALUE: 750^{+100}_{-50} rpm

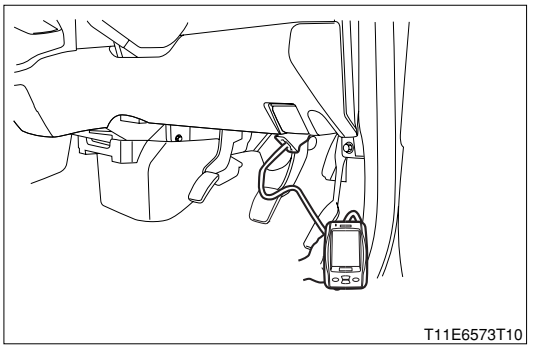
▼If it is OK, proceed to Σ>2.
▼If it is NG, proceed to Σ>3.

Σ>2. Re-confirmation of DTC.

1.The IG switch turned "LOCK".
2.Connect the diagnosis tester to DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000



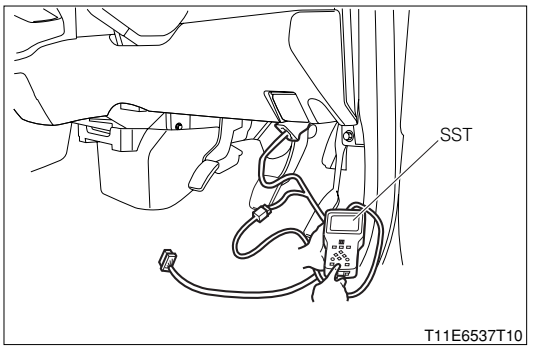
(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



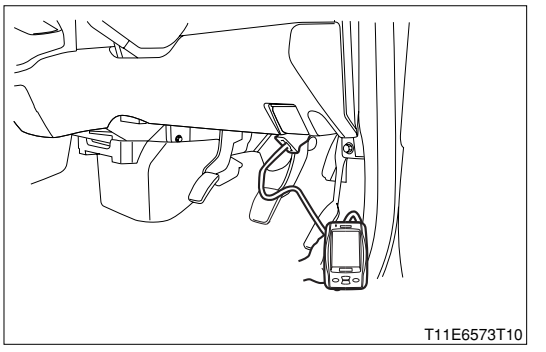
3.Turn "ON" the IG switch, and turn "ON" the main switch of the tester.
4.Erase the DTC. (As for the operation, follow the instruction manual of the diagnosis tester (DS-21/DS-Ⅱ).)
5.Turn "OFF" the main switch of the tester. Turn "LOCK" the IG switch.
6.Turn "ON" the IG switch. Turn "ON" the main switch of the tester.
7.Check the DTC.
▼If it is OK, the ISC system is normal.
▼If it is NG, check the EFI ECU circuit.
<RefCode=SA01_0041 file="EA01.txt">

Σ>3. Operation check of stepper motor for ISC.

1.IG switch turned "LOCK".
2.Connect the diagnosis tester to DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.Warm up the engine fully.
4.Turn "ON" the main switch of the diagnosis tester (DS-21/DS-Ⅱ).
5.Drive the actuator during idling.
(1) DS-21: Select the "ISC" of the "Actuator driving".
Execute the "Open" and "Close" respectively.
(2) DS-Ⅱ: Select the "ISC" of the "Active test".
Execute the "Open" and "Close" respectively.
6.Ensure that the engine revolution speed rises when the "Open" is selected. Also ensure that the engine revolution speed drops when the "Close" is selected.
SPECIFIED VALUE: The engine revolution speed will change.

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, go to Σ>4.

Σ4. Check of output signal of stepper motor for ISCof ECU.

1.Turn "OFF" the main switch of the tester. Turn "LOCK" the IG switch.

2.Connect the SST.

SST: 09842-97209-000

3.Warm up the engine.

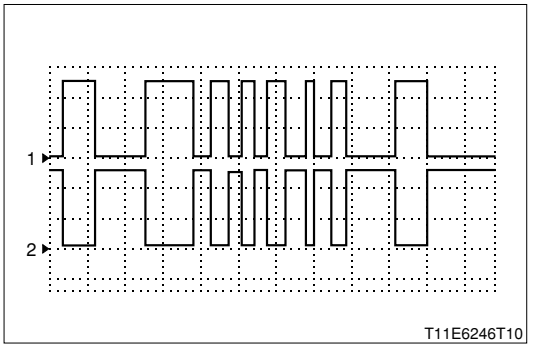
4.Perform output check between the following terminals using an oscilloscope.

(1) Between SST 66 (IACALO) - SST 125 (E1) (Right figure 1▶)

(2) Between SST 67 (IACAHI) - SST 125 (E1) (Right figure 2▶)

Time axis	1s / DIV
Voltage axis	5V / DIV
Measuring condition	When air conditioner is "ON" and while idling

Air conditioner "ON": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "ON".



NOTE

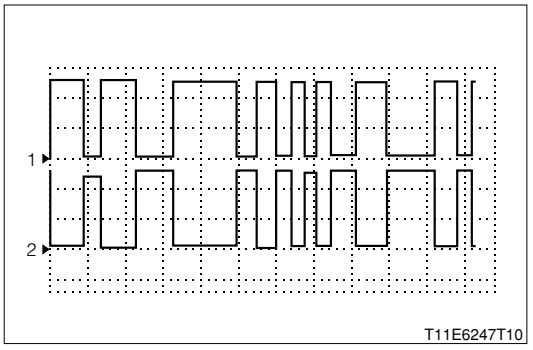
- The waveform cannot be specified, but confirm that a waveform as in the right figure (one such example) shows up.

(3) Between SST 68 (IACBLO) - SST 125 (E1) (Right figure 1▶)

(4) Between SST 69 (IACBHI) - SST 125 (E1) (Right figure 2▶)

Time axis	1s / DIV
Voltage axis	5V / DIV
Measuring condition	When air conditioner is "ON" and while idling

Air conditioner "ON": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "ON".



NOTE

- The waveform cannot be specified, but confirm that a waveform as in the right figure (One such example) shows up.

5.Confirm the following points.

(1) The pulse of 0V ⇄ battery voltage is generated.

(2) The "LO" and "HI" will form waveforms in opposite phase.

▼If it is OK, go to Σ5.

▼If it is NG, replace the EFI ECU.

Refer to Page B8-1.

Σ5. Check of harness between valve for ISC and ECU.

1.Turn "OFF" the main switch of the tester. Turn "LOCK" the IG switch.

2.Disconnect the SST connector at the EFI ECU side.

3.Perform continuity check between each of the following terminals.

(1) Between stepper motor for ISC connection vehicle harness side connector 1 (IACALO) - ECU connection vehicle harness side connector 66 (IACALO)

(2) Between stepper motor for ISC connection vehicle harness side connector 2 (IACBLO) - ECU connection vehicle harness side connector 68 (IACBLO)

(3) Between stepper motor for ISC connection vehicle harness side connector 31 (IACAHI) - ECU connection vehicle harness side connector 67 (IACAHI)

(4) Between stepper motor for ISC connection vehicle harness side connector 4 (IACBHI) - ECU connection vehicle harness side connector 69 (IACBHI)

4.Are the check results for open wire and short OK?
▼If it is OK, replace the throttle body Ay.
Refer to Page B3-3.

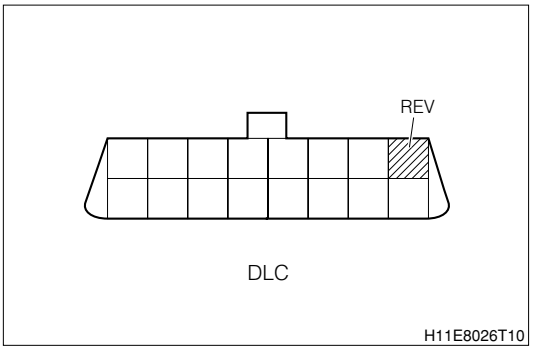
▼If it is NG, repair or replace the harness or connector.

② **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

Σ>1. Check of idle speed

1.Install an engine tachometer to the terminal "REV" of the DLC, using the SST.
SST: 09991-87402-000
09991-87404-000

NOTE
- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.



2.Is the engine revolution speed high during cold period and does it get lower as the warm-up proceeds and maintain idling speed?
SPECIFIED VALUE: 750^{+100}_{-50} rpm
▼If it is OK, the ISC system is normal.
▼If it is NG, proceed to Σ>2.

Σ>2. Stepper motor for ISC operation check

1.Confirm whether the stepper motor for ISC is making an operation sound right after the engine is stopped using a sound scope or a long screwdriver.
SPECIFIED VALUE: It is making operation sound.

▼If it is OK, proceed to Σ>4.
▼If it is NG, proceed to Σ>3.

Σ>3. Check of wire harness continuity

1.Perform continuity check between each of the following terminals.
(1) Between stepper motor for ISC connection vehicle harness side connector 1 (IACALO) - ECU connection vehicle harness side connector 66 (IACALO)
(2) Between stepper motor for ISC connection vehicle harness side connector 2 (IACBLO) - ECU connection vehicle harness side connector 68 (IACBLO)
(3) Between stepper motor for ISC connection vehicle harness side connector 31 (IACAHI) - ECU connection vehicle harness side connector 67 (IACAHI)
(4) Between stepper motor for ISC connection vehicle harness side connector 4 (IACBHI) - ECU connection vehicle harness side connector 69 (IACBHI)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ>4.
▼If it is NG, repair the harness and connectors and recheck it.

Σ>4. EFI ECU signal check

1.Connect the SST.
SST: 09842-97209-000

2.Perform output check between the following terminals using an oscilloscope.
(1) Between SST 66 (IACALO) - SST 125 (E1) (Right figure 1▶)

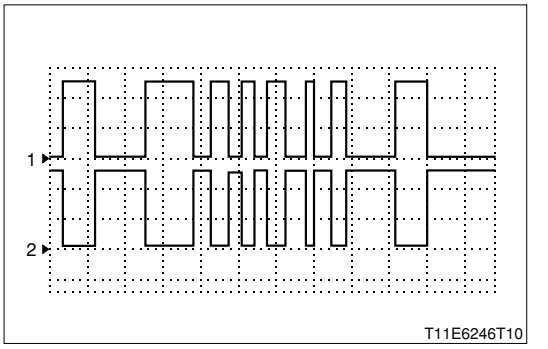
(2) Between SST 67 (IACAHI) - SST 125 (E1) (Right figure 2▶)

Time axis	1s / DIV
Voltage axis	5V / DIV
Measuring condition	When air conditioner is "ON" and while idling

Air conditioner "ON": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "ON".

NOTE

- The waveform cannot be specified, but confirm that a waveform as in the right figure (One such example) shows up.



(3) Between SST 68 (IACBLO) - SST 125 (E1) (Right figure 1▶)

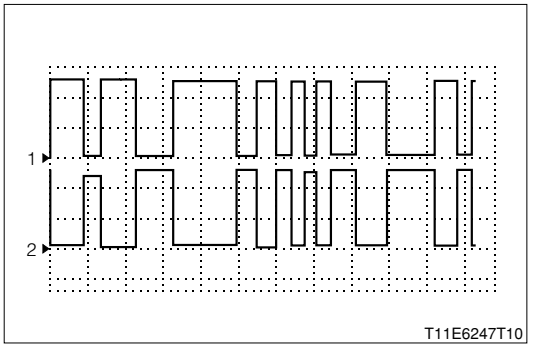
(4) Between SST 69 (IACBHI) - SST 125 (E1) (Right figure 2▶)

Time axis	1s / DIV
Voltage axis	5V / DIV
Measuring condition	When air conditioner is "ON" and while idling

Air conditioner "ON": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "ON".

NOTE

- The waveform cannot be specified, but confirm that a waveform as in the right figure (one such example) shows up.



3.Confirm the following points.

(1) The pulse of 0V ⇄ battery voltage is generated.

(2) The "LO" and "HI" will form waveforms in opposite phase.

▼If it is OK, replace the throttle body Ay.

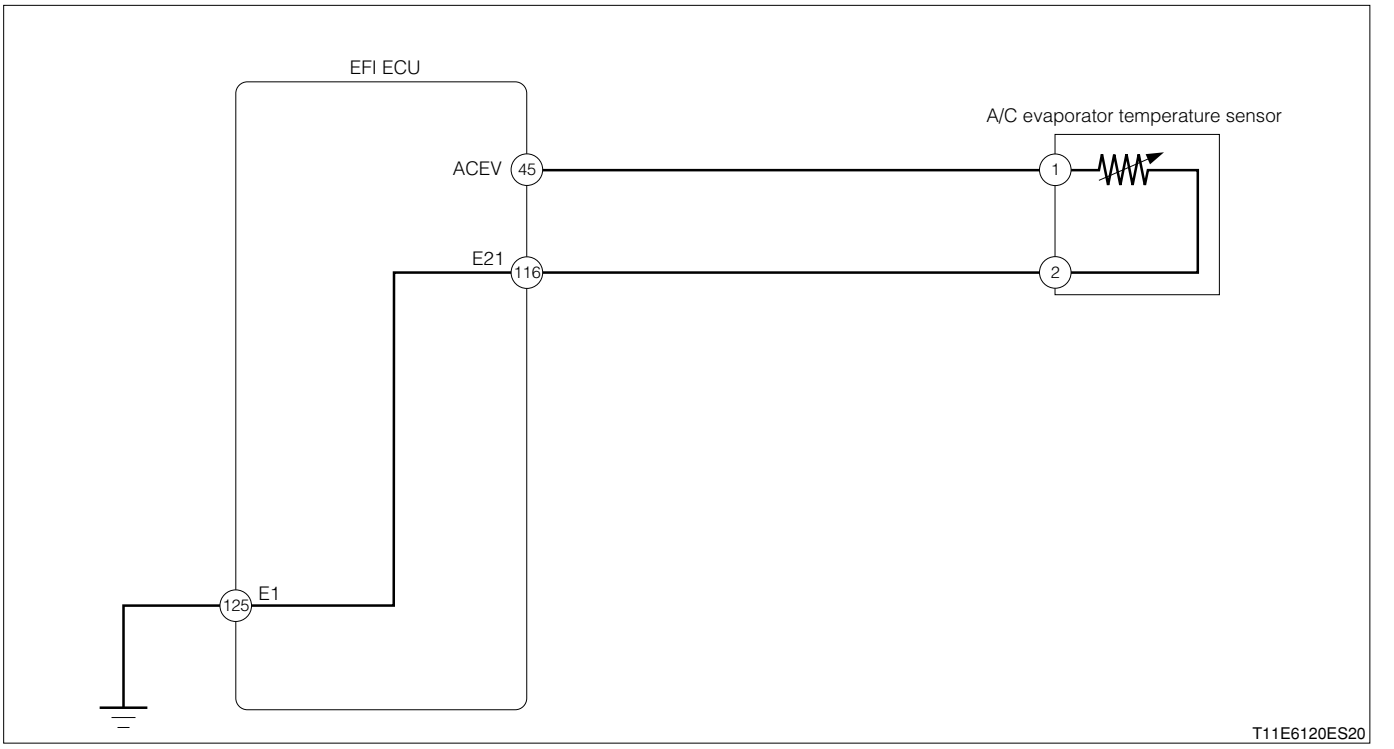
Refer to Page B3-3.

▼If it is NG, check the EFI ECU circuit.

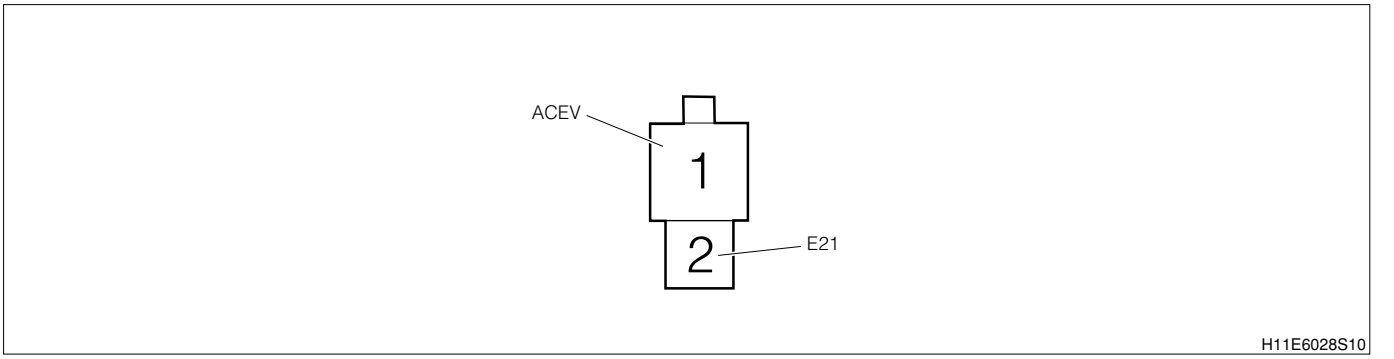
Refer to Page A1-24.

7-12-18 DTC NO.P0535/44 AIR CONDITIONER EVAPORATOR TEMPERATURE SENSOR CIRCUIT MALFUNCTION

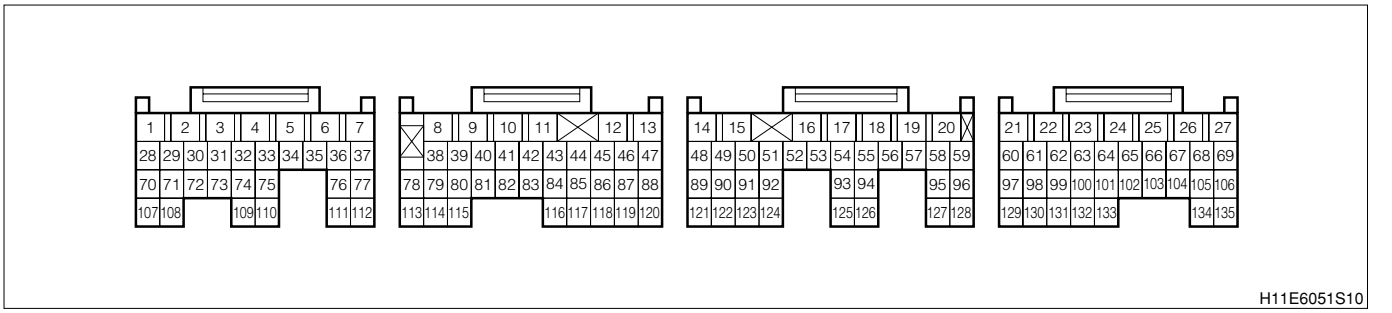
(1) System diagram



Air conditioner evaporator temperature sensor connection vehicle harness side connector

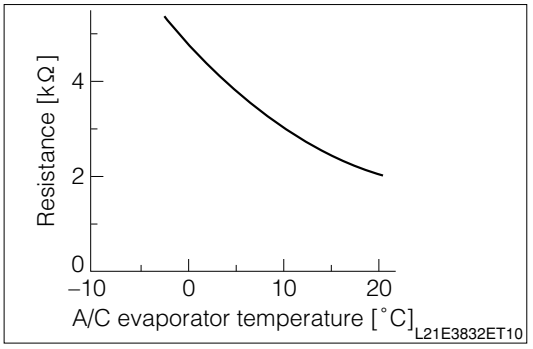


EFI ECU connection vehicle harness side connector



(2) Circuit description

1.This circuit, located at the rear of the evaporator of the air conditioner unit, detects the temperature of the air passing through the evaporator. A thermistor is incorporated in the sensor. This thermistor has characteristics that its resistance decreases as the temperature rise, while the resistance increases as the temperature drops. When the temperature becomes a constant value, the thermistor disengages the magnet clutch through the MGC relay, thus preventing frosting.



(3) Diagnosis code output conditions

1.When the signals from the air conditioner evaporator temperature sensor are not outputted continuously over a certain length of time after starting with the air conditioner switch turned "ON"

(4) Trouble area

1.Air conditioner (A/C) evaporator temperature sensor
2.Open wire or short circuit for the air conditioner evaporator temperature sensor
3.EFI ECU

(5) Checking points

1.Are the signals from the air conditioner evaporator temperature sensor inputted to the EFI ECU?
2.Is the harness between the air conditioner evaporator temperature sensor and the EFI ECU normal?
3.Is the output of the air conditioner evaporator temperature sensor normal?

(6) Inspection procedure

① **When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

Σ>1. Check of ECU output voltage.

1.Set the SST.
SST: 09842-97209-000

2.IG switch turned "ON"
3.Measure the voltage between the following terminals.
(1) Between SST 45 (ACEV) and 116 (E21)
SPECIFIED VALUE: 0.1 - 4.8 V (Varies, depending upon the temperature.)

4.Are the check results OK?
▼If it is NG, go to Σ>2.
▼If it is NG, check the EFI ECU circuit.
Refer to Page A1-24.

Σ2. Wiring harness check

1.With the IG switch turned "LOCK", disconnect the SST connector from the ECU.
2.Perform the continuity check between the following terminals.
(1) Harness side connector 1 (ACEV) of sensor - EFI ECU 45 (ACEV)
(2) Harness side connector 2 (E21) of sensor - EFI ECU 116 (E21)
SPECIFIED VALUE: Continuity exists

3.Are the check results for open wire and short OK?
▼If it is OK, go to Σ3.
▼If it is NG, repair the defective point.

Σ3. Unit check of A/C evaporator temperature sensor.

1.Perform the unit check of the air conditioner evaporator temperature sensor.
Refer to Page B8-223.

2.Are the unit check results OK?
▼If it is OK, check or replace the EFI ECU.
▼If it is NG, replace the A/C evaporator temperature sensor

7-12-19 DTC NO.P1105/32 ATMOSPHERIC PRESSURE SENSOR CIRCUIT MALFUNCTION

(1) Circuit description

1.An atmospheric sensor is mounted in the ECU.

(2) Diagnosis code output conditions

1.When the signals from the atmospheric pressure sensor are not outputted continuously over a certain length of time after starting.

(3) Trouble area

1.EFI ECU

(4) Inspection procedure

① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

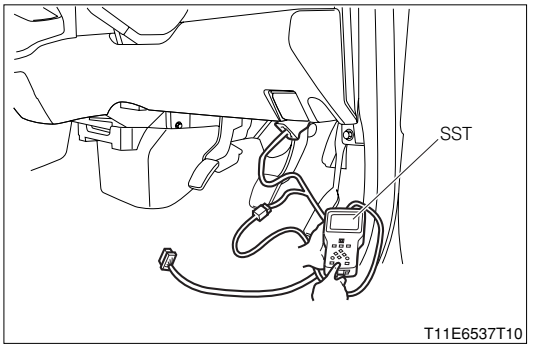
Σ>1. Erase the DTC

1.The IG switch turned "LOCK".

2.Connect the diagnosis tester to DLC.

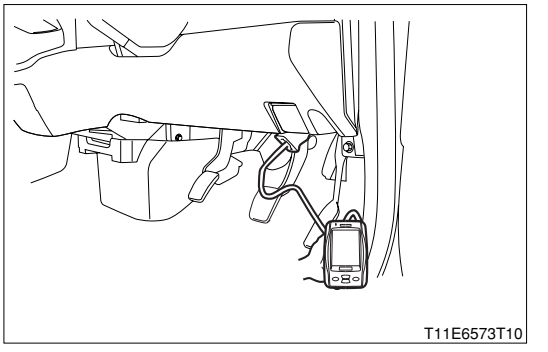
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.

(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.After turning "ON" the IG switch, Turn "ON" the main switch of the tester.

4.Cancel the diagnosis code.

5.Is No.P1105/32 indicated ?

▼If the output is made, replace the EFI ECU.

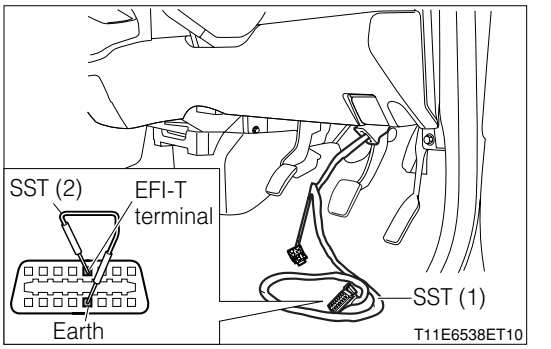
▼If no output is made, check the EFI ECU circuit.

Refer to Page A1-24.

② When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

Σ>1. Erase the DTC

1.Remove the EFI fuse. Erase the DTC.
2.Set the EFI fuse to the original position.
3.Short circuit the DLC terminals 5 (EFI-T) and 13 (E), using the SST.
SST: 09991-87404-000(1)
09991-87403-000(2)
4.Turn "ON" the IG switch.
5.Check the DTC.
6.Is No.P1105/32 indicated ?

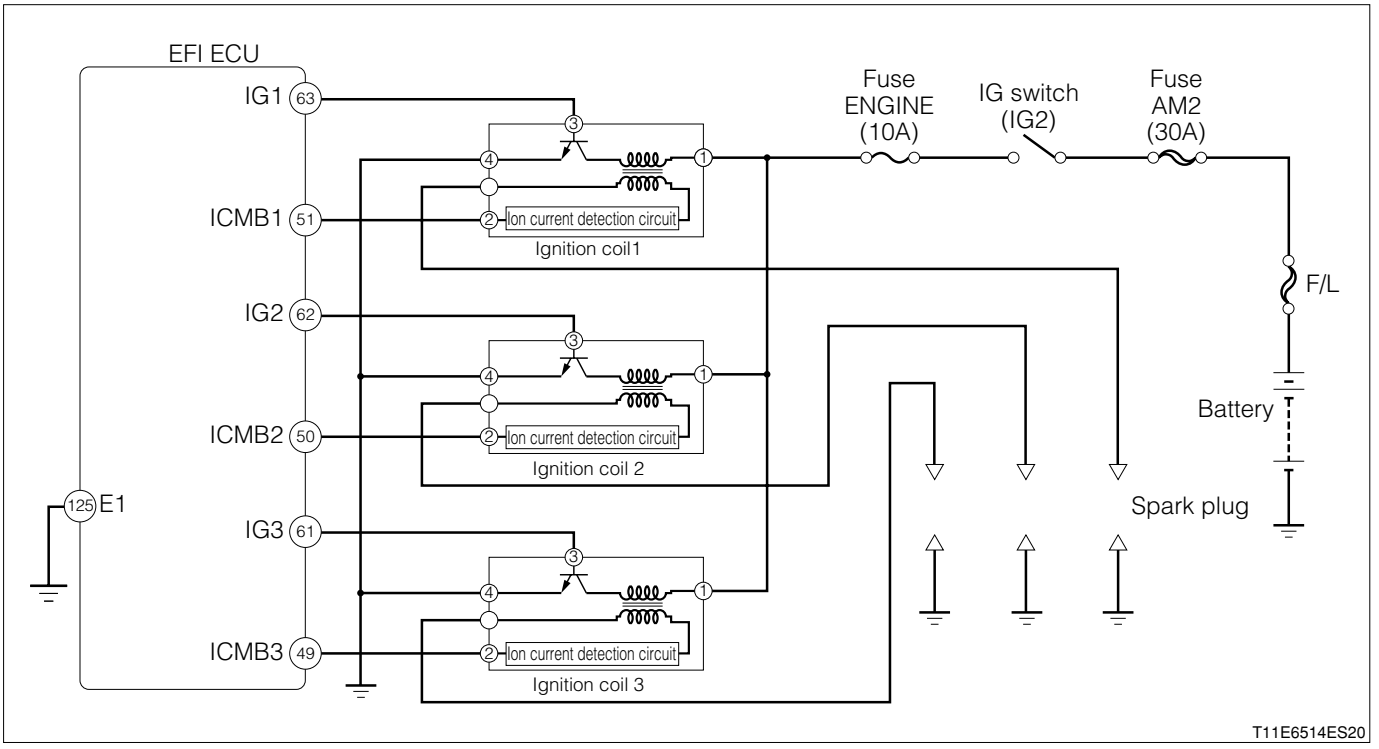


▼If the output is made, replace the EFI ECU.
Refer to Page B8-1.

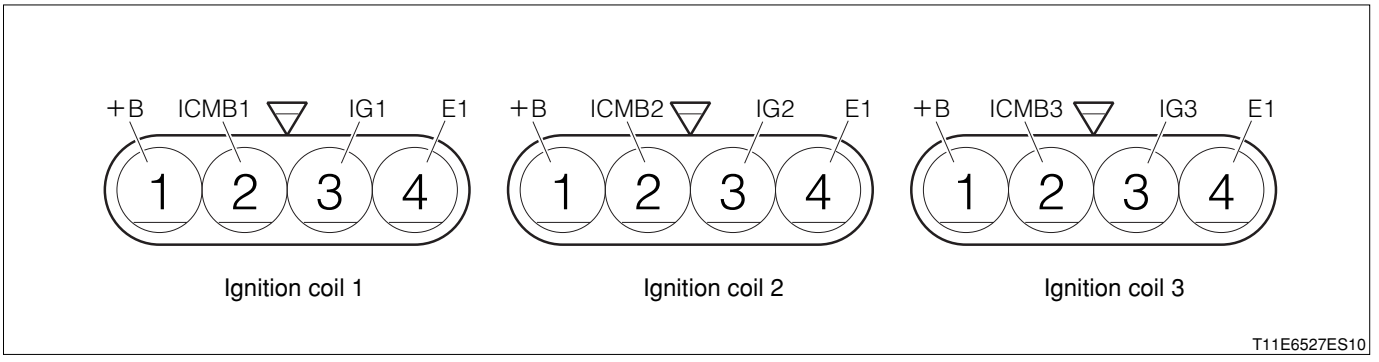
▼If no output is made, check the EFI ECU circuit.
Refer to Page A1-24.

7-12-20 DTC NO.P1300/36 ION CURRENT COMBUSTION CONTROL SYSTEM

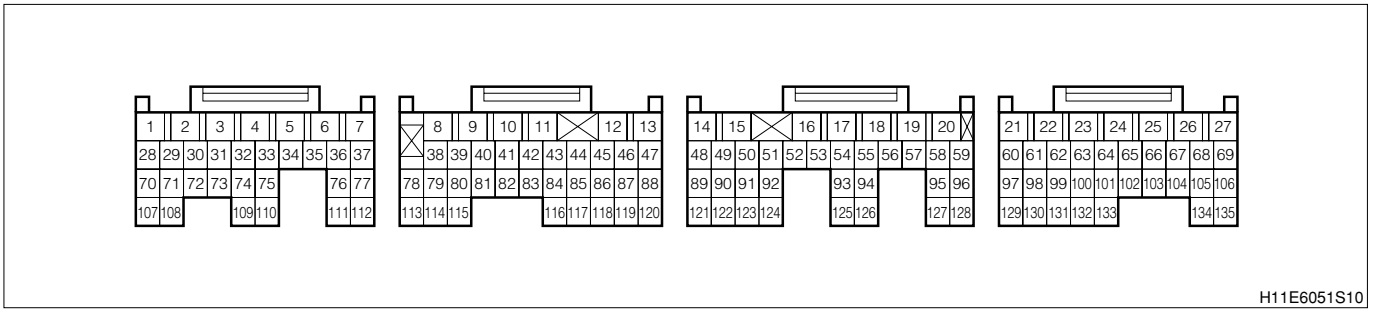
(1) System diagram



Ignition coil connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1. This system detects any misfire of the engine by using an ion current which has the same waveforms as those of the combustion pressure. When any misfire takes place, no ion current is produced. Therefore, if the input voltage at the ECU side is below a certain value, it is judged that a misfire took place. Since the detected ion current is very weak, it is amplified in the igniter unit.

(3) Diagnosis code output conditions

1.After the engine has been warmed up, when the signal from the ion current combustion control system is not inputted to the EFI ECU while the engine is running
2.After the engine has been warmed up, when the signal from the ion current combustion control system is inputted continuously to the EFI ECU while the engine is running
3.When the signal from the ion current combustion control system is inputted to the EFI ECU during the fuel-cut operation

(4) Trouble area

1.Open wire or short circuit for ion system circuit
2.Ignition coil
3.Spark plug
4.EFI ECU

(5) Checking points

1.Is the ignition system normal?
2.Is the signal from the ion current combustion control system normal?
3.Is the combustion system normal?
4.Is the harness between the ignition coil and the EFI ECU normal?
5.Is the ignition coil is normal?
6.Is the EFI ECU normal?

(6) Inspection procedure

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

Σ>1. Diagnosis code check

1.Use the SST to short-circuit DLC terminals between 5(EFI-T) - 13(E).
SST: 09991-87404-000
09991-87403-000

2.Check whether the diagnosis code other than Code No.36 is outputted or not.
SPECIFIED VALUE: No output.

▼If it is OK, go to Σ>2.
▼In the case of NG, first check and repair a condition that caused the diagnosis code output.

Σ>2. Unit check of spark plug

1.Check whether the designated spark plug is used. (See Engine Turning-up section for spark plug specifications.)
Refer to Page B1-4.

2.Perform the unit check of the spark plug
Refer to Page B8-223.

▼If it is OK, go to Σ>3.
▼If it is NG, clean or replace the spark plug. If a designated spark plug is not used, replace the spark plug with the designated spark plug.

Σ3. Spark check

WARNING

- There is a hazard potential for sparks are generated. Do not place combustible materials in the vicinity.

1.Warm up the engine.
2.Set the IG switch to "LOCK".
3.Remove the fuel pump relay.
4.Idle the engine and wait until the engine stops by itself.
5.Set the IG switch to "LOCK".
6.Remove all the connectors from the injector.

CAUTION

- Operations described above will stop fuel injection, thus preventing damage to the catalyst due to non-burned gas etc.

7.Remove the spark plug and install it to the ignition coil to earth the plug.
8.Check whether the spark plug generates sparks during cranking.
SPECIFIED VALUE: Sparks are generated.

▼If it is OK, go to Σ8.
▼If it is NG, go to Σ4.

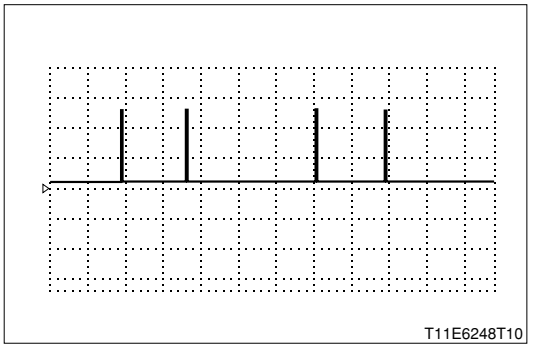
Σ4. EFI ECU signal check (1)

1.Connect the SST.
SST: 09842-97209-000

2.Completely warm up the engine.
3.When the engine is in the starting condition, check an output waveform of an ignition signal between the following terminals using an oscilloscope.
(1) Between SST 63(IG1) - SST 125 (E1)
(2) Between SST 62(IG2) - SST 125 (E1)
(3) Between SST 61(IG3) - SST 125 (E1)

Time axis	100ms / DIV
Voltage axis	2V / DIV
Condition	Air-conditioner "OFF", no electrical load, idling

Air-conditioner "OFF": Set the air-conditioner switch (ACSW), blower switch (BLW), and magnet clutch (MGC) to "OFF".



NOTE

- Check that the waveform shown in the figure [Example] is displayed.

4.Check the following points.
(1) The pulse of 0 ⇄ 5V is generated.
(2) The waveform cycle is shortened as the engine speed increases.

NOTE

- The ignition signal can not be judged correctly if an oscilloscope is not used.

▼If it is OK, go to Σ5.
▼If it is NG, check the EFI ECU circuit.
Refer to Page A1-24.

Σ5. Wire harness continuity check (1)

1.Check continuity between the following terminals.

(1) Between ignition coil 1connection vehicle harness side connector 3 (IG1) - ECU connection vehicle harness side connector 63 (IG1)

(2) Between ignition coil 2 connection vehicle harness side connector 3 (IG2) - ECU connection vehicle harness side connector 62 (IG2)

(3) Between ignition coil 3 connection vehicle harness side connector 3 (IG3) - ECU connection vehicle harness side connector 61 (IG3)

SPECIFIED VALUE: Continuity exists

▼If it is OK, go to Σ6.

▼If it is NG, repair or replace the faulty harness.

Σ6. Ignition coil voltage check

1.Measure the voltage between the following terminals when the IG switch is "ON".

(1) Between each ignition coil connection vehicle harness side connector 1 (+B) - body earth

SPECIFIED VALUE: Battery voltage

▼If it is OK, go to Σ7.

▼In the case of NG, repair or replace the harness between the following terminals.

(2) Each ignition coil - battery

Σ7. Wire harness continuity check (2)

1.Check continuity between the following terminals.

(1) Between each ignition coil connection vehicle harness side connector 4 (E1) - ECU connection vehicle harness side connector 125 (E1)

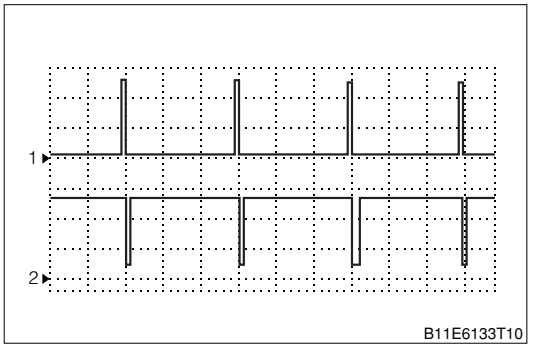
SPECIFIED VALUE: Continuity exists.

▼If it is OK, replace the ignition coil.

Refer to Page B10-2.

▼In the case of NG, repair or replace the faulty harness.

Σ>8. EFI ECU signal check (2)



1.Completely warm up the engine.

2.While idling, check each cylinder for output waveforms of the ignition signal (1▶) and ion current combustion control signal (2▶), using an oscilloscope, respectively.

	Channel	+ side measuring terminal	− side measuring terminal
Cylinder No.1	1▶	63 (IG1)	125 (E1)
	2▶	51 (ICMB1)	125 (E1)
Cylinder No.2	1▶	62 (IG2)	125 (E1)
	2▶	50 (ICMB2)	125 (E1)
Cylinder No.3	1▶	61 (IG3)	125 (E1)
	2▶	49 (ICMB3)	125 (E1)

Time axis	50ms / DIV
Voltage axis	2V / DIV
Condition	Water temperature is 80℃ or more: air conditioner is "ON": Electric load exists: during air conditioner idle up rotation

Air conditioner is "ON": Condition where all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "ON".

Electric load exists: Conditions where the headlight (H/L) and Defogger (DEF) are both "ON".

Air conditioner idle up rotation:950±50 rpm

NOTE

- Check that waveforms like those in the figure (One example) is produced.

3.Check the following points.

(1) According to the output waveform of the ignition signal (Channel 1 ▶), the output waveform of the ion current combustion control signal (Channel 2▶) has been produced.

(2) The waveform of 5 ⇄ 0V has been produced.

NOTE

- Correct evaluation cannot be made for the ignition signals and ion current combustion control signals, unless you use an oscilloscope.

	Waveform (Channel 2▶) state
a	Normal
b	Clamped at 0V.
c	Clamped at 5V.
d	Clamped to the battery voltage.
e	Waveform is unstable※.

※: According to the output waveform of the ignition signal (Channel 1 ▶), the output waveform of the ion current combustion control signal (Channel 2▶) has not been produced.

▼In the case of "a", go to Σ>9.

▼In the case of "b" go to Σ>11.

▼In the case of "c" go to Σ>13.

▼In the case of "d" go to Σ>12.

▼In the case of "e" go to Σ>16.

Σ9. EFI ECU signal check (3)

1.Retain the measurement conditions in Σ8.

2.Under the following conditions, check each cylinder for output waveforms of the ion current combustion control signal, using an oscilloscope.

(1) Raise the engine revolution speed slowly from the idle state to 4000 rpm. Then, close the throttle opening quickly.

SPECIFIED VALUE: No waveform is outputted while fuel is cut.

▼If it is OK, replace the EFI ECU.

Refer to Page B8-1.

▼If it is NG, go to Σ10.

Σ10. Fuel cut operation check

1.Check the output state between the following terminals using an oscilloscope.

(1) Between SST 24 (#10) - SST 125 (E1)

(2) Between SST 23(#20) - SST 125 (E1)

(3) Between SST 22(#30) - SST 125 (E1)

2.Check the operating sound of the injector using a sound scope when the fuel cut is active.

NOTE

- Check operating sound, while checking the output waveform to the injector using an oscilloscope.

SPECIFIED VALUE: The operating sound of the injector stops when the fuel cut is active.

▼If it is OK, replace the ignition coil.

Refer to Page B10-2.

▼In the case of NG, perform unit check of the injector.

Refer to Page B8-224.

Σ11. Check of wire harness for short-circuit (1)

1.Check continuity of the cylinder whose waveform is clamped at 0V.

(1) Between ignition coil 1 connection vehicle harness side connector 2 (ICMB1) - body earth

(2) Between ignition coil 2 connection vehicle harness side connector 2 (ICMB2) - body earth

(3) Between ignition coil 3 connection vehicle harness side connector 2 (ICMB3) - body earth

SPECIFIED VALUE: No continuity exists

▼If it is OK, replace the ignition coil.

Refer to Page B10-2.

▼In the case of NG, repair the faulty section.

Σ>12. Check of wire harness for short-circuit (2)

1.Check continuity of the cylinder whose waveform is clamped to the battery voltage.

(1) Between ignition coil 1 connection vehicle harness side connector 2 (ICMB1) - battery positive (+) terminal

(2) Between ignition coil 2 connection vehicle harness side connector 2 (ICMB2) - battery positive (+) terminal

(3) Between ignition coil 3 connection vehicle harness side connector 2 (ICMB3) - battery positive (+) terminal

SPECIFIED VALUE: No continuity exists

▼If it is OK, replace the ignition coil.

Refer to Page B10-2.

▼In the case of NG, repair or replace the faulty component.

Σ>13. Check of wire harness for open wire

1.Check continuity of the cylinder whose waveform is clamped at 5V.

(1) Between ignition coil 1connection vehicle harness side connector 2 (ICMB1) - EFI ECU connection vehicle harness side connector 51 (ICMB1)

(2) Between ignition coil 2 connection vehicle harness side connector 2 (ICMB2) - EFI ECU connection vehicle harness side connector 50 (ICMB2)

(3) Between ignition coil 3 connection vehicle harness side connector 2 (ICMB3) - EFI ECU connection vehicle harness side connector 49 (ICMB3)

SPECIFIED VALUE: Continuity exists

▼If it is OK, go to Σ>14.

▼In the case of NG, repair or replace the faulty component.

Σ>14. Check of short-circuit between the wire harnesses

1.Check whether the cylinder, whose waveform is clamped at 5V, is short-circuited to the power wire of the sensor system.

NOTE

- The power supply for the sensor system is 5V.

(1) Between ignition coil 1 connection vehicle harness side connector 2 (ICMB1) - body earth

(2) Between ignition coil 2 connection vehicle harness side connector 2 (ICMB2) - body earth

(3) Between ignition coil 3 connection vehicle harness side connector 2 (ICMB3) - body earth

SPECIFIED VALUE: 0V

▼If it is OK, replace the ignition coil and go to Σ>15.

Refer to Page B10-2.

▼In the case of NG, repair or replace the faulty component.

Σ>15. EFI ECU signal recheck (1)

1.Recheck the cylinder, whose waveform is clamped at 5V, under the Σ>8) conditions.

2.Check that the output waveform of the ion current combustion control signal (Channel 2▶) is not clamped at 5V.

SPECIFIED VALUE: The output waveform (Channel 2▶) is not clamped at 5V.

▼If it is OK, finish the troubleshooting.

▼In the case of NG, misfire may have occurred. Identify the cause of the misfire and repair.

Σ>16. Harness, connector check

1.When the following actions are taken to the cylinder whose waveform is unstable , check whether the waveform will change or not.

(1) Lightly shake the connector vertically and laterally.

(2) Lightly shake the wire harness vertically and laterally.

SPECIFIED VALUE: There is no change in the waveform.

2.Perform the following checks.

(1) Connector fitting condition

(2) Loose connection of the connector and the terminal.

SPECIFIED VALUE: No fault.

▼If it is OK, replace the ignition coil and go to Σ>17.

Refer to Page B10-2.

▼In the case of NG, repair or replace the faulty component.

Σ>17. EFI ECU signal recheck (2)

1.Recheck the cylinder, whose waveform is unstable, under the Σ>8) conditions.

2.Check that the output waveform of the ion current combustion control signal (Channel 2▶) is outputted stably.

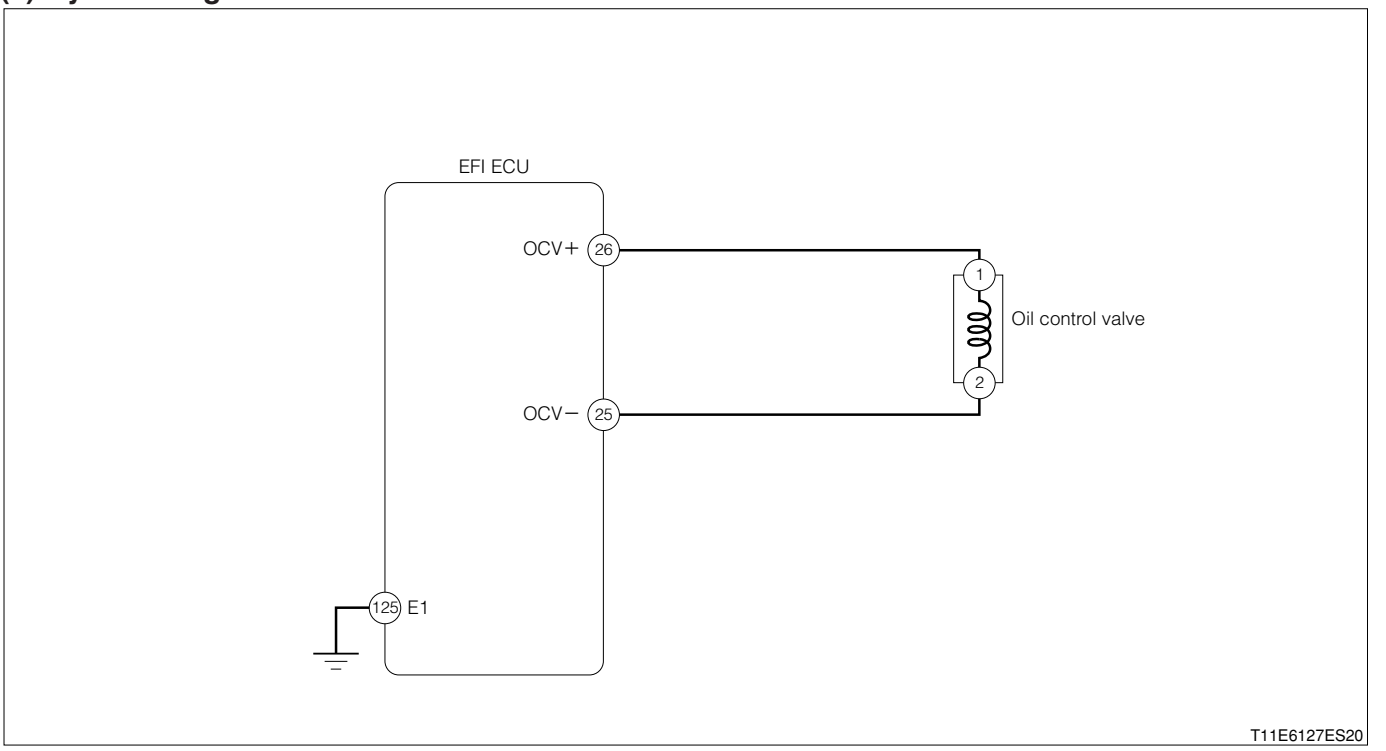
SPECIFIED VALUE: The output waveform (Channel 2▶) is outputted stably.

▼If it is OK, finish the troubleshooting.

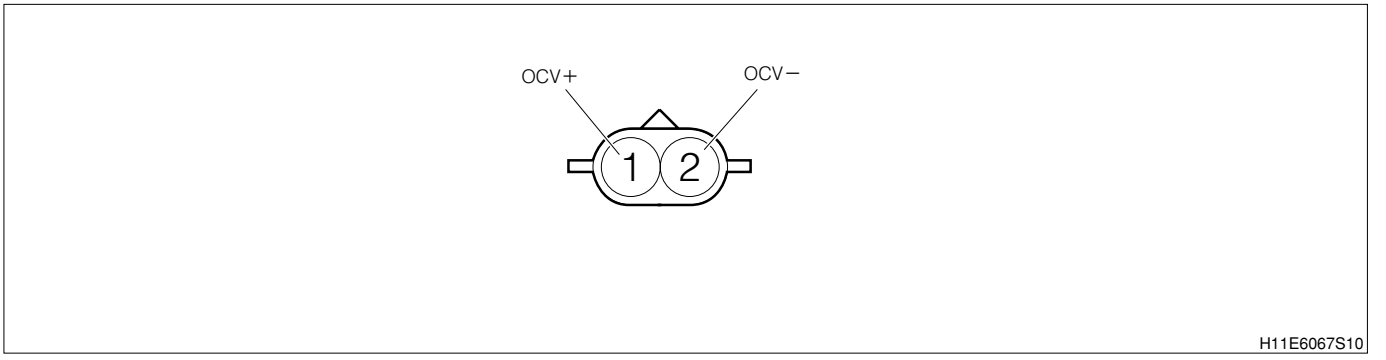
▼In the case of NG, combustion instability may have occurred. Identify the cause of the combustion instability and repair.

7-12-21 DTC NO.P1346/75 VARIABLE VALVE TIMING CONTROL SYSTEM (VALVE TIMING)DTC NO.P1346/75 VARIABLE VALVE TIMING CONTROL SYSTEM (ADVANCED TIMING/RETARDED TIMING)

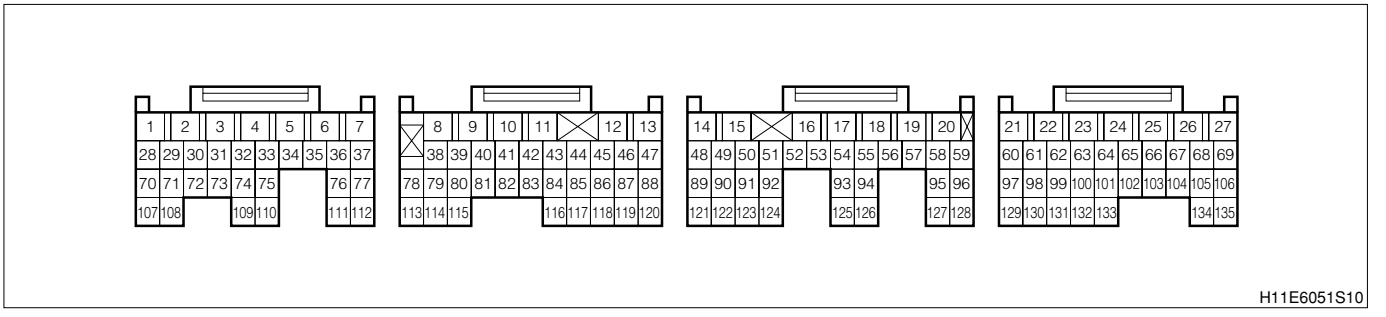
(1) System diagram



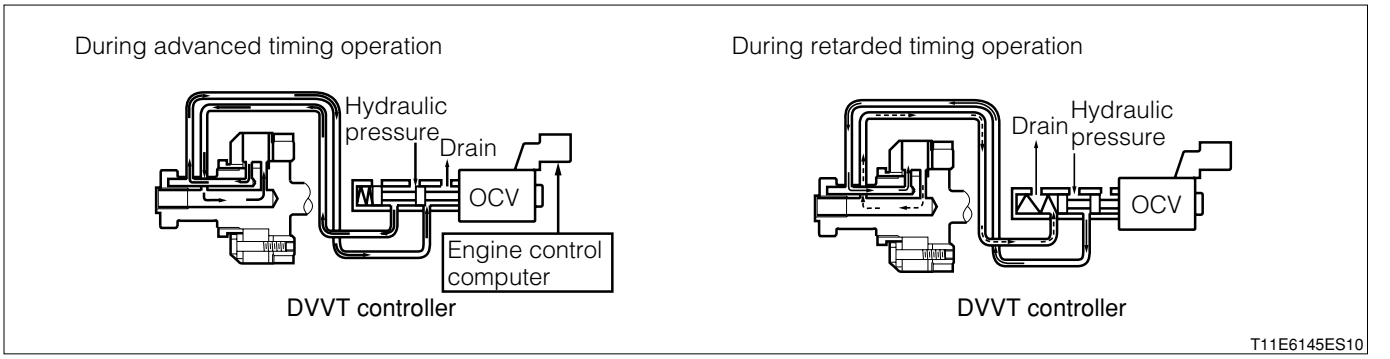
Oil control valve connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Variable valve timing control operation outline



1.The DVVT system controls the intake valve timing to proper timing in response to the driving conditions. The engine ECU controls the OCV (Oil Control Valve) to make the intake valve timing proper. The oil pressure controlled by the OCV is supplied to the DVVT controller, and then, the DVVT controller changes the relative position between the camshaft and the crankshaft.

(3) No.1346/75 output conditions

1.When a valve timing fail of the variable timing is detected

(4) No.P1349/73 output conditions

1.When a valve timing fail of the variable timing is detected

(5) Checking points

1.Is the variable valve timing controller operating normally?
2.Is the variable valve timing controller operating normally?
3.Is the timing deviated between the camshaft drive gear and the camshaft driven gear? (Are the mating marks matched?)

(6) Checking Method

NOTE

- Read the freeze frame data, using the DS-21 diagnosis tester or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

∑>1. Oil control valve operation check

WARNING

- Do not put any flammable material around because sparks may be generated and is dangerous.
- Pay attention for safety since this is an operation during engine operation.

1.Remove the connector of the oil control valve.
2.Start the engine and perform idling.

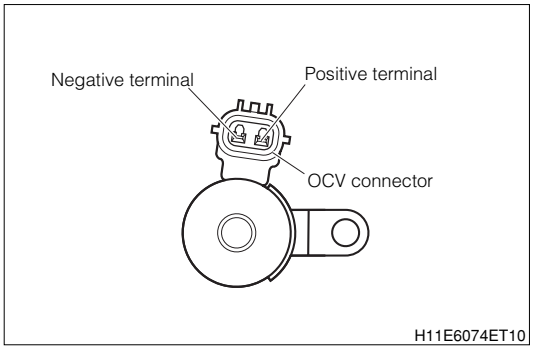
3.Apply the battery voltage to the connector of the oil control valve.

CAUTION

- Do not mistake the voltage polarity.
- Be careful of shorting while operating (As a precaution, install a fuse at the positive side).
- Set the energizing time at one minute or less.

NOTE

- Refer to the right figure for voltage polarity.



4.Confirm the idling condition of the engine.

SPECIFIED VALUE: Rough idling or engine stall takes place.

▼If it is OK, proceed to Σ>2.

▼If it is NG, proceed to Σ>4.

Σ>2. Check of wire harness continuity

1.Stop the engine.

2.Perform continuity check between each of the following terminals.

(1) Between oil control valve connection vehicle harness side connector 1 (OCV+) - ECU connection vehicle harness side connector 26 (OCV+)

(2) Between oil control valve connection vehicle harness side connector 2 OCV−) - ECU connection vehicle harness side connector 25 (OCV−)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ>3.

▼If it is NG, repair the harness and the connectors.

Σ>3. Camshaft gear deviation check

1.Check the deviation between the camshaft drive gear and the camshaft driven gear.

SPECIFIED VALUE: There is no deviation.

▼If it is OK, check the EFI ECU circuit.

Refer to Page A1-24.

▼If it is NG, reassemble the camshaft.

Σ>4. Oil control valve unit check

1.Perform unit check of the oil control valve.

Refer to Page B8-224.

▼If it is OK, proceed to Σ>5.

▼If it is NG, replace the oil control valve.

Refer to Page B8-9.

Σ>5. DVVT actuator unit check

1.Perform unit check of DVVT actuator.

Refer to Page B2-16.

▼If it is OK, proceed to Σ>6.

▼If it is NG, replace the camshaft No.2.

Refer to Page B2-12.

Σ>6. Oil passage check

1.Check the passageway of the engine oil.
SPECIFIED VALUE: There is no clogging.

▼If it is OK, proceed to Σ>7.
▼If it is NG, repair the defective section of the oil passage.

Σ>7. Camshaft gear deviation check

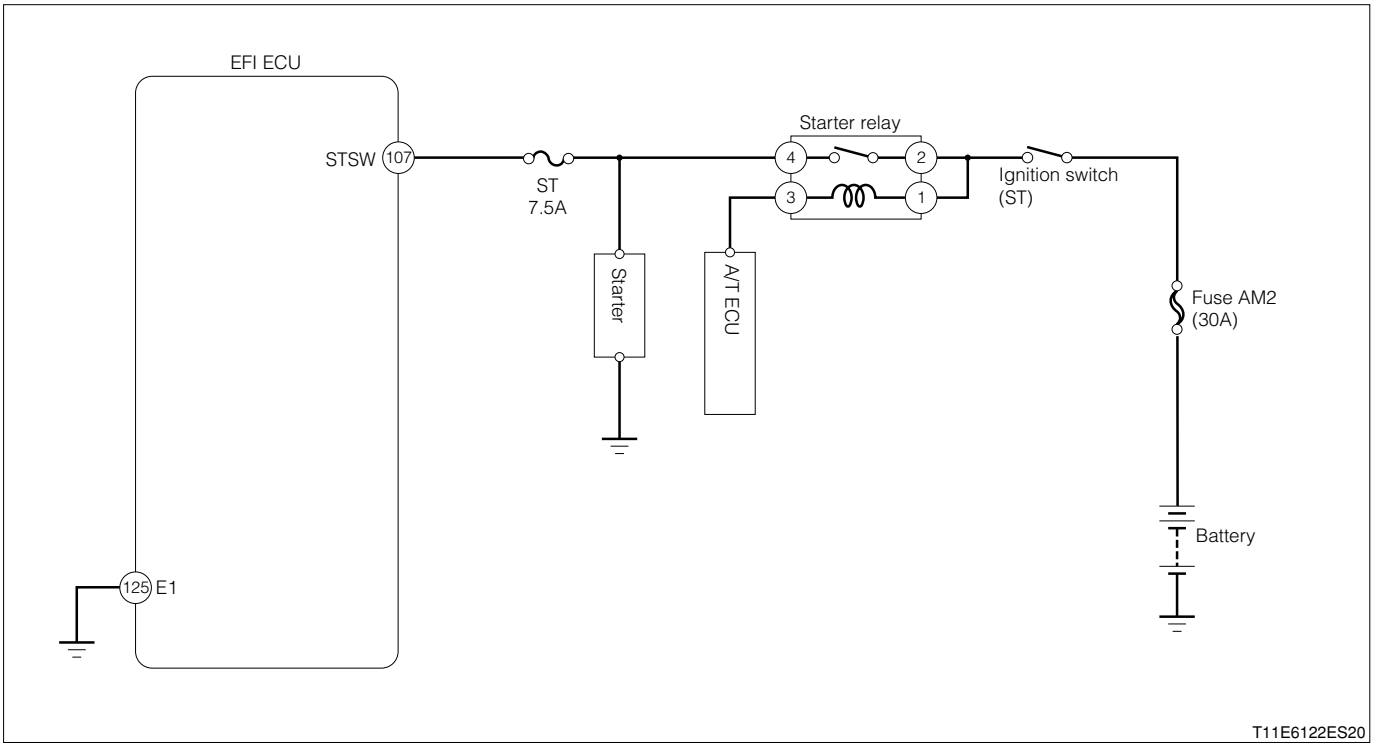
1.Check the deviation between the camshaft drive gear and the camshaft driven gear.
SPECIFIED VALUE: There is no deviation.

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

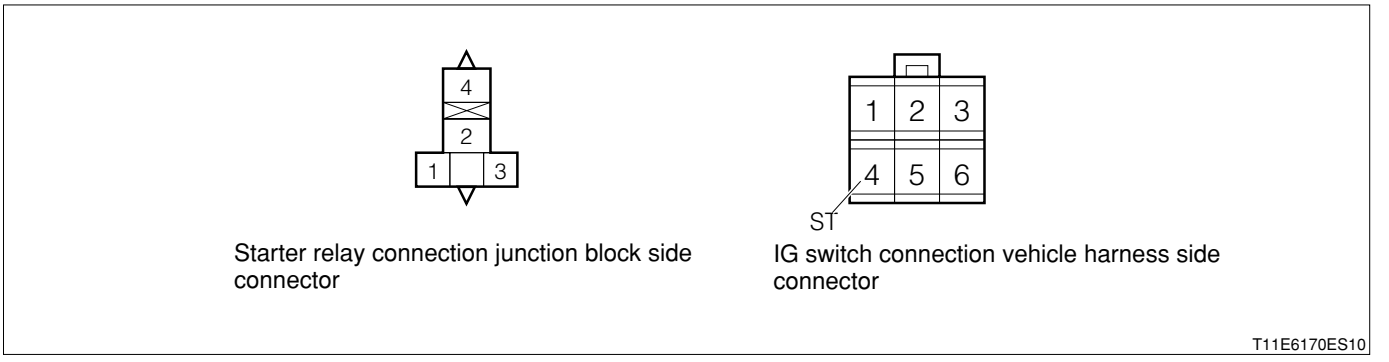
▼If it is NG, reassemble the camshaft.

7-12-22 DTC NO.P1510/54 STARTER SIGNAL SYSTEM MALFUNCTION

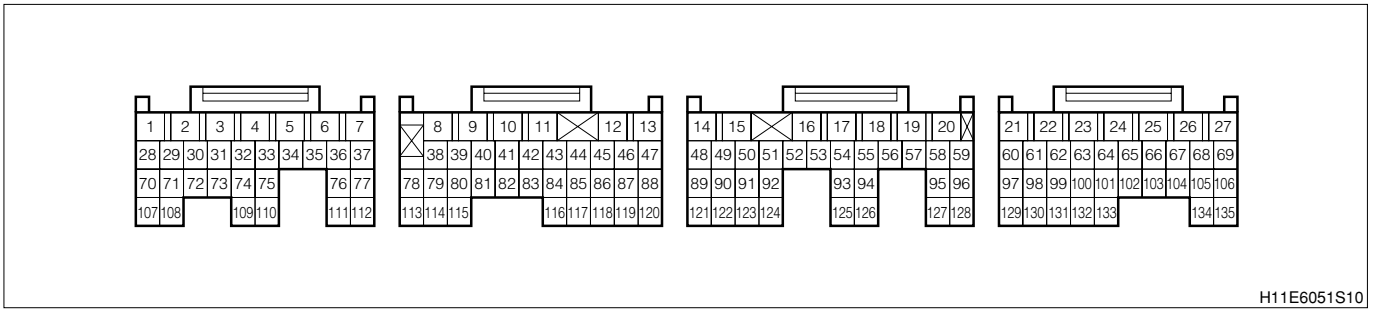
(1) System diagram



IG switch connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Output conditions

1.When there is no "ON" signal even when the engine revolution speed reaches the set value or above when the vehicle speed is 0km/h:

(3) Checking points

1.Is the harness between the starter and EFI ECU normal?

(4) Checking method

Σ1. EFI ECU signal check

1.Connect the SST.
SST: 09842-97209-000

2.Perform voltage measurement between the following terminals during starting.
(1) Between SST 107 (STSW) - SST 125 (E1)
SPECIFIED VALUE: Battery voltage

▼If it is OK, check the EFI ECU circuit.
▼If it is NG, proceed to Σ2.

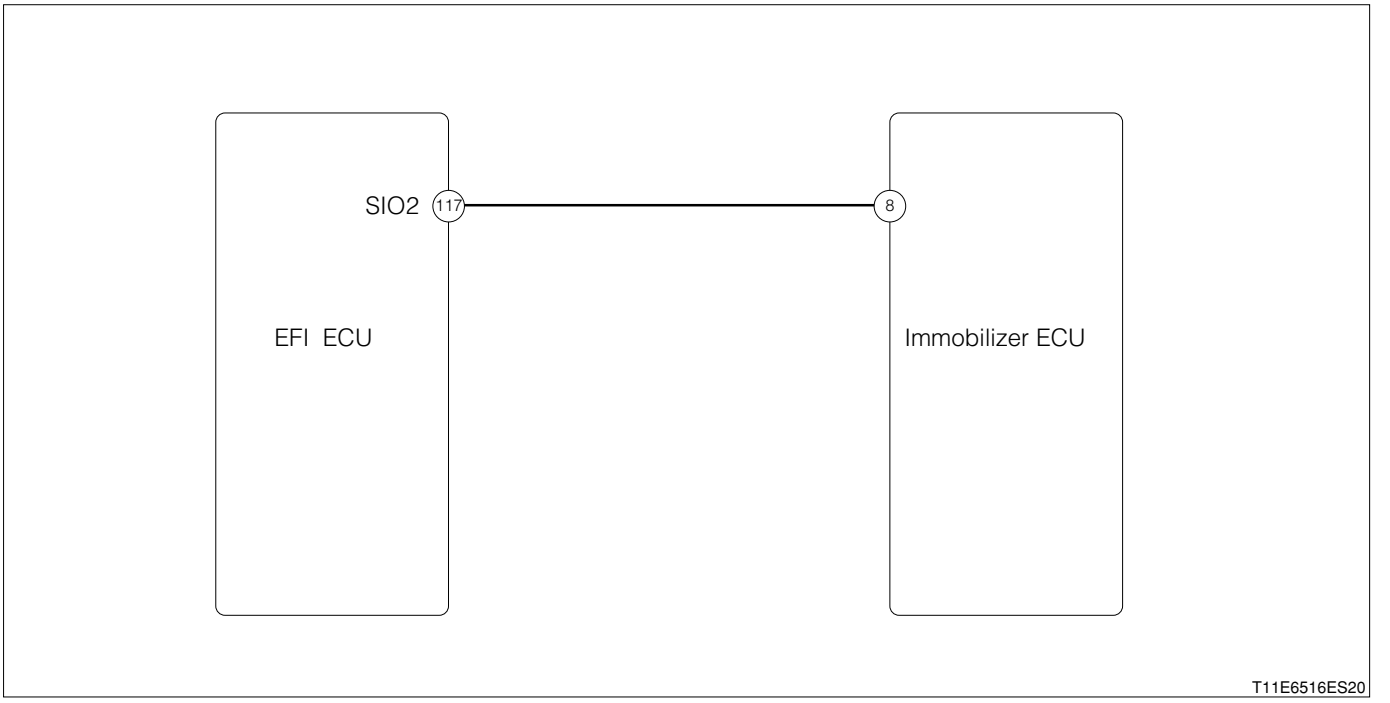
Σ2. Check of wire harness continuity

1.Perform continuity check between each of the following terminals.
(1) Between IG switch side connector 4 (ST) - ECU connection vehicle harness side connector 107 (STSW)
SPECIFIED VALUE: Continuity exists.

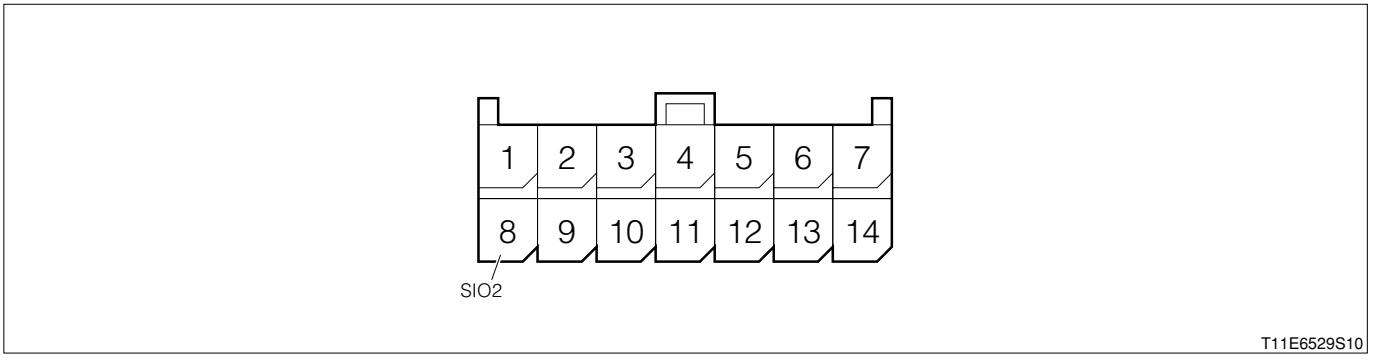
▼If it is OK, check the vehicle speed sensor system.
▼If it is NG, repair the harness and connectors.

7-12-23 DTC NO.P1600/83 IMMOBILIZER SIGNAL CIRCUIT MALFUNCTION

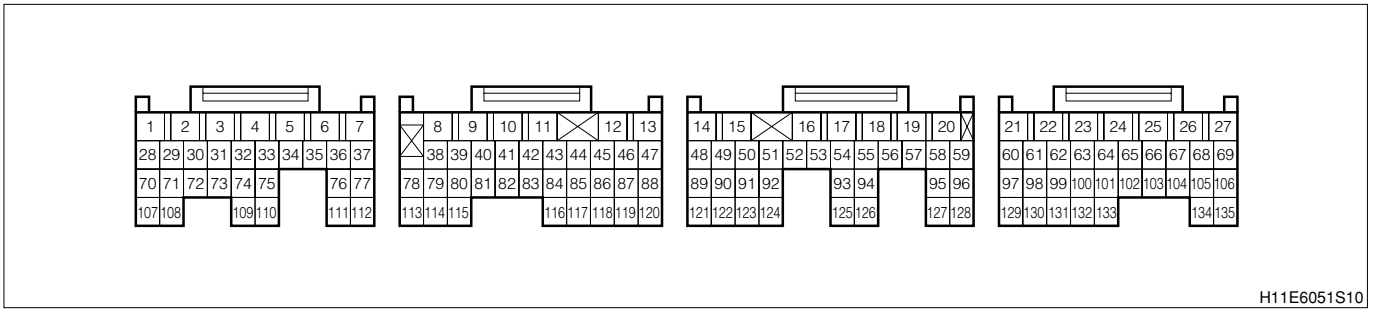
(1) System diagram



Immobilizer ECU wire harness side



EFI ECU wire harness side



(2) Circuit description

1.This circuit performs collation and updating of the rolling code in the communication between the immobilizer ECU and the EFI ECU. The engine can start only when the collation and updating of the rolling code can be done. The rolling code is collated and updated by reading out or writing to non volatile memory (E2PROM) of both ECUs.

(3) Diagnosis code output conditions

1.When the engine starts, the rolling code can not reading out or writing to the EFI ECU.

(4) Trouble area

1.EFI ECU

(5) Inspection procedure

① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

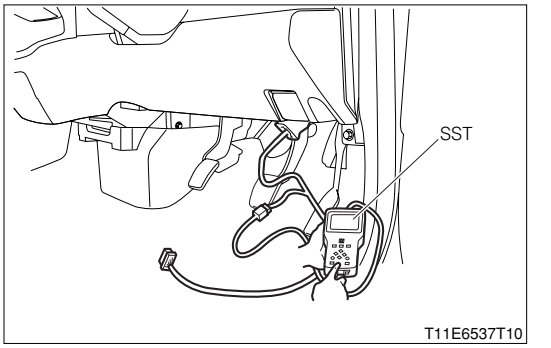
Σ>1. Re-confirmation of DTC.

1.IG switch turned "LOCK".

2.Connect the diagnosis tester to DLC.

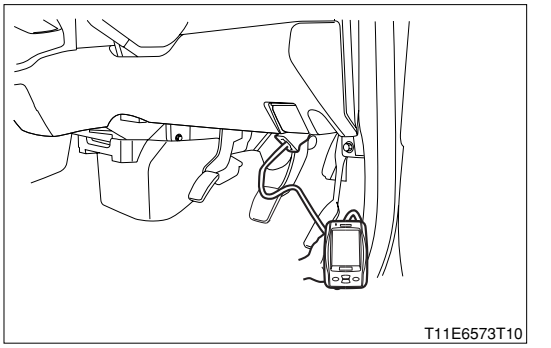
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.

(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.Turn "ON" the IG switch, and turn "ON" the main switch of the tester.

4.Erase the DTC. (As for the operation, follow the instruction manual of the diagnosis tester (DS-21/DS-Ⅱ).)

5.Turn "OFF" the main switch of the tester. Turn "LOCK" the IG switch.

6.Turn "ON" the IG switch. Turn "ON" the main switch of the tester.

7.Check the DTC.

8.Is P1600 indicated ?

▼If the output is made, proceed to Σ>2.

▼If no output is made, proceed to Σ>3.

Σ>2. Wiring harness check

1.Turn "LOCK" the ignition switch.

2.Perform the continuity check between the following terminals.

(1) Between the EFI ECU connection vehicle harness side connector 117 (SIO2) and the immobilizer ECU connection vehicle harness side connector 8 (SIO2)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to Σ>3.

▼If it is NG, repair the defective point.

3. Immobilizer side diagnosis code check

1.Turn "ON" the IG switch. Turn "ON" the main switch of the tester.

2.Check the immobilizer diagnosis code.

▼If no output is made, replace the EFI ECU.

Refer to Page B8-1.

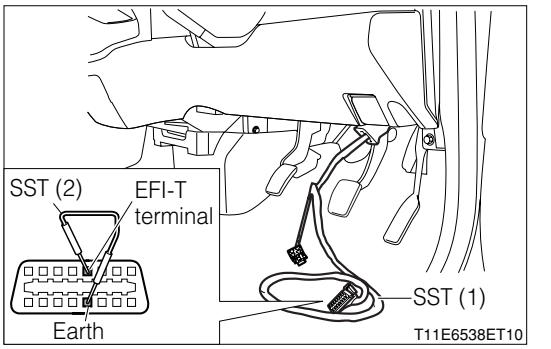
▼If the output is made, check the immobilizer.

Refer to Page I4-31.

② **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

Σ>1. Re-confirmation of DTC.

1.Remove the EFI fuse. Erase the DTC. (As for the erasing method.)
2.Set the EFI fuse to the original position.
3.Short circuit the DLC terminals 5 (EFI-T) and 13 (E), using the SST.
SST: 09991-87404-000(1)
09991-87403-000(2)
4.Turn "ON" the IG switch.
5.Check the DTC. (Read out the flashing pattern of the MIL.)
6.Is "P1600/83" indicated?
▼If the output is made, proceed to Σ>2.
▼If no output is made, proceed to Σ>3.



Σ>2. Wiring harness check

1.Turn "LOCK" the ignition switch.
2.Perform the continuity check between the following terminals.
(1) Between the EFI ECU connection vehicle harness side connector 117 (SIO2) and the immobilizer ECU connection vehicle harness side connector
SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to Σ>3.
▼If it is NG, repair the defective point.

Σ>3. Immobilizer side diagnosis code check

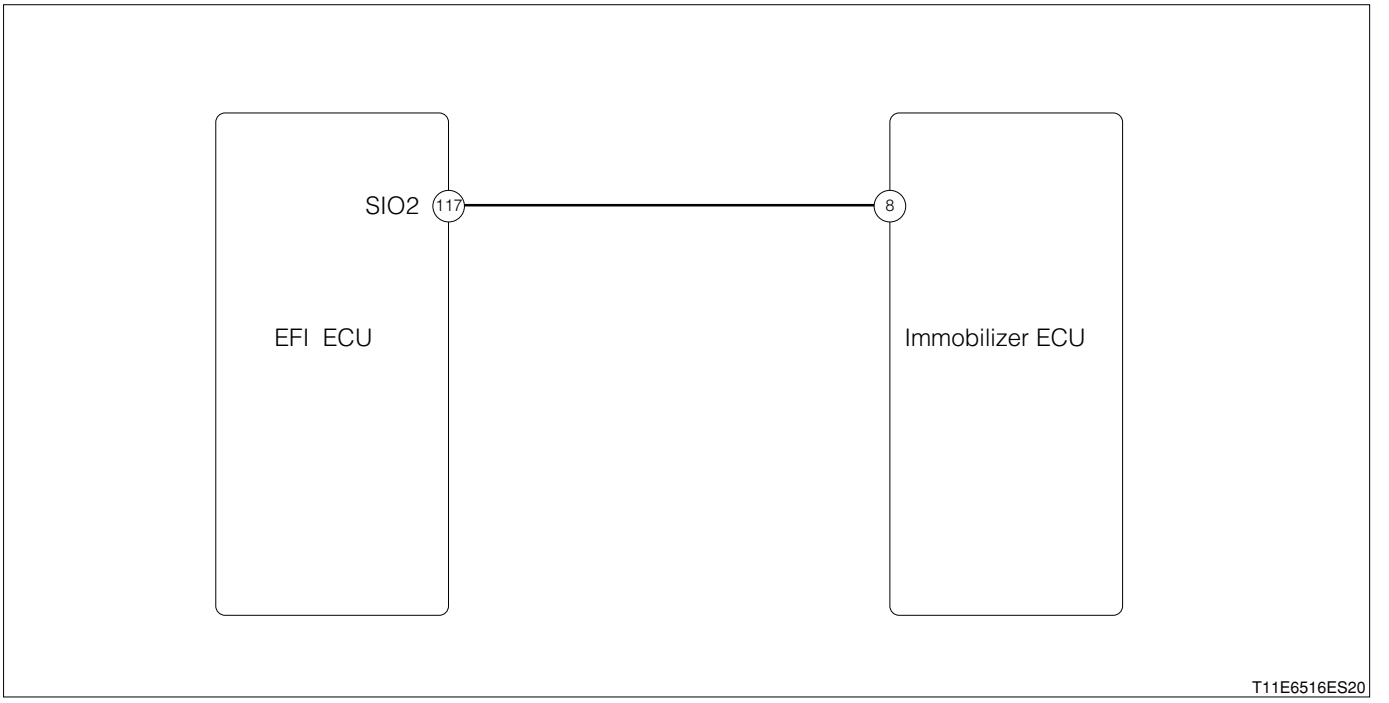
1.Short between the DLC terminals 4 (ECU-T) and 13 (E), using the SST.
SST: 09991-87404-000(1)
09991-87403-000(2)

2.Turn "ON" the IG switch.
3.Is the diagnosis code of the immobilizer outputted?
▼If no output is made, replace the EFI ECU.
Refer to Page B8-1.

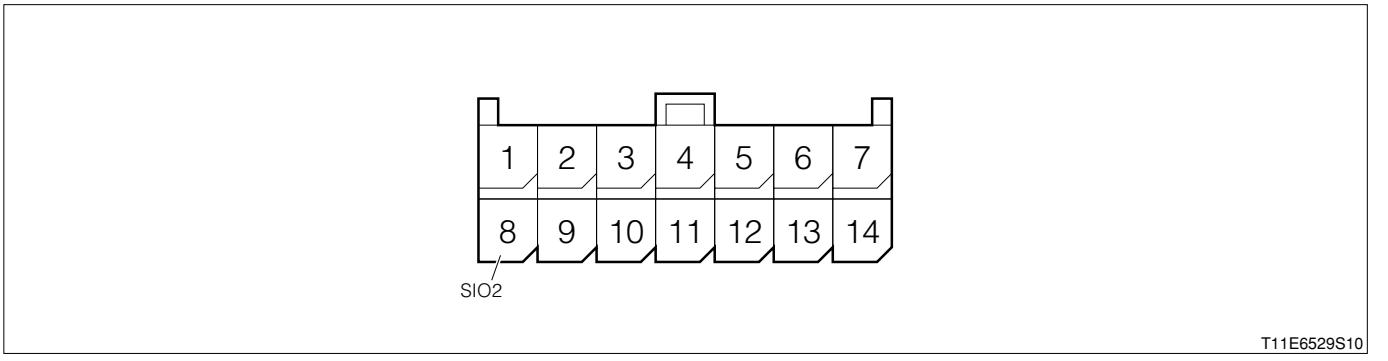
▼If the output is made, check the immobilizer.
Refer to Page I4-31.

7-12-24 DTC NO.P1601/81 IMMOBILIZER SIGNAL MALFUNCTION

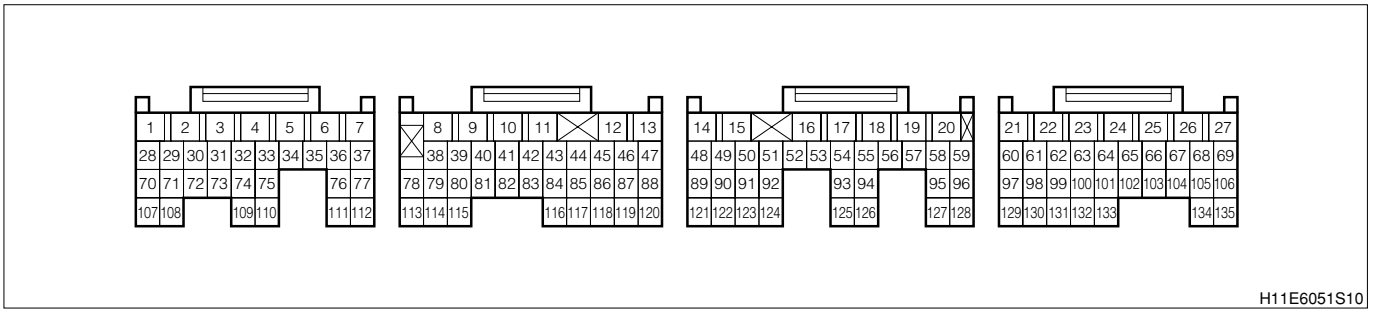
(1) System diagram



Immobilizer ECU wire harness side



EFI ECU wire harness side



(2) Circuit description

1.When the ignition switch is turned "ON", communication starts between the immobilizer ECU and EFI ECU. The engine can start only when the communication between the two ECU is possible and the rolling codes are matched. In order cases, fuel injection and ignition are prohibited, thus making engine starting impossible.

(3) Diagnosis code output conditions

1.When the engine starts, the rolling codes are not matched.

(4) Trouble area

1.Open wire or short circuit for the immobilizer system circuit
2.Immobilizer ECU
3.EFI ECU

(5) Inspection procedure

Σ>1. Wiring harness check

1.Set the SST (Sub-harness). However, the SST connectors at the EFI ECU side should remain disconnected.
SST: 09842-97209-000

2.Disconnect the immobilizer ECU connector.
3.Perform the continuity check between the following terminals with the IG switch set to the "LOCK" position.
(1) Connector 8 (SIO1) at immobilizer ECU harness side - SST terminal 117 (SIO1).
SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to Σ>2.
▼If it is NG, repair or replace the harness or connector.

Σ>2. Check of immobilizer system (1).

1.Connect the connector of the immobilizer ECU.
2.Replace the EFI ECU with a new one. Connect the SST connector to the EFI ECU.
3.Start the engine with the master key.
SPECIFIED VALUE: The engine starts.

▼If it is OK, check or replace the EFI ECU.
▼If it is NG, go to Σ>3.

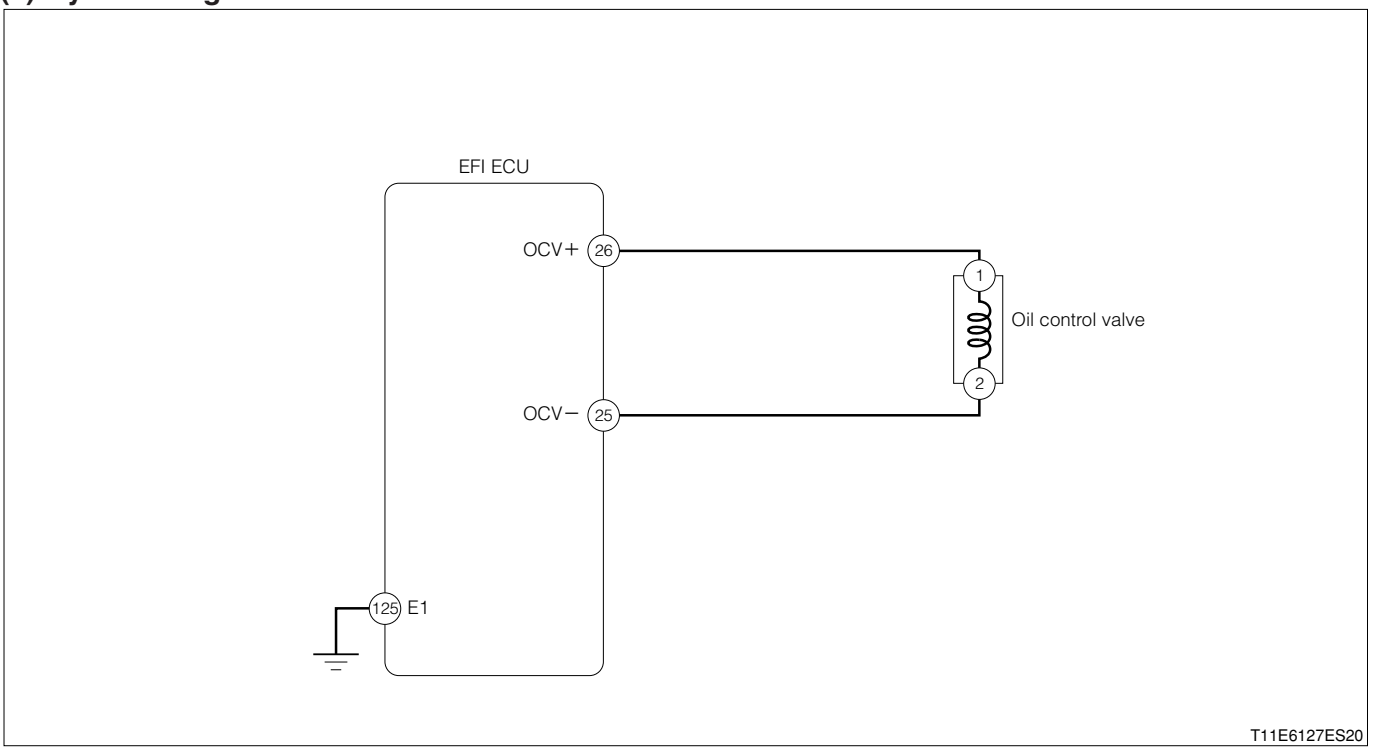
Σ>3. Check of immobilizer system (2).

1.Replace the immobilizer ECU with a new one, with the IG switch turned "LOCK".
2.Start the engine with the master key.
SPECIFIED VALUE: The engine starts.

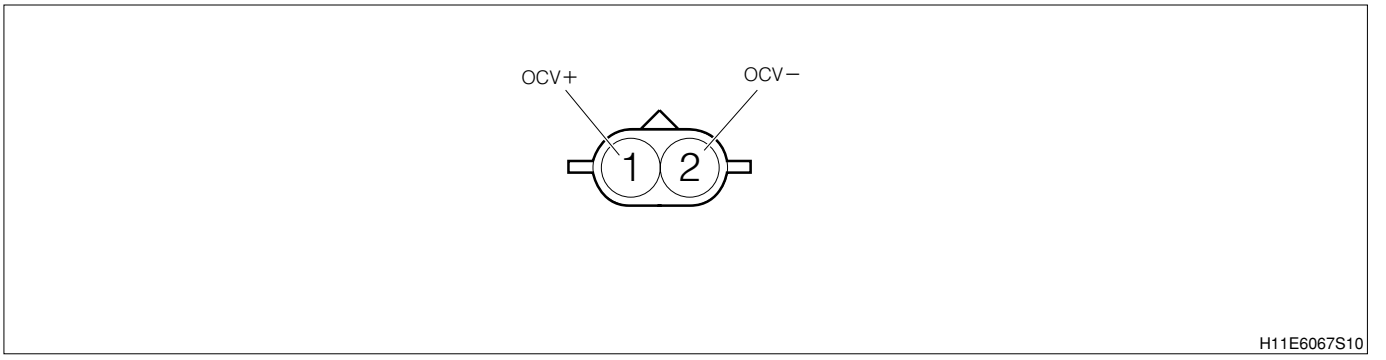
▼If it is OK, check the IG key, antenna coil, etc. (Refer to section "BODY ELECTRICAL SYSTEM".)
▼If it is NG, check or replace the immobilizer ECU. (Refer to section "BODY ELECTRICAL SYSTEM".)
Refer to Page I4-29.

7-12-25 DTC NO.P1656/74 OIL CONTROL VALVE CONTROL SYSTEM MALFUNCTION

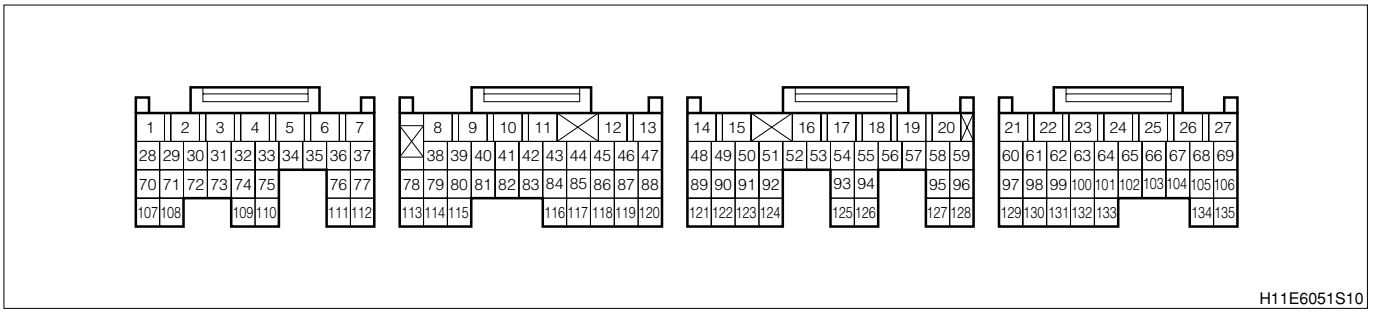
(1) System diagram



Oil control valve connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Diagnosis code output conditions

1.When, under a condition where the battery voltage is 12V or more, one of the following conditions is continued over a certain length of time

(1) When the output duty ratio is 99% or more and the oil control valve voltage is below the evaluation specified value

(2) When the output duty ratio is 0% and the oil control valve voltage is the evaluation specified value or more

(3) Checking points

1.Is the control signal of the oil control valve outputted normally from the EFI ECU?
2.Is the harness between the oil control valve and the EFI ECU normal?

(4) Checking Method

Σ>1. Oil control valve operation check

WARNING

- Do not put any combustible in the surrounding area, for sparks are occurring and there are fire potentials.
- This is an operation to be made while the engine is running. Special care must be exercised for the safety.

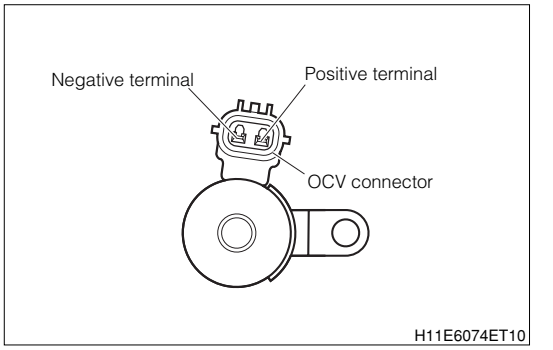
1.Disconnect the oil control valve connector.
2.Start the engine and perform an idling operation.
3.Apply the battery voltage to the oil control valve connector.

CAUTION

- Do not mistake the voltage polarity.
- Pay utmost attention as for a short during the operation. (Put a fuse at the plus side as a precautionary measure.)
- Make sure that the energizing time should be within one minute.

NOTE

- For the voltage polarity, refer to the right figure.



4.Confirm the engine idling condition.
SPECIFIED VALUE: Rough idling or engine stalling occurs.
▼If it is YES, go to Σ>2.
▼If it is NG, replace the oil control valve.
Refer to Page B8-9.

Σ>2. Oil control valve voltage check

1.Stop the engine and set the IG switch to the "LOCK" position.
2.Connect the SST.
SST: 09842-97209-000

3.Turn "ON" the ignition switch.
4.Check the voltage between the following terminals.
(1) Between SST 25 (OCV−) and SST 26 (OCV+)
SPECIFIED VALUE: Battery voltage

▼If it is OK, go to Σ>3.
▼If it is NG, check the EFI ECU circuit.
Refer to Page A1-24.

Σ>3. Check of wire harness continuity

1.With the IG switch turned "LOCK", disconnect the SST connector from the ECU.

2.Perform continuity check between the following terminals.

(1) Between the oil control valve connection vehicle harness side connector 1 (OCV+) and the ECU connection vehicle harness side connector 26 (OCV+)

(2) Between the oil control valve connection vehicle harness side connector 2 (OCV−) and the ECU connection vehicle harness side connector 25 (OCV−)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, check the EFI ECU circuit.

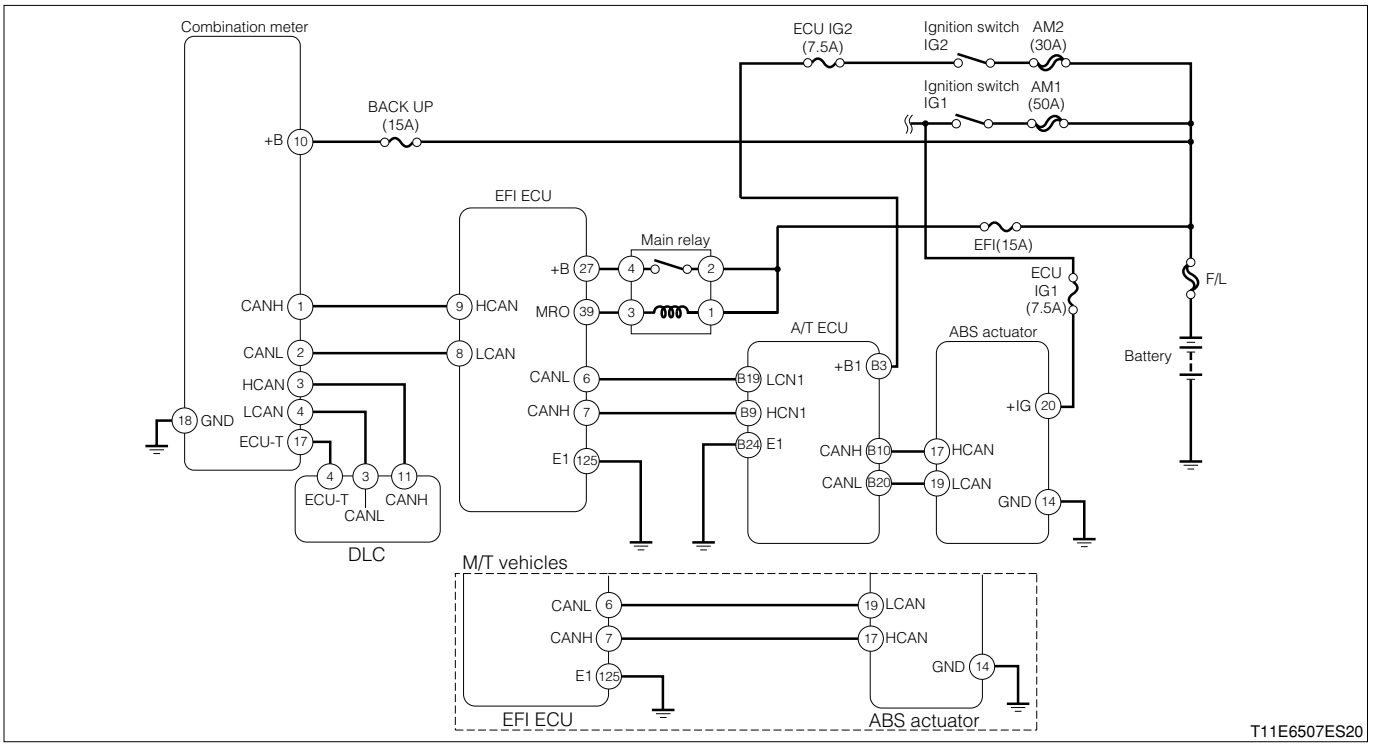
Refer to Page A1-24.

▼If it is NG, repair the harness and connector.

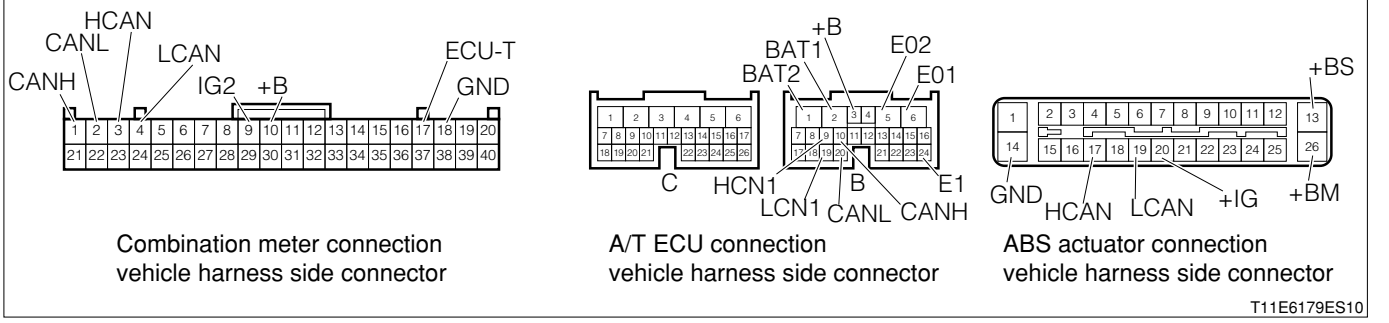
7-12-26 DTC NO.U0121/86 ABS COMMUNICATION FAILURE

(1) System diagram

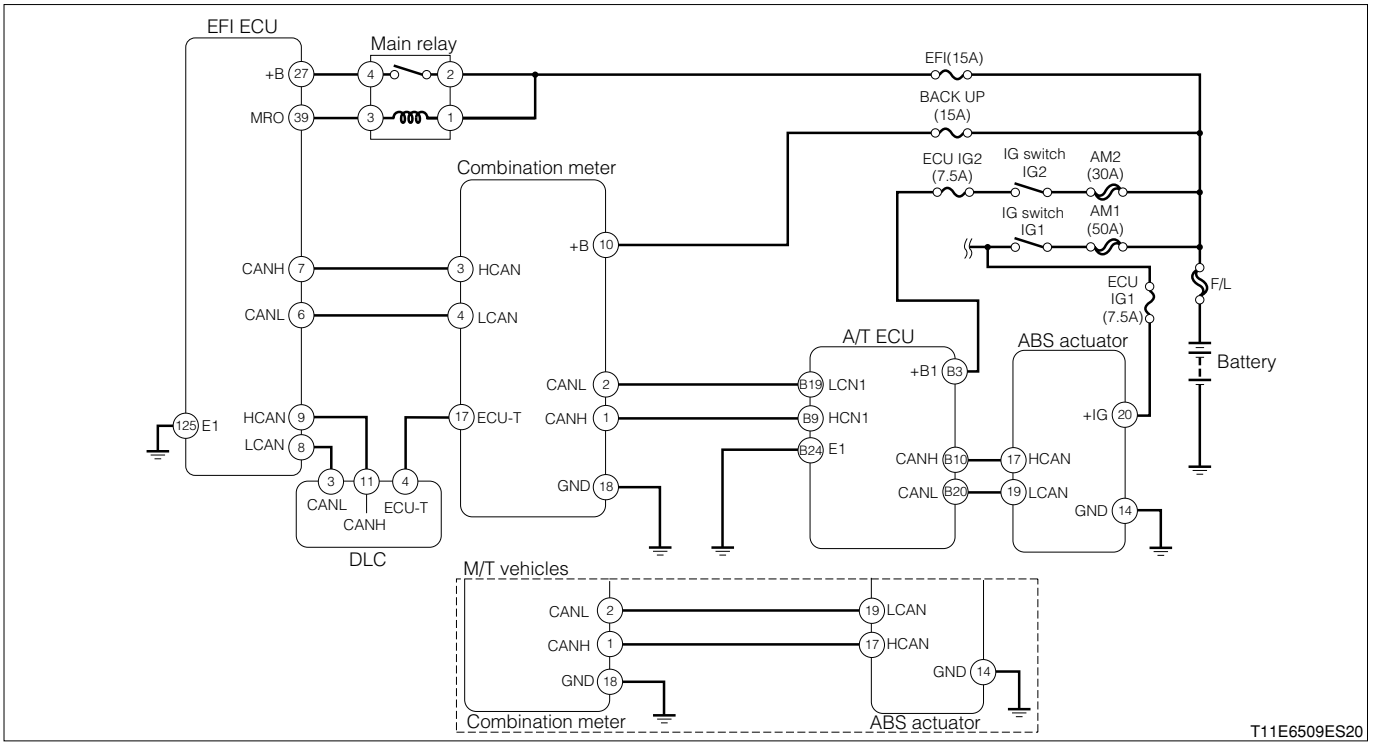
① RHD vehicles



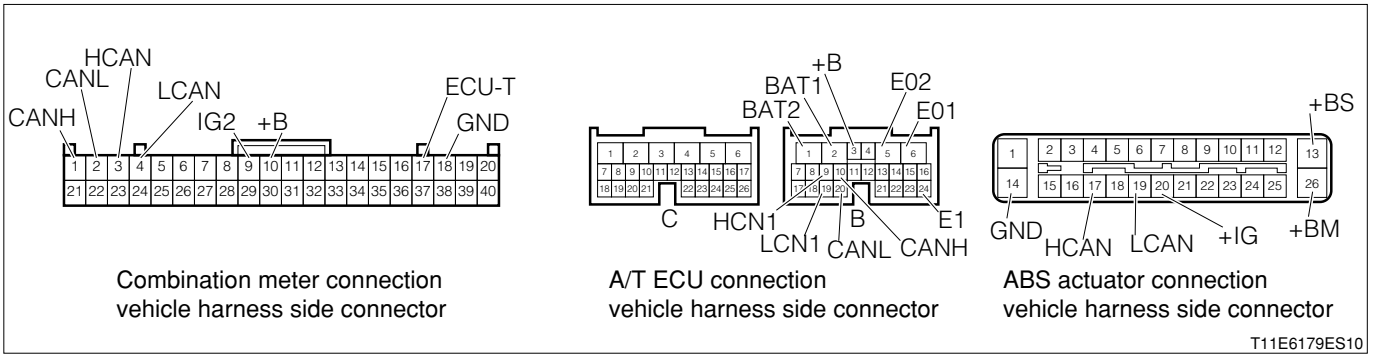
Each unit, relays connection vehicle harness side connector



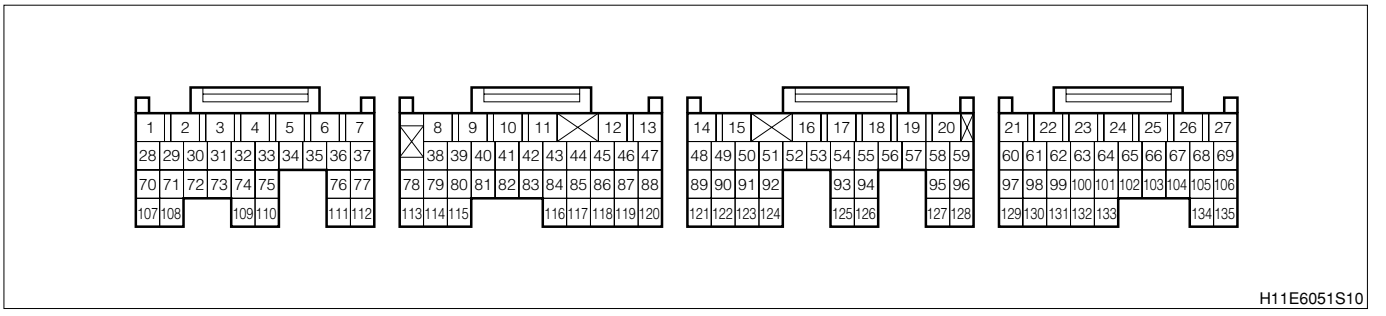
② **LHD vehicles**



Each unit, relays connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Diagnosis code output conditions

1.When communication signal cannot be received from ABS ECU

(3) Checking points

1.Is the harness between EFI ECU - ABS ECU normal?

2.Is the ABS actuator normal?

3.Check whether there is any poor contact at the connector section.

(4) Checking method

① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

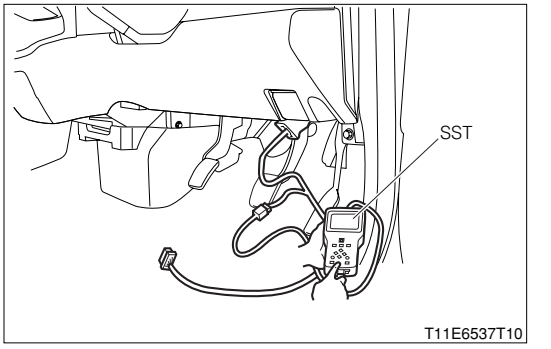
Σ>1. Diagnosis code confirmation (ABS related)

1.IG switch turned "LOCK".

2.Connect the diagnosis tester to DLC.

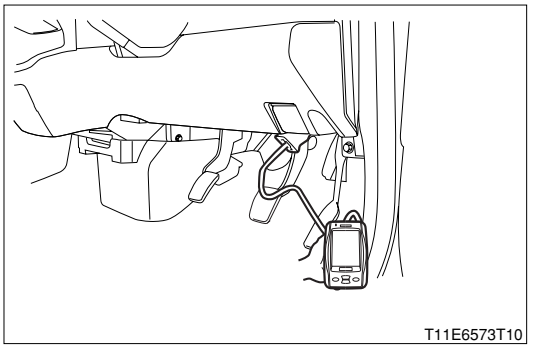
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.

(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.Check to see if the diagnosis code of the ABS is outputted (No.C0200/21 - No.C0215/24: short circuit or open wire of wheel speed sensor, No.C1235/25 - No.C1238/28: period abnormality of wheel speed sensor, No.C1237/29: Rotor tooth missing abnormality)

▼If it is outputted, proceed to Σ>2.

▼If it is not outputted, proceed to Σ>4.

Σ>2. Trouble shooting according to diagnosis code (ABS related)

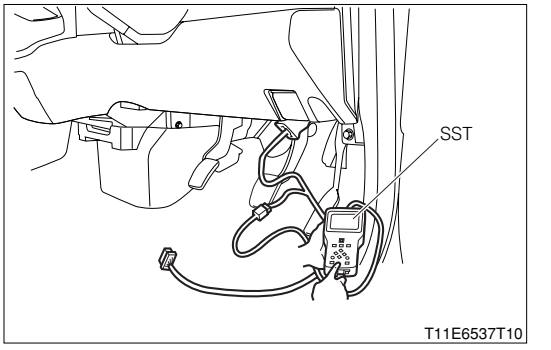
1.Perform trouble shooting for the diagnosis code outputted in Σ>1.

Refer to Page E3-26.

2.After completion of the repairs, connect the diagnosis tester to DLC.

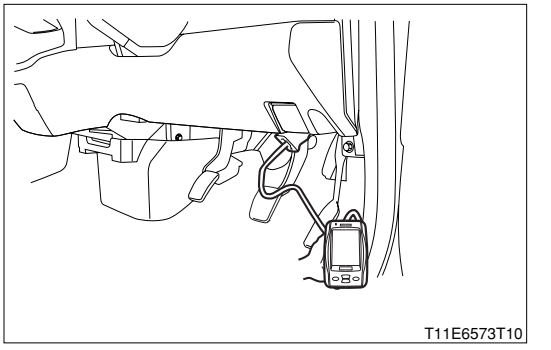
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.

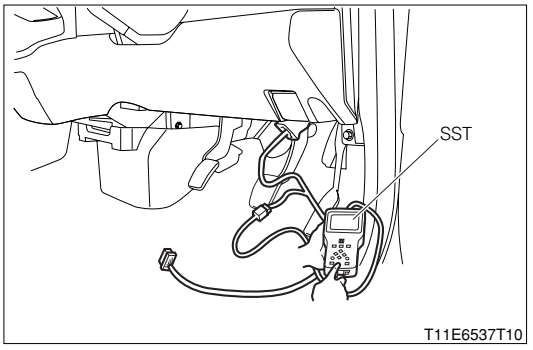
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



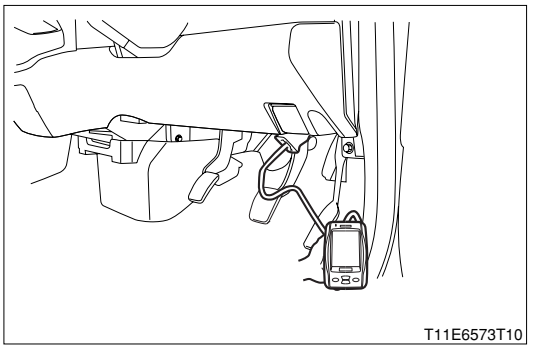
3.Confirm that the diagnosis code of ABS is not outputted.
▼If it is not outputted, proceed to Σ>3.
▼If it is outputted, perform recheck for the diagnosis code outputted.

Σ>3. Diagnosis code reconfirmation (EFI related)

1.Connect the diagnosis tester to DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



2.Cancel the diagnosis code of the EFI.
3.Check to see if the diagnosis code of EFI is outputted.
SPECIFIED VALUE: It is not outputted.

▼If it is OK, the EFI system is normal.
▼If it is NG, proceed to Σ>4.

Σ>4. CAN communication basic check

1.Perform basic check of the CAN communication.
Refer to Page L2-14.

▼If it is OK, go to Σ>5 for RHD vehicles.
▼If it is OK, go to Σ>6 for LHD vehicles.
▼If it is NG, repair or replace the defective sections.

Σ>5. CAN line open wire check (RHD vehicles)

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the EFI ECUand ABS actuator.
3.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)
(2) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - ABS actuator connection vehicle harness side connector 19 (LCAN)
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>7.
▼If it is NG, repair or replace the defective sections.

Σ>6. CAN line open wire check (LHD vehicles)

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the EFI ECU, combination meter and ABS actuator.
3.Perform continuity check between each of the following terminals.
(1) Between combination meter connection vehicle harness side connector 1 (CANH) - combination meter connection vehicle harness side connector 2 (CANL)
(2) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - ABS actuator connection vehicle harness side connector 19 (LCAN)
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>7.
▼If it is NG, repair or replace the defective sections.

Σ>7. CAN line short circuit check

1.Perform continuity check between each of the following terminals.
(1) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - battery positive terminal
(2) Between ABS actuator connection vehicle harness side connector 19 (LCAN) - battery positive terminal
(3) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - body earth
(4) Between ABS actuator connection vehicle harness side connector 19 (LCAN) - body earth
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>8.
▼If it is NG, repair or replace the defective sections.

Σ>8. EFI ECU internal resistance check

1.Remove all connectors of the EFI ECU.
2.Measure the resistance between the following terminals.
(1) Between EFI ECU side connector 6 (CANL) - EFI ECU side connector 7 (CANH)
(2) Between EFI ECU side connector 8 (LCAN) - EFI ECU side connector 9 (HCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to Σ>9.
▼If it is NG, replace the EFI ECU.
Refer to Page B8-1.

Σ>9. Combination meter internal resistance check

1.Remove the connectors of the combination meter.
2.Measure the resistance between the following terminals.
(1) Between combination meter side connector 1 (CANH) - combination meter side connector 2 (CANL)
(2) Between combination meter side connector 3 (HCAN) - combination meter side connector 4 (LCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to Σ>10.
▼If it is NG, replace the combination meter.
Refer to Page J3-3.

Σ10. ABS actuator internal circuit check

1.Remove the connectors of the ABS actuator.

2.Perform continuity check between each of the following terminals.

(1) Between ABS actuator side connector 17 (HCAN) - ABS actuator side connector 19 (LCAN)

SPECIFIED VALUE: Continuity exists. (Less than 1MΩ)

▼If everything is OK, perform the circuit check of the combination meter, EFI ECU and ABS actuator.

▼If it is NG, replace the ABS actuator.

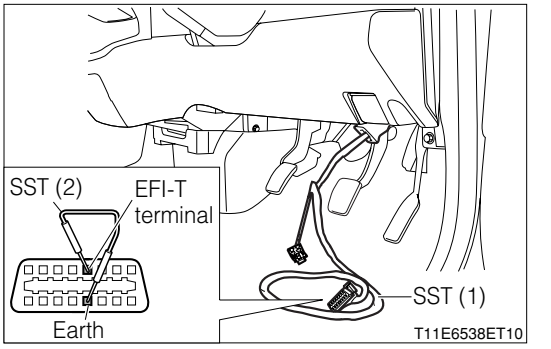
Refer to Page E3-1.

② When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

Σ>1. Diagnosis code confirmation (ABS related)

1.Short-circuit the terminals 4 (ECU-T) and 13 (E) of the DLC, using the SST.
SST: 09991-87404-000(1)
09991-87403-000(2)

2.Check to see if the diagnosis code of the ABS is outputted (No.C0200/21 - No.C0215/24: short circuit or open wire of wheel speed sensor, No.C1235/25 - No.C1239/28: period abnormality of wheel speed sensor, No.C1237/29: Rotor tooth missing abnormality)



NOTE
- Refer to the diagnosis code output indication method of ABS.

Refer to Page E3-19.

▼If it is outputted, proceed to Σ>2.
▼If it is not outputted, proceed to Σ>4.

Σ>2. Trouble shooting according to diagnosis code (ABS related)

1.Perform trouble shooting for the diagnosis code outputted in Σ>1.
Refer to Page E3-28.

2.After repairing, short-circuit the terminals 4 (ECU-T) and 13 (E) of the DLC, using the SST.
SST: 09991-87404-000(1)
09991-87403-000(2)

3.Confirm that the diagnosis code of ABS is not outputted.
▼If it is not outputted, proceed to Σ>3.
▼If it is outputted, perform recheck for the diagnosis code outputted.

Σ>3. Diagnosis code reconfirmation (EFI related)

1.Cancel the diagnosis code of the EFI.
2.After canceling, short-circuit the terminals 5 (EFI-T) and 13 (E) of the DLC, using SST.
SST: 09991-87404-000(1)
09991-87403-000(2)

3.Check to see if the diagnosis code of EFI is outputted.
SPECIFIED VALUE: It is not outputted.

▼If it is OK, the EFI system is normal.
▼If it is NG, proceed to Σ>4.

Σ>4. CAN communication basic check

1.Perform basic check of the CAN communication.
Refer to Page L2-14.

▼If it is OK, go to Σ>5 for RHD vehicles.
▼If it is OK, go to Σ>7 for LHD vehicles.
▼If it is NG, repair or replace the defective sections.

Σ>5. CAN line open wire check (RHD vehicles)

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the EFI ECU, combination meter and ABS actuator.
3.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)
(2) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - ABS actuator connection vehicle harness side connector 19 (LCAN)
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>7.
▼If it is NG, repair or replace the defective sections.

Σ>6. CAN line open wire check (LHD vehicles)

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the EFI ECU, combination meter and ABS actuator.
3.Perform continuity check between each of the following terminals.
(1) Between combination meter connection vehicle harness side connector 6 (CANL) - combination meter connection vehicle harness side connector 7 (CANH)
(2) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - ABS actuator connection vehicle harness side connector 19 (LCAN)
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>7.
▼If it is NG, repair or replace the defective sections.

Σ>7. CAN line short circuit check

1.Perform continuity check between each of the following terminals.
(1) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - battery positive terminal
(2) Between ABS actuator connection vehicle harness side connector 19 (LCAN) - battery positive terminal
(3) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - body earth
(4) Between ABS actuator connection vehicle harness side connector 19 (LCAN) - body earth
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>8.
▼If it is NG, repair or replace the defective sections.

Σ>8. EFI ECU internal resistance check

1.Remove all connectors of the EFI ECU.
2.Measure the resistance between the following terminals.
(1) Between EFI ECU side connector 6 (CANL) - EFI ECU side connector 7 (CANH)
(2) Between EFI ECU side connector 8 (LCAN) - EFI ECU side connector 9 (HCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to Σ>9.
▼If it is NG, replace the EFI ECU.
Refer to Page B8-1.

Σ9. Combination meter internal resistance check

1.Remove the connectors of the combination meter.

2.Measure the resistance between the following terminals.

(1) Between combination meter side connector 1 (CANH) - combination meter side connector 2 (CANL)

(2) Between combination meter side connector 3 (HCAN) - combination meter side connector 4 (LCAN)

SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to Σ10.

▼If it is NG, replace the combination meter.

Refer to Page J3-3.

Σ10. ABS actuator internal circuit check

1.Remove the connectors of the ABS actuator.

2.Perform continuity check between each of the following terminals.

(1) Between ABS actuator side connector 17 (HCAN) - ABS actuator side connector 19 (LCAN)

SPECIFIED VALUE: Continuity exists. (less than 1MΩ)

▼If everything is OK, perform the circuit check of the combination meter, EFI ECU and ABS actuator.

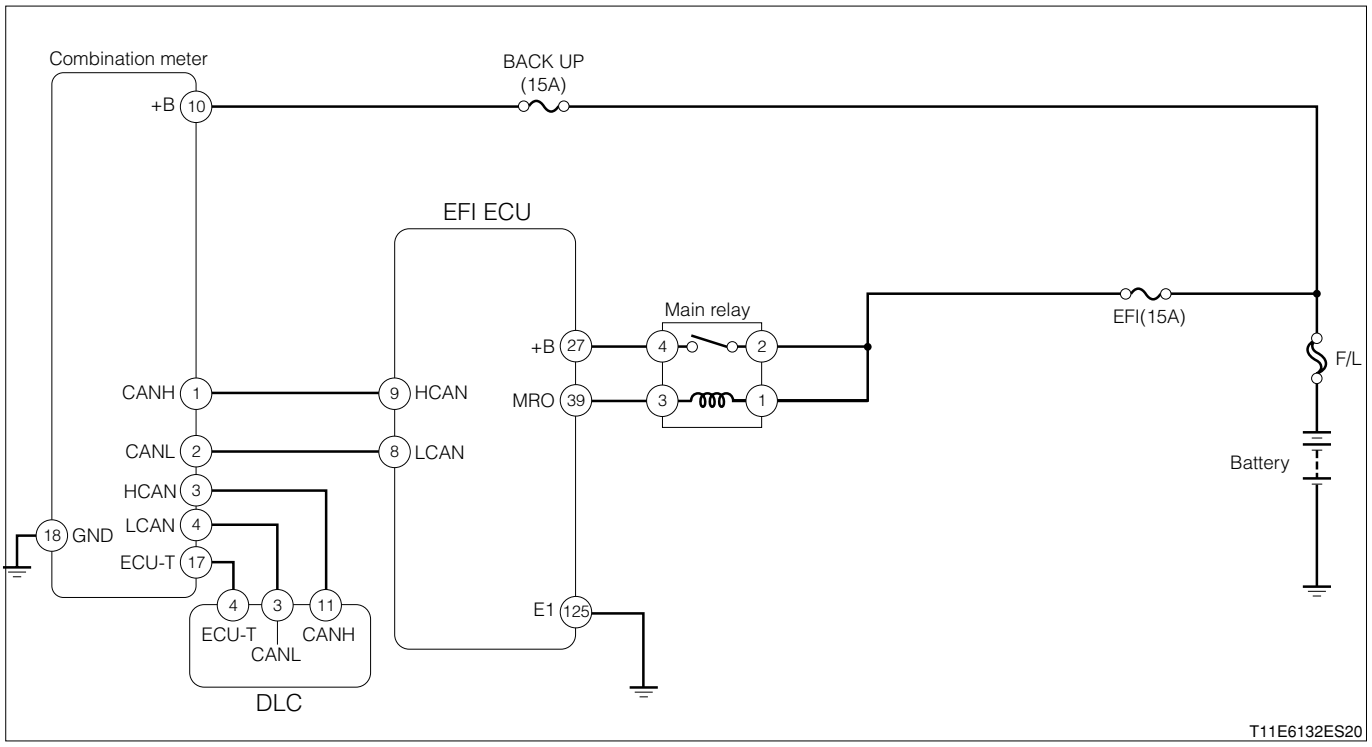
▼If it is NG, replace the ABS actuator.

Refer to Page E3-1.

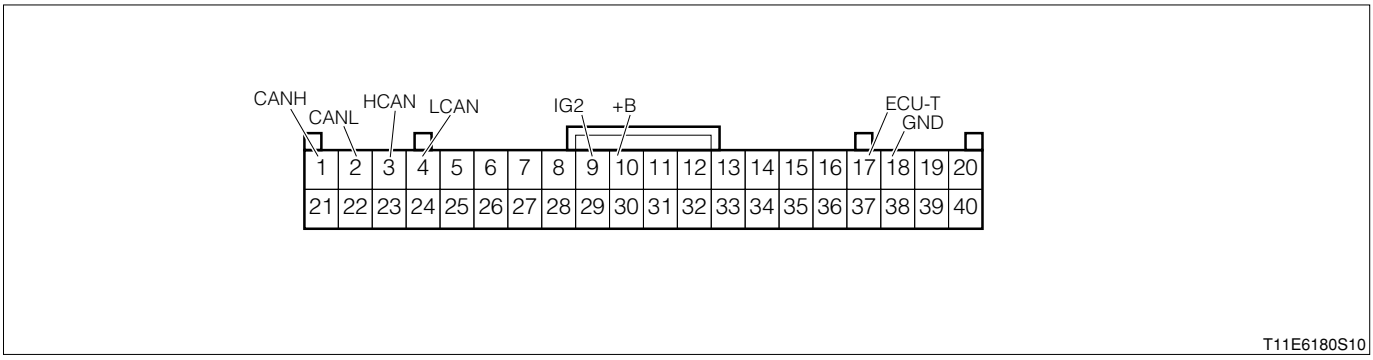
7-12-27 DTC NO.U0156/87 COMBINATION METER COMMUNICATION FAILURE

(1) System diagram

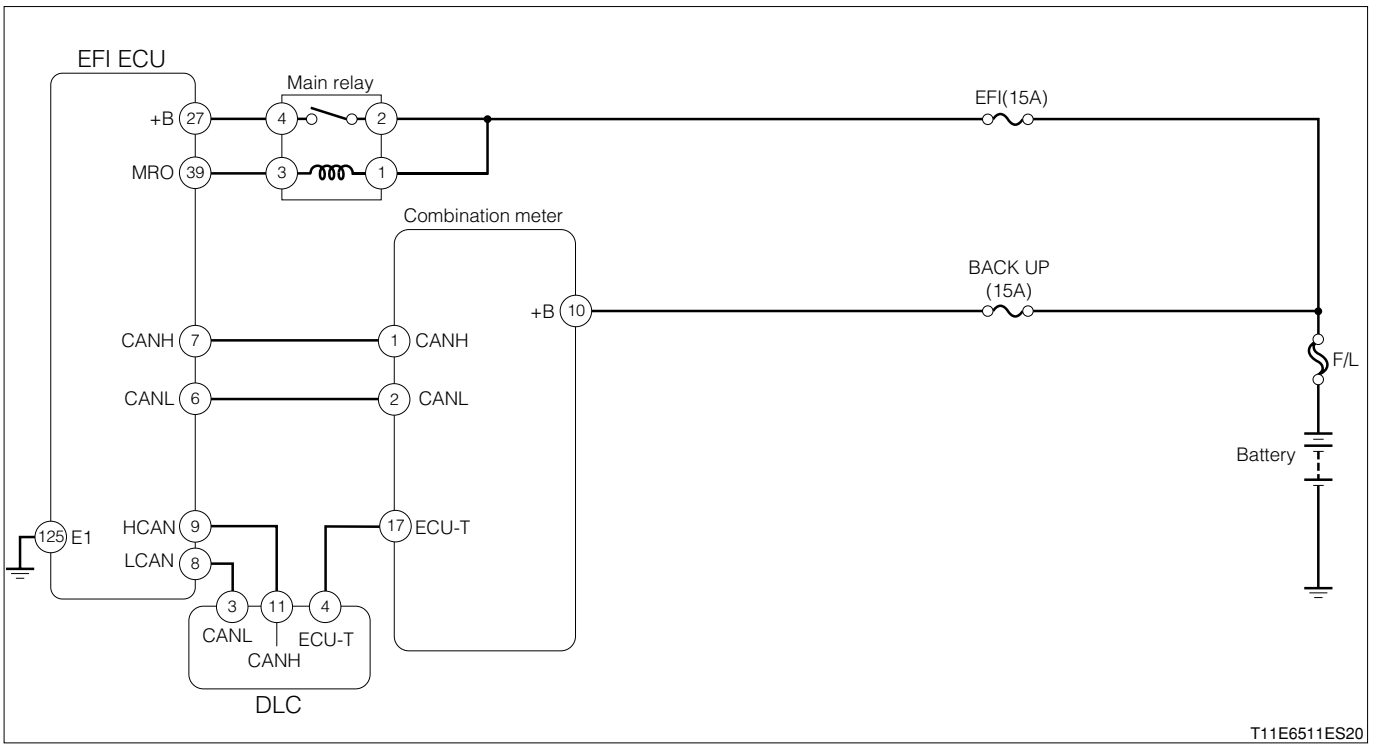
① RHD vehicles



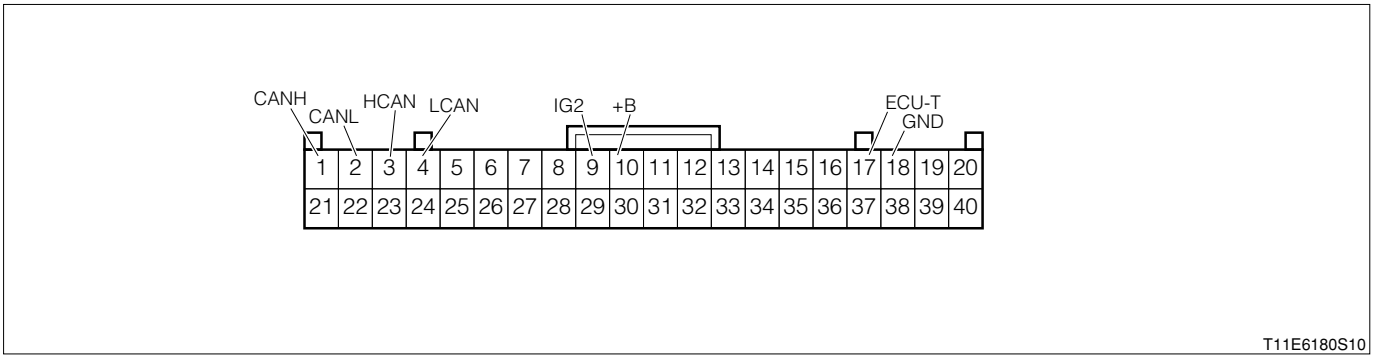
Each unit, relays connection vehicle harness side connector



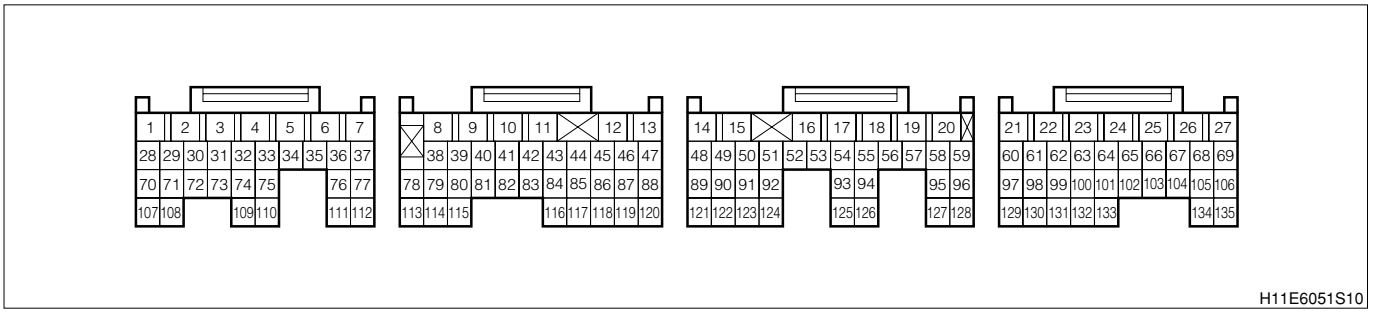
② **LHD vehicles**



Each unit, relays connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Diagnosis code output conditions

1.When communication signal cannot be received from combination meter

(3) Checking points

1.Is the harness between EFI ECU - combination meter normal?

2.Is the combination meter normal?

3.Check whether there is no poor contact at the connector section.

(4) Checking method

① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

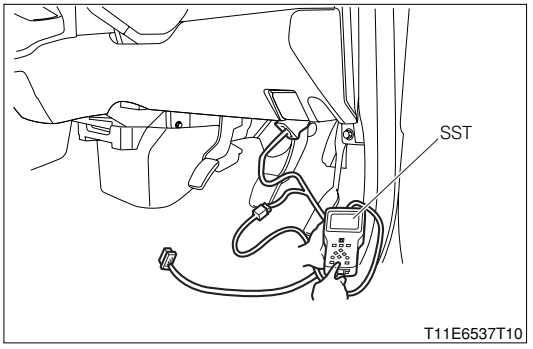
Σ>1. Confirmation of the diagnosis codes (related to meter)

1.IG switch turned "LOCK".

2.Connect the diagnosis tester to DLC.

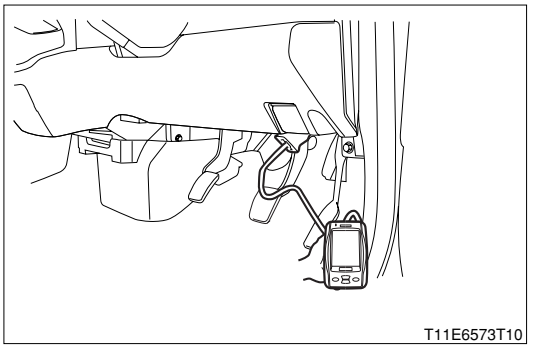
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.

(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.Confirm whether any meter-related diagnosis code is outputted.

(No.0043: Failure to read out CAN system connection ECU information, No.0061: Abnormal low voltage)

Refer to Page J3-14.

▼If it is outputted, go to Σ>2.

▼If it is not outputted, go to Σ>4.

Σ>2. Troubleshooting according to diagnosis code (Related to meters)

1.Perform the troubleshooting related to the diagnosis codes that have been outputted in Σ>1.

(1) No.43: Failure to read out CAN system connection ECU information

Refer to Page J3-20.

(2) No.61: Abnormal low voltage

Refer to Page J3-20.

2.After completion of the repairs, connect the diagnosis tester (DS-21/DS-Ⅱ) to toe DLC, using the SST.

SST: 09991-87404-000

3.Confirm whether any diagnosis code related to the meter is outputted.

▼If it is not outputted, go to Σ>3.

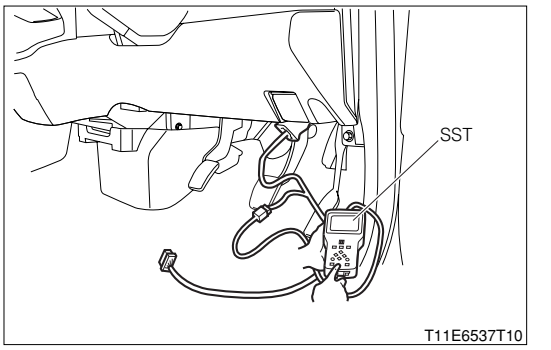
▼If it is output, perform the recheck of the diagnosis code that has been outputted.

Σ3. Reconfirmation of diagnosis code (Related to EFI)

1.Connect the diagnosis tester to DLC.

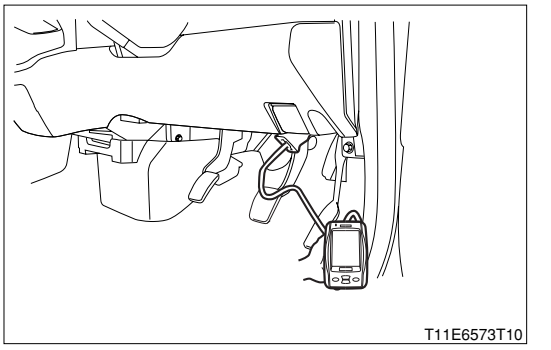
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.

(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



2.Erase the diagnosis code of the EFI.

3.Confirm whether the diagnosis code of the EFI is outputted.

SPECIFIED VALUE: It is not outputted.

▼If it is OK, the EFI system is normal.

▼If it is NG, go to Σ4.

Σ4. Check of CAN line for open wire

1.Set the IG switch to the "LOCK" position.

2.Disconnect all of the EFI ECU connectors.

3.Perform continuity check between the following terminals.

(1) Between EFI ECU connection vehicle harness side connector 6(CANL) - EFI ECU connection vehicle harness side connector 7(CANH)

SPECIFIED VALUE: No continuity exists

▼If it is OK, go to Σ5.

▼If it is NG, repair or replace malfunctioning sections.

Σ5. Check of EFI ECU internal resistance

1.Disconnect all of the EFI ECU connectors.

2.Measure the resistance between the following terminals.

(1) Between EFI ECU side connector 6(CANL) - EFI ECU side connector 7(CANH)

(2) Between EFI ECU side connector 8(LCAN) - EFI ECU side connector 9(HCAN)

SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, go to Σ6.

▼If it is NG, replace the EFI ECU.

Refer to Page B8-1.

Σ>6. Check of combination meter internal resistance

1.Disconnect the connector of the combination meter.

2.Measure the resistance between the following terminals.

(1) Between combination meter side connector 1(CANH) - combination meter side connector 2(CANL)

(2) Between combination meter side connector 3(HCAN) - combination meter side connector 4(LCAN)

SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, check the circuits of the combination meter and ECU.

▼If it is NG, replace the combination meter.

Refer to Page J3-3.

② When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

Σ>1. Diagnosis code confirmation (Meter-related)

1.Short-circuit the terminals 4 (ECU-T) and 13 (E) of the DLC, using the SST.
SST: 09991-87404-000(1)
09991-87403-000(2)

2.Check to see if the meter-related diagnosis code is outputted
(No.0043: CAN system connection ECU information readout not possible, No.0061: low voltage abnormality)

NOTE

- Refer to the diagnosis code output indication method of combination meter.

Refer to Page J3-14.

▼If it is outputted, proceed to Σ>2.
▼If it is not outputted, proceed to Σ>4.

Σ>2. Trouble shooting according to diagnosis code (Meter-related)

1.Perform trouble shooting for the diagnosis code outputted in Σ>1.
(1) No.0043: CAN system connection ECU information readout not possible
Refer to Page J3-20.

(2) No.0061: Low voltage abnormality
Refer to Page J3-20.

2.After repairing, short-circuit the terminals 4 (ECU-T) and 13 (E) of the DLC, using the SST.
SST: 09991-87404-000(1)
09991-87403-000(2)

3.Confirm that the diagnosis code related to the meter is not outputted.
▼If it is not outputted, proceed to Σ>3.
▼If it is outputted, perform recheck for the diagnosis code outputted.

Σ>3. Diagnosis code reconfirmation (EFI related)

1.Cancel the diagnosis code of the EFI.
2.After canceling, short-circuit the terminals 5 (EFI-T) and 13 (E) of the DLC, using SST.
SST: 09991-87404-000(1)
09991-87403-000(2)

3.Check to see if the diagnosis code of EFI is outputted.
SPECIFIED VALUE: It is not outputted.

▼If it is OK, the EFI system is normal.
▼If it is NG, proceed to Σ>4.

Σ>4. CAN communication basic check

1.Perform basic check of the CAN communication.
Refer to Page L2-14.

▼If it is OK, proceed to Σ>5.
▼If it is NG, repair or replace the defective sections.

Σ>5. CAN line open wire check

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the EFI ECU and A/T ECU.
3.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - A/T ECU connection vehicle harness side connector B19 (LCN1)
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>6.
▼If it is NG, repair or replace the defective sections.

Σ>6. EFI ECU internal resistance check

1.Remove all of the EFI ECU connectors.
2.Measure the resistance between the following terminals.
(1) Between EFI ECU side connector 6 (CANL) - EFI ECU side connector 7 (CANH)
(2) Between EFI ECU side connector 8 (LCAN) - EFI ECU side connector 9 (HCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to Σ>7.
▼If it is NG, replace the EFI ECU.
Refer to Page B8-1.

Σ>7. Combination meter internal resistance check

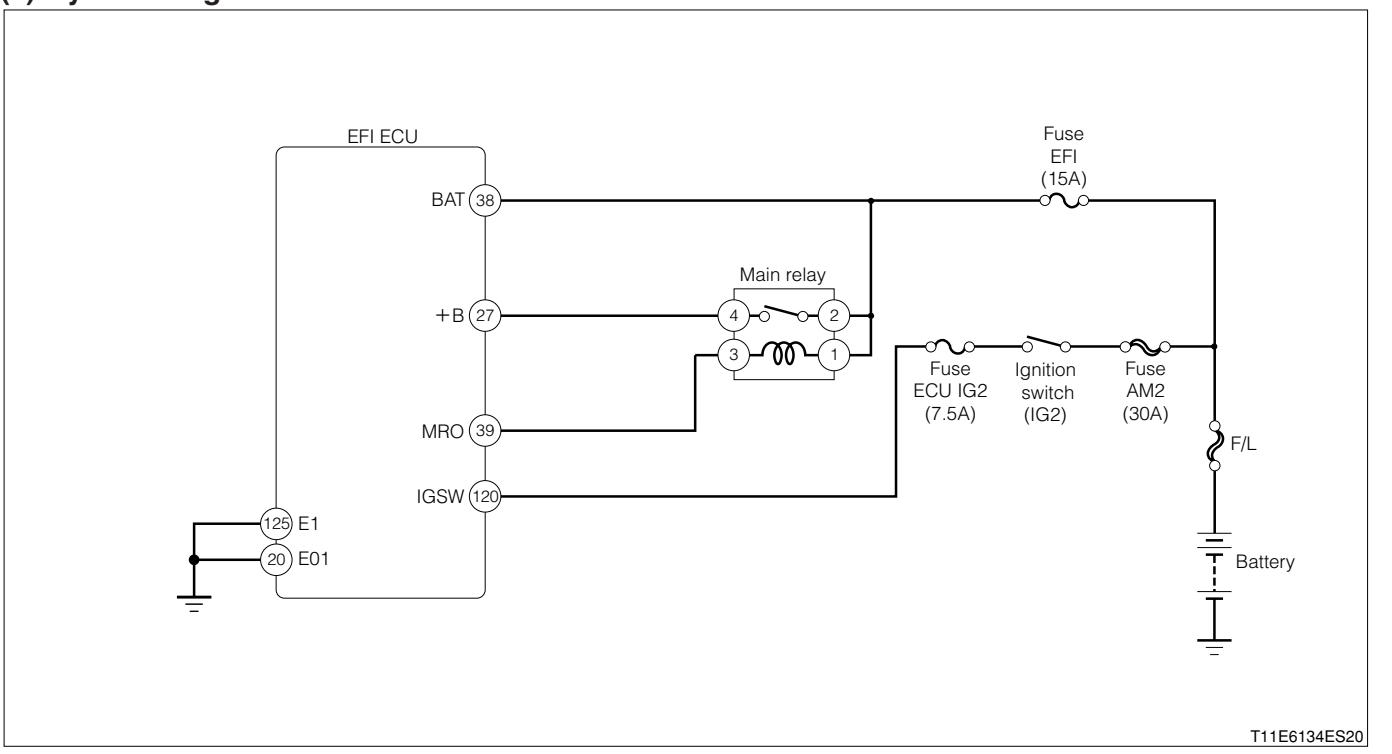
1.Remove all connectors of the combination meter.
2.Measure the resistance between the following terminals.
(1) Between combination meter side connector 1 (CANH) - combination meter side connector 2 (CANL)
(2) Between combination meter side connector 3 (HCAN) - combination meter side connector 4 (LCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, perform circuit check of the combination meter and EFI ECU.
▼If it is NG, replace the combination meter.
Refer to Page J3-3.

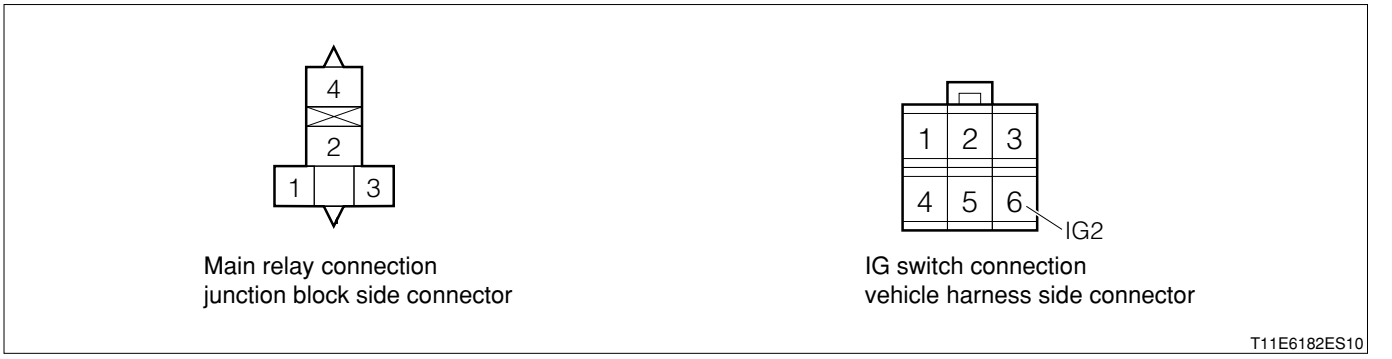
7-13 TROUBLE SHOOTING ACCORDING TO SYSTEM

7-13-1 EFI ECU POWER SUPPLY SYSTEM CHECK

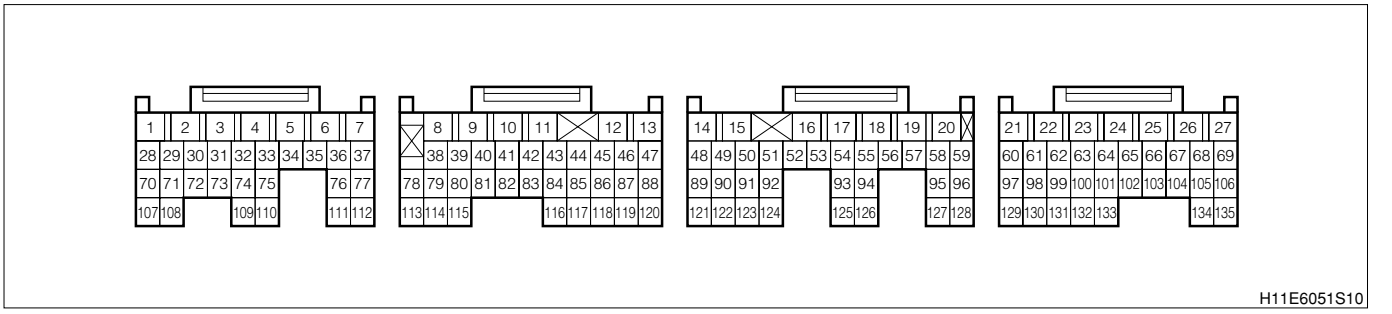
(1) System diagram



Each unit connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Checking points

1. If the engine check lamp does not light up when the IG switch is "ON" or during diagnosis indication, it is possible that there is no power supplied to the EFI ECU.

(3) Checking method

Σ1. EFI ECU voltage check

1.Remove the connector on the EFI ECU side and perform voltage measurements for each of the terminals when the IG switch is "ON".
(1) ECU connection vehicle harness side connector 27 (+B) - ECU connection vehicle harness side connector 125 (E1)
(2) ECU connection vehicle harness side connector 38 (BAT) - ECU connection vehicle harness side connector 125 (E1)
SPECIFIED VALUE: Battery voltage

▼If it is OK, there is no abnormality in the EFI ECU power supply system.
▼If it is NG, proceed to Σ2.

Σ2. Check of wire harness continuity (1)

1.Perform continuity check between each of the following terminals.
(1) Between ECU connection vehicle harness side connector 27 (+B) - relay side connector 4
(2) Between ECU connection vehicle harness side connector 38 (BAT) - relay side connector 4
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ3.
▼If it is NG, repair the harness and the connectors.

Σ3. Main relay unit check

1.Perform unit check of the main relay.
Refer to Page B8-225.

▼If it is OK, proceed to Σ4.
▼If it is NG, replace the main relay.

Σ4. Main relay voltage check

1.Remove the main relay.
2.Perform voltage measurement between each terminal when the IG switch is "ON".
(1) Between relay side connector 1 (coil side) - body earth
(2) Between relay side connector 2 (switch side) - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, perform checking or repairing of the harness and connector for each of the following terminals.
(3) Between main relay - body earth
▼if the switch side is NG, perform checking or repairing of the harness and connector for each of the following terminals.
(1) Between main relay - battery
▼If the coil side is NG, proceed to Σ5.

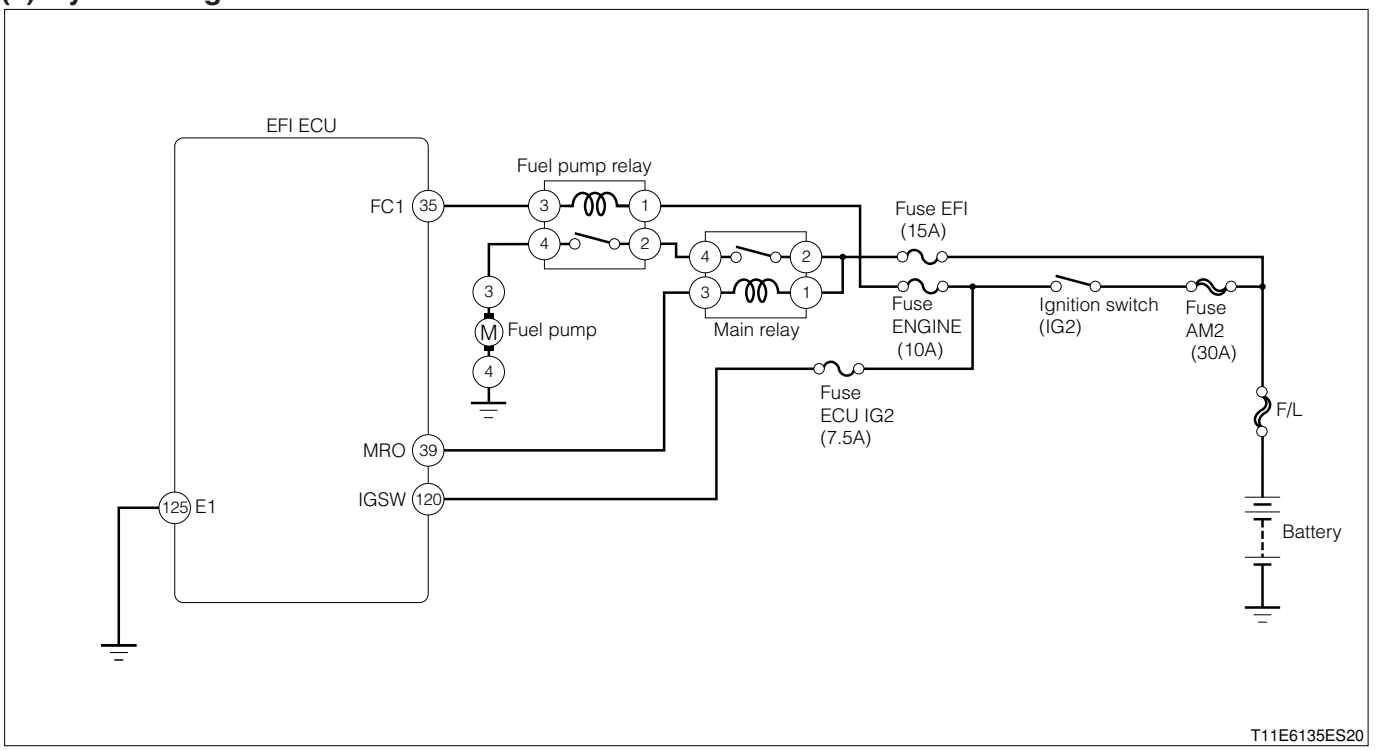
Σ5. Check of wire harness continuity (2)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 1 - IG switch side connector 6 (IG2)
SPECIFIED VALUE: Continuity exists.

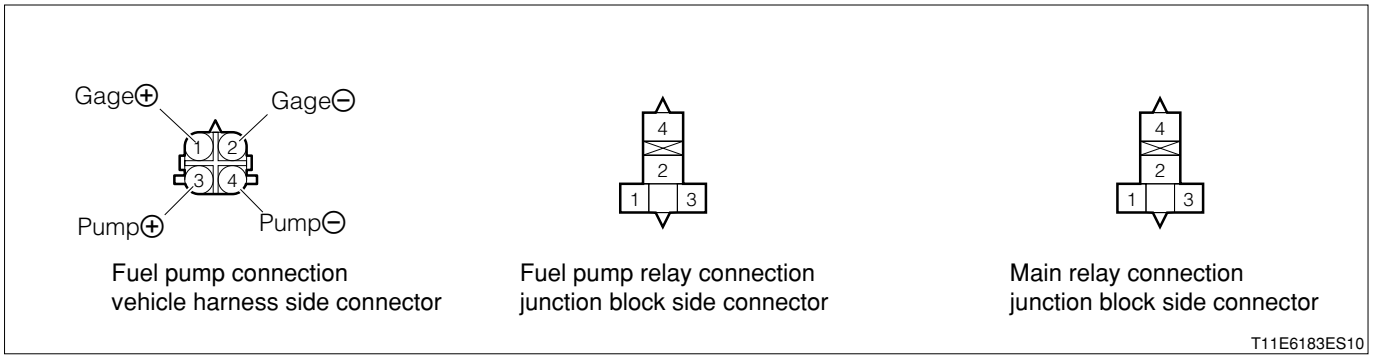
▼If it is OK, perform checking or repairing of the IG switch.
▼If it is NG, repair the harness and the connectors.

7-13-2 FUEL PUMP SYSTEM CHECK

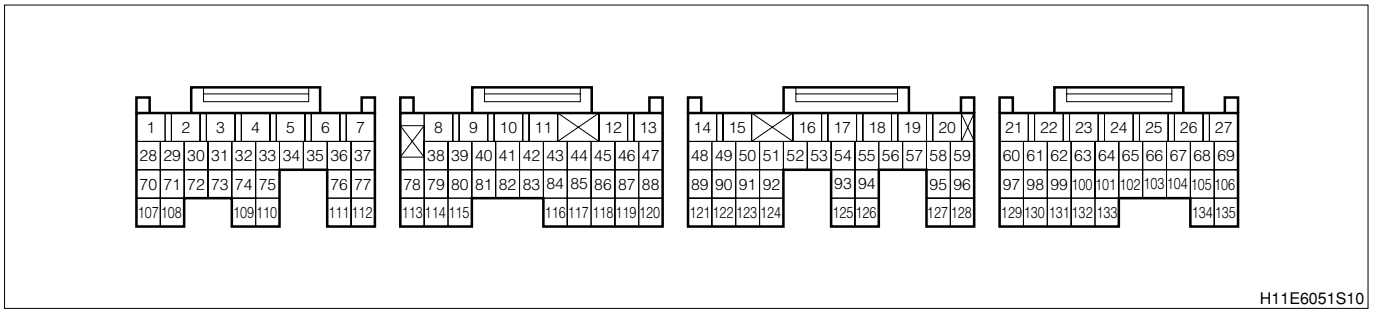
(1) System diagram



Each unit connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Checking points

1.Is the fuel pump relay power supply voltage normal?
2.Is the fuel pump relay operating correctly?
3.Is the fuel pump power supply voltage normal?
4.Is the fuel pump operating correctly?

(3) Checking method

① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

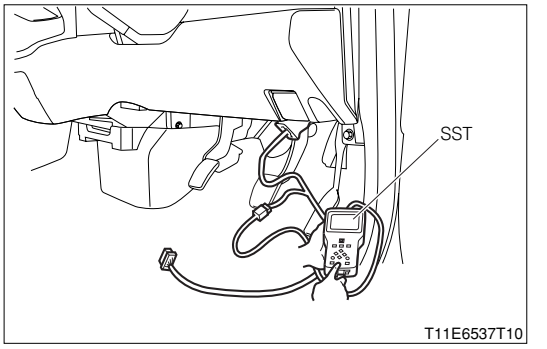
Σ>1. Fuel pump operation check

1.IG switch turned "LOCK".

2.Connect the diagnosis tester to DLC.

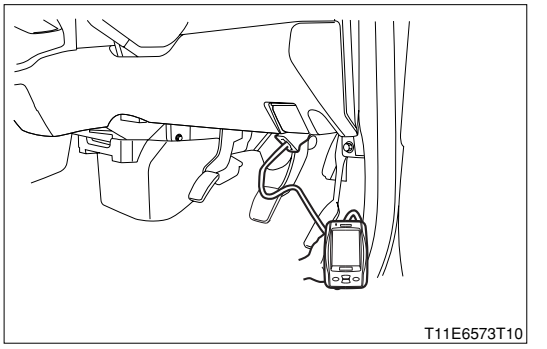
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.

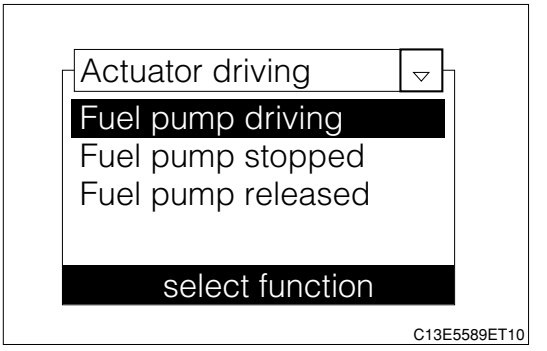
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.Turn "ON" the IG switch, and turn "ON" the main switch of the tester.

4.Confirmation of operation of the purge VSV for EVAP.

(1) DS-21: Select the "Fuel pump" of the "Actuator driving" so as to drive the fuel pump.



(2) DS-Ⅱ: Select the "Fuel pump" of the "Active test" so as to drive the fuel pump.

5.At the time, check the operation sound of the fuel pump.

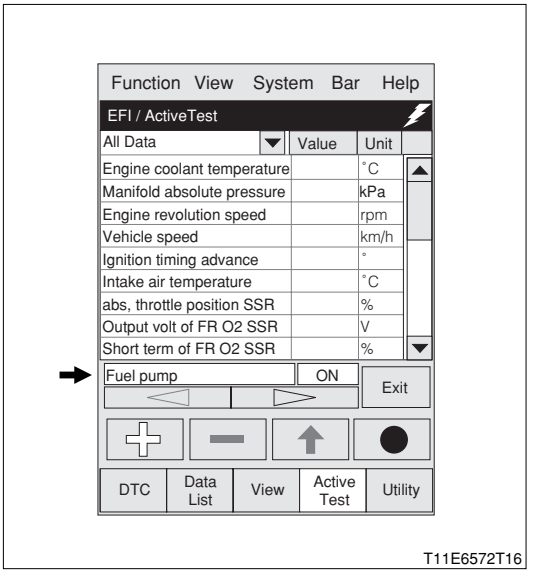
NOTE

- Confirm the operation sound from the fuel inlet side.

SPECIFIED VALUE: Operation sound is generated.

▼If it is OK, proceed to Σ>2.

▼If it is NG, proceed to Σ>3.



Σ2. Fuel pressure check

1.Perform fuel pressure check.
Refer to Page B8-219.

▼If it is OK, the fuel pump system is normal.
▼If it is NG, perform the following operations.
(1) Replacement of the fuel pump
Refer to Page B7-9.

(2) Repairing of the fuel line

Σ3. Fuel pump relay voltage check

1.Remove the fuel pump relay.
2.Perform voltage measurements between each of the following terminals when the IG switch is "ON".
(1) Between relay side connector 1 (coil side) - body earth
(2) Between relay side connector 2 (switch side) - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to Σ4.
▼If the switch side is NG, proceed to Σ8.
▼If the coil side is NG, perform checking and repairing for the following portions.
(1) Harness and connectors between the fuel pump relay and battery
(2) Fuse
(3) Ignition switch

Σ4. Fuel pump relay unit check

1.Perform unit check of the fuel pump relay.
Refer to Page B8-219.

▼If it is OK, proceed to Σ5.
▼If it is NG, replace the fuel pump relay.

Σ5. Check of wire harness continuity (1)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 4 - pump side connector 3 (pump+)
(2) Between pump side connector 4 (pump−) - body earth
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ6.
▼If it is NG, repair the harness and the connectors of the defective sections.

Σ6. Fuel pump unit check

1.Perform unit check of the fuel pump.
Refer to Page B8-219.

▼If it is OK, proceed to Σ7.
▼If it is NG, replace the fuel pump.

Σ7. Check of wire harness continuity (2)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 3 - ECU connection vehicle harness side connector 35 (FC1)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, check the EFI ECU circuit.
▼If it is NG, repair the harness and the connectors.

Σ8. Check of wire harness continuity (3)

1.Perform continuity check between each of the following terminals.
(1) Between fuel pump relay side connector 2 - main relay side connector 4
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ9.
▼If it is NG, repair the harness and the connectors.

Σ9. Main relay unit check

1.Perform unit check of the main relay.
Refer to Page B8-225.

▼If it is OK, proceed to Σ10.
▼If it is NG, replace the main relay.

Σ10. Main relay voltage check

1.Remove the main relay.
2.Perform voltage measurement between each terminal when the IG switch is "ON".
(1) Between relay side connector 1 (coil side) - body earth
(2) Between relay side connector 2 (switch side) - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, perform checking or repairing of the harness and connector for each of the following terminals.
(1) Between main relay - body earth
▼If the switch side is NG, perform checking or repairing of the following portions.
(1) Harness and connectors between the main relay side connector 2 and battery
(2) Fuse
▼If the coil side is NG, perform checking and repairing for the following portions.
(1) Harness and connectors between main relay side connector 1 and battery
(2) Ignition switch
(3) Fuse

② **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

Σ>1. Fuel pump operation check

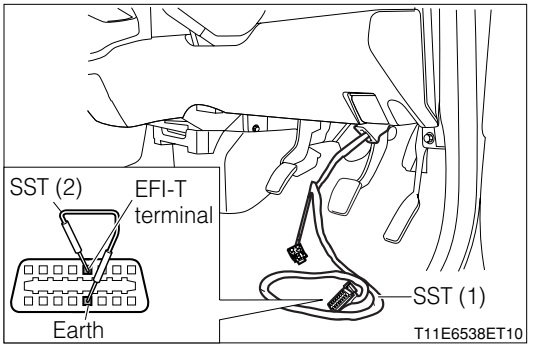
1.Check if there is the operation sound of the fuel pump by shorting the EFI-T terminal when the IG switch is "ON".
SST: 09991-87404-000(1)
09991-87403-000(2)

NOTE

- Confirm the operation sound from the fuel inlet side.

SPECIFIED VALUE: Operation sound is generated.

▼If it is OK, proceed to Σ>2.
▼If it is NG, proceed to Σ>3.



Σ>2. Fuel pressure check

1.Perform fuel pressure check.
Refer to Page B8-219.

▼If it is OK, the fuel pump system is normal.
▼If it is NG, perform the following operations.
(1) Replacement of the fuel pump
Refer to Page B7-9.

(2) Repairing of the fuel line

Σ>3. Fuel pump relay voltage check

1.Remove the fuel pump relay.
2.Perform voltage measurements between each of the following terminals when the IG switch is "ON".
(1) Between relay side connector 1 (coil side) - body earth
(2) Between relay side connector 2 (switch side) - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to Σ>4.
▼If the switch side is NG, proceed to Σ>8.
▼If the coil side is NG, perform checking and repairing for the following portions.
(1) Harness and connectors between the fuel pump relay and battery
(2) Fuse
(3) Ignition switch

Σ>4. Fuel pump relay unit check

1.Perform unit check of the fuel pump relay.
Refer to Page B8-219.

▼If it is OK, proceed to Σ>5.
▼If it is NG, replace the fuel pump relay.

Σ>5. Check of wire harness continuity (1)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 4 - pump side connector 3 (pump+)
(2) Between pump side connector 4 (pump−) - body earth
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ>6.
▼If it is NG, repair the harness and the connectors of the defective sections.

Σ>6. Fuel pump unit check

1.Perform unit check of the fuel pump.
Refer to Page B8-219.

▼If it is OK, proceed to Σ>7.
▼If it is NG, replace the fuel pump.

Σ>7. Check of wire harness continuity (2)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 3 - ECU connection vehicle harness side connector 35 (FC1)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, check the EFI ECU circuit.
▼If it is NG, repair the harness and the connectors.

Σ>8. Check of wire harness continuity (3)

1.Perform continuity check between each of the following terminals.
(1) Between fuel pump relay side connector 2 - main relay side connector 4
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ>9.
▼If it is NG, repair the harness and the connectors.

Σ>9. Main relay unit check

1.Perform unit check of the main relay.
Refer to Page B8-225.

▼If it is OK, proceed to Σ>10.
▼If it is NG, replace the main relay.

10. Main relay voltage check

1.Remove the main relay.

2.Perform voltage measurement between each terminal when the IG switch is "ON".

(1) Between relay side connector 1 (Coil side) - body earth

(2) Between relay side connector 2 (Switch side) - body earth

SPECIFIED VALUE: Battery voltage

▼If it is OK, perform checking or repairing of the harness and connector for each of the following terminals.

(1) Between main relay - body earth

▼If the switch side is NG, perform checking or repairing of the following portions.

(1) Harness and connectors between the main relay side connector 2 and battery

(2) Fuse

▼If the coil side is NG, perform checking and repairing for the following portions.

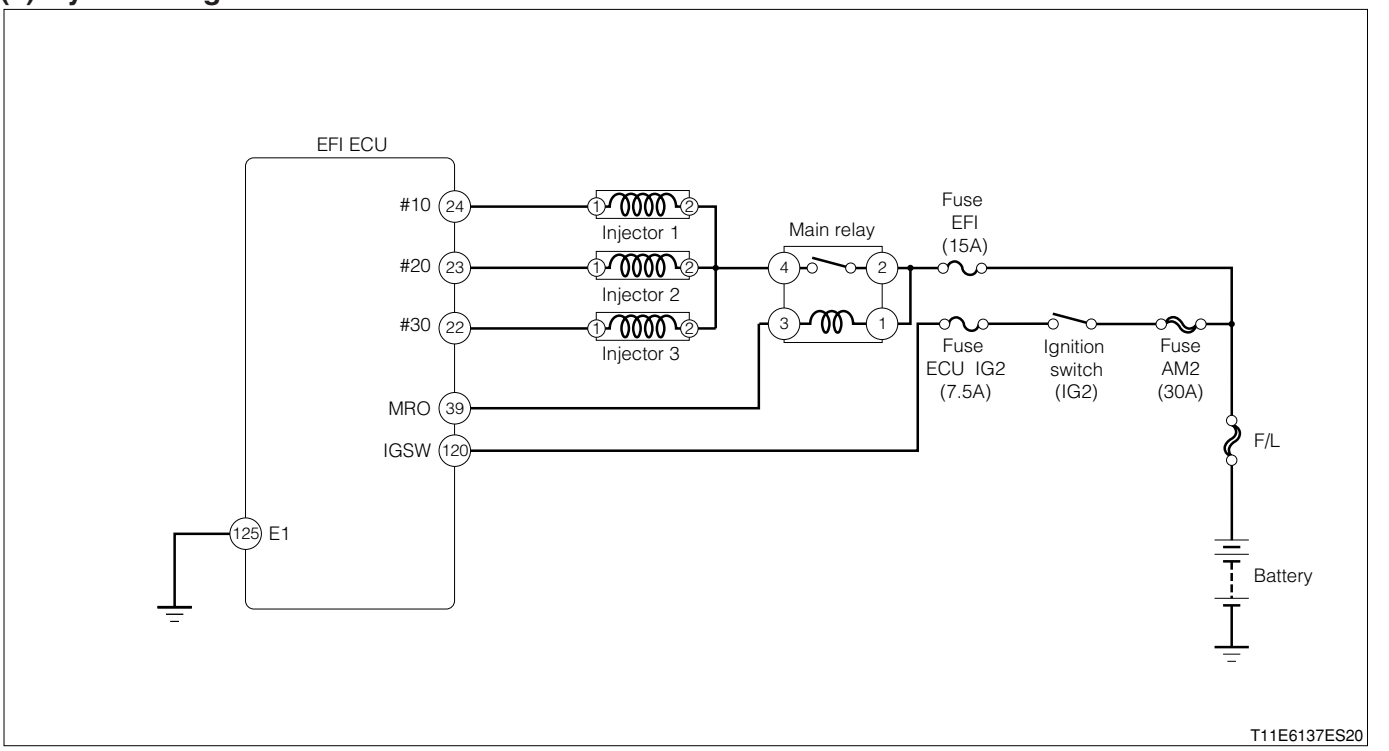
(1) Harness and connectors between main relay side connector 1 and battery

(2) Ignition switch

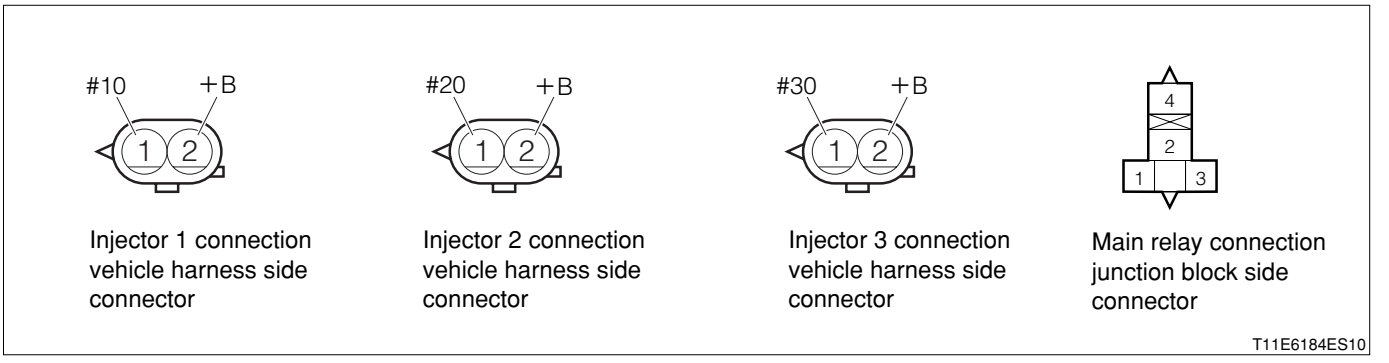
(3) Fuse

7-13-3 INJECTOR SYSTEM CHECK

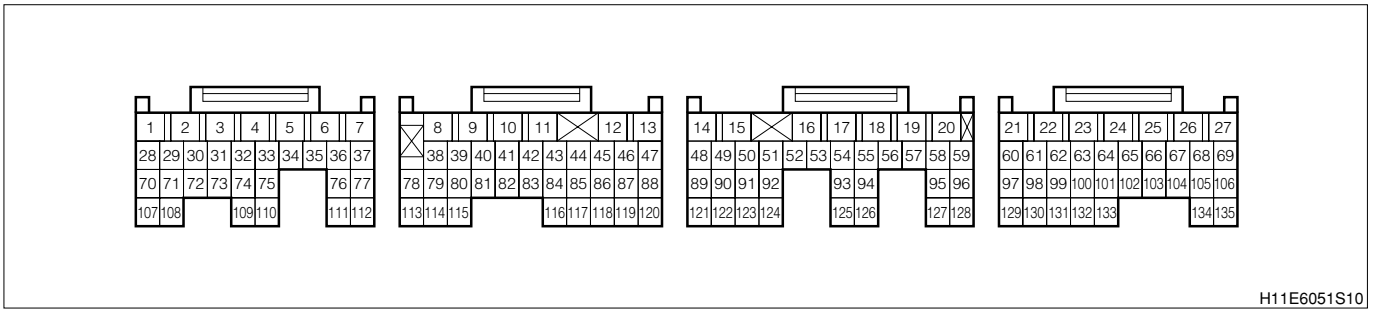
(1) System diagram



Each units connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Checking points

1.Is the injector control signal outputted correctly from the EFI ECU?
2.Is the injector power supply voltage normal?
3.Is the harness between the injector and EFI ECU normal?
4.Is the injection of the injector proper?

(3) Checking method

Σ1. Injector operation check

1.Check if there is the operation sound of the injector using a sound scope or a long screwdriver.
SPECIFIED VALUE: Operation sound is generated.

▼If it is OK, proceed to Σ2.
▼If it is NG, proceed to Σ3.

Σ2. Injector unit check (1)

1.Perform unit check of the injector.
Refer to Page B8-224.

▼If it is OK, the injector system is normal.
▼If it is NG, replace the injector.
Refer to Page B7-11.

Σ3. Injector voltage check

1.Remove all of the connectors on the injector side.
2.Perform voltage measurements between each of the following terminals when the IG switch is "ON".
(1) Each injector connection vehicle harness side connector 2 (+B) - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to Σ4.
▼If it is NG, perform checking or repairing of the harness and relay between the following terminals.
(2) Between battery - injector

Σ4. Check of wire harness continuity

1.Perform continuity check between each of the following terminals.
(1) Between ECU connection vehicle harness side connector 24 (#10) - injector 1 connection vehicle harness side connector 1 (#10)
(2) Between ECU connection vehicle harness side connector 23 (#20) - injector 2 connection vehicle harness side connector 1 (#20)
(3) Between ECU connection vehicle harness side connector 22 (#30) - injector 3 connection vehicle harness side connector 1 (#30)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ5.
▼If it NG, repair the harness and connectors of the defective sections.

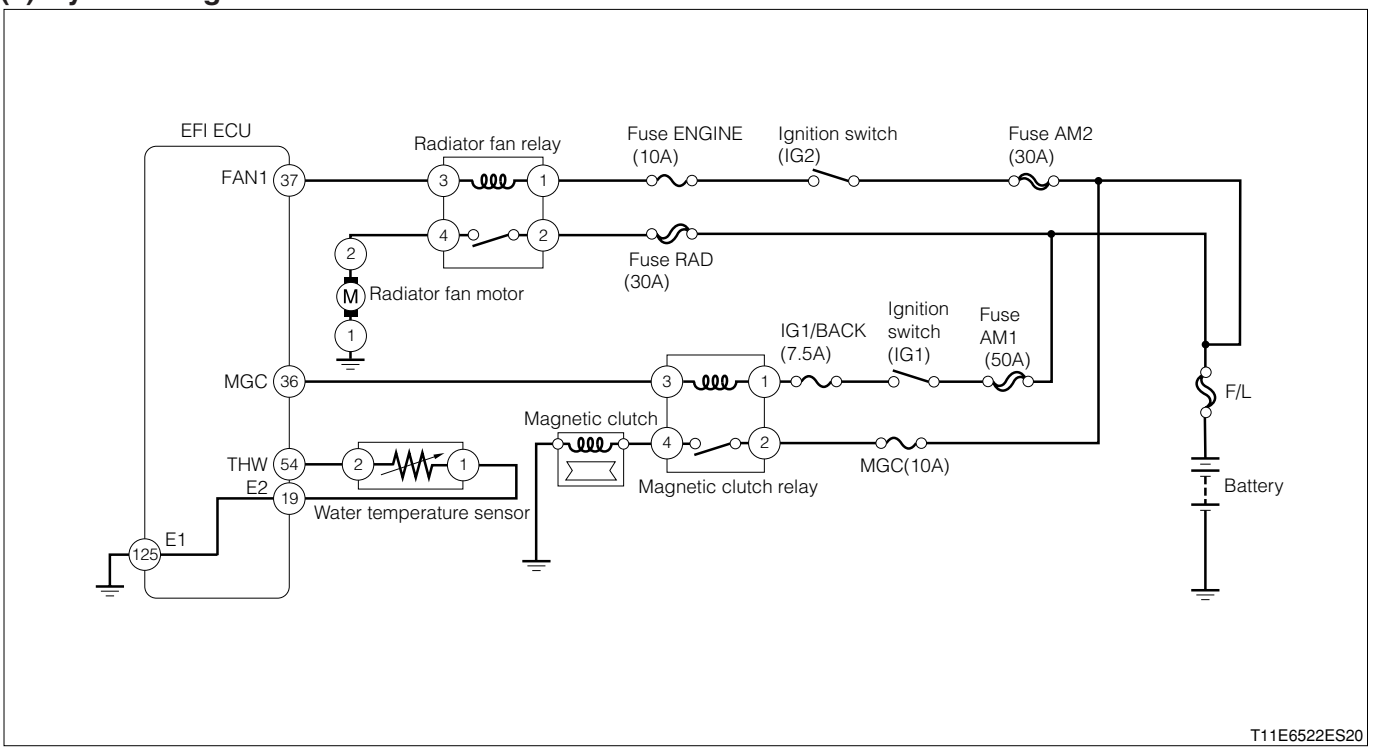
Σ5. Injector unit check (2)

1.Perform unit check of the injector.
Refer to Page B8-224.

▼If it is OK, check the connecting condition of each connector.
▼If it is NG, replace the injector.
Refer to Page B7-11.

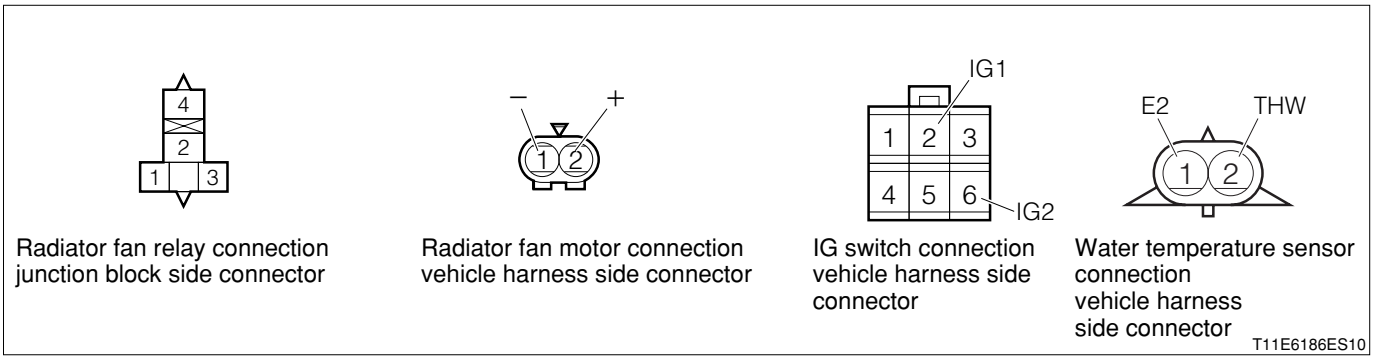
7-13-4 RADIATOR FAN SYSTEM CHECK

(1) System diagram



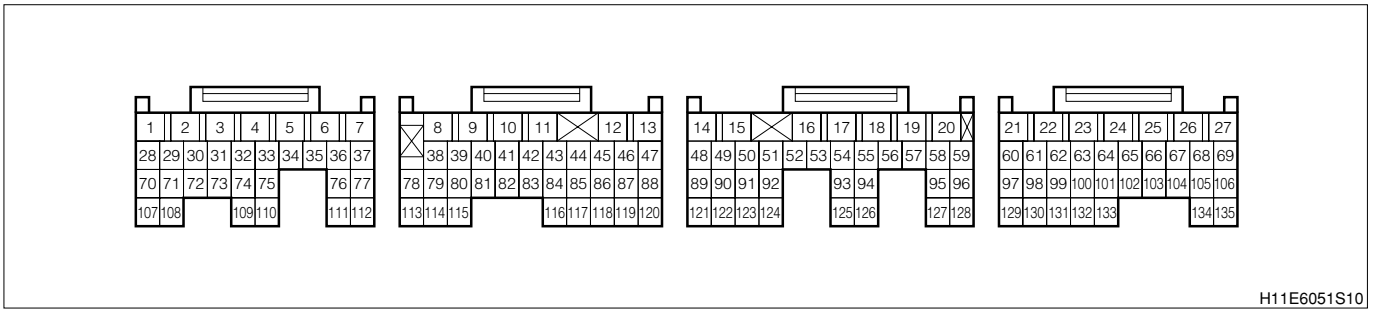
T11E6522ES20

Each unit, relays connection vehicle harness side connector



T11E6186ES10

EFI ECU connection vehicle harness side connector



H11E6051S10

(2) Checking points

1. Is the signal from the water temperature sensor inputted to the EFI ECU?
2. Is the harness between the water temperature sensor and EFI ECU normal?
3. Is the output of the water temperature sensor correct?
4. Is the signal from the magnet clutch relay inputted to the EFI ECU?
5. Is the harness between the magnet clutch relay and EFI ECU normal?
6. Is the harness between the radiator fan relay and EFI ECU normal?
7. Is the radiator fan motor normal?

(3) Checking method

① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

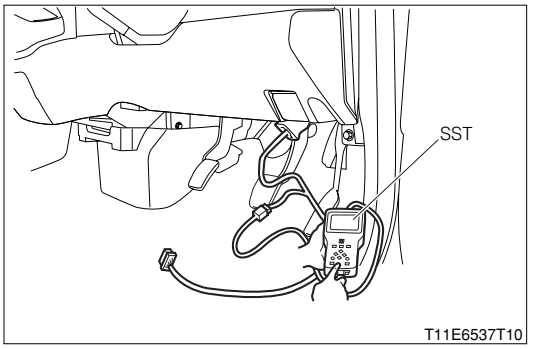
Σ>1. Radiator fan operation check (1)

1.The IG switch turned "LOCK".

2.Connect the diagnosis tester to DLC.

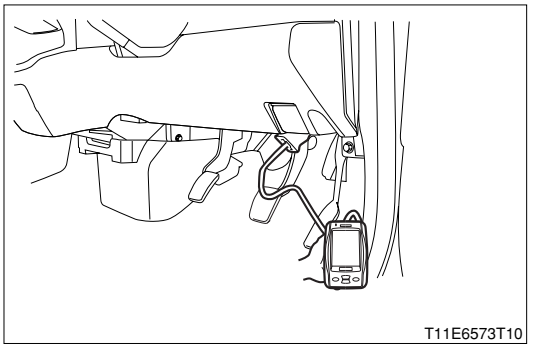
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.

(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.Turn "ON" the IG switch, and turn "ON" the main switch of the tester.

4.Confirmation of operation of the radiator fan.

(1) DS-21: Select the "Radiator fan 1st stage" of the "Actuator driving".

(2) DS-Ⅱ: Select the "Radiator fan 1st stage" of the "Active test".

5.Choose the "Radiator fan 1st stage ON" and "Radiator fan 1st stage OFF", respectively.

SPECIFIED VALUE: The fan rotates when "ON" is chosen. The fan stops when "OFF" is chosen.

▼If it is OK, proceed to Σ>2.

▼If it is NG, proceed to Σ>9.

Σ>2. Radiator fan operation check (2)

1.Check if the fan does not operate during cold period, but operates after warm-up when warming up the engine.

2.Check if the fan operates when the air conditioner is turned "ON".

NOTE

- Air conditioner "ON" means that the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are all "ON".

SPECIFIED VALUE: The fan operates when the air conditioner is turned "ON".

▼If it is OK, the system is normal.

▼If it does not rotate after warm-up, perform checking the water temperature sensor system.

Refer to Page B8-74.

▼If it does not rotate when the air conditioner is "ON", proceed to Σ>3.

▼When it is rotating constantly, proceed to Σ>6.

▼If it does not rotate at all, proceed to Σ>9.

Σ3. Check of wire harness continuity (1)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 3 - ECU connection vehicle harness side connector 36 (MGC)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ4.
▼If it is NG, repair or replace the defective sections.

Σ4. Magnet clutch relay voltage check

1.Perform voltage measurements between each of the following terminals when the IG switch is "ON".
(1) Between relay side connector 1 - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to Σ5.
▼If it is NG, perform checking or repairing the harness and the connectors for the following terminals.
(2) Between magnet clutch relay - battery

Σ5. Magnet clutch relay unit check

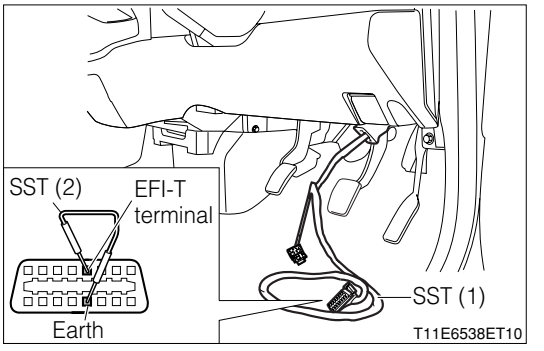
1.Perform unit check of the magnet clutch relay.
Refer to Page B8-225.

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, replace the magnet clutch relay

Σ6. Diagnosis code check

1.Short-circuit the EFI-T terminals, using SST.
SST: 09991-87404-000
09991-87403-000
2.Is the normal code outputted when the IG switch is "ON"?
SPECIFIED VALUE: The normal code is outputted.
▼If it is OK, proceed to Σ7.
▼If code No.42 is outputted, perform checking of the water temperature sensor system.
Refer to Page B8-74.



Σ7. Wire harness check (2)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 3 - ECU connection vehicle harness side connector 37 (FAN1)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ8.
▼If it is NG, repair or replace the defective sections.

Σ8. Radiator fan relay unit check (1)

1.Perform unit check of the radiator fan relay.
Refer to Page B8-225.

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, replace the radiator fan relay.

Σ9. EFI ECU voltage check

1.Connect the SST.
SST: 09842-97209-000

2.Perform voltage measurements between the following terminals when the air conditioner is turned "ON".

NOTE

- Air conditioner "ON" means that the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are all "ON".

(1) Between SST 37 (FAN1) - SST 125 (E1)
SPECIFIED VALUE:

Measuring condition	Specified value
When magnet clutch is "ON".	1V or less
When magnet clutch is "OFF".	Battery voltage

▼If it is OK, proceed to Σ13.
▼If it is NG, proceed to Σ10.

Σ10. Check of wire harness continuity (3)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 3 - ECU connection vehicle harness side connector 37 (FAN1)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ11.
▼If it is NG, repair the harness and the connectors.

Σ11. Radiator fan relay coil side voltage check

1.Perform voltage measurements between each of the following terminals when the IG switch is "ON".
(1) Between relay side connector 1 - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to Σ12.
▼If it is NG, perform checking or repairing of the harness and connectors between the following terminals.
(1) Between radiator fan relay - battery

Σ>12. Radiator fan relay unit check (2)

1.Perform unit check of radiator fan relay.
Refer to Page B8-225.

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, replace the radiator fan relay.

Σ>13. Radiator fan relay switch side voltage check

1.Perform voltage measurements between the following terminals when the IG switch is "ON".
(1) Between relay side connector 2 - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to Σ>13.
▼If it is NG, perform checking or repairing of the harness and connectors between the following terminals.
(1) Between radiator fan relay - battery

Σ>14. Radiator fan relay unit check (3)

1.Perform unit check of radiator fan relay.
Refer to Page B8-225.

▼If it is OK, proceed to Σ>14.
▼If it is NG, replace the radiator fan relay.

Σ>15. Check of wire harness continuity (4)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 4 - motor side connector 2 (+)
(2) Between motor side connector 1 (−) - body earth
SPECIFIED VALUE: Continuity exists.

▼If it is OK, replace the radiator fan motor.
Refer to Page B6-5.

▼If it is NG, perform repairing and replacing of the defective sections.

② **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

Σ>1. Radiator fan operation check

1.Check if the fan does not operate during cold period, but operates after warm-up when warming up the engine.

2.Check if the fan operates when the air conditioner is turned "ON".

NOTE

- Air conditioner "ON" means that the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are all "ON".

SPECIFIED VALUE: The fan operates when the air conditioner is turned "ON".

▼If it is OK, the system is normal.

▼If it does not rotate after warm-up, perform checking the water temperature sensor system.

Refer to Page B8-74.

▼If it does not rotate when the air conditioner is "ON"

▼When it is rotating constantly, proceed to Σ>5.

▼If it does not rotate at all, proceed to Σ>8.

Σ>2. Check of wire harness continuity (1)

1.Perform continuity check between each of the following terminals.

(1) Between relay side connector 3 - ECU connection vehicle harness side connector 36 (MGC)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ>3.

▼If it is NG, repair or replace the defective sections.

Σ>3. Magnet clutch relay voltage check

1.Perform voltage measurements between each of the following terminals when the IG switch is "ON".

(1) Between relay side connector 1 - body earth

SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to Σ>4.

▼If it is NG, perform checking or repairing the harness and the connectors for the following terminals.

(1) Between magnet clutch relay - battery

Σ>4. Magnet clutch relay unit check

1.Perform unit check of the magnet clutch relay.

Refer to Page B8-225.

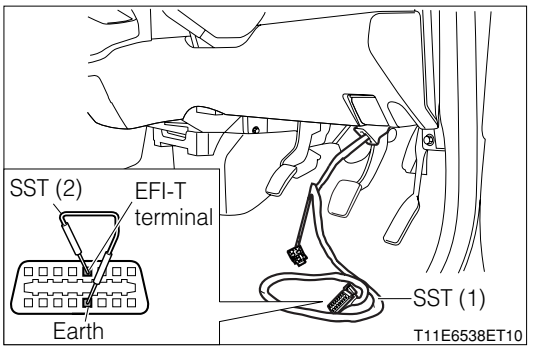
▼If it is OK, check the EFI ECU circuit.

▼If it is NG, replace the magnet clutch relay

Σ5. Diagnosis code check

1.Short-circuit the EFI-T terminals, using SST.
SST: 09991-87404-000(1)
09991-87403-000(2)

2.Is the normal code outputted when the IG switch is "ON"?
SPECIFIED VALUE: The normal code is outputted.
▼If it is OK, proceed to Σ6.
▼If code No.42 is outputted, perform checking of the "water temperature sensor system".
Refer to Page B8-74.



Σ6. Wire harness check (2)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 3 - ECU connection vehicle harness side connector 37 (FAN1)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ7.
▼If it is NG, repair or replace the defective sections.

Σ7. Radiator fan relay unit check (1)

1.Perform unit check of the radiator fan relay.
Refer to Page B8-225.

▼If it is OK, check the EFI ECU circuit.
▼If it is NG, replace the radiator fan relay.

Σ8. EFI ECU voltage check

1.Connect the SST.
SST: 09842-97209-000

2.Perform voltage measurements between the following terminals when the air conditioner is turned "ON".

NOTE

- Air conditioner "ON" means that the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are all "ON".

(1) Between SST 37 (FAN1) - SST 125 (E1)
SPECIFIED VALUE:

Measuring condition	Specified value
When magnet clutch is "ON".	1V or less
When magnet clutch is "OFF".	Battery voltage

▼If it is OK, proceed to Σ2.
▼If it is NG, proceed to Σ9.

Σ9. Check of wire harness continuity (3)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 3 - ECU connection vehicle harness side connector 37 (FAN1)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ10.
▼If it is NG, repair the harness and the connectors.

Σ10. Radiator fan relay coil side voltage check

1.Perform voltage measurements between each of the following terminals when the IG switch is "ON".
(1) Between relay side connector 1 - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to Σ11.
▼If it is NG, perform checking or repairing of the harness and connectors between the following terminals.
(1) Between radiator fan relay - battery

Σ11. Radiator fan relay unit check (2)

1.Perform unit check of radiator fan relay.
Refer to Page B8-225.

▼If it is OK, check the EFI ECU circuit.
▼If it is NG, replace the radiator fan relay.

Σ12. Radiator fan relay switch side voltage check

1.Perform voltage measurements between the following terminals when the IG switch is "ON".
(1) Between relay side connector 2 - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to Σ13.
▼If it is NG, perform checking or repairing of the harness and connectors between the following terminals.
(1) Between radiator fan relay - battery

Σ13. Radiator fan relay unit check (3)

1.Perform unit check of radiator fan relay.
Refer to Page B8-225.

▼If it is OK, proceed to Σ14.
▼If it is NG, replace the radiator fan relay.

Σ14. Check of wire harness continuity (4)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 4 - motor side connector 2 (+)
(2) Between motor side connector 1 (−) - body earth
SPECIFIED VALUE: Continuity exists.

▼If it is OK, replace the radiator fan motor.
▼If it is NG, perform repairing and replacing of the defective sections.

7-14 UNIT CHECK

WARNING

- If the vehicle is driven with the SST (EFI computer check sub harness, etc.) connected there is a possibility of causing malfunction and may be very dangerous. Therefore, remove it without fail before running.

7-14-1 FUEL PRESSURE CHECK

WARNING

- Fire is strictly forbidden while operation.
  Place cloth, etc. to prevent fuel from splashing.

1.Connect the SST.
SST: 09842-97209-000
09268-87701-000
09268-87702-000

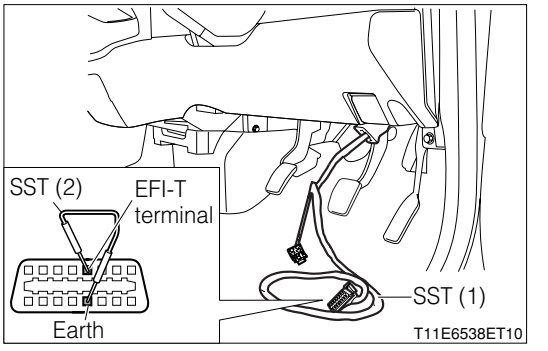
2.Turn the IG switch to the "ON" position.
3.Drive the fuel pump by shorting between SST 35 (FC1) - SST 125 (E1) and measure the fuel pressure at this point.
SPECIFIED VALUE: 324±5kPa {3.3±0.05kgf/cm²}
There should be no large fluctuation.

7-14-2 FUEL PUMP

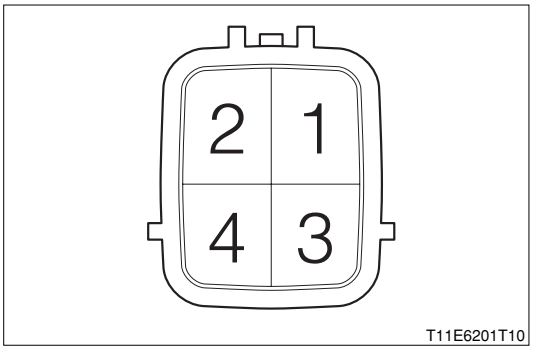
WARNING

- Fire is strictly forbidden while operation.

1.Turn the IG switch to the "ON" position.
2.Short-circuit the terminals 5 (EFI-T) and 13 (E) of the DLC, using the SST and confirm the operation sound of the fuel pump at this point.
SST: 09991-87404-000(1)
09991-87403-000(2)
3.Turn the IG switch to "LOCK".



4.Pull out the pump connector on top of the fuel tank and measure the resistance between 3 (pump+) - 4 (pump−) of the fuel pump.
SPECIFIED VALUE: 0.2 - 3.0Ω



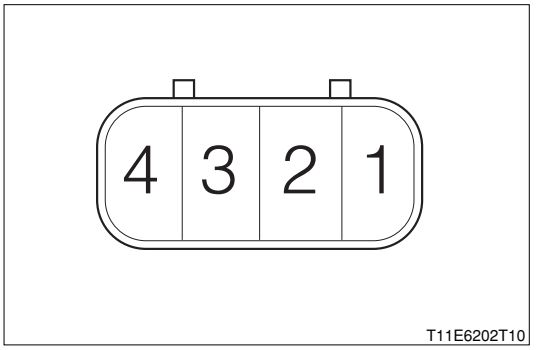
7-14-3 INTAKE MANIFOLD PRESSURE/INTAKE TEMPERATURE INTEGRATED SENSOR

1.Connect the SST.
SST: 09842-97209-000

2.Perform voltage measurements between the following terminals when the IG switch is "ON".
(1) Between SST 57 (VCPM) - SST 122 (E2PM)
SPECIFIED VALUE: 4.5 - 5.5V

3.Perform voltage measurements between the following terminals when the IG switch is "ON".
(1) Between SST 52 (PIM) - SST 122 (E2PM)
SPECIFIED VALUE: 3.1 - 4.1V

4.Perform voltage measurements between the following terminals by cranking with the fuel pump relay removed.
(1) Between SST 52 (PIM) - SST 122 (E2PM)
SPECIFIED VALUE: The voltage value changes.

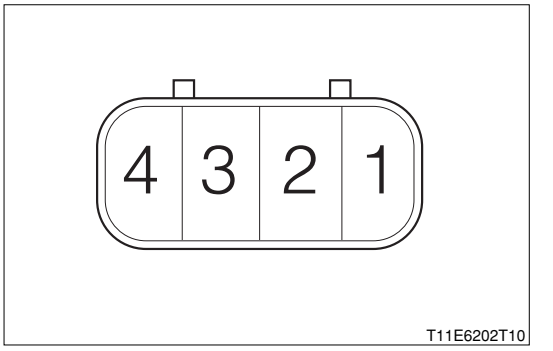


T11E6202T10

5.Measure the resistance between the following terminals.
(1) Between 4 (THA) - 2 (E2PM)

Intake air temperature sensor characteristics

Temperature (°C)	−30	−20	20	80	120
Resistance (kΩ)	28.6	16.2	2.45	0.322	0.117

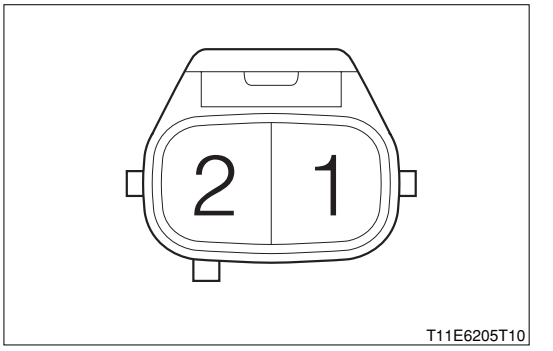


T11E6202T10

NOTE
- The reference value is indicated in the parentheses.

7-14-4 ENGINE REVOLUTION SENSOR

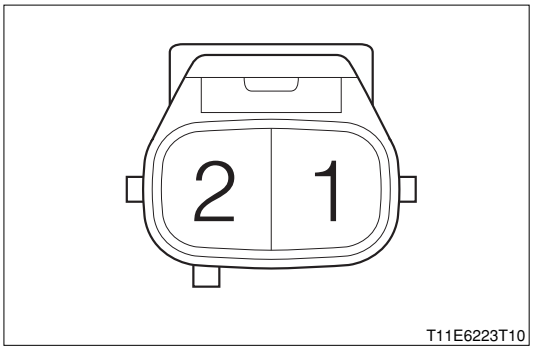
1.Measure the resistance between the following terminals.
(1) Between 1 (N1+) - 2 (N1−)
SPECIFIED VALUE: 2150±300Ω (At 20°C)



T11E6205T10

7-14-5 CAMSHAFT POSITION SENSOR

1.Measure the resistance between the following terminals.
(1) Between 1 (N2+) - 2 (N2−)
SPECIFIED VALUE: 2150±300Ω (At 20°C)

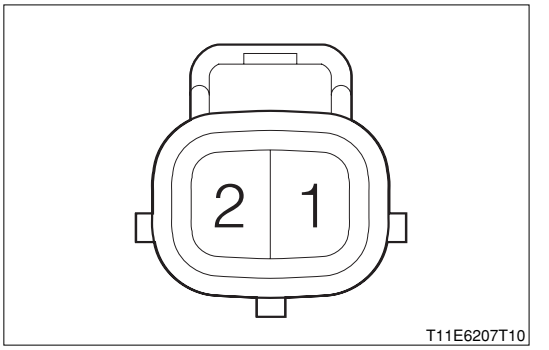


T11E6223T10

7-14-6 WATER TEMPERATURE SENSOR

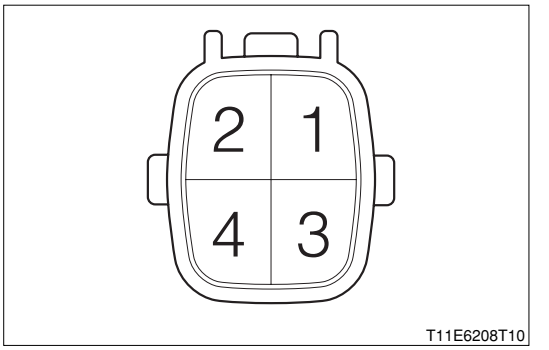
1.Measure the resistance between the following terminals.
(1) Between 1 (E2) - 2 (THW)

Temperature (℃)	−20	20	80	110
Resistance (kΩ)	15.04	2.45	0.318	0.142



7-14-7 OXYGEN SENSOR

1.Measure the resistance between the following terminals.
(1) Between 1 (OXH1) - 2 (+)
SPECIFIED VALUE: $7.0^{+1.4}_{-0.7}$ Ω (20±1°C)
2.Confirm that there is no continuity between each of the following terminals.
(1) Between oxygen sensor body - 3 (OX1)
(2) Between oxygen sensor body - 4 (E2)
(3) Between oxygen sensor body - 1 (OXH1)
(4) Between oxygen sensor body - 2 (+B)
(5) Between 3 (OX1) - 1 (OXH1)
(6) Between 3 (OX1) - 2 (+B)
(7) Between 4 (E2) - 1 (OXH1)
(8) Between4 (E2) - 2 (+B)
SPECIFIED VALUE: No continuity exists

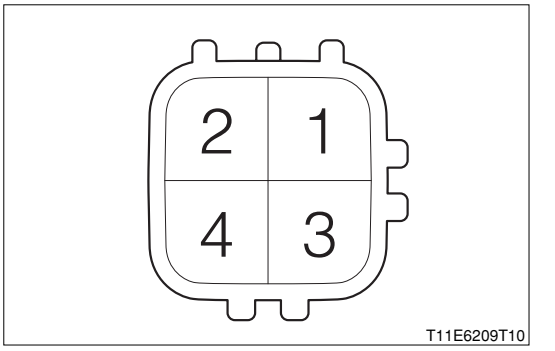


NOTE

- Other than the above unit check, perform checking for the oxygen sensor output voltage under the condition in which it is installed to the vehicle.
(Refer to the page of the oxygen sensor system of the trouble shooting according to the systems.)

Refer to Page B8-96.

7-14-8 REAR OXYGEN SENSOR



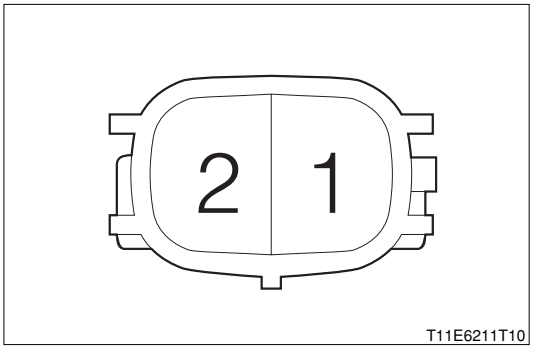
1.Measure the resistance between the following terminals.
(1) Between 1 (OXH2) - 2 (+)
SPECIFIED VALUE: $13.0^{+2.5}_{-1.3}$ Ω (20±1°C)
2.Confirm that there is no continuity between each of the following terminals.
(1) Between rear oxygen sensor body - 3 (OX2)
(2) Between rear oxygen sensor body - 4 (E2)
(3) Between rear oxygen sensor body - 1 (OXH2)
(4) Between rear oxygen sensor body - 2 (+B)
(5) Between 3 (OX2) - 1 (OXH2)
(6) Between 3 (OX2) - 2 (+B)
(7) Between 4 (E2) - 1 (OXH2)
(8) Between 4 (E2) - 2 (+B)
SPECIFIED VALUE: No continuity exists.

NOTE

- Other than the above unit check, perform checking for the rear oxygen sensor output voltage under the condition in which it is installed to the vehicle.
  (Refer to the page of the rear oxygen sensor system of the trouble shooting according to the systems.)

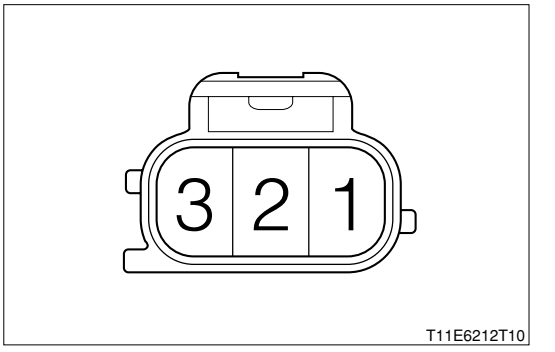
Refer to Page B8-223.

7-14-9 KNOCK SENSOR



1.Measure the resistance between the following terminals.
(1) Between 1 (E2) - 2 (KNK)
SPECIFIED VALUE: 200±80kΩ

7-14-10 THROTTLE POSITION SENSOR



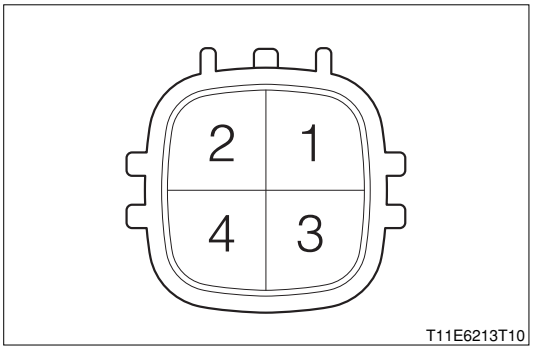
1.Measure the resistance between the following terminals.
(1) Between 1 (VC) - 2 (E2)
SPECIFIED VALUE: 2.5 - 6.0kΩ
2.Measure the resistance between the following terminals.
(1) Between 3 (VTH) - 2 (E2)
SPECIFIED VALUE: The resistance value will increase proportionally to the throttle lever opening.

NOTE

- The resistance value when the throttle lever is fully closed is about 0.4kΩ.
- The resistance value when the throttle lever is fully opened is about 3.4kΩ.

7-14-11 STEPPER MOTOR FOR ISC

1.Warm up the engine completely.
2.Confirm the engine revolution speed under the idling condition with no air conditioner and electric load applied.
SPECIFIED VALUE: It is at the regular idling speed.
Idling speed 750^{+100}_{-50} rpm



T11E6213T10

7-14-12 AIR CONDITIONER EVAPORATOR TEMPERATURE SENSOR

1.Measure the resistance between the sensor side connector terminals.
2.Connect the connectors and leave it for five minutes with the air conditioner "ON".

NOTE

- Air conditioner "ON" means that the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are all "ON".

3.Turn the air conditioner "OFF" and measure the resistance value between the following terminals.

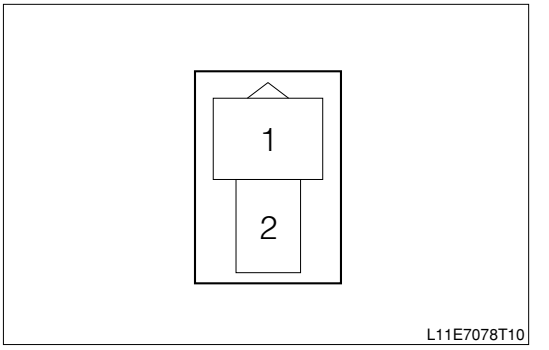
NOTE

- Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".

(1) Between 1 (ACEV) - 2 (E21)
SPECIFIED VALUE: The resistance value changes before and after the air conditioner operation.

NOTE

- The lower the temperature is the higher the resistance value will become.



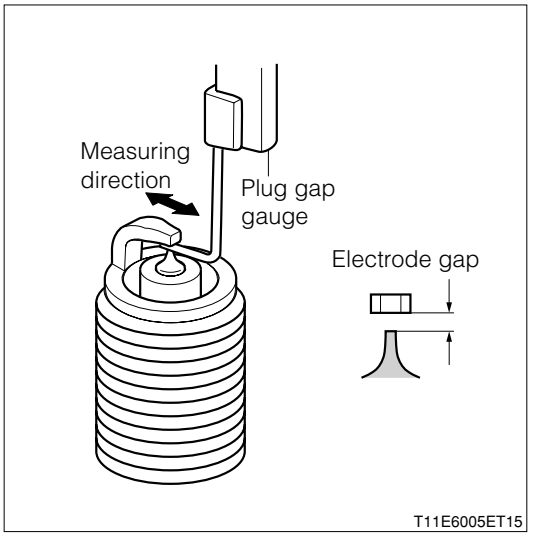
L11E7078T10

7-14-13 SPARK PLUG

WARNING

- Be very careful not to burn yourself since the spark plugs are hot.

1.Check that the spark plugs exhibits no smoldering and the plugs are not burnt excessively.
2.Check the plug gaps using the plug gap gauge.
SPECIFIED VALUE: $1.1^{+0}_{-0.1}$ mm



T11E6005ET15

7-14-14 INJECTOR

WARNING

- Never use fire during the work.
- Put cloth, etc. to prevent fuel from splashing.

1.Remove the injector to be checked.

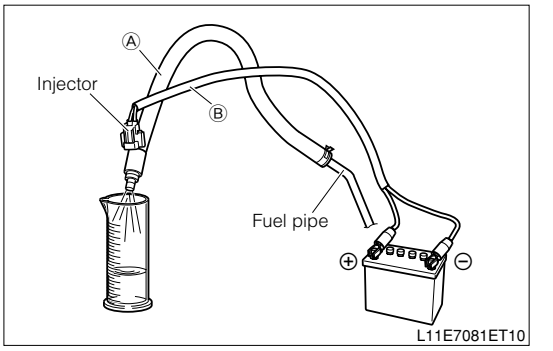
CAUTION

- After removing, install a substitute injector.

2.Remove the fuel hose between the fuel inlet pipe and fuel pipe.

3.Set the injector to be checked to the fuel hose, using SST (Sub harness, measuring tool, EFI inspection wire). (Refer to the right figure.)

SST: 09842-97209-000
09268-41047-000(A)
09842-30070-000(B)



L11E7081ET10

4.With the IG switch "ON"

5.Confirm that the fuel is injected when the battery voltage is applied to the injector.

SPECIFIED VALUE: It is injected.

CAUTION

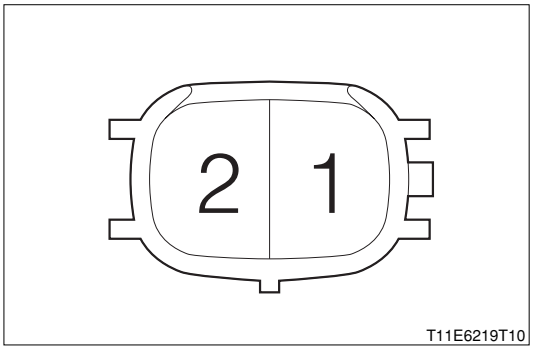
- Perform "ON" or "OFF" at the battery side.

6.Measure the amount leaking from the injector in one minute by removing the battery in the injection check condition.

SPECIFIED VALUE: One drop or less

7.Measure the resistance value between the injector terminals.

SPECIFIED VALUE: 12Ω (At 20°C)

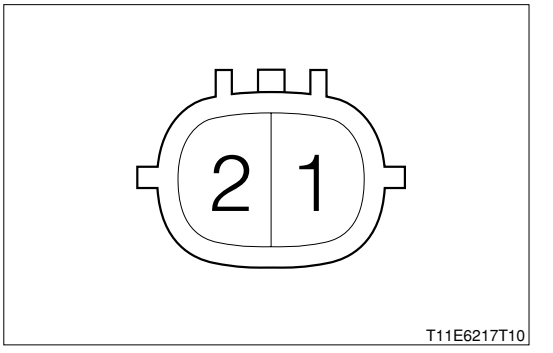


T11E6219T10

7-14-15 OIL CONTROL VALVE

1.Visually confirm the operation of the valve when battery voltage is applied to between the connector terminals of the oil control valve.

	Connected to:
Battery positive terminal	1 (OCV+)
Battery negative (-) terminal	2 (OCV−)



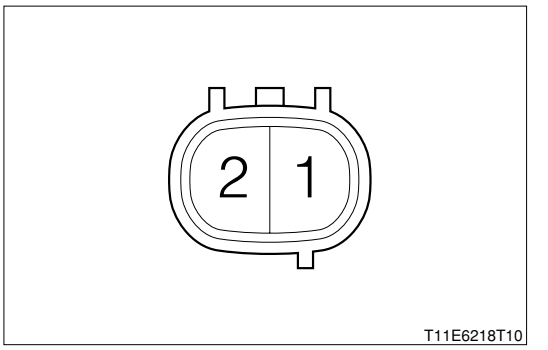
T11E6217T10

CAUTION

- The time while the battery voltage is applied should be kept within one minute.

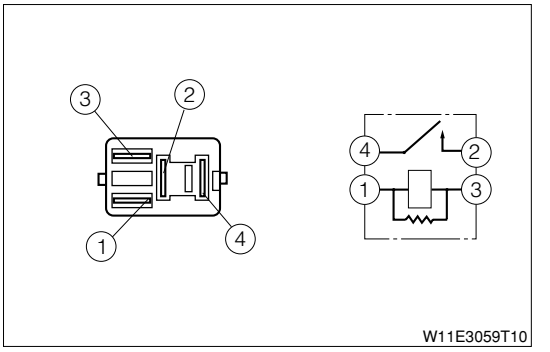
SPECIFIED VALUE: The valve operates when the battery voltage is applied.

7-14-16 VSV FOR EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL



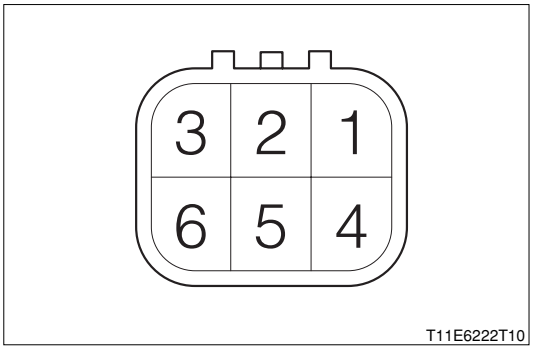
1. Perform air continuity check between the ports.
   SPECIFIED VALUE: No air continuity
2. Perform air continuity check between the ports when battery voltage is applied between the VSV for evaporative emission control system purge control connector terminals.
   SPECIFIED VALUE: Air continuity exists.
3. Measure the resistance value between the following terminals.
   (1) Between 1 (PRG) - 2 (+B)
   SPECIFIED VALUE: 30 - 34 Ω (20°C)

7-14-17 MAIN RELAY (EFI), FUEL PUMP RELAY (FUEL PUMP), RADIATOR FAN RELAY (RAD), MAGNET CLUTCH RELAY (MGC)



1. Ensure that the relay is operating when the IG switch is "ON" by sound and vibration.
   WARNING
   - Do not touch the relay during operation since the relay may become hot while operating.
2. Measure the resistance between relay side terminals 1 and 3.
   SPECIFIED VALUE: 131 - 230 Ω (At 20°C)
   NOTE
   - Measure after the temperature in the relay becomes the same with the ambient temperature (20°C). (Measure after leaving it for one hour or more in the ambient temperature 20°C with the relay "OFF".)
3. Ensure that there is no continuity between each terminal other than the relay side terminals 1 and 3.
4. Ensure that there is continuity between relay side terminals 2 and 4 when battery voltage is applied between the relay side terminal 1 and 3.

7-14-18 STEPPER MOTOR TYPE EGR VALVE



(1) Resistance value check

1.Measure the resistance value between the following terminals.
(1) 1 (EGR4) - 2 (B2)
(2) 3 (EGR2) - 2 (B2)
(3) 4 (EGR1) - 5 (B1)
(4) 6 (EGR3) - 5 (B1)
SPECIFIED VALUE: 18 - 22Ω (At 20℃)

NOTE

- Measure after the temperature in the stepper motor type EGR valve becomes the same with the ambient temperature (20℃).
  (Measure after leaving it for one hour or more in the ambient temperature 20℃ with the engine stopped.)

(2) Visual check

1.Check that there are no clogging, damage or foreign matters in the passage of the EGR gas of the EGR valve.

CAUTION

- Be careful not to touch the valve section by tools when removing any foreign matters.

7-15 ECU INPUT/OUTPUT SIGNAL CHECK

7-15-1 CHECKING METHOD

7-15-2 SPECIFIED VALUE FOR INPUT/ OUTPUT SIGNAL

Check system	Terminal	Measuring condition	Specified value
Power supply system	27 (＋B) - 125 (E1)	When IG switch is "ON"	Battery voltage
	38 (BAT) - 125 (E1)	At all times	
Manifold absolute pressure sensor system	57 (VCPM) - 122 (E2PM)	When IG switch is "ON"	4.5 - 5.5V
	52 (PIM) - 122 (E2PM)	When the sensor is opened to the atmosphere	3.1 - 4.1V
		After starting the engine	Changes according to the opening of the accelerator
Throttle positionsensor system	56 (VC) - 19 (E2)	When IG switch is "ON"	4.5 - 5.5V
	53 (VTH) - 19 (E2)	When throttle valve is fully closed	0.4 - 0.8V
		When throttle valve is fully opened	3.2 - 5.0V
Water temperature sensor system	54 (THW) - 19 (E2)	When warmed up (water temperature 60 - 120℃)	0.3 - 1.3V
Intake air temperature sensor system	51 (THA) - 19 (E2)	When warmed up	0.5 - 4.3V
Knock sensor system	121 (KNK) - 19 (E2)	When idling, when racing	Pulse generation
Engine revolution sensor system	59 (N1＋) - 128 (N1－)	When idling	Pulse generation
Camshaft position sensor system	58 (N2＋) - 127 (N2－)	When idling	Pulse generation
Oxygen sensor system	123 (OX1) - 19 (E2)	After maintaining at 3000rpm for four minutes	Changes between 0.2 - 1.0V
Injector system	24 (#10) - 125 (E1)	When IG switch is "ON" When idling	Battery voltage Pulse generation
	23 (#20) - 125 (E1)		
	22 (#30) - 125 (E1)		
Ignition system	63 (IG1) - 125 (E1)	When IG switch is "ON" When idling	0 - 0.11V Pulse generation
	62 (IG2) - 125 (E1)		
	61 (IG3) - 125 (E1)		
Ion current combustion control system※	51 (ICMB1) - 125 (E1)	While idling	Pulse generation
	50 (ICMB2) - 125 (E1)		
	49 (ICMB3) - 125 (E1)		

※: Only vehicles with EU specifications

Check system	Terminal	Measuring condition	Specified value
ISC driving signal system	66 (IACALO) - 125 (E1)	When idling	Pulse generation
	67 (IACAHI) - 125 (E1)		
	68 (IACBLO) - 125 (E1)		
	69 (IACBHI) - 125 (E1)		
	12 (EPS) - 125 (E1)	When the steering wheel is turned with the vehicle stopped	0 - 1V
		When the steering wheel is not turned with the vehicle stopped	Battery voltage
Fuel pump system	35 (FC1) - 125 (E1)	Fuel pump stopped	Battery voltage
		When idling (or when cranking)	1.2V or less
Evaporative emission temperature sensor system	45 (ACEV) - 116 (E21)	When air conditioner is "ON"	0.15 - 4.8V
Air conditioner input signal system	3 (ACSW) - 125 (E1)	When air conditioner switch is "ON"	Battery voltage
		When air conditioner switch is "OFF"	0 - 0.5V
Air conditioner relay system	36 (MGC) - 125(E1)	When magnet clutch relay is "ON"	Around 0V
		When magnet clutch relay is "OFF"	Battery voltage
Stop lamp system	43 (STP) - 125 (E1)	When stop lamp is lighted	Battery voltage
		When stop lamp is not lighted	0 - 0.5V
Defogger system	11 (DEF) - 125 (E1)	When defogger switch is "ON"	Battery voltage
		When defogger switch is "OFF"	0 - 0.5V
Blower system	42 (BLW) - 125 (E1)	When heater blower switch is "ON"	0 - 0.5V
		When heater blower switch is "OFF"	Battery voltage
Radiator fan control system	37 (FAN1) - 125 (E1)	When magnet clutch is "ON"	1V or less
		When magnet clutch is "OFF"	Battery voltage
Variable valve timing control system	26 (OCV+) - 25 (OCV−)	When idling	Pulse generation
Engine revolution output system	118 (REV) - 125 (E1)	When idling	Pulse generation
Stepper motor type EGR valve control system	130 (EGR4) - 27 (+B)	When cranking	Pulse generation
	131 (EGR3) - 27 (+B)		
	132 (EGR2) - 27 (+B)		
	133 (EGR1) - 27 (+B)		
Earth system	Between 19 (E2) - body	At all times	Continuity exists.
	Between 20 (E01) - body		
	Between 116 (E21) - body		
	Between 125 (E1) - body		

7-15-3 OSCILLOSCOPE WAVEFORMS

(1) Injector

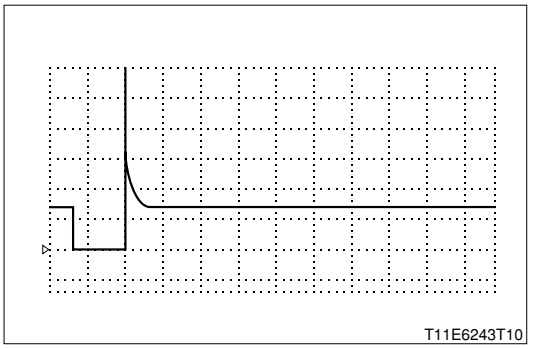
1.Connect the SST.
SST: 09842-97209-000

2.Perform output check between the following terminals using an oscilloscope.
(1) Between SST 24 (#10) - SST 125 (E1)
(2) Between SST 23 (#20) - SST 125 (E1)
(3) Between SST 22 (#30) - SST 125 (E1)

3.As an example, in case of the following measuring range and measuring conditions, it will be as in the right figure.

Time axis	2ms / DIV
Voltage axis	10V / DIV
Measuring condition	When air conditioner is "OFF" with no electric load and while idling

Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".


T11E6243T10

NOTE

- The waveform cannot be specified, but confirm that a waveform as in the right figure (one such example) shows up.

4.Confirm the following points.
(1) The voltage changes from the battery voltage to 0V while fuel injection.

(2) Oil control valve

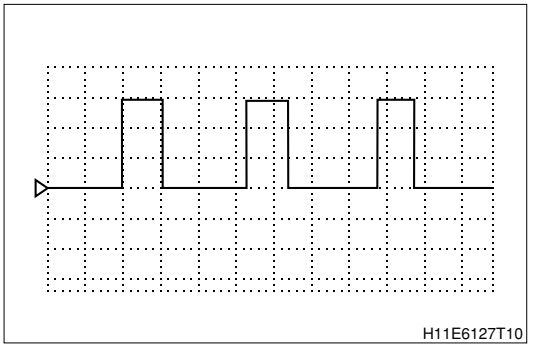
1.Connect the SST.
SST: 09842-97209-000

2.Completely warm up the engine.
3.Perform output check between the following terminals using an oscilloscope.
(1) SST 26 (OCV+) - SST 25 (OCV−)

4.As an example, in case of the following measuring range and measuring conditions, it will be as in the right figure.

Time axis	1ms / DIV
Voltage axis	5V / DIV
Measuring condition	When air conditioner is "OFF" with no electric load and while idling

Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".


H11E6127T10

NOTE

- The waveform cannot be specified, but confirm that a waveform as in the right figure (One such example) shows up.

5.Confirm the following points.
(1) The pulse of 0V ⇄ battery voltage is generated.

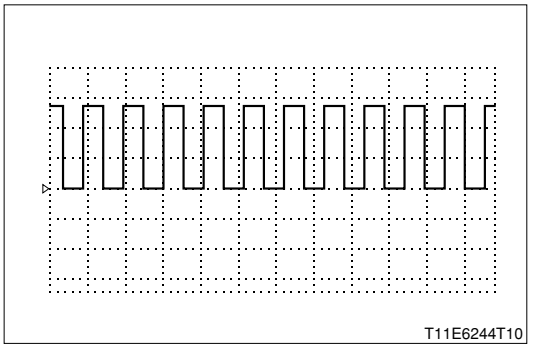
(3) Engine revolution output signal

1.Connect the SST.
SST: 09842-97209-000

2.Perform output check between the following terminals using an oscilloscope.
3.Completely warm up the engine.
(1) SST 118 (REV) - SST 125 (E1)
4.As an example, in case of the following measuring range and measuring conditions, it will be as in the right figure.

Time axis	50ms / DIV
Voltage axis	5V / DIV
Measuring condition	When air conditioner is "OFF" with no electric load and while idling

Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".



NOTE

- The waveform cannot be specified, but confirm that a waveform as in the right figure (One such example) shows up.

5.Confirm the following points.
(1) The pulse of 0V ⇄ battery voltage is generated.
(2) The wave period becomes shorter as the engine revolution speed rises.

■ K3
1 ENGINE CONTROL COMPUTER
1-1 REMOVAL AND INSTALLATION
Refer to Page B8-1.

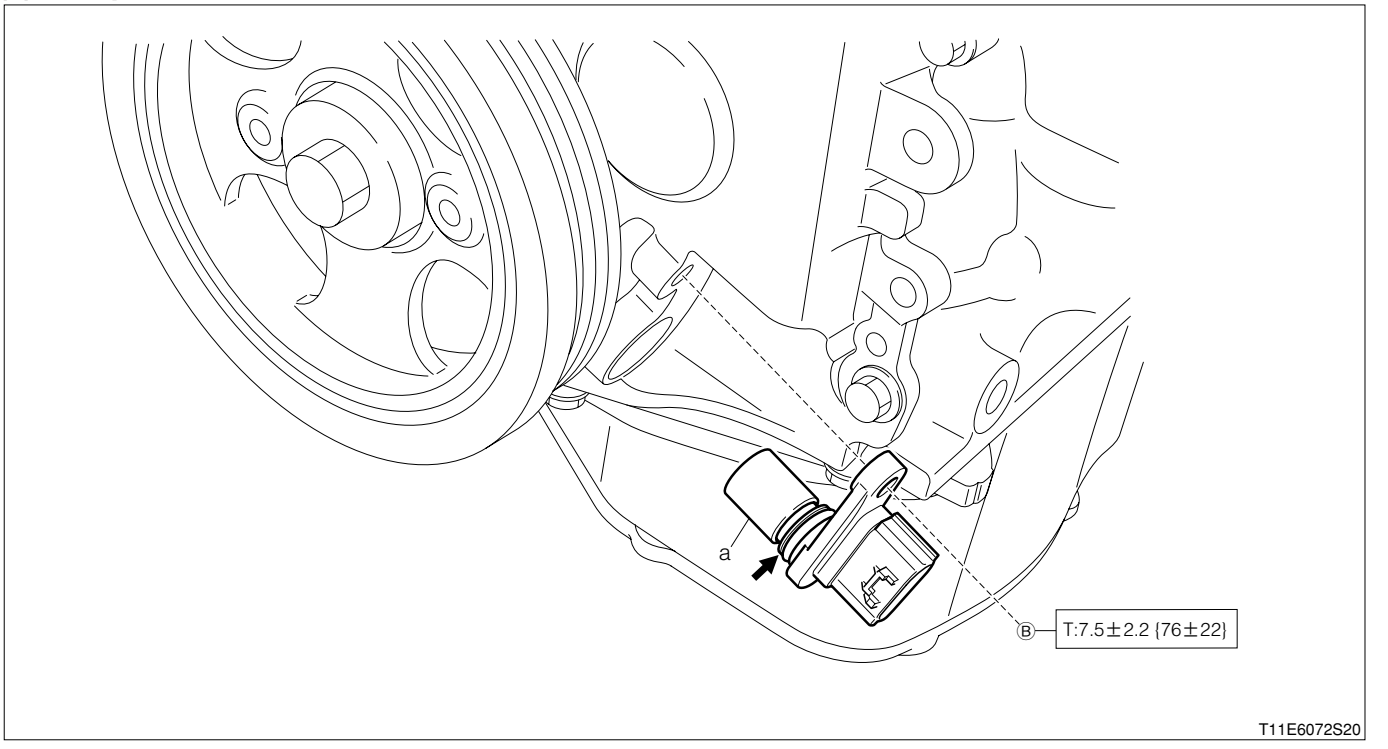
2 ENGINE REVOLUTION SENSOR
2-1 REMOVAL AND INSTALLATION
2-1-1 ARTICLES TO BE PREPARED
Instrument

Torque wrench

LUBRICANT: Engine oil

2-1-2 OPERATION BEFORE REMOVAL
1.Disconnect the negative (-) terminal of the battery.
2.Remove the connectors of the crank position sensor Ay.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES
(1) Components



➡:Engine oil
Unit: N·m{kgf·cm}

(2) Removeal and installation procedures

▲ 1 a Sensor Ay, crank position

2-1-4 POINTS OF INSTALLATION
(1) Sensor Ay, crank position

1.Apply engine oil to the O-ring of the sensor Ay.
LUBRICANT: Engine oil

2-1-5 OPERATION AFTER INSTALLATION
1.Connect the connectors of the crank position sensor Ay.
2.Connect the negative (-) terminal of the battery.

3 CAMSHAFT POSITION SENSOR

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

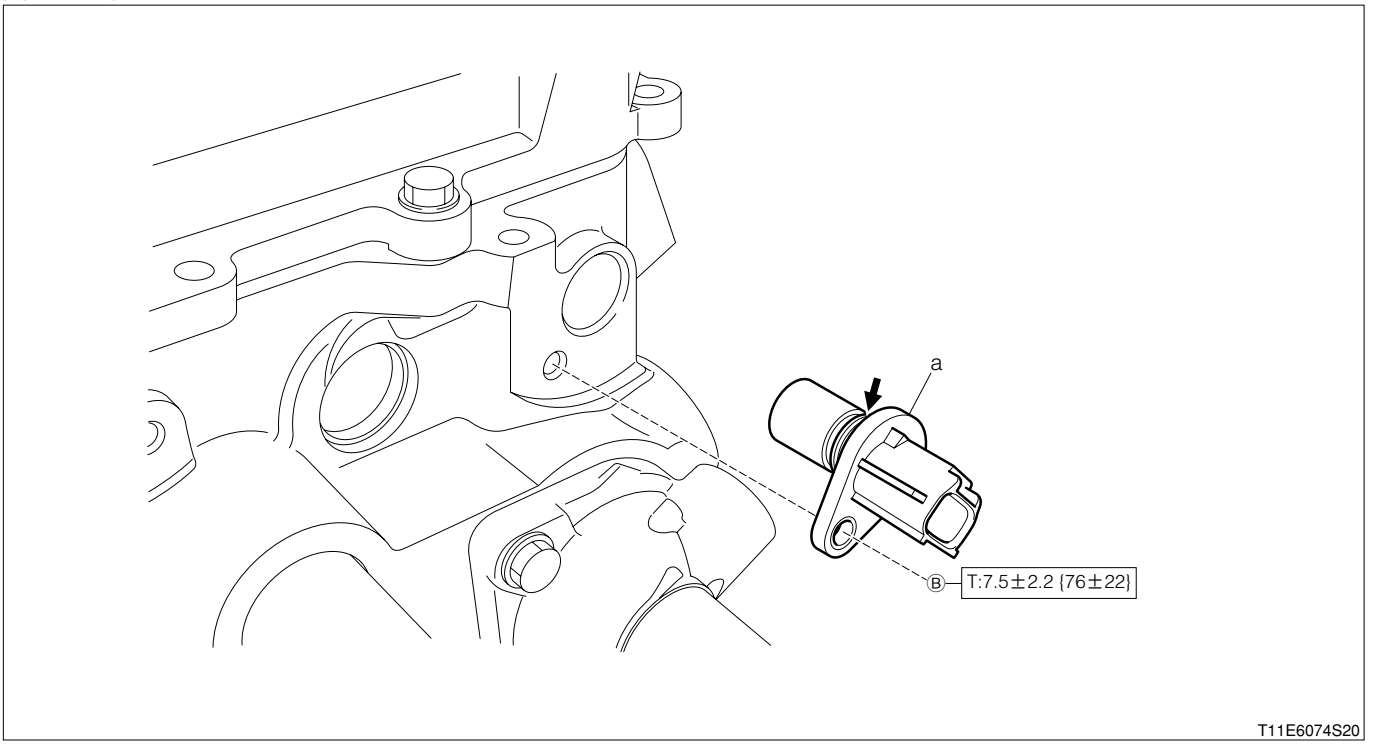
Engine oil

3-1-2 OPERATION BEFORE REMOVAL

1.Disconnect the negative (-) terminal of the battery.
2.Remove the connectors of the cam position sensor Ay.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



➡:Engine oil
Unit: N·m{kgf·cm}

(2) Removeal and installation procedures

▲ 1 a Sensor Ay, cam position

3-1-4 POINTS OF INSTALLATION

(1) Sensor Ay, cam position

1.Apply engine oil to the O-ring of the sensor Ay.
LUBRICANT: Engine oil

3-1-5 OPERATION AFTER INSTALLATION

1.Connect the connectors of the cam position sensor Ay.
2.Connect the negative (-) terminal of the battery.

4 KNOCK SENSOR

4-1 REMOVAL AND INSTALLATION

4-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

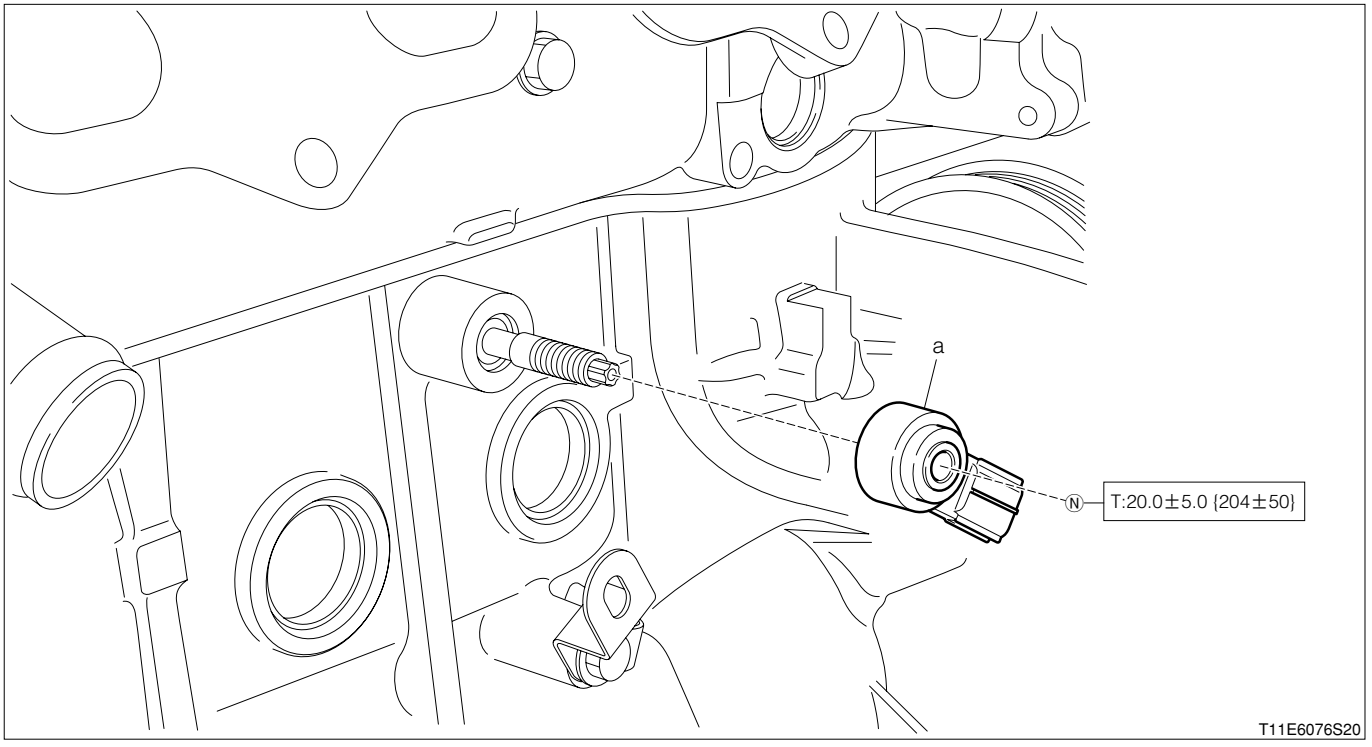
4-1-2 OPERATION BEFORE REMOVAL

1.Disconnect the negative (-) terminal of the battery.
2.Remove the intake manifold Ay.
Refer to Page B3-14.

3.Remove the connectors of the knock control sensor.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

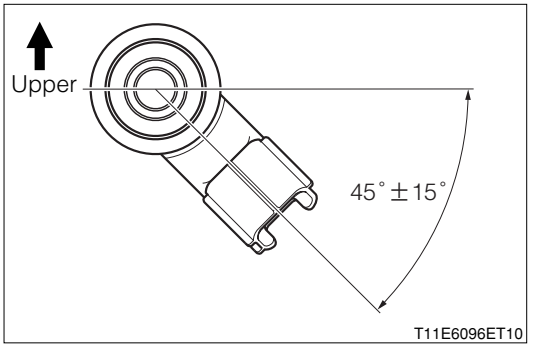
(2) Removeal and installation procedures

▲ 1 a Sensor, knock control

4-1-4 POINTS OF INSTALLATION

(1) Sensor, knock control

1.When installing the sensor to the engine Ay, install in the range shown in the figure.



4-1-5 OPERATION AFTER INSTALLATION

1.Connect the connectors of the knock control sensor.
2.Install the intake manifold Ay.
Refer to Page B3-14.

3.Connect the negative (-) terminal of the battery.

5 ENGINE COOLANT TEMPERATURE SENSOR

5-1 REMOVAL AND INSTALLATION

5-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

5-1-2 OPERATION BEFORE REMOVAL

1.Disconnect the negative (-) terminal of the battery.
2.Drain the cooling water.

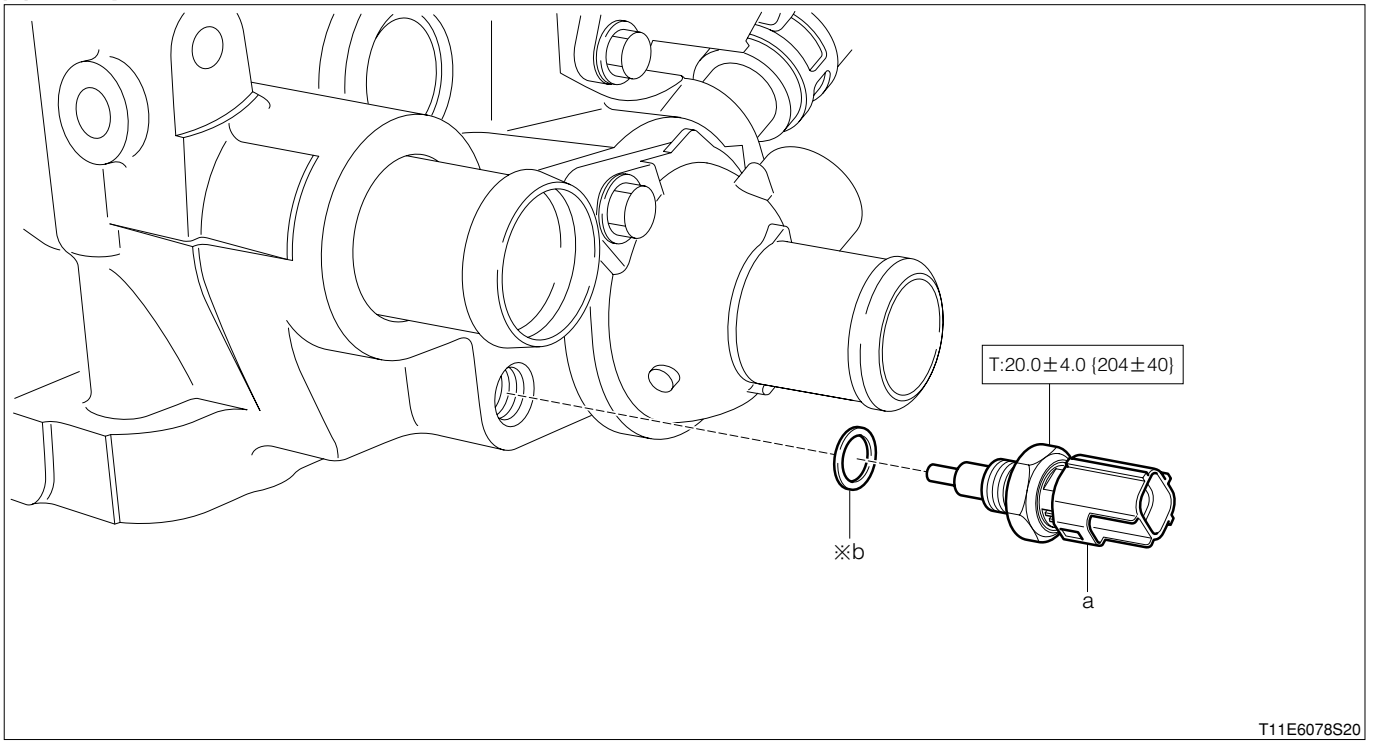
NOTE

- Drain a certain amount of the cooling water so that it would not leak from the No.1 radiator hose.

3.Remove the No.1 radiator hose (Engine side).
4.Remove the connectors of the water temperature sensor.

5-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※: Non-reusable parts
Unit: N·m {kgf·cm}

(2) Removeal and installation procedures

1 a Sensor, water temperature
2 b Gasket

5-1-4 OPERATION AFTER INSTALLATION

1.Connect the connectors of the water temperature sensor.
2.Install the No.1 radiator hose (Engine side).
3.Fill cooling water.
4.Connect the negative (-) terminal of the battery.
5.Start the engine and perform air-bleeding of the cooling water.
6.Stop the engine and check for leakage of cooling water.

6 INTAKE AIR TEMPERATURE SENSOR

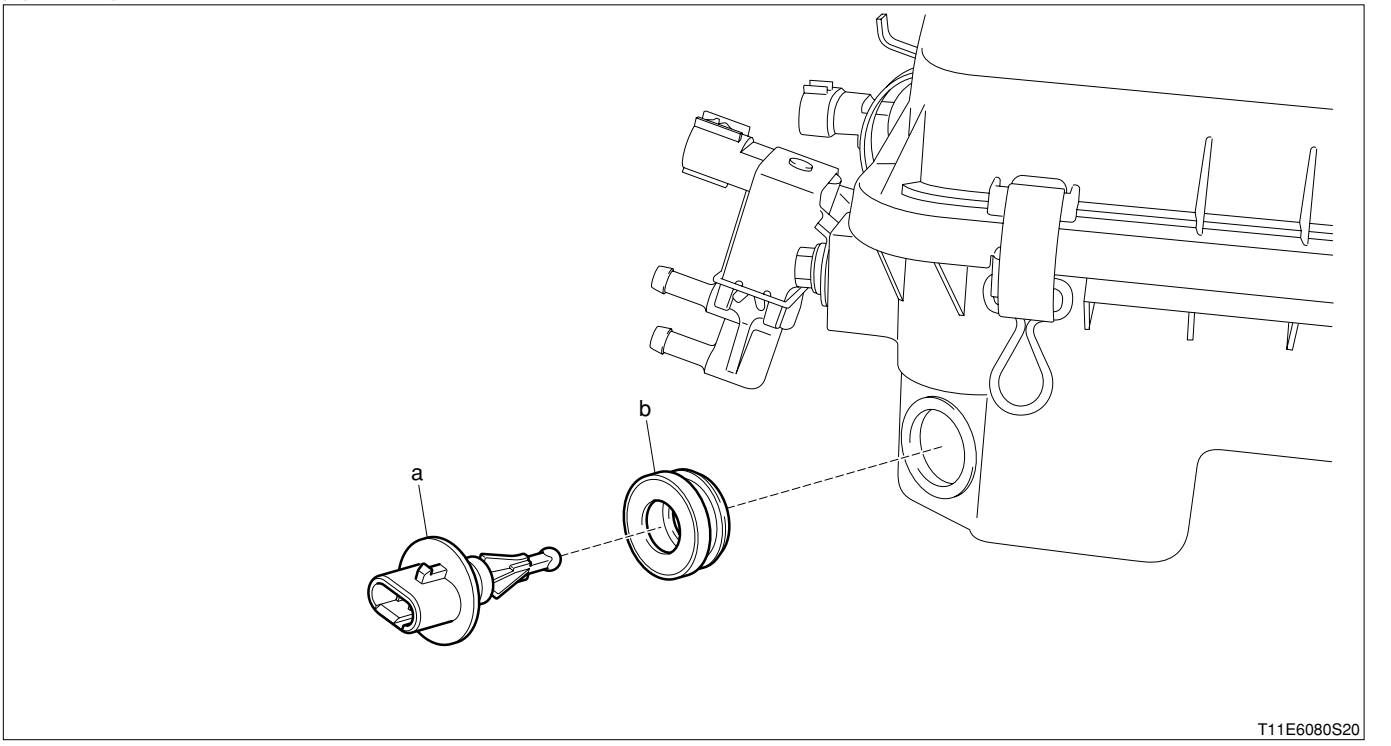
6-1 REMOVAL AND INSTALLATION

6-1-1 OPERATION BEFORE REMOVAL

1.Disconnect the negative (-) terminal of the battery.
2.Remove the connectors of the thermo sensor.

6-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removeal and installation procedures

1 a Sensor, thermo
2 b Grommet

6-1-3 OPERATION AFTER INSTALLATION

1.Connect the connectors of the thermo sensor.
2.Connect the negative (-) terminal of the battery.

7 MANIFOLD ABSOLUTE PRESSURE SENSOR

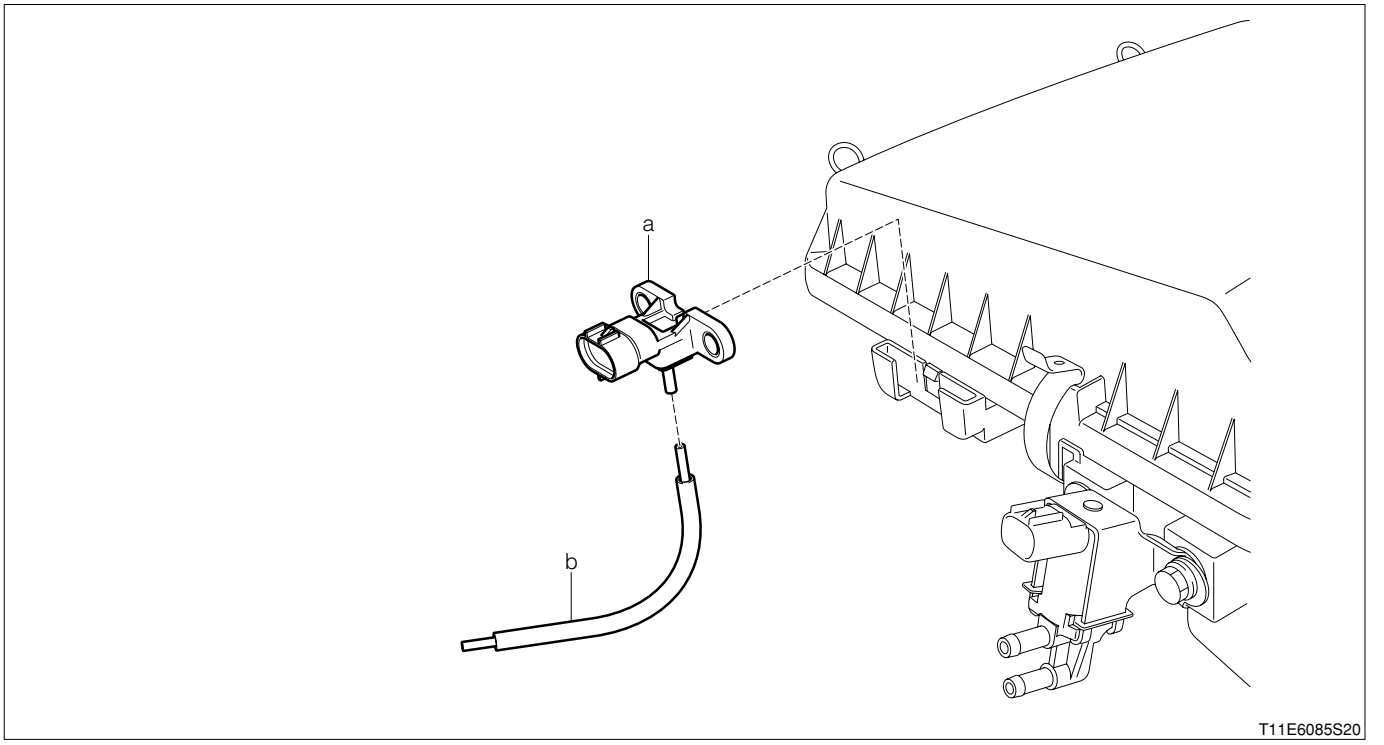
7-1 REMOVAL AND INSTALLATION

7-1-1 OPERATION BEFORE REMOVAL

1.Disconnect the negative (-) terminal of the battery.
2.Remove the vacuum hose S/A from the intake manifold Ay.
3.Remove the connectors of the vacuum sensor.

7-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removeal and installation procedures

1 a Sensor, vacuum
2 b Hose S/A, vacuum

7-1-3 OPERATION AFTER INSTALLATION

1.Connect the connectors of the vacuum sensor.
2.Install the vacuum hose S/A to the intake manifold Ay.
3.Connect the negative (-) terminal of the battery.

8 OIL CONTROL VALVE

8-1 REMOVAL AND INSTALLATION

8-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

Engine oil

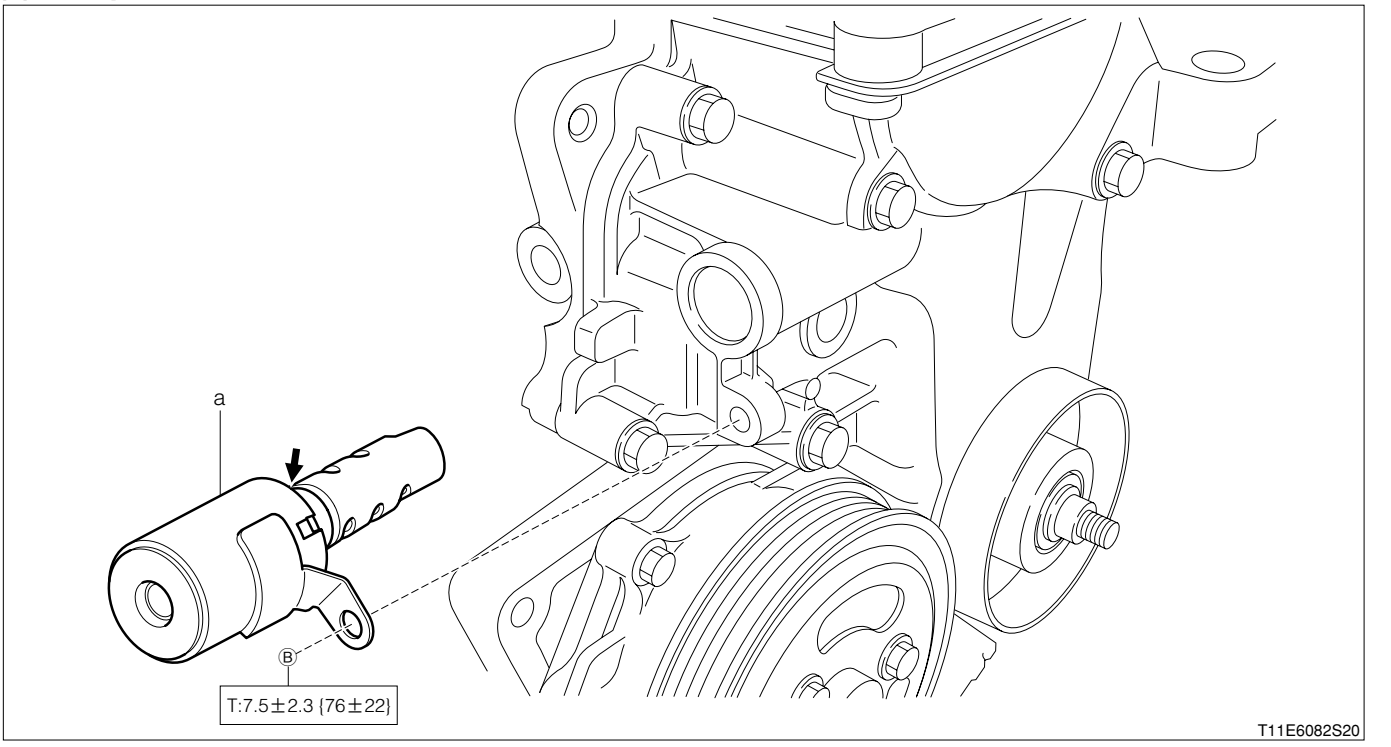
8-1-2 OPERATION BEFORE REMOVAL

1.Disconnect the negative (-) terminal of the battery.
2.Remove the No.1 air cleaner hose.
Refer to Page B3-9.

3.Remove the connectors of the cam timing oil control valve Ay.

8-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



➡:Engine oil
Unit: N·m{kgf·cm}

(2) Removeal and installation procedures

▲ 1 a Valve Ay, cam timing oil control

8-1-4 POINTS OF INSTALLATION

(1) Valve Ay, cam timing oil control

1.Apply engine oil to the O-ring of the valve Ay.
LUBRICANT: Engine oil

8-1-5 OPERATION AFTER INSTALLATION

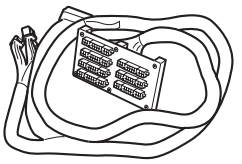
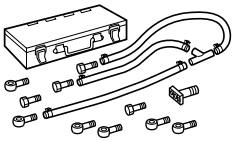
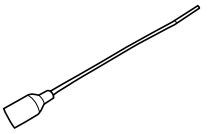
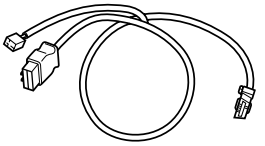
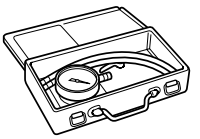
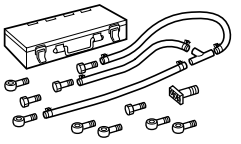
1.Connect the connectors of the cam timing oil control valve Ay.
2.Install the No.1 air cleaner hose.
Refer to Page B3-9.

3.Connect the negative (-) terminal of the battery.

9 ENGINE CONTROL SYSTEM

9-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09842-97209-000	Sub-harness,EFI computer check
	09268-41047-000 (09268-41045-000)	Tool set,injection measuring
	09842-30070-000	Wire,EFI inspection
	09991-87402-000	Wire,tacho-pulse pick up
	09991-87403-000	Wire,diagnosis check
	09991-87404-000 (09991-87401-000)	Wire,engine control system inspection
	09991-87301-000	Set,Diagnosis tester
	09965-97230-000 (09965-97207-000)	Trouble-Shooting program card
	09268-87701-000	Gauge,EFI fuel pressure
	09268-87702-000	Tool set,measuring

Instrument

Tachometer,Timing light,Compression gauge,Sound scope,Electrical Tester,Oscillo scope

WARNING

- If the vehicle is driven with the SST (EFI computer check sub harness, etc.) connected there is a possibility of causing malfunction and may be very dangerous. Therefore, remove it without fail before running.

9-2 HANDLING INSTRUCTIONS OF CONTROL SYSTEM

9-2-1 INSTRUCTIONS ON USE OF THIS SERVICE MANUAL

1.This service manual has been compiled in such a way that the manual may be used both in regions where the type certification is implemented based on the EU exhaust emission approval, and other regions.

2..Hence, with regard to the assignment, reading, erasing of diagnostic trouble codes and those steps of checks, repairs and confirmation, the service manual contains the procedures for both cases; One is a procedure that uses the DS-21 diagnosis tester or the OBD Ⅱ generic scan tool, and the other is a procedure that does not use this tester or tool.

Therefore, the following instructions given below must be observed.

3.About Use of DS-21 Diagnosis Tester or OBD Ⅱ Generic Scan Tool

(1) Regions where type certification is implemented based on EU exhaust emission approval; Make sure to use the DS-21 diagnosis tester or the OBD Ⅱ generic scan tool.

(2) Other regions; You may use or not use the DS-21 diagnosis tester or the OBD Ⅱ generic scan tool. You may perform the operation, employing whichever method that will be easier to you.

4.Instructions to be followed concerning Diagnosis Trouble Codes

Diagnosis trouble codes, such as P0105/31 (Four-digit code/two-digit code) are posted additionally.

(1) Regions where type certification is implemented based on EC exhaust emission approval

Make sure to use only four-digit trouble codes (E.G. P0105) whose have been assigned according to the ISO regulations.

(2) Other regions;

You may perform the operation using the four-digit code, employing the DS-21 diagnosis tester or the OBD Ⅱ generic scan tool. Or you may perform the operation using the two-digit codes (E.G. 31), without the use of the tester or tool. You may perform the operation, employing whichever method that will be easier to you.

Or you may perform the operation using the two-digit codes (E.G. 31), without the use of the tester or tool.

You may perform the operation, employing whichever method that will be easier to you.

NOTE

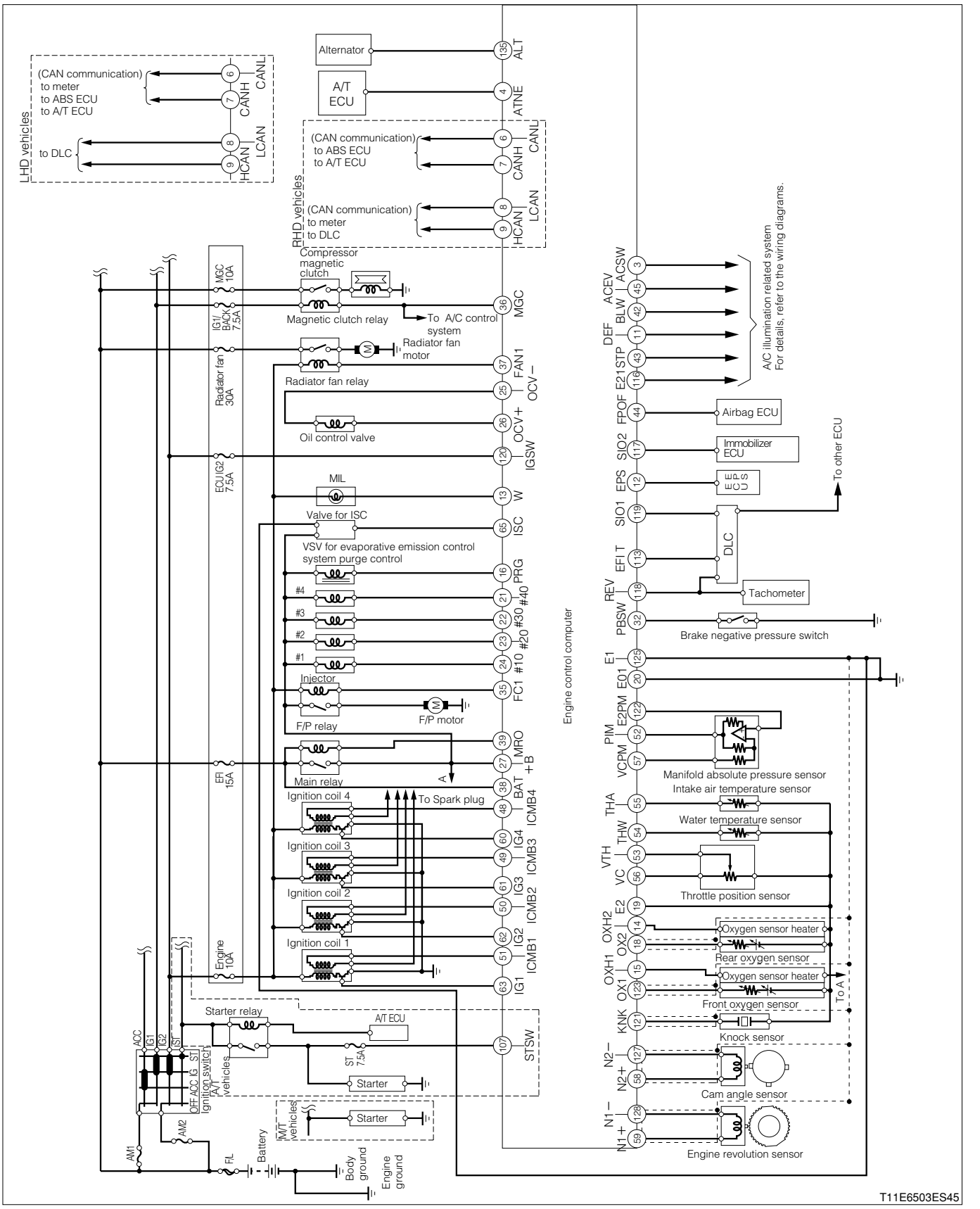
- The OBD Ⅱ generic scan tool means a scan tool complying with the ISO 14230 (KWP2000) format.
- In cases where the OBD Ⅱ generic scan tool is employed, not all diagnostic trouble codes (Four-digit codes) can be read out. It should be noted that only those diagnostic trouble codes in which "zero" follows after "P", for example, P0XXX, can be read out.
- The accuracy of the two-digit codes in diagnosing malfunctioning components is slightly inferior to that of the four-digit codes.
- Hereinafter, those regions where the type certification is implemented based on the EU exhaust emission approval, is referred to as the "EU specifications".

9-2-2 PRECAUTIONARY MEASURES DURING TROUBLE-SHOOTING

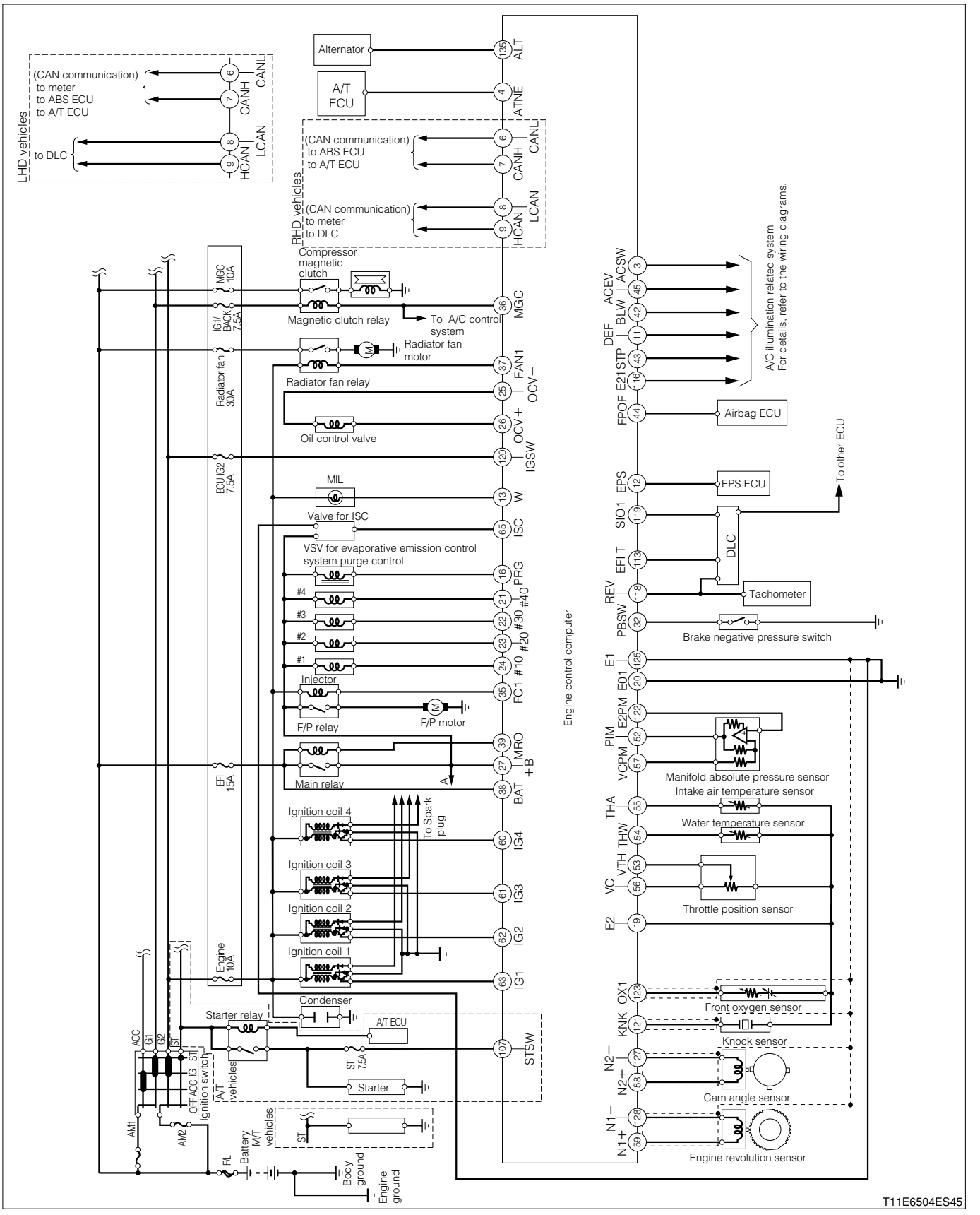
1. Before the diagnosis information memorized in the EFI ECU memory is confirmed, never disconnect the connector from the EFI ECU, the battery negative (-) terminal, the EFI ECU earth wire from the engine, or the main fuse.
2. The diagnosis information memorized in the EFI ECU memory can be erased by using the DS-21 diagnosis tester or the OBD-II generic scan tool in the same way as the check. Therefore, before using the tester, read its instruction manual so as to understand the functions furnished and how to use it.
3. Priority in trouble-shooting
   (1) If the priority in trouble-shooting for a number of diagnostic trouble codes is given in the concerned DTC flow chart, make sure to follow the priority.
   (2) If not given, follow the priority given below and perform the trouble-shooting for each diagnostic trouble code (DTC).
   (1) DTC other than DTC P0171/25, DTC P0172/26 (Too lean/too rich in fuel system), and DTC 0300/17, DTC P0301-P0304/17 (Misfire found)
   (2) DTC P0171/25, DTC P0172/26 (Too lean/too rich in fuel system)
   (3) DTC 0300/17, DTC P0301-P0304/17 (Misfire found)

9-3 SYSTEM WIRING DIAGRAM

9-3-1 FOR EU SPECIFICATIONS

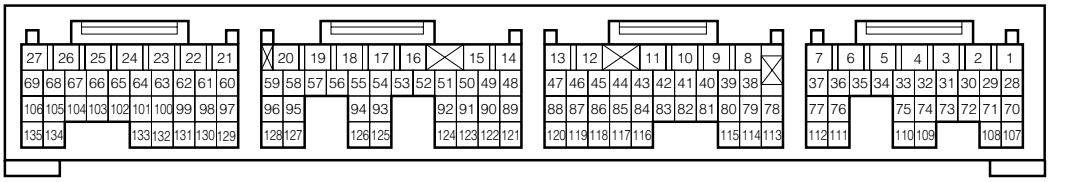


9-3-2 FOR GENERAL SPECIFICATIONS



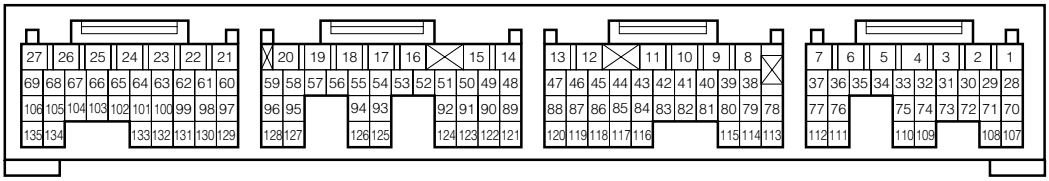
9-4 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS

(1) For EU specifications



H11E6091S10

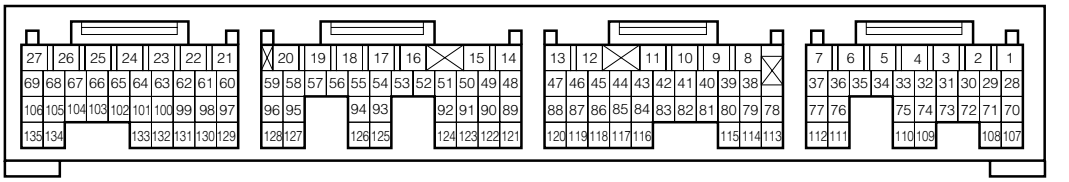
Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
1	—	—	31	—	—
2	—	—	32	PBSW	Brake negative pressure switch
3	ACSW	Air conditioner switch	33	—	—
4	ATNE	Engine revolution signal for AT	34	—	—
5	—	—	35	FC1	Fuel pump relay driving
6	CANL	CAN communication LO (1)	36	MGC	Magnetic clutch relay driving
7	CANH	CAN communication HI (1)	37	FAN1	Radiator fan relay driving
8	LCAN	CAN communication LO (2)	38	BAT	Backup power supply
9	HCAN	CAN communication HI (2)	39	MRO	Main relay driving
10	—	—	40	—	—
11	DEF	defogger signal	41	—	—
12	EPS	EPS ECU	42	BLW	Heater blower signal
13	W	Engine check lamp	43	STP	Stop lamp signal
14	OXH2	Rear oxygen sensor heater	44	FPOF	Airbag fuel pump "OFF" request signal
15	OXH1	Front oxygen sensor heater	45	—	—
16	PRG	VSV for evaporative emission control system purge control	46	—	—
17	—	—	47	—	—
18	OX2	Rear oxygen sensor signal	48	ICMB4	Ion current combustion control signal (#4)
19	E2	Sensor system earth	49	ICMB3	Ion current combustion control signal (#3)
20	E01	Power system earth	50	ICMB2	Ion current combustion control signal (#2)
21	#40	Injector (#4)	51	ICMB1	Ion current combustion control signal (#1)
22	#30	Injector (#3)	52	PIM	Manifold absolute pressure sensor
23	#20	Injector (#2)	53	VTH	Throttle position sensor
24	#10	Injector (#1)	54	THW	Engine water temperature sensor
25	OCV−	Oil control valve driving (−)	55	THA	Intake air temperature sensor
26	OCV+	Oil control valve driving (+)	56	VC	Sensor power supply
27	+B	EFI ECU power supply	57	VCPM	Sensor power supply (Exclusively for manifold absolute pressure sensor)
28	—	—	58	N2+	Cam angle sensor(+)
29	—	—	59	N1+	Engine revolution sensor(+)
30	—	—			



H11E6091S10

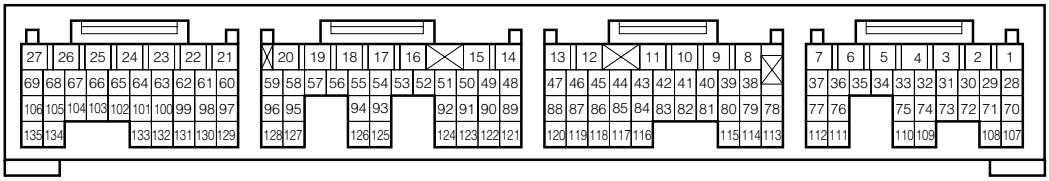
Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
60	IG4	Igniter (#4)	98	—	—
61	IG3	Igniter (#3)	99	—	—
62	IG2	Igniter (#2)	100	—	—
63	IG1	Igniter (#1)	101	—	—
64	—	—	102	—	—
65	ISC	Valve for ISC	103	—	—
66	—	—	104	—	—
67	—	—	105	—	—
68	—	—	106	—	—
69	—	—	107	STSW	Starter switch
70	—	—	108	—	—
71	—	—	109	—	—
72	—	—	110	—	—
73	—	—	111	—	—
74	—	—	112	—	—
75	—	—	113	EFIT	EFI-T check terminal
76	—	—	114	—	—
77	—	—	115	—	—
78	—	—	116	E21	Body sensor earth
79	—	—	117	SIO2	Immobilizer communication
80	—	—	118	REV	DLC (REV terminal)
81	—	—	119	SIO1	DLC (Diagnostic device)
82	—	—	120	IGSW	Ignition switch
83	—	—	121	KNK	Knock sensor
84	—	—	122	E2PM	Sensor earth (Exclusively for manifold absolute pressure sensor)
85	—	—	123	—	—
86	—	—	124	—	—
87	—	—	125	E1	Calculation system earth
88	—	—	126	—	—
89	—	—	127	N2−	Cam angle sensor(−)
90	—	—	128	N1−	Engine revolution sensor(−)
91	—	—	129	—	—
92	—	—	130	—	—
93	—	—	131	—	—
94	—	—	132	—	—
95	—	—	133	—	—
96	—	—	134	ALTC	Alternator voltage control output
97	—	—	135	ALT	Alternator cut control output

(2) For general specifications



H11E6091S10

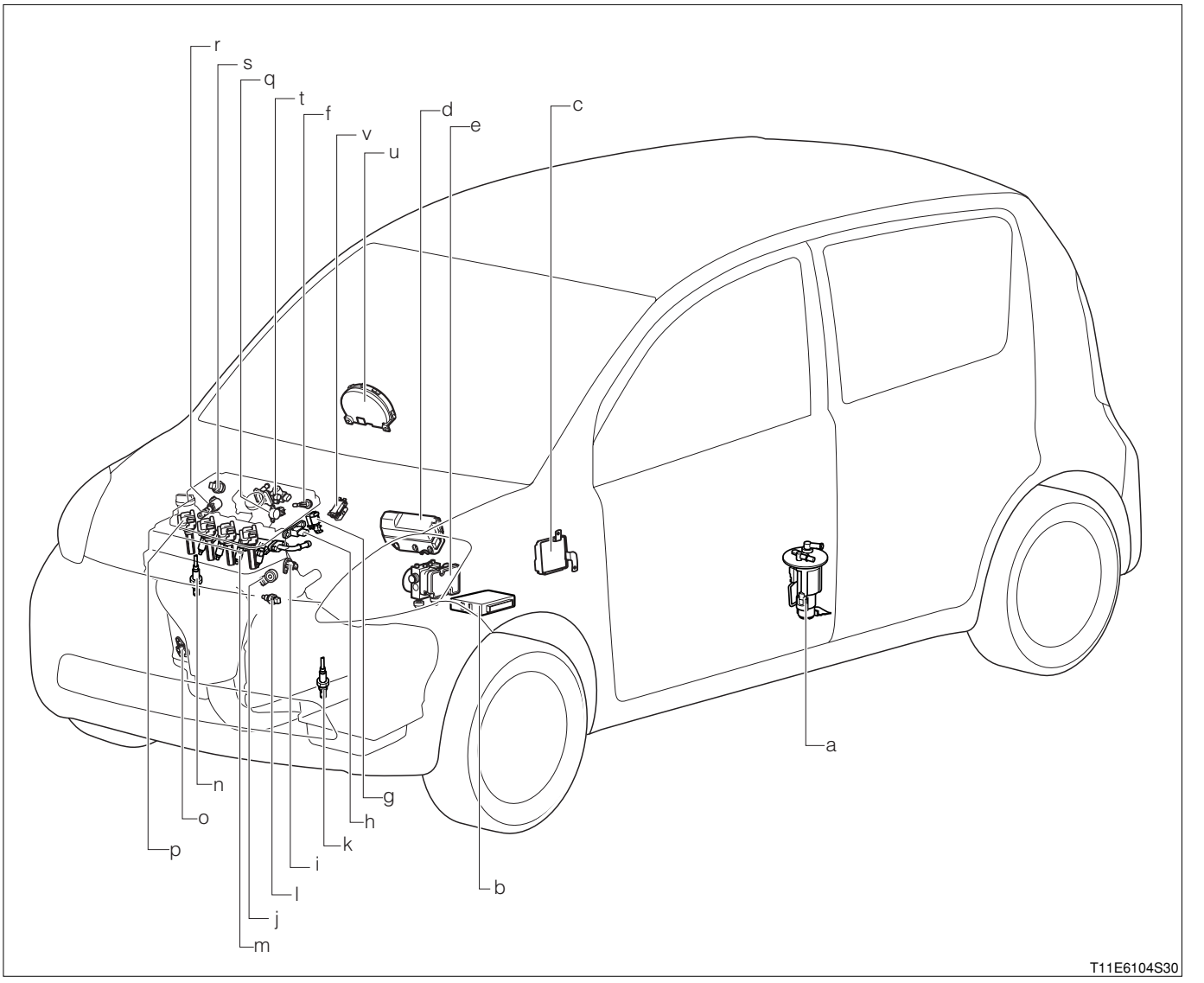
Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
1	—	—	31	—	—
2	—	—	32	PBSW	Brake negative pressure switch
3	ACSW	Air conditioner switch	33	—	—
4	ATNE	Engine revolution signal for AT	34	—	—
5	—	—	35	FC1	Fuel pump relay driving
6	CANL	CAN communication LO (1)	36	MGC	Magnetic clutch relay driving
7	CANH	CAN communication HI (1)	37	FAN1	Radiator fan relay driving
8	LCAN	CAN communication HI (2)	38	BAT	Backup power supply
9	HCAN	CAN communication HI (2)	39	MRO	Main relay driving
10	—	—	40	—	—
11	DEF	defogger signal	41	—	—
12	EPS	EPS ECU	42	BLW	Heater blower signal
13	W	Engine check lamp	43	STP	Stop lamp signal
14	—	—	44	FPOF	Airbag fuel pump "OFF" request signal
15	—	—	45	ACEV	Air conditioner evaporator temperature sensor
16	PRG	VSV for evaporative emission control system purge control	46	—	—
17	—	—	47	—	—
18	—	—	48	—	—
19	E2	Sensor system earth	49	—	—
20	E01	Power system earth	50	—	—
21	#40	Injector (#4)	51	—	—
22	#30	Injector (#3)	52	PIM	Manifold absolute pressure sensor
23	#20	Injector (#2)	53	VTH	Throttle position sensor
24	#10	Injector (#1)	54	THW	Engine water temperature sensor
25	OCV−	Oil control valve driving (−)	55	THA	Intake air temperature sensor
26	OCV+	Oil control valve driving (+)	56	VC	Sensor power supply
27	+B	EFI ECU power supply	57	VCPM	Sensor power supply (Exclusively for manifold absolute pressure sensor)
28	—	—	58	N2+	Cam angle sensor(+)
29	—	—	59	N1+	Engine revolution sensor(+)
30	—	—			



H11E6091S10

Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
60	IG4	Ignition coil (#4)	98	—	—
61	IG3	Ignition coil (#3)	99	—	—
62	IG2	Ignition coil (#2)	100	—	—
63	IG1	Ignition coil (#1)	101	—	—
64	—	—	102	—	—
65	ISC	Valve for ISC	103	—	—
66	—	—	104	—	—
67	—	—	105	—	—
68	—	—	106	—	—
69	—	—	107	STSW	Starter switch
70	—	—	108	—	—
71	—	—	109	—	—
72	—	—	110	—	—
73	—	—	111	—	—
74	—	—	112	—	—
75	—	—	113	EFIT	EFI-T check terminal
76	—	—	114	—	—
77	—	—	115	—	—
78	—	—	116	E21	Body sensor earth
79	—	—	117	SIO2	Immobilizer communication
80	—	—	118	REV	DLC (REV terminal)
81	—	—	119	SIO1	DLC (Diagnostic device)
82	—	—	120	IGSW	Ignition switch
83	—	—	121	KNK	Knock sensor
84	—	—	122	E2PM	Sensor earth (Exclusively for manifold absolute pressure sensor)
85	—	—	123	OX1	Front oxygen sensor
86	—	—	124	—	—
87	—	—	125	E1	Calculation system earth
88	—	—	126	—	—
89	—	—	127	N2−	Cam angle sensor(−)
90	—	—	128	N1−	Engine revolution sensor(−)
91	—	—	129	—	—
92	—	—	130	—	—
93	—	—	131	—	—
94	—	—	132	—	—
95	—	—	133	—	—
96	—	—	134	ALTC	Alternator voltage control output
97	—	—	135	ALT	Alternator cut control output

9-5 LOCATION OF COMPONENTS



	Part name
a	Fuel pump
b	Engine control computer
c	Transmission control computer (A/T vehicle)
d	Relay block
e	ABS actuator (ABS-equipped vehicles)
f	Intake air temperature sensor
g	VSV for evaporative emission control system purge control
h	Manifold absolute pressure sensor
i	Camshaft position sensor
j	Knock sensor
k	Rear oxygen sensor
l	Water temperature sensor
m	Injector
n	Oxygen sensor
o	Engine revolution sensor
p	Ignition coil
q	Throttle position sensor
r	Oil control valve
s	Brake negative pressure switch
t	Valve for ISC
u	Combination meter
v	DLC

9-6 HOW TO PROCEED WITH TROUBLE SHOOTING

9-6-1 GENERAL INFORMATION

1.The engine and engine control system of this vehicle are controlled by the EFI ECU. Furthermore, the vehicle is provided with the on-board diagnosis system.
Therefore, when any abnormality takes place in the input/output systems (Sensors, actuators, harnesses, connectors, etc.) of the engine control system, the EFI ECU memorizes the system concerned and informs the driver by making the malfunction indicator lamp (MIL) illuminate or flash.

2.Also the malfunction is informed to the operator by means of the malfunction indicator lamp (MIL). When trouble-shooting the engine, it is imperative for you to get the general idea of the onboard diagnostic system, and fully understand the precautionary measures in trouble-shooting, the items diagnostic system, and fully understand the precautionary measures in trouble-shooting, the items to be observed and how to use testers.

3.Then, conduct the trouble-shooting following the flow chart that indicates the correct procedure for the engine troubleshooting.

(1) On-board diagnostic system of vehicles for EU specifications

1.The vehicles for Europe have the following functions that comply with the 1999/102/EC (Generally called Euro-OBD) standards.

2.When the ignition switch is turned "ON", the malfunction indicator lamp (MIL) goes on. When no malfunction has been detected, the lamp will go out after the engine has started. (Check for a blown bulb)

3.While the engine is running, if the EFI ECU detects any malfunction in the emission control system/components that will affect the emissions from the vehicle, or in the power train control components, or if any malfunction is detected in the EFI ECU itself, the EFI ECU illuminates or flashes the MIL (Only when misfire is detected which will damage the catalyst). Then, the EFI ECU memorizes the malfunction area. (DTC by ISO15031-6/SAEJ2012)

4.If that malfunction will not occur in three successive running, the MIL is automatically turned off. However, the DTC will be recorded in the EFI ECU memory.

NOTE

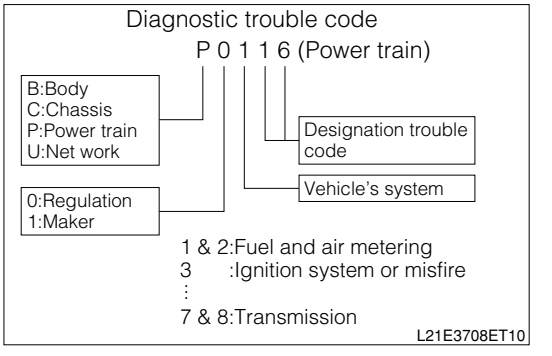
- The MIL is illuminated only by the malfunction that affects the emissions from the vehicle. (Only items bearing a circle ("○" mark) in the MIL column.)

DTC No.	De	Malfunction evaluation method	MIL
P0105/31	Manifold pressure pressure	1 trip	!
P0110/43	Intake air malfunction	1 trip	!
P0115/42	Engine co malfunction	1 trip	!
P0116/42	Engine coo circuit mance	2 trip	!
P0120/41	Throttle/P switch "A"	1 trip	!

L21E3706ET10

5.It is possible to read out various data from the engine ECU by connecting the OBD Ⅱ generic scan tool which complies with the ISO 14230 format or DS-21 diagnosis tester to the DLC of the vehicle. You can perform trouble-shooting efficiently by checking these data (DTC, freeze-frame data, current data, oxygen sensor monitor data, etc.).

6.The DTC is composed of the ISO standard code (Specified by ISO 15031-6) and the manufacturer's designation code. The ISO standard code should be set pursuant to the ISO. On the other hand, the manufacturer's designation code can be freely set forth by the manufacturer within a specified limit.

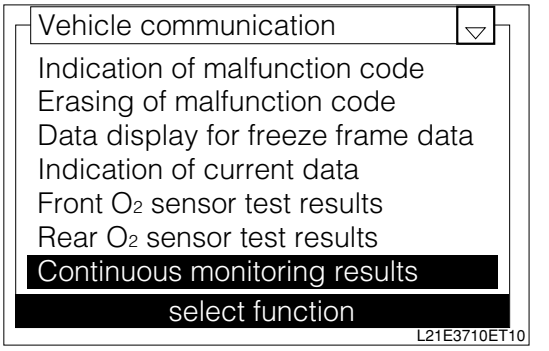


7.Many DTC have a two trip detection logic which assures avoidance of wrong detection and functions only when a malfunction is surely occurring. However, another diagnosis mode is provided, in which only a one-time final confirmation test is necessary for a service mechanic to confirm that the malfunction has been completely remedied after the repair.

DTC No.	De	Malfunction evaluation method	MIL
P0141/24	Oxygen sens malfunction	2 trip	!
P0171/25	Fuel trim (Air-fuel malfunction	2 trip	!
P0172/26	Fuel trim (Air-fuel malfunction	2 trip	!

L21E3709ET10

(1) In case DS-21 or OBD Ⅱ generic scan tool, the "Continuous monitoring results" of "Vehicle communication in CARB mode" must be selected.



L21E3710ET10

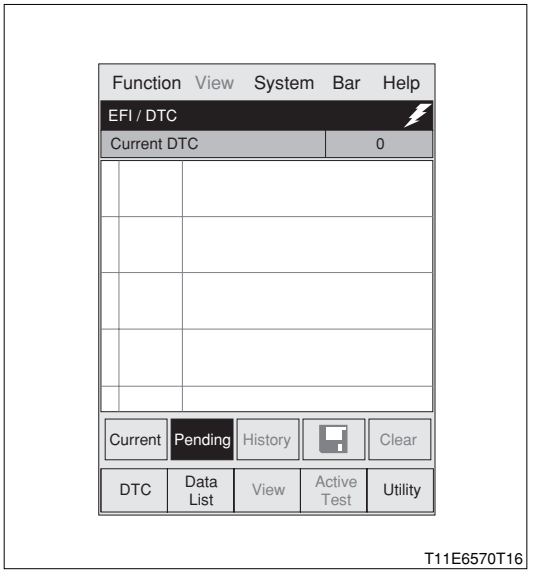
(2) In the case of the DS-II diagnosis tester, select the "Pending"of "DTC" in CARB mode.

8.When a malfunction is detected, the engine and running conditions at that moment are memorized as a freeze-frame data in the EFI ECU memory.

9.Two trip detection logic

When a malfunction is detected for the first time, that malfunction is temporarily memorized in the engine ECU memory. (First running). If the same malfunction is detected again during the second running, the MIL is illuminated and the DTC is determined. (Second running).

(However, the ignition switch should be turned off between the first running and the second running.)



T11E6570T16

(2) On-board diagnostic system of vehicles for other regions

1.When the ignition switch is turned "ON", the MIL goes on. When no malfunction has been detected, the lamp will go out after the engine has started. (Check for a blown bulb)

While the engine is running, if the ECU detects any malfunction in the engine control system/components, or if any malfunction is detected in the EFI ECU itself, the EFI ECU illuminates the MIL.

2.In addition to the illumination of the MIL, the corresponding diagnostic trouble code (DTC) is memorized in the engine ECU memory. When the malfunction has been remedied or the system returns to its normal state, the MIL automatically goes out. However, the DTC remains memorized in the engine ECU memory.

3.It is possible to read out various data from the engine ECU by connecting the DS-21diagnosis tester to the DLC of the vehicle. You can perform trouble-shooting accurately and efficiently by checking these data (DTC, freeze-frame data, current data, oxygen sensor monitor data, etc.). (Only when DS-21 diagnosis tester is used)

4.The DTC (Diagnostic trouble code) is set to a four-digit code in accordance with ISO standard. Furthermore, the conventional two-digit code is also provided. The four-digit code can be read out by the DS-21 diagnosis tester. The two-digit code has been set forth by the DMC itself. This code can be read by observing the flashing pattern of the MIL.

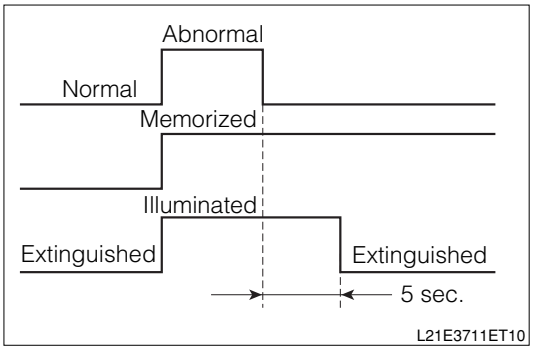
5.Some DTC have a two trip detection logic which assures avoidance of wrong detection and functions only when a malfunction is surely taking place.

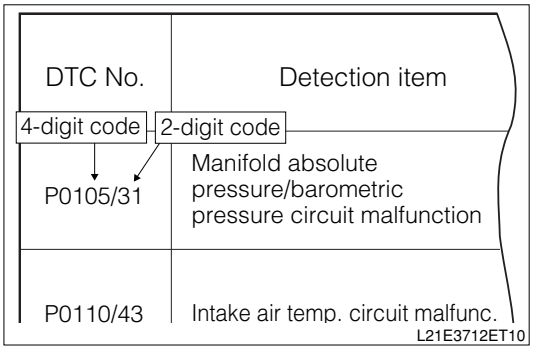
6.When a malfunction is detected, the engine and running conditions at that moment are memorized as a freeze-frame data in the EFI ECU memory.

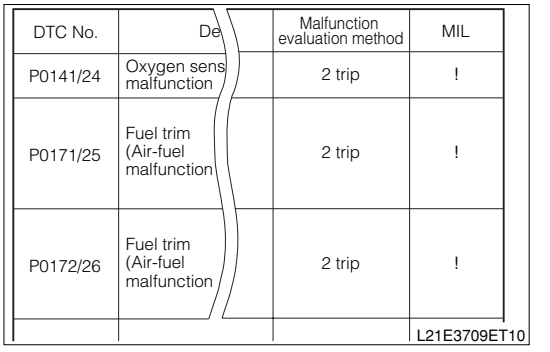
7.Two trip detection logic

When a malfunction is initially detected, that malfunction is temporarily memorized in the engine ECU memory. (First running) If the same malfunction is detected again during the second running, the MIL is illuminated and the DTC is determined. (Second running)

(However, the ignition switch should be turned off between the first running and the second running.)

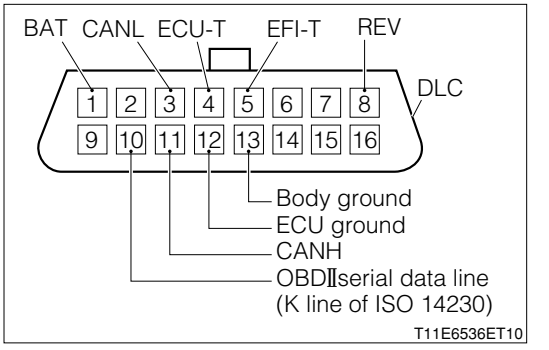






9-6-2 DLC, COMMON DESTINATIONS

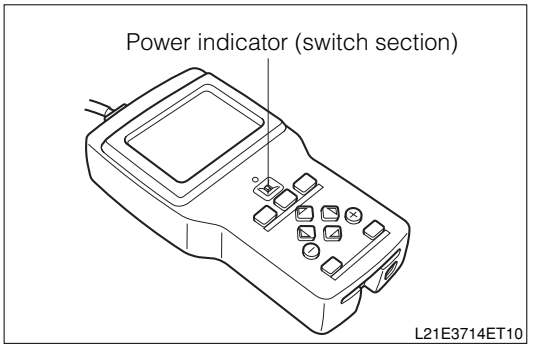
1.The vehicle engine ECU uses the ISO14230 (Euro-OBD) protocol. As regards the position, connector shape and pin arrangement, the DLC is in accordance with the ISO 15031-3 (SAEJ1962) and has complied with the ISO14230 format. The OBD Ⅱ serial data line (K line of ISO14230) is used for the OBD Ⅱ generic scan tool or the diagnosis tester (DS-21/DS-Ⅱ) in order to communicate with the ECU.



NOTE

- With the cable of the DS-21 diagnosis tester connected to the DLC through the SST, turn "ON" the ignition switch. If the power indicator of the tester will not go on, conduct the following checks and repair any malfunctioning parts.

SST: 09991-87404-000

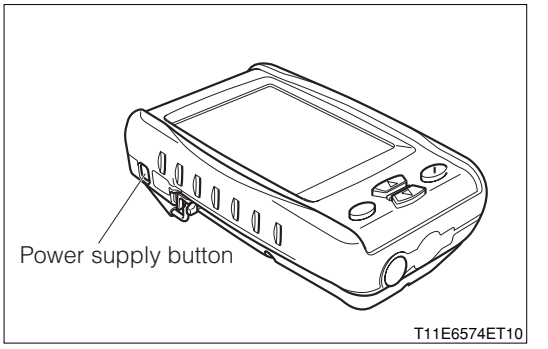


NOTE

- With the cable of the DS-Ⅱ diagnosis tester connected to the DLC, turn ON the IG switch. If the tester does not function, perform the following checks and repair the faulty parts.

(1) Connect the diagnosis tester (DS-21/DS-Ⅱ) to another vehicle.

(2) Turn "ON" the ignition switch.



9-6-3 CONNECTING PROCEDURE FOR SST (EFI COMPUTER CHECK SUB-HARNESS)

1.When the EFI ECU terminal voltage is measured with the EFI ECU connector connected to the engine ECU, connect the SST, following the procedure given below.

NOTE

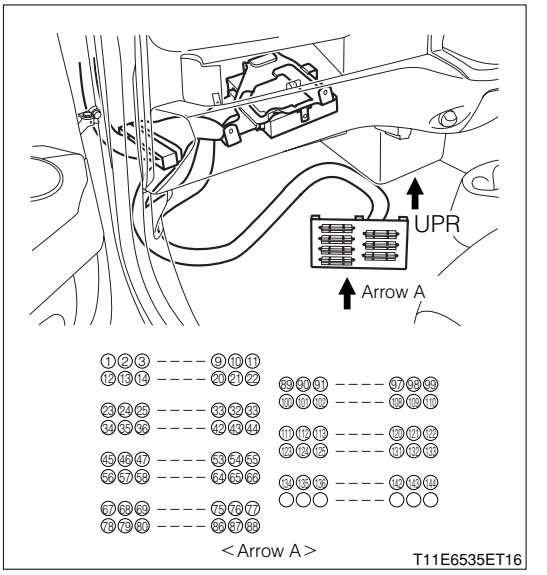
- The terminal number of the SST connector is the same as the EFI ECU connector.

2.Turn "LOCK" the ignition switch. Disconnect the battery negative (-) terminal with the ignition switch turned "LOCK".

NOTE

- Be sure to memorize the diagnostic trouble code before disconnecting the battery negative (-) terminal. Otherwise, the diagnostic trouble code(s) will be erased by disconnecting the battery negative (-) terminal.

3.Remove the glove compartment sub assembly.
4.Remove the No.1 instrument panel under cover.
5.Remove the fuse box opening cover and lower instrument cover.
6.Connect the following SST between the wire harness connectors and the EFI ECU connectors.
SST: 09842-97209-000
7.Reconnect the battery negative (-) terminal.



CAUTION

- When disconnecting or reconnecting the EFI ECU connectors, be sure to disconnect the battery negative (-) terminal with the ignition switch and all accessory switches in the off state.
- When installing a new battery, care must be exercised not to mistake the battery polarity. Failure to observe this caution could cause EFI ECU malfunction.
- Before using the SST, be sure to check to see if short circuit or open wire exists between the terminals of the SST.

9-6-4 TROUBLE-SHOOTING PROCEDURE

(1) Discription

1.The engine control system is equipped with diagnosis functions whose are capable of diagnosing malfunctioning sections. These functions give important clues in trouble-shooting. The flow chart on the next page shows how to proceed with trouble-shooting by using these diagnosis functions.
The flow chart shows how the diagnostic trouble code check can be used effectively. Moreover, when its results are fully reviewed, you can determine whether you are going to do the trouble-shooting according to diagnostic trouble codes or the trouble-shooting according to malfunctioning phenomena.
The diagnosis of this system is equipped with a battery back-up function (A function which supplies power for diagnosis memory even if the ignition switch is turned "LOCK".)

NOTE

- When no DS-21 diagnosis tester or OBD-II generic scan tool is used, the DTC or freeze-frame data in the flow chart can not be read out.

Σ>1. Bringing malfunctioning vehicle in garage

▼Go to Σ>2.

Σ>2. Diagnosis through interview

1.Thoroughly obtain information from the customer concerning the conditions, environment and phenomena in which the malfunction took place.

▼Go to Σ>3.

Σ>3. Normal operation confirmation of diagnosis code indication of LCD in meter.

1.Short-circuit the terminals 4 (ECU-T) and 13 (E) of the DLC, using SST.
SST: 09991-87403-000

2.Ensure that the LCD in the meter indicate the diagnosis codes (Including the normal codes).
SPECIFIED VALUE: Will indicate

NOTE

- It is also fine when codes other than the CAN related ones are outputted.

▼If it is OK, proceed to Σ>4.

▼When it is NG, perform the following checks for the meter and if there is no problem, replace the meter.

(1) Check of harness for meter - DLC and DLC - body earth

(2) Meter power supply system and earth system check

Σ>4. Confirmation of diagnosis code of LCD in meter (CAN-related)

1.Ensure that the CAN related diagnosis code (Code 0051 - 0053) is not indicated in the LCD in the meter.
SPECIFIED VALUE: Code 0051 - 0053 are not indicated.

▼If it is OK, proceed to Σ>5.

▼When it is NG, refer to the section of CAN communication system.
Refer to Page L2-1.

Σ>5. Confirmation and record of engine check lamp condition

1.Confirm and record the lighting of the engine check lamp when turning "ON" the IG switch and after starting the engine.

	When IG switch is "ON"	After starting the engine	Judgment
Engine check lamp	Illuminated	Extinguished	a
	Illuminated	Illuminated	b
	Extinguished	Extinguished	c

▼In case of a, go to Σ>6.

▼In case of b, go to Σ>6.

▼In case of c, perform the following operations and if there is no problem, replace the meter.

(1) Harness and connector check between battery and meter

(2) Harness and connector check between meter and EFI ECU

(3) EFI ECU power supply system and earth system check

Σ6. Confirmation and recording of diagnosis code

1.Short-circuit the terminals 5 (EFI-T) and 13 (E) of DLC, using the SST.
SST: 09991-87403-000
09991-87404-000

2.Confirm and record the diagnosis code outputted from the engine check lamp in the meter.
NOTE
- If the data during malfunctioning may be confirmed by the diagnosis system, record the data during malfunctioning before canceling the diagnosis code.

▼Go to Σ7.

Σ7. Malfunction phenomena confirmation

1.Confirm the malfunction phenomena and confirm the abnormal situation.
▼Go to Σ8.

Σ8. Erasure of diagnosis code

1.Erase the diagnosis code.
▼Go to Σ9.

Σ9. Confirmation of reproduction of malfunction phenomena

1.Confirm whether the malfunction phenomena can be reproduced.
▼If the malfunction phenomena can be reproduced, proceed to Σ10.
▼If the malfunction phenomena cannot be reproduced, proceed to Σ11.

Σ10. Reconfirmation of diagnosis code

1.Perform reconfirmation of the diagnosis code.
▼If an abnormality code is outputted, proceed to Σ12.
▼If a normal code is outputted, proceed to Σ11.

Σ11. Basic check

1.Perform basic checks.
Refer to Page B8-270.

▼Go to Σ13.

Σ12. Trouble-shooting check according to diagnosis code

1.Perform trouble-shooting concerning the diagnosis code outputted.
Refer to Page B8-292.

▼After repairing, go to Σ14.

Σ13. Trouble-shooting according to malfunction phenomena.

1.Estimate the cause for the malfunction phenomenon and perform trouble-shooting.
Refer to Page B8-287.

▼After repairing, go to Σ14.

Σ14. Canceling method of diagnosis

1.Cancel the diagnosis code.
▼Go to Σ15.

Σ>15. Confirmation and recording of diagnosis code

1.Confirm and record the diagnosis code.

▼If a normal code is outputted, proceed to Σ>16.

▼If an abnormal code is outputted, go back to Σ>7 and perform the checks again.

Σ>16. Confirmation test

1.Ensure that the malfunction phenomena claimed by the customer concerning the vehicle has been completely solved and that it has been recovered to the normal.

▼If it is OK, finish the trouble shooting.

▼If it is NG, go back to Σ>3 and perform the checks again.

9-7 INQUIRY

1. In your attempt to remove the causes for a malfunction of the vehicle, you will not able to remove the causes unless you actually confirm the malfunctioning phenomenon. No matter how long you continue operations, the vehicle may not resume the normal state unless you confirm the malfunctioning phenomenon. The inquiry with the customer is a vital information collecting activity which is to be conducted previous to the confirmation of malfunctioning phenomenon.
2. This inquiry will provide you with an important clue in an effort to reproduce the malfunctioning phenomenon. Furthermore, the information obtained by the inquiry can be referred to during the trouble-shooting. Hence, instead of making general questions, it is necessary to focus your questions on the items related to the malfunction.
3. The main points of the inquiry given below are the most important points in analyzing the malfunction. In some cases, the information about malfunctions whose took place in the past and about the history of previous repairs, which seem to have nothing to do with the current malfunction, may prove to be helpful in solving the malfunction.
   Hence, it is important to obtain as much information as possible and keep them accurately in mind as reference information when trouble-shooting the malfunctioning phenomenon.

9-7-1 DIAGNOSIS BY INTERVIEW SHEET FOR ENGINE CONTROL SYSTEM

[INQUIRY SHEET]

<table>
<tr><td colspan="8">Inquiry sheet</td></tr>
<tr><td colspan="2">Name of customer</td><td colspan="2">Vehicle model</td><td colspan="2">Engine - N/A, T/C,
S/C, carburetor,
EFI, LPG</td><td colspan="2">Transmission - 4M/T, 5M/T,
2WD, 4WD 2A/T, 3A/T,
4A/T</td></tr>
<tr><td rowspan="3">Details of vehicle</td><td colspan="2">Frame No.</td><td colspan="2">Registration date · ·</td><td colspan="2">Date of malfunction · ·</td><td colspan="2">Running distance km</td></tr>
<tr><td colspan="8">Equipment:</td></tr>
<tr><td colspan="2">[Sex] of customer (driver)
Male Female</td><td>[Age]
Approx.</td><td colspan="2">[Occupation]</td><td colspan="2">[Places where vehicle is mainly used]
Urban district/suburb/seacoast/mountain/others</td><td>[Parking place]
Outdoor/indoor</td></tr>
<tr><td rowspan="4">Symptom</td><td>Poor starting</td><td colspan="6">• No initial explosion takes place. • Explosion is incomplete although initial explosion takes place.
• Hard starting (cold engine, hot engine, always) • No cranking takes place.
• Other ( )</td></tr>
<tr><td>Faulty idling</td><td colspan="6">• Fast idling ineffective • Idling speed too low
• Idling speed too high • Idling unstable (cold engine, hot engine, always)
• Other ( )</td></tr>
<tr><td>Poor drive-ability</td><td colspan="6">• Hesitation (during start, during acceleration, during deceleration, during a certain period) • Knocking
• Backfire • Lack of power • Poor acceleration • Poor blow
• Other ( )</td></tr>
<tr><td>Engine stall</td><td colspan="6">• During idling (during warming up, after warming up) • At time of starting • During running ( )
• Immediately after vehicle stops (Re-start possible, Re-start impossible) • Under loaded state (Air conditioner, electric load, power steering)
• Other ( )</td></tr>
<tr><td colspan="2">From when malfunction has started?</td><td colspan="6">• Since vehicle was purchased as a new car • Recently (since what year/ month)</td></tr>
<tr><td colspan="2">Frequency of occurrence</td><td colspan="6">• At all times • Under a certain condition ( ) • Sometimes</td></tr>
<tr><td colspan="2" rowspan="2">Meteorological conditions
Weather
Temperature</td><td colspan="6">• At all times
• Fine • Cloudy • Rain • Snow • Other ( )
• Temperature (about ˚C) (Spring, summer, autumn, winter)</td></tr>
<tr><td colspan="2">Engine condition</td><td colspan="6">• When cold • After warming-up • During warming-up (Water temperature about °C)</td></tr>
<tr><td colspan="2">Road</td><td colspan="6">• Urban district • Suburb • Highway • Mountainous road (Uphill, downhill)</td></tr>
<tr><td colspan="2">Driving conditions</td><td colspan="6">• No relation • During racing under no load
• During running (Vehicle speed: km/h, Engine speed: rpm, MT Which gear?)
• During turn (right curve, left curve)</td></tr>
<tr><td colspan="2">Other situations</td><td colspan="6"></td></tr>
</table>

<table>
<tr><td>State of malfunction indicator lamp (MIL)</td><td colspan="3">• Illuminated or flashing at all times • Illuminated or flashing sometimes • Will not go on.</td></tr>
<tr><td rowspan="2">Indication of DTC
• Reading out by using OBDⅡ generic scan tool or DS-21 diagnosis tester
• Reading-out of MIL flashing pattern by shorting terminal T</td><td>During checking</td><td>• Normal</td><td>• Malfunction code ( )</td></tr>
<tr><td>2nd time</td><td>• Normal</td><td>• Malfunction code ( )</td></tr>
</table>

L21E3717ES40

9-8 CONFIRMATION, RECORD AND ERASURE OF DIAGNOSIS CODE

9-8-1 CHECKING METHOD OF DIAGNOSIS

1.Prior to the check, check the malfunction indicator lamp (MIL), following the procedure given below.

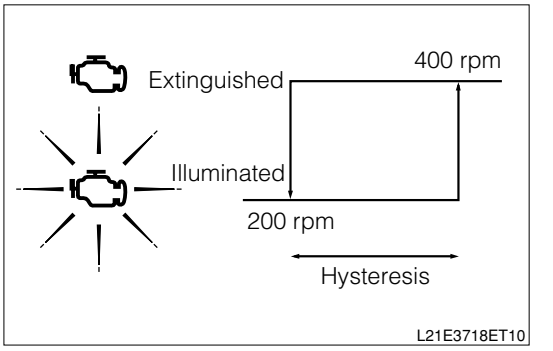
2. Check of malfunction indicator lamp

(1) Ensure that the malfunction indicator lamp goes on when the ignition switch is turned "ON", but with the engine not running.

NOTE

- If the malfunction indicator lamp (MIL) fails to go on, perform the trouble-shooting for the combination meter.

(2) Ensure that the malfunction indicator lamp goes out when the engine starts. If the lamp remains illuminated or is flashing, the diagnosis system is detecting a malfunction. Therefore, a DTC is memorized in the EFI ECU. If no DTC is memorized in the EFI ECU, perform the trouble-shooting for the malfunction indicator lamp circuit.



(1) Check of DTC, using DS-21 diagnosis tester:

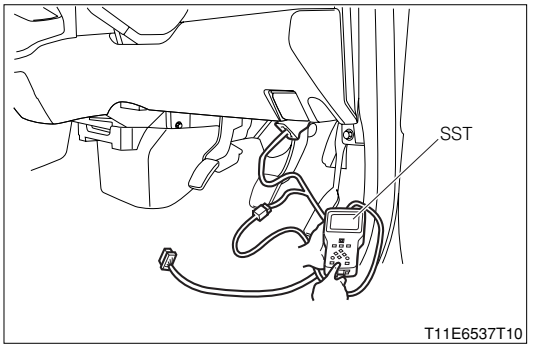
1.Prepare the DS-21 diagnosis tester.

2.Connect the DS-21 diagnosis tester to the DLC located at the lower section of the instrument panel on the driver's seat side. At this time, the DS-21 tester should be connected to the DLC with the following SST interposed.

SST: 09991-87404-000

NOTE

- When DS-21 diagnosis tester is used, refer the instruction manual for tester.



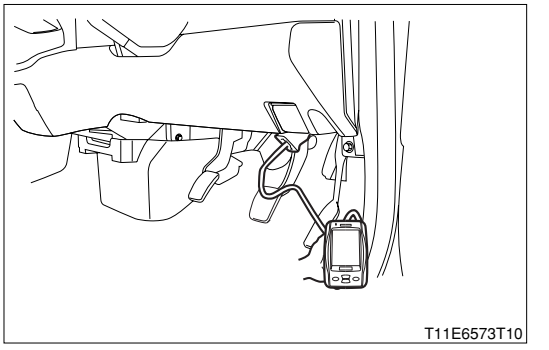
(2) Check of DTC, using DS-Ⅱ diagnosis tester or OBD Ⅱ generic scan tool:

1.Prepare the DS-Ⅱ diagnosis tester or OBD Ⅱ generic scan tool.

2.Connect the DS-Ⅱ diagnosis tester or the OBD Ⅱ generic tester directly to the DLC located at the lower section of the instrument panel on the driver's seat side.

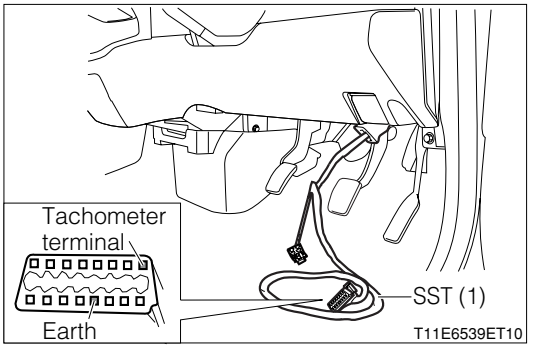
NOTE

- When DS-Ⅱ diagnosis tester or OBD-Ⅱ generic scan tool is used, refer the instruction manual for each tester.



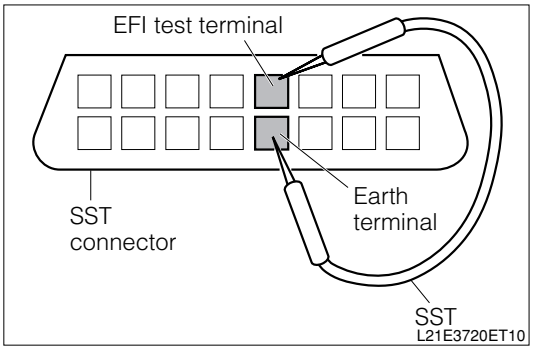
(3) Check of DTC without using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

1.With the ignition switch turned "LOCK", connect the following SST to the DLC located at the lower section of the instrument panel on the driver's seat side.
SST: 09991-87404-000(1)

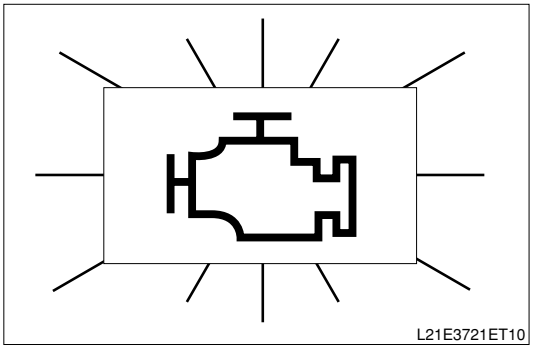


2.Short circuit the DLC terminals 5 (EFI-T) and 13 (E), using the SST.
SST: 09991-87403-000

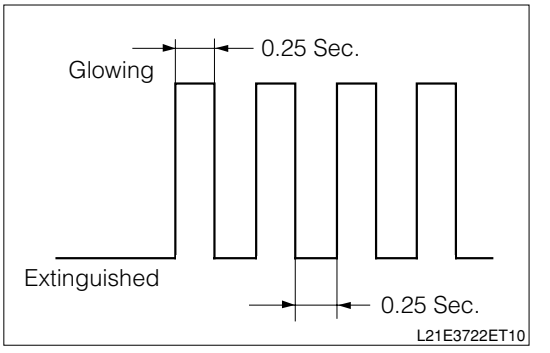
3.Turn the ignition switch to the "ON" position. At this time, be careful not to start the engine.



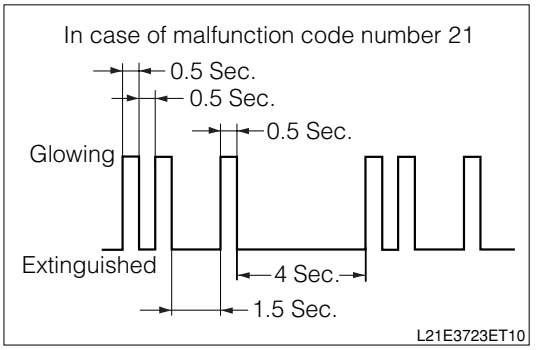
4.Read out the diagnostic trouble code (DTC) by observing the flashing number of the malfunction indicator lamp.



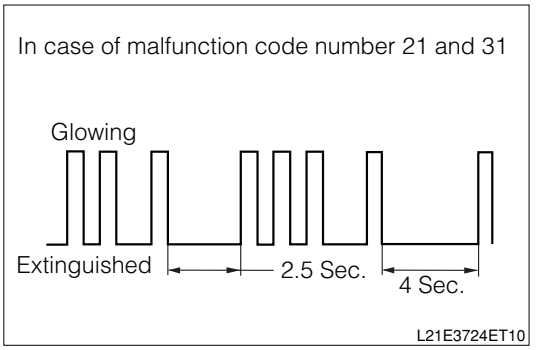
5.The illustration shows an example of the flashing pattern of the normal code. The malfunction indicator lamp glows for 0.25 second, right after the ignition switch has been turned "ON". After a lapse of 0.25 second, the malfunction indicator lamp again glows for 0.25 second. Then, this pattern will be repeated.



6. The illustration shows an example of the flashing pattern of the code No. 21. The diagnostic trouble code is composed of two digits. These two numbers are indicated by blinking of the malfunction indicator lamp. Four seconds after the ignition switch has been turned "ON", the malfunction indicator lamp indicates first the number of the tens digit of the diagnostic trouble code by glowing the same times as the number. The lamp glows for 0.5 second each time and then it is extinguished for 0.5 second. After a pause of 1.5 seconds, the lamp indicates the number of the units digit of the diagnostic trouble code by glowing the same times as the number. The lamp glows for 0.5 second each time and then it is extinguished for 0.5 second. Then, this pattern will be repeated after a pause of 4 seconds.



7.The illustration shows an example of the flashing pattern of the codes No. 21 and 31. In cases where plural malfunction codes have been detected, the two-digit diagnostic trouble codes are indicated in the sequence of the code number, starting from a smaller number. Each diagnostic trouble code is indicated in the above described pattern. A pause of 2.5 seconds occurs between the outputs of respective diagnostic trouble codes, thus separating one from the others. After all of the plural diagnostic trouble codes that have been detected are indicated, the malfunction indicator lamp is extinguished for four seconds. Then, the detected plural diagnostic trouble codes will be indicated again.



8.For the details of malfunctions, refer to the DTC chart.

9.After completion of the check, disconnect the jump wire and turn "LOCK" the ignition switch. Then, disconnect the SST from the DLC.

NOTE

- In cases where plural malfunction codes have been detected, the indication will be made progressively, starting from the smaller number to the larger number.
- In cases where the diagnosis tester (DS-21/DS-Ⅱ) or the OBD Ⅱ generic scan tool is not used, it is impossible to take a reading of unidentified two-trip DTC from the SST connector.
- When malfunctioning phenomena are to be reproduced without using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool, follow the procedure given below to detect the DTC.

(1) It is assumed that two trip detection logic is used for the DTC detection.

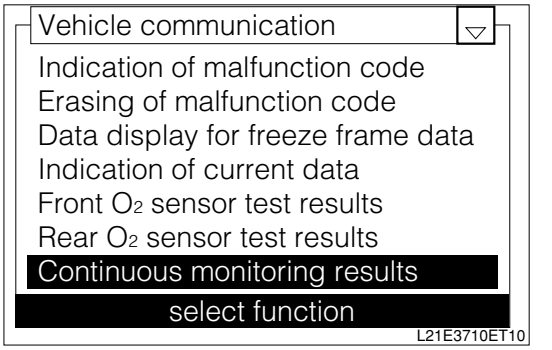
(2) Therefore, after a malfunctioning phenomenon is first reproduced, turn "LOCK" the ignition switch.

(3) Then, repeat the same reproduction procedure once again.

(4) When the malfunction is reproduced again, the malfunction indicator lamp goes on and the DTC is memorized in the engine ECU. For reading out of the DTC.

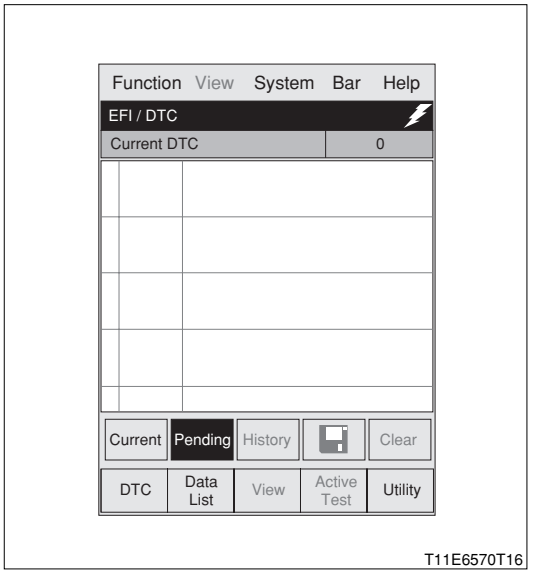
NOTE

- When malfunctioning phenomena are to be reproduced with the DS-21 diagnosis tester or OBD Ⅱ generic scan tool connected to the DLC, the "Continuous monitoring results" function can be used. (In the case of the DS-21 diagnosis tester, select the "Continuous monitoring results" of the "Vehicle communication" in CARB mode.) This function makes it possible to indicate the DTC when the malfunctioning phenomenon is first reproduced. (Request of onboard monitoring test results of ISO 15031-5 Continuous monitoring system.)



NOTE

- In the case of the DS-Ⅱ diagnosis tester, select the "Pending"of "DTC" in CARB mode.



9-8-2 CANCELING METHOD OF DIAGNOSIS

1.The DTC and freeze-frame data can be erased through the following methods.

(1) The diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool is used to erase the DTC. (For the operating procedure, refer to the instruction manual.)

(2) The power supply to the EFI ECU is shut off to erase the DTC without using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. (Disconnect the battery negative (-) terminal or detach the EFI fuse.)

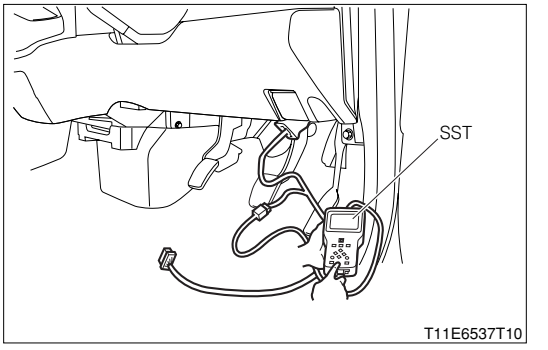
(1) When DS-21 diagnosis is used:

1.In the same way as the check of DTC, connect the diagnosis tester (DS-21/DS-Ⅱ) to the DLC with the following SST interposed.

SST: 09991-87404-000

NOTE

- When DS-21 diagnosis tester is used, refer the instruction manual for tester.

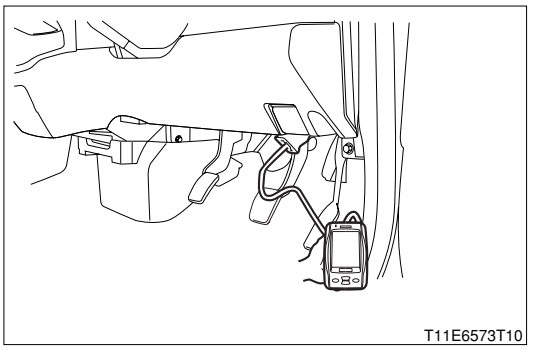


(2) When DS-21 diagnosis tester or OBD Ⅱ generic scan tool is used

1.In the same way as the check of DTC, connect the DS-Ⅱ diagnosis tester or the OBD Ⅱ generic scan tool directly to the DLC.

NOTE

- When DS-Ⅱ diagnosis tester or OBD Ⅱ generic scan tool is used, refer the instruction manual for each tester.



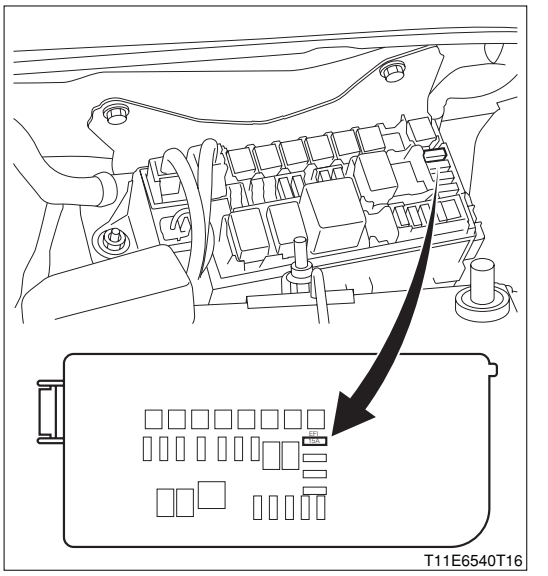
(3) When diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool is not used:

1.Erasure by disconnecting EFI fuse

To erase the diagnostic trouble codes (DTC) memorized in the ECU after malfunctions have been repaired, disconnect the EFI fuse from the relay block for at least 60 seconds with the ignition switch turned "LOCK". (When ambient temperature is about 20°C.)

NOTE

- It is possible to complete this erasing for approximately 60 seconds. In some cases, however, it may take longer. Furthermore, the erasing can be made by disconnecting the circuit, such as the battery power supply and fusible link. In cases where the battery negative (-) terminal is to be disconnected, record the radio channels in advance. After completion of the operation, set the radio channels the same as before.
- In cases where the same malfunction (DTC) cannot be detected again during the 40 cycles of the engine warming-up, the DTC and freeze-frame data will be automatically erased from the ECU memory. (Only in the case of vehicles with EU specifications)
- Warming-up cycle
- The warming-up cycle refers to a driving cycle that sufficiently allows the water temperature to rise by at least 22°C above the temperature at the time of engine starting and to reach at least 70°C.
- Driving cycle
- The driving cycle consists of the engine starting and engine stopping.



9-9 SYMPTOM CONFIRMATION

9-9-1 CONFIRMATION OF REPRODUCTION OF MALFUNCTIONING PHENOMENA

1. In the course of trouble-shooting, the operator can not pinpoint the cause for the malfunction unless he confirms the phenomenon. For this purpose, it is indispensable to reproduce the malfunctioning phenomenon by creating conditions and environments that are similar to those customer.
2. As for phenomena whose can not be reproduced easily, it is necessary to produce running conditions that are similar to those when the malfunction occurred (Road surface condition, weather condition, driving condition). For this end, it is of great importance to try to reproduce the conditions that are similar to those when the malfunction occurred (Road surface condition, weather relays by hand), heat (Applying hot air) and water (Applying moisture).
3. Vibration, heat or moisture can constitute causes for malfunction that are difficult to reproduce.
4. Therefore, with the vehicle in a stationary state, you can perform the following malfunction reproduction simulation tests given below.
   Moreover, if you presume a section (Part) which can cause a malfunction and connect a tester, etc. to that section so as to confirm the malfunctioning phenomenon, you can also achieve a function to that section so as to confirm the malfunctioning phenomenon, you can also achieve a function evaluation of that section (Part).

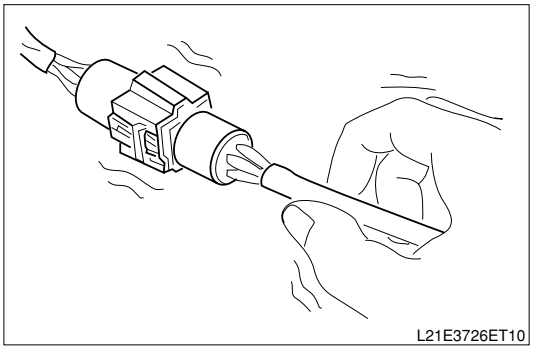
(1) Malfunction reproduction simulation test methods

① Vibration method:

1. When vibration is thought to be the main cause

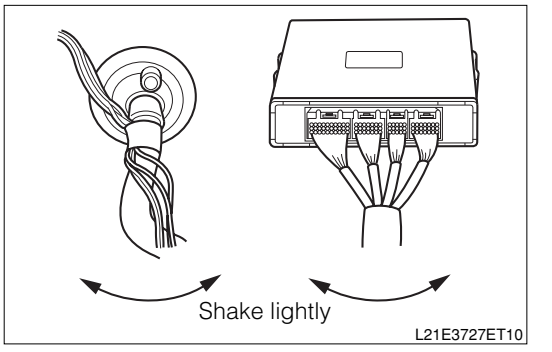
(1) Connector

Lightly shake the connector vertically and laterally.



(2) Wire harness

Lightly shake the wire harness vertically and laterally. The points to be checked are connector joints, the vibrating point and the section where the wire harness is passing through the body.

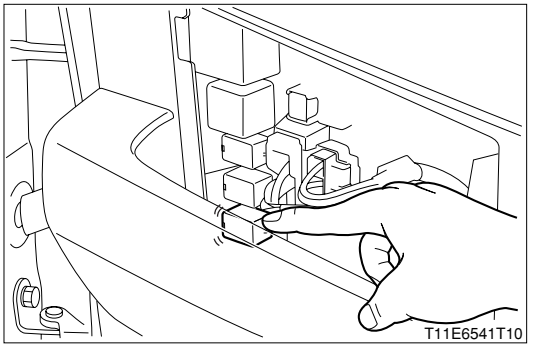


(3) Parts, sensors

With your finger, apply light vibrations to a part of the sensor which is presumed to be the cause for the malfunction. Check to see if the malfunction is reproduced.

NOTE

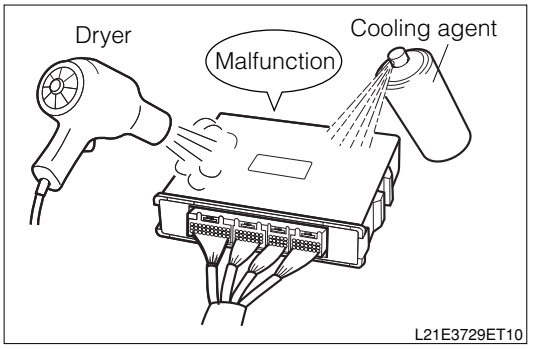
- Be careful not to apply too strong vibration to a relay, for it can cause an open wire in the relay.



② **Cool/hot method:**

1.When a suspected section is likely causing the malfunction when it is cold or hot.

(1) Heat a component which is presumed to be causing the malfunction by using a dryer or the like. Check to see if the malfunction occurs.



CAUTION

- Do not heat the section beyond 60°C. (Temperature limit to assure that no damage be made to the component.)
- Do not directly heat the parts inside the ECU.

③ **Water applying method:**

1.When the malfunction is believed to occur on rainy days or under humid conditions. Apply water to the vehicle. Check to see if the malfunction occurs.

NOTE

- Never apply water directly to the engine compartment. By applying water to the front of the radiator, you can indirectly change the temperature and humidity.
- Never apply water directly to the electronic parts.
- If rain leaks into the vehicle compartment, rain may get into the inside of the ECU through the wire harnesses. If the vehicle has experienced any rain leakage before, utmost attention must be paid in respect to this point.

9-9-2 RECHECK AND MAKING RECORD OF DTC/FREEZE-FRAME DATA

1.By checking the DTC/freeze-frame data after confirming the reproduction of the malfunctioning phenomenon, it is possible to judge whether the system related to the DTC that was indicated before confirmation of the reproduction is now functioning properly or not. Then, you are to proceed to one of the following three steps.

(1) When a DTC was indicated at the time of checking the DTC and the same DTC is indicated after the confirmation of reproduction of the malfunction, it indicates that the malfunction is still persisting in the diagnosis circuit. Proceed to the trouble-shooting according codes.

(2) When no abnormal code is indicated, although the occurrence of malfunction was observed during the confirmation of reproduction of malfunction, a malfunction other than those related to the diagnosis system is likely taking place. Proceed to the trouble-shooting according to malfunctioning phenomena.

(3) When no malfunction is observed during the confirmation of reproduction of malfunction, and the normal code is indicated at the check of the DTC, it is presumed that an abnormality, such as poor contacts at the harnesses and connectors, occurred in the past, but now they are functioning properly. Check the harnesses and connectors of those systems related to the DTC that was indicated before the confirmation of reproduction of the malfunctioning phenomenon.

9-10 BASIC CHECK

9-10-1 BASIC ENGINE CHECK FLOW CHART

1.When the ECU is detecting no DTC during the reproduction test of malfunctioning phenomena and when no abnormality is found by the visual inspection, it is necessary to progressively perform the trouble-shooting for circuits which are most likely causing the malfunctions.

2.In many cases, sections causing malfunctions can be narrowed down quickly and effectively by performing the basic engine check indicated in the following flow chart. Therefore, it is very important to perform this check for the engine trouble-shooting.

(1) Basic engine check

Σ>1. Check the battery voltage.

1.Is the battery voltage 11 V or more with the engine in a stopped state?

▼If it is OK, go to Σ>2.

▼If it is NG, charge the battery or replace it.

Σ>2. Check the engine cranking.

1.Does the engine crank?

▼If it is OK, go to Σ>3.

▼If it is NG, go to "Matrix Table for Trouble-Shooting According to Malfunctioning Phenomena".

Refer to Page B8-287.

Σ>3. Check the engine starting.

1.Does the engine start?

▼If it is OK, go to Σ>4.

▼If it is NG, go to Σ>6.

Σ>4. Check the engine idle speed.

1.Warm up the engine, until the engine water temperature reaches 90℃ or more.

2.Turn "OFF" all electric load switches (Including A/C switch).

3.Set the transmission to neutral.

4.When the DS-21 diagnosis tester is used:

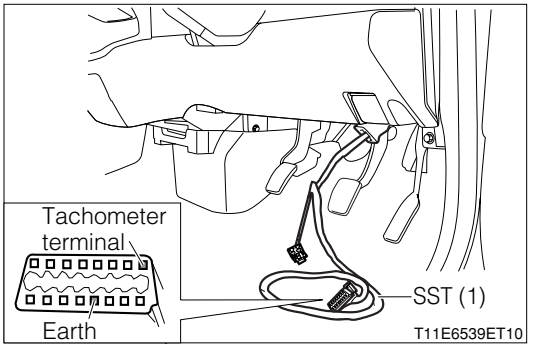
(1) Connect the DS-21 tester to the DLC with the SST interposed.

SST: 09991-87404-000

5.When the DS-Ⅱ diagnosis tester or OBD Ⅱ generic scan tool is used:

(1) Connect the DS-Ⅱ diagnosis tester or OBD Ⅱ generic scan tool to the DLC directly.

6.Check the engine idle speed.



7.When the diagnosis tester (DS-21/DS-Ⅱ) or general-purpose tester is not used, connect a tachometer to the Tachometer terminal.

(1) Install an engine tachometer to the terminal "REV" of the DLC, using the SST.

SST: 09991-87402-000
09991-87404-000

NOTE

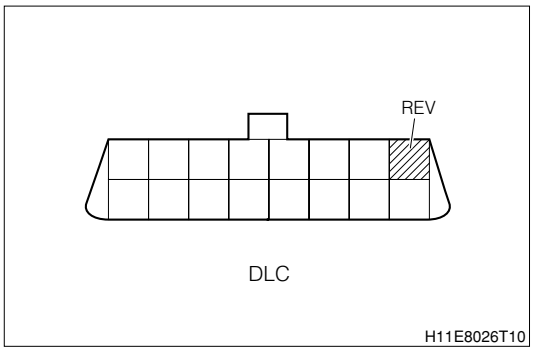
- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

SPECIFIED VALUE: 700^{+100}_{-50} rpm(A/T)
650^{+100}_{-50} rpm(M/T)

▼If it is OK, go to Σ>5.

▼If it is NG, go to "Matrix Table for Trouble-Shooting According to Malfunctioning Phenomena".

Refer to Page B8-287.

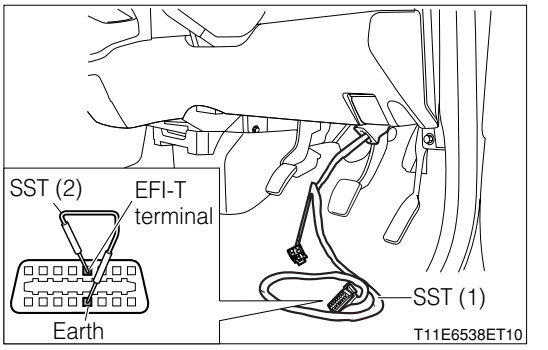


Σ>5. Check the ignition timing.

1.When the diagnosis tester (DS-21/DS-Ⅱ) is not used:

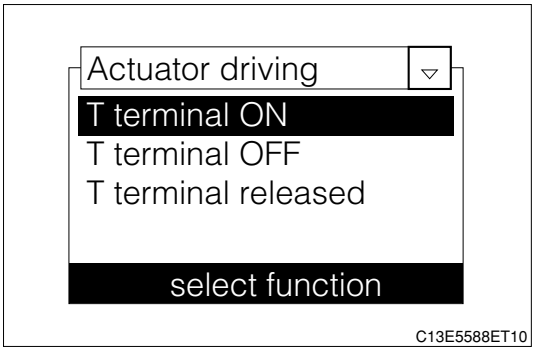
2.Connect the terminal T of the SST connector to the earth terminal, using a jump wire.

SST: 09991-87404-000(1)
09991-87403-000(2)

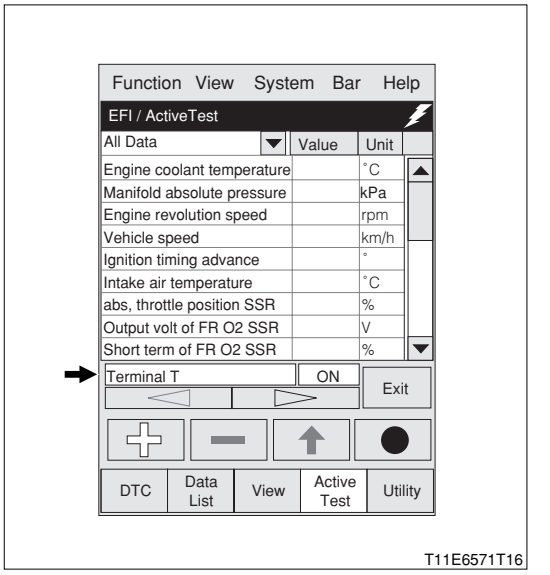


3.When the DS-21 diagnosis tester is used:

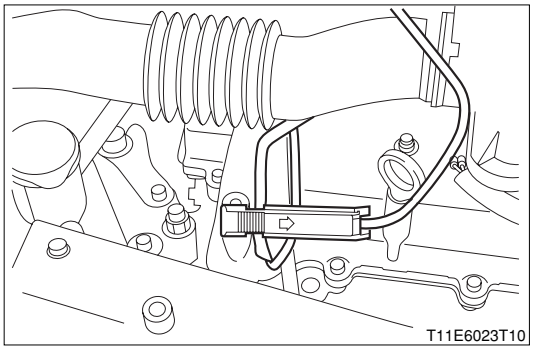
(1) Select the "Engine adjustment" on the course menu so as to connect the EFI- T terminal.



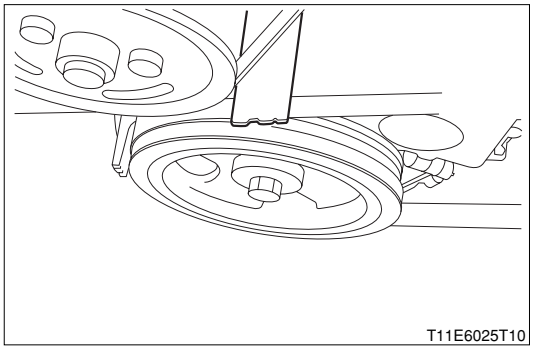
4.When the DS-Ⅱ diagnosis tester is used:
(1) Select the "Terminal T" of "Active Test" so as to connect the EFI-T terminal.



5.Attach the clip of the timing light to the wire harness for timing light connection wire.



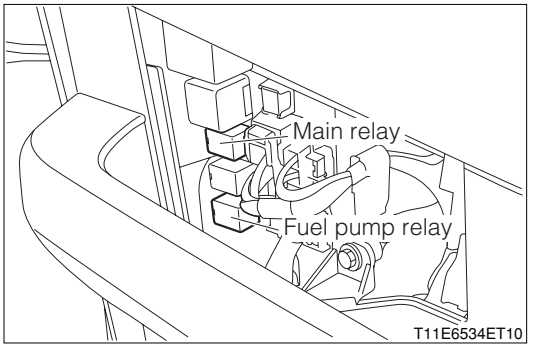
6.Is the timing mark of the crankshaft within a range of the indicator for ignition timing check provided on the timing chain cover?
SPECIFIED VALUE: 6± 2 degrees (BTDC)
7.Are the check results OK?
▼If it is OK, go to "Matrix Table for Trouble-Shooting According to Malfunctioning Phenomena".
Refer to Page B8-287.



▼If it is NG, check the timing chain for wrong assembling. Also, check the plunger protruding amount of the tensioner.

Σ>6. Fuel pressure check (Simple check).

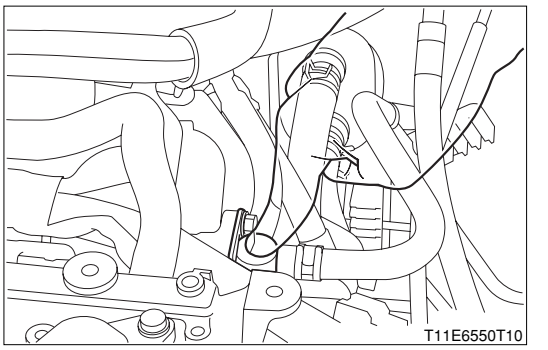
1.When DS-21 diagnosis tester is not used:
(1) Ensure that the fuel tank is filled with sufficient fuel.



(2) Remove the fuel pump relay and connect a jump wire, as indicated in the illustration.

SST: 09991-87403-000

(3) Ensure that the IG switch is turned "ON" and the pulsation damper exhibits pulsation.


T11E6550T10

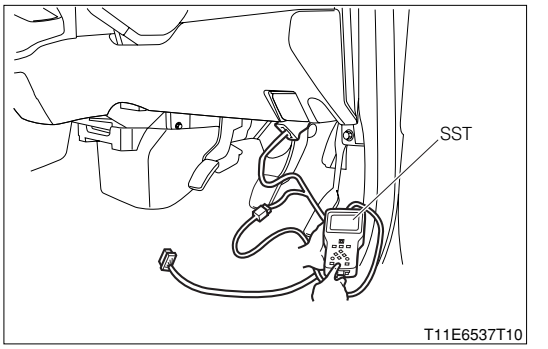
2.When DS-21 diagnosis tester is used:

(1) Connect the DS-21 diagnosis tester to the DLC with the SST interposed.

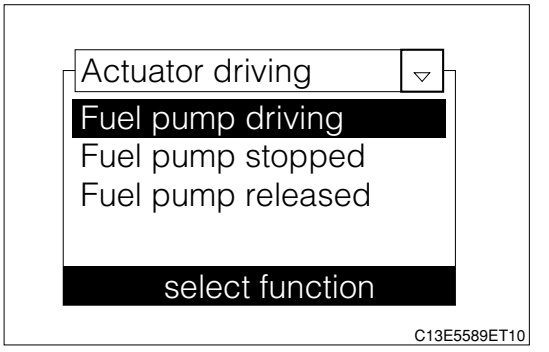
SST: 09991-87404-000

(2) Turn "ON" the ignition switch. Then, select the "Fuel pump" of the "Actuator driving" among the individual functions so as to drive the fuel pump.

(3) Does the pulsation damper exhibit pulsation?



T11E6537T10



C13E5589ET10

3.When DS-Ⅱ diagnosis tester is used:

(1) Connect the DS-II diagnosis tester to the DLC.

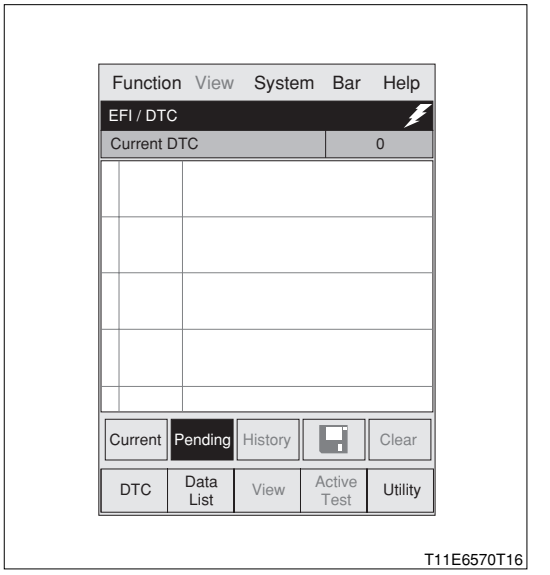
(2) Turn "ON" the ignition switch. Then, select the "Fuel Pump" of the "Actuator driving" so as to drive the fuel pump.

(3) Does the pulsation damper exhibit pulsation?

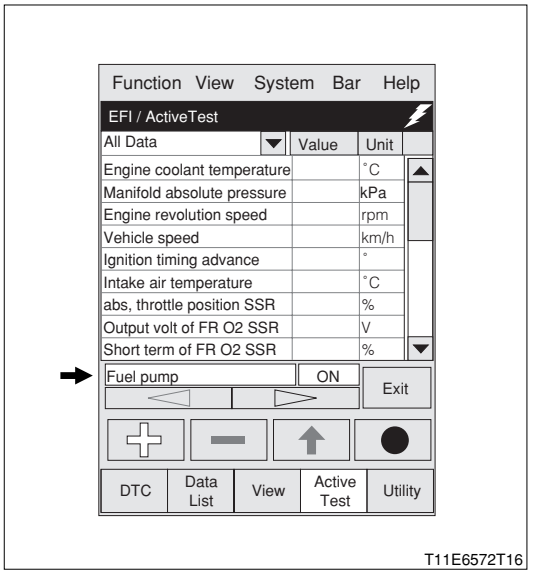
▼If it is OK, go to ▷7.

▼If it is NG, go to "Check of Fuel Pump and F/P Regulator".

Refer to Page B8-448.

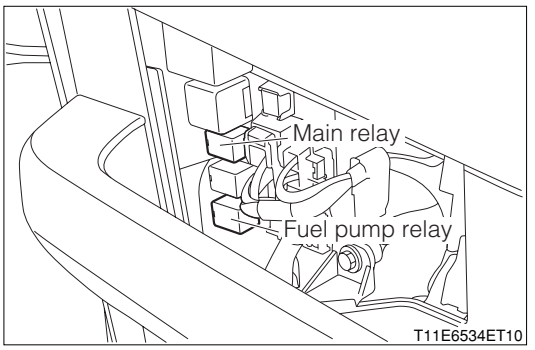


T11E6570T16



T11E6572T16

Σ7. Spark check.



1.Remove the fuel pump relay from the relay block.
2.Remove the ignition coils and spark plugs (All cylinders #1, 2, 3 and 4).
3.Disconnect the fuel pump relay
4.Disconnect the connector of the injector.

CAUTION

- Stop the fuel injection by the operations at Steps 3 and 4 above so as to prevent the catalyst from being damaged by unburnt gas, etc.
- When there is no fuel, the injector injection must be avoided wherever possible, as this may damage the injector.

5.Install the spark plug to the ignition coil. Connect the ignition coil connector to the ignition coil.
6.Ground the spark plug.
7.Crank the engine. At this time, check to see if each spark plug sparks.
8.Are sparks jumping?

▼If it is OK, go to Σ8.
▼If it is NG, go to Check of ignition System.

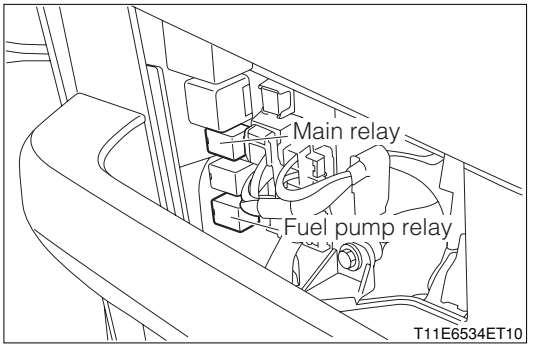
Σ8. Confirmation of operation of fuel injector.

1.Install the spark plugs, ignition coils and fuel pump relay. Connect the connector of the ignition coil.
2.Using a sound scope, check each injector for operation sound while the engine is being cranked or idling.
3.Can you hear operator sound of all injectors?

▼If it is OK, go to Σ9.
▼If it is NG, go to "Check of Fuel Injector Circuit".
Refer to Page B8-455.

Σ9. Inspection of compression pressure.

1.Warm up the engine.
2.With the IG switch turned "LOCK", remove all of the ignition coils and spark plugs.
3.Temporarily remove the main relay and fuel pump relay.



4.Insert a compression gauge into the spark plug hole.
5.Depress the accelerator pedal fully.
6.While cranking the engine, measure the compression pressure.
7.Repeat the steps 4, 5 and 6 to perform the measurement for all cylinders.

NOTE

- Be sure to use a fully-charged battery. Also the measurement should be performed in the shortest possible length of time.

8.Are the check results OK?

▼If it is OK, go to Σ10.
▼If it is NG, perform the checks, referring to the section ENGINE MECHANICAL.

Σ>10. Inspection of idle CO and HC concentrations.

1.Warm up the engine completely.

NOTE

- Warm up the engine, until the fan motor starts to operate.

2.Measure CO and HC concentrations at idle speed.

SPECIFIED VALUE:

CO concentration	Not to exceed 0.2 %
HC concentration	Not to exceed 200 ppm

3.Are the check results OK?

▼If it is OK, go to "Matrix Table for Trouble-Shooting According to Malfunctioning Phenomena".
Refer to Page B8-287.

▼If it is NG, perform the checks, referring to the section ENGINE MECHANICAL.

(2) Check of wire harnesses and connectors

1.Check of open wire

(1) Check of open wire

This is caused by detached wire harness, poor contact inside the connector, detached connector terminal, and so forth.

NOTE

- The wires are rarely cut at the center. In most cases, an open wire occurs at the connectors. Particularly, the connectors of the sensor and actuator should be checked very carefully.
- Poor contact is caused by rust formation at the connector terminal, foreign substances adhered to the terminal, or drop in the contact pressure between the male and female terminals of the connector.
- Simply disconnect the connector once, and then, reconnect it. It may change the contacting condition, thus returning to the normal operation. Hence, if no abnormality was found when the wire harness and connector were checked during the trouble-shooting, and if the malfunction ceases to exist after completion of the checks, then the wire harness or connector was most likely causing the malfunction.

2.Check of short circuit

(1) Check of short circuit

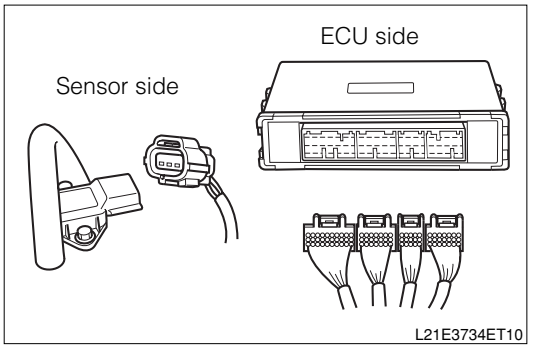
This is caused by a short circuit between the wire harness and the body ground or by an internal short circuit of the switches, etc.

NOTE

- If a short circuit is present between the wire harness and the body ground, thoroughly check to see if the wire harness is caught in the body, if the wire is rubbed and the insulator section is ruptured, thus contacting other parts, and if the wire is clamped properly.

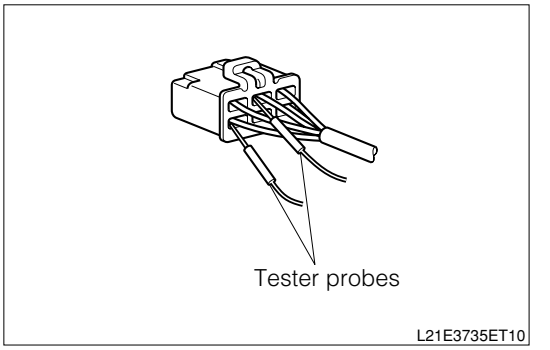
3.Continuity check (Check for open wire)

(1) Disconnect the connector on both sides of the EFI ECU and sensor.



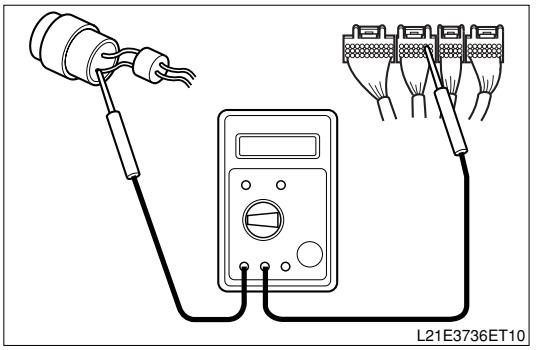
(2) Measure the resistance between the relevant terminals of the connector.

SPECIFIED VALUE: Resistance: 1 Ω or less



NOTE

- Lightly shake the wire harness in a longitudinal direction as well as in a horizontal direction when the resistance is measured.
- In the case of non-waterproof connectors, the test probe should be inserted into the connector from each wire harness side.
- In cases where the waterproof connector is checked without removing the waterproof rubber, be very careful not to deform the connector terminal when applying the test probes.

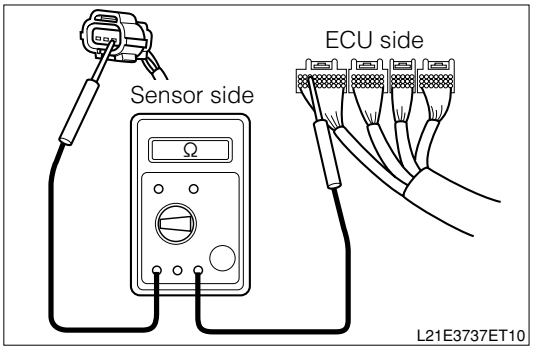


4.Continuity check (Check for short circuit)

(1) Disconnect the connector on both sides.

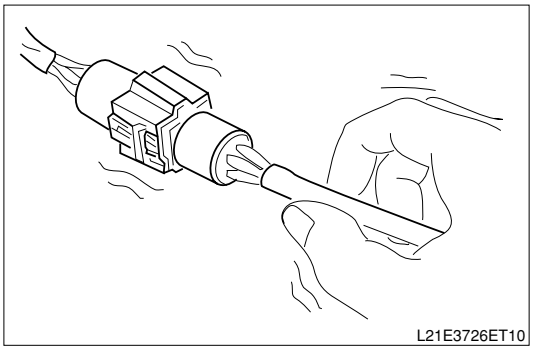
(2) Measure the resistance between the relevant terminal of the connector and the body ground. Moreover, be sure to check for the connectors on both sides.

SPECIFIED VALUE: Resistance:1 MΩ or more



NOTE

- Lightly shake the wire harness in a longitudinal direction as well as in a horizontal direction when the resistance is measured.



5.Check of EFI ECU and its circuit

(1) The EFI ECU and its circuit can be checked by measuring the voltage and resistance at the EFI ECU connector. In order to narrow down the cause further after the cause has been decided to a certain system, it is imperative to measure the voltage and resistance of the external route of the EFI ECU.

(2) The measurement of the voltage and resistance is conducted during the system check, following the procedure given below.

CAUTION

- The EFI ECU cannot be checked by itself. Never connect a voltmeter or an ohmmeter to the EFI ECU with the connector disconnected from the EFI ECU.
- When conducting the continuity test or measuring the resistance, turn "LOCK" the ignition switch once. Then, disconnect the connector at the EFI ECU.

6.Voltage check

(1) Installation of SST

First, install the SST between the engine ECU and the vehicle harness.

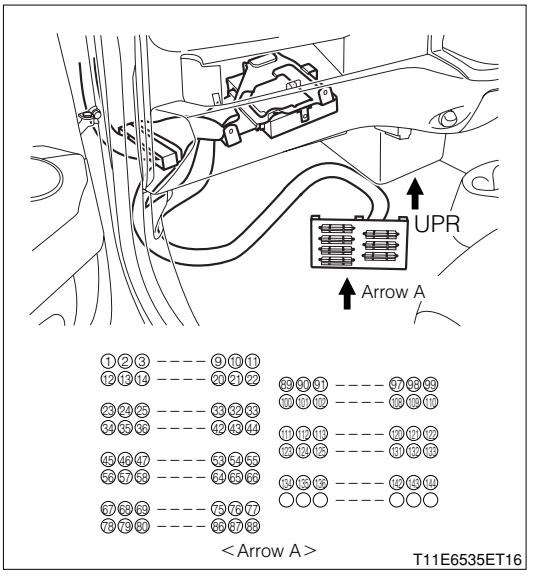
For the installation procedure, refer to the section under.

(2) Measure the voltages between the respective terminals of the SST connectors.

(3) Check to see if the measured values conform to the specification in accordance with the following table "Characteristics of ECU Output".

NOTE

- Make sure that the battery voltage is 11 V or more with the ignition switch turned "ON", for each terminal voltage is affected by the battery voltage.



7.Resistance check

(1) Installation of SST

First, install the SST between the engine ECU and the vehicle harness. However, the SST connector at the ECU side should not be connected.

For the installation procedure, refer to the section under "Connecting Procedure for SST".

(2) Measure the resistances between the respective terminals.

(3) Check to see if the measured resistances conform to the specification in accordance with the following table "Standard Resistances".

NOTE

- Make sure that the ignition switch is turned "LOCK" during the measurement.
- The following table shows the resistance at the time when the temperature of parts is 20°C.

standard resistances

System to be checked	Terminals	Circuit	Standard resistance
Front oxygen sensor system	15 (OXH1) - 27 (+B)	Front oxygen sensor and main relay	4.7 - 6.1 Ω
Rear oxygen sensor system	14 (OXH2) - 27 (+B)	Rear oxygen sensor and main relay	11.7 - 14.5 Ω
Engine revolution sensor system	22 (N1+) - 52 (N1−)	Engine revolution sensor system	1850 - 2450 Ω
Camshaft position sensor system	58(N2+) - 127(N2−)	Camshaft position sensor system	1850 - 2450 Ω
Injector system	24 (#10) - 27 (+B)	No.1 - 4 fuel injector	11.6 - 12.4 Ω
	23 (#20) - 27 (+B)		
	22 (#30) - 27 (+B)		
	21 (#40) - 27 (+B)		
VSV for evaporative emission control system purge control system	79 (PRG) - 7 (+B)	Evaporative emission purge control valve	30 - 34 Ω
Ground system	125 (E1) - Body ground	Ground	10 Ω or less
	19 (E2) - Body ground		
	122 (E2PM) - Body ground		
	116 (E21) - Body ground		

9-10-2 CHECK AND REPAIR BY CHART ACCORDING TO DTC

(1) Scan tool data (ECU DATA)

1.The following data values given below are representative values obtained under the "normal condition".

However, there are cases where the system is functioning normally even if the measured value is different from the values listed here. Therefore, no judgment as to whether any malfunction is occurring or not should be made only on the basis of these data under the "normal condition".

NOTE

- The data monitor value may vary significantly, depending on slight difference in the measurement, difference in the measurement environment, deterioration due to passage of time in the vehicle, and so forth. Therefore, it is difficult to indicate the definite reference values. Hence, there are cases where malfunctions are occurring even when the measured value is within the reference value.
- With regard to minor phenomenon, such as hesitation and rough idling, it is necessary to make total evaluation, based on all the data monitor items, by sampling the data of the vehicle of the same type under the same conditions and comparing them.
- In the case of the OBD Ⅱ generic scan tool, it is possible to take a reading of the values with an ※ mark in the following table.
- When checking the data under a condition where the engine is "idling" or "racing", the shift lever should be placed in the "neutral", the A/C switch should be turned "OFF", and all accessory switches should be turned "OFF".

Items specified by CARB

	DS-21 diagnosis tester display	Signal name	Vehicle condition	Reference values under normal condition
※1	FUEL SYSTEM	FSYS	At idle speed after warming up	O2
※2	CALC LOAD	LOAD	At idle speed after warming up	1.7 - 2.2 %
			At 2500 rpm with no load after warming up	5.0 - 6.3 %
※3	COOLANT TEMP	ECT	Cold start - Warming up running	Value should be rising gradually
			When engine has warmed up completely	80 - 102˚C
			During fail-safe function (At time of starting)	20˚C
			During fail-safe function (After starting)	80˚C
※4	SHORT FT	SHRT	At idle speed after warming up	−20 - 20 %
※5	LONG FT	LONG	At idle speed after warming up	−16 - +16 %
※6	ENGINE SPEED	RPM	When engine is running at constant speed	There should be no remarkable variation
			At idle speed after warming up	600 - 750 rpm (M/T vehicles) 650 - 800 rpm (A/T vehicle)
※7	VEHICLE SPEED	VS	During running (Compared with speedometer)	There should be no remarkable variation
※8	IGN ADVANCE	ITA	At idle speed after warming up	0 - 15˚
			When idle switch is OFF	Changes should be made according to running conditions
※9	INTAKE AIR TEMP	IAT	When engine is running	Changes should be made according to running conditions
※10	MAIN ABS PRESS	MAP	When ignition switch is ON	70 - 104 kPa
			At idle speed after warming up	20 - 40 kPa
			During fail-safe function	34 - 72 kPa
※11	THROTTLE POS	TP	When acceleration pedal is operate	Changes should be made according to pedal operation
※12	OXYGEN SENSOR S1	O_2FP	At idle speed after warming up	−5 - +5 %
		O_2FV		0.0 - 1.0 V
※13	OXYGEN SENSOR S2	O_2RP	When engine is running at 2000 rpm, for 3 minutes or longer after warming up.	20 - 77 %
		O_2RV		0.10 - 0.95 V
※14	MIL ON RUN DIST	DWM	When there is no DTC	0 km

Items specified by DMC

	DS-21 diagnosis tester display	Signal name	Vehicle condition	Reference values under normal condition
1	BATTERY VOLTAGE	BAT	When engine is running at 5000 rpm (25˚C)	Approx. 14 V
2	ELECTRIC LOAD	DSW	When light, heater blower, defogger or radiator fan is ON	OFF→ON
3	AIR CONDITIONING	AC	When air conditioner switch is set to ON	OFF→ON
4	CTP SWITCH	IDL	When throttle valve is switched from fully closed state to opened state	ON→OFF
5	INJ PULSE WIDTH	TAU	Cold start - Warming up running	Value should be decreasing gradually
			At idle speed after warming up	1.4 - 1.8 ms
6	ISC DUTY RATIO	ISC	When ignition switch is ON	0%
			Cold start - Warming up running	Value should be decreasing gradually
			At idle speed after warming up	6 - 14 %
			When air conditioner switch is set to ON	20 - 60 %
			When light, heater blower or defogger is ON	7 - 19 %
			At idle speed after warming up	0 - 2˚CA
7	ACTUAL DIS ANGLE OF IN CAM	VT	During vehicle running	The value changes, depending on driving conditions.
			At idle speed after warming up	0˚CA
8	TARGET DISP ANGLE OF IN CAM	VTT	During vehicle running	The value changes, depending on driving conditions.

NOTE

- The items with a (※) mark is provided only for the EU specifications. Therefore, in the case of the non-EU specification vehicles, no indication will be made.

(2) DTC chart specifications

1.The parameters indicated in the table may vary, depending upon the system types and specifications. This applies to vehicles for all destinations.

For details of the checking of each code, refer to the DTC chart for each code.

Codes specified by ISO/SAE

DTC No.	Diagnosis Items	Diagnosis contents	Malfunction evaluation method	Warning indication
P0105/31	Manifold absolute pressure/barometric pressure circuit malfunction	When abnormality takes place in the signal from manifold absolute pressure/barometric pressure circuit: Malfunction of the sensor, or open wire or short circuit in the manifold absolute pressure/barometric pressure circuit.	1 trip	○
P0110/43	Intake air temperature sensor circuit malfunction	When malfunction takes place in the signal from the intake air temperature sensor: Malfunction of the sensor, or open wire or short circuit in intake air temperature sensor circuit.	1 trip	○
P0115/42	Engine coolant temperature sensor circuit malfunction	When abnormality takes place in the signal from the engine coolant temperature sensor: Malfunction of the sensor, or open wire or short circuit in engine coolant temperature sensor circuit.	1 trip	○
P0120/41	Throttle/pedal position sensor/switch malfunction	When abnormality takes place in the signal from throttle/pedal position sensor: ·Malfunction of the sensor, or open wire or short circuit in throttle/pedal position sensor/switch circuit.	1 trip	○
P0130/21	Oxygen sensor circuit malfunction (Bank 1 sensor 1)	When abnormalities take place two times consecutively in the signal from the oxygen sensor: ·Malfunction of the sensor, or open wire or short circuit in oxygen sensor circuit.	2 trip	○
P0135/23※1	Oxygen sensor heater circuit malfunction (Bank1 sensor1).	When abnormalities take place in the signal from the oxygen sensor heater: ·Open wire or short circuit in oxygen sensor heater circuit.	2 trip	○
P0136/22	Rear oxygen sensor circuit malfunction (Bank 1 sensor 2)	When abnormalities take place two times consecutively in the signal from the rear oxygen sensor: ·Malfunction of the sensor, or open wire or short in the rear oxygen sensor circuit.	2 trip	○
P0141/24※1	Oxygen sensor heater circuit malfunction (Bank 1 sensor 2)	When abnormalities take place in the signal from the oxygen sensor heater: ·Open wire or short circuit in oxygen sensor heater circuit.	2 trip	○
P0171/25	Fuel trim system too lean (Air-fuel ratio lean malfunction, bank 1)	When the air-to-fuel ratio deviates two times consecutively to the lean side due to abnormality of the fuel trim system: ·Abnormal combustion pressure, malfunctioning injector or oxygen sensor	2 trip	○

DTC No.	Diagnosis Items	Diagnosis contents	Malfunction evaluation method	Warning indication
P0172/26	Fuel trim system too rich (Air-fuel ratio rich malfunction, bank 1)	When the air-to-fuel ratio deviates two times consecutively to the rich side due to abnormality of the fuel trim system: ·Abnormal combustion pressure, malfunctioning injector or oxygen sensor	2 trip	○
P0350/16※2	Ignition system circuit malfunction	When the ignition signal is not inputted continually.	1trip	○
P0300/17※1	Random/multiple cylinder misfire detected	When malfunction takes place in the signal from the Ion current combustion control system	2 trip	MIL flashing during misfire detection.
P0301/17※1 P0302/17※1 P0303/17※1 P0304/17※1	Misfire detected Cylinder 1 Cylinder 2 Cylinder 3 Cylinder 4			○
P0325/18	Knock sensor 1 circuit malfunction	When malfunction takes place in the signal from the knock sensor: ·Malfunction of the sensor, or open wire or short circuit in the signal system	1 trip	—
P0335/13	Engine revolution sensor circuit malfunction	When malfunction takes place in the signal from the engine revolution sensor: ·Malfunction of the sensor, or open wire or short circuit in engine revolution sensor circuit.	1 trip	○
P0340/14	Camshaft position sensor circuit malfunction	When malfunction takes place in the signal from the camshaft position sensor. ·Malfunction of the sensor, or open wire or short-circuit in the sensor circuit.	1 trip	○
P0443/76	Evaporative emission control system purge control valve circuit malfunction	When malfunction takes place in the detection signal of the evaporative emission control system purge control valve: ·Open wire or short circuit in evaporative emission control system purge control circuit.	2 trip	○
P500/52	Vehicle speed sensor circuit malfunction	When malfunction takes place in the signal from the vehicle speed sensor. ·Sensor malfunction, open wire or short circuit of the signal system	1 trip	○
P0505/71	Idle control system malfunction	When malfunction takes in the signal from the valve for ISC. ·Open wire or short in valve for ISC circuit	1 trip	○

NOTE

- 1 trip: 1 trip detection logic
- 2 trip: 2 trip detection logic
- MIL; Malfunction indicator lamp
- When the "O" mark is shown in the MIL column, the lamp will go on for that DTC number, but when the "—" mark is shown, the lamp will not go on for that DTC number. Therefore, it is possible to read out the DTC number by using the diagnosis tester (DS-21/DS-Ⅱ). As for the DTC number bearing the mark, the MIL will go on except the EU specifications.
- DTC number with ※1 mark: For EU specifications
- DTC number with ※2 mark: For general specifications

Codes specified by DMC

DTC No.	Diagnosis Items	Diagnosis contents	Malfunction evaluation method	Warning indication
P0535/44	A/C evaporator temperature sensor circuit malfunction	When malfunction takes place in the signal from the A/C evaporator temperature sensor: ·Malfunction of the sensor, or open wire or short circuit in A/C evaporator temperature sensor circuit.	1 trip	–
P1105/32※1	Atmospheric pressure sensor circuit malfunction	When the signals from the atmospheric pressure sensor are not outputted continuously over a certain length of time after starting.	1 trip	○
P1300/36※1	Ion current combustion control system malfunction	When malfunction takes place in the signal from Ion current combustion control system	2 trip	○
P1346/75	Variable valve timing control system (valve timing)	When abnormalities take place two times consecutively in the valve timing control. ·Deviation of camshaft drive and driven gears	1 trip	○
P1349/73	Variable valve timing control system (advanced timing/retarded timing)	When abnormalities take place two times consecutively in the valve timing control. ·Oil control valve abnormality, admission of foreign matters in the oil passage	1 trip	○
P1510/54	Starter signal system malfunction	When abnormalities take place in the signal from the starter. ·Open wire or short circuit in the signal system	2 trip	○
P1600/83	Immobilizer signal circuit malfunction	When abnormality occur in the wring and reading-out of the rolling codes into/from the immobilizer ECU during immobilizer communication	1 trip	–
P1601/81	Immobilizer signal malfunction	When the rolling codes can not be exchanged between the EFI ECU and the immobilizer ECU or the rolling codes are not matched.	1 trip	–
P1656/74	Oil control valve control system malfunction	When malfunction takes place in the control voltage for the oil control valve.	1 trip	○
U0101/82	E-AT abnormal reception	When the communication signal from the A/T ECU cannot be received: Open wire or short circuit between EFI ECU and A/T ECU.	1 trip	○
No.U0121/86	ABS communication failure	When the communication signal from the ABS actuator cannot be received: ·Open wire or short circuit between EFI ECU and ABS actuator.	1 trip	○
U0156/87	Combination meter communication failure	When the communication signal from the combination meter cannot be received: ·Open wire or short circuit between EFI ECU and combination meter	1 trip	○
U1000/85	E-AT abnormal transmission	When the communication signal to the A/T ECU cannot be sent: ·Open wire or short circuit between EFI ECU and A/T ECU.	1 trip	○
U1002/88	Communication history error	When there is no communication establishment history with all the CAN communication making-up ECU. ·Open wire, etc. in the wiring of the CAN communication terminal of the EFI ECU.	1 trip	○

NOTE

- 1 trip: 1 trip detection logic
- 2 trip: 2 trip detection logic
- MIL; Malfunction indicator lamp
- When the "O" mark is shown in the MIL column, the lamp will go on for that DTC number, but when the "—" mark is shown, the lamp will not go on for that DTC No. Therefore, it is possible to read out the DTC No. by using the diagnosis tester (DS-21/DS-Ⅱ). As for the DTC No. bearing the mark, the MIL will go on except the EU specifications.
- DTC No. with ※1 mark: For EU specifications

(3) Fail-safe function

1.When any of the following DTC has been detected, the EFI ECU enters the fail-safe mode in order to make it possible for the vehicle to drive for evacuation and to ensure safety. When the malfunction is remedied to a normal condition, the fail-safe control will be released.
However, the diagnosis results will remain memorized. Hence, it is necessary to determine whether the malfunction still persists or not.

Fail-safe specifications

DTC No.	Fail-safe operation	Fail-specifications
Manifold absolute pressure sensor signal system	When abnormality takes place in the signal from the manifold absolute pressure/barometric pressure circuit	The signal from the intake manifold pressure sensor is set to the value determined from the throttle opening angle, engine speed and ISC opening angle. If both the throttle opening angle and engine speed exceed their set values, the fuel is cut.
Ignition system	When malfunction takes place in the ignition signal:	The fuel injection of the cylinder in which abnormality is taking place in the ignition signal is cut.
Water temperature sensor signal system	When malfunction takes place in the signal from the water temperature sensor:	The signal from the water temperature sensor is set to a constant value.
Throttle position sensor signal system	When malfunction takes place in the signal from the throttle position sensor:	The signal from the throttle position sensor is set to a constant value.
A/C evaporator temperature sensor signal system	When malfunction takes place in the signal from the A/C evaporator temperature sensor.	The air conditioner will be cut.
Atmospheric pressure sensor circuit malfunction	When malfunction takes place in the signal from the atmospheric pressure sensor:	The signal from the atmospheric pressure sensor is set to a constant value.
Knock sensor system	When abnormality takes place in the signal from the knock sensor circuit	The ignition timing is retarded.
Intake air temperature sensor signal system	When malfunction takes place in the signal from the intake air temperature sensor:	The signal from the intake air temperature sensor is set to a constant value.
Oil control valve system	When malfunction takes place in the oil control valve control voltage.	Oil control valve energizing control is prohibited.
Rear oxygen sensor system	When malfunction takes place in the signal from the rear oxygen sensor:	The feedback control is turned to open control.
Immobilizer signal circuit malfunction	When abnormality occur in the wring and reading-out of the rolling codes into/from the immobilizer ECU during immobilizer communication. When the rolling codes can not be exchanged between the EFI ECU and immobilizer ECU or rolling codes are not mached.	Prohibition of fuel injection and ignition.

9-11 TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA

9-11-1 DESCRIPTION

1. Here, checking procedures when there is no abnormal code indication of the diagnosis but there is a malfunction taking place are described.
2. As for the trouble shooting according to the malfunction phenomena, first organize the contents of the diagnosis by interview, basic check and EFI ECU circuit check results. Then, narrow down and decide the check priority of the possible causes by cross-checking it with the list of possible causes according to malfunction phenomena. On that basis, perform trouble shooting sequentially for each system and parts by following the directions provided in the list.

WARNING

- If the vehicle is driven with the SST (EFI computer check sub harness, etc.) connected, there is a possibility of causing malfunction and may be very dangerous. Therefore, remove it without fail.

NOTE

- When performing checks for each component, make sure to check the harness and connectors that are connected to it.
- As for the reason why no malfunction is detected by diagnosis even when the malfunction phenomena is reproduced, it is possible that there is a malfunction taking place out of the range of the code output conditions of the diagnosis, or there is a malfunction taking place out of the diagnosis circuit.

9-11-2 LIST OF POSSIBLE CAUSES ACCORDING TO MALFUNCTION PHENOMENA

(1) Poor startability

Malfunction phenomena		Possible causes		
		System	Components	Malfunction mode
No initial explosion		Power supply system	EFI ECU power supply circuit	Open wire and short circuit
			Ignition switch	Will not turn ON
			Main relay	
		Engine earth system	Engine earth※	Open wire, defective earth
		Fuel system	Fuel pump relay	Will not turn ON
			Fuel line, Fuel filter	Clogging
			Injector	Will not inject, constant injection
			Fuel pump	Will not operate
		Ignition system	Engine fuse※	Fuse melt down
			Ignition coil	Will not generate sparks
			Spark plug	
			Ignition timing	Deviated
		Control system	Engine revolution sensor	"NE signal" is not outputted.
			Camshaft position sensor	Defective output signal
There is initial explosion but no complete explosion.		Fuel system	Fuel pump relay	Will not turn ON
			Fuel line, Fuel filter	Clogging
			Injector	Leakage, Will not inject, constant injection
			Fuel pump	Will not operate
		Ignition system	Spark plug	Misfire
		Intake system	Air hoses, etc.	Leakage
		Control system	Manifold absolute pressure sensor	Characteristics deviated, open wire, short circuit
			Water temperature sensor	
			Engine revolution sensor	Defective output signal
			Camshaft position sensor	
			Oil control valve	Malfunction
Hard to start	During cold period	Intake system	Throttle body	Defective opening, does not open
		Control system	Water temperature sensor	Characteristics deviated, open wire, short circuit
	During hot period	Fuel system	Injector	Leakage
		Intake system	Valve for ISC	Defective opening, will not open
	At all times	Fuel system	Fuel pump relay	Will not turn ON
			Fuel line, Fuel filter	Clogging
			Injector	Leakage
		Ignition system	Spark plug	No smoldering
		Intake system	Valve for ISC	Defective opening

※: If the IG switch is turned "ON" under the condition of defective grounding of the engine earth connection (Between 125 (E1) connection earth and engine block), the "ENGINE fuse (10A)" can melt down.

(2) Idling malfunction

Malfunction phenomena	Possible causes		
	System	Components	Malfunction mode
Fast idle not working	Intake system	Valve for ISC	Defective opening, will not open
	Control system	Water temperature sensor	Open wire and short circuit
Idling speed is high.	Intake system	Air hoses, etc.	Leakage
		Throttle body	Defective closing
		Valve for ISC	Constantly open
	Control system	Manifold absolute pressure sensor	Characteristics deviated, open wire, short circuit
		Water temperature sensor	
		Throttle position sensor	Characteristics deviated
		Defogger switch	Constantly ON
		Stop lamp switch	
		Heater blower signal	
Idling speed is low.	Intake system	Air hoses, etc.	Clogging
		Throttle body	
	Control system	Manifold absolute pressure sensor	Characteristics deviated
		Water temperature sensor	
		Defogger switch	Will not turn ON
		Stop lamp switch	
		Heater blower signal	
When idling hunting takes place.	Intake system	Air hoses, etc.	Leakage
		Throttle body	
		Valve for ISC	Constantly open
	Control system	Manifold absolute pressure sensor	Characteristics deviated
		Camshaft position sensor	Defective output signal
		Oil control valve	Malfunction
Unstable idling	Fuel system	Injector	Leakage, Will not inject
		Fuel pump	Malfunction
	Intake system	Throttle body	Suction
	Ignition system	Ignition coil	Poor connection
		Spark plug	Misfire
	Control system	Manifold absolute pressure sensor	Malfunction, poor connection
		Oxygen sensor	Malfunction, poor connection

(3) Engine stall

Malfunction phenomena	Possible causes		
	System	Components	Malfunction mode
The engine stalls after a while from starting.	Fuel system	Fuel pump relay	Will not turn ON
		Fuel line, Fuel filter	Clogging
		Fuel pump	Will not operate
	Control system	Water temperature sensor	Characteristics deviated
		Camshaft position sensor	Defective output signal
		Oil control valve	Malfunction
The engine stalls when pressing on the accelerator.	Control system	Manifold absolute pressure sensor	Characteristics deviated
		Water temperature sensor	
		Camshaft position sensor	Defective output signal
		Oil control valve	Malfunction
The engine stalls when releasing the accelerator.	Intake system	Throttle body	Malfunction
	Control system	Manifold absolute pressure sensor	Characteristics deviated
When the air conditioner is turned ON	Intake system	Valve for ISC	Constantly closed
The engine stalls but can be restarted.	Power supply system	EFI ECU power supply circuit	Poor connection
		Ignition switch	
		Main relay	
	Intake system	Valve for ISC	Constantly closed
	Ignition system	Ignition coil	Poor connection
	Control system	Manifold absolute pressure sensor	Poor connection
		Engine revolution sensor	

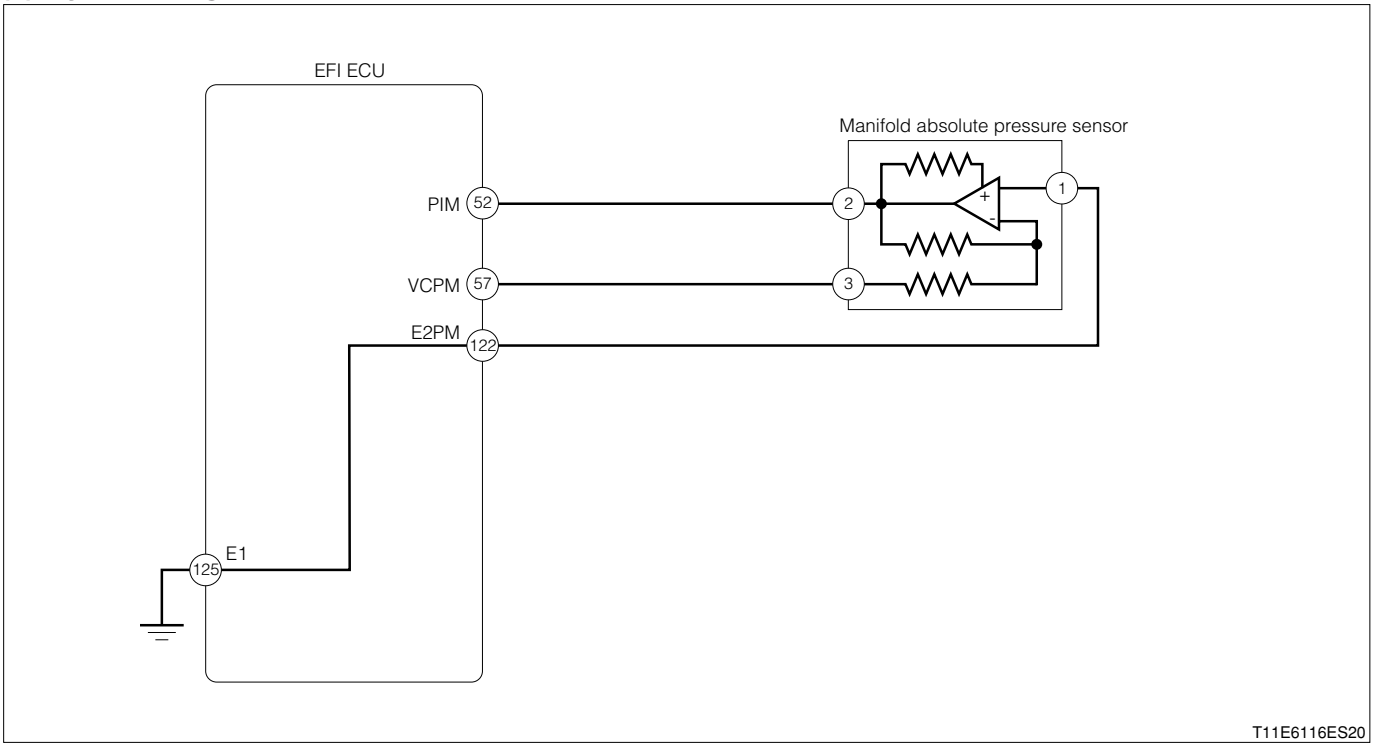
(4) Defective running

Malfunction phenomena	Possible causes		
	System	Components	Malfunction mode
Hesitation takes place when accelerating.	Fuel system	Fuel line, fuel filter	Clogging
		Injector	Flow rate decrease
		Fuel pump	
	Ignition system	Ignition coil	Ignition missing
		Spark plug	Misfire
		Ignition timing	Deviated
	Control system	Manifold absolute pressure sensor	Characteristics deviated, open wire, short circuit
		Water temperature sensor	
		Throttle position sensor	
		Knock sensor	Open wire and short circuit
Back fire, after fire	Fuel system	Injector	Flow rate decrease
	Ignition system	Ignition coil	Poor connection
		Spark plug	Misfire
		Ignition timing	Deviated
	Control system	Manifold absolute pressure sensor	Malfunction
		Intake air temperature sensor	Characteristics deviated
		Water temperature sensor	
		Camshaft position sensor	Defective output signal
		Oil control valve	Malfunction
Insufficient output	Fuel system	Fuel line, Fuel filter	Fuel pressure will not rise.
		Injector	Flow rate decrease
		Fuel pump	Fuel pressure will not rise.
	Ignition system	Spark plug	Misfire
	Control system	Manifold absolute pressure sensor	Characteristics deviated, open wire, short circuit
		Intake air temperature sensor	
		Water temperature sensor	
		Throttle position sensor	Characteristics deviated
		Camshaft position sensor	Defective output signal
		Oil control valve	Malfunction
Emits black smoke.	Fuel system	Injector	Constant injection
	Control system	Manifold absolute pressure sensor	Characteristics deviated, open wire, short circuit
		Intake air temperature sensor	Characteristics deviated
		Water temperature sensor	
		Throttle position sensor	
Hunting takes place while running.	Fuel system	Fuel line, fuel filter	Clogging
		Injector	Malfunction
	Ignition system	Ignition coil	Poor connection
	Control system	Throttle position sensor	Characteristics deviated
		Camshaft position sensor	Defective output signal
		Oil control valve	Malfunction
Abnormal knocking takes place.	Control system	Manifold absolute pressure sensor	Characteristics deviated, open wire, short circuit
		Throttle position sensor	Characteristics deviated
		Knock sensor	Characteristics deviated, open wire, short circuit

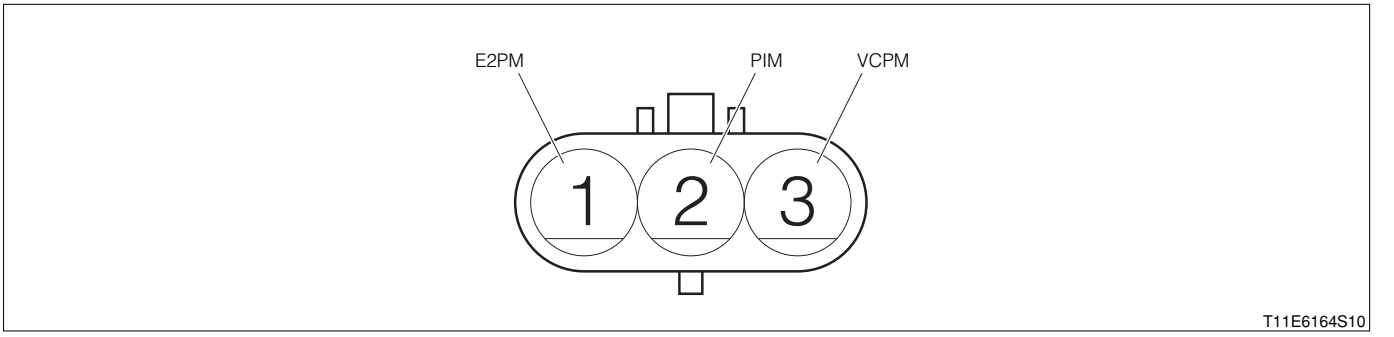
9-12 TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE

9-12-1 DTC NO.P0105/31 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT MALFUNCTION

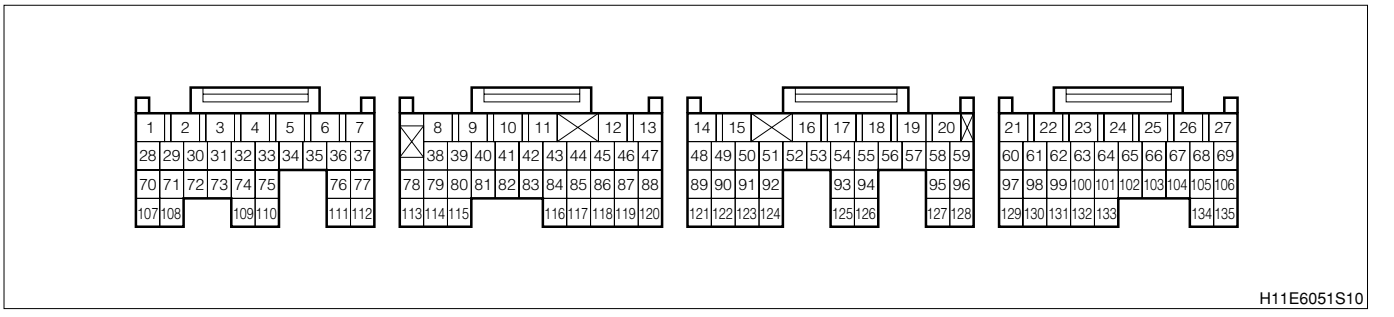
(1) System diagram



Manifold absolute pressure sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1. The manifold absolute pressure sensor detects the intake manifold pressure as a voltage.
2. Since the Manifold absolute pressure, intake air temperature integral type sensor (Manifold absolute pressure sensor section) does not use the atmospheric pressure as a criterion, but senses the absolute pressure inside the intake manifold (The pressure in proportion to the present absolute vacuum 0), it is not influenced by fluctuations in the atmospheric pressure due to high altitude and other factors. This permits it to control the air-fuel ratio at the proper level under all conditions.

(3) Diagnosis code output conditions

1.When the signal from the manifold absolute pressure sensor is not outputted continuously over a certain length of time

NOTE

- After confirming DTC P0105/31, use the OBD Ⅱ generic scan tool or diagnosis tester (DS-21/DS-Ⅱ) to confirm the "Manifold abs. pressure" from "CURRENT DATA".
- If the ECU detects DTC P0105/31, it operates the fail-safe function, keeping the ignition timing and injection volume constant and making it possible to drive the vehicle.

(4) Trouble area

1.Open wire or short circuit in manifold absolute pressure sensor circuit
2.Manifold absolute pressure sensor
3.EFI ECU

(5) Checking points

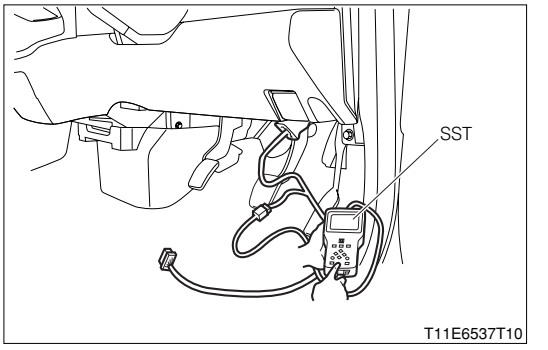
1.Is the signal from the manifold absolute pressure sensor inputted to the EFI ECU?
2.Is the harness between the manifold absolute pressure sensor section and the EFI ECU normal?
3.Is the power supply voltage of the manifold absolute pressure sensor section normal?
4.Is the output of the manifold absolute pressure sensor section normal?

(6) Inspection procedure

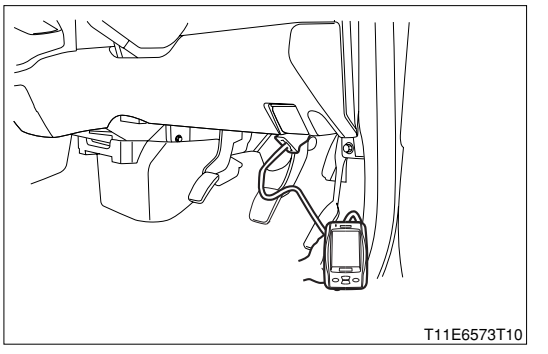
① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

Σ>1. Check of output value of sensor.

1.The IG switch turned "LOCK".
2.Diagnosis tester connect the DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.After turning "ON" the IG switch, turn "ON" the main switch of the tester.
4.Read the "Manifold abs. pressure" value of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.
SPECIFIED VALUE: Atmospheric pressure (Approx. 100 kPa).

▼If it is OK, check the EFI ECU circuit.
Refer to Page BA1-24.

▼If it is NG, go to Σ>2.

Σ2. Check of manifold absolute pressure sensor voltage

1.Disconnect the connector of the manifold absolute pressure sensor

2.With the IG switch turned "ON", measure the voltage between the following terminals given below.

(1) Between the sensor connection vehicle harness side connector 3 (VCPM) and the sensor connection vehicle harness side connector 2 (E2PM)

SPECIFIED VALUE: 4.5 - 5.5V

3.Is the measured voltage the specified value?

NOTE

- If no voltage appears, check the EFI ECU power supply circuit.

▼If it is OK, go to Σ3.

▼If it is NG, check or replace the EFI ECU.

Σ3. Manifold absolute pressure sensor unit check

1.Perform the unit check of the manifold absolute pressure sensor.

Refer to Page B8-468.

2.Are the check result OK?

▼If it is YES, go to Σ2.

▼If it is NG, replace the manifold absolute pressure sensor.

Refer to Page B8-237.

Σ4. Check of wire harness continuity

1.After turning "OFF" the main switch of the tester, turn "LOCK" the IG switch.

2.Check the continuity between the following terminals given below.

(1) Between the sensor connection vehicle harness side connector 1(E2PM) and the EFI ECU connection vehicle harness side connector 122 (E2PM)

(2) Between the sensor connection vehicle harness side connector 2 (PIM) and the EFI ECU connection vehicle harness side connector 52 (PIM)

(3) Between the sensor connection vehicle harness side connector 3 (VCPM) and the EFI ECU connection vehicle harness side connector 57 (VCPM)

SPECIFIED VALUE: Continuity exists

3.Are the check results for open wire and short OK?

▼If it is OK, replace the Manifold absolute pressure, intake air temperature integral type sensor.

Refer to Page B8-237.

▼If it is NG, repair or replace the harness or connector.

② **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

Σ1. EFI ECU signal check

1.Connect the SST.
SST: 09842-97209-000

2.Remove the hose of the manifold absolute pressure sensor.
3.Perform voltage measurements between the following terminals when the IG switch is "ON".
(1) Between SST 52 (PIM) - SST 122 (E2PM)
SPECIFIED VALUE: 3.1 - 4.1 V (Room temperature)

▼If it is OK, check the EFI ECU circuit.
▼If it is NG, proceed to Σ2.

Σ2. Check of wire harness continuity

1.Perform continuity check between each of the following terminals.
(1) Between sensor connection vehicle harness side connector 2 (PIM) - ECU connection vehicle harness side connector 52 (PIM)
(2) Between sensor connection vehicle harness side connector 1 (E2PM) - ECU connection vehicle harness side connector 122 (E2PM)
(3) Between sensor connection vehicle harness side connector 3 (VCPM) - ECU connection vehicle harness side connector 57 (VCPM)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ3.
▼If it is NG, repair the harness and connectors.

Σ3. Manifold absolute pressure sensor voltage check

1.Remove the connector of the manifold absolute pressure sensor.
2.Perform voltage measurement between the following terminals when the IG switch is "ON".
(1) Between sensor connection vehicle harness side connector 3 (VCPM) - sensor connection vehicle harness side connector 2 (E2PM)
SPECIFIED VALUE: 4.5 - 5.5V

▼If it is OK, proceed to Σ4.
▼If it is NG, check the EFI ECU circuit.
Refer to Page A1-24.

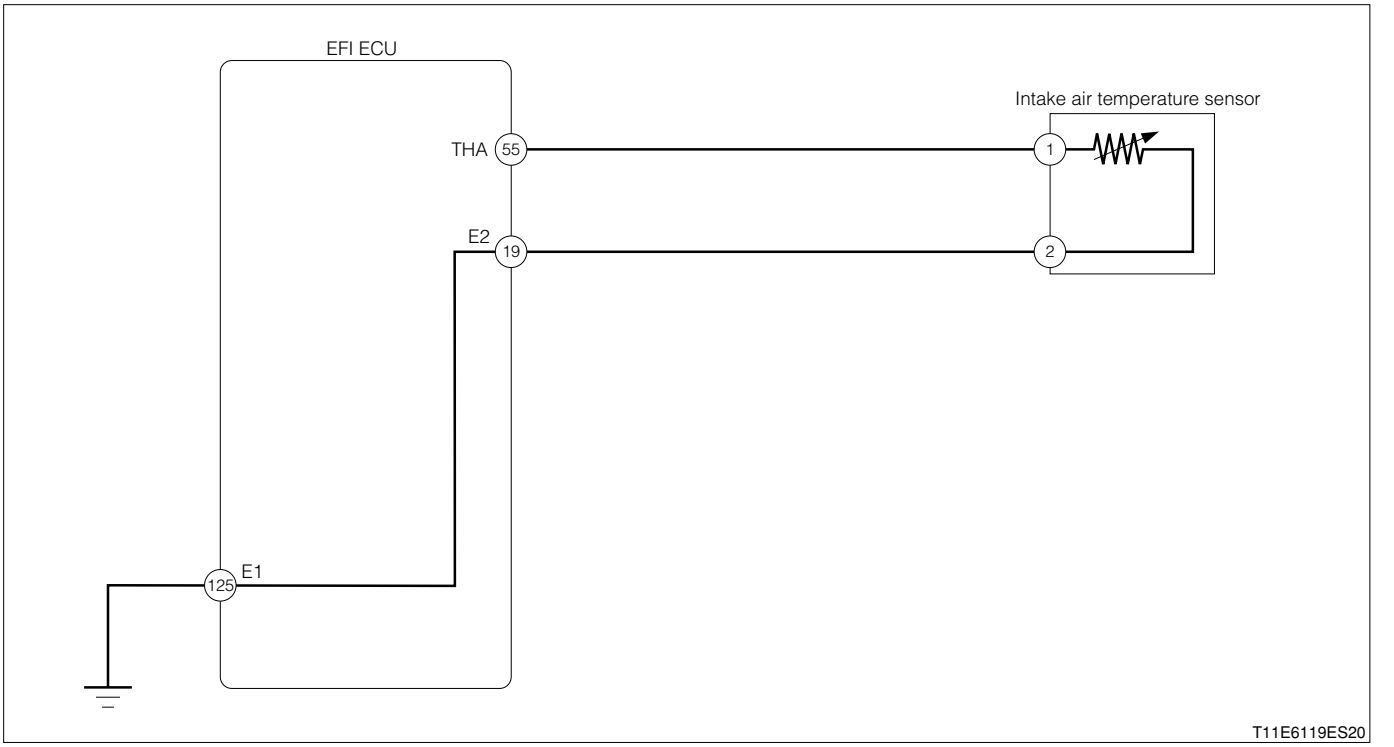
Σ4. Manifold absolute pressure sensor unit check

1.Perform unit check of the manifold absolute pressure sensor.
Refer to Page B8-468.

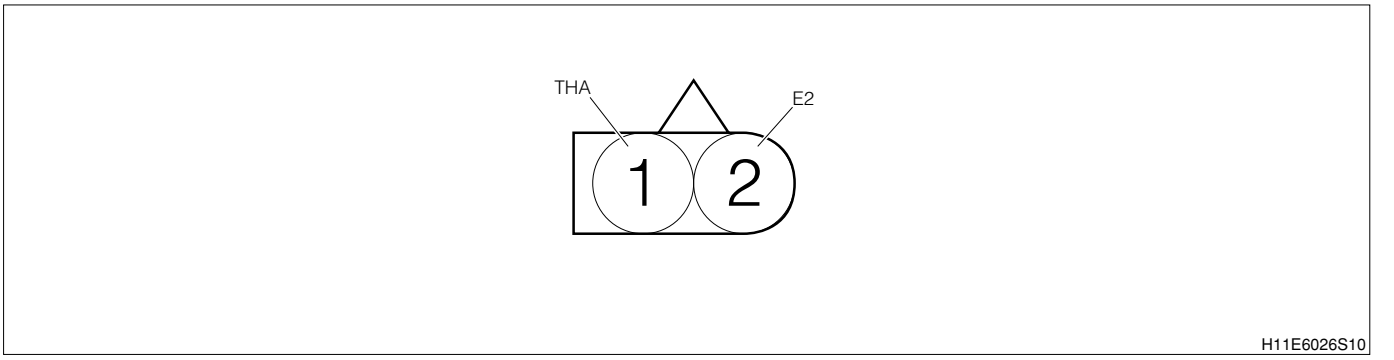
▼If it is OK, check the connecting condition of each connector.
▼If it is NG, replace the manifold absolute pressure sensor.
Refer to Page B8-237.

9-12-2 DTC NO.P0110/43 INTAKE AIR TEMPERATURE (IAT) SENSOR CIRCUIT MALFUNCTION

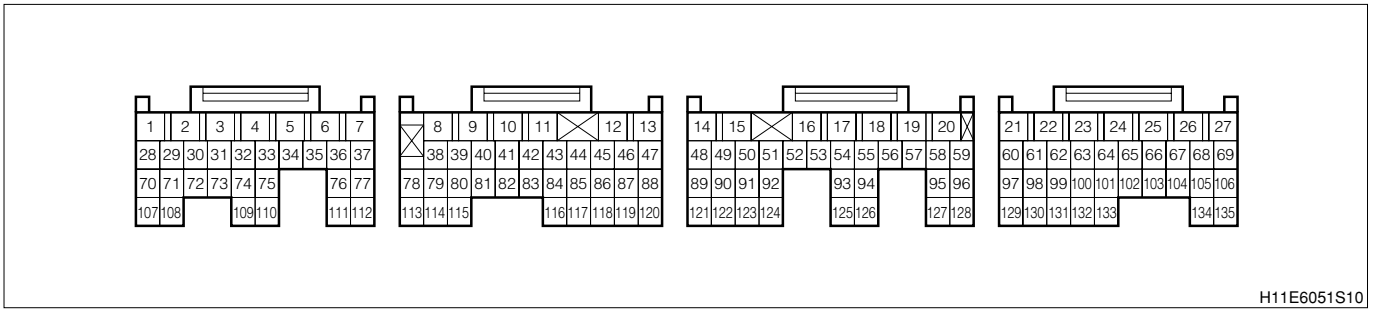
(1) System diagram



Intake air temperature sensor connection vehicle harness side connector

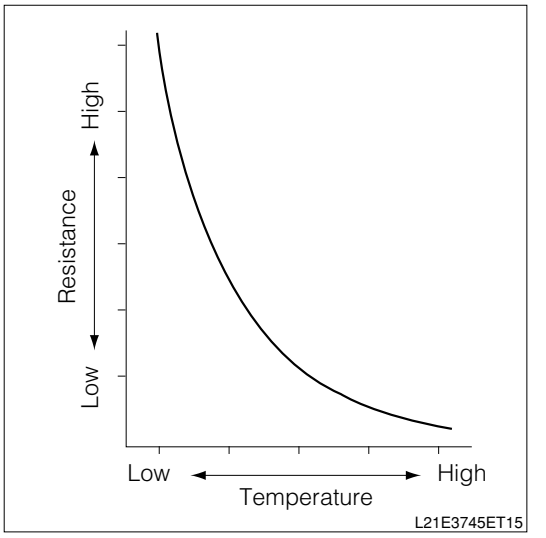


EFI ECU connection vehicle harness side connector



(2) Circuit description

1.The intake air temperature sensor is located at the intake manifold. A thermistor built in the sensor changes the resistance value according to the intake air temperature. The lower the intake air temperature, the greater the thermistor resistance value, and the higher the intake air temperature sensor lower the thermistor resistance value. When the resistance value of the intake air temperature sensor changes in accordance with changes in the intake air temperature, the potential at terminal THA also changes. Based on this signal, the EFI ECU increases the fuel injection volume to improve driveability during cold engine operation.



(3) Diagnosis code output conditions

1.When the signal from the intake air temperature sensor is not outputted continuously over a certain length of time after starting

(4) Trouble area

1.Open wire or short circuit intake air temperature sensor circuit
2.Manifold absolute pressure, intake air temperature integral type sensor (Intake air temperature sensor section)
3.EFI ECU

(5) Checking points

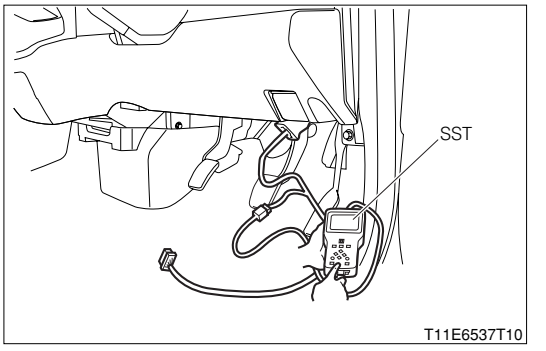
1.Is the signal from the intake air temperature sensor inputted to the EFI ECU?
2.Is the harness between the intake air temperature sensor section and the EFI ECU normal?
3.Is the output of the intake air temperature sensor normal?

(6) Inspection procedure

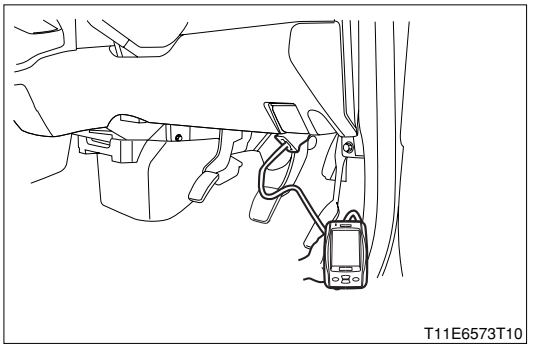
① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

Σ>1. Check of sensor output value.

1.The IG switch turned "LOCK".
2.Connect the diagnosis tester to DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000(1)
09991-87403-000(2)



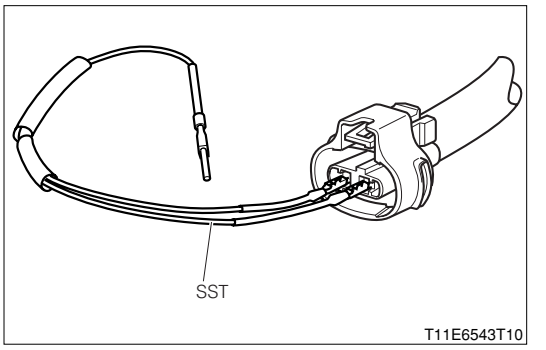
(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.After turning "ON" the IG switch, Turn "ON" the main switch of the tester.
4.Read the "Intake air temperature" of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.
SPECIFIED VALUE: Measured ambient temperature
▼If it is OK, check the EFI ECU circuit.
▼If it is NG, go to Σ2.

Σ2. Confirmation of IAT sensor output value.
1.Read the "Intake air temperature" of the DS-21 diagnosis tester or OBD Ⅱ generic scan tool.
▼When −40°C, go to Σ3.
▼When 140°C or above, go to Σ5.

Σ3. Check of open wire in harness or inside EFI ECU (1)
1.After turning "OFF" the main switch of the tester, turn "LOCK" the IG switch.
2.Disconnect the connector of the intake air temperature sensor.
3.Short circuit between the following terminals given below.
4.Between the sensor connection vehicle harness side connector 1 (THA) and the sensor connection vehicle harness side connector 2 (E2)
5.After turning "ON" the IG switch, turn "ON" the main switch of the tester. Read the "Intake air temperature" of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.
SPECIFIED VALUE: 140°C or above
▼If it is OK, carry out the following operations given below.
(1) Check the connector or the connection state of the terminal of the manifold absolute pressure/intake air temperature integral type sensor.
(2) If there is no abnormality, replace the manifold absolute pressure/intake air temperature integral type sensor.
▼If it is NG, go to Σ4.



Σ4. Check of open wire in harness or inside EFI ECU (2)
1.After turning "OFF" the main switch of the tester, turn "LOCK" the IG switch.
2.Set the SST (Sub-harness).
SST: 09842-97209-000
3.Release the short circuit of the connector of the manifold absolute pressure/intake air temperature integral type sensor.
4.Short circuit between the following terminals given below.
(1) Between SST 55 (THA) - SST 19 (E2)
5.After turning "ON" the IG switch, turn "ON" the main switch of the tester. Read the "intake air temperature value" of the DS-21 diagnosis tester or OBD Ⅱ generic scan tool.
6.Is the measured value 140℃ or above?
▼If it is OK, the harness between the intake air temperature sensor section and the EFI ECU is open. Repair or replace the harness.
▼If it is NG, check the ECU connector or terminal for connecting condition. If they are satisfactory, replace the EFI ECU.

∑5. Check of short in harness or inside EFI ECU (1)

1.After turning "OFF" the main switch of the tester, turn "LOCK" the IG switch.
2.Disconnect the connector of the intake air temperature sensor.
3.After turning "ON" the IG switch, turn "ON" the main switch of the tester.
4.Read the "Intake air temperature " of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.
SPECIFIED VALUE: −40°C

▼If it is OK, replace the intake air temperature sensor.
Refer to Page B8-236.

▼If it is NG, go to ∑6.

∑6. Check of short in harness or inside EFI ECU (2)

1.After turning "OFF" the main switch of the tester, turn "LOCK" the IG switch.
2.Perform continuity check between each of the following terminals.
(1) Between sensor connection vehicle harness side connector 1 (THA) - ECU connection vehicle harness side connector 55 (THA)
(2) Between sensor connection vehicle harness side connector 2 (E2) - ECU connection vehicle harness side connector 19 (E2)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, repair or replace the harness or connector.
▼If it is NG, check or replace the EFI ECU.

② When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

∑1. EFI ECU signal check

1.Connect the SST.
SST: 09842-97209-000

2.Perform voltage measurement between the following terminals when the IG switch is "ON".
(1) Between SST 55 (THA) - SST 19 (E2)
SPECIFIED VALUE: 0.15 V - 4.85 V (Changes according to the intake temperature)

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, proceed to ∑2.

∑2. Check of wire harness continuity

1.Perform continuity check between each of the following terminals.
(1) Between sensor connection vehicle harness side connector 1 (THA) - ECU connection vehicle harness side connector 55 (THA)
(2) Between sensor connection vehicle harness side connector 2 (E2) - ECU connection vehicle harness side connector 19 (E2)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to ∑3.
▼If it is NG, repair the harness and connectors.

⊿3. Intake air temperature sensor unit check

1.Perform unit check of the intake air temperature sensor.

Refer to Page B8-469.

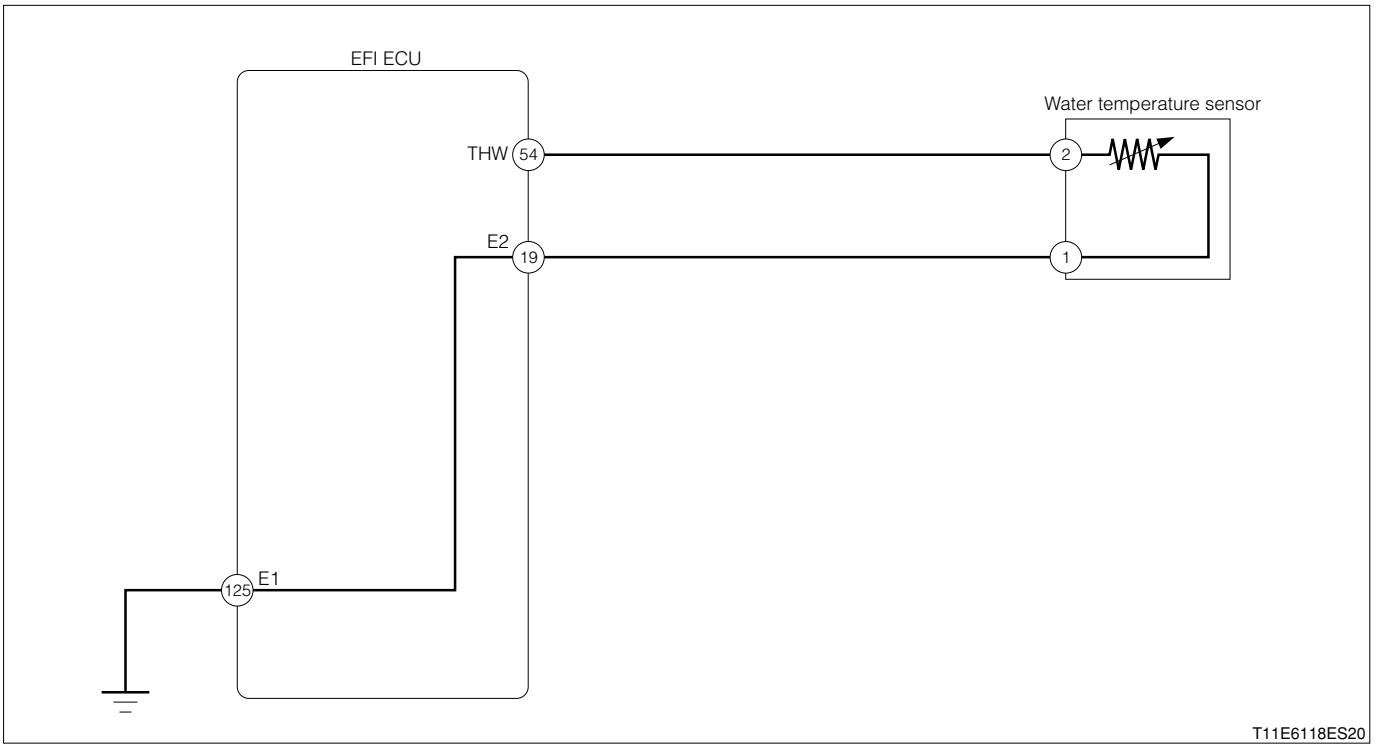
▼If it is OK, check the connecting condition of each connector.

▼If it is NG, replace the intake air temperature sensor.

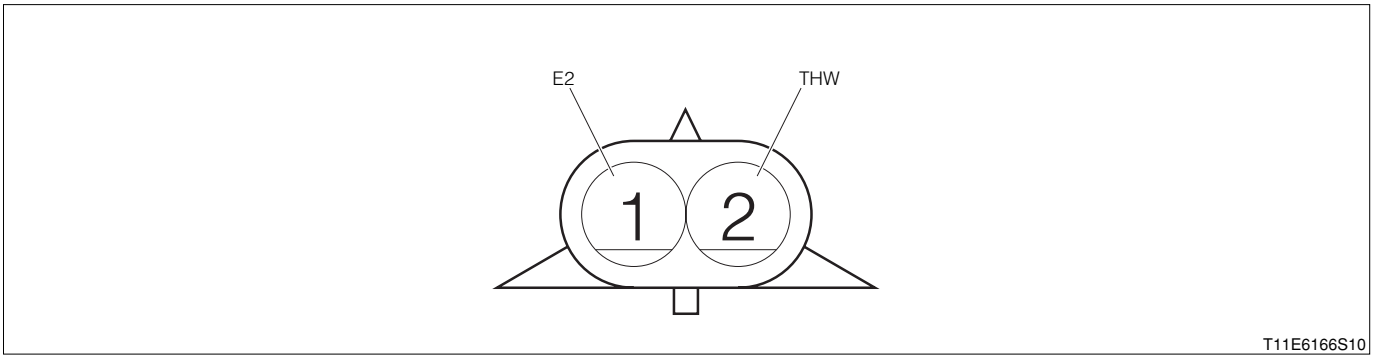
Refer to Page B8-236.

9-12-3 DTC NO.P0115/42 ENGINE COOLANT TEMPERATURE SENSOR (ECT) CIRCUIT MALFUNCTION

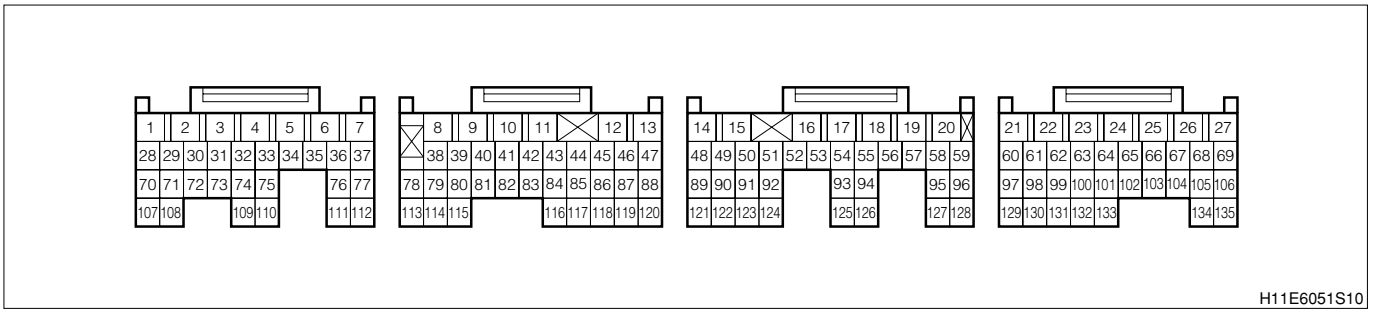
(1) System diagram



Water temperature sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1.A thermistor built into the engine coolant temperature sensor changes the resistance valve according to the engine coolant temperature. The structure of the sensor and connection to the EFI ECU is the same as in the DTC P0110/43 (IAT Sensor Circuit Malfunction).

(3) Diagnosis code output conditions

1.When the signals from the water temperature sensor are not outputted continuously after starting over a certain length of time:

(4) Trouble area

1.Open wire or short circuit in the engine coolant temperature sensor circuit
2.Engine coolant temperature sensor
3.EFI ECU

(5) Checking points

1.Are the signals from the water temperature sensor inputted to the EFI ECU?
2.Is the harness between the water temperature sensor and the EFI ECU normal?
3.Is the output of the water temperature sensor normal?

(6) Inspection procedure

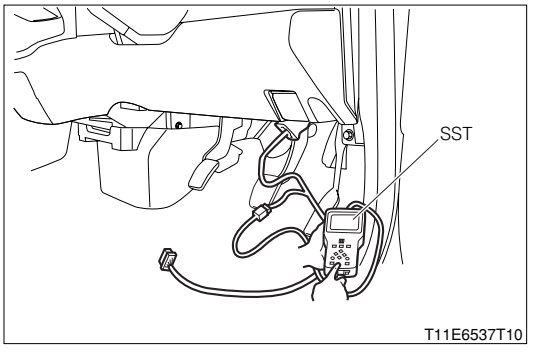
① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

NOTE

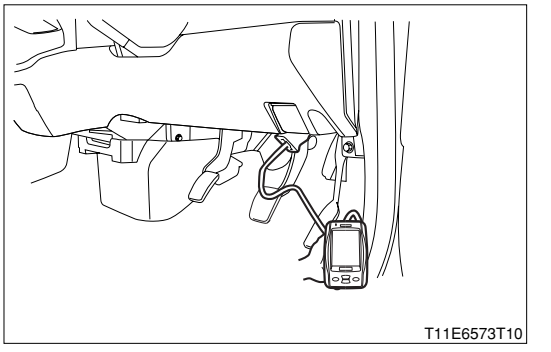
- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

Σ1. Check of output value of sensor.

1.The IG switch turned "LOCK".
2.Connect the diagnosis tester to DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.After turning "ON" the IG switch, turn "ON" the main switch of the tester.
4.Read the "Engine coolant temperature" of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.
SPECIFIED VALUE: The same as the actual engine cooling water temperature

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, go to Σ2.

Σ2. Confirmation of sensor output value.

1.Read the "Engine coolant temperature" of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.

▼When −40°C, go to Σ3.

▼When 140°C or above, go to Σ5.

Σ3. Check of open wire in harness or inside EFI ECU (1).

1.After turning "OFF" the main switch of the tester, turn "LOCK" the IG switch.

2.Disconnect the connector of the engine coolant temperature sensor.

3.Short circuit between the following terminals given below.

(1) Between the water temperature sensor connection vehicle harness side connector 1 (E2) and the water temperature sensor connection vehicle harness side connector 2 (THW)

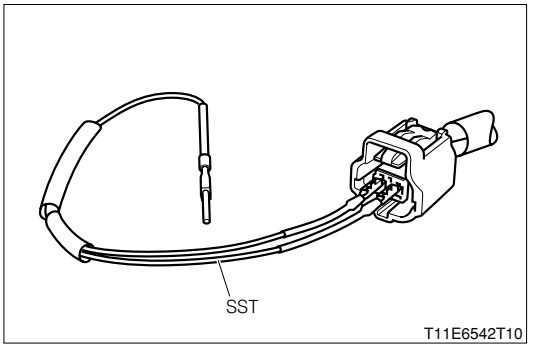
4.After turning "ON" the IG switch, turn "ON" the main switch of the tester.

5.Read the "Engine coolant temperature" of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.

SPECIFIED VALUE: 140°C or above

▼If it is OK, check the ECT sensor connector or terminal for connecting condition. If they are satisfactory, replace the ECT sensor.

▼If it is NG, go to Σ4.



Σ4. Check of open wire in harness or inside EFI ECU (2).

1.After turning "OFF" the main switch of the tester, turn "LOCK" the IG switch.

2.Set the SST (Sub-harness).

SST: 09842-97209-000

3.Disconnect the jump wire from the ECT sensor connector.

4.Short circuit between the following terminals given below.

(1) Between SST 54 (THW) and SST 19 (E2)

5.After turning "ON" the IG switch, turn "ON" the main switch of the tester.

6.Read the "Engine coolant temperature" of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.

SPECIFIED VALUE: 140°C or above

▼If it is OK, the harness between the ECT sensor and the EFI ECU is open. Repair or replace the harness.

▼If it is NG, check the EFI ECU connector and terminal for connecting condition. If they are satisfactory, replace the EFI ECU.

Σ5. Check of short in harness or inside EFI ECU (1).

1.After turning "OFF" the main switch of the tester, turn "LOCK" the IG switch.
2.Disconnect the connector of the ECT sensor.
3.After turning "ON" the IG switch, turn "ON" the main switch of the tester.
4.Read the "Engine coolant temperature" of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.
SPECIFIED VALUE: −40°C

▼If it is OK, replace the engine coolant temperature sensor.
Refer to Page B8-235.

▼If it is NG, go to Σ6.

Σ6. Check of short in harness or inside EFI ECU (2).

1.After turning "OFF" the main switch of the tester, turn "LOCK" the IG switch.
2.Perform continuity check between each of the following terminals.
(1) Between sensor connection vehicle harness side connector 1 (E2) - ECU connection vehicle harness side connector 19 (E2)
(2) Between sensor connection vehicle harness side connector 2 (THW) - ECU connection vehicle harness side connector 54 (THW)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, repair or replace the harness or connector.
▼If it is NG, check or replace the EFI ECU.

② When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

Σ1. EFI ECU signal check

1.Connect the SST.
SST: 09842-97209-000

2.Perform voltage measurement between the following terminals when the IG switch is "ON".
(1) Between SST 54 (THW) - SST 19 (E2)
SPECIFIED VALUE: 0.15 V - 4.85 V (Changes according to the water temperature)

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, proceed to Σ2.

Σ2. Check of wire harness continuity

1.Perform continuity check between each of the following terminals.
(1) Between sensor connection vehicle harness side connector 1 (E2) - ECU connection vehicle harness side connector 19 (E2)
(2) Between sensor connection vehicle harness side connector 2 (THW) - ECU connection vehicle harness side connector 54 (THW)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ3.
▼If it is NG, repair the harness and connectors.

∑3. Water temperature sensor unit check

1.Perform unit check of the water temperature sensor.

Refer to Page B8-468.

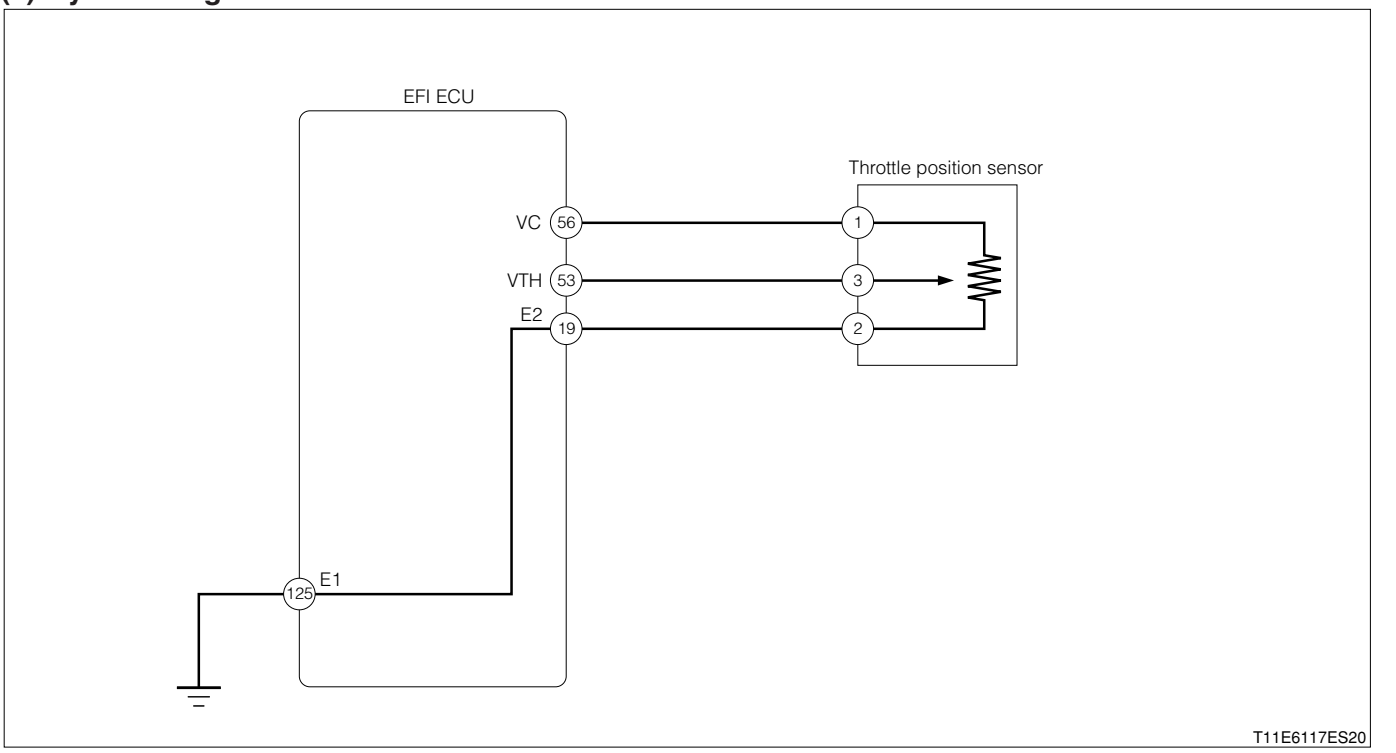
▼If it is OK, check the connecting condition of each connector.

▼If it is NG, replace the water temperature sensor.

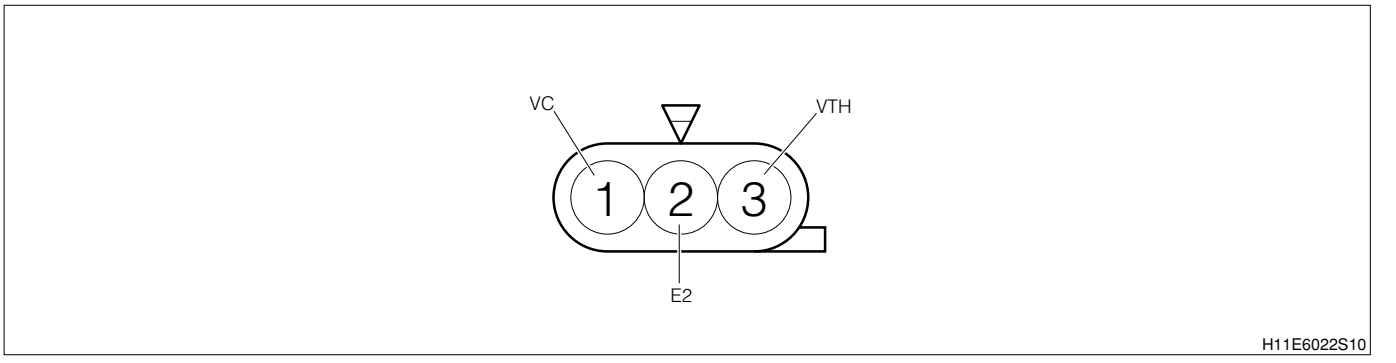
Refer to Page B8-235.

9-12-4 DTC NO.P0120/41 THROTTLE/PEDAL POSITION SENSOR

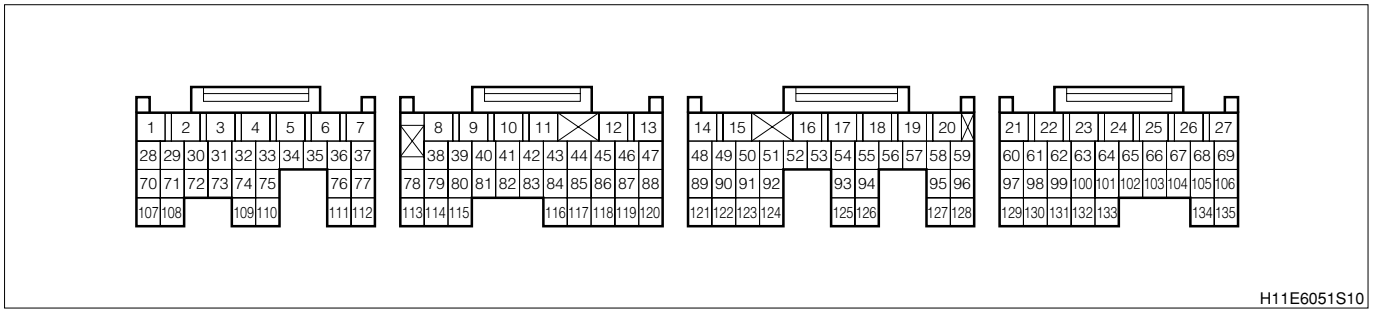
(1) System diagram



Throttle position sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1.The throttle position sensor is mounted in the throttle body and detects the throttle valve opening angle. When the throttle valve is fully closed, a voltage of approximately 0.4 - 0.8 V is applied to terminal VTH of the EFI ECU. The voltage applied to the terminals VTH of the EFI ECU increases in proportion to the opening angle of the throttle valve and becomes approximately 3.5 - 5.0 V when the throttle valve is fully opened. The EFI ECU judges the vehicle driving conditions from these signals input from terminal VTH, uses them as one of the conditions for deciding the air-fuel ratio correction, power increase correction and fuel-cut control etc.

(3) Diagnosis code output conditions

1.When the signals from the throttle position are not outputted continuously after starting over a certain length of time:

(4) Trouble area

1.Open wire or short circuit in the throttle position sensor circuit.
2.Throttle position sensor
3.EFI ECU

(5) Checking points

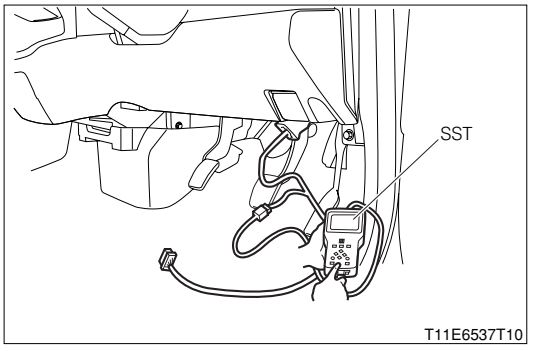
1.Are the signals from the throttle position sensor inputted to the EFI ECU?
2.Is the harness between the throttle position sensor and the EFI ECU normal?
3.Is the power supply voltage of the throttle position sensor normal?
4.Is the output of the throttle position sensor normal?

(6) Inspection procedure

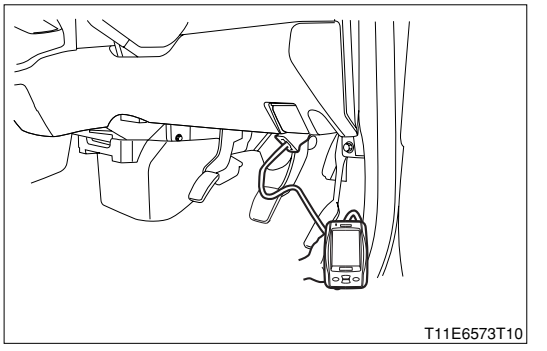
① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

Σ>1. Check of output value of throttle position sensor.

1.The IG switch turned "ON".
2.Connect the diagnosis tester to DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.After turning "ON" the IG switch, turn "ON" the main switch of the tester.
4.Read the "Abs. throttle position SSR" of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.

Throttle valve	Throttle valve opening [%]
Fully closed	0.0
Fully open	100.0

5.Are the check results OK?
▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, go to Σ>2.

Σ2. Check of power supply voltage.

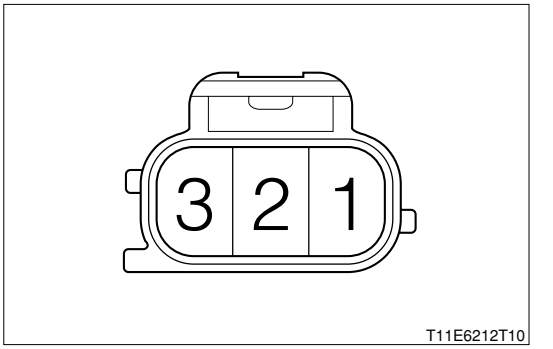
1.After turning "OFF" the main switch of the tester, turn "LOCK" the IG switch.
2.Disconnect the connector of the throttle position sensor.
3.Measure the voltage between the following terminals, in which the IG switch is turned "ON".
(1) Between the throttle position sensor connection vehicle harness side connector 1 (VC) and the body earth
SPECIFIED VALUE: 4.5 - 5.5V

4.Is the voltage within the specified value?
▼If it is OK, go to Σ3.
▼If it is NG, go to Σ5.

Σ3. Check of linear throttle sensor.

1.Turn "LOCK" the IG switch.
2.Measure the resistance between the respective terminals.

Terminal	Condition	Standard value [kΩ]
1 (VC) - 2 (E2)	—	2.5 - 6.0
2 (E2) - 3 (VTH)	Throttle valve fully closed	0.1 - 1.3
	Throttle valve fully opened	1.7 - 4.2



3.Are the check results OK?
▼If it is OK, go to Σ4.
▼If it is NG, replace the throttle body Ay.
Refer to Page B3-11.

Σ4. Check of input signal.

1.Set the SST (Sub-harness).
SST: 09842-97209-000

2.The IG switch turned "ON".
3.Measure the voltage between the SST connector 53 (VTH) and 19 (E2) under the following condition given below.

Throttle valve	Specified value [V]
Fully closed	0.4 - 0.8
Fully open	3.5 - 5.0

4.Is the measured value within the specified value?
▼If it is OK, check or replace the EFI ECU.
▼If it is NG, check between the following terminals for open wire or short.
(1) Between the EFI ECU and the throttle position sensor (VTH line)

Σ>5. Check of power supply voltage ECU side.

1.Turn "LOCK" the IG switch.
2.Set the SST (Sub-harness).
SST: 09842-97209-000

3.The IG switch turned "ON".
4.Check the voltage between the following terminals given below.
(1) Between SST 56 (VC) and SST 19 (E2)
SPECIFIED VALUE: 4.5 - 5.5V

5.Is the measured value within the specified value?

NOTE

- If no voltage appears, check the EFI ECU power supply circuit.

▼If it is OK, check between the following terminals for open wire or short.
(1) Between the EFI ECU and the throttle position sensor (VC line)
▼If it is NG, check or replace the EFI ECU.

② When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

Σ>1. EFI ECU input signal check

1.Connect the SST.
SST: 09842-97209-000

2.Turn the IG switch to the "ON" position.
3.Perform voltage measurements between the following terminals.
(1) Between SST 56 (VC) - SST 19 (E2)
(2) Between SST 53 (VTH) - SST 19 (E2)
SPECIFIED VALUE:

Measuring terminals	Specified value
Between SST 56 (VC) - SST 19 (E2)	4.5 - 5.5V
53 (VTH) - 19 (E2)	It increases in proportion to the throttle opening in the range of 0.2V - 4.8V when the throttle lever is fully opened from the fully closed state.

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, proceed to Σ>2.

Σ>2. Check of wire harness continuity

1.Perform continuity check between each of the following terminals.
(1) Between sensor connection vehicle harness side connector 1 (VC) - ECU connection vehicle harness side connector 56 (VC)
(2) Between sensor connection vehicle harness side connector 2 (E2) - ECU connection vehicle harness side connector 19 (E2)
(3) Between sensor connection vehicle harness side connector 3 (VTH) - ECU connection vehicle harness side connector 53 (VTH)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ>3.
▼If it is NG, repair the harness and connectors.

Σ>3. Throttle position sensor unit check

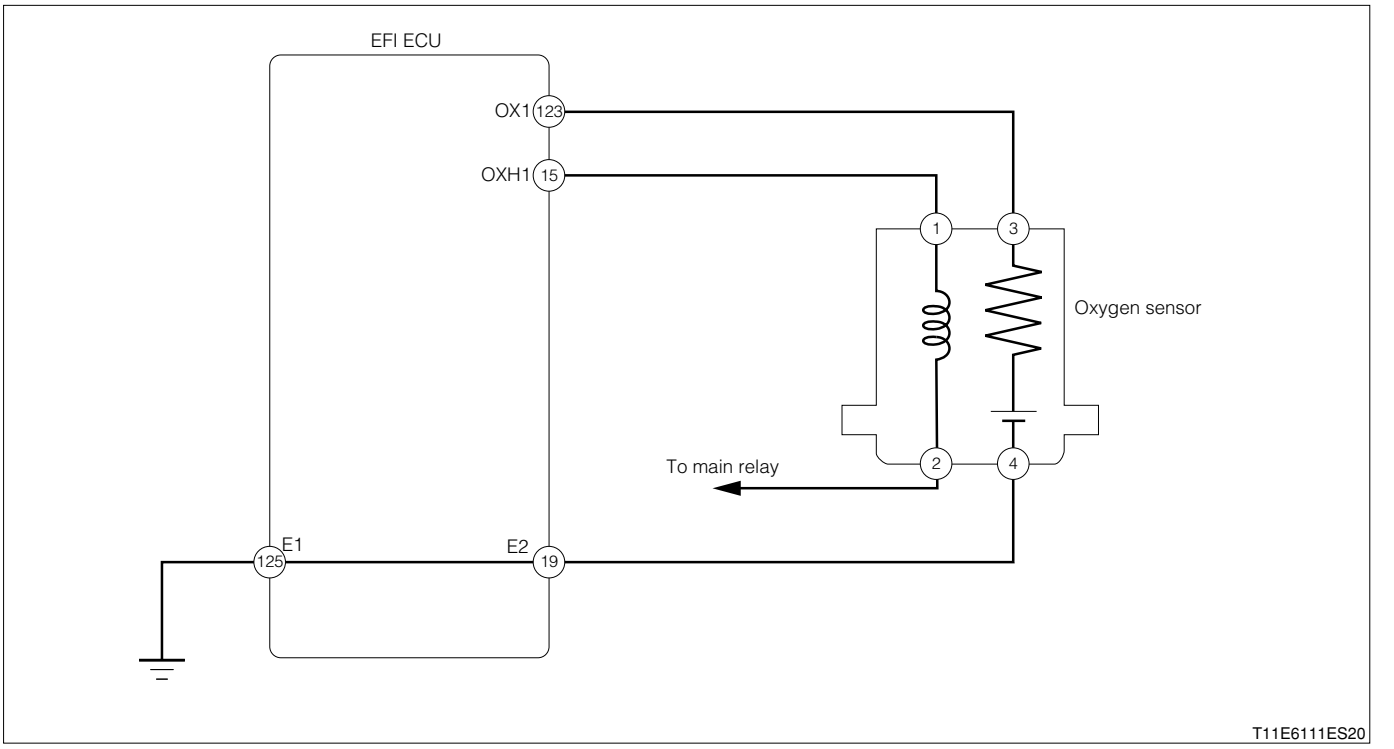
1.Perform unit check of the throttle position sensor.
Refer to Page B8–470.

▼If it is OK, check the connecting condition of each connector.
▼If it is NG, replace the throttle body Ay.
Refer to Page B3-11.

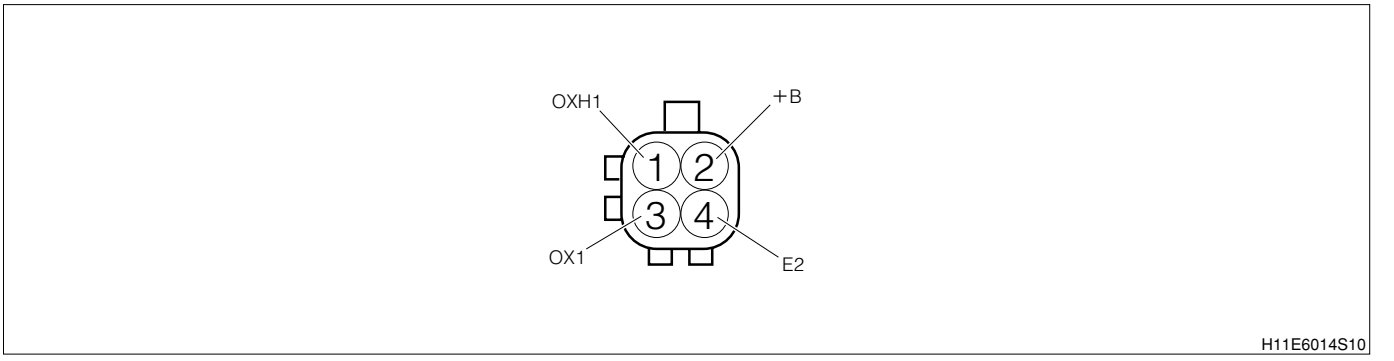
9-12-5 DTC NO.P0130/21 OXYGEN SENSOR CIRCUIT MALFUNCTION (BANK 1 SENSOR 1)

(1) System diagram

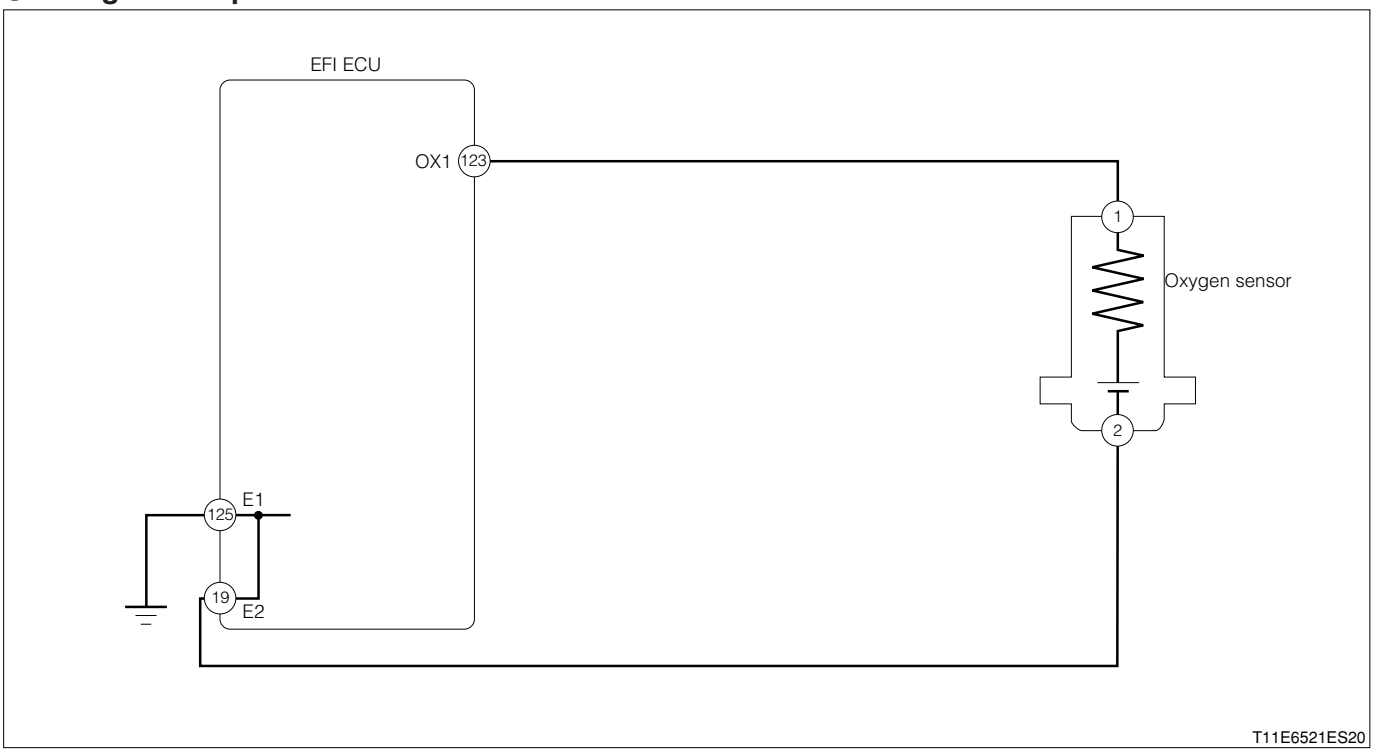
① For EU specifications



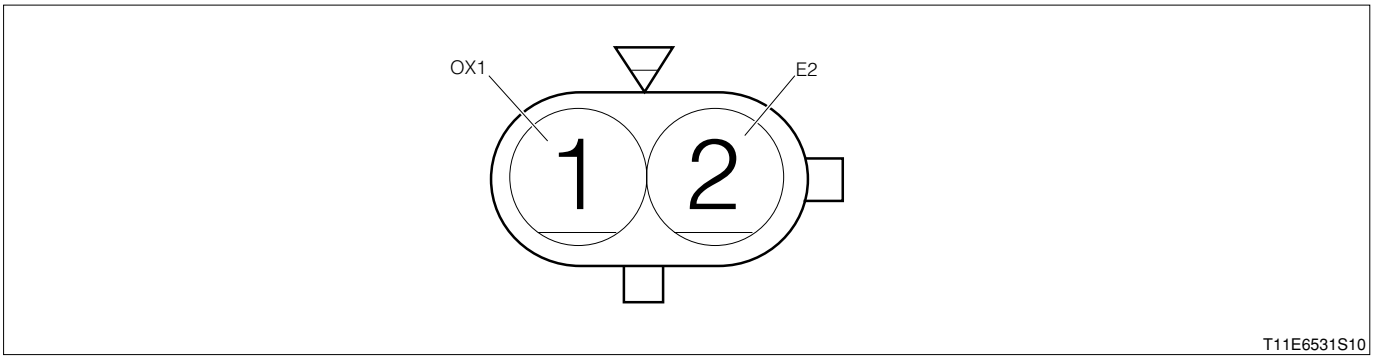
Oxygen sensor connection vehicle harness side connector



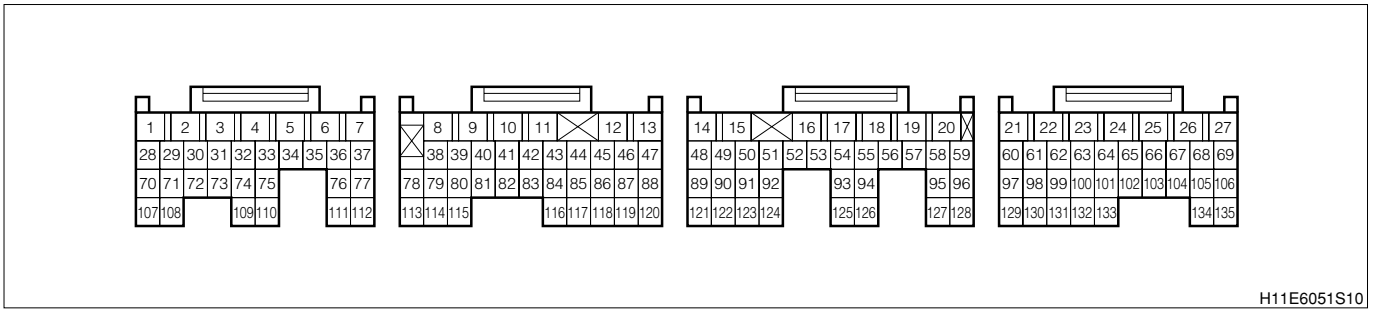
② **For general specifications**



Oxygen sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1.The front oxygen sensor (Bank 1, sensor 1) detects the concentration of oxygen contained in the exhaust gas according to the magnitude of the electromotive force that is being generated in itself. When the air-to-fuel ratio becomes richer than the stoichiometric ratio, a greater electromotive force (Approx. 1 volt) is applied to the EFI ECU. Conversely, when the ratio becomes leaner than the stoichiometric ratio, a smaller electromotive force (Approx. 0 volt) is applied to the EFI ECU. In this way, the EFI ECU determines whether the air-to-fuel ratio is rich or lean. Based on this evaluation, the injection time is controlled.

(3) Diagnosis code output conditions

1.When no rich signal is sent even once from the oxygen sensor even if the condition continues in which the engine revolution speed is more than 3000 rpm and the power increase compensation is continued over the specified value after the engine warming-up

(4) Trouble area

1.Air induction system
2.Fuel pressure
3.Injector
4.Open wire or short circuit in the oxygen sensor circuit
5.Oxygen sensor
6.EFI ECU

(5) Checking points

NOTE

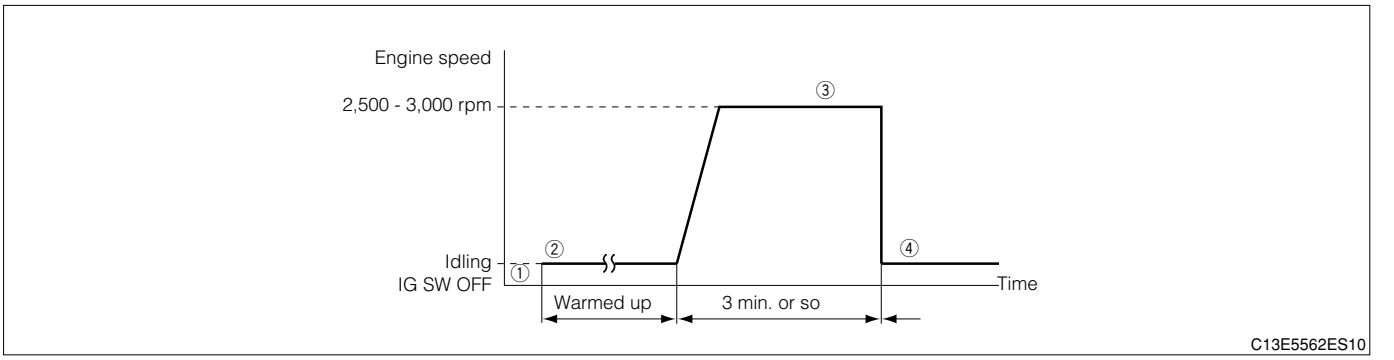
- When this code is outputted concurrently with another code, carry out the check for that code first.

1.Is the signal from the oxygen sensor inputted to the EFI ECU?
2.Is the harness between the oxygen sensor and the EFI ECU normal?
3.Is the output of the oxygen sensor correct? (If there are no causes for "Lean A/F" (The oxygen concentration in the exhaust gas is too high), the oxygen sensor is judged as defective.)
4.Check the oxygen sensor heater system for open wire or short.

NOTE

- Sensor 1 means a sensor which is located near the engine block.
- Using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool, confirm the output voltage of the oxygen sensor (Bank 1, sensor 1) from the current data. If the output voltage of the oxygen sensor (Bank 1, sensor 1) is 0.1 V or less, most likely the circuit of the oxygen sensor (Bank 1, sensor 1) is open or shorted.

Confirmation engine racing pattern (For EU specifications)



(1) Step ①; Using the DS-21, with the IG switch turned "LOCK", connect the DS-21 diagnosis tester to DLC through the SST. Turn "ON" the IG switch and the main switch of the tester. Set the tester to the "Continuous monitoring results" of the CARB mode.

SST: 09991-87404-000

(2) Step ①; Using DS-Ⅱ, with the IG switch turned "LOCK", connect the DS-Ⅱ diagnosis tester to DLC. Turn "ON" the IG switch and the main switch of the tester. Set the tester to the "Continuous monitoring results" of the CARB mode.

(3) Step ②; Start the engine. Keep on warming the engine for more than five minutes until the engine cooling water temperature reaches 90℃ or above.

(4) Step ③; Race the engine for about three minutes at 2500 to 3000 rpm.

(5) Step ④; After one minute of idling, press the F1 key of the tester. Check to see if the DTC P0130/21 is outputted.

NOTE

- If the condition in this test is not strictly followed, detection of the malfunction will not be possible.
- If you do not have the diagnosis tester (DS-21/DS-Ⅱ), turn the ignition switch "LOCK" after performing steps ② to ④, then perform steps ② to ④ again.

(6) Inspection procedure

① **When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

Σ>1. Check of DTC.

1.Check other codes (Those other than DTC P0130/21) outputted?

▼If an output is made, proceed to the trouble shooting for the outputted code concerned.

▼If no output is made, in the case of the EU specification vehicles, proceed to Σ>2.

▼If no output is made, in the case of the general specification vehicles, proceed to Σ>3.

Σ>2. Wiring harness check (EU specification)

1.With the IG switch turned "LOCK", set the SST (Sub-harness). However, the SST connectors at the EFI ECU side should remain disconnected.
SST: 09842-97209-000

2.Disconnect the oxygen sensor connector.

3.Check the harness and connector between the following terminals for open wire and short.

(1) Between the sensor connection vehicle harness side connector 3 (OX1) and SST 123 (OX1)
SPECIFIED VALUE: Continuity exists.

(2) Between the sensor connection vehicle harness side connector 3 (OX1) and the body earth
SPECIFIED VALUE: No continuity exists

4.Are the check results for open wire and short OK?

▼If it is OK, go to Σ>4.

▼If it is NG, repair or replace the harness or connector.

Σ>3. Wiring harness (General specification)

1.With the IG switch turned "LOCK", set the SST (Sub-harness). However, the SST connectors at the EFI ECU side should remain disconnected.
SST: 09842-97209-000

(1) Between the sensor connection vehicle harness side connector 1 (OX1) and SST 123 (OX1)
SPECIFIED VALUE: Continuity exists.

(2) Between the sensor connection vehicle harness side connector 1 (OX1) and the body earth
SPECIFIED VALUE: No continuity exists

2.Are the check results for open wire and short OK?

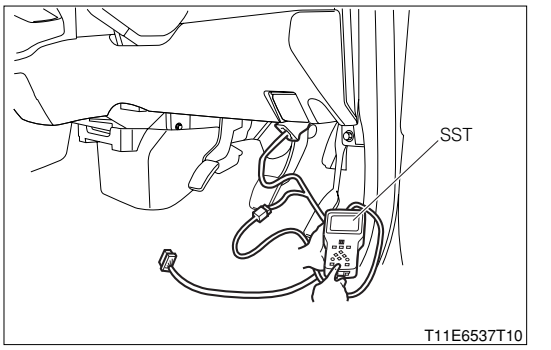
▼If it is OK, go to Σ>4.

▼If it is NG, repair or replace the harness or connector.

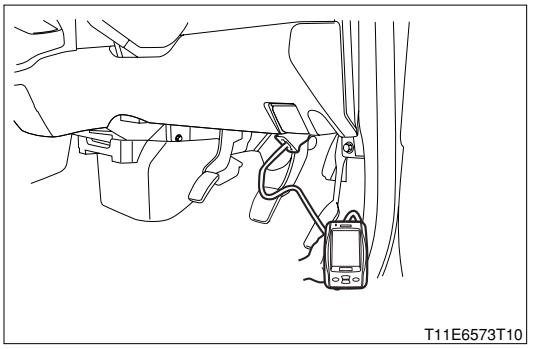
Σ>4. Check of output voltage of sensor.

1.Connect the oxygen sensor and SST connectors, respectively.

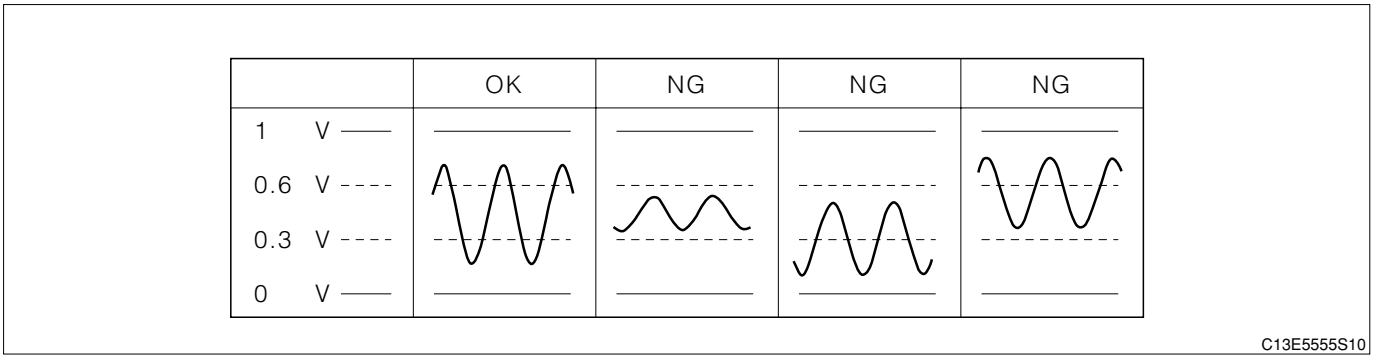
2.Connect the diagnosis tester to DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.Turn "ON" the main switch of the tester.
4.Warm up the engine at 2500 rpm for about 90 seconds.
5.Check the output voltage of oxygen sensor during idling.
SPECIFIED VALUE: The voltage varies repeatedly between a range from a voltage below 0.3 V and to a voltage above 0.6 V. (See the diagram below.)



6.Are the check results OK?
▼If it is OK, in the case of the EU specification vehicles, go to Σ>11.
▼If it is OK, in the case of the general specification vehicles, go to Σ>12.
▼If it is NG, in the case of the EU specification vehicles, proceed to Σ>5.
▼If it is NG, in the case of the general specification vehicles, proceed to Σ>6.

Σ>5. Check of misfire.
1.Check to see if any misfire is occurring by monitoring the DTC and data list.
2.Are the check results OK?
▼If it is OK, go to Σ>6.
▼If it is NG, perform troubleshooting for misfire. (Go to troubleshooting of DTC P0300/17, P0301 - 0304/17.)
Refer to Page B8-388.

Σ6. Check of air induction system.

1.Check the following items given below:
(1) Check of the engine oil level gauge, oil filler cap and PCV hose for disconnection.
(2) Check of parts of the air induction system between the cylinder head and the throttle body for disconnection, looseness, or cracks.
2.Are the check results OK?
▼If it is OK, go to Σ7.
▼If it is NG, repair or replace the induction system.

Σ7. Check of fuel pressure.

1.Check the fuel pressure.
Refer to Page B8-467.

2.Are the check results OK?
▼If it is OK, go to Σ8.
▼If it is NG, check and repair fuel pump, fuel pipe line and filter.

Σ8. Check of injector injection.

1.Check the injector unit.
Refer to Page B7-23.

2.Are the check results OK?
▼If it is OK, go to Σ9.
▼If it is NG, replace the injector.
Refer to Page B7-23.

Σ9. Check of gas leakage of exhaust system.

1.Check that there is no gas leakage in the exhaust gas-related system.
Refer to Page B1-26.

2.Are the check results OK?
▼If it is OK, go to Σ10.
▼If it is NG, repair or replace the defective point.

Σ10. Check of output voltage of sensor.

1.Warm up engine completely.
2.Disconnect the connector of the oxygen sensor with IG switch turned "LOCK".
3.Disconnect the oxygen sensor connector.
4.Connect a voltmeter to the connector terminal of oxygen sensor.
5.Hold the engine racing speed for 4 minutes at 3000 rpm. At this time, ensure that the reading of the volt meter is within the specified value.
SPECIFIED VALUE: The voltmeter exhibits an output voltage of 0.2 V or more at least one time.

6.Are the check results OK?
▼If it is OK, check or replace the EFI ECU.
▼If it is NG, replace the oxygen sensor. (Bank 1, sensor 1)
Refer to Page B4-4.

Σ>11. Perform confirmation engine racing pattern.

1.Again conduct the check of engine racing pattern.

2.Is there DTC P0130/21 being output again?

▼If the output is made, check or replace the EFI ECU.

▼If no output is made, proceed to Σ>11.

Σ>12. The past situation of vehicles operation is investigated.

1.Confirm the past vehicle running situation.

2.Did the vehicle run out of fuel in the past?

▼If it is YES, DTC P0130/21 is caused by running out of fuel.

▼If it is NO, check the EFI ECU circuit.

Refer to Page A1-24.

② **When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

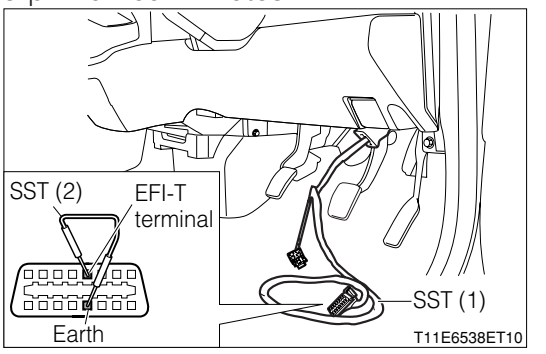
Σ1. Oxygen sensor feedback control check

1.Start the engine.

2.Activate the oxygen sensor by maintaining the engine at 3000rpm for four minutes.

3.Connect the SST and short- circuit the EFI-T terminal.

SST: 09991-87404-000(1)
09991-87403-000(2)



4.Maintain the engine revolution speed at 2000rpm or more and step on the brake pedal.

5.Check if the engine check lamp in the meter blinks.

SPECIFIED VALUE: It blinks.

NOTE

- The blinking interval will change by the condition of activation of the oxygen sensor.

▼If it is OK, the oxygen sensor system is normal.

▼If it is NG, proceed to Σ2.

Σ2. Oxygen sensor signal check

1.Connect the SST.

SST: 09842-97209-000

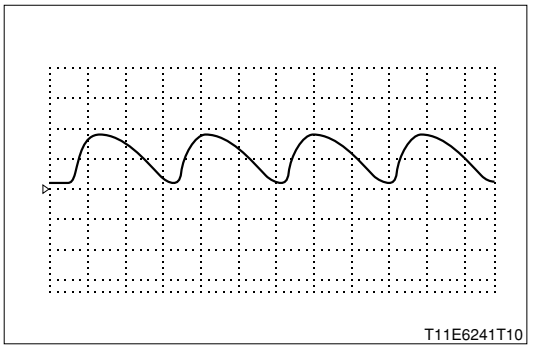
2.Activate the oxygen sensor by maintaining the engine at 3000rpm for four minutes.

3.Perform output check between the following terminals using an oscilloscope.

(1) Between SST 123 (OX1) - SST 125 (E1)

Time axis	Time axis
Voltage axis	500mV / DIV
Measuring condition	Air conditioner "OFF", no electric load, maintaining 3000rpm

Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".



NOTE

- The waveform cannot be specified, but ensure that a waveform as in the right figure (One such example) shows up

4.Confirm the following points.

(1) The waveform is showing up with the oxygen sensor activated.

(2) The waveform 0 ⇄ 1V is showing up.

NOTE

- As for the oxygen sensor signal, the correct output cannot be confirmed without using the oscilloscope.

▼If it is OK, proceed to Σ3.

▼If it is NG, replace the oxygen sensor.

Refer to Page B4-4.

Σ>3. Check of wire harness continuity

1.Perform continuity check between each of the following terminals.

(1) Between sensor connection vehicle side connector 3 (OX1) - ECU connection vehicle harness connection side connector 123 (OX1)

(2) Between sensor connection vehicle side connector 3 (OX1) - ECU connection vehicle harness connection side connector 123 (OX1)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, replace the EFI ECU.

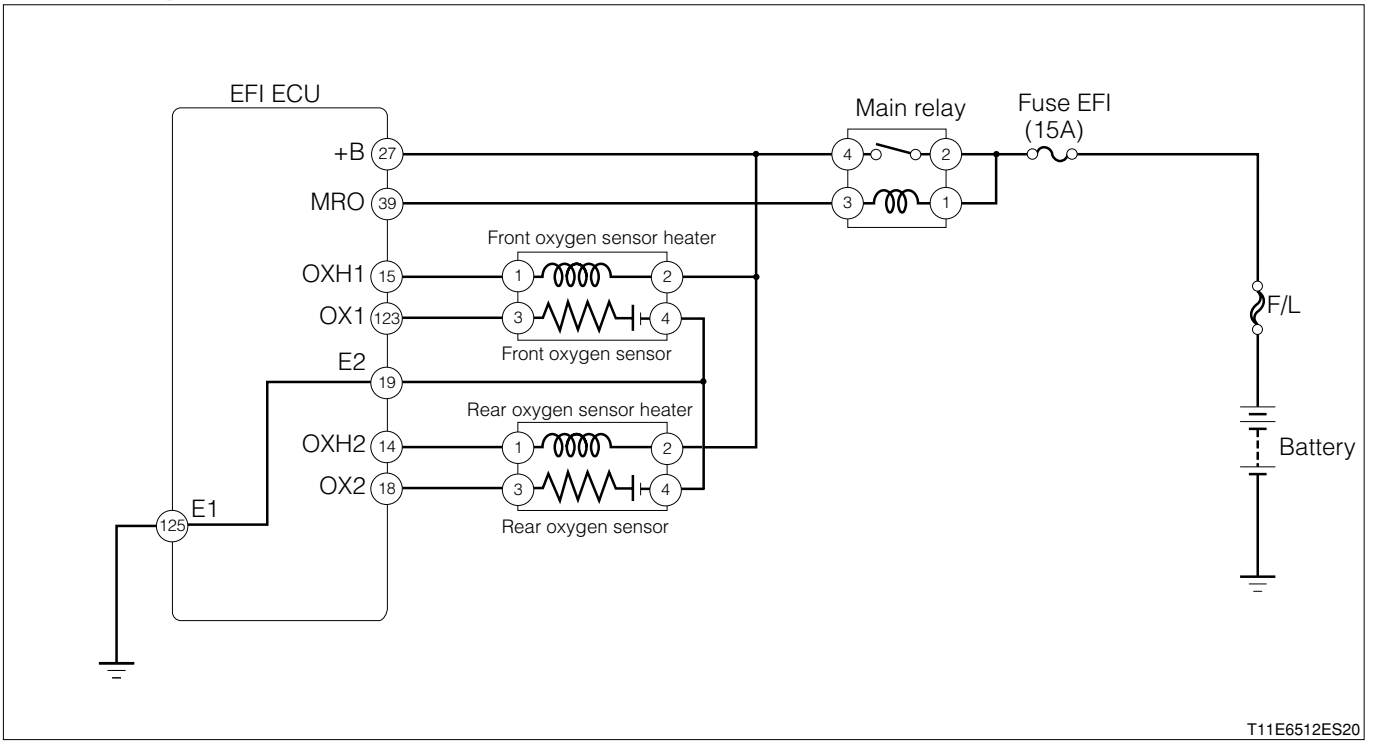
Refer to Page B8-1.

▼If it is NG, perform checking or repairing of the harness of the defective sections.

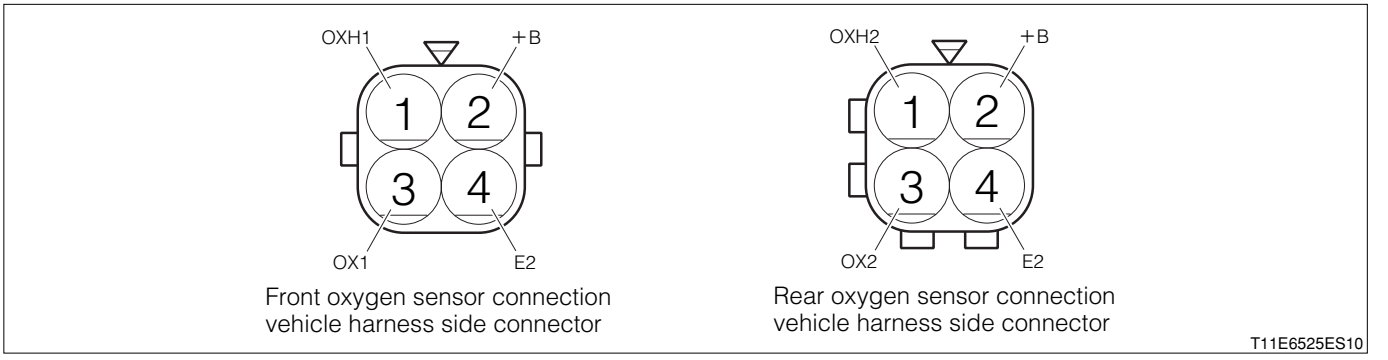
9-12-6 DTC NO.P0135/23 OXYGEN SENSOR HEATER CIRCUIT MALFUNCTIONDTC NO.P0141/24 REAR OXYGEN SENSOR HEATER CIRCUIT MALFUNCTION

(1) System diagram

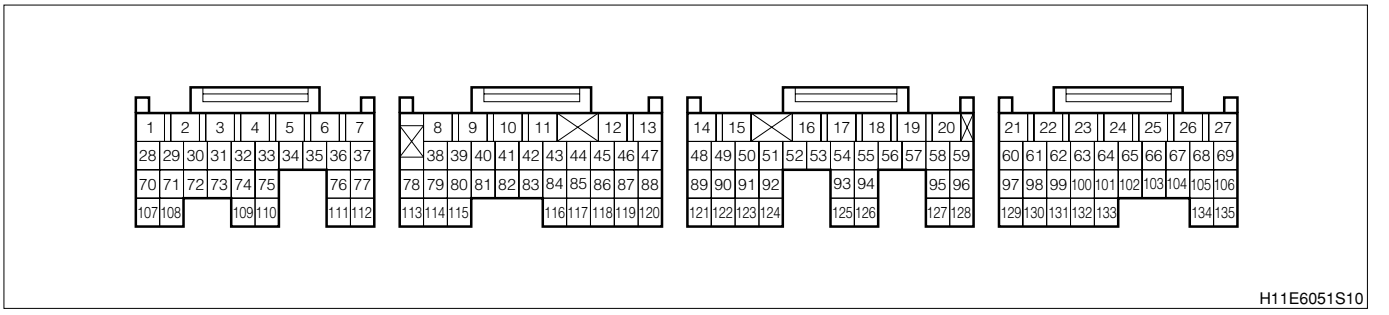
① **For EU specifications**



Oxygen sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Diagnosis code output conditions

1.When an open wire or short is present in the oxygen sensor heater system,

(3) Trouble area

1.Open wire or short circuit for the oxygen sensor heater circuit
2.Oxygen sensor heater
3.EFI ECU

(4) Checking points

NOTE

- When this code is outputted concurrently with another code, carry out the check for that code first.

1.Is the signal from the oxygen sensor inputted to the EFI ECU?
2.Is the harness between the oxygen sensor and the EFI ECU normal?
3.Is the output of the oxygen sensor correct? (If there are no causes for "Lean A/F" (The oxygen concentration in the exhaust gas is too high), the oxygen sensor is judged as defective.)
4.Check the oxygen sensor heater system for open wire or short.

(5) Inspection procedure

Σ>1. Check of output voltage of ECU.

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

1.Set the SST (Sub-harness).
SST: 09842-97209-000

2.Conduct the voltage measurement between the next terminals under the following conditions given below.
(1) Between SST 15 (OXH1) and the body earth
(2) Between SST 14 (OXH2) and the body earth

	Measurement conditions	
	IG switch "ON"	After engine started
Front Oxygen sensor heater	Battery voltage	Below 1.0 V/ Immediately after
Rear Oxygen sensor heater.	Battery voltage	Below 1.0 V/After more than 3 minutes

3.Are the check results OK?
▼If it is OK, check or replace the EFI ECU.
▼If it is NG, go to Σ>2.

Σ>2. Unit check of oxygen sensor.

1.Check the front and rear oxygen sensor heater units.
(1) Front oxygen sensor
Refer to Page B8-469.

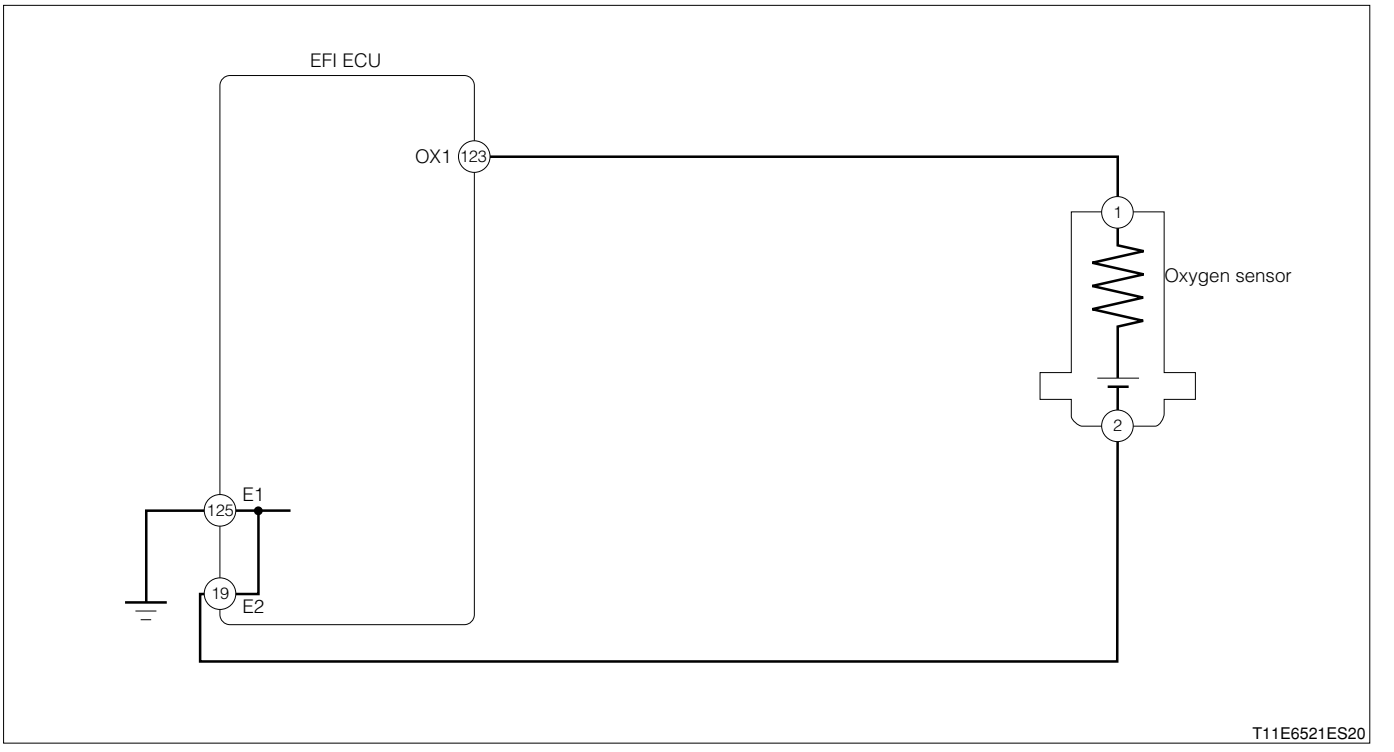
(2) Rear oxygen sensor
Refer to Page B8-470.

2. Are the unit check results OK?
▼If it is OK, check the harness and connector between the following terminals for open wire and short.
(1) Between the main relay and the EFI ECU
(2) Between the front oxygen sensor and the EFI ECU
(3) Between the rear oxygen sensor and the EFI ECU
▼If it is NG, replace the defective oxygen sensor.

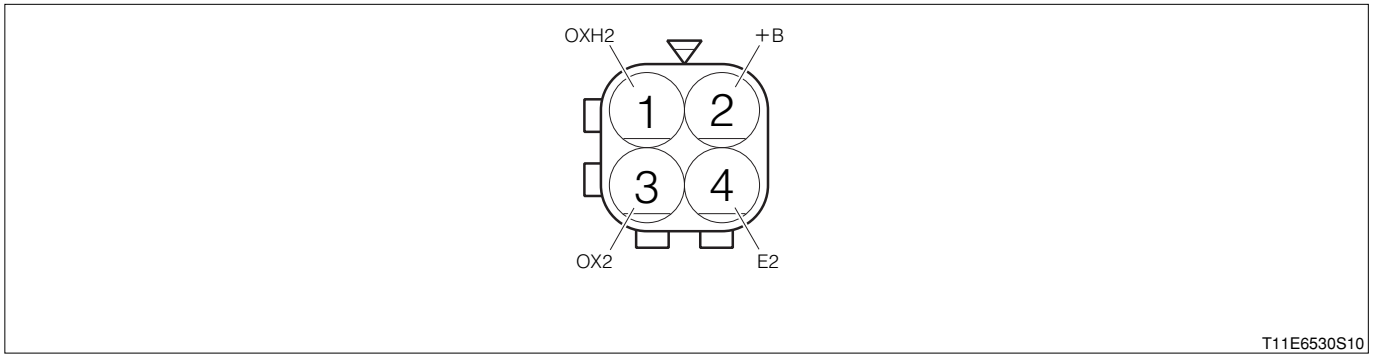
9-12-7 DTC NO.P0136/22 REAR OXYGEN SENSOR CIRCUIT MALFUNCTION (BANK 1 SENSOR 2)

(1) System diagram

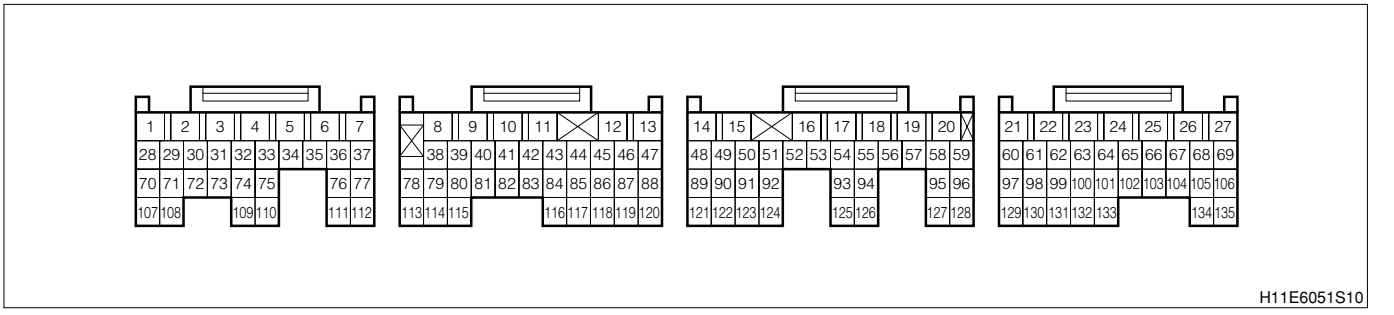
① For EU specifications



Rear oxygen sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1.Refer to DTC P0130/21 (Oxygen sensor circuit malfunction (Bank 1 sensor 1)).

(3) Trouble area

1.Open wire or short circuit in the rear oxygen sensor circuit
2.Rear oxygen sensor
3.EFI ECU

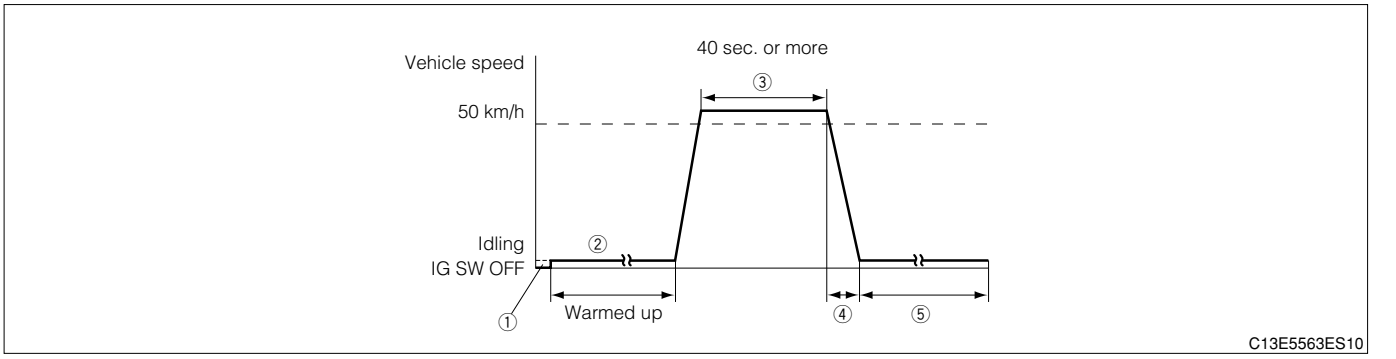
(4) Checking points

NOTE

- When this code is outputted concurrently with another code, carry out the check for that code first.

1.Is the signal from the rear oxygen sensor inputted to the EFI ECU?
2.Is the harness between the rear oxygen sensor and the EFI ECU normal?
3.Is the output of the rear oxygen sensor normal?

Confirmation driving pattern



(1) Step ①; Using DS-21, with the IG switch turned "LOCK", connect the DS-21 diagnosis tester to DLC through the SST. Turn "ON" the IG switch and the main switch of the tester. Set the tester to the "Continuous monitoring results" of the CARB mode.

SST: 09991-87404-000

(2) Step ①; Using DS-Ⅱ, with the IG switch turned "LOCK", connect the DS-Ⅱ diagnosis tester to DLC. Turn "ON" the IG switch and the main switch of the tester. Set the tester to the "Continuous monitoring results" of the CARB mode.
(3) Step ②; Start the engine. With all switch turned "OFF", keep on warming the engine for more than five minutes until the engine coolant temperature reaches 90℃ or above.
(4) Step ③; Accelerate the vehicle until the vehicle speed reaches 50 km/h or more in the 1st → 2nd gear. Keep on running the vehicle at that speed for at least 40 seconds.
(5) Step ④; Under this condition, release the foot off from the accelerator pedal so as to decelerate the vehicle. Maintain the idling state.
(6) Step ⑤; After one minute of idling, press the F1 key of the tester. Check to see if the DTC P0130/21 is outputted.

NOTE

- If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.
- If you do not have diagnosis tester (DS-21/DS-Ⅱ), turn the ignition switch "LOCK" after performing steps ② to ④, then perform steps ② to ④ again.

(5) Inspection procedure

① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

Σ1. Check of DTC.

1.Are other codes (Those other than DTC P0136/22) outputted?

▼If the output is made, proceed to the Item of the relevant diagnosis code.

▼If no output is made, proceed to Σ2.

Σ2. Wiring harness check

1.The IG switch turned "LOCK".

2.Set the SST. However, the SST connectors at the ECU side should remain disconnected.

SST: 09842-97209-000

3.Disconnect the oxygen sensor connector.

4.Check the harness and connector for open wire or short.

(1) Between the oxygen sensor connection vehicle harness side connector 1 (OX2) and SST 18 (OX2)

SPECIFIED VALUE: Continuity exists.

(2) Between the oxygen sensor connection vehicle harness side connector 1 (OX2) and the body earth

SPECIFIED VALUE: No continuity exists

5.Are the check results for open wire and short OK?

▼If it is OK, go to Σ3.

▼If it is NG, repair or replace the harness or connector.

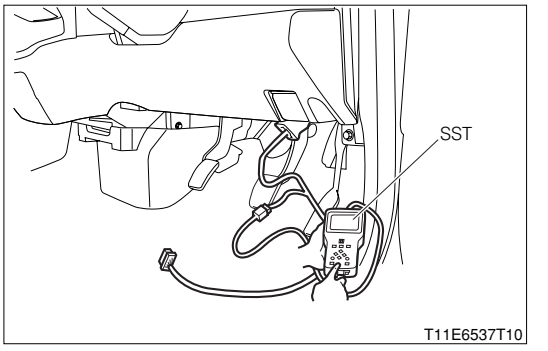
Σ3. Check of output voltage of sensor.

1.Connect the rear oxygen sensor and SST connectors, respectively.

2.Connect the diagnosis tester to DLC.

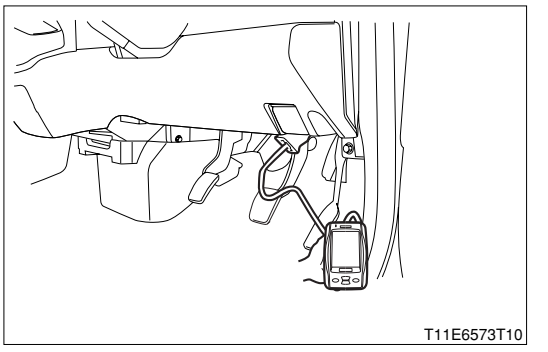
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.

(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.Warm up the engine.
4.Turn "ON" the main switch of the tester.
5.Race the engine at 4000 rpm for three minutes by depressing the accelerator pedal.
6.Under the condition of step 4, release the foot off from the accelerator pedal so as to allow the engine to idle.
7.Read the output voltage of the oxygen sensor between Steps 4 to 5.
SPECIFIED VALUE: The voltage should become 0.4 V or below and 0.55 V or more, respectively, at least one time.

8.Are the check results OK?
▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, go to Σ>4.

Σ>4. Check of output voltage of sensor.
1.Warm up engine completely.
2.IG switch turned "LOCK".
3.Disconnect the connector of the rear oxygen sensor.
4.Connect a voltmeter to the connector terminal of oxygen sensor.
5.Hold the engine racing speed for 3 minutes at 2000 rpm. At this time, ensure that the reading of the volt meter is within the specified value.
SPECIFIED VALUE: The voltmeter exhibits an output voltage of 0.2 V or more at least one time?

6.Are the check results OK?
▼If it is OK, check or replace the EFI ECU.
▼If it is NG, replace the oxygen sensor. (Bank 1, sensor 2)
Refer to Page B4-6.

② **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**
Σ>1. Check of wire harness continuity
1.Perform continuity check between each of the following terminals.
(1) Between sensor connection vehicle harness side connector 1 (OX2) - ECU connection vehicle harness side connector 18 (OX2)
(2) Between sensor connection vehicle harness side connector 2 (E2) - ECU connection vehicle harness side connector 19 (E2)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ>2.
▼If it is NG, repair the harness and connectors.

Σ2. Rear oxygen sensor continuity check

1.Perform continuity check between each of the following terminals.
(1) Between rear oxygen sensor side connector 1 (OX2) - rear oxygen sensor body
(2) Between rear oxygen sensor side connector 2 (E2) - rear oxygen sensor body
SPECIFIED VALUE: No continuity exists

▼If it is OK, proceed to Σ3.
▼If it is NG, replace the rear oxygen sensor.
Refer to Page B4-6.

Σ3. Rear oxygen sensor signal check

1.Stop the vehicle.
2.Continue racing of 2000rpm or above for about five minutes from the state in which the rear oxygen sensor is cooled.
3.Perform output voltage measurements of the rear oxygen sensor during this time (Between the rear oxygen sensor side terminals).
SPECIFIED VALUE: It becomes 0 V (During cold period) → 0.65 V or above (When detecting rich state after warm-up).

4.Stop the engine and perform the output voltage measurements between the following terminals.
(1) Between rear oxygen sensor side connector 1 (OX2) - rear oxygen sensor side connector 2 (E2)
SPECIFIED VALUE: 0.55V or less.

NOTE
- Measure them under the condition in which the rear oxygen sensor is detecting oxygen (Lean condition).

▼If it is OK, proceed to Σ4.
▼If it is NG, replace the rear oxygen sensor.
Refer to Page B4-6.

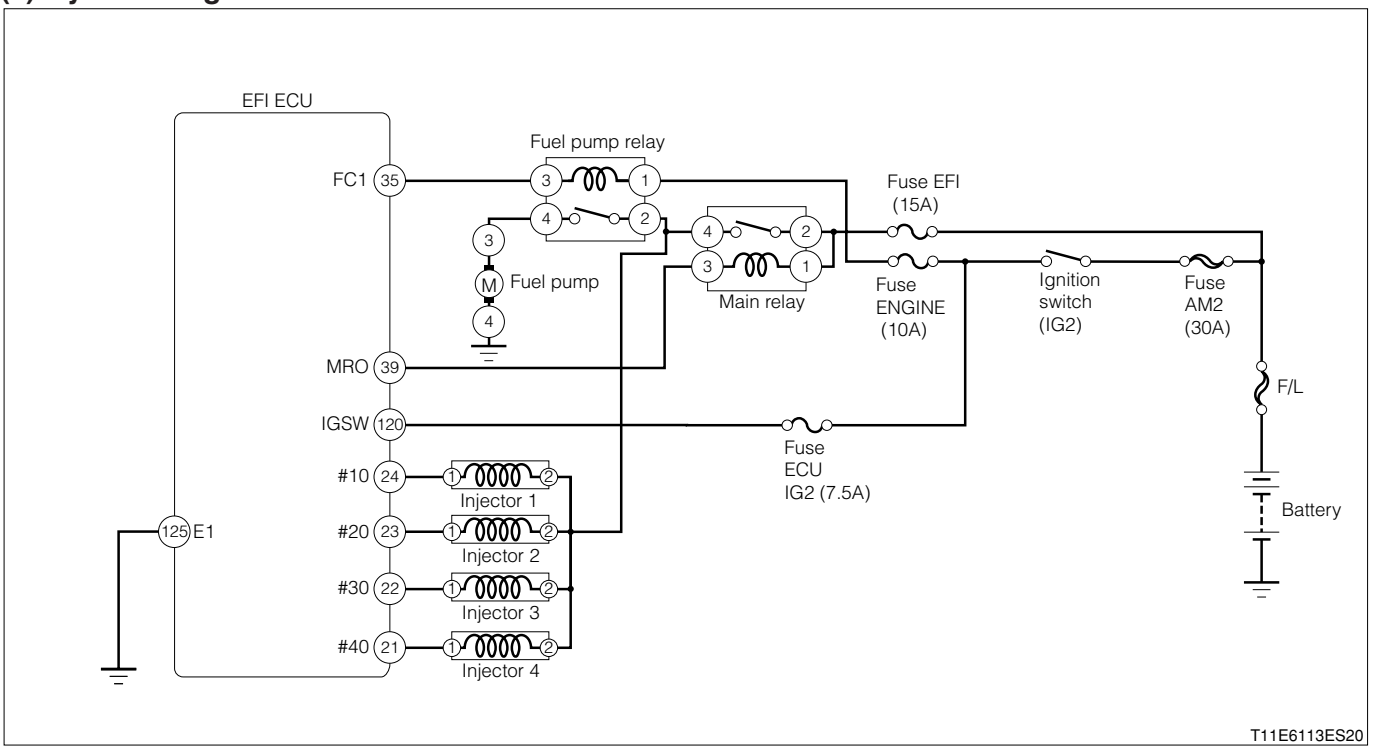
Σ4. Rear oxygen sensor unit check

1.Perform unit check of the rear oxygen sensor.
Refer to Page B8-470.

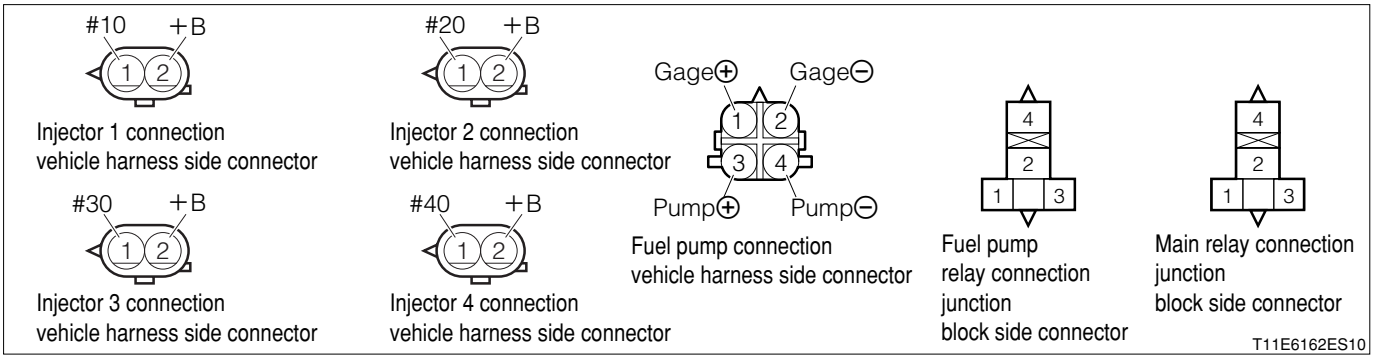
▼If it is OK, check the oxygen sensor system.
▼If it is NG, replace the rear oxygen sensor.
Refer to Page B4-6.

9-12-8 DTC NO.P0171/25 FUEL TRIM SYSTEM TOO LEAN (AIR-FUEL RATIO LEAN MALFUNCTION, BANK 1)DTC NO.P0172/26 FUEL TRIM SYSTEM TOO RICH (AIR-FUEL RATIO RICH MALFUNCTION, BANK 1)

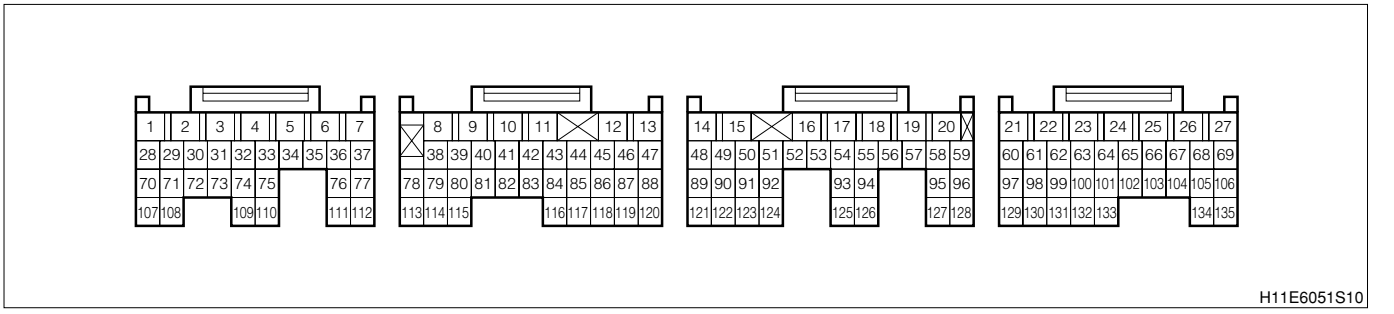
(1) System diagram



Each unit, relay, etc. connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1.The fuel trim means the feedback compensation value that will compensate the basic injection time. The fuel trim comes in two kinds: the short-term fuel trim and the long-term fuel trim.

2.The short-term fuel trim is a short-term fuel compensation to be carried out to maintain the air-to-fuel ratio at the stoichiometric air-to-fuel ratio. The signal from the oxygen sensor indicates whether the current air-to-fuel ratio is rich or lean than the stoichiometric air-to-fuel ratio. Hence, if the air-to-fuel ratio is rich, the fuel injection amount will be reduced. Conversely, if the air-to-fuel ratio is lean, the fuel injection amount will be increased.

3.The long-term fuel trim is overall fuel compensation over a long period of time in order to compensate a continues deviation of the short-term fuel trim from the central value, which will be caused by the engines inherent characteristics, the wear due to operation over a long period of time and the change in operational environment.

(3) Code No.P0171/25 output conditions

1.The correction coefficient is stuck to the one side (Lean state of air fuel ratio) during the air fuel ratio feedback period

(4) Code No.P0172/26 output conditions

1.The correction coefficient is stuck to the one side (Rich state of air fuel ratio) during the air fuel ratio feedback period

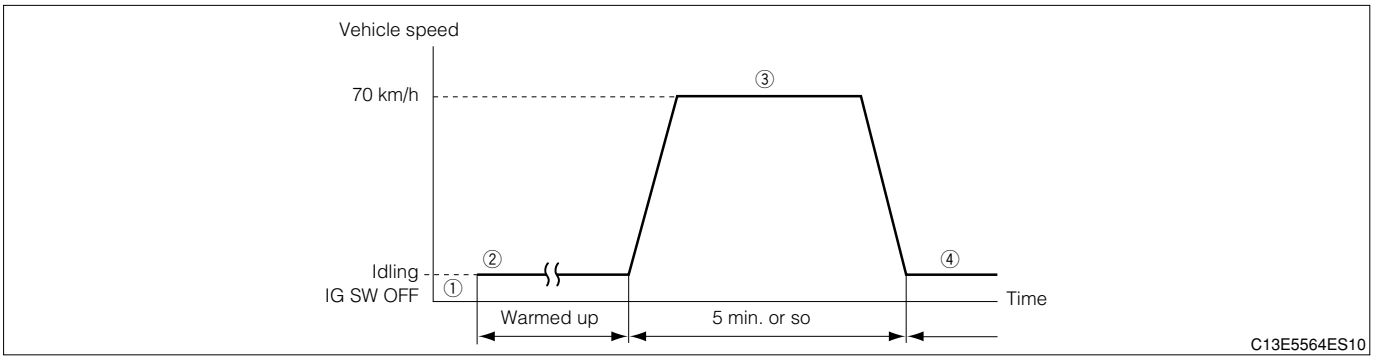
(5) Trouble area

1.Open wire or short circuit in the oxygen sensor circuit
2.Oxygen sensor
3.ECT sensor
4.Evaporative emission purge VSV
5.EFI ECU

(6) Checking points

1.Is the fuel pressure normal?
2.Is the injector normal?
3.Is the oxygen sensor normal?

Confirmation driving pattern (For only EU specification)



(1) Step ①; Using DS-21, with the IG switch turned "LOCK", connect the DS-21 diagnosis tester to DLC through the SST. Turn "ON" the IG switch and the main switch of the tester. Set the tester to the "Continuous monitoring results" of the CARB mode.

SST: 09991-87404-000

(2) Step ①; Using DS-Ⅱ, with the IG switch turned "LOCK", connect the DS-Ⅱ diagnosis tester to DLC through the SST. Turn "ON" the IG switch and the main switch of the tester. Set the tester to the "Continuous monitoring results" of the CARB mode.

(3) Step ②; Start the engine. Keep on warming the engine for more than five minutes until the engine cooling water temperature reaches 90℃ or above.

(4) Step ③; Run the vehicle for more than five minutes at a speed of 70 km/h with the gear selected to the 5th gear.

(5) Step ④; After one minute of idling, press the F1 key of the tester. Check to see if the DTC P0171/0172 is detected.

NOTE

- If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.
- If you do not have diagnosis tester (DS-21/DS-Ⅱ), turn the ignition switch "LOCK" after performing steps ② to ④, then perform steps ② to ④ again.

(7) Inspection procedure

① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

Σ>1. Check of DTC.

1.Check other codes (Those other than DTC P0171/25 or P0172/26) outputted?

▼If the output is made, proceed to the Item of the relevant diagnosis code.

▼If no output is made, proceed to Σ>2.

Σ2. Check of air induction system.

1.Check the following items given below.

(1) Check of the engine oil level gauge, oil filler cap and PCV hose for disconnection.

(2) Check of parts of the air induction system between the cylinder head and the throttle body for disconnection, looseness, or cracks.

▼If it is OK, go to Σ3.

▼If it is NG, repair or replace the induction system.

Σ3. Check of injector injection.

1.Check the injector unit.

Refer to Page B8-472.

2.Are the check results OK?

▼If it is OK, go to Σ4.

▼If it is NG, replace the injector.

Refer to Page B7-23.

Σ4. Check of purge VSV for EVAP.

1.Perform the unit check of the VSV for evaporative emission purge.

Refer to Page B8-473.

2.Are the check results OK?

▼If it is OK, go to Σ5.

▼If it is NG, replace the purge VSV for EVAP.

Σ5. Check of engine cooling coolant temperature sensor.

1.Perform the unit check of the water temperature sensor.

Refer to Page B8-468.

2.Are the check results OK?

▼If it is OK, go to Σ6.

▼If it is NG, replace the engine cooling coolant temperature sensor.

Refer to Page B8-235.

Σ6. Manifold absolute pressure sensor unit check

1.Perform the unit check of the manifold absolute pressure sensor.

Refer to Page B8-468.

2.Are the check results OK?

▼If it is OK, go to Σ7.

▼If it is NG, replace the manifold absolute pressure sensor.

Refer to Page B8-237.

Σ7. Check of fuel pressure.

1.Check the fuel pressure.

Refer to Page B8-467.

2.Are the check results OK?

▼If it is OK, go to Σ8.

▼If it is NG, check and repair fuel pump, fuel pipe line and filter.

Σ>8. Check of gas leakage of exhaust system.

1.Check the exhaust gas leakage.
Refer to Page B1-26.

2.Are the check results OK?
▼If it is OK, go to Σ>9.
▼If it is NG, repair or replace the defective point.

Σ>9. Wiring harness check

1.IG switch turned "LOCK".
2. set the SST (Sub-harness). However, the SST connectors at the ECU side should remain disconnected.
SST: 09842-97209-000

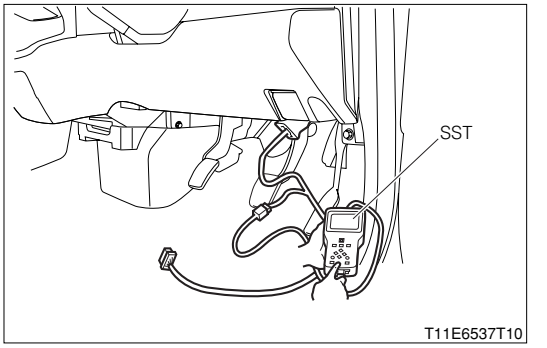
3.Disconnect the oxygen sensor connector.
4.Check the harness and connector for open wire or short.
(1) Between the oxygen sensor connection vehicle harness side connector 3 (OX1) and SST 123 (OX1)
SPECIFIED VALUE: Continuity exists.

(2) Between the oxygen sensor connection vehicle harness side connector 3 (OX1) and the body earth
SPECIFIED VALUE: No continuity exists

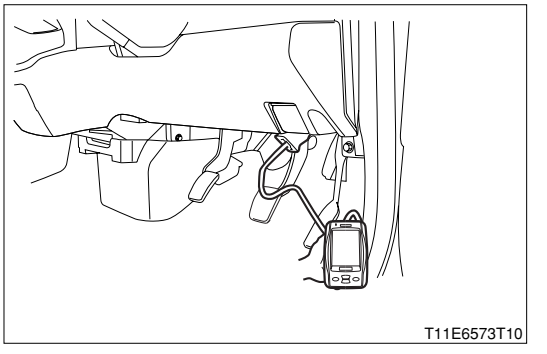
5.Are the check results for open wire and short OK?
▼If it is OK, go to Σ>10.
▼If it is NG, repair or replace the harness or connector.

Σ>10. Check of output voltage of sensor.

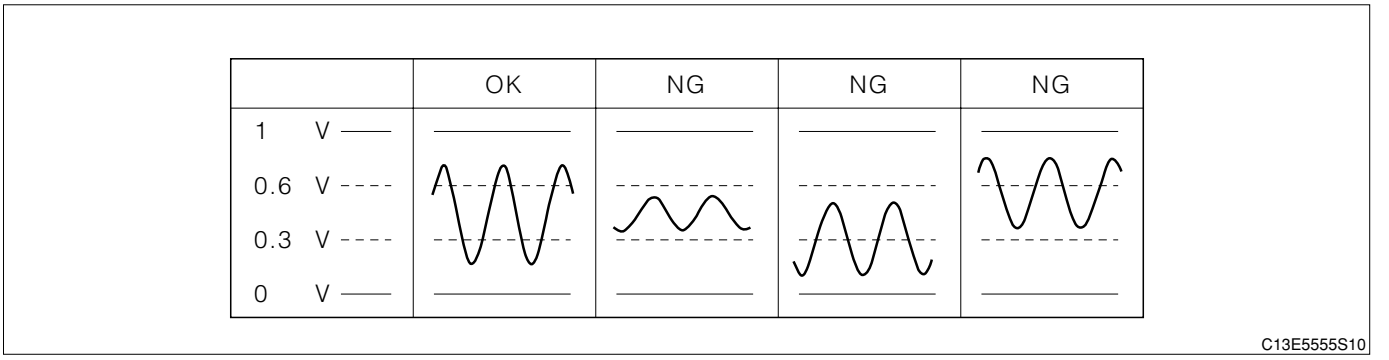
1.Connect the oxygen sensor and SST connectors, respectively.
2.Connect the diagnosis tester to DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.Warm up the engine at 2500 rpm for about 90 seconds.
4.Turn "ON" the main switch of the tester.
5.Read the output voltage of oxygen sensor during idling.
SPECIFIED VALUE: The voltage varies repeatedly between a range from a voltage below 0.3 V and to a voltage above 0.6 V. (See the diagram below.)



6.Are the check results OK?
▼If it is OK, go to Σ>12.
▼If it is NG, go to Σ>11.

Σ>11. Check of output voltage of sensor.
1.Warm up engine completely.
2.IG switch turned "LOCK".
3.Disconnect the connector of the oxygen sensor.
4.Connect a voltmeter to the connector terminal of oxygen sensor.
5.Hold the engine racing speed for 3 minutes at 2000 rpm.
6.At this time, ensure that the reading of the volt meter is within the specified value.
SPECIFIED VALUE: The voltmeter exhibits an output voltage of 0.2 V or more at least one time?

7.Are the check results OK?
▼If it is OK, check or replace the EFI ECU.
▼If it is NG, replace the oxygen sensor. (Bank 1, sensor 1)
Refer to Page B4-4.

Σ>12. Perform confirmation driving pattern.
1.Is there DTC P0171/25 or P0172/26 being output again?
▼If the output is made, check or replace the EFI ECU.
▼If the output is made, proceed to Σ>13.

Σ>13. The past situation of vehicles operation is investigated.
1.Did the vehicle run out of fuel in the past?
▼If it is OK, DTC P0171/25 is caused by running out of fuel.
▼If it is NG, check the EFI ECU circuit.
Refer to Page A1-24.

② When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

Σ>1. Oxygen sensor system check

1.Perform checking of the oxygen sensor system.
Refer to Page B8-311.

▼If it is OK, proceed to Σ>2.
▼If it is NG, repair the oxygen sensor system.

Σ>2. Fuel pressure check

1.Perform fuel pressure check.
Refer to Page B8-467.

▼If it is OK, proceed to Σ>3.
▼If it is NG, check and repair the following portions.
(1) Fuel pump system
(2) Fuel line

Σ>3. Injector system check

1.Perform checking of the injector system.
Refer to Page B8-455.

▼If it is OK, proceed to Σ>4.
▼If it is NG, repair the injector system.

Σ>4. Spark plug unit check

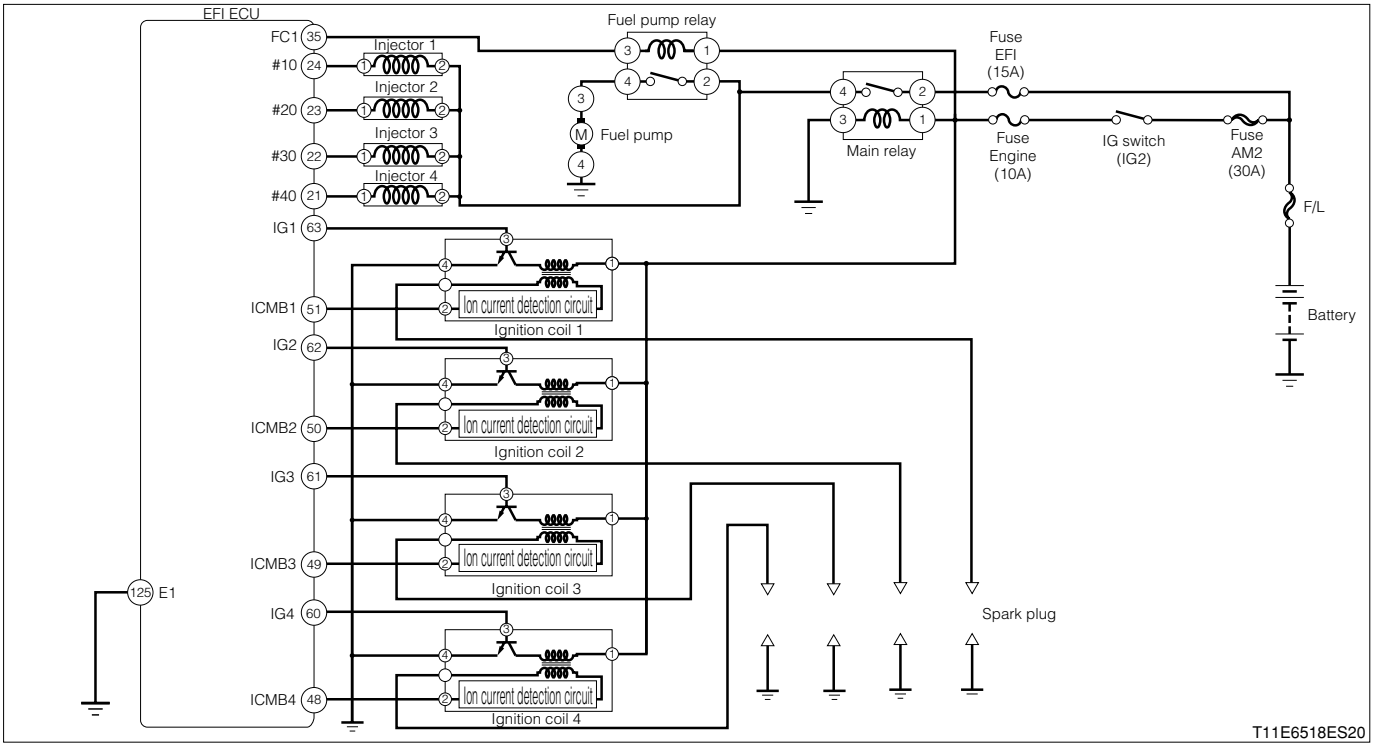
1.Perform unit check of the spark plug.
Refer to Page B8-472.

▼If it is OK, replace the EFI ECU.
Refer to Page B8-1.

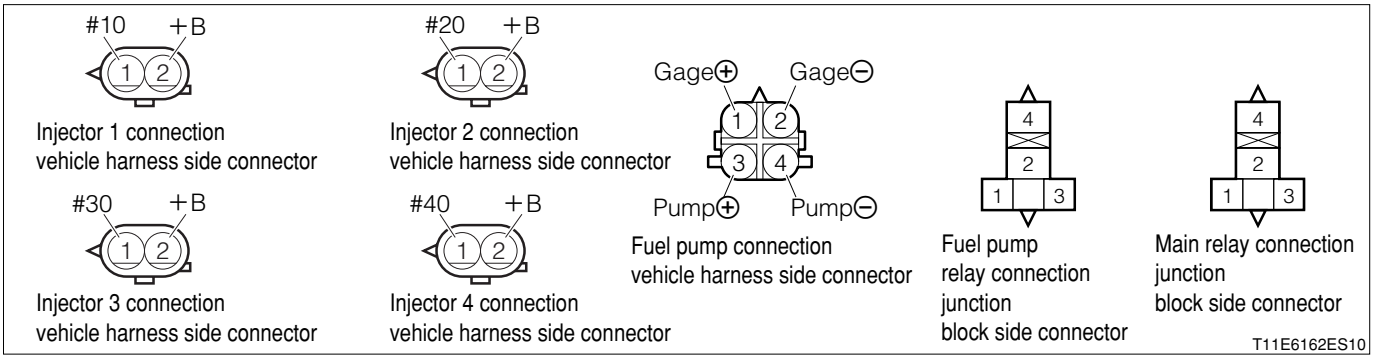
▼If it is NG, replace the spark plug.
Refer to Page B10-6.

9-12-9 DTC NO.P0300/17 RANDOM/MULTIPLE CYLINDER MISFIRE DETECTED
DTC NO.P0301/17 MISFIRE DETECTED (CYLINDER 1)
DTC NO.P0302/17 MISFIRE DETECTED (CYLINDER 2)
DTC NO.P0303/17 MISFIRE DETECTED (CYLINDER 3)
DTC NO.P0304/17 MISFIRE DETECTED (CYLINDER 4)

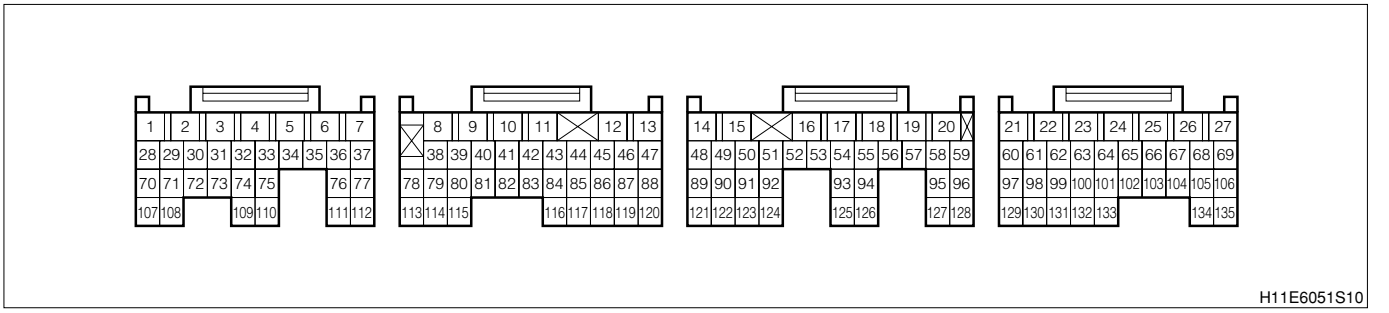
(1) System diagram



Each unit, relay, etc. connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

① **Misfire:**

1.The igniter unit detects the ion current that flows in proportion to the combustion pressure. This ion current is converted into a voltage, which will be inputted to the ECU. If the voltage value is below a certain value, the EFI ECU evaluate it as a misfire and counts its occurrence numbers.

2.When the misfire rate becomes or exceeds a number that indicates deteriorated engine conditions, this state will cause the malfunction indicator lamp (MIL) to be illuminated. If such a misfire is occurring whose misfire rate is high enough that the driving condition will most likely cause the catalyst to be overheated, the malfunction indicator lamp (MIL) will flash.

(3) Diagnosis code output conditions

① **P0300/17:**

1.Misfiring of random/multiple cylinders is detected during any particular 400 or 2000 ignitions.

② **P0301/17, P0302/17, P0303/17, P0304/17:**

1.For any particular 400 ignitions for engine, misfire is detected which can cause catalyst overheating. (This causes MIL to blink.)

2.For any particular 2000 ignitions for engine, misfire is detected which can cause deterioration in emissions.

NOTE

- When the 2 or more codes for a misfiring cylinder are recorded repeatedly but no random/multiply cylinder misfire code is recorded, it indicates that the misfire were detected and recorded at different times.

(4) Trouble area

1.Open wire/short circuit for the ignition system circuit
2.Open wire/short circuit for the ion system circuit
3.Injector
4.Fuel pressure
5.Combustion pressure
6.Manifold absolute pressure/ intake air temperature integral type sensor
7.Engine coolant temperature sensor
8.EFI ECU

(5) Points of inspection

1.Is the signal from the ignition coils (Igniter section) inputted to the ECU proper ?
2.Does the ignition coils (Igniter) operate proper ?
3.Is the harness between the injector and the ECU proper ?
4.Does the injector operate proper ?
5.Is the harness between the ECT sensor and the ECU proper ?
6.Is the output of the water temperature sensor normal?

(6) Inspection procedure

NOTE

- In order to memorize DTC of misfire, it is necessary to drive around MISFIRE RPM, MISFIRE LOAD in the data list for the following period of time.

Confirmation driving pattern

Engine speed	Time
Idling	3 minutes 30 seconds or more
1000 rpm	3 minutes or more
2000 rpm	1 minutes 30 seconds or more
3000 rpm	1 minutes or more

NOTE

- If it is the case that any DTC besides misfire is memorized simultaneously, first perform the troubleshooting for them.

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.
- When the vehicle is brought to the workshop and the misfire is not occurred, misfire can be confirmed by reproducing the condition of freeze frame data. Also, after finishing the repair, confirm that there is no misfire. (See the confirmation driving pattern)

① **When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

Σ>1. Visual check of inside of engine compartment.

1.Check the connecting conditions of the wire harnesses and connectors.
2.Check the vacuum hoses, purge hoses, fuel hoses and pipes for disconnection and breakage.
3.Are the check results OK?

▼If it is OK, go to Σ>2.

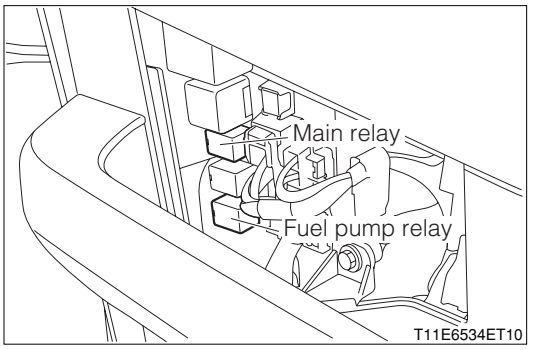
▼If it is NG, repair or replace the defective point. Ensure that there is no misfiring. (Refer to the confirmation of the running pattern.)

Σ>2. Check of spark plug and spark of misfiring cylinder.

1.Warm up the engine.
2.Turn the IG switch to "LOCK".
3.Remove the fuel pump relay.
4.Let the engine idle and wait until it stops by itself.
5.Turn the IG switch to "LOCK".
6.Remove the connector of the injector.

CAUTION

- Stop the fuel injection through the above operation and prevent damaging the catalyst by the unburned gas.



7.Remove the ignition coils and spark plugs (Misfire cylinders).
8.Install the spark plug to the ignition coil.
9.Ground the spark plug.
10.Crank the engine at this time, check to see if the spark plug sparks.
11.Are sparks jumping?

▼If it is OK, go to Σ>3.
▼If it is NG, perform the following operation.

(1) Replace the spark plug
(2) Check the ignition system and ion system.

CAUTION

- Do not use any spark plugs other than those designated.

Σ>3. Check of output signal of injector of misfiring cylinder.

1.With the IG switch turned "LOCK", perform restoration.
2.Set the SST (Sub-harness).
SST: 09842-97209-000

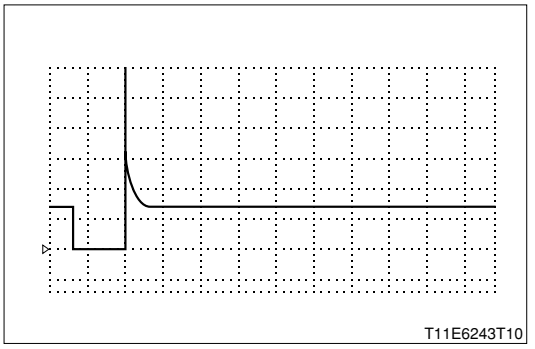
3.IG switch turned "ON".
4.As for the harness between the following terminals, measure the injector voltage of the cylinder where the misfiring is occurring.
(1) Between SST 24 (#10) and the body earth
(2) Between SST 23 (#20) and the body earth
(3) Between SST 22 (#30) and the body earth
(4) Between SST 21 (#40) and the body earth
SPECIFIED VALUE: Battery voltage

5.Observation of injector waveform with oscilloscope (Reference).
6.Check the oscillographic waveform between the following terminals during the idling.
(1) Between SST 24 (#10) and SST 125 (E1)
(2) Between SST 23 (#20) and SST 125 (E1)
(3) Between SST 22 (#30) and SST 125 (E1)
(4) Between SST 21 (#40) and SST 125 (E1)

7.As an example, in case of the following measuring range and measuring conditions, it will be as in the right figure.

Time axis	2ms / DIV
Voltage axis	10V / DIV
Measuring condition	When air conditioner is "OFF" with no electric load and while idling

Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".



NOTE

- The waveform cannot be specified, but confirm that a waveform as in the right figure (One such example) shows up

8.Confirm the following points.

(1) The voltage changes from the battery voltage to 0V while fuel injection.

9.Are the check results OK?

▼If it is OK, go to Σ>6.

▼If it is NG, go to Σ>4.

Σ>4. Unit check of injector of misfiring cylinder.

1.Turn "LOCK" the IG switch.

2.Disconnect the injector connector of the misfiring cylinder.

3.Measure the resistance between the injector terminals (Injector side).

SPECIFIED VALUE: 12 Ω at 20°C

4.Are the unit check results OK?

▼If it is OK, go to Σ>5.

▼If it is NG, replace the injector.

Refer to Page B7-23.

∑5. Wiring harness check

1.IG switch turned "LOCK".
2.Disconnect the SST connectors from the EFI ECU.
3.Check the harness and connector for open wire or short.
(1) Between the injector 1 connection vehicle harness side connector 1 (#10) and the EFI ECU connection vehicle harness side connector 24 (#10)
(2) Between the injector 2 connection vehicle harness side connector 1 (#20) and the EFI ECU connection vehicle harness side connector 23 (#20)
(3) Between the injector 3 connection vehicle harness side connector 1 (#30) and the EFI ECU connection vehicle harness side connector 22 (#30)
(4) Between the injector4 connection vehicle harness side connector1(#40) and the EFI ECU connection vehicle harness side connector21(#40)
SPECIFIED VALUE: Continuity exists.

(5) Between the injector 1 connection vehicle harness side connector 1 (#10) and the body earth
(6) Between the injector 2 connection vehicle harness side connector 1 (#20) and the body earth
(7) Between the injector 3 connection vehicle harness side connector 1 (#30) and the body earth
(8) Between the injector4 connection vehicle harness side connector1(#40) and the body earth
SPECIFIED VALUE: No continuity exists

4.Are the check results for open wire and short OK?
▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, repair or replace the harness or connector.

∑6. Check of ion system.

1.Perform the trouble shooting for the code No.P1300/36.
Refer to Page B8-388.

2.Are the check results OK?
▼If it is OK, go to ∑7.
▼If it is NG, repair or replace the defective point.

∑7. Check of fuel pressure.

1.Check the fuel pressure.
Refer to Page B8-467.

2.Are the check results OK?
▼If it is OK, go to ∑8.
▼If it is NG, check and repair the fuel pump, pressure regulator, fuel pipe line and filter.

∑8. Check of injector injection.

1.Check the injector unit.
Refer to Page B8-472.

2.Are the check results OK?
▼If it is OK, go to ∑9.
▼If it is NG, replace the injector.
Refer to Page B7-23.

Σ>9. Manifold absolute pressure sensor unit check

1.Perform the unit check of the manifold absolute pressure sensor section.
Refer to Page B8-468.

2.Are the check results OK?
▼If it is OK, go to Σ>10.
▼If it is NG, replace the manifold absolute pressure sensor.

Σ>10. Water temperature sensor unit check

1.Perform the unit check of the water temperature sensor.
Refer to Page B8-468.

2.Are the check results OK?
▼If it is OK, perform the following checks given below.
(1) Compression pressure
Refer to Page B1-24

(2) Valve clearance
Refer to Page B1-22.

▼If it is NG, replace the engine coolant temperature sensor.
Refer to Page B8-235.

② **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

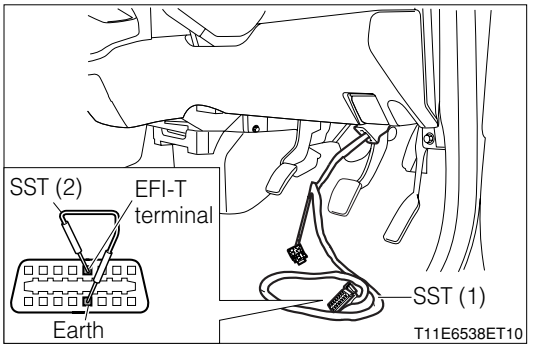
Σ>1. Diagnosis code check

1.Use the SST to short-circuit DLC terminals between 5 (EFI-T) - 13 (E).
SST: 09991-87404-000(1)
09991-87403-000(2)

2.Check whether the diagnosis code other than Code No.36 is outputted or not.
SPECIFIED VALUE: No output.

▼If it is OK, go to Σ>2.

▼In the case of NG, first check and repair a condition that caused the diagnosis code output.



Σ>2. Unit check of spark plug

1.Check whether the designated spark plug is used. (See Engine Turning-up section for spark plug specifications.)
Refer to Page B1-20.

2.Perform the unit check of the spark plug
Refer to Page B8-472.

▼If it is OK, go to Σ>3.

▼If it is NG, clean or replace the spark plug. If a designated spark plug is not used, replace the spark plug with the designated spark plug.

Σ>3. Spark check

WARNING

- There is a hazard potential for sparks are generated. Do not place combustible materials in the vicinity.

1.Warm up the engine.
2.Set the IG switch to "LOCK".
3.Remove the fuel pump relay.
4.Idle the engine and wait until the engine stops by itself.
5.Set the IG switch to "LOCK".
6.Remove all the connectors from the injector.

CAUTION

- Operations described above will stop fuel injection, thus preventing damage to the catalyst due to non-burned gas etc.

7.Remove the spark plug and install it to the ignition coil to earth the plug.
8.Check whether the spark plug generates sparks during cranking.
SPECIFIED VALUE: Sparks are generated.

▼If it is OK, go to Σ>8.

▼If it is NG, go to Σ>4.

Σ4. EFI ECU signal check (1)

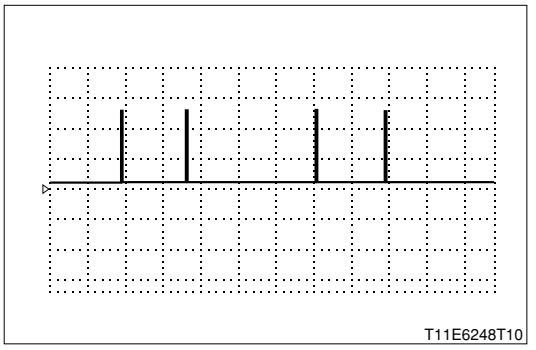
1.Connect the SST.
SST: 09842-97209-000

2.Completely warm up the engine.

3.When the engine is in the starting condition, check an output waveform of an ignition signal between the following terminals using an oscilloscope.
(1) Between SST 63 (IG1) - SST 125 (E1)
(2) Between SST 62 (IG2) - SST 125 (E1)
(3) Between SST 61 (IG3) - SST 125 (E1)
(4) Between SST 60 (IG4) - SST 125 (E1)

Time axis	100ms / DIV
Voltage axis	2V / DIV
Condition	Air-conditioner "OFF", no electrical load, idling

Air-conditioner "OFF": Set the air-conditioner switch (ACSW), blower switch (BLW), and magnet clutch (MGC) to "OFF".



NOTE
- Check that the waveform shown in the figure [Example] is displayed.

4.Check the following points.
(1) The pulse of 0 ⇄ 5V is generated.
(2) The waveform cycle is shortened as the engine speed increases.

NOTE
- The ignition signal can not be judged correctly if an oscilloscope is not used.

▼If it is OK, go to Σ5.
▼If it is NG, check the EFI ECU circuit.
Refer to Page A1-24.

Σ5. Wire harness continuity check (1)

1.Check continuity between the following terminals.
(1) Between ignition coil 1connection vehicle harness side connector 3 (IG1) - ECU connection vehicle harness side connector 63 (IG1)
(2) Between ignition coil 2 connection vehicle harness side connector 3 (IG2) - ECU connection vehicle harness side connector 62 (IG2)
(3) Between ignition coil 3 connection vehicle harness side connector 3 (IG3) - ECU connection vehicle harness side connector 61 (IG3)
(4) Between ignition coil 4 connection vehicle harness side connector 3 (IG4) - ECU connection vehicle harness side connector 60 (IG4)

SPECIFIED VALUE: Continuity exists

▼If it is OK, go to Σ6.
▼If it is NG, repair or replace the faulty harness.

Σ>6. Ignition coil voltage check

1.Measure the voltage between the following terminals when the IG switch is "ON".

(1) Between each ignition coil connection vehicle harness side connector 1 (+B) - body earth

SPECIFIED VALUE: Battery voltage

▼If it is OK, go to Σ>7.

▼In the case of NG, repair or replace the harness between the following terminals.

(2) Each ignition coil - battery

Σ>7. Wire harness continuity check (2)

1.Check continuity between the following terminals.

(1) Between each ignition coil connection vehicle harness side connector 4 (E1) - ECU connection vehicle harness side connector 125 (E1)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, replace the ignition coil.

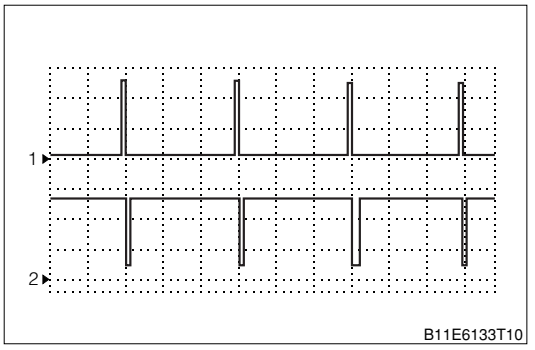
Refer to Page B10-6.

▼In the case of NG, repair or replace the faulty harness.

Σ>8. EFI ECU signal check (2)

1.Completely warm up the engine.

2.While idling, check each cylinder for output waveforms of the ignition signal (1▶) and ion current combustion control signal (2▶), using an oscilloscope, respectively.



	Channel	+ side measuring terminal	− side measuring terminal
Cylinder No.1	1▶	63 (IG1)	125 (E1)
	2▶	51 (ICMB1)	125 (E1)
Cylinder No.2	1▶	62 (IG2)	125 (E1)
	2▶	50 (ICMB2)	125 (E1)
Cylinder No.3	1▶	61 (IG3)	125 (E1)
	2▶	49 (ICMB3)	125 (E1)
Cylinder No.4	1▶	60 (IG4)	125 (E1)
	2▶	48 (ICMB3)	125 (E1)

Time axis	20ms / DIV
Voltage axis	2V / DIV
Condition	Water temperature is 80℃ or more; air conditioner is "ON"; electric load exists; during air conditioner idle up rotation

Air conditioner is "ON": Condition where all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "ON".

Electric load exists: Conditions where the headlight (H/L) and Defogger (DEF) are both "ON".

Air conditioner idle up rotation:950^{+100}_{-50} rpm(A/T vehicle), 850^{+100}_{-50} rpm(M/T vehicle),

NOTE

- Check that waveforms like those in the figure (One example) is produced.

3.Check the following points.

(1) According to the output waveform of the ignition signal (Channel 1 ▶), the output waveform of the ion current combustion control signal (Channel 2▶) has been produced.

(2) The waveform of 5 ⇄ 0V has been produced.

NOTE

- Correct evaluation cannot be made for the ignition signals and ion current combustion control signals, unless you use an oscilloscope.

	Waveform (Channel 2▶) state
a	Normal
b	Clamped at 0V.
c	Clamped at 5V.
d	Clamped to the battery voltage.
e	Waveform is unstable ※.

※: According to the output waveform of the ignition signal (Channel 1 ▶), the output waveform of the ion current combustion control signal (Channel 2▶) has not been produced.

▼In the case of "a", go to Σ>9.

▼In the case of "b", go to Σ>11.

▼In the case of "c", go to Σ>13.

▼In the case of "d", go to Σ>12.

▼In the case of "e", go to Σ>16.

Σ9. EFI ECU signal check (3)

1.Retain the measurement conditions in Σ8.

2.Under the following conditions, check each cylinder for output waveforms of the ion current combustion control signal, using an oscilloscope.

(1) Raise the engine revolution speed slowly from the idle state to 4000 rpm. Then, close the throttle opening quickly.

SPECIFIED VALUE: No waveform is outputted while fuel is cut.

▼If it is OK, replace the EFI ECU.

Refer to Page B8-1.

▼If it is NG, go to Σ10.

Σ10. Fuel cut operation check

1.Check the output state between the following terminals using an oscilloscope.

(1) Between SST 24 (#10) - SST 125 (E1)

(2) Between SST 23 (#20) - SST 125 (E1)

(3) Between SST 22 (#30) - SST 125 (E1)

(4) Between SST 21 (#40) - SST 125 (E1)

2.Check the operating sound of the injector using a sound scope when the fuel cut is active.

NOTE

- Check operating sound, while checking the output waveform to the injector using an oscilloscope.

SPECIFIED VALUE: The operating sound of the injector stops when the fuel cut is active.

▼If it is OK, replace the ignition coil.

Refer to Page B10-6.

▼In the case of NG, perform unit check of the injector.

Refer to Page B8-472.

Σ11. Check of wire harness for short-circuit (1)

1.Check continuity of the cylinder whose waveform is clamped at 0V.

(1) Between ignition coil 1 connection vehicle harness side connector 2 (ICMB1) - body earth

(2) Between ignition coil 2 connection vehicle harness side connector 2 (ICMB2) - body earth

(3) Between ignition coil 3 connection vehicle harness side connector 2 (ICMB3) - body earth

(4) Between ignition coil 4 connection vehicle harness side connector 2 (ICMB4) - body earth

SPECIFIED VALUE: No continuity exists

▼If it is OK, replace the ignition coil.

Refer to Page B10-6.

▼In the case of NG, repair the faulty section.

Σ12. Check of wire harness for short-circuit (2)

1.Check continuity of the cylinder whose waveform is clamped to the battery voltage.

(1) Between ignition coil 1 connection vehicle harness side connector 2 (ICMB1) - battery positive (+) terminal

(2) Between ignition coil 2 connection vehicle harness side connector 2 (ICMB2) - battery positive (+) terminal

(3) Between ignition coil 3 connection vehicle harness side connector 2 (ICMB3) - battery positive (+) terminal

(4) Between ignition coil 4 connection vehicle harness side connector 2 (ICMB4) - battery positive (+) terminal

SPECIFIED VALUE: No continuity exists

▼If it is OK, replace the ignition coil.

Refer to Page B10-6.

▼In the case of NG, repair or replace the faulty component.

Σ13. Check of wire harness for open wire

1.Check continuity of the cylinder whose waveform is clamped at 5V.

(1) Between ignition coil 1connection vehicle harness side connector 2 (ICMB1) - EFI ECU connection vehicle harness side connector 51 (ICMB1)

(2) Between ignition coil 2 connection vehicle harness side connector 2(ICMB2) - EFI ECU connection vehicle harness side connector 50 (ICMB2)

(3) Between ignition coil 3 connection vehicle harness side connector 2 (ICMB3) - EFI ECU connection vehicle harness side connector 49 (ICMB3)

(4) Between ignition coil 4 connection vehicle harness side connector 2 (ICMB4) - EFI ECU connection vehicle harness side connector 48 (ICMB4)

SPECIFIED VALUE: Continuity exists

▼If it is OK, go to Σ14.

▼In the case of NG, repair or replace the faulty component.

Σ14. Check of short-circuit between the wire harnesses

1.Check whether the cylinder, whose waveform is clamped at 5V, is short-circuited to the power wire of the sensor system.

NOTE

- The power supply for the sensor system is 5V.

(1) Between ignition coil 1 connection vehicle harness side connector 2 (ICMB1) - body earth

(2) Between ignition coil 2 connection vehicle harness side connector 2 (ICMB2) - body earth

(3) Between ignition coil 3 connection vehicle harness side connector 2 (ICMB3) - body earth

(4) Between ignition coil 4 connection vehicle harness side connector 2 (ICMB4) - body earth

SPECIFIED VALUE: 0V

▼If it is OK, replace the ignition coil and go to Σ15.

Refer to Page B10-6.

▼In the case of NG, repair or replace the faulty component.

Σ>15. EFI ECU signal recheck (1)

1.Recheck the cylinder, whose waveform is clamped at 5V, under the Σ>8 conditions.

2.Check that the output waveform of the ion current combustion control signal (Channel 2▶) is not clamped at 5V.

SPECIFIED VALUE: The output waveform (Channel 2▶) is not clamped at 5V.

▼If it is OK, finish the troubleshooting.

▼In the case of NG, misfire may have occurred. Identify the cause of the misfire and repair.

Σ>16. Harness, connector check

1.When the following actions are taken to the cylinder whose waveform is unstable , check whether the waveform will change or not.

(1) Lightly shake the connector vertically and laterally.

(2) Lightly shake the wire harness vertically and laterally.

SPECIFIED VALUE: There is no change in the waveform.

2.Perform the following checks.

(1) Connector fitting condition

(2) Loose connection of the connector and the terminal.

SPECIFIED VALUE: No fault.

▼If it is OK, replace the ignition coil and go to Σ>17.

Refer to Page B10-6.

▼In the case of NG, repair or replace the faulty component.

Σ>17. EFI ECU signal recheck (2)

1.Recheck the cylinder, whose waveform is unstable, under the Σ>8 conditions.

2.Check that the output waveform of the ion current combustion control signal (Channel 2▶) is outputted stably.

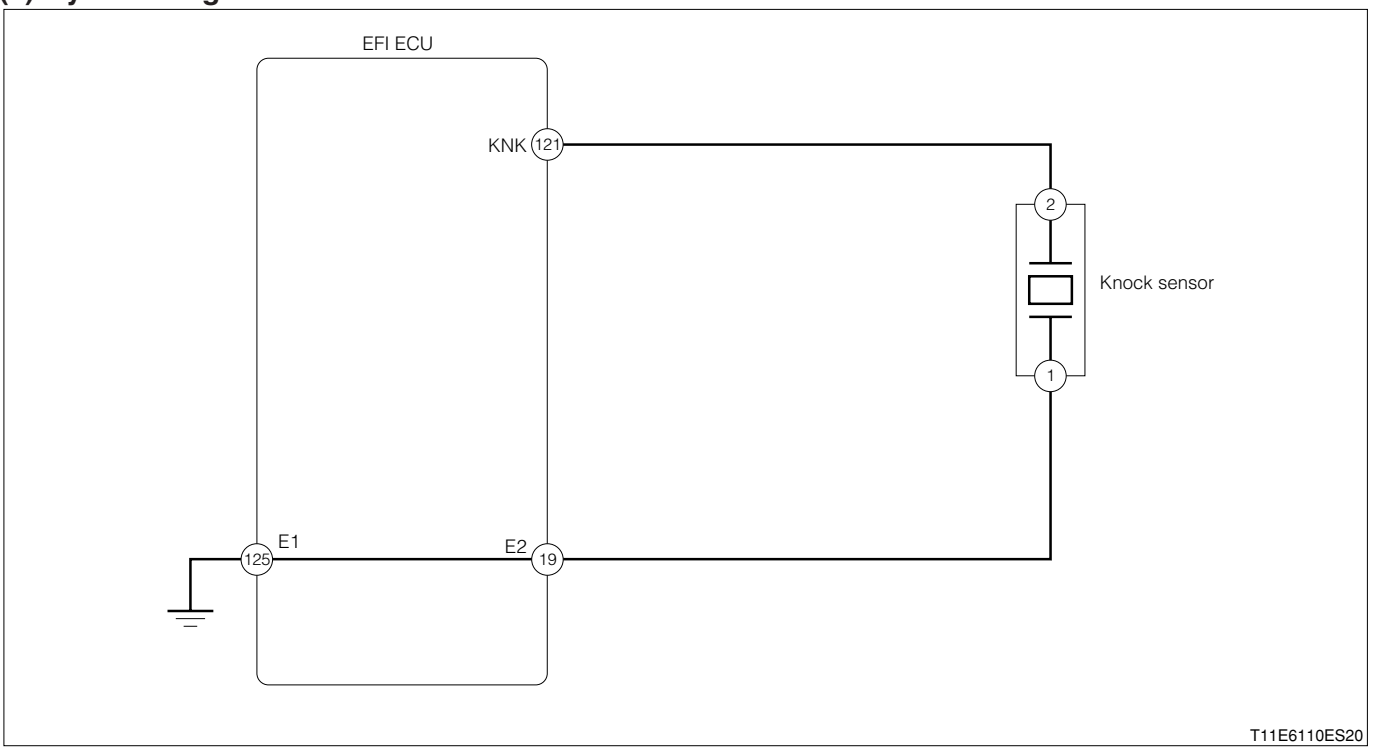
SPECIFIED VALUE: The output waveform (Channel 2▶) is outputted stably.

▼If it is OK, finish the troubleshooting.

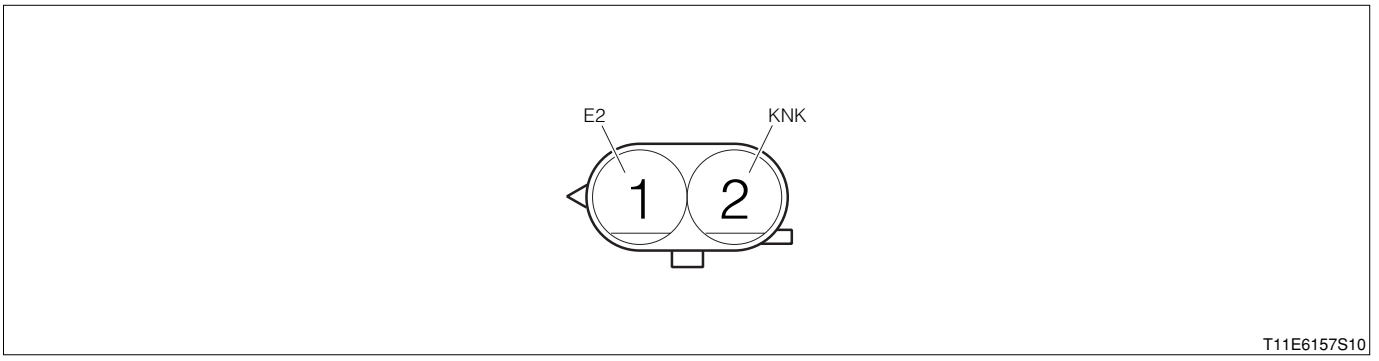
3.In the case of NG, combustion instability may have occurred. Identify the cause of the combustion instability and repair.

9-12-10 DTC NO.P0325/18 KNOCK SENSOR 1 CIRCUIT MALFUNCTION

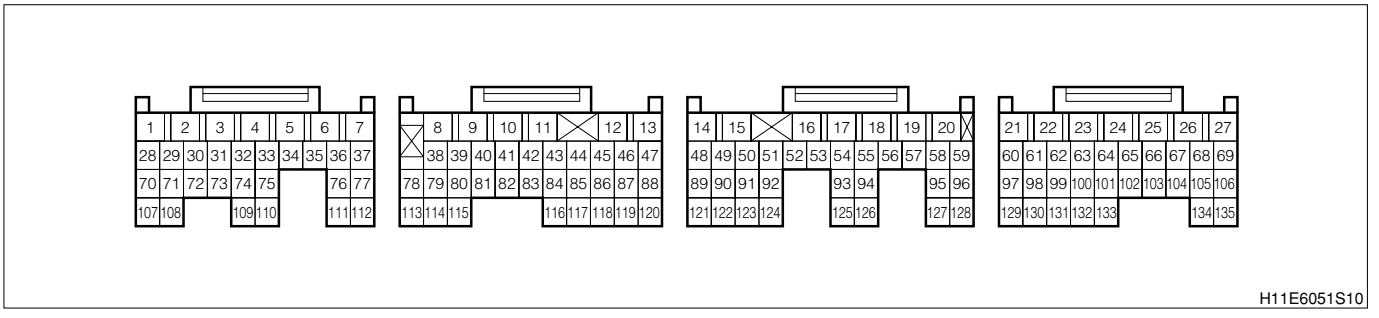
(1) System diagram



Knock sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1. The knock sensor is installed at the cylinder block. The knock sensor detects the occurrence of knocking indirectly from the cylinder block vibration that is caused by the knocking.
2. The knock sensor incorporates a piezo element, whereby the vibration inside the cylinder block is converted to an electric signal.

(3) Diagnosis code output conditions

1. When the signals from the knock sensor are not outputted continuously after starting over a certain length of time.

(4) Trouble area

1.Open wire or short circuit for knock sensor system circuit
2.Knock sensor
3.EFI ECU

(5) Checking points

1.Is the signal from the knock sensor inputted to the EFI ECU?
2.Is the harness between the knock sensor and the EFI ECU normal?
3.Is the output of the knock sensor normal?

(6) Inspection procedure

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

Σ>1. Check of continuity of knock sensor circuit.

1.IG switch turned "LOCK".
2.Set the SST (Sub-harness). However, the SST connector should remain disconnected from the ECU connector.
SST: 09842-97209-000

3.Measure the resistance between the following terminals.
(1) Between SST 121 (KNK) and 19 (E2)
SPECIFIED VALUE: 200±80kΩ

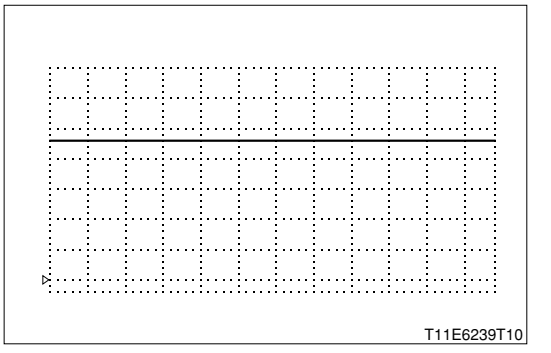
4.Are the unit check results OK?
▼If it is OK, go to Σ>2.
▼If it is NG, replace the knock sensor.

Σ>2. EFI ECU signal check

1.Connect the SST connector at the EFI ECU side.
2.Start the engine.
3.Perform output check between the following terminals using an oscilloscope.
(1) Between SST 121 (KNK) - SST 19 (E2)

Time axis	50μs /DIV
Voltage axis	500mV / DIV
Measuring condition	When air conditioner is "OFF" with no electric load and while idling

Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".

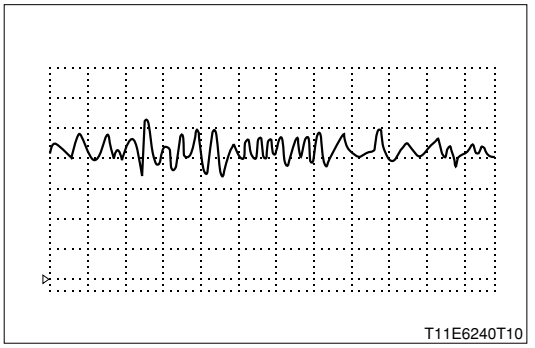


NOTE

- The waveform cannot be specified, but ensure that a waveform as in the right figure (One such example) shows up.

Time axis	50μs / DIV
Voltage axis	500mV / DIV
Measuring condition	When air conditioner is "OFF" with no electric load and while racing

Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".



NOTE

- The waveform cannot be specified, but ensure that a waveform as in the right figure (One such example) shows up.

4.Is each of the waveform outputted when idling and when racing?

▼If it is OK, check the EFI ECU circuit.

Refer to Page A1-24.

▼If it is NG, proceed to Σ>3.

Σ>3. Wiring harness check

1.Check the harness and connector between the EFI ECU and the knock sensor for open wire or short.

(1) Between the knock sensor connection vehicle harness side connector 2 (KNK) and the EFI ECU connection vehicle harness side connector 121 (KNK)

(2) Between the knock sensor connection vehicle harness side connector 1 (E2) and the EFI ECU connection vehicle harness side connector 19 (E2)

SPECIFIED VALUE: Continuity exists.

(3) Between the knock sensor connection vehicle harness side connector 2 (KNK) and the body earth

(4) Between the knock sensor connection vehicle harness side connector 1 (E2) and the body earth

SPECIFIED VALUE: No continuity exists

2.Are the check results for open wire and short OK?

▼If it is OK, go to Σ>4.

▼If it is NG, repair or replace the harness or connector.

Σ>4. Unit check the knock sensor.

1.Perform the unit check of the knock sensor.

Refer to Page B8-470.

▼If it is OK, go to Σ>5.

▼If it is NG, check the EFI ECU circuit.

Refer to Page A1-24.

Σ>5. Check of knock sensor installation state

1.Check the knock sensor for installing condition (E.G. looseness, installation angle).

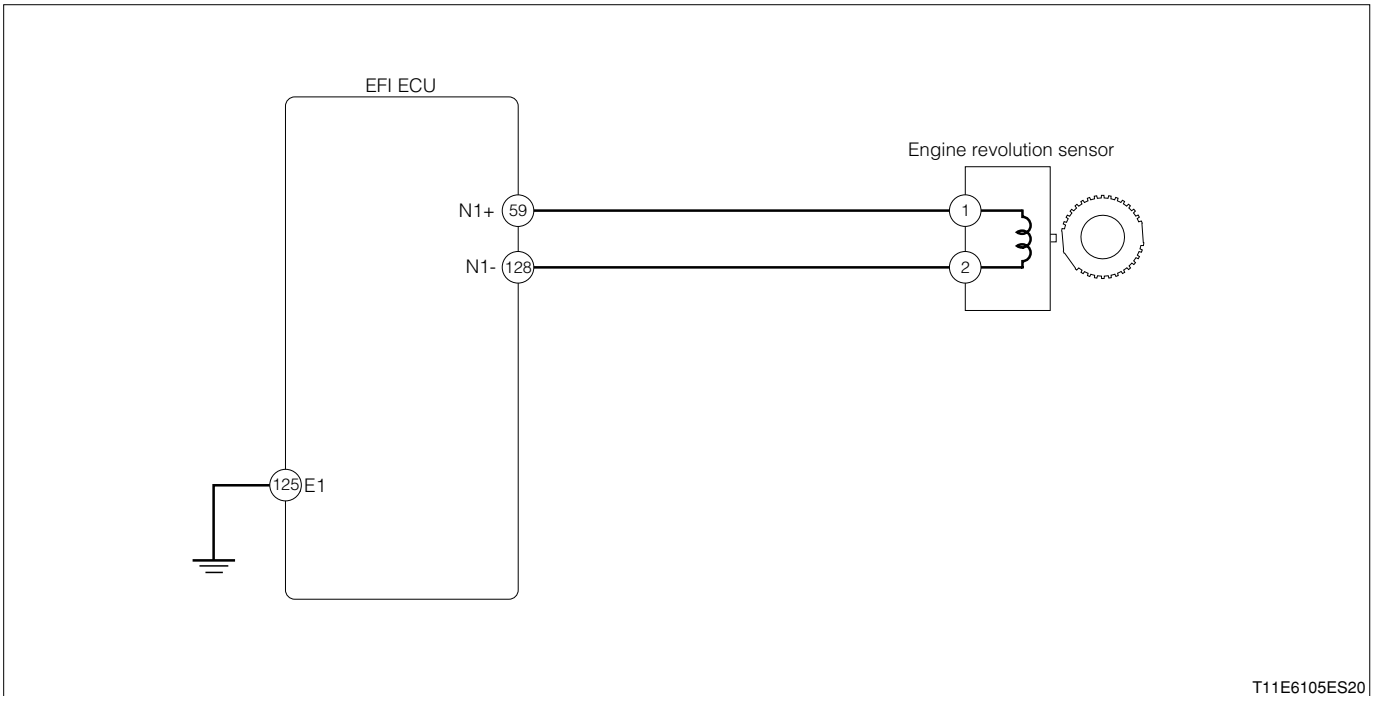
2.Are the check results OK?

▼If it is OK, check or replace the EFI ECU.

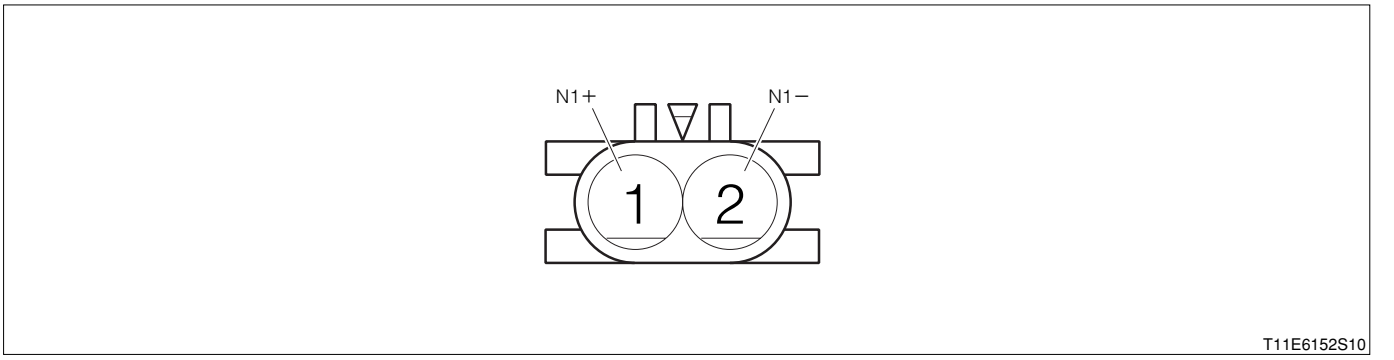
▼If it is NG, tighten the knock sensor.

9-12-11 DTC NO.P0335/13 ENGINE REVOLUTION SENSOR CIRCUIT MALFUNCTION

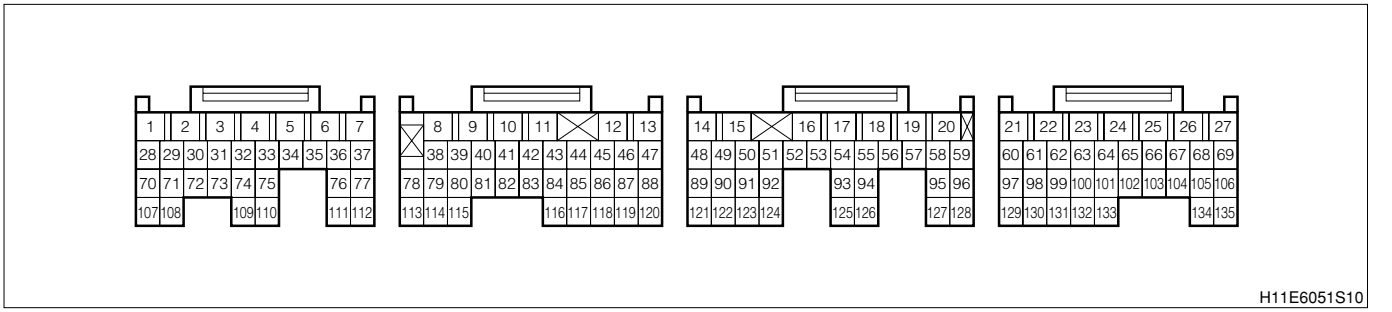
(1) System diagram



Engine revolution sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1. The signal rotor is installed at the front side of the crankshaft so as to detect the crank angle. Furthermore, a pickup coil (Engine revolution sensor) is provided in relation to the projection of this signal rotor.
2. When the crankshaft turns, the air gap between the signal rotor projection and the engine revolution sensor varies and pulses are generated. The engine revolution is calculated based on the intervals of these pulses.

(3) Diagnosis code output conditions

1. No revolution signal is inputted, even once, while the cranking is continued for several seconds.

(4) Trouble area

1.Open wire or short circuit for engine revolution sensor system circuit
2.Engine revolution sensor
3.EFI ECU

(5) Checking points

1.Is the signal from the engine revolution sensor inputted to the EFI ECU?
2.Is the harness between the engine revolution sensor and the EFI ECU normal?
3.Is the output of the engine revolution sensor normal?

(6) Inspection procedure

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

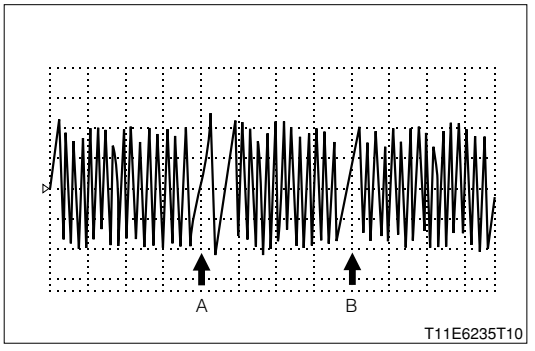
Σ>1. EFI ECU signal check

1.Connect the SST.
SST: 09842-97209-000

2.Perform the output check between the following terminals using an oscilloscope.
(1) Between SST 59 (N1＋) - SST 128 (N1－)
SPECIFIED VALUE:

Time axis	10ms /DIV
Voltage axis	2V / DIV
Measuring condition	When air conditioner is "OFF" with no electric load and while idling

When air conditioner is "OFF" with no electric load and while idling



NOTE

- The waveform cannot be specified, but ensure that a waveform as in the right figure (One such example) shows up.

3.Confirm the following points.
(1) Each of the cylinder distinguishing signals (A) and (B) is coming out.
(2) The wave period becomes shorter as the engine revolution speed rises.

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, proceed to Σ>2.

Σ2. Check of wire harness continuity

1.Perform continuity checks between each of the following terminals.

(1) Between sensor connection vehicle harness side connector 1 (N1＋) - ECU connection vehicle harness side connector 59 (N－)

(2) Between sensor connection vehicle harness side connector 2 (N1－) - ECU connection vehicle harness side connector 128 (N－)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ3.

▼If it is NG, repair the harness and connectors.

Σ3. Engine rev sensor unit check

1.Perform unit check of the engine rev sensor.

Refer to Page B8-468.

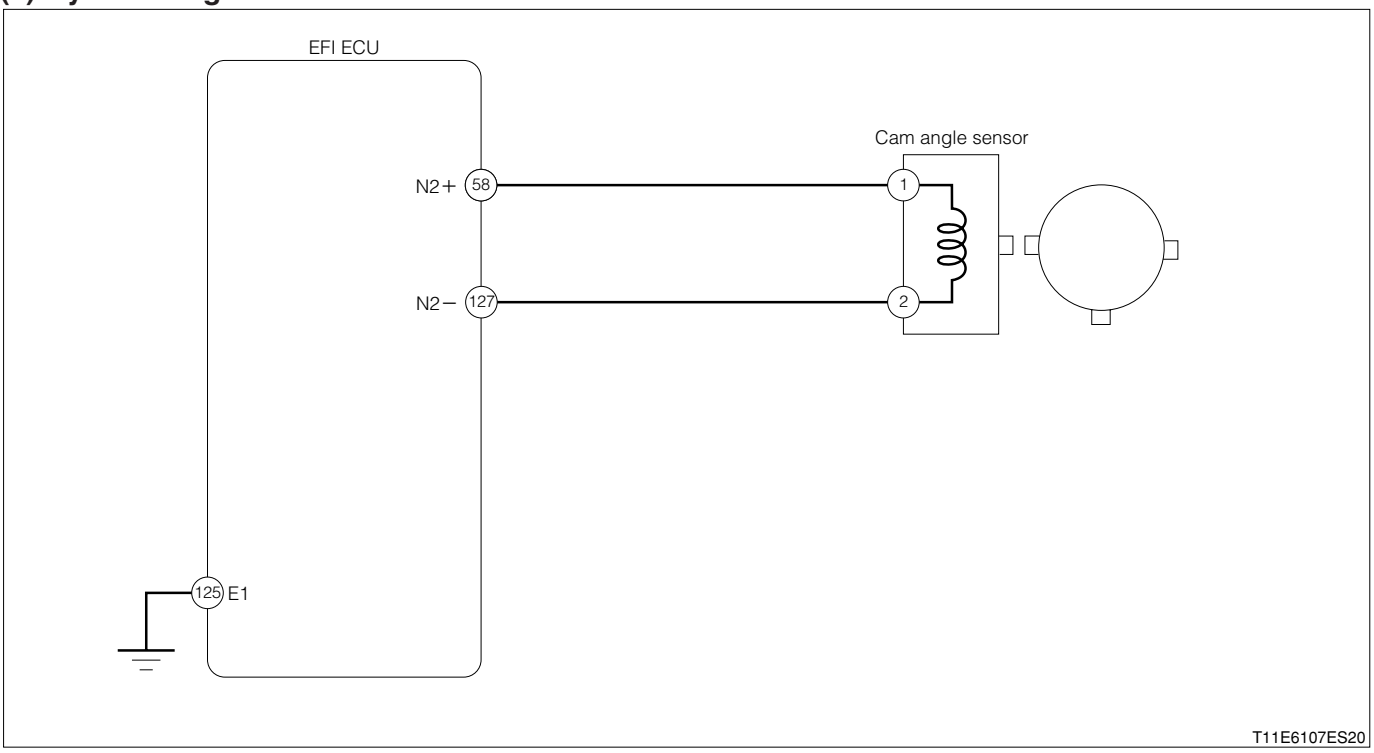
▼If it is OK, check the connecting condition of each connector.

▼If it is NG, replace the engine rev sensor.

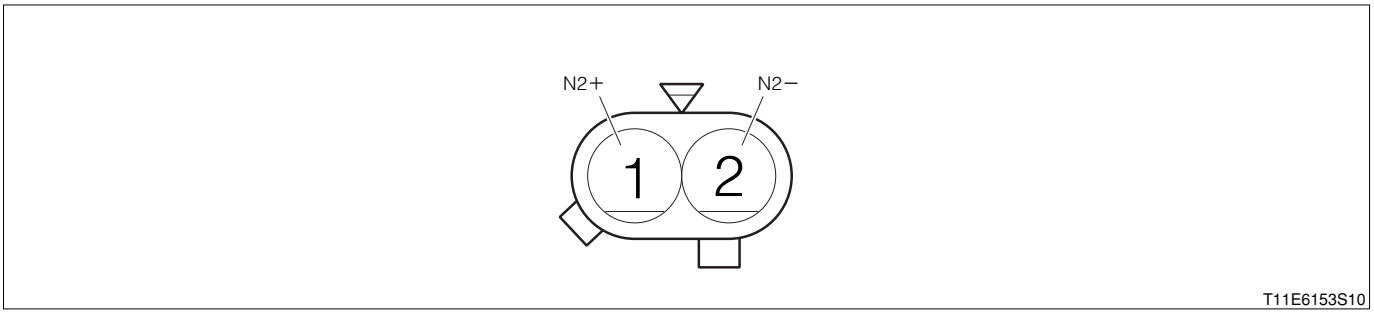
Refer to Page B8-3.

9-12-12 DTC NO.P0340/14 CAMSHAFT POSITION SENSOR CIRCUIT MALFUNCTION

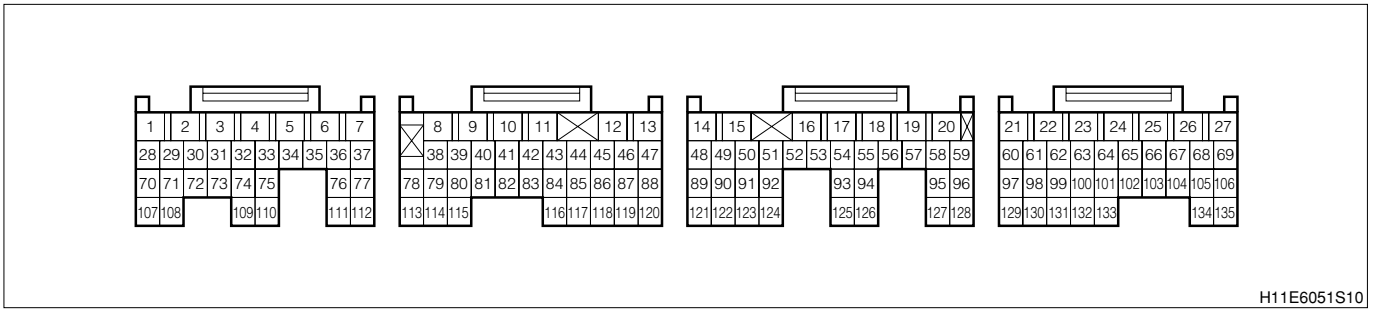
(1) System diagram



Cam angle sensor connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1.The cam angle sensor consists of a signal rotor and a pickup coil. The signal rotor is mounted to the intake side camshaft, using three teeth. As for the NE signal, three signals are outputted per one revolution of the engine. The phases of the camshaft and crankshaft are detected based on the signal from the cam angle sensor and the signal from the engine revolution sensor. Based on these phases, the variable valve timing is controlled.

(3) Diagnosis code output conditions

1.When the signal from the cam angle sensor is not outputted over a certain length of time after the starting,

(4) Trouble area

1.Open wire or short circuit for Camshaft angle sensor system circuit
2.Camshaft angle sensor
3.EFI ECU

(5) Checking points

1.Is the signal from the cam angle sensor inputted to the EFI ECU?
2.Is the harness between the cam angle sensor and the EFI ECU normal?
3.Is the output of the cam angle sensor normal?

(6) Inspection procedure

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

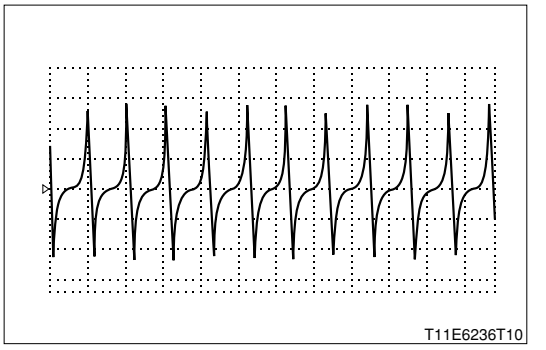
Σ>1. EFI ECU signal check

1.Connect the SST.
SST: 09842-97209-000

2.Perform output check between the following terminals using an oscilloscope.
(1) Between SST 58 (N2+) - SST 127 (N2−)
SPECIFIED VALUE:

Time axis	50ms /DIV
Voltage axis	1V / DIV
Measuring condition	When air conditioner is "OFF" with no electric load and while idling

Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".



NOTE

- The waveform cannot be specified, but ensure that a waveform as in the right figure (One such example) shows up.

3.Confirm the following points.
(1) Periodic wave is showing up.
(2) The wave period becomes shorter as the engine revolution speed rises.

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, proceed to Σ>2.

Σ>2. Check of wire harness continuity

1.Perform continuity checks between each of the terminals.
(1) Between sensor connection vehicle harness side connector 1 (N2+) - ECU connection vehicle harness side connector 58 (N2+)
(2) Between sensor connection vehicle harness side connector 2 (N2−) - ECU connection vehicle harness side connector 127 (N2−)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ>3.
▼If it is NG, repair the harness and connectors.

3. Camshaft position sensor unit check

1.Perform unit check of the camshaft position sensor.

Refer to Page B8-468.

▼If it is OK, check the connecting condition of each connector.

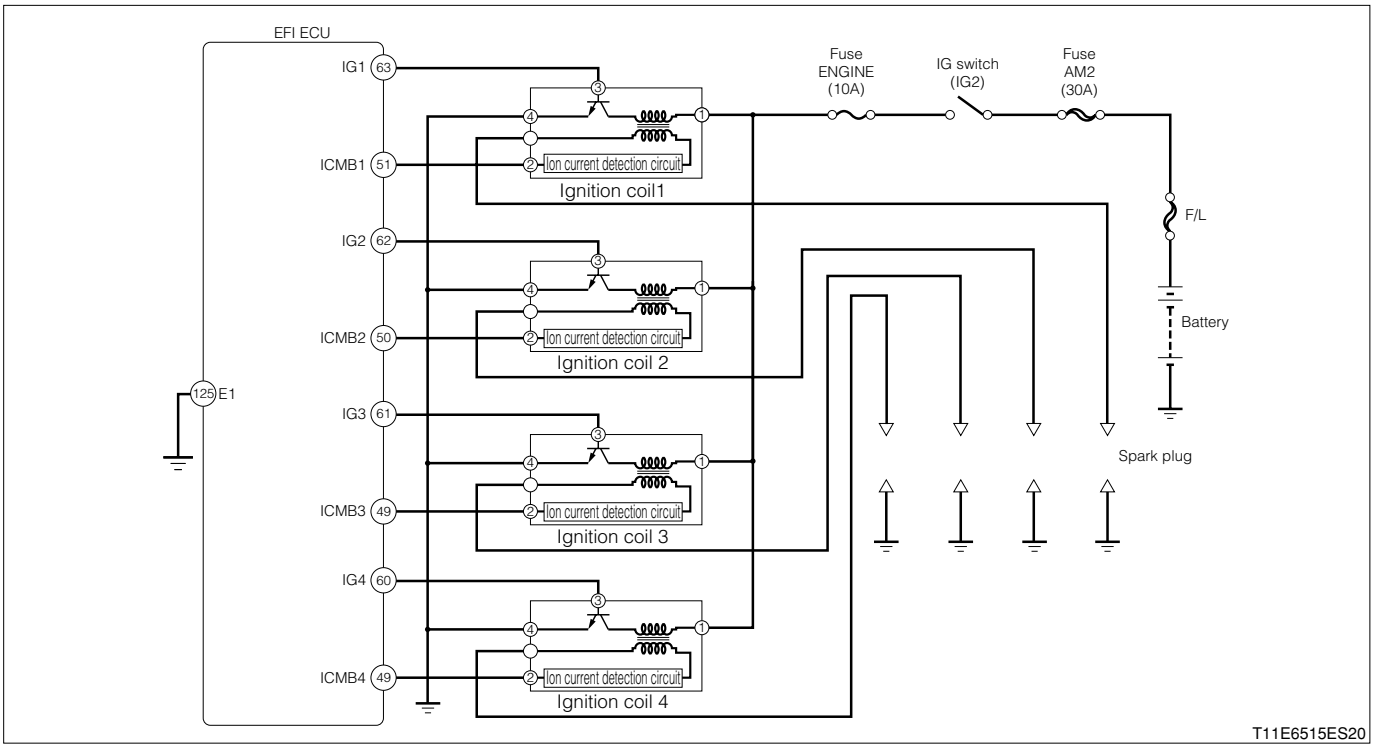
▼If it is NG, replace the camshaft position sensor.

Refer to Page B8-232

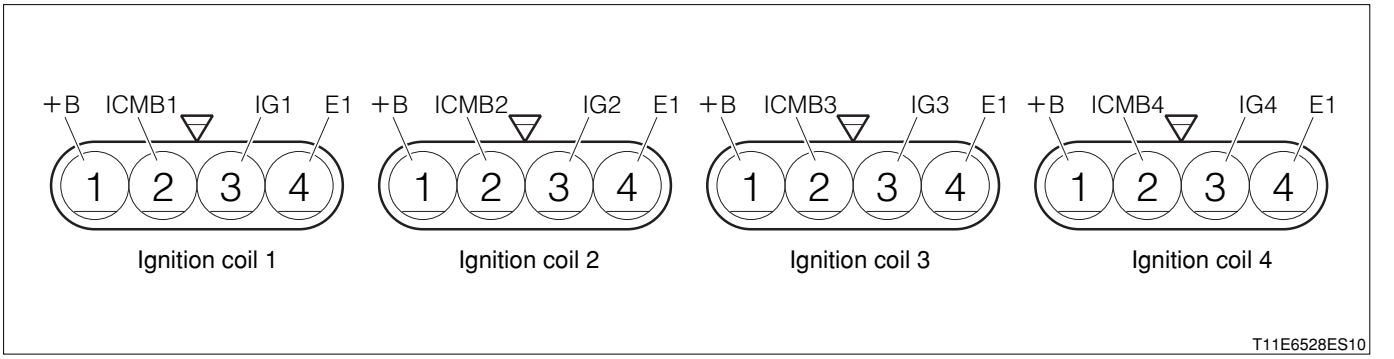
9-12-13 DTC NO.P0350/16 IGNITION SYSTEM CIRCUIT MALFUNCTION

(1) System diagram

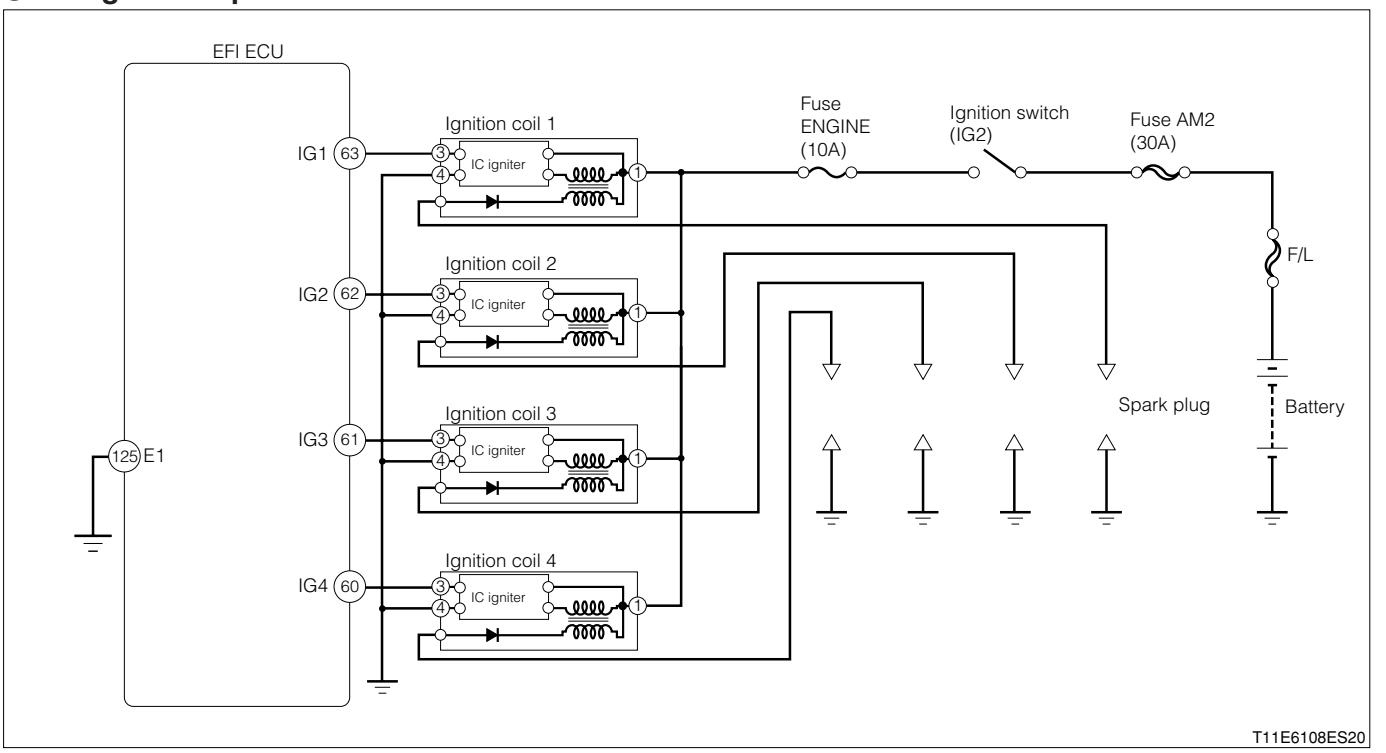
① For EU specifications



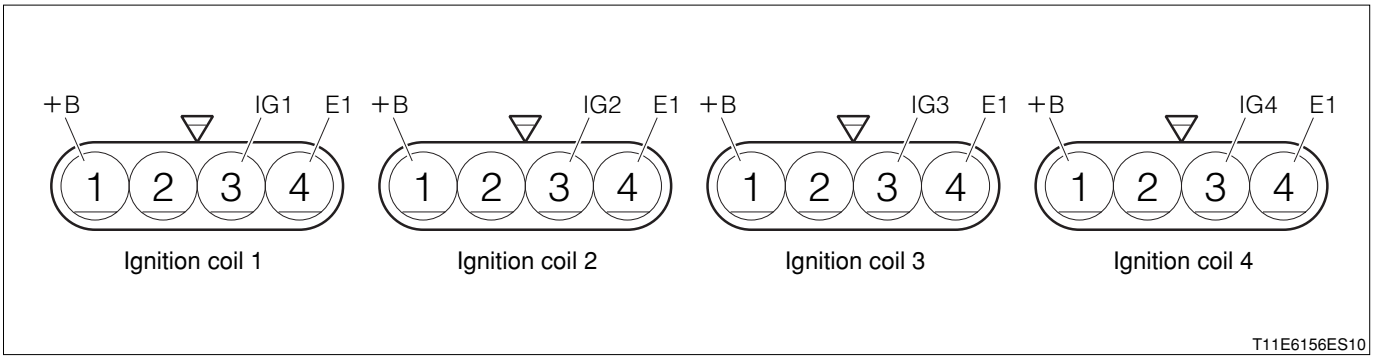
Ignition coil connection vehicle harness side connector



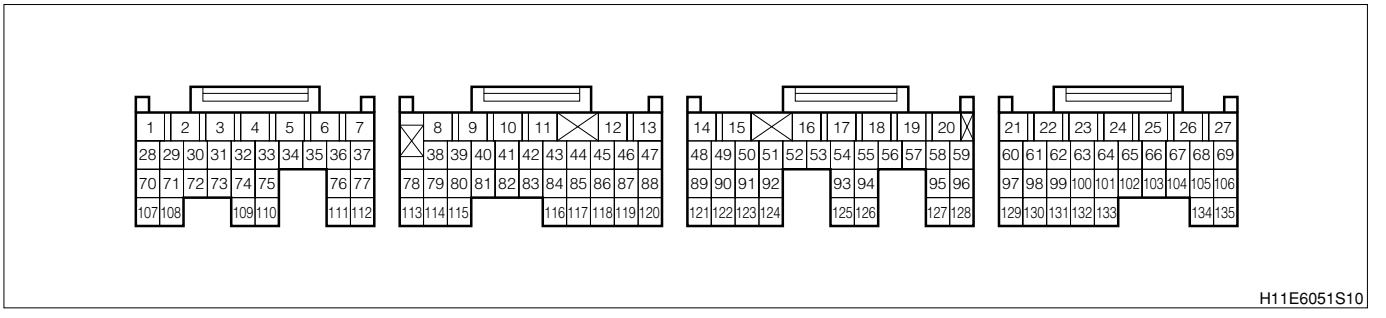
② **For general specifications**



Ignition coil connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1.A DLI (Distributorless Ignition) system has been employed.

2.The DLI system has no distributor. Furthermore, the ignition coil is located just above the spark plug. Consequently, there is no ignition energy loss due to the electricity distribution, thus making it possible to directly furnish the electric energy induced at the coil. Therefore, an optimum ignition condition can be obtained at all times.

(3) Diagnosis code output conditions

1.When the ignition signal is not outputted consistently for a certain length of time after starting:

(4) Trouble area

1.Open wire/short circuit for the ignition system circuit
2.Ignition coil
3.Battery
4.EFI ECU

(5) Checking points

1.Is the power supply voltage of the ignition coil normal?
2.Is the harness between the ignition coil and EFI ECU normal?
3.Is the sparks of the spark plug proper?

(6) Inspection procedure

Σ>1. Spark check

1.Warm up the engine.
2.Turn the IG switch to "LOCK".
3.Remove the fuel pump relay.
4.Let the engine idle and wait until it stops by itself.
5.Turn the IG switch to "LOCK".
6.Remove the connector of the injector.

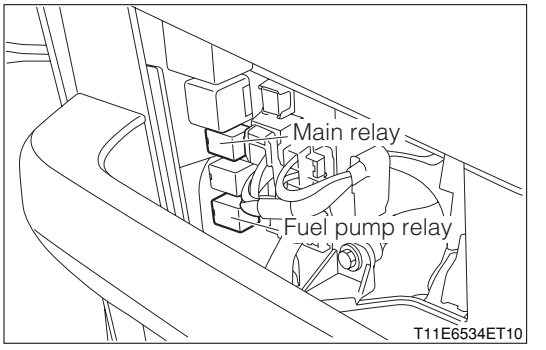
CAUTION

- Stop the fuel injection through the above operation and prevent damaging the catalyst by the unburned gas.

7.Remove the spark plug and earth it by attaching it to the ignition coil.
8.When cranking, check if the sparks are flying in the spark plugs.

SPECIFIED VALUE: The sparks are generated.

▼If it is OK, the ignition system is normal.
▼If it is NG, proceed to Σ>2.



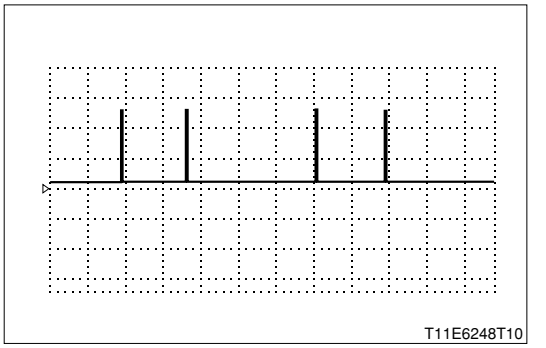
Σ>2. EFI ECU signal check

1.Connect the SST.
SST: 09842-97209-000

2.With the engine started, check the output waveform of the ignition signal between each of the following terminals using an oscilloscope.
(1) Between SST 63 (IG1) - SST 125 (E1)
(2) Between SST 62 (IG2) - SST 125 (E1)
(3) Between SST 61 (IG3) - SST 125 (E1)

(4) Between SST 60 (IG4) - SST 125 (E1)

Time axis	100ms / DIV
Voltage axis	2V / DIV
Measuring condition	When air conditioner is "OFF" with no electric load and while idling



Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".

NOTE

- Ensure that a waveform as in the right figure (One such example) shows up.

3.Confirm the following points.

(1) The pulse of 0 ⇄ 5V battery voltage is generated.

(2) The wave period becomes shorter as the engine revolution speed rises.

NOTE

- Correct judgment cannot be made concerning the ignition signal without using the oscilloscope.

▼If it is OK, proceed to Σ>3.

▼If it is NG, check the EFI ECU circuit.

Refer to Page A1-24.

Σ>3. Ignition coil voltage check

1.Measure the voltage between the following terminals when the IG switch is "ON".

(1) Between each ignition coil connection vehicle harness side connector 1 (+B) - body earth

SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to Σ>4.

▼If it is NG, repair or replace the harness between the following terminals.

(1) Between each ignition coil - battery

Σ>4. Wire harness continuity check (1)

1.Perform continuity checks between each of the following terminals.

(1) Between ignition coil 1 connection vehicle harness side connector 3 (IG1) - ECU connection vehicle harness side connector 63 (IG1)

(2) Between ignition coil 2 connection vehicle harness side connector 3 (IG2) - ECU connection vehicle harness side connector 62 (IG2)

(3) Between ignition coil 3 connection vehicle harness side connector 3 (IG3) - ECU connection vehicle harness side connector 61 (IG3)

(4) Between ignition coil 4 connection vehicle harness side connector 3 (IG4) - ECU connection vehicle harness side connector 60 (IG3)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ>5.

▼If it is NG, repair or replace the harness of the defective sections.

∑>5. Check of wire harness continuity (2)

1.Perform continuity checks for each of the following terminals

(1) Between each ignition coil connection vehicle harness side connector 4 (E1) - ECU connection vehicle harness side connector 125 (E1)

SPECIFIED VALUE: Continuity exists.

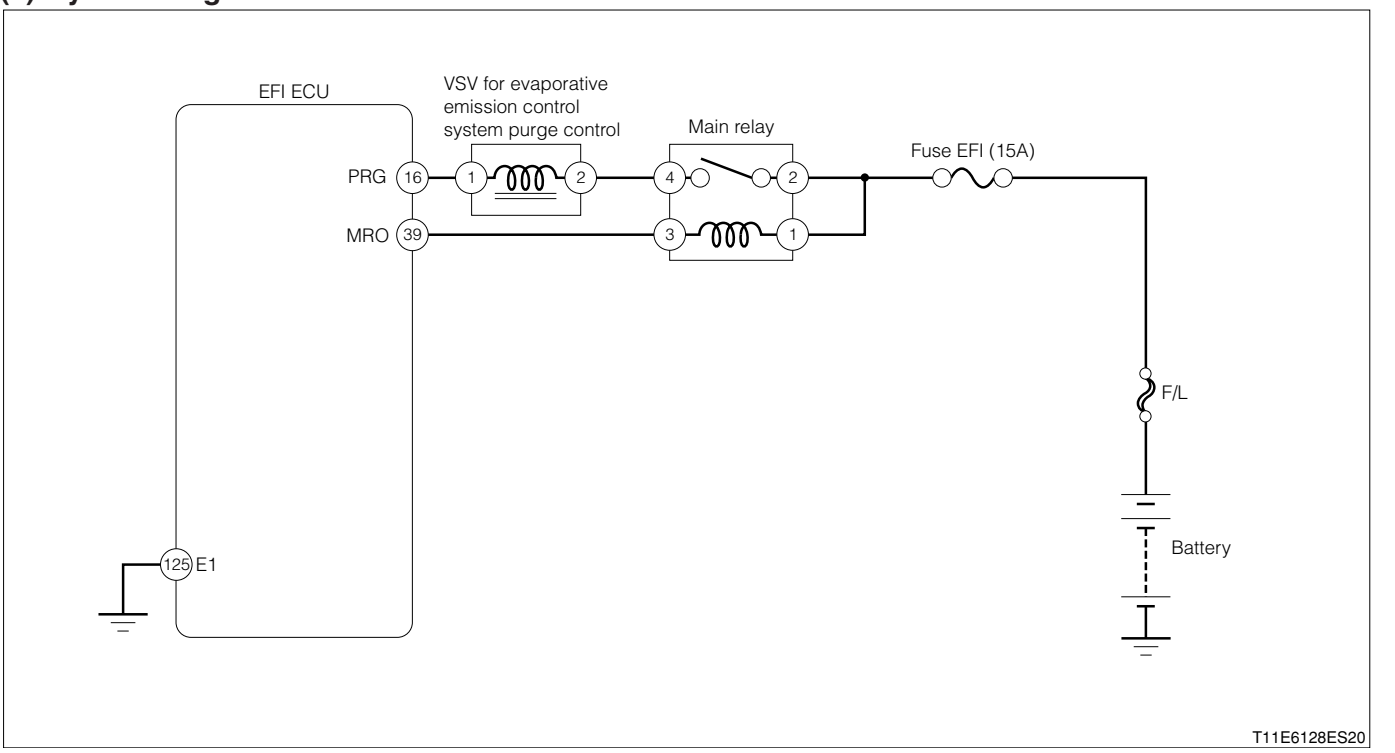
▼If it is OK, replace the ignition coil.

Refer to Page B10-6.

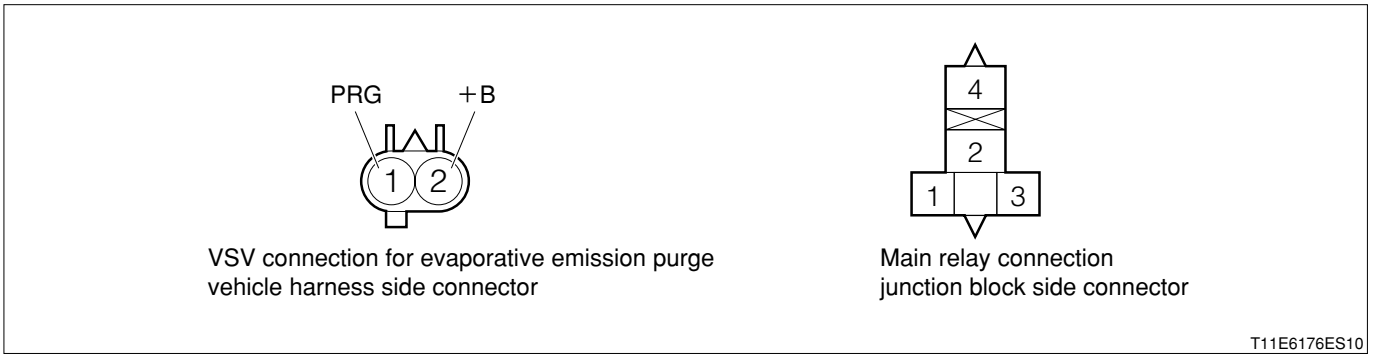
▼If it is NG, repair or replace the harness of the defective sections.

9-12-14 DTC NO.P0443/76 VSV FOR EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL

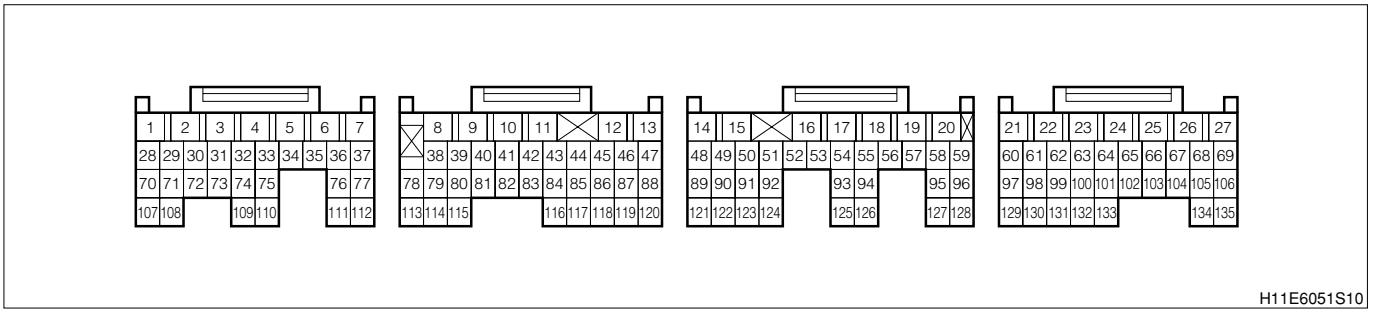
(1) System diagram



Each unit, etc. connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1.When the execution conditions for the evaporative emission purging are met, the EFI ECU performs the duty control for the VSV for evaporative emission purging and purges the evaporative emissions into the combustion chamber.

(3) Diagnosis code output conditions

1.When the detection signal of the VSV for evaporative emission purge is not turned "ON" or "OFF"

(4) Trouble area

1.VSV for evaporative emission control system purge control (Purge VSV for EVAP)
2.Open wire or short circuit for the evaporative emission purge VSV control system circuit
3.EFI ECU

(5) Checking points

1.Is the harness between the VSV for evaporative emission purge and the EFI ECU normal?
2.Is the control signal of the VSV for evaporative emission purge outputted from the EFI ECU normally?
3.Is the VSV for evaporative emission purge operating normally?

(6) Inspection procedure

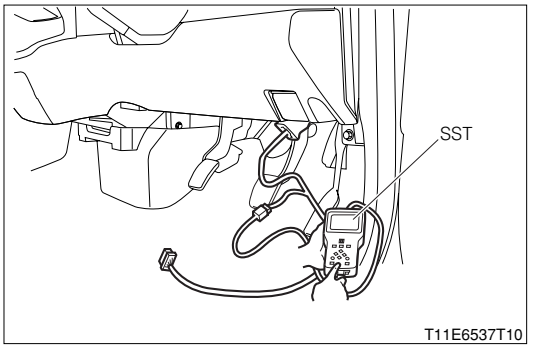
NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

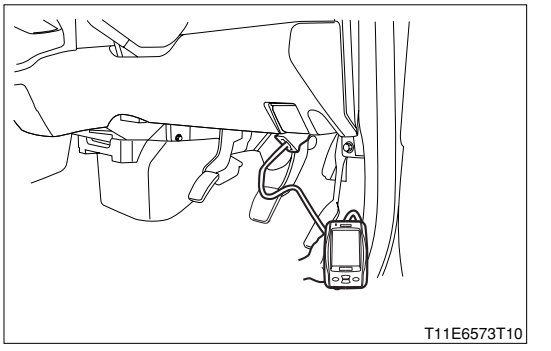
① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

Σ>1. Operation check of Purge VSV for EVAP.

1.IG switch turned "LOCK".
2.Connect the diagnosis tester to DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000



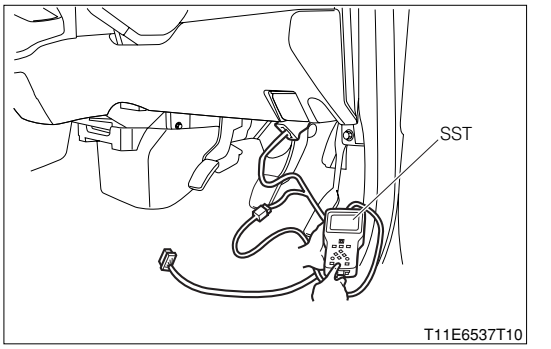
(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.Disconnect the hose going to the purge VSV for EVAP from the charcoal canister.
4.Turn "ON" the IG switch, and turn "ON" the main switch of the tester.
5.Erase the DTC.
6.Confirmation of operation of the purge VSV for EVAP.
(1) DS-21: Select the "Purge VSV" of the "Actuator driving".
(2) DS-Ⅱ: Select the "Purge VSV" of the "Active test".

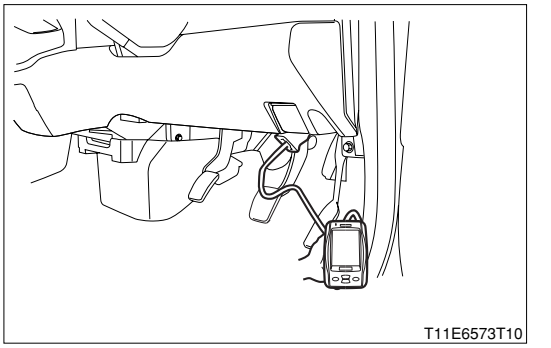
7.When executing "ON" and "OFF" check the operation of the VSV for purging.
SPECIFIED VALUE:

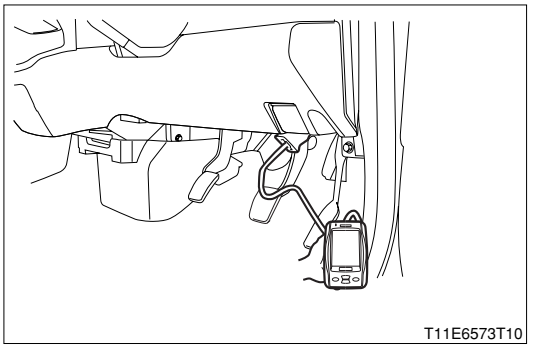
VSV "OFF"	No air continuity should exist when air is blown into the hose.
VSV "ON"	Air continuity should exist when air is blown into the hose.

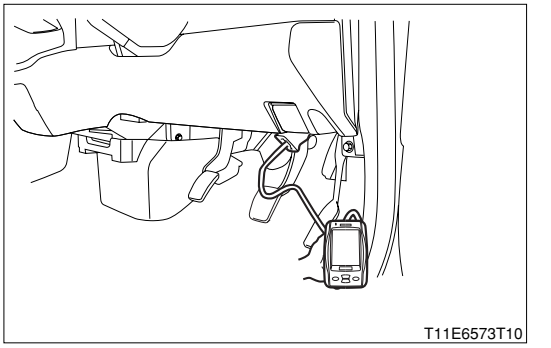


8.Are the check results OK?
▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

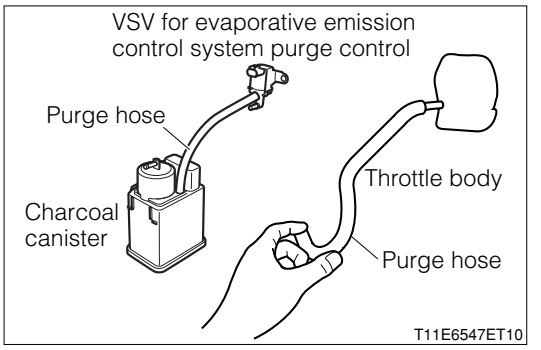
▼If it is OK, go to ▷2.

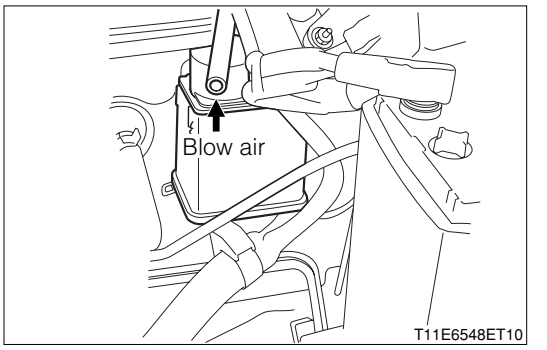






▷2. Check of purge hose and passage.
1.Execute the "VSV "Release" so as to return the purge VSV for EVAP to the original operating state.
2.Start the engine and keep the engine racing.
3.Disconnect the hose going from the purge VSV for EVAP to the intake manifold.
4.Apply your finger to the disconnected hose. Ensure that a negative pressure is applied.
SPECIFIED VALUE: Negative pressure should be applied.
5.Check the hose for connecting state, leakage, restriction, bending and deterioration.
6.Are the check results OK?
▼If it is OK, go to ▷3.
▼If it is NG, clean, repair or replace.





Σ3. Check of power supply voltage of Purge VSV for EVAP.

1.Turn "OFF" the main switch of the tester. Turn "OFF" the IG switch.
2.Disconnect the purge VSV for EVAP connector.
3.With the IG switch turned "ON", measure the voltage between the following terminals given below.
(1) Between the VSV for evaporative emission purge connection vehicle harness side connector 2 (+B) and the body earth

SPECIFIED VALUE: Battery voltage

4.Are the check results OK?
▼If it is OK, go to Σ4.
▼If it is NG, check the harness and connector between the VSV for purging and the battery, and the main relay for open wire or short. Repair or replace, as required.

Σ>4. Wiring harness check

1.IG switch turned "LOCK".
2.Check the harness and connector between the following terminals for open wire and short.
(1) Is the control signal of the VSV for evaporative emission purge outputted from the EFI ECU normally?
SPECIFIED VALUE: Continuity exists.

(2) Between the VSV for evaporative emission purge connection vehicle harness side connector 2 (PRG) and the body earth
SPECIFIED VALUE: No continuity exists

3.Are the check results for open wire and short OK?
▼If it is OK, go to Σ>5.
▼If it is NG, repair or replace the harness or connector.

Σ>5. Unit check of purge VSV for EVAP.

1.Perform the unit check of the VSV for evaporative emission purge.
Refer to Page B8-473.

2.Are the unit check results OK?
▼If it is OK, go to Σ>6.
▼If it is NG, replace the purge VSV for EVAP.

Σ>6. Check of ECU output signal.

1.Connect the connector to VSV for purging.
2.Connect the hoses that have been disconnected to the original places.
3.Set the SST (Sub-harness).
SST: 09842-97209-000

4.Measure the voltage between the following terminals while the engine is cold and idling.
5.Between SST 16 (PRG) and SST 125 (E1)
SPECIFIED VALUE: Battery voltage

6.After warming up the engine (After the radiator fan has operated at least one time), measure the voltage, for more than two minutes with the accelerator pedal depressed.
7.Between SST 16 (PRG) and SST 125 (E1)
SPECIFIED VALUE: The voltage should become 0 to 1 V within the two minutes.

8.Are the check results OK?
▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, check or replace the ECU.

② **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

Σ1. Evaporative emission purge hose check

1.Check if there are any evaporative emission purge hoses pulled out or damaged
SPECIFIED VALUE: There are none pulled out nor damaged.

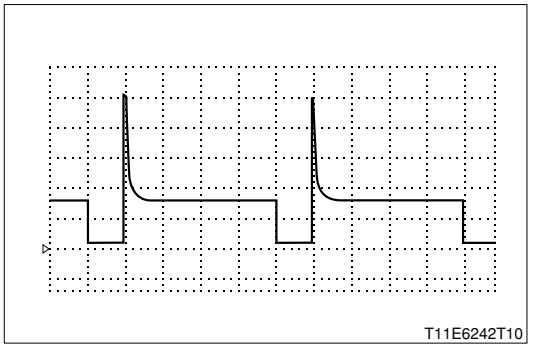
▼If it is OK, proceed to Σ2.
▼If it is NG, repair or replace the hose.

Σ2. EFI ECU signal check

1.Connect the SST.
SST: 09842-97209-000

2.Perform voltage measurements between the following terminals when idling (During cold period).
(1) Between SST 16 (PRG) - SST 125 (E1)
SPECIFIED VALUE: Battery voltage

3.Perform output check between the following terminals for more than two minutes using an oscilloscope with the accelerator depressed (Idle switch "OFF") after warming-up the engine (After the radiator fan has rotated at least once).
(1) Between SST 16 (PRG) - SST 125 (E1)
SPECIFIED VALUE:



Time axis	20ms / DIV
Voltage axis	10V / DIV
Measuring condition	When air conditioner is "OFF" with no electric load and keeping 2000 rpm

Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".

NOTE
- The waveform cannot be specified, but ensure that a waveform as in the right figure (One such example) shows up.

4.Confirm the following points.
(1) The pulse of 0V ⇄ battery voltage is generated.

NOTE
- The VSV for evaporative emission control system purge control does not operate unless during air-fuel ratio feedback.

▼If it is OK, proceed to Σ3.
▼If it is NG, check the EFI ECU circuit.
Refer to Page A1-24.

Σ3. Voltage check of VSV for evaporative emission control system purge control

1.Remove the connector of the VSV for evaporative emission control system purge control.
2.Perform voltage measurement between the following terminals when the IG switch is "ON".
(1) Between VSV for evaporative emission control system purge control vehicle harness side connector 2 (+B) - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to Σ4.
▼If it is NG, perform checking or repairing of the harness and relay between the following terminals.
(1) Between battery - VSV for evaporative emission control system purge control

Σ>4. Check of wire harness continuity

1.Perform continuity check between each of the following terminals.

(1) Between ECU connection vehicle harness side connector 15 (PRG) - VSV for evaporative emission control system purge control side connector 1 (PRG)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ>5.

▼If it is NG, repair the harness and the connectors.

Σ>5. VSV for evaporative emission control system purge control unit check

1.Perform unit check of the VSV for evaporative emission control system purge control.

Refer to Page B8-473.

▼If it is OK, proceed to Σ>6.

▼If it is NG, replace the VSV for evaporative emission control system purge control.

Σ>6. Connection condition check of each connector

1.Check the connecting conditions of each connector.

SPECIFIED VALUE: There are none that is half fit or pulled out.

▼If it is OK, check the EFI ECU circuit.

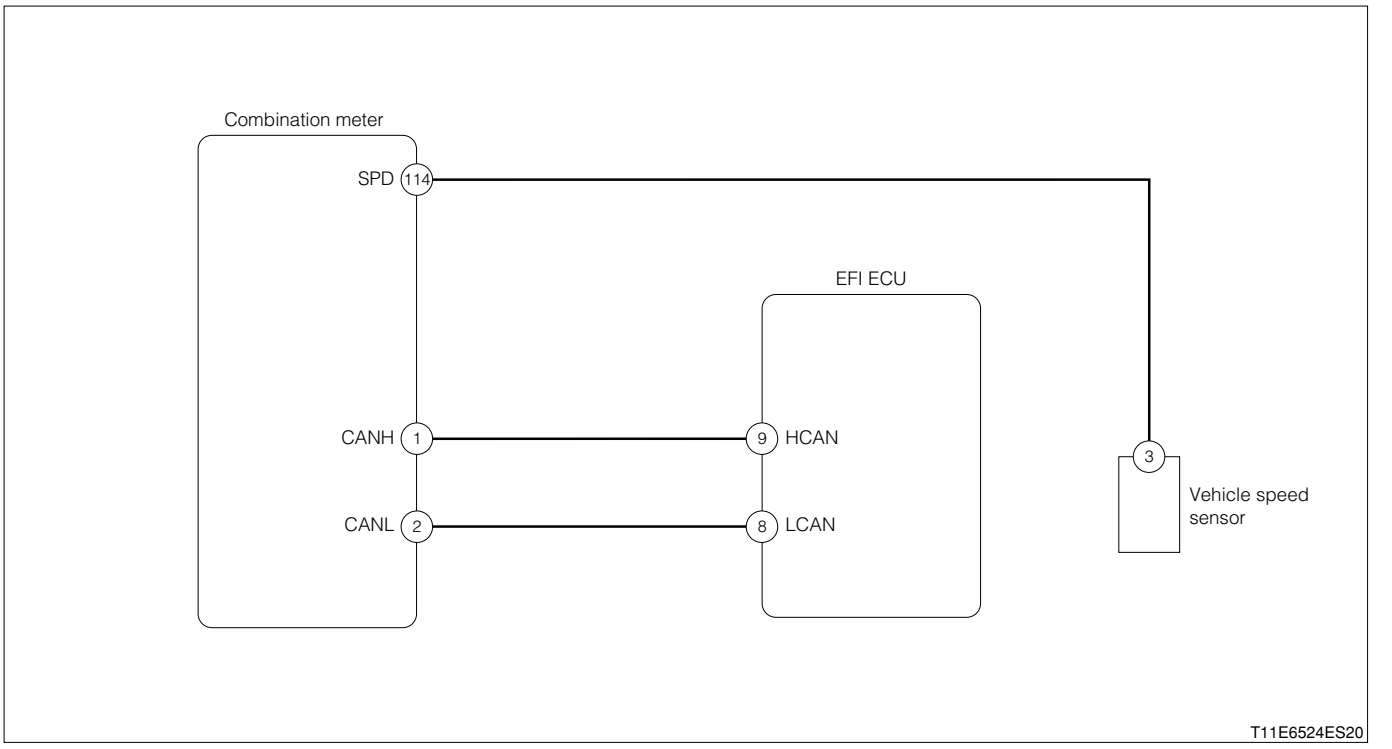
Refer to Page A1-24.

▼If it is NG, repair the connector of the defective section.

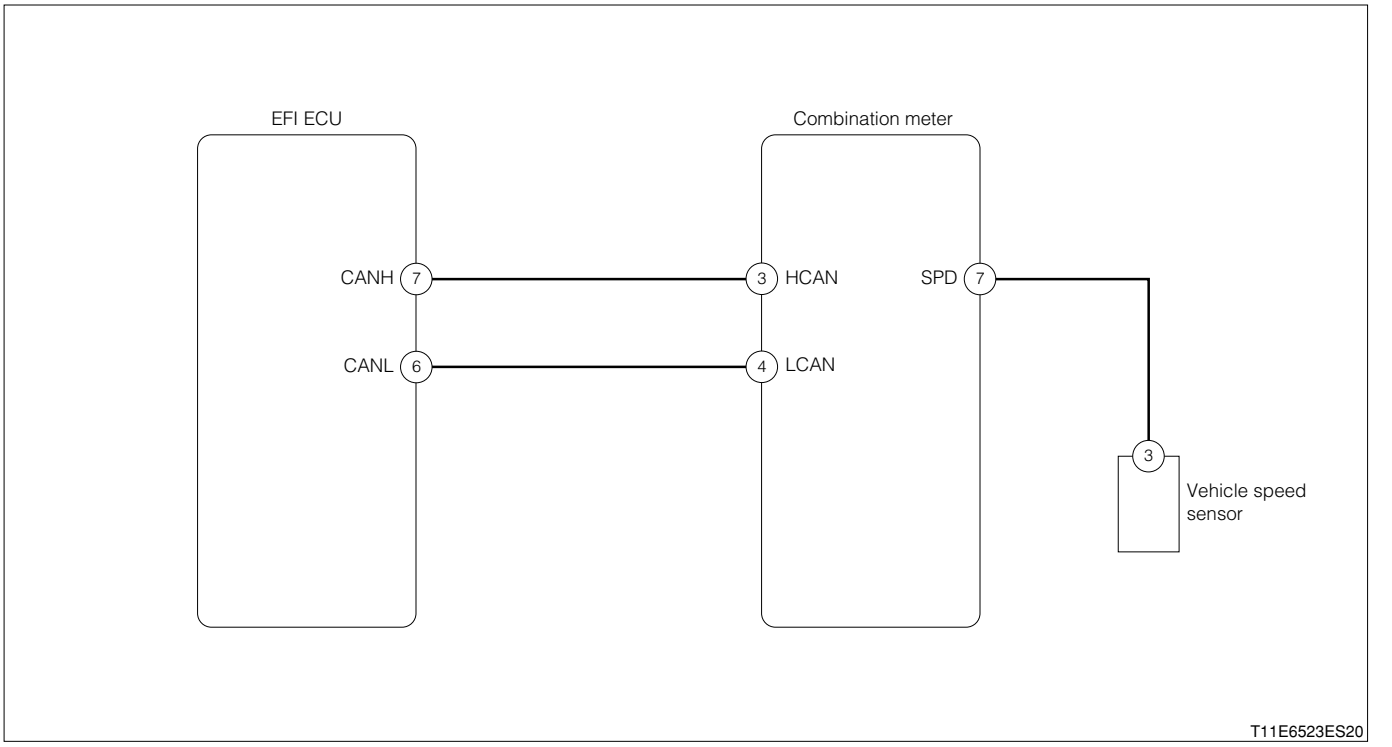
9-12-15 DTC NO.P0500/52 VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION

(1) System diagram

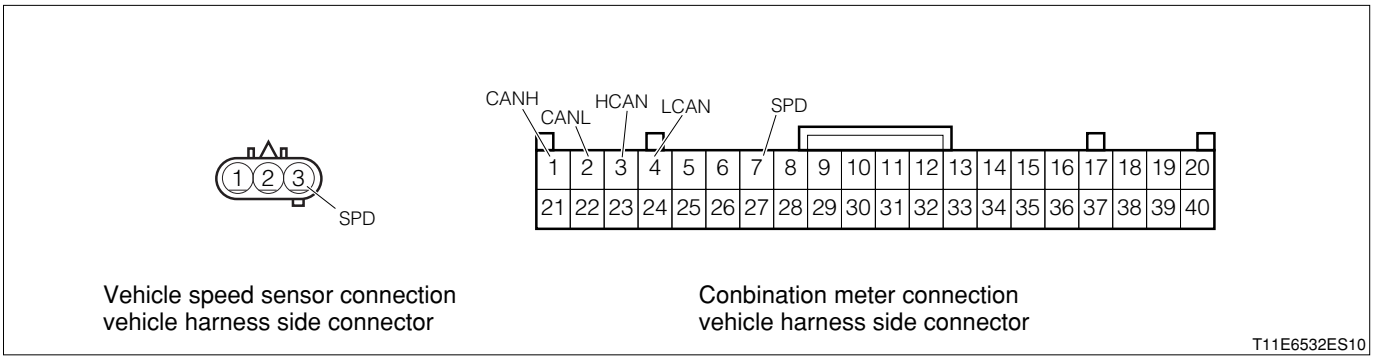
RHD vehicles



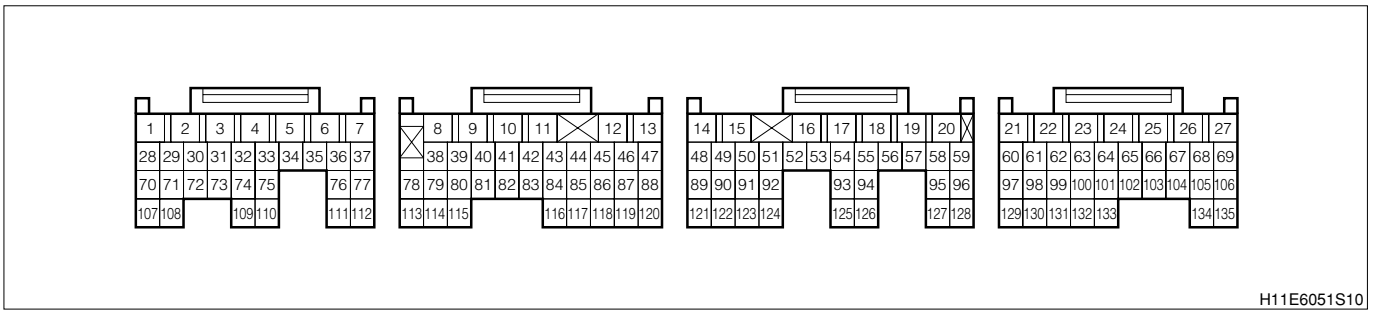
LHD vehicles



Each unit, relays connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Diagnosis code output conditions

1.When no vehicle speed signal is inputted from the combination meter

(3) Checking points

1.Is the vehicle speed signal inputted to the combination meter?
2.Is the combination meter normal?
3.Is the CAN line normal?
4.Is the harness between the vehicle speed sensor and the combination meter normal?
5.Is the vehicle speed sensor normal?

① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

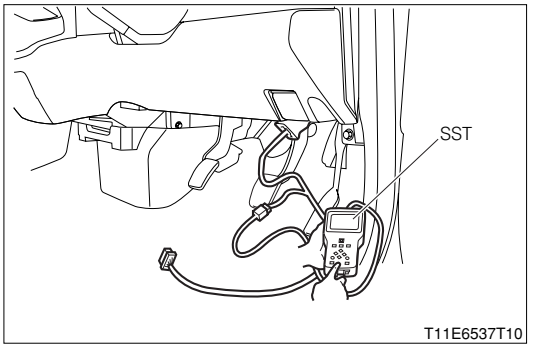
Σ>1. CAN communication basic check

1.Perform basic check of the CAN communication.
Refer to Page L2-14.

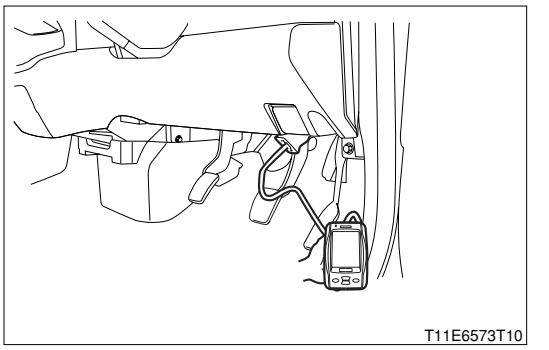
▼If it is OK, proceed to Σ>2.
▼If NG, repair the faulty section and go to Σ>2.

Σ>2. Vehicle speed signal check

1.The IG switch turned "LOCK".
2.Connect the diagnosis tester to DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.


T11E6573T10

3.After turning "ON" the IG switch, Turn "ON" the main switch of the tester.
4.Read the "Vehicle speed" of the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool.
5.Check to see if the normal vehicle speed is indicated on the tool.
SPECIFIED VALUE: The normal vehicle speed is indicated.

▼If it is OK, proceed to Σ>3.
▼If it is NG and the vehicle is a RHD vehicle, go to Σ>4.
▼If it is NG and the vehicle is a LHD vehicle, go to Σ>6.

Σ>3. Combination meter operation check
1.Check to see if the speedometer of the combination meter functions properly.
SPECIFIED VALUE: The normal vehicle speed is indicated.

▼If it is OK, perform the operations in the following order.
(1) Erase the diagnosis code and check the state for a while.
(2) If the diagnosis code is once again outputted, replace the EFI ECU.
▼If it is NG, proceed to Σ>8.

Σ>4. CAN line open wire check (RHD vehicles)
1.Turn the IG switch to "LOCK".
2.Remove all connectors of the EFI ECU.
3.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 8 (LCAN) - EFI ECU connection vehicle harness side connector 9 (HCAN)
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>5.
▼If it is NG, repair the defective point.

Σ>5. CAN line short circuit check check (RHD vehicles)
1.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 8 (LCAN) - battery positive terminal
(2) Between ABS actuator connection vehicle harness side connector 19 (LCAN) - battery positive terminal
(3) Between EFI ECU connection vehicle harness side connector 8 (LCAN) - body earth
(4) Between EFI ECU connection vehicle harness side connector 9 (HCAN) - body earth
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>8.
▼If it is NG, repair the defective point.

Σ>6. CAN line open wire check (LHD vehicles)

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the EFI ECU.
3.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)

SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>7.
▼If it is NG, repair the defective point.

Σ>7. CAN line short circuit check check (LHD vehicles)

1.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - battery positive terminal
(2) Between ABS actuator connection vehicle harness side connector 7 (CANH) - battery positive terminal
(3) Between EFI ECU connection vehicle harness side connector 6 (CANL) - body earth
(4) Between EFI ECU connection vehicle harness side connector 7 (CANH) - body earth

SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>8.
▼If it is NG, repair the defective point.

Σ>8. Combination meter input signal check

1.Check the vehicle speed input signal to the combination meter.
Refer to Page J3-1.

▼If it is OK, replace the combination meter and go to Σ>0.
▼If it is NG, proceed to Σ>9.

Σ>9. Check of wire harness continuity

1.Perform the continuity check between the following terminals.
(1) Combination meter vehicle harness side connector 7 (SPD) - Vehicle speed sensor vehicle harness side connector 3 (SPD)

▼If it is OK, replace the vehicle speed sensor.
▼If it is NG, repair the defective point.

② **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

Σ>1. CAN communication basic check

1.Perform basic check of the CAN communication.
Refer to Page L2-14.

▼If it is OK, proceed to Σ>2.
▼If NG, repair the faulty section and go to Σ>2.

Σ>2. Combination meter operation check

1.Check to see if the speedometer of the combination meter functions properly.
SPECIFIED VALUE: The normal vehicle speed is indicated.

▼If it is OK and the vehicle is a RHD vehicle, go to Σ>3.
▼If it is OK and the vehicle is a LHD vehicle, go to Σ>5.
▼If it is NG, proceed to Σ>7.

Σ>3. CAN line open wire check (RHD vehicles)

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the EFI ECU.
3.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 8 (LCAN) - EFI ECU connection vehicle harness side connector 9 (HCAN)
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>4.
▼If it is NG, repair the defective point.

Σ>4. CAN line short circuit check check (RHD vehicles)

1.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 8 (LCAN) - battery positive terminal
(2) Between ABS actuator connection vehicle harness side connector 19 (LCAN) - battery positive terminal
(3) Between EFI ECU connection vehicle harness side connector 8 (LCAN) - body earth
(4) Between EFI ECU connection vehicle harness side connector 9 (HCAN) - body earth
SPECIFIED VALUE: No continuity exists.

▼If it is OK, perform the operations in the following order.
(1) Erase the diagnosis code and check the state for a while.
(2) If the diagnosis code is once again outputted, replace the EFI ECU.
▼If it is NG, repair the defective point.

Σ>5. CAN line open wire check (LHD vehicles)

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the EFI ECU.
3.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)

SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>6.
▼If it is NG, repair the defective point.

Σ>6. CAN line short circuit check check (LHD vehicles)

1.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - battery positive terminal
(2) Between EFI ECU connection vehicle harness side connector 7 (CANH) - battery positive terminal
(3) Between EFI ECU connection vehicle harness side connector 6 (CANL) - body earth
(4) Between EFI ECU connection vehicle harness side connector 7 (CANH) - body earth

SPECIFIED VALUE: No continuity exists.

▼If it is OK, perform the operations in the following order.
(1) Erase the diagnosis code and check the state for a while.
(2) If the diagnosis code is once again outputted, replace the EFI ECU.
▼If it is NG, repair the defective point.

Σ>7. Combination meter input signal check

1.Check the vehicle speed input signal to the combination meter.
Refer to Page J3-1.

▼If it is OK, replace the combination meter and go to Σ>2.
▼If it is NG, proceed to Σ>8.

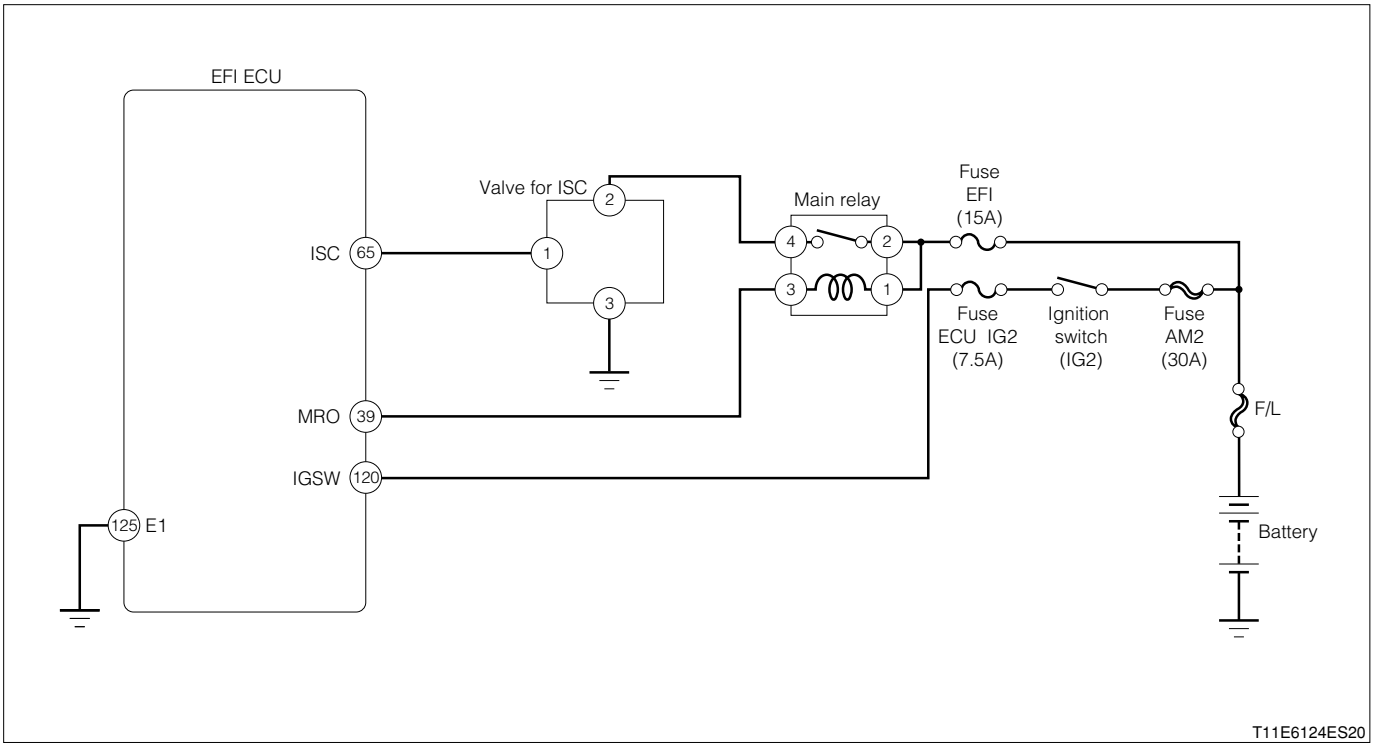
Σ>8. Check of wire harness continuity

1.Perform the continuity check between the following terminals.
(1) Combination meter vehicle harness side connector 7 (SPD) - Vehicle speed sensor vehicle harness side connector 3 (SPD)

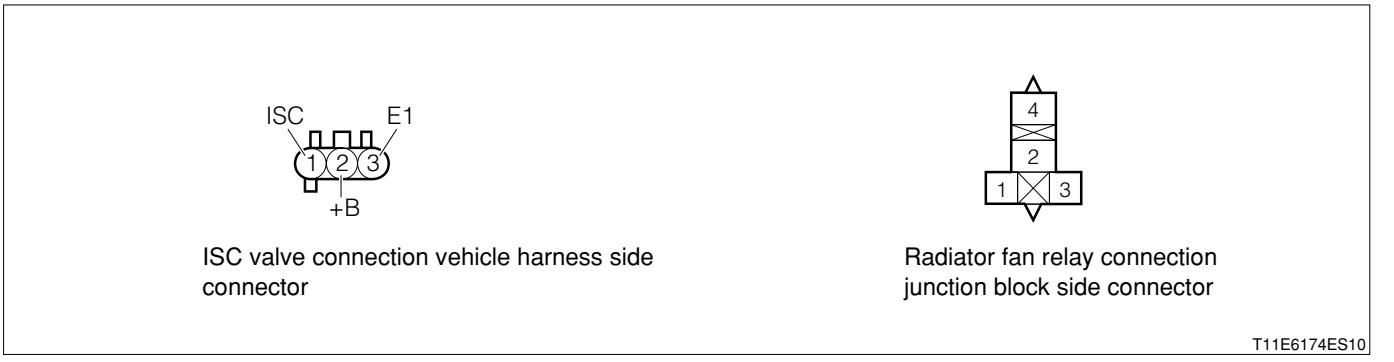
▼If it is OK, replace the vehicle speed sensor.
▼If it is NG, repair the defective point.

9-12-16 DTC NO.P0505/71 IDLE CONTROL SYSTEM MALFUNCTION

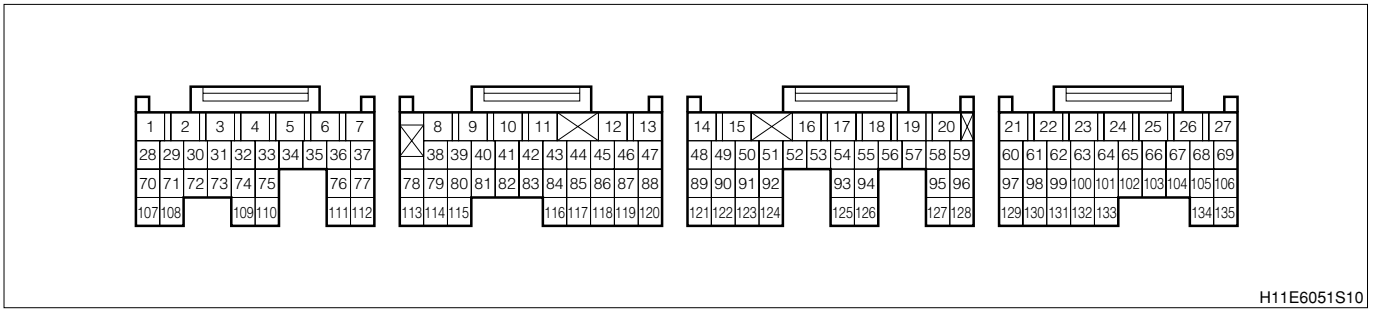
(1) System diagram



Each unit, etc. connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1.The rotary solenoid type valve for ISC is located in front of the intake manifold and the intake air bypassing the throttle valve is directed to the valve for ISC through a passage. In this way the intake air volume bypassing the throttle valve is regulated, controlling the engine speed. The EFI ECU operates only the valve for ISC to perform idle-up and provide feedback for the target idling speed.

(3) Diagnosis code output conditions

1.When the valve detection signal for ISC is not turned "ON" or "OFF"

(4) Trouble area

1.Open wire or short circuit for ISC system circuit
2.Valve for ISC
3.EFI ECU

(5) Checking points

1.Is the harness between the valve for ISC and the EFI ECU normal?
2.Is the valve for ISC operating normally?

(6) Inspection procedure

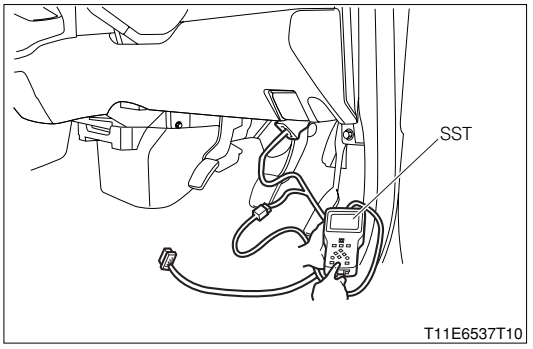
① **When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

NOTE

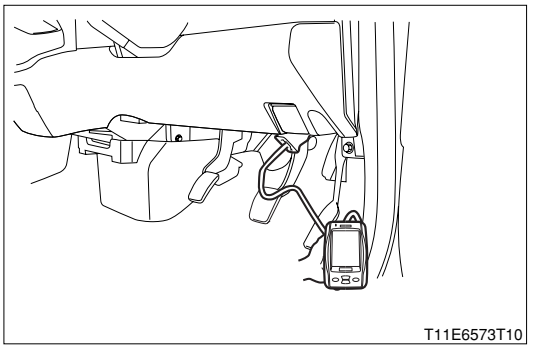
- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

Σ>1. Operation check of valve for ISC.

1.IG switch turned "LOCK".
2.Connect the diagnosis tester to DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.Warm up the engine fully.
4.Turn "ON" the main switch of the diagnosis tester (DS-21/DS-Ⅱ).
5.Drive the actuator during idling.
(1) DS-21: Select the "ISC" of the "Actuator driving".
Execute the "ISC 5% open" and "ISC 50% open" respectively.
(2) DS-Ⅱ: Select the "ISC" of the "Active test".
Execute the "5% " and "50%" respectively.
6.Ensure that the engine revolution speed rises when the "50%" is selected. Also ensure that the engine revolution speed drops when the "5%" is selected.
SPECIFIED VALUE: The engine revolution speed will change.

▼If it is OK, check the EFI ECU circuit.
▼If it is NG, go to Σ>2.

Σ>2. Check of power supply voltage of valve for ISC.

1.Turn" OFF" the main switch of the tester. Turn "LOCK" the IG switch
2.Disconnect the connector of the valve for ISC.
3.Turn "ON" the ignition switch.
4.Measure the voltage between the following terminals.
(1) Between the ISC connection vehicle harness side 2 (+B) and the body earth
SPECIFIED VALUE: Battery voltage

5.Is the measured value the specified value?
▼If it is OK, go to Σ>3.
▼If it is NG, check the following points for open wire or short.
(1) Between the valve for ISC and the main relay
(2) Between the main relay and the battery

Σ>3. Check of input signal of valve for ISC.

1.After warming up the engine fully, turn "ON" the main switch of the diagnosis tester (DS-21/DS-Ⅱ).
(1) DS-21: select the "ISC" in the "Actuator driving"
.Execute the "5% open" and "50 % open" respectively.
(2) DS-Ⅱ: select the "ISC" in the "Active test".
Execute the "5%" and "50 %" respectively.
2.With the connector connected, measure the voltage between the following terminals.
3.Between the ISC connection vehicle harness side connector 1 (ISC) and the ISC connection vehicle harness side connector 3 (E1)
4.Does the voltage increase or decrease in accordance with the change in the ISC duty ratio (5 %, 50 %)?
SPECIFIED VALUE: The voltage varies.

▼If it is OK, replace the throttle body Ay.
Refer to Page B3-11.

▼If it is NG, go to Σ>4.

Σ>4. Check of output signal of ECU.

1.Turn "OFF" the main switch of the tester. Turn "LOCK" the IG switch.
2.Connect the SST between the EFI ECU connectors and the wire harness connectors.
SST: 09842-97209-000

3.Warm up the engine.
4.With the engine idling, select the "ISC" in the "Actuator driving".
5.Execute the "5% open" and "50 % open" respectively.
6.Measure the voltage between the following terminals.
(1) Between SST 54 (ISC) and SST 23 (E1)
7.Does the voltage increase or decrease in accordance with the change in the ISC duty ratio (5 %, 50 %)?
SPECIFIED VALUE: The voltage varies.

▼If it is OK, go to Σ>5.
▼If it is NG, check or replace the EFI ECU.

∑>5. Wiring harness check

1.Turn "OFF" the main switch of the tester. Turn "LOCK" the IG switch.
2.Disconnect the SST connector at the EFI ECU side.
3.Perform the continuity check between the following terminals.
(1) Valve for ISC connector 1 (ISC) - SST terminal 54 (ISC)
(2) Valve for ISC connector 3 (E1) - SST terminal 23 (E1)
SPECIFIED VALUE: Continuity exists

4.Are the check results for open wire and short OK?
▼If it is OK, replace the throttle body Ay.
Refer to Page B3-11.

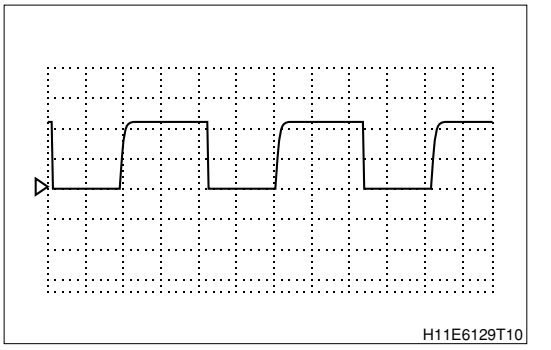
▼If it is NG, repair or replace the harness or connector.

② **Check by oscilloscope.**

1.When an oscilloscope is used, the ISC control signal becomes the waveform as indicated in the figure above.
(1) Between SST65 (ISC) - SST 125 (E1)

Time axis	1ms / DIV
Voltage axis	5V / DIV
Measuring condition	When air conditioner is "ON" with electric load and while idling

Air conditioner "ON": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "ON".

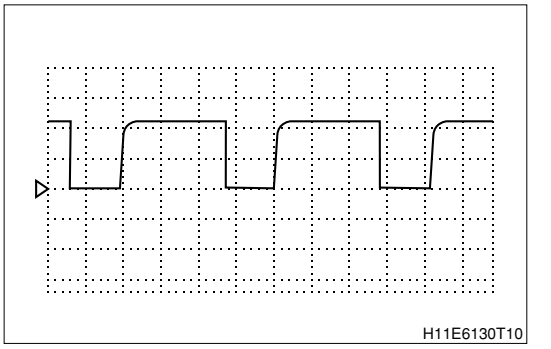


NOTE

- The waveform cannot be specified, but confirm that a waveform as in the right figure (One such example) shows up.

Time axis	1ms / DIV
Voltage axis	5V / DIV
Measuring condition	When air conditioner is "ON" with electric load and while idling

Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".



③ **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

Σ>1. Check of idle speed

1.Install an engine tachometer to the terminal "REV" of the DLC, using the SST.
SST: 09991-87402-000
09991-87404-000

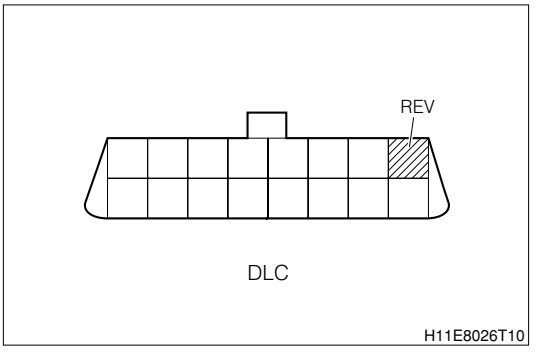
NOTE

- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

2.Is the engine revolution speed high during cold period and does it get lower as the warm-up proceeds and maintain idling speed?
SPECIFIED VALUE: 700^{+100}_{-50} rpm(A/T vehicle)
650^{+100}_{-50} rpm(M/T vehicle)

▼If it is OK, the ISC system is normal.

▼If it is NG, proceed to Σ>2.



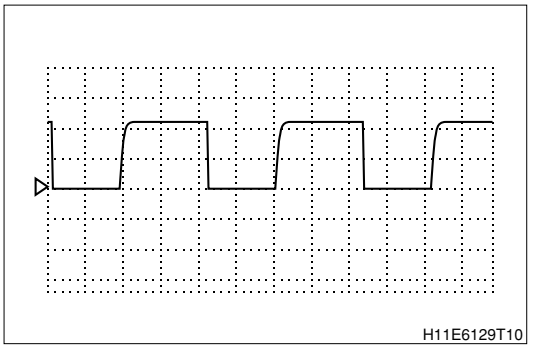
Σ>2. EFI ECU signal check

1.Connect the SST.
SST: 09842-97209-000

2.Perform output check between the following terminals using an oscilloscope.
(1) Between SST 65 (ISC) - SST 125 (E1)

Time axis	1ms / DIV
Voltage axis	5V / DIV
Measuring condition	When air conditioner is "ON" with electric load and while idling

Air conditioner "ON": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "ON".

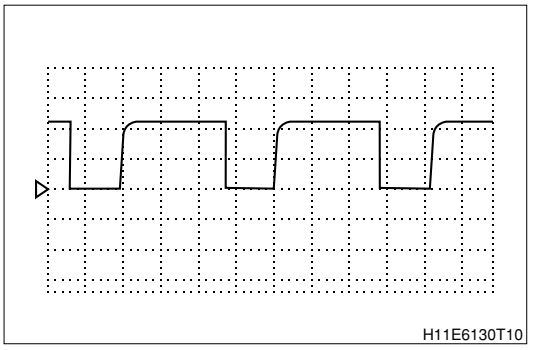

H11E6129T10

NOTE

- The waveform cannot be specified, but confirm that a waveform as in the right figure (One such example) shows up.

Time axis	1ms / DIV
Voltage axis	5V / DIV
Measuring condition	When air conditioner is "OFF" with no electric load and while idling

Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".


H11E6130T10

NOTE

- The waveform cannot be specified, but ensure that a waveform as in the right figure (One such example) shows up.

3.Confirm the following points.
(1) The pulse of 0V ⇄ battery voltage is generated.
(2) The duty ratio changes according to the electric load.
▼If it is OK, proceed to Σ>3.
▼If it is NG, check the EFI ECU circuit.
Refer to Page A1-24.

Σ>3. Check of wire harness continuity

1.Check the harness between the EFI ECU and valve for ISC.
(1) Between the ECU connection vehicle harness side connector 65 (ISC) - Valve for ISC connection vehicle harness side connector 1 (ISC)
2.Check the earth of the valve for ISC.
(1) Between valve for ISC connection vehicle harness side connector 3 (E1) - body earth
▼If it is OK, proceed to Σ>4.
▼If it is NG, perform the following operations.
(1) Repairing of the harness and the connectors

Σ>4. Check the power supply of the valve for ISC.

1.Remove the valve for ISC connector.
2.Perform voltage measurement between the following terminals when the IG switch is "ON".
(1) Between valve for ISC connection vehicle harness side connector 2 (+B) - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to Σ>5.
▼If it is NG, repair or replace the defective sections.

∑5. Valve for ISC unit check

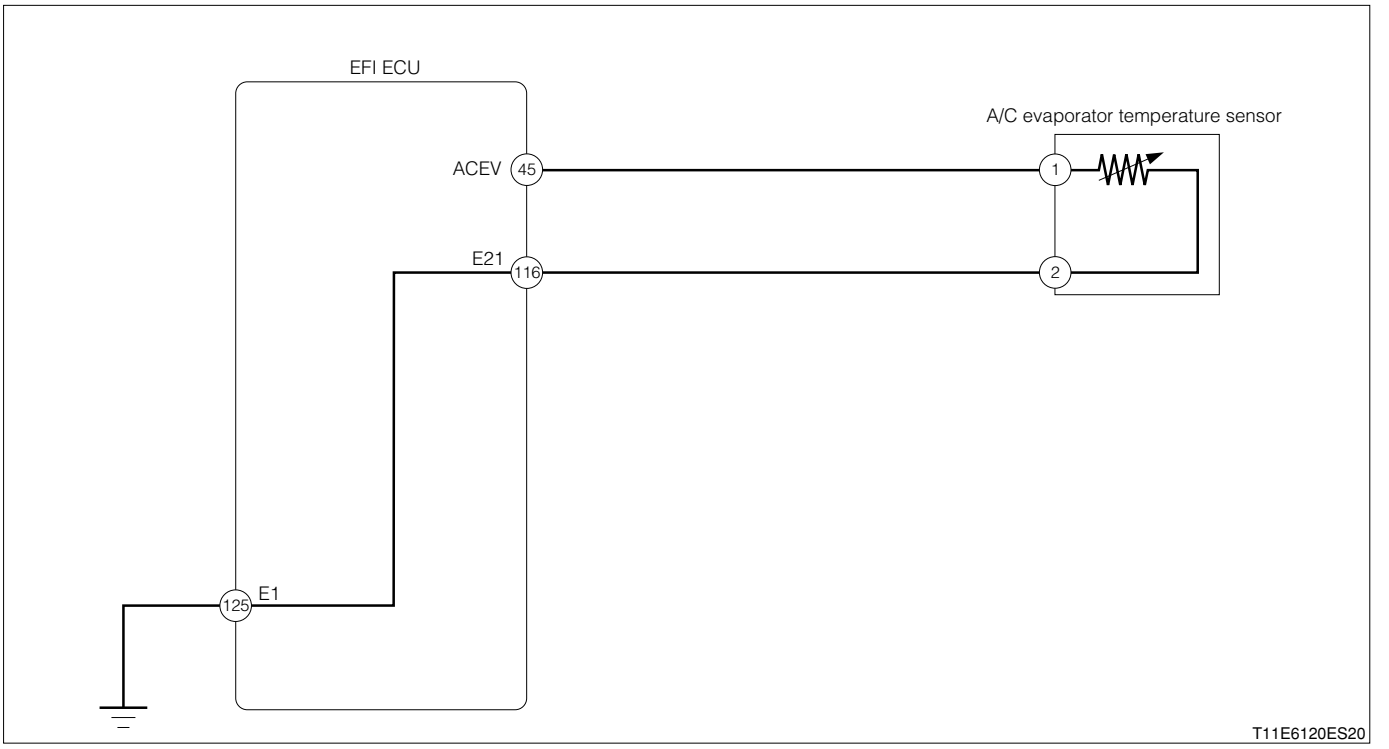
1.Perform unit check of the valve for ISC.
Refer to Page B8-471.

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

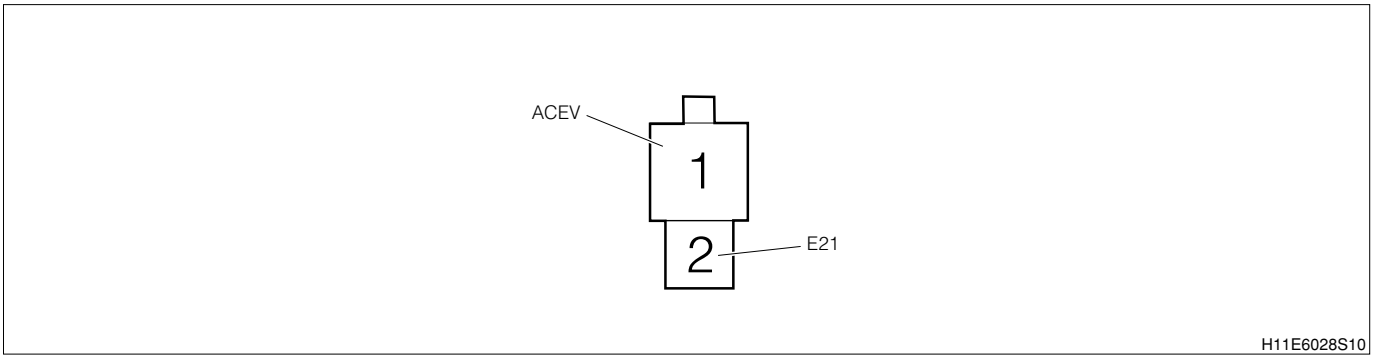
▼If it is NG, replace the throttle body Ay.
Refer to Page B3-11.

9-12-17 DTC NO.P0535/44 AIR CONDITIONER EVAPORATOR TEMPERATURE SENSOR CIRCUIT MALFUNCTION

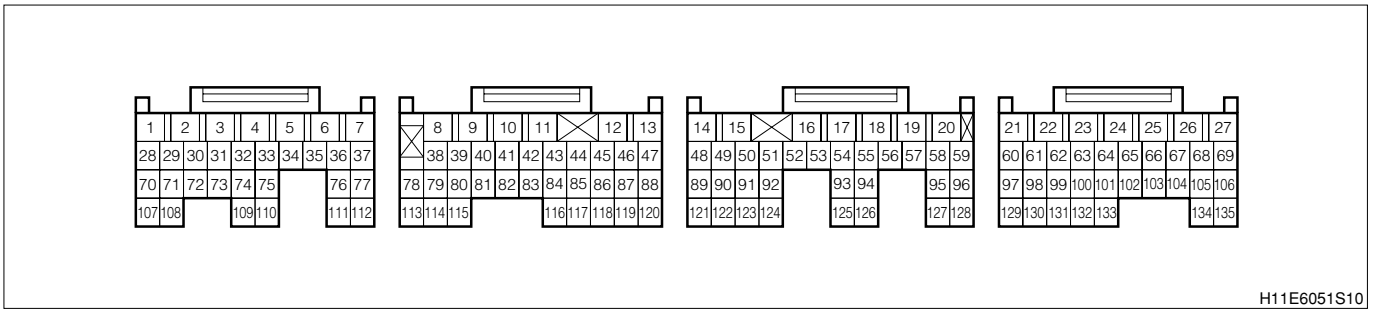
(1) System diagram



Air conditioner evaporator temperature sensor connection vehicle harness side connector

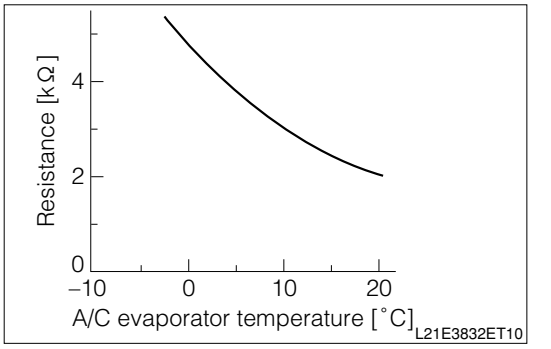


EFI ECU connection vehicle harness side connector



(2) Circuit description

1.This circuit, located at the rear of the evaporator of the air conditioner unit, detects the temperature of the air passing through the evaporator. A thermistor is incorporated in the sensor. This thermistor has characteristics that its resistance decreases as the temperature rise, while the resistance increases as the temperature drops. When the temperature becomes a constant value, the thermistor disengages the magnet clutch through the MGC relay, thus preventing frosting.



(3) Diagnosis code output conditions

1.When the signals from the air conditioner evaporator temperature sensor are not outputted continuously over a certain length of time after starting with the air conditioner switch turned "ON"

(4) Trouble area

1.Air conditioner (A/C) evaporator temperature sensor
2.Open wire or short circuit for the air conditioner evaporator temperature sensor
3.EFI ECU

(5) Checking points

1.Are the signals from the air conditioner evaporator temperature sensor inputted to the EFI ECU?
2.Is the harness between the air conditioner evaporator temperature sensor and the EFI ECU normal?
3.Is the output of the air conditioner evaporator temperature sensor normal?

(6) Inspection procedure

① **When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

Σ>1. EFI ECU signal check

1.Connect the SST.
SST: 09842-97209-000

2.Perform voltage measurements between the following terminals when the IG switch is "ON".
(1) Between SST 45 (ACEV) - SST 116 (E21)
SPECIFIED VALUE: 0.1 - 4.85V (Changes according to the temperature)

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, proceed to Σ>2.

Σ2. Check of wire harness continuity

1.Perform continuity check between each of the following terminals.

(1) Between sensor connection vehicle harness side connector 1 (ACEV) - ECU connection vehicle harness side connector 45 (ACEV)

(2) Between sensor connection vehicle harness side connector 2 (E21) - ECU connection vehicle harness side connector 116 (E21)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ3.

▼If it is NG, repair the harness and connectors.

Σ3. Air conditioner evaporator temperature sensor unit check

1.Perform unit check of air conditioner evaporator temperature sensor.

Refer to Page B8-471.

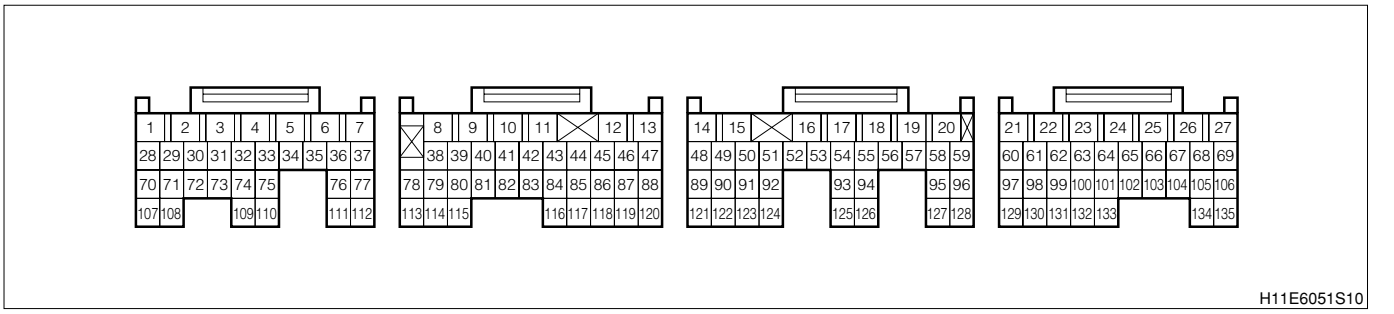
▼If it is OK, check the connecting condition of each connector.

▼If it is NG, replace the air conditioner evaporator temperature sensor.

9-12-18 DTC NO.P1105/32 BAROMETRIC PRESSURE SENSOR CIRCUIT MALFUNCTION

(1) System diagram

EFI ECU connection vehicle harness side connector



(2) Circuit description

1.An atmospheric sensor is mounted in the ECU.

(3) Diagnosis code output conditions

1.When the signals from the air atmospheric sensor are not outputted continuously over a certain length of time after starting.

(4) Trouble area

1.EFI ECU

(5) Inspection procedure

① **When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

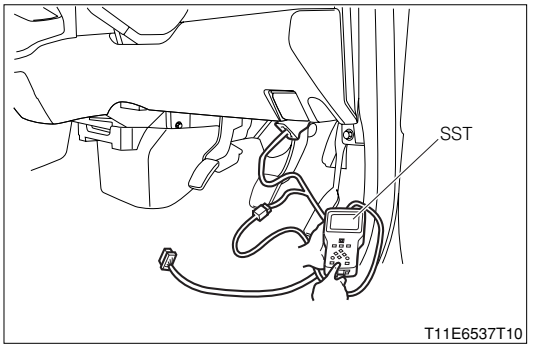
Σ>1. Erase the DTC

1.The IG switch turned "LOCK".

2.Connect the diagnosis tester to DLC.

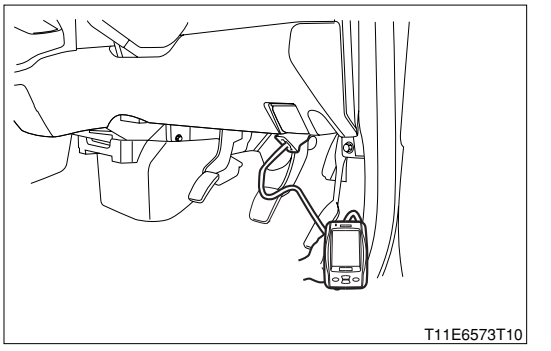
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000

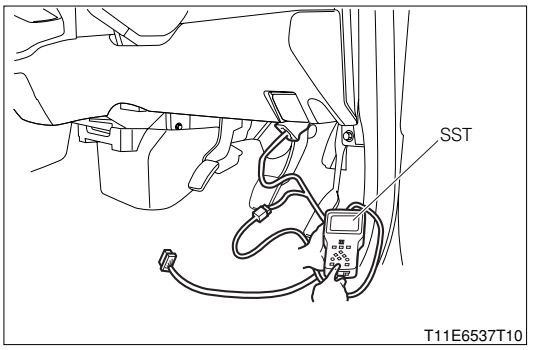


(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.

(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



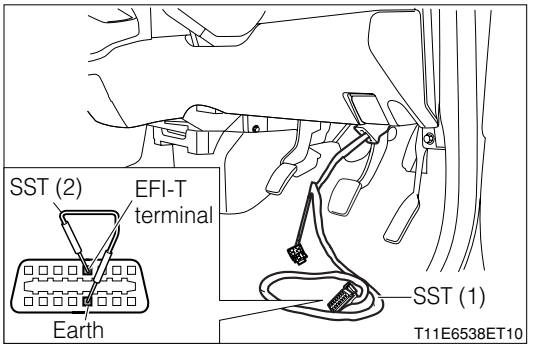
3.After turning "ON" the IG switch, Turn "ON" the main switch of the tester.
4.Cancel the diagnosis code.
5.Is No.P1105/32 indicated ?
▼If the output is made, replace the EFI ECU.
▼If no output is made, check the EFI ECU circuit.
Refer to Page A1-24.



② **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

Σ>1. Erase the DTC

1.Remove the EFI fuse. Erase the DTC.
2.Set the EFI fuse to the original position.
3.Short circuit the DLC terminals 5 (EFI-T) and 13 (E), using the SST.
SST: 09991-87404-000(1)
09991-87403-000(2)
4.Turn "ON" the IG switch.
5.Check the DTC.
6.Is No.P1105/32 indicated ?

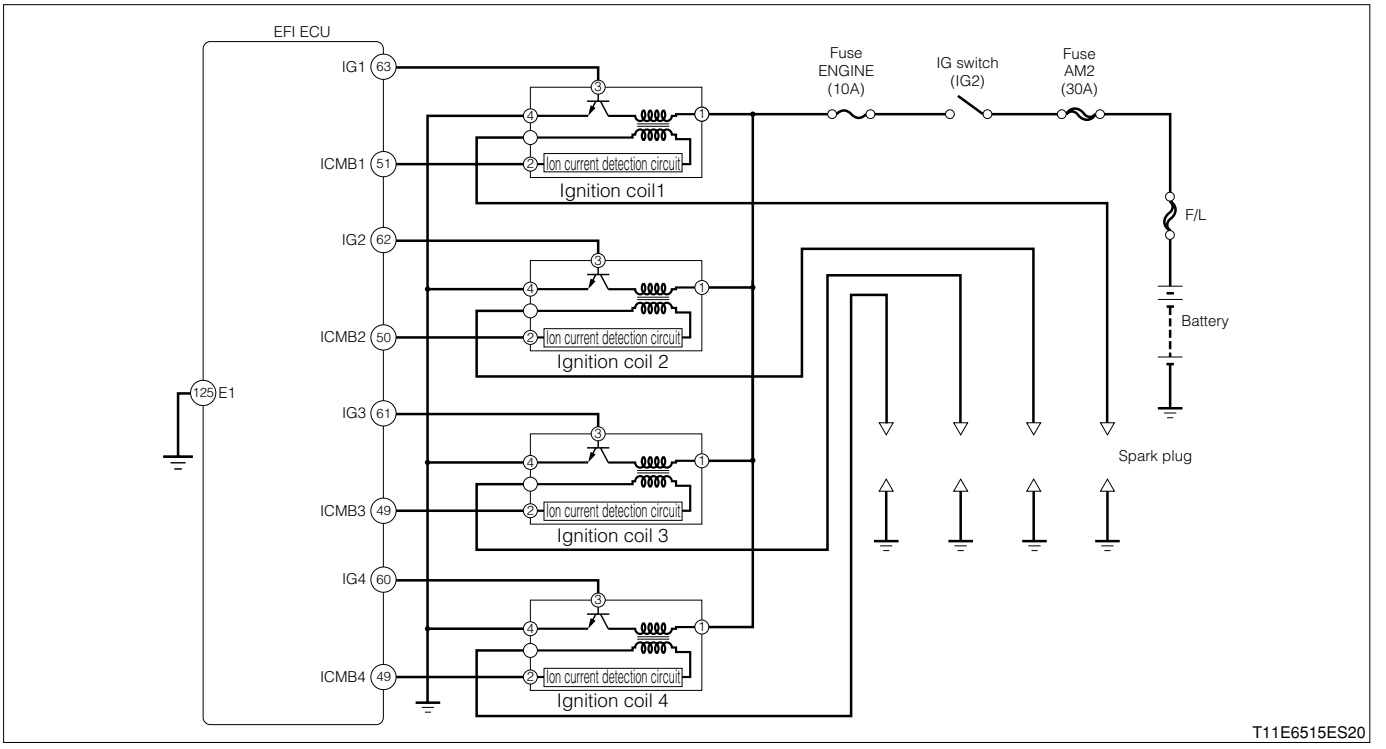


▼If the output is made, replace the EFI ECU.
Refer to Page B8-1.

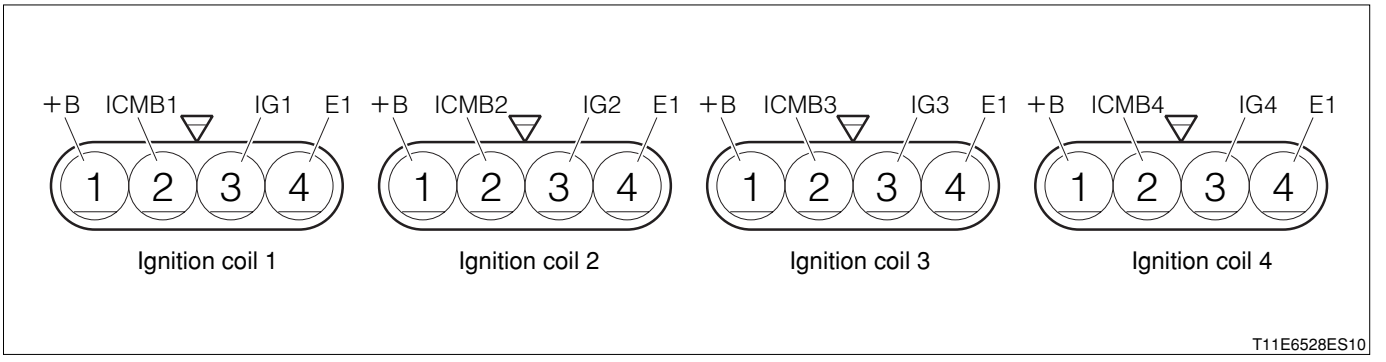
▼If no output is made, check the EFI ECU circuit.
Refer to Page A1-24.

9-12-19 DTC NO.P1300/36 ION CURRENT COMBUSTION CONTROL SYSTEM

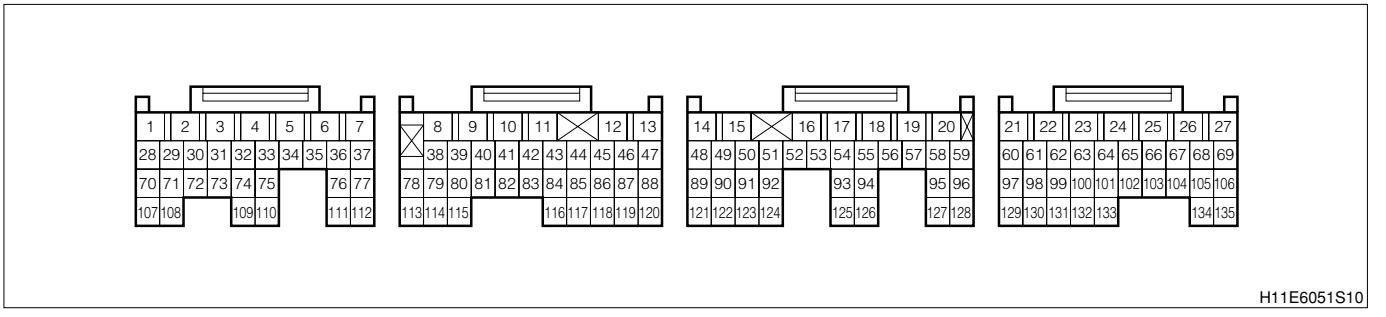
(1) System diagram



Ignition coil connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Circuit description

1. This system detects any misfire of the engine by using an ion current which has the same waveforms as those of the combustion pressure. When any misfire takes place, no ion current is produced. Therefore, if the input voltage at the ECU side is below a certain value, it is judged that a misfire took place. Since the detected ion current is very weak, it is amplified in the igniter unit.

(3) Diagnosis code output conditions

1.After the engine has been warmed up, when the signal from the ion current combustion control system is not inputted to the EFI ECU while the engine is running
2.After the engine has been warmed up, when the signal from the ion current combustion control system is inputted continuously to the EFI ECU while the engine is running
3.When the signal from the ion current combustion control system is inputted to the EFI ECU during the fuel-cut operation

(4) Trouble area

1.Is the ignition system normal?
2.Is the signal from ion current combustion control system normal?
3.Is the fuel system normal?
4.Is the harness between the ignition coil - the EFI ECU normal?
5.Is the ignition coil normal?
6.Is the EFI ECU normal?

(5) Checking points

1.Is the harness between the ignition coil and the EFI ECU normal?
2.Is the ignition coil is normal?

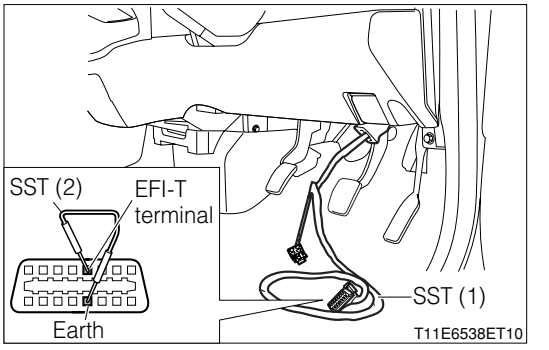
(6) Inspection procedure

NOTE

- Read the freeze frame data, using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

Σ1. Diagnosis code check

1.Use the SST to short-circuit DLC terminals between 5 (EFI-T) - 13 (E).
SST: 09991-87404-000(1)
09991-87403-000(2)
2.Check whether the diagnosis code other than Code No.36 is outputted or not.
SPECIFIED VALUE: No output.
▼If it is OK, go to Σ2.
▼In the case of NG, first check and repair a condition that caused the diagnosis code output.



Σ2. Unit check of spark plug

1.Check whether the designated spark plug is used. (See Engine Turning-up section for spark plug specifications.)
Refer to Page B1-20.

2.Perform the unit check of the spark plug
Refer to Page B8-472.

▼If it is OK, go to Σ3.
▼If it is NG, clean or replace the spark plug. If a designated spark plug is not used, replace the spark plug with the designated spark plug.

Σ3. Spark check

WARNING

- There is a hazard potential for sparks are generated. Do not place combustible materials in the vicinity.

1.Warm up the engine.
2.Set the IG switch to "LOCK".
3.Remove the fuel pump relay.
4.Idle the engine and wait until the engine stops by itself.
5.Set the IG switch to "LOCK".
6.Remove all the connectors from the injector.

CAUTION

- Operations described above will stop fuel injection, thus preventing damage to the catalyst due to non-burned gas etc.

7.Remove the spark plug and install it to the ignition coil to earth the plug.
8.Check whether the spark plug generates sparks during cranking.
SPECIFIED VALUE: Sparks are generated.

▼If it is OK, go to Σ8.
▼If it is NG, go to Σ4.

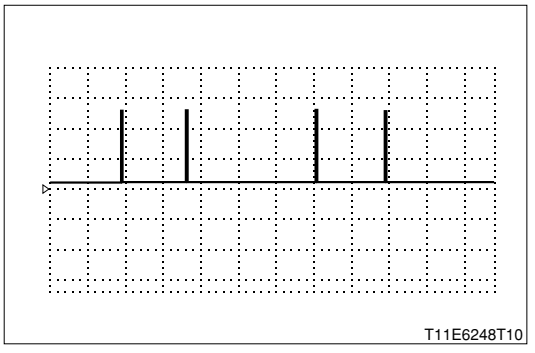
Σ4. EFI ECU signal check (1)

1.Connect the SST.
SST: 09842-97209-000

2.Completely warm up the engine.
3.When the engine is in the starting condition, check an output waveform of an ignition signal between the following terminals using an oscilloscope.
(1) Between SST 63 (IG1) - SST 125 (E1)
(2) Between SST 62 (IG2) - SST 125 (E1)
(3) Between SST 61 (IG3) - SST 125 (E1)
(4) Between SST 60 (IG4) - SST 125 (E1)

Time axis	100ms / DIV
Voltage axis	2V / DIV
Condition	Air-conditioner "OFF", no electrical load, idling

Air-conditioner "OFF": Set the air-conditioner switch (ACSW), blower switch (BLW), and magnet clutch (MGC) to "OFF".



NOTE

- Check that the waveform shown in the figure [Example] is displayed.

4.Check the following points.
(1) The pulse of 0 ⇄ 5V is generated.
(2) The waveform cycle is shortened as the engine speed increases.

NOTE

- The ignition signal can not be judged correctly if an oscilloscope is not used.

▼If it is OK, go to Σ5.
▼If it is NG, check the EFI ECU circuit.
Refer to Page A1-24.

Σ5. Wire harness continuity check (1)

1.Check continuity between the following terminals.

(1) Between ignition coil 1connection vehicle harness side connector 3 (IG1) - ECU connection vehicle harness side connector 63 (IG1)

(2) Between ignition coil 2 connection vehicle harness side connector 3 (IG2) - ECU connection vehicle harness side connector 62 (IG2)

(3) Between ignition coil 3 connection vehicle harness side connector 3 (IG3) - ECU connection vehicle harness side connector 61 (IG3)

(4) Between ignition coil 4 connection vehicle harness side connector 3 (IG4) - ECU connection vehicle harness side connector 60 (IG4)

SPECIFIED VALUE: Continuity exists

▼If it is OK, go to Σ6.

▼If it is NG, repair or replace the faulty harness.

Σ6. Ignition coil voltage check

1.Measure the voltage between the following terminals when the IG switch is "ON".

(1) Between each ignition coil connection vehicle harness side connector 1 (+B) - body earth

SPECIFIED VALUE: Battery voltage

▼If it is OK, go to Σ7.

▼In the case of NG, repair or replace the harness between the following terminals.

(1) Each ignition coil - battery

Σ7. Wire harness continuity check (2)

1.Check continuity between the following terminals.

(1) Between each ignition coil connection vehicle harness side connector 4 (E1) - ECU connection vehicle harness side connector 125 (E1)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, replace the ignition coil.

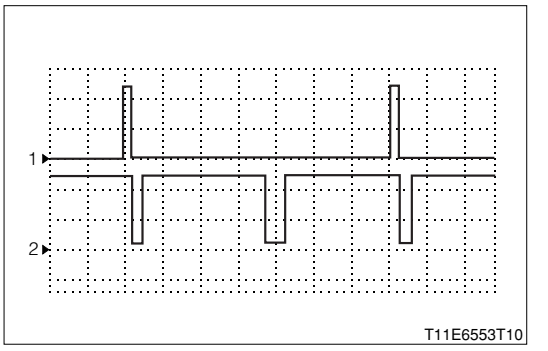
Refer to Page B10-6.

▼In the case of NG, repair or replace the faulty harness.

Σ8. EFI ECU signal check (2)

1.Completely warm up the engine.

2.While idling, check each cylinder for output waveforms of the ignition signal (1▶) and ion current combustion control signal (2▶), using an oscilloscope, respectively.



	Channel	+ side measuring terminal	− side measuring terminal
Cylinder No.1	1▶	63 (IG1)	125 (E1)
	2▶	51 (ICMB1)	125 (E1)
Cylinder No.2	1▶	62 (IG2)	125 (E1)
	2▶	50 (ICMB2)	125 (E1)
Cylinder No.3	1▶	61 (IG3)	125 (E1)
	2▶	49 (ICMB3)	125 (E1)
Cylinder No.4	1▶	60 (IG4)	125 (E1)
	2▶	48 (ICMB3)	125 (E1)

Time axis	20ms / DIV
Voltage axis	2V / DIV
Condition	Water temperature is 80℃ or more; air conditioner is "ON"; electric load exists; during air conditioner idle up rotation

Air conditioner is "ON": Condition where all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "ON".

Electric load exists: Conditions where the headlight (H/L) and Defogger (DEF) are both "ON".

Air conditioner idle up rotation:950$^{+100}_{-50}$

NOTE

- Check that waveforms like those in the figure (One example) is produced.

3.Check the following points.

(1) According to the output waveform of the ignition signal (Channel 1 ▶), the output waveform of the ion current combustion control signal (Channel 2▶) has been produced.

(2) The waveform of 5 ⇄ 0V has been produced.

NOTE

- Correct evaluation cannot be made for the ignition signals and ion current combustion control signals, unless you use an oscilloscope.

	Waveform (Channel 2▶) state
a	Normal
b	Clamped at 0V.
c	Clamped at 5V.
d	Clamped to the battery voltage.
e	Waveform is unstable ※.

※: According to the output waveform of the ignition signal (Channel 1 ▶), the output waveform of the ion current combustion control signal (Channel 2▶) has not been produced.

▼In the case of "a", go to Σ9.

▼In the case of "b", go to Σ11.

▼In the case of "c", go to Σ13.

▼In the case of "d", go to Σ12.

▼In the case of "e", go to Σ16.

Σ9. EFI ECU signal check (3)

1.Retain the measurement conditions in Σ8.

2.Under the following conditions, check each cylinder for output waveforms of the ion current combustion control signal, using an oscilloscope.

(1) Raise the engine revolution speed slowly from the idle state to 4000 rpm. Then, close the throttle opening quickly.

SPECIFIED VALUE: No waveform is outputted while fuel is cut.

▼If it is OK, replace the EFI ECU.

Refer to Page B8-1.

▼If it is NG, go to Σ10.

Σ10. Fuel cut operation check

1.Check the output state between the following terminals using an oscilloscope.

(1) Between SST 24 (#10) - SST 125 (E1)

(2) Between SST 23 (#20) - SST 125 (E1)

(3) Between SST 22 (#30) - SST 125 (E1)

(4) Between SST 21 (#40) - SST 125 (E1)

2.Check the operating sound of the injector using a sound scope when the fuel cut is active.

NOTE

- Check operating sound, while checking the output waveform to the injector using an oscilloscope.

SPECIFIED VALUE: The operating sound of the injector stops when the fuel cut is active.

▼If it is OK, replace the ignition coil.

Refer to Page B10-6.

▼In the case of NG, perform unit check of the injector.

Refer to Page B8-472.

Σ11. Check of wire harness for short-circuit (1)

1.Check continuity of the cylinder whose waveform is clamped at 0V.

(1) Between ignition coil 1 connection vehicle harness side connector 2 (ICMB1) - body earth

(2) Between ignition coil 2 connection vehicle harness side connector 2 (ICMB2) - body earth

(3) Between ignition coil 3 connection vehicle harness side connector 2 (ICMB3) - body earth

(4) Between ignition coil 4 connection vehicle harness side connector 2 (ICMB4) - body earth

SPECIFIED VALUE: No continuity exists

▼If it is OK, replace the ignition coil.

Refer to Page B10-6.

▼In the case of NG, repair the faulty section.

Σ>12. Check of wire harness for short-circuit (2)

1.Check continuity of the cylinder whose waveform is clamped to the battery voltage.

(1) Between ignition coil 1 connection vehicle harness side connector 2 (ICMB1) - battery positive (+) terminal

(2) Between ignition coil 2 connection vehicle harness side connector 2 (ICMB2) - battery positive (+) terminal

(3) Between ignition coil 3 connection vehicle harness side connector 2 (ICMB3) - battery positive (+) terminal

(4) Between ignition coil 4 connection vehicle harness side connector 2 (ICMB4) - battery positive (+) terminal

SPECIFIED VALUE: No continuity exists

▼If it is OK, replace the ignition coil.

Refer to Page B10-6.

▼In the case of NG, repair or replace the faulty component.

Σ>13. Check of wire harness for open wire

1.Check continuity of the cylinder whose waveform is clamped at 5V.

(1) Between ignition coil 1connection vehicle harness side connector 2 (ICMB1) - EFI ECU connection vehicle harness side connector 51 (ICMB1)

(2) Between ignition coil 2 connection vehicle harness side connector 2 (ICMB2) - EFI ECU connection vehicle harness side connector 50 (ICMB2)

(3) Between ignition coil 3 connection vehicle harness side connector 2 (ICMB3) - EFI ECU connection vehicle harness side connector 49 (ICMB3)

(4) Between ignition coil 4 connection vehicle harness side connector 2 (ICMB4) - EFI ECU connection vehicle harness side connector 48 (ICMB4)

SPECIFIED VALUE: Continuity exists

▼If it is OK, go to Σ>14.

▼In the case of NG, repair or replace the faulty component.

Σ>14. Check of short-circuit between the wire harnesses

1.Check whether the cylinder, whose waveform is clamped at 5V, is short-circuited to the power wire of the sensor system.

NOTE

- The power supply for the sensor system is 5V.

(1) Between ignition coil 1 connection vehicle harness side connector 2 (ICMB1) - body earth

(2) Between ignition coil 2 connection vehicle harness side connector 2 (ICMB2) - body earth

(3) Between ignition coil 3 connection vehicle harness side connector 2 (ICMB3) - body earth

(4) Between ignition coil 4 connection vehicle harness side connector 2 (ICMB4) - body earth

SPECIFIED VALUE: 0V

▼If it is OK, replace the ignition coil and go to Σ>15.

Refer to Page B10-6.

▼In the case of NG, repair or replace the faulty component.

Σ>15. EFI ECU signal recheck (1)

1.Recheck the cylinder, whose waveform is clamped at 5V, under the Σ>8) conditions.

2.Check that the output waveform of the ion current combustion control signal (Channel 2▶) is not clamped at 5V.

SPECIFIED VALUE: The output waveform (Channel 2▶) is not clamped at 5V.

▼If it is OK, finish the troubleshooting.

▼In the case of NG, misfire may have occurred. Identify the cause of the misfire and repair.

Σ>16. Harness, connector check

1.When the following actions are taken to the cylinder whose waveform is unstable , check whether the waveform will change or not.

(1) Lightly shake the connector vertically and laterally.

(2) Lightly shake the wire harness vertically and laterally.

SPECIFIED VALUE: There is no change in the waveform.

2.Perform the following checks.

(1) Connector fitting condition

(2) Loose connection of the connector and the terminal.

SPECIFIED VALUE: No fault.

▼If it is OK, replace the ignition coil and go to Σ>17.

Refer to Page B10-6.

▼In the case of NG, repair or replace the faulty component.

Σ>17. EFI ECU signal recheck (2)

1.Recheck the cylinder, whose waveform is unstable, under the Σ>8) conditions.

2.Check that the output waveform of the ion current combustion control signal (Channel 2▶) is outputted stably.

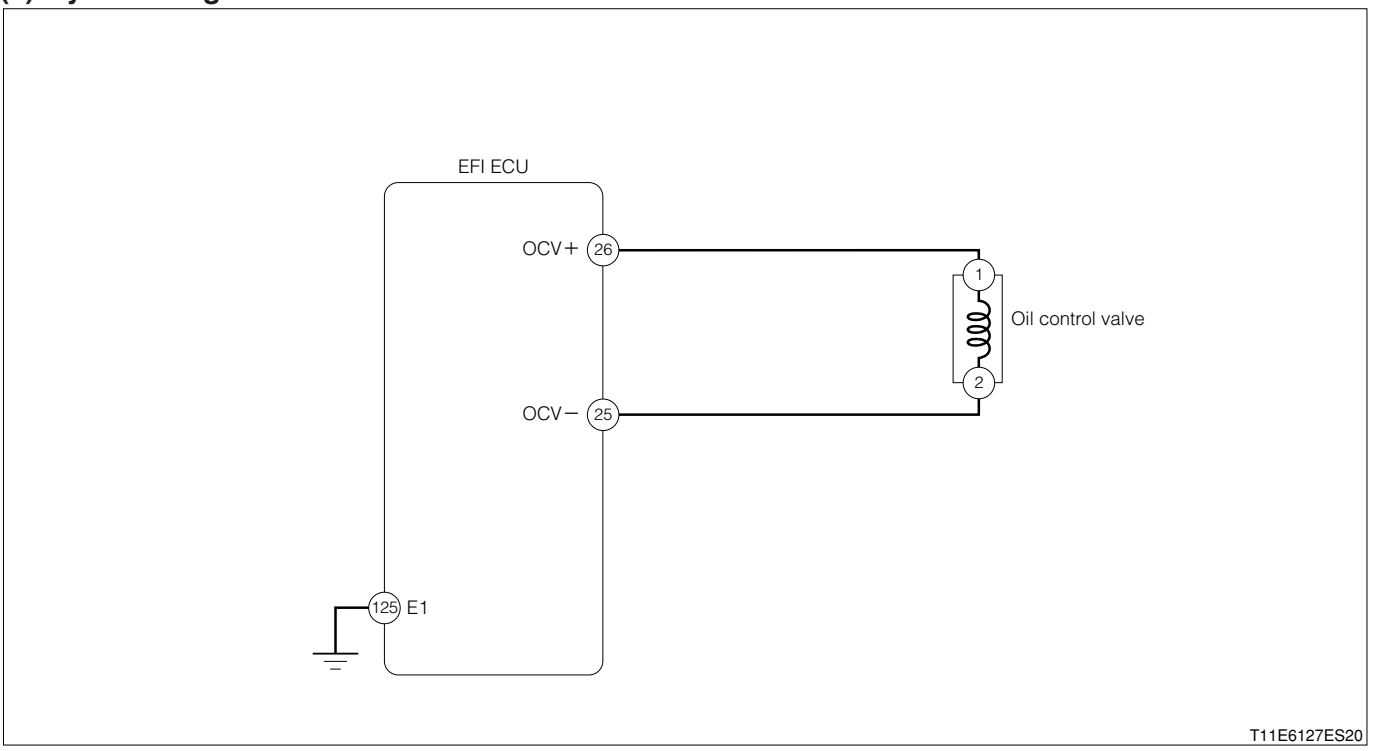
SPECIFIED VALUE: The output waveform (Channel 2▶) is outputted stably.

▼If it is OK, finish the troubleshooting.

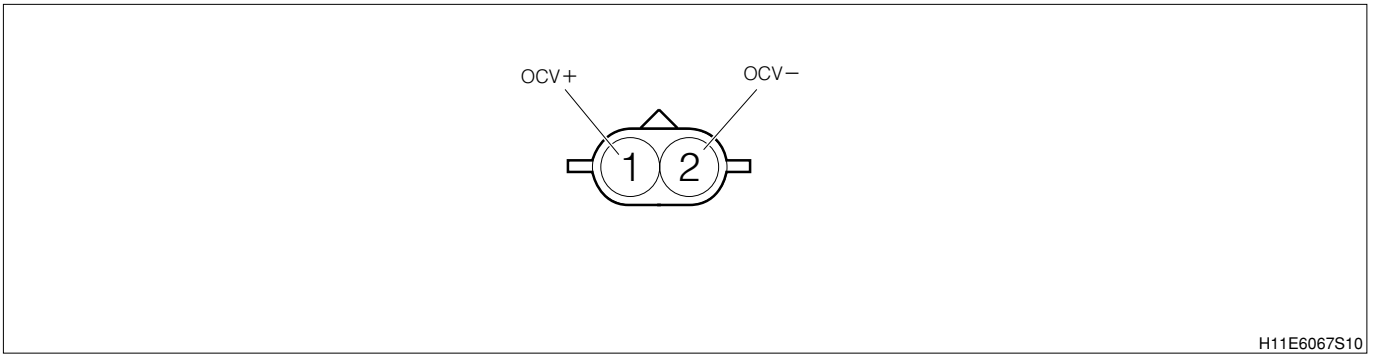
3.In the case of NG, combustion instability may have occurred. Identify the cause of the combustion instability and repair.

9-12-20 DTC NO.P1346/75 VARIABLE VALVE TIMING CONTROL SYSTEM (VALVE TIMING)DTC NO.P1346/73 VARIABLE VALVE TIMING CONTROL SYSTEM (ADVANCED TIMING/RETARDED TIMING)

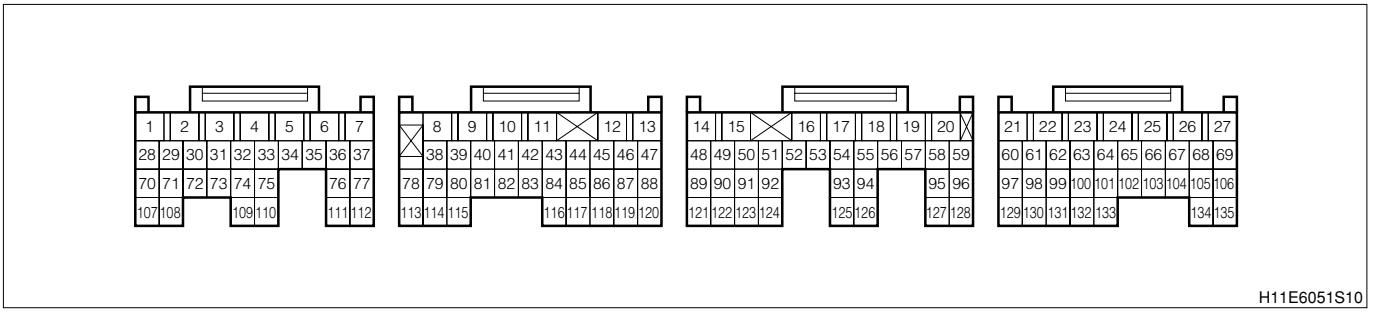
(1) System diagram



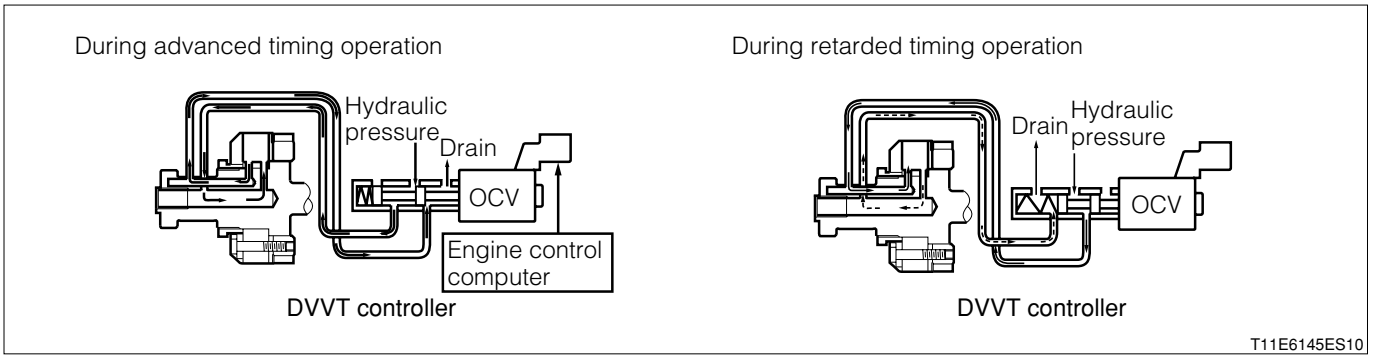
Oil control valve connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Variable valve timing control operation outline



1.The DVVT system controls the intake valve timing to proper timing in response to the driving conditions. The engine ECU controls the OCV (Oil Control Valve) to make the intake valve timing proper. The oil pressure controlled by the OCV is supplied to the DVVT controller, and then, the DVVT controller changes the relative position between the camshaft and the crankshaft.

(3) No.P1346/75 output conditions

1.When a valve timing fail of the variable timing is detected

(4) No.P1349/73 output conditions

1.Is the variable valve timing controller operating normally?

(5) Checking points

1.Is the variable valve timing controller operating normally?
2.Is the variable valve timing controller operating normally?
3.Is the timing deviated between the camshaft drive gear and the camshaft driven gear? (Are the mating marks matched?)

(6) Checking method

NOTE

- Read the freeze frame data, using the DS-21 diagnosis tester or OBD Ⅱ generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

⊳1. Oil control valve operation check

WARNING

- Do not put any flammable material around because sparks may be generated and is dangerous.
- Pay attention for safety since this is an operation during engine operation.

1.Remove the connector of the oil control valve.
2.Start the engine and perform idling.

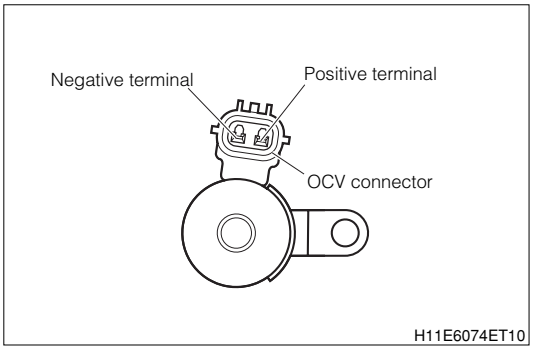
3.Apply the battery voltage to the connector of the oil control valve.

CAUTION

- Do not mistake the voltage polarity.
- Be careful of shorting while operating (As a precaution, install a fuse at the positive side).
- Set the energizing time at one minute or less.

NOTE

- Refer to the right figure for voltage polarity.



4.Confirm the idling condition of the engine.

SPECIFIED VALUE: Rough idling or engine stall takes place.

▼If it is OK, proceed to ⊳2.

▼If it is NG, proceed to ⊳4.

⊳2. Check of wire harness continuity

1.Stop the engine.

2.Perform continuity check between each of the following terminals.

(1) Between oil control valve connection vehicle harness side connector 1 (OCV+) - ECU connection vehicle harness side connector 26 (OCV+)

(2) Between oil control valve connection vehicle harness side connector 2 (OCV−) - ECU connection vehicle harness side connector 25 (OCV−)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to ⊳3.

▼If it is NG, repair the harness and the connectors.

⊳3. Camshaft gear deviation check

1.Check the deviation between the camshaft drive gear and the camshaft driven gear.

SPECIFIED VALUE: There is no deviation.

▼If it is OK, check the EFI ECU circuit.

Refer to Page A1-24.

▼If it is NG, reassemble the camshaft.

⊳4. Oil control valve unit check

1.Perform unit check of the oil control valve.

Refer to Page B8-473.

▼If it is OK, proceed to ⊳5.

▼If it is NG, replace the oil control valve.

Refer to Page B8-238.

⊳5. DVVT actuator unit check

1.Perform unit check of DVVT actuator.

Refer to Page B2-45.

▼If it is OK, proceed to ⊳6.

▼If it is NG, replace the camshaft No.2.

Refer to Page B2-41.

⊃6. Oil passage check

1.Check the passageway of the engine oil.
SPECIFIED VALUE: There is no clogging.

▼If it is OK, proceed to ⊃7.
▼If it is NG, repair the defective section of the oil passage.

⊃7. Camshaft gear deviation check

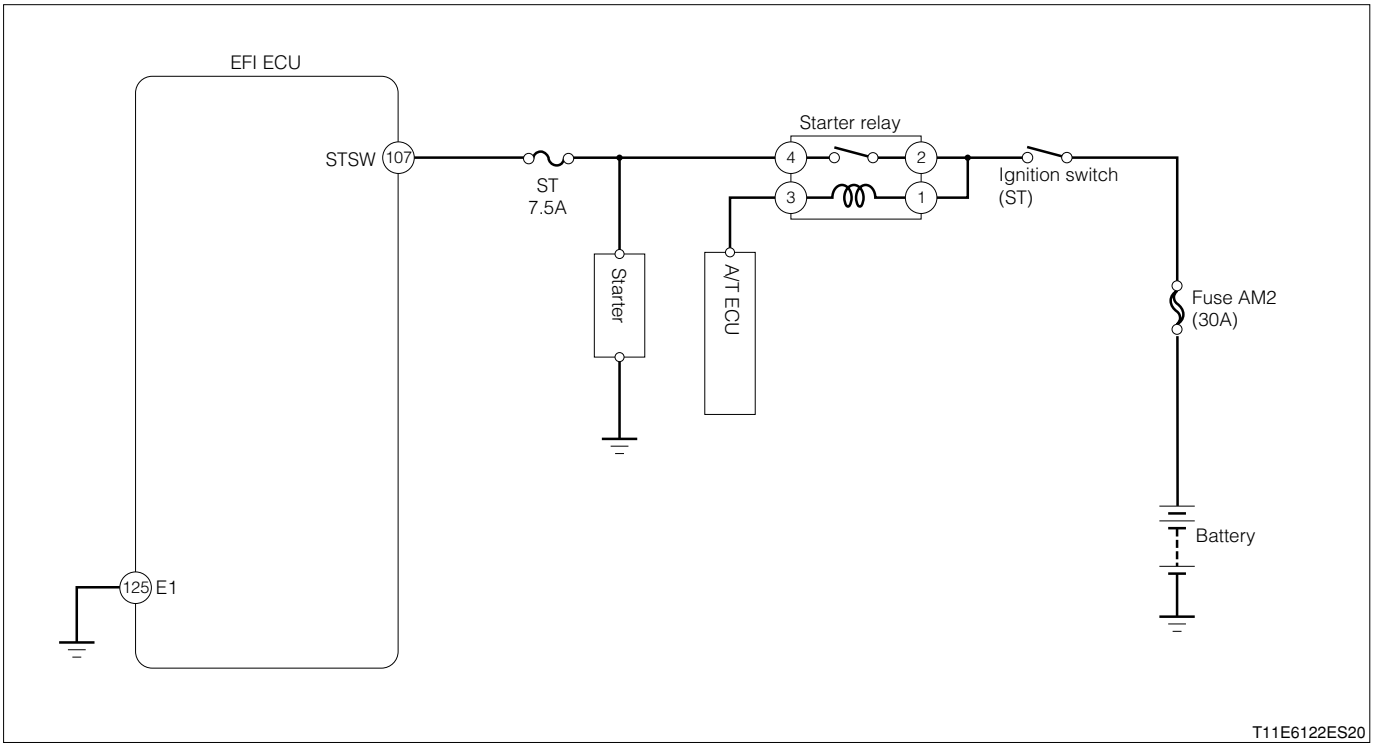
1.Check the deviation between the camshaft drive gear and the camshaft driven gear.
SPECIFIED VALUE: There is no deviation.

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

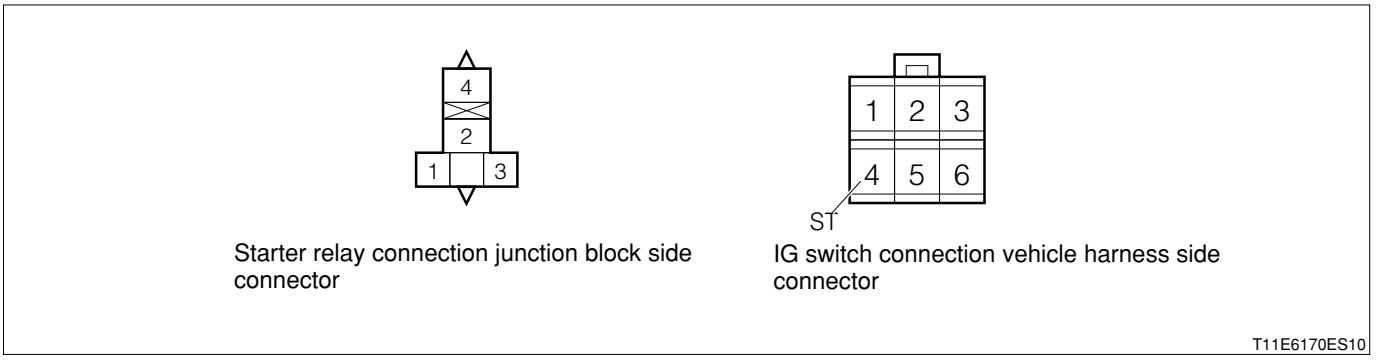
▼If it is NG, reassemble the camshaft.

9-12-21 DTC NO.P1510/54 STARTER RELAY OUTPUT SYSTEM

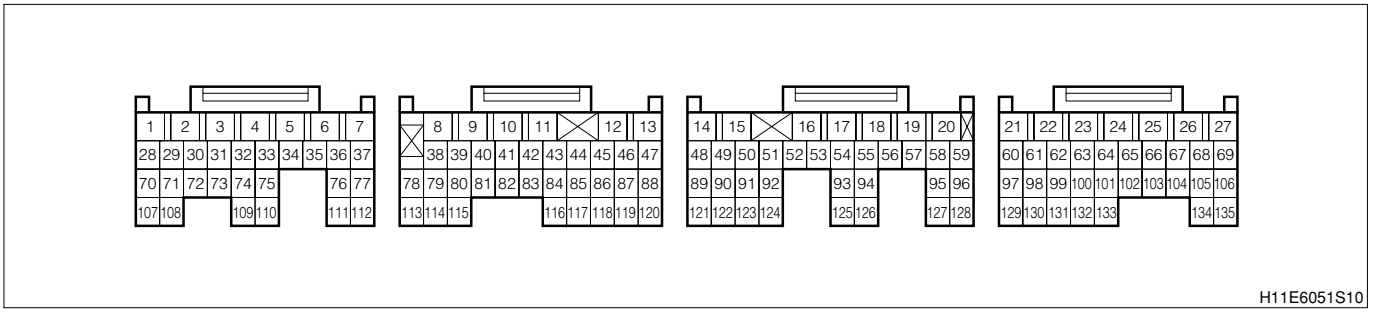
(1) System diagram



IG switch connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Diagnosis code output conditions

1.When no "ON" signal is made even if the engine revolution is more than the specified value with the vehicle speed set to 0 km/h

(3) Checking points

1.Is the harness between the starter and the EFI ECU normal?

(4) Checking method

⊳1. EFI ECU signal check

1.Connect the SST.
SST: 09842-97209-000

2.Perform voltage measurement between the following terminals during starting.
(1) Between SST 107 (STSW) - SST 125 (E1)
SPECIFIED VALUE: Battery voltage

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, proceed to ⊳2.

⊳2. Check of wire harness continuity

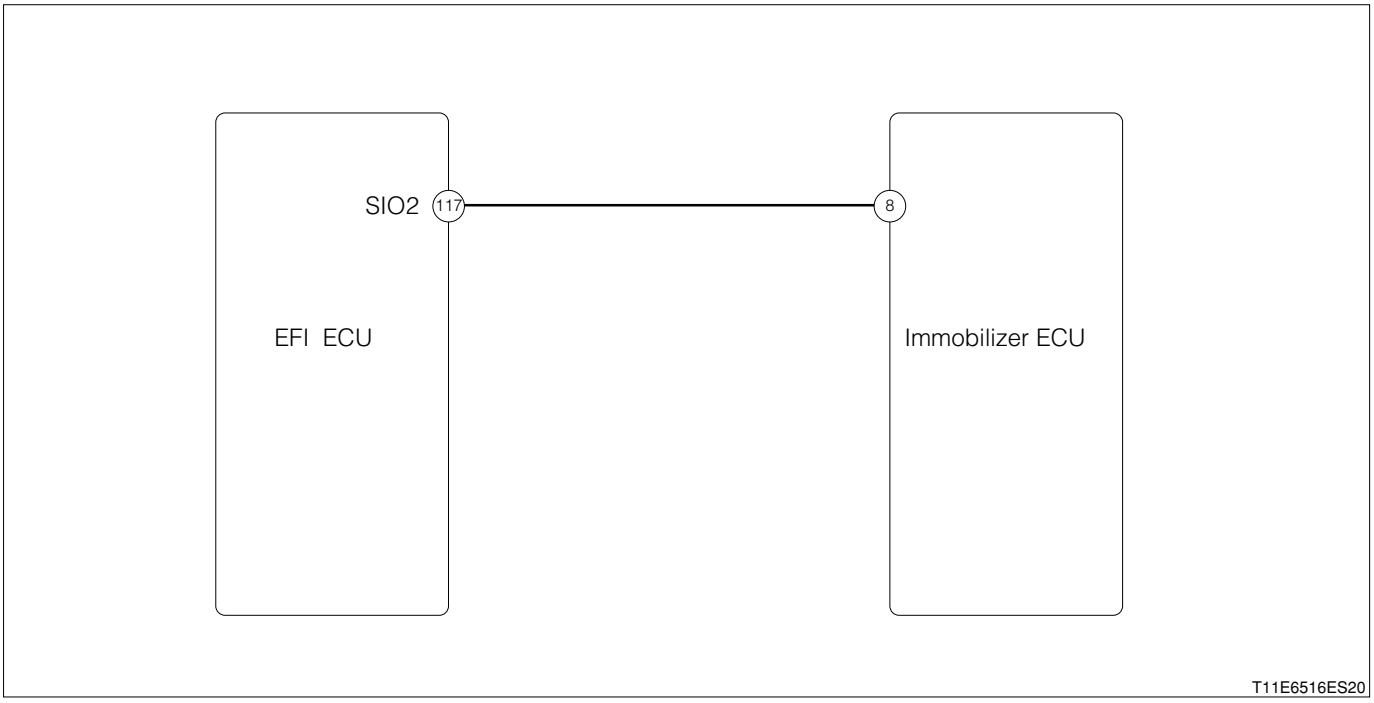
1.Perform continuity check between each of the following terminals.
(1) Between IG switch side connector 4 (ST) - ECU connection vehicle harness side connector 107 (STSW)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, check the vehicle speed sensor system.
Refer to Page F5-53.

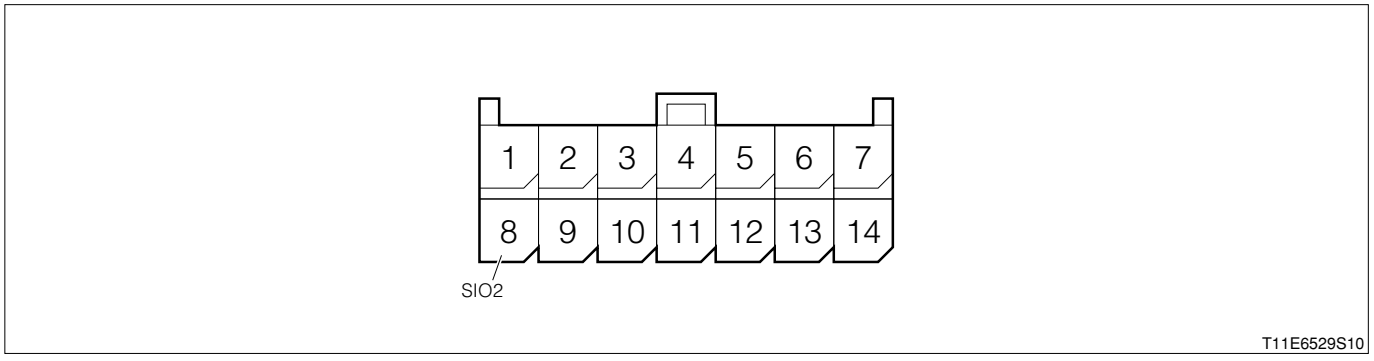
▼If it is NG, repair the harness and connectors.

9-12-22 DTC NO.P1600/83 IMMOBILIZER SIGNAL CIRCUIT MALFUNCTION

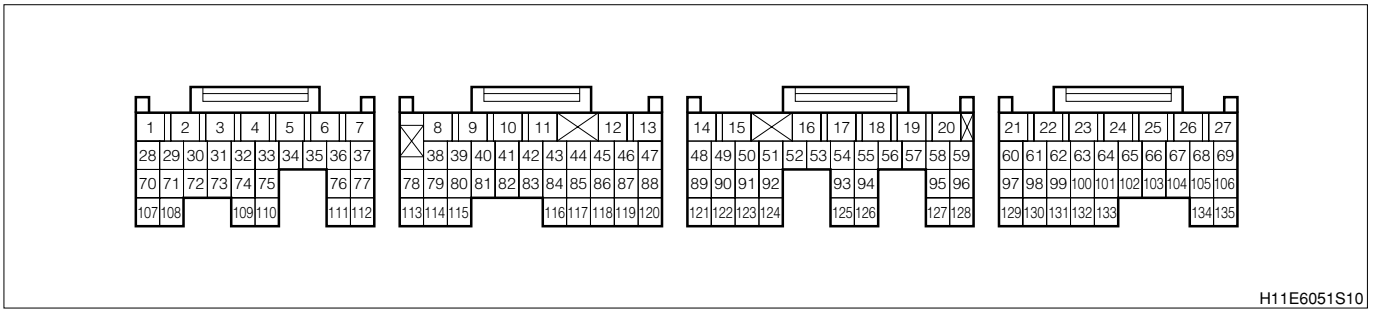
(1) System diagram



Immobilizer ECU wire harness side



EFI ECU wire harness side



(2) Circuit description

1.This circuit performs collation and updating of the rolling code in the communication between the immobilizer ECU and the EFI ECU. The engine can start only when the collation and updating of the rolling code can be done. The rolling code is collated and updated by reading out or writing to non volatile memory (E2PROM) of both ECUs.

(3) Diagnosis code output conditions

1.When the engine starts, the rolling code can not reading out or writing to the EFI ECU.

(4) Trouble area

1.EFI ECU

(5) Inspection procedure

1 **When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

≫1. Re-confirmation of DTC.

1.IG switch turned "LOCK".

2.Connect the DS-21 diagnosis tester to the DLC through the SST.

SST: 09991-87404-000

3.Turn "ON" the IG switch, and turn "ON" the main switch of the tester.

4.Erase the DTC. (As for the operation, follow the instruction manual of the DS-21 diagnosis tester.)

5.Turn "OFF" the main switch of the tester. Turn "LOCK" the IG switch.

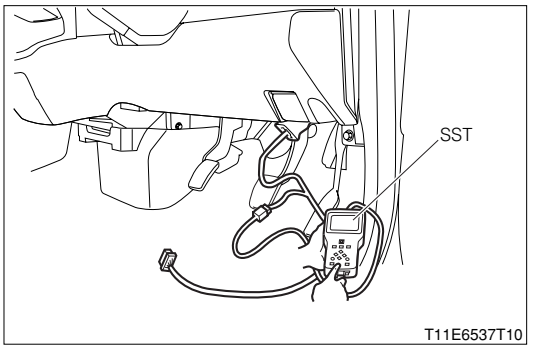
6.Turn "ON" the IG switch. Turn "ON" the main switch of the tester.

7.Check the DTC.

8.Is" P1600/83" indicated ?

▼If the output is made, proceed to ≫2.

▼If no output is made, proceed to ≫3.



≫2. Wiring harness check

1.Turn "LOCK" the ignition switch.

2.Perform the continuity check between the following terminals.

(1) Between the EFI ECU connection vehicle harness side connector 117 (SIO2) and the immobilizer ECU connection vehicle harness side connector 8 (SIO2)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to ≫3.

▼If it is NG, repair the defective point.

≫3. Check of immobilizer side diagnosis code

1.Turn "ON" the IG switch. Turn "ON" the main switch of the tester.

2.Check the immobilizer diagnosis code.

▼If no output is made, replace the EFI ECU.

Refer to Page B8-7.

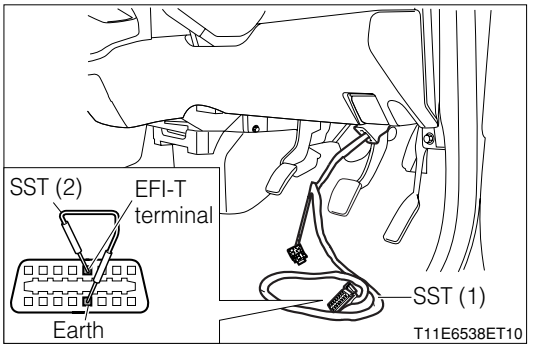
▼If the output is made, check the immobilizer.

Refer to Page I4-31.

2 **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

∑>1. Re-confirmation of DTC.

1.Remove the EFI fuse. Erase the DTC. (As for the erasing method.)
2.Set the EFI fuse to the original position.
3.Short circuit the DLC terminals 5 (EFI-T) and 13 (E), using the SST.
SST: 09991-87404-000 (1)
09991-87403-000 (2)
4.Turn "ON" the IG switch.
5.Check the DTC. (Read out the flashing pattern of the MIL.)
6.Is "83" indicated?
▼If the output is made, proceed to ∑>2.
▼If no output is made, proceed to ∑>3.



∑>2. Wiring harness check

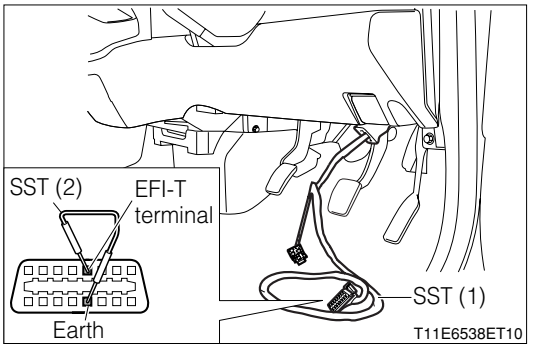
1.Turn "LOCK" the ignition switch.
2.Perform the continuity check between the following terminals.
(1) Between the EFI ECU connection vehicle harness side connector 117 (SIO2) and the immobilizer ECU connection vehicle harness side connector 8 (SIO2)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to ∑>3.
▼If it is NG, repair the defective point.

∑>3. Check of immobilizer side diagnosis code

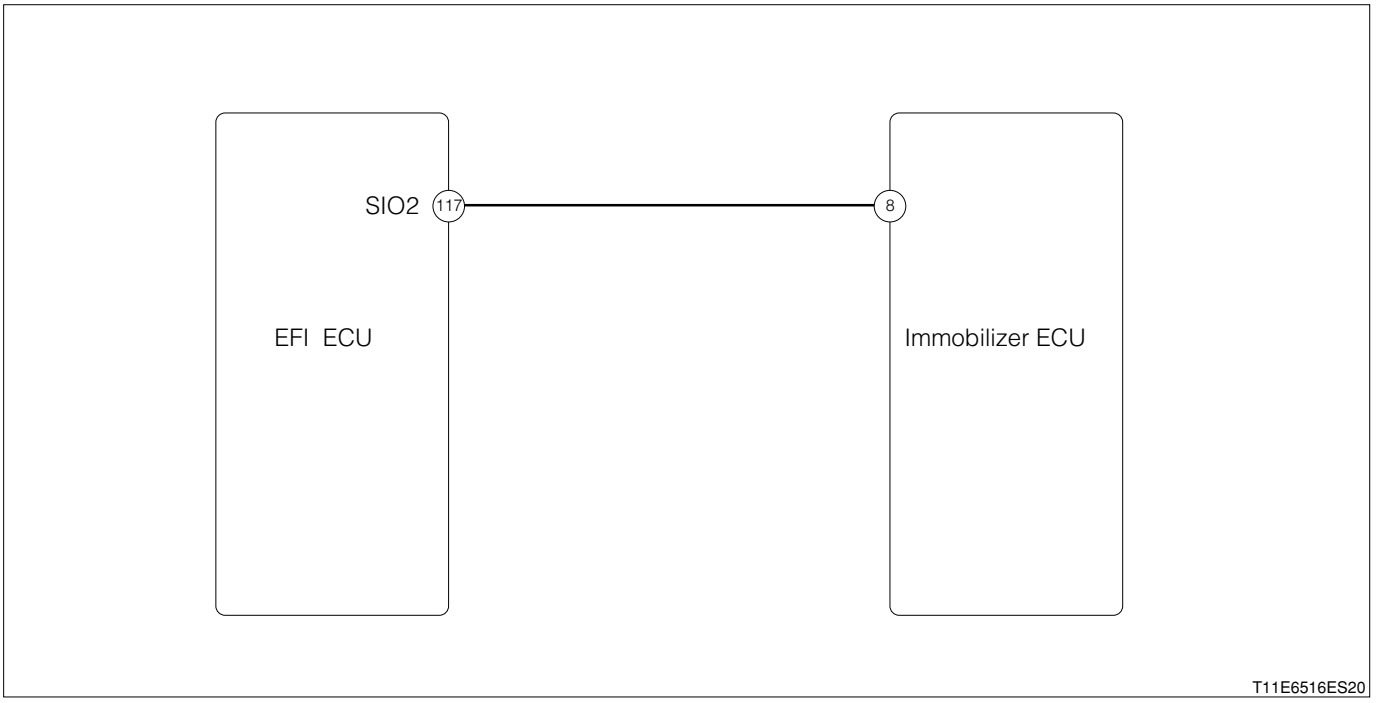
1.Short between the DLC terminals 4 (ECU-T) and 13 (E), using the SST.
SST: 09991-87404-000 (1)
09991-87403-000(2)
2.Turn "ON" the IG switch.
3.Is the diagnosis code of the immobilizer outputted?
▼If no output is made, replace the EFI ECU.
Refer to Page B8-1.

▼If the output is made, check the immobilizer.
Refer to Page I4-31.

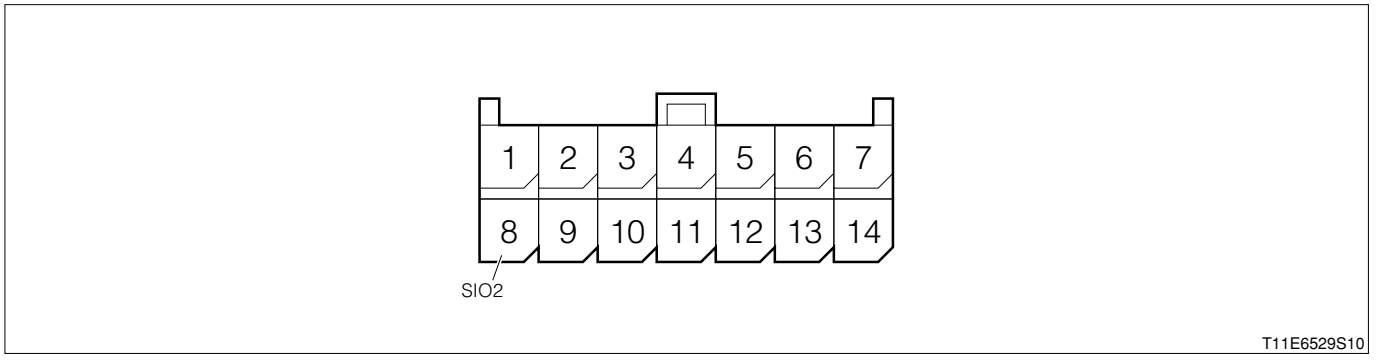


9-12-23 DTC NO.P1601/81 IMMOBILIZER SIGNAL MALFUNCTION

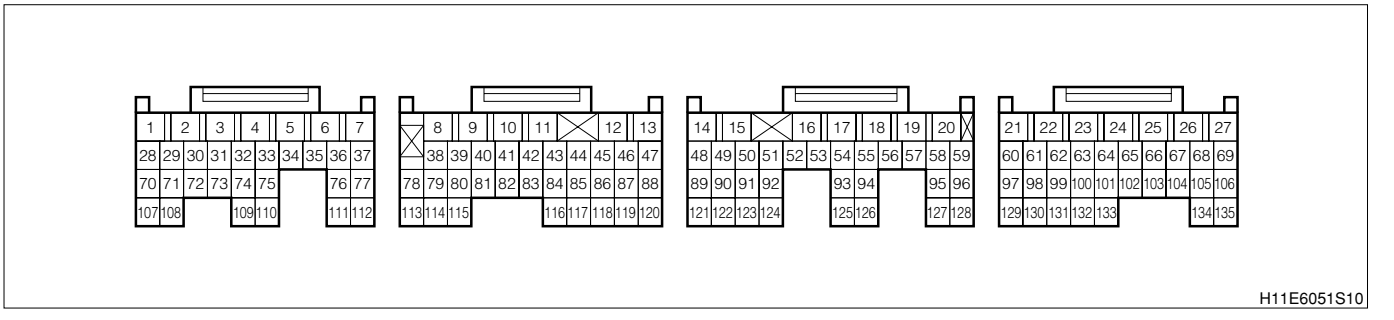
(1) System diagram



Immobilizer ECU wire harness side



EFI ECU wire harness side



(2) Circuit description

1.When the ignition switch is turned "ON", communication starts between the immobilizer ECU and EFI ECU. The engine can start only when the communication between the two ECU is possible and the rolling codes are matched. In order cases, fuel injection and ignition are prohibited, thus making engine starting impossible.

(3) DTC DETECTING CONDITION

1.When the engine starts, the rolling codes are not matched.

(4) Trouble area

1.Open wire or short circuit for the immobilizer system circuit
2.Immobilizer ECU
3.EFI ECU

(5) Inspection procedure

Σ>1. Check of harness between immobilizer ECU and EFI ECU.

1.Set the SST (Sub-harness). However, the SST connectors at the EFI ECU side should remain disconnected.
SST: 09842-97209-000

2.Disconnect the immobilizer ECU connector.
3.Perform the continuity check between the following terminals with the IG switch set to the "LOCK" position.
(1) Connector 8 (SIO1) at immobilizer ECU harness side - SST terminal 117 (SIO1).
4.Are the check results for open wire and short OK?
▼If it is OK, go to Σ>2.
▼If it is NG, repair or replace the harness or connector.

Σ>2. Check of immobilizer system (1).

1.Connect the connector of the immobilizer ECU.
2.Replace the EFI ECU with a new one. Connect the SST connector to the EFI ECU.
3.Start the engine with the master key.
4.Does the engine start?
SPECIFIED VALUE: The engine starts.

▼If it is OK, check or replace the EFI ECU.
▼If it is NG, go to Σ>3.

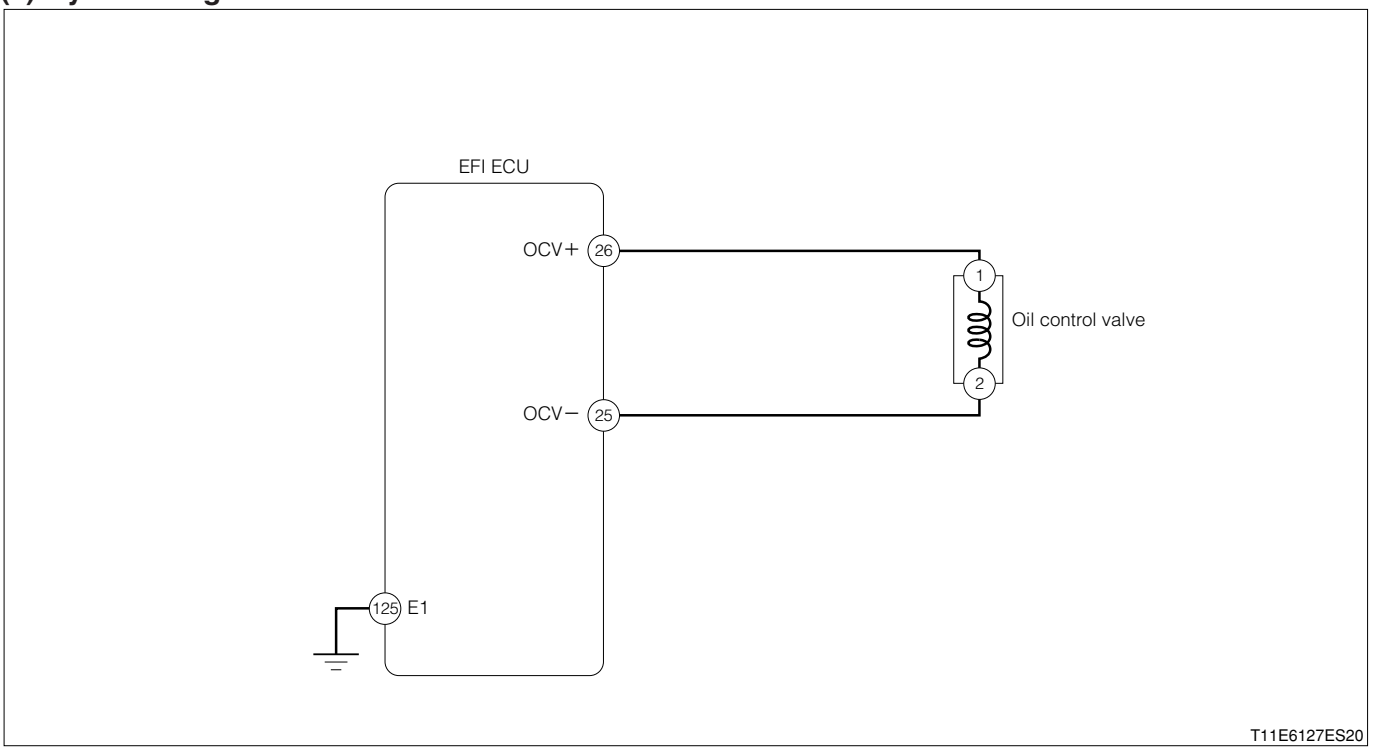
Σ>3. Check of immobilizer system (2).

1.Replace the immobilizer ECU with a new one, with the IG switch turned "LOCK".
2.Start the engine with the master key.
3.Does the engine start?
SPECIFIED VALUE: The engine starts.

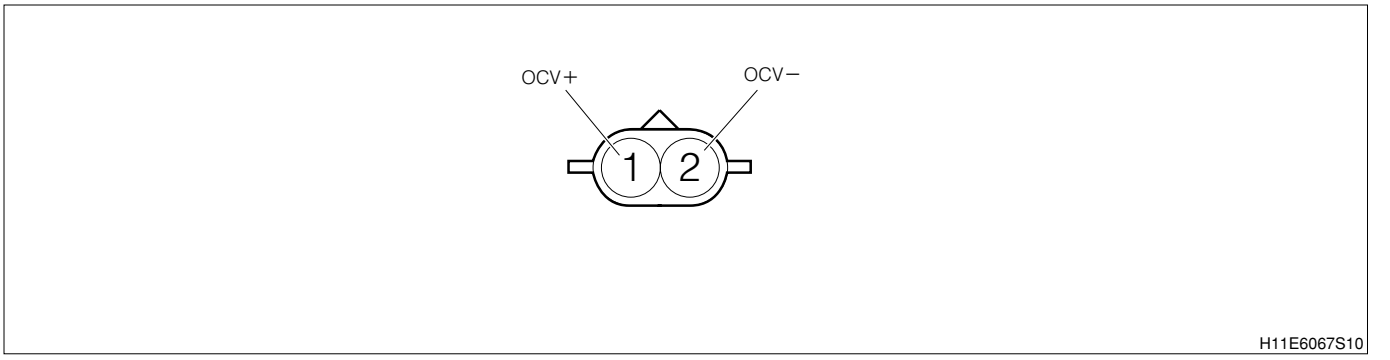
▼If it is OK, check the IG key, antenna coil, etc. (Refer to section "BODY ELECTRICAL SYSTEM".)
▼If it is NG, check or replace the immobilizer ECU.
Refer to Page I4-29.

9-12-24 DTC NO.P1656/74 OIL CONTROL VALVE CONTROL SYSTEM MALFUNCTION

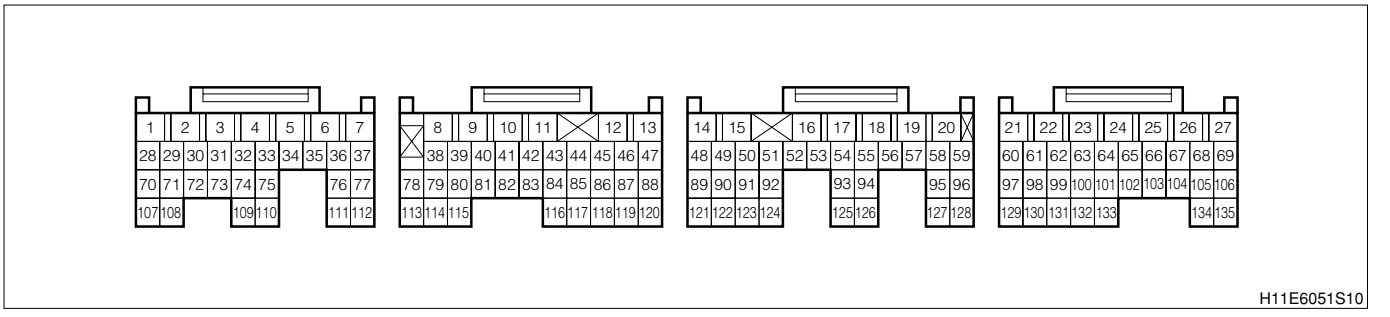
(1) System diagram



Oil control valve connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Diagnosis code output conditions

1.When, under a condition where the battery voltage is 12V or more, one of the following conditions is continued over a certain length of time

(1) When the output duty ratio is 99% or more and the oil control valve voltage is below the evaluation specified value

(2) When the output duty ratio is 0% and the oil control valve voltage is the evaluation specified value or more

(3) Checking points

1.Is the control signal of the oil control valve outputted normally from the EFI ECU?
2.Is the harness between the oil control valve and the EFI ECU normal?

⊳1. Oil control valve operation check

WARNING

- Do not put any combustible in the surrounding area, for sparks are occurring and there are fire potentials.
- This is an operation to be made while the engine is running. Special care must be exercised for the safety.

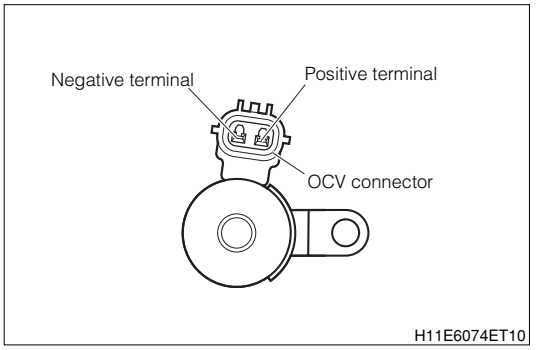
1.Disconnect the oil control valve connector.
2.Start the engine and perform an idling operation.
3.Apply the battery voltage to the oil control valve connector.

CAUTION

- Do not mistake the voltage polarity.
- Pay utmost attention as for a short during the operation. (Put a fuse at the plus side as a precautionary measure.)
- Make sure that the energizing time should be within one minute.

NOTE

- For the voltage polarity, refer to the right figure.



4.Confirm the engine idling condition.
SPECIFIED VALUE: Rough idling or engine stalling occurs.
▼If it is YES, go to ⊳2.
▼If it is NG, replace the oil control valve.
Refer to Page B8-238

⊳2. Oil control valve voltage check

1.Stop the engine and set the IG switch to the "LOCK" position.
2.Connect the SST.
SST: 09842-97209-000

3.Turn "ON" the ignition switch.
4.Check the voltage between the following terminals.
(1) Between SST 25 (OCV−) and SST 26 (OCV+)
SPECIFIED VALUE: Battery voltage

▼If it is OK, go to ⊳3.
▼If it is NG, check the EFI ECU circuit.
Refer to Page A1-24.

⊃3. Check of wire harness continuity

1.With the IG switch turned "LOCK", disconnect the SST connector from the ECU.

2.Perform continuity check between the following terminals.

(1) Between the oil control valve connection vehicle harness side connector1 (OCV+) and the ECU connection vehicle harness side connector 26 (OCV+)

(2) Between the oil control valve connection vehicle harness side connector 2 (OCV−) and the ECU connection vehicle harness side connector 25 (OCV−)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, check the EFI ECU circuit.

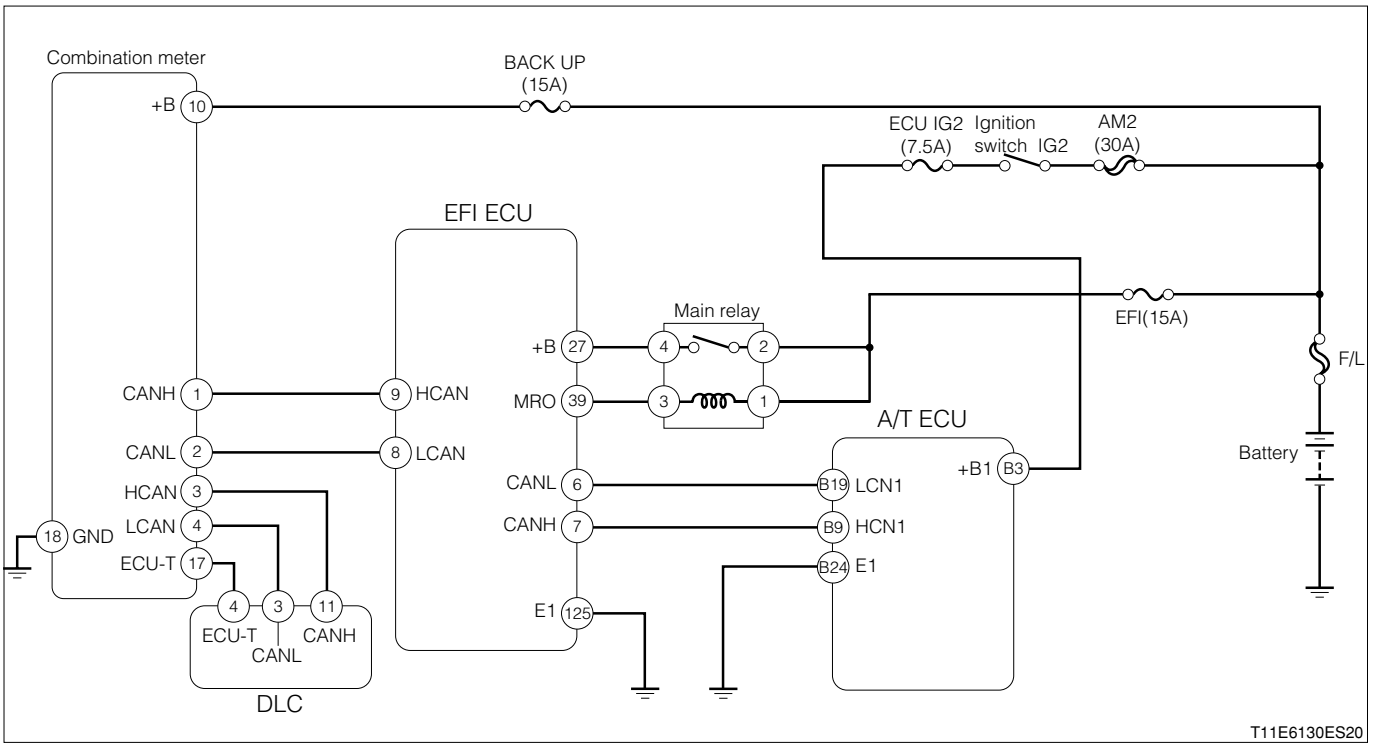
Refer to Page A1-24.

▼If it is NG, repair the harness and connector.

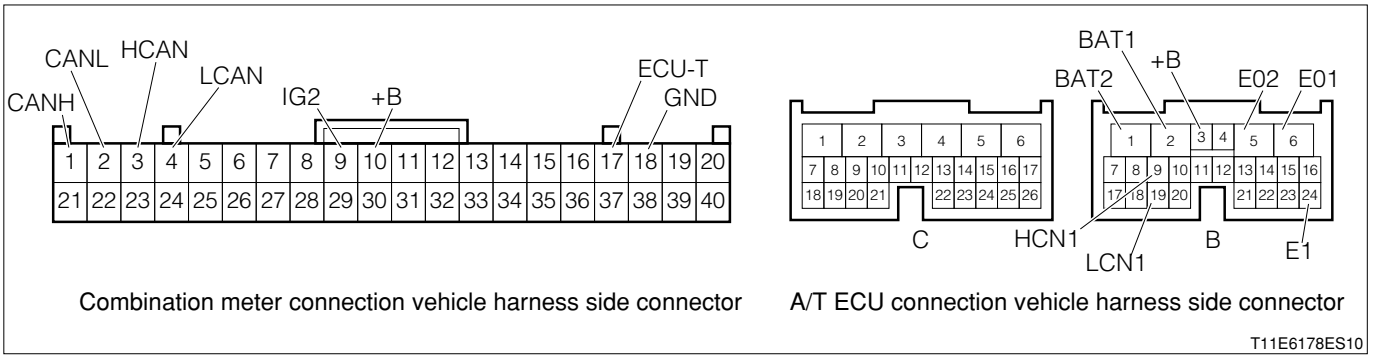
9-12-25 DTC NO. U101/82 E-AT ABNORMAL RECEPTION

(1) System diagram

1 **RHD vehicles**



Each unit, relays connection vehicle harness side connector

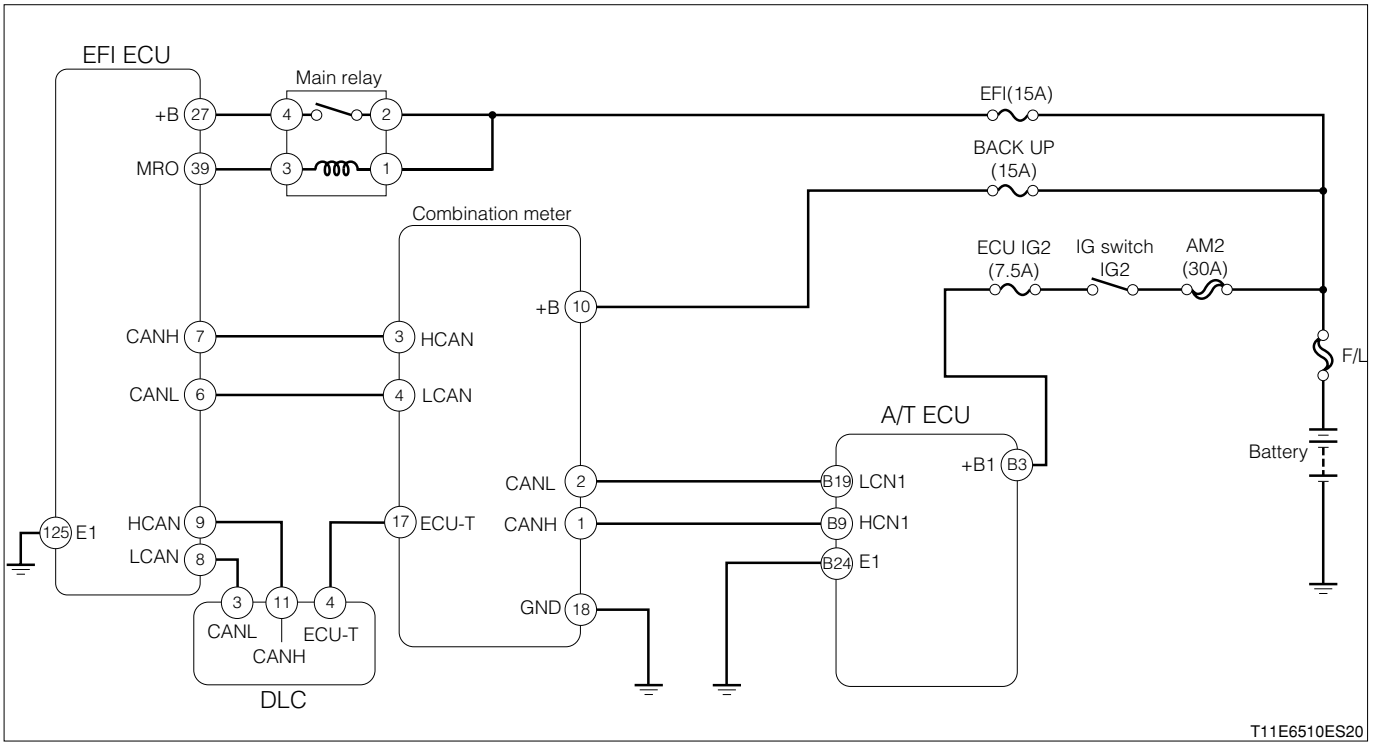


Combination meter connection vehicle harness side connector

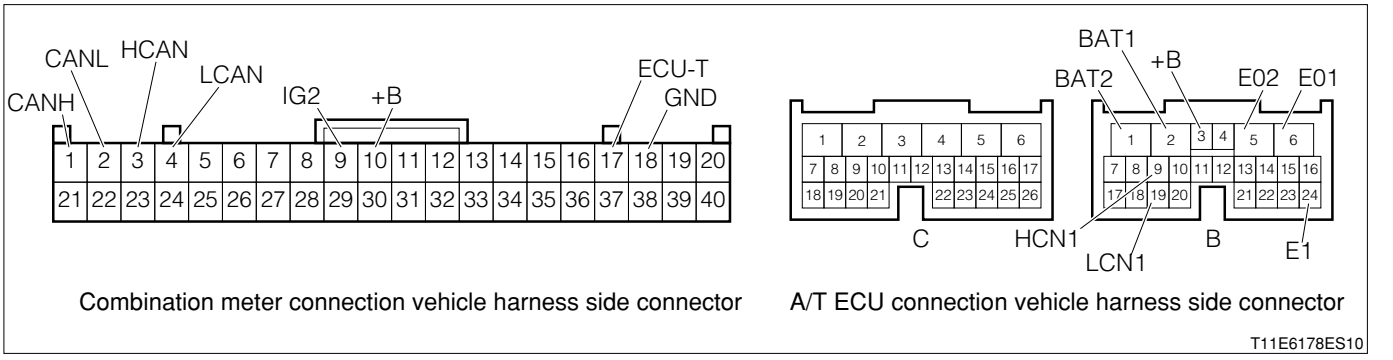
A/T ECU connection vehicle harness side connector

T11E6178ES10

2 **LHD vehicles**



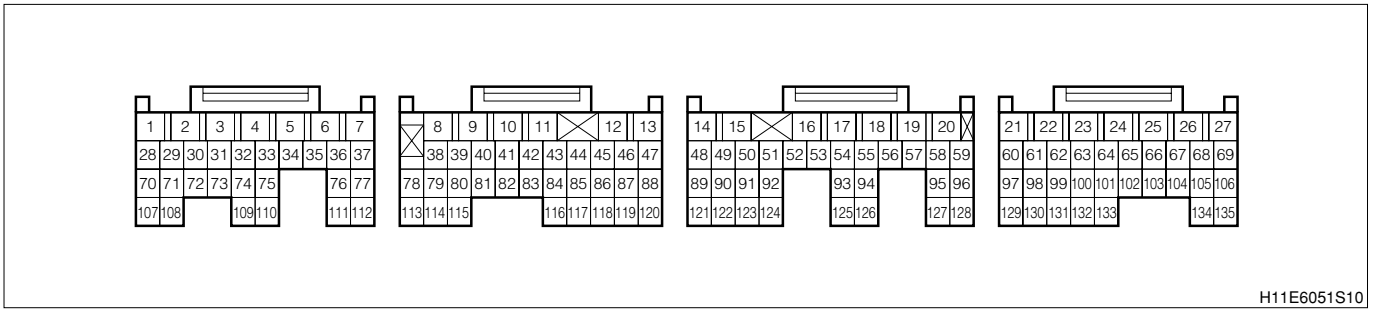
Each unit, relays connection vehicle harness side connector



Combination meter connection vehicle harness side connector

A/T ECU connection vehicle harness side connector

EFI ECU connection vehicle harness side connector



(2) Output conditions

1.When communication signal cannot be received from A/T ECU

(3) Checking points

1.Is the harness between EFI ECU - A/T ECU normal?

2.Is the A/T ECU normal?

3.Check whether there is any poor contact at the connector section.

(4) Checking method

1 **When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

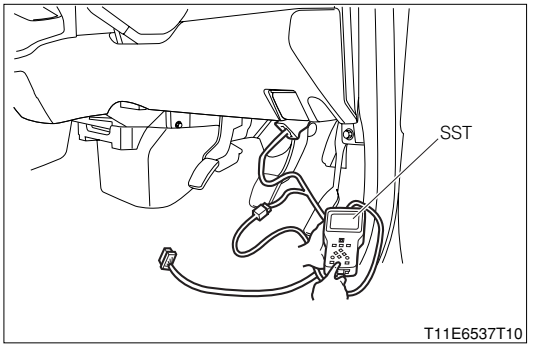
▷1. Confirmation of the diagnosis codes (Related to A/T)

1.IG switch turned "LOCK".

2.Connect the diagnosis tester to DLC.

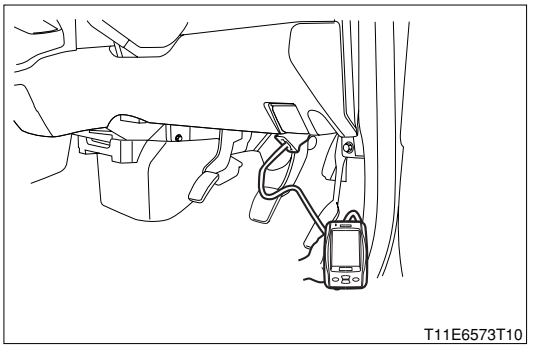
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.

(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.Confirm whether any A/T-related diagnosis code is outputted.
(No.P0705/55, No.P0705/56: Neutral start switch malfunctioning)

▼If it is outputted, go to ▷2.

▼If it is not outputted, go to ▷4.

▷2. Troubleshooting according to diagnosis code (Related to A/T)

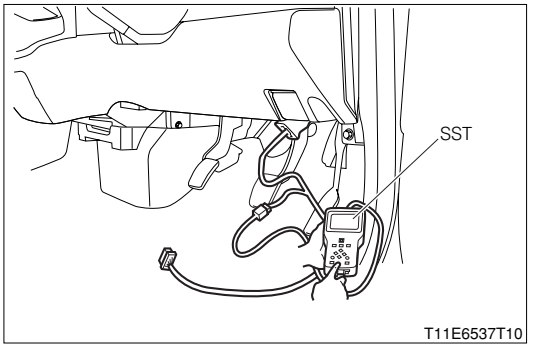
1.Perform the check and repair related to the diagnosis codes that have been outputted in ▷1.

(1) No.P0705/55: No input to neutral start switch

Refer to Page F5-35.

(2) No.P0705/56: Duplicate input to neutral start switch

Refer to Page F5-37.

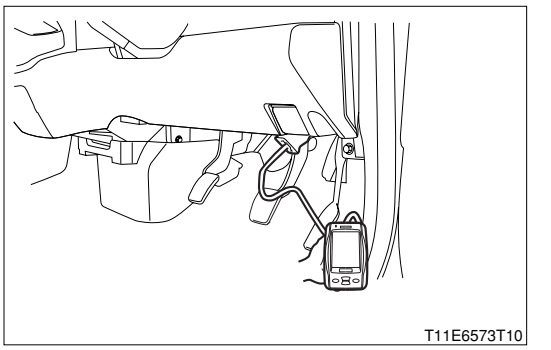


2.After completion of the repairs, connect the diagnosis tester to DLC.

(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

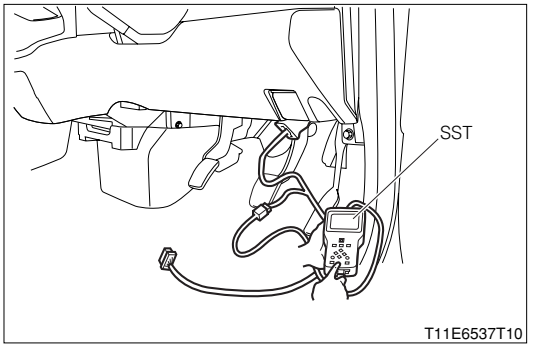
SST: 09991-87404-000

(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.


T11E6573T10

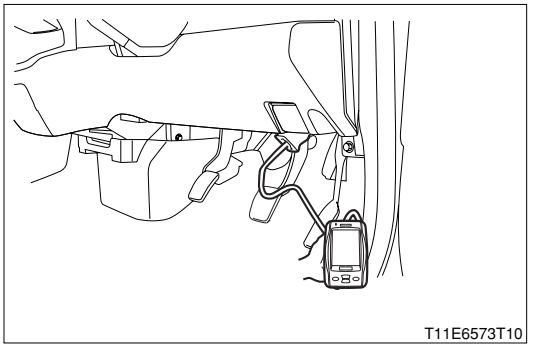
3.Confirm whether any diagnosis code related to the A/T is outputted.
▼If it is not outputted, go to ∑>3.
▼If it is outputted, perform the recheck of the diagnosis code that has been outputted.

∑>3. Reconfirmation of diagnosis code (Related to EFI)
1.Connect the diagnosis tester to DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000



T11E6537T10

(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.


T11E6573T10

2.Erase the diagnosis code of the EFI.
3.Confirm whether the diagnosis code of the EFI is outputted or not.
SPECIFIED VALUE: It is not outputted.

▼If it is OK, the EFI system is normal.
▼If it is NG, go to ∑>4.

∑>4. CAN communication basic check
1.Perform the CAN communication basic check.
Refer to Page L2-14.

▼If it is OK, go to ∑>5 for RHD vehicles.
▼If it is OK, go to ∑>6 for LHD vehicles.
▼If it is NG, repair or replace malfunctioning sections.

∑5. Check of CAN line for open wire (RHD vehicles)

1.Set the IG switch to the "LOCK" position.
2.Disconnect all of the connectors for the EFI ECU and A/T ECU.
3.Perform continuity check between the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - A/T ECU connection vehicle harness side connector B19 (LCN1)
SPECIFIED VALUE: No continuity exists

▼If it is OK, go to ∑6.
▼If it is NG, repair or replace malfunctioning sections.

∑6. Check of CAN line for open wire (LHD vehicles)

1.Set the IG switch to the "LOCK" position.
2.Disconnect all of the connectors for the EFI ECU and A/T ECU.
3.Perform continuity check between the following terminals.
(1) Between combination meter connection vehicle harness side connector 1 (CANH) - combination meter connection vehicle harness side connector 2 (CANL)
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - A/T ECU connection vehicle harness side connector B19 (LCN1)
SPECIFIED VALUE: No continuity exists

▼If it is OK, go to ∑7.
▼If it is NG, repair or replace malfunctioning sections.

∑7. Check of CAN line for short circuit

1.Perform continuity check between the following terminals.
(1) Between A/T ECU connection vehicle harness side connector B19 (LCN1) - battery positive (+) terminal
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - battery positive (+) terminal
(3) Between A/T ECU connection vehicle harness side connector B19 (LCN1) - body earth
(4) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - body earth
SPECIFIED VALUE: No continuity exists

▼If it is OK, go to ∑8.
▼If it is NG, repair or replace malfunctioning sections.

∑8. Check of EFI ECU internal resistance

1.Disconnect all of the EFI ECU connectors.
2.Measure the resistance between the following terminals.
(1) Between EFI ECU side connector 6 (CANL) - EFI ECU side connector 7 (CANH)
(2) Between EFI ECU side connector 8 (LCAN) - EFI ECU side connector 9 (HCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, go to ∑9.
▼If it is NG, replace the EFI ECU.
Refer to Page B8-1.

⊳9. Check of combination meter internal resistance

1.Disconnect the connector of the combination meter.

2.Measure the resistance between the following terminals.

(1) Between combination meter side connector 1 (CANH) - combination meter side connector 2 (CANL)

(2) Between combination meter side connector 3 (HCAN) - combination meter side connector 4 (LCAN)

SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, go to ⊳10.

▼If it is NG, replace the combination meter.

Refer to Page J3-3.

⊳10. Check of A/T ECU internal circuit

1.Disconnect all of the A/T ECU connectors.

2.Perform continuity check between the following terminals.

(1) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B19 (LCN1)

(2) Between A/T ECU side connector B10 (CANH) - A/T ECU side connector B20 (CANL)

(3) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B10 (CANH)

(4) Between A/T ECU side connector B19 (LCN1) - A/T ECU side connector B20 (CANL)

SPECIFIED VALUE:

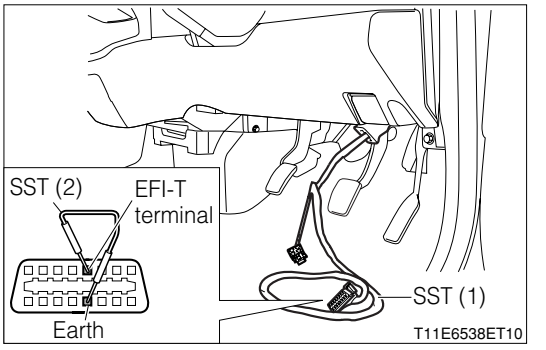
Between the measuring terminals	Continuity
Between B9 (HCN1) - B19 (LCN1)	Continuity exists (less than 1MΩ).
Between B10 (CANH) - B20 (CANL)	
Between B9 (HCN1) - B10 (CANH)	Continuity exists (1MΩ or less).
Between B19 (LCN1) - B20 (CANL)	

▼If everything is OK, perform the circuit check of the combination meter as well as the EFI ECU and A/T ECU.

▼If any one is NG, replace the A/T ECU.

Refer to Page F5-2.

2 **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**



∑1. Diagnosis code confirmation (A/T related)

1.Short-circuit the terminals 4(ECU-T) and 13 (E) of the DLC, using the SST.
SST: 09991-87404-000 (1)
09991-87403-000 (2)

2.Check to see if the diagnosis code of the A/T is outputted (No.P0705/55, No.P0705/56: Neutral start switch failure)

NOTE

- Refer to the diagnosis code output indication method of A/T.

Refer to Page F5-23

▼If it is outputted, proceed to ∑2.
▼If it is not outputted, proceed to ∑4.

∑2. Trouble shooting according to diagnosis codes (A/T related)

1.Perform checking and repairing for the diagnosis code outputted in ∑1.
(1) No.P0705/55: No input of neutral start switch
Refer to Page F5-35.

(2) No.P0705/56: Multiple input of neutral start switch
Refer to Page F5-37.

2.After repairing, short-circuit the terminals 4 (ECU-T) and 13 (E) of the DLC, using the SST.
SST: 09991-87404-000 (1)
09991-87403-000 (2)

3.Confirm that the diagnosis code of A/T is not outputted.
▼If it is not outputted, proceed to ∑3.
▼If it is outputted, perform recheck for the diagnosis code outputted.

∑3. Diagnosis code reconfirmation (EFI related)

1.Cancel the diagnosis code of the EFI.
2.After canceling, short-circuit the terminals 5 (EFI-T) and 13 (E) of the DLC, using SST.
SST: 09991-87404-000 (1)
09991-87403-000 (2)

3.Check to see if the diagnosis code of EFI is outputted.
SPECIFIED VALUE: It is not outputted.

▼If it is OK, the EFI system is normal.
▼If it is NG, proceed to ∑4.

∑4. CAN communication basic check

1.Perform basic check of the CAN communication.
Refer to Page L2-14.

▼If it is OK, go to ∑5 for RHD vehicles.
▼If it is OK, go to ∑6 for LHD vehicles.
▼If it is NG, repair or replace the defective sections.

⊃5. CAN line open wire check (RHD vehicle)

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the EFI ECU and A/T ECU.
3.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - A/T ECU connection vehicle harness side connector B19 (LCN1)
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to ⊃7.
▼If it is NG, repair or replace the defective sections.

⊃6. CAN line open wire check (LHD vehicle)

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the EFI ECU, combination meter and A/T ECU.
3.Perform continuity check between each of the following terminals.
(1) Between combination meter connection vehicle harness side connector 1 (CANH) - combination meter connection vehicle harness side connector 2 (CANl)
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - A/T ECU connection vehicle harness side connector B19 (LCN1)
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to ⊃7.
▼If it is NG, repair or replace the defective sections.

⊃7. CAN line short circuit check

1.Perform continuity check between each of the following terminals.
(1) Between A/T ECU connection vehicle harness side connector B19 (LCN1) - battery positive terminal
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - battery positive terminal
(3) Between A/T ECU connection vehicle harness side connector B19 (LCN1) - body earth
(4) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - body earth
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to ⊃8.
▼If it is NG, repair or replace the defective sections.

⊃8. EFI ECU internal resistance check

1.Remove all connectors of the EFI ECU.
2.Measure the resistance between the following terminals.
(1) Between EFI ECU side connector 6 (CANL) - EFI ECU side connector 7 (CANH)
(2) Between EFI ECU side connector 8 (LCAN) - EFI ECU side connector 9 (HCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to ⊃9.
▼If it is NG, replace the EFI ECU.
Refer to Page B8-1.

∑9. Combination meter internal resistance check

1.Remove the connectors of the combination meter.

2.Measure the resistance between the following terminals.

(1) Between combination meter side connector 1 (CANH) - combination meter side connector 2 (CANL)

(2) Between combination meter side connector 3 (HCAN) - combination meter side connector 4 (LCAN)

SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to ∑10.

▼If it is NG, replace the combination meter.

Refer to Page J3-3.

∑10. A/T ECU internal circuit check

1.Remove all the connectors of the A/T ECU.

2.Perform continuity check between each of the following terminals.

(1) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B19 (LCN1)

(2) Between A/T ECU side connector B10 (CANH) - A/T ECU side connector B20 (CANL)

(3) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B10 (CANH)

(4) Between A/T ECU side connector B19 (LCN1) - A/T ECU side connector B20 (CANL)

SPECIFIED VALUE:

Between terminals measured	Continuity
Between B9 (HCN1) - B19 (LCN1)	Continuity exists. (less than 1MΩ)
Between B10 (CANH) - B20 (CANL)	
Between B9 (HCN1) - B10 (CANH)	Continuity exists. (1Ω or less)
Between B19 (LCN1) - B20 (CANL)	

▼If everything is OK, perform the circuit check of the combination meter, EFI ECU and A/T ECU.

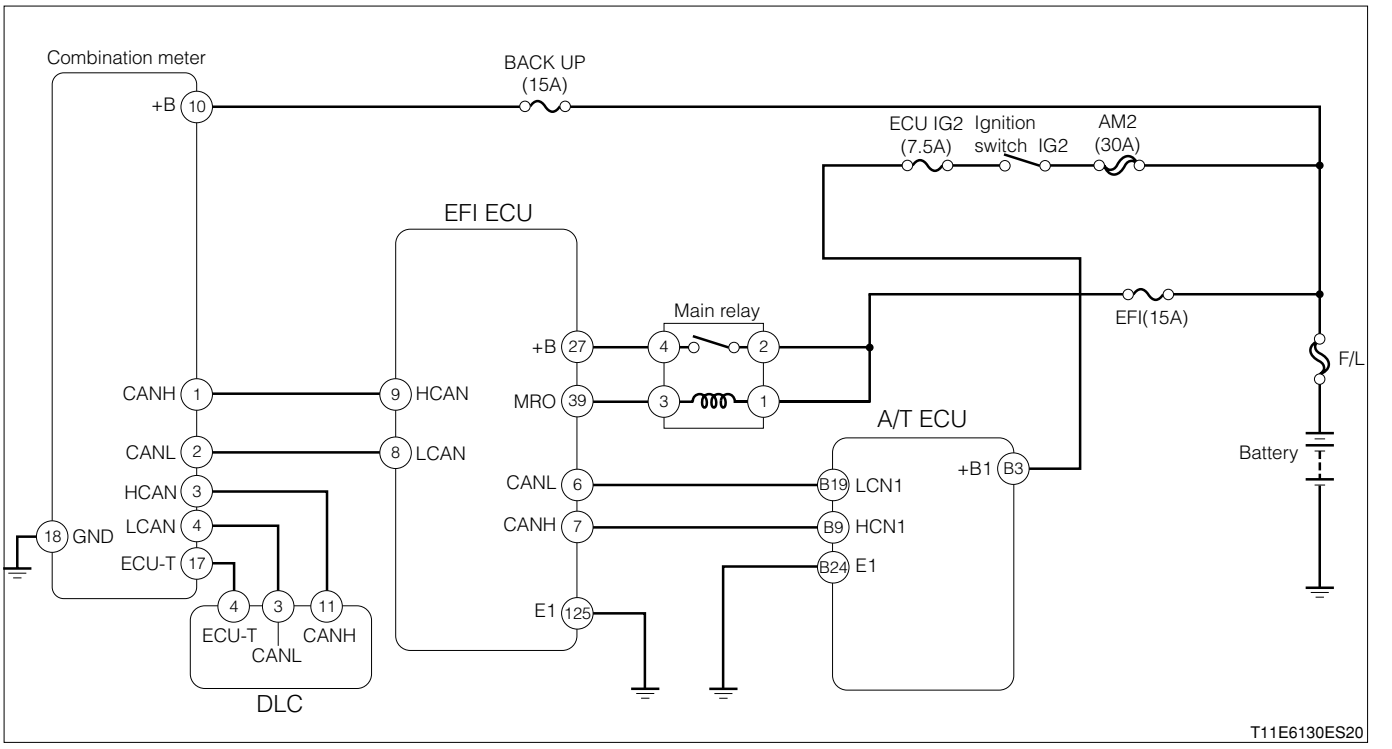
▼If even one of them is NG, replace the A/T ECU.

Refer to Page F5-2.

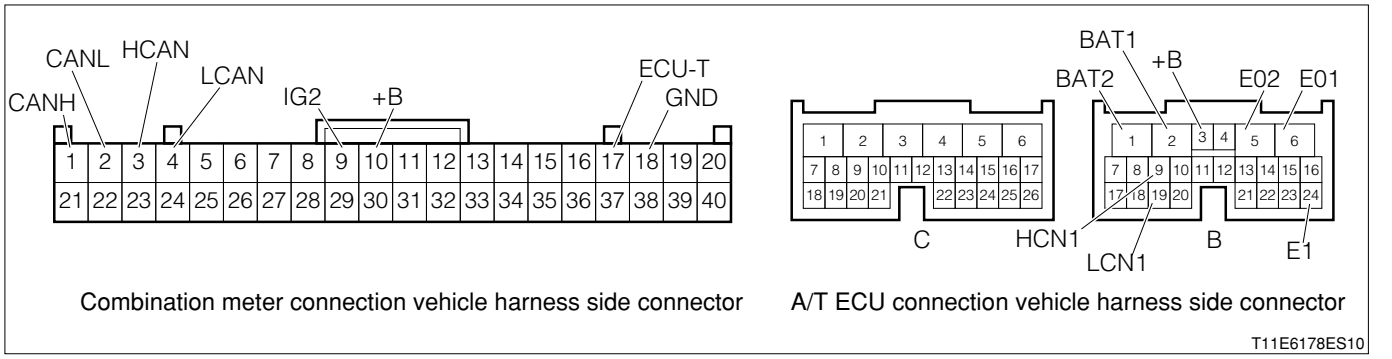
9-12-26 DTC NO. U1000/85 E-AT ABNORMAL TRANSMISSION

(1) System diagram

1 **RHD vehicles**



Each unit, relays connection vehicle harness side connector

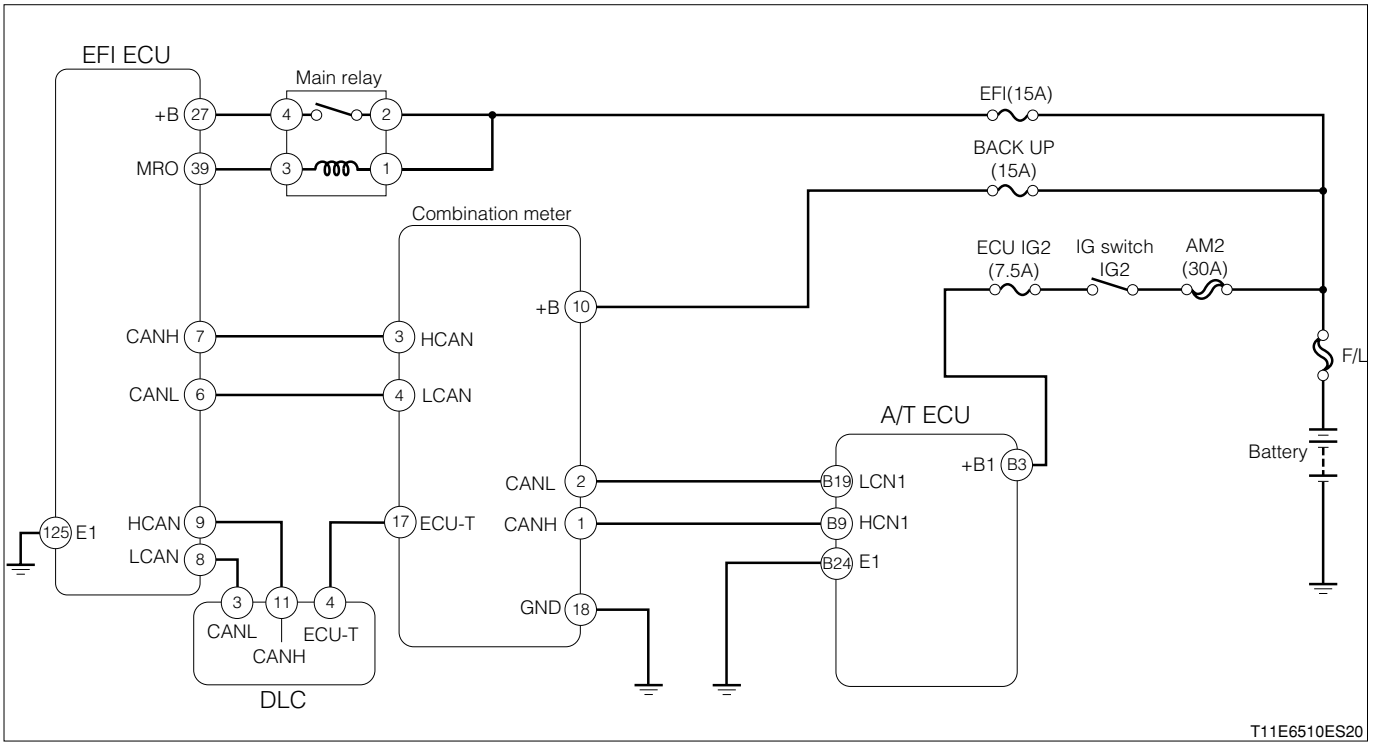


Combination meter connection vehicle harness side connector

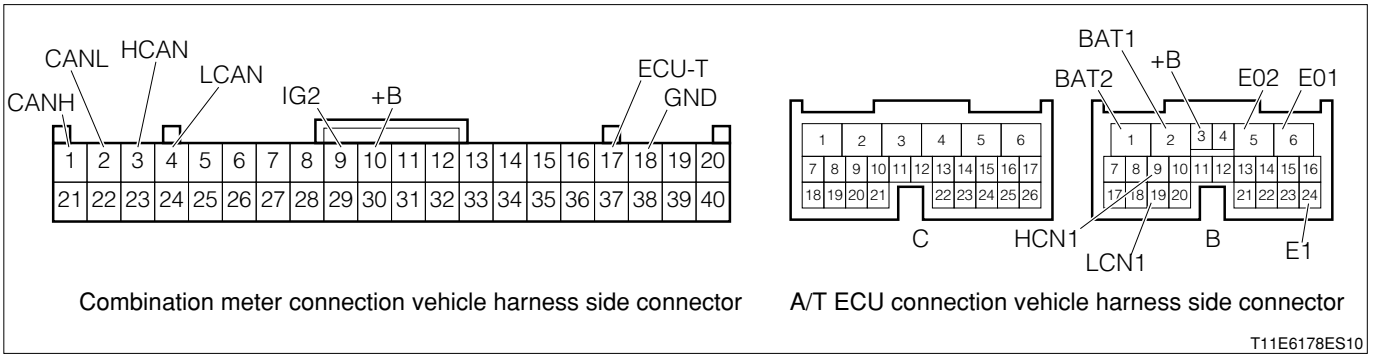
A/T ECU connection vehicle harness side connector

T11E6178ES10

2 **LHD vehicles**



Each unit, relays connection vehicle harness side connector

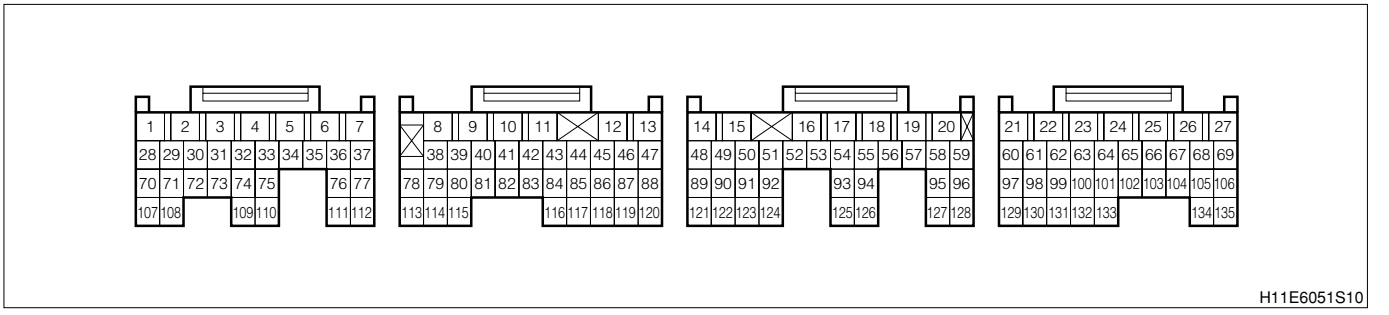


Combination meter connection vehicle harness side connector

A/T ECU connection vehicle harness side connector

T11E6178ES10

EFI ECU connection vehicle harness side connector



H11E6051S10

(2) Output conditions

1.When communication signal cannot be sent from EFI ECU to A/T ECU

(3) Checking points

1.Is the harness between EFI ECU - A/T ECU normal?

2.Is the A/T ECU normal?

3.Check whether there is any poor contact at the connector section.

(4) Checking method

1 **When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

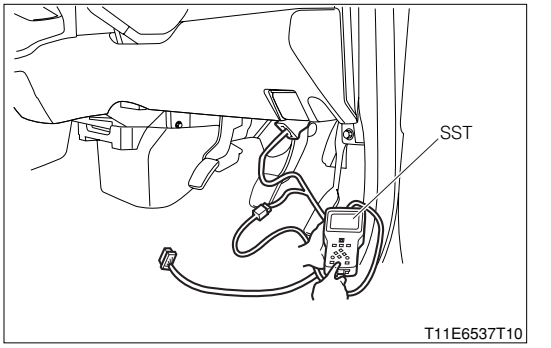
▷1. Confirmation of diagnosis code (Related to EFI)

1.IG switch turned "LOCK".

2.Connect the diagnosis tester to DLC.

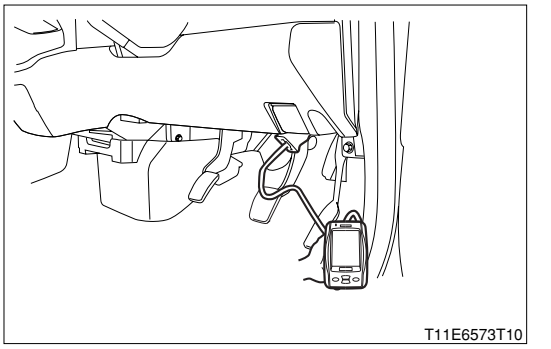
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.

(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.Check to see if the EFI related diagnosis code is outputted other than No.U1000/85.

▼If it is outputted, proceed to ▷2.

▼If it is not outputted, proceed to ▷4.

▷2. Troubleshooting according to diagnosis code (Related to EFI)

1.Perform the check and repair related to the diagnosis codes that have been outputted in ▷1.

Refer to Page B8-292.

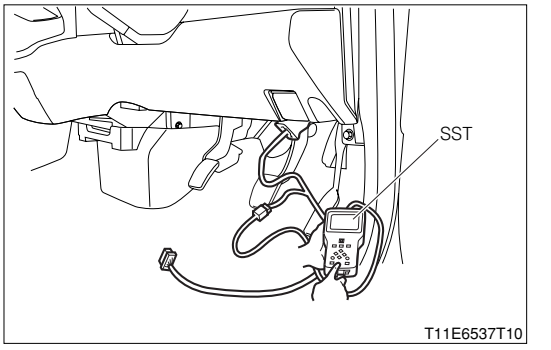
2.After completion of the repairs, connect the DS-21 diagnosis tester to toe DLC, using the SST.

SST: 09991-87404-000

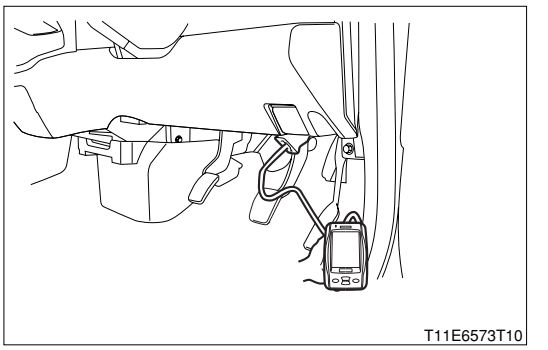
3.After completion of the repairs, connect the diagnosis tester to DLC.

(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000



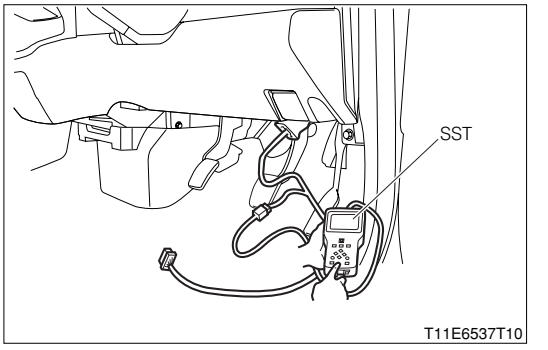
(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.


T11E6573T10

4.Confirm that the diagnosis code that has been outputted in ∑>1 is not outputted.
SPECIFIED VALUE: It is not outputted.

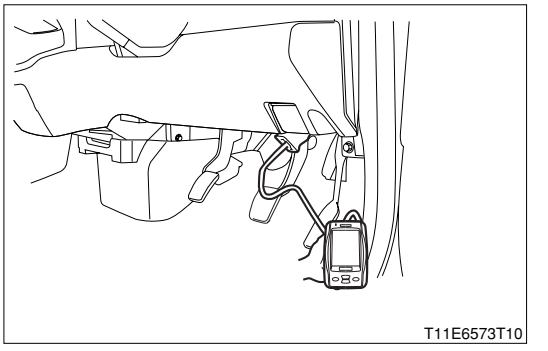
▼If it is OK, go to ∑>3.
▼If it is NG, perform the recheck of the diagnosis code that has been outputted.

∑>3. Reconfirmation of diagnosis code (Related to EFI)
1.Connect the diagnosis tester to DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000



T11E6537T10

(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.


T11E6573T10

2.Erase the diagnosis code of the EFI.
3.Confirm whether the diagnosis code of the EFI is outputted.
SPECIFIED VALUE: It is not outputted.

▼If it is OK, the EFI system is normal.
▼If it is NG, go to ∑>4.

∑>4. CAN communication basic check
1.Perform the CAN communication basic check.
Refer to Page L2-14.

▼If it is OK, go to ∑>5 for RHD vehicles.
▼If it is OK, go to ∑>6 for LHD vehicles.
▼If it is NG, repair or replace malfunctioning sections.

∑5. Check of CAN line for open wire

1.Set the IG switch to the "LOCK" position.
2.Disconnect all of the connectors for the EFI ECU and A/T ECU.
3.Perform continuity check between the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - A/T ECU connection vehicle harness side connector B19 (LCN1)
SPECIFIED VALUE: No continuity exists

▼If it is OK, go to ∑6.
▼If it is NG, repair or replace malfunctioning sections.

∑6. Check of CAN line for short circuit

1.Perform continuity check between the following terminals.
(1) Between A/T ECU connection vehicle harness side connector B19 (LCN1) - battery positive (+) terminal
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - battery positive (+) terminal
(3) Between A/T ECU connection vehicle harness side connector B19 (LCN1) - body earth
(4) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - body earth
SPECIFIED VALUE: No continuity exists

▼If it is OK, go to ∑7.
▼If it is NG, repair or replace malfunctioning sections.

∑7. Check of EFI ECU internal resistance

1.Disconnect all of the EFI ECU connectors.
2.Measure the resistance between the following terminals.
(1) Between EFI ECU side connector 6 (CANL) - EFI ECU side connector 7 (CANH)
(2) Between EFI ECU side connector 8 (LCAN) - EFI ECU side connector 9 (HCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, go to ∑8.
▼If it is NG, replace the EFI ECU.
Refer to Page B8-1.

∑8. Check of combination meter internal resistance

1.Disconnect the connector of the combination meter.
2.Measure the resistance between the following terminals.
(1) Between combination meter side connector 1 (CANH) - combination meter side connector 2 (CANL)
(2) Between combination meter side connector 3 (HCAN) - combination meter side connector 4 (LCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, go to ∑9.
▼If it is NG, replace the combination meter.
Refer to Page J3-3.

⊳9. Check of A/T ECU internal circuit

1.Disconnect the A/T ECU connectors.

2.Perform continuity check between the following terminals.

(1) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B19 (LCN1)

(2) Between A/T ECU side connector B10 (CANH) - A/T ECU side connector B20 (CANL)

(3) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B10 (CANH)

(4) Between A/T ECU side connector B19 (LCN1) - A/T ECU side connector B20 (CANL)

SPECIFIED VALUE:

Between the measuring terminals	Continuity
Between B9 (HCN1) - B19 (LCN1)	Continuity exists (less than 1MΩ).
Between B10 (CANH) - B20 (CANL)	
Between B9 (HCN1) - B10 (CANH)	Continuity exists (1MΩ or less).
Between B19 (LCN1) - B20 (CANL)	

▼If everything is OK, perform the circuit check of the combination meter as well as the EFI ECU and A/T ECU.

▼If any one is NG, replace the A/T ECU.

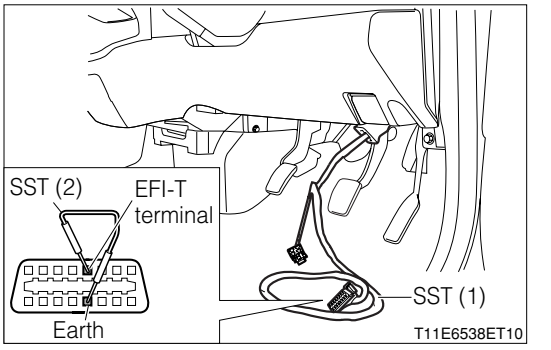
Refer to Page F5-2.

2 **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

∑1. Diagnosis code confirmation (EFI related)

1.Short-circuit the terminals 5 (EFI-T) and 13 (E) of the DLC, using the SST.
SST: 09991-87404-000 (1)
09991-87403-000 (2)

2.Check to see if the EFI related diagnosis code is outputted other than No.U1000/85.
▼If it is outputted, proceed to ∑2.
▼If it is not outputted, proceed to ∑4.



∑2. Trouble shooting according to diagnosis code (EFI related)

1.Perform trouble shooting for the diagnosis code outputted in ∑1.
Refer to Page B8-292.

2.After repairing, short-circuit the terminals 5 (EFI-T) and 13 (E) of the DLC, using the SST.
SST: 09991-87404-000 (1)
09991-87403-000 (2)

3.Confirm that the diagnosis code outputted in ∑1) is not outputted.
SPECIFIED VALUE: It is not outputted.

▼If it is OK, proceed to ∑3.
▼If it is NG, perform recheck for the diagnosis code outputted.

∑3. Diagnosis code reconfirmation (EFI related)

1.Cancel the diagnosis code of the EFI.
2.After canceling, short-circuit the terminals 5 (EFI-T) and 13 (E) of the DLC, using the SST.
SST: 09991-87404-000 (1)
09991-87403-000 (2)

3.Confirm that the diagnosis code of the EFI is outputted.
SPECIFIED VALUE: It is not outputted.

▼If it is OK, the EFI system is normal.
▼If it is NG, proceed to ∑4.

∑4. CAN communication basic check

1.Perform basic check of the CAN communication.
Refer to Page L2-14.

▼If it is OK, go to ∑5 for RHD vehicles.
▼If it is OK, go to ∑6 for LHD vehicles.
▼If it is NG, repair or replace the defective sections.

∑5. CAN line open wire check (RHD vehicle)

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the EFI ECU and A/T ECU.
3.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - A/T ECU connection vehicle harness side connector B19 (LCN1)
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to ∑7.
▼If it is NG, repair or replace the defective sections.

∑6. CAN line open wire check (LHD vehicles)

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the combination meter and A/T ECU.
3.Perform continuity check between each of the following terminals.
(1) Between combination meter connection vehicle harness side connector 1 (CANH) - combination meter connection vehicle harness side connector 2 (CANL)
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - A/T ECU connection vehicle harness side connector B19 (LCN1)
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to ∑7.
▼If it is NG, repair or replace the defective sections.

∑7. CAN line short circuit check

1.Perform continuity check between each of the following terminals.
(1) Between A/T ECU connection vehicle harness side connector B19 (LCN1) - battery positive terminal
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - battery positive terminal
(3) Between A/T ECU connection vehicle harness side connector B19 (LCN1) - body earth
(4) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - body earth
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to ∑8.
▼If it is NG, repair or replace the defective sections.

∑8. EFI ECU internal resistance check

1.Remove all connectors of the EFI ECU.
2.Measure the resistance between the following terminals.
(1) Between EFI ECU side connector 6 (CANL) - EFI ECU side connector 7 (CANH)
(2) Between EFI ECU side connector 8 (LCAN) - EFI ECU side connector 9 (HCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to ∑9.
▼If it is NG, replace the EFI ECU.
Refer to Page B8-1.

⊳9. Combination meter internal resistance check

1.Remove the connectors of the combination meter.

2.Measure the resistance between the following terminals.

(1) Between combination meter side connector 1 (CANH) - combination meter side connector 2 (CANL)

(2) Between combination meter side connector 3 (HCAN) - combination meter side connector 4 (LCAN)

SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to ⊳10.

▼If it is NG, replace the combination meter.

Refer to Page J3-3.

⊳10. A/T ECU internal circuit check

1.Remove all the connectors of the A/T ECU.

2.Perform continuity check between each of the following terminals.

(1) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B19 (LCN1)

(2) Between A/T ECU side connector B10 (CANH) - A/T ECU side connector B20 (CANL)

(3) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B10 (CANH)

(4) Between A/T ECU side connector B19 (LCN1) - A/T ECU side connector B20 (CANL)

SPECIFIED VALUE:

Between terminals measured	Continuity
Between B9 (HCN1) - B19 (LCN1)	Continuity exists. (less than 1MΩ)
Between B10 (CANH) - B20 (CANL)	
Between B9 (HCN1) - B10 (CANH)	Continuity exists. (1Ω or less)
Between B19 (LCN1) - B20 (CANL)	

▼If everything is OK, perform the circuit check of the combination meter, EFI ECU and A/T ECU

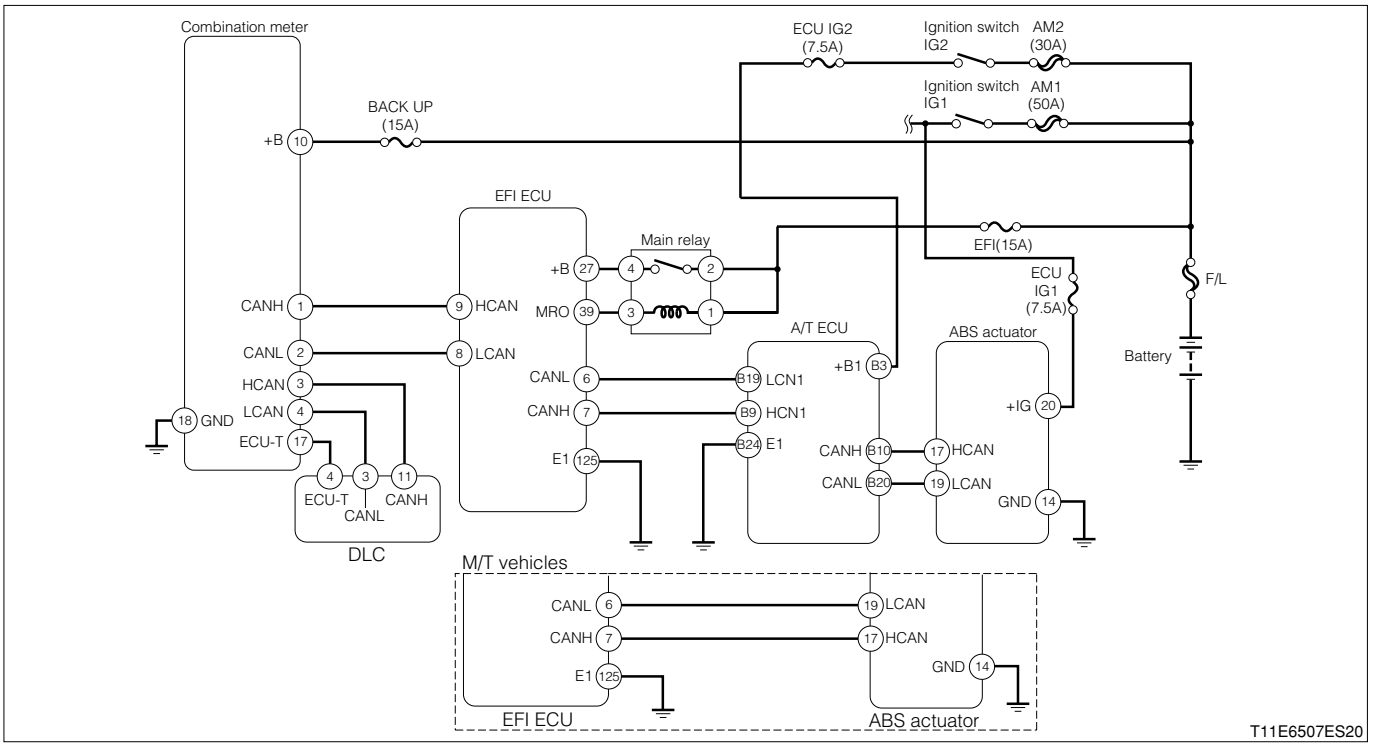
▼If even one of them is NG, replace the A/T ECU.

Refer to Page F5-2.

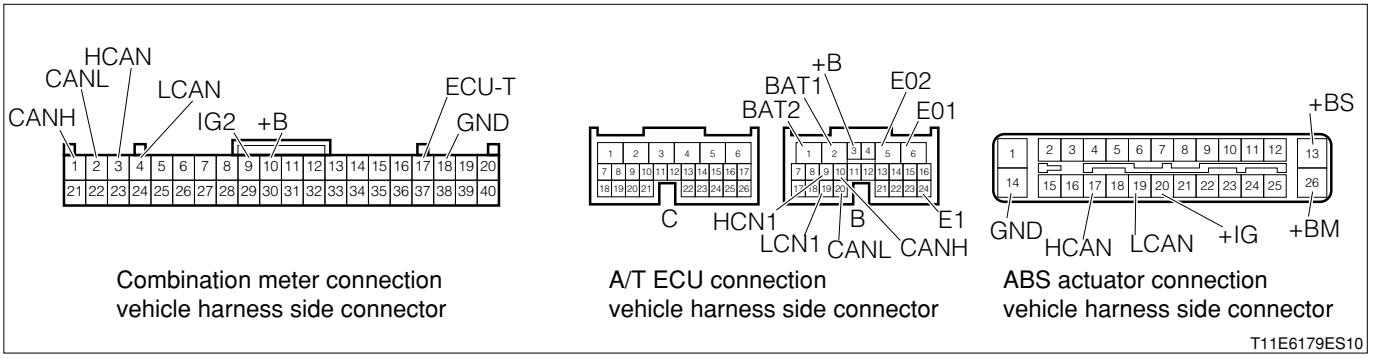
9-12-27 DTC NO.U0121/86 ABS COMMUNICATION FAILURE

(1) System diagram

1 **RHD vehicles**



Each unit, relays connection vehicle harness side connector



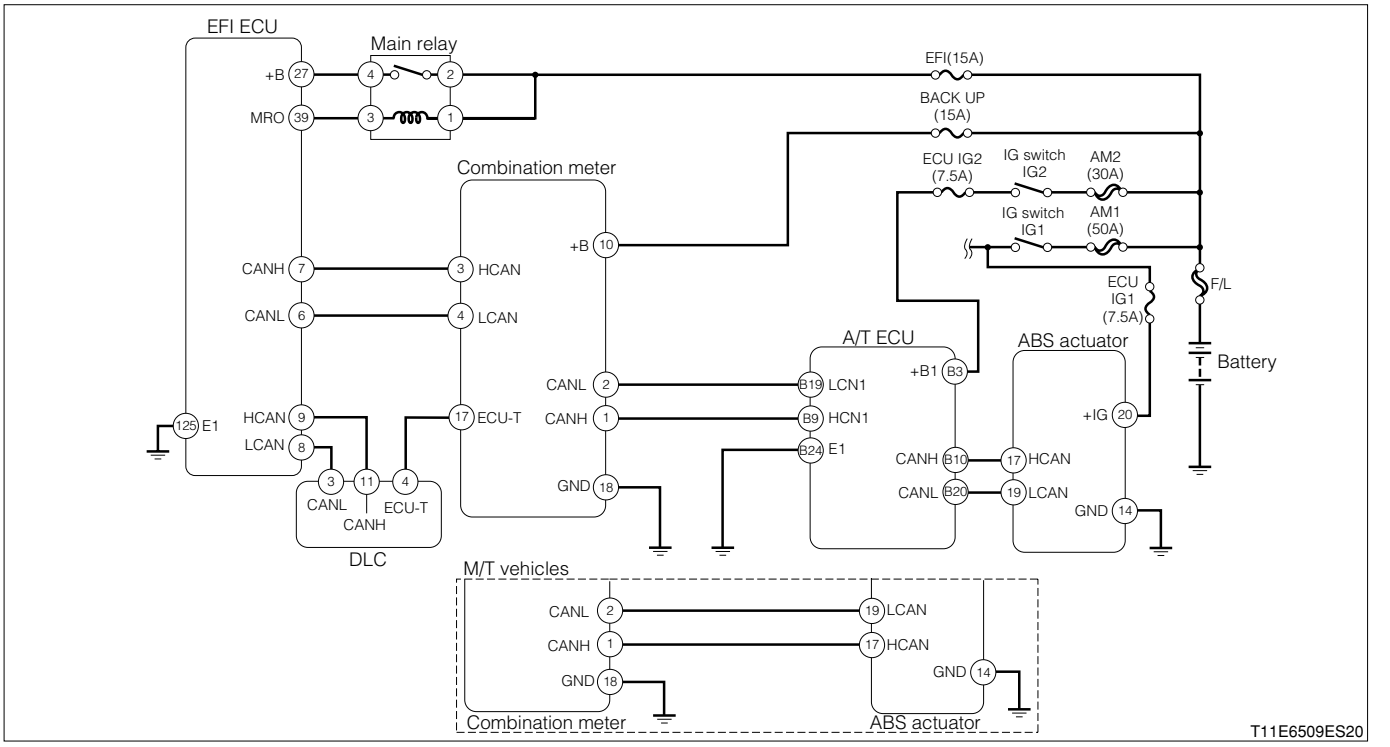
Combination meter connection vehicle harness side connector

A/T ECU connection vehicle harness side connector

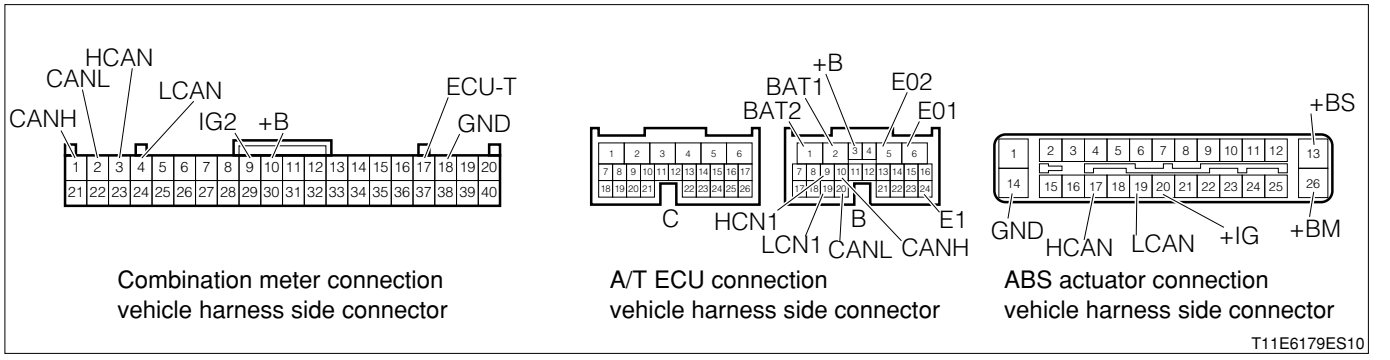
ABS actuator connection vehicle harness side connector

T11E6179ES10

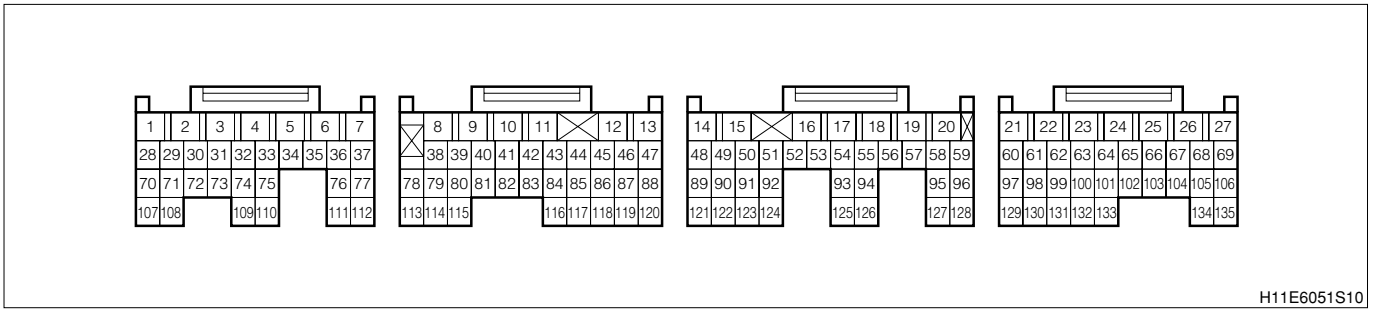
2 **LHD vehicles**



Each unit, relays connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Output conditions

1.When communication signal cannot be received from ABS EFI ECU

(3) Checking points

1.Is the harness between EFI ECU - ABS ECU normal?

2.Is the ABS actuator normal?

3.Check whether there is any poor contact at the connector section.

(4) Checking method

1 **When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

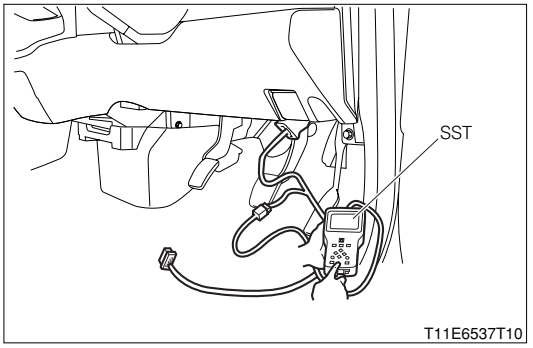
▷1. Diagnosis code confirmation (ABS related)

1.IG switch turned "LOCK".

2.Connect the diagnosis tester to DLC.

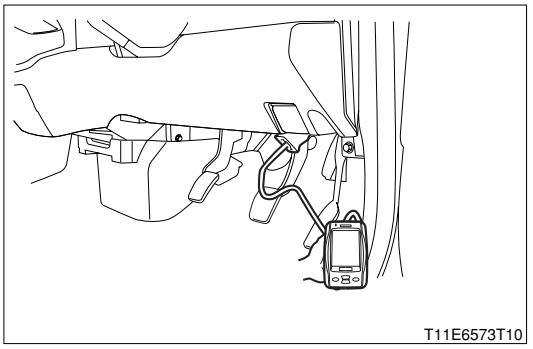
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.

(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.Check to see if the diagnosis code of the ABS is outputted.

(No.C0200/21 - No.C0215/24: short circuit or open wire of wheel speed sensor, No.C1235/25 - No.C1239/28: period abnormality of wheel speed sensor, No.C1237/29: Rotor tooth missing abnormality)

▼If it is outputted, proceed to ▷2.

▼If it is not outputted, proceed to ▷4.

▷2. Trouble shooting according to diagnosis code (ABS related)

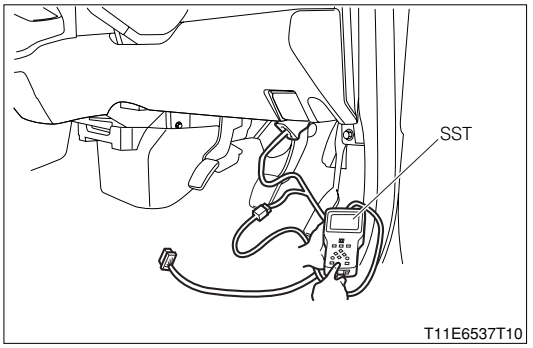
1.Perform trouble shooting for the diagnosis code outputted in ▷1.

Refer to Page E3-28.

2.After completion of the repairs, connect the diagnosis tester to DLC.

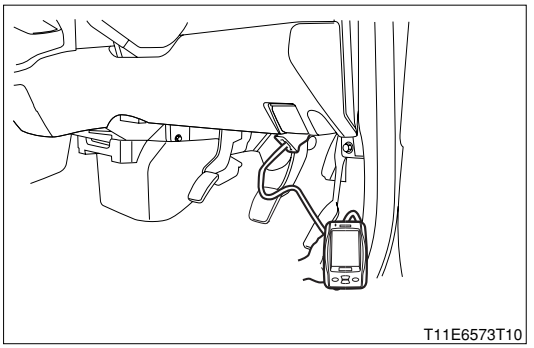
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000

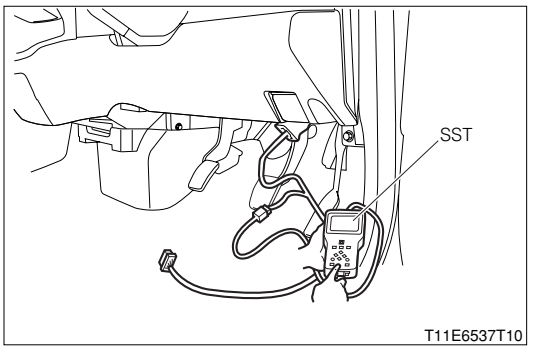


(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.

(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.

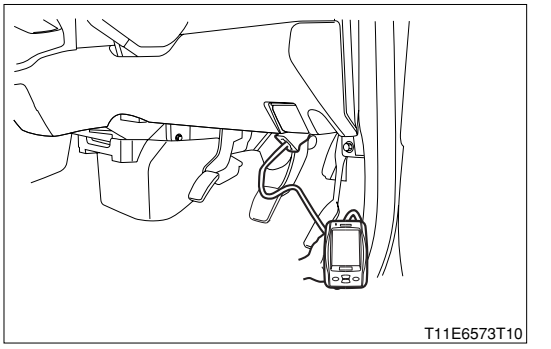


3.Confirm that the diagnosis code of ABS is not outputted.
▼If it is not outputted, proceed to ⊃3.
▼If it is outputted, perform recheck for the diagnosis code outputted.



⊃3. Diagnosis code reconfirmation (EFI related)
1.Connect the diagnosis tester to DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000

(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



2.Cancel the diagnosis code of the EFI.
3.Check to see if the diagnosis code of EFI is outputted.
SPECIFIED VALUE: Perform basic check of the CAN communication.

▼If it is OK, proceed to ⊃5.
▼If it is NG, repair or replace the defective sections.

⊃4. CAN communication basic check
1.Perform basic check of the CAN communication.
Refer to Page L2-14.

▼If it is OK, go to ⊃5 for RHD vehicles.
▼If it is OK, go to ⊃6 for LHD vehicles.
▼If it is NG, repair or replace the defective sections.

⊳5. CAN line open wire check (RHD vehicles)

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the EFI ECU, A/T ECU and ABS actuator.
3.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - A/T ECU connection vehicle harness side connector B19 (LCN1)
(3) Between A/T ECU connection vehicle harness side connector B10 (CANH) - A/T ECU connection vehicle harness side connector B20 (CANL)
(4) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - ABS actuator connection vehicle harness side connector 19 (LCAN)

SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to ⊳7.
▼If it is NG, repair or replace the defective sections.

⊳6. CAN line open wire check (LHD vehicles)

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the combination meter, A/T ECU and ABS actuator.
3.Perform continuity check between each of the following terminals.
(1) Between combination meter connection vehicle harness side connector 1 (CANH) - combination meter connection vehicle harness side connector 2 (CANL)
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - A/T ECU connection vehicle harness side connector B19 (LCN1)
(3) Between A/T ECU connection vehicle harness side connector B10 (CANH) - A/T ECU connection vehicle harness side connector B20 (CANL)
(4) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - ABS actuator connection vehicle harness side connector 19 (LCAN)

SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to ⊳7.
▼If it is NG, repair or replace the defective sections.

⊳7. CAN line short circuit check

1.Perform continuity check between each of the following terminals.
(1) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - battery positive terminal
(2) Between ABS actuator connection vehicle harness side connector 19 (LCAN) - battery positive terminal
(3) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - body earth
(4) Between ABS actuator connection vehicle harness side connector 19 (LCAN) - body earth

SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to ⊳8.
▼If it is NG, repair or replace the defective sections.

∑8. EFI ECU internal resistance check

1.Remove all connectors of the EFI ECU.
2.Measure the resistance between the following terminals.
(1) Between ABS actuator connection vehicle harness side connector 19 (LCAN) - battery positive terminal
(2) Between EFI ECU side connector 8 (LCAN) - EFI ECU side connector 9 (HCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to ∑9.
▼If it is NG, replace the EFI ECU.
Refer to Page B8-1.

∑9. Combination meter internal resistance check

1.Remove the connectors of the combination meter.
2.Measure the resistance between the following terminals.
(1) Between combination meter side connector 1 (CANH) - combination meter side connector 2 (CANL)
(2) Between combination meter side connector 3 (HCAN) - combination meter side connector 4 (LCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to ∑10.
▼If it is NG, replace the combination meter.
Refer to Page J3-3.

∑10. ABS actuator internal circuit check

1.Remove all the connectors of the ABS actuator.
2.Perform continuity check between each of the following terminals.
(1) Between ABS actuator side connector 17 (HCAN) - ABS actuator side connector 19 (LCAN)
SPECIFIED VALUE: Continuity exists. (Less than 1MΩ)

▼If it is OK, proceed to ∑11.
▼If it is NG, replace the ABS actuator.
Refer to Page E3-1.

⊳11. A/T ECU internal circuit check

1.Remove all the connectors of the A/T ECU.

2.Perform continuity check between each of the following terminals.

(1) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B19 (LCN1)

(2) Between A/T ECU side connector B10 (CANH) - A/T ECU side connector B20 (CANL)

(3) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B10 (CANH)

(4) Between A/T ECU side connector B19 (LCN1) - A/T ECU side connector B20 (CANL)

SPECIFIED VALUE:

Between terminals measured	Continuity
Between B9 (HCN1) - B19 (LCN1)	Continuity exists. (less than 1MΩ)
Between B10 (CANH) - B20 (CANL)	
Between B9 (HCN1) - B10 (CANH)	Continuity exists. (1Ω or less)
Between B19 (LCN1) - B20 (CANL)	

▼If everything is OK, perform the circuit check of the combination meter, EFI ECU and A/T ECU

▼If even one of them is NG, replace the A/T ECU.

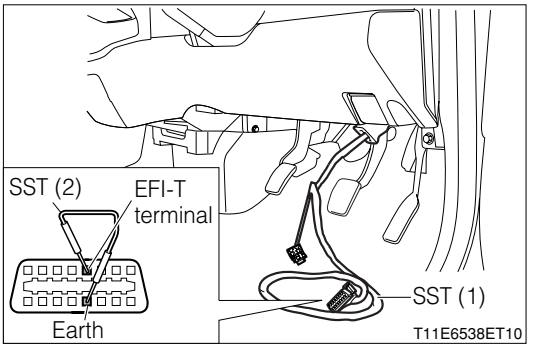
Refer to Page F5-2.

2 **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

⊳1. Diagnosis code confirmation (ABS related)

1.Short-circuit the terminals 4 (ECU-T) and 13 (E) of the DLC, using the SST.
SST: 09991-87404-000 (1)
09991-87403-000 (2)

2.Check to see if the diagnosis code of the ABS is outputted (No.C0210/21 - No.C0215/24: short circuit or open wire of wheel speed sensor, No.C1235/25 - No.C1239/28: period abnormality of wheel speed sensor, No.C1237/29: Rotor tooth missing abnormality)



NOTE

- Refer to the diagnosis code output indication method of ABS.

Refer to Page E3-19.

▼If it is outputted, proceed to ⊳2.
▼If it is not outputted, proceed to ⊳4.

⊳2. Trouble shooting according to diagnosis code (ABS related)

1.Perform trouble shooting for the diagnosis code outputted in ⊳1.
Refer to Page E3-28.

2.After repairing, short-circuit the terminals 4 (ECU-T) and 13 (E) of the DLC, using the SST.
SST: 09991-87404-000 (1)
09991-87403-000 (2)

3.Confirm that the diagnosis code of ABS is not outputted.
▼If it is not outputted, proceed to ⊳3.
▼If it is outputted, perform recheck for the diagnosis code outputted.

⊳3. Diagnosis code reconfirmation (EFI related)

1.Cancel the diagnosis code of the EFI.
2.After canceling, short-circuit the terminals 5 (EFI-T) and 13 (E) of the DLC, using SST.
SST: 09991-87404-000 (1)
09991-87403-000 (2)

3.Check to see if the diagnosis code of EFI is outputted.
SPECIFIED VALUE: It is not outputted.

▼If it is OK, the EFI system is normal.
▼If it is NG, proceed to ⊳4.

⊳4. CAN communication basic check

1.Perform basic check of the CAN communication.
Refer to Page L2-14.

▼If it is OK, go to ⊳5 for RHD vehicles.
▼If it is OK, go to ⊳6 for LHD vehicles.
▼If it is NG, repair or replace the defective sections.

⊳5. CAN line open wire check (RHD vehicles)

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the EFI ECU, A/T ECU and ABS actuator.
3.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - A/T ECU connection vehicle harness side connector B19 (LCN1)
(3) Between A/T ECU connection vehicle harness side connector B10 (CANH) - A/T ECU connection vehicle harness side connector B20 (CANL)
(4) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - ABS actuator connection vehicle harness side connector 19 (LCAN)

SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to ⊳7.
▼If it is NG, repair or replace the defective sections.

⊳6. CAN line open wire check (LHD vehicles)

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the combination meter, A/T ECU and ABS actuator.
3.Perform continuity check between each of the following terminals.
(1) Between combination meter connection vehicle harness side connector 1 (CANH) - vombination meter connection vehicle harness side connector 2 (CANL)
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - A/T ECU connection vehicle harness side connector B19 (LCN1)
(3) Between A/T ECU connection vehicle harness side connector B10 (CANH) - A/T ECU connection vehicle harness side connector B20 (CANL)
(4) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - ABS actuator connection vehicle harness side connector 19 (LCAN)

SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to ⊳7.
▼If it is NG, repair or replace the defective sections.

⊳7. CAN line short circuit check

1.Perform continuity check between each of the following terminals.
(1) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - battery positive terminal
(2) Between ABS actuator connection vehicle harness side connector 19 (LCAN) - battery positive terminal
(3) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - body earth
(4) Between ABS actuator connection vehicle harness side connector 19 (LCAN) - body earth

SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to ⊳8.
▼If it is NG, repair or replace the defective sections.

⊳8. EFI ECU internal resistance check

1.Remove all connectors of the EFI ECU.
2.Measure the resistance between the following terminals.
(1) Between EFI ECU side connector 6 (CANL) - EFI ECU side connector 7 (CANH)
(2) Between EFI ECU side connector 8 (LCAN) - EFI ECU side connector 9 (HCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to ⊳9.
▼If it is NG, replace the EFI ECU.
Refer to Page B8-1.

⊳9. Combination meter internal resistance check

1.Remove the connectors of the combination meter.
2.Measure the resistance between the following terminals.
(1) Between combination meter side connector 1 (CANH) - combination meter side connector 2 (CANL)
(2) Between combination meter side connector 3 (HCAN) - combination meter side connector 4 (LCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to ⊳10.
▼If it is NG, replace the combination meter.
Refer to Page J3-3.

⊳10. ABS actuator internal circuit check

1.Remove all the connectors of the ABS actuator.
2.Perform continuity check between each of the following terminals.
(1) Between ABS actuator side connector 17 (HCAN) - ABS actuator side connector 19 (LCAN)
SPECIFIED VALUE: Continuity exists. (less than 1MΩ)

▼If it is OK, proceed to ⊳11.
▼If it is NG, replace the ABS actuator.
Refer to Page E3-1.

⊳11. A/T ECU internal circuit check

1.Remove all the connectors of the A/T ECU.
2.Perform continuity check between each of the following terminals.
(1) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B19 (LCN1)
(2) Between A/T ECU side connector B10 (CANH) - A/T ECU side connector B20 (CANL)
(3) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B10 (CANH)
(4) Between A/T ECU side connector B19 (LCN1) - A/T ECU side connector B20 (CANL)
SPECIFIED VALUE:

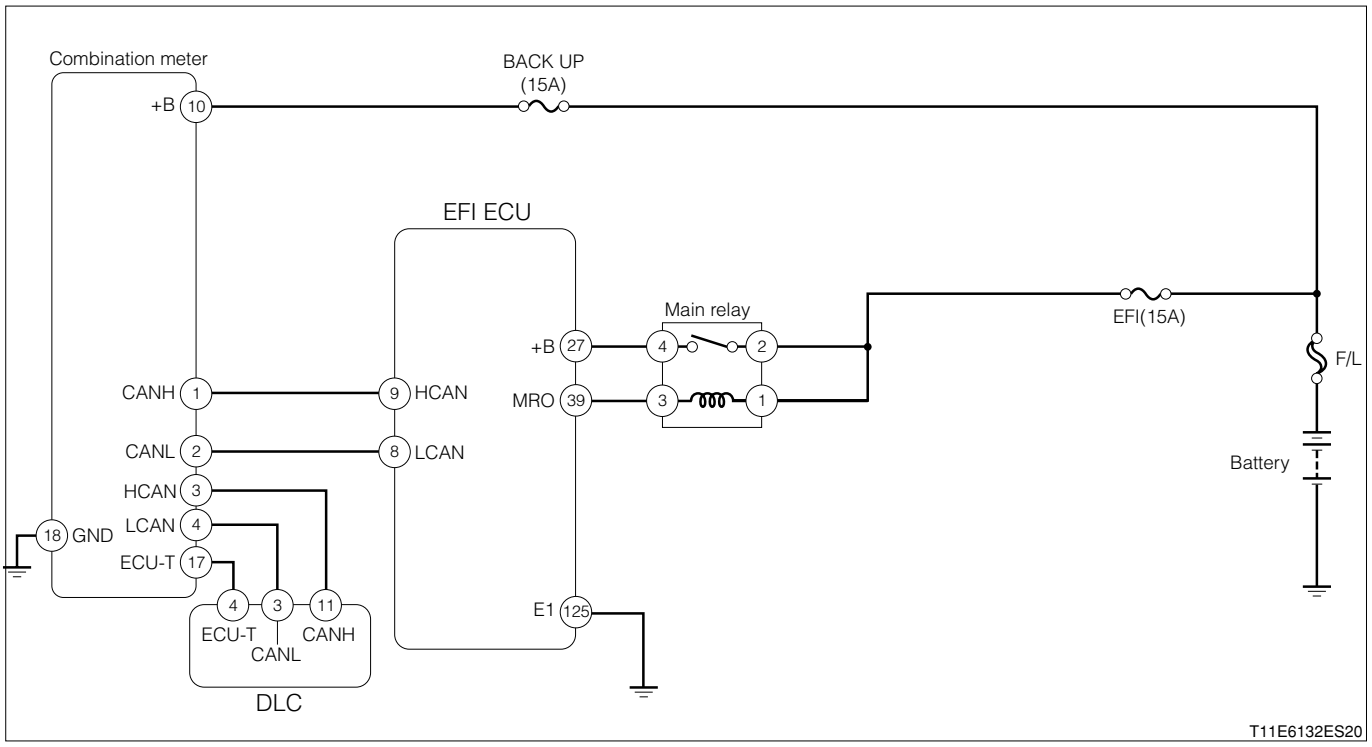
Between terminals measured	Continuity
Between B9 (HCN1) - B19 (LCN1)	Continuity exists. (less than 1MΩ)
Between B10 (CANH) - B20 (CANL)	
Between B9 (HCN1) - B10 (CANH)	Continuity exists. (1Ω or less)
Between B19 (LCN1) - B20 (CANL)	

▼If everything is OK, perform the circuit check of the combination meter, EFI ECU and A/T ECU
▼If even one of them is NG, replace the A/T ECU.
Refer to Page F5-2.

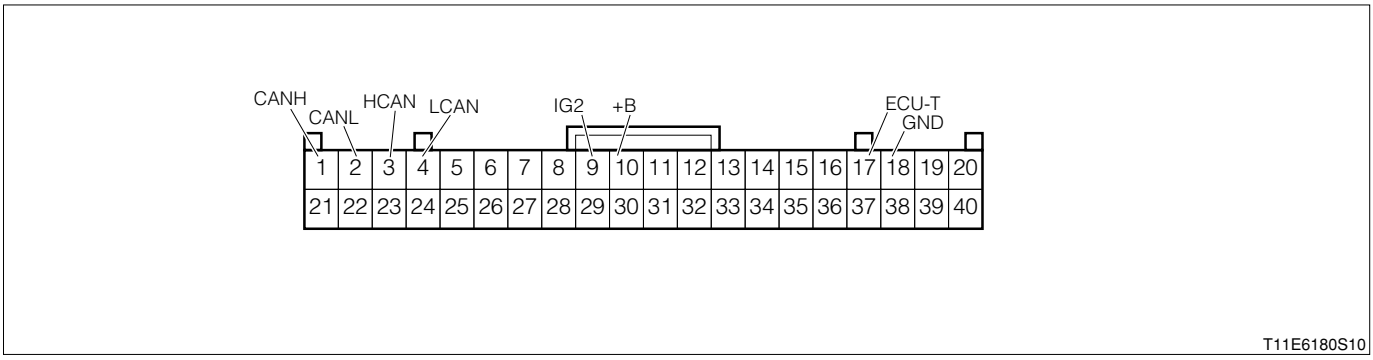
9-12-28 DTC NO.U0156/87 COMBINATION METER COMMUNICATION FAILURE

(1) System diagram

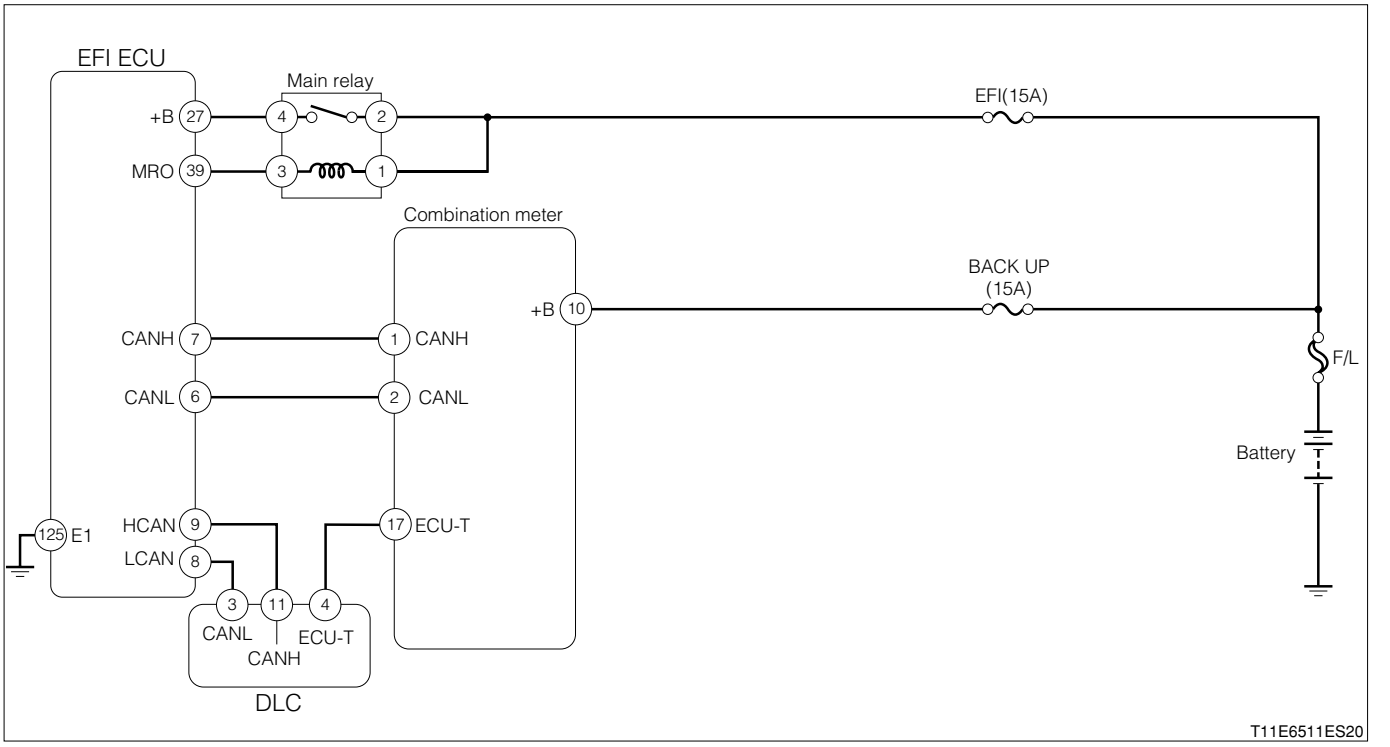
1 **RHD vehicles**



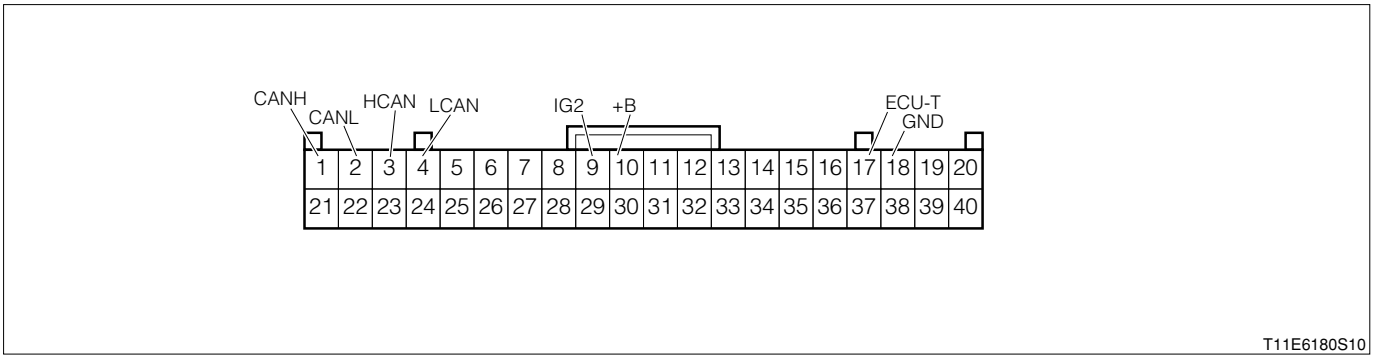
Each unit, relays connection vehicle harness side connector



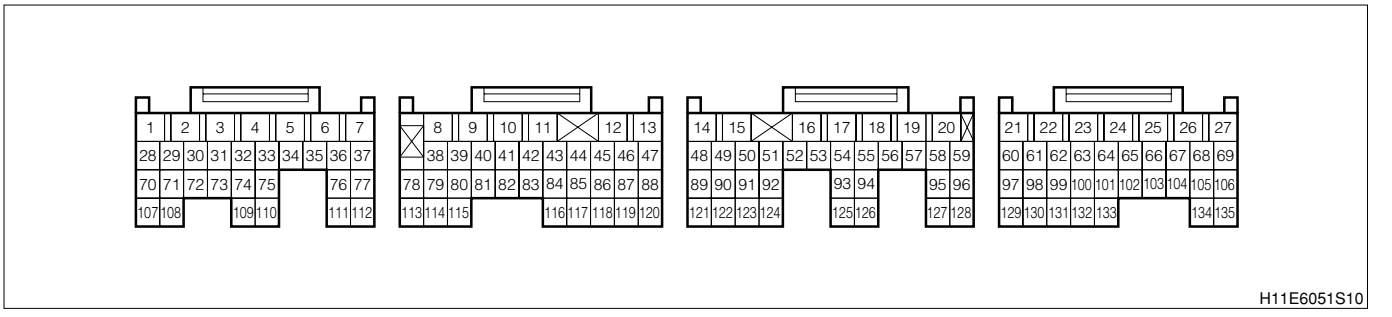
2 **LHD vehicles**



Each unit, relays connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Output conditions

1.When communication signal cannot be received from combination meter

(3) Checking points

1.Is the harness between EFI ECU - combination meter normal?

2.Is the combination meter normal?

3.Check whether there is no poor contact at the connector section.

(4) Checking method

1 **When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

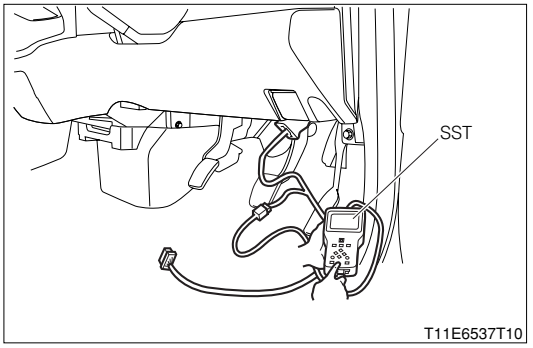
▷1. Confirmation of the diagnosis codes (Related to meter)

1.IG switch turned "LOCK".

2.Connect the diagnosis tester to DLC.

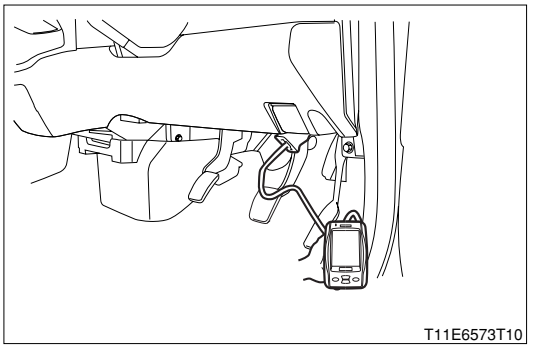
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.

(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.Confirm whether any meter-related diagnosis code is outputted.

(No.0043: Failure to read out CAN system connection ECU information, No.0061: Abnormal low voltage)

Refer to Page J3-14.

▼If it is outputted, go to ▷2.

▼If it is not outputted, go to ▷4.

▷2. Troubleshooting according to diagnosis code (Related to meters)

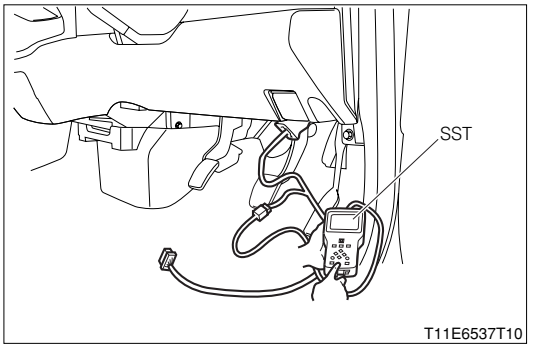
1.Perform the troubleshooting related to the diagnosis codes that have been outputted in ▷1.

(1) No.0043: Failure to read out CAN system connection ECU information

Refer to Page J3-20.

(2) No.0061: Abnormal low voltage

Refer to Page J3-20.

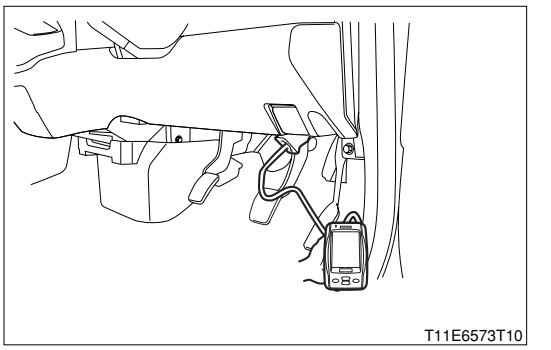


2.After completion of the repairs, connect the diagnosis tester to DLC.

(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000

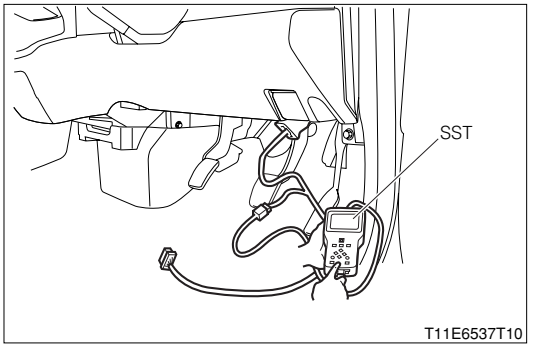
(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.


T11E6573T10

3.Confirm whether any diagnosis code related to the meter is outputted.
▼If it is not outputted, go to ∑>3.
▼If it is outputted, perform the recheck of the diagnosis code that has been output.

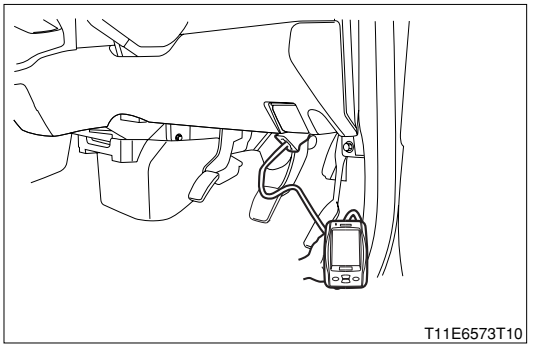
∑>3. Reconfirmation of diagnosis code (Related to EFI)

1.Connect the diagnosis tester to DLC.
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.
SST: 09991-87404-000



T11E6537T10

(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.


T11E6573T10

2.Erase the diagnosis code of the EFI.
3.Confirm whether the diagnosis code of the EFI is outputted.
SPECIFIED VALUE: It is not outputted.

▼If it is OK, the EFI system is normal.
▼If it is NG, go to ∑>4.

∑>4. Check of CAN line for open wire

1.Set the IG switch to the "LOCK" position.
2.Disconnect all of the EFI ECU connectors.
3.Perform continuity check between the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)
SPECIFIED VALUE: No continuity exists

▼If it is OK, go to ∑>5.
▼If it is NG, repair or replace malfunctioning sections.

∑5. Check of EFI ECU internal resistance

1.Disconnect all of the EFI ECU connectors.
2.Measure the resistance between the following terminals.
(1) Between EFI ECU side connector 6 (CANL) - EFI ECU side connector 7 (CANH)
(2) Between EFI ECU side connector 8 (LCAN) - EFI ECU side connector 9 (HCAN)
SPECIFIED VALUE: 110 - 130Ω

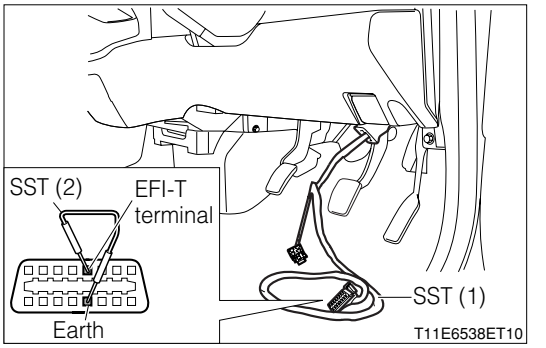
▼If it is OK, go to ∑6.
▼If it is NG, replace the EFI ECU.
Refer to Page B8-1.

∑6. Check of combination meter internal resistance

1.Disconnect the connector of the combination meter.
2.Measure the resistance between the following terminals.
(1) Between combination meter side connector 1 (CANH) - combination meter side connector 2 (CANL)
(2) Between combination meter side connector 3 (HCAN) - combination meter side connector 4 (LCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, check the circuits of the combination meter and ECU.
▼If it is NG, replace the combination meter.
Refer to Page J3-3.

2 **When not using DS-21 diagnosis tester or OBD Ⅱ generic scan tool:**



∑1. Diagnosis code confirmation (Related to Meter)

1.Short-circuit the terminals 4 (ECU-T) and 13 (E) of the DLC, using the SST.
SST: 09991-87404-000 (1)
09991-87403-000 (2)

2.Check to see if the meter-related diagnosis code is outputted.
(No.0043: CAN system connection ECU information readout not possible, No.0061: low voltage abnormality)

NOTE

- Refer to the diagnosis code output indication method of combination meter.

Refer to Page J3-14.

▼If it is outputted, proceed to ∑2.
▼If it is not outputted, proceed to ∑4.

∑2. Trouble shooting according to diagnosis code (Related to Meter)

1.Perform trouble shooting for the diagnosis code outputted in ∑1.
(1) No.0043: CAN system connection ECU information readout not possible
Refer to Page J3-20.

(2) No.0061: Low voltage abnormality
Refer to Page J3-20.

2.After repairing, short-circuit the terminals 4 (ECU-T) and 13 (E) of the DLC, using the SST.
SST: 09991-87404-000 (1)
09991-87403-000 (2)

3.Confirm that the diagnosis code related to the meter is not outputted.
▼If it is not outputted, proceed to ∑3.
▼If it is outputted, perform recheck for the diagnosis code outputted.

∑3. Diagnosis code reconfirmation (EFI related)

1.Cancel the diagnosis code of the EFI.
2.After canceling, short-circuit the terminals 5 (EFI-T) and 13 (E) of the DLC, using SST.
SST: 09991-87404-000 (1)
09991-87403-000 (2)

3.Check to see if the diagnosis code of EFI is outputted.
SPECIFIED VALUE: It is not outputted.

▼If it is OK, the EFI system is normal.
▼If it is NG, proceed to ∑4.

∑4. CAN communication basic check

1.Perform basic check of the CAN communication.
Refer to Page L2-14.

▼If it is OK, go to ∑5 for RHD vehicles.
▼If it is OK, go to ∑6 for LHD vehicles.
▼If it is NG, repair or replace the defective sections.

∑5. CAN line open wire check (RHD vehicles)

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the EFI ECU and A/T ECU.
3.Perform continuity check between each of the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - A/T ECU connection vehicle harness side connector B19 (LCN1)
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to ∑7.
▼If it is NG, repair or replace the defective sections.

∑6. CAN line open wire check (LHD vehicles)

1.Turn the IG switch to "LOCK".
2.Remove all connectors of the EFI ECU and A/T ECU.
3.Perform continuity check between each of the following terminals.
(1) Between combination meter connection vehicle harness side connector 1 (CANH) - combination meter connection vehicle harness side connector 2 (CANL)
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - A/T ECU connection vehicle harness side connector B19 (LCN1)
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to ∑7.
▼If it is NG, repair or replace the defective sections.

∑7. EFI ECU internal resistance check

1.Remove all of the EFI ECU connectors.
2.Measure the resistance between the following terminals.
(1) Between EFI ECU side connector 6 (CANL) - EFI ECU side connector 7 (CANH)
(2) Between EFI ECU side connector 8 (LCAN) - EFI ECU side connector 9 (HCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to ∑7.
▼If it is NG, replace the EFI ECU.
Refer to Page B8-1.

⊳8. Combination meter internal resistance check

1.Remove all connectors of the combination meter.

2.Measure the resistance between the following terminals.

(1) Between combination meter side connector 1 (CANH) - combination meter side connector 2 (CANL)

(2) Between combination meter side connector 3 (HCAN) - combination meter side connector 4 (LCAN)

SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, perform circuit check of the combination meter and EFI ECU.

Refer to Page A1-24.

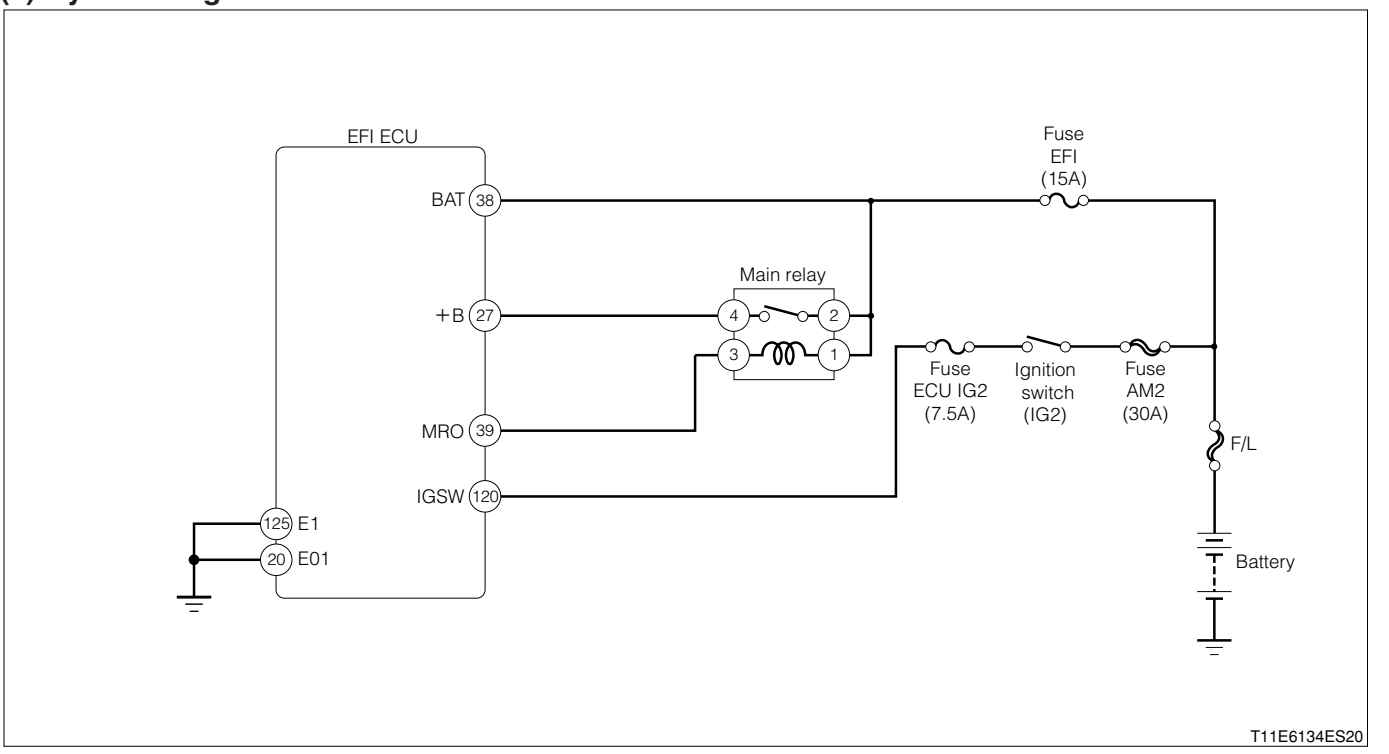
▼If it is NG, replace the combination meter.

Refer to Page J3-3.

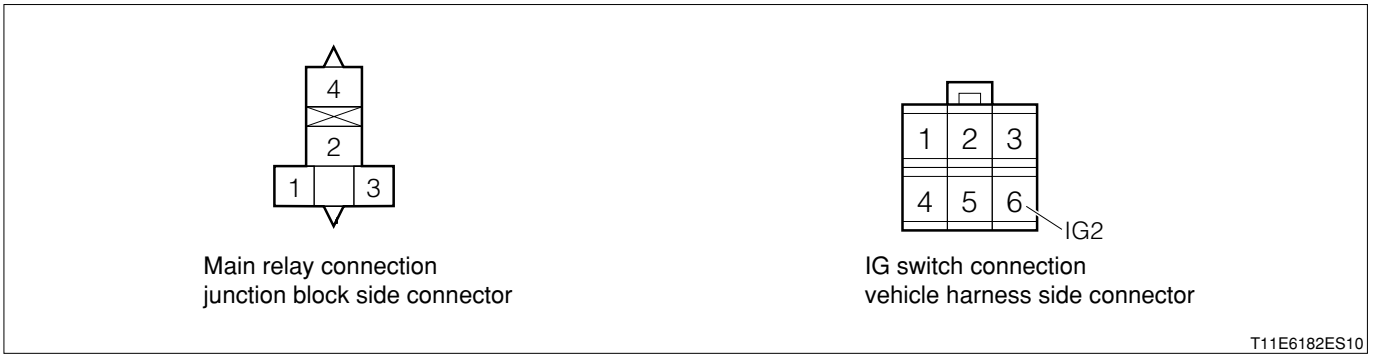
9-13 TROUBLE SHOOTING ACCORDING TO SYSTEM

9-13-1 EFI ECU POWER SUPPLY SYSTEM CHECK

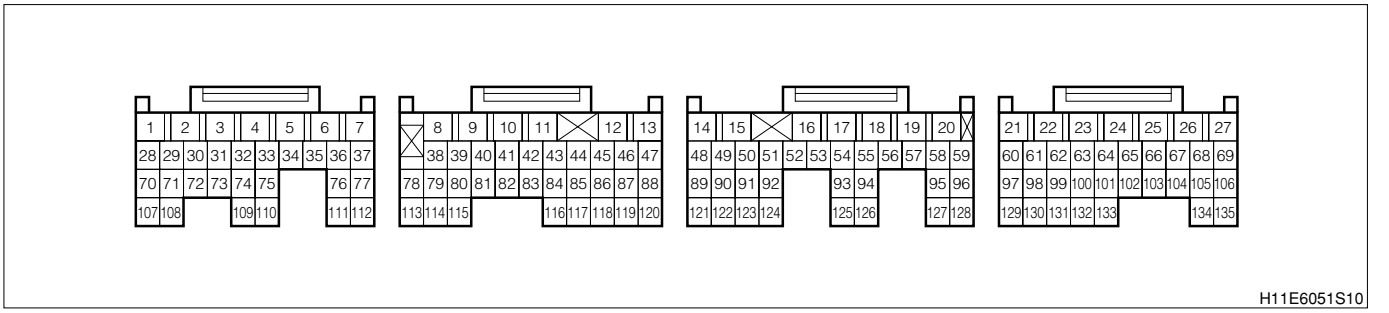
(1) System diagram



Each unit connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Checking points

1.If the engine check lamp does not light up when the IG switch is "ON" or during diagnosis indication, it is possible that there is no power supplied to the EFI ECU.

(3) Checking method

∑1. EFI ECU voltage check

1.Remove the connector on the EFI ECU side and perform voltage measurements for each of the terminals when the IG switch is "ON".
(1) ECU connection vehicle harness side connector 27 (+B) - ECU connection vehicle harness side connector 125 (E1)
(2) ECU connection vehicle harness side connector 38 (BAT) - ECU connection vehicle harness side connector 125 (E1)
SPECIFIED VALUE: Battery voltage

▼If it is OK, there is no abnormality in the EFI ECU power supply system.
▼If it is NG, proceed to ∑2.

∑2. Check of wire harness continuity (1)

1.Perform continuity check between each of the following terminals.
(1) Between ECU connection vehicle harness side connector 27 (+B) - relay side connector 4
(2) Between ECU connection vehicle harness side connector 38 (BAT) - relay side connector 4
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to ∑3.
▼If it is NG, repair the harness and the connectors.

∑3. Main relay unit check

1.Perform unit check of the main relay.
Refer to Page B8-474.

▼If it is OK, proceed to ∑4.
▼If it is NG, replace the main relay.

∑4. Main relay voltage check

1.Remove the main relay.
2.Perform voltage measurement between each terminal when the IG switch is "ON".
(1) Between relay side connector 1 (Coil side) - body earth
(2) Between relay side connector 2 (Switch side) - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, perform checking or repairing of the harness and connector for each of the following terminals.
(1) Between main relay - body earth
▼if the switch side is NG, perform checking or repairing of the harness and connector for each of the following terminals.
(1) Between main relay - battery
▼If the coil side is NG, proceed to ∑5.

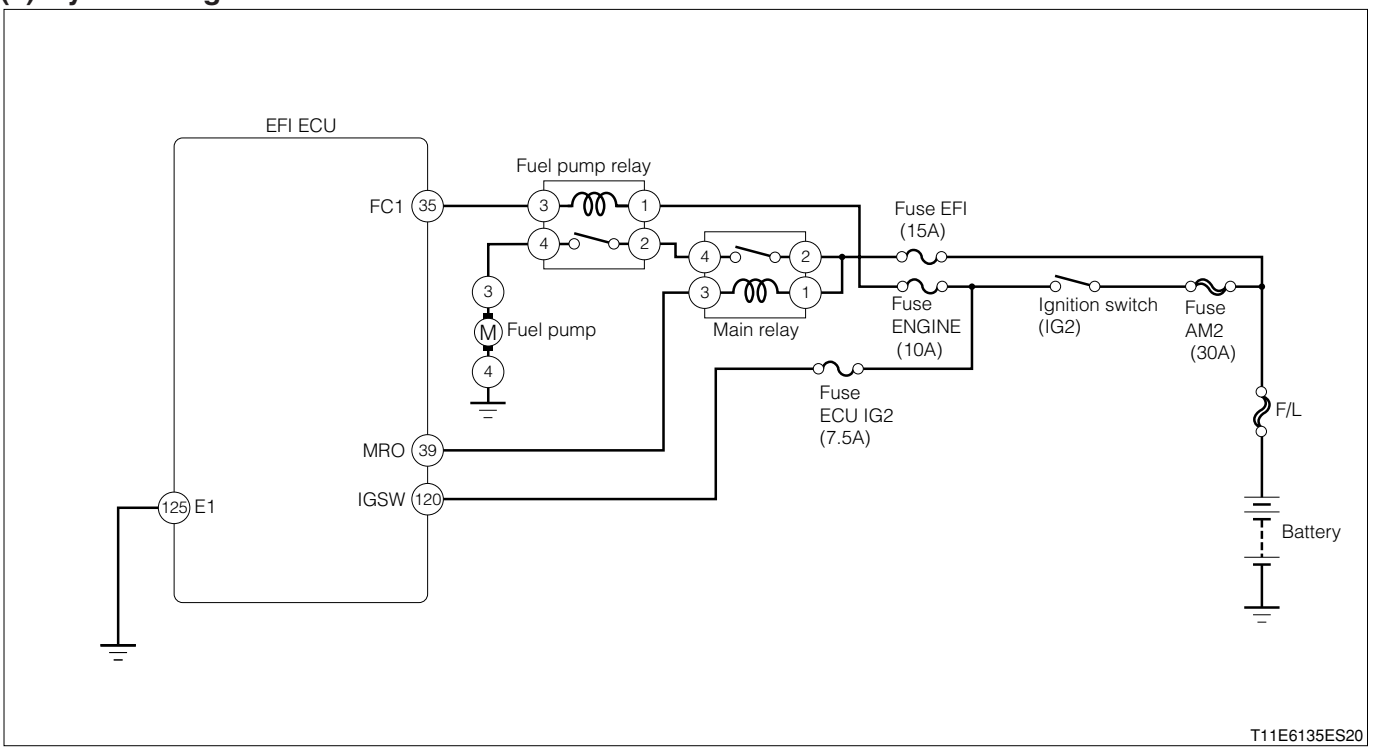
∑5. Check of wire harness continuity (2)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 1 - IG switch side connector 6 (IG2)
SPECIFIED VALUE: Continuity exists.

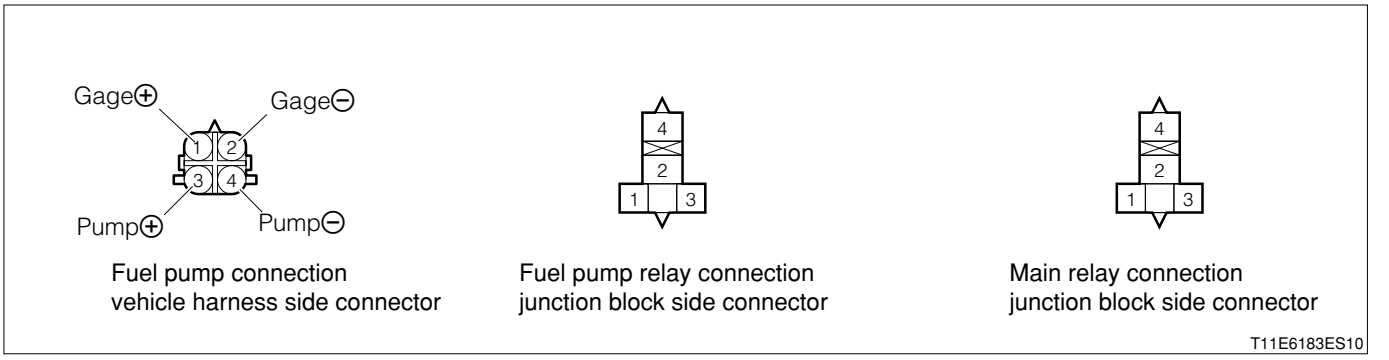
▼If it is OK, perform checking or repairing of the IG switch.
▼If it is NG, repair the harness and the connectors.

9-13-2 FUEL PUMP SYSTEM CHECK

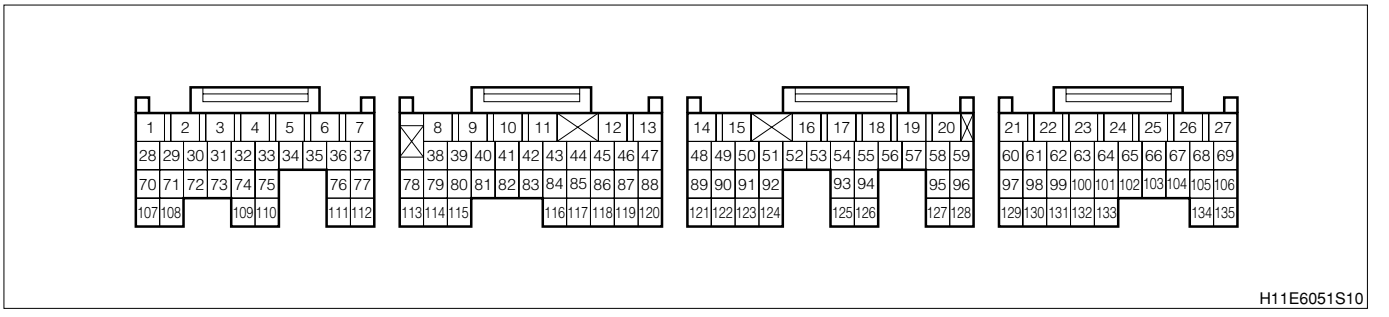
(1) System diagram



Each unit connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Checking points

1. Is the fuel pump relay power supply voltage normal?
2. Is the fuel pump relay operating correctly?
3. Is the fuel pump power supply voltage normal?
4. Is the fuel pump operating correctly?

(3) Checking method

1 **When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

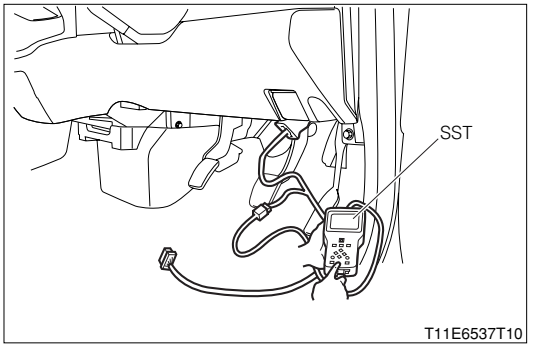
⇒1. Fuel pump operation check

1.IG switch turned "LOCK".

2.Connect the diagnosis tester to DLC.

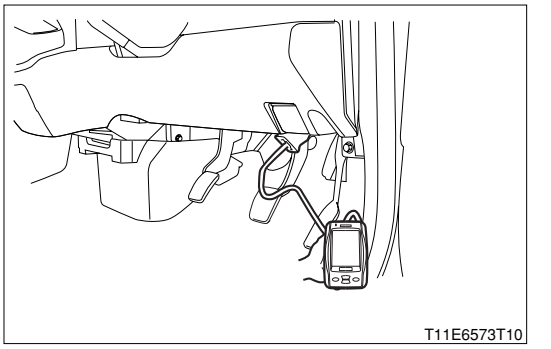
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.

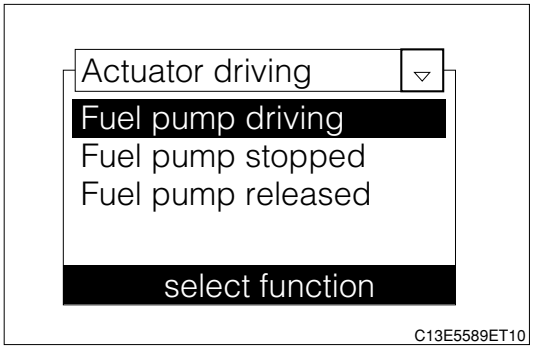
(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.Turn "ON" the IG switch, and turn "ON" the main switch of the tester.

4.Confirmation of operation of the purge VSV for EVAP.

(1) DS-21: Select the "Fuel pump" of the "Actuator driving" so as to drive the fuel pump.



(2) DS-Ⅱ: Select the "Fuel pump" of the "Active test" so as to drive the fuel pump.

5.At the time, check the operation sound of the fuel pump.

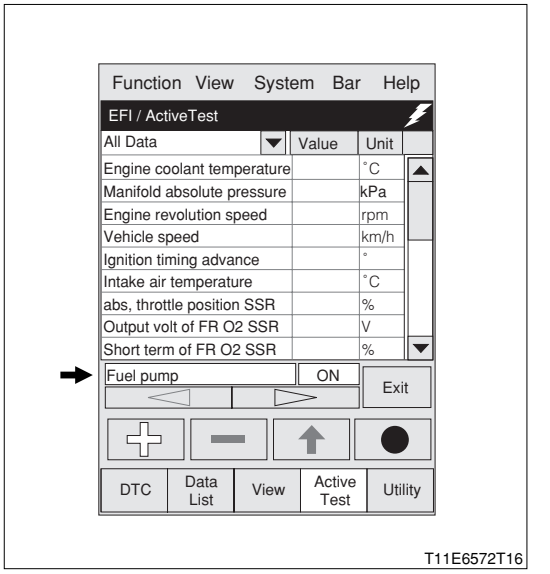
NOTE

- Confirm the operation sound from the fuel inlet side.

SPECIFIED VALUE: Operation sound is generated.

▼If it is OK, proceed to ⇒2.

▼If it is NG, proceed to ⇒3.



∑2. Fuel pressure check

1.Perform fuel pressure check.
Refer to Page B8-467.

▼If it is OK, the fuel pump system is normal.
▼If it is NG, perform the following operations.
(1) Replacement of the fuel pump
Refer to Page B7-21.

(2) Repairing of the fuel line

∑3. Fuel pump relay voltage check

1.Remove the fuel pump relay.
2.Perform voltage measurements between each of the following terminals when the IG switch is "ON".
(1) Between relay side connector 1 (Coil side) - body earth
(2) Between relay side connector 2 (Switch side) - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to ∑4.
▼If the switch side is NG, proceed to ∑8.
▼If the coil side is NG, perform checking and repairing for the following portions.
(1) Harness and connectors between the fuel pump relay and battery
(2) Fuse
(3) Ignition switch

∑4. Fuel pump relay unit check

1.Perform unit check of the fuel pump relay.
Refer to Page B8-474.

▼If it is OK, proceed to ∑5.
▼If it is NG, replace the fuel pump relay.

∑5. Check of wire harness continuity (1)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 4 - pump side connector 3 (Pump+)
(2) Between pump side connector 4 (Pump−) - body earth
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to ∑6.
▼If it is NG, repair the harness and the connectors of the defective sections.

∑6. Fuel pump unit check

1.Perform unit check of the fuel pump.
Refer to Page B8-467.

▼If it is OK, proceed to ∑7.
▼If it is NG, replace the fuel pump.

⊳7. Check of wire harness continuity (2)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 3 - ECU connection vehicle harness side connector 35 (FC1)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, check the EFI ECU circuit.
▼If it is NG, repair the harness and the connectors.

⊳8. Check of wire harness continuity (3)

1.Perform continuity check between each of the following terminals.
(1) Between fuel pump relay side connector 2 - main relay side connector 4
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to ⊳9.
▼If it is NG, repair the harness and the connectors.

⊳9. Main relay unit check

1.Perform unit check of the main relay.
Refer to Page B8-474.

▼If it is OK, proceed to ⊳10.
▼If it is NG, replace the main relay.

⊳10. Main relay voltage check

1.Remove the main relay.
2.Perform voltage measurement between each terminal when the IG switch is "ON".
(1) Between relay side connector 1 (Coil side) - body earth
(2) Between relay side connector 2 (Switch side) - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, perform checking or repairing of the harness and connector for each of the following terminals.
(1) Between main relay - body earth
▼If the switch side is NG, perform checking or repairing of the following portions.
(1) Harness and connectors between the main relay side connector 2 and battery
(2) Fuse
▼If the coil side is NG, perform checking and repairing for the following portions.
(1) Harness and connectors between main relay side connector 1 and battery
(2) Ignition switch
(3) Fuse

② **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

Σ1. Fuel pump operation check

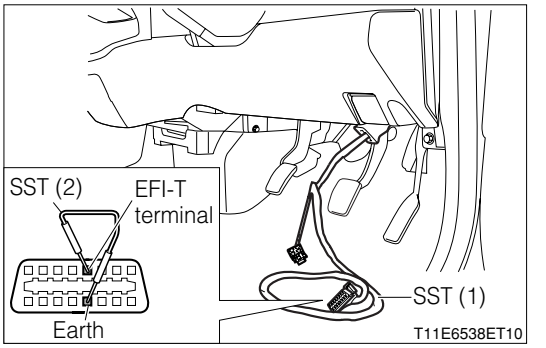
1.Check if there is the operation sound of the fuel pump by shorting the EFI-T terminal when the IG switch is "ON".
SST: 09991-87404-000 (1)
09991-87403-000 (2)

NOTE

- Confirm the operation sound from the fuel inlet side.

SPECIFIED VALUE: Operation sound is generated.

▼If it is OK, proceed to Σ2.
▼If it is NG, proceed to Σ3.



Σ2. Fuel pressure check

1.Perform fuel pressure check.
Refer to Page B8-467.

▼If it is OK, the fuel pump system is normal.
▼If it is NG, perform the following operations.
(1) Replacement of the fuel pump
Refer to Page B7-21.

(2) Repairing of the fuel line

Σ3. Fuel pump relay voltage check

1.Remove the fuel pump relay.
2.Perform voltage measurements between each of the following terminals when the IG switch is "ON".
(1) Between relay side connector 1 (Coil side) - body earth
(2) Between relay side connector 2 (Switch side) - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to Σ4.
▼If the switch side is NG, proceed to Σ8.
▼If the coil side is NG, perform checking and repairing for the following portions.
(1) Harness and connectors between the fuel pump relay and battery
(2) Fuse
(3) Ignition switch

Σ4. Fuel pump relay unit check

1.Perform unit check of the fuel pump relay.
Refer to Page B8-474.

▼If it is OK, proceed to Σ5.
▼If it is NG, replace the fuel pump relay.

⊃5. Check of wire harness continuity (1)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 4 - pump side connector 3 (Pump+)
(2) Between pump side connector 4 (Pump−) - body earth
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to ⊃6.
▼If it is NG, repair the harness and the connectors of the defective sections.

⊃6. Fuel pump unit check

1.Perform unit check of the fuel pump.
Refer to Page B8-467.

▼If it is OK, proceed to ⊃7.
▼If it is NG, replace the fuel pump.
Refer to Page B7-21.

⊃7. Check of wire harness continuity (2)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 3 - ECU connection vehicle harness side connector 35 (FC1)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, check the EFI ECU circuit.
▼If it is NG, repair the harness and the connectors.

⊃8. Check of wire harness continuity (3)

1.Perform continuity check between each of the following terminals.
(1) Between fuel pump relay side connector 2 - main relay side connector 4
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to ⊃9.
▼If it is NG, repair the harness and the connectors.

⊃9. Main relay unit check

1.Perform unit check of the main relay.
Refer to Page B8-474.

▼If it is OK, proceed to ⊃10.
▼If it is NG, replace the main relay.

⊳10. Main relay voltage check

1.Remove the main relay.

2.Perform voltage measurement between each terminal when the IG switch is "ON".

(1) Between relay side connector 1 (Coil side) - body earth

(2) Between relay side connector 2 (Switch side) - body earth

SPECIFIED VALUE: Battery voltage

▼If it is OK, perform checking or repairing of the harness and connector for each of the following terminals.

(1) Between main relay - body earth

▼If the switch side is NG, perform checking or repairing of the following portions.

(1) Harness and connectors between the main relay side connector 2 and battery

(2) Fuse

▼If the coil side is NG, perform checking and repairing for the following portions.

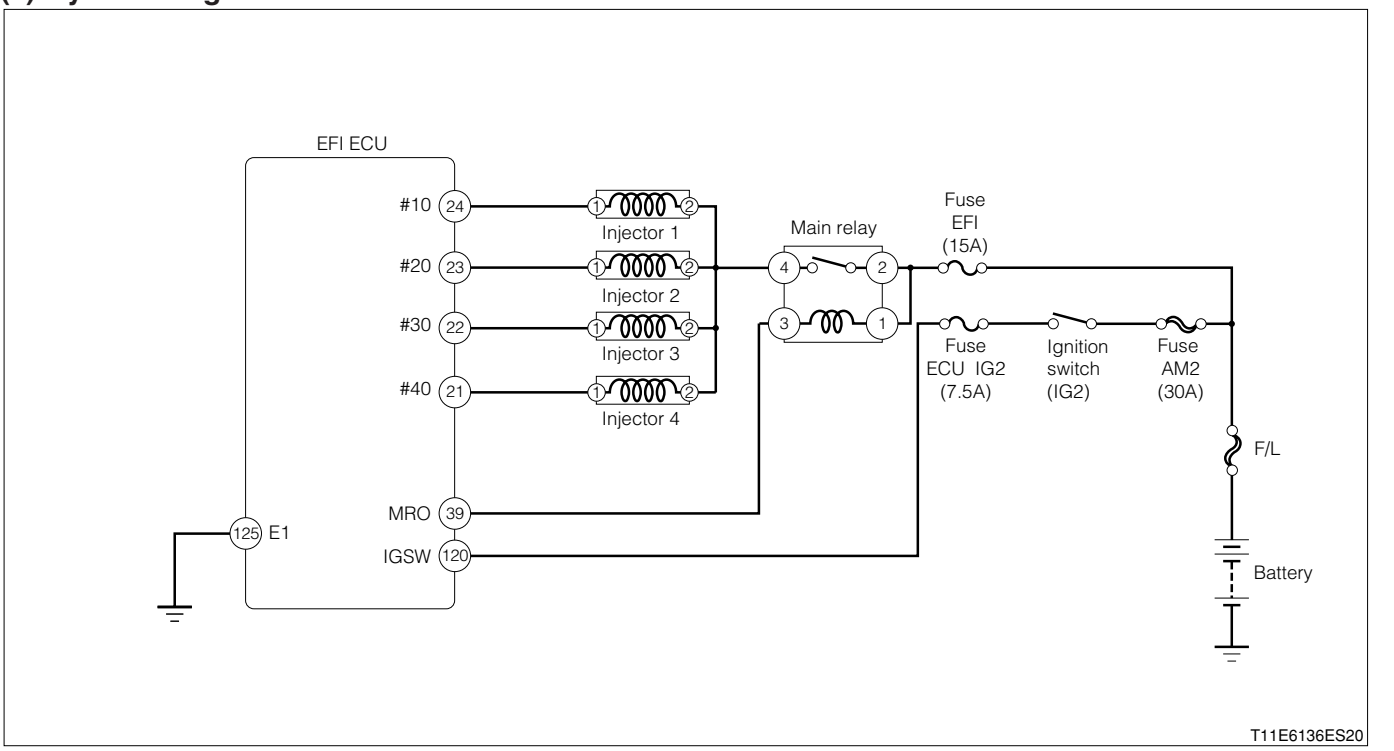
(1) Harness and connectors between main relay side connector 1 and battery

(2) Ignition switch

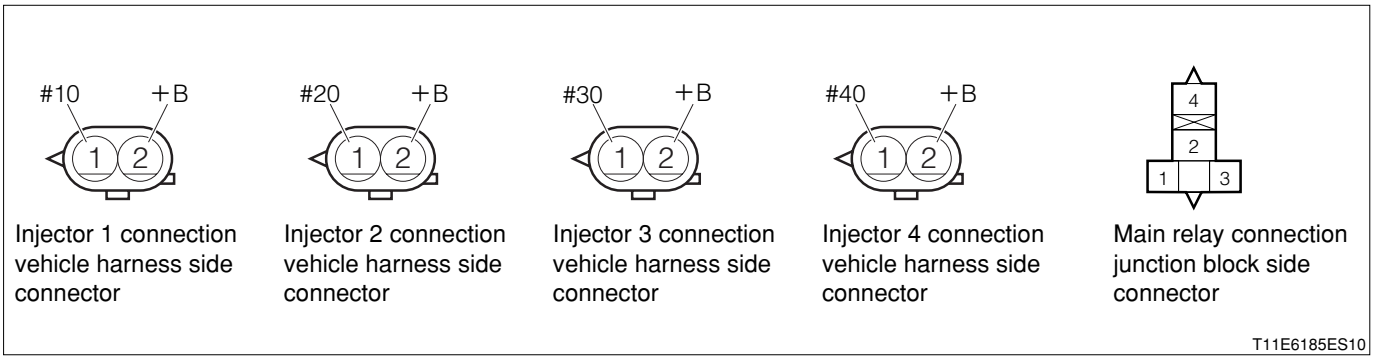
(3) Fuse

9-13-3 INJECTOR SYSTEM CHECK

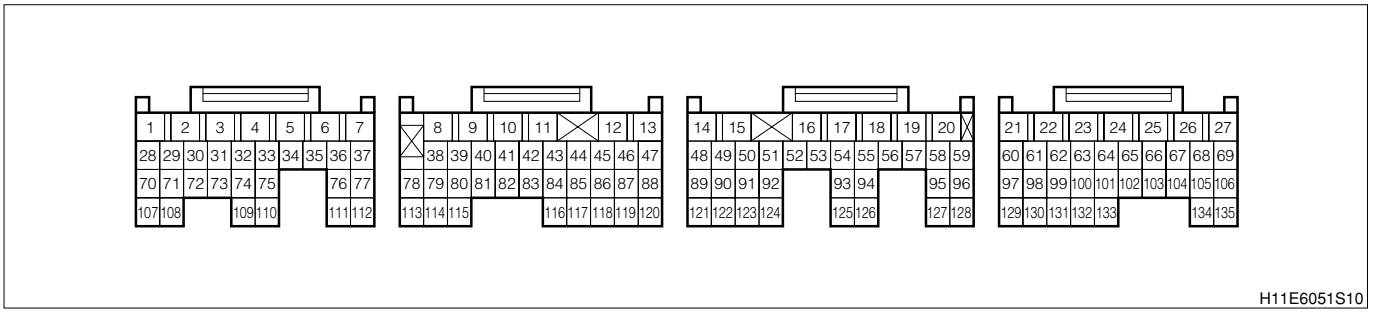
(1) System diagram



Each units connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Checking points

1. Is the injector control signal outputted correctly from the EFI ECU?
2. Is the injector power supply voltage normal?
3. Is the harness between the injector and EFI ECU normal?
4. Is the injection of the injector proper?

(3) Checking method

Σ1. Injector operation check

1.Check if there is the operation sound of the injector using a sound scope or a long screwdriver.
SPECIFIED VALUE: Operation sound is generated.

▼If it is OK, proceed to Σ2.
▼If it is NG, proceed to Σ3.

Σ2. Injector unit check (1)

1.Perform unit check of the injector.
Refer to Page B8-472.

▼If it is OK, the injector system is normal.
▼If it is NG, replace the injector.
Refer to Page B7-23.

Σ3. Injector voltage check

1.Remove all of the connectors on the injector side.
2.Perform voltage measurements between each of the following terminals when the IG switch is "ON".
(1) Each injector connection vehicle harness side connector 1 (+B) - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to Σ4.
▼If it is NG, perform checking or repairing of the harness and relay between the following terminals.
(1) Between battery - injector

Σ4. Check of wire harness continuity

1.Perform continuity check between each of the following terminals.
(1) Between ECU connection vehicle harness side connector 24 (#10) - injector 1 connection vehicle harness side connector 2 (#10)
(2) Between ECU connection vehicle harness side connector 23 (#20) - injector 2 connection vehicle harness side connector 2 (#20)
(3) Between ECU connection vehicle harness side connector 22 (#30) - injector 3 connection vehicle harness side connector 2 (#30)
(4) Between ECU connection vehicle harness side connector 21 (#40) - injector 3 connection vehicle harness side connector 2 (#40)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ5.
▼If it NG, repair the harness and connectors of the defective sections.

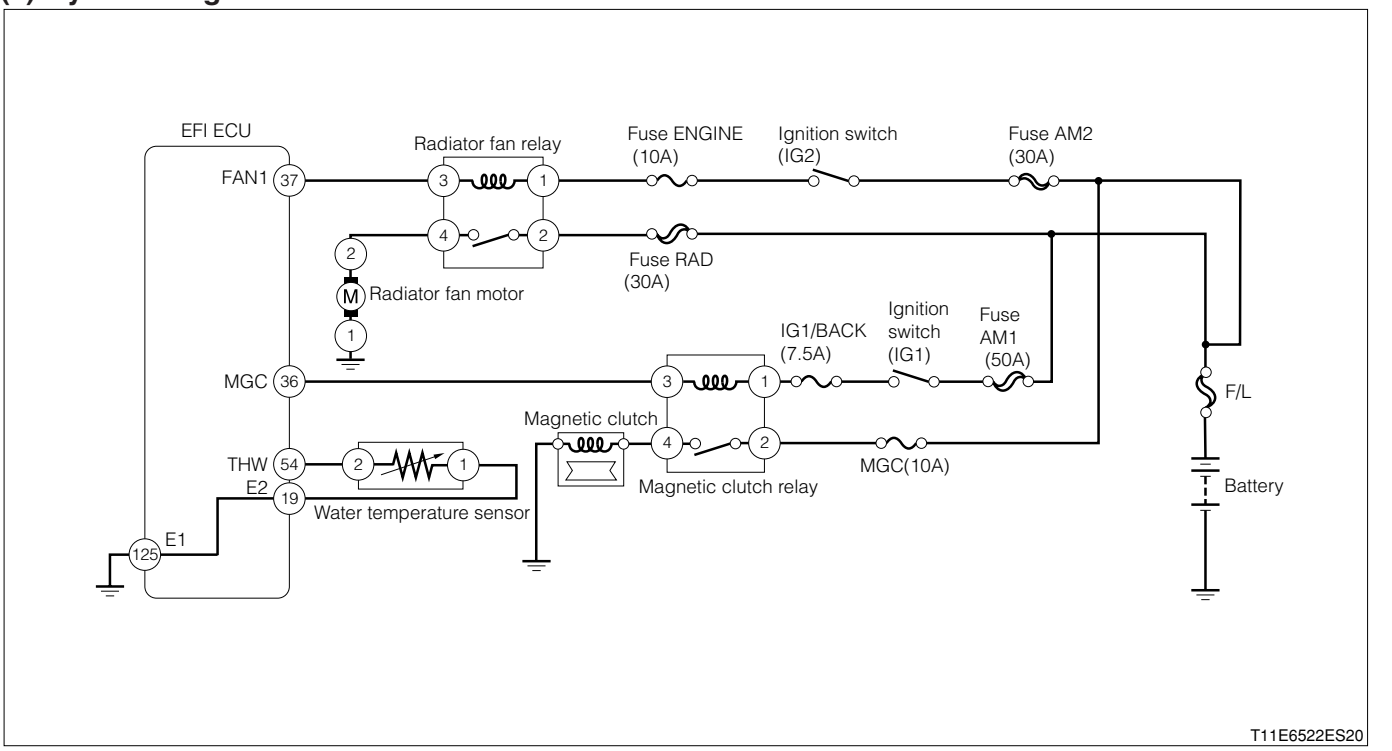
Σ5. Injector unit check (2)

1.Perform unit check of the injector.
Refer to Page B8-472.

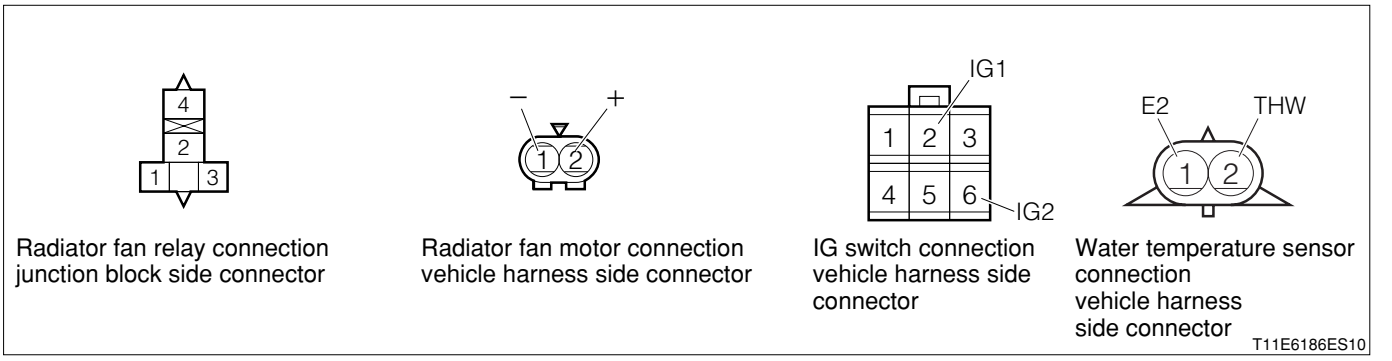
▼If it is OK, check the connecting condition of each connector.
▼If it is NG, replace the injector.
Refer to Page B7-23.

9-13-4 RADIATOR FAN SYSTEM CHECK

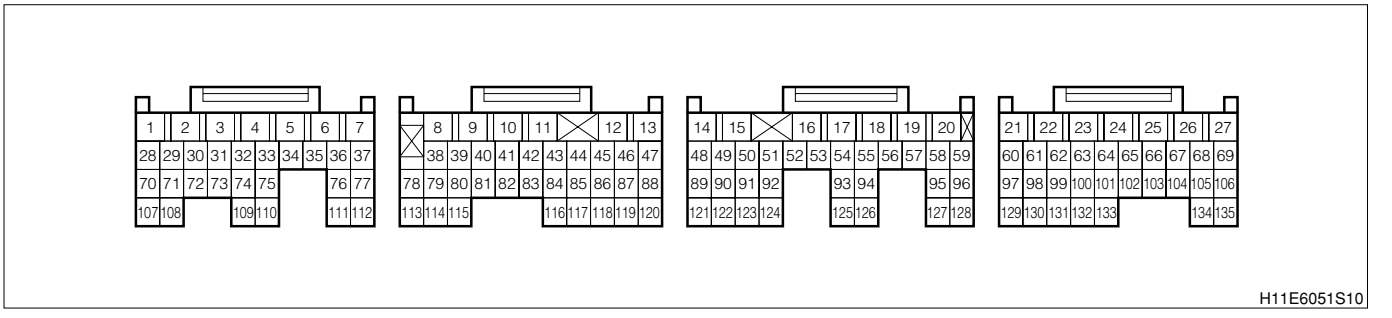
(1) System diagram



Each unit, relays connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Checking points

1. Is the signal from the water temperature sensor inputted to the EFI ECU?
2. Is the harness between the water temperature sensor and EFI ECU normal?
3. Is the output of the water temperature sensor correct?
4. Is the signal from the magnet clutch relay inputted to the EFI ECU?
5. Is the harness between the magnet clutch relay and EFI ECU normal?
6. Is the harness between the radiator fan relay and EFI ECU normal?
7. Is the radiator fan motor normal?

(3) Checking method

① When using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:

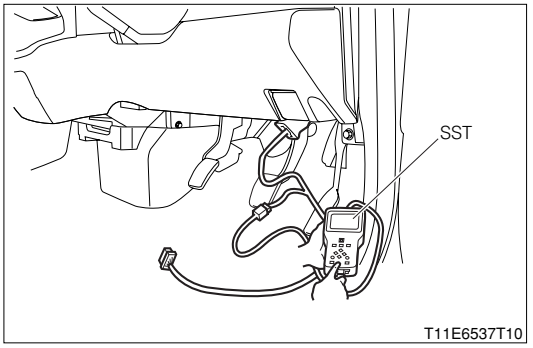
Σ1. Radiator fan operation check (1)

1.The IG switch turned "LOCK".

2.Connect the diagnosis tester to DLC.

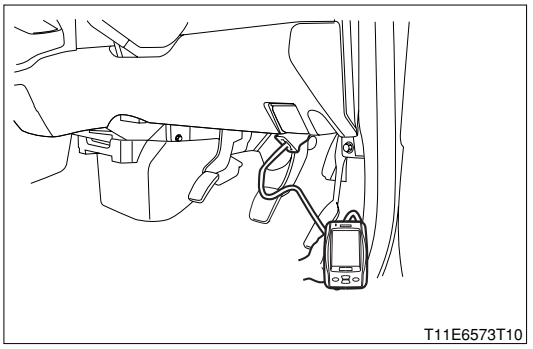
(1) In case of DS-21, connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000



(2) In case of DS-Ⅱ, connect the DS-Ⅱ diagnosis tester directly to DLC.

(3) In case of the OBD Ⅱ generic scan tool, connect the OBD Ⅱ generic scan tool directly to DLC.



3.Turn "ON" the IG switch, and turn "ON" the main switch of the tester.

4.Confirmation of operation of the radiator fan.

(1) DS-21: Select the "Radiator fan 1st stage" of the "Actuator driving".

(2) DS-Ⅱ: Select the "Radiator fan 1st stage" of the "Active test".

5.Choose the "Radiator fan 1st stage ON" and "Radiator fan 1st stage OFF", respectively.

SPECIFIED VALUE: The fan rotates when "ON" is chosen. The fan stops when "OFF" is chosen.

▼If it is OK, proceed to Σ2.

▼If it is NG, proceed to Σ9.

Σ2. Radiator fan operation check (2)

1.Check if the fan does not operate during cold period, but operates after warm-up when warming up the engine.

2.Check if the fan operates when the air conditioner is turned "ON".

SPECIFIED VALUE: The fan operates when the air conditioner is turned "ON".

NOTE

- Air conditioner "ON" means that the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are all "ON".

▼If it is OK, the system is normal.

▼If it does not rotate after warm-up, perform checking the water temperature sensor system.

Refer to Page B8-301.

▼If it does not rotate when the air conditioner is "ON", proceed to Σ3.

▼When it is rotating constantly, proceed to Σ6.

▼If it does not rotate at all, proceed to Σ9.

∑3. Check of wire harness continuity (1)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 3 - ECU connection vehicle harness side connector 36 (MGC)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to ∑4.
▼If it is NG, repair or replace the defective sections.

∑4. Magnet clutch relay voltage check

1.Perform voltage measurements between each of the following terminals when the IG switch is "ON".
(1) Between relay side connector 1 - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to ∑5.
▼If it is NG, perform checking or repairing the harness and the connectors for the following terminals.
(1) Between magnet clutch relay - battery

∑5. Magnet clutch relay unit check

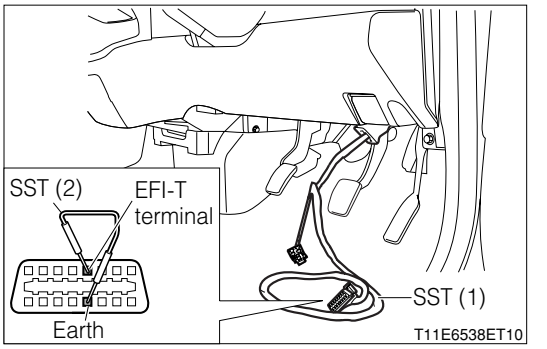
1.Perform unit check of the magnet clutch relay.
Refer to Page B8-474.

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, replace the magnet clutch relay

∑6. Diagnosis code check

1.Short-circuit the EFI-T terminals, using SST (Inspection harness).
SST: 09991-87404-000
SST: 09991-87403-000
2.Is the normal code outputted when the IG switch is "ON"?
SPECIFIED VALUE: The normal code is outputted.
▼If it is OK, proceed to ∑7.
▼If code No.P0115/42 is outputted, perform checking of the water temperature sensor system.
Refer to Page B8-301.



∑7. Wire harness check (2)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 3 - ECU connection vehicle harness side connector 37 (FAN1)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to ∑8.
▼If it is NG, repair or replace the defective sections.

∑8. Radiator fan relay unit check (1)

1.Perform unit check of the radiator fan relay.
Refer to Page B8-474.

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, replace the radiator fan relay.

∑9. EFI ECU voltage check

1.Connect the SST.
SST: 09842-97209-000

2.Perform voltage measurements between the following terminals when the air conditioner is turned "ON".

NOTE

- Air conditioner "ON" means that the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are all "ON".

(1) Between SST 37 (FAN1) - SST 125 (E1)
SPECIFIED VALUE:

Measuring condition	Specified value
When magnet clutch is "ON".	1V or less
When magnet clutch is "OFF".	Battery voltage

▼If it is OK, proceed to ∑13.
▼If it is NG, proceed to ∑10.

∑10. Check of wire harness continuity (3)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 3 - ECU connection vehicle harness side connector 37 (FAN1)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to ∑11.
▼If it is NG, repair the harness and the connectors.

∑11. Radiator fan relay coil side voltage check

1.Perform voltage measurements between each of the following terminals when the IG switch is "ON".
(1) Between relay side connector 1 - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to ∑11.
▼If it is NG, perform checking or repairing of the harness and connectors between the following terminals.
(1) Between radiator fan relay - battery

⊳12. Radiator fan relay unit check (2)

1.Perform unit check of radiator fan relay.
Refer to Page B8-474.

▼If it is OK, check the EFI ECU circuit.
Refer to Page A1-24.

▼If it is NG, replace the radiator fan relay.

⊳13. Radiator fan relay switch side voltage check

1.Perform voltage measurements between the following terminals when the IG switch is "ON".
(1) Between relay side connector 2 - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to ⊳13.
▼If it is NG, perform checking or repairing of the harness and connectors between the following terminals.
(1) Between radiator fan relay - battery

⊳14. Radiator fan relay unit check (3)

1.Perform unit check of radiator fan relay.
Refer to Page B8-474.

▼If it is OK, proceed to ⊳14.
▼If it is NG, replace the radiator fan relay.

⊳15. Check of wire harness continuity (4)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 4 - motor side connector 2 (+)
(2) Between motor side connector 1 (−) - body earth
SPECIFIED VALUE: Continuity exists.

▼If it is OK, replace the radiator fan motor.
Refer to Page B6-13.

▼If it is NG, perform repairing and replacing of the defective sections.

② **When not using diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool:**

Σ>1. Radiator fan operation check

1.Check if the fan does not operate during cold period, but operates after warm-up when warming up the engine.

2.Check if the fan operates when the air conditioner is turned "ON".

NOTE

- Air conditioner "ON" means that the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are all "ON".

SPECIFIED VALUE: The fan operates when the air conditioner is turned "ON".

▼If it is OK, the system is normal.

▼If it does not rotate after warm-up, perform checking the water temperature sensor system.

Refer to Page B8-74.

▼If it does not rotate when the air conditioner is "ON"

▼When it is rotating constantly, proceed to Σ>5.

▼If it does not rotate at all, proceed to Σ>8.

Σ>2. Check of wire harness continuity (1)

1.Perform continuity check between each of the following terminals.

(1) Between relay side connector 3 - ECU connection vehicle harness side connector 36 (MGC)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ>3.

▼If it is NG, repair or replace the defective sections.

Σ>3. Magnet clutch relay voltage check

1.Perform voltage measurements between each of the following terminals when the IG switch is "ON".

(1) Between relay side connector 1 - body earth

SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to Σ>4.

▼If it is NG, perform checking or repairing the harness and the connectors for the following terminals.

(1) Between magnet clutch relay - battery

Σ>4. Magnet clutch relay unit check

1.Perform unit check of the magnet clutch relay.

Refer to Page B8-225.

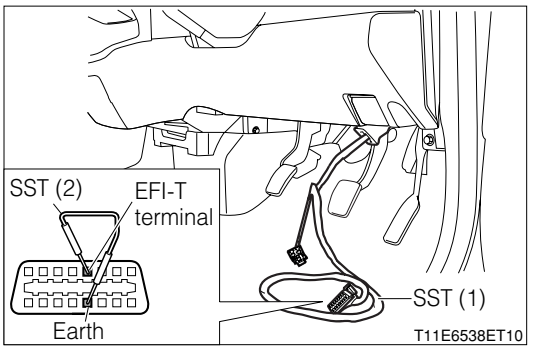
▼If it is OK, check the EFI ECU circuit.

▼If it is NG, replace the magnet clutch relay

∑5. Diagnosis code check

1.Short-circuit the EFI-T terminals, using SST.
SST: 09991-87404-000
09991-87403-000

2.Is the normal code outputted when the IG switch is "ON"?
SPECIFIED VALUE: The normal code is outputted.
▼If it is OK, proceed to ∑6.
▼If code No.42 is outputted, perform checking of the water temperature sensor system.
Refer to Page B8-74.



∑6. Wire harness check (2)

1.Perform continuity check between each of the following terminals.
(1) Between relay side connector 3 - ECU connection vehicle harness side connector 37 (FAN1)
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to ∑7.
▼If it is NG, repair or replace the defective sections.

∑7. Radiator fan relay unit check (1)

1.Perform unit check of the radiator fan relay.
Refer to Page B8-225.

▼If it is OK, check the EFI ECU circuit.
▼If it is NG, replace the radiator fan relay.

∑8. EFI ECU voltage check

1.Connect the SST.
SST: 09842-97209-000

2.Perform voltage measurements between the following terminals when the air conditioner is turned "ON".

NOTE

- Air conditioner "ON" means that the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are all "ON".

(1) Between SST37(FAN1) - 125(E1)
SPECIFIED VALUE:

Measuring condition	Specified value
When magnet clutch is "ON".	1V or less
When magnet clutch is "OFF".	Battery voltage

▼If it is OK, proceed to ∑2.
▼If it is NG, proceed to ∑9.

⊳9. Check of wire harness continuity (3)

1.Perform continuity check between each of the following terminals.

(1) Between relay side connector 3 - ECU connection vehicle harness side connector 37 (FAN1)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to ⊳10.

▼If it is NG, repair the harness and the connectors.

⊳10. Radiator fan relay coil side voltage check

1.Perform voltage measurements between each of the following terminals when the IG switch is "ON".

(1) Between relay side connector 1 - body earth

SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to ⊳11.

▼If it is NG, perform checking or repairing of the harness and connectors between the following terminals.

(1) Between radiator fan relay - battery

⊳11. Radiator fan relay unit check (2)

1.Perform unit check of radiator fan relay.

Refer to Page B8-225.

▼If it is OK, check the EFI ECU circuit.

▼If it is NG, replace the radiator fan relay.

⊳12. Radiator fan relay switch side voltage check

1.Perform voltage measurements between the following terminals when the IG switch is "ON".

(1) Between relay side connector 2 - body earth

SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to ⊳13.

▼If it is NG, perform checking or repairing of the harness and connectors between the following terminals.

(1) Between radiator fan relay - battery

⊳13. Radiator fan relay unit check (3)

1.Perform unit check of radiator fan relay.

Refer to Page B8-225.

▼If it is OK, proceed to ⊳14.

▼If it is NG, replace the radiator fan relay.

⊳14. Check of wire harness continuity (4)

1.Perform continuity check between each of the following terminals.

(1) Between relay side connector 4 - motor side connector 2 (+)

(2) Between motor side connector 1 (−) - body earth

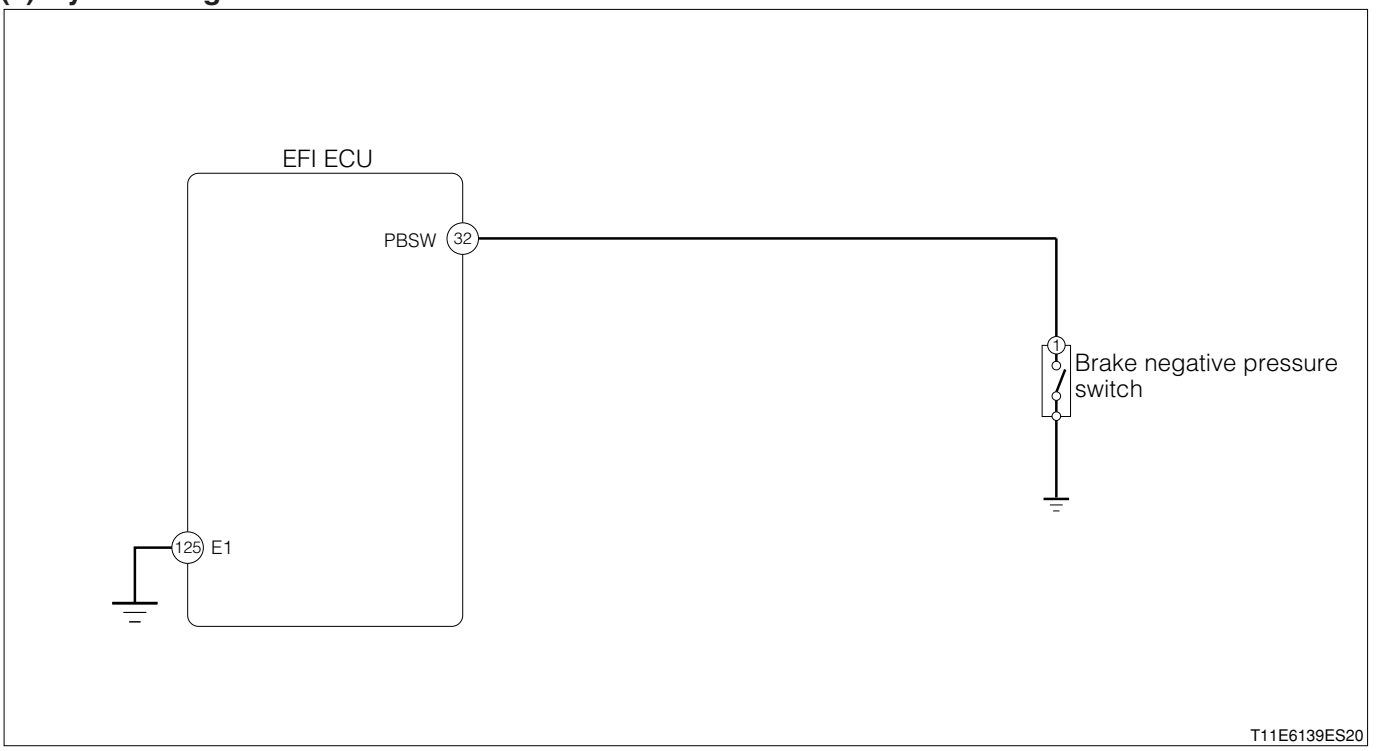
SPECIFIED VALUE: Continuity exists.

▼If it is OK, replace the radiator fan motor.

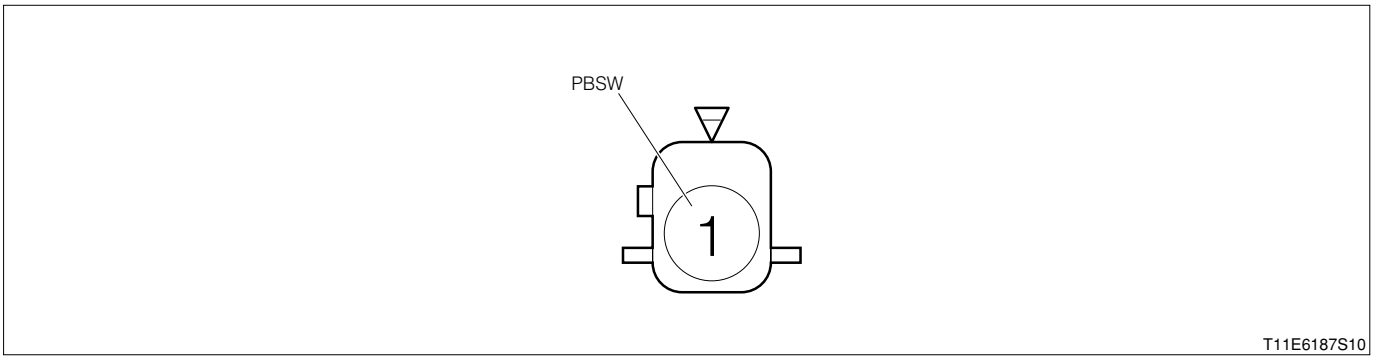
▼If it is NG, perform repairing and replacing of the defective sections.

9-13-5 BRAKE VACUUM SWITCH SYSTEM CHECK

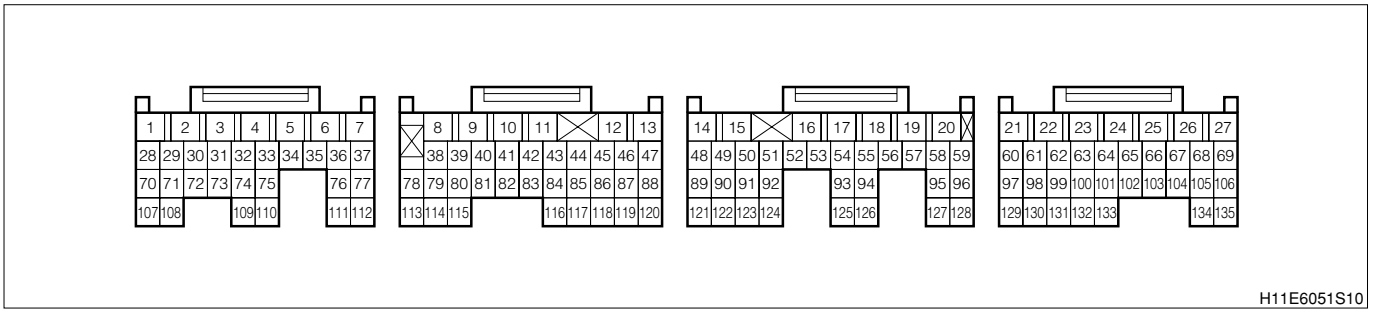
(1) System diagram



Brake vacuum switch connection vehicle harness side connector



EFI ECU connection vehicle harness side connector



(2) Checking points

1.Is the brake vacuum switch operating normally?
2.Is the harness between the brake vacuum switch and EFI ECU normal?

(3) Checking method

∑1. Air conditioner cut operation confirmation

1.Start the engine and wait until the negative pressure in the brake booster becomes high.

2.Turn air conditioner "ON" and confirm that the air conditioner is operating and that it is at the air conditioner idle up speed.

NOTE

- Air conditioner "ON" means that the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are all "ON".

3.Disconnect the brake booster hose from the brake booster and shut the lid down on both sides.

4.Raise the vehicle speed to about 20km/h with the vehicle lifted up and step on the brake pedal and decrease the vehicle speed to 5km/h.

SPECIFIED VALUE: The air conditioner is cut off.

NOTE

- As for the brake vacuum switch, the contact points will be closed when the negative pressure in the brake booster is more toward the atmospheric pressure side than −34.6±4kPa.

▼If it is OK, there is no abnormality.

▼If it is NG, proceed to ∑2.

∑2. EFI ECU signal check

1.Stop the engine and connect the SST.

SST: 09842-97209-000

2.Perform voltage measurements between each terminal when under the following conditions.

(1) Between SST 32 (PBSW) - SST 125 (E1)

SPECIFIED VALUE:

Measuring condition	Specified value
When the negative pressure in the brake booster is high after starting the engine:	Battery voltage
When the engine is stopped and the negative pressure in the brake booster is more toward the atmospheric side than −30.6 kPa (−230 mmHg) after stepping on the brake pedal several times:	Around 0V

▼If it is OK, proceed to ∑3.

▼If it is NG, check the EFI ECU circuit.

∑3. Check of wire harness continuity

1.Perform continuity check between each of the following terminals.

(1) Between ECU connection vehicle harness side connector 32 (PBSW) - brake vacuum switch side connector 1 (PBSW)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, perform checking and repairing or replacing of the brake vacuum switch.

Refer to Page E1-36.

▼If it is NG, repair or replace the harness.

9-14 UNIT CHECK

WARNING

- If the vehicle is driven with the SST (EFI computer check sub harness, etc.) connected there is a possibility of causing malfunction and may be very dangerous. Therefore, remove it without fail before running.

9-14-1 FUEL PRESSURE CHECK

WARNING

- Fire is strictly forbidden while operation.
  Place cloth, etc. to prevent fuel from splashing.

1. Connect the SST.
   SST: 09842-97209-000
   09268-87701-000
   09268-87702-000

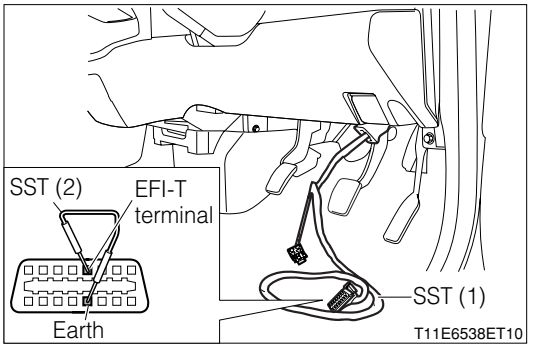
2. Turn the IG switch to the "ON" position.
3. Drive the fuel pump by shorting between SST 35 (FC1) -SST 125 (E1) and measure the fuel pressure at this point.
   SPECIFIED VALUE: 324±5kPa {3.3±0.05kgf/cm²}
   There should be no large fluctuation.

9-14-2 FUEL PUMP

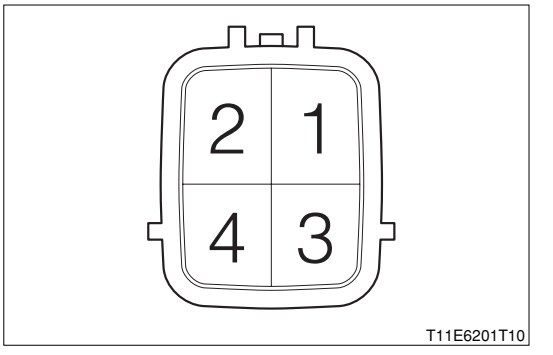
WARNING

- Fire is strictly forbidden while operation.

1. Turn the IG switch to the "ON" position.
2. Short-circuit the terminals 5 (EFI-T) and 13 (E) of the DLC, using the SST and confirm the operation sound of the fuel pump at this point.
   SST: 09991-87404-000 (1)
   09991-87403-000 (2)
3. Turn the IG switch to "LOCK".



4. Pull out the pump connector on top of the fuel tank and measure the resistance between 3 (Pump+) - 4 (pump−) of the fuel pump.
   SPECIFIED VALUE: 0.2 - 3.0Ω



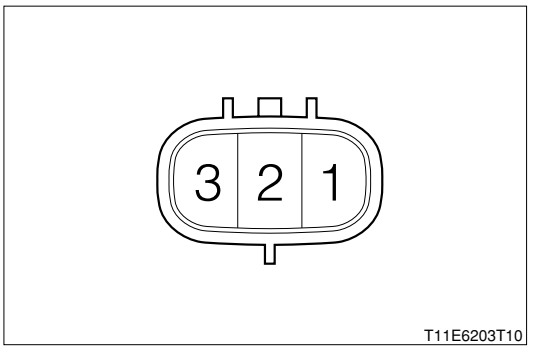
9-14-3 MANIFOLD ABSOLUTE PRESSURE SENSOR

1.Connect the SST.
SST: 09842-97209-000

2.Perform voltage measurements between the following terminals when the IG switch is "ON".
(1) Between SST57 (VCPM) - SST 122 (E2PM)
SPECIFIED VALUE: 4.5 - 5.5V

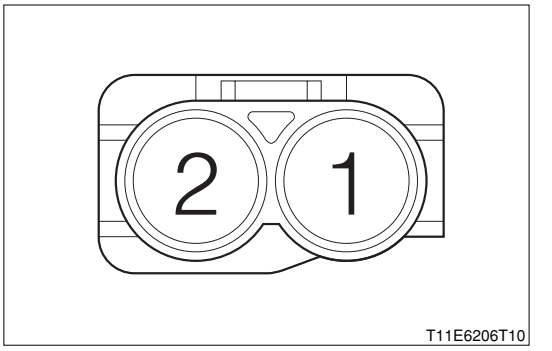
3.Perform voltage measurements between the following terminals when the IG switch is "ON".
(1) Between SST 52 (PIM) - SST 122 (E2PM)
SPECIFIED VALUE: 3.1 - 4.1V

4.Perform voltage measurements between the following terminals by cranking with the fuel pump relay removed.
(1) Between SST 52 (PIM) -SST 122 (E2PM)
SPECIFIED VALUE: The voltage value changes.



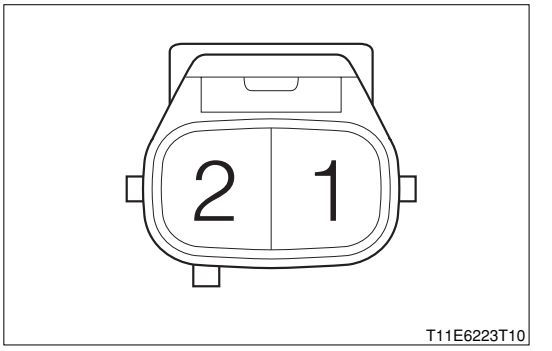
9-14-4 ENGINE REVOLUTION SENSOR

1.Measure the resistance between the following terminals.
(1) Between 1 (N1+) - 2 (N1−)
SPECIFIED VALUE: 2150±300Ω (At 20°C)



9-14-5 CAMSHAFT POSITION SENSOR

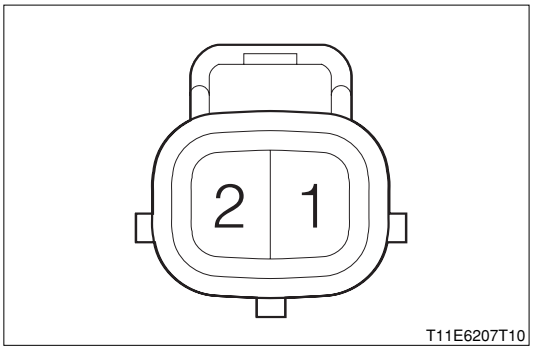
1.Measure the resistance between the following terminals.
(1) Between 1 (N2+) - 2 (N2−)
SPECIFIED VALUE: 2150±300Ω (At 20°C)



9-14-6 WATER TEMPERATURE SENSOR

1.Measure the resistance between the following terminals.
(1) Between 1 (E2) - 2 (THW)

Temperature (℃)	−20	20	80	110
Resistance (kΩ)	15.04	2.45	0.318	0.142

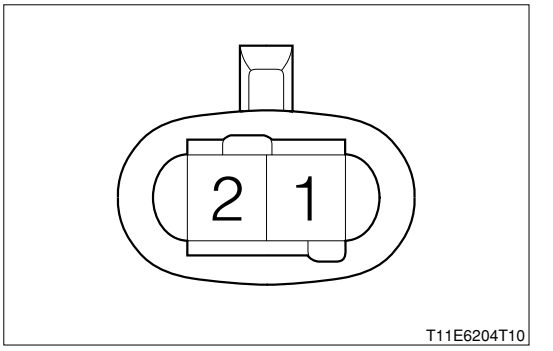


9-14-7 INTAKE AIR TEMPERATURE SENSOR

1.Measure the resistance value between the following terminals.
(1) Between 1 (THA) - 2 (E2)

Intake air temperature sensor

Temperature (℃)	−30	−20	20	80	120
Resistance (kΩ)	28.6	16.2	2.45	0.322	0.117



NOTE

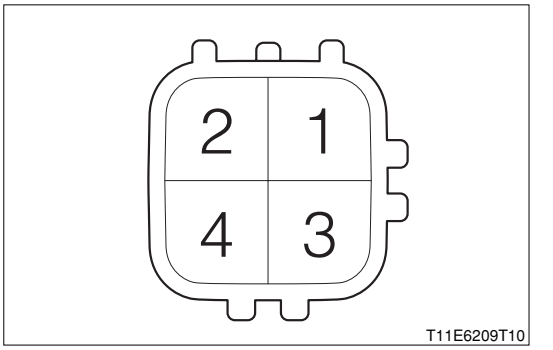
- The reference value is indicated in the parentheses.

9-14-8 OXYGEN SENSOR

(1) For EU specifications

1.Measure the resistance between the following terminals.
(1) Between 1 (OXH1) - 2 (+)
SPECIFIED VALUE: $5.6^{+1.4}_{-0.6}$ Ω (At 20±1°C)

2.Confirm that there is no continuity between each of the following terminals.
(1) Between oxygen sensor body - 3 (OX1)
(2) Between oxygen sensor body - 4 (E2)
(3) Between oxygen sensor body - 1 (OXH1)
(4) Between oxygen sensor body - 2 (+B)
(5) Between 3 (OX1) - 1 (OXH1)
(6) Between 3 (OX1) - 2 (+B)
(7) Between 4 (E2) - 1 (OXH1)
(8) Between4 (E2) - 2 (+B)
SPECIFIED VALUE: No continuity exists.



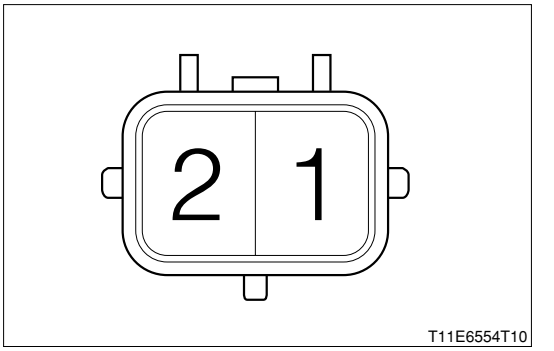
(2) For general specifications

1.Confirm that there is no continuity between the oxygen sensor body and each of the following terminals.
(1) Between oxygen sensor body - 1 (OX1)
(2) Betwee oxygen sensor body - 2 (E2)
SPECIFIED VALUE: No continuity exists.

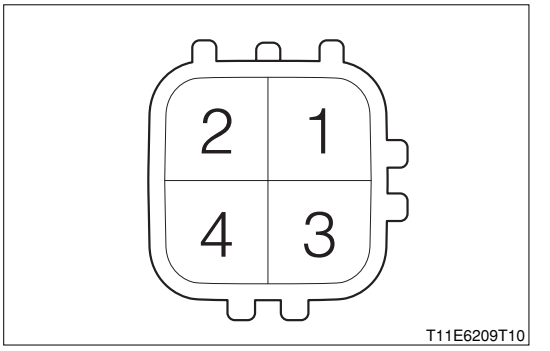
NOTE

- Other than the above unit check, perform checking for the oxygen sensor output voltage under the condition in which it is installed to the vehicle.
(Refer to the page of the oxygen sensor system of the trouble shooting according to the systems.)

Refer to Page B8-311.



9-14-9 REAR OXYGEN SENSOR



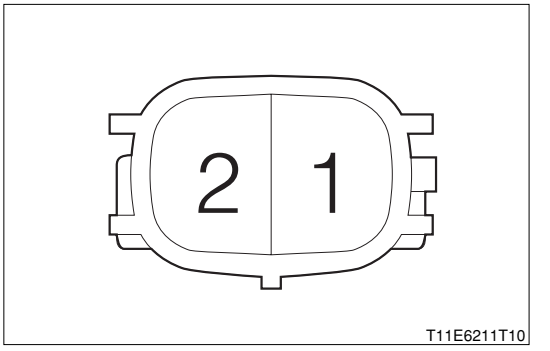
1.Measure the resistance between the following terminals.
(1) Between 1 (OXH2) - 2 (+)
SPECIFIED VALUE: $13.0^{+2.5}_{-1.3}$ Ω (At 20±1°C)
2.Confirm that there is no continuity between each of the following terminals.
(1) Between rear oxygen sensor body - 3 (OX2)
(2) Between rear oxygen sensor body - 4 (E2)
(3) Between rear oxygen sensor body - 1 (OXH2)
(4) Between rear oxygen sensor body - 2 (+B)
(5) Between 3 (OX2) - 1 (OXH2)
(6) Between 3 (OX2) - 2 (+B)
(7) Between 4 (E2) - 1 (OXH2)
(8) Between4 (E2) - 2 (+B)
SPECIFIED VALUE: No continuity exists.

NOTE

- Other than the above unit check, perform checking for the rear oxygen sensor output voltage under the condition in which it is installed to the vehicle.
  (Refer to the page of the rear oxygen sensor system of the trouble shooting according to the systems.)

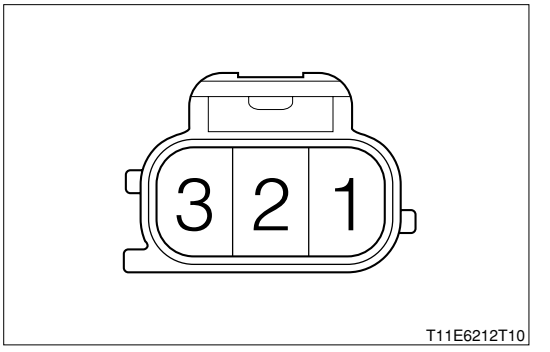
Refer to Page B8-323.

9-14-10 KNOCK SENSOR



1.Measure the resistance between the following terminals.
(1) Between 1 (E2) - 2 (KNK)
SPECIFIED VALUE: 200±80kΩ

9-14-11 THROTTLE POSITION SENSOR



1.Measure the resistance between the following terminals.
(1) Between 1 (VC) - 2 (E2)
SPECIFIED VALUE: 2.5 - 5.0kΩ
2.Measure the resistance between the following terminals.
(1) Between 3 (VTH) - 2 (E2)
SPECIFIED VALUE: The resistance value will increase proportionally to the throttle lever opening.

NOTE

- The resistance value when the throttle lever is fully closed is about 0.6kΩ.
- The resistance value when the throttle lever is fully opened is about 3.9kΩ.

9-14-12 VALVE FOR ISC

1.Warm up the engine completely.
2.Confirm the engine revolution speed under the idling condition with no air conditioner and electric load applied.

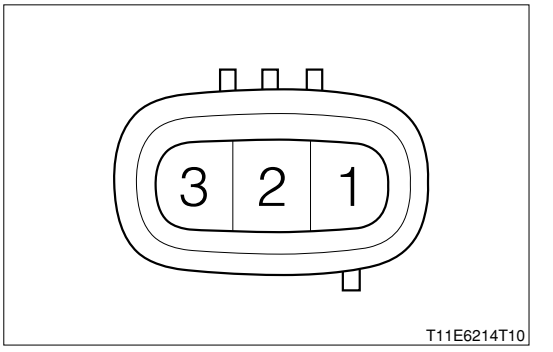
SPECIFIED VALUE: It is at the regular idling speed.
Idling speed 700^{+100}_{-50} rpm (A/T vehicle)
650^{+100}_{-50} rpm (M/T vehicle)

CAUTION

- Do not connect the battery power supply to 1 (ISC) and 3 (E1) of the valve for ISC. There is a possibility that the internal circuit be malfunctioning when connected.

NOTE

- The operation check is difficult by the coil resistance and as an unit, since the valve for ISC has an IC circuit built in and the duty signal from the ECU is transformed in the driving circuit.



T11E6214T10

9-14-13 AIR CONDITIONER EVAPORATOR TEMPERATURE SENSOR

1.Measure the resistance between the sensor side connector terminals.
2.Connect the connectors and leave it for five minutes with the air conditioner "ON".

NOTE

- Air conditioner "ON" means that the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are all "ON".

3.Turn the air conditioner "OFF" and measure the resistance value between the following terminals.

NOTE

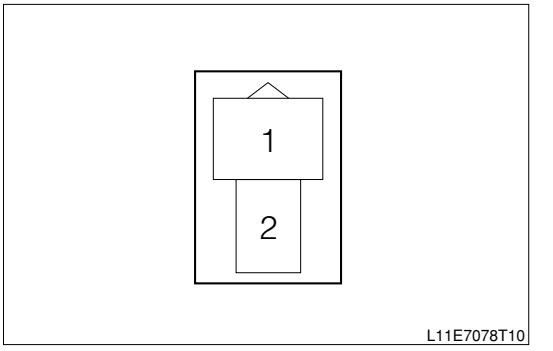
- Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".

(1) Between 1 (ACEV) - 2 (E21)

SPECIFIED VALUE: The resistance value changes before and after the air conditioner operation.

NOTE

- The lower the temperature is the higher the resistance value will become.



L11E7078T10

9-14-14 SPARK PLUG

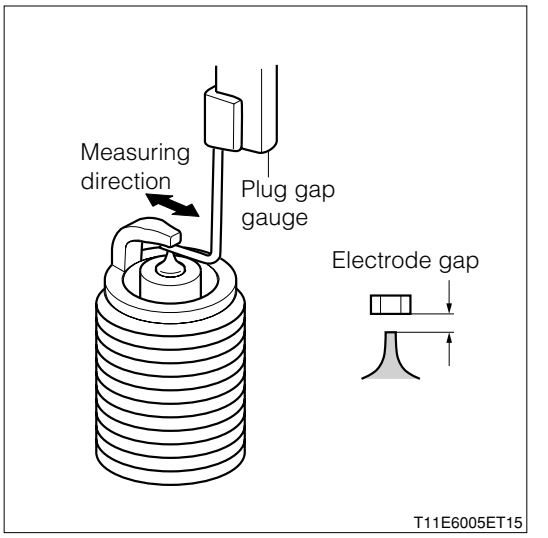
WARNING

- Be very careful not to burn yourself since the spark plugs are hot.

1.Check that the spark plugs exhibits no smoldering and the plugs are not burnt excessively.

2.Check the plug gaps using the plug gap gauge.

SPECIFIED VALUE: $1.1^{+0}_{-0.1}$ mm



9-14-15 INJECTOR

WARNING

- Never use fire during the work.
- Put cloth, etc. to prevent fuel from splashing.

1.Remove the injector to be checked.

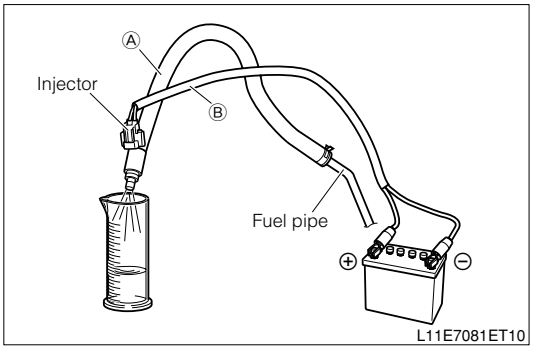
CAUTION

- After removing, install a substitute injector.

2.Remove the fuel hose between the fuel inlet pipe and fuel pipe.

3.Set the injector to be checked to the fuel hose, using SST (Sub harness, measuring tool, EFI inspection wire). (Refer to the right figure.)

SST: 09842-97209-000
09268-41047-000 (A)
09842-30070-000 (B)



4.With the IG switch "ON"

5.Confirm that the fuel is injected when the battery voltage is applied to the injector.

SPECIFIED VALUE: It is injected.

CAUTION

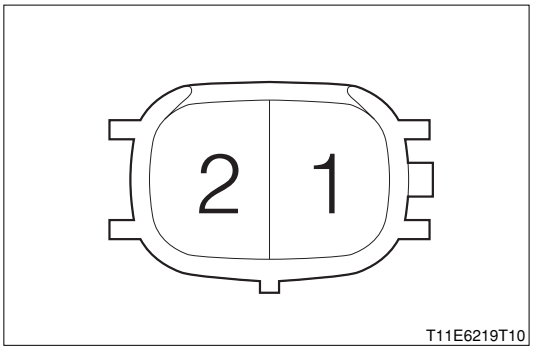
- Perform "ON" or "OFF" at the battery side.

6.Measure the amount leaking from the injector in one minute by removing the battery in the injection check condition.

SPECIFIED VALUE: One drop or less

7.Measure the resistance value between the injector terminals.

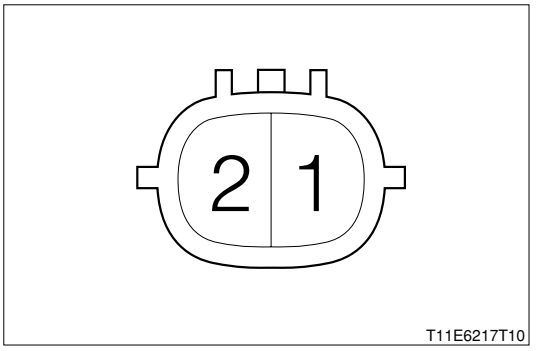
SPECIFIED VALUE: 12Ω (At 20°C)



9-14-16 OIL CONTROL VALVE

1.Visually confirm the operation of the valve when battery voltage is applied to between the connector terminals of the oil control valve.

	Connected to:
Battery positive terminal	1 (OCV+)
Battery negative (-) terminal	2 (OCV−)



CAUTION

- The time while the battery voltage is applied should be kept within one minute.

SPECIFIED VALUE: The valve operates when the battery voltage is applied.

9-14-17 VSV FOR EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL

1.Perform air continuity check between the ports.

SPECIFIED VALUE: No air continuity

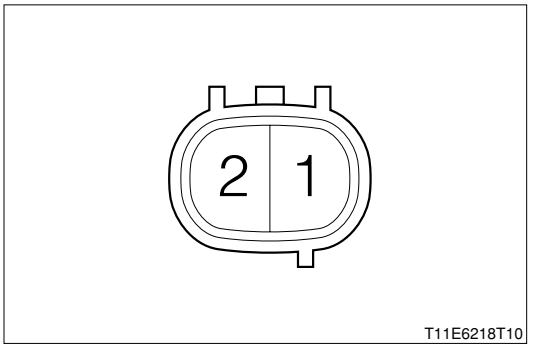
2.Perform air continuity check between the ports when battery voltage is applied between the VSV for evaporative emission control system purge control connector terminals.

SPECIFIED VALUE: Air continuity exists.

3.Measure the resistance value between the following terminals.

(1) Between 1 (PRG) - 2 (+B)

SPECIFIED VALUE: 30 - 34 Ω (20°C)



9-14-18 BRAKE NEGATIVE PRESSURE SWITCH

1.With the brake vacuum switch installed to the vehicle, install the pressure gauge (Negative pressure gauge) between the brake booster and the check valve.

NOTE

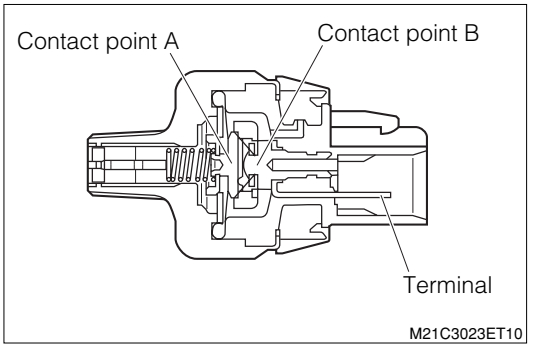
- The check valve is installed within the brake booster and engine intake pipe hose.

2.Start the engine and wait until the negative pressure in the brake booster becomes high.

3.Stop the engine and perform continuity check between the brake vacuum switch terminal and brake vacuum switch body when the negative pressure in the brake booster is changed by stepping on the brake several times.

SPECIFIED VALUE:

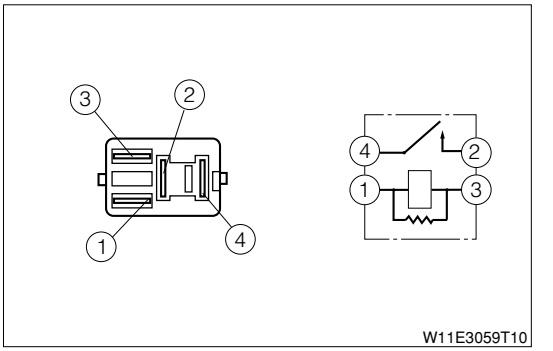
Negative pressure in the brake booster	Continuity
It is higher than −38.6 kPa (−290 mmHg).	Not exists
It is lower than −30.6 kPa (−230 mmHg) (more toward the atmospheric pressure side).	Exists



NOTE

- The operation pressure of the brake vacuum switch is −34.6±4 kPa(−260±30 mmHg).

9-14-19 MAIN RELAY (EFI), FUEL PUMP RELAY (FUEL PUMP), RADIATOR FAN RELAY (RAD), MAGNET CLUTCH RELAY (MGC)



1. Ensure that the relay is operating when the IG switch is "ON" by sound and vibration.

WARNING

- Do not touch the relay during operation since the relay may become hot while operating.

2. Measure the resistance between relay side terminals 1 and 3.

SPECIFIED VALUE: 131 - 230 Ω (At 20°C)

NOTE

- Measure after the temperature in the relay becomes the same with the ambient temperature (20°C). (Measure after leaving it for one hour or more in the ambient temperature 20°C with the relay "OFF".)

3. Ensure that there is no continuity between each terminal other than the relay side terminals 1 and 3.
4. Ensure that there is continuity between relay side terminals 2 and 4 when battery voltage is applied between the relay side terminal 1 and 3.

9-15 ECU INPUT/OUTPUT SIGNAL CHECK

9-15-1 CHECKING METHOD

9-15-2 SPECIFIED VALUE FOR INPUT/ OUTPUT SIGNAL

Check system	Terminal	Measuring condition	Specified value
Power supply system	27 (+B) - 125 (E1)	When IG switch is "ON"	Battery voltage
	38 (BAT) - 125 (E1)	At all times	
Manifold absolute pressure sensor system	57 (VCPM) - 122 (E2PM)	When IG switch is "ON"	4.5 - 5.5V
	52 (PIM) - 122 (E2PM)	When the sensor is opened to the atmosphere	3.1 - 4.1V
		After starting the engine	Changes according to the opening of the accelerator
Throttle position sensor system	56 (VC) - 19 (E2)	When IG switch is "ON"	4.5 - 5.5V
	53 (VTH) - 19 (E2)	When throttle valve is fully closed	0.4 - 0.8V
		When throttle valve is fully opened	3.2 - 5.0V
Water temperature sensor system	54 (THW) - 19 (E2)	When warmed up (Water temperature 60 - 120°C)	0.3 - 1.3V
Intake air temperature sensor system	51 (THA) - 19 (E2)	When warmed up	0.5 - 4.3V
Knock sensor system	121 (KNK) - 19 (E2)	When idling, when racing	Pulse generation
Engine revolution sensor system	59 (N1+) - 128 (N1−)	When idling	Pulse generation
Camshaft position sensor system	58 (N2+) - 127 (N2−)	When idling	Pulse generation
Oxygen sensor system	123 (OX1) - 19 (E2)	After maintaining at 3000rpm for four minutes	Changes between 0.2 - 1.0V
Injector system	24 (#10) - 125 (E1)	When IG switch is "ON"	Battery voltage
	23 (#20) - 125 (E1)		
	22 (#30) - 125 (E1)	When idling	Pulse generation
	21 (#40) - 125 (E1)		
Ignition system	63 (IG1) - 125 (E1)	When IG switch is "ON"	0 - 0.11V
	62 (IG2) - 125 (E1)		
	61 (IG3) - 125 (E1)	When idling	Pulse generation
	60 (IG4) - 125 (E1)		

Check system	Terminal	Measuring condition	Specified value
Ion current combustion control system ※1	51 (ICMB1) - 125 (E1)	While idling	Pulse generation
	50 (ICMB2) - 125 (E1)		
	49 (ICMB3) - 125 (E1)		
	48 (ICMB4) - 125 (E1)		
ISC driving signal system	65 (ISC) - 125 (E1)	When idling	Pulse generation
	12 (EPS) - 125 (E1)	When the steering wheel is turned with the vehicle stopped	0 - 1V
		When the steering wheel is not turned with the vehicle stopped	Battery voltage
Brake vacuum switch signal system	32 (PBSW) - 125 (E1)	When brake vacuum switch is "ON"	1V or less
		When brake vacuum switch is "OFF"	Battery voltage
Fuel pump system	35 (FC1) - 125 (E1)	Fuel pump stopped	Battery voltage
		When idling (Or when cranking)	1.2V or less
Starter switch signal system※2	107 (STSW) - 125 (E1)	When starter switch is "ON"	Battery voltage
		When starter switch is "OFF"	Around 0V
Evaporative emission temperature sensor system	45 (ACEV) - 116 (E21)	When air conditioner is "ON"	0.15 - 4.8V
Air conditioner input signal system	3 (ACSW) - 125 (E1)	When air conditioner is operating	Battery voltage
		When air conditioner is not operating	0 - 0.5V
Air conditioner relay system	36 (MGC) - 125 (E1)	When air conditioner relay is "ON"	Around 0V
		When air conditioner relay is "OFF"	Battery voltage
Stop lamp system	43 (STP) - 125 (E1)	When stop lamp is lighted	Battery voltage
		When stop lamp is not lighted	0 - 0.5V
Defogger system	11 (DEF) - 125 (E1)	When defogger switch is "ON"	Battery voltage
		When defogger switch is "OFF"	0 - 0.5V
Blower system	42 (BLW) - 125 (E1)	When heater blower switch is "ON"	0 - 0.5V
		When heater blower switch is "OFF"	Battery voltage
Radiator fan control system	37 (FAN1) - 125 (E1)	When magnet clutch is "ON"	1V or less
		When magnet clutch is "OFF"	Battery voltage
Variable valve timing control system	26 (OCV＋) - 25 (OCV－)	When idling	Pulse generation
Engine revolution output system	118 (REV) - 125 (E1)	When idling	Pulse generation
Earth system	Between 19 (E2) - body	At all times	Continuity exists.
	Between 20 (E01) - body		
	Between 116 (E21) - body		
	Between 125 (E1) - body		

※1: Only vehicles with EU specifications
※2: A/T vehicles only

9-15-3 OSCILLOSCOPE WAVEFORMS

(1) Injector

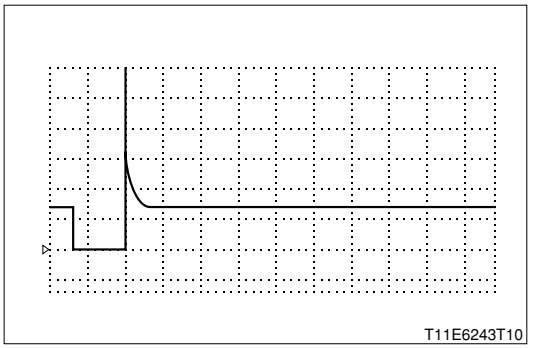
1.Connect the SST.
SST: 09842-97209-000

2.Perform output check between the following terminals using an oscilloscope.
(1) Between SST 24 (#10) - SST 125 (E1)
(2) Between SST 23 (#20) - SST 125 (E1)
(3) Between SST 22 (#30) - SST 125 (E1)
(4) Between SST 21 (#40) - SST 125 (E1)

3.As an example, in case of the following measuring range and measuring conditions, it will be as in the right figure.

Time axis	2ms / DIV
Voltage axis	10V / DIV
Measuring condition	When air conditioner is "OFF" with no electric load and while idling

Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".



NOTE

- The waveform cannot be specified, but confirm that a waveform as in the right figure (One such example) shows up.

4.Confirm the following points.
(1) The voltage changes from the battery voltage to 0V while fuel injection.

(2) Oil control valve

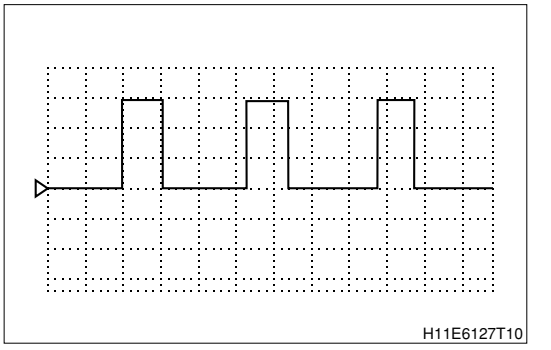
1.Connect the SST.
SST: 09842-97209-000

2.Completely warm up the engine.
3.Perform output check between the following terminals using an oscilloscope.
(1) SST 26 (OCV+) - SST 25 (OCV−)

4.As an example, in case of the following measuring range and measuring conditions, it will be as in the right figure.

Time axis	1ms / DIV
Voltage axis	5V / DIV
Measuring condition	When air conditioner is "OFF" with no electric load and while idling

Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".



NOTE

- The waveform cannot be specified, but confirm that a waveform as in the right figure (One such example) shows up.

5.Confirm the following points.
(1) The pulse of 0V ⇄ battery voltage is generated.

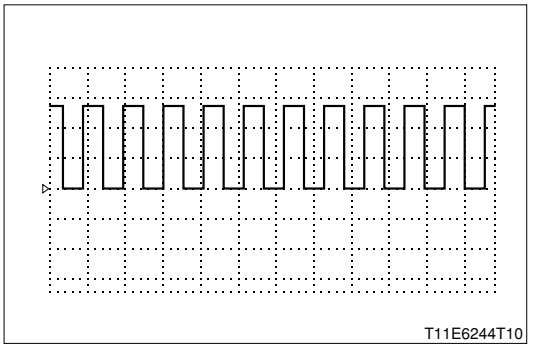
(3) Engine revolution output signal

1.Connect the SST.
SST: 09842-97209-000

2.Perform output check between the following terminals using an oscilloscope.
3.Completely warm up the engine.
(1) SST 118 (REV) - SST 125 (E1)
4.As an example, in case of the following measuring range and measuring conditions, it will be as in the right figure.

Time axis	50ms / DIV
Voltage axis	5V / DIV
Measuring condition	When air conditioner is "OFF" with no electric load and while idling

Air conditioner "OFF": Conditions in which all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are "OFF".



NOTE

- The waveform cannot be specified, but confirm that a waveform as in the right figure (One such example) shows up.

5.Confirm the following points.
(1) The pulse of 0V ⇄ battery voltage is generated.
(2) The wave period becomes shorter as the engine revolution speed rises.

B9 EMISSION CONTROL SYSTEM

1KR ---------- B9 - 1
CHARCOAL CANISTER ---------- B9 - 1
REMOVAL AND INSTALLATION(RHD VEHAICLES) ---------- B9 - 1
REMOVAL AND INSTALLATION(LHD VEHAICLES) ---------- B9 - 2
STEPPER MOTOR TYPE EGR VALVE-- B9 - 3
REMOVAL AND INSTALLATION-------- B9 - 3
EXHAUST EMISSION PURIFICATION SYSTEM ---------- B9 - 3
LIST OF EMISSION CONTOROL DEVICES ---------- B9 - 3
DIAGRAM OF EMISSION CONTROL SYSTEM ---------- B9 - 5
DIAGRAM SHOWING POSITION OF EMISSION CONTOROL DEVICE------- B9 - 6
AIR-FUEL RATIO CONTROL DEVICE ---------- B9 - 7
IGNITION TIMING CONTROL DEVICE ---------- B9 - 7
DECELERATION CONTOROL DEVICE ---------- B9 - 7
EXHAUST GAS RECICULATION DEVICE ---------- B9 - 7
EVAPORATIVE EMISSION CONTROL DEVICE ---------- B9 - 7
BLOW-BY RECICULATION DEVICE -- B9 - 8
K3 ---------- B9 - 9
CHARCOAL CANISTER ---------- B9 - 9
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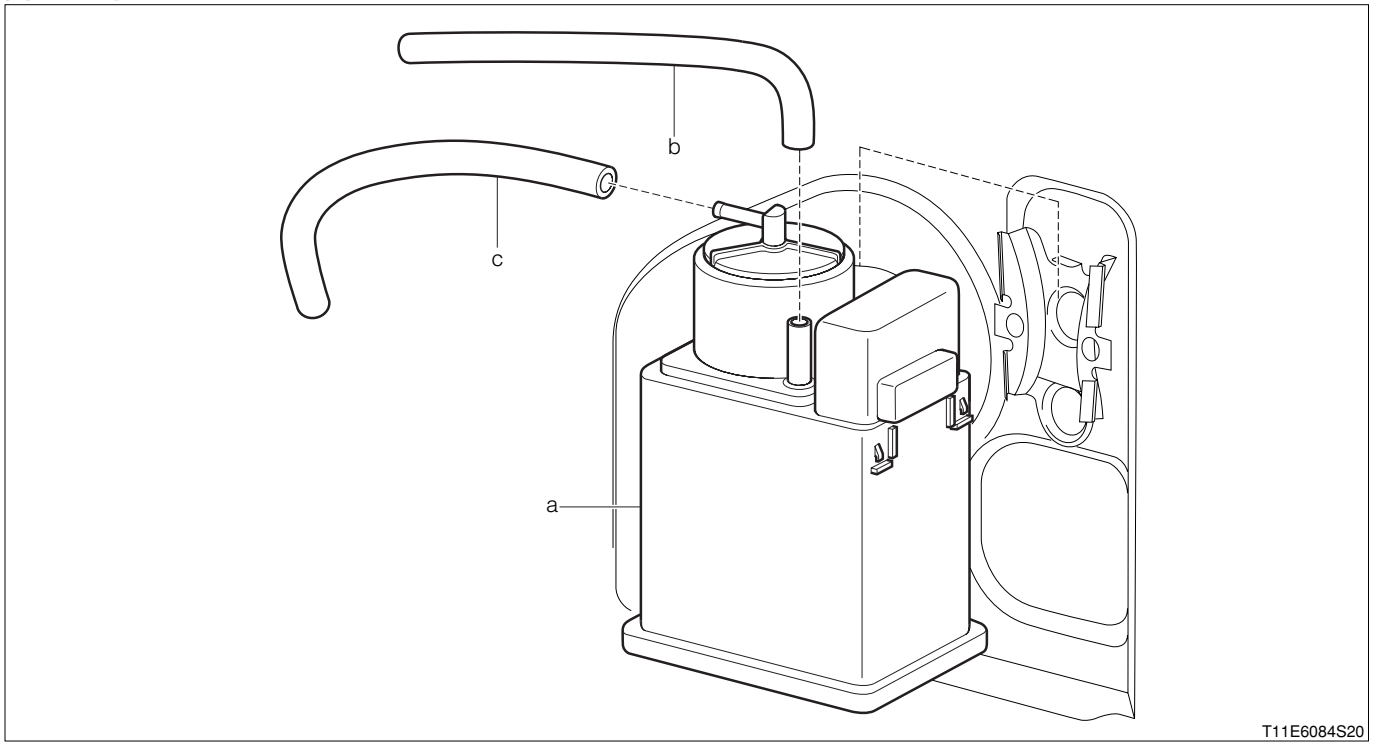
DIAGRAM OF EMISSION CONTROL SYSTEM ---------- B9 - 11
DIAGRAM SHOWING POSITION OF EMISSION CONTOROL DEVICE----- B9 - 12
AIR-FUEL RATIO CONTROL DEVICE ---------- B9 - 13
IGNITION TIMING CONTROL DEVICE ---------- B9 - 13
DECELERATION CONTOROL DEVICE ---------- B9 - 13
EVAPORATIVE EMISSION CONTROL DEVICE---------- B9 - 13
BLOW-BY RECICULATION DEVICE- B9 - 14

■ 1KR
1 CHARCOAL CANISTER
1-1 REMOVAL AND INSTALLATION(RHD VEHICLES)
1-1-1 OPERATION BEFORE REMOVAL
1.Remove the charcoal canister outlet hose No.1 (vacuum switching valve Ay side).
2.Remove the evaporative emission hose (body side).
1-1-2 REMOVAL AND INSTALLATION PROCEDURES
(1) Components



(2) Removal and installation procedures

Electrical Tester

1-1-3 OPERATION AFTER INSTALLATION
1.Install the charcoal canister outlet hose No.1 (vacuum switching valve Ay side).
2.Install the evaporative emission hose (body side).

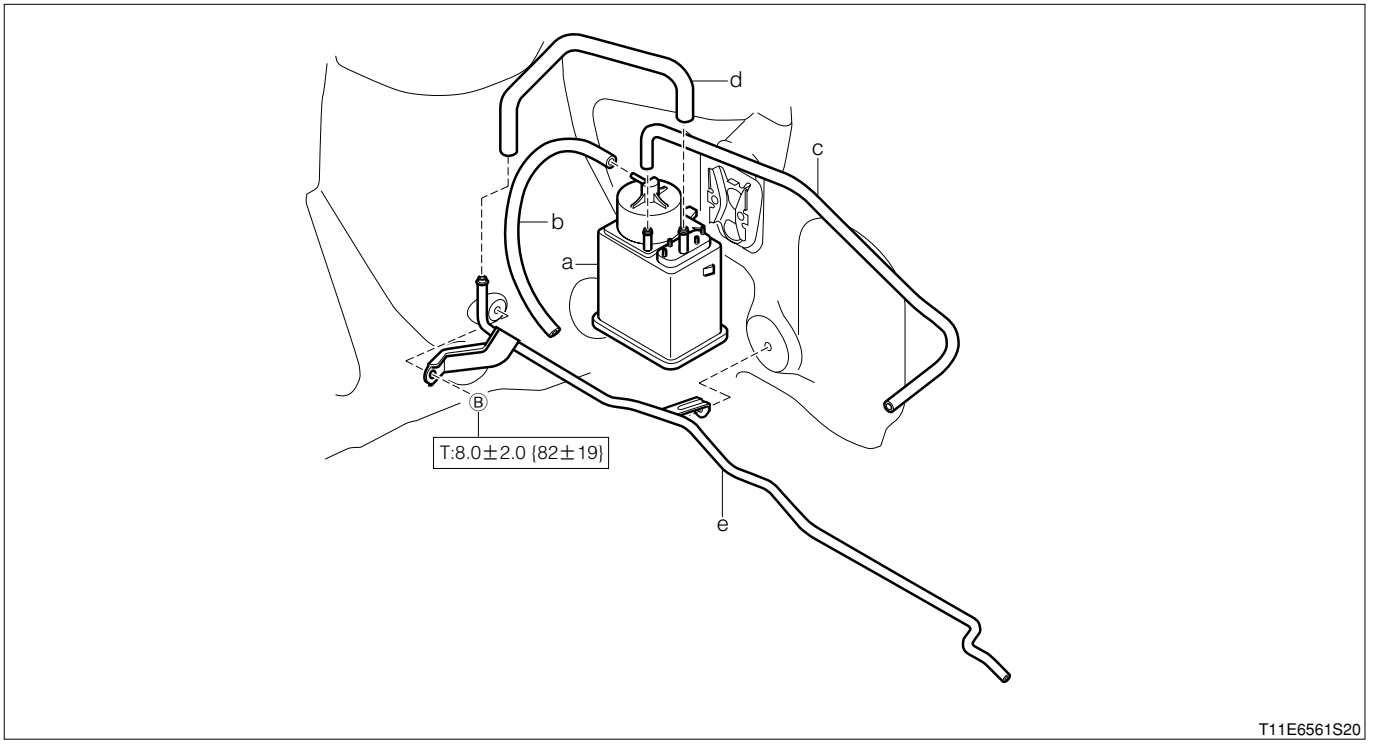
1-2 REMOVAL AND INSTALLATION(LHD VEHICLES)

1-2-1 OPERATION BEFORE REMOVAL

1.Remove the charcoal canister outlet hose No.1 (vacuum switching valve Ay side).
2.Remove the evaporative emission hose (body side).

1-2-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Charcoal canister Ay
2 b Evaporative emission hose
3 c Charcoal canister outlet hose No.1
4 d Charcoal canister hose
5 e Tube,charcoal canister outlet

1-2-3 OPERATION AFTER INSTALLATION

1.Install the charcoal canister outlet hose No.1 (vacuum switching valve Ay side).
2.Install the evaporative emission hose (body side).

2 STEPPER MOTOR TYPE EGR VALVE

2-1 REMOVAL AND INSTALLATION

Refer to Page B3-5.

3 EXHAUST EMISSION PURIFICATION SYSTEM

3-1 LIST OF EMISSION CONTOROL DEVICES

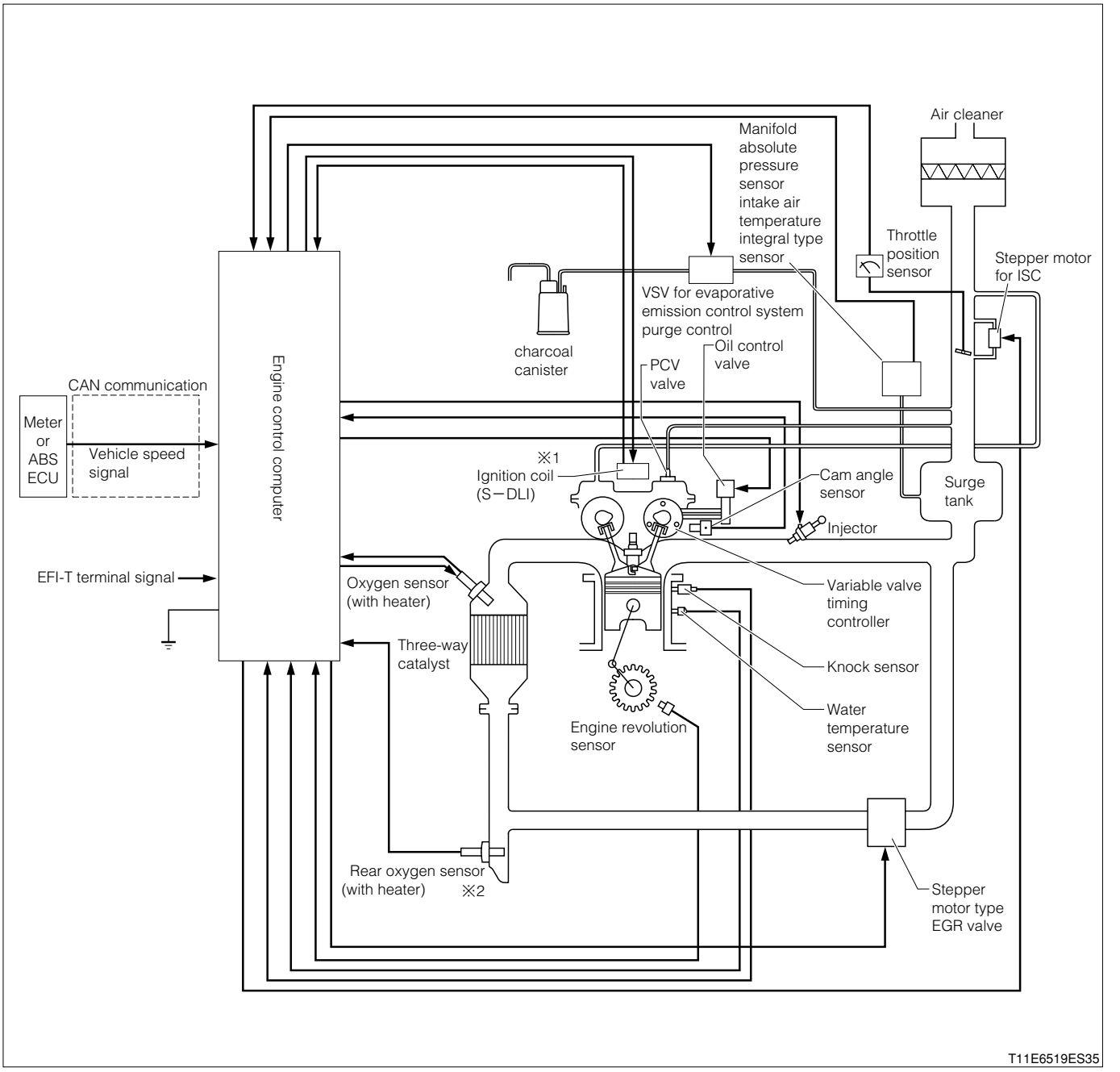
Name of device	System of device	COMPONENTS	Purpose/function
Catalyst device	Three-way catalyst system	(1)Monolithic catalyst 0.849ℓ	·Reduction of CO, HC and NO_x
Air-fuel ratio control device	Electronic controlled fuel injection system	(1)Injector (2) Oxygen sensor (with heater) (3)Rear oxygen sensor (with heater)※1 (4)Computer for control (5)Operation control device Throttle position sensor, intake pipe pressure/intake air temperature integrated sensor, water temperature sensor, engine revolution sensor, atmospheric pressure sensor※1, stepper motor for ISC	·Reduction of CO, HC and NO_x (The air-fuel ratio of the mixture taken in the combustion chamber will be controlled approximately to the stoichiometric air-fuel ratio, thus enabling the three-way catalyst to fully exercise the purification performance.)
Ignition timing control device (For EU specifications)	Electronic controlled system	(1)Ignition coil (Ion current detection device built-in) (2)Computer for control (3)Operation control device Intake pipe pressure/intake air temperature integrated sensor, water temperature sensor, throttle position sensor, engine revolution sensor, cam angle sensor, knock sensor, injector	·Reduction of HC ·Reduction of NO_x (An appropriate ignition timing control is performed according to the operating conditions.)
Ignition timing control device (For General specifications)	Electronic controlled system	(1)Ignition coil (2)Computer for control (3)Operation control device Intake pipe pressure/intake air temperature integrated sensor, water temperature sensor, throttle position sensor, engine revolution sensor, cam angle sensor, knock sensor, injector	·Reduction of NO_x (An appropriate ignition timing control is performed according to the operating conditions.)
Deceleration control device		(1)Injector (2)Computer for control (3)Operation control device Throttle position sensor	·Reduction of CO and HC during deceleration ·Improvement of fuel consumption ·Prevention of catalyst heating (Fuel cut is carried out during deceleration by the control device.)
Evaporative emission control device	Canister type	(1)Charcoal canister 0.36 ℓ (2)VSV for evaporative emission control system purge control (3)Computer for control	·Emission control of fuel evaporative emission
Blow-by gas recirculation device	Closed type	(1)Ventilation hose (2)PCV valve	·Reduction of CO and HC (The blow-by gas will be burned again to prevent emission of CO and HC.)

※1: For only EU specifications

Name of device	System of device	COMPONENTS	Purpose/function
Variable valve timing device		(1)Oil control valve Variable valve timing controller (3)Computer for control (4)Operation control device Engine revolution sensor, cam angle sensor, intake pipe pressure/intake air temperature integrated sensor, water temperature sensor, injector	·Reduction of NO_x (The NO_x is reduced by controlling the opening and closing of the intake valve to the appropriate timing according to the operating conditions.)
Exhaust gas recirculation device	Electronic controlled system	(1)Stepper motor type EGR valve (2)Computer for control (3)Operation control device Engine revolution sensor, water temperature sensor, intake pipe pressure/intake air temperature integrated sensor, throttle position sensor	·Reduction of NO_x (The NO_x in the exhaust gas is reduced by the external EGR effect.) ·Improvement of fuel consumption
On-board diagnosis device		Engine control computer, throttle position sensor, intake pipe pressure/intake air temperature integrated sensor, water temperature sensor, engine revolution sensor, cam angle sensor, oxygen sensor, oxygen sensor heater circuit, rear oxygen sensor※1, rear oxygen sensor heater circuit※1, oil control valve, atmospheric pressure sensor※1, ignition coil (ion current detection device built-in※1), fuel supply system, exhaust gas recirculation system, warning lamp	·Detection of failure of the emission control device

※1: For only EU specifications

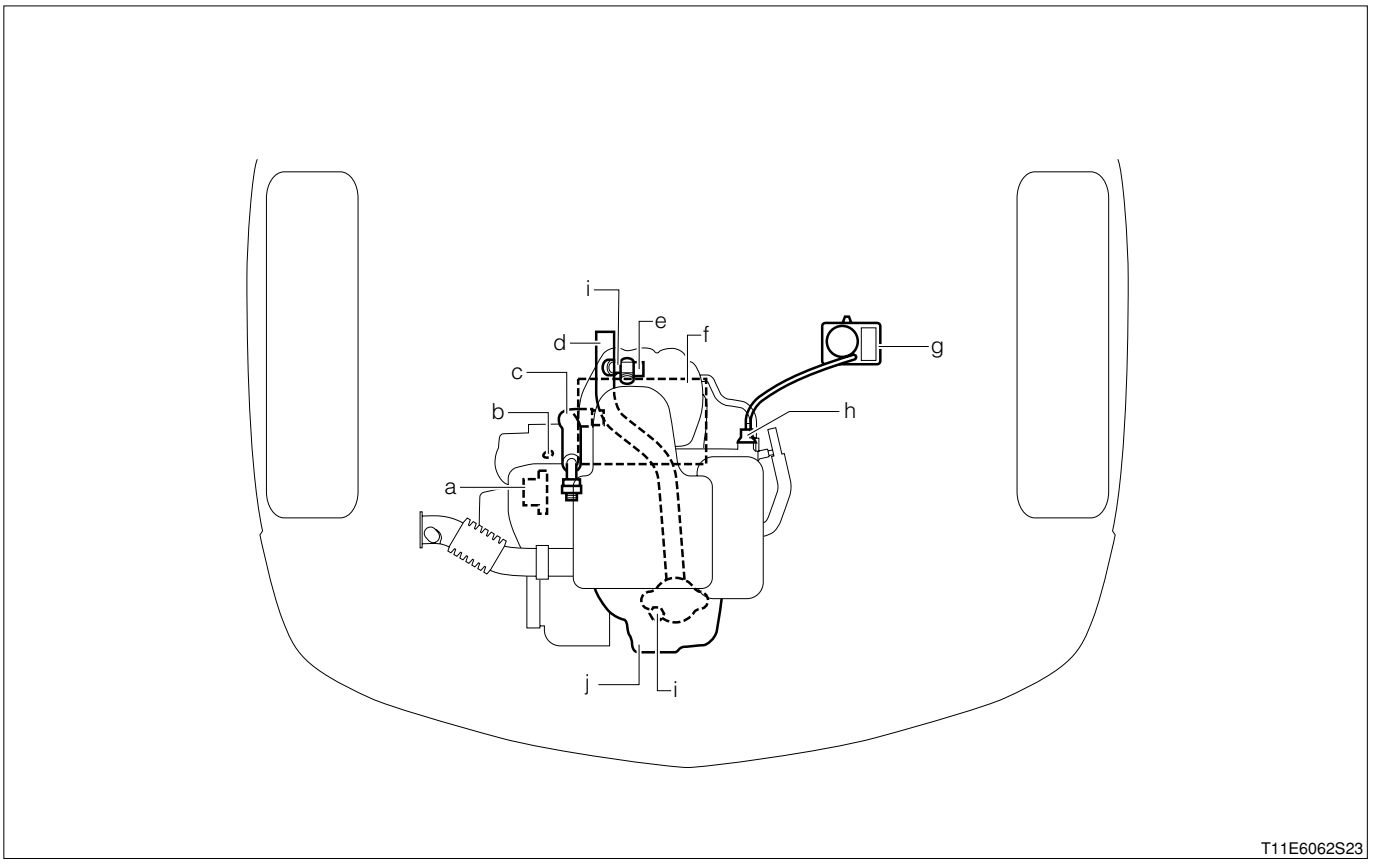
3-2 DIAGRAM OF EMISSION CONTROL SYSTEM



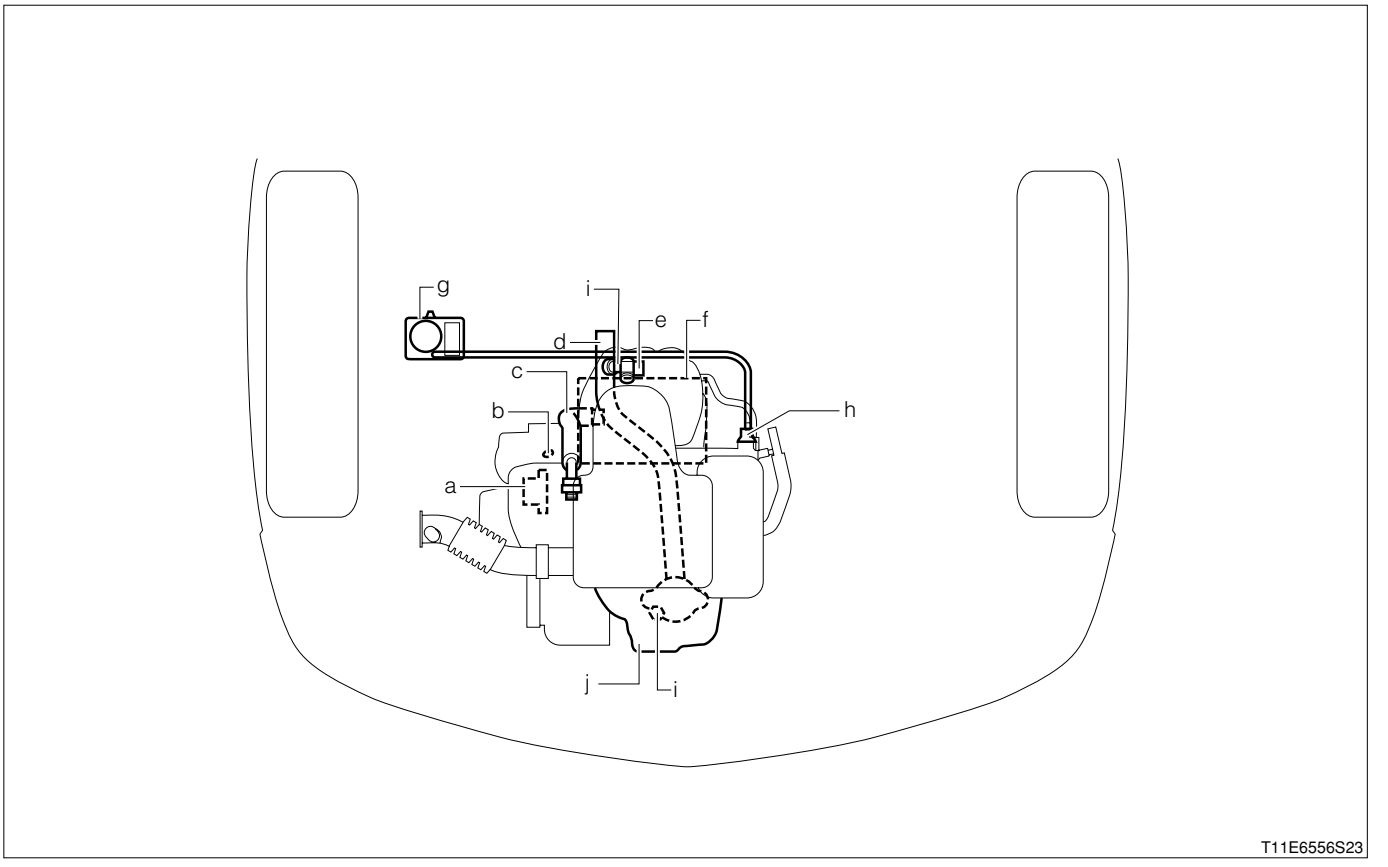
※1: Ion current detection device built-in for only EU specifications
※2: For only EU specifications

3-3 DIAGRAM SHOWING POSITION OF EMISSION CONTOROL DEVICE

RHD vehicles



LHD vehicles



	Part name
a	Variable valve timing device
b	Engine revolution sensor (Ignition timing control device)
c	Blow-by gas hose (countermeasure for blow-by gas)
d	Exhaust pipe
e	Intake pipe pressure/intake air temperature integrated sensor
f	Electronic controlled fuel injection device (air-fuel ratio control device) (deceleration control device)
g	Charcoal canister (countermeasure for fuel evaporative gas)
h	VSV for evaporative emission control system purge control
i	Oxygen sensor (with front oxygen sensor heater, rear oxygen sensor heater※1)
j	Exhaust manifold (three-way catalyst)

※1: For only EU specifications

3-4 AIR-FUEL RATIO CONTROL DEVICE

3-4-1 FUNCTION CHECK

1.Refer to "CO/HC concentration check" of the engine tune-up.
Refer to Page B1-11.

2.Refer to "Unit check" of the engine control system.
Refer to Page B8-219.

3-5 IGNITION TIMING CONTROL DEVICE

3-5-1 FUNCTION CHECK

1.Refer to "Ignition timing check" of the engine tune-up.
Refer to Page B1-8.

2.Perform the "unit check" of the engine control system.
Refer to Page B8-219.

3-6 DECELERATION CONTOROL DEVICE

3-6-1 FUNCTION CHECK

1.Refer to "Function check of deceleration control device" of the engine tune-up.
Refer to Page B14-14.

3-7 EXHAUST GAS RECICULATION DEVICE

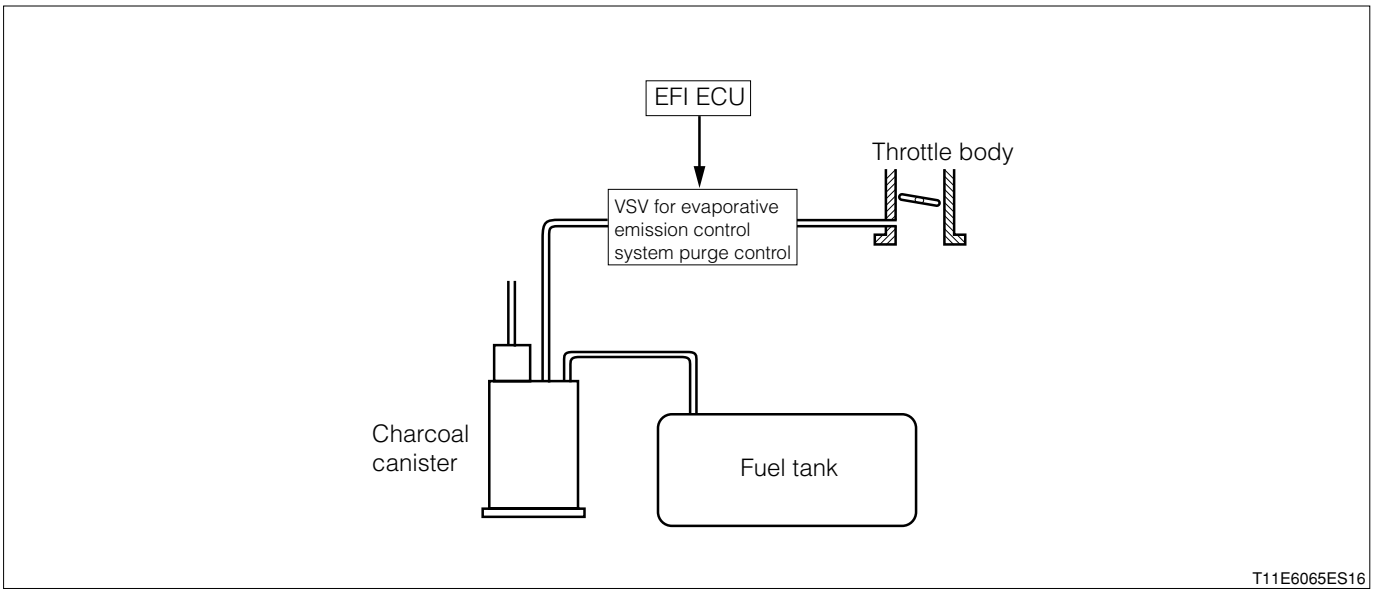
3-7-1 FUNCTION CHECK

Refer to "Exhaust gas recirculation device check" of the engine tune-up.
Refer to Page B1-15.

3-8 EVAPORATIVE EMISSION CONTROL DEVICE

＜canister type＞

3-8-1 SYSTEM DIAGRAM



3-8-2 UNIT CHECK

(1) VSV for evaporative emission control system purge control

1.Refer to "Unit check" of the engine control system.
Refer to Page B8-225.

(2) Charcoal canister

1.Refer to "Charcoal canister check" of the engine tune-up.
Refer to Page B1-13.

3-9 BLOW-BY RECICULATION DEVICE

3-9-1 UNIT CHECK

(1) PCV valve (metering valve)

1.Refer to "Check of piping of blow-by recirculation device for damage" of the engine tune-up.
Refer to Page B1-14.

■ K3
1 CHARCOAL CANISTER
1-1 REMOVAL AND INSTALLATION
Refer to Page B9-1.

Refer to Page B9-2.

2 EXHAUST EMISSION PURIFICATION SYSTEM
2-1 LIST OF EMISSION CONTOROL DEVICES

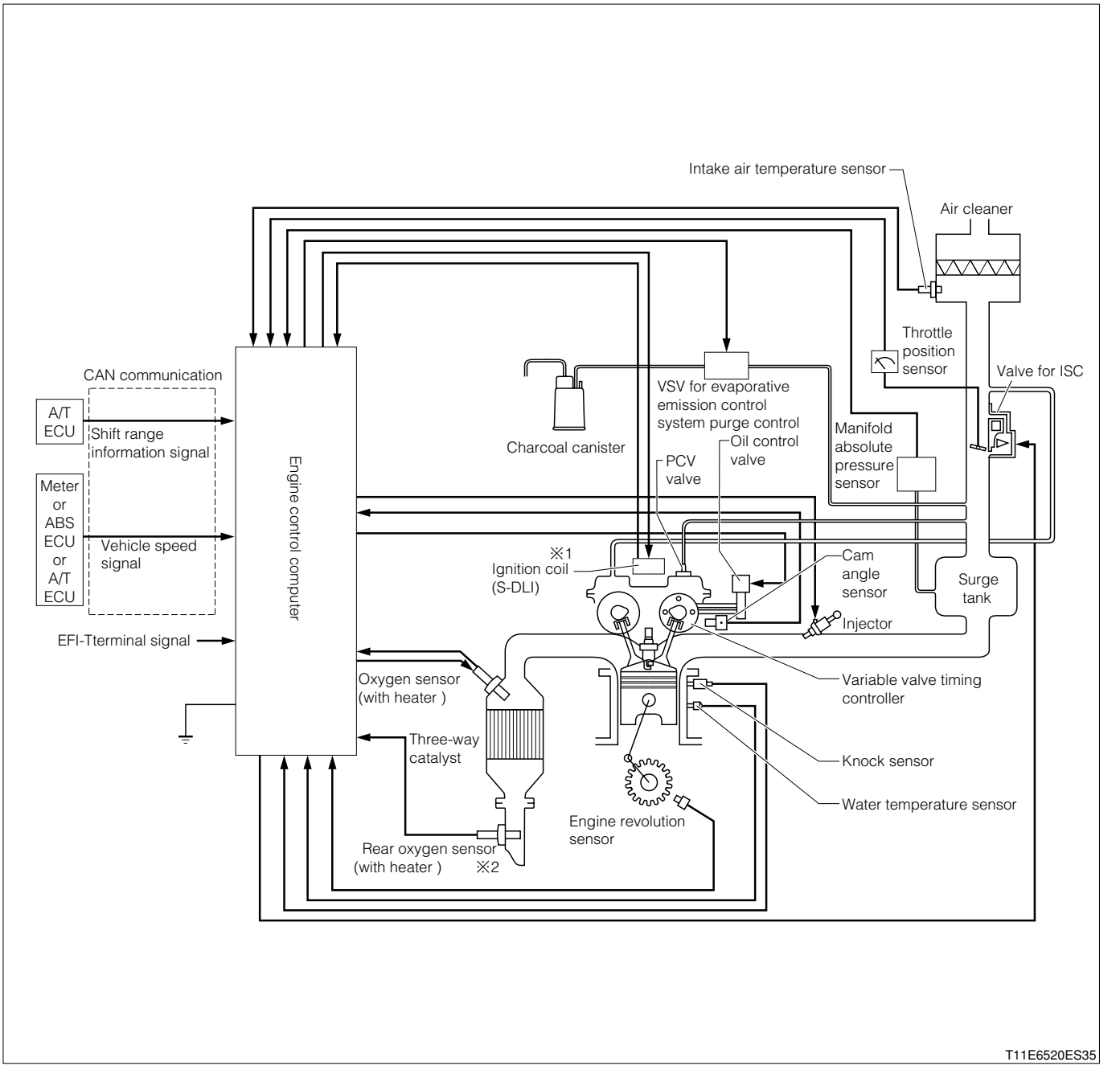
Name of device	System of device	COMPONENTS	Purpose/function
Catalyst device	Three-way catalyst system	(1)Monolithic catalyst 1.152ℓ	·Reduction of CO, HC and NO_x
Air-fuel ratio control device	Electronic controlled fuel injection system	(1)Injector (2)Oxygen sensor (with heater※1) (3)Rear oxygen sensor (with heater)※1 (4)Computer for control (5)Operation control device Throttle position sensor, intake pipe pressure sensor, water temperature sensor, intake air temperature sensor, engine revolution sensor, atmospheric pressure sensor※1	·Reduction of CO, HC and NO_x (The air-fuel ratio of the mixture taken in the combustion chamber will be controlled approximately to the stoichiometric air-fuel ratio, thus enabling the three-way catalyst to fully exercise the purification performance.)
Ignition timing control device (For EU specifications)	Electronic controlled system	(1)Ignition coil (Ion current detection device built-in) (2)Computer for control (3)Operation control device Intake pipe pressure sensor, water temperature sensor, throttle position sensor, engine revolution sensor, cam angle sensor knock sensor	·Reduction of HC ·Reduction of NO_x (An appropriate ignition timing control is performed according to the operating conditions.)
Ignition timing control device (For General specifications)	Electronic controlled system	(1)Ignition coil (2)Computer for control (3)Operation control device Intake pipe pressure sensor, water temperature sensor, throttle position sensor, engine revolution sensor, cam angle sensor knock sensor	·Reduction of NO_x (An appropriate ignition timing control is performed according to the operating conditions.)
Deceleration control device		(1)Injector (2)Computer for control (3)Operation control device Throttle position sensor, engine revolution sensor	·Reduction of CO and HC during deceleration ·Improvement of fuel consumption ·Prevention of catalyst heating (Fuel cut is carried out during deceleration by the control device.)
Evaporative emission control device	Canister type	(1)Charcoal canister 0.36 ℓ (2)VSV for evaporative emission control system purge control (3)Computer for control	·Emission control of fuel evaporative emission

※1: For only EU specifications

Name of device	System of device	COMPONENTS	Purpose/function
Blow-by gas recirculation device	Closed type	(1)Ventilation hose (2)PCV valve	·Reduction of CO and HC (The blow-by gas will be burned again to prevent emission of CO and HC.)
Variable valve timing device		(1)Oil control valve Variable valve timing controller (3)Computer for control (4)Operation control device Engine revolution sensor, cam angle sensor, intake pipe pressure, water temperature sensor	·Reduction of NO_x (The NO_x is reduced by controlling the opening and closing of the intake valve to the appropriate timing according to the operating conditions.)
On-board diagnosis device		Engine control computer, throttle position sensor, intake pipe pressure sensor, intake air temperature sensor, water temperature sensor, engine revolution sensor, cam angle sensor, oxygen sensor, oxygen sensor heater circuit※1, rear oxygen sensor※1, rear oxygen sensor heater circuit※1, oil control valve, , atmospheric pressure sensor※1, ignition coil (Ion current detection device built-in※), fuel supplying system, water pump	·Detection of failure of the emission control device

※1: For only EU specifications

2-2 DIAGRAM OF EMISSION CONTROL SYSTEM

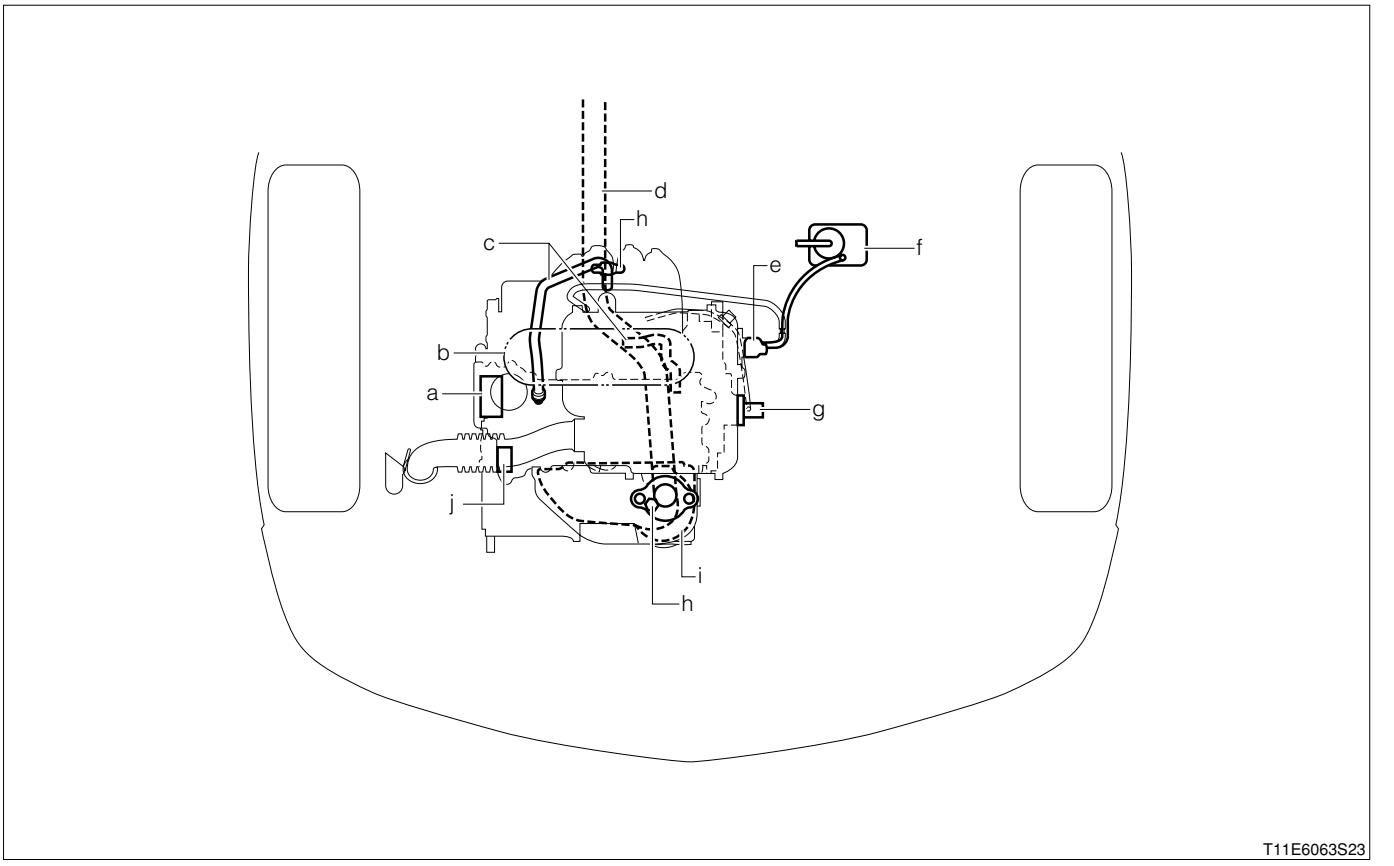


T11E6520ES35

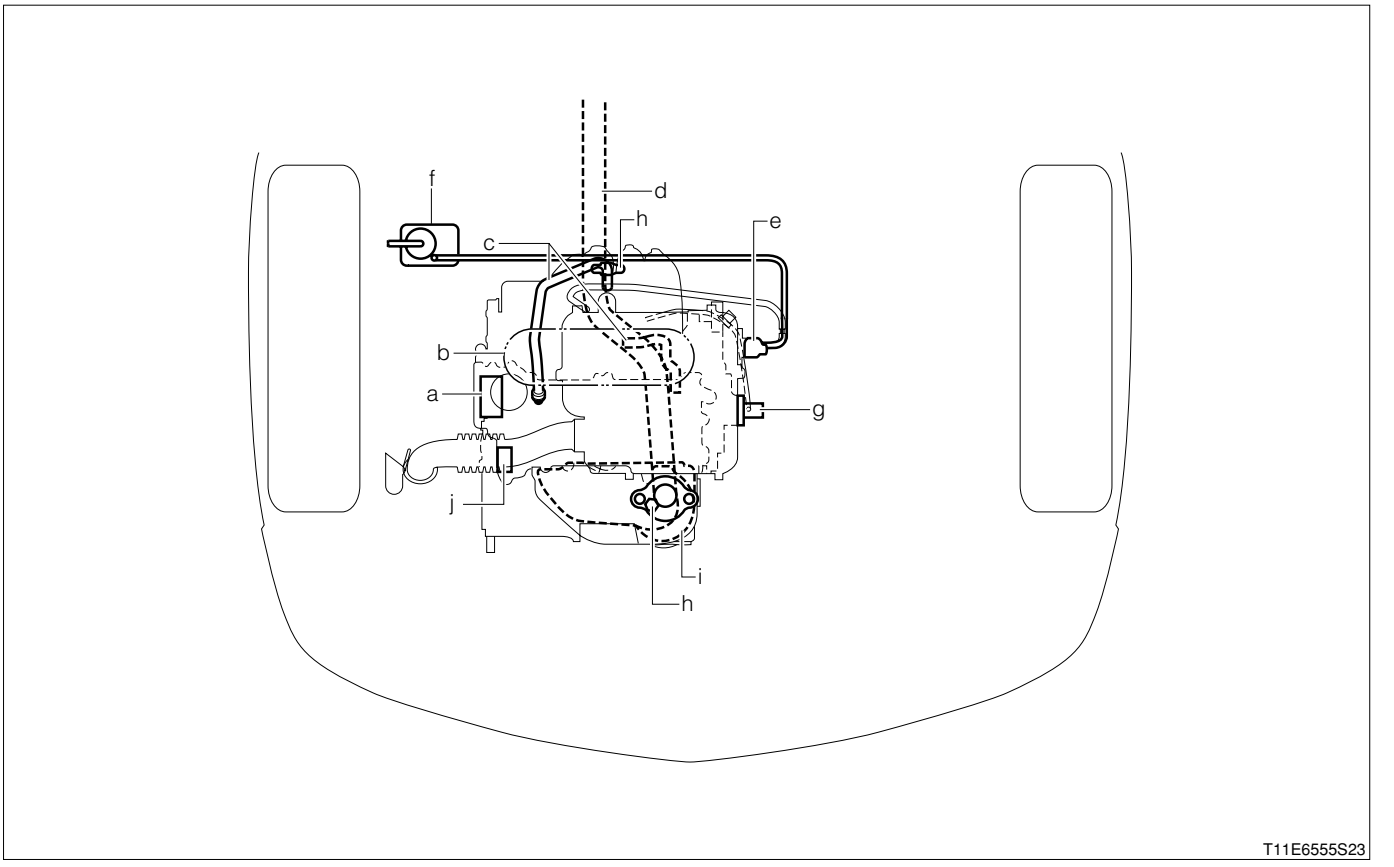
※1: Ion current detection device built-in for only EU specifications
※2: For only EU specifications

2-3 DIAGRAM SHOWING POSITION OF EMISSION CONTOROL DEVICE

RHD vehicles



LHD vehicles



	Part name
a	Variable valve timing device
b	Electronic controlled fuel device (air-fuel ratio control device) (deceleration control device)
c	Blow-by gas hose (countermeasure for blow-by gas)
d	Exhaust pipe
e	VSV for evaporative emission control system purge control
f	Charcoal canister (countermeasure for fuel evaporative gas)
g	Manifold absolute pressure sensor
h	Oxygen sensor (with front oxygen sensor heater※1)
i	Exhaust manifold (three-way catalyst)
j	Engine revolution sensor (Ignition timing control device)

※1: For only EU specifications

2-4 AIR-FUEL RATIO CONTROL DEVICE

2-4-1 FUNCTION CHECK

1.Refer to "CO/HC concentration check" of the engine tune-up.
Refer to Page B1-27.

2.Refer to "Unit check" of the engine control system.
Refer to Page B8-467.

2-5 IGNITION TIMING CONTROL DEVICE

2-5-1 FUNCTION CHECK

1.Refer to "Ignition timing check" of the engine tune-up.
Refer to Page B1-24.

2.Perform the "Unit check" of the engine control system.
Refer to Page B8-467.

2-6 DECELERATION CONTOROL DEVICE

2-6-1 FUNCTION CHECK

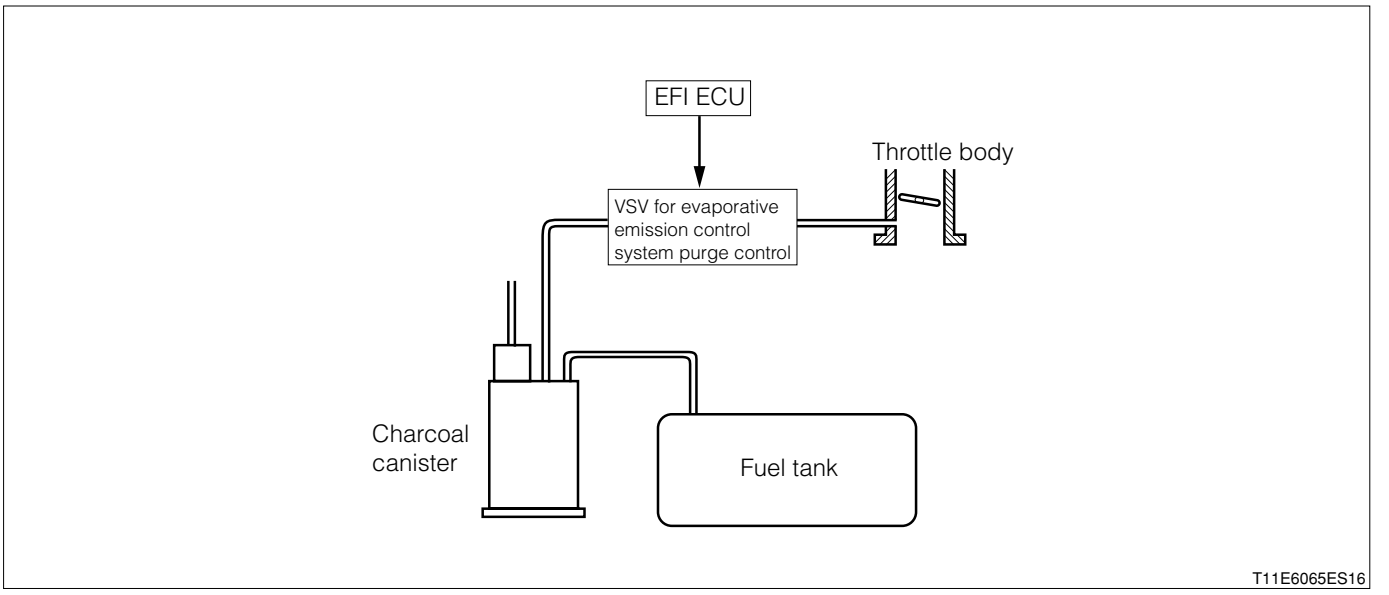
1.Refer to "Function check of deceleration control device" of the engine tune-up.
Refer to Page B1-30.

2.Refer to "Unit check" of the engine control system.
Refer to Page B8-467.

2-7 EVAPORATIVE EMISSION CONTROL DEVICE

＜canister type＞

2-7-1 SYSTEM DIAGRAM



2-7-2 UNIT CHECK

(1) VSV for evaporative emission control system purge control

1.Refer to "Unit check" of the engine control system.
Refer to Page B8-473.

(2) Charcoal canister

1.Refer to "Charcoal canister check" of the engine tune-up.
Refer to Page B1-29.

2-8 BLOW-BY RECICULATION DEVICE

2-8-1 UNIT CHECK

1.Refer to "Check of piping of blow-by recirculation control device for damage" of the engine tune-up.
Refer to Page B1-30.

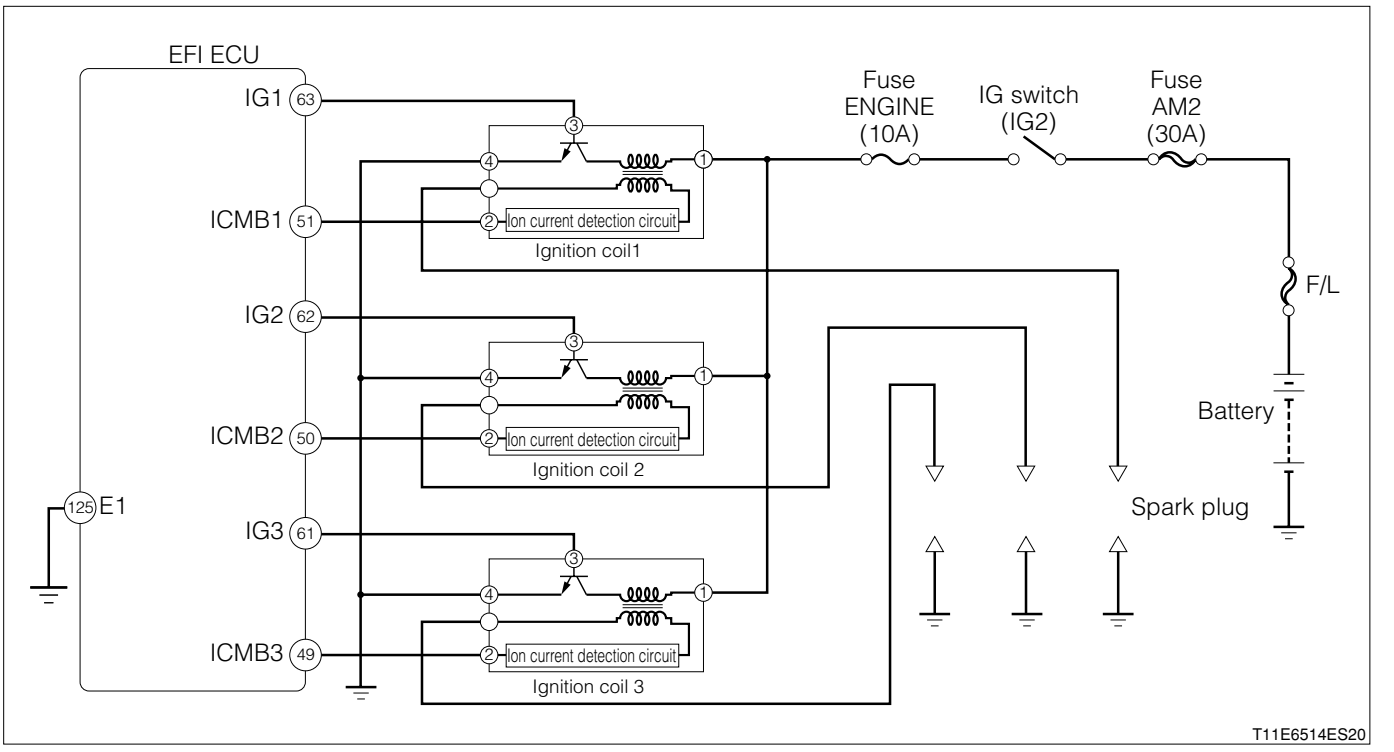
TO INDEX

B10 IGNITION SYSTEM

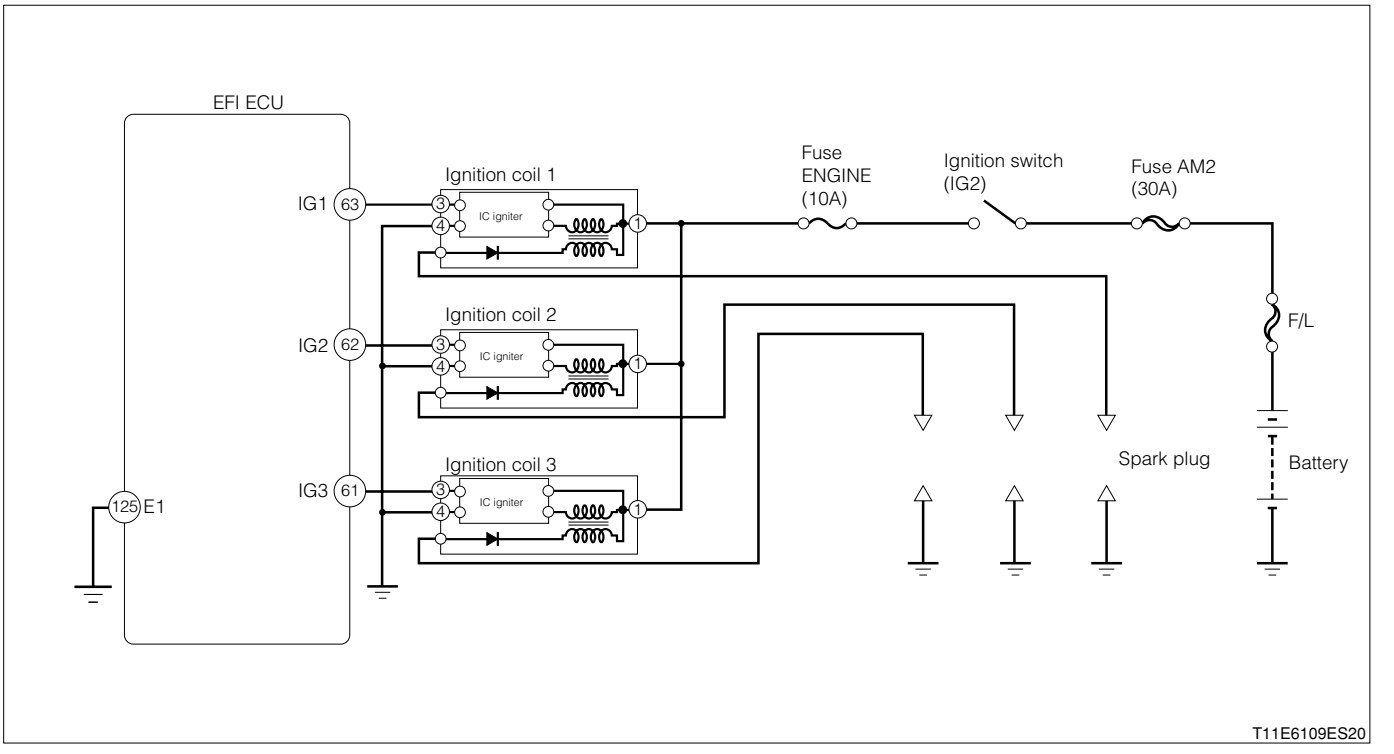
1KR ---------- B10 - 1
IGNITION SYSTEM ---------- B10 - 1
SYSTEM DIAGRAM ---------- B10 - 1
SPARK PLUG ---------- B10 - 2
REMOVAL AND INSTALLATION ------ B10 - 2
K3 ---------- B10 - 5
IGNITION SYSTEM ---------- B10 - 5
SYSTEM DIAGRAM ---------- B10 - 5
SPARK PLUG ---------- B10 - 6
REMOVAL AND INSTALLATION ------ B10 - 6

■ 1KR
1 IGNITION SYSTEM
1-1 SYSTEM DIAGRAM

EU SPEC



GENEAL SPC

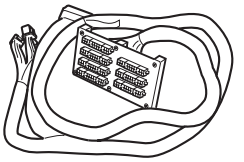


2 SPARK PLUG

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09842-97209-000	Sub-harness,EFI computer check

Instrument

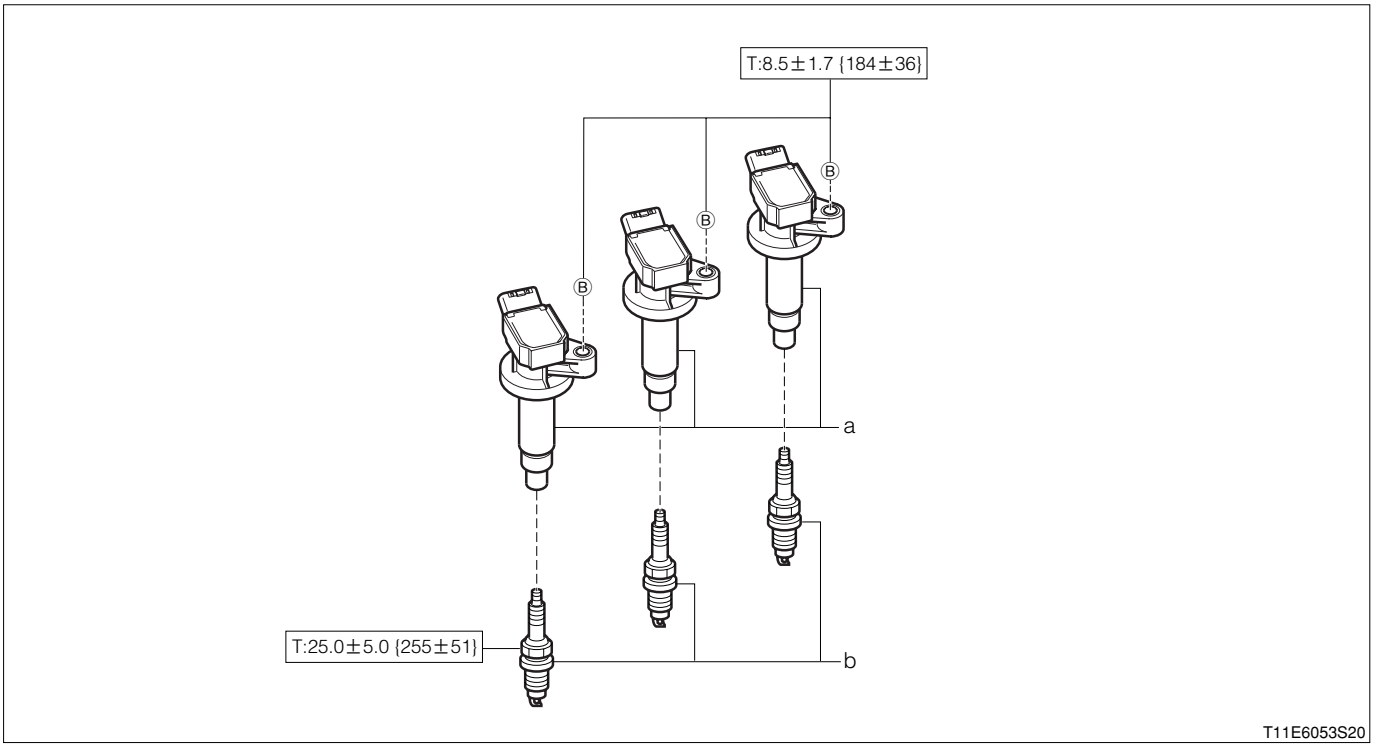
Torque wrench

2-1-2 OPERATION BEFORE REMOVAL

1.Remove the hose S/A, air cleaner.
Refer to Page B3-1.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removeal and installation procedures

1 a Coil Ay, W/igniter
2 b Plug, spark

2-1-4 INSPECTION

(1) Coil Ay, W/igniter

1.Spark check

WARNING

- Sparks will take place. Care must be exercised to the surrounding combustible objects.

(1) Warm up the engine.
(2) Turn the IG switch to LOCK.
(3) Remove the fuel pump relay.
(4) Let the engine idle and wait until it stops by itself.
(5) Turn the IG switch to LOCK.
(6) Remove the connector of the injector.

CAUTION

- Stop the fuel injection through the above operation and prevent damaging the catalyst by the unburned gas.

(7) Remove the spark plug and install it to the ignition coil to earth the plug.
(8) Check the state of the spark plug during cranking..

SPECIFIED VALUE: An ignition spark is generated.

2.Diagnosis check

(1) Check the diagnosis.

Refer to Page B8-33.

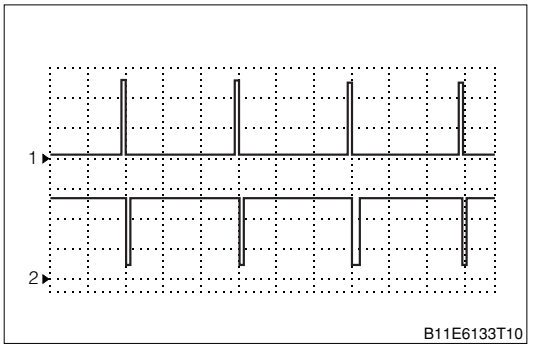
3.Ion current combustion detection circuit check (Vehicle equipped with the ion current combustion control system)

(1) Connect the SST.

SST: 09842-97209-000

(2) Completely warm up the engine.

(3) While idling (With the air conditioner turned ON with electric load), check each cylinder for output waveforms of the ignition signal (1▶) and ion current combustion control signal (2▶), using an oscilloscope.



	Channel	+ side measuring terminal	− side measuring terminal
Cylinder No.1	1▶	63(IG1)	125(E1)
	2▶	51(ICMB1)	125(E1)
Cylinder No.2	1▶	62(IG2)	125(E1)
	2▶	50(ICMB2)	125(E1)
Cylinder No.3	1▶	61(IG3)	125(E1)
	2▶	49(ICMB3)	125(E1)

Time axis	50ms / DIV
Voltage axis	2V / DIV
Measuring condition	Air conditioner is ON; Electric load exists; during idling

Air conditioner is ON: Condition where all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are ON.
Electric load exists: Conditions where the headlight (H/L) and defogger (DEF) are both ON.

SPECIFIED VALUE: Check that waveforms like those in the figure (Example) are produced (Ion current combustion control signal must output 0⇄5V waveforms).

4.If 0⇄5V waveform output is not detected in the ion current detection circuit check in Step 3 above, inspect the following points.
(1) Check for an open or short circuit in the harness between the ignition coil - EFI ECU of the ion current combustion control signal system. (Repair fault if any.)
(2) Check that no engine misfire has occurred and that idle state is stable, and then repeat the ion current detection circuit check in Step 3 above.

5.Using an oscilloscope, check the output waveform of the ion current combustion control signal for each cylinder, when the engine speed is increased slowly from an idle state to 4000rpm, and then the throttle is suddenly closed (At the fuel cut).

SPECIFIED VALUE: The output level must be constant at approx. 5V (0⇄5V waveform must not be outputted).

(2) Plug, spark

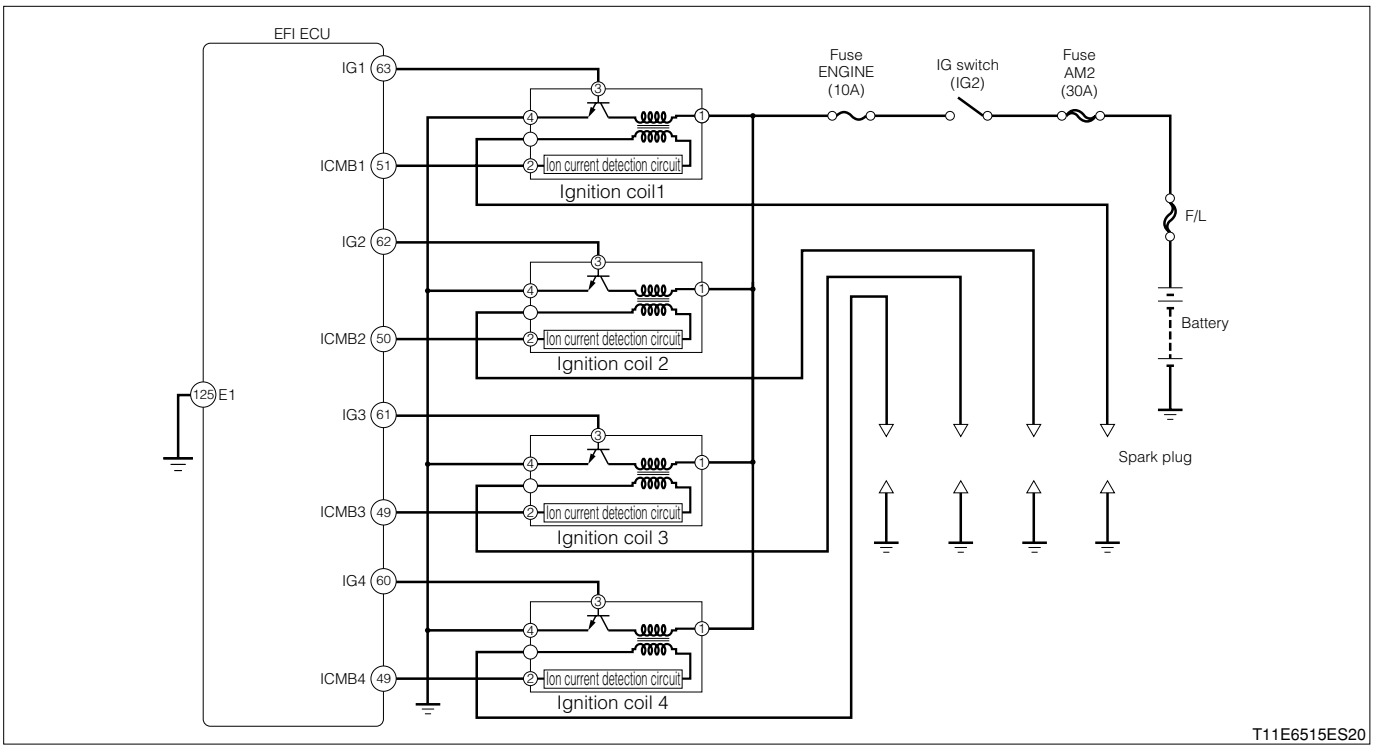
1.Perform the plug check.
Refer to Page B8-222.

2-1-5 OPERATION AFTER INSTALLATION

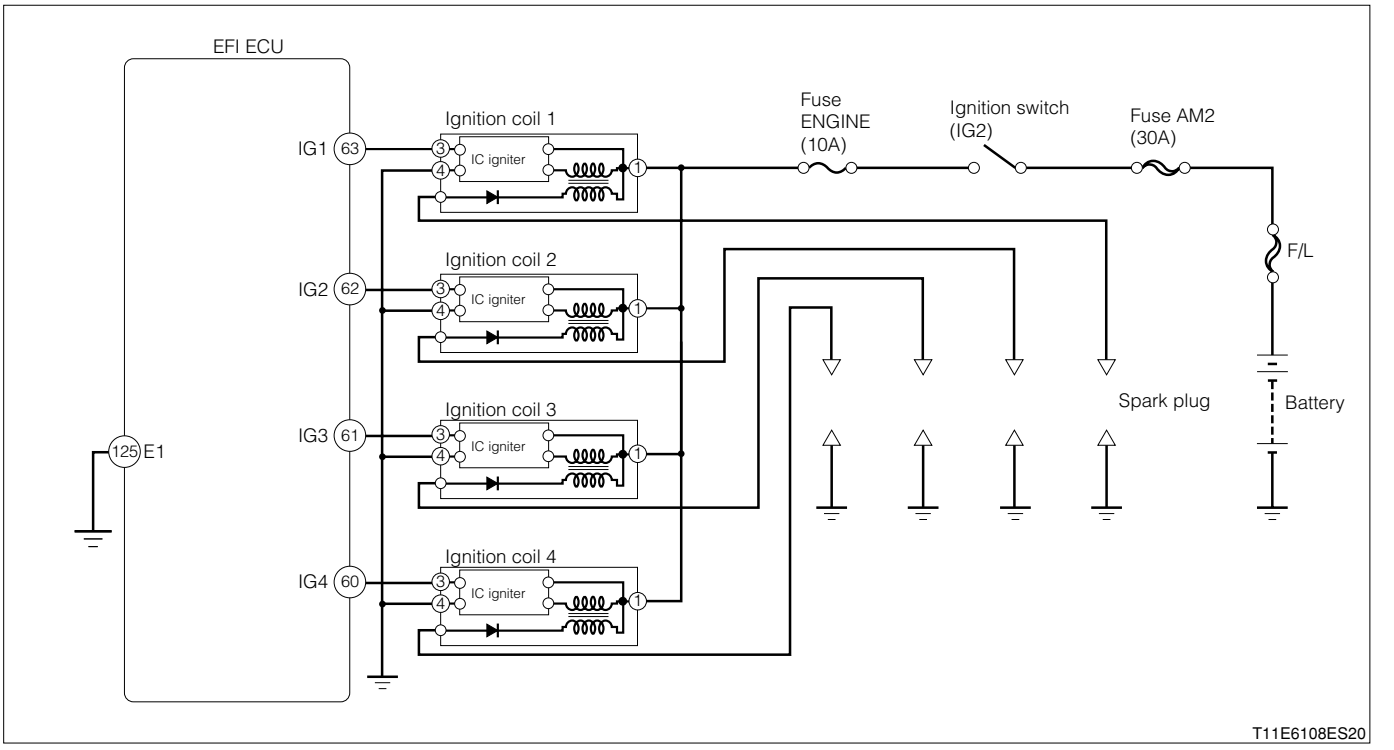
1.Install air cleaner cap S/A.
Refer to Page B3-1.

■ K3
1 IGNITION SYSTEM
1-1 SYSTEM DIAGRAM

EU SPEC



GENEAL SPC

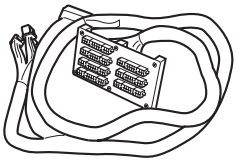


2 SPARK PLUG

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09842-97209-000	Sub-harness,EFI computer check

Instrument

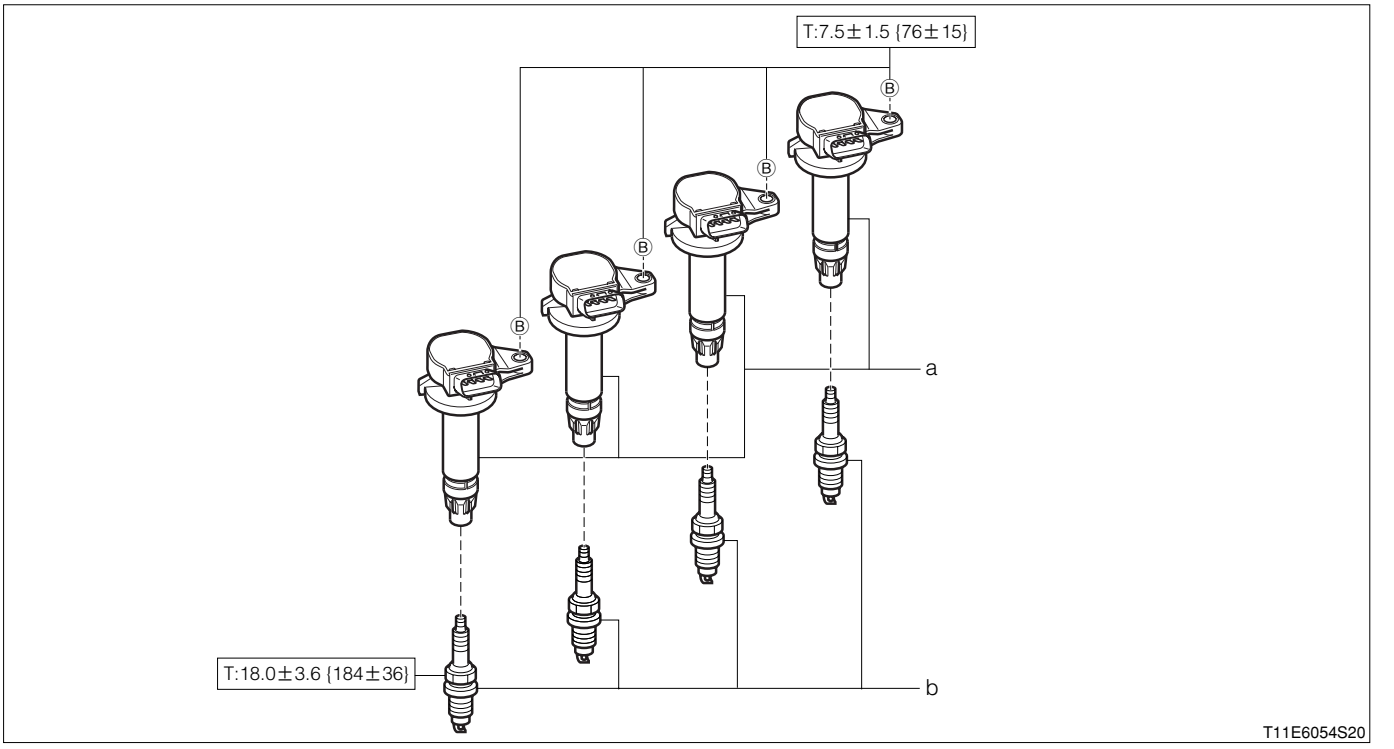
Torque wrench

2-1-2 OPERATION BEFORE REMOVAL

1.Remove the cleaner Ay, air W/ element.
Refer to Page B3-9.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removeal and installation procedures

1 a Coil Ay, w/igniter
2 b Plug, spark

2-1-4 INSPECTION

(1) Coil Ay, W/igniter

1.Spark check

WARNING

- Sparks will take place. Care must be exercised to the surrounding combustible objects.

(1) Warm up the engine.
(2) Turn the IG switch to LOCK.
(3) Remove the fuel pump relay.
(4) Let the engine idle and wait until it stops by itself.
(5) Turn the IG switch to LOCK.
(6) Remove the connector of the injector.

CAUTION

- Stop the fuel injection through the above operation and prevent damaging the catalyst by the unburned gas.

(7) Remove the spark plug and install it to the ignition coil to earth the plug.
(8) Check the state of the spark plug during cranking.

SPECIFIED VALUE: An ignition spark is generated.

2.Diagnosis check

(1) Check the diagnosis.

Refer to Page B8-33.

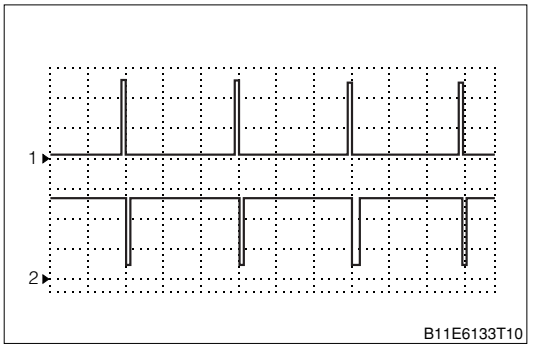
3.Ion current detection circuit check (Vehicle equipped with the ion current combustion control system)

(1) Connect the SST.

SST: 09842-97209-000

(2) Completely warm up the engine.

(3) While idling (With the air conditioner turned ON with electric load), check each cylinder for output waveforms of the ignition signal (1▶) and ion current combustion control signal (2▶), using an oscilloscope.



	Channel	+ side measuring terminal	− side measuring terminal
Cylinder No.1	1▶	63(IG1)	125(E1)
	2▶	51(ICMB1)	125(E1)
Cylinder No.2	1▶	62(IG2)	125(E1)
	2▶	50(ICMB2)	125(E1)
Cylinder No.3	1▶	61(IG3)	125(E1)
	2▶	49(ICMB3)	125(E1)
Cylinder No.4	1▶	60(IG4)	125(E1)
	2▶	48(ICMB4)	125(E1)

Time axis	50ms / DIV
Voltage axis	2V / DIV
Measuring condition	Air conditioner is ON; Electric load exists; during idling

Air conditioner is ON: Condition where all of the air conditioner switch (ACSW), blower switch (BLW) and magnet clutch (MGC) are ON.
Electric load exists: Conditions where the headlight (H/L) and defogger (DEF) are both ON.

SPECIFIED VALUE: Check that waveforms like those in the figure (Example) are produced (Ion current combustion control signal must output 0⇄5V waveforms).

4.If 0⇄5V waveform output is not detected in the ion current detection circuit check in Step 3 above, inspect the following points.
(1) Check for an open or short circuit in the harness between the ignition coil - EFI ECU of the ion current combustion control signal system. (Repair fault if any.)
(2) Check that no engine misfire has occurred and that the idle state is stable, and then repeat the ion current detection circuit check in Step 3 above.

5.Using an oscilloscope, check the output waveform of the ion current combustion control signal for each cylinder, when the engine speed is increased slowly from an idle state to 4000rpm, and then the throttle is suddenly closed (At the fuel cut).

SPECIFIED VALUE: The output level must be constant at approx. 5V (0⇄5V waveform must not be outputted).

(2) Plug, spark

1.Perform the plug check.
Refer to Page B8-471.

2-1-5 OPERATION AFTER INSTALLATION

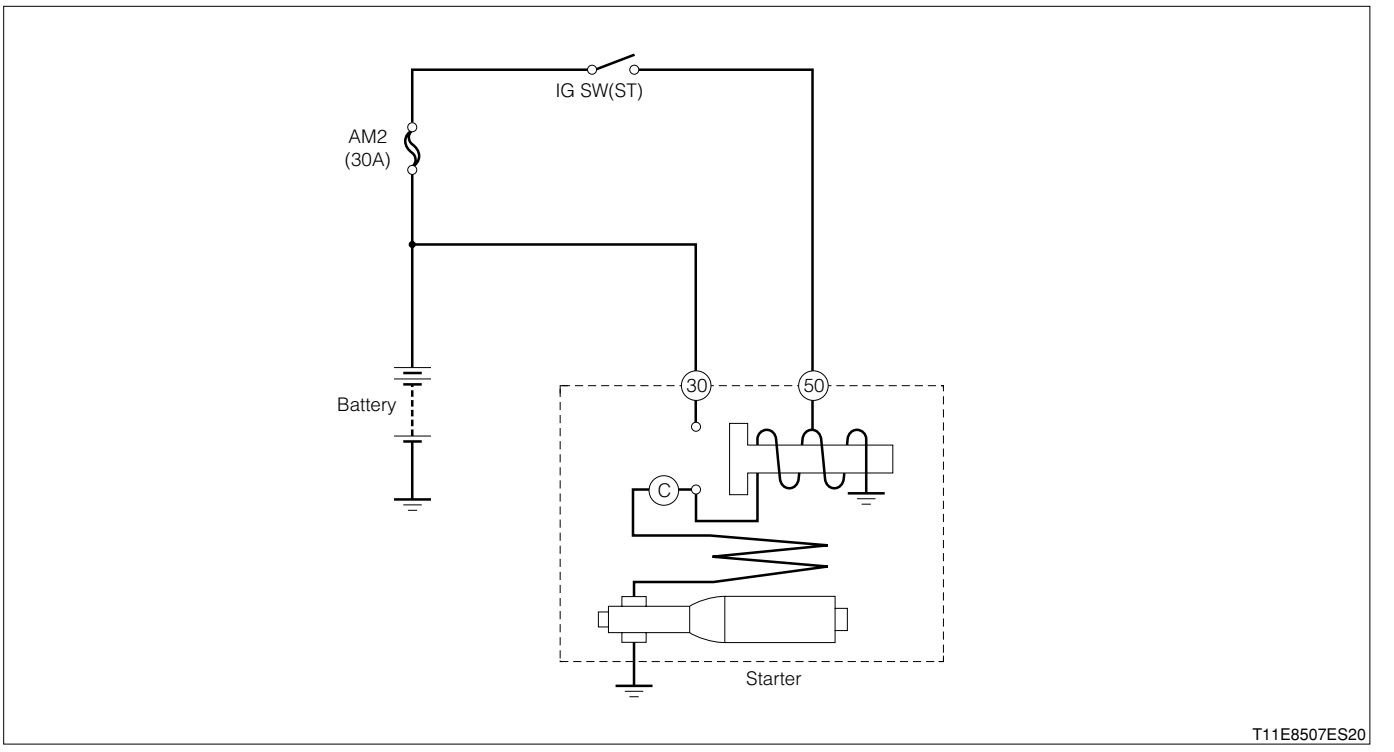
1.Remove the cleaner Ay, air W/ element.
Refer to Page B3-9.

B11 STARTING SYSTEM/CHARGING SYSTEM

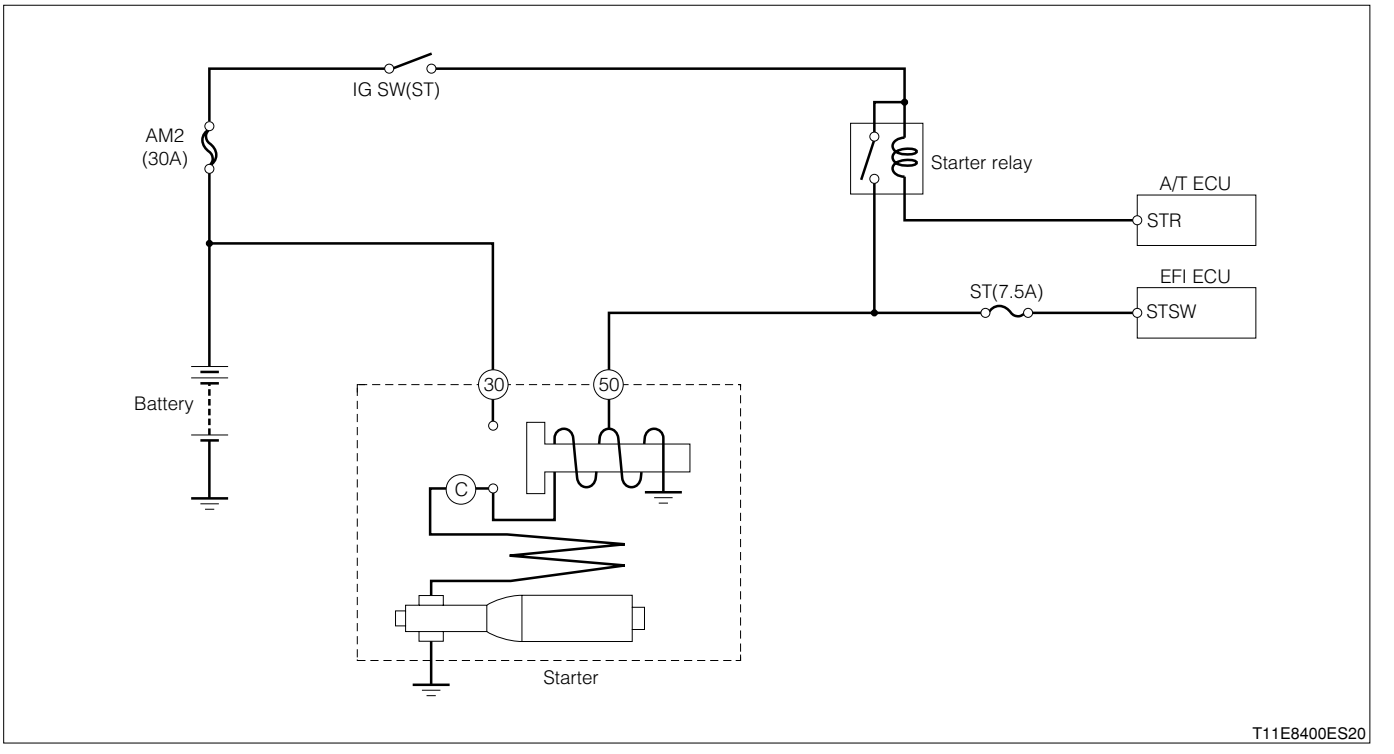
1KR ---------- B11 - 1
STARTING SYSTEM ---------- B11 - 1
SYSTEM DIAGRAM ---------- B11 - 1
STARTER ---------- B11 - 2
REMOVAL AND INSTALLATION ------ B11 - 2
CHARGING SYSTEM ---------- B11 - 4
ARTICLES TO BE PREPARED -------- B11 - 4
SYSTEM DIAGRAM ---------- B11 - 4
IN-VEHICLE CHECK ---------- B11 - 4
ALTERNATOR ---------- B11 - 6
REMOVAL AND INSTALLATION ------ B11 - 6
K3 ---------- B11 - 7
STARTING SYSTEM ---------- B11 - 7
SYSTEM DIAGRAM ---------- B11 - 7
STARTER ---------- B11 - 8
REMOVAL AND INSTALLATION ------ B11 - 8
CHARGING SYSTEM ---------- B11 - 10
ARTICLES TO BE PREPARED ------ B11 - 10
SYSTEM DIAGRAM ---------- B11 - 10
IN-VEHICLE CHECK ---------- B11 - 10
ALTERNATOR ---------- B11 - 12
REMOVAL AND INSTALLATION ---- B11 - 12

■ 1KR
1 STARTING SYSTEM
1-1 SYSTEM DIAGRAM

M/T



A/T



2 STARTER

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Instrument

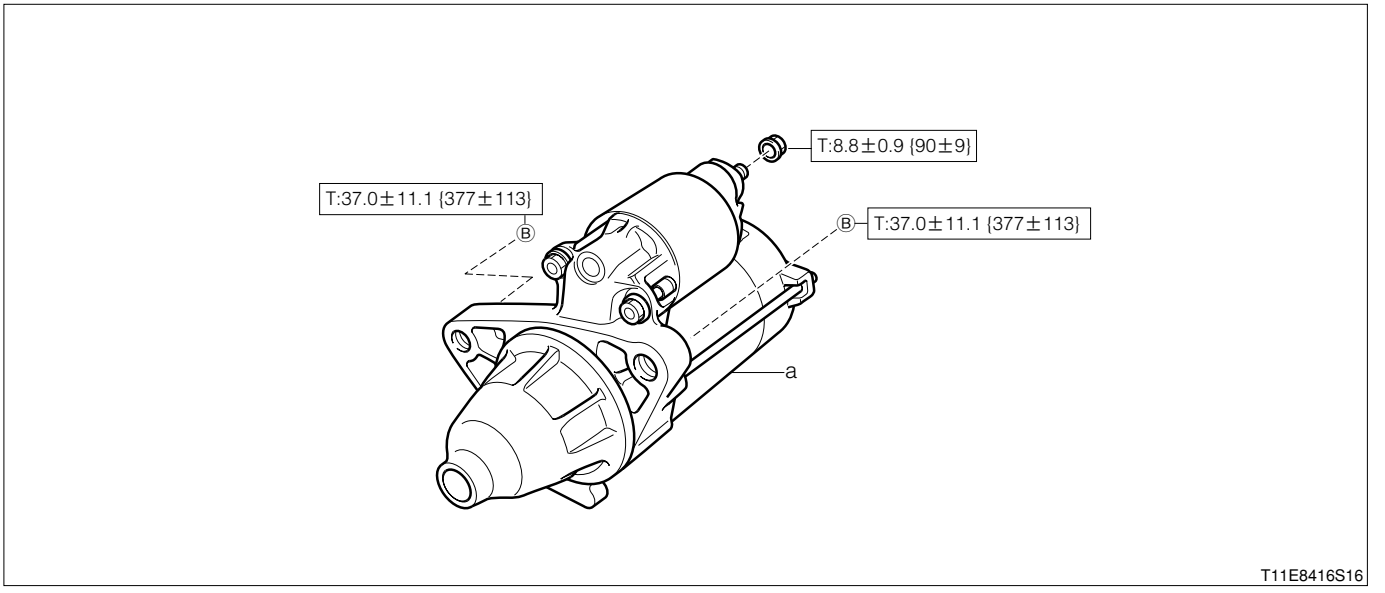
Torque wrench,Electrical Tester

2-1-2 OPERATION BEFORE REMOVAL

1.Disconnect the negative (-) terminal of the battery.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

▼ 1 a Starter Ay

2-1-4 POINTS OF REMOVAL

(1) Starter Ay

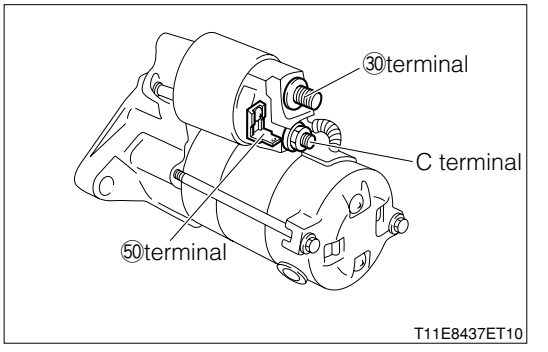
1.After removing the attaching bolts, take out the starter assembly from the engine compartment to the upper section of the vehicle.

2-1-5 INSPECTION

(1) Points to be observed and terminal positions

CAUTION

- Make sure to perform each check in a short length of time (Three to five seconds).



(2) Operation check

CAUTION

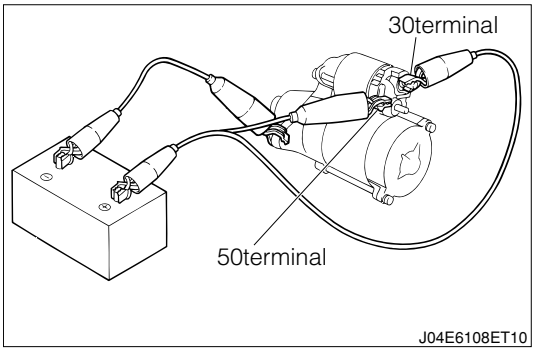
- A large current will flow during the test. Hence, be certain to employ a heavy lead wire.

1.Secure the starter with a vice etc.

2.Connect the cables as shown in the figure. (At this time, do no connect the wire for terminal ⑤⓪.)

3.Connect the terminal ⑤⓪ . Ensure that the pinion gear jumps out and turns.

4.Disconnect the terminal ⑤⓪ . Ensure that the pinion gear stops its turning and returns to the original position.



(3) No-load test

CAUTION

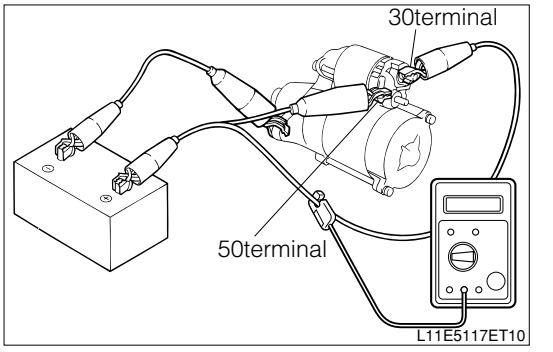
- A large current will flow during the test. Hence, be certain to employ a heavy lead wire.

1.Secure the starter with a vice etc.

2.Perform wiring to the cable and tester, as indicated in the figure. (At this time, do not connect the wire for the terminal ⑤⓪ .)

3.Connect the terminal ⑤⓪ . When the ammeter reading has stabilized, take the reading of the ammeter.

SPECIFIED VALUE: 50A or less(0.7kW type)
90A or less(1.0kW type)



2-1-6 OPERATION AFTER INSTALLATION

1.Connect the negative (-) terminal of the battery.

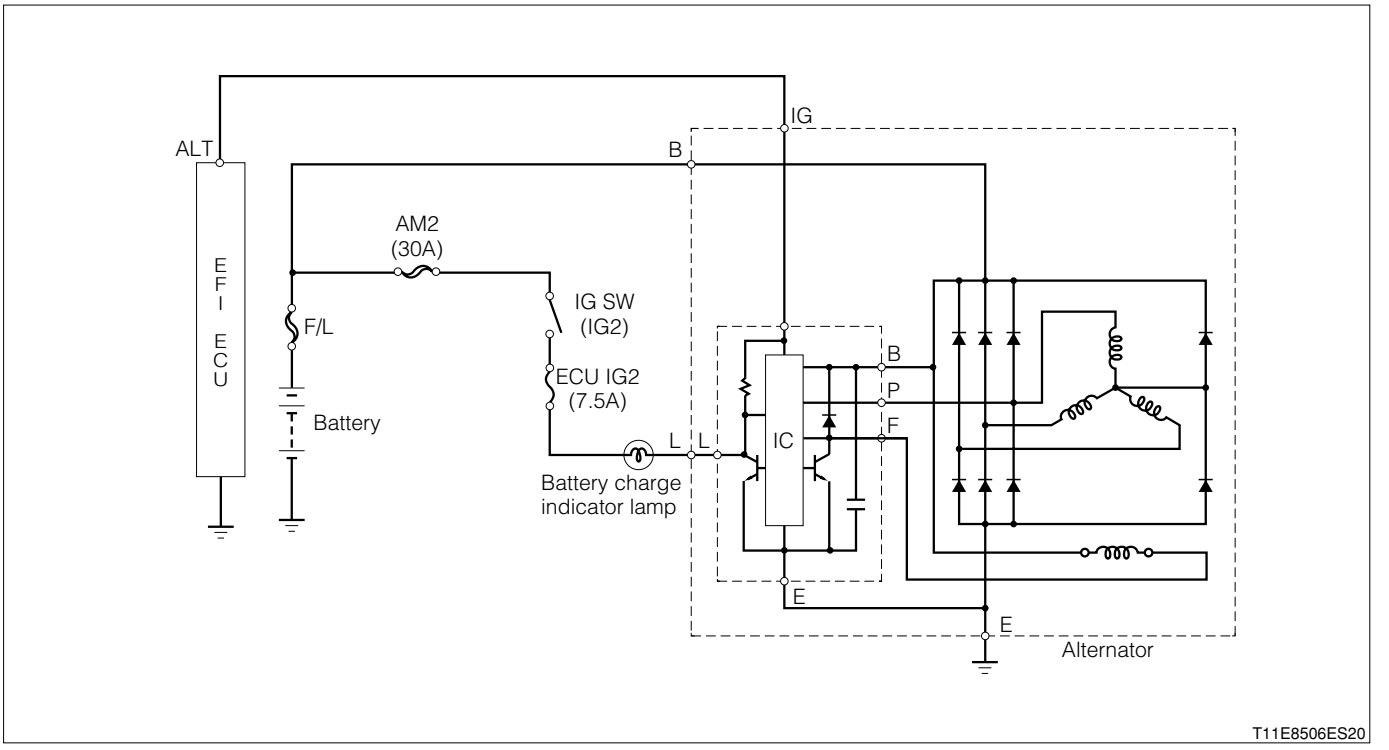
3 CHARGING SYSTEM

3-1 ARTICLES TO BE PREPARED

Instrument

Electrical Tester

3-2 SYSTEM DIAGRAM



3-3 IN-VEHICLE CHECK

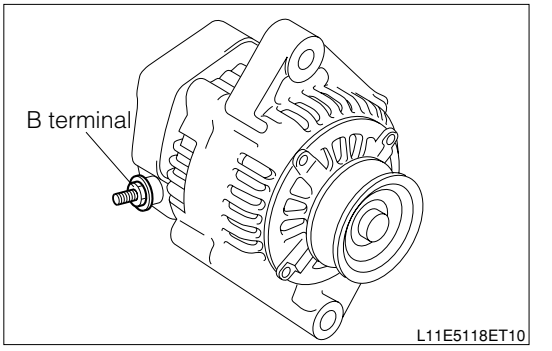
3-3-1 PRE-CHECK

1.After conducting the checks given below, carry out the in-vehicle check.
(1) Check the battery terminals for connecting state.
(2) Check the deflection amount of the V-belt.
Refer to Page B1-5.

(3) Check the fuse.
(4) Check the wiring.
(5) Check that the alternator emits abnormal noise while the engine is running.

3-3-2 NO-LOAD TEST

1.Connect a tester to the harness connected to the terminal B in the right figure.
2.Gradually raise the engine speed up to 2100 to 2300 rpm. Measure the current.
SPECIFIED VALUE: 10A or less (25°C)
3.Measure the battery voltage at this time.
SPECIFIED VALUE: 14.2 - 14.8V(25°C)



3-3-3 LOAD TEST

1. Under the conditions of the no-load test , turn ON the high beams of the headlamps and set the heater blower switch to the high position.
2. Gradually raise the engine speed up to 2000 rpm. Measure the current.
   SPECIFIED VALUE: 30A or more

NOTE

- It should be noted that the charging current may become smaller when the battery is in a fully charged state. Therefore, replace the present battery with a battery that has been discharged to some extent or increase the electrical load (Hazard lamps or defogger etc.) Carry out the measurement again.

4 ALTERNATOR

4-1 REMOVAL AND INSTALLATION

4-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

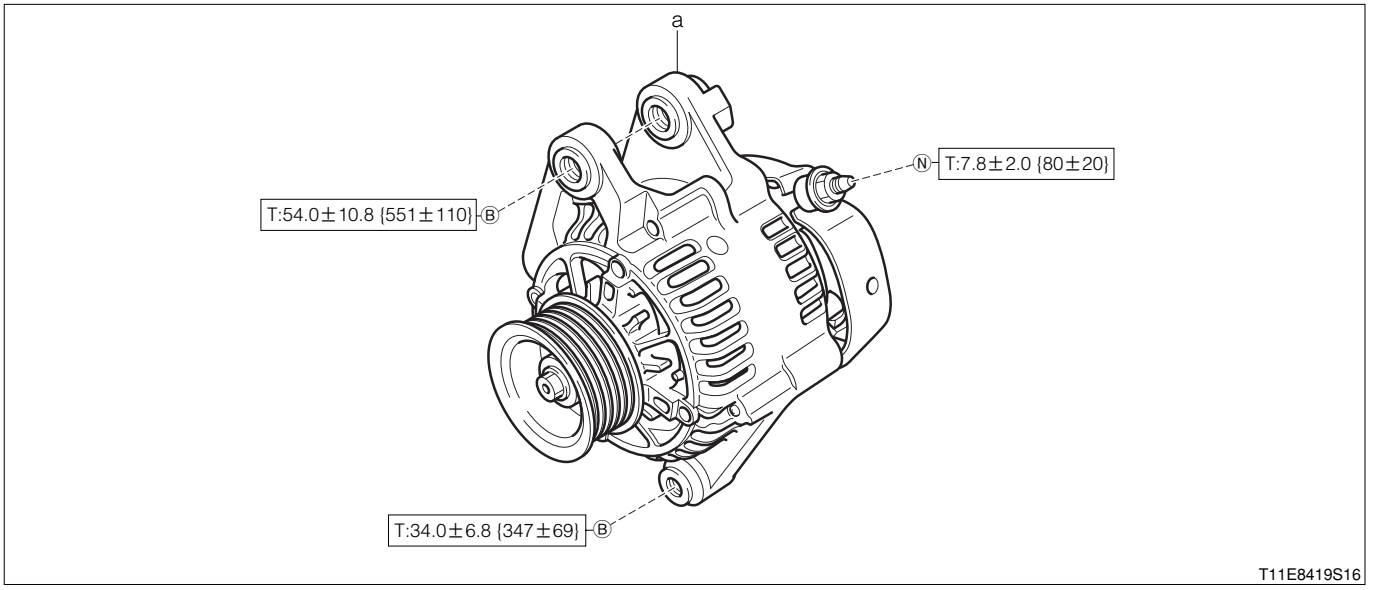
4-1-2 OPERATION BEFORE REMOVAL

1.Disconnect the negative (-) terminal of the battery.
2.Remove the front bamper cover.
Refer to Page I2-2.

3.Remove the V-ribbed belt.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Alternator Ay

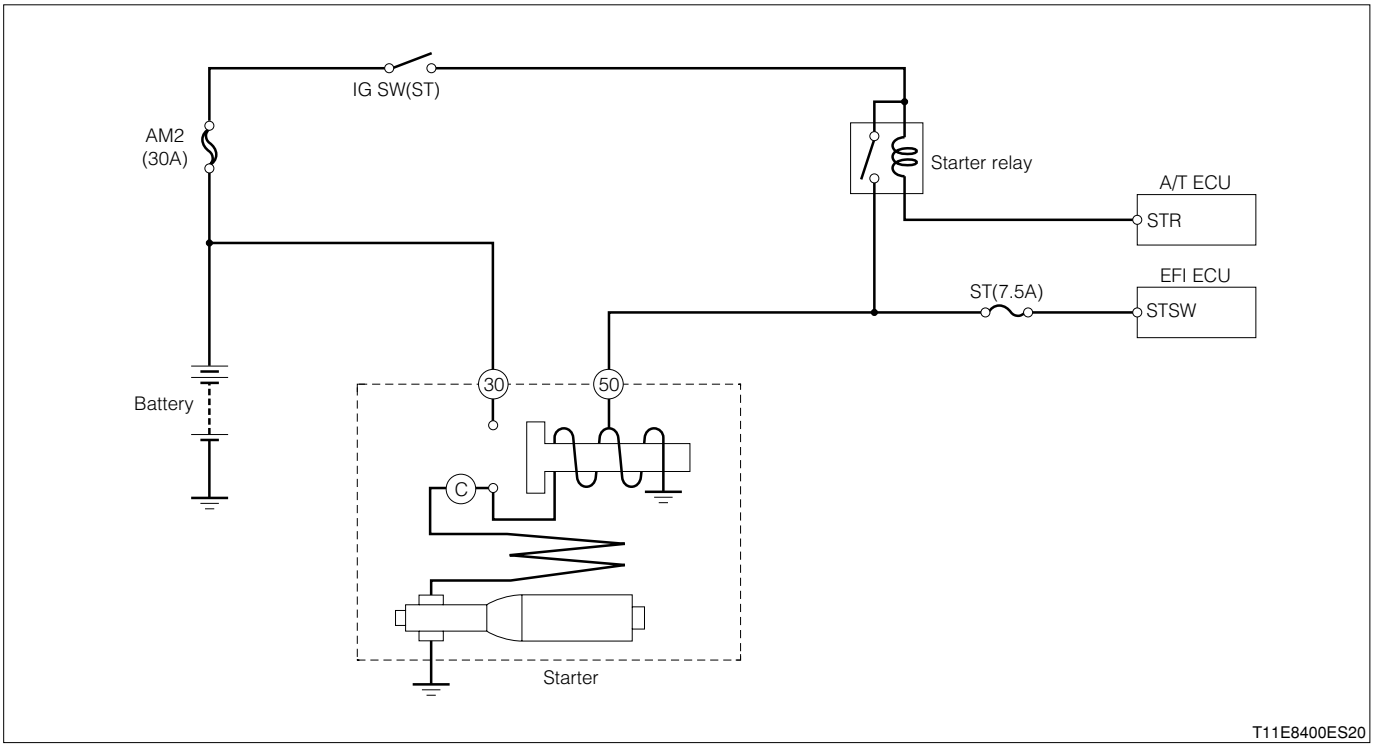
4-1-4 OPERATION AFTER INSTALLATION

1.Install the V-ribbed belt and adjust the tension.
Refer to Page B1-5.

2.Install the front bamper cover.
Refer to Page I2-2.

3.Install the negative (-) terminal of the battery.

■ K3
1 STARTING SYSTEM
1-1 SYSTEM DIAGRAM



2 STARTER

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Instrument

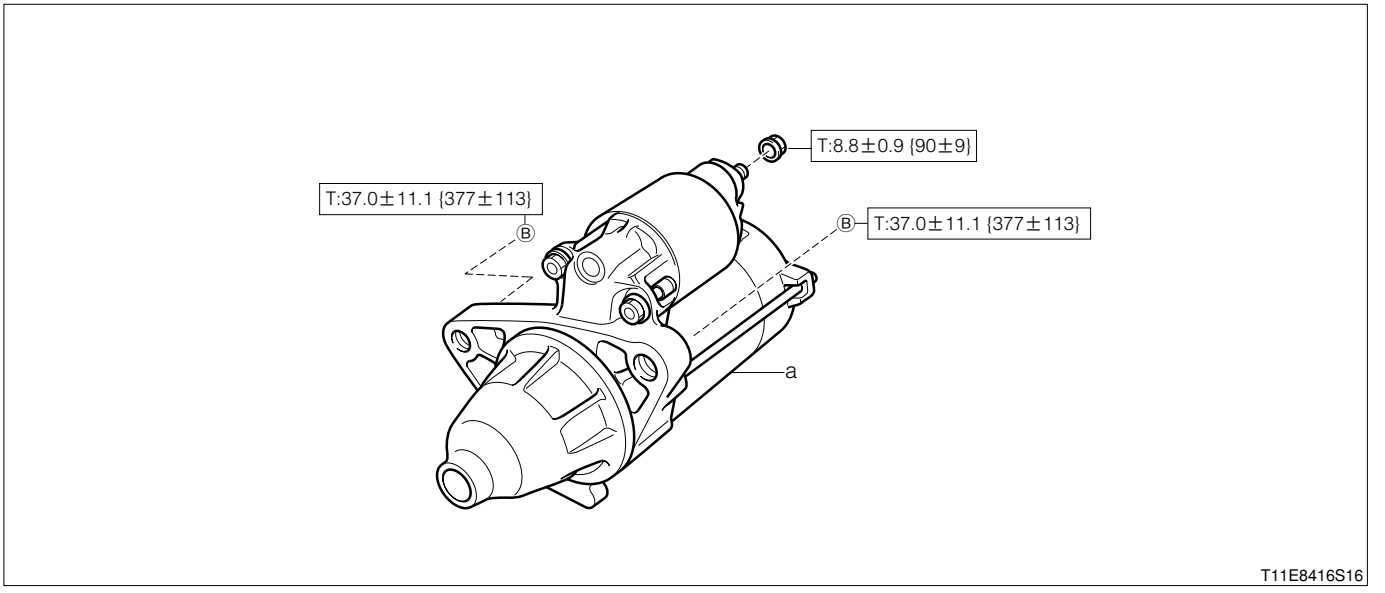
Torque wrench,Electrical Tester

2-1-2 OPERATION BEFORE REMOVAL

1.Remove the negative (-) terminal of the battery.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

▼ 1 a Starter Ay

2-1-4 POINTS OF REMOVAL

(1) Starter Ay

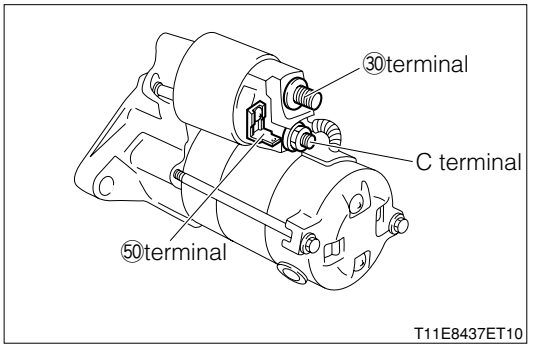
1.After removing the attaching bolts, take out the starter assembly from the engine compartment to the upper section of the vehicle.

2-1-5 INSPECTION

(1) Points to be observed and terminal positions

CAUTION

- Make sure to perform each check in a short length of time (Three to five seconds).



(2) Operation check

CAUTION

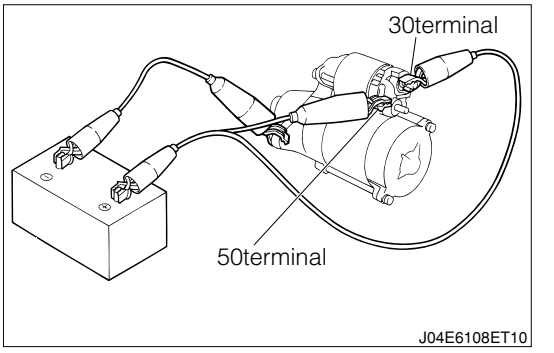
- A large current will flow during the test. Hence, be certain to employ a heavy lead wire.

1.Secure the starter with a vice etc.

2.Perform wiring to the cable, as indicated in the figure. (At this time, do not connect the wire for the terminal ⑤⓪ .)

3.Connect the terminal ⑤⓪ . Ensure that the pinion gear jumps out and turns.

4.Disconnect the terminal ⑤⓪ . Ensure that the pinion gear stops its turning and returns to the original position.



(3) No-load test

CAUTION

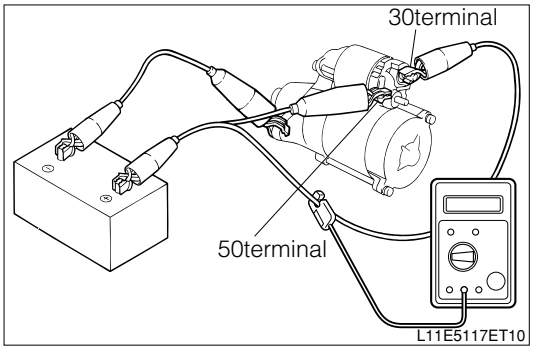
- A large current will flow during the test. Hence, be certain to employ a heavy lead wire.

1.Secure the starter with a vice etc.

2.Perform wiring to the cable and tester, as indicated in the figure. (At this time, do not connect the wire for the terminal ⑤⓪ .)

3.Connect the terminal ⑤⓪ . When the ammeter reading has stabilized, take the reading of the ammeter.

SPECIFIED VALUE: 50A or less(0.8kW type)
90A or less(1.0kW type)



2-1-6 OPERATION AFTER INSTALLATION

1.Install the negative (-) terminal of the battery.

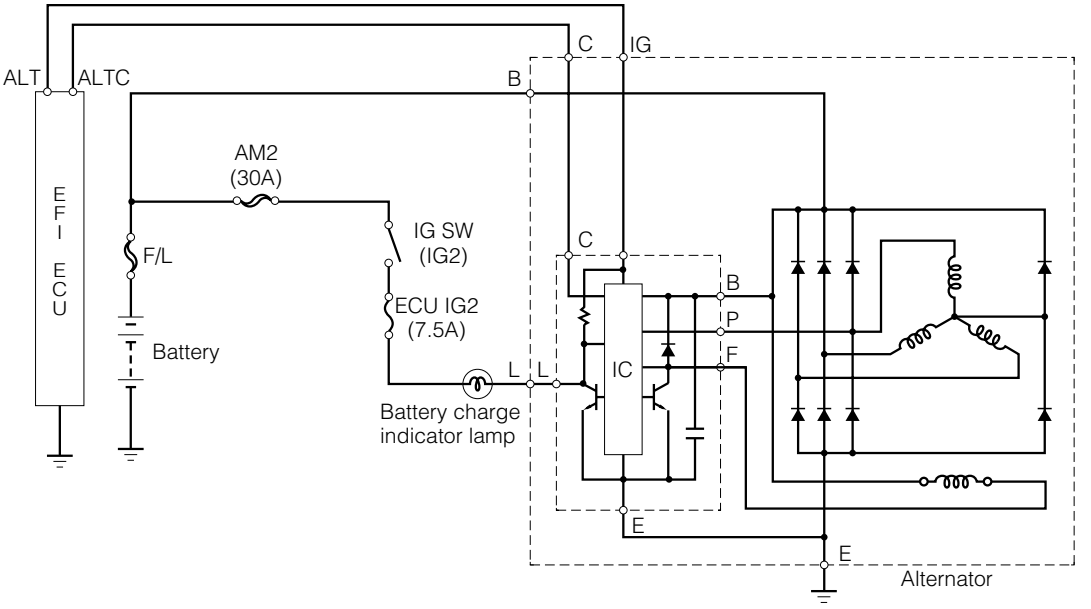
3 CHARGING SYSTEM

3-1 ARTICLES TO BE PREPARED

Instrument

Electrical Tester

3-2 SYSTEM DIAGRAM



T11E8401ES20

3-3 IN-VEHICLE CHECK

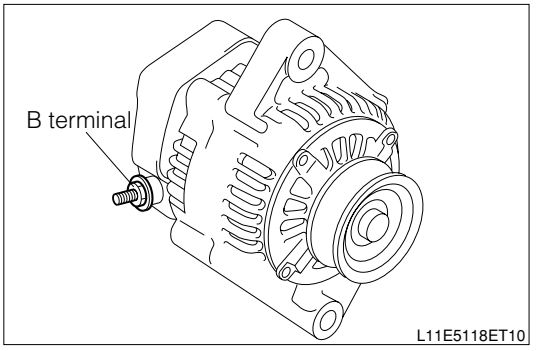
3-3-1 PRE-CHECK

1.After conducting the checks given below, carry out the in-vehicle check.
(1) Check the battery terminals for connecting state.
(2) Check the deflection amount of the V-ribbed belt.
Refer to Page B1-22.

(3) Check the fuse.
(4) Check the wiring.
(5) Check that the alternator emits abnormal noise while the engine is running.

3-3-2 NO-LOAD TEST

1.Connect a tester to the harness connected to the terminal B in the right figure.
2.Gradually raise the engine speed up to 2100 to 2300 rpm. Measure the current.
SPECIFIED VALUE: 10A or less (25°C)
3.Measure the battery voltage at this time.
SPECIFIED VALUE: 14.2 - 14.8V(25°C)



L11E5118ET10

3-3-3 LOAD TEST

1. Under the conditions of the no-load test , turn ON the high beams of the headlamps and set the heater blower switch to the high position.
2. Gradually raise the engine speed up to 2000 rpm. Measure the current.
   SPECIFIED VALUE: 30A or more

NOTE

- It should be noted that the charging current may become smaller when the battery is in a fully charged state. Therefore, replace the present battery with a battery that has been discharged to some extent or increase the electrical load (Hazard lamps or defogger etc.) Carry out the measurement again.

4 ALTERNATOR

4-1 REMOVAL AND INSTALLATION

4-1-1 ARTICLES TO BE PREPARED

Instrument

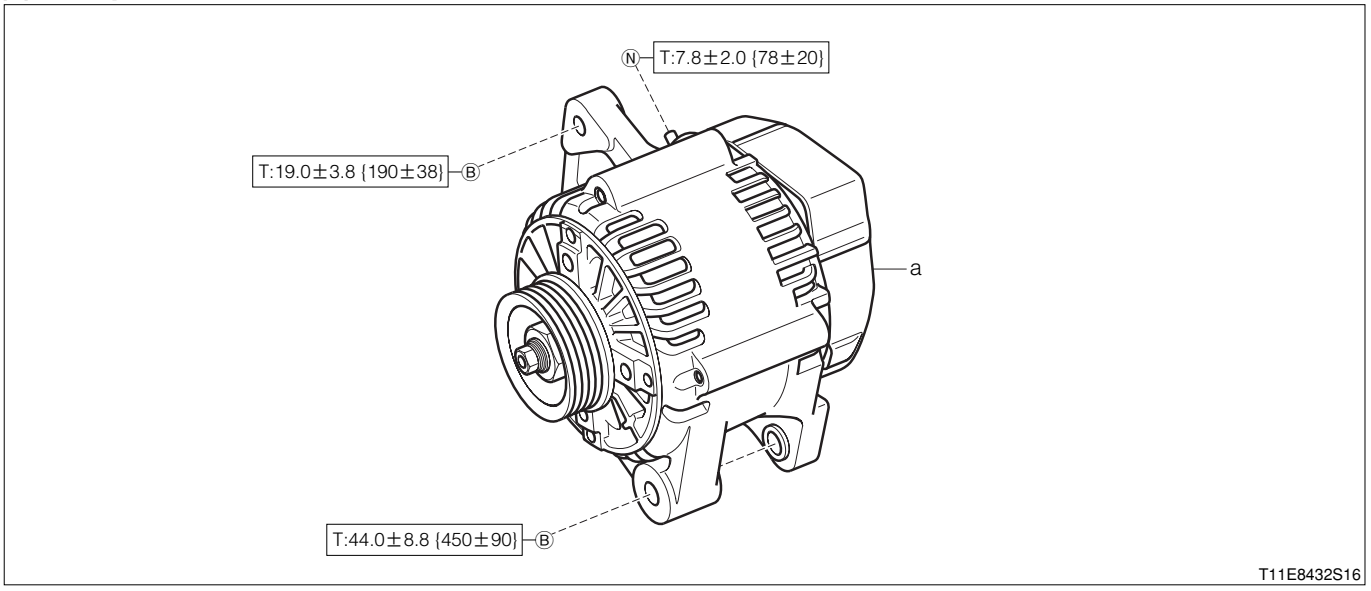
Torque wrench

4-1-2 OPERATION BEFORE REMOVAL

1.Disconnect the negative (-) terminal of the battery.
2.Remove the disc wheel. (Front RH)
3.Remove the engine under cover RH.
4.Remove the V-ribbed belt.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

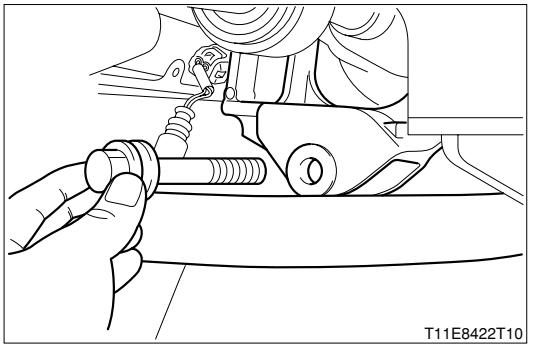
(2) Removal and installation procedures

▼ ▲ 1 a Alternator Ay

4-1-4 POINTS OF REMOVAL

(1) Alternator Ay

1.Disconnect the alternator assembly.
2.Remove the attaching bolts of the alternator assembly.
3.Remove the bolts of the exhaust front pipe Ay.
4.Remove the attaching bolts of the rear engine mounting bracket, while pressing down the exhaust front pipe Ay.
5.Remove the alternator Ay after passing it between the front side member Ay and the RH drive shaft Ay.



4-1-5 POINTS OF INSTALLATION

(1) Alternator Ay

1. Install the alternator assembly after passing it through the front side member and the drive shaft. Tighten the attaching bolts temporally.
2. Install the attaching bolts of the rear engine mounting bracket.
   TIGHTENING TORQUE: 120±18 N·m{1224±183kgf·cm}

3. Install the bolts of the exhaust front pipe Ay.
   TIGHTENING TORQUE: 46.6±7.3 N·m{475±74kgf·cm}

4. Install the connector of the alternator assembly.

4-1-6 OPERATION AFTER INSTALLATION

1. Install the V-ribbed belt and adjust the tension.
   Refer to Page B1-21.

2. Install the engine under cover RH.
3. Install the disc wheel. (Front RH)
4. Install the negative terminal of the battery.

TO INDEX

B12 ENGINE MOUNTING

ENGINE MOUNTING RIGHT
INSULATOR ---------- B12 - 1
REMOVAL AND INSTALLATION ------ B12 - 1
ENGINE MOUNTING LEFT
INSULATOR ---------- B12 - 4
REMOVAL AND INSTALLATION ------ B12 - 4
ENGINE MOUNTING REAR
INSULATOR ---------- B12 - 7
REMOVAL AND INSTALLATION ------ B12 - 7

1 ENGINE MOUNTING RIGHT INSULATOR

1-1 REMOVAL AND INSTALLATION

1-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

Wooden block

1-1-2 OPERATION BEFORE REMOVAL

1.Disconnect the air cleaner hose No.1.

(1) Vehicle mounted with Type 1KR engine

Refer to Page B3-1.

(2) Vehicle mounted with Type K3 engine

Refer to Page B3-9.

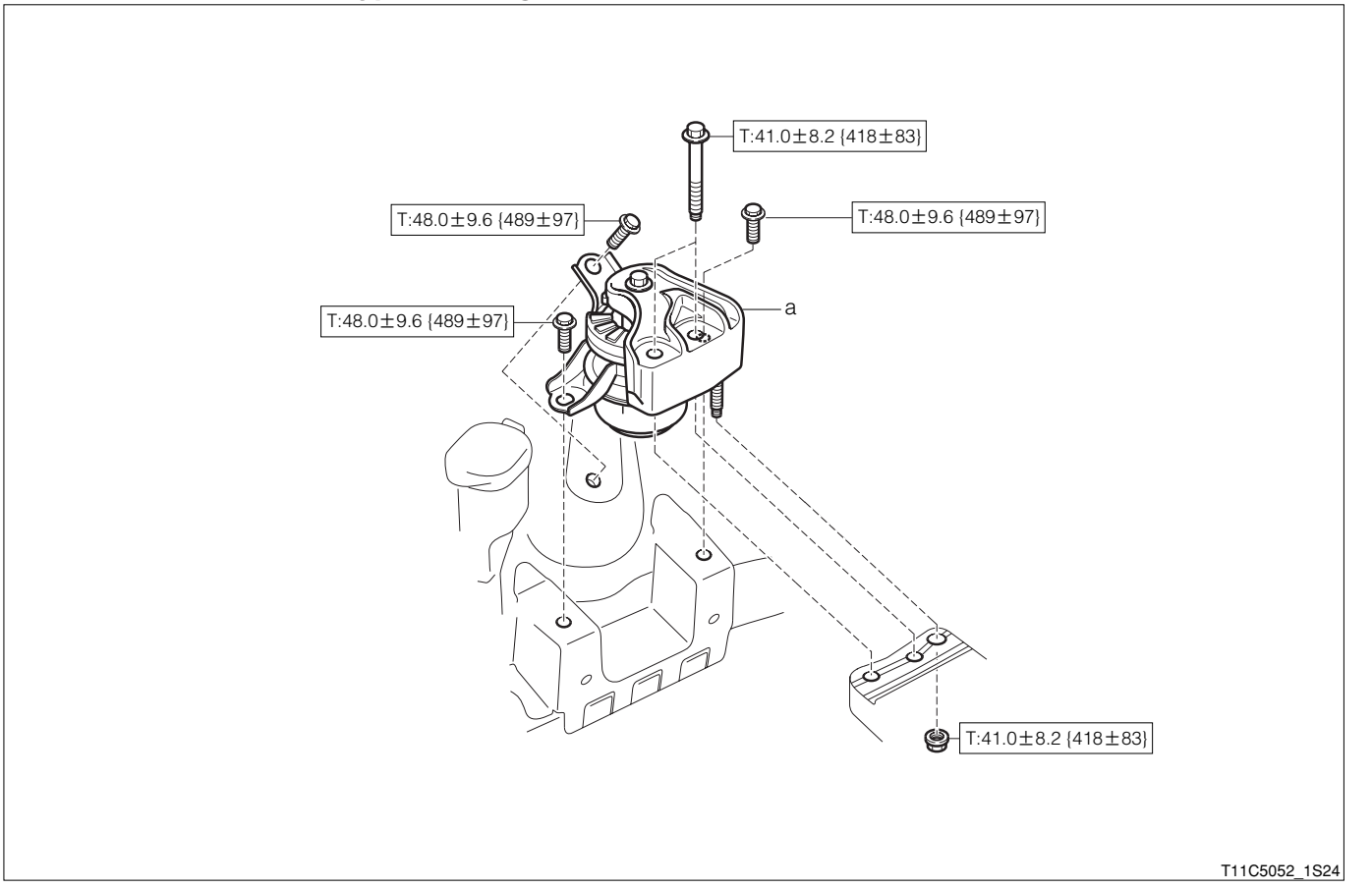
2.Lift up the vehicle.

3.Remove the engine under cover RH.

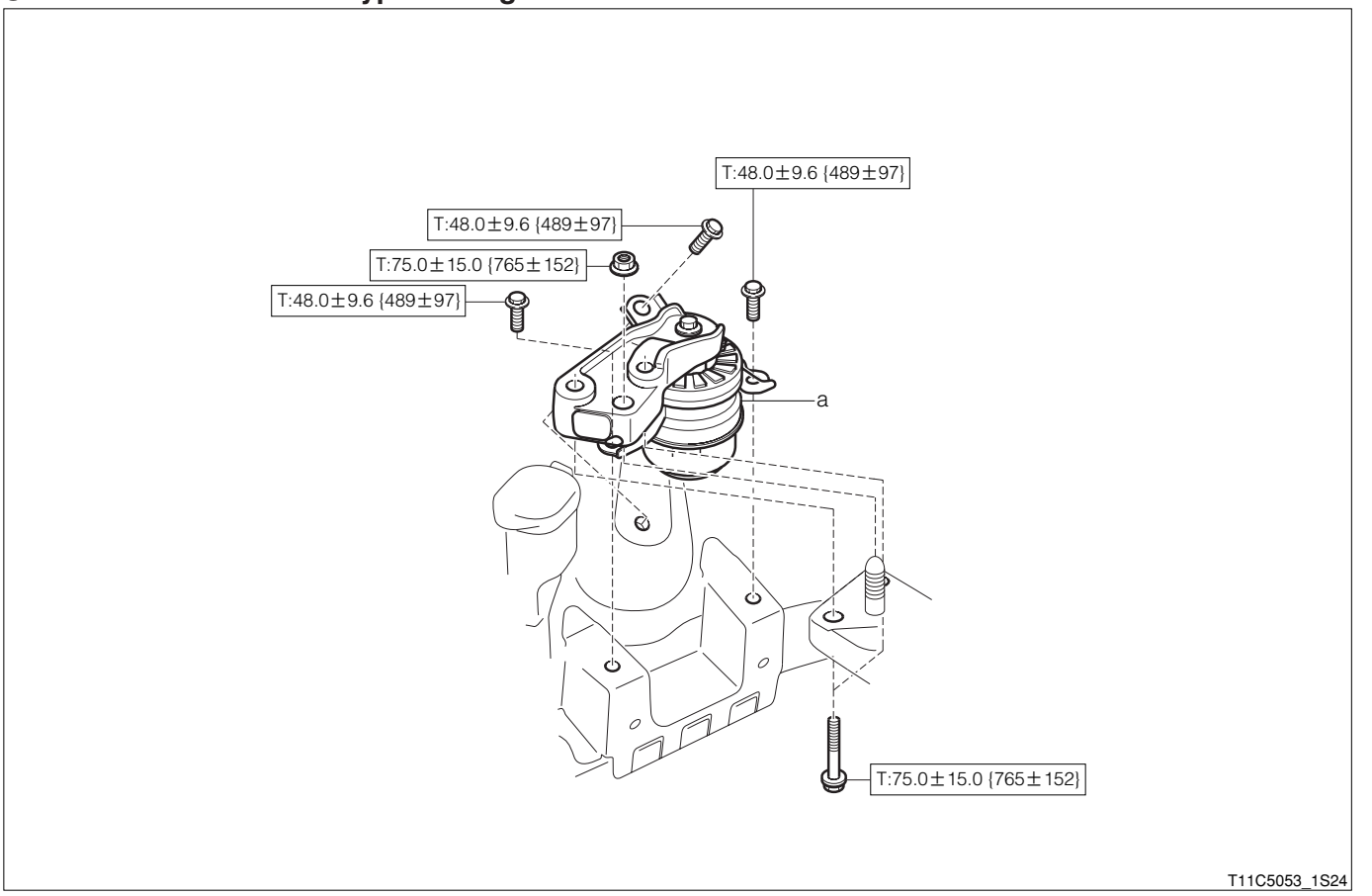
1-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components

① Vehicle mounted with type 1KR engine



② **Vehicle mounted with type K3 engine**



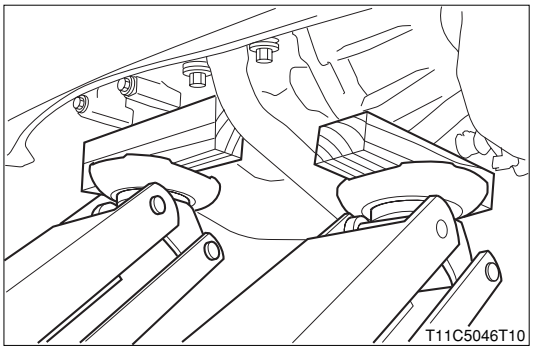
Unit:N·m{kgf·cm}

(2) Removal and installation procedures

▼ ▲ 1 a Insulator S/A, engine mounting, RH

1-1-4 POINTS OF REMOVAL

(1) Insulator S/A, engine mounting, RH



1.Apply a garage jack to the joint section between the engine Ay and the manual transaxle Ay/automatic transaxle Ay to support.

CAUTION

- When applying a garage jack, be sure to interpose a wooden block or cloth so as not to scratch the parts.

2.Apply a garage jack to the joint section of the engine Ay and the compressor Ay with magnet clutch.

CAUTION

- When applying a garage jack, be sure to interpose a wooden block or cloth so as not to scratch the parts.
- Be very careful not to bring the garage jack in contact with the tank section of the oil pan S/A. (Engine)

3.Remove the insulator S/A.

NOTE

- Do not disassemble the insulator section and bracket section during the removal of the insulator S/A.

1-1-5 INSPECTION

(1) Insulator S/A, engine mounting, RH

1.Replace any insulator S/A that exhibits cracks, fluid leakage or a flattened condition.

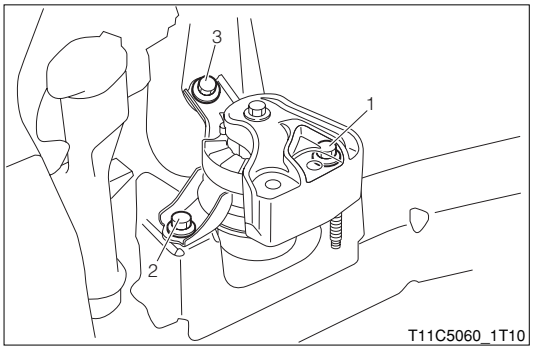
1-1-6 POINTS OF INSTALLATION

(1) Insulator S/A, engine mounting, RH

1.Install the insulator S/A while adjusting the position of the engine with a garage jack.

2.Thoroughly tighten the three attaching bolts at the body side in the order of (1), (2) and (3) indicated in the right figure.

3.Lower the garage jack. With the load applied to the insulator S/A, thoroughly tighten the bolts and nuts connected to the engine Ay.



1-1-7 OPERATION AFTER INSTALLATION

1.Install the engine under cover RH.

2.Lift down the vehicle.

3.Connect the air cleaner hose No.1.

(1) Vehicle mounted with Type 1KR engine

Refer to Page B3-1.

(2) Vehicle mounted with Type K3 engine

Refer to Page B3-9.

2 ENGINE MOUNTING LEFT INSULATOR

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

Wooden block

2-1-2 OPERATION BEFORE REMOVAL

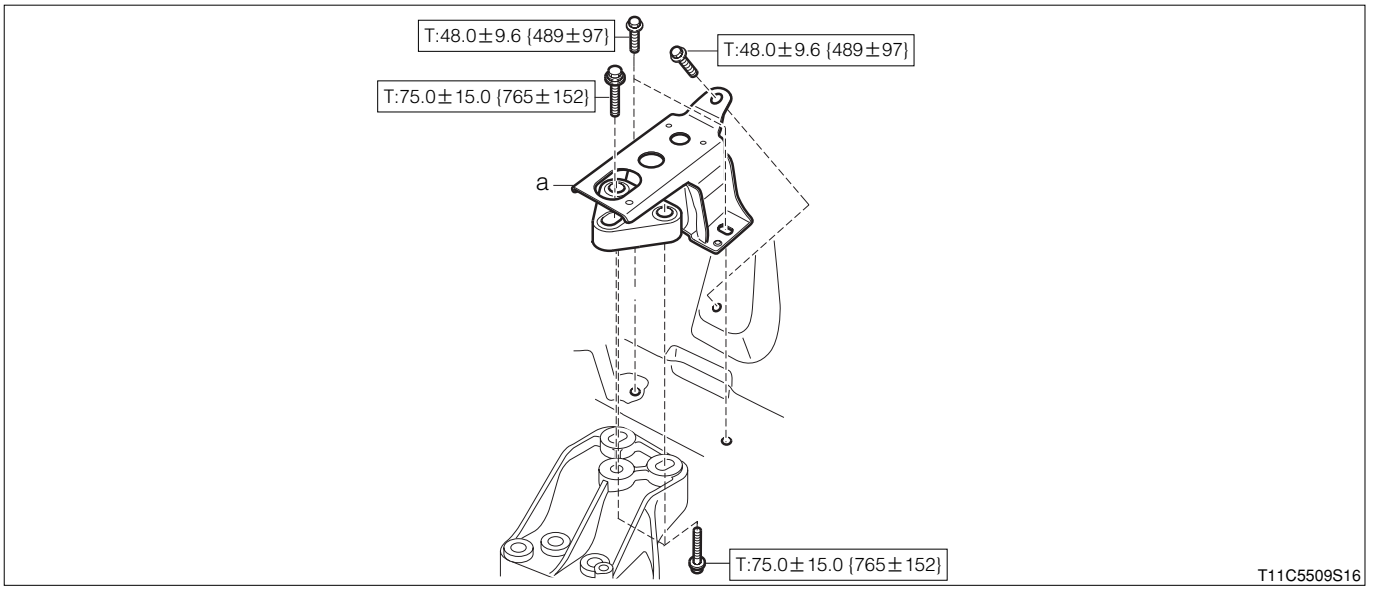
1.Remove the battery carrier.
Refer to Page J5-3.

2.Lift up the vehicle.
3.Remove the engine under cover LH.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

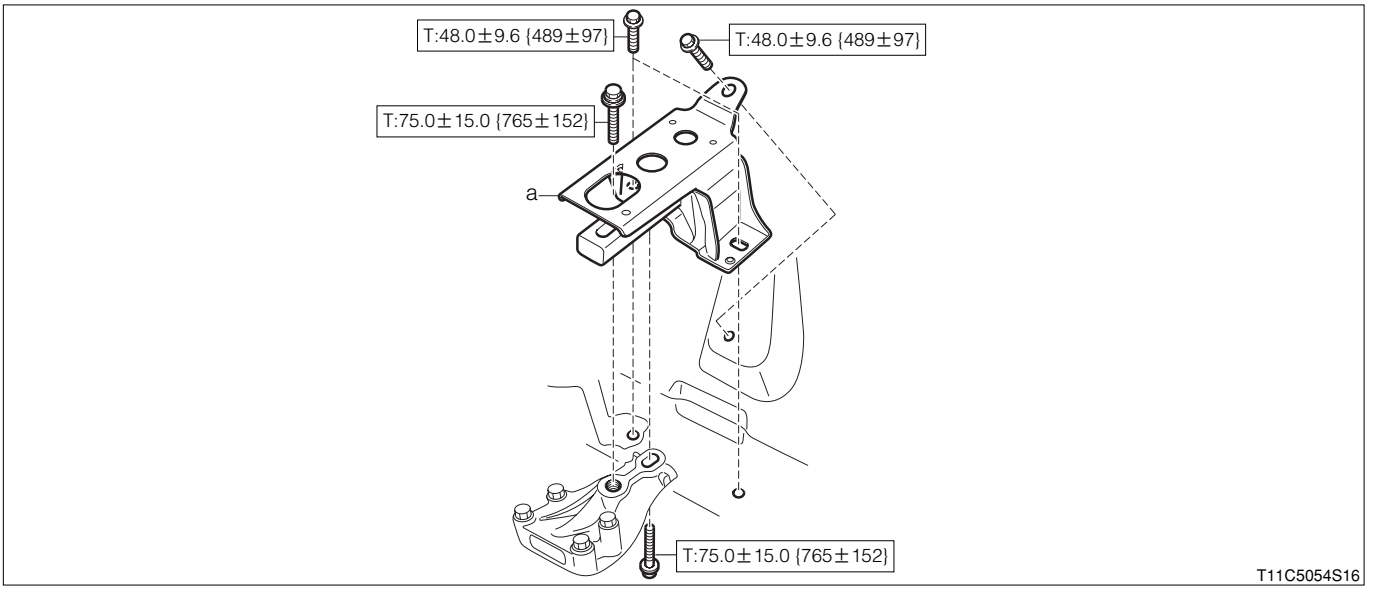
(1) Components

① M/T Vehicle



Unit:N·m{kgf·cm}

② **A/T Vehicle**



Unit:N·m{kgf·cm}

(2) RemovaL and installation procedures

▼ ▲ 1 a Insulator S/A, engine mounting, LH

2-1-4 POINTS OF REMOVAL

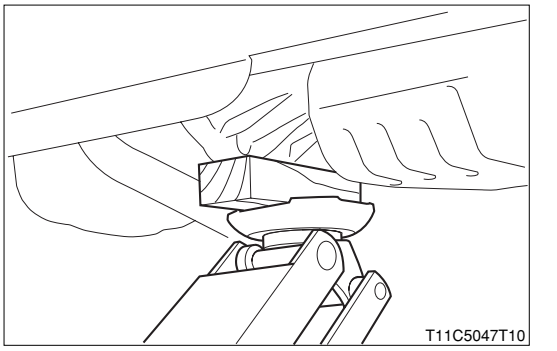
(1) Insulator S/A, engine mounting, LH

1.Apply a garage jack to the joint section between the engine Ay and the manual transaxle Ay/automatic transaxle Ay to support.

CAUTION

- When applying a garage jack, be sure to interpose a wooden block or cloth so as not to scratch the parts.

2.Remove the insulator S/A.



2-1-5 INSPECTION

(1) Insulator S/A, engine mounting, LH

1.Replace any insulator S/A that exhibits cracks, or a flattened condition.

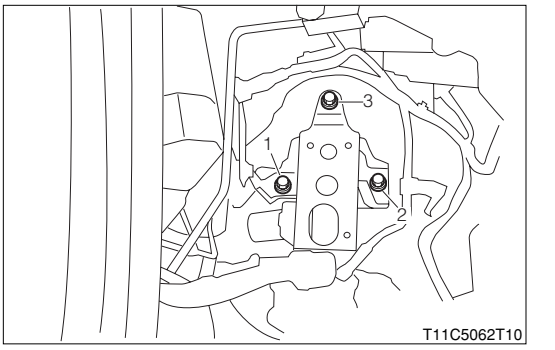
2-1-6 POINTS OF INSTALLATION

(1) Insulator S/A, engine mounting, LH

1.Install the insulator S/A to the body. Then, fully tighten the bolts in the sequence of (1), (2), and (3) in the right figure.

2.Install the insulator S/A to the LH engine mounting bracket while adjusting the position of the automatic transaxle Ay with a garage jack.

3.Completely lower the garage jack. Under the condition in which the load is applied to the insulator S/A, fully tighten the bolts attaching the LH engine mounting bracket.



2-1-7 OPERATION AFTER INSTALLATION

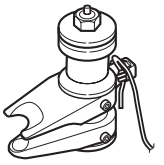
1.Install the engine under cover LH.
2.Lift down the vehicle.
3.Install the battery carrier.
Refer to Page J5-3.

3 ENGINE MOUNTING REAR INSULATOR

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09628-00011-000 (09611-87701-000)	Puller,tie-rod end

Instrument

Torque wrench

Lubricant,adhesive,others

Wooden block

3-1-2 OPERATION BEFORE REMOVAL

1.Separate the joint at the steering gear assembly side of the steering shaft universal joint assembly No.2.
Refer to Page G1-5.

2.Push out the steering column hole shield to the vehicle outside under a condition where it is attached to the steering gear assembly.
3.Lift up the vehicle.
4.Remove the disc wheels. (Front)
Refer to Page C3-3.

5.Remove the front speed sensor RH/LH from the steering knuckle RH/LH. (ABS-equipped vehicle)
Refer to Page E3-4.

6.Remove the front disc brake caliper Ay RH/LH and suspend it with wire, etc.
Refer to Page E1-53.

7.Remove the Front disc.
Refer to Page E1-60.

8.Separate the stabilizer link from the suspension lower arm S/A RH/LH with bush.
Refer to Page C1-14.

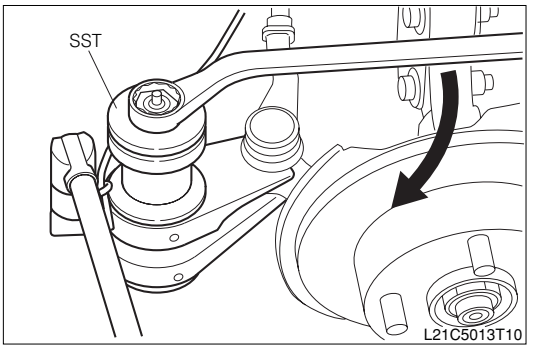
9.Remove the nuts of the front drive shaft Ay RH/LH.
Refer to Page D2-8.

10.Separate the steering knuckle RH/LH from the ball joint section of the tie-rod end S/A RH/LH, using the SST.

CAUTION

- When setting the SST, attach a dummy nut to the threaded portion of the tie-rod end S/A RH/LH so that the threaded portion may not be damaged.
- Hang the SST using a cord.

SST: 09628-00011-000



11.Separate the front shock absorber Ay from the steering knuckle RH/LH.

Refer to Page C1-6.

12.Pull out the front drive shaft Ay RH/LH from the steering knuckle RH/LH and suspend it with wire, etc.

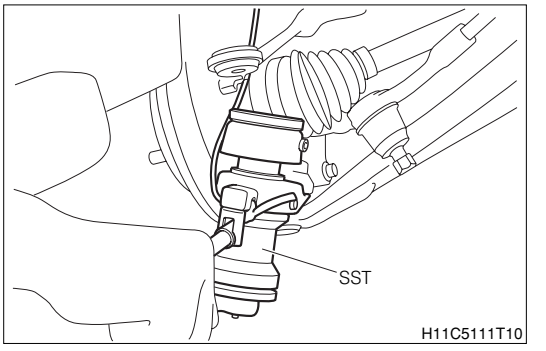
Refer to Page D2-8.

13.Separate the steering knuckle RH/LH from the ball joint section of the suspension lower arm S/A with bush RH/LH, using the SST.

CAUTION

- When setting the SST, attach a dummy nut to the threaded portion of the suspension lower arm S/A with bush RH/LH so that the threaded portion may not be damaged.
- Hang the SST using a cord.

SST: 09628-00011-000



14.Remove the exhaust front pipe Ay.

(1) Vehicle mounted with Type 1KR engine

Refer to Page B4-3.

(2) Vehicle mounted with Type K3 engine

Refer to Page B4-6.

15.Remove the transmission floor shift Ay.(M/T vehicle)

Refer to Page F2-15.

16.Remove the transmission control cable Ay.(A/T vehicle)

Refer to Page F3-34.

17.Apply a garage jack to the joint section between the engine Ay and the manual transaxle Ay/automatic transaxle Ay to support.

CAUTION

- When applying a garage jack, be sure to interpose a wooden block or cloth so as not to scratch the parts.
- Care must be exercised so that the engine will not come down, while supporting with the garage jack.

18.Remove the bolts connecting the rear engine mounting bracket and the engine mounting control rod S/A.

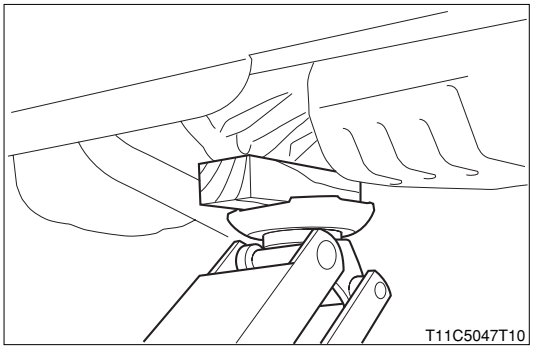
19.Apply a garage jack to the jack point of the front suspension crossmember S/A.

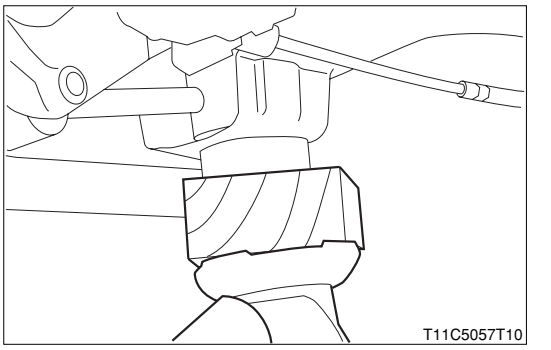
CAUTION

- When applying a garage jack, be sure to interpose a wooden block or cloth so as not to scratch the parts.

20.With the following parts installed, remove the front suspension crossmember S/A from the vehicle.

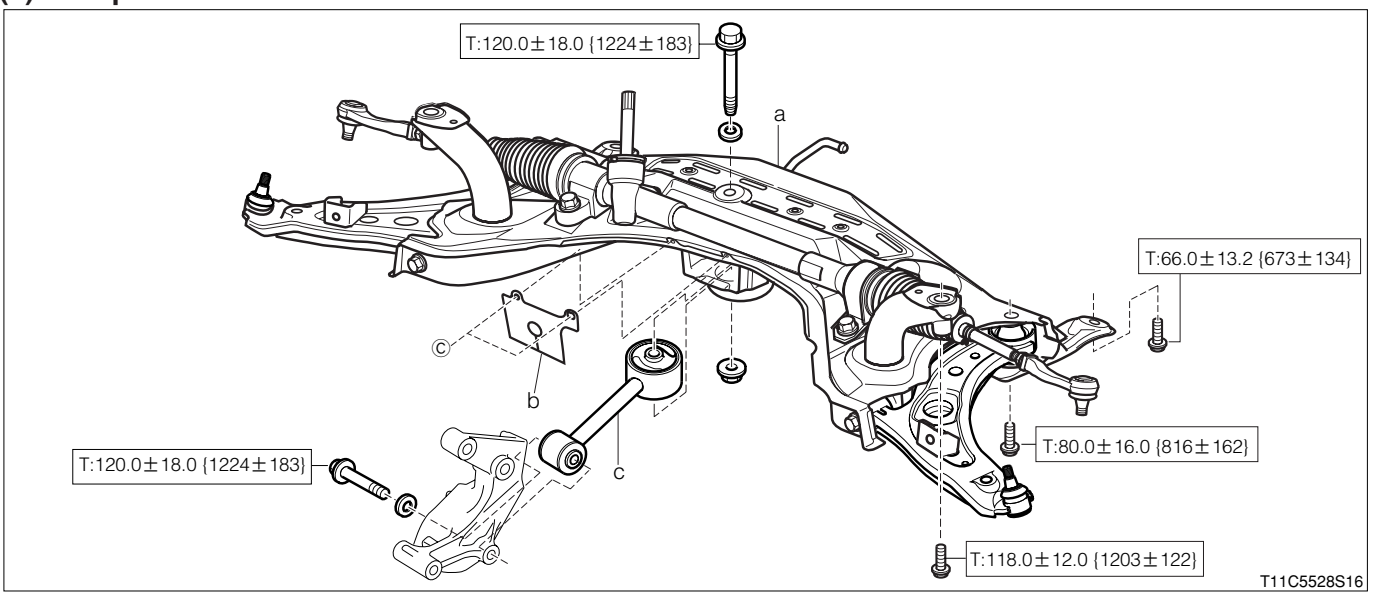
(1) Arm S/A, suspension lower w/bush, RH/LH
(2) Gear Ay, steering
(3) Cover, engine mounting hole (Cold region specification vehicle)
(4) Rod S/A, engine mounting control





3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal procedures

1 a Crossmember S/A, front suspension
2 b Cover, engine mounting hole (Cold region specification vehicle)
3 c Rod S/A, engine mounting control

(3) Installation procedures

1 a Crossmember S/A, front suspension
▲ 2 c Rod S/A, engine mounting control
3 b Cover, engine mounting hole (Cold region specification vehicle)

3-1-4 INSPECTION

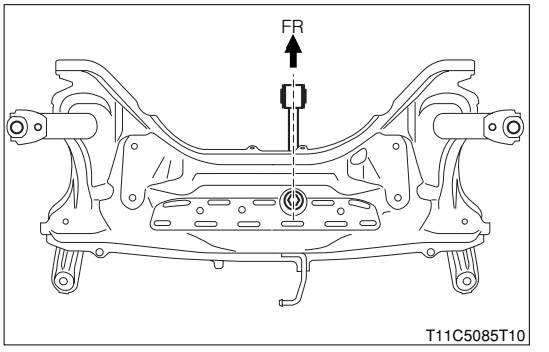
(1) Rod S/A, engine mounting control

1.Replace any rod S/A that exhibits cracks, or a flattened condition.

3-1-5 POINTS OF INSTALLATION

(1) Rod S/A, engine mounting control

1.Install the rod S/A to the front suspension crossmember S/A, making sure that it faces the front direction of the vehicle as shown in the figure. Then, tighten from the bolt side.

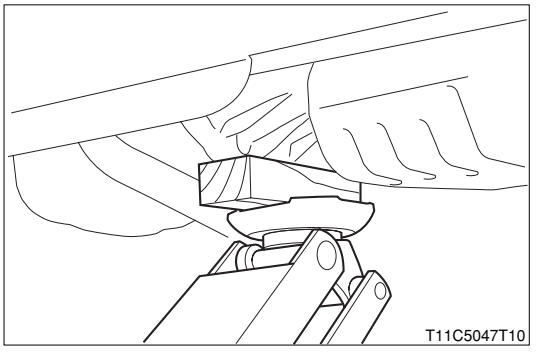


3-1-6 OPERATION AFTER INSTALLATION

1.With the following parts installed to the front suspension crossmember S/A, support it with a garage jack. Then, install it to the vehicle, while adjusting the position.
(1) Arm S/A, suspension lower w/bush, RH/LH
(2) Gear Ay, steering
(3) Cover, engine mounting hole (Cold region specification vehicle)
(4) Rod S/A, engine mounting control

CAUTION
- When applying a garage jack, be sure to interpose a wooden block or cloth so as not to scratch the parts.

2.Apply a garage jack to the joint section between the engine Ay and the manual transaxle Ay/automatic transaxle Ay to support.



CAUTION
- When applying a garage jack, be sure to interpose a wooden block or cloth so as not to scratch the parts.
- Care must be exercised so that the engine will not come down, while supporting with the garage jack.

3.Tighten the bolts connecting the engine mounting rear bracket and engine mounting control rod S/A.

4.Install the transmission floor shift Ay.(M/T vehicle)
Refer to Page F2-15.

5.Install the transmission control cable Ay.(A/T vehicle)
Refer to Page F3-34.

6.Install the exhaust front pipe Ay.
(1) Vehicle mounted with Type 1KR engine
Refer to Page B4-3.

(2) Vehicle mounted with Type K3 engine
Refer to Page B4-6.

7.Adjust the mounting dimensions of the suspension lower arm S/A with bush RH/LH.
Refer to Page C1-10.

8.Install the ball joint section of the suspension lower arm S/A with bush RH/LH to the steering knuckle RH/LH.
Refer to Page C1-10.

9.Insert the front drive shaft Ay RH/LH into the steering knuckle RH/LH.
Refer to Page D2-8.

10.Install the steering knuckle RH/LH to the front shock absorber.
Refer to Page C1-6.

11.Install the joint section of the steering tie-rod end S/A RH/LH to the steering knuckle RH/LH.
Refer to Page G2-1.

12.Tighten the nuts of the front drive shaft Ay RH/LH.
Refer to Page D2-8.

13.Install the stabilizer link to the suspension lower arm S/A with bush RH/LH.
Refer to Page C1-14.

14.Install the front disc.
Refer to Page E1-60.

15.Install the front disc brake caliper Ay RH/LH.
Refer to Page E1-53.

16.Install the front speed sensor RH/LH to the steering knuckle RH/LH. (ABS-equipped vehicle)
Refer to Page E3-4.

17.Install the disc wheels. (Front)
Refer to Page C3-3.

18.Lift down the vehicle.
19.Install the steering shaft universal joint Ay No.2 to the steering gear Ay.
Refer to Page G1-5.

20.Check and adjust the front wheel alignment.
Refer to Page C1-1.

TO INDEX

C1 FRONT SUSPENSION

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BASIC CHECK AND ADJUSTMENT -- C1 - 1
FRONT SHOCK ABSORBER AND
FRONT COIL SPRING ---------- C1 - 6
REMOVAL AND INSTALLATION ------- C1 - 6
FRONT SUSPENSION LOWER ARM -- C1 - 10
REMOVAL AND INSTALLATION ------ C1 - 10
FRONT STABILIZER BAR ---------- C1 - 14
REMOVAL AND INSTALLATION ------ C1 - 14
FRONT SUSPENSION MEMBER ------- C1 - 17
REMOVAL AND INSTALLATION ------ C1 - 17

1 FRONT SUSPENSION

1-1 BASIC CHECK AND ADJUSTMENT

1-1-1 CHECK OF EACH PART OF SUSPENSION

(1) Operations prior to check

1.Jack up the vehicle.
2.Remove the front disc wheels.

(2) Check of bolts for tightening condition

1.Check bolts and nuts of each part of the axle and suspensions for loosen.

(3) Check of excessive play

1.Check each part of the axle and suspensions specified in the item given below to see if any looseness, etc. is present.
(1) Ball joint
(2) Steering linkage
(3) Each part of the suspension
(4) Front disc wheel bearing
Refer to Page D2-1.

(4) Check of damage

1.Visually check each part of the axle and suspensions to see if any damage is present.

(5) Check of cracks and damage

1.Visually check the dust boots of the ball joints to see if any cracks and damage are present.

(6) Check of shock absorber for oil leakage

1.Visually check the front shock absorber sleeve section, etc. to see if any oil leakage is present.

1-1-2 FRONT WHEEL ALIGNMENT

(1) Articles to be prepared

Tool

CCK gauge compensator,Brake pedal pusher

Instrument

Turning radius gauge,Tire pressure gauge,Camber caster gauge,Dial gauge

(2) Checks prior to measurement

① Check of vehicle conditions

1.Check that the vehicle is in the unloaded state. (Fuel fully filled, spare tire and tools mounted)

② Check of tires for size and wear conditions

1.Check that the tires has no wrong size, no significant difference in wear between the right and left and uneven wear.

③ Check of tire air inflation pressure

Refer to Page C3-1.

④ Check of tires for runout

Refer to Page C3-2.

⑤ Check bolts of each part of the suspension for tightening conditions

Refer to Page C1-1.

⑥ Check of each part of the suspensions for excessive play

Refer to Page C1-1.

(3) Toe-in

① Check

1.Rock the vehicle so that it may be stabilized.

2.Move the vehicle about 5 m straight forward by pushing it by hands.

CAUTION

- When the vehicle has been moved backward, be sure to move it forward by the distance that the vehicle traveled backward.

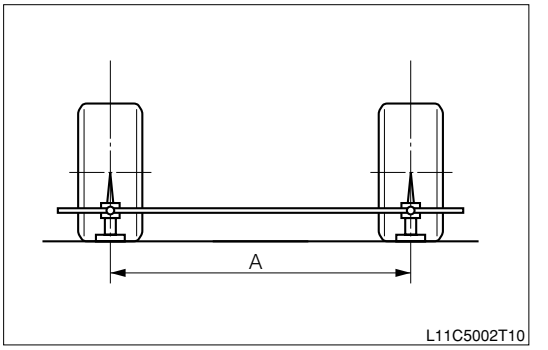
3.Align the height of the pointer of the toe-in gauge with the center height of the front disc wheel axle, and place the gauge behind the tires.

4.Put a mark on the tread center of each front wheel tire at the rear side. Measure the distance between the two marks. (Dimension A)

5.Slowly move the vehicle forward by pushing it, until the front wheels tire make 180 degrees turn.

CAUTION

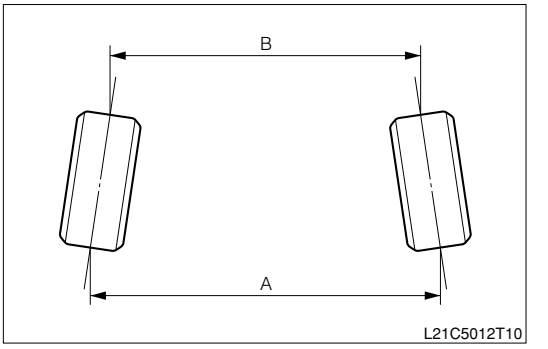
- Be very careful not to turn the wheel more than 180 degrees. If the wheel is turned more than 180 degrees, repeat the operations from Step 3.



6.Measure the distance (B) between the marks at the front section of the front tires.

7.Calculate the toe-in (A-B).

SPECIFIED VALUE: 0.0±2.0mm



② Adjustment

1.Detach the steering rack boot band No.2.

2.Loosen the lock nut of the tie-rod end.

3.Turn the rack ends at the right and left sides the same amount in the opposite direction and adjust them so that the toe-in may enter within the specified range.

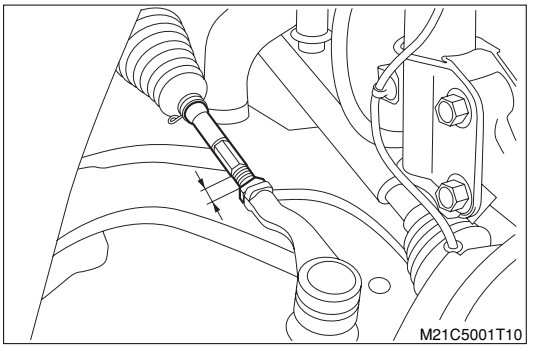
SPECIFIED VALUE: 0.0±1.0mm

4.Tighten the lock nut of the tie-rod end.

TIGHTENING TORQUE: 36.8±7.3N·m{375±74kgf·cm}

CAUTION

- Make sure that the length indicated in the right figure is the same. (Failure to observe this caution may cause differences in the wheel turning angle.)



5.Check the toe-in again.

SPECIFIED VALUE: 0.0±1.0mm

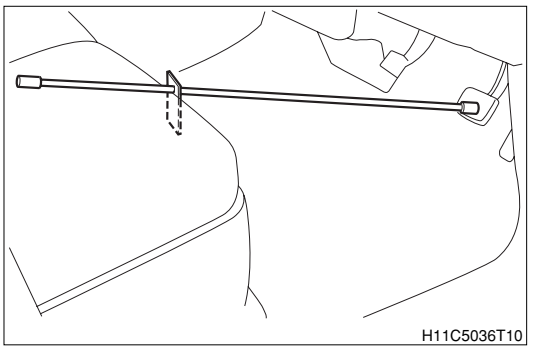
(4) Camber, caster and kingpin inclination angle

① Check

1.Setting of turning radius gauge

2.Align the turning radius gauge with the 0 degrees position and lock it.

3.Drive the vehicle so that the center of the ground-contacting surface of the tire may be aligned with the center of the turning radius gauge.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CAUTION

- The checks should be conducted under the unloaded state and with the service brake applied, using a brake pedal pressure, so that the front wheels may not turn.
- When using a portable type turning radius gauge, make sure to put a base having the same height as the gauge so as to assure the horizontal state.
- Remove the stop lamp fuse so that the stop lamp may not be turned on.

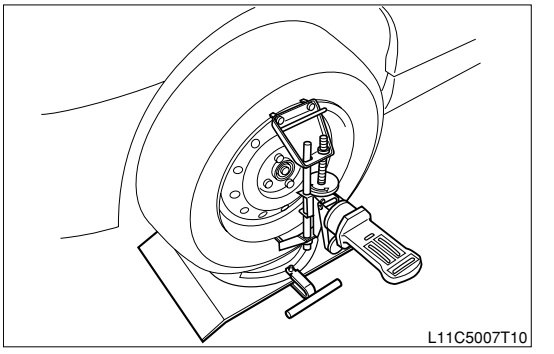
TOOL: Brake pedal pusher

4.Install a compensator to the disc wheel. Then, install a camber/caster/kingpin gauge.

5.Align the graduation of the turning radius gauge with the 0 degrees position. Unlock the turning radius gauge.

6.Install the gauge, while aligning the tip end of the center rod of the camber-caster-kingpin gauge with the designated position of the compensator.

TOOL: CCK gauge compensator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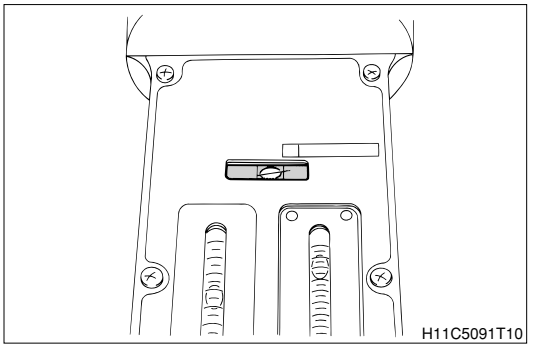
7.Check the camber.

8.Confirm the straight-ahead position.

9.Set the gauge horizontally so that a level bubble of the gauge comes at the center.

10.Read out the graduation at the center position of the bubble of the gauge for the camber measurement.

SPECIFIED VALUE: 0 ° ±45′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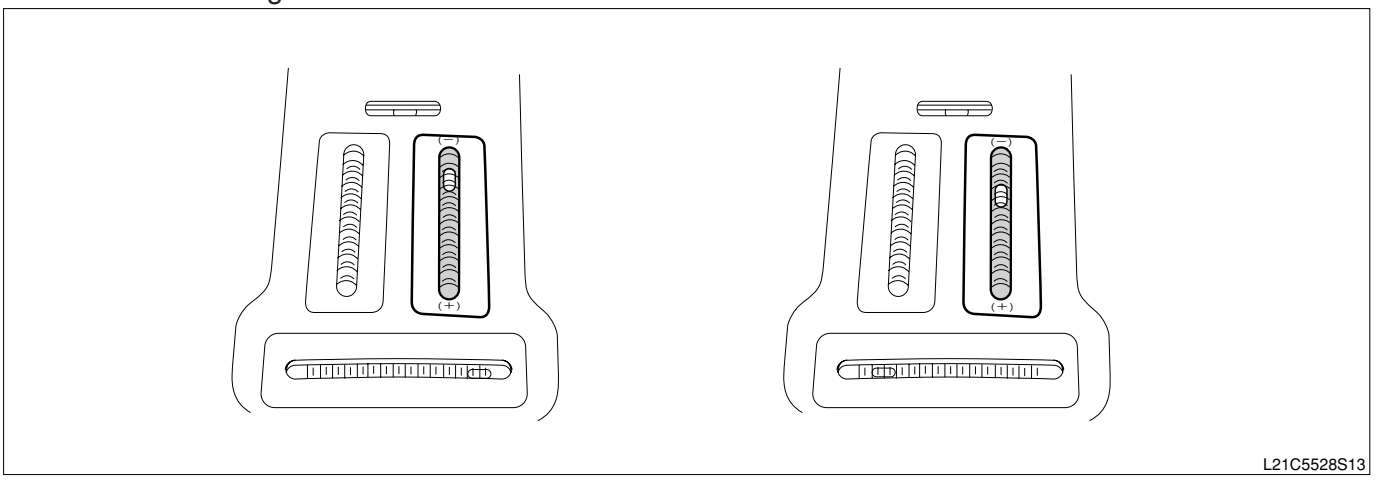
11.Check the caster angle and kingpin angle (Right wheel).

Caster inclination angle



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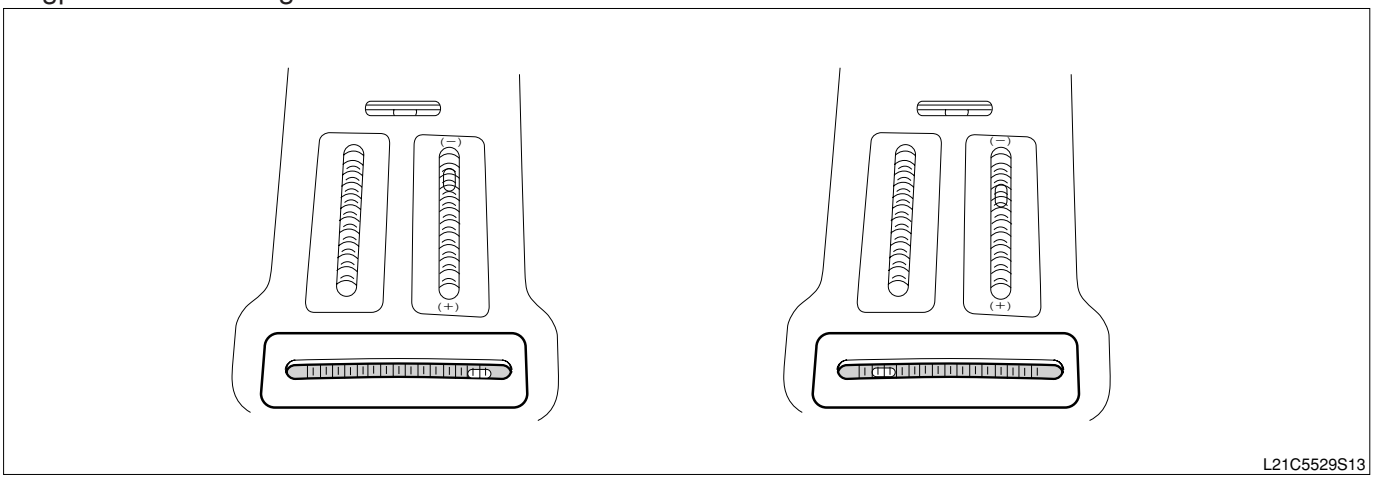
Kingpin inclination angle



L21C5529S13

12.Turn the steering wheel clockwise until the turning radius gauge points to 20 degrees.

13.Adjust the adjusting screws of the caster angle and kingpin inclination angel until each air bubble is aligned with the "0" position.

14.Turn the steering wheel counterclockwise until the turning radius gauge points 20 degrees.

15.Read the graduation of the bubble center position at the caster angle measuring gauge and kingpin angle measuring gauge.

SPECIFIED VALUE: caster angle 3 ° 28′ ± 1 °
kingpin inclination angle 10 ° 36′ ± 1 °

16.Check the caster angle and kingpin inclination angle (Left wheel).

NOTE

- This is a non-adjustable type, in which the camber, caster and kingpin inclination angle have already been adjusted to the specified values.

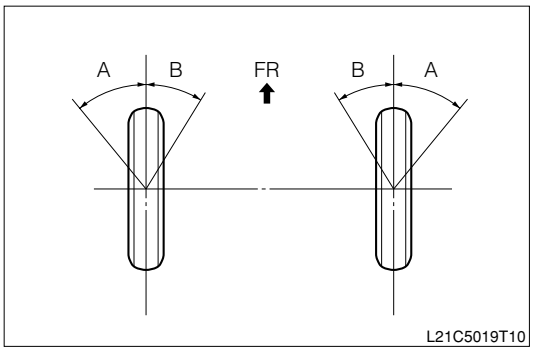
17.Remove the gauge and SST.

(5) Wheel turning angle

① **Check**

1.Turn the steering wheel fully to the right and to the left. At this time, check the wheel turning angle.

Tire	Inside (A)	Outside (B)
155/80R13	45 °42′ $^{+2°}_{-3°}$	37 °00′ $^{+2°}_{-3°}$
175/65R14	40 °00′ $^{+2°}_{-3°}$	33 °48′ $^{+2°}_{-3°}$



② **Adjustment**

1.If the turning angles differ greatly between the right and left sides or they are deviated greatly from the specified values, carry out the check and adjustment of the toe-in.

(6) Front side slip

① **Check**

NOTE

- Even when the side slip value is within the range of the specified value, if there is any abnormality, be sure to check and adjust the above items.

1.Check the side slip, using a side slip tester.
SPECIFIED VALUE: In 5 mm - out 5 mm

2 FRONT SHOCK ABSORBER AND FRONT COIL SPRING

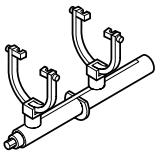
2-1 REMOVAL AND INSTALLATION

WARNING

- If you try to remove the lock nut without using the SST, the front coil spring would jump out, posing a serious danger. Therefore, make sure to employ the SST.

2-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09727-30021-000 (09727-30020-000)	Compressor,front coil spring

Instrument

Torque wrench

2-1-2 OPERATION BEFORE REMOVAL

1.Jack up the vehicle.

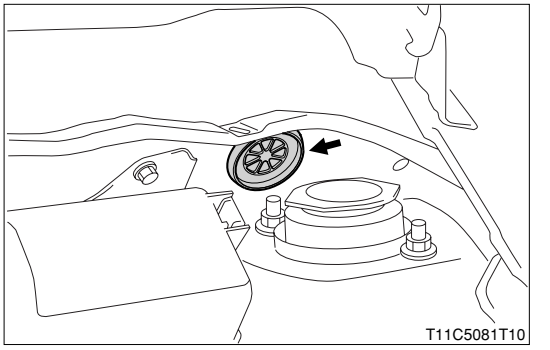
2.Remove the disc weel. (Front)
Refer to Page C3-3.

3.Remove the clamp section of the flexible hose.
Refer to Page E1-43.

4.Remove the clamp section of the front speed sensor RH/LH. (ABS-equipped vehicle)
Refer to Page E3-4.

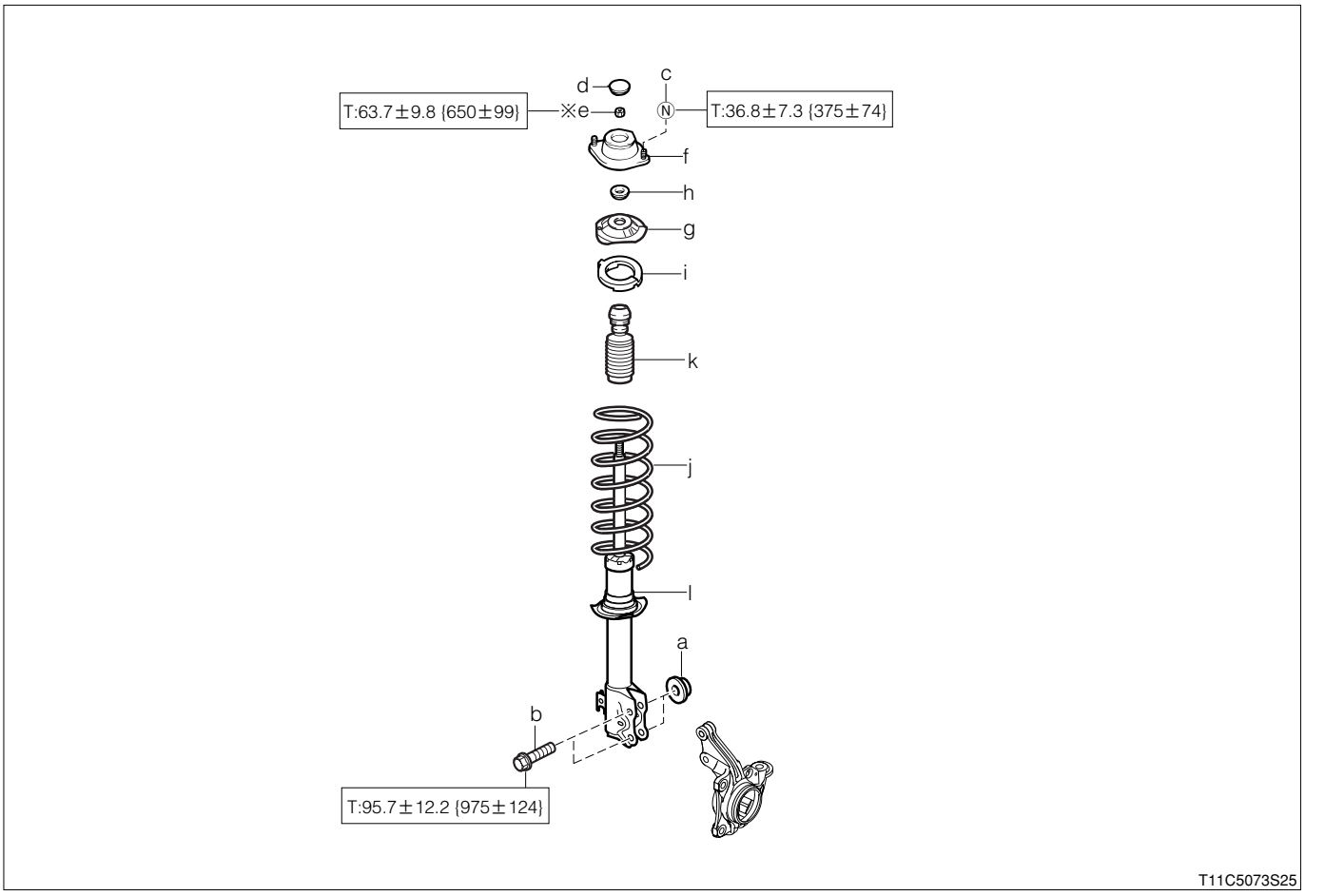
5.Remove the cowl top ventilator louver S/A RH/LH.
Refer to Page I2-8.

6.Disconnect the control cable from the cowl top inner panel S/A.



2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts
Unit:N·m{kgf·cm}

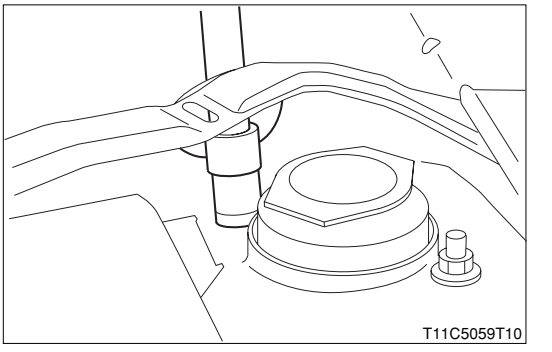
(2) Removal and installation procedures

1 a Nut, hexagon
2 b Bolt, hexagon
3 c Nut
4 d Cover, bearing dust
5 e Nut, lock
▼ 6 f Support S/A, front suspension
7 g Seat Ay, front spring, upper
8 h Bearing, strut mounting
9 i Insulator, front coil spring
▼ ▲ 10 j Spring, coil, front
11 k Bumper, front spring
12 l Absorber Ay, shock, front

2-1-4 POINTS OF REMOVAL

(1) Support S/A, front suspension

1.Put the tool through the service hole so as to remove the nut of the support S/A.



(2) Spring, front, coil

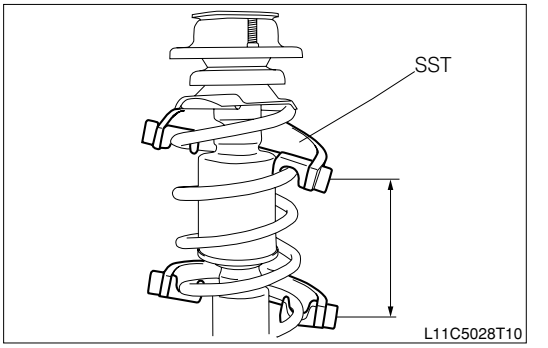
1.Install the SST to the spring.

2.Compress the spring fully.

WARNING

- At this time, make sure that the SST is installed in such a way that the distance between the hooks becomes the greatest.
- When compressing the spring, do not use an impact wrench.

SST: 09727-30021-000

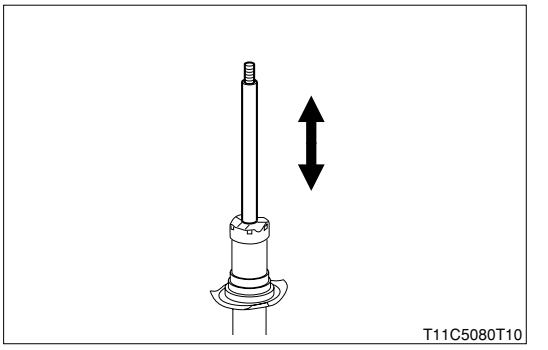


2-1-5 INSPECTION

(1) Absorber AY, shock, front RH/LH

1.Check the operation of the shock absorber Ay by compressing and expanding it.

SPECIFIED VALUE: When the shock absorber is compressed by hand, ensure that it can be compressed with a certain resistance, but without binding.
When you release your hand after compressing the shock absorber, ensure that it is extended at a constant speed by itself.



(2) Spring, front, coil

1.Check the spring for cracks, wear and damage.

2-1-6 POINTS OF INSTALLATION

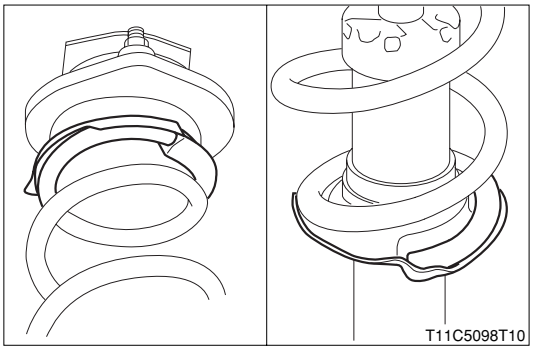
(1) Spring, front, coil

1.Install the spring to the front shock absorber assembly RH/LH, using the SST.

WARNING

- At this time, make sure that the SST is installed in such a way that the distance between the hooks becomes the greatest.
- When compressing the spring, do not use an impact wrench.
- Make sure to align the groove of the spring seats at the upper and lower sides with the edge of the spring.

SST: 09727-30021-000



2-1-7 OPERATION AFTER INSTALLATION

1.Install the hole plug to the inner top cowl panel S/A.
2.Install the cowl top ventilator louver S/A RH/LH.
Refer to Page I2-8.

3.Install the clamp section of the front speed sensor RH/LH. (ABS-equipped vehicle)
Refer to Page E3-4.

4.Install the clamp section of the flexible hose.
Refer to Page E1-43.

5.Install the disc weel. (Front)
Refer to Page C3-3.

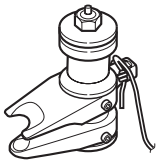
6.Jack down the vehicle.
7.Check and adjust the front wheel alignment.
Refer to Page C1-1.

3 FRONT SUSPENSION LOWER ARM

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09628-00011-000 (09611-87701-000)	Puller,tie-rod end

Instrument

Torque wrench

Lubricant,adhesive,others

Wire

3-1-2 OPERATION BEFORE REMOVAL

1.Jack up the vehicle.

2.Remove the disc weel. (Front)
Refer to Page C3-3.

3.Remove the front speed sensor RH/LH from the steering knuckles RH/LH. (ABS-equipped vehicles)
Refer to Page E3-4.

4.Remove the front disc brake caliper Ay RH/LH. Hang them with wire, etc.
Refer to Page E1-53.

5.Remove the front disc.
Refer to Page E1-60.

6.Separate the stabilizer link from the suspension lower arm S/A RH/LH with bush.
Refer to Page C1-14.

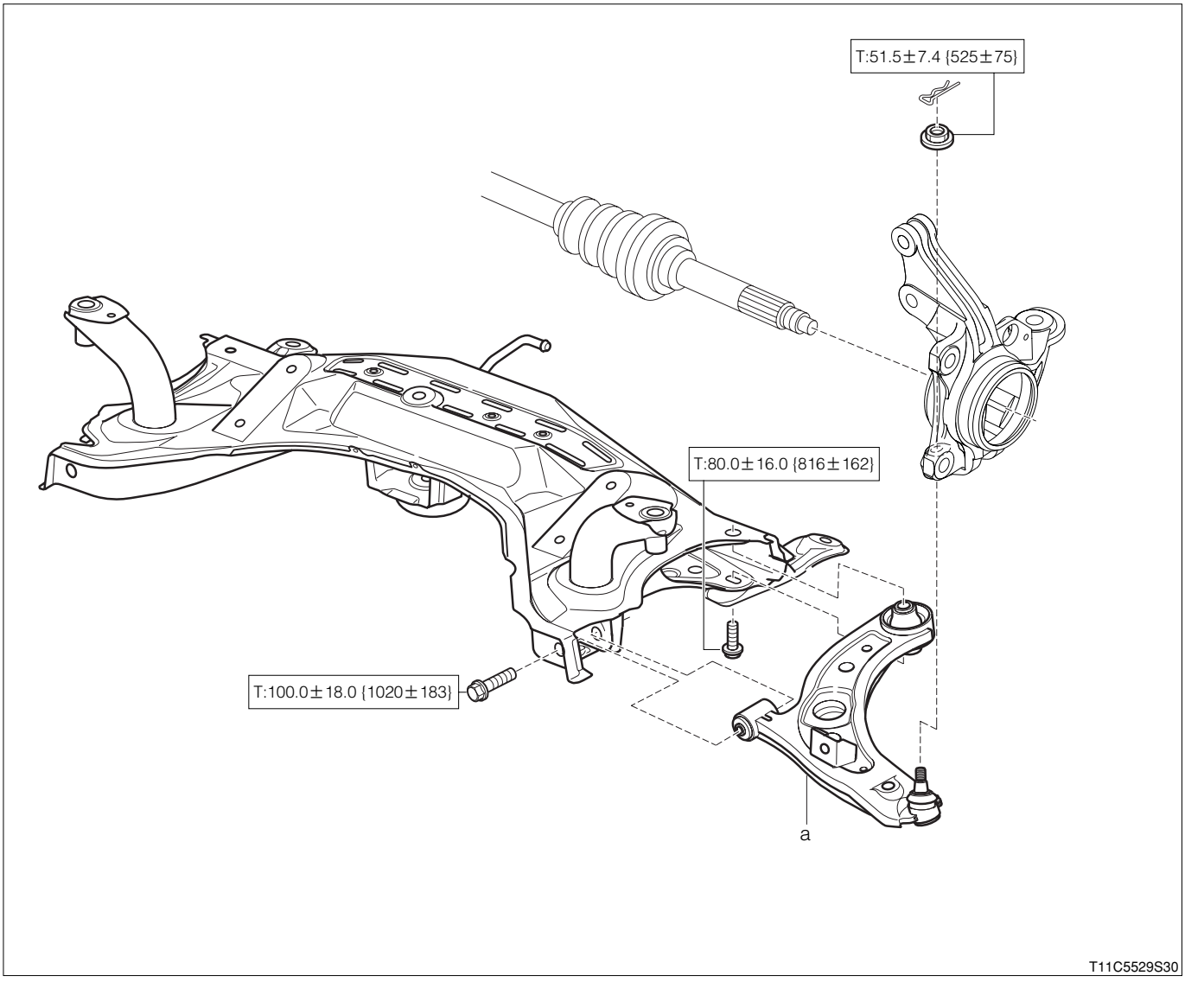
7.Remove the nut of the front drive shaft Ay RH/LH.
Refer to Page D2-8.

8.Separate the front shock absorber Ay from the steering knuckles RH/LH.
Refer to Page C1-6.

9.Pull out the front drive shaft Ay RH/LH from the steering knuckles RH/LH. Then, hang it with wire, etc.
Refer to Page D2-8.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

▼ ▲ 1 a Arm S/A, suspension lower arm w/bush, RH/LH

3-1-4 POINTS OF REMOVAL

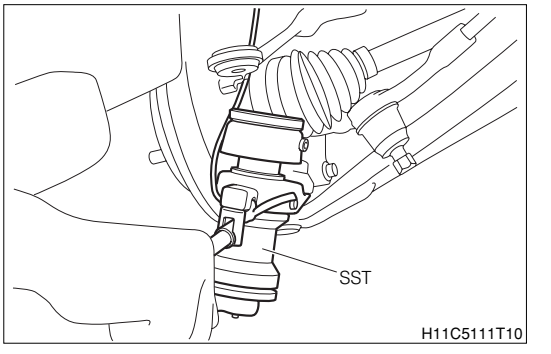
(1) Arm S/A, Suspension lower w/bush, RH/LH

1.Separate the steering knuckles RH/LH from the ball joint section of the arm S/A, using the SST.

CAUTION

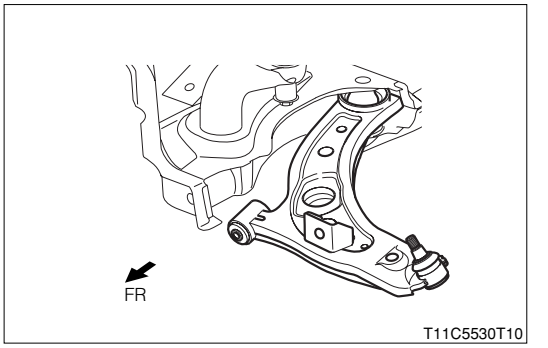
- When setting the SST, attach a dummy nut to the threaded portion of the arm subassembly so that the threaded portion may not be damaged.
- Hang the SST using a cord.

SST: 09628-00011-000



2.Remove the two bolts that connect the arm S/A with the front suspension cross member S/A.

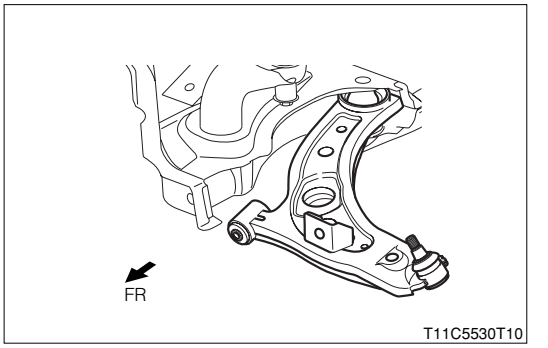
3.Remove the arm S/A from the front side of the vehicle.



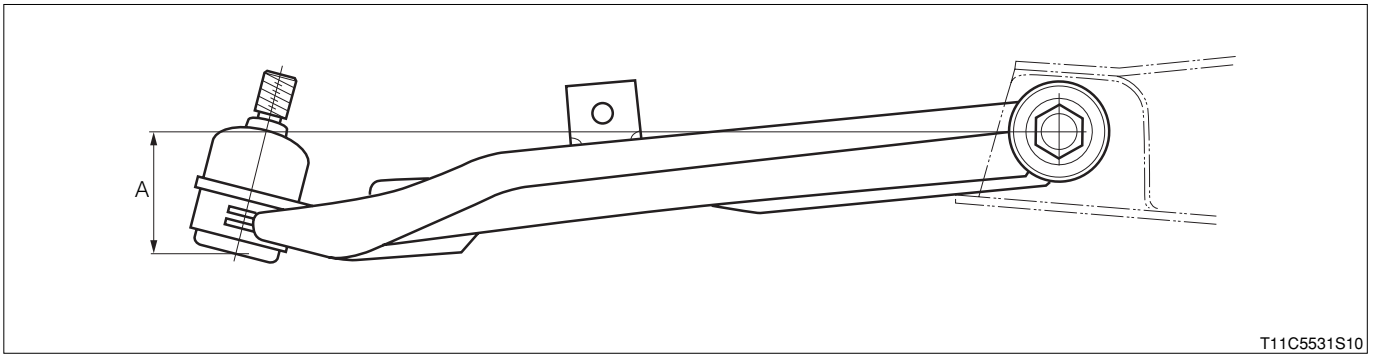
3-1-5 POINTS OF INSTALLATION

(1) Arm S/A, suspension lower w/bush, RH/LH

1.Install the arm S/A from the rear side of the vehicle.



(1) Tighten the arm S/A to the dimensions indicated in the figure. Or, temporarily tighten the arm S/A at this step. Then, rock the vehicle several times under a condition where the vehicle weight is applied, thus stabilizing the suspension. Finally, securely tighten the bolts.

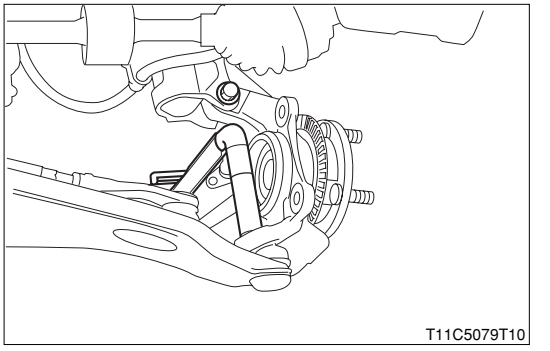


SPECIFIED VALUE:

Measuring point	Dimension A [mm]
Lower arm bush - Lowest edge of arm S/A	46±5

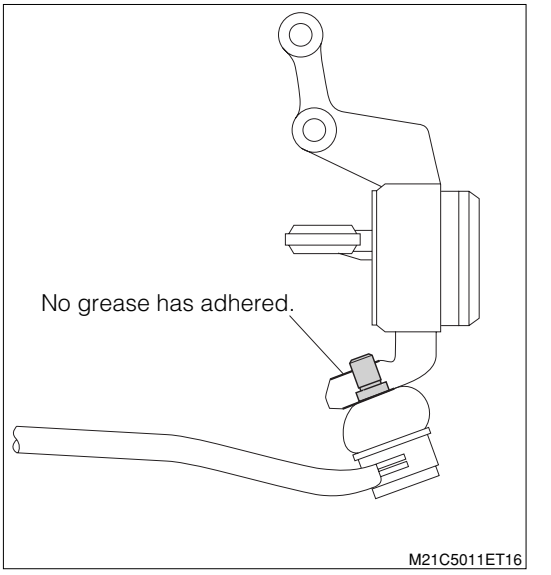
2.Temporarily install the front suspension absorber Ay and the steering knuckle RH/LH.

3.Install the arm S/A to the steering knuckle RH/LH. Tighten them securely.



CAUTION

- During the assembly, ensure that no oil nor grease is adhered to the threaded portion of the ball stud, tapered section, and steering knuckle RH/LH installation section of the arm subassembly. If oil or grease is adhered, be certain to wipe it off.



3-1-6 OPERATION AFTER INSTALLATION

1. Insert the front drive shaft Ay RH/LH to the steering knuckle RH/LH.
   Refer to Page D2-8.

2. Install the steering knuckle RH/LH to the front shock absorber Ay.
   Refer to Page C1-6.

3. Tighten the nuts of the front drive shaft Ay RH/LH.
   Refer to Page D2-8.

4. Install the stabilizer link to the suspension lower arm S/A with bush RH/LH.
   Refer to Page C1-14.

5. Install the Front disc.
   Refer to Page E1-60.

6. Install the front disc brake caliper Ay RH/LH.
   Refer to Page E1-53.

7. Install the front speed sensors RH/LH to the steering knuckles RH/LH. (ABS-equipped vehicles)
   Refer to Page E3-4.

8. Install the disc weel. (Front)
   Refer to Page C3-3.

9. Jack down the vehicle.
10. Check and adjust the front wheel alignment.
    Refer to Page C1-1.

4 FRONT STABILIZER BAR

4-1 REMOVAL AND INSTALLATION

4-1-1 ARTICLES TO BE PREPARED

Instrument

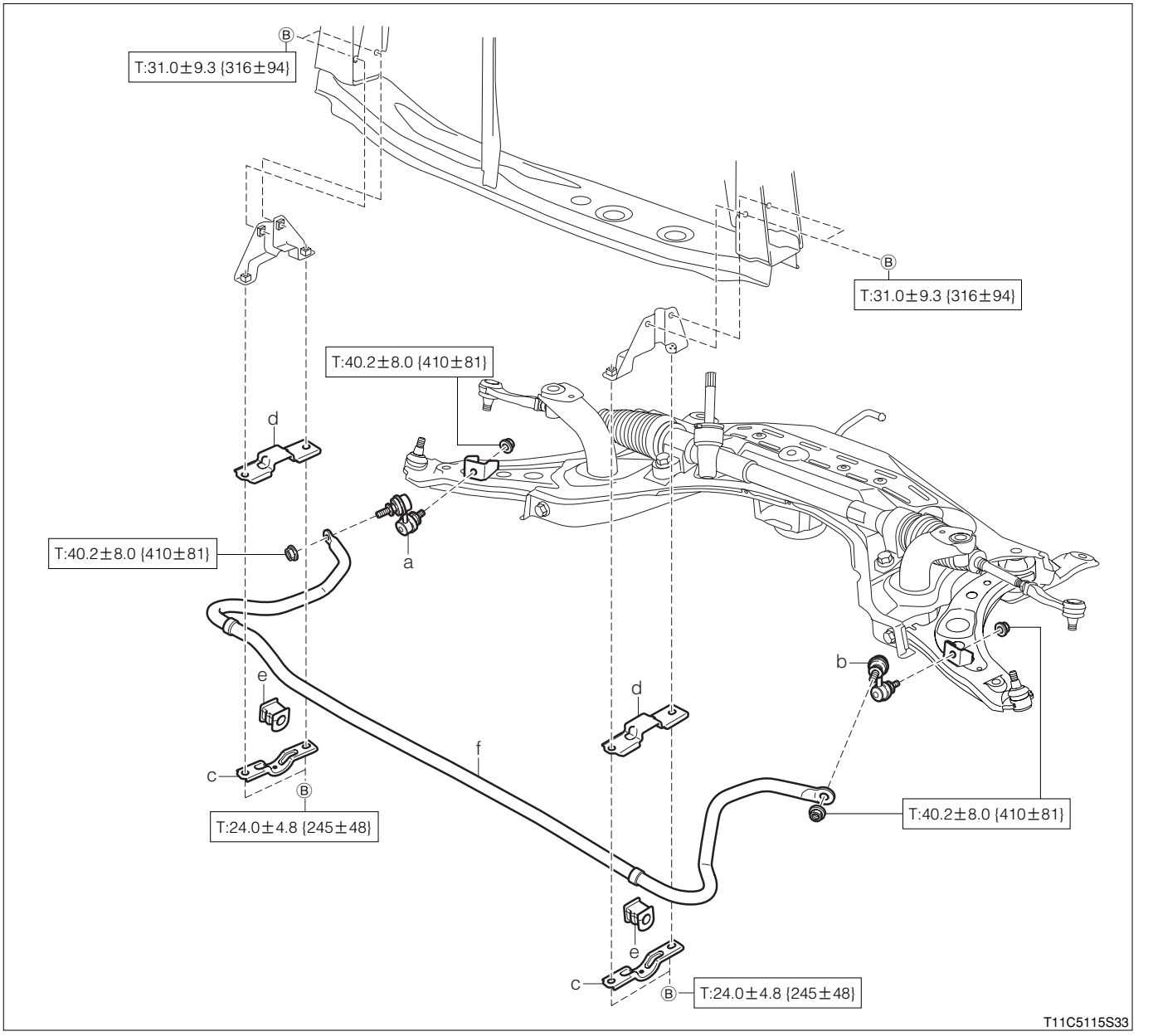
Torque wrench

4-1-2 OPERATION BEFORE REMOVAL

1.Lift up the vehicle.
2.Remove the disc wheels. (Front)
Refer to Page C3-3.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

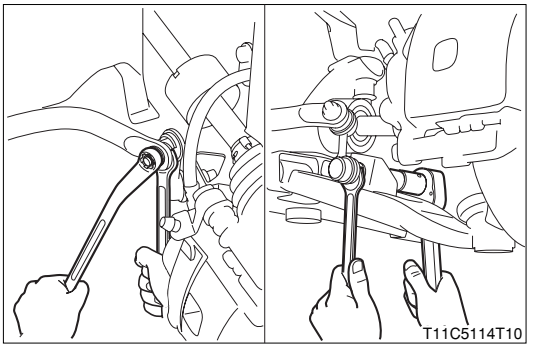
(2) Removal and installation procedures

▼ ▲ 1 a Link, stabilizer, No.1
▼ ▲ 2 b Link, stabilizer, No.2
▲ 3 c Bracket, stabilizer, No.2
▲ 4 d Bracket, stabilizer
5 e Bush, stabilizer
▼ ▲ 6 f Bar, stabilizer, front

4-1-4 POINTS OF REMOVAL

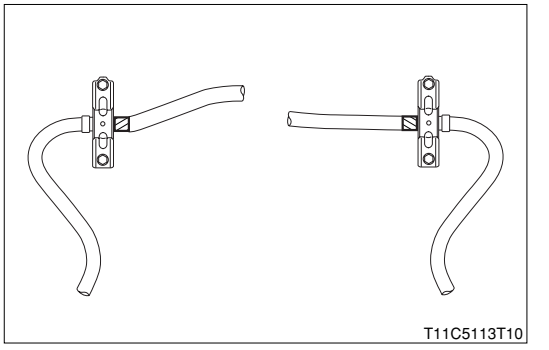
(1) Link, stabilizer

1.When removing the rink, be sure to secure the nut section, using a spanner, so that no excessive force may be applied to the ball joint section.



(2) Bar, stabilizer, front

1.Put a mating mark at the position where the bar is assembled with the stabilizer bush.



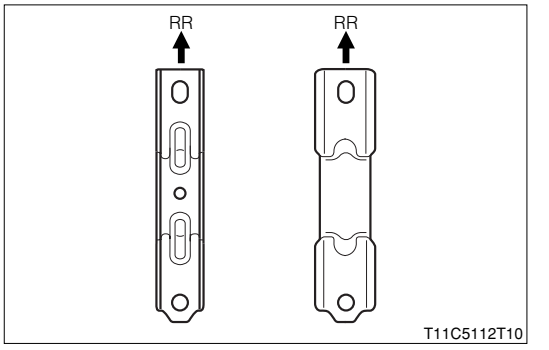
4-1-5 POINTS OF INSTALLATION

(1) Bar, stabilizer, front

1.Install the stabilizer bushing to the bar, while referring to the mating mark that has been put during the removal operation.

(2) Bracket, stabilizer

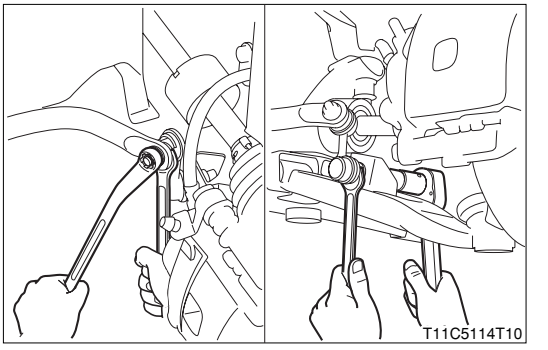
1.Install the bracket in such a way that the side at which an elongated hole is provided comes to the vehicle rear side. Then, gradually tighten the attaching bolts alternately at the front and rear sides, while exercising utmost care so that the bracket may not be tilted.



(3) Link, stabilizer

1.When tightening the hexagon nut, be sure to secure the nut section of the link so that no excessive force may be applied to the ball joint section of the link, using a spanner.

2.Once tighten the link temporarily. Afterward, rock the vehicle several times under the weighted condition so that the suspension may be settled. Then, carry out the tightening securely.



4-1-6 OPERATION AFTER INSTALLATION

1.Install the disc wheels. (Front)

Refer to Page C3-3.

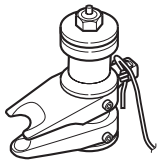
2.Lift down the vehicle.

5 FRONT SUSPENSION MEMBER

5-1 REMOVAL AND INSTALLATION

5-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09628-00011-000 (09611-87701-000)	Puller,tie-rod end

Instrument

Torque wrench

Lubricant,adhesive,others

Wooden block

5-1-2 OPERATION BEFORE REMOVAL

1.Separate the joint at the steering gear assembly side of the steering shaft universal joint assembly No.2.
Refer to Page G1-5.

2.Push out the steering column hole shield to the vehicle outside under a condition where it is attached to the steering gear assembly.
3.Lift up the vehicle.
4.Remove the disc wheels. (Front)
Refer to Page C3-3.

5.Remove the front speed sensors RH/LH from the steering knuckles RH/LH. (ABS-equipped vehicles)
Refer to Page E3-4.

6.Remove the front disc brake caliper Ay RH/LH. Hang it with a wire, etc.
Refer to Page E1-53.

7.Remove the Front disc.
Refer to Page E1-60.

8.Separate the stabilizer link from the suspension lower arm S/A RH/LH with bush.
Refer to Page C1-14.

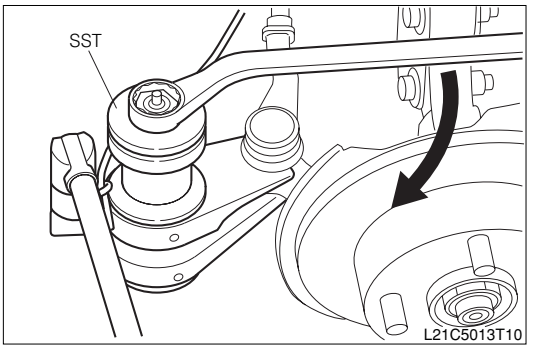
9.Remove the nuts of the front drive shaft Ay RH/LH.
Refer to Page D2-8.

10.Remove the steering knuckles RH/LH and the ball joint sections of the tie-rod end S/A RH/LH, using the SST.

CAUTION

- When setting the SST, attach a dummy nut to the threaded portion of the tie-rod end S/A RH/LH so that the threaded portion may not be damaged.
- Hang the SST using a cord.

SST: 09628-00011-000



11.Separate the front shock absorber Ay from the steering knuckles RH/LH.

Refer to Page C1-6.

12.Pull out the front drive shaft Ay RH/LH from the steering knuckles RH/LH. Then, hang them with a wire, etc.

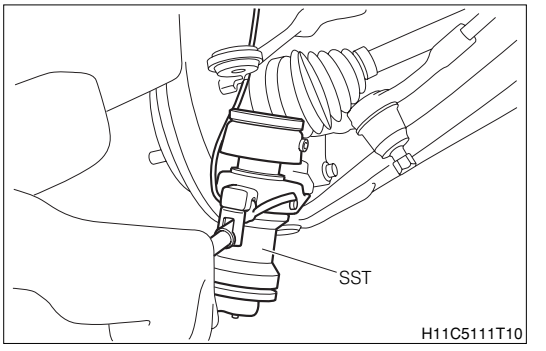
Refer to Page D2-8.

13.Separate the steering knuckles RH/LH from the ball joints of the suspension lower arm S/A with bush RH/LH, using the SST.

CAUTION

- When setting the SST, attach a dummy nut to the threaded portion of the suspension lower arm S/A with bush RH/LH so that the threaded portion may not be damaged.
- Hang the SST using a cord.

SST: 09628-00011-000



14.Remove the exhaust front pipe Ay.

(1) Vehicle mounted with Type 1KR engine

Refer to Page B4-3.

(2) Vehicle mounted with Type K3 engine

Refer to Page B4-6.

15.Remove the transmission floor shift Ay. (M/T vehicle)

Refer to Page F2-15.

16.Remove the transmission control cable Ay. (A/T vehicle)

Refer to Page F3-34.

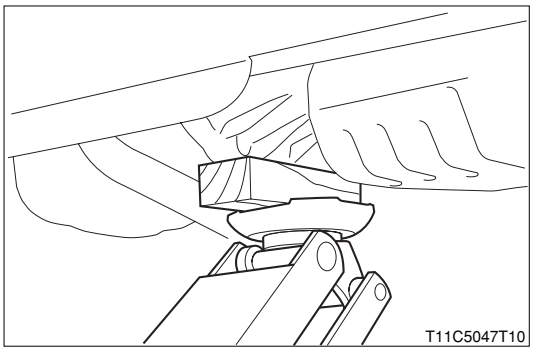
17.Apply a garage jack to the joint section between the engine Ay and the manual transaxle Ay/automatic transaxle Ay to support.

CAUTION

- When applying a garage jack, be sure to interpose a wooden block or cloth so as not to scratch the parts.
- Care must be exercised that the engine will not get lowered while it is supported with the garage jack.

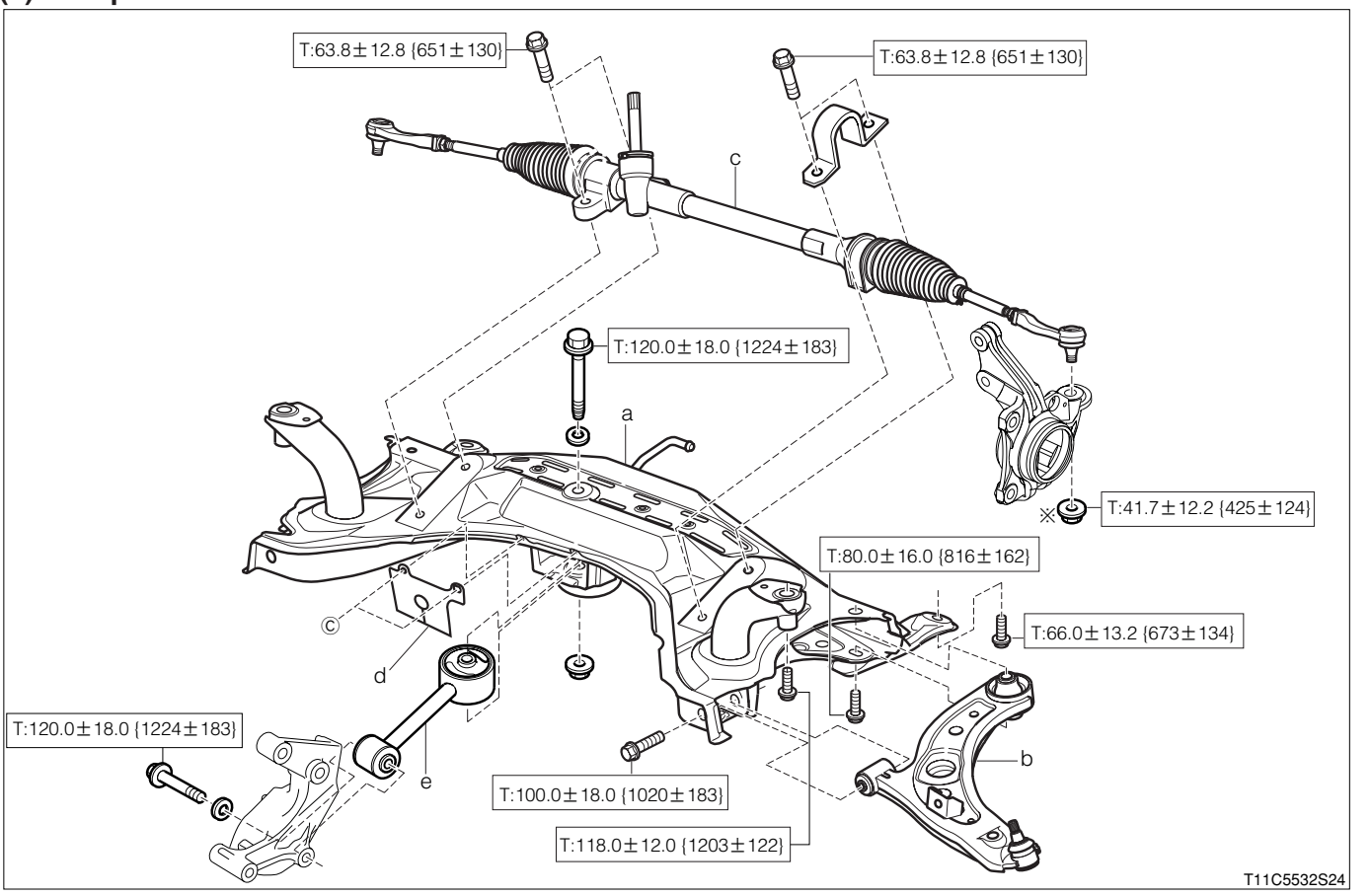
18.Remove the bolts that connect the engine mounting rear bracket with the engine mounting control rod S/A.

Refer to Page B12-7.



5-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts

Unit:N·m{kgf·cm}

(2) Removal procedures

▼ 1 a Crossmember S/A, front suspension
2 b Arm S/A, suspension lower w/bush, RH/LH
3 c Gear Ay, steering
4 d Cover, engine mounting hole (Cold region specification vehicle)
5 e Rod S/A, engine mounting control

(3) Installation procedures

▲ 1 a Crossmember S/A, front suspension
2 b Arm S/A, suspension lower w/bush, RH/LH
3 c Gear Ay, steering
4 d Cover, engine mounting hole (Cold region specification vehicle)
5 e Rod S/A, engine mounting control

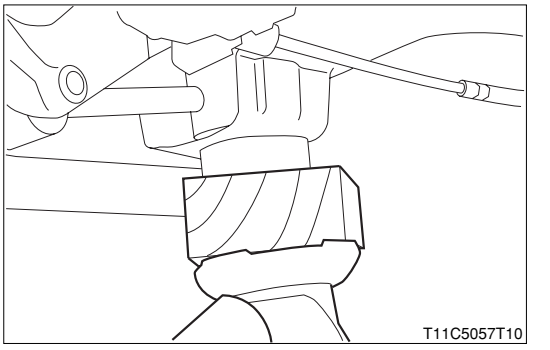
5-1-4 POINTS OF REMOVAL

(1) Crossmember S/A, front suspension

1.Apply a garage jack to the jacking point of the crossmember S/A.

CAUTION

- When applying a garage jack, be sure to interpose a wooden block or cloth so as not to scratch the parts.



2.Remove the crossmember S/A from the vehicle with the following parts given below mounted on it.
  (1) Arm S/A, suspension lower w/bush, RH/LH
  (2) Gear Ay, steering
  (3) Cover, engine mounting hole (Cold region specification vehicle)
  (4) Rod S/A, engine mounting control

3.Remove the suspension lower w/bush RH/LH.

4.Remove the steering gear Ay.

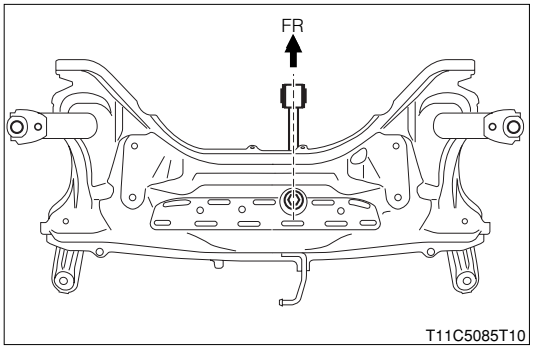
5.Remove the engine mounting hole cover. (Cold region specification vehicle)

6.Remove the engine mounting control rod S/A.

5-1-5 POINTS OF INSTALLATION

(1) Crossmember S/A, front suspension

1.Install the engine mounting control rod S/A in such a direction that it faces toward the front side of the vehicle relative to the crossmember S/A. Then, tighten it from the bolt side.



2.Install the engine mounting hole cover. (Cold region specification vehicle)

3.Install the steering gear Ay.

4.Install the suspension lower w/bush RH/LH.

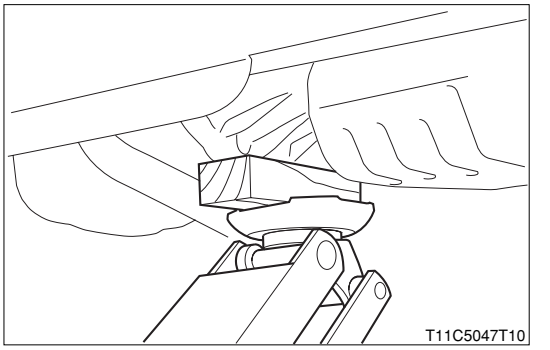
5.Using a garage jack, support the following parts given below while they are mounted on the crossmember S/A. Install the crossmember S/A to the vehicle, while adjusting its position.

CAUTION

- When applying a garage jack, be sure to interpose a wooden block or cloth so as not to scratch the parts.

  (1) Arm S/A, suspension lower w/bush, RH/LH
  (2) Gear Ay, steering
  (3) cover, engine mounting hole (Cold region specification vehicle)
  (4) Rod S/A, engine mounting control

5-1-6 OPERATION AFTER INSTALLATION



1.Apply a garage jack to the joint section between the engine Ay and the manual transaxle Ay/automatic transaxle Ay to support.

CAUTION

- When applying a garage jack, be sure to interpose a wooden block or cloth so as not to scratch the parts.
- Care must be exercised that the engine will not get lowered while it is supported with the garage jack.

2.Tighten the bolts connecting the engine mounting rear bracket and engine mounting control rod S/A.

Refer to Page B12-7.

3.Install the transmission floor shift Ay. (M/T vehicle)

Refer to Page F2-15.

4.Install the transmission control cable Ay. (A/T vehicle)

Refer to Page F3-34.

5.Install the exhaust front pipe Ay.

(1) Vehicle mounted with Type 1KR engine

Refer to Page B4-3.

(2) Vehicle mounted with Type K3 engine

Refer to Page B4-6.

6.Adjust the installation dimension of the suspension lower arm S/A with bush RH/LH.

Refer to Page C1-10.

7.Install the ball joint sections of the suspension lower arm S/A with bush RH/LH to the steering knuckles RH/LH.

Refer to Page C1-10.

8.Insert the front drive shaft Ay RH/LH to the steering knuckle RH/LH.

Refer to Page D2-8.

9.Install the steering knuckle RH/LH to the front shock absorber Ay.
Refer to Page C1-6.

10.Install the ball joint sections of the steering tie-rod end S/A RH/LH to the steering knuckles RH/LH.
Refer to Page G2-1.

11.Tighten the nuts of the front drive shaft Ay RH/LH.
Refer to Page D2-8.

12.Install the stabilizer link to the suspension lower arm S/A with bush RH/LH.
Refer to Page C1-14.

13.Install the front disc.
Refer to Page E1-60.

14.Install the front disc brake caliper Ay RH/LH.
Refer to Page E1-53.

15.Install the front speed sensors RH/LH to the steering knuckles RH/LH. (ABS-equipped vehicles)
Refer to Page E3-4.

16.Install the disc wheels. (Front)
Refer to Page E3-3.

17.Lift down the vehicle.
18.Install the No.2 steering shaft universal joint Ay to the steering gear Ay.
Refer to Page G1-5.

19.Check and adjust the front wheel alignment.
Refer to Page C1-1.

TO INDEX

C2 REAR SUSPENSION

REAR SUSPENSION ---------- C2 - 1
BASIC CHECK AND ADJUSTMENT -- C2 - 1
REAR SHOCK ABSORBER AND
REAR COIL SPRING ---------- C2 - 2
REMOVAL AND INSTALLATION ------- C2 - 2
REAR SUSPENSION ARM ---------- C2 - 5
REMOVAL AND INSTALLATION ------- C2 - 5
REAR STABILIZER BAR---------- C2 - 8
REMOVAL AND INSTALLATION ------- C2 - 8

1 REAR SUSPENSION

1-1 BASIC CHECK AND ADJUSTMENT

1-1-1 CHECK OF EACH PART OF SUSPENSION

(1) Operations prior to check

1.Lift up the vehicle.

2.Remove the rear disc wheel.

Refer to Page C3-3.

(2) Check of bolts for tightening conditions

1.Visually check each attaching section of the axle and suspension for loosening.

(3) Check of excessive play

1.Check each part of the axle and suspension given in the following item to see if any looseness is present.

(1) Each part of suspension

(2) Rear axle hub & bearing

(4) Check of damage

1.Visually check each part of the axle and suspension to see if any damage is present.

(5) Check of shock absorber for oil leakage

1.Visually check the rear shock absorber sleeve section, etc. to see if any oil leakage is present.

1-1-2 REAR WHEEL ALIGNMENT

1.The rear wheel alignment has no adjusting mechanism. (The following values are referential values.)

(1) Toe-in

SPECIFIED VALUE: 3.0±3.3mm

(2) Camber angle

SPECIFIED VALUE: −0°45′±45′

(3) Rear wheel alignment

SPECIFIED VALUE: In 10 mm - out 3 mm

2 REAR SHOCK ABSORBER AND REAR COIL SPRING

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

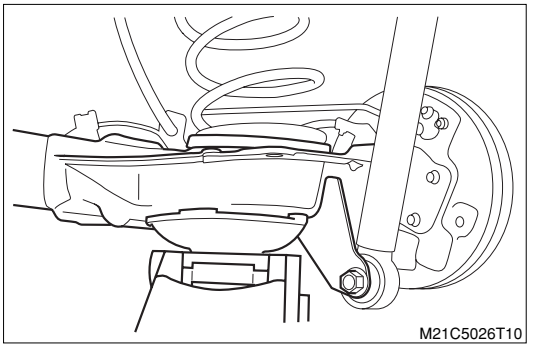
Instrument

Torque wrench

2-1-2 OPERATION BEFORE REMOVAL

1.Lift up the vehicle.

2.Remove the disc wheels. (Rear)
Refer to Page C3-3.


M21C5026T10

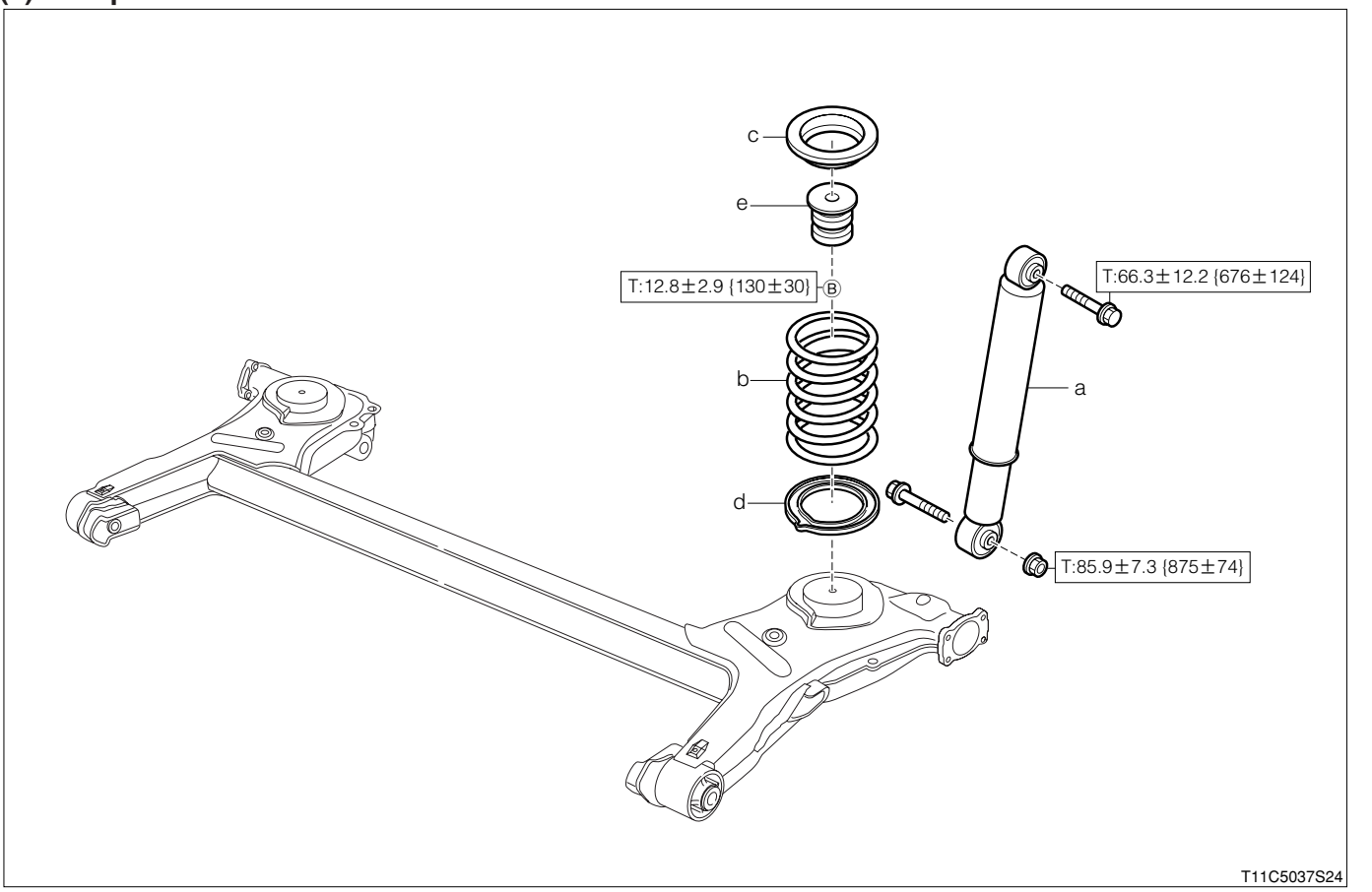
3.Support the rear suspension arm Ay with a garage jack.

CAUTION

- Make sure to support the trailing arm with a garage jack. Never apply the jack to the bracket section below the rear shock absorber or the torsion beam section.
- When using a garage jack, interpose a cloth or the like so as not to scratch the affected surface.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

▲ 1 a Absorber, shock, rear
▼ ▲ 2 b Spring, coil, rear
3 c Seat, rear spring, upper
4 d Seat, rear coil spring, lower
5 e Bumper, rear spring

2-1-4 POINTS OF REMOVAL

(1) Spring, coil, rear

1.When the spring is removed, slowly lower the jack that is supporting the rear suspension arm Ay.

2-1-5 INSPECTION

(1) Absorber, shock, rear

1.Extend and compress the absorber. If any abnormality is present, replace the shock absorber.
SPECIFIED VALUE: When the shock absorber is compressed by hand, ensure that it can be compressed with a certain resistance, but without binding.
When you release your hand after compressing the shock absorber, ensure that it is extended at a constant speed by itself.

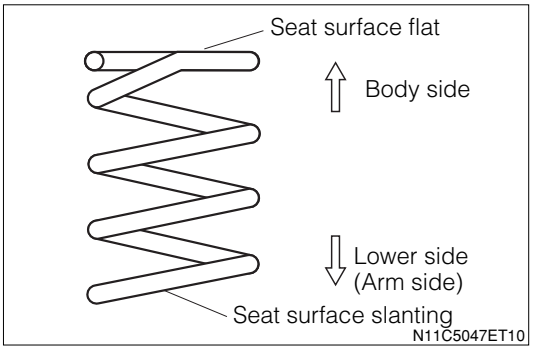
(2) Spring, coil, rear

1.Check the spring for cracks, wear and damage. If any damage is present, replace the spring.

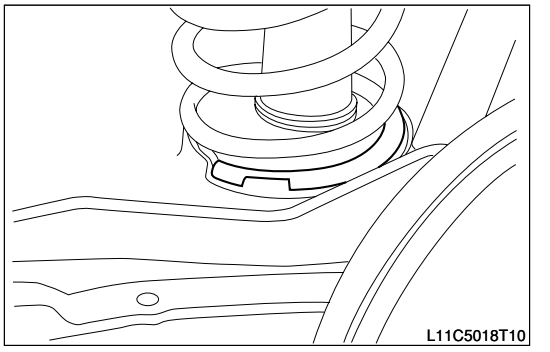
2-1-6 POINTS OF INSTALLATION

(1) Spring, coil, rear

1.Set the vertical direction of the springin to such a direction as shown in the right figure.



2.Align the lower edge section of the spring with the groove of the rear suspension arm Ay during the installation.



(2) Absorber, shock, rear

1.With the rear coil spring set to the specified position, slowly raise the jack supporting the rear suspension arm Ay.

2.Compress the rear coil spring and raise the rear suspension arm Ay up to a point where the shock absorber can be installed. Then, install the shock absorber.

2-1-7 OPERATION AFTER INSTALLATION

1.Remove the garage jack.

2.Install the disc wheels. (Rear)

Refer to Page C3-3.

3.Jack down the vehicle. Rock the vehicle up and down several times so as to settle down the suspensions.

4.Under a condition where the vehicle weight is applied, tighten the attaching bolts and nuts of the rear shock absorber to the specified torque.

3 REAR SUSPENSION ARM

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

3-1-2 OPERATION BEFORE REMOVAL

1.Lift up the vehicle.
2.Remove the disc wheels. (Rear)
Refer to Page C3-3.

3.Remove the rear stabilizer bar. (Rear stabilizer bar equipped vehicles)
Refer to Page C2-8.

4.Remove the rear shock absorber and rear coil spring.
Refer to Page C2-2.

5.Remove the flexible hose from the rear suspension arm Ay.
Refer to Page E1-46.

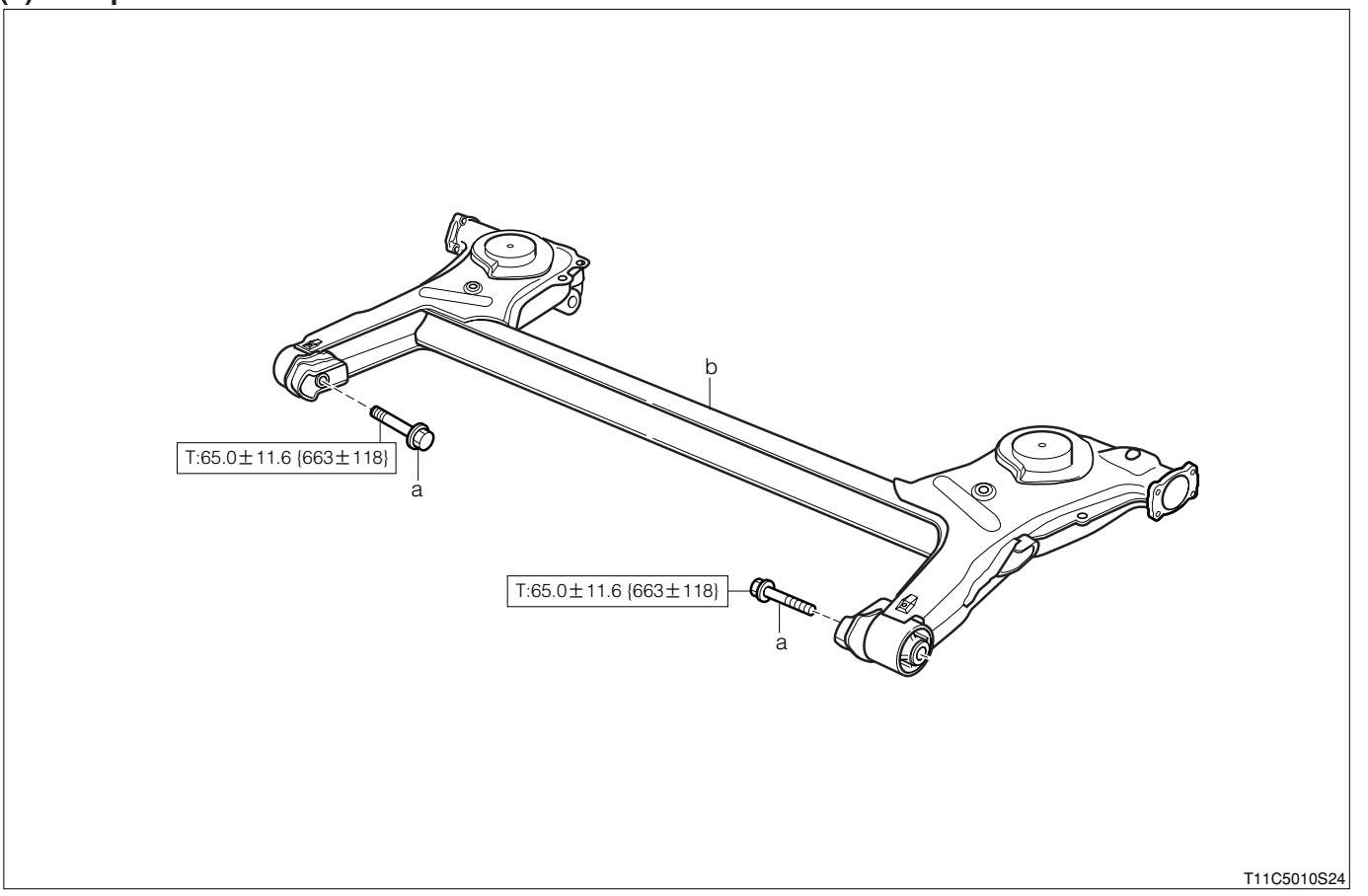
6.Remove the rear brake Ay.
Refer to Page E1-65.

7.Remove the RH/LH speed sensor wires from the rear suspension arm Ay. (ABS-equipped vehicles)
Refer to Page E3-6.

8.Remove No.2/No.3 parking brake cable Ay from the rear suspension arm Ay.
Refer to Page E2-2.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Shaft, rear suspension lower arm, No.1
▲ 2 b Arm Ay, rear suspension

3-1-4 POINTS OF INSTALLATION

(1) Arm Ay, rear suspension

1.Temporarily tighten the arm Ay with a bolt and a nut.

3-1-5 OPERATION AFTER INSTALLATION

1. Install the No.2/No.3 parking brake cable Ay to the rear suspension arm Ay.
   Refer to Page E2-2.

2. Install the RH/LH speed sensor wires to the rear suspension arm Ay. (ABS-equipped vehicles)
   Refer to Page E3-6.

3. Install the rear brake Ay.
   Refer to Page E1-65.

4. Install the flexible hose to the rear suspension arm Ay.
   Refer to Page E1-46.

5. Install the rear shock absorber and rear coil spring.
   Refer to Page C2-2.

6. Install the rear stabilizer bar. (Rear stabilizer bar equipped vehicles)
   Refer to Page C2-8.

7. Install the disc wheels. (Rear)
   Refer to Page C3-3.

8. Lift down the vehicle. Rock the vehicle up and down several times so that the suspensions may be settled.
9. Under a condition where the vehicle weight is applied, tighten the attaching bolts and nuts of the rear suspension arm Ay and rear shock absorber to the specified torque.

4 REAR STABILIZER BAR

4-1 REMOVAL AND INSTALLATION

4-1-1 ARTICLES TO BE PREPARED

Instrument

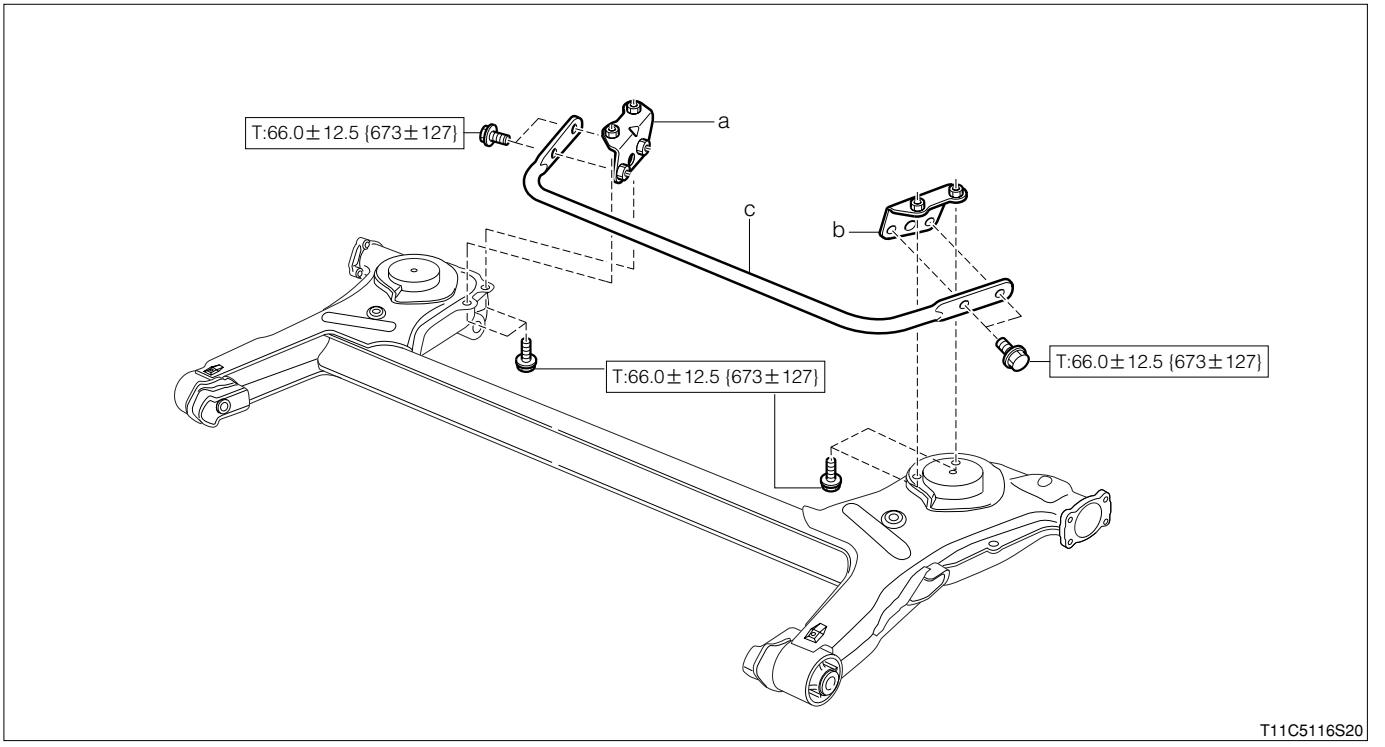
Torque wrench

4-1-2 OPERATION BEFORE REMOVAL

1.Lift up the vehicle.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Bracket, stabilizer, RH
2 b Bracket, stabilizer, LH
▲ 3 c Bar, stabilizer, rear

4-1-4 POINTS OF INSTALLATION

(1) Bar,stabilizer,rear

1.Install the RH/LH stabilizer bracket to the bar.
2.Install the bar to the rear suspension arm Ay.

4-1-5 OPERATION AFTER INSTALLATION

1.Lift down the vehicle.

TO INDEX

C3 WHEEL & TIRE

WHEEL & TIRE SYSTEM ---------- C3 - 1
BASIC CHECK AND ADJUSTMENT -- C3 - 1
WHEEL & TIRE---------- C3 - 3
REMOVAL AND INSTALLATION ------- C3 - 3

1 WHEEL & TIRE SYSTEM

1-1 BASIC CHECK AND ADJUSTMENT

1-1-1 TIRE CONDITIONS

(1) Articles to be prepared

Instrument

Tire pressure gauge,

(2) Check of air inflation pressure

1.Remove the valve cap.

2.Check to see if the tire air inflation pressure is the specified value, using a tire pressure gauge. Also, check the spare tire, too.

SPECIFIED VALUE:

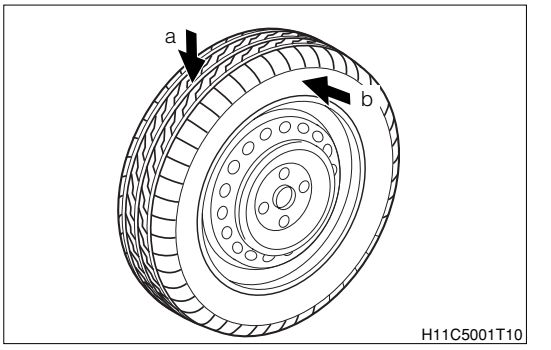
TIRE SIZE	Air inflation pressure [kPa{kgf/cm^2}]	
	Front wheel	Rear wheel
155/80R13 79S	220{2.2}	
175/65R14 82S	220{2.2}	
175/65R14 82T	220{2.2}	
T115/70D14	420{4.2}	

3.After the air pressure check, ensure that there is no air leakage from the tire valve.

(3) Check of cracks and damage

1.Jack up the vehicle.

2.Visually check the tread section (a) and side wall section (b) over all the peripheries to see if any cracks or damage is present.



(4) Check of metal piece or foreign matter

1.Visually check the tread section (a) and side wall section (b) over all the peripheries to see if any metal piece, gravel or other foreign matter is stuck or caught in.

(5) Check of abnormal wear

1.Visually check to see if any uneven wear or stepped wear or other abnormal wear is present.

CAUTION

- If there is abnormal wear, check the wheel balance and front wheel alignment.

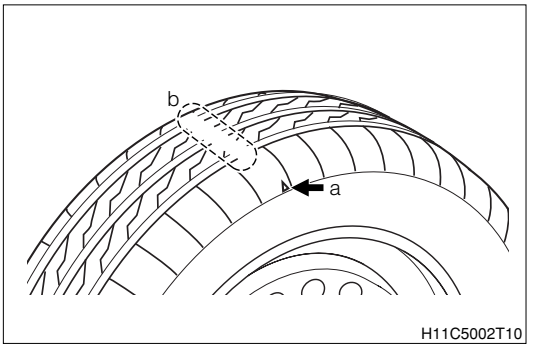
(6) Check the groove depth

1.Check the groove depth, using a depth gauge or the like.

SPECIFIED VALUE: 1.6 mm or more

NOTE

- When the depth of the remaining groove becomes less than 1.6 mm, a slip sign (b) will appear on the extended line of the triangle mark (a) on the side wall section.

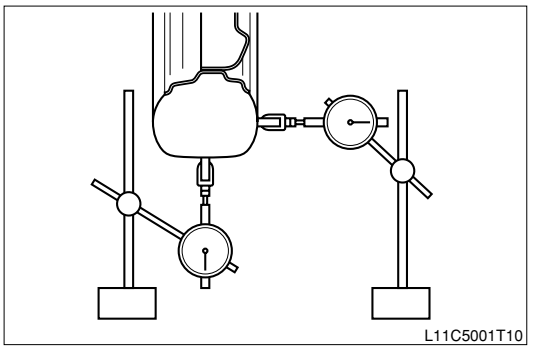


(7) Check of tires for runout

1.Jack up the vehicle.

2.Check the tire for runout, using a dial gauge.

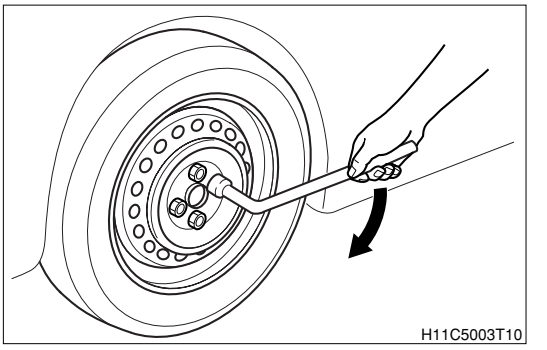
ALLOWABLE LIMIT: 1.4mm (Vertical runout)
2.0mm (Lateral runout)



1-1-2 DISC WHEEL

(1) Check the hub nuts for looseness

1.Check the hub nuts for looseness, using a wheel nut wrench, etc.



(2) Check of disc wheel for damage

1.Jack up the vehicle.

2.Visually check the disc wheel to see if any corrosion, deformation, cracks or runout is present.

2 WHEEL & TIRE

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Instrument

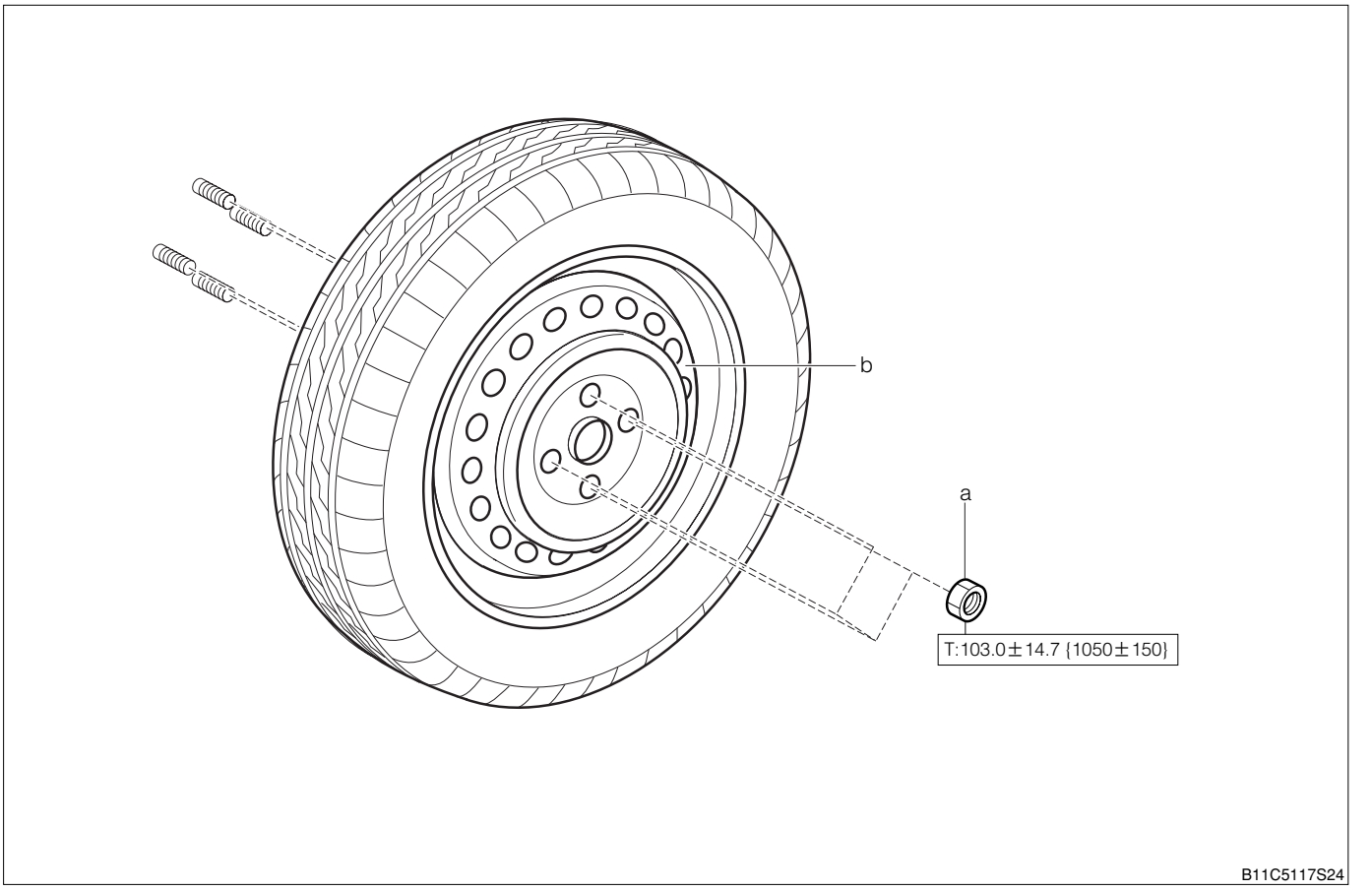
Torque wrench

2-1-2 OPERATION BEFORE REMOVAL

1.Remove the wheel cap S/A. (Wheel cap S/A mounted vehicles)
2.Jack up the vehicle.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Nut, hub
2 b Wheel, disc

2-1-4 OPERATION AFTER INSTALLATION

1.Jack down the vehicle.
2.Install the wheel cap S/A. (Wheel cap S/A mounted vehicles)

D2 DRIVE SHAFT/PROPELLER SHAFT/AXLE

AXLE SYSTEM ---------- D2 - 1
BASIC CHECK AND ADJUSTMENT -- D2 - 1
FRONT AXLE ---------- D2 - 2
REMOVAL AND INSTALLATION ------- D2 - 2
FRONT DRIVE SHAFT ---------- D2 - 8
REMOVAL AND INSTALLATION ------- D2 - 8
DISASSEMBLING AND ASSEMBLING ---------- D2 - 12
REAR AXLE BEARING (2WD) --------- D2 - 17
REMOVAL AND INSTALLATION(VEHICLES NOT EQUIPPED WITH ABS) ---------- D2 - 17
REMOVAL AND INSTALLATION(ABS-EQUIPPED VEHICLES) ---------- D2 - 17

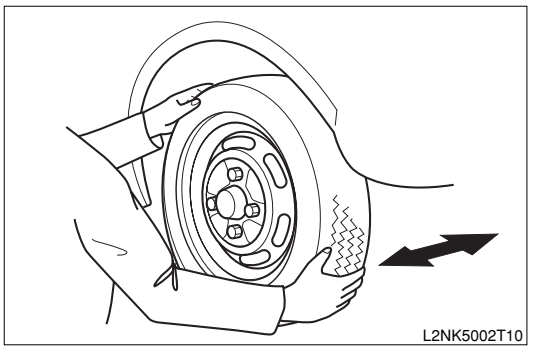
1 AXLE SYSTEM

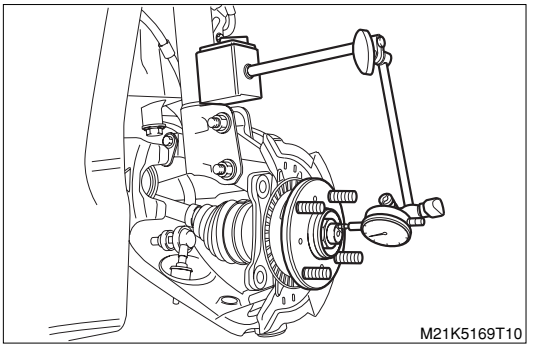
1-1 BASIC CHECK AND ADJUSTMENT

1-1-1 CHECK OF WHEEL BEARING FOR EXCESSIVE PLAY

(1) Check of wheel bearing for excessive play

1. Move the tire by holding the tire at the upper and lower parts by hands. Check to see if the wheel bearing has excessive play.
   If there is excessive play, perform the check again while depressing the brake pedal and confirm whether it is excessive play of the wheel bearing or not.
2. Turn the wheel and check to see if abnormal noise is emitted.
3. If necessary, set a dial gauge at the circumference of the forward end of the drive shaft and check for excessive play in the bearing axial direction.
   If the allowable limit is exceeded, replace the axle hub and radial ball bearing.
   ALLOWABLE LIMIT: 0.05mm





(2) Check of boot for cracks and damage

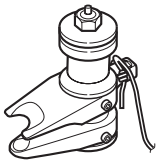
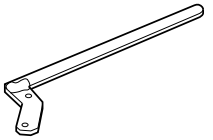
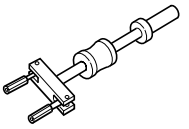
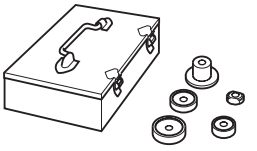
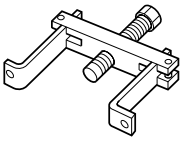
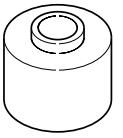
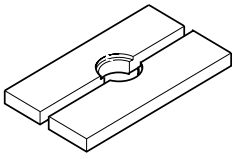
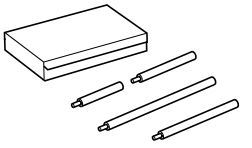
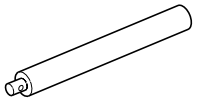
1. Visually check the boot of the universal joint section of the drive shaft for any cracks or damage.
2. Visually check to see if any boot rupture or boot band looseness is present.

2 FRONT AXLE

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09628-00011-000 (09611-87701-000)	Puller,tie-rod end
	09511-87202-000	Wrench rear axle bearing lock nut
	09520-00031-000 (09520-00030-000)	Puller,rear axle shaft
	09550-10013-000 (09550-10012-000)	set,replacer B
	09950-97201-000 (09950-20017-000)	Puller,universal
	09510-87301-000	Puller,axle shaft
	09506-87301-000	Replacer,differential drive pinion bearing corn,rear
	09527-87301-000	Remover,rear axle shaft bearing
	09950-70010-000	Set,handle
	09951-07200-000 (09631-00020-000)	Handle

Tool

Snap ring pliers

Instrument

Dial gauge,Torque wrench

2-1-2 OPERATION BEFORE REMOVAL

1.Lift up the vehicle.
2.Remove the front wheel.
3.Remove the front wheel speed sensor.(ABS equipped vehicles)
Refer to Page E3-4.

4.Remove the front disc brake caliper assembly and hang it, using a wire or the like.
Refer to Page E1-53.

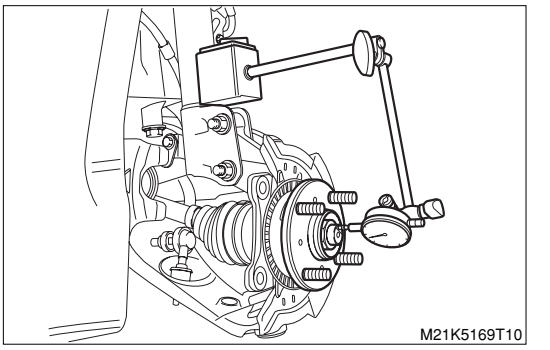
CAUTION
- Be very careful not to damage the flexible hose.

5.Remove the brake disc.

2-1-3 INSPECTION

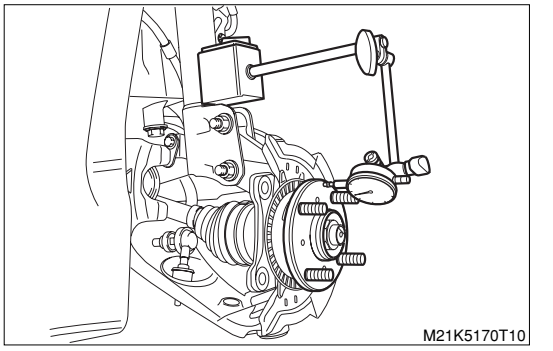
(1) Check of bearing for axial play

1.Set a dial gauge to a point on the periphery at the tip-end of the drive shaft. Check the bearing for axial play.
If the play exceeds the limit, replace the axle hub and radial ball bearing.
ALLOWABLE LIMIT: 0.05mm



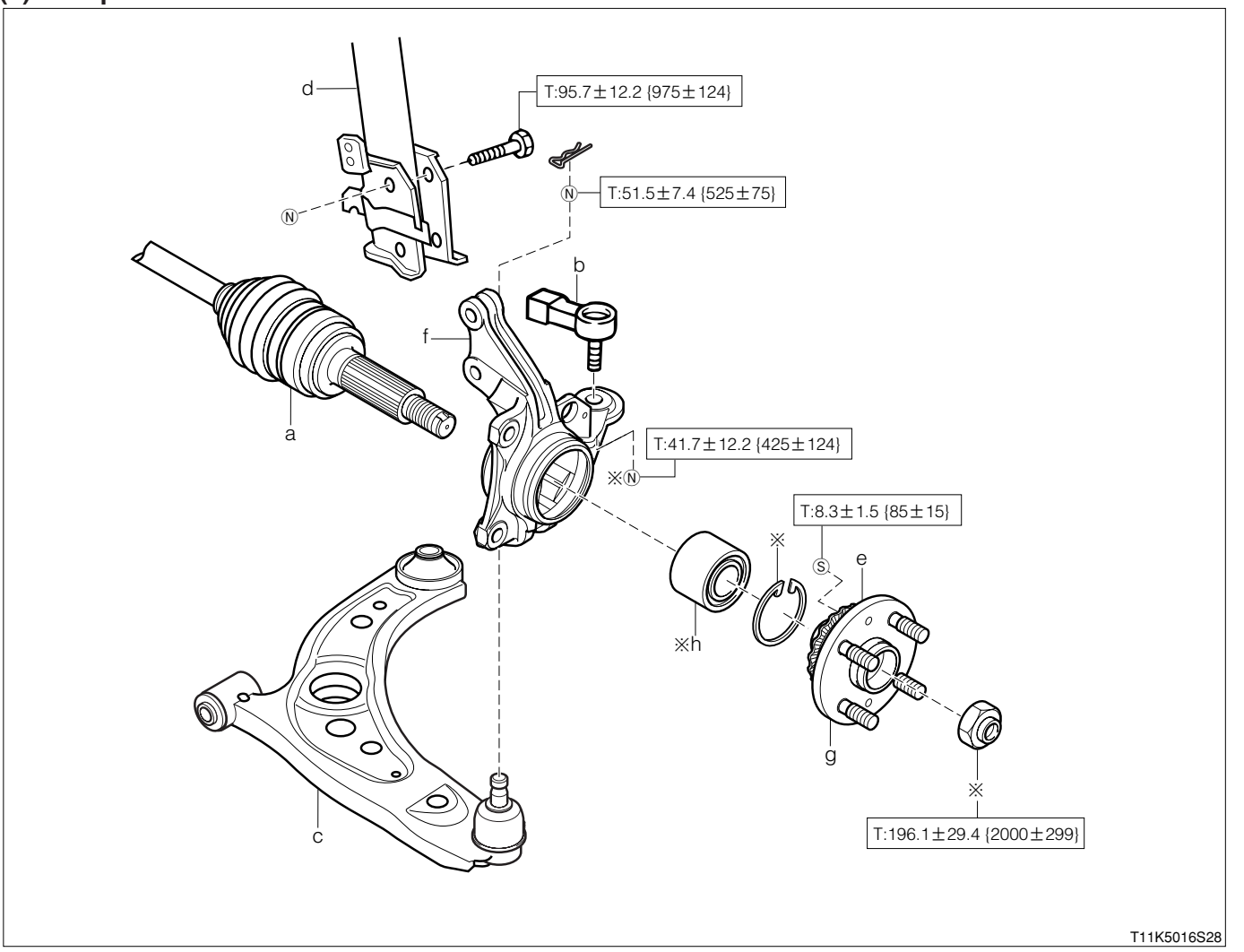
(2) Check of front axle runout

1.Set a dial gauge to the outer periphery of the axle hub. Turn the axle hub to check the runout.
If the runout exceeds the limit, replace the axle hub and radial ball bearing.
ALLOWABLE LIMIT: 0.05mm



2-1-4 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts

Unit:N·m{kgf·cm}

(2) Removal and installation procedures

- ▼ ▲ 1 a Shaft Ay, front drive,RH/LH
- ▼ 2 b End S/A, tie rod,RH/LH
- ▼ ▲ 3 c Arm S/A, suspension lower W/bush,RH/LH
- ▼ 4 a Shaft Ay, front drive,RH/LH
- 5 d Absorber Ay, shock front,RH/LH
- ▼ 6 e Hub S/A, front axle
- 7 f Knuckle, steering,RH/LH
- 8 g Rotor, skid control, sensor front
- ▼ ▲ 9 h Bearing, Radial ball

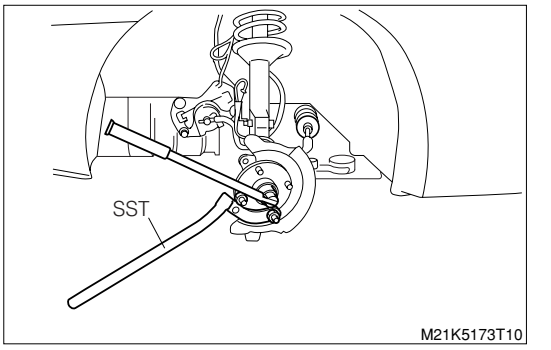
2-1-5 POINTS OF REMOVAL

(1) Shaft Ay, front drive,RH/LH

1.Remove the nut.

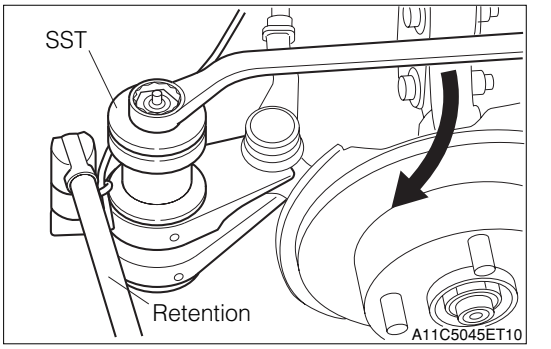
(1) Release the staked portion, using a chisel or the like.

(2) Remove the nut, using the SST.
SST: 09511-87202-000



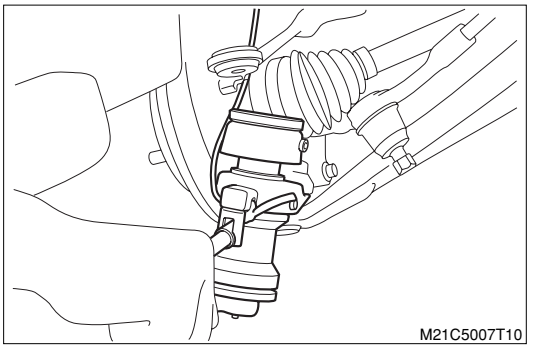
(2) End S/A, tie rod,RH/LH

1.Separate the RH/LH steering knuckles from the end S/A, using the SST.
(1) Suspend the SST with a rope.
(2) Install a dummy nut to the threaded section of the end S/A. Set the SST and remove the end S/A.
SST: 09628-00011-000



(3) Arm S/A, suspension lower W/bush,RH/LH

1.Remove the ball joint section of the arm S/A, using the SST.
(1) Suspend the SST with a rope.
(2) Install a dummy nut to the threaded section of the arm S/A. Set the SST and remove the arm S/A.
SST: 09628-00011-000

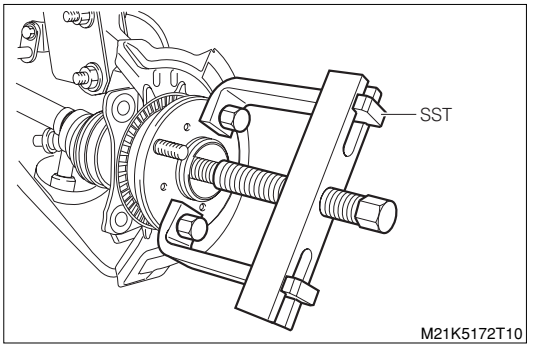


(4) Shaft Ay, front drive,RH/LH

1.Separate the shaft Ay from the front axle hub S/A and RH/LH steering knuckle, using the SST.
SST: 09510-87301-000

CAUTION

- Hang the drive shaft by means of wire or the like.



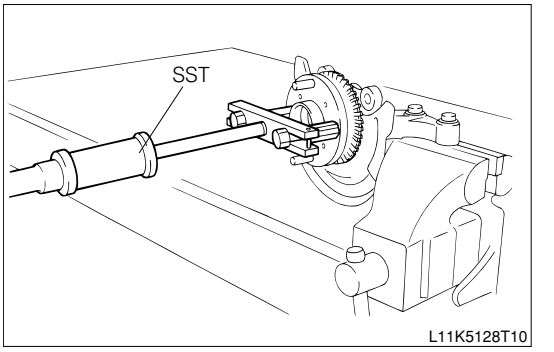
(5) Hub S/A, front axle

1.Remove the hub S/A and RH/LH steering knuckle from the RH/LH front shock absorber Ay.
2.Remove the front axle hub S/A.
(1) Secure the hub S/A and RH/LH steering knuckle in a vice, using the bolts that retain the RH/LH steering knuckles in the RH/LH front shock absorber Ay.

(2) Remove the hub S/A from the RH/LH steering knuckle, using the SST.

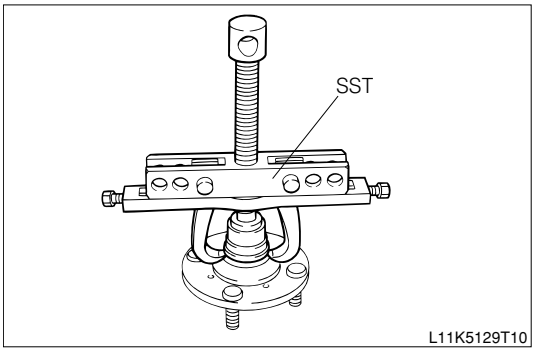
SST: 09520-00031-000

(3) Remove the skid control sensor rotor.(ABS-equipped vehicles)



(4) Remove the radial ball bearing inner race, using the SST.

SST: 09950-97201-000

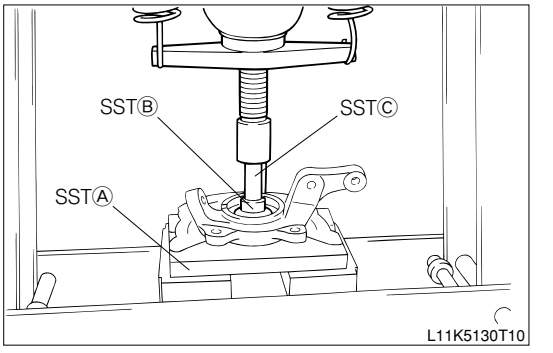


(6) Bearing, radial ball

1.Detach the hole snap ring, using a snap ring expander.

2.Remove the bearing, using the SST in combination with a press.

SST: 09527-87301-000(Ⓐ)
09554-10011-000 [09554-10011-000](Ⓑ)
09951-07200-000 [09951-07200-000](Ⓒ)



2-1-6 POINTS OF INSTALLATION

(1) Bearing, radial ball

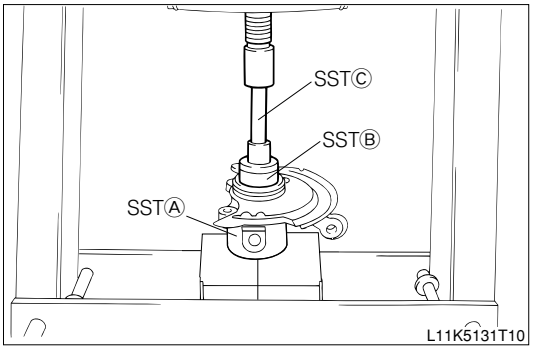
1.Press the radial ball bearing to the steering knuckle S/A, using the SST in combination with a press. Install the hole snap ring.

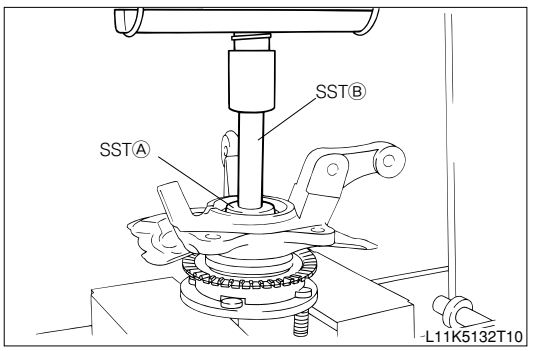
SST: 09506-87301-000(Ⓐ)
09554-10011-000 [09554-10011-000](Ⓑ)
09951-07200-000 [09951-07200-000](Ⓒ)

2.Install the skid control sensor rotor.(ABS-equipped vehicles)

3.Press the front axle hub S/A into the steering knuckle, using the SST in combination with a press.

SST: 09556-10011-000 [09556-10011-000](Ⓐ)
09951-07200-000 [09551-07200-000](Ⓑ)





(2) Arm S/A, suspension lower W/bush,RH/LH

1.Install the RH/LH steering knuckle to the arm S/A.

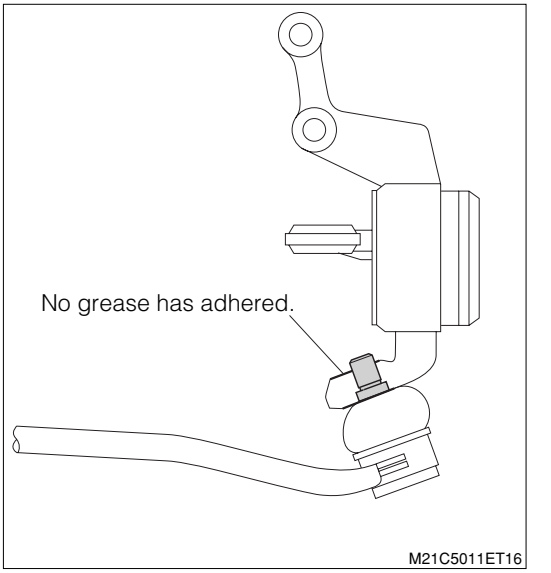
CAUTION

- During the assembly, ensure that no lubricant, such as grease, is adhered to the threaded portion, tapered section, and RH/LH steering knuckle installation sections of the ball stud of the arm S/A. If any lubricant is adhered, be certain to wipe it off.

2.Install the front axle hub S/A and RH/LH steering knuckle to the shock absrober, while inserting the RH/LH front drive shaft Ay.

CAUTION

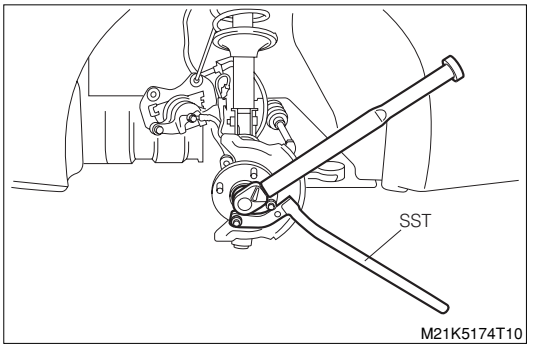
- Do not pull out the drive shaft beyond the required extent.



(3) ShaftAy, front drive,RH/LH

1.Install the nut.

(1) Tighten the nut to the specified torque, using the SST.
SST: 09511-87202-000



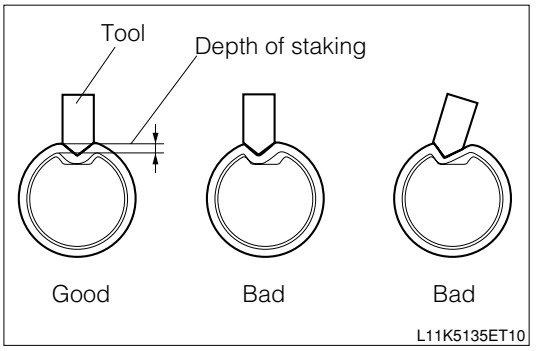
(2) Using a chisel, firmly stake the tip-end of the front drive shaft and nut, as indicated in the right figure.

CAUTION

- Ensure that the staked section of the nut and the threaded portion of the shaft Ay exhibit no crack. (Peeling off of the plating of the nut is permissible.)

NOTE

- The staking should be carried out in the center direction of the shaft Ay. The staking depth must be $3.5^{+1.5}_{-0.5}$ mm



2-1-7 OPERATION AFTER INSTALLATION

1.Install the brake disc.

2.Install the front disc brake caliper assembly.
Refer to Page E1-53.

3.Install the front wheel speed sensor.(ABS-equipped vehicles)
Refer to Page E3-4.

4.Install the front wheel.
TIGHTENING TORQUE: 103.0±14.7N·m {1050±150kgf·cm}

5.Check the front alignment.
Refer to Page C1-1.

6.Lift down the vehicle.

3 FRONT DRIVE SHAFT

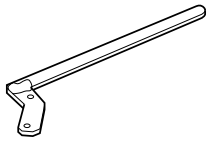
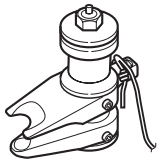
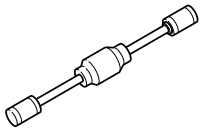
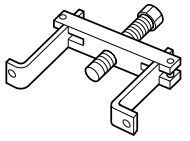
3-1 REMOVAL AND INSTALLATION

WARNING

- Do not carry out the operation while the exhaust pipe is still hot, for there is a pssibility of getting scalded.

3-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09511-87202-000	Wrench rear axle bearing lock nut
	09628-00011-000 (09611-87701-000)	Puller,tie-rod end
	09912-87301-000	Puller,slide hammer
	09510-87301-000	Puller,axle shaft

Instrument

Torque wrench

Lubricant,adhesive,others

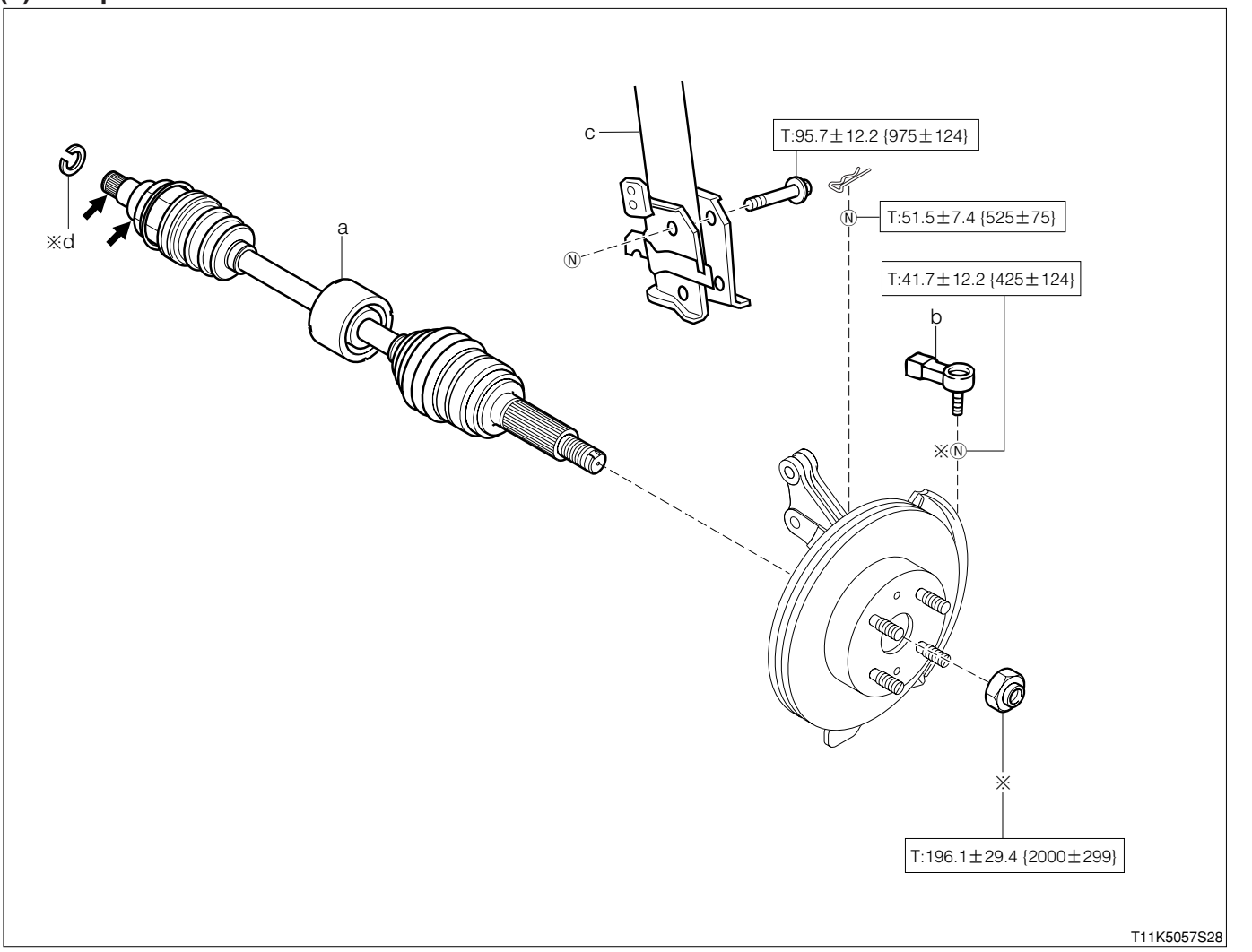
MP grease,ATF Dexron®Ⅲ,Transmission gear oil SAE75W－90 or SAE75W－85 or SAE75W－80 (API Classification GL3 or GL4)

3-1-2 OPERATION BEFORE REMOVAL

1.Lift up the vehicle.
2.Remove the front wheel.
3.Drian the transaxle oil.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



➡: MP grease
※: Non-reusable parts
Unit: N·m{kgf·cm}

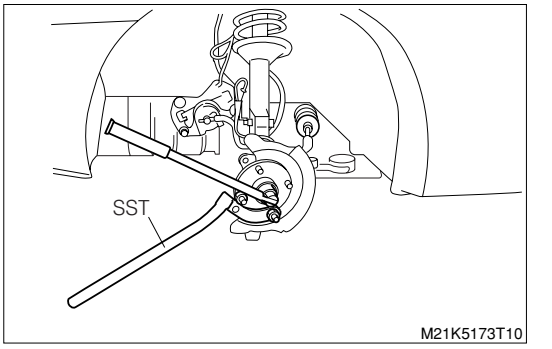
(2) Removal and installation procedures

▼ ▲ 1 a Shaft Ay, front drive,RH/LH
▼ 2 b End S/A, tie rod,RH/LH
3 c Absorber Ay, shock front,RH/LH
▼ ▲ 4 a Shaft Ay, front drive,RH/LH
5 d Ring, shaft snap

3-1-4 POINTS OF REMOVAL

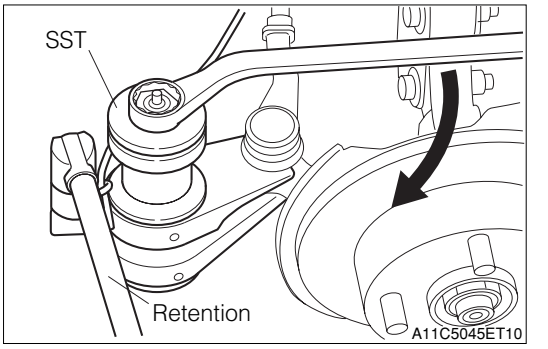
(1) Shaft Ay, front drive,RH/LH

1.Remove the lock nut.
(1) Release the staked portion, using a chisel or the like.
(2) Remove the nut by using the SST to prevent turning.
SST: 09511-87202-000



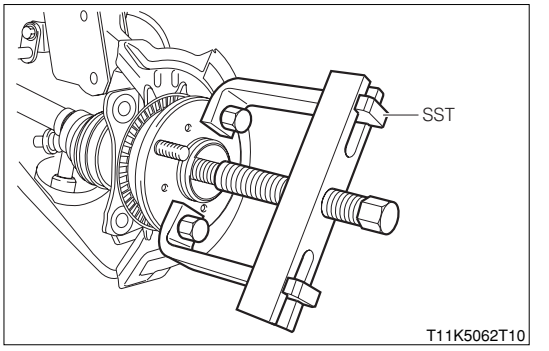
(2) End S/A, tie rod,RH/LH

1.Remove the end S/A from the RH/LH steering knuckles, using the SST.
(1) Suspend the SST with a rope.
(2) Install a dummy nut to the threaded section of the end S/A. Set the SST and remove the end S/A.
SST: 09628-00011-000

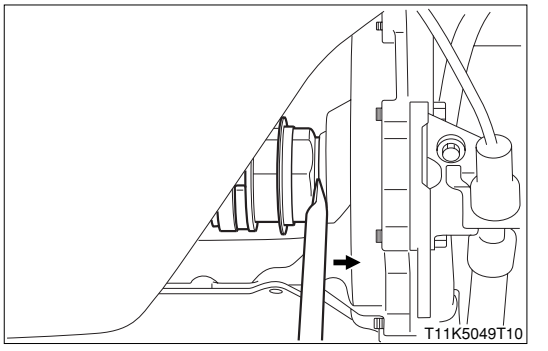


(3) Shaft Ay, front drive,RH/LH

1.Separate the shaft Ay from the RH/LH steering knuckles, using the SST.
SST: 09510-87301-000



2.Turn over the dust cover, while paying attention not to scratch the dust cover. Remove the shaft Ay by applying the arrow edge of the hub nut wrench to the edge surface of the shaft Ay.



3-1-5 INSPECTION

Check the boot for brekage or damage. Replace any faulty part.

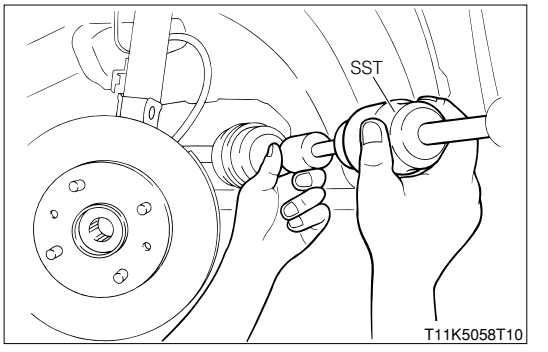
3-1-6 POINTS OF INSTALLATION

(1) Shaft Ay, front drive,RH/LH

1.Insert the front drive shaft assembly to the differential carrier assembly, using the SST.
SST: 09912-87301-000

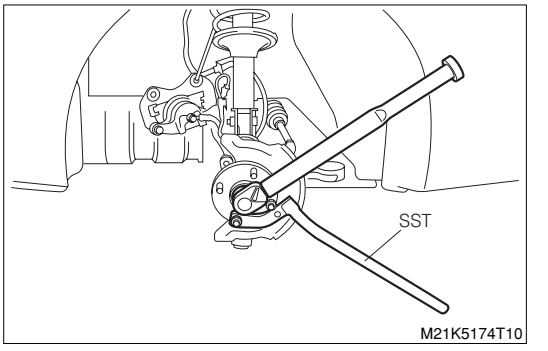
CAUTION

- The insertion should be carried out in such a way that the lip section of the oil seal may not be damaged.
- Apply MP grease to the oil seal contact surface of the shaft Ay and its serration section.

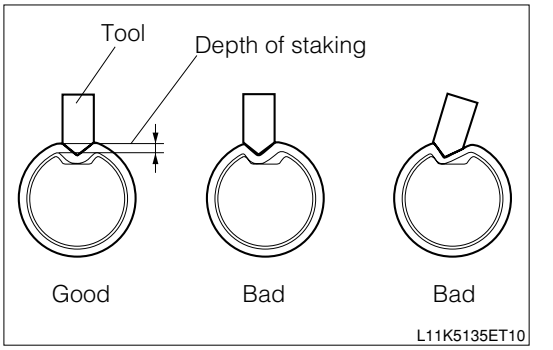


(2) Shaft Ay, front drive,RH/LH

1.Install the nut.
(1) Tighten the nut to the specified torque, using the SST.
SST: 09511-87202-000



(2) Using a chisel, firmly stake the tip-end of the front drive shaft and nut, as indicated in the right figure.



CAUTION

- Ensure that the staked section of the nut and the threaded portion of the shaft Ay exhibit no crack. (Peeling off of the plating of the nut is permissible.)

NOTE

- The staking should be carried out in the center direction of the shaft Ay. The staking depth must be $3.5^{+1.5}_{-0.5}$ mm

3-1-7 OPERATION AFTER INSTALLATION

1.Fill transaxle fluid.

(1) M/T vehicle

Refer to Page F2-1.

(2) A/T vehicle

Refer to Page F3-1.

2.Install the front wheel.

TIGHTENING TORQUE: 103.0±14.7N·m {1050±150kgf·cm}

3.Lift down the vehicle.

4.Check and adjust the front wheel alignment.

Refer to Page C1-1.

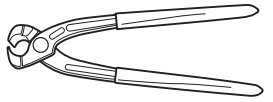
3-2 DISASSEMBLING AND ASSEMBLING

3-2-1 ARTICLES TO BE PREPARED

Tool

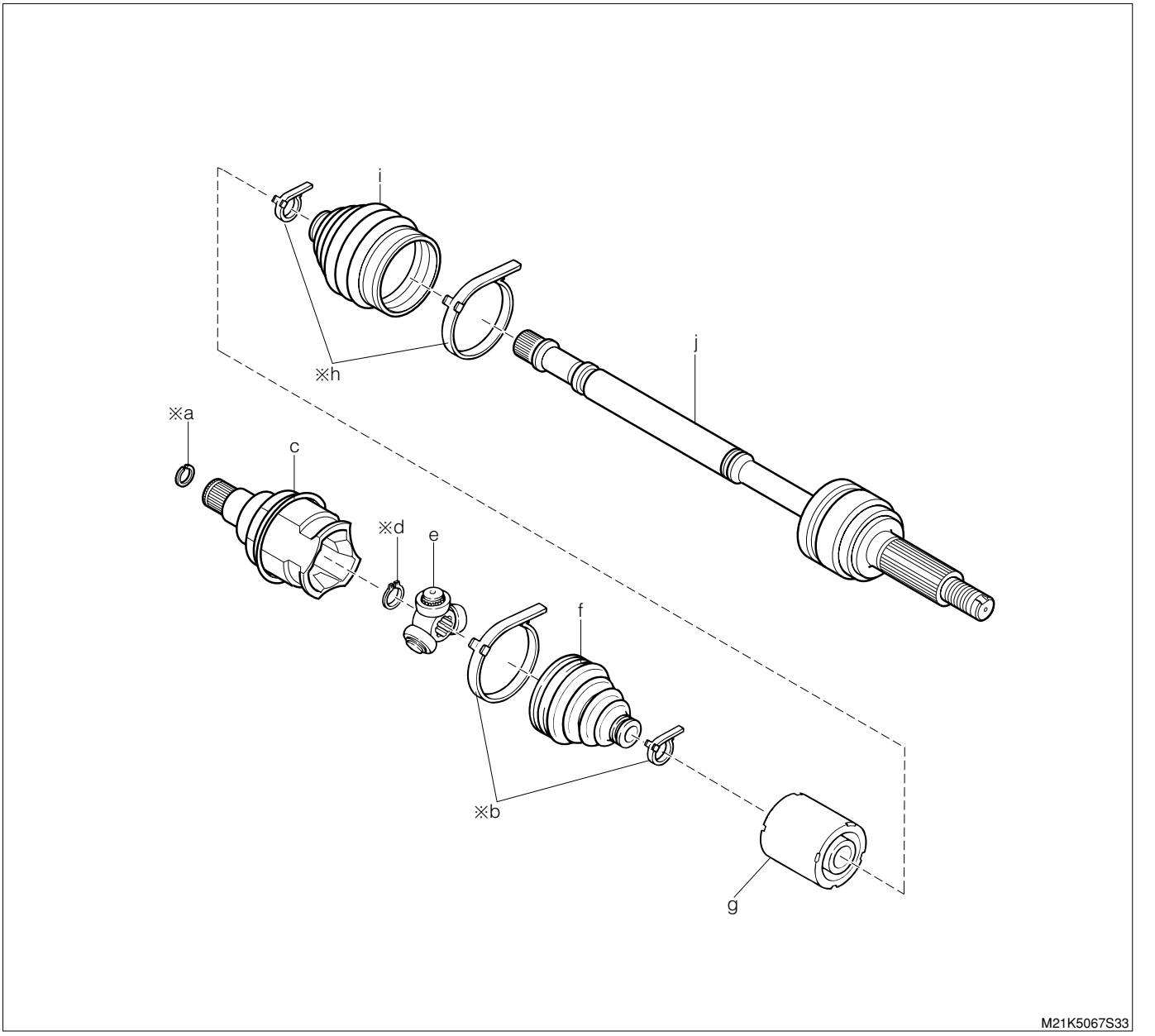
Snap ring expander

SST

Shape	Part No.	Part name
	09648-97202-000	pliers B,drive shaft boots band

3-2-2 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Components



※:Non - reusable parts

(2) Disassembling and assembling procedure

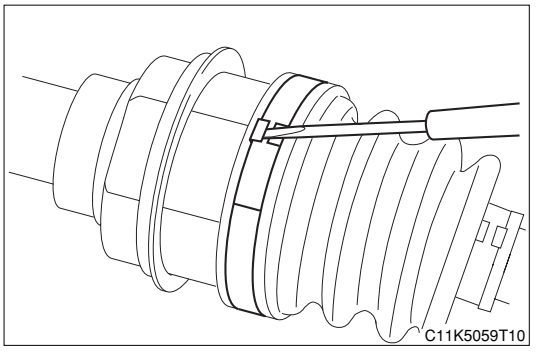
	1	a	Ring, shaft snap
	2	b	Clamp, rear drive shaft boot
▼ ▲	3	c	Joint S/A, front axle inboard
	4	d	Ring, drive shaft snap
▼ ▲	5	e	Tripod Ay, Inboard joint
▼	6	f	Boot, front axle inboard joint
▼ ▲	7	g	Damper, drive shaft
	8	h	Clamp, Rear drive shaft boot
▼ ▲	9	i	Boot, front axle outboard joint
	10	j	Shaft,front axle,RH/LH

3-2-3 POINTS OF DISASSEMBLY

(1) Joint S/A, front axle inboard

1.Remove the rear drive shaft boot clamp (At the inboard side).

(1) Using a flat screwdriver, release the locking at the bent section of the boot band (At the inboard side).

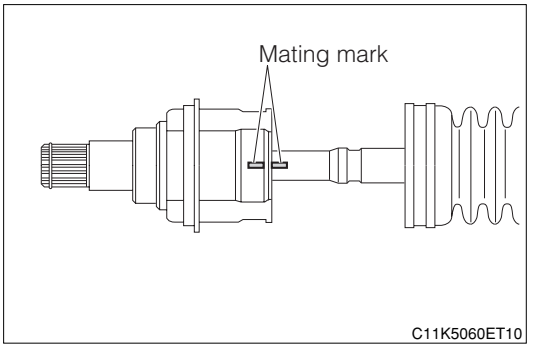


2.Displace the front axle inboard joint boot. Wipe off grease. Put mate marks on the joint S/A and RH/LH front axle shaft.

CAUTION

- As for the mate marks, use paint. (Do not use punching.

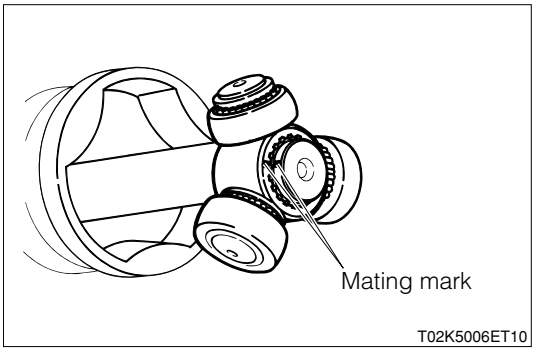
3.Remove the front axle inboard joint S/A



(2) Tripod Ay, Inboard joint

1.Remove the drive shaft snap ring, using a snap ring expander.
TOOL: Snap ring expander

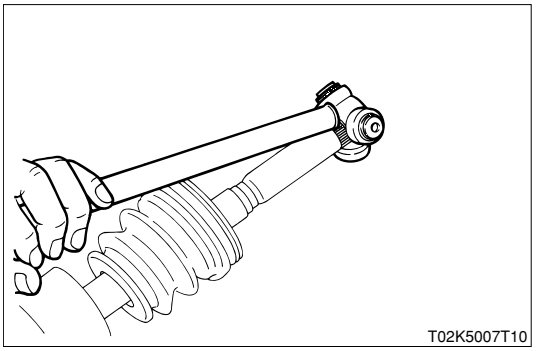
2.Put mating marks on the tripod Ay and RH/LH front axle shaft.



3.Remove the inboard joint tripod Ay, using a brass bar.

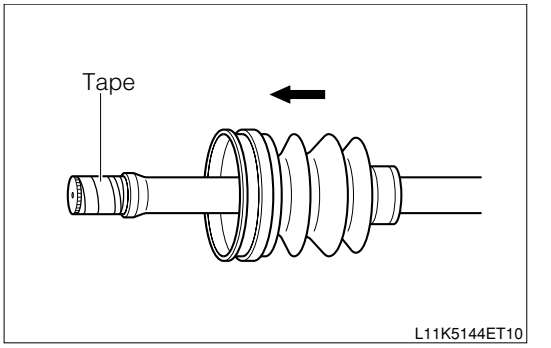
CAUTION

- Be sure to apply a brass bar to the boss section of the tripod, not at the roller section.


T02K5007T10

(3) Boot, front axle inboard joint

1.Wind a tape on the spline section at the inboard side. Remove the boot (At the inboard side).

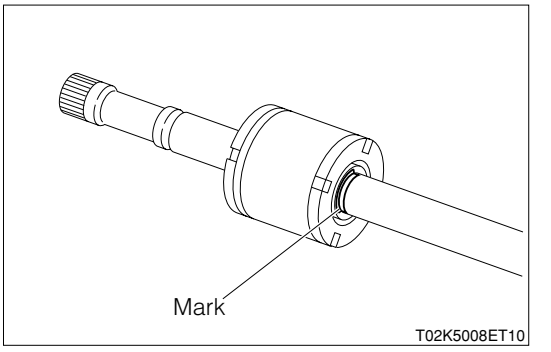


L11K5144ET10

(4) Damper, drive shaft

1.Put mate marks on the damper and drive shaft. (These mate marks are used as a guide during the press-fitting.)

2.Remove the damper, using a press.

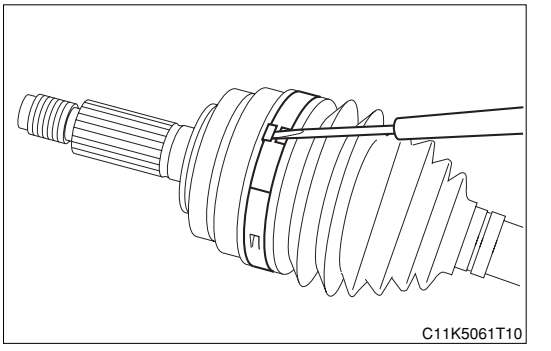


T02K5008ET10

(5) Boot, front axle outboard joint

1.Remove the boot band (At the outboard side).

(1) Using a flat screwdriver, release the locking at the bent section of the boot band (at the outboard side).


C11K5061T10

2.Remove the boot (At the outboard side).

3-2-4 POINTS OF ASSEMBLY

(1) Boot, front axle outboard joint

1. Assemble the boot (At the outboard side).

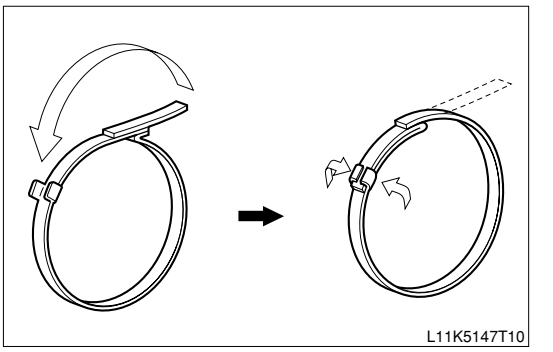
(1) Wind a tape on the spline section at the inboard side. .

(2) Fill the outboard joint section and the inside of the boot with the grease furnished in the boot set. Assemble the boot (At the outboard side).

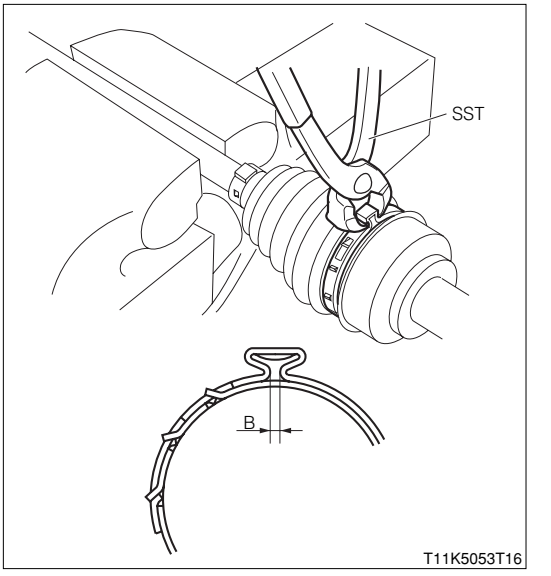
NOTE

- Filling amount: 1KR engine mounted vehicles: 70±10g
  K3 engine mounted vehicles: 95±10g

2.Assemble the rear drive shaft boot clamp by bending it in the sequence specified in the right figure.
(Type 1KR engine mounted vehicles)


L11K5147T10

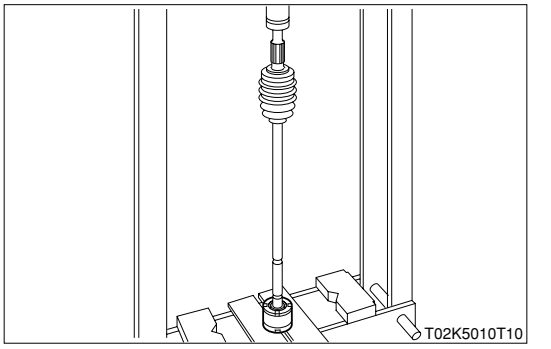
3.Positively stake the rear drive shaft boot clamp, using the SST.
(Type K3 engine mounted vehicles)
SST: 09648-97202-000
NOTE
- Dimensions B 1.0 - 4.0mm



T11K5053T16

(2) Damper, drive shaft

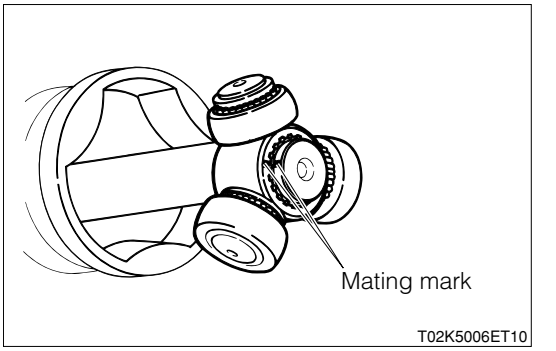
1.The press-fitting should be made up to the mark position that was put during the disassembly.
CAUTION
- The press-fitting should be with the joint section in a straight condition.


T02K5010T10

(3) Tripod Ay, inboard joint

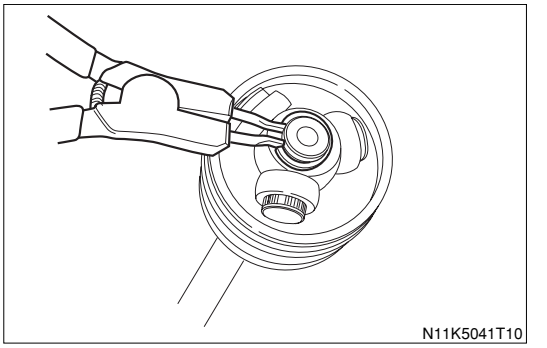
1.Assemble the front axle inboard joint boot and rear drive shaft boot clamp to the RH/LH front axle shafts.

2.Assemble the tripod Ay, aligning with the mating marks on the RH/LH front axle shaft.
CAUTION
- Assemble the tripod Ay to the RH/LH front axle shaft from the chamfered side of the spline.
- When the brass bar is used for driving, be sure to apply the brass bar to the boss section of the tripod, not to the roller section.



T02K5006ET10

3.Install the drive shaft snap ring, using a snap ring expander.
TOOL: Snap ring expander

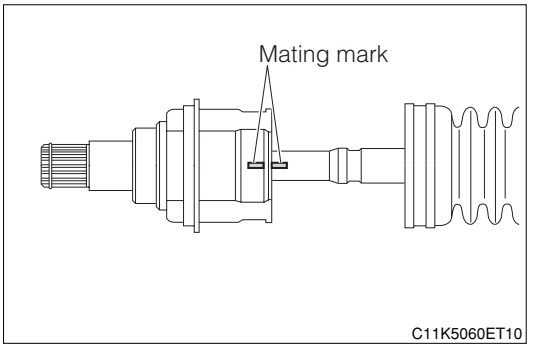

N11K5041T10

(4) Joint S/A, front axle inboard

1.Fill the joint S/A with the grease furnished in the boot set. Assemble the joint S/A, aligning with the mate marks on the RH/LH front axle shafts. .

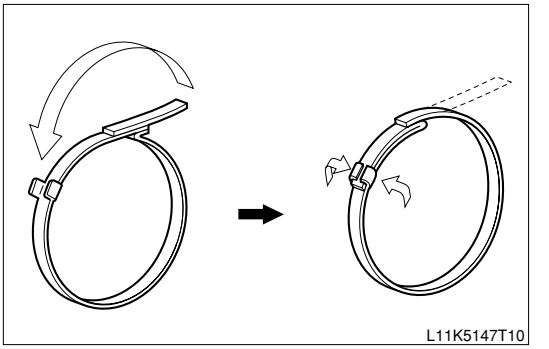
NOTE

- Filling amount:1KR engine mounted vehicles: 65±10g
  K3 engine mounted vehicles: 80±10g



C11K5060ET10

2.Bend and assemble the boot band, as indicated in the right figure.


L11K5147T10

4 REAR AXLE BEARING (2WD)

4-1 REMOVAL AND INSTALLATION (VEHICLES NOT EQUIPPED WITH ABS)

Refer to Page E1-65.

4-3 REMOVAL AND INSTALLATION (ABS-EQUIPPED VEHICLES)

Refer to Page E1-65.

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DISASSEMBLING AND ASSEMBLING ---------- E1 - 69

1 BRAKE

1-1 ARTICLES TO BE PREPARED

Instrument

Foot pressure gauge,Torque wrench

Lubricant,adhesive,others

Brake fluid(DOT3),Brake grease

1-2 BASIC CHECK AND ADJUSTMENT

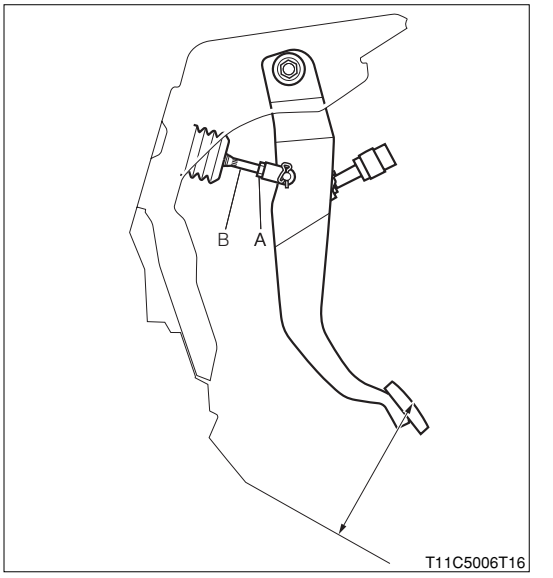
1-2-1 BRAKE PEDAL

(1) Height check

1.Turn over the carpet near the brake pedal.

2.Measure the height from the central section of the brake pedal depressing surface to the upper surface of the dash panel.

SPECIFIED VALUE: 135.7±5mm (RHD vehicles)
134.9±5mm (LHD vehicles)



(2) Height adjustment

1.Remove the instrument panel finish lower panel S/A.

2.Loosen the attaching bolt of the shift lock release cable. (Shift lock release cable Ay equipped vehicle)

3.Disconnect the connector of the stop lamp switch Ay.

4.Remove the stop lamp switch assembly by turning it counterclockwise so that the brake pedal may have a free play.

5.Loosen the nut (A) indicated in the figure. Adjust the brake pedal height by turning the push rod (B).

TIGHTENING TORQUE: 13.0±3.0N·m{133±30kgf·cm}

6.Adjust the installing position of the shift lock release cable Ay. (Shift lock release cable Ay equipped vehicle)

Refer to Page F3-37.

7.Lock the stop lamp switch assembly by turning the main body of the assembly clockwise. Confirm the protruding amount of the shaft of the stop lamp switch assembly.

SPECIFIED VALUE: 2 mm or less (A clearance shall be provided so that the screw end surface of the stop lamp switch assembly may not be brought into contact with the bracket cushion at the brake pedal side.)

8.Connect the connector of the stop lamp switch Ay.

9.Check the brake pedal play. Ensure that the stop lamp is illuminated.

10.Install the instrument panel finish lower panel S/A.

(3) Free play check

1.After stopping the engine, depress strongly the brake pedal several times so that the negative pressure inside the brake booster no longer exists.

2.Measure the play of the pedal (Excessive play between the clevis and the clevis pin) by pulling the brake pedal toward your side. (The stop lamp switch side)

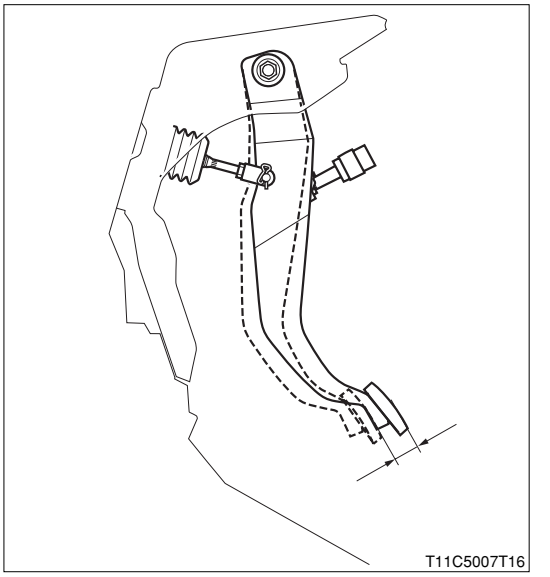
SPECIFIED VALUE: 0.5 - 3.0 mm

NOTE

- If the measured value is out of the specification, check and adjust the protruding amount of the stop lamp SW and that of the shift lock release cable lock mechanism. (If so equipped)

Refer to Page E1-16.

Refer to Page F3-37.



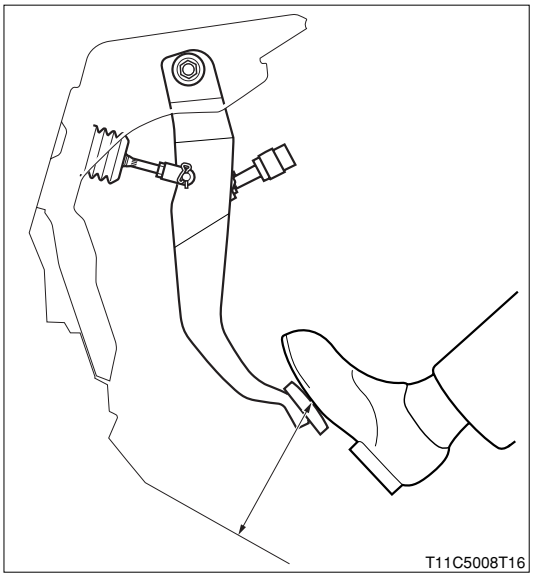
(4) Reserve travel check

1.Turn over the carpet near the brake pedal.

2.Release the parking brake while the engine is idling.

3.While the brake pedal is being depressed by the specified depressing force, measure the height from the central section of the brake pedal depressing surface to the upper surface of the dash panel.

SPECIFIED VALUE: 70 mm or more (Depressing force 294N {30kgf}) (RHD vehicles)
60 mm or more (Depressing force 294N {30kgf}) (LHD vehicles)



(5) Check of depressing state

1.Depress the brake pedal. Carry out the following checks.

(1) Ensure that there exists no ingress of air by checking the depression state.

(2) Ensure that there exists no abnormal noise due to looseness at the installing section's.

(3) Ensure that there exists no excessive play due to wear or looseness at the installing section.

(6) Brake working condition check

① Check through actual running

1.Run on dry road surface and depress the brake pedal. Ensure that you can get the braking force equivalent to the depressing force and the vehicle can stop straight in the advancing direction.

(7) Check of brake operation state

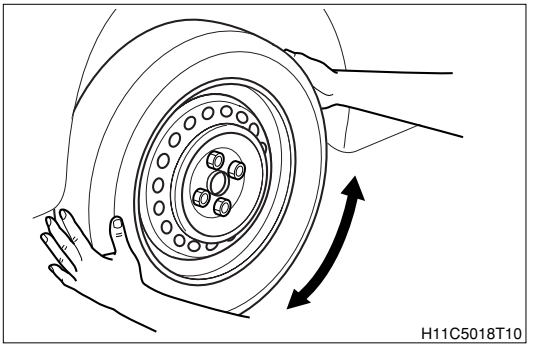
1.Ensure that the brake master cylinder, front brake calipers and rear wheel cylinder are operating correctly, based on the check results of the brake pedal free play, reserve travel and braking performance.

1-2-2 CHECK OF BRAKE DRAGGING

(1) Dragging check

1.Jack up the vehicle.

2.Operate the brake pedal and parking brake several times so as to stabilize the front brake pads and rear brake shoe linings. Then, turn the wheels by hand to see if the brake exhibits no dragging.



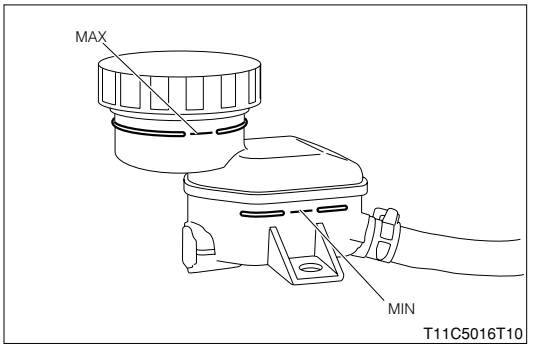
1-2-3 CHECK AND REPLENISHING OF BRAKE FLUID

CAUTION

- Never reuse the wiped-out brake fluid.
- Care must be exercised so that no brake fluid may adhere to the paint surface. If brake fluid is adhered to the paint surface, immediately wipe it out and wash it with water.

(1) Fluid level check

1.Check that the fluid level of the reservoir tank is within the specified range. (Between MIN and MAX)



(2) Replenishment

1.If the fluid level is below the MIN level, after the following check has been conducted, replenish brake fluid up to a level between MIN and MAX levels of the reservoir tank.

LUBRICANT: Brake fluid(DOT3)

(1) Brake pad thickness check

Refer to Page E1-5.

(2) Brake master cylinder fluid leakage check

Refer to Page E1-4.

(3) Check of brake hoses and pipes for fluid leakage

Refer to Page E1-5.

(4) Front brake caliper fluid leakage check

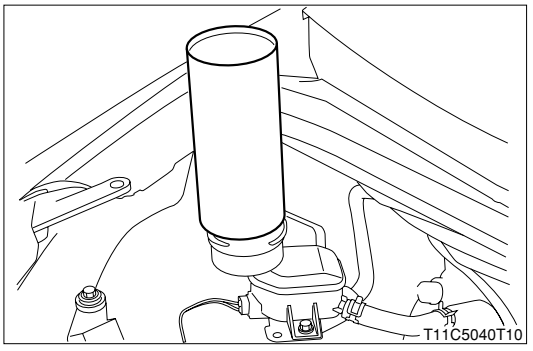
Refer to Page E1-5.

(5) Rear wheel cylinder fluid leakage check

Refer to Page E1-7.

(3) Air bleeding

1.Jack up the vehicle.
2.Remove the disc wheels.
3.Replenish the brake fluid by placing the container of brake fluid upside down on the reservoir tank.
LUBRICANT: Brake fluid(DOT3)



CAUTION

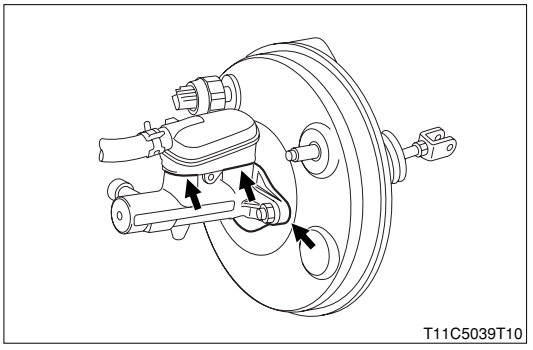
- Ensure that the container contains an adequate amount of brake fluid.
- When replenishing, ensure that the master cylinder reservoir at the upper section of the master cylinder Ay is filled with brake fluid fully. Then, proceed to the operation.
- To avoid any ingress of air, keep refilling the brake fluid at all times so that the reservoir tank may not become empty.

4.Install a transparent tube to the bleeder plug and receive the brake fluid in a container.
5.Depress the brake pedal several times.
6.Carry out air bleeding by loosening the bleeder plug with the brake pedal in the depressed state.
7.When the brake fluid stops coming out strongly, temporarily tighten the bleeder plug and return the brake pedal.
8.Repeat the operations posted in Items 5 through 7 until the air is no longer emitted.
9.Tighten the bleeder plug.
TIGHTENING TORQUE: 8.4±1.4N·m{85±14kgf·cm}
10.Carry out the operations posted in Items 4 through 9 for each wheel.
11.Check the fluid level of the reservoir tank.
Refer to Page E1-3.

1-2-4 CHECK OF EACH PART OF BRAKE MASTER CYLINDER

(1) Check of fluid leakage

1.Visually check around the reservoir tank to ensure that no fluid leakage is present.
2.Visually check around the brake master cylinder to ensure that no fluid leakage is present.



(2) Check of wear and damage

1.Visually check the external view of the brake master cylinder to ensure that no damage or fluid leakage is present.
2.When disassembling the brake master cylinder, check the following items given below.
(1) Scores on bore surfaces of the brake master cylinder
(2) Deformation and damage of cylinder

1-2-5 CHECK OF BRAKE HOSES AND PIPES

(1) Operations prior to check

1.Jack up the vehicle.

(2) Check of fluid leakage

1.Visually check the connections of the brake hoses and pipes to ensure that no fluid leakage is present.

(3) Check of damage

1.Visually check the brake hoses for bulge or cracks due to deterioration; the pipes for cracks or damage.

(4) Check of installing conditions

1.Check that the clamps are installed to the brake hoses or pipes securely.

2.Visually check that the brake hoses and pipes do not interfere with the body or other sections due to vibration during running. Furthermore, fully turn the steering wheel to the right and left sides to ensure that the brake hoses will not interfere with other parts.

(5) Check of tightening conditions

1.Check the connections and clamps for loosening, using spanners or the like.

1-2-6 CHECK OF EACH PART OF FRONT BRAKE SYSTEM

(1) Operations prior to check

1.Jack up the vehicle.

2.Remove the front disc wheels.

Refer to Page C3-3.

(2) Check of front brake pads

① Thickness check

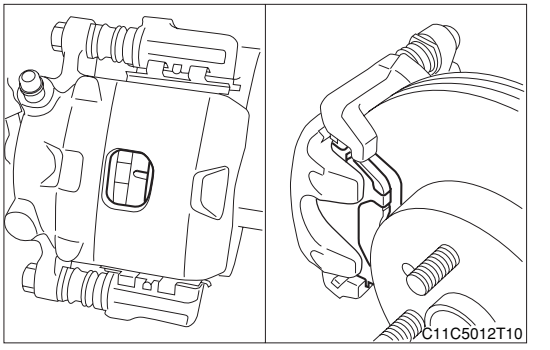
1.Check the pad thickness.

ALLOWABLE LIMIT: 1mm

NOTE

- New part

	Front disc 234 mm dai	Front disc 246 mm dai
Standard value [mm]	10	9.5



2.If the pad thickness is below the limit, replace the pad.

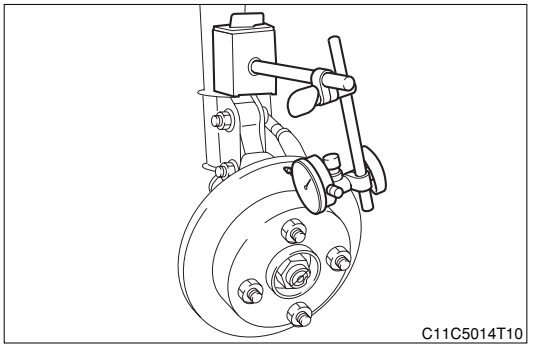
(3) Check of front brake disc

① Runout check

1.Secure the front brake disc by attaching proper four wheel nuts (Penetration type) and tightening them to a uniform torque.

2.Ensure that the front hub bearing exhibit no excessive looseness.

Refer to Page D2-1.



3.Measure the runout of the disc edge at a point 10 mm from the outer periphery of the disc, using a dial gauge.

ALLOWABLE LIMIT: 0.10mm

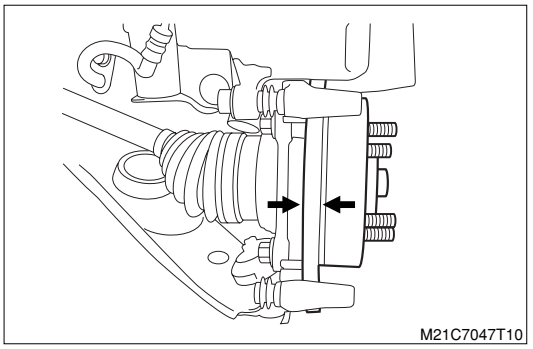
4.If the runout of the front brake disc exceeds the limit, check the axle hub for runout. If no abnormality is found, replace the front brake disc.

② **Check of wear, damage and thickness**

1.Visually check the front brake disc to ensure that no excessive wear or damage is present.

2.Measure the thickness of the front brake disc.

ALLOWABLE LIMIT:



	Front disc 234 mm dai	Front disc 246 mm dai
Standard value [mm]	15	16

NOTE

- New part

	Front disc 234 mm dai	Front disc 246 mm dai
Standard value [mm]	16	17

3.If the front brake disc thickness becomes below the limit or the brake disc exhibits excessive uneven wear or damage, replace the front brake disc.

(4) Check of front brake caliper

① **Check of fluid leakage**

1.Visually check around the front brake caliper to ensure that no fluid leakage is present.

② **Check of wear and damage**

1.Visually check the external view of the front brake caliper to ensure that no fluid leakage is present.

2.When the front brake caliper is disassembled, check the following items.

(1) Disc brake cylinder bore surface

(2) Wear and damage of disc brake piston

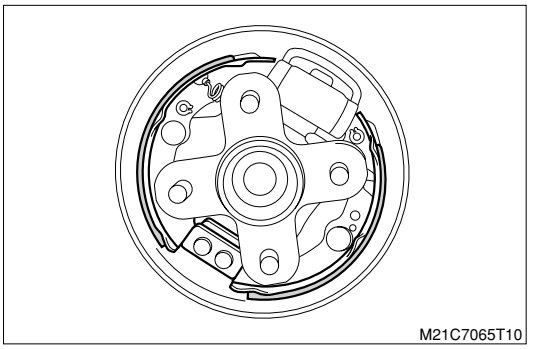
1-2-7 CHECK OF EACH SECTION OF REAR BRAKE SYSTEM

(1) Operations prior to check

1.Remove the rear brake drum.
Refer to Page E1-65.

(2) Check of rear brake shoe linings

① Check of wear, damage and thickness


M21C7065T10

1.Visually check the shoe linings to ensure that no excessive uneven wear, damage or peeling off is present.
2.Measure the thickness of the shoe lining.
ALLOWABLE LIMIT: 1mm
NOTE
- New part: 4 mm

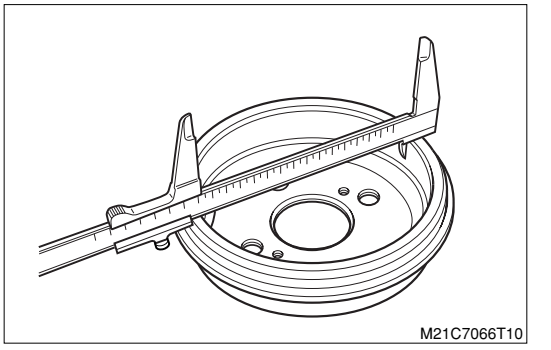
3.If the shoe lining thickness becomes below the limit or the shoe linings exhibit excessive uneven wear, damage or peeling off, replace the brake shoes.
CAUTION
- When replacing the rear brake shoe Ay, replace both shoes in right and left wheels as a set in order to prevent the pulling of brake.

4.When the rear brake shoe is disassembled, check the following items.
(1) Excessive wear at the contact surface between the rear brake backing plate and the rear brake shoe.
CAUTION
- Lack of grease at the contact surface between the rear brake backing plate and the rear brake shoe causes premature wear or abnormal noise. Therefore, apply grease here at the time of checking.

LUBRICANT: Brake grease
(2) Flattened return spring
(3) Smooth operation of adjusting device

(3) Check of rear brake drum

① Check of wear, damage and bore diameter


M21C7066T10

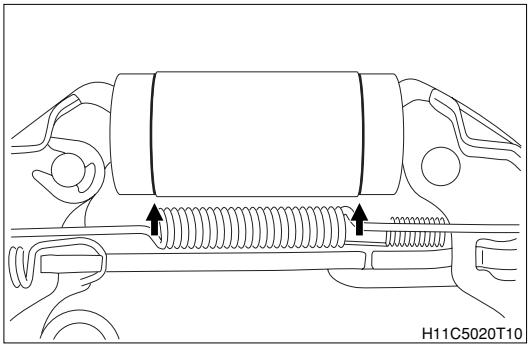
1.Visually check the inner surface of the rear brake drum to ensure that no excessive uneven wear, cracks or damage, etc. is present.
2.Measure the rear brake drum inner diameter.
ALLOWABLE LIMIT: 181mm
NOTE
- New part: 180 mm

3.If the rear brake drum exhibits excessive uneven wear, cracks, or damage, grind or replace the rear brake drum.

(4) Check of rear wheel cylinder

① Check of fluid leakage

1.Visually check around the rear wheel cylinder boot to ensure that no fluid leakage is present.



② Check of wear and damage

1.Visually check the external view of the rear wheel cylinder to ensure that no damage or fluid leakage is present.

2.When the rear wheel cylinder is disassembled, check the following items

(1) Wear and damage of wheel brake cylinder piston

(2) Wear and damage of rear body bore of wheel brake cylinder

2 BRAKE FLUID

2-1 REPLACEMENT

CAUTION

- Never reuse the wiped-out brake fluid.
- Care must be exercised so that no brake fluid may adhere to the paint surface. If brake fluid is adhered to the paint surface, immediately wipe it out and wash it with water.

2-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

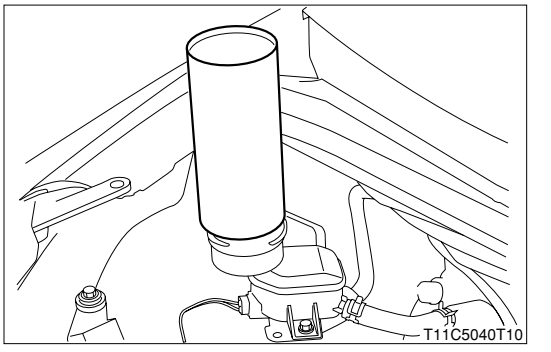
Lubricant,adhesive,others

Brake fluid(DOT3)

2-1-2 OPERATION BEFORE REPLACEMENT

1.Jack up the vehicle.
2.Remove the disc wheels.
Refer to Page C3-3.

2-1-3 REPLACING PROCEDURE



1.Replenish the brake fluid by placing the container of brake fluid upside down on the reservoir tank.
LUBRICANT: Brake fluid(DOT3)

CAUTION

- Ensure that the container contains an adequate amount of brake fluid.
- When replenishing, ensure that the master cylinder reservoir at the upper section of the master cylinder Ay is filled with brake fluid fully. Then, proceed to the operation.
- To avoid any ingress of air, keep refilling the brake fluid at all times so that the reservoir tank may not become empty.

2.Install a transparent tube to the bleeder plug and receive the brake fluid in a container.
3.Loosen the bleeder plug. Slowly depress the brake pedal and return the pedal.
4.Repeat the operations posted in Item 3 at intervals of two or three seconds. At the time when the fresh brake fluid starts emitting, depress the brake pedal and tighten the bleeder plug.
TIGHTENING TORQUE: 8.4±1.4N·m{85±14kgf·cm}
5.Conduct the operations posted in Items 2 through 4 above for each wheel.
6.Check the fluid level of the reservoir tank.
Refer to Page E1-3.

2-1-4 OPERATION AFTER REPLACEMENT

1.Install the disc wheels.
Refer to Page C3-3.

2.Jack down the vehicle.

3 BRAKE PEDAL

3-1 REMOVAL AND INSTALLATION (RHD VEHICLES)

3-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

MP grease

3-1-2 OPERATION BEFORE REMOVAL

1.Remove the instrument panel finish panel subassembly lower.
Refer to Page I2-23.

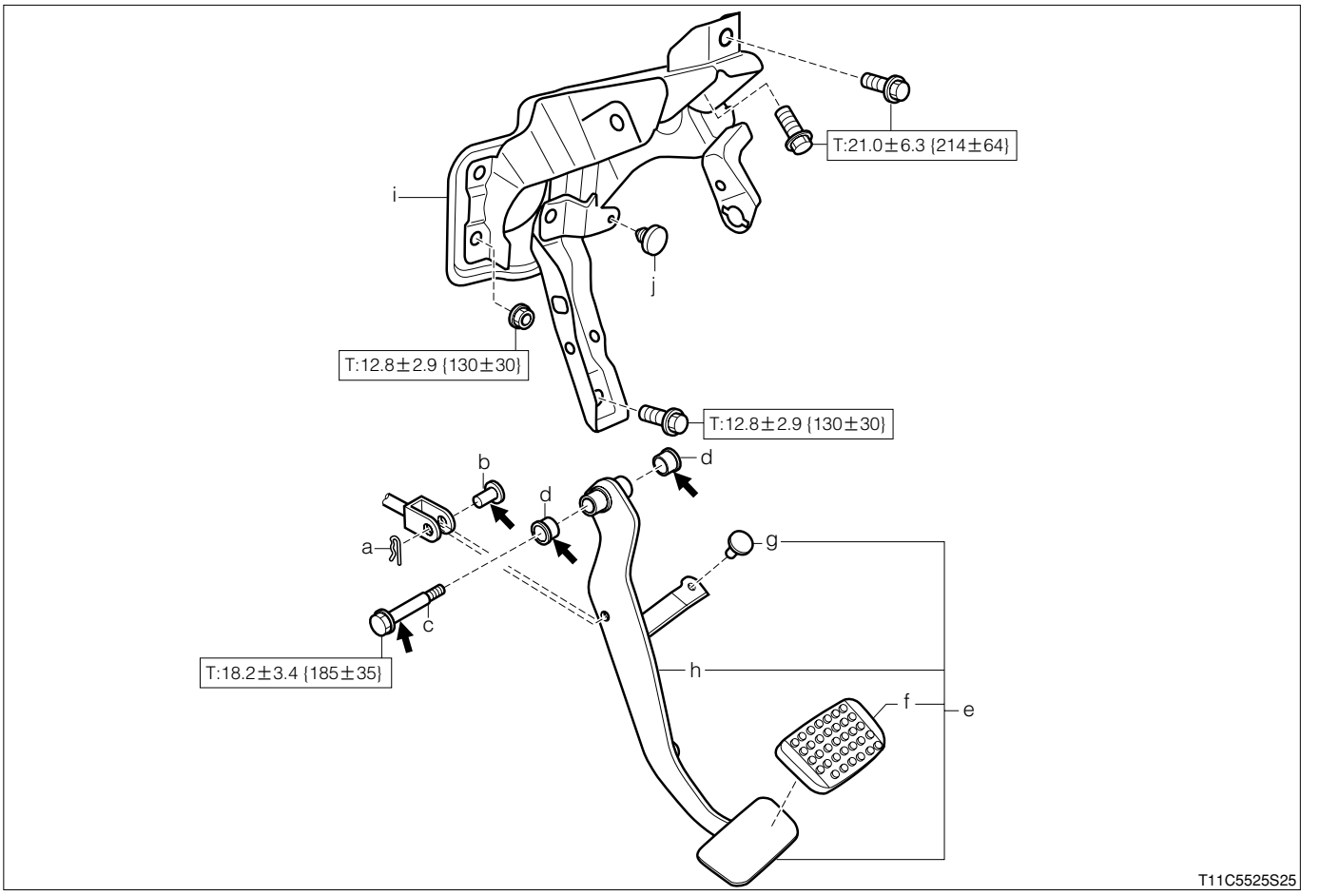
2.Remove the steering column cover lower.
Refer to Page G1-5.

3.Remove the stop lamp switch assembly.
Refer to Page E1-16.

4.Remove the accelerator pedal assembly.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit: N·m{kgf·cm}

➡: MP grease

(2) Removal and installation procedures

1 a Clip
2 b Pin, w/hall
3 c Shaft, pedal
4 d Bush
5 e Pedal Ay, brake
6 f Pad, pedal
7 g Cushion
8 h Pedal S/A, brake
9 i Support S/A, brake pedal
10 j Cushion

3-1-4 OPERATION AFTER INSTALLATION

1.Install the accelerator pedal assembly.
2.Install the stop lamp switch assembly.
Refer to Page E1-16.

3.Install the steering column cover lower.
Refer to Page G1-5.

4.Install the instrument panel finish panel subassembly lower.
Refer to Page I2-23.

5.Check and adjust the brake pedal Ay.
Refer to Page E1-1.

3-2 REMOVAL AND INSTALLATION (LHD VEHICLES)

3-2-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

MP grease

3-2-2 OPERATION BEFORE REMOVAL

1.Remove the instrument panel finish panel subassembly lower.
Refer to Page I2-23.

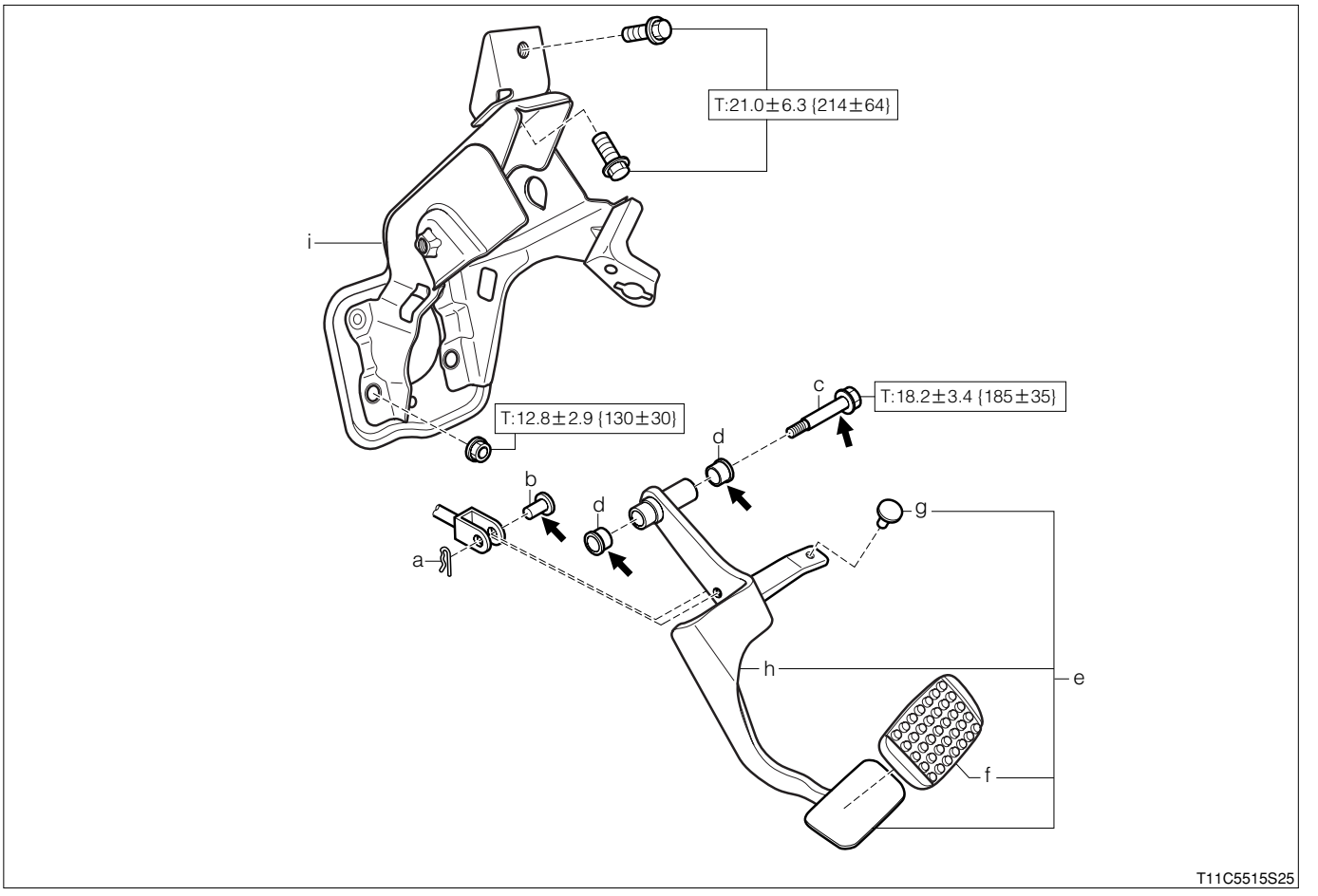
2.Remove the steering column cover lower.
Refer to Page G1-5.

3.Remove the stop lamp switch assembly.
Refer to Page E1-16.

4.Remove the shift lock release cable assembly. (If so equipped)
Refer to Page F3-38.

3-2-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit: N·m{kgf·cm}

➡: MP grease

(2) Removal and installation procedures

1	a	Clip	6	f	Pad, pedal
2	b	Pin, w/hall	7	g	Cushion
3	c	Shaft, pedal	▼ 8	h	Pedal S/A, brake
4	d	Bush	9	i	Cushion
5	e	Pedal Ay, brake			

3-2-4 POINTS OF REMOVAL

(1) Support S/A, brake pedal

1.With the brake pedal Ay installed, remove the support S/A from the vehicle.

3-2-5 OPERATION AFTER INSTALLATION

1.Install the shift lock release cable assembly. (If so equipped)
Refer to Page F3-38.

2.Install the stop lamp switch assembly.
Refer to Page E1-16.

3.Install the steering column cover lower.
Refer to Page G1-5.

4.Install the instrument panel finish panel subassembly lower.
Refer to Page I2-23.

5.Check and adjust the brake pedal Ay.
Refer to Page E1-1.

4 STOP LAMP SWITCH

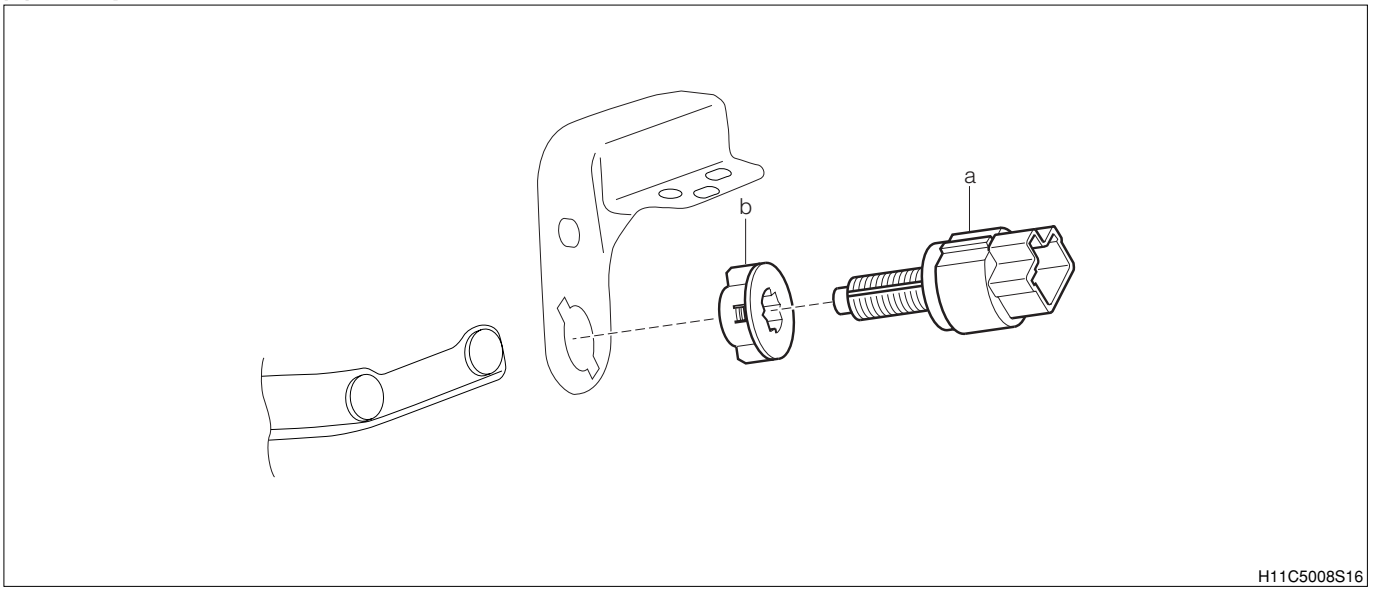
4-1 REMOVAL AND INSTALLATION

4-1-1 OPERATION BEFORE REMOVAL

1.Disconnect the connector of the stop lamp switch Ay.

4-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

▼ ▲ 1 a Switch Ay, stop lamp
2 b Adjuster, stop lamp switch mounting

4-1-3 POINTS OF REMOVAL

(1) SW AY, stop lamp

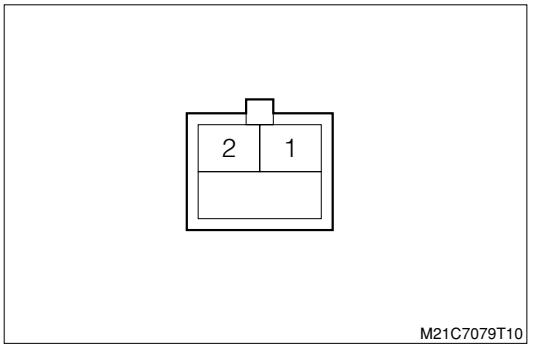
1.Remove the switch assembly by turning it counterclockwise.

4-1-4 INSPECTION

1.Check continuity between the connector terminals of the stop lamp switch Ay.

SPECIFIED VALUE:

Switch conditions	Continuity
When released	Exists
When pushed	Not exists



4-1-5 POINTS OF INSTALLATION

(1) SW AY, stop lamp

1.Lightly push the edge surface of the threaded section of the switch Ay to the bracket of the brake pedal Ay.

CAUTION

- Make sure that the edge surface of the threaded portion of the switch assembly will not push the brake pedal assembly.

2.Turn the main body of the switch assembly clockwise in order to lock it. At this time, ensure that the shaft protruding amount of the switch assembly is 2 mm or less.

4-1-6 OPERATION AFTER INSTALLATION

1.Connect the connector of the stop lamp switch Ay.
2.Depress the brake pedal Ay. At this time, ensure that the stop lamp functions properly.
3.Check the free travel of the brake pedal Ay.
Refer to Page E1-2.

5 BRAKE MASTER CYLINDER

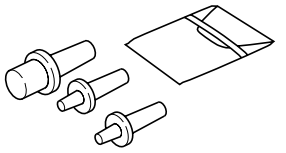
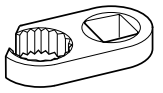
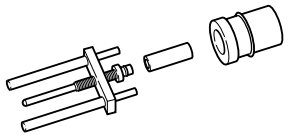
5-1 REMOVAL AND INSTALLATION

CAUTION

- Care must be exercised so that no brake fluid may adhere to the paint surface. If brake fluid is adhered to the paint surface, immediately wipe it out and wash it with water.
- Never reuse the wiped-out brake fluid.

5-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09258-00030-000	Plug set,hose
	09023-00100-000	Wrench,union nut
	09730-87401-000	Gauge set,brake booster gauge

Lubricant,adhesive,others

Brake fluid(DOT3),Brake grease,Silicon grease

5-1-2 OPERATION BEFORE REMOVAL

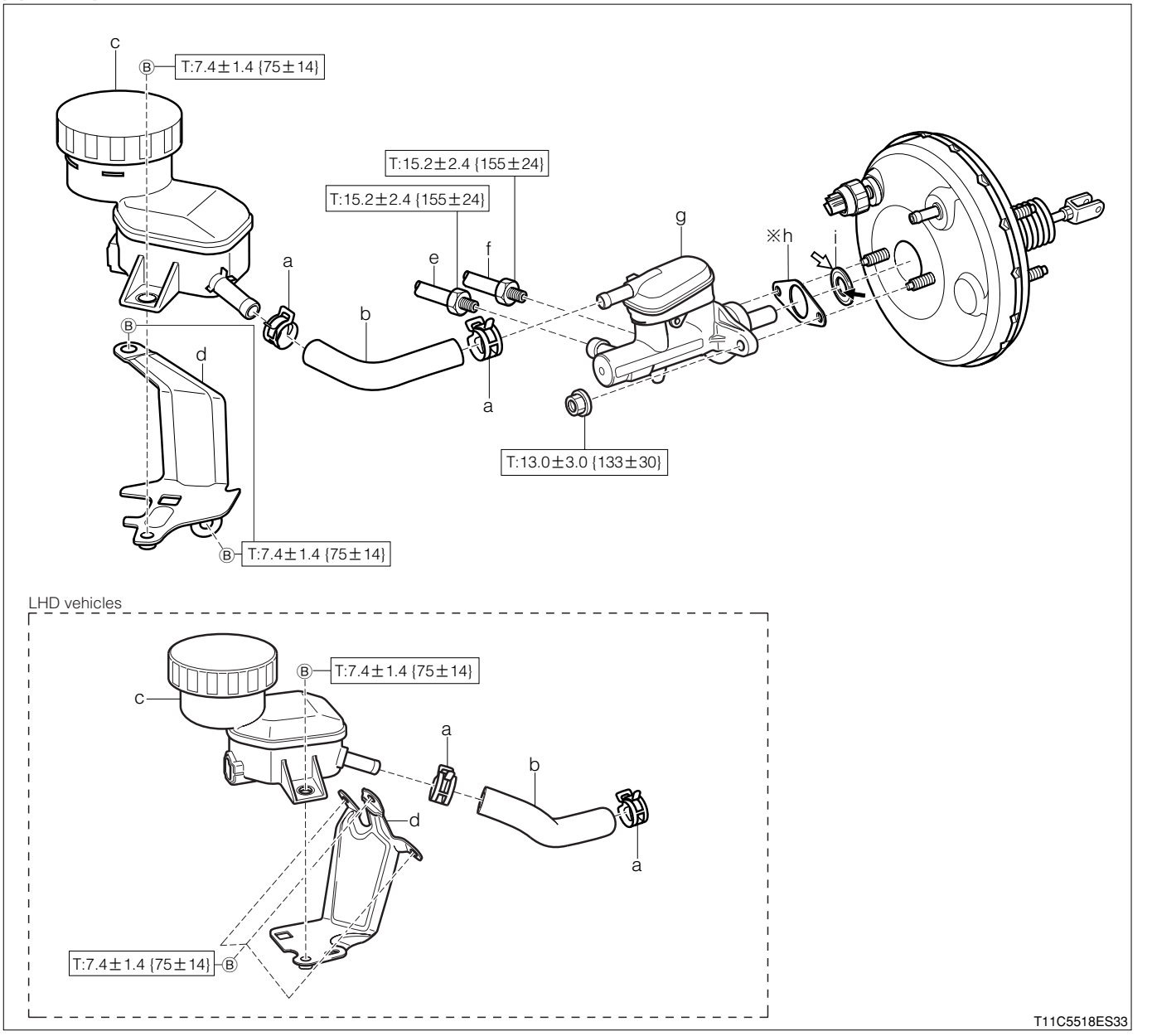
1.Remove the disc wheels.
2.On ABS-equipped vehicles, perform the following operations.
  (1) After setting the IG SW "LOCK"
  (2) Disconnect the connector of the brake actuator Ay.
3.Disconnect the air cleaner hose No.1. (RHD vehicles)
  (1) Vehicle mounted with Type 1KR engine
  Refer to Page B3-1.

  (2) Vehicle mounted with Type K3 engine
  Refer to Page B3-9.

4.Remove the battery. (LHD vehicles)
5.Disconnect the connector of the level warning switch to the brake master reservoir S/A.

5-1-3 REMOVAL AND INSTALLATION PROCEDURES (ABS-EQUIPPED VEHICLES)

(1) Components



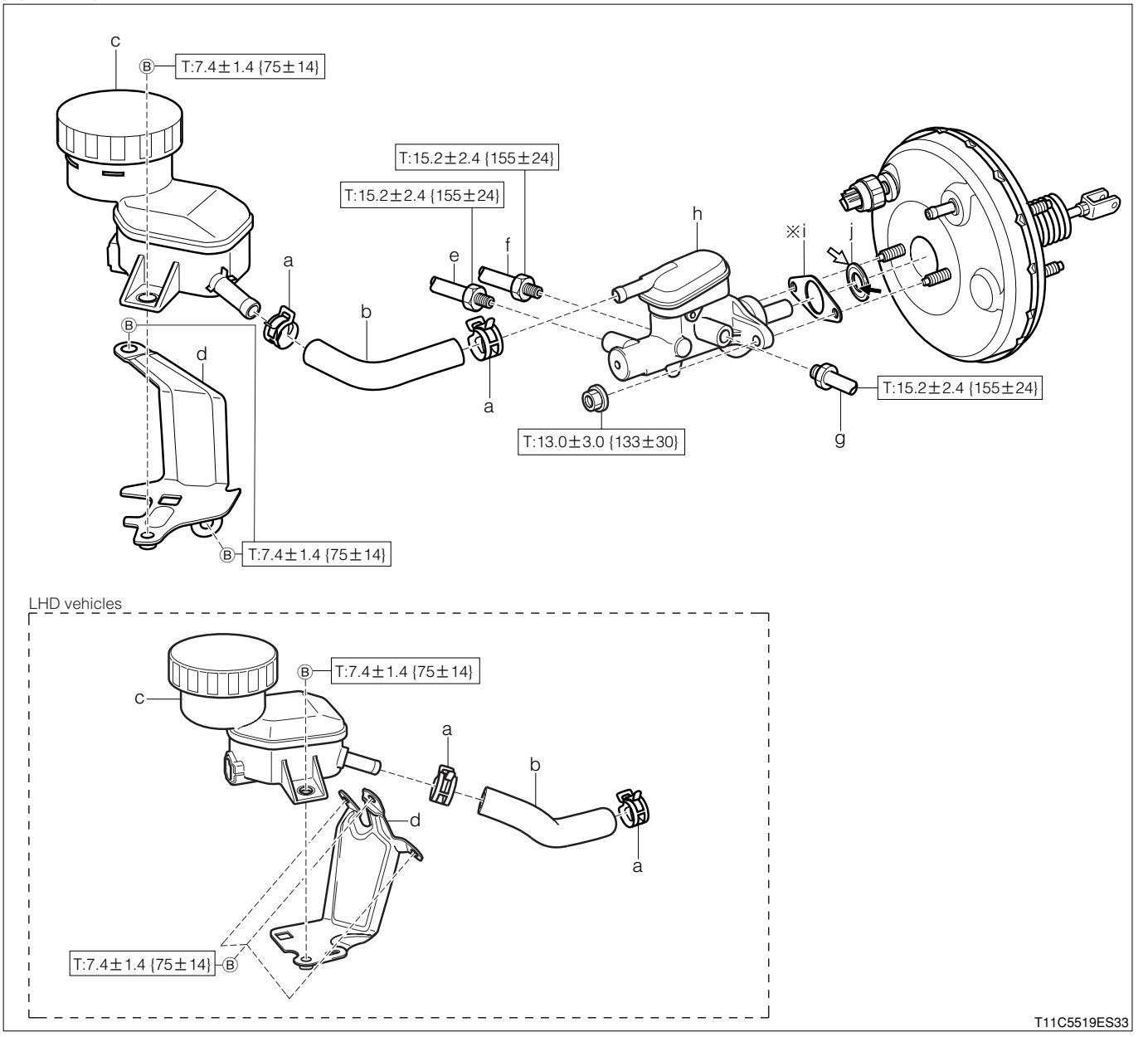
Unit: N·m{kgf·cm}
※: Non-reusable parts
➡: Brake grease
⇨: Silicone grease

(2) Removal and installation procedures

	1	a	Clip
▼ ▲	2	b	Hose, reservoir, No.1
	3	c	Reservoir Ay, master cylinder
	4	d	Bracket, reservoir
▼ ▲	5	e	Tube, front brake, No.1
▼ ▲	6	f	Tube, front brake, No.3
▲	7	g	Cylinder S/A, brake master
	8	h	Gasket, master cylinder
	9	i	Seal, master cylinder

5-1-4 REMOVAL AND INSTALLATION PROCEDURES (VEHICLES NOT EQUIPPED WITH ABS)

(1) Components



Unit: N·m{kgf·cm}
※: Non-reusable parts
➡: Brake grease
⇨: Silicone grease

(2) Removal and installation procedures

	1	a	Clip		
▼ ▲	2	b	Hose, reservoir, No.1		
	3	c	Reservoir Ay, master cylinder		
	4	d	Bracket, reservoir		
▼ ▲	5	e	Tube, front brake, No.1		
▼ ▲	6	f	Tube, front brake, No.3		
▼ ▲	7	g	Tube, front brake, No.4		
▲	8	h	Cylinder S/A, brake master		
	9	i	Gasket, master cylinder		
	10	j	Seal, master cylinder		

5-1-5 POINTS OF REMOVAL

(1) Hose, reservoir, No.1

1.Disconnect the hose at the brake master cylinder S/A. side. Plug the hose tip end with the SST.
SST: 09258-00030-000

(2) Tube, front brake

1.Disconnect the tube from the brake master cylinder S/A.

2.Plug the disconnected tube with the bleeder plug cap or the like.

5-1-6 POINTS OF INSTALLATION

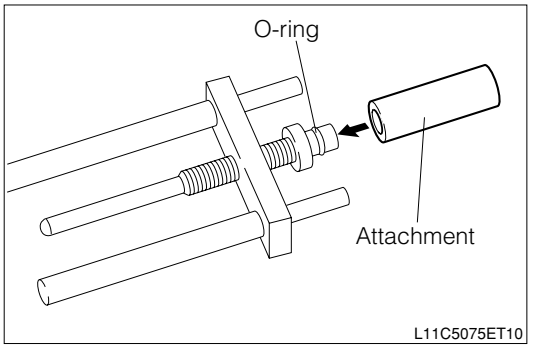
(1) Cylinder S/A, brake master

1.Check the push rod gap of the brake booster Ay, following the next procedure given below.

(1) Fit an O-ring (SST) into the groove at the rod section of the gauge (SST). Then, install an attachment (SST) to the same place. Moreover, apply brake grease to the surface of the attachment (SST) in advance.

SST: 09730-87401-000

LUBRICANT: Brake grease



(2) Install the vacuum hose Ay to the brake booster Ay.

(3) Apply brake grease to the bore lip section of the master cylinder seal attached between the cylinder S/A and the brake booster Ay. Also, apply silicone grease to its outer circumference.

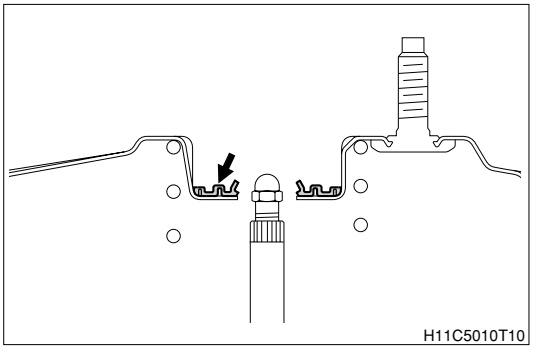
LUBRICANT: Brake grease
Silicon grease

(4) Install the master cylinder seal to the brake booster Ay side.

CAUTION

- Make sure that the master cylinder seal is attached in the correct direction.

(5) Install the master cylinder gasket to the brake master cylinder Ay.



(6) Set the gauge (SST) to a position where the rod of the gauge (SST) may come in contact lightly with the master cylinder piston S/A No.1 of the cylinder S/A.

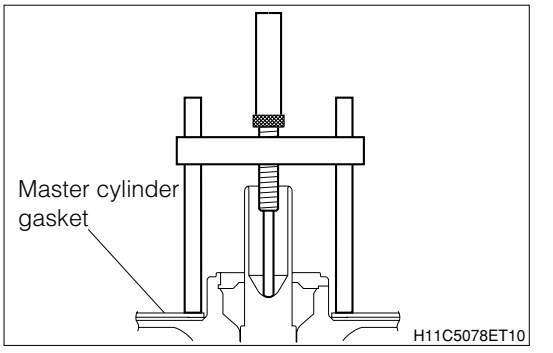
(7) Install the negative terminal of the battery. Start the engine. Apply a negative pressure of about 66.7kPa{500mmHg} to the booster.

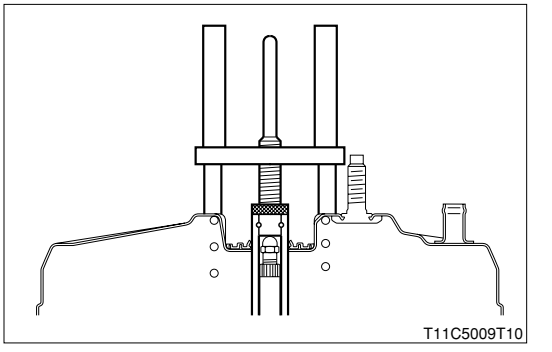
CAUTION

- Connect the negative terminal of the battery with the connector of the brake actuator Ay disconnected.

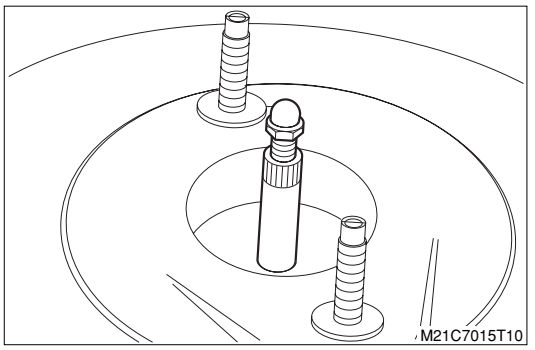
(8) Install the SST at the brake booster Ay side in an inverted state. Then, check the clearance between the rod of the SST and the push rod of the brake booster Ay.

SPECIFIED VALUE: Clearance: 0 mm

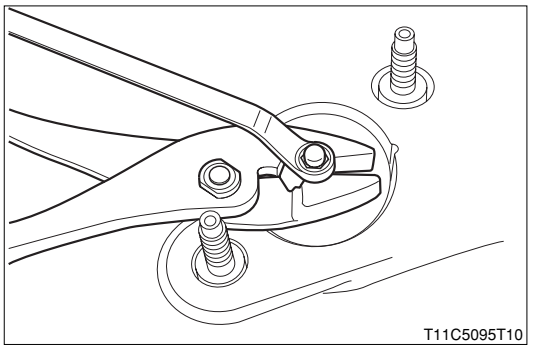




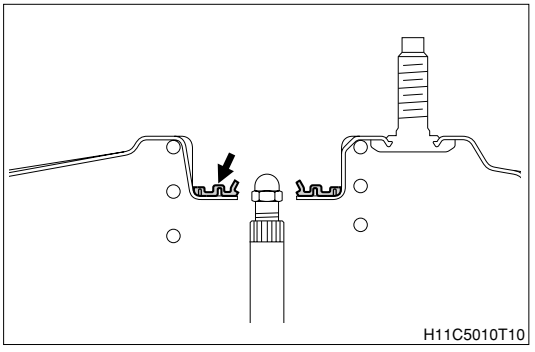
2.If the clearance of the brake booster push rod fails to conform to the specified value, perform the adjustment, following the procedure given below.
(1) Retain the push rod in a pushed-out state.



(2) Secure the push rod, using pliers or the like. Then, adjust the length by turning the bolt provided at the tip end of the push rod.
3.Apply silicone grease to the tip-end of the push rod of the brake booster Ay.
LUBRICANT: Silicon grease



4.Ensure that the master cylinder seal is correctly installed. Then, install the cylinder subassembly to the brake booster assembly.



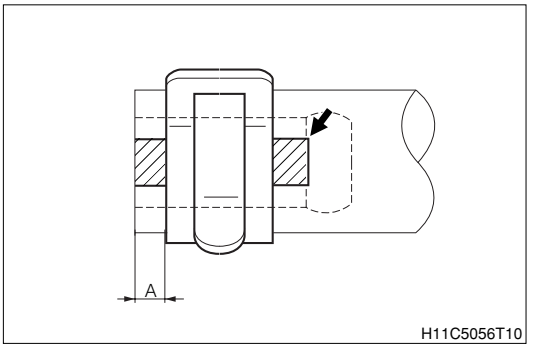
(2) Tube, front brake

1.When the brake master cylinder S/A has been removed and installed, before the tube is connected, carry out air bleeding of the brake master cylinder S/A.
Refer to Page E1-29.

2.Temporarily tighten the union nut until the tube flare section contacts closely with the seat.
3.Using the SST, connect the tube to the brake master cylinder S/A and tighten it to the specified torque.
SST: 09023-00100-000

(3) Hose, reservoir, No.1

1.Install the hose, using the following procedure.
(1) The installation must be in such a way that the paint line at both ends of the hose come at the upper side of the vehicle.
(2) Be sure to insert the hose up to the stopper surface of the union.
(3) The installation positions of the clips at the both ends of the hose are such that the point (A) in the figure comes in a range of 4±2mm.



5-1-7 OPERATION AFTER INSTALLATION

1.Connect the connector of the level warning switch to the brake master reservoir S/A.
2.Connect the air cleaner hose No.1. (RHD vehicles)
(1) Vehicle mounted with Type 1KR engine
Refer to Page B3-1.

(2) Vehicle mounted with Type K3 engine
Refer to Page B3-9.

3.Install the battery. (LHD vehicles)
4.Carry out the air bleeding of the brake.
Refer to Page E1-4.

5.On ABS-equipped vehicles, perform the following operations.
(1) Connect the connector of the brake actuator Ay.
(2) Connect the negative (-) terminal of the battery.
6.Install the disc wheels.
Refer to Page C3-3.

7.Confirm that there is no brake dragging.
Refer to Page C1-3.

8.Jack down the vehicle.

5-2 DISASSEMBLING AND ASSEMBLING (ABS-EQUIPPED VEHICLES)

5-2-1 ARTICLES TO BE PREPARED

Tool

Snap ring pliers

Lubricant, adhesive, others

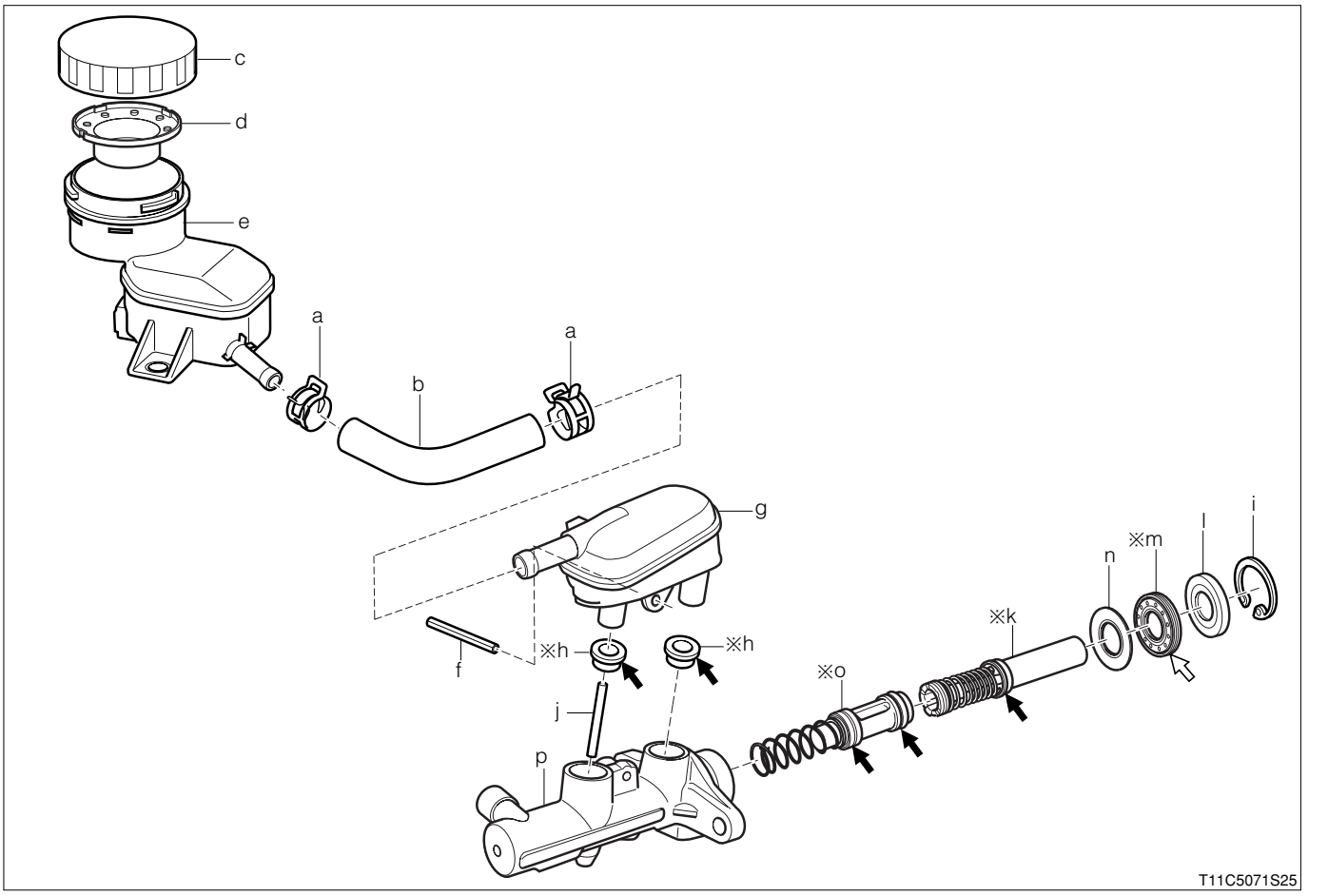
Brake fluid(DOT3),Brake grease,Silicon grease

5-2-2 OPERATION BEFORE DISASSEMBLY

1.Remove the brake master cylinder S/A.
Refer to Page E1-18.

5-2-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Components



※: Non-reusable parts
➡: Brake fluid (Equivalent to DOT3)
⇨: Brake grease

(2) Disassembling and assembling procedure

	1	a	Clip	▼▲	9	i	Ring, hole snap
▲	2	b	Hose, reservoir, No.1	▼▲	10	j	Pin
	3	c	Cap Ay, reservoir filler	▼▲	11	k	Piston S/A, master cylinder No.1
	4	d	Strainer, master cylinder reservoir		12	l	Guide, master cylinder piston
	5	e	Reservoir S/A, master cylinder	▲	13	m	Cup, cylinder
	6	f	Pin		14	n	Plate, master cylinder piston stop
	7	g	Reservoir, master cylinder	▼▲	15	o	Piston S/A, master cylinder, No.2
▲	8	h	Grommet, reservoir		16	p	Body, master cylinder

5-2-4 POINTS OF DISASSEMBLY

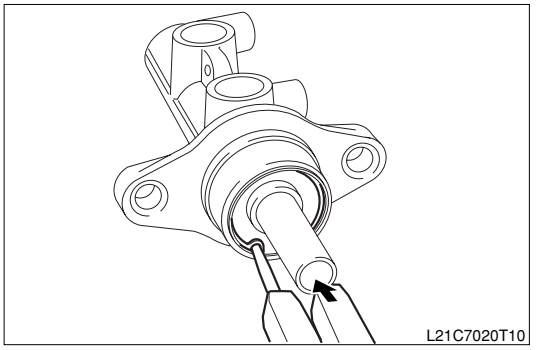
(1) Ring, hole snap

1.Remove the residual brake fluid inside the brake master cylinder S/A by pushing the master cylinder piston S/A No.1 several times.

CAUTION

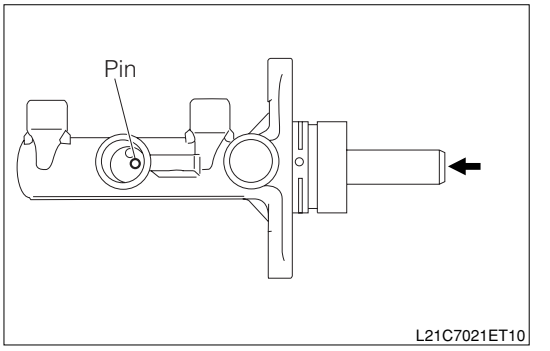
- Be careful so that the fluid may not scatter when pushing the master cylinder piston S/A No.1.

2.With the master cylinder piston S/A No.1 pushed in, remove the ring, using snap ring pliers.
TOOL: Snap ring pliers



(2) Pin

1.With the master cylinder piston S/A No.1 pushed in, remove the pin.



(3) Piston S/A, master cylinder, No.1

1.Take out the piston S/A straight.

CAUTION

- The removal must be made in such a way that no score be made to the bore surface of the master cylinder body.

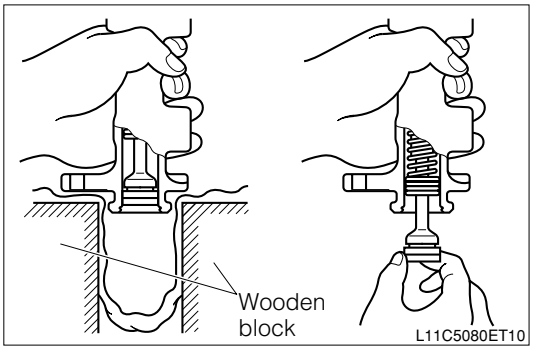
(4) Piston S/A, master cylinder, No.2

1.Tap flange portion lightly against a chip of wood until the end of the piston S/A comes out.

2.When the end of the piston S/A comes out, then pull out the piston S/A straight.

CAUTION

- The removal must be made in such a way that no score be made to the bore surface of the master cylinder body.



5-2-5 INSPECTION

(1) body, master cylinder

1.Check to see if the cylinder bore exhibits scratches.

2.Check to see if the cylinder exhibits deformation and scratches.

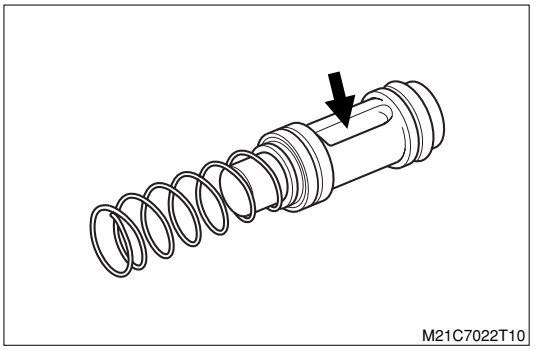
5-2-6 POINTS OF ASSEMBLY

(1) Piston S/A, master cylinder, No.2

1.Apply brake fluid to the entire periphery of the cylinder inner surface of the master cylinder body.
LUBRICANT: Brake fluid(DOT3)

2.Apply brake fluid to the entire periphery of the cup of the piston subassembly.
LUBRICANT: Brake fluid(DOT3)

3.Insert the piston S/A in such a way that the elongated hole of it is aligned with the pin attaching hole of the master cylinder body.


M21C7022T10

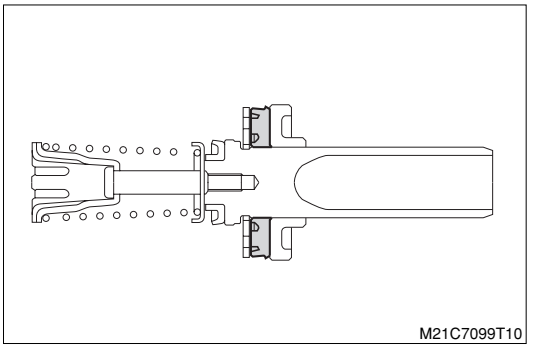
(2) Cup, cylinder

1.Apply brake grease to the entire periphery of the inner and outer surfaces of the cup.
LUBRICANT: Brake grease

2.Install the cup to the master cylinder piston S/A No.1.

CAUTION

- Install the cup in such a way that the side having the groove comes at the master cylinder piston stop plate side.


M21C7099T10

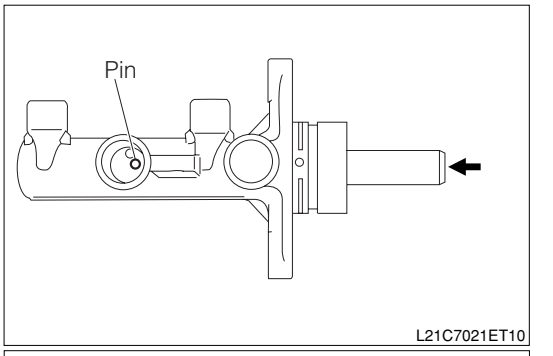
(3) Piston S/A, master cylinder, No.1

1.Apply brake fluid to the entire periphery of the cup of the piston subassembly.
LUBRICANT: Brake fluid(DOT3)

2.Insert the piston S/A into the master cylinder body.

(4) Pin

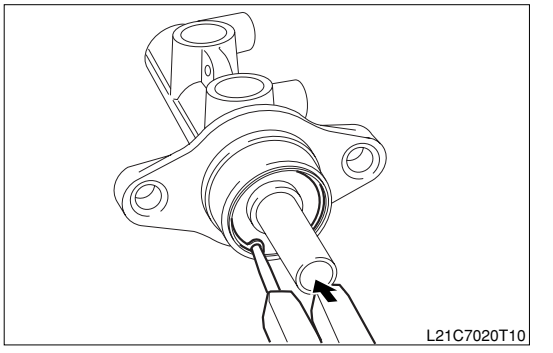
1.With the master cylinder piston S/A No.1 pushed in, remove the pin.



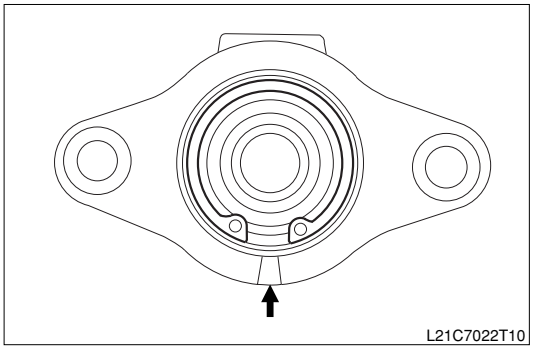
L21C7021ET10

(5) Ring, hole snap

1.With the master cylinder piston S/A No. 1 pushed in, assemble the ring, using snap ring pliers.
TOOL: Snap ring pliers


L21C7020T10

2.Install the ring in such a way that the opening may face downward.

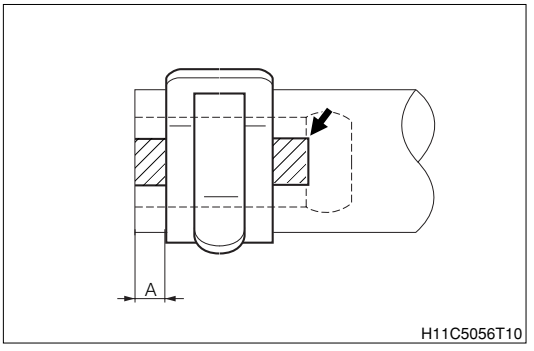


(6) Grommet, reservoir

1.Apply brake fluid to the entire periphery of the inner and outer surfaces of the grommet.
LUBRICANT: Brake fluid(DOT3)

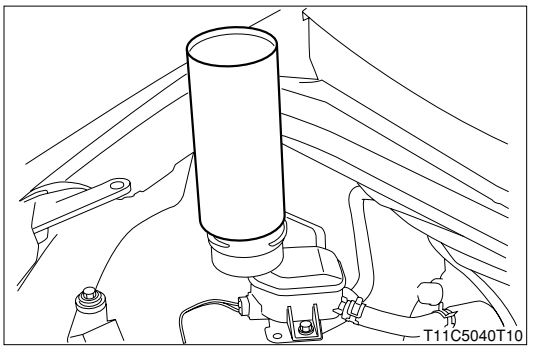
(7) Hose, reservoir, No.1

1.Install the hose, using the following procedure.
(1) The installation must be in performed in such a way that the paint line at both ends of the hose come at the upper side of the vehicle.
(2) Be sure to insert the hose up to the stopper surface of the union.
(3) The installation positions of the clips at the both ends of the hose are such that the point (A) in the figure comes in a range of 4±2mm.



5-2-7 OPERATION AFTER ASSEMBLY

1.With the brake tube only disconnected, install the brake master cylinder S/A.
Refer to Page E1-18.



2.Carry out the air bleeding of the brake master cylinder S/A, using the following procedure given below.

(1) Replenish the brake fluid by placing the container of brake fluid upside down on the master cylinder reservoir S/A.

LUBRICANT: Brake fluid(DOT3)

CAUTION

- Ensure that the container contains an adequate amount of brake fluid.
- When replenishing, ensure that the master cylinder reservoir at the upper section of the brake master cylinder S/A is filled with brake fluid fully. Then, proceed to the operation.
- To avoid any ingress of air, keep refilling the brake fluid at all times so that the master cylinder reservoir S/A may not become empty.

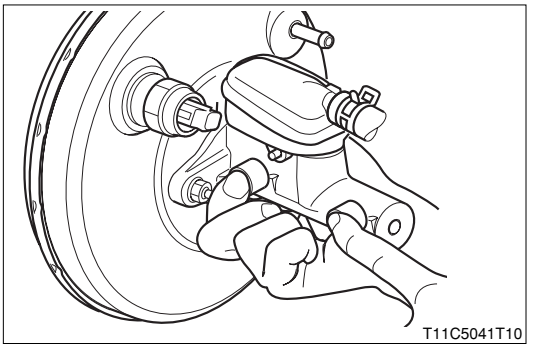
(2) Slowly depress the brake pedal and maintain this state.

(3) Plug the installing hole of the brake tube with your finger. Return the brake pedal.

(4) Release your finger from the installing hole of the brake tube.

(5) Repeat the operations posted in Items (2) through (4) above three or four times. Thus, fill the brake master cylinder S/A with brake fluid.

(6) Install the brake tube to the brake master cylinder S/A.
Refer to Page E1-18.



5-3 DISASSEMBLING AND ASSEMBLING (VEHICLES NOT EQUIPPED WITH ABS)

5-3-1 ARTICLES TO BE PREPARED

Tool

Snap ring pliers

Instrument

Torque wrench

Lubricant, adhesive, others

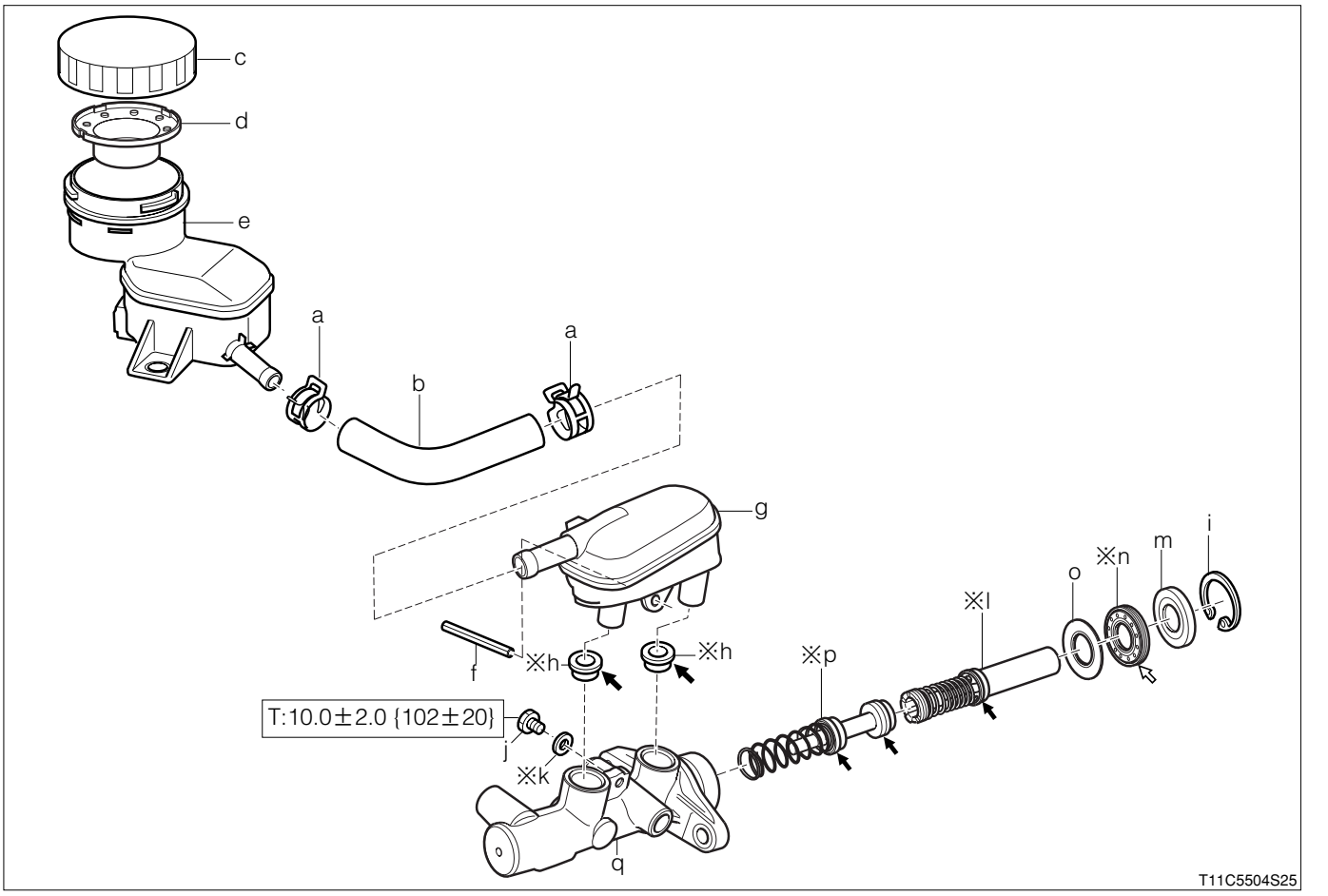
Brake fluid(DOT3),Brake grease,Silicon grease

5-3-2 OPERATION BEFORE DISASSEMBLY

1.Remove the brake master cylinder S/A.
Refer to Page E1-18.

5-3-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Components



Unit: N·m{kgf·cm}
※: Non-reusable parts
➡: Brake fluid (Equivalent to DOT3)
⇨: Brake grease

(2) Disassembling and assembling procedure

	1	a	Clip		
▲	2	b	Hose, reservoir, No.1		
	3	c	Cap Ay, reservoir filler		
	4	d	Strainer, master cylinder reservoir		
	5	e	Reservoir S/A, master cylinder		
	6	f	Pin		
	7	g	Reservoir, master cylinder		
▲	8	h	Grommet, reservoir		
▼ ▲	9	i	Ring, hole snap		
▼ ▲	10	j	Bolt, hexagon		
	11	k	Gasket		
▼ ▲	12	l	Piston S/A, master cylinder No.1		
	13	m	Guide, master cylinder piston		
▲	14	n	Cup, cylinder		
	15	o	Plate, master cylinder piston stop		
▼ ▲	16	p	Piston S/A, master cylinder, No.2		
	17	q	Body, master cylinder		

5-3-4 POINTS OF DISASSEMBLY

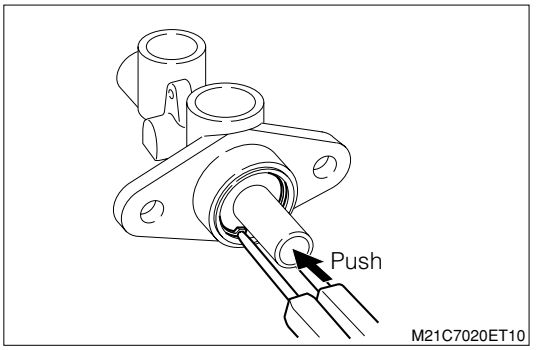
(1) Ring, hole snap

1.Remove the residual brake fluid inside the brake master cylinder S/A by pushing the master cylinder piston S/A No.1 several times.

CAUTION

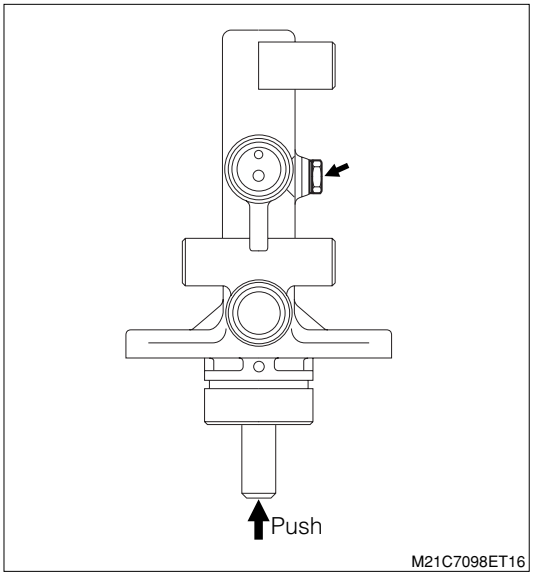
- Be careful so that the fluid may not scatter when pushing the master cylinder piston S/A No.1.

2.With the master cylinder piston S/A No.1 pushed in, remove the hole snap ring, using snap ring pliers.
TOOL: Snap ring pliers



(2) Bolt, hexagon

1.With the master cylinder piston S/A No.1 pushed in, remove the bolt.



(3) Piston S/A, master cylinder, No.1

1.Take out the piston S/A straight.

CAUTION

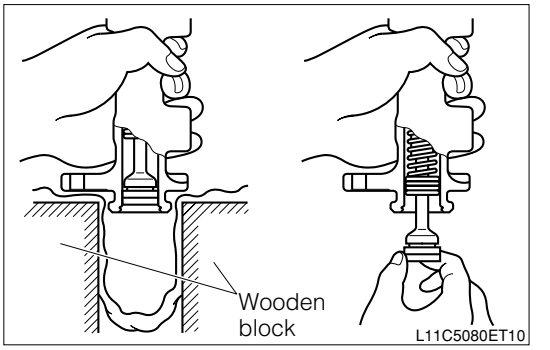
- Remove the master cylinder body, while paying attention not to score the cylinder bore surface.

(4) Piston S/A, master cylinder, No.2

1.Tap flange portion lightly against a chip of wood until the end of the piston S/A comes out.
2.When the end of the piston S/A comes out, then pull out the piston S/A straight.

CAUTION

- Remove the master cylinder body, while paying attention not to score the cylinder bore surface.



5-3-5 INSPECTION

(1) Body, master cylinder

1.Check to see if the cylinder bore exhibits scratches.
2.Check to see if the cylinder exhibits deformation and scratches.

5-3-6 POINTS OF ASSEMBLY

(1) Piston S/A, master cylinder, No.2

1.Apply brake fluid to the entire periphery of the cylinder inner surface of the master cylinder body.
LUBRICANT: Brake fluid(DOT3)

2.Apply brake fluid to the entire periphery of the cup of the piston subassembly.
LUBRICANT: Brake fluid(DOT3)

3.Insert the piston S/A into the master cylinder body.

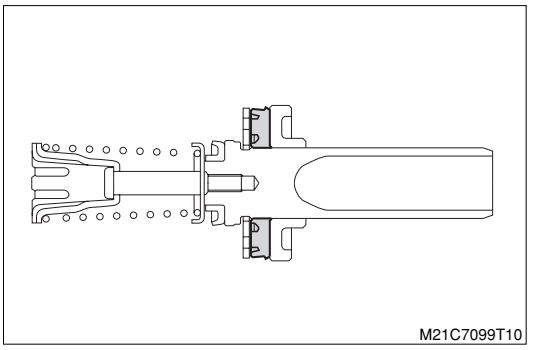
(2) Cup, cylinder

1.Apply brake grease to the entire periphery of the inner and outer surfaces of the cup.
LUBRICANT: Brake fluid(DOT3)

2.Install the cup to the master cylinder piston S/A No.1.

CAUTION

- Install the cup in such a way that the side having the groove comes at the master cylinder piston stop plate side.



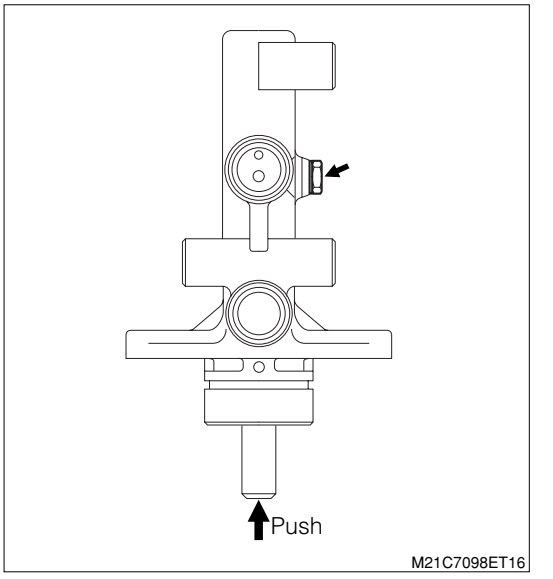
(3) Piston S/A, master cylinder, No.1

1.Apply brake fluid to the entire periphery of the cup of the piston subassembly.
LUBRICANT: Brake fluid(DOT3)

2.Insert the piston S/A into the master cylinder body.

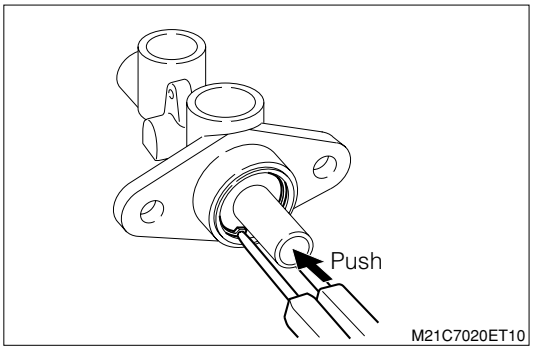
(4) Bolt, hexagon

1.With the piston S/A in a pushed state, install the gasket and bolt.

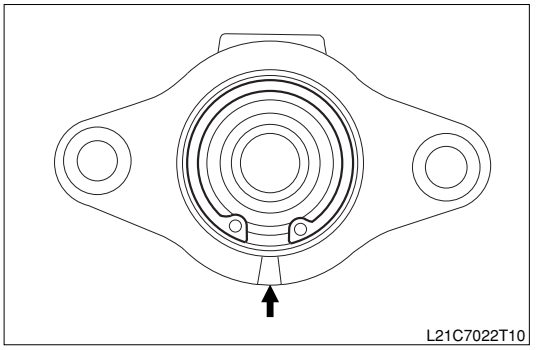


(5) Ring, hole snap

1.With the master cylinder piston S/A No.1 pushed in, install the ring, using snap ring pliers.
TOOL: Snap ring pliers



2.Install the ring in such a way that the opening may face downward.

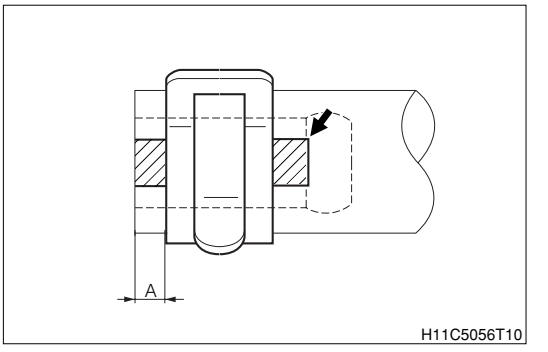


(6) Grommet, reservoir

1.Apply brake fluid to the entire periphery of the inner and outer surfaces of the grommet.
LUBRICANT: Brake fluid(DOT3)

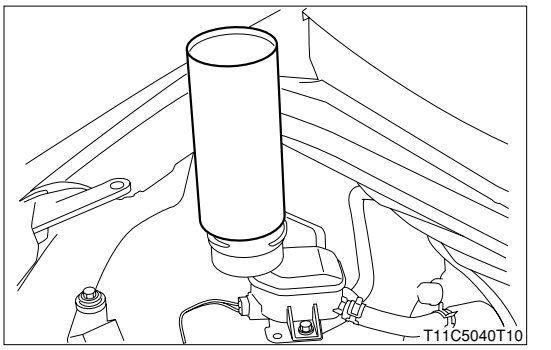
(7) Hose, reservoir, No.1

1.Install the hose, using the following procedure.
(1) The installation must be performed in such a way that the paint line at both ends of the hose come at the upper side of the vehicle.
(2) Be sure to insert the hose up to the stopper surface of the union.
(3) The installation positions of the clips at the both ends of the hose are such that the point (A) in the figure comes in a range of 4±2mm.



5-3-7 OPERATION AFTER ASSEMBLY

1.With the brake tube only disconnected, install the brake master cylinder S/A.
Refer to Page E1-18.



2.Carry out the air bleeding of the brake master cylinder S/A, using the following procedure given below.

(1) Replenish the brake fluid by placing the container of brake fluid upside down on the master cylinder reservoir S/A.

LUBRICANT: Brake fluid(DOT3)

CAUTION

- Ensure that the container contains an adequate amount of brake fluid.
- When replenishing, ensure that the master cylinder reservoir at the upper section of the brake master cylinder S/A is filled with brake fluid fully. Then, proceed to the operation.
- To avoid any ingress of air, keep refilling the brake fluid at all times so that the master cylinder reservoir S/A may not become empty.

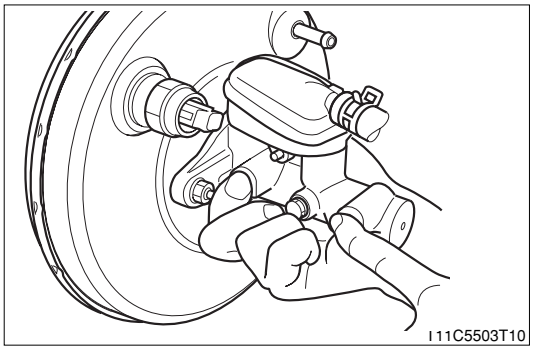
(2) Slowly depress the brake pedal and maintain this state.

(3) Plug the installing hole of the brake tube with your finger. Return the brake pedal.

(4) Release your finger from the installing hole of the brake tube.

(5) Repeat the operations posted in Items (2) through (4) above three or four times. Thus, fill the brake master cylinder S/A with brake fluid.

(6) Install the brake tube to the brake master cylinder S/A.
Refer to Page E1-18.



6 BRAKE BOOSTER

6-1 REMOVAL AND INSTALLATION

NOTE

- Never turn "ON" the IG SW until the air bleeding is completed. Failure to observe this caution causes air to be trapped into the brake actuator Ay, making it difficult to carry out air bleeding.

6-1-1 ARTICLES TO BE PREPARED

Instrument

MityVac,Torque wrench

Lubricant,adhesive,others

Brake fluid(DOT3),MP grease

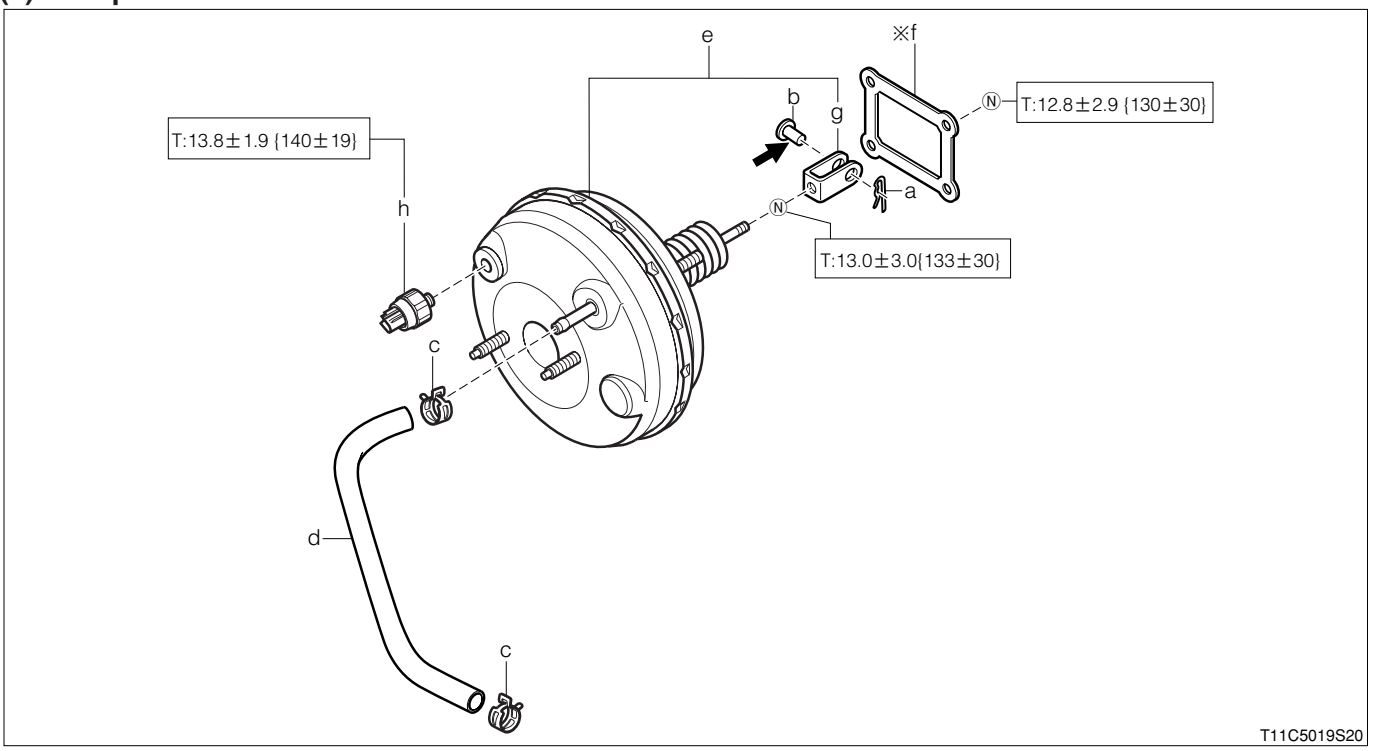
6-1-2 OPERATION BEFORE REMOVAL

1.Remove the brake master cylinder S/A.
Refer to Page E1-18.

2.Disconnect the connector of the vacuum SW Ay. (A/T vehicle)
3.Remove the instrument panel finish panel subassembly lower.
Refer to Page I2-23.

6-1-3 REMOVAL AND INSTALLATION PROCEDURES (RHD VEHICLES)

(1) Components



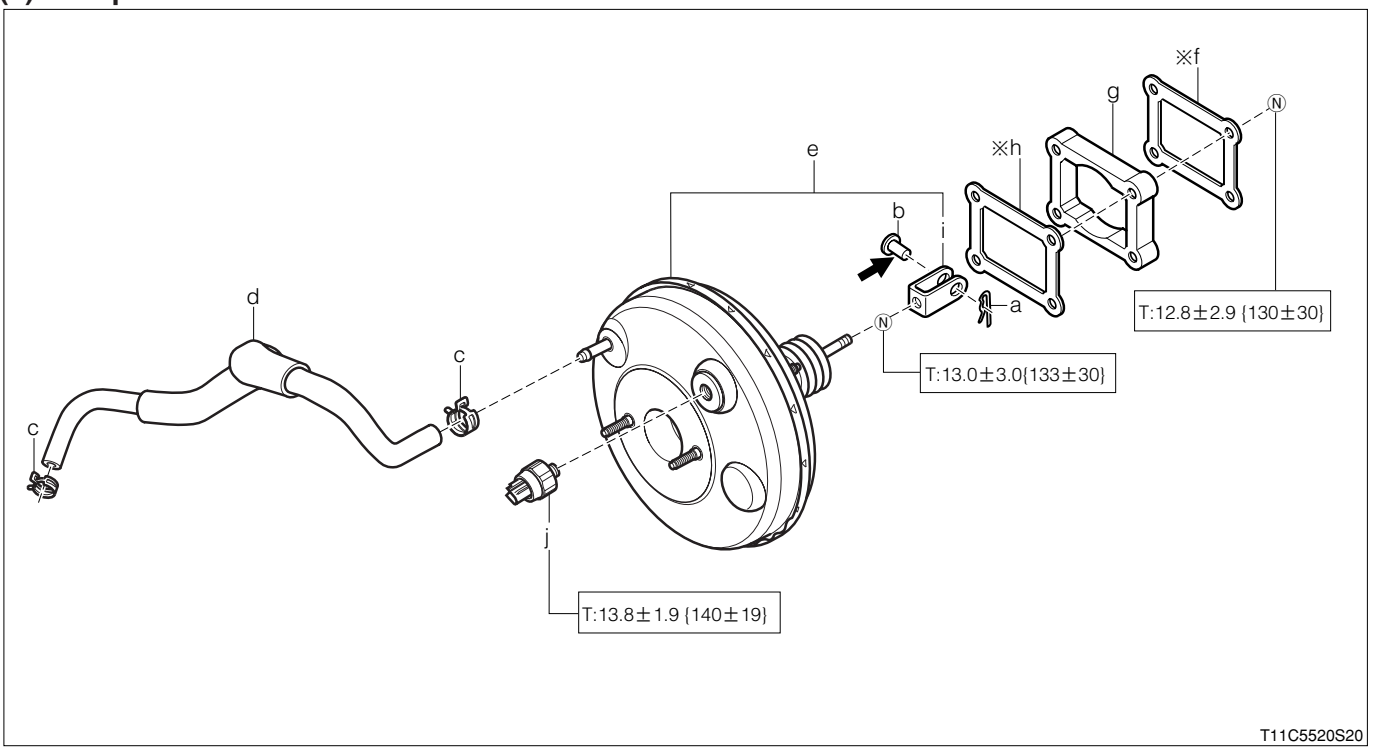
Unit: N·m{kgf·cm}
※: Non-reusable parts
➡: MP grease

(2) Removal and installation procedures

1 a Clip
2 b Pin, w/hole
3 c Clip
▲ 4 d Hose Ay, vacuum
5 e Booster Ay, brake
6 f Gasket, master cylinder bracket
7 g Clevis, master cylinder push rod
8 h SW Ay, vacuum

6-1-4 REMOVAL AND INSTALLATION PROCEDURES (LHD VEHICLES)

(1) Components



Unit: N·m{kgf·cm}
※: Non-reusable parts
➡: MP grease

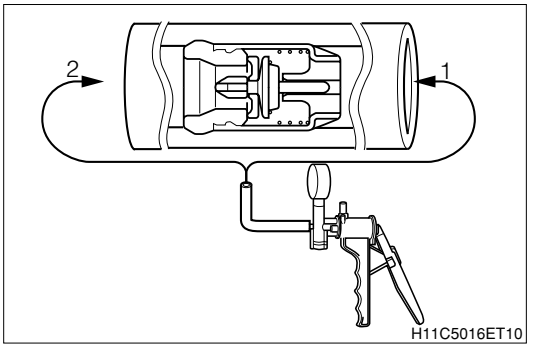
(2) Removal and installation procedures

1 a Clip
2 b Pin, w/hole
3 c Clip
▲ 4 d Hose Ay, vacuum
5 e Booster Ay, brake
6 f Gasket, master cylinder bracket (9-inch brake booster-equipped vehicles)
7 g Spacer, master cylinder (9-inch brake booster-equipped vehicles)
8 h Gasket, master cylinder bracket
9 i Clevis, master cylinder push rod
10 j SW Ay, vacuum

6-1-5 INSPECTION

(1) Hose Ay, vacuum

1.Connect a MityVac to the engine side (1). Then, check that air continuity exists from the booster side (2) to the engine side (1) (No negative pressure is applied).
2.Connect a MityVac to the booster side (2). Then, check that no air continuity exists from the engine side (1) to the booster side (2) (Negative pressure is applied).
3.Replace the hose Ay in case that the above condition is not satisfied.



(2) Booster Ay, brake

1.Check and adjust the push rod clearance of the brake booster Ay.
Refer to Page E1-18.

6-1-6 POINTS OF INSTALLATION

(1) Hose Ay, vacuum

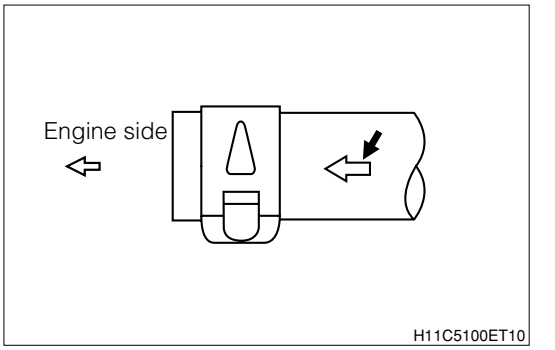
1.Install the hose Ay, using the following procedure.

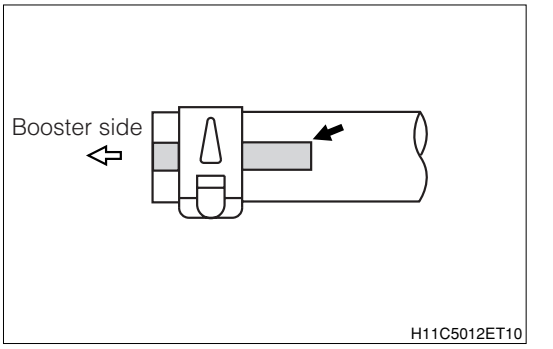
(1) The installation must be made in such a way that the side having the arrow-marked paint comes at the intake manifold Ay side of the engine Ay.

(2) If the mark is no longer visible, check continuity. The installation must be made in such a way that continuity exists from the brake booster Ay to the intake manifold Ay.

(3) The installation must be made in such a way that the arrow-marked paint comes at the upper side of the vehicle.

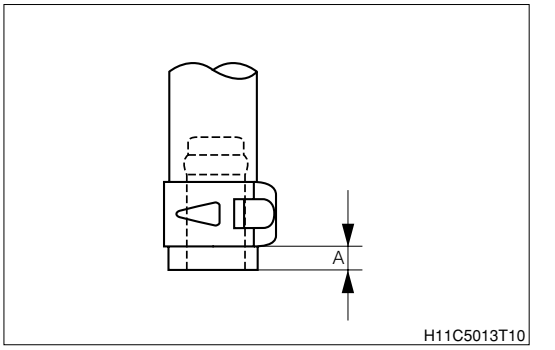
(4) Connection at the brake booster Ay side should be performed in such a way that the paint line faces the vehicle upward.





(5) Be sure to insert the hose Ay up to the stopper surface of the union.

(6) The installing position of the clip is such that point (A) in the figure comes within a range of 2 to 4.5 mm.



6-1-7 OPERATION AFTER INSTALLATION

1.Connect the connector of the vacuum SW Ay. (A/T vehicle)

2.Install the brake master cylinder S/A.
Refer to Page E1-18.

3.Install the instrument panel finish panel subassembly lower.
Refer to Page I2-23.

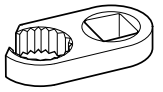
4.Check and adjust the brake pedal Ay.
Refer to Page E1-1.

7 PROPORTIONING VALVE (VEHICLES NOT EQUIPPED WITH ABS)

7-1 REMOVAL AND INSTALLATION

7-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09023-00100-000	Wrench,union nut

Tool

Brake pedal pusher

Instrument

Torque wrench

Lubricant,adhesive,others

Brake fluid(DOT3)

7-1-2 OPERATION BEFORE REMOVAL

1.Prevent brake fluid from flowing out, following the procedure given below.

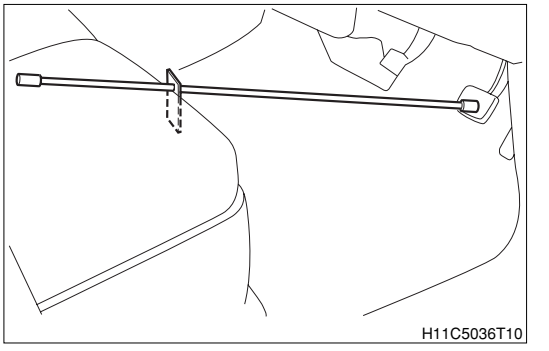
(1) Remove the disc wheels.

Refer to Page C3-3.

(2) Connect a bottle for air bleeding to the bleeder plug of the RH/LH front disc brake caliper Ay. Open the bleeder plug.

(3) Fully depress the brake pedal Ay. At this point, secure the brake pedal Ay.

TOOL: Brake pedal pusher



NOTE

- This causes the port of the brake master cylinder S/A to close. Therefore, any escape of brake fluid from the brake hydraulic circuit can be prevented.

(4) Close the bleeder plug of the front wheels at the right and left sides.

2.Remove the intake manifold Ay.

(1) Vehicle mounted with Type 1KR engine

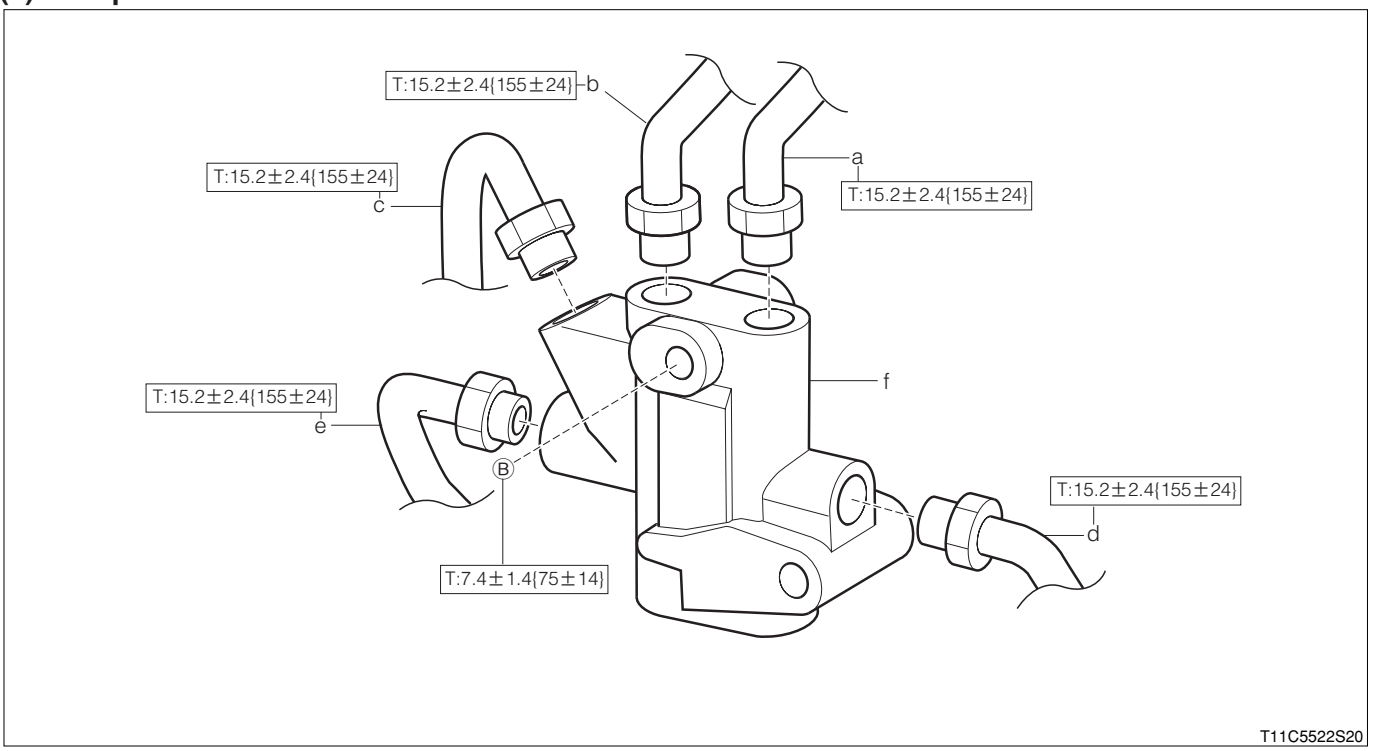
Refer to Page B3-5.

(2) Vehicle mounted with Type K3 engine

Refer to Page B3-14.

7-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit: N·m{kgf·cm}

(2) Removal and installation procedures

▼ ▲ 1 a Tube, rear brake, No.2
▼ ▲ 2 b Tube, rear brake, No.4
▼ ▲ 3 c Tube, front brake, No.2
▼ ▲ 4 d Tube, front brake, No.3
▼ ▲ 5 e Tube, front brake, No.1
6 f Valve Ay, proportioning

7-1-4 POINTS OF REMOVAL

(1) Tube, brake

1.Disconnect the tube from the proportioning valve Ay.
2.Plug the disconnected tube with the bleeder plug cap or the like.

7-1-5 POINTS OF INSTALLATION

(1) Tube, brake

1.Temporarily tighten the union nut by hand until the tube flare section contacts closely with the seat.
2.Using the SST, connect the tube to the proportioning valve Ay and tighten it to the specified torque.
SST: 09023-00100-000

7-1-6 OPERATION AFTER INSTALLATION

1.Remove the intake manifold Ay.
(1) Vehicle mounted with Type 1KR engine
Refer to Page B3-5.

(2) Vehicle mounted with Type K3 engine
Refer to Page B3-14.

2.Release the securing of the brake pedal Ay.
3.Perform air bleeding of the brake.
Refer to Page E1-4.

4.Remove the disc wheels.
Refer to Page C3-3.

5.Jack down the vehicle.

8 BRAKE HOSE

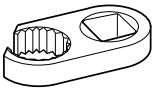
8-1 REMOVAL AND INSTALLATION (FRONT)

CAUTION

- Care must be exercised so that no brake fluid may adhere to the paint surface. If brake fluid is adhered to the paint surface, immediately wipe it out and wash it with water.
- Never reuse the wiped-out brake fluid.
- Care must be exercised so that no brake fluid or oil, etc. may adhere to the flexible hose.

8-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09023-00100-000	Wrench,union nut

Tool

Brake pedal pusher

Instrument

Torque wrench

Lubricant,adhesive,others

Brake fluid(DOT3)

8-1-2 OPERATION BEFORE REMOVAL

1.Remove the disc wheels. (Front)
Refer to Page C3-3.

2.Prevent brake fluid from flowing out, using the following procedure.

(1) Connect a bottle for air bleeding to the bleeder plug of the RH/LH front disc brake caliper Ay. Open the bleeder plug.

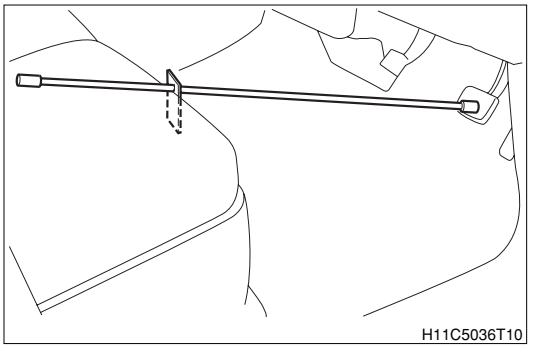
(2) Fully depress the brake pedal. At this point, secure the brake pedal Ay.

TOOL: Brake pedal pusher

NOTE

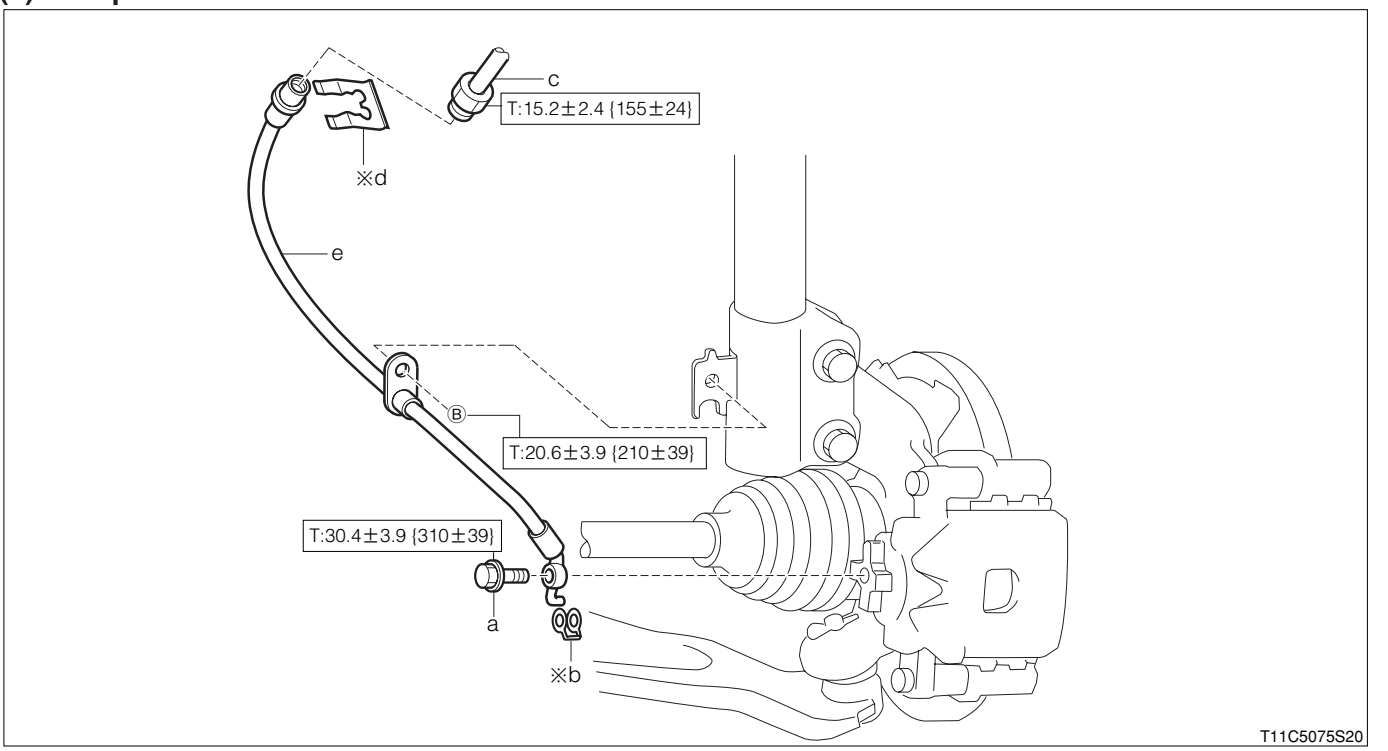
- This causes the port of the brake master cylinder S/A to close. Therefore, any escape of brake fluid from the brake hydraulic circuit can be prevented.

(3) Close the bleeder plug of the RH/LH front disc brake caliper Ay.



8-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit: N·m{kgf·cm}
※: Non-reusable parts

(2) Removal procedures

1 a Bolt, union
2 b Gasket, fiexible hose
▼ 3 c Tube, front brake, No.2(RH)/No.4(LH)
4 d Clamp
5 e Hose, fiexible

(3) Installation procedures

▲ 1 c Tube, front brake No.2(RH)/No.4(LH)
▲ 2 e Hose, flexible
▲ 3 d Clamp
4 b Gasket, flexible hose
5 a Bolt, union

8-1-4 POINTS OF REMOVAL

(1) Tube, front brake

1.Disconnect the tube from the flexible hose.
2.Plug the disconnected tube with the bleeder plug cap or the like.

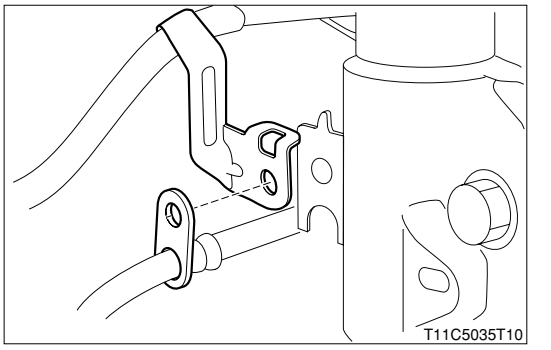
8-1-5 POINTS OF INSTALLATION

(1) Tube, front brake

1.Temporarily tighten the union nut until the tube flare section contacts closely with the seat.

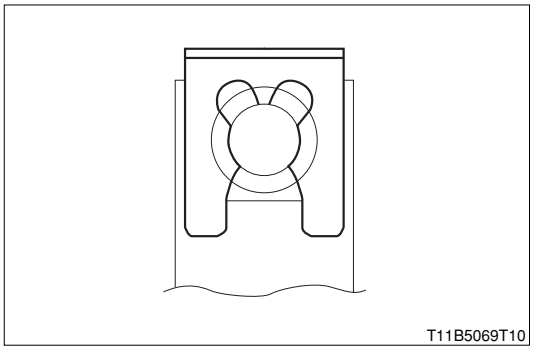
(2) Hose, flexible

1.Install the hose bracket as indicated in the right figure so that it may be interposed by the RH/LH front speed sensor brackets.



(3) Clamp

1.Positively insert the clamp until it touches the hose metal fitting. Be very careful not to mistake the installing direction.



(4) Tube, front brake

1.Using the SST, connect the tube to the RH/LH flexible hose and tighten it to the specified torque.
SST: 09023-00100-000

8-1-6 OPERATION AFTER INSTALLATION

1.Release the securing of the brake pedal Ay.
2.Perform air bleeding of the brake.
Refer to Page E1-4.

3.Install the disc wheels. (Front)
Refer to Page C3-3.

4.Confirm that there is no brake dragging.
Refer to Page E1-3.

5.Jack down the vehicle.

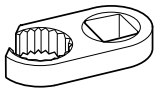
8-2 REMOVAL AND INSTALLATION (REAR)

CAUTION

- Care must be exercised so that no brake fluid may adhere to the paint surface. If brake fluid is adhered to the paint surface, immediately wipe it out and wash it with water.
- Never reuse the wiped-out brake fluid.
- Care must be exercised so that no brake fluid or oil, etc. may adhere to the flexible hose.

8-2-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09023-00100-000	Wrench,union nut

Tool

Brake pedal pusher

Instrument

Torque wrench

Lubricant,adhesive,others

Brake fluid(DOT3)

8-2-2 OPERATION BEFORE REMOVAL

1.Remove the disc wheels. (Rear)
Refer to Page C3-3.

2.Prevent brake fluid from flowing out, using the following procedure.

(1) Connect a bottle for air bleeding to the bleeder plug of the rear wheel brake cylinder Ay. Open the bleeder plug,

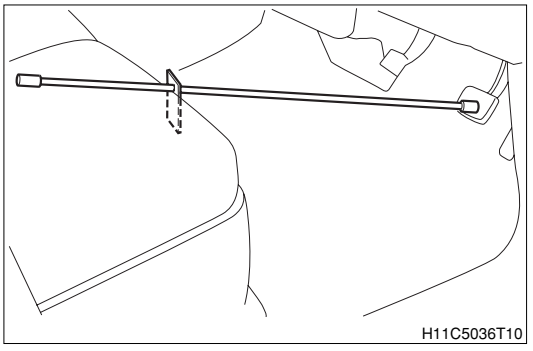
(2) Fully depress the brake pedal Ay. At this point, secure the brake pedal Ay.

TOOL: Brake pedal pusher

NOTE

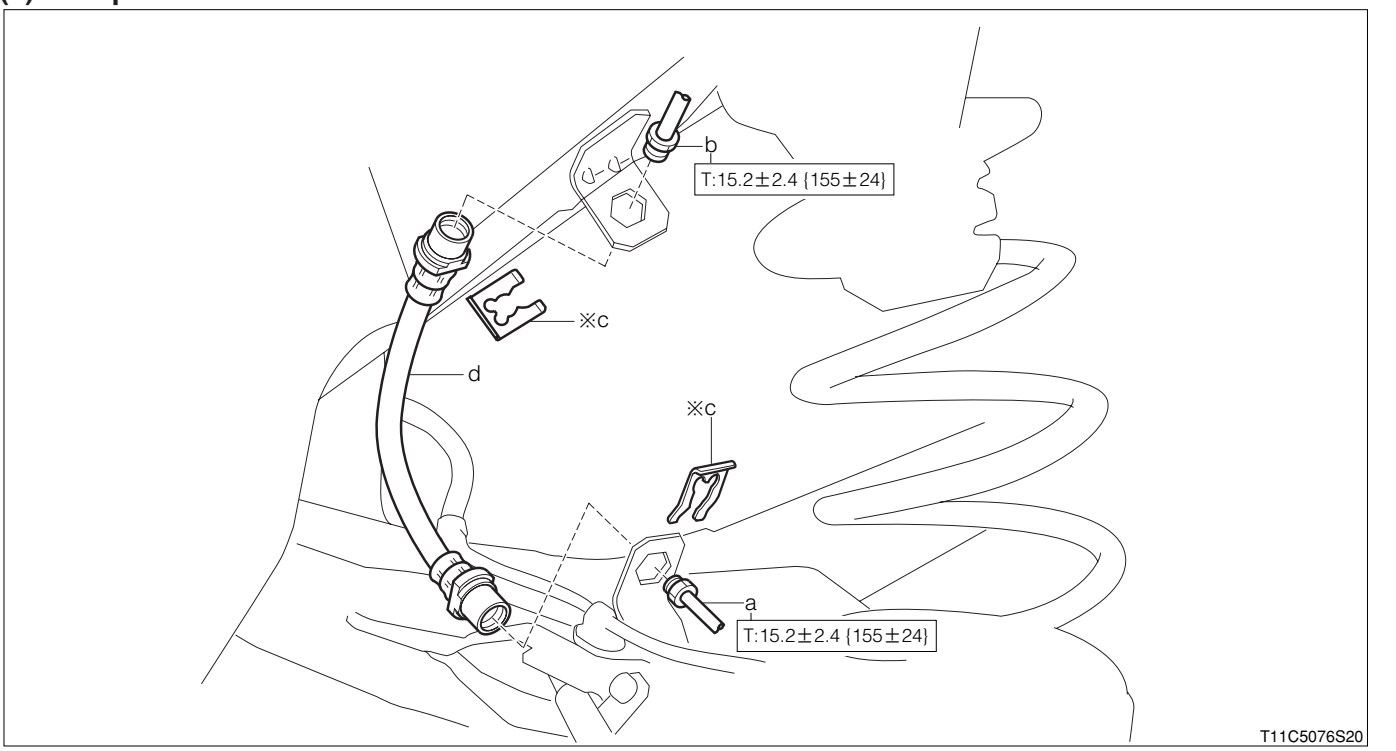
- This causes the port of the brake master cylinder S/A to close. Therefore, any escape of brake fluid from the brake hydraulic circuit can be prevented.

(3) Close the bleeder plug of the rear wheel brake cylinder Ay.



8-2-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit: N·m{kgf·cm}
※: Non-reusable parts

(2) Removal procedures

▼ 1 a Tube, rear brake No.5(RH)/No.6(LH)
▼ 2 b Tube, rear brake, No.2(RH)/No.4(LH)
3 c Clamp
4 d Hose, flexible

(3) Installation procedures

1 d Hose, flexible
▲ 2 b Tube, rear brake, No.2(RH)/No.4(LH)
▲ 3 a Tube, rear brake No.5(RH)/No.6(LH)
▲ 4 c Clamp

8-2-4 POINTS OF REMOVAL

(1) Tube, rear brake

1.Disconnect the tube from the flexible hose.
2.Plug the disconnected tube with the bleeder plug cap or the like.

8-2-5 POINTS OF INSTALLATION

(1) Tube, rear brake

1.Temporarily tighten the union nut by hand until the tube flare section contacts closely with the seat.

(2) Clamp

1.Positively insert the clamp until it touches the hose metal fitting. Be very careful not to mistake the installing direction.

(3) Tube, rear brake

1.Using the SST, connect the tube to the flexible hose and tighten it to the specified torque.
SST: 09023-00100-000

8-2-6 OPERATION AFTER INSTALLATION

1.Release the securing of the brake pedal Ay.
2.Perform air bleeding of the brake.
Refer to Page E1-4.

3.Install the disc wheels. (Rear)
Refer to Page C3-3.

4.Confirm that there is no brake dragging.
Refer to Page E1-3.

5.Jack down the vehicle.

9 FRONT DISC BRAKE PAD

9-1 REMOVAL AND INSTALLATION

CAUTION

- Care must be exercised so that no oil, grease, etc. may adhere to the sliding surface between the disc brake pad and the front disc.
- Care must be exercised so that no brake fluid may adhere to the paint surface. If brake fluid is adhered to the paint surface, immediately wipe it out and wash it with water.

9-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

Wire

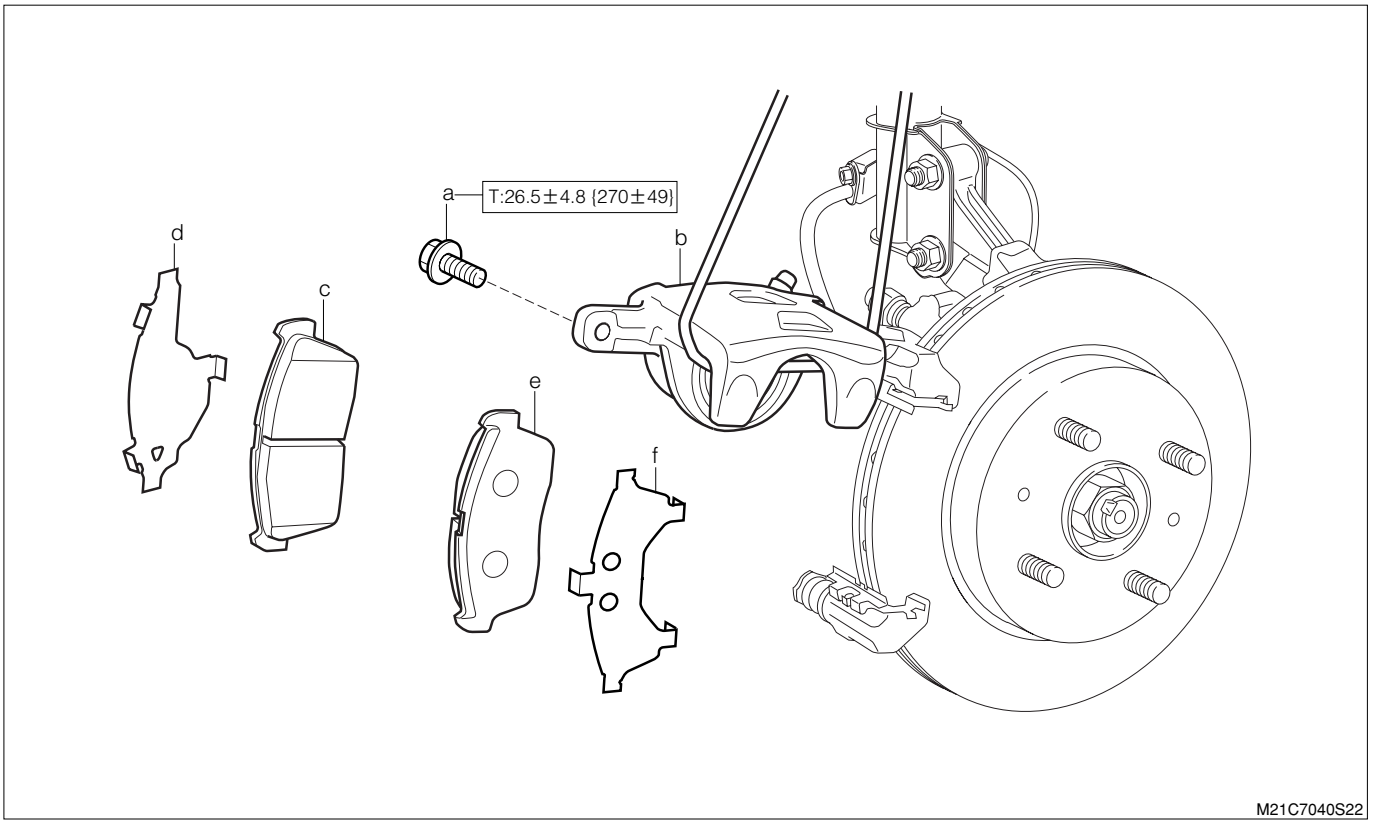
9-1-2 OPERATION BEFORE REMOVAL

1.Remove the disc wheels. (Front)

Refer to Page C3-3.

9-1-3 REMOVAL AND INSTALLATION PROCEDURES(FRONT DISC 234MM DAI)

(1) Components



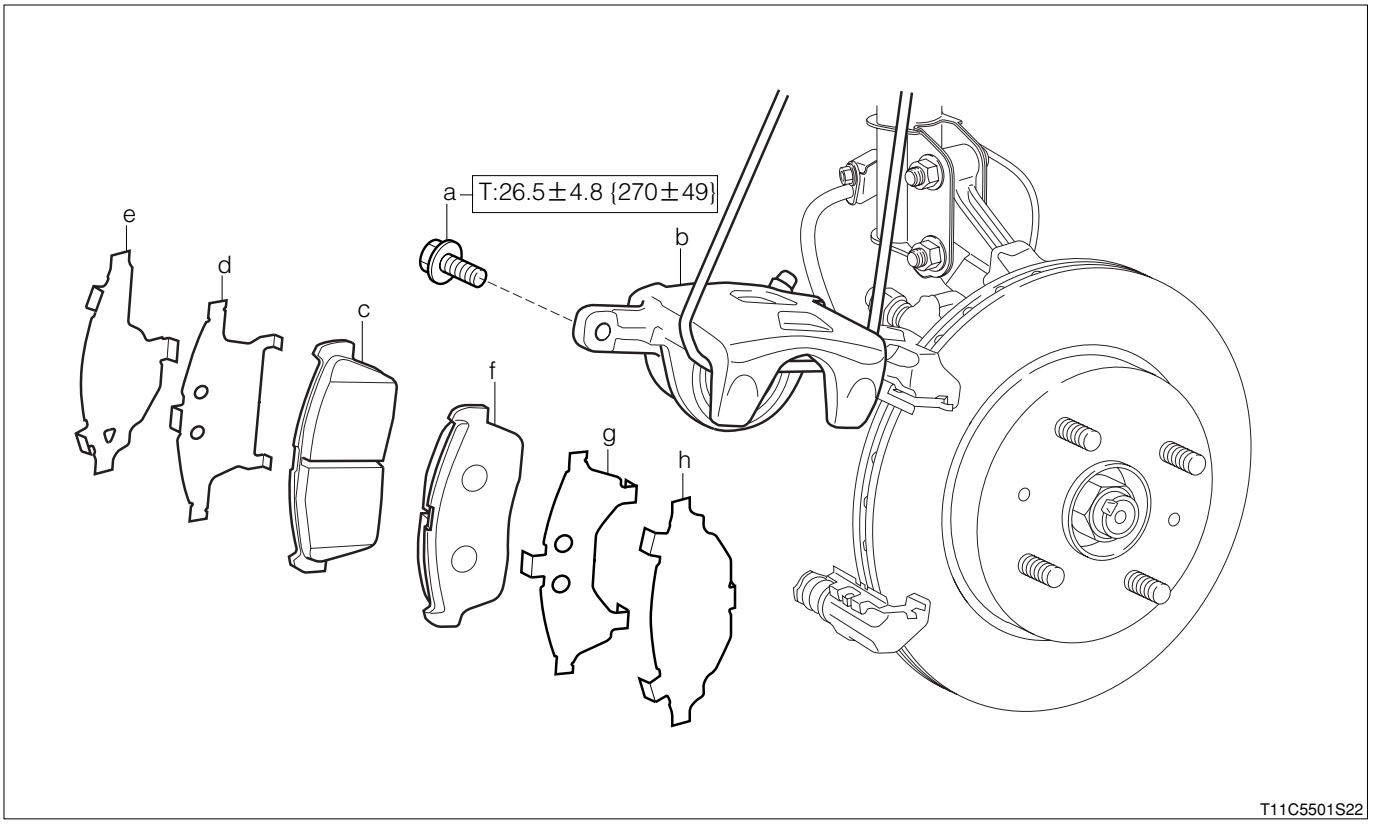
Unit:N·m{kgf·cm}

(2) Removal and installation procedures

		1	a	Bolt,disc brake cylinder	
▼	▲	2	b	Cylinder Ay, disc brake, RH/LH	
	▲	3	c	Pad, disc brake, No.1	
		4	d	Shim, anti squeal, No.3	
		5	e	Pad, disc brake, No.2	
		6	f	Shim, anti squeal, No.2	

9-1-4 REMOVAL AND INSTALLATION PROCEDURES(FRONT DISC 246MM DAI)

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

	1	a	Bolt, disc brake cylinder	6	f Pad, disc brake, No.2
▼ ▲	2	b	Cylinder Ay, diac brake, RH/LH	7	g Shim, anti squeal, No.2
▲	3	c	Pad, disc brake W/wear indicator, No.1	8	h Shim, anti squeal, No.4
	4	d	Shim, anti squeal, No.1		
	5	e	Shim, anti squeal, No.3		

9-1-5 POINTS OF REMOVAL

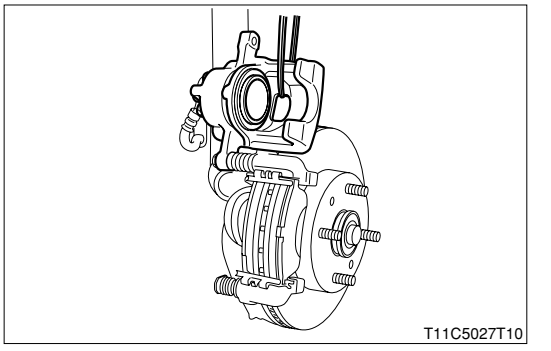
(1) Cylinder Ay, disc brake, RH/LH

1.After removing the disc brake cylinder bolt, raise the cylinder Ay.

2.Suspend the cylinder assembly, using a wire or the like.

CAUTION

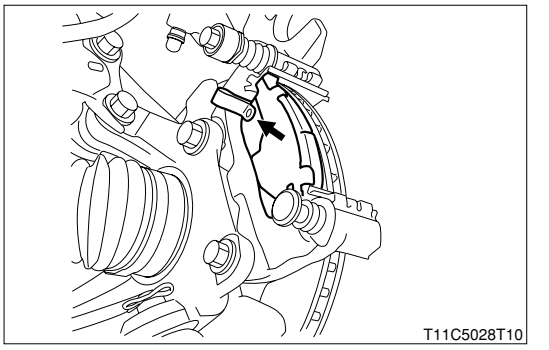
- Do not pull the flexible hose. Also, be very careful not to damage the flexible hose.



9-1-6 POINTS OF INSTALLATION

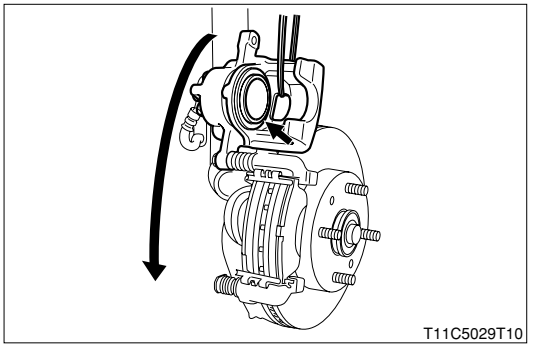
(1) Pad, disc brake, No.1 / Pad, disk brake W/wear indicator, No.1

1.Install the pad with a wear indicator at the inner side of the vehicle. At this time, make sure that the wear indicator comes at the vehicle upper side during the installation.


T11C5028T10

(2) Cylinder Ay, disc brake, RH/LH

1.Check the brake fluid level of the brake master reservoir S/A.
2.Slowly push the disc brake piston.
3.Ensure that no brake fluid is leaking from the brake master reservoir S/A.
4.Remove the wire that has been supporting the cylinder assembly and return the cylinder assembly to the original position.


T11C5029T10

9-1-7 OPERATION AFTER INSTALLATION

1.Depress the brake pedal Ay several times so that the brake disc piston of the disc brake cylinder Ay RH/LH may be pushed out.
2.Check the brake fluid level of the brake master reservoir S/A.
Refer to Page E1-3.

3.Install the disc wheels. (Front)
Refer to Page C3-3.

4.Confirm that there is no brake dragging.
Refer to Page E1-3.

5.Jack down the vehicle.

10 FRONT DISC CALIPER

10-1 REMOVAL AND INSTALLATION

CAUTION

- Care must be exercised so that no brake fluid may adhere to the paint surface. If brake fluid is adhered to the paint surface, immediately wipe it out and wash it with water.
- Never reuse the wiped-out brake fluid.
- Care must be exercised so that no oil, grease, etc. may adhere to the sliding surface between the disc brake pad and the front disc.

10-1-1 ARTICLES TO BE PREPARED

Tool

Brake pedal pusher

Instrument

Torque wrench

Lubricant,adhesive,others

Brake fluid(DOT3)

10-1-2 OPERATION BEFORE REMOVAL

1.Remove the disc wheels. (Front)
Refer to Page C3-3.

2.Prevent brake fluid from flowing out, using the following procedure.

(1) Connect a bottle for air bleeding to the bleeder plug of the RH/LH front disc brake caliper Ay. Open the bleeder plug.

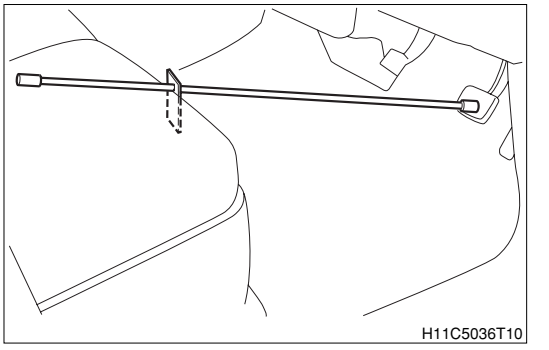
(2) Fully depress the brake pedal. At this point, secure the brake pedal Ay.

TOOL: Brake pedal pusher

NOTE

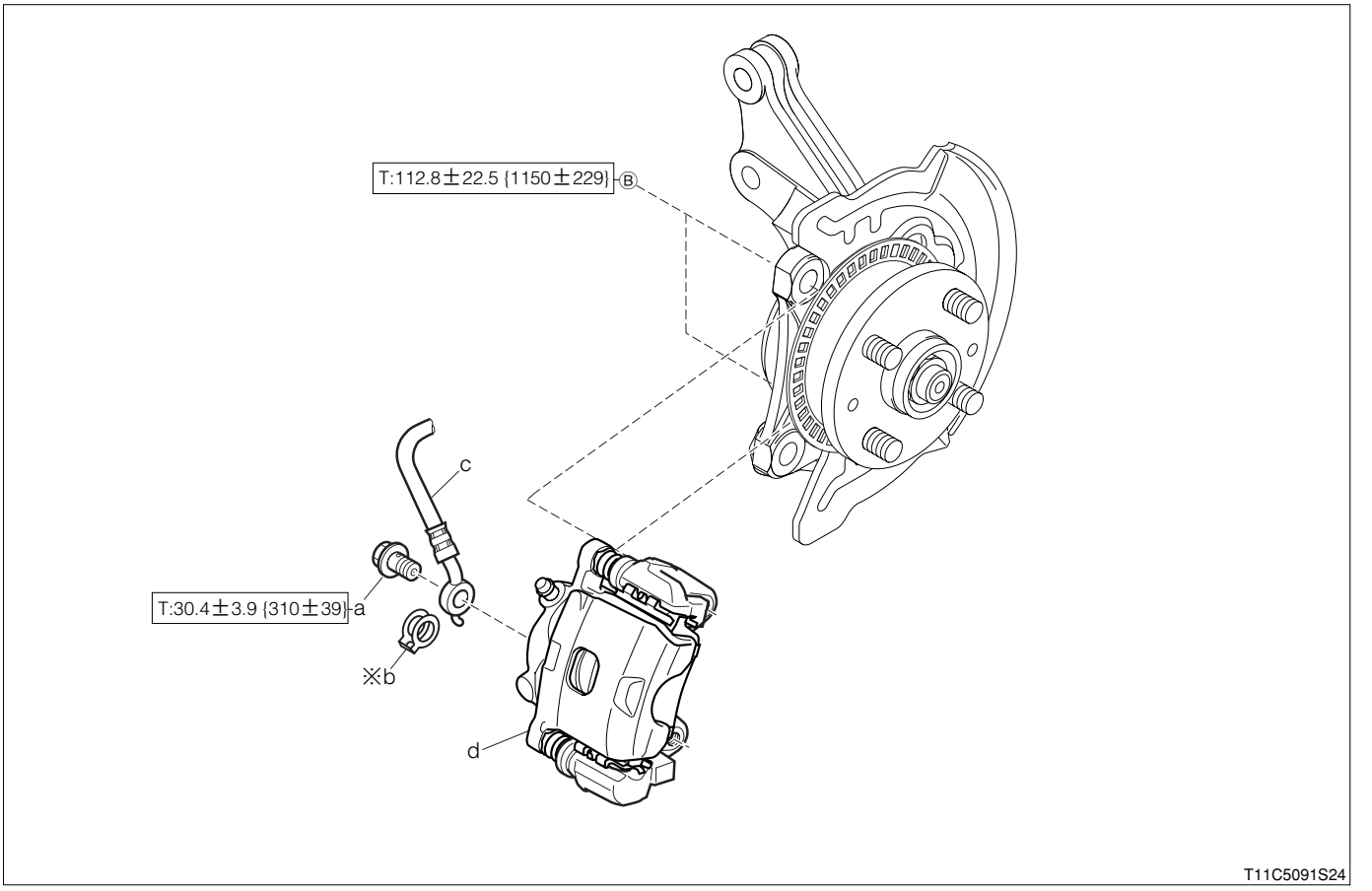
- This causes the port of the brake master cylinder S/A to close. Therefore, any escape of brake fluid from the brake hydraulic circuit can be prevented.

(3) Close the bleeder plugs of the front RH/LH disc brake caliper Ay.



10-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit: N·m{kgf·cm}
※: Non-reusable parts

(2) Removal and installation procedures

1 a Bolt, union
2 b Gasket, flexible, hose
3 c Hose, flexible
4 d Caliper Ay, disc brake, front RH/LH

10-1-4 OPERATION AFTER INSTALLATION

1.Release the securing of the brake pedal Ay.
2.Perform air bleeding of the brake.
Refer to Page E1-4.

3.Install the disc wheels. (Front)
Refer to Page C3-3.

4.Confirm that there is no brake dragging.
Refer to Page E1-3.

5.Jack down the vehicle.

10-2 DISASSEMBLING AND ASSEMBLING

WARNING

- Be sure to wear protective goggles when using compressed air.

CAUTION

- Never reuse the wiped-out brake fluid.
- Care must be exercised so that no oil, grease, etc. may adhere to the sliding surface between the disc brake pad and the front disc.

10-2-1 ARTICLES TO BE PREPARED

Instrument

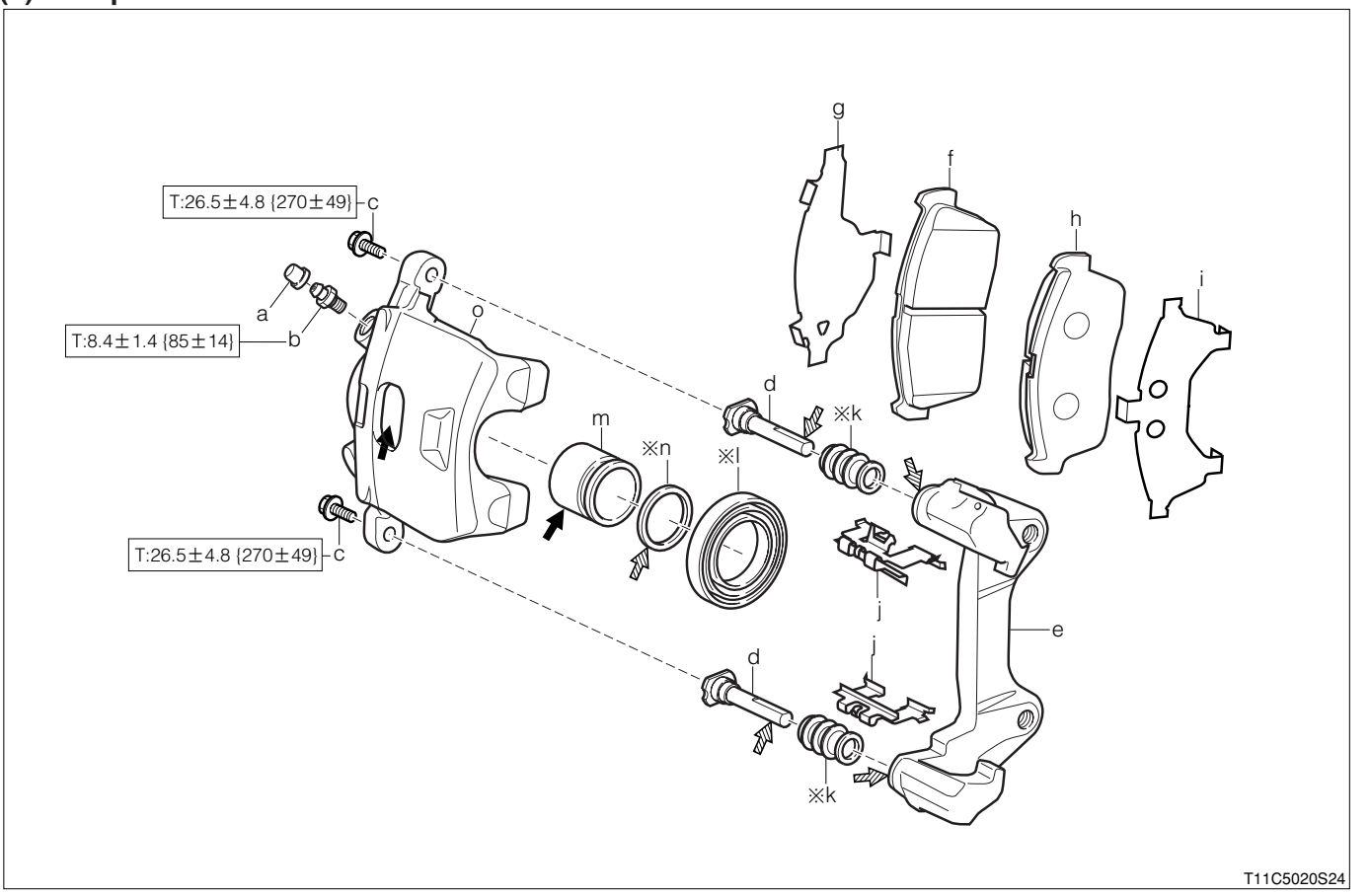
Torque wrench

Lubricant, adhesive, others

Brake fluid(DOT3),Brake grease,Cloth

10-2-2 DISASSEMBLY AND ASSEMBLY PROCEDURES(FRONT DISC 234MM DAI)

(1) Components



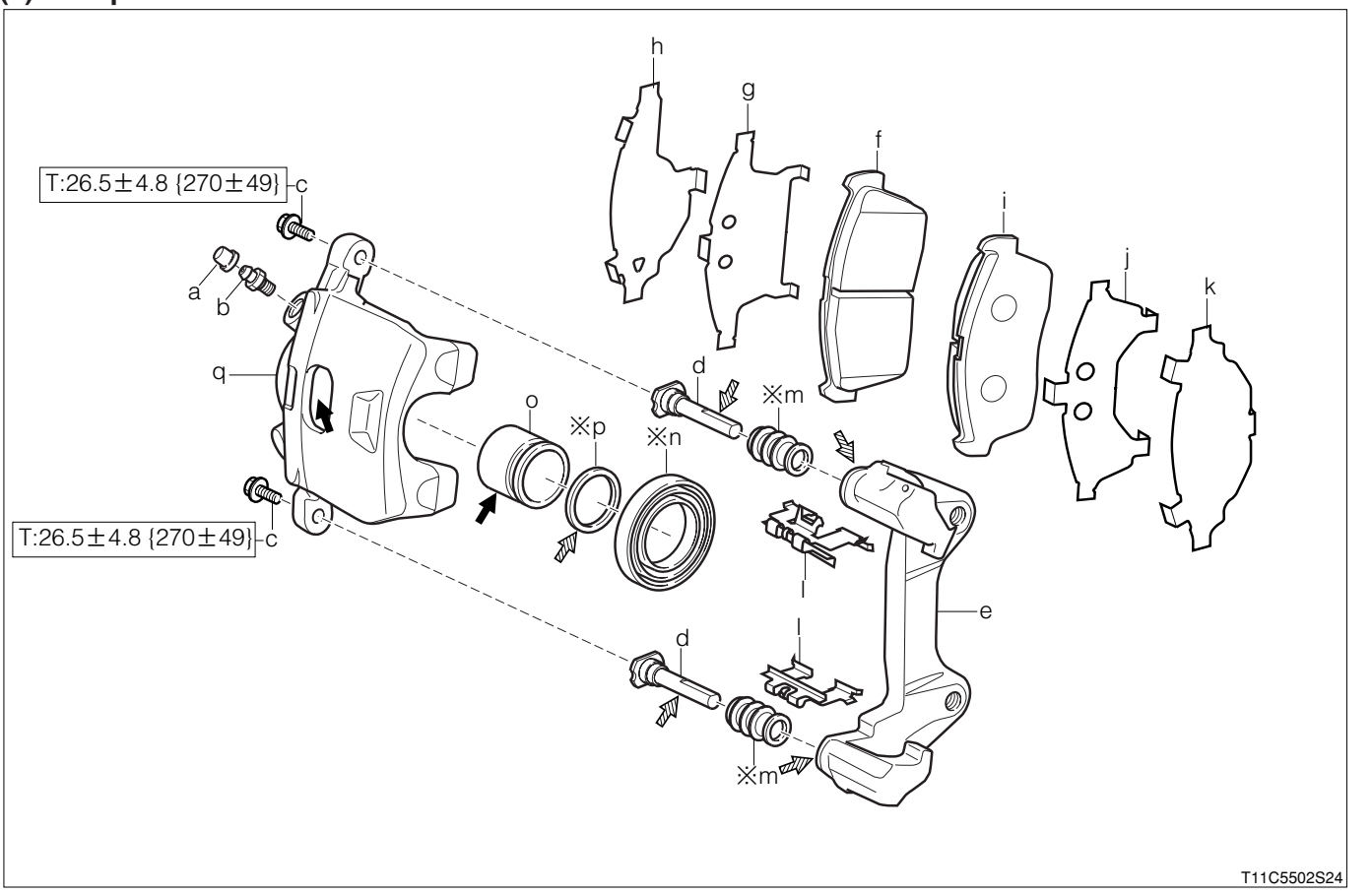
Unit: N·m{kgf·cm}
※: Non-reusable parts
➡: Brake fluid (Equivalent to DOT3)
⇨: Brake grease

(2) Disassembling and assembling procedure

	1	a	Cap, bleeder plug	9	i	Shim, anti squeal, No.2
	2	b	Plug, bleeder	10	j	Plate, disc brake pad guide
	3	c	Bolt,disc brake cylinder	11	k	Boot, pin
▲	4	d	Pin, cylinder slide	▲	12	l	Boot, cylinder
▲	5	e	Mounting, disc brake cylinder	▼ ▲	13	m	Piston, disc brake
▲	6	f	Pad, disc brake, No.1	▼ ▲	14	n	Seal, piston
	7	g	Shim, anti squeal, No.3		15	o	Cylinder, disc brake, RH/LH
	8	h	Pad, disc brake, No.2				

10-2-3 DISASSEMBLY AND ASSEMBLY PROCEDURES(FRONT DISC 246MM DAI)

(1) Components



Unit: N·m{kgf·cm}
※: Non-reusable parts
➡: Brake fluid (Equivalent to DOT3)
⇨: Brake grease

(2) Disassembly and assembly procedures

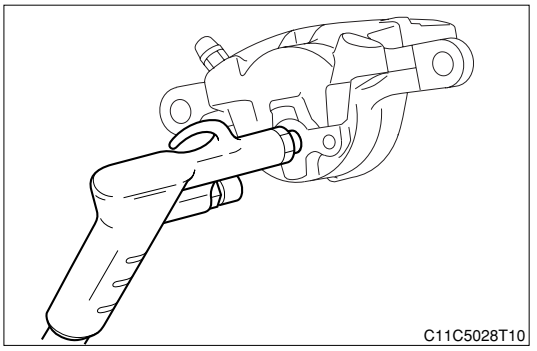
	1	a	Cap, bleeder plug		
	2	b	plug, bleeder		
	3	c	Bolt,disc brake cylinder		
▲	4	d	Pin, cylinder slide		
▲	5	e	Mounting, disc brake cyinder		
▲	6	f	Pad, disc brake W/wear indicator, No.1		
	7	g	Shim, anti squeal, No.1		
	8	h	Shim, anti squeal, No.3		
	9	i	Pad, disc brake, No.2		
	10	j	Shim, anti squeal, No.2		
	11	k	Shim, anti squeal, No.4		
	12	l	Piate, disc brake pad guide		
	13	m	Boot, pin		
▲	14	n	Boot, cylinder		
▼	▲	15	o	Piston, disc brake	
▼	▲	16	p	Seal, piston	
	17	q	Cylinder, disc brake, RH/LH		

10-2-4 POINTS OF DISASSEMBLY

(1) Piston, disc brake

1.Drain the residual brake fluid in the disc brake cylinder RH/LH from the flexible hose installation section.

2.To prevent damages, be sure to interpose a cloth or the like in the disc brake cylinder Rh/LH. While holding the bleeder plug installation section, apply compressed air from the flexible hose installation section in order to pull out the piston.


C11C5028T10

WARNING

- Care must be exercised to prevent your finger from being pinched by the piston that may jump up strongly.

CAUTION

- Care must be exercised to ensure that the bore of the RH/LH disc brake cylinder may not be scored.

(2) Seal, piston

1.Remove the seal from the disc brake piston, using a toothpick or the like.

10-2-5 POINTS OF ASSEMBLY

Prior to the assembling, wash each part with brake fluid that is the same as the one to be used.

LUBRICANT: Brake fluid(DOT3)

(1) Seal, piston

1.Apply brake grease to the entire periphery of the inner and outer surfaces of the seal.

LUBRICANT: Brake grease

2.Securely assemble the piston seal into the groove of the disc brake cylinder RH/LH in such a way that the seal may not be twisted.

(2) Piston, disc brake

1.Apply brake fluid to the cylinder inner surface of the disc brake cylinder RH/LH.

2.Apply brake fluid to the outer periphery of the piston.

LUBRICANT: Brake fluid(DOT3)

3.Assemble the piston to the disc brake cylinder RH/LH by your hand.

CAUTION

- Be sure to insert the piston straight. Be very careful not to insert it diagonally nor push it with an excessive force.

(3) Boot, cylinder

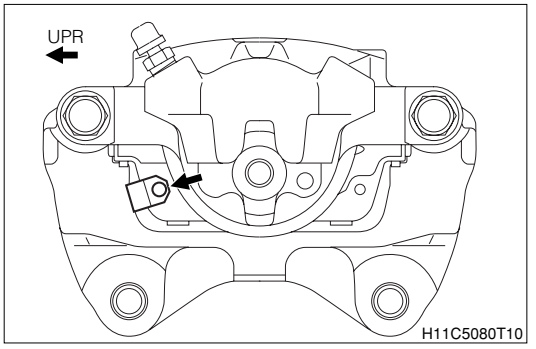
1.Attach the boot to the groove at the edge of the disc brake piston.

2.Securely install the boot to the boot groove at the bore surface of the RH/LH disc brake cylinders.

3.Ensure that the boot is securely installed in the boot groove.

(4) Pad, disc brake, No.1/Pad, disk brake w/wear indicator, No.1

1.Install the pad with a wear indicator at the inner side of the vehicle. At this time, make sure that the wear indicator comes at the vehicle upper side during the installation.



H11C5080T10

(5) Mounting, disc brake cylinder

1.Apply brake grease to the pin boot installation groove of the mounting and the inner periphery of the cylinder slide pin sliding hole.
LUBRICANT: Brake grease

(6) Pin, cylinder slide

1.Apply brake grease to the pin boot installation groove of the pin and the entire periphery of the sliding section.
LUBRICANT: Brale grease

11 FRONT BRAKE DISC

11-1 REMOVAL AND INSTALLATION

CAUTION

- Care must be exercised so that no oil, grease, etc. may adhere to the sliding surface between the disc brake pad and the front disc.

11-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

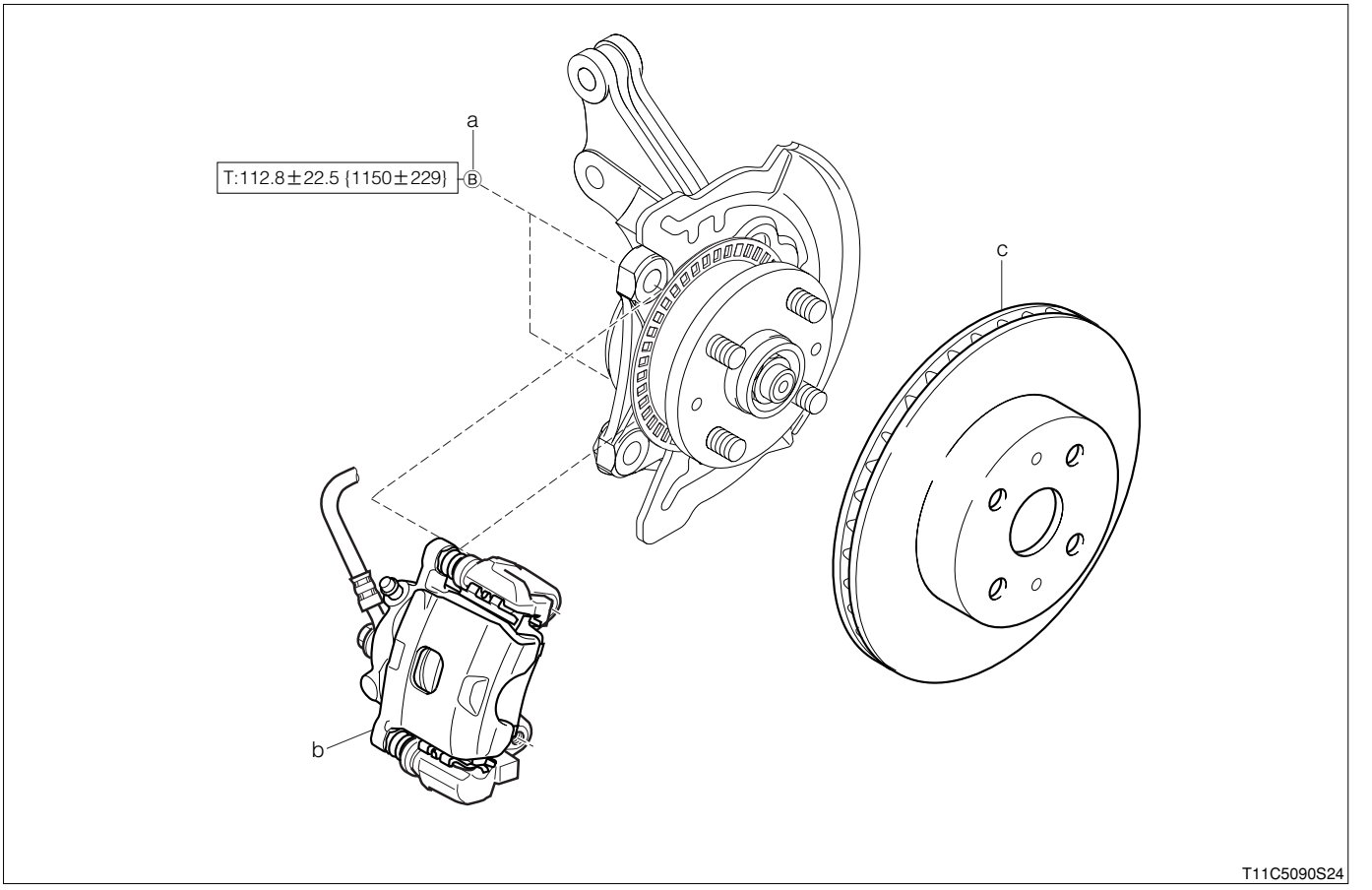
Wire

11-1-2 OPERATION BEFORE REMOVAL

1.Remove the disc wheels. (Front)
Refer to Page C3-3.

11-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

		1	a Bolt, washer based head hexagon
▼	▲	2	b Caliper Ay, disc brake, front RH/LH
▼		3	c Disc, front

11-1-4 POINTS OF REMOVAL

(1) Caliper Ay, disc brake, front RH/LH

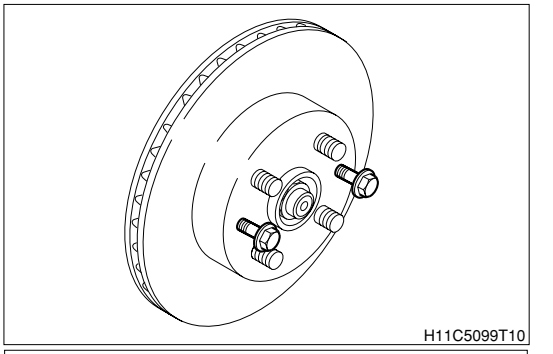
1.Remove the caliper Ay from the RH/LH steering knuckles. Suspend it with a wire or the like.

CAUTION

- Do not pull the flexible hose. Also, be very careful not to damage the flexible hose.

(2) Disc, front

1.If the disc cannot be removed because it has seized to the front axle hub S/A, screw two appropriate bolts (M8×1.25) in the screw holes of the disc, thus removing the disc.


H11C5099T10

11-1-5 POINTS OF INSTALLATION

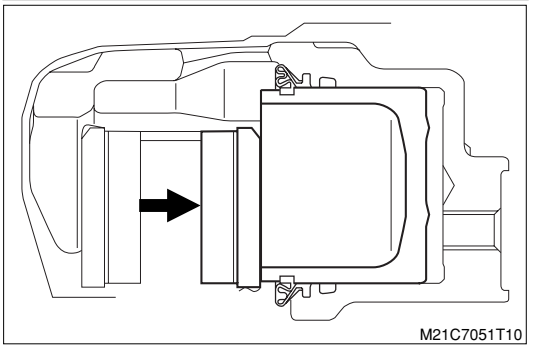
(1) Caliper Ay, Disc brake, front RH/LH

1.Check the brake fluid level of the brake master reservoir S/A.

2.Slowly push the disc brake piston.

3.Ensure that no brake fluid is leaking from the brake master reservoir S/A.

4.Remove the wire suspending the caliper Ay. Install the caliper Ay to the RH/LH steering knuckles.


M21C7051T10

11-1-6 OPERATION AFTER INSTALLATION

1.Depress the brake pedal Ay several times so that the brake disc piston of the disc brake cylinder Ay RH/LH may be pushed out.

2.Check the brake fluid level of the brake master reservoir S/A.
Refer to Page E1-3.

3.Install the disc wheels. (Front)
Refer to Page C3-3.

4.Confirm that there is no brake dragging.
Refer to Page E1-3.

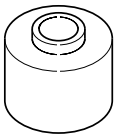
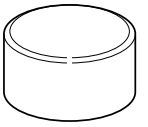
5.Jack down the vehicle.

12 FRONT BREAK DUST COVER

12-1 REMOVAL AND INSTALLATION

12-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09506-87302-000	Replacer,differential drive pinion bearing corn,rear
	09718-87701-000	Replacer,dust cover

12-1-2 OPERATION BEFORE REMOVAL

1.Remove the disc wheels. (Front)
Refer to Page C3-3.

2.Remove the front speed sensor RH/LH.
Refer to Page E3-4.

3.Remove the front disc brake caliper assembly RH/LH from the steering knuckle RH/LH without cutting the brake pipe. Then, suspend the front brake caliper assembly, RH/LH using a wire or the like.

CAUTION

- Do not pull the flexible hose. Also, be very careful not to damage the flexible hose.

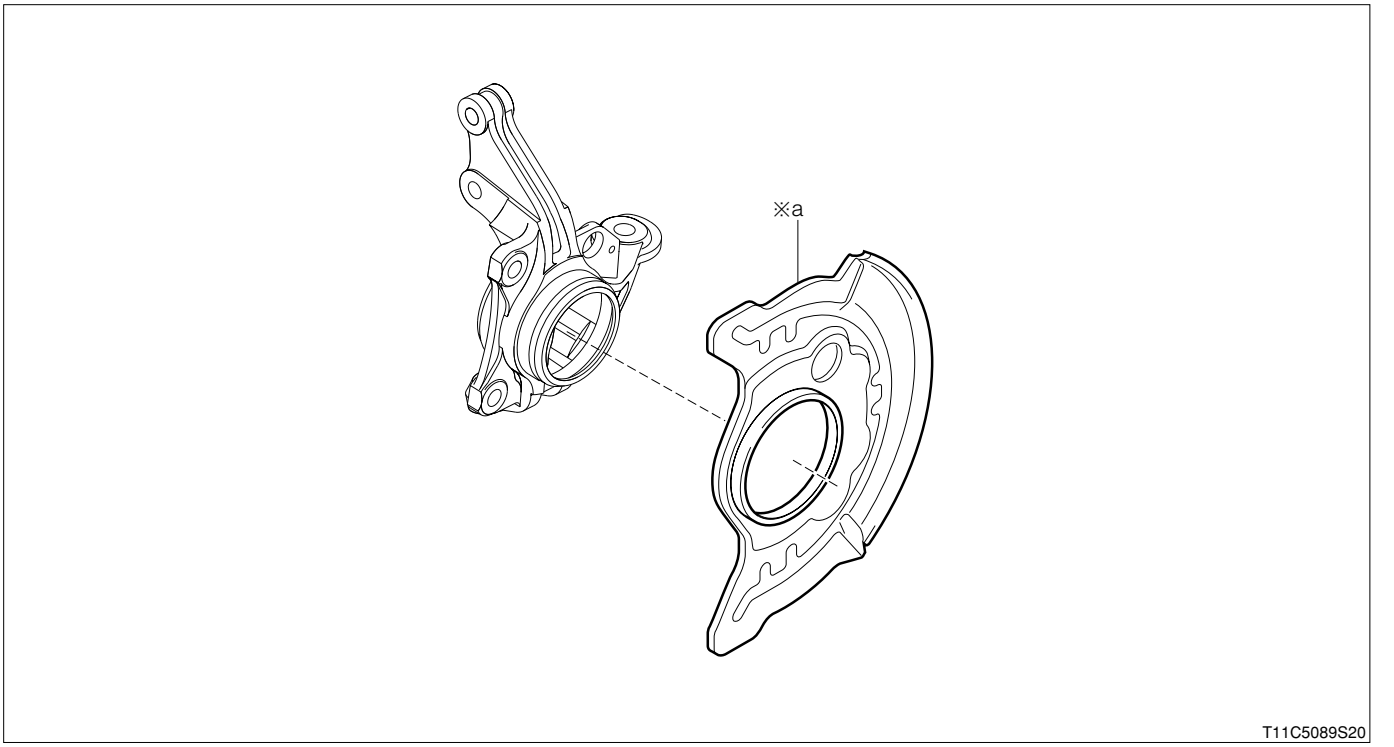
Refer to Page E1-53.

4.Remove the front disc.
Refer to Page E1-60.

5.Remove the front axle hub subassembly. Then, remove the steering knuckle RH/LH together with the radial ball bearing and disc brake dust front cover.
Refer to Page D2-2.

12-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※: Non-reusable parts

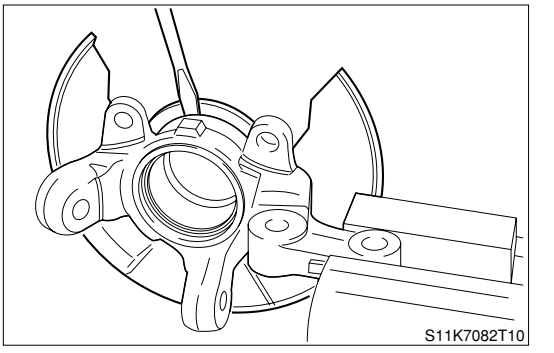
(2) Removal and installation procedures

▼ ▲ 1 a Cover, disc brake dust, front RH/LH

12-1-4 POINTS OF REMOVAL

(1) Cover, disc brake dust, front RH/LH

1.Lightly tap the outer periphery to make a clearance. Then, remove the cover, using a flat screwdriver or the like.

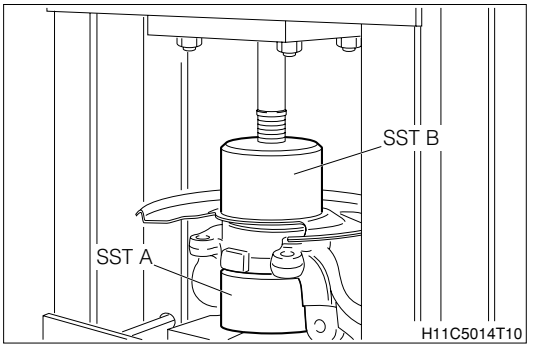


12-1-5 POINTS OF INSTALLATION

(1) Cover, disc brake dust, front RH/LH

1.Install the disc cover to the steering knuckle, using a press in combination with the SST.

SST: 09506-87302-000:A
09718-87701-000:B



12-1-6 OPERATION AFTER INSTALLATION

1. Install the steering knuckle RH/LH together with the radial ball bearing and disc brake dust front cover RH/LH.
2. Install the front axle hub subassembly.
   Refer to Page D2-2.
3. Remove the front disc.
   Refer to Page E1-60.
4. Install the front disc brake caliper assembly RH/LH.
   Refer to Page E1-53.
5. Install the front speed sensor RH/LH.
   Refer to Page E3-4.
6. Install the disc wheels. (Front)
   Refer to Page C3-3.
7. Check and adjust the front wheel alignment.
   Refer to Page C1-1.

13 REAR BRAKE DRUM

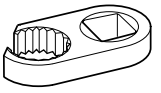
13-1 REMOVAL AND INSTALLATION

CAUTION

- Care must be exercised so that no brake fluid may adhere to the paint surface. If brake fluid is adhered to the paint surface, immediately wipe it out and wash it with water.
- Care must be exercised so that no lubricant, etc. may adhere to the sliding surfaces of the brake shoe linings and brake drums.

13-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09023-00100-000	Wrench,union nut

Tool

Long TORX® wrench T55,Brake pedal pusher

Instrument

Torque wrench

Lubricant,adhesive,others

Brake fluid(DOT3),Brake grease

13-1-2 OPERATION BEFORE REMOVAL

1.Remove the disc wheels. (Rear)
Refer to Page C3-3.

2.Prevent brake fluid from flowing out, using the following procedure.

(1) Connect a bottle for air bleeding to the bleeder plug of the rear wheel brake cylinder Ay. Open the bleeder plug.

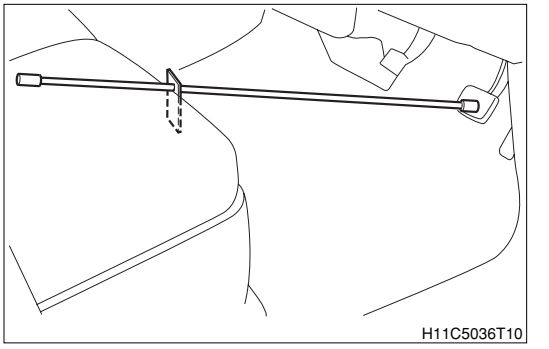
(2) Fully depress the brake pedal Ay. At this point, secure the brake pedal Ay.

TOOL: Brake pedal pusher

NOTE

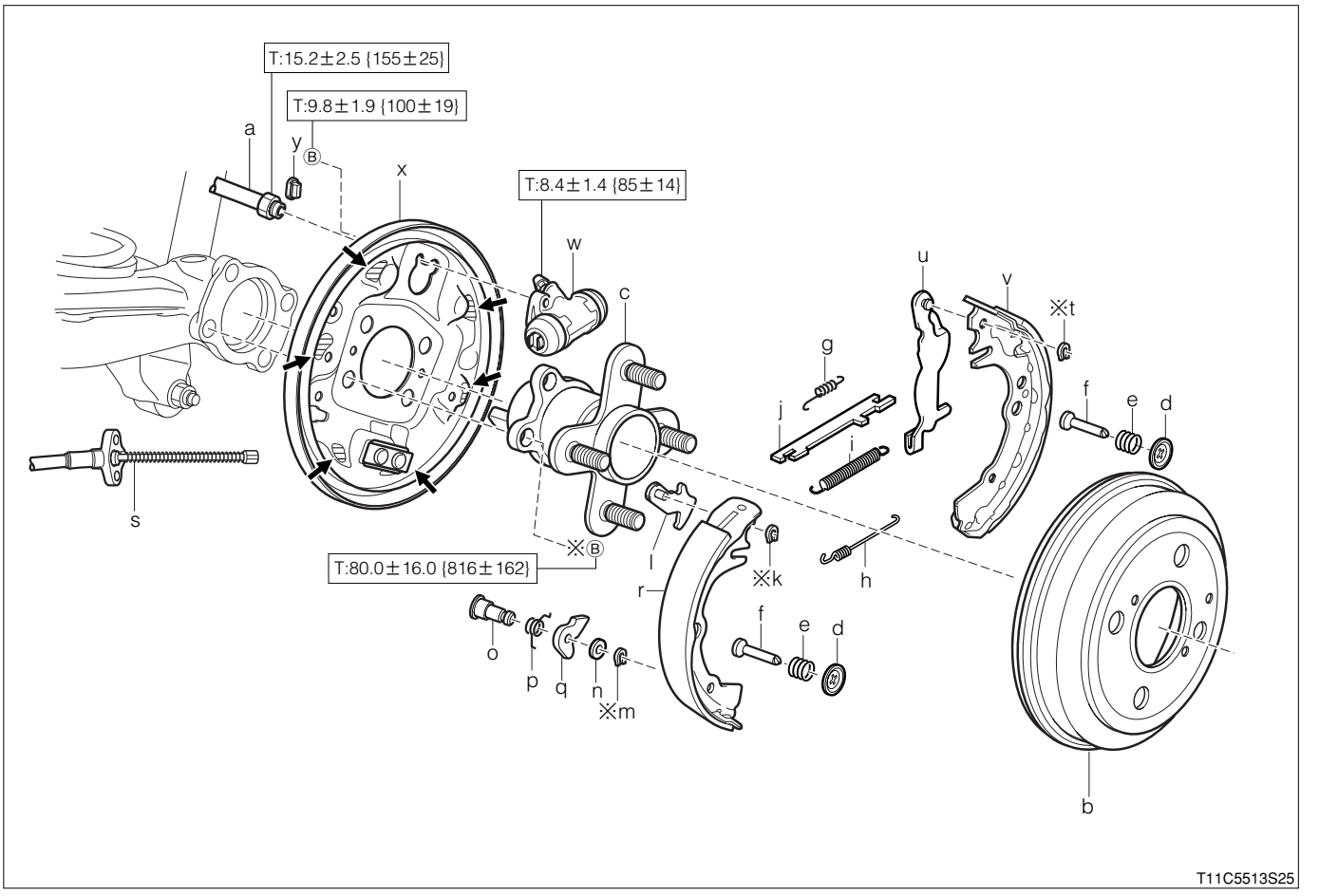
- This causes the port of the brake master cylinder S/A to close. Therefore, any escape of brake fluid from the brake hydraulic circuit can be prevented.

(3) Close the bleeder plug of the rear wheel brake cylinder Ay.



13-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit: N·m{kgf·cm}
※: Non-reusable parts
➡: Brake grease

(2) Removal and installation procedures

▼ ▲ 1 a Tube, rear brake, No.5(RH)/No.6(LH)
▼ ▲ 2 b Drum, brake
▼ ▲ 3 c Hub & bearing Ay, rear axle
4 d Cup, shoe hold down spring
5 e Spring, compression
6 f Pin, shoe hold down spring
7 g Spring, tension
8 h Spring, tension
9 i Spring, tension
10 j Strut, parking brake shoe
11 k Washer, type C
12 l Lever S/A, automatic adjust, RH/LH
13 m Washer, type C
14 n Washer, wave
15 o Pin, automatic adjust lever
16 p Spring, torsion
17 q Latch, automatic adjust RH/LH
18 r Shoe Ay, brake, No.3
19 s Cable Ay, parking brake, No.2(RH)/No.3(LH)
20 t Washer, type C
21 u Lever S/A, parking brake shoe RH/LH
22 v Shoe Ay, brake, No.3
23 w Cylinder Ay, disc brake, rear RH/LH
24 x Plate S/A, brake backing, rear RH/LH
25 y Plug, shoe adjusting hole

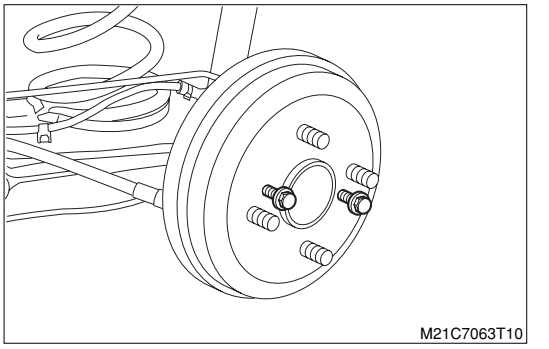
13-1-4 POINTS OF REMOVAL

(1) Tube, rear brake, No.5 (RH)/No.6 (LH)

1.Disconnect the tube from the rear wheel brake cylinder Ay.
2.Plug the disconnected tube with the bleeder plug cap or the like.

(2) Drum, brake

1.If the drum cannot be removed because it has seized to the rear axle hub & bearing Ay, screw two appropriate bolts (M6×1.00) into the screw holes of the drum and remove it.



(3) Hub & bearing Ay, rear axle

1.Remove the bolt retaining the hub & bearing assembly, using a long Torx wrench T55.
TOOL: Long TORX® wrench T55

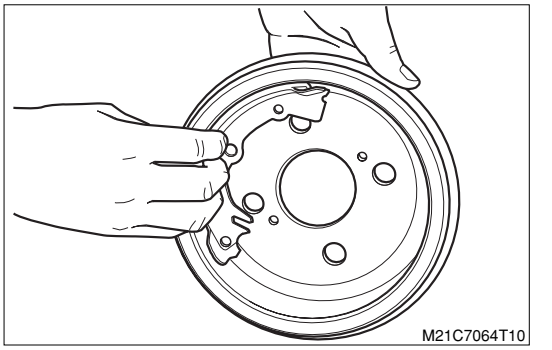
2.Slowly pull out the hub & bearing assembly from the rear suspension arm assembly. Disconnect the connector from the speed sensor wire.

13-1-5 INSPECTION

(1) Contact between brake shoe lining and brake drum

1.Apply chalk to the inner surface of the drum. Slide the lining, while it is being pressed against the inner surface of the drum. If poor contact is present, be sure to grind the lining.
SPECIFIED VALUE: No significant poor contact is present.

2.Be sure to wipe off the chalk.



(2) Cylinder Ay, disc brake, rear

1.Check the cylinder assembly for corrosion and damage.

(3) Plate S/A, brake backing, rear RH/LH

1.Check the plate subassembly for wear and damage.

13-1-6 POINTS OF INSTALLATION

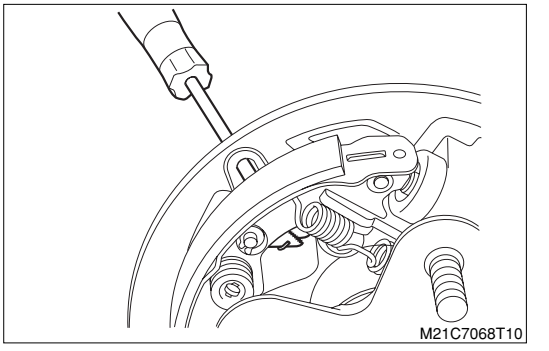
(1) Hub & bearing Ay, rear axle

1.Connect the connector of the speed sensor wire to the hub & bearing assembly. Then, install the hub & bearing assembly to the rear suspension arm assembly.

2.Secure the hub & bearing assembly and brake backing rear plate subassembly RH/LH, using a long Torx wrench T55.
TOOL: Long TORX® wrench T55

(2) Drum, brake

1.Insert a flat screwdriver through the shoe adjusting hole of the RH/LH rear brake backing plate S/A and turn the RH/LH automatic adjusting ratchets by . In this way, release the engagement with the RH/LH automatic adjusting lever S/A. Then, fully contract the brake shoe Ay No. 3 at the leading side and the trailing side. Under this condition, install the drum into position.



(3) Tube, rear brake, No.5 (RH)/No.6 (LH)

1.Temporarily tighten the union nut until the tube flare section contacts closely with the seat.
2.Using the SST, connect tube to the rear wheel brake cylinder Ay and tighten it to the specified torque.
SST: 09023-00100-000

13-1-7 OPERATION AFTER INSTALLATION

1.Release the securing of the brake pedal Ay.
2.Perform air bleeding of the brake.
Refer to Page E1-4.

3.Depress the brake pedal several times to actuate the adjusting mechanism of the brake shoe adjuster mechanism. In this way, adjust the clearance between the brake shoe linings.
4.Check and adjust the reserve travel of the parking brake.
Refer to Page E2-1.

5.Install the disc wheels. (Rear)
Refer to Page C3-3.

6.Confirm that there is no brake dragging.
Refer to Page E1-3.

7.Jack down the vehicle.

14 REAR WHEEL CYLINDER

14-1 DISASSEMBLING AND ASSEMBLING

CAUTION

- Never reuse the wiped-out brake fluid.

14-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

Brake fluid(DOT3),Brake grease

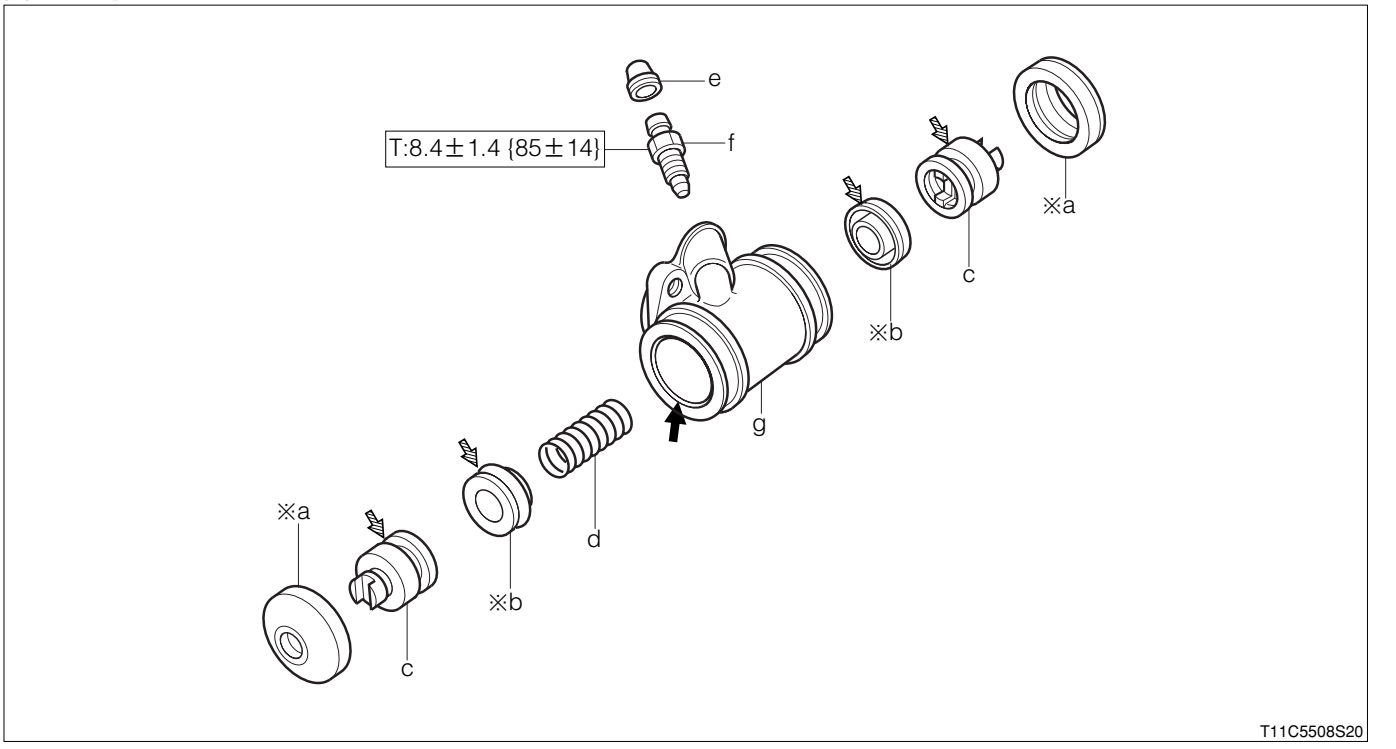
14-1-2 OPERATION BEFORE DISASSEMBLY

1.Remove the rear wheel brake cylinder assembly.
Refer to Page E1-65.

2.Drain the remaining brake fluid in the rear wheel brake cylinder Ay from the installing sections of the rear brake tube No. 5 and No. 6.

14-1-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Components



Unit: N·m{kgf·cm}
※: Non-reusable parts
➡: Brake fluid (Equivalent to DOT3)
⇨: Brake grease

(2) Disassembling and assembling procedure

1 a Boot, wheel cylinder
▲ 2 b Cup, cylinder
▲ 3 c Piston S/A, wheel brake cylinder
4 d Spring, compression
5 e Cap, bleeder plug
6 f Plug, bleeder
▲ 7 g Body, wheel brake cylinder, rear RH/LH

14-1-4 INSPECTION

(1) Piston S/A, wheel brake cylinder

1.Check for wear and damage.

(2) Body, wheel brake cylinder, rear

1.Check the cylinder inner surface for wear and damage.

14-1-5 POINTS OF ASSEMBLY

(1) Body, wheel brake cylinder, rear

1.Apply brake fluid to the entire periphery of the cylinder inner surface of the body.
LUBRICANT: Brake fluid(DOT3)

(2) Piston S/A, wheel brake cylinder

1.Apply brake grease to the entire periphery of the piston S/A.
LUBRICANT: Brake grease

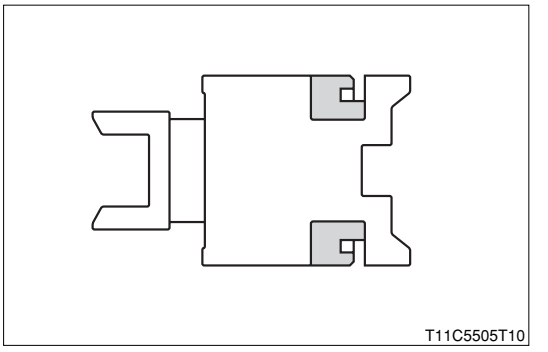
(3) Cup, cylinder

1.Apply brake grease to the entire periphery of the inner and outer surfaces of the cup.
LUBRICANT: Brake grease

2.Install the cup to the wheel brake cylinder piston S/A.

CAUTION

- Make sure that the cup is installed in the correct direction.



14-1-6 OPERATION AFTER ASSEMBLY

1.Install the rear wheel brake cylinder assembly.
Refer to Page E1-65.

TO INDEX

E2 PARKING BRAKE

PARKING BRAKE---------- E2 - 1
BASIC CHECK AND ADJUSTMENT -- E2 - 1
PARKING BRAKE LEVER---------- E2 - 2
REMOVAL AND INSTALLATION-------- E2 - 2

1 PARKING BRAKE

1-1 BASIC CHECK AND ADJUSTMENT

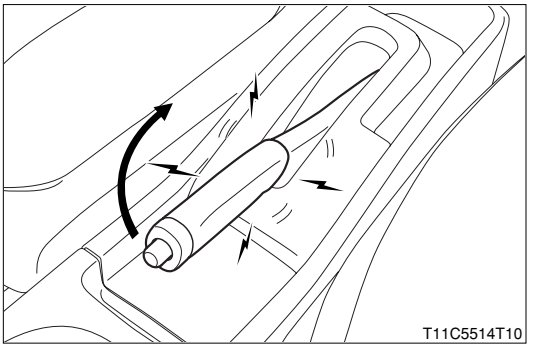
1-1-1 PARKING BRAKE LEVER

(1) Check of pulling amount

1.Depress the brake pedal several times.

2.Operate the parking brake lever. At this time, ensure that the brake warning lamp goes on.

SPECIFIED VALUE: Ensure that the brake warning lamp goes on before the parking brake lever is engaged one notch after the lever starts to be pulled out.



3.Operate the parking brake lever several times. Then, return the lever fully.

4.Slowly pull the parking brake lever with the specified force. At this time, count the number of clicking sounds.

SPECIFIED VALUE: 4 to 7 notches (Operating force: 196N {20kgf})

5.Check to see if the running position is held when released.

(2) Adjustment of pulling amount

1.Depress the brake pedal several times.

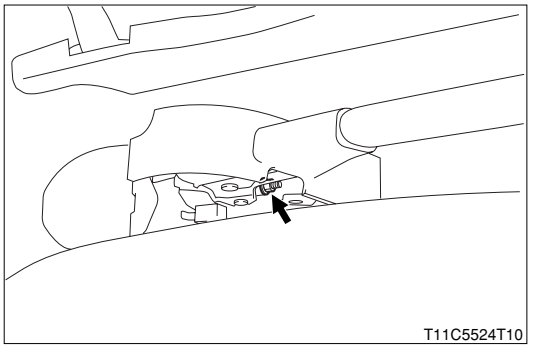
2.Remove the rear console box.

Refer to Page I2-31.

3.Move the front seat backward as far as it will go.

4.Perform the adjustment to the specified value by turning the adjusting nut from the vehicle rear side, using a deep socket (10 mm).

SPECIFIED VALUE: 4 to 7 notches (Operating force: 196N {20kgf})



5.Check that there is no rear brake dragging.

Refer to Page E1-3.

(3) Brake working condition check

1.Check that the stopped state can be held at a dry hill.

2 PARKING BRAKE LEVER

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

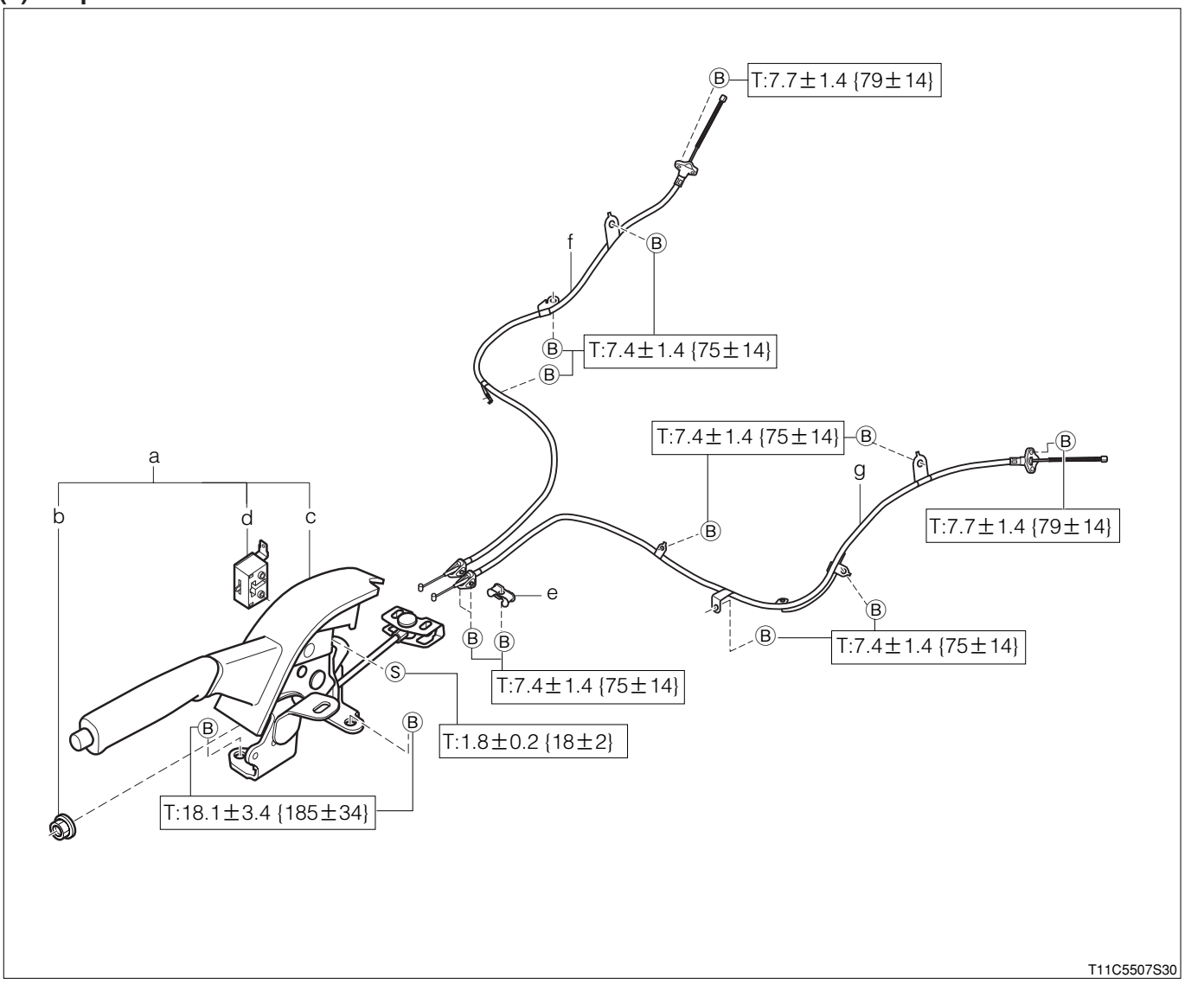
2-1-2 OPERATION BEFORE REMOVAL

1.Remove the front console box S/A and rear console box S/A.
Refer to Page I2-31.

2.Jack up the vehicle.
3.Remove the brake shoe assembly.
Refer to Page E1-65.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Cmponents



Unit:N·m {kgf·cm}

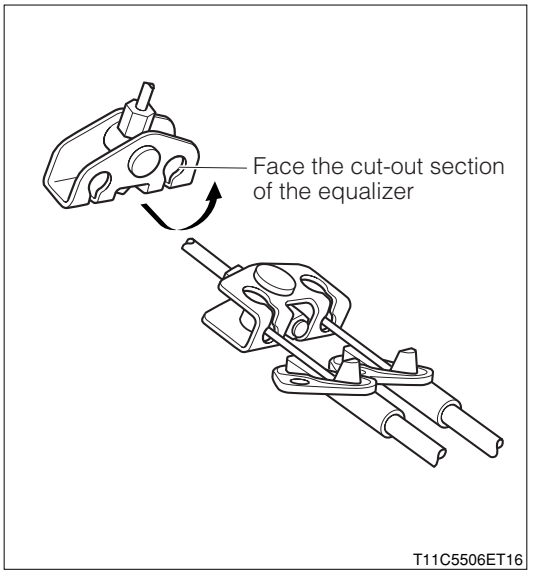
(2) Removal and installation procedure

▲ 1 a Lever Ay, parking brake
2 b Nut, wire adjusting
3 c Cover, parking brake dust
4 d Switch Ay, brake warning test
5 e Clamp
6 f Cable Ay, parking brake No.2
7 g Cable Ay, parking brake No.3

2-1-4 POINTS OF INSTALLATION

(1) Lever Ay, parking brake

1.When assembling the parking brake cable Ay No.2/No.3 to the equalizer section of the parking brake lever Ay, face the cut-out section of the equalizer toward the cable. Then, turn it 90 degrees.



2-1-5 OPERATION AFTER INSTALLATION

1.Install the rear brake shoe assembly.
Refer to Page E1-65.

2.Check and adjust the pulling amount of the parking brake lever.
Refer to Page E2-1.

3.Make sure that the parking brake cable Ay No.2/No.3 cannot be separated from the equalizer section of the parking brake lever Ay.

4.Confirm that there is no rear brake dragging.
Refer to PageE1-3.

5.Jack down the vehicle.

6.Install the front console box S/A and rear console box S/A.
Refer to Page I2-31.

TO INDEX

E3 BRAKE CONTROL

ABS ---------- E3 - 1
ABS ACTUATOR UNIT ---------- E3 - 1
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FRONT WHEEL SPEED SENSOR ------- E3 - 4
REMOVAL AND INSTALLATION-------- E3 - 4
REAR WHEEL SPEED SENSOR --------- E3 - 6
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ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS ---------- E3 - 12
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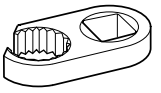
■ ABS
1 ABS ACTUATOR UNIT
1-1 REMOVAL AND INSTALLATION
1-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09023-00100-000	Wrench,union nut

Tool

Brake pedal pusher,Long TORX® wrench T25

Instrument

Torque wrench

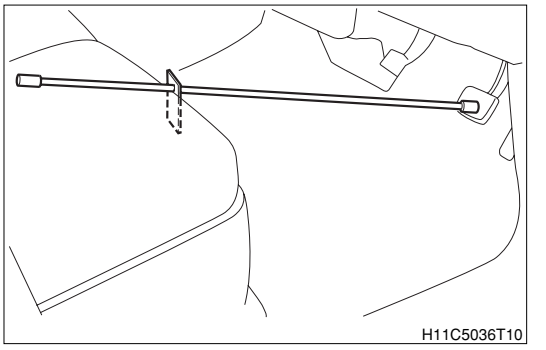
Lubricant, adhesive, others

Brake fluid(DOT3)

1-1-2 OPERATION BEFORE REMOVAL

1.After setting IG SW "LOCK" position, disconnect the negative (-) terminal of the battery.
2.Disconnect the connector of the brake actuator Ay.
3.Prevent brake fluid from flowing out, using the following procedure.
(1) Remove the disc wheels.
Refer to Page C3-3.

(2) Connect a bottle for air bleeding to the bleeder plug of the front disc brake caliper Ay RH/LH. Then, open the bleeder plug.
(3) Fully depress the brake pedal Ay. At this point, secure the brake pedal Ay.
TOOL: Brake pedal pusher



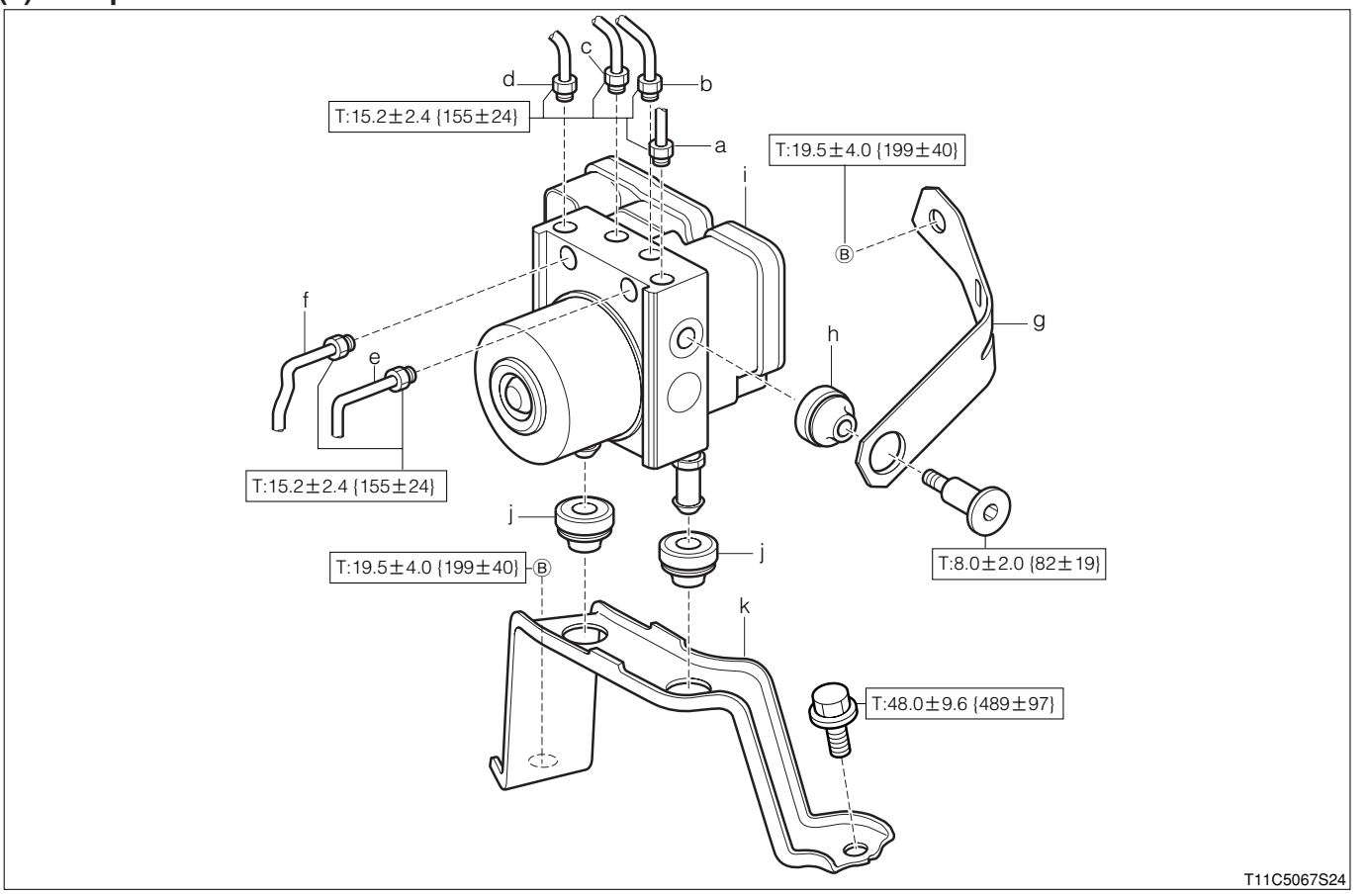
NOTE
- This closes the brake master cylinder S/A port, thus preventing the brake fluid from flowing out from the brake hydraulic circuit.

(4) Close the bleeder plug of the RH/LH front disc brake caliper Ay.

4.Remove the battery carrier.
Refer to Page J5-3.

1-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

▼ ▲ 1 a Tube, front brake, No.1
▼ ▲ 2 b Tube, front brake, No.4
▼ ▲ 3 c Tube, front brake, No.2
▼ ▲ 4 d Tube, front brake, No.3
▼ ▲ 5 e Tube, rear brake, No.2
▼ ▲ 6 f Tube, rear brake, No.4
▲ 7 g Bracket, brake actuator (Upper side)
▲ 8 h Cushion, brake actuator bracket
▼ 9 i Actuator Ay, Brake
▲ 10 j Cushion, brake actuator bracket
▲ 11 k Bracket, brake actuator (Low side)

1-1-4 POINTS OF REMOVAL

(1) Tube, brake

1.Disconnect the tube from the brake actuator Ay.
2.Plug the disconnected tube with the bleeder plug cap or the like.

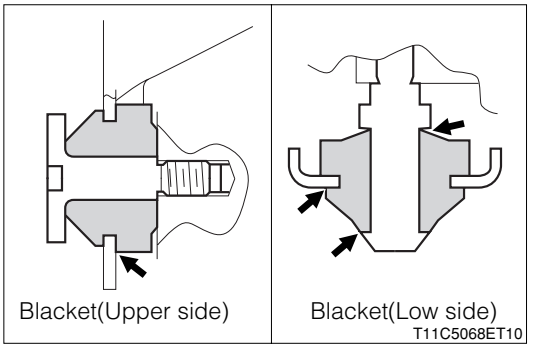
(2) Actuator Ay, brake

1.In order to prevent the brake fluid from flowing out, attach the bleeder plug or the like to the brake tube attaching section of the actuator assembly.

1-1-5 POINTS OF INSTALLATION

(1) Cushion, brake actuator bracket

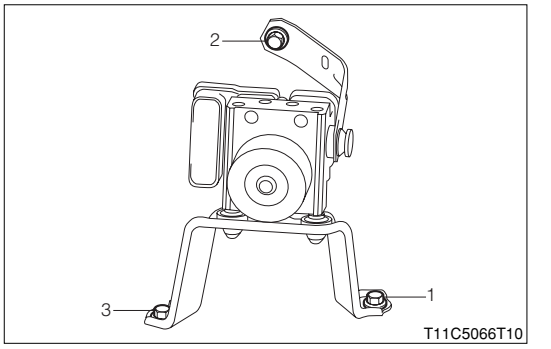
1.Install the cushion correctly to the brake actuator Ay and brake actuator bracket, as indicated in the right figure.



(2) Bracket, brake actuator

1.Using the Torx wrench T25, install the bracket (Upper side) assembled with the brake actuator bracket cushion to the brake actuator Ay.
TOOL: Long TORX® wrench T25

2.After installing the bolt (1) temporarily, securely tighten the bolts in an order of (2), (3) and (1).



(3) Tube, brake

1.Temporarily tighten the union nut until the tube flare section contacts closely with the seat.
2.Using the SST, tighten tube to the brake actuator Ay to the specified torque.
SST: 09023-00100-000

1-1-6 OPERATION AFTER INSTALLATION

1.Install the battery carrier.
Refer to Page J5-3.

2.Release the securing of the brake pedal Ay.
3.Connect the connector of the brake actuator Ay.
4.Connect the negative (−) terminal of the battery.
5.Perform air bleeding of the brake.
Refer to Page E1-4.

6.Install the disc wheels.
Refer to Page C3-3.

2 FRONT WHEEL SPEED SENSOR

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

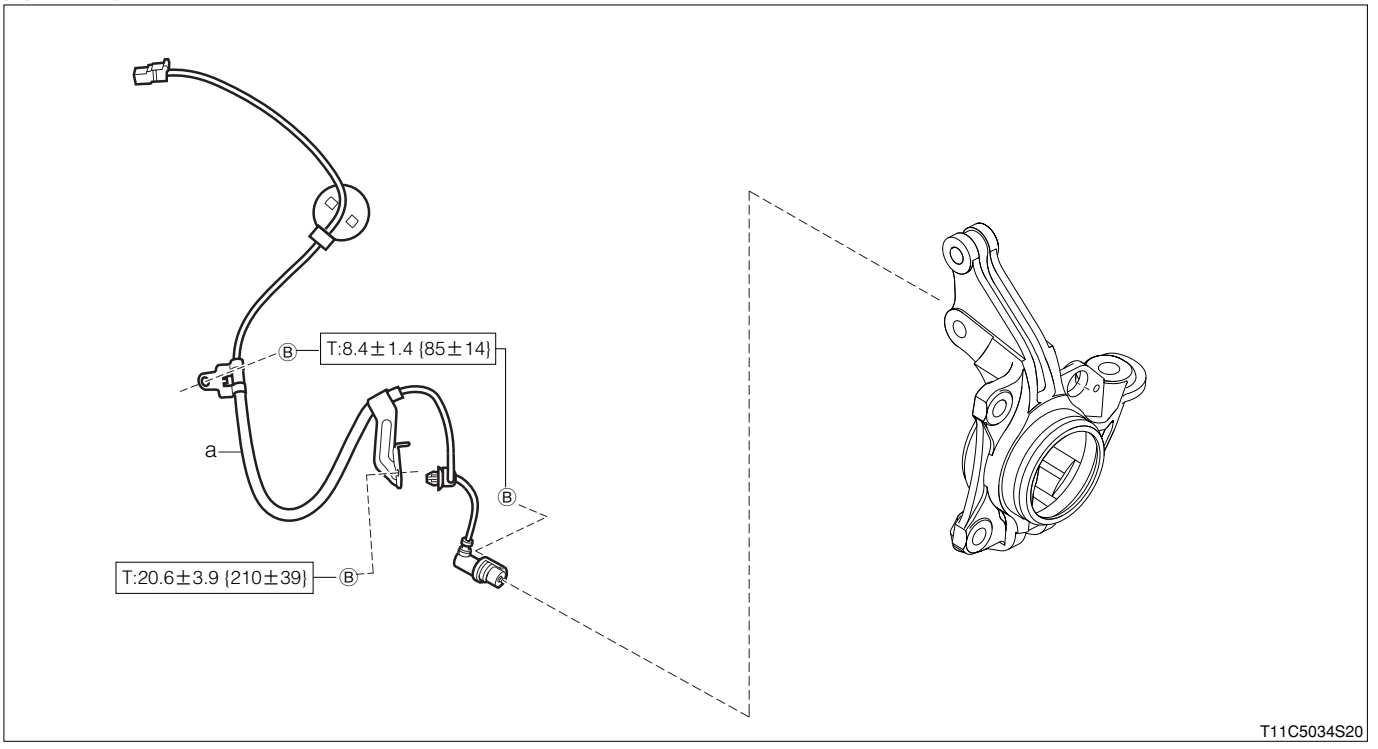
2-1-2 OPERATION BEFORE REMOVAL

1.After setting the IG SW "LOCK" position, disconnect the negative (−) terminal of the battery.
2.Remove the disc wheels. (Front)
Refer to Page C3-3.

3.Disconnect the connectors of the RH/LH front speed sensors.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

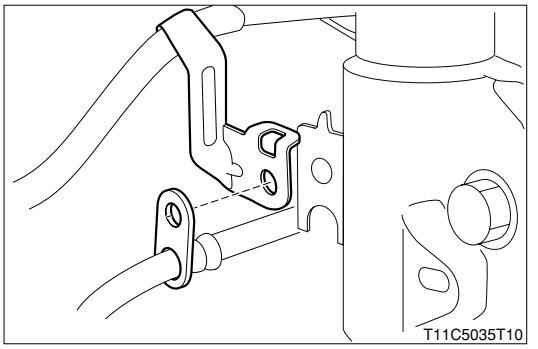
(2) Removal and installation procedures

▲ 1 a Sensor, speed, front RH/LH

2-1-4 POINTS OF INSTALLATION

(1) Sensor, speed, front RH/LH

1.Install the sensor bracket in such a way that it is interposed by the brackets of the RH/LH front shock absorber Ay and the flexible hose, as indicated in the right figure. Tighten it by the bolt.



2-1-5 OPERATION AFTER INSTALLATION

1.Connect the connector of the RH/LH front speed sensors.
2.Install the disc wheels. (Front)
Refer to Page C3-3.

3.Connect the negative (−) terminal of the battery.

3 REAR WHEEL SPEED SENSOR

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

Tool

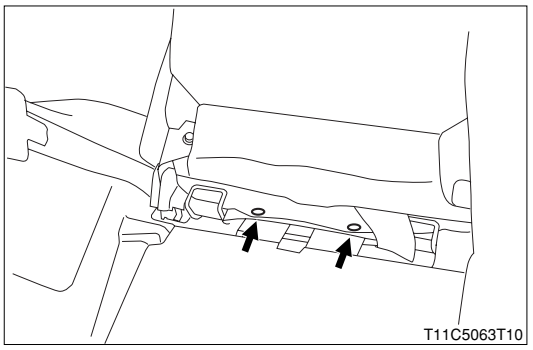
Long TORX® wrench T55

Instrument

Torque wrench

3-1-2 OPERATION BEFORE REMOVAL

1.After setting the IG SW "LOCK" position, disconnect the negative (−) terminal of the battery.
2.Remove the rear door scuff plate RH/LH.
Refer to Page I2-48.

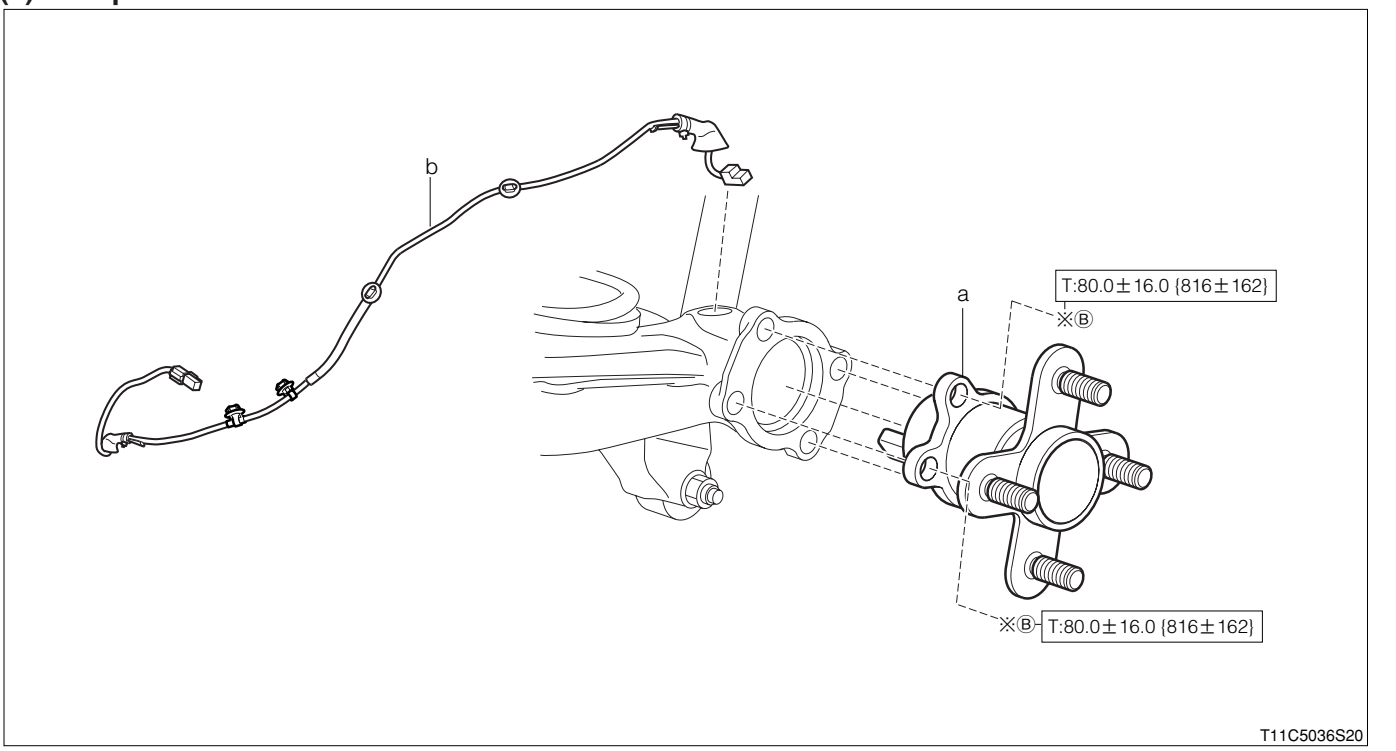


3.Tilt forward the seatback of the rear RH/LH seat Ay. Remove the clips of the carpet.
4.Erect the cushions of the rear RH/LH seat Ay. Turn over the carpet around the rear RH/LH seat Ay.
5.Remove the rear floor board front RH/LH.
Refer to Page I2-57.

6.Detach the clip at one point of the rear RH/LH quarter trim panel Ay. Float the rear RH/LH quarter trim panel Ay.
7.Disconnect the connectors of the RH/LH speed sensor wires.
8.Remove the drum brake.
Refer to Page E1-65.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) Removal and installation procedures

▼ ▲ 1 a Hub & bearing Ay, rear axle
2 b Wire, speed sensor, RH/LH

3-1-4 POINTS OF REMOVAL

(1) Hub & bearing Ay, rear axle

1.Remove the bolt retaining the hub & bearing assembly, using a long Torx wrench T55.
TOOL: Long TORX® wrench T55

2.Slowly pull out the hub & bearing assembly from the rear suspension arm assembly. Disconnect the connector from the speed sensor wire RH/LH.

3-1-5 POINTS OF INSTALLATION

(1) Hub & bearing Ay, rear axle

1.Connect the connectors of the RH/LH speed sensor wires to the hub & bearing Ay. Install the hub & bearing Ay to the rear suspension arm Ay.
2.Secure the hub & bearing assembly and rear brake backing plate subassembly RH/LH, using a long Torx wrench T55.
TOOL: Long TORX® wrench T55

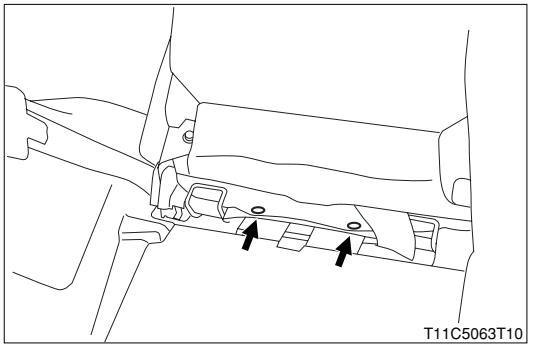
3-1-6 OPERATION AFTER INSTALLATION

1.Install the drum brake.
Refer to Page E1-65.

2.Connect the connectors of the RH/LH speed sensor wires.
3.Install the rear quarter trim panel Ay RH/LH.
4.Install the rear floor board front RH/LH.
Refer to Page I2-57.

5.Place the carpet around the RH/LH rear seat Ay. Return the cushion to the original place.
6.Tilt the seatback of the RH/LH rear seat Ay and install the carpet clips.
7.Install the rear door scuff plate RH/LH.
Refer to Page I2-48.

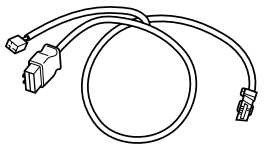
8.Connect the negative (−) terminal of the battery.



4 CONTROL SYSTEM

4-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09991-87404-000 (09991-87401-000)	Wire,engine control system inspection
	09991-87403-000	Wire,diagnosis check

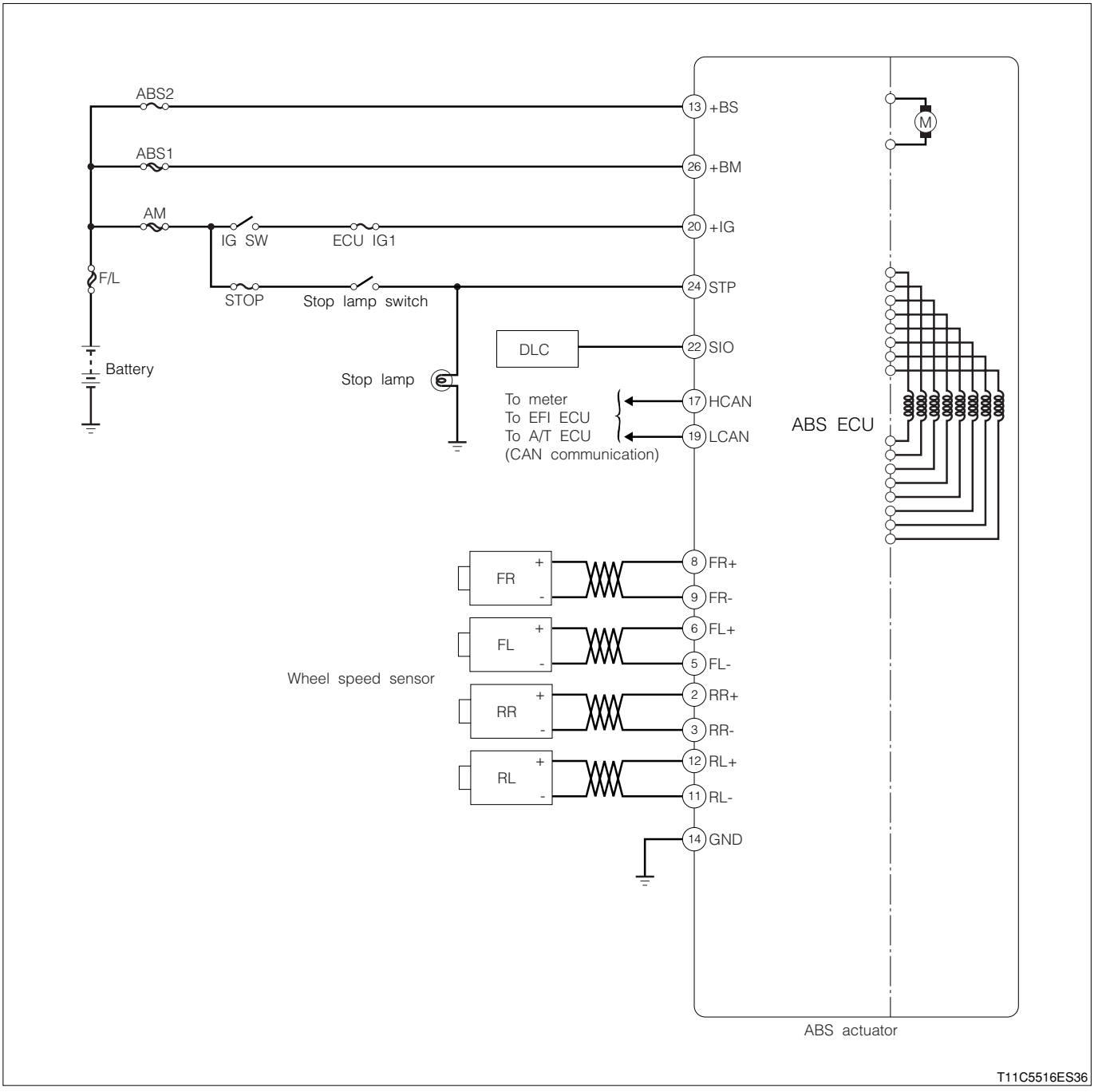
Instrument

Electrical Tester

4-2 HANDLING INSTRUCTIONS OF CONTROL SYSTEM

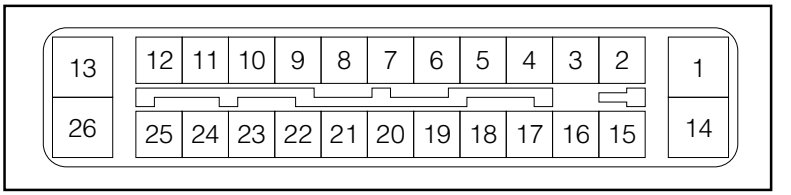
1. Never apply big shocks to the ABS actuator and sensors, etc. during the removal/installation, etc. for they are precision components. Do not use any such parts that have undergone big shocks (E.g. dropped to the floor).
2. Make sure water does not get in the system when conducting an inspection during rainy weather or when the vehicle is washed. Do not allow water to get to the ABS actuators or sensors.
3. If the vehicle becomes normal by judging that the ABS ECU was abnormal and by replacing the ABS ECU, be sure to install the old ABS actuator (That has been judged to be malfunctioning) in order to confirm that the initially-observed malfunction may be reproduced. Then, finally judge that the ABS ECU was malfunctioning.
4. Do not disassemble the ABS actuator.
5. Make sure that the brake related parts of each wheel are installed properly.
6. When a wireless device is to be mounted, care must be exercised as for the following points given below.
   (1) Place the antenna as far away as possible from the ABS ECU.
   (2) The feeder of the antenna should be routed as far away as possible (Minimum distance: 30 cm) from the ABS ECU and wire harness. Also, make certain to avoid routing the feeder for a long distance in parallel with these parts.
   (3) The antenna should be matched well.
   (4) Do not install wireless devices with a high output.

4-3 SYSTEM WIRING DIAGRAM



T11C5516ES36

4-4 ARRANGEMENT OF ECU TERMINAL



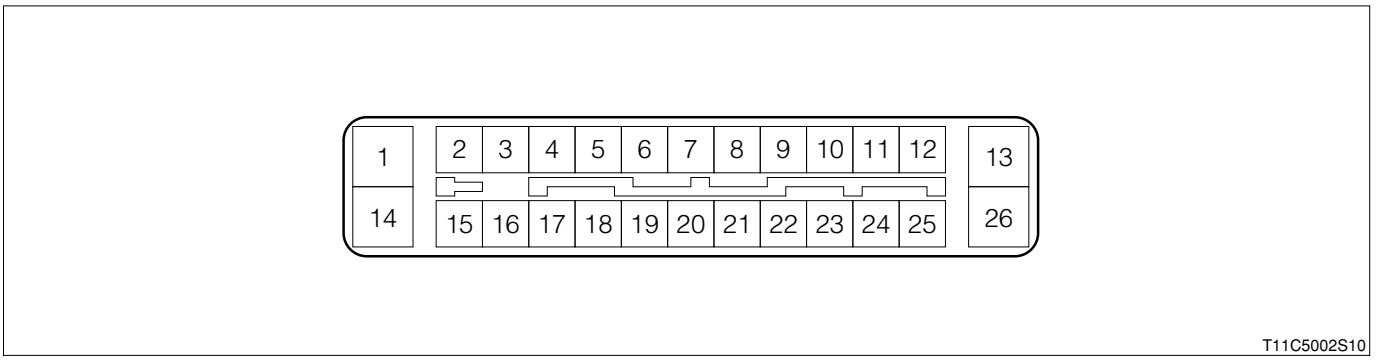
T11C5001S10

Terminal name

Terminal No.	Terminal code	Terminal name
1	–	–
2	RR+	Input of the rear right wheel speed sensor (+)
3	RR–	Input of the rear right wheel speed sensor (–)
4	–	–
5	FL–	Input of the front left wheel speed sensor (–)
6	FL+	Input of the front left wheel speed sensor (+)
7	–	–
8	FR+	Input of the front right wheel speed sensor (+)
9	FR–	Input of the front right wheel speed sensor (–)
10	–	–
11	RL–	Input of the rear left wheel speed sensor (–)
12	RL+	Input of the rear left wheel speed sensor (+)
13	+BS	Solenoid valve power supply
14	GND	Earth
15	–	–
16	–	–
17	HCAN	CAN communication HI
18	–	–
19	LCAN	CAN communication LO
20	+IG	Power supply through IG SW
21	–	–
22	SIO	External communication
23	–	–
24	STP	Input of the stop lamp SW
25	–	–
26	+BM	Motor power supply

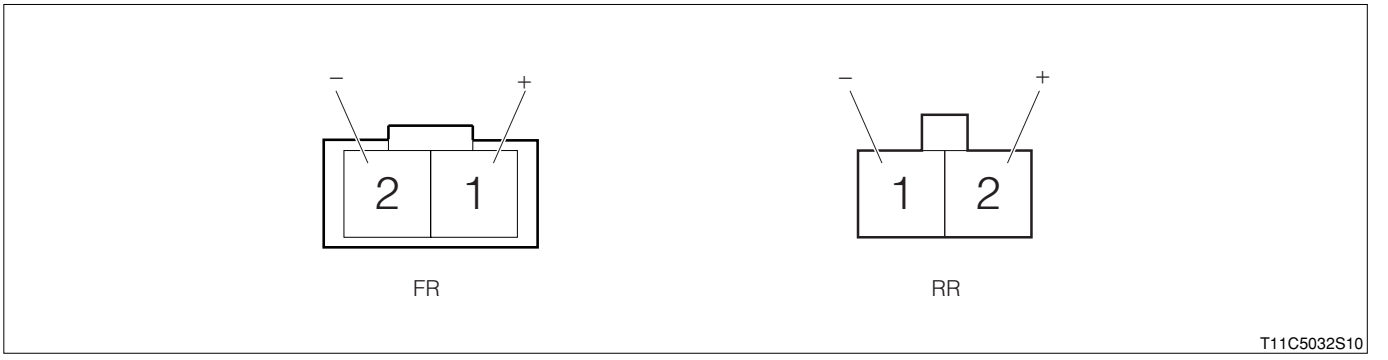
4-5 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS

ABS ECU

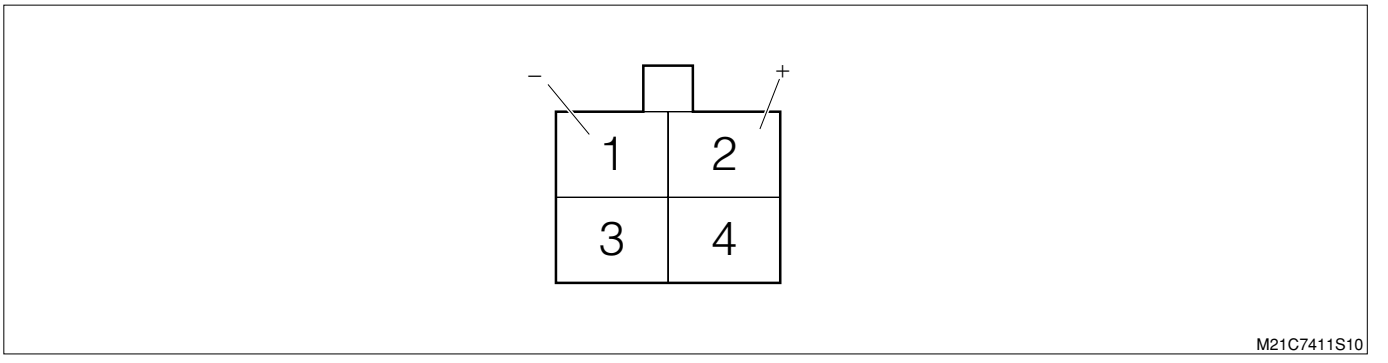


As for the terminal names of computer at the ABS ECU vehicle harness side, refer to the computer connector terminal arrangement diagram.

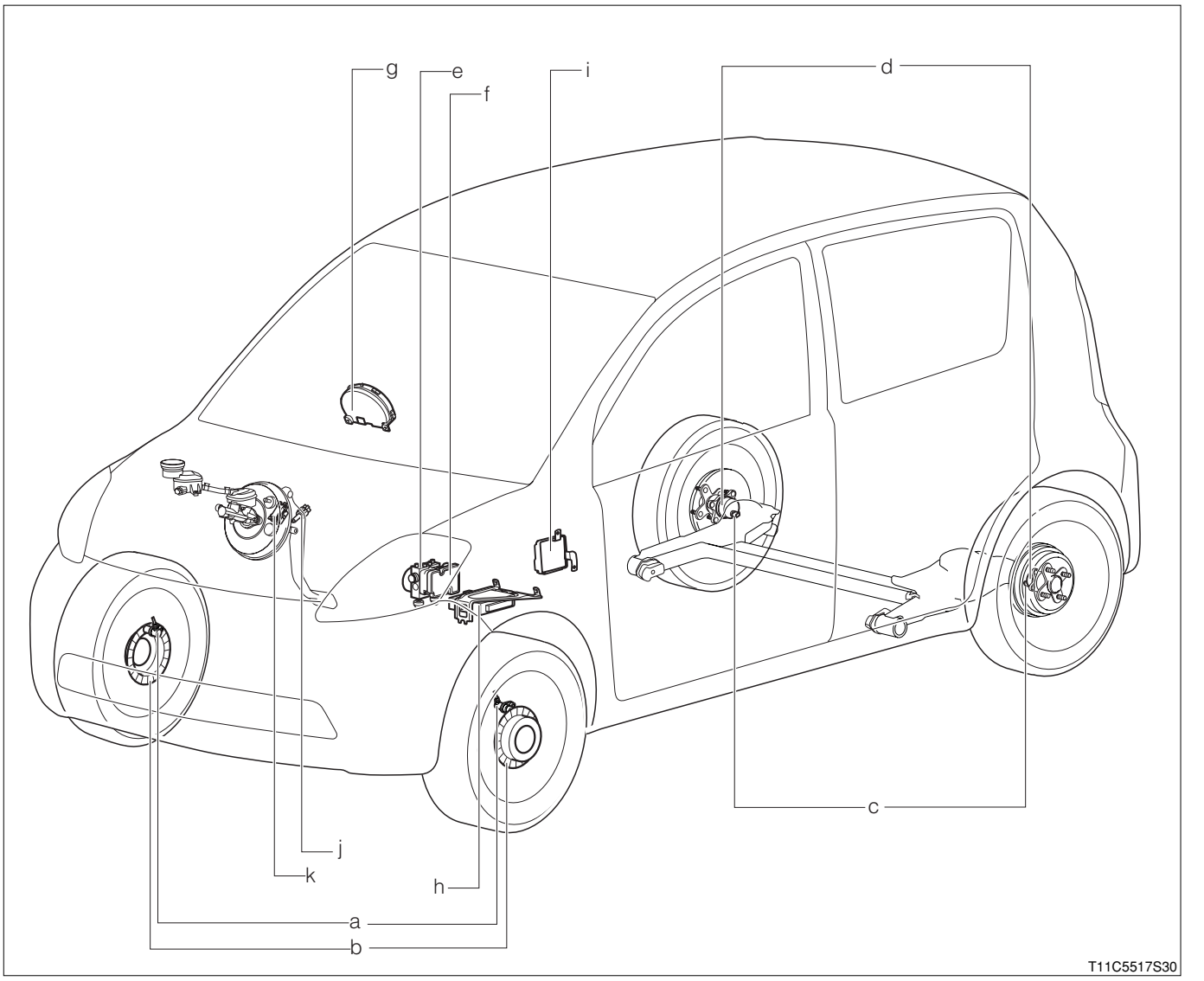
Wheel speed sensor



Stop lamp SW



4-6 LOCATION OF COMPONENTS



a	Front wheel speed sensor
b	Front wheel speed sensor rotor
c	Rear wheel speed sensor
d	Rear wheel speed sensor rotor
e	ABS actuator
f	ABS ECU
g	Combination meter (Incorporating the warning lamp)
h	EFI ECU
i	Transmission control ECU
j	Stop lamp SW
k	DLC

4-7 HOW TO PROCEED WITH TROUBLE SHOOTING

1.This system is equipped with a diagnosis function capable of performing the self-diagnosis for malfunctioning sections. This will be an important help at the time of trouble-shooting. The diagnosis of this system has a backup that uses an EEPROM (Non-volatile ROM). Hence, the diagnosis code is stored in the memory even if the power is cut off.

Σ1. Bringing of malfunctioning vehicles to workshop

▼Go to Σ2.

Σ2. Inquiry with customer

Fully obtain information about the conditions and environmental phenomena in which the malfunctions took place.

▼Go to Σ3.

Σ3. Confirmation of normal indication of diagnosis code of LCD inside meter

1.Using the SST, short-circuit the DLC terminals 4 (ECU-T) and 13 (E).

SST: 09991-87403-000
09991-87404-000

2.Ensure that the LCD inside the meter indicates the diagnosis code (Including the normal codes).

SPECIFIED VALUE: Indicated

NOTE

- It is permissible that codes other than the CAN-related codes are outputted.

▼If it is OK, go to Σ4.

▼In the case of NG, check the meter in particular about the points given below. If no problems are found, replace the meter.

(1) Check the harness between the meter and the DLC and the harness between the DLC and the body earth.

(2) Check the power supply system and the earth system of the meter.

Σ4. Confirmation of diagnosis code (Related to CAN)

1.Confirm that the CAN related-diagnosis codes (Codes 0051 through 0053) are not indicated on the LCD in the meter.

SPECIFIED VALUE: Codes 0051 through 0053 are not indicated.

▼If it is OK, go to Σ5.

▼In the case of NG, refer to the item of the CAN communication system.

Refer to Page L2-1

Σ5. Confirmation and recording of diagnosis code

Refer to Page E3-19.

▼Go to Σ6.

Σ6. Erasing of diagnosis code

Refer to Page E3-20.

▼In the case of erasable one, proceed to Σ7.

▼In the case of inerasable one, proceed to Σ9.

⊳7. Running test using the sensor check function (Test mode)
Refer to Page E3-23.

▼Go to ⊳8.

⊳8. Basic check
Refer to Page E3-25.

▼Go to ⊳9.

⊳9. Reconfirmation of malfunctioning phenomena
Confirm the phenomenon to grasp the malfunctioning situation.
▼Go to ⊳10.

⊳10. Reconfirmation of diagnosis code
Narrow down the malfunctioning system.
Refer to Page E3-19.

▼If the malfunction is reproduced and the normal code is outputted, proceed to ⊳11.
▼If the malfunction is not reproduced and the normal code is outputted, proceed to ⊳11.
▼If an abnormal code is outputted, proceed to ⊳12.

⊳11. Trouble-shooting according to malfunction phenomenon.
Refer to Page E3-32.

▼Go to ⊳13.

⊳12. Trouble-shooting according to diagnosis code
As for the system for which the abnormal code was outputted at the first check, check its harness with a top priority.
Refer to Page E3-26.

▼Go to ⊳13.

⊳13. Erasing of diagnosis code
Refer to Page E3-20.

▼In the case of erasable one, proceed to ⊳14.
▼In the case of inerasable one, proceed to ⊳9.

⊳14. Running test by sensor check function (Test mode)
Refer to Page E3-23.

▼In the case of the normal one, proceed to ⊳15.
▼If an abnormal code is outputted, proceed to ⊳9.

∑15. Confirmation test

Confirm that the malfunctioning phenomenon the customer had been appealing has been solved completely and the vehicle has been restored to the normal condition.

▼If OK, complete the check.

▼If it is NG, go to ∑3.

4-7-1 SERVICE NOTICE

1.Although the system is normal, the warning lamps may light according to the vehicle running conditions or the work contents.

Warning lamp illuminating	Cases where there is a possibility of lighting	Lamp extinguishing conditions	Control conditions
·ABS warning lamp ·Brake warning lamp	When the front wheels only are turned at a speed of 10 km/h or more by stacking, jacking up or chassis roller, etc.	After setting IG SW "LOCK" position once: Run the vehicle at a speed of 10 km/h or more, When the normal state is confirmed,	ABS control: Suspend. EBD control: Suspend
	The brakes are dragging,		
	During quick accelerating period		

4-8 INQUIRY

1.When the vehicle is encountered with a malfunction, even if an attempt is made to remove its cause, it is impossible to find out the cause, unless the malfunction phenomenon can be actually confirmed. Hence, the vehicle may not be remedied to the normal condition regardless of the repairing operations if the cause is not known. The diagnosis through inquiries to the customer is to be performed in order to collect information from the customer before confirming the malfunction phenomenon. This step will be a very important help in reproducing the malfunction phenomenon.

2.Since the information obtained by the diagnosis through interviews is referred to during the trouble shooting, it is imperative to make an inquiry of the customer, centering on the items related to the malfunction, instead of simply asking general questions.

3.In addition, during the diagnosis through interviews, utmost attention must be paid to complaints of the customer, for it may include phenomena peculiar to the ABS-equipped vehicles.

4-8-1 DIAGNOSIS INTERVIEW SHEET FOR ABS SYSTEM

Checked by		Check date	Day Month (Day of week)

Customer information

Name of customer	Mr./Ms.	Gender of customer (Male, Female)		Age [Approx.]	Occupation [ ]	
		Area where vehicle is mainly used	Urban, suburb, seashore, mountain, others		Parking place	Outdoor, indoor

Details of vehicle

Date when vehicle was brought to workshop	Day Month (Day of week)	Date when malfunction took place	Day Month (Day of week)	Repair history	No, Yes (How many times?)	
Frame No.		Registration date	Day Month Year	Vehicle model		
Engine type		Transmission	5M/T·3A/T·4A/T·CVT electronically-controlled 4A/T		Driving	2WD·4WD
Running distance	km	Equipment	Tire [ ]· Wheel [Steel · Aluminum]			

Weather

☐ Fine	☐ Cloudy	☐ Rainy	☐ Snow	☐ Other( )
Temperature(Approx. ℃)				

Frequency of malfunction

☐ Always ☐ Under certain condition( ) ☐ Sometimes( )

Road conditions

☐ Urban ☐ Suburb ☐ Express way ☐ Mountain road (uphill, downhill)
☐ Snowy road ☐ Icy road ☐ Dry concrete ☐ Wet asphalt

Driving conditions

☐ When the brake pedal is depressed lightly.
☐ When the brake pedal is depressed at a vehicle speed of ( ) km/h during driving.
☐ During hard braking at vehicle speed of ( ) km/h.
☐ When the brake pedal is depressed at a vehicle speed of ( ) km/h during curve driving (right curve, left curve).
☐ Others

State of parts

☐ Wear of tire
☐ Wear breakage of brake
☐ Others

Phenomena

ABS warning lamp	☐ Always illuminated when IG SW is turned ON.
	☐ Does not illuminate for three seconds after IG SW is turned ON.
Brake warning lamp	☐ Always illuminated when IG SW is turned ON.
	☐ Does not illuminate for three seconds after IG SW is turned ON.
Brake malfunction	☐ Uneven brake application.
	☐ Lack of brake efficiency.
	☐ ABS is actuated during normal braking.
	☐ Pedal vibrates during ABS operation.
☐ ABS warning lamp is illuminated during running.	
☐ Others	

Diagnosis indication (Short circuit of T terminal)	During check	☐ Normal ☐ Abnormal code [ ]
	Second time	☐ Normal ☐ Abnormal code [ ]
	nd(rd) time	☐ Normal ☐ Abnormal code [ ]

4-9 CONFIRMATION, RECORD AND ERASURE OF DIAGNOSIS CODE

NOTE

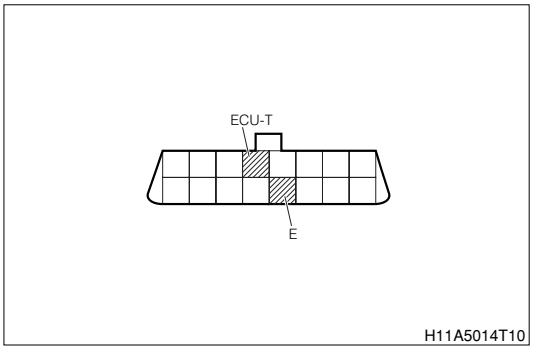
- When any abnormality code of the diagnosis is indicated, it is necessary to confirm the relationship with the reproduced malfunction phenomenon by ascertaining whether the system malfunction has occurred in the past or it still persists up to the present. To this end, the diagnosis code should be indicated twice, i.e. before and after the confirmation of the phenomenon

4-9-1 CHECKING METHOD OF DIAGNOSIS

(1) Indication by ABS warning lamp

1.Stop the vehicle.

2.With the IG SW set to "LOCK", short-circuit the ECU-T terminal and E terminal of the DLC located below the instrument panel.



CAUTION

- Be sure to employ the specified SST for short-circuit of the DLC.
- If the short-circuit of the DLC is made for wrong positions, it may cause a malfunction. Be very careful not to select wrong terminals.

SST: 09991-87404-000
09991-87403-000

3.After setting the IG SW "ON" position, read out the flashing number of the ABS warning lamp.

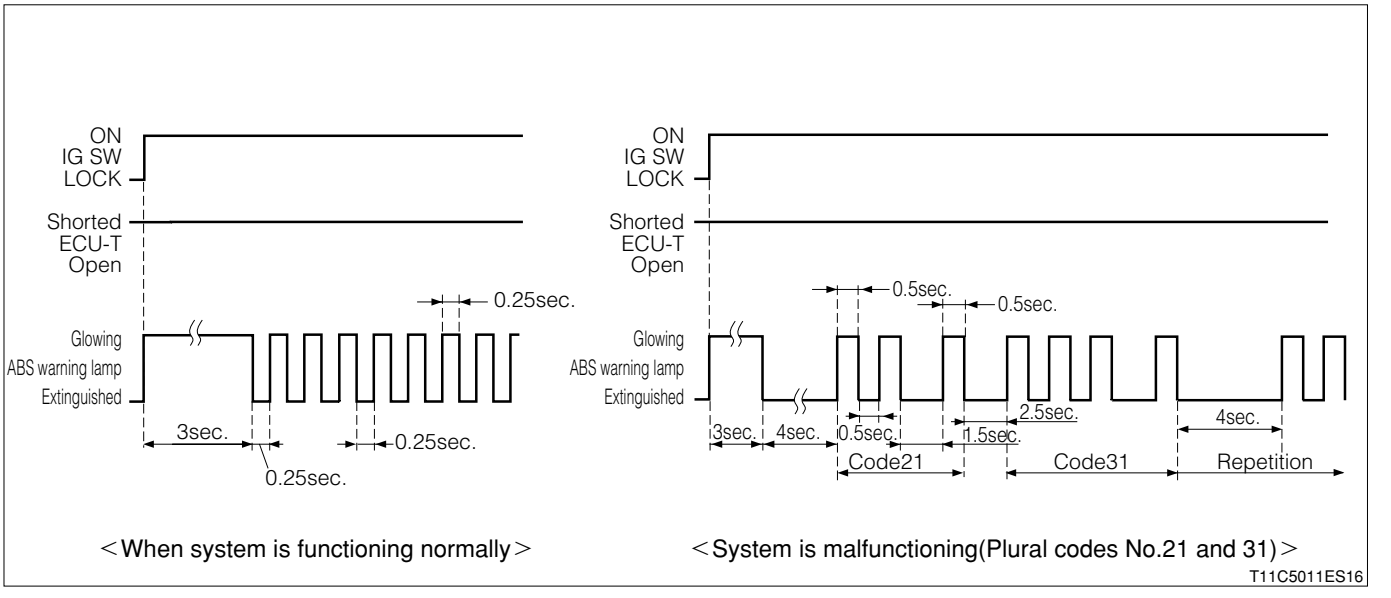
(1) When the system is functioning normally, the flashing interval is 0.25 second.

(2) If there is one malfunction code, after a pause of four seconds, the same code will be outputted.

(3) If plural codes are outputted, the respective codes will be outputted at an interval of 2.5 seconds. After all the codes have been outputted, there will be another 4 second pause before the output of the codes starts over again.

NOTE

- When the DLC is short-circuited, the warning lamps other than that for ABS will flash. However, this does not represent a malfunction of the system.
- When plural codes are outputted, they will appear in the order of the code number, starting from the smaller one.



4-9-2 CANCELING METHOD OF DIAGNOSIS

NOTE

- When the section for which codes are outputted has been repaired, erase the abnormality code memorized in the ECU by the following method given below.
- When the memory is erased, the test mode function (See the next item) will automatically start, and the ABS warning lamp will flash. In this case, perform the test mode function and check that each sensor has no abnormality.
- If the abnormal code can not erased, again carry out the check and repair for the abnormal code generating point.

(1) Erasure by stop lamp SW

1.Stop the vehicle.

2.With the IG SW set to "LOCK", short-circuit the ECU-T terminal and E terminal of the DLC located below the instrument panel.

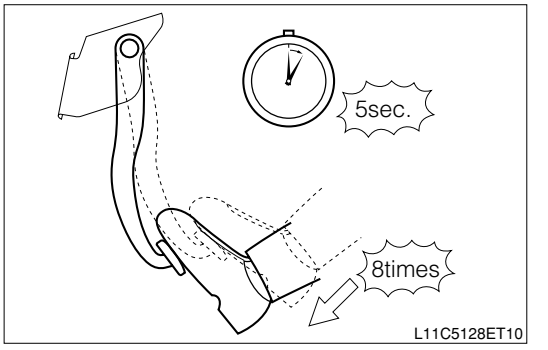
Refer to Page A1-19.

CAUTION

- Be sure to employ the specified SST for short-circuiting the DLC.
- If the short-circuit of the DLC is made for wrong positions, it may cause a malfunction. Be very careful not to select wrong terminals.

SST: 09991-87404-000
09991-87403-000

3.After setting the IG SW to "ON", within 0.5 second to three seconds, start depressing the brake pedal. Within five seconds from this point, repeat "ON" and "OFF"of the stop lamp switch more than eight times.



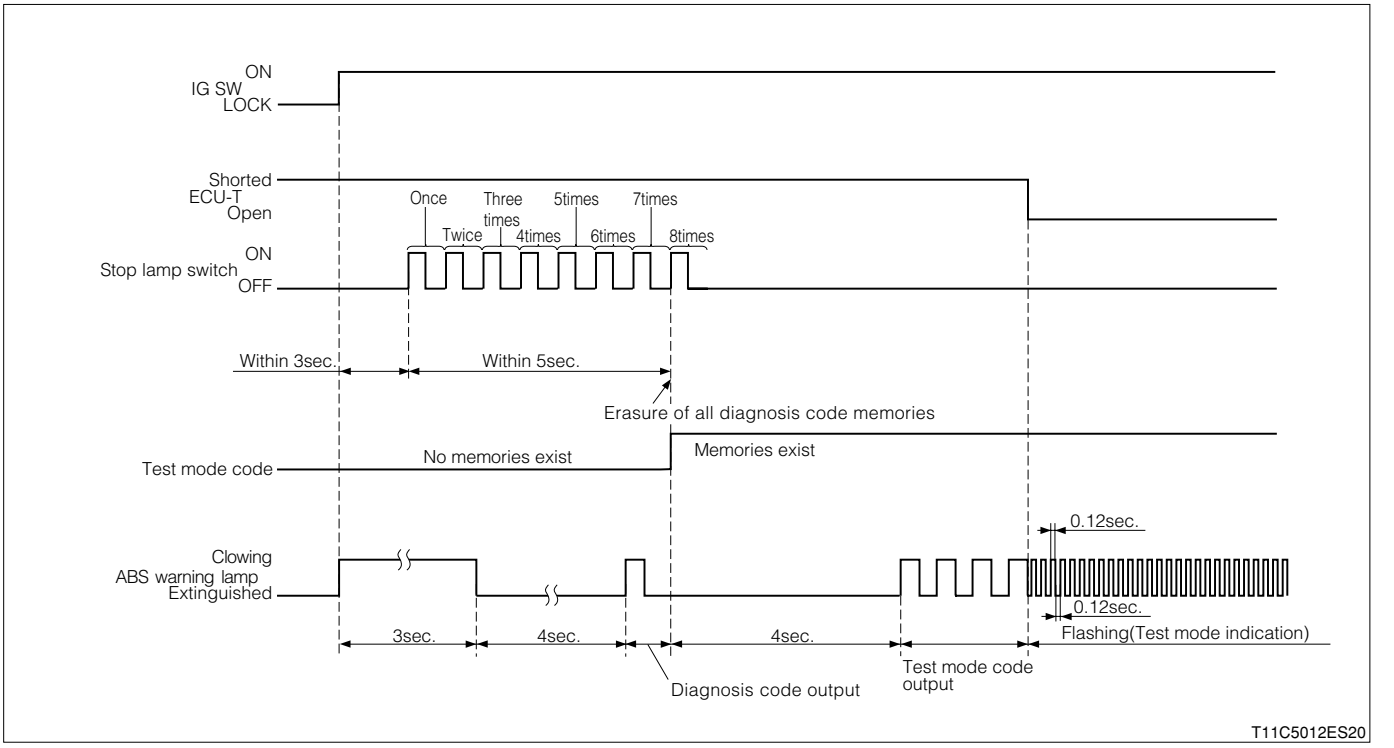
NOTE

- If the malfunction still persists after the abnormal code has been erased, again record the abnormal code. After being extinguished four seconds, the ABS warning lamp outputs the diagnosis code and test mode code.
- If there is no malfunction, the test mode code only is outputted.
- If the diagnosis code cannot be erased, set the IG SW "LOCK" position. Then, perform the operation above again.

4.Open the ECU-T terminal and E terminal.

NOTE

- If there is no malfunction when the ECU-T terminal and the E terminal are opened, the ABS warning lamp flashes (Test mode indication). At this point, release the short-circuiting. With the IG SW "LOCK" position again, run the vehicle to check the function of each sensor.



4-9-3 CONTENTS OF DIAGNOSIS

Contents of diagnosis

Code No.		Warning indication (Provided: ○,Not-provided:×)		Code memory (Provided: ○,Not-provided:×)	Contents of diagnosis	
Two digit	Four digit	ABS	Brake		System diagnosed	Diagnosis items
11	C0278	○	○	○	Solenoid relay	Open/short
15	C1241	○	×/○※1	○	Power supply	Voltage dropping/rise
21	C0200	○	×※2	○	Wheel speed sensor front right	Open/short
22	C0205	○	×※2	○	Wheel speed sensor front left	Open/short
23	C0210	○	×※2	○	Wheel speed sensor rear right	Open/short
24	C0215	○	×※2	○	Wheel speed sensor rear left	Open/short
25	C1235	○	×※2	○	Wheel speed sensor front right	Abnormal intervals
26	C1236	○	×※2	○	Wheel speed sensor front left	Abnormal intervals
27	C1238	○	×※2	○	Wheel speed sensor rear right	Abnormal intervals
28	C1239	○	×※2	○	Wheel speed sensor rear left	Abnormal intervals
29	C1237	○	×※2	○	Rotor	Missing teeth
51	C1251	○	×	○	Motor pump	Abnormality of non-rotation
52	C0226	○	○	○	Holding or front/right pressure-reducing solenoid	Abnormal
54	C0236	○	○	○	Holding or front/left pressure-reducing solenoid	Abnormal
56	C0246	○	○	○	Holding or rear/right pressure-reducing solenoid	Abnormal
58	C0256	○	○	○	Holding or rear/left pressure-reducing solenoid	Abnormal
77	C1300	○	○	○	ABS ECU	ECU internal abnormality

※1:When the voltage rises: "○", When the voltage drops:"×"
※2:When failure occurred on two or more wheels: "○"

4-10 SENSOR CHECK FUNCTION (TEST MODE)

1.The test mode is executed, immediately after any abnormal code has been erased through the brake pedal operation or at the time when the IG SW is turned "ON" for the first time after a new ABS actuator has been installed. Then, the test mode checks the following items to detect any abnormal output of each sensor, the rotor deformation or missing tooth, etc.

(1) Output voltage of wheel speed sensor

(2) Output interval of wheel speed sensor

During the test mode, the ABS warning lamp flashes. When the check of each sensor completes normally, the lamp is extinguished.

4-10-1 OUTPUT OF TEST MODE CODE

1.The indicating method of the test mode code output is the same as that of the diagnosis code output. Refer to Page E3-19.

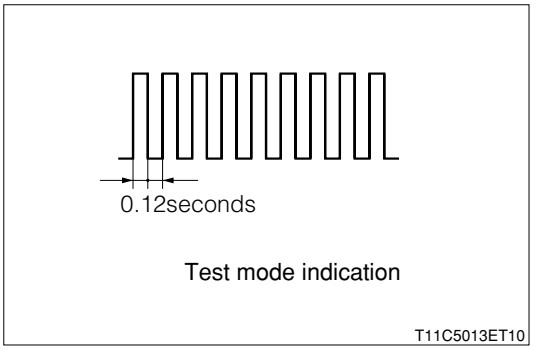
4-10-2 HOW TO ERASE TEST MODE CODE

1.When the test mode starts, all the test mode codes are automatically memorized.

2.Turn "ON" the IG SW with the DLC ECU-T terminal and E terminal released. Ensure that the ABS warning lamp flashes in the test mode indication.

CAUTION

- If the ABS warning lamp remains illuminated, the system may be malfunctioning. Therefore, confirm the diagnosis code.

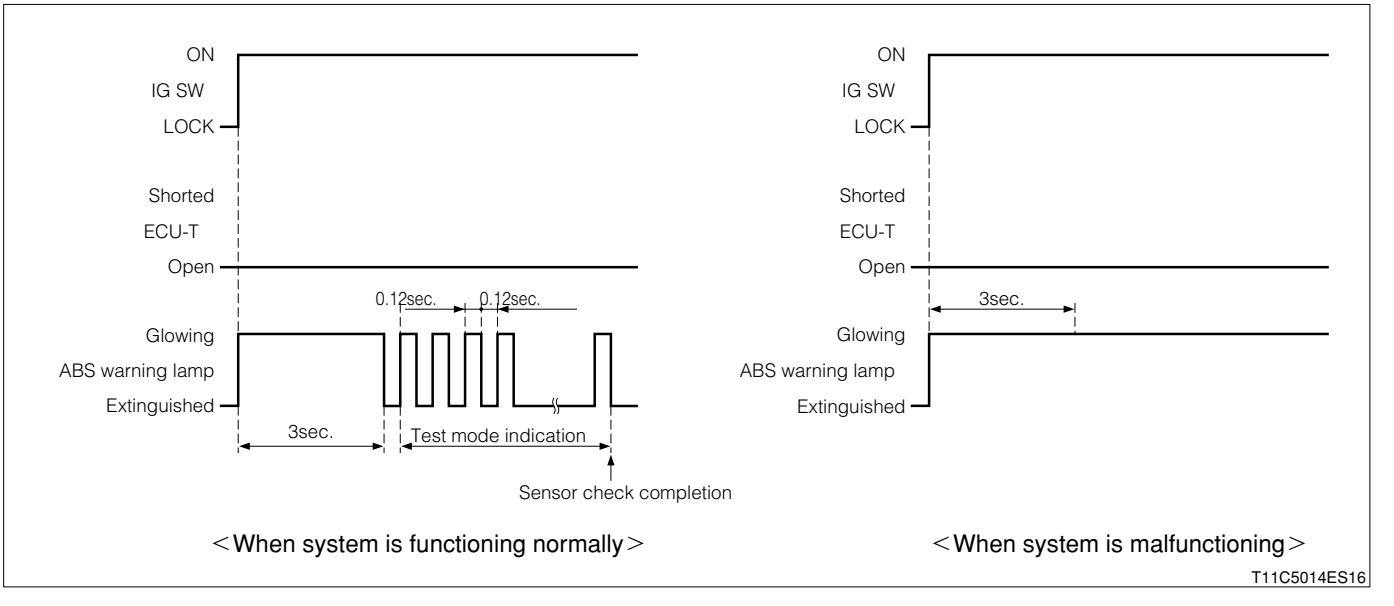


3.Run the vehicle straight at a speed of 40 km/h or more.

4.Stop the vehicle.

NOTE

- If the test finishes successfully for all the check items, the test mode code will be automatically erased and the ABS warning lamp will go out.
- If the vehicle has not been run or the test mode check conditions have not been satisfied, the memorized test mode code will not be erased. The ABS warning lamp will keep flashing (Test mode indication).



4-10-3 CONTENTS OF DIAGNOSIS

Test mode code table

Check system	Code No.		Check items	Releasing conditions
	Two digit	Four digit		
Wheel speed sensor Output voltage	81	C1271	The right front wheel speed sensor is malfunctioning electrically.	Run the vehicle straight at a speed of 4 km/h to 7 km/h.
	82	C1272	The left front wheel speed sensor is malfunctioning electrically.	
	83	C1273	The right rear wheel speed sensor is malfunctioning electrically.	
	84	C1274	The left rear wheel speed sensor is malfunctioning electrically.	
Wheel speed sensor Output interval	85	C1275	Right front wheel speed sensor interval faulty	Run the vehicle straight at least five seconds at a vehicle speed of 10 km/h to 40 km/h. Or run the vehicle straight up to 40 km/h or more.
	86	C1276	Left front wheel speed sensor interval faulty	
	87	C1277	Right rear wheel speed sensor interval faulty	
	88	C1278	Left rear wheel speed sensor interval faulty	

4-11 BASIC CHECK

4-11-1 ABS ECU

(1) Circuit check

1.During the system check, carry out the ABS ECU circuit check, following the procedure given below. If faulty, repair the circuit or connector concerned. If the check results are normal, replace the ABS actuator.

CAUTION

- When you apply a tester to the ABS ECU connector or short-circuit to the body earth, use the SST to reduce the possibility of damage to the terminals.

SST: 09991-87403-000

(2) Visual check of connector section and check of contact pressure

1.After setting the IG SW "LOCK" position, remove the negative (−) terminal of the battery.
2.Check the connector of the ABS actuator.

(3) Earth circuit check

1.After setting the IG SW "LOCK" position, remove the negative (−) terminal of the battery.
2.Disconnect the connector of the ABS actuator. Check that there is continuity between the following harness side connector terminal and the body earth.
(1) Harness side connector 14 (GND)−Body earth
SPECIFIED VALUE: Continuity exists.

(4) Power supply circuit check

1.Disconnect the connector of the ABS actuator. Measure the voltage between the following harness side connector terminal and the body earth.
(1) Harness side connector 13 (+BS)−Body earth
(2) Harness side connector 26 (+BM)−Body earth
(3) Harness side connector 20 (+IG) terminal −Body earth (To be measured with IG SW "ON")
SPECIFIED VALUE: Battery voltage

4-11-2 MEASUREMENT OF BATTERY VOLTAGE

1.Measure the battery voltage with the engine stopped.
SPECIFIED VALUE: 10−14V (When engine is stopped)

4-11-3 CHECK OF BRAKE FLUID

Refer to Page E1-3.

4-11-4 BRAKE WORKING CONDITION CHECK

Refer to Page E1-2

4-11-5 CHECK OF WARNING LAMP

1.Set the IG SW "ON" position. Ensure that the ABS warning lamp and brake warning lamp illuminate for about three seconds and, then, they go out.

NOTE

- Conduct the brake warning lamp check with the parking brake released.

4-12 TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE

4-12-1 NO.11 (SOLENOID RELAY SYSTEM)

(1) Diagnostic code output conditions

1.When the solenoid relay remains in the "OFF" state, although the ECU turns "ON" the solenoid relay.
2.When the solenoid relay remains in the "ON" state, although the ECU turns "OFF" the solenoid relay.

NOTE

- The ABS ECU monitors the solenoid relay circuit at all times.

(2) Checking points

1.Is the ABS 2 fusible link normal?
2.Is the harness between the ABS 2 fusible link and ABS actuator normal?
3.Are all connected connectors normal?

(3) Checking method

Σ1. Check of ABS2 fusible link

SPECIFIED VALUE: Not fused.

▼If it is OK, go to Σ2.
▼If it is NG, go to Σ3.

Σ2. Check of continuity between the ABS2 fusible link and ABS actuator

1.After setting the IG SW "LOCK" position, remove the negative (−) terminal of the battery.
2.Separate the connectors of the ABS2 fusible link and ABS actuator. Check the harness.
(1) Terminal between the ABS2 fusible link connector downstream side and the ABS actuator harness side connector 13 (+BS)
(2) Between the ABS actuator harness side connector 14 (GND) and the body earth

SPECIFIED VALUE: Continuity exists.

▼If OK, replace the ABS actuator.
Refer to Page E3-1.

▼If NG, repair the harness and connectors between the ABS actuator and the ABS2 fusible link.

Σ3. Check continuity between the ABS2 fusible link and the ABS actuator.

1.After setting the IG SW "LOCK" position, remove the negative (−) terminal of the battery.
2.Separate the connectors of the ABS2 fusible link and ABS actuator. Check the harness.
(1) Between the ABS2 fusible link connector downstream side and the body earth

SPECIFIED VALUE: No continuity exists.

▼If it is OK, go to Σ4.
▼If NG, repair the harness and connectors between the ABS actuator and the ABS2 fusible link.

Σ4. Check the ABS2 fusible link for operating conditions.

1.After the ABS2 fusible link has been replaced, install the connector and negative (−) terminal of the battery. Turn "ON" the IG SW.

SPECIFIED VALUE: The fusible link should not burn out.

▼If OK, observe for a while.
▼If NG, replace the ABS actuator.
Refer to Page E3-1.

4-12-2 NO.15 (ABS ECU POWER SUPPLY SYSTEM)

(1) Diagnostic code output conditions

1.When the power supply voltage of the ABS ECU is below 9.7V,
2.When the power supply voltage of the ABS ECU exceeds 18.0 V,

NOTE

- The ABS ECU monitors the power supply voltage.

(2) Checking points

1.Is the alternator normal?
2.Is the battery normal?
3.Is the ABS 2 fusible link normal?
4.Are the harness and connector between the battery and ABS actuator normal?

(3) Checking method

⌦1. Check of the voltage between the ABS2 fuse and the ABS actuator

1.After the IG SW has been set to "LOCK" position, disconnect the connector from the ABS actuator.
2.After turning "ON" the IG SW, measure the voltage between the terminals given below.
(1) Between the ABS actuator harness side connector 13 (+BS) terminal and the 14 (GND) terminal
SPECIFIED VALUE: 10.0V−16.0V

▼If OK, observe for a while.
▼If it is NG, go to ⌦2.

⌦2. Continuity check between the ABS2 fuse and the ABS actuator

1.After setting the IG SW "LOCK" position, measure the resistance between the following terminals given below.
(1) Between the ABS actuator harness side connector 13 (+BS) terminal and the ABS2 fuse downstream side terminal
SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to ⌦3.
▼If NG, carry out the following operations.
(2) Check the harness between the ABS2 fuse and the ABS actuator.
(3) Repair or replace the harness and connector

⌦3. Check continuity between the ABS actuator and the earth.

1.After the IG SW has been set to "LOCK" position, disconnect the connector from the ABS actuator.
2.Measure the resistance between the following terminals.
(1) Between the ABS actuator harness side connector 14 (GND) and the body earth
SPECIFIED VALUE: No continuity exists.

▼If OK, check and repair the battery or the alternator.
▼If NG, carry out the following operations.
(2) Repair of harness and connector
(3) Check of body earth section

4-12-3 NO.21 THROUGHT NO.29 (WHEEL SPEED SENSOR, ROTOR SYSTEM)

(1) Diagnostic code output conditions

① No.21, No.22, No.23, No.24: Wheel speed sensor system open wire / short

1.When open wire or short is detected in the wheel speed sensor system or improper connection of the connector is detected:

② No.25, No.26, No.27, No.28: Wheel speed sensor interval abnormal

1.When no wheel speed sensor signal is inputted during running:
2.When signal is missing during running:
3.When noises are mixed in the signal during running:
4.When ABS control and EBD control are judged as abnormal:

NOTE

- When this code is outputted, check not only the circuits, but also the installing conditions, etc. of the wheel speed sensor and rotor.

③ No.29: Rotor teeth missing

1.When the signals are missing periodically according to the tire rotation.

(2) Checking points

① No.21, No.22, No.23, No.24: Wheel speed sensor system open wire / short

1.Are the harness and connector between the wheel speed sensor and ABS actuator normal?
2.Is the sensor resistance in the range of 0.9kΩ − 2kΩ?

② No.25, No.26, No.27, No.28, No29: Wheel speed sensor interval abnormal

1.Are the wheel speed sensor and the rotor installing conditions normal? (Are there any factors causing an unstable output of the wheel speed sensor?)

③ No.29: Rotor teeth missing

1.Does the rotor exhibit any teeth missing, deformation or excessive play?

(3) Checking method

Σ>1. Unit check of wheel speed sensor

1.Carry out the unit check of the wheel speed sensor.
Refer to Page E3-36.

Refer to Page E3-37.

DIAGNOSIS CODES	Applicable item of check
No.21, No25	Right front wheel speed sensor
No.22, No26	Left front wheel speed sensor
No.23, No27	Right rear wheel speed sensor
No.24, No28	Left rear wheel speed sensor

▼If it is OK, go to Σ>2.
▼If NG, carry out the following checks.
(1) Check of the wheel speed sensor installing conditions
(2) Adjustment, repair or replacement of the wheel speed sensor and wheel speed sensor rotor
(3) Check the axle bearing for excessive play.

∑2. Continuity check between the wheel speed sensor and the ABS actuator

1.Separate the connectors of the affected wheel speed sensor and ABS actuator. Check the harness.

Check contents according to diagnosis codes

No.21, No25	Between the front wheel speed sensor harness side connector 1 (+) terminal and the ABS actuator harness side connector 8 (FR+) terminal
	Between the front wheel speed sensor harness side connector 2 (−) terminal and the ABS actuator harness side connector 9 (FR−) terminal
No.22, No26	Between the front wheel speed sensor harness side connector 1(+) terminal and the ABS actuator harness side connector 6(FL+) terminal
	Between the front wheel speed sensor harness side connector 2 (−) terminal and the ABS actuator harness side connector 5 (FL−) terminal
No.23, No27	Between the rear wheel speed sensor harness side connector 1 (−) terminal and the ABS actuator harness side connector 3 (RR−) terminal
	Between the rear wheel speed sensor harness side connector 2 (+) terminal and the ABS actuator harness side connector 2 (RR+) terminal
No.24, No28	Between the rear wheel speed sensor harness side connector 1 (−) terminal and the ABS actuator harness side connector 11 (RL−) terminal
	Between the rear wheel speed sensor harness side connector 2 (+) terminal and the ABS actuator harness side connector 12 (RL+) terminal

SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to ∑3.

▼If NG, repair the harness and connectors between the wheel speed sensor and the ABS actuator.

∑3. Check the harness between the wheel speed sensor and the ABS actuator.

1.Visually check the wheel speed sensor concerned and the harness between the wheel speed sensor and the ABS actuator. Check to see if each harness is damaged or the connector has poor contact.

▼If it is OK, go to ∑4.

▼If NG, repair the harness and connectors between the wheel speed sensor and the ABS actuator.

∑4. Check of the wheel speed sensor

1.Check that the installing conditions of the wheel speed sensor or the wheel speed sensor rotor exhibits no abnormality.

▼If OK, replace the ABS actuator.

Refer to Page E3-1.

▼If NG, repair the installing condition of the wheel speed sensor and replace the wheel speed sensor rotor.

4-12-4 NO.51 (MOTOR PUMP SYSTEM)

(1) Diagnostic code output conditions

1.When the motor pump is not operating

(2) Checking points

1.Is the ABS 1 fusible link normal?

2.Is the harness between the ABS 1 fusible link and ABS actuator normal?

(3) Checking method

Σ1. Check of ABS1fusible link

SPECIFIED VALUE: Not burnt out

▼If it is OK, go to Σ2.

▼If it is NG, go to Σ3.

Σ2. Continuity check between the ABS1 fusible link and the ABS actuator

1.After setting the IG SW "LOCK" position, remove the negative (−) terminal of the battery.

2.Separate the connectors of the ABS1fusible link and ABS actuator. Check the harness.

(1) Between the ABS1 fusible link connector downstream side and the ABS actuator harness side connector 26 (+BM) terminal.

SPECIFIED VALUE: Continuity exists.

▼If OK, replace the ABS actuator.

Refer to Page E3-1.

▼If NG, repair the harness and connectors between the ABS1fusible link and the ABS actuator.

Σ3. Continuity check between the ABS1 fusible link and the ABS actuator

1.After setting the IG SW "LOCK" position, remove the negative (−) terminal of the battery.

2.Separate the connectors of the ABS1 fusible link and ABS actuator. Check the harness.

(1) Between the ABS1 fusible link connector downstream side and the body earth

SPECIFIED VALUE: No continuity exists.

▼If it is OK, go to Σ4.

▼If NG, repair the harness and connectors between the ABS1 fusible link and the ABS actuator.

Σ4. Check of the ABS1 fusible link for operating conditions

1.After replacing the ABS1 fusible link, connect the connector and the negative (−) terminal of the battery. Then, turn "ON" the IG SW.

SPECIFIED VALUE: The fusible link should not burn out.

▼If OK, observe for a while.

▼If NG, replace the ABS actuator.

Refer to Page E3-1.

4-12-5 NO.52, NO.54, NO.56, NO.58 (SOLENOID SYSTEM)

(1) Repairing method

1.Replace the ABS actuator.

Refer to Page E3-1.

4-12-6 NO.77 (ABS ECU SYSTEM)

(1) Repairing method

1.Replace the ABS actuator.

Refer to Page E3-1.

4-13 TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA

4-13-1 THE ABS WARNING LAMP REMAINS ILLUMINATED BY TURNING "ON" IG SW.

(1) Checking points

1.Has the diagnosis function detected any abnormal sections?
2.Is the connector of the ABS actuator normally connected?
3.Is the CAN communication operating normally?

(2) Checking method

Σ>1.Confirmation of diagnosis codes

1.Perform the diagnosis code output indication by the ABS warning lamp.
Refer to Page E3-19.

2.After turning "ON" the IG SW, check the lightening state of the ABS warning lamp.
SPECIFIED VALUE: Output the abnormal codes.

▼If OK, perform the trouble-shooting according to the diagnosis code table.
Refer to Page E3-19.

▼If it is NG, go to Σ>2.

Σ>2. Check of connector fitting state

1.After setting the IG SW "LOCK"
2.After turning "ON" the IG SW, check the lightening state of the ABS warning lamp.
SPECIFIED VALUE: abnormal codes are outputted.

▼If OK, perform the trouble-shooting according to the diagnosis code table.
Refer to Page E3-19.

▼If it is NG, go to Σ>3.

Σ>3. Confirmation of diagnosis codes

SPECIFIED VALUE: The normal code is indicated.

▼If OK, observe for a while. (Normal code indication)
▼If it is NG, go to Σ>4.

Σ>4. Check of ECU IG1 fuse

SPECIFIED VALUE: Not burnt out

▼If it is OK, go to Σ>5.
▼If NG, replace the ECU IG1 fuse and check the ECU IG1 fuse system.

⊃5. Check the CAN communication continuity between the ABS actuation and the combination meter.

1.After setting the IG SW "LOCK", remove the negative (−) terminal of the battery. Stop the short-circuiting the DLC.

2.Disconnect the connector of the ABS actuator. Check continuity between the ABS actuator harness side connector CAN communication (HCAN and LCAN) and the combination meter harness side connector CAN communication (HCAN and LCAN)

Refer to Page L2-14.

SPECIFIED VALUE: Continuity exists.

▼If OK, perform the trouble-shooting of the CAN communication.

Refer to Page L2-1.

▼If NG, repair the harness between the ABS actuator and the combination meter.

4-13-2 THE BRAKE WARNING LAMP REMAINS ILLUMINATED BY TURNING "ON" IG SW.

(1) Checking points

1.When the brake warning lamp is illuminated at the same time with the ABS warning lamp, perform the troubleshooting for the case The ABS warning lamp is illuminated at all times with the IG SW "ON" position.

Refer to Page E3-32.

2.If the brake warning lamp only is illuminated at all times, refer to the following.

(1) Is the parking brake SW "ON" position?
(2) Is the brake fluid level normal?
(3) Is the parking brake SW normal?
(4) Is the brake fluid level SW normal?
(5) Are the brake fluid level SW and parking brake SW system circuit normal?
(6) Is there open wire in the brake warning lamp system circuit?
(7) Is the combination meter normal?

NOTE

- Perform the check with the parking brake released.

(2) Checking method

1.Perform the trouble-shooting of the combination meter.

Refer to Page J3-27.

4-13-3 THE ABS WARNING LAMP DOES NOT GO ON FOR THREE SECONDS AFTER IG SW IS SET TO "ON" POSITION.

(1) Checking points

NOTE

- The ABS warning lamp illuminates about three seconds.

1.Is the combination meter normal?

(2) Checking method

1.Perform the trouble-shooting of the combination meter.

Refer to Page J3-30.

4-13-4 THE BRAKE WARNING LAMP DOES NOT GO TO ON FOR THREE SECONDS AFTER IG SW IS SET TO "ON" POSITION.

(1) Checking points

NOTE

- The brake warning lamp illuminates about three seconds.

1.Is the combination meter normal?

(2) Checking method

1.Perform the trouble-shooting of the combination meter.

Refer to Page J3-29.

4-13-5 BRAKE MALFUNCTIONS (THE BRAKES ON ONE SIDE ONLY WORK; THE BRAKING EFFECT IS INSUFFICIENT; THE ABS OPERATES DURING NORMAL BRAKING; THE PEDAL VIBRATES DURING ABS OPERATION), AND THE ABS WARNING LAMP ILLUMINATES WHILE DRIVING.

(1) Checking points

1.Although it is not easy to evaluate malfunctions as they are observed differently depending upon the running conditions and road conditions, perform the following checking methods when the diagnosis code is the normal code.

(2) Checking method

Σ1.Check of ABS warning lamp

1.Perform the diagnosis code output indication.
Refer to Page E3-19.

2.After turning "ON" the IG SW, check the lightening state of the ABS warning lamp.
SPECIFIED VALUE: The normal code is flashing.

▼If it is OK, go to Σ2.
▼If NG, perform the trouble-shooting according to the diagnosis code table.
Refer to Page E3-19.

Σ2. Check of the installing conditions of each wheel speed sensor

1.Check the installing conditions of each wheel speed sensor.
SPECIFIED VALUE: Ensure that the retaining bolts exhibit no looseness and are installed correctly.

▼If it is OK, go to Σ3.
▼If NG, the installation of the wheel speed sensor is improper.

Σ3. Continuity check between the terminals of each wheel speed sensor

1.Disconnect the connector of the ABS actuator. Check continuity between the terminals of each harness side sensor.
▼If it is OK, go to Σ4.
▼If NG, the wire harness is faulty.

Σ4. Check of harness fitting state

1.Check the continuity state while the harness and connector are being moved.
SPECIFIED VALUE: Malfunction exists.

▼If OK, the wire harness fitting is poor.
▼If it is NG, go to Σ5.

Σ5. Check of the wheel speed sensor system

1.Check the wheel speed sensor.
Refer to Page E3-36.

▼If OK, observe for a while.
▼If NG, the following is true.
(1) The wheel speed sensor malfunctioning
(2) The wheel speed sensor rotor malfunctioning
(3) The wheel speed sensor malfunctioning

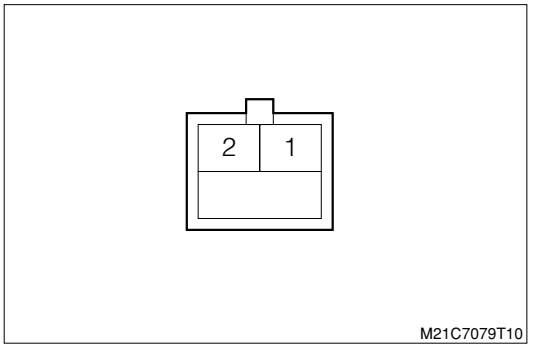
4-14 UNIT CHECK

4-14-1 STOP LAMP SWITCH

1.Check continuity between the connector terminals of the stop lamp switch.

SPECIFIED VALUE:

SW conditions	Continuity
When released	Exists
When pushed	Not exists



4-14-2 FRONT WHEEL SPEED SENSOR

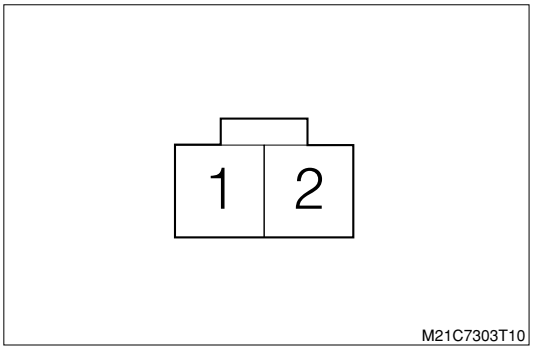
(1) Measurement and visual inspection

1.Measure the resistance between the connector terminals.
SPECIFIED VALUE: 1.60±0.20kΩ (at time of 20°C)

2.Check the wheel speed sensor installation condition.
SPECIFIED VALUE: The sensor should not float up from the sensor installation surface.

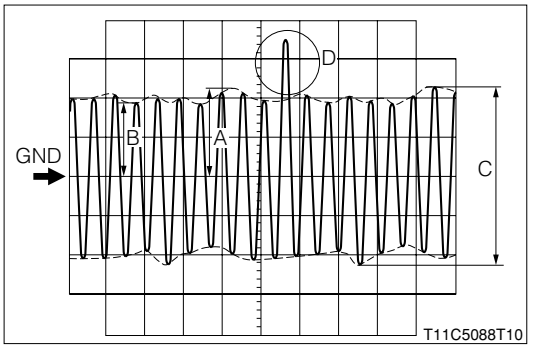
3.Check the tightened condition of the wheel speed sensor installation bolts.
TIGHTENING TORQUE: 8.4±1.4N·m{85±14kgf·cm}

4.Check if debris is stuck to the end of the front wheel sensor.
SPECIFIED VALUE: There should be no foreign matters attached, scratches, chips or deformation.



(2) Inspection using an oscilloscope

1.Using an oscilloscope, check the output waveform between the wheel speed sensor connector terminals when running at a speed of 20 km/h or more.
(1) Connecting terminals:
1 (FR+)−2 (FR−), 1 (FL+)−2 (FL−)
SPECIFIED VALUE: When C is 0.5V or more
B is 70% or more of A
D will not occur.



NOTE

- If C is deviated from the requirement, check the wheel speed sensor.
- If B is deviated from the requirement, check the wheel speed sensor rotor.
- If D is generated, check the tip-end of the sensor.

4-14-3 FRONT WHEEL SPEED SENSOR ROTOR

1.Check the wheel speed sensor rotor of the axle hub.
SPECIFIED VALUE: There should be no problems with the rotor, such as scratches, chips, or deformation.

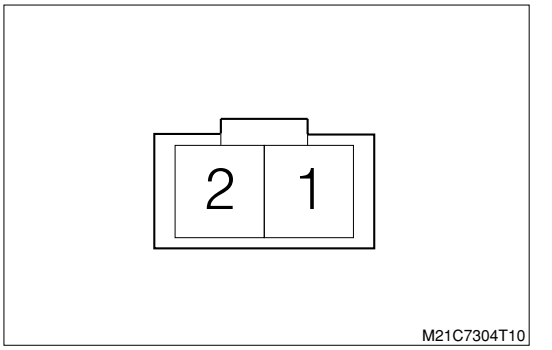
NOTE

- Air gap between wheel speed sensor and sensor rotor: 1.2±0.5 mm (Reference)

4-14-4 REAR WHEEL SPEED SENSOR

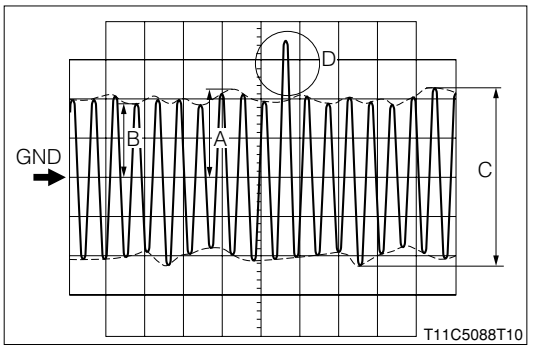
(1) Measurement and visual Inspection

1.Measure the resistance between the connector terminals.
SPECIFIED VALUE: 1.11±0.20kΩ (At time of 20°C)



(2) Inspection using an oscilloscope

1.Using an oscilloscope, check the output waveform between the wheel speed sensor connector terminals when running at a speed of 20 km/h or more.
(1) Connecting terminals:
2 (RR+)−1 (RR−), 2 (RL+)−1 (RL−)
SPECIFIED VALUE: When C is 0.5V or more
B is 70% or more of A
D will not occur.



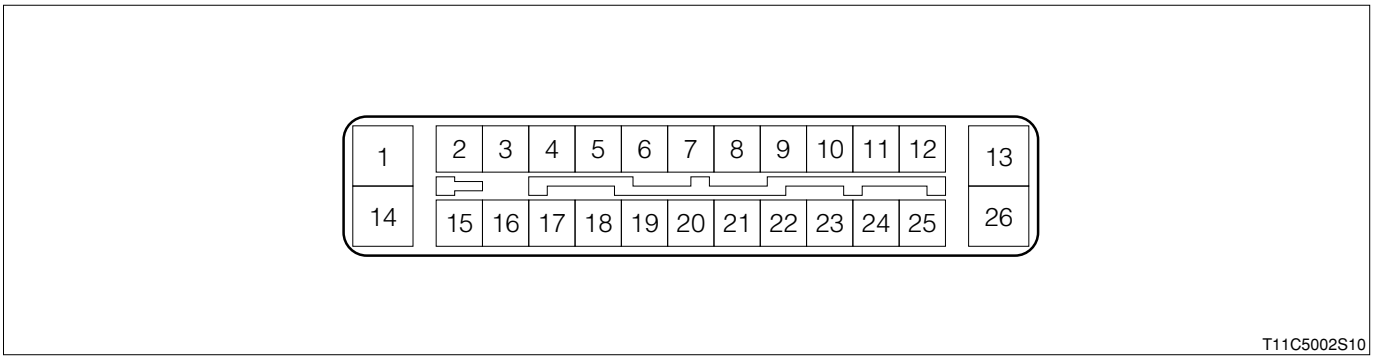
NOTE

- If C, B and D are deviated from the requirements, check the rear axle hub & bearing Ay.

4-15 ECU INPUT/OUTPUT SIGNAL CHECK

1. After setting the IG SW "LOCK", disconnect the connector of the ABS actuator. At the harness side connector, check the voltage, resistance and continuity between each terminal and the body earth.

Harness side connector



ABS ECU input/output characteristic

Check system	Connection				Measuring condition	Specification value
Power supply	20	+IG	−	Body earth	IG SW "ON"	10.0 − 16.0V
Wheel speed sensor	6	FL+	5	FL−	IG SW "LOCK"	1.1±0.2kΩ
	8	FR+	9	FR−	IG SW "LOCK"	1.1±0.2kΩ
	12	RL+	11	RL−	IG SW "LOCK"	1.2±0.15kΩ
	2	RR+	3	RR−	IG SW "LOCK"	1.2±0.15kΩ
Stop lamp SW	24	STP	−	Body earth	When the brake pedal is depressed	10.0 − 16.0V
					When the brake pedal is released	0V or less

TO INDEX

F1 CLUTCH

CLUTCH SYSTEM---------- F1 - 1
BASIC CHECK AND ADJUSTMENT--- F1 - 1
CLUTCH PEDAL ---------- F1 - 2
REMOVAL AND INSTALLATION(RHD VEHICLE)---------- F1 - 2
REMOVAL AND INSTALLATION(LHD VEHICLE)---------- F1 - 5
CLUTCH CABLE ---------- F1 - 8
REMOVAL AND INSTALLATION-------- F1 - 8
CLUTCH ---------- F1 - 13
REMOVAL AND INSTALLATION------ F1 - 13

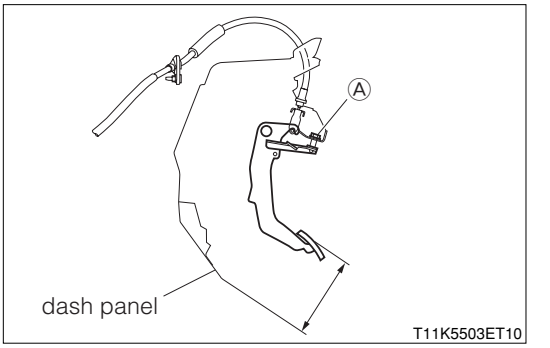
1 CLUTCH SYSTEM

1-1 BASIC CHECK AND ADJUSTMENT

1-1-1 CHECK OF CLUTCH PEDAL HEIGHT

1.Check the height from the dash panel to the center of the pedal at the right side.

SPECIFIED VALUE: Height of clutch pedal
149.9-154.9mm(RHD)
149.1-154.1mm(LHD)



CAUTION

- There is no need of adjusting the pedal height.
- The height cannot be adjusted by means of the bolt at the section Ⓐ.

1-1-2 ADJUSTMENT OF CLUTCH PEDAR FREE TRAVEL

1.Move the clutch release lever by your left hand and stop it at a position where it comes in contact lightly with the diaphragm spring of the clutch cover.
(The arrow mark in the figure shows the direction in which the release lever is moved.)

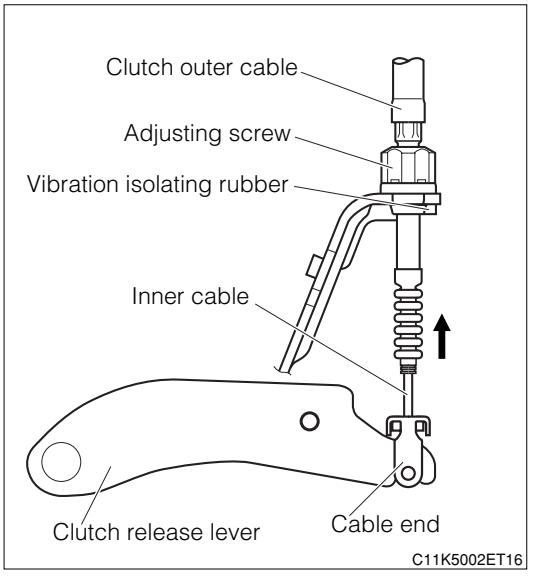
2.Pull up the clutch outer cable by your right hand and hold it at a position where there is no slack of the inner cable. Then, release your left hand.

3.Screw in the adjusting screw by your left hand, until it comes in contact with the rotation stopper protrusion of the vibration preventive rubber.
At this time, if the rotation stopper protrusion is not aligned with the groove position of the adjusting screw, perform the alignment by backing off the adjusting screw.

4.Release your hand under a condition where the groove position of the adjusting screw is aligned with the rotation stopper protrusion.

5.Ensure that the free travel of the clutch pedal conforms to the specified value.
(When carrying out the operations above, the operations to be performed by your right hand can be performed by your left hand and vice versa.)

SPECIFIED VALUE: Free travel of clutch pedal
10 to 25 mm
(Upper surface of pedal pad)



1-1-3 CHECK OF DISTANCE TO THE FLOOR WHEN THE CLUTCH IS DISENGAGED

1.Check and adjust the clutch pedal height.

2.Check and adjust the free travel of the clutch pedal.

3.With the engine idling, pull the parking brake lever fully. Then, move the shift lever to the 1st gear position and slowly release the pedal. Check the distance between the pedal at a moment immediately before the clutch is engaged and the position when the clutch pedal is depressed fully to the floor.

SPECIFIED VALUE: 20 mm or more (Reserve travel)

2 CLUTCH PEDAL

2-1 REMOVAL AND INSTALLATION(RHD VEHICLES)

2-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

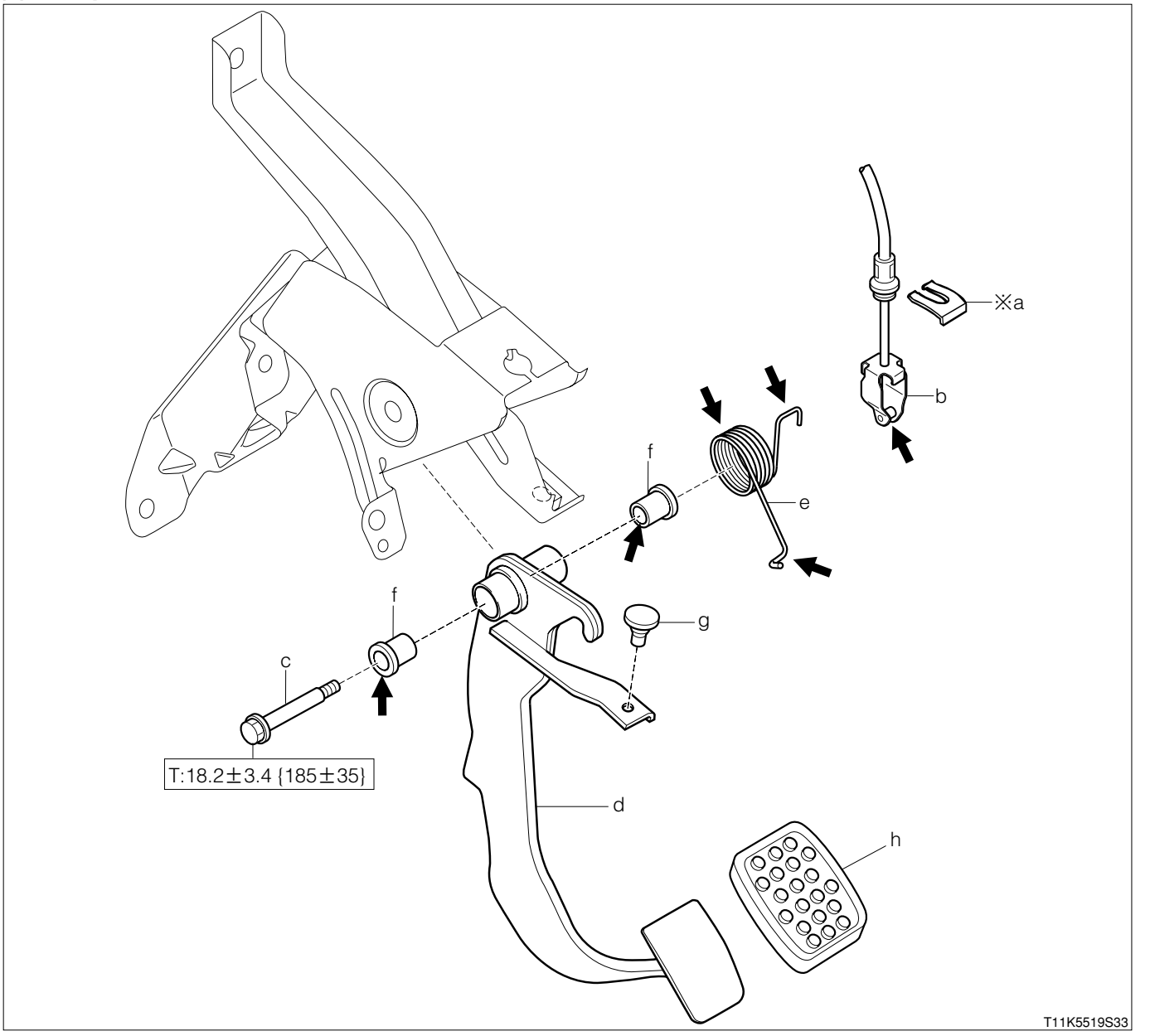
MP grease

2-1-2 OPERATION BEFORE REMOVAL

1.Remove the instrument panel finish lower panel.
Refer to Page I2-23.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



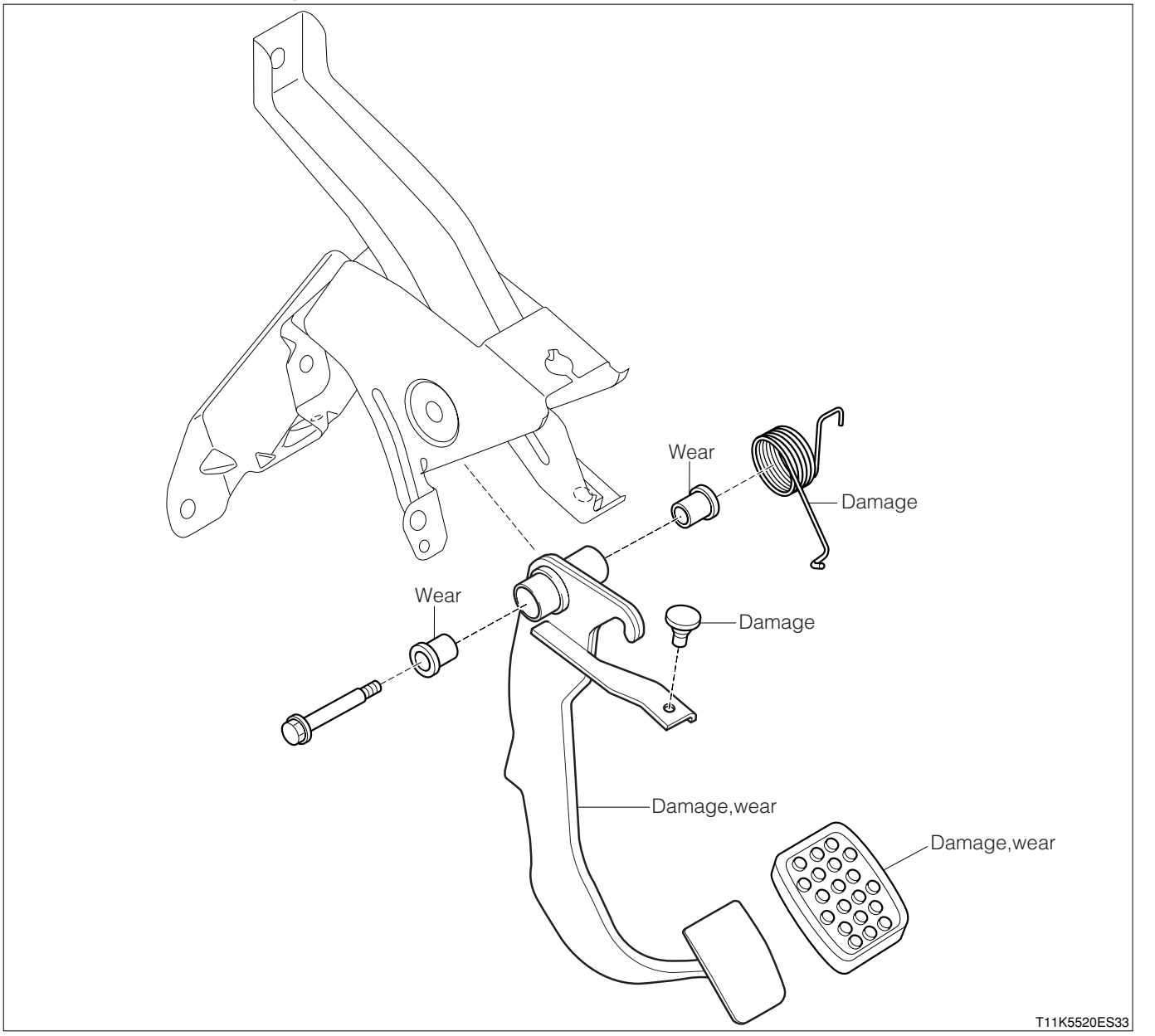
➡: MP grease
※:Non - reusable parts
Unit: N·m{kgf·cm}

(2) Removal and installation procedures

1 a Clip
2 b Cable Ay, clutch release
3 c Shaft, pedal
4 d Pedal S/A, clutch
5 e Spring, torsion
6 f Bush
▲ 7 g Cushion
8 h Pad, clutch pedal

2-1-4 INSPECTION

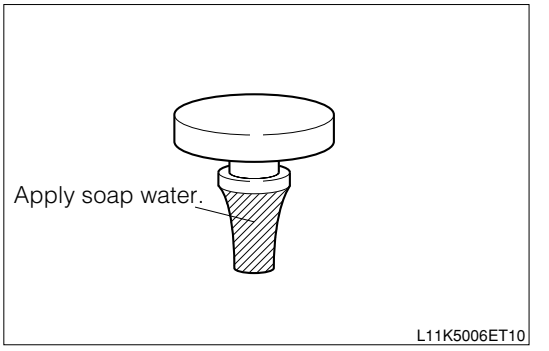
Check each of the following parts. Replace any faulty part.



2-1-5 POINTS OF INSTALLATION

(1) Cushion

1.Apply soap water to the tip end of the cushion. Then, install it to the clutch pedal subassembly.



2-1-6 OPERATION AFTER INSTALLATION

1.Check the clutch pedal height and adjust the free play.
Refer to Page F1-1.

2.Install the instrument panel finish lower panel.
Refer to Page I2-23.

2-2 REMOVAL AND INSTALLATION

2-2-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

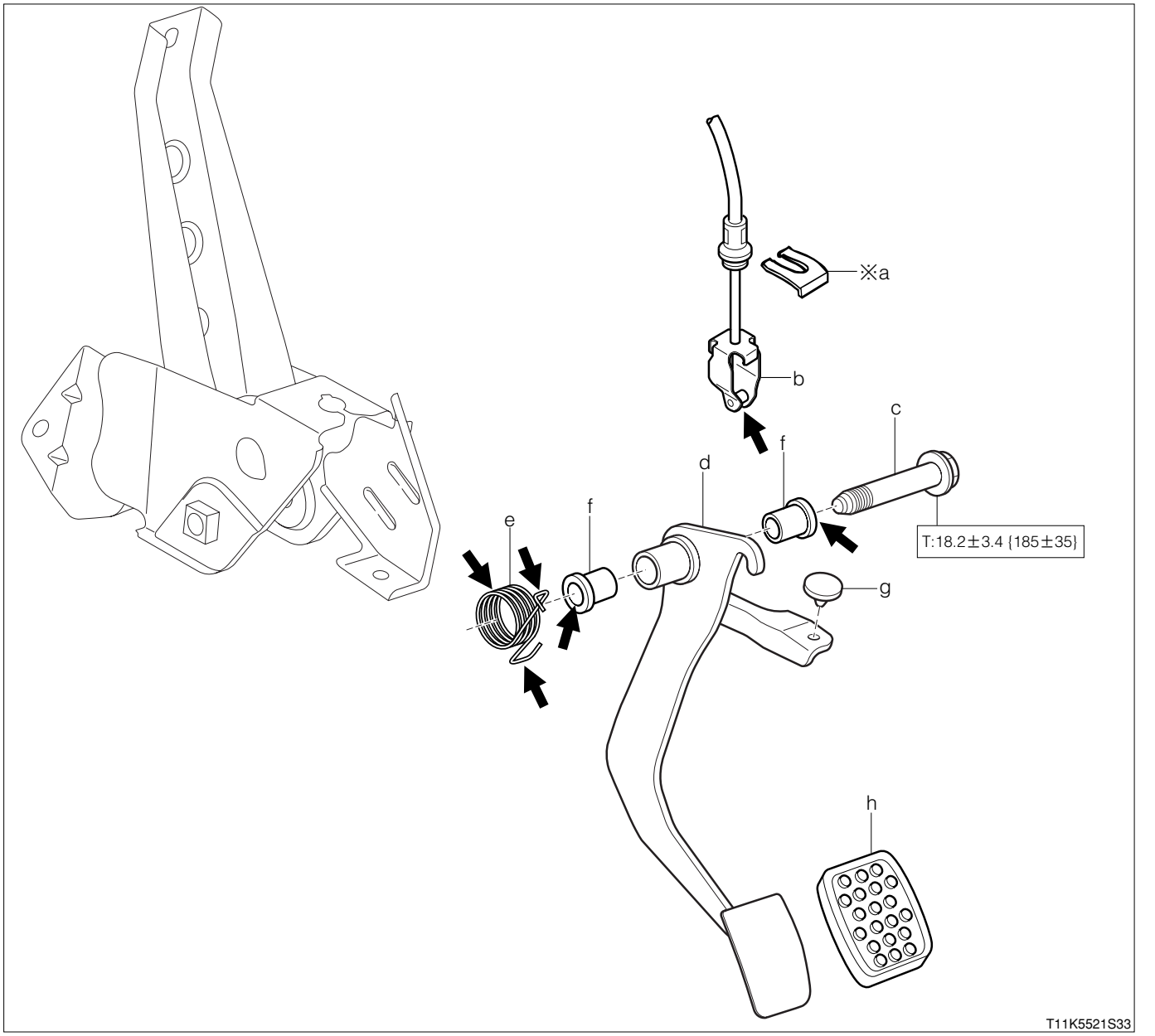
MP grease

2-2-2 OPERATION BEFORE REMOVAL

1.Remove the instrument panel finish lower panel.
Refer to Page I2-23.

2-2-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



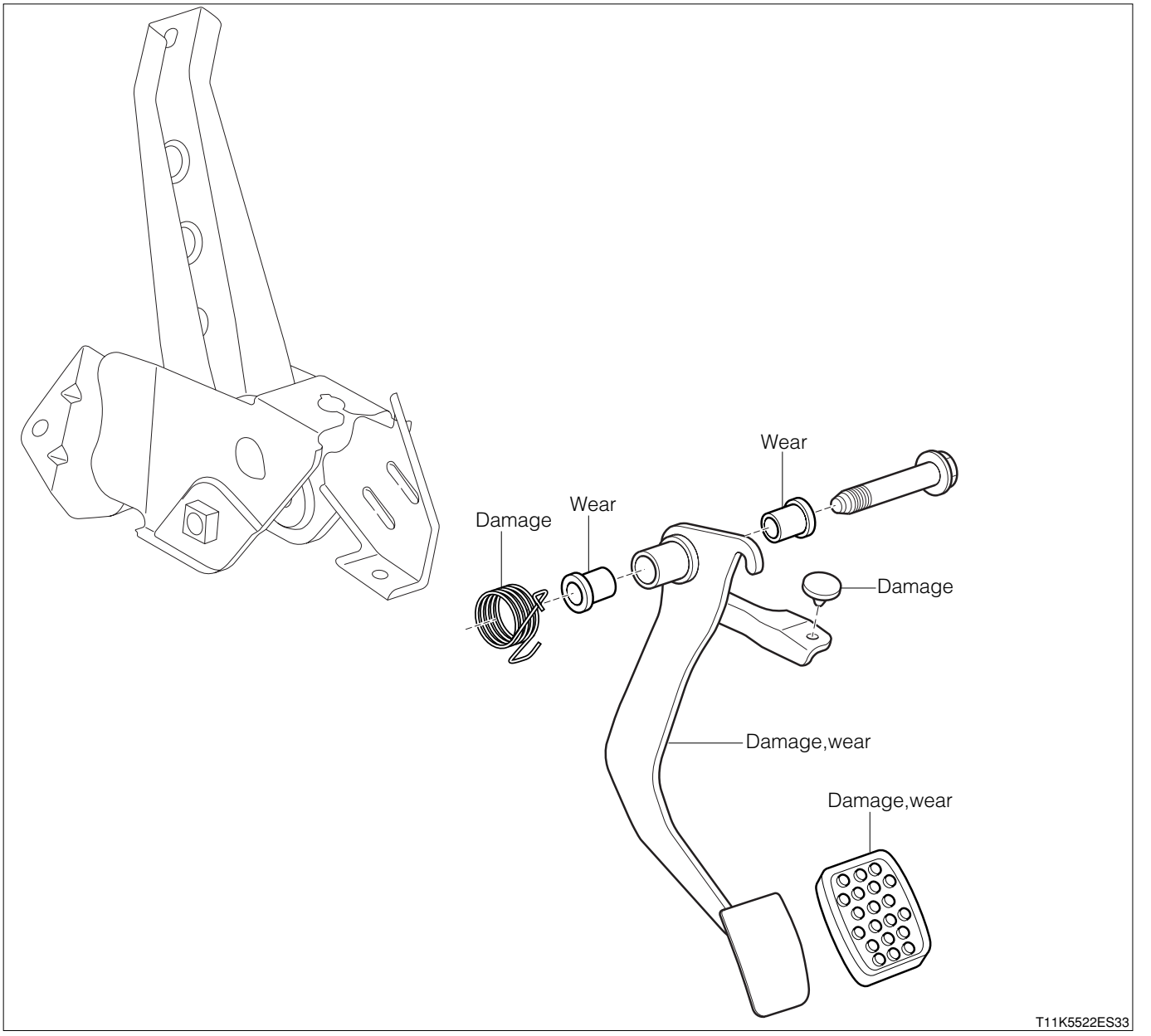
➡: MP grease
※:Non - reusable parts
Unit: N·m{kgf·cm}

(2) Removal and installation procedures

1 a Clip
2 b Cable Ay, clutch release
3 c Shaft, pedal
4 d Pedal S/A, clutch
5 e Spring, torsion
6 f Bush
▲ 7 g Cushion
8 h Pad, clutch pedal

2-2-4 INSPECTION

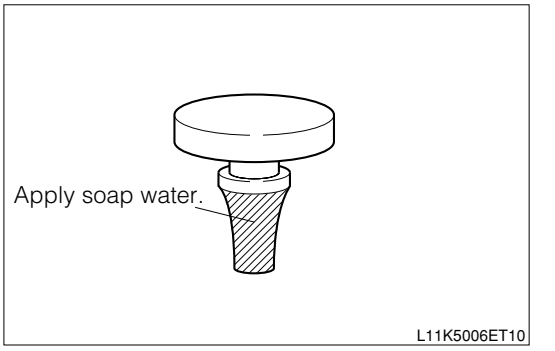
Check each of the following parts. Replace any faulty part.



2-2-5 POINTS OF INSTALLATION

(1) Cushion

1.Apply soap water to the tip end of the cushion. Then, install it to the clutch pedal subassembly.



2-2-6 OPERATION AFTER INSTALLATION

1.Check the clutch pedal height and adjust the free play.
Refer to Page F1-1.

2.Install the instrument panel finish lower panel.
Refer to Page I2-23.

3 CLUTCH CABLE

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

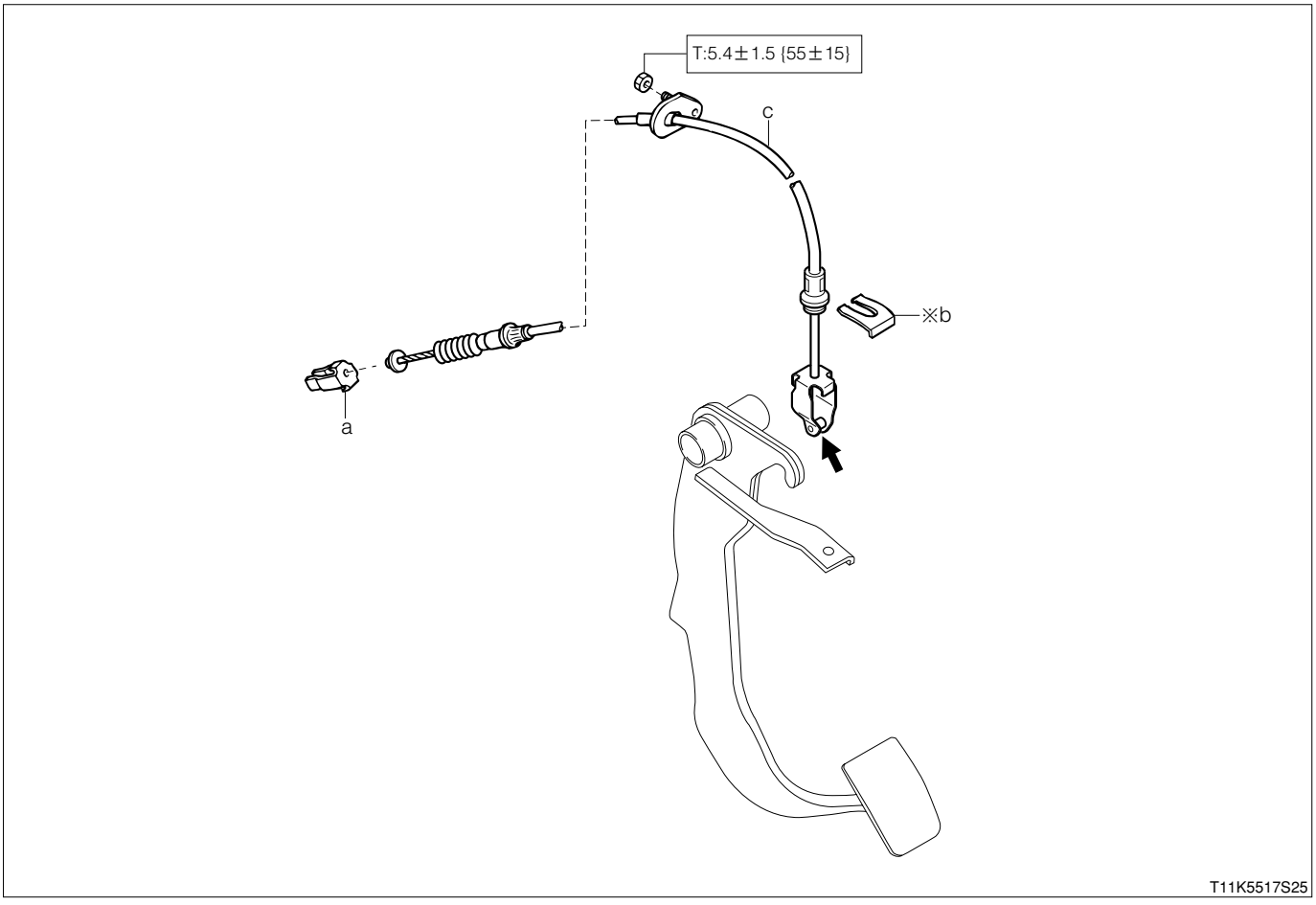
MP grease,Rope

3-1-2 OPERATION BEFORE REMOVAL

1.Remove the instrument panel finish lower panel S/A.
Refer to Page I2-23.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



➡: MP grease
※:Non - reusable parts
Unit: N·m{kgf·cm}

(2) Removal and installation procedures

▼ ▲ 1 a Bracket, clutch release cable No.1
2 b Clip
▼ ▲ 3 c Cable Ay, clutch release

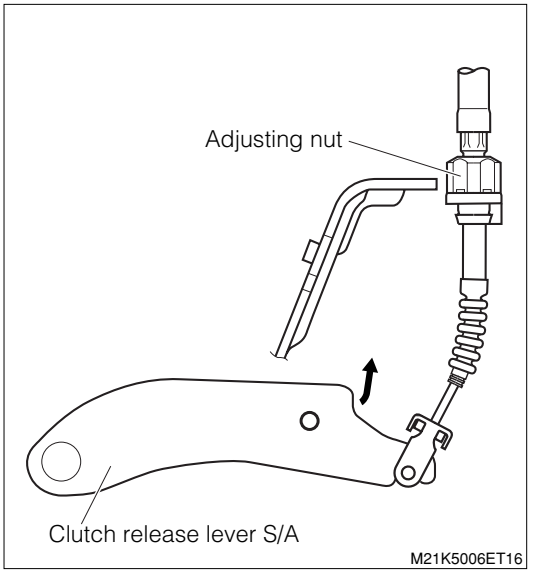
3-1-4 POINTS OF REMOVAL

(1) Bracket, clutch cable, No.1

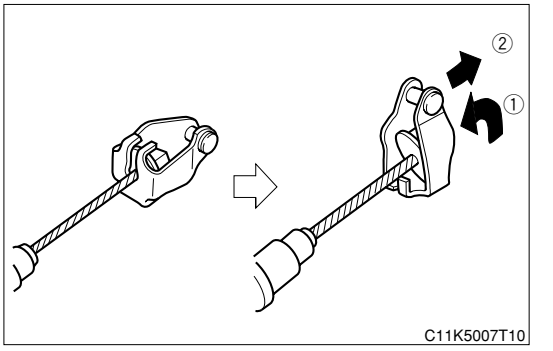
1.Remove the bracket.

(1) Loosen the adjusting nut of the clutch release cable assembly.

(2) While pulling up the clutch release lever subassembly by your hand, take out the clutch release cable bracket No.1 from the clutch release lever sub-assembly.



(3) Route the cable at the cutout section of the clutch release cable bracket No.1. Then, remove the clutch release cable bracket No.1 by raising it 90 degrees.

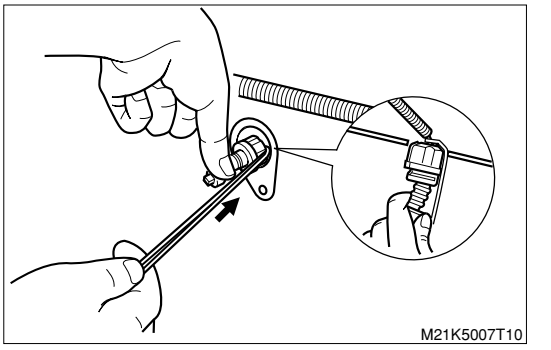


(2) Cable Ay, clutch release

1.Loosen the play adjusting nut of the clutch release cable assembly fully to the position indicated in the figure on the right. Then, while pulling the clutch release cable assembly by the cord, push it into the vehicle interior.

CAUTION

- This cord will be used when the clutch release cable assembly is installed. Hence, leave this cord routed from the engine compartment side to the vehicle interior side.
- Be sure to use a cord of about 2 m in length.

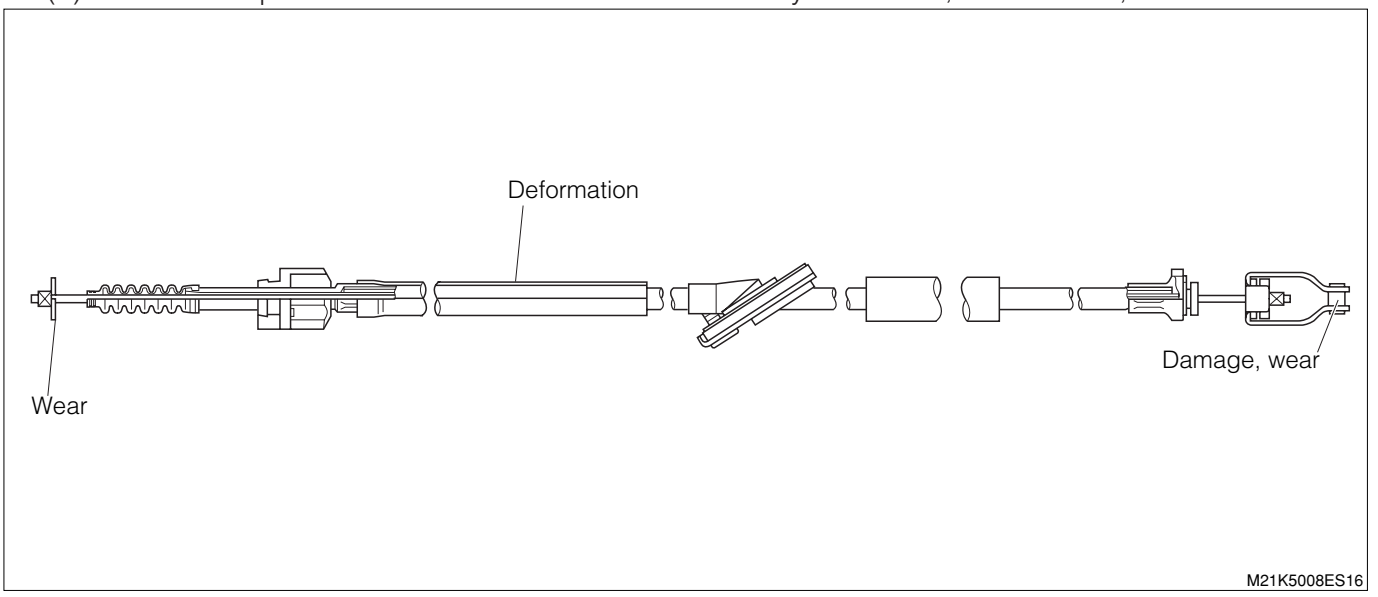


3-1-5 INSPECTION

1.Check the following items. Replace any faulty part.

(1) Push and pull the inner cable of the clutch release cable assembly. At this time, ensure that there is no abnormal resistance and binding.

(2) Check each part of the clutch release cable assembly for scores, deformation, wear and cracks.



(3) Clutch release cable bracket No.1 for damage and wear.

3-1-6 POINTS OF INSTALLATION

(1) Cable Ay, clutch release

1.Install the cable Ay.

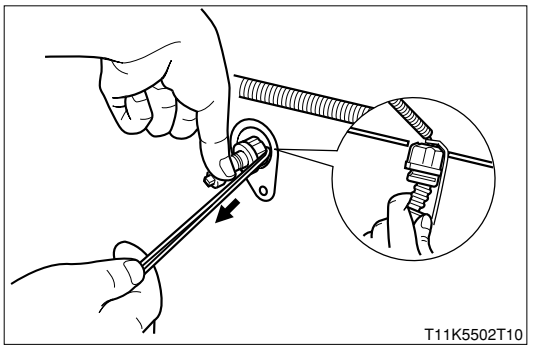
CAUTION

- Utmost care must be exercised so that the inner cable may not be bent.

(1) Fully loosen the play adjusting nut of the clutch release cable assembly.

(2) Apply the cord, that was used at the time of the removal, to the play adjusting nut.

(3) Pull the cord from the engine compartment side. Also, push the clutch release cable from the vehicle interior side at the same time, thus pulling out the tip end to the engine compartment side.



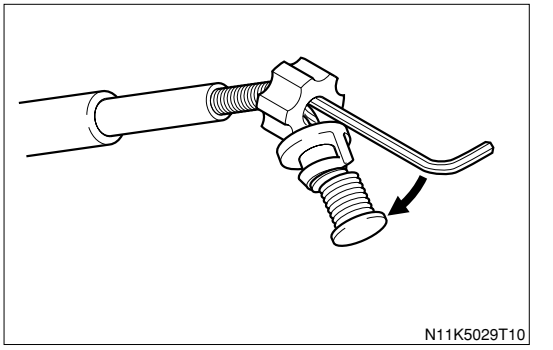
CAUTION

- There is the possibility that the inner cable is bent if the cord is pulled strongly. Be very careful not to pull the cord strongly.

(4) Set the play adjusting nut of the clutch release cable assembly to the position indicated in the figure on the right. While pulling by means of the cord, pull the play adjusting nut to the engine compartment side.

NOTE

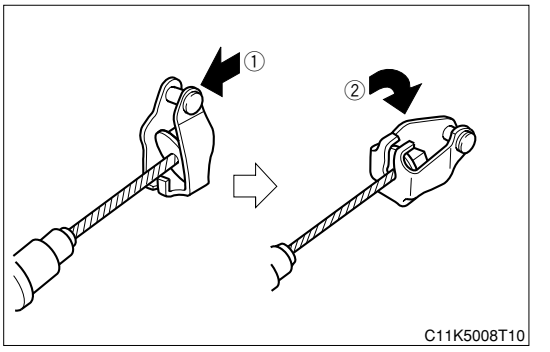
- If any difficulty is encountered in passing the adjusting nut through the dash panel, adjust the angle of the nut by inserting a fine rod into the nut, as indicated in the figure on the right.



(2) Bracket, clutch cable, No.1

1.Install the bracket.

(1) Connect the cable by routing it at the cutout section of the clutch release cable bracket No.1. Then, tilt the cable 90 degrees.



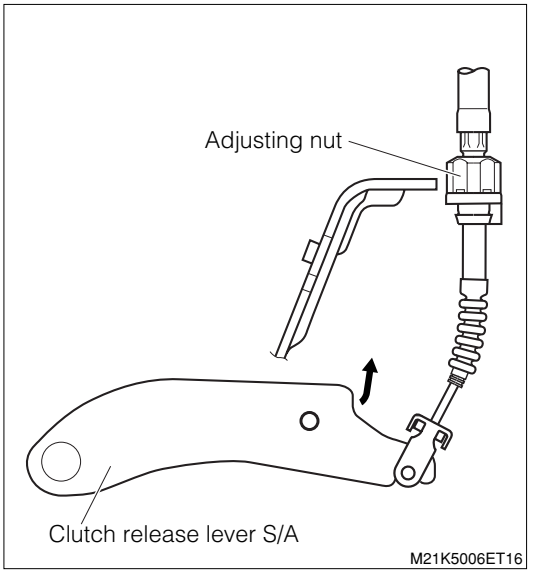
(2) Lightly pull the clutch release lever S/A by hand, until it is brought into contact with the clutch cover. Then, apply the bracket to the clutch release lever S/A.

(3) Tighten the adjusting nut to adjust the play.

Refer to Page F1-1.

CAUTION

- Be very careful not to damage the grommet section.



3-1-7 OPERATION AFTER INSTALLATION

1.Install the instrument panel finish lower panel S/A.

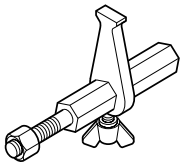
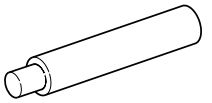
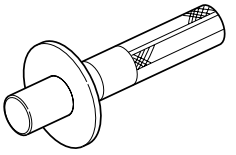
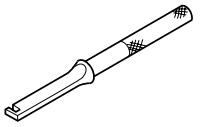
Refer to Page I2-23.

4 CLUTCH

4-1 REMOVAL AND INSTALLATION

4-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09210-87701-000	Holder,fly wheel
	09301-87703-000	Tool,clutch guide
	09302-87701-000	Gauge,clutch diaphragm spring height No.4
	09333-00013-000 (09301-00012-000)	Aligner,clutch diaphragm spring

Instrument

Dial gauge,Vernier calipers,Thickness gauge,Torque wrench

Lubricant,adhesive,others

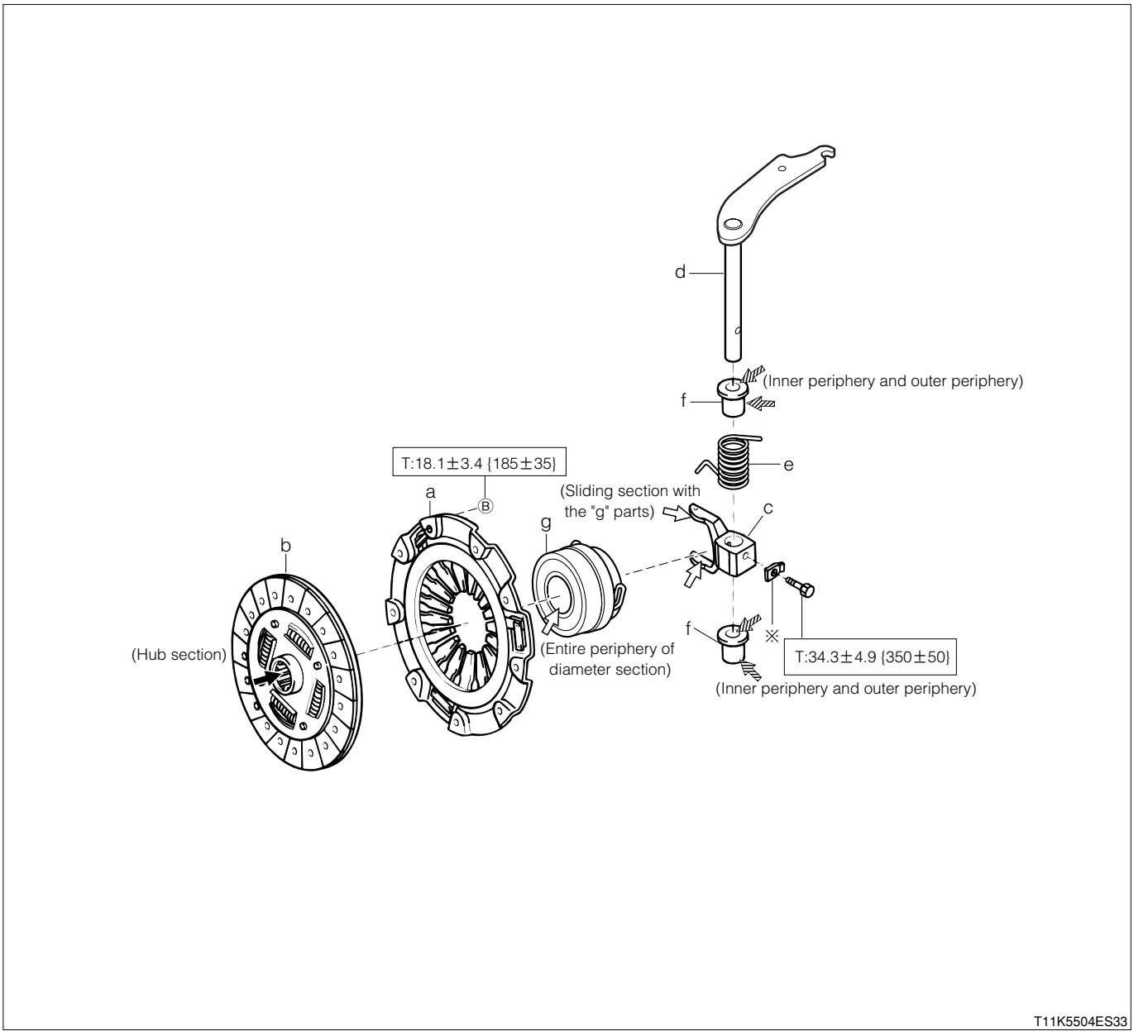
MP grease,EP grease,Clutch grease

4-1-2 OPERATION BEFORE REMOVAL

1.Remove the manual transaxle assembly from the vehicle.
Refer to Page F2-2.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



➡:MP grease
⇨:EP grease
➡:Clutch grease
※:Non - reusable parts
Unit:N·m{kgf·cm}

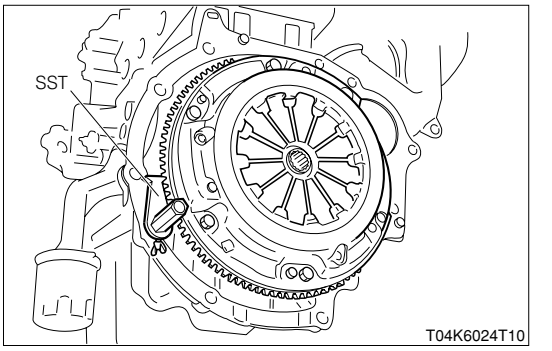
(2) Removal and installation procedures

▼ ▲ 1 a Cover Ay, clutch
▲ 2 b Disc Ay, clutch
3 c Yoke, clutch release lever
4 d Lever S/A, clutch release
5 e Spring, torsion
6 f Bush
7 g Hub Ay, clutch release bearing

4-1-4 POINTS OF REMOVAL

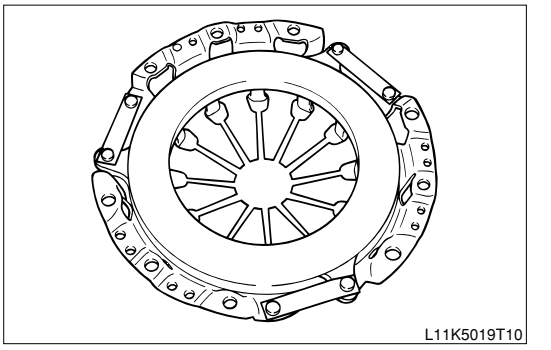
(1) Cover Ay, clutch, and disk Ay, clutch

1.Prevent the ring gear from turning, using the SST. Under this condition, remove the clutch cover assembly and clutch disc assembly.
SST: 09210-87701-000

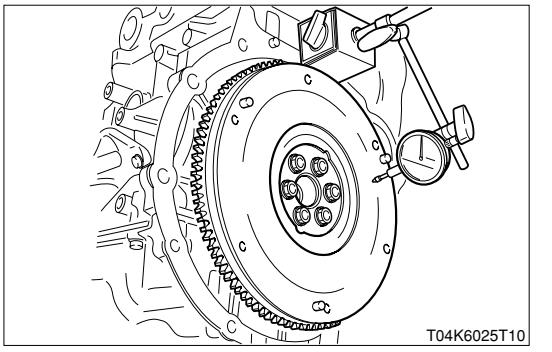


4-1-5 INSPECTION

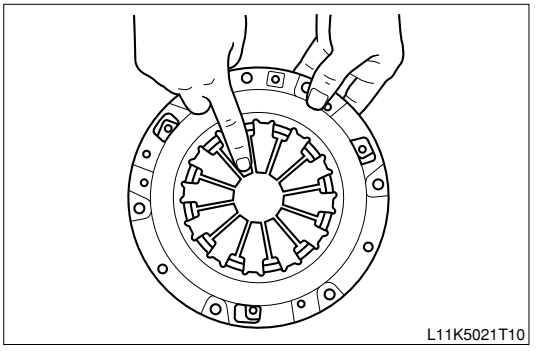
1.Check the following items. Replace any faulty part.
(1) Flywheel and pressure plate surface of clutch cover assembly for streak, cracks and discoloration.



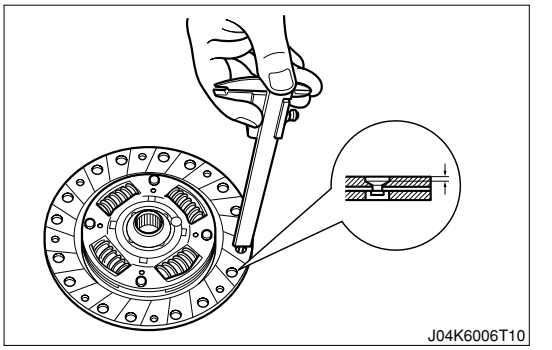
(2) Clean the flywheel surface. Then, check the runout.
ALLOWABLE LIMIT: 0.10mm



(3) Pressure plate (Diaphragm spring finger section) of clutch cover assembly for wear, rust formation and breakage

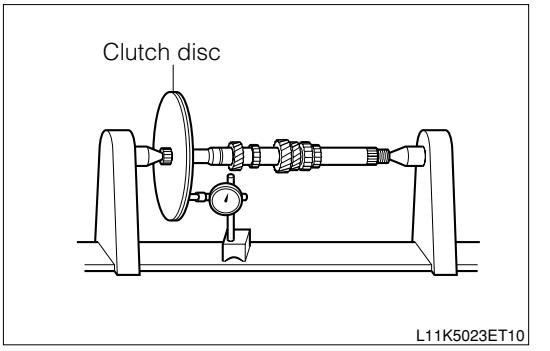


(4) Clutch disc assembly for wear and runout
ALLOWABLE LIMIT: Wear limit
0.3mm(Sagging of rivet)
Lateral runout limit
1.0mm

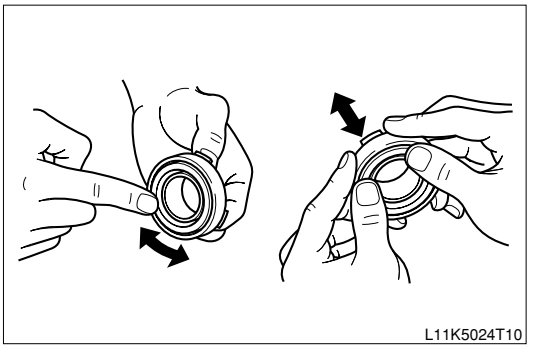


CAUTION

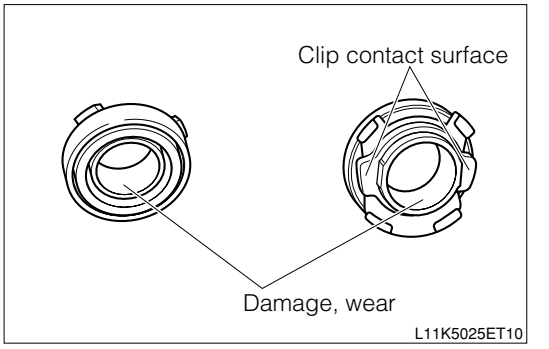
- The measurement of the lateral runout should be carried out under a condition where the clutch disc assembly is assembled with a new input shaft.



(5) When the sliding section (the contact surface with the clutch cover) of the clutch release bearing hub subassembly is turned, and when pressure is applied to push the sliding section in the turning direction, ensure that there is no abnormal resistance nor binding.



(6) Check the clutch release bearing hub subassembly for damage and wear. Also, check the clip contact surface and sliding section of the housing for damage and wear.



4-1-6 POINTS OF INSTALLATION

(1) Disc Ay, clutch

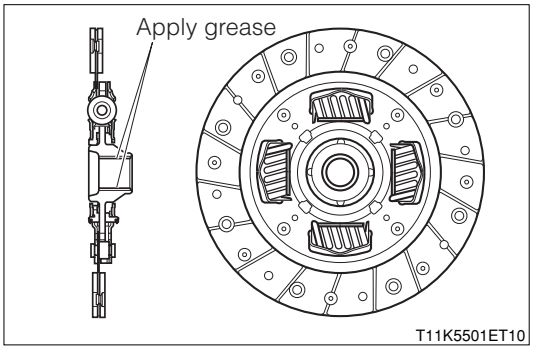
1.Install the clutch disc Ay.

(1) Thinly apply clutch grease to the hub inside (the spline section) of the clutch disc assembly.

CAUTION

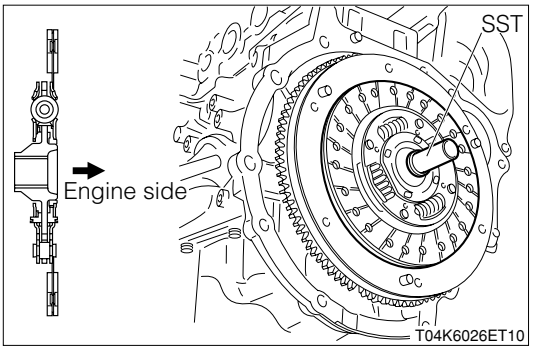
- As regards the grease applying direction, grease should be applied from the clutch cover side. Be sure to apply grease as thinly as possible so that the excessive grease may not ooze out to the flywheel side.

LUBRICANT: Clutch grease



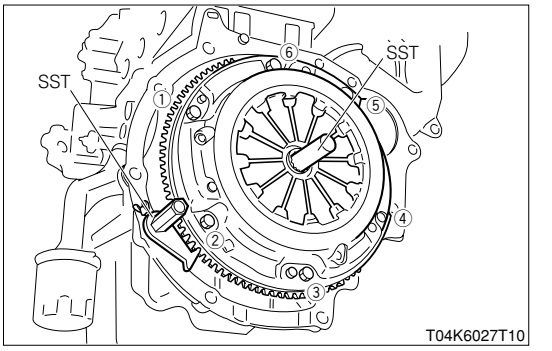
(2) Install the clutch disc assembly to the flywheel by centering it, using the SST.

SST: 09301-87703-000

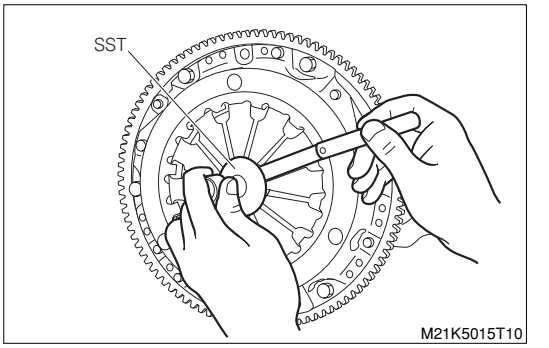


(2) Cover Ay, clutch

1. Install the cover Ay while aligning it with the knock pin of the flywheel S/A.
2. Using the SST, prevent the flywheel S/A from turning.
   SST: 09210-87701-000
3. Temporarily tighten the bolts in the sequence of ① and ⑤.
4. Temporarily tighten the bolts in the sequence of ③, ①, ⑤, ②, ⑥ and ④.
5. Check the diaphragm spring section for unevenness in height, using the SST.
   SST: 09302-87701-000
   ALLOWABLE LIMIT: 0.6mm

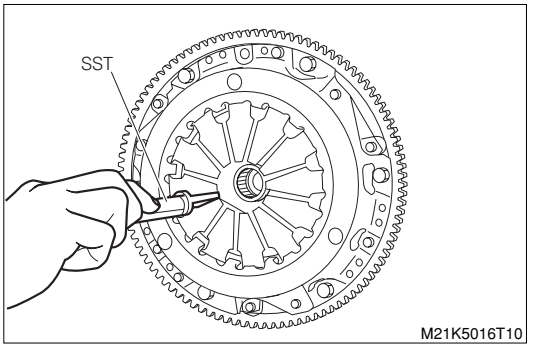


T04K6027T10



M21K5015T10

6. If the above check has revealed that the unevenness exceeds the limit, correct the unevenness in height, using the SST.
   SST: 09333-00013-000



M21K5016T10

4-1-7 OPERATION AFTER INSTALLATION

1. Install the manual transaxle Ay.
   Refer to Page F2-2.

F2 MANUAL TRANSMISSION/MANUAL TRANSAXLE

MANUAL TRANSAXLE ---------- F2 - 1
BASIC CHECK AND ADJUSTMENT--- F2 - 1
TRANSMISSION GEAR OIL ---------- F2 - 1
REPLACEMENT ---------- F2 - 1
MANUAL TRANSAXLE AY ---------- F2 - 2
REMOVAL AND INSTALLATION -------- F2 - 2
DIFFERENTIAL SIDE OIL SEAL---------- F2 - 8
REMOVAL AND INSTALLATION -------- F2 - 8
SPEEDOMETER DRIVEN GEAR -------- F2 - 10
REMOVAL AND INSTALLATION(VEHICLES EQUIPPED WITH VEHICLES SPEED SENSOR) ---------- F2 - 10
BACK UP LAMP SWITCH ---------- F2 - 13
REMOVAL AND INSTALLATION ------ F2 - 13
SHIFT LEVER ---------- F2 - 15
REMOVAL AND INSTALLATION ------ F2 - 15
DISASSEMBLING AND ASSEMBLING ---------- F2 - 18

1 MANUAL TRANSAXLE

1-1 BASIC CHECK AND ADJUSTMENT

1-1-1 CHECK OF TRANSMISSION OIL LEVEL

1.Remove the filler plug. With the vehicle placed in a horizontal state, ensure that the oil level is at the specified level.

SPECIFIED VALUE: 5 mm or less below lower edge of filler plug hole

TIGHTENING TORQUE: 39.2±9.8N·m{400±100kgf·cm}

CAUTION

- If the oil level is low, check for oil leakage. Never reuse the gasket.

2 TRANSMISSION GEAR OIL

2-1 REPLACEMENT

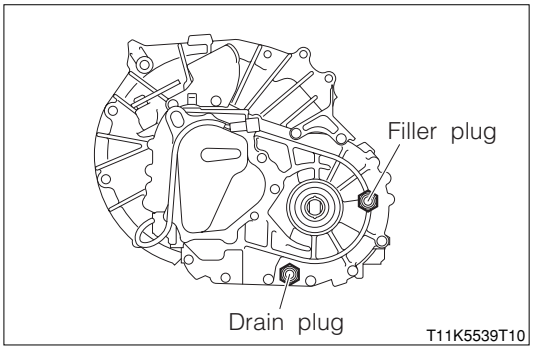
LUBRICANT: Transmission gear oil SAE75W–90 or SAE75W–85 or SAE75W–80 (API Classification GL3 or GL4)

SPECIFIED VALUE: 5 mm or less below lower edge of filler plug hole

TIGHTENING TORQUE: 39.2±9.8N·m{400±100kgf·cm}

CAUTION

- Never reuse the removed gasket.

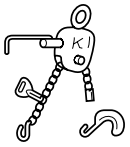


3 MANUAL TRANSAXLE AY

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09090-04020-000 (09090-04010-000)	Device,engine sling

Tool

Low transmission jack

Instrument

Torque wrench

Lubricant,adhesive,others

Transmission gear oil SAE75W−90 or SAE75W−85 or SAE75W−80 (API Classification GL3 or GL4),Engine hanger No.1 (Replacement parts),Engine hanger No.2 (Replacement parts)

3-1-2 OPERATION BEFORE REMOVAL

1.Remove the battery and battery carrier.
Refer to Page J5-3.

2.Drain the transaxle oil.

3.Remove the exhaust pipe.
Refer to Page B4-3.

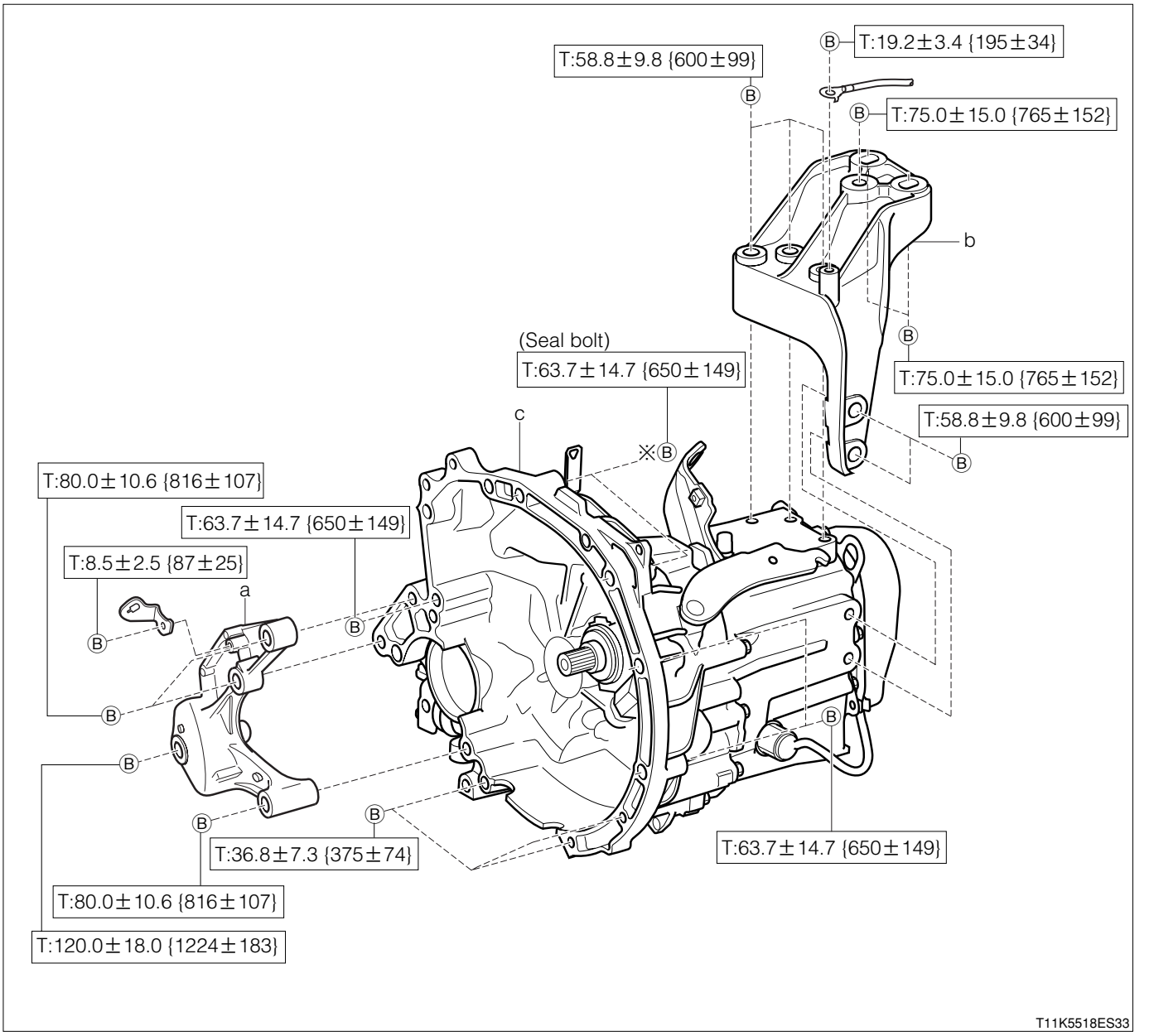
4.Remove the RH/LH front drive shaft assemblies.
Refer to Page D2-8.

5.Remove the starter assembly.
Refer to Page B11-2.

6.Remove the transmission floor shift assembly.
Refer to Page F2-15.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non-reusable parts
Unit:N·m{kgf·cm}

(2) Removal and installation procedures

▼ ▲ 1 a Bracket, engine mounting, rear
▼ ▲ 2 b Bracket, engine mounting, LH
▼ ▲ 3 c Transaxle Ay, manual

3-1-4 POINTS OF REMOVAL

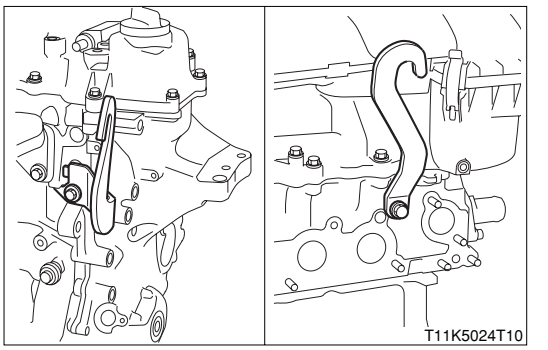
(1) Bracket, engine mounting, rear

1.Install the engine hanger at a position shown in the figure.

(1) Type 1KR-FE engine-mounted vehicles

NOTE

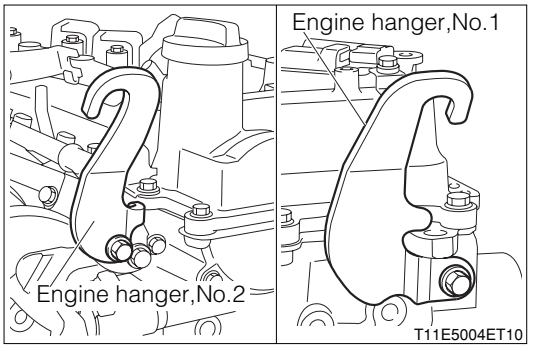
- Part number of engine hanger No.1:12282-40030-000
- Part number of engine hanger No.2:12282-40010-000



(2) Type K3-VE engine-mounted vehicles

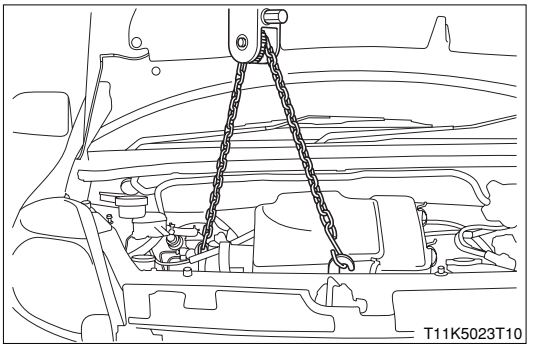
NOTE

- Part number of engine hanger No.1:12281-97401-000
- Part number of engine hanger No.2:12281-97403-000



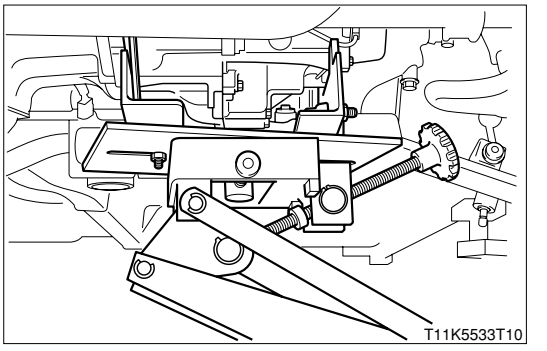
2.Hang the engine Ay, using a chain block and engine sling device

SST: 09090-04020-000



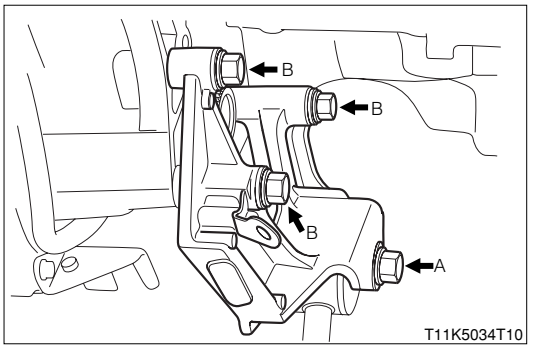
3.Support the manual transaxle Ay, using a low transmission jack.

TOOL: Low transmisson jack



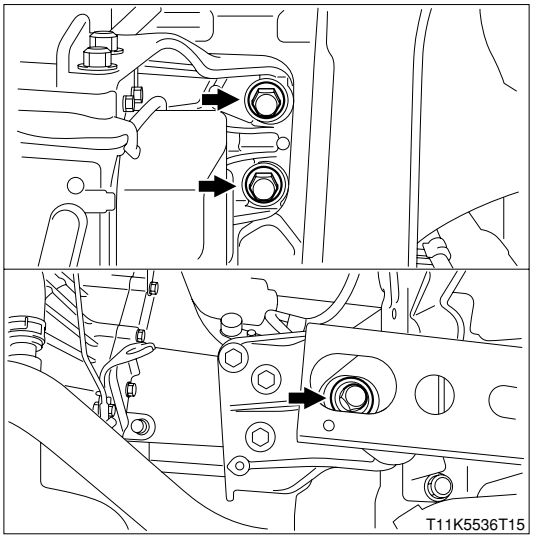
4.Remove the connecting bolt (A) between the bracket and engine mounting control rod S/A.

5.Remove the installing bolt (B) of the bracket.

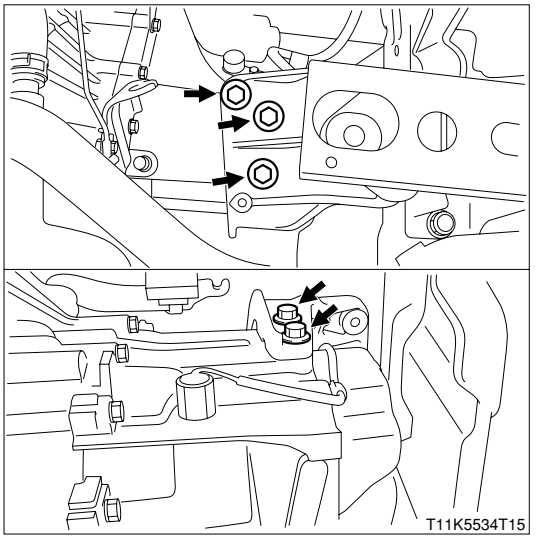


(2) Bracket, engine mounting, LH

1.Remove the connecting bolts of the bracket and engine mounting insulator LH.

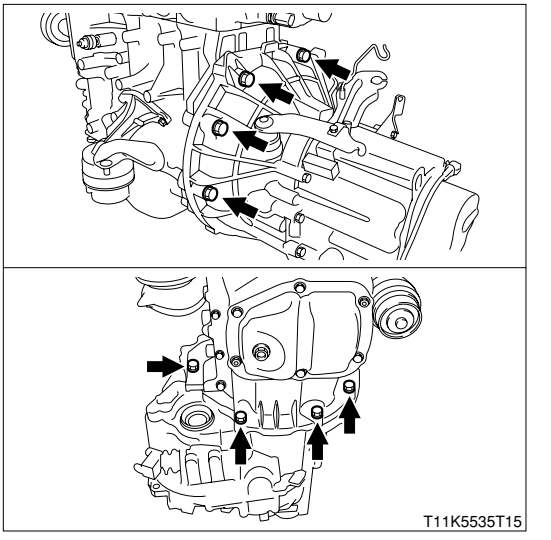


2.Remove the installing bolt of the bracket.



(3) Transaxle Ay, manual

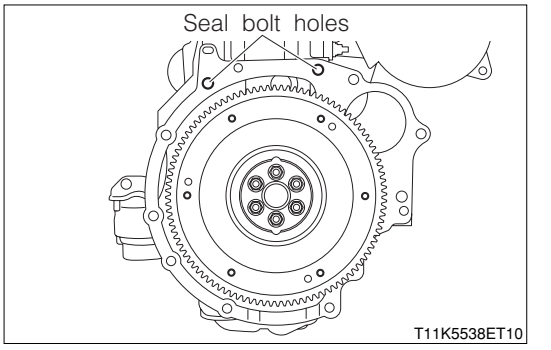
1.Remove the connecting bolt between the transaxle Ay and engine Ay. Separate the transaxle Ay from the engine Ay.



3-1-5 POINTS OF INSTALLATION

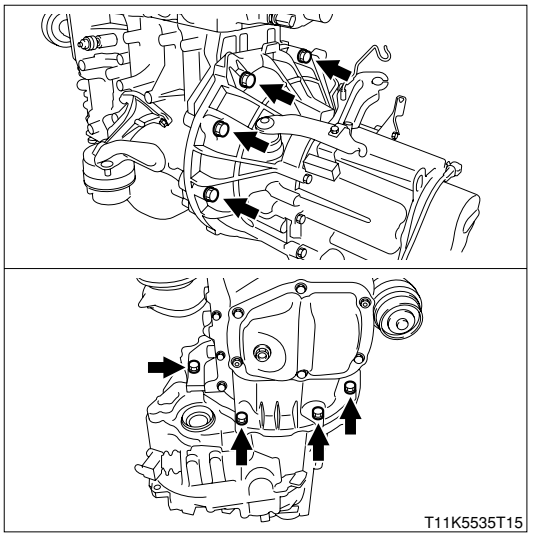
(1) Transaxle Ay, manual

1.Clean the seal bolt holes of the engine block.



2.Install the transaxle Ay to the engine Ay.

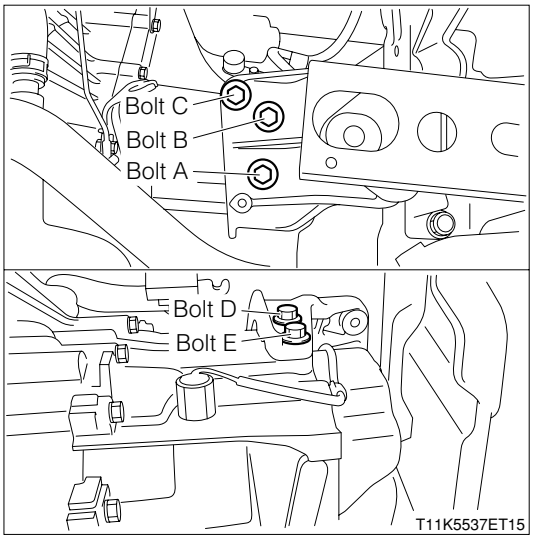
3.Tighten the connecting bolt between the transaxle Ay and engine Ay.



(2) Bracket, engine mounting, LH

1.Temporarily tighten the bracket by using the bolt (A) in the right figure.

2.Fully tighten the bolts (D), (E), (B), (C) and (A) shown in the right figure in this order.

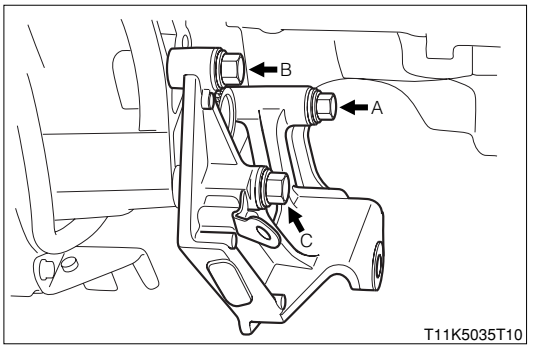


(3) Bracket, engine mounting, rear

1.Temporarily tighten the bolt (A) in the right figure.

2.Fully tighten the bolts (B), (C) and (A) shown in the right figure in this order.

3.Install the connecting bolt between the bracket and engine mounting control rod S/A.



3-1-6 OPERATION AFTER INSTALLATION

1. Install the transmission floor shift assembly.
   Refer to Page F2-15.

2. Install the starter assembly.
   Refer to Page B11-2.

3. Install the RH/LH front drive shaft assemblies.
   Refer to Page D2-8.

4. Install the exhaust pipe Ay.
   Refer to Page B4-3.

5. Install the battery and battery carrier.
   Refer to Page J5-3.

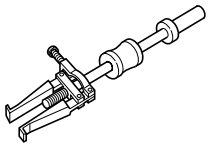
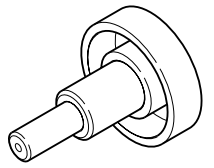
6. Fill transaxle fluid.
   Refer to Page F2-1.

4 DIFFERENTIAL SIDE OIL SEAL

4-1 REMOVAL AND INSTALLATION

4-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09308-00010-000	Puller,oil seal
	09518-87709-000	Replacer,oil seal No.8

Lubricant,adhesive,others

Transmission gear oil SAE75W−90 or SAE75W−85 or SAE75W−80 (API Classification GL3 or GL4)

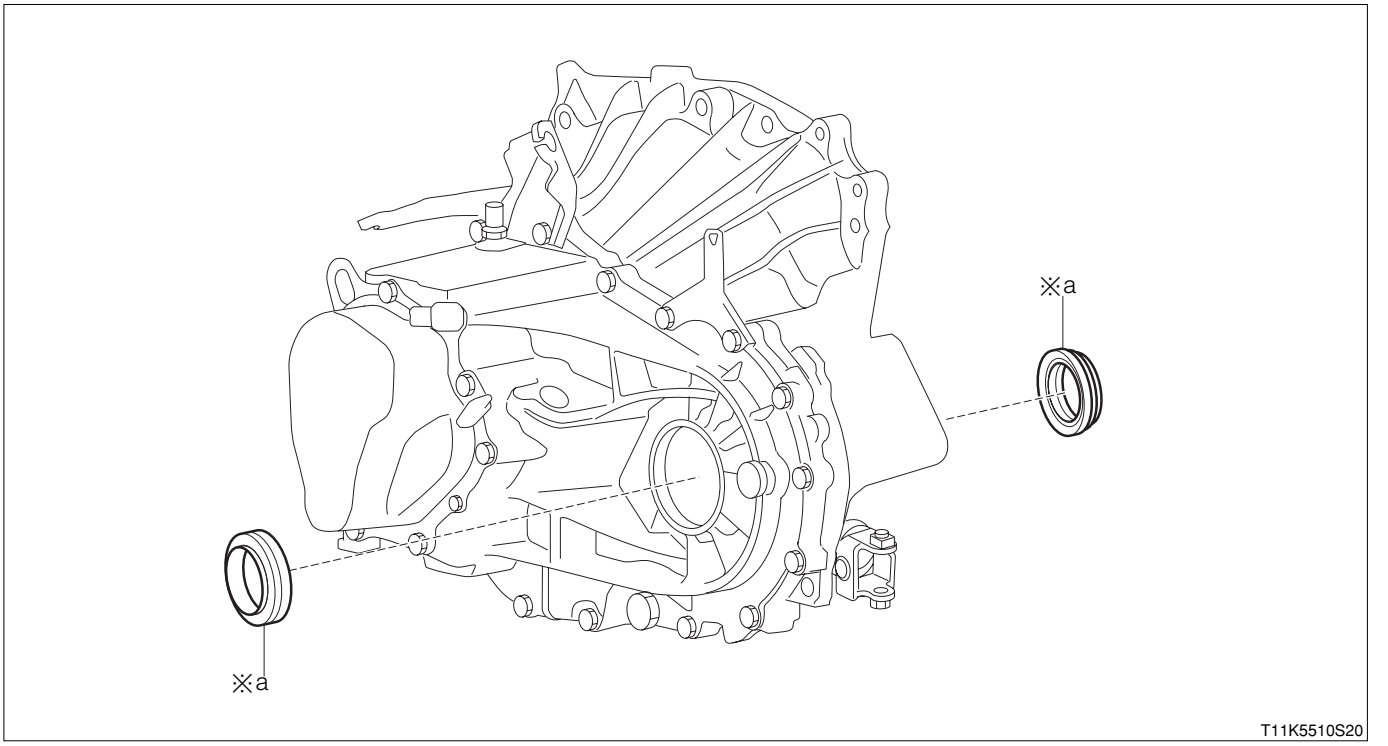
4-1-2 OPERATION BEFORE REMOVAL

1.Remove the drive shaft.

Refer to Page D2-8.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts

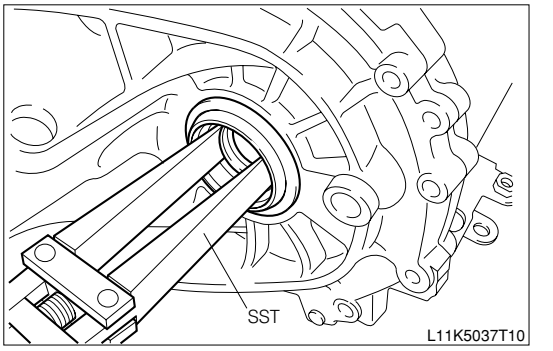
(2) Removal and installation procedures

▼ ▲ 1 a Seal, type T oil

4-1-4 POINTS OF REMOVAL

(1) Seal, type T oil

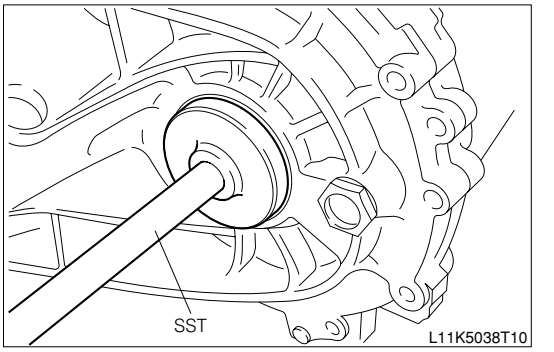
1.Remove the type T oil seal, using the SST.
SST: 09308-00010-000



4-1-5 POINTS OF INSTALLATION

(1) Seal, type T oil

1.Drive the type T oil seal in place, using the SST.
SST: 09518-87709-000



4-1-6 OPERATION AFTER INSTALLATION

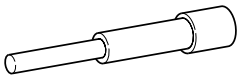
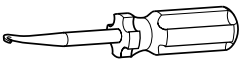
1.Install the drive shaft.
Refer to Page D2-8.

5 SPEEDOMETER DRIVEN GEAR

5-1 REMOVAL AND INSTALLATION(VEHICLES EQUIPPED WITH VEHICLE SPEED SENSOR)

5-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09201-01080-000 (09201-60011-000)	Remover & replacer,valve guide bush
	09921-00010-000	Tool,spring tension

Instrument

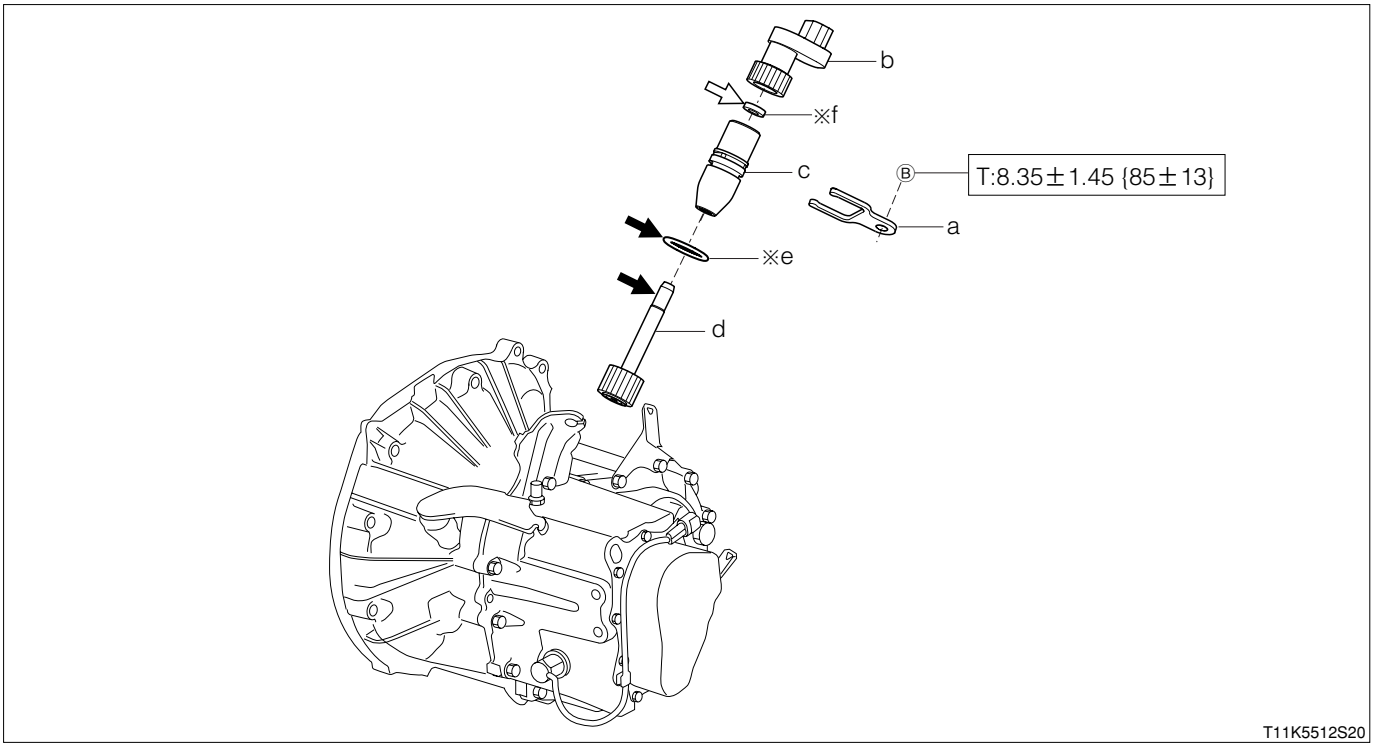
Torque wrench

Lubricant,adhesive,others

MP grease,Transmission gear oil SAE75W−90 or SAE75W−85 or SAE75W−80 (API Classification GL3 or GL4)

5-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



➡: Transmission gear oil
⇨: MP grease
※:Non - reusable parts
Unit:N·m{kgf·cm}

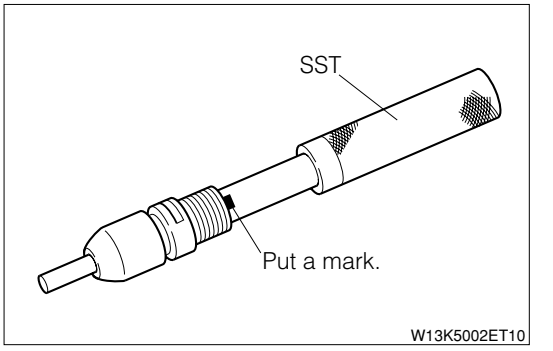
(2) Removal and installation procedures

1 a Plate, speedometer sleeve lock
2 b Sensor, speedometer
3 c Sleeve Ay, speedometer shaft
▲ 4 d Gear, speedometer driven
▲ 5 e Ring, O
▼ ▲ 6 f Seal, type K oil

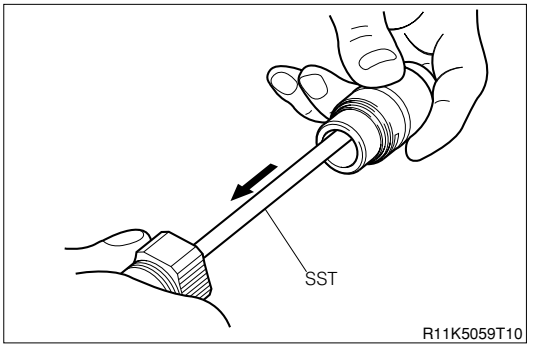
5-1-3 POINTS OF REMOVAL

(1) Seal, type K oil

1.Before removing the type K oil seal, insert the SST into the speedometer shaft sleeve subassembly. Then, put a mark for the reference at the time of the installation operation.
SST: 09201-01080-000

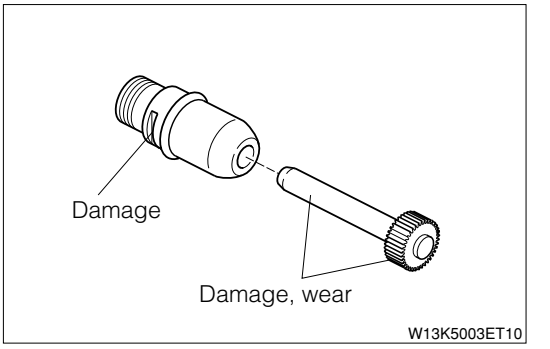


2.Remove the type K oil seal from the speedometer shaft sleeve subassembly, using the SST.
SST: 09921-00010-000



5-1-4 INSPECTION

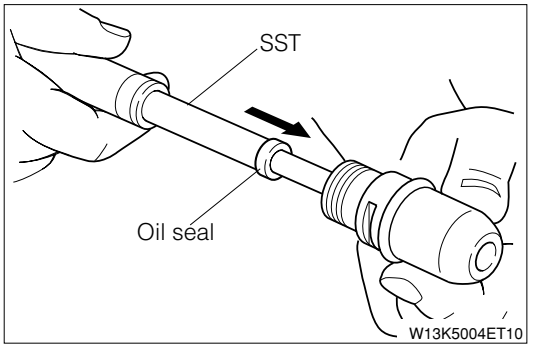
1.Check the following items. Replace any faulty part.
(1) Check the shaft section and gear section of the speedometer driven gear for wear and damage.
(2) Check the speedometer shaft sleeve subassembly for damage.



5-1-5 POINTS OF INSTALLATION

(1) Seal, type K oil

1.Install the seal.
(1) Apply MP grease to the entire periphery of the seal lip surface.
(2) Using the SST, install the seal to the speedometer shaft sleeve, while referring to the mark put during the removal.
LUBRICANT: MP grease
SST: 09201-01080-000



(2) Ring, O

1.Apply the transmission gear oil ring and install it to the speedometer shaft sleeve.
LUBRICANT: Transmisson gear oil SAE75W–90 or SAE75W–85 or SAE75W–80 (API Classification GL3 or GL4)

(3) Gear S/A, speedometer driven

1.Apply Transmission gear oil to the entire periphery of the speedometer driven gear shaft. Then, install the speedometer driven gear shaft to the speedometer shaft sleeve subassembly.

LUBRICANT: Transmisson gear oil SAE75W–90 or SAE75W–85 or SAE75W–80 (API Classification GL3 or GL4)

6 BACK UP LAMP SWITCH

6-1 REMOVAL AND INSTALLATION

6-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench,Electrical Tester

Lubricant,adhesive,others

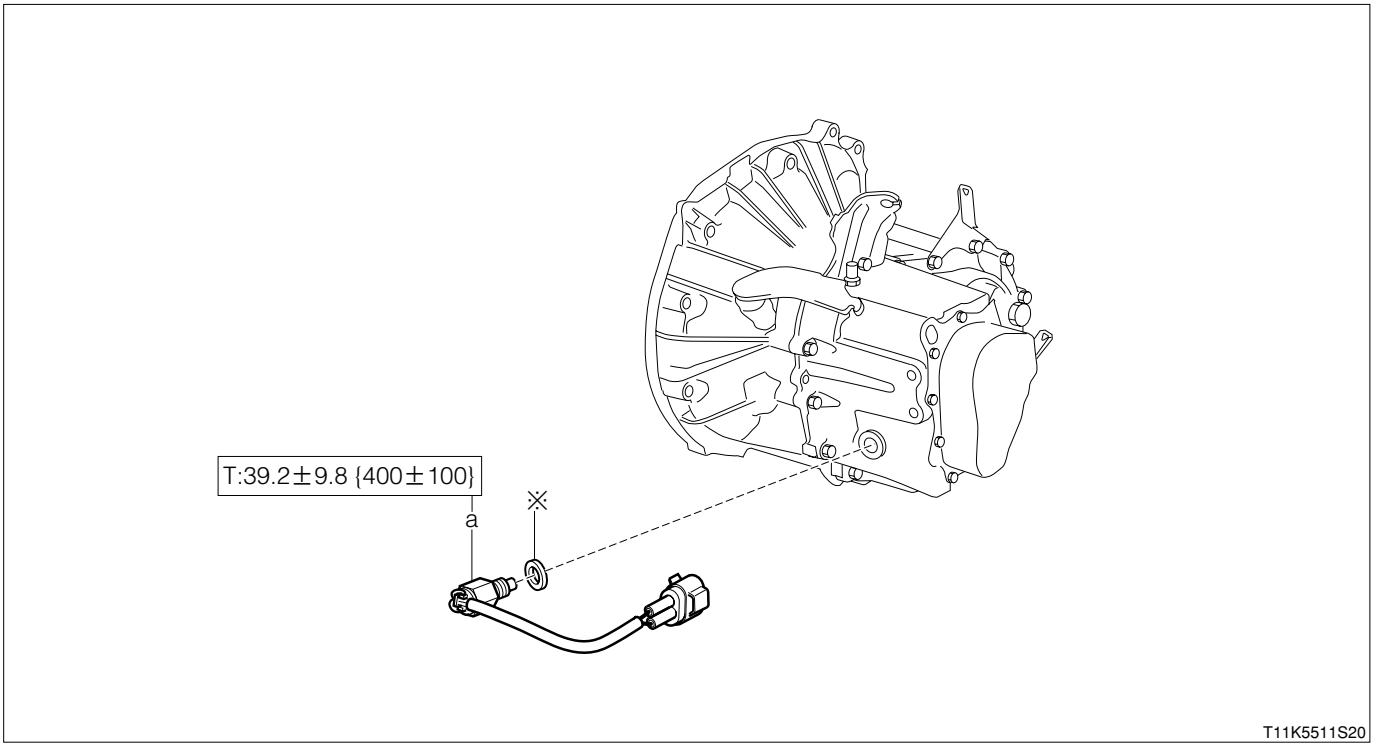
Transmission gear oil SAE75W−90 or SAE75W−85 or SAE75W−80 (API Classification GL3 or GL4)

6-1-2 OPERATION BEFORE REMOVAL

1.Drain the transaxle oil.

6-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts

Unit:N·m{kgf·cm}

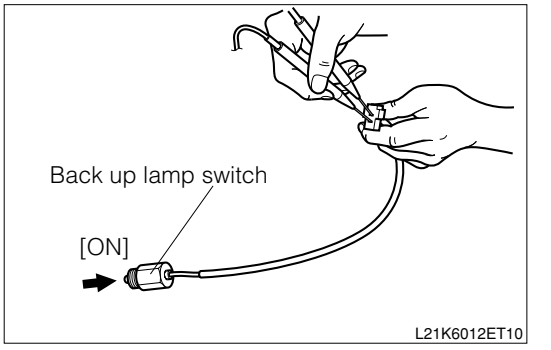
(2) Removal and installation procedures

1 a Switch Ay, back up lamp

6-1-4 INSPECTION

Check the following items. Replace any faulty part.

1.Ensure that continuity exists when the switch of the back-up lamp switch assembly is pushed (ON). Conversely, ensure that no continuity exists when the switch is not pushed (OFF).



6-1-5 OPERATION AFTER INSTALLATION

1.Fill transaxle oil.

Refer to Page F2-1.

7 SHIFT LEVER

7-1 REMOVAL AND INSTALLATION

WARNING

- Never perform the operation when the exhaust pipe is still hot, for there is a hazard potential of getting burned.

7-1-1 ARTICLES TO BE PREPARED

Tool

Snap ring pliers

Instrument

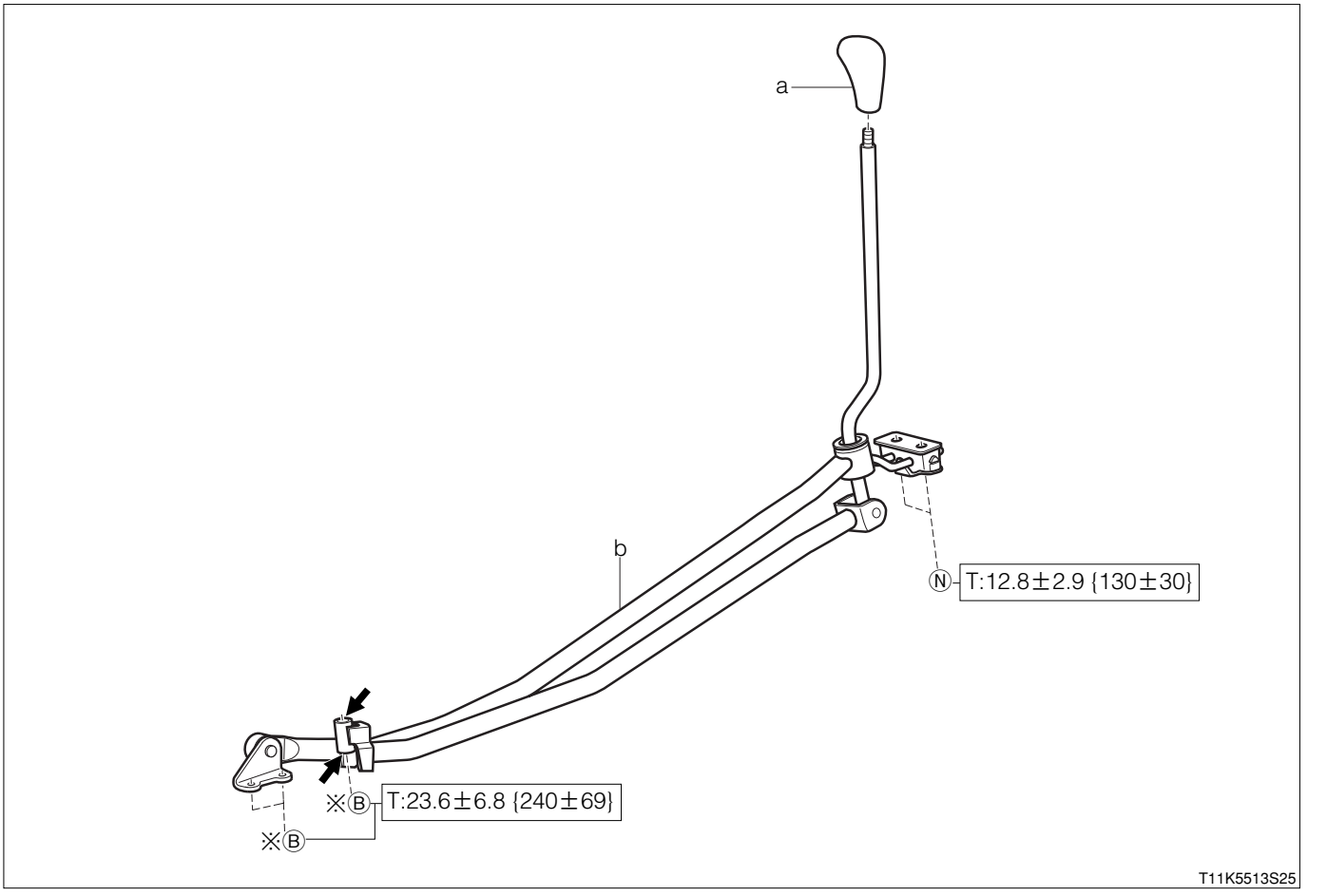
Torque wrench

Lubricant,adhesive,others

MP grease

7-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



➡: MP grease
※:Non - reusable parts
Unit: N·m{kgf·cm}

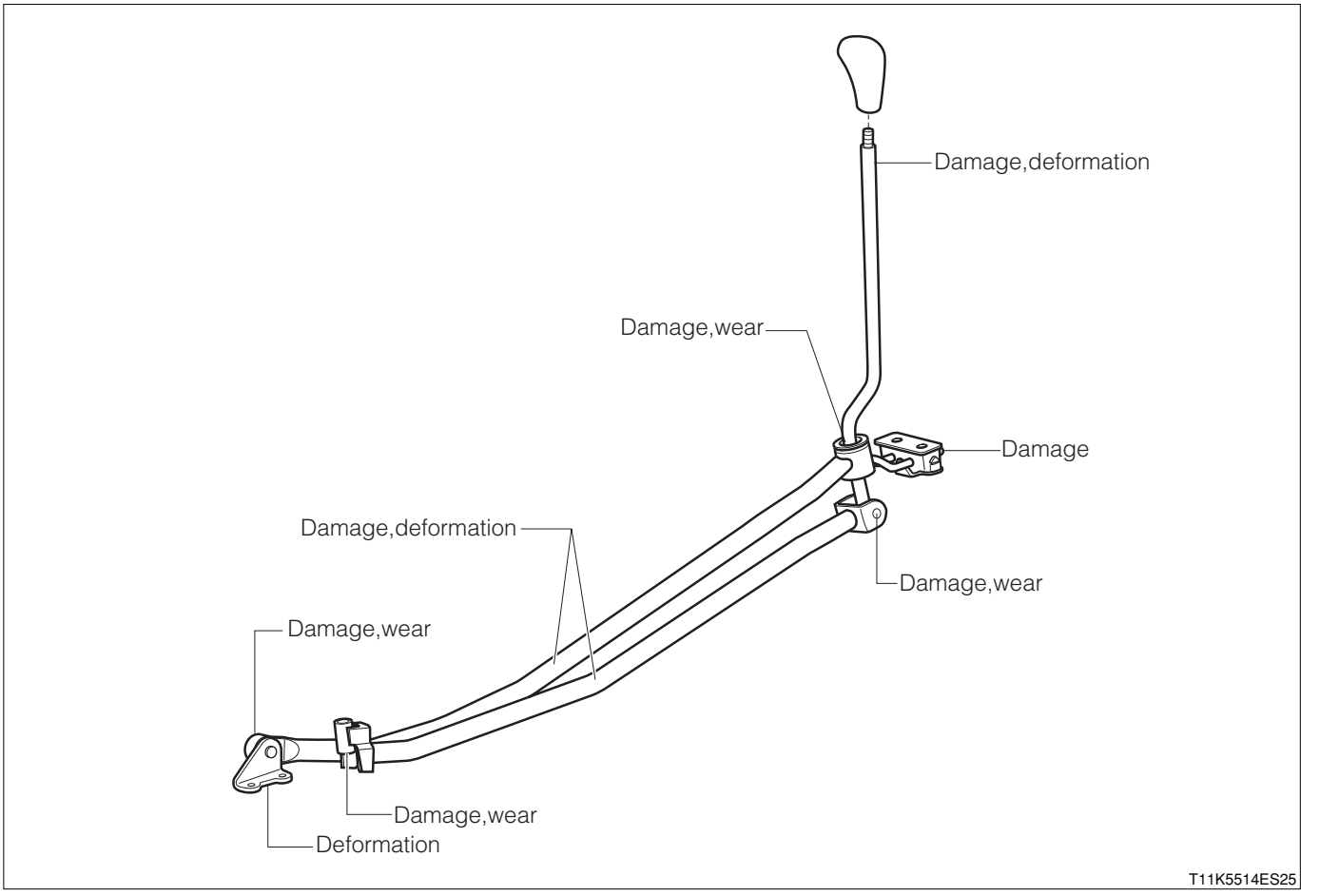
(2) Removal and installation procedures

▲ 1 a Knob, shift lever
▲ 2 b Floor shift Ay, transmission

7-1-3 INSPECTION

1.Check the following items. Replace any faulty part.

(1) Check that each joint section of the assembly turns smoothly without any binding. If any malfunction is found, perform the replacement, following the procedure under



7-1-4 POINTS OF INSTALLATION

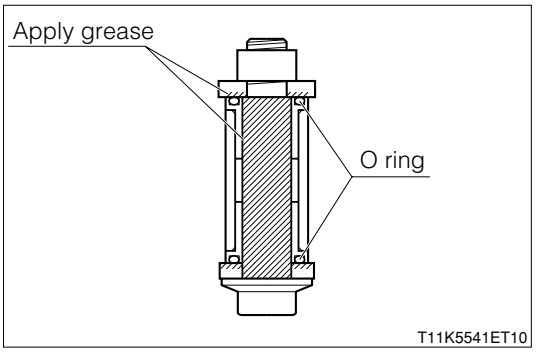
(1) Floor shift Ay, transmission

1.Install the control shaft subassembly (the lower shaft of the transmission floor shift assembly) to the transaxle.

(1) Ensure that the O-ring has been installed securely to the bush.

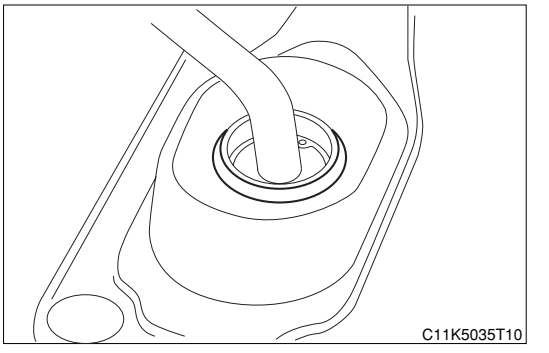
(2) Apply MP grease to the control shaft S/A at the transmission side (the entire periphery indicated by the hatched section in the right figure).

LUBRICANT: MP grease



2.Secure the shift lever housing rod S/A (upper rod of the floor shift Ay) to the manual transaxle Ay.

3.Securely fit the shift lever retainer dust boot into the groove of the shift lever housing rod subassembly.



(2) Knob, shift lever

1.Install the shift lever hole cover.

2.Install the shift lever knob.

(1) Screw in the shift lever knob, until it comes in contact lightly with the shift lever . Then, retighten the shift lever knob further 1.5 turns. Finally, adjust the direction of the shift pattern by turning the shift lever knob in the retightening direction.

7-2 DISASSEMBLING AND ASSEMBLING

7-2-1 ARTICLES TO BE PREPARED

Tool

Hand grinder

Snap ring pliers

Instrument

Torque wrench

Lubricant,adhesive,others

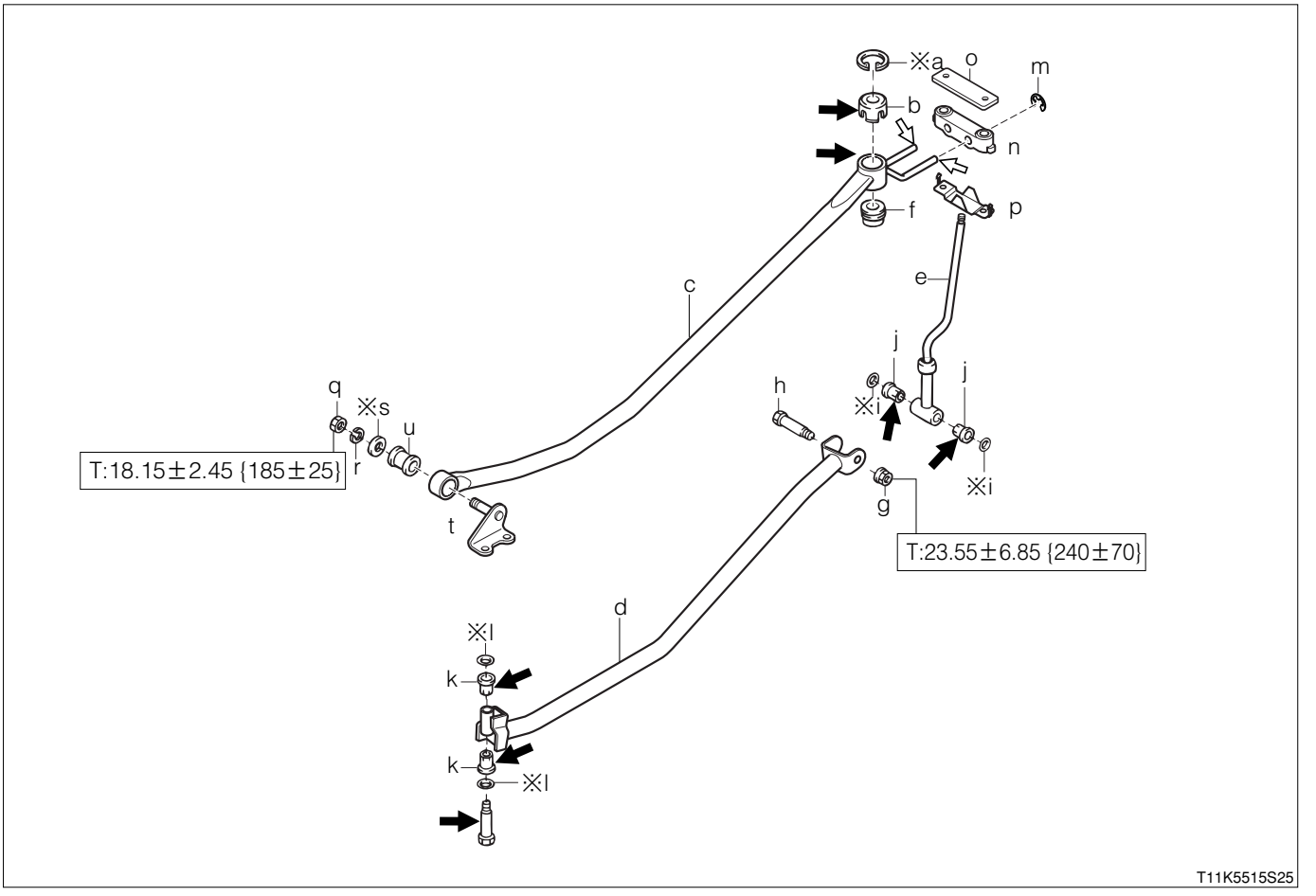
MP grease,Silicon grease

7-2-2 OPERATION BEFORE DISASSEMBLY

1.Remove the floor shift assembly from the vehicle.
Refer to Page F2-15.

7-2-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Components



➡: MP grease
⇨: Silicone grease
※:Non - reusable parts
Unit: N·m{kgf·cm}

(2) Disassembling and assembling procedure

	1	a	Ring, snap
	2	b	Seat, shift lever
▼ ▲	3	c	Rod S/A, shift lever housing
▼ ▲	4	d	Shaft S/A, control
	5	e	Lever, shift
	6	f	Boot, shift lever retainer dust
	7	g	Nut (Replacement parts)
	8	h	Bolt (Replacement parts)
	9	i	Ring, O
	10	j	Bush
	11	k	Bush
	12	l	Ring, O
	13	m	Ring, E (No replacement part)
	14	n	Support Ay, control rod No.2
	15	o	Washer, plate
	16	p	Retainer S/A, control shift lever
	17	q	Nut (Replacement parts)
	18	r	Washer (Replacement parts)
	19	s	Collar (Replacement parts)
	20	t	Support Ay, control rod (Replacement parts)
	21	u	Bush

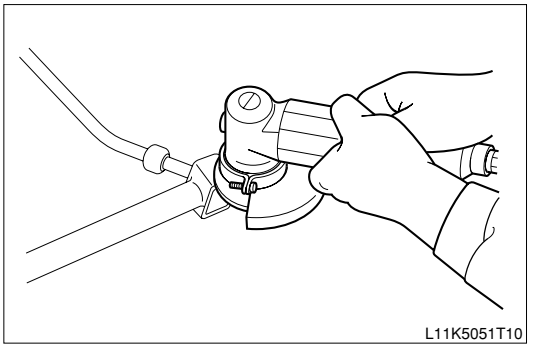
7-2-4 POINTS OF DISASSEMBLY

(1) Shaft S/A, control

1.Remove the staked state, using a grinder. Then, disassemble the control shaft subassembly and shift lever.

CAUTION

- Never reuse the pin whose staked section has been cut off.



(2) Rod S/A, shift lever housing

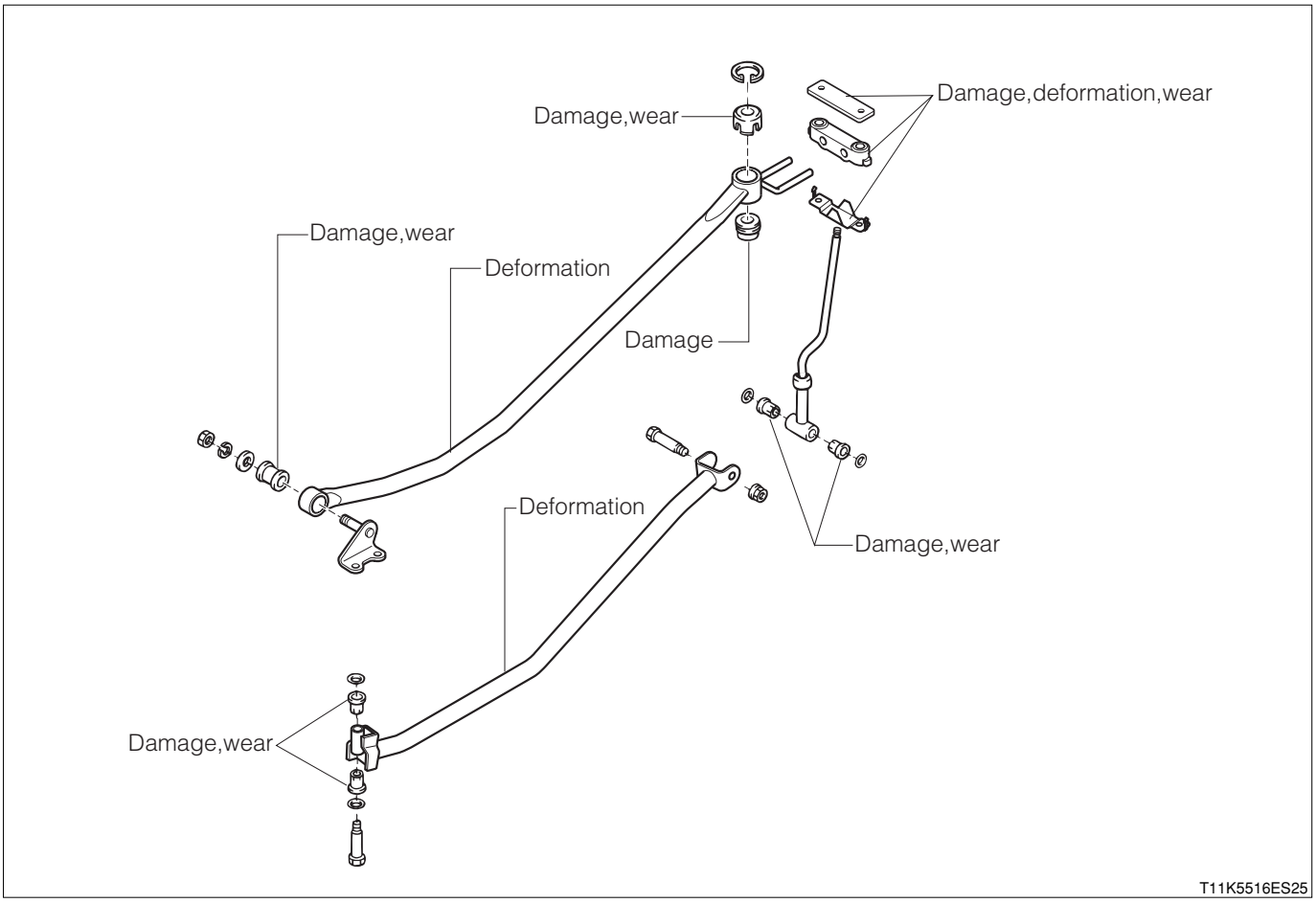
1.Remove the staked state, using a grinder. Then, disassemble the rod S/A and control rod support Ay.

CAUTION

- Never reuse the control rod support whose staked section has been cut off.

7-2-5 INSPECTION

1.Check the following items. Replace any faulty part.



7-2-6 POINTS OF ASSEMBLY

(1) Rod S/A, shift lever housing

1.Assemble the rod S/A and control rod support Ay.

CAUTION

- In the case of replacement parts, the connecting method is of a nut securing type. Utmost care must be exercised so that no wrong installation method is employed.

2.Apply silicone grease to the rod S/A and assemble it to the No.2 control rod support Ay.

NOTE

- There is no need of assembling the E-ring. (No replacement part)

LUBRICANT: Silicon grease

(2) Shaft S/A, control

1.Assemble the shift lever and control shaft subassembly.

CAUTION

- In the case of replacement parts, the connecting method is of a bolt securing type. Utmost care must be exercised so that no wrong installation method is employed.

7-2-7 OPERATION AFTER ASSEMBLY

1.Install the floor shift assembly to the vehicle.

Refer to Page F2-15.

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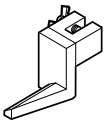
■ A4B
1 AUTOMATIC TRANSAXLE
1-1 BASIC CHECK AND ADJUSTMENT
1-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09302-87201-000	Gauge,neutral start switch adjust

Instrument

Torque wrench

1-1-2 PREPARATION PRIOR TO CHECKS

1.Park the vehicle on a flat space.
2.Confirm safety before and after the vehicle.

1-1-3 CHECK OF OIL LEVEL

(1) Check of oil level

1.Check of engine idling speed.
(1) Vehicle mounted with Type 1KR-FE engine
Refer to Page B1-9.

(2) Vehicle mounted with Type K3-VE engine
Refer to Page B1-25.

2.Warm up the transmission until its oil temperature reaches to a fully warmed-up state (70 - 90°C).
3.Apply the parking brake.
4.Depress the brake pedal. With the engine idling, move the shift lever slowly through all ranges. Finally, return the lever to the Ⓟ range.
5.With the engine idling, pull out the level gauge. Wipe out oil, using cloth, and blow air to remove lint. Then, insert the level gauge again to check whether the oil level is within the range of "H" of the level gauge.

NOTE

- In cases where it is necessary to conduct the check using a low oil temperature (20 - 30°C), for example, at time of oil change, first adjust up to the "C" range on the level gauge. Then, carry out the check in a fully warmed-up state.
  If the level differs between the front and rear sides of the level gauge, use the side having the lower level.

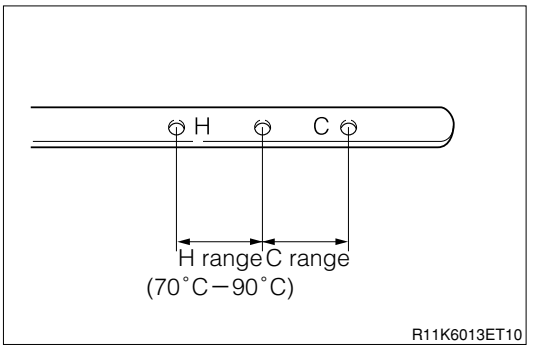
LUBRICANT: ATF Dexron®Ⅲ

NOTE

- Total capacity: Approx. 5.0ℓ
  Drain amount from oil pan: Approx. 2.2ℓ

TIGHTENING TORQUE: 24.5±4.9N·m {250±50kgf·cm}
(drain bolt)

CAUTION
- Never reuse the removed gasket.
- If the oil level is too low or too high, it could cause malfunctions."



(2) Check of oil leakage

1.Visually check the oil cooler, unions, transaxle main body, etc. to ensure that they exhibit no oil leakage.

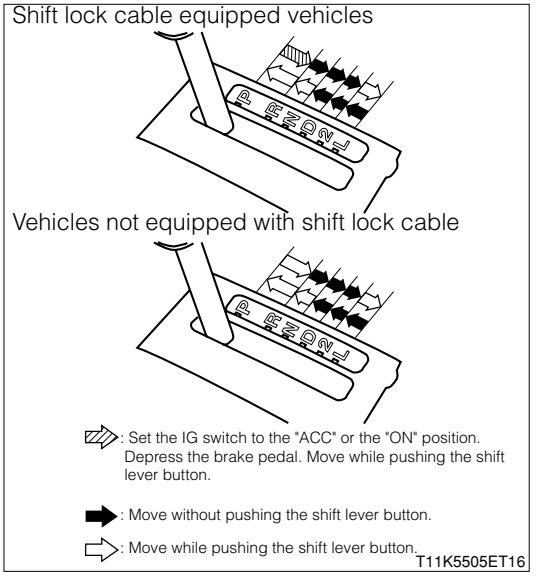
1-1-4 CHECK OF SHIFT LEVER POSITION

1.Check the shift lock operation.
Refer to Page F3-36.

2.Shift the shift lever to each range. Here, check that the shift lever functions as indicated in the right figure and the shift lever moves freely to each range with a clear detent feeling.
Furthermore, the LCD indication can be made accurately in each range. Check that the LCD range indication will not differ within the play of the shift lever. Also, check that there is no lighting of the frame only nor flashing.

3.Start the engine. Ensure that the vehicle moves forward when you move the shift lever to the Ⓓ, ② and Ⓛ ranges, respectively. Make sure that the vehicle moves backward when you move the shift lever to the Ⓡ range.

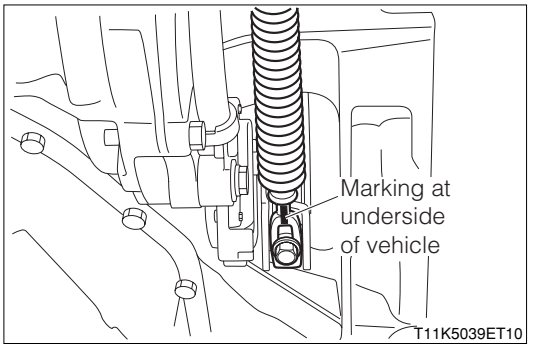
4.Turn ON the IG switch. When the shift is made up to Ⓡ, check that the back-up lamp lights and the reverse warning buzzer is set off.



1-1-5 CHECK AND ADJUSTMENT OF CONTROL CABLE

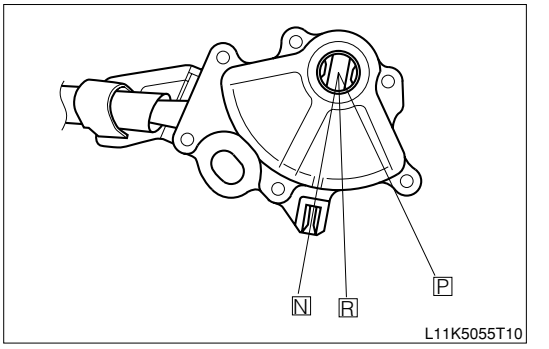
1.Check the connecting section of the control cable and control shaft lever assembly for wear. Also, check other connecting sections for wear and deformation.

2.Put an up/bottom identification mark. Remove the retaining bolts of the control cable and control shaft lever Ay.



3.Turn the control shaft lever assembly counterclockwise, until it stops (P range). From this condition, back off the control shaft lever assembly 2 stages (N range).
4.Set the shift lever to the N range.
5.Install the control cable, with the slack taken up, to the transmission control shaft lever Ay.
TIGHTENING TORQUE: 8.4±1.4N·m {85±14kgf·cm}
CAUTION
- Do not pull the end of the cable during installation.

6.After completion of the adjustment, check the operating feeling and operation.



1-1-6 CHECK AND ADJUSTMENT OF NEUTRAL START SWITCH

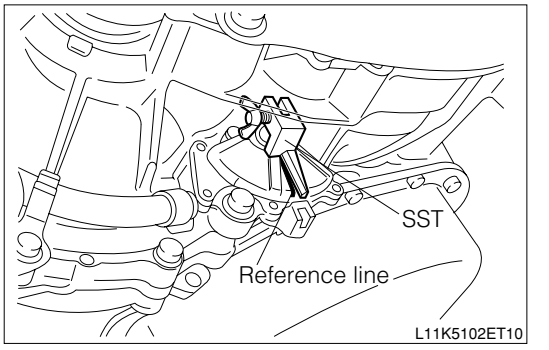
(1) Check of neutral start switch operation

1.Apply the parking brake and turn ON the ignition switch.
2.Depress the brake pedal and ensure that the engine starts only when the shift lever is shifted to the N or P range and should not start in any other range.
3.Ensure that the backup lamp goes on and the reverse warning buzzer is set off only when the shift lever is placed in the R range.
4.If there is a problem, perform the installation position check, adjustment, and continuity check for the neutral start switch.

(2) Check and adjustment of neutral start switch installation position

1.Set the shift lever to the N range.
2.Remove the bolts retaining the control cable to the control shaft lever assembly.
3.Remove the control shaft lever assembly.
4.Install the SST. Ensure that the gauge section of the SST is aligned with the line of the neutral start switch.
5.If not aligned, loosen the bolt and turn the switch section until an alignment is attained. After the adjustment, tighten the bolt to the specified torque.
TIGHTENING TORQUE: 18.2±3.4N·m
{185±35kgf·cm}
CAUTION
- Do not use an impact wrench for tightening the securing bolt of the neutral start switch.

SST: 09302-87201-000
6.Remove the SST and install the control shaft lever assembly.
TIGHTENING TORQUE: 12.8±2.9N·m
{130±30kgf·cm}
7.In cases where the operation in Step 5 has been carried out, confirm the operation of the control shaft lever, following the procedure given below.
(1) Move the control shaft lever to the P range. Then, move the lever about 2 to 3 mm in the direction of the R range by hand. At this time, ensure that the lever returns to the P range fully.
(2) If the full return can not be made, once loosen the retaining bolt of the neutral start switch and perform the adjustment and retighten again.



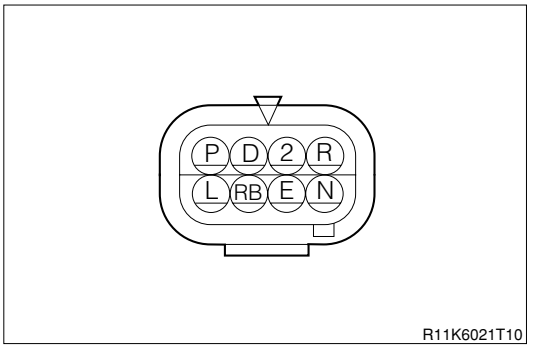
8.Install the control cable, with the slack taken up, to the transmission control shaft lever Ay.
TIGHTENING TORQUE: 8.4±1.4N·m {85±14kgf·cm}

CAUTION
- When installing, do not pull the tip-end of the control cable.

9.After the installation, check the position of the shift lever.
Refer to Page F3-2.

(3) Continuity check of neutral start switch

1.Disconnect the connector from the neutral start switch. Then, perform the continuity check according to the connection table.



R11K6021T10

○—○:Continuity should exist

Shift position \ Terminal No.	E	R	RB	P	N	D	2	L
P	○			○				
R		○	○					
N	○				○			
D	○					○		
2	○						○	
L	○							○

R11K6110EL10

1-2 FUNCTION CHECK

1-2-1 ITEMS TO BE OBSERVED

1.Each test should be conducted after performing the basic inspection and adjustments.
2.The fluid should be at the normal running temperature. (70 - 90°C)
3.Be sure to turn OFF the air conditioner .

1-2-2 STALL TEST

1.Place chocks at the four wheels.
2.Install an engine tachometer and fully apply the parking brake.
3.Start the engine.
4.While depressing the brake pedal strongly by your left foot, move the shift lever from the Ⓓ . Depress the accelerator pedal fully by your right foot. Quickly read the highest engine rpm at this time. Perform the same test in the Ⓡ range.

CAUTION

- Do not conduct this test continuously for more than five seconds.
- Wait at least one minute before the switching is made from the Ⓓ range to the Ⓡ range.

SPECIFIED VALUE: Engine type K3-VE
Stall speed (rpm) 1900 - 2400

NOTE

- If the stall speed fails to conform to the specified value, most likely the following malfunctions are taking place.

If the stall speed is the same for both ranges (Ⓓ, Ⓡ) but lower than the specified value	·Lack of engine output ·One-way clutch (At the stator section inside the torque converter) malfunctioning
If the stall speed is the same for both ranges (Ⓓ, Ⓡ) but higher than the specified value	·Lack of transmission fluid ·Low line pressure ·Slippage of forward clutch, direct clutch, one-way clutch and 1st & reverse brakes, or faulty operation of one-way clutch
If the stall speed at the Ⓓ range is higher than the specified value.	·Low line pressure ·Forward clutch slipping, one-way clutch malfunctioning
If the stall speed in the Ⓡ range is higher than the specified value.	·Line pressure too low ·Direct clutch slipping ·First & reverse brake slipping

1-2-3 TIME LAG TEST

1.Apply the parking brake and place chocks at the four wheels.
2.Start the engine.
3.While depressing the brake pedal , move the shift lever from the [N] to the [D] range. Using a stopwatch, measure the time required from the lever shifting to the time when you feel a shock. In the same manner, measure the time lag when shifting is made from the[N] to [R] range.

CAUTION

- Be sure to allow one minute intervals between tests.
- Conduct the measurement three times and take the average value.

SPECIFIED VALUE: [N]→[D]:Not to exceed 1.0 second
[N]→[R]:Not to exceed 1.0 second

NOTE

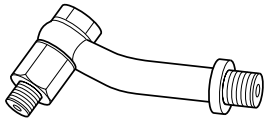
- If the time lag fails to conform to the specified value, most likely the following malfunctions are taking place.

If the [N]→[D] time lag is longer than the specified value.	·Slippage of forward clutch ·Low line pressure
If the [N]→[R] time lag is longer than the specified value.	·Slippage of direct clutch ·Slippage of 1st & reverse brakes ·Low line pressure

1-2-4 HYDRAULIC TEST

(1) Articles to be prepared

SST

Shape	Part No.	Part name
	09325-87201-000	Adapter,A/T pressure gauge No.1

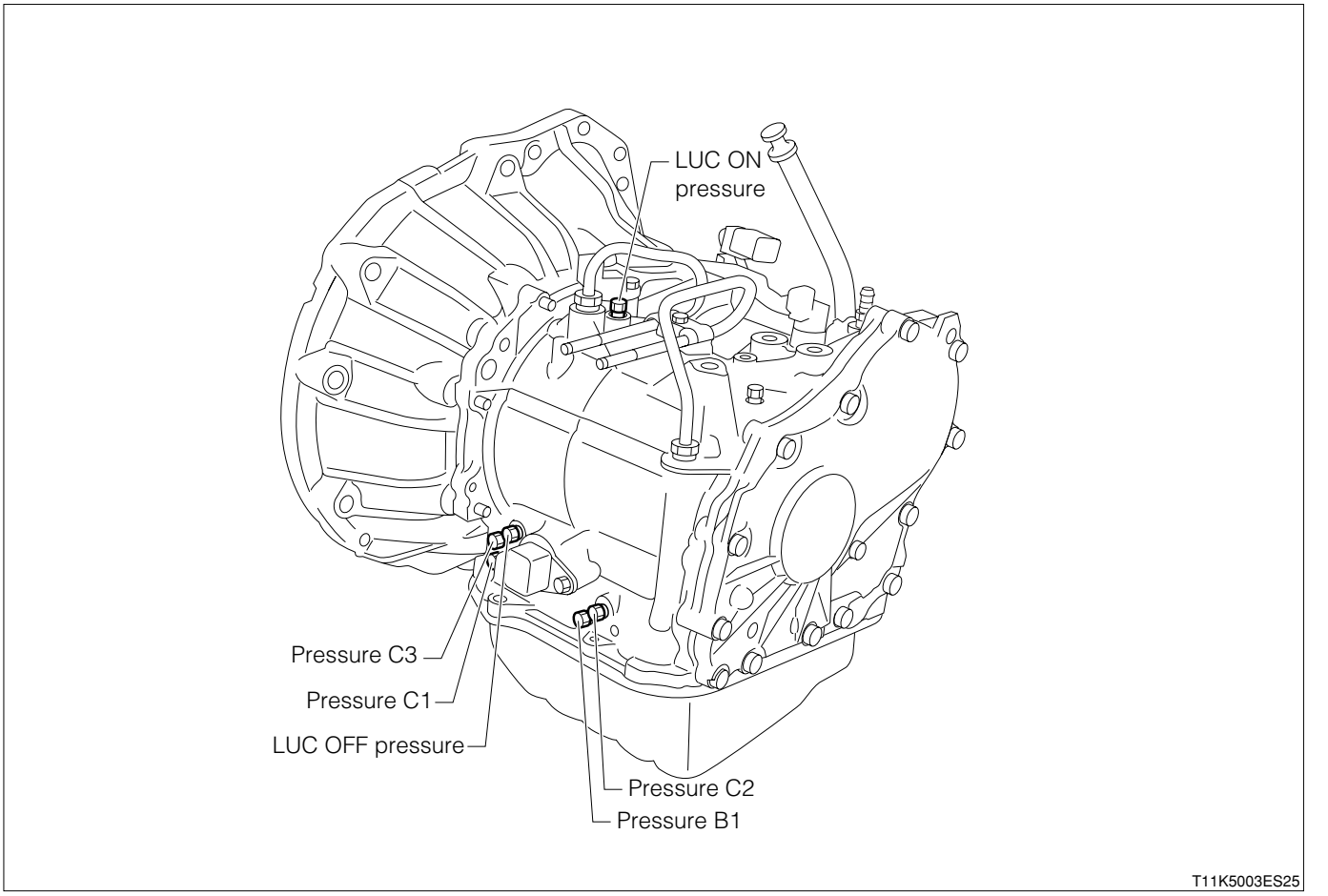
Instrument

Oil pressure gauge

Lubricant,adhesive,others

ATF Dexron®Ⅲ

(2) Position of the hydraulic pressure test plug



(3) Pressure gauge installation procedure

CAUTION

- Be sure to use new gasket for the SST and instrument.
- The test plug is a non-reusable part.

1.Remove the battery and battery carrier.
Refer to Page J5-3.

2.Remove the test plug and install the Pressure gauge.
SST: 09325-87201-000

3.Install the battery and battery carrier.
Refer to Page J5-3.

4.After completing the hydraulic test, remove the pressure gauge and replace the test plug.
TIGHTENING TORQUE: 9.8±2.9N·m {100±30kgf·cm}

5.The ABS memorizes diagnosis codes. Therefore, first confirm the code output and ensure that there exist only abnormality codes related to the rear wheel system. Then, erase the diagnosis codes.
(1) ABS-equipped vehicles
Refer to Page E3-19.

(4) Hydraulic pressure measuring procedure

① **Pressure C2**

1.Apply the parking brake and place chocks at the four wheels.
2.Start the engine.
3.Strongly depress the brake pedal with your left foot. Move the shift lever to the Ⓓ range, operate the accelerator pedal with your right foot so as to measure the hydraulic pressure.

② **Pressure C1**

1.Apply the parking brake and place chocks at the four wheels.
2.Start the engine.
3.Strongly depress the brake pedal with your left foot. Move the shift lever to the Ⓡ range and operate the accelerator pedal with your right foot so as to measure each hydraulic pressure.

③ **Pressure B1**

1.Jack up the four wheels. Support the vehicle with rigid racks.
2.Start the engine.
3.Move the shift lever to the Ⓓ range and gradually depress the accelerator pedal until the transmission may be shifted to the 2nd gear. Measure the hydraulic pressure with the engine speed set to 2000 rpm.

④ **Pressure C3**

1.Jack up the four wheels. Support the vehicle with rigid racks.
2.Start the engine.
3.Move the shift lever to the Ⓓ range and gradually depress the accelerator pedal until the transmission may be shifted to the 3rd gear. When the accelerator pedal is released, measure the hydraulic pressure.

⑤ **LUC OFF pressure**

1.Jack up the four wheels. Support the vehicle with rigid racks.
2.Start the engine.
3.Move the shift lever to the Ⓓ range and measure the hydraulic pressure. (Hydraulic pressure at the time of lock-up OFF)
4.Gradually depress the accelerator pedal until the transmission may be shifted to the 4th gear. Then, continue gradual acceleration. When the lock up takes place, measure the hydraulic pressure. (Hydraulic pressure at the time of lock-up ON)

NOTE

- Under conditions of a vehicle speed of 57 to 78 km/h and a throttle opening of 5 to 20 %, the 4th lock-up turns ON.

SPECIFIED VALUE:

Detected item	Condition		Specified value{kPa{kg/cm^2}}
	Range	Running condition	
C2	Ⓓ	Stall revolving condition	930 - 1130{9.4- 11.4}
C1	Ⓡ	Stall revolving condition	1520 - 2110{15.5 - 21.5}
C3	Ⓓ	3rd gear, accelerator pedal "OFF" (at the time of lock-up OFF)	440 - 640{4.5 -6.5}
B1	Ⓓ	2nd gear·Engine speed 2000rpm	930 - 1130{9.4 - 11.4}
LUC OFF pressure	Ⓓ	At the time of lock-up OFF	590 - 750{6.0 - 7.6}
		At the time of lock-up ON	20{0.2} or less

1-2-5 ROAD TEST

(1) Items to be observed

CAUTION

- Thoroughly confirm the safety on the road during the tests.
- The fluid should be at the normal running temperature. (70 - 90°C)

(2) Ⓓ range test

1. Start off the vehicle, using the Ⓓ range. Check to see if the upshift or downshift takes place as follows. 1st⇄2nd, 2nd⇄3rd, 3rd⇄4th(O/D) . Furthermore, the gear shift points of 1st⇄2nd and 2nd⇄3rd meet the requirements. Also, ensure that there are no abnormal shocks, slippage, etc.
2. Perform kickdown operations while the vehicle is running in the 4th(O/D), 3rd and 2nd gears using the Ⓓ range. Check to see if the kickdown takes place as follows.. 4th(O/D)→3rd, 3rd→2nd, 2nd→1st gears. Furthermore, the kickdown possible vehicle speed limits for 3rd→2nd and 2nd→1st gears meet the requirements. Also, ensure that there are no abnormal shocks, slippage, etc.
3. While the vehicle is running in the 4th (O/D) gear, turn OFF the O/D switch. Ensure that the gear downshift takes place from the 4th (O/D) to the 3rd gear.

(3) Ⓒ range test

1. Start off the vehicle, using the Ⓒ range. Check to see if the upshift or downshift takes place between 1st⇄2nd gears. Furthermore, the gear shift point meets the requirements. Also, ensure that there are no abnormal shocks, slippage, etc.
2. Start off the vehicle in the Ⓒ range. Check that the upshift takes place from1st→2nd gear, but, no upshift to the 3rd gear takes place.
3. While the vehicle is running in the Ⓒ range / 2nd gear, perform the kickdown operation. Check that the kickdown takes place from the 2nd→1st gear. Furthermore, the kickdown possible vehicle speed limit meets the requirement. Also, ensure that there are no abnormal shocks, slippage, etc.
4. While the vehicle is running in the Ⓓ range / 3rd gear, perform a downshift to the Ⓒ range. Check that a downshift takes place from the 3rd to 2nd gear and engine braking is applied. Furthermore, ensure that the shift point meets the requirement.

(4) Ⓛ range test

1. Start off the vehicle in the Ⓛ range. Check that no upshift to the 2nd gear takes place.
2. While the vehicle is running in the Ⓓ range / 3rd gear, perform a downshift to Ⓛ range. Check that downshifts of 3rd→2nd→1st gear take place and the engine braking is applied. Furthermore, ensure that the shift point meets the requirement.

(5) Lock-up test

1. While the vehicle is running in the 3rd gear, gradually accelerate the vehicle. Check that the lock-up is turned ON. Ensure that the vehicle speed at which the engine speed starts to drop meets the specified lock-up ON timing. Furthermore, check that the engine speed will not change significantly when the accelerator pedal is depressed lightly.
2. Conduct the same check in the 4th gear.

(6) Ⓟ range test

1.Stop the vehicle on an upgrade (Approx. 5 degrees or more). Shift the shift lever to the Ⓟ range and release the parking brake lever. At this time, check that the parking lock mechanism functions and the vehicle will not move.

2.In cases where the vehicle is stopped on a downgrade, perform the check, following the same procedure.

3.Under the condition above, shift the shift lever from the Ⓟ range to other range. At this time, check that the vehicle moves.

SPECIFIED VALUE:

Gear shifting vehicle speed (Type K3-VE engine-mounted vehicle)

Throttle opening degree	Range	Gear shifting	Vehicle speed (km/h)
100%	Ⓓ	1st→2nd	51 - 66
		2nd→3rd	93 - 108
		3rd→4th	159 - 174
		4th→3rd	150 - 165
		3rd→2nd	83 - 98
		2nd→1st	37 - 52
0%	Ⓓ	1st→2nd	13 - 28
		2nd→3rd	25 - 40
		3rd→4th	38 - 53
		4th→3rd	22 - 37
		3rd→2nd	8 - 23
		2nd→1st	8 - 23
0—100%	Ⓓ→Ⓒ·Ⓛ	4th→3rd	159 - 174
		3rd→2nd	93 - 108
		2nd→1st	51 - 66

·The gear shifting vehicle speed for the 1st⇄2nd gear in the Ⓒ range and in the throttle opening of 100%·0% is the same as with the Ⓓ range.

SPECIFIED VALUE:

Lock-up vehicle speed (Type K3-VE engine-mounted vehicle)

Throttle opening degree	Gear position	Lock up	Vehicle speed (km/h)
5—20%	3rd	ON	82 - 97
	4th	ON	58 - 76
	3rd	OFF	40 - 55
	4th	OFF	52 - 67

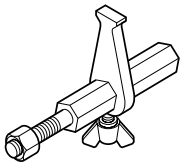
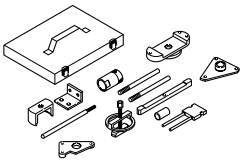
NOTE: Be sure to gradually depress the accelerator pedal.

2 AUTOMATIC TRANSAXLE AY

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09210-87701-000	Holder,fly wheel
	09090-04020-000 (09090-04010-000)	Device,engine sling
	09350-87202-000	Tool set,automatic transmission

Tool

Low transmission jack

Instrument

Torque wrench,Dial gauge

Lubricant,adhesive,others

ATF Dexron®Ⅲ,MP grease,Engine hanger No.1 (Replacement parts),Engine hanger No.2 (Replacement parts)

2-1-2 OPERATION BEFORE REMOVAL

1.Remove the battery and battery carrier.
Refer to Page J5-3.

2.Drain the automatic transaxle fluid.

3.Remove the pipe exhaust.
Refer to Page B4-3.

4.Remove the Oil cooler hose.
Refer to Page E3-20.

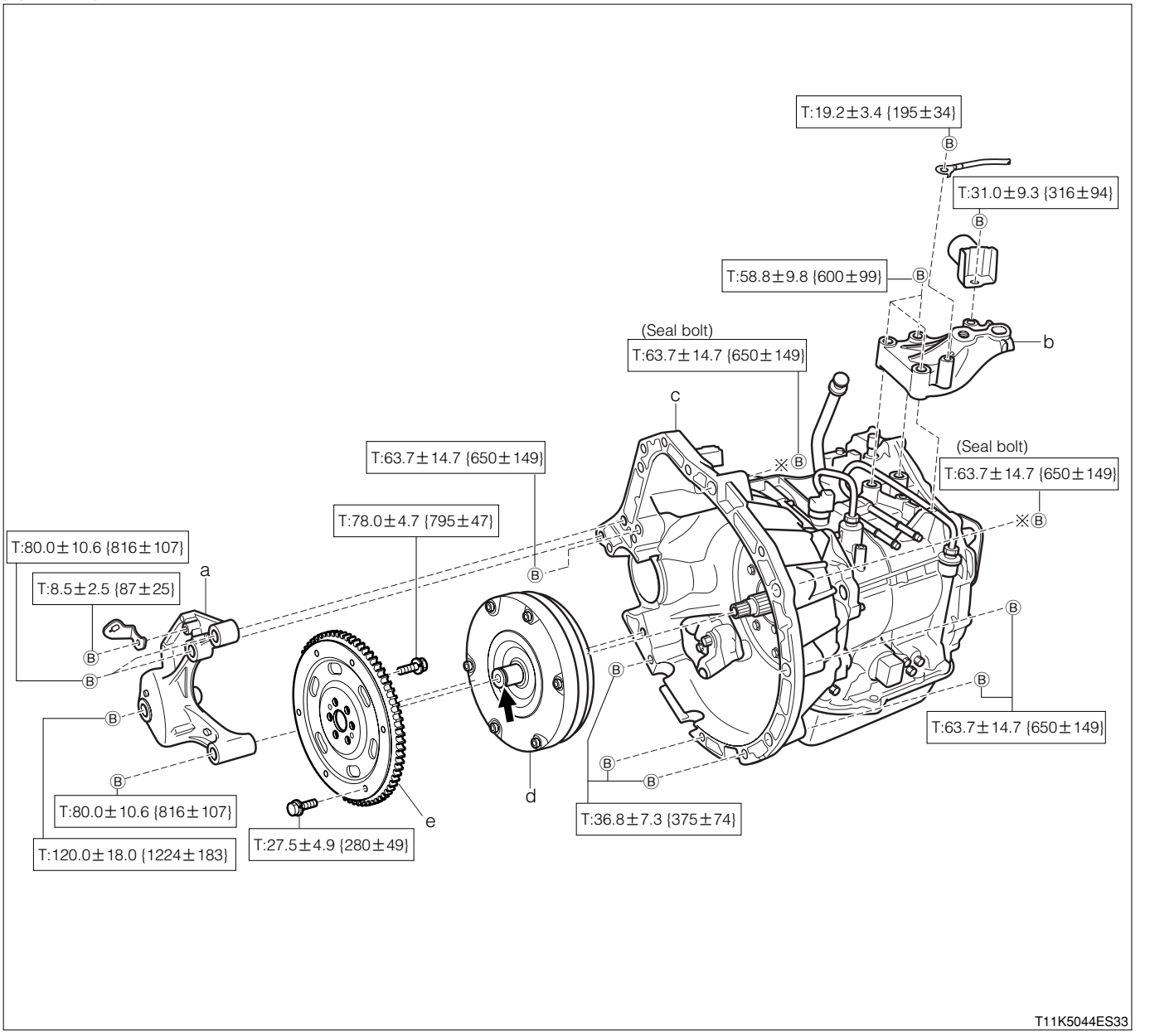
5.Remove the drive shaft.
Refer to Page D2-8.

6.Disconnect the control cable at the transaxle side.
Refer to Page F3-33.

7.Remove the starter.
Refer to Page B11-2.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※: Non-reusable parts
➡: MP grease
Unit: N·m{kgf·cm}

(2) Removal and installation procedures

▼ ▲ 1 a Bracket, engine mounting, rear
▼ ▲ 2 b Bracket, engine mounting, LH
▼ ▲ 3 c Transaxle Ay, automatic
▲ 4 d Converter Ay, torque
▼ ▲ 5 e Plate, pump impeller drive

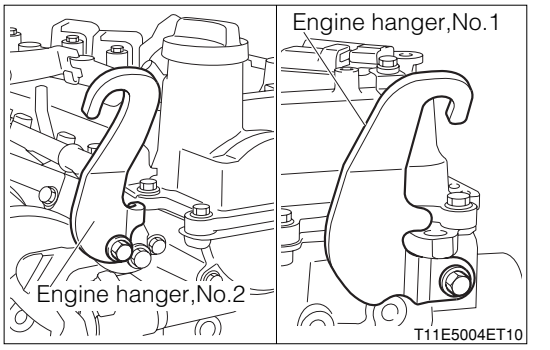
2-1-4 POINTS OF REMOVAL

(1) Bracket, engine mounting, rear

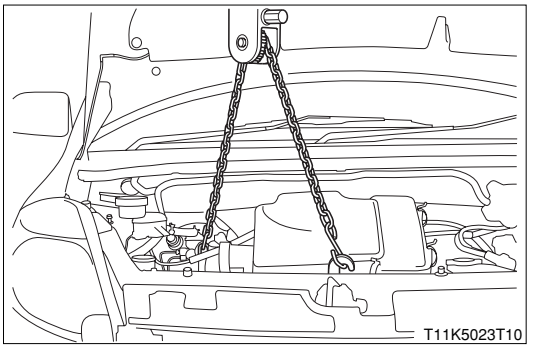
1.Install the engine hanger at a point in the figure.
(1) Type K3-VE engine-mounted vehicles

NOTE

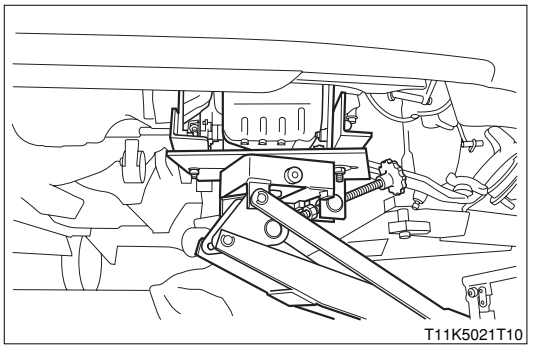
- Part number of engine hanger No.1:12281-97401-000
- Part number of engine hanger No.2:12282-97403-000



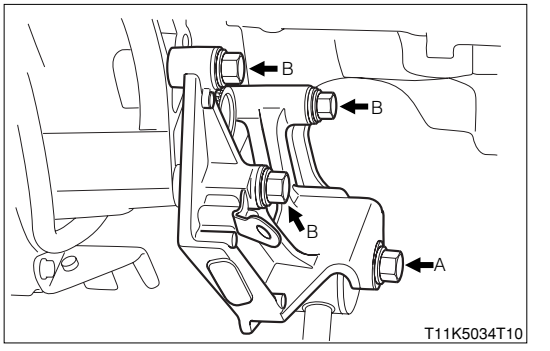
2.Suspend the engine Ay with a chain block and engine sling device.
SST: 09090-04020-000



3.Support the transaxle Ay, using a low transmission jack.
TOOL: Low transmisson jack

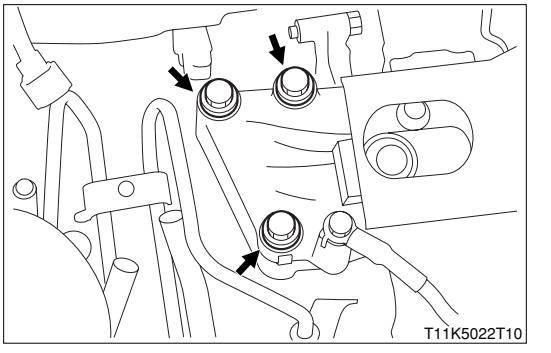


4.Remove the connecting bolt (A) that connects the engine mounting control rod S/A with the bracket.
5.Remove the retaining bolt (B) of the bracket.



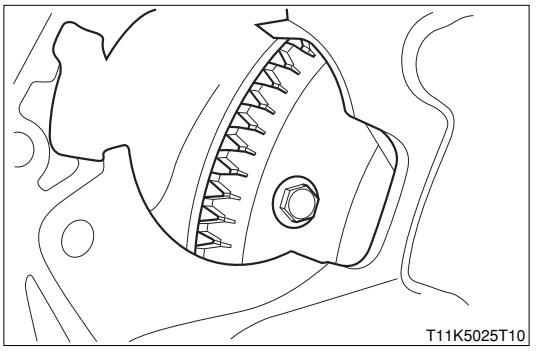
(2) Bracket, engine mounting, LH

1.Remove the retaining bolt of the bracket.

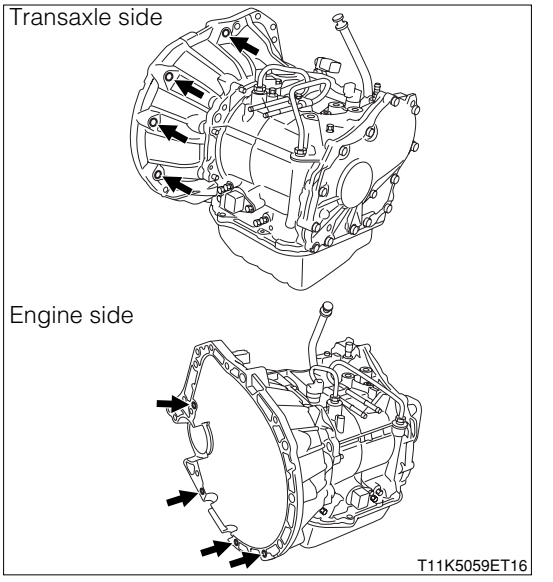


(3) Transaxle Ay, automatic

1.Through the starter Ay retaining hole, remove the bolt (Plate, pump impeller drive × converter Ay, torque).

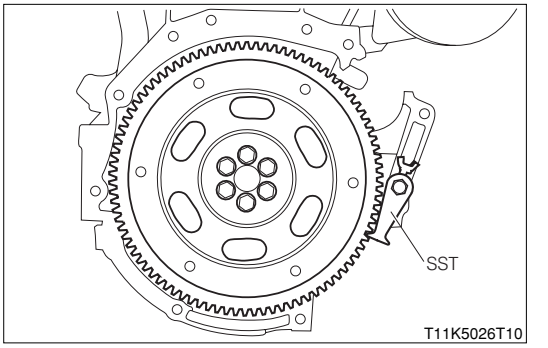


2.Remove the connecting bolts that connect the transaxle Ay with the engine Ay so as to separate the transaxle Ay from the engine Ay.



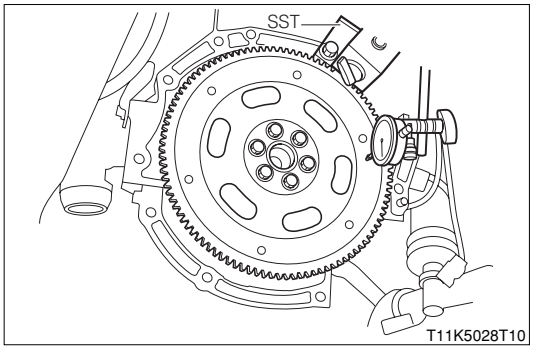
(4) Plate, pump impeller drive

1.While preventing rotation, using the SST, remove the drive plate.
SST: 09210-87701-000

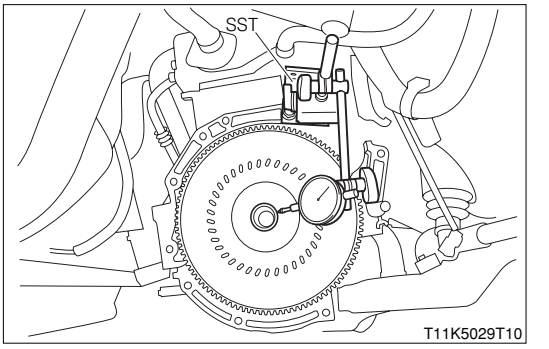


2-1-5 INSPECTION

1.Using the SST and instruments, check the runout of the drive plate.
SST: 09351-87210-000 [09351-87210-000]
SPECIFIED VALUE: 0.25mm
2.Install the torque converter Ay to the drive plate.



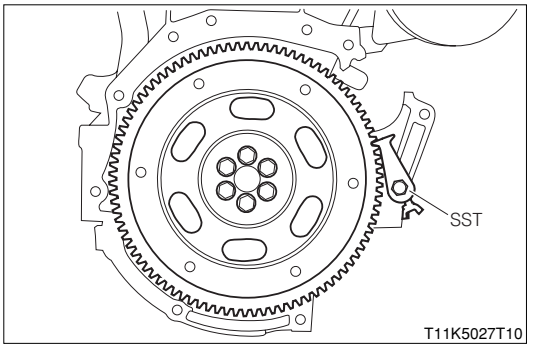
3.Using the SST and instruments, check the runout of the shaft.
SST: 09351-87210-000 [09351-87210-000]
SPECIFIED VALUE: 0.30mm



2-1-6 POINTS OF INSTALLATION

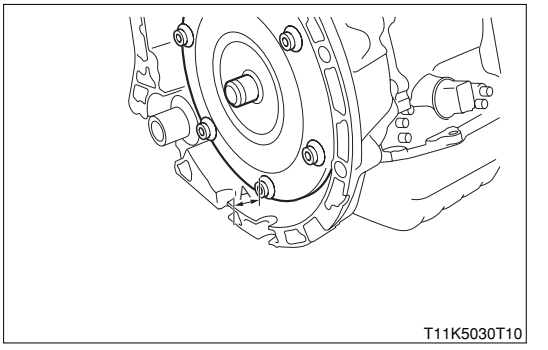
(1) Plate, pump impeller drive

1.While preventing rotation, using the SST, install the drive plate.
SST: 09210-87701-000



(2) Converter Ay, torque

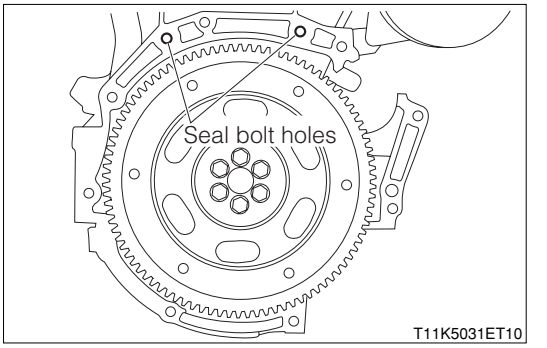
1.Install the torque converter.
(1) Insert the torque converter into the transaxle assembly while turning it. Ensure that the torque converter is inserted positively.
SPECIFIED VALUE: Dimension A at least 16.5 mm
(The dimension A is a distance from the edge surface of the housing to the drive plate attaching surface of the torque converter.)
(2) Apply MP grease to the tip end of the torque converter.
LUBRICANT: MP grease



(3) Transaxle Ay, automatic

1.Connect the transaxle Ay to the engine Ay.

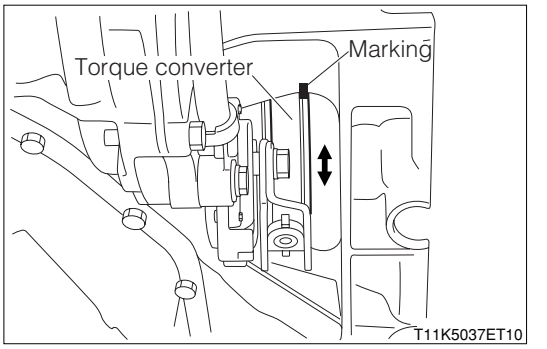
(1) Clean the seal bolt holes of the engine block.



(2) Mark the edge position of the torque converter on the transaxle case. While confirming that the position is not deviated, connect the transaxle assembly to the engine block.

NOTE

- If the position is out of place, remove the transaxle and recheck how far the torque converter should be inserted.



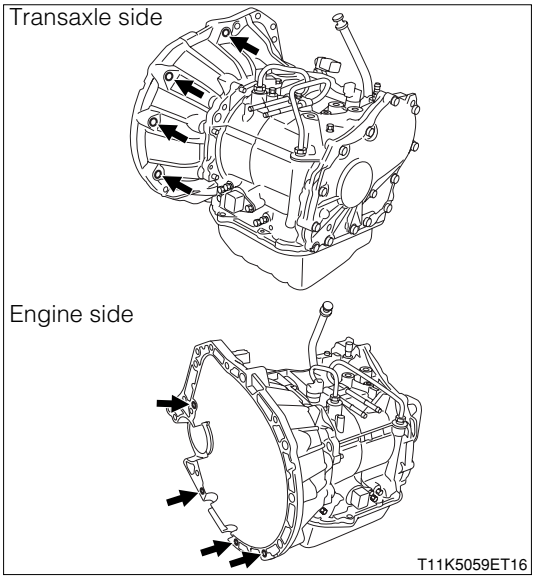
2.While ensuring that the torque converter Ay turns lightly, tighten the connecting bolts of the transaxle Ay and engine Ay.

NOTE

- If the torque converter does not turn easily, the torque converter is not in the specified position, so remove the transaxle Ay and check how far the torque converter should be inserted.
  If the connection bolts are tightened when the torque converter is not in the correct position, the oil pump could be damaged.

CAUTION

- If the connecting bolts are tightened with the torque converter Ay deviated from the specified position, there is the possibility that the starter shaft & oil pump Ay may be damaged.

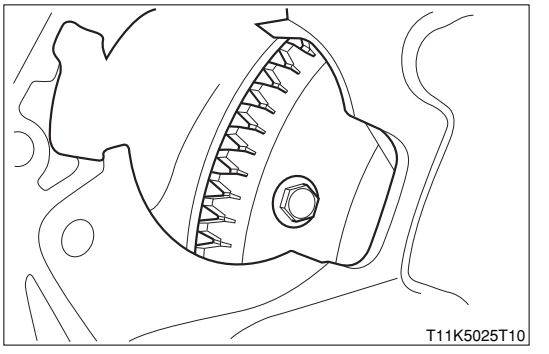


3.Through the starter Ay retaining hole, tighten the bolt (Plate, pump impeller drive × converter Ay, torque).

(1) Tighten first the reference bolt (Silver color) of the pump impeller drive plate.

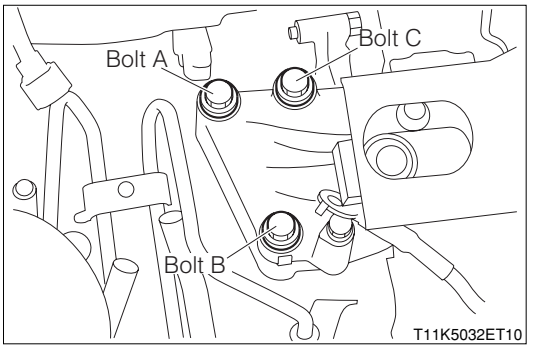
CAUTION

- Never use bolts other than the specified bolts. (If bolts other than the specified bolts are used, it will cause poor tightening or deform the converter inner shape, resulting in curtailed performance.)



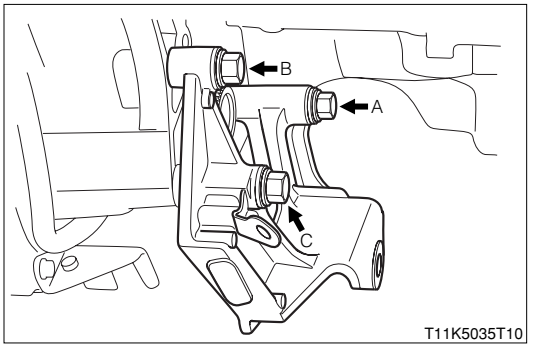
(4) Bracket, engine mounting, LH

1.Temporarily tighten the bracket, using the bolt C indicated in the right figure.
2.Securely tighten the bolts A, B and C in this order.



(5) Bracket, engine mounting, rear

1.Temporarily install the bracket on the automatic transaxle Ay by tightening the bolts (B) and (A) in this order as shown in the right figure.
2.Securely tighten the bolts (B), (C) and A in this order.
3.Install the connecting bolt that connects the engine mounting control rod S/A with the bracket.



2-1-7 OPERATION AFTER INSTALLATION

1.Install the starter.
Refer to Page B11-2.

2.Install the transmission control cable Ay at the transaxle side.
Refer to Page F3-33.

3.Install the drive shaft.
Refer to Page D2-8.

4.Install the Oil cooler hose.
Refer to Page F3-20.

5.Install the pipu exhaust.
Refer to Page B4-3.

6.Install the battery and battery carrier.
Refer to Page J5-3.

7.Fill automatic transaxle fluid.
Refer to Page F3-1.

8.Carry out the basic check and adjustments.
Refer to Page F3-1.

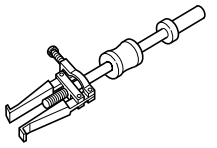
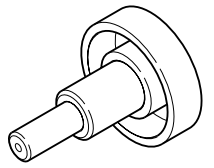
9.When the automatic transaxle Ay has been replaced, erase the learning values of the A/T ECU (Transmission control computer)..
Refer to Page F5-17.

3 DIFFERENTIAL SIDE OIL SEAL

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09308-00010-000	Puller,oil seal
	09518-87709-000	Replacer,oil seal No.8

Lubricant,adhesive,others

ATF Dexron®Ⅲ

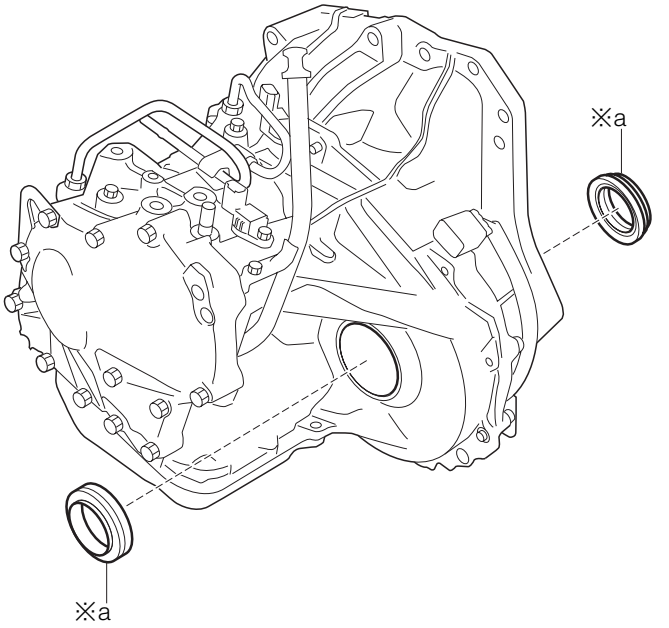
3-1-2 OPERATION BEFORE REMOVAL

1.Remove the drive shaft.

Refer to Page D2-8.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



T11K5509S20

※:Non - reusable parts

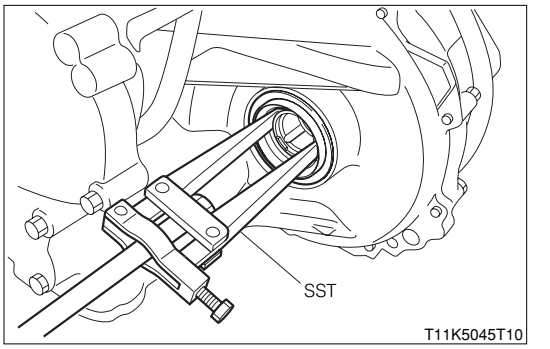
(2) Removal and installation procedures

▼ ▲ 1 a Seal, type T oil

3-1-4 POINTS OF REMOVAL

(1) Seal, type T oil

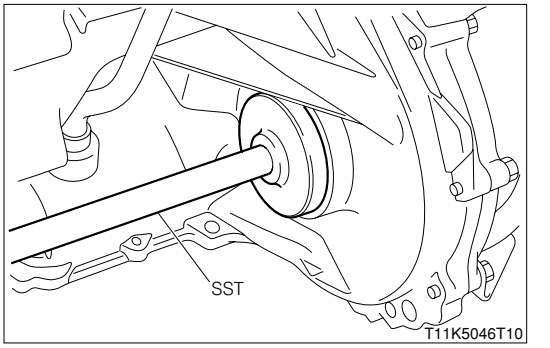
1.Remove the seal, using the SST.
SST: 09308-00010-000



3-1-5 POINTS OF INSTALLATION

(1) Seal, type T oil

1.Drive the seal into place, using the SST.
SST: 09518-87709-000



3-1-6 OPERATION AFTER INSTALLATION

1.Install the drive shaft.
Refer to Page D2-8.

4 OIL COOLER HOSE

4-1 REMOVAL AND INSTALLATION

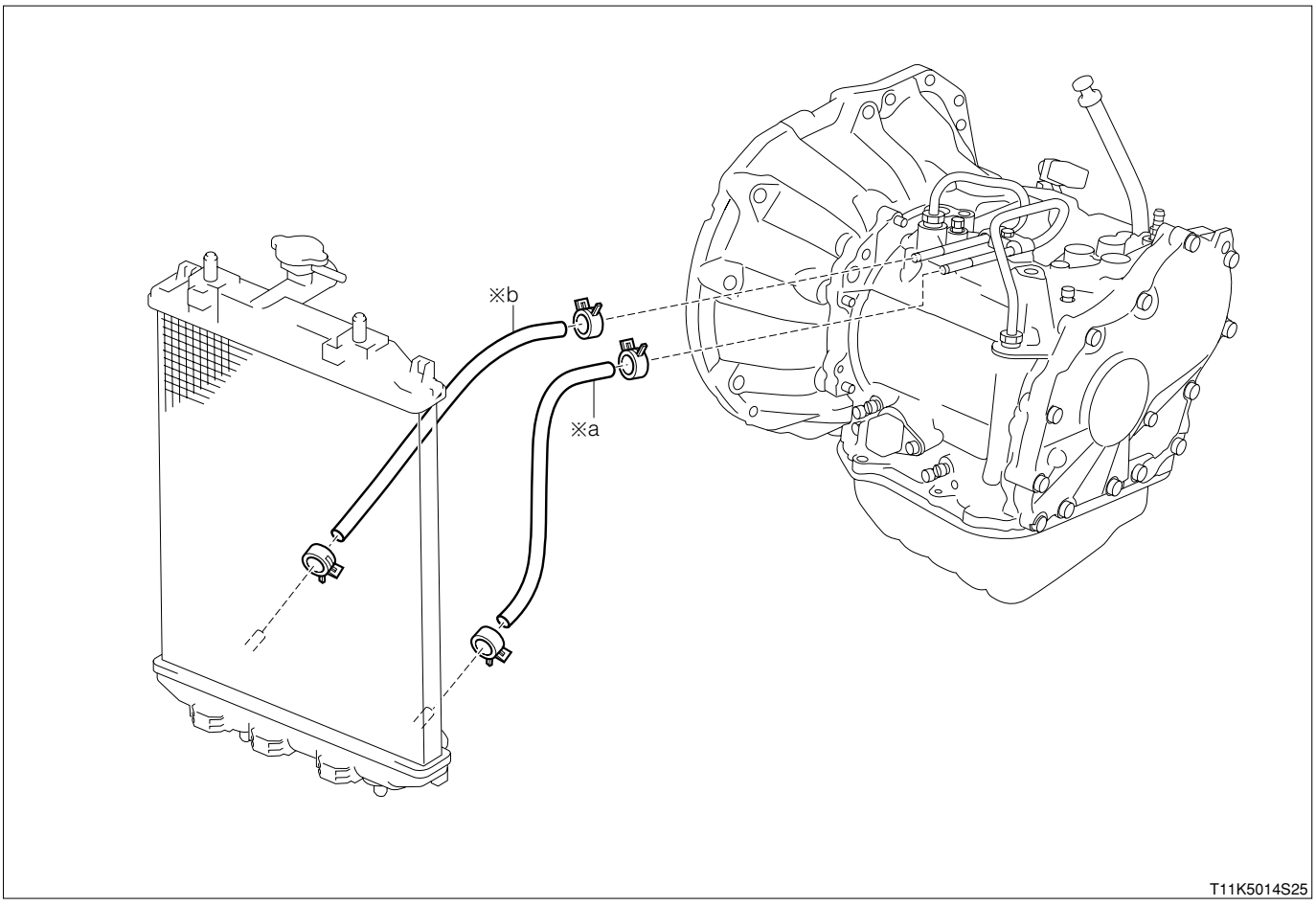
4-1-1 ARTICLES TO BE PREPARED

4-1-2 OPERATION BEFORE REMOVAL

1.Remove the battery and battery carrier.
Refer to Page J5-3.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts

(2) Removal and installation procedures

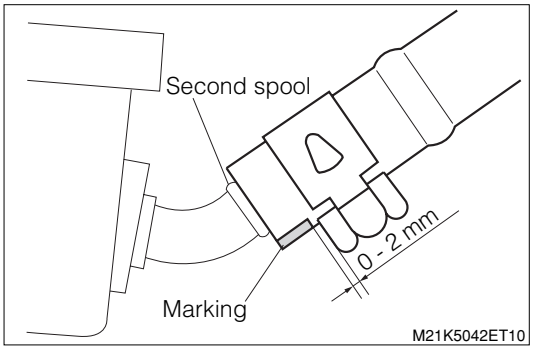
▲ 1 a Hose, oil cooler inlet
▲ 2 b Hose, oil cooler outlet

4-1-4 POINTS OF INSTALLATION

(1) Hose, oil cooler inlet / Hose, oil cooler outlet

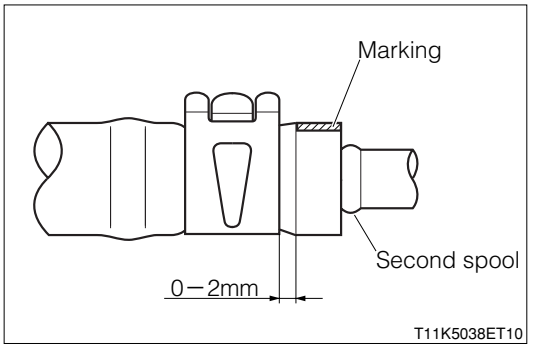
1.Clean the oil cooler union at the radiator side and the tube at the transaxle side, using white gasoline.

2.Install the inlet hose and outlet hose at the radiator side.
(1) With the marking at the hose facing toward the lower side of the vehicle, insert the hose up to the second spool of the union at the radiator side.
(2) Install the clip with the protrusion of the clip facing toward the lower side of the vehicle and aligning with the marking position.



CAUTION
- Care must be exercised so that the hose may not be overlapped on the second spool.

3.Install the inlet hose and outlet hose at the transaxle side.
(1) With the marking at the hose facing toward the upper side of the vehicle, insert the hose up to the second spool of the union at the transaxle side.
(2) Install the clip with the protrusion of the clip facing toward the upper side of the vehicle and aligning with the marking position.



CAUTION
- Care must be exercised so that the hose may not be overlapped on the second spool.

4.Ensure that each hose is not twisted, not interfering with other parts, and not having extremely small gaps wither other parts.

4-1-5 OPERATION AFTER INSTALLATION

1.Install the batty and battery carrier.
Refer to Page J5-3.

2.Start the engine. Check that there is no fluid leakage from the automatic transaxle.
3.Check the fluid level. If the fluid level is too low, replenish.
Refer to Page F3-1.

5 OIL PAN

5-1 REMOVAL AND INSTALLATION

5-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

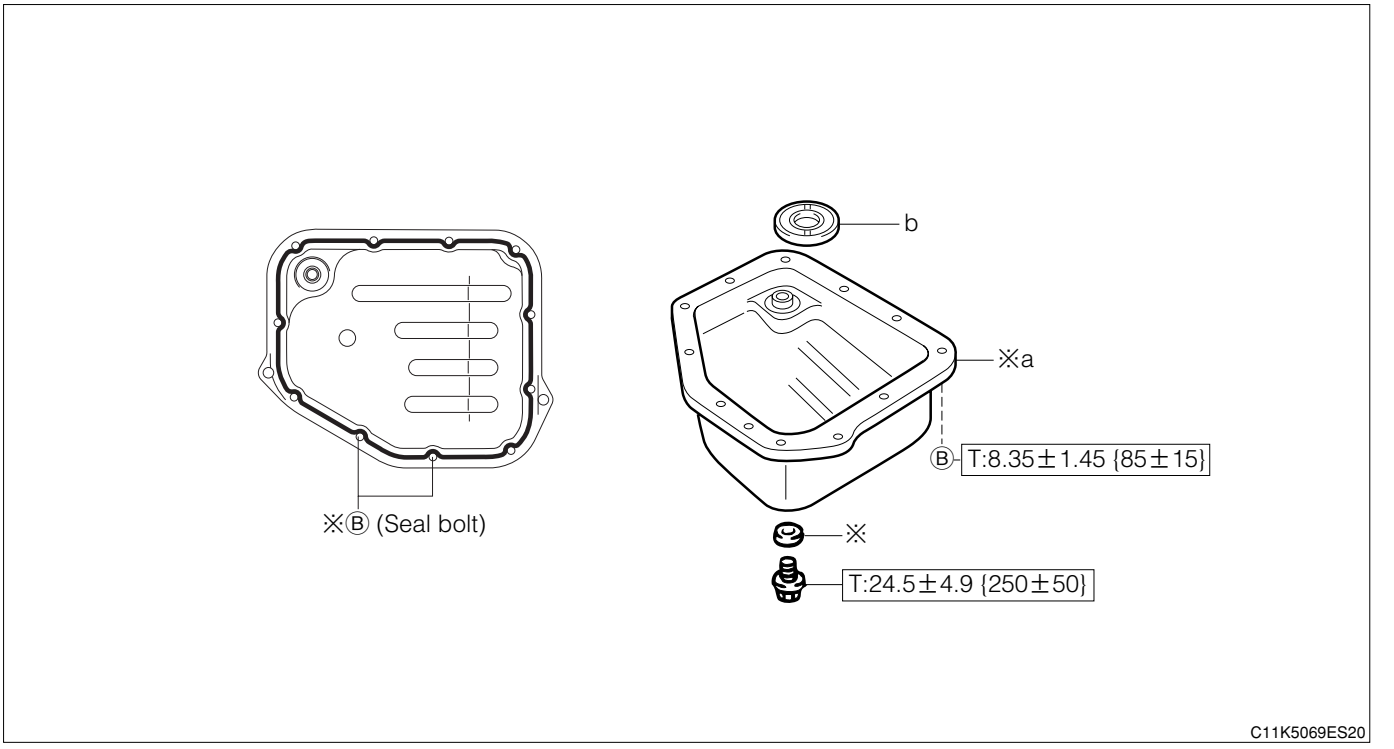
ATF Dexron®Ⅲ,Three Bond1281B

5-1-2 OPERATION BEFORE REMOVAL

1.Drain the automatic transaxle fluid.

5-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts

Unit:N·m{kgf·cm}

(2) Removal and installation procedures

▼ ▲ 1 a Pan S/A, transaxle oil

2 b Magnet, transmission

5-1-4 POINTS OF REMOVAL

(1) Pan S/A, transaxle oil

1.After removing the pan S/A retaining bolts, remove the pan S/A by tapping lightly the flange section of it with a plastic hammer, while holding the pan S/A by hand.

CAUTION

- Oil is remaining in the pan S/A. Therefore, be very careful not to allow the oil to spill over.

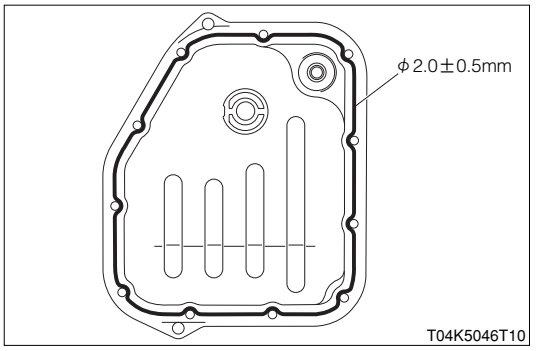
5-1-5 POINTS OF INSTALLATION

(1) Pan S/A, transaxle oil

1.Clean and degrease the mating surface. Apply liquid gasket to the areas indicated in the right figure.
ADHESIVE: Three Bond1281B

CAUTION

- Do not apply the liquid gasket too much. (If a great quantity of liquid gasket is mixed into ATF, ATF will be deteriorated.)



5-1-6 OPERATION AFTER INSTALLATION

1.Fill automatic transaxle fluid.
Refer to Page F3-1.

2.Check that no oil leakage is present.

6 OIL STRAINER

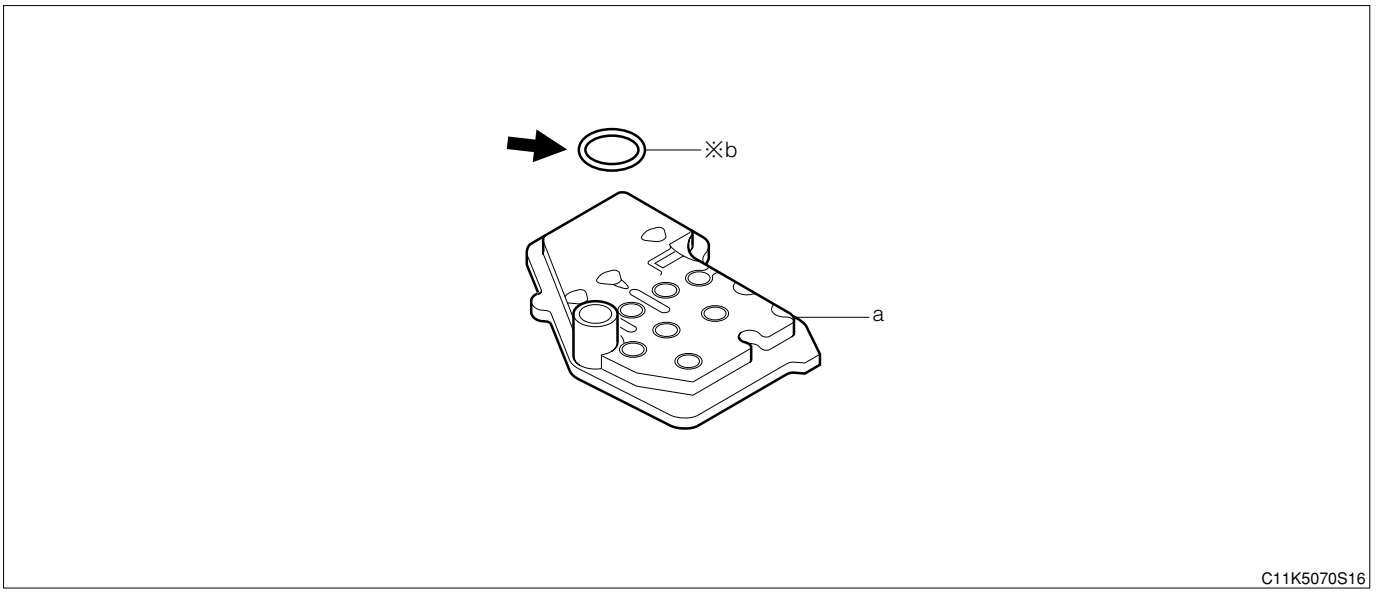
6-1 REMOVAL AND INSTALLATION

6-1-1 OPERATION BEFORE REMOVAL

1.Remove the oil pan.
Refer to Page F3-22.

6-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



➡: Apply ATF.
※: Non-reusable parts

(2) Removal and installation procedures

▼ ▲ 1 a Strainer S/A, oil
2 b Ring, o

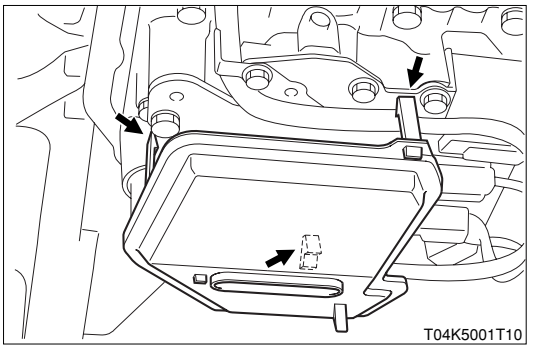
6-1-3 POINTS OF REMOVAL

(1) Strainer S/A, oil

1.Remove the oil strainer.

CAUTION

- The strainer S/A is attached to the transmission valve body Ay with pawls indicated in the figure. Therefore, carefully remove the strainer S/A , while expanding the pawls, and paying attention not to apply undue force to the strainer S/A.



6-1-4 POINTS OF INSTALLATION

(1) Strainer S/A, oil

1.Apply ATF to the strainer S/A and assemble the O-ring.

6-1-5 OPERATION AFTER INSTALLATION

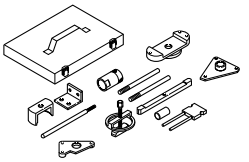
1.Install the oil pan.
Refer to Page F3-22.

7 VALVE BODY

7-1 REMOVAL AND INSTALLATION

7-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09350-87202-000	Tool set,automatic transmission

Instrument

Torque wrench

Lubricant,adhesive,others

ATF Dexron®Ⅲ

7-1-2 OPERATION BEFORE REMOVAL

1.Remove the oil pan.
Refer to Page F3-22.

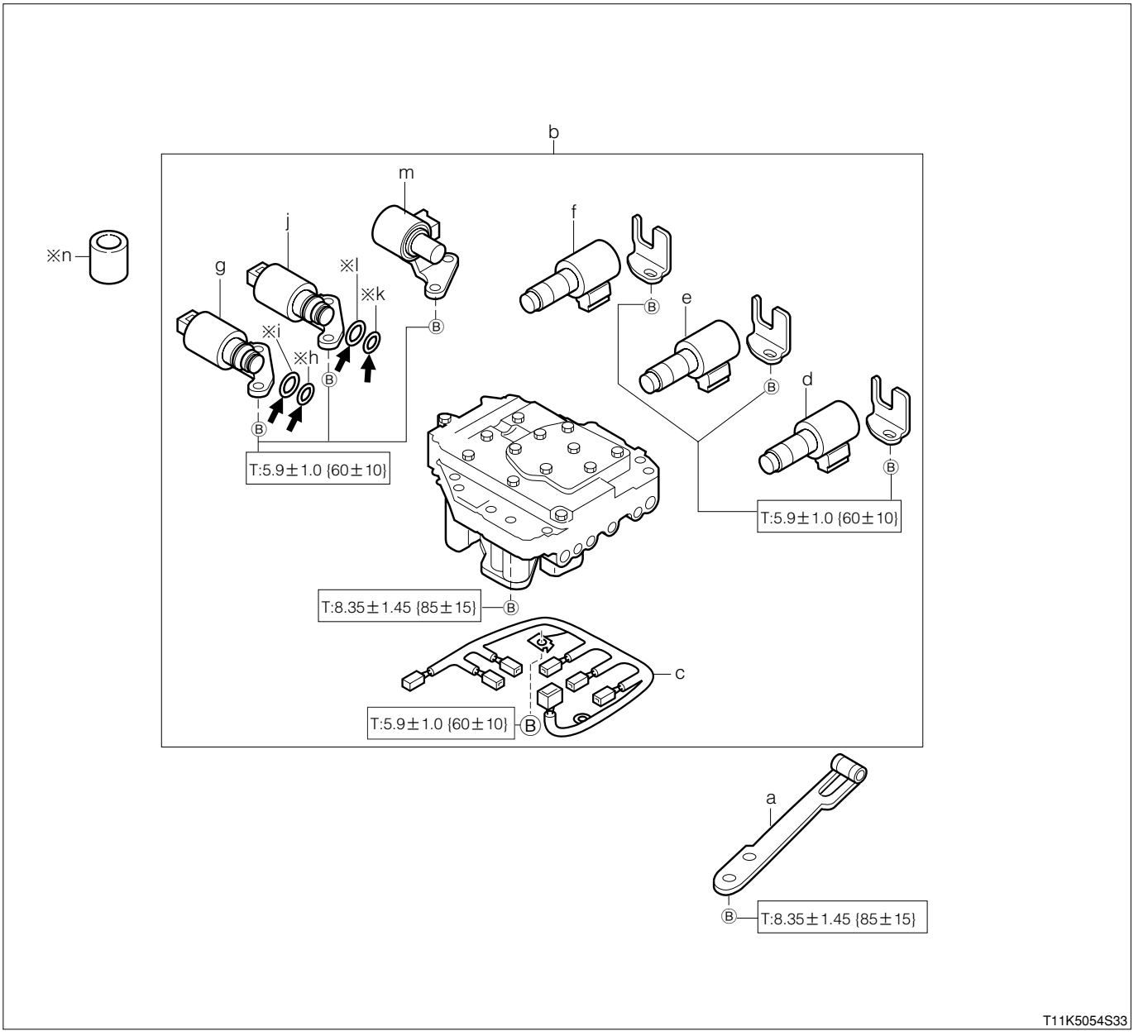
2.Remove the oil strainer.
Refer to Page F3-24.

7-1-3 REMOVAL AND INSTALLATION PROCEDURES

CAUTION

- Prior to the operations, be sure to completely remove sands and mud that have adhered to the external of the transmission so that no foreign matters enter the transmission.
- Perform the operations at a clean place free of dirt and dust.
- Perform the operations with bare hands or by wearing vinyl gloves. Do not use working gloves nor cloth to prevent admission of lint. (Use nylon cloth, or paper cloth.)
- Place removed parts in order at all times. Keep them away from dust.
- Thoroughly wash the removed parts before assembling. After drying, apply ATF. However, do not wash aluminum and rubber parts with alkali chemicals. Never wash rubber parts, such as O-rings, gaskets, oil seals, with cleaning solvent (White gasoline or the like)
- Do not use parts that have undergone impacts, such as ones dropped. (In particular, the characteristics of the solenoid valves may be changed.)

(1) Components



➡: Apply ATF.
※: Non-reusable parts
Unit: N·m{kgf·cm}

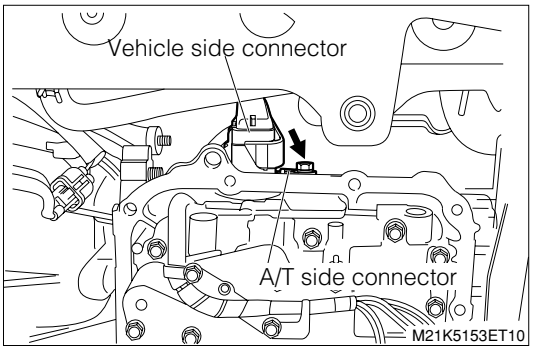
(2) Removal and installation procedures

- ▲ 1 a Spring S/A, manual detent
- ▼ ▲ 2 b Body Ay, transmission valve
- ▼ ▲ 3 c Wire Ay, solenoid
- 4 d Solenoid Ay, clutch control No.1 (Solenoid No.2) (Connector white)
- 5 e Solenoid Ay, clutch control No.2 (Solenoid No.1) (Connector black)
- 6 f Solenoid Ay, clutch control No.1 (Solenoid No.3) (Connector white)
- 7 g Solenoid Ay, transmission 3way (switch solenoid)
- 8 h Ring, o
- 9 i Ring, o
- 10 j Solenoid Ay, transmission 3way (LUC solenoid)
- 11 k Ring, o
- 12 l Ring, o
- 13 m Solenoid Ay, lock up control (Duty solenoid)
- ▼ ▲ 14 n Seal, 2nd & 4th brake cylinder

7-1-4 POINTS OF REMOVAL

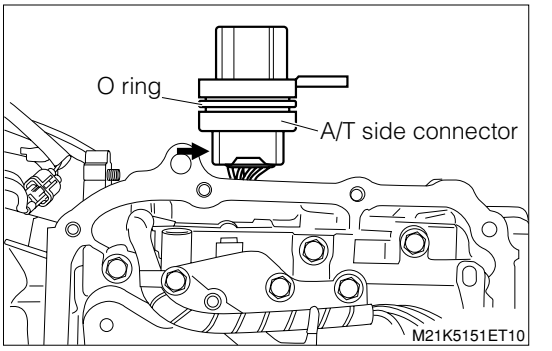
(1) Wire Ay, solenoid

1.Remove the vehicle side wire Ay.
2.Remove the retaining bolt of the A/T side connector.
3.Remove the A/T side connector from the A/T. Remove the connector (White).



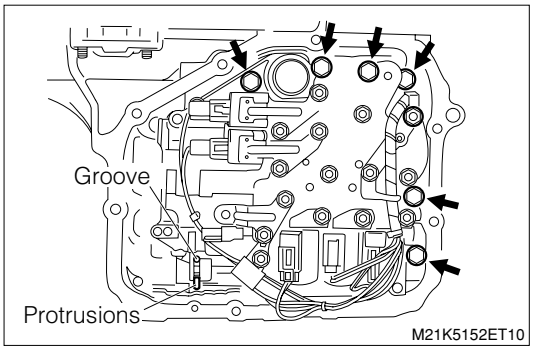
CAUTION

- The O-ring of the A/T side connector can not be re-used.

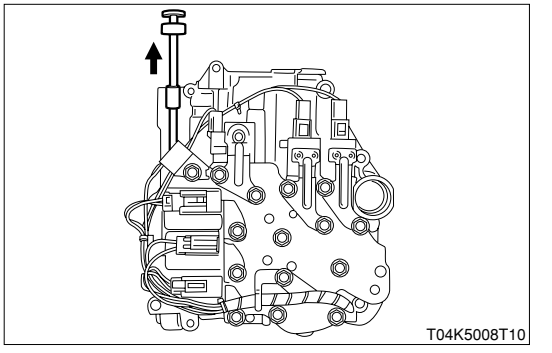


(2) Body Ay, transmission valve

1.Remove the body Ay by loosening the six bolts evenly.

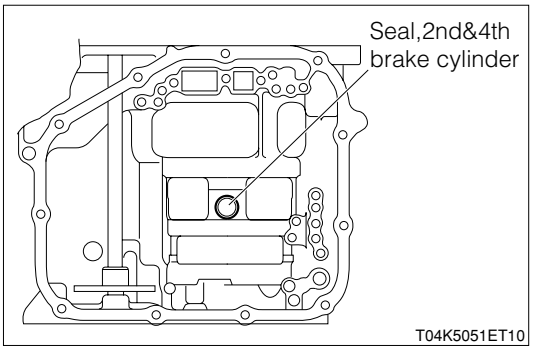


2.Remove gently the manual valve from the valve body Ay.



(3) Seal, 2nd & 4th brake cylinder

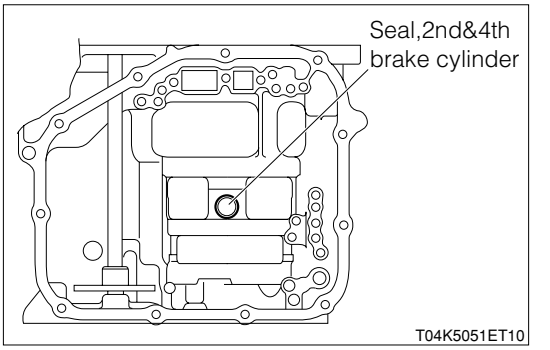
1.Remove the seal.



7-1-5 POINTS OF INSTALLATION

(1) Seal, 2nd & 4th brake cylinder

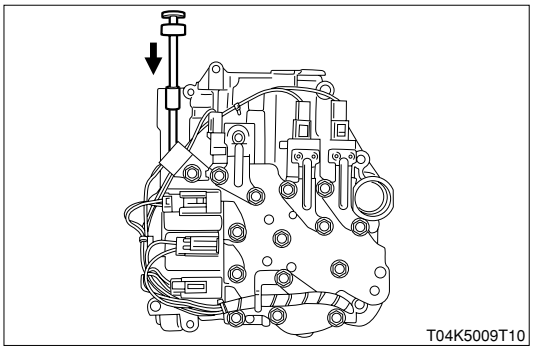
1.Install the seal.



(2) Body Ay, Transmission valve

1.Apply ATF to the manual valve. Slowly assemble the manual valve by its own weight into the body Ay. After the assembling, lightly move the body Ay in a fore-and-aft direction. Check that there is no abnormal binding.
LUBRICANT: AFT Dexron®III

2.Pass the connector through the transmission case hole.



3.While aligning the protrusion of the manual valve lever S/A with the groove of the manual valve, assemble the valve body assembly to the transaxle case.

NOTE

- Tilt the manual valve lever S/A toward the L range direction.

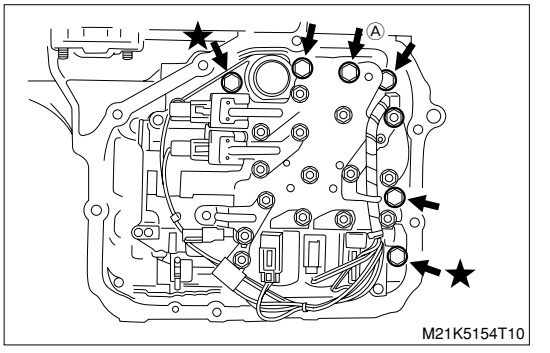
4.After the six bolts have been installed temporarily, tighten the two reference bolts (The ※ marked one in the figure) to the specified torque.

NOTE

- The bolt Ⓐ has a nominal length of 65 mm. Other bolts have a nominal length of 35 mm.

CAUTION

- Before assembling, clean the bolts with compressed air.



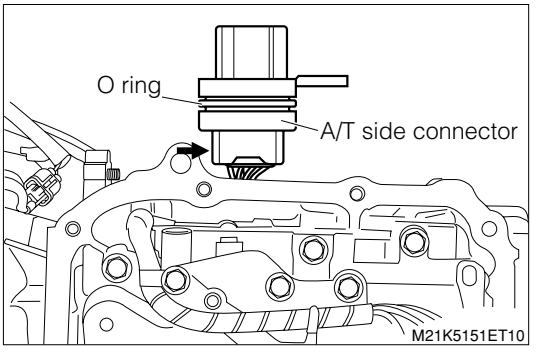
5.Tighten the remaining bolts up to the specified torque.

(3) Wire Ay, solenoid

1.After a new O-ring has been installed to the A/T side connector, install the connector (White).

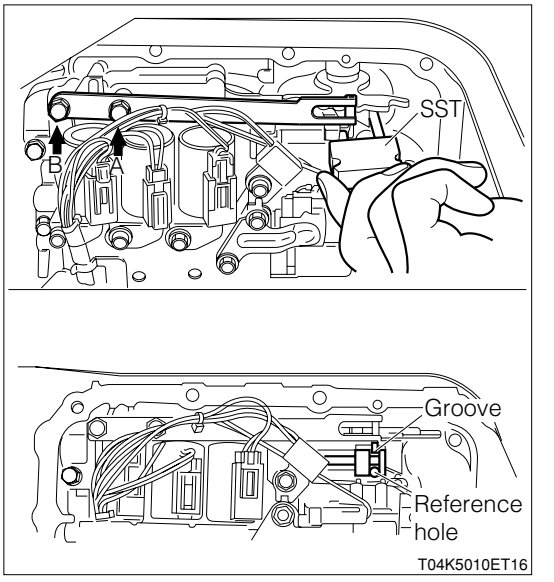
CAUTION

- The O-ring of the A/T side connector can not be re-used.



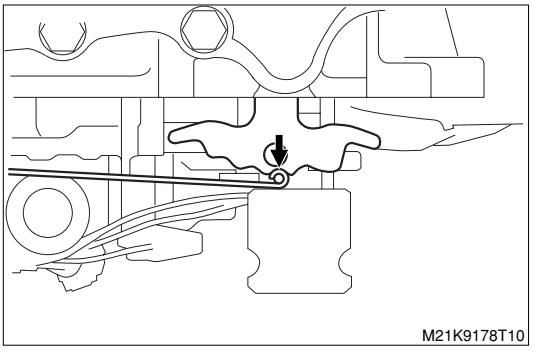
(4) Spring S/A, manual detent

1.Using the SST, align the manual valve groove with transmission valve body hole (N range position) and assemble the spring S/A. Tighten the bolt A (Nominal length 12 mm) and bolt B (Nominal length 35 mm) in this order.
SST: 09351-87211-000 [09351-87211-000]



CAUTION

- When tightening the bolt A, ensure that the roller located at the end of the spring S/A is properly positioned in the hollow of the manual valve lever S/A shown in the illustration.



7-1-6 OPERATION AFTER INSTALLATION

1.Install the oil strainer.
Refer to Page F3-24.

2.Install the oil pan.
Refer to Page F3-22.

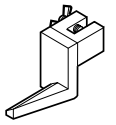
3.When the valve body Ay or the solenoid valve has been replaced, erase the learning values of the A/T ECU.
Refer to Page F5-17.

8 NEUTRAL START SWITCH

8-1 REMOVAL AND INSTALLATION

8-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09302-87201-000	Gauge,neutral start switch adjust

Instrument

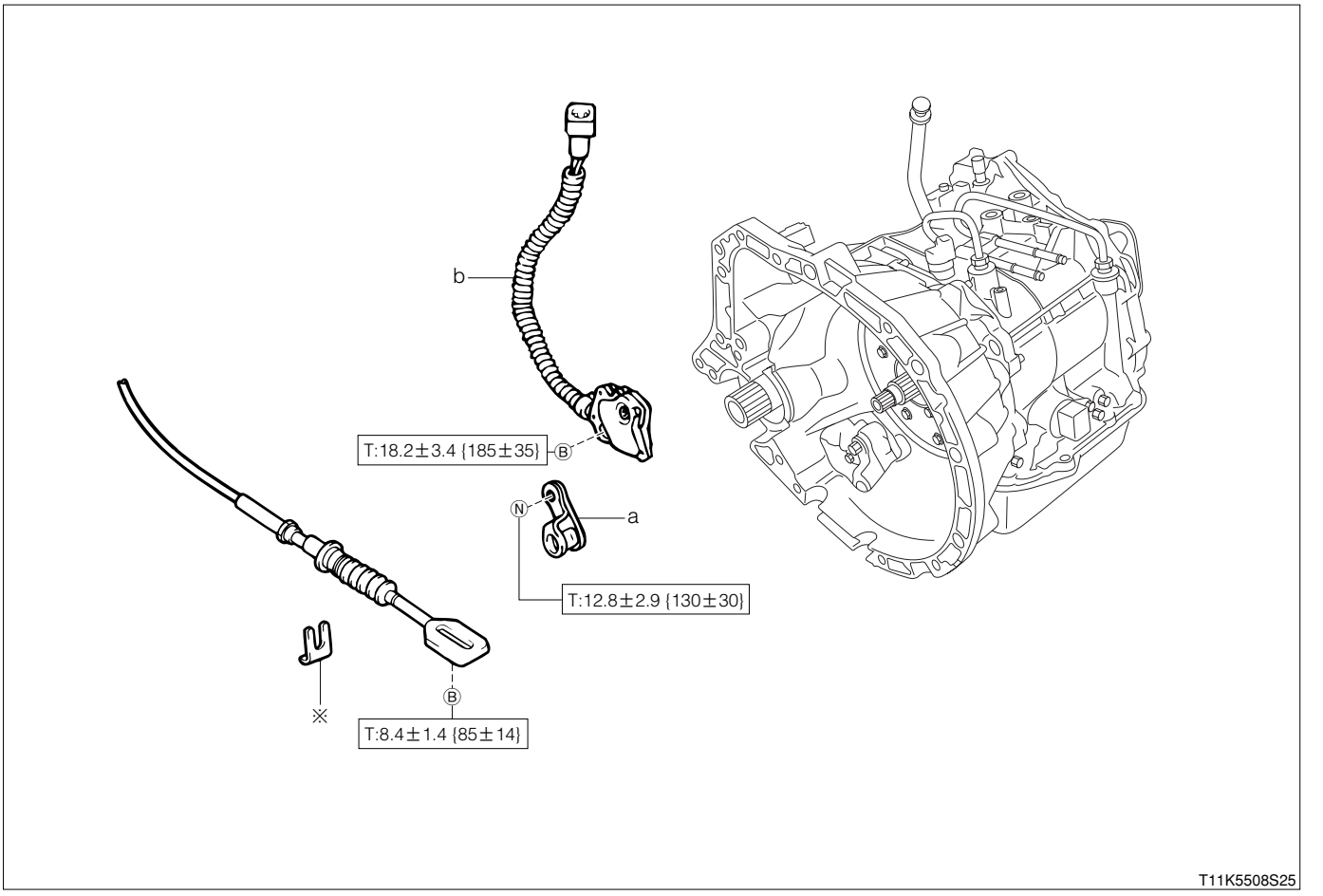
Torque wrench

8-1-2 OPERATION BEFORE REMOVAL

1.Disconnect the control cable at the transaxle side.
Refer to Page F3-33.

8-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



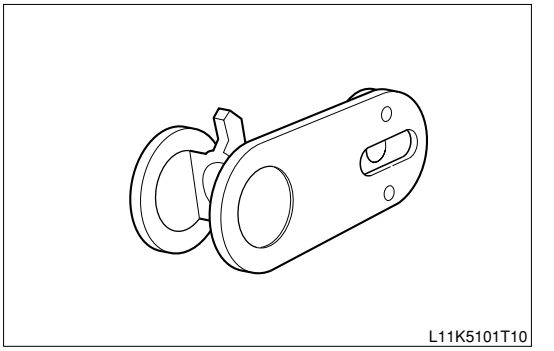
※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Lever S/A, transmission control shaft
▲ 2 b Switch Ay, neutral start

8-1-4 INSPECTION

1.Check that the cable installation section (The resin section) of the transmission control shaft lever assembly can be turned lightly. Also, ensure that it does not exhibit any damage.


L11K5101T10

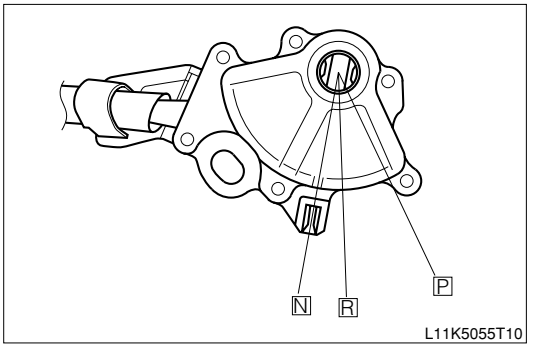
8-1-5 POINTS OF INSTALLATION

(1) Switch Ay, neutral start

1.Install the neutral start switch.

(1) Temporarily install the neutral start switch assembly and control shaft lever assembly.

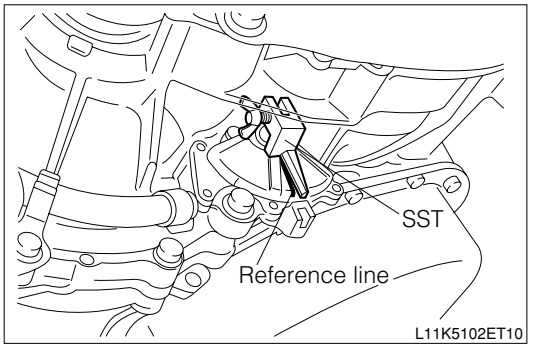
(2) Turn the transmission control shaft lever S/A counterclockwise, until it stops (P range). From this condition, back off the control shaft lever S/A two stages (N range).



L11K5055T10

(3) Using the SST, turn the switch section in such a way that the gauge section of the SST is aligned with the reference line of the switch Ay. Then, tighten the bolt to the specified torque

SST: 09302-87201-000



L11K5102ET10

2.After completion of the installation of the transmission control lever S/A, confirm the operation of the transmission control shaft lever S/A, following the procedure given below.

(1) Move the transmission control shaft lever S/A to the P range. Then, move the lever S/A about 2 to 3 mm in the direction of the R range by hand. At this time, ensure that the lever fully returns to the P range.

(2) If the lever fails to return fully, once loosen the retaining bolt of the switch Ay and carry out the adjusting operation. Then, retighten the bolt.

8-1-6 OPERATION AFTER INSTALLATION

1.Connect the control cable at the transaxle side.

Refer to Page F3-33.

2.Check the shift lever position and perform the check of the neutral start switch.

Refer to Page F3-1.

9 SHIFT LEVER(FLOOR SHIFT)

9-1 REMOVAL AND INSTALLATION

9-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

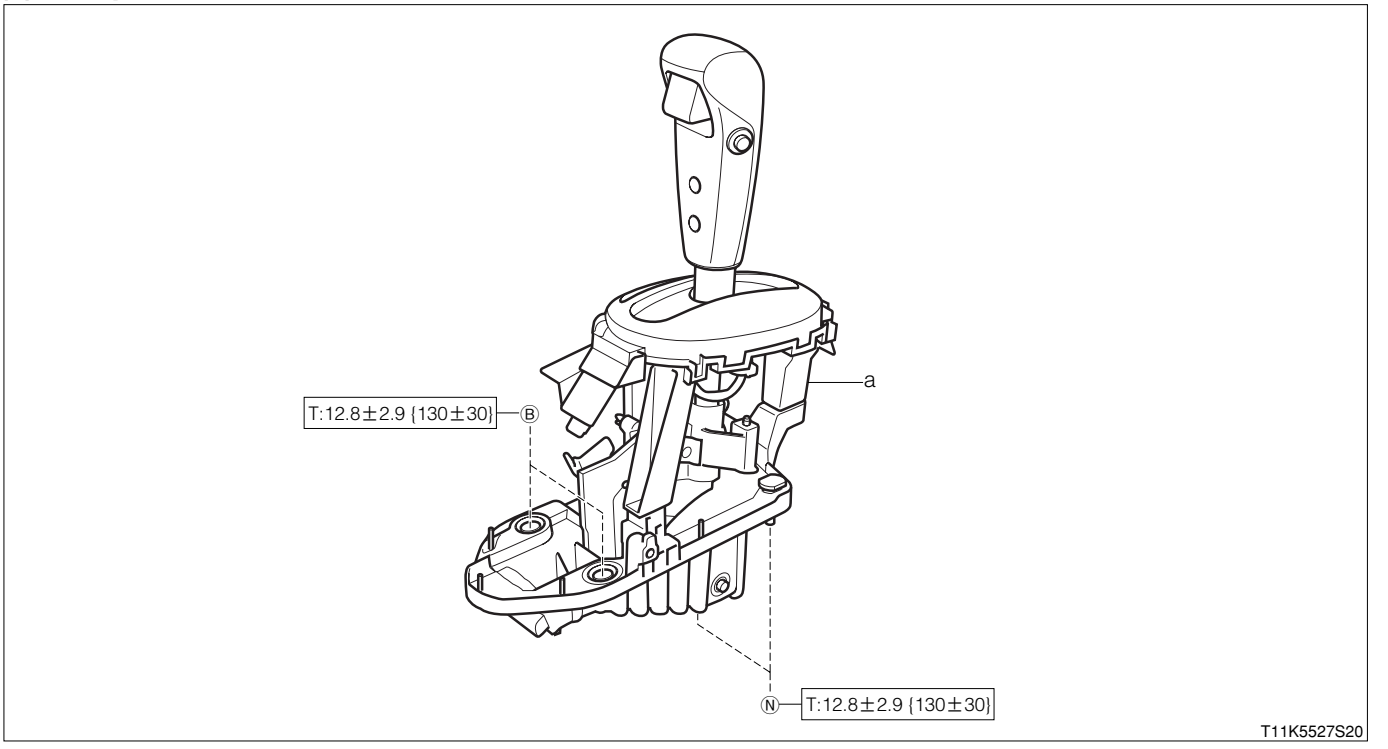
9-1-2 OPERATION BEFORE REMOVAL

1.Remove the transmission floor shift Ay side of the shift lock release cable Ay.
Refer to Page F3-37.

2.Remove the transmission floor shift Ay side of the transmission control cable Ay.
Refer to Page F3-33.

9-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Floor shift Ay, transmission

9-1-4 OPERATION AFTER INSTALLATION

1.Install the transmission floor shift Ay side of the transmission control cable Ay.
Refer to Page F3-33.

2.Install the transmission floor shift Ay side of the shift lock release cable Ay.
Refer to Page F3-37.

Check the shift lever position.
Refer to Page F3-1.

10 CONTROL CABLE(FLOOR SHIFT)

10-1 REMOVAL AND INSTALLATION

10-1-1 ARTICLES TO BE PREPARED

Instrument

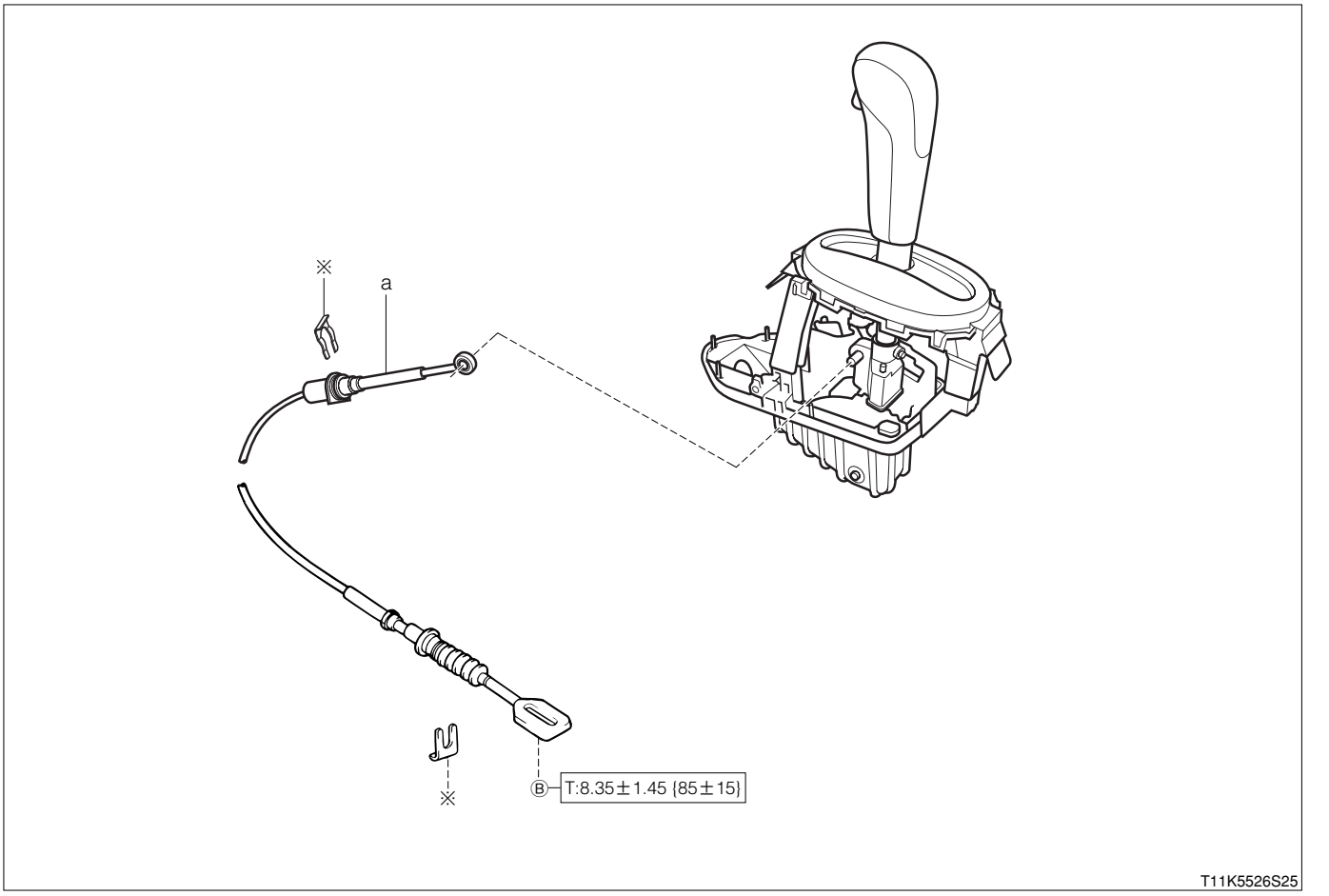
Torque wrench

10-1-2 OPERATION BEFORE REMOVAL

1.Remove the front console box S/A.
Refer to Page I2-31.

10-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) Removal and installation procedures

▼ ▲ 1 a Cable Ay, transmission control

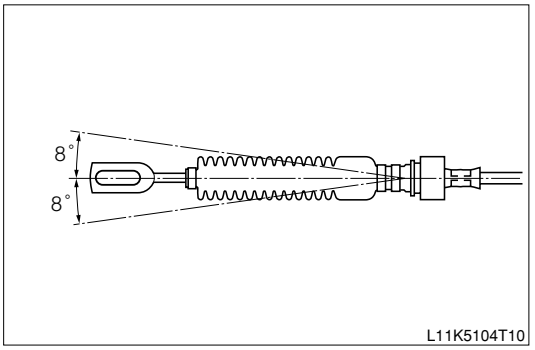
10-1-4 POINTS OF REMOVAL

(1) Cable Ay, transmission control

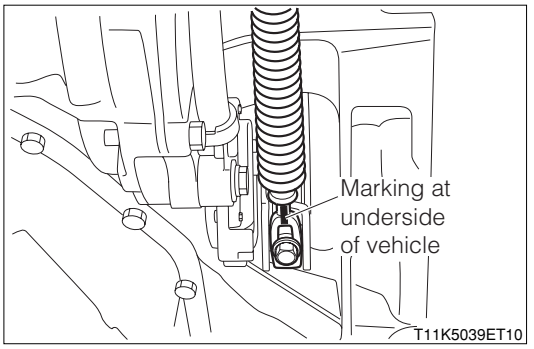
CAUTION

- Do not apply load to the end of the cable Ay (Both the shift lever and the transmission sides), or swing it more than 8 degrees.

1.Set the shift lever to the [N] range.

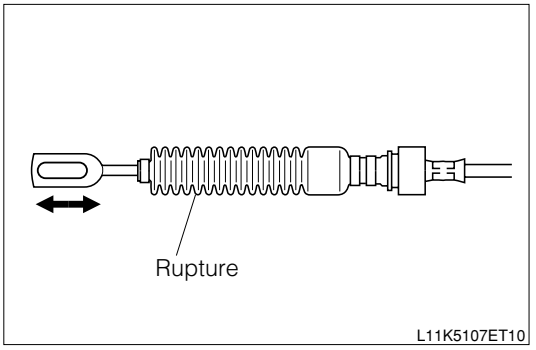


2.Mark the end of the transaxle side of the cable Ay to identify upper and lower sides, and then remove the cable Ay.



10-1-5 INSPECTION

1.Check that the inner cable of the cable Ay slides smoothly and that the boot is free from any damage or deformation.

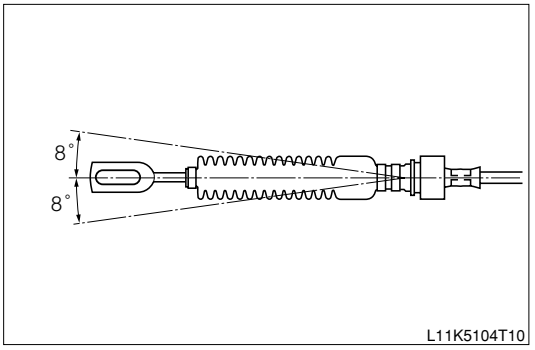


10-1-6 POINTS OF INSTALLATION

(1) Cable Ay, transmission control

CAUTION

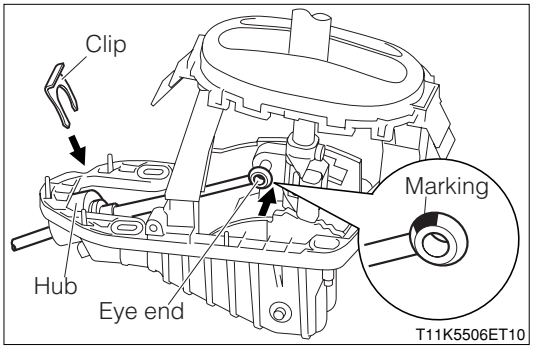
- Do not apply load to the end of the cable Ay (Both the shift lever and the transmission sides), or swing it more than 8 degrees.



1.Install the shift lever side of the cable Ay.

(1) Insert the clip into the slot of the cable Ay to secure the hub.

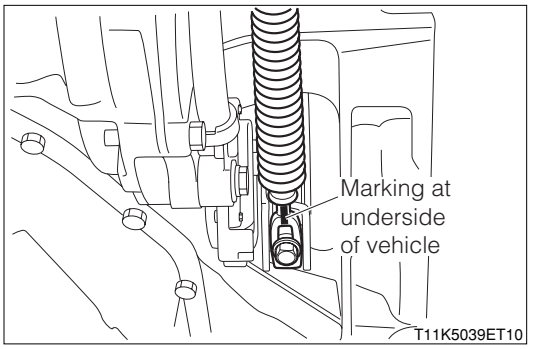
(2) Install the eye end in such a way that the marking of the eye end faces toward the upper side of the vehicle.



2.Ensure that upper/lower identification marking of the transaxle side of the cable Ay faces down and that there is no sagging in the cable. Then install the cable Ay to the transmission control shaft lever S/A.

CAUTION

- Check that the boot is not twisted.



10-1-7 OPERATION AFTER INSTALLATION

1.Check the shift lever position.
Refer to Page F3-1.

2.Install the front console box S/A.
Refer to Page I2-31.

11 SHIFT LOCK WITH KEY-INTERLOCKING (MECHANICAL TYPE)

11-1 FUNCTION CHECK

11-1-1 CHECK THE SHIFT LOCK OPERATION

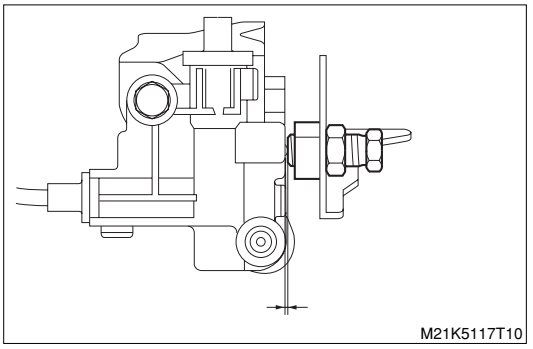
1.Set the IG switch to the "ACC" or "ON" position.
2.Move the shift lever to the Ⓟ range and release the shift lever button.
3.Confirm that it is impossible to push-in the shift lever button and shifting can not be made to ranges other than the Ⓟ range when the brake pedal is not depressed.
4.Confirm that it is possible to push-in the shift lever button when the brake pedal is depressed and shifting can be made to ranges other than the Ⓟ range.
5.Move the shift lever to the Ⓟ range and release the shift lever button.
6.Set the IG switch to the "LOCK" position.
7.Confirm that the shift lever button can not be pushed-in whether the brake pedal is depressed or not and shifting can not be made to ranges other than the Ⓟ range.

11-1-2 CHECK OF KEY-INTERLOCKING MECHANISM

1.Set the IG switch to the "ACC" position.
2.Depress the brake pedal and move the shift lever to ranges other than the Ⓟ range.
3.Confirm that the IG switch can not be set to the "LOCK" position.
4.Move the shift lever to the Ⓟ range.
5.Confirm that the IG switch can be set to the "LOCK" position and the key can be pulled out.

11-2 BASIC CHECK AND ADJUSTMENT

11-2-1 AJUSTMENT OF SHIFT LOCK RELEASE CABLE AY MOUNTING POSITION(FLOOR SHIFT)



1.Loosen the nut and adjust the amount of the projection of the lock mechanism to 1.5±0.5mm when the brake pedal is not depressed. Then secure with the nut.
2.Ensure that play of the brake pedal is within the specified value.

Refer to Page E1-2.

SPECIFIED VALUE: 1.5±0.5mm (Amount of projection of the lock mechanism)
TIGHTENING TORQUE: 24.5±5.9N·m {250±59kgf·cm}

12 SHIFT LOCK RELEASE CABLE(FLOOR SHIFT)

12-1 REMOVAL AND INSTALLATION

12-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

12-1-2 OPERATION BEFORE REMOVAL

1.Remove the front console box S/A.
Refer to Page I2-31.

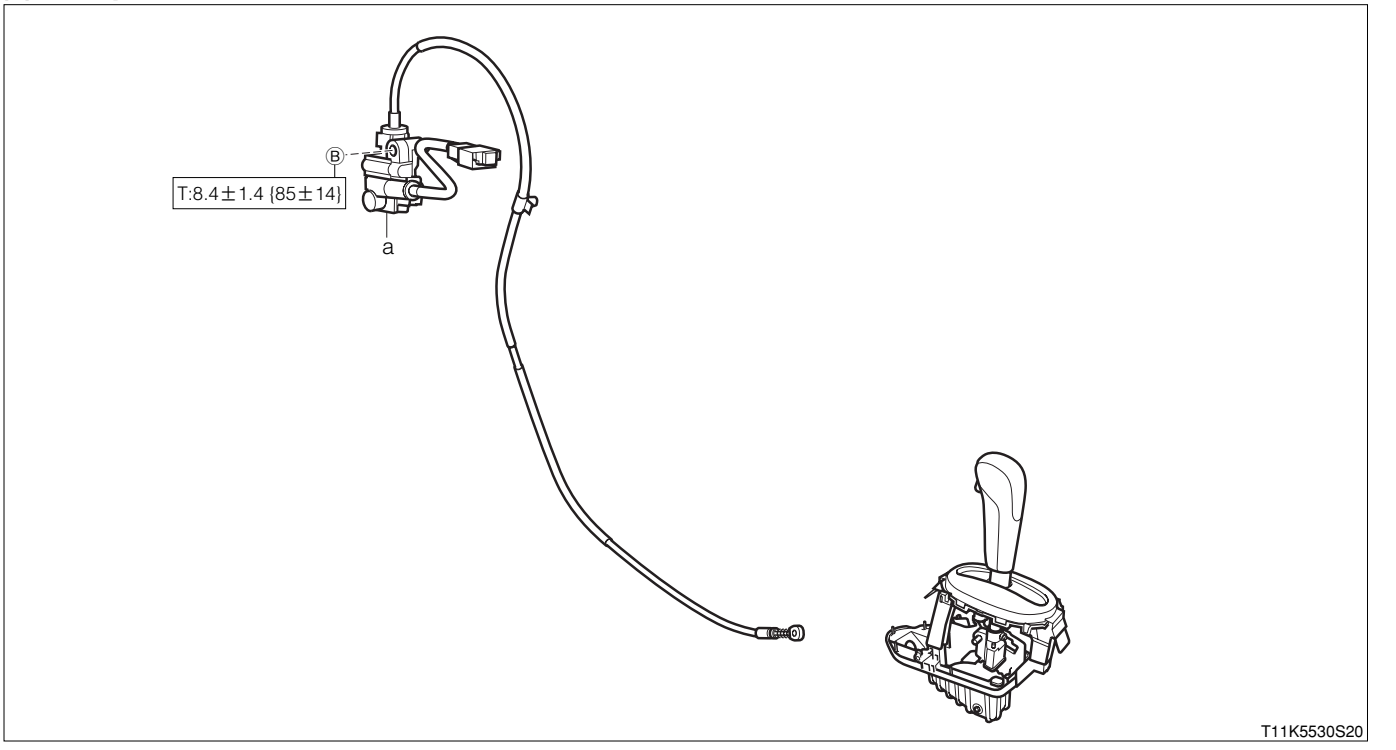
2.Remove the lower instrument panel finish panel S/A.
Refer to Page I2-23.

3.Remove the lower steering column cover.
Refer to Page G1-5.

4.Remove the front floor carpet Ay. (Driver's side only)
Refer to Page I2-57.

12-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



T11K5530S20

Unit:N·m{kgf·cm}

(2) Removal and installation procedures

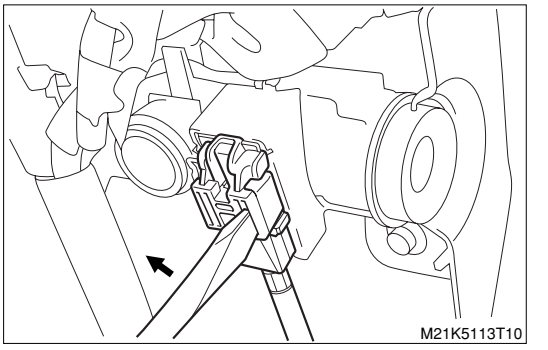
▼ ▲ 1 a Cable Ay, shift lock release

12-1-4 POINTS OF REMOVAL

(1) Cable Ay, shift lock release

1.Set the shift lever to the Ⓟ range.
2.Set the ignition key to the "ACC" position.

3.Remove the steering column bracket side of the cable Ay.
(1) Insert a flat screwdriver or the like into the hole of the cable Ay end portion and pry lightly in the direction shown by the arrow in the illustration, and remove the cable Ay.

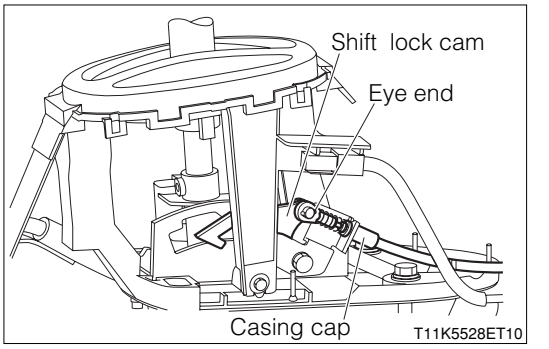


4.Remove the shift lever side of the cable Ay.
(1) Remove the eye end first, and then remove the casing cap.

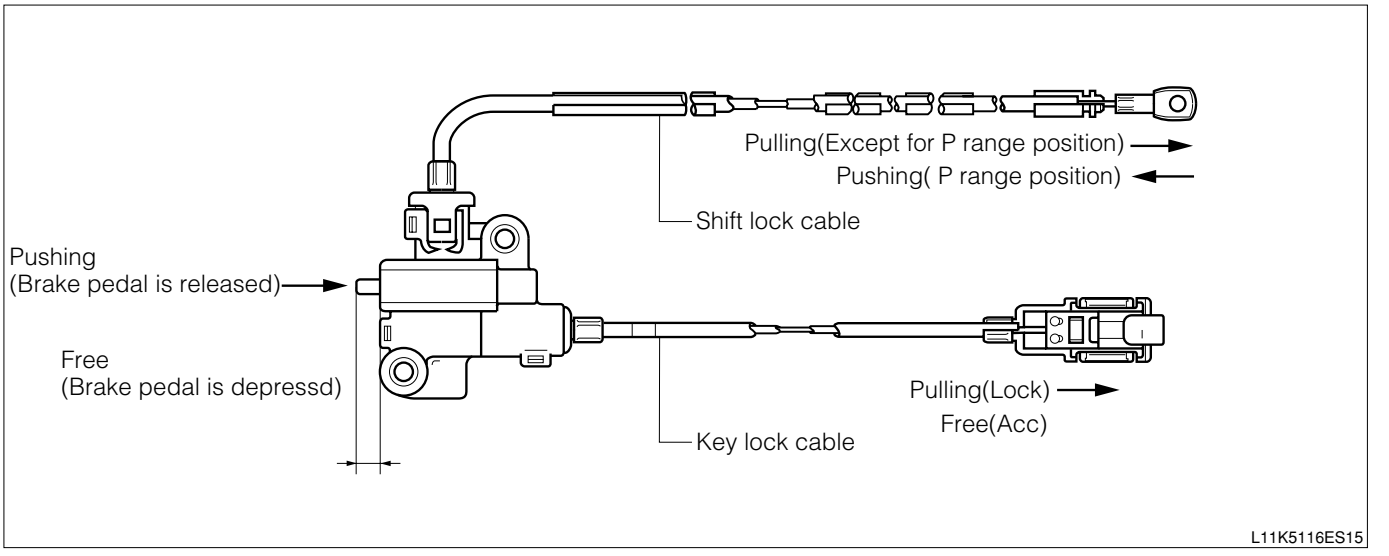
CAUTION
- If removed in the reverse order, excess force may be applied to the casing cap, resulting in damage.

5.Remove the cable assembly.

CAUTION
- Do not bend the cable more than is necessary.



12-1-5 INSPECTION



1.Check that there is no unnatural bending in each cable.
2.Ensure that the brake lock actuator moves smoothly, with strokes of about 8 mm.
3.Check that the key lock cable functions as specified in the operation table according to each state of the shift lock cable.

Key lock cable operation table

State of the shift lock cable	State of the key lock cable
Push	Able to pull.
Pull	Unable to pull.

4.Check that the shift lock cable functions as specified in the operation table according to each state of the key lock cable and brake lock actuator.

Shift lock cable operation table

Key lock cable State of the brake actuator		State of the shift lock cable
Key lock cable	Free	Able to push and pull.
Brake actuator	Free	
Key lock cable	Free	Able to push (only once). Unable to pull after locked.
Brake actuator	Push	
Key lock cable	Pull	Unable to pull.
Brake actuator	Free	
Key lock cable	Pull	Unable to pull.
Brake actuator	Push	

12-1-6 POINTS OF INSTALLATION

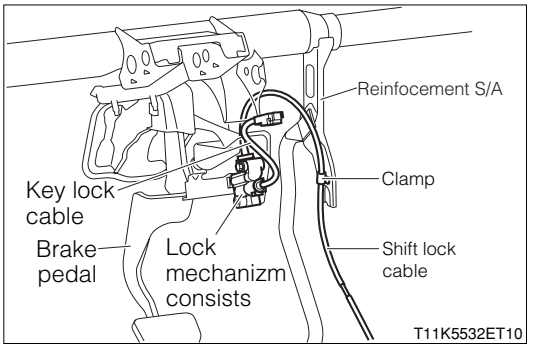
(1) Cable Ay, shift lock release

1.Install the cable assembly.

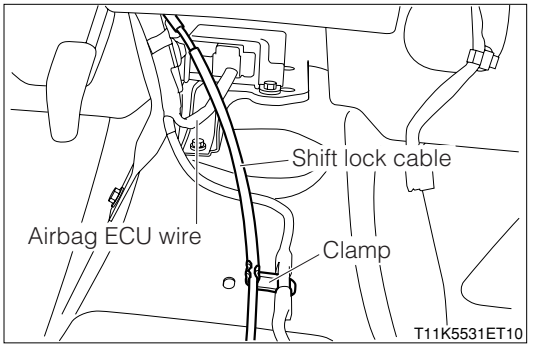
CAUTION

- Do not bend the cable more than is necessary.

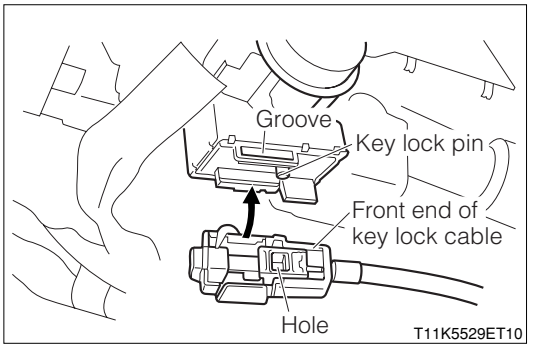
(1) Install the lock mechanism to the pedal bracket Ay.
(2) Securely insert the clamp of the shift lock cable into the square hole of the reinforcement S/A.



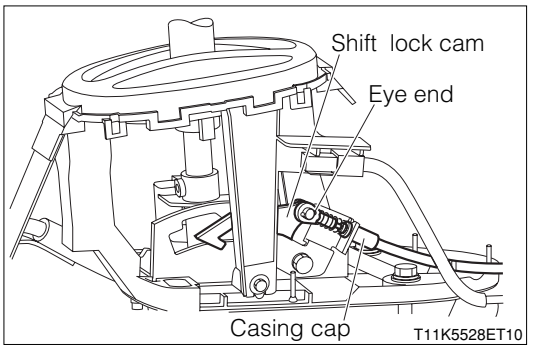
(3) Root the shift lock cable so that it may pass the vehicle right side of the airbag ECU harness.



2.Install the steering column bracket side of the cable Ay.
(1) Set the ignition key to the ACC position and position the key lock pin as shown in the illustration.
(2) Match the hole of the key lock cable end with the key lock pin, and securely insert into the slot of the steering column bracket.



3.Install the shift lever side of the cable Ay.
(1) Set the shift lever to the Ⓟ range.
(2) Install the eye end into the shift lock cam.
(3) Insert the casing cap into the notch of the bracket.



12-1-7 OPERATION AFTER INSTALLATION

1.Adjust the mounting position of the shift lock release cable Ay.
Refer to Page F3-36.

2.Check the shift lock operation and the key interlocking operation.
Refer to Page F3-36.

3.Install the front floor carpet Ay. (Driver's side only)
Refer to Page I2-57.

4.Install the lower steering column cover.
Refer to Page G1-5.

5.Install the lower instrument panel finish panel S/A.
Refer to Page I2-23.

6.Install the front console box S/A.
Refer to Page I2-31.

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■ AUTOMATIC TRANSAXLE (A4B)

1 TURBINE REVOLUTION SENSOR, OUTPUT REVOLUTION SENSOR

1-1 REMOVAL AND INSTALLATION

1-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

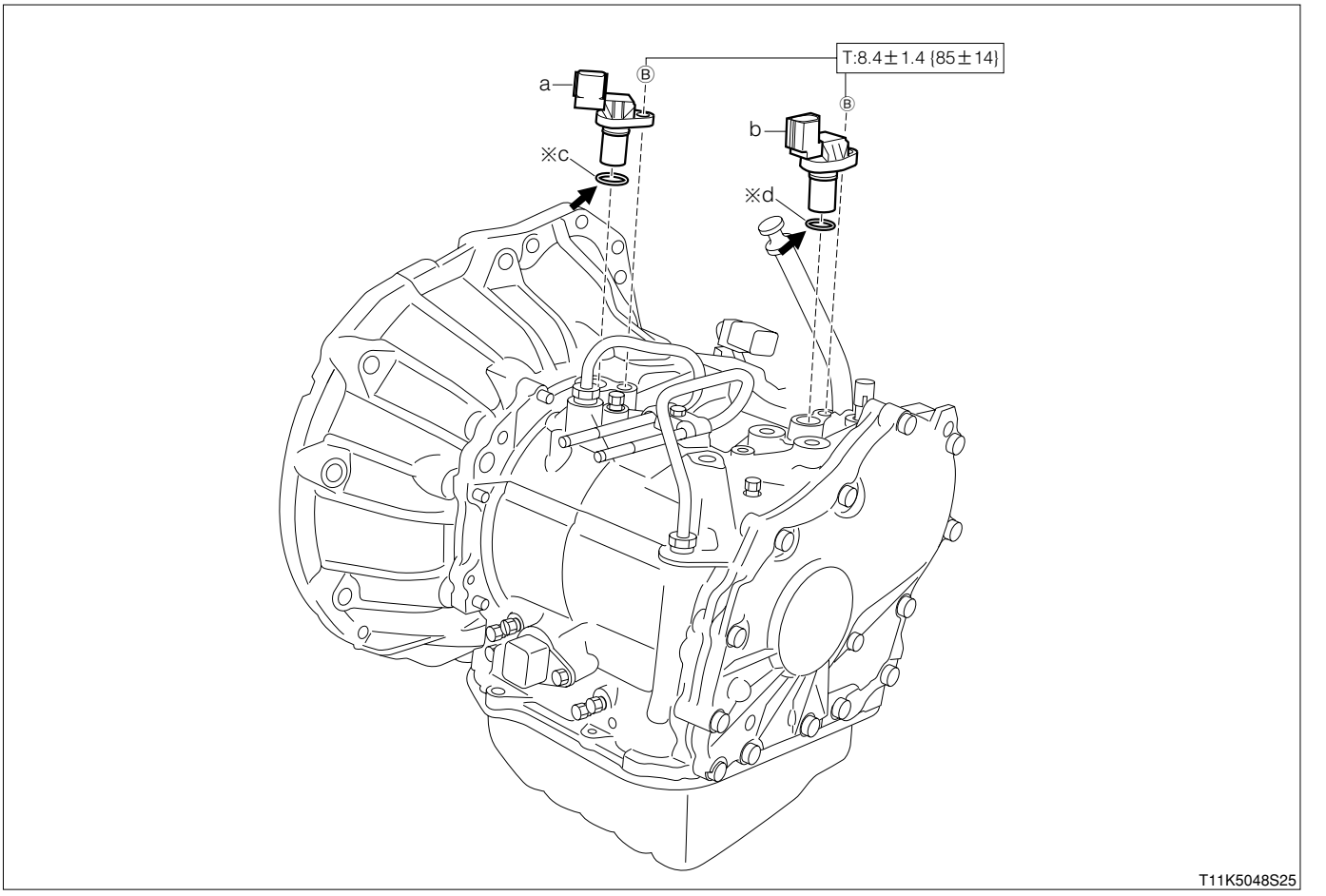
ATF Dexron®Ⅲ

1-1-2 OPERATION BEFORE REMOVAL

1.Remove the battery and battery carrier.

1-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



➡:ATF application
※:Non-reusable parts
Unit N·m{kgf·cm}

(2) Removal and installation procedures

1 a Sensor, T/M revolution (Turbine revolution sensor)
2 b Sensor, T/M revolution (Output revolution sensor)
3 c Ring, O
4 d Ring, O

1-1-4 OPERATION AFTER INSTALLATION

1.Install the battery and battery carrier.

2 TRANSMISSION CONTROL COMPUTER

2-1 REMOVAL AND INSTALLATION

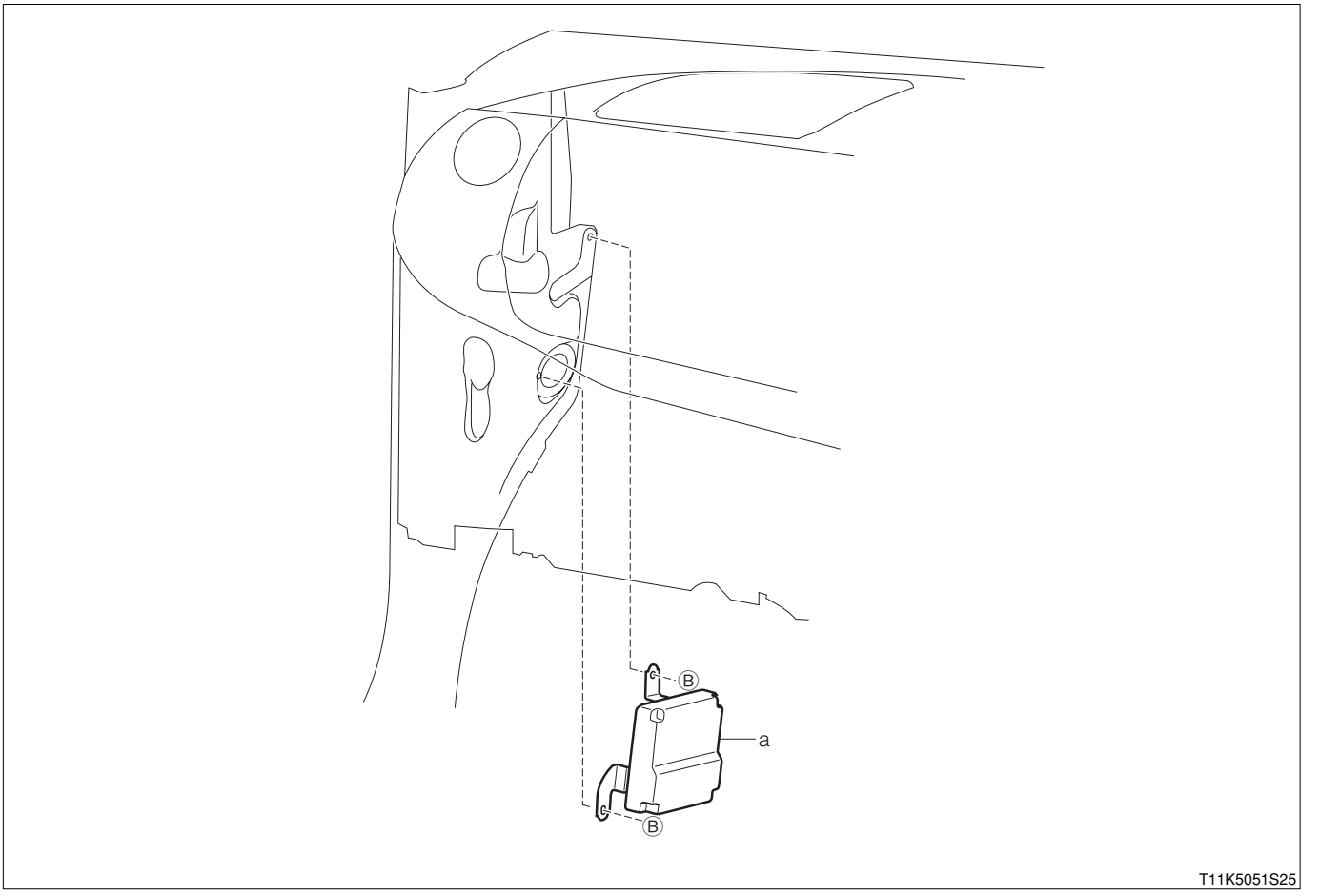
2-1-1 OPERATION BEFORE REMOVAL

1.Remove the lower instrument panel finish panel S/A and fuse box opening.
Refer to Page I2-23.

2.Remove the fuse block Ay.
Refer to Page I4-1.

2-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



T11K5051S25

(2) Removal and installation procedures

1 a Computer Ay, transmission control

2-1-3 OPERATION AFTER INSTALLATION

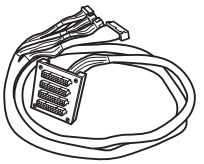
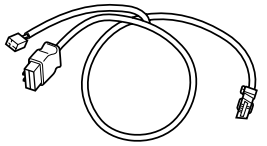
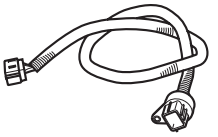
1.Install the fuse block Ay.
Refer to Page I4-1.

2.Install the lower instrument panel finish panel S/A and fuse box opening.
Refer to Page I2-23.

3 TRANSMISSION CONTROL SYSTEM

3-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09842-97215-000	Sub-harness,transmission control computer check
	09991-87404-000 (09991-87401-000)	Wire,engine control system inspection
	09991-87403-000	Wire,diagnosis check
	09990-97201-000	Sub-harness,A/T solenoid wire check

Instrument

Electrical Tester,Oscillo scope

3-2 HANDLING INSTRUCTIONS OF CONTROL SYSTEM

3-2-1 INSTRUCTIONS ON USE OF THIS SERVICE MANUAL

1.This service manual has been compiled in such a way that the manual may be used both in regions where the type certification is implemented based on the EU exhaust emission approval, and other regions.

2.Hence, with regard to the assignment, reading, erasing of diagnostic trouble codes and those steps of checks, repairs and confirmation, the service manual contains the procedures for both cases: One is a procedure that uses the diagnosis tester (DS-21/DS-Ⅱ) or the OBD Ⅱ generic scan tool, and the other is a procedure that does not use this tester or tool.
Therefore, the following instructions given below must be observed.

3.About Use of diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ Generic Scan Tool

(1) Regions where type certification is implemented based on EC exhaust emission approval: Make sure to use the diagnosis tester (DS-21/DS-Ⅱ) or the OBD Ⅱ generic scan tool.

(2) Other regions: You may use or not use the diagnosis tester (DS-21/DS-Ⅱ) or the OBD Ⅱ generic scan tool. You may perform the operation, employing whichever method that will be easier to you.

4.Instructions to be followed concerning Diagnosis Trouble Codes
Diagnosis trouble codes, such as P0105/31 (Four-digit code/two-digit code) are posted additionally.
(1) Regions where type certification is implemented based on EC exhaust emission approval
Make sure to use only four-digit trouble codes (E.G.P0105) whose have been assigned according to the ISO regulations.
(2) Other regions:
You may perform the operation using the four-digit code, employing the diagnosis tester (DS-21/DS-Ⅱ) or the OBD Ⅱ generic scan tool. Or you may perform the operation using the two-digit codes (E.G.31), without the use of the tester or tool. You may perform the operation, employing whichever method that will be easier to you.
Or you may perform the operation using the two-digit codes (E.G.31), without the use of the tester or tool.
You may perform the operation, employing whichever method that will be easier to you.

NOTE

- The OBD Ⅱ generic scan tool means a scan tool complying with the ISO 14230 (KWP2000) format.
- In cases where the OBD Ⅱ generic scan tool is employed, not all diagnostic trouble codes (Four-digit codes) can be read out. It should be noted that only those diagnostic trouble codes in which "zero" follows after "P", for example, P0XXX, can be read out.
- The accuracy of the two-digit codes in diagnosing malfunctioning components is slightly inferior to that of the four-digit codes.
- Hereinafter, those regions where the type certification is implemented based on the EU exhaust emission approval, is referred to as the "EU specifications".

3-2-2 PRECAUTIONARY MEASURES DURING TROUBLE-SHOOTING

1.Before the diagnosis information memorized in the A/T ECU memory is confirmed, never disconnect the connector from the A/TECU, the battery negative (-) terminal, the A/T ECU earth wire from the engine, or the main fuse.
2.The diagnosis information memorized in the A/T ECU memory can be erased by using the diagnosis tester (DS-21/DS-Ⅱ) or the OBD-II generic scan tool in the same way as the check. Therefore, before using the tester, read its instruction manual so as to understand the functions furnished and how to use it.
3.Priority in trouble-shooting
(1) If the priority in trouble-shooting for a number of diagnostic trouble codes is given in the concerned DTC flow chart, make sure to follow the priority.

3-3 HOW TO PROCEED WITH TROUBLE SHOOTING

3-3-1 GENERAL INFORMATION

1.The A/T control system of this vehicle are controlled by the A/T ECU. Furthermore, the vehicle is provided with the on-board diagnosis system.
Therefore, when any abnormality takes place in the input/output systems (Sensors, actuators, harnesses, connectors, etc.) of the engine control system, the A/T ECU memorizes the system concerned and informs the driver by making the malfunction indicator lamp (MIL) illuminate or flash.
2.Also the malfunction is informed to the operator by means of the malfunction indicator lamp (MIL). When trouble-shooting the engine, it is imperative for you to get the general idea of the onboard diagnostic system, and fully understand the precautionary measures in trouble-shooting, the items diagnostic system, and fully understand the precautionary measures in trouble-shooting, the items to be observed and how to use testers.
3.Then, conduct the trouble-shooting following the flow chart that indicates the correct procedure for the engine troubleshooting.

(1) On-board diagnostic system of vehicles for EU specifications

1.The vehicles for Europe have the following functions that comply with the 1999/102/EC (Generally called Euro-OBD) standards.

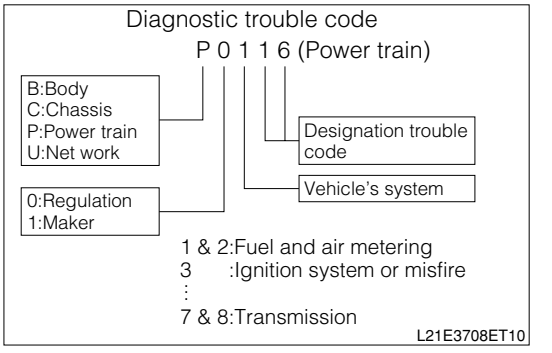
2.When the ignition switch is turned "ON", the malfunction indicator lamp (MIL) goes on. When no malfunction has been detected, the lamp will go out after the engine has started. (Check for a blown bulb)

3.While the engine is running, if the EFI ECU detects any malfunction in the emission control system/components that will affect the emissions from the vehicle, or in the power train control components, or if any malfunction is detected in the ECU itself, the A/T ECU illuminates or flashes the MIL (Only when misfire is detected which will damage the catalyst). Then, the A/T ECU memorizes the malfunction area. (DTC by ISO15031-6/SAEJ2012)

4. If that malfunction will not occur in three successive running, the MIL is automatically turned off. However, the DTC will be recorded in the A/T ECU memory.

5.It is possible to read out various data from the engine ECU by connecting the OBD Ⅱ generic scan tool which complies with the ISO 14230 format or diagnosis tester (DS-21/DS-Ⅱ) to the DLC of the vehicle. You can perform trouble-shooting efficiently by checking these data (DTC, freeze-frame data, current data, etc.).

6.The DTC is composed of the ISO standard code (Specified by ISO 15031-6) and the manufacturer's designation code. The ISO standard code should be set pursuant to the ISO. On the other hand, the manufacturer's designation code can be freely set forth by the manufacturer within a specified limit.



7.Many DTC have a two trip detection logic which assures avoidance of wrong detection and functions only when a malfunction is surely occurring. However, another diagnosis mode is provided, in which only a one-time final confirmation test is necessary for a service mechanic to confirm that the malfunction has been completely remedied after the repair.

8.When a malfunction is detected, the engine and running conditions at that moment are memorized as a freeze-frame data in the A/T ECU memory.

(2) On-board diagnostic system of vehicles for other regions

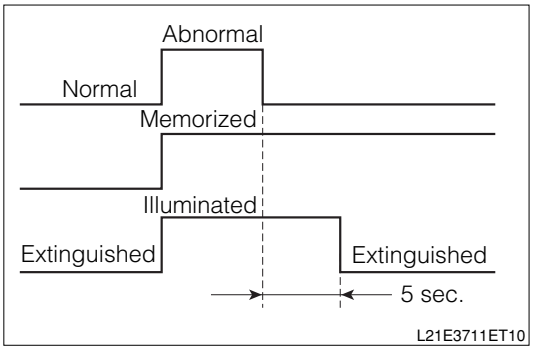
1.When the ignition switch is turned "ON", the MIL goes on. When no malfunction has been detected, the lamp will go out after the engine has started. (Check for a blown bulb)
While the engine is running, if the ECU detects any malfunction in the engine control system/components, or if any malfunction is detected in the A/T ECU itself, the A/T ECU illuminates the MIL.

2.In addition to the illumination of the MIL, the corresponding diagnostic trouble code (DTC) is memorized in the A/T ECU memory. When the malfunction has been remedied or the system returns to its normal state, the MIL automatically goes out. However, the DTC remains memorized in the A/T ECU memory.

3.It is possible to read out various data from the A/T ECU by connecting the diagnosis tester (DS-21/DS-Ⅱ) to the DLC of the vehicle. You can perform trouble-shooting accurately and efficiently by checking these data (DTC, freeze-frame data, current data, oxygen sensor monitor data, etc). Only when diagnosis tester (DS-21/DS-Ⅱ) is used.

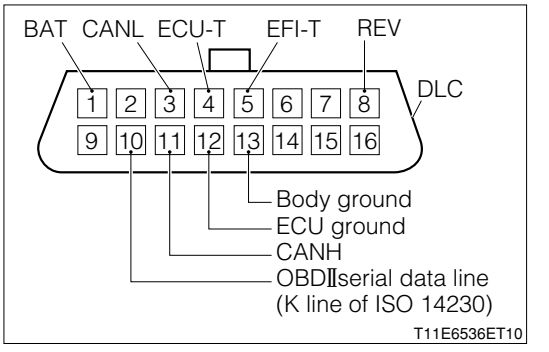
4.The DTC (Diagnostic trouble code) is set to a four-digit code in accordance with ISO standard. Furthermore, the conventional two-digit code is also provided. The four-digit code can be read out by the diagnosis tester (DS-21/DS-Ⅱ). The two-digit code has been set forth by the DMC itself. This code can be read by observing the flashing pattern of the MIL.

5.When a malfunction is detected, the engine and running conditions at that moment are memorized as a freeze-frame data in the A/T ECU memory.



3-3-2 DLC, COMMON DESTINATIONS

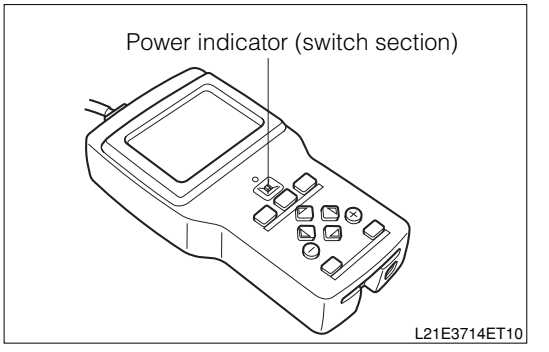
1.The vehicle A/T ECU uses the ISO14230 (Euro-OBD) protocol. As regards the position, connector shape and pin arrangement, the DLC is in accordance with the ISO 15031-3 (SAEJ1962) and has complied with the ISO14230 format. The OBD Ⅱ serial data line (K line of ISO14230) is used for the OBD Ⅱ generic scan tool or the diagnosis tester (DS-21/DS-Ⅱ) in order to communicate with the ECU.



NOTE

- With the cable of the diagnosis tester (DS-21/DS-Ⅱ) connected to the DLC through the SST, turn "ON" the ignition switch. If the power indicator of the tester will not go on, conduct the following checks and repair any malfunctioning parts.

SST: 09991-87404-000

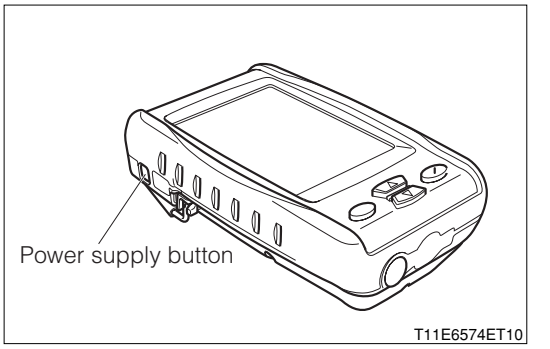


NOTE

- With the cable of the DS-Ⅱ diagnosis tester connected to the DLC, turn ON the IG switch. If the tester does not function, perform the following checks and repair the faulty parts.

(1) Connect the diagnosis tester (DS-21/DS-Ⅱ) to another vehicle.

(2) Turn "ON" the ignition switch.



3-3-3 TROUBLE-SHOOTING PROCEDURE

(1) Discription

1.The A/T control system is equipped with diagnosis functions whose are capable of diagnosing malfunctioning sections. These functions give important clues in trouble-shooting. The flow chart on the next page shows how to proceed with trouble-shooting by using these diagnosis functions.

The flow chart shows how the diagnostic trouble code check can be used effectively. Moreover, when its results are fully reviewed, you can determine whether you are going to do the trouble-shooting according to diagnostic trouble codes or the trouble-shooting according to malfunctioning phenomena.

The diagnosis of this system is equipped with a battery back-up function (A function which supplies power for diagnosis memory even if the ignition switch is turned "LOCK".)

NOTE

- When no diagnosis tester (DS-21/DS-Ⅱ) or OBD-II generic scan tool is used, the DTC or freeze-frame data in the flow chart can not be read out.

3-4 CONFIRMATION, RECORD AND ERASURE OF DIAGNOSIS CODE

3-4-1 CHECKING METHOD OF DIAGNOSIS

1.Prior to the check, check the malfunction indicator lamp (MIL), following the procedure given below.

2. Check of malfunction indicator lamp

(1) Ensure that the malfunction indicator lamp goes on when the ignition switch is turned "ON", but with the engine not running.

(2) Ensure that the malfunction indicator lamp goes out when the engine starts. If the lamp remains illuminated or is flashing, the diagnosis system is detecting a malfunction. Therefore, a DTC is memorized in the A/T ECU. If no DTC is memorized in the A/T ECU, perform the trouble-shooting for the malfunction indicator lamp circuit.

(1) Check of DTC, using DS-21 diagnosis tester:

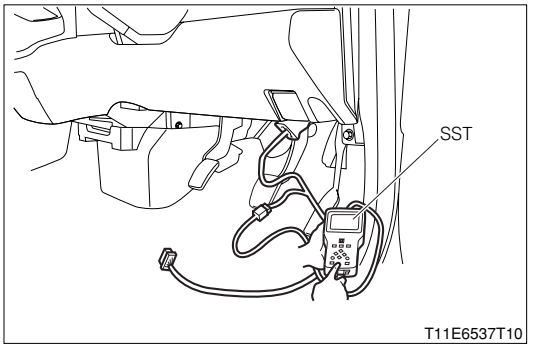
1.Prepare the DS-21 diagnosis tester.

2.Connect the DS-21 diagnosis tester to the DLC located at the lower section of the instrument panel on the driver's seat side. At this time, the DS-21 tester should be connected to the DLC with the following SST interposed.

SST: 09991-87404-000

NOTE

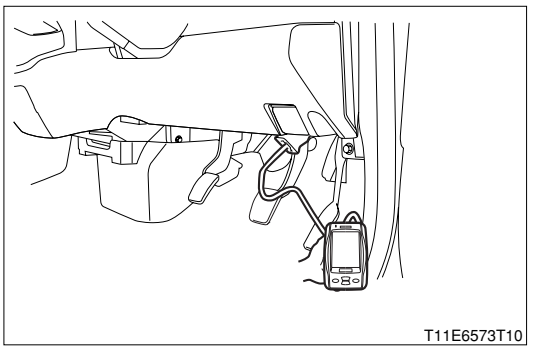
- When DS-21 diagnosis tester is used, refer the instruction manual for tester.



(2) Check of DTC, using DS-Ⅱ diagnosis tester or OBD Ⅱ generic scan tool

1.Prepare the DS-Ⅱ diagnosis tester or OBD Ⅱ generic scan tool.

2.Connect the DS-Ⅱ diagnosis tester or the OBD Ⅱ generic tester directly to the DLC located at the lower section of the instrument panel on the driver's seat side.



NOTE

- When DS-Ⅱ diagnosis tester or OBD-Ⅱ generic scan tool is used, refer the instruction manual for each tester.

3-4-2 CANCELING METHOD OF DIAGNOSIS

1.The DTC and freeze-frame data can be erased through the following methods.

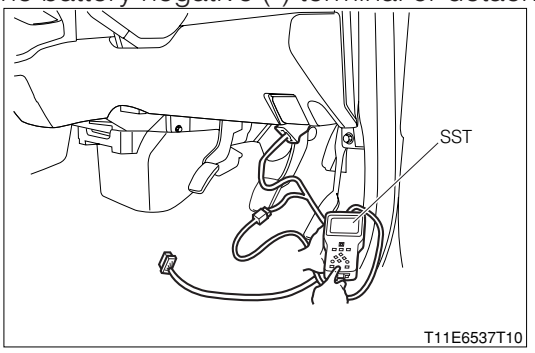
(1) The diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool is used to erase the DTC. (For the operating procedure, refer to the instruction manual.)

(2) The power supply to the A/T ECU is shut off to erase the DTC without using the diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool. (Disconnect the battery negative (-) terminal or detach the EFI fuse.)

(1) When DS-21 diagnosis is used:

1.In the same way as the check of DTC, connect the diagnosis tester (DS-21/DS-Ⅱ) to the DLC with the following SST interposed.

SST: 09991-87404-000

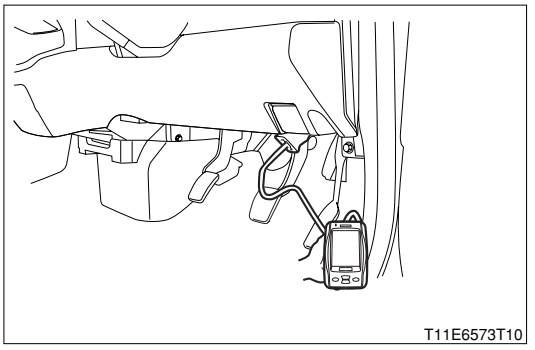


NOTE

- When DS-21 diagnosis tester is used, refer the instruction manual for tester.

(2) When DS-21 diagnosis tester or OBD Ⅱ generic scan tool is used:

1.In the same way as the check of DTC, connect the DS-Ⅱ diagnosis tester or the OBD Ⅱ generic scan tool directly to the DLC.



NOTE

- When DS-Ⅱ diagnosis tester or OBD Ⅱ generic scan tool is used, refer the instruction manual for each tester.

(3) When diagnosis tester (DS-21/DS-Ⅱ) or OBD Ⅱ generic scan tool is not used:

1.Erasure by disconnecting EFI fuse

To erase the diagnostic trouble codes (DTC) memorized in the ECU after malfunctions have been repaired, disconnect the ECU-B fuse from the relay block for at least 30 seconds with the ignition switch turned "LOCK". (When ambient temperature is about 20°C.)

NOTE

- It is possible to complete this erasing for approximately 60 seconds. In some cases, however, it may take longer. Furthermore, the erasing can be made by disconnecting the circuit, such as the battery power supply and fusible link. In cases where the battery negative (-) terminal is to be disconnected, record the radio channels in advance. After completion of the operation, set the radio channels the same as before.

3-5 SYMPTOM CONFIRMATION

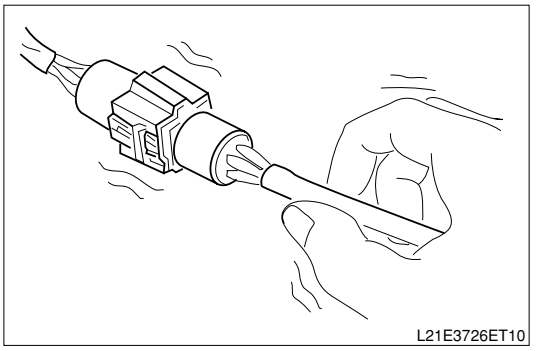
3-5-1 CONFIRMATION OF REPRODUCTION OF MALFUNCTIONING PHENOMENA

1. In the course of trouble-shooting, the operator can not pinpoint the cause for the malfunction unless he confirms the phenomenon. For this purpose, it is indispensable to reproduce the malfunctioning phenomenon by creating conditions and environments that are similar to those customer.
2. As for phenomena whose can not be reproduced easily, it is necessary to produce running conditions that are similar to those when the malfunction occurred (Road surface condition, weather condition, driving condition). For this end, it is of great importance to try to reproduce the conditions that are similar to those when the malfunction occurred (Road surface condition, weather relays by hand), heat (applying hot air) and water (Applying moisture).
3. Vibration, heat or moisture can constitute causes for malfunction that are difficult to reproduce.
4. Therefore, with the vehicle in a stationary state, you can perform the following malfunction reproduction simulation tests given below.
   Moreover, if you presume a section (Part) which can cause a malfunction and connect a tester, etc. to that section so as to confirm the malfunctioning phenomenon, you can also achieve a function to that section so as to confirm the malfunctioning phenomenon, you can also achieve a function evaluation of that section (Part).

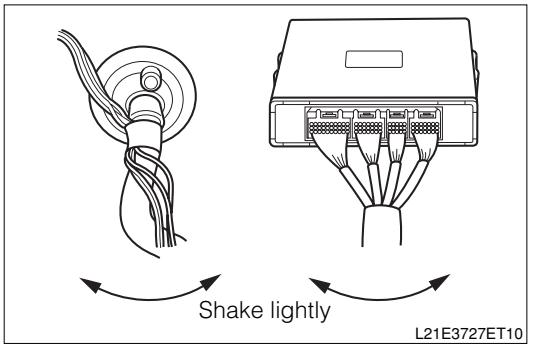
(1) Malfunction reproduction simulation test methods

① Vibration method:

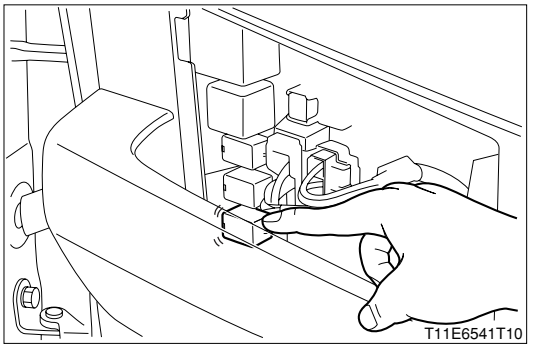
1. When vibration is thought to be the main cause
   (1) Connector
   Lightly shake the connector vertically and laterally.



(2) Wire harness
Lightly shake the wire harness vertically and laterally. The points to be checked are connector joints, the vibrating point and the section where the wire harness is passing through the body.



(3) Parts, sensors
With your finger, apply light vibrations to a part of the sensor which is presumed to be the cause for the malfunction. Check to see if the malfunction is reproduced.



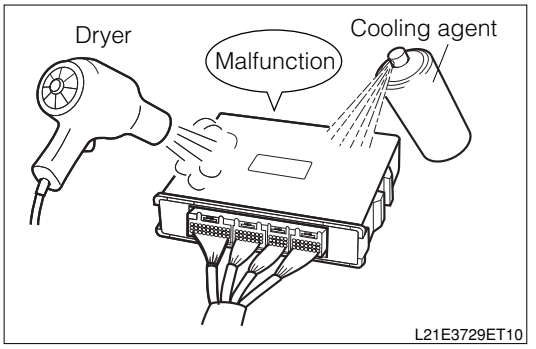
NOTE

- Be careful not to apply too strong vibration to a relay, for it can cause an open wire in the relay.

② **Cool/hot method:**

1.When a suspected section is likely causing the malfunction when it is cold or hot.

(1) Heat a component which is presumed to be causing the malfunction by using a dryer or the like. Check to see if the malfunction occurs.



CAUTION

- Do not heat the section beyond 60°C. (Temperature limit to assure that no damage be made to the component.)
- Do not directly heat the parts inside the ECU.

③ **Water applying method:**

1.When the malfunction is believed to occur on rainy days or under humid conditions. Apply water to the vehicle. Check to see if the malfunction occurs.

NOTE

- Never apply water directly to the engine compartment. By applying water to the front of the radiator, you can indirectly change the temperature and humidity.
- Never apply water directly to the electronic parts.
- If rain leaks into the vehicle compartment, rain may get into the inside of the ECU through the wire harnesses. If the vehicle has experienced any rain leakage before, utmost attention must be paid in respect to this point.

3-5-2 RECHECK AND MAKING RECORD OF DTC/FREEZE-FRAME DATA

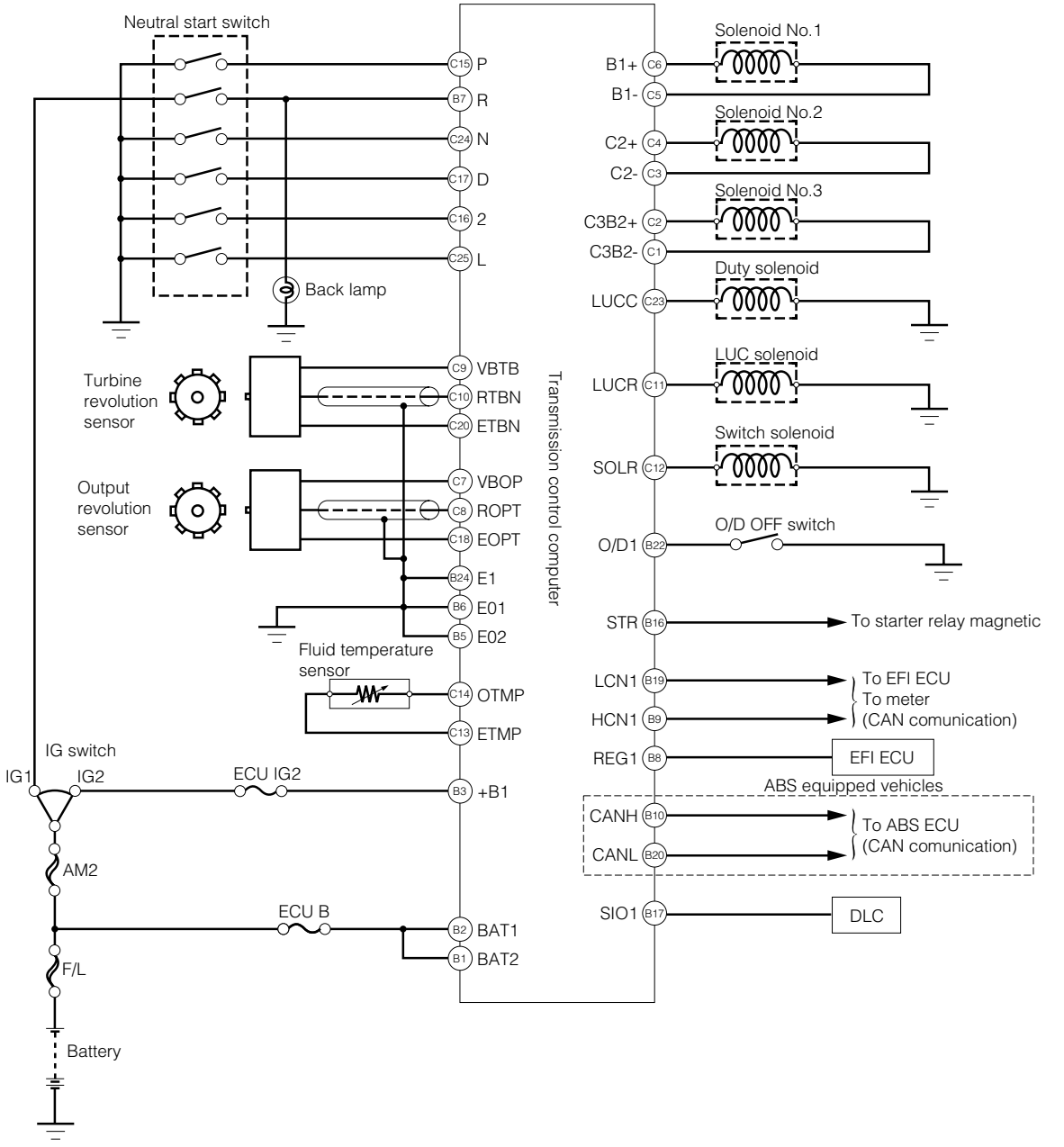
1.By checking the DTC/freeze-frame data after confirming the reproduction of the malfunctioning phenomenon, it is possible to judge whether the system related to the DTC that was indicated before confirmation of the reproduction is now functioning properly or not. Then, you are to proceed to one of the following three steps.

(1) When a DTC was indicated at the time of checking the DTC and the same DTC is indicated after the confirmation of reproduction of the malfunction, it indicates that the malfunction is still persisting in the diagnosis circuit. Proceed to the trouble-shooting according codes.

(2) When no abnormal code is indicated, although the occurrence of malfunction was observed during the confirmation of reproduction of malfunction, a malfunction other than those related to the diagnosis system is likely taking place. Proceed to the trouble-shooting according to malfunctioning phenomena.

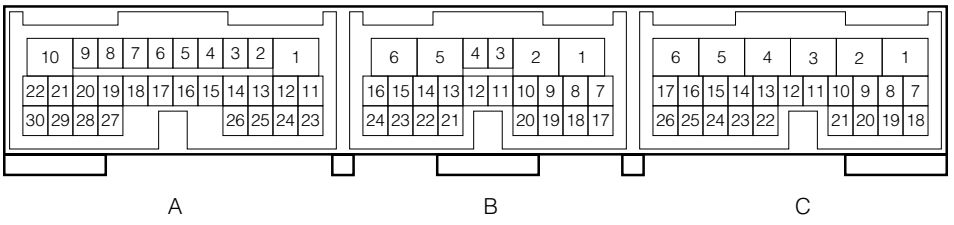
(3) When no malfunction is observed during the confirmation of reproduction of malfunction, and the normal code is indicated at the check of the DTC, it is presumed that an abnormality, such as poor contacts at the harnesses and connectors, occurred in the past, but now they are functioning properly. Check the harnesses and connectors of those systems related to the DTC that was indicated before the confirmation of reproduction of the malfunctioning phenomenon.

3-6 SYSTEM WIRING DIAGRAM



T11K5524ES44

Transmission control computer terminal name



T11K5006S10

1.Connectors A

This connector is not used.

2.Connectors B

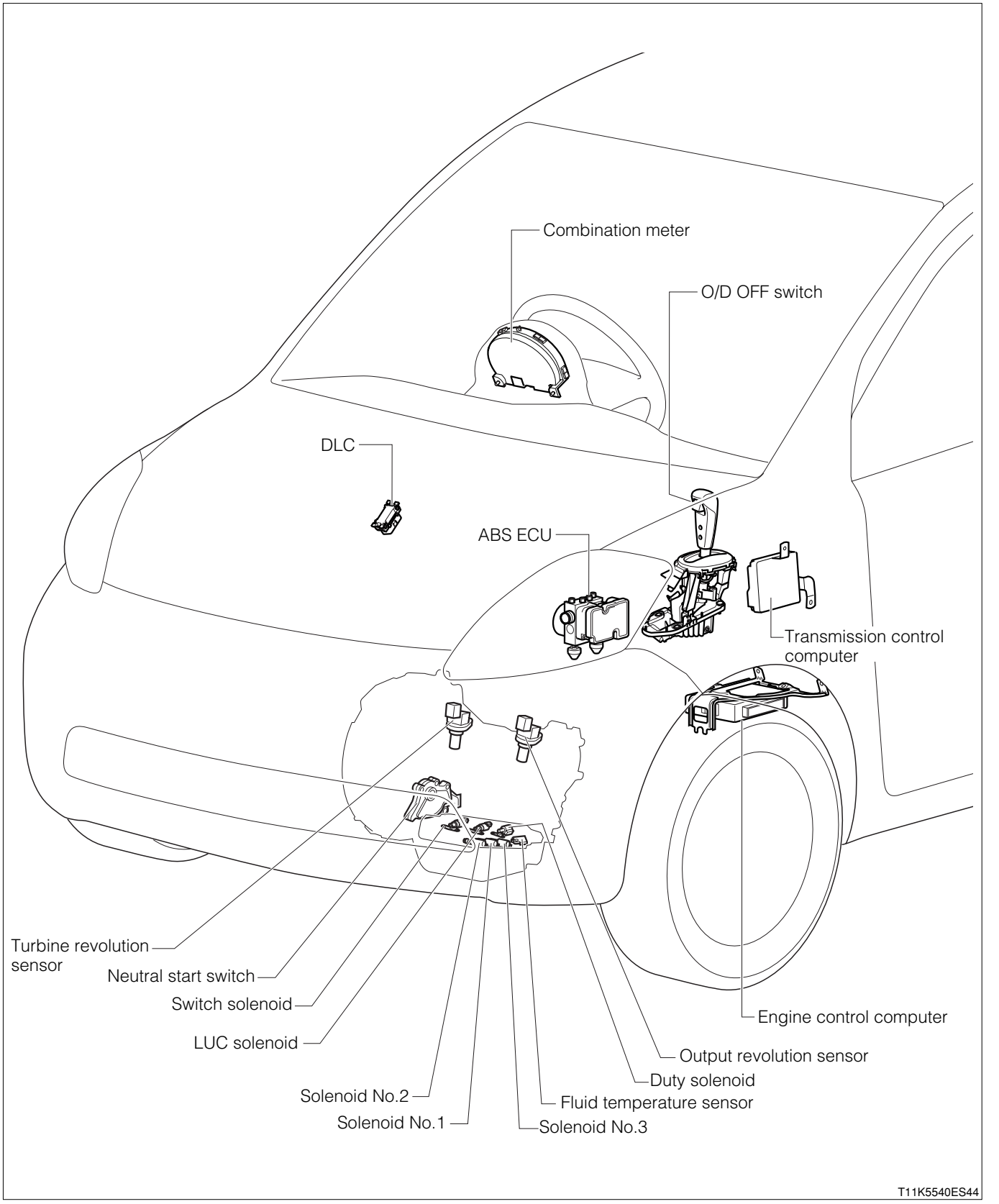
Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
1	BAT2	Backup power supply	13	—	—
2	BAT1	Backup power supply	14	—	—
3	+B1	ECU power supply	15	—	—
4	—	—	16	STR	Starter relay output circuit
5	E02	A/T power system ground	17	SIO1	Diagnostic tester communication
6	E01	A/T power system ground	18	—	—
7	R	Neutral start switch (R)	19	LCN1	CAN communication LO (1)
8	REG1	Engine revolution speed	20	CANL	CAN communication LO (2)
9	HCN1	CAN communication HI (1)	21	—	—
10	CANH	CAN communication HI (2)	22	O/D1	O/D OFF switch
11	—	—	23	—	—
12	—	—	24	E1	Sensor ground

3.Connectors C

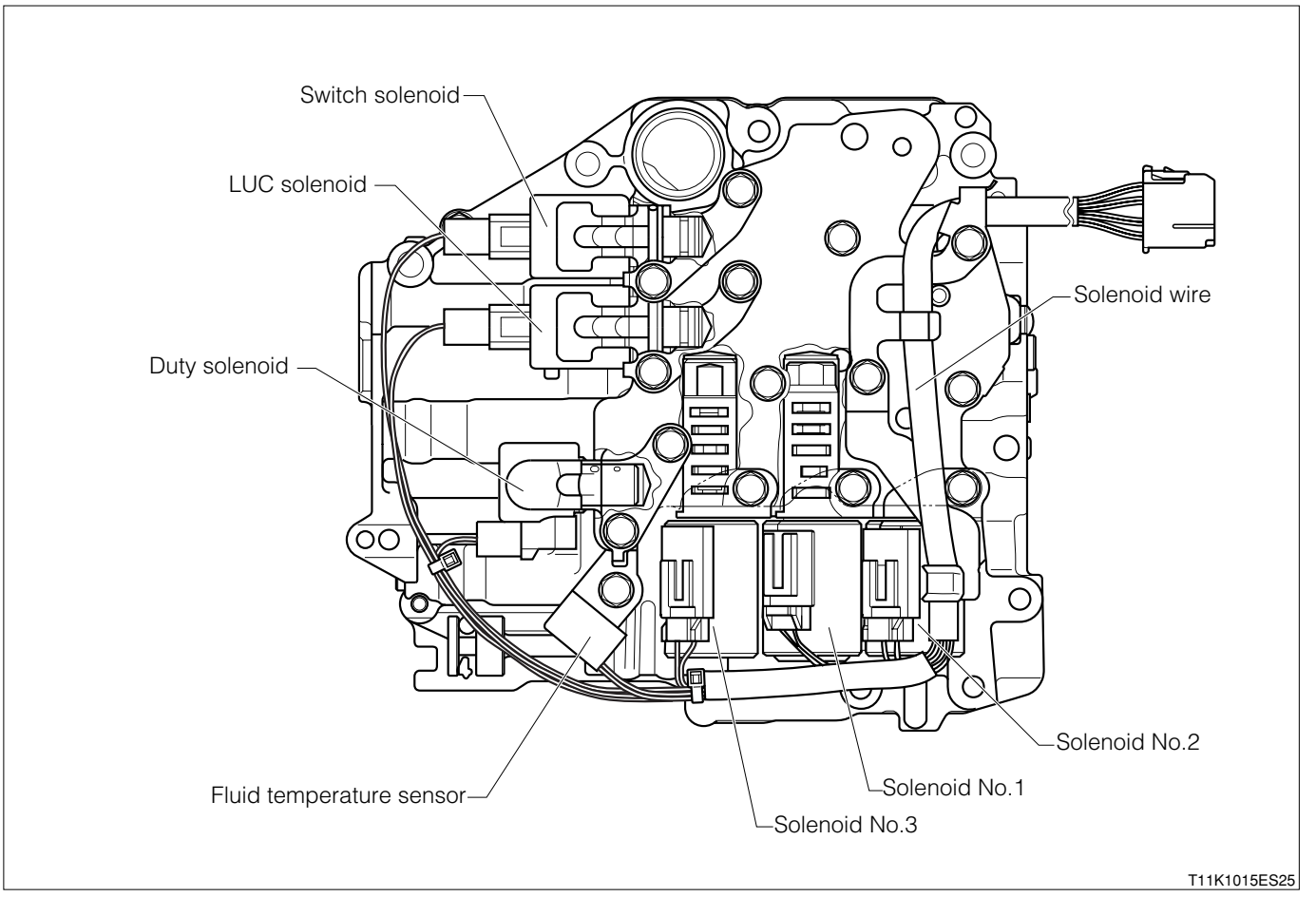
Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
1	C3B2 —	Solenoid No.3 (—)	14	OTMP	Fluid temperature sensor
2	C3B2 +	Solenoid No.3 (+)	15	P	Neutral start switch (P)
3	C2—	Solenoid No.2 (—)	16	2	Neutral start switch (2)
4	C2+	Solenoid No.2 (+)	17	D	Neutral start switch (D)
5	B1—	Solenoid No.1 (—)	18	EOPT	Output revolution sensor ground
6	B1+	Solenoid No.1 (+)	19	—	—
7	VBOP	Output revolution sensor power supply	20	ETBN	Turbine revolution sensor ground
8	ROPT	Output revolution sensor	21	—	—
9	VBTB	Turbine revolution sensor power supply	22	—	—
10	RTBN	Turbine revolution sensor	23	LUCC	Duty solenoid
11	LUCR	LUC solenoid	24	N	Neutral start switch (N)
12	SOLR	Switch solenoid	25	L	Neutral start switch (L)
13	ETMP	Fluid temperature sensor ground	26	—	—

3-7 LOCATION OF COMPONENTS

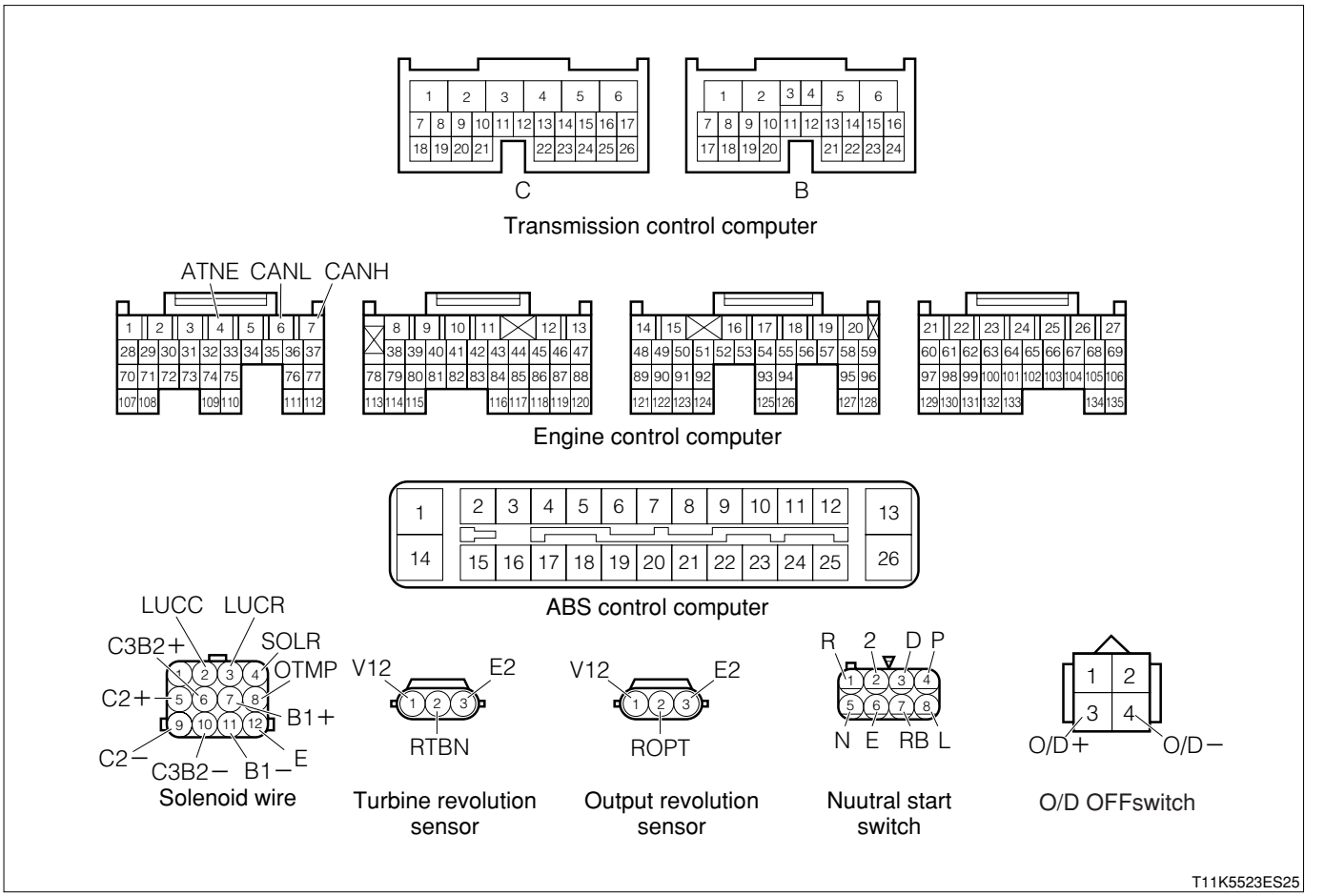
3-7-1 WHOLE VEHICLE



3-7-2 VALVE BODY SECTION



3-8 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS



For the terminal names of transmission control computer vehicle harness side connectors, refer to the system wiring diagram.

3-9 ERASING OF LEARNING VALUE AND INITIAL LEARNING

When the automatic transaxle Ay, valve body Ay (Including the solenoid valve) have been replaced, it is necessary to erase the transmission control computer learning values and to perform the initial learning, following the procedure given below.

1. Short the ECU-T terminal and E terminal inside the DLC.
   Refer to Page F5-22.
2. Within three seconds after turning ON the IG SW(Not starting the engine), depress the brake pedal and keep depressing it. (Until the following operations 3 and 4 are completed).
3. Move the shift lever P→R→P within one second. (The time required for P→R→P is within one second.)
4. Repeat the operation of Item 3 above eight times. (The O/D OFF lamp quickly flashes for 2.5 seconds as a signal telling the completion of erasing operation.)
5. Release the short-circuit of the ECU-T terminal and E terminal inside the DLC.
6. Turn "LOCK" the IG SW and turn it "ON" again.
7. Fully warm up the engine and transmission.

NOTE

- The initial learning starts when the transmission oil temperature rises above 50°C.

8. Perform the initial learning (Urban running of about 15 minutes) (Go through the driving at various gears and kickdowns.)

3-10 HOW TO PROCEED WITH TROUBLE SHOOTING

This system is equipped with a diagnosis function that diagnoses the defective sections and this provides important clues in performing trouble shooting.

Σ>1. Bringing of malfunctioning vehicle in garage

▼Go to step Σ>2.

Σ>2. INQUIRY WITH CUSTOMER

1.Thoroughly obtain information from the customer concerning the conditions, environment and phenomena in which the malfunction took place.

▼Go to step Σ>3.

Σ>3. Confirm the normal indication of the diagnosis code of LCD inside the meter

1.Using the SST, short-circuit between the DLC4 (ECU-T) and the 13(E).
SST: 09991-87403-000

2.Confirm that the LCD inside the meter indicates the diagnosis codes (Including the normal code).
SPECIFIED VALUE: Indicates.

NOTE

- Codes other than the CAN-related codes are permissible.

▼If it is OK, go to step Σ>4.

▼If NG, conduct the following checks given below concerning the meter. If no problems are found, replace the meter.

(1) Check the harnesses between the meter and the DLC as well as between the DLC and the body ground.
(2) Check the power supply system and ground system of the combination meter.
(3) Check the power supply system and ground system of the meter.

Σ>4. Confirm the diagnosis code of LCD inside the meter (CAN-related).

1.Confirm that the LCD inside the meter will not indicate the CAN-related diagnosis codes (Codes 0051 through 0053).
SPECIFIED VALUE: Will not indicate codes 0051 through 0053.

▼If it is OK, go to step Σ>5.

▼If NG, refer to the item of the CAN communication system.
Refer to Page L2-1.

Σ>5. Confirmation and recording of diagnosis code

1.Using the SST, short-circuit between the DLC4 (ECU-T) and the 13(E).
SST: 09991-87403-000

▼Go to step Σ>6.

Σ>6. Erasing of diagnosis codes

1.Erase the diagnosis codes.

NOTE

- Before erasing the codes, record the codes that are being outputted.

▼Go to step Σ>7.

∑7.Reproduction and confirmation of malfunction phenomenon

1.Confirm the malfunctioning phenomenon and reproduce the malfunctioning situation.
SPECIFIED VALUE: The malfunctioning phenomenon has been reproduced.

▼If it is OK, go to step ∑8.
▼If NG, presume the cause of malfunction, based on the diagnosis by interview to the customer or the trouble-shooting according to malfunctioning phenomena.

∑8. Reconfirmation of diagnosis code

1.Reconfirm the diagnosis codes.
SPECIFIED VALUE: The abnormality code is outputted again.

▼If it is OK, go to step ∑9.
▼If it is OK, go to step ∑10.

∑9. Trouble-shooting according to diagnosis code

1.Perform the check concerning the diagnosis codes that are currently outputted.
Refer to Page F5-29.

▼After completion of the check, proceed to ∑11.

∑10. Trouble-shooting according to malfunction phenomenon.

1.Perform the check for the malfunctioning phenomena.
Refer to Page F5-50.

▼After completion of the check, proceed to ∑11.

∑11. Confirmation test

1.Checks whether the problem that the customer described has been corrected and the operation is back to normal.
▼If OK, finish the trouble shooting.
▼If NG, return to the ∑3 and redo the check.

3-11 INQUIRY

In an effort to remove causes for malfunction from the vehicle concerned, it is impossible to determine the cause without confirming the malfunction phenomenon. If the phenomenon is not confirmed, the vehicle may not be able to return to the normal conditions even if you continue your work. The diagnosis through interview is to collect information from the customer before confirming the malfunction phenomena. The diagnosis through interview provides very important clues in reproducing malfunction phenomena.

Since the information obtained by the diagnosis through interview is referred to during the trouble shooting, it is imperative to make an inquiry of the customer, centering on the items related to the malfunction, instead of simply asking general questions.

Please make use of the information on the next page, as it provides an example of the diagnosis by interview.

3-11-1 DIAGNOSIS BY INTERVIEW SHEET FOR AUTOMATIC TRANSMISSION SYSTEM

Checked by		Check date	Day Month (Day of week)

Customer information

Name of customer	Mr./Ms.	Gender of customer (Male, female)		Age [Approx.]	Occupation [ ]
		Area where vehicle is mainly used	Urban, suburb, seashore, mountain, others	Parking place	Outdoor, indoor

Details of vehicle

Date when vehicle was brought to workshop	Day Month (Day of week)	Date when malfunction took place	Day Month (Day of week)	Repair history	No, Yes (How many times?)
Frame No.		Registration date	Day Month Year	Vehicle model	
Engine type		Transmission	Electronically controlled 4A/T	Driving	2WD·4WD
Running distance	km	Equipment	Tire [ ]· Wheel [Steel · Aluminum]		

Contents of diagnosis by interview

Symptom		Specific contents
Engine Poor starting	☐Starter does not turn.⇨ ☐Starter turns.⇨	☐Ⓟ range ☐Ⓝ range ☐Ⓡ range ☐Ⓓ range ☐Ⓓ4 range ☐3 range ☐2 range ☐Ⓛ range
Unable to run	☐Does not run forward⇨ ☐Does not run backward⇨ ☐At time of Ⓝ→Ⓓ(Ⓓ4)·Ⓡ, engine stalls⇨	☐Ⓓ range ☐Ⓓ4 range ☐3 range ☐2 range ☐Ⓛ range ☐Ⓡ range ☐Ⓝ → Ⓓ(Ⓓ4) range ☐Ⓝ → Ⓡ range
Abnormal running	☐Clutch slips.⇨ At ☐Ⓟ·Ⓝ range, vehicle moves.⇨	☐1st gear ☐2nd gear ☐3rd gear ☐ 4th gear ☐ Reverse ☐Ⓟ range ☐Ⓝrange
Improper gear shifting	☐No gear shifting⇨ ☐Shift points deviated⇨	☐1st gear fixed ☐3rd gear fixed ☐1st ⇄3rd gear shifting only takes place. ☐1st→2nd gear ☐2nd→3rd gear ☐3rd→4th gear ☐Starts off at 2nd gear ☐Jumps from 1st→3rd gear
Gear shift shock Time lag	☐Large gear shifting shock ☐Long time lag at time of ⇨ gear shifting ☐Engine races during gear shifting.⇨	☐Ⓝ→Ⓓ(Ⓓ4) ☐Ⓝ→Ⓡ ☐1st→2nd gear ☐2nd→1st gear☐2nd→3rd gear ☐3rd→2nd gear ☐3rd→4th gear ☐4th →3rd gear ☐2nd→3rd gear ☐3rd→4th gear
Others		
Since when malfunction started?	☐Since new vehicle ☐Recently(Since about year month)	
Frequency of malfunction	☐Always ☐Under certain condition( ) ☐Sometimes( )	
Weather conditions	☐At all times	
Weather	☐Fine ☐Cloudy ☐Rainy ☐Snow ☐Other( )	
Temperature	Temperature(Approx.) (☐Spring·☐Summer·☐Fall·☐Winter)	
Road	☐Urban area ☐Suburb ☐Highway ☐Dry road ☐Wet road ☐Snowy road ☐Frozen road Hill (☐Uphill ☐Downhill)	
Driving conditions	☐Has nothing to do with malfunction ☐During running ☐During starting Vehicle speed km/h ☐During racing Engine revolution rpm During curving(☐Right curve ☐Left curve) Engine ☐During cold ☐During hot	
Other conditions		

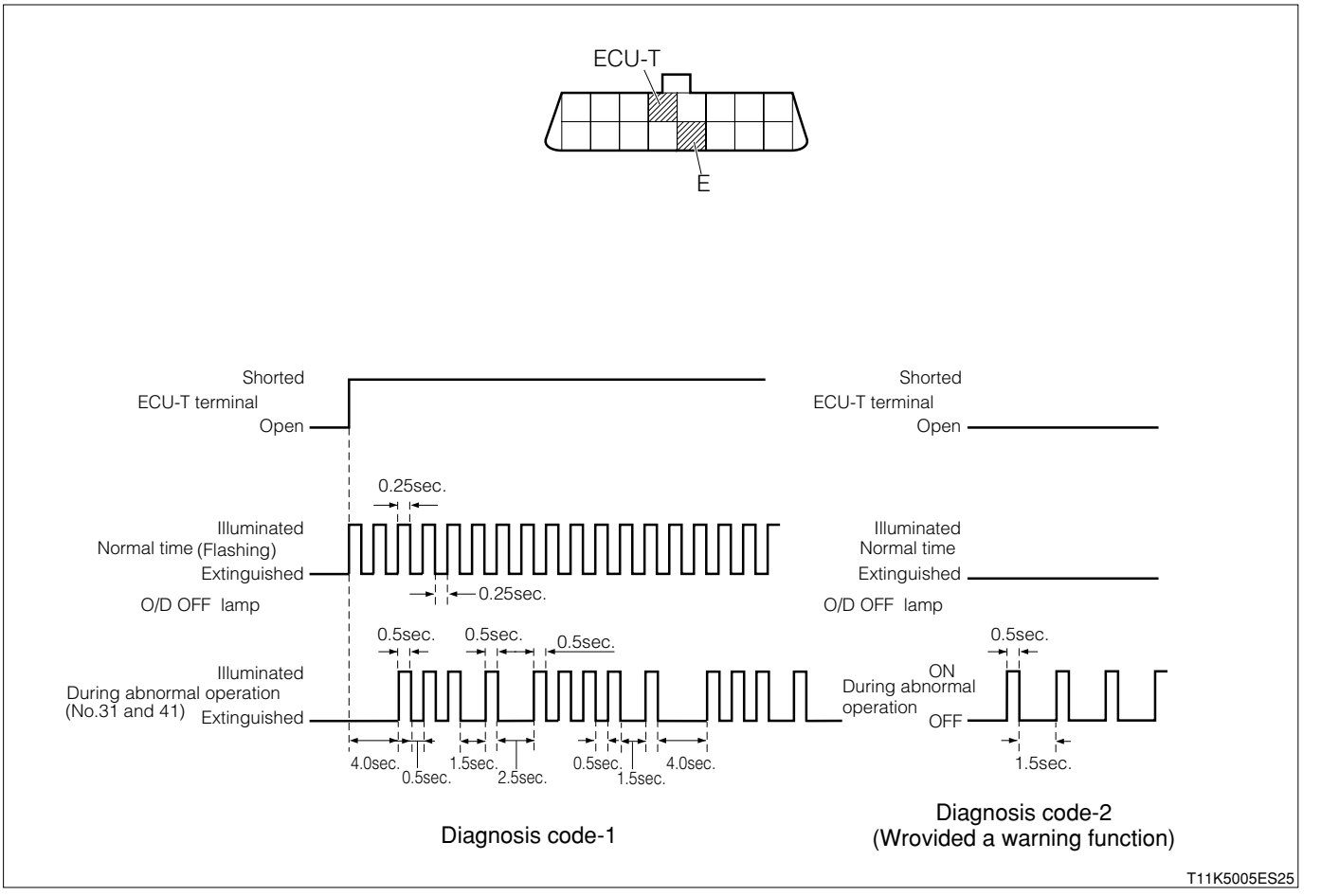
Warning lamp conditions	☐ Illuminated at all times ☐ Illuminated sometimes ☐ Not illuminated	
Diagnosis indication (Terminal T short circuited)	During checking	☐ Normal ☐ Abnormality code [ ]
	2nd time	☐ Normal ☐ Abnormality code [ ]
	th time	☐ Normal ☐ Abnormality code [ ]

When the diagnosis code is indicated, confirm whether the malfunction took place sometimes in the system or is still persisting. Also it is necessary to check any relation between the code and the reproduced malfunction. For this purpose, the diagnosis code should be indicated twice, namely before and after the confirmation of the phenomena.

3-11-2 CHECKING METHOD OF DIAGNOSIS

1. With the vehicle in a stationary state, short-circuit the ECU-T terminal and the E terminal inside the DLC, using the SST.
   SST: 09991-87404-000
   09991-87403-000

2. Turn "ON" the IG SW and read out the number of flashing of the O/D OFF lamp.



CAUTION

- If the short-circuiting is made for wrong connectors, it may cause malfunction. Be very careful not to select wrong terminals
- When the check terminals are short-circuited, the warning lamps for systems other than the electronic controlled A/T system may flash. However, this does not mean that the systems are malfunctioning.

3-11-3 CANCELING METHOD OF DIAGNOSIS

1.With the IG SW turned "LOCK", detach the ECU-B fuse located in the relay box inside the engine compartment at lease 30 seconds. (Normal temperature)

CAUTION

- When other backup circuit and ground circuit are disconnected, the diagnosis is cancelled Example: Battery power supply, fusible link.
- There are cases where the time required for erasing the diagnosis becomes longer during cold time.

3-11-4 CONTENTS OF DIAGNOSIS

Codes specified by ISO/SAE

DTC No.	Diagnosis contents	Malfunction evaluation method	Warning indication (Provided:○, Not provided:×)	Code memory (Provided:○, Not provided:×)	MIL (Malfunction indicator lamp)
P0705/56	Neutral start switch multiple-input	–	○	○	–
P0710/38	Oil temperature sensor circuit open wire or short-circuit	1 trip	○	○	○
P0711/38	Abnormal oil temperature sensor characteristics	2 trip	○	○	○
P0715/37	No turbine revolution input	2 trip	○	○	○
P0720/42	No output revolution input	2 trip	○	○	○
P0725/86	No engine revolution input	2 trip	○	○	○
P0753/61	Solenoid No.1 circuit open wire and short-circuit	1 trip	○	○	○
P0758/62	Solenoid No.2 circuit open wire and short-circuit	1 trip	○	○	○
P0763/63	Solenoid No.3 circuit open wire and short-circuit	1 trip	○	○	○
P0768/64	Duty solenoid circuit open wire and short-circuit	1 trip	○	○	○
P0773/65	LUC solenoid circuit open wire and short-circuit	1 trip	○	○	○

NOTE

- 1 trip: 1 trip detection logic
- 2 trip: 2 trip detection logic
- MIL: Malfunction indicator lamp
  When the "O" mark is shown in the MIL column, the lamp will go on for that DTC number, but when the "—" mark is shown, the lamp will not go on for that DTC No. Therefore, it is possible to read out the DTC No. by using the diagnosis tester (DS-21/DS-Ⅱ). As for the DTC No. bearing the mark, the MIL will go on except the EU specifications.

Codes specified by DMC

DTC No.	Diagnosis contents	Malfunction evaluation method	Warning indication (Provided:○, Not provided:×)	Code memory (Provided:○, Not provided:×)	MIL (Malfunction indicator lamp)
P0705/55	No neutral start switch input	–	×	×	–
P1703/72	Lockup revolution not matched	2 trip	○	○	○
P1706/31	Abnormal engine torque	–	○	×	–
P1711/41	EFI throttle sensor malfunctioning	–	○	×	–
P1730/21	Abnormal battery power supply	2 trip	○	○	○
P1731/22	Abnormal sensor system power supply	2 trip	○	○	○
P1780/66	Switch solenoid circuit open wire and short-circuit	1 trip	○	○	○
U0100/82	Abnormal communication receiving with EFI	1 trip	○	○	○
U1001/85	Abnormal communication sending with EFI	1 trip	○	○	○

NOTE

- 1 trip: 1 trip detection logic
- 2 trip: 2 trip detection logic
- MIL: Malfunction indicator lamp
  When the "O" mark is shown in the MIL column, the lamp will go on for that DTC number, but when the "−" mark is shown, the lamp will not go on for that DTC No. Therefore, it is possible to read out the DTC No. by using the diagnosis tester (DS-21/DS-Ⅱ). As for the DTC No. bearing the mark, the MIL will go on except the EU specifications.

3-12 FAIL-SAFE FUNCTION

The fail-safe function starts, based on the control contents indicated in the Table so that the drivability may not be curtailed significantly even if an abnormality occurs in the input/output signal system of the transmission control computer.

Furthermore, when the vehicle returns to the normal state after an abnormality has been detected, the fail-safe will be released. However, the memory of the diagnosis results remains. (except for some codes).

Furthermore, while the fail-safe is functioning, the warning lamp (O/D OFF lamp) is flashing. (except for the diagnosis code No.55)

FAIL-SAFE SPECIFICATIONS

DTC No.	Contents of trouble	Contents of fail-safe control	Fail-safe releasing conditions
P0705/55	No neutral start switch input	·The normal gear shift control is carried out with the shift position set to the D range.	·The fail-safe function is released when the system returns to the normal condition.
P0705/56	Neutral start switch multiple-input	·The normal gear shift control is carried out with the shift position set to the D range.	·The fail-safe function is released when the system returns to the normal condition.
P0710/38	Oil temperature sensor circuit open wire or short-circuit	·After a malfunction has been detected, the transmission is set to the 3rd gear. Then, the 1—3 gearshift takes place according to the vehicle speed and throttle opening.	·After the system has returned to the normal state, the fail-safe function is released, when the vehicle speed reaches 0 km/h in the P or N range.
P0711/38	Abnormal oil temperature sensor characteristics	After a malfunction has been detected, the transmission is set to the 3rd gear. Then, the 1—3 gearshift takes place according to the vehicle speed and throttle opening.	·After the system has returned to the normal state, the fail-safe function is released, when the vehicle speed reaches 0 km/h in the P or N range.
P0715/37	No turbine revolution input	·After a malfunction has been detected, the transmission is set to the 3rd gear. Then, the 1—3 gearshift takes place according to the vehicle speed and throttle opening.	·After the system has returned to the normal state, the fail-safe function is released, when the vehicle speed reaches 0 km/h in the P or N range.
P0720/42	No output revolution input	·In the case of the malfunction of the sensor system, the gear position at the time of the detection of malfunction will be retained. When the vehicle stops once, the transmission is kept to the first gear. ·In the case of the malfunction of the A/T main body, the transmission is kept to the first gear.	·In the case of the malfunction of the sensor system, after the system has returned to the normal state, the fail-safe function is released, when the vehicle speed reaches 0 km/h in the P or N range. ·In the case of the malfunction of the A/T main body, after the system has retuned to the normal state, the fail-safe function is released when the IG SW is turned "LOCK" once.
P0725/86	No engine revolution input	·When a malfunction is detected, the transmission is set to the 3rd gear. Then, the 1—3 gearshift takes place according to the vehicle speed and throttle opening.	·After the system has returned to the normal state, the fail-safe function is released, when the vehicle speed reaches 0 km/h in the P or N range.

DTC No.	Contents of trouble	Contents of fail-safe control	Fail-safe releasing conditions
P0753/61	Solenoid No.1 circuit open wire and short-circuit	·Energizing to the solenoid which has been judged malfunctioning is prohibited. ·In the case of short circuit, the transmission is shifted to the 3rd gear. Afterward, 1—3 shift is performed using the normal solenoid based on the vehicle speed and throttle opening degree. However, in the case of the short circuit of the No.3 solenoid, the transmission is fixed to the 3rd gear. ·When the wire is open or plural solenoids are malfunctioning, the transmission is kept to the 3rd gear.	·After the system has returned to the normal state, the fail-safe function is released, when the IG SW is turned "LOCK" once.
P0758/62	Solenoid No.2 circuit open wire and short-circuit		
P0763/63	Solenoid No.3 circuit open wire and short-circuit		
P0768/64	Duty solenoid circuit open wire and short-circuit		
P0773/65	LUC solenoid circuit open wire and short-circuit		
P1703/72	Lockup revolution not matched	·Lockup is prohibited.	·After the system has returned to the normal state, the fail-safe function is released, when the vehicle speed reaches 0 km/h in the P or N range.
P1706/31	Abnormality of engine torque	·The engine torque is set to a constant value. ·After a malfunction has been detected, the transmission is set to the 3rd gear. Then, the 1—3 gearshift takes place according to the vehicle speed and throttle opening.	·After the system has returned to the normal state, the fail-safe function is released, when the vehicle speed reaches 0 km/h in the P or N range.
P1711/41	Abnormality of throttle sensor	·The throttle opening is set to a constant value. ·After a malfunction has been detected, the transmission is set to the 3rd gear. Then, the 1—3 gearshift takes place according to the vehicle speed.	·After the system has returned to the normal state, the fail-safe function is released, when the vehicle speed reaches 0 km/h in the P or N range.
P1730/21	Abnormal battery system power supply	·After detecting a malfunction, the 3rd gear is fixed.	·After the system has returned to the normal state, turn "LOCK" the IG SW. Then, the fail-safe function is released.
P1731/22	Abnormal sensor system power supply	·After detecting a malfunction, the 3rd gear is fixed.	·After the system has returned to the normal state, turn "LOCK" the IG SW. Then, fail-safe function is released.
P1780/66	Solenoid switch circuit open wire and short-circuit	·Energizing to the solenoid which has been judged malfunctioning is prohibited. ·In the case of short circuit, the transmission is shifted to the 3rd gear. Afterward, 1—3 shift is performed using the normal solenoid based on the vehicle speed and throttle opening degree. However, in the case of the short circuit of the switch solenoid, the transmission is fixed to the 3rd gear. ·When the wire is open or plural solenoids are malfunctioning, the transmission is kept to the 3rd gear.	·After the system has returned to the normal state, the fail-safe function is released, when the IG SW is turned "LOCK" once.

DTC No.	Contents of trouble	Contents of fail-safe control	Fail-safe releasing conditions
U0100/82	Abnormal communication receiving with EFI	·The throttle opening and engine torque are set to constant values. ·When a malfunction is detected, the transmission is set to the 3rd gear. Then, the 1—3 gear-shift takes place according to the vehicle speed.	·After the system has returned to the normal state, the fail-safe function is released, when the vehicle speed reaches 0 km/h in the P or N range.
U1001/85	Abnormal communication sending with EFI	·The throttle opening and engine torque are set to constant values. ·When a malfunction is detected, the transmission is set to the 3rd gear. Then, the 1—3 gear-shift takes place according to the vehicle speed.	·After the system has returned to the normal state, the fail-safe function is released, when the vehicle speed reaches 0 km/h in the P or N range.

3-13 TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE

3-13-1 NO.21 (ABNORMAL BATTERY SYSTEM POWER SUPPLY)

(1) Output conditions

1.The battery system power supply (BAT1, BAT2) are interrupted over a certain period of time.

(2) Checking points

1.Are the harness and connector between the battery and the A/T ECU normal?

(3) Checking method

⊳1. Check of ECU B fuse

SPECIFIED VALUE: Not fused.

▼If it is OK, go to step ⊳2.
▼If it is NG, go to step ⊳4.

⊳2. Check the voltage between the A/T ECU and the ECU B fuse.

1.After setting the IG SW to "LOCK", disconnect the connector from the A/T ECU.
2.After turning ON the IG SW, measure the voltage.
(1) Between A/T ECU vehicle harness side connector B2 (BAT1) and B6(E01)
(2) Between A/T ECU vehicle harness side connector B1 (BAT2) and B6(E01)

SPECIFIED VALUE: Battery voltage

▼If OK, check the A/T ECU unit circuit.
Refer to Page A1-24.

▼If it is NG, go to step ⊳3.

⊳3. Check the continuity between A/T ECU and ECU B fuse.

1.After setting IG switch to LOCK, measure the resistance.
(1) Between A/T ECU vehicle harness side connector B2 (BAT1) and ECU B fuse downstream side terminal
(2) Between A/T ECU vehicle harness side connector B1 (BAT2) and ECU B fuse downstream side terminal

SPECIFIED VALUE: Continuity exists.

▼If OK, check the fitting condition of each connector and harness condition.
▼If NG, repair or replace the harness and connector.

⊳4. Check short-circuit between A/T ECU and ECU B fuse.

1.After setting IG switch to LOCK, disconnect the connector from the A/T ECU. Check the continuity.
(1) Between A/T ECU vehicle harness side connector B2 (BAT1) and B6(E01)
(2) Between A/T ECU vehicle harness side connector B1 (BAT2) and B6(E01)

SPECIFIED VALUE: No continuity exists.

▼If it is OK, replace the ECU B fuse. Then, wait for a little while.
▼If NG, repair the harness and connector between A/T ECU and ECU B fuse. Then, replace the ECU B fuse.

3-13-2 NO.22 (ABNORMAL SENSOR SYSTEM POWER SUPPLY)

(1) Output conditions

1.When the revolution sensor system power supply is short-circuited over a certain period of time.

(2) Checking points

1.Are the harness and connector between A/T ECU and turbine revolution sensor, output revolution sensor normal?

2.Are the turbine revolution sensor and output revolution sensor normal?

(3) Checking method

Σ>1. Check the short-circuit between A/T ECU and body ground.

1.After setting IG SW to "LOCK", disconnect the connector from the A/T ECU. Check the continuity.

(1) Between A/T ECU vehicle harness side connector C9(VBTB) and body ground.

(2) Between A/T ECU vehicle harness side connector C7(VBOP) and body ground.

SPECIFIED VALUE: No continuity exists.

▼If it is OK, go to step Σ>2.

▼If NG, repair or replace the vehicle harness.

Σ>2. Check the turbine revolution sensor unit.

1.Disconnect the vehicle harness side connector of the turbine revolution sensor.

2.After turning ON the IG switch, check that the code No.22 is extinguished.

NOTE

- When the vehicle harness side connector of the turbine revolution sensor is disconnected, ensure that the code No.37 is indicated.

SPECIFIED VALUE: The code No.22 is extinguished.

▼If OK, replace the turbine revolution sensor.

Refer to Page F5-1.

▼If it is NG, go to step Σ>3.

Σ>3. Check of the output revolution sensor unit

1.Disconnect the vehicle harness side connector of the output revolution sensor.

2.After turning ON the IG switch, check that the code No.22 is extinguished.

NOTE

- When the vehicle harness side connector of the output revolution sensor is disconnected, ensure that the code No.42 is indicated.

SPECIFIED VALUE: The code No.22 is extinguished.

▼If OK, replace the output revolution sensor.

Refer to Page F5-1.

▼If NG, check the A/T ECU unit circuit.

Refer to Page A1-24.

3-13-3 NO.31 (ABNORMAL ENGINE TORQUE)

(1) Output conditions

1.Detected when one of the following items is malfunctioning.
(1) Manifold absolute pressure sensor malfunctioning
(2) Engine revolution sensor malfunctioning
(3) Knocking sensor malfunctioning
(4) Variable valve timing control system malfunctioning

(2) Checking method

1.Check the engine system.
(1) Type K3-VE engine-mounted vehicle
Refer to Page B8-292.

Refer to Page B8-349.

Refer to Page B8-352.

Refer to Page B8-355.

Refer to Page B8-396.

Refer to Page B8-407.

3-13-4 NO.37 (TURBINE REVOLUTION SENSOR SYSTEM)

(1) Output conditions

1.Outputted under conditions specified in Item (1) or (2).
(1) When the engine is running and the vehicle is stopped in the range of Ⓟ or Ⓝ, the turbine will not run over a certain period of time.
(2) The turbine will not run when the vehicle is running in ranges other than Ⓟ·Ⓝ.

(2) Checking points

1.Is the D range signal system of the neutral start switch normal?
2.Is the turbine revolution sensor normal?
3.Are the harness and connector between A/T ECU and turbine revolution sensor normal?

(3) Checking method

∑1. Illumination of neutral start switch D range signal system

1.The diagnosis output is indicated at the shift lever D range position.
SPECIFIED VALUE: The diagnosis code No.55 or No.56 is outputted.

▼If YES, check the neutral start switch system.
Refer to Page F5-36.

Refer to Page F5-38.

▼If it is NO, go to step ∑2.

⊳2. Check the vehicle harness and connector between A/T ECU and the turbine revolution sensor.

1.Between A/T ECU vehicle harness side connector C20 (ETBN) and sensor vehicle harness side connector 3

2.Between A/T ECU vehicle harness side connector C10 (RTBN) and sensor vehicle harness side connector 2

3.Between A/T ECU vehicle harness side connector C9 (VBTB) and sensor vehicle harness side connector 1

SPECIFIED VALUE: Continuity exists.

▼If NG, repair or replace the vehicle harness.

▼If it is OK, go to step ⊳3.

⊳3. Replacement of turbine revolution sensor.

1.Replace the turbine revolution sensor.

SPECIFIED VALUE: The vehicle returns to the normal state.

▼If OK, finish the trouble shooting.

▼If it is NG, go to step ⊳4.

⊳4. Check of A/T ECU input/output signals (Turbine revolution sensor)

1.Is the normal waveform outputted?

2.Does the waveform include abnormal noise?

Refer to Page F5-79.

SPECIFIED VALUE: The normal waveform is outputted.

▼If OK, check the A/T ECU unit circuit.

Refer to Page A1-24.

▼If NG, perform the following operations.

(1) Remove the noise generating source.

(2) Again check the fitting state of each connector and harness conditions.

3-13-5 NO.38 (OIL TEMPERATURE SENSOR SYSTEM)

(1) Output conditions

1.When a voltage value which is not plausible in view of the sensor characteristics is detected for a certain length of time.

(2) Checking points

1.Is the oil temperature sensor (Solenoid wire) normal?

2.Are the harness and connector between A/T ECU and oil temperature sensor (Solenoid wire) normal?

(3) Checking method

⊳1. Check of vehicle harness and connector between A/T ECU and solenoid wire

1.Between A/T ECU vehicle harness side connector C14 (OTMP) and solenoid wire vehicle harness side connector 8

2.Between A/T ECU vehicle harness side connector C13 (ETMP) and solenoid wire vehicle harness side connector 12

SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to step ⊳2.

▼If NG, repair or replace the vehicle harness.

⊳2. Check of solenoid wire unit (Oil temperature sensor system)

Refer to Page F5-73.

▼If it is OK, go to step ⊳3.

▼If NG, replace the solenoid wire.

⊳3. Check of A/T ECU input/output signals (Oil temperature sensor system)

Refer to Page F5-79.

▼If OK, check the A/T ECU unit circuit.

Refer to Page A1-24.

▼If NG, again check the fitting state of each connector and harness conditions.

3-13-6 NO.41 (ABNORMAL THROTTLE SENSOR)

1.Check the engine ECU throttle sensor system.

Type K3-VE engine-mounted vehicle

Refer to Page B8-306.

3-13-7 NO.42 (OUTPUT REVOLUTION SENSOR SYSTEM)

(1) Output conditions

1.Outputted under conditions specified in Item (1) or (2).

(1) While the vehicle is running, the output revolution disappears suddenly. Or the ratio relative to the turbine revolution is abnormal (sensor system open wire or short-circuit).

(2) The vehicle can not start off due to failure of the C2 clutch engagement. (The turbine revolution only rises) (Malfunction of the A/T main body)

(2) Checking points

1.Is the P, N range signal system of the neutral start switch normal?

2.Is the output revolution sensor normal?

3.Are the harness and connector between A/T ECU and output revolution sensor normal?

4.Is the A/T main body normal?

(3) Checking method

⊿1. Check of neutral start switch P·N range signal system

1.The diagnosis code output is indicated at the shift lever P·N range position.

SPECIFIED VALUE: The diagnosis code No.55 or No.56 is outputted.

▼If YES, check the neutral start switch system.

Refer to Page F5-36.

Refer to Page F5-38.

▼If it is NO, go to step ⊿2.

⊿2. Check of neutral start switch signal 1

1.After turning "LOCK" the IG SW once, start the engine in the N range.

2.With the accelerator set to OFF, move the shift lever from the N→D range.

SPECIFIED VALUE: The vehicle moves forward.

▼If it is OK, go to step ⊿4.

▼If it is NG, go to step ⊿3.

⊿3. Check of neutral start switch signal 2

1.After turning "LOCK" the IG SW once, start the engine in the neutral range.

2.With the accelerator set to OFF, move the shift lever in the sequence of the N→D→N→D range.

SPECIFIED VALUE: The vehicle moves forward.

▼If OK, replace the valve body Ay.

▼If NG, replace the A/T Ay.

Σ>4. Check of vehicle harness and connector between A/T ECU and output revolution sensor

1.Between A/T ECU vehicle harness side connector C18 (EOPT) and sensor vehicle harness side connector 3
2.Between A/T ECU vehicle harness side connector C8 (ROPT) and sensor vehicle harness side connector2
3.Between A/T ECU vehicle harness side connector C7 (VBOP) and sensor vehicle harness side connector 1

SPECIFIED VALUE: Continuity exists.

▼If OK, repair or replace the vehicle harness.
▼If it is NG, go to step Σ>5.

Σ>5. Replace the output revolution sensor.

1.Replace the output revolution sensor.

SPECIFIED VALUE: The vehicle returns to the normal state.

▼If OK, finish the trouble shooting.
▼If it is NG, go to step Σ>6.

Σ>6. Check of A/T ECU input/output signals (Output revolution sensor system)

1.Is the normal waveform outputted?
2.Does the waveform include abnormal noise?

Refer to Page F5-79.

SPECIFIED VALUE: The normal waveform is outputted.

▼If OK, check the A/T ECU unit circuit.

Refer to Page A1-24.

▼If NG, perform the following operations,
(1) Remove the noise generating source.
(2) Again check the fitting state of each connector and harness conditions.

3-13-8 NO.55 (NO NEUTRAL START SWITCH INPUT)

(1) Output conditions

1.When no signal input state is detected over a certain length of time:

(2) Checking points

1.Is the neutral start switch normal?

2.Are the harness and connector between A/T ECU and the neutral start switch normal?

CAUTION

- The diagnosis code No.55 is not memorized. (The code is outputted only when a malfunction is occurring.)

(3) Checking method

⊿1. Check of lighting of the shift indicator

1.Check the illuminating state of the shift indicator inside the combination meter by operating the shift lever .

SPECIFIED VALUE: Illuminates normally.

▼If it is OK, go to step ⊿2.

▼If NG, check the neutral start switch unit.

Refer to Page F5-78.

⊿2. Check of harness and connector between A/T ECU and sensor harness.

1.With the vehicle in a stationary state, short-circuit the ECU-T terminal and the E terminal inside the DLC, using the SST.

SST: 09991-87404-000
09991-87403-000

2.After turning ON the IG switch, move the shift lever progressively and hold it in each range (for about 10 seconds). Check to see in which range the O/D OFF lamp flashes (the diagnosis code indication).

3.At the range where the O/D OFF lamp flashes, check the harness for fitting state and open wire.

(1) Between A/T ECU vehicle harness side connector C15 (P) and switch vehicle harness side connector 4 (P)

(2) Between A/T ECU vehicle harness side connector B7 (R) and switch vehicle harness side connector 1 (R)

(3) Between A/T ECU vehicle harness side connector C24 (N) and switch vehicle harness side connector 5 (N)

(4) Between A/T ECU vehicle harness side connector C17 (D) and switch vehicle harness side connector 3 (D)

(5) Between A/T ECU vehicle harness side connector C16 (2) and switch vehicle harness side connector 2 (2)

(6) Between A/T ECU vehicle harness side connector C25 (L) and switch vehicle harness side connector 8 (L)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to step ⊿3.

▼If NG, repair or replace the harness of the vehicle concerned.

⊃3. Check of A/T ECU input/output signals (Neutral start switch system)

Refer to Page F5-79.

▼If OK, check the A/T ECU unit circuit.

Refer to Page A1-24.

▼If NG, again check the fitting state of each connector and harness conditions.

3-13-9 NO.56 (NEUTRAL START SWITCH MULTIPLE INPUT)

(1) Output conditions

1.When multiple input of signals is detected over a certain length of time.

(2) Checking points

1.Is the neutral start switch normal?

2.Are the harness and connector between A/T ECU and neutral start switch normal?

(3) Checking method

Σ>1. Check of lighting of shift indicator

1.Check the illuminating state of the shift indicator inside the combination meter by operating the shift lever .

SPECIFIED VALUE: Illuminates normally.

▼If it is OK, go to step Σ>2.

▼If NG, check the neutral start switch unit.

Refer to Page F5-78.

Σ>2. Check of harness and connector between A/T ECU and sensor harness

1.Check each harness for being pinched (Short-circuit).

(1) Between A/T ECU vehicle harness side connector C15 (P) and switch vehicle harness side connector 4 (P)

(2) Between A/T ECU vehicle harness side connector B7 (R) and switch vehicle harness side connector 1 (R)

(3) Between A/T ECU vehicle harness side connector C24 (N) and switch vehicle harness side connector 5 (N)

(4) Between A/T ECU vehicle harness side connector C17 (D) and switch vehicle harness side connector 3 (D)

(5) Between A/T ECU vehicle harness side connector C16 (2) and switch vehicle harness side connector 2 (2)

(6) Between A/T ECU vehicle harness side connector C25 (L) and switch vehicle harness side connector 8 (L)

SPECIFIED VALUE: Not pinched (Short-circuit)

▼If it is OK, go to step Σ>3.

▼If NG, repair or replace the vehicle harness.

Σ>3. Check of A/T ECU input/output signals (Neutral start switch system)

Refer to Page F5-79.

▼If OK, check A/T ECU unit circuit.

Refer to Page A1-24.

▼If NG, again check the state of each connector and harness conditions.

3-13-10 NO.61 (SOLENOID NO.1 SYSTEM)

(1) Output conditions

1.When the solenoid No.1 is energized, no current flowed or excessive current flowed over a certain length of time.

(2) Checking points

1.Are the harness and connector between A/T ECU and solenoid No.1 normal?

2.Is the solenoid No.1 normal?

(3) Checking method

Σ>1. Check of vehicle harness and connector between the A/T ECU and solenoid wire

1.Between A/T ECU vehicle harness side connector C6 (B1+) and solenoid wire vehicle harness side connector 7

2.Between A/T ECU vehicle harness side connector C5 (B1-) and solenoid wire vehicle harness side connector 11

SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to step Σ>2.

▼If NG, repair or replace the vehicle harness.

Σ>2. Check of solenoid wire unit (Solenoid No.1 system)

Refer to Page F5-73.

▼If it is OK, go to step Σ>3.

▼If NG, replace the solenoid wire.

Σ>3. Check of solenoid No.1 unit

Refer to Page F5-77.

▼If OK, check the A/T ECU unit circuit.

Refer to Page A1-24.

▼If NG, replace the solenoid No.1.

3-13-11 NO.62 (SOLENOID NO.2 SYSTEM)

(1) Output conditions

1.When the solenoid No.2 is energized, no current flowed or excessive current flowed over a certain length of time.

(2) Checking points

1.Are the harness and connector between A/T ECU and solenoid No.2 normal?

2.Is the solenoid No.2 normal?

(3) Checking method

Σ>1. Check the vehicle harness and connector between A/T ECU and solenoid wire

1.Between A/T ECU vehicle harness side connector C4 (C2+) and solenoid wire vehicle harness side connector 5

2.Between A/T ECU vehicle harness side connector C3 (C2-) and solenoid wire vehicle harness side connector 9

SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to step Σ>2.

▼If NG, repair or replace the vehicle harness.

Σ>2. Check of solenoid wire unit (Solenoid No.2 system)

Refer to Page F5-73.

▼If it is OK, go to step Σ>3.

▼If NG, replace the solenoid wire.

Σ>3. Check of solenoid No.2 unit

Refer to Page F5-77.

▼If OK, check the A/T ECU unit circuit.

Refer to Page A1-24.

▼If NG, replace the solenoid No.2.

3-13-12 NO.63 (SOLENOID NO.3 SYSTEM)

(1) Output conditions

1.When the solenoid No.3 is energized, no current flowed or excessive current flowed over a certain length of time.

(2) Checking points

1.Is the harness and connector between A/T ECU and solenoid No.3 normal?

2.Is the solenoid No.3 normal?

(3) Checking method

⊳1. Check of vehicle harness and connector between A/T ECU and solenoid wire

1.Between A/T ECU vehicle harness side connector C2 (C3B2+) and solenoid wire vehicle harness side connector 6

2.Between A/T ECU vehicle harness side connector C1 (C3B2-) and solenoid wire vehicle harness side connector 10

SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to step ⊳2.

▼If NG, repair or replace the vehicle harness.

⊳2. Check of solenoid wire unit (Solenoid No.3 system)

Refer to Page F5-73.

▼If it is OK, go to step ⊳3.

▼If NG, replace the solenoid wire.

⊳3. Check of solenoid No.3 unit

Refer to Page F5-77.

▼If OK, check the A/T ECU unit circuit.

Refer to Page A1-24.

▼If NG, replace the solenoid No.3.

3-13-13 NO.64 (DUTY SOLENOID SYSTEM)

(1) Output conditions

1.When the duty solenoid is energized, no current flowed or excessive current flowed over a certain length of time.

(2) Checking points

1.Are the harness and connector between A/T ECU and duty solenoid normal?
2.Is the duty solenoid normal?

(3) Checking method

Σ>1. Check of vehicle harness and connector between A/T ECU and solenoid wire

1.Between A/T ECU vehicle harness side connector C23 (LUCC) and solenoid wire vehicle harness side connector 2
SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to step Σ>2.
▼If NG, repair or replace the vehicle harness.

Σ>2. Check of solenoid wire unit (Duty solenoid system)

Refer to Page F5-73.

▼If it is OK, go to step Σ>3.
▼If NG, replace the solenoid wire.

Σ>3. Check of duty solenoid unit

Refer to Page F5-77.

▼If OK, check the A/T ECU unit circuit.
Refer to Page A1-24.

▼If NG, replace the duty solenoid.

3-13-14 NO.65 (LUC SOLENOID SYSTEM)

(1) Output conditions

1.When the LUC solenoid is energized, no current flowed or excessive current flowed over a certain length of time.

(2) Checking points

1.Are the harness and connector between A/T ECU and LUC solenoid normal?
2.Is the LUC solenoid normal?

(3) Checking method

Σ>1. Check of vehicle harness and connector between A/T ECU and solenoid wire

1.Between A/T ECU vehicle harness side connector C11 (LUCR) and solenoid wire vehicle harness side connector 3
SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to step Σ>2.
▼If NG, repair or replace the vehicle harness.

Σ>2. Check of solenoid wire unit (LUC solenoid system)

Refer to Page F5-73.

▼If it is OK, go to step Σ>3.
▼If NG, replace the solenoid wire.

⊃3. Check of LUC solenoid unit

Refer to Page F5-78.

▼If OK, check the A/T ECU unit circuit.

Refer to Page A1-24.

▼If NG, replace the LUC solenoid.

3-13-15 NO.66 (SWITCH SOLENOID SYSTEM)

(1) Output conditions

1.When the switch solenoid is energized, no current flowed or excessive current flowed over a certain length of time.

(2) Checking points

1.Are the harness and connector between A/T ECU and switch solenoid normal?

2.Is the switch solenoid normal?

(3) Checking method

Σ>1. Check of vehicle harness and connector between A/T ECU and solenoid wire

1.Between A/T ECU vehicle harness side connector C12 (SOLR) and solenoid wire vehicle harness side connector 4

SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to step Σ>2.

▼If NG, repair or replace the vehicle harness.

Σ>2. Check of solenoid wire unit (Switch solenoid system)

Refer to Page F5-73.

▼If it is OK, go to step Σ>3.

▼If NG, replace the solenoid wire.

Σ>3. Check of switch solenoid unit

Refer to Page F5-78.

▼If OK, check the A/T ECU unit circuit.

Refer to Page A1-24.

▼If NG, replace the switch solenoid.

3-13-16 NO.72 (LOCK-UP REVOLUTION NOT MASTCHED)

(1) Output conditions

1.When the engine revolution differs from the lock-up revolution greatly during the direct lock-up operation.

(2) Checking points

1.Is the valve body Ay normal?
2.Is the torque converter Ay normal?

(3) Checking method

Σ>1. Check of hydraulic pressure

Refer to Page F3-6.

1.With the vehicle lifted up, slowly depress the accelerator pedal so that the transmission may be set to the 3rd gear and further accelerate the vehicle until the direct lockup occurs. Measure the LUC ON pressure and LUC OFF pressure.
SPECIFIED VALUE: 666±49kPa{6.8±0.5kgf/cm } (LUC ON pressure−LUC OFF pressure)

NOTE

- When the direct lock-up occurs, the duty ratio of the LUC control solenoid is 100%. (Refer to the A/T input/output signal check.)
- When you want to measure the hydraulic pressure after the warning indication, stop the vehicle and move the shift lever once to the neutral range (Releasing of the fail-safe). Then, again set the shift lever to the D range so as to perform the measurement.

▼If it is OK, go to step Σ>2.
▼If NG, replace the valve body Ay.

Σ>2.Replace the torque converter Ay

1.Replace the torque converter Ay.
SPECIFIED VALUE: The vehicle retunes to the normal state.

▼If OK, finish the trouble shooting.
▼If NG, replace the A/T Ay.

3-13-17 NO.82 (ABNORMAL COMMUNICATION RECEIVING WITH EFI)
NO.85 (ABNORMAL COMMUNICATION SENDING WITH EFI)

(1) No.82 output conditions

1.When the communication signal from the EFI ECU can not be received:

(2) No.85 output conditions

1.When the communication signal to the EFI ECU can not be sent out:

(3) Checking points

1.Is the harness between EFI ECU and A/T ECU normal?
2.Does the connector section exhibit poor contact?

(4) Checking method

Σ>1. CAN communication basic check

1.Conduct the CAN communication basic check.
Refer to Page L2-14.

▼If OK for the R.H.D. vehicles, proceed to Σ>2.
▼If OK for the L.H.D. vehicles, proceed to Σ>3.
▼If NG, repair or replace the malfunctioning sections.

Σ>2. Check of short-circuit in CAN line

1.Conduct continuity check for between the following terminals given below.
(1) Between A/T ECU connection vehicle harness side connector B9 (HCN1) and A/T ECU connection vehicle harness side connectorB19 (LCN1)
(2) Between EFI ECU connection vehicle harness side connector 6 (CANL) and EFI ECU connection vehicle harness side connector 7 (CANH)
(3) Between EFI ECU connection vehicle harness side connector 8 (LCAN) and EFI ECU connection vehicle harness side connector 9 (HCAN)
SPECIFIED VALUE: No continuity exists.

▼If it is OK, go to step Σ>4.
▼If NG, repair or replace the malfunctioning sections.

Σ>3. Check of short-circuit in CAN line

1.Perform continuity check between the following terminals.
(1) Between A/T ECU connection vehicle harness side connector B9(HCN1) and A/T ECU connection vehicle harness side connector B19(LCN1)
(2) Between meter connection vehicle harness side connector 1(CANH) and meter connection vehicle harness side connector 2(CANL) interval
(3) Between meter connection vehicle harness side connector 3(HCAN) and meter connection vehicle harness side connector 4(LCAN)
SPECIFIED VALUE: No continuity exists.

▼If it is OK, go to step Σ>4.
▼If NG, repair or replace the malfunctioning sections.

⊳4. Check of CAN line for short circuit

1.Conduct continuity check for between the following terminals given below.
(1) Between A/T ECU connection vehicle harness side connector B19 (LCN1) and battery positive terminal
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) and battery positive terminal
(3) Between A/T ECU connection vehicle harness side connector B19 (LCN1) and body ground
(4) Between A/T ECU connection vehicle harness side connector B9 (HCN1) and body ground
SPECIFIED VALUE: No continuity exists.

▼If it is OK, go to step ⊳5.
▼If NG, repair or replace the malfunctioning sections.

⊳5. Check of EFI ECU voltage

1.Turn ON the IG SW.
2.Measure the voltage between the following terminals given below.
(1) Between EFI ECU connection vehicle harness side connector 27 (+B) and body ground
(2) Between EFI ECU connection vehicle harness side connector 38 (BAT) and body ground
(3) Between EFI ECU connection vehicle harness side connector 39 (MRO) and body ground
SPECIFIED VALUE: Battery voltage

▼If OK for the R.H.D. vehicles, proceed to ⊳7.
▼If OK for the R.H.D. vehicles, proceed to ⊳6.
▼If NG, repair or replace the malfunctioning sections.

⊳6. Check of meter voltage

1.Measure the voltage between the following terminals given below.
SPECIFIED VALUE: Battery voltage

▼If it is OK, go to step ⊳7.
▼If NG, repair or replace the malfunctioning sections.

⊳7. Check of A/T ECU voltage

1.Measure the voltage between the following terminals given below.
(1) Between A/T ECU connection vehicle harness side connector B2 (BAT2) and body ground
(2) Between A/T ECU connection vehicle harness side connector 2(BAT2) and body ground
(3) Between A/T ECU connection vehicle harness side connector B3(+B) and body ground
SPECIFIED VALUE: Battery voltage

▼If OK for the R.H.D. vehicles, proceed to ⊳8.
▼If OK for the R.H.D. vehicles, proceed to ⊳9.
▼If NG, repair or replace the malfunctioning sections.

⊃8. Check of ECU ground

1.Set the IG SW to the "LOCK" position.
2.Conduct continuity check for between the following terminals given below.
(1) Between EFI ECU connection vehicle harness side connector 20 (E01) and body ground
(2) Between EFI ECU connection vehicle harness side connector 125(E1) and body ground
(3) Between A/T ECU connection vehicle harness side connector B5(E02) and body ground
(4) Between A/T ECU connection vehicle harness side connector B6(E01) and body ground
(5) Between A/T ECU connection vehicle harness side connector B24(E1) and body ground
SPECIFIED VALUE: Continuity exists.

▼If OK, check the unit circuits of the EFI ECU and A/T ECU.
Refer to Page A1-24.

▼If NG, repair or replace the malfunctioning sections.

⊃9. Check of ECU ground

1.Set the IG SW to the "LOCK" position.
2.Conduct continuity check for between the following terminals given below.
(1) Between EFI ECU connection vehicle harness side connector 20 (E01) and body ground
(2) Between EFI ECU connection vehicle harness side connector 125(E1) and body ground
(3) Between A/T ECU connection vehicle harness side connector B5(E02) and body ground
(4) Between A/T ECU connection vehicle harness side connector B6(E01) and body ground
(5) Between A/T ECU connection vehicle harness side connector B24(E1) and body ground
(6) Between meter connection vehicle harness side connector 18(GND) and body ground
SPECIFIED VALUE: Continuity exists.

▼If OK, check the unit circuits of the EFI ECU and A/T ECU.
Refer to Page A1-24.

▼If NG, repair or replace the malfunctioning sections.

3-13-18 NO.86 (NO ENGINE REVOLUTION INPUT)

(1) Output conditions

1.When the engine revolution signal from the EFI ECU is not inputted into the A/T ECU over a certain length of time:

(2) Checking points

1.Is the engine revolution sensor signal of the EFI ECU normal?

2.Is the EFI ECU normal?

(3) Checking method

⊳1. Check of harness and connector between A/T ECU and EFI ECU

1.After setting IG switch to LOCK, disconnect the connector from the A/T ECU. Conduct the continuity check.

(1) Between A/T ECU vehicle harness side connector B8(REG1) and EFI ECU vehicle harness side connector 4 (AYNE)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to step ⊳2.

▼If NG, repair or replace the vehicle harness.

⊳2. Check of EFI ECU unit circuit

Refer to Page A1-24.

▼If OK, replace the EFI ECU.

▼If NG, repair the malfunctioning sections.

3-14 TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA

3-14-1 TABLE SHOWING POSSIBLE CAUSES ACCORDING TO MALFUNCTION PHENOMENA

Malfunction phenomena \ Possible causes	Idle speed faulty	Poor engine performance	Valve body malfunctioning (except for solenoid valve)	Solenoid No.2 malfunctioning	Solenoid No.3 malfunctioning	Solenoid No.1 malfunctioning	Duty solenoid malfunctioning	LUC solenoid malfunctioning	Switch solenoid malfunctioning	Strainer O-ring broken or worn out	2nd & 4th brake cylinder seal faulty	Torque converter malfunctioning	Oil pump malfunctioning	Manual valve lever improperly adjusted	Neutral start switch improperly adjusted	Transmission Ay malfunctioning	Drive plate cracked, bolts loose	Improper oil level	Control cable improperly adjusted	A/T ECU malfunctioning	Stop lamp switch system open wire or short-circuit
(1) Starter inoperative													○		○				○		
(2) The vehicle can not move forward nor backward.			○									○	○	○			○	○	○	○	
(3) The vehicle can not move forward.			○	○										○		○			○	○	
(4) The vehicle can not move backward.														○		○			○	○	
(5) The engine stalls during N→D·R.	○	○	○				○	○				○									
(6) The clutch is slipping during the 1st gear running.			○	○						○				○		○		○	○	○	
(7) The clutch is slipping during the 2nd gear running.			○	○		○				○	○			○		○		○		○	
(8) The clutch is slipping during the 3rd gear running.			○	○	○				○	○				○		○		○		○	
(9) The clutch is slipping during the 4th gear running.			○		○	○			○	○	○			○		○		○		○	
(10) The clutch is slipping during the R range running.			○		○		○			○				○		○		○	○	○	
(11) The vehicle starts moving in the P or N range.														○		○			○		
(12) When the engine speed is raised in the N range, the vehicle starts to move.																○					
(13) The engine starts in ranges other than P·N .															○				○		
(14) No gear shifting takes place. (kept in the 1st gear)			○				○														
(15) No gear shifting takes place. (kept in the 3rd gear)																				○	
(16) The vehicle starts off from the 2nd gear.																				○	○
(17) Gear shifting shock·time lag large (N→D)			○	○			○			○						○		○		○	○
(18) Gear shifting shock·time lag large (N→R)			○		○		○			○						○		○		○	
(19) Gear shifting shock·time lag large (1st⇄2nd)			○			○				○	○					○		○		○	
(20) Gear shifting shock·time lag large (2nd⇄3rd)			○		○	○				○	○					○		○		○	
(21) Gear shifting shock·time lag large (3rd⇄4th)			○	○		○			○	○	○					○		○		○	
(22) Engine racing during gear shifting (2nd→3rd)			○			○					○					○				○	
(23) Engine racing during gear shifting (3rd→4th)			○	○							○					○				○	
(24) Gear shifting takes place only in (1st⇄3rd)			○																	○	

3-14-2 TROUBLE-SHOOTING ACCORDING TO MALFUNCTION PHENOMENON ITEMS

(1) Starter inoperative

1.CHECK AND ADJUSTMENT OF CONTROL CABLE
Refer to Page F3-2.

2.CHECK AND ADJUSTMENT OF NEUTRAL START SWITCH
Refer to Page F3-3.

3.Check of engine cranking system
4.Check of oil pump system

(2) The vehicle will not move forward nor backward.

Σ>1. Check of oil level
Refer to Page F3-1.

▼If it is OK, go to step Σ>2.
▼If NG, adjust the oil level.

Σ>2. Check and adjustment of control cable
Refer to Page F3-2.

▼If it is OK, go to step Σ>3.
▼If NG, adjust the control cable.

Σ>3. Manual running test

1.Disconnect the A/T ECU connector. Check the gear position at each range.
SPECIFIED VALUE:

Range	Ⓟ·Ⓝ	Ⓓ	Ⓡ
Gear position	Neutral	3rd	Reverse

▼If it is OK, go to step Σ>4.
▼If it is NG, go to step Σ>5.

Σ>4. Check of ECU power supply circuit
Refer to Page A1-24.

▼If OK, replace the A/T ECU. After the replacement, if the malfunction persists, proceed to Σ>5.
▼If NG, repair the connector or circuit concerned.

Σ>5. Check and adjustment of manual valve

1.Remove the oil pan. Check that the manual valve groove is aligned with the hole at the valve body in the Ⓝ range.
Refer to Page F3-25.

CAUTION
- The oil pan is a non-reusable part.

▼If it is OK, go to step Σ>6.
▼If NG, adjust the manual valve.

Σ6. Replacement of valve body

Refer to Page F3-25.

SPECIFIED VALUE: The vehicle returns to the normal state.

▼If OK, finish the trouble shooting.
▼If it is NG, go to step Σ7.

Σ7. Hydraulic pressure measurement

1.Measure the LUC OFF pressure when the lockup is OFF.
Refer to Page F3-6.

▼If OK, replace the torque converter Ay.
▼If it is NG, go to step Σ8.

Σ8. Check of drive plate

1.Remove the A/T from the vehicle. Check the drive plate for cracks; the bolts for looseness.
▼If OK, replace the oil pump Ay.
▼If NG, replace the drive plate or tighten the bolts.

(3) The vehicle can not move forward.

Σ1. Check and adjustment of control cable

Refer to Page F3-2.

▼If it is OK, go to step Σ2.
▼If NG, adjust the control cable.

Σ2. Manual running test

1.Disconnect the connector of the A/T ECU. Check the gear position of each range.
▼If it is OK, go to step Σ3.
▼If it is NG, go to step Σ4.

Range	P·N	D	R
Gear position	Neutral	3rd	Reverse

Σ3. Check of ECU power supply circuit

Refer to Page A1-24.

▼If OK, replace the A/T ECU. After the replacement, if the malfunction persists, proceed to Σ5.
▼If NG, repair the connector or circuit concerned.

Σ4. Check and adjustment of manual valve

1.Remove the oil pan. Check that the manual valve groove is aligned with the hole at the valve body in the N range.
Refer to Page F3-25.

▼If it is OK, go to step Σ5.
▼If NG, adjust the manual valve.

CAUTION

- The oil pan is a non-reusable part.

Σ5. Check of solenoid No.2 unit (Operation)
Refer to Page F5-77.

▼If it is OK, go to step Σ6.
▼If NG, replace the solenoid No.2.

Σ6. Replacement of valve body
Refer to Page F3-25.

SPECIFIED VALUE: The vehicle returns to the normal state.

▼If OK, finish the trouble shooting.
▼If NG, repair or replace the A/T Ay.

(4) The vehicle can not move backward.

Σ1. Check and adjustment of control cable
Refer to Page F3-2.

▼If it is OK, go to step Σ2.
▼If NG, adjust the control cable.

Σ2. Manual running test
1.Disconnect the connector of the A/T ECU. Check the gear position of each range.
▼If it is OK, go to step Σ3.
▼If it is NG, go to step Σ4.
SPECIFIED VALUE:

Range	P·N	D	R
Gear position	Neutral	3rd	Reverse

Σ3. ECU power supply circuit check
Refer to Page A1-24.

▼If OK, replace the A/T ECU. After the replacement, if the malfunction persists, proceed to Σ4.
▼If NG, repair the connector or circuit concerned.

Σ4. Check and adjustment of manual valve
1.Remove the oil pan. Check that the manual valve groove is aligned with the hole at the valve body in the N range.
Refer to Page F3-25.

CAUTION
- The oil pan is a non-reusable part.

▼If OK, repair or replace the A/T Ay.
▼If NG, adjust the manual valve.

(5) The engine stalls during [N]→[D]·[R]

Σ>1. Check of idle speed

1.Check the idle speed.

(1) Type K3-VE engine-mounted vehicle

Refer to Page B1-25.

▼If it is OK, go to step Σ>2.

▼If NG, repair the engine idle system.

Σ>2. Check of duty solenoid, LUC solenoid unit (Operation)

Refer to Page F5-77.

Refer to Page F5-78.

▼If it is OK, go to step Σ>2.

▼If NG, replace the solenoid concerned.

Σ>3. Replacement of valve body

Refer to Page F3-25.

SPECIFIED VALUE: The vehicle returns to the normal state.

▼If OK, finish the trouble shooting.

▼If NG, replace the torque converter Ay.

(6) The clutch is slipping during the 1st gear running.

Σ>1. Check of oil level

Refer to Page F3-1.

▼If it is OK, go to step Σ>2.

▼If NG, adjust the oil level.

Σ>2. Check and adjustment of control cable

Refer to Page F3-2.

▼If it is OK, go to step Σ>3.

▼If NG, adjust the control cable.

Σ>3. Manual running test

1.Disconnect the connector of the A/T ECU. Check the gear position of each range.

▼If it is OK, go to step Σ>4.

▼If it is NG, go to step Σ>5.

SPECIFIED VALUE:

Range	[P]·[N]	[D]	[R]
Gear position	Neutral	3rd	Reverse

Σ>4. Check of ECU power supply circuit

Refer to Page A1-24.

▼If OK, replace the A/T ECU. After the replacement, if the malfunction persists, proceed to Σ>5.

▼If NG, repair the connector or circuit concerned.

∑5. Check of strainer

1.Replace the oil pan and strainer. Check the O-ring of the strainer for cut and wear.

▼If it is OK, go to step ∑6.

▼If NG, replace the O-ring of the strainer.

CAUTION

- The O-ring is a non-reusable part. Hence, even in the case of OK, replace the O-ring.
- The oil pan is a non-reusable part.

∑6. Check and adjustment of manual valve

1.Check that the manual valve groove is aligned with the hole at the valve body in the N range.
Refer to Page F3-25.

▼If it is OK, go to step ∑7.

▼If NG, adjust the manual valve.

∑7. Check of solenoid No.2 unit (Operation)

Refer to Page F5-77.

▼If it is OK, go to step ∑8.

▼If NG, replace the solenoid No.2.

∑8. Replacement of valve body

Refer to Page F3-25.

SPECIFIED VALUE: The vehicle returns to the normal state.

▼If OK, finish the trouble shooting.

▼If NG, repair or replace the A/T Ay.

(7) The clutch is slipping during the 2nd gear running.

∑1. Check of oil level

Refer to Page F3-1.

▼If it is OK, go to step ∑2.

▼If NG, adjust the oil level.

∑2. Manual running test

1.Disconnect the connector of the A/T ECU. Check the gear position of each range.

▼If it is OK, go to step ∑3.

▼If it is NG, go to step ∑4.

SPECIFIED VALUE:

Range	P·N	D	R
Gear position	Neutral	3rd	Reverse

∑3. Check of ECU power supply circuit

Refer to Page A1-24.....

▼If OK, replace the A/T ECU. After the replacement, if the malfunction persists, proceed to ∑4.

▼If NG, repair the connector or circuit concerned.

∑>4. Check of strainer

1.Remove the oil pan and strainer. Check the strainer O-ring for cut and wear.

▼If it is OK, go to step ∑>5.

▼If NG, replace the strainer O-ring.

CAUTION

- The O-ring is a non-reusable part. Hence, even in the case of OK, replace the O-ring.
- The O-ring is a non-reusable part.

∑>5. Check and adjustment of manual valve

1.Check that the manual valve groove is aligned with the hole at the valve body in the [N] range.

▼If it is OK, go to step ∑>6.

▼If NG, adjust the manual valve.

∑>6. Check of solenoid No1, solenoid No.2 units (Operation)

Refer to Page F5-77.

Refer to Page F5-77.

▼If it is OK, go to step ∑>7.

▼If NG, replace the solenoid concerned.

∑>7. Check of the 2nd & 4th brake cylinder seal

Refer to Page F3-25.

1.Check the 2nd & 4th brake cylinder seal for cut or wear.

▼If it is OK, go to step ∑>8.

▼If NG, replace the 2nd & 4th brake cylinder seal.

CAUTION

- The 2nd & 4th brake cylinder seal is a non-reusable part. Hence, even in the case of OK, replace the seal.

∑>8. Replacement of valve body

Refer to Page F3-25.

SPECIFIED VALUE: The vehicle returns to the normal state.

▼If OK, finish the trouble shooting.

▼If NG, repair or replace the A/T Ay.

(8) The clutch is slipping during the 3rd gear running.

∑>1. Check of oil level

Refer to Page F3-1.

▼If it is OK, go to step ∑>2.

▼If NG, adjust the oil level.

∑2. Manual running test

1.Disconnect the connector of the A/T ECU. Check the gear position of each range.

▼If it is OK, go to step ∑3.

▼If it is NG, go to step ∑4.

SPECIFIED VALUE:

Range	Ⓟ·Ⓝ	Ⓓ	Ⓡ
Gear position	Neutral	3rd	Reverse

∑3. Check of ECU power supply circuit

Refer to Page A1-24.

▼If OK, replace the A/T ECU. After the replacement, if the malfunction persists, proceed to ∑4.

▼If NG, repair the connector or circuit concerned.

∑4. Check of strainer

1.Remove the oil pan and strainer. Check the strainer O-ring for cut and wear.

▼If it is OK, go to step ∑5.

▼If NG, replace the strainer O-ring.

CAUTION

- The O-ring is a non-reusable part. Hence, even in the case of OK, replace the O-ring.

∑5. Check and adjustment of manual valve

1.Check that the manual valve groove is aligned with the hole at the valve body in the Ⓝ range.

Refer to Page F3-25.

▼If it is OK, go to step ∑6.

▼If NG, adjust the manual valve.

∑6. Check of solenoid No2, solenoid No.3 and switch solenoid unit (Operation)

Refer to Page F5-77.

Refer to Page F5-78.

▼If it is OK, go to step ∑7.

▼If NG, replace the solenoid concerned.

∑7. Replacement of valve body

Refer to Page F3-25.

SPECIFIED VALUE: The vehicle returns to the normal state.

▼If OK, finish the trouble shooting.

▼If NG, repair or replace the A/T Ay.

(9) The clutch is slipping during the 4th gear running.

∑1. Check of oil level

Refer to Page F3-1.

▼If it is OK, go to step ∑2.

▼If NG, adjust the oil level.

Σ2. Manual running test

1.Disconnect the connector of the A/T ECU. Check the gear position of each range.

▼If it is OK, go to step Σ3.

▼If it is NG, go to step Σ4.

SPECIFIED VALUE:

Range	P·N	D	R
Gear position	Neutral	3rd	Reverse

Σ3. Check of ECU power supply circuit

Refer to Page A1-24.

▼If OK, replace the A/T ECU. After the replacement, if the malfunction persists, proceed to the Σ4.

▼If NG, repair the connector or circuit concerned.

Σ4. Check of strainer

1.Remove the oil pan and strainer. Check the strainer O-ring for cut or wear.

▼If it is OK, go to step Σ5.

▼If NG, replace the O-ring of the strainer.

CAUTION

- The O-ring is a non-reusable part. Hence, even in the case of OK, replace the O-ring.

Σ5. Check and adjustment of manual valve

1.Check that the manual valve groove is aligned with the hole at the valve body in the N range.

Refer to Page F3-25.

▼If it is OK, go to step Σ6.

▼If NG, adjust the manual valve.

Σ6. Check of solenoid No.1, solenoid No.3 and switch solenoid unit (Operation)

Refer to Page F5-77.

Refer to Page F5-77.

Refer to Page F5-78.

▼If it is OK, go to step Σ7.

▼If NG, replace the solenoid concerned.

Σ7. Check of 2nd & 4th brake cylinder seal

Refer to Page F3-25.

1.Check the 2nd & 4th brake cylinder seal for cut or wear.

▼If it is OK, go to step Σ8.

▼If NG, replace the 2nd & 4th brake cylinder seal.

CAUTION

- The 2nd & 4th brake cylinder seal is a non-reusable part. Hence, even in the case of OK, replace the seal.

Σ8. Replacement of valve body

Refer to Page F3-25.

SPECIFIED VALUE: The vehicle returns to the normal state.

▼If OK, finish the trouble shooting.
▼If NG, repair or replace the A/T Ay.

(10) The clutch is slipping during the Ⓡ range running.

Σ1. Check of oil level

Refer to Page F3-1.

▼If it is OK, go to step Σ2.
▼If NG, adjust the oil level.

Σ2. Check and adjustment of control cable

Refer to Page F3-2.

▼If it is OK, go to step Σ3.
▼If NG, adjust the control cable.

Σ3. Manual running test

1.Disconnect the connector of the A/T ECU. Check the gear position of each range.
▼If it is OK, go to step Σ4.
▼If it is NG, go to step Σ5.
SPECIFIED VALUE:

Range	Ⓟ·Ⓝ	Ⓓ	Ⓡ
Gear position	Neutral	3rd	Reverse

Σ4. Check of ECU power supply circuit

Refer to Page A1-24.

▼If OK, replace the A/T ECU. After the replacement, if the malfunction persists, proceed to the Σ5.
▼If NG, repair the connector or circuit concerned.

Σ5. Check of strainer

1.Remove the oil pan and strainer. Check the strainer O-ring for cut or wear.
▼If it is OK, go to step Σ6.
▼If NG, replace the O-ring of the strainer.

CAUTION

- The O-ring is a non-reusable part. Hence, even in the case of OK, replace the O-ring.

Σ6. Check and adjustment of manual valve

1.Check that the manual valve groove is aligned with the hole at the valve body in the Ⓝ range.
Refer to Page F3-25.

▼If it is OK, go to step Σ7.
▼If NG, adjust the manual valve.

∑7. Check of solenoid No.3 and duty solenoid unit (Operation)
Refer to Page F5-77.

Refer to Page F5-77.

▼If it is OK, go to step ∑8.
▼If NG, replace the solenoid concerned.

∑8. Replacement of valve body
Refer to Page F3-25.

SPECIFIED VALUE: The vehicle returns to the normal state.

▼If OK, finish the trouble shooting.
▼If NG, repair or replace the A/T Ay.

(11) The vehicle starts to move in the Ⓟ or Ⓝ range.
∑1. Check and adjustment of control cable
Refer to Page F3-2.

▼If it is OK, go to step ∑2.
▼If NG, adjust the control cable.

∑2. Check and adjustment of manual valve
1.Remove the oil pan. Check that the manual valve groove is aligned with the hole at the valve body in the Ⓝ range.
Refer to Page F3-25.

CAUTION
- The oil pan is a non-reusable part.

▼If OK, replace the A/T Ay.
▼If NG, adjust the manual valve.

(12) When the engine speed is raised in the Ⓝ range, the vehicle starts to move.
1.Repair or replace the A/T Ay.

(13) The engine starts in ranges other than Ⓟ·Ⓝ.
∑1. Check and adjustment of neutral start switch
Refer to Page F3-3.

▼If it is OK, go to step ∑2.
▼If NG, adjust the neutral start switch position.

∑2. Check and adjustment of control cable
Refer to Page F3-2.

(14) No gear shifting takes place (Kept in the 1st gear)

∑1. Check of duty solenoid unit (Operation)

Refer to Page F5-77.

▼If OK, replace the valve body.

▼If NG, replace the duty solenoid.

(15) No gear shifting takes place (Kept in the 3rd gear)

∑1. Check of ECU power supply circuit

Refer to Page A1-24.

▼If OK, replace the A/T ECU.

▼If NG, repair the connector or circuit concerned.

(16) The vehicle starts off from the 2nd gear

∑1. Check of stop lamp switch unit

Refer to Page E3-36.

▼If it is OK, go to step ∑2.

▼If NG, replace the stop lamp switch.

∑2. Check of ECU power supply circuit

Refer to Page A1-24.

▼If OK, replace the A/T ECU.

▼If NG, repair the connector or circuit concerned.

(17) Gear shifting shock · time lag large (N→D)

∑1. Check of oil level

Refer to Page F3-1.

▼If it is OK, go to step ∑2.

▼If NG, adjust the oil level.

∑2. Check of stop lamp switch unit

Refer to Page E3-36.

▼If it is OK, go to step ∑3.

▼If NG, replace the stop lamp switch.

∑3. Check of ECU power supply circuit

Refer to Page A1-24.

▼If OK, replace the A/T ECU. After the replacement, if the malfunction persists, proceed to the ∑4.

▼If NG, repair the connector or circuit concerned.

Σ>4. Check of strainer

1.Remove the oil pan and strainer. Check the strainer O-ring for cut or wear.

▼If it is OK, go to step Σ>5.

▼If NG, replace the O-ring of the strainer.

CAUTION

- The O-ring is a non-reusable part. Hence, even in the case of OK, replace the O-ring.
- The oil pan is a non-reusable part.

Σ>5. Check of solenoid No.2, duty solenoid unit (Operation)

Refer to Page F5-77.

Refer to Page F5-77.

▼If it is OK, go to step Σ>6.

▼If NG, replace the solenoid concerned.

Σ>6. Replacement of valve body

Refer to Page F3-25.

SPECIFIED VALUE: The vehicle returns to the normal state.

▼If OK, finish the trouble shooting.

▼If NG, repair or replace the A/T Ay.

(18) Gear shifting shock · time lag large (N→R)

Σ>1. Check of oil level

Refer to Page F3-1.

▼If it is OK, go to step Σ>2.

▼If NG, adjust the oil level.

Σ>2. Check of ECU power supply circuit

Refer to Page A1-24.

▼If OK, replace the A/T ECU. After the replacement, if the malfunction persists, proceed to the Σ>3.

▼If NG, repair the connector or circuit concerned.

Σ>3. Check of strainer

1.Remove the oil pan and strainer. Check the strainer O-ring for cut or wear.

▼If it is OK, go to step Σ>4.

▼If NG, replace the O-ring of the strainer.

CAUTION

- The O-ring is a non-reusable part. Hence, even in the case of OK, replace the O-ring.
- The oil pan is a non-reusable part.

Σ>4. Check of solenoid No.3, duty solenoid unit (Operation)

Refer to Page F5-77.

▼If it is OK, go to step Σ>5.

▼If NG, replace the solenoid concerned.

⊃5. Replacement of valve body

Refer to Page F3-25.

SPECIFIED VALUE: The vehicle returns to the normal state.

▼If OK, finish the trouble shooting.
▼If NG, repair or replace the A/T Ay.

(19) Gear shifting shock · time lag large (1st⇄2nd)

∑>1. Check of oil level

Refer to Page F3-1.

▼If it is OK, go to step ∑>2.
▼If NG, adjust the oil level.

∑>2. Check of ECU power supply circuit

Refer to Page A1-24.

▼If OK, replace the A/T ECU. After the replacement, if the malfunction persists, proceed to the ∑>3.
▼If NG, repair the connector and circuit concerned.

∑>3. Check of strainer

1.Remove the oil pan and strainer. Check the strainer O-ring for cut or wear.
▼If it is OK, go to step ∑>4.
▼If NG, replace the O-ring of the strainer.

CAUTION
- The O-ring is a non-reusable part. Hence, even in the case of OK, replace the O-ring.
- The oil pan is a non-reusable part.

∑>4. Check of solenoid No.1 unit (Operation)

Refer to Page F5-77.

▼If it is OK, go to step ∑>5.
▼If NG, replace the solenoid No.1.

∑>5. Check of 2nd & 4th brake cylinder seal

Refer to Page F3-25.

1.Check the 2nd & 4th brake cylinder seal for cut or wear.
▼If it is OK, go to step ∑>6.
▼If NG, replace the 2nd & 4th brake cylinder seal.

CAUTION
- The 2nd & 4th brake cylinder seal is a non-reusable part.Hence, even in the case of OK, replace the seal.

∑>6. Replacement of valve body

Refer to Page F3-25.

SPECIFIED VALUE: The vehicle returns to the normal state.

▼If OK, finish the trouble shooting.
▼If NG, repair or replace the A/T Ay.

(20) Gear shifting shock · time lag large (2nd⇄3rd)

∑>1. Check of oil level

Refer to Page F3-1.

▼If it is OK, go to step ∑>2.
▼If NG, adjust the oil level.

Σ2. Check of ECU power supply circuit

Refer to Page A1-24.

▼If OK, replace the A/T ECU. After the replacement, if the malfunction persists, proceed to the Σ3.
▼If NG, repair the connector or circuit concerned.

Σ3. Check of strainer

1.Remove the oil pan and strainer. Check the strainer O-ring for cut or wear.
▼If it is OK, go to step Σ4.
▼If NG, replace the O-ring of the strainer.

CAUTION
- The O-ring is a non-reusable part. Hence, even in the case of OK, replace the O-ring.
- The oil pan is a non-reusable part.

Σ4. Check of solenoid No.3 and solenoid No.1 unit (Operation)

Refer to Page F5-77.

Refer to Page F5-77.

▼If it is OK, go to step Σ5.
▼If NG, replace the solenoid concerned.

Σ5. Check of 2nd & 4th brake cylinder seal

Refer to Page F3-25.

1.Check the 2nd & 4th brake cylinder seal for cut or wear.
▼If it is OK, go to step Σ6.
▼If NG, replace the 2nd & 4th brake cylinder seal.

CAUTION
- The 2nd & 4th brake cylinder seal is a non-reusable part. Hence, even in the case of OK, replace the seal.

Σ6. Replacement of valve body

Refer to Page F3-25.

SPECIFIED VALUE: The vehicle returns to the normal state.

▼If OK, finish the trouble shooting.
▼If NG, repair or replace the A/T Ay.

(21) Gear shifting shock· time lag large (3rd⇄4th)

Σ1. Check of oil level

Refer to Page F3-1.

▼If it is OK, go to step Σ2.
▼If NG, adjust the oil level.

Σ2. Check of ECU power supply circuit

Refer to Page A1-24.

▼If OK, replace the A/T ECU. After the replacement, if the malfunction persists, proceed to the Σ3.
▼If NG, repair the connector or circuit concerned.

Σ3. Check of strainer

1.Remove the oil pan and strainer. Check the strainer O-ring for cut or wear.
▼If it is OK, go to step Σ4.
▼If NG, replace the O-ring of the strainer.

CAUTION
- The O-ring is a non-reusable part. Hence, even in the case of OK, replace the O-ring.
- The oil pan is a non-reusable part.

Σ4. Check of solenoid No.1, solenoid No.2 and switch solenoid unit (Operation)

Refer to Page F5-77.

Refer to Page F5-77.

Refer to Page F5-78.

▼If it is OK, go to step Σ5.
▼If NG, replace the solenoid concerned.

Σ5. Check of the 2nd & 4th brake cylinder seal

Refer to Page F3-25.

1.Check the 2nd & 4th brake cylinder seal for cut or wear.
▼If it is OK, go to step Σ6.
▼If NG, replace the 2nd & 4th brake cylinder seal.

CAUTION
- The 2nd & 4th brake cylinder seal is a non-reusable part. Hence, even in the case of OK, replace the seal.

Σ6. Replacement of valve body

Refer to Page F3-25.

SPECIFIED VALUE: The vehicle returns to the normal state.

▼If OK, finish the trouble shooting.
▼If NG, repair or replace the A/T Ay.

(22) Engine racing during gear shifting (2nd→3rd

Σ1. Check of solenoid No.1 unit (Operation)

Refer to Page F5-77.

▼If it is OK, go to step Σ2.
▼If NG, replace the solenoid No.1.

Σ2. Check of ECU power supply circuit
Refer to Page A1-24.

▼If OK, replace the A/T ECU. After the replacement, if the malfunction persists, proceed to the Σ3.
▼If NG, repair the connector or circuit concerned.

Σ3. Check of 2nd & 4th brake cylinder seal
Refer to Page F3-25.

1.Check the 2nd & 4th brake cylinder seal for cut or wear.
▼If it is OK, go to step Σ4.
▼If NG, replace the 2nd & 4th brake cylinder seal.
CAUTION
- The 2nd & 4th brake cylinder seal is a non-reusable part. Hence, even in the case of OK, replace the seal.

Σ4. Replacement of valve body
Refer to Page F3-25.

SPECIFIED VALUE: The vehicle returns to the normal state.

▼If OK, finish the trouble shooting.
▼If NG, repair or replace the A/T Ay.

(23) The engine racing during the gear shifting (3rd→4th)
Σ1. Check of solenoid No.2 unit (Operation)
Refer to Page F5-77.

▼If it is OK, go to step Σ2.
▼If NG, replace the solenoid No.2.

Σ2. Check of ECU power supply circuit
Refer to Page A1-24.

▼If OK, replace the A/T ECU. After the replacement, if the malfunction persists, proceed to the Σ3.
▼If NG, repair the connector or circuit concerned.

Σ3. Check of 2nd & 4th brake cylinder seal
Refer to Page F3-25.

1.Check the 2nd & 4th brake cylinder seal for cut or wear.
▼If it is OK, go to step Σ4.
▼If NG, replace the 2nd & 4th brake cylinder seal.
CAUTION
- The 2nd & 4th brake cylinder seal is a non-reusable part. Hence, even in the case of OK, replace the seal.

⊳4. Replacement of valve body

Refer to Page F3-25.

SPECIFIED VALUE: The vehicle returns to the normal state.

▼If OK, finish the trouble shooting.
▼If NG, repair or replace the A/T Ay.

(24) The gear shifting takes place only for 1st⇄3rd

⊳1. Check of ECU power supply circuit

Refer to Page A1-24.

▼If OK, replace the A/T ECU. After the replacement, if the malfunction persists, proceed to the ⊳2.
▼If NG, repair the connector or circuit concerned.

⊳2. Replacement of valve body

Refer to Page F3-25.

SPECIFIED VALUE: The vehicle returns to the normal state.

▼If OK, finish the trouble shooting.
▼If NG, repair or replace the A/T Ay.

3-15 UNIT CHECK

3-15-1 TURBINE REVOLUTION SENSOR,OUTPUT REVOLUTION SENSOR

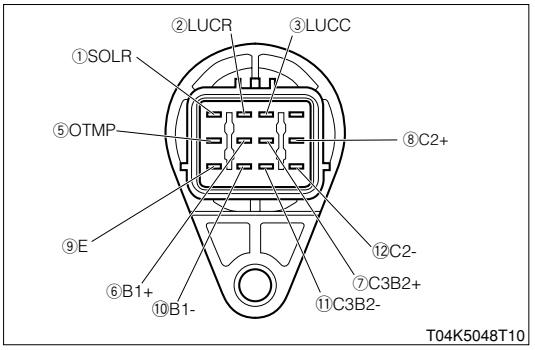
1. As for the turbine revolution sensor and output revolution sensor, it is impossible to evaluate good/bad of their individual performance because of their construction. Hence, make a total evaluation, using the trouble-shooting according to diagnosis codes (No.37, 42) and transmission control computer input / output signal check (Oscilloscope waveform).

Refer to Page F5-31.

Refer to Page F5-34.

Refer to Page F5-79.

3-15-2 SOLENOID WIRE AY (INCLUDING OIR TEMPERATURE SENSOR)



(1) In-vehicle Check

1.Disconnect the solenoid connector of the transaxle.

2.Connect the SST to the transaxle.

SST: 09990-97201-000

3.Check of switch solenoid system

(1) Measure the resistance between the ①SOLR and the transmission ground.

SPECIFIED VALUE: 16±2.0Ω(at time of 20°C)

(2) Connect the battery positive terminal to the ①SOLR terminal. Connect the battery negative terminal to the transmission ground. Check the solenoid for operating sound.

SPECIFIED VALUE: Emits a clicking sound.

CAUTION

- No spring is included in the switch solenoid valve. Therefore, when it is necessary to operate it again after it has been operated, once start the engine in the P range. Then, after stopping, redo the operation.
- The operating sound is very small. Hence, it is necessary to apply a sound scope or the like to the oil pan so as to confirm it.

4.Check of LUC solenoid system

(1) Measure the resistance between the ② LUCR and the transmission ground

SPECIFIED VALUE: 16±2.0Ω(At time of 20°C)

(2) Connect the battery positive terminal to the ②LUCR. Connect the battery negative terminal to the transmission ground. Check the solenoid for operating sound.

SPECIFIED VALUE: Emits a clicking sound.

CAUTION

- No spring is included in the switch solenoid valve. Therefore, when it is necessary to operate it again after it has been operated, once start the engine in the P range. Then, after stopping, redo the operation.
- The operating sound is very small. Hence, it is necessary to apply a sound scope or the like to the oil pan so as to confirm it.

5.Check of duty solenoid system

(1) Measure the resistance between ③ LUCC and transmission ground.

SPECIFIED VALUE: 12±1Ω(at time of 20°C)

(2) Connect the battery positive terminal to the③LUCC.Connect the battery negative terminal to the transmission ground.Check the solenoid for operating sound.

SPECIFIED VALUE: Emits a clicking sound.

6.Check of oil temperature sensor system
(1) Measure the resistance between ⑤OTMP and ⑨E.
SPECIFIED VALUE: 5.63±0.56kΩ(0°C)
0.072±0.0022kΩ(140°C)

NOTE
- About 2.4kΩ(20°C)
  about 0.313kΩ(80°C)

CAUTION
- The final evaluation shall be carried out in the next unit check given below.

7.Check of solenoid No.1 system
(1) Measure the resistance between ⑥B1+ and ⑩B1−.
SPECIFIED VALUE: 5.3±0.3Ω(At time of 20°C)

(2) Connect the battery positive terminal to the ⑥B1+ with a bulb of 12V−21W interposed.Connect the battery negative terminal to the ⑩B1−. Check for the operating sound of the solenoid.
SPECIFIED VALUE: Emits a clicking sound.

CAUTION
- Never directly apply the battery voltage. (Do not allow a current of 1A or more to flow) Carry out the operation check through the specified bulb (resistance).
- If a current of 1A or more is allowed to flow, the solenoid characteristics will be changed.

8.Check of solenoid No.2 system
(1) Measure the resistance between the ⑧C2+ and the ⑫C2−.
SPECIFIED VALUE: 5.3±0.2Ω(at time of 20°C)

(2) Connect the battery positive terminal to the ⑧C2+ with a bulb of 12V−21W interposed. Connect the battery negative terminal to the ⑫C2−. Check for the operating sound of the solenoid.
SPECIFIED VALUE: Emits a clicking sound.

CAUTION
- Never directly apply the battery voltage. (Do not allow a current of 1A or more to flow.) Carry out the operation check through the specified bulb (Resistance).
- If a current of 1A or more is allowed to flow, the solenoid characteristics will be changed.

9.Check of solenoid No.3 system
(1) ⑦C3B2+ - ⑪C3B2−
SPECIFIED VALUE: 5.3±0.2Ω(At time of 20°C)

(2) Connect the battery positive terminal to the ⑦C3B2+ with a bulb of 12V−21W interposed. Connect the battery negative terminal to the ⑪C3B2−. Check for the operating sound of the solenoid.
SPECIFIED VALUE: Emits a clicking sound.

CAUTION

- Never directly apply the battery voltage. (Do not allow a current of 1A or more to flow.) Carry out the operation check through the specified bulb (Resistance).
- If a current of 1 A or more is allowed to flow, the solenoid characteristics will be changed.

(2) Unit Check

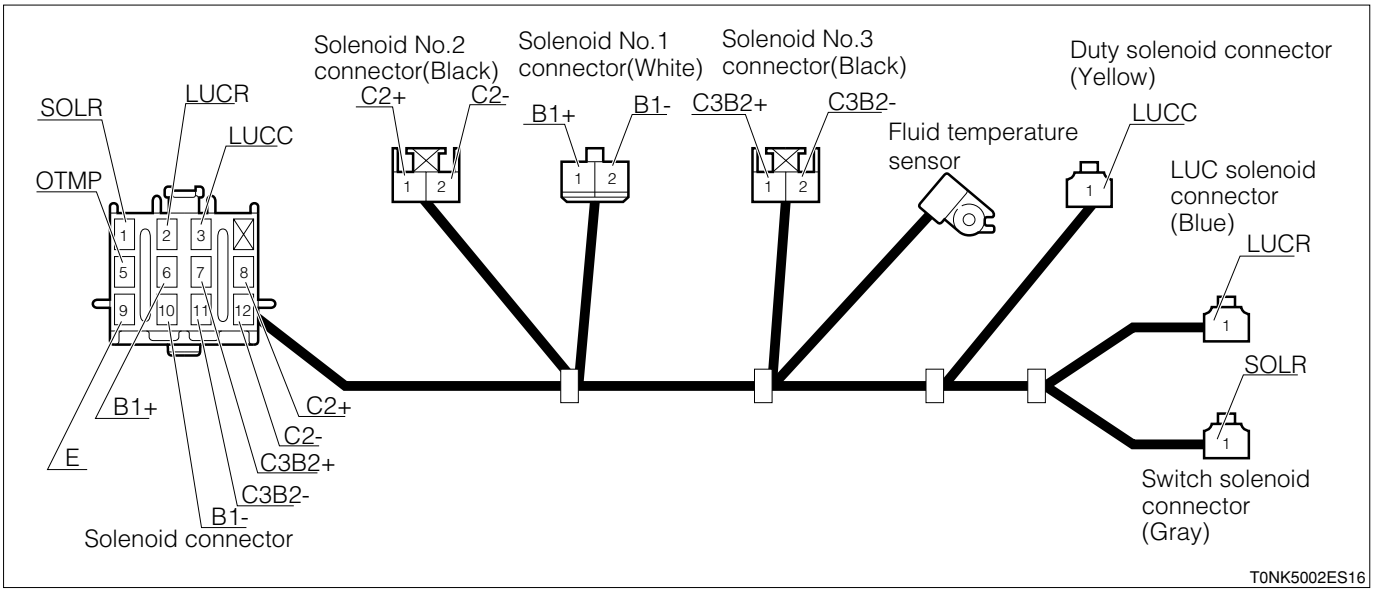
1.Remove the solenoid wire Ay from the transaxle.
Refer to Page F3-25.

2.Check continuity between the following terminals given below.
SPECIFIED VALUE: Continuity exists.

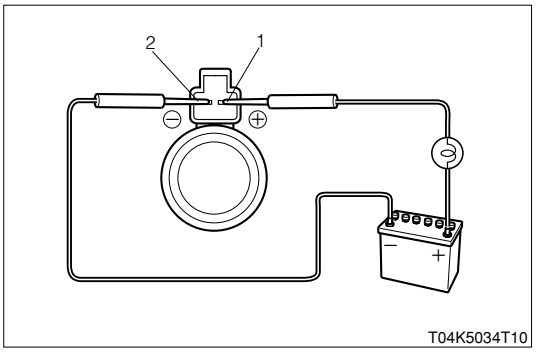
(1) Switch solenoid system
Between solenoid connector ① and switch solenoid connector ① (SOLR)
(2) LUC solenoid system
Between solenoid connector ② and LUC solenoid connector ① (LUCR)
(3) Duty solenoid system
Between solenoid connector ③ and duty solenoid connector ① (LUCC)
(4) Solenoid No.1 system
Between solenoid connector ⑥ and solenoid No.1 connector ① (B1+)
Between solenoid connector ⑩ and solenoid No.1 connector ② (B1−)
(5) Solenoid No.2 system
Between solenoid connector ⑧ and solenoid No.2 connector ① (C2+)
Between solenoid connector ⑫ and solenoid No.2 connector ② (C2−)
(6) Solenoid No.3 system
Between solenoid connector ⑦ and solenoid No.3 connector ① (C3B2+)
Between solenoid connector ⑪ and solenoid No.3 connector ② (C3B2−)

3.Oil temperature sensor system
(1) Measure the resistance between solenoid connectors ⑤OTMP and ⑨E.
SPECIFIED VALUE: 5.63±0.56kΩ(0°C)
0.072±0.0022kΩ(140°C)

4.Ensure that there is no short-circuit between connector terminals.



3-15-3 SOLENOID NO.1



1.Operation check

(1) Connect the battery positive terminal to the terminal 1 with a bulb of 12V−21W interposed. Connect the battery negative terminal to the terminal 2. Check that the valve inside the solenoid is working.

CAUTION

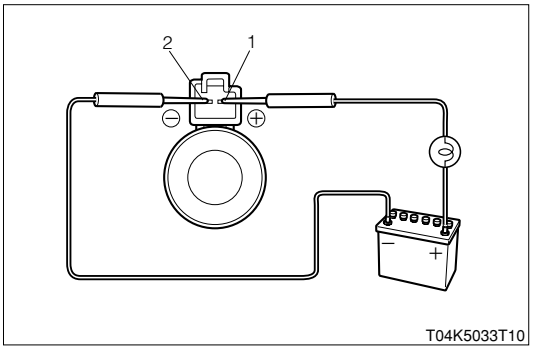
- Never directly apply the battery voltage. (Do not allow a current of 1A or more to flow.) Carry out the operation check through the specified bulb (Resistance)
- If a current of 1A or more is allowed to flow, the solenoid characteristics will be changed.

2.Resistance check

(1) Measure the resistance between terminals 1 and 2.

SPECIFIED VALUE: 5.3±0.3Ω(At time of 20°C)

3-15-4 SOLENOID NO.2, SOLENOID NO.3



1.Operation check

(1) Connect the battery positive terminal to the terminal 1 with a bulb of 12V−21W interposed. Connect the battery negative terminal to the terminal 2. Check that the valve inside the solenoid is working.

CAUTION

- Never directly apply the battery voltage. (Do not allow a current of 1A or more to flow.) Carry out the operation check through the specified valve (Resistance)
- If a current of 1 A or more is allowed to flow, the solenoid characteristics will be changed.

2.Resistance check

(1) Measure the resistance between the terminals 1 and 2.

SPECIFIED VALUE: 5.3±0.2Ω(At time of 20°C)

3-15-5 DUTY SOLENOID

1.Operation check

(1) Connect the battery positive terminal to the solenoid terminal. Connect the battery negative terminal to the solenoid body. Check that the valve inside the solenoid is working.

2.Resistance check

(1) Check the resistance between the solenoid terminal and solenoid body.

SPECIFIED VALUE: 12±1Ω(At time of 20°C)

3-15-6 LUC SOLENOID, SWITCH SOLENOID

1.Operation check

(1) Connect the battery positive terminal to the solenoid terminal. Connect the battery negative terminal to the solenoid body. Check that the valve inside the solenoid is working.

CAUTION

- No spring is included in the LUC solenoid, switch solenoid valve. Therefore, when you want to operate it again after it has been operated, shake the solenoid or return the valve position by pushing the ball. (When you want to return the valve position on the vehicle, start the engine in the P range.)

2.Resistance check

(1) Check the resistance between the solenoid terminal and solenoid body.

SPECIFIED VALUE: 16±2.0Ω (at time of 20°C)

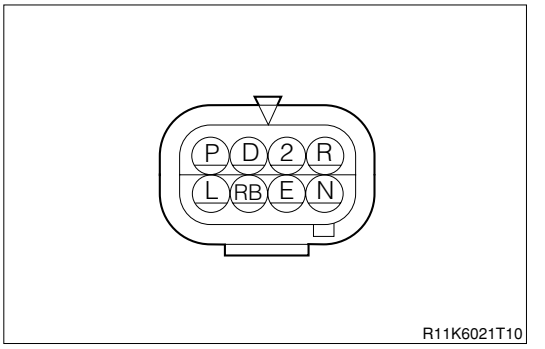
3-15-7 NEUTRAL START SWITCH

1.Carry out the continuity check, based on the connection table.

○—○:Continuity should exist

Shift position \ Terminal No.	E	R	RB	P	N	D	2	L
P	○			○				
R		○	○					
N	○				○			
D	○					○		
2	○						○	
L	○							○

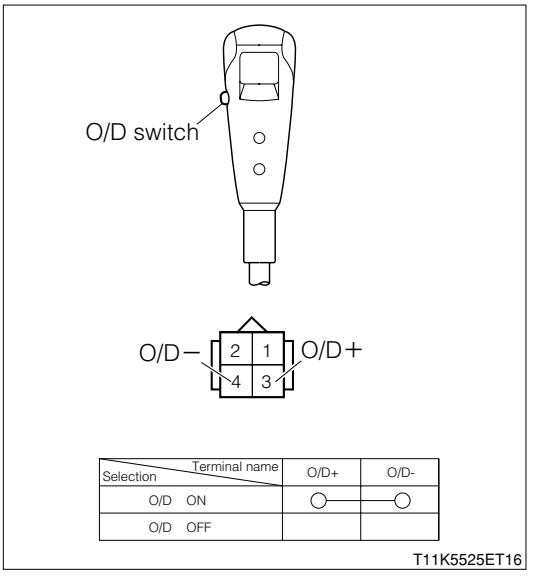
R11K6110EL10



R11K6021T10

3-15-8 O/D OFF SWITCH

1.Carry out the continuity check, based on the connection table.



Selection \ Terminal name	O/D+	O/D-
O/D ON	○	○
O/D OFF		

T11K5525ET16

3-16 ECU INPUT/OUTPUT SIGNAL CHECK

3-16-1 CHECKING METHOD

1. Check the voltage, pulse and continuity between each terminal, using the SST.
   SST: 09842-97215-000

2. As for those items where no specific measuring conditions are provided, perform checks with the engine stopped and the IG SW turned ON.

3-16-2 SPECIFIED VALUE FOR INPUT/ OUTPUT SIGNAL

Check system	Terminal	Measuring condition	Specified value	Reference value (Example of measured value)
Turbine revolution sensor	C10(RTBN)~B24(E1)	When the engine is idling	Pulse generation	※
Output revolution sensor	C8(ROPT)－B24(E1)	At the time when the vehicle speed is 20 km/h	Pulse generation	※
Turbine revolution sensor power supply	C9(VBTB)－B24(E1)	Engine stopped, IG SW turned ON	Battery voltage	13.3V
Output revolution sensor power supply	C7(VBOP)－B24(E1)	Engine stopped, IG SW turned ON	Battery voltage	13.3V
Engine revolution signal	B8(REG1)－B24(E1)	When the engine is idling	Pulse generation	※
NEUTRAL START SWITCH	C15(P)－B24(E1)	Ⓟ range	About 0V	0V
		Except for Ⓟ range	Battery voltage	12.1V
	B7(R)－B24(E1)	Ⓡ range	Battery voltage	11.2V
		Except for Ⓡ range	About 0V	0V
	C24(N)－B24(E1)	Ⓝ range	About 0V	0V
		Except for Ⓝ range	Battery voltage	11.9V
	C17(D)－B24(E1)	Ⓓ range	About 0V	0V
		Except for Ⓓ range	Battery voltage	10.8V
	C16(2)－B24(E1)	② range	About 0V	0V
		Except for ② range	Battery voltage	12.4V
	C25(L)－B24(E1)	Ⓛ range	About 0V	0V
		Except for Ⓛ range	Battery voltage	12.3V
Oil temperature sensor system	C14(OTMP)－C13(ETMP)	At time when the oil temperature is 20℃	About 3.4V	－
		At the time when the oil temperature is 80℃	About 1.1V	
Solenoid No.1	C6(B1＋)－C5(B1－)	During non-energizing period	About 0V	0V
		During energizing period	Pulse generation	※
Solenoid No.2	C4(C2＋)－C3(C2－)	During non-energizing period	About 0V	0V
		During energizing period	Pulse generation	※
Solenoid No.3	C2(C3B2＋)－C1(C3B2－)	During non-energizing period	About 0V	0V
		During energizing period	Pulse generation	※
Duty solenoid	C23(LUCC)－B6(E01)	Lock-up OFF period	About 0V	0V
		Slip lock-up period	Pulse generation	※
LUC solenoid	C11(LUCR)－B6(E01)	During non-energizing period	About 0V	0V
		During energizing period	Battery voltage	12.6V
Switch solenoid	C12(SOLR)－B6(E01)	During non-energizing period	About 0V	0V
		During energizing period	Battery voltage	12.6V
Power supply	B3(＋B1)－B6(E01)	Engine stopped, IG SW turned ON	Battery voltage	12.3V
	B2(BAT1)－B6(E01)	At all times	Battery time	12.5V
	B1(BAT2)－B6(E01)	At all times	Battery voltage	12.5V
Ground	B7(R)－Body ground	At all times	Continuity exists.	Continuity exists.
	B6(E01)－Body ground	At all times	Continuity exists.	Continuity exists.
	B5(E02)－Body ground	At all times	Continuity exists.	Continuity exists.

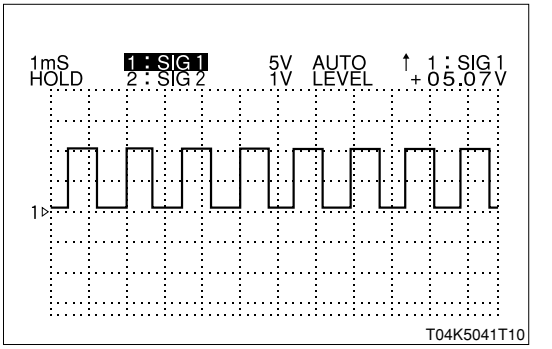
※:Refer to the oscilloscope waveforms indicated in the following Item given below.

3-16-3 OSCILLOSCOPE WAVEFORMS

Waveforms measured by the oscilloscope function of the diagnosis tester (DS-21) are shown below as reference.

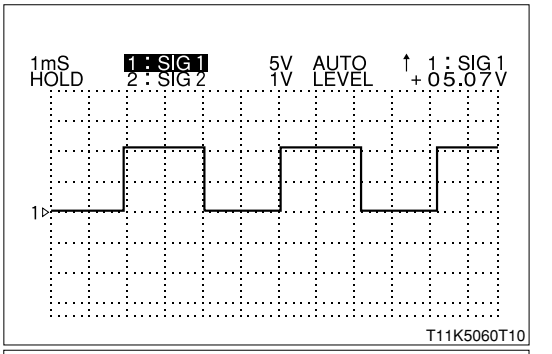
(1) Turbine revolution sensor

1. Measuring terminals C10(RTBN)—B24(E1)
2. Measuring conditions: During engine idling period: (Measured waveform is the one at the time of 1360rpm)
3. Measuring range : 5V (voltage axis), 1mS (time axis)
4. The more the turbine revolution speed, the shorter the period.



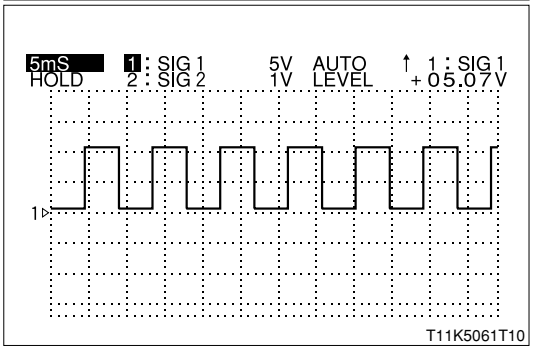
(2) Output revolution sensor

1. Measuring terminals C8(ROPT)—B24(E1)
2. Measuring conditions: The vehicle speed is about 20 km/h.
3. Measuring range : 5V (Voltage axis), 1mS (Time axis)
4. The more the output revolution speed (Vehicle speed), the shorter the period.



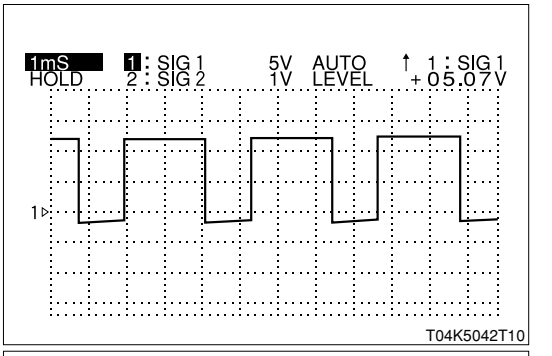
(3) Engine revolution signal waveform

1. Measuring terminals B8(REG1)—B24(E1)
2. Measuring conditions: During engine idling period: (Measurement waveform is the one at the time of 1100 rpm)
3. Measuring range : 5V (Voltage axis), 5mS (Time axis)
4. The more the engine revolution speed, the shorter the period.



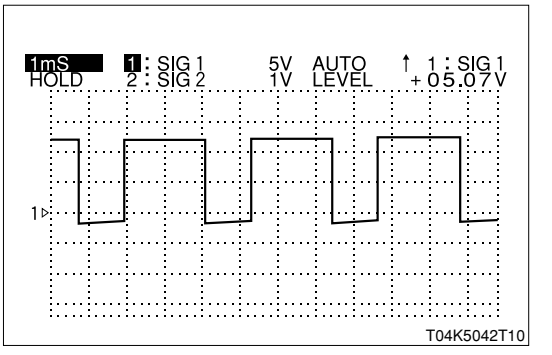
(4) Solenoid No.1

1. Measuring terminals C6(B1+)—C5(B1—)
2. Measuring conditions: During energizing period
3. Measuring range : 5V (Voltage axis), 1mS (Time axis)
4. The duty ratio becomes smaller during the gear shift transient period.
5. The waveform frequency: 300 Hz



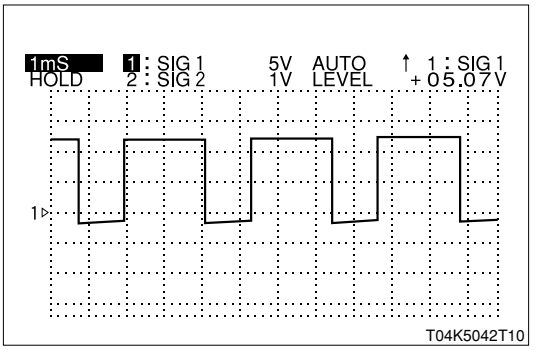
(5) Solenoid No.2

1. Measuring terminals C4(C2+)—C3(C2—)
2. Measuring conditions: During energizing period
3. Measuring range : 5V (Voltage axis), 1mS (time)
4. The duty ratio becomes smaller during the gear shift transient period.
5. The waveform frequency: 300 Hz



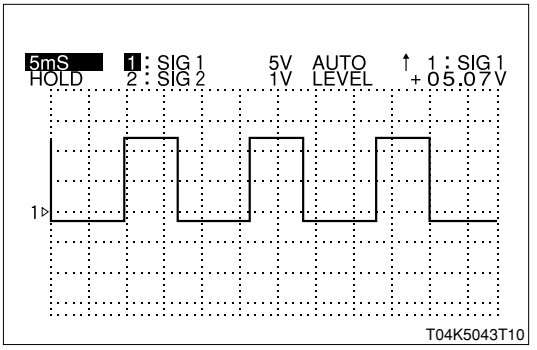
(6) Solenoid No.3

1.Measuring terminals C2(C3B2+)−C1(C3B2−)
2.Measuring conditions: During energizing period
3.Measuring range : 5V (Voltage axis), 1mS (Time axis)
4.The duty ratio becomes smaller during the gear shift transient period and line pressure regulating period
5.The waveform frequency: 300 Hz



(7) Duty solenoid

1.Measuring terminals C23(LUCC)−B6(E01)
2.Measuring conditions: Slip lock-up time period
3.Measuring range : 5V (Voltage axis), 5mS (Time axis)
4.The duty ratio becomes 100% during the direct lock-up period.
5.The waveform frequency: 60 Hz



FOREWORD

This service manual has been prepared to proved information covering general service repairs for the model M300 series manufactured in November, 2004 afterward.
For the service specifications and repair procedures of the model M300 series other than those listed in this manual, refer to the following manuals.

All information used in this service manual was in effect at time when the manual was printed. However, the specifications and procedures may be revised owing to continuing improvements in design without advance notice and without incurring any obligation to us.

Published in November, 2004

REFERENCE

MANUAL NAME	MANUAL NO.	PUBLISHED
TECHNICAL INFORMATION SIRION (M300 series)	No.9402	November, 2004
TYPE 1KR ENGINE SERVICE MANUAL	No.9893	November, 2004
SIRION (M300 series) WIRING SERVICE MANUAL	No.9891	November, 2004

No.9890

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STEERING COLUMN ---------- G1 - 5
REMOVAL AND INSTALLATION ------- G1 - 5

1 STEERING SYSTEM

1-1 INSTRUCTIONS FOR SERVICE OPERATION

CAUTION

- See the servicing instructions.

Refer to Page A1-26.

1-2 BASIC CHECK AND ADJUSTMENT

1-2-1 CHECK OF STEERING WHEEL

(1) Free play check

1.Set the tires to a straight-ahead state.
2.Start the engine and keep the engine idling.
3.Lightly turn the steering wheel by hand to the right and left. At this time, measure the free play (Amount of movement before the tires start moving) on the outer periphery of the steering wheel.
SPECIFIED VALUE: 0 - 10 mm

(2) Check of excessive play

1.Move the steering wheel in up-and-down, right-and-left and fore-and-aft directions by holding it by hand. At this time, check that no excessive play is present.

(3) Check of operating conditions

1.As for the operating conditions during running, check the following items to see if there is any abnormality.
(1) The steering wheel does not shake continuously during running at a constant speed.
(2) The vehicle does not pull to the right or left during running straight on a flat road.
(3) The steering effort is normal and does not vary considerably over the entire operating range.
(4) When returning to straightforward running after turning, there is no abnormally heavy steering effort or binding in steering operation.

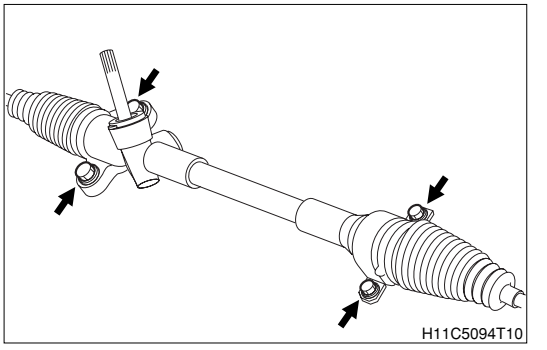
1-2-2 CHECK OF STEERING GEAR

(1) Operations prior to check

1.Jack up the vehicle.

(2) Check of tightening conditions

1.Check to see if any looseness exists at the installation of the steering gear and the front suspension member, using a spanner or the like.
2.With the tire touching the ground, let the assistant turn the steering wheel approx. 90 degrees to the right and left. Visually check to see if any looseness exists at the installation section between the steering gear and front suspension member.

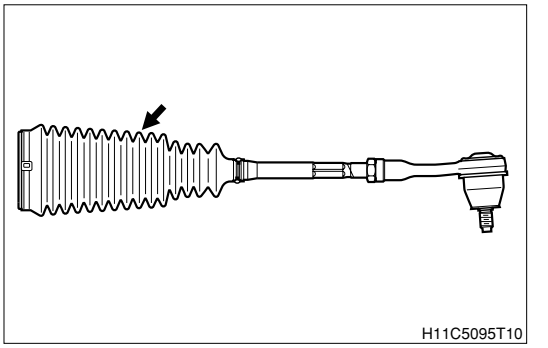


CAUTION

- Since the steering rack housing bracket LH is installed through the steering rack housing grommet LH, care must be exercised not to tighten excessively.
- If the steering wheel is turned with the vehicle stopped, movement is made only in the amount of deformation of the steering rack housing grommet. This should not be taken as looseness.

(3) Check of cracks and damage

1.Wipe off dirt on the boot. Check to see if there is crack, damage, disengagement or deterioration. If the boot has crack or damage, there might be rust formation at the gear, admission of foreign matters and lack of grease. Check these points, too.



1-2-3 CHECK OF STEERING TIE ROD S/A AND STEERING RACK END S/A

(1) Operations prior to check

Jack up the vehicle.

(2) Check of tightening condition and excessive play

1.Shake the moving sections by hand in the direction that the steering force is transmitted. Visually check the installing section for looseness and moving sections for excessive play.

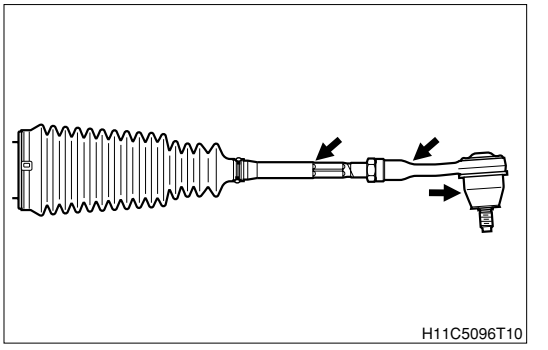
2.With the tire touching the ground, let the assistant turn the steering wheel approx. 90 degrees to the right and left. Visually check to see if any looseness exists at the installation section and excessive play exists at the moving sections.

(3) Check of cracks and damage

1.Visually check the following items.

(1) The steering tie rod end S/A and steering rack end S/A should have no damage nor bend.

(2) The dust boot of the ball joint of the steering tie rod end S/A should have no crack nor damage.



1-2-4 CHECK OF STEERING KNUCKLE

(1) Operations prior to check

1.Jack up the vehicle.

(2) Check of tightening conditions and excessive plays

1.Check the attaching bolts for the steering knuckle and front shock absorber for looseness. Also check the fitting section for excessive play.

(3) Check of ball joint for excessively play

1.With the brake pedal depressed, move the tire by holding the upper and lower parts of the tire. Check to see if the ball joint has excessive play.

2 STEERING WHEEL

2-1 REMOVAL AND INSTALLATION

CAUTION

- See the servicing instructions.

Refer to Page A1-26.

2-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

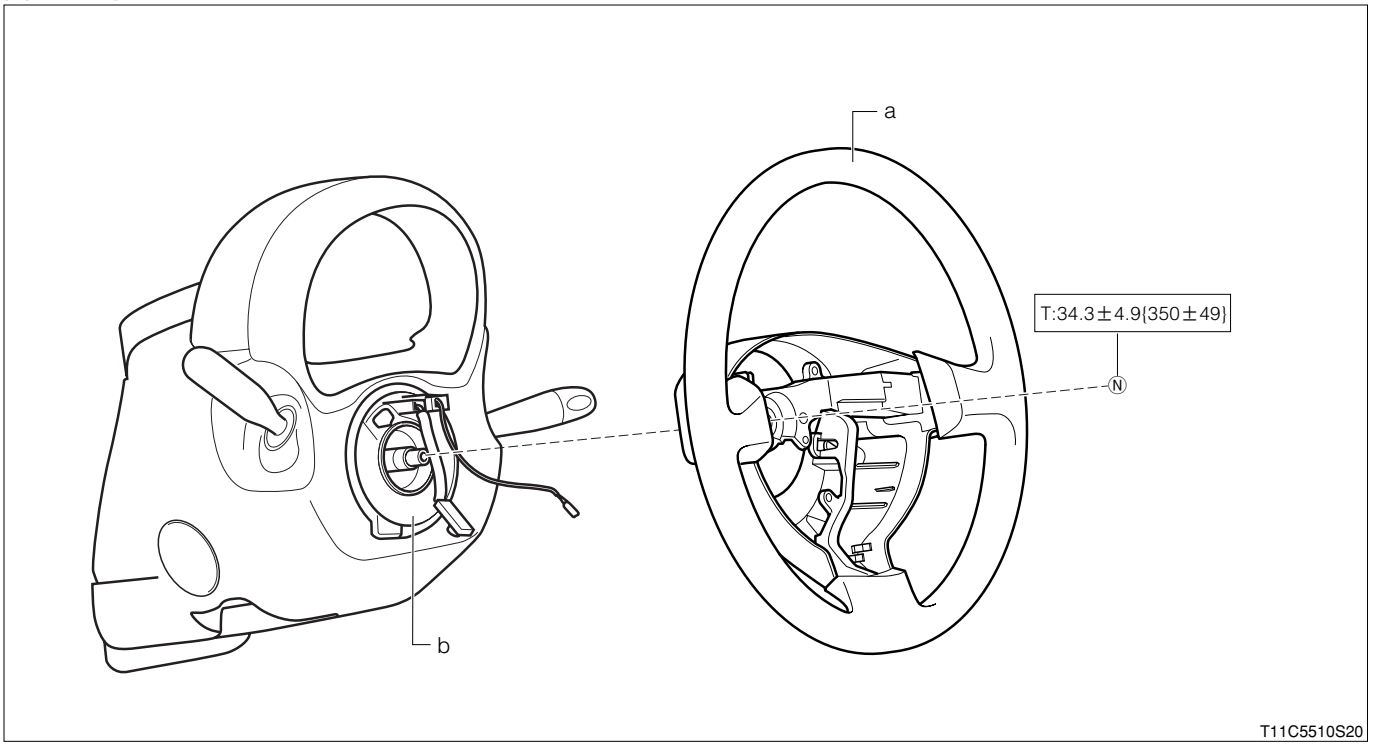
2-1-2 OPERATION BEFORE REMOVAL

1. After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2. Ensure that the steering wheel Ay is in the straight ahead condition.
3. Remove the steering pad Ay.

Refer to Page H1-1.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

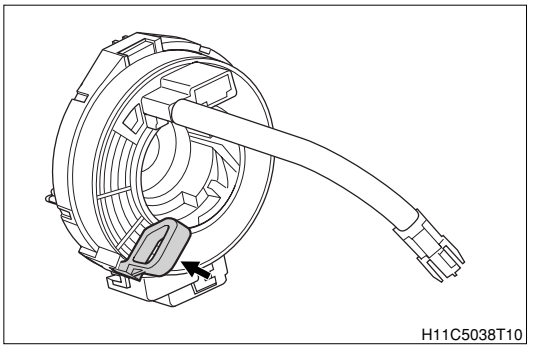
▲ 1 a Wheel S/A, steering
2 b Cable S/A, spiral

2-1-4 POINTS OF INSTALLATION

(1) Wheel S/A, steering

1. Ensure that the tires are in a straight-ahead state.
2. Align the center position of the spiral cable S/A.

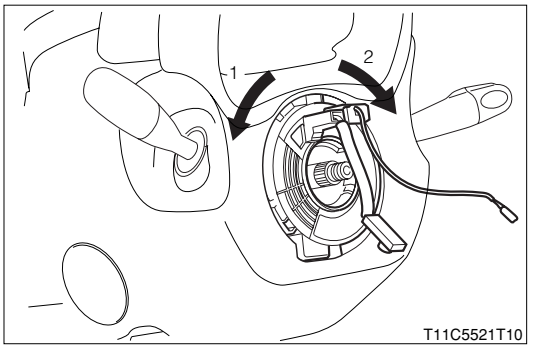
3.When installing the new spiral cable S/A, ensure that the neutral securing pin is not disengaged. Only if it is disengaged, perform the following operations.


H11C5038T10

(1) Turn the spiral cable S/A counterclockwise (Direction 1 in the right figure) until it is locked. Back off about three turns clockwise (Direction 2 in the right figure) from the lock position.

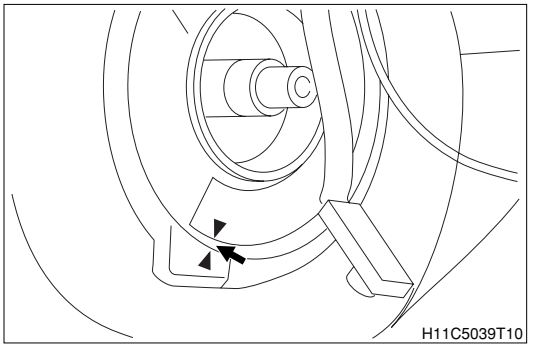
NOTE

- It should be noted that the number of lock-to-lock turns of the spiral cable subassembly is about six.



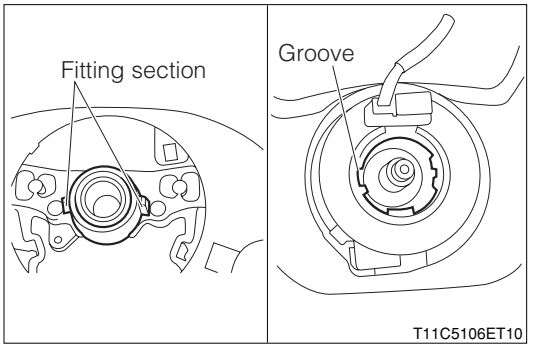
T11C5521T10

(2) Adjust the center position by turning the spiral cable subassembly in the direction close to the center mark.


H11C5039T10

4.Insert the wheel S/A completely as far as it will go. Turn it two or three time to the right and left so as to install it to the steering column tube Ay in such a way that the assembling groove at the spiral cable S/A side can align with the fitting section of the wheel S/A.

5.When a new spiral cable subassembly is installed, remove the neutral securing pin by breaking it.



T11C5106ET10

2-1-5 OPERATION AFTER INSTALLATION

1.Ensure that the steering wheel Ay is in the straight ahead condition.

2.Install the steering wheel pad Ay.

Refer to Page H1-1.

3.Connect the negative terminal of the battery.

4.After the IG SW has been set to "ON" position, ensure that the airbag warning lamp is illuminated for about 6 seconds and then remains extinguished afterward.

3 STEERING COLUMN

3-1 REMOVAL AND INSTALLATION

CAUTION

- Refer to the precaution on checking procedure.

Refer to Page A1-26.

3-1-1 ARTICLES TO BE PREPARED

Tool

Center ponch,Drill,Tap

Instrument

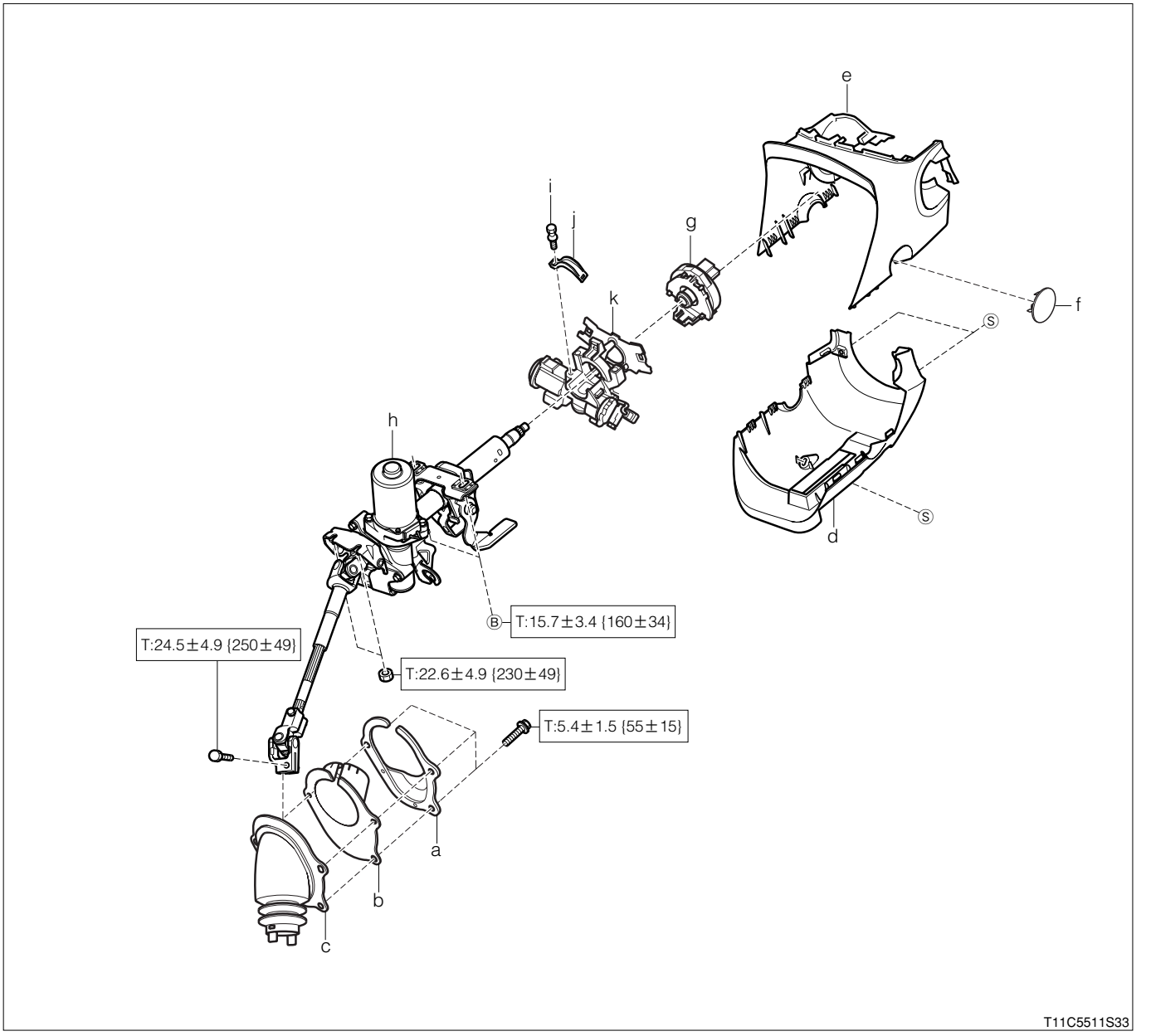
Torque wrench

3-1-2 OPERATION BEFORE REMOVAL

1. After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2. Remove the steering wheel pad Ay.
   Refer to Page H1-1.
3. Remove the steering wheel S/A.
   Refer to Page G1-3.
4. Remove the combination meter assembly.
   Refer to Page J3-3.
5. Remove the instrument cluster finish panel.
   Refer to Page I2-23.
6. Remove the instrument panel finish panel S/A lower.
   Refer to Page I2-23.
7. Turn over the carpet near the dust cover retainer.
   Refer to Page I2-57.
8. Remove the shift lock release cable Ay. (If so equipped)
   Refer to Page F3-38.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

- ▲ 1 a Retainer, dust cover
- 2 b Cover, dust
- 3 c Shield, steering column hole
- 4 d Cover, steering column, lower
- ▼ 5 e Cover, steering column, upper
- 6 f Spacer, columu cover
- 7 g Cable S/A, spiral
- ▼ ▲ 8 h Tube Ay, steering column
- 9 i bolt, steering lock set
- 10 j Housing, steering column, upper
- ▼ ▲ 11 k Bracket Ay, steering column upper, w/switch

3-1-4 POINTS OF REMOVAL

(1) Cover, steering column, upper

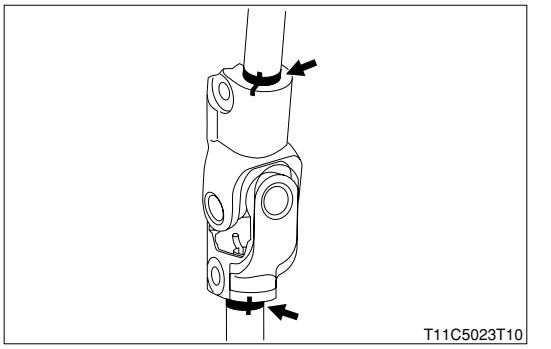
1.Unlock the operation lever of the tilt mechanism. Lower the steering column tube Ay fully and remove the cover.

(2) Tube Ay, steering column

1.Put mating marks on the joint section of the universal joint section.
2.Disconnect the connector of each harness.
3.Be sure to lock the operating lever of the tilt mechanism. Then, remove the tube Ay.

CAUTION

- Do not operate the operating lever of the tilt mechanism when the tube Ay is in the unit state.


T11C5023T10

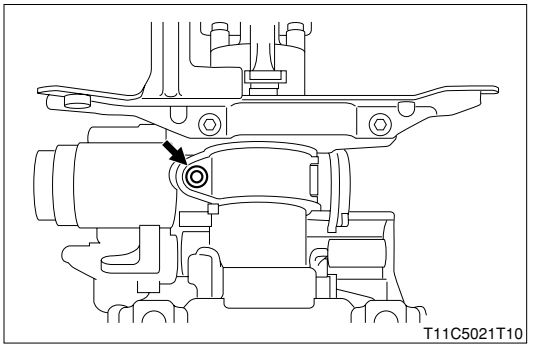
(3) Bracket Ay, steering column upper w/ swich

1.Remove the lever Ay in the following procedure.
(1) Make a hole, using a drill, to such an extent that the reverse tapping of the steering lock set bolt is possible.

TOOL: Center ponch
Drill

(2) Remove the steering lock set bolt, using the reverse tapping. Then, remove the lever assembly.

TOOL:

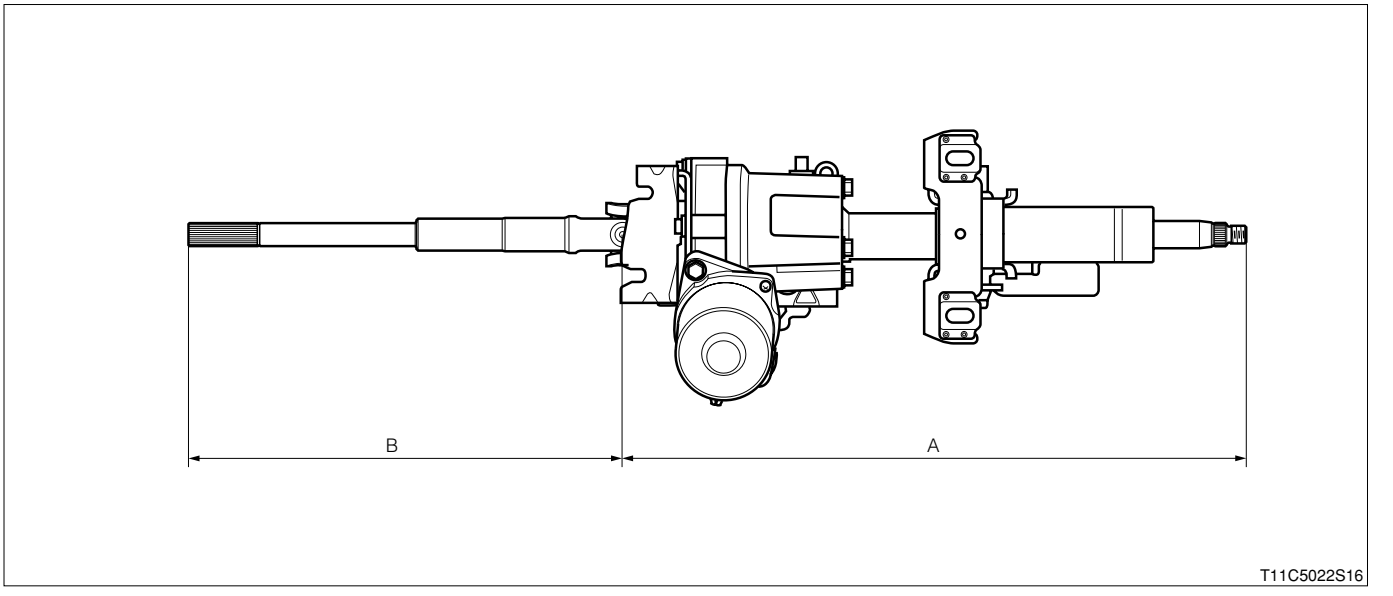

T11C5021T10

3-1-5 INSPECTION

(1) Tube Ay, steering column

Since the tube Ay has impact absorbing construction, measure the dimensions A and B shown in the figure below after the removal. If they are considerably short, replace the assembly.

SPECIFIED VALUE: A:430.7mm
B:301.0mm



T11C5022S16

3-1-6 POINTS OF INSTALLATION

(1) Bracket Ay, steering column upper w/swich

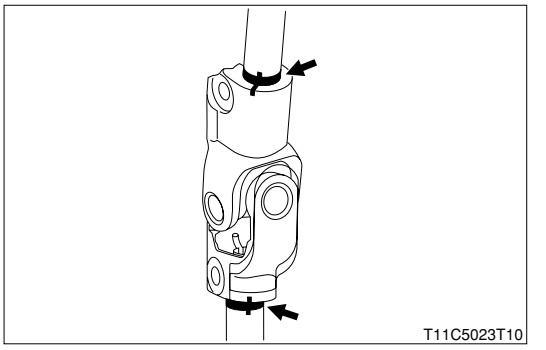
1.Install a new steering lock set bolt. Tighten it, until the head of the bolt is cut off.

(2) Tube Ay, steering column

1.Perform the installation while aligning the mating mark of the steering gear assembly with that of the tube assembly.

CAUTION

- Ensure that there are no foreign matters.



2.Ensure that the operating lever of the tilt mechanism is locked.

CAUTION

- Do not operate the operating lever of the tilt mechanism when the tube Ay is in the unit state.

NOTE

- If the tilt mechanism is operated, the impact absorption construction of the tube Ay is actuated during the installation and the tube Ay contracts.

3.Temporarily tighten the nut (a) of the lower side bracket of the tube Ay.

4.Temporarily tighten the bolt (b) of the upper side bracket of the tube Ay.

5.Completely tighten the nut (a) of the lower side bracket of the tube Ay. Then, completely tighten the bolt (b) of the upper side bracket.

6.Loosen the bolt (2) indicated in the right figure.

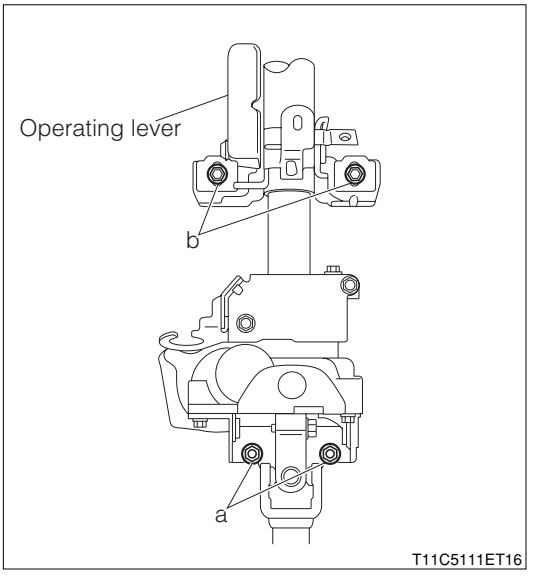
7.Temporarily install the bolts (1) and (2) shown in the right figure in this order. Then, tighten the bolts (1) and (2) again to the specified torque in this order.

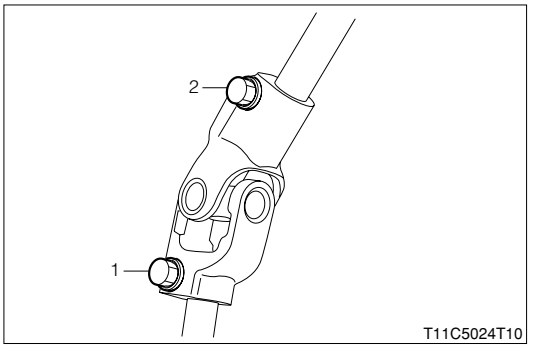
TIGHTENING TORQUE: 24.5±4.9N·m
{250±49kgf·cm}

CAUTION

- Be sure to start the installation of bolts from the direction where the spot facing of the joint Ay is present.

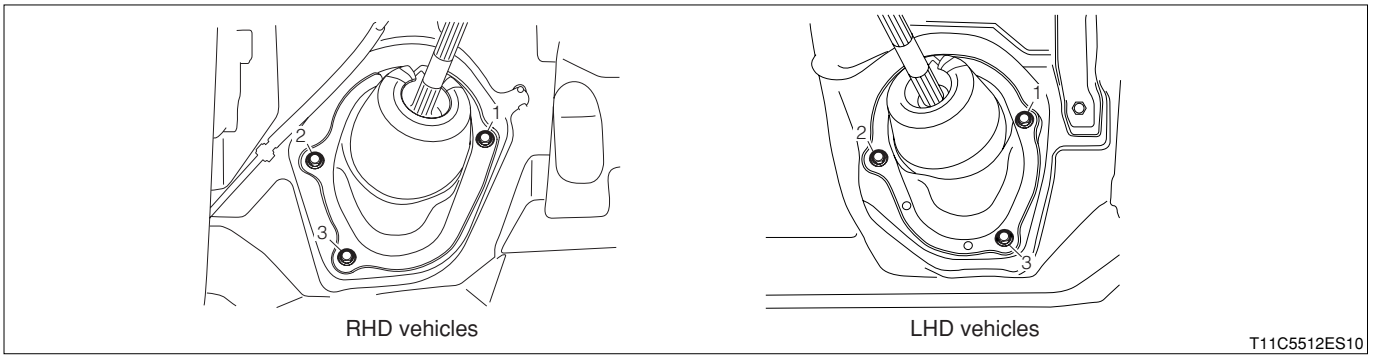
8.Connect the connector to each harness, etc.





(3) Retainer, dust cover

1.Tighten the retainer attaching bolts to the specified torque in the sequence of (1), (2) and (3) as shown in the figure below.



3-1-7 OPERATION AFTER INSTALLATION

1.Install the shift lock release cable Ay. (If so equipped)
Refer to Page F3-38.

2.Place the carpet near the dust cover retainer.
Refer to Page I2-57.

3.Install the instrument panel finish panel S/A lower.
Refer to Page I2-23.

4.Install the instrument cluster finish panel.
Refer to Page I2-23.

5.Install the combination meter assembly.
Refer to Page J3-3.

6.Install the steering wheel S/A.
Refer to Page G1-3.

7.Ensure that the steering wheel Ay is in the straight ahead condition.
8.Install the steering wheel pad Ay.
Refer to Page H1-1.

9.Connect the negative terminal of the battery.
10.After the IG SW has been set to "ON" position, ensure that the airbag warning lamp is illuminated for about 6 seconds and then remains extinguished afterward.
11.Check the shift lock operation check. (If so equipped)
Refer to Page F3-37.

12.Check of key-interlocking mechanism check. (If so equipped)
Refer to Page F3-37.

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■ ELECTRIC POWER STEERING

1 ELECTRONIC CONTROLLED POWER STEERING

1-1 INSTRUCTIONS FOR SERVICE OPERATION

CAUTION

- See the servicing instructions.

Refer to Page A1-26.

2 STEERING COLUMN

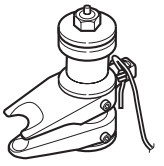
Refer to Page G1-5.

3 STEERING GEAR

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09628-00011-000 (09611-87701-000)	Puller,tie-rod end

Instrument

Torque wrench

Lubricant,adhesive,others

Wooden block

3-1-2 OPERATION BEFORE REMOVAL

1.Separate the joint at the steering gear assembly side of the steering shaft universal joint assembly No.2.
Refer to Page G1-5.

2.Push out the steering column hole shield to the vehicle outside under a condition where it is attached to the steering gear assembly.
3.Lift up the vehicle.
4.Remove the disc wheels. (Front)
Refer to Page C3-3.

5.Remove the front RH/LH speed sensor from the RH/LH steering knuckle. (ABS-equipped vehicles)
Refer to Page E3-4.

6.Remove the front RH/LH disc brake caliper Ay and hang it with a wire or the like.
Refer to Page E1-53.

7.Remove the Front disc.
Refer to Page E1-60.

8.Separate the stabilizer link from the suspension lower arm S/A RH/LH with bush.
Refer to Page C1-14.

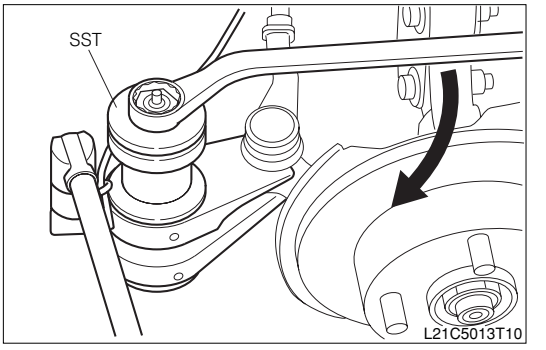
9.Remove the nuts of the front drive shaft Ay RH/LH.
Refer to Page D2-8.

10.Using the SST, disconnect the RH/LH steering knuckle and ball joint section of the RH/LH tie rod end S/A.

CAUTION

- When setting the SST, attach a dummy nut to the threaded portion of the tie-rod end S/A RH/LH so that the threaded portion may not be damaged.
- Hang the SST using a cord.

SST: 09628-00011-000



11.Disconnect the front shock absorber Ay and RH/LH steering knuckle.
Refer to Page C1-6.

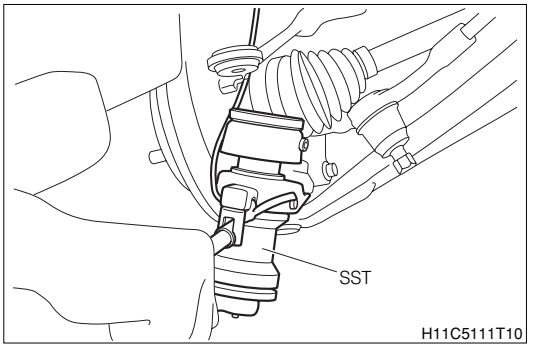
12.Pull out the RH/LH front drive shaft Ay from the RH/LH steering knuckle and hang it with a wire.
Refer to Page D2-8.

13.Using the SST, disconnect the RH/LH steering knuckle and ball joint section of the RH/LH suspension lower arm S/A with bush.

CAUTION

- When setting the SST, attach a dummy nut to the threaded portion of the RH/LH suspension lower arm S/A with bush so as to protect the threaded portion from damage.
- Hang the SST using a cord.

SST: 09628-00011-000



14.Remove the exhaust front pipe Ay.

(1) Vehicle mounted with Type 1KR engine

Refer to Page B4-3.

(2) Vehicle mounted with Type K3 engine

Refer to Page B4-6.

15.Remove the transmission floor shift Ay. (M/T vehicle)

Refer to Page F2-15.

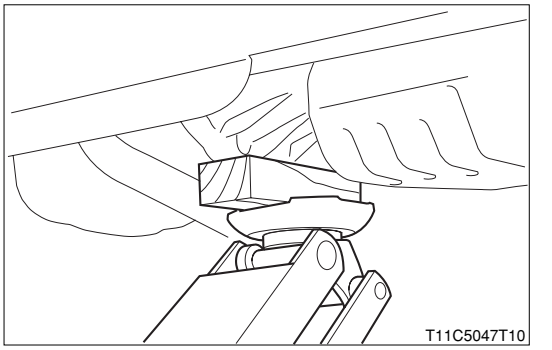
16.Remove the transmission control cable Ay. (A/T vehicle)

Refer to Page F3-34.

17.Apply a garage jack to the joint section between the engine Ay and the manual transaxle Ay/automatic transaxle Ay to support.

CAUTION

- When applying a garage jack, be sure to interpose a wooden block or cloth so as not to scratch the parts.
- Care should be exercised so that the engine will not get lowered while being supported by the garage jack.



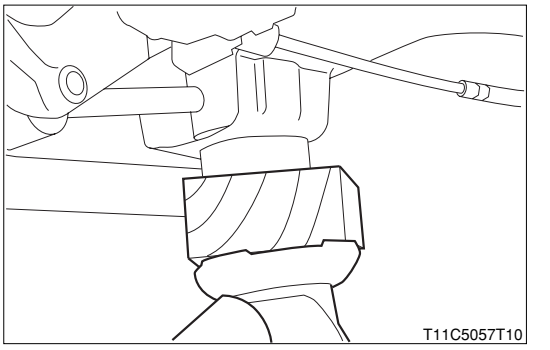
18.Remove the bolts that secure the rear engine mounting bracket with the engine mounting control rod S/A.

Refer to Page B12-7.

19.Apply a garage jack to the jack point of the front suspension cross member S/A.

CAUTION

- When applying a garage jack, be sure to interpose a wooden block or cloth so as not to scratch the parts.



20.Remove the front suspension cross member S/A with the following parts installed.

(1) Arm S/A, suspension lower w/bush, RH/LH

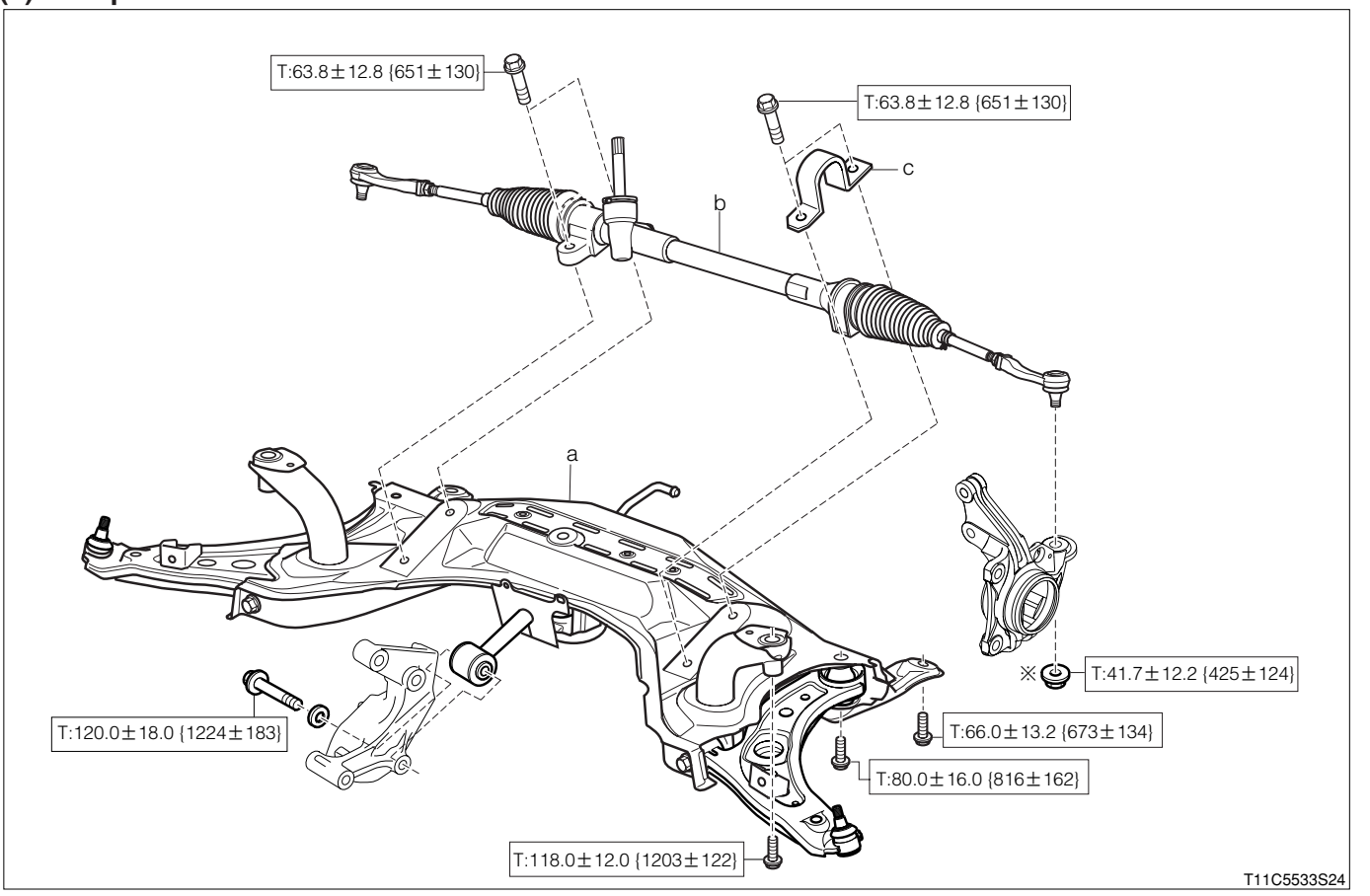
(2) Gear Ay, steering

(3) Cover, engine mounting hole (Cold region specification vehicle)

(4) Rod S/A, engine mounting control

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※: Non-reusable parts
Unit: N·m{kgf·cm}

(2) Removal procedures

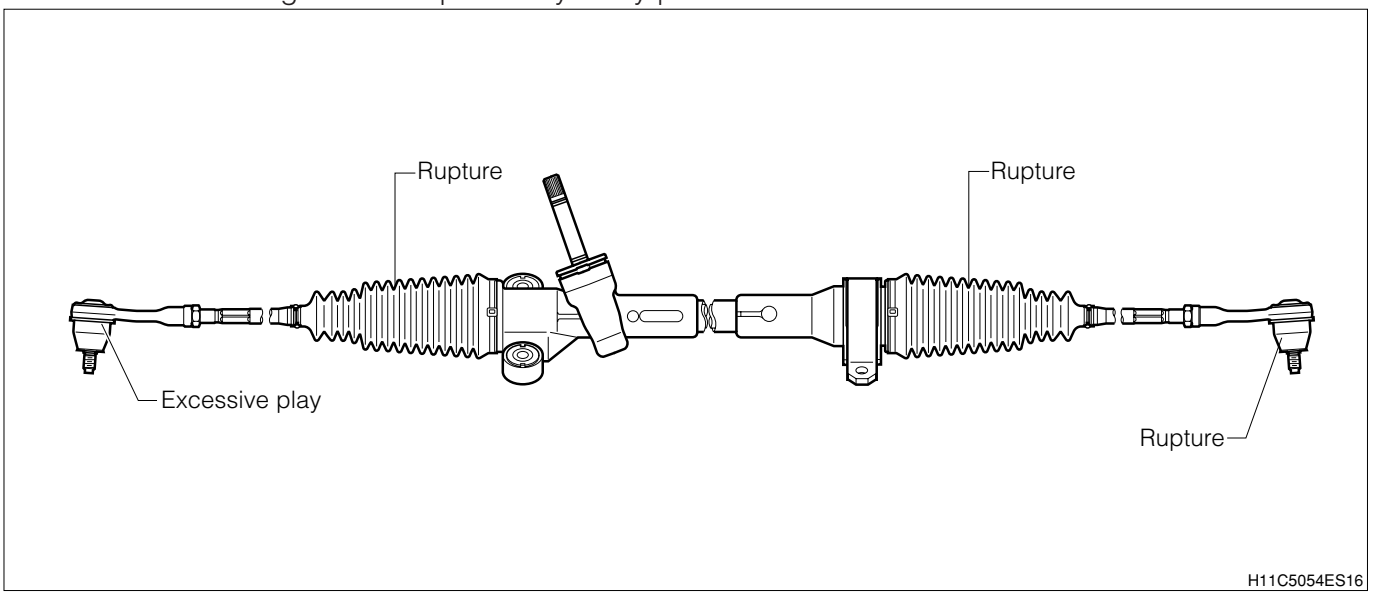
1 a Crossmember S/A, front suspension
2 b Gear assembly, steering
3 c Bracket, steering rack housing

(3) Installation procedures

1 a Crossmember S/A, front suspension
▲ 2 c Bracket, steering rack housing
▲ 3 b Gear assembly, steering

3-1-4 INSPECTION

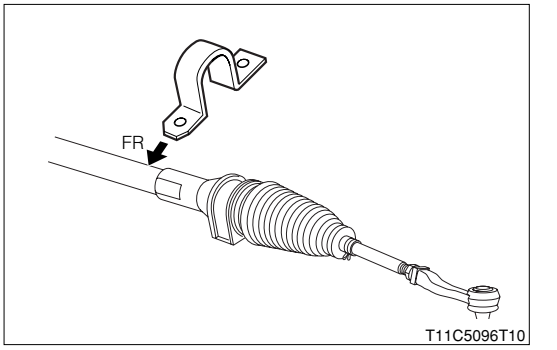
1.Check the following items. Replace any faulty part.



3-1-5 POINTS OF INSTALLATION

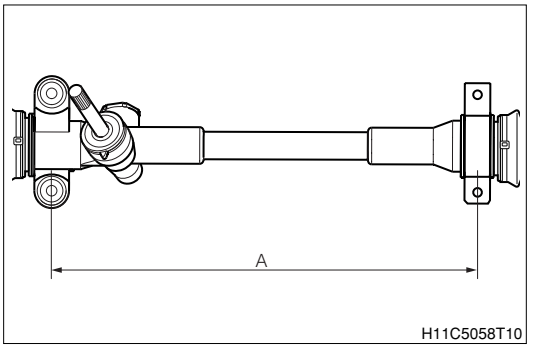
(1) Bracket, steering rack housing

1.Install the bracket to the steering gear Ay in such a way that the side with a cut out section comes at the vehicle front.



NOTE

- If you are uncertain about the installation position of the bracket at the left side, the installation should be performed in such a way that the dimensions A indicated in the figure on the right becomes 502±1 mm from the reference point of the installation hole on the power steering rack housing assembly.

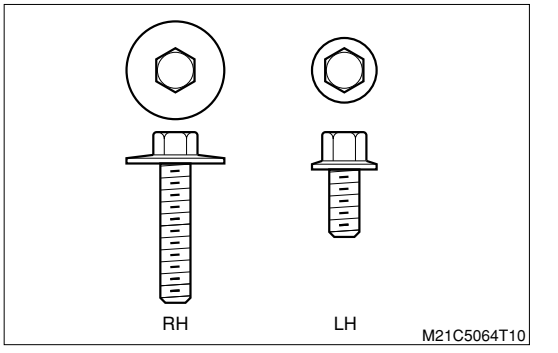


(2) Gear Ay, steering

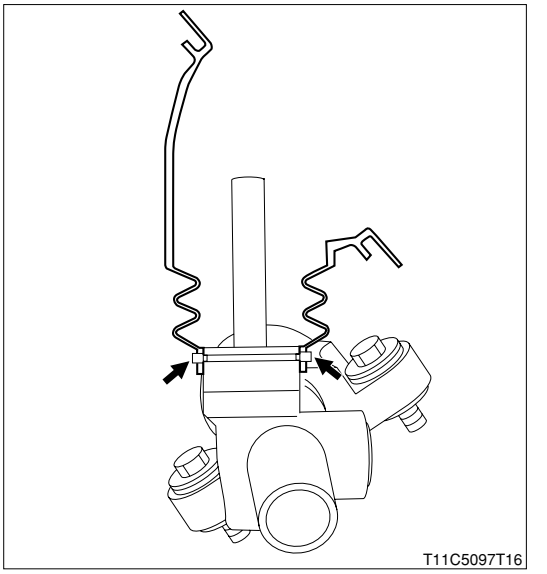
1.Install the gear Ay to the front suspension cross member S/A.

CAUTION

- Make sure that the right and left attaching bolts are installed at the correct positions, for the right and left bolts are different from each other.

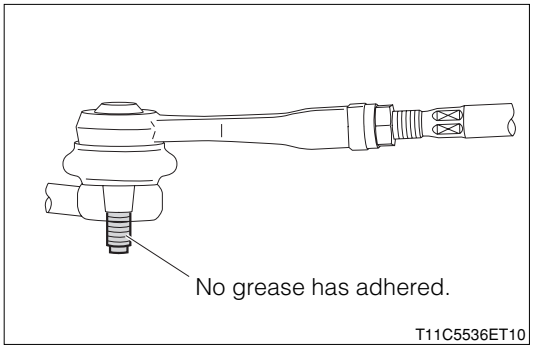


2.Install the steering column hole shield to the protrusion of the gear Ay.
3.Install the ball joint section of the RH/LH steering tie rod end S/A to the RH/LH steering knuckle.


T11C5097T16

CAUTION

- Ensure that no oil nor grease gets to the ball joint section of the RH/LH steering tie-rod end S/A. If any oil or grease gets to that section, degrease there completely.

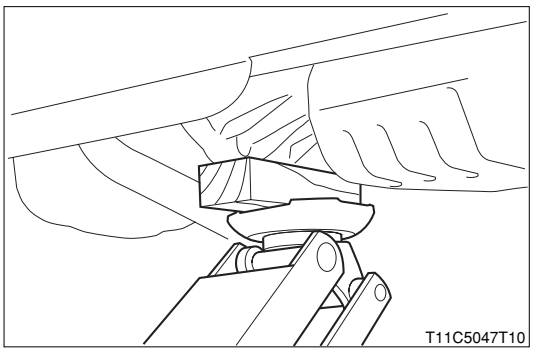


T11C5536ET10

3-1-6 OPERATION AFTER INSTALLATION

1.With the following parts installed to the front suspension cross member S/A, support them with a garage jack. While positioning them correctly, installed them to the vehicle.
(1) Arm S/A, suspension lower w/bush, RH/LH
(2) Gear Ay, steering
(3) Cover, engine mounting hole (Cold region specification vehicle)
(4) Rod S/A, engine mounting control

2.Apply a garage jack to the joint section between the engine Ay and the manual transaxle Ay/automatic transaxle Ay to support.



CAUTION

- When applying a garage jack, be sure to interpose a wooden block or cloth so as not to scratch the parts.
- Care should be exercised so that the engine will not get lowered while being supported by the garage jack.

3.Tighten the bolts connecting the engine mounting rear bracket and engine mounting control rod S/A.
Refer to Page B12-7.

4.Install the transmission floor shift Ay. (M/T vehicle)
Refer to Page F2-15.

5.Install the transmission control cable Ay. (A/T vehicle)
Refer to Page F3-34.

6.Install the exhaust front pipe Ay.
(1) Vehicle mounted with Type 1KR engine
Refer to Page B4-3.

(2) Vehicle mounted with Type K3 engine
Refer to Page B4-6.

7.Adjust the installation dimensions of the RH/LH suspension lower arm S/A with bush.
Refer to Page C1-10.

8.Install the ball joint section of the RH/LH suspension lower arm S/A with bush to the RH/LH steering knuckle.
Refer to Page C1-10.

9.Insert the RH/LH front drive shaft Ay to the RH/LH steering knuckle.
Refer to Page D2-8.

10.Install the RH/LH steering knuckle to the front shock absorber Ay.
Refer to Page C1-6.

11.Install the ball joint section of the RH/LH steering tie rod end S/A to the RH/LH steering knuckle.

12.Tighten the nut of the RH/LH front drive shaft Ay.
Refer to Page D2-8.

13.Install the stabilizer link to the suspension lower arm S/A with bush RH/LH.
Refer to Page C1-14.

14.Install the front disk.
Refer to Page E1-60.

15.Install the disk brake caliper Ay front RH/LH.
Refer to Page E1-53.

16.Install the front RH/LH speed sensor to the RH/LH steering knuckle. (ABS-equipped vehicles)
Refer to Page E3-4.

17.Install the disc wheels. (Front)
Refer to Page C3-3.

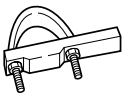
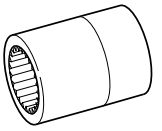
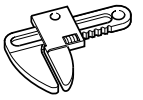
18.Lift down the vehicle.
19.Install the No.2 steering shaft universal joint Ay to the steering gear Ay.
Refer to Page G1-5.

20.Check and adjust the front wheel alignment.
Refer to Page C1-1.

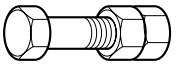
3-2 DISASSEMBLING AND ASSEMBLING

3-2-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09612-00012-000 (09612-00011-000)	Stand,rack & pinion steering rack housing
	09616-87702-000	Socket,steering pinion bearing adjusting
	09922-10010-000	Wrench,steering rack end

Tool

Shape	Part No.	Part name	Use
	—	Simplified spinner	Screw two nuts which across flats is 17mm into a bolt and fix them as double nut.

Instrument

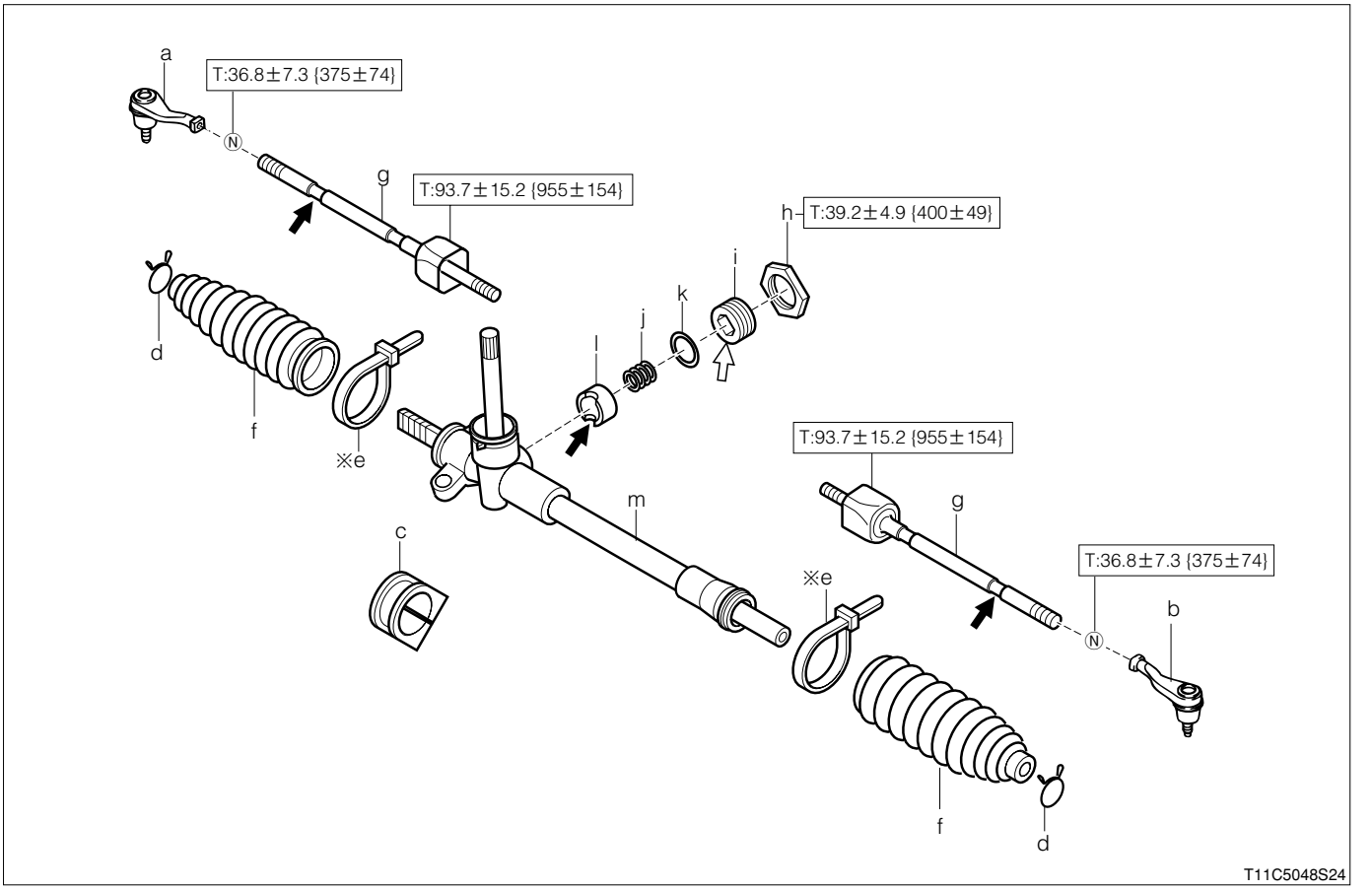
Torque wrench

Lubricant,adhesive,others

Molybdenum disulphide lithium base grease,EP grease,Wire

3-2-2 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Components



※: Non-reusable parts
Unit: N·m{kgf·cm}
➡: Molybdenum disulphide lithium base grease
⇨: EP grease

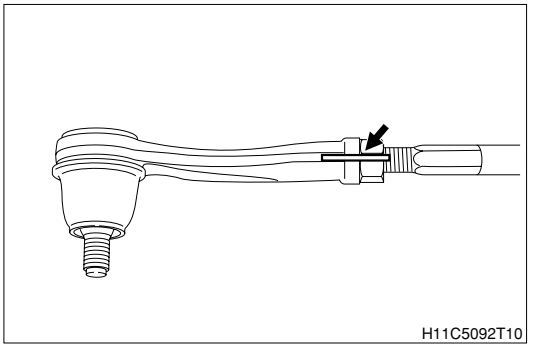
(2) Disassembling and assembling procedure

- ▼ ▲ 1 a End S/A, tie rod, RH
- ▼ ▲ 2 b End S/A, tie rod, LH
- ▼ ▲ 3 c Grommet, steering rack housing, No.1
- 4 d Band, steering rack boot, No.2
- 5 e Band, steering rack boot
- ▼ ▲ 6 f Boots, steering rack, No.1
- ▼ ▲ 7 g End S/A, steering rack
- ▼ 8 h Nut, lock
- ▼ ▲ 9 i Cap, rack guide spring
- 10 j Spring, compression
- ▲ 11 k Washer, conical spring
- ▲ 12 l Guide, rack
- 13 m Housing S/A, steering rack

3-2-3 POINTS OF DISASSEMBLY

(1) End S/A, steering tie rod, RH/LH

1. In order to distinguish the right and left of the end S/A and steering rack end S/A, put mating marks.

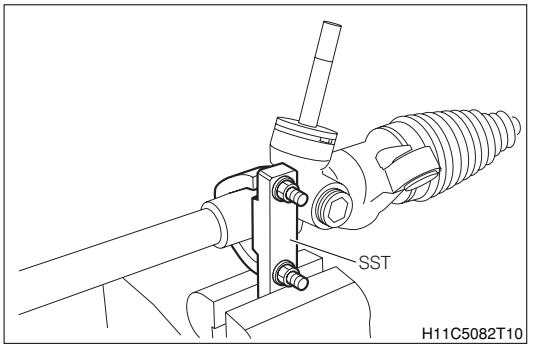


2.By applying the SST to the steering rack housing section of the steering gear Ay, secure the steering gear Ay to a vice and remove the end S/A.

CAUTION

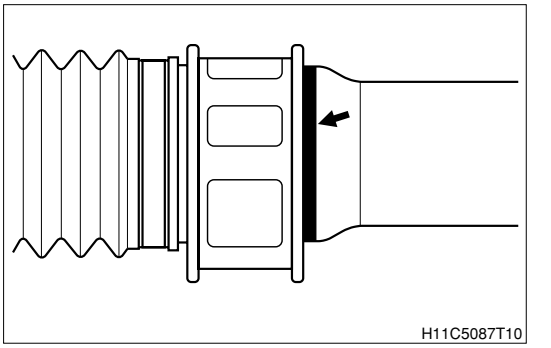
- Do not secure the rack housing section of the steering gear assembly directly in a vice.

SST: 09612-00012-000



(2) Grommet, steering rack housing, No.1

1.Before removing the grommet, put mating marks on the steering rack housing S/A so that the installation position of the grommet can be known easily.



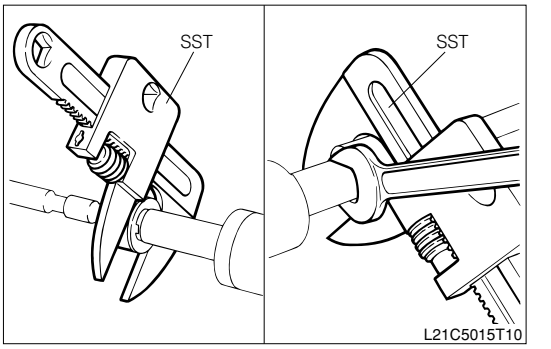
(3) Boots, steering rack, No.1

1.Remove the boot by removing the No.2 steering rack boot band and steering rack boot band. (Both right and left)

(4) End S/A, steering rack

1.Remove the end subassembly, using the SST in combination with a spanner. (Both right and left sides)

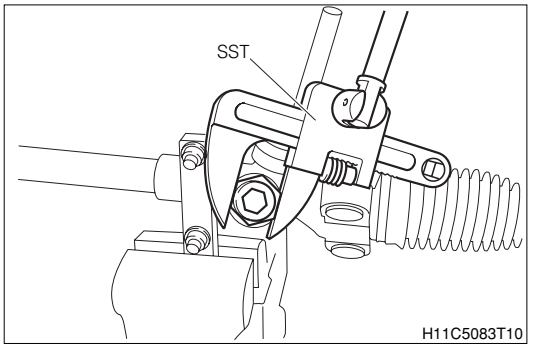
SST: 09922-10010-000



(5) Nut, hexagon

1.Remove the nut, using the SST.

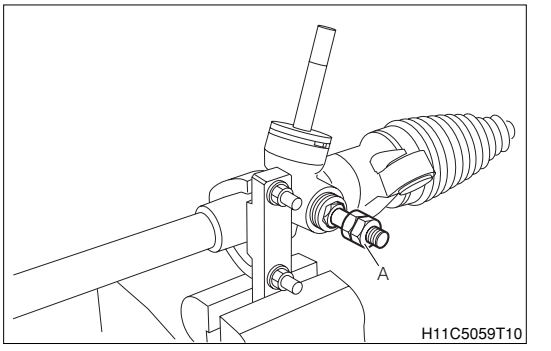
SST: 09922-10010-000



(6) Cap, rack guide spring

1.Remove the cap, using a simplified spinner.

TOOL: Simplified spinner:A



3-2-4 INSPECTION

(1) Grommet, steering rack housing, No.1

1.Check the following parts. Replace any faulty part.
(1) grommet for cracks and damage

(2) End S/A, tie rod, RH/LH

1.Check the following parts. Replace any faulty part.
(1) Check the dust boot of end S/A for rupture and ball joint for unsmooth operation

(3) Boot, steering rack, No.1

1.Check the following parts. Replace any faulty part.
(1) Boot for cracks, damage and aging

(4) End S/A, steering rack

1.Check the following items. Replace any faulty part.
(1) End subassembly ball for excessive play and non-smooth operation
(2) End subassembly for foreign matter and grease for discoloration
(3) Tie-rod section of End subassembly for bending and cracks

(5) Guide, rack

1.Check the following parts. Replace any faulty part.
(1) Check the guide sliding surface seat for abnormal wear.

(6) Housing S/A, steering rack

1.Check the following items. Replace any faulty part.
(1) Housing subassembly for cracks and damage
(2) Harmful scores in groove where large-diameter boot is assembled

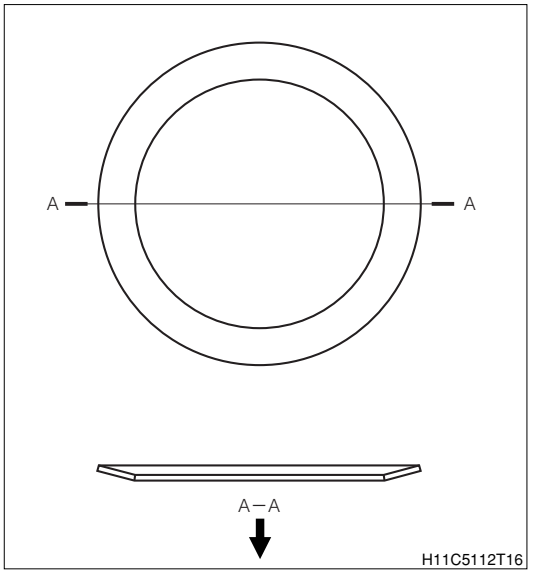
3-2-5 POINTS OF ASSEMBLY

(1) Guide, rack

1.Apply long-life grease to the inside of the guide (Contact surface with the rack shaft). Then, install the steering rack housing subassembly.
LUBRICANT: Molybdenum disulphide lithium base grease

(2) Washer, conical spring

1.Install the washer in such a way that the arrow in the right figure faces the rack guide spring cap side.



(3) Cap, rack guide spring

1.Apply EP grease to between the cap and conical spring washer.
LUBRICANT: EP grease

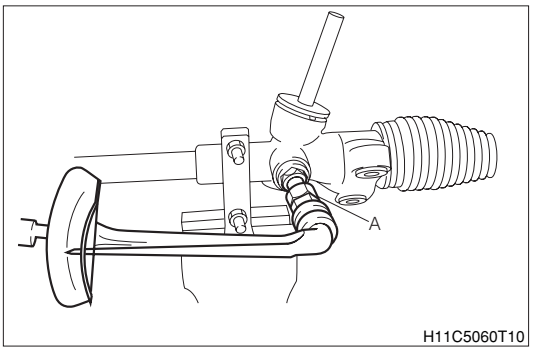
2.Insert the compression spring to the rack guide. Install the cap and temporarily tighten.

3.Adjust the preload.

(1) Using a simplified spinner, tighten the cap to the specified torque.

TOOL: Simplified spinner:A

TIGHTENING TORQUE: 12.3±2.0N·m
{125±20kgf·cm}



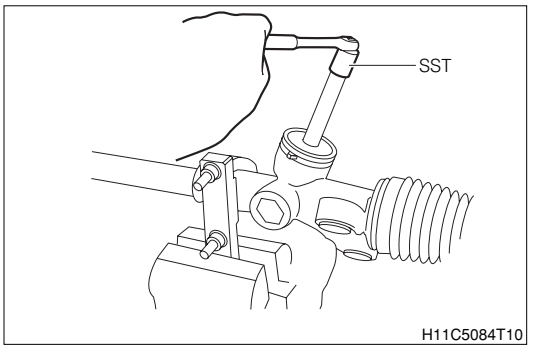
(2) From the state in the step (1) above, back off the cap about 45°.

(3) Operate the steering rack once or twice in the full stroke by turning the steering pinion, using the SST. In this way, the steering rack is bedded in.

CAUTION

- Be careful not to allow the end surface of the steering rack housing S/A to enter into the inside beyond the end surface of the steering rack bush.

SST: 09616-87702-000

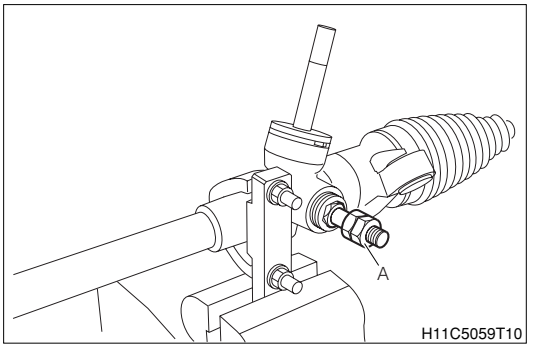


(4) Loosen the cap with a simple spinner until the compression spring of the rack guide no longer works.

CAUTION

- Loosen the end surface of the steering rack housing S/A by pushing it by hand until it can move smoothly.

TOOL: Simplified spinner:A

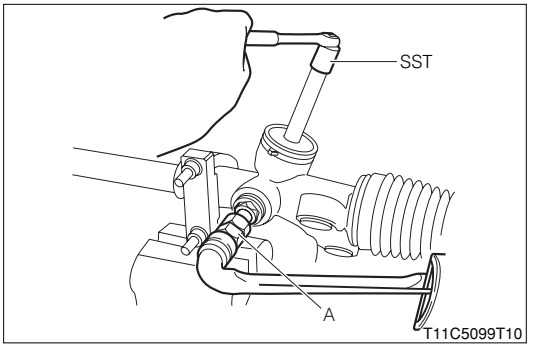


(5) Turn the steering pinion, using the SST. At this time, tighten the cap so that the preload during turning may conform to the specified value.

SST: 09616-87702-000

TOOL: Simplified spinner:A

SPECIFIED VALUE: 1.03±0.25N·m{10.5±2.5kgf·cm}
(During turning)



(6) With the SST, tighten the hexagon nut (For the cap) to the specified torque.

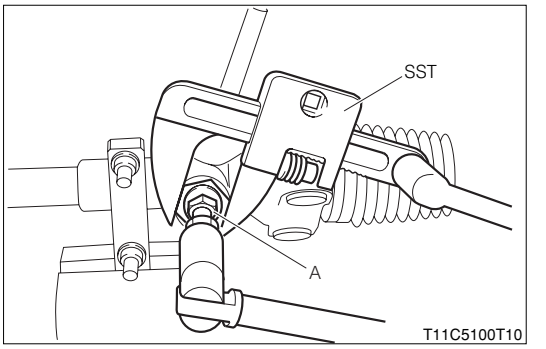
SST: 09922-10010-000

TOOL: Simplified spinner:A

NOTE

- When tightening is made by extending the overall length by combining the torque wrench with the SST, tools, etc., obtain the reading of the torque wrench by the calculation formula.

Refer to Page A1-8.



(7) Turn the steering pinion again, using the SST. At this time, ensure that the preload during turning conforms to the specified value.

SST: 09616-87702-000

SPECIFIED VALUE: 1.03±0.25N·m{10.5±2.5kgf·cm}
(During turning)

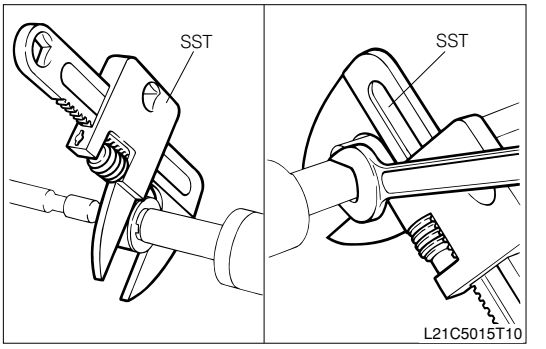
(4) End S/A, steering rack

1.Install the end subassembly and tighten it to the specified torque, using the SST in combination with a spanner.

CAUTION

- While tightening, be very careful not to twist the end subassembly.

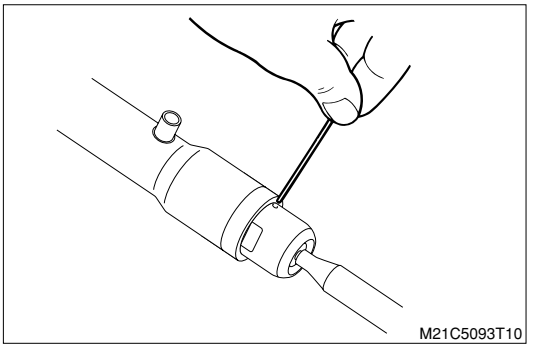
SST: 09922-10010-000



2.Insert a wire (Outer diameter of approx. 2 mm, length of approx. 50 mm) into the vent hole of the end S/A to see if the vent hole is clogged with grease.

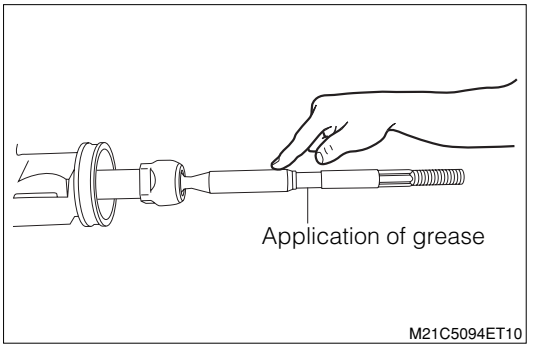
NOTE

- The vent hole of the end subassembly equalizes pressure difference in both sides of the steering rack boot No.1 right and left. For this reason, if the vent hole is blocked, the pressure in the steering rack boot No.1 when the steering is turned may vary so that the steering rack boot No.1 may be deflected or broken.



3.Apply long-life grease to the steering rack boot No.1 installation groove of the end subassembly.

LUBRICANT: Molybdenum disulphide lithium base grease



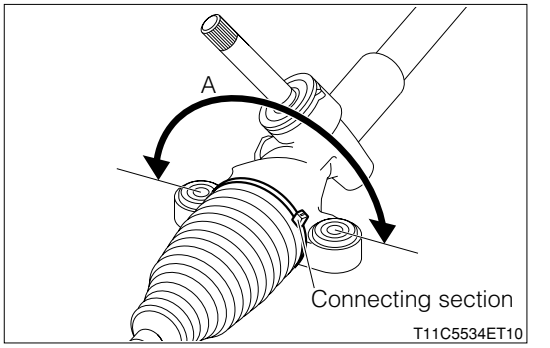
(5) Boot, steering rack, No.1

1.Attach the steering rack boot band to the steering rack housing subassembly. Then, install the boot.

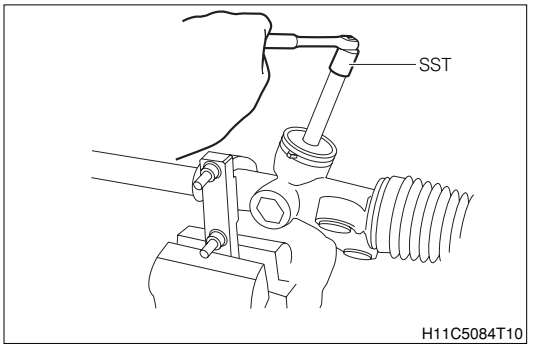
2.Secure fully by means of the steering rack boot band that has already been installed.

CAUTION

- When installing the steering gear Ay, make sure that the connecting section of the steering rack boots band comes within the range (A) so that the connecting section of the steering rack boots band may not contact the front suspension crossmember S/A.

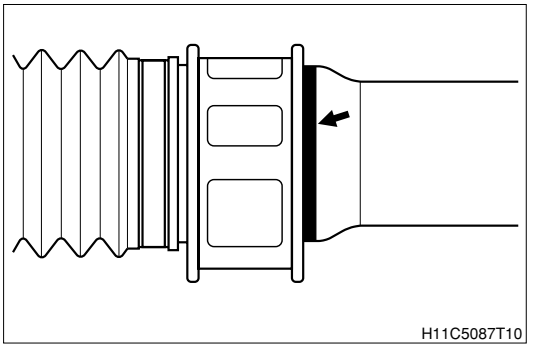


3.With the SST, turn the steering pinion to see if the boot can be smoothly extended or contracted.
SST: 09616-87702-000



(6) Grommet, steering rack housing, No.1

1.Install the grommet LH, while referring to the mating mark that has been put during the disassembling.



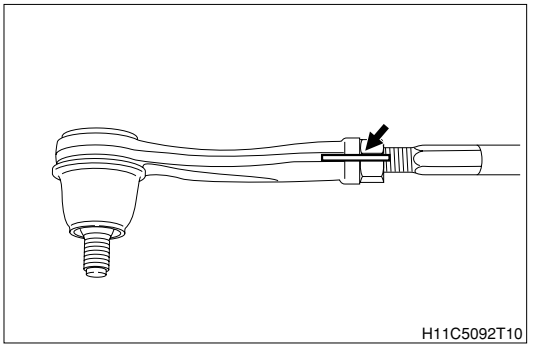
(7) End S/A, steering tie rod RH/LH

1.By referring to the mating marks put during the removal of the end S/A, temporarily install the end S/A correctly, being careful not to mistake the right side for the left side.

CAUTION

- While tightening, be very careful not to twist the steering rack end subassembly.
- After the steering gear assembly has been mounted on the vehicle, fully tighten the nut of the end S/A at the time of adjusting the front wheel alignment.

2.Remove the SST for securing the steering rack housing subassembly.
SST: 09612-00012-000



4 EPS COMPUTER

4-1 REMOVAL AND INSTALLATION (RHD VEHICLE)

4-1-1 OPERATION BEFORE REMOVAL

1.After setting IG SW "LOCK" position, disconnect the negative (-) terminal of the battery.
2.Remove the instrument panel finish panel S/A lower.
Refer to Page I2-23.

3.Remove the steering column lower cover.
Refer to Page G1-5.

4.Remove the combination meter assembly.
Refer to Page J3-3.

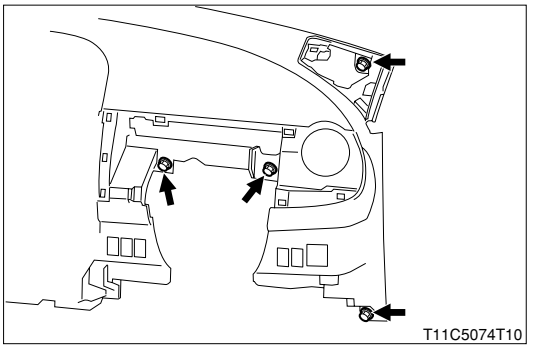
5.Remove the instrument cluster finish panel.
Refer to Page I2-23.

6.Remove the steering column upper cover.
Refer to Page G1-5.

7.Remove the front pillar garnish RH/LH.
Refer to Page I2-48.

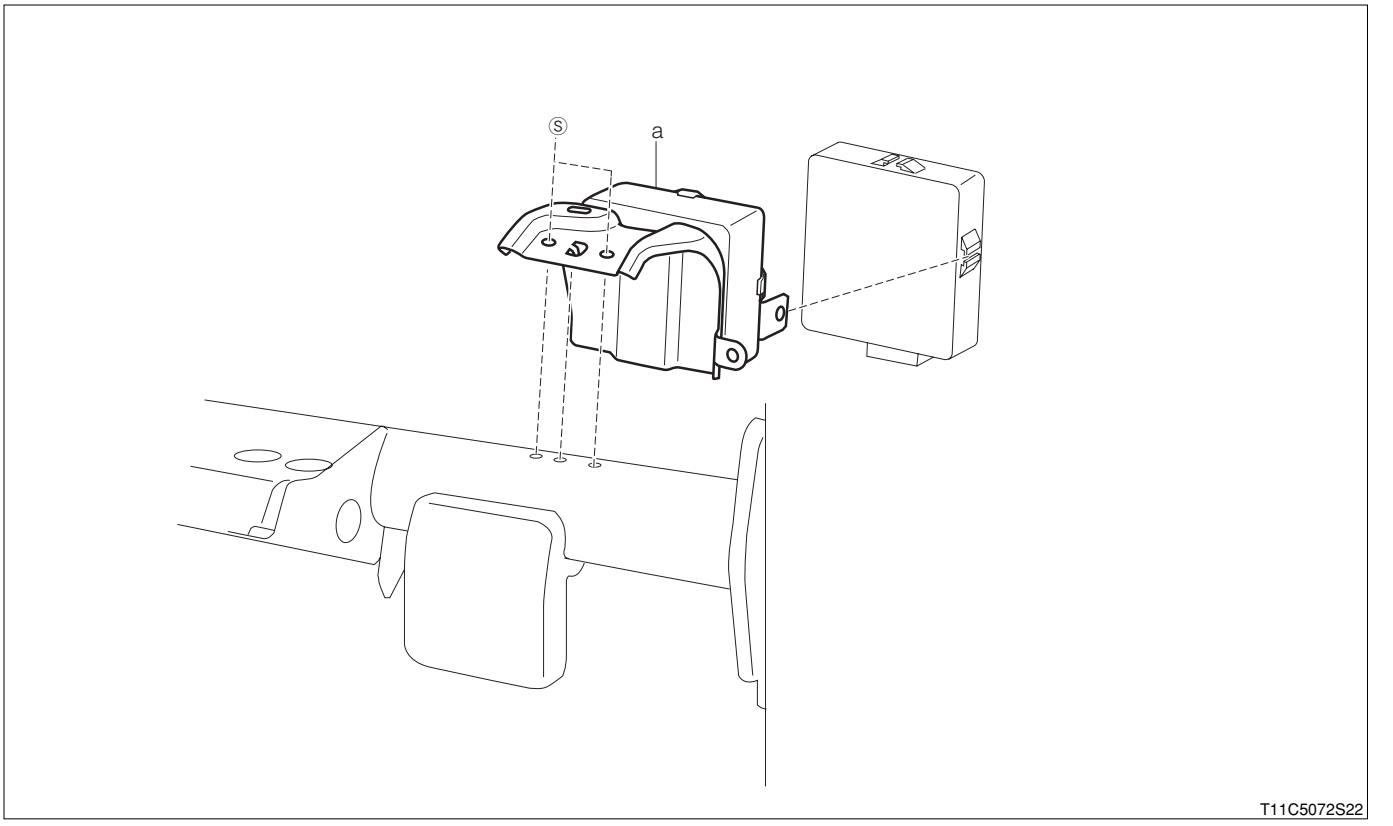
8.Remove the grille speaker RH.
Refer to Page I2-23.

9.Remove each connector.
10.Remove the bolts and screws shown in the right figure.
Raise the instrument panel.
Refer to Page I2-23.



4-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Computer Ay, power steering

4-1-3 OPERATION AFTER INSTALLATION

1.Install the instrument panel.
Refer to Page I2-23.

2.Install each connector.

3.Install the speaker grille RH.
Refer to Page I2-23.

4.Install the front pillar garnish RH/LH.
Refer to Page I2-48.

5.Install the steering column upper cover.
Refer to Page G1-5.

6.Install the instrument cluster finish panel.
Refer to Page I2-23.

7.Install the combination meter assembly.
Refer to Page J3-3.

8.Install the steering column lower cover.
Refer to Page G1-5.

9.Install the instrument panel finish panel S/A lower.
Refer to Page I2-23.

10.After setting IG SW "LOCK" position, connect the negative (−) terminal of the battery.

4-2 REMOVAL AND INSTALLATION (LHD VEHICLES)

4-2-1 OPERATION BEFORE REMOVAL

1.After setting IG SW "LOCK" position, disconnect the negative (−) terminal of the battery.
2.Remove the instrument panel finish panel S/A lower.
Refer to Page I2-23.

3.Remove the steering column lower cover.
Refer to Page G1-5.

4.Remove the combination meter assembly.
Refer to Page J3-3.

5.Remove the instrument cluster finish panel.
Refer to Page I2-23.

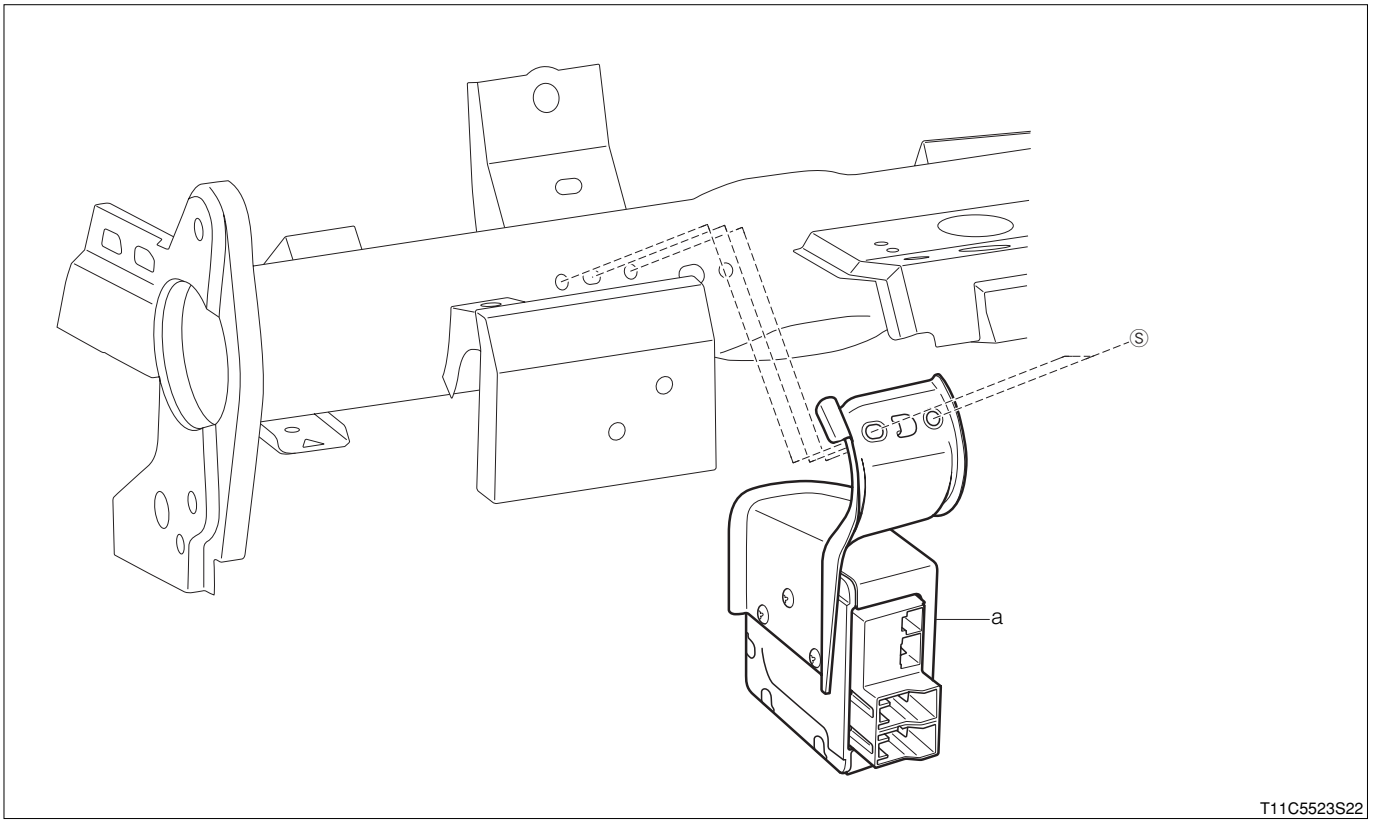
6.Remove the steering column upper cover.
Refer to Page G1-5.

7.Remove the fuse box opening cover.
Refer to Page I2-23.

8.Remove each connector.

4-2-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Computer Ay, power steering

4-2-3 OPERATION AFTER INSTALLATION

1.Install each connector.
2.Install the fuse box opening cover
Refer to Page I2-23.

3.Install the steering column upper cover.
Refer to Page G1-5.

4.Install the instrument cluster finish panel.
Refer to Page I2-23.

5.Install the combination meter assembly.
Refer to Page J3-3.

6.Install the steering column lower cover.
Refer to Page G1-5.

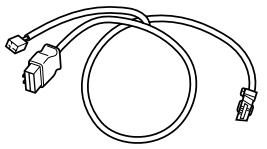
7.Install the instrument panel finish panel S/A lower.
Refer to Page I2-23.

8.After setting IG SW "LOCK" position, connect the negative (−) terminal of the battery.

5 CONTROL SYSTEM

5-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09991-87404-000 (09991-87401-000)	Wire,engine control system inspection
	09991-87403-000	Wire,diagnosis check

Instrument

Spring separates ,Electrical Tester

5-2 HANDLING INSTRUCTIONS OF CONTROL SYSTEM

1.Since the sensors are precision parts, be careful not to allow great shocks to apply to the parts during the removal and installation. Never use the parts which have been subjected to great shocks (E.g. parts dropped on to the floor).

2.Do not disassemble the EPS ECU steering column.

3.When carrying the steering column, be very careful not to pull the harness. Rather, be certain to hold the motor section or housing section.

4.Never apply an excessive force or an impact to the steering column in the axial direction and turning direction.

5.Never use the steering column if a strong impact has been applied to it, especially to the motor section, torque sensor section and EPS ECU (Cases where the part has been dropped onto the floor or the motor section has a dent).

6.Utmost care must be exercised so that no water may be admitted during the checks in rainy weather or when washing the vehicle (Especially when washing the vehicle interior). Also, care should be paid so that no water may be splashed on the steering column, each sensor, EPS ECU, etc.

7.Except during the abnormality check of the system, connecting / disconnecting the connector should be carried out only after the battery negative (-) terminal is removed.

8.If the EPS ECU is judged abnormal and the vehicle resumes the normal operation after replacing the EPS ECU, install the EPS ECU that was removed (Judged abnormal) and confirm that the initial abnormality is reproduced. If it is reproduced, make a final judgment that the EPS ECU is faulty.

9.After installing the steering column and EPS ECU, confirm that each bolt is securely installed and the connector is securely connected.

10.When a wireless device is installed, take the following precautions.

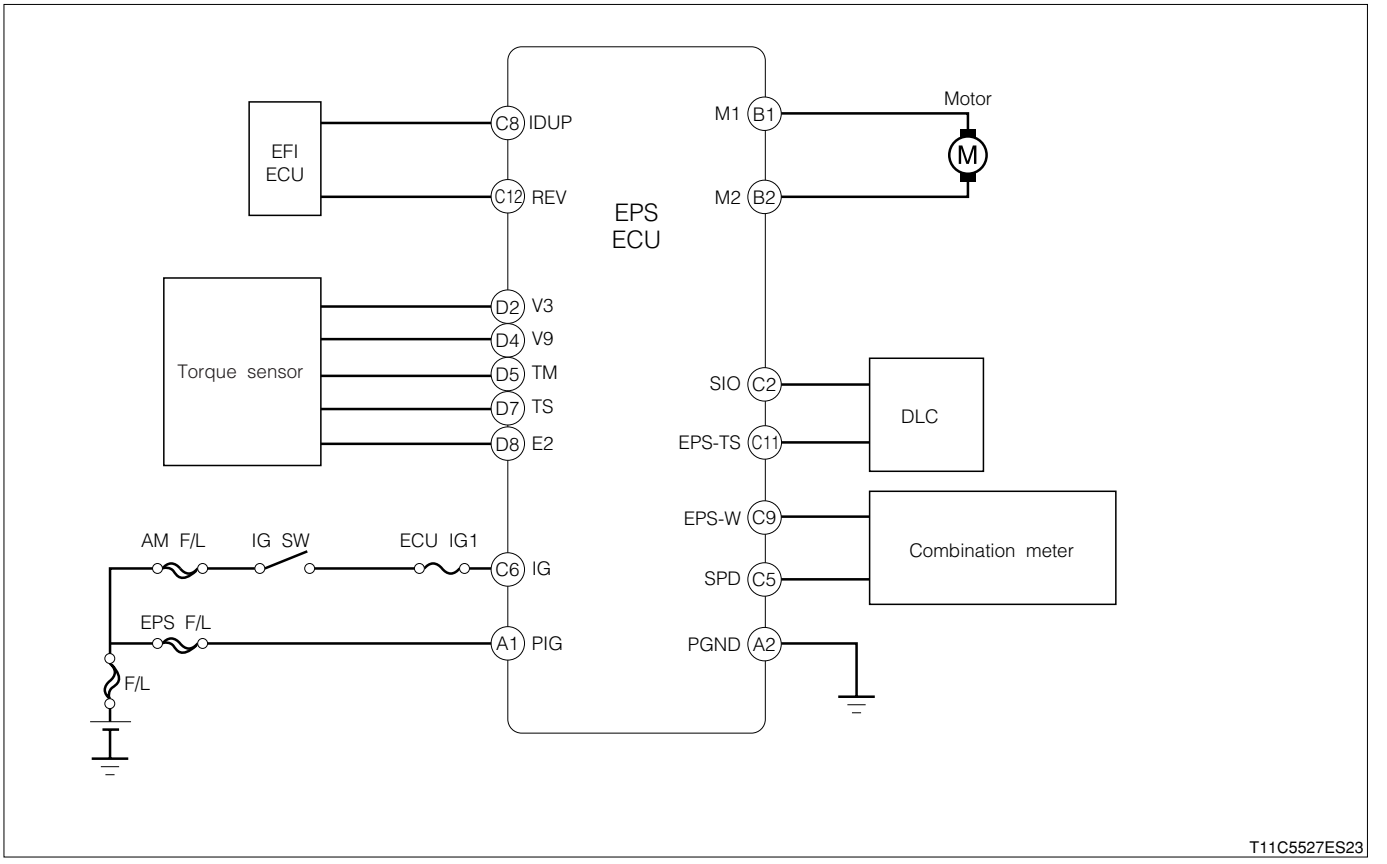
(1) The antenna should be installed at the farthest position from the EPS ECU.

(2) The feeder of the antenna should be routed as far away as possible (Minimum distance: 30 cm) from the steering column and wire harness. Also, make certain to avoid routing the feeder for a long distance in parallel with these parts.

(3) The antenna should be matched well.

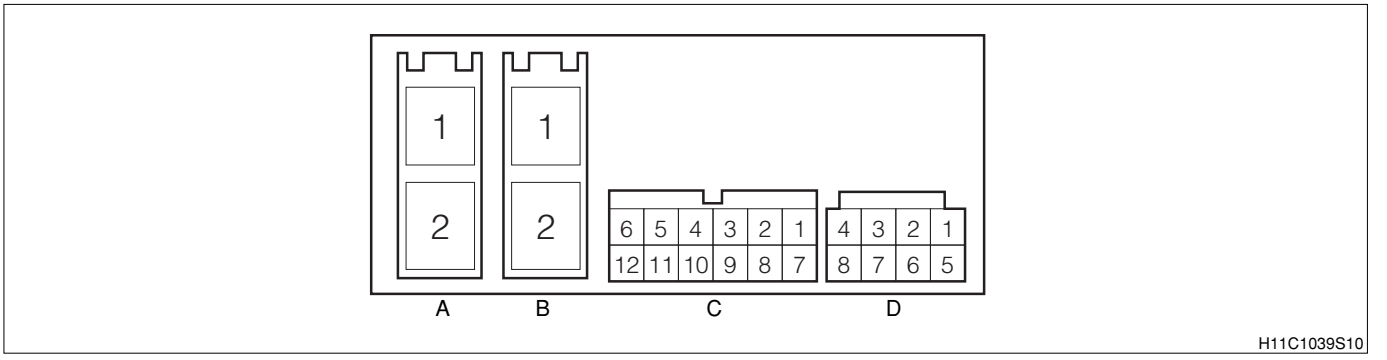
(4) Do not install wireless devices with a high output.

5-3 SYSTEM WIRING DIAGRAM



5-4 ARRANGEMENT OF ECU TERMINAL

ECU side



Connector A

Terminal No.	Terminal code	Terminal name
1	PIG	Battery power supply
2	PGND	Battery earth

Connector B

Terminal No.	Terminal code	Terminal name
1	M1	Motor output 1
2	M2	Motor output 2

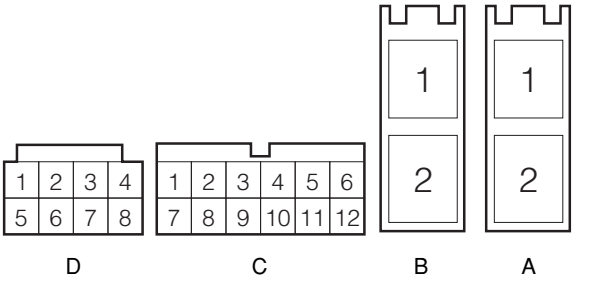
Connector C

Terminal No.	Terminal code	Terminal name
1	—	—
2	SIO	Communication of diagnosis device
3	—	—
4	—	—
5	SPD	Input of vehicle speed signal
6	IG	IG power supply
7	—	—
8	IDUP	Idle up signal
9	EPS-W	Warning lamp / diagnosis output
10	—	—
11	EPS-TS	Start of diagnosis
12	REV	Input of engine revolution speed signal

Connector D

Terminal No.	Terminal code	Terminal name
1	—	—
2	V3	Torque sensor power supply of 3.3V
3	—	—
4	V9	Torque sensor power supply of 9V
5	TM	Main torque sensor input
6	—	—
7	TS	Sub torque sensor input
8	E2	Torque sensor earth

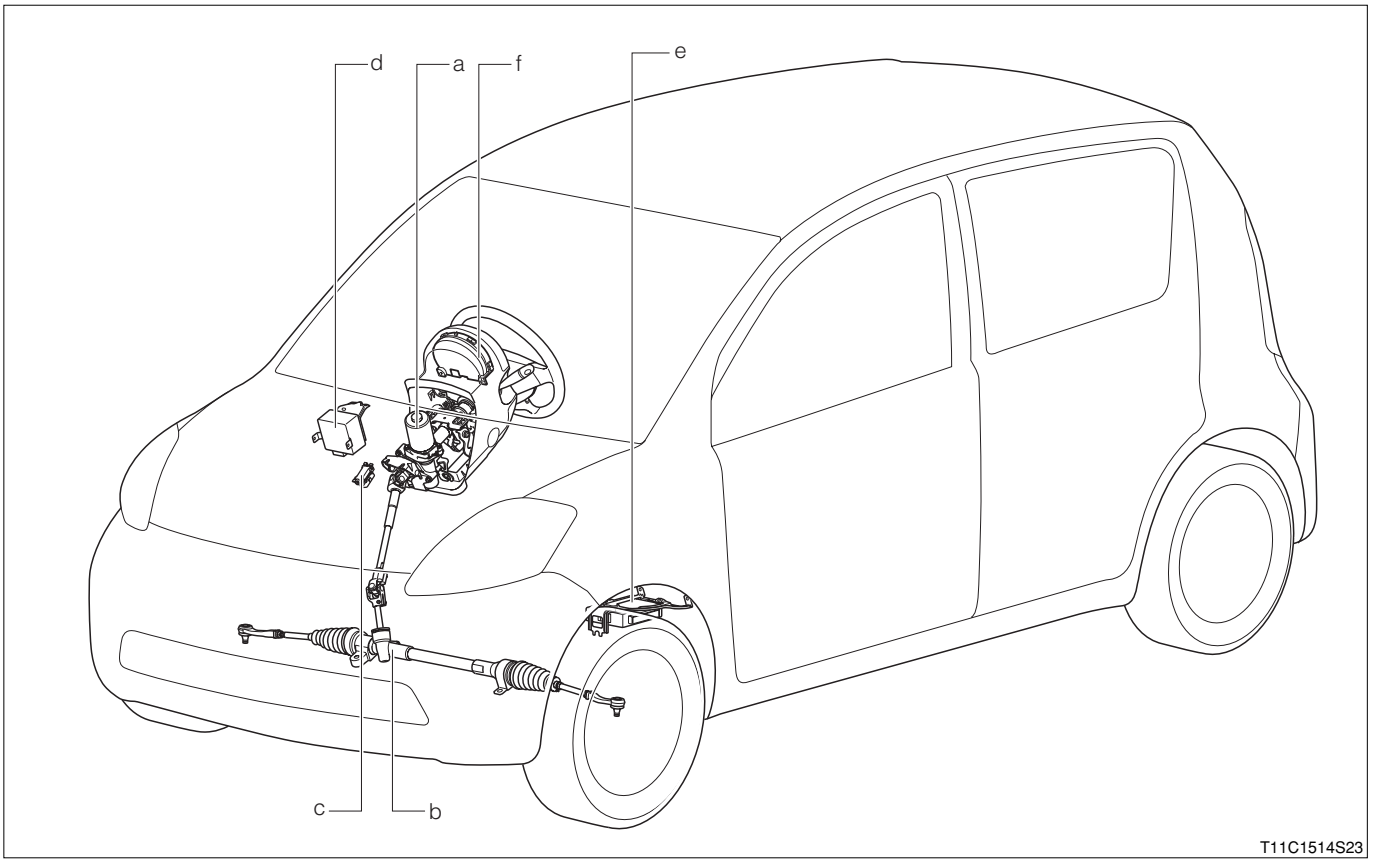
5-5 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS



H11C1040S10

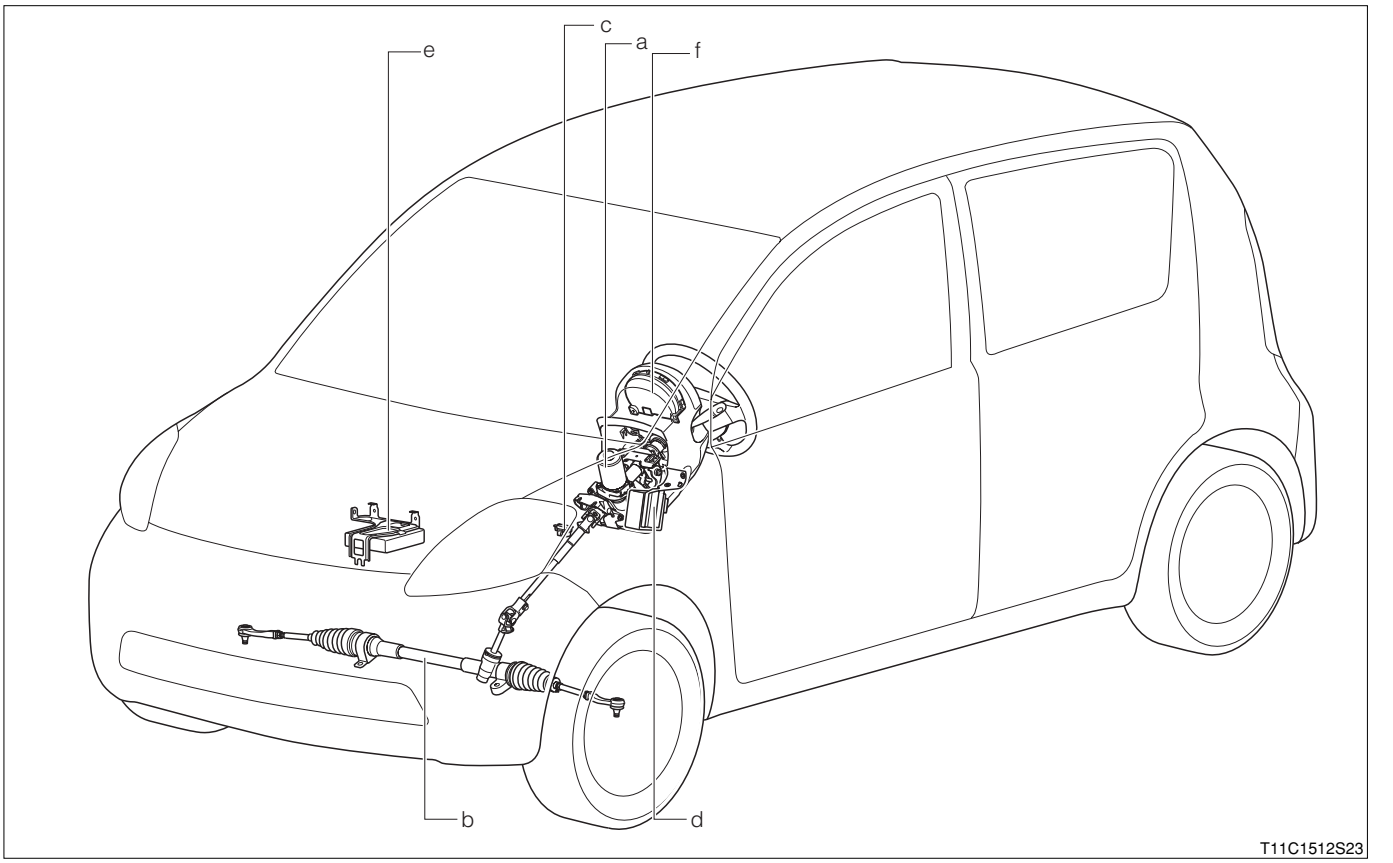
5-6 LOCATION OF COMPONENTS

RHD VEHICLES



a	STEERING COLUMN
b	Steering gear
c	DLC
d	EPS ECU
e	EFI ECU
f	Combination meter (EPS warning lamp incorporated)

LHD VEHICLES

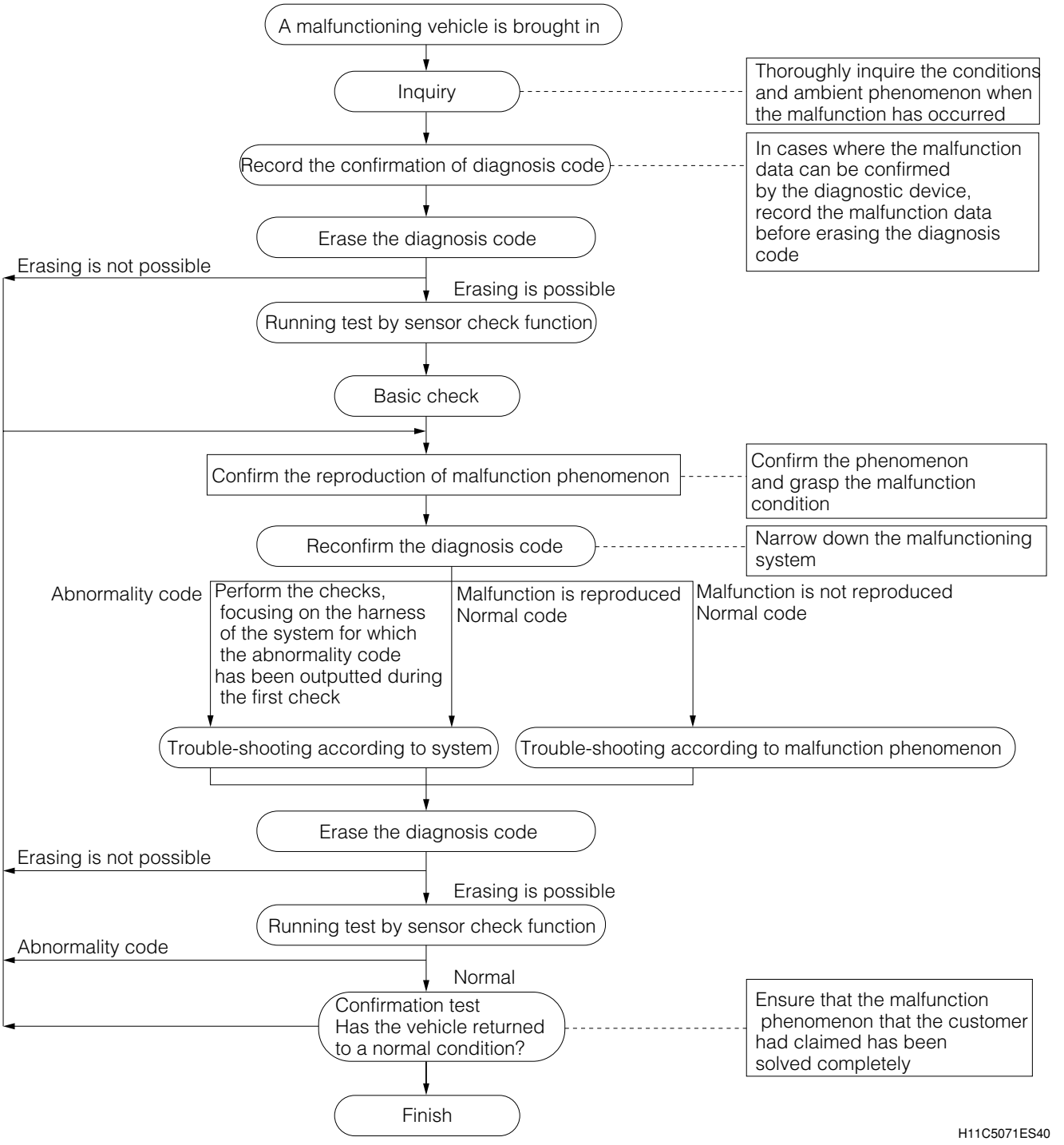


a	STEERING COLUMN
b	Steering gear
c	DLC
d	EPS ECU
e	EFI ECU
f	Combination meter (EPS warning lamp incorporated)

5-7 HOW TO PROCEED WITH TROUBLE SHOOTING

1.This system is equipped with a diagnosis function capable of performing the self-diagnosis for malfunctioning sections. This will be an important help at the time of trouble-shooting.

The diagnosis of this system has a backup that uses an EEPROM (Non-volatile ROM). Hence, the diagnosis code is stored in the memory even if the power is cut off.



5-8 INQUIRY

1. In an effort to remove causes for malfunction from the vehicle concerned, it is impossible to determine the cause without confirming the malfunction phenomenon. If the phenomenon is not confirmed, the vehicle may not be able to return to the normal conditions even if you continue your work. The diagnosis through interview is to collect information from the customer before confirming the malfunction phenomena. The diagnosis through interview provides very important clues in reproducing malfunction phenomena.
2. Since the information obtained by the diagnosis through interview is referred to during the trouble shooting, it is imperative to make an inquiry of the customer, centering on the items related to the malfunction, instead of simply asking general questions.
3. During the diagnosis through interviews, utmost attention must be paid to complaints of the customer, for it may include phenomena peculiar to the EPS-equipped vehicles.

5-8-1 DIAGNOSIS INTERVIEW SHEET FOR ELECTRIC POWER STEERING SYSTEM

Checked by		Check date	Day Month (Day of week)

Customer information

Name of customer	Mr./Ms.	Gender of customer (Male, female)	Age [approx.]	Occupation [ ]	
		Area where vehicle is mainly used	Urban, suburb, seashore, mountain, others	Parking place	Outdoor, indoor

Details of vehicle

Date when vehicle was brought to workshop	Day Month (day of week)	Date when malfunction took place	Day Month (day of week)	Repair history	No,Yes (How many times?)
Frame No.		Registration date	Day Month Year	Vehicle model	
Engine type		Transmission	5M/T·3A/T·4A/T·CVT electronically-controlled 4A/T	Driving	2WD·4WD
Running distance	km	Equipment	Tire [ ]· Wheel [Steel · Aluminum]		

Phenomena

☐ Steering effort is excessive, or the steering wheel does not return properly.
☐ The steering wheel has no play, or excessive play.
☐ Clonking abnormal noise is emitted when the power steering is operating or steering wheel is turned.
☐ When the steering wheel is turned at a low vehicle speed, a rubbing noise is emitted.
☐ When the steering wheel is turned slowly with the vehicle stopped, a high pitched noise is emitted (squeaking sound).
☐When the steering wheel is turned with the vehicle stationary, the steering wheel vibrates. (Emits abnormal noise.).
☐
☐
☐ Others

State of EPS warning lamp	☐ Always illuminated ☐ Sometimes illuminated ☐ Not illuminated	
Diagnosis indication (Short circuit of T terminal)	During check	☐ Normal ☐ Abnormal code [ ]
	Second time	☐ Normal ☐ Abnormal code [ ]
	nd(rd) time	☐ Normal ☐ Abnormal code [ ]

5-9 CONFIRMATION, RECORD AND ERASURE OF DIAGNOSIS CODE

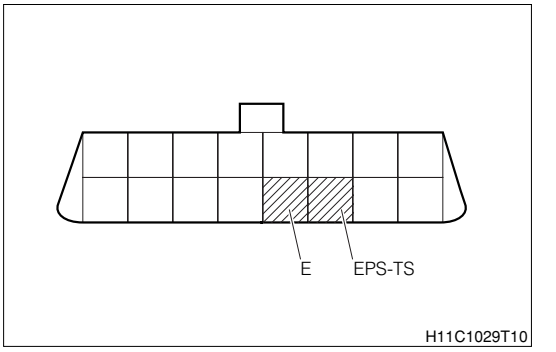
5-9-1 OUTLINE

1.When any abnormality code of the diagnosis is indicated, it is necessary to confirm the relationship with the reproduced malfunction phenomenon by ascertaining whether the system malfunction has occurred in the past or it still persists up to the present. To this end, the diagnosis code should be indicated twice, i.e. before and after the confirmation of the phenomenon.

5-9-2 CHECKING METHOD OF DIAGNOSIS

1.Stop the vehicle.

2.With the IG SW "LOCK" position, short circuit the terminals EPS-TS and E of the DLC located under the instrument panel.



CAUTION

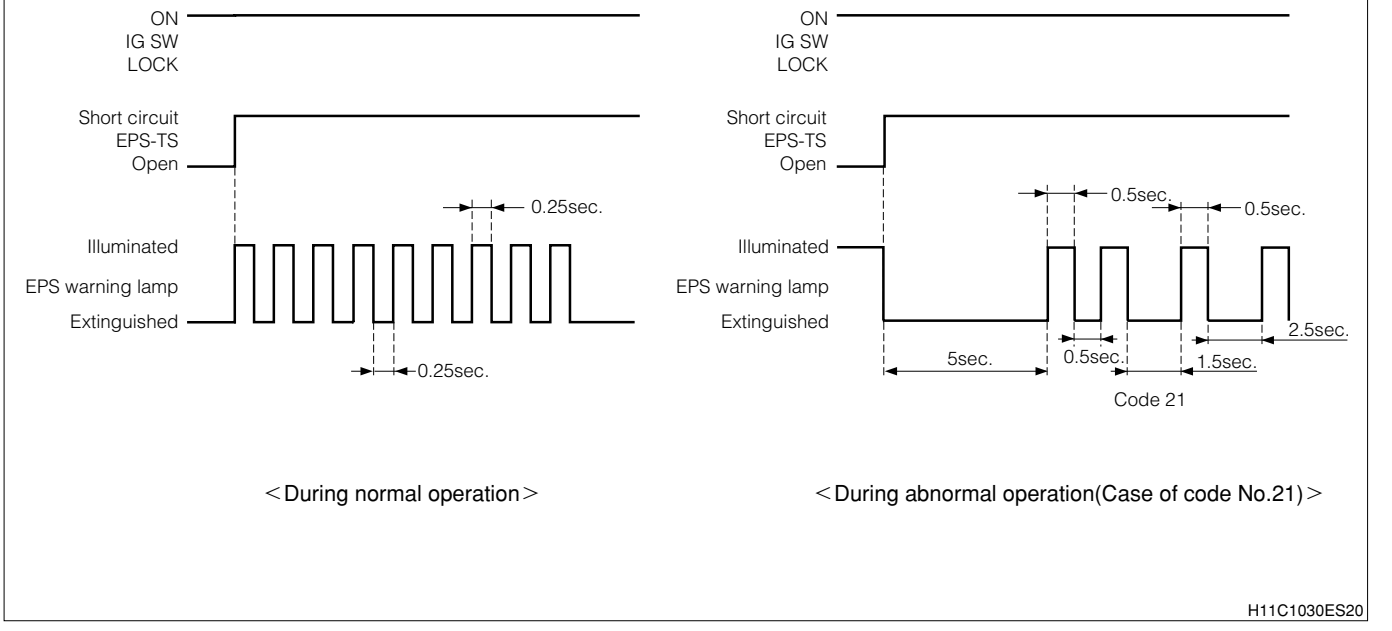
- In order to short-circuit the DLC, be sure to use the specified SST.
- If the short-circuit of the DLC is made for wrong terminals, it may cause malfunction. Be very careful not to select wrong terminals.

SST: 09991-87404-000
09991-87403-000

3.After turning "ON" the IG SW, read the flashing number of the EPS warning lamp.

CAUTION

- Connecting the connector in the wrong location could cause a malfunction. Therefore, make sure the connection is correct.



NOTE

- When the system is functioning normally, the flashing interval is 0.5 second.
- If there is one malfunction code, after a pause of five seconds, the same code will be outputted. If plural codes are outputted, the respective codes will be outputted at an interval of 2.5 seconds. After all the codes have been outputted, there will be another 4 second pause before the output of the codes starts over again.
- When plural codes are outputted, they will appear in the order of the code number, starting from the smaller one.

5-9-3 CANCELING METHOD OF DIAGNOSIS

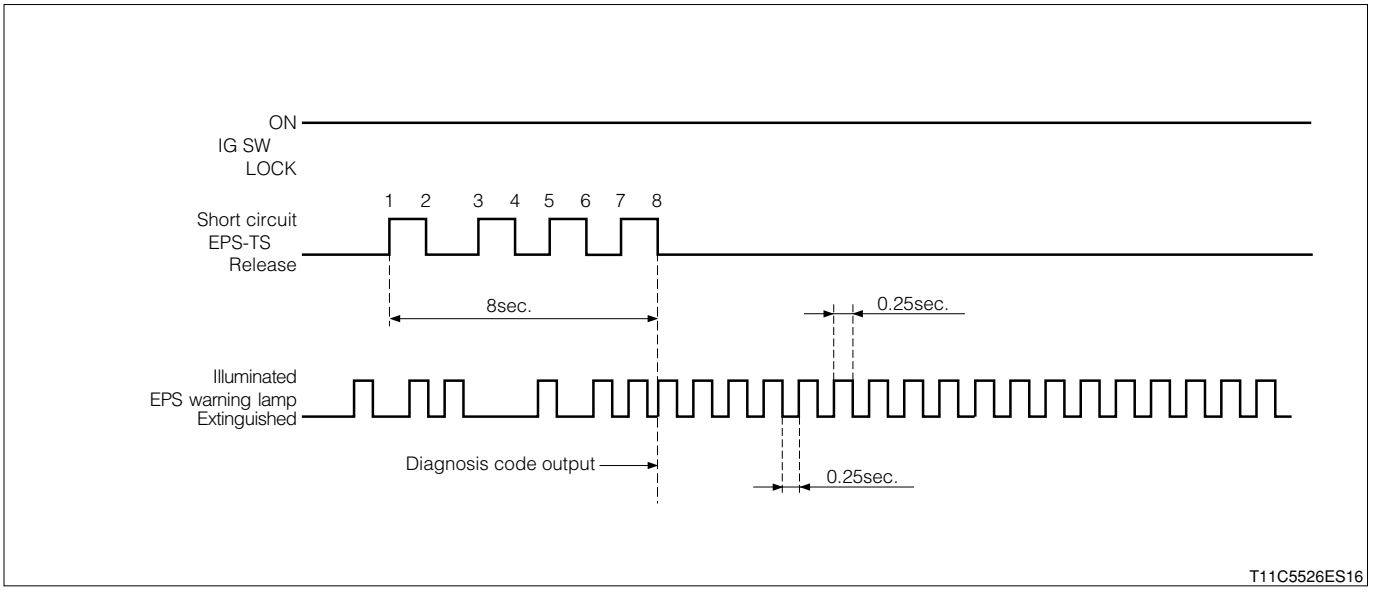
1. The diagnosis of this system has a backup that uses an EEPROM (Non-volatile ROM). Hence, the diagnosis code is stored in the memory even if the power is cut off. When having checked and repaired a section concerning which an abnormal code is generated, erase that abnormality code by following the procedure given below.
2. Stop the vehicle and keep the IG SW in the "LOCK" position five seconds or more.
3. With the IG SW turned "ON", short-circuit and release the terminal EPS-TS and E of the DLC at least eight times in eight seconds. This will erase the code.

Refer to Page A1-19.

CAUTION

- In order to short-circuit the DLC, be sure to use the specified SST.
- If the short-circuit of the DLC is made for wrong terminals, it may cause malfunction. Be very careful not to select wrong terminals.

SST: 09991-87404-000
09991-87403-000



NOTE

- If the malfunction persists, the abnormality code can not be erased.

5-9-4 CONTENTS OF DIAGNOSIS

Contents of diagnosis

Code No.		Warning indication (Provided: ○, Not-provided:×)	Code memory (Provided: ○, Not-provided:×)	Contents of diagnosis	
2 digits	4 digits			System diagnosed	Diagnosis items
11	C1511	○	○	Torque sensor	Open wire, short-circuit, main torque sensor characteristics faulty
12	C1512	○	○	Torque sensor	Open wire, short-circuit, sub torque sensor characteristics faulty
13	C1513	○	○	Torque sensor	Excessive permissible difference between main sensor output and sub sensor output
14	C1514	○	○	Torque sensor	Abnormality of 9V power supply voltage of sensor
21	C1521	○	○	Motor	Excessive current
23	C1523	○	○	Motor	Open wire
24	C1524	○	○	Motor	Excessive voltage between both terminals of motor Low voltage, short circuit
31	C1531	○	○	EPS ECU	Faulty internal circuit
32	C1532	○	○	EPS ECU	Faulty internal circuit
33	C1533	×	○	EPS ECU	Faulty internal temperature sensor
34	C1534	×	○	EPS ECU	Faulty internal non-volatile EEPROM
41※1	C1541	○	○	Vehicle speed signal	Faulty vehicle speed sensor main body open wire, short circuit
44※2	C1544	○	○	Engine revolution speed signal	Missing of engine revolution speed (REV) signal, or open wire, short circuit
51	C1551	○	○	Power supply	Abnormal rise of battery voltage
52	C1552	○	○	Power supply	Abnormal drop of battery voltage Voltage monitor circuit faulty
54	C1554	○	○	Power supply	Abnormality of power supply relay in EPS ECU
55※3	C1555	○	○	EPS ECU	Abnormality of motor relay in EPS ECU
57※4	C1557	×	○	EPS ECU	Protection of over-heating of motor or EPS ECU is performed. (This is not a malfunction.)

※1:This code may be memorized if the engine speed is varied for five minutes or more in an unloaded state (Racing).
※2:This code may be memorized when running the vehicle in the neutral gear without starting the engine.
※3:This code may be memorized when IG SW is set to "LOCK", and the motor terminal is connected to the ground.
※4:If the motor or ECU gets overheated because the steering wheel has been turned for a long time with the vehicle stopped, the motor current is controlled to a smaller amount to protect the motor and ECU. This code shows that the protection of the motor from overheating has been performed, and therefore, it does not mean that there is a malfunction.

5-10 SENSOR CHECK FUNCTION (TEST MODE)

1.In the test mode, the vehicle speed sensor signal system and engine revolution speed signal system are checked by running the vehicle. In cases where both items have been judged to be normal, the warning lamp changes from a flashing state to an extinguished state. Then, the test mode code will be erased automatically. Therefore, if the flashing indication will not go out (The test mode code is memorized) even after the running has been conducted, repair the vehicle speed sensor signal system and engine revolution speed signal system. Then, check and repair the relevant malfunctioning system.

5-10-1 OUTPUT OF TEST MODE CODE

1.With the IG SW turned "ON", short-circuit and release the terminal EPS-TS and E of the DLC at least eight times in eight seconds. Check to see if the warning lamp flashes at an interval of about 0.25 second.

CAUTION

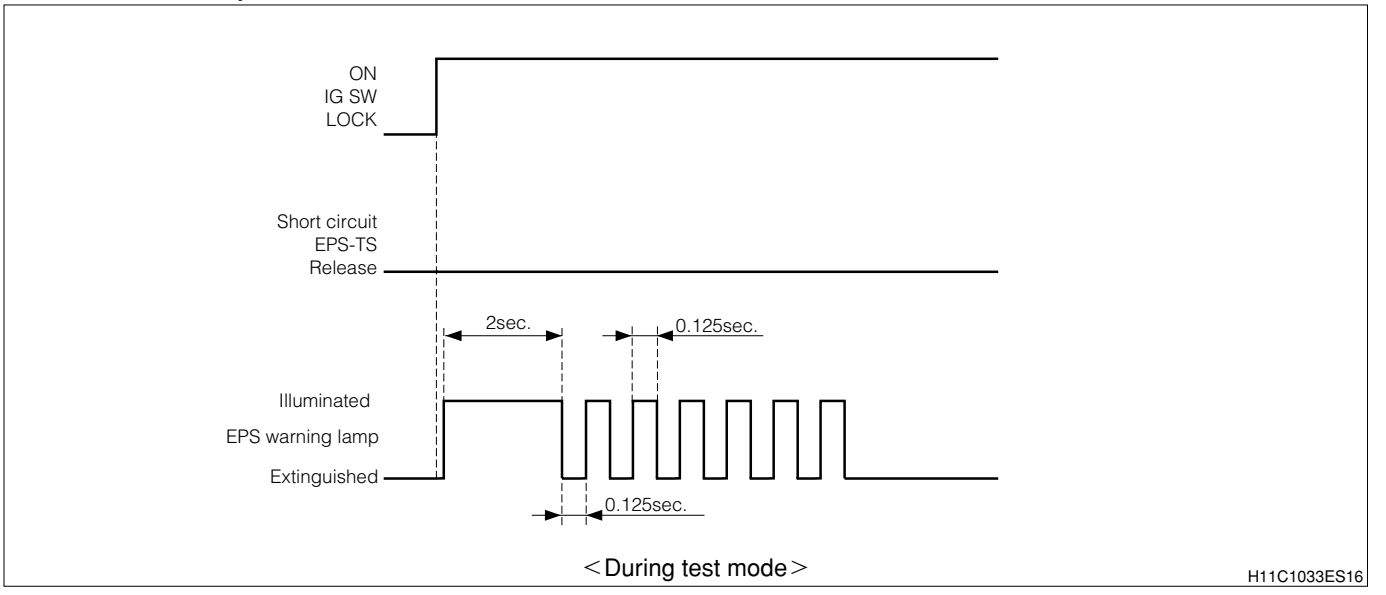
- If the EPS warning lamp illuminates at all the times, the system may be malfunctioning. Check the diagnosis code.

2.Start the engine.

3.Run the vehicle for at least 2 seconds at a speed of about 20 km/h or more.

4.In cases where all check items are normal, the EPS warning lamp goes out. Under this condition, stop the vehicle.

5.In cases where the EPS warning lamp will not go out even when the running continues, most likely the vehicle speed sensor signal system and engine revolution speed signal system are malfunctioning. Check these systems.



5-10-2 CONTENTS OF DIAGNOSIS

Test mode code table

Code No.		Warning indication (Provided: ○, Not-provided:×)	Code memory (Provided: ○, Not-provided:×)	Contents of diagnosis	Releasing conditions
Two digit	Four digit				
71	C1571	○	○	Vehicle speed signal system	Meter vehicle speed signal State of 20km/h or more continues at least 2 seconds.
73	C1573	○	○	Engine revolution speed signal system	Engine revolution speed signal State of 360rpm or more continues at least 2 seconds.

5-11 BASIC CHECK

5-11-1 ENGINE STARTING CHECK

1.Check to see if the engine can start.
2.Check to see if the engine revolution speed drops significantly or fluctuates under the idling condition.

5-11-2 MEASUREMENT OF BATTERY VOLTAGE

1.With the engine running and the vehicle in a stationary state, measure the battery voltage.
SPECIFIED VALUE: 10.5—14V (At idle speed)

5-11-3 CHECK OF SPEEDOMETER INDICATION

1.Ensure that the indication of the speedometer is appropriate under the running condition.

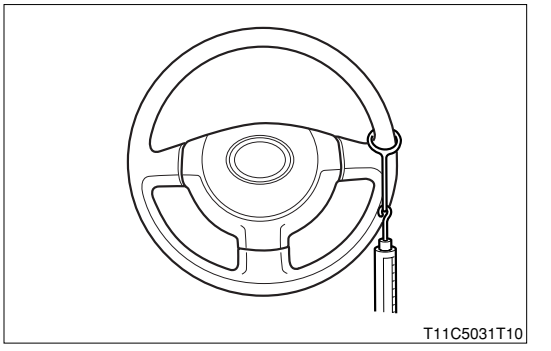
5-11-4 CHECK OF TIRE AIR INFLATION PRESSURE

1.Place the vehicle on a flat asphalt or concrete road. Perform the measurement with the steering wheel set straight-ahead state.
Refer to Page C3-1.

5-11-5 CHECK OF STEERING EFFORT

1.Start the engine.
2.With one person riding on the vehicle and the engine idling, make one turn of the steering wheel from the straight-ahead condition to the right. At this point, attach a spring balance to the steering wheel. Then, pull the spring balance in a right-turn tangential direction and measure the steering effort. In the same way, make one turn of the steering wheel from the straight-ahead condition to the left. At this point, measure the steering effort.
SPECIFIED VALUE:

	While power steering is operating
Steering effort	30N{3.1kgf} or less


T11C5031T10

5-11-6 CHECK OF EPS WARNING LAMP

1.After turning "ON" the IG SW, ensure that the EPS warning lamp illuminates and is extinguished 2 seconds later.

5-11-7 CHECK OF POWER SUPPLY CIRCUIT

1.With the EPS ECU connector connected, turn "ON" the IG SW. Measure the voltage between the following connector and body earth.
(1) Vehicle side connector A1 (PIG)—Vehicle side connector A2 (PGND)
SPECIFIED VALUE: 9V—16V

(2) Vehicle side connector C6 (IG)—Vehicle side connector A2 (PGND)
SPECIFIED VALUE: 10V—16V

5-11-8 CHECK OF EARTH CIRCUIT

1. With the EPS ECU connector connected, set the IG SW "LOCK". Measure the resistance between the following connector and body earth.
   (1) Vehicle side connector A2 (PGND) and body earth
   SPECIFIED VALUE: 0.1 Ω or less

   (2) Column side connector D8 (E2) — Body earth
   SPECIFIED VALUE: 0.1 Ω or less

5-12 TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA

Phenomenon	Check points
The steering wheel is heavy or it does not return smoothly.	· Front tires (Improper air inflation pressure, uneven wear) · Front wheel alignment (Improper) · Front suspension (Lower ball joint) · Steering shaft universal joint assembly. · Steering column tube assembly · Steering gear assembly · EPS ECU
The steering wheel exhibits no play or exhibits excessive play.	· Steering shaft universal joint assembly. · Steering column tube assembly · Steering gear assembly
When the steering wheel is returned while the power steering is operating, an abnormal noise, such as clonking noise, is emitted.	· Front suspension (Lower ball joint) · Steering shaft universal joint Ay · Steering column tube Ay · Front axle hub (Hub bearing) · Steering gear assembly
When the steering wheel is operated while the vehicle is running at a low speed, a scraping noise is emitted.	· Spiral cable S/A · Steering column hole shield · Steering column tube assembly
When the steering wheel is turned slowly with the vehicle in a stationary state, a squeaking noise is emitted.	· Spiral cable S/A · Steering column hole shield · Steering column tube assembly
When the steering wheel is turned with the vehicle in a stationary state, the steering wheel vibrates (With abnormal noise).	· Front tires (Improper air inflation pressure) · Steering column tube assembly

5-13 TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE

5-13-1 DIAGNOSIS CODE NO.11 (TORQUE SENSOR SYSTEM)

(1) Checking method

⊿1.Voltage check between EPS ECU side connectors

1.After setting IG SW "LOCK", disconnect the connector D of the EPS ECU.

2.Turn "ON" the IG SW. Measure the ECU side connector voltage.

NOTE

- There may be cases that diagnosis codes not related to the malfunction are memorized when the engine starts.
- The voltage may be varying when the steering wheel is operated.

(1) ECU side connector D4 (V9)−D8 (E2)

SPECIFIED VALUE: 8.0−11.0V

▼If it is OK, go to ⊿2 .

▼In the case of NG, replace the EPS ECU.

Refer to Page G2-16.

⊿2. Voltage check of torque sensor power supply

1.After setting IG SW "LOCK", connect the connector D of the EPS ECU.

2.Turn "ON" the IG SW. Measure the connector voltage.

(1) Column side connector D4 (V9)−D8 (E2)

SPECIFIED VALUE: 8.0−11.0V

▼If it is OK, go to ⊿3 .

▼In the case of NG, replace the steering column.

Refer to Page G1-5.

⊿3. Voltage check of main torque sensor input

1.Measure the voltage of the connector.

(1) Column side connector D5 (TM)−D8 (E2)

SPECIFIED VALUE: When no steering operation is made: 2.5±0.3V

▼If OK, replace the EPS ECU.

Refer to Page G2-16.

▼In the case of NG, replace the steering column.

Refer to Page G1-5.

5-13-2 DIAGNOSIS CODE NO.12 (TORQUE SENSOR SYSTEM)

(1) Checking method

∑1. Voltage check between EPS ECU side connectors

1.After setting IG SW "LOCK", disconnect the connector D of the EPS ECU.

2.Turn "ON" the IG SW. Measure the ECU side connector voltage.

NOTE

- There may be cases that diagnosis codes not related to the malfunction are memorized when the engine starts.
- The voltage may be varying when the steering wheel is operated.

(1) EPS ECU side connectors D4 (V9)−D8 (E2)

SPECIFIED VALUE: 8.0−11.0V

▼If it is OK, go to ∑2 .

▼If NG, replace the EPS ECU.

Refer to Page G2-16.

∑2. Voltage check of torque sensor power supply

1.After setting IG SW "LOCK", connect the connector D of the EPS ECU.

2.Turn "ON" the IG SW, and measure the voltage of the connector.

(1) Column side connectors D4 (V9)−D8 (E2)

SPECIFIED VALUE: 8.0−11.0V

▼If it is OK, go to ∑3 .

▼If NG, replace the steering column.

Refer to Page G1-5.

∑3. Voltage check of sub torque sensor input

1.Measure the voltage of the connector.

(1) Column side connectors D7 (TS)−D8 (E2)

SPECIFIED VALUE: When no steering operation is made: 2.5±0.3V

▼If OK, replace the EPS ECU.

Refer to Page G2-16.

▼In the case of NG, replace the steering column.

Refer to Page G1-5.

5-13-3 DIAGNOSIS CODE NO.13 (TORQUE SENSOR SYSTEM)

(1) Checking method

⊳1. Voltage check of main torque sensor input and sub torque sensor input

1.After turning "ON" the IG SW, measure the column side connector voltage.

NOTE

- There may be cases that diagnosis codes not related to the malfunction are memorized when the engine starts.
- The voltage may be varying when the steering wheel is operated.

(1) Column side connectors D5 (TM)−D8 (E2), D7 (TS)−D8 (E2)

SPECIFIED VALUE: When no steering operation is made: 2.5±0.3V

▼If OK, replace the EPS ECU.

Refer to Page G2-16.

▼In the case of NG, replace the steering column.

Refer to Page G1-5.

5-13-4 DIAGNOSIS CODE NO.14 (TORQUE SENSOR SYSTEM)

(1) Checking method

⊳1. Check of voltage between EPS ECU side connectors

1.After setting the IG SW "LOCK", disconnect the connector D of the EPS ECU.

2.Turn "ON" the IG SW and measure the ECU side connector voltage.

NOTE

- There may be cases that diagnosis codes not related to the malfunction are memorized when the engine starts.
- The voltage may be varying when the steering wheel is operated.

(1) EPS ECU side connectors D4 (V9)−D8 (E2)

SPECIFIED VALUE: 8.0−11.0V

▼If it is OK, go to ⊳2 .

▼In the case of NG, replace the EPS ECU.

Refer to Page G2-16.

⊳2. Voltage check of torque sensor power supply

1.After setting IG SW "LOCK", connect the connector D of the EPS ECU.

2.Turn "ON" the IG SW, and measure the voltage of the connector.

(1) Column side connectors D4 (V9)−D8 (E2)

SPECIFIED VALUE: 8.0−11.0V

▼If OK, replace the EPS ECU.

Refer to Page G2-16.

▼In the case of NG, replace the steering column.

Refer to Page G1-5.

5-13-5 DIAGNOSIS CODE NO.24, NO.24, NO.55 (MOTOR SYSTEM)

(1) Checking method

⊳1. Check of voltage between motor side connectors

1.After setting the IG SW "LOCK", disconnect the connector B of the EPS ECU.

2.Measure the voltage of the column side connector. (When steering wheel is operated)

NOTE

- There may be cases that diagnosis codes not related to the malfunction are memorized when the measurement is done with the IG SW turned "ON".

(1) Column side connectors B1 (M1)—B2 (M2)

SPECIFIED VALUE: The voltage varies according to the steering wheel operating speed.

▼If it is OK, go to ⊳2 .

▼In the case of NG, replace the steering column.

Refer to Page G1-5.

⊳2. Check of continuity between motor side connector and body earth

1.Check continuity of the column side connector. (When no steering operation is made)

(1) Column side connectors B1 (M1)—body earth

(2) Column side connectors B2 (M2)—body earth

SPECIFIED VALUE: Continuity exists.

▼If OK, replace the steering column.

Refer to Page G1-5.

▼In the case of NG, replace the EPS ECU.

Refer to Page G2-16.

5-13-6 DIAGNOSIS CODE NO.23 (OPEN WIRE IN MOTOR SYSTEM)

(1) Checking method

⊳1. Check of continuity between motor side connectors

1.After setting the IG SW "LOCK", disconnect the connector B of the EPS ECU.

2.Check continuity of the column side connector. (When no steering operation is made)

NOTE

- There may be cases that diagnosis codes not related to the malfunction are memorized when the check is done with the IG SW turned "ON".

(1) Column side connectors B1 (M1)—B2 (M2)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to ⊳2 .

▼In the case of NG, replace the steering column.

Refer to Page G1-5

⊳2. Check of continuity between motor side connector and body earth

1.Check continuity of the column side connector. (When no steering operation is made)

(1) Column side connector B1 (M1)—body earth

(2) Column side connector B2 (M2)—body earth

SPECIFIED VALUE: Continuity exists.

▼If OK, replace the steering column.

Refer to Page G1-5.

▼In the case of NG, replace the EPS ECU.

Refer to Page G2-16.

5-13-7 DIAGNOSIS CODE NO.31, NO.33, NO.34 (POWER STEERING COMPUTER SYSTEM)

(1) Repairing method

Replace the EPS ECU.

Refer to Page G2-16.

5-13-8 DIAGNOSIS CODE NO.32 (POWER STEERING COMPUTER SYSTEM)

(1) Checking method

⊳1. Check of voltage between motor side connectors

1.After setting the IG SW "LOCK", disconnect the connector B of the EPS ECU.

2.Measure the voltage of the column side connector. (When steering wheel is operated)

NOTE

- There may be cases that diagnosis codes not related to the malfunction are memorized when the measurement is done with the IG SW turned "ON".

(1) Column side connectors B1 (M1)—B2 (M2)

SPECIFIED VALUE: The voltage varies according to the steering wheel operating speed.

▼If it is OK, go to ⊳2 .

▼In the case of NG, replace the steering column.

Refer to Page G1-5.

⊳2. Check of continuity between motor side connector and body earth

1.Check continuity of the column side connector. (When no steering operation is made)

(1) Column side connector B1 (M1)—body earth

(2) Column side connector B2 (M2)—body earth

SPECIFIED VALUE: Continuity exists

▼If OK, replace the steering column.

Refer to Page G1-5.

▼In the case of NG, replace the EPS ECU.

Refer to Page G2-16.

5-13-9 DIAGNOSIS CODE NO.41 (VEHICLE SPEED SIGNAL SYSTEM)

(1) Checking method

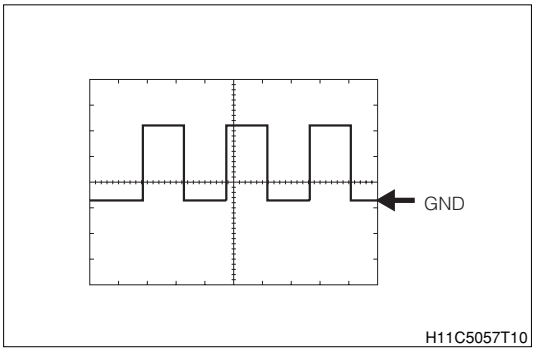
∑1. Measurement of waveform between column side connector and body earth

1.After setting IG SW "LOCK", disconnect the connector C of the EPS ECU.

2.Measure the waveform between the column side connector and body earth during vehicle running.

SPECIFIED VALUE: The pulse waveform shown in the right figure is outputted.

Detected item	Contents
Measuring terminals	Column side connector C5 (SPD)—body earth
Instrument setting	2V/DIV, 20ms/DIV
Measuring condition	Vehicle speed of about 20 km/h or more, and 2 seconds or more



▼If it is OK, go to ∑2 .

▼If NG, perform the following check.

(1) ABS ECU check
(2) A/T ECU check
(3) Combination meter check
(4) Wire harness check
(5) EFI ECU check

∑2. Confirmation of erasure of test mode code

1.After setting IG SW "LOCK", connect the connector C of the EPS ECU.

2.Perform the test mode check. Check to see if the test mode code No.71 can be erased.

SPECIFIED VALUE: The test mode code No.71 can be erased by running the vehicle for 2 seconds or more at a speed of 20 km/h or more.

▼If OK, the following can be said.

(1) Hard braking accompanied by brake locking has taken place.
(2) It is possible that abnormality detection was made due to engine racing. No repair is needed.

▼In the case of NG, replace the EPS ECU.

Refer to Page G2-16.

5-13-10 DIAGNOSIS CODE NO.44 (ENGINE REVOLUTION SPEED SIGNAL SYSTEM)

(1) Checking method

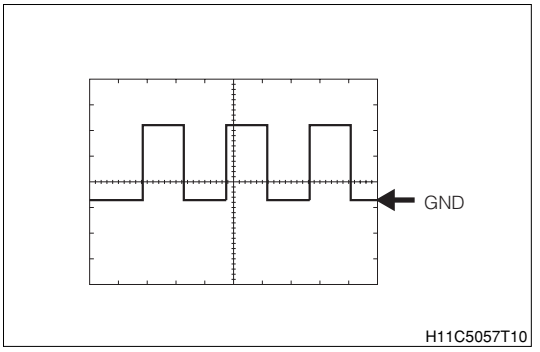
Σ1. Measurement of waveform between column side connector and body earth

1.After setting IG SW "LOCK", disconnect the connector C of the EPS ECU.

2.Start the engine. Measure the waveform between the column side connector and body earth during idling.

SPECIFIED VALUE: The pulse waveform shown in the right figure is outputted.

Detected item	Contents
Measuring terminals	Column side connector C12 (REV)—body earth
Instrument setting	5V/DIV, 10ms/DIV
Condition	When the engine is idling



▼If it is OK, go to Σ2 .

▼If NG, perform the following check.

(1) Combination meter check

(2) Wire harness check

(3) EFI ECU check

Σ2. Confirmation of erasure of test mode code

1.After setting IG SW "LOCK", connect the connector C of the EPS ECU.

2.Perform the test mode check. Check to see if the test mode code No.73 can be erased.

SPECIFIED VALUE: The test mode code No.73 can be erased during idling.

▼If it is OK, it is possible that the abnormality was detected due to engine stall. It is not necessary to repair.

▼If NG, replace the EPS ECU.

Refer to Page G2-16.

5-13-11 DIAGNOSIS CODE NO.51 (POWER SUPPLY SYSTEM)

(1) Checking method

⊳1. Measurement of voltage between column side connector and body earth

1.Start the engine. Measure the voltage between the column side connector and body earth during idling.

(1) Column side connector C6 (IG)—body earth

SPECIFIED VALUE: 16V or less

▼If OK, replace the EPS ECU.

Refer to Page G2-16.

▼If NG, replace the alternator.

5-13-12 DIAGNOSIS CODE NO.52, NO.54 (POWER SUPPLY SYSTEM)

(1) Checking method

⊳1. Measurement of voltage between column side connector and body earth

1.With the vehicle side connector (Connector A) disconnected, measure the voltage between the column side connector and the body earth.

(1) Column side connector A1 (PIG)—body earth

SPECIFIED VALUE: At least 9V

▼If it is OK, go to ⊳2 .

▼If NG, perform the following check.

(1) EPS F/L check

(2) Wire harness check

⊳2. Measurement of voltage between column side connectors

1.Measure the voltage between the column side connectors during engine starting and steering operation.

(1) Between column side connectors A1 (PIG)—A2 (PGND)

SPECIFIED VALUE: At least 9V

▼If OK, replace the EPS ECU.

Refer to Page G2-16.

▼If NG, perform the following check.

(1) Wire harness check

(2) Connector check

(3) Battery check

5-13-13 VEHICLE SPEED SIGNAL AND ENGINE REVOLUTION SPEED SIGNAL SYSTEM

(1) Checking method

▷1. Measurement of waveform between column side connector and body earth

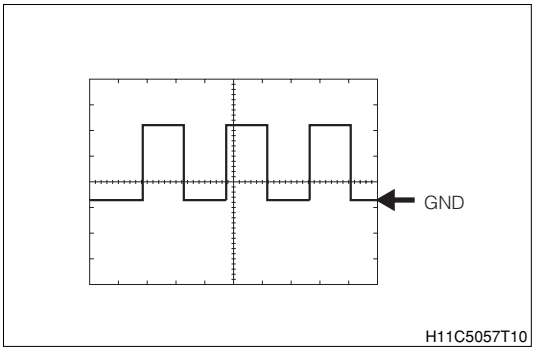
1.After setting IG SW "LOCK", disconnect the connector C of the EPS ECU.

2.Start the engine. Measure the waveform specified below.

(1) Column side connector C12 (REV)—body earth (During idling)

SPECIFIED VALUE: The pulse waveform shown in the right figure is outputted.

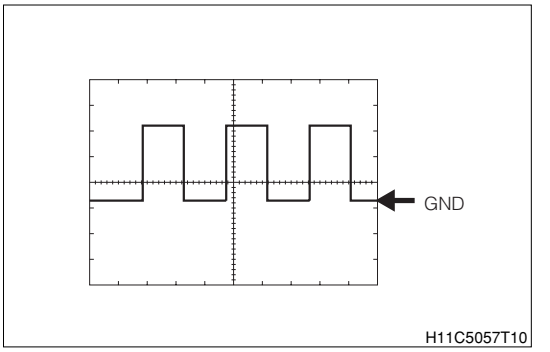
Detected item	Contents
Measuring terminals	Column side connector C12 (REV)—body earth
Instrument setting	5V/DIV, 10ms/DIV
Measuring condition	When the engine is idling



(2) Column side connector C5 (SPD)—body earth (During running at a speed of about 20 km/h)

SPECIFIED VALUE: The pulse waveform shown in the right figure is outputted.

Detected item	Contents
Measuring terminals	Column side connector C5 (SPD)—body earth
Instrument setting	2V/DIV, 20ms/DIV
Measuring condition	Vehicle speed of about 20 km/h or more, and 2 seconds or more



▼If it is OK, go to ▷2 .

▼If NG, perform the following check.

(1) Meter check

(2) Harness check

(3) ABS ECU check

(4) EFI ECU check

▷2. Test mode check

1.After setting the IG SW "LOCK", connect the connector C of the EPS ECU.

2.Perform the test mode check.

SPECIFIED VALUE: The test mode code No.73 can be erased at a speed of 360 rpm or more.
The test mode code No.71 can be erased by running the vehicle for 2 seconds or more at a speed of 20 km/h or more.

▼If OK, the normal state has been reached. (Check other sections.)

▼In the case of NG, replace the EPS ECU.

Refer to Page G2-16.

5-13-14 EPS WARNING LAMP SYSTEM

(1) Checking method

⊳1. Confirmation of lighting of EPS warning lamp

1.After turning "ON" the IG SW, check how many seconds the EPS warning lamp illuminates.
SPECIFIED VALUE: The lamp illuminates for 2 seconds.

▼If it is OK, go to ⊳2 .
▼If it is NG, go to ⊳5 .

⊳2. Confirmation of going out of EPS warning lamp

SPECIFIED VALUE: The lamp goes out.

▼If OK, the normal state has been reached.
▼If it is NG, go to ⊳3 .

⊳3. Confirmation of lighting of EPS warning lamp

1.After setting the IG SW "LOCK", disconnect the connector C of the EPS ECU.
2.After turning "ON" the IG SW, check to see if the warning lamp illuminates.
SPECIFIED VALUE: Illuminates.

▼If OK, perform the following checks.
(1) Harness check
(2) Meter check
(3) Connector check
▼If it is NG, go to ⊳4 .

⊳4. Diagnosis code output check

1.Connect the connector of the EPS ECU.
SPECIFIED VALUE: Are diagnosis codes outputted.

▼If OK, perform the trouble shooting according to the diagnosis codes.
▼In the case of NG, replace the EPS ECU.
Refer to Page G2-16.

⊳5. Check of ECU IG1 fuse

SPECIFIED VALUE: The ECU IG1 fuse is blown out.

▼If OK, replace the fuse.
▼If it is NG, go to ⊳6 .

⊳6. Check of warning lamp bulb

SPECIFIED VALUE: The warning lamp bulb is blown out.

▼If OK, replace the warning lamp bulb.
▼If it is NG, go to ⊳7 .

⊃7. Continuity check of warning lamp harness between combination meter and EPS ECU

1.After setting the IG SW "LOCK", disconnect the EPS ECU connector and combination meter connector.

2.Perform continuity check of the warning lamp harness between the combination meter and the EPS ECU.

SPECIFIED VALUE: No continuity exists.

▼If OK, perform the following checks.

(1) Harness check

(2) Connector check

▼If NG, replace the EPS ECU.

Refer to Page G2-16.

5-13-15 POWER SUPPLY SYSTEM

(1) Checking method

⊳1. Continuity check between column side connector and body earth

1.After setting the IG SW "LOCK", disconnect the connector A of the EPS ECU.

2.Perform continuity check between the column side connector and body earth.

(1) Vehicle side connector A2 (PGND)—body earth

SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to ⊳2 .

▼If NG, perform the following check.

(2) Harness check

(3) Connector check

⊳2. Measurement of voltage between column side connector and body earth

1.Connect the connector A of the EPS ECU.

2.Turn "ON" the IG SW. Measure the voltage between the column side connector and the body earth.

(1) Between column side connectors C6 (IG)—body earth

SPECIFIED VALUE: At least 9V

▼If it is OK, go to ⊳3 .

▼If NG, perform the following check.

(1) Battery check

(2) Harness check

(3) ECU IG fuse check

⊳3. Measurement of voltage between column side connector and body earth

1.Measure the voltage between the column side connector and the body earth during engine starting.

(1) Column side connector C6 (IG)—body earth

SPECIFIED VALUE: 16V or less

▼If it is OK, go to ⊳4 .

▼If NG, check the alternator.

⊳4. Measurement of voltage between column side connectors

1.Measure the voltage between the column side connectors during engine starting with the steering wheel operated.

(1) Between column side connector A1 (PIG)—A2 (PGND)

SPECIFIED VALUE: At least 9V

▼If OK, the normal state has been reached. (Check other sections.)

▼If NG, perform the following check.

(1) Battery check

(2) Harness check

(2) EPS F/L check

5-14 UNIT CHECK

5-14-1 VEHICLE SPEED SENSOR

1.Check the vehicle speed signal.
Refer to Page J3-1.

5-14-2 WARNING LAMP

1.Set the IG SW "LOCK" and disconnect the connector of the steering gear Ay. Under this condition, connect the vehicle side connector C9 (EPS-W) terminal of the disconnected steering column Ay to the earth. Turn "ON" the IG SW. Check to see if the EPS warning lamp illuminates.

5-14-3 POWER STEERING COLUMN ASSEMBLY

(1) TORQUE SENSOR

1.With the column side connector (Connector D) connected, measure the voltage between the following terminals.
SPECIFIED VALUE:

Steering position	D5 (TM)−D8 (E2)	D7 (TS)−D8 (E2)
Neutral	2.5±0.3V	←
Right turn	2.20−4.50V	0.50−2.80V
Left turn	0.50−2.80V	2.20−4.50V

(2) Motor

1.With the column side connector (Connector B) disconnected, check continuity between the column side connectors B1 (M1)−B2 (M2).
SPECIFIED VALUE: Continuity exists. (Resistance 0.1 Ω or less)

2.With the column side connector (Connector B) disconnected, measure the voltage between the column side connectors B1 (M1)−B2 (M2) when the steering wheel is operated.
SPECIFIED VALUE: Ensure that the voltage changes according to the steering wheel operating speed.

3.With the column side connector (Connector B) disconnected, check continuity between the column side connector B1 (M1)−body earth, and between the column side connector B2 (M2)−body earth.
SPECIFIED VALUE: No continuity

4.With the column side connector (Connector B) connected, measure the voltage between the following terminals.
SPECIFIED VALUE:

Steering position	B1 (M1)−A2 (PGND)	B2 (M2)−A2 (PGND)
Neutral position → right turn and steering wheel held	The voltage rises.	The voltage drops.
Neutral position → left turn and steering wheel held	The voltage drops.	The voltage rises.

5-14-4 POWER STEERING COMPUTER ASSEMBLY

1.Check the connector terminal for deformation or bend.
2.Check the connector for crack and deformation.
3.The following checks should be carried out with all electric loads applied while idling.
(1) Check the battery voltage.
SPECIFIED VALUE: 10.5—14.0V

4.The following checks should be carried out with the IG SW set to "LOCK".
(1) Check continuity between the terminal A2 (PGND) and the body earth.
SPECIFIED VALUE: Continuity exists. (Resistance 0.1 Ω or less)

5-15 ECU INPUT/OUTPUT SIGNAL CHECK

5-15-1 CHECKING METHOD

The checks should be carried out with the connector connected to the EPS ECU.

5-15-2 SPECIFIED VALUE FOR INPUT/ OUTPUT SIGNAL

Check system	Connecting terminal	Name of input/output	Check items	Measuring condition	Standard
Torque sensor	D4 (V9) −D8 (E2)	Torque sensor power supply input	Voltage	IG SW "ON"	8.0−11.0V
	D8 (E2) −Body earth	Torque sensor earth	Continuity	At all times	Continuity exists.
	D5 (TM) −D8 (E2)	Main torque sensor signal input	Voltage	Steering neutral position	2.5±0.3V
			Voltage	Steering right turn	2.20−4.50V
			Voltage	Steering left turn	0.50−2.80V
	D7 (TS) −D8 (E2)	Sub torque sensor signal input	Voltage	Steering neutral position	2.5±0.3V
			Voltage	Steering right turn	0.50−2.80V
			Voltage	Steering left turn	2.20−4.50V
Motor	B1 (M1) −A2 (PGND)	Motor output	Voltage	Steering right turn	The voltage rises.
			Voltage	Steering left turn	The voltage drops.
	B2 (M2) −A2 (PGND)	Motor output	Voltage	Steering right turn	The voltage drops.
			Voltage	Steering left turn	The voltage rises.
Vehicle power supply	A1 (PIG) −A2 (PGND)	Power supply input of power system	Voltage	IG SW "ON"	9−16V
	A2 (PGND) −Body earth	Earth	Continuity	At all times	Continuity exists
Vehicle communication	C6 (IG) −A2 (PGND)	IG key input	Voltage	IG SW "ON"	10−16V
	C5 (SPD) −A2 (PGND)	Vehicle speed sensor signal input	Voltage waveform	Running at a vehicle speed of about 20 km/h	Pulse generation
	C11 (EPS-TS) −A2 (PGND)	DLC Terminal input	Voltage	Inside DLC Short circuit between terminals EPS-TS−E.	2V or less
			Voltage	Within DLC Release between terminals EPS-TS−E.	9−14V
	C12 (REV) −A2 (PGND)	Engine revolution signal input	Voltage waveform	When the engine is idling	Pulse generation
	C9 (EPS-W) −A2 (PGND)	EPS warning lamp output	Voltage	IG SW "LOCK"→"ON"	When the lamp is illuminated 1V or less When the lamp is extinguished 9−14V
	C8 (IDUP) −A2 (PGND)	Idle up request signal output	Voltage	The steering wheel is not turned while the EPS is operating. → The steering wheel is turned with the vehicle in a stationary state.	9−14V →2V or less

H1 SRS AIRBAG SYSTEM

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1 SRS AIRBAG (DRIVER'S SEAT SIDE)

1-1 REMOVAL AND INSTALLATION

CAUTION

- Refer to the Caution Tips on Servicing.

Refer to Page A1-26.

1-1-1 ARTICLES TO BE PREPARED

Tool

Long TORX® wrench T30

Instrument

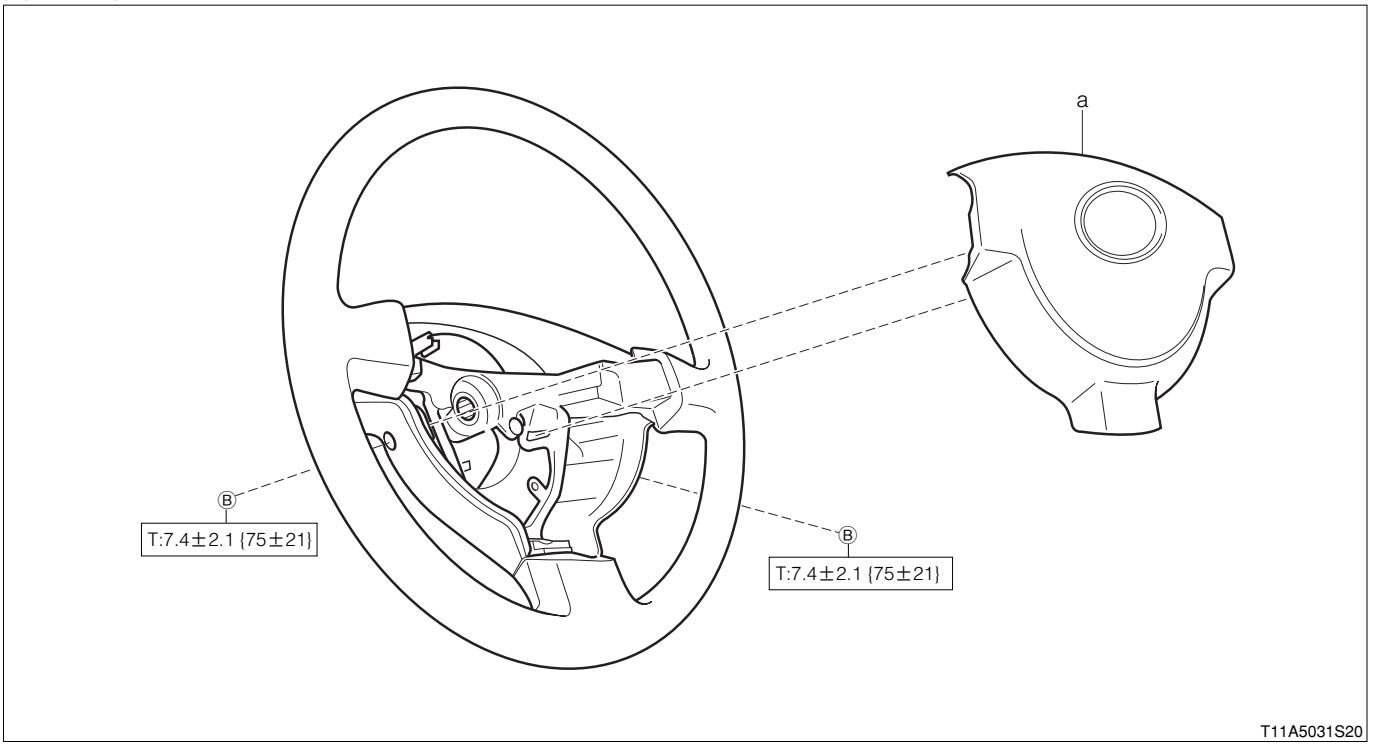
Torque wrench

1-1-2 OPERATION BEFORE REMOVAL

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

1-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

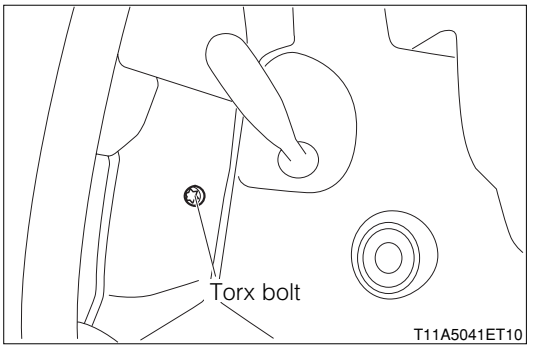
(2) Removal and installation procedures

▼ ▲ 1 a Pad Ay, steering wheel

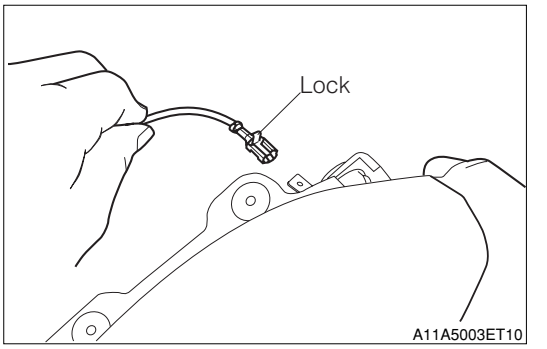
1-1-4 POINTS OF REMOVAL

(1) Pad Ay, steering wheel

1.Loosen the Torx bolts located at the right and left sides of the pad Ay.
TOOL: Long TORX® wrench T30



2.Disconnect the horn connector.
3.Disconnect the connector for the airbag.
4.Remove the pad Ay.



1-1-5 INSPECTION

(1) Check of steering wheel pad Ay

1.When the following cases have occurred, perform visual checks or system checks. If there are any faulty parts, replace them.
(1) Case where the vehicle is damaged, including minor collisions where the airbag has not been deployed.
(2) Case where problems have been found out by the diagnosis check

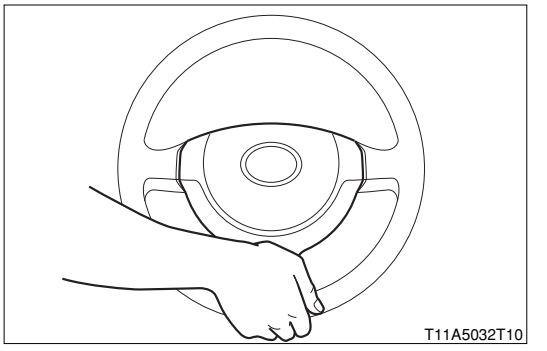
(2) External Check of steering wheel pad Ay

1.When the following cases have occurred, replace the pad assembly.
(1) Case where the airbag has been deployed.
(2) Case where the airbag deploying surface has scratches or cracks.
(3) Case where the connector or harness has dents or chips.
(4) Case where grease, water, detergent or oil has got to the pad assembly in a large quantity.
(5) Case where the pad assembly dropped and got damaged.

1-1-6 POINTS OF INSTALLATION

(1) Pad Ay, steering wheel

1.Insert firmly the connector for the airbag as far as it will go.
2.When installing the pad Ay, hold the lower side of the pad Ay.



1-1-7 OPERATION AFTER INSTALLATION

1.Connect the negative (−) terminal of the battery.
2.Set the IG SW to "ON" position. At this time, ensure that the airbag warning lamp goes on about six seconds and then goes out.

1-2 DISPOSAL

CAUTION

- Refer to the Caution Tips on Servicing.

Refer to Page A1-26.

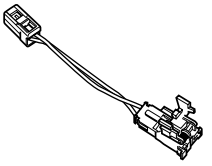
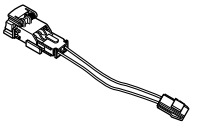
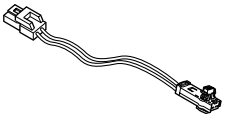
1-2-1 OUTLINE

1.When scrapping a vehicle equipped with an airbag system or scrapping the airbag at the driver's seat, be sure to deploy the airbag. Then, follow the "Scrapping procedure" to scrap the airbag itself. When scrapping the airbag at the driver's seat, that has been deployed by a customer during its use, too, follow the "Scrapping procedure."

1-2-2 DEPLOYMENT OF STEERING WHEEL PAD AY

(1) Articles to be prepared

SST

Shape	Part No.	Part name
	09082-87710-000 (09082-87701-000)	Wire,air bag deployment
	09082-00760-000	Sub-harness 4,air bag deployment wire
	09082-10801-000	Sub-harness 8A,air bag deployment wire
	09082-20801-000	Sub-harness 8B,air bag deployment wire

Lubricants, bonds and others

Wire harness (1.25mm^2),Two bolts (Nominal length of 35 mm or more, pitch of 1.0 mm, nominal diameter of 6.0 mm),12V battery for car use,2 tires with disc wheel,3 tires,Vinyl bag

(2) In-vehicle deployment

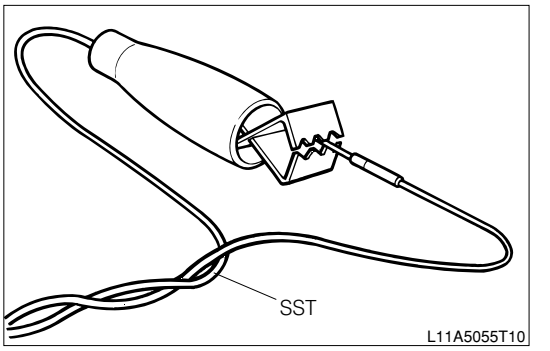
1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Connect the following two SSTs.

SST: 09082-87710-000
09082-00760-000

3.Short the terminal with the alligator clip of the SST.
SST: 09082-87710-000
4.Remove the steering column lower cover.
Refer to Page G1-5.

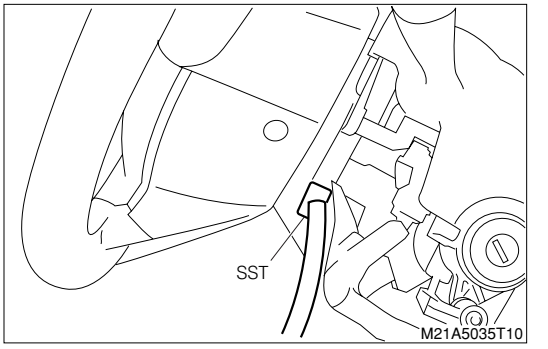
5.Disconnect the harness side connector for the airbag from the spiral cable S/A.



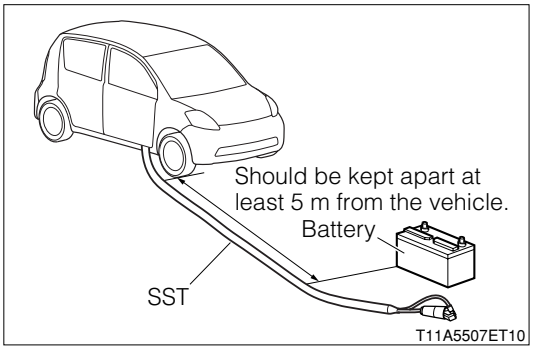
6.Connect the SST connector to the connector for the airbag (Yellow 2P).

WARNING

- Ensure that there is no excessive play around the steering wheel S/A.
- At this time, close all the doors and windows.



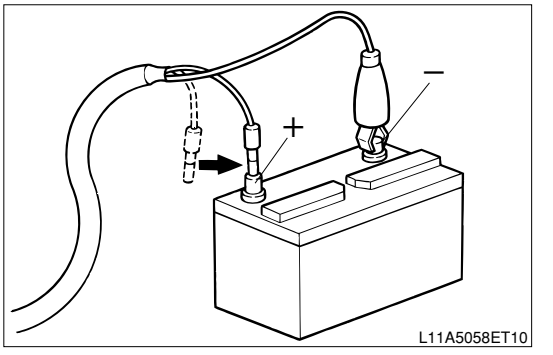
7.Extend the SST fully. Place the battery at least 5 m away from the vehicle.



8.Confirm safety inside and around the vehicle. Then, connect the SST to the battery (The alligator clip to the negative (−) terminal of the battery; the terminal to the positive (+) terminal) so as to actuate the airbag.

WARNING

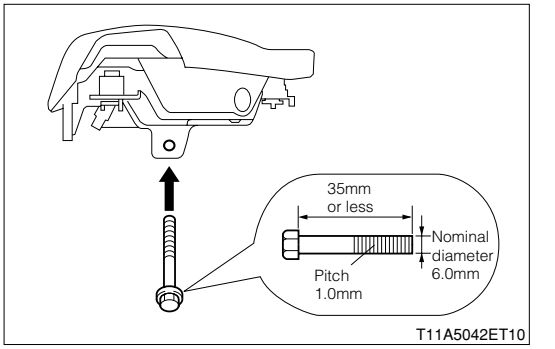
- Make sure that there is no one inside and around the vehicle.
- Give warning loudly to those nearby before deploying the airbag.



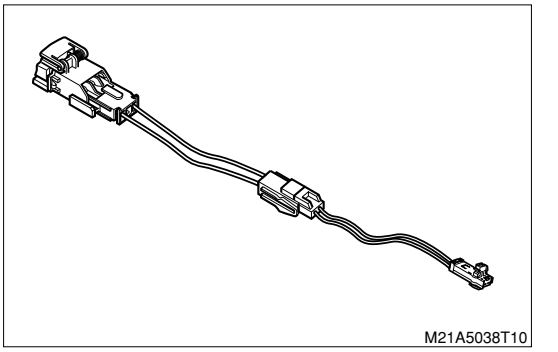
(3) Unit deployment

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Remove the pad Ay.

3.Attach plate washers to two bolts. By your hands, fully tighten the bolts to the two attaching holes of the pad assembly.



4.Connect the following two SSTs.
SST: 09082-10801-000
09082-20801-000



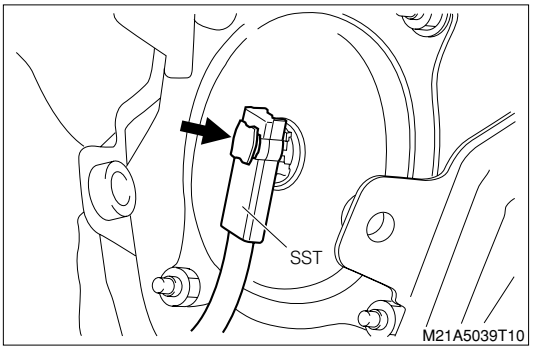
5.Connect the SST to the pad Ay.

CAUTION

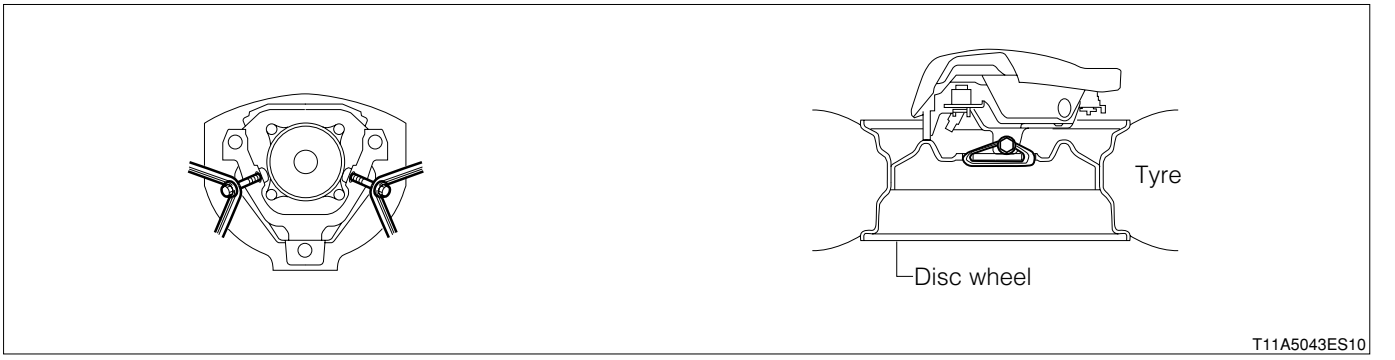
- Firmly lock the SST.

NOTE

- The connector section of the SST, which is connected to the pad Ay directly, will melt away once it operates, due to high temperature of the pad Ay.



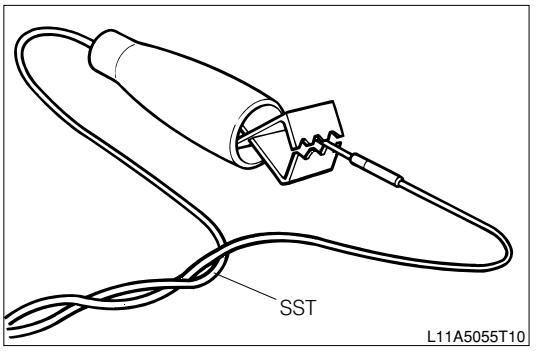
6.Secure the pad Ay to a disc wheel, using a wire harness for automotive use (Cross-sectional area of core wire: 1.25mm^2 or more).



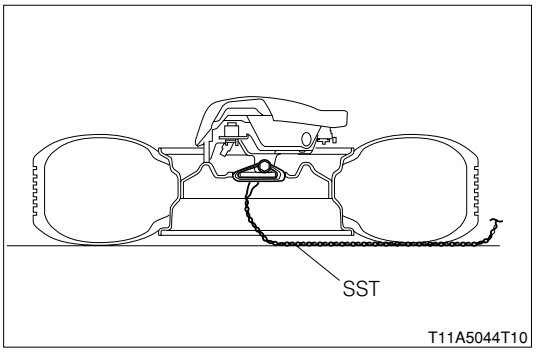
WARNING

- Perform the installation in such a direction that the airbag deploying surface faces upward.
- A great force will be applied to the wire harness at the time of airbag deployment. Therefore, secure the wire harness firmly by winding it triple.

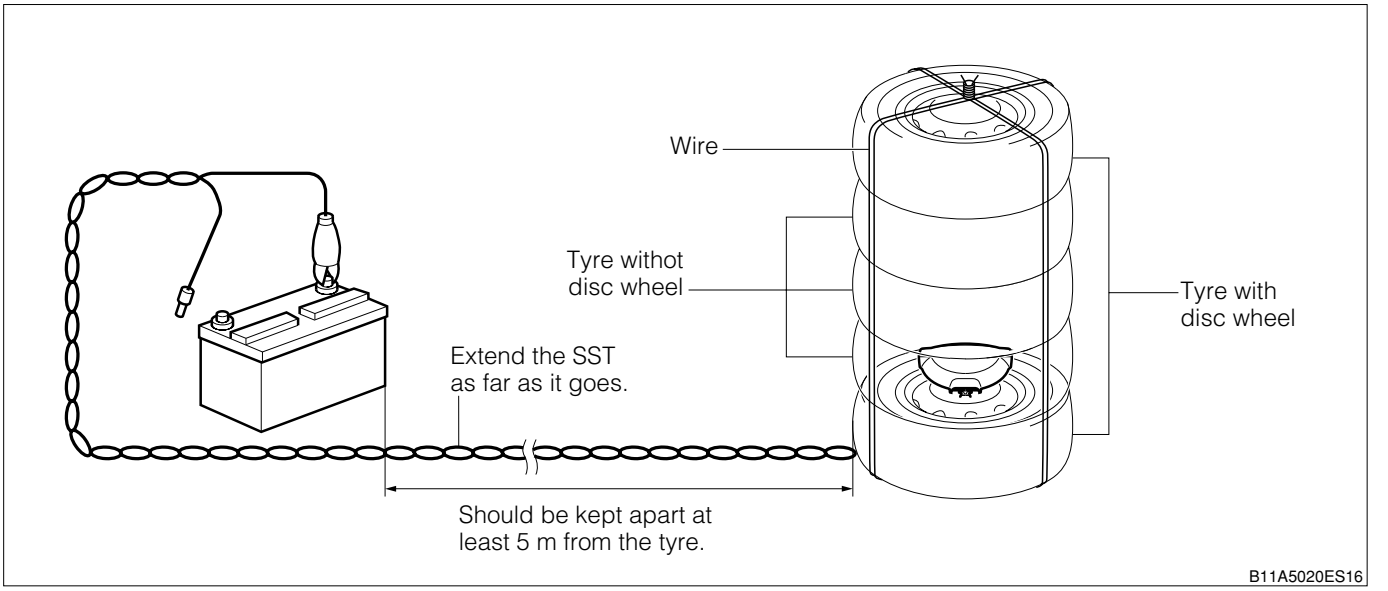
7.Short the terminal with the alligator clip of the SST.
SST: 09082-87710-000



8.Connect the SST at a point under the disc wheel.



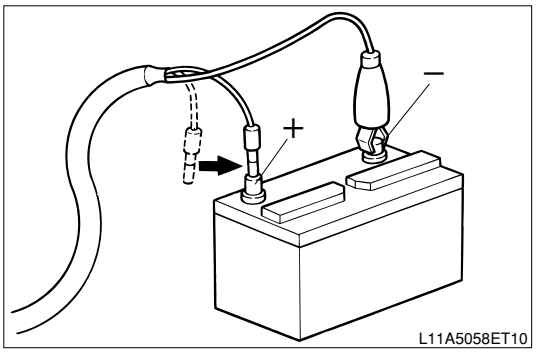
9.Pile up at least three tires on the disc wheel to which the pad Ay has been secured. Then, place a tire with a disc wheel on the top.
10.Connect the tires with wire so that the tires will not be scattered when the airbag is deployed.
11.Extend the SST fully. Place the battery at least 5 m away from the tire.



12.Confirm safety inside and around the vehicle. Then, connect the SST to the battery (The alligator clip to the negative (−) terminal of the battery; the terminal to the positive (+) terminal) so as to deploy the airbag.

WARNING

- Make sure that there is no one inside and around the vehicle.
- Give warning loudly to those nearby before deploying the airbag.
- Never mount and reuse the tires and disc wheels used for the deployment on vehicles.

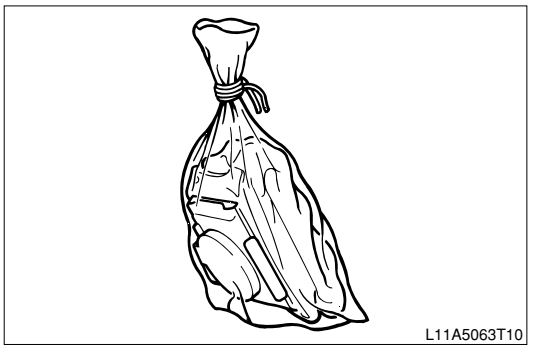


(4) Scrapping procedure

1.Seal the deployed pad assembly in a plastic bag before it is scrapped.

WARNING

- The temperature reaches a few hundred °C at some sections. Therefore, leave it at least 30 minutes after it is deployed.
- Do not apply water, etc.
- When handling, wear dust protective goggles and gloves.
- After completion of the operation, be sure to wash your hands with water.
- Never scrap the pad Ay that has not been deployed.



2 SPIRAL CABLE

2-1 REMOVAL AND INSTALLATION

CAUTION

- Refer to the Caution Tips on Servicing.

Refer to Page A1-26.

2-1-1 OPERATION BEFORE REMOVAL

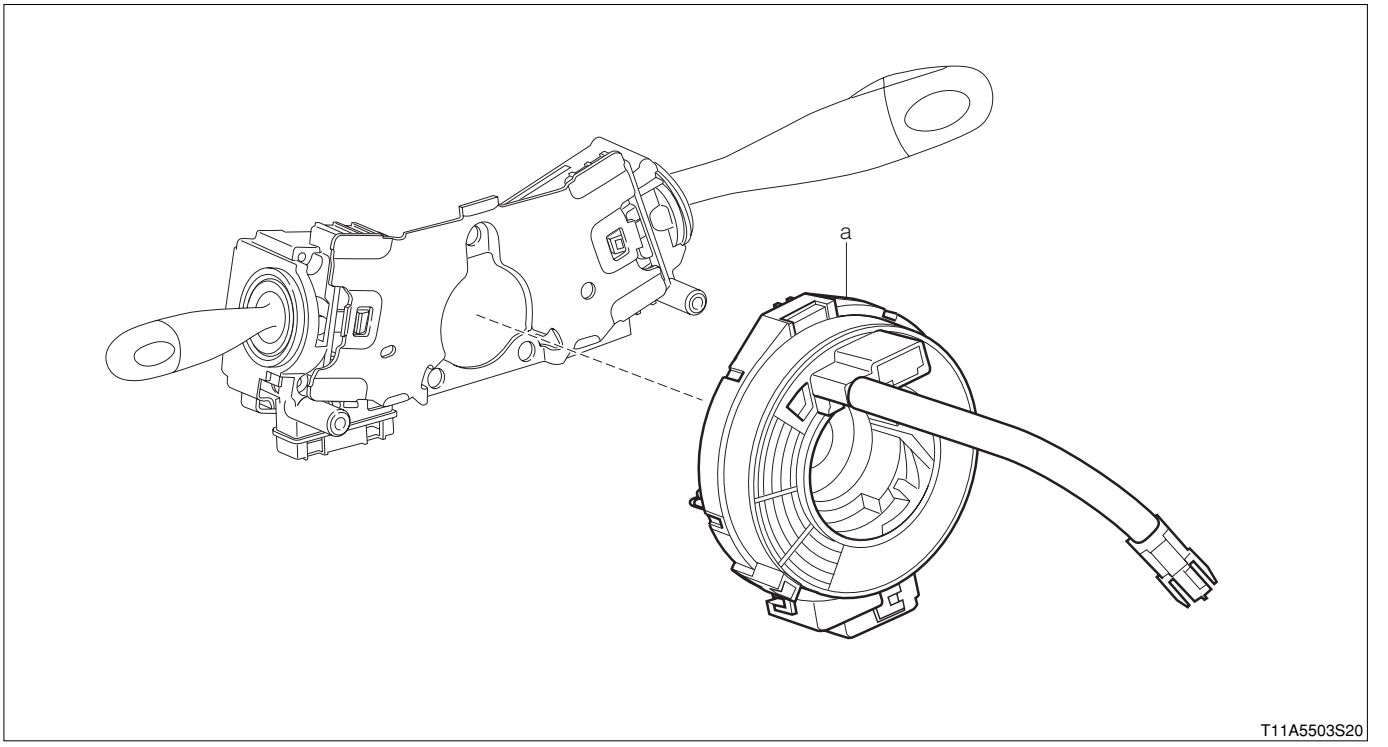
1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Ensure that the steering wheel subassembly is in the straight ahead condition.
3.Remove the steering wheel pad assembly.
Refer to Page H1-1.

4.Remove the steering wheel subassembly.
Refer to Page G1-3.

5.Lower the steering column assembly as far as it goes.
6.Remove the steering column upper cover and steering column lower cover.
Refer to Page G1-5.

2-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

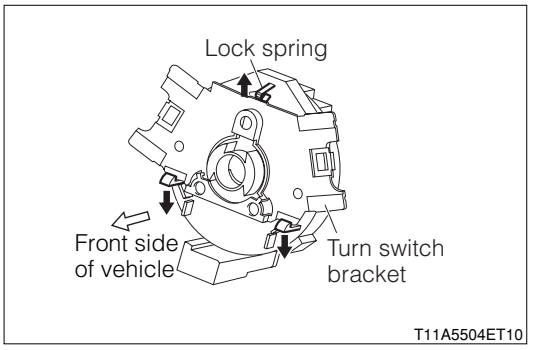
▼ ▲ 1 a Cable S/A, spiral

2-1-3 POINTS OF REMOVAL

(1) Cable S/A, spiral

1.Disconnect the connector.

2.Perform the removal operation by releasing the lock spring and two pawls of the cable S/A.



2-1-4 INSPECTION

(1) Check standard for spiral cable S/A

1.Check the cable S/A in the following cases. Replace it if problems are found.
(1) Case where the vehicle is involved in a collision.

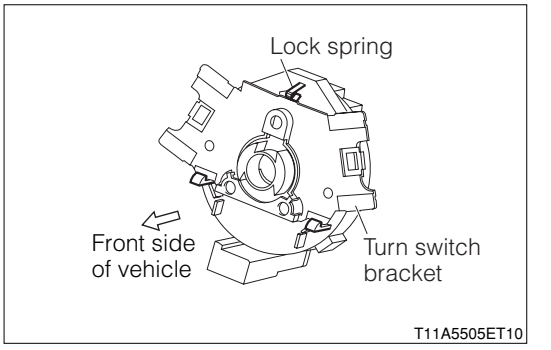
(2) Check of spiral cable S/A

1.When the following cases have occurred, replace the cable subassembly.
(1) When the driver's seat airbag has been deployed:
(2) When the cable S/A is dropped:
(3) Case where the connector section has scratches, cracks and breakage:
(4) Case where the cable S/A has deformation, cracks and breakage:
(5) Case where the harness section is damaged:

2-1-5 POINTS OF INSTALLATION

(1) Cable S/A, spiral

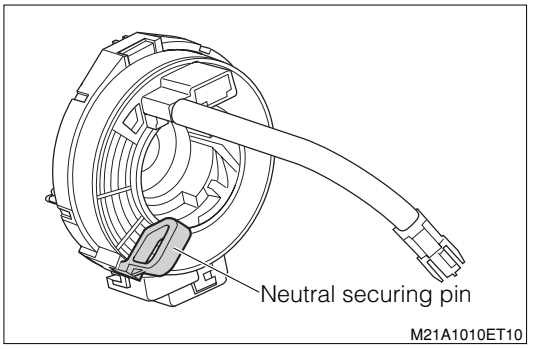
1.Ensure that the steering wheel is in the straight ahead state.
2.Perform the installation in such a way that the lock spring and two pawls are engaged.



NOTE

- In the case of a new cable S/A, do not bend the neutral fixing pin at this moment.

3.Connect the connector.



2-1-6 OPERATION AFTER INSTALLATION

1.Install the steering column upper cover and steering column lower cover.
Refer to Page G1-5.

2.Install the steering wheel S/A to the steering column Ay.
Refer to Page G1-3.

3.Install the steering wheel pad assembly.
Refer to Page H1-1.

4.Ensure that the steering wheel subassembly is in the straight ahead condition.
5.Connect the negative (−) terminal of the battery.
6.Set the IG SW to "ON" position. At this time, ensure that the airbag warning lamp goes on about six seconds and then goes out.

3 SRS AIRBAG (FRONT PASSENGER SEAT SIDE)

3-1 REMOVAL AND INSTALLATION

CAUTION

- Refer to the Caution Tips on Servicing.

Refer to Page A1-26.

3-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

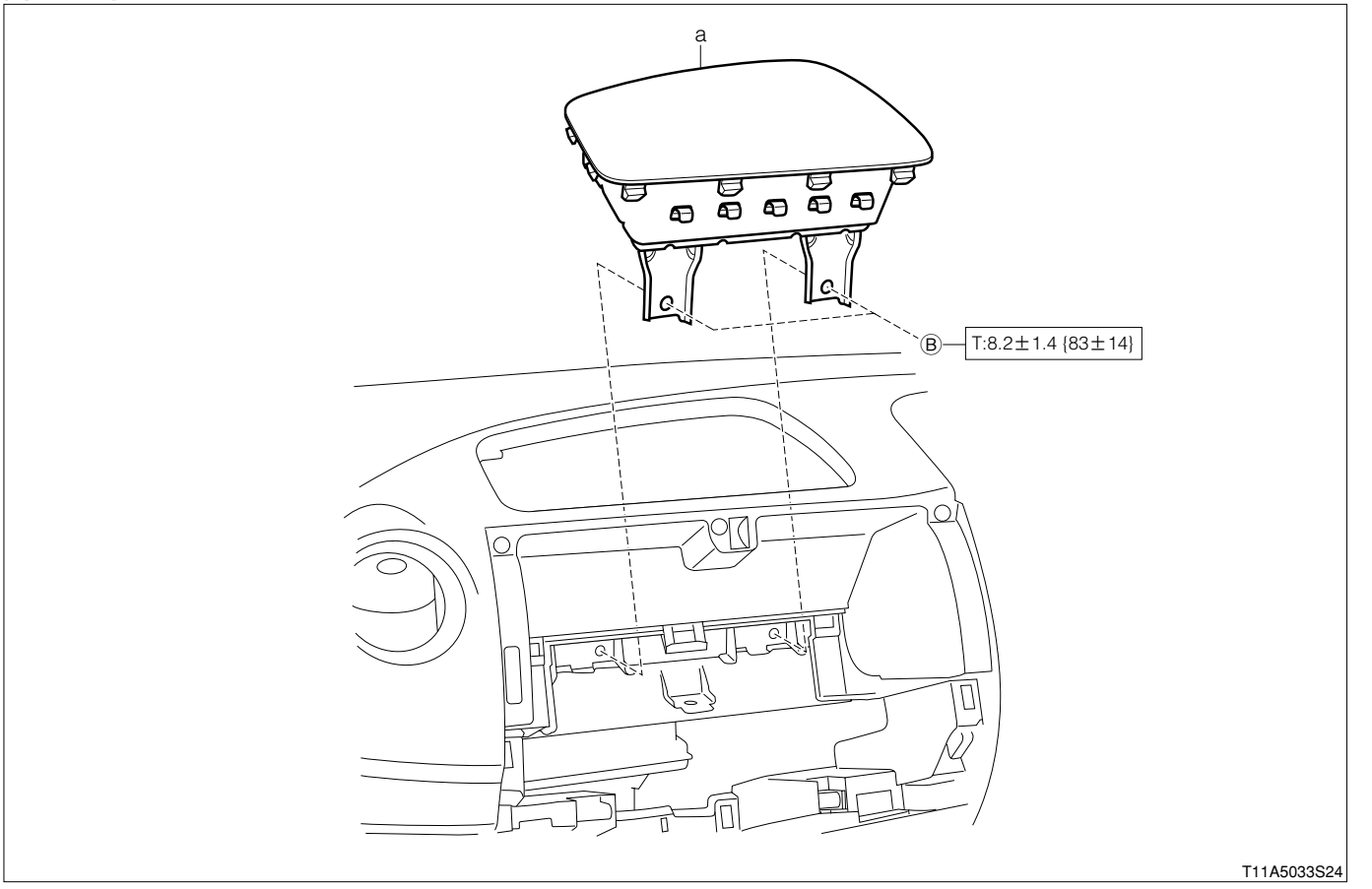
3-1-2 OPERATION BEFORE REMOVAL

1. After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2. Remove the instrument panel box No. 1.

Refer to Page I2-23.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

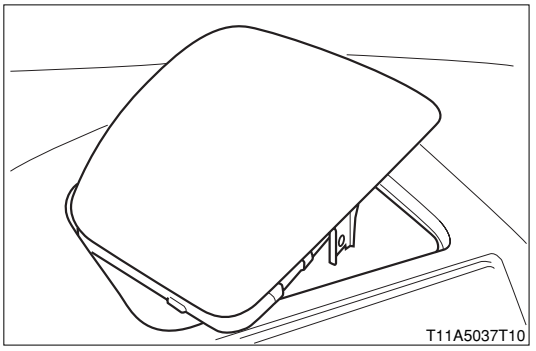
▼ ▲ 1 a Airbag Ay, instrument panel passenger

3-1-4 POINTS OF REMOVAL

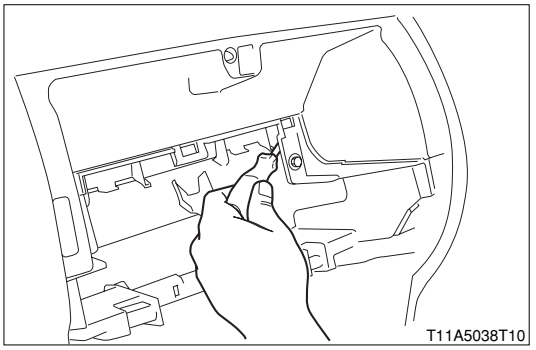
(1) AIRBAG AY, INSTRUMENT PANEL PASSENGER

1. Remove the bolt retaining the instrument panel reinforcement S/A and airbag Ay.

2.Disconnect the connector under a condition that the airbag Ay is floated from the instrument panel.



3.With a flat screwdriver or the like, remove the clamp of the airbag Ay harness from the instrument panel reinforcement S/A through the installation section of the instrument panel box No. 1.



3-1-5 INSPECTION

(1) Check of instrument panel passenger airbag Ay

1.When the following cases have occurred, perform checks. If there are any faulty parts, replace them.
(1) Case where the vehicle is damaged, including minor collisions where the airbag has not been deployed.
(2) Case where problems have been found out by the diagnosis check

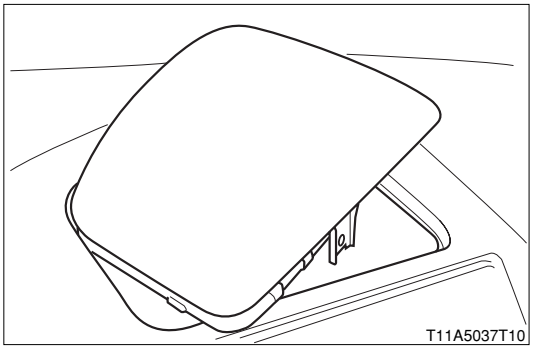
(2) External check of Instrument panel passenger airbag Ay

1.When the following cases have occurred, replace the airbag assembly.
(1) Case where the airbag has been deployed.
(2) Case where the airbag deploying surface has scratches or cracks.
(3) Case where the connector or harness has dents or chips.
(4) Case where grease, water, detergent or oil has got to the airbag assembly in a large quantity.
(5) Case where the airbag assembly dropped and got damaged.

3-1-6 POINTS OF INSTALLATION

(1) Airbag Ay, instrument panel passenger

1.Connect the connector and harness under a condition that the airbag Ay is floated.
2.Fit the airbag Ay into the instrument panel. Then, tighten the attaching bolts.



3-1-7 OPERATION AFTER INSTALLATION

1.Install the instrument panel box No. 1.
Refer to Page I2-23.

2.Connect the negative (−) terminal of the battery.
3.Set the IG SW to "ON" position. At this time, ensure that the airbag warning lamp goes on about six seconds and then goes out.

3-2 DISPOSAL

CAUTION

- Refer to the Caution Tips on Servicing.

Refer to Page A1-26.

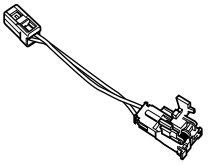
3-2-1 OUTLINE

1.When scrapping a vehicle equipped with an airbag system or scrapping the airbag at the passenger seat, be sure to deploy the airbag. Then, follow the "Scrapping procedure" to scrap the airbag itself. When scrapping the airbag at the passenger seat, that has been deployed by a customer during its use, too, follow the "Scrapping procedure."

3-2-2 DEPLOYMENT OF INSTRUMENT PANEL PASSENGER AIRBAG AY

(1) Articles to be prepared

SST

Shape	Part No.	Part name
	09082-87710-000 (09082-87701-000)	Wire,air bag deployment
	09082-00760-000	Sub-harness 4,air bag deployment wire

Lubricants, bonds and others

Wire harness (1.25mm^2),12V battery for car use,1 tire with disc wheel,4 tires,Vinyl bag

(2) In-vehicle deployment

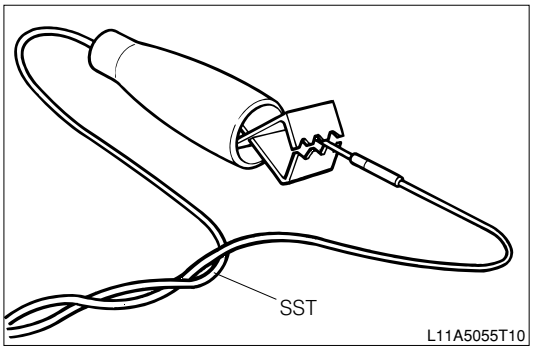
1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Connect the following two SSTs.

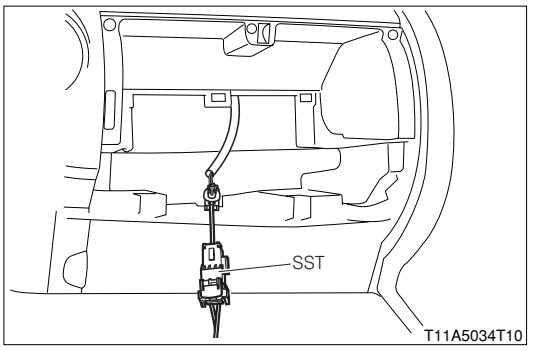
SST: 09082-87710-000
09082-00760-000

3.Short the terminal with the alligator clip of the SST.

SST: 09082-87710-000



4.Remove the instrument panel box No. 1.
Refer to Page I2-23.

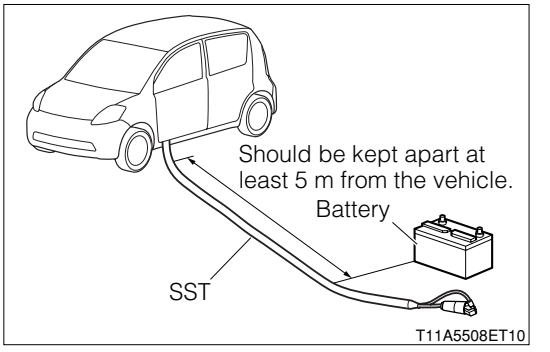


5.Disconnect the connector at the airbag harness side.
Refer to Page H1-11.

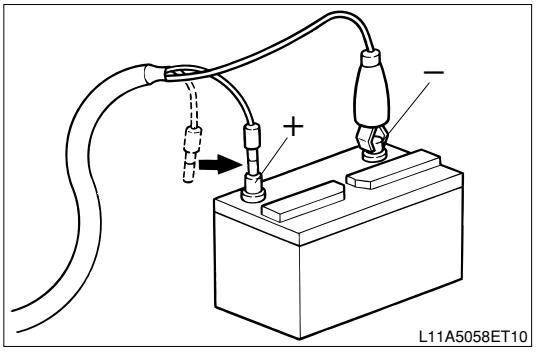
6.Install the airbag Ay to the instrument panel reinforcement S/A.
Refer to Page H1-11.

7.Connect the SST connector to the connector for the airbag (Yellow 2P).
SST: 09082-00760-000
WARNING
- Ensure that there is no excessive play at the airbag assembly.
- At this time, close all the doors and windows.

8.Extend the SST fully. Place the battery at least 5 m away from the vehicle.



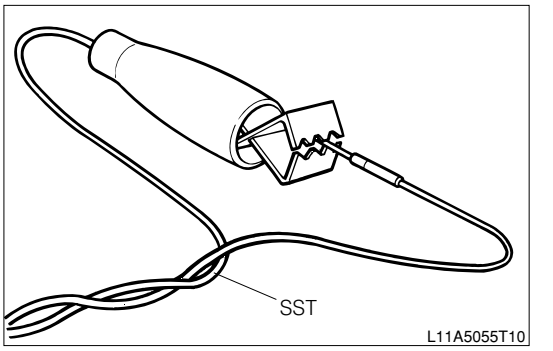
9.Confirm safety inside and around the vehicle. Then, connect the SST to the battery (The alligator clip to the negative (−) terminal of the battery; the terminal to the positive (+) terminal) so as to actuate the airbag.
SST: 09082-87710-000
WARNING
- Make sure that there is no one inside and around the vehicle.
- Give warning loudly to those nearby before deploying the airbag.



(3) Unit deployment

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Connect the following two SSTs.
SST: 09082-87710-000
09082-00760-000

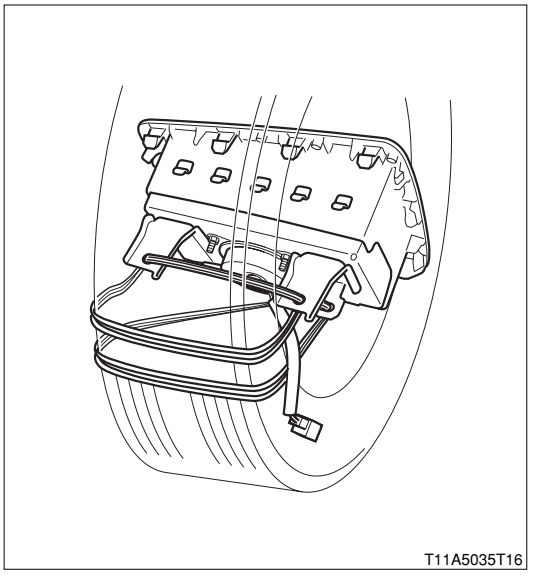
3.Short the terminal with the alligator clip of the SST.
SST: 09082-87710-000
4.Remove the airbag Ay from the instrument main panel.



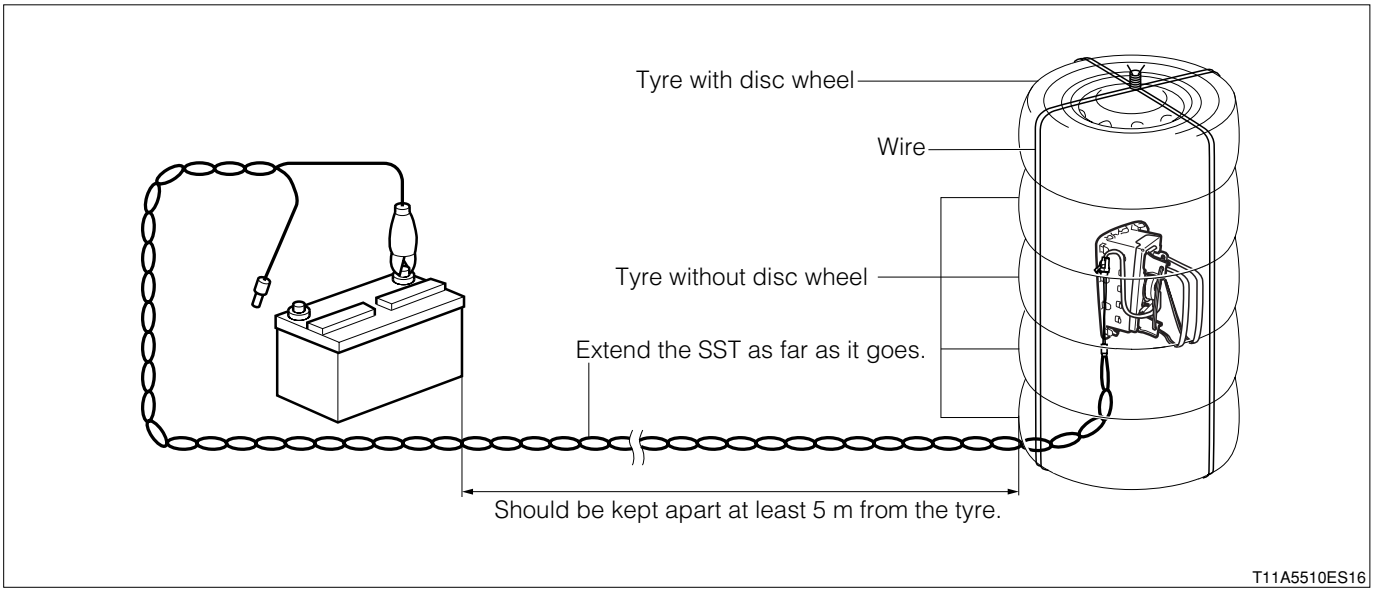
5.Secure the airbag Ay to a tire, using a wire harness for automotive use (Cross-sectional area of core wire: 1.25mm^2 or more).

WARNING

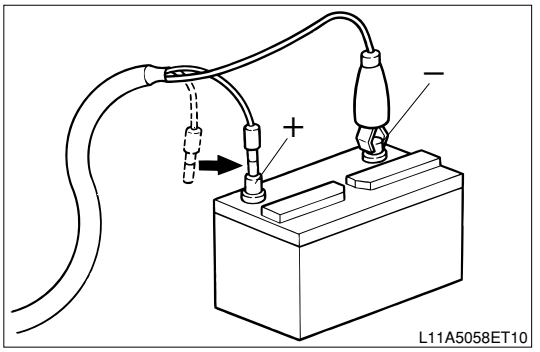
- Install the airbag assembly in such a way that the airbag deploying surface faces toward the center of the tire.
- A great force will be applied to the wire harness at the time of airbag deployment. Therefore, secure the wire harness firmly by winding it triple.



6.Connect the SST connector to the connector for the airbag (Yellow 2P).
7.Place a tire tied with the airbag Ay to two tires stacked vertically. Then, place one or more tires on these tires. Finally place a tire with a disc wheel on the top.
8.Connect the tires with wire so that the tires will not be scattered when the airbag is deployed.
9.Extend the SST fully. Place the battery at least 5 m away from the tire.



10.Confirm safety inside and around the vehicle. Then, connect the SST to the battery (The alligator clip to the negative (−) terminal of the battery; the terminal to the positive (+) terminal) so as to deploy the airbag.

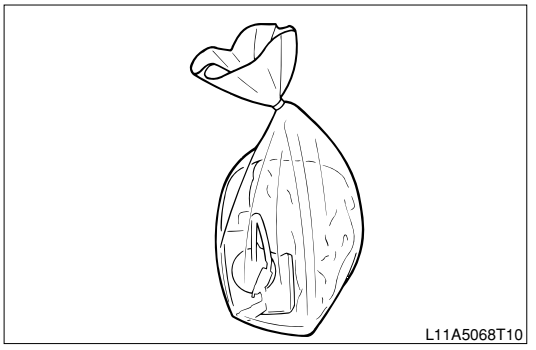


WARNING

- Make sure that there is no one inside and around the vehicle.
- Give warning loudly to those nearby before deploying the airbag.
- Never mount and reuse the tires and disc wheels used for the deployment on vehicles.

(4) Scrapping procedure

1.Seal the deployed airbag assembly in a plastic bag before it is scrapped.



WARNING

- The temperature reaches a few hundred °C at some sections. Therefore, leave it at least 30 minutes after it is deployed.
- Do not apply water, etc.
- When handling, wear dust protective goggles and gloves.
- After completion of the operation, be sure to wash your hands with water.
- Never scrap the pad Ay that has not been deployed.

4 FRONT SEAT OUTER BELT (EQUIPPED WITH PRETENSIONER AND FORCE LIMITER MECHANISM)

4-1 REMOVAL AND INSTALLATION

CAUTION

- Refer to the Caution Tips on Servicing.

Refer to Page A1-26.

Refer to Page I2-42.

4-2 DISPOSAL

CAUTION

- Refer to the Caution Tips on Servicing.

Refer to Page A1-26.

4-2-1 OUTLINE

1.When scrapping a vehicle equipped with a pretensioner or scrapping the front seat outer belt itself, be sure to actuate the pretensioner. Then, follow the "Scrapping procedure" to scrap the front seat outer belt itself. When scrapping the front seat outer belt that has been actuated by a customer during its use, too, follow the "Scrapping procedure."

NOTE

- The pretensioner is actuated even if the seat belt is not fastened.

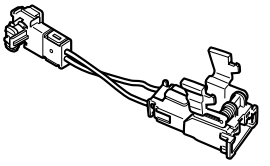
4-2-2 CONFIRMATION OF ACTUATED PRETENSIONER

1.The pretensioner is actuated together with the airbag. Therefore if the airbag has been deployed in an accident, the pretensioner also has been actuated.

4-2-3 ACTUATION OF PRETENSIONER

(1) Articles to be prepared

SST

Shape	Part No.	Part name
	09082-87710-000 (09082-87701-000)	Wire,air bag deployment
	09082-97201-000	Sub-harness D1,air bag deployment wire

Lubricants, bonds and others

12V battery for car use,2 tires with disc wheel,A steel sheet(a thickness t＝1 to 2mm),Vinyl bag

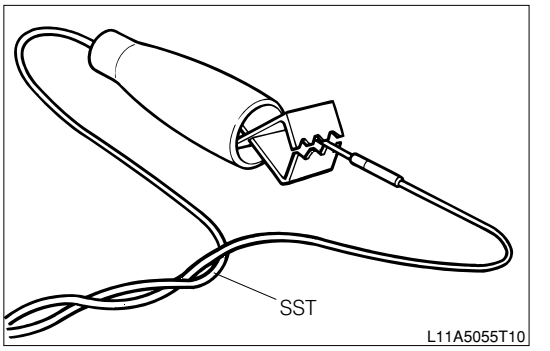
(2) In-vehicle actuation

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Connect the following two SSTs.

SST: 09082-87710-000
09082-97201-000

3.Short the terminal with the alligator clip of the SST.
SST: 09082-87710-000



4.Remove the front door scuff plate RH/LH.
Refer to Page I2-48.

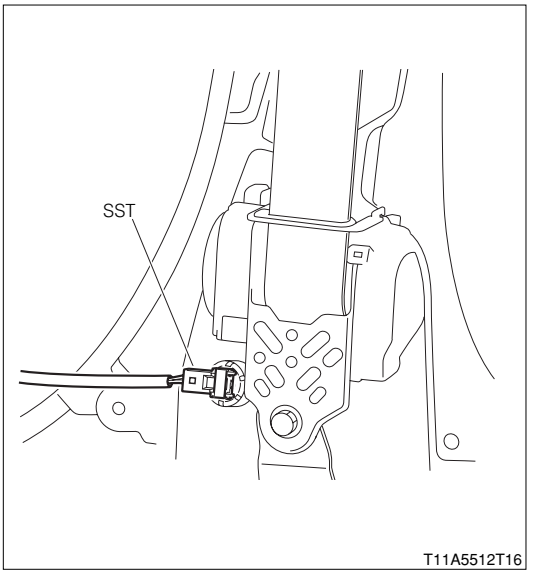
5.Remove the rear door scuff plate RH/LH.
Refer to Page I2-48.

6.Remove the center pillar lower garnish RH/LH.
Refer to Page I2-48.

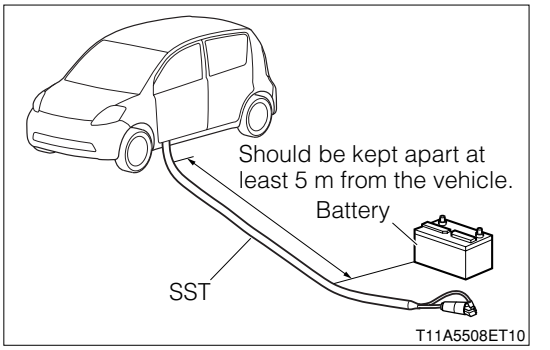
7.Disconnect the connector for the pretensioner.
8.Connect the connector of the SST to the pretensioner.
SST: 09082-97201-000

WARNING

- Ensure that there is no excessive play at the pretensioner installing section.
- Check that the belt section of the outside (Front) belt Ay has no looseness.
- Do not cut the belt of the outside (Front) belt Ay before the actuation is completed.
- At this time, close all the doors and windows.



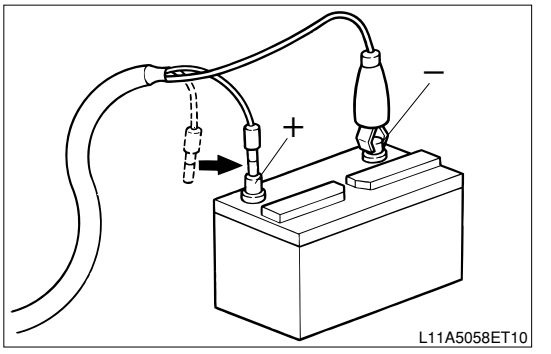
9.Extend the SST fully. Place the battery at least 5 m away from the vehicle.



10.Confirm safety inside and around the vehicle. Then, connect the SST to the battery (The alligator clip to the negative (−) terminal of the battery; the terminal to the positive (+) terminal) so as to actuate the pretensioner.

WARNING

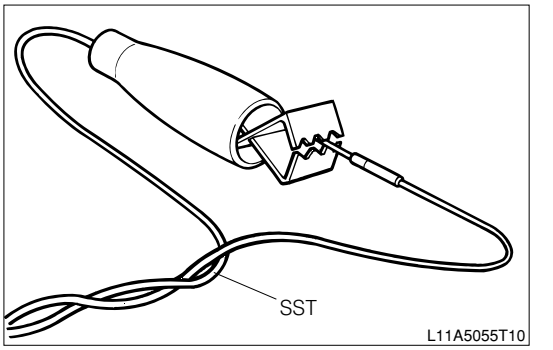
- Make sure that there is no one inside and around the vehicle.
- Give warning loudly to those nearby before actuating the pretensioner.



(3) Unit actuation

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Connect the following two SSTs.
SST: 09082-87710-000
09082-97201-000

3.Short the terminal with the alligator clip of the SST.
SST: 09082-87710-000

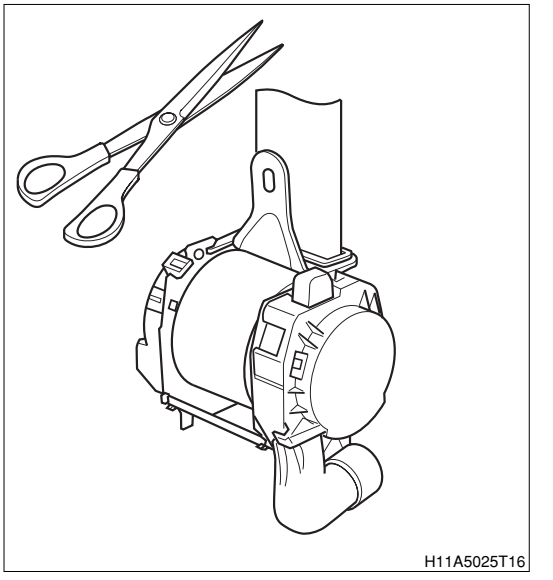


4.Remove the front door scuff plate RH/LH.
Refer to Page I2-48.

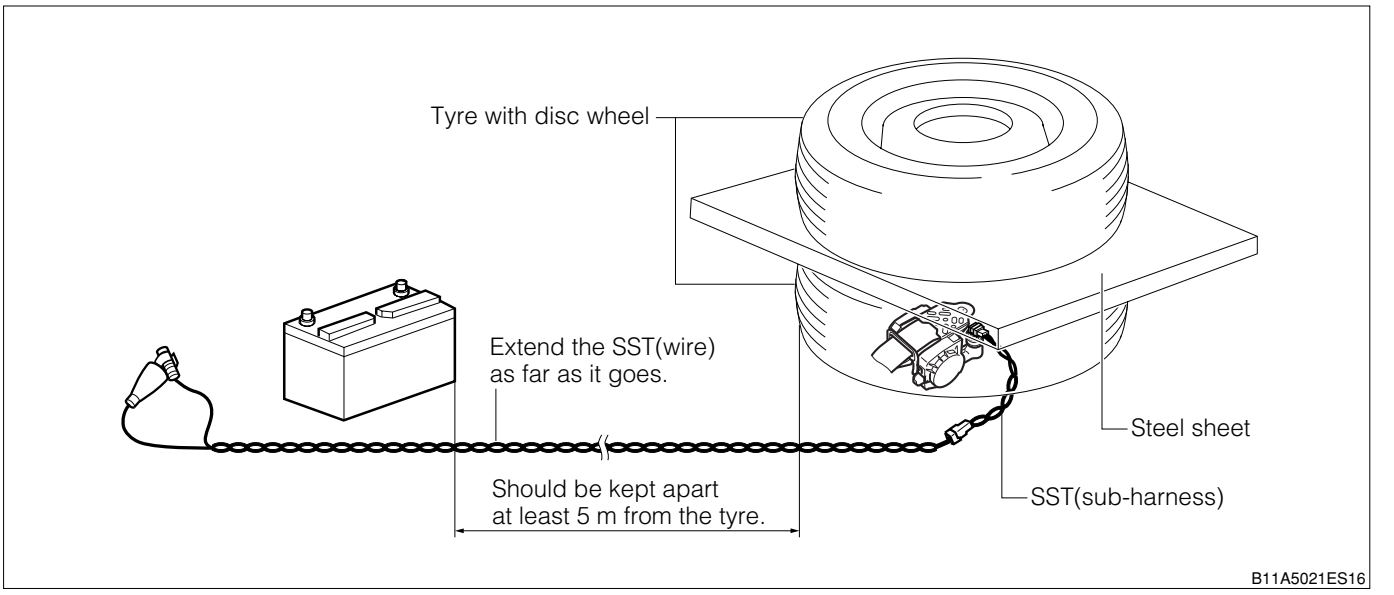
5.Remove the rear door scuff plate RH/LH.
Refer to Page I2-48.

6.Remove the center pillar lower garnish RH/LH.
Refer to Page I2-48.

7.Disconnect the connector for the pretensioner.
8.Cut the belt of the outside (Front) belt Ay at the retractor section.
9.Remove the pretensioner from the vehicle.
10.Connect the connector of the SST to the pretensioner.
SST: 09082-97201-000



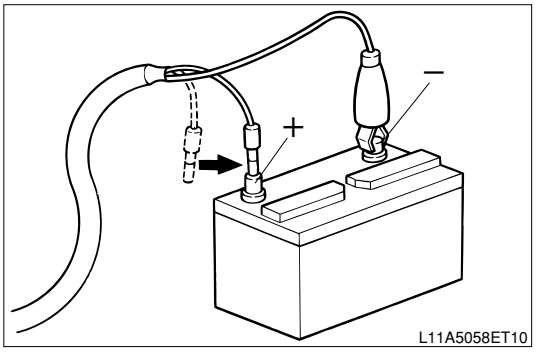
11.Place the pretensioner on the ground with its connector side facing upward. Place a tire with a disc wheel on it.
12.Place a steel sheet (Thickness t = approx. 1 − 2 mm) on the tire with disc wheel. Place another tire with a disc wheel on it.
13.Extend the SST fully. Place the battery at least 5 m away from the tire.



14.Confirm safety inside and around the vehicle. Then, connect the SST to the battery (The alligator clip to the negative (−) terminal of the battery; the terminal to the positive (+) terminal) so as to deploy the airbag.

WARNING

- Make sure that there is no one inside and around the vehicle.
- Give warning loudly to those nearby before actuating the pretensioner.
- Never mount and reuse the tires and wheels used for the deployment on vehicles.

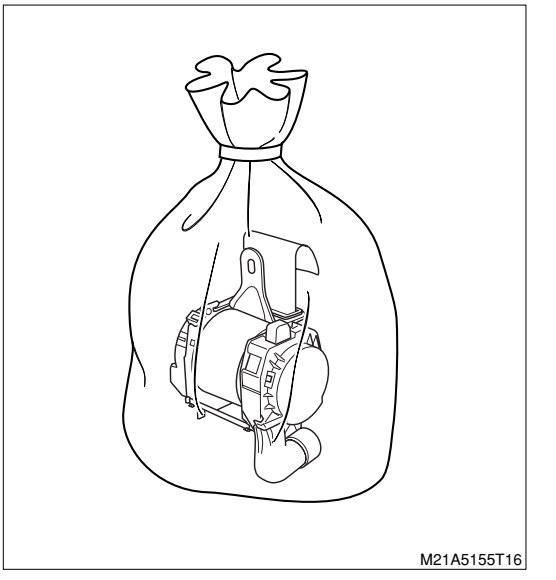


4-2-4 SCRAPPING PROCEDURE

1.Put the actuated pretensioner in a plastic bag and seal it to be scrapped.

WARNING

- The temperature reaches a few hundred °C at some sections. Therefore, leave it at least 30 minutes after it is actuated.
- Do not apply water, etc.
- When handling, wear dust protective goggles and gloves.
- After completion of the operation, be sure to wash your hands with water.
- Never scrap the pad Ay that has not been deployed.



5 SRS SIDE AIRBAG

5-1 REMOVAL AND INSTALLATION

CAUTION

- Refer to the Caution Tips on Servicing.

Refer to Page A1-26.

5-1-1 ARTICLES TO BE PREPARED

Instrument

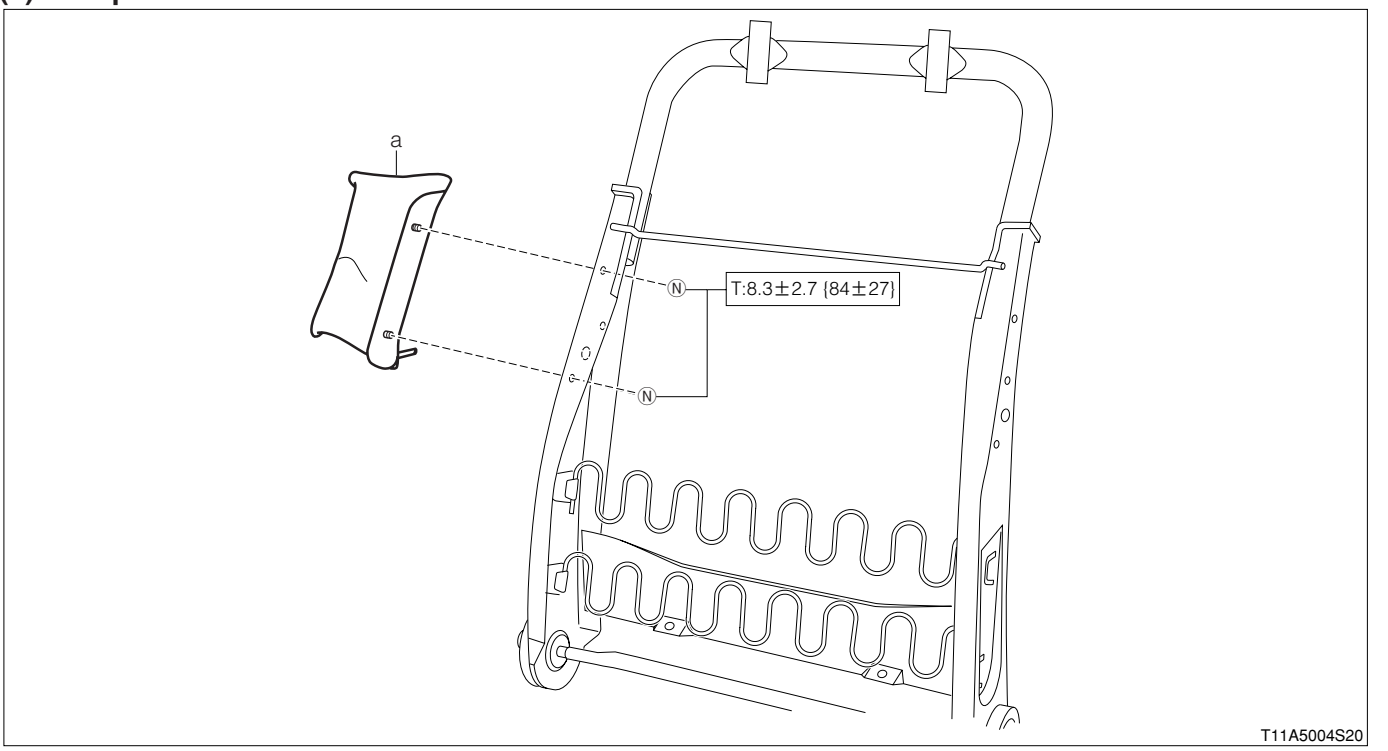
Torque wrench

5-1-2 OPERATION BEFORE REMOVAL

1. After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2. Disconnect the connectors of the front seat airbag Ay, RH/LH.
3. Remove the front seat Ay RH/LH.
   Refer to Page I2-33.
4. Remove the front seat back w/cover pad S/A RH/LH.
   Refer to Page I2-35.
5. Detach the hook and clip at the skirt of the front seat cushion pad with cover RH/LH.
   Refer to Page I2-35.
6. Disconnect the harness of the front seat airbag Ay RH/LH from the front seat Ay RH/LH.

5-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Airbag Ay, front seat, RH/LH

5-1-4 INSPECTION

(1) Check of front seat airbag Ay RH/LH

1.When the following cases have occurred, perform checks. If there are any faulty parts, replace them.
(1) Case where the vehicle is damaged, including minor collisions where the airbag has not been deployed.
(2) Case where problems have been found out by the diagnosis check

(2) External check of front seat airbag Ay RH/LH

1.When the following cases have occurred, replace the airbag assembly.
(1) Case where the airbag has been deployed.
(2) Case where the airbag deploying surface has scratches or cracks.
(3) Case where the connector or harness has dents or chips.
(4) Case where grease, water, detergent or oil has got to the airbag assembly in a large quantity.
(5) Case where the airbag assembly dropped and got damaged.

5-1-5 OPERATION AFTER INSTALLATION

1.Connect the harness of the front seat airbag Ay RH/LH to the front seat Ay RH/LH.
2.Attach the hook and clip at the skirt of the front seat cushion pad with cover RH/LH.
Refer to Page I2-35.

3.Install the front seat back w/cover pad S/A RH/LH.
Refer to Page I2-35.

4.Install the front seat Ay RH/LH.
Refer to Page I2-33.

5.Connect the connector of the front seat airbag Ay RH/LH.
6.Install the negative (−) terminal of the battery.
7.Set the IG SW "ON" position. At this time, ensure that the airbag warning lamp goes on about six seconds and then goes out.

5-2 DISPOSAL

CAUTION

- Refer to the Caution Tips on Servicing.

Refer to Page A1-26.

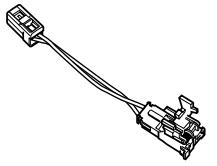
5-2-1 OUTLINE

1.When scrapping a vehicle equipped with an airbag system or scrapping the front seat airbag Ay, be sure to deploy the airbag. Then, follow the "Scrapping procedure" to scrap the airbag itself. When scrapping the front seat airbag Ay, that has been deployed by a customer during its use, too, follow the "Scrapping procedure."

5-2-2 DEPLOYMENT OF SRS SIDE AIRBAG

(1) Articles to be prepare

SST

Shape	Part No.	Part name
	09082-87710-000 (09082-87701-000)	Wire,air bag deployment
	09082-00760-000	Sub-harness 4,air bag deployment wire

Lubricant,adhesive,others

12V battery for car use,Wire harness (1.25mm^2),1 tire with disc wheel,4 tires,Vinyl bag

(2) In-vehicle deployment of front seat airbag Ay

1.Set the IG SW "LOCK" position. Remove the negative (−) terminal of the battery.

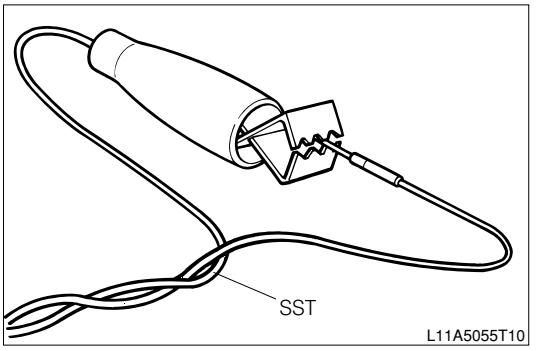
2.Connect the following two SSTs.

SST: 09082-87710-000

SST: 09082-00760-000

3.Short the terminal with the alligator clip of the SST.

SST: 09082-87710-000



4.Disconnect the harness side connector for the airbag of the front seat Ay RH/LH at the side to be deployed.

5.Connect the SST connector to the front seat airbag assembly connector (Yellow 2P).

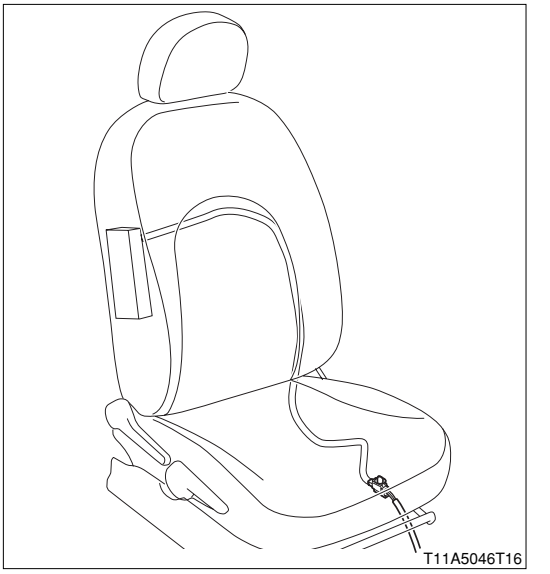
SST: 09082-00760-000

WARNING

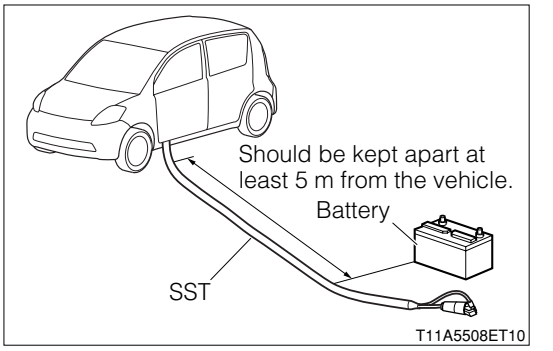
- At this time, close all the doors and windows.

CAUTION

- Ensure that the front seat Ay RH/LH is secured to the vehicle.



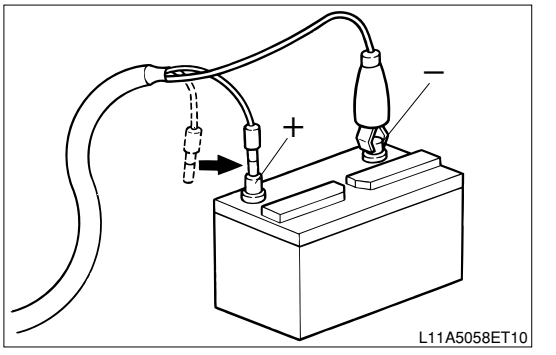
6.Extend the SST fully. Place the battery at least 5 m away from the vehicle.



7.Confirm safety inside and around the vehicle. Then, connect the SST to the battery (The alligator clip to the negative (−) terminal of the battery; the terminal to the positive (+) terminal) so as to deploy the airbag.

WARNING

- Make sure that there is no one inside and around the vehicle.
- Give warning loudly to those nearby before deploying the airbag.



(3) Deployment of front seat airbag Ay

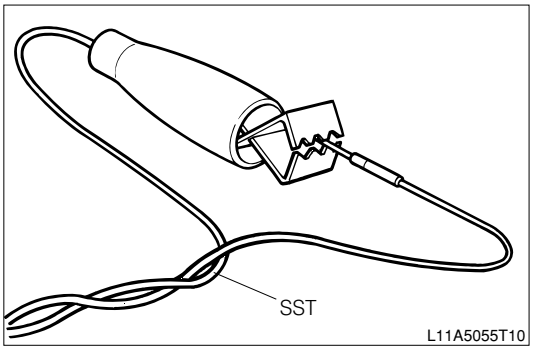
1.Set the IG SW "LOCK" position. Remove the negative (−) terminal of the battery.If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

2.Connect the following two SSTs.

SST: 09082-87710-000
09082-00760-000

3.Short the terminal with the alligator clip of the SST.

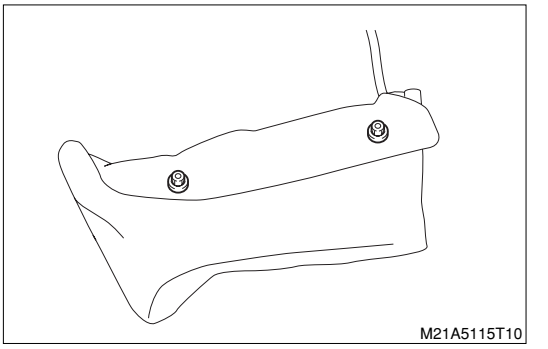
SST: 09082-87710-000



4.Remove the airbag Ay from the front seat Ay RH/LH.

Refer to Page H1-21.

5.Install the two wire harness installing nuts to the airbag assembly.



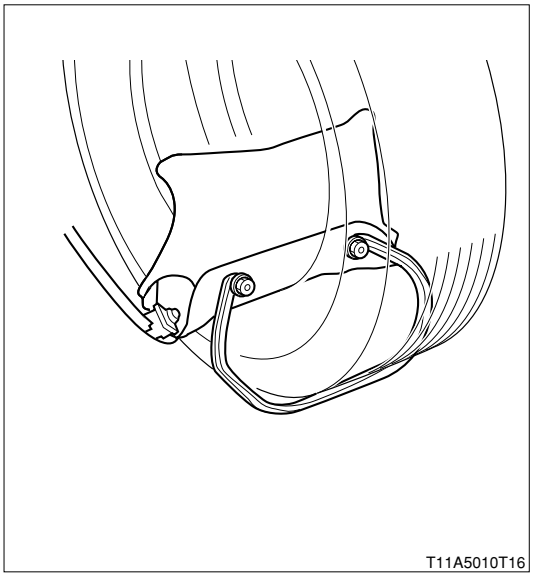
6.Secure the front seat airbag assembly to a tyre, using a wire harness for car use (Cross-sectional area of core wire: 1.25 mm2 or more).

WARNING

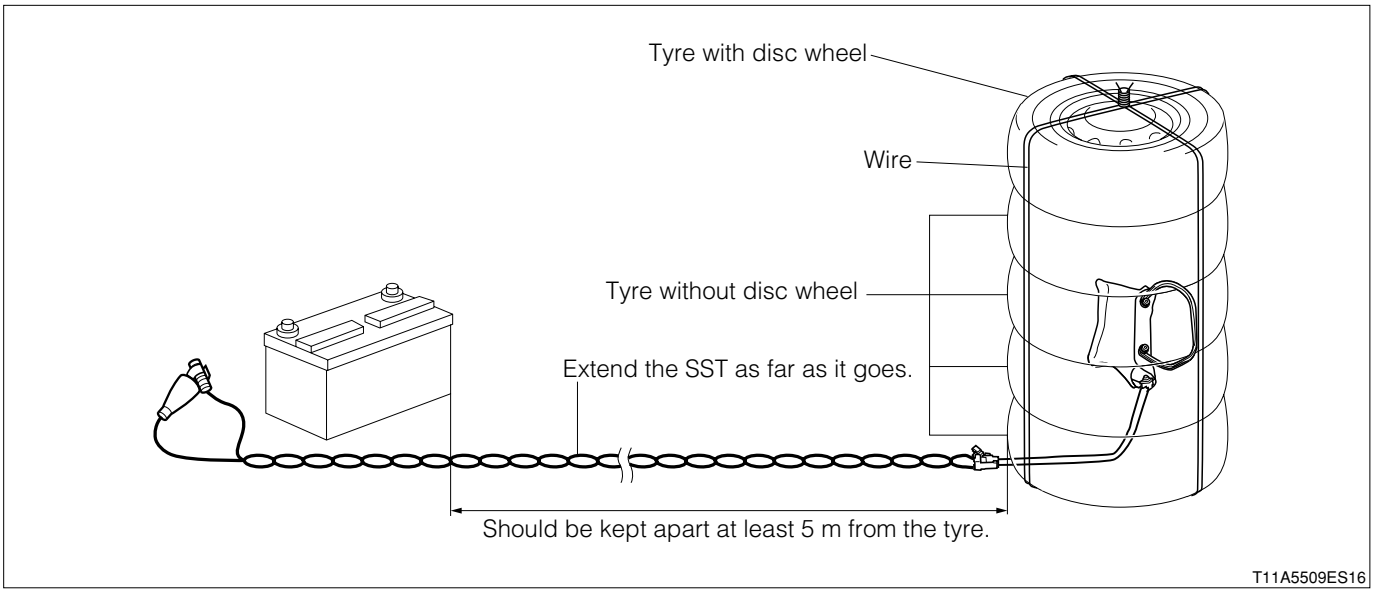
- Install the airbag assembly in such a way that the airbag deploying surface faces toward the center of the tyre.
- A great force will be applied to the wire harness at the time of airbag deployment. Therefore, secure the wire harness securely by winding it triple.

7.Install the SST to the front seat airbag assembly connector (2P).

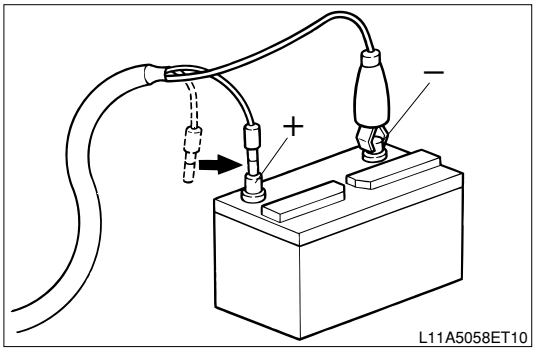
SST: 09082-00760-000



8.Place a tire tied with the airbag Ay to two tires stacked vertically. Then, place one or more tires on these tires. Finally place a tire with a disc wheel on the top.
9.Connect the tires with wire so that the tires will not be scattered when the airbag is deployed.
10.Extend the SST fully. Place the battery at least 5 m away from the tire.



11.Confirm safety inside and around the vehicle. Then, connect the SST to the battery (The alligator clip to the negative (−) terminal of the battery; the terminal to the positive (+) terminal) so as to deploy the airbag.

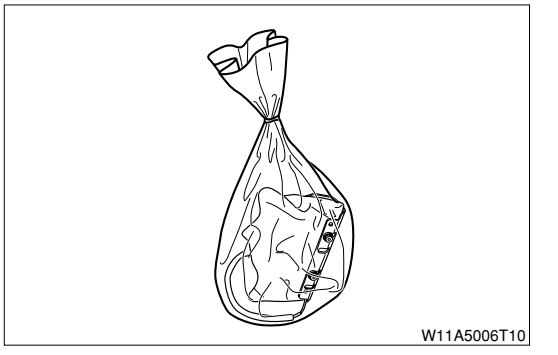


WARNING

- Make sure that there is no one inside and around the vehicle.
- Give warning loudly to those nearby before deploying the airbag.
- Never mount and reuse the tires and wheels used for the deployment on vehicles.

(4) Scrapping procedure

1.Seal the deployed airbag assembly in a plastic bag before it is scrapped.



WARNING

- The temperature of the front seat airbag assembly that has been deployed is a few hundred °C at some sections. Therefore, leave it at least 30 minutes after it is deployed.
- Do not apply water, etc. to the deployed front seat airbag assembly.
- When handling the deployed front seat airbag assembly, wear protective goggles and gloves.
- After completion of the operation, be sure to wash your hands with water.
- Never scrap the front seat airbag assembly that has not been deployed.

6 CURTAIN SHIELD AIRBAG

6-1 REMOVAL AND INSTALLATION

CAUTION

- Refer to the Caution Tips on Servicing.

Refer to Page A1-26.

6-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

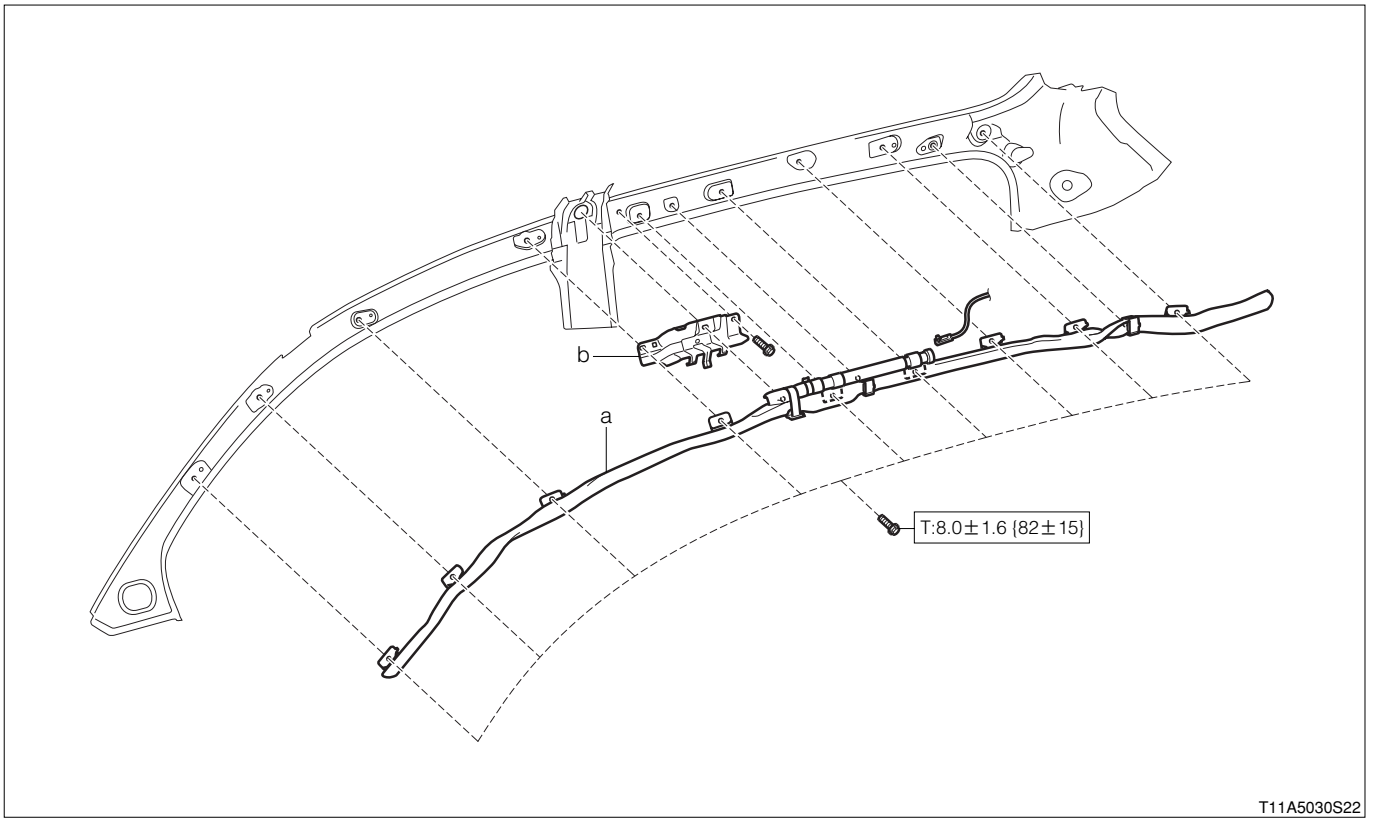
6-1-2 OPERATION BEFORE REMOVAL

1. After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2. Remove the roof headlining Ay.

Refer to Page I2-53.

6-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

▲ 1 a Airbag Ay, curtain shield, RH/LH
2 b Bracket S/A, roof side rail, RH/LH

6-1-4 INSPECTION

(1) Check of curtain shield airbag ay RH/LH

1.When the following cases have occurred, perform checks. If there are any faulty parts, replace them.
(1) Case where the vehicle is damaged, including minor collisions where the airbag has not been deployed.
(2) Case where problems have been found out by the diagnosis check

(2) External check of curtain shield airbag Ay RH/LH

1.When the following cases have occurred, replace the airbag assembly.
(1) Case where the airbag has been deployed.
(2) Case where the airbag deploying surface has scratches or cracks.
(3) Case where the connector or harness has dents or chips.
(4) Case where grease, water, detergent or oil has got to the airbag assembly in a large quantity.
(5) Case where the airbag assembly dropped and got damaged.

6-1-5 POINTS OF INSTALLATION

(1) Airbag Ay, curtain shield, RH/LH

1.Install the airbag assembly.

CAUTION

- Be very careful not to installed the airbag Ay in a twisted state.

6-1-6 OPERATION AFTER INSTALLATION

1.Install the roof headlining Ay.
Refer to Page I2-53.

2.Connect the negative (−) terminal of the battery.
3.Set the IG SW "ON" position. At this time, ensure that the airbag warning lamp goes on about six seconds and then goes out.

6-2 DISPOSAL

CAUTION

- Refer to the Caution Tips on Servicing.

Refer to Page A1-26.

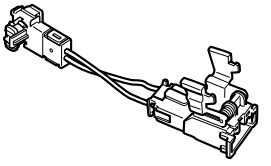
6-2-1 DESCRIPTION

1.When scrapping a vehicle equipped with an airbag system or scrapping the curtain shield airbag Ay, be sure to deploy the airbag. Then, follow the "Scrapping procedure" to scrap the airbag itself. When scrapping the curtain shield airbag Ay, that has been deployed by a customer during its use, too, follow the "Scrapping procedure."

6-2-2 DEPLOYMENT OF CURTAIN SHIELD AIRBAG AY

(1) Articles to be prepared

SST

Shape	Part No.	Part name
	09082-87710-000 (09082-87701-000)	Wire,air bag deployment
	09082-97201-000	Sub-harness D1,air bag deployment wire

Lubricant,adhesive,others

12V battery for car use,1 tire with disc wheel,4 tires,Vinyl bag

(2) In-vehicle deployment

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Connect the following two SSTs.

SST: 09082-87710-000
09082-97201-000

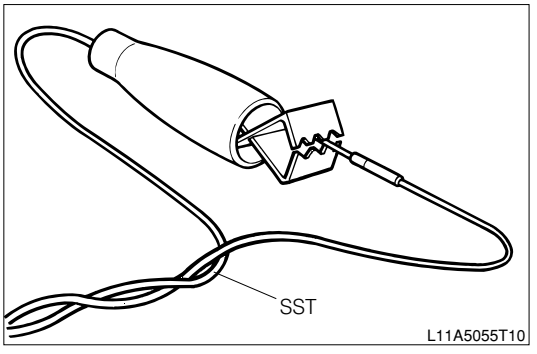
3.Short the terminal with the alligator clip of the SST.

SST: 09082-87710-000

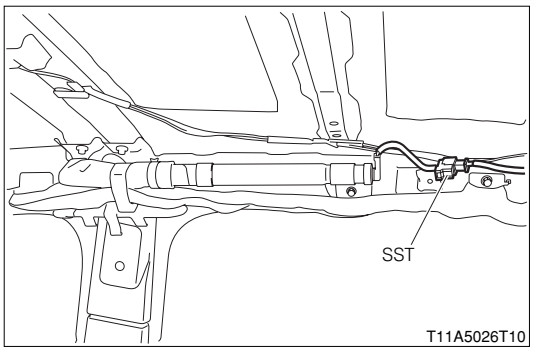
4.Remove the roof headlining Ay.

Refer to Page I2-53.

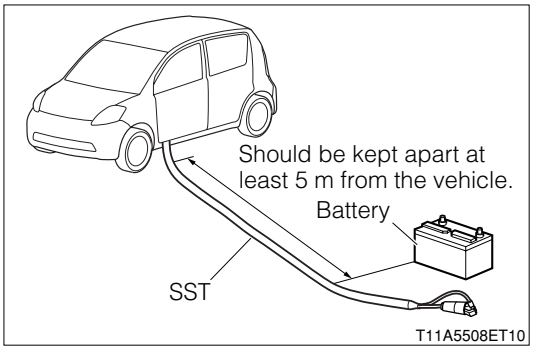
5.Disconnect the harness side connector for the airbag.



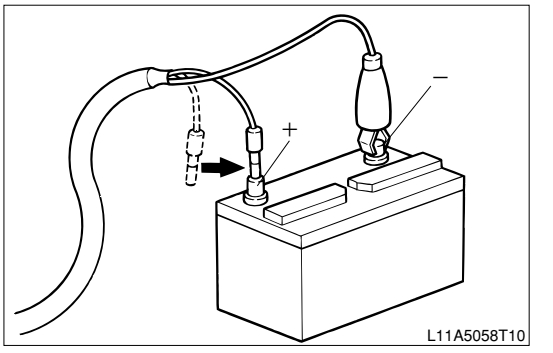
6.Connect the SST connector to the connector for the airbag (Yellow 2P).
SST: 09082-97201-000
WARNING
- Ensure that there is no excessive play at the airbag assembly.
- At this time, close all the doors and windows.



7.Extend the SST fully. Place the battery at least 5 m away from the vehicle.



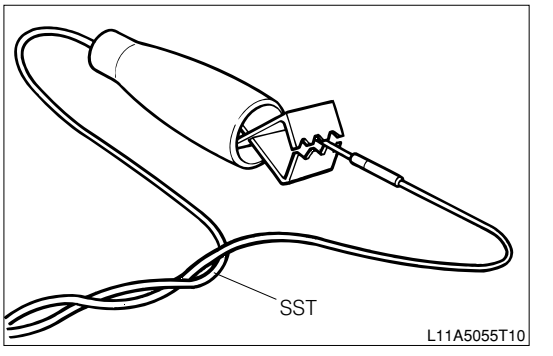
8.Confirm safety inside and around the vehicle. Then, connect the SST to the battery (The alligator clip to the negative (−) terminal of the battery; the terminal to the positive (+) terminal) so as to actuate the airbag.
WARNING
- Make sure that there is no one inside and around the vehicle.
- Give warning loudly to those nearby before deploying the airbag.



(3) Unit deployment

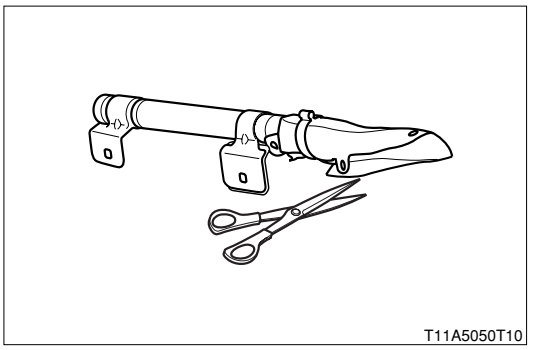
1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Connect the following two SSTs.
SST: 09082-87710-000
09082-97201-000

3.Short the terminal with the alligator clip of the SST.
SST: 09082-87710-000



4.Remove the airbag assembly.
Refer to Page H1-28.

5.Cut the bag of the airbag Ay at the root of the inflator.

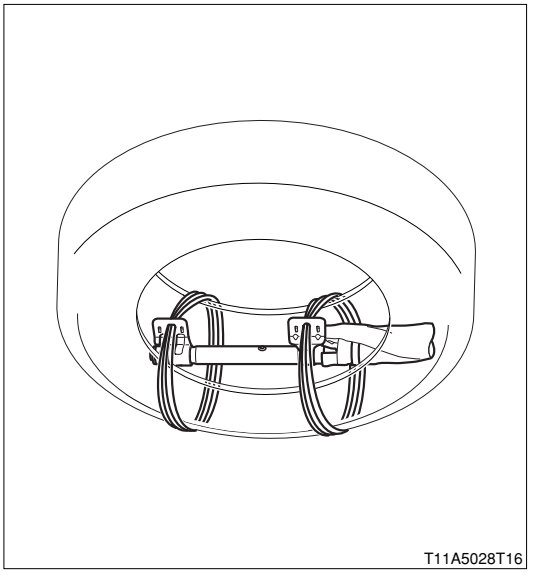

T11A5050T10

6.Secure the airbag Ay to a tire, using a wire harness for automotive use (Cross-sectional area of core wire: 1.25mm^2 or more).

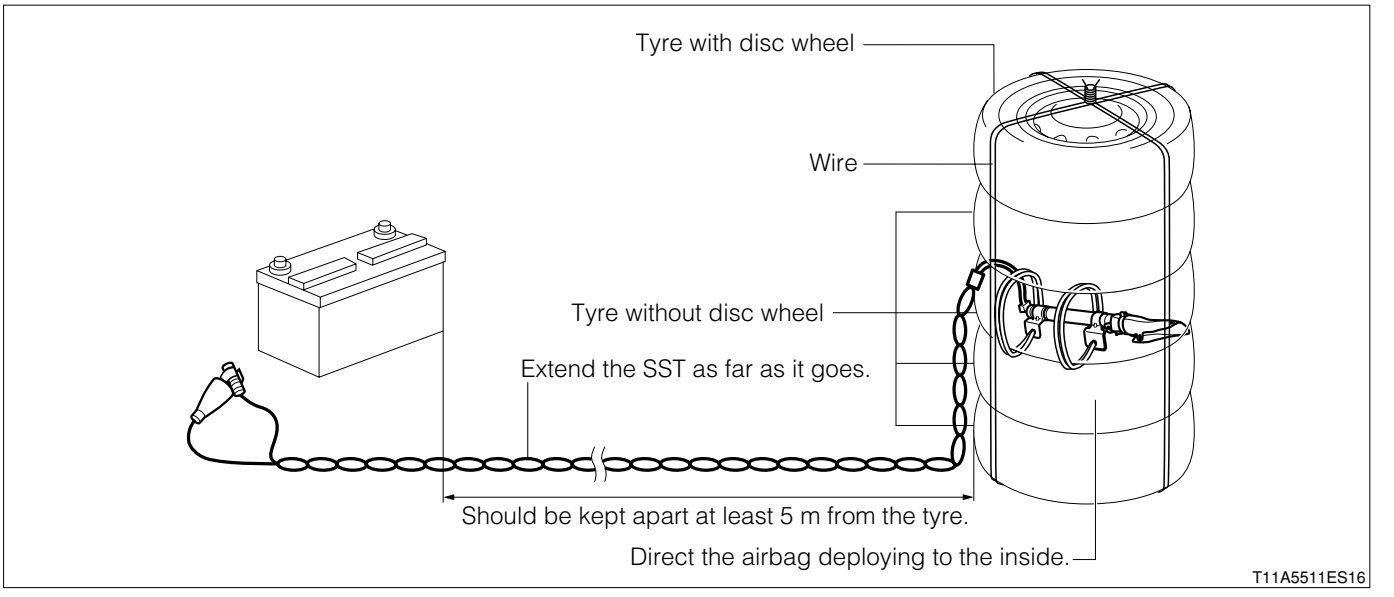
WARNING

- Make sure that the airbag deploying surface faces toward the inside of the tire during the installation.
- A great force will be applied to the wire harness at the time of airbag deployment. Therefore, secure the wire harness firmly by winding it triple.

7.Connect the SST connector to the connector for the airbag (Yellow 2P).
SST: 09082-97201-000


T11A5028T16

8.Place a tire tied with the airbag Ay to two tires stacked vertically. Then, place one or more tires on these tires. Finally place a tire with a disc wheel on the top.
9.Connect the tires with wire so that the tires will not be scattered when the airbag is deployed.
10.Extend the SST fully. Place the battery at least 5 m away from the tire.

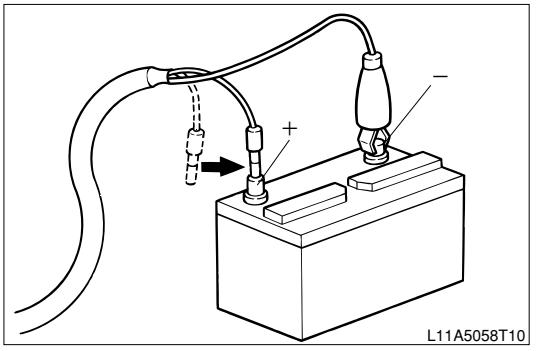


T11A5511ES16

11.Confirm safety inside and around the vehicle. Then, connect the SST to the battery (The alligator clip to the negative (−) terminal of the battery; the terminal to the positive (+) terminal) so as to deploy the airbag.

WARNING

- Make sure that there is no one inside and around the vehicle.
- Give warning loudly to those nearby before deploying the airbag.
- Never mount and reuse the tires and wheels used for the deployment on vehicles.

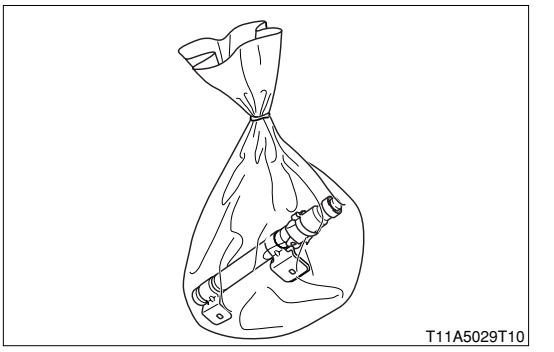


(4) Scrapping procedure

1.Seal the deployed airbag assembly in a plastic bag before it is scrapped.

WARNING

- The temperature reaches a few hundred °C at some sections. Therefore, leave it at least 30 minutes after it is deployed.
- Do not apply water, etc.
- When handling, wear dust protective goggles and gloves.
- After completion of the operation, be sure to wash your hands with water.
- Never scrap the pad Ay that has not been deployed.



7 AIRBAG COMPUTER

7-1 REMOVAL AND INSTALLATION

CAUTION

- Refer to the Caution Tips on Servicing.

Refer to Page A1-26.

7-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

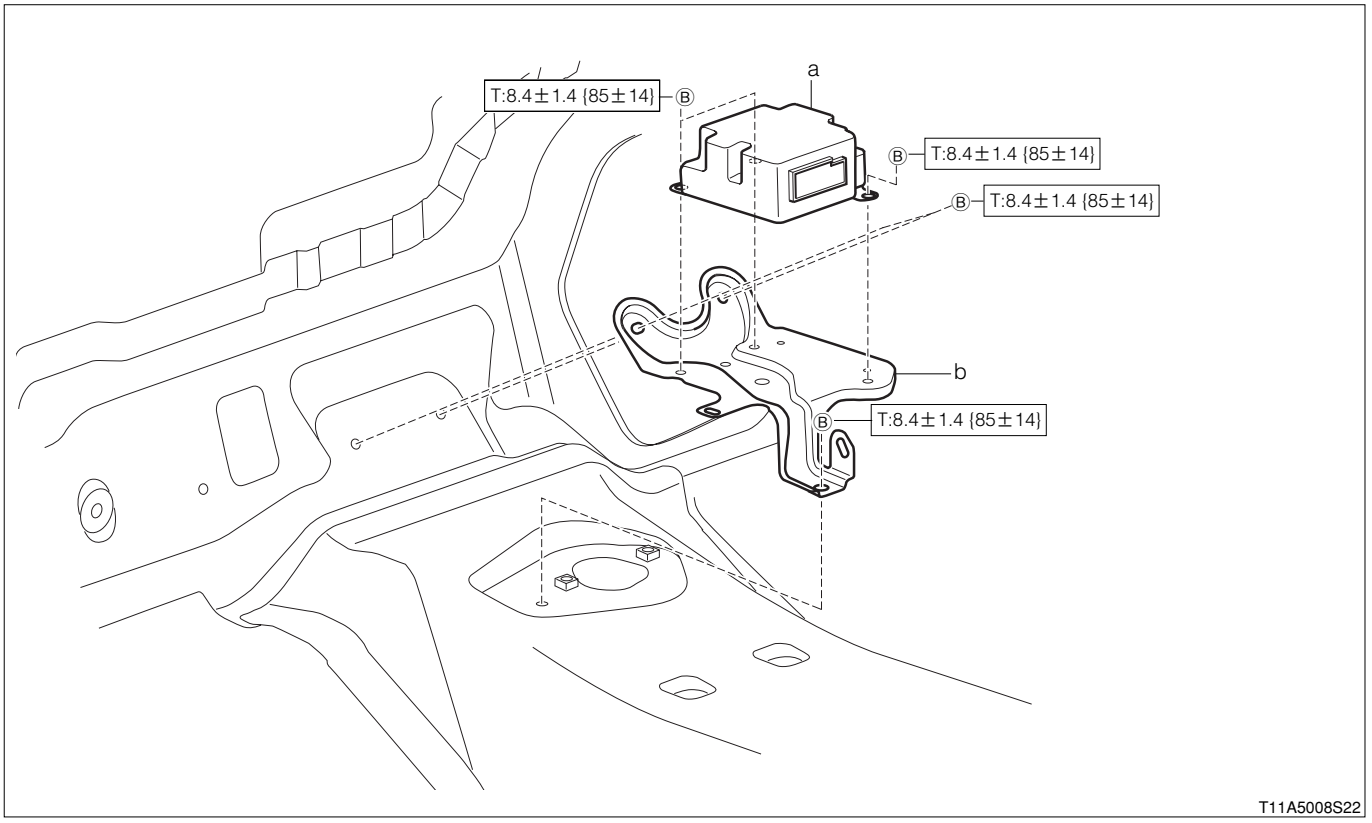
7-1-2 OPERATION BEFORE REMOVAL

1. After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2. Remove the console panel and turn over the carpet.

Refer to Page I2-23.

7-1-3 REMOVAL AND INSTALLATION PROCEDURES (VEHICLES NOT EQUIPPED WITH CURTAIN SHIELD AIRBAG & SIDE AIRBAG)

(1) Components



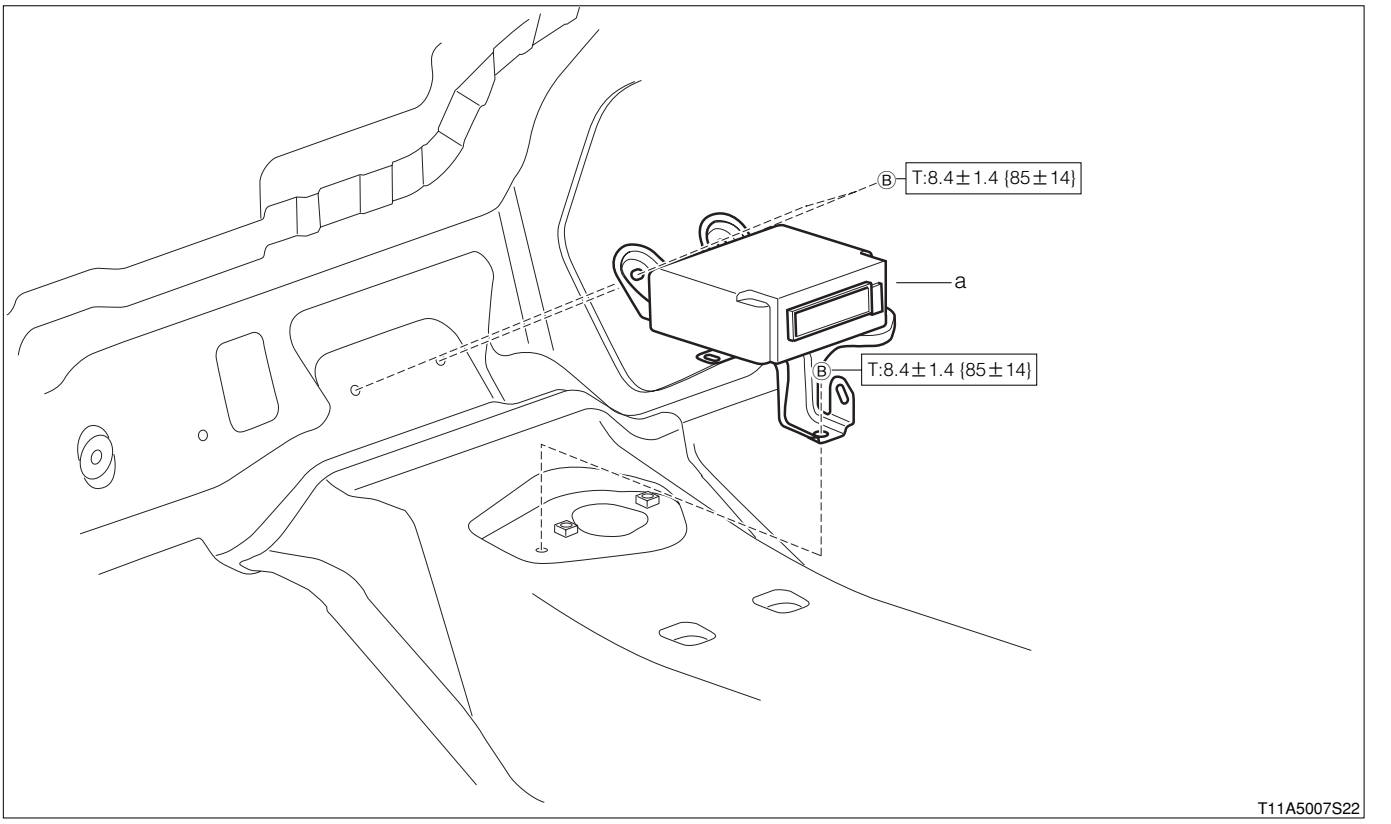
Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Computer Ay, airbag
2 b Bracket, ECU unit

7-1-4 REMOVAL AND INSTALLATION PROCEDURES (VEHICLES EQUIPPED WITH CURTAIN SHIELD AIRBAG & SIDE AIRBAG)

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Computer Ay, airbag

7-1-5 INSPECTION

(1) Check standard for airbag computer Ay

1.In cases where the vehicle is involved in a collision, check the computer Ay. Replace it if it is faulty.

(2) External Check of airbag computer Ay

1.When the following cases have occurred, replace the computer assembly.
(1) Case where the computer Ay is dropped:
(2) Case where the connector section of the computer Ay has damage and cracks:
(3) Case where the computer Ay has deformation and cracks:

7-1-6 OPERATION AFTER INSTALLATION

1.Place the carpet and install the console panel.
Refer to Page I2-232.

2.Connect the negative (−) terminal of the battery.
3.Set the IG SW "ON" position. At this time, ensure that the airbag warning lamp goes on about six seconds and then goes out.

8 FRONT AIRBAG SENSOR

8-1 REMOVAL AND INSTALLATION

CAUTION

- Refer to the Caution Tips on Servicing.

Refer to Page A1-26.

8-1-1 ARTICLES TO BE PREPARED

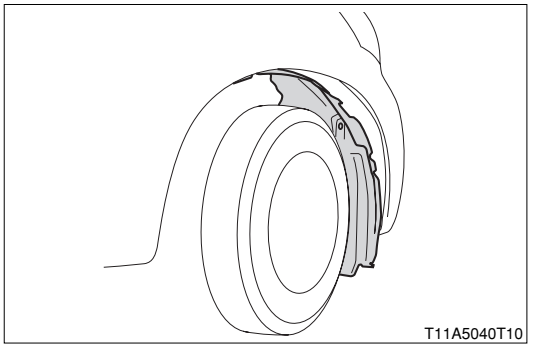
Instrument

Torque wrench

8-1-2 OPERATION BEFORE REMOVAL

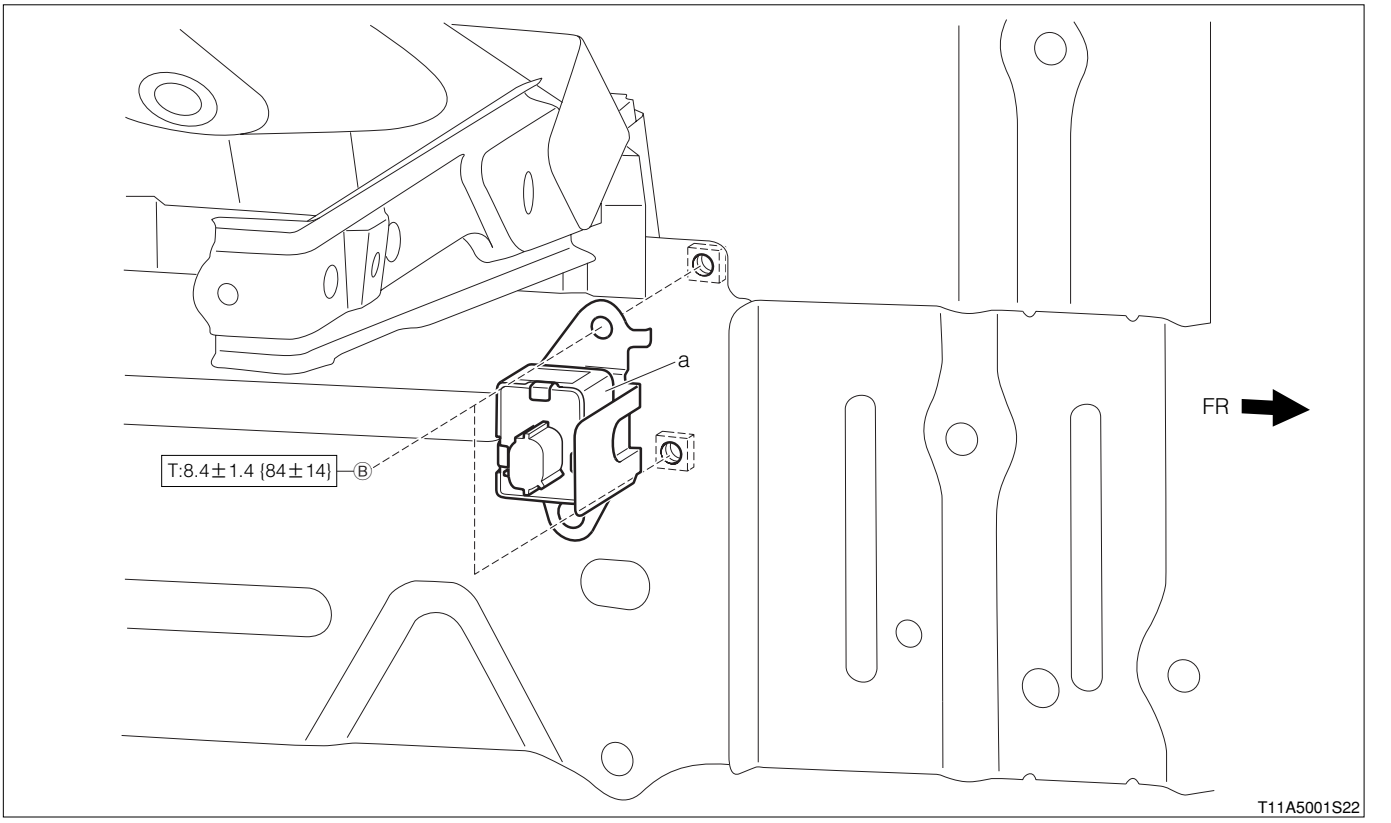
1. After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2. Remove the clip and grommet of the front fender liner RH (RHD vehicles) or the front fender liner LH (LHD vehicles). Then, turn over the front side.

Refer to Page I1-24.



8-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

The component diagram shows the RHD vehicle.

(2) Removal and installation procedures

▲ 1 a Sensor, airbag, front RH/LH

8-1-4 INSPECTION

(1) Check standard for sensor, airbag front

1.In cases where the vehicle is involved in a collision, check the sensor. Replace it if it is faulty.

(2) External check of sensor, airbag front

1.When the following cases have occurred, replace the sensor.

(1) Case where the sensor is dropped:

(2) Case where the connector section of the sensor has damage and cracks:

(3) Case where the sensor has deformation and cracks:

8-1-5 POINTS OF INSTALLATION

(1) Sensor, airbag front

1.Install the side member Ay RH, being very careful not to install the sensor in a wrong direction.

8-1-6 OPERATION AFTER INSTALLATION

1.Install the front fender liner RH (RHD vehicles) or the front fender liner LH (LHD vehicles).
Refer to Page I1-24.

2.Connect the negative (−) terminal of the battery.

3.Set the IG SW "ON" position. At this time, ensure that the airbag warning lamp goes on about six seconds and then goes out.

9 SIDE AIRBAG SENSOR

9-1 REMOVAL AND INSTALLATION

CAUTION

- Refer to the Caution Tips on Servicing.

Refer to Page A1-26.

9-1-1 ARTICLES TO BE PREPARED

Instrument

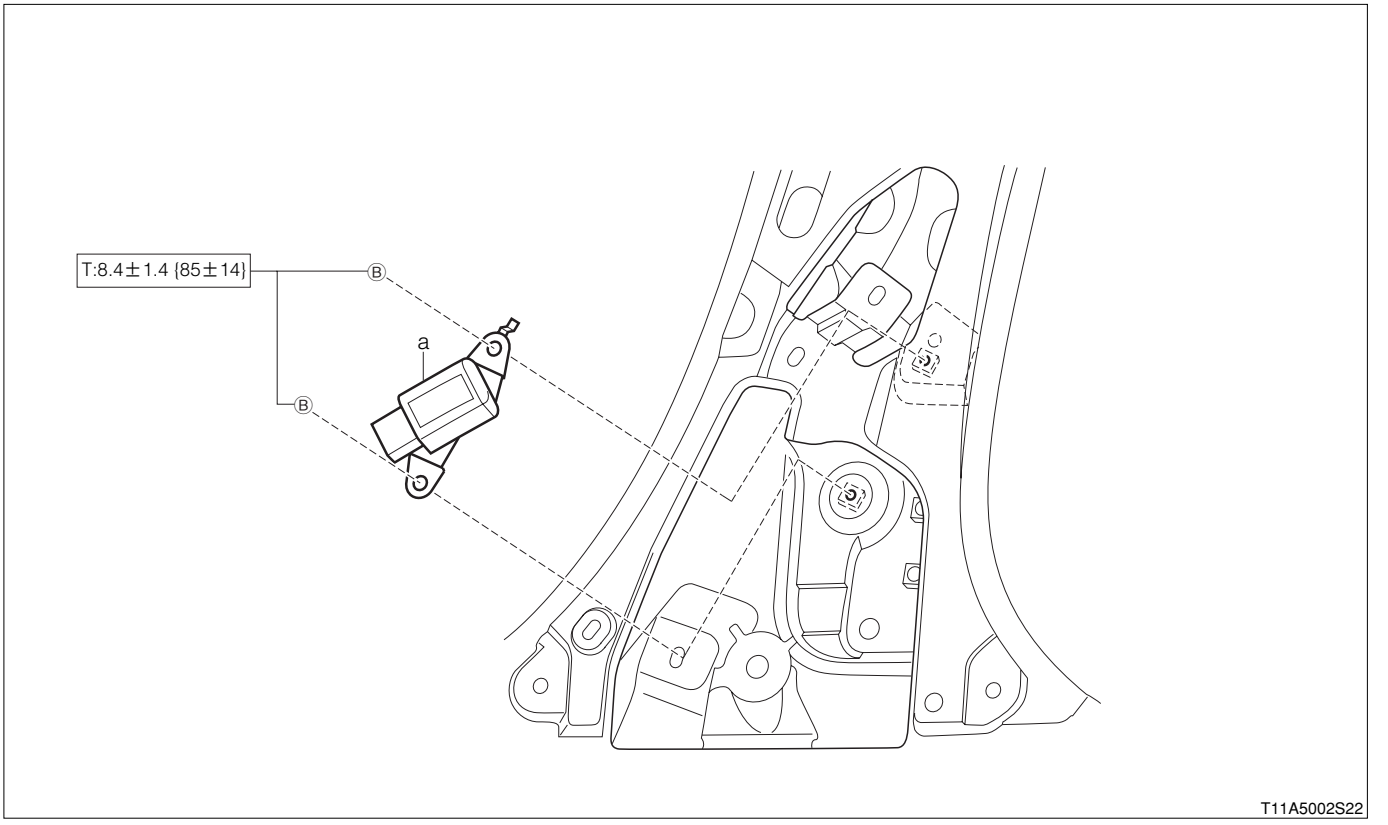
Torque wrench

9-1-2 OPERATION BEFORE REMOVAL

1. Set the IG SW "LOCK" position. Remove the negative (−) terminal of the battery.If you begin the operation before 60 seconds pass, there is a danger that the airbag and pretensioner are mistakenly actuated and deployed.
2. Remove the center pillar lower garnish RH/LH.
   Refer to Page I2-48.
3. Remove the front seat belt outer belt Ay RH/LH.
   Refer to Page I2-42.

9-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Sensor, side airbag, RH/LH

9-1-4 INSPECTION

(1) Check standard for sensor Ay, side airbag RH/LH

1.In cases where the vehicle is involved in a collision, check the sensor Ay. Replace it if it is faulty.

(2) External check of sensor Ay, side airbag RH/LH

1.When the following cases have occurred, replace the sensor assembly.

(1) Case where the sensor Ay is dropped:

(2) Case where the connector section of the sensor Ay has damage and cracks:

(3) Case where the computer Ay has deformation and cracks:

9-1-5 OPERATION AFTER INSTALLATION

1.Install the front seat belt outer belt Ay RH/LH.

Refer to Page I2-42.

2.Install the center pillar lower garnish RH/LH.

Refer to Page I2-48.

3.Install the negative (−) terminal of the battery.

4.Set the IG SW "ON" position. At this time, ensure that the airbag warning lamp goes on about six seconds and then goes out.

10 SIDE AIRBAG REAR SENSOR

10-1 REMOVAL AND INSTALLATION

CAUTION

- Refer to the Caution Tips on Servicing.

Refer to Page A1-26.

10-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

10-1-2 OPERATION BEFORE REMOVAL

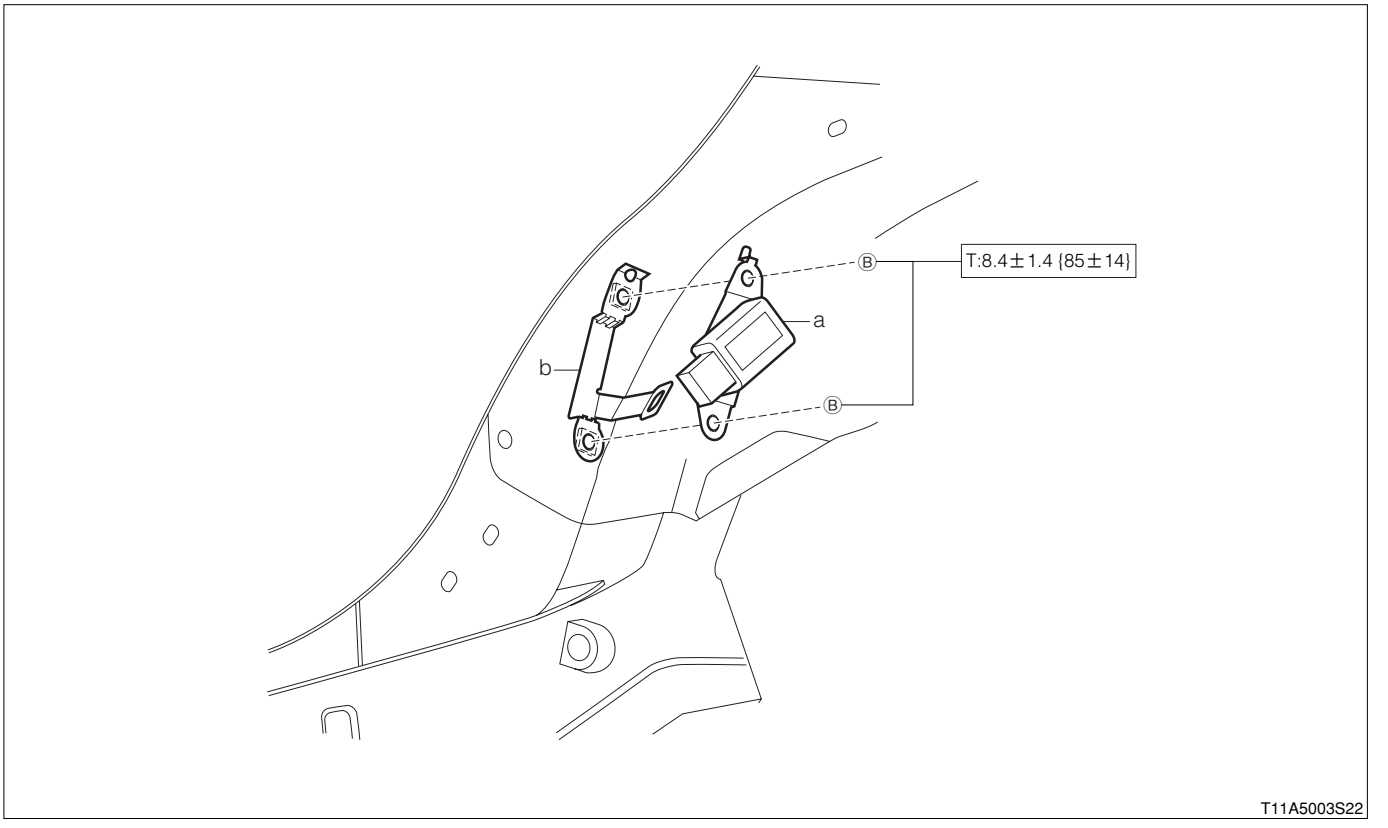
1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Remove the rear quarter trim panel Ay RH/LH.

Refer to Page I2-48.

10-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



T11A5003S22

Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Sensor, side airbag, RH/LH

10-1-4 INSPECTION

(1) Check standard for sensor Ay, side airbag RH/LH

1.In cases where the vehicle is involved in a collision, check the sensor Ay. Replace it if it is faulty.

(2) External check of sensor Ay, side airbag RH/LH

1.When the following cases have occurred, replace the sensor assembly.
(1) Case where the sensor Ay is dropped:
(2) Case where the connector section of the sensor Ay has damage and cracks:
(3) Case where the computer Ay has deformation and cracks:

10-1-5 OPERATION AFTER INSTALLATION

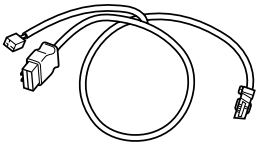
1.Install the rear quarter trim panel Ay RH/LH.
Refer to Page I2-48.

2.Install the negative (−) terminal of the battery.
3.Set the IG SW "ON" position. At this time, ensure that the airbag warning lamp goes on about six seconds and then goes out.

11 CONTROL SYSTEM

11-1 ARTICLES TO BE PREPARED

SST

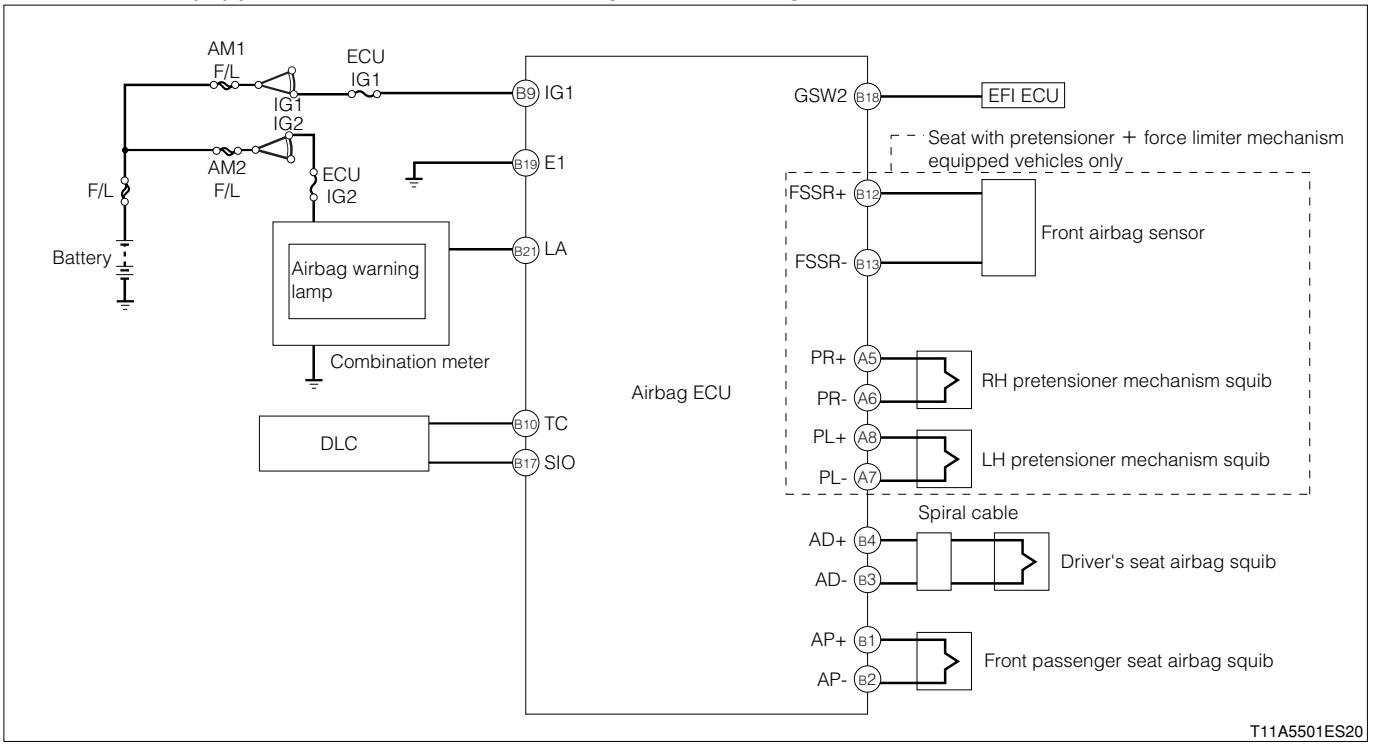
Shape	Part No.	Part name
	09991-87404-000 (09991-87401-000)	Wire,engine control system inspection
	09991-87403-000	Wire,diagnosis check
	09082-87710-000 (09082-87701-000)	Wire,air bag deployment

Instrument

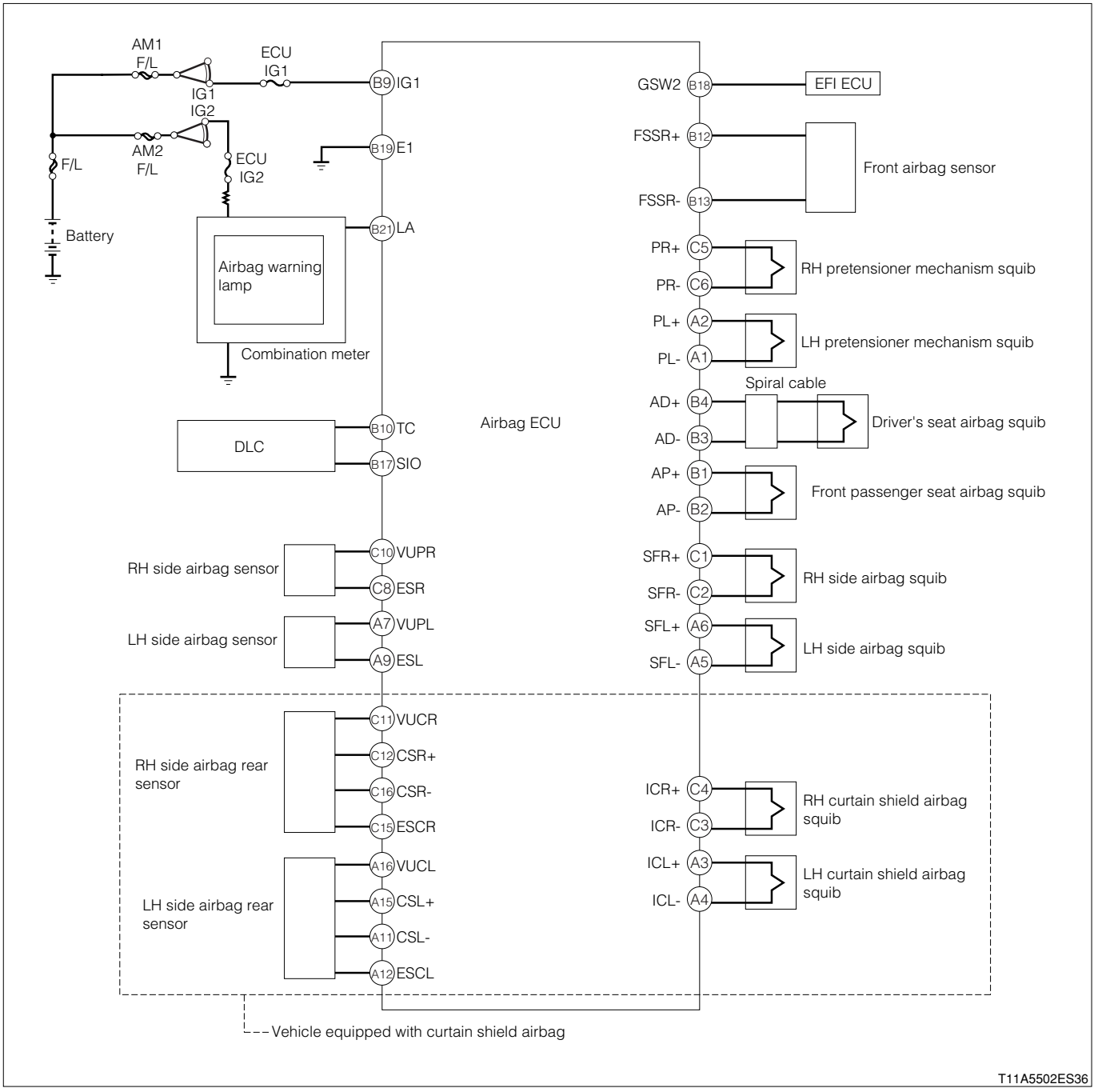
Electrical Tester

11-2 SYSTEM WIRING DIAGRAM

Vehicles not equipped with curtain shield airbag & side airbag

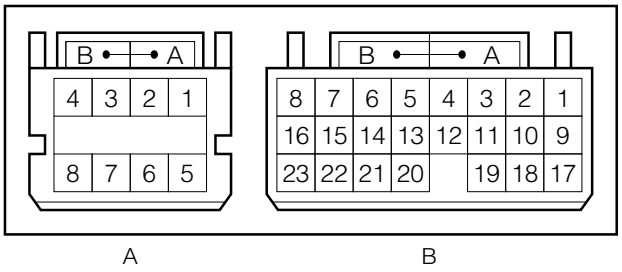


Vehicles equipped with side airbag / Vehicles equipped with curtain shield airbag & side airbag



11-3 ARRANGEMENT OF ECU TERMINAL

Vehicles not equipped with curtain shield airbag & side airbag



T11A5014S10

Connector A

Terminal No.	Terminal code	Terminal name
A	—	Half fit detecting mechanism
B	—	Half fit detecting mechanism
1	—	—
2	—	—
3	—	—
4	—	—
5※	PR+	RH pretensioner mechanism squib (+)
6※	PR−	RH pretensioner mechanism squib (−)
7※	PL−	LH pretensioner mechanism squib (−)
8※	PL+	LH pretensioner mechanism squib (+)

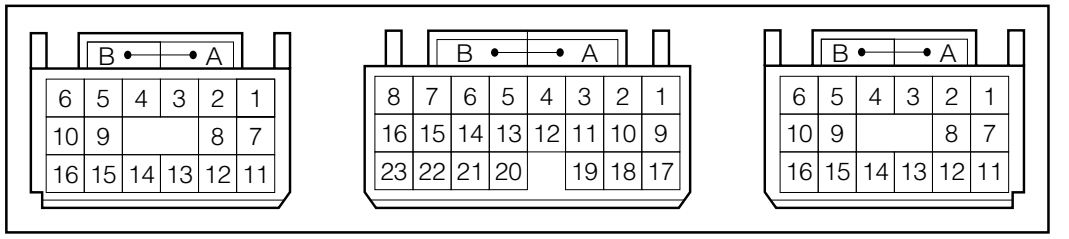
※:Vehicles equipped with only seat belt with pretensioner + force limiter mechanism

Connector B

Terminal No.	Terminal code	Terminal name
A	—	Half fit detecting mechanism
B	—	Half fit detecting mechanism
1	AP+	Front passenger seat airbag squib (+)
2	AP−	Front passenger seat airbag squib (−)
3	AD−	Driver's seat airbag squib (−)
4	AD+	Driver's seat airbag squib (+)
5	—	—
6	—	—
7	—	—
8	—	—
9	IG1	IG power supply
10	TC	Start of diagnosis
11	—	—
12※	FSSR +	Front airbag sensor (+)
13※	FSSR −	Front airbag sensor (−)
14	—	—
15	—	—
16	—	—
17	SIO	DLC
18	GSW2	EFI ECU
19	E1	Earth
20	—	—
21	LA	Airbag warning lamp
22	—	—
23	—	—

※:Vehicles equipped with only seat belt with pretensioner + force limiter mechanism

Vehicles equipped with side airbag / Vehicles equipped with curtain shield airbag & side airbag



T11A5012S10

Connector A

Terminal No.	Terminal code	Terminal name
A	—	Half fit detecting mechanism
B	—	Half fit detecting mechanism
1	PL−	LH pretensioner mechanism squib (−)
2	PL+	LH pretensioner mechanism squib (+)
3※	ICL+	LH curtain shield airbag squib (+)
4※	ICL−	LH curtain shield airbag squib (−)
5	SFL−	LH side airbag squib (−)
6	SFL+	LH side airbag squib (+)
7	VUPL	LH side airbag sensor power supply, communication
8	—	—
9	ESL	LH side airbag sensor earth
10	—	—
11※	CSL−	LH side airbag safing rear sensor (−)
12※	ESCL	LH side airbag rear sensor earth
13	—	—
14	—	—
15※	CSL+	LH side airbag safing rear sensor (+)
16※	VUCL	LH side airbag rear sensor power supply, communication

※:Vehicle equipped with curtain shield airbag

Connector B

Terminal No.	Terminal code	Terminal name
A	—	Half fit detecting mechanism
B	—	Half fit detecting mechanism
1	AP+	Front passenger seat airbag squib (+)
2	AP−	Front passenger seat airbag squib (−)
3	AD−	Driver's seat airbag squib (−)
4	AD+	Driver's seat airbag squib (+)
5	—	—
6	—	—
7	—	—
8	—	—
9	IG1	IG power supply
10	TC	Start of diagnosis
11	—	—
12	FSSR +	Front airbag sensor (+)
13	FSSR−	Front airbag sensor (−)
14	—	—
15	—	—
16	—	—
17	SIO	DLC
18	GSW2	EFI ECU
19	E1	Earth
20	—	—
21	LA	Airbag warning lamp
22	—	—
23	—	—

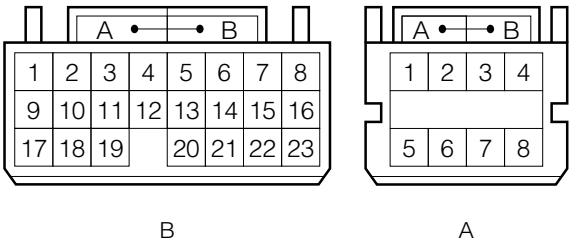
Connector C

Terminal No.	Terminal code	Terminal name
A	—	Half fit detecting mechanism
B	—	Half fit detecting mechanism
1	SFR+	RH side airbag squib (+)
2	SFR−	RH side airbag squib (−)
3※	ICR−	RH curtain shield airbag squib (−)
4※	ICR+	RH curtain shield airbag squib (+)
5	PR+	RH pretensioner mechanism squib (+)
6	PR−	RH pretensioner mechanism squib (−)
7	—	—
8	ESR	RH side airbag sensor earth
9	—	—
10	VUPR	RH side airbag sensor power supply, communication
11※	VUCR	RH side airbag rear sensor power supply, communication
12※	CSR+	RH side airbag safing rear sensor (+)
13	—	—
14	—	—
15※	ESCR	RH side airbag rear sensor earth
16※	CSR−	RH side airbag safing rear sensor (−)

※:Vehicle equipped with curtain shield airbag

11-4 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS

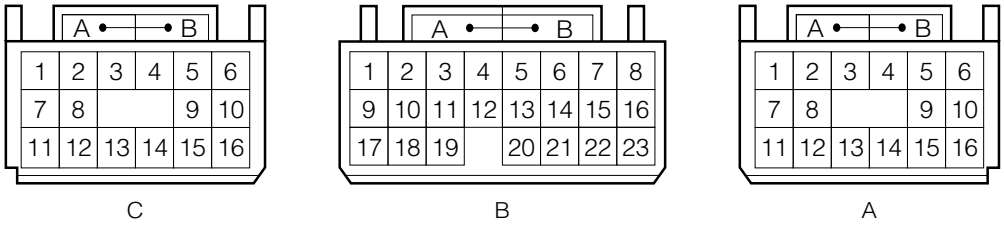
Harness side connector of airbag ECU (Vehicles not equipped with curtain shield airbag & side airbag)



T11A5015S10

With regard to the terminal names of the connector leading to the airbag ECU, refer to the "Arrangement Diagram of Computer Connector Terminals."

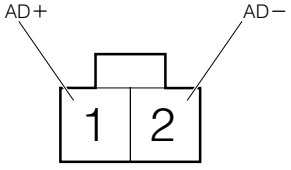
Harness side connector of airbag ECU (Vehicles equipped with side airbag / Vehicles equipped with curtain shield airbag & side airbag)



T11A5013S10

With regard to the terminal names of the connector leading to the airbag ECU, refer to the "Arrangement Diagram of Computer Connector Terminals."

Connector leading to spiral cable



T11A5023S10

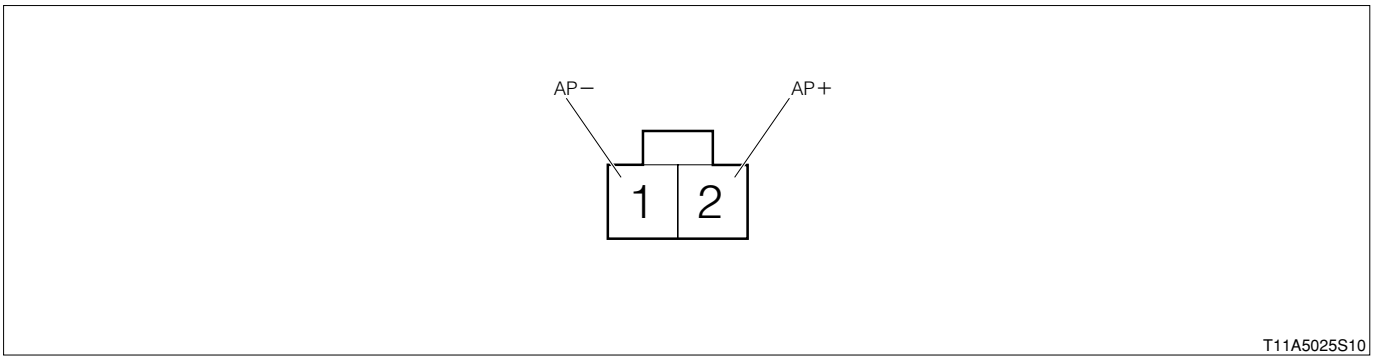
Spiral cable

Vehicle harness side connector

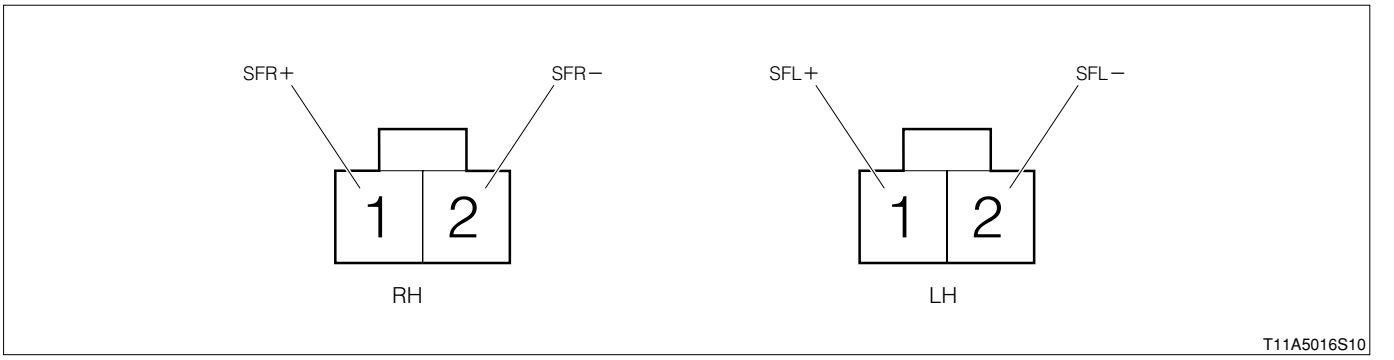
Pad side connector

T11A5024ES10

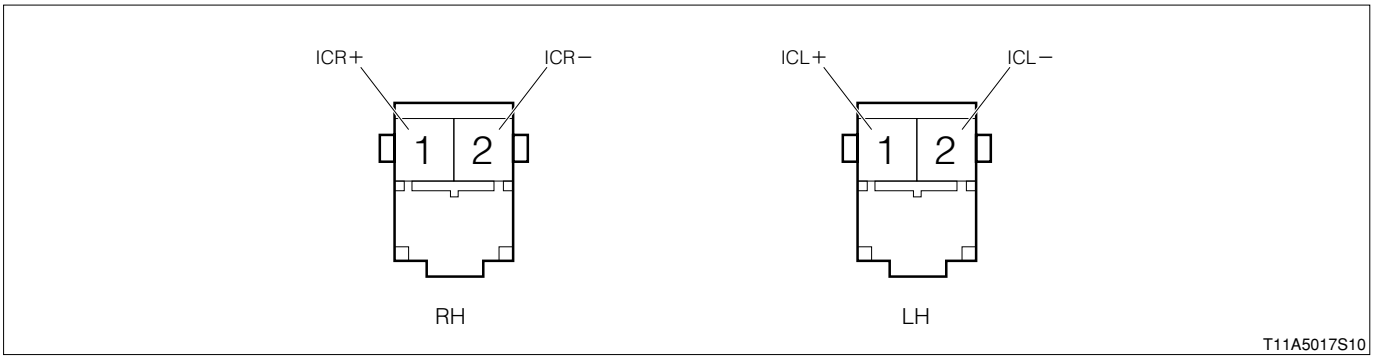
Front passenger seat airbag



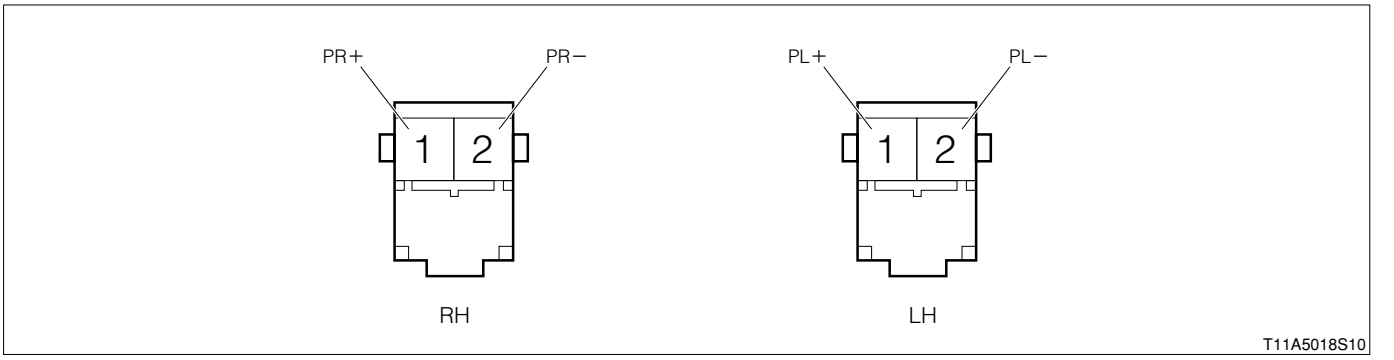
Side airbag



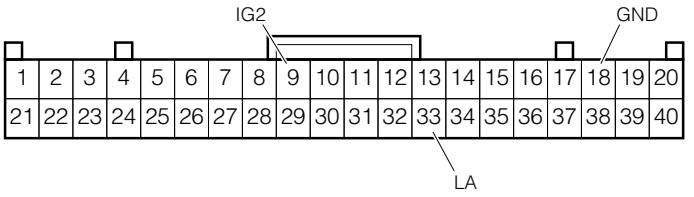
Curtain shield airbag



Seat belt with pretensioner + force limiter mechanism

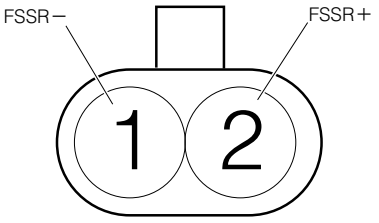


Combination meter



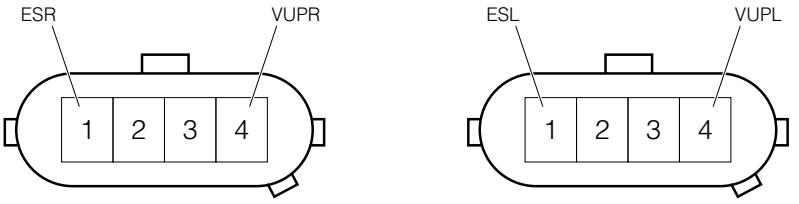
T11A5019S10

Front airbag sensor



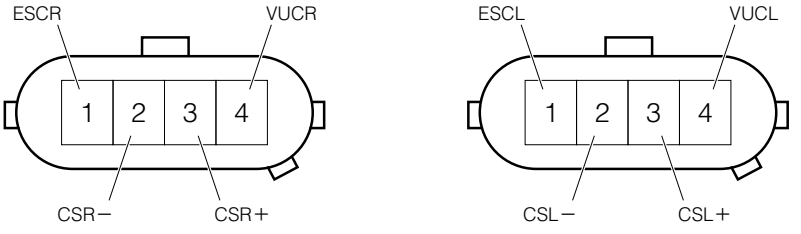
H11A5026S10

Side airbag sensor



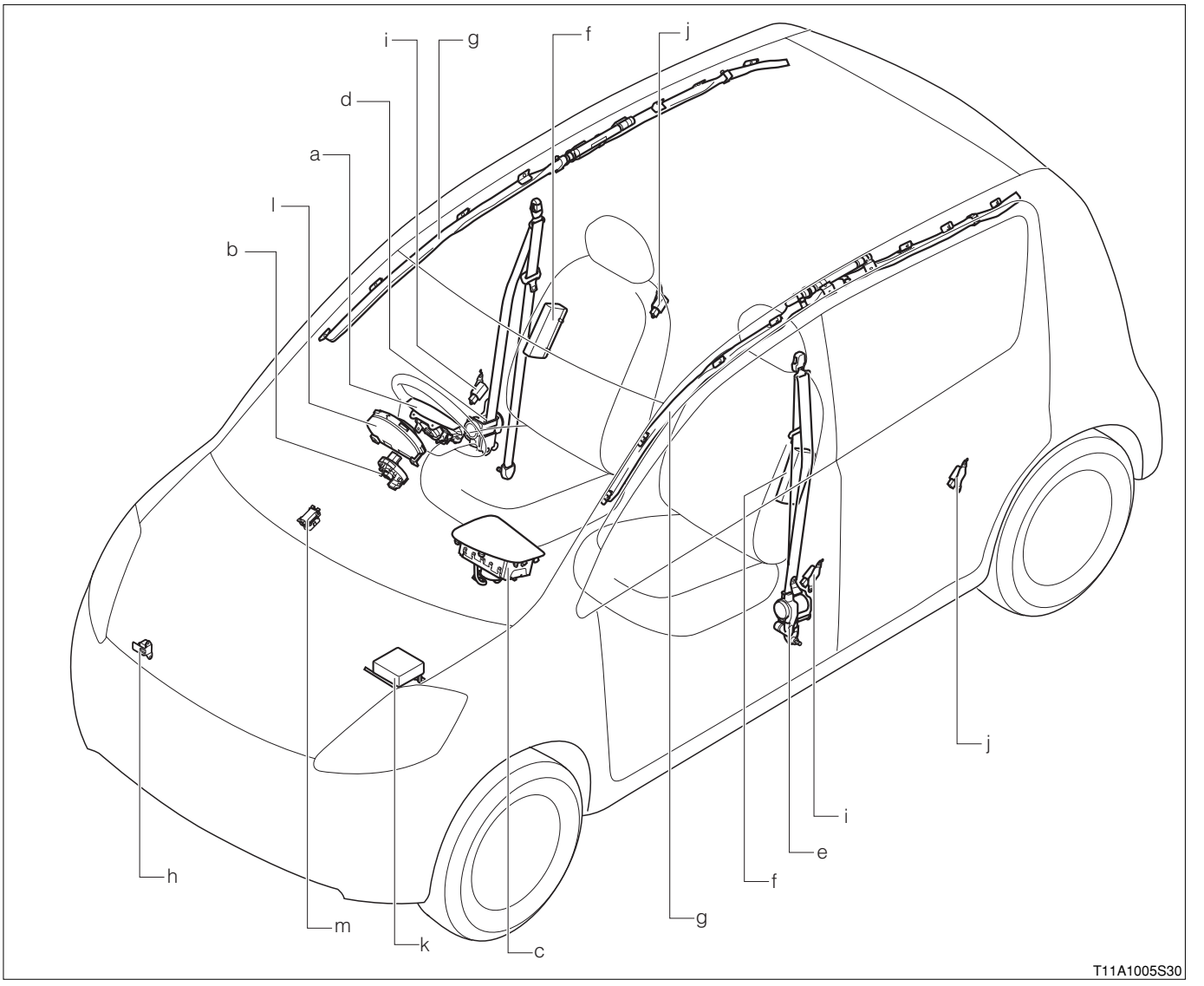
T11A5020S10

Side airbag rear sensor



T11A5021S10

11-5 LOCATION OF COMPONENTS



The figure shows the RHD vehicle.

		Vehicles with the airbags at the driver's seat and front passenger seat		Vehicles with the side airbag	Vehicles with the curtain shield airbag & side airbag
		Vehicles with RH, LH pretensioner + force limiter mechanism equipped seat belt	Vehicles without RH, LH pretensioner + force limiter mechanism equipped seat belt		
a	Driver's seat airbag	○	○	○	○
b	Spiral cable	○	○	○	○
c	Front passenger-side airbag	○	○	○	○
d	Seatbelts with the RH pretensioner and the force limiter mechanism	○	–	○	○
e	Seatbelts with the LH pretensioner and the force limiter mechanism	○	–	○	○
f	Side airbag RH/LH	–	–	○	○
g	Curtain Shield Airbag RH/LH	–	–	–	○
h	Front Airbag Sensor	○	–	○	○
i	Side Airbag Sensor RH/LH	–	–	○	○
j	Side airbag rear sensor RH/LH	–	–	–	○
k	Airbag ECU	○	○	○	○
l	Combination Meter (air bag warning lamp)	○	○	○	○
m	DLC	○	○	○	○

○: Provided –: Not provided

11-6 HOW TO PROCEED WITH TROUBLE SHOOTING

1.The airbag is provided with a diagnosis function which diagnoses malfunctioning sections. This function gives important clues in carrying out the trouble shooting. This system is provided with a backup function (EEPROM) which memorizes the diagnosis code. Therefore, even if the power supply is cut off, the diagnosis contents are retained.

2.The diagnosis code is indicated by illumination of the airbag warning lamp inside the combination meter.

3.In the airbag system, by using the diagnosis mode function that uses the diagnosis tester (DS- 21/DS-Ⅱ), you can choose between the normal mode and test mode. When the test mode is selected, the detection sensitivity of diagnosis will be increased.

(1) Refer to the diagnosis code list in the service manual for the diagnosis codes which correspond to each test mode.

CAUTION

- In the airbag trouble-shooting procedure, there are cases where confirmation as to the "※"-marked items given below is difficult due to the characteristics of the system (safety device).
- If wrong operations are performed during checks or repairs, the system may have malfunction or wrong operation. Therefore, care must be exercised to observe the notes given and perform the operations according to the instructions of this manual.

Σ1. Bringing-in of malfunctioning vehicle

▼Go to Σ2 .

Σ2. Inquiry with customer※

1.Thoroughly inquire about conditions and environmental phenomenon when the malfunction took place.

▼Go to Σ3 .

Σ3.Check of airbag warning lamp

1.Check the airbag warning lamp.

▼Proceed to Σ4 in cases where the warning lamp is illuminated at all times (The airbag ECU is detecting a malfunction).

▼Proceed to Σ11 in the case of an abnormality of the warning lamp not illuminated (A malfunction is taking place in the warning lamp system).

Σ4. Record the confirmation of diagnosis codes

Refer to Page H1-59.

▼Go to Σ5 .

Σ5. Erasing of diagnosis code

Refer to Page H1-60.

▼Go to Σ6 .

Σ6. Basic check

Refer to Page H1-62.

▼Go to Σ7 .

Σ7. Reproduction and confirmation of malfunction phenomenon ※

1.Confirm the phenomenon and grasp the malfunctioning condition.
Refer to Page A1-17.

▼Go to Σ8 .

Σ8. Reconfirmation of diagnosis code

Refer to Page H1-59.

▼Proceed to Σ10 in cases where a diagnosis code is outputted.
▼Proceed to Σ11 in cases where the lamp is illuminated at all times.
▼Proceed to Σ9 in cases where no diagnosis code is outputted.

Σ9.Check using test mode function (Using DS-21)

1.Confirm and record diagnosis codes, using the test mode function.
▼Proceed to Σ10 in cases where a diagnosis code is outputted.
▼Proceed to Σ11 in cases where no diagnosis code is outputted.

Σ10. Trouble-shooting check according to diagnosis code

Refer to Page H1-64.

▼In cases where no malfunction can be found, the reproduction method must be employed. Proceed to Σ12.

Refer to Page A1-17.

▼Narrow down the malfunctioning system and perform repairs if a malfunction is found. Then, proceed to Σ12.

Σ11. Trouble-shooting check according to malfunction phenomenon

Refer to Page H1-117.

▼In cases where no malfunction can be found, the reproduction method must be employed. Proceed to Σ12.

Refer to Page A1-17.

▼Narrow down the malfunctioning system and perform repairs if a malfunction is found. Then, proceed to Σ12.

Σ12. Erasing of diagnosis code

Refer to Page H1-60.

▼Go to Σ13 .

Σ13. Confirmation and recording of diagnosis code

Refer to Page H1-59.

▼Proceed to Σ14 in cases where the normal code is outputted.
▼Proceed to Σ10 in cases where a diagnosis code is outputted.

⊃14.Confirmation test

1.Confirm that the malfunction phenomenon of the vehicle claimed by the customer has been remedied and the vehicle has been restored to the normal condition.

▼If the result is OK, the test is finished.

11-6-1 DIAGNOSIS THROUGH INQUIRIES

1.In an effort to remove causes for malfunction from the vehicle concerned, it is impossible to determine the cause without confirming the malfunction phenomenon. If the phenomenon is not confirmed, the vehicle may not be able to return to the normal conditions even if you continue your work. The diagnosis by interviews is to collect information from the customer before confirming the malfunction phenomena. The diagnosis by interviews provides very important clues in reproducing malfunction phenomena.

2.Since the information obtained through the diagnosis by interviews is referred to during the trouble shooting, it is imperative to make an inquiry of the customer, centering on the items related to the malfunction, instead of simply asking general questions.

(1) Diagnosis interview sheet for SRS airbag system

Checked by		Check date	Day Month (Day of week)

Customer information

Name of customer	Mr./Ms.	Gender of customer (Male, female)		Age [approx.]	Occupation [ ]
		Area where vehicle is mainly used	Urban, suburb, seashore, mountain, others	Parking place	Outdoor, indoor

Details of vehicle

Date when vehicle was brought to workshop	Day Month (day of week)	Date when malfunction took place	Day Month (day of week)	Repair history	No,Yes (how many times?)
Frame No.		Registration date	Day Month Year	Vehicle model	
Engine type		Transmission	5M/T·3A/T·4A/T·CVT electronically-controlled 4A/T	Driving	2WD·4WD
Running distance	km	Equipment	Tire [ ]· Wheel [Steel · Aluminum]		

Weather

☐ Fine	☐ Cloudy	☐ Rainy	☐ Snow	☐ Other( )
Temperature(Approx. °C)				

Vehicle conditions

☐ Starting ☐ Idling ☐ Running (Constant speed Acceleration Deceleration
Others)

Road conditions

Contents of problem

State of airbag warning lamp	☐ Always illuminated ☐ Sometimes illuminated ☐ Not illuminated	
Diagnosis indication (Short circuit of T terminal)	During check	☐ Normal ☐ Abnormal code [ ]
	Second time	☐ Normal ☐ Abnormal code [ ]
	nd(rd) time	☐ Normal ☐ Abnormal code [ ]

11-6-2 CONFIRMATION, RECORD AND ERASURE OF DIAGNOSIS CODE

1.When an abnormality code is indicated, confirm whether the malfunction took place sometimes in the system or is still persisting. Also it is necessary to check any relation between the code and the reproduced malfunction (Malfunction code). For this purpose, the diagnosis code should be indicated twice, namely before and after the confirmation of the phenomena.

11-6-3 BASIC CHECK

1.The basic check enables you to narrow down the malfunctioning system.

11-6-4 RE-CONFIRMATION OF DIAGNOSIS CODE

1.After confirming the malfunction phenomenon, check the illuminating condition of the warning lamp (Malfunction mode). Note whether any change has occurred before and after the confirmation. In this way, judge whether the system is currently normal or not.

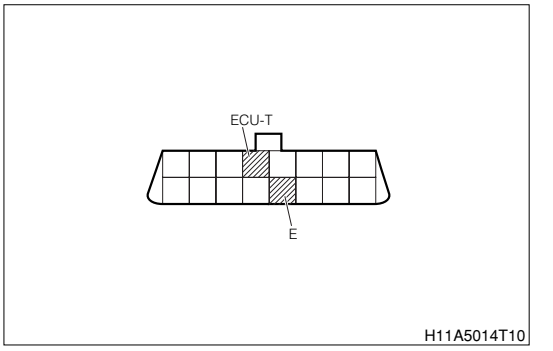
11-7 CONFIRMATION, RECORD AND ERASURE OF DIAGNOSIS CODE

11-7-1 CHECKING METHOD OF DIAGNOSIS

(1) Indication by airbag warning lamp

1.Stop the vehicle.

2.With the IG SW set to "ON" position, short the ECU-T terminal and E terminal of the DLC located under the instrument panel.



CAUTION

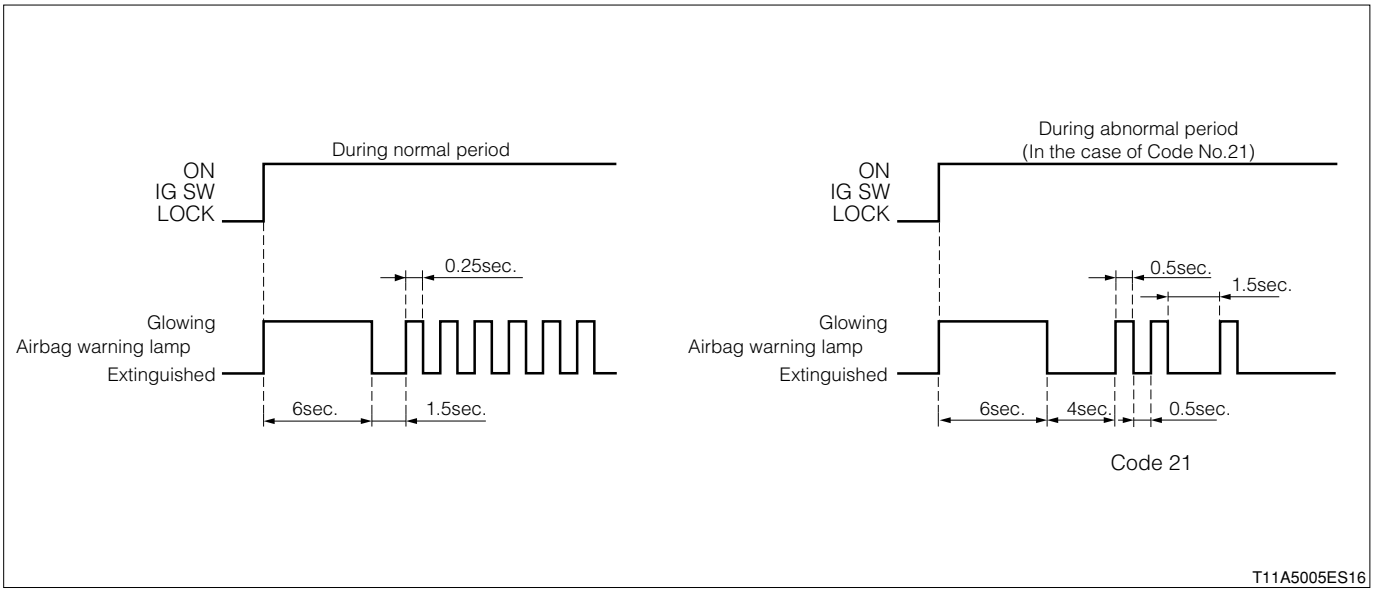
- In order to short the DLC, be sure to use the specified SST.
- If the short is made for wrong positions of the DLC, it will cause malfunction. Be very careful not to select wrong terminals.

SST: 09991-87404-000
09991-87403-000

3.The airbag warning lamp inside the combination meter flashes, thus indicating the code.

NOTE

- When the DLC is shorted, warning lamps other than the airbag warning lamp will flash. But this does not indicate system malfunction.
- All the memorized codes are shown repeatedly in the sequence of malfunction number, starting from the smallest number.
- When there is one code, the malfunction code is indicated again after a pause of four second.
- When there are more than one code, the codes are shown starting from the smaller number with a pause of 2.5 seconds made between each code indication. When all codes have been shown, after a pause of 4 seconds, the codes are again indicated one by one from the smaller one.



11-7-2 CANCELING METHOD OF DIAGNOSIS

(1) Canceling method using DLC

1.When the section which is responsible for the malfunction code has been checked and repaired, erase the memory, following the procedure given below.

(1) Make the abnormality code be outputted to the airbag warning lamp by using the diagnosis code output indicating method.

(2) While looking at a clock (Having a second hand), short the ECU-T terminal and E terminal of the DLC for 1±0.4 second, and release these terminals for 1±0.4 second. Repeat connecting/releasing four times. Then, when the ECUT terminal and E terminal are shorted fifth time, these terminals should be kept connected.

Refer to Page A1-19.

(3) If the code has been erased by now, the airbag warning lamp will flash quickly.

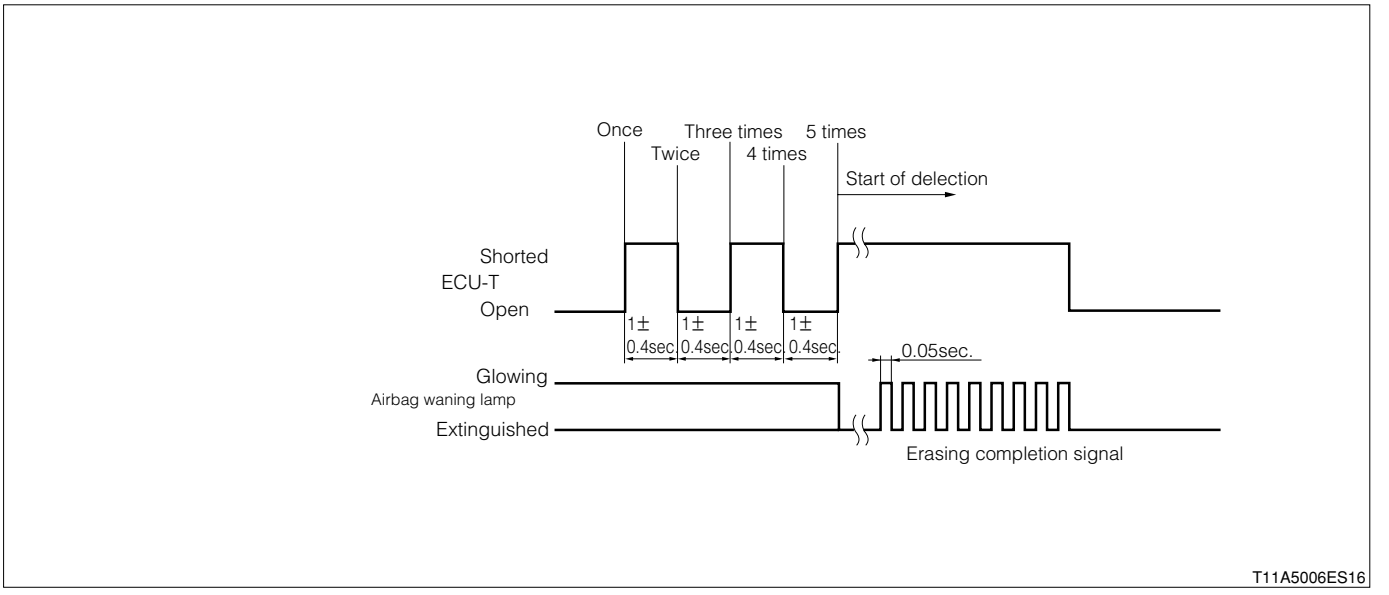
CAUTION

- In order to short the DLC, be sure to use the specified SST.
- If the short is made for wrong positions of the DLC, it will cause malfunction. Be very careful not to select wrong terminals.

SST: 09991-87404-000
09991-87403-000

NOTE

- If the airbag warning lamp does not flash quickly, repeat this operation from the beginning.



(4) After the memory has been erased, ensure that the airbag warning lamp is extinguished. Let the code be outputted again. Ensure that the normal code is outputted.

11-7-3 CONTENTS OF DIAGNOSIS

Contents of diagnosis

Code No.		Test mode Output ※3 (Provided: ○) (Not provided: ×)	Warning Indication (Provided: ○) (Not provided: ×)	Cord Memory (Provided: ○) (Not provided: ×)	Contents of diagnosis	
Two-digit code	Four-digit code				System diagnosed	Diagnosis items
11	B1802	○	○	○	Driver's seat airbag squib circuit	Earth short
12	B1803	○	○	○	Driver's seat airbag squib circuit	Power supply short
13	B1800	○	○	○	Driver's seat airbag squib circuit	Short between wires
14	B1801	○	○	○	Driver's seat airbag squib circuit	Open wire
15※1	B1600	×	○	○	Front airbag sensor	Abnormality of the main body
23※1	B1630	○	○	○	RH side airbag rear sensor	Abnormality of the main body
24※1	B1635	○	○	○	LH side airbag rear sensor	Abnormality of the main body
31※2	B1000	×	○	○	Airbag ECU	Abnormality of the main body
32※1	B1620	○	○	○	RH side airbag sensor	Abnormality of the main body
33※1	B1625	○	○	○	LH side airbag sensor	Abnormality of the main body
41	B1822	○	○	○	RH side airbag squib circuit	Earth short
42	B1823	○	○	○	RH side airbag squib circuit	Power supply short
43	B1820	○	○	○	RH side airbag squib circuit	Short between wires
44	B1821	○	○	○	RH side airbag squib circuit	Open wire
45	B1827	○	○	○	LH side airbag squib circuit	Earth short
46	B1828	○	○	○	LH side airbag squib circuit	Power supply short
47	B1825	○	○	○	LH side airbag squib circuit	Short between wires
48	B1826	○	○	○	LH side airbag squib circuit	Open wire
51	B1807	○	○	○	Front passenger's seat airbag squib circuit	Earth short
52	B1808	○	○	○	Front passenger's seat airbag squib circuit	Power supply short
53	B1805	○	○	○	Front passenger's seat airbag squib circuit	Short between wires
54	B1806	○	○	○	Front passenger's seat airbag squib circuit	Open wire
61	B1902	○	○	○	RH pretensioner mechanism squib circuit	Earth short
62	B1903	○	○	○	RH pretensioner mechanism squib circuit	Power supply short
63	B1900	○	○	○	RH pretensioner mechanism squib circuit	Short between wires
64	B1901	○	○	○	RH pretensioner mechanism squib circuit	Open wire
71	B1907	○	○	○	LH pretensioner mechanism squib circuit	Earth short
72	B1908	○	○	○	LH pretensioner mechanism squib circuit	Power supply short
73	B1905	○	○	○	LH pretensioner mechanism squib circuit	Short between wires
74	B1906	○	○	○	LH pretensioner mechanism squib circuit	Open wire
81	B1832	○	○	○	RH curtain shield airbag squib circuit	Earth short
82	B1833	○	○	○	RH curtain shield airbag squib circuit	Power supply short

83	B1830	○	○	○	RH curtain shield airbag squib circuit	Short between wires
84	B1831	○	○	○	RH curtain shield airbag squib circuit	Open wire
85	B1837	○	○	○	LH curtain shield airbag squib circuit	Earth short
86	B1838	○	○	○	LH curtain shield airbag squib circuit	Power supply short
87	B1835	○	○	○	LH curtain shield airbag squib circuit	Short between wires
88	B1836	○	○	○	LH curtain shield airbag squib circuit	Open wire

※1: This may be emitted, not only when the airbag sensor inside is malfunctioning, but also when the circuit has an abnormality.
※2: This may be emitted, not only when the airbag ECU inside is malfunctioning, but also when the squib system circuit has an abnormality.
※3: This is outputted when the diagnosis tester (DS- 21/DS-Ⅱ) is used.

NOTE

- After the airbag and pretensioner have operated and deployed, the airbag warning lamp flashes at an interval of 0.5 second.

11-8 BASIC CHECK

11-8-1 MEASUREMENT OF BATTERY VOLTAGE

1.With the engine in a stopped state, measure the battery voltage.
SPECIFIED VALUE: 10－14V

11-8-2 CHECK OF SRS AIRBAG SYSTEM POWER SUPPLY AND EARTH CIRCUIT

(1) Check of power supply circuit

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connector from the airbag ECU.
3.Connect the negative (－) terminal of the battery.
4.After the IG SW has been turned "ON", check the voltage of the connectors at the airbag ECU harness side, respectively.
(1) Connector B9 (IG1)－B19 (E1) at airbag ECU harness side
SPECIFIED VALUE: 10－14V (Battery voltage)

(2) Check of earth circuit

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connector from the airbag ECU.
3.Check continuity between the connectors between the airbag ECU and the vehicle harness, respectively.
(1) Connectors B19 (E1)(body earth at the airbag ECU side
SPECIFIED VALUE: Continuity exists

(2) Connectors B19 (E1)(body earth at airbag ECU harness side
SPECIFIED VALUE: Continuity exists

11-9 TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE

11-9-1 WARNING LAMP CIRCUIT SYSTEM

(1) Checking points

1.Is the gauge fuse normal?
2.Is the combination meter normal?
3.Is there any abnormality in the harness of the warning lamp system?

(2) Checking method

è**1. Confirmation of warning lamp illuminating state**

1.After the IG SW has been set to "ON" position, check the illuminating state of the airbag warning lamp.
çProceed to è2 when the lamp remains illuminated even after an elapse of 6 seconds.
çIf the lamp is extinguished, proceed to è4.

è**2. Confirmation of warning lamp illuminating state**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connector from the airbag ECU. Short the connector B21 (LA) with earth, using the SST.
SST: 09991-87403-000

3.Install the negative terminal of the battery. With the IG SW set to "ON" position, check the lighting state of the airbag warning lamp.
SPECIFIED VALUE: The lamp goes out.

çReplace the airbag ECU if the lamp goes out.
Refer to Page H1-34.

çIf it remains illuminated, proceed to è3.

è**3. Continuity check between combination meter and airbag ECU**

1.After the IG SW has been set to "LOCK" position, disconnect the combination meter connector.
2.Check the harness between the combination meter and the airbag ECU.
(1) Connector 33 (LA) of combination meter at harness side(Connector B21 (LA) of airbag ECU at harness side
SPECIFIED VALUE: Continuity exists

çIf the result is OK, repair or replace the combination meter.
Refer to Page J3-3.

çIf the result is NG, replace the harness and connector.

è**4. Confirmation of warning lamp illuminating state**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connector from the airbag ECU. Then, install the negative (() terminal of the battery.
3.After the IG SW has been set to "ON" position, check the illuminating state of the warning lamp.
SPECIFIED VALUE: Illuminates.

çIf the lamp is illuminated, replace the airbag ECU.
Refer to Page H1-34.

çIf the lamp is extinguished, proceed to è5.

è**5. Check of fuse**

1.After the IG SW has been set to "LOCK" position, remove the negative (() terminal of the battery. Check the fuse.
SPECIFIED VALUE: No fuse has blown out.

çIf it is OK, go to è6 .
çIf it is NG, go to è8 .

è**6. Check continuity between the combination meter and the fuse and continuity between the combination meter and the earth.**

1.Check the harnesses between the combination meter and the gauge fuse as well as between the combination meter and the earth for open wire.
(1) Connector 9 (IG2) of combination meter at harness side(gauge fuse (Downstream side)
(2) Connector 18 (GND) of combination meter at harness side(body earth
SPECIFIED VALUE: Continuity exists

çIf it is OK, go to è7 .
çIf the result is NG, replace the harness and connector.

è**7. Check of short between combination meter and airbag ECU**

1.Check the harness between the combination meter and the airbag ECU for short circuit.
(1) Connector B21 (LA) of airbag ECU at harness side(body earth
SPECIFIED VALUE: 1MΩ or more (No continuity)

çIf the result is OK, repair or replace the combination meter.
Refer to Page J3-3.

çIf the result is NG, replace the harness and connector.

è**8. Check continuity between the combination meter and the fuse**

1.Check the harness between the combination meter and the fuse.
(1) Connector 9 (IG2) of combination meter at harness side(IG SW ('B side)
SPECIFIED VALUE: Continuity exists

çIf the result is OK, replace the gauge fuse. Then, observe for a while.
çIf the result is NG, replace the gauge fuse and replace the harness and connector.

11-9-2 DIAGNOSIS CODE NO.11(DRIVER'S SEAT AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.Cases where the harness between the driver's seat airbag and the airbag ECU is shorted with the earth

(2) Checking points

1.Is there any abnormality in the harness and connector between the driver's seat airbag and the airbag ECU.

CAUTION

- Since a connector with terminal short mechanism is used for the spiral cable, there is the possibility to make a wrong judgment that there is a short between harnesses. Therefore, before starting the check, ensure that there is no damage, such as open wire or short, in the SST for deploying the airbag (Part number: 09082-87710-000). Then, install it to the spiral cable. Check the harness with the SST installed.

(3) Checking method

è**1. Check of harness between steering wheel pad Ay and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Remove the airbag ECU and steering wheel pad Ay. Then, check the harness between the pad Ay and the airbag ECU for short circuit.

(1) Connector 1 (AD') of spiral cable at pad side(Body earth

(2) Connector 2 (AD() of spiral cable at pad side(Body earth

SPECIFIED VALUE: 1MΩ or more (No continuity)

çIf it is OK, go to è2 .

çIf it is NG, go to è4 .

è**2. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, install the airbag ECU to the vehicle and connector the connector.

2.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the codes. Then, check the code again.

SPECIFIED VALUE: Diagnosis code No.11 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.

çIf outputted, replace the airbag ECU.

Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Install the steering wheel pad assembly.

3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.11 is not outputted. (Other codes may be outputted.)

çIf not outputted, it means that the system has returned to the normal state. Erase the diagnosis code and observe for a while.

çIf outputted, replace the steering wheel pad Ay.

Refer to Page H1-1.

è**4. Check of harness between spiral cable and airbag ECU for short circuit**

1.Disconnect the connector at the spiral cable harness side.
2.Check the harness between the spiral cable and the airbag ECU for short circuit.
(1) Connector 2 (AD() leading to spiral cable(Body earth
SPECIFIED VALUE: 1MΩ or more (No continuity)

çIf it is OK, go to è5 .
çIf the result is NG, replace the harness and connector at the vehicle side.

è**5. Check of spiral cable inside for short circuit.**

1.Check the inside of the spiral cable for short circuit.
(1) Connector 1 (AD') of spiral cable at pad side(Body earth
SPECIFIED VALUE: 1MΩ or more (No continuity)

çIf the result is OK, it means that the system has returned to the normal state. Erase the diagnosis code and observe for a while.
çIf the result is NG, replace the spiral cable.
Refer to Page H1-8.

11-9-3 DIAGNOSIS CODE NO.12(DRIVER'S SEAT AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.Cases where the harness between the driver's seat airbag and the airbag ECU is shorted with the earth

(2) Checking points

1.Check the harness and connector between the driver's seat airbag and the airbag ECU for abnormality.

CAUTION

- Since a connector with terminal short mechanism is used for the spiral cable, there is the possibility to make a wrong judgment that there is a short between harnesses. Therefore, before starting the check, ensure that there is no damage, such as open wire or short, in the SST for deploying the airbag (Part number: 09082-87710-000). Then, install it to the spiral cable. Check the harness with the SST installed.

(3) Checking method

è**1. Check of harness between steering wheel pad Ay and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Remove the airbag ECU and steering wheel pad Ay.

3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", check the harness between the pad Ay and the airbag ECU for short circuit.

(1) Connector 1 (AD') of spiral cable at pad side(Body earth

(2) Connector 2 (AD() of spiral cable at pad side(Body earth

SPECIFIED VALUE: 0 V (No continuity with 'B)

çIf it is OK, go to è2 .

çIf it is NG, go to è4 .

è**2. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, install the airbag ECU to the vehicle and connector the connector.

2.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.12 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.

çIf outputted, replace the airbag ECU.

Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Install the steering wheel pad assembly.
3.Install the negative terminal of the battery. With the IG SW set to "ON" position, erase the diagnosis codes. Then, check the diagnosis code.
SPECIFIED VALUE: Diagnosis code No.12 is not outputted. (Other codes may be outputted.)

çIf not outputted, it means that the system has returned to the normal state. Erase the diagnosis code and observe for a while.
çIf outputted, replace the steering wheel pad Ay.
Refer to Page

è**4. Check of harness between spiral cable and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, disconnect the connector at the vehicle harness side of the spiral cable.
2.After the IG SW has been turned "ON", check the harness between the spiral cable and the airbag ECU for short circuit.
(1) Connector 2 (AD() leading to spiral cable(Body earth
SPECIFIED VALUE: 0 V (No continuity with 'B)

çIf it is OK, go to è5 .
çIf the result is NG, replace the harness and connector at the vehicle side.

è**5. Check of spiral cable inside for short circuit.**

1.Set the IG SW "LOCK" position.
2.With the IG SW set to "ON" position, check the spiral cable inside for short circuit.
(1) Connector 1 (AD') of spiral cable at pad side(Body earth
SPECIFIED VALUE: 0 V (No continuity with 'B)

çIf the result is OK, the system has returned to the normal state. Erase the diagnosis code and observe for a while.
çIf the result is NG, replace the spiral cable.
Refer to Page H1-8.

11-9-4 DIAGNOSIS CODE NO.13(DRIVER'S SEAT AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.Case of short between wires of the harness between the driver's seat airbag and the airbag ECU

(2) Checking points

1.Check the harness and connector between the driver's seat airbag and the airbag ECU for abnormality.

CAUTION

- Since a connector with terminal short mechanism is used for the spiral cable, there is the possibility to make a wrong judgment that there is a short between harnesses. Therefore, before starting the check, ensure that there is no damage, such as open wire or short, in the SST for deploying the airbag (Part number: 09082-87710-000). Then, install it to the spiral cable. Check the harness with the SST installed.

(3) Checking method

è**1. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Remove the steering wheel pad Ay. Then, short both terminals of the connector of the spiral cable at pad side.

3.Install the negative (() terminal of the battery. Erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.13 is outputted.

çIf outputted, proceed to è2.

çIf not outputted, replace the airbag ECU.

Refer to Page H1-34.

è**2. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, release the short between the terminals of the connector of the spiral cable at pad side.

2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.13 is outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.

çIf outputted, proceed to è4.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Install the steering wheel pas Ay.

2.After the IG SW has been turned "ON", check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.13 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.

çIf outputted, replace the steering wheel pad Ay.

Refer to Page H1-1.

è**4. Confirmation of diagnosis codes**

1.After the IG SW has been set to "LOCK" position, disconnect the connector at the vehicle harness side of the spiral cable.
2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.13 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è5.
çIf outputted, proceed to è6.

è**5. Check of spiral cable inside for short circuit.**

1.After the IG SW has been set to "LOCK" position, disconnect the spiral cable from the vehicle.
2.Connect the SST to the connector at the spiral cable vehicle harness side.
SST: 09082-87710-000

3.Ensure that the terminals of the SST for connecting the battery are not in contact with each other. Then, check the spiral cable inside for short circuit.
(1) Connector 1 (AD') of spiral cable at vehicle harness side
(Connector 2 (AD() of spiral cable at vehicle harness side
SPECIFIED VALUE: 1MΩ or more (No continuity)

çIf the result is OK, the system has returned to the normal state. Erase the diagnosis code and observe for a while.
çIf the result is NG, replace the spiral cable.
Refer to Page H1-8.

è**6. Check of harness between spiral cable and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, disconnect the connector of the airbag ECU. Then, disconnect the shorted terminal of the connector at the airbag ECU vehicle side.
2.Check the harness between the spiral cable and the airbag ECU for short circuit.
(1) Connector 1 (AD') leading to spiral cable
(Connector 2 (AD() leading to spiral cable
SPECIFIED VALUE: 1MΩ or more (No continuity)

çIf the result is OK, the system has returned to the normal state. Erase the diagnosis code and observe for a while.
çIf it is NG, replace the vehicle side harness.

11-9-5 DIAGNOSIS CODE NO.14(DRIVER'S SEAT AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.When open wire took place in the harness between the driver's seat airbag and the airbag ECU

(2) Checking points

1.Check the harness and connector between the driver's seat airbag and the airbag ECU for abnormality.

CAUTION

- Since a connector with terminal short mechanism is used for the spiral cable, there is the possibility to make a wrong judgment that there is a short between harnesses. Therefore, before starting the check, ensure that there is no damage, such as open wire or short, in the SST for deploying the airbag (Part number: 09082-87710-000). Then, install it to the spiral cable. Check the harness with the SST installed.

(3) Checking method

è**1. Continuity check between steering wheel pad Ay and airbag ECU**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Remove the airbag ECU and steering wheel pad Ay.
3.Check the harness between the pad Ay and the airbag ECU for open wire.
(1) Connector 1 (AD') of spiral cable at pad side
(Connector B4 (AD') of airbag ECU at harness side
(2) Connector 2 (AD() of spiral cable at pad side
(Connector B3 (AD() of airbag ECU at harness side
SPECIFIED VALUE: Continuity exists

çIf it is OK, go to è2 .
çIf it is NG, go to è4 .

è**2. Confirmation of diagnosis code**

1.Short the connectors 1 (AD') and 2 (AD() of the spiral cable at pad side.
2.Install the airbag ECU to the vehicle and connect the connector.
3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.14 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, replace the airbag ECU.
Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Release the short between the terminals of the spiral cable. Then, install the steering wheel pad Ay.
3.After the IG SW has been turned "ON", check the diagnosis code.
SPECIFIED VALUE: Diagnosis code No.14 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the steering wheel pad Ay.
Refer to Page H1-1.

è**4. Continuity check between spiral cable and airbag ECU**

1.Disconnect the connector at the vehicle harness side of the spiral cable.
2.Check the harness between the spiral cable and the airbag ECU for open wire.
(1) Connector 1 (AD') leading to spiral cable
(Connector 2 (AD() leading to spiral cable
SPECIFIED VALUE: Continuity exists

çIf it is OK, go to è5 .
çIf the result is NG, replace the vehicle harness and connector.

è**5. Continuity check of spiral cable inside**

1.Check the spiral cable inside for open wire.
(1) Connector 1 (AD') of spiral cable at pad side
(Connector 2 (AD() of spiral cable at pad side
SPECIFIED VALUE: Continuity exists

çIf the result is OK, the system has returned to the normal state. Erase the diagnosis code and observe for a while.
çIf the result is NG, replace the spiral cable.
Refer to Page H1-8.

11-9-6 DIAGNOSIS CODE NO.15(FRONT SATELLITE SENSOR SYSTEM)

(1) Diagnostic code output conditions

1.Cases where the harness between the front airbag sensor and the airbag ECU exhibits open wire or short circuit

2.Inner abnormality in the front airbag sensor

(2) Checking points

1.Check the harness and connector between the front airbag sensor and the airbag ECU for abnormality.

(3) Checking method

è**1. Unit check of front airbag sensor**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Disconnect the connector from the front airbag sensor.

3.Remove the front airbag sensor. Then, perform the unit check.

Refer to Page H1-117.

çIf it is OK, go to è2 .

çIf the result is NG, replace the front airbag sensor.

Refer to Page H1-36.

è**2. Continuity check between front airbag sensor and airbag ECU**

1.Disconnect the connector at the harness side from the airbag ECU.

2.Check the harness between the front airbag sensor and the airbag ECU for open wire.

(1) Connector 1 (FSSR() of front airbag sensor at vehicle side(Connector B13 (FSSR() of airbag ECU at harness side

(2) Connector 2 (FSSR') of front airbag sensor at vehicle side(Connector B12 (FSSR') of airbag ECU at harness side

SPECIFIED VALUE: Continuity exists

çIf it is OK, go to è3 .

çIf it is NG, replace the vehicle side harness.

è**3. Check of harness between front airbag sensor and airbag ECU for short circuit**

1.Check that the harness between the front airbag sensor and the airbag ECU is not shorted with the earth.

(1) Connector 1 (FSSR() of front airbag at sensor vehicle side(Body earth

SPECIFIED VALUE: 1MΩ or more (No continuity)

2.Check that the harness between the front airbag sensor and the airbag ECU is not shorted with the power supply.

(1) Connector 2 (FSSR') of front airbag sensor at vehicle side(Body earth

SPECIFIED VALUE: 0 V (No continuity with 'B)

3.Check that the harnesses of the front airbag sensor are not shorted with each other.

(1) Connector 1 (FSSR() of front airbag sensor at vehicle side(Connector 2 (FSSR') of front airbag sensor at vehicle side

SPECIFIED VALUE: 1MΩ or more (No continuity)

çIf it is OK, go to è4 .

çIf it is NG, replace the vehicle side harness.

è**4. Confirmation of diagnosis codes**

1.Connect the connector to the airbag ECU.

2.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.15 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.

çIf outputted, replace the airbag ECU.

Refer to Page H1-34.

11-9-7 NO.23 (RH SIDE AIRBAG REAR SENSOR SYSTEM)

(1) Output conditions of diagnosis code

1.Cases where the harness between the RH side airbag rear sensor and the airbag ECU exhibits open wire or short circuit

2.Inner abnormality in the RH side airbag rear sensor

3.Cases where the safing sensor inside the sensor is shorted

(2) Checking points

1.Check the harness and connector between the RH side airbag rear sensor and the airbag ECU for abnormality.

(3) Checking method

è**1. Continuity check between connector of RH side airbag rear sensor at vehicle side and connector of airbag ECU at vehicle side**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Disconnect the connectors from the airbag ECU and RH side airbag rear sensor.

3.Check the harness between the RH side airbag rear sensor and the airbag ECU for open wire.

(1) Connector 1 (ESCR) of RH side airbag rear sensor at vehicle side(Connector C15 (ESCR) of airbag ECU at vehicle side

(2) Connector 2 (CSR() of RH side airbag rear sensor at vehicle side(Connector C16 (CSR() of airbag ECU at vehicle side

(3) Connector 3 (CSR') of RH side airbag rear sensor at vehicle side(Connector C12 (CSR') of airbag ECU at vehicle side

(4) Connector 4 (VUCR) of RH side airbag rear sensor at vehicle side(Connector C11 (VUCR) of airbag ECU at vehicle side

SPECIFIED VALUE: Continuity exists

çIf it is OK, go to è2 .

çIf the result is NG, replace the vehicle harness and connector.

è**2. Check of harness between RH side airbag rear sensor and airbag ECU for short circuit**

1.Check the harness between the RH side airbag rear sensor and the airbag ECU for short circuit.

(1) Connector of RH side airbag rear sensor at vehicle side(Body earth

SPECIFIED VALUE: 1MΩ or more (No continuity)

2.Check that the harness between the RH side airbag rear sensor and the airbag ECU is not shorted with the power supply.

(1) Connector of RH side airbag rear sensor at vehicle side(Body earth

SPECIFIED VALUE: 0 V (No continuity with 'B)

3.Check that the harnesses of the RH side airbag rear sensor are not shorted with each other.

(1) Each terminal of connector of RH side airbag rear sensor at vehicle side(Other terminals of connector of RH side airbag rear sensor at vehicle side

SPECIFIED VALUE: 1MΩ or more (No continuity)

çIf it is OK, go to è3 .

çIf the result is NG, replace the vehicle harness and connector.

è**3. Confirmation of diagnosis code**

1.Connect the connectors to the airbag ECU and RH side airbag rear sensor.

2.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.23 is not outputted.

çIf the result is OK, the system has returned to the normal state. Erase the diagnosis code and observe for a while.

çIf the result is NG, replace the RH side airbag rear sensor.

Refer to Page H1-40.

11-9-8 NO.24 (LH SIDE AIRBAG REAR SENSOR SYSTEM)

(1) Output conditions of diagnosis code

1.Cases where the harness between the LH side airbag rear sensor and the airbag ECU exhibits open wire or short circuit

2.Inner abnormality in the LH side airbag rear sensor

3.Cases where the safing sensor inside the sensor is shorted

(2) Checking points

1.Check the harness and connector between the LH side airbag rear sensor and the airbag ECU for abnormality.

(3) Checking method

è**1. Continuity check between connector of LH airbag rear sensor at vehicle side and connector of airbag at vehicle side**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Disconnect the connectors from the airbag ECU and LH side airbag rear sensor.

3.Check the harness between the LH side airbag rear sensor and the airbag ECU for open wire.

(1) Connector 1 (ESCL) of LH side airbag rear sensor at vehicle side(Connector A12 (ESCL) of airbag ECU at vehicle side

(2) Connector 2 (CSL() of LH side airbag rear sensor at vehicle side(Connector A11 (CSL() of airbag ECU at vehicle side

(3) Connector 3 (CSL') of LH side airbag rear sensor at vehicle side(Connector A15 (CSL') of airbag ECU at vehicle side

(4) Connector 4 (VUCL) of LH side airbag rear sensor at vehicle side(Connector A16 (VUCL) of airbag ECU at vehicle side

SPECIFIED VALUE: Continuity exists

çIf it is OK, go to è2 .

çIf the result is NG, replace the vehicle harness and connector.

è**2. Check of harness between LH side airbag rear sensor and airbag ECU for short circuit**

1.Check the harness between the LH side airbag rear sensor and the airbag ECU for short circuit.

(1) Connector of LH side airbag rear sensor at vehicle side(Body earth

SPECIFIED VALUE: 1MΩ or more (No continuity)

2.Check that the harness between the LH side airbag rear sensor and the airbag ECU is not shorted with the power supply.

(1) Connector of LH side airbag rear sensor at vehicle side(Body earth

SPECIFIED VALUE: 0 V (No continuity with 'B)

3.Check that the harnesses of the LH side airbag rear sensor are not shorted with each other.

(1) Each terminal of connector of LH side airbag rear sensor at vehicle side(Other terminals of connector of LH side airbag rear sensor at vehicle side

SPECIFIED VALUE: 1MΩ or more (No continuity)

çIf it is OK, go to è3 .

çIf the result is NG, replace the vehicle harness and connector.

è**3. Confirmation of diagnosis code**

1.Connect the connectors to the airbag ECU and LH side airbag rear sensor.

2.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.24 is not outputted.

çIf the result is OK, the system has returned to the normal state. Erase the diagnosis code and observe for a while.

çIf the result is NG, replace the LH side airbag rear sensor.

Refer to Page H1-40.

11-9-9 NO.32 (RH SIDE AIRBAG SENSOR SYSTEM)

(1) Output conditions of diagnosis code

1.Cases where the harness between the RH side airbag sensor and the airbag ECU exhibits open wire or short circuit

2.Inner abnormality in the RH side airbag sensor

(2) Checking points

1.Check the harness and connector between the RH side airbag sensor and the airbag ECU for abnormality.

(3) Checking method

è**1. Continuity check between connector of RH side airbag sensor at vehicle side and connector of airbag ECU at vehicle side**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Disconnect the connectors from the airbag ECU and RH side airbag sensor.

3.Check the harness between the RH side airbag sensor and the airbag ECU for open wire.

(1) Connector 1 (ESR) of RH side airbag sensor at vehicle side(Connector C8 (ESR) of airbag ECU at vehicle side

(2) Connector 4 (VUPR) of RH side airbag sensor at vehicle side(Connector C10 (VUPR) of airbag ECU at vehicle side

SPECIFIED VALUE: Continuity exists

çIf it is OK, go to è2 .

çIf the result is NG, replace the vehicle harness and connector.

è**2. Check of harness between RH side airbag sensor and airbag ECU for short circuit**

1.Check that the harness between the RH side airbag sensor and the airbag ECU is not shorted with the earth.

(1) Connector of RH side airbag sensor at vehicle side(Body earth

SPECIFIED VALUE: 1M+ or more (No continuity)

2.Check that the harness between the RH side airbag sensor and the airbag ECU is not shorted with the power supply.

(1) Connector of RH side airbag sensor at vehicle side(Body earth

SPECIFIED VALUE: 0 V (No continuity with 'B)

3.Check that the harnesses of the RH side airbag sensor are not shorted with each other.

(1) Each terminal of connector of RH side airbag sensor at vehicle side(Other terminals of connector of RH side airbag sensor at vehicle side

SPECIFIED VALUE: 1M+ or more (No continuity)

çIf it is OK, go to è3 .

çIf the result is NG, replace the vehicle harness and connector.

è**3. Confirmation of diagnosis code**

1.Connect the connectors to the airbag ECU and RH side airbag sensor.

2.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.32 is not outputted.

çIf the result is OK, the system has returned to the normal state. Erase the diagnosis code and observe for a while.

çIf the result is NG, replace the RH side airbag rear sensor.

Refer to Page H1-38.

11-9-10 NO.33 (LH SIDE AIRBAG SENSOR SYSTEM)

(1) Output conditions of diagnosis code

1.Cases where the harness between the LH side airbag sensor and the airbag ECU exhibits open wire or short circuit

2.Inner abnormality in the LH side airbag sensor

(2) Checking points

1.Check the harness and connector between the LH side airbag sensor and the airbag ECU for abnormality.

(3) Checking method

è**1. Continuity check between connector of LH side airbag sensor at vehicle side and connector of airbag ECU at vehicle side**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Disconnect the connectors from the airbag ECU and LH side airbag sensor.

3.Check the harness between the LH side airbag sensor and the airbag ECU for open wire.

(1) Connector 1 (ESL) of LH side airbag sensor at vehicle side(Connector A9 (ESL) of airbag ECU at vehicle side

(2) Connector 4 (VUPL) of LH side airbag sensor at vehicle side(Connector A7 (VUPL) of airbag ECU at vehicle side

SPECIFIED VALUE: Continuity exists

çIf it is OK, go to è2 .

çIf the result is NG, replace the vehicle harness and connector.

è**2. Check of harness between LH side airbag sensor and airbag ECU for short circuit**

1.Check that the harness between the LH side airbag sensor and the airbag ECU is not shorted with the earth.

(1) Connector of LH side airbag sensor at vehicle side(Body earth

SPECIFIED VALUE: 1MΩ or more (No continuity)

2.Check that the harness between the LH side airbag sensor and the airbag ECU is not shorted with the power supply.

(1) Connector of LH side airbag sensor at vehicle side(Body earth

SPECIFIED VALUE: 0 V (No continuity with 'B)

3.Check that the harnesses of the LH side airbag sensor are not shorted with each other.

(1) Each terminal of connector of LH side airbag sensor at vehicle side(Other terminals of connector of LH side airbag sensor at vehicle side

SPECIFIED VALUE: 1MΩ or more (No continuity)

çIf it is OK, go to è3 .

çIf the result is NG, replace the vehicle harness and connector.

è**3. Confirmation of diagnosis code**

1.Connect the connectors to the airbag ECU and passenger seat airbag sensor.

2.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.33 is not outputted.

çIf the result is OK, the system has returned to the normal state. Erase the diagnosis code and observe for a while.

çIf the result is NG, replace the LH side airbag sensor.

Refer to Page H1-38.

11-9-11 NO.41 (RH SIDE AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Output conditions of diagnosis codes

1.Cases where the harness between the RH side airbag and the airbag ECU is shorted with the earth

(2) Checking points

1.Check the harness and connector between the RH side airbag and the airbag ECU for abnormality.

(3) Checking method

è**1. Continuity check between RH side airbag and airbag ECU**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Disconnect the connectors from the airbag ECU and RH side airbag.

3.Check the harness between the RH side airbag and the airbag ECU for short circuit.

(1) Connector 1 (SFR') of RH side airbag at vehicle side(Body earth

(2) Connector 2 (SFR() of RH side airbag at vehicle side(Body earth

SPECIFIED VALUE: 1MΩ (No continuity)

çIf it is OK, go to è2 .

çIf it is NG, replace the vehicle side harness.

è**2. Confirmation of diagnosis code**

1.Connect the connector to the airbag ECU.

2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.41 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.

çIf outputted, replace the airbag ECU.

Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Connect the connector to the RH side airbag.

3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.41 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.

çIf outputted, replace the RH side airbag.

Refer to Page H1-21.

11-9-12 NO.42 (RH SIDE AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Output conditions of diagnosis codes

1.Cases where the harness between the RH side airbag and the airbag ECU is shorted with the power supply

(2) Checking points

1.Check the harness and connector between the RH side airbag and the airbag ECU for abnormality.

(3) Checking method

è**1. Continuity check between RH side airbag and airbag ECU**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connectors from the airbag ECU and RH side airbag.
3.Connect the negative (() terminal of the battery.
4.After the IG SW has been turned "ON", check the harness between the RH side airbag and the airbag ECU for short circuit.
(1) Connector 1 (SFR') of RH side airbag at vehicle side(Body earth
(2) Connector 2 (SFR() of RH side airbag at vehicle side(Body earth
SPECIFIED VALUE: 0 V (No continuity with 'B)

çIf it is OK, go to è2 .
çIf it is NG, replace the vehicle side harness.

è**2. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, connect the connector to the airbag ECU.
2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.42 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, replace the airbag ECU.
Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Connect the connector to the RH side airbag.
3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.42 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the RH side airbag.
Refer to Page H1-21.

11-9-13 NO.43 (RH SIDE AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Output conditions of diagnosis codes

1.Case of short between wires of the harness between the RH side airbag and the airbag ECU

(2) Checking points

1.Check the harness and connector between the RH side airbag and the airbag ECU for abnormality.

(3) Checking method

è**1. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connector from the RH side airbag.
3.Short both terminals of the connector of the RH side airbag at vehicle side.
4.Install the negative (() terminal of the battery. Erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.43 is outputted.

çIf outputted, proceed to è2.
çIf not outputted, replace the airbag ECU.
Refer to Page H1-34.

è**2. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, release the short between the terminals of the connector of the RH side airbag at vehicle side.
2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.43 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, proceed to è4.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative (() terminal of the battery. Then, install the RH side airbag.
2.After the IG SW has been turned "ON", check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.43 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the RH side airbag.
Refer to Page H1-21.

è**4. Check of harness between RH side airbag and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, disconnect the connector from the airbag ECU.
2.Check the harness between the RH side airbag and the airbag ECU for short circuit.
(1) Connector 1 (SFR') of RH side airbag at vehicle side(Connector 2 (SFR() of RH side airbag at vehicle side

SPECIFIED VALUE: 1MΩ or more (No continuity)

çIf the result is OK, the system has returned to the normal state. Erase the diagnosis code and observe for a while.
çIf it is NG, replace the vehicle side harness.

11-9-14 NO.44 (RH SIDE AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Output conditions of diagnosis codes

1.When open wire took place in the harness between the RH side airbag and the airbag ECU

(2) Checking points

1.Check the harness and connector between the RH side airbag and the airbag ECU for abnormality.

(3) Checking method

è**1. Continuity check between RH side airbag and airbag ECU**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connectors from the airbag ECU and RH side airbag.
3.Check the harness between the RH side airbag and the airbag ECU for open wire.
(1) Connector 1 (SFR') of RH side airbag at vehicle side(Connector C1 (SFR') of airbag ECU at vehicle side
(2) Connector 2 (SFR() of RH side airbag at vehicle side(Connector C2 (SFR() of airbag ECU at vehicle side

SPECIFIED VALUE: Continuity exists

çIf it is OK, go to è2 .
çIf the result is NG, replace the vehicle harness and connector.

è**2. Confirmation of diagnosis code**

1.Short the connectors 1 (SFR') and 2 (SFR() of the RH side airbag at vehicle side.
2.Connect the connector to the airbag ECU.
3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.44 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, replace the airbag ECU.
Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Release the short between the terminals of the RH side airbag at vehicle side.
3.Connect the connector to the RH side airbag.
4.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.44 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the RH side airbag.
Refer to Page H1-21.

11-9-15 NO.45 (LH SIDE AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Output conditions of diagnosis codes

1.Cases where the harness between the LH side airbag and the airbag ECU is shorted with the earth

(2) Checking points

1.Check the harness and connector between the LH side airbag and the airbag ECU for abnormality.

(3) Checking method

è**1. Continuity check between LH side airbag and airbag ECU**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connectors from the airbag ECU and LH side airbag.
3.Check the harness between the LH side airbag and the airbag ECU for short circuit.
(1) Connector 1 (SFL') of LH side airbag at vehicle side(Body earth
(2) Connector 2 (SFL() of LH side airbag at vehicle side(Body earth
SPECIFIED VALUE: 1MΩ (No continuity)

çIf it is OK, go to è2 .
çIf it is NG, replace the vehicle side harness.

è**2. Confirmation of diagnosis code**

1.Connect the connector to the airbag ECU.
2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.45 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, replace the airbag ECU.
Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Connect the connector to the LH side airbag.
3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.45 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the LH side airbag.
Refer to Page H1-21.

11-9-16 NO.46 (LH SIDE AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Output conditions of diagnosis codes

1.Cases where the harness between the LH side airbag and the airbag ECU is shorted with the power supply

(2) Checking points

1.Check the harness and connector between the LH side airbag and the airbag ECU for abnormality.

(3) Checking method

è**1. Continuity check between LH side airbag and airbag ECU**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connectors from the airbag ECU and LH side airbag.
3.Connect the negative (() terminal of the battery.
4.After the IG SW has been turned "ON", check the harness between the LH side airbag and the airbag ECU for short circuit.
(1) Connector 1 (SFL') of LH side airbag at vehicle side(Body earth
(2) Connector 2 (SFL() of LH side airbag at vehicle side(Body earth
SPECIFIED VALUE: 0 V (No continuity with 'B)

çIf it is OK, go to è2 .
çIf it is NG, replace the vehicle side harness.

è**2. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, connect the connector to the airbag ECU.
2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.46 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, replace the airbag ECU.
Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Connect the connector to the LH side airbag.
3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.46 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the LH side airbag.
Refer to Page H1-21.

11-9-17 NO.47 (LH SIDE AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Output conditions of diagnosis codes

1.Case of short between wires of the harness between the LH side airbag and the airbag ECU

(2) Checking points

1.Check the harness and connector between the LH side airbag and the airbag ECU for abnormality.

(3) Checking method

è**1. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connector from the LH side airbag.
3.Short both terminals of the connector of the LH side airbag at vehicle side.
4.Install the negative (() terminal of the battery. Erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.47 is outputted.

çIf outputted, proceed to è2.
çIf not outputted, replace the airbag ECU.
Refer to Page H1-34.

è**2. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, release the short between the terminals of the connector of the LH side airbag at vehicle side.
2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.47 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, proceed to è4.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative (() terminal of the battery. Then, install the LH side airbag.
2.After the IG SW has been turned "ON", check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.47 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the LH side airbag.
Refer to Page H1-21.

è**4. Check of harness between LH side airbag and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, disconnect the connector from the airbag ECU.
2.Check the harness between the LH side airbag and the airbag ECU for short circuit.
(1) Connector 1 (SFL') of LH side airbag at vehicle side(Connector 2 (SFL() of LH side airbag at vehicle side

SPECIFIED VALUE: 1MΩ or more (No continuity)

çIf the result is OK, the system has returned to the normal state. Erase the diagnosis code and observe for a while.
çIf it is NG, replace the vehicle side harness.

11-9-18 NO.48 (LH SIDE AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Output conditions of diagnosis codes

1.When open wire took place in the harness between the LH side airbag and the airbag ECU

(2) Checking points

1.Check the harness and connector between the LH side airbag and the airbag ECU for abnormality.

(3) Checking method

è**1. Continuity check between LH side airbag and airbag ECU**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connectors from the airbag ECU and LH side airbag.
3.Check the harness between the LH side airbag and the airbag ECU for open wire.
(1) Connector 1 (SFL') of LH side airbag at vehicle side(Connector A6 (SFL') of airbag ECU at vehicle side
(2) Connector 2 (SFL() of LH side airbag at vehicle side(Connector A5 (SFL() of airbag ECU at vehicle side

SPECIFIED VALUE: Continuity exists

çIf it is OK, go to è2 .
çIf the result is NG, replace the vehicle harness and connector.

è**2. Confirmation of diagnosis code**

1.Short the connectors 1 (SFL') and 2 (SFL() of the LH side airbag at vehicle side.
2.Connect the connector to the airbag ECU.
3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.48 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, replace the airbag ECU.
Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Release the short between the terminals of the LH side airbag at vehicle side.
3.Connect the connector to the LH side airbag.
4.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.48 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the LH side airbag.
Refer to Page H1-21.

11-9-19 DIAGNOSIS CODE NO.51(FRONT PASSENGER SEAT AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.Cases where the harness between the passenger seat airbag and the airbag ECU is shorted with the earth

(2) Checking points

1.Check the harness and connector between the passenger seat airbag and the airbag ECU for abnormality.

(3) Checking method

è**1. Check of harness between passenger seat airbag and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connectors from the airbag ECU and passenger seat airbag.
3.Check the harness between the passenger seat airbag and the airbag ECU for short circuit.
(1) Connector 1 (AP() of passenger seat airbag at vehicle side(Body earth
(2) Connector 2 (AP') of passenger seat airbag at vehicle side(Body earth
SPECIFIED VALUE: 1MΩ (No continuity)

çIf it is OK, go to è2 .
çIf it is NG, replace the vehicle side harness.

è**2. Confirmation of diagnosis code**

1.Connect the connector to the airbag ECU.
2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.51 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, replace the airbag ECU.
Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Connect the connector to the passenger seat airbag.
3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.51 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the passenger seat airbag.
Refer to Page H1-11.

11-9-20 DIAGNOSIS CODE NO.52(FRONT PASSENGER SEAT AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.Cases where the harness between the passenger seat airbag and the airbag ECU is shorted with the power supply

(2) Checking points

1.Check the harness and connector between the passenger seat airbag and the airbag ECU for abnormality.

(3) Checking method

è**1. Check of harness between passenger seat airbag and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Disconnect the connectors from the airbag ECU and passenger seat airbag. Then, install the negative (() terminal of the battery.

3.After the IG SW has been turned "ON", check the harness between the passenger seat airbag and the airbag ECU for short circuit.

(1) Connector 1 (AP() of passenger seat airbag at vehicle side(Body earth

(2) Connector 2 (AP') of passenger seat airbag at vehicle side(Body earth

SPECIFIED VALUE: 0 V (No continuity with 'B)

çIf it is OK, go to è2 .

çIf it is NG, replace the vehicle side harness.

è**2. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, connect the connector to the airbag ECU.

2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.52 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.

çIf outputted, replace the airbag ECU.

Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Connect the connector to the passenger seat airbag.

3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.52 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.

çIf outputted, replace the passenger seat airbag.

Refer to Page H1-11.

11-9-21 DIAGNOSIS CODE NO.53(FRONT PASSENGER SEAT AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.Case of short between wires of the harness between the passenger seat airbag and the airbag ECU

(2) Checking points

1.Check the harness and connector between the passenger seat airbag and the airbag ECU for abnormality.

(3) Checking method

è**1. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Disconnect the connector from the passenger seat airbag. Then, short both terminals of the connector of the passenger seat airbag at vehicle side.

3.Install the negative (() terminal of the battery. Erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.53 is outputted.

çIf outputted, proceed to è2.

çIf not outputted, replace the airbag ECU.

Refer to Page H1-34.

è**2. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, release the short between the terminals of the connector of the passenger seat airbag at vehicle side.

2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.53 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.

çIf outputted, proceed to è4.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative (() terminal of the battery. Then, connect the connector to the passenger seat airbag.

2.After the IG SW has been turned "ON", check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.53 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.

çIf outputted, replace the passenger seat airbag.

Refer to Page H1-11.

è**4. Check of harness between passenger seat airbag and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, disconnect the connector from the airbag ECU. Then, disconnect the shorted terminal of the connector of the airbag ECU at vehicle side.

2.Check the harness between the passenger seat airbag and the airbag ECU for short circuit.

(1) Connector 1 (AP() of passenger seat airbag at vehicle side(Connector 2 (AP') of passenger seat airbag at vehicle side

SPECIFIED VALUE: 1MΩ or more (No continuity)

çIf the result is OK, the system has returned to the normal state. Erase the diagnosis code and observe for a while.

çIf it is NG, replace the vehicle harness.

11-9-22 DIAGNOSIS CODE NO.54(FRONT PASSENGER SEAT AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.When open wire took place in the harness between the passenger seat airbag and the airbag ECU

(2) Checking points

1.Check the harness and connector between the passenger seat airbag and the airbag ECU for abnormality.

(3) Checking method

è**1. Continuity check between passenger seat airbag and airbag ECU**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Disconnect the connectors from the airbag ECU and passenger seat airbag. Then, check the harness between the passenger seat airbag and the airbag ECU for open wire.

(1) Connector 1 (AP() of passenger seat airbag at vehicle side(Connector B2 (AP() of airbag ECU at harness side

(2) Connector 2 (AP') of passenger seat airbag at vehicle side(Connector B1 (AP') of airbag ECU at harness side

SPECIFIED VALUE: Continuity exists

çIf it is OK, go to è2 .

çIf the result is NG, replace the vehicle harness and connector.

è**2. Confirmation of diagnosis code**

1.Short the connectors 1 (AP() and 2 (AP') of the passenger seat airbag at vehicle side. Then, connect the connector to the airbag ECU.

2.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.54 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.

çIf outputted, replace the airbag ECU.

Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Release the short between the terminals of the passenger seat airbag at vehicle side. Then, connect the connector to the passenger seat airbag.

3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.54 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.

çIf outputted, replace the passenger seat airbag.

Refer to Page H1-11.

11-9-23 DIAGNOSIS CODE NO.61(FRONT DRIVER'S PRETENSIONER SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.Cases where the harness between the RH pretensioner mechanism and the airbag ECU is shorted with the earth

(2) Checking points

1.Check the harness and connector between the RH pretensioner mechanism and the airbag ECU for abnormality.

(3) Checking method

è**1. Check of harness between RH pretensioner mechanism and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connectors from the airbag ECU and RH pretensioner mechanism.
3.Check the harness between the RH pretensioner mechanism and the airbag ECU for short circuit.
(1) Connector 1 (PR') of RH pretensioner mechanism at vehicle side(Body earth
(2) Connector 2 (PR() of RH pretensioner mechanism at vehicle side(Body earth
SPECIFIED VALUE: 1MΩ or more (No continuity)

çIf it is OK, go to è2 .
çIf it is NG, replace the vehicle side harness.

è**2. Confirmation of diagnosis code**

1.Connect the connector to the airbag ECU.
2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.61 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, replace the airbag ECU.
Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Connect the connector to the RH pretensioner mechanism.
3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.61 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the RH pretensioner mechanism.
Refer to Page I2-42.

11-9-24 DIAGNOSIS CODE NO.62(FRONT DRIVER'S PRETENSIONER SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.Cases where the harness between the RH or LH pretensioner mechanism and the airbag ECU is shorted with the power supply

(2) Checking points

1.Check the harness and connector between the RH pretensioner mechanism and the airbag ECU for abnormality.

(3) Checking method

è**1. Check of harness between RH pretensioner mechanism and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connectors from the airbag ECU and RH pretensioner mechanism.
3.Install the negative (() terminal of the battery. With the IG SW turned "ON", check the harness between the RH pretensioner mechanism and the airbag ECU for short circuit.
(1) Connector 1 (PR') of RH pretensioner mechanism at vehicle side(Body earth
(2) Connector 2 (PR() of RH pretensioner mechanism at vehicle side(Body earth
SPECIFIED VALUE: 0 V (No continuity with 'B)

çIf it is OK, go to è2 .
çIf it is NG, replace the vehicle side harness.

è**2. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, connect the connector to the airbag ECU.
2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.62 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, replace the airbag ECU.
Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Connect the connector to the RH pretensioner mechanism.
3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.62 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the RH pretensioner mechanism.
Refer to Page I2-42.

11-9-25 DIAGNOSIS CODE NO.63(FRONT DRIVER'S PRETENSIONER SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.Case of short between wires of the harness between the RH pretensioner mechanism squib and the airbag ECU

(2) Checking points

1.Check the harness and connector between the RH pretensioner mechanism and the airbag ECU for abnormality.

(3) Checking method

è**1. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connector from the RH pretensioner mechanism.
3.Short both terminals of the connector of the RH pretensioner mechanism at vehicle side.
4.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.63 is outputted.

çIf outputted, proceed to è2.
çIf not outputted, replace the airbag ECU.
Refer to Page H1-34.

è**2. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, release the short between the terminals of the connector of the RH pretensioner mechanism at vehicle side.
2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.63 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, proceed to è4.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, install the negative (() terminal of the battery. Then, connect the connector to the RH pretensioner mechanism.
2.After the IG SW has been turned "ON", check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.63 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the RH pretensioner mechanism.
Refer to Page I2-42.

è**4. Check of harness between RH pretensioner mechanism and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, disconnect the connector from the airbag ECU.

2.Check the harness between the RH pretensioner mechanism and the airbag ECU for short circuit.

(1) Connector 1 (PR') of RH pretensioner mechanism at vehicle side(Connector 2 (PR() of RH pretensioner mechanism at vehicle side

SPECIFIED VALUE: 1MΩ or more (No continuity)

çIf the result is OK, the system has returned to the normal state. Erase the diagnosis code and observe for a while.

çIf it is NG, replace the vehicle side harness.

11-9-26 DIAGNOSIS CODE NO.64(FRONT DRIVER'S PRETENSIONER SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.When open wire took place in the harness between the RH pretensioner mechanism and the airbag ECU

(2) Checking points

1.Check the harness and connector between the RH pretensioner mechanism and the airbag ECU for abnormality.

(3) Checking method

è**1. Continuity check of harness between RH pretensioner mechanism and airbag ECU**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Disconnect the connectors from the airbag ECU and RH pretensioner mechanism.

3.Check the harness between the RH pretensioner mechanism and the airbag ECU for open wire.

Vehicles not equipped with curtain shield airbag & side airbag	Connector 1 (PR+) of RH pretensioner mechanism at vehicle side −Connector A5 (PR+) of airbag ECU at harness side
	Connector 2 (PR−) of RH pretensioner mechanism at vehicle side −Connector A6 (PR−) of airbag ECU at harness side
Vehicles equipped with curtain shield airbag & side airbag	Connector 1 (PR+) of RH pretensioner mechanism at vehicle side −Connector C5 (PR+) of airbag ECU at harness side
	Connector 2 (PR−) of RH pretensioner mechanism at vehicle side −Connector C6 (PR−) of airbag ECU at harness side

SPECIFIED VALUE: Continuity exists

çIf it is OK, go to è2 .

çIf the result is NG, replace the vehicle harness and connector.

è**2. Confirmation of diagnosis code**

1.Short the connectors 1 (PR') and 2 (PR() of the RH pretensioner mechanism at vehicle side.

2.Connect the connector to the airbag ECU.

3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.64 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.

çIf outputted, replace the airbag ECU.

Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Release the short between the terminals of the RH pretensioner mechanism at vehicle side.

3.Connect the connector to the RH pretensioner mechanism.

4.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.64 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.

çIf outputted, replace the RH pretensioner mechanism.

Refer to Page I2-42.

11-9-27 DIAGNOSIS CODE NO.71(FRONT PASSENGER'S PRETENSIONER SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.Cases where the harness between the LH pretensioner mechanism and the airbag ECU is shorted with the earth

(2) Checking points

1.Check the harness and connector between the LH pretensioner mechanism and the airbag ECU for abnormality.

(3) Checking method

è**1. Check of harness between LH pretensioner mechanism and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Disconnect the connectors from the airbag ECU and LH pretensioner mechanism.

3.Check the harness between the LH pretensioner mechanism and the airbag ECU for short circuit.

(1) Connector 1 (PL') of LH pretensioner mechanism at vehicle side(Body earth

(2) Connector 2 (PL() of LH pretensioner mechanism at vehicle side(Body earth

SPECIFIED VALUE: 1MΩ or more (No continuity)

çIf it is OK, go to è2 .

çIf it is NG, replace the vehicle side harness.

è**2. Confirmation of diagnosis code**

1.Connect the connector to the airbag ECU.

2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.71 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.

çIf outputted, replace the airbag ECU.

Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Connect the connector to the LH pretensioner mechanism.

3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.71 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.

çIf outputted, replace the LH pretensioner mechanism.

Refer to Page I2-42.

11-9-28 DIAGNOSIS CODE NO.72(FRONT PASSENGER'S PRETENSIONER SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.Cases where the harness between the LH pretensioner mechanism and the airbag ECU is shorted with the power supply

(2) Checking points

1.Check the harness and connector between the LH pretensioner mechanism and the airbag ECU for abnormality.

(3) Checking method

è**1. Check of harness between LH pretensioner mechanism and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connectors from the airbag ECU and LH pretensioner mechanism.
3.Install the negative (() terminal of the battery. With the IG SW turned "ON", check the harness between the LH pretensioner mechanism and the airbag ECU for short circuit.
(1) Connector 1 (PL') of LH pretensioner mechanism at vehicle side(Body earth
(2) Connector 2 (PL() of LH pretensioner mechanism at vehicle side(Body earth
SPECIFIED VALUE: 0 V (No continuity with 'B)

çIf it is OK, go to è2 .
çIf it is NG, replace the vehicle side harness.

è**2. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Connect the connector to the airbag ECU.
3.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.72 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, replace the airbag ECU.
Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Connect the connector to the LH pretensioner mechanism.
3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.72 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the LH pretensioner mechanism.
Refer to Page I2-42.

11-9-29 DIAGNOSIS CODE NO.73(FRONT PASSENGER'S PRETENSIONER SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.Case of short between wires of the harness between the LH pretensioner mechanism squib and the airbag ECU

(2) Checking points

1.Check the harness and connector between the RH pretensioner mechanism and the airbag ECU for abnormality.

(3) Checking method

è**1. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connector from the LH pretensioner mechanism.
3.Short both terminals of the connector of the LH pretensioner mechanism at vehicle side.
4.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.73 is outputted.

çIf outputted, proceed to è2.
çIf not outputted, replace the airbag ECU.
Refer to Page H1-34.

è**2. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, release the short between the terminals of the connector of the LH pretensioner mechanism at vehicle side.
2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.73 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, proceed to è4.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, install the negative (() terminal of the battery. Then, connect the connector to the LH pretensioner mechanism.
2.After the IG SW has been turned "ON", check the diagnosis code.
SPECIFIED VALUE: Diagnosis code No.73 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the LH pretensioner mechanism.
Refer to Page I2-42.

è**4. Check of harness between LH pretensioner mechanism and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, disconnect the connector from the airbag ECU.

2.Check the harness between the LH pretensioner mechanism and the airbag ECU for short circuit.

(1) Connector 1 (PL') of LH pretensioner mechanism at vehicle side(Connector 2 (PL() of LH pretensioner mechanism at vehicle side

SPECIFIED VALUE: 1MΩ or more (No continuity)

çIf the result is OK, the system has returned to the normal state. Erase the diagnosis code and observe for a while.

çIf it is NG, replace the vehicle side harness.

11-9-30 DIAGNOSIS CODE NO.74(FRONT PASSENGER'S PRETENSIONER SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.When open wire took place in the harness between the LH pretensioner mechanism and the airbag ECU

(2) Checking points

1.Check the harness and connector between the LH pretensioner mechanism and the airbag ECU for abnormality.

(3) Checking method

è**1. Continuity check between LH pretensioner mechanism and airbag ECU**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Disconnect the connectors from the airbag ECU and LH pretensioner mechanism.

3.Check the harness between the LH pretensioner mechanism and the airbag ECU for open wire.

Vehicles not equipped with curtain shield airbag & side airbag	Connector 1 (PL+) of LH pretensioner mechanism at vehicle side −Connector A8 (PL+) of airbag ECU at harness side
	Connector 2 (PL−) of LH pretensioner mechanism at vehicle side −Connector A7 (PL−) of airbag ECU at harness side
Vehicles equipped with curtain shield airbag & side airbag	Connector 1 (PL+) of LH pretensioner mechanism at vehicle side −Connector A2 (PL+) of airbag ECU at harness side
	Connector 2 (PL−) of LH pretensioner mechanism at vehicle side −Connector A1 (PL−) of airbag ECU at harness side

SPECIFIED VALUE: Continuity exists

çIf it is OK, go to è2 .

çIf the result is NG, replace the vehicle harness and connector.

è**2. Confirmation of diagnosis code**

1.Short the connectors 1 (PL') and 2 (PL() of the LH pretensioner mechanism at vehicle side.

2.Connect the connector to the airbag ECU.

3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.74 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.

çIf outputted, replace the airbag ECU.

Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

2.Release the short between the terminals of the LH pretensioner mechanism at vehicle side.

3.Connect the connector to the LH pretensioner mechanism.

4.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.74 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.

çIf outputted, replace the LH pretensioner mechanism.

Refer to Page I2-42.

11-9-31 NO.81 (RH CURTAIN SHIELD AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.Cases where the harness between the RH curtain shield airbag and the airbag ECU is shorted with the earth

(2) Checking points

1.Check the harness and connector between the RH curtain shield airbag and the airbag ECU for abnormality.

(3) Checking method

è**1. Check of harness between RH curtain shield airbag and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connectors from the airbag ECU and RH curtain shield airbag.
3.Check the harness between the RH curtain shield airbag and the airbag ECU for short circuit.
(1) Connector 1 (ICR') of RH curtain shield airbag at vehicle side(Body earth
(2) Connector 2 (ICR() of RH curtain shield airbag at vehicle side(Body earth
SPECIFIED VALUE: 1MΩ (No continuity)

çIf it is OK, go to è2 .
çIf it is NG, repair or replace the vehicle side harness.

è**2. Confirmation of diagnosis code**

1.Connect the connector to the airbag ECU.
2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.81 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, replace the airbag ECU.
Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Connect the connector to the RH curtain shield airbag.
3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.81 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the RH curtain shield airbag.
Refer to Page H1-28.

11-9-32 NO.82 (RH CURTAIN SHIELD AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.Cases where the harness between the RH curtain shield airbag and the airbag ECU is shorted with the power supply

(2) Checking points

1.Check the harness and connector between the RH curtain shield airbag and the airbag ECU for abnormality.

(3) Checking method

è**1. Check of harness between RH curtain shield airbag and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connectors from the airbag ECU and RH curtain shield airbag.
3.Connect the negative (() terminal of the battery.
4.After the IG SW has been turned "ON", check the harness between the RH curtain shield airbag and the airbag ECU for short circuit.
(1) Connector 1 (ICR') of RH curtain shield airbag at vehicle side(Body earth
(2) Connector 2 (ICR() of RH curtain shield airbag at vehicle side(Body earth
SPECIFIED VALUE: 0 V (No continuity with 'B)

çIf it is OK, go to è2 .
çIf it is NG, replace the vehicle side harness.

è**2. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, connect the connector to the airbag ECU.
2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.82 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, replace the airbag ECU.
Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Connect the connector to the RH curtain shield airbag.
3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.82 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the RH curtain shield airbag.
Refer to Page H1-28.

11-9-33 NO.83 (RH CURTAIN SHIELD AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.Case of short between wires of the harness between the RH curtain shield airbag and the airbag ECU

(2) Checking points

1.Check the harness and connector between the RH curtain shield airbag and the airbag ECU for abnormality.

(3) Checking method

è**1. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connector from the RH curtain shield airbag.
3.Short both terminals of the connector of the RH curtain shield airbag at vehicle side.
4.Install the negative (() terminal of the battery. Erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.83 is outputted.

çIf outputted, proceed to è2.
çIf not outputted, replace the airbag ECU.
Refer to Page H1-34.

è**2. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, release the short between the terminals of the connector of the RH curtain shield airbag at vehicle side.
2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.83 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, proceed to è4.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative (() terminal of the battery. Then, install the RH curtain shield airbag.
2.After the IG SW has been turned "ON", check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.83 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the RH curtain shield airbag.
Refer to Page H1-28.

è**4. Check of harness between RH curtain shield airbag and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, disconnect the connector from the airbag ECU.

2.Check the harness between the RH curtain shield airbag and the airbag ECU for short circuit.

(1) Connector 1 (ICR') of RH curtain shield airbag at vehicle side(Connector 2 (ICR() of RH curtain shield airbag at vehicle side

SPECIFIED VALUE: 1MΩ or more (No continuity)

çIf the result is OK, the system has returned to the normal state. Erase the diagnosis code and observe for a while.

çIf the result is NG, repair or replace the vehicle side harness.

11-9-34 NO.84 (RH CURTAIN SHIELD AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.When open wire took place in the harness between the RH curtain shield airbag and the airbag ECU

(2) Checking points

1.Check the harness and connector between the RH curtain shield airbag and the airbag ECU for abnormality.

(3) Checking method

è**1. Continuity check of harness between RH curtain shield airbag and airbag ECU**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connectors from the airbag ECU and RH curtain shield airbag.
3.Check the harness between the RH curtain shield airbag and the airbag ECU for open wire.
(1) Connector 1 (ICR') of RH curtain shield airbag at vehicle side(Connector C4 (ICR') of airbag ECU at vehicle side
(2) Connector 2 (ICR() of RH curtain shield airbag at vehicle side(Connector C3 (ICR() of airbag ECU at vehicle side

SPECIFIED VALUE: 4.6+ or less (Continuity exists.)

çIf it is OK, go to è2.
çIf the result is NG, repair or replace the vehicle harness and connector.

è**2. Confirmation of diagnosis code**

1.Short the connectors 1 (ICR') and 2 (ICR() of the RH curtain shield airbag at vehicle side.
2.Connect the connector to the airbag ECU.
3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.84 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, replace the airbag ECU.
Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Release the short between the terminals of the RH curtain shield airbag at vehicle side.
3.Connect the connector to the RH curtain shield airbag.
4.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.84 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the RH curtain shield airbag.
Refer to Page H1-28.

11-9-35 NO.85 (LH CURTAIN SHIELD AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.Cases where the harness between the LH curtain shield airbag and the airbag ECU is shorted with the earth

(2) Checking points

1.Check the harness and connector between the LH curtain shield airbag and the airbag ECU for abnormality.

(3) Checking method

è**1. Check of harness between LH curtain shield airbag and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connectors from the airbag ECU and LH curtain shield airbag.
3.Check the harness between the LH curtain shield airbag and the airbag ECU for short circuit.
(1) Connector 1 (ICL') of LH curtain shield airbag at vehicle side(Body earth
(2) Connector 2 (ICL() of LH curtain shield airbag at vehicle side(Body earth
SPECIFIED VALUE: 1MΩ (No continuity)

çIf it is OK, go to è2.
çIf it is NG, repair or replace the vehicle side harness.

è**2. Confirmation of diagnosis codes**

1.Connect the connector to the airbag ECU.
2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.85 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, replace the airbag ECU.
Refer to Page H1-34.

è**3. Confirmation of diagnosis codes**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Connect the connector to the LH curtain shield airbag.
3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.85 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the LH curtain shield airbag.
Refer to Page H1-28.

11-9-36 NO.86 (LH CURTAIN SHIELD AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.Cases where the harness between the LH curtain shield airbag and the airbag ECU is shorted with the power supply

(2) Checking points

1.Check the harness and connector between the LH curtain shield airbag and the airbag ECU for abnormality.

(3) Checking method

è**1. Check of harness between LH curtain shield airbag and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connectors from the airbag ECU and LH curtain shield airbag.
3.Connect the negative (() terminal of the battery.
4.After the IG SW has been turned "ON", check the harness between the LH curtain shield airbag and the airbag ECU for short circuit.
(1) Connector 1 (ICL') of LH curtain shield airbag at vehicle side(Body earth
(2) Connector 2 (ICL() of LH curtain shield airbag at vehicle side(Body earth
SPECIFIED VALUE: 0 V (No continuity with 'B)

çIf it is OK, go to è2 .
çIf it is NG, repair or replace the vehicle side harness.

è**2. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, connect the connector to the airbag ECU.
2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.86 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, replace the airbag ECU.
Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Connect the connector to the LH curtain shield airbag.
3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.
SPECIFIED VALUE: Diagnosis code No.86 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the LH curtain shield airbag.
Refer to Page H1-28.

11-9-37 NO.87 (LH CURTAIN SHIELD AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.Case of short between wires of the harness between the LH curtain shield airbag and the airbag ECU

(2) Checking points

1.Check the harness and connector between the LH curtain shield airbag and the airbag ECU for abnormality.

(3) Checking method

è**1. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connector from the LH curtain shield airbag.
3.Short both terminals of the connector of the LH curtain shield airbag at vehicle side.
4.Install the negative (() terminal of the battery. Erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.87 is outputted.

çIf outputted, proceed to è2.
çIf not outputted, replace the airbag ECU.
Refer to Page H1-34.

è**2. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, release the short between the terminals of the connector of the LH curtain shield airbag at vehicle side.
2.After the IG SW has been turned "ON", erase the diagnosis code. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.87 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, proceed to è4.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative (() terminal of the battery. Then, install the LH curtain shield airbag.
2.After the IG SW has been turned "ON", check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.87 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the LH curtain shield airbag.
Refer to Page H1-28.

è**4. Check of harness between LH curtain shield airbag and airbag ECU for short circuit**

1.After the IG SW has been set to "LOCK" position, disconnect the connector from the airbag ECU.

2.Check the harness between the LH curtain shield airbag and the airbag ECU for short circuit.

(1) Connector 1 (ICL') of LH curtain shield airbag at vehicle side(Connector 2 (ICL() of LH curtain shield airbag at vehicle side

SPECIFIED VALUE: 1MΩ or more (No continuity)

çIf the result is OK, the system has returned to the normal state. Erase the diagnosis code and observe for a while.

çIf the result is NG, repair or replace the vehicle side harness.

11-9-38 NO.88 (LH CURTAIN SHIELD AIRBAG SQUIB CIRCUIT SYSTEM)

(1) Diagnostic code output conditions

1.When open wire took place in the harness between the LH curtain shield airbag and the airbag ECU

(2) Checking points

1.Check the harness and connector between the LH curtain shield airbag and the airbag ECU for abnormality.

(3) Checking method

è**1. Continuity check of harness between LH curtain shield airbag and airbag ECU**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connectors from the airbag ECU and LH curtain shield airbag.
3.Check the harness between the LH curtain shield airbag and the airbag ECU for open wire.
(1) Connector 1 (ICL') of LH curtain shield airbag at vehicle side(Connector A3 (ICL') of airbag ECU at vehicle side
(2) Connector 2 (ICL() of LH curtain shield airbag at vehicle side(Connector A4 (ICL() of airbag ECU at vehicle side

SPECIFIED VALUE: Continuity exists

çIf it is OK, go to è2 .
çIf the result is NG, repair or replace the vehicle harness and connector.

è**2. Confirmation of diagnosis code**

1.Short the connectors 1 (ICL') and 2 (ICL() of the LH curtain shield airbag at vehicle side.
2.Connect the connector to the airbag ECU.
3.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.88 is not outputted. (Other codes may be outputted.)

çIf not outputted, proceed to è3.
çIf outputted, replace the airbag ECU.
Refer to Page H1-34.

è**3. Confirmation of diagnosis code**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Release the short between the terminals of the LH curtain shield airbag at vehicle side.
3.Connect the connector to the LH curtain shield airbag.
4.Install the negative (() terminal of the battery. After the IG SW has been turned "ON", erase the diagnosis codes. Then, check the diagnosis code again.

SPECIFIED VALUE: Diagnosis code No.88 is not outputted. (Other codes may be outputted.)

çIf not outputted, the system has returned to the normal state. Erase the diagnosis codes and observe for a while.
çIf outputted, replace the LH curtain shield airbag.
Refer to Page H1-28.

11-10 TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA

11-10-1 NO DIAGNOSIS CODE IS INDICATED

(1) Checking points

1.Open wire of harness and connector between airbag ECU and DLC
2.Abnormality of airbag ECU main body

(2) Checking method

è**1. Continuity check between airbag ECU and DLC**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connector from the airbag ECU.
3.Check the harness between the airbag ECU and the DLC for open wire.
(1) Connector B10 (TC) of airbag ECU at harness side(DLC4 (ECU-T)
(2) Connector B17 (SIO) of airbag ECU at harness side(DLC10 (SIO)
SPECIFIED VALUE: Continuity exists

çIf it is OK, go to è2 .
çIf the result is NG, replace the harness and connector.

è**2. Continuity check between DLC and earth**

1.Check the harness between the DLC and the earth for open wire.
(1) DLC13 (E)(Body earth
SPECIFIED VALUE: Continuity exists

çIf the result is OK, connect the connector to the airbag ECU and observe for a while.
çIf the result is NG, replace the harness and connector.

11-10-2 THE DIAGNOSIS CODE IS ALWAYS INDICATED

(1) Checking points

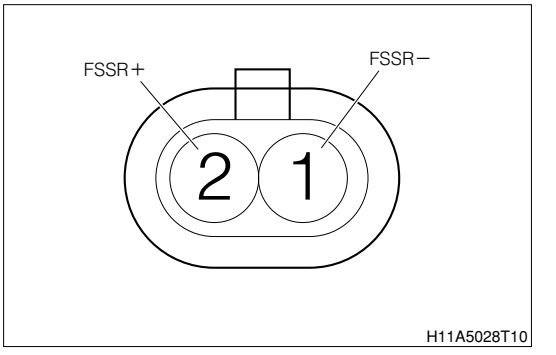
1.Short circuit of harness between airbag ECU and DLC

(2) Checking method

è**1. Check of harness between airbag ECU and DLC for short circuit**

1.After the IG SW has been set to "LOCK" position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.
2.Disconnect the connector from the airbag ECU.
3.Check the harness between the airbag ECU and the DLC for short circuit.
(1) Connector B10 (TC) of airbag ECU at harness side(DLC4 (ECU-T)
çIf the result is OK, replace the airbag ECU.
Refer to Page H1-34.

çIf the result is NG, replace the harness and connector.



11-11 UNIT CHECK

11-11-1 FRONT AIRBAG SENSOR

1.Measure the resistance between the terminals 1 (FSSR() and 2 (FSSR') of the front airbag sensor.
SPECIFIED VALUE: 820&82+ (at 20°C)
CAUTION
- Be sure to perform the check if there is the possibility that the front section of the vehicle has received an impact.

I1 BODY

BODY ---------- I1 - 1
BASIC CHECK AND ADJUSTMENT---- I1 - 1
FRONT DOOR(TRIM-RELATED) ---------- I1 - 8
DISASSEMBLING AND
ASSEMBLING ---------- I1 - 8
FRONT DOOR(GLASS-RELATED) ------- I1 - 11
DISASSEMBLING AND
ASSEMBLING ---------- I1 - 11
FRONT DOOR(LOCK-RELATED) -------- I1 - 13
DISASSEMBLING AND
ASSEMBLING ---------- I1 - 13
REAR DOOR(TRIM-RELATED) ---------- I1 - 15
DISASSEMBLING AND
ASSEMBLING ---------- I1 - 15
REAR DOOR(GLASS-RELATED)--------- I1 - 18
DISASSEMBLING AND
ASSEMBLING ---------- I1 - 18
REAR DOOR(LOCK-RELATED) ---------- I1 - 20
DISASSEMBLING AND
ASSEMBLING ---------- I1 - 20
BACK DOOR ---------- I1 - 22
DISASSEMBLING AND
ASSEMBLING ---------- I1 - 22
FENDER ---------- I1 - 24
REMOVAL AND INSTALLATION ------- I1 - 24
HOOD LOCK CONTROL CABLE --------- I1 - 27
REMOVAL AND INSTALLATION(RHD VEHI-
CLES) ---------- I1 - 27
REMOVAL AND INSTALLATION(LHD VEHI-
CLES) ---------- I1 - 29
FUEL LID CONTROL CABLE ---------- I1 - 32
REMOVAL AND INSTALLATION ------- I1 - 32
REMOVAL AND INSTALLATION ------- I1 - 35
FUEL FILLER OPENING LID ---------- I1 - 39
REMOVAL AND INSTALLATION ------- I1 - 39

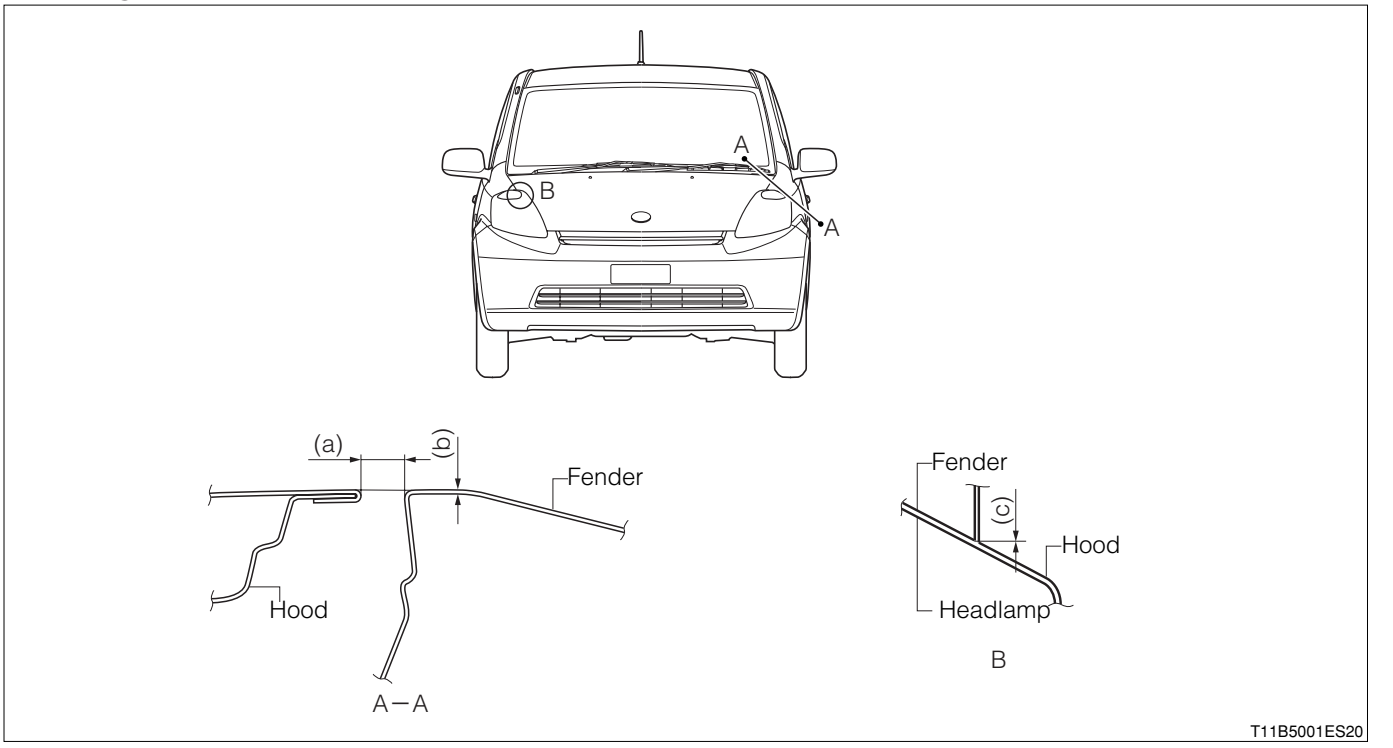
1 BODY

1-1 BASIC CHECK AND ADJUSTMENT

1-1-1 FITTING ADJUSTMENT

(1) hood

① Fitting dimensions



FITTING DIMENSIONS OF HOOD PANEL

Measuring point		Specified gap (a)	Difference in height (b)	Flatness (c)	Difference between right and left	Deviation value
A — A	Hood × Front fender	3.5 ± 1.5	0 ± 1.5	—	Not to exceed 1.5	Not to exceed 1.5
B	Hood end	—	—	0 ± 1.5	Not to exceed 1.5	—

Unit : mm

② Fitting adjustment

a. Adjustment of the hood in longitudinal direction, and in lateral direction at the rear end

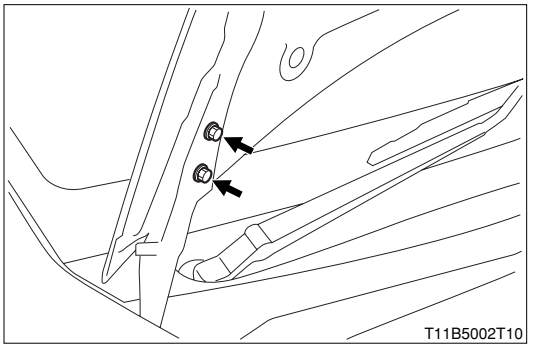
1.Loosen the hood hinge bolts to adjust.

CAUTION

- Since the centering bolt is used, adjustment must be done only after the centering bolt is replaced with the supplied bolt.

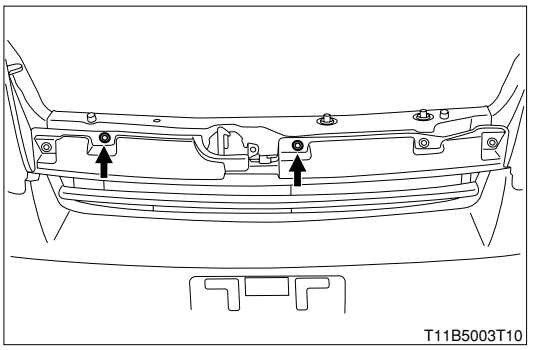
NOTE

- Part number of bolt:91631-60614-000



b. Adjustment of the hood in vertical and lateral direction at the front end

1.Remove two clips on the front bumper cover and pull the hood lock area of the front bumper cover to provide a gap for the tool.



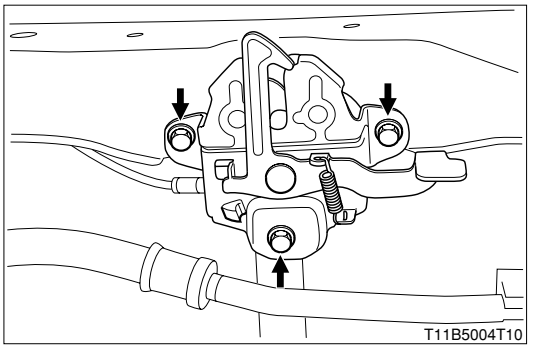
2.Loosen the hood lock bolt prior to adjustment.

CAUTION

- In cases where the centering bolt has been used, replace it with a bolt supplied for adjustment use in advance.

NOTE

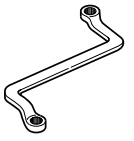
- Part number of bolt:91511-G0612-000



(2) Front & rear door

① Articles to be prepared

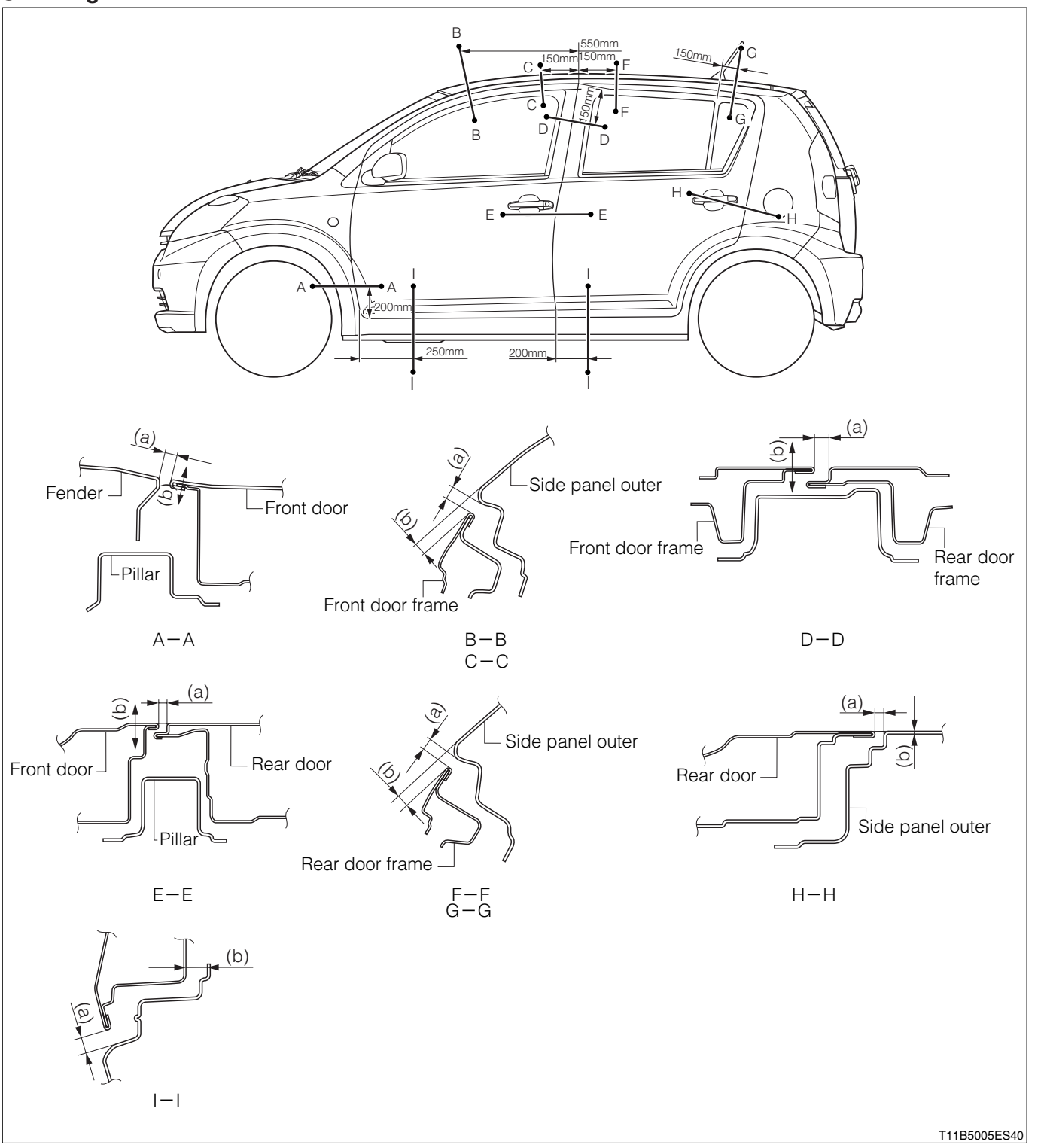
SST

Shape	Part No.	Part name
	09812-00010-000 (09812-22010-000)	Wrench door hinge set bolt

Tool

Long TORX® wrench T40

② Fitting dimensions



Fitting dimensions of door

Measuring point		Specified gap (a)	Difference in height (b)	Difference between right and left	Deviation value
A – A	Front door × Front fender	4.2 ± 1.2	0 ± 1.5	–	Not to exceed 1.5
B – B	Front door × Side panel	4.8 ± 1.5	−3.7 ± 1.5	–	Not to exceed 1.5
C – C	Front door × Side panel	4.8 ± 1.5	−3.8 ± 1.5	–	Not to exceed 1.5
D – D	Front door × Rear door	4.2 ± 1.2	0 ± 1.5	Not to exceed 1.5	Not to exceed 1.5
E – E	Front door × Rear door	4.2 ± 1.2	0 ± 1.5	–	Not to exceed 1.5
F – F	Rear door × Side panel	4.8 ± 1.5	−3.5±1.5 (Side panel reference)	–	Not to exceed 1.5
G – G	Rear door × Side panel	4.8 ± 1.5	−3.1±1.5 (Side panel reference)	–	Not to exceed 1.5
H – H	Rear door × Quarter panel	4.2 ± 1.2	0±1.5 (Rear door reference)	–	Not to exceed 1.5
I – I	Front/Rear door × Rocker panel	6.0 ± 1.5	–	–	Not to exceed 2.0

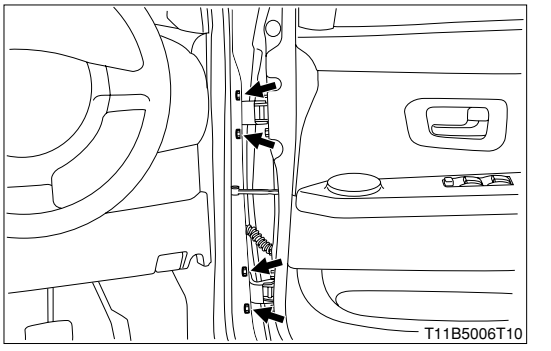
Unit : mm

③ **Fitting adjustment (Front door)**

c. Adjustment of the door at the rear end, and in vertical and lateral directions

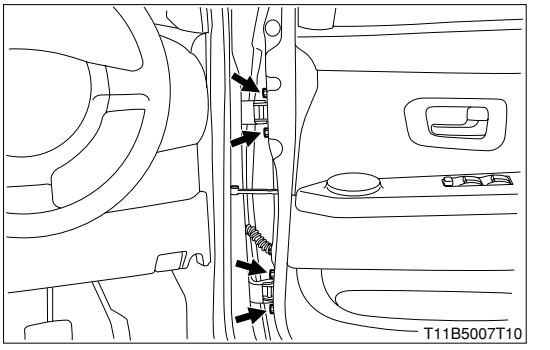
1.Loosen the bolt on the pillar side with the SST and perform adjustment.

SST: 09812-00010-000



d. Adjustment of the door in vertical direction, and in lateral direction at the front end

1.Loosen the bolt on the door side to adjust.

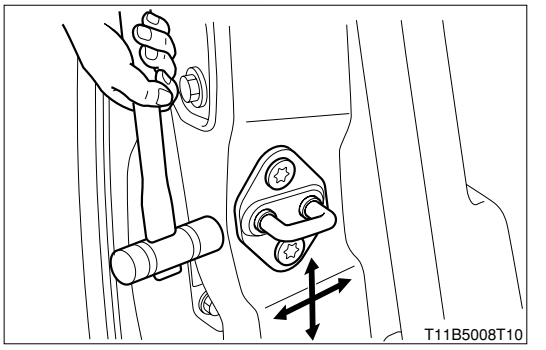


e. Adjustment of the door in longitudinal and lateral directions and the front door lock striker

1.Loosen the striker mounting screw until the striker gets loose.

TOOL: Long TORX® wrench T40

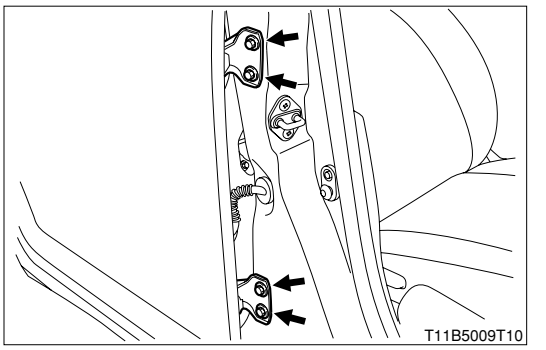
2.Adjust the striker by tapping lightly.



④ **Fitting adjustment (Rear door)**

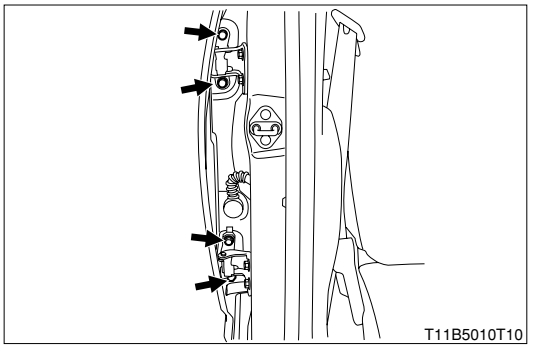
f. Adjustment of the door at the rear end, and in vertical and lateral directions

1.Loosen the bolt on the pillar side to adjust.



g. Adjustment of the door in vertical direction, and lateral direction at the door front end

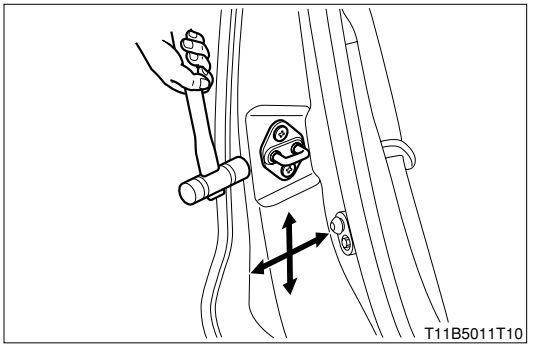
1.Loosen the bolt on the door side to adjust.



h. Adjustment of the door in longitudinal and lateral directions and the rear door lock striker

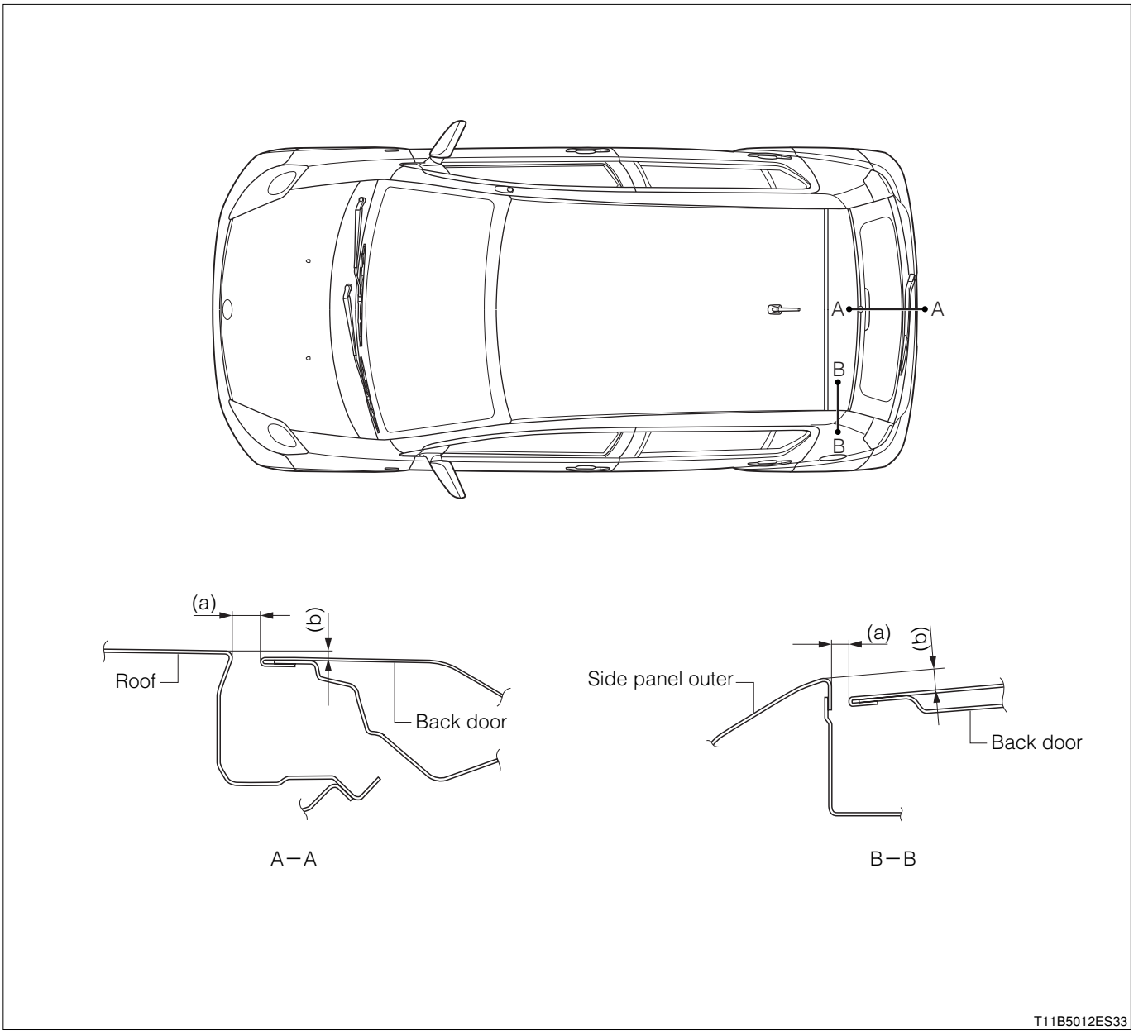
1.Loosen the striker mounting screw until the striker gets loose.
TOOL: Long TORX® wrench T40

2.Adjust the striker by tapping lightly.



(3) Back door

① Fitting dimensions



Fitting dimensions of back door

Measuring point		Specified gap (a)	Difference in height (b)	Difference between right and left	Deviation value
A − A	Back door ✕ Roof	7.5 ± 1.5	−1.0 ± 1.6	−	Not to exceed 1.5
B − B	Back door ✕ Quarter panel	5.0 ± 1.5	9.8 ± 1.5	Not to exceed 1.5	−

Unit : mm

② **Fitting adjustment**

i. Adjustment of the back door in vertical and lateral directions at the upper end

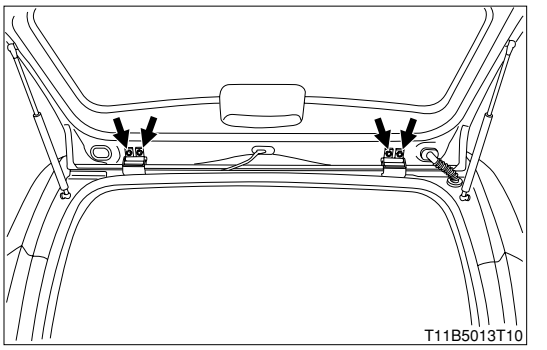
1.Loosen the hinge mounting bolt on the door side before the adjustment.

CAUTION

- Since the centering bolt is used, adjustment must be done only after the centering bolt is replaced with the supplied bolt.

NOTE

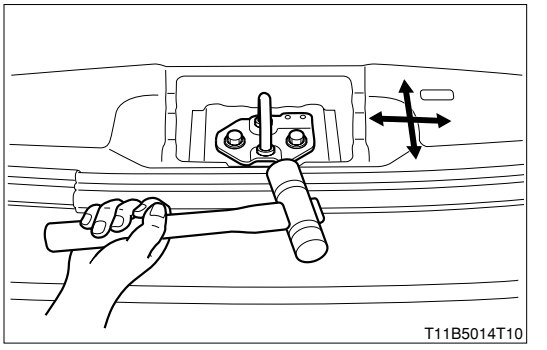
- Part number of bolt:91651-40816-000



j. Adjustment of the back door in longitudinal direction and the back door lock striker

1.Loosen the striker mounting screw until the striker gets loose.

2.Adjust the striker by tapping lightly.



1-1-2 CHECK THE FRAME AND THE BODY FOR ANY LOOSENING AND DAMAGE

1.Check the conditions of the tightening bolts, nuts and rivets for the frames and cross members with a spanner.

SPECIFIED VALUE: There shall be no loosening.

2.Check the body, frame and cross member for damage such as rust, crack, deformation, and peel-off of welding.

SPECIFIED VALUE: There shall be no damage, such as rust, crack, deformation, and peel-off of welding.

3.Move the door by hand to ensure there are no loose hinges due to excessive play.

SPECIFIED VALUE: There shall be no loosening.

2 FRONT DOOR(TRIM-RELATED)

2-1 DISASSEMBLING AND ASSEMBLING

2-1-1 ARTICLES TO BE PREPARED

Tool

Clip remover

Lubricant,adhesive,others

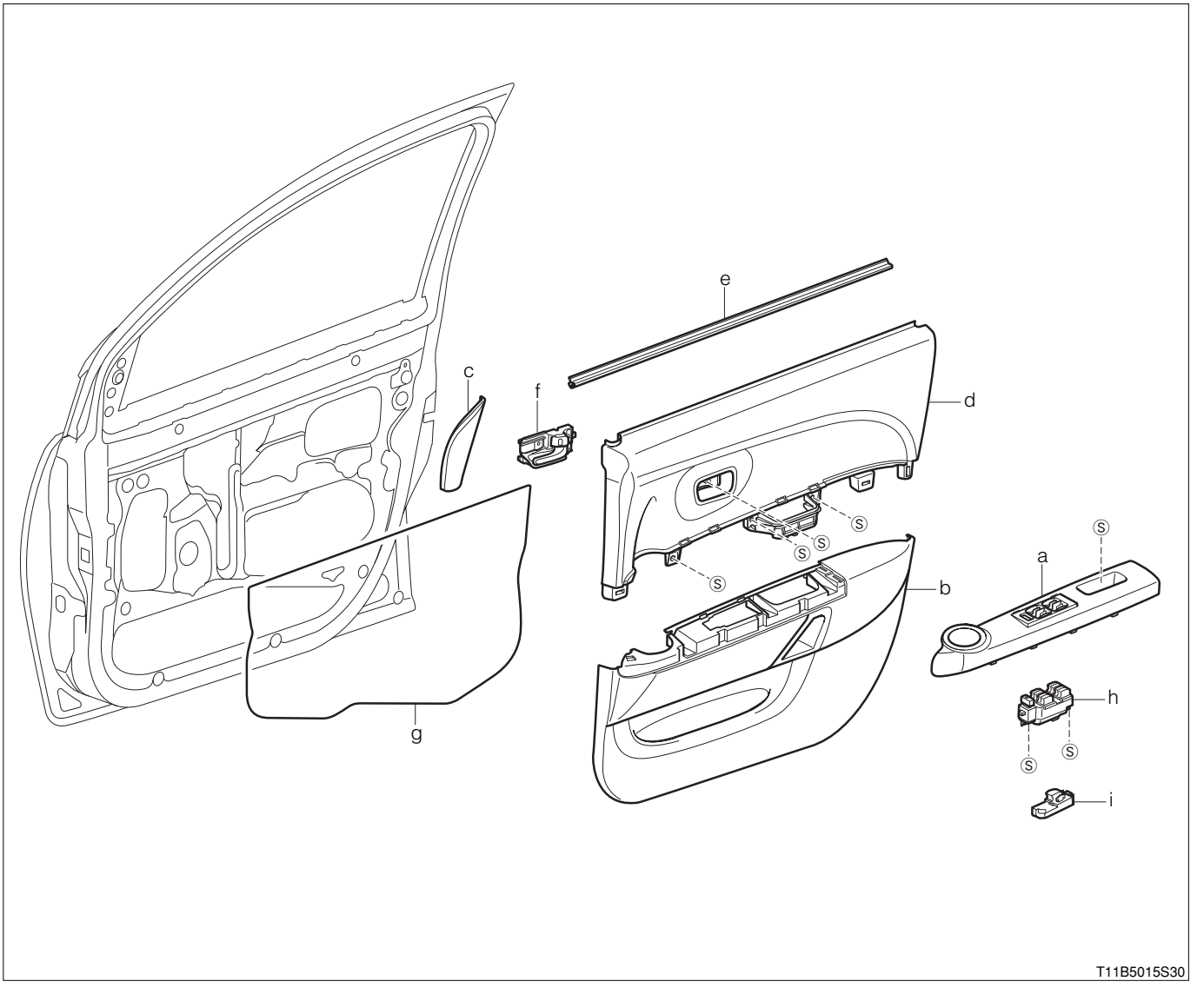
Butyl tape

2-1-2 OPERATION BEFORE DISASSEMBLY

1.Disconnect the battery negative (−) terminal.

2-1-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Components



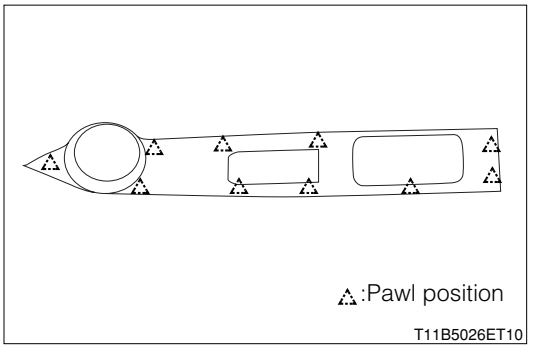
(2) Disassembling and assembling procedures

- ▼ 1 a Panel, front door armrest base, upper RH/LH
- ▼ 2 b Board Ay, front door trim, lower RH/LH
- ▼ 3 c Garnish, front door lower frame bracket, RH/LH
- ▼ 4 d Board Ay, front door trim, upper RH/LH
- 5 e Weather-strip, front door glass, inner RH/LH
- ▲ 6 f Handle S/A, front door inside RH/LH
- ▲ 7 g Cover, front door service hole, RH
- 8 h Master switch Ay, power window regulator (Driver's seat side)
- 9 i Switch Ay, power window regulator (Passenger seat side)

2-1-4 POINTS OF DISASSEMBLY

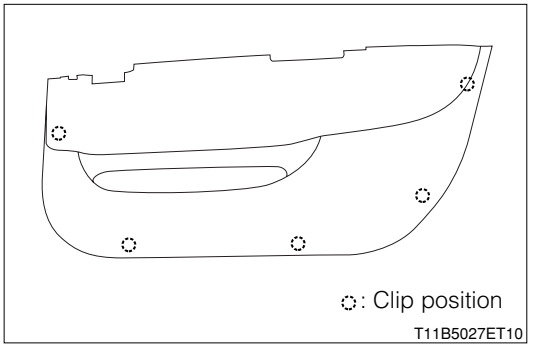
(1) Panel, front door armrest base, upper RH/LH

1.Remove 1 screw.
2.Disengage and remove the tabs.



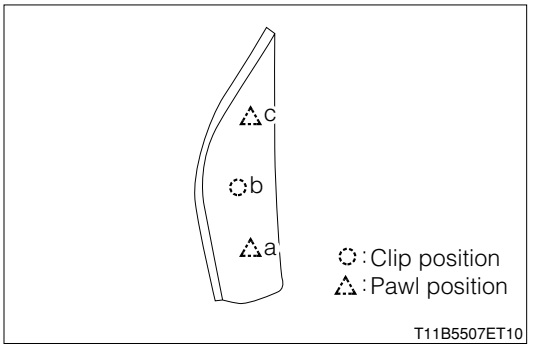
(2) Board Ay, front door trim, lower RH/LH

1.Remove the screws (3 locations).
2.Disengage and remove the pawls and clips.



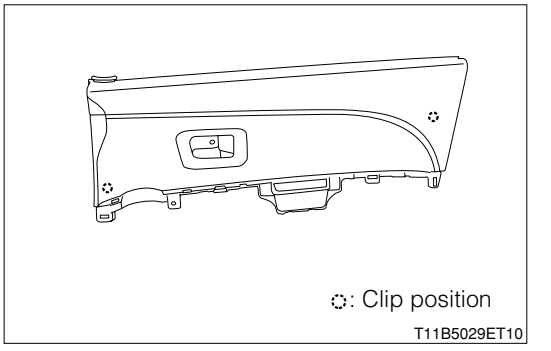
(3) Garnish, front door lower frame bracket, RH/LH

1.Disengage the pawl (a) and clip (b).
2.Slightly lift the garnish to the upward of the vehicle, and remove it by disengaging the pawl (c).



(4) Board Ay, front door trim, upper RH/LH

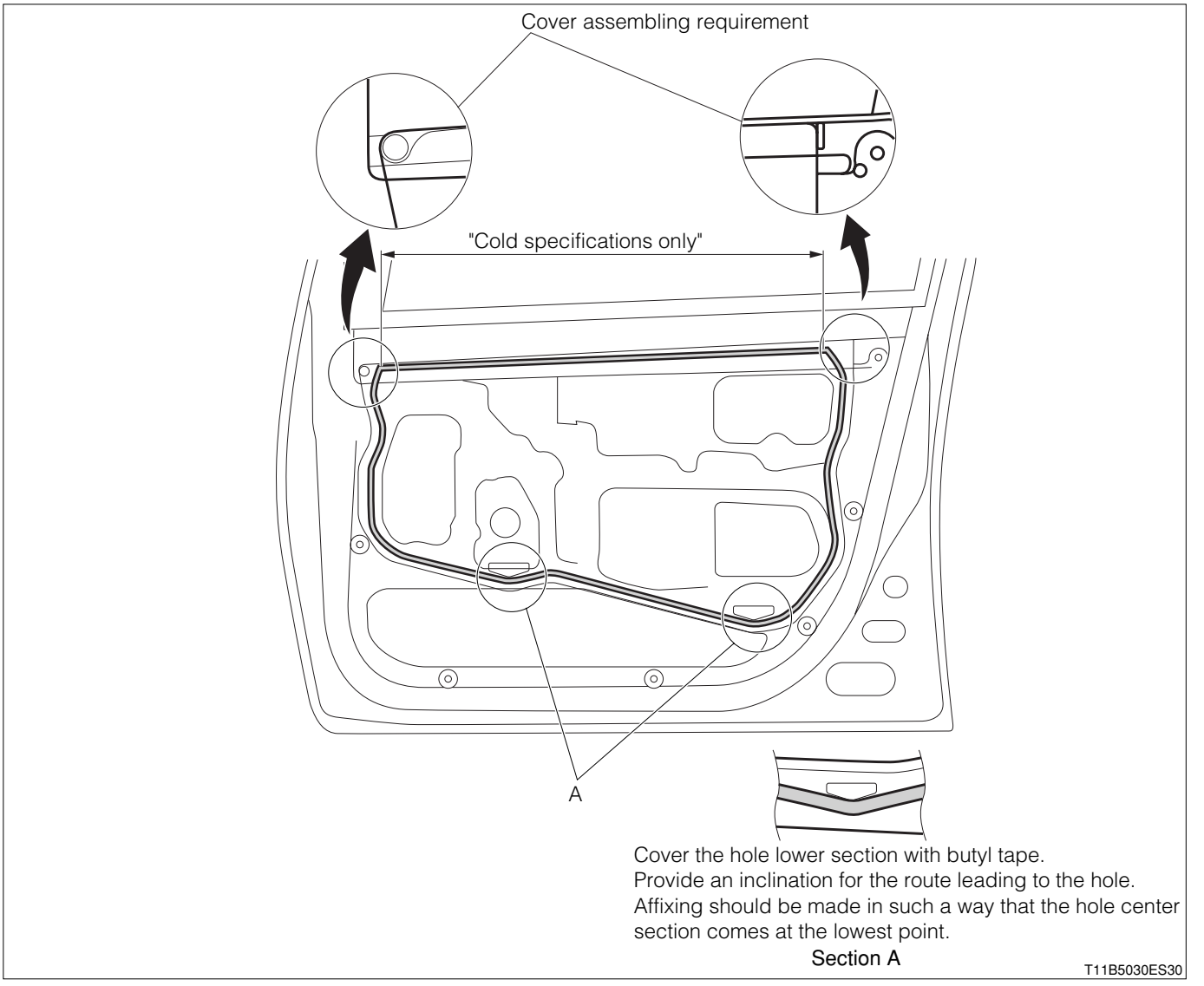
1.Disengage the clips.
2.Lift the board Ay toward the upper side of the vehicle and remove.



2-1-5 POINTS OF ASSEMBLY

(1) Cover, front door service hole, RH

1.Perform the assembling by referring to the main points given in the figure below.



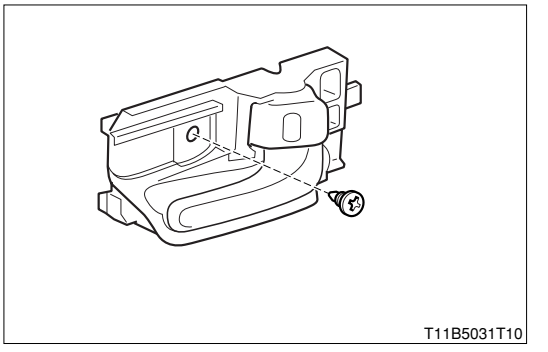
(2) Handle S/A, front door, inside RH/LH

CAUTION

- Be very careful not to break the threaded hole by tightening the screw with an excessive torque, for an ET screw has been employed.
- Do not use an impact driver when tightening the screw.
- If the threaded section should be broken, be sure to use an oversized ET screw (90041-67041-000).

NOTE

- ET screw: This is a screw by which a female screw is threaded as it is tightened, utilizing the shape at the tip end which has a self-drilling effect.



2-1-6 OPERATION AFTER ASSEMBLY

1.Connect the battery negative (−) terminal.

3 FRONT DOOR(GLASS-RELATED)

3-1 DISASSEMBLING AND ASSEMBLING

3-1-1 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

MP grease,Protective tape

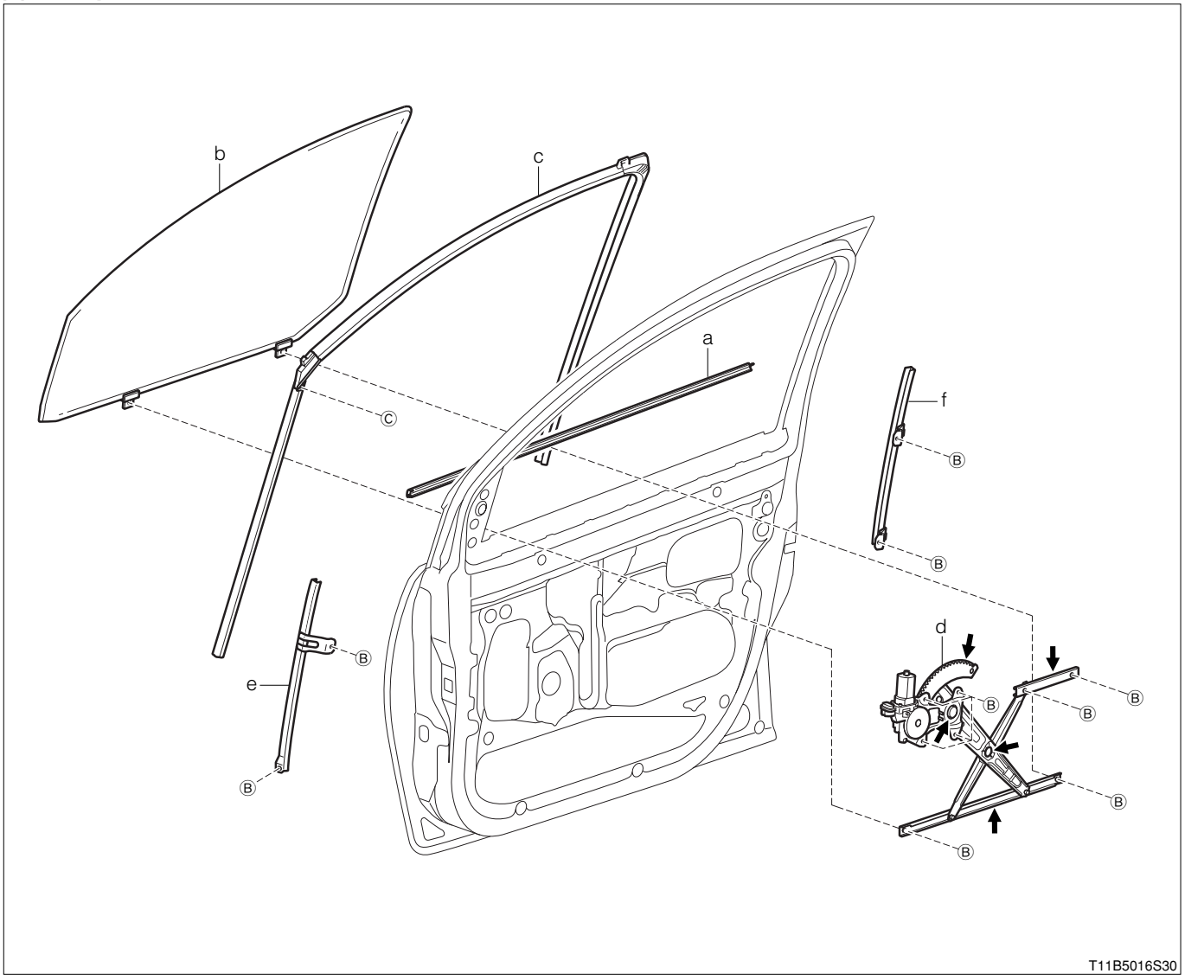
3-1-2 OPERATION BEFORE DISASSEMBLY

1.Disconnect the battery negative (−) terminal.
2.Remove the front door service hole cover RH.
Refer to Page I1-8.

3.Remove the outer rear view mirror Ay RH/LH.
Refer to Page I3-26.

3-1-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Components



➡: MP grease

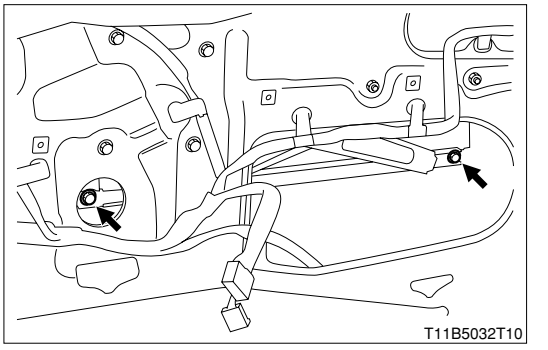
(2) Disassembling and assembling procedures

1 a Weather-strip, front door window, outer RH/LH
▼ 2 b Glass S/A, front door, RH/LH
3 c Run, front door glass front, RH/LH
4 d Regulator Ay, front door power window, RH/LH
5 e Frame S/A, front door, front lower, RH/LH
6 f Frame S/A, front door, rear lower, RH/LH

3-1-4 POINTS OF DISASSEMBLY

(1) Glass S/A, front door, RH/LH

1.Apply a protective tape to the door panel flange.
2.Operate the glass S/A until the bolts are visible.
3.Remove the bolts (2 locations).



3-1-5 OPERATION AFTER ASSEMBLY

1.Install the outer rear view mirror Ay RH/LH.
Refer to Page I3-26.

2.Install the front door service hole cover RH.
Refer to Page I1-8.

3.Connect the battery negative (−) terminal.

4 FRONT DOOR(LOCK-RELATED)

4-1 DISASSEMBLING AND ASSEMBLING

4-1-1 ARTICLES TO BE PREPARED

Tool

TORX® wrench T30

Lubricant,adhesive,others

MP grease

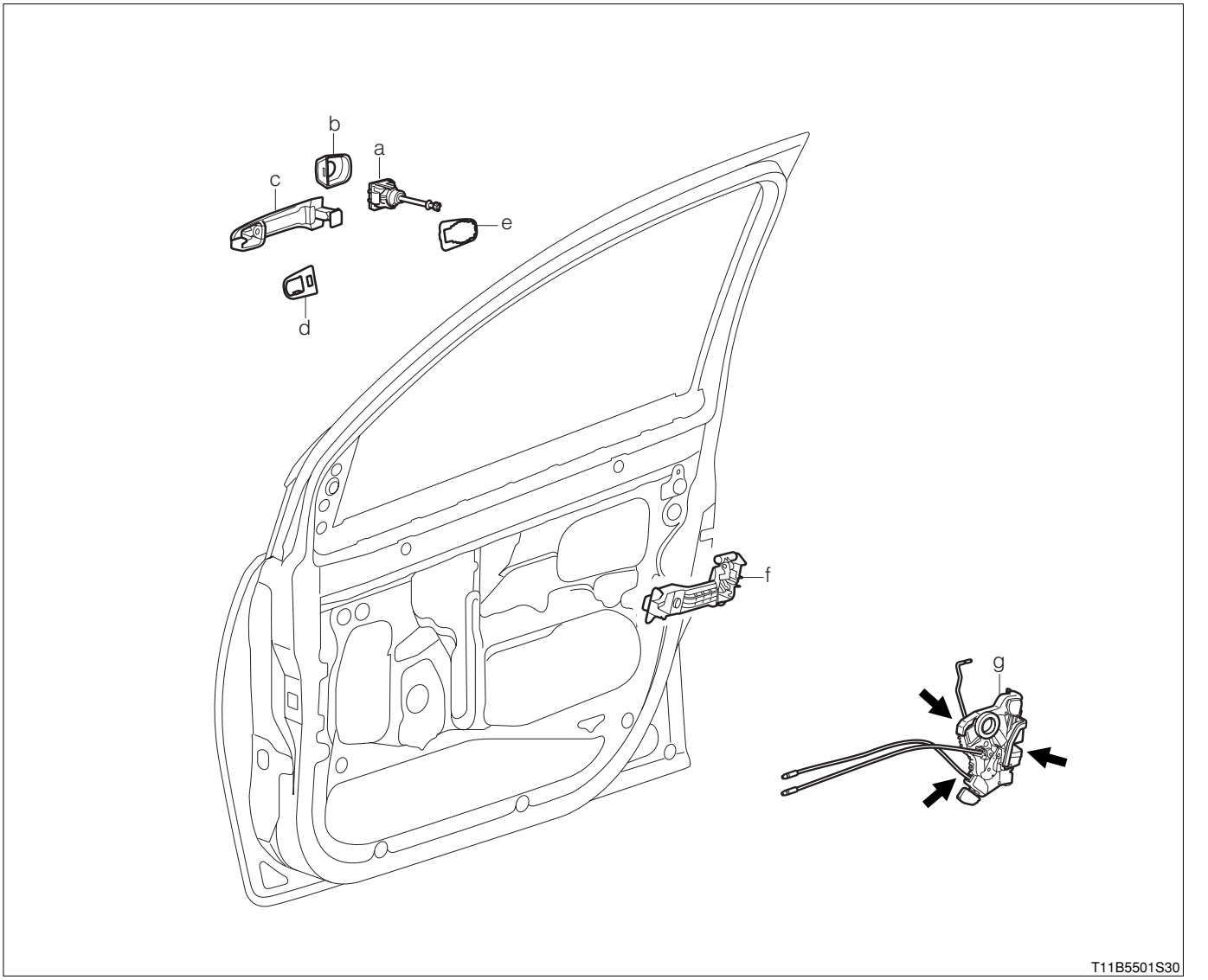
4-1-2 OPERATION BEFORE DISASSEMBLY

1.Disconnect the battery negative (−) terminal.
2.Remove the front door service hole cover RH.
Refer to Page I1-8.

3.Remove the front door rear lower frame S/A RH/LH.
Refer to Page I1-11.

4-1-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Components



➡: MP grease

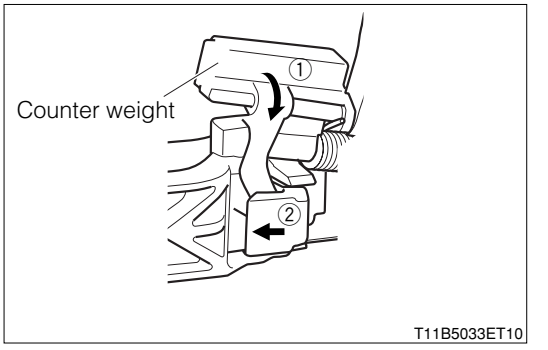
(2) Disassembling and assembling procedures

1 a Cylinder Ay, front door lock, RH/LH
2 b Cover, front door outside handle, RH/LH
▲ 3 c Handle, front door outside RH
4 d Pad, front door outside handle, RH
5 e Pad, front door outside handle, LH
6 f Frame S/A, front door outside handle, RH/LH
7 g Lock Ay, front door w/motor, RH/LH

4-1-4 POINTS OF ASSEMBLY

(1) Handle, front door outside RH/LH

1.While pushing the counterweight of the RH/LH front door outside handle frame S/A, push the handle toward the front of the vehicle to assemble.



4-1-5 OPERATION AFTER ASSEMBLY

1.Install the front door rear lower frame S/A RH/LH.
Refer to Page I1-11.

2.Install the front door service hole cover RH.
Refer to Page I1-8.

3.Connect the battery negative (−) terminal.

5 REAR DOOR(TRIM-RELATED)

5-1 DISASSEMBLING AND ASSEMBLING

5-1-1 ARTICLES TO BE PREPARED

Tool

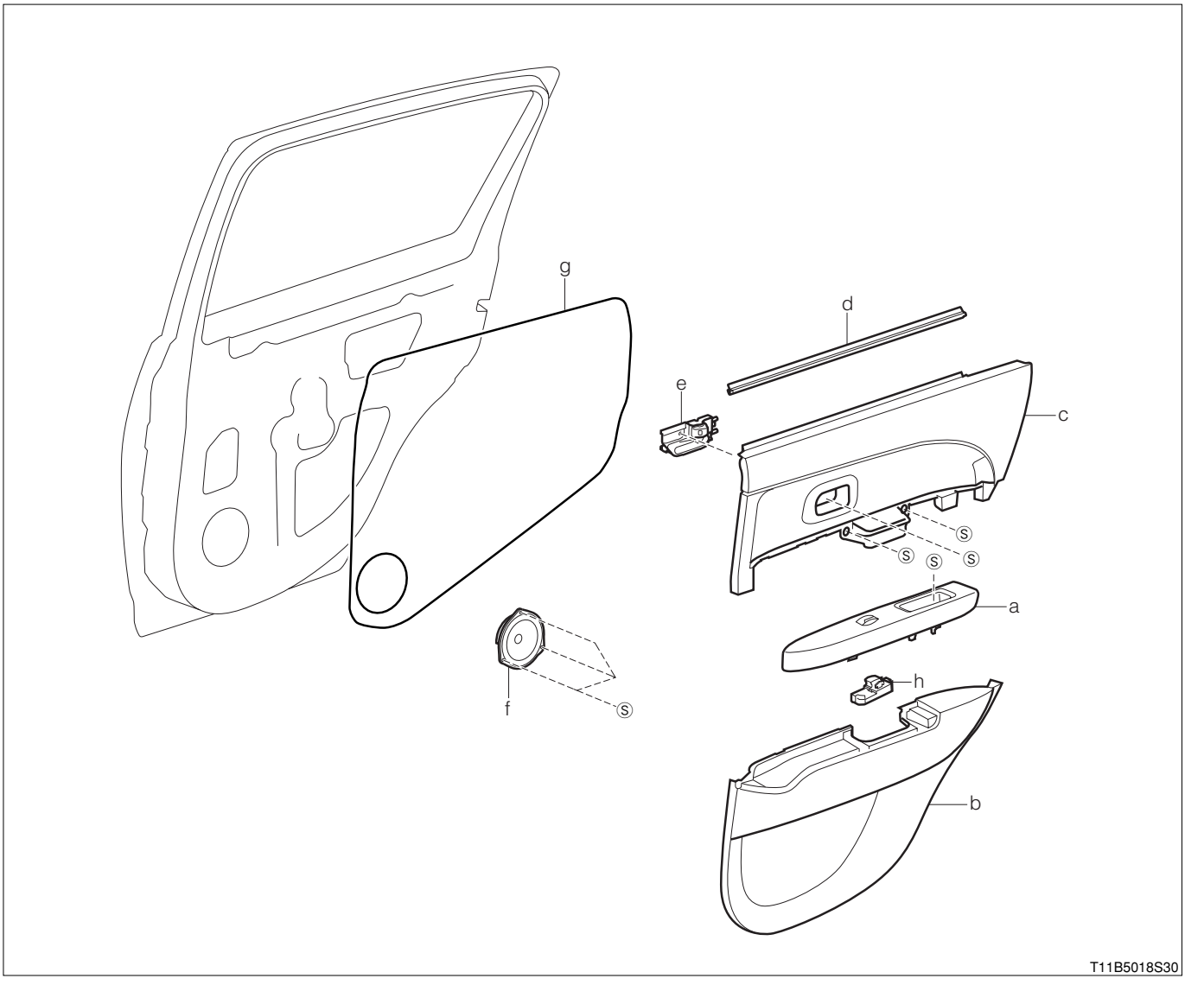
Clip remover

Lubricant,adhesive,others

Butyl tape

5-1-2 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Components



T11B5018S30

(2) Disassembling and assembling procedures

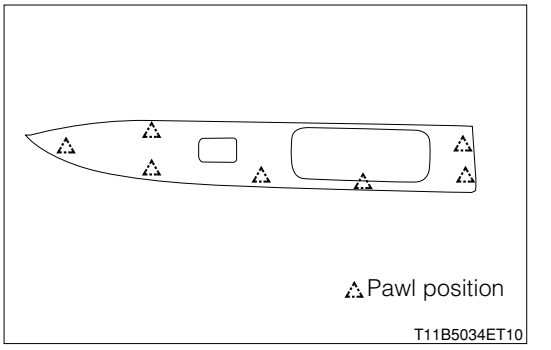
- ▼ 1 a Panel, rear door armrest base, upper RH/LH
- ▼ 2 b Board Ay, rear door trim, lower RH/LH
- ▼ 3 c Panel, rear door trim, upper RH/LH
- 4 d Weather-strip, rear door trim, inner RH/LH
- ▲ 5 e Handle S/A, front door inside, RH/LH
- 6 f Speaker Ay, radio
- ▲ 7 g Cover, rear door service hole, RH
- 8 h Switch Ay, power window regulator

5-1-3 POINTS OF DISASSEMBLY

(1) Panel, rear door armrest base, upper RH/LH

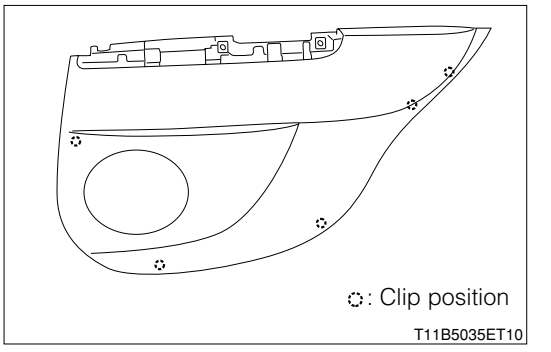
1.Remove the screw (1 location).

2.Disengage the pawls to remove.



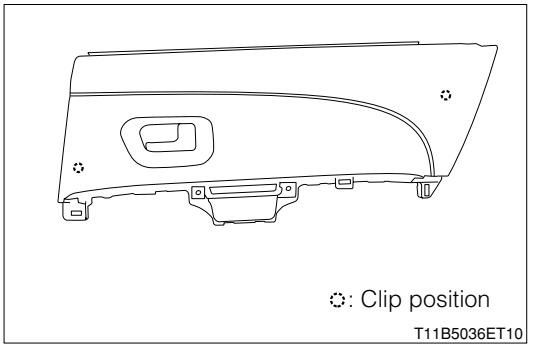
(2) Board Ay, rear door trim, lower RH/LH

1.Remove the screws (2 locations).
2.Disengage the pawls and clips to remove.



(3) Panel, rear door trim, upper RH/LH

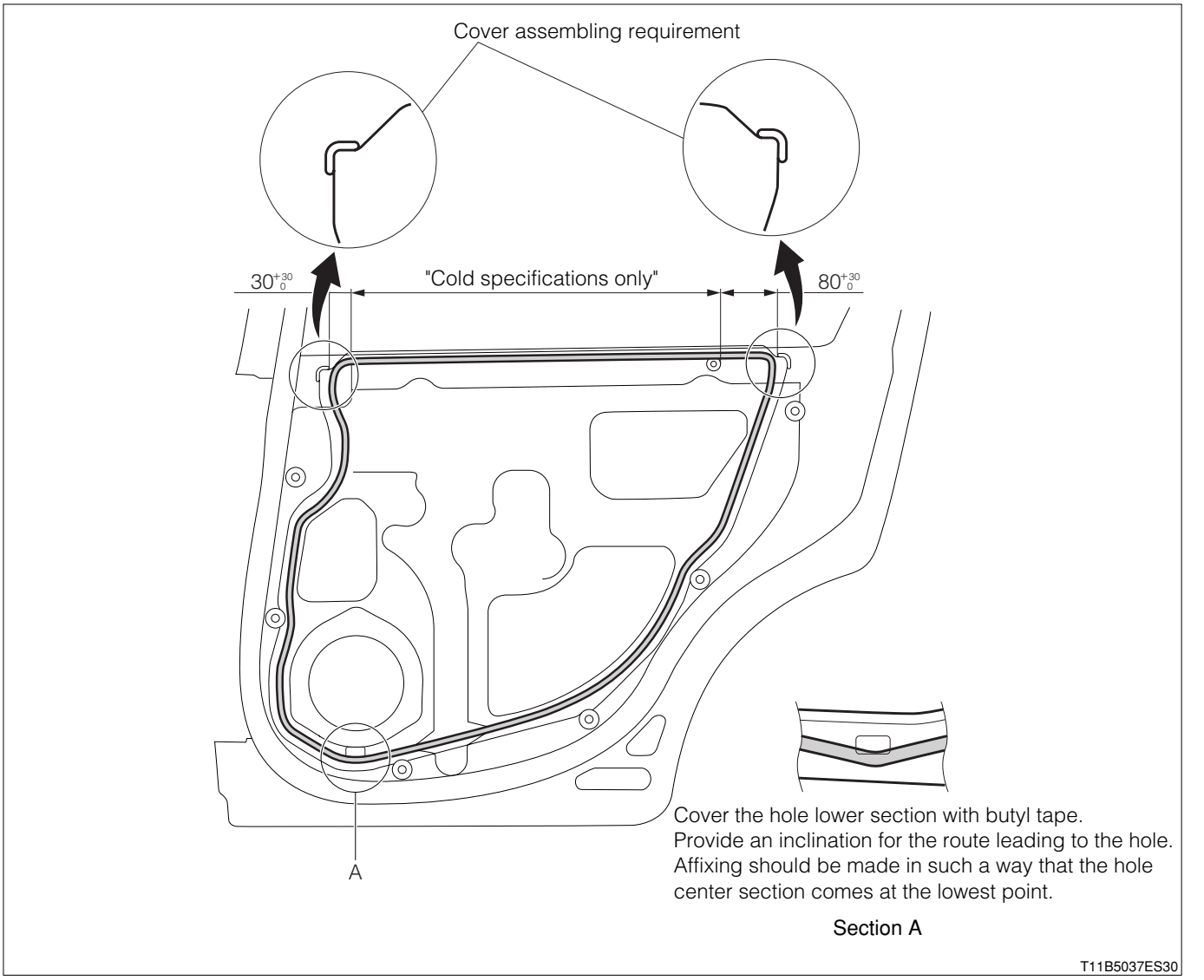
1.Disengage the clips.
2.Lift the panel Ay toward the upper side of the vehicle and remove.



5-1-4 POINTS OF ASSEMBLY

(1) Cover, rear door service hole, RH

1.Perform the assembling by referring to the main points given in the figure below.



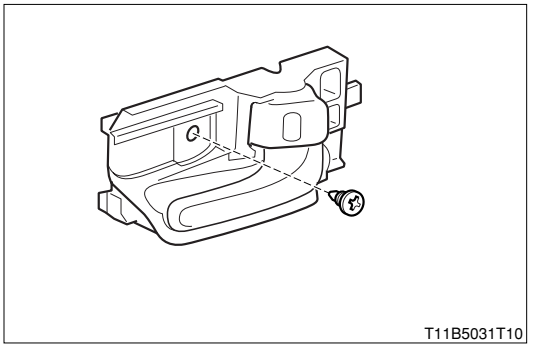
(2) Handle S/A, front door inside, RH/LH

CAUTION

- Be very careful not to break the threaded hole by tightening the screw with an excessive torque, for an ET screw has been employed.
- Do not use an impact driver when tightening the screw.
- If the threaded section should be broken, be sure to use an oversized ET screw(90041-67041-000).

NOTE

- ET screw: This is a screw by which a female screw is threaded as it is tightened, utilizing the shape at the tip end which has a self-drilling effect.



6 REAR DOOR(GLASS-RELATE)

6-1 DISASSEMBLING AND ASSEMBLING

6-1-1 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

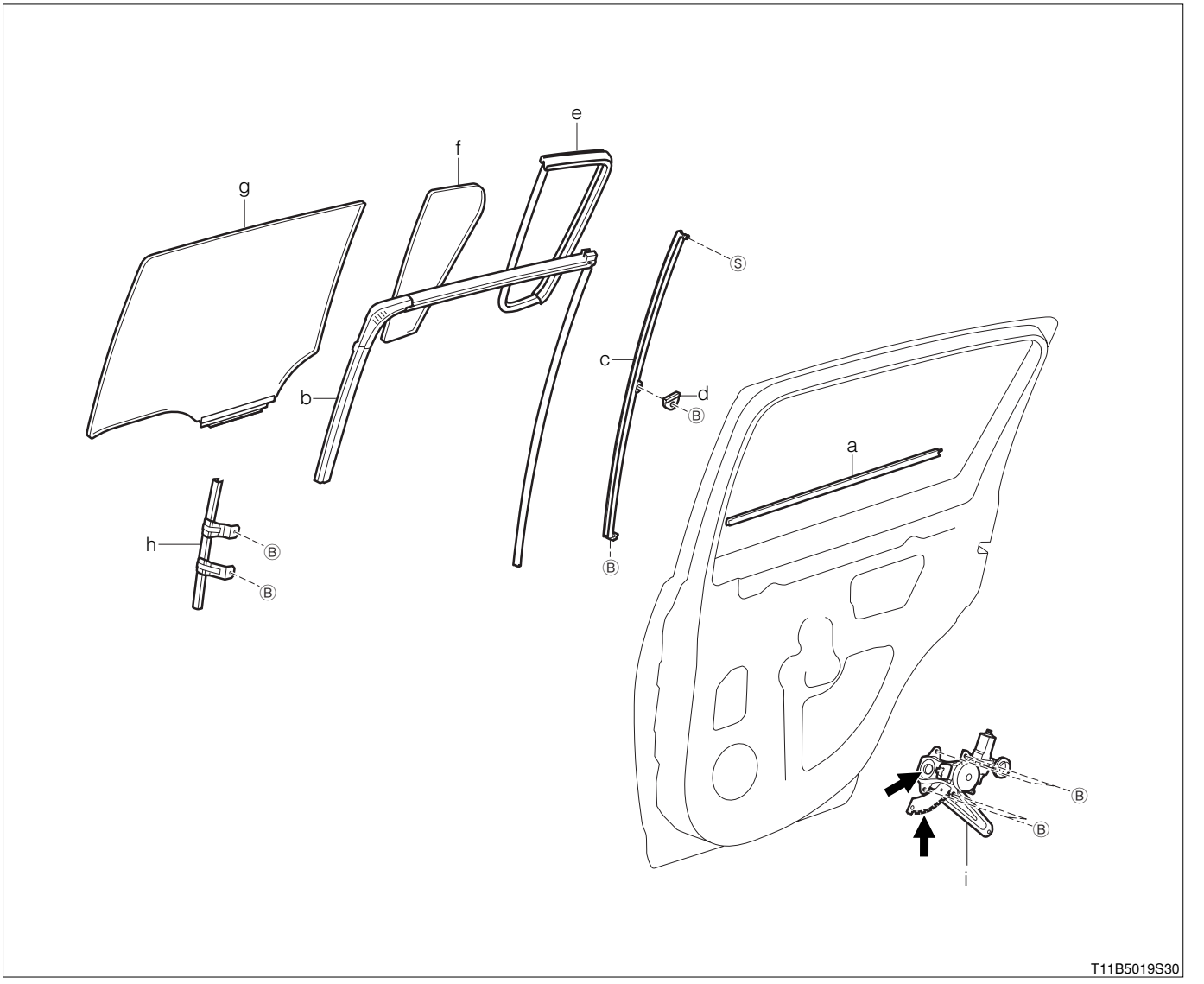
MP grease,Protective tape

6-1-2 OPERATION BEFORE DISASSEMBLY

1.Disconnect the battery negative (−) terminal.
2.Remove the rear door service hole cover RH.
Refer to Page I1-15.

6-1-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Components



➡: MP grease

(2) Disassembling procedure

1 a Weather-strip, rear door glass, outer RH/LH
2 b Run, rear door glass, RH/LH
3 c Bar S/A, rear door window division, RH/LH
4 d Spacer, side window frame
5 e Weather-strip, rear door quarter window, RH/LH
6 f Glass, rear door quarter window, RH/LH
▼
7 g Glass S/A, rear door, RH/LH
8 h Guide S/A, rear door window, front RH/LH
9 i Regulator Ay, rear door window, RH/LH

(3) Assembling procedure

1 h Guide S/A, rear door window, front RH/LH
▲ 2 g Glass S/A, rear door, RH/LH
3 f Glass, rear door quarter window, RH/LH
4 e Weather-strip, rear door quarter window, RH/LH
5 d Spacer, side window frame
▲ 6 c Bar S/A, rear door window division, RH/LH
▲ 7 i Regulator Ay, rear door window, RH/LH
8 b Run, rear door glass, RH/LH
9 a Weather-strip, rear door glass, outer RH/LH

6-1-4 POINTS OF DISASSEMBLY

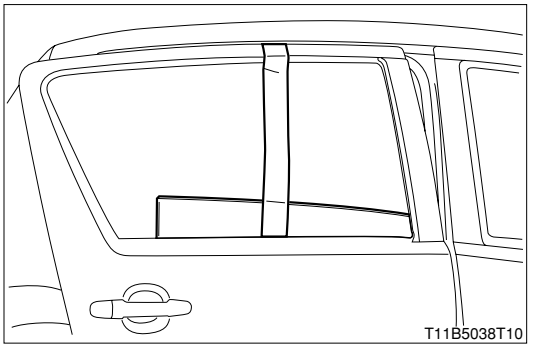
(1) Glass S/A, rear door, RH/LH

1.Apply a protective tape to the door panel flange.
2.Move the glass S/A toward the back of the vehicle and remove it from the RH/LH rear door window regulator Ay.

6-1-5 POINTS OF ASSEMBLY

(1) Glass S/A, rear door, RH/LH

1.Insert the glass S/A inside the door panel. Hang and hold it with a tape.



(2) Bar S/A, rear door window division, RH/LH

1.Place the bar S/A between the RH/LH rear door glass S/A and the RH/LH rear door quarter window weather-strip so that the RH/LH rear door glass S/A will fit in the groove of the bar S/A.

(3) Regulator Ay, rear door window, RH/LH

1.Insert the roller of the regulator Ay into the rail of the RH/LH rear door glass S/A.
2.Install the regulator Ay, while adjusting the height of the RH/LH rear door glass S/A.

6-1-6 OPERATION AFTER ASSEMBLY

1.Install the rear door service hole cover RH.
Refer to Page I1-15.

2.Connect the battery negative (−) terminal.

7 REAR DOOR(LOCK-RELATED)

7-1 DISASSEMBLING AND ASSEMBLING

7-1-1 ARTICLES TO BE PREPARED

Tool

TORX® wrench T30

Lubricant,adhesive,others

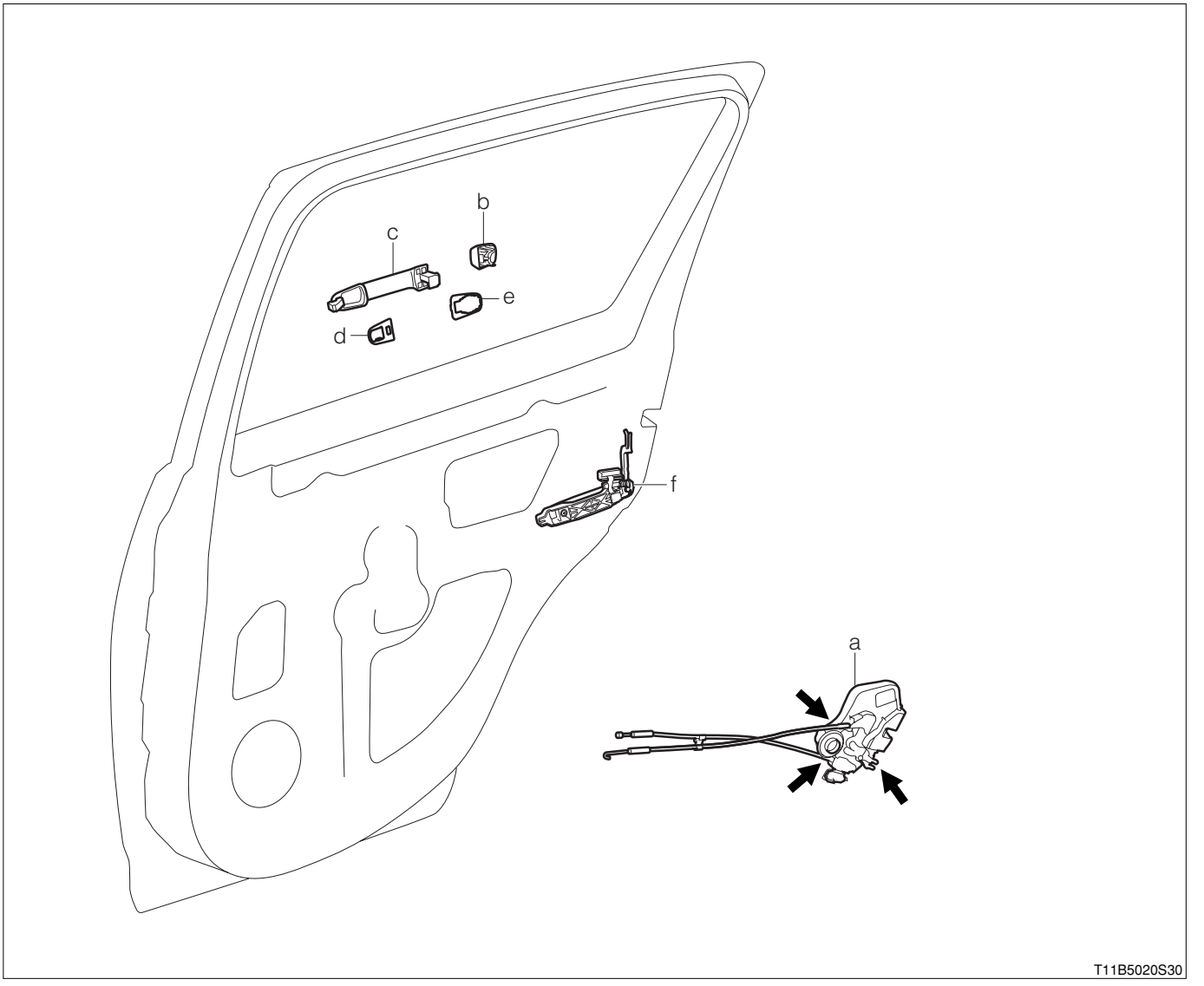
MP grease

7-1-2 OPERATION BEFORE DISASSEMBLY

1.Disconnect the battery negative (−) terminal.
2.Remove the rear door service hole cover RH.
Refer to Page I1-15.

7-1-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Components



➡: MP grease

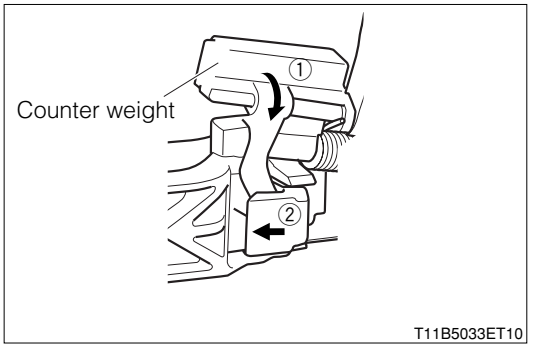
(2) Disassembling and assembling procedures

1 a Lock Ay, rear door w/motor, RH/LH
2 b Cover, rear door outside handle, RH
▲ 3 c Handle, front door, outside RH
4 d Pad, front door outside handle
5 e Pad, front door outside handle, LH
6 f Frame S/A, rear door outside handle, S/A

7-1-4 POINTS OF ASSEMBLY

(1) Handle, front door, outside RH

1.While pushing the counterweight of the RH/LH front door outside handle frame S/A, push the handle toward the front of the vehicle to assemble.



7-1-5 OPERATION AFTER ASSEMBLY

1.Install the rear door service hole cover RH.
Refer to Page I1-15.

2.Connect the battery negative (−) terminal.

8 BACK DOOR

8-1 DISASSEMBLING AND ASSEMBLING

8-1-1 ARTICLES TO BE PREPARED

Tool

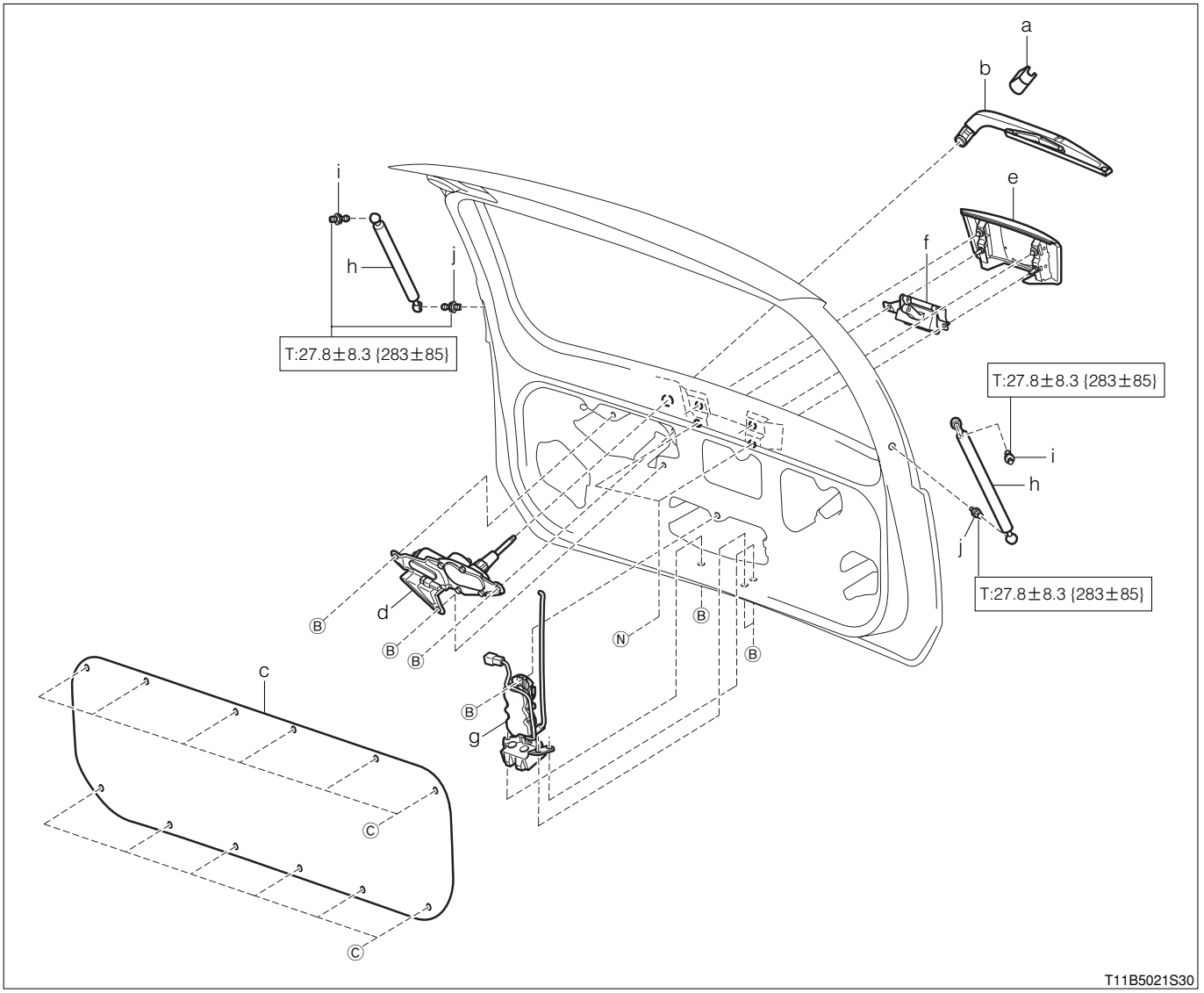
Clip remover

Instrument

Torque wrench

8-1-2 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Disassembling and assembling procedures

	1	a	Cap, wiper arm head	6	f	Handle S/A, back door outside
▲	2	b	Arm & blade Ay, rear wiper	7	g	Lock Ay, back door
	3	c	Panel Ay, back door trim	8	h	Stay Ay, back door
▲	4	d	Motor Ay, rear wiper	9	i	Stud, back door stay
	5	e	Cover Ay, door outside handle	10	j	Bolt, back door stay

8-1-3 POINTS OF ASSEMBLY

(1) Motor Ay, rear wiper

Refer to Page J2-15.

(2) Arm & blade Ay, rear wiper

Refer to Page J2-15.

9 FENDER

9-1 REMOVAL AND INSTALLATION

9-1-1 ARTICLES TO BE PREPARED

Tool

Cutter knife

Lubricant,adhesive,others

Protective tape

9-1-2 OPERATION BEFORE REMOVAL

1.Remove the front bumper cover.
Refer to Page I2-2.

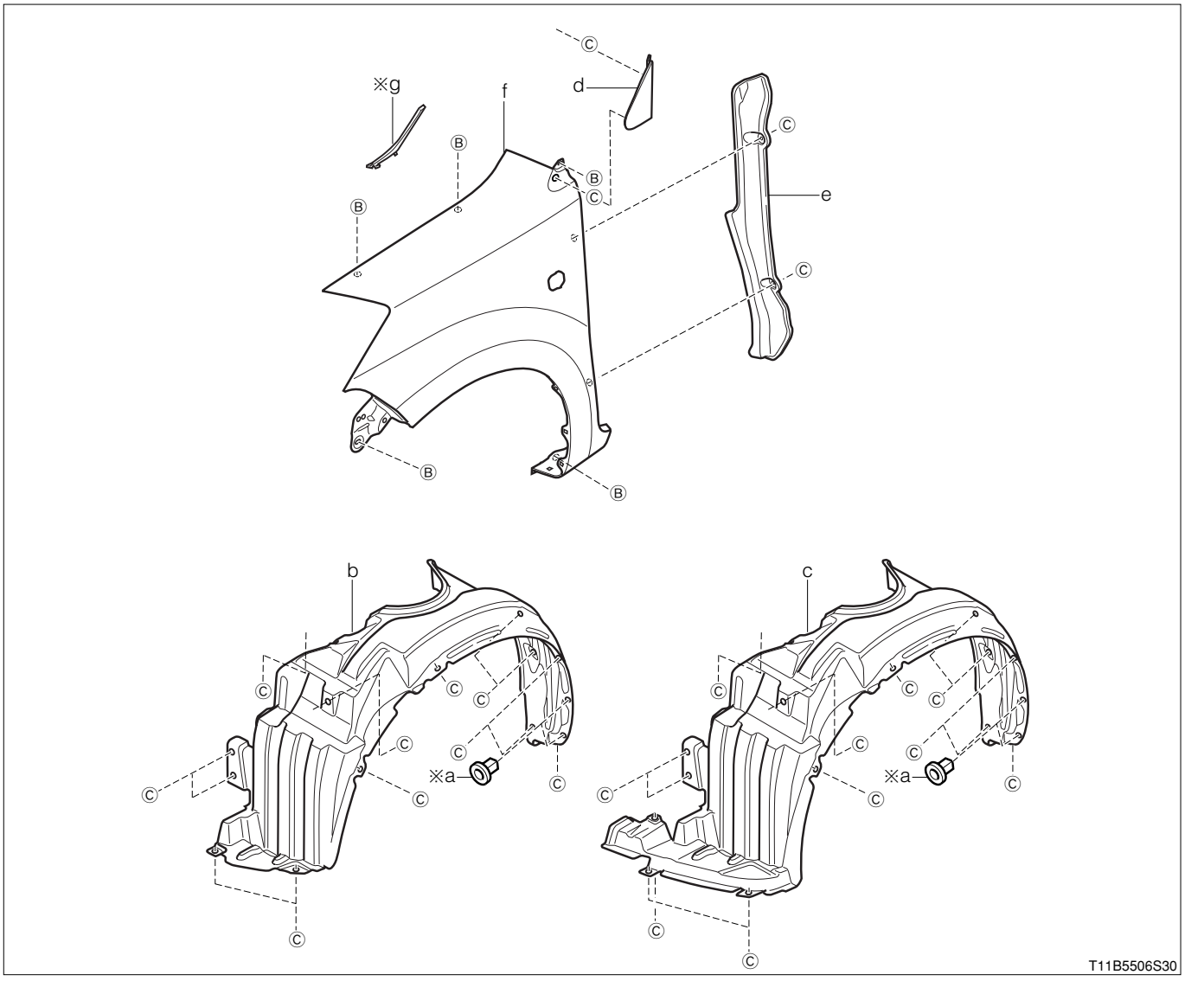
2.Remove the cowl top ventilator louver RH/LH.
Refer to Page I2-8.

3.Remove the side turn signal lamp Ay.
Refer to Page J1-11.

4.Remove the body rocker panel moulding RH/LH (Side stone guard equipped vehicles).
Refer to Page I2-10.

9-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts

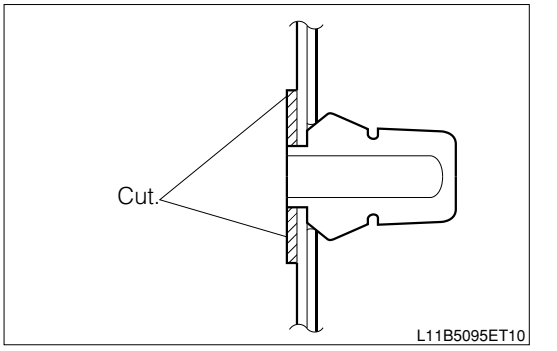
(2) Removal and installation procedures

▼ 1 a Grommet, screw
2 b Liner, front fender, RH/LH (Standard-bumper equipped vehicle)
3 c Shield S/A, fender splash, front RH/LH (Aero-bumper equipped vehicle)
▼ 4 d Garnish, front pillar, lower RH/LH
5 e Protector, front fender side panel, RH/LH
6 f Panel, front fender, RH/LH
7 g Seal, front fender to cowl side, No.2 RH/LH

9-1-4 POINTS OF REMOVAL

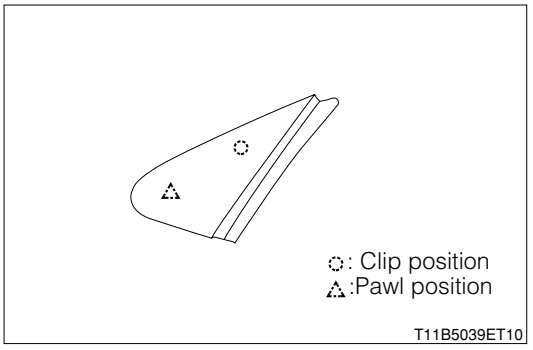
(1) Grommet, screw

1.To remove the grommet, cut off the edge
TOOL: Cutter knife



(2) Garnish, front pillar, Lower RH/LH

1.Apply a protective tape to the front fender panel RH/LH.
2.Disengage the pawls and clips to remove.



9-1-5 OPERATION AFTER INSTALLATION

1.Install the body rocker panel moulding RH/LH (Side stone guard equipped vehicles).
Refer to Page I2-10.

2.Install the side turn signal lamp Ay.
Refer to Page J1-11.

3.Install the front bumper cover.
Refer to Page I2-2.

4.Install the cowl top ventilator louver RH/LH.
Refer to Page I2-8.

10 HOOD LOCK CONTROL CABLE

10-1 REMOVAL AND INSTALLATION(RHD VEHICLES)

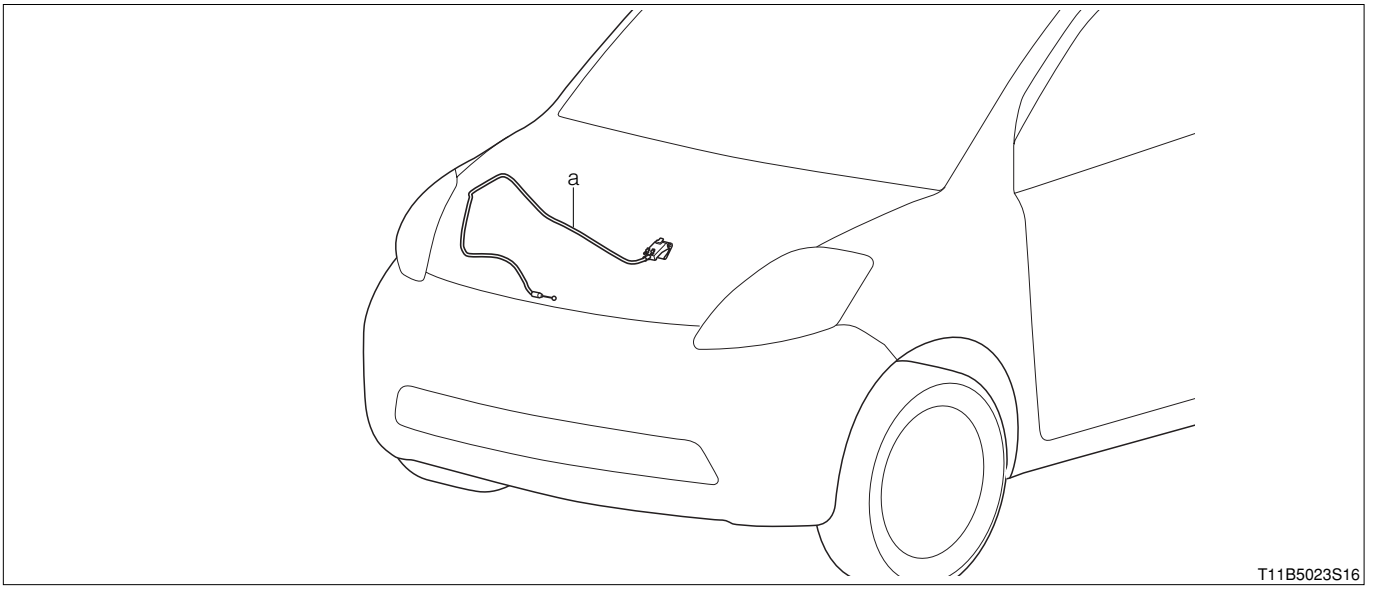
10-1-1 OPERATION BEFORE REMOVAL

1.Remove the front bumper cover.
Refer to Page I2-2.

2.Remove the front fender liner RH.
Refer to Page I2-24

10-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



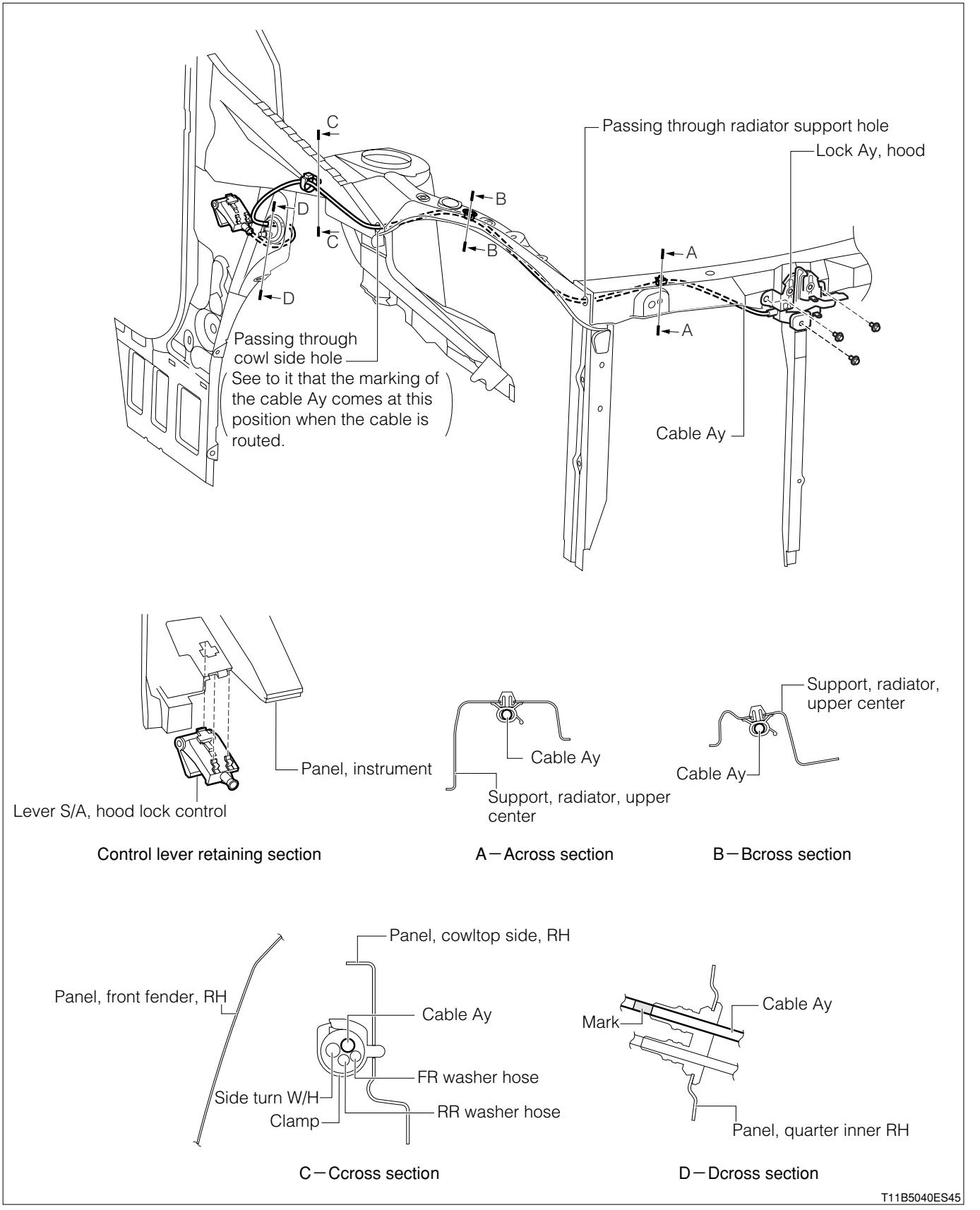
(2) Removal and installation procedures

▲ 1 a Cable Ay, hood lock control

10-1-3 POINTS OF INSTALLATION

(1) Cable Ay, hood lock control

1.Perform the installation by referring to the main points given in the figure below.



10-1-4 OPERATION AFTER INSTALLATION

1.Install the front fender liner RH.
Refer to Page I1-24.

2.Install the front bumper cover.
Refer to Page I2-2.

10-2 REMOVAL AND INSTALLATION(LHD VEHICLES)

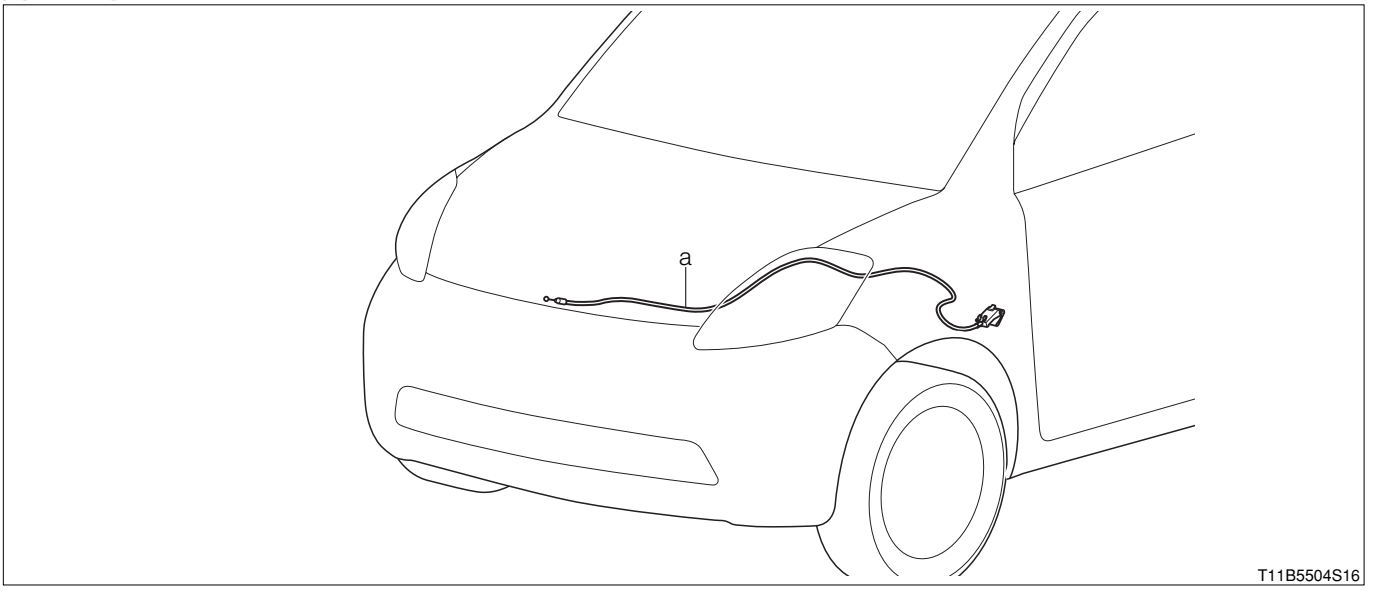
10-2-1 OPERATION BEFORE REMOVAL

1.Remove the cover front bumper cover.
Refer to Page I2-2.

2.Remove the front fender liner LH.
Refer to Page I1-24.

10-2-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



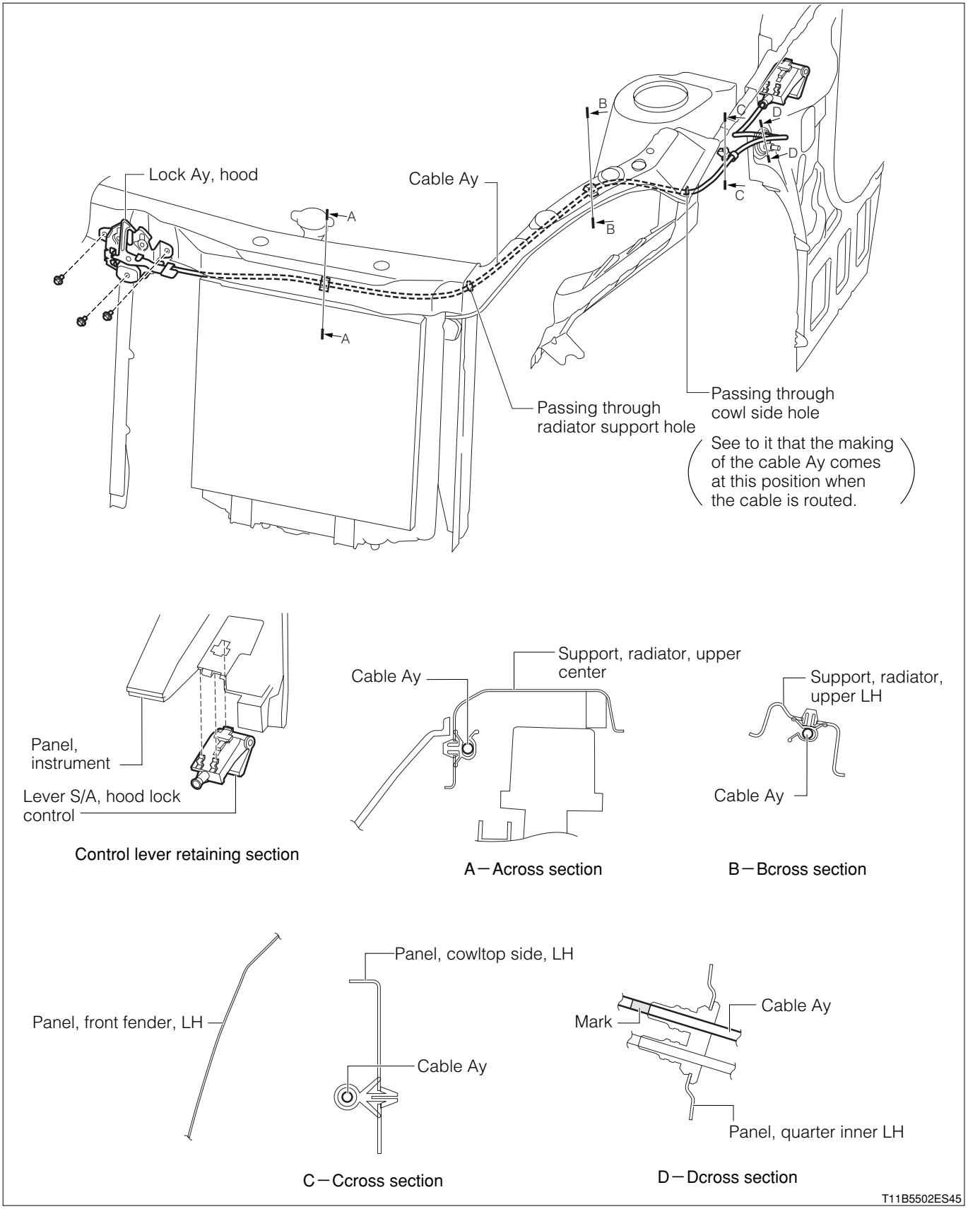
(2) Removal and installation procedures

▲ 1 a Cable Ay, hood lock control

10-2-3 POINTS OF INSTALLATION

(1) Cable Ay, hood lock control

1.Perform the installation by referring to the main points given in the figure below.



10-2-4 OPERATION AFTER INSTALLATION

1. Install the front fender liner LH.
   Refer to Page I1-24.

2. Install the front bumper cover.
   Refer to Page I2-2.

11 FUEL LID CONTROL CABLE

11-1 REMOVAL AND INSTALLATION(RHD VEHICLES)

11-1-1 OPERATION BEFORE REMOVAL

1.Remove the front seat Ay RH/LH.
Refer to Page I2-33.

2.Remove the rear quarter trim panel Ay LH.
Refer to Page I2-48.

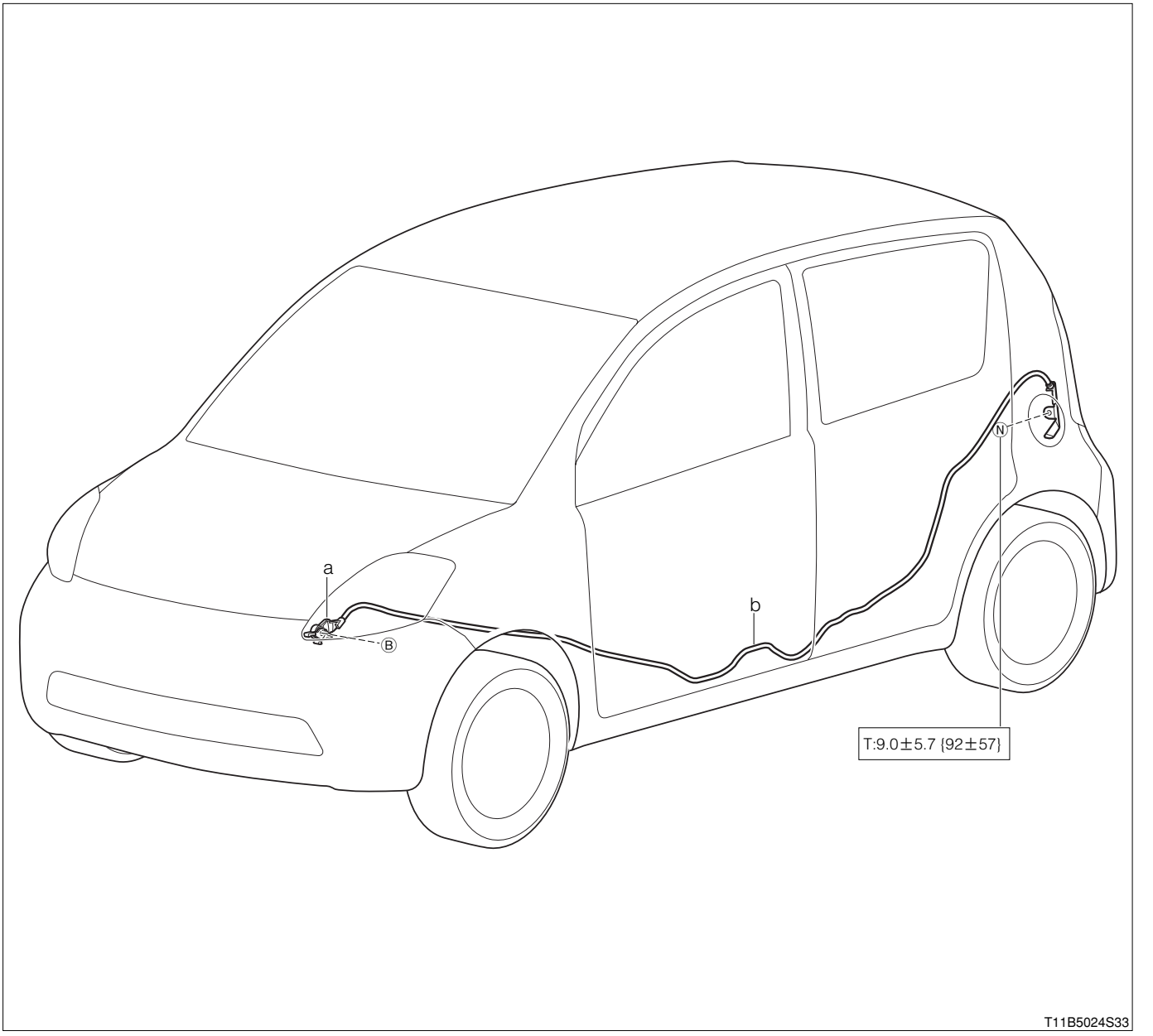
3.Remove the rear console box S/A.
Refer to Page I2-31.

4.Remove the front console box S/A.
Refer to Page I2-31.

5.Remove the front floor carpet Ay (Driver's seat, front passenger's seat, left-rear seat).
Refer to Page I2-57.

11-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

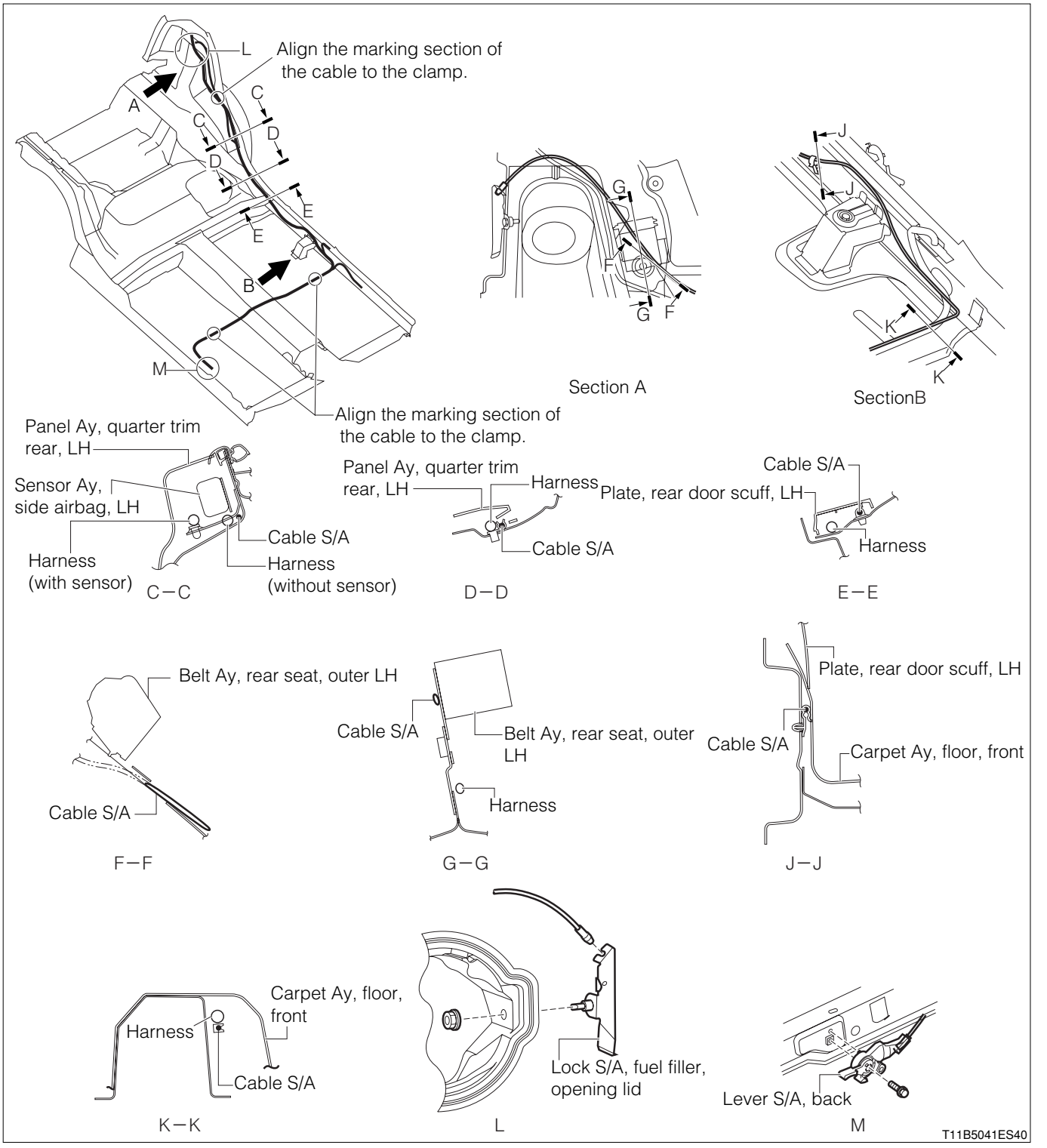
1 a Lever S/A, back door lock open

▲ 2 b Cable S/A, fuel lid lock control

11-1-3 POINTS OF INSTALLATION

(1) Cable S/A, fuel lid lock control

1.Perform the installation by referring to the main points given in the figure below.



11-1-4 OPERATION AFTER INSTALLATION

1.Install the front floor carpet Ay.
Refer to Page I2-57.

2.Install the front console box S/A.
Refer to Page I2-31.

3.Install the rear console box S/A.
Refer to Page I2-31.

4.Install the rear quarter trim panel Ay LH.
Refer to Page I2-48.

5.Install the front seat Ay RH/LH.
Refer to Page I2-33.

11-2 REMOVAL AND INSTALLATION(LHD VEHICLES)

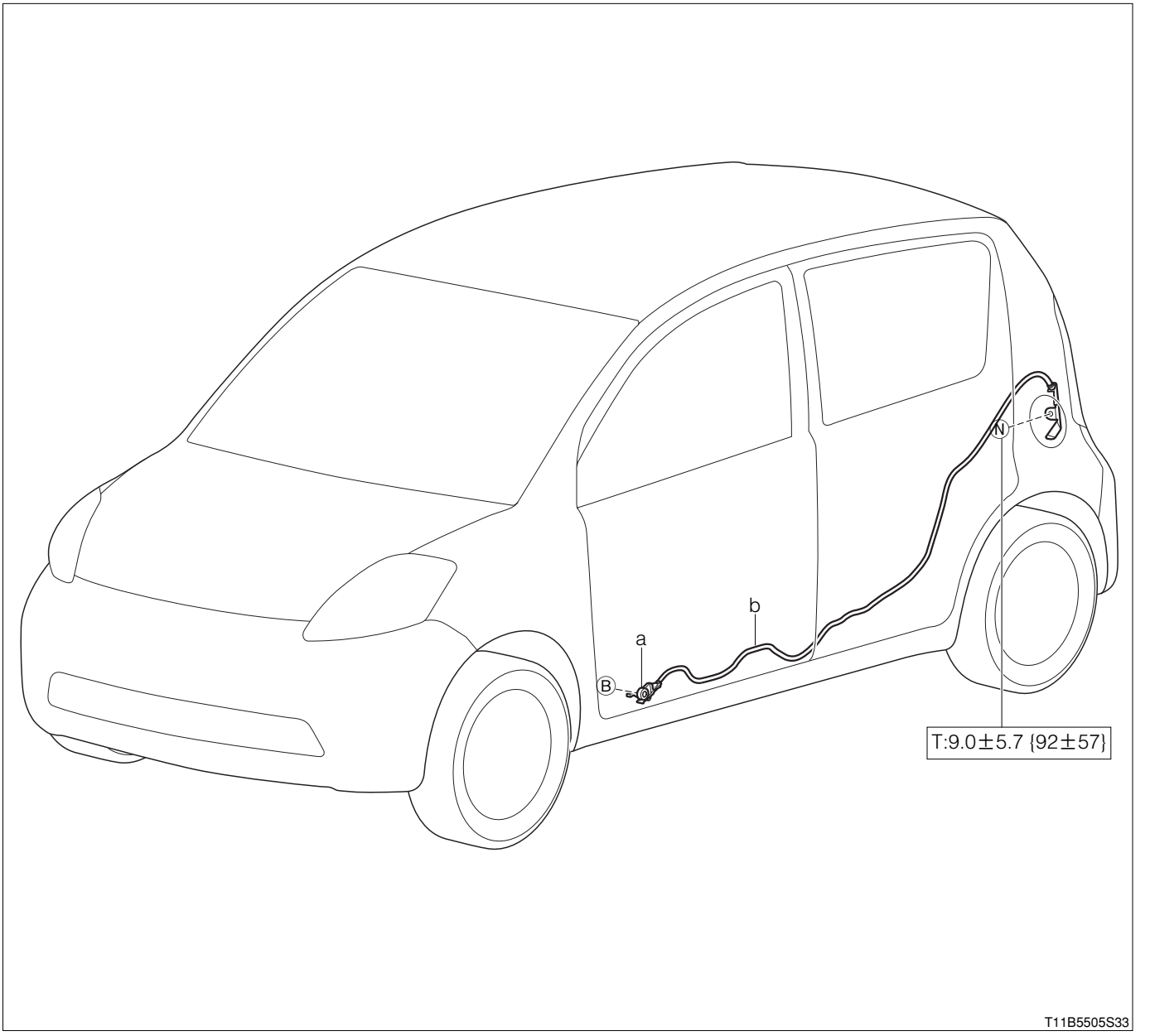
1.Remove the front seat Ay LH.
Refer to Page I2-33.

2.Remove the rear quarter trim panel Ay LH.
Refer to Page I2-48.

3.Remove the front floor carpet Ay (Driver's seat, left-rear seat).
Refer to Page I2-57.

11-2-1 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

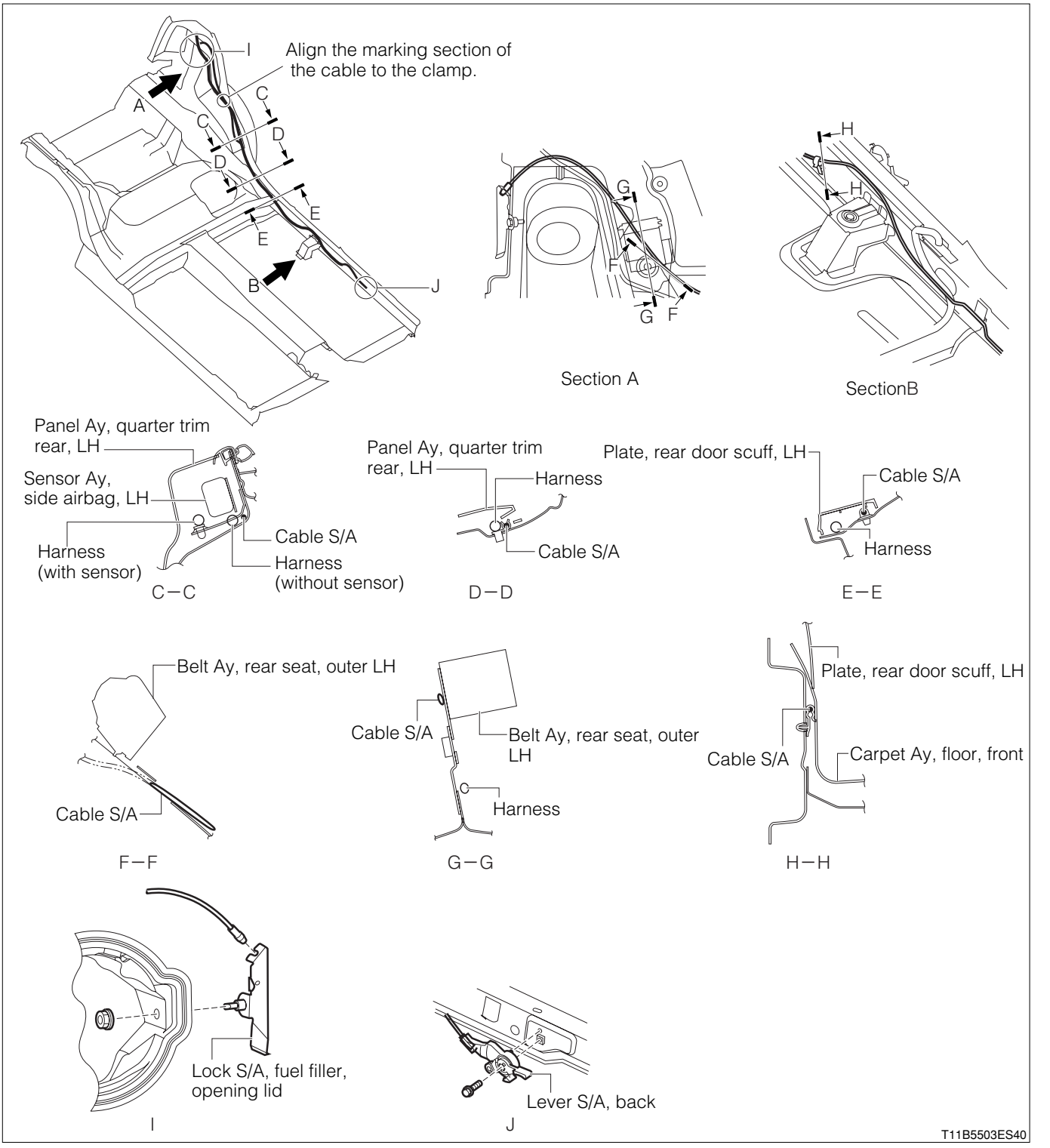
1 a Lever S/A, back door lock open

▲ 2 b Cable S/A, fuel lid lock control

11-2-2 POINTS OF INSTALLATION

(1) Cable S/A, fuel lid lock control

1.Perform the installation by referring to the main points given in the figure below.



11-2-3 OPERATION AFTER INSTALLATION

1.Install the front floor carpet Ay.
Refer to Page I2-57.

2.Install the rear quarter trim panel Ay LH.
Refer to Page I2-48.

3.Install the front seat Ay LH.
Refer to Page I2-33.

12 FUEL FILLER OPENING LID

12-1 REMOVAL AND INSTALLATION

12-1-1 ARTICLES TO BE PREPARED

Tool

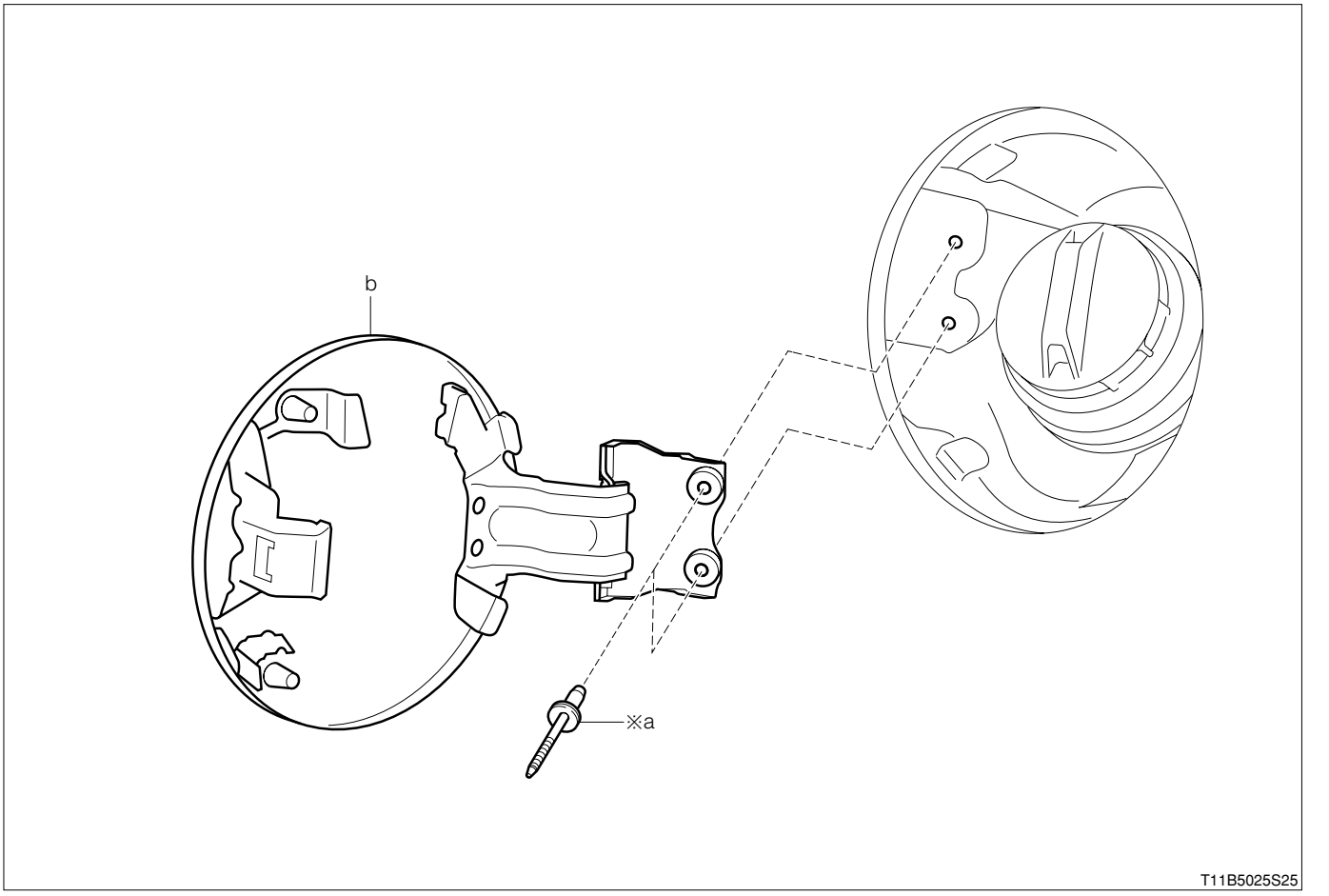
Hand riveter,Drill

12-1-2 OPERATION BEFORE REMOVAL

1.Remove the rear quarter trim panel Ay LH.
Refer to Page I2-482.

12-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts

(2) Removal and installation procedures

1 a Rivet
▼ ▲ 2 b Lid Ay, fuel filler opening.

12-1-4 POINTS OF REMOVAL

(1) Lid Ay, fuel filler opening

1.Secure the rivet with a tape, butyl tape, etc. from the inside of the vehicle so that the removed rivet may not fall down to the locker section.

CAUTION

- When the head section of the rivet is removed, be sure to secure it so that the rivet may not fall down to the locker section.

2.Apply a protective tape or cloth to prevent the lid Ay from being damaged.

3.Lightly apply a drill to the rivet vertically. Then, grind the flange section of the rivet, using the drill.

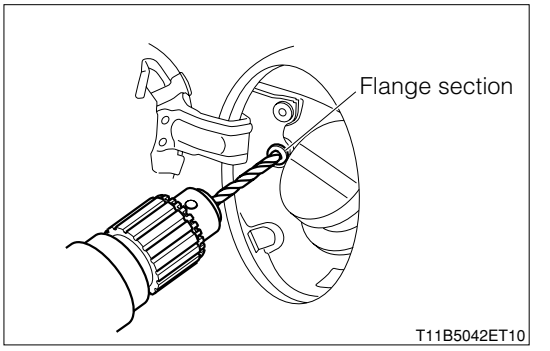
WARNING

- Wear safety glasses to protect your eyes from iron powder or the like during the operation.

CAUTION

- Be careful not to damage the lid Ay area.

TOOL:



4.After the flange section of the rivet has been removed, stop the drilling operation. Then, remove the remaining fragments of the rivet, using pliers or the like.

WARNING

- The rivet is very hot, when removed.

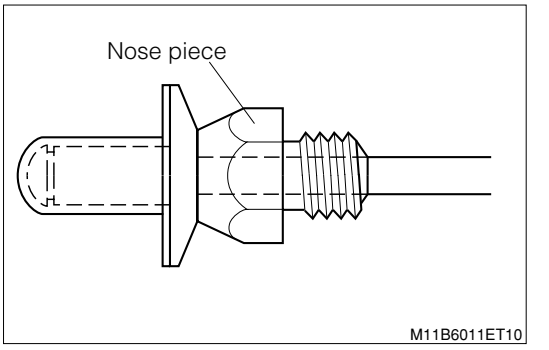
12-1-5 POINTS OF INSTALLATION

(1) Lid Ay, fuel filler opening

1.Select a nose piece with the minimum diameter for which the mandrel of the rivet can be inserted.

CAUTION

- Any wrong selection of the nose piece will cause improper rivet tightening and malfunctions of riveter.



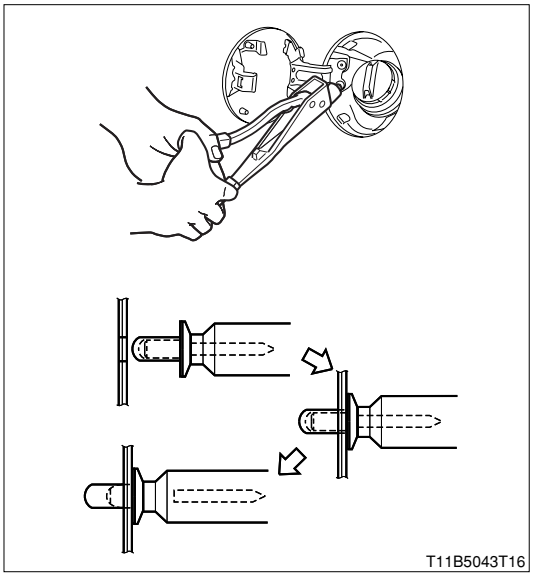
2.Mount the nose piece to the hand riveter and insert the mandrel section of the rivet into the nose piece.

NOTE

- Part number of rivet:90042-69027-000

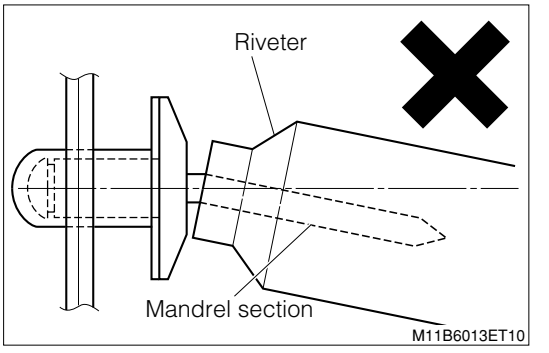
3.With the rivet applied strongly and vertically to the installation hole, operate the hand riveter to install the rivet.

TOOL: Hand riveter



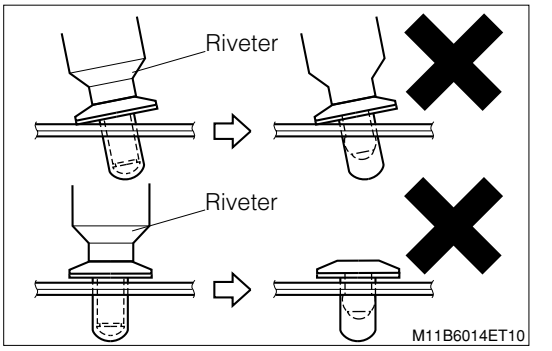
CAUTION

- Be careful not to damage the lid Ay area.
- In cases where the rivet has not been tightened by one riveter operation (the mandrel has not been cut), repeat the operation again.
- If the operation is performed by prying during the hand riveter operation, the mandrel section of the rivet will be bent, leading to improper rivet tightening and malfunctions of the hand riveter.



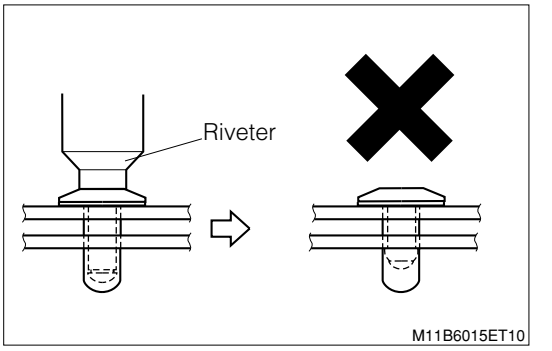
CAUTION

- If the hand riveter is operated with the rivet tilted or floating, it will lead to improper rivet tightening.



CAUTION

- If the rivet is installed without press-fitting the installation parts, it will lead to improper rivet tightening.



12-1-6 OPERATION AFTER INSTALLATION

1. Install the rear quarter trim panel Ay LH.
   Refer to Page I2-48.

I2 EXTERIOR/INTERIOR

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1 EXTERIOR/INTERIOR

1-1 BASIC CHECK AND ADJUSTMENT

1-1-1 SEATBELT DAMAGE CHECK

1. Visually check the seatbelt for damage.
   SPECIFIED VALUE: There should be no defect.

2. Operate the buckle to see if there is any problem in engagement
   SPECIFIED VALUE: There should be no defect.

2 BUMPER

2-1 REMOVAL AND INSTALLATION(STANDARD-BUMPER EQUIPPED VEHICLE)

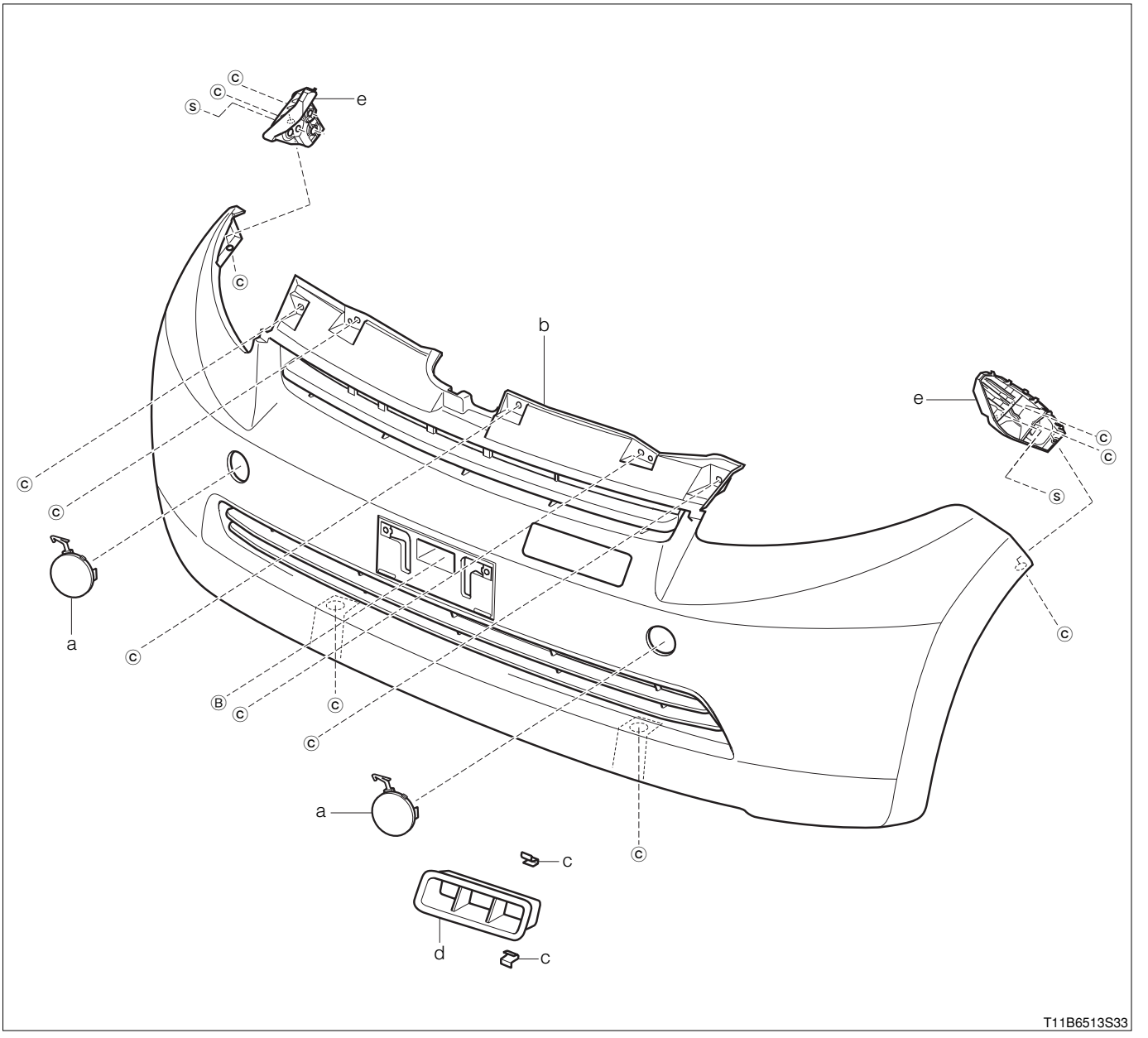
2-1-1 ARTICLES TO BE PREPARED

Tool

Clip remover

2-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



T11B6513S33

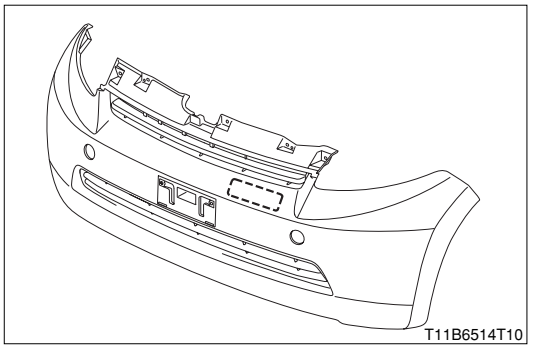
(2) Removal and installation procedures

1 a Cover, front bumper hole, RH/LH
2 b Cover, front bumper
3 c Clip (not equipped for some specifications)
▲ 4 d Garnish, front bumper (not equipped for some specifications)
5 e Support, front bumper side, RH/LH

2-1-3 POINTS OF INSTALLATION

(1) Cover, front bumper

1.When replacing the cover with a new one, cut the cover at the scribing line shown at the back of the cover.



2-2 REMOVAL AND INSTALLATION(AERO-BUMPER EQUIPPED VEHICLE)

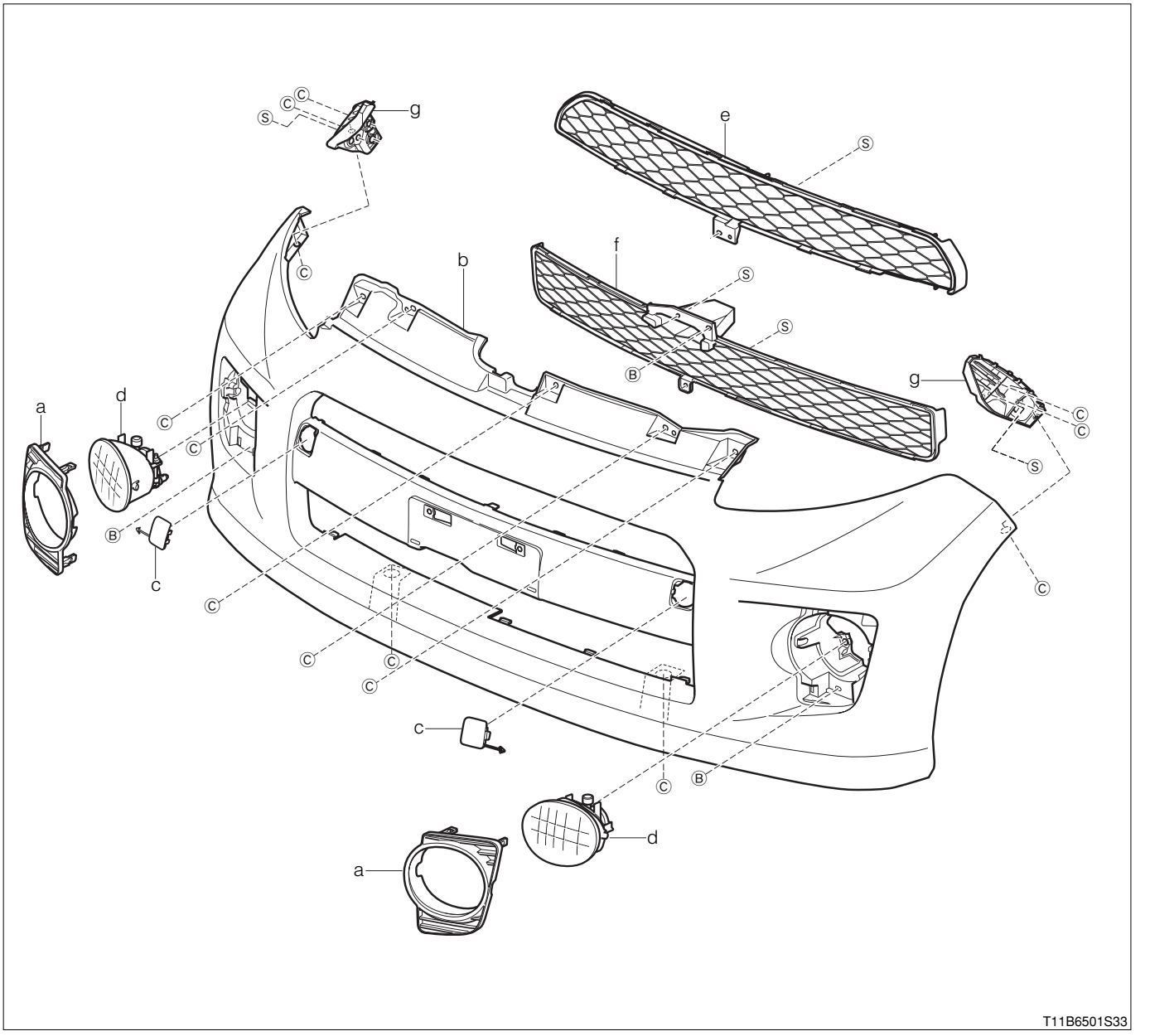
2-2-1 ARTICLES TO BE PREPARED

Tool

Clip remover

2-2-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



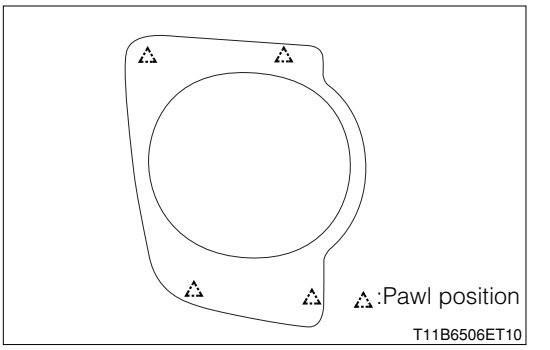
(2) Removal and installation procedures

▼ 1 a Moulding, front bumper side, RH/LH
2 b Cover, front bumper
3 c Cover, front bumper hole, RH/LH
▼ ▲ 4 d Lamp Ay, fog, RH/LH
5 e Grille, radiator, lower No.1
6 f Grille, radiator, lower No.2
7 g Support, front bumper side, RH/LH

2-2-3 POINTS OF REMOVAL

(1) Moulding, front bumper side, RH/LH

1.Remove by detaching the pawl at the position indicated in the right figure.



(2) Lamp Ay, fog, RH/LH

Refer to Page J1-9.

2-2-4 POINTS OF INSTALLATION

(1) Lamp Ay, fog, RH/LH

Refer to Page J1-9.

2-2-5 OPERATION AFTER INSTALLATION

1.Carry out the photometric axis adjustment of the front fog lamp.

Refer to Page J1-2.

3 REAR BUMPER

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

Tool

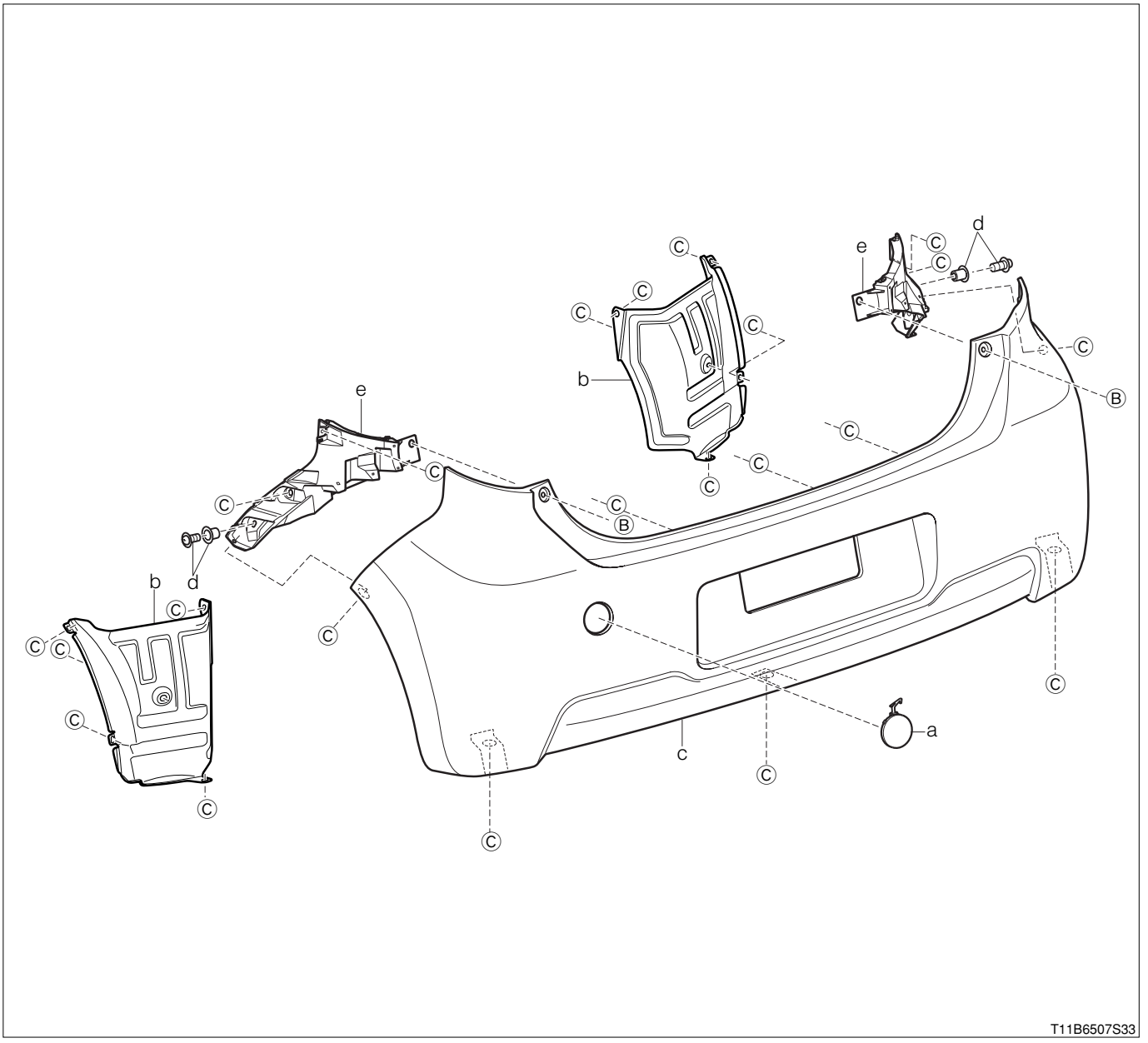
Long TORX® wrench T40,Clip remover

3-1-2 OPERATION BEFORE REMOVAL

1.Remove the license plate lamp Ay.
Refer to Page J1-14.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Cover, rear bumper, upper LH
2 b Liner, rear wheel house, RH/LH
▼ 3 c Cover, rear bumper
4 d Retainer, front bumper, upper
5 e Support, rear bumper side, RH/LH

3-1-4 POINTS OF REMOVAL

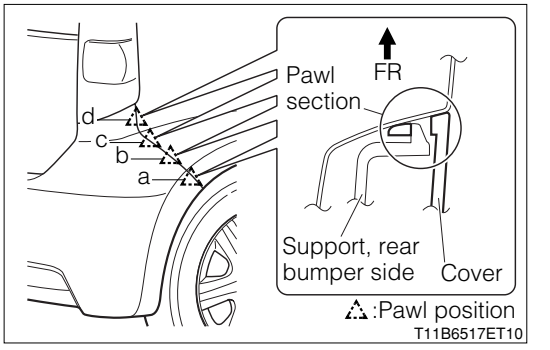
(1) Cover, rear bumper

1.Remove the clips (8 pcs) and the bolts (2 pcs).
TOOL: Long TORX® wrench T40

2.Remove the pawls of the bumper side support in the order of a→b→c→d.

NOTE

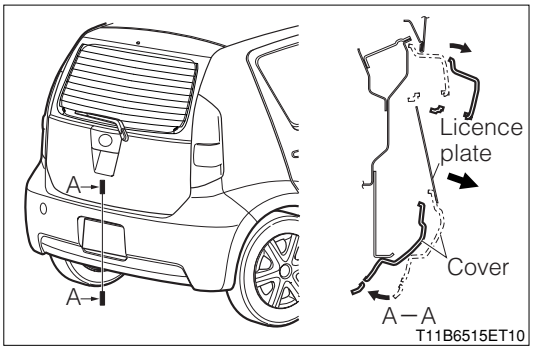
- Draw the cover to the outer side of the vehicle and disengage the pawls.



3.Turn the lower end of the cover to the front of the vehicle; the upper end to the rear of the vehicle. Pass the license plate through the service hole for the cover removal/installation use. Move the cover downward to remove.

CAUTION

- Be careful not to allow the cover to interfere with the rear end of the exhaust pipe.



3-1-5 OPERATION AFTER INSTALLATION

1.Install the license plate lamp Ay.
Refer to Page J1-14.

4 COWL TOP VENTILATOR LOUVER

4-1 REMOVAL AND INSTALLATION

4-1-1 ARTICLES TO BE PREPARED

Tool

Clip remover

Lubricant, adhesive, others

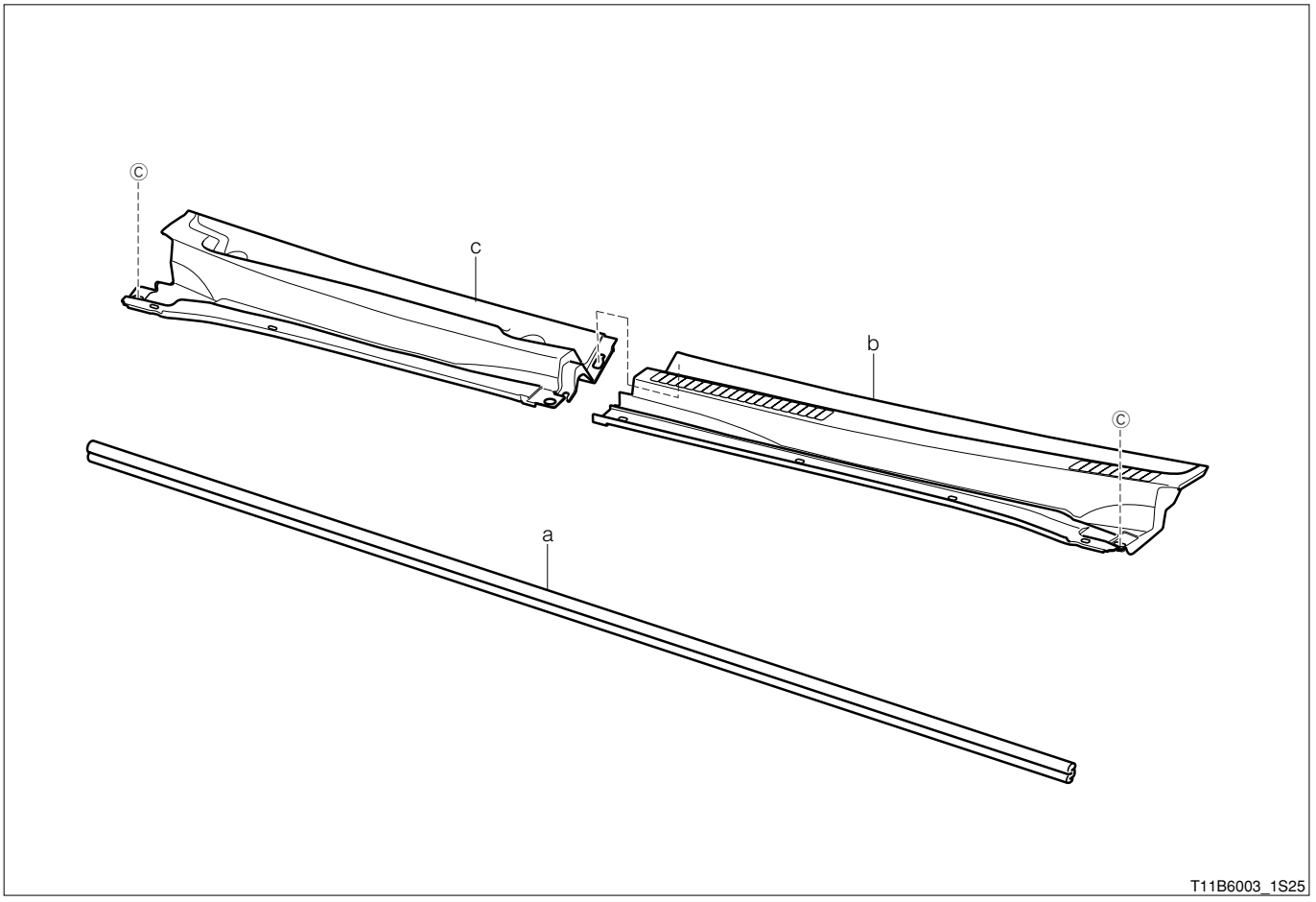
Primer for molding (equivalent 3M K-500)

4-1-2 OPERATION BEFORE REMOVAL

1.Remove the front wiper arm RH/LH.
Refer to Page J2-12.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

▼ ▲ 1 a Seal, hood to cowl top
2 b Louver, cowl top ventilator, LH
▼ ▲ 3 c Louver, cowl top ventilator, RH

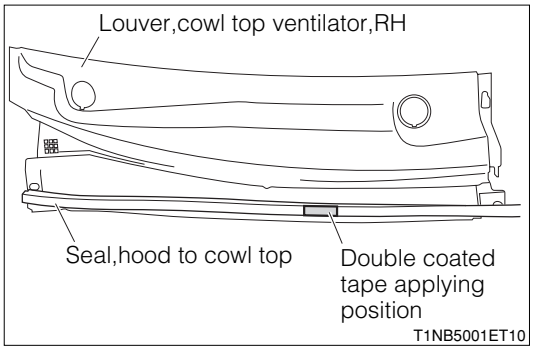
4-1-4 POINTS OF REMOVAL

(1) Hood to cowl top seal, RH cowl top ventilator louver

1.When removing the seal and the louver from the vehicle, remove them while the seal is mounted to the louver.

CAUTION

- When the seal is removed from the louver, the seal surface will be broken where the double-coated tape is attached.



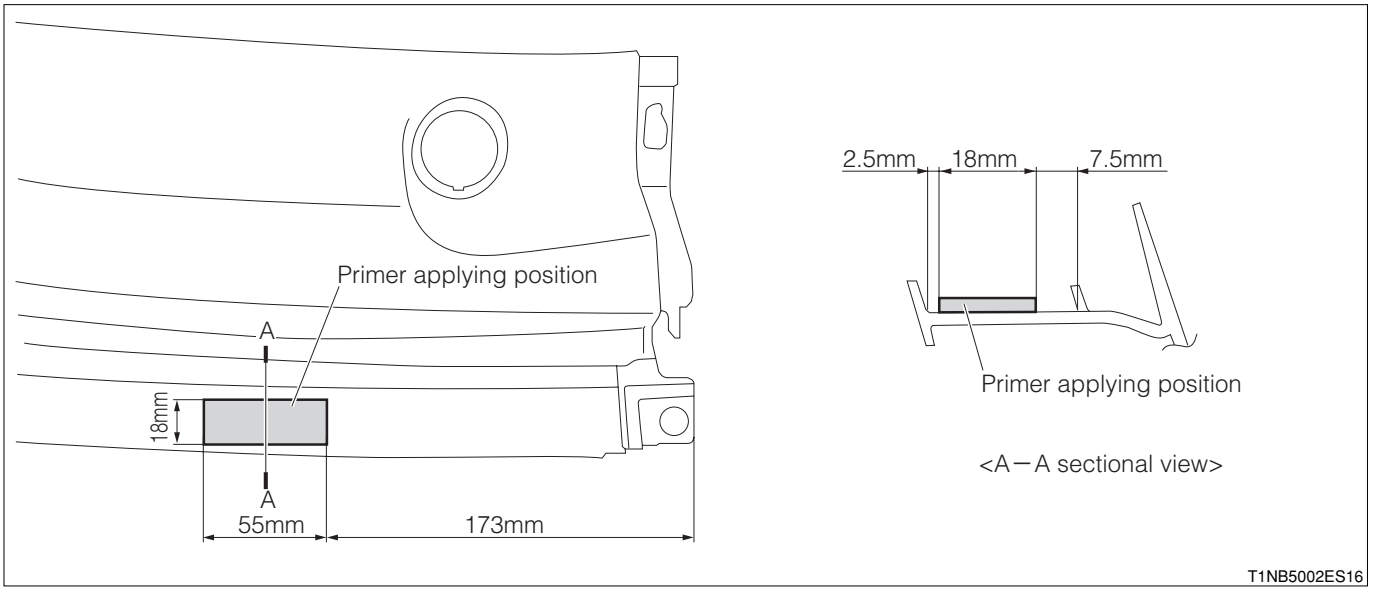
4-1-5 POINTS OF INSTALLATION

(1) Hood to cowl top seal, RH cowl top ventilator louver

① When the RH louver is reused

1.After removing the seal from the louver, remove any remaining double-coated tape and primer on the louver.

2.Apply primer to the louver.



NOTE

- When applying the primer, follow the instruction of the primer instruction manual, etc.

LUBRICANT: Primer for molding (equivalent to 3M K-500)

3.After installing the louver to the vehicle, attach the seal clips onto the louver, except for the double-coated tape, to temporarily attach the seal.

4.Peel-off the affixed paper of the double-coated tape and apply the double-coated tape to the louver.

② When the new RH louver is used

1.Install the louver to the vehicle.

NOTE

- There is no need to apply the primer, as the primer has been coated to the replacement parts.

2.Attach the seal clips onto the louver, except for the double-coated tape, to temporarily attach the seal.

3.Peel-off the affixed paper of the double-coated tape and apply the double-coated tape to the louver.

4-1-6 OPERATION AFTER INSTALLATION

1.Install the front wiper arm RH/LH.

Refer to Page J2-12.

5 SIDE STONE GUARD

5-1 REMOVAL AND INSTALLATION

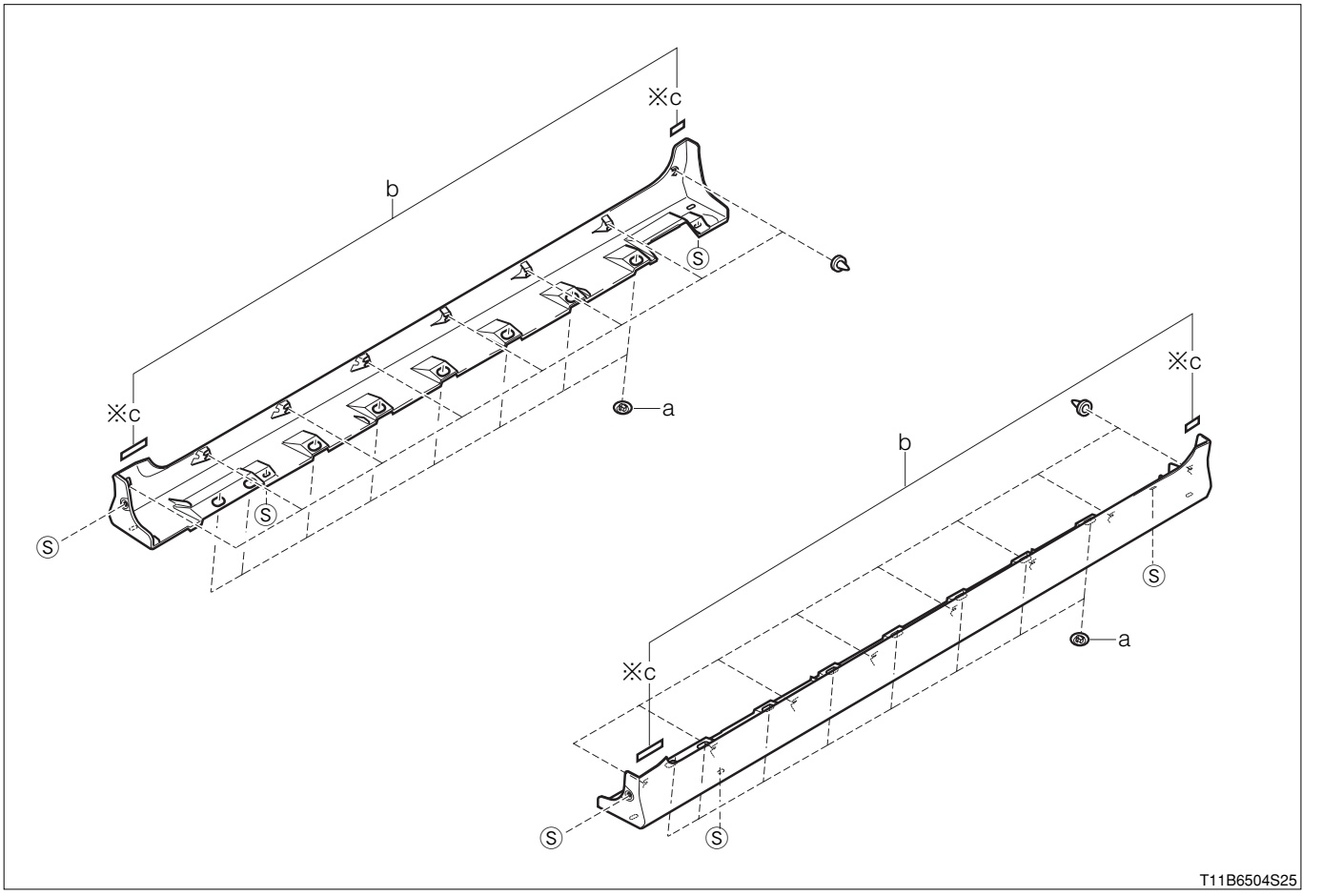
5-1-1 ARTICLES TO BE PREPARED

Tool

Clip remover

5-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



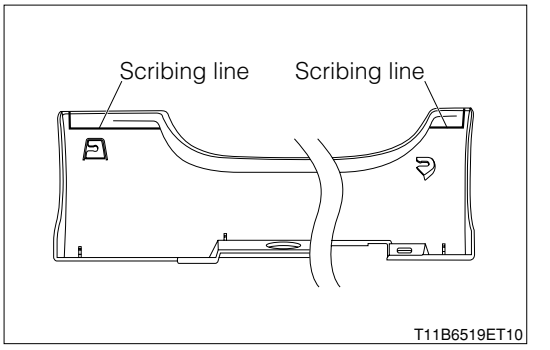
※:Non - reusable parts

(2) Removal and installation procedures

1 a Retainer, side mudguard, No.2
2 b Moulding, body rocker panel, RH/LH
▲ 3 c Tape, moulding, No.1

5-1-3 POINTS OF INSTALLATION

1.When using the body rocker panel molding again, peel off the tape that has already been affixed. Then, affix the tape along the scribing line shown in the illustration at the back of the body rocker panel molding.



6 ROOF END SPOILER

6-1 REMOVAL AND INSTALLATION

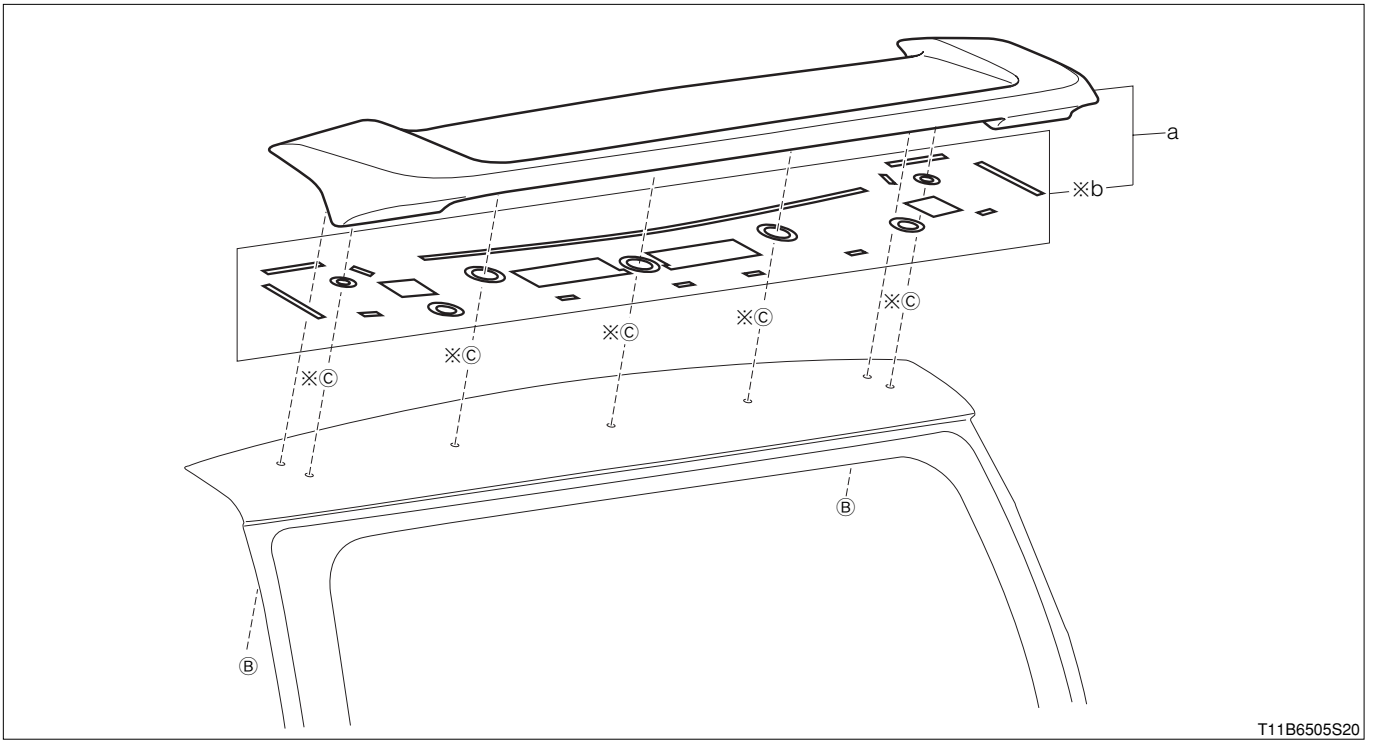
6-1-1 ARTICLES TO BE PREPARED

Tool

Clip remover

6-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts

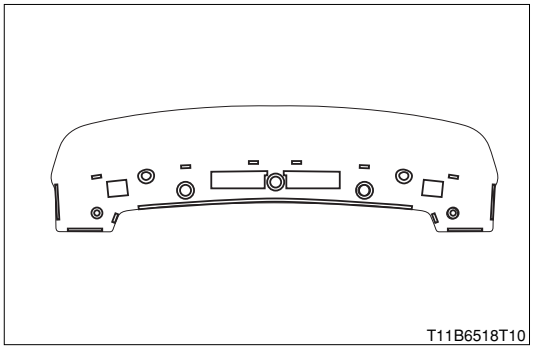
(2) Removal and installation procedures

1 a Spoiler S/A, rear upper

▲ 2 b Seal, rear spoiler

6-1-3 POINTS OF INSTALLATION

1.When using the rear upper spoiler S/A again, peel off the seal that has already been affixed. Then, affix the seal along the scribing line shown in the illustration at the back of the rear upper spoiler S/A.



7 ROOF MOLDING

7-1 REMOVAL AND INSTALLATION

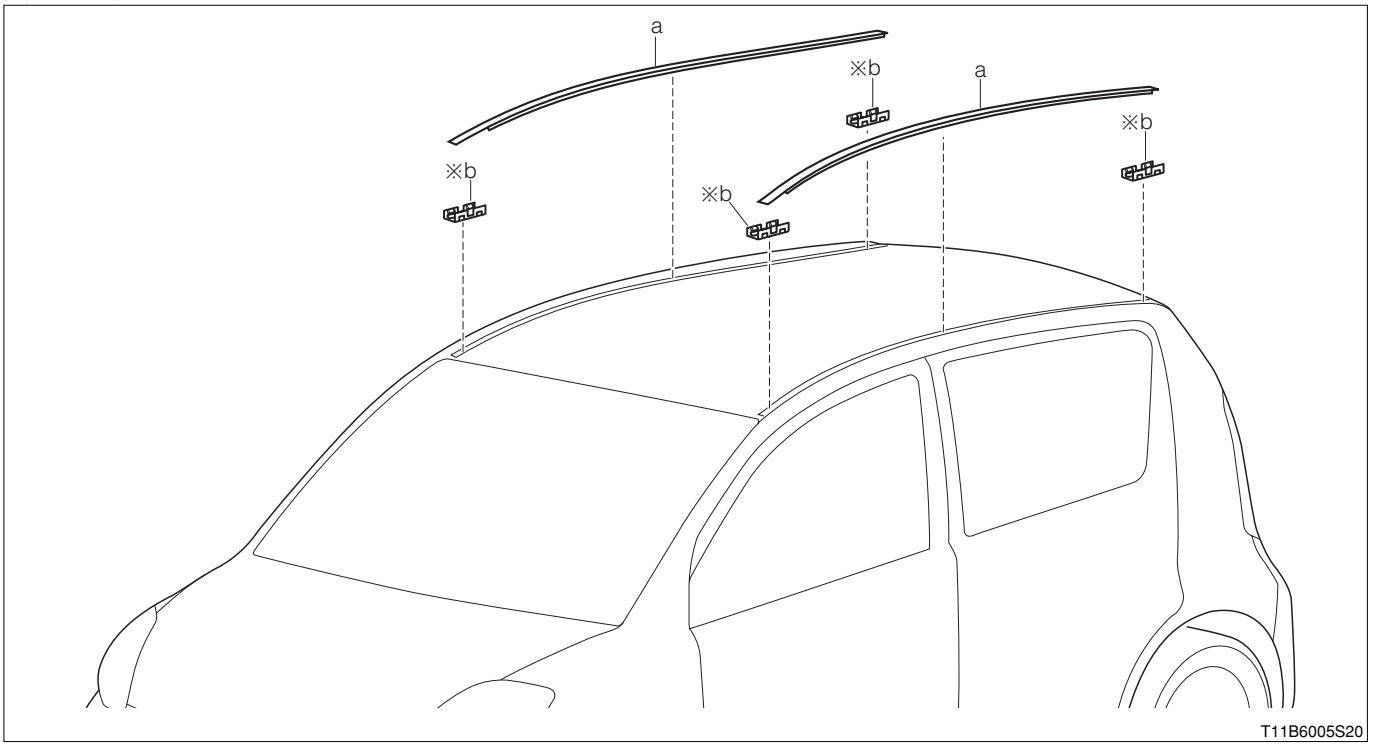
7-1-1 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

Alcohol or white gasoline,Cemedine EP001

7-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts

(2) Removal and installation procedures

▼ 1 a Moulding, roof drip side, RH

▼ ▲ 2 b Clip, roof drip side finish moulding

7-1-3 POINTS OF REMOVAL

(1) Moulding, roof drip side, RH

1.Disengage the fitting of the roof drip side finish moulding clip, and remove the moulding.

(2) Clip, roof drip side finish moulding

1.Remove using tools such as a flat screw driver.

CAUTION

- Do not damage the body.

NOTE

- If the tape is hard and difficult to remove, heat up the tape (needs to be lower than 80℃) to soften it for easy removal.

2.Remove the remaining tape without damaging the body.

7-1-4 POINTS OF INSTALLATION

(1) Clip, roof drip side finish moulding

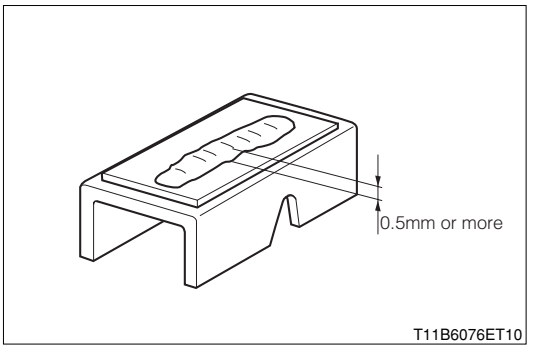
1.Clean up the sealed side.
LUBRICANT: Alcohol or white gasoline

2.Put adhesive material and hardener at the ratio of 1 to 1 in a plastic bag and mix them until the clear adhesive material becomes milky white.

CAUTION
- Note that incorrect ratio of the adhesive material and hardener impairs adhesiveness.
- Note that unevenly mixed material could cause a hardening problem.
- Spread the material within 20 minutes after mixing.

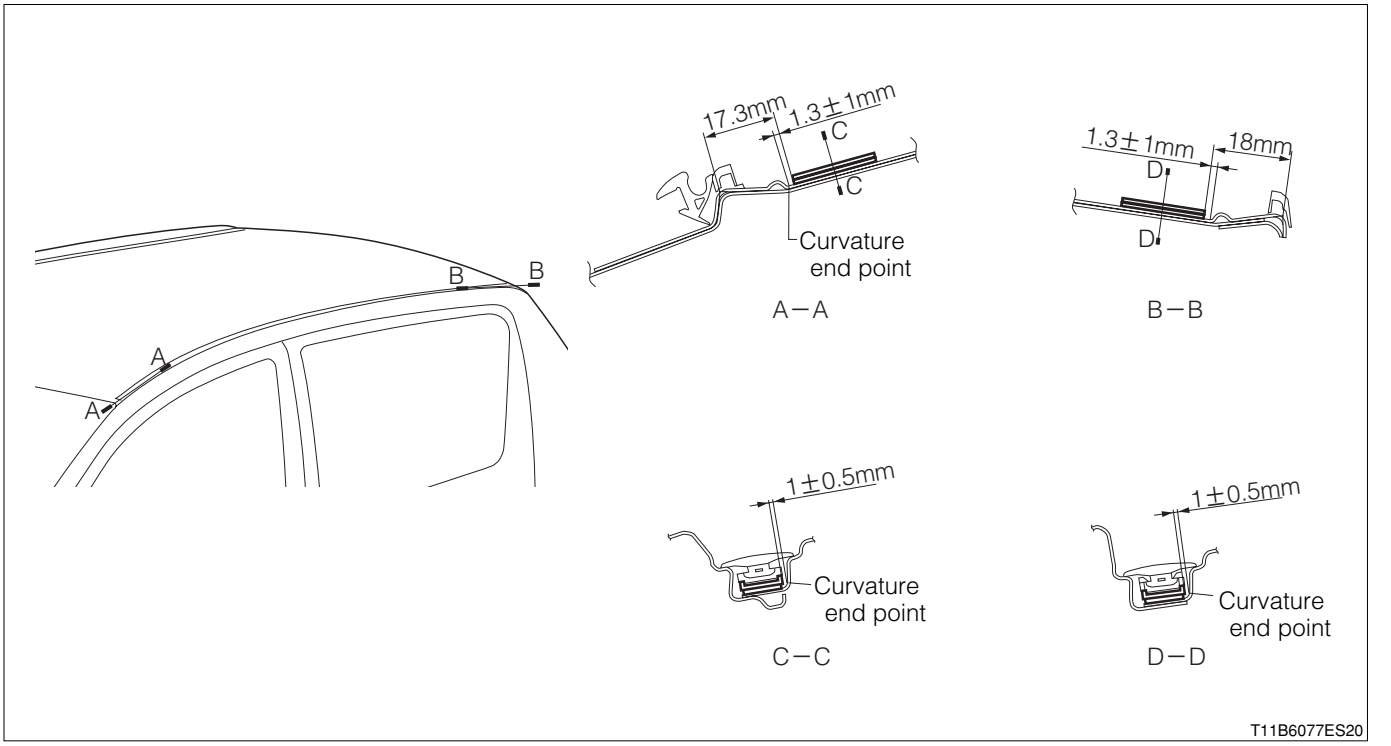
ADHESIVE: Cemedine EP001

3.Spread the adhesive material on the clip whose thickness shall be thicker than 0.5mm.
SPECIFIED VALUE: The adhesive material comes out at the sides of the clips when pressed down hard.



4.Press the clips on the exact places indicated in the figure below.

CAUTION
- Do not touch the sealed side with fingers.
- Note that no oil, water or dust shall be in the material.
- Press the tape onto the body evenly.
- Pressed at right angles to the body.



5.Let the adhesive material harden.

CAUTION

- Do not touch until the material harden.

NOTE

- Warming up (lower than 80°C) accelerates the hardening procedure.

Let it sit.	Longer than 3 hours at a room temperature.
Heat up.	Longer than 30 minutes at 80℃.

6.Remove/install the RH roof drip side moulding to ensure the clips stay firmly.

8 BLACKOUT TAPES(FRONT DOOR)

8-1 REMOVAL AND INSTALLATION

8-1-1 ARTICLES TO BE PREPARED

Tool

Rubber spatula

Lubricant,adhesive,others

Spray,Dryer,Soap water,Cloth

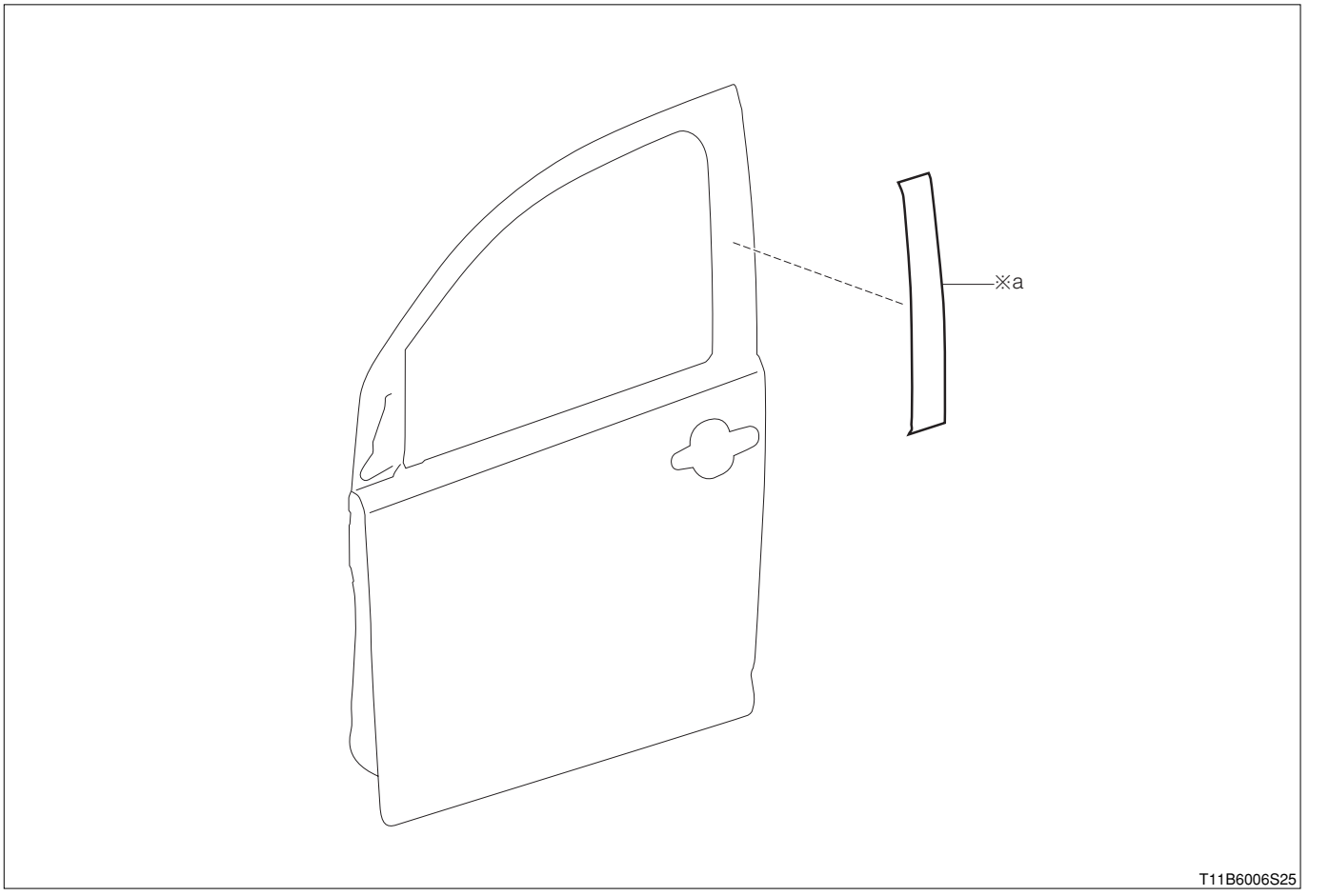
8-1-2 OPERATION BEFORE REMOVAL

1.Remove the front door window outer weather-strip.
Refer to Page I1-11.

2.Remove the front door glass run RH/LH.
Refer to Page I1-11.

8-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts

(2) Removal and installation procedures

▼ ▲ 1 a Tape, black out, No.2 RH/LH

8-1-4 POINTS OF REMOVAL

(1) Tape, black out, No.2 RH/LH

1.Take off the tape from the end slowly.

NOTE

- If the tape doesn't come off easily due to seizure, heat the tape by a drier for easy removal.

8-1-5 POINTS OF INSTALLATION

CAUTION

- Work inside of the building where there is little wind and dust.
- Application operation shall be done at the temperature between 15 to 27℃.
- Warm up the tape and the door sash sealing side with a drier when the temperature is below 15℃.

(1) Tape, black out, No.2 RH/LH

1.With alcohol, clean off the application surface of the RH/LH front door panel S/A sash to remove dirt and foreign matters from there.

CAUTION

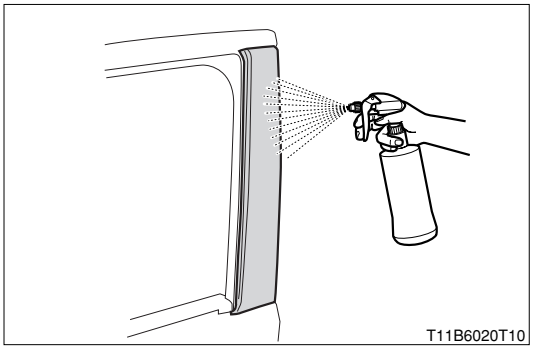
- Anything left on the sealing side when taping will cause weak adhesiveness and external defects such as spots. Therefore, be sure to wipe off dirt.

2.Wrap a spatula with cloth.

NOTE

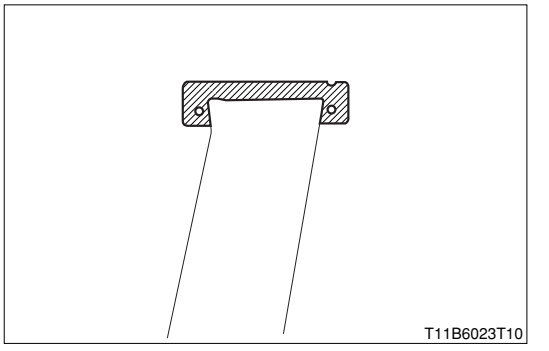
- A spatula wrapped with cloth gives smooth strokes, thus improving workability.

3.Mix tap water and mild liquid detergent at the ratio of 100 to 1, and spray it evenly onto the applying surface of the RH/LH front door panel S/A sash.


T11B6020T10

4.Cut out the marked area in the figure on the right.

5.Remove the backing sheet on the top end of the tape.

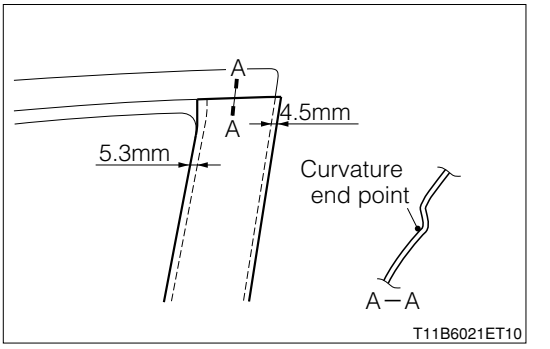

T11B6023T10

6.Place the cut-out of the tape onto the end of curvature of the RH/LH front door panel S/A sash, and paste it temporarily.

CAUTION

- The tape is temporarily pasted parallel to the RH/LH front door panel S/A sash.
- Ensure that there is about 4.5mm of roll-in length behind the vehicle.

7.Check the taping position.

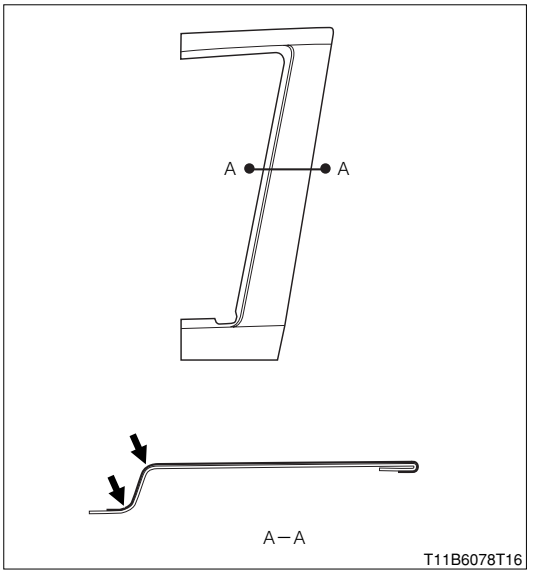


8.Press and paste with the spatula on curvature section (2 locations).

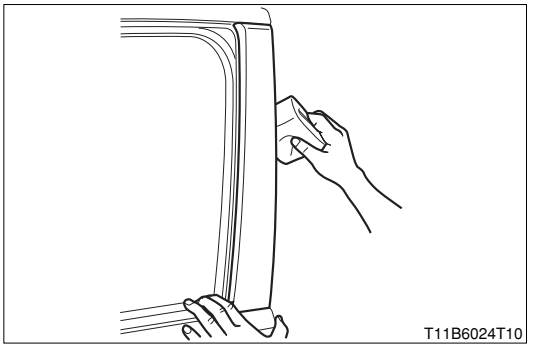
9.After application, push out the water with the spatula and press it down hard.

CAUTION

- Ensure to push out all water from between the tape and the RH/LH front door panel S/A sash, for any remaining water will cause spots later.

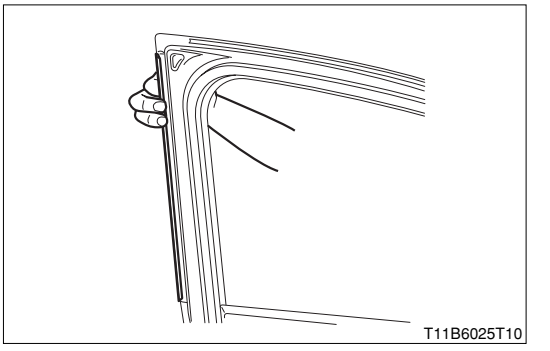


10.With a spatula, make a fold on the tape roll-in portions at both sides of the RH/LH front door panel S/A sash.



11.Lightly warm up the tape roll-in portion with a drier, and fold it with fingers.

12.Press the entire tape hard and let it dry after wiping off water.



8-1-6 OPERATION AFTER INSTALLATION

1.Install the front door glass run RH/LH.
Refer to Page I1-11.

2.Install the front door window outer weather-strip.
Refer to Page I1-11.

9 BLACKOUT TAPES(REAR DOOR)

9-1 REMOVAL AND INSTALLATION

9-1-1 ARTICLES TO BE PREPARED

Tool

Rubber spatula

Lubricant,adhesive,others

Spray,Dryer,Soap water,Cloth

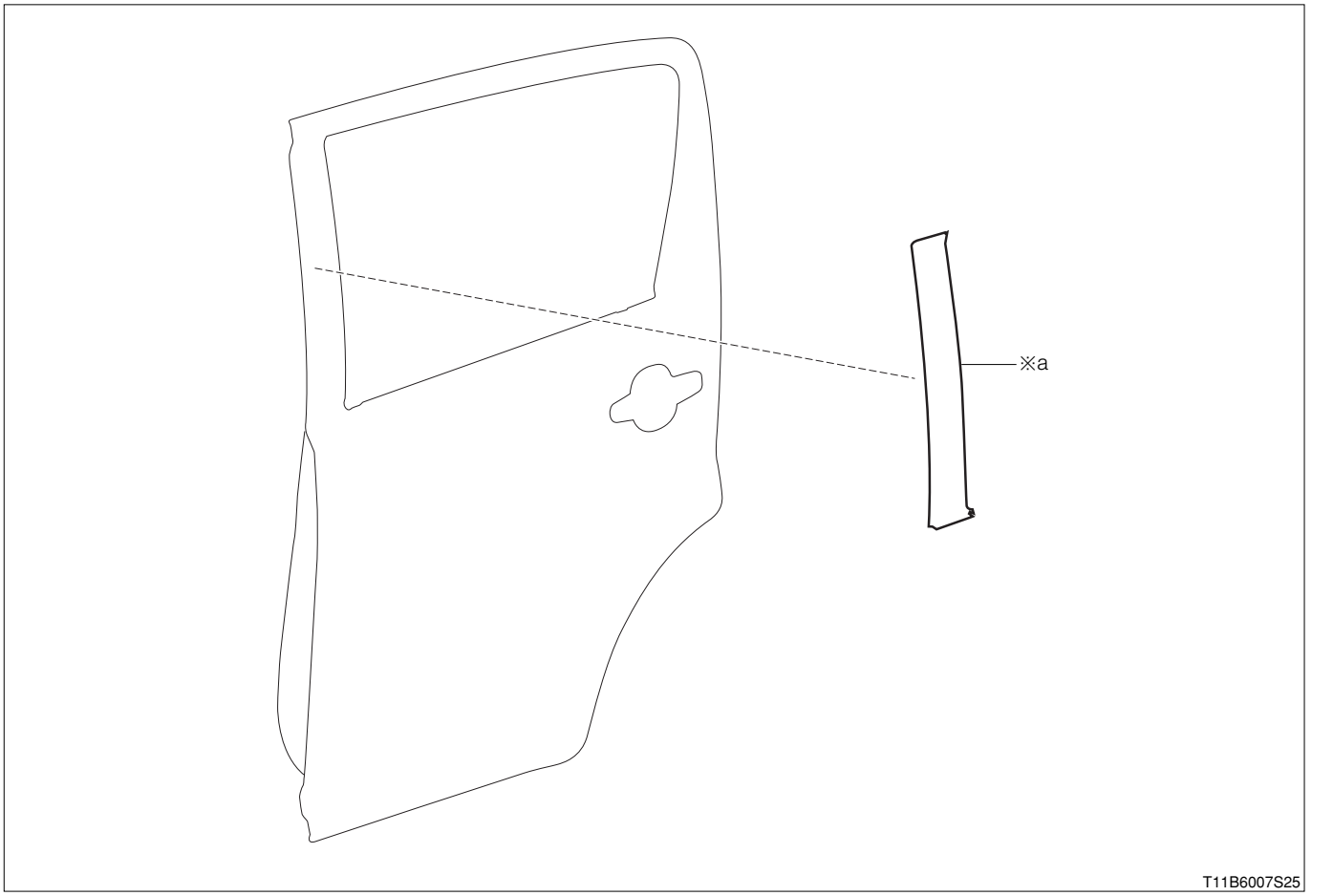
9-1-2 OPERATION BEFORE REMOVAL

1.Remove the rear door window outer weather-strip.
Refer to Page I1-18.

2.Remove the rear door glass run RH/LH.
Refer to Page I1-18.

9-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts

(2) Removal and installation procedures

▼ ▲ 1 a Tape, black out, No.3 RH/LH

9-1-4 POINTS OF REMOVAL

(1) Tape, black out, No.3 RH/LH

1.Take off the tape from the end slowly.

NOTE

- If the tape doesn't come off easily due to seizure, heat the tape by a drier for easy removal.

9-1-5 POINTS OF INSTALLATION

CAUTION

- Work inside of the building where there is little wind and dust.
- Tape application shall be done at the temperature between 15 to 27°C.
- Warm up the tape and the door sash sealing surface with a drier when the temperature is below 15°C.

(1) Tape, black out, No.3 RH/LH

1.With alcohol, clean off the application surface of the RH/LH rear door panel S/A sash to remove dirt and foreign matters from there.

CAUTION

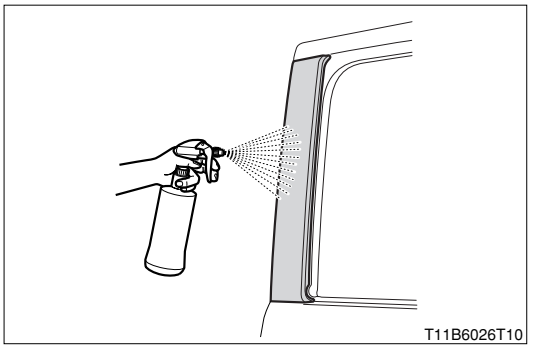
- Anything left on the sealing side when taping will cause weak adhesiveness and external defects such as spots. Therefore, be sure to wipe off dirt.

2.Wrap a spatula with cloth.

NOTE

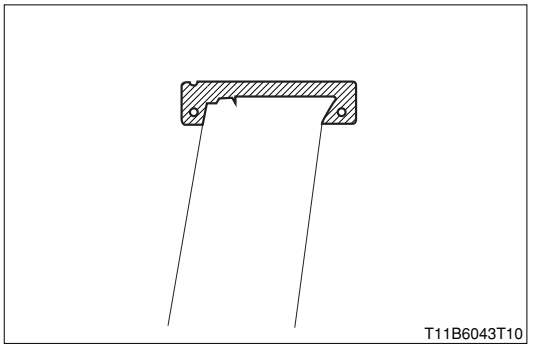
- A spatula wrapped with cloth gives smooth strokes, thus improving workability.

3.Mix tap water and mild liquid detergent at the ratio of 100 to 1, and spray it evenly onto the applying surface of the RH/LH rear door panel S/A sash.



4.Cut out the marked area in the figure on the right.

5.Remove the backing sheet on the top end of the tape.

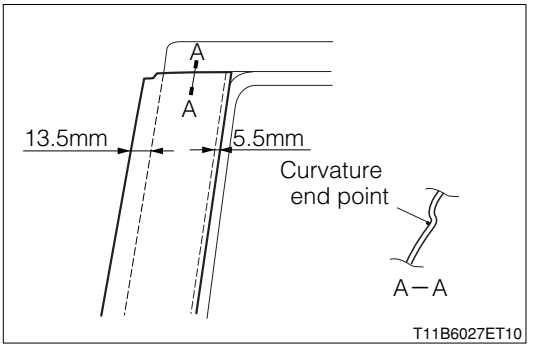


6.Place the cut-out of the tape onto the end of curvature of the RH/LH rear door panel S/A sash, and paste it temporarily.

CAUTION

- The tape is temporarily pasted parallel to the RH/LH rear door panel S/A sash.
- Check that the there is approx. 13.5mm of roll-in length for the left side.

7.Check the taping position.



8.Press and paste with the spatula on the curvature section (4 locations).

9.After taping, push out the water with the spatula.

CAUTION

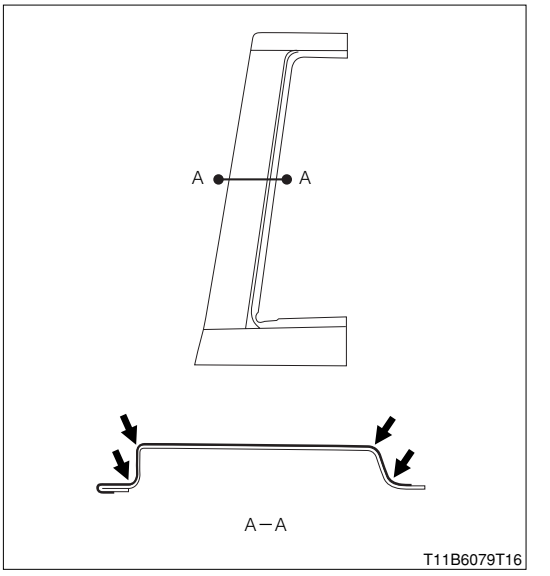
- Paste parallel to the RH/LH rear door panel S/A sash.

10.Check the taping position.

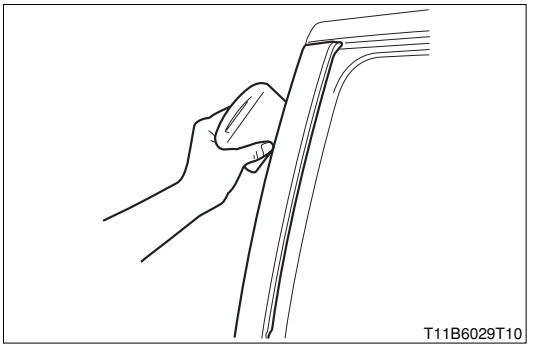
11.After taping, push out the water with the spatula.

CAUTION

- Ensure to push out all water from between the tape and the RH/LH rear door panel S/A sash, for any remaining water will cause spots later.

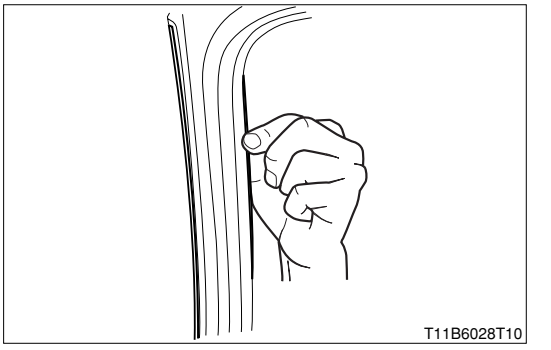


12.With a spatula, make a fold on the tape roll-in portions.



13.Lightly warm up the tape roll-in portion with a drier, and fold it with fingers.

14.Press the entire tape hard and let it dry after wiping off water.



9-1-6 OPERATION AFTER INSTALLATION

1.Install the rear door glass run RH/LH.
Refer to Page I1-18.

2.Install the rear door window outer weather-strip.
Refer to Page I1-18.

10 INSTRUMENT PANEL

10-1 REMOVAL AND INSTALLATION

CAUTION

- Refer to the precaution on maintenance for SRS airbag system.

Refer to Page A1-26.

10-1-1 ARTICLES TO BE PREPARED

Tool

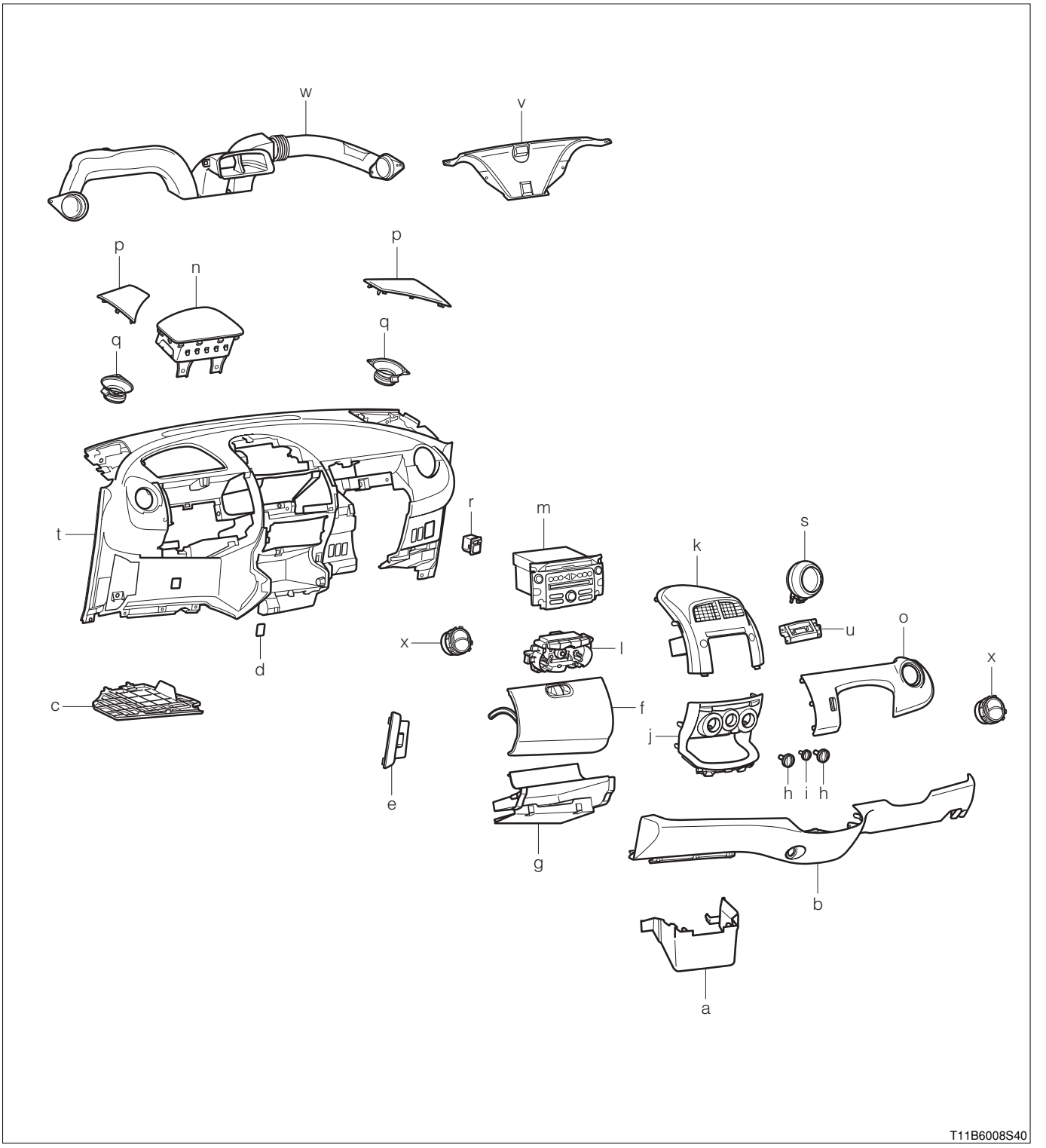
Clip remover

10-1-2 OPERATION BEFORE REMOVAL

1. Remove the battery negative (−) terminal.
2. Remove the front pillar garnish RH/LH.
   Refer to Page I2-48.
3. Remove the cowl side trim board RH/LH.
   Refer to Page I2-48.

10-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



The illustration shows a typical example.

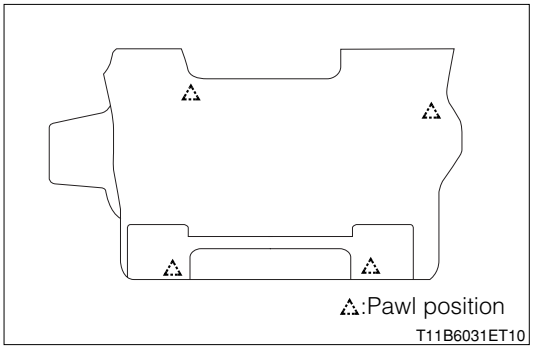
(2) Removal and installation procedures

▼		1	a	Panel, console
▼		2	b	Panel S/A, instrument panel finish, lower
▼		3	c	Cover, instrument panel under, No.1
▼		4	d	Cover, instrument, lower
▼		5	e	Cover, fuse box opening
▼		6	f	Door, instrument panel
▼		7	g	Box Ay, instrument panel, No.1
		8	h	Knob S/A, control
		9	i	Knob S/A, control
▼		10	j	Panel S/A, instrument cluster finish, lower center
▼		11	k	Panel S/A, instrument cluster finish, center
▼	▲	12	l	Control Ay, heater
▼	▲	13	m	Receiver Ay, radio
▼	▲	14	n	Airbag Ay, instrument panel passenger
▼	▲	15	o	Panel, instrument cluster finish
▼		16	p	Grille, speaker, RH/LH
	▲	17	q	Speaker Ay, radio
		18	r	Switch Ay, outer mirror
▼		19	s	Tachometer Ay, engine
▼		20	t	Panel, instrument
▼		21	u	Bracket, accessory meter
▼		22	v	Nozzle Ay, defroster
▼		23	w	Duct S/A, heater to register, center
▼		24	x	Register Ay, instrument panel, No.1

10-1-4 POINTS OF REMOVAL

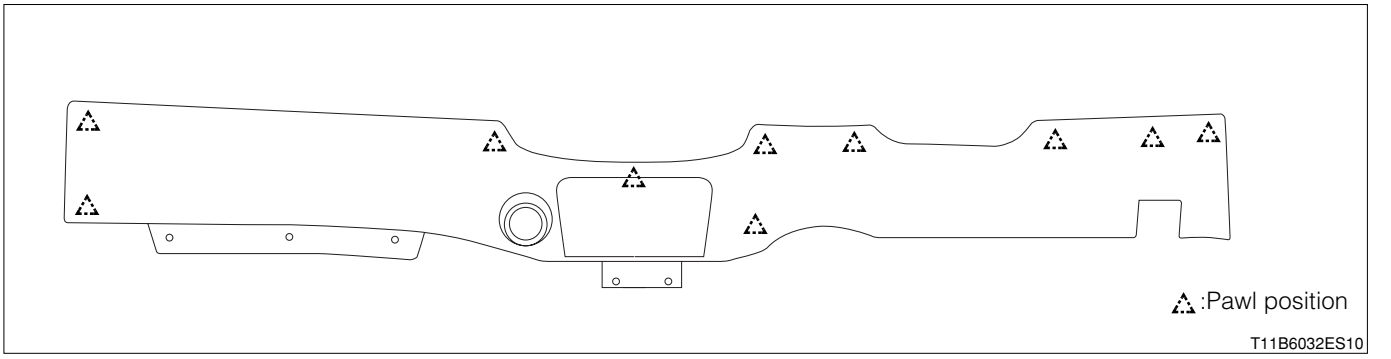
(1) Panel, console

1.Disengage the pawls indicated in the right figure and remove the panel.



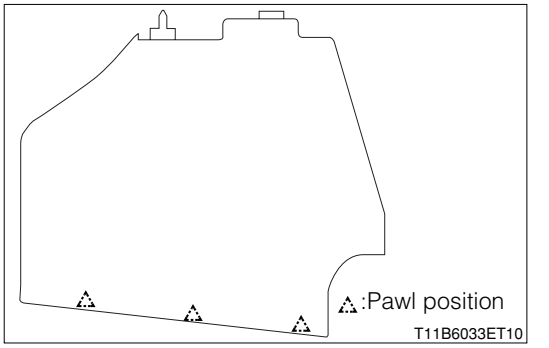
(2) Panel, instrument panel finish, lower

1.Remove the screws. (RHD vehicle: 6 points, LHD vehicle: 5 points)
2.Remove the clips (3 locations).
3.Disengage the pawls indicated in the figure below and remove.



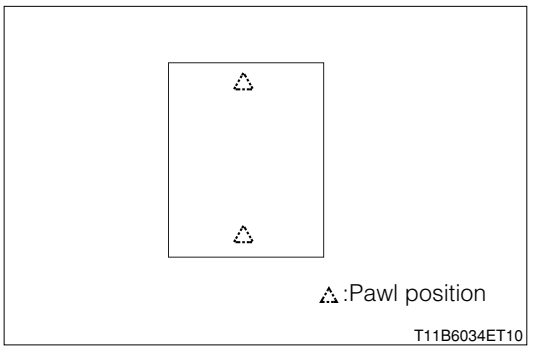
(3) Cover, instrument panel under, No.1

1.Disengage the pawls indicated in the right figure and remove the cover.



(4) Cover, instrument, lower

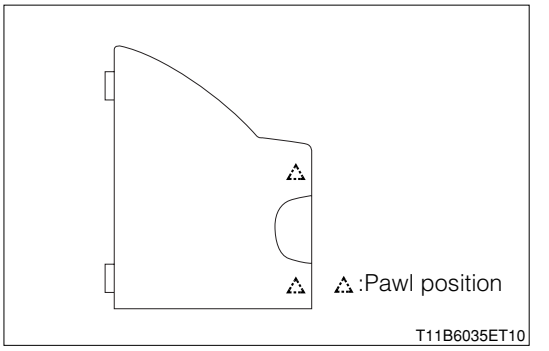
1.Disengage the pawls indicated in the right figure and remove the cover.



(5) Cover, fuse box opening

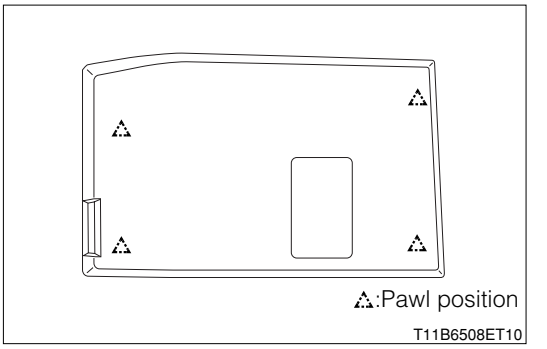
① RHD vehicles

1.Disengage the pawls indicated in the right figure and remove the cover.



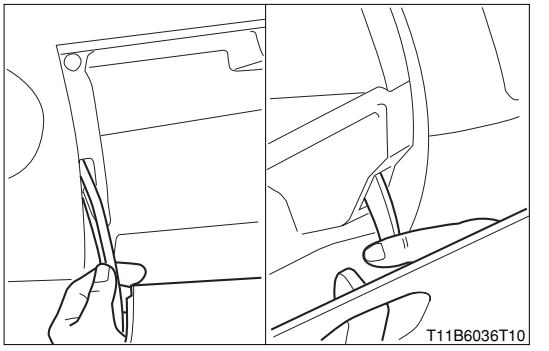
② LHD vehicles

1.Disengage the pawls indicated in the right figure and remove the cover.



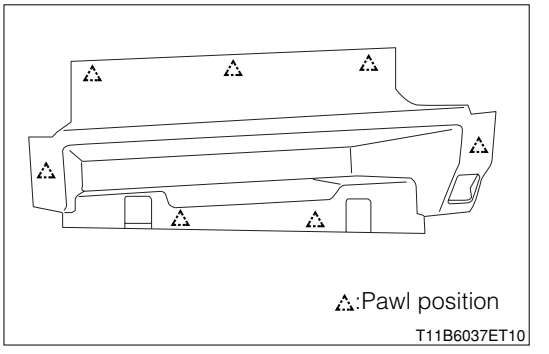
(6) Door, instrument panel

1.Open the door fully and then close approx. 10mm from the full open position. While pushing up the right and left door arm sections together, remove them through the instrument panel holes.



(7) Box, instrument panel,No.1

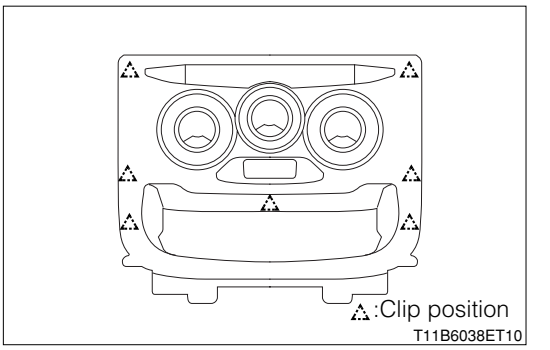
1.Disengage the pawls indicated in the right figure and remove the box.



(8) Panel S/A, instrument cluster finish, lower center

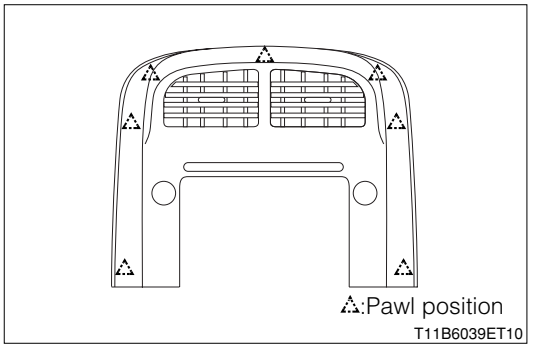
1.Remove the screws (4 locations).

2.Disengage the pawls indicated in the right figure and remove the panel S/A.



(9) Panel S/A, instrument cluster finish, center

1.Disengage the pawls indicated in the right figure and remove the panel S/A.



(10) Control Ay, heater

Refer to Page K1-7.

(11) Receiver Ay, radio

Refer to Page J4-1.

(12) Airbag Ay, instrument panel passenger

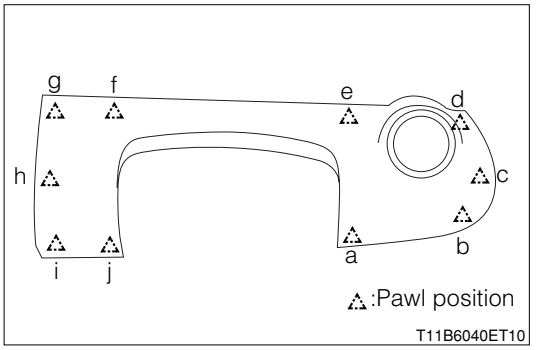
Refer to Page H1-11.

(13) Panel, instrument cluster finish

1.Disengage the pawls in the sequence of d→e→f→c→b→a→g→h→i→j, and remove the panel.

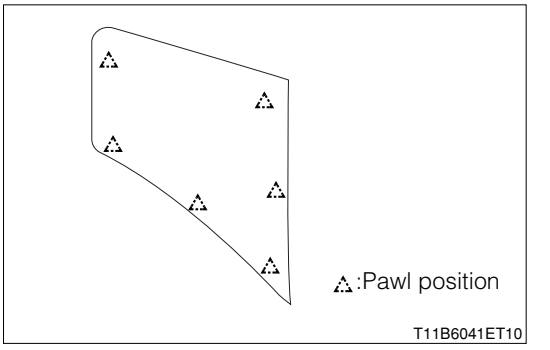
CAUTION

- Failure to follow the sequence will break the panel.



(14) Grille, speaker, RH/LH

1.Disengage the pawls indicated in the right figure and remove it.



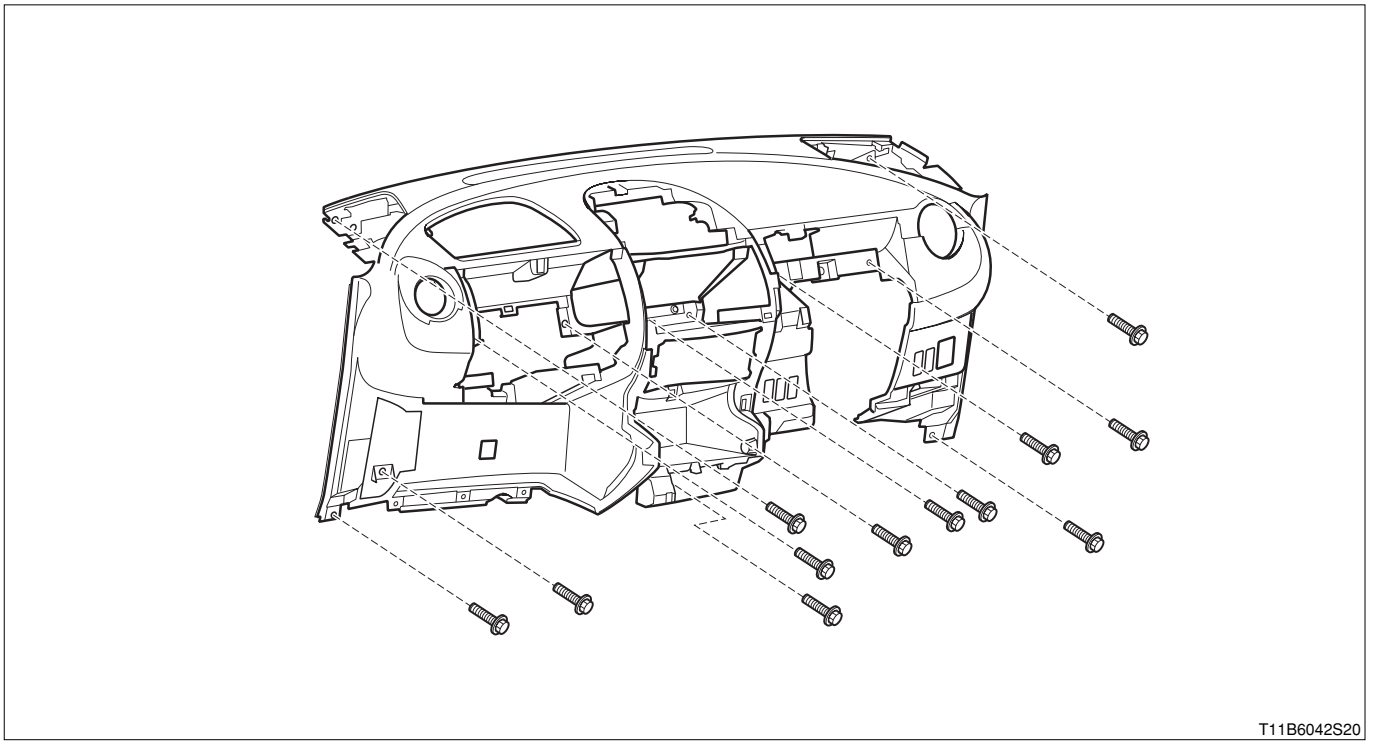
(15) Tachometer Ay, engine

Refer to Page J3-4.

(16) Panel, instrument

1.Remove the electric power steering column Ay from the instrument panel reinforcement S/A.
Refer to Page G1-5.

2.Remove the front door front lower frame subassembly by removing the bolts at the positions indicated in the figure below.



T11B6042S20

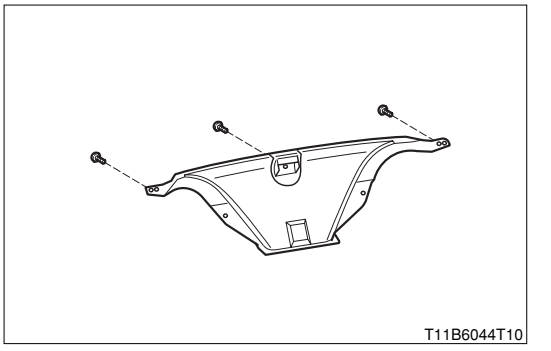
(17) Bracket, accessory meter

Refer to Page J3-4.

(18) Nozzle Ay, defroster

① **RHD vehicles**

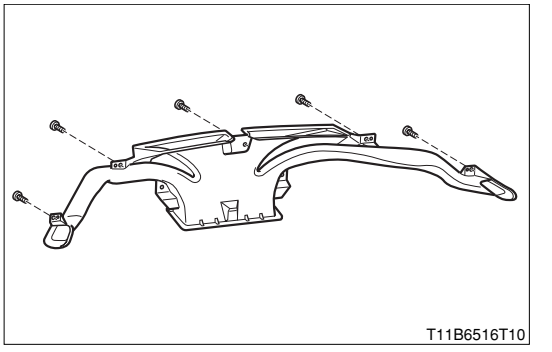
1.Remove the screws (3 locations).



T11B6044T10

② **LHD vehicles**

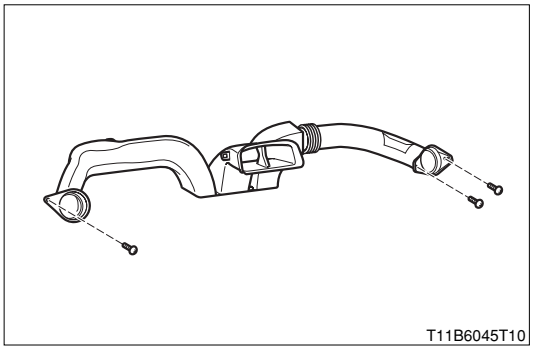
1.Remove the screws (5 locations).



T11B6516T10

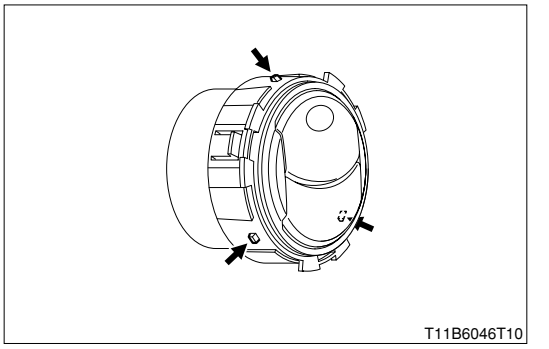
(19) Duct S/A, heater to register, center

1.Remove the screws (3 locations).



(20) Register Ay, instrument panel, No.1

1.Disengage the pawls indicated in the right figure and remove the register Ay.



10-1-5 POINTS OF INSTALLATION

(1) Speaker Ay, radio

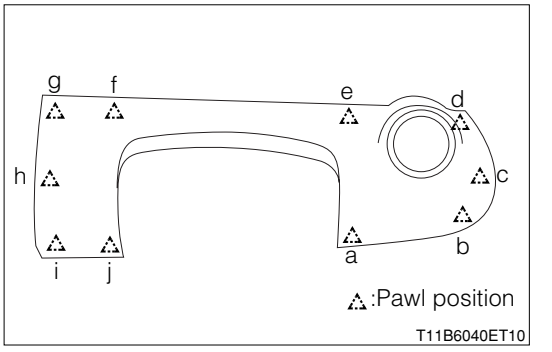
Refer to Page J4-3.

(2) Panel, instrument cluster finish

1.Engage the pawls indicated in the right figure in the sequence of j to a.

CAUTION

- Press the top part of the pawl to install.



(3) Airbag Ay, instrument panel passenger

Refer to Page H1-11.

(4) Receiver Ay, radio

Refer to Page J4-1.

(5) Control Ay, heater

Refer to Page K1-7.

10-1-6 OPERATION AFTER INSTALLATION

1.Install the front pillar garnish RH/LH.
Refer to Page I2-48.

2.Install the cowl side trim board RH/LH.
Refer to Page I2-48.

3.Connect the battery negative (−) terminal.

11 REAR CONSOLE BOX

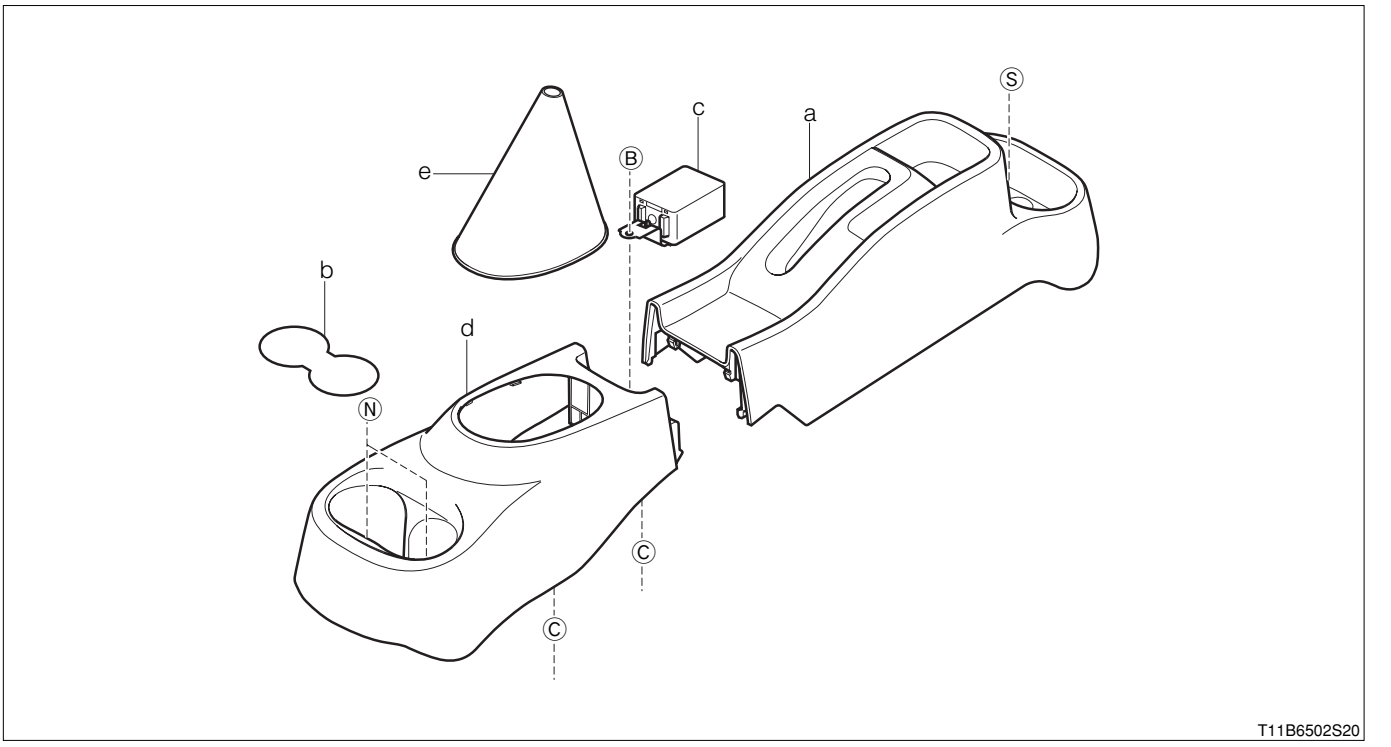
11-1 REMOVAL AND INSTALLATION

11-1-1 OPERATION BEFORE REMOVAL

1.Remove the shift lever knob S/A (M/T vehicle only)
Refer to Page F2-15.

11-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



T11B6502S20

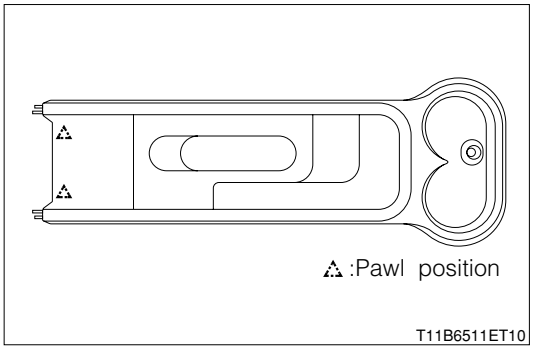
(2) Removal and installation procedures

▼ 1 a Box S/A, console, rear
2 b Carpet, console box
3 c Relay Ay, windshield wiper (not equipped for some specifications)
4 d Box S/A, console, front
5 e Cover Ay, shifting hole (M/T vehicle only)

11-1-3 POINTS OF REMOVAL

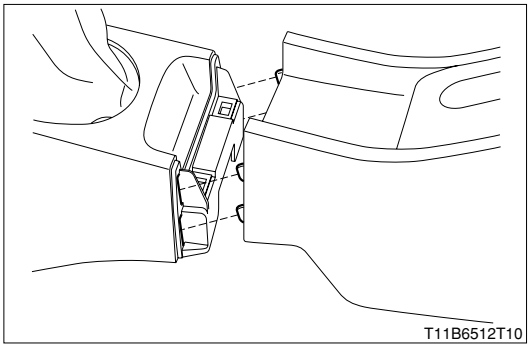
(1) Box S/A, console, rear

1.Pull the parking brake lever to provide a gap for moving the box S/A.
2.Disengage the pawls indicated in the right figure and lift the box S/A upward.



T11B6511ET10

3.Move the box S/A toward the rear of the vehicle. Disengage it from the front console box S/A to remove.



11-1-4 OPERATION AFTER INSTALLATION

1.Install the shift lever knob S/A (M/T vehicle only)
Refer to Page F2-15.

12 FRONT SEAT

12-1 REMOVAL AND INSTALLATION

CAUTION

- Refer to the precaution on checking procedure for SRS airbag system.

Refer to Page A1-26.

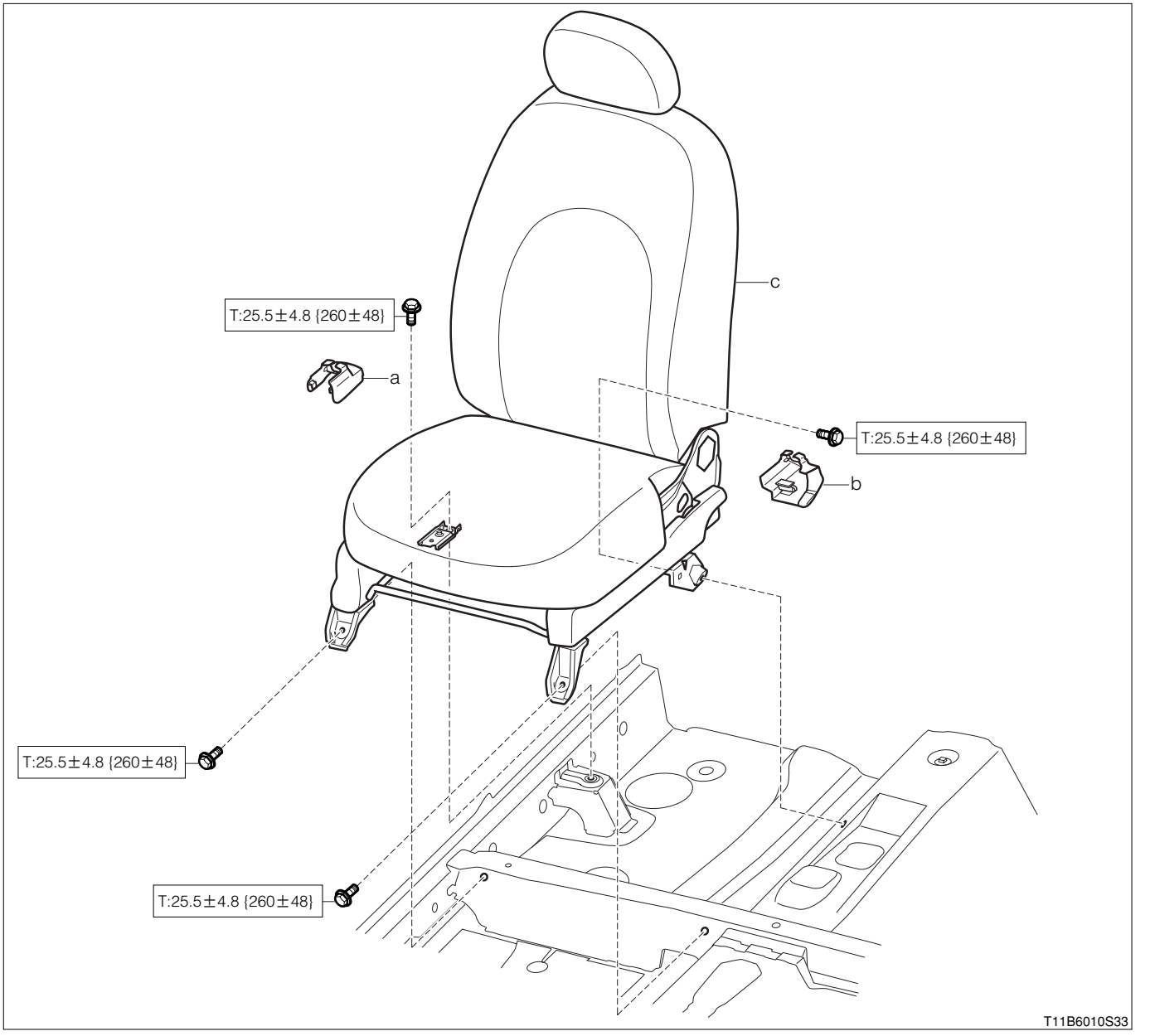
12-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

12-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

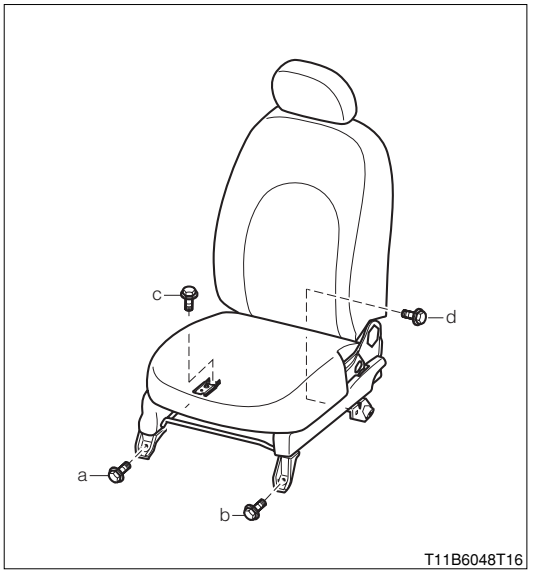
(2) Removal and installation procedures

1 a Cover, front seat leg
2 b Cover, front seat leg, LH
▲ 3 c Seat Ay, front RH/LH

12-1-3 POINTS OF INSTALLATION

(1) Seat Ay, front RH/LH

1.Temporarily install the bolts a and b.
2.Slide the seat to the most forward position.
3.Tighten the bolts c and d.
4.Tighten the bolts a and b.



12-2 DISASSEMBLING AND ASSEMBLING

12-2-1 ARTICLES TO BE PREPARED

Instrument

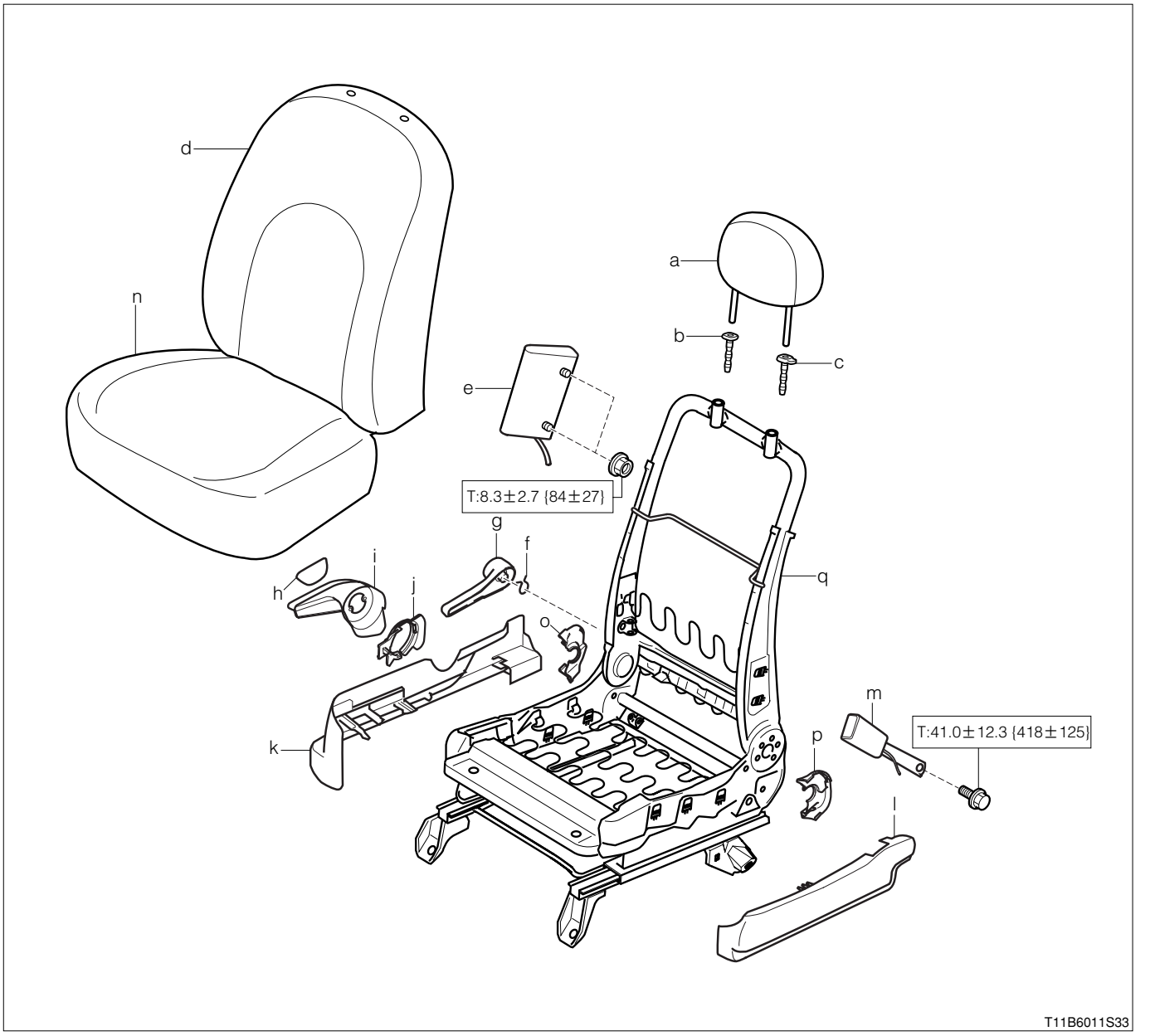
Torque wrench

12-2-2 OPERATION BEFORE DISASSEMBLY

1.Remove the front seat Ay RH/LH.
Refer to Page I2-33.

12-2-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

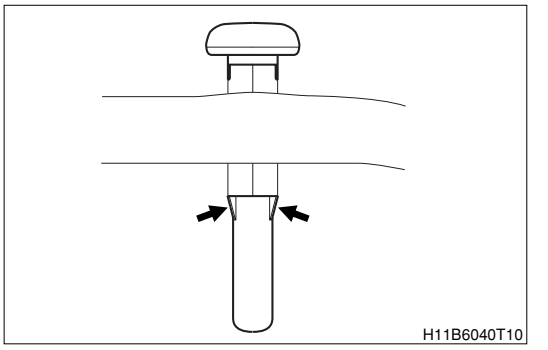
(2) Disassembling and assembling procedures

	1	a	Headrest Ay, front seat	10	j	Spacer, vertical adjuster
▼	2	b	Support, front seat headrest, RH	11	k	Shield, front seat cushion, RH
▼	3	c	Support, front seat headrest, LH	12	l	Shield, front seat cushion, inner RH
	4	d	Pad, front seat back w/cover, RH	13	m	Belt Ay, front seat, inner
	5	e	Air bag Ay, front seat, RH	14	n	Pad S/A, front seat cushion, RH
	6	f	Ring	15	o	Cover, seat hinge outer, RH
▼	7	g	Handle, reclining adjuster release, RH	16	p	Cover, seat hinge inner, RH
	8	h	Cover, vertical adjuster	17	q	Frame S/A, front seat w/adjuster, RH
	9	i	Lever, vertical adjuster lock			

12-2-4 POINTS OF DISASSEMBLY

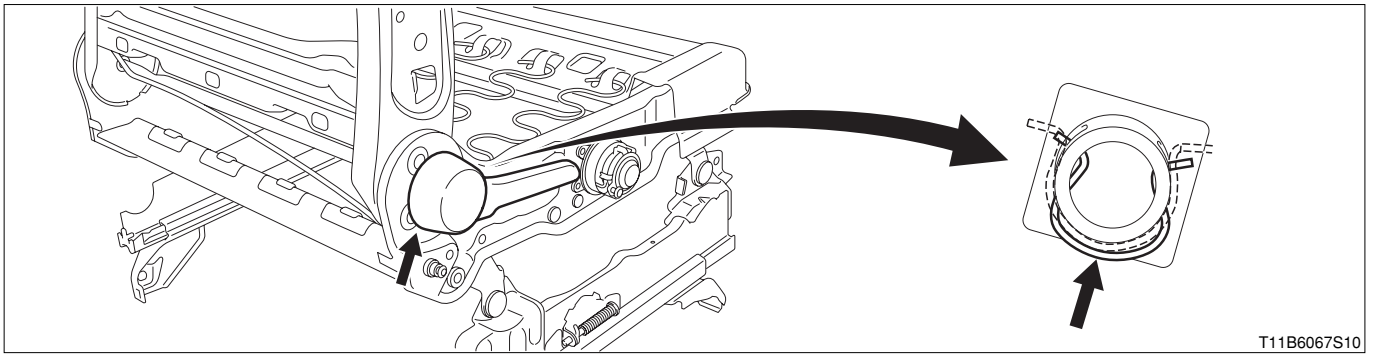
(1) Support, front seat headrest, RH / Support Ay, front seat headrest, LH

1.Put a hand from the bottom of the RH front seat back pad W/cover, and press the pawl to push off the support Ay.



(2) Handle, reclining adjuster release, RH

1.Press the ring and disengage the fitting with the RH front seat frame Ay W/adjuster.
2.Remove with a flat screwdriver while pressing the ring.



12-2-5 OPERATION AFTER ASSEMBLY

1.Install the front seat Ay RH/LH.
Refer to Page I2-33.

13 REAR SEAT

13-1 REMOVAL AND INSTALLATION

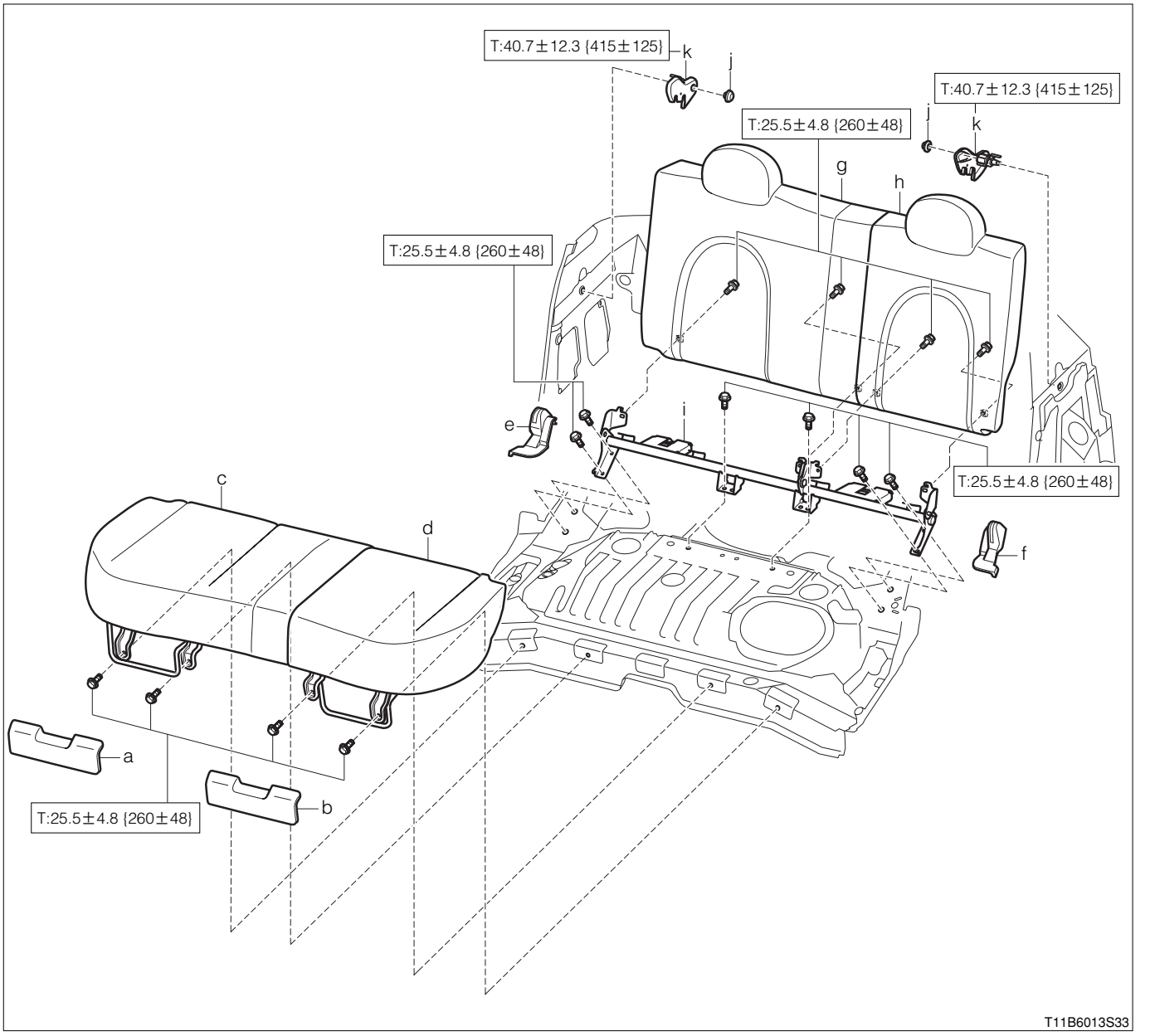
13-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

13-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

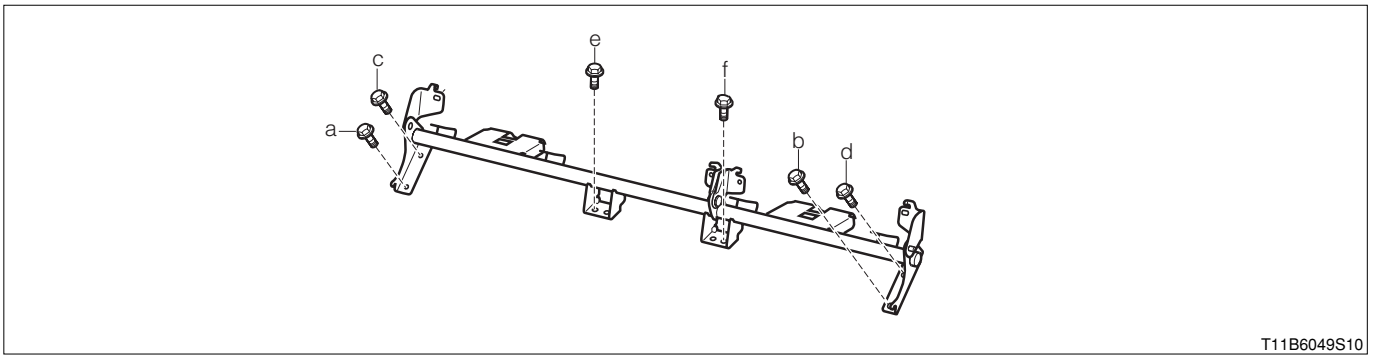
(2) Removal and installation procedures

1 a Leg S/A, rear seat cushion
2 b Leg S/A, rear seat cushion
3 c Cushion Ay, rear seat, RH
4 d Cushion Ay, rear seat, LH
5 e Cover, rear seat hinge
6 f Cover, rear seat hinge, LH
7 g Back Ay, rear seat, RH
8 h Back Ay, rear seat, LH
▲ 9 i Bracket S/A, CRS anchor
10 j Cap
11 k Lock S/A, rear seat back, RH/LH

13-1-3 POINTS OF INSTALLATION

(1) Bracket S/A, CRS anchor

1.Tighten the bolts in the sequence of a to f.



13-2 DISASSEMBLING AND ASSEMBLING

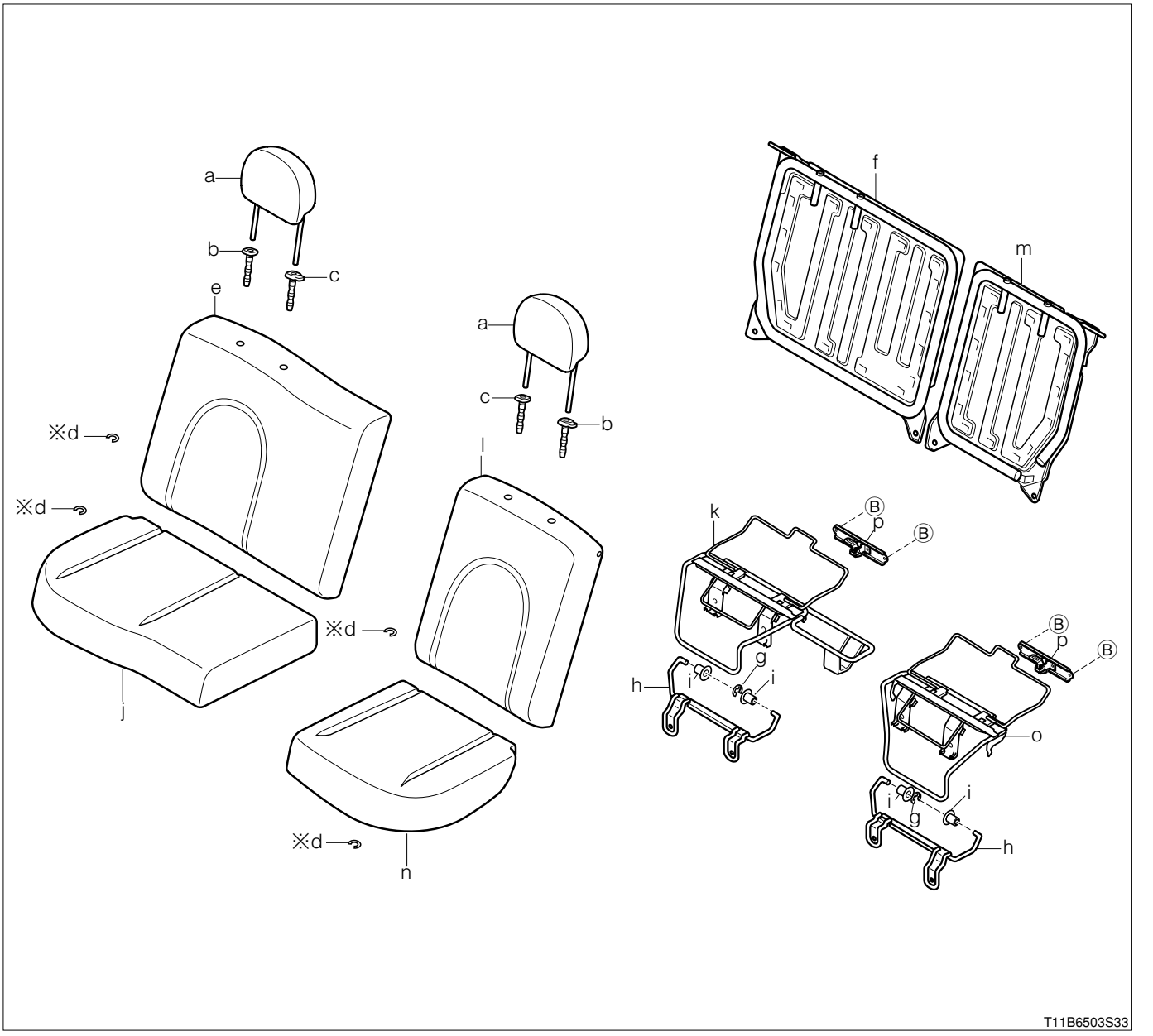
13-2-1 OPERATION BEFORE DISASSEMBLY

1.Remove the rear seat cushion Ay RH/LH.
Refer to Page I2-37.

2.Remove the rear seat back Ay RH/LH.
Refer to Page I2-37.

13-2-2 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Components



※:Non - reusable parts

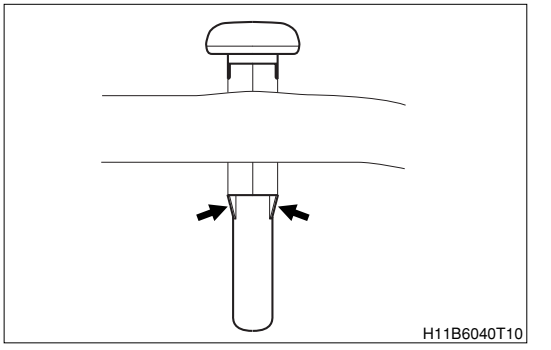
(2) Disassembling and assembling procedures

	1	a	Headrest Ay, rear seat
▼	2	b	Support, front seat headrest, RH
▼	3	c	Support Ay, front seat headrest, LH
▲	4	d	Ring, hog small
▼	5	e	Pad S/A, rear seat back, RH
	6	f	Frame S/A, rear seat back, RH
▲	7	d	Ring, hog small
	8	g	Ring, E
	9	h	Leg S/A, rear seat cushion
	10	i	Bush
▼	11	j	Pad S/A, rear seat cushion, RH
	12	k	Frame S/A, rear seat cushion, RH
	13	a	Headrest Ay, rear seat
▼	14	b	Support, front seat headrest, RH
▼	15	c	Support Ay, front seat headrest, LH
▼	16	l	Pad S/A, rear seat back, LH
	17	m	Frame S/A, rear seat back, LH
▲	18	d	Ring, hog small
	19	g	Ring, E
	20	h	Leg S/A, rear seat cushion
	21	i	Bush
▼	22	n	Pad S/A, rear seat cushion, LH
	23	o	Frame S/A, rear seat cushion, LH
▲	24	d	Ring, hog small
	25	p	Lock S/A, rear seat turn

13-2-3 POINTS OF DISASSEMBLY

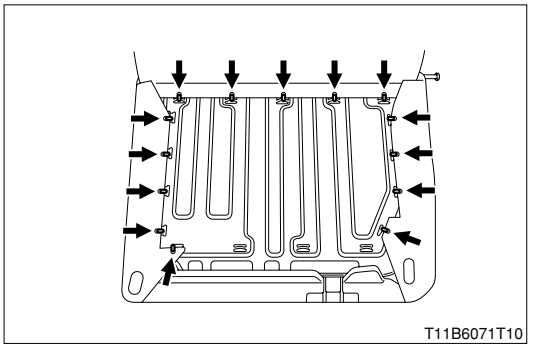
(1) Support, front seat headrest, RH / Support Ay, front seat headrest, LH

1.Put a hand from the bottom of the RH/LH rear seat back pad S/A, and press the pawls to push out the support.



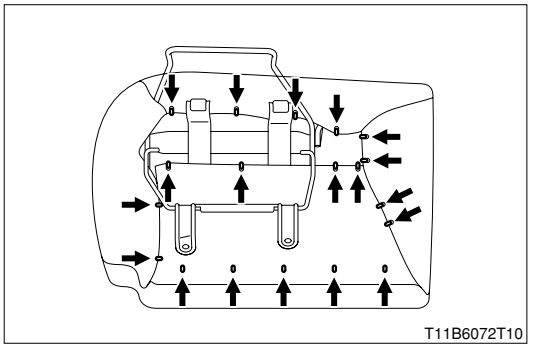
(2) Pad S/A, rear seat back, RH

1.Take off the small hog rings indicated in the figure, and remove the pad S/A from the RH rear seat back frame S/A.



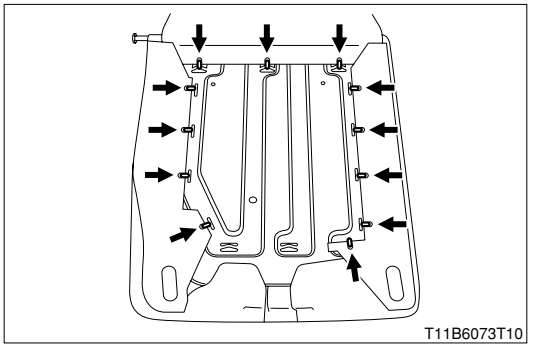
(3) Pad S/A, rear seat cushion, RH

1.Take off the small hog rings indicated in the figure, and remove pad S/A from the RH rear seat cushion frame S/A.



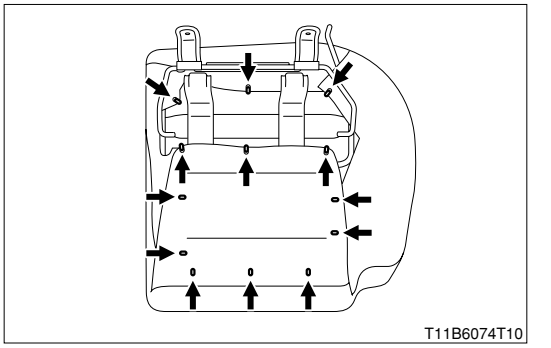
(4) Pad S/A, rear seat back, LH

1.Take off the small hog rings indicated in the figure, and remove the pad S/A from the LH rear seat back frame S/A.



(5) Pad S/A, rear seat cushion, LH

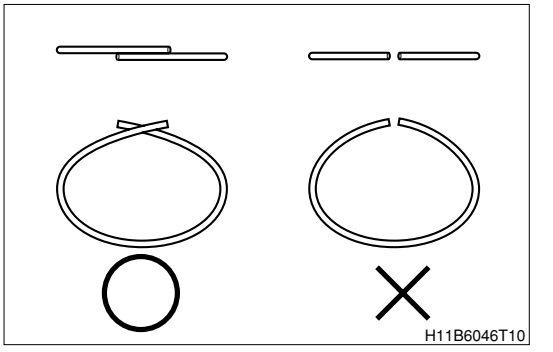
1.Take off the small hog rings indicated in the figure, and remove the pad S/A from the LH rear seat cushion frame S/A.



13-2-4 POINTS OF ASSEMBLY

(1) Ring, hog small

1.Install the ring as indicated in the figure.



13-2-5 OPERATION AFTER ASSEMBLY

1.Install the rear seat back Ay RH/LH.
Refer to Page I2-37.

2.Install the rear seat cushion Ay RH/LH.
Refer to Page I2-37.

14 FRONT SEAT OUTER BELT

14-1 REMOVAL AND INSTALLATION

CAUTION

- Refer to the precaution on maintenance procedure for the SRS airbag system.

Refer to Page A1-26.

14-1-1 ARTICLES TO BE PREPARED

Instrument

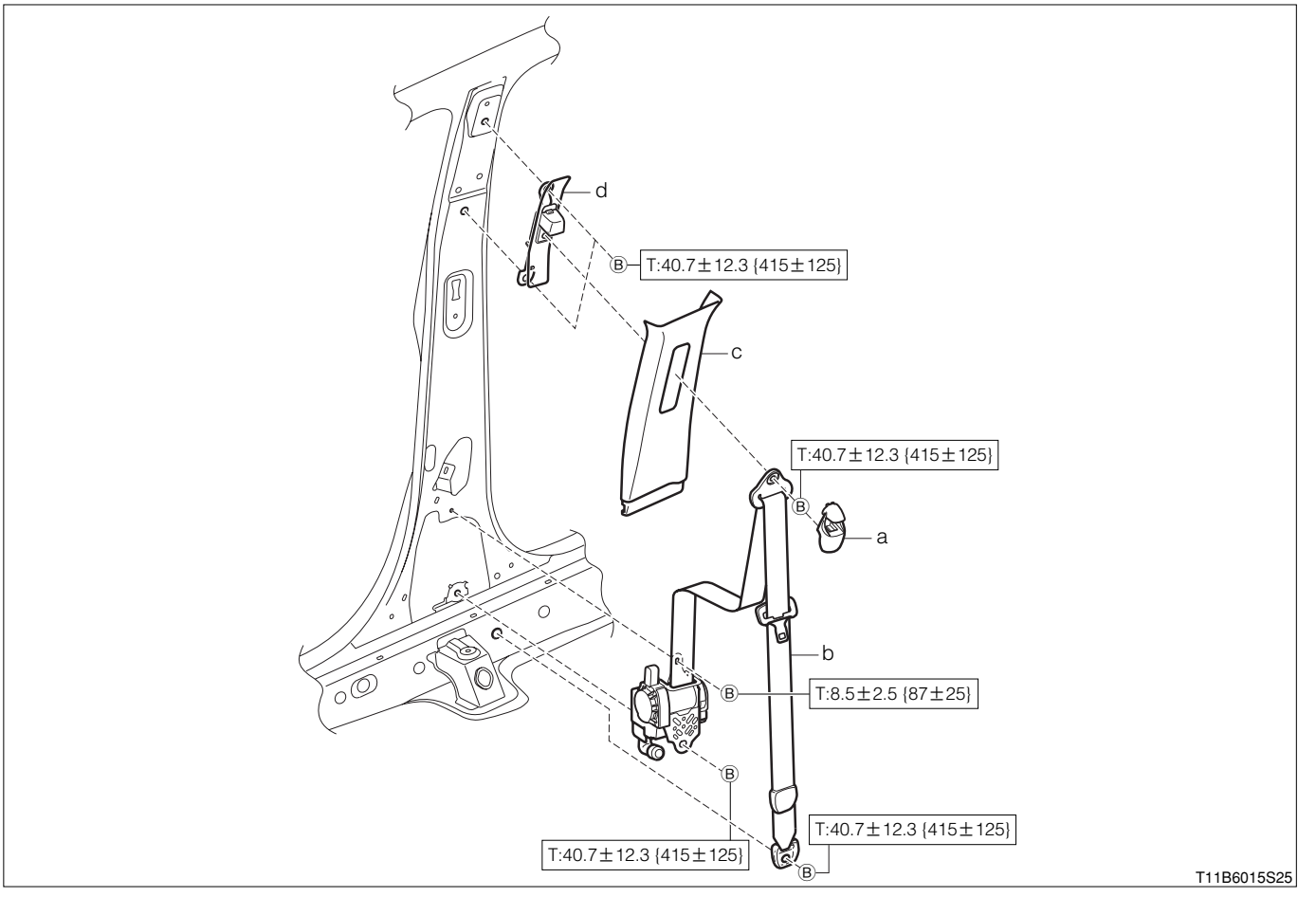
Torque wrench

14-1-2 OPERATION BEFORE REMOVAL

1.Remove the battery negative (−) terminal.
2.Remove the center pillar lower garnish RH/LH.
Refer to Page I2-48.

14-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Cover, shoulder belt anchor
2 b Belt Ay, front seat outer RH/LH
▼ 3 c Garnish, center pillar, upper RH/LH
4 d Adjuster Ay, front shoulder belt anchor

14-1-4 POINTS OF REMOVAL

(1) Garnish, center pillar, upper RH/LH

Refer to Page I2-48.

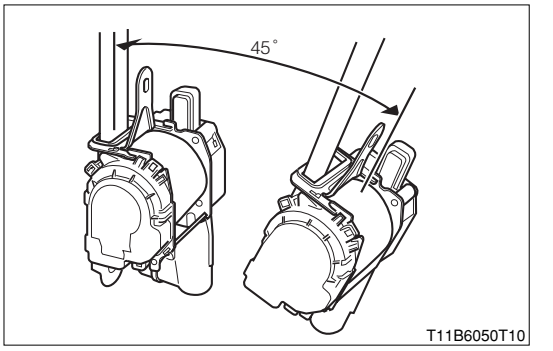
14-1-5 INSPECTION

(1) Belt Ay, front seat belt outer RH/LH

① Check of inclination angle at time of ELR lock

1.Gently move the belt Ay and check the locking state at various tilting angles.

SPECIFIED VALUE: Ensure that the belt locking does not take place within 15 degrees in all directions. Also ensure that the lock is retained beyond 45 degrees.



WARNING

- Never disassemble the retractor.

② ELR lock check

1.Check the locking state when the seat belt is pulled out abruptly in the vehicle assembled state.

SPECIFIED VALUE: The belt Ay shall be locked.

(2) External appearance check

1.When the following cases have occurred, replace the belt assembly.

(1) Case where the pretensioner mechanism has been actuated.

(2) Case where the vehicle is damaged in a collision, including a minor one in which pretensioner mechanism has not been actuated.

(3) In cases where the pretensioner mechanism of the belt Ay exhibits damage or cracks.

(4) Case where the connector or harness has dents or chips.

(5) Case where considerable amount of grease, water, detergent and oil are left on the pretensioner mechanism of the belt Ay.

(6) Case where the pretensioner mechanism of the belt Ay has been dropped and damaged.

14-1-6 OPERATION AFTER INSTALLATION

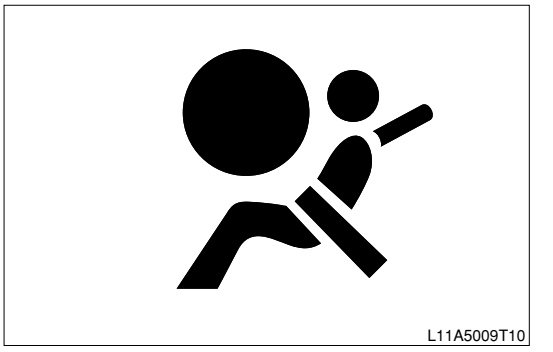
1.Install the RH/LH center pillar lower garnish.

Refer to Page I2-48.

2.Connect the battery negative (−) terminal.

3.Turn ON the IG switch.

4.Ensure that the airbag warning lamp is illuminated for about 6 seconds and then remains extinguished afterward.



15 REAR SEAT OUTER BELT

15-1 REMOVAL AND INSTALLATION(TWO-POINT SEAT BELTS)

15-1-1 ARTICLES TO BE PREPARED

Instrument

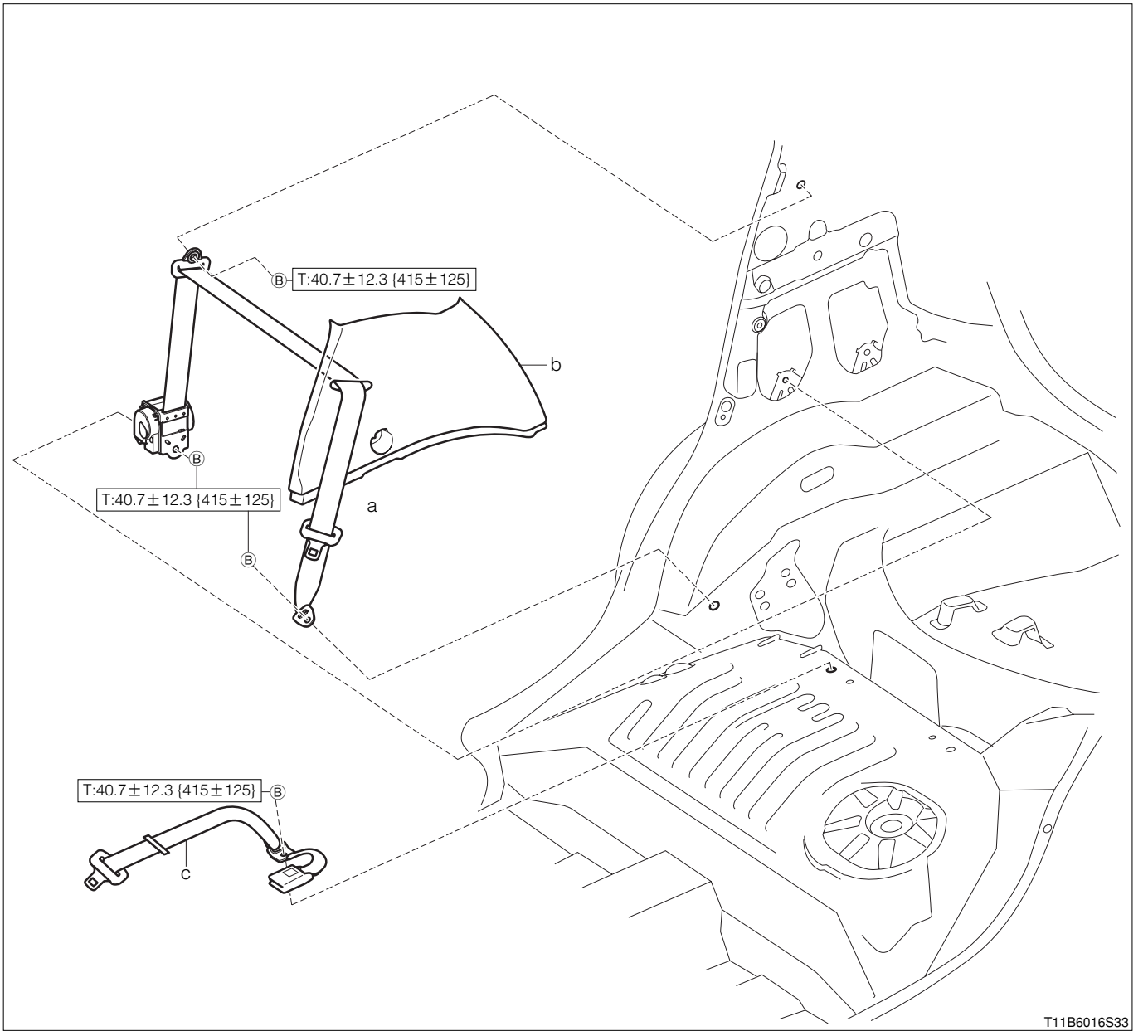
Torque wrench

15-1-2 OPERATION BEFORE REMOVAL

1.Remove the rear quarter trim panel Ay RH/LH.
Refer to Page I2-48.

15-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Belt Ay, rear seat, outer RH/LH
▼ 2 b Garnish, roof side inner, RH/LH
3 c Belt Ay, rear seat lap type, center W/inner

15-1-4 POINTS OF REMOVAL

(1) Garnish, roof side, inner RH/LH

Refer to Page I2-48.

15-1-5 INSPECTION

(1) Belt Ay, rear seat, outer

① CHECK of inclination angle at time of ELR lock

1.Gently move the belt Ay and check the locking state at various tilting angles.

SPECIFIED VALUE: Ensure that the belt locking does not take place within 15 degrees in all directions. Also ensure that the lock is retained beyond 45 degrees.

WARNING

- Never disassemble the retractor.

(2) ELR lock check

1.Check the locking state when the seat belt is pulled out abruptly in the vehicle assembled state.

SPECIFIED VALUE: The belt shall be locked.

15-1-6 POINTS OF INSTALLATION

(1) Belt Ay, rear seat, outer RH/LH

CAUTION

- Assemble in a way that the webbing does not twist.
- In the assembled state, ensure that the belt can be pulled out and returned smoothly.

15-1-7 OPERATION AFTER INSTALLATION

1.Install the rear quarter trim panel Ay RH/LH.

Refer to Page I2-48.

15-2 REMOVAL AND INSTALLATION(THREE-POINT SEAT BELTS)

15-2-1 ARTICLES TO BE PREPARED

Instrument

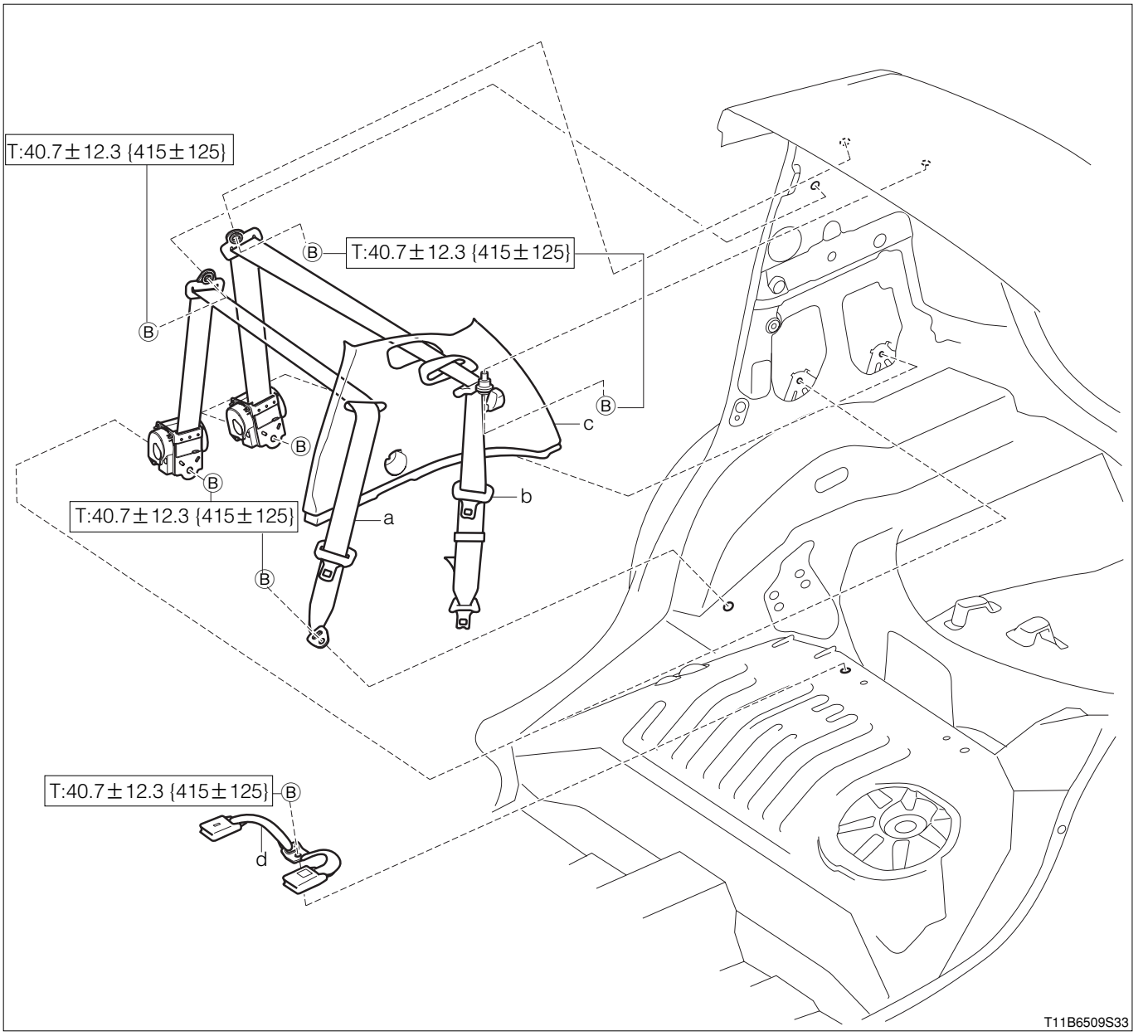
Torque wrench

15-2-2 OPERATION BEFORE REMOVAL

1.Remove the rear quarter trim panel Ay RH/LH.
Refer to Page I2-48.

15-2-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Belt Ay, rear seat, outer RH/LH
2 b Belt Ay, rear seat, outer center
▼ 3 c Garnish, roof side inner, RH/LH
4 d Belt Ay, rear seat lap type, center W/inner

15-2-4 POINTS OF REMOVAL

(1) Garnish, roof side, inner RH/LH

Refer to Page I2-48.

15-2-5 INSPECTION

(1) Belt Ay, rear seat, outer and belt Ay, rear seat, outer center

① Check of inclination angle at time of ELR lock

1.Gently move the belt Ay and check the locking state at various tilting angles.

SPECIFIED VALUE: Ensure that the belt locking does not take place within 15 degrees in all directions. Also ensure that the lock is retained beyond 45 degrees.

WARNING

- Never disassemble the retractor.

(2) ELR lock check

1.Check the locking state when the seat belt is pulled out abruptly in the vehicle assembled state.

SPECIFIED VALUE: The belt shall be locked.

15-2-6 POINTS OF INSTALLATION

(1) Belt Ay, rear seat, outer center and belt Ay, rear seat, outer RH/LH

CAUTION

- Assemble in a way that the webbing does not twist.
- In the assembled state, ensure that the belt can be pulled out and returned smoothly.

15-2-7 OPERATION AFTER INSTALLATION

1.Install the rear quarter trim panel Ay RH/LH.

Refer to Page I2-48.

16 TRIM PANEL

16-1 REMOVAL AND INSTALLATION

16-1-1 ARTICLES TO BE PREPARED

Tool

Clip remover

Lubricant,adhesive,others

Protective tape

16-1-2 OPERATION BEFORE REMOVAL

1.Remove the shoulder anchor portion of the RH/LH outer front seat belt Ay. (Only when removing the RH/LH upper center pillar garnish.)
Refer to Page I2-42.

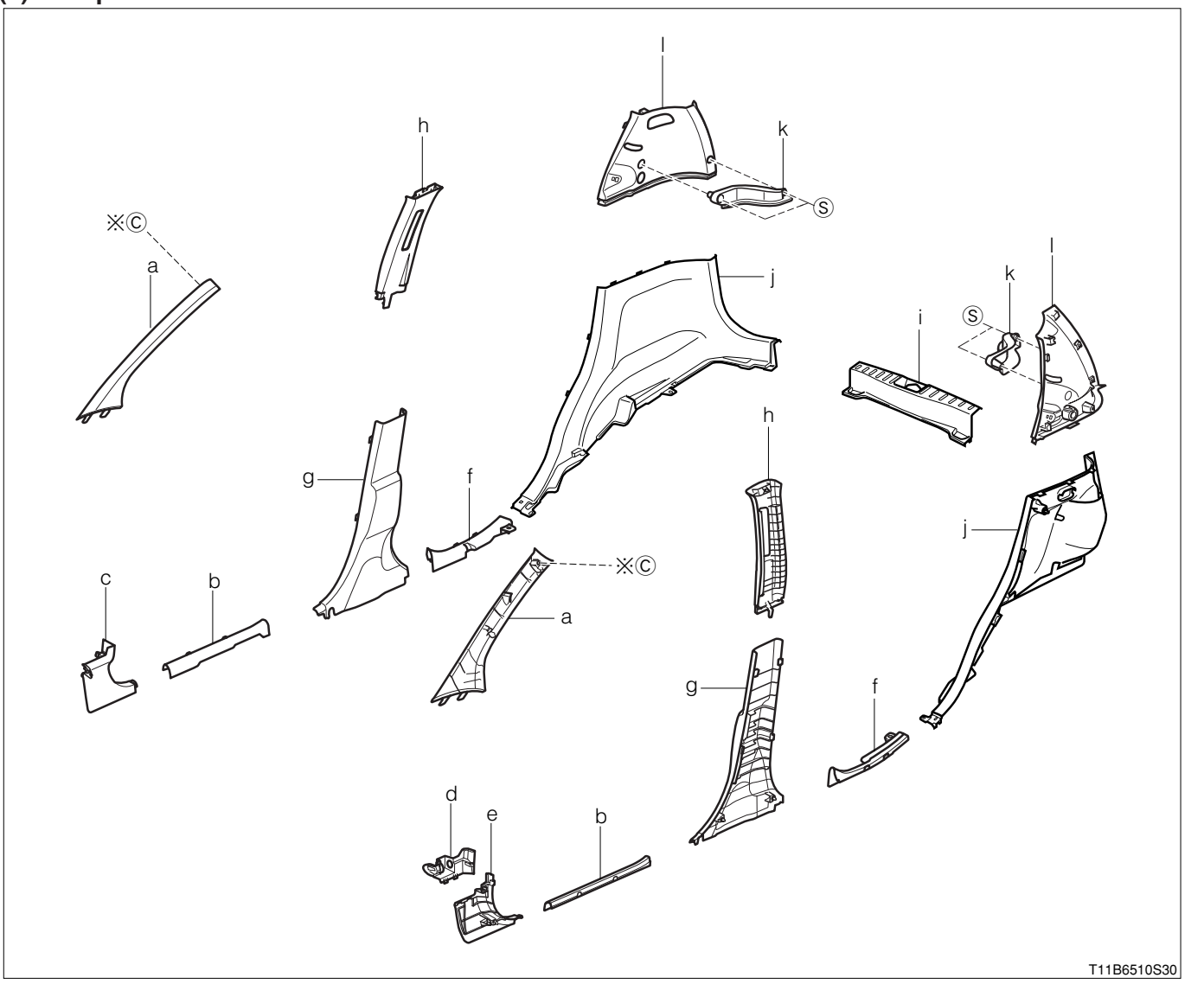
2.Remove the shoulder anchor portion of the RH/LH outer rear seat belt Ay. (Only when removing the RH/LH inner roof side garnish.)
Refer to Page I2-44.

3.Remove the shoulder anchor section of the outer center rear seat belt Ay. (Only when the inner RH /LH roof side garnish of the three-point seat belt-equipped vehicle has been removed)
Refer to Page I2-46.

4.Remove the dome lamp Ay. (Only when removing the LH rear quarter trim panel Ay.)
Refer to Page J1-17.

16-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non-reusable parts (vehicles with curtain shield airbag)

(2) Removal and installation procedures

- ▼ 1 a Garnish, front pillar, RH/LH
- ▼ 2 b Plate, front door scuff, RH/LH
- ▼ 3 c Board, cowl side trim, RH
- ▼ 4 d Cover, cowl side trim service hole
- ▼ 5 e Board, cowl side trim, LH
- ▼ 6 f Plate, rear door scuff, RH/LH
- ▼ 7 g Garnish, center pillar, lower RH/LH
- ▼ 8 h Garnish, center pillar, upper RH/LH
- ▼ 9 i Cover, deck trim, rear
- ▼ 10 j Panel Ay, quarter trim, rear RH/LH
- 11 k Panel S/A, quarter trim, upper RH/LH
- ▼ 12 l Garnish, roof side, inner RH/LH

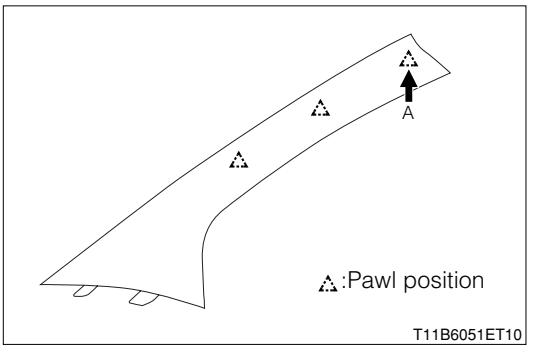
16-1-4 POINTS OF REMOVAL

(1) Garnish, front pillar, RH/LH

1.Remove the weather-strip.

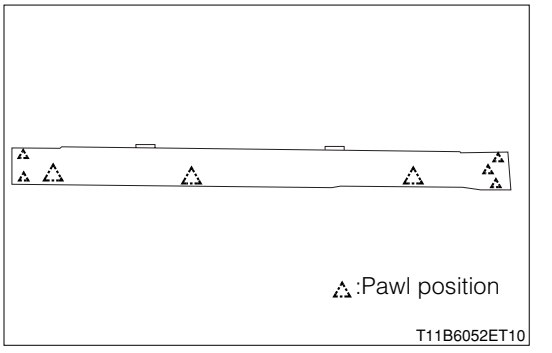
2.Using a flat screwdriver wrapped with a protection tape, press the pawl (A) fitting section from the bottom of the vehicle indicated in the right figure and remove.

3.Disengage the pawls indicated in the right figure except the one in section A at the right figure and, remove the garnish.



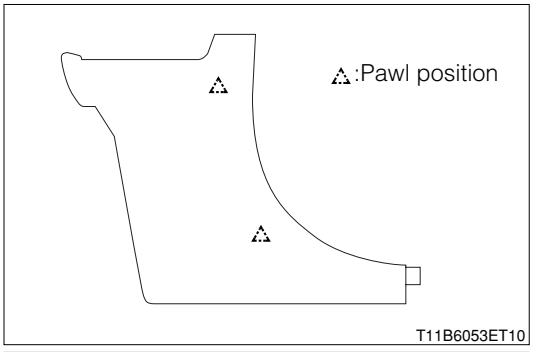
(2) Plate, front door scuff, RH/LH

1.Disengage the pawls indicated in the right figure and, remove the plate.



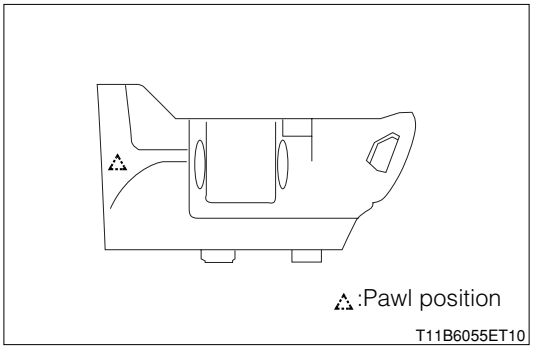
(3) Board, cowl side trim, RH

1.Disengage the pawls indicated in the right figure and, remove the board.



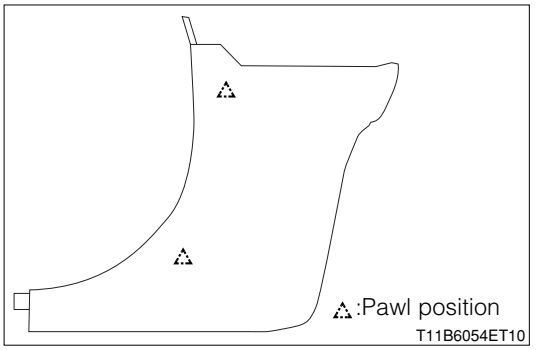
(4) Cover, cowl side trim service hole

1.Disengage the pawls indicated in the right figure and, remove the cover.



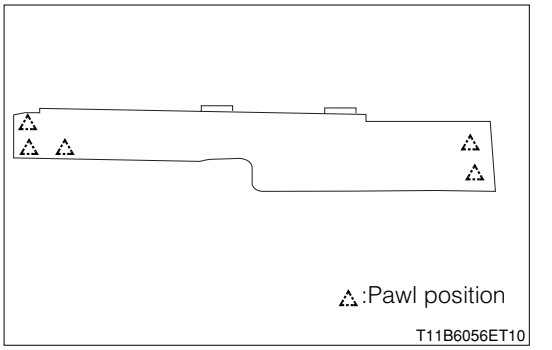
(5) Board, cowl side trim, LH

1.Disengage the pawls indicated in the right figure and, remove the board.



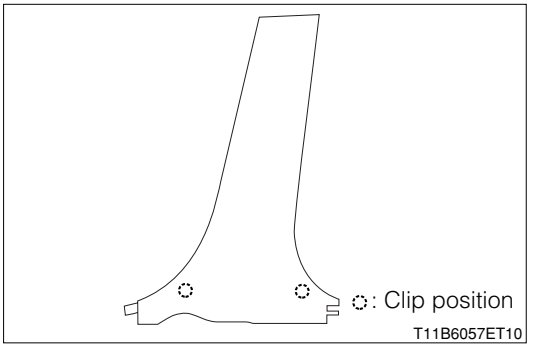
(6) Plate, rear door scuff, RH/LH

1.Disengage the pawls indicated in the right figure and, remove the plate.



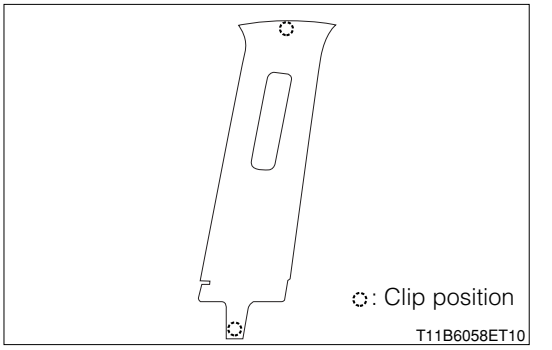
(7) Garnish, center pillar, lower RH/LH

1.Disengage the clips indicated in the right figure and, remove the garnish.



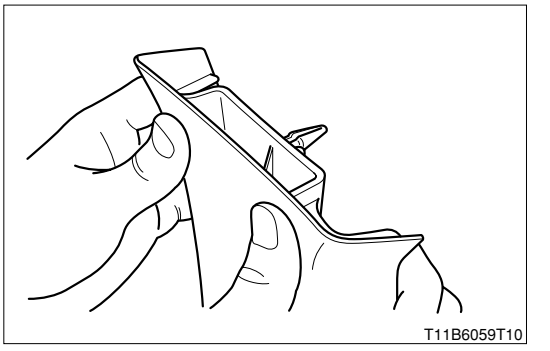
(8) Garnish, center pillar, upper RH/LH

1.Disengage the clips indicated in the right figure and, remove the garnish.



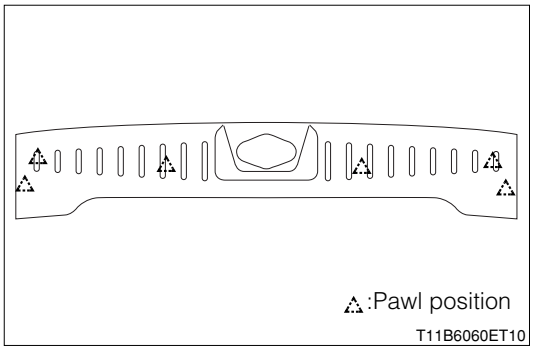
CAUTION

- Hold the correct place indicated in the right figure to prevent the garnish from getting deformed. Remove it without bending.



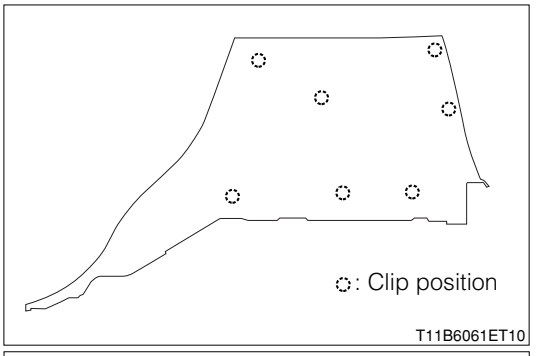
(9) Cover, deck trim, rear

1.Disengage the pawls indicated in the right figure and, remove the cover.



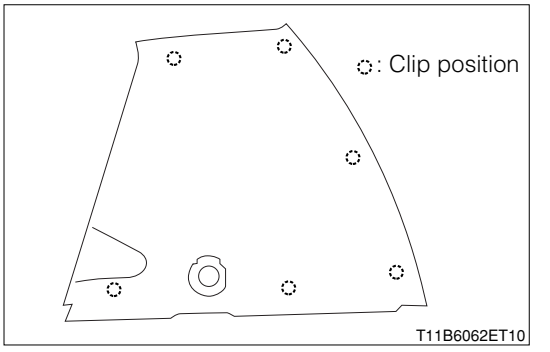
(10) Panel Ay, quarter trim, rear RH/LH

1.Disengage the clips indicated in the right figure and, remove the panel Ay.



(11) Garnish, roof side, inner RH/LH

1.Disengage the clips indicated in the right figure and, remove the garnish.



16-1-5 OPERATION AFTER INSTALLATION

1.Install the dome lamp Ay. (Only when removing the LH rear quarter trim panel Ay.)
Refer to Page J1-17.

2.Install the shoulder anchor section of the RH/LH outer front seat belt Ay. (Only when removing the RH/LH upper center pillar garnish.)
Refer to Page I2-42.

3.Install the shoulder anchor section of the outer center rear seat belt Ay. (Only when the inner RH /LH roof side garnish of the three-point seat belt-equipped vehicle has been removed)
Refer to Page I2-46.

4.Install the shoulder anchor portion of the RH/LH outer rear seat belt Ay. (Only when removing the RH/LH inner roof side garnish.)
Refer to Page I2-44.

17 ROOF HEADLINING

17-1 REMOVAL AND INSTALLATION

17-1-1 ARTICLES TO BE PREPARED

Tool

Clip remover

Lubricant,adhesive,others

Protective tape,Wire harness repair tape (Part number : 82997-B2010-000)

17-1-2 OPERATION BEFORE REMOVAL

1. Remove the front pillar garnish RH/LH.
   Refer to Page I2-48.

2. Remove the center pillar upper garnish RH/LH.
   Refer to Page I2-48.

3. Remove the shoulder anchor section of the outer center rear seat belt Ay. (Three-point seat belt-equipped vehicle)
   Refer to Page I2-48.

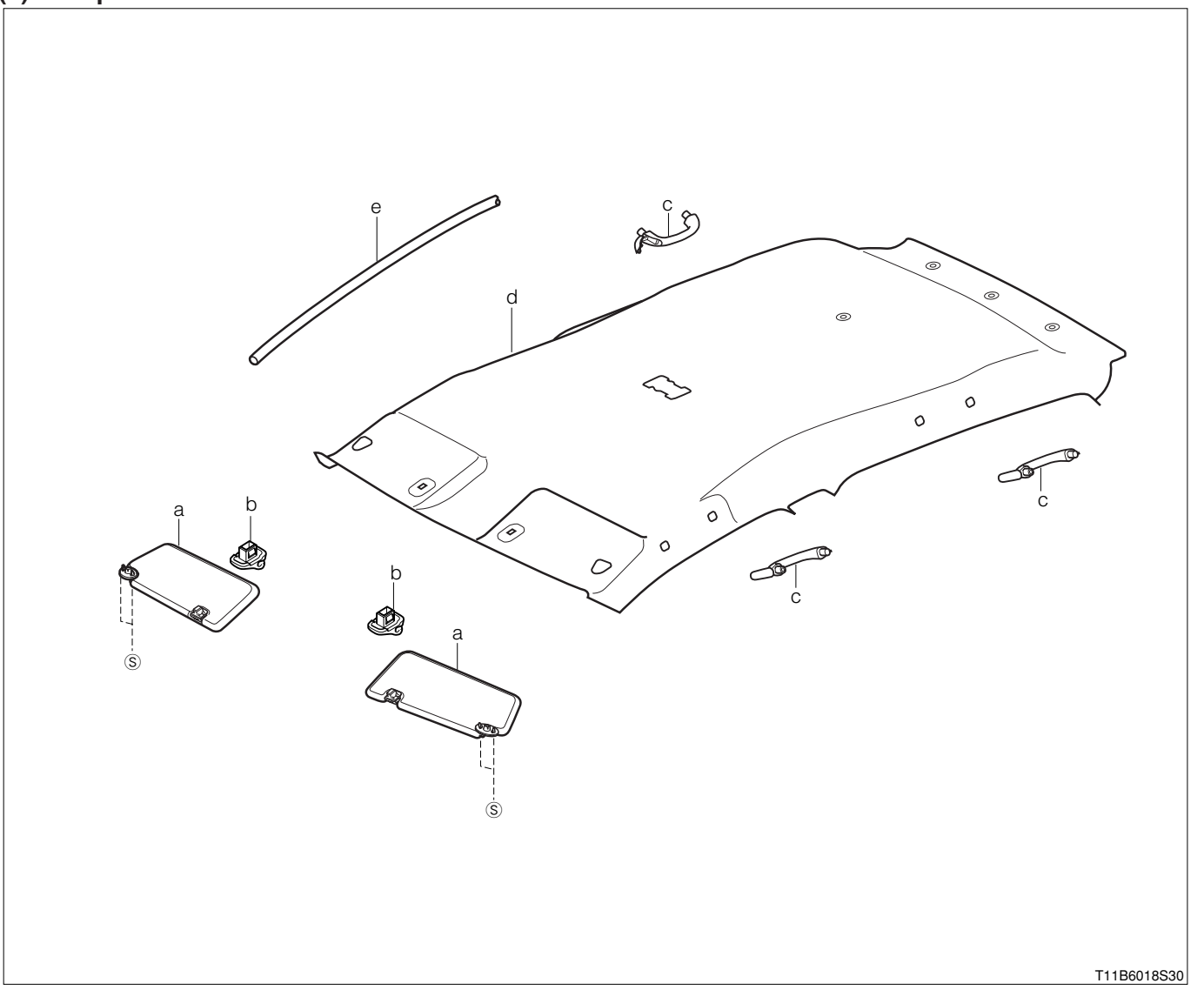
4. Remove the roof side inner garnish RH/LH.
   Refer to Page I2-46

5. Remove the map lamp Ay.
   Refer to Page J1-15.

6. Remove the dome lamp Ay.
   Refer to Page J1-16.

17-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



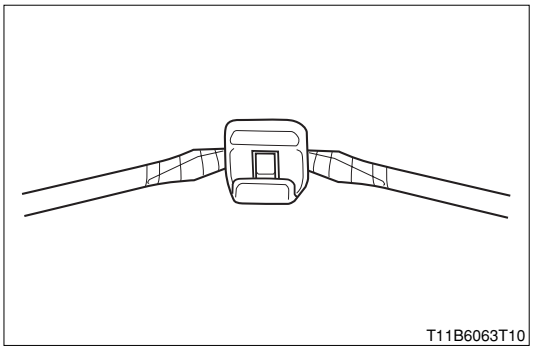
(2) Removal and installation procedures

1 a Visor Ay, RH/LH
▼ 2 b Holder, visor
3 c Grip, assist
▼ ▲ 4 d Headlining Ay, roof
5 e Hose Ay, washer

17-1-4 POINTS OF REMOVAL

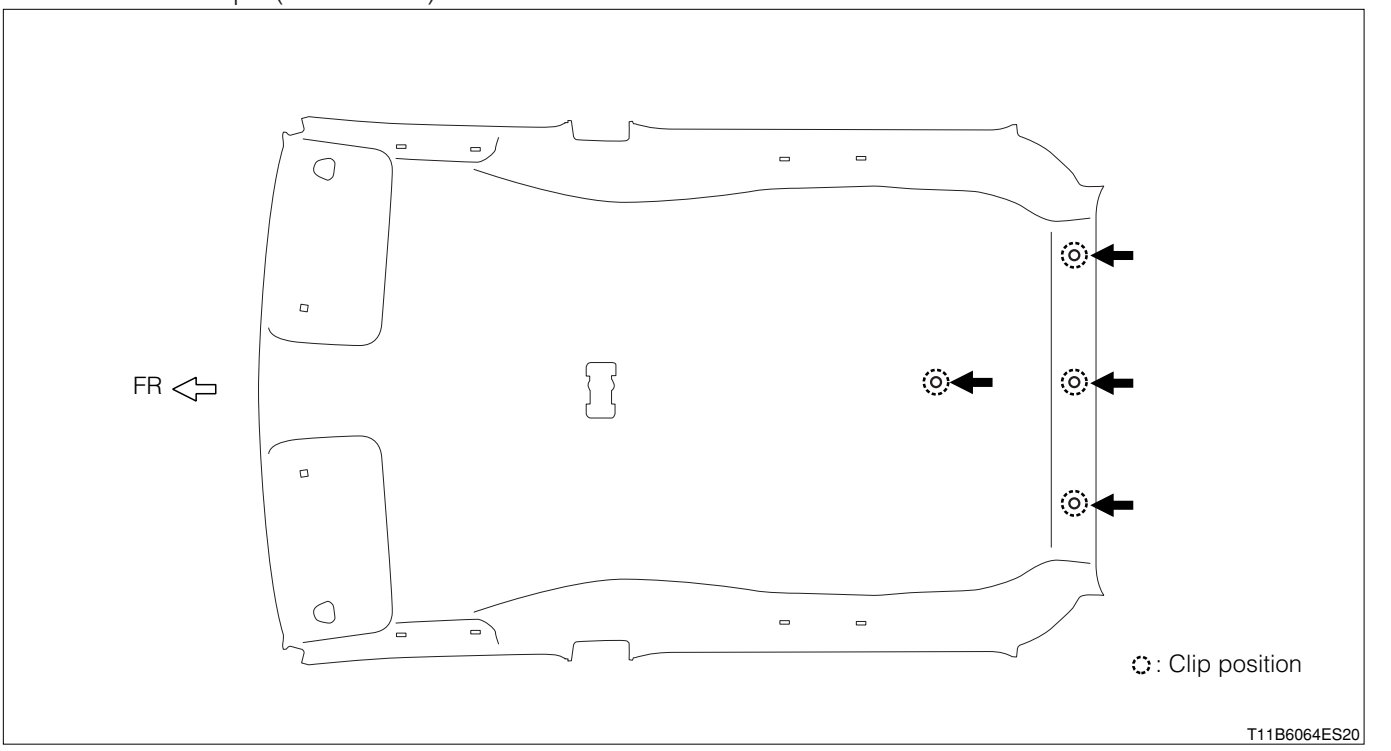
(1) Holder, visor

1.Disengage the pawls to remove it by inserting a minus driver wrapped in protection tape from both sides.



(2) Headlining Ay, roof

1.Remove the clips (4 locations).



17-1-5 POINTS OF INSTALLATION

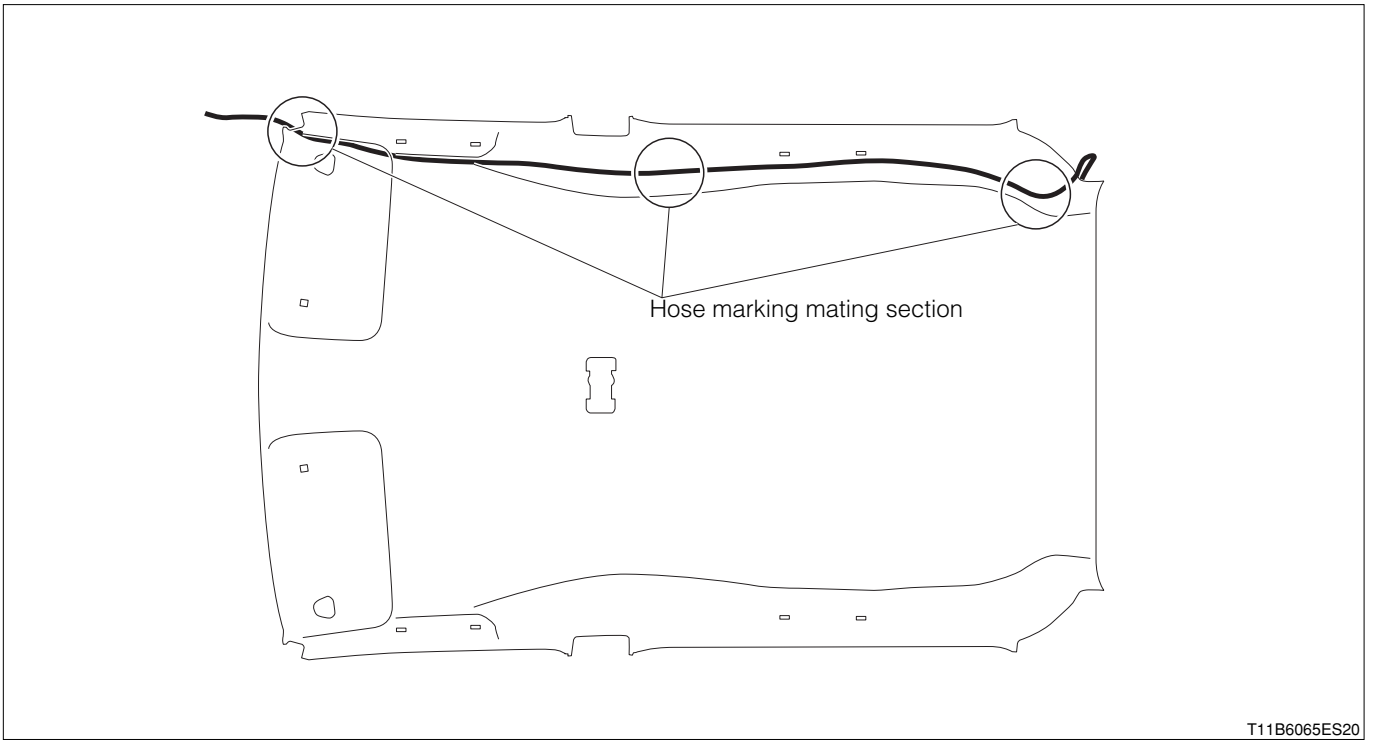
(1) Headlining Ay, roof

1.Apply the double-sided tape to the groove in the head lining Ay.

2.Fix the washer hose Ay along the head lining Ay groove to which the double-sided tape has been affixed.

NOTE

- Tape: Wire harness repair tape, Part No : 82997-B2010-000



17-1-6 OPERATION AFTER INSTALLATION

1.Install the dome lamp Ay.
Refer to Page J1-16.

2.Install the map lamp Ay.
Refer to Page J1-15.

3.Install the roof side inner garnish RH/LH.
Refer to Page I2-48.

4.Install the shoulder anchor section of the outer center rear seat belt Ay. (Three-point seat belt-equipped vehicle)
Refer to Page I2-46.

5.Install the center pillar upper garnish RH/LH.
Refer to Page I2-48.

6.Install the front pillar garnish RH/LH.
Refer to Page I2-48.

18 FLOOR CARPET

18-1 REMOVAL AND INSTALLATION

18-1-1 OPERATION BEFORE REMOVAL

1. Remove the front seat Ay RH/LH.
   Refer to Page I2-33.

2. Remove the rear console box S/A.
   Refer to Page I2-31.

3. Remove the front console box S/A.
   Refer to Page I2-31.

4. Remove the rear seat cushion Ay RH/LH.
   Refer to Page I2-37.

5. Remove the front door scuff plate RH/LH.
   Refer to Page I2-48.

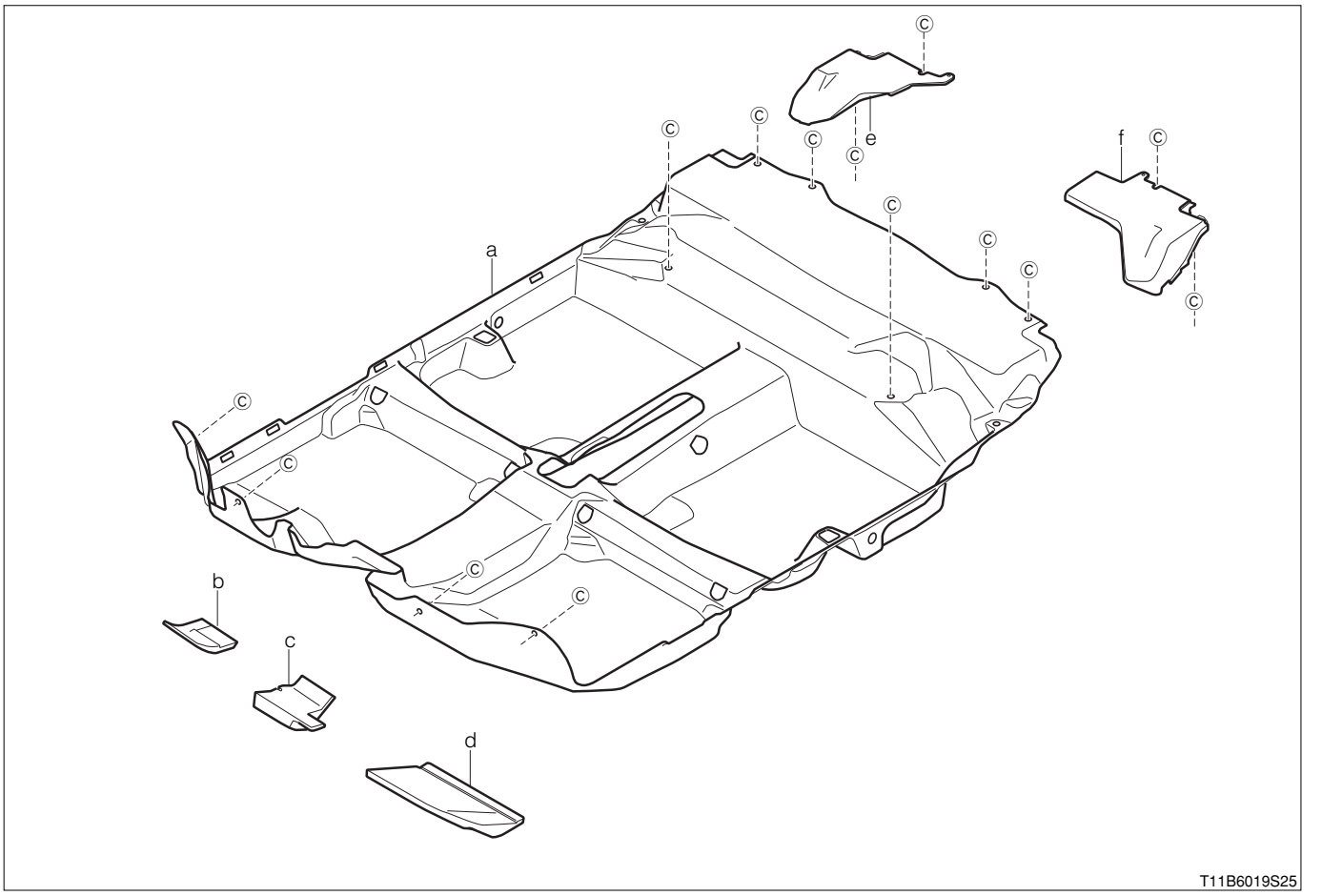
6. Remove the cowl side trim board RH/LH.
   Refer to Page I2-48.

7. Remove the rear door scuff plate RH/LH.
   Refer to Page I2-48.

8. Remove the center pillar lower garnish RH/LH.
   Refer to Page I2-48.

18-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Carpet Ay, floor, front
2 b Pad, dash panel insulator, No.2
3 c Pad, dash panel insulator, No.4
4 d Pad, dash panel insulator, No.3
5 e Board, rear floor, front RH
6 f Board, rear floor, front LH

18-1-3 OPERATION AFTER INSTALLATION

1. Install the center pillar lower garnish RH/LH.
   Refer to Page I2-48.

2. Install the rear door scuff plate RH/LH.
   Refer to Page I2-48.

3. Install the cowl side trim board RH/LH.
   Refer to Page I2-48.

4. Install the front door scuff plate RH/LH.
   Refer to Page I2-48.

5. Install the rear seat cushion Ay RH/LH.
   Refer to Page I2-37.

6. Install the front console box S/A.
   Refer to Page I2-31.

7. Install the rear console box S/A.
   Refer to Page I2-31.

8. Install the front seat Ay RH/LH.
   Refer to Page I2-33.

I3 WINDSHIELD WINDOWGLASS/MIRROR

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REMOVAL AND INSTALLATION --------- I3 - 6
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REMOVAL AND INSTALLATION ------- I3 - 10
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FRONT DOOR REGULATOR ---------- I3 - 10
REMOVAL AND INSTALLATION ------- I3 - 10
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1 WINDSHIELD GLASS

1-1 REMOVAL AND INSTALLATION

1-1-1 ARTICLES TO BE PREPARED

Tool

Sealant gun,Drill or eyeleteer (heavy needle to make a hole),Cutter knife,Rubber suction cups

Lubricant,adhesive,others

Seal set (Part number : 999-09600-U9-001),Wooden block,Protective tape,Cloth,Alcohol or white gasoline,

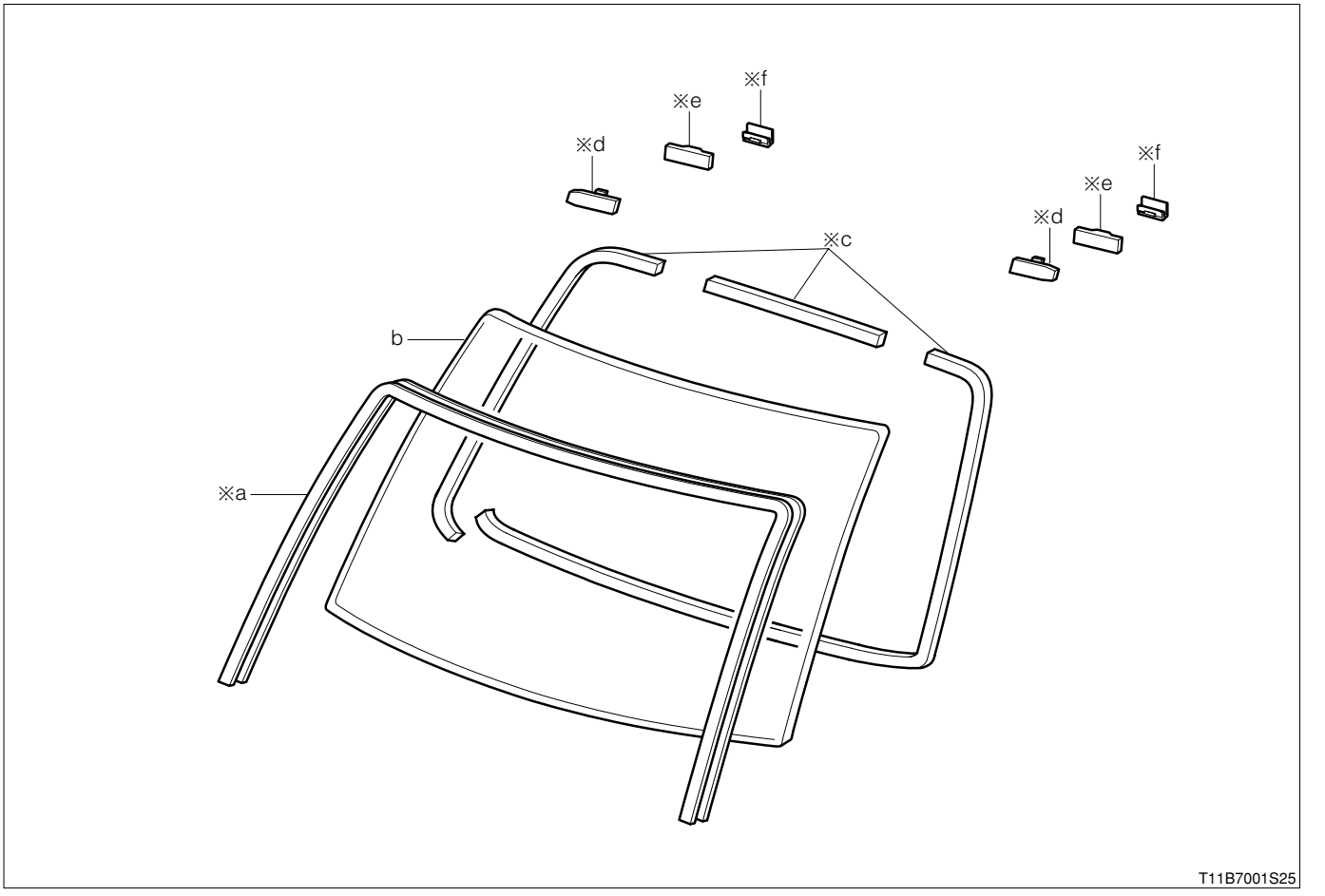
1-1-2 OPERATION BEFORE REMOVAL

1.Remove the cowl top ventilator louver RH/LH.
Refer to Page I2-8.

2.Remove the instrument panel.
Refer to Page I2-23.

1-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non-reusable parts.
The window glass adhesive dam is supplied as a single part in length necessary for one car.

(2) Removal procedures

1 a Moulding, windshield, outside
▼ 2 b Glass S/A, windshield
3 c Dam, window glass adhesive
4 d Stopper, windshield glass

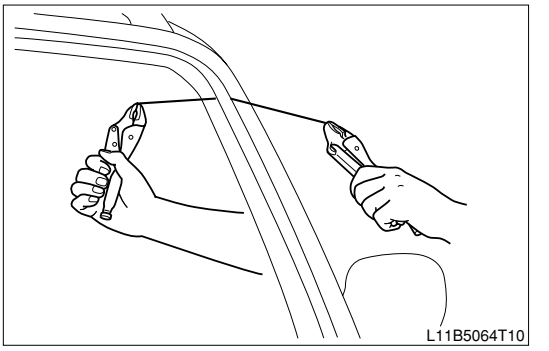
(3) installation procedures

▲ 1 f Stopper, windshield glass, No.1(For repair)
▲ 2 e Stopper, windshield glass, No.2 (For repair)
▲ 3 c Dam, window glass adhesive
▲ 4 b Glass S/A, windshield
▲ 5 a Moulding, windshield, outside

1-1-4 POINTS OF REMOVAL

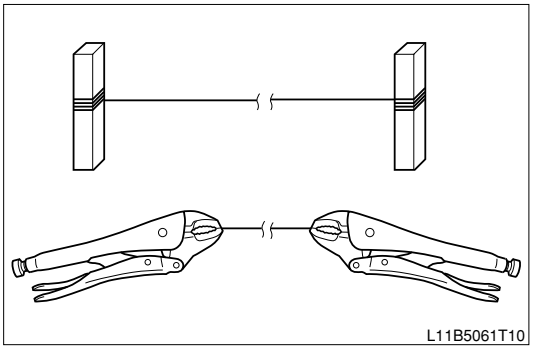
(1) Glass S/A, windshield

1.Apply a protective seal to the body around the edge of the glass.
2.Make a hole in the adhesive layer and pass a piano wire through it.
3.Using the piano wire, saw the adhesive layer.


L11B5064T10

CAUTION

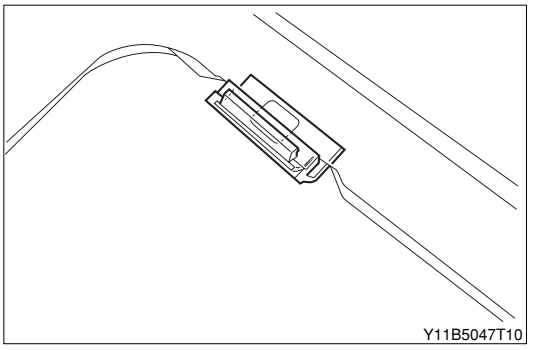
- When cutting the glass adhesive layer, attach a wooden block to each end of the piano wire or fit vice pliers to it.


L11B5061T10

1-1-5 POINTS OF INSTALLATION

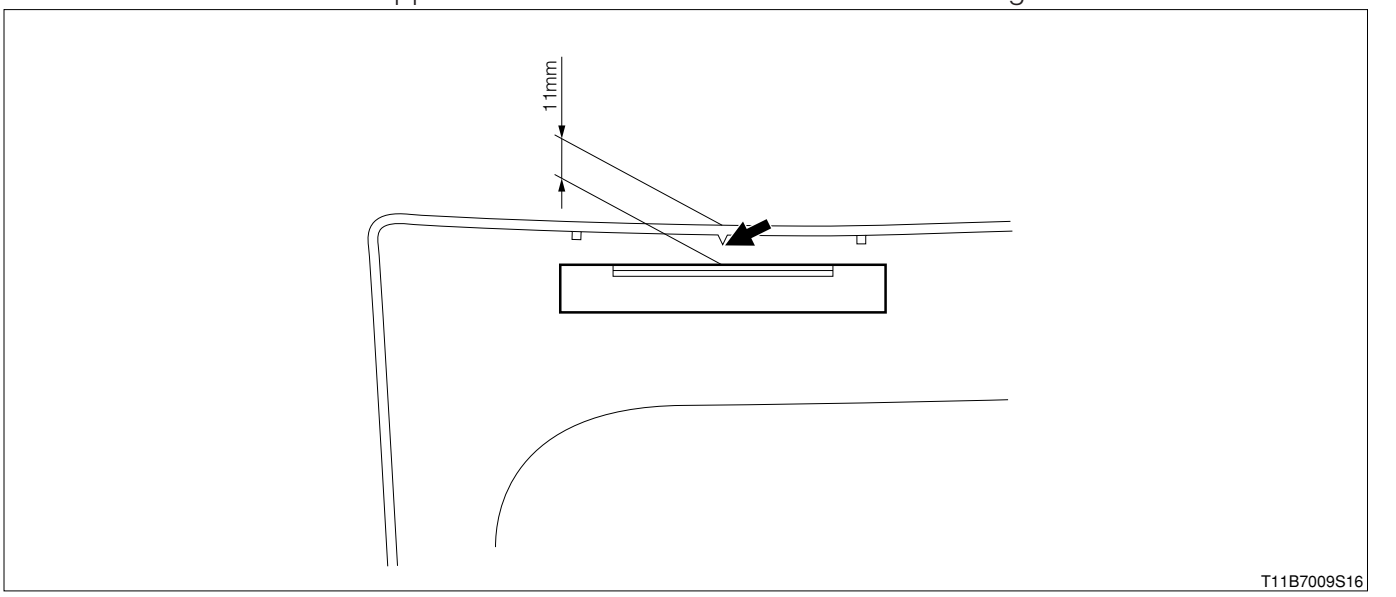
(1) Stopper, windshield glass, No.1

1.Attach the stopper to the body hook section. (Two sections at both right and left)


Y11B5047T10

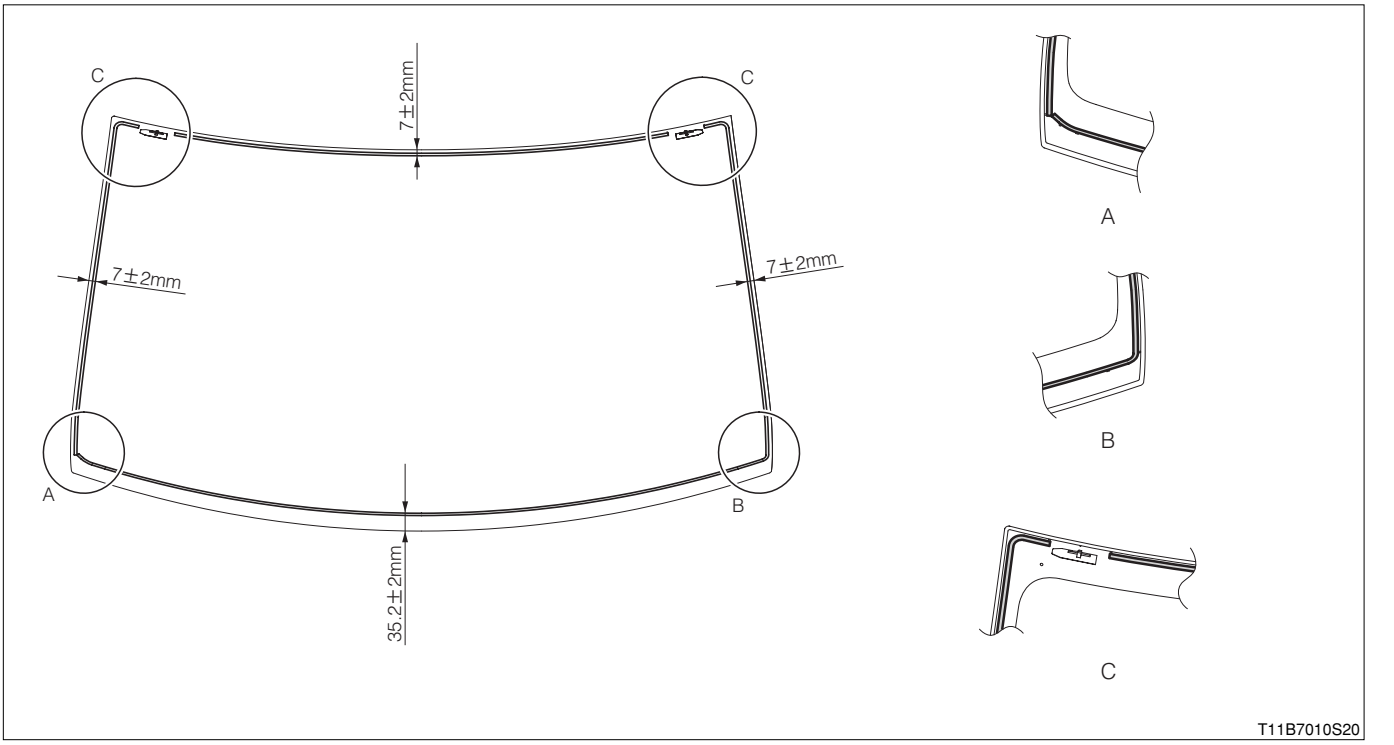
(2) Stopper, windshield glass, No.2

1.Affix the stopper to the position shown at the figure below. (Two sections at both right and left)
2.Match the center of the stopper with the cut-out section and affix it to the glass.



(3) Dam, window glass adhesive

1.Attach the dam to the position shown in the figure below based on the procedure below.
Match the dams at the corner. (Area A)
Do not bend. (Area B)
Cut the dam at the ceramic cut-out section and affix. (Area C)



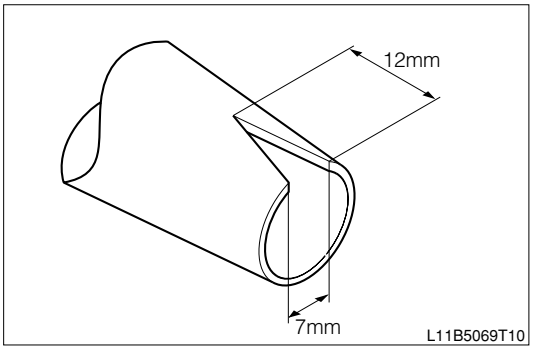
(4) Glass S/A, windshield

1.Apply glass primer to the glass side adhesive section.

CAUTION

- Do not coat thickly.
- Do not coat the adhesive.
- Proceed with work after the primer is dry.

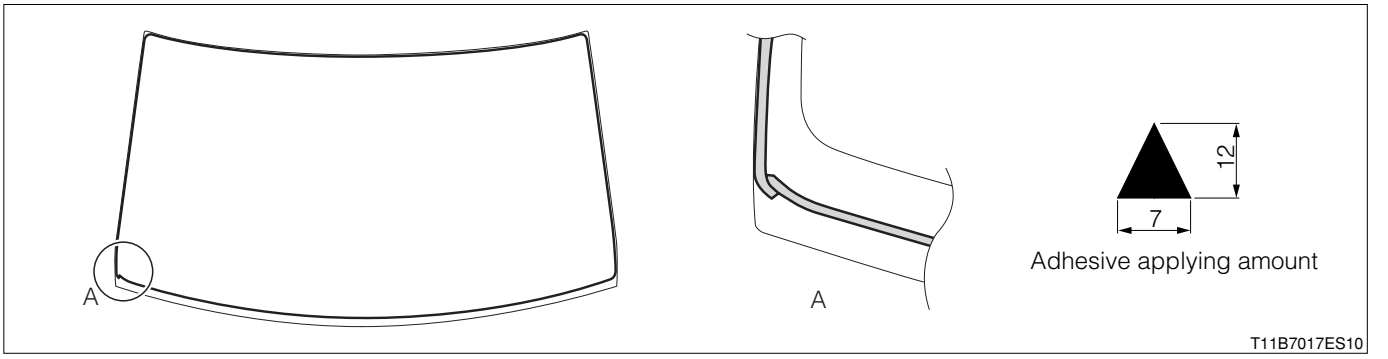
2.Cut the cartridge nozzle tip as shown in the illustration at right.



3.Load the cartridge into the gun and apply adhesive all the way around the dam.

CAUTION

- Proceed with work after the primer is dry.
- Apply the adhesive amply to the corners.
- Overlap adhesive at the corner. (Area A)



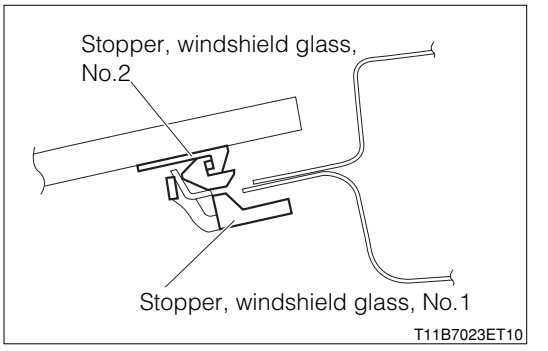
4.Using a suction rubber cup, hook the No.2 windshield glass stopper mounted to the glass S/A to the No.1 windshield glass stopper mounted on the body.

TOOL:

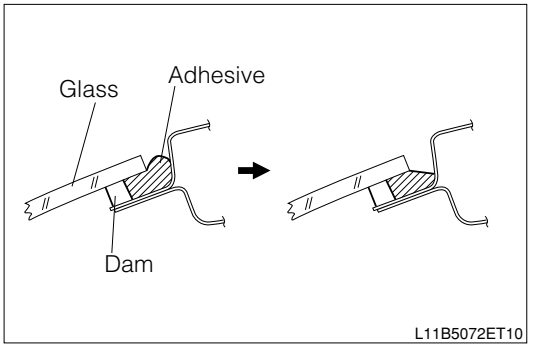
5.Lightly push the glass front surface to fit it firmly.

CAUTION

- Install the glass within 5 minutes after applying the adhesive.



6.Using a spatula or the like, correct any adhesive oozing out from the glass top section and side sections.



(5) Moulding, windshield, outside

1.Before the adhesive hardens, install the moulding.
2.After the adhesive hardens, check for water leakage.

CAUTION

- If water leaks, after removing water, reapply the glass from the beginning.
- If you move the vehicle after the glass installation, move the vehicle gently.

NOTE

- Refer to the seal set instruction manual for information regarding the adhesive's minimum drying time.

1-1-6 OPERATION AFTER INSTALLATION

1.Install the instrument panel.
Refer to Page I2-23.

2.Install the cowl top ventilator louver RH/LH.
Refer to Page I2-8.

2 BACK DOOR WINDOW

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Tool

Sealant gun,Drill or eyeleteer (heavy needle to make a hole),Cutter knife,Rubber suction cups

Lubricant,adhesive,others

Seal set (Part number : 999-09600-U9-001),Wooden block,Protective tape,Cloth,Alcohol or white gasoline,

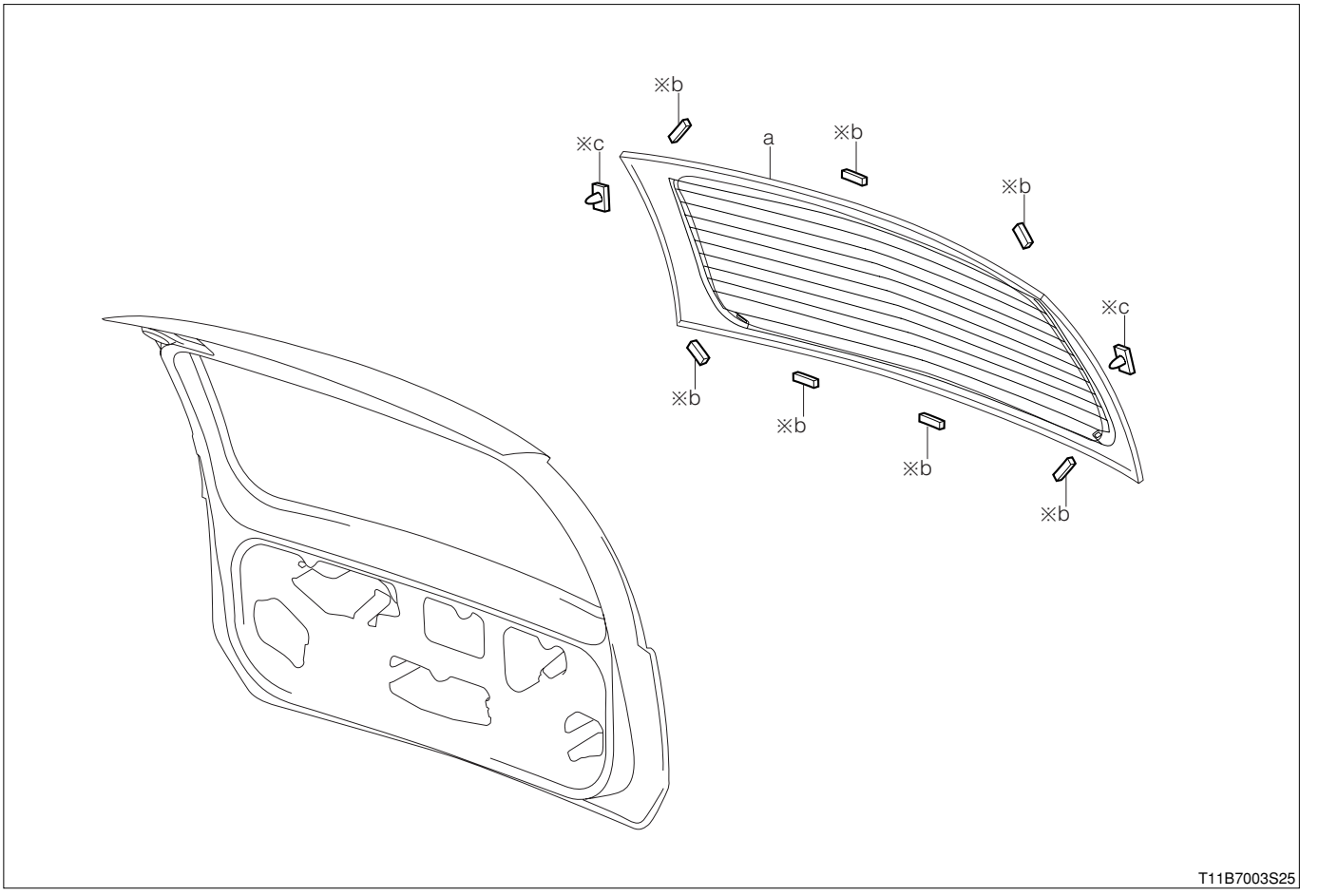
2-1-2 OPERATION BEFORE REMOVAL

1.Remove the rear wiper arm Ay.
Refer to Page J2-15.

2.Remove the rear upper spoiler S/A (Roof end spoiler equipped vehicles).
Refer to Page I2-11.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



※:Non - reusable parts

(2) Removal and installation procedures

▼ ▲ 1 a Glass, back door
▲ 2 b Spacer, back window glass
▲ 3 c Clip, back window glass, RH

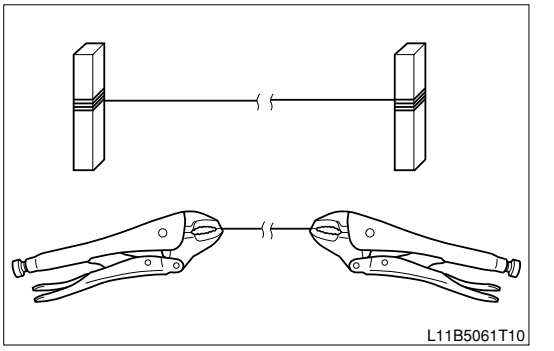
2-1-4 POINTS OF REMOVAL

(1) Glass, back door

1.Apply a protective tape to the body around the edge of the glass.
2.Make a hole in the adhesive layer and pass a piano wire through it.
3.Using the piano wire, saw the adhesive layer.

CAUTION

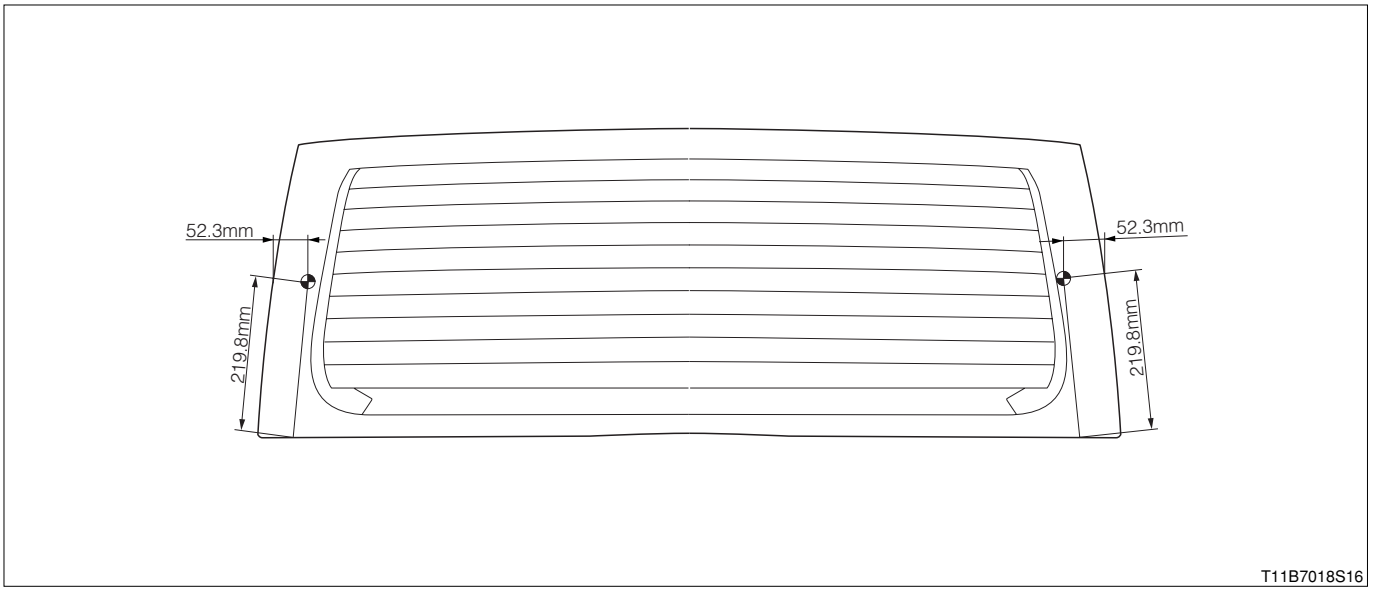
- When cutting the glass adhesive layer, attach a wooden block to each end of the piano wire or fit vice pliers to it.



2-1-5 POINTS OF INSTALLATION

(1) Clip, back window glass, RH

1.Attach to the positions shown below.



CAUTION

- The dimension in the illustration is the one along the glass surface.

(2) Spacer, back window glass

1.Use a cutter knife to smooth the cut adhesive layers on the body side and glass side.

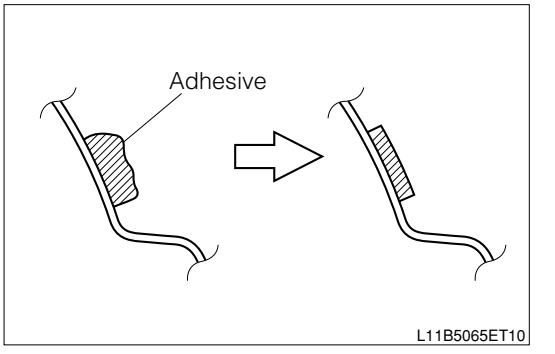
CAUTION

- Degrease the cutter knife.
- Leave a thin film of the adhesive layer.

2.Apply body primer to exposed body surfaces of the body side adhesion area.

CAUTION

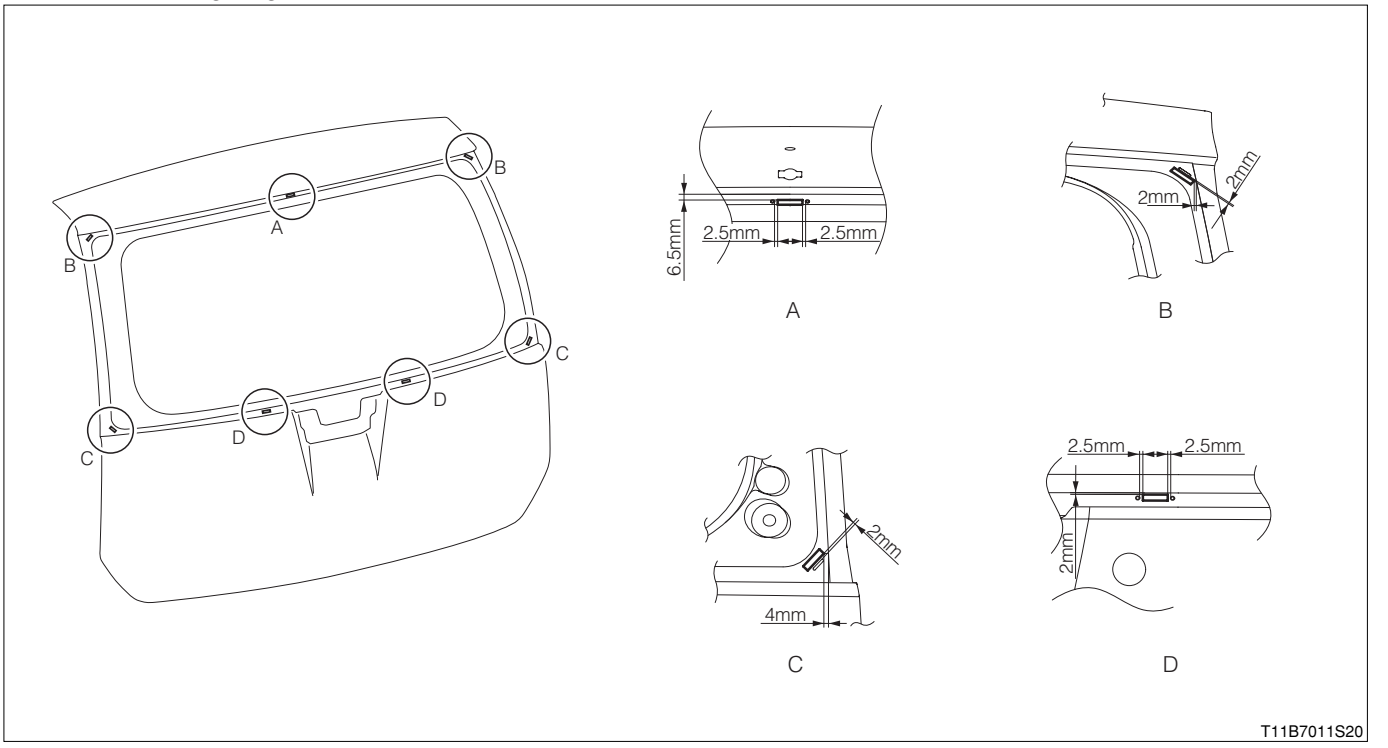
- Do not coat thickly.
- Do not coat the adhesive.
- After the primer is dry, proceed with the work.



3.Install the spacer. (7 points)

CAUTION

- Attach, aligning with the mark.



(3) Glass, back door

1.When installing new glass, apply glass primer to the glass adhesive section.

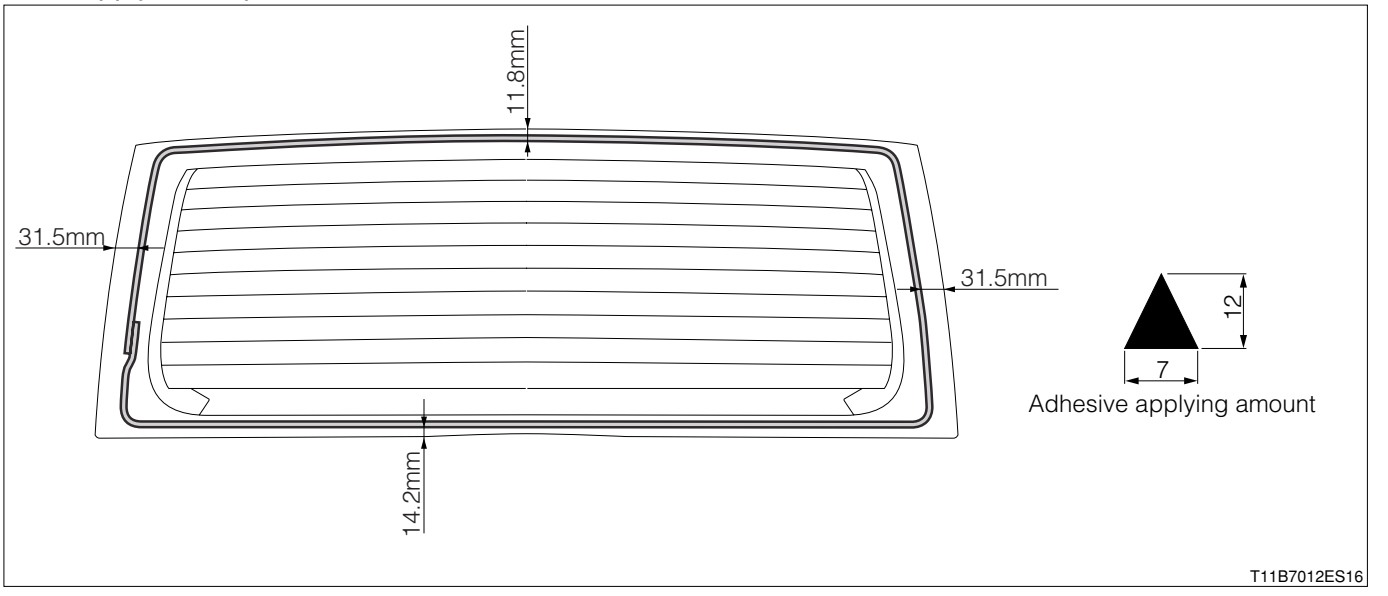
CAUTION

- Do not coat thickly.
- Do not coat the adhesive.
- After the primer is dry, proceed with the work.

2.Mount the cartridge in the gun. Apply the adhesive to the positions shown at the figure below.

CAUTION

- After the primer is dry, proceed with the work.
- Apply an ample amount of adhesive to the corners.



3.Using a suction rubber, install the glass. Install it firmly by lightly pushing the glass front surface.

CAUTION

- After applying the adhesive, install the glass within 5 minutes.

4.After the adhesive hardens, check for water leakage.

CAUTION

- If water leaks, after removing water, reapply the glass from the beginning.
- If you move the vehicle after the glass installation, move the vehicle gently.

2-1-6 OPERATION AFTER INSTALLATION

1.Install the rear upper spoiler S/A (Roof end spoiler equipped vehicles).

Refer to Page I2-11.

2.Install the rear wiper arm Ay.

Refer to Page J2-15.

3 POWER WINDOW MASTER SWITCH

3-1 REMOVAL AND INSTALLATION

Refer to Page I1-8.

4 FRONT DOOR POWER WINDOW SWITCH

4-1 REMOVAL AND INSTALLATION

Refer to Page I1-8.

5 REAR DOOR POWER WINDOW SWITCH

5-1 REMOVAL AND INSTALLATION

Refer to Page I1-15.

6 FRONT DOOR REGULATOR

6-1 REMOVAL AND INSTALLATION

Refer to Page I1-11.

7 REAR DOOR REGULATOR

7-1 REMOVAL AND INSTALLATION

Refer to Page I1-18.

8 POWER WINDOW SYSTEM

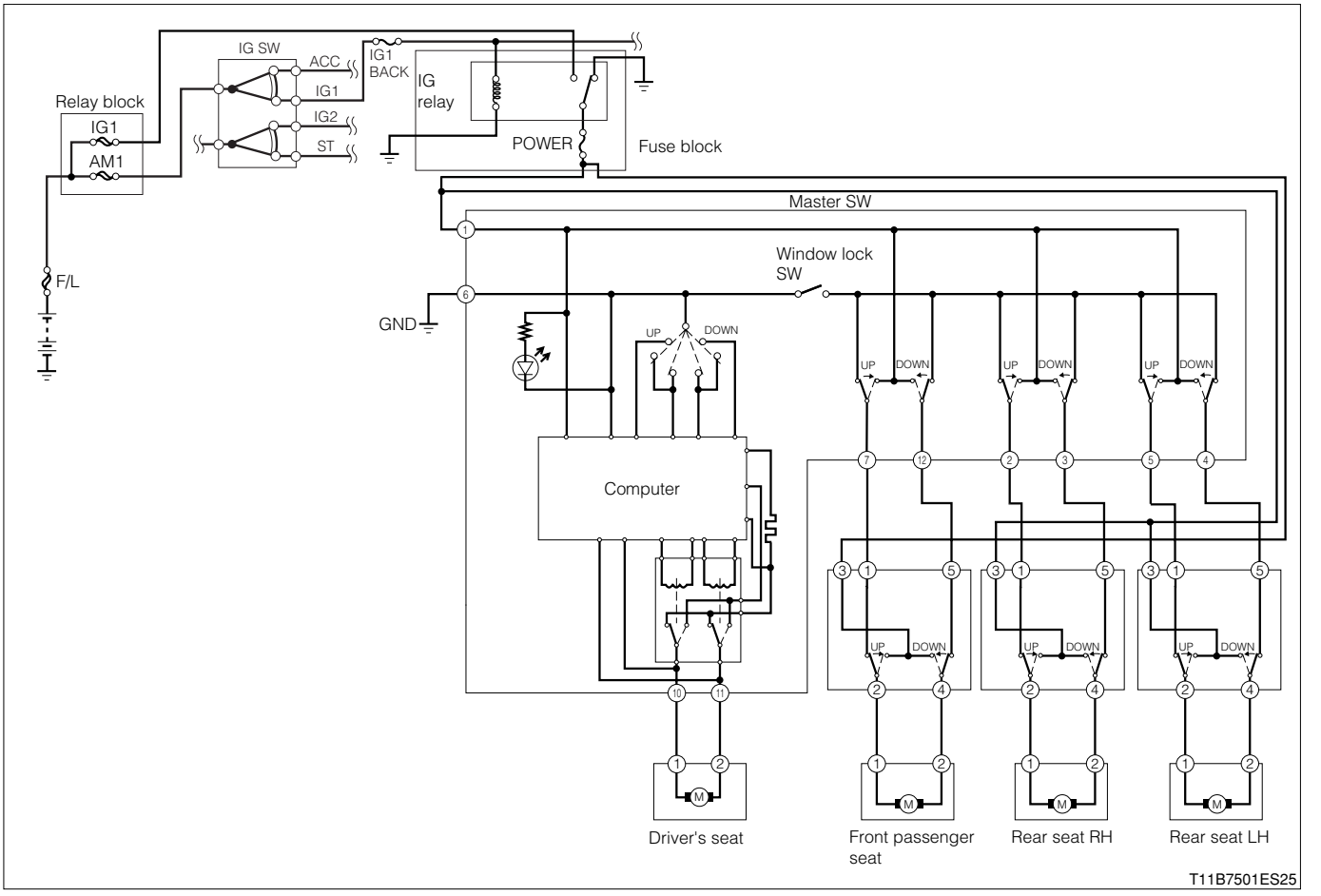
8-1 ARTICLES TO BE PREPARED

Instrument

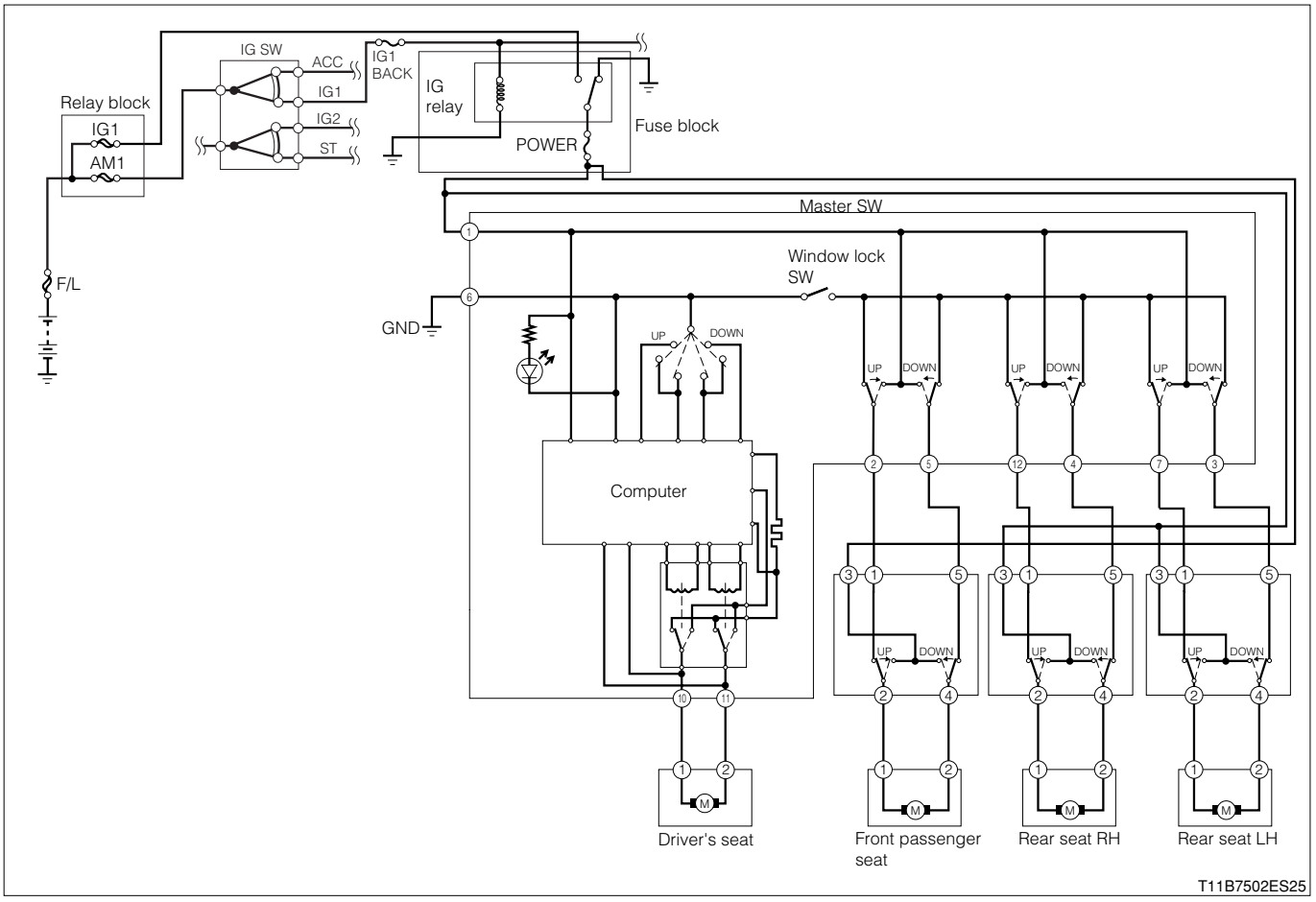
Voltage tester

8-2 SYSTEM WIRING DIAGRAM

RHD vehicles

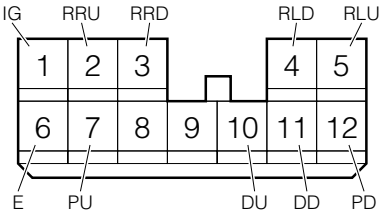


LHD vehicles

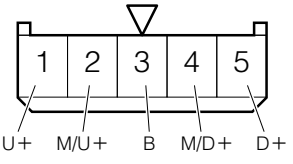


8-3 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS

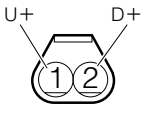
RHD vehicles



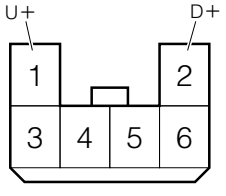
Driver's seat master switch



Front passenger seat • rear seat switch



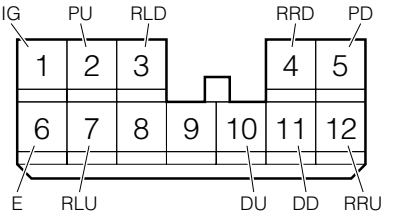
Driver's seat motor
Front passenger seat motor



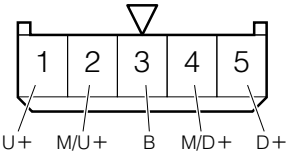
Rear seat motor

T11B7503ES20

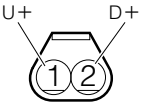
LHD vehicles



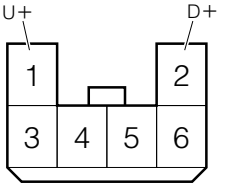
Driver's seat master switch



Front passenger seat • rear seat switch



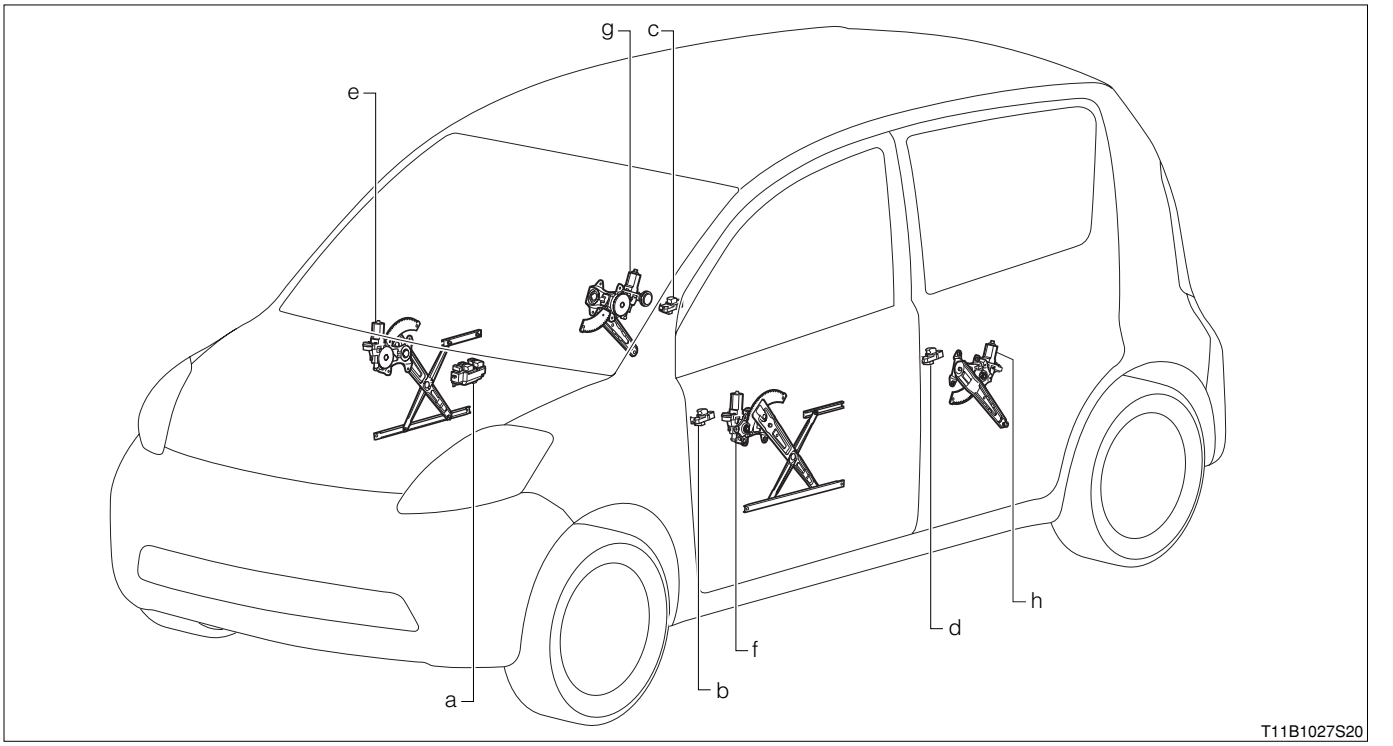
Driver's seat motor
Front passenger seat motor



Rear seat motor

T11B7504ES20

8-4 LOCATION OF COMPONENTS



T11B1027S20

a	Power window master switch
b	Front door power window switch
c	Rear door power window switch RH
d	Rear door power window switch LH
e	Front door regulator motor RH
f	Front door regulator motor LH
g	Rear door regulator motor RH
h	Rear door regulator motor LH

8-5 HOW TO PROCEED WITH TROUBLE SHOOTING

8-5-1 INQUIRY

1. In your attempt to remove the causes for a malfunction of the vehicle, you will not able to remove the causes unless you actually confirm the malfunctioning phenomenon. No matter how long you continue operations, the vehicle may not resume the normal state unless you confirm the malfunctioning phenomenon. The inquiry with the customer is a vital information collecting activity which is to be conducted previous to the confirmation of malfunctioning phenomenon.
2. This inquiry will provide you with an important clue in an effort to reproduce the malfunctioning phenomenon. Furthermore, the information obtained by the inquiry can be referred to during the troubleshooting. Hence, instead of making general questions, it is necessary to focus your questions on the items related to the malfunction.

(1) DIAGNOSIS BY INTERVIEW SHEET FOR POWER WINDOW SYSTEM

Checked by		Check date	Day Month (day of week)

Customer information

Name of customer	Mr./Ms.	Gender of customer (Male, female)	Age [approx.]	Occupation [ ]	
		Area where vehicle is mainly used	Urban, suburb, seashore, mountain, others	Parking place	Outdoor, indoor

Details of vehicle

Date when vehicle was brought to workshop	Day Month (day of week)	Date when malfunction took place	Day Month (day of week)	Repair history	No,Yes (How many times?)
Frame No.		Registration date	Day Month Year	Vehicle model	
Engine type		Transmission	5M/T·3A/T·4A/T·CVT electronically-controlled 4A/T	Driving	2WD·4WD
Running distance	km	Equipment	Tire [ ]· Wheel [Steel · Aluminum]		

Weather

☐ Fine	☐ Cloudy	☐ Rainy	☐ Snow	☐ Other( )
Temperature(Approx.)				

Frequency of malfunction

☐ Always	☐ Under certain condition( )	☐ Sometimes( )

Phenomenon

☐ Power window at the driver`s seat will not operate.
☐ Power window at the front passenger seat will not operete.
☐ Power window at the rear seat will not operate.
☐ It does not operate automatically(can be operated manuslly).
☐
☐
☐ Other

8-6 BASIC CHECK

8-6-1 MANUAL OPERATION

1.With the ignition switch set to ON position, perform the following checks.
(1) By means of the master switch at the driver's seat and power window switch at each door, each door glass can be opened or closed.
(2) When the window lock switch at the driver's seat is set to LOCK position, no operation can be made by the power window switches at the front passenger's seat and rear seats.

8-6-2 AUTOMATIC OPERATION FUNCTION

1.With the ignition switch set to ON position, perform the following checks.
(1) By means of the master switch at the driver's seat side, perform 2-step operation for the driver's seat side door glass in the up and down directions. Ensure that up and down automatic operations are executed, and the door stops at the full open or full closed position.
(2) By means of the master switch at the driver's seat side, perform 2-step operation for the driver's seat side door glass in the down direction. Ensure that down automatic operation is executed, and the door stops at the full open position.
(3) Operate the power window switch in the reverse direction during the automatic operation. Ensure that the automatic operation stops.

8-7 TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA

8-7-1 POWER WINDOW AT THE DRIVER`S SEAT WILL NOT OPERATE.

Σ1. Check earth of master switch

1.Check continuity between terminals below.
(1) Between the earth wire 6 of the master switch and the body earth
SPECIFIED VALUE: Continuity exists

▼If it is OK, go to Σ2.
▼If it is NG, repair the earth wire.

Σ2. Check of master switch voltage

1.Check the voltage of the terminals below.
(1) Between the master switch 1 and the master switch 6
SPECIFIED VALUE: 10 — 14V

▼If it is OK, go to Σ4.
▼If it is NG, go to Σ3.

Σ3. Battery voltage check

1.Check the battery voltage.
SPECIFIED VALUE: 10 — 14V

▼If it is OK, check defect of wire harness and repair.
▼If it is NG, charge the battery.

Σ>4. Wiring harness check

1.Check continuity and short circuit between terminals below.

(1) Between the vehicle harness side connector 10 of the master switch and the harness side connector 1 between motors

(2) Between the vehicle harness side connector 11 on the master switch and the connector 2 on harness side between motors

SPECIFIED VALUE: Continuity exists and no short circuit occurs.

▼If it is OK, go to Σ>5.

▼If it is NG, repair the wire harness.

Σ>5. power window motor check

1.Remove the power window motor and check operation when applying 12V to the motor connector directly.

SPECIFIED VALUE: Rotates normally.

▼If it is OK, replace the master switch.

▼If it is NG, replace the driver's seat side power window motor.

8-7-2 POWER WINDOW AT THE FRONT PASSENGER SEAT WILL NOT OPERETE

Σ>1. Check of master switch condition

1.Check that the window lock switch is at "unlock" position.

SPECIFIED VALUE: It is in the unlocked position.

▼If it is OK, go to Σ>2.

▼If it is NG, turn the window lock switch to "unlocked" position.

Σ>2. Switch power voltage check

1.Turn the IG switch "ON."

2.Check the voltage between terminals below.

(1) Between the master switch 1 and the body earth

(2) Between the front passenger's seat side switch 3 and the body earth.

SPECIFIED VALUE: 10 — 14V

▼If it is OK, go to Σ>3.

▼If it is NG, check the battery voltage, fuse/fusible link, and continuity of the harness.

Σ>3. Master switch operation check

1.Check that the operation can be performed by the master switch.

SPECIFIED VALUE: The operation can be performed.

▼If it is OK, replace the passenger's seat side switch.

▼If it is NG, go to Σ>4.

Σ>4. Front passenger's seat side switch operation check

1.Check that the operation can be performed by the front passenger's seat side switch.

SPECIFIED VALUE: The operation can be performed.

▼If it is OK, replace the master switch.

▼If it is NG, go to Σ>5.

∑>5. Harness check between the master switch and the front passenger's seat side switch

1.Check continuity and short circuit between terminals below.

RHD vehicles

(1) Between the vehicle harness side connector 7 on the master switch and the vehicle harness side connector 1 on the front passenger's seat side switch

(2) Between the vehicle harness side connector 12 on the master switch and the vehicle harness side connector 5 on the front passenger's seat side switch

LHD vehicles

(3) Between the vehicle harness side connector 2 on the master switch and the vehicle harness side connector 1 on the front passenger's seat side switch

(4) Between the vehicle harness side connector 5 on the master switch and the vehicle harness side connector 5 on the front passenger's seat side switch

SPECIFIED VALUE: Continuity exists and no short circuit occurs.

▼If it is OK, go to ∑>6.

▼If it is NG, repair the wire harness.

∑>6. Master switch earth check

1.With the window lock switch at "unlocked," check continuity between terminals below.

RHD vehicles

(1) Between the vehicle harness side connector 7 on the master switch and the body earth

(2) Between the vehicle harness side connector 12 on the master switch and the body earth

LHD vehicles

(3) Between the vehicle harness side connector 2 on the master switch and the body earth

(4) Between the vehicle harness side connector 5 on the master switch and the body earth

SPECIFIED VALUE: Continuity exists

▼If it is OK, go to ∑>7.

▼If it is NG, replace the master switch.

∑>7. Power window motor earth check

1.With the switch turned "OFF," check continuity between terminals below.

(1) Between the power window motor 1 and the body earth

(2) Between the power window motor 2 and the body earth

SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to ∑>9.

▼If it is NG, go to ∑>8.

∑>8. Front passenger's seat side switch unit check

1.Check continuity between terminals below.

(1) Between the front passenger's seat side switch 1 and the front passenger's seat side switch 2

(2) Between the front passenger's seat side switch 4 and the front passenger's seat side switch 5

SPECIFIED VALUE: Continuity exists.

▼If it is OK, repair the wire harness.

▼If it is NG, replace the front passenger's seat side switch.

⊳9. Power window motor power voltage check (1)

1.Check voltage between terminals below during the up and down operation of the front passenger's seat side switch.
(1) Between the power window motor 1 and the power window motor 2
SPECIFIED VALUE: 10 — 14V

▼If it is OK, go to ⊳4.
▼If it is NG, replace the front passenger's seat side switch.

⊳10. Power window motor power voltage check (2)

1.Check the voltage between terminals below during the up and down operation of the master switch.
(1) Between the power window motor terminal 1 and the body earth
(2) Between the power window motor terminal 2 and the booty earth
SPECIFIED VALUE: 10 — 14V

▼If it is OK, replace the power window motor.
▼If it is NG, replace the master switch.

8-7-3 POWER WINDOW AT THE REAR SEAT WILL NOT OPERATE.

⊳1. Master switch condition check

1.Check that the window lock switch is at "unlocked."
SPECIFIED VALUE: It is in the unlocked position.

▼If it is OK, go to ⊳2.
▼If it is NG, turn the window lock switch to the "unlocked" position.

⊳2. Master switch power voltage check

1.Turn "ON" the IG switch.
2.Check the voltage between terminals below.
(1) Between the master switch terminal 1 and the body earth
(2) Between the rear seat's switch terminal 3 and the body earth
SPECIFIED VALUE: 10 — 14V

▼If it is OK, go to ⊳1.
▼If it is NG, check the battery voltage, fuse/fusible link, and continuity of harness.

⊳3. Check of master switch operation

1.Check that the operation can be performed by the master switch.
SPECIFIED VALUE: The operation can be performed.

▼If it is OK, replace the rear seat's switch.
▼If it is NG, go to ⊳2.

⊳4. Rear seat's switch operation check

1.Check that the operation can be performed by the rear seat's switch.
SPECIFIED VALUE: The operation can be performed.

▼If it is OK, replace the master switch.
▼If it is NG, go to ⊳3.

∑5. Wire harness check

1.Check continuity between the master switch terminal below and the rear seat's switch terminal.

RHD vehicles

2.Rear left seat

(1) Between the vehicle harness side connector 5 on the master switch and the vehicle harness side connector 1 on the rear seat's switch

(2) Between the vehicle harness side connector 4 on the master switch and the vehicle harness side connector 5 on the rear seat's switch

3.Rear right seat

(1) Between the vehicle harness side connector 3 on the master switch and the vehicle harness side connector 5 on the rear seat's switch

(2) Between the vehicle harness side connector 2 on the master switch and the vehicle harness side connector 1 on the rear seat's switch

LHD vehicles

4.Rear left seat

(1) Between the vehicle harness side connector 7 on the master switch and the vehicle harness side connector 1 on the rear seat's switch

(2) Between the vehicle harness side connector 3 on the master switch and the vehicle harness side connector 5 on the rear seat's switch

5.Rear right seat

(1) Between the vehicle harness side connector 4 on the master switch and the vehicle harness side connector 5 on the rear seat's switch

(2) Between the vehicle harness side connector 12 on the master switch and the vehicle harness side connector 1 on the rear seat's switch

SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to ∑0.

▼If it is NG, repair the wire harness.

∑6. Master switch earth check

1.Check continuity between terminals below with the window lock switch "unlocked."

RHD vehicles

(1) Between the vehicle harness side connector 2 on the master switch and the vehicle harness side connector 6 on the master switch

(2) Between the vehicle harness side connector 3 on the master switch and the vehicle harness side connector 6 on the master switch

(3) Between the vehicle harness side connector 4 on the master switch and the vehicle harness side connector 6 on the master switch

(4) Between the vehicle harness side connector 5 on the master switch and the vehicle harness side connector 6 on the master switch

LHD vehicles

(5) Between the vehicle harness side connector 3 on the master switch and the vehicle harness side connector 6 on the master switch

(6) Between the vehicle harness side connector 4 on the master switch and the vehicle harness side connector 6 on the master switch

(7) Between the vehicle harness side connector 7 on the master switch and the vehicle harness side connector 6 on the master switch

(8) Between the vehicle harness side connector 12 on the master switch and the vehicle harness side connector 6 on the master switch

SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to ⊳7.

▼If it is NG, replace the master switch.

⊳7. Power window motor earth check

1.With the switch turned "OFF," check continuity between terminals below.

(1) Between the power window motor 1 and the power window motor 2

SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to ⊳9.

▼If it is NG, go to ⊳8.

⊳8. Rear seat's switch unit check

1.Check continuity between rear seat's switch terminals below.

(1) Between the rear seat's switch 1 and the rear seat's switch 2

(2) Between the rear seat's switch 4 and the rear seat's switch 5

SPECIFIED VALUE: Continuity exists.

▼If it is OK, repair the wire harness.

▼If it is NG, replace the rear seat's switch.

⊳9. Power window motor power voltage check (1)

1.Check the voltage between terminals below during the up and down operation of the rear seat's switch.

(1) Between the power window motor 1 and the window motor 2.

SPECIFIED VALUE: 10 — 14V

▼If it is OK, go to ⊳10.

▼If it is NG, replace the rear seat's switch.

⊳10. Power window motor power voltage check (2)

1.Check the voltage between terminals below during the up and down operation of the master switch.

(1) Between the power window motor 1 and the window motor 2

SPECIFIED VALUE: 10 — 14V

▼If it is OK, replace the power window motor.

▼If it is NG, replace the master switch.

8-8 UNIT CHECK

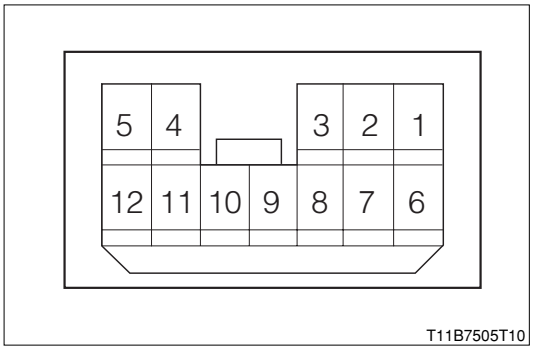
8-8-1 DRIVER'S SEAT MASTER SWITCH

(1) Continuity check

1.Check continuity between each terminal of the master switch Ay.

CAUTION

- Since continuity check by operating driver's seat side switch up and down cannot be made, check whether the state is good or bad by operation check.



RHD vehicles

Switch operation		Front passenger seat	Rear seat at the right side	Rear seat at the left side	Standard
Unlock	UP	1 — 7	1 — 2	1 — 5	Continuity exists
		6 — 12	3 — 6	4 — 6	
	OFF	6 — 7 — 12	1 — 3 — 6	4 — 5 — 6	
	DOWN	1 — 12	1 — 3	1 — 4	
		6 — 7	2 — 6	5 — 6	
Lock	UP	1 — 7	1 — 2	1 — 5	
	OFF	7 — 12	2 — 3	4 — 5	
	DOWN	1 — 12	1 — 3	1 — 4	

LHD vehicles

Switch operation		Front passenger seat	Rear seat at the right side	Rear seat at the left side	Standard
Unlock	UP	1 — 2	1 — 12	1 — 7	Continuity exists
		5 — 6	4 — 6	3 — 6	
	OFF	1 — 5 — 6	4 — 6 — 12	3 — 6 — 7	
	DOWN	1 — 5	1 — 4	1 — 3	
		2 — 6	6 — 12	6 — 7	
Lock	UP	1 — 2	1 — 12	1 — 7	
	OFF	2 — 5	4 — 12	3 — 7	
	DOWN	1 — 5	1 — 4	1 — 3	

(2) Operation check

CAUTION

- When the continuity check has indicated that the system is normal, perform this check.

1.Check conductivity and voltage between each terminal and body earth following the check procedure below.

NOTE

- "Disconnected Vehicle side" in the table shows that the check is to be made at the vehicle side connector with the connector disconnected. "Connector connected" means that the check is to be made with the connector connected.

RHD vehicles

Measurement connector condition	Terminal No. Tester positive (+) ⇄ tester negative	Check items	Checking condition	Standard	Defective areas in the case of non-compliance of standard
Disconnected Vehicle side	6⇄Earth	Voltage	At all times	0V	Vehicle side
	1⇄Earth	Voltage	IG switch "OFF"→"ON"	0V→10 − 14V	
Connector connected	11⇄Earth	Voltage	IG switch "ON," the driver's seat side switch for the master switch "OFF"→DOWN (manual operation)	0V→9V or more	Master switch
			IG switch "ON," the driver's seat side door completely closed → the driver's seat side switch for the master switch "DOWN" (automatic operation)→ the door glass completely open	0V→9V or more →0V	
	10⇄Earth	Voltage	IG switch "ON," the driver's seat side switch for the master switch "OFF"→ UP (manual operation)	0V→9V or more	
			IG switch "ON," the driver's seat side door completely open → the driver's seat side switch for the master switch UP (automatic operation) → Door glass completely closed.	0V→9V or more →0V	
	12⇄Earth	Voltage	IG switch "ON," window lock switch "ON," front seat (left) switch "OFF"→DOWN	0V→9V or more	
	7⇄Earth	Voltage	IG switch "ON," window lock switch "ON," front seat (left) switch "OFF"→UP	0V→9V or more	
	3⇄Earth	Voltage	IG switch "ON," window lock switch "ON," rear seat (right) switch "OFF"→DOWN	0V→9V or more	
	2⇄Earth	Voltage	IG switch "ON," window lock switch "ON," rear seat (right) switch "OFF"→UP	0V→9V or more	
	4⇄Earth	Voltage	IG switch "ON," window lock switch "ON," rear seat (left) switch "OFF"→ DOWN	0V→9V or more	
	5⇄Earth	Voltage	IG switch "ON," window lock switch "ON," rear seat (left) switch "OFF"→ UP	0V→9V or more	

LHD vehicles

Measurement connector condition	Terminal No. Tester positive (+) ⇄ tester negative	Check items	Checking condition	Standard	Defective areas in the case of non-compliance of standard
Disconnected Vehicle side	6⇄Earth	Voltage	At all times	0V	Vehicle side
	1⇄Earth	Voltage	IG switch "OFF"→"ON"	0V→10 − 14V	
Connector connected	11⇄Earth	Voltage	IG switch "ON," the driver's seat side switch for the master switch "OFF"→DOWN (manual operation)	0V→9V or more	Master switch
			IG switch "ON," the driver's seat side door completely closed → the driver's seat side switch for the master switch "DOWN" (automatic operation)→ the door glass completely open	0V→9V or more →0V	
	10⇄Earth	Voltage	IG switch "ON," the driver's seat side switch for the master switch "OFF"→ UP (manual operation)	0V→9V or more	
			IG switch "ON," the driver's seat side door completely open → the driver's seat side switch for the master switch UP (automatic operation) → Door glass completely closed.	0V→9V or more →0V	
	5⇄Earth	Voltage	IG switch "ON," window lock switch "ON," front seat (left) switch "OFF"→DOWN	0V→9V or more	
	2⇄Earth	Voltage	IG switch "ON," window lock switch "ON," front seat (left) switch "OFF"→UP	0V→9V or more	
	4⇄Earth	Voltage	IG switch "ON," window lock switch "ON," rear seat (right) switch "OFF"→DOWN	0V→9V or more	
	12⇄Earth	Voltage	IG switch "ON," window lock switch "ON," rear seat (right) switch "OFF"→UP	0V→9V or more	
	3⇄Earth	Voltage	IG switch "ON," window lock switch "ON," rear seat (left) switch "OFF"→ DOWN	0V→9V or more	
	7⇄Earth	Voltage	IG switch "ON," window lock switch "ON," rear seat (left) switch "OFF"→ UP	0V→9V or more	

(3) Illumination check

1.When connecting the battery positive (+) with the terminal 1 and the battery negative with the terminal 6, check the switch illumination condition.

SPECIFIED VALUE: The switch illuminates.

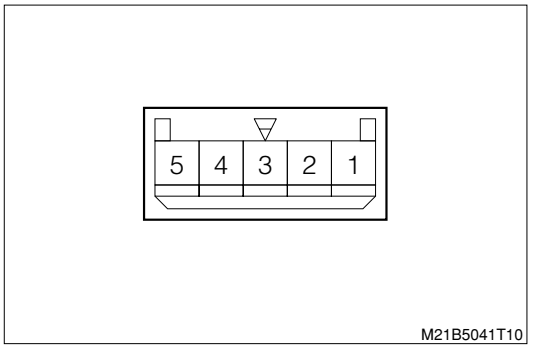
8-8-2 FRONT PASSENGER SEAT SWITCH

(1) Continuity check

1.Check continuity between terminals of the switch.

Power window regulator switch section

Switching	Terminal No.	Standard
UP	2 − 3	Continuity exists
	4 − 5	
OFF	1 − 2	
	4 − 5	
DOWN	1 − 2	
	3 − 4	



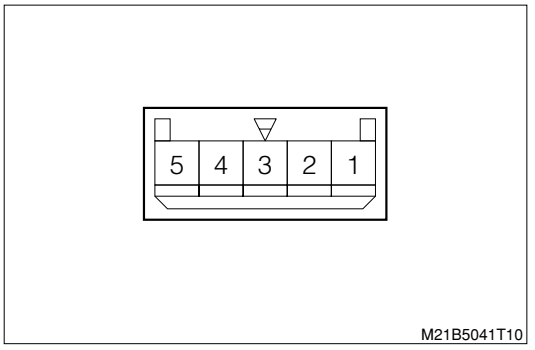
8-8-3 REAR SEAT SWITCH

(1) Continuity check

1.Check continuity between terminals of the switch.

Power window regulator switch section

Switching	Terminal No.	Standard
UP	2 — 3	Continuity exists
	4 — 5	
OFF	1 — 2	
	4 — 5	
DOWN	1 — 2	
	3 — 4	



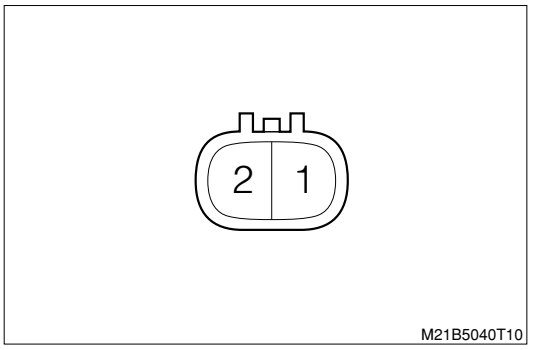
8-8-4 DRIVER'S SEAT REGULATOR MOTOR

1.Connect each battery terminal with the terminal 1 and the terminal 2 as shown in the table below and check the rotating direction.

2.Check for abnormal noise, axis rattling, or distortion during the motor rotation.

CAUTION

- Do not short-circuit the battery positive (+) and negative (−) terminals.



RHD vehicles

Connection	Terminal	Motor rotating direction (as viewed from the pinion gear side)
Battery positive (+)	1	Right turn
Battery negative (−)	2	
Battery positive (+)	2	Left turn
Battery negative (−)	1	

LHD vehicles

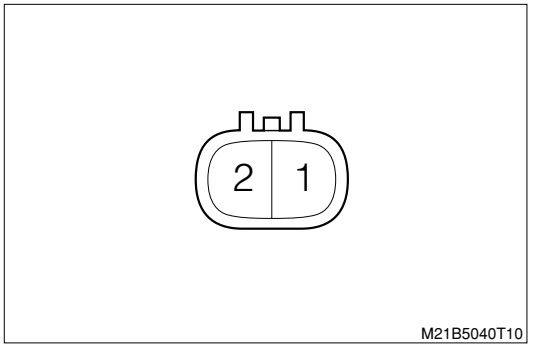
Connection	Terminal	Motor rotating direction (as viewed from the pinion gear side)
Battery positive (+)	2	Right turn
Battery negative (−)	1	
Battery positive (+)	1	Left turn
Battery negative (−)	2	

8-8-5 FRONT PASSENGER SEAT REGULATOR MOTOR

1.Connect each battery terminal with the terminal 1 and the terminal 2 as shown in the table below and check the rotating direction.
2.Check for abnormal noise, axis rattling, or distortion during the motor rotation.

CAUTION

- Do not short-circuit the battery positive (+) and negative (−) terminals.



RHD vehicles

Connection	Terminal	Motor rotating direction (as viewed from the pinion gear side)
Battery positive (+)	2	Right turn
Battery negative (−)	1	
Battery positive (+)	1	Left turn
Battery negative (−)	2	

LHD vehicles

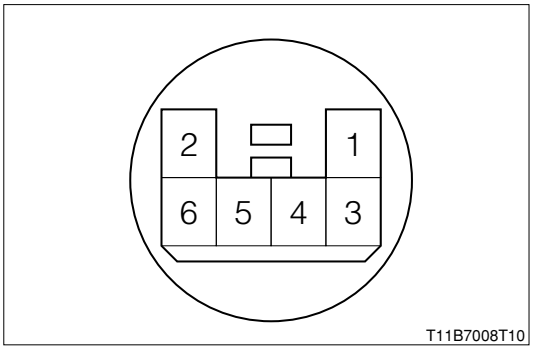
Connection	Terminal	Motor rotating direction (as viewed from the pinion gear side)
Battery positive (+)	1	Right turn
Battery negative (−)	2	
Battery positive (+)	2	Left turn
Battery negative (−)	1	

8-8-6 REAR SEAT REGULATOR MOTOR

1.Connect each battery terminal with the terminal 1 and the terminal 2 as shown in the table below and check the rotating direction.
2.Check for abnormal noise, axis rattling, or distortion during the motor rotation.

CAUTION

- Do not short-circuit the battery positive (+) and negative (−) terminals.



Rear seat at the right side

Connection	Terminal	Motor rotating direction (as viewed from the pinion gear side)
Battery positive (+)	1	Right turn
Battery negative (−)	2	
Battery positive (+)	2	Left turn
Battery negative (−)	1	

Rear seat at the left side

Connection	Terminal	Motor rotating direction (as viewed from the pinion gear side)
Battery positive (+)	2	Right turn
Battery negative (−)	1	
Battery positive (+)	1	Left turn
Battery negative (−)	2	

9 OUTER REAR VIEW MIRROR

9-1 REMOVAL AND INSTALLATION

9-1-1 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

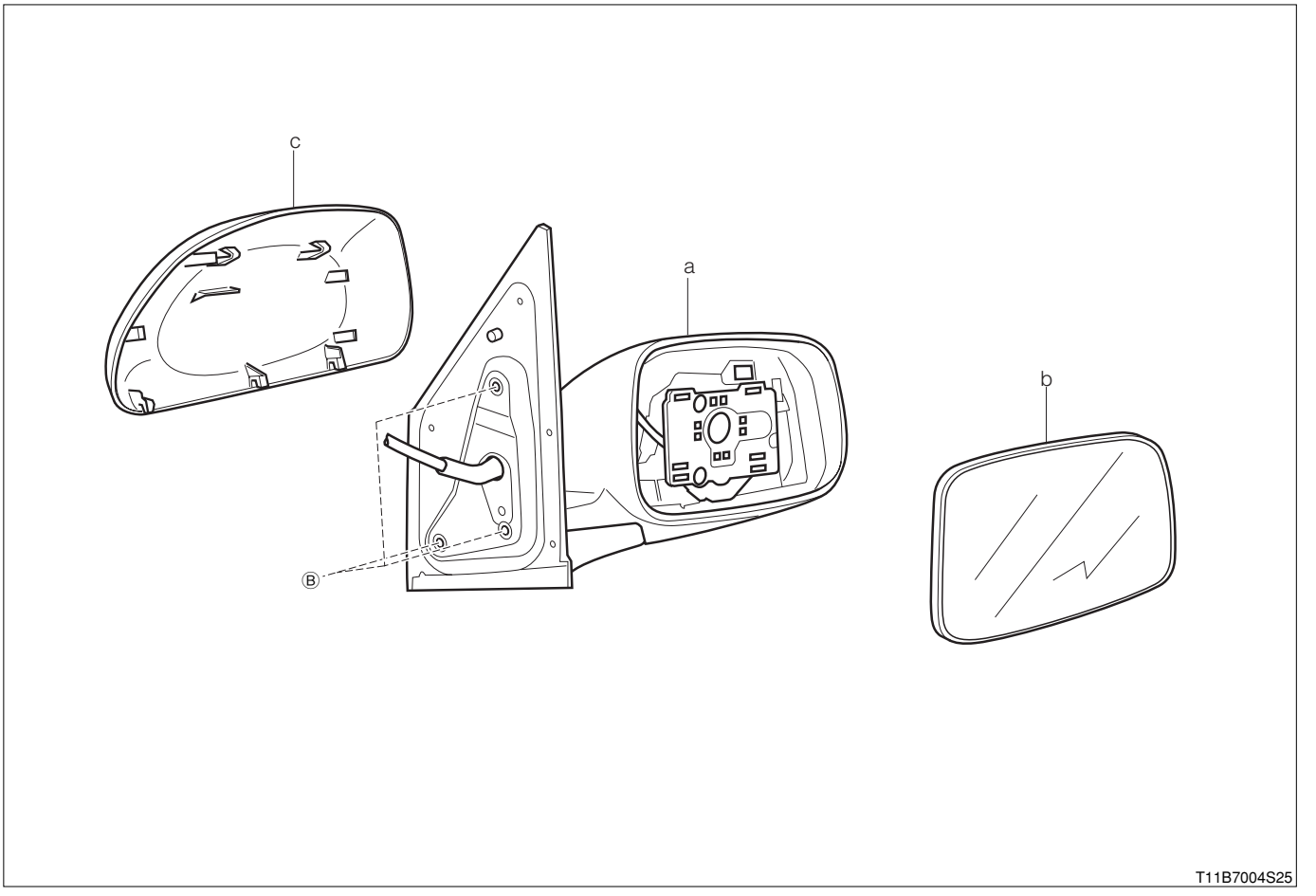
Protective tape

9-1-2 OPERATION BEFORE REMOVAL

1.Remove the front door lower frame bracket garnish RH/LH.
Refer to Page I1-8.

9-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Mirror Ay, outer rear view, RH/LH
▼ ▲ 2 b Mirror, outer rear view, RH/LH
▼ 3 c Cover, outer mirror, RH/LH

9-1-4 POINTS OF REMOVAL

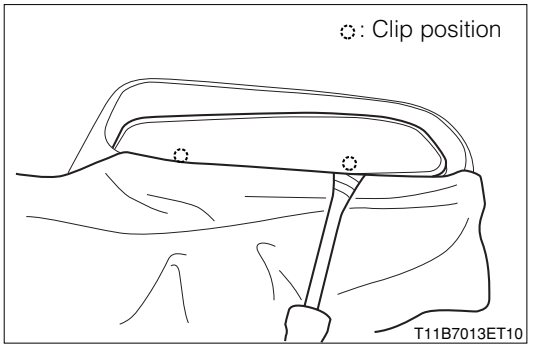
(1) Mirror, outer rear view, RH/LH

1.Attach the protection tape.

2.Separate the clip fitted area with a flat screwdriver and remove the mirror.

CAUTION

- When the temperature is low, the clip may be broken. Therefore, warm the mirror surface with a hair-dryer before removing.



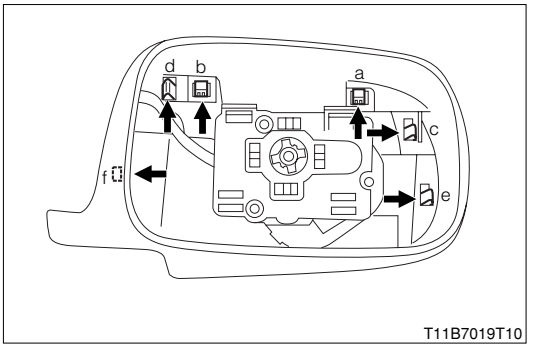
(2) Cover, outer mirror, RH/LH

1.Disengage the fitting of the pawls (a, b).

2.With the pawls (a, b) disengaged, disengage the pawls in the order of c to f.

CAUTION

- Since the pawl f is not visible, carefully remove it to avoid damaging.

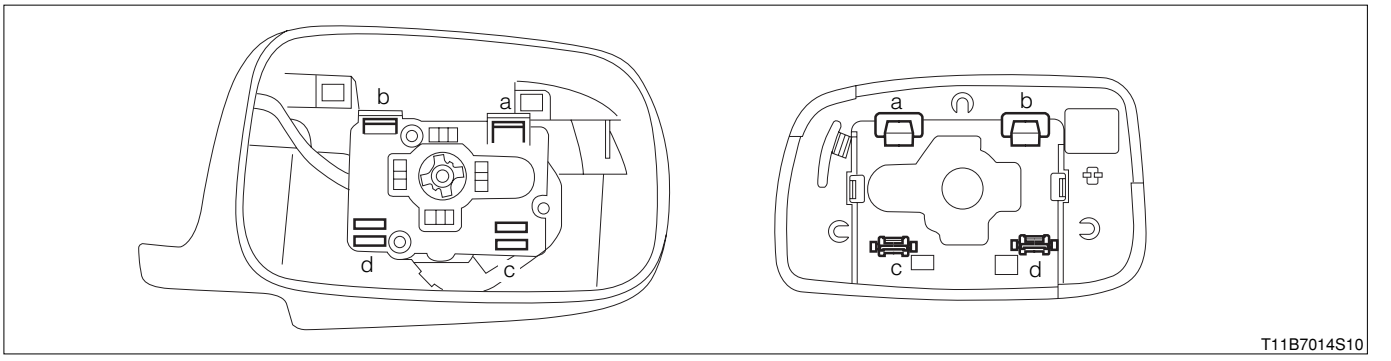


9-1-5 POINTS OF INSTALLATION

(1) Mirror, outer rear view, RH/LH

1.Hook the pawls (a, b) on the mirror to the outer rear view mirror Ay, RH/LH.

2.Engage the clip (c, d) and install the mirror.



9-1-6 OPERATION AFTER INSTALLATION

1.Install the front door lower frame bracket garnish RH/LH.

Refer to Page I1-8.

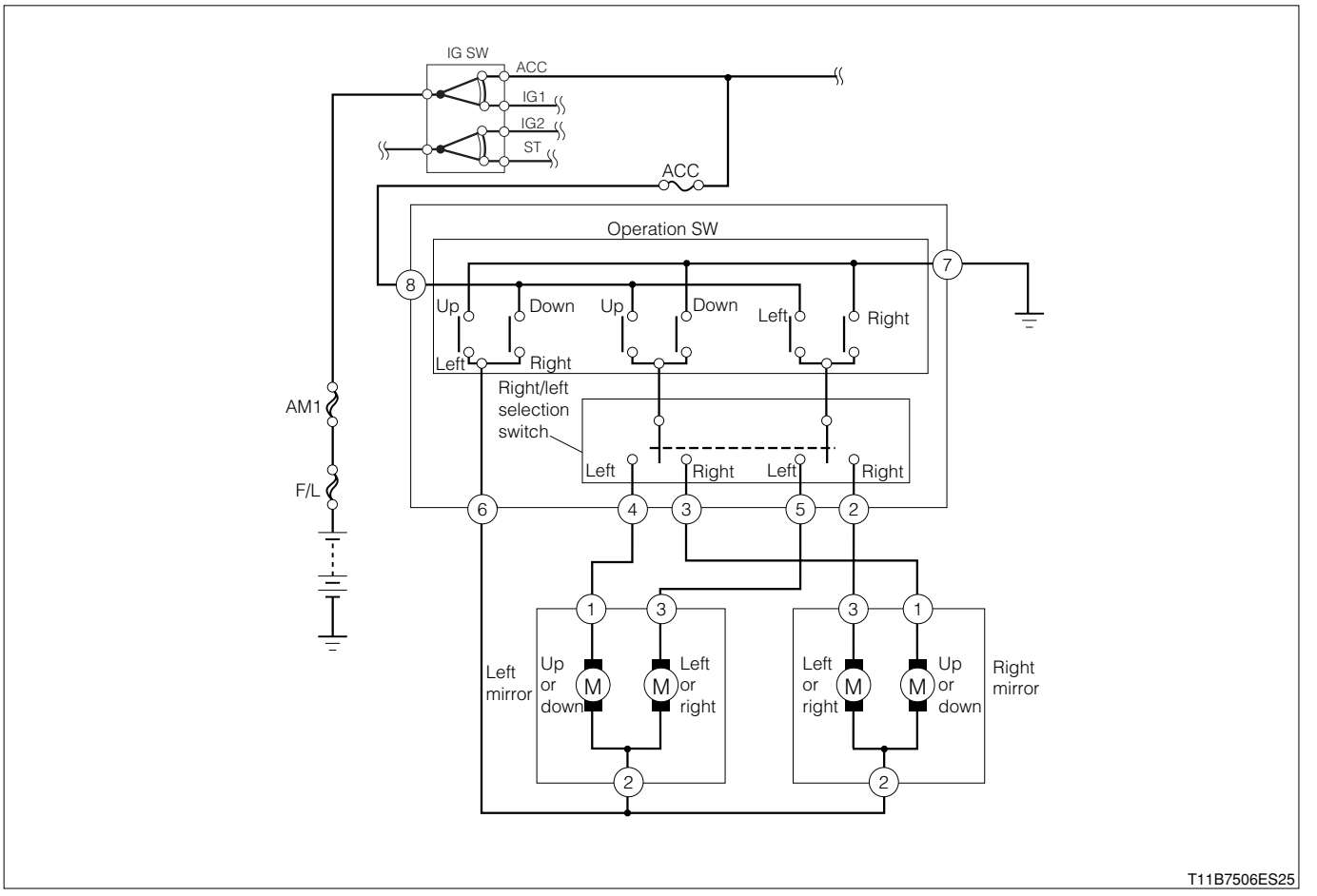
10 MIRROR SURFACE MOTOR-DRIVEN MOVABLE TYPE OUTER REAR-VIEW MIRROR

10-1 ARTICLES TO BE PREPARED

Instrument

Voltage tester

10-2 SYSTEM WIRING DIAGRAM



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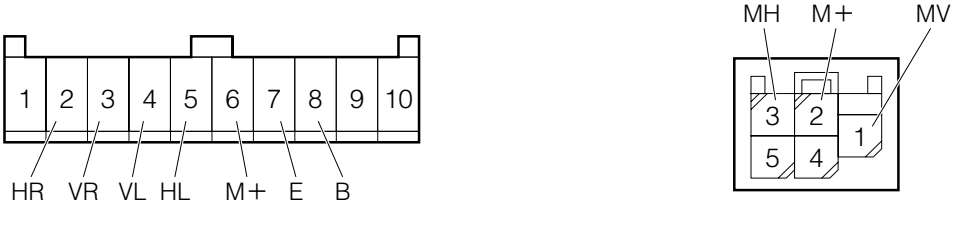
10-3 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS



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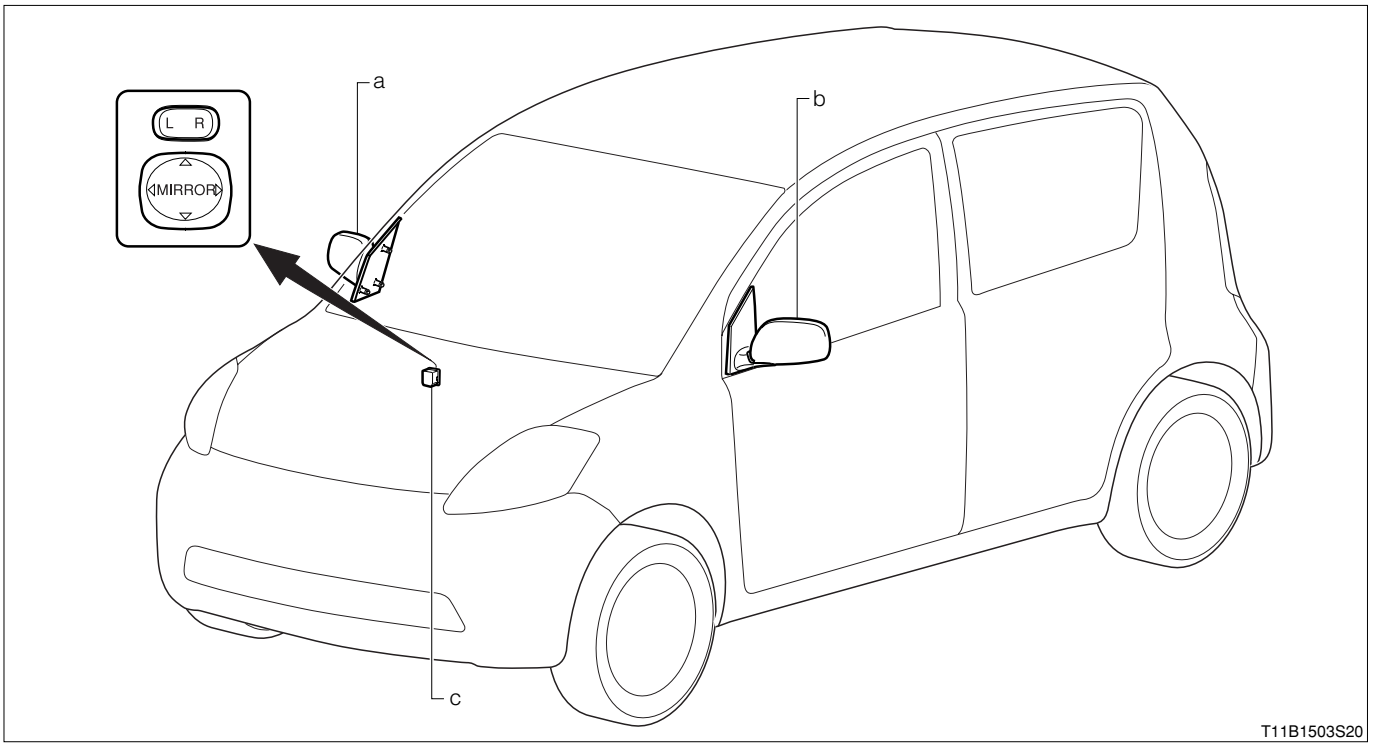
10-4 LOCATION OF COMPONENTS

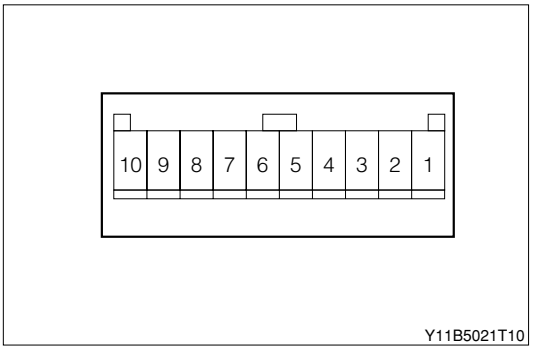


a	Outer rear view mirror RH
b	Outer rear view mirror LH
c	Outer mirror switch

10-5 UNIT CHECK

10-5-1 OUTER MIRROR SWITCH AY

Check continuity between each terminal by operating the switch.



Right/Left Switching SW Mirror operation

SW section

○—○: Continuity should exist

Switching	Terminal No.	⑧	⑥	⑦	③	②	④	⑤
LH	Up	○		○			○	
			○	○				
	Down	○	○	○			○	
	OFF							
	Left	○						○
			○	○				
	Right	○	○	○				○
OFF	Up			○				○
	Down	○						○
	OFF							
	Left			○			○	
	Right	○					○	
RH	Up	○			○			
			○	○				
	Down	○	○	○	○			
	OFF							
	Left	○				○		
			○	○				
	Right	○	○	○		○		

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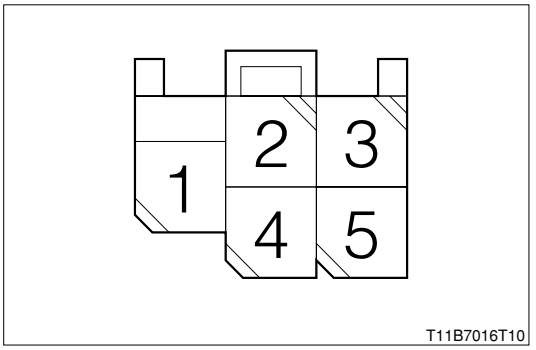
10-5-2 OUTER REAR VIEW MIRROR AY, RH/LH

Check the operation when applying battery voltage between each terminal.



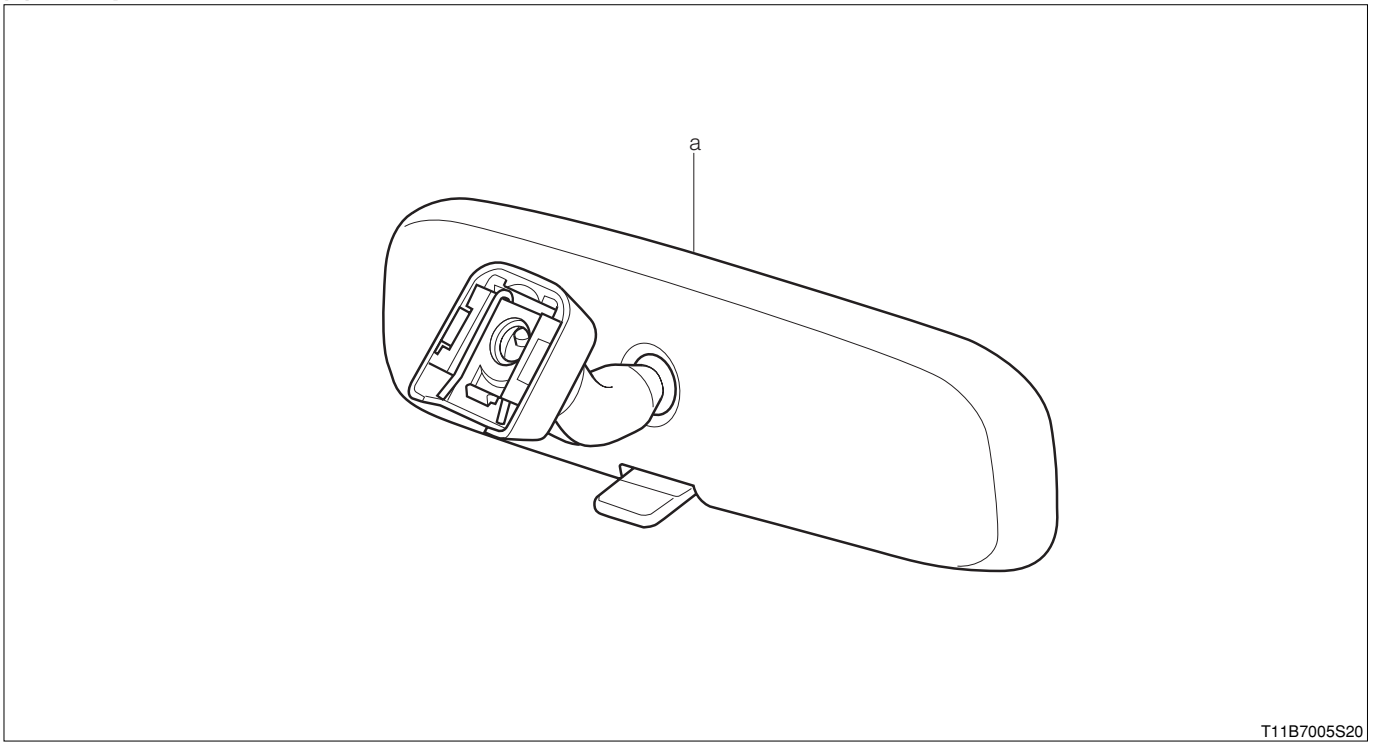
Connection	Terminal	Operating direction
Battery positive (+)	1	Up
Battery negative (−)	2	
Battery positive (+)	2	Down
Battery negative (−)	1	
Battery positive (+)	2	Left
Battery negative (−)	3	
Battery positive (+)	3	Right
Battery negative (−)	2	

11 INNER REAR VIEW MIRROR

11-1 REMOVAL AND INSTALLATION

11-1-1 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



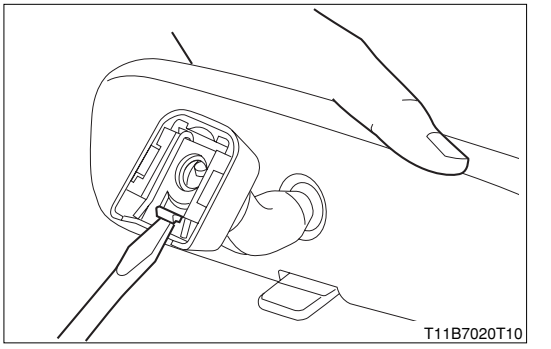
(2) Removal and installation procedures

▼ 1 a Mirror Ay, inner rear view

11-1-2 POINTS OF REMOVAL

(1) Mirror Ay, inner rear view

1.Press the pawl of the mirror Ay with a flat screwdriver to disengage fitting, and push upward along the glass surface to remove.



I4 DOOR LOCK & THEFT DETERRENT

POWER DOOR LOCK SYSTEM ---------- I4 - 1
ITC COMPUTER ---------- I4 - 1
REMOVAL AND INSTALLATION --------- I4 - 1
FRONT DOOR LOCK MOTOR ---------- I4 - 2
REMOVAL AND INSTALLATION --------- I4 - 2
REAR DOOR LOCK MOTOR ---------- I4 - 2
REMOVAL AND INSTALLATION --------- I4 - 2
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TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE ---------- I4 - 37
UNIT CHECK ---------- I4 - 41

■ POWER DOOR LOCK SYSTEM
1 ITC COMPUTER
1-1 REMOVAL AND INSTALLATION

CAUTION

- Be careful not to drop the door control relay Ay or give great impacts to it.
- If the door control relay Ay dropped or was subjected to great impacts, replace it with a new one even if there is no abnormality in its external appearance.

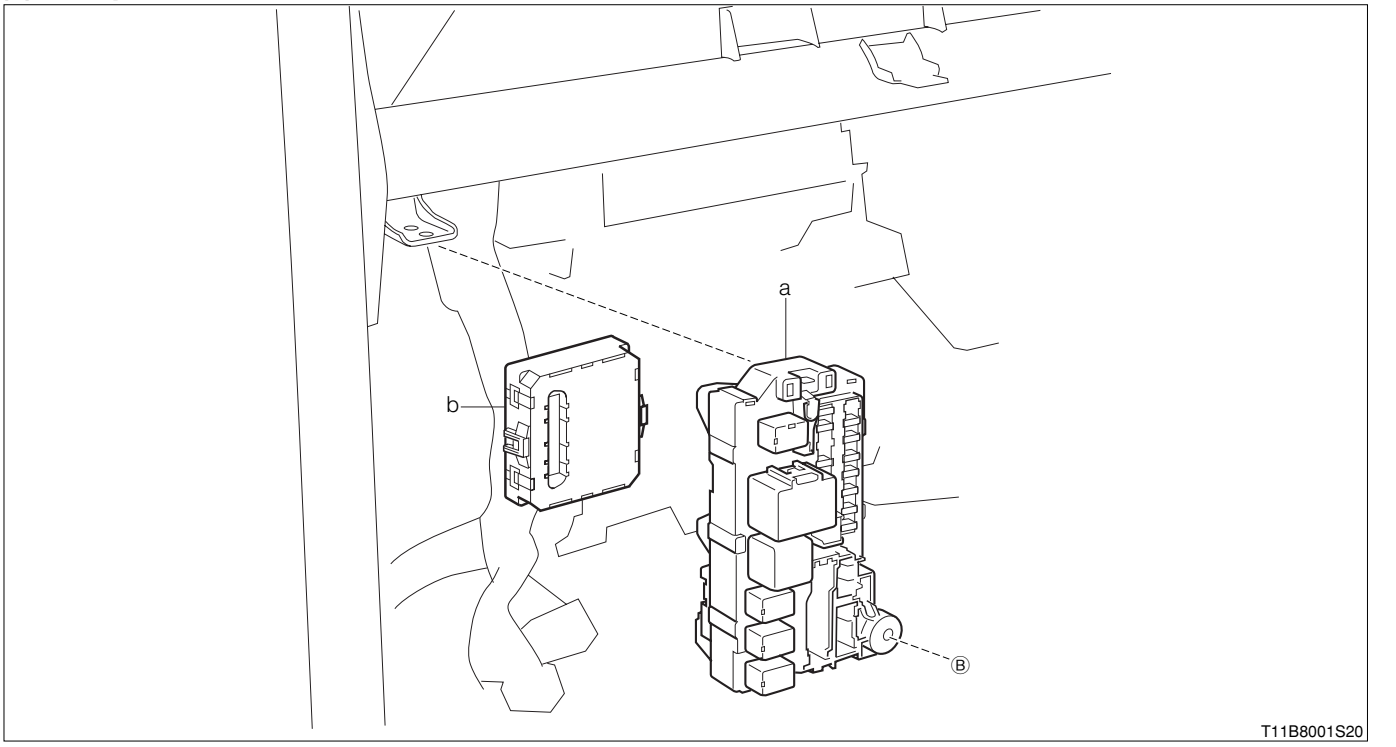
1-1-1 OPERATION BEFORE REMOVAL

1.Disconnect the battery negative (−) terminal.
2.Remove the instrument panel finish lower panel S/A.
Refer to Page I2-23.

3.Remove the fuse box opening cover.
Refer to Page I2-23.

1-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Block Ay, fuse W/fuse
2 b Relay Ay, door control

1-1-3 INSPECTION

(1) Relay Ay, door control

1.Replace the computer with a new one in the following cases.
(1) Case where the door control relay Ay has deformation, abrasion, cracks or breakage.

CAUTION

- Never disassemble the computer.

1-1-4 OPERATION AFTER INSTALLATION

1.Install the fuse box opening cover.
Refer to Page I2-23.

2.Install the instrument panel finish lower panel S/A.
Refer to Page I2-23.

3.Connect the battery negative (−) terminal.

2 FRONT DOOR LOCK MOTOR

2-1 REMOVAL AND INSTALLATION

Refer to Page I1-13.

3 REAR DOOR LOCK MOTOR

3-1 REMOVAL AND INSTALLATION

Refer to Page I1-20.

4 BACK DOOR LOCK MOTOR

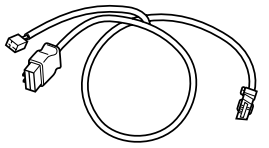
4-1 REMOVAL AND INSTALLATION

Refer to Page I1-22.

5 POWER DOOR LOCK SYSTEM

5-1 ARTICLES TO BE PREPARED

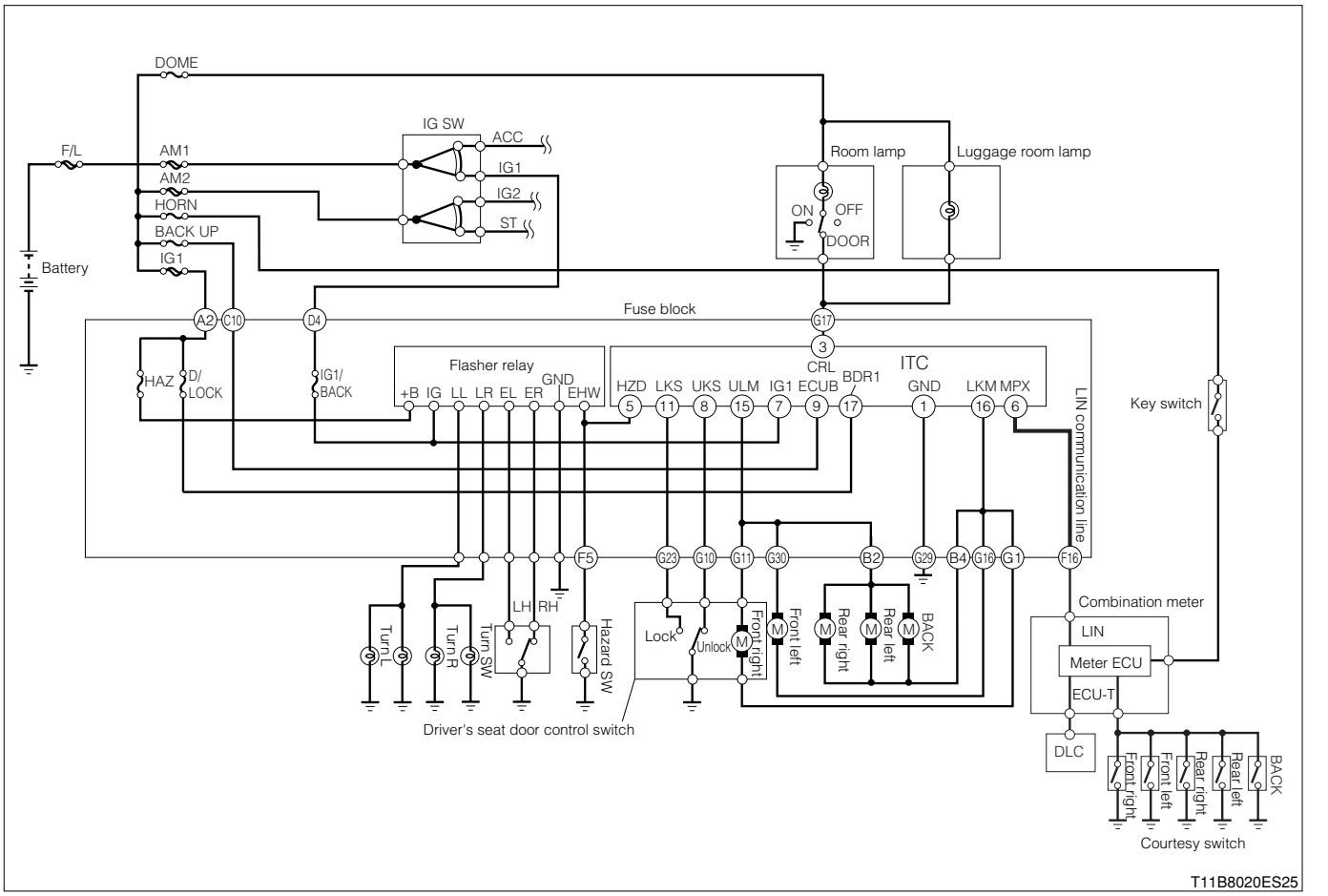
SST

Shape	Part No.	Part name
	09991-87403-000	Wire,diagnosis check
	09991-87404-000 (09991-87401-000)	Wire,engine control system inspection

Instrument

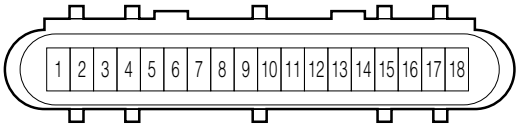
Voltage tester,Oscillo scope

5-2 SYSTEM WIRING DIAGRAM

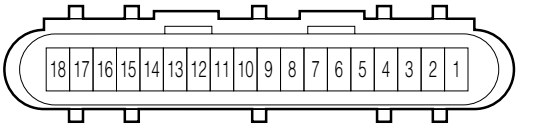


T11B8020ES25

5-3 ARRANGEMENT OF ECU TERMINAL



ITC



ITC (fuse block side)

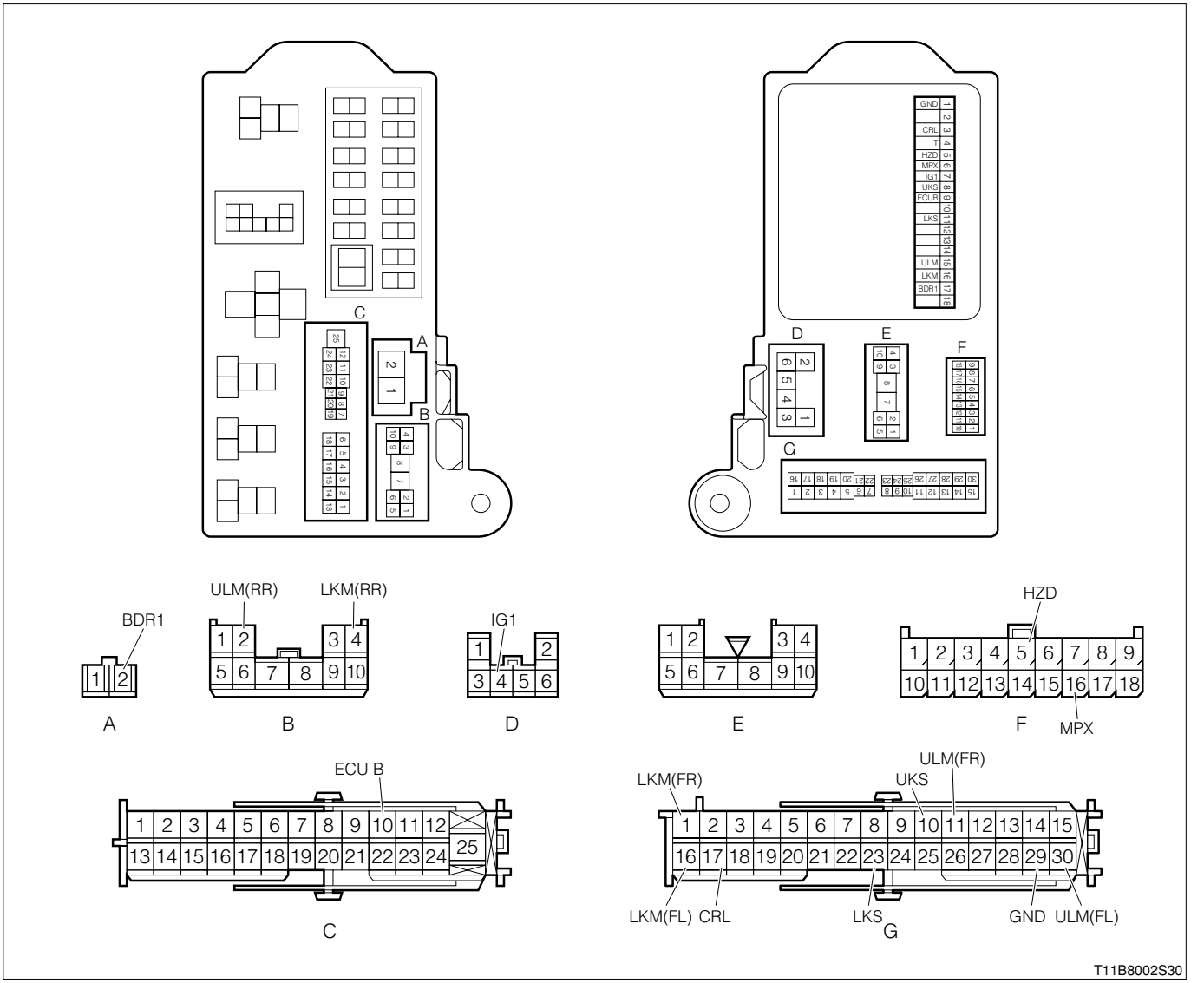
M21B5015ES10

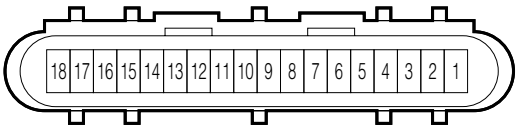
Body integrated controller (ITC) terminal name

Terminal No.	Terminal code	Terminal name
1	GND	Earth
2	–	–
3	CRL	Room lamp driving output
4	–	–
5	HZD	Hazard lamp driving output
6	MPX	LIN communication input/output
7	IG1	ECU power supply
8	UKS	Door control unlock side switch input
9	ECU B	ECU power supply
10	–	–
11	LKS	Door control lock side switch input
12	–	–
13	–	–
14	–	–
15	ULM	Door lock motor unlock side output
16	LKM	Door lock motor lock side output
17	BDR1	Power supply
18	–	–

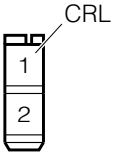
5-4 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS

Fuse block

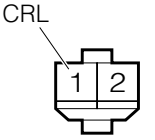




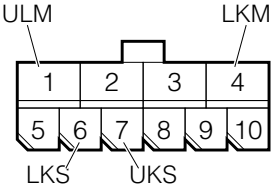
ITC (fuse block side)



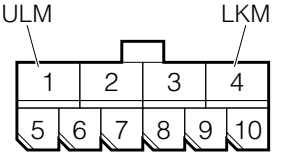
Room lamp



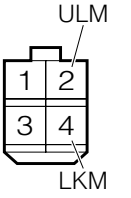
Luggage room lamp



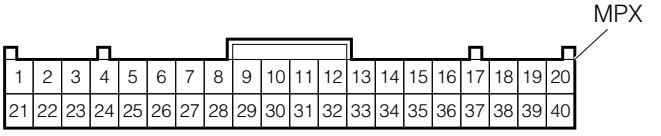
Driver's seat door control switch
Driver's seat door lock motor



Front passenger seat door lock motor
Rear seat door lock motor



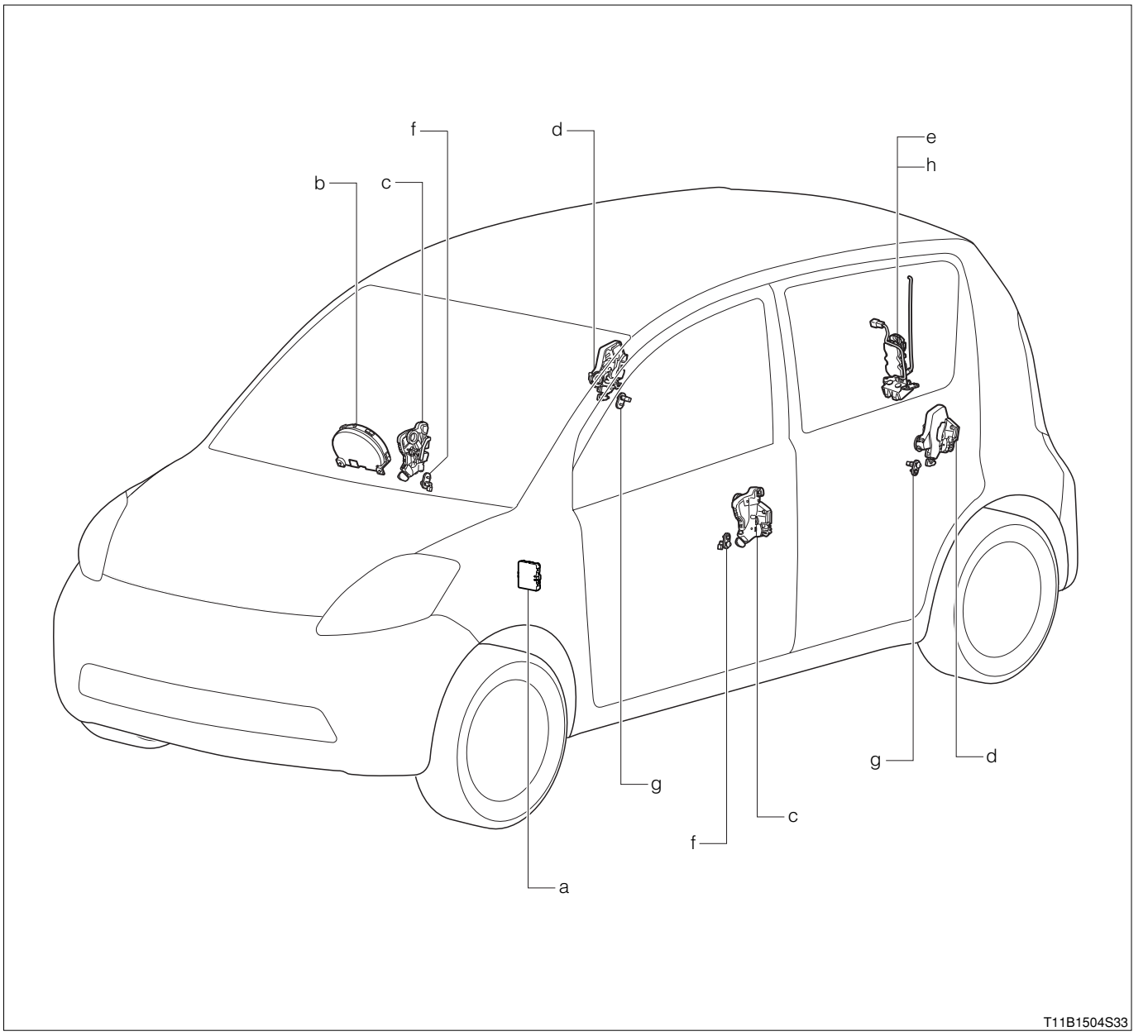
Back door lock motor



Combination meter

T11B8003ES30

5-5 LOCATION OF COMPONENTS



T11B1504S33

a	Body integrated controller (ITC)
b	Meter ECU
c	Front door lock motor
d	Rear door lock motor
e	Back door lock motor
f	Front door courtesy switch
g	Rear door courtesy switch

5-6 HOW TO PROCEED WITH TROUBLE SHOOTING

5-6-1 INQUIRY

1. In your attempt to remove the causes for a malfunction of the vehicle, you will not able to remove the causes unless you actually confirm the malfunctioning phenomenon. No matter how long you continue operations, the vehicle may not resume the normal state unless you confirm the malfunctioning phenomenon. The inquiry with the customer is a vital information collecting activity which is to be conducted previous to the confirmation of malfunctioning phenomenon.
2. This inquiry will provide you with an important clue in an effort to reproduce the malfunctioning phenomenon. Furthermore, the information obtained by the inquiry can be referred to during the troubleshooting. Hence, instead of making general questions, it is necessary to focus your questions on the items related to the malfunction.

(1) DIAGNOSIS BY INTERVIEW SHEET FOR POWER DOOR LOCK SYSTEM

Checked by		Check date	Day Month (day of week)

Customer information

Name of customer	Mr./Ms.	Gender of customer (Male, female)	Age [approx.]	Occupation [ ]	
		Area where vehicle is mainly used	Urban, suburb, seashore, mountain, others	Parking place	Outdoor, indoor

Details of vehicle

Date when vehicle was brought to workshop	Day Month (day of week)	Date when malfunction took place	Day Month (day of week)	Repair history	No,Yes (How many times?)
Frame No.		Registration date	Day Month Year	Vehicle model	
Engine type		Transmission	5M/T·3A/T·4A/T·CVT electronically-controlled 4A/T	Driving	2WD·4WD
Running distance	km	Equipment	Tire [ ]· Wheel [Steel · Aluminum]		

Weather

☐ Fine	☐ Cloudy	☐ Rainy	☐ Snow	☐ Other( )
Temperature(Approx.)				

Frequency of malfunction

☐ Always	☐ Under certain condition( )	☐ Sometimes( )

Phenomenon

☐ All doors are not locked interlocking with lock operation at driver's seat.
☐ Some doors are not locked interlocking with lock operation at driver's seat.
☐
☐
☐
☐
☐ Other

5-7 TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA

5-7-1 ALL DOORS ARE NOT LOCKED INTERLOCKING WITH LOCK OPERATION AT DRIVER'S SEAT.

⊿1. Power supply system check

1.Check the voltage A2 and C10 on the fuse block.
SPECIFIED VALUE: 10 — 14V

▼If it is OK, go to Step ⊿2.
▼In the case of NG, perform the following procedures.

2.Check the fuse (door lock) and the F/L for any defect .
3.Check the battery voltage.
4.Check that there are no abnormality such as open circuit in the harness of the power supply system.

⊿2. Earth system check

1.Check continuity between the fuse block G29 and the body earth.
SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to ⊿3.
▼In the case of NG, repair the earth wire.

⊿3. Door control switch single unit check

1.Check the door control switch single unit on the driver's seat.
<RefCode=SI04_0036>

▼If it is OK, go to Step ⊿4.
▼In the case of NG, replace the door control switch.

⊿4. Wire harness check

1.Check continuity of the wire harness between the following terminals.
(1) Fuse block G10 — Door control switch terminal 7
(2) Fuse block G23 — Door control switch terminal 6
(3) Body earth — Door control switch terminal 8
SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to Step ⊿5.
▼In the case of NG, repair the harness.

⊿5. Fuse block voltage check

1.Check the voltage between the following fuse block terminals when the door control switch is activated.
(1) Fuse block G16 — G30
(2) Fuse block G1 — G11
(3) Fuse block B4 — B2
SPECIFIED VALUE: 12 — 14V

▼If it is OK, go to Step ⊿7.
▼In the case of NG, go to Step ⊿6.

⊳6. Fuse block check

1.Check the fuse block single unit.

▼If it is OK, replace the ITC.

Refer to Page I4-1.

▼In the case of NG, replace the fuse block.

⊳7. Door lock motor single unit check

1.Check all the door lock motor single units.

Refer to Page I4-9.

▼If it is OK, repair the harness between the fuse block and all doors.

▼In the case of NG, replace the door lock motor.

5-7-2 SOME DOORS ARE NOT LOCKED INTERLOCKING WITH LOCK OPERATION AT DRIVER'S SEAT.

⊳1. Fuse block voltage check

1.Check the voltage between the following fuse block terminals when the door control switch is activated.

(1) Fuse block G16 — G30

(2) Fuse block G1 — G11

(3) Fuse block B4 — B2

SPECIFIED VALUE: 10 — 14V

▼If it is OK, go to Step ⊳2.

▼In the case of NG, replace the fuse block.

⊳2. Door lock motor single unit check

1.Check the door lock motor single units that are not functioning.

Refer to Page I4-9.

▼If it is OK, repair the harness.

▼In the case of NG, replace the door lock motor.

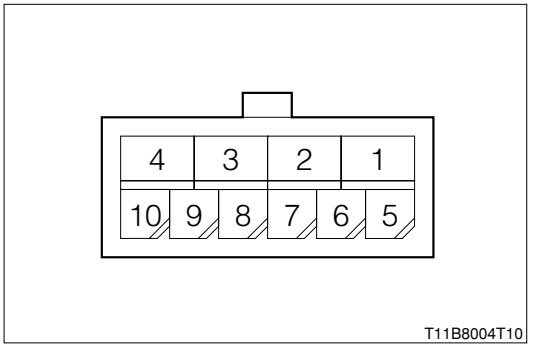
5-8 UNIT CHECK

5-8-1 FRONT DOOR CONTROL MOTOR, FR/RH

1.Check the door locking operation when the battery voltage is applied between the motor Ay terminals.

2.Check continuity between the terminals of the driver's seat door control switch.

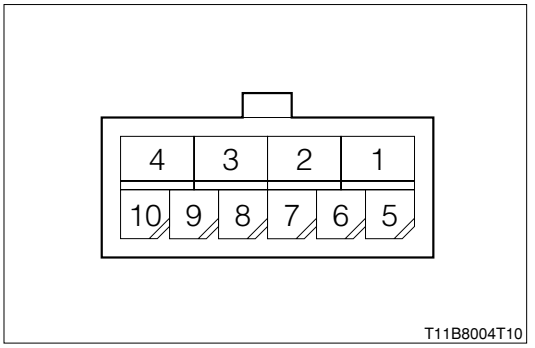
OPERATION	Battery +	Battery —	Terminal No.	Standard
Lock	4	1	6—8	Continuity exists
Unlock	1	4	7—8	



5-8-2 DOOR CONTROL MOTOR AY(FR/LH,RR/RH,RR/LH)

1.Check the door locking operation when the battery voltage is applied between the motor Ay terminals.

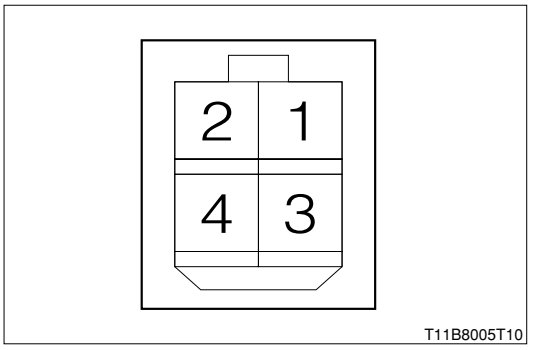
OPERATION	Battery +	Battery −
Lock	4	1
Unlock	1	4



5-8-3 BACK DOOR LOCK ACTUATOR AY

1.Check the door locking operation when the battery voltage is applied between the actuator Ay terminals.

OPERATION	Battery +	Battery −
Lock	4	2
Unlock	2	4



5-8-4 FUSE BLOCK

Remove the door control relay Ay from the fuse block and check continuity between each terminal of the fuse block and the ITC connector of the fuse block.

SPECIFIED VALUE: Continuity exists.

FUSE BLOCK INSIDE CONTINUITY CHECK

ITC fuse block side terminal	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Fuse block terminal	G29	—	G17	—	F5	F16	D4	G10	C10	—	G23	—	—	—	G11 G30 B2	G1G 16B 4	A2	—

5-9 ECU INPUT/OUTPUT SIGNAL CHECK

5-9-1 CHECKING METHOD

1.With the door control relay Ay installed to the fuse block, check that each terminal of the fuse block conforms to the following specified values given below.

5-9-2 SPECIFIED VALUE FOR INPUT/ OUTPUT SIGNAL

Check system	Terminal	Condition	Specified value	Reference (example of measurement)
Power supply	A2(BDR1) — G29(GND) C10(ECU B) — G29(GND)	At all times	Battery voltage	12.8V
IG switch	D4(IG1) — G29(GND)	IG switch "OFF"	About 0V	0V
		IG switch "ON"	Battery voltage	12.5V
Room lamp	G17(CRL) — G29(GND)	All the doors "OPEN"	About 0V	0V
		All the doors "CLOSED"	Battery voltage	12.6V
Hazard lamp	F5(HZD) — G29(GND)	Hazard Lamp "Extinguished"	Battery voltage	12.7V
		Hazard lamp "Blinking"	About 0V	0V
Front door lock motor	G16(LKM) — G30(ULM) G1(LKM) — G11(ULM) B4(LKM) — B2(ULM)	When "LOCK" is selected on the door control switch.	Battery voltage	12 — 14V
	G30(ULM) — G16(LKM) G11(ULM) — G1(LKM) B2(ULM) — B4(LKM)	When "UNLOCK" is selected on the door control switch.	Battery voltage	12 — 14V
Door control switch	G23(LKS) — Body earth	When the door control switch is in "LOCK" position.	Continuity exists	Continuity exists
	G10(UKS) — Body earth	When the door control switch is in "UNLOCK" position.	Continuity exists	Continuity exists

■ KEY-LESS ENTRY SYSTEM

1 ITC COMPUTER

1-1 REMOVAL AND INSTALLATION

Refer to Page I4-1.

2 DOOR CONTROL RECEIVER

2-1 REMOVAL AND INSTALLATION

CAUTION

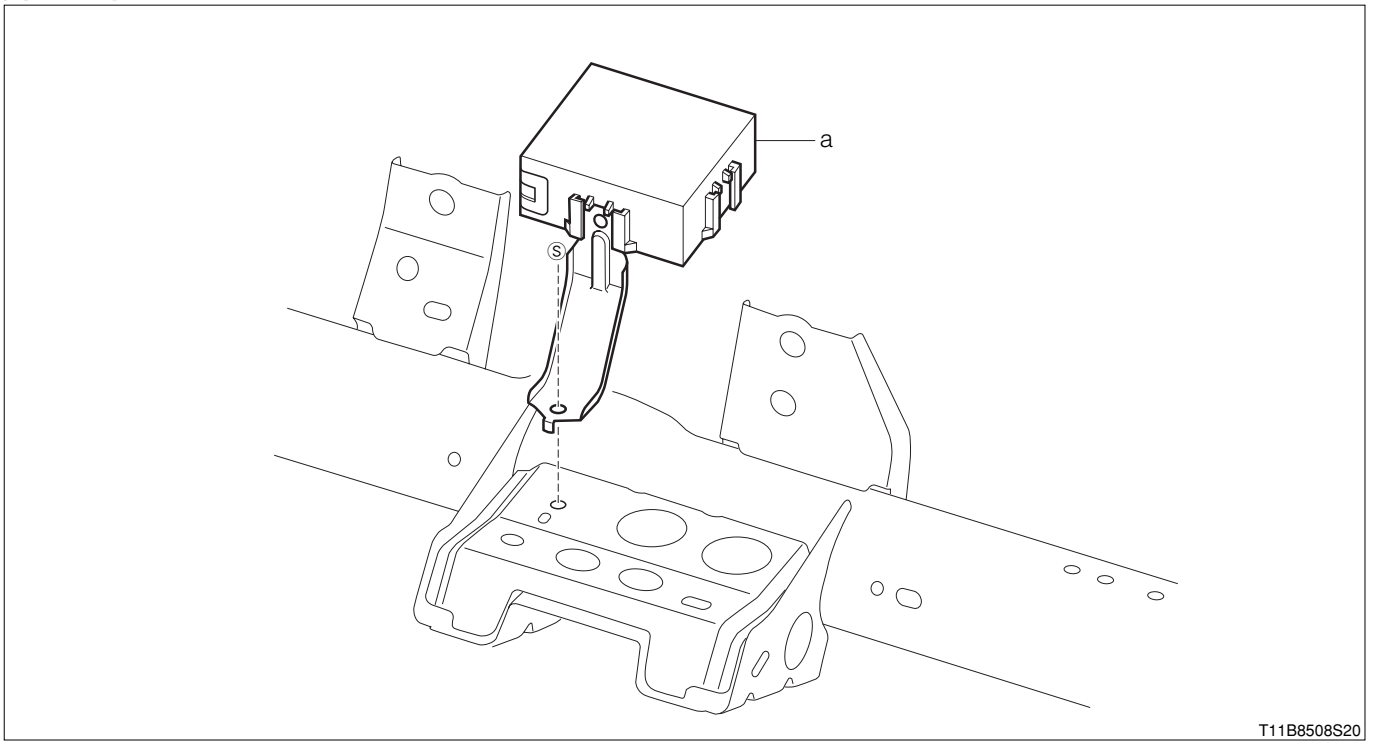
- Be careful not to drop the door control receiver or give great impacts to it.
- If the door control receiver dropped or was subjected to great impacts, replace it with a new one even if there is no abnormality in its external appearance.

2-1-1 OPERATION BEFORE REMOVAL

1.Disconnect the battery negative (−) terminal.
2.Remove the instrument cluster finish panel.
Refer to Page I2-23.

2-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Receiver, door control

2-1-3 OPERATION AFTER INSTALLATION

1.Install the instrument cluster finish panel.
Refer to Page I2-23.

2.Connect the battery negative (−) terminal.
3.Register the identification code (only when the receiver is to be replaced).
Refer to Page I4-18.

3 FRONT DOOR LOCK MOTOR

3-1 REMOVAL AND INSTALLATION

Refer to Page I1-13.

4 REAR DOOR LOCK MOTOR

4-1 REMOVAL AND INSTALLATION

Refer to Page I1-20.

5 BACK DOOR LOCK MOTOR

5-1 REMOVAL AND INSTALLATION

Refer to Page I1-22.

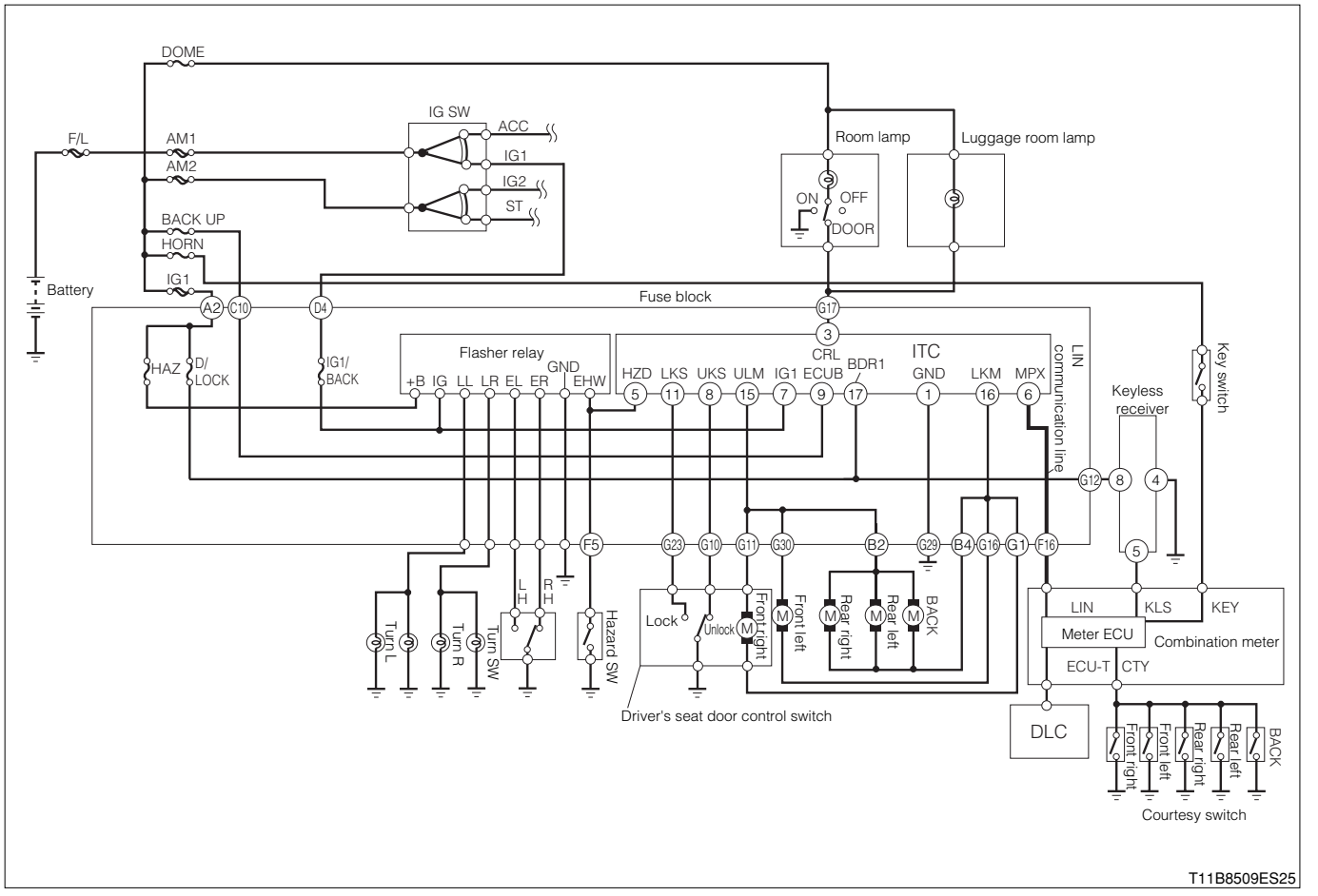
6 KEY-LESS ENTRY SYSTEM

6-1 ARTICLES TO BE PREPARED

Instrument

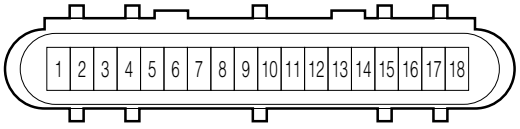
Voltage tester,Oscillo scope

6-2 SYSTEM WIRING DIAGRAM

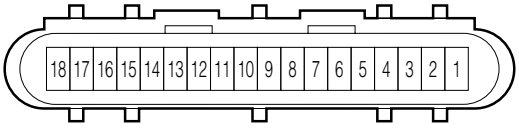


T11B8509ES25

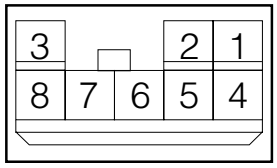
6-3 ARRANGEMENT OF ECU TERMINAL



ITC



ITC fuse block side



Keyless reciever

T11B8511ES16

Body integrated controller (ITC) terminal name

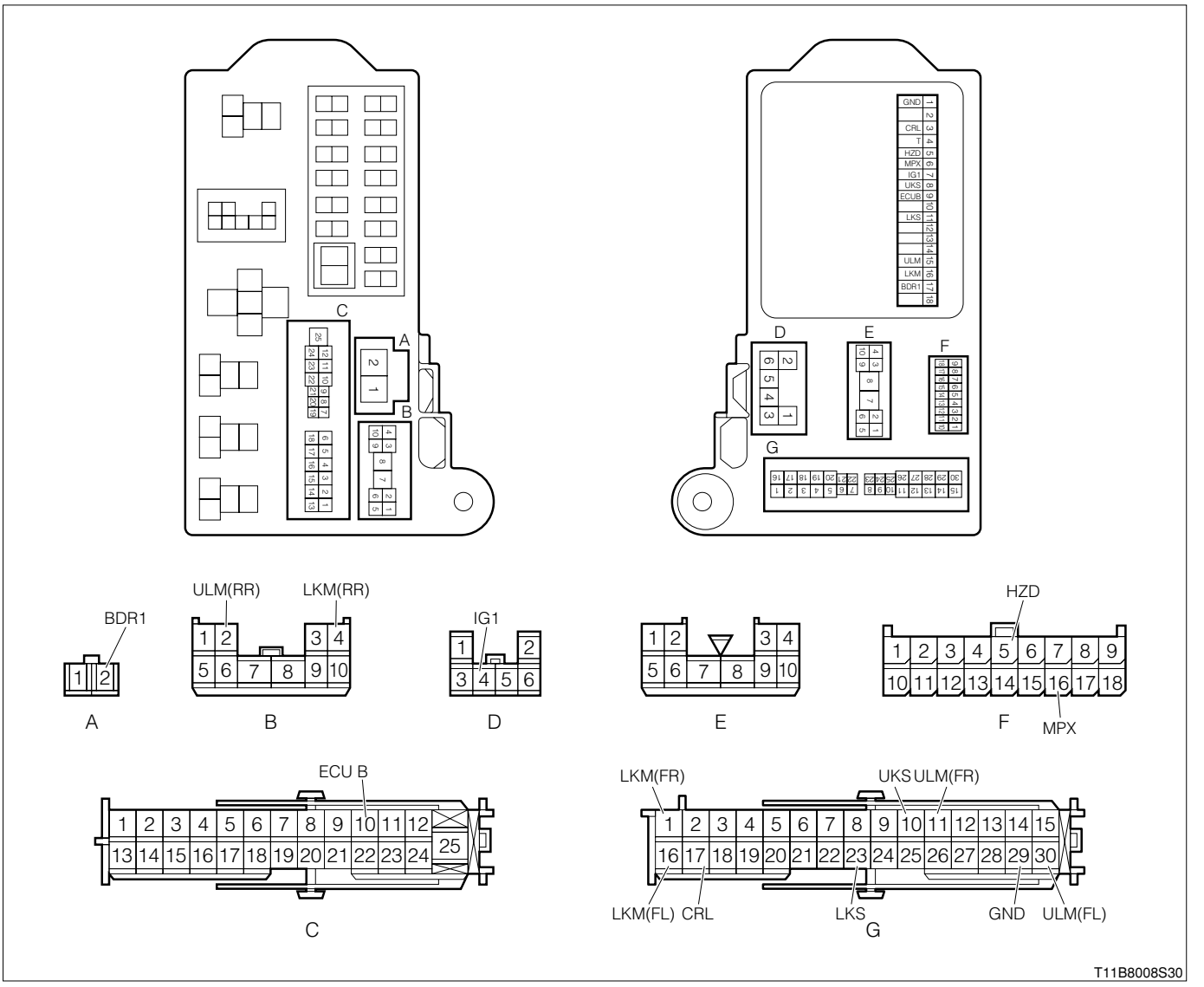
Terminal No.	Terminal code	Terminal name
1	GND	Earth
2	—	—
3	CRL	Room lamp driving output
4	—	—
5	HZD	Hazard lamp driving output
6	MPX	LIN communication input/output
7	IG1	ECU power supply
8	UKS	Door control unlock side switch input
9	ECU B	ECU power supply
10	—	—
11	LKS	Door control lock side switch input
12	—	—
13	—	—
14	—	—
15	ULM	Door lock motor unlock side output
16	LKM	Door lock motor lock side output
17	BDR1	Power supply
18	—	—

Receiver connector terminal name

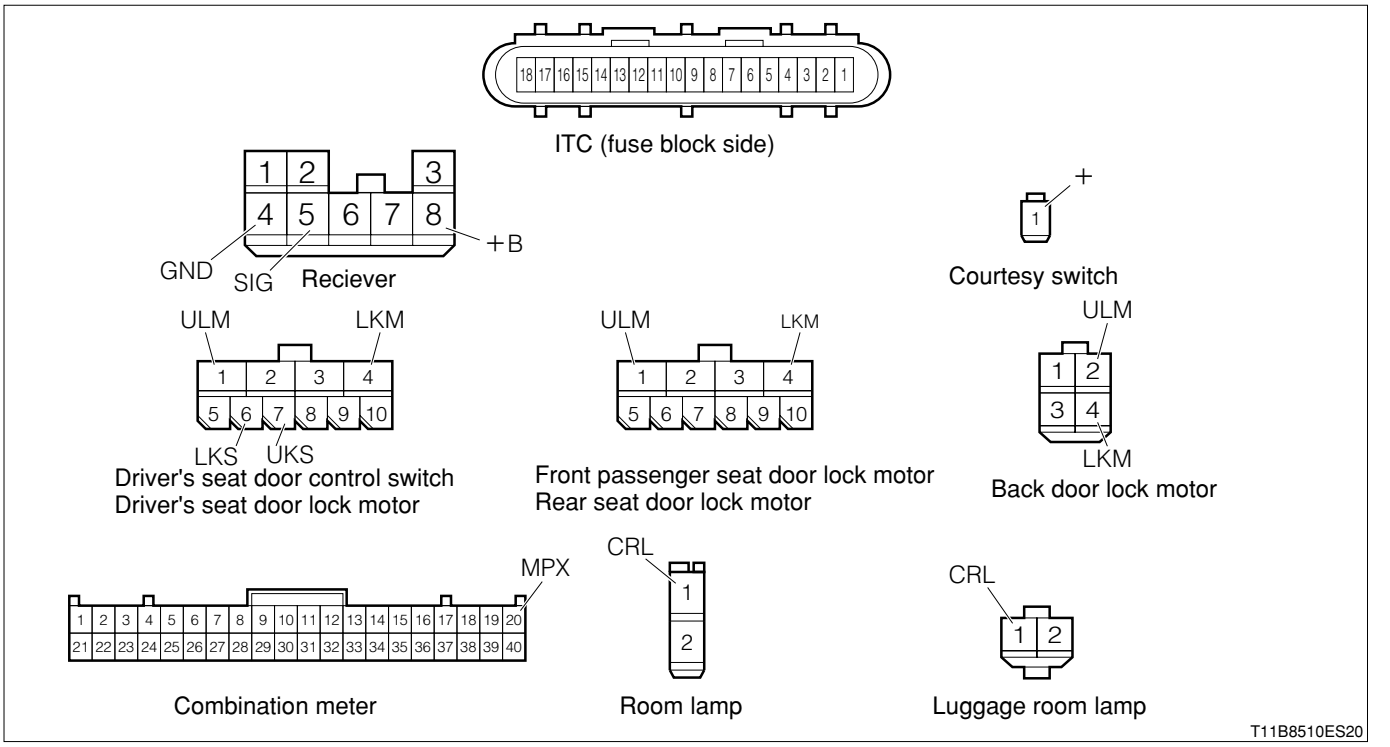
Terminal No.	Terminal code	Terminal name
1	—	—
2	—	—
3	—	—
4	GND	Earth
5	SIG	Keyless signal output
6	—	—
7	—	—
8	+B	Receiver power supply

6-4 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS

Fuse block

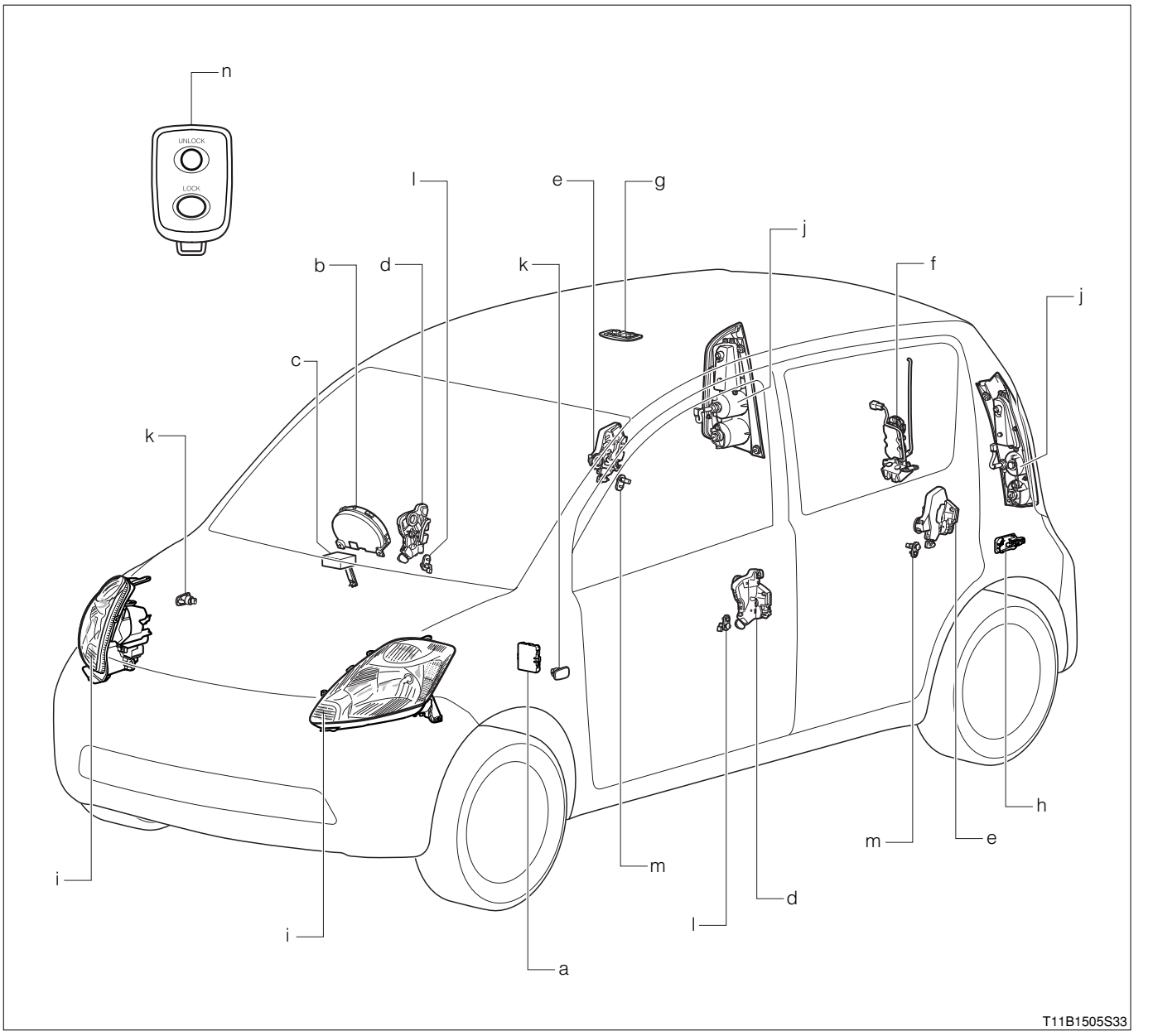


T11B8008S30



T11B8510ES20

6-5 LOCATION OF COMPONENTS



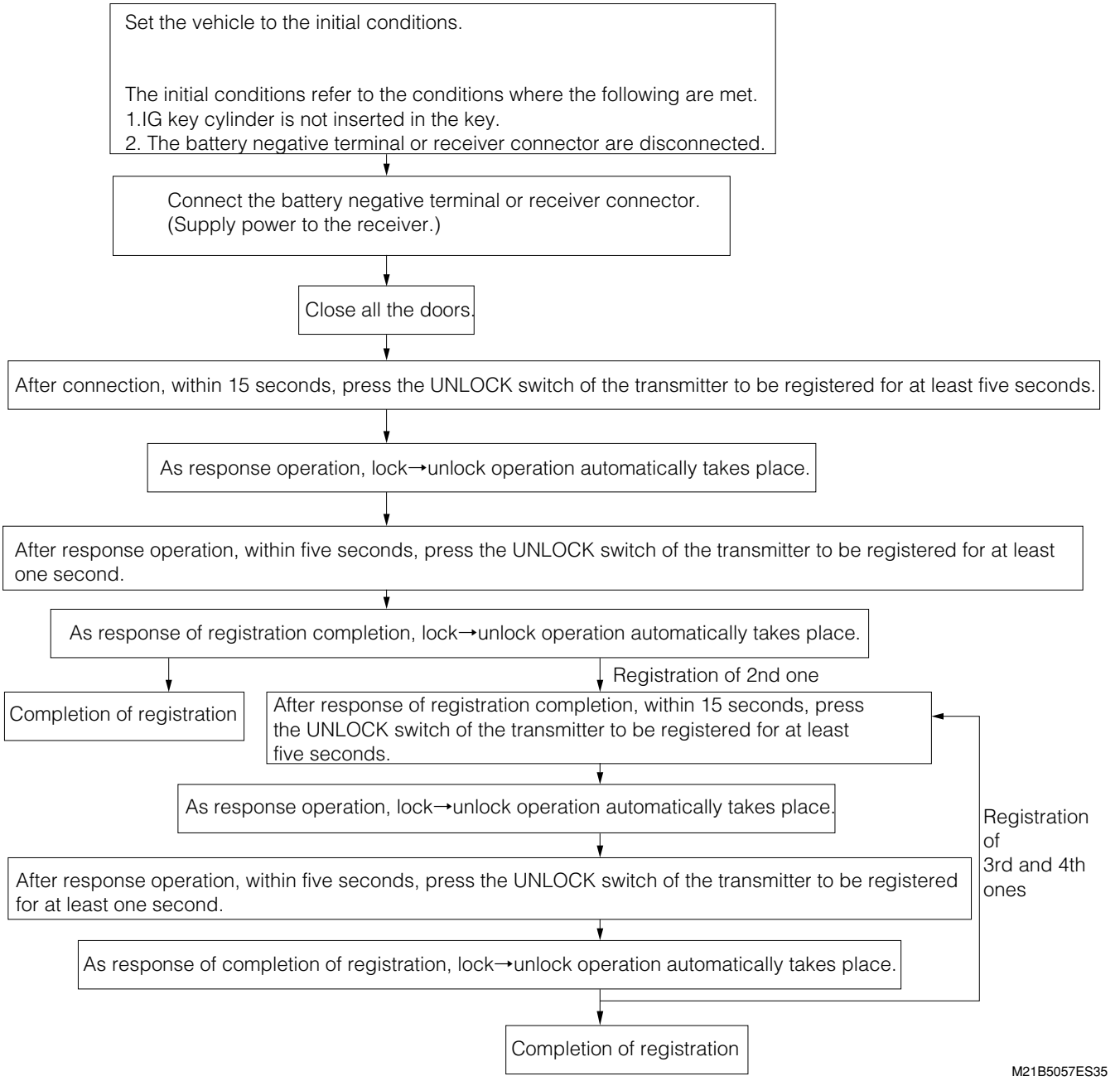
a	Body integrated controller (ITC)
b	Meter ECU
c	Keyless receiver
d	Front door lock motor
e	Rear door lock motor
f	Back door lock motor
g	Room lamp
h	Luggage room lamp
i	Front turn signal lamp
j	Rear turn signal lamp
k	Side turn signal lamp
l	Front door courtesy switch
m	Rear door courtesy switch
n	Transmitter

6-6 REGISTRATION OF IDENTIFICATION CODE

6-6-1 DESCRIPTION

1.If the transmitter is lost or added, it is necessary to resister the identification code.
2.Maximum four identification codes can be registered for the receiver, and four transmitters can be used. When two or more transmitters are to be registered, register two or more transmitters in sequence by following instructions provided below.
3.When a new transmitter is registered, all the old identification codes that had been previously registered in the receiver will be erased.
4.Even if the battery is removed, the identification code will not be erased from the memory.

6-6-2 HOW TO REGISTER IDENTIFICATION CODE



6-7 HOW TO PROCEED WITH TROUBLE SHOOTING

6-7-1 INQUIRY

1. In your attempt to remove the causes for a malfunction of the vehicle, you will not able to remove the causes unless you actually confirm the malfunctioning phenomenon. No matter how long you continue operations, the vehicle may not resume the normal state unless you confirm the malfunctioning phenomenon. The inquiry with the customer is a vital information collecting activity which is to be conducted previous to the confirmation of malfunctioning phenomenon.
2. This inquiry will provide you with an important clue in an effort to reproduce the malfunctioning phenomenon. Furthermore, the information obtained by the inquiry can be referred to during the troubleshooting. Hence, instead of making general questions, it is necessary to focus your questions on the items related to the malfunction.

(1) DIAGNOSIS BY INTERVIEW SHEET FOR KEY-LESS SYSTEM

Checked by		Check date	Day Month (day of week)

Customer information

Name of customer	Mr./Ms.	Gender of customer (Male, female)	Age [approx.]	Occupation [ ]	
		Area where vehicle is mainly used	Urban, suburb, seashore, mountain, others	Parking place	Outdoor, indoor

Details of vehicle

Date when vehicle was brought to workshop	Day Month (day of week)	Date when malfunction took place	Day Month (day of week)	Repair history	No,Yes (How many times?)
Frame No.		Registration date	Day Month Year	Vehicle model	
Engine type		Transmission	5M/T·3A/T·4A/T·CVT electronically-controlled 4A/T	Driving	2WD·4WD
Running distance	km	Equipment	Tire [ ]· Wheel [Steel · Aluminum]		

Weather

☐ Fine	☐ Cloudy	☐ Rainy	☐ Snow	☐ Other( )
Temperature(Approx.)				

Frequency of malfunction

☐ Always	☐ Under certain condition( )	☐ Sometimes( )

Phenomenon

☐ In case the keyless function (remote control) is inoperative (when there is no new transmitter or no properly functioning transmitter for the same type vehicle).
☐ The keyless function (remote control) is inoperative (when there is a new or normally operating transmitter).
☐
☐
☐
☐
☐ Other

6-8 TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA

6-8-1 IN CASE THE KEYLESS FUNCTION (REMOTE CONTROL) IS INOPERATIVE (WHEN THERE IS NO NEW TRANSMITTER OR NO PROPERLY FUNCTIONING TRANSMITTER FOR THE SAME TYPE VEHICLE).

⌦1. LIN communication system diagnostic code check

1.With the SST, short-circuit the ECU-T terminal and the E terminal in the DLC. Then turn the IG switch "ON"

2.Check the diagnostic code displayed for the LIN communication system.

SPECIFIED VALUE: Diagnostic codes 0011, 002 are not displayed.

▼If it is OK, go to Step ⌦2.

▼In the case of NG, go to troubleshooting for the LIN communication system.

Refer to Page L2-45.

⌦2. Basic function check of keyless system

1.Bring the vehicle into the initial state.

NOTE

- Initial state: The key is not inserted in the IG key cylinder.
  All doors are closed.

2.Repeat 3 continuous LOCK and UNLOCK standard operations alternately. Check that the lock/unlock are activated properly after the 3rd trial onward.

NOTE

- Standard operation: Move away from the outside handle on the driver's seat by approx. 1m to the right.
  Point the transmitter at the vehicle and press either of the transmitting switches for about 1 second.

SPECIFIED VALUE: The switch shall operate properly.

▼If it is OK, go to Step ⌦3.

▼In the case of NG, go to Step ⌦6.

⌦3. Answer back functional check

1.When performing LOCK and UNLOCK operations, check to see if the answer back is performed properly by the room lamp and luggage room lamp that are interlocked with the door, and hazard lamp. (With LOCK operation, the room lamp and the luggage room lamp shall dim for 3 seconds, and the hazard lamp shall make one blink. With UNLOCK operation, the room lamp and the luggage room lamp shall dim for 15 seconds and the hazard lamp shall make two blinks.)

SPECIFIED VALUE: Answer-back function shall operate properly.

▼If it is OK, the function is normal.

NOTE

- Operation range depends on by whom and where the operation is executed, as well as how the transmitter is being held.
- Since the system uses week electric wave, the operation range may be reduced due to strong electric wave or noise in the operating frequency.

▼In the case of NG, go to Step ⌦4.

⊳4. Room lamp, hazard lamp check

1.Check that the room lamp and the hazard lamp light up with the switch "ON".
SPECIFIED VALUE: Illuminates.

▼If it is OK, go to Step ⊳5.
▼In the case of NG, check the bulb, fuse and harness of the room lamp, luggage room lamp and hazard lamp.

⊳5. Wire harness check

1.Check continuity between the room lamp, hazard lamp and the ITC.
SPECIFIED VALUE: Continuity exists.

▼If it is OK, check the ITC power supply and the earth system.
▼In the case of NG, repair the harness.

⊳6. Transmitter battery check

1.Check whether the indicator of the transmitter blinks, when the "LOCK" or "UNLOCK" switch of the transmitter is pressed.
SPECIFIED VALUE: The indicator shall blink.

▼If it is OK, go to Step ⊳7.
▼In the case of NG, replace battery.

⊳7. Check by the registration function

1.Bring the vehicles into the initial state.
2.Follow the procedure below to start out in the registration mode.
(1) Disconnect the battery negative (−) terminal or the connector of the keyless receiver.
(2) Connect the battery negative (−) terminal or the connector of the keyless receiver that has been removed.
(3) Close all the doors.
(4) Press the "UNLOCK" switch of the transmitter for more than 5 seconds within 15 seconds after connection has been established.
3.Check whether lock→unlock operates properly after shifted to the registration mode.
SPECIFIED VALUE: Operation shall be normal.

▼If it is OK, go to Step ⊳8.
▼In the case of NG, go to Step ⊳9.

⊳8. Keyless entry operation check

1.After the identification code has been registered, check basic functions of the keyless entry system to ensure proper operation.
SPECIFIED VALUE: The system shall function properly.

▼If it is OK, the function is normal.
▼In the case of NG, the keyless receiver is defective.

⊳9. Keyless receiver check

Refer to Page I4-25.

▼If it is OK, the function is normal.

▼In the case of NG, the keyless receiver is defective.

6-8-2 THE KEYLESS FUNCTION (REMOTE CONTROL) IS INOPERATIVE (WHEN THERE IS A NEW OR NORMALLY OPERATING TRANSMITTER).

⊳1. Meter check

1.With the SST, short-circuit the ECU-T terminal and the E terminal in the DLC. Then turn the IG switch "ON".

2.Check the diagnostic code displayed for the LIN communication system.

SPECIFIED VALUE: Diagnostic codes 0011,0021 are not displayed.

▼If it is OK, go to Step ⊳2.

▼In the case of NG, go to trouble shooting for the LIN communication system.

Refer to Page L2-45.

⊳2. Basic function check of keyless system

1.Bring the vehicle into the initial state.

NOTE

- Initial state: The key is not inserted in the IG key cylinder.
  All doors are closed

2.Repeat 3 continuous LOCK and UNLOCK standard operations alternately. Check that the lock/unlock are activated properly after the 3rd trial onward.

NOTE

- Standard operation: Move away from the outside handle on the driver's seat by approx. 1m to the right.
  Point the transmitter at the vehicle and press either of the transmitting switches for about 1 second.

SPECIFIED VALUE: The switch shall operate properly.

▼If it is OK, go to Step ⊳3.

▼In the case of NG, go to Step ⊳6.

⊿3. Answer back functional check

1.When performing LOCK and UNLOCK operations, check to see if the answer back is performed properly by the room lamp and luggage room lamp that are interlocked with the door, and hazard lamp. (With LOCK operation, the room lamp and the luggage room lamp shall dim for 3 seconds, and the hazard lamp shall make one blink. With UNLOCK operation, the room lamp and the luggage room lamp shall dim for 15 seconds and the hazard lamp shall make two blinks.)
SPECIFIED VALUE: Answer-back function shall operate properly.

▼If it is OK, the function is normal.

NOTE

- Operation range depends on by whom and where the operation is executed, as well as how the transmitter is being held.
- Since the system uses week electric wave, the operation range may be reduced due to strong electric wave or noise in the operating frequency.

▼In the case of NG, go to Step ⊿4.

⊿4. Room lamp, hazard lamp check

1.Check that the room lamp and the hazard lamp light up with the switch turned "ON".
SPECIFIED VALUE: Illuminates.

▼If it is OK, go to Step ⊿5.
▼In the case of NG, check the bulb, fuse and harness of the room lamp, and hazard lamp.

⊿5. Wire harness check

1.Check continuity between the room lamp, hazard lamp and the ITC.
SPECIFIED VALUE: Continuity exists.

▼If it is OK, check the ITC power supply and the earth system.
▼In the case of NG, repair the harness.

⊿6. Transmitter battery check

1.Check whether the indicator of the transmitter blinks, when the "LOCK" or "UNLOCK" switch of the transmitter is executed.
SPECIFIED VALUE: The indicator shall blink.

▼If it is OK, go to Step ⊿7.
▼In the case of NG, replace the battery.

⊿7. Check by the registration function

1.Bring the vehicles into the initial state.
2.Follow the procedure below to start out in the registration mode (use a normally functioning transmitter).
(1) Disconnect the battery negative (−) terminal or the connector of the keyless receiver.
(2) Connect the battery negative (−) terminal or the connector of the keyless receiver that has been removed.
(3) Close all the doors.
(4) Press the "UNLOCK" switch of the transmitter for more than 5 seconds within 15 seconds after connection has been established.

3.Check whether lock→unlock operates properly after shifted to the registration mode.
SPECIFIED VALUE: Operation shall be normal.

▼If it is OK, go to Step ⊳8.
▼In the case of NG, go to Step ⊳10.

⊳8. Transmitter basic check
1.Interrupt the operation of the transmitter for more than 5 seconds to discontinue the registration mode.
2.Perform check again by the registration function. (Use the transmitter which was not able to operate.)
3.Take the same procedure as was previously done for the registration mode.
4.Check whether lock→unlock operates properly after shifted to the registration mode.
▼In the case of NG, go to Step ⊳9.
▼In the case of NG, the transmitter is defective.

⊳9. Keyless entry operation check
1.After the identification code has been registered, check basic functions of the keyless entry system to ensure proper operation.
SPECIFIED VALUE: The system shall function properly.

▼If it is OK, the function is normal.
▼In the case of NG, the keyless receiver is defective.

⊳10. Keyless receiver check
Refer to Page I4-25.

▼If it is OK, the function is normal.
▼In the case of NG, the keyless receiver is defective.

6-9 ECU INPUT/OUTPUT SIGNAL CHECK
6-9-1 CHECKING METHOD
1.With the door control relay Ay installed to the fuse block, check to see if each terminal of the fuse block conforms to the following specified value given below.

6-9-2 SPECIFIED VALUE FOR INPUT/ OUTPUT SIGNAL

Check system	Terminal	Condition	Specified value	Reference (example of measure-ment)
Power supply	A2(BDR1) — G29(GND) C10(ECU B) — G29(GND)	At all times	Battery voltage	12.8V
IG switch	D4(IG1) — G29(GND)	IG switch "OFF"	About 0V	0V
		IG switch "ON"	Battery voltage	12.5V
Room lamp	G17(CRL) — G29(GND)	All the door "OPEN"	About 0V	0V
		All the door "CLOSED"	Battery voltage	12.6V
Hazard lamp	F5(HZD) — G29(GND)	Hazard lamp is "Extinguished"	Battery voltage	12.7V
		Hazard lamp "blinks"	About 0V	0V
Door lock motor	G16(LKM) — G30(ULM) G1(LKM) — G11(ULM) B4(LKM) — B2(ULM)	When the door control switch is in "LOCK" position.	Battery voltage	12 — 14V
	G30(ULM) — G16(LKM) G11(ULM) — G1(LKM) B2(ULM) — B4(LKM)	When the door control switch is in "UNLOCK" position.	Battery voltage	12 — 14V
Door control switch	G23(LKS) — Body earth	Door control switch "LOCK"	Continuity exists	Continuity exists
	G10(UKS) — Body earth	Door control switch "UNLOCK"	Continuity exists	Continuity exists
Earth	G29(GND) — Body earth	At all times	Continuity exists	Continuity exists

6-10 ECU INPUT/OUTPUT SIGNAL CHECK

6-10-1 CHECKING METHOD

(1) Check

1.Check whether or not the values between the respective terminals of the receiver meet the following specified values.

Standard input/output signal of receiver

Check system	Terminal	Check items	Specified value	Reference value (Example of measured value)
Power supply	8(+B) — 4(GND)	Voltage	Battery voltage	12.8V
Keyless signal	5(SIG) — 4(GND)	Voltage	About 12V	12V
		Voltage	Pulse generation	※
		Voltage	Pulse generation	※
Earth	4(GND) — Body earth	Continuity	Continuity exists	Continuity exists

※ Refer to the oscilloscope waveform in the following section.

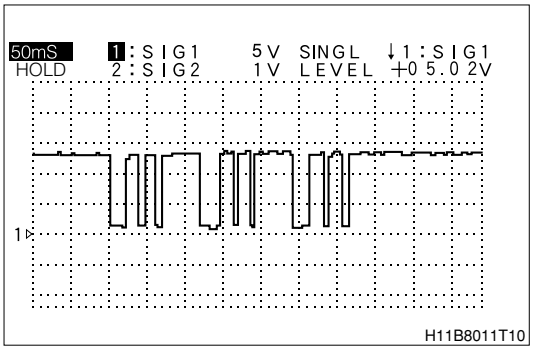
6-10-2 OSCILLOSCOPE WAVEFORMS

(1) Waveform of keyless signal system

1.Measuring terminals : 5(SIG) — 4(GND)

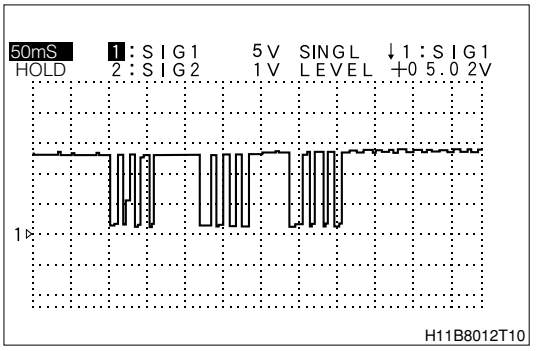
2.Measurement conditions: When "LOCK" is executed.

3.Measuring range : 5V (voltage axis), 50ms (time axis)



H11B8011T10

4.Measuring terminals : 5(SIG) − 4(GND)
5.Measurement condition: When "UNLOCK" is executed.
Measuring range: 5V (voltage axis), 50ms (time axis)

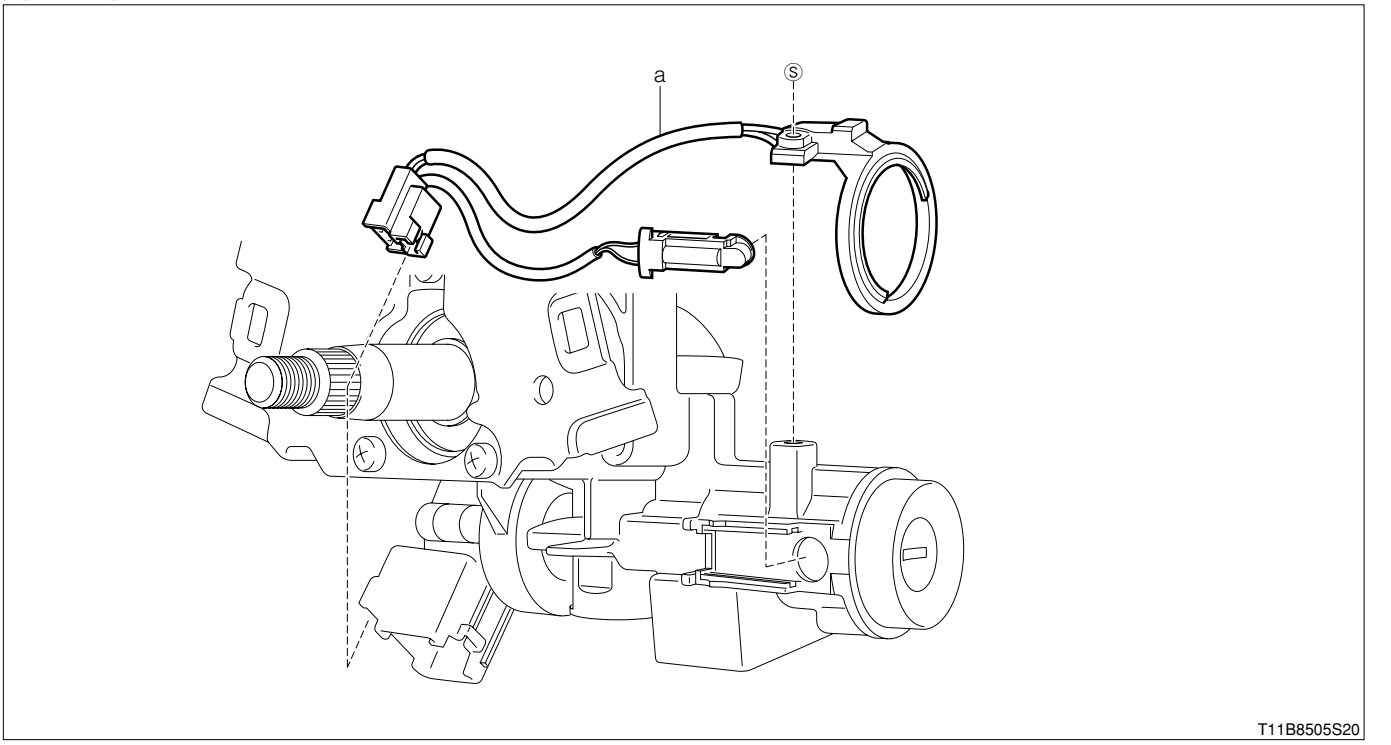


■ IMMOBILIZER SYSTEM
1 STEERING COLUMN W/SWITCH BRACKET
1-1 REMOVAL AND INSTALLATION
Refer to Page G1-5.

2 TRANSPONDER KEY COIL
2-1 REMOVAL AND INSTALLATION
2-1-1 OPERATION BEFORE REMOVAL
1.Disconnect the battery negative (−) terminal.
2.Remove the steering column lower cover.
Refer to Page G1-5.

3.Remove the steering column upper cover.
Refer to Page G1-5.

2-1-2 REMOVAL AND INSTALLATION PROCEDURES
(1) Components

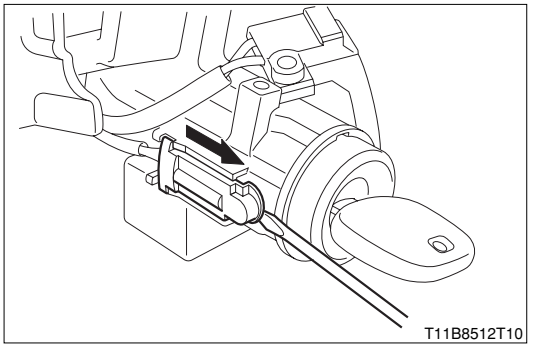


(2) Removal and installation procedures

▼ 1 a Coil, transponder key

2-1-3 POINTS OF REMOVAL
(1) Coil, transponder key
1.Insert the key into the key cylinder.
2.With the key inserted, insert a flat screwdriver or the like into between the coil case and the ignition switch lock cylinder Ay.

3.With the flat screwdriver or the like inserted, push the case to the right to remove.



2-1-4 OPERATION AFTER INSTALLATION

1.Install the steering column upper cover.
Refer to Page G1-5.

2.Install the steering column lower cover.
Refer to Page G1-5.

3.Connect the battery negative (−) terminal.

3 TRANSPONDER KEY COMPUTER

3-1 REMOVAL AND INSTALLATION

CAUTION

- Be careful not to drop the transponder key computer Ay or give great impacts to it.
- If the transponder key computer Ay dropped or was subjected to great impacts, replace it with a new one even if there is no abnormality in its external appearance.
- Refer to the precaution on maintenance for SRS airbag system.

Refer to Page A1-26.

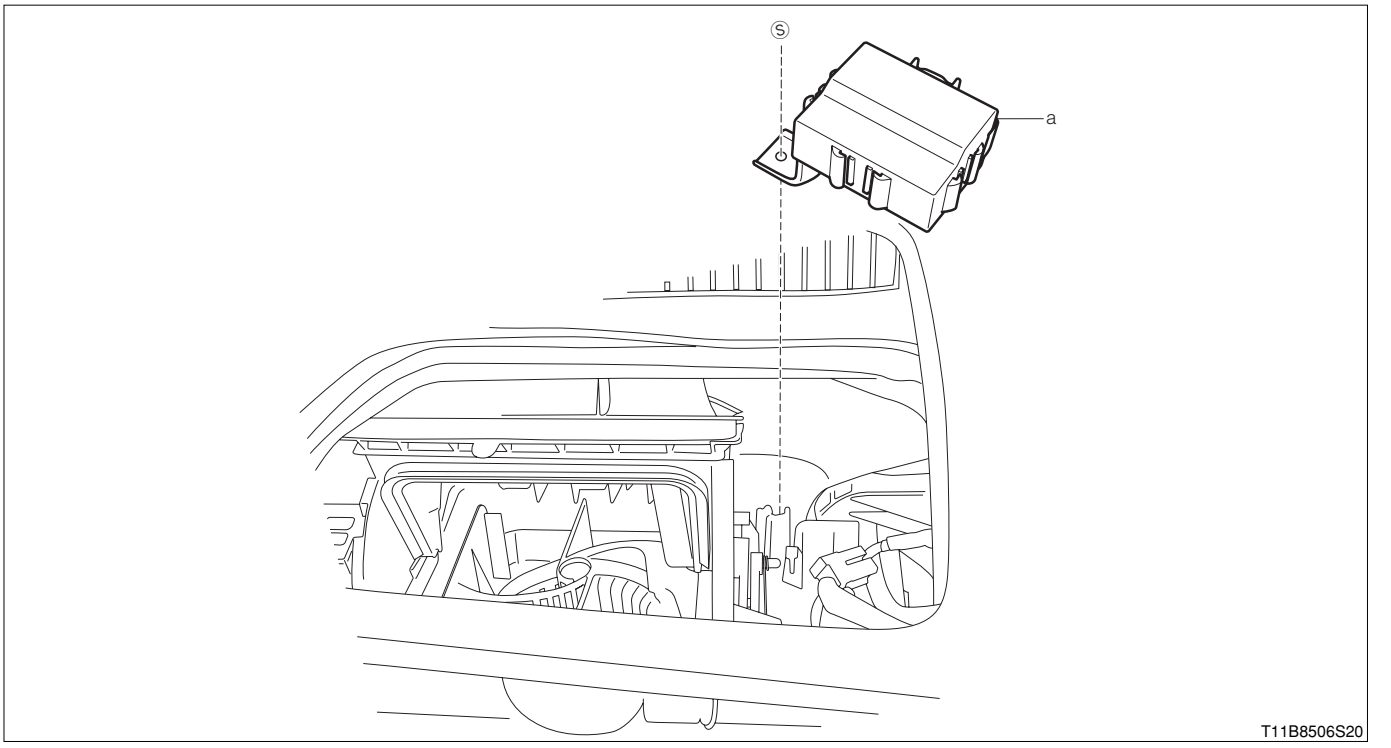
3-1-1 OPERATION BEFORE REMOVAL

1.Disconnect the battery negative (−) terminal.
2.Remove the instrument panel passenger airbag Ay.
Refer to Page H1-11.

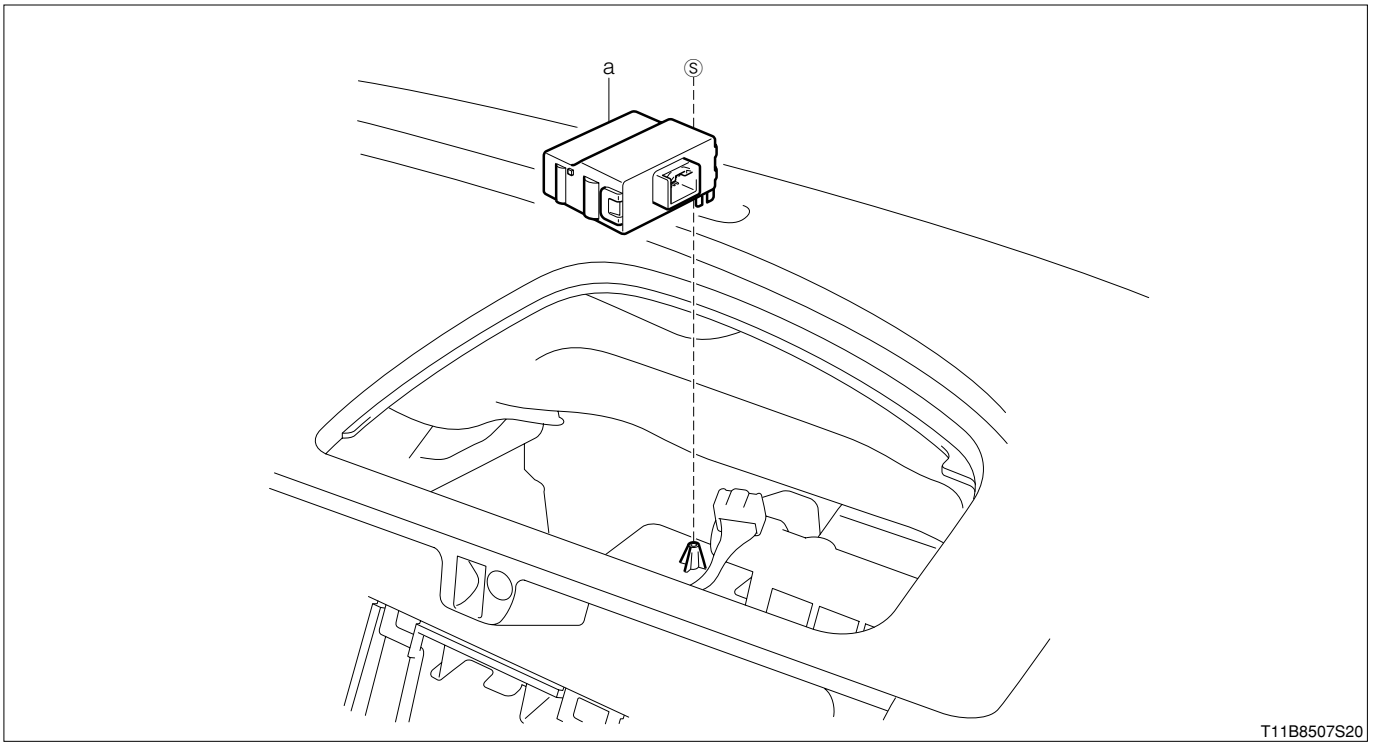
3-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components

RHD vehicles



LHD vehicles



(2) Removal and installation procedures

1 a Computer Ay, transponder key

3-1-3 INSPECTION

(1) Computer Ay, transponder key

1.Replace the computer with a new one in the following cases.

(1) Case where the computer Ay has deformation, abrasion, cracks or breakage.

CAUTION

- Never disassemble the computer.

3-1-4 OPERATION AFTER INSTALLATION

1.Install the instrument panel passenger airbag Ay.

Refer to Page H1-11.

2.Connect the battery negative (−) terminal.

4 IMMOBILIZER SYSTEM

4-1 ARTICLES TO BE PREPARED

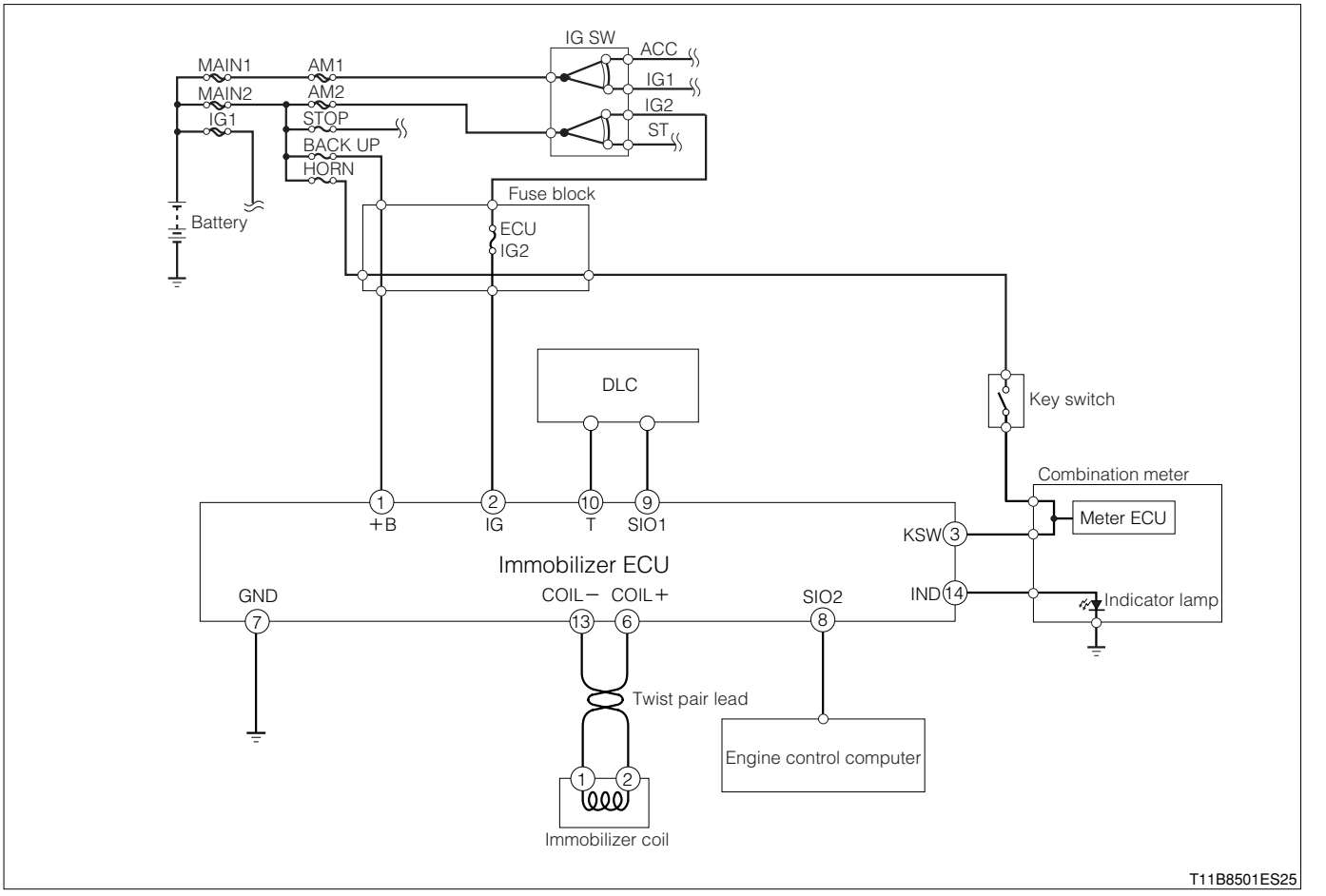
SST

Shape	Part No.	Part name
	09991-87403-000	Wire,diagnosis check

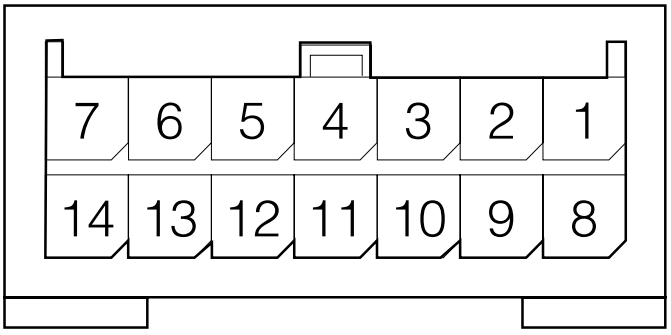
Instrument

Voltage tester

4-2 SYSTEM WIRING DIAGRAM



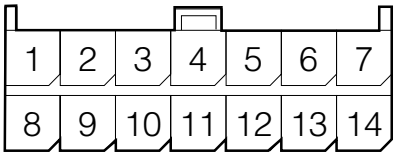
4-3 ARRANGEMENT OF ECU TERMINAL



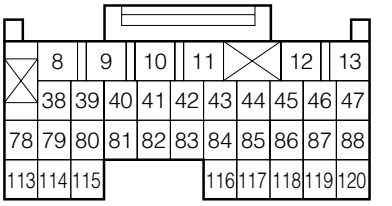
T11B8502S16

Terminal No.	Terminal code	Terminal name
1	+B	ECU power supply
2	IG	Ignition switch power supply
3	KSW	Key switch
4	–	–
5	–	–
6	COIL+	Transponder communication
7	GND	Earth
8	SIO2	Immobilizer communication
9	SIO1	Diagnostic tester communication
10	T	Diagnostic tester communication
11	–	–
12	–	–
13	COIL–	Transponder communication
14	IND	Security indicator

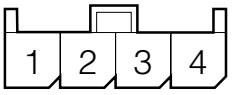
4-4 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS



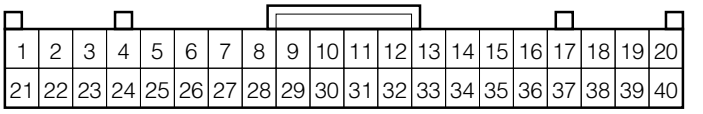
Immobilizer ECU



Engine control computer



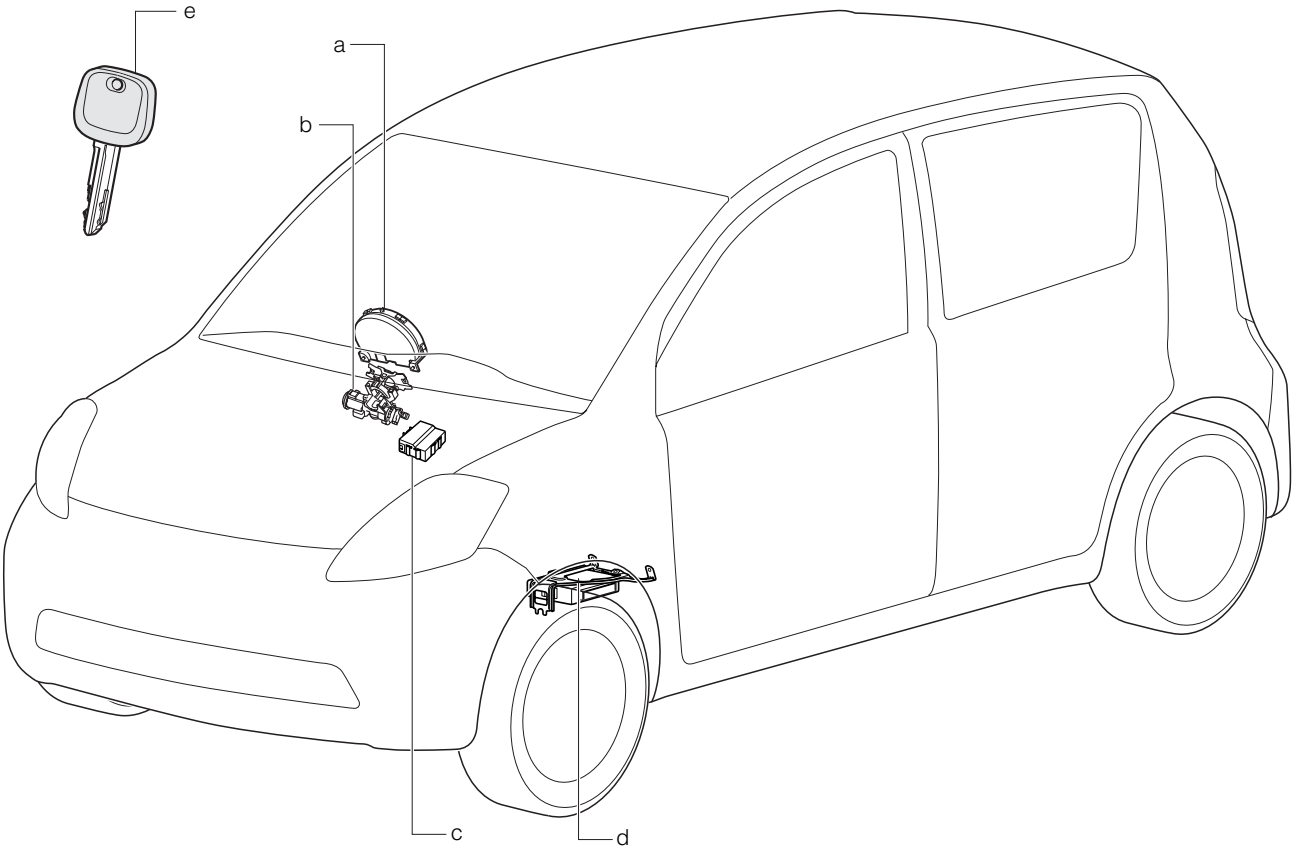
Immobilizer coil
key switch



Combination meter

T11B8503ES20

4-5 LOCATION OF COMPONENTS

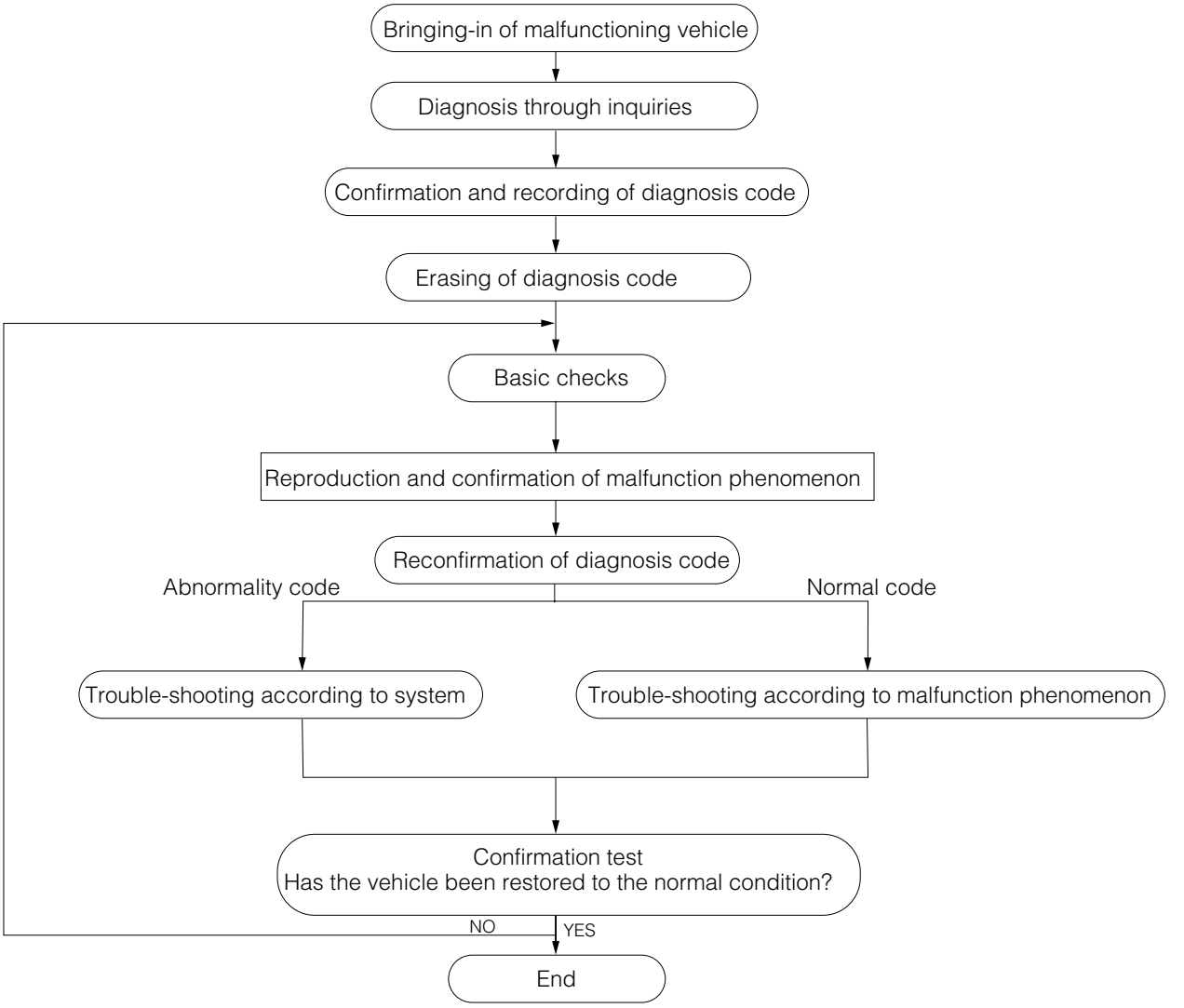


code	Part name
a	Meter ECU
b	Steering column upper W/switch bracket
c	Immobilizer ECU
d	EFI ECU
e	Transponder

4-6 HOW TO PROCEED WITH TROUBLE SHOOTING

1.The immobilizer system is equipped with a diagnosis function which diagnoses malfunctioning sections and gives important clues in the trouble shooting.

2.The diagnosis function of the immobilizer system is equipped with the battery backup (which keeps supplying power for diagnosis memory even when the ignition switch is set to OFF position).



4-7 INQUIRY

1.In an effort to remove causes for malfunction from the vehicle concerned, it is impossible to determine the cause without confirming the malfunction phenomenon. If the phenomenon is not confirmed, the vehicle may not be able to return to the normal conditions even if you continue your work. The diagnosis through inquiries is to collect information from the customer before confirming the malfunction phenomena. The diagnosis through inquiries provides very important clues in reproducing malfunction phenomena.

2.Since the information obtained by the diagnosis through inquiries is referred to during the trouble shooting, it is imperative to make an inquiry of the customer, centering on the items related to the malfunction, instead of simply asking general questions.

4-8 CONFIRMATION, RECORD AND ERASURE OF DIAGNOSIS CODE

4-8-1 OUTLINE

1.When the diagnosis code is indicated, confirm whether the malfunction took place sometimes in the system or is still persisting. Also it is necessary to check any relation between the code and the reproduced malfunction. For this purpose, the diagnosis code should be indicated twice, namely before and after the confirmation of the phenomena.

4-8-2 CHECKING METHOD OF DIAGNOSIS

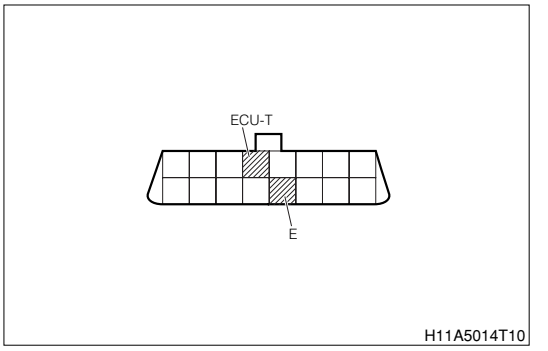
1.Bring the vehicle into the stopped state.

2.Set the IG switch to LOCK. Using the SST, short circuit the terminals ECU-T and E of the DLC located under the instrument panel.

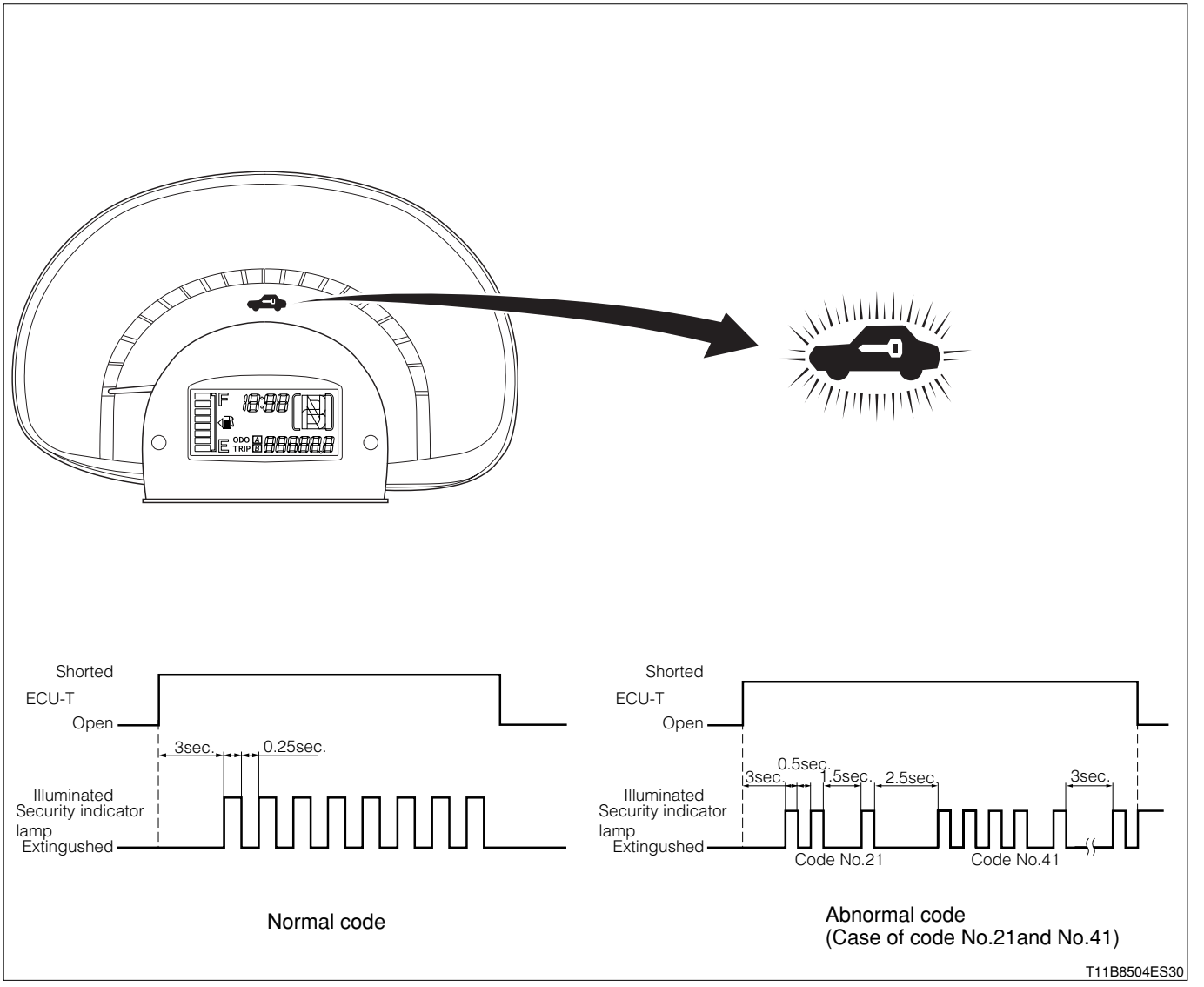
CAUTION

- If wrong connector connecting positions are selected, this may cause malfunction. Therefore, utmost care must be paid so as not to choose wrong positions.

SST: 09991-87403-000
09991-97201-000



3.Turn ON the IG switch. Let the security indicator flash and indicate the diagnosis code.
4.All the diagnosis codes memorized are shown repeatedly in the sequence of diagnosis number, starting from the smallest number.



4-8-3 CANCELING METHOD OF DIAGNOSIS

1.When the section which is responsible for the malfunction code has been checked and repaired, erase the memory, following the procedure given below. After the erasure, let the diagnosis code be outputted again and confirm that the normal code is outputted.
(1) Disconnect the negative (−) terminal of the battery.

4-8-4 CONTENTS OF DIAGNOSIS

Contents of diagnosis

Code No.		Warning indication (Provided: ○, Not-provided: ×)	code memorizing (Provided: ○, Not-provided: ×)	Contents of diagnosis	
2-digit	4-digit			Diagnosis system	Diagnosis item
12	B2796	○	×	Immobilizer coil	Faulty key or immobilizer coil
15	B2780	○	○	Key switch	Key switch "OFF" malfunction
21	B2795	○	○	Transponder signal sending	Mismatching of key ID codes
22	B2794	○	○		Mismatching of key ID codes
23	B2793	○	○	Transponder lock	Key ID codes not registered
24	B2797	○	×	Transponder communication	Transponder communication faulty
25	B2798	○	×		Frame receiving faulty
41	B2788	○	○	Communication with EFI (Code mismatching)	Faulty communication with EFI ECU (1)
42	B2789	○	○	Communication with EFI (No signal receiving)	Faulty communication with EFI ECU (2)

4-9 TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE

4-9-1 DIAGNOSIS CODE NO.12

(1) Checking points

1.Is immobilizer coil normal?

2.Are the harness and connector between the immobilizer coil and the immobilizer ECU normal?

(2) Checking method

⌦1. Wire harness continuity check

1.Check continuity between the following terminals.

(1) Immobilizer coil vehicle harness side 1(COIL+) — immobilizer ECU vehicle harness side 6(COIL+)

(2) Immobilizer coil vehicle harness side 2(COIL−) — immobilizer ECU vehicle harness side 13(COIL−)

SPECIFIED VALUE: Continuity exists

▼If it is OK, go to Step ⌦2.

▼If it is NG, replace the harness and connector.

⌦2.Immobilizer coil unit check

1.Perform unit check of the transponder key coil (immobilizer coil).

Refer to Page I4-41.

SPECIFIED VALUE: No abnormality exists.

▼If it is OK, go to Step ⌦3.

▼If it is NG, replace the transponder key coil.

⌦3. Operation check by other key

1.Check the operation by the master key.

SPECIFIED VALUE: The system should operate properly.

▼If it is OK, perform the key replacement and re-registration.

▼If it is NG, replace the transponder key coil.

4-9-2 DIAGNOSIS CODE NO.15

(1) Checking points

1.Is the key insertion switch normal?

(2) Checking method

⊳1. Wire harness continuity check

1.Check continuity between the following terminals.

(1) Vehicle harness side 4(+) of upper steering column W/switch bracket Ay — Battery positive (+) terminal

(2) Vehicle harness side 3(—) of upper steering column W/switch bracket Ay — Meter vehicle harness side 26(KEY2)

(3) Immobilizer ECU vehicle harness side 3(KEY) — Meter vehicle harness side 26(KEY2)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to Step ⊳2.

▼If it is NG, replace the harness and connector.

⊳2. Key insertion switch check

1.Perform unit check of the upper steering column W/switch bracket Ay (Key insertion switch).

SPECIFIED VALUE: No abnormality exists.

▼If it is OK, this completes the check.

▼If it is NG, replace the transponder key coil.

4-9-3 DIAGNOSIS CODE NO.21, NO.22

(1) Checking points

1.Is the registered key use?

2.Is the key properly used?

3.Is immobilizer ECU normal?

(2) Checking method

⊳1. Operation check by the master key

1.Check to see if the engine can start by the master key.

SPECIFIED VALUE: The engine can start.

▼If it is OK, perform the key re-registration.

NOTE

- The ID code of the key used has not been registered yet.

▼If it is NG, go to Step ⊳2.

⊳2. Check of key use conditions

1.Check to see if the key is used in a wrong way.

SPECIFIED VALUE: Do not use the keys in an overlapped state. Use the key correctly.

▼If it is OK, replace the immobilizer ECU. Then, proceed to ⊳3.

▼If it is NG, use the key correctly.

⊃3.Check of immobilizer ECU operation

1.After the key ID code has been registered on the immobilizer ECU, check that the system functions normally.

SPECIFIED VALUE: The engine can start.

▼If it is OK, this completes the check.

▼If it is NG, replace the transponder key coil.

4-9-4 DIAGNOSIS CODE NO.23

(1) Checking points

1.Is the master key normal?

(2) Checking method

⊃1.Confirmation of diagnosis code

1.After registering the ID code of the master key again, check the output of the diagnosis code.

SPECIFIED VALUE: The normal code is outputted.

▼If it is OK, this completes the check.

▼If it is NG, perform the key replacement and re-registration of the key ID code.

CAUTION

- Be sure to recover the master key that has been replaced.

4-9-5 DIAGNOSIS CODE NO.24, NO,25

(1) Checking points

1.Are the keys located too close?

2.Does the communication line has a noise source?

(2) Checking method

⊃1. Immobilizer ECU check

1.Insert a registered master key into the key cylinder.

2.Check to see if noises exist at the immobilizer ECU computer side terminal 6(COL+).

SPECIFIED VALUE: Noises are detected.

NOTE

- The communication line has noises to a certain degree.

▼If it is OK, remove the causes for the noises.

▼If it is NG, go to Step ⊃2.

⊃2. Operation check of upper steering column W/switch bracket Ay

1.Replace the upper steering column W/switch bracket Ay with a properly functioning one (for check use).

2.Check to see if the engine starts.

SPECIFIED VALUE: Starts.

▼If it is OK, replace the upper steering column W/switch bracket Ay.

▼If it is NG, replace the immobilizer ECU.

4-9-6 DIAGNOSIS CODE NO.41,42

(1) Checking points

1.Are the harness and connector between the EFI ECU and the immobilizer ECU normal?

(2) Checking method

⊃1. Wire harness continuity check

1.Check continuity between the following terminals.

(1) EFI ECU vehicle harness side 117(SIO2) — immobilizer ECU vehicle harness side 8(SIO2)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, replace the immobilizer ECU. Then, proceed to ⊃2.

▼If it is NG, replace the harness and connector.

⊃2. Check of immobilizer ECU operation

1.After the key ID code has been registered on the immobilizer ECU, check that the system functions normally.

SPECIFIED VALUE: The engine can start.

▼If it is OK, this completes the check.

▼If it is NG, replace EFI ECU.

4-10 UNIT CHECK

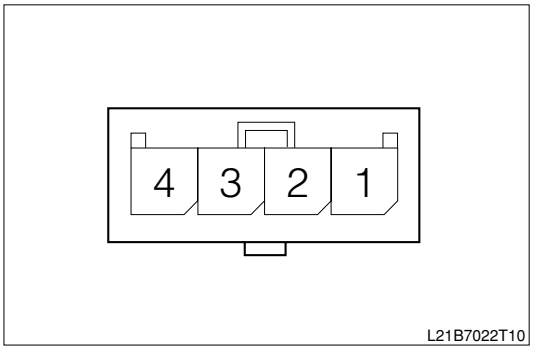
4-10-1 STEERING COLUMN UPPER W/SWITCH BRACET AY

(1) Key insertion switch

1.At the LOCK position of the ignition switch, insert and pull out the key to check continuity between the terminals.

Key SW continuity table

Switching \ Terminal No.		3 — 4
Lock cylinder	Key not inserted	No continuity exists.
	Key inserted	Continuity exists.



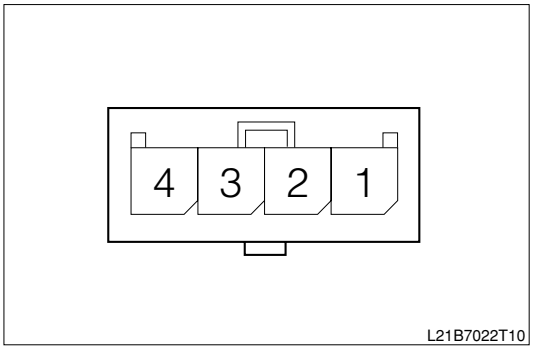
(2) Immobilizer coil

1.Check continuity between the terminals 1 and 2.

SPECIFIED VALUE: Continuity exists.

CAUTION

- Even if continuity exists, no judgment can be made about whether the coil is normal or not.



A.GENERAL INFORMATION	GENERAL INFORMATION	A1
	MAINTENANCE	A2
B.ENGINE	ENGINE	B1
	ENGINE MECHANICAL	B2
	INTAKE SYSTEM	B3
	EXHAUST SYSTEM	B4
	LUBRICATION SYSTEM	B5
	COOLING SYSTEM	B6
←	FUEL SYSTEM	B7
	ENGINE CONTROL SYSTEM	B8
	EMISSION CONTROL SYSTEM	B9
	IGNITION SYSTEM	B10
	STARTING SYSTEM/CHARGING SYSTEM	B11
	ENGINE MOUNTING	B12
C.SUSPENSION	FRONT SUSPENSION	C1
	REAR SUSPENSION	C2
	WHEEL & TIRE	C3
D.DRIVELINE/AXLE	DRIVE SHAFT/PROPELLER SHAFT/AXLE	D2
E.BRAKE	BRAKE	E1
	PARKING BRAKE	E2
	BRAKE CONTROL	E3
F. TRANSMISSION/ TRANSAXLE	CLUTCH	F1
	MANUAL TRANSMISSION/MANUAL TRANSAXLE	F2
	AUTOMATIC TRANSMISSION/AUTOMATIC TRANSAXLE	F3
	TRANSMISSION CONTROL	F5

G.STEERING	STEERING	G1
	POWER STEERING	G2
H.SRS AIRBAG	SRS AIRBAG SYSTEM	H1
I.BODY	BODY	I1
	EXTERIOR/INTERIOR	I2
	WINDSHIELD WINDOWGLASS/MIRROR	I3
	DOOR LOCK & THEFT DETERRENT	I4
J.BODY ELECTRICAL SYSTEM	LIGHTING	J1
	WIPER & WASHER	J2
	METER	J3
	AUDIO & VISUAL SYSTEM	J4
	WIRING	J5
	OTHER ELECTRICAL PARTS	J6
K.HEATER AND AIR CONDITIONER	HEATER & AIR CONDITIONER	K1
L.VEHICLE COMMUNICATIONS	MULTIPLEX COMMUNICATION SYSTEM	L2

J1 LIGHTING

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INSTRUCTIONS FOR SERVICE OPERATION ---------- J1 - 1
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HEADLAMP AY ---------- J1 - 8
REMOVAL AND INSTALLATION -------- J1 - 8
FRONT FOG LAMP AY ---------- J1 - 9
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SIDE TURN SIGNAL LAMP AY ---------- J1 - 11
REMOVAL AND INSTALLATION ------- J1 - 11
REAR COMBINATION LAMP AY --------- J1 - 12
REMOVAL AND INSTALLATION ------ J1 - 12
HIGH MOUNTED STOP LAMP AY ------ J1 - 13
REMOVAL AND INSTALLATION ------ J1 - 13
LICENSE PLATE LAMP AY ---------- J1 - 14
REMOVAL AND INSTALLATION ------ J1 - 14
ROOM LAMP AY
(FRONT MAP LAMP) ---------- J1 - 15
REMOVAL AND INSTALLATION ------ J1 - 15
ROOM LAMP AY ---------- J1 - 16
REMOVAL AND INSTALLATION ------ J1 - 16
ROOM LAMP AY
(LUGGAGE ROOM LAMP) ---------- J1 - 17
REMOVAL AND INSTALLATION ------ J1 - 17
HEADLAMP BULB ---------- J1 - 18
REMOVAL AND INSTALLATION ------ J1 - 18
CLEARANCE LAMP BULB ---------- J1 - 19
REMOVAL AND INSTALLATION ------ J1 - 19
FRONT TURN SIGNAL LAMP BULB --- J1 - 20
REMOVAL AND INSTALLATION ------ J1 - 20
FRONT FOG LAMP BULB ---------- J1 - 21
REMOVAL AND INSTALLATION ------ J1 - 21
SIDE TURN SIGNAL LAMP BULB ------- J1 - 22
REMOVAL AND INSTALLATION ------ J1 - 22
TAIL AND STOP LAMP BULB ---------- J1 - 22
REMOVAL AND INSTALLATION ------ J1 - 22
REAR TURN SIGNAL LAMP BULB ----- J1 - 22
REMOVAL AND INSTALLATION ------ J1 - 22
BACK UP LAMP BULB ---------- J1 - 22
REMOVAL AND INSTALLATION ------ J1 - 22
REAR FOG LAMP BULB ---------- J1 - 22
REMOVAL AND INSTALLATION ------ J1 - 22
HIGH MOUNTED STOP LAMP BULB -- J1 - 22
REMOVAL AND INSTALLATION ------ J1 - 22
LICENSE PLATE LAMP BULB ---------- J1 - 22
REMOVAL AND INSTALLATION ------ J1 - 22
ROOM LAMP BULB
(FRONT MAP LAMP BULB) ---------- J1 - 22
REMOVAL AND INSTALLATION ------ J1 - 22
ROOM LAMP BULB ---------- J1 - 22
REMOVAL AND INSTALLATION ------ J1 - 22
ROOM LAMP BULB
(LUGGAGE ROOM LAMP) ---------- J1 - 23
REMOVAL AND INSTALLATION ------ J1 - 23
HEADLAMP DIMMER SWITCH AY ------ J1 - 24
REMOVAL AND INSTALLATION ------ J1 - 24

1 LIGHTING

1-1 INSTRUCTIONS FOR SERVICE OPERATION

1-1-1 ITEMS TO BE OBSERVED DURING REPLACEMENT OF EACH LAMP

1. Halogen lamps become very high temperature while they are operated. When grease etc gets to the bulb surface, the bulb life will be shortened. Therefore, hold the flange section during the replacement. Do not allow your hand to touch the glass section.
2. If your hand should touch the bulb, degrease the affected section using alcohol etc. and proceed to assemble it to the lamp.
3. In the case of halogen lamps, the pressure inside the glass bulb is very high. Hence, if the bulb is dropped or hit or scratched, it is prone to be broken and the glass be scattered around.
4. If the bulb is left in a detached state for a prolonged period of time, there are possibilities that dirt or humidity gets to the lens. Therefore, when the bulb is to be replaced, first prepare a new bulb and then start to replace it.
5. The bulb should be replaced by a bulb with the same wattage.
6. Improper installation of the socket will cause the lens to be misted or allow water to be admitted. After completion of the bulb replacement, make sure to install the socket correctly.

1-2 ARTICLES TO BE PREPARED

Instrument

Electrical Tester

1-3 BASIC CHECK AND ADJUSTMENT

1-3-1 HEADLAMP PHOTOMETRIC AXIS ADJUSTMENT

(1) Operation prior to photometric axis adjustment

1. Adjust the tire air inflation pressure to the specified value.
2. Seat one person at the Driver's seat.
3. Replenish oils to the specified levels. Fill gasoline to the full capacity.
4. Mount the tools, jack and spare tire at the specified positions.
5. Rock the vehicle in the up-and-down direction as well as in the right-and-left direction so that the suspension may bed well.
6. Set the engine speed to a level of 1500 rpm or more. (If the engine speed is too low, the lamp terminal voltage drops, thus making it difficult to recognize the cut-off line.

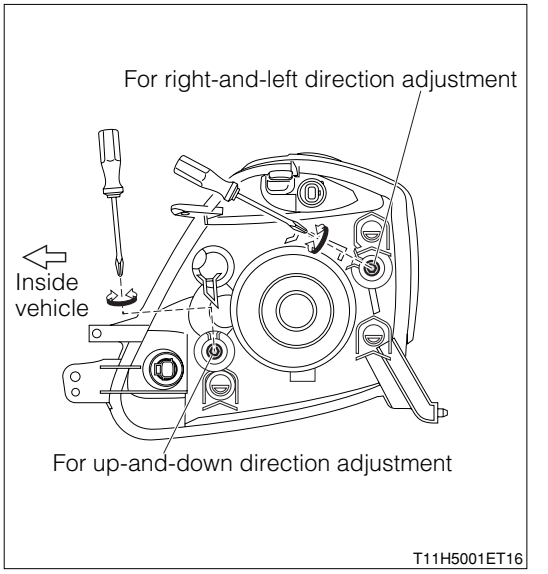
NOTE

- Cut-off line: Boundary line between the bright zone and dark zone in the low beam.

7. In the case of motor vehicles equipped with a headlamp levelling switch, set the levelling switch to the zero position.

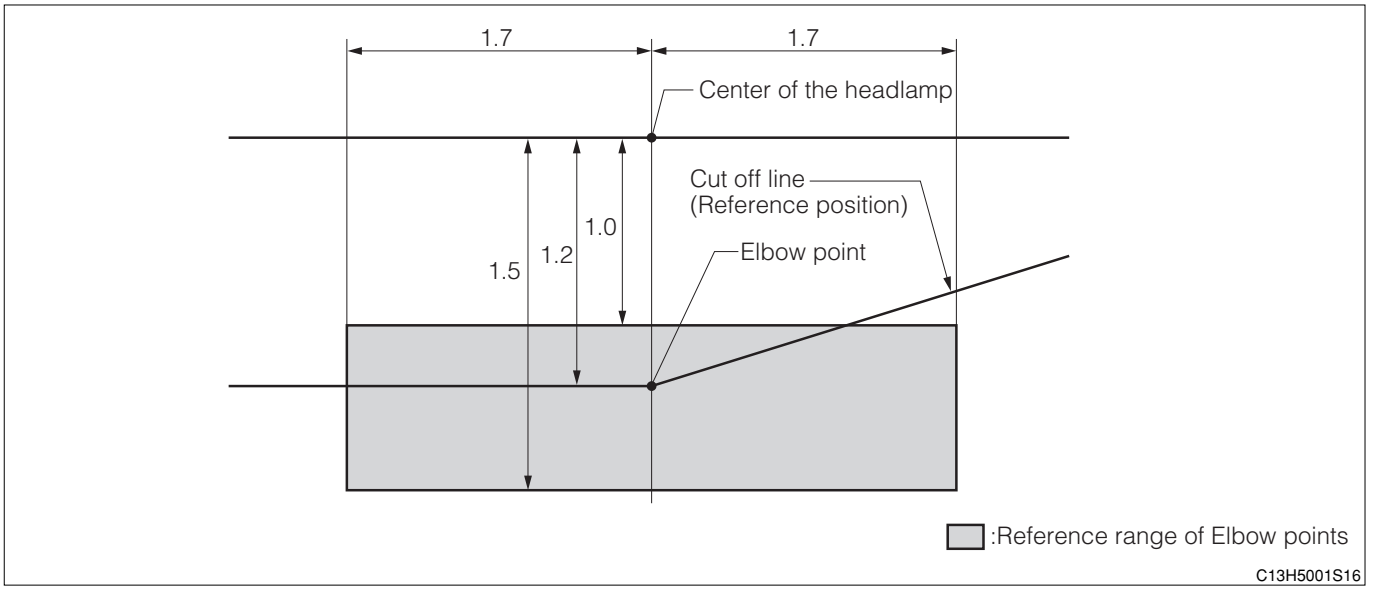
(2) Photometric axis adjustment

1.Adjust the photometric axis of the low beam according to the instruction manual of the headlamp tester to be used.



Reference range of cut-off line elbow points

Vertical position	Range from 1.0% to 1.5% below the horizontal line that passes through the lamp center (Reference position: 1.2% below)
Horizontal position	Range between 1.7 % right and left from the vertical line that passes through the lamp center: (Reference position: On the vertical line that passes through the lamp center)



Unit : %

NOTE

- Elbow point: Point where the cut-off line is articulated

1-3-2 FRONT FOG LAMP PHOTOMETRIC AXIS ADJUSTMENT

(1) Operation prior to photometric axis adjustment

1.Turn over the shield S/A, fender splash, front RH/LH to such an extent that the photometric axis adjustment can be done.

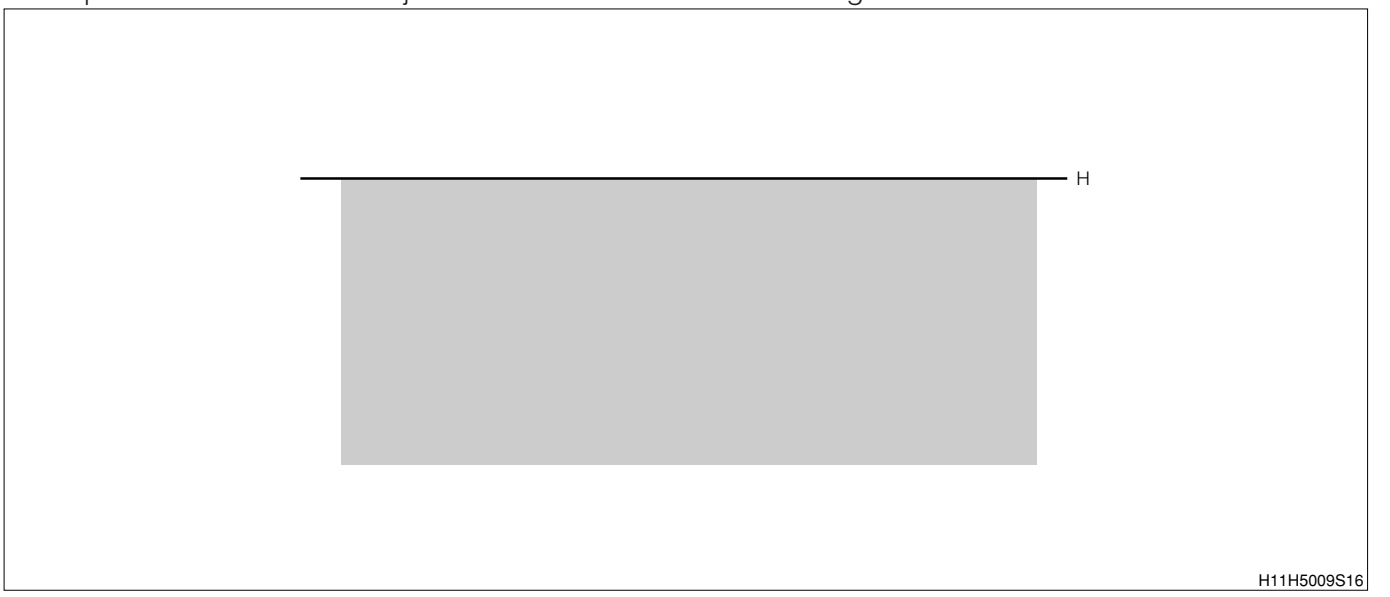
Refer to Page I1-24.

2.Adjust the tire air inflation pressure to the specified value.

3.Set the engine speed to a level of 1500 rpm or more.

(2) Photometric axis adjustment

1.Prepare a screen for the adjustment use as indicated in the figure.



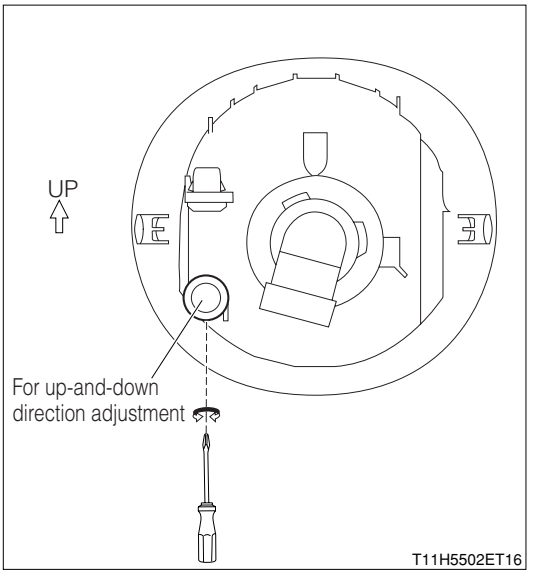
2.Place the screen normally at a distance of three meters ahead of the lamp. Align line H with the center of the front fog lamp.

- This normal placing can be carried out easily when a screen is affixed to the lens of the headlamp tester.

3.Turn ON the front fog lamp. Perform adjustment in such a way that the light distribution comes in the shaded section on the screen.

NOTE

- Perform the adjustment by turning the aiming screw in the tightened direction. (When performing the adjustment in the loosening direction, first loosen the screw, then turn it in the tightened direction.)
- There is no screw for the right-and-left direction adjustment.
- The figure shows the right side front fog lamp.



1-3-3 MANUAL HEADLAMP LEVELING OPERETION CHECK

1.Perform the photometric axis adjustment for the headlamp.
Refer to Page J1-1.

2.Place the screen normally at a distance of three meters ahead of the lamp.

NOTE

- This normal placing can be carried out easily when a screen is affixed to the lens of the headlamp tester.

3.Turn the headlamp leveling switch 0-1-2-3-4-5. At this time, check the vertical movement amount on the photometric axis.

Headlamp leveling switch

Position	Movement amount (mm)
0 — 1	30
1 — 2	30
2 — 3	30
3 — 4	30
4 — 5	30

1-3-4 OPERATION CHECK OF LIGHTING DEVICES

1.Visually check the operation of lamps, etc. provided on the vehicle surface.

(1) Headlamp(Hi-Lo change)
(2) Clearance lamp
(3) Tail lamp
(4) Stop lamp
(5) Back-up lamp
(6) License plate lamp
(7) Turn signal lamp
(8) Hazard lamp
(9) Fog lamp

SPECIFIED VALUE: Illuminates or flashes normally.

2.Visually check the operation of the room lamp.
SPECIFIED VALUE: Illuminates normally.

1-3-5 CHECK OF LIGHTING DEVICE FOR INSTALLING CONDITION

1.Shake the lamps, etc. by hand and check the installing condition.
SPECIFIED VALUE: There should be no excessive play.

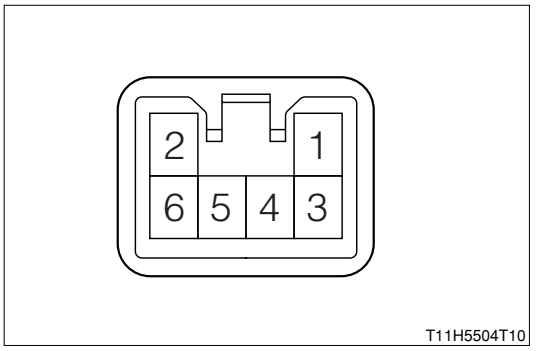
2.Check that the lens or reflector of the lamp has no damage such as discoloration and crack. Also check that they are not smeared and that no water has been admitted in the lamp.
SPECIFIED VALUE: There should be no discoloration nor cracks.
SPECIFIED VALUE: There should be no contamination nor admission of water.

1-4 FUNCTION CHECK

1-4-1 HEADLAMP LEVELING SWITCH

(1) Voltage test

1.With the connector connected, operate the headlamp leveling switch. At this time, working from the back of the connector, check the voltage between the connector terminals using an electrical tester.



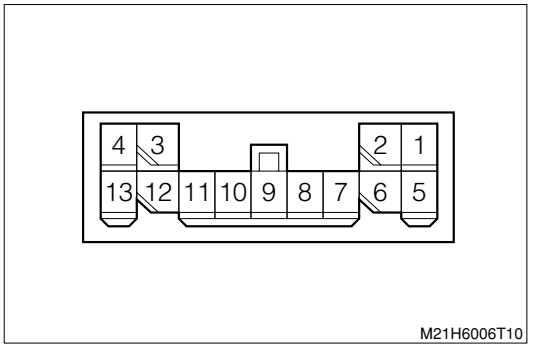
Specified value

Switch position	Terminal No.	Voltage (At time of battery voltage of 12 V)
0	4(LH) and 5(RH) — 2(GND)	10.4 — 11.2V
1	4(LH) and 5(RH) — 2(GND)	9.2 — 9.9V
2	4(LH) and 5(RH) — 2(GND)	7.9 — 8.6V
3	4(LH) and 5(RH) — 2(GND)	6.6 — 7.3V
4	4(LH) and 5(RH) — 2(GND)	5.3 — 6.0V
5	4(LH) and 5(RH) — 2(GND)	4.0 — 4.8V

1-5 UNIT CHECK

1-5-1 HEADLAMP DIMMER SWITCH(VEHICLE WHERE IT IS INSTALLED AT THE RIGHT SIDE THE COLUMN)

1.Check continuity between terminals in each state.



Light control switch

Switch condition	Terminal No.	Standard
TAIL	5 — 8	Continuity exists.
HEAD	5 — 8, 6 — 7	Continuity exists.

Headlamp dimmer switch

Switch condition	Terminal No.	Standard
FLASH	6 — 7 — 9	Continuity exists.
LOW BEAM	7 — 10	Continuity exists.
HIGH BEAM	7 — 9	Continuity exists.

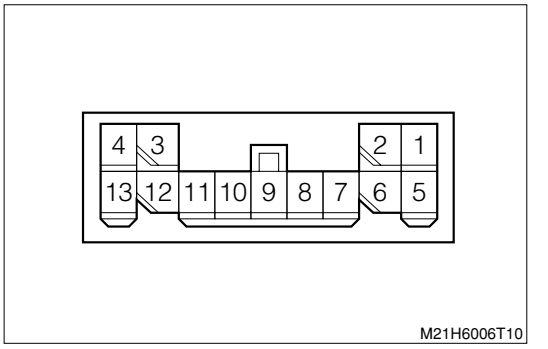
Turn signal switch

Switch condition	Terminal No.	Standard
RIGHT	12 — 13	Continuity exists.
LEFT	11 — 12	Continuity exists.

Front fog lamp switch

Switch condition	Terminal No.	Standard
ON	1 — 3	Continuity exists.

1-5-2 HEADLAMP DIMMER SWITCH(VEHICLE WHERE IT IS INSTALLED AT THE LEFT SIDE OF THE CULUMN)



1.Check continuity between terminals in each state.

Light control switch

Switch condition	Terminal No.	Standard
TAIL	10 — 13	Continuity exists.
HEAD	10 — 13, 11 — 12	Continuity exists.

Headlamp dimmer switch

Switch condition	Terminal No.	Standard
FLASH	9 — 11 — 12	Continuity exists.
LOW BEAM	8 — 11	Continuity exists.
HIGH BEAM	9 — 11	Continuity exists.

Turn signal switch

Switch condition	Terminal No.	Standard
RIGHT	6 — 7	Continuity exists.
LEFT	5 — 6	Continuity exists.

Front fog lamp switch

Switch condition	Terminal No.	Standard
ON	2 — 4	Continuity exists.

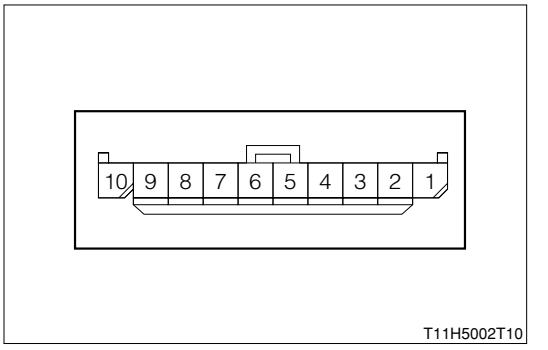
Rear fog lamp switch

Switch condition	Terminal No.	Standard
ON	3 — 4	Continuity exists.

Front fog lamp switch + Rear fog lamp switch

Switch condition	Terminal No.	Standard
ON(Front fog lamp)	2 — 4	Continuity exists.
OFF(Front fog lamp switch + Rear fog lamp switch)	2 — 3— 4	Continuity exists.

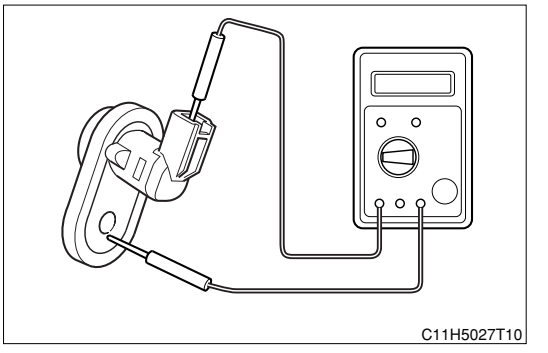
1-5-3 HAZARD SWITCH(HEATER CONTROL AY)



1.Check continuity between terminals when the hazard switch is turned ON.

Switch condition	Terminal No.	Standard
ON	2 — 3	Continuity exists.

1-5-4 COURTESY SWITCH



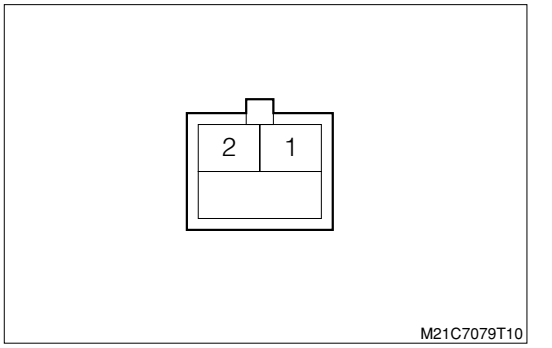
1.Check the continuity between the switch connector terminal and the switch body.

Switch condition	Standard
When free	Continuity exists.
When pushed	No continuity exists.

1-5-5 STOP LAMP SWITCH

1.Check continuity between the switch connector terminals.

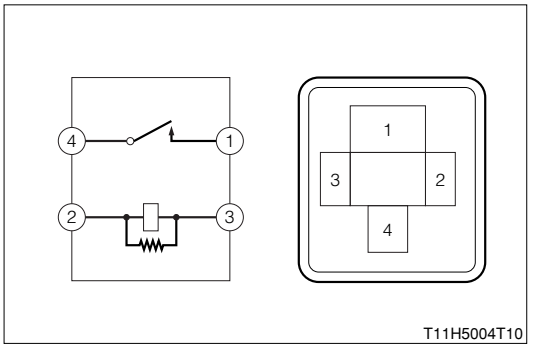
Switch condition	Standard
When free	Continuity exists.
When pushed	No continuity exists.



1-5-6 HEADLAMP RELAY

1.Check continuity between the respective terminals of the connector.

Terminal No.	Standard
1 — 4	No continuity exists.
2 — 3	Continuity exists.



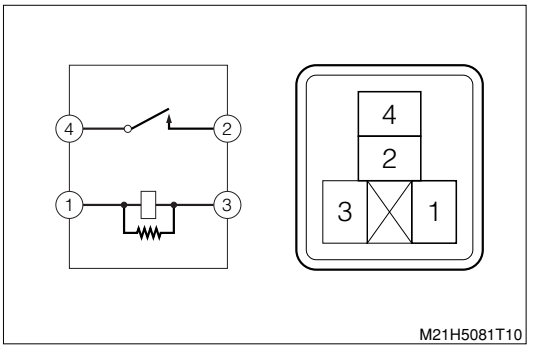
2.Apply the battery voltage between the terminals 2 and 3. At this time, check continuity between the terminals 1 and 4.

SPECIFIED VALUE: Continuity exists.

1-5-7 FOG LAMP RELAY

1.Check continuity between the respective terminals of the connector.

Terminal No.	Standard
2 — 4	No continuity exists.
1 — 3	Continuity exists.



2.Apply the battery voltage between the terminals 1 and 3. At this time, check continuity between the terminals 2 and 4.

SPECIFIED VALUE: Continuity exists.

2 HEADLAMP AY

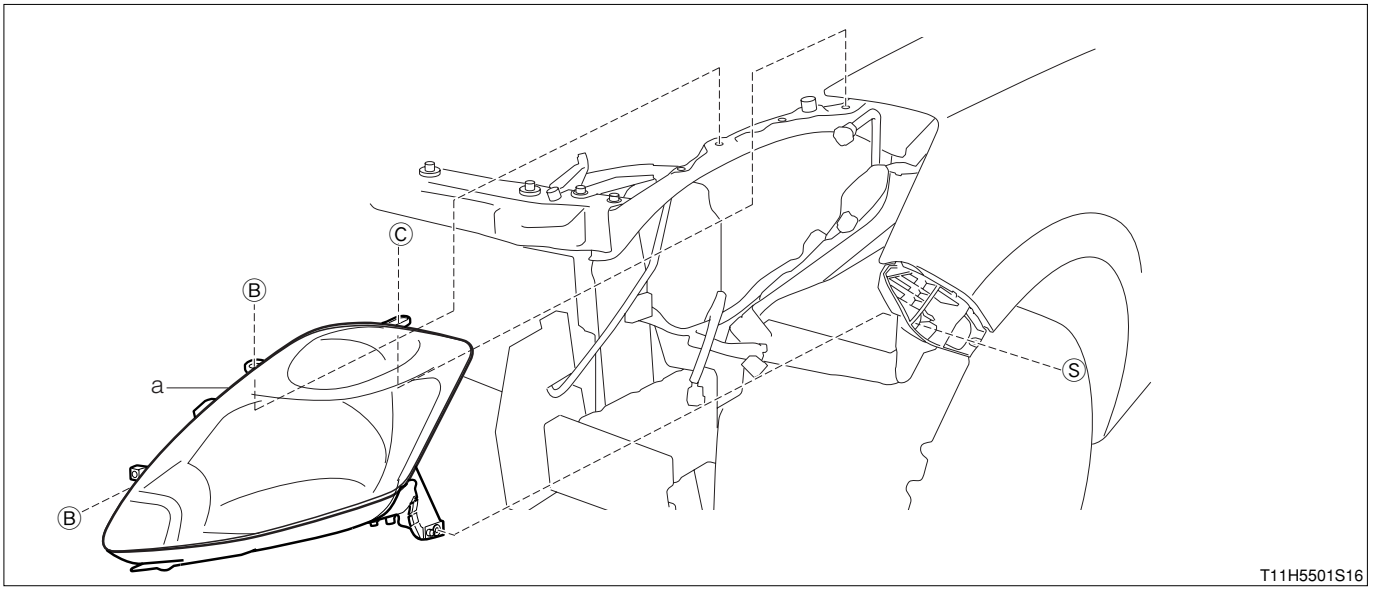
2-1 REMOVAL AND INSTALLATION

2-1-1 OPERATION BEFORE REMOVAL

1.Remove the front bumper cover.
Refer to Page I2-2.

2-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Headlamp Ay, RH/LH

2-1-3 OPERATION AFTER INSTALLATION

1.Install the front bumper cover.
Refer to Page I2-2.

2.Perform the photometric axis adjustment for the headlamp.
Refer to Page J1-1.

3 FRONT FOG LAMP AY

3-1 REMOVAL AND INSTALLATION

3-1-1 OPERATION BEFORE REMOVAL

1.Remove the front bumper cover.
Refer to Page I2-4.

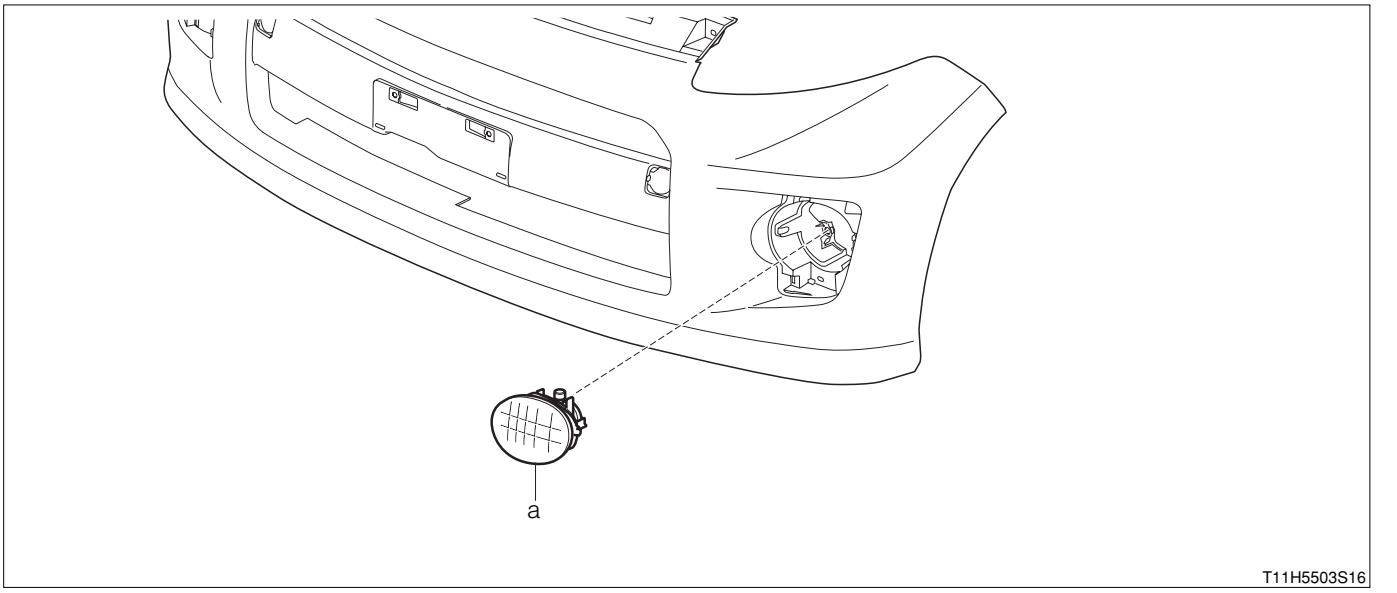
3-1-2 REMOVAL AND INSTALLATION PROCEDURES

3-1-3 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

Protective tape

(1) Components



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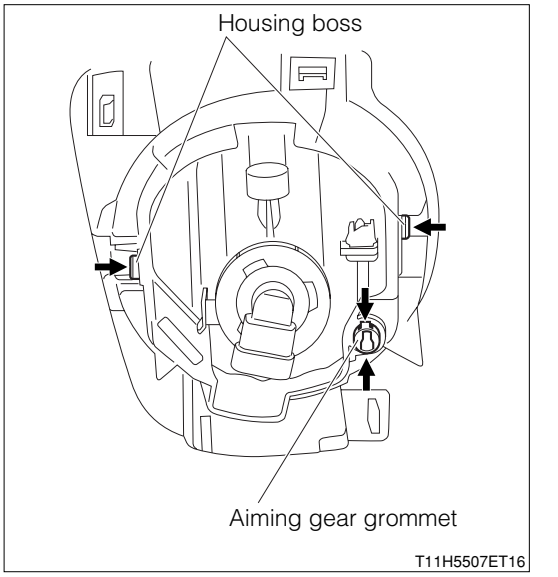
(2) Removal and installation procedures

▼ 1 a Lamp Ay,fog (RH/LH)

3-1-4 POINTS OF REMOVAL

(1) Lamp Ay, fog, RH/LH

1.Perform operations from the back of the bumper.
2.Hold the claw of the aiming gear grommet.
3.Disengage the housing boss at the both sides of the lamp Ay from the bumper and push out the lamp Ay.



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3-1-5 OPERATION AFTER INSTALLATION

1.Install the front bumper cover.
Refer to Page I2-4.

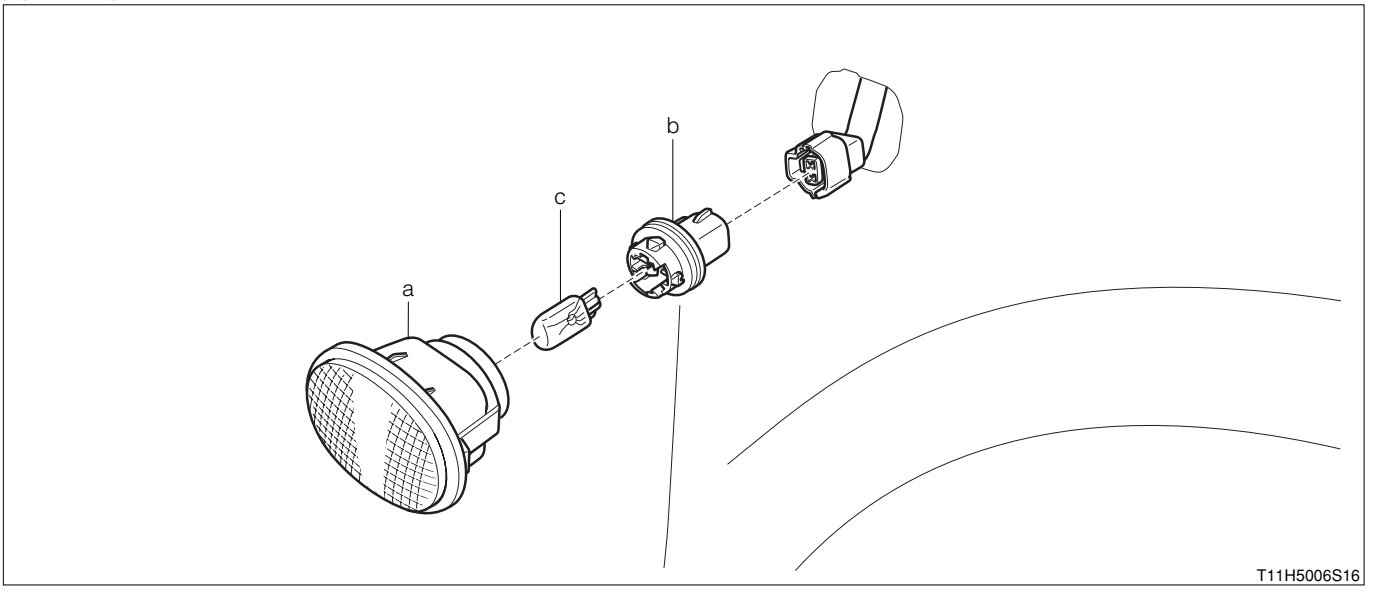
2.Perform the photometric axis adjustment for the front fog lamp.
Refer to Page J1-2.

4 SIDE TURN SIGNAL LAMP AY

4-1 REMOVAL AND INSTALLATION

4-1-1 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



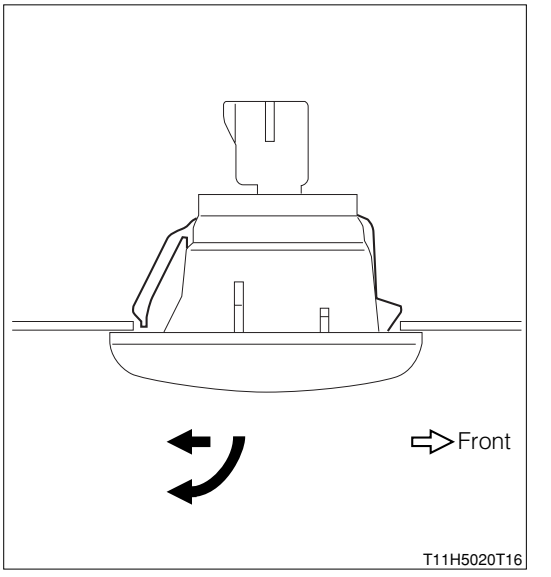
(2) Removal and installation procedures

▼ 1 a Lamp Ay, side turn signal(RH/LH)
2 b Socket
3 c Bulb

4-1-2 POINTS OF REMOVAL

(1) Lamp Ay, side turn signal, RH/LH

1.Removes the lamp Ay by pushing it toward the rear of the vehicle.



5 REAR COMBINATION LAMP AY

5-1 REMOVAL AND INSTALLATION

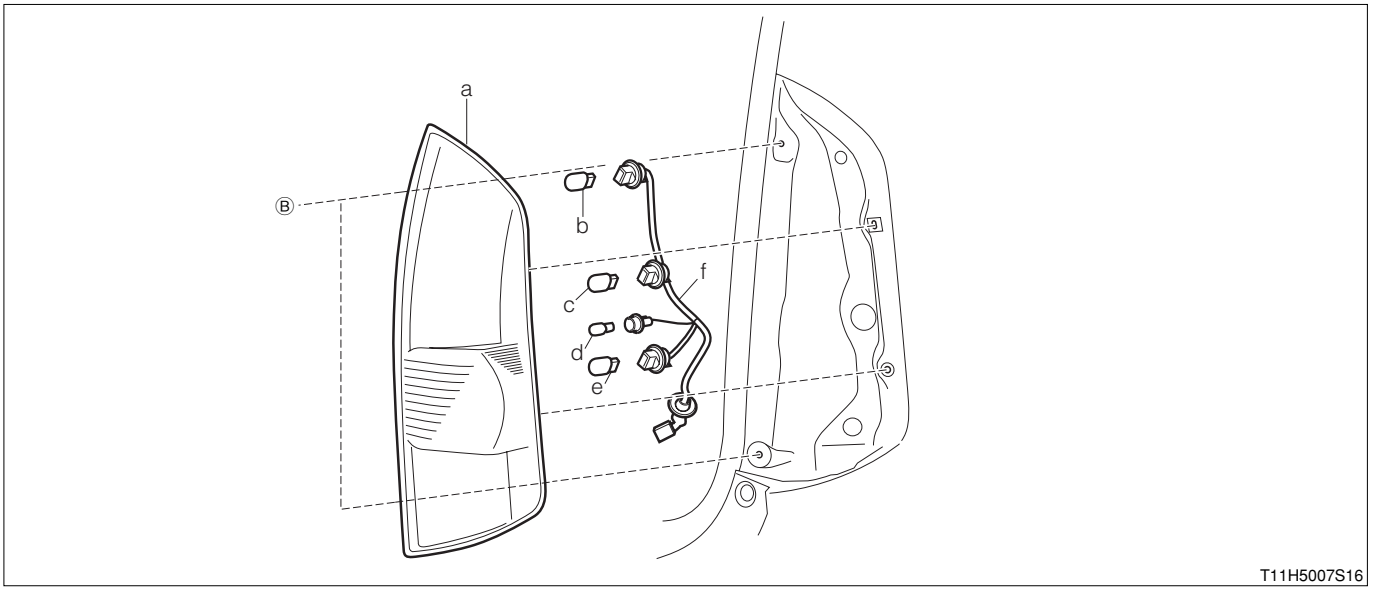
5-1-1 OPERATION BEFORE REMOVAL

1.Remove the rear deck trim cover.
Refer to Page I2-48.

2.Remove the rear RH/LH quarter trim panel Ay.
Refer to Page I2-48.

5-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



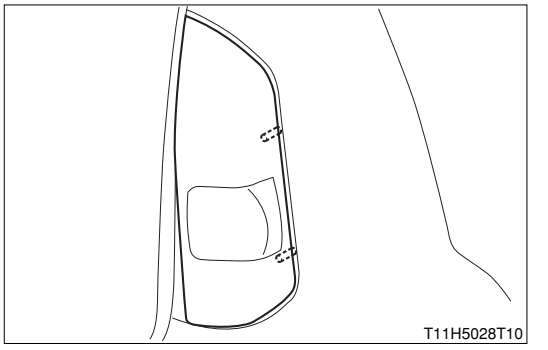
(2) Removal and installation procedures

▼ 1 a Lamp Ay, rear combination, RH/LH
2 b Bulb (Tail & stop lamp)
3 c Bulb (Rear turn signal lamp)
4 d Bulb (Back up lamp)
5 e Bulb (Rear fog lamp)
6 f Harness Ay

5-1-3 POINTS OF REMOVAL

(1) Lamp Ay, rear combination, RH/LH

1.Remove the two(2) mounting bolts, and then release the stud pin from the grommet (two locations) to disassemble the lamp Ay.



5-1-4 OPERATION AFTER INSTALLATION

1.Remove the rear RH/LH quarter trim panel Ay.
Refer to Page I2-48.

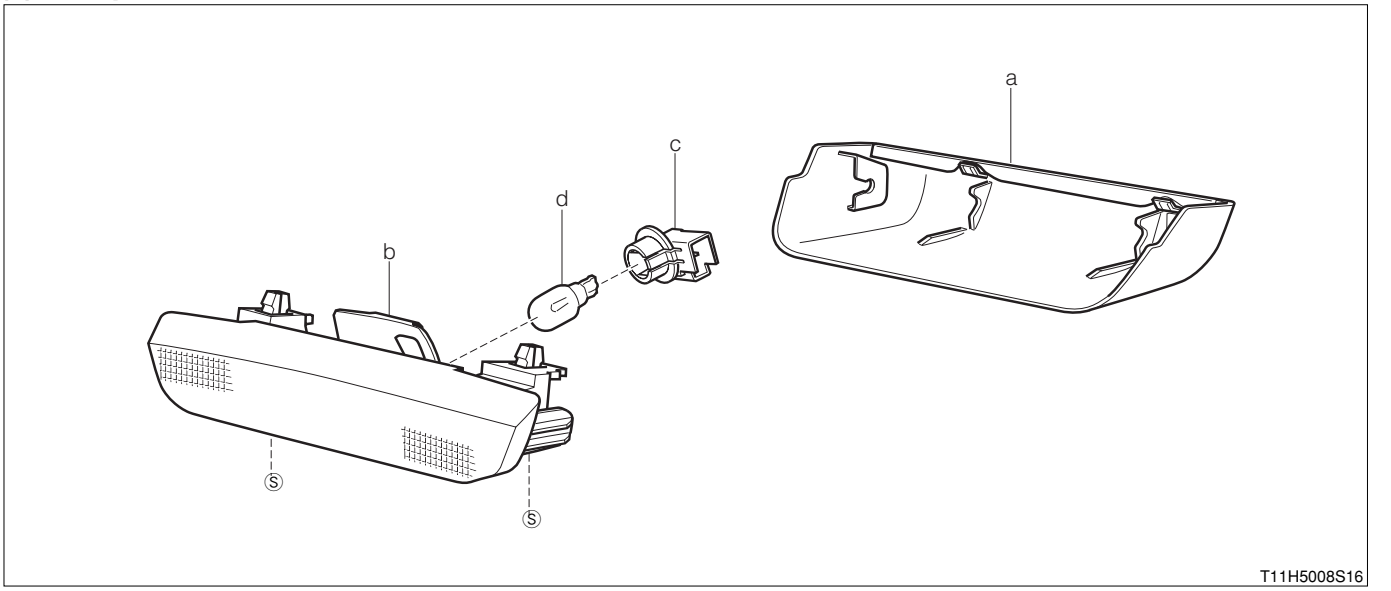
2.Install the rear deck trim cover.
Refer to Page I2-48.

6 HIGH MOUNTED STOP LAMP AY

6-1 REMOVAL AND INSTALLATION

6-1-1 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



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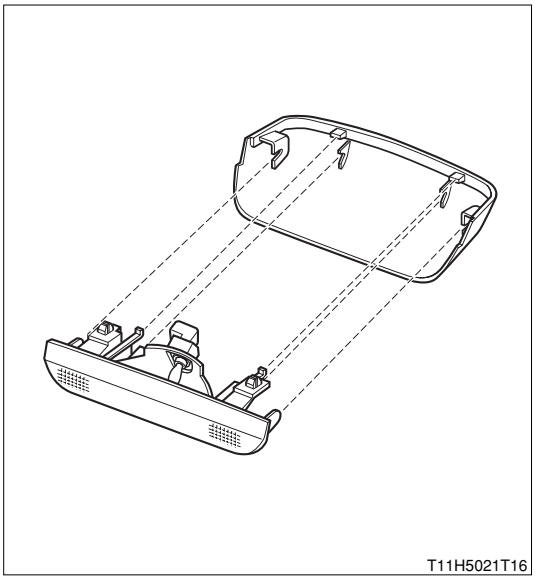
(2) Removal and installation procedures

▼ 1 a Cover, center stop lamp
2 b Lamp Ay, stop center
3 c Socket
4 d Bulb

6-1-2 POINTS OF REMOVAL

(1) Cover, center stop lamp

1.Slide the cover toward the rear of the lamp Ay to release and remove from the lamp Ay.



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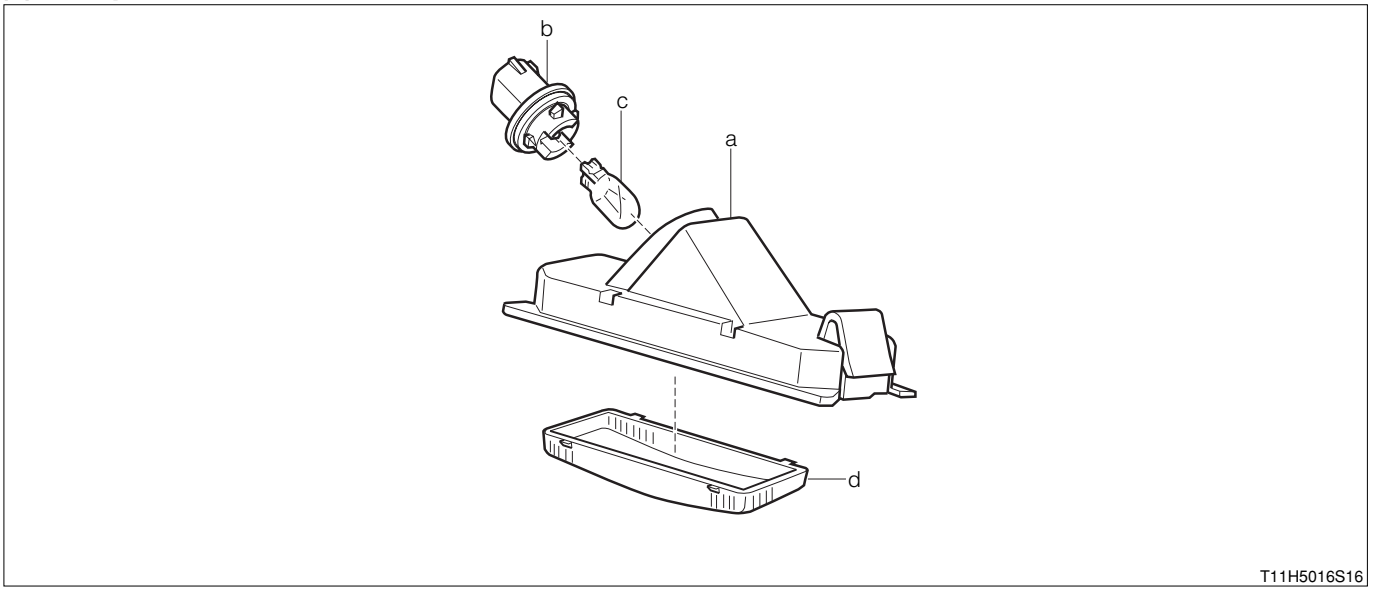
7 LICENSE PLATE LAMP AY

7-1 REMOVAL AND INSTALLATION

7-1-1 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



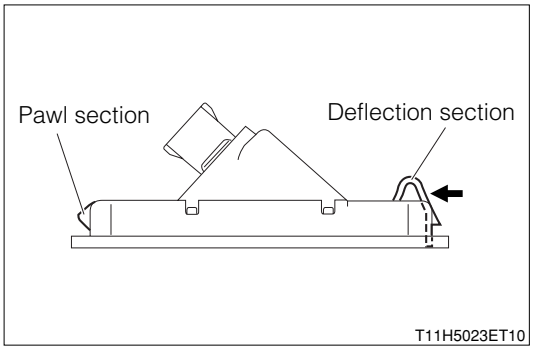
(2) Removal and installation procedures

▼ 1 a Lamp Ay, license plate
2 b Socket
3 c Bulb
4 d Lens, license plate lamp

7-1-2 POINTS OF REMOVAL

(1) Lamp Ay, license plate

1.Remove the lamp Ay, while pressing down the deflecting portion.



8 ROOM LAMP AY

8-1 REMOVAL AND INSTALLATION

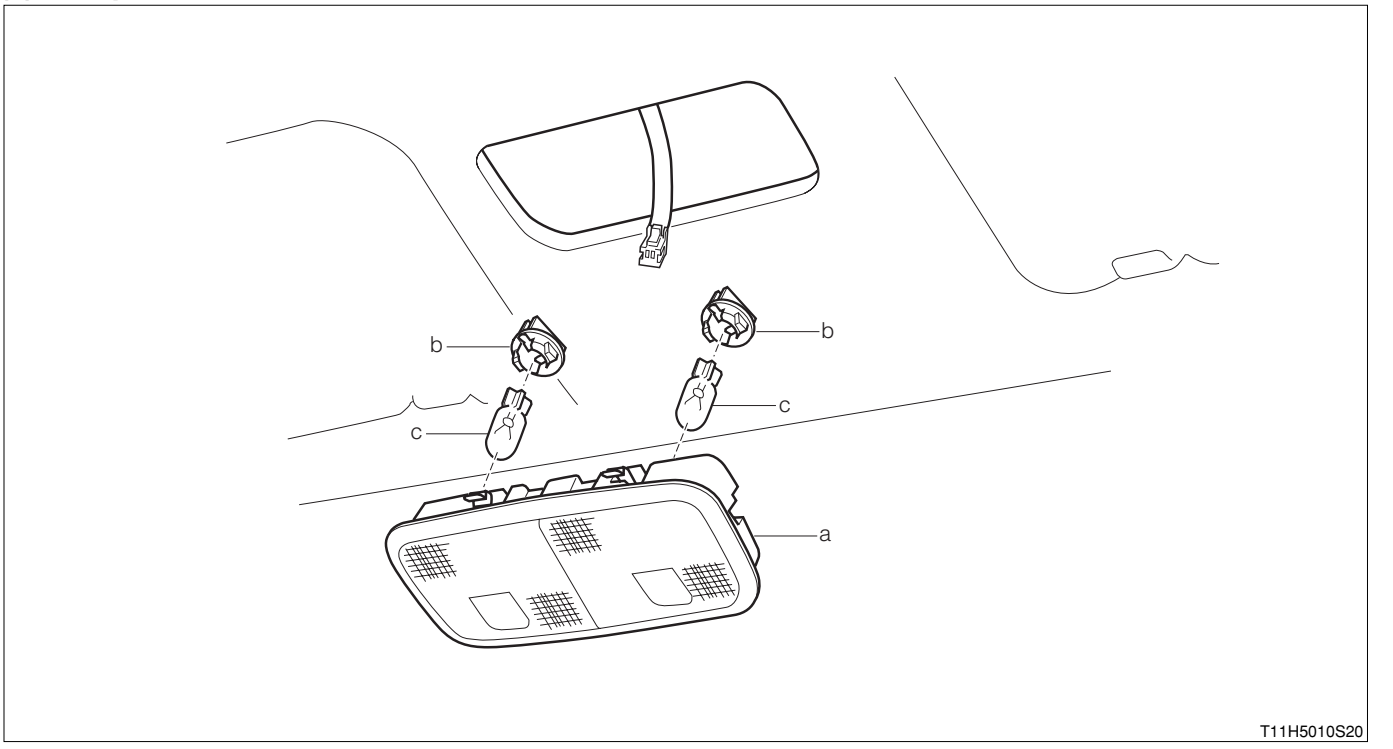
8-1-1 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

Protective tape

8-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



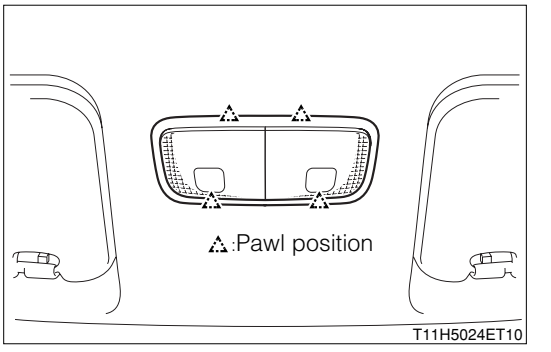
(2) Removal and installation procedures

▼ 1 a Lamp Ay, map
2 b Socket
3 c Bulb

8-1-3 POINTS OF REMOVAL

(1) Lamp Ay, map

1.Remove by disengaging the pawls (at four points), using a flat screwdriver wrapped with a protective tape.

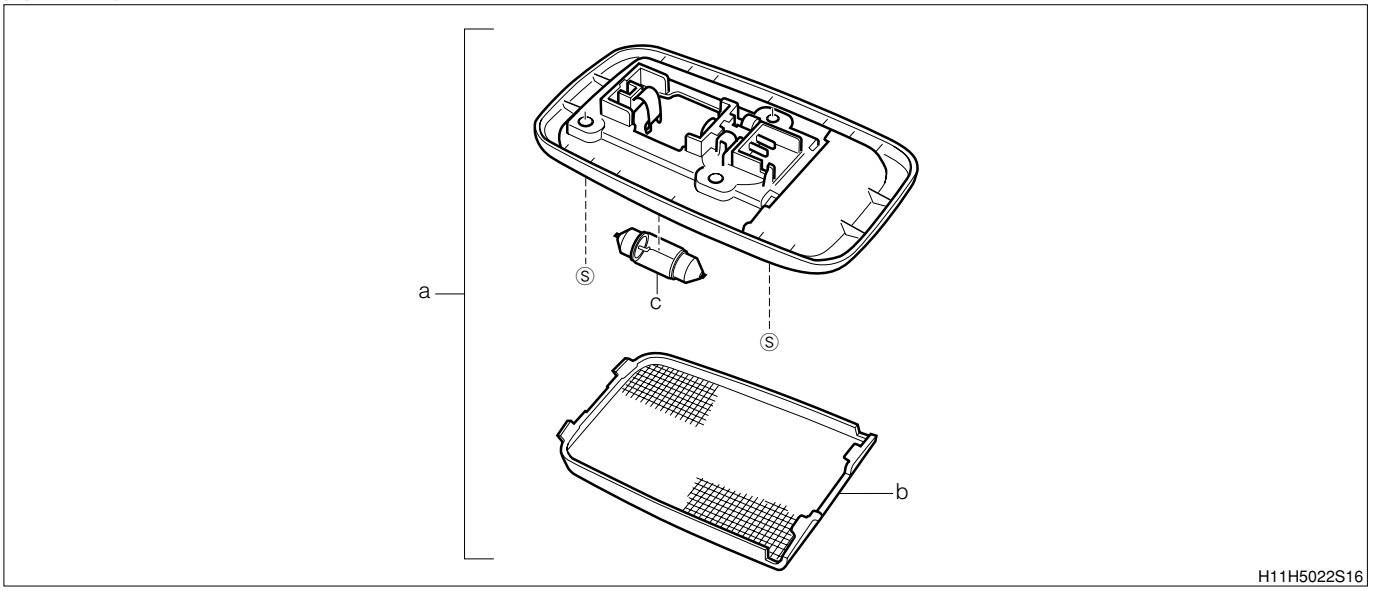


9 ROOM LAMP AY

9-1 REMOVAL AND INSTALLATION

9-1-1 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 b Lens, dome lamp
2 c Bulb
3 a Lamp Ay, dome

10 ROOM LAMP AY

10-1 REMOVAL AND INSTALLATION

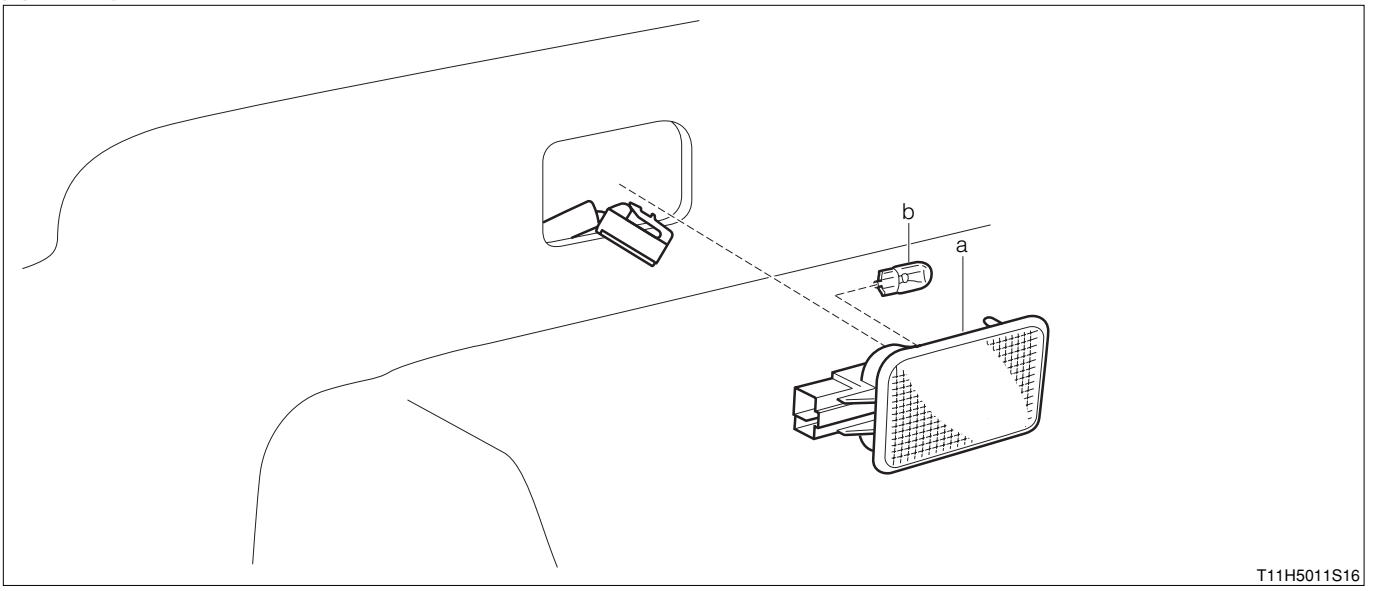
10-1-1 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

Protective tape

10-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



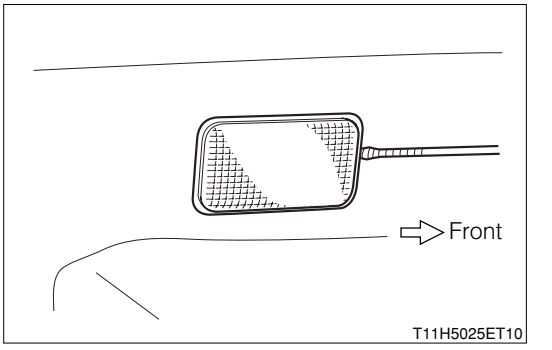
(2) Removal and installation procedures

▼ 1 a Lamp Ay, dome
2 b Bulb

10-1-3 POINTS OF REMOVAL

(1) Lamp Ay, dome

1.Using a flat (−) screw driver wound with a protective tape, release.

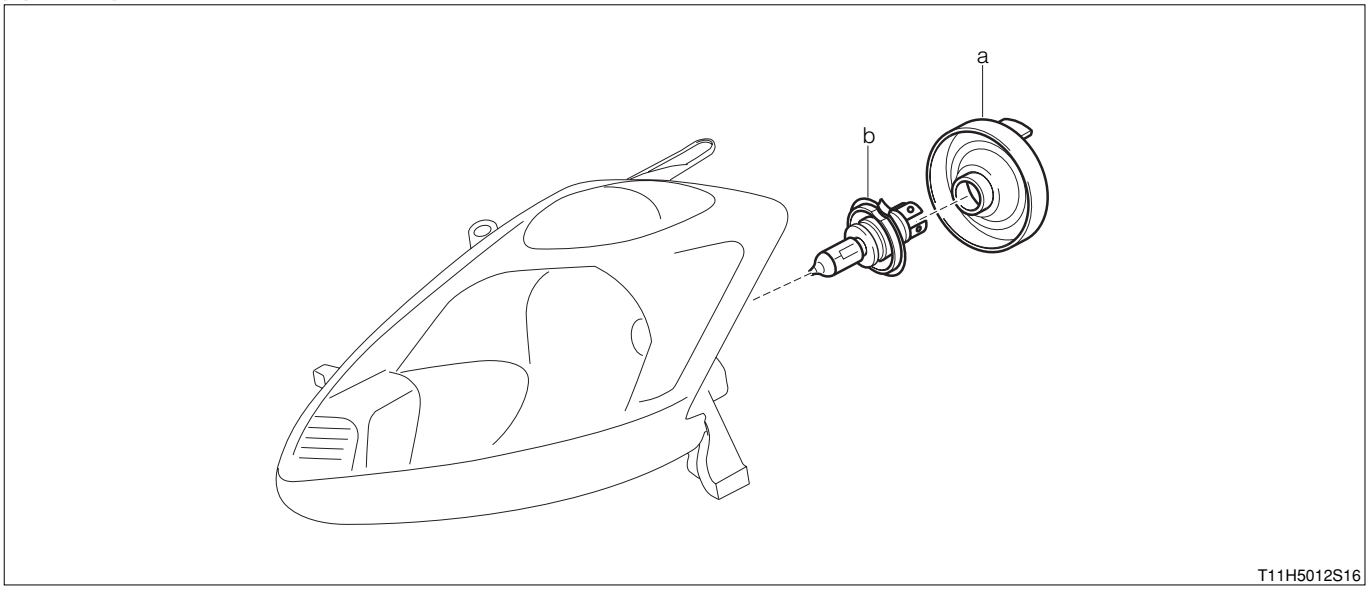


11 HEADLAMP BULB

11-1 REMOVAL AND INSTALLATION

11-1-1 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Cover, headlamp
2 b Bulb(Headlamp)

12 CLEARANCE LAMP BULB

12-1 REMOVAL AND INSTALLATION

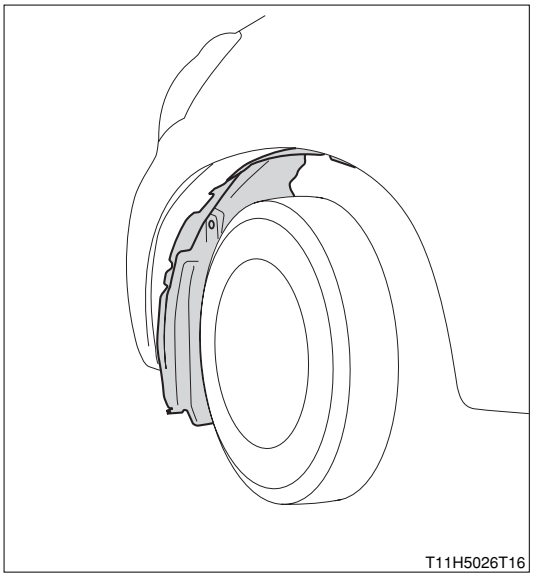
12-1-1 OPERATION BEFORE REMOVAL

1.Turn over the RH/LH front fender liner (front RH/LH fender splash shield S/A in the case of the aero specification vehicles) to provide a space to remove the bulb.

NOTE

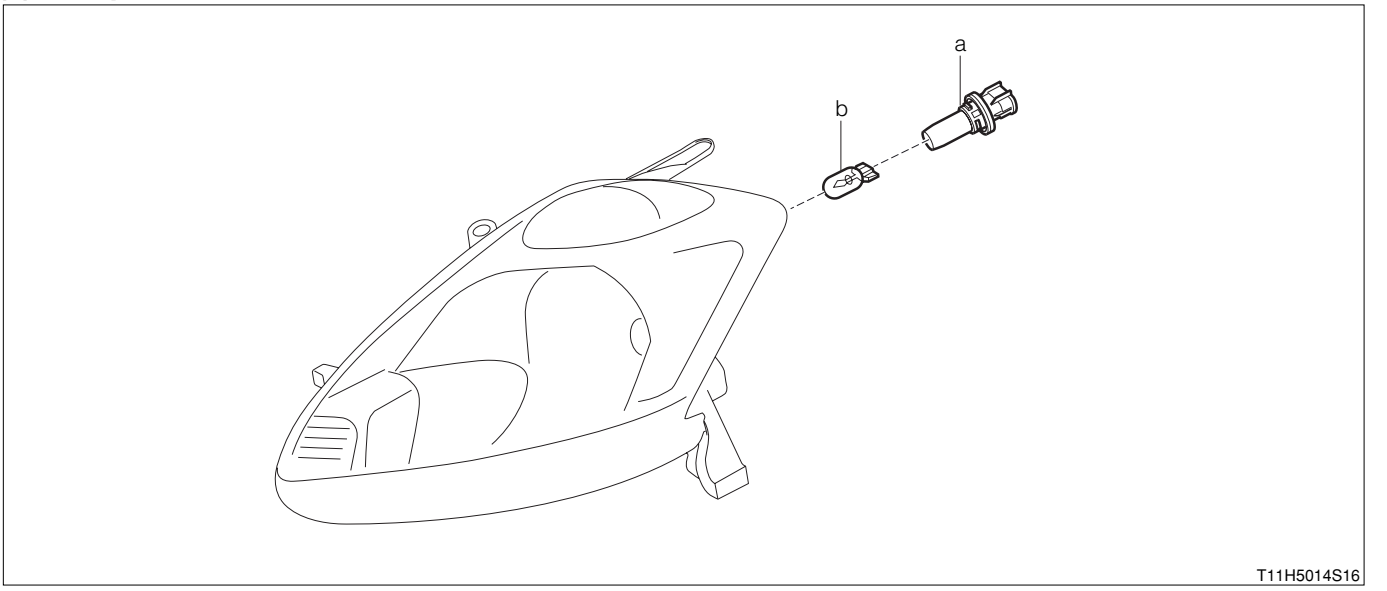
- For easier operation, the steering wheel may be kept in a turned state during this operation, thus providing extra work space.

Refer to Page I1-24.



12-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Socket (Clearance lamp)
2 b Bulb (Clearance lamp)

12-1-3 OPERATION AFTER INSTALLATION

1.Return the RH/LH front fender liner (front RH/LH fender splash shield S/A in the case of the aero specification vehicles) to the original state.

Refer to Page I1-24.

13 FRONT TURN SIGNAL LAMP BULB

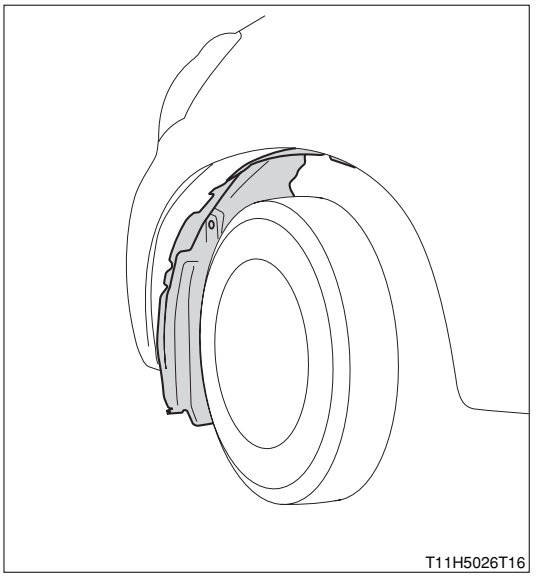
13-1 REMOVAL AND INSTALLATION

13-1-1 OPERATION BEFORE REMOVAL

1.Turn over the LH front fender liner (front LH fender splash shield S/A in the case of the aero specification vehicles) to provide a space to disengage the socket. (When replacing the LH side bulb)
Refer to Page I1-24.

NOTE

- The RH bulb can be replaced from the engine compartment.
- For easier operation, the steering wheel may be kept in a turned state during this operation, thus providing extra work space.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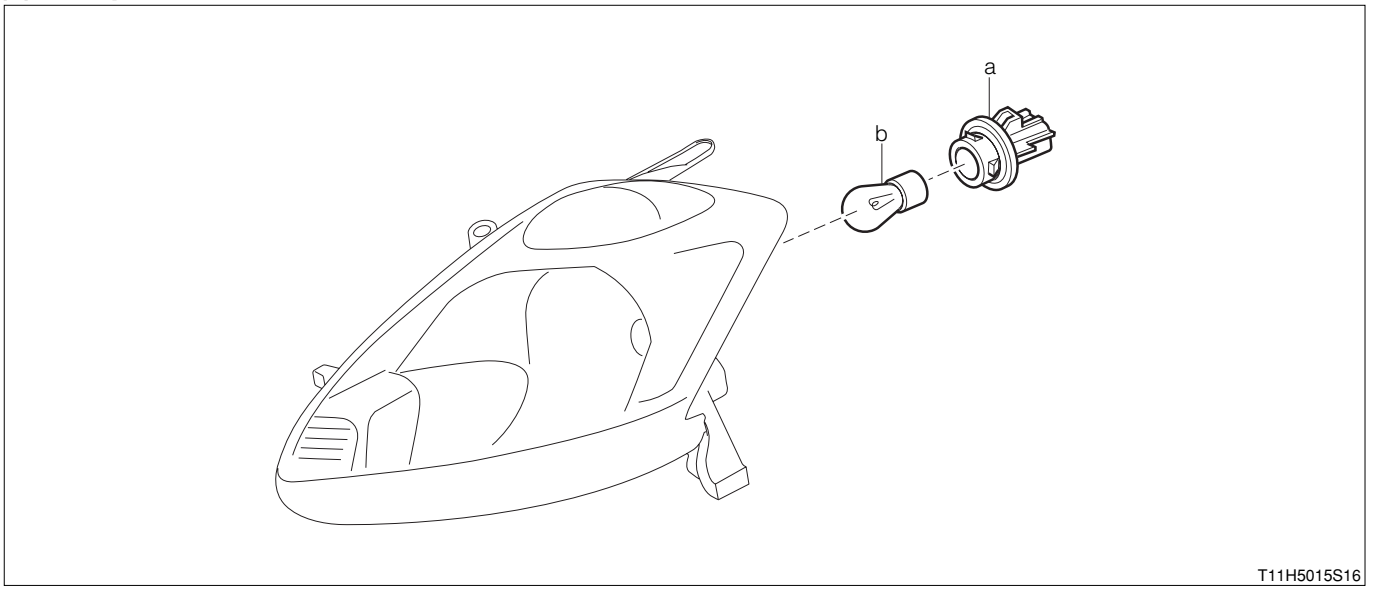
13-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



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(2) Removal and installation procedures

1 a Socket (Front turn signal lamp)
2 b Bulb (Front turn signal lamp)

13-1-3 OPERATION AFTER INSTALLATION

1.Return the LH front fender liner (front LH fender splash shield S/A in the case of the aero specification vehicles) to the original state.(When replacing the LH side bulb)
Refer to Page I1-24.

14 FRONT FOG LAMP BULB

14-1 REMOVAL AND INSTALLATION

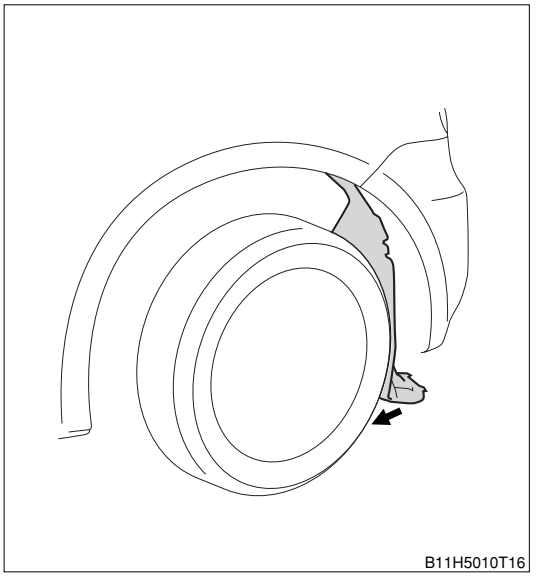
14-1-1 OPERATION BEFORE REMOVAL

1.Turn over the front RH/LH fender splash shield S/A to provide a space to remove the bulb.

NOTE

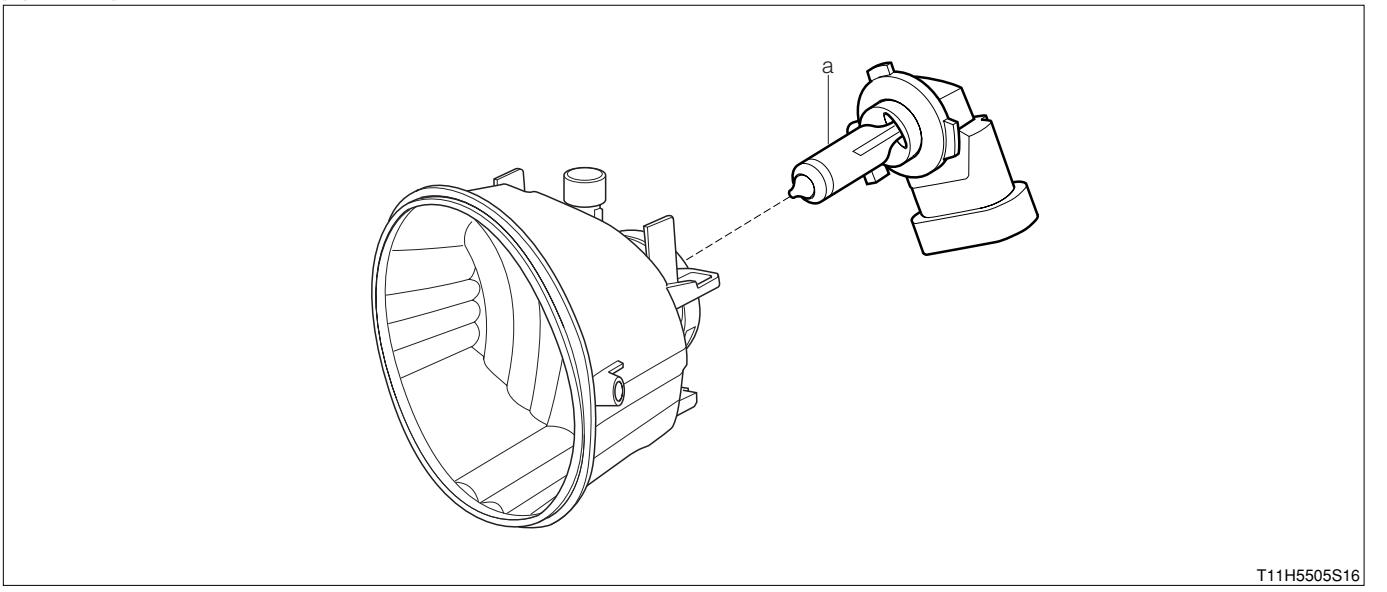
- The space for the work can be easily obtained if the operation is performed with the steering wheel held in a turned state.

Refer to Page I1-24.



14-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Bulb(Front fog lamp)

14-1-3 OPERATION AFTER INSTALLATION

1.Return the front RH/LH fender splash shield S/A to the original state.
Refer to Page I1-24.

2.Perform the photometric axis adjustment for the front fog lamp.

15 SIDE TURN SIGNAL LAMP BULB
15-1 REMOVAL AND INSTALLATION
Refer to Page J1-11.

16 TAIL AND STOP LAMP BULB
16-1 REMOVAL AND INSTALLATION
Refer to Page J1-12.

17 REAR TURN SIGNAL LAMP BULB
17-1 REMOVAL AND INSTALLATION
Refer to Page J1-12.

18 BACK UP LAMP BULB
18-1 REMOVAL AND INSTALLATION
Refer to Page J1-12.

19 REAR FOG LAMP BULB
19-1 REMOVAL AND INSTALLATION
Refer to Page J1-12.

20 HIGH MOUNTED STOP LAMP BULB
20-1 REMOVAL AND INSTALLATION
Refer to Page J1-13.

21 LICENSE PLATE LAMP BULB
21-1 REMOVAL AND INSTALLATION
Refer to Page J1-14.

22 ROOM LAMP BULB(FRONT MAP LAMP BULB)
22-1 REMOVAL AND INSTALLATION
To replace the bulb, remove the map lamp Ay, and then remove the bulb from the back side of the lamp Ay.

CAUTION

- It is important to remove the bulb from the backside of the lamp Ay, to prevent damage to the switch that may occur if the lens is removed.

Refer to Page J1-15.

23 ROOM LAMP BULB
23-1 REMOVAL AND INSTALLATION
Refer to Page J1-16.

24 ROOM LAMP BULB(LUGGAGE ROOM LAMP BULB)

24-1 REMOVAL AND INSTALLATION

Refer to Page J1-17.

25 HEADLAMP DIMMER SWITCH AY

25-1 REMOVAL AND INSTALLATION

25-1-1 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

Protective tape

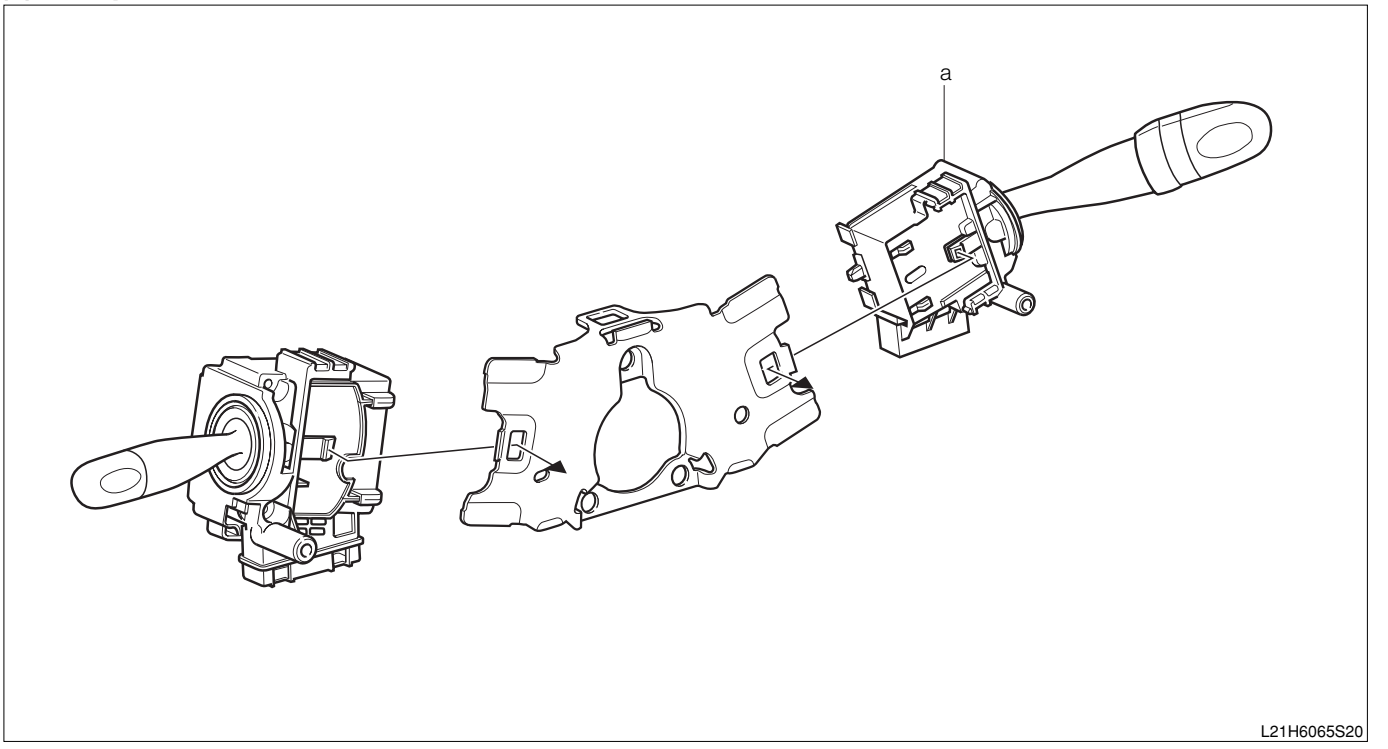
25-1-2 OPERATION BEFORE REMOVAL

1.Remove the lower steering column cover.
Refer to Page G1-5.

2.Remove the upper steering column cover.
Refer to Page G1-5.

25-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

▼ 1 a Switch Ay, headlamp dimmer

25-1-4 POINTS OF REMOVAL

(1) Switch Ay, headlamp dimmer

1.Using a flat (−) screwdriver wound with a protective tape, release the fitting of the the claw.

25-1-5 OPERATION AFTER INSTALLATION

1.Install the upper steering column cover.
Refer to Page G1-5.

2.Install the lower steering column cover.
Refer to Page G1-5.

J2 WIPER & WASHER

WIPER AND WASHER ---------- J2 - 1
ARTICLES TO BE PREPARED ---------- J2 - 1
SYSTEM DRAWING ---------- J2 - 1
BASIC CHECK AND ADJUSTMENT --- J2 - 4
UNIT CHECK ---------- J2 - 6
FRONT WIPER ---------- J2 - 12
REMOVAL AND INSTALLATION ------ J2 - 12
REAR WIPER ---------- J2 - 15
REMOVAL AND INSTALLATION ------ J2 - 15
REAR WIPER RELAY ---------- J2 - 17
REMOVAL AND INSTALLATION ------ J2 - 17
WASHER TANK ---------- J2 - 18
REMOVAL AND INSTALLATION ------ J2 - 18
WASHER HOSE(FRONT) ---------- J2 - 19
REMOVAL AND INSTALLATION ------ J2 - 19
WASHER HOSE(ROOF) ---------- J2 - 21
REMOVAL AND INSTALLATION ------ J2 - 21
WASHER HOSE(REAR) ---------- J2 - 21
REMOVAL AND INSTALLATION ------ J2 - 21
WIPER SWITCH AY ---------- J2 - 22
REMOVAL AND INSTALLATION ------ J2 - 22

1 WIPER AND WASHER

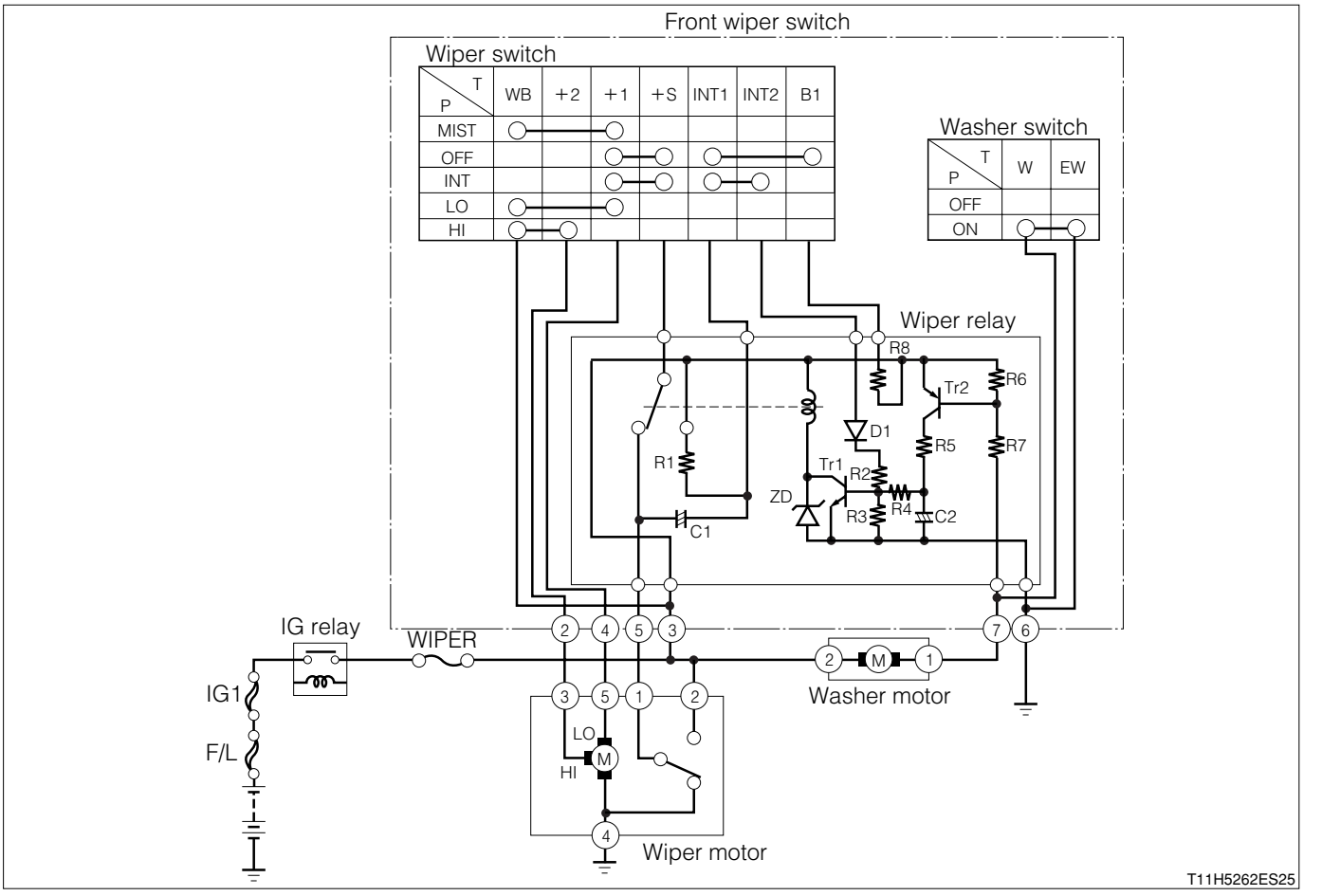
1-1 ARTICLES TO BE PREPARED

Instrument

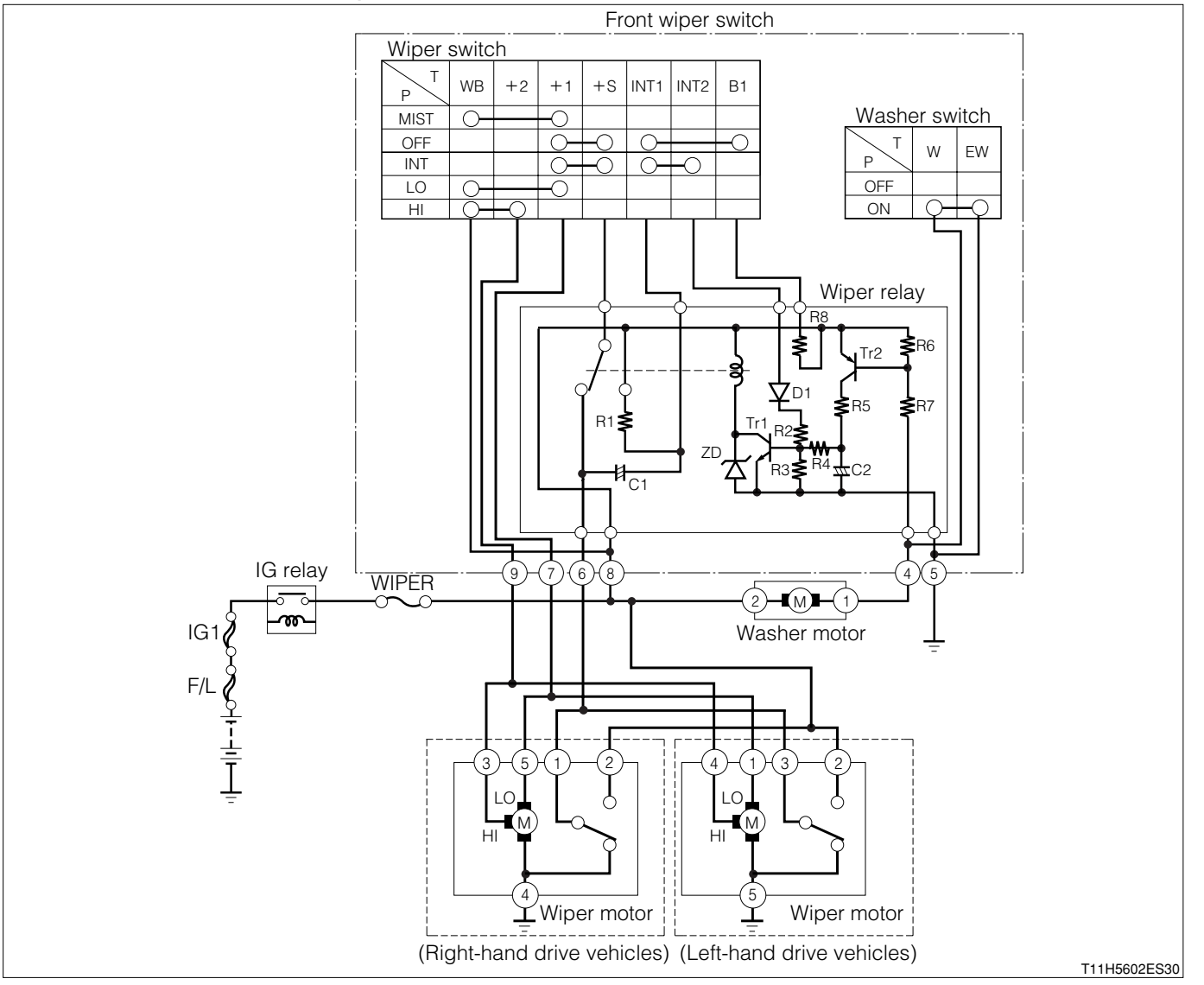
Electrical Tester

1-2 SYSTEM DRAWING

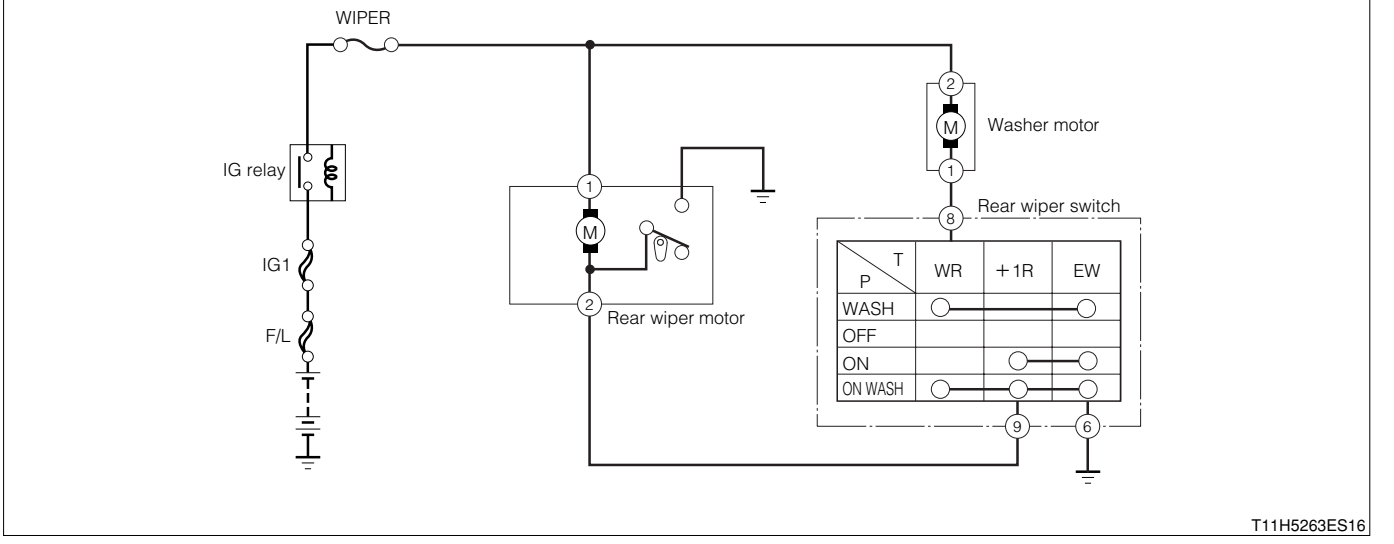
1-2-1 FRONT WIPER & WASHER (VEHICLE EQUIPPED WITH THE WIPER SWITCH ON THE LEFT SIDE OF THE COIUMN)



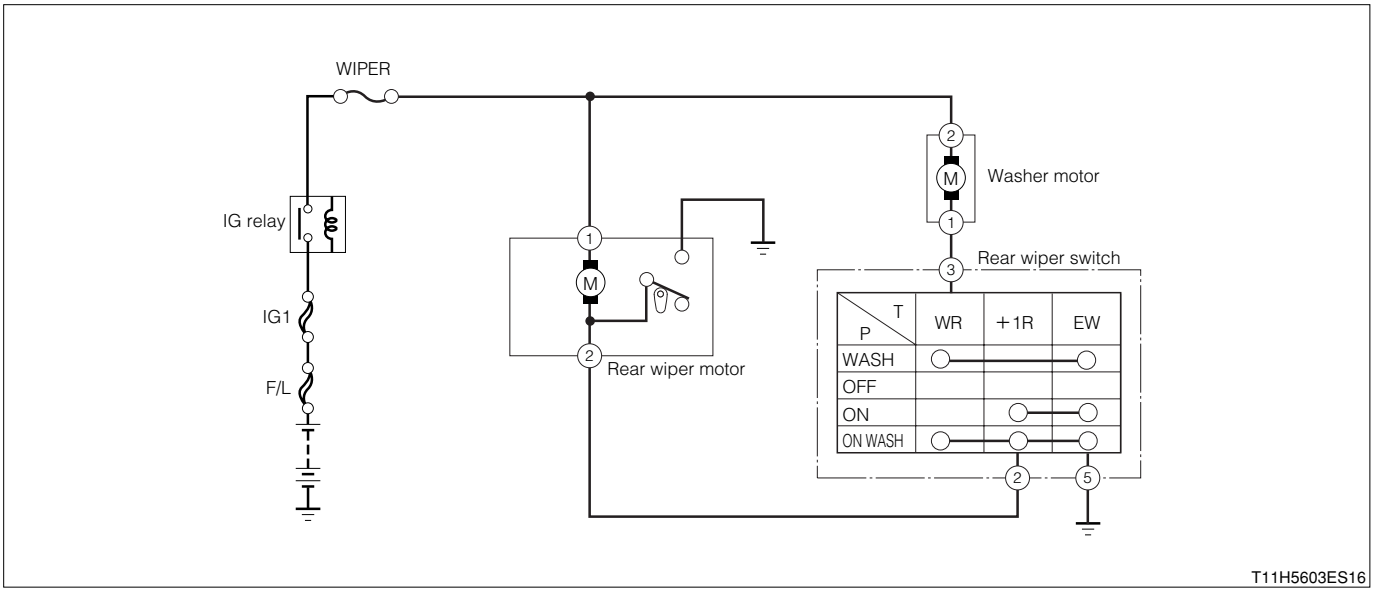
1-2-2 FRONT WIPER & WASHER (VEHICLE EQUIPPED WITH THE WIPER SWITCH ON THE RIGHT SIDE OF THE COLUMN)



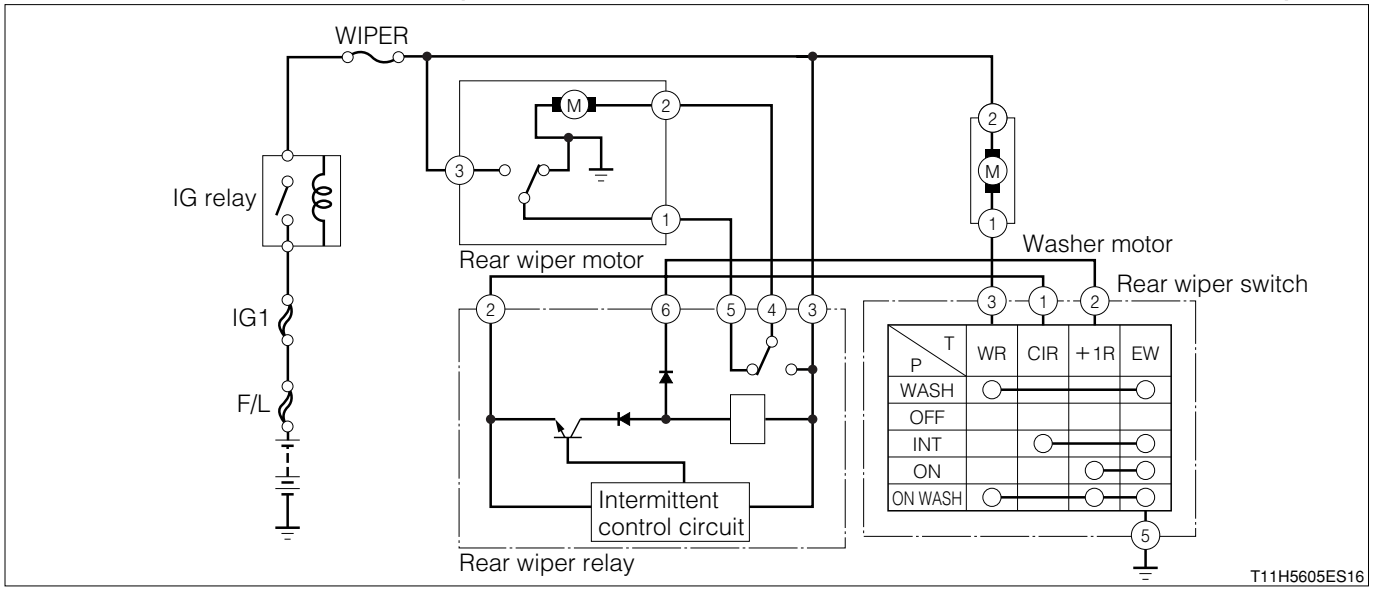
1-2-3 REAR WIPER & WASHER (VEHICLE EQUIPPED WITH THE WIPER SWITCH ON THE LEFT SIDE OF THE COLUMN)



1-2-4 REAR WIPER & WASHER (VEHICLE EQUIPPED WITH THE WIPER SWITCH ON THE RIGHT SIDE OF THE COLUMN)



1-2-5 REAR WIPER & WASHER (VEHICLES FOR EUROPE WITH INTERMITTENT FUNCTION)



1-3 BASIC CHECK AND ADJUSTMENT

1-3-1 CHECK OF WIPER,WASHER

1.Check the wiper for proper operation with the ignition switch turned "ON" and the wiper switch activated.

SPECIFIED VALUE: "Lo" position: Low-speed operation.
"Hi" position: High-speed operation.
"INT" position: Intermittent operation.
"MIST" position: activates wiper for a single wipe and stops.

2.Check the wiper for wiping performance.

SPECIFIED VALUE: Good.

3.Check the direction and height of the washer fluid flows when the washer fluid is squirted.

SPECIFIED VALUE: Good.

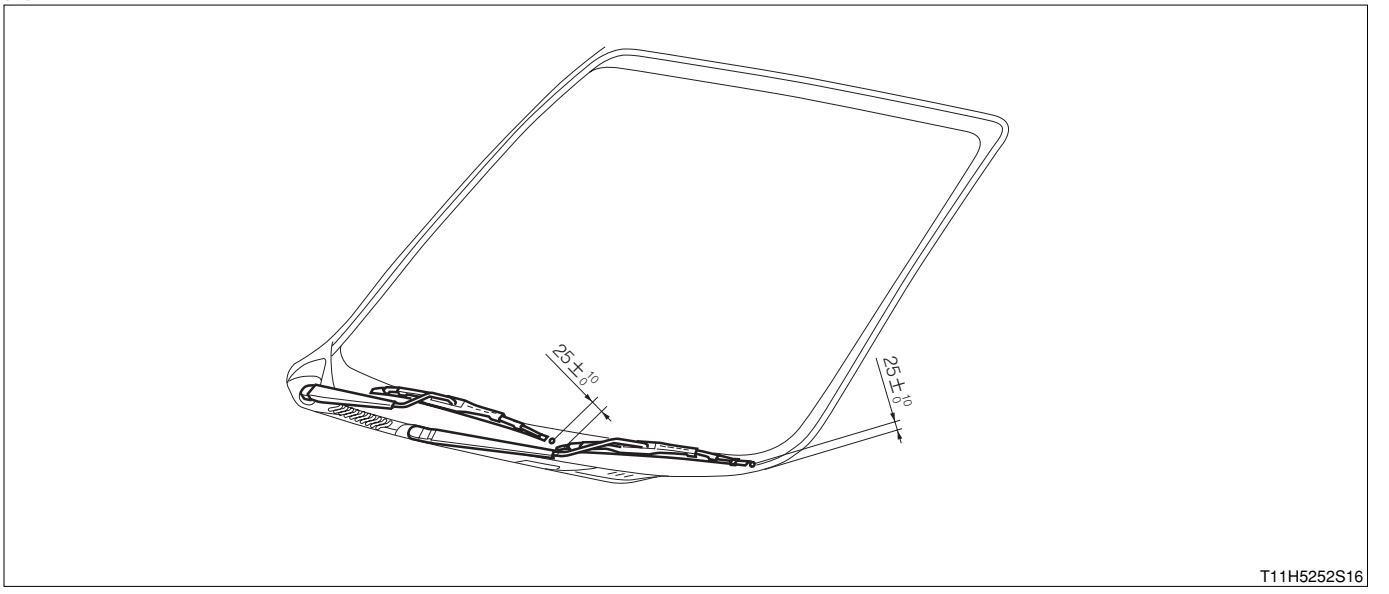
4.Visually check the washer level in the washer tank.

SPECIFIED VALUE: Good.

1-3-2 CHECK AND ADJUSTMENT OF STOP POISITION OF WIPER BLADE

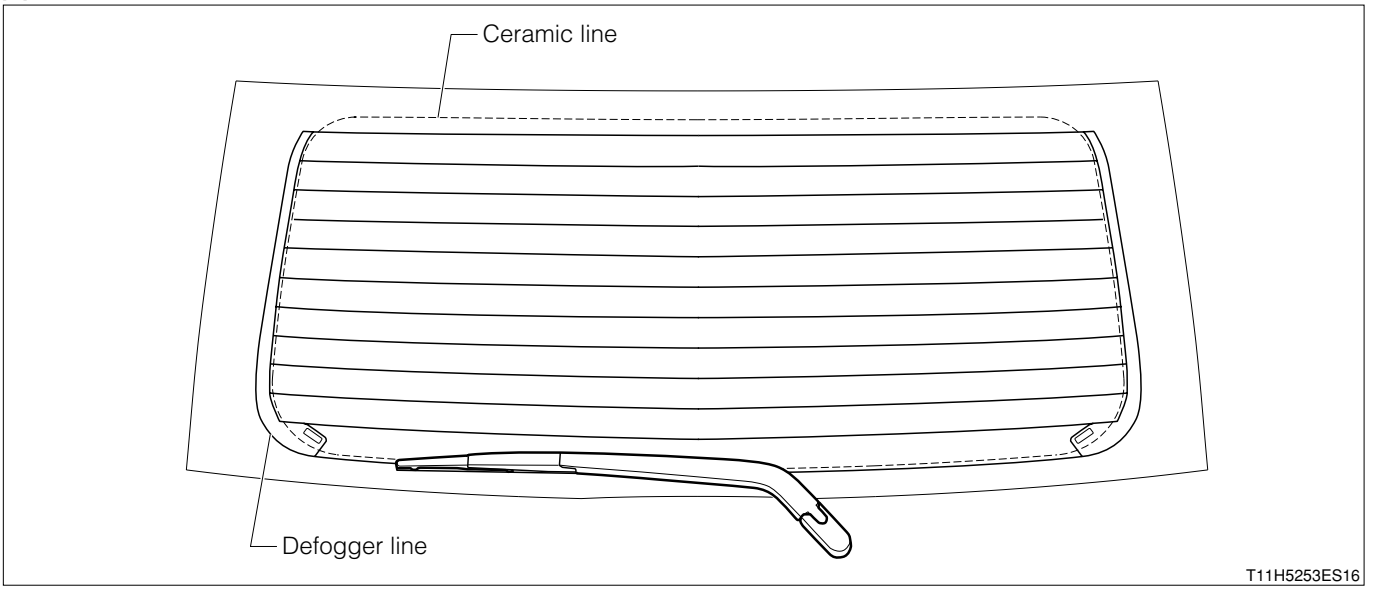
Check the wiper blade stop position and adjust as shown in the illustration.

(1) Front



Unit : mm

(2) Rear

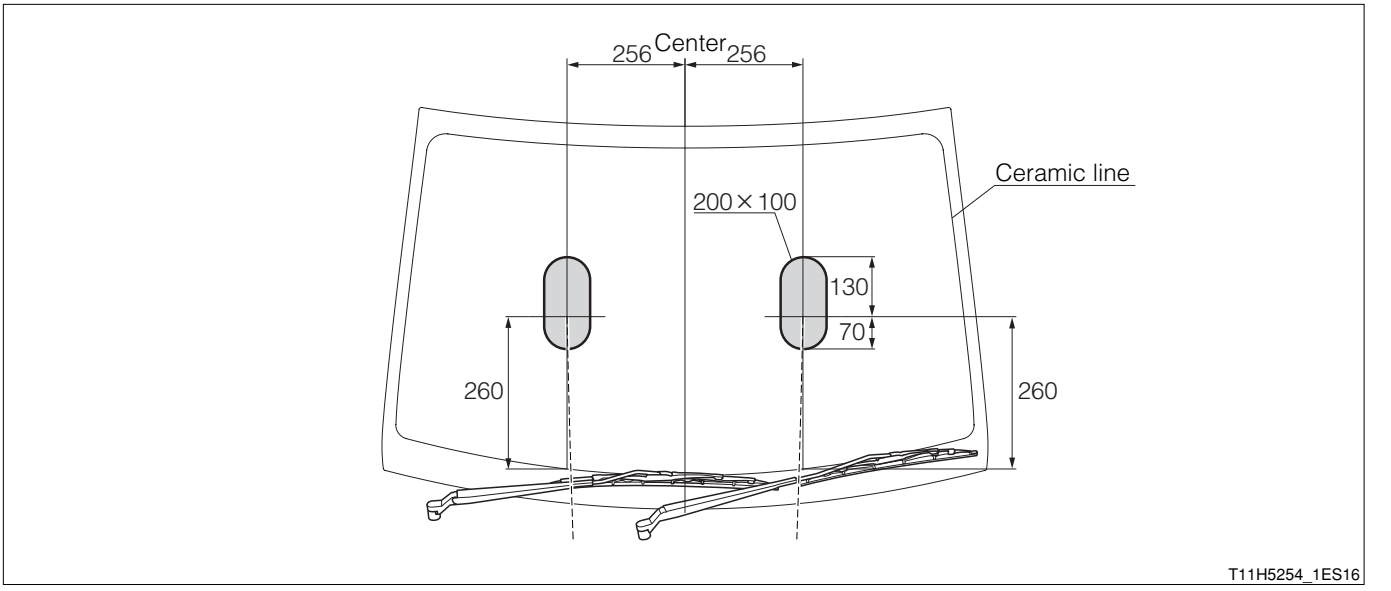


SPECIFIED VALUE: Ensure that the wiper blade is ±5mm above and below the defogger line.

1-3-3 CHECK AND ADJUSTMENT OF WASHER FLUID FLOW PATTERNS

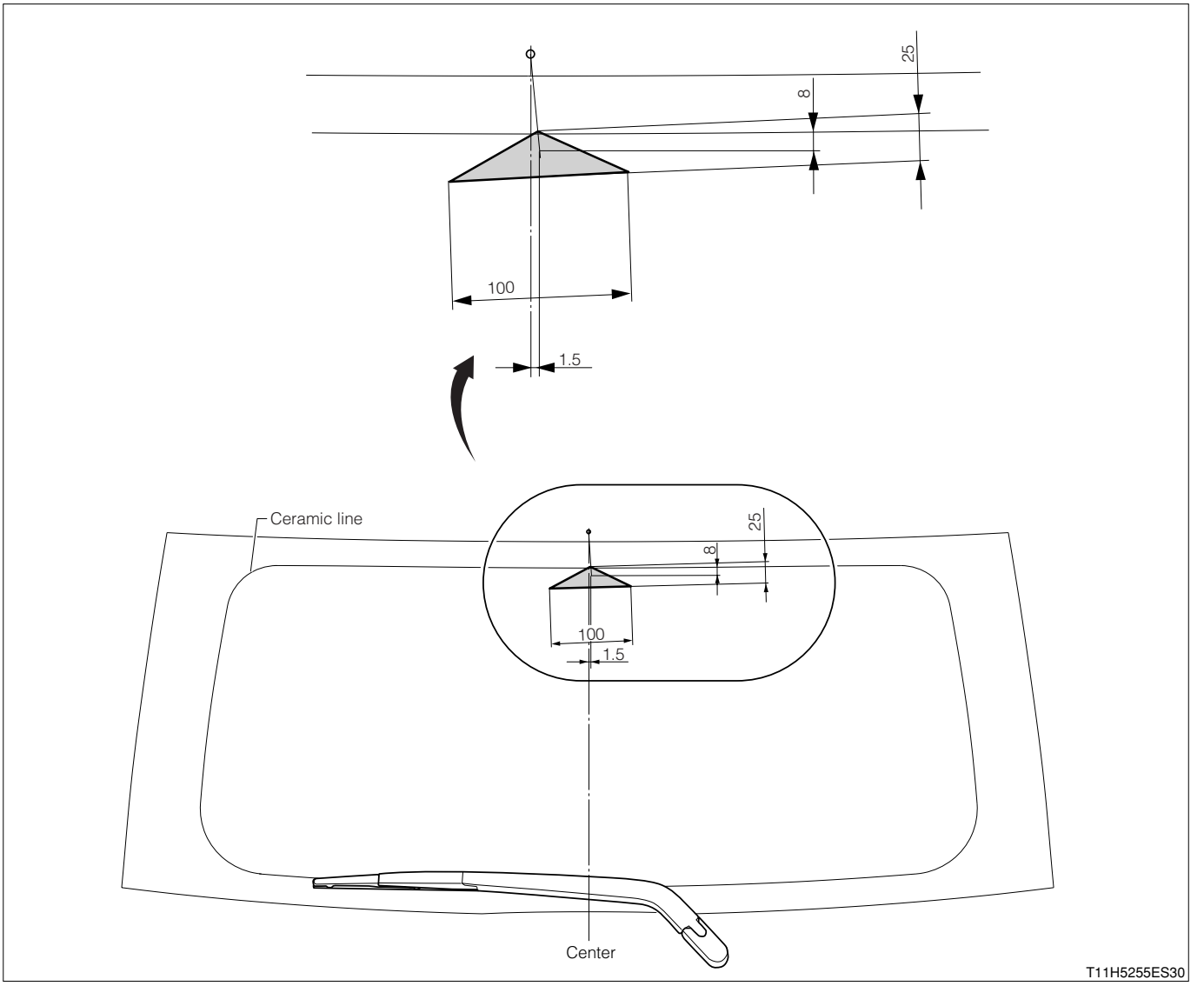
Check the washer fluid flow patterns and adjust as shown in the illustration.

(1) Front



Unit : mm

(2) Rear



Unit : mm

1-4 UNIT CHECK

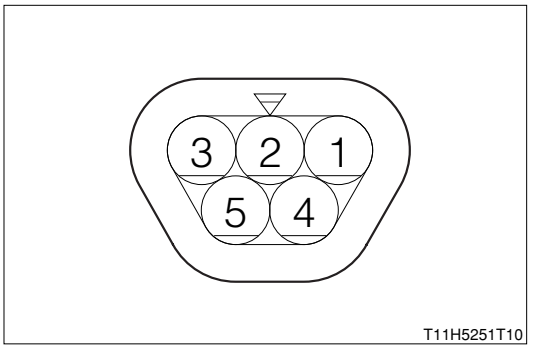
1-4-1 FRONT WIPER MOTOR (RIGHT-HAND DRIVE VEHICLE)

(1) Low operation check

1.Connect the front wiper motor terminal 4(E) to the battery negative (−) terminal.

2.Connect the terminal 5(+1) to the battery positive (+) terminal and check the motor for proper operation.

SPECIFIED VALUE: Operate at low-speed.



(2) High operation check

1.Connect the front wiper motor terminal 4(E) to the battery negative (−) terminal.

2.Connect the terminal 3(+2) to the battery positive (+) terminal and check the motor for proper operation.

SPECIFIED VALUE: Operate at high-speed.

(3) Operation check for automatic stop position

1.In the Lo operation check, while operating the wiper motor at a low speed, remove the terminal 5(+1) from the positive (+) terminal of the battery, thereby stopping the motor crank at a position other than the automatic stop position.

2.After short-circuiting the terminal 5(+1) to the terminal 1(S), connect the terminal 2(WB) to the battery positive (+) terminal. Then check the motor's operation and the crank's stop position.

SPECIFIED VALUE: The motor restarts at a low speed, and the crank stops at the automatic stop position

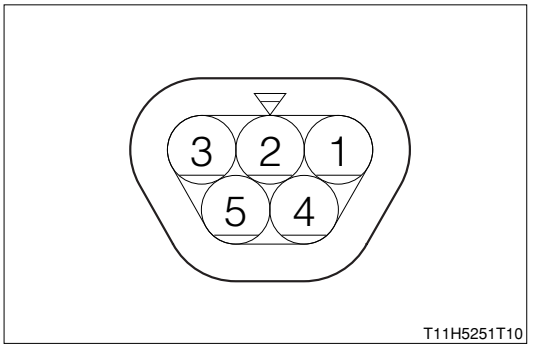
1-4-2 FRONT WIPER MOTOR (LEFT-HAND DRIVE VEHICLE)

(1) Low operation check

1.Connect the front wiper motor terminal 5(E) to the battery negative (−) terminal.

2.Connect the terminal 1(+1) to the battery positive (+) terminal and check the motor for proper operation.

SPECIFIED VALUE: Operate at low-speed.



(2) High operation check

1.Connect the front wiper motor terminal 5(E) to the battery negative (−) terminal.

2.Connect the terminal 4(+2) to the battery positive (+) terminal and check the motor for proper operation.

SPECIFIED VALUE: Operate at high-speed.

(3) Operation check for automatic stop position

1.In the Lo operation check, while operating the wiper motor at a low speed, remove the terminal 1(+1) from the positive (+) terminal of the battery, thereby stopping the motor crank at a position other than the automatic stop position.

2.After short-circuiting the terminal 1(+1) to the terminal 3(S), connect the terminal 2(WB) to the battery positive (+) terminal. Then check the motor's operation and the crank's stop position.

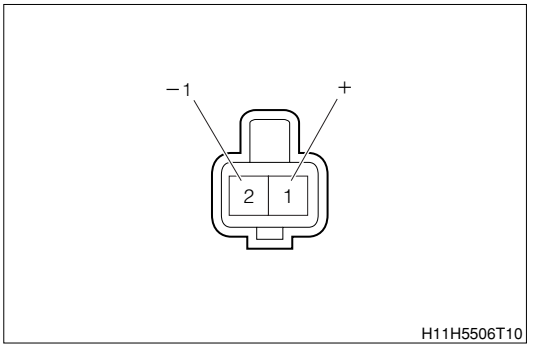
SPECIFIED VALUE: The motor restarts at a low speed, and the crank stops at the automatic stop position

1-4-3 REAR WIPER MOTOR(EXCEPT VEHICLES WITH INTERMITTENT FUNCTION)

(1) Operation check

1.Check the motor for proper operation, with the rear wiper motor terminal 1(+) connected to the battery positive (+) terminal, and the terminal 2(−1) to the battery negative (−) terminal.

SPECIFIED VALUE: The motor operates.



(2) Check of automatic stop function

1.In the state of Step 1, disconnect the terminal 2(−1) from the battery negative (−) terminal to let the motor shaft stop off from the automatic stop position.

2.In the state of 1, connect the wiper motor earth bolt to the battery negative (−) terminal. Then check the motor's operation and the shaft's stop position.

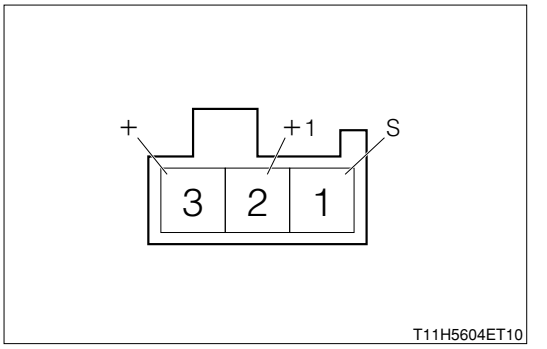
SPECIFIED VALUE: The motor shall restart and the shaft stops at the automatic stop position.

1-4-4 REAR WIPER MOTOR(VEHICLES FOR EUROPE WITH INTERMITTENT FUNCTION)

(1) Operation check

1.Check the motor for proper operation, with the rear wiper motor terminal 2(+1) connected to the battery positive (+) terminal, and the battery negative terminal to the bracket (earth).

SPECIFIED VALUE: The motor operates.



(2) Check of automatic stop function

1.Stop the motor shaft at a position other than the automatic stop position.

2.Connect the rear wiper motor terminal 3(+) to the battery positive (+) terminal, and the battery negative terminal to the bracket (earth).

3.When the rear wiper motor terminal 2(+) is connected to the terminal 1(S), check the motor operation and shaft stopping position.

SPECIFIED VALUE: The motor shall restart and the shaft stops at the automatic stop position.

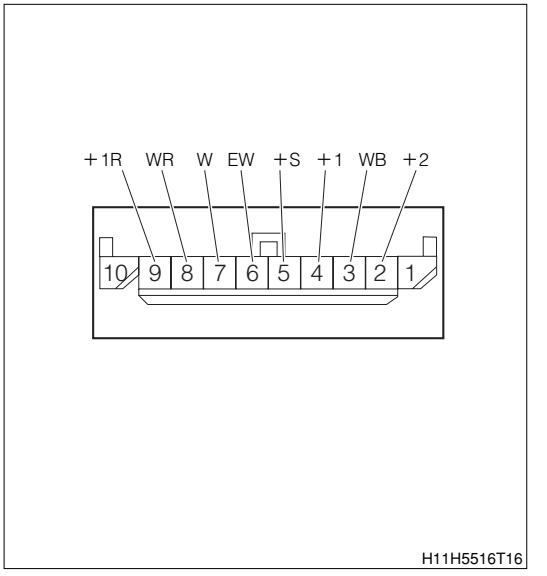
1-4-5 WINDSHIELD WIPPER SWITCH(VEHICLE WHERE IT IS INSTALLED AT THE LEFT SIDE OF THE COLUMN)

(1) Front wiper switch

① Continuity check

1.Check the continuity between each connector terminal, in each switch position.

Switch condition	Terminal No. (Terminal code)	Standard
MIST	3(WB) − 4(+1)	Continuity exists
OFF	4(+1) − 5(+S)	
INT	4(+1) − 5(+S)	
LO	3(WB) − 4(+1)	
HI	3(WB) − 2(+2)	



② Intermittent operation check (Wiper with an intermittent function)

1.Connect the battery positive (+) terminal to the terminal 3(WB) and the battery negative (−) terminal to the terminal 6(EW) and the terminal 5(+S).

2.Set the wiper switch to "INT" position.

3.Disconnect the terminal 5(+S) from the battery negative (−) terminal. Then, connect the terminal 5(+S) to the battery positive (+) terminal for five seconds.

4.After the step 3, connect the terminal 5(+S) to the battery negative (−) terminal, thus actuating the relay. At this time, measure the voltage between the terminal 4(+1) and the terminal 6(EW).

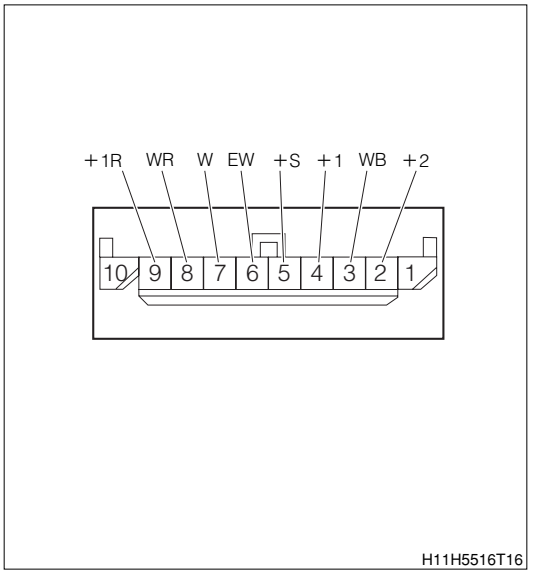
SPECIFIED VALUE: Approx. 3 seconds after connecting the battery negative (−) terminal: 1V or below

Approx. 3 seconds after connecting the negative battery (−) terminal: 10 − 14V

(2) Front washer switch

① Continuity check

1.Turn "ON" the washer switch and check the continuity between the terminal 6(EW) and the terminal 7(W).
SPECIFIED VALUE: Continuity exists.



② Operation check (Wiper with an intermittent function)

1.Set the wiper switch to "OFF" position.
2.Connect the battery positive (+) terminal to the terminal 3(WB), and the battery negative (−) terminal to the terminal 6(EW) and the terminal 5(+S).
3.Under the condition in Step 2, turn "ON" and "OFF" the wiper switch. Then measure the voltage between the terminal 4(+1) and the terminal 6(EW).
SPECIFIED VALUE: Period from approx. 0.3 second after turning "ON" to approx. 2.2 seconds after turning "OFF": 10 − 14V
Other than period above: 1V or less

(3) Rear wiper & washer switch

1.Check the continuity between each connector terminal, in each switch position.

Continuity table of rear wiper switch

Switch condition	Terminal No. (Terminal code)	Standard
WASH	6(EW) − 8(WR)	Continuity exists
ON	6(EW) − 9(+1R)	
ON WASH	6(EW)−8(WR) − 9(+1R)	

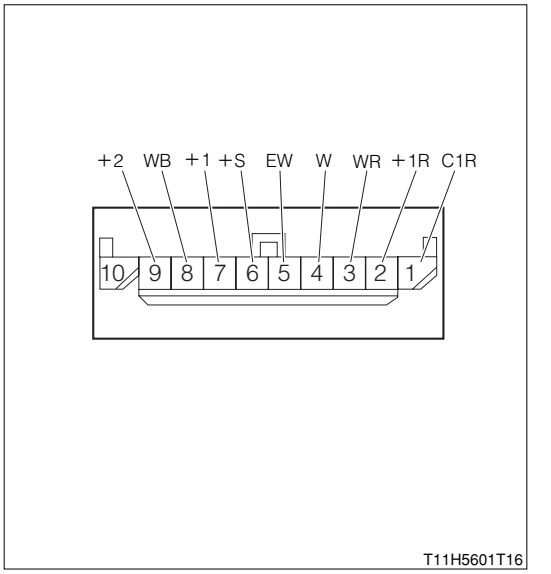
1-4-6 WINDSHIELD WIPER AWITCH(VEHICLE WHERE IT IS INSTALLED AT THE RIGHT SIDE OF THE COIUMN)

(1) Front wiper switch

① Continuity check

1.Check the continuity between each connector terminal, in each switch position.

Switch condition	Terminal No. (Terminal code)	Standard
MIST	7(+1) − 8(WB)	Continuity exists
OFF	6(+S) − 7(+1)	
INT	6(+S) − 7(+1)	
LO	7(+1) − 8(WB)	
HI	8(WB) − 9(+2)	



② **Intermittent operation check (Wiper with an intermittent function)**

1.Connect the battery positive (+) terminal to the terminal 8(WB) and the battery negative (−) terminal to the terminal 5(EW) and the terminal 6(+S).
2.Set the wiper switch to "INT" position.
3.Disconnect the terminal 6(+S) from the battery negative (−) terminal. Then, connect the terminal 6(+S) to the battery positive (+) terminal for five seconds.
4.After the step 3, connect the terminal 6(+S) to the battery negative (−) terminal, thus actuating the relay. At this time, measure the voltage between the terminal 7(+1) and the terminal 5(EW).

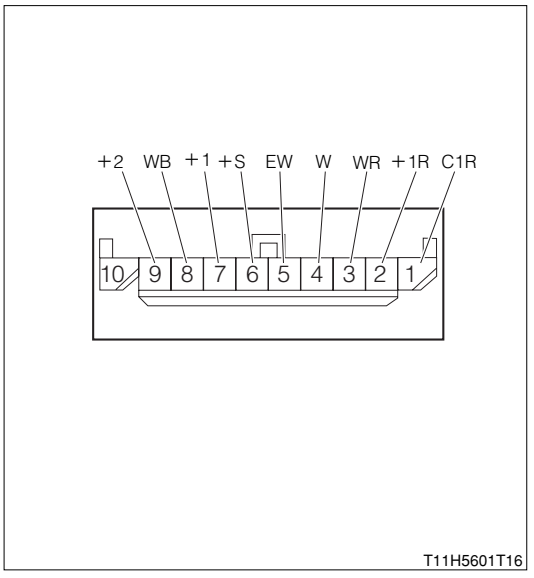
SPECIFIED VALUE: Approx. 3 seconds after connecting the battery negative (−) terminal: 1V or below
Approx. 3 seconds after connecting the negative battery (−) terminal: 10 − 14V

(2) Front washer switch

① **Continuity check**

1.Turn "ON" the washer switch and check the continuity between the terminal 5(EW) and the terminal 4(W).

SPECIFIED VALUE: Continuity exists.



② **Operation check (Wiper with an intermittent function)**

1.Set the wiper switch to "OFF" position.
2.Connect the battery positive (+) terminal to the terminal 8(WB), and the battery negative (−) terminal to the terminal 5(EW) and the terminal 6(+S).
3.Under the condition in Step 2, turn "ON" and "OFF" the wiper switch. Then measure the voltage between the terminal 7(+1) and the terminal 5(EW).

SPECIFIED VALUE: Period from approx. 0.3 second after turning "ON" to approx. 2.2 seconds after turning "OFF": 10 − 14V
Other than period above: 1V or less

(3) Rear wiper & washer switch

1.Check the continuity between each connector terminal, in each switch position.

Continuity table of rear wiper switch(Except vehicles with intermittent function)

Switch condition	Terminal No. (Terminal code)	Standard
WASH	5(EW) − 3(WR)	Continuity exists
ON	5(EW) − 2(+1R)	
ON WASH	5(EW)−3(WR) − 2(+1R)	

Continuity table of rear wiper switch(Vehicles with intermittent function)

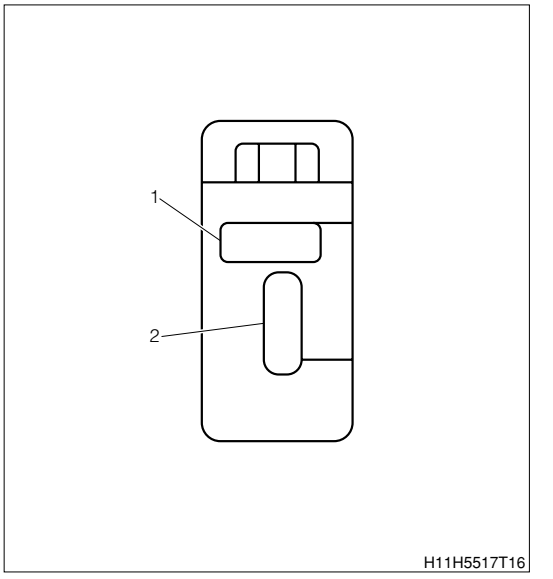
Switch condition	Terminal No. (Terminal code)	Standard
WASH	5(EW) − 3(WR)	Continuity exists
INT	5(EW) − 1(C1R)	
ON	5(EW) − 2(+1R)	
ON WASH	5(EW)−3(WR) − 2(+1R)	

1-4-7 WINDSHIELD WASHER MOTOR & PUMP

1.Put water into the washer tank.

2.Connect the motor & pump connector terminal 1 to the battery negative (−) terminal, and the terminal 2 to the battery positive (+) terminal. Then check whether water is pressure fed from the motor & pump.

SPECIFIED VALUE: Water is pressure fed.



2 FRONT WIPER

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Tool

TORX® wrench T30

Instrument

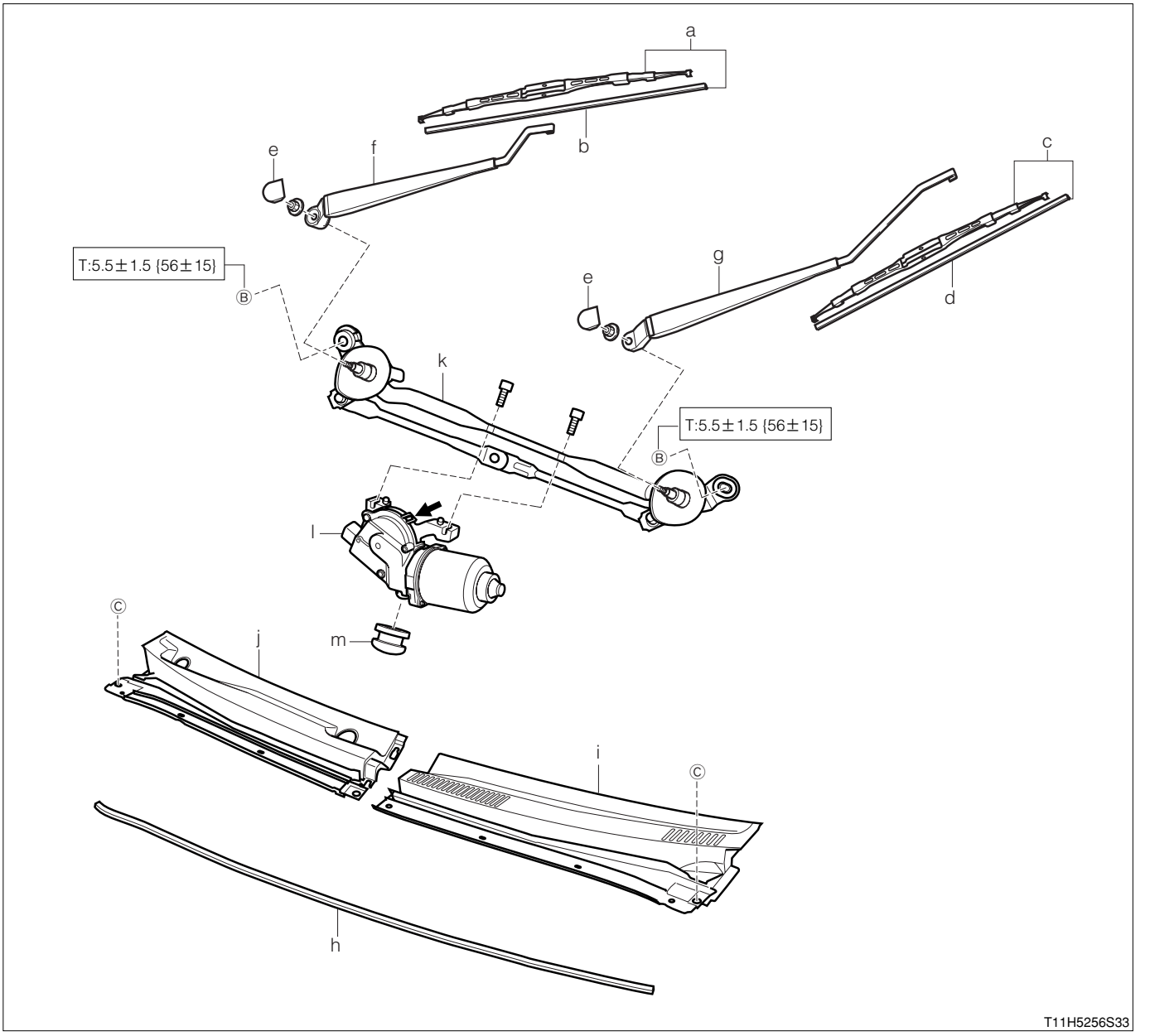
Torque wrench

Lubricant,adhesive,others

DENSO No.50 grease or equivalent

2-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

➡: DENSO No.50 grease or equivalent

(2) Removal and installation procedures

▲ 1 a Blade, front wiper, RH
2 b Rubber, wiper blade (RH)
▲ 3 c Blade, front wiper, LH
4 d Rubber, wiper blade (LH)
5 e Cap, wiper arm head
▲ 6 f Arm, front wiper, RH
▲ 7 g Arm, front wiper, LH
8 h Seal,hood to cowl top
▼ 9 i Louver, cowl top ventilator, LH
▼ 10 j Louver, cowl top ventilator, RH
11 k Link Ay, front wiper
▼ ▲ 12 l Motor Ay, front wiper
13 m Rubber, mount

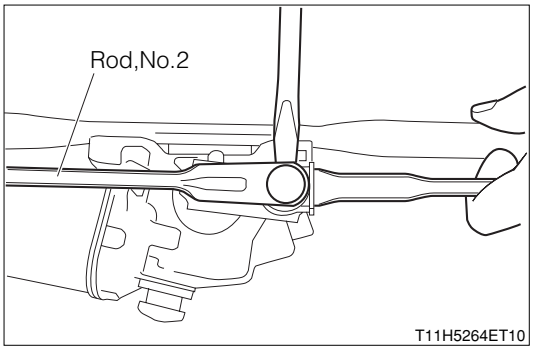
2-1-3 POINTS OF REMOVAL

(1) Louver, cowl top ventilator, RH/LH

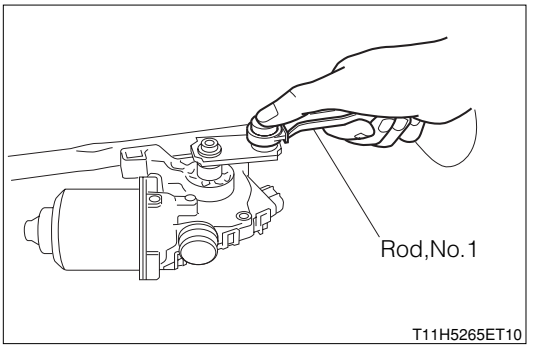
Refer to Page I2-8.

(2) Motor Ay, front wiper

1.Remove the No.2 rod of the front wiper link Ay, using a flat screwdriver.



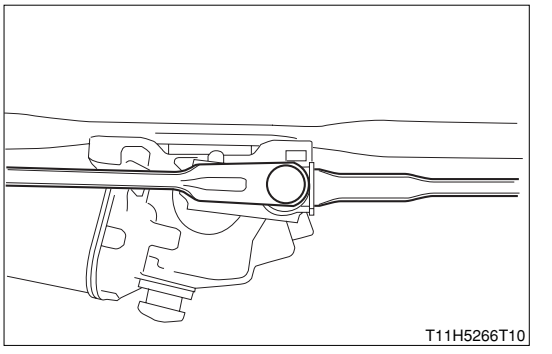
2.Remove the No.1rod of the front wiper link Ay from the crank arm of the motor Ay.
3.Remove the motor Ay by removing the TORX bolts (two pcs.).
TOOL: TORX® wrench T30



2-1-4 POINTS OF INSTALLATION

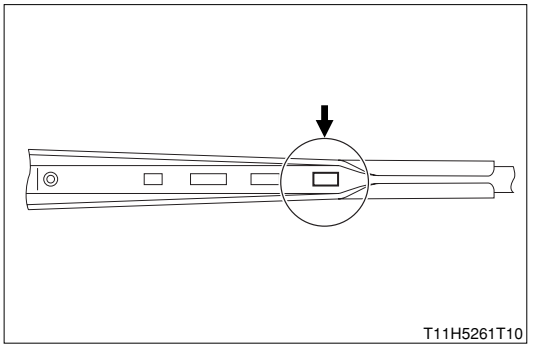
(1) Front wiper motor Ay

1.Install the motor Ay to the front wiper link Ay.
2.Apply grease to the pivot area on the crank arm motor Ay and assemble the rod.
LUBRICANT: DENSO No.50 grease or equivalent
3.After assembling the rod, connect the motor Ay to the vehicle harness. Then activate and stop the wiper at the automatic stop position.



(2) Arm, front wiper, RH/LH

1.The shapes of the arms differ between the right and left. Therefore, check the identification code stamped on the arm before installation.



Arm,identification code

	Driver's seat side	Front passenger seat side
RHD vehicles other than EU specification	RD	RP
RHD EU specifications	ED	EP
LHD	LD	LP

2.Match the blade stop position with the regular position and install the arm.

Refer to Page J2-4.

(3) Blade, front wiper, RH/LH

1.Since the length differs between the right and left, refer to the blade length below for proper installation.

Wiper blade dimensions

	Driver's seat side	Front passenger seat side
Blade length (mm)	500	400

3 REAR WIPER

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

Instrument

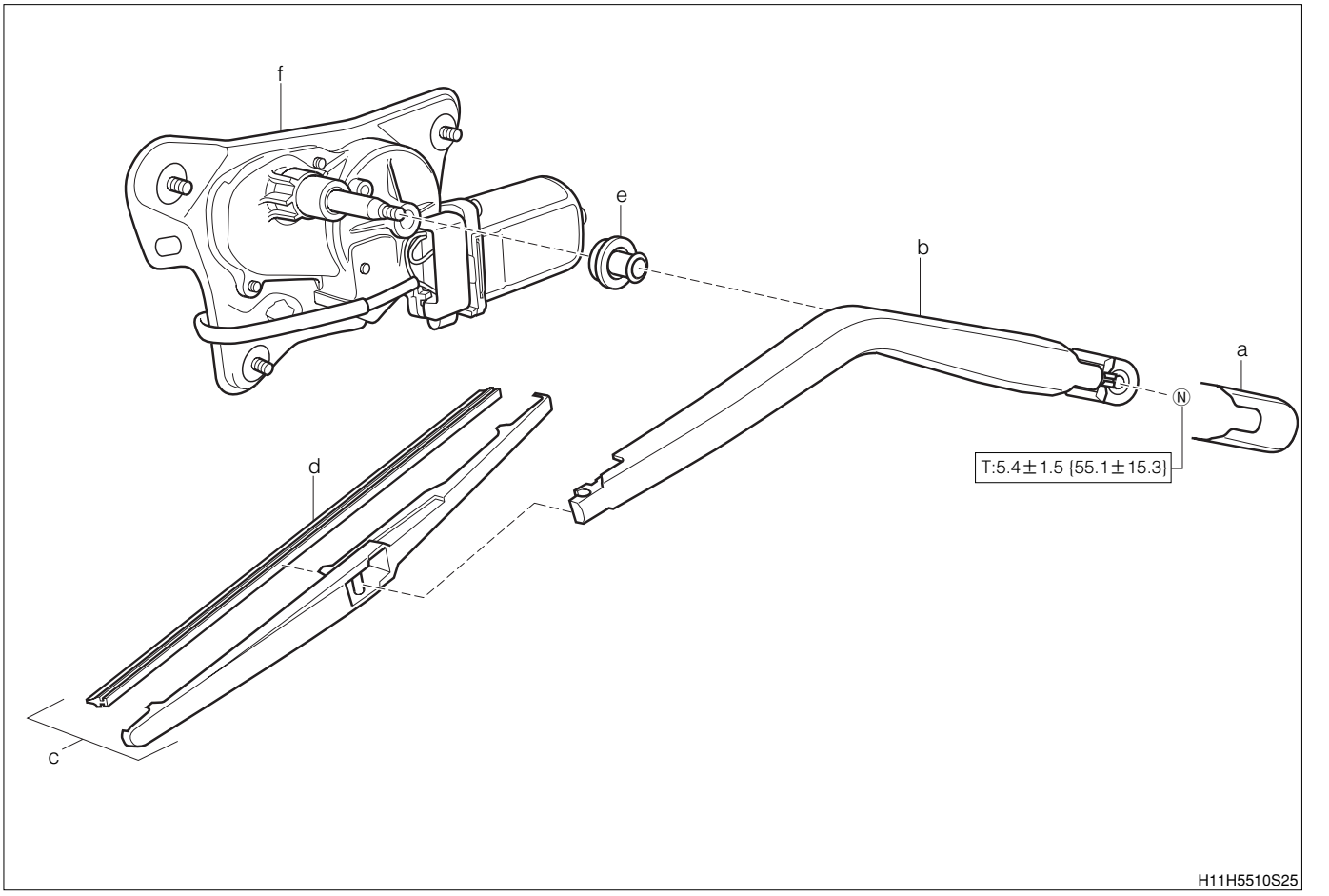
Torque wrench

3-1-2 OPERATION BEFORE REMOVAL

1.Remove the back door trim Ay.
Refer to Page I1-22.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Cap, wiper arm head
▲ 2 b Arm, rear wiper
3 c Blade, rear wiper
4 d Rubber, wiper blade
5 e Cap, rear wiper link
▲ 6 f Motor Ay, rear wiper

3-1-4 POINTS OF INSTALLATION

(1) Motor Ay, rear wiper

1.When the unit check for the motor Ay has been performed, before the installation, ensure that the motor Ay is at the automatic stop position.
Refer to Page J2-6.

(2) Arm, rear wiper

1.Match the blade stop position with the regular position and install the arm.
Refer to Page J2-4.

3-1-5 OPERATION AFTER INSTALLATION

1.Install the back door trim Ay.
Refer to Page I1-22.

4 REAR WIPER RELAY

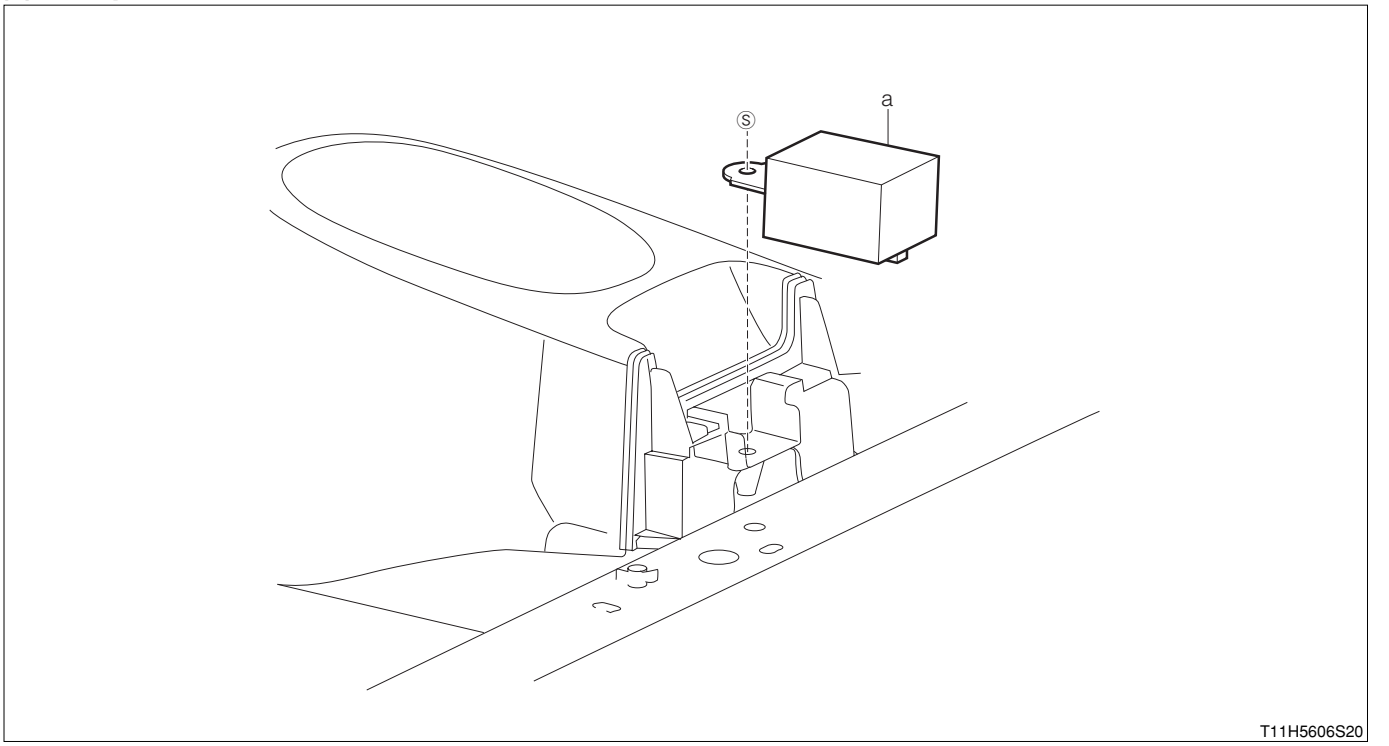
4-1 REMOVAL AND INSTALLATION

4-1-1 OPERATION BEFORE REMOVAL

1.Remove the box S/A, console, rear.
Refer to Page I2-31.

4-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Relay Ay,Windshield wiper

4-1-3 OPERATION AFTER INSTALLATION

1.Install the box S/A, console, rear.
Refer to Page I2-31.

5 WASHER TANK

5-1 REMOVAL AND INSTALLATION

5-1-1 OPERATION BEFORE REMOVAL

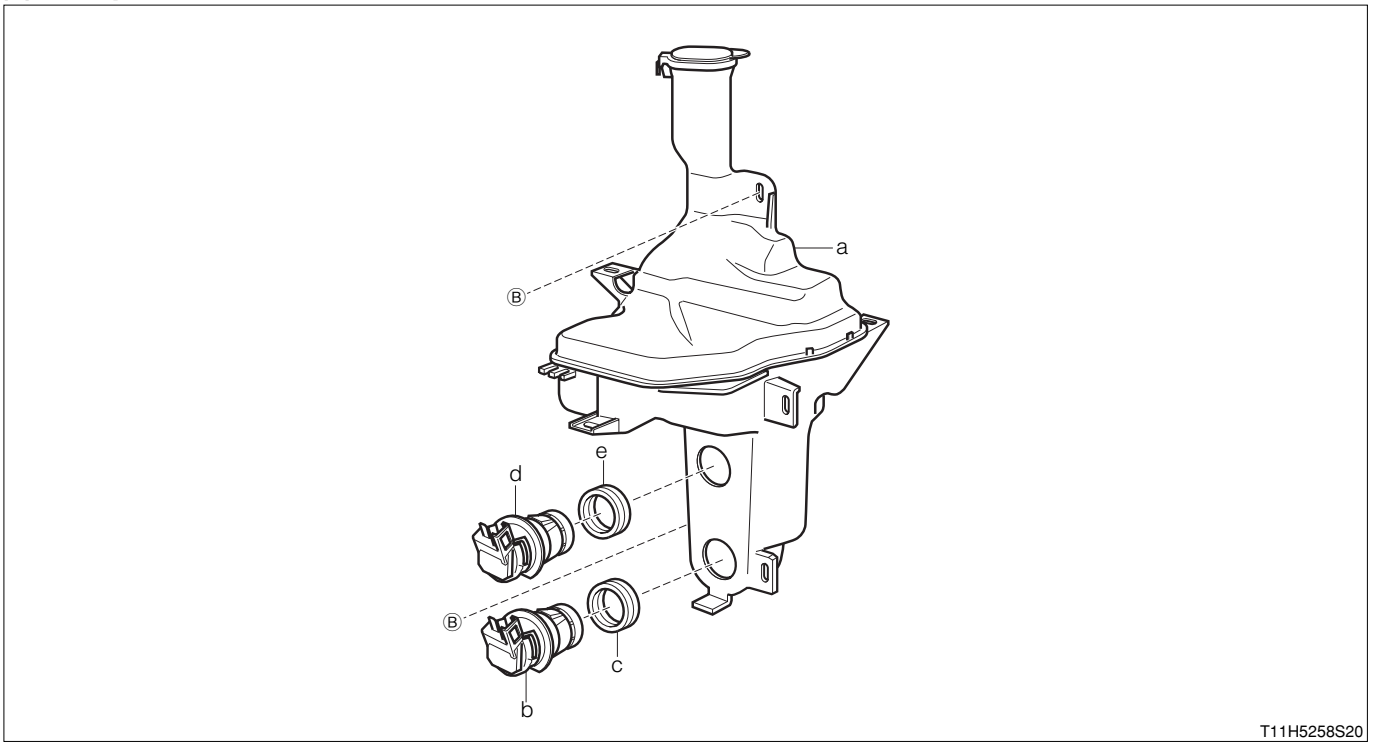
1.Remove the front bumper cover.
Refer to Page I2-2.

2.Remove the RH head lamp Ay.
Refer to Page J1-8.

3.Drain the washer fluid.

5-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Jar&pomp Ay, front washer
2 b Motor&pomp Ay, washer (Front)
3 c Grommet
4 d Motor&pomp Ay, washer (Rear)
5 e Grommet

5-1-3 OPERATION AFTER INSTALLATION

1.Refill the washer fluid.
2.Install the RH head lamp Ay.
Refer to Page J1-8.

3.Install the front bumper cover.
Refer to Page I2-2.

6 WASHER HOSE

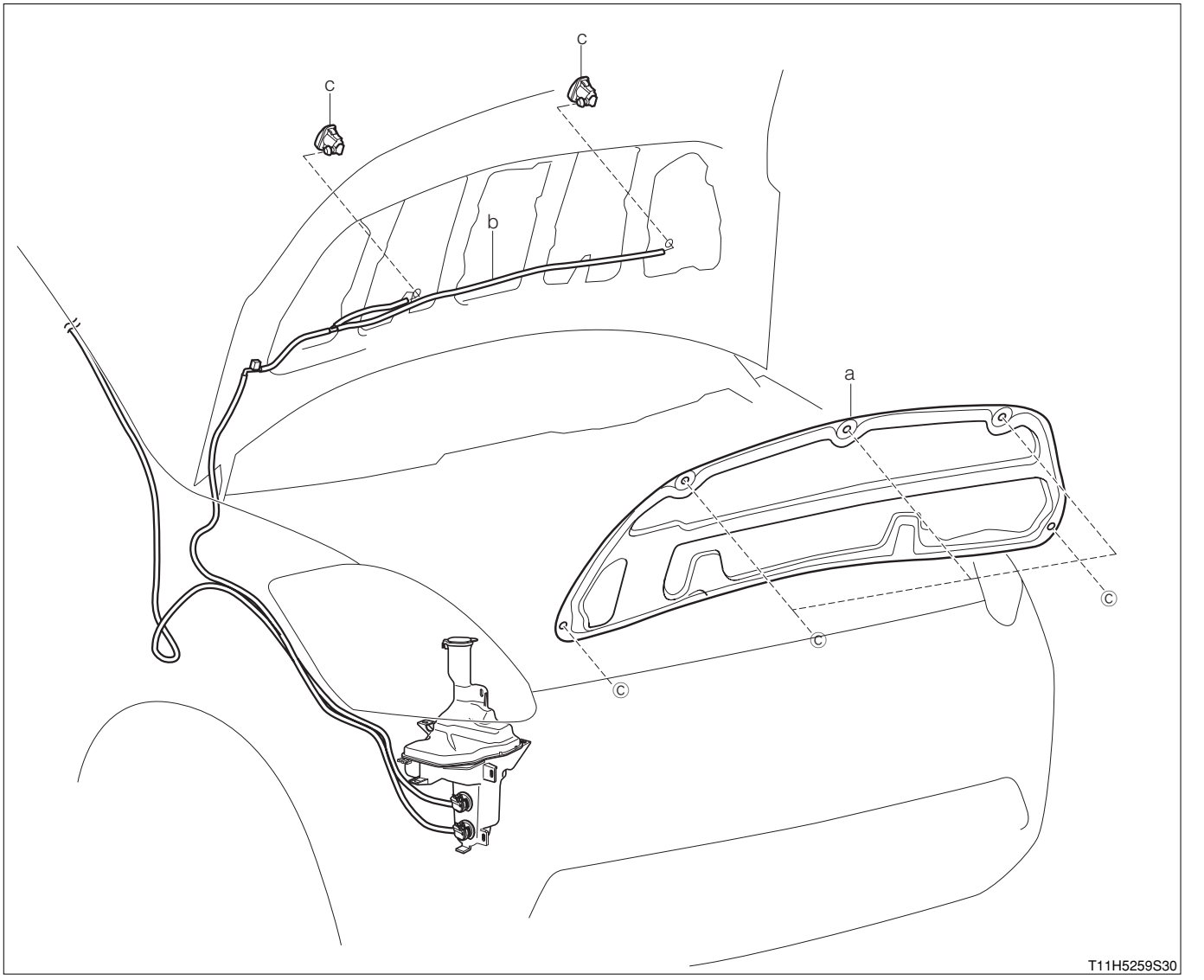
6-1 REMOVAL AND INSTALLATION

6-1-1 OPERATION BEFORE REMOVAL

1.Remove the RH front fender liner (front RH fender splash shield S/A in the case of the aero specification vehicles).
Refer to Page I1-24.

6-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Insulator, hood
2 b Hose Ay, washer
▲ 3 c Nozzle, front washer

6-1-3 POINTS OF INSTALLATION

(1) Nozzle, front washer

1.After the nozzle is installed, check the washer fluid flow patterns and adjust.
Refer to Page J2-5.

6-1-4 OPERATION AFTER INSTALLATION

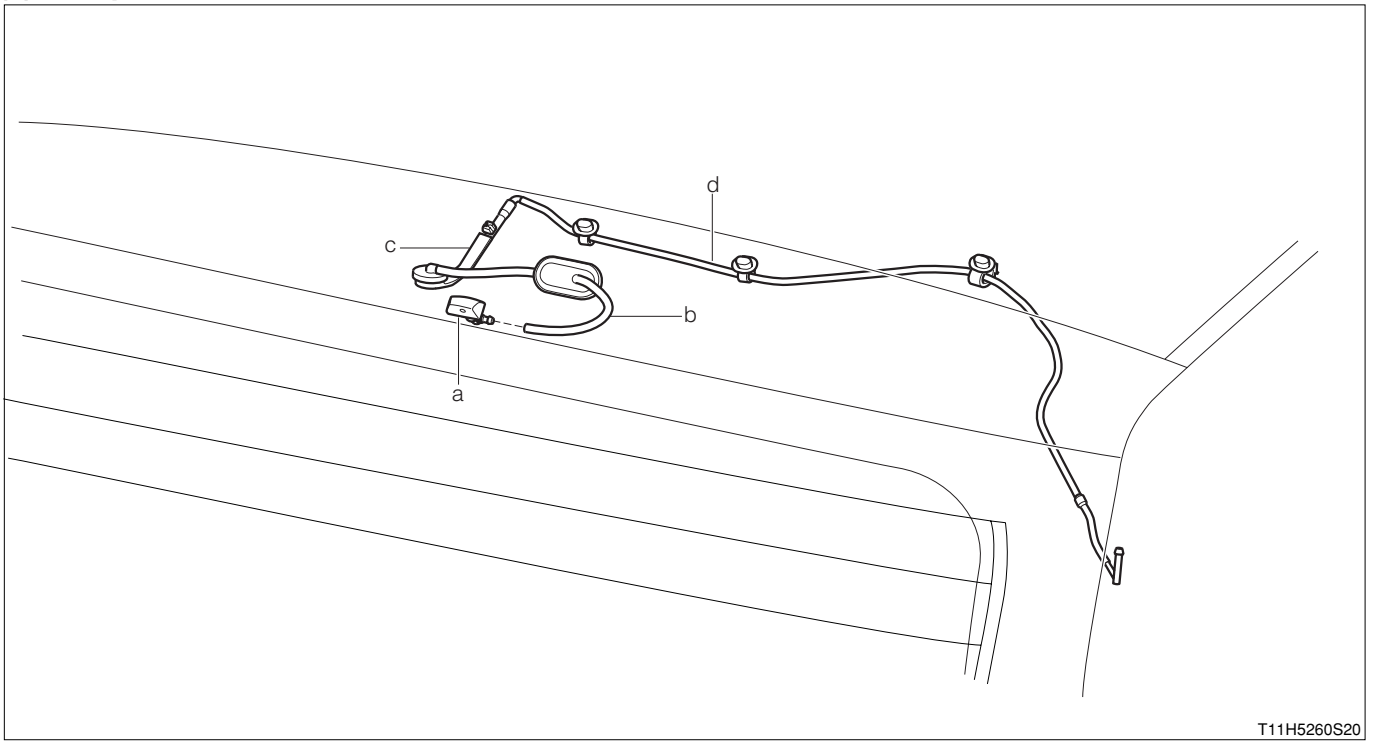
1.Install the RH front fender liner (front RH fender splash shield S/A in the case of the aero specification vehicles)

Refer to Page I1-24.

7 WASHER HOSE
7-1 REMOVAL AND INSTALLATION
Refer to Page I2-53.

8 WASHER HOSE
8-1 REMOVAL AND INSTALLATION
8-1-1 OPERATION BEFORE REMOVAL
1.Remove the stop center lamp Ay.
Refer to Page J1-13.

8-1-2 REMOVAL AND INSTALLATION PROCEDURES
(1) Components



(2) Removal and installation procedures

▲ 1 a Nozzle Ay, washer
2 b Hose Ay, washer
3 c Grommet S/A, washer
4 d Hose Ay, washer

8-1-3 POINTS OF INSTALLATION
(1) Nozzle Ay, washer
1.After the nozzle Ay is installed, check the washer fluid flow patterns and adjust.
Refer to Page J2-5.

8-1-4 OPERATION AFTER INSTALLATION
1.Install the stop center lamp Ay.
Refer to Page J1-13.

9 WIPER SWITCH AY

9-1 REMOVAL AND INSTALLATION

9-1-1 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

Protective tape

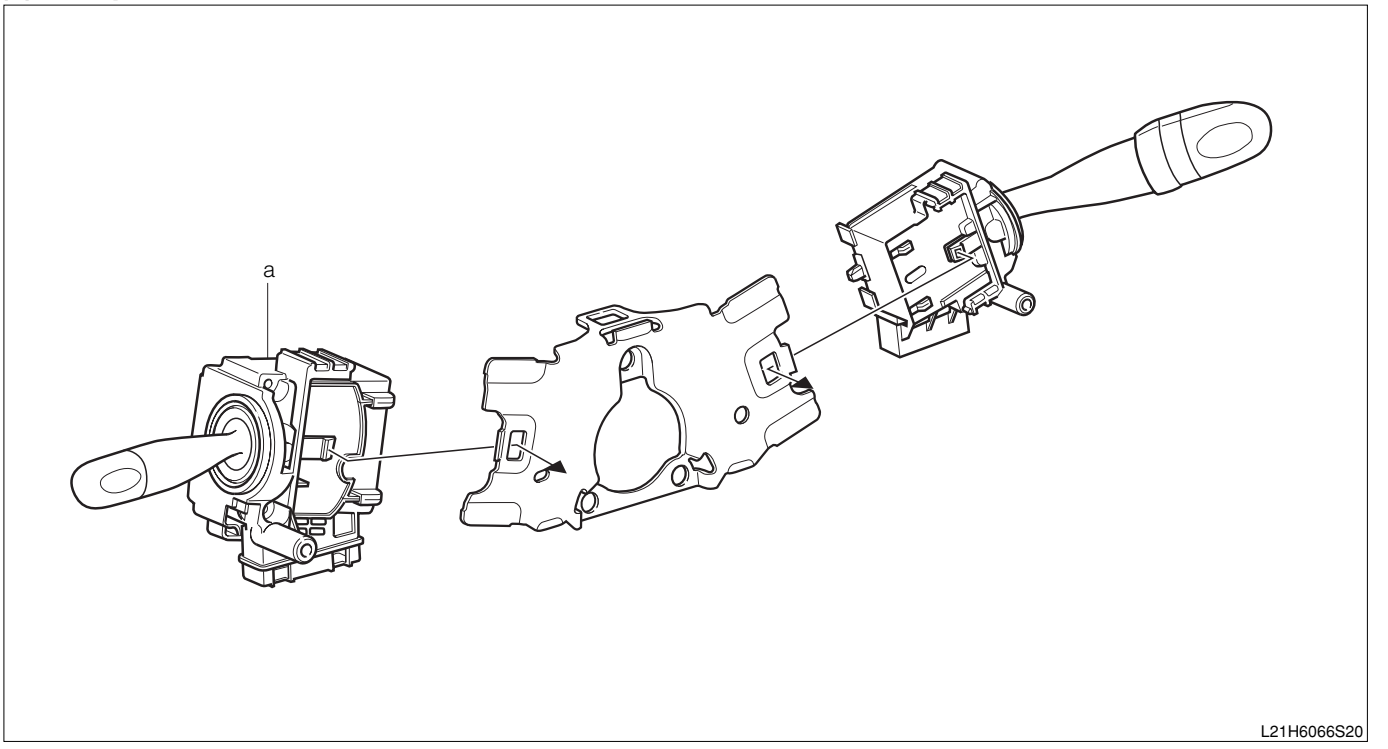
9-1-2 OPERATION BEFORE REMOVAL

1.Remove the upper steering column cover.
Refer to Page G1-5.

2.Remove the lower steering column cover.
Refer to Page G1-5.

9-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

▼ 1 a Switch, windshield wiper

9-1-4 POINTS OF REMOVAL

(1) Switch, windshield wiper

1.Disengage the pawl, using a flat screwdriver wrapped with a protective tape.

9-1-5 OPERATION AFTER INSTALLATION

1.Install the lower steering column cover.
Refer to Page G1-5.

2.Install the upper steering column cover.
Refer to Page G1-5.

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1 METER

1-1 ARTICLES TO BE PREPARED

Instrument

Oscillo scope

1-2 FUNCTION CHECK

1-2-1 VEHICLE SPEED SIGNAL

(1) Vehicle speed signal input check (Only M/T and ABS non-equipped vehicles)

1.Check the frequency of the voltage pulse between the terminal 7(SPD) - 18(GND) at the vehicle speed of 10 km/h.

Terminal No. (Nomenclature of terminal)	Frequency
7(SPD) - 18(GND)	About 7Hz

CAUTION

- With the connector connected, perform the check from behind the connector at the vehicle harness side.

NOTE

- Take the following procedures for easy checking .
  1. Insert a lead wire to the backside of the vehicle harness side connector.
  2. Secure the vehicles harness and the lead with tape.
  3. Check the signal through the lead wire.

(2) Vehicle speed signal output check

1.Check the frequency of the voltage pulse between the terminal 12(SPOUT) - 18(GND) at the vehicle speed of 10 km/h.

Terminal No. (Nomenclature of terminal)	Frequency
12(SPOUT) - 18(GND)	About 7Hz

CAUTION

- With the connector connected, perform the check from behind the connector at the vehicle harness side.

NOTE

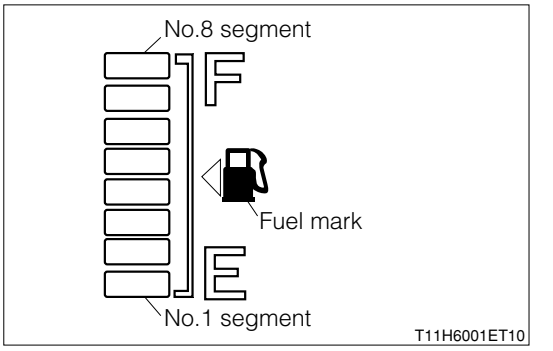
- Take the following procedures for easy checking .
  1. Insert a lead wire to the backside of the vehicle harness side connector.
  2. Secure the vehicles harness and the lead with tape.
  3. Check the signal through the lead wire.

1-2-2 FUEL GAUGE

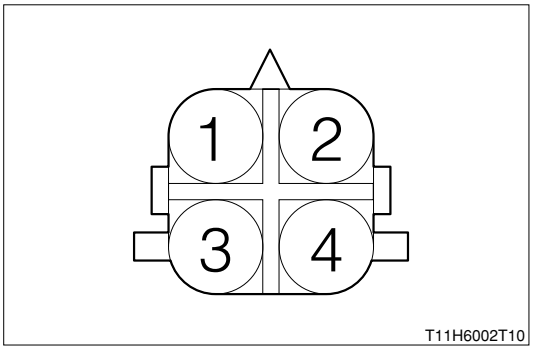
1.Disconnect the connector from the fuel sender gage.

2.Check fuel gauge state when the ignition switch is turned "ON" (without starting the engine).

SPECIFIED VALUE: No.1 segment shall blink.
Fuel mark shall blink.



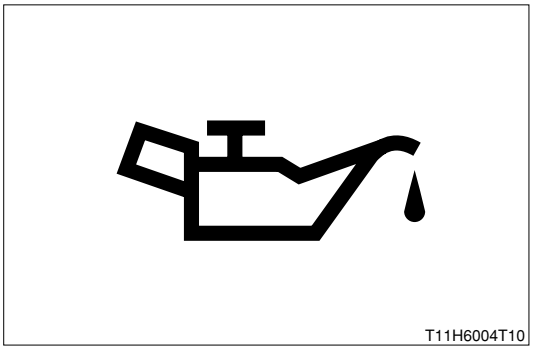
3.Short-circuit the vehicle harness side connector terminals 1and 2 of the fuel sender gauge.
4.Check the fuel gauge state when the ignition switch is turned "ON" (without starting the engine).
SPECIFIED VALUE: No.1 - No.8 segments shall illuminate.
Fuel mark shall illuminate.



T11H6002T10

1-2-3 OIL PRESSURE WARNING LAMP

1.Disconnect the connector from the engine oil pressure switch.
2.Turn ON the ignition switch.
3.Check the oil pressure warning lamp status when the vehicle wire harness connector terminal is short-circuited to the body earth.
SPECIFIED VALUE: The warning lamp shall illuminate.

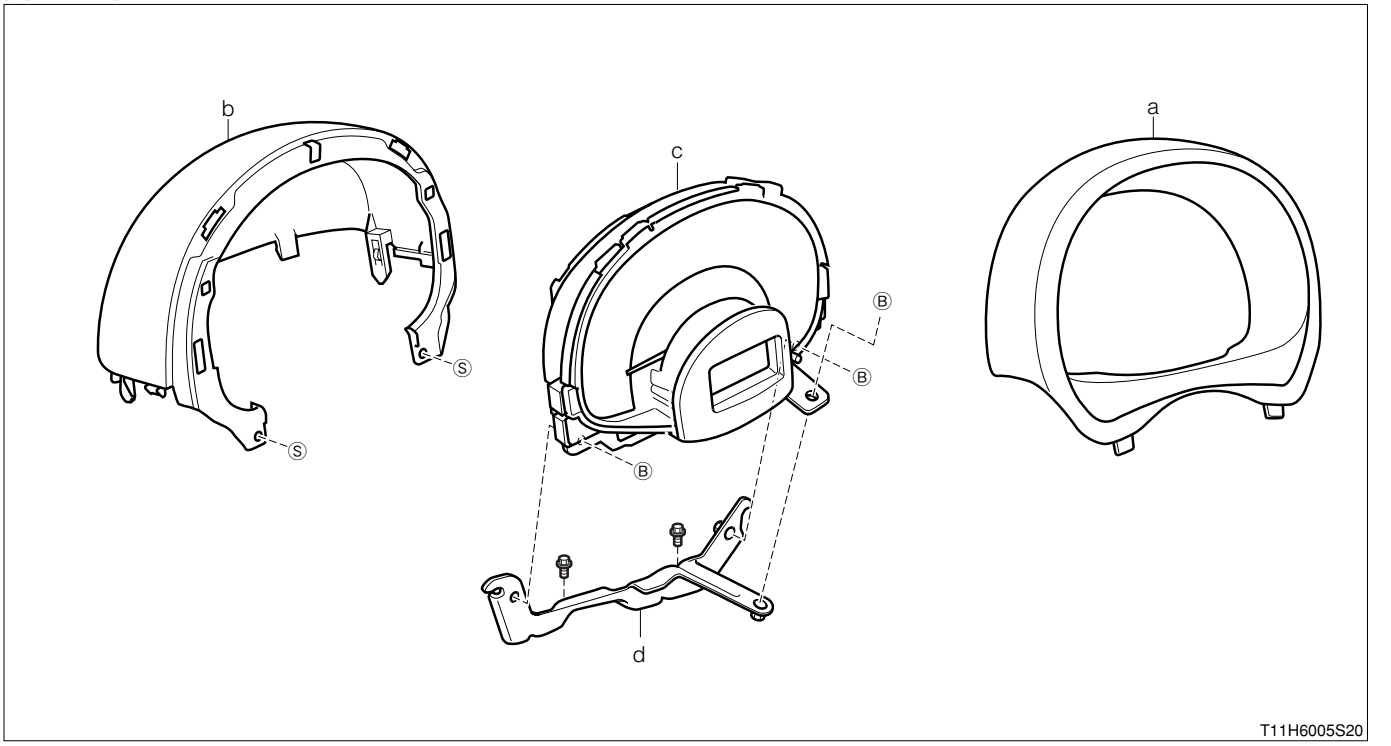

T11H6004T10

2 COMBINATION METER

2-1 REMOVAL AND INSTALLATION

2-1-1 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Panel S/A, cluster finish
2 b Cover, meter opening
3 c Meter Ay, combination
4 d Bracket, meter

3 TACHOMETER

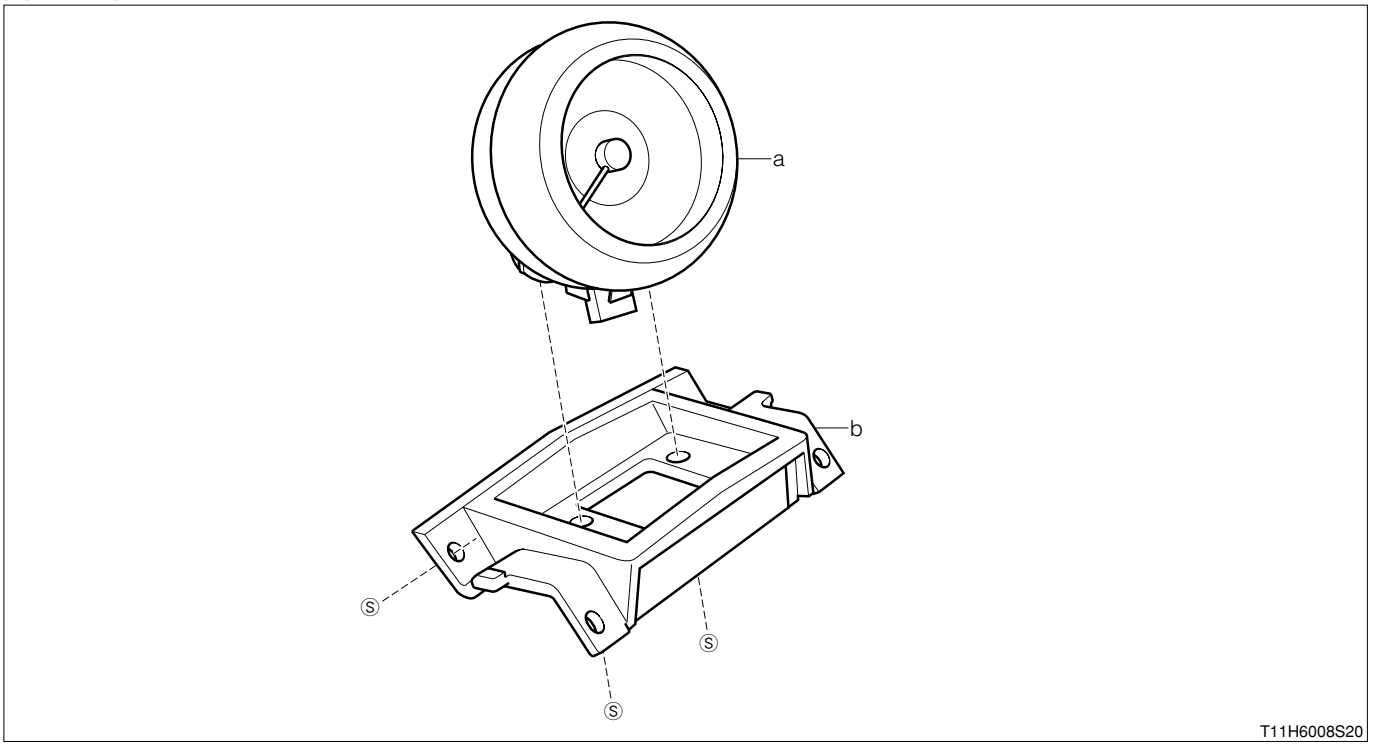
3-1 REMOVAL AND INSTALLATION

3-1-1 OPERATION BEFORE REMOVAL

1.Remove the panel S/A, instrument cluster finish, center.
Refer to Page I2-23.

3-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Tachometer Ay, engine
2 b Bracket, accessory meter

3-1-3 OPERATION AFTER INSTALLATION

1.Install the panel S/A, instrument cluster finish, center.
Refer to Page I2-23.

4 VEHICLE SPEED SENSOR

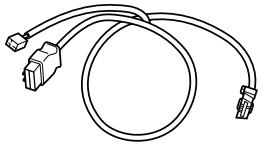
4-1 REMOVAL AND INSTALLATION

Refer to Page F2-10.

5 CONTROL SYSTEM

5-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09991-87403-000	Wire,diagnosis check
	09991-87404-000 (09991-87401-000)	Wire,engine control system inspection

Instrument

Electrical Tester,Tachometer

5-2 HANDLING INSTRUCTIONS OF CONTROL SYSTEM

5-2-1 CAN COMMUNICATION DESTINATION INFORMATION

(1) Description

1.In CAN communication, the meter itself stores information on which ECU the meter is connected with as CAN communication destination information. The meter, based on this CAN communication destination information, determines which indicator and/or warning lamp should be turned on. Therefore, it is necessary to set up CAN communication destinations when the meter is replaced.

NOTE

- The CAN communication destination information that meter stores is to recognize whether EFI ECU, A/T ECU, and ABS ECU are present.

(2) Setup procedures for CAN communication destinations

1.Check vehicle specifications.

NOTE

- Check vehicle specifications as to whether the transmission and ABS exist or not.

2.Set the IG switch to LOCK.

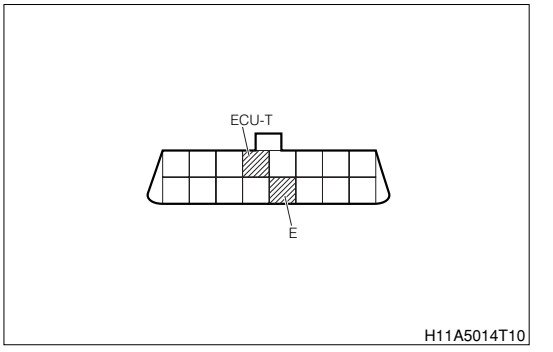
3.Use SST to short-circuit the ECU-T terminal and E terminal of DLC located beneath the instrument panel.

CAUTION

- Connecting the connector in the wrong location could cause a malfunction. Therefore, make sure the connection is correct.

SST: 09991-87403-000

SST: 09991-87404-000



4.Turn the IG switch ON, while the odometer/trip selection switch remains ON.

5.Set the odometer/trip selection switch to OFF.

6.Set the odometer/trip selection switch to ON again and hold more than 3 seconds.

NOTE

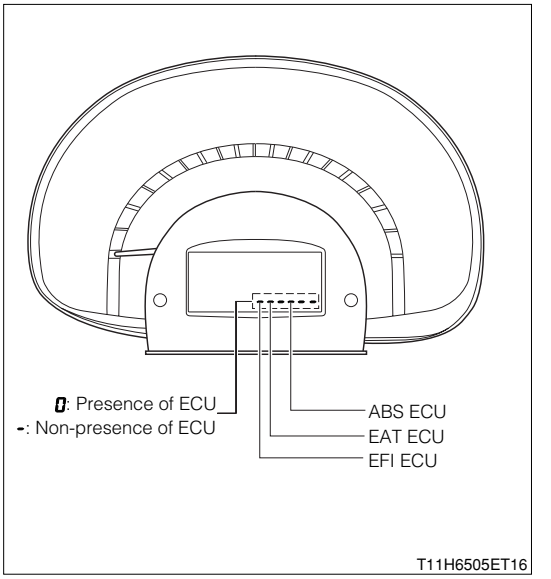
- When held for more than 3 seconds, the LCD display will indicate "b−0000" and blinks.

7.A buzzer sounds in about 6 seconds, CAN communication destination information is stored, and the setup is now complete.

8.The CAN communication destination information is displayed on the LCD display. Check whether the vehicle specification matches the information displayed.

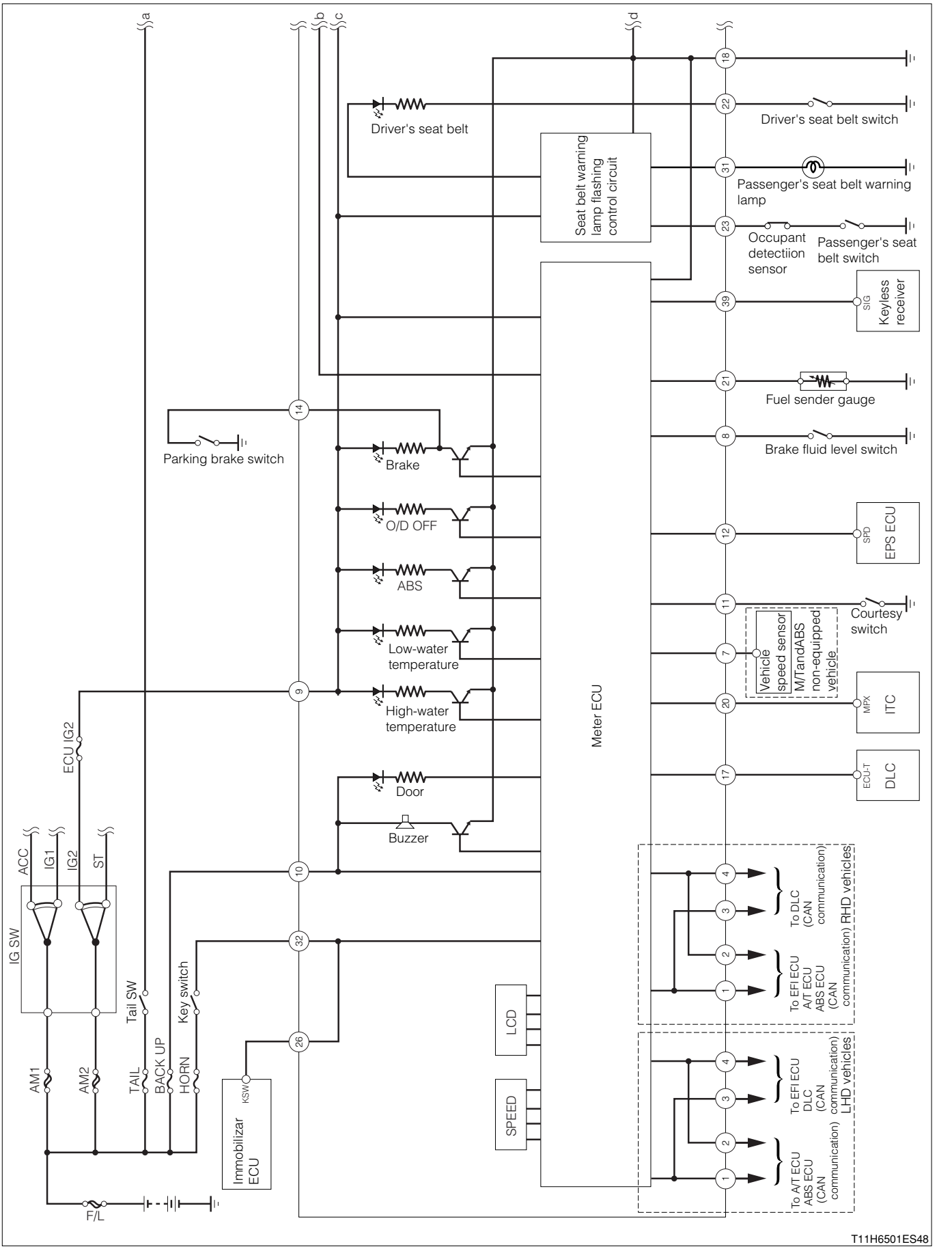
NOTE

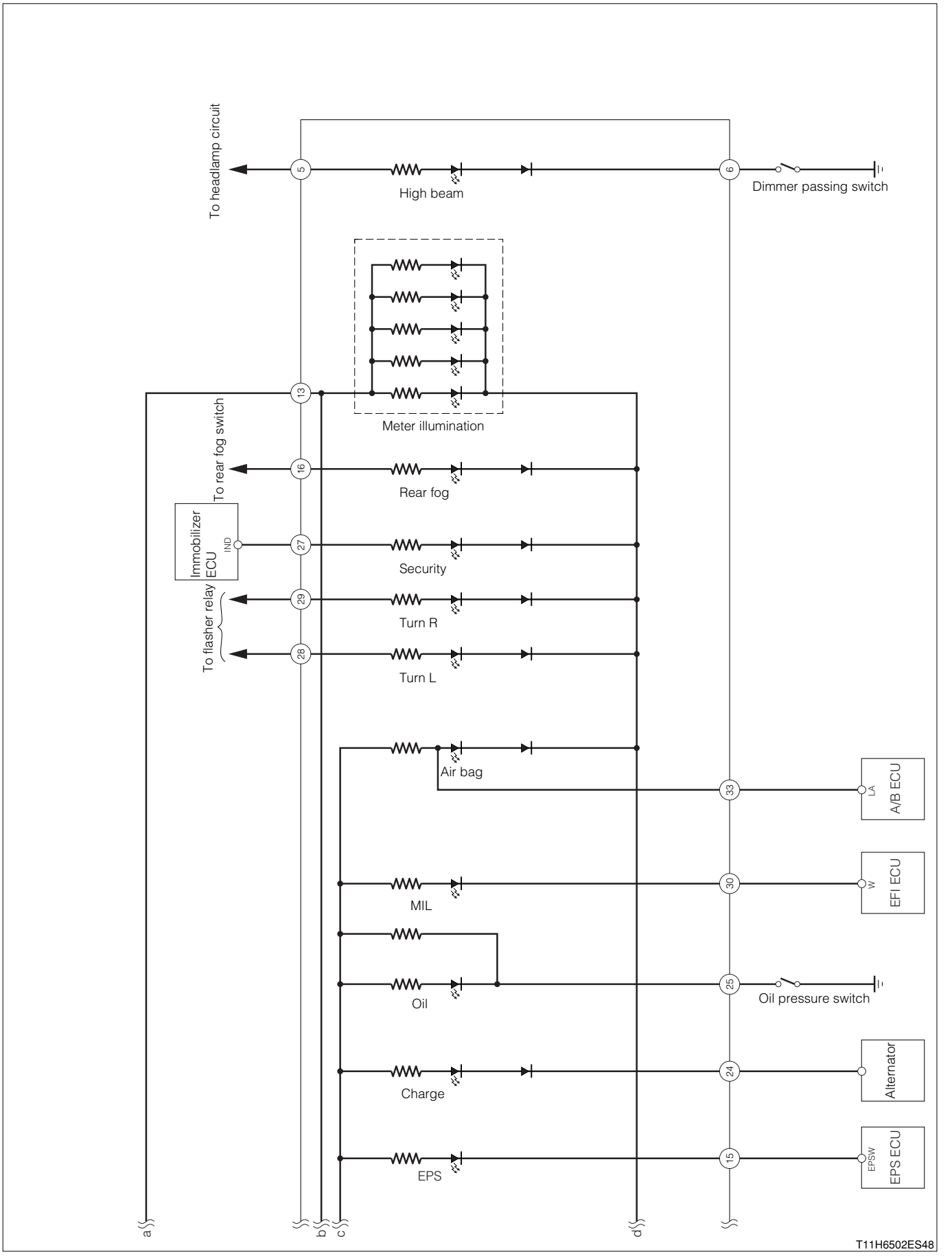
- The factory setting for CAN communication destination of the meter is that the vehicle is a M/T vehicle with no ABS equipped.
- The CAN communication destination information will not be erased even if the battery or the connector of the meter is removed.



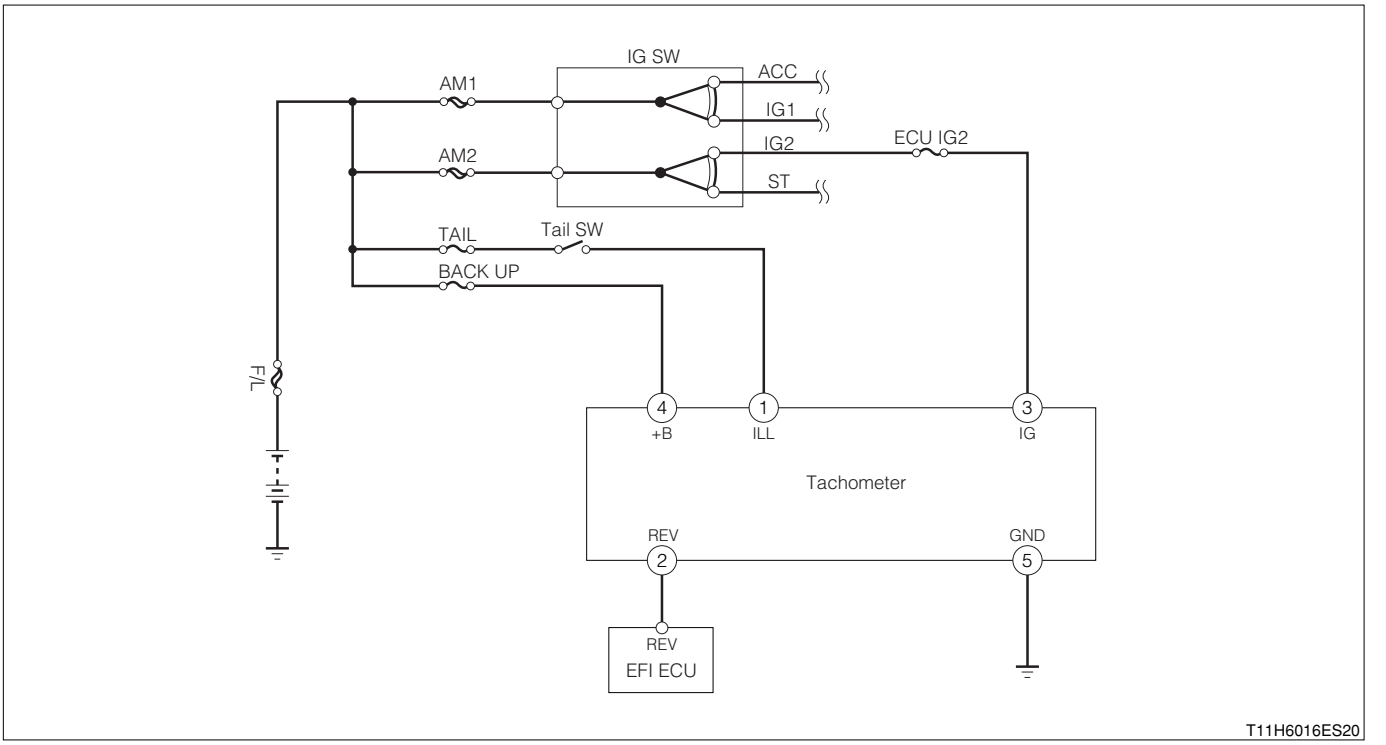
5-3 SYSTEM WIRING DIAGRAM

5-3-1 COMBINATION METER




To headlamp circuit
5
High beam
6
Dimmer passing switch
13
Meter illumination
To rear fog switch
16
Rear fog
Immobilizer ECU
IND
27
Security
To flasher relay
29
Turn R
28
Turn L
Air bag
33
A/B ECU
LA
MIL
30
EFI ECU
W
Oil
25
Oil pressure switch
Charge
24
Alternator
EPS
15
EPS ECU
EPSW
a
b
c
d
T11H6502ES48

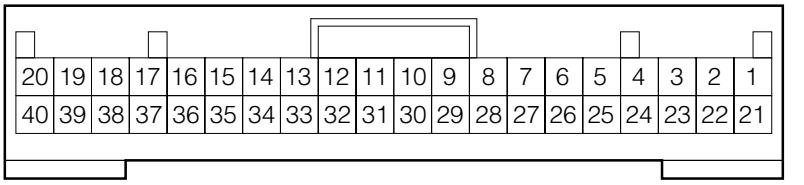
5-3-2 TACHOMETER



T11H6016ES20

5-4 ARRANGEMENT OF ECU TERMINAL

5-4-1 COMBINATION METER

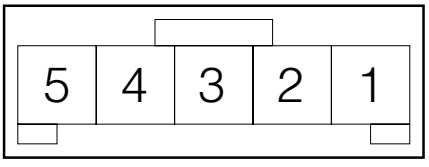


T11H6013S10

Meter terminal name

Terminal No.	Terminal code	Terminal name
1	CANH	CAN communication HI (1)
2	CANL	CAN communication LO (1)
3	HCAN	CAN communication HI (2)
4	LCAN	CAN communication LO (2)
5	BEAM+	High beam +
6	BEAM−	High beam −
7	SPD	Input of vehicle speed signal
8	BRK	Input of brake fluid signal
9	IG2	IG power supply
10	+B	+B power supply
11	DOOR	Input of courtesy switch signal
12	SPOUT	Output of vehicle speed signal
13	TAIL	Illumination +
14	PKBSW	Parking brake
15	EPS	EPS
16	RR-FOG	REAR FOG LAMP
17	ECU-T	ECU-T terminal signal input
18	GND	Earth
19	−	−
20	LIN	LIN communication input/output
21	FUEL	Input of fuel signal
22	D-BELT	Seat belt at driver's seat side
23	P-BELT	Front passenger seat side seat belt signal input
24	CHG	Charge
25	OIL	Oil
26	KEY2	Output of key switch signal
27	SEC	Security
28	TURNL	Turn LH
29	TURNR	Turn RH
30	MIL	MIL
31	P-BELOUT	Front passenger seat side seat belt signal output
32	KEY	Input of key switch signal
33	A/B	Airbag
34	−	−
35	−	−
36	−	−
37	−	−
38	−	−
39	KLS	Keyless receiver signal input
40	−	−

5-4-2 TACHOMETER

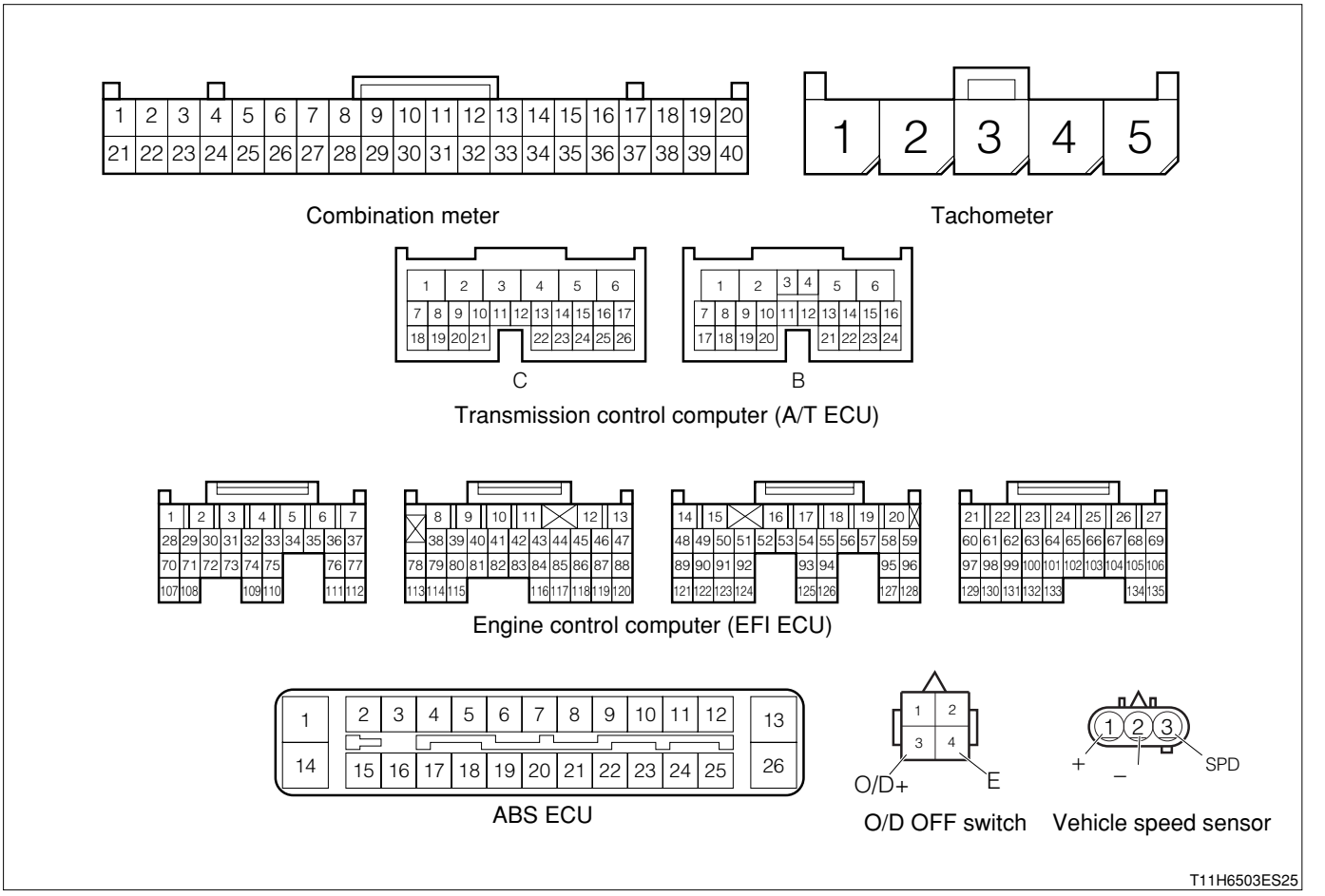


T11H6017S10

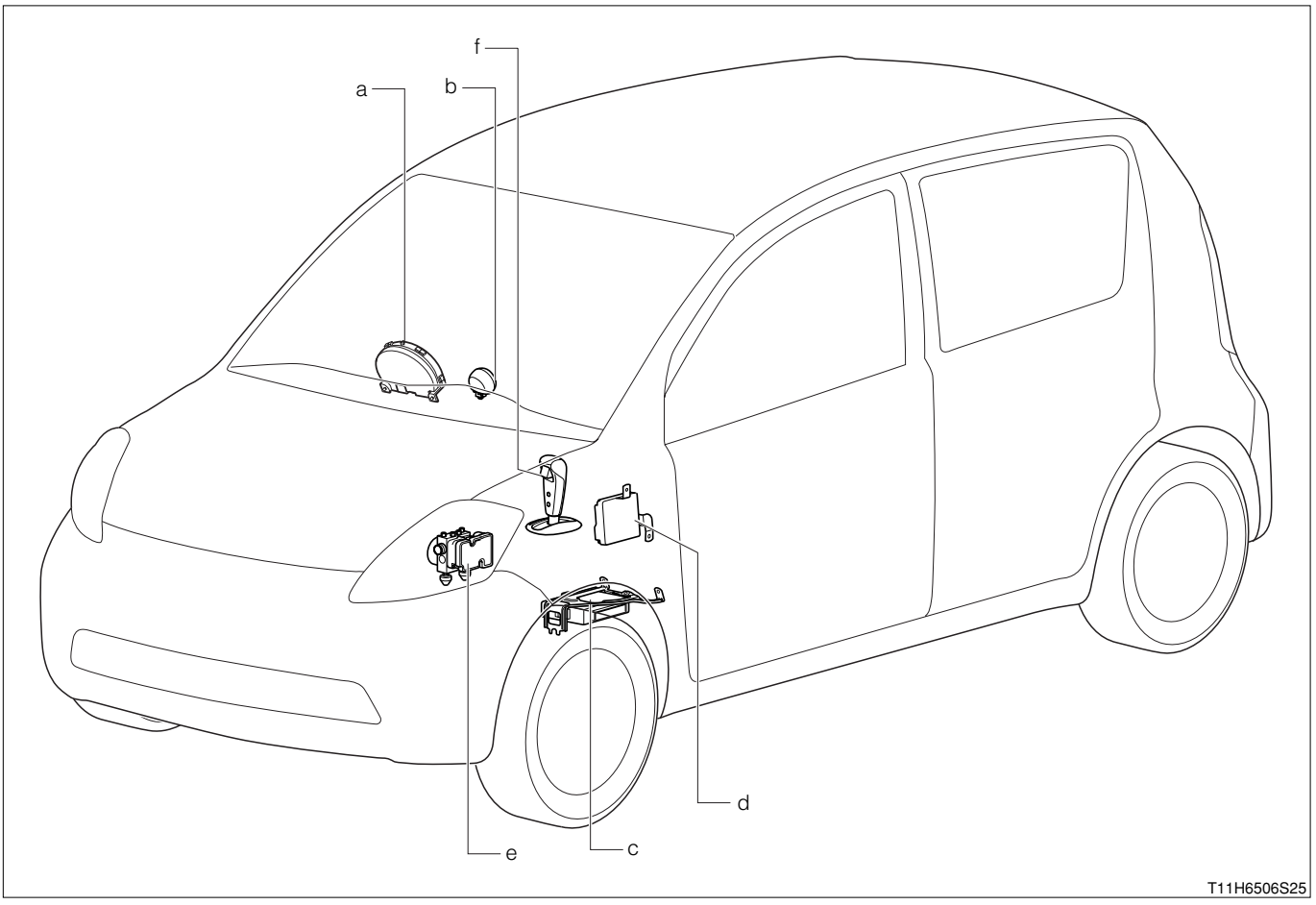
Tachometer terminal name

Terminal No.	Terminal code	Terminal name
1	ILL	Illumination
2	REV	Input of engine revolution speed signal
3	IG	IG power supply
4	+B	+B power supply
5	GND	Earth

5-5 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS



5-6 LOCATION OF COMPONENTS



The illustration represents the RHD vehicles. In the case of the LHD vehicles, the illustration is symmetrical except the A/T ECU and ABS ECU.

a	Combination meter
b	Tachometer
c	EFI ECU
d	A/T ECU
e	ABS ECU
f	O/D OFF switch

5-7 HOW TO PROCEED WITH TROUBLE SHOOTING

1.This system incorporates diagnosis functions that will locate malfunctioning parts, thus providing a vital clue in trouble shooting.

∑1. Bringing malfunctioning vehicle to workshop

▼Go to Step ∑2.

∑2. Diagnosis by interview

1.Gather enough information from the customer on conditions, environment, and phenomenon in which the malfunction took place.

▼Go to Step ∑3.

∑3. Check the meter LCD diagnostic code indication for proper operation

1.Use the SST to short-circuit the DLC terminals between 4(ECU-T) - 13(E).
SST: 09991-87403-000

2.Check whether the meter LCD displays a diagnostic code (including the normal code).
SPECIFIED VALUE: Shall display properly.

NOTE

- Codes other than the CAN-related code are acceptable.

▼If it is OK, go to Step ∑4.
▼In the case of NG, check the meter for the following conditions. Replace the meter if no problem is found.
(1) Check the harness between the meter - DLC, and the DLC - body earth.
(2) Check of meter power supply system and earth system.

∑4. Check the diagnostic code (CAN-related)

1.Check that the LCD of the meter does not display a CAN-related diagnostic code (code No.00 51-00 53).
SPECIFIED VALUE: Shall not display the code No.00 51-00 53.

▼If it is OK, go to Step ∑5.
▼In the case of NG, refer to the CAN communication system section.
Refer to Page L2-1.

∑5. Check and record the diagnostic code (meter-related)

1.Check and record the meter-related diagnostic code (code No.00 41 - 00 43, 61) displayed on the meter LCD.

NOTE

- The meter LCD displays diagnosis codes for the CAN communication system and LIN communication system, in addition to a meter-related diagnostic code.

▼Go to Step ∑6.

∑6.Basic check

1.Perform the basic checks.
Refer to Page J3-16.

▼Go to Step ∑7.

∑7. Recheck the diagnostic code (CAN-related)

1.Recheck the meter related diagnostic code (code No.00 41 - 00 43, 61) displayed on the meter LCD.
▼Go to Step ∑8, if an abnormality code is displayed.
▼Go to Step ∑9, if the normal code is displayed.

∑>8. Trouble shooting according to the diagnostic code

1.Perform troubleshooting for the outputted diagnostic code.
Refer to Page J3-19.

▼Go to Step ∑>10 when the repair is complete.

∑>9.Trouble-shooting according to malfunction phenomenon

1.Perform troubleshooting for the malfunction phenomenon which is taking place.
Refer to Page J3-21.

▼Go to Step ∑>5 when the repair is complete.

∑>10.Confirmation test

1.Ensure that the problem that the customer described has been completely corrected and the operation is back to normal.
▼If it is OK, finish the trouble shooting.
▼In the case of NG, go back to Step ∑>3 for a recheck.

5-8 INQUIRY

1.In an effort to remove causes for malfunction from the vehicle concerned, it is impossible to determine the cause without confirming the malfunction phenomenon. If the phenomenon is not confirmed, the vehicle may not be able to return to the normal conditions even if you continue your work. The diagnosis through interviews is to collect information from the customer before confirming the malfunction phenomena. The diagnosis through interviews provides very important clues in reproducing malfunction phenomena.
2.Since the information obtained by the diagnosis through interviews is referred to during the trouble shooting, it is imperative to make an inquiry of the customer, centering on the items related to the malfunction, instead of simply asking general questions.

5-9 CONFIRMATION, RECORD AND ERASURE OF DIAGNOSIS CODE

1.The error message of the diagnostic code remains displayed as long as the communication failure exists, and will be erased when the communication is back to normal.

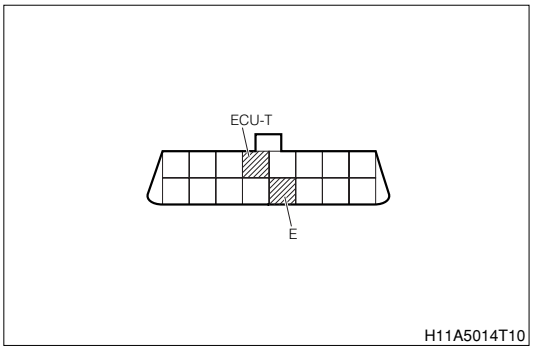
5-9-1 CHECKING METHOD OF DIAGNOSIS

1.Stop the vehicle.
2.Set the IG switch to LOCK and use SST to short-circuit the ECU-T terminal and E terminal of DLC located beneath the instrument panel.

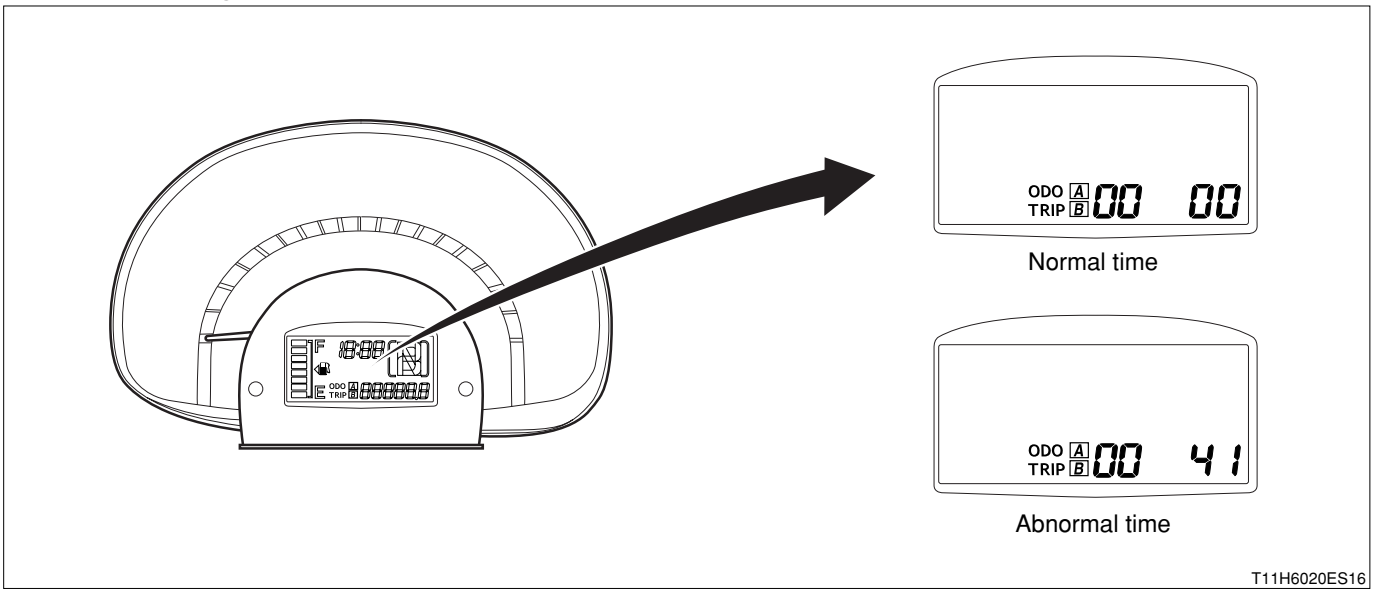
CAUTION

- Connecting the connector in the wrong location could cause a malfunction. Therefore, make sure the connection is correct.

SST: 09991-87403-000
09991-87404-000



3.With the IG switch turned ON, read the diagnosis code that is indicated on the LCD (Liquid Crystal Display) using numerals.



NOTE

- The meter LCD displays diagnosis codes for the CAN communication system and LIN communication system, in addition to a meter-related diagnostic code.
- When plural codes are to be outputted, they are outputted, starting from a smaller code number. Furthermore, when one cycle of indications is completed, these codes are repeatedly outputted at intervals of four seconds.

5-9-2 CANCELING METHOD OF DIAGNOSIS

1.The diagnosis code will be erased automatically when the problem has been solved.

5-9-3 CONTENTS OF DIAGNOSIS

Code No.		Warning indication (Provided: ○, Not provided: ×)	Code memory (Provided: ○, Not provided: ×)	Contents of diagnosis
LCD	4 digits			
00 00	–	×	×	Normal
00 41	–	×	×	A/T shift range information signal not yet received
00 42	–	×	×	More than one A/T shift range information signals received.
00 43	–	×	×	Unable to read CAN communication system connected ECU information
00 61	–	×	×	Low voltage error

NOTE

- The meter LCD displays diagnosis codes for the CAN communication system and LIN communication system, in addition to a meter-related diagnostic code.

CAN communication system (00 51 - 00 53)

Refer to Page L2-13.

LIN communication system (00 11, 00 21)

Refer to Page L2-44.

5-10 BASIC CHECK

5-10-1 BATTERY VOLTAGE CHECK

1.Measure the battery voltage with the engine stopped.
SPECIFIED VALUE: 10 - 14V

5-10-2 POWER SUPPLY CIRCUIT CHECK

1.Disconnect the connector of the meter. Measure the voltage between the following harness side connector terminal and the body earth.
(1) Between the meter harness side connector 9(IG2) and the body earth.
(2) Between the meter harness side connector 10(+B) and the body earth.
SPECIFIED VALUE: 10 - 14V

5-10-3 EARTH CIRCUIT CHECK

1.After setting the IG switch to "LOCK" remove the battery negative (-) terminal.
2.Disconnect the connector of the meter. Check continuity between the following harness side connector terminal and the body earth.
(1) Between the meter harness side connector 18(GND) and the body earth.
SPECIFIED VALUE: Continuity exists.

5-10-4 SPEEDOMETER CHECK

1.Place the vehicle on the speedometer tester.
2.Check the indication on the speedometer, and the measured speed of the speedometer tester.

EU region (MPH indication)

Tester indication standard speed (MPH)	Permissible range (MPH) of meter indication value
40	41.5 — 44.0
60	61.9 — 65.1
80	82.3 — 86.3
100	103.0 — 107.4
120	123.6 — 126.5
140	144.3 — 149.6

EU region (km/h indication), GCC region

Tester indication standard speed (km/h)	Permissible range (km/h) of meter indication value
40	41.9 — 45.2
60	62.3 — 65.8
80	82.7 — 87.7
100	103.1 — 108.9
120	123.5 — 130.1
140	143.9 — 151.3
160	164.4 — 172.5
180	184.8 — 193.7
200	205.2 — 214.9

Regions other than above

Tester indication standard speed (km/h)	Permissible range (km/h) of meter indication value
40	37.9 — 41.3
60	58.3 — 62.5
80	77.7 — 83.7
100	98.5 — 104.9
120	119.0 — 125.5
140	139.0 — 146.0
160	159.0 — 167.0
180	179.0 — 188.0
200	199.0 — 209.0

NOTE

- Improper air pressure and/or wear of a tire will lead to a meter reading error.

3.Check the deflection (without vibration) of the speedometer pointer.
SPECIFIED VALUE: Shall be within ±0.3km/h.

4.Check the odometer for proper operation.
SPECIFIED VALUE: Shall operate properly.

5-10-5 TACHOMETER CHECK

1.Connect a rev counter to the vehicle.
2.Check the error in the reading of the tachometer and the rev counter.

Rev counter reading (r/min)	Permissible range of tachometer reading (r/min)
700	630 — 770
1000	(900 — 1100)
2000	(1850 — 2150)
3000	2800 — 3200
4000	(3800 — 4200)
5000	4800 — 5200
6000	(5750 — 6250)
7000	6700 — 7300
8000	(7700 — 8300)

CAUTION

- Do not run the engine beyond the permissible engine speed (above the red zone on the tachometer).

NOTE

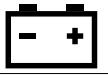
- Figures in ( ) show reference values.

5-10-6 CHECK OF WARNING LAMP INDICATOR

1.Check the lighting condition of the warning lamp indicator under conditions provided below.

CAUTION

- Perform checks with the engine stopped and the IG switch turned "ON".

Detected item		Condition	Standard
	Turn	When the turn signal switch is operated for the right turning	Right side flashing
		When the turn signal switch is operated for the left turning	Left side flashing
	High beam	When the dimmer passing switch HI is being operated	Illuminated
	Charge	The IG switch turned "OFF"→the IG switch turned "ON"(Engine stopped)→ the IG switch turned "ON"(Engine started)	Extinguished→Illuminated→Extinguished
	Oil	The IG switch turned "OFF"→the IG switch turned "ON"(Engine stopped)→ the IG switch turned "ON"(Engine started)	Extinguished→Illuminated→Extinguished
	MIL	The IG switch turned "OFF"→the IG switch turned "ON"(Engine stopped)→ the IG switch turned "ON"(Engine started)	Extinguished→Illuminated→Extinguished
	Brake	With the parking brake turned "OFF", the IG switch turned "OFF"→ the IG switch turned "ON"	Extinguished →Illuminated (for 3sec.)→Extinguished
	Driver's seat belt	Unengaged driver's seat belt→Engaged	Flashing→Extinguished
	Passenger's seat belt	Unengaged front passenger's seat belt the occupant seating on the front passenger seat →Engaged	Flashing→Extinguished
	Airbag	IG switch OFF→IG switch ON	Extinguished →Illuminated (for 6sec.)→Extinguished
	ABS	IG switch OFF→IG switch ON	Extinguished →Illuminated (for 3sec.)→Extinguished
	High-water temperature	IG switch OFF→IG switch ON	Extinguished →Illuminated (for 3sec.)→Extinguished
	Low-water temperature	With the water temperature above 40˚C IG switch turned "OFF"→ the IG switch turned "ON"	Extinguished →Illuminated (for 3sec.)→Extinguished
EPS	EPS	IG switch OFF→IG switch ON	Extinguished →Illuminated (for 2sec.)→Extinguished
O/D OFF	O/D OFF	When O/D OFF switch is turned ON:	Illuminated
	Security	Key insertion switch OFF→Key insertion switch ON	Flashing→Extinguished
	Rear fog	When the rear fog lamp is illuminated	Illuminated
—	Shift position	Each shift position	The shift indicator concerned is indicated.

T11H6504ES37

5-11 TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE

5-11-1 NO.00 41 (A/T SHIFT RANGE INFORMATION SIGNARL NOT YET RECEIVED)

⊳1. Diagnostic code check (CAN-related)

1.Check that the meter LCD does not display a CAN-related diagnostic code (code No.00 51 - 00 53).
SPECIFIED VALUE: Shall not display the code No.00 51 - 00 53.

▼If it is OK, go to Step⊳2.
▼In the case of NG, refer to the CAN communication system section.
Refer to Page L2-1.

⊳2. Diagnostic code check (transmission control computer related)

1.Check the A/T ECU diagnostic code.
SPECIFIED VALUE: Shall display the code No.55.

▼If it is OK, perform the troubleshooting for the diagnostic code No.55 for A/T ECU.
Refer to Page F5-36.

▼If it is NG, go to Step ⊳3.

⊳3. Check of meter power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the meter, earth terminal, and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, go to Step ⊳4.
▼If it is NG, repair or replace the wire harness.

⊳4. Check of A/T ECU power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the A/T ECU, earth terminal, and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, replace the meter. If the problem is not solved after the replacement, replace the A/T ECU, too.
▼If it is NG, repair or replace the wire harness.

5-11-2 NO.00 42(MORE THAN ONE A/T SHIFT RANGE INFORMATION SIGNALS RECEIVED.)

⊳1. Diagnostic code check (CAN-related)

1.Check that the meter LCD does not display the CAN related diagnostic code (code No.00 51 - 00 53).
SPECIFIED VALUE: Shall not display the code No.00 51 - 00 53.

▼If it is OK, go to Step ⊳2.
▼In the case of NG, refer to the CAN communication system section.
Refer to Page L2-1.

⊳2. Diagnosis code check (transmission control computer related)

1.Check the A/T ECU diagnostic code.
SPECIFIED VALUE: Shall display the code No.56.

▼If it is OK, perform the troubleshooting for the A/T ECU diagnostic code No.56.
Refer to Page F5-38.

▼If it is NG, go to Step ⊳3.

⊳3. Check of meter power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the meter, earth terminal, and body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, go to Step ⊳4.
▼If it is NG, repair or replace the wire harness.

⊳4. Check of A/T ECU power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the A/T ECU, the earth terminal, and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, replace the meter. If the problem is not solved after the replacement, replace the A/T ECU, too.
▼If it is NG, repair or replace the wire harness.

5-11-3 NO.00 43 (UNABLE TO READ CAN COMMUNICATION SYSTEM CONNECTED ECU INFORMEITION.)

⊳1. Check of meter power supply system and earth system

1.Check voltage between the vehicles harness side connector power supply terminal of the meter, earth terminal, and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, the meter is defective.
▼If it is NG, repair or replace the wire harness.

5-11-4 NO.00 61 (LOW VOLTAGE ERROR)

1.Check voltage between the vehicle harness side connector power supply terminal of the meter, earth terminal, and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, the meter is defective.
▼If it is NG, repair or replace the wire harness.

5-12 TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA

5-12-1 SPEEDOMETER FAULTY(ABS-EQUIPPED VEHICLES)

⊳1. Diagnostic code check (CAN-related)

1.Check that the meter LCD does not display a CAN-related diagnostic code (code No.00 51 - 00 53).
SPECIFIED VALUE: Shall not display the code No.00 51 - 00 53.

▼If it is OK, go to Step ⊳2.
▼In the case of NG, refer to the CAN communication system section.
Refer to Page L2-1.

⊳2. Diagnostic code check (ABS-related)

1.Check the ABS ECU diagnostic code.
SPECIFIED VALUE: Shall not display the code No.21 - 29.

▼If it is OK, go to Step ⊳3.
▼In the case of NG, perform troubleshooting for the outputted diagnostic code.
Refer to Page E3-28.

⊳3. Check of meter power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the meter, earth terminal, and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, go to Step ⊳4.
▼If it is NG, repair or replace the wire harness.

⊳4. Check of ABS ECU power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the ABS ECU, earth terminal, and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, replace the meter. If the problem is not solved after the replacement, replace the ABS ECU, too.
▼If it is NG, repair or replace the wire harness.

5-12-2 SPEEDOMETER FAULTY(A/T AND ABS NON–EQUIPPED VEHICLE)

⊳1. Diagnostic code check (CAN-related)

1.Check that the meter LCD does not display a CAN-related diagnostic code (code No.00 51 - 00 53).
SPECIFIED VALUE: Shall not display the code No.00 51 - 00 53.

▼If it is OK, go to Step ⊳2.
▼In the case of NG, refer to the CAN communication system section.
Refer to Page L2-1.

Σ2. Diagnostic code check (A/T ECU-related)

1.Check the A/T ECU diagnostic code.
SPECIFIED VALUE: Shall not display the code No.42.

▼If it is OK, go to Step Σ3.
▼In the case of NG, perform troubleshooting for the outputted diagnostic code.
Refer to Page F5-29.

Σ3. Check of meter power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the meter, earth terminal, and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, go to Step Σ4.
▼If it is NG, repair or replace the wire harness.

Σ4. Check of A/T ECU power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the A/T ECU, earth terminal, and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, replace the meter. If the problem is not solved after the replacement, replace the A/T ECU, too.
▼If it is NG, repair or replace the wire harness.

5-12-3 SPEEDOMETER FAULTY(M/T AND ABS NON–EQUIPPED VEHICLE)

Σ1.Vehicle speed signal input / output check

1.Perform the vehicle speed signal input / output check.
Refer to Page J3-1.

▼If it is OK, go to Step Σ2.
▼If it is NG, go to Step Σ3.

Σ2. Check of meter power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the meter, earth terminal, and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, the meter is faulty.
▼If it is NG, repair or replace the wire harness.

Σ3. power supply system and earth system

1.Check the voltage between the vehicle harness side connectors 1(+) and 2(−) of the vehicle speed sensor and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, go to Step Σ4.
▼If it is NG, repair or replace the wire harness.

⊳4. Wiring harness check

1.Check continuity and short circuit between terminals below.

(1) Meter vehicle harness side connector terminal 7(SPD) - Vehicle speed sensor vehicle harness side connector terminal 3(SPD)

SPECIFIED VALUE: Continuity exists and no short circuit occurs.

▼In the case of NG, the vehicle speed sensor is faulty.

▼If it is OK, repair or replace the harness between the meter and vehicle speed sensor.

5-12-4 ODOMETER FAULTY, TRIP METER FAURLTY(ABS-EQUIPPED VEHICLES)

⊳1. Diagnostic code check (CAN-related)

1.Check that the meter LCD does not display a CAN-related diagnostic code (code No.00 51 - 00 53).

SPECIFIED VALUE: Shall not display the code No.00 51 - 00 53.

▼If it is OK, go to Step ⊳2.

▼In the case of NG, refer to the CAN communication system section.

Refer to Page L2-1.

⊳2. Diagnostic code check (ABS-related)

1.Check the ABS ECU diagnostic code.

SPECIFIED VALUE: Shall not display the code No.21 - 29.

▼If it is OK, go to Step ⊳3.

▼In the case of NG, perform troubleshooting for the outputted diagnostic code.

Refer to Page E3-28.

⊳3. Check of meter power supply and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the meter, earth terminal, and the body earth.

SPECIFIED VALUE: 10 - 14V

▼If it is OK, go to Step ⊳4.

▼If it is NG, repair or replace the wire harness.

⊳4. Check of ABS ECU power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the ABS ECU, earth terminal, and the body earth.

SPECIFIED VALUE: 10 - 14V

▼If it is OK, replace the meter. If the problem is not solved after the replacement, replace the ABS ECU, too.

▼If it is NG, repair or replace the wire harness.

5-12-5 ODOMETER FAULTY, TYIP METER FAULTY(A/T AND ABS NON–EQUIPPED VEHICLE)

∑1. Diagnostic code check (CAN-related)

1.Check that the meter LCD does not display a CAN-related diagnostic code (code No.00 51 - 00 53).
SPECIFIED VALUE: Shall not display the code No.00 51 - 00 53.

▼If it is OK, go to Step ∑2.
▼In the case of NG, refer to the CAN communication system section.
Refer to Page L2-1.

∑2. Diagnostic code check (A/T ECU-related)

1.Check the A/T ECU diagnostic code.
SPECIFIED VALUE: Shall not display the code No.42.

▼If it is OK, go to Step ∑3.
▼In the case of NG, perform troubleshooting for the outputted diagnostic code.
Refer to Page F5-29.

∑3. Check of meter power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the meter, earth terminal, and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, go to Step ∑4.
▼If it is NG, repair or replace the wire harness.

∑4. Check of A/T ECU power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the A/T ECU, earth terminal, and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, replace the meter. If the problem is not solved after the replacement, replace the A/T ECU, too.
▼If it is NG, repair or replace the wire harness.

5-12-6 ODOMETER FAULTY, TRIP METER FAULTY(M/T AND ABS NON–EQUIPPED VEHICLE)

∑1.Vehicle speed signal input / output check

1.Perform the vehicle speed signal input / output check.
Refer to Page J3-1.

▼If it is OK, go to Step ∑2.
▼If it is NG, go to Step ∑3.

∑2. Check of meter power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the meter, earth terminal, and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, the meter is faulty.
▼If it is NG, repair or replace the wire harness.

∑3. power supply system and earth system

1.Check the voltage between the vehicle harness side connectors 1(+) and 2(−) of the vehicle speed sensor and the body earth.

SPECIFIED VALUE: 10 - 14V

▼If it is OK, go to Step ∑4.

▼If it is NG, repair or replace the wire harness.

∑4. Wiring harness check

1.Check continuity and short circuit between terminals below.

(1) Meter vehicle harness side connector terminal 7(SPD) - Vehicle speed sensor vehicle harness side connector terminal 3(SPD)

SPECIFIED VALUE: Continuity exists and no short circuit occurs.

▼In the case of NG, the vehicle speed sensor is faulty.

▼If it is OK, repair or replace the harness between the meter and vehicle speed sensor.

5-12-7 SHIFT POSITION INDICATOR DEFECTIVE

1.Perform troubleshooting according to the diagnostic code, 00 41 and 00 42.

Refer to Page J3-19.

5-12-8 HIGH WATER TEMPERATURE WARNING LAMP DEFECTIVE, LOW WATER TEMPERATURE INDICATOR LAMP DEFECTIVE

∑1. Diagnostic code check (CAN-related)

1.Check that the meter LCD does not display a CAN-related diagnostic code (code No.00 51 - 00 53).

SPECIFIED VALUE: Shall not display the code No.00 51 - 00 53.

▼If it is OK, go to Step ∑2.

▼In the case of NG, refer to the CAN communication system section.

Refer to Page L2-1.

∑2. Diagnostic code check (EFI-related)

1.Check the EFI ECU diagnostic code.

SPECIFIED VALUE: Shall not display the code No.42.

▼If it is OK, go to Step ∑3.

▼In the case of NG, perform troubleshooting for the EFI ECU diagnostic code No.42.

Vehicle with Type 1KR-FE engine

Refer to Page B8-74.

Vehicle with Type K3-VE engine

Refer to Page B8-301.

∑3. Check of meter power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the meter, earth terminal, and the body earth.

SPECIFIED VALUE: 10 - 14V

▼If it is OK, go to Step ∑4.

▼If it is NG, repair or replace the wire harness.

⊳4. Check of EFI ECU power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the EFI ECU, earth terminal, and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, replace the meter. If the problem is not solved after the replacement, replace the EFI ECU as well.
▼If it is NG, repair or replace the wire harness.

5-12-9 O/D OFF INDICATOR LAMP DOES NOT LIGHT UP.

⊳1. Diagnostic code check (CAN-related)

1.Check that the meter LCD does not display a CAN-related diagnostic code (code No.00 51 - 00 53).
SPECIFIED VALUE: Shall not display the code No.00 51 - 00 53.

▼If it is OK, go to Step ⊳2.
▼In the case of NG, refer to the CAN communication system section.
Refer to Page L2-1.

⊳2. A/T ECU voltage check

1.Check voltage between the vehicle harness side connector terminal B22 (O/D+) of the A/T ECU and the body earth, when the O/D OFF switch is turned "ON".
SPECIFIED VALUE: 0V

▼If it is OK, go to Step ⊳3.
▼If it is NG, go to Step ⊳5.

3.O/D OFF switch check

1.Perform unit check for the O/D OFF switch.
Refer to Page F5-78.

▼If it is OK, go to Step ⊳4.
▼If it is NG, replace the O/D OFF switch.

⊳4. Wiring harness check

1.Check the following wire harness for continuity.
(1) The vehicle harness side connector terminal B22 (O/D+) of the A/T ECU - the vehicle harness side connector terminal 3 (O/D+) of the O/D OFF switch
(2) The vehicles harness side connector terminal 4(E) of the O/D OFF switch - the body earth
SPECIFIED VALUE: Continuity exists

▼If it is OK, go to Step ⊳5.
▼If it is NG, repair or replace the wire harness.

⊳5. Check of A/T ECU power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the A/T ECU, earth terminal, and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, go to Step ⊳6.
▼If it is NG, repair or replace the wire harness.

⊳6. Check of meter power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the meter, earth terminal, and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, replace the A/T ECU. If the problem is not solved after the replacement, replace the meter, too.
▼If it is NG, repair or replace the wire harness.

5-12-10 BRAKE WARNING LAMP REMAINS ILLUMINATED EVEN AFTER IGNITION SWITCH IS TURNED ON.(IN THE CASE OF ABS–EQUIPPED VEHICLES WHERE NO ABS DIAGNOSIS CODE IS OUTPUTTED)

⊳1. Diagnostic code check (CAN-related)

1.Check that the meter LCD does not display a CAN-related diagnostic code (code No.00 51 - 00 53).
SPECIFIED VALUE: Shall not display the code No.00 51 - 00 53.

▼If it is OK, go to Step ⊳2.
▼In the case of NG, refer to the CAN communication system section.
Refer to Page L2-1.

⊳2. Brake fluid level check

1.Check whether the master cylinder reservoir contains the specified level of brake fluid.
SPECIFIED VALUE: The level shall be as specified.

▼If it is OK, go to Step ⊳3.
▼In the case of NG, fill the brake fluid to the specified level.

⊳3. Level warning switch check

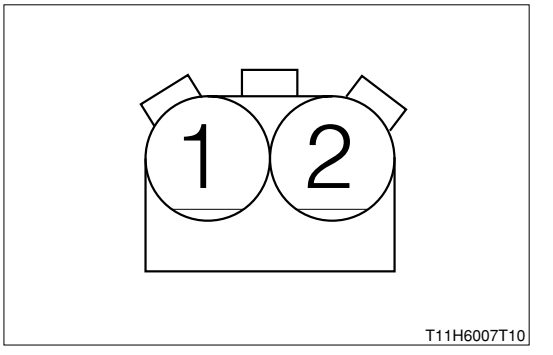
1.Check continuity between the level warning switch terminals.

Switching	Standard
ON	Continuity exists
OFF	No continuity exists

▼If it is OK, go to Step ⊳4.
▼If it is NG, replace the level warning switch.

⊳4. Wiring harness check

1.Check the following harnesses for continuity.
(1) The vehicle harness side connector 8 of the meter - the vehicles harness side connector 1of the level warning switch
(2) The vehicle harness side connector 2 of the level warning switch - the body earth
SPECIFIED VALUE: Continuity shall exist, without short-circuiting.



▼If it is OK, go to Step ⊳5.
▼If it is NG, repair or replace the wire harness.

∑5. Parking brake switch check

1.Check continuity between the parking brake switch and the body earth.

Switching	Standard
ON	Continuity exists
OFF	No continuity exists

▼If it is OK, go to Step ∑6.
▼If it is NG, replace the parking brake switch.

∑6.Wiring harness check

1.Check the following harness for continuity.
(1) The vehicle harness side connector 14 of the meter - the vehicle harness side connector of the parking brake switch
SPECIFIED VALUE: Continuity shall exist, without short-circuiting.

▼If it is OK, go to Step ∑7.
▼If it is NG, repair or replace the wire harness.

∑7. Check of meter power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the meter, earth terminal, and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, go to Step ∑8.
▼If it is NG, repair or replace the wire harness.

∑8. Check of ABS ECU power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the ABS ECU, earth terminal, and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, replace the meter. If the problem is not solved after the replacement, replace the ABS ECU, too.
▼If it is NG, repair or replace the wire harness.

5-12-11 BRAKE WARNING LAMP REMAINS ILLUMINATED EVEN AFTER IGNITION SWITCH IS TURNED ON.(VEHICLES NOT EQUIPPED WITH ABS)

∑1. Brake fluid level check

1.Check whether the master cylinder reservoir contains the specified level of brake fluid.
SPECIFIED VALUE: The level shall be as specified.

▼If it is OK, go to Step ∑2.
▼In the case of NG, fill the brake fluid to the specified level.

∑2. Level warning switch check

1.Check continuity between the level warning switch terminals.

Switching	Standard
ON	Continuity exists
OFF	No continuity exists

▼If it is OK, go to Step ∑3.
▼If it is NG, replace the level warning switch.

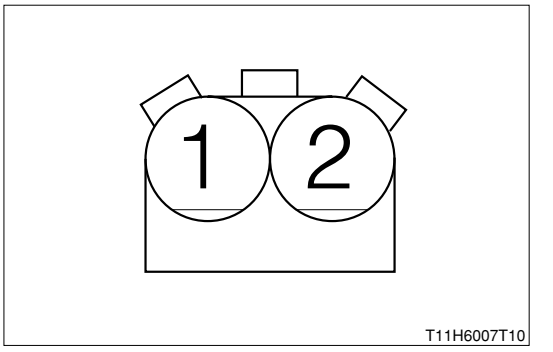
⊳3. Wiring harness check

1.Check the following harnesses for continuity.

(1) The vehicle harness side connector 8 of the meter - the vehicles harness side connector 1of the level warning switch

(2) The vehicle harness side connector 2 of the level warning switch - the body earth

SPECIFIED VALUE: Continuity shall exist, without short-circuiting.



▼If it is OK, go to Step ⊳4.

▼If it is NG, repair or replace the wire harness.

⊳4. Parking brake switch check

1.Check continuity between the parking brake switch and the body earth.

Switching	Standard
ON	Continuity exists
OFF	No continuity exists

▼If it is OK, go to Step ⊳5.

▼If it is NG, replace the parking brake switch.

⊳5.Wiring harness check

1.Check the following harness for continuity.

(1) The vehicle harness side connector 14 of the meter - the vehicle harness side connector of the parking brake switch

SPECIFIED VALUE: Continuity shall exist, without short-circuiting.

▼If it is OK, go to Step ⊳6.

▼If it is NG, repair or replace the wire harness.

⊳6. Check of meter power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the meter, earth terminal, and the body earth.

SPECIFIED VALUE: 10 - 14V

▼If it is OK, replace the meter.

▼If it is NG, repair or replace the wire harness.

5-12-12 THE BRAKE WARNING LAMP DOES NOT GO ON FOR THREE SECONDS AFTER IG SWITCH IS SET TO ON POSITION.

⊳1. Diagnostic code check (CAN-related)

1.Check that the meter LCD does not display a CAN-related diagnostic code (code No.00 51 - 00 53).

SPECIFIED VALUE: Shall not display the code No.00 51 - 00 53.

▼If it is OK, go to Step ⊳2.

▼In the case of NG, refer to the CAN communication system section.

Refer to Page L2-1.

▷2. Check of meter power supply system and earth system

1.Check voltage between the vehicle harness side connector power supply terminal of the meter, earth terminal, and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, the meter is defective.
▼If it is NG, repair or replace the wire harness.

5-12-13 BRAKE WARNING LAMP REMAINS ILLUMINATED EVEN AFTER IGNITION SWITCH IS TURNED ON.

Refer to Page E3-32.

5-12-14 THE ABS WARNING LAMP DOES NOT GO ON FOR THREE SECONDS AFTER IG SWITCH IS SET TO ON POSITION.

▷1. Diagnostic code check (CAN-related)

1.Check that the meter LCD does not display a CAN-related diagnostic code (code No.00 51 - 00 53).
SPECIFIED VALUE: Shall not display the code No.00 51 - 00 53.

▼If it is OK, go to Step ▷2.
▼In the case of NG, refer to the CAN communication system section.
Refer to Page L2-1.

▷2. Check of meter power supply system and earth system

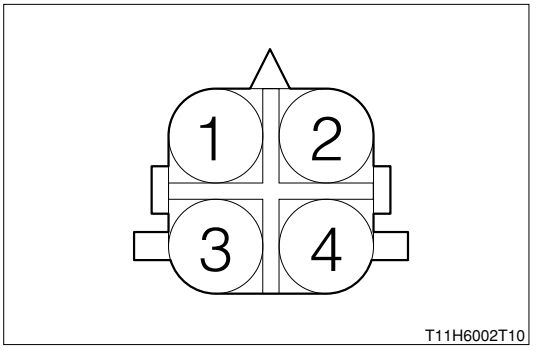
1.Check voltage between the vehicle harness side connector power supply terminal of the meter, earth terminal, and the body earth.
SPECIFIED VALUE: 10 - 14V

▼If it is OK, the meter is defective.
▼If it is NG, repair or replace the wire harness.

5-13 UNIT CHECK

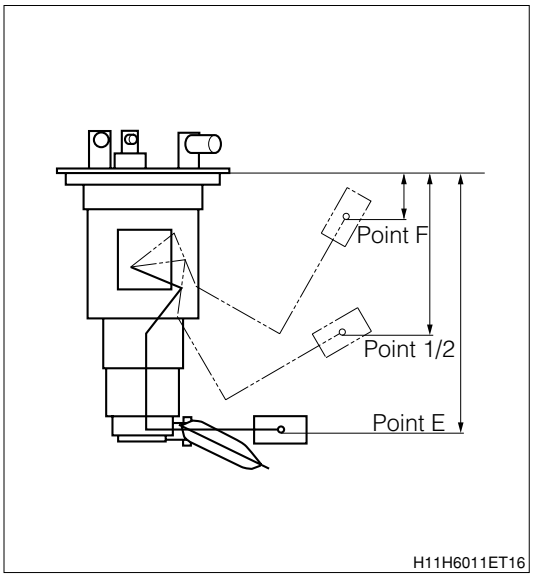
5-13-1 FUEL SENDER GAGE

1.Ensure that the float can move without any binding.



2.Check resistance between the terminals 1 - 2, when the float position is shifted from Point E to F.

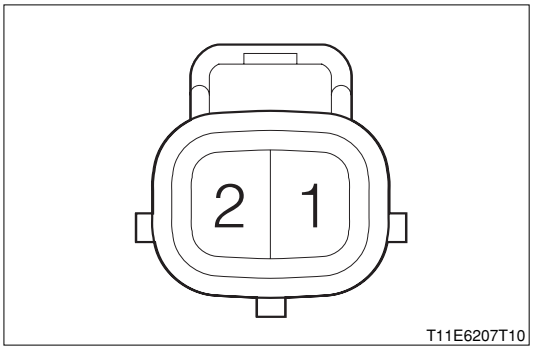
Level	Float position	Resistance (Ω)
F	33.7	3.0±1.0
1/2	107.4	32.5±3.0
E	175.6	120.0±1.0



5-13-2 WATER TEMPERATURE SENSOR

1.Check resistance between the terminal 1 - 2.

Temperature (°C)	Resistance (Ω)
20	2450
80	318±8
110	141.7±1.8



5-13-3 VEHICLE SPEED SENSOR (MRE TYPE:MAGNETIC RESISTANCE ELEMENT)

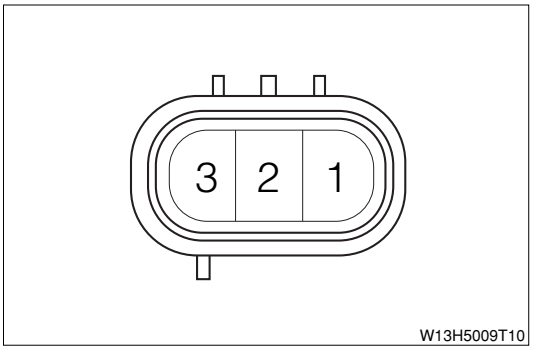
CAUTION

- This check is applied only to the M/T and ABS non-equipped vehicle.

1.Connect the connector terminal 1 of the vehicle speed sensor with the battery positive (+) terminal, whereas connect the terminal 2 with the battery negative (-) terminal.

2.When the sensor shaft is made one turn, check the change in resistance between the terminal 2 and terminal 3.

SPECIFIED VALUE: The switching between high and low occurs four times per turn.



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1 TUNER AY

1-1 REMOVAL AND INSTALLATION

1-1-1 OPERATION BEFORE REMOVAL

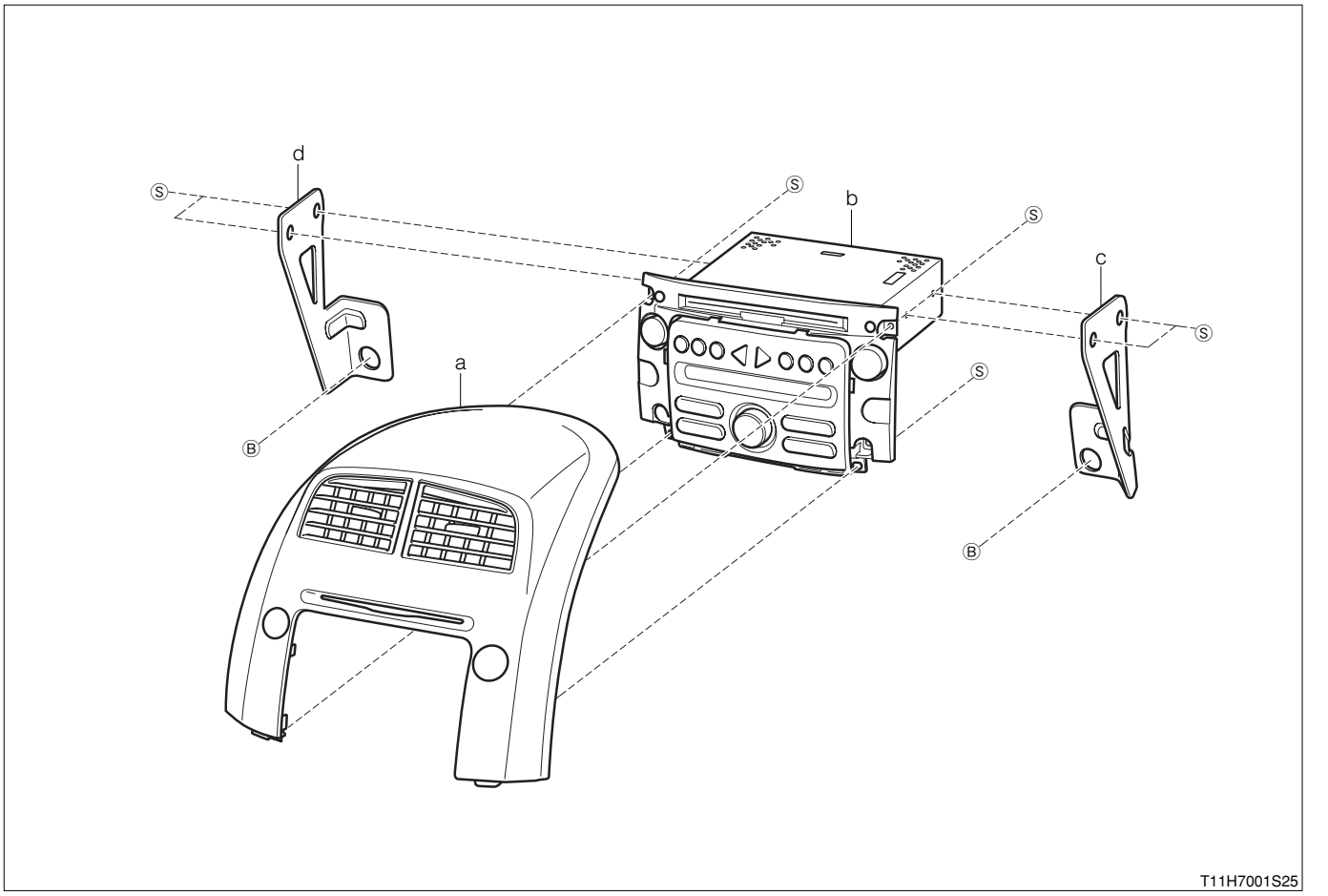
1.Remove the lower instrument panel finish panel S/A.
Refer to Page I2-23.

2.Remove the lower center instrument cluster finish panel S/A.
Refer to Page I2-23.

3.Move the heater control Ay until the bolts (2pcs) securing the stereo component tuner Ay can be removed.
Refer to Page K1-7.

1-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Panel S/A, instrument cluster finish, center
▼ 2 b Tuner Ay, stereo component
3 c Bracket, radio receiver A
4 d Bracket, radio receiver B

1-1-3 POINTS OF REMOVAL

(1) Tuner Ay, stereo component

1.The tuner Ay is secured on the center instrument cluster finish panel S/A by screws (4pcs). First remove the whole panel S/A from the vehicle. Then remove the screws (4pcs) to remove the tuner Ay.

1-1-4 OPERATION AFTER INSTALLATION

1.Reinstall the heater control Ay.
Refer to Page K1-7.

2.Install the lower center instruent cluster finish panel S/A.
Refer to Page I2-23.

3.Install the lower instruent panel finish panel S/A.
Refer to Page I2-23.

2 SPEAKER(FRONT SPEAKER)

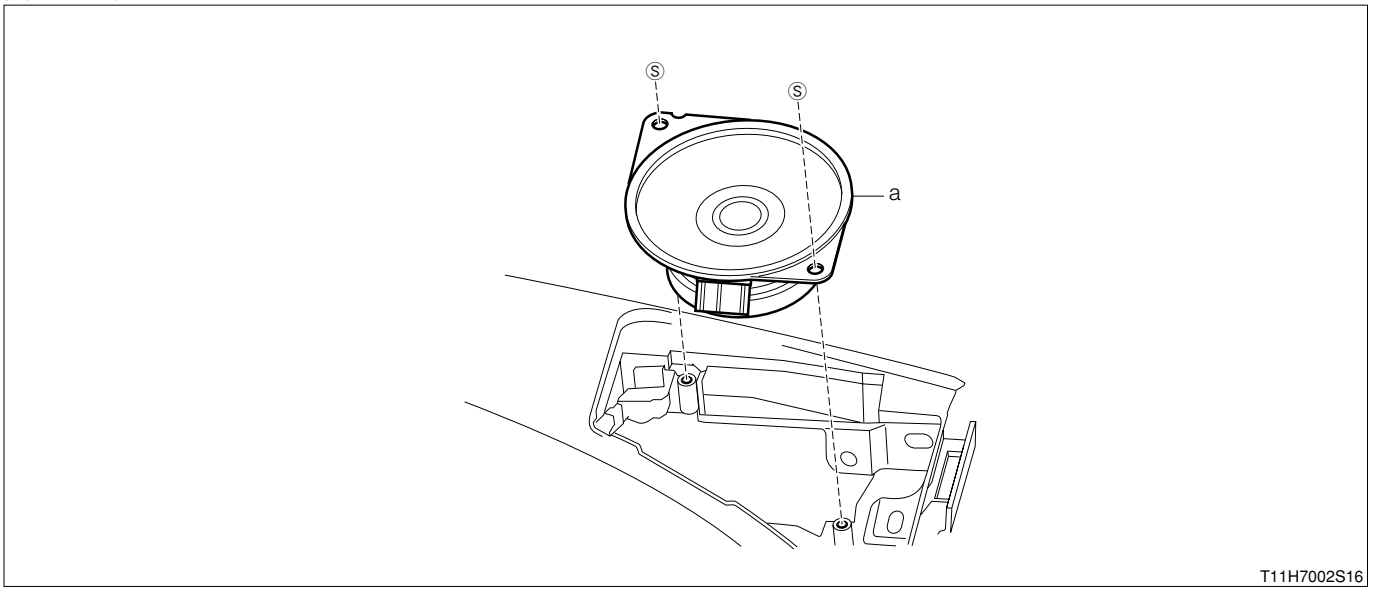
2-1 REMOVAL AND INSTALLATION

2-1-1 OPERATION BEFORE REMOVAL

1.Remove the RH/LH speaker grille.
Refer to Page I2-23.

2-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Speaker Ay, radio (RH/LH)

2-1-3 OPERATION AFTER INSTALLATION

1.Install the RH/LH speaker grille.
Refer to Page I2-23.

3 SPEAKER(REAR SPEAKER)

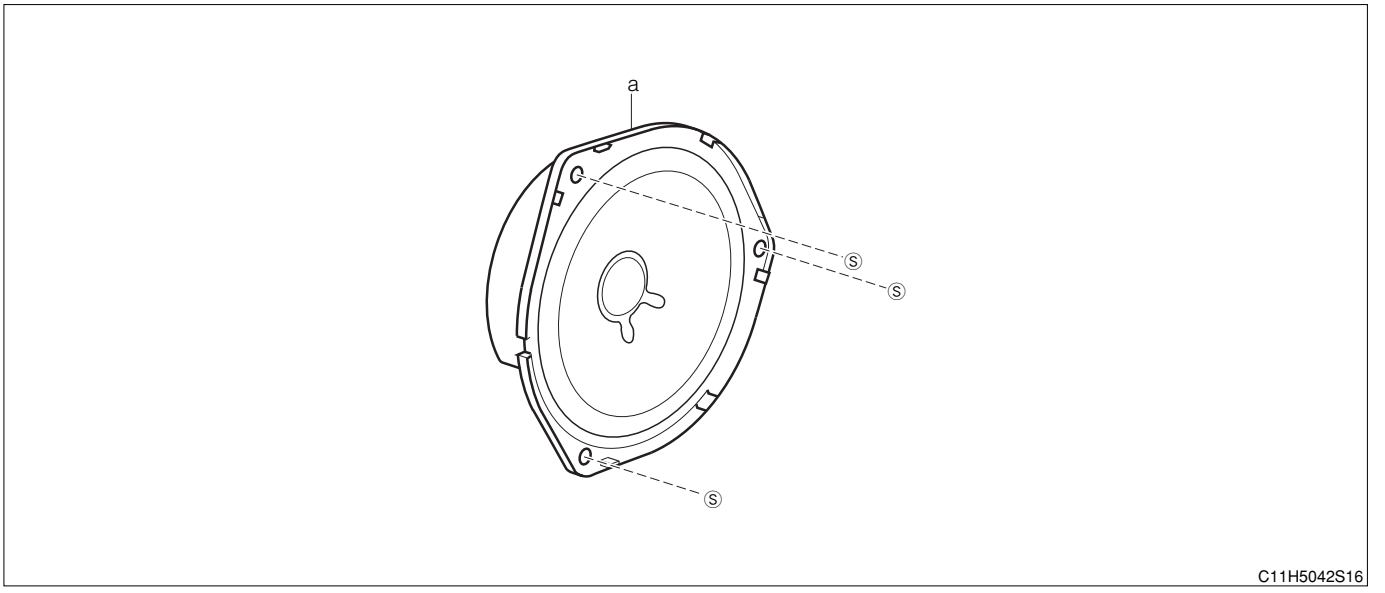
3-1 REMOVAL AND INSTALLATION

3-1-1 OPERATION BEFORE REMOVAL

1.Remove the lower RH/LH rear door trim board Ay.
Refer to Page I1-15.

3-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Speaker Ay, radio (RH/LH)

3-1-3 OPERATION AFTER INSTALLATION

1.Install the lower RH/LH rear door trim board Ay.
Refer to Page I1-15.

4 ANTENNA

4-1 REMOVAL AND INSTALLATION

4-1-1 ARTICLES TO BE PREPARED

Instrument

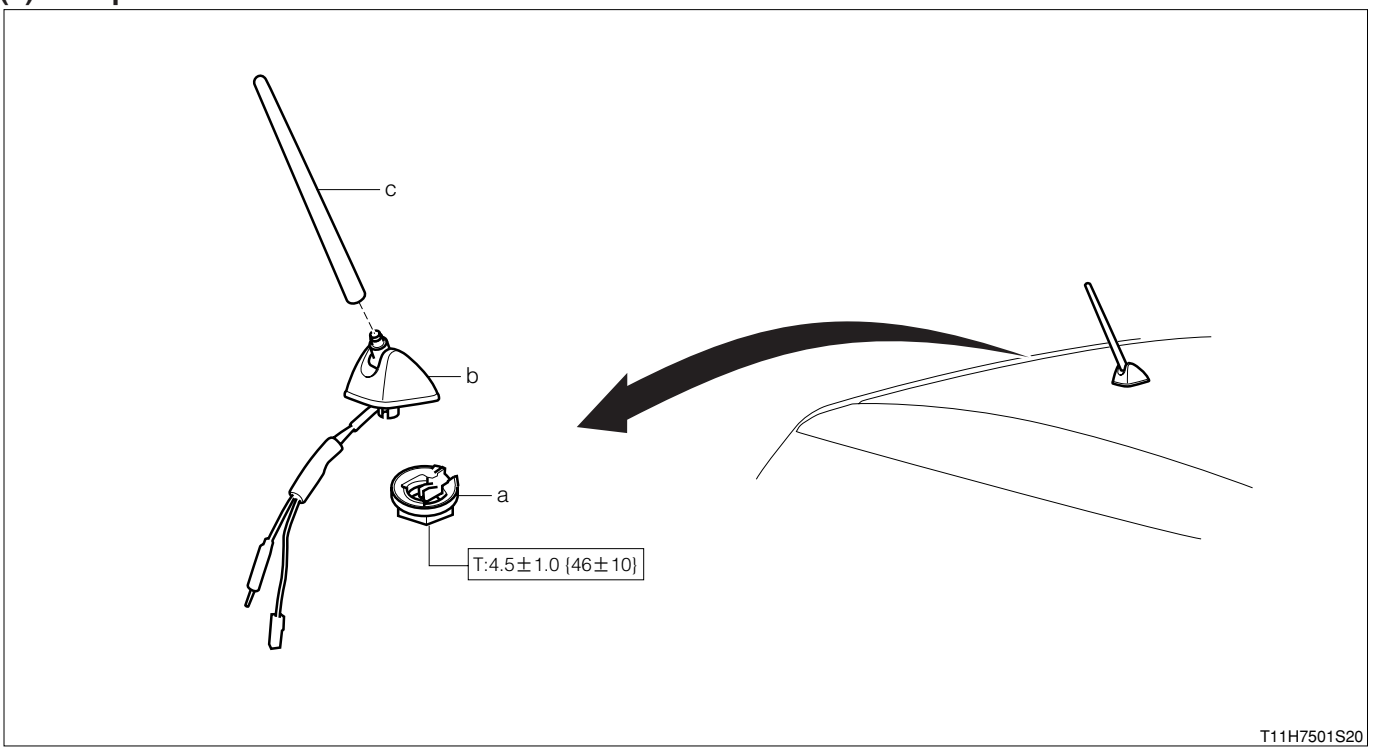
Torque wrench

4-1-2 OPERATION BEFORE REMOVAL

1.Remove the roof head lining Ay.
Refer to Page I2-53.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

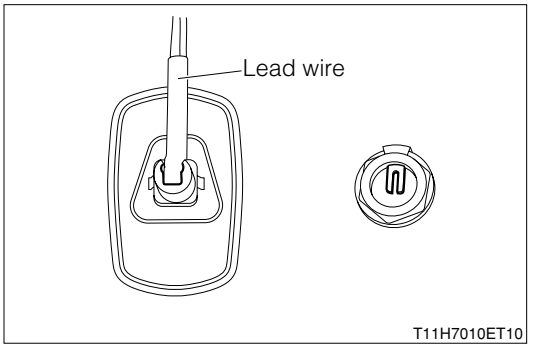
(2) Removal and installation procedures

▲ 1 a Nut, antenna
2 b Antenna Ay, amplifier
3 c Rod, antenna

4-1-4 POINTS OF INSTALLATION

(1) Nut, antenna

1.Place a lead along the U-shaped slot of the antenna Ay amplifier. Place the nut in the direction of the lead, and tighten it to the specified torque.
TIGHTENING TORQUE: 4.5±1.0N·m {46±10kgf·cm}



4-1-5 OPERATION AFTER INSTALLATION

1.Install the roof head lining Ay.

Refer to Page I2-53.

TO INDEX

J5 WIRING

WIRING ---------- J5 - 1
BASIC CHECK AND ADJUSTMENT --- J5 - 1
UNIT CHECK ---------- J5 - 2
BATTERY ---------- J5 - 3
REMOVAL AND INSTALLATION -------- J5 - 3

1 WIRING

1-1 BASIC CHECK AND ADJUSTMENT

1-1-1 CHECK OF ELECTRIC WIRING CONNECTION FOR LOOSING OR DAMAGE.

1.Manually move the wiring in the engine compartment to check for loose connection.
SPECIFIED VALUE: Shall have no loose connection.

2.Visually check for damage in electric wiring or loosing of clamps.
SPECIFIED VALUE: Shall be free form damage or loosing.

3.Check that the electric wiring will not interfere with other parts.
SPECIFIED VALUE: Shall have no interference.

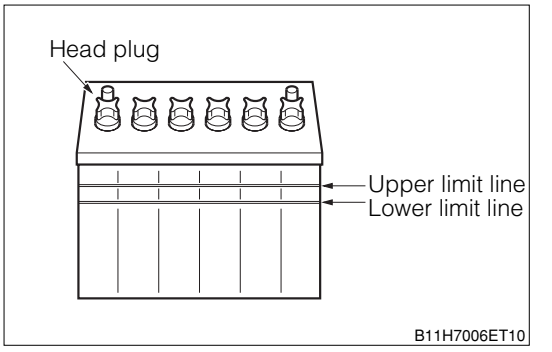
1-1-2 CHECK OF BATTERY TERMINAL CONNECTION

1.Visually check for the faulty connection of the terminal due to loosing or corrosion.
SPECIFIED VALUE: Shall be free from faulty connection due to loosing or corrosion.
SPECIFIED VALUE: Shall be free from fault.

1-1-3 CHECK OF BATTERY FLUID LEVEL

1.Visually check the fluid level in each battery tank (cell).
SPECIFIED VALUE: Shall be within the specified range.

2.Check that the case is free from cracks and that the head plug of each battery tank (cell) is free from cracks, damage, or clogging in the air vent hole.
SPECIFIED VALUE: Check that each component is free from cracks, damage, or clogging in the air vent hole.



1-1-4 SPECIFIC GRAVITY CHECK OF THE BATTERY

1.Check that the specific gravity of the battery tank (cell) is within the prescribed limits, using a hydrometer.
SPECIFIED VALUE: Reference value (fluid temperature 20°C) : 1.25—1.29
Difference between tanks (fluid temperature 20°C) : 0.04 or below

1-2 UNIT CHECK

1-2-1 LGNITION SWITCH

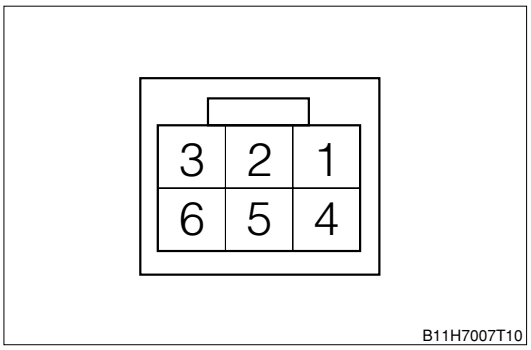
1.Check continuity between terminals in each state.

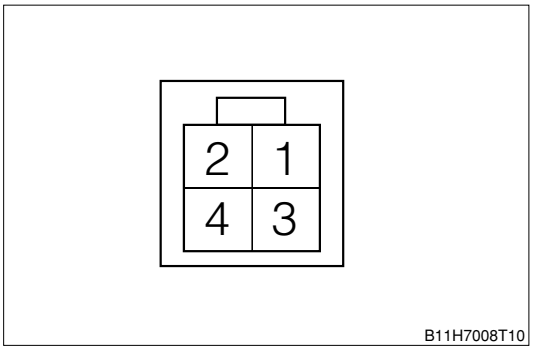
Ignition switch

Switch condition	Terminal No.	Standard
ACC	1 — 3	Continuity exists.
ON	1 — 2 — 3, 5 — 6	Continuity exists.
START	1 — 2, 4 — 5 — 6	Continuity exists.

Key switch

Switch condition	Terminal No.	Standard
When the key is inserted	1 — 2	Continuity exists.
When the key is not inserted	1 — 2	No continuity exists.





2 BATTERY

2-1 REMOVAL AND INSTALLATION

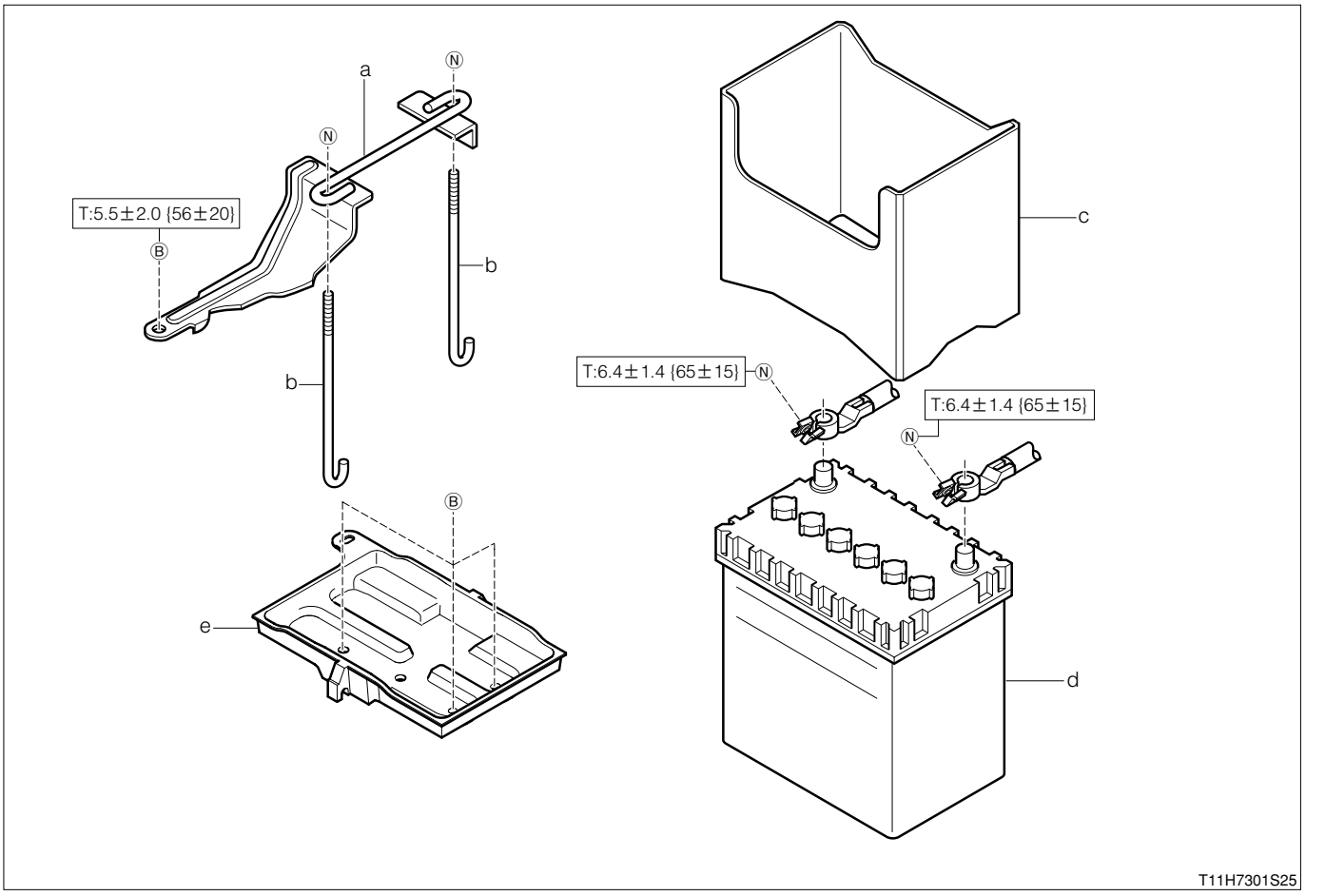
2-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

2-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

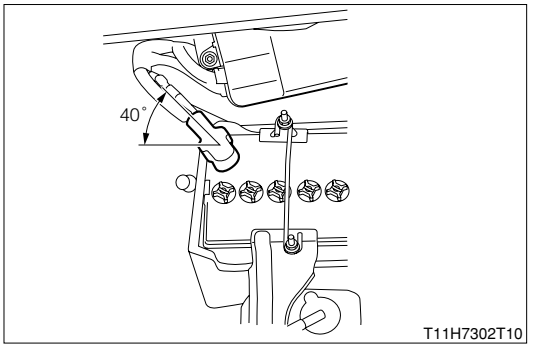
(2) Removal and installation procedures

- ▲ 1 a Clamp S/A, battery hold down
- 2 b Bolt, buttery clamp
- ▲ 3 c Cover S/A, battery
- ▲ 4 d Battery
- 5 e Carrier, battery

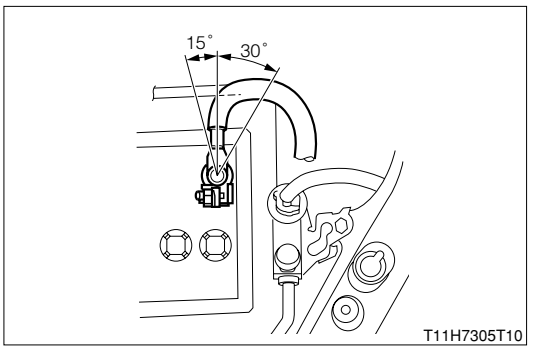
2-1-3 POINTS OF INSTALLATION

(1) Battery

1.Connect the battery positive (+) terminal so that the terminal wire will stay in the range shown in the illustration.



2.Connect the battery negative (−) terminal so that the terminal wire will stay in the range shown in the illustration.

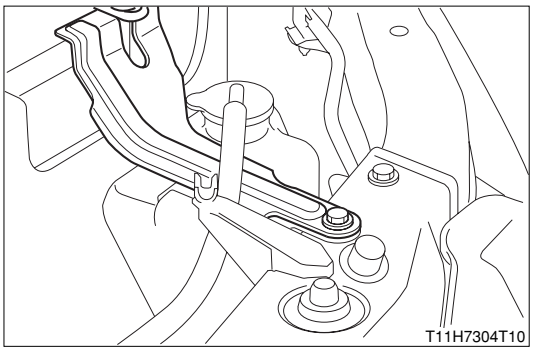


(2) Cover S/A, battery

1.Install the cover so that the larger notching will face the vehicles front.

(3) Clamp S/A, battery hold down

1.Install the clamp S/A and the radiator reserve tank Ay to the radiator upper support to the specified torque.
TIGHTENING TORQUE: 5.5±2.0N·m{56±20kgf·cm}



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J6 OTHER ELECTRICAL PARTS

HORN SYSTEM ---------- J6 - 1
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HORN---------- J6 - 1
REMOVAL AND INSTALLATION (STANDARD-BUMPER EQUIPPED VEHICLE)---------- J6 - 1
REMOVAL AND INSTALLATION (AERO-BUMPER EQUIPPED VEHICLE)---------- J6 - 2

1 HORN SYSTEM

1-1 BASIC CHECK AND ADJUSTMENT

1-1-1 CHECK OF HORN OPERATIO

1.Check that the horn sounds when the horn button is pushed, while the steering wheel is being turned.
SPECIFIED VALUE: The horn shall sound.

2.Check whether the volume level and quality of sound stay constant.
SPECIFIED VALUE: The quality of sound shall stay constant.

2 HORN

2-1 REMOVAL AND INSTALLATION (STANDARD-BUMPER EQUIPPED VEHICLE)

2-1-1 ARTICLES TO BE PREPARED

Instrument

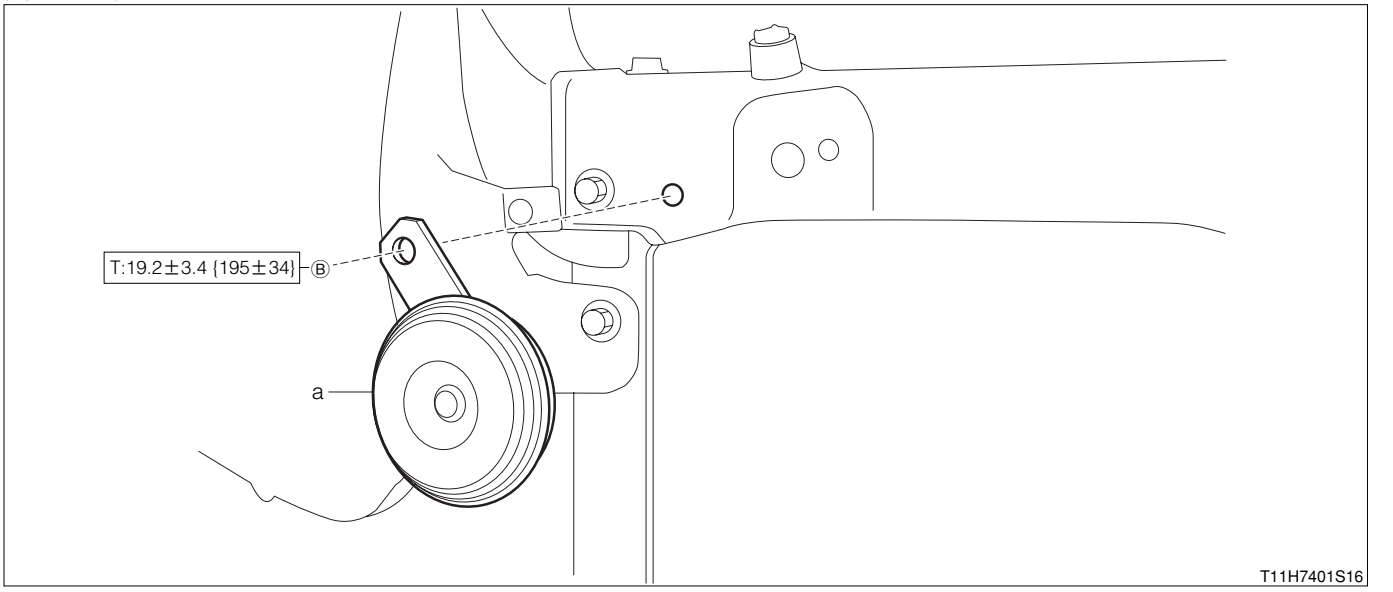
Torque wrench

2-1-2 OPERATION BEFORE REMOVAL

1.Remove the battery negative (−) terminal.
2.Remove the front bumper cover.
Refer to Page I2-2.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Horn Ay,high-pitch

2-1-4 OPERATION AFTER INSTALLATION

1.Install the front bumper cover.
Refer to Page I2-2.

2.Install the battery negative (−) terminal.

2-2 REMOVAL AND INSTALLATION(AERO-BUMPER EQUIPPED VEHICLE)

2-2-1 ARTICLES TO BE PREPARED

Instrument

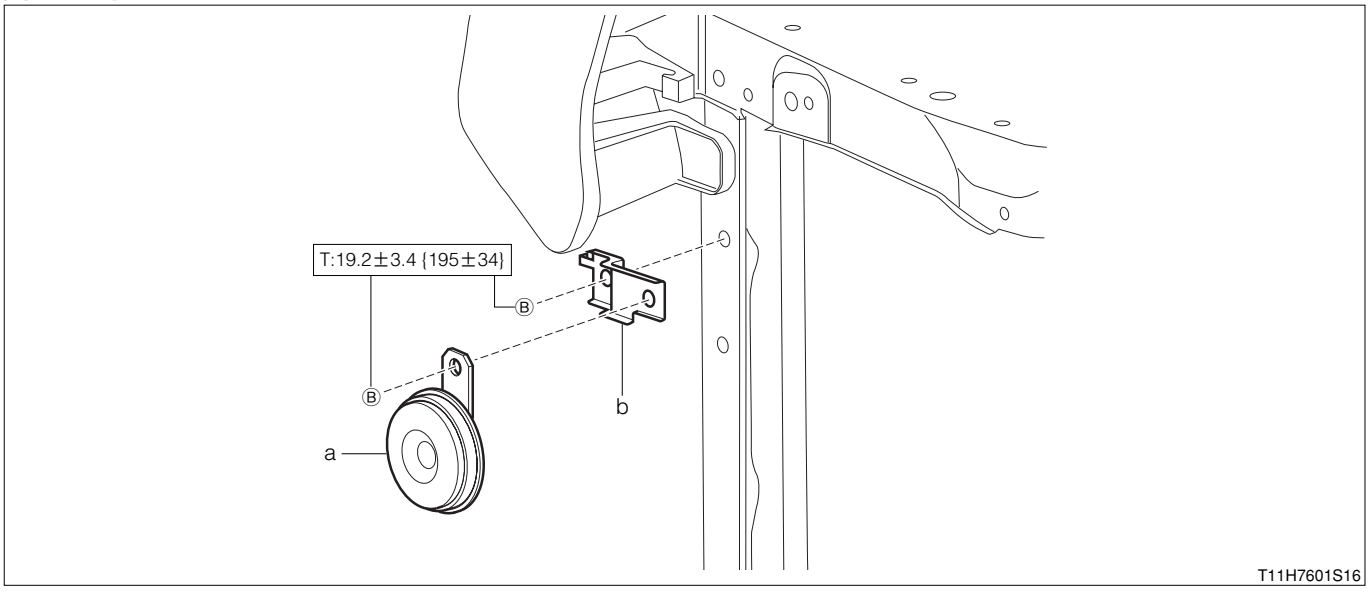
Torque wrench

2-2-2 OPERATION BEFORE REMOVAL

1.Remove the battery negative (−) terminal.
2.Remove the front bumper cover.
Refer to Page I2-4.

2-2-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit:N·m{kgf·cm}

(2) Removal and installation procedures

1 a Horn Ay,high-pitch
2 b Stay,horn

2-2-4 OPERATION AFTER INSTALLATION

1.Install the front bumper cover.
Refer to Page I2-4.

2.Install the battery negative (−) terminal.

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TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA -- K1 - 41
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1 HEATER AND AIR CONDITIONER

1-1 INSTRUCTIONS FOR SERVICE OPERATION

1-1-1 REFRIGERANT AND COMPRESSOR OIL SPECIFICATIONS

Refrigerant	HFC－134a
Refrigerant replenishing amount (g)	300±30
Compressor oil	ND－OIL8

CAUTION

- When adjusting the amount of refrigerant, remove all the refrigerant in the cycle, and then refill the amount provided above [additional refill is not allowed].

NOTE

- Refrigerant service can (300 g):999-01090-C9-006

1-1-2 INSTRUCTIONS FOR REFRIGERANT AND SERVIS CAN

WARNING

- Any wrong handling may cause toxic substances to generate or the service can to explode, thus leading to serious injuries. Or, the liquid may splash, resulting in blindness, frostbite, etc.

1. Be sure to use the refrigerant HFC－134a.
2. When taking out the refrigerant during the repair, etc. of the air conditioner, be sure to use a refrigerant recovery machine. Never allow the refrigerant to be discharged to the atmosphere.
3. Be sure to recover the refrigerant when the vehicle is scrapped or the car air conditioner is disposed of.
4. When the refrigerant gas is exposed to open flame or very high temperature, it will be dissolved, thus generating toxic substances. Therefore, utmost care must be exercised so that the refrigerant gas may not leak at such a place.
5. Do not perform operations at a place with poor ventilation.
6. Never use a halide torch-type leak detector. This type of detector does not detect HFC－134a gas leak. Also, it decomposes the HFC－134a, thus generating a toxic substance.
7. Do not heat up the service can. When heating of the service can is absolutely necessary, use hot water at a temperature below 40˚C.
8. Do not recycle the can by returning the refrigerant into the service can.
9. Be very careful not to shake the service can strongly. There is a danger that the can valve may be detached if it has been installed improperly.
10. Do not handle the can near your face in preparation for the explosion of the can. Also, be certain to wear protective goggles.
11. Do not open the valve of the manifold gauge at the high-pressure side while the engine is running. There is a danger that the high-pressure gas flows backward, thus leading to the explosion of the can.
12. In cases where the refrigerant should enter your eyes, do not rub your eyes with your hands or handkerchief, but immediately wash your eyes with clean water for more than 15 minutes. Then, immediately receive medical treatment at an eye doctor.

1-1-3 INSTRUCTIONS FOR COMPRESSOR OIL

1. Be sure to use the designated compressor oil.
2. The compressor oil has high moisture-absorption characteristics. Hence, when an air conditioner part is removed, be sure to immediately shut off the exposure to the atmosphere, using plugs, vinyl tape, etc.
3. The compressor oil has an adverse influence on the paint surface and resin. Therefore, utmost care must be exercised so that the compressor oil may not adhere to such places. If the compressor oil should be adhered to such places, immediately wipe off the oil, using cloth.

1-1-4 INSTRUCTIONS FOR INSTALLATION OF O-RINGS AND PIPES

1.Be certain to use O-rings for HFC—134a.
2.Be sure to use new O-rings when the pipes are connected.
3.When the O-rings are detached, use a soft object, such as a toothpick, being very careful not to damage the pipes.
4.Liberally apply compressor oil to the O-ring.
5.Route the hose pipes naturally. Be very careful not to twist them or bend them forcibly.
6.If a foreign substance, such as a lint, is adhered to the joint section of the pipes and O-rings, it will cause the refrigerant gas to leak. Therefore, make sure that no foreign substance is present before connecting the pipes. Also, do not touch the joint section of the pipes and O-rings with cotton work gloves.
7.When the pipes are replaced with new ones, replenish the following amount of compressor oil.

REPLACEMENT PARTS	Pipes and hoses
Replenishing amount of compressor oil	5 cc (per 1 piece)

1-2 ARTICLES TO BE PREPARED

Instrument

Dial gauge,Torque wrench,Tachometer,Dry and wet bulb hygrometer,Temperature gauge

Tool

Manifold gauge

1-3 BASIC CHECK AND ADJUSTMENT

1-3-1 CHECK OF COOLING PERFORMANCE

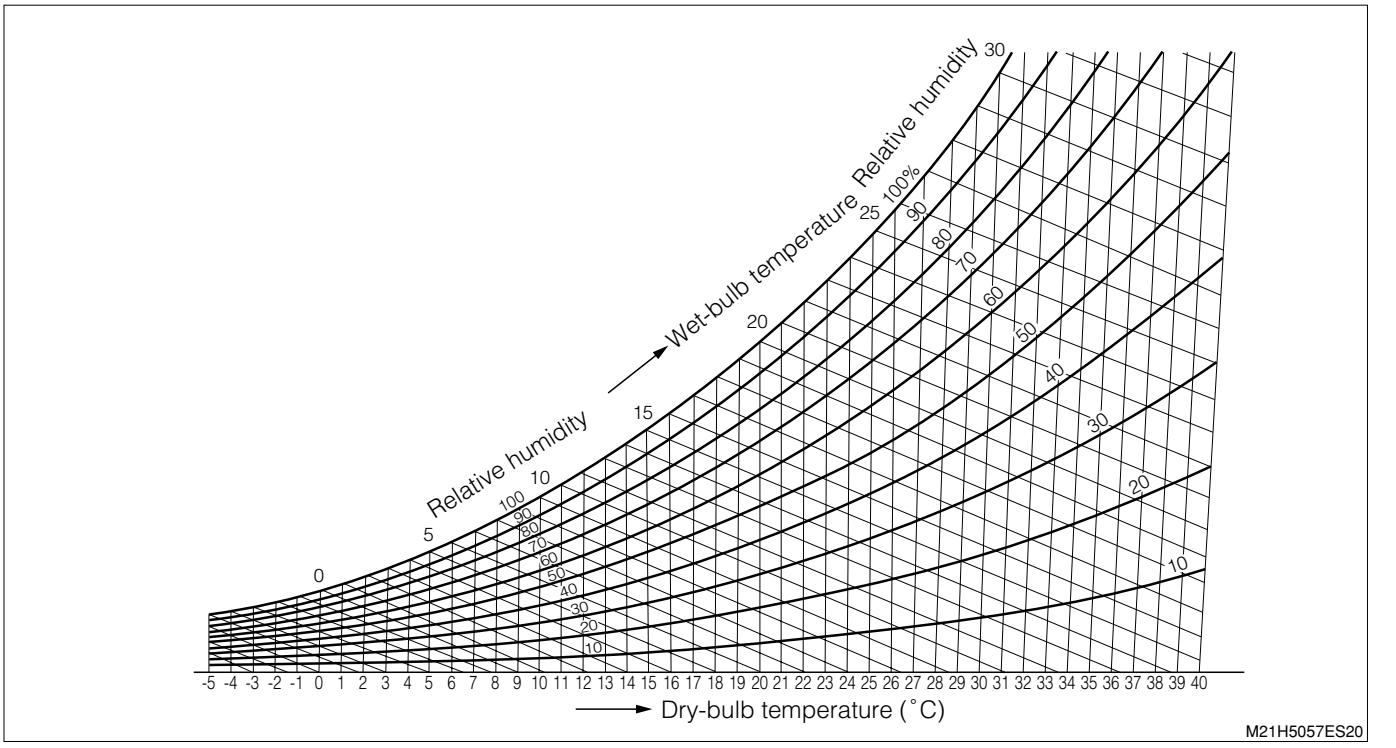
1.Install a manifold gauge.
2.Set the vehicle to the following conditions.

Detected item	Condition
Vehicle body	Parked state in a shaded area
Hood door	Fully opened
A/C switch (magnet clutch)	ON
Engine revolution speed	2000rpm
Switching of inside and outside air	Inside air
Register	VENT
Set temperature	MAX COOL
Blower speed	HI
Temperature at cooling unit intake port *1	25 - 35˚C
Gauge high-pressure side pressure *2	1.5MPa {15.5kgf/cm^2}

CAUTION

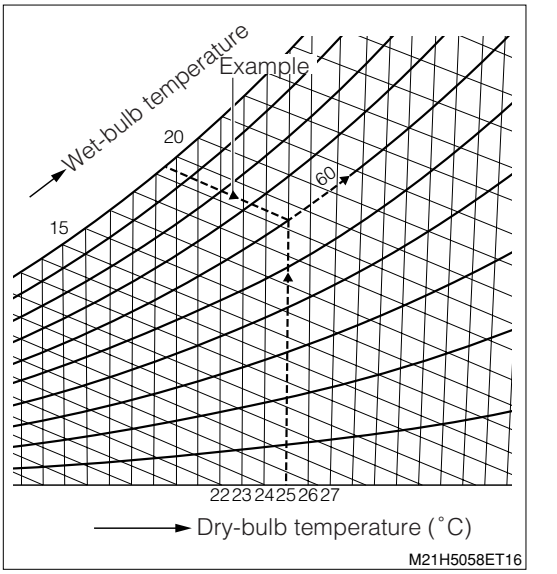
- *1 To ensure accurate measurements, the temperatures at the air intake port of the cooling unit must be somewhere between 25 - 35˚C. If the temperature is too low, postpone the testing.
  *2 When the pressure is too high, pour water on the condenser to reduce the pressure. Conversely, if the pressure is too low, cover the front part of the condenser to raise the pressure.

3.Remove the glove box. Place a wet and dry bulb thermometer (necessary for measuring humidity) at the air intake port of the cooling unit.
4.Insert the bulb section of the wet and dry bulb thermometer into the center of the register.
5.Start the operation under the condition of Item 2, thus stabilizing the temperature at the register. (Approx. 5 to 6 minutes)
6.Measure dry-bulb and wet-bulb temperatures of the air intake port and the register temperature.
7.Determine the relative humidity using the air diagram from the measured temperatures of the wet and dry bulb of the air intake port.

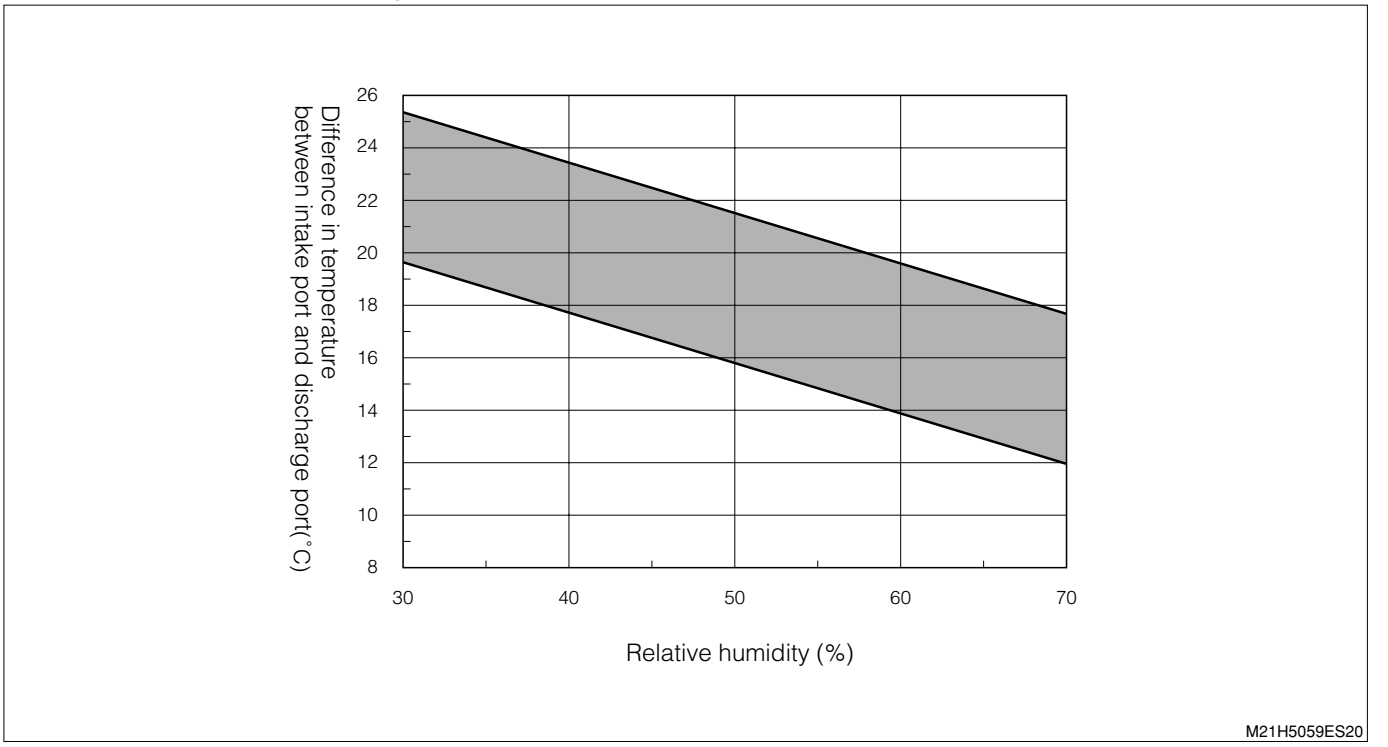


NOTE

- When the dry-bulb temperature of the wet and dry bulb thermometer that has been set to the air intake port is 25˚C and the wet-bulb temperature is 19.5˚C, the intersection of the dotted lines in the diagram indicates the relative humidity. In this case, the relative humidity is 60%.



8.Check the difference between measured temperatures of the air intake port and the register as well as their relative humidity using the standard performance table.

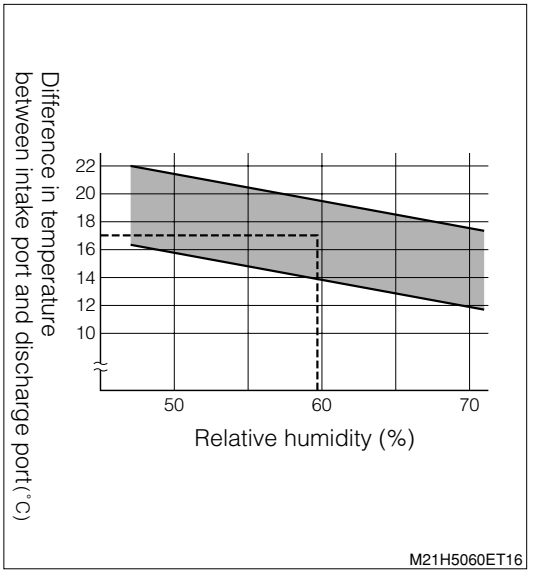


SPECIFIED VALUE: Ensure that the check results are within the range of the slant line section in the figure.

NOTE

- The example shows how to evaluate performance using the standard performance table, where the difference between the dry-bulb temperatures of the air intake port and the register is 17˚C and the relative humidity is 60%.

9.In cases where an abnormality is confirmed, check and repair the air conditioner system according to the trouble-shooting.



1-3-2 CHECK AND ADJUSTMENT OF AIR CONDITIONER COMPRESSOR BELT TENSION (DEFLECTION AMOUNT)

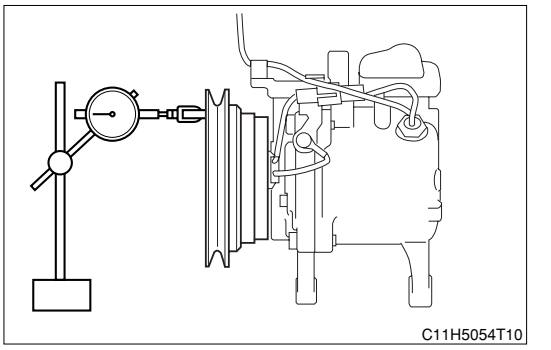
(1) Type 1KR-FE engine

Refer to Page B1-5.

(2) Type K3-VE engine

Refer to Page B1-21.

1-3-3 CHECK AND ADJUSTMENT OF MAGNET CLUTCH AIR GAP



1.Remove the compressor.
Refer to Page K1-22.

2.Install the dial gauge to the magnet clutch hub vertically.
3.Connect the connector terminal of the magnet clutch to the positive (+) terminal of the battery, and the body earth of the compressor to the negative (-) terminal of the battery. Then, start the operation of the magnet clutch. At this time, check the air gap.
SPECIFIED VALUE: $0.5^{+0.15}_{-0.20}$ mm
4.If the check results fail to conform to the specified value, remove the magnet clutch hub and perform the adjustment by means of the plate washer.

CAUTION
- The number of plate washers to be used should be 3 pcs. or less.

Refer to Page K1-24.

1-3-4 CHECK OF DEFROSTER OPERATION

1.Check that air blows out the defroster vent, when the IG switch is turned "ON".
2.Checks that air volume changes according to the blower switch operation.

2 REFRIGERANT

2-1 REPLACEMENT

CAUTION

- When adjusting the amount of refrigerant, remove all the refrigerant in the cycle, and then refill the amount below [additional refill is not allowed].

2-1-1 ARTICLES TO BE PREPARED

Tool

Vacuum pump,Manifold gauge,Halogen leak detector

Lubricant,adhesive,others

Chlorofluorocarbon recovery and regenerating machine,Refrigerant gus HFC－134a(R134a)

2-1-2 REPLACING PROCEDURE

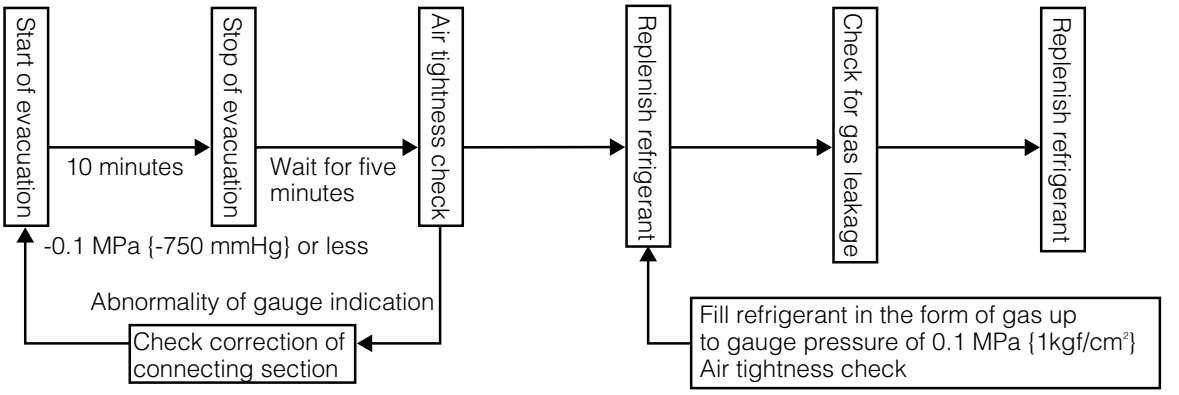
(1) Recovery procedure

1.Turn ON the A/C switch.

2.Start the engine and operate the compressor for about 5 to 6 minutes so that the residual compressor oil in each function part may circulate with the refrigerant and be recovered to the compressor.

3.Recover the refrigerant, following the instruction manual of the refrigerant recovery and recycling machine to be used.

(2) Replenishing procedure



C11H5050_1ES16

SPECIFIED VALUE: Replenishing amount of refrigerant: 300±30g

NOTE

- Refrigerant service can (300 g):999-01090-C9-006

3 HEATER CONTROL PANEL

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

Tool

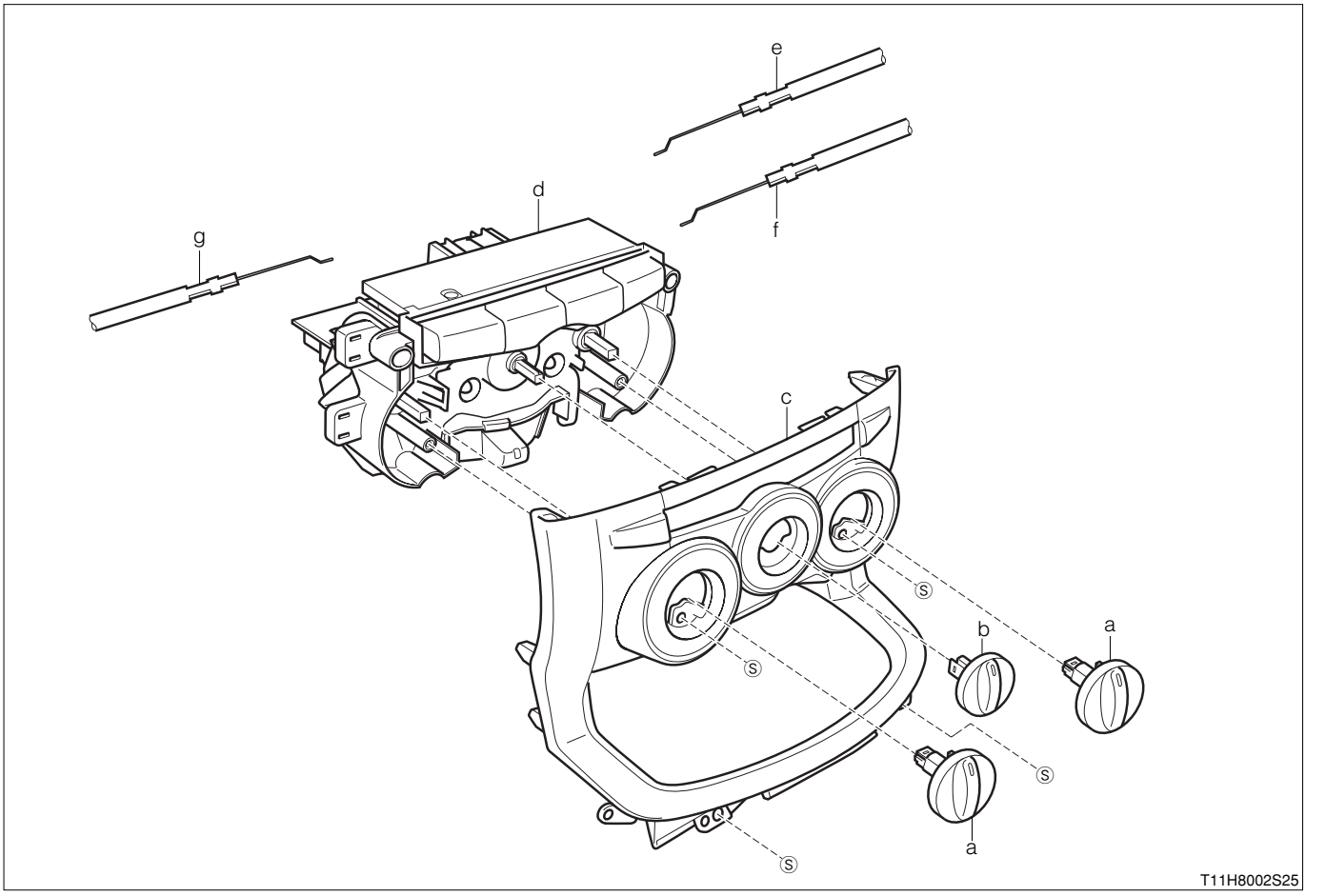
Snap ring pliers

3-1-2 OPERATION BEFORE REMOVAL

1.Remove the panel S/A, instrument panel finish lower.
Refer to Page I2-23.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

	1	a	Knob S/A, control (temperature control mode)
	2	b	Knob S/A, control (blower)
	3	c	Panel S/A, instrument cluster finish, lower center
▼	4	d	Control S/A, heater
▼ ▲	5	e	Cable S/A, defroster damper control
▼ ▲	6	f	Cable S/A, temp damper control
▼ ▲	7	g	Cable S/A, air inlet damper control

3-1-4 POINTS OF REMOVAL

(1) Control S/A, heater

1.Disconnect the cooling unit side cable S/A to remove the control Ay together with the cable S/A.

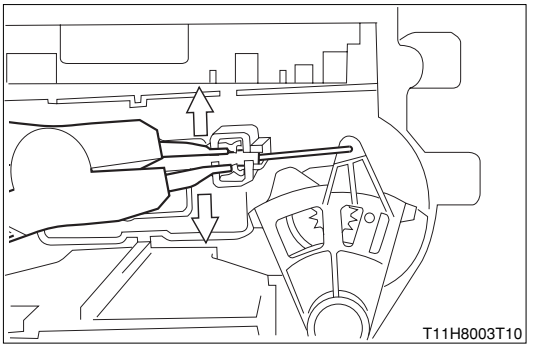
(2) Cable S/A, defroster damper control, Cable S/A, temp damper control, Cable S/A, air inlet damper control

1.Disconnect the cable S/A from the heater blower switch, while widening the cable clip pawl with snap ring pliers.

CAUTION

- The cable at the switch, heater blower side is of a pawl securing type. Therefore, there is the possibility that, if the pawl is opened forcibly, the securing force becomes weak, thus becoming unable to secure the cable again. Hence, be sure to use snap ring pliers.

TOOL: Snap ring pliers

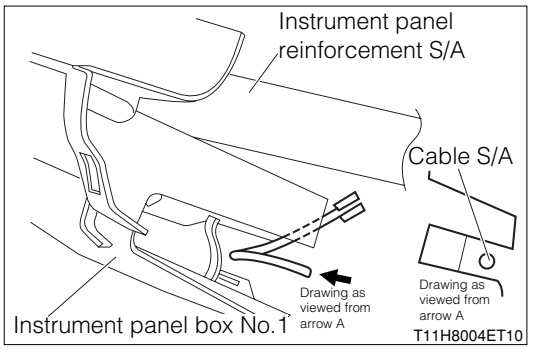


3-1-5 POINTS OF INSTALLATION

(1) Cable S/A, air inlet damper control

① RHD vehicles

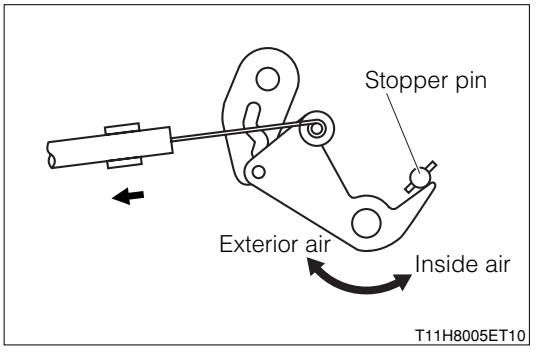
1.Route the cable S/A on the vehicle front side of the No.1 instrument panel box.



2.Set the inside/outside air selection lever to the inside air.

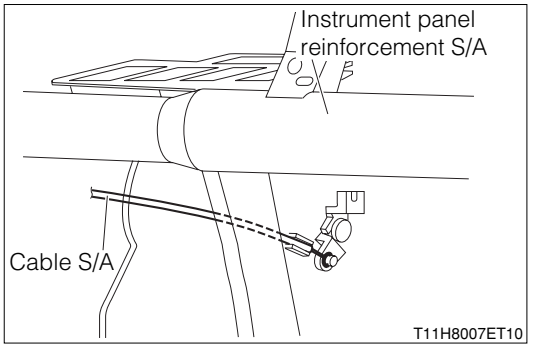
3.Push the inside/outside air selection link of the unit assembly, air conditioner against the stopper pin at the inside air side.

4.While pulling the cable outer in the arrowheaded direction, clamp the cable.



② LHD vehicles

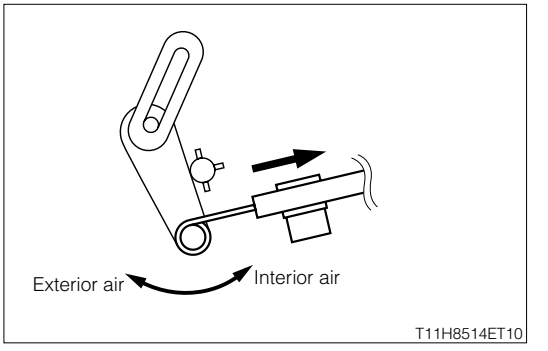
1.Route the cable S/A between the brace and the vehicle harness.



2.Set the inside/outside air selection lever to the inside air.

3.Push the inside/outside air selection link of the unit assembly, air conditioner against the stopper pin at the inside air side.

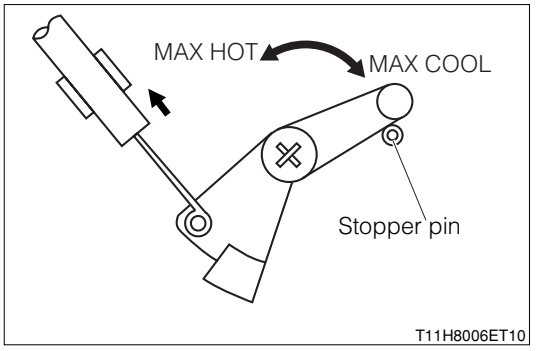
4.While pulling the cable outer in the arrowheaded direction, clamp the cable.



(2) Cable S/A, temp damper control

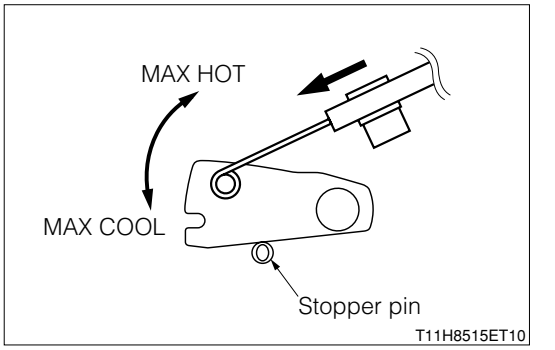
① RHD vehicles

1.Set the temperature adjusting dial to the MAX COOL.
2.Push the control link of the heater radiator Ay against the MAX COOL side stopper pin.
3.While pushing the cable outer in the arrowheaded direction, clamp the cable.



② LHD vehicles

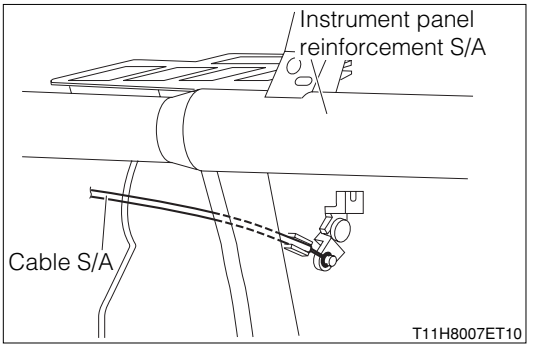
1.Set the temperature adjusting dial to the MAX COOL.
2.Push the control link of the heater radiator Ay against the MAX COOL side stopper pin.
3.While pushing the cable outer in the arrowheaded direction, clamp the cable.



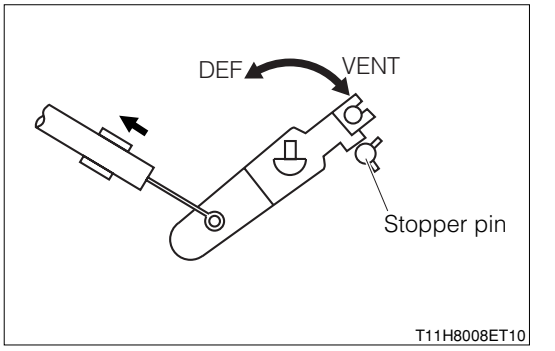
(3) Cable S/A, defroster damper control

① RHD vehicles

1.Route the cable S/A between the brace and the vehicle harness.

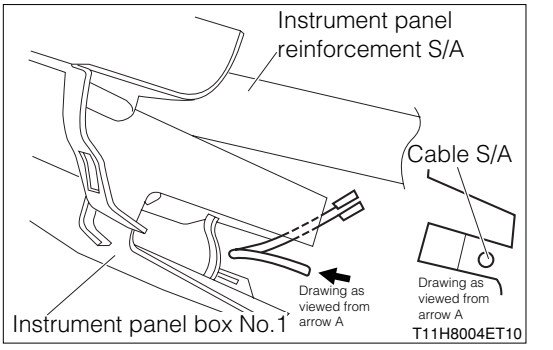


2.Set the register selection dial to the VENT position.
3.Push the mode link of the heater radiator Ay against the VENT side stopper pin.
4.While pulling the cable outer in the arrowheaded direction, clamp the cable.

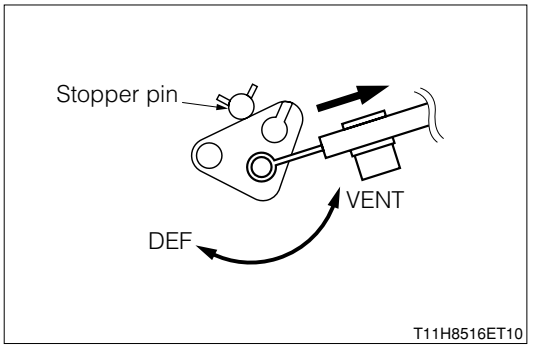


② LHD vehicles

1.Route the cable S/A on the vehicle front side of the No.1 instrument panel box.



2.Set the register selection dial to the VENT position.
3.Push the mode link of the heater radiator Ay against the VENT side stopper pin.
4.While pulling the cable outer in the arrowheaded direction, clamp the cable.



3-1-6 OPERATION AFTER INSTALLATION

1.Install the panel S/A, instrument panel finish lower.
Refer to Page I2-23.

4 COOLING UNIT

4-1 REMOVAL AND INSTALLATION

4-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

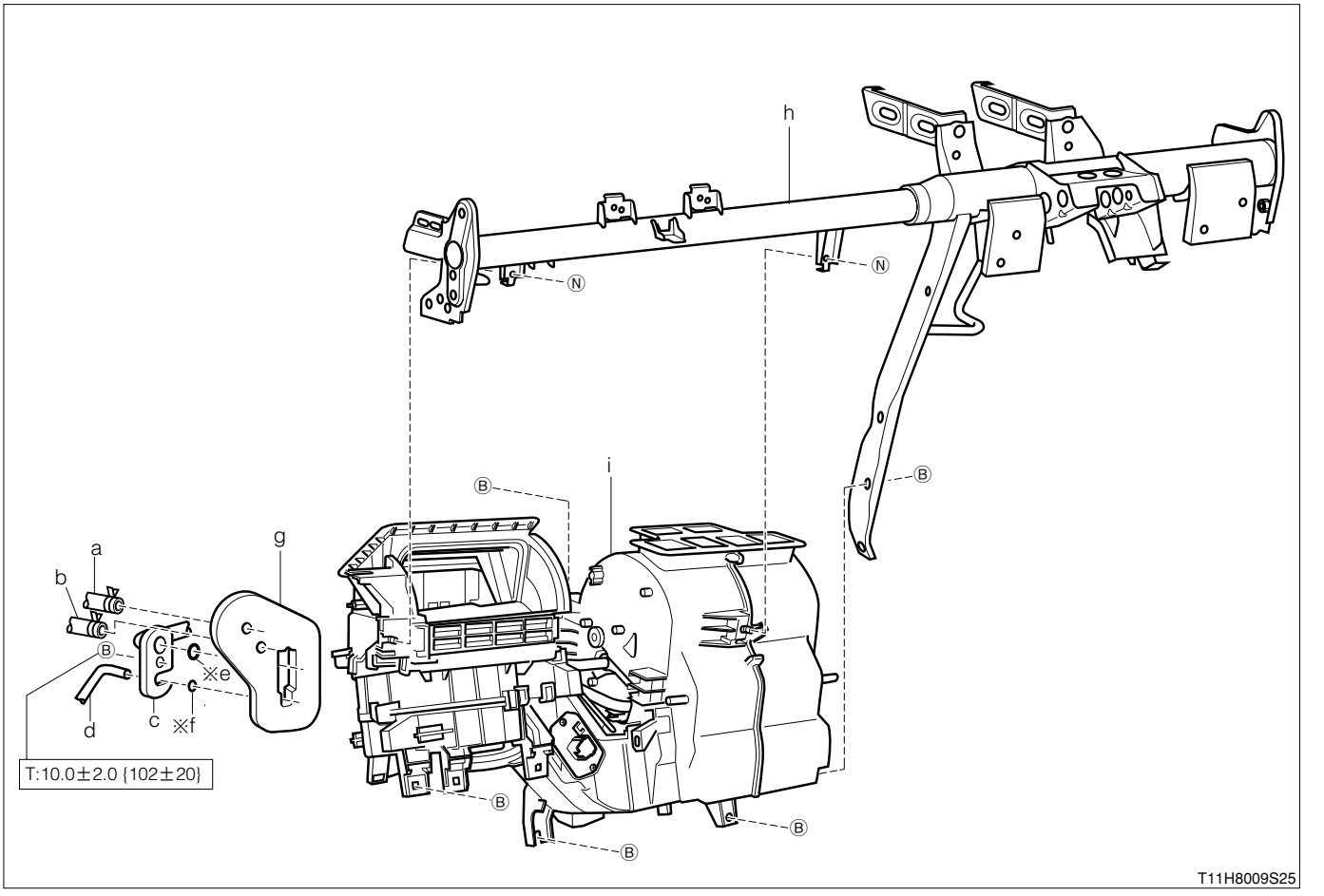
4-1-2 OPERATION BEFORE REMOVAL

1.Drain refrigerant.
Refer to Page K1-6.

2.Drain the cooling water.
3.Remove the panel, instrument.
Refer to Page I2-23.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit: N·m{kgf·cm}
※: Non-reusable parts

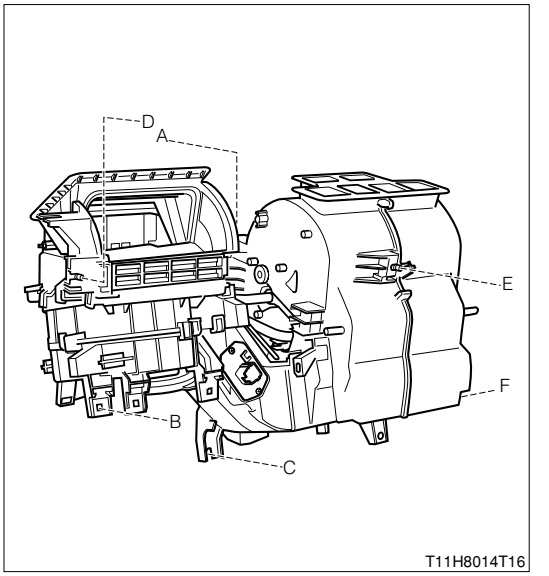
(2) Removal and installation procedures

1 a Hose, water
2 b Hose, water, No.2
3 c Hose, suction
4 d Tube, liquid, No.1
5 e Ring, O
6 f Ring, O
7 g Packing
8 h Reinforcement S/A, instrument panel
▼ ▲ 9 i Unit Ay, air conditioner

4-1-4 POINTS OF REMOVAL

(1) Unit Ay, air conditioner

1.Remove "A" from the engine compartment side.
2.Remove the bolts in the sequence of "B" and "C".
3.Remove the bolts from the instrument panel reinforcement S/A in the sequence of "D".
4.Move the instrument panel reinforcement S/A toward the back of the vehicle and remove the unit Ay.



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4-1-5 POINTS OF INSTALLATION

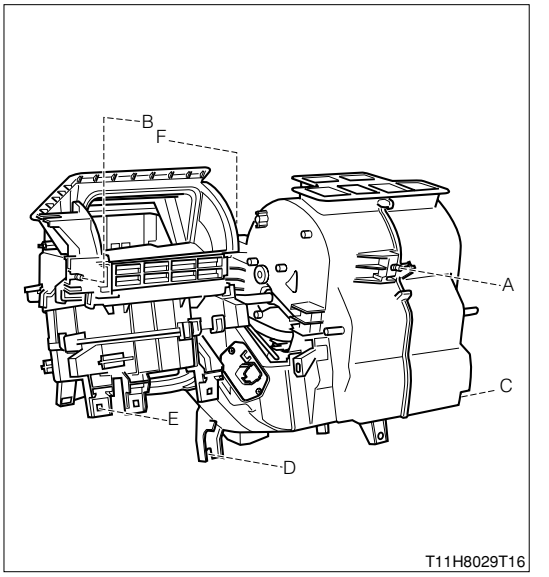
(1) Unit Ay, air conditioner

1.When the unit assembly is replaced with a new one, replenish the following amount of compressor oil.

REPLACEMENT PARTS	Unit Ay
Replenishing amount of compressor oil	25

LUBRICANT: Compressor oil (ND—OIL8)

2.Reinstall the unit Ay to the instrument panel reinforcement S/A in the sequence of "A".
3.Move the instrument panel reinforcement S/A toward the front of the vehicle and tighten the bolts in the sequence of "D" and "E".
4.Install "F" from the engine compartment side.



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4-1-6 OPERATION AFTER INSTALLATION

1.Install the panel instrument.
Refer to Page I2-23.

2.Fill cooling water.
3.Replenish refrigerant.
Refer to Page K1-6.

4-2 DISASSEMBLING AND ASSEMBLING

4-2-1 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

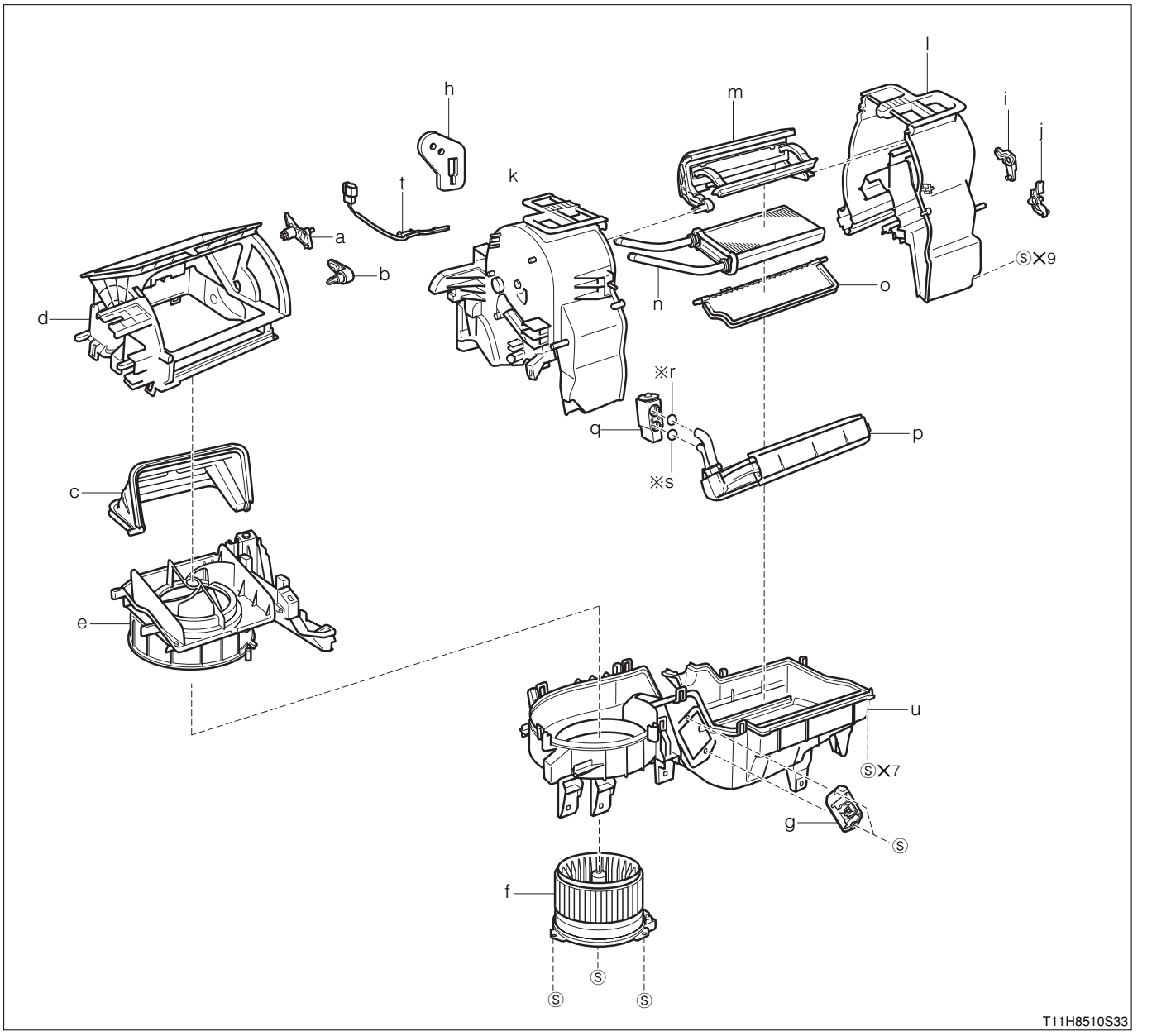
Compressor oil (ND—OIL8)

4-2-2 OPERATION BEFORE DISASSEMBLY

1.Remove the unit assembly, air conditioner.
Refer to Page K1-11.

4-2-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Components



※: Non-reusable parts

(2) Disassembling and assembling procedure

1 a Lever (for inside-and-outside mind doors)
2 b Lever (for inside-and-outside air cable)
3 c Door S/A (for inside-and-outside air)
▲ 4 d Case S/A, blower (for inside-and-outside air)
5 e Case S/A, blower (blower upper)
6 f Motor Ay, w/fan
7 g Resistor, blower
8 h Packing
9 i Lever (for mode selection)
10 j Lever (for air mixture)
11 k Case, heater, LH
12 l Case, heater, RH
13 m Door S/A (for mode selection)
14 n Core S/A, heater
15 o Door S/A (for air mixture)
16 p Evaporator S/A
17 q Valve, expansion
18 r Ring, O
19 s Ring, O
20 t Thermistor, cooler
▲ 21 u Case S/A, blower (blower lower)

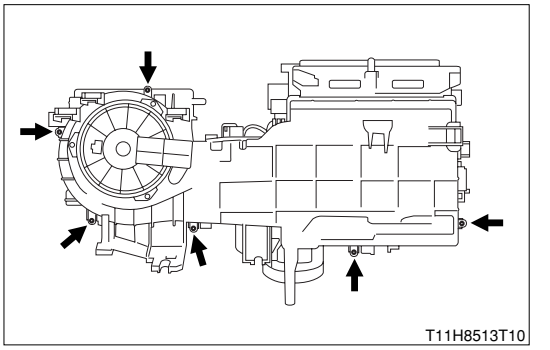
4-2-4 POINTS OF ASSEMBLY

(1) Case S/A, blower (Blower lower)

1.When the case is used again, attach and tighten the screws supplied as replacement parts at the (six) positions shown in the right figure.

NOTE

- Screw part number:88466-87202-000

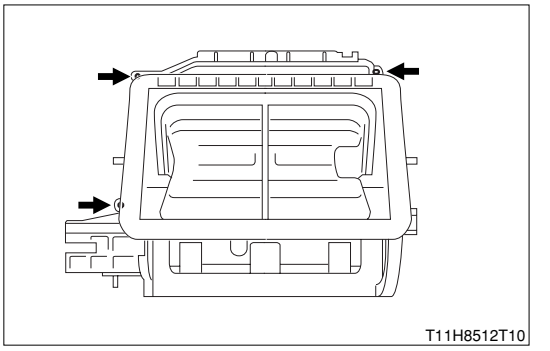


(2) Case S/A, blower (For inside-and-outside air)

1.When the case is used again, attach and tighten the screws supplied as replacement parts at the (three) positions shown in the right figure.

NOTE

- Screw part number:88466-87202-000



4-2-5 OPERATION AFTER ASSEMBLY

1.Install the unit assembly, air conditioner.
Refer to Page K1-11.

4-3 REMOVAL AND INSTALLATION (LHD VEHICLES)

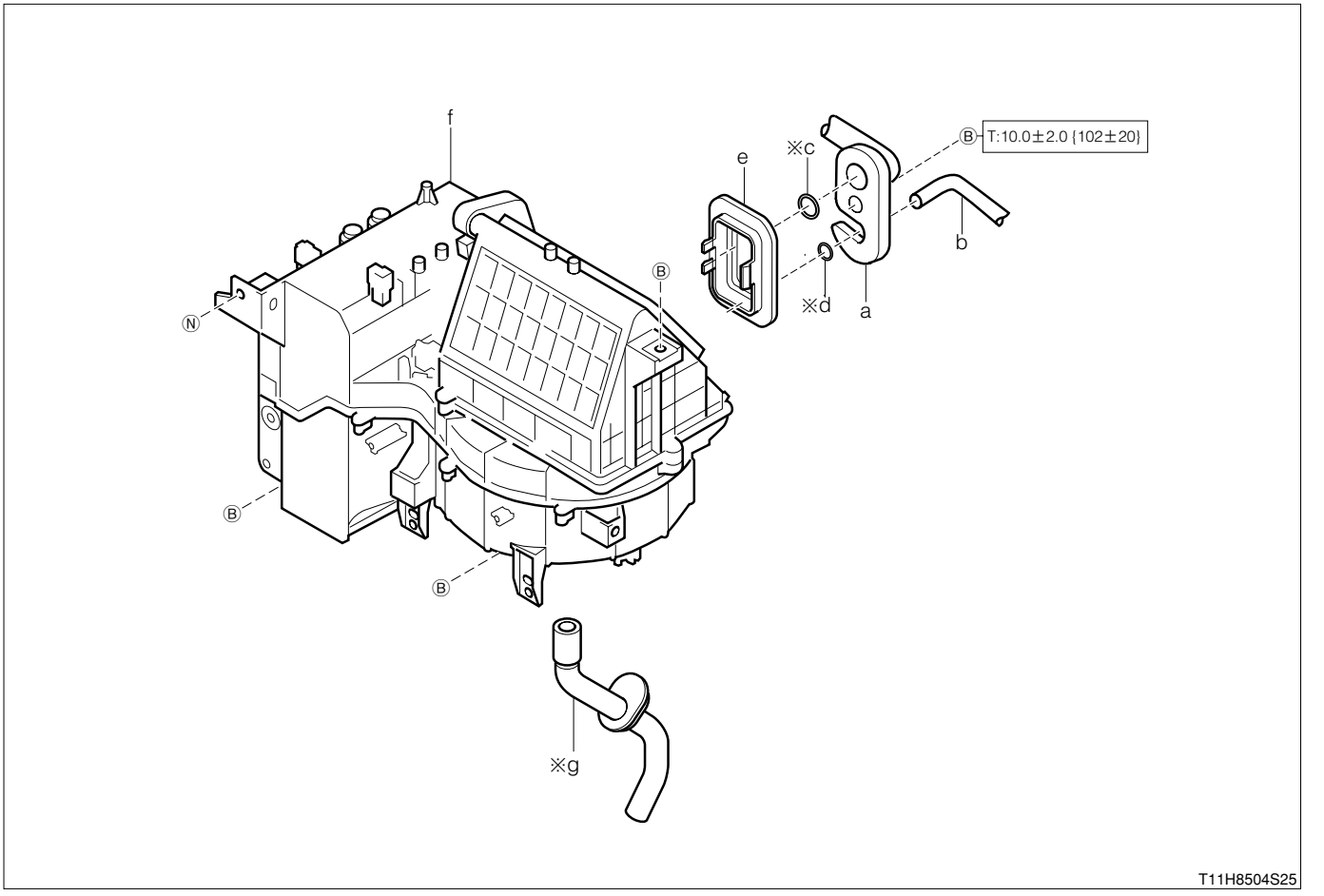
4-3-1 OPERATION BEFORE REMOVAL

1.Drain refrigerant.
Refer to Page K1-6.

2.Drain the cooling water.
3.Remove the panel, instrument.
Refer to Page I2-23.

4-3-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit: N·m{kgf·cm}
※: Non-reusable parts

(2) Removal and installation procedures

1 a Tube, suction, No.1
2 b Tube, liquid, No.1
3 c Ring, O
4 d Ring, O
5 e Cover, cooler, No.1
6 f Unit Ay, air conditioner
7 g Hose, drain cooler

4-3-3 OPERATION AFTER INSTALLATION

1.Install the panel instrument.
Refer to Page I2-23.

2.Fill cooling water.
3.Replenish refrigerant.
Refer to Page K1-6.

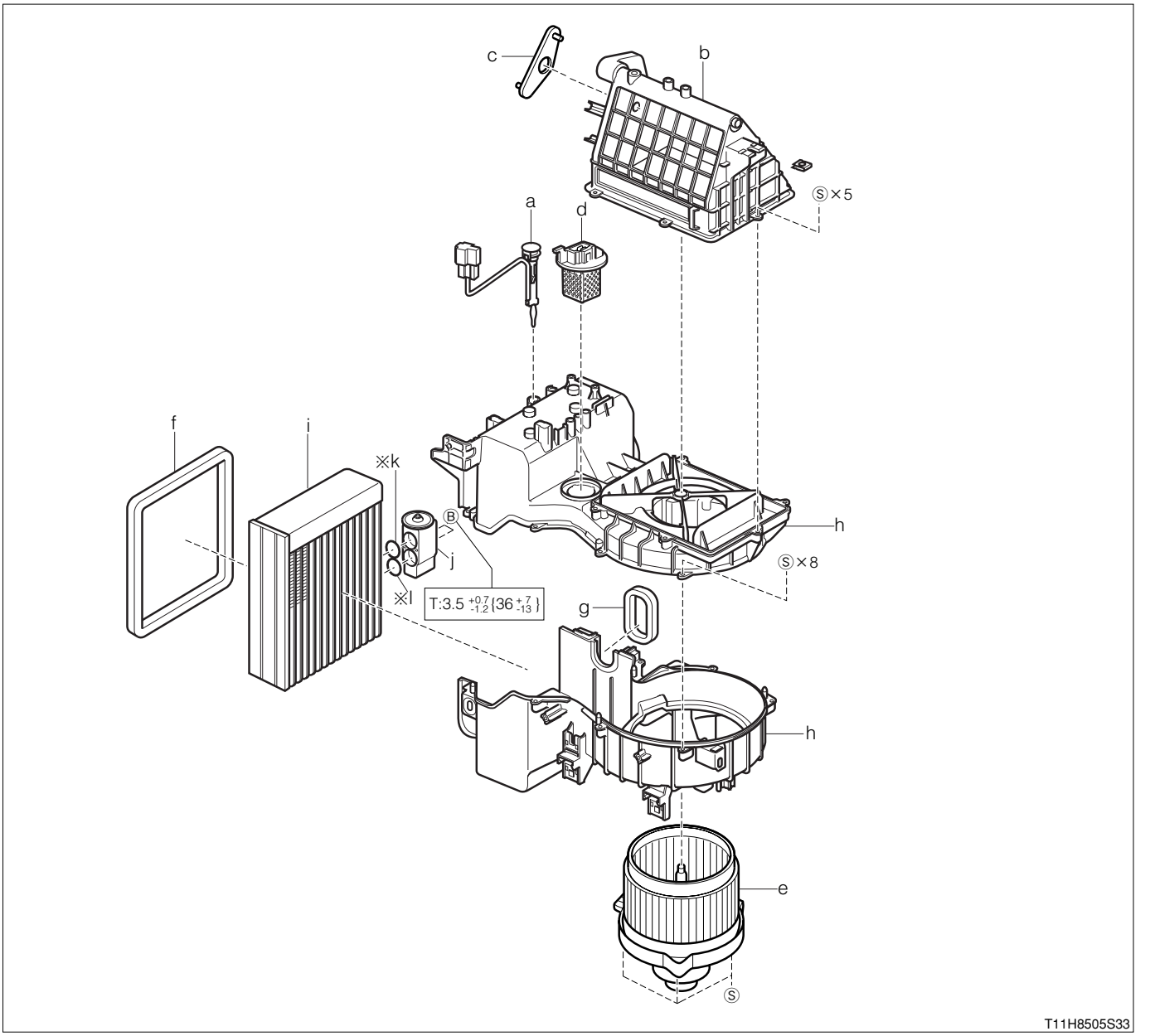
4-4 DISASSEMBLING AND ASSEMBLING

4-4-1 OPERATION BEFORE DISASSEMBLY

1.Remove the unit assembly, air conditioner.
Refer to Page K1-15.

4-4-2 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Components



Unit: N·m{kgf·cm}
※: Non-reusable parts

(2) Disassembling and assembling procedure

1	a	Thermistor, cooler	7	g	Packing, cooler
2	b	Case, air damper	8	h	Case S/A, cooling unit
3	c	Element, air refiner	9	i	Evaporator S/A
4	d	Resistor, blower	10	j	Valve, expansion
5	e	Motor S/A, blower w/fan	11	k	Ring, O
6	f	Packing, cooler	12	l	Ring, O

4-4-3 OPERATION AFTER ASSEMBLY

1.Install the unit assembly, air conditioner.

Refer to Page K1-15.

5 HEATER UNIT

5-1 REMOVAL AND INSTALLATION (LHD VEHICLES)

5-1-1 OPERATION BEFORE REMOVAL

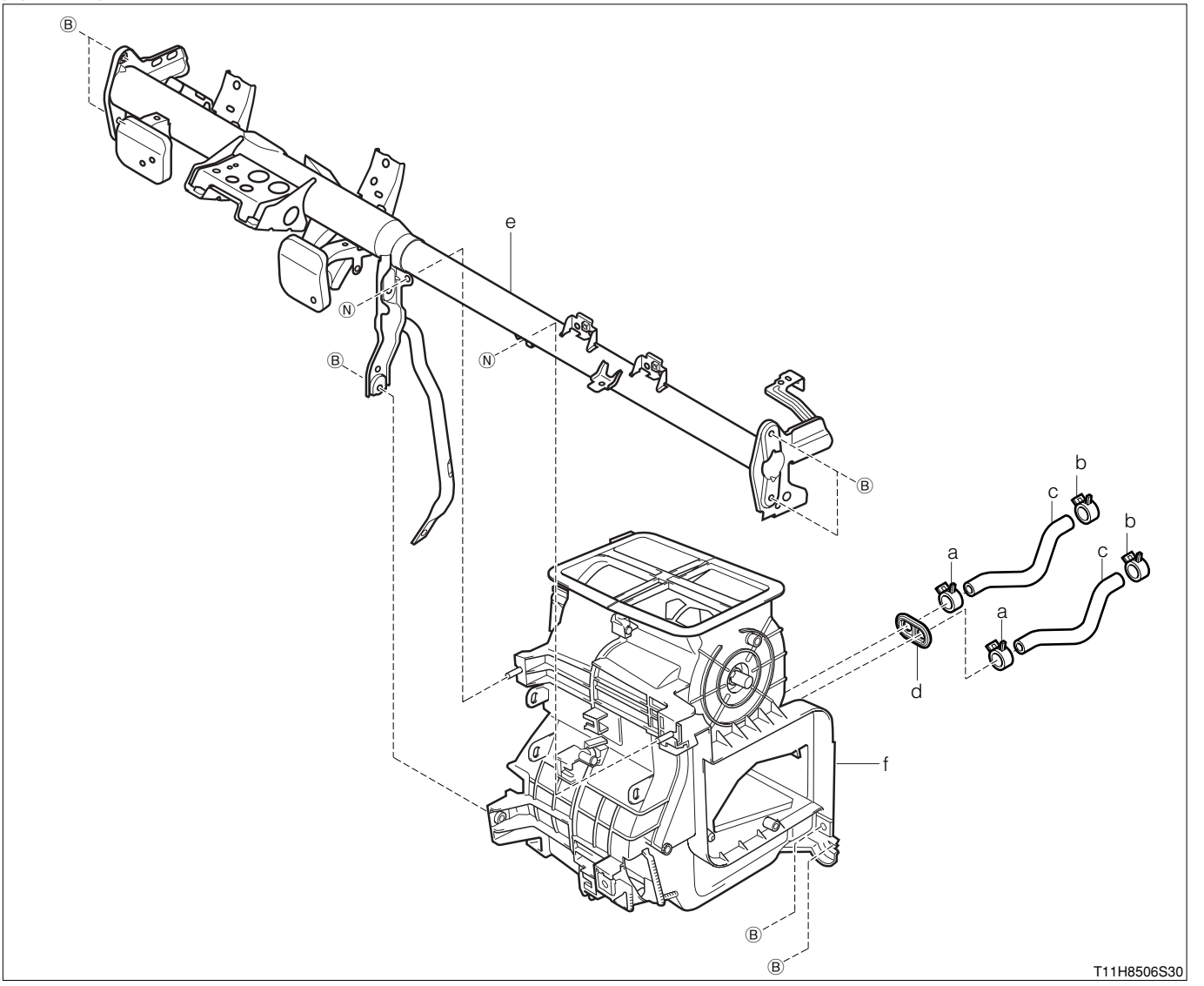
1.Drain refrigerant.
Refer to Page K1-6.

2.Drain the cooling water.
3.Remove the panel, instrument.
Refer to Page I2-23.

4.Remove the unit assembly, air conditioner.
Refer to Page K1-15.

5-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Clip
2 b Clip
3 c Hose, water, No.1
4 d Grommet
5 e Reinforcement S/A, instrument panel
6 f Radiator Ay, heater

5-1-3 OPERATION AFTER INSTALLATION

1.Install the unit assembly, air conditioner.
Refer to Page K1-15.

2.Install the panel instrument.
Refer to Page I2-23.

3.Fill cooling water.
4.Replenish refrigerant.
Refer to Page K1-6.

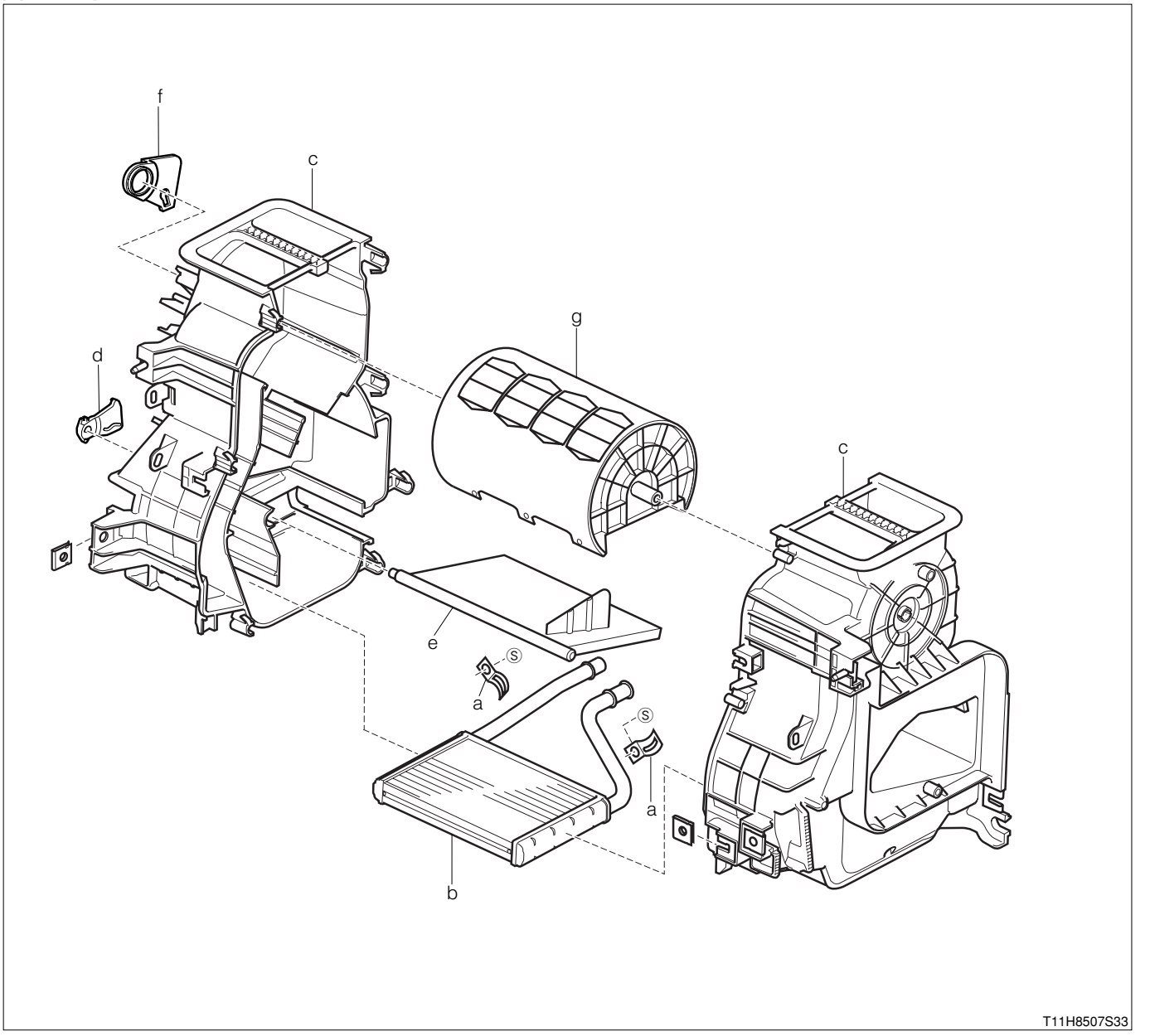
5-2 DISASSEMBLING AND ASSEMBLING (LHD VEHICLES)

5-2-1 OPERATION BEFORE DISASSEMBLY

1.Remove the radiator assembly, heater.
Refer to Page K1-18.

5-2-2 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Components



(2) Disassembling and assembling procedure

1 a Clamp, cooler, No.1
2 b Unit S/A, radiator heater
▲ 3 c Case, heater, RH/LH
4 d Element, air refiner (for air mixture)
5 e Damper, heater duct (for air mixture)
6 f Element, air refiner (for mode selection)
7 g Damper, heater duct (for mode selection)

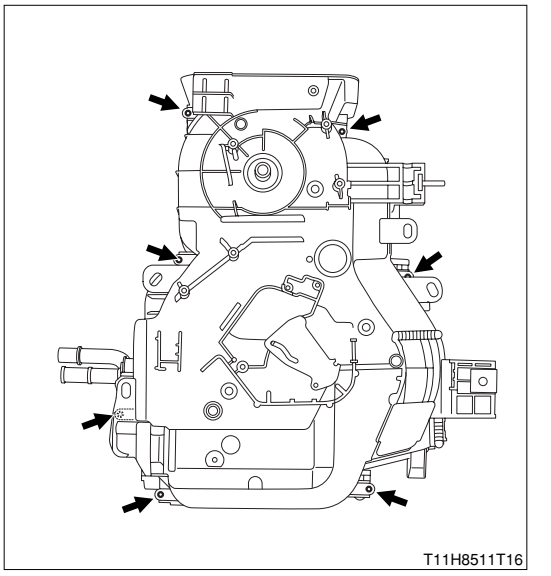
5-2-3 POINTS OF ASSEMBLY

(1) Case, heater, RH/LH

1.When the case is used again, attach and tighten the screws supplied as replacement parts at the (seven) positions shown in the right figure.

NOTE

- Screw part number:88466-87202-000



5-2-4 OPERATION AFTER ASSEMBLY

1.Install the radiator assembly, heater.
Refer to Page K1-18.

6 COMPRESSOR

6-1 REMOVAL AND INSTALLATION

6-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

6-1-2 OPERATION BEFORE REMOVAL

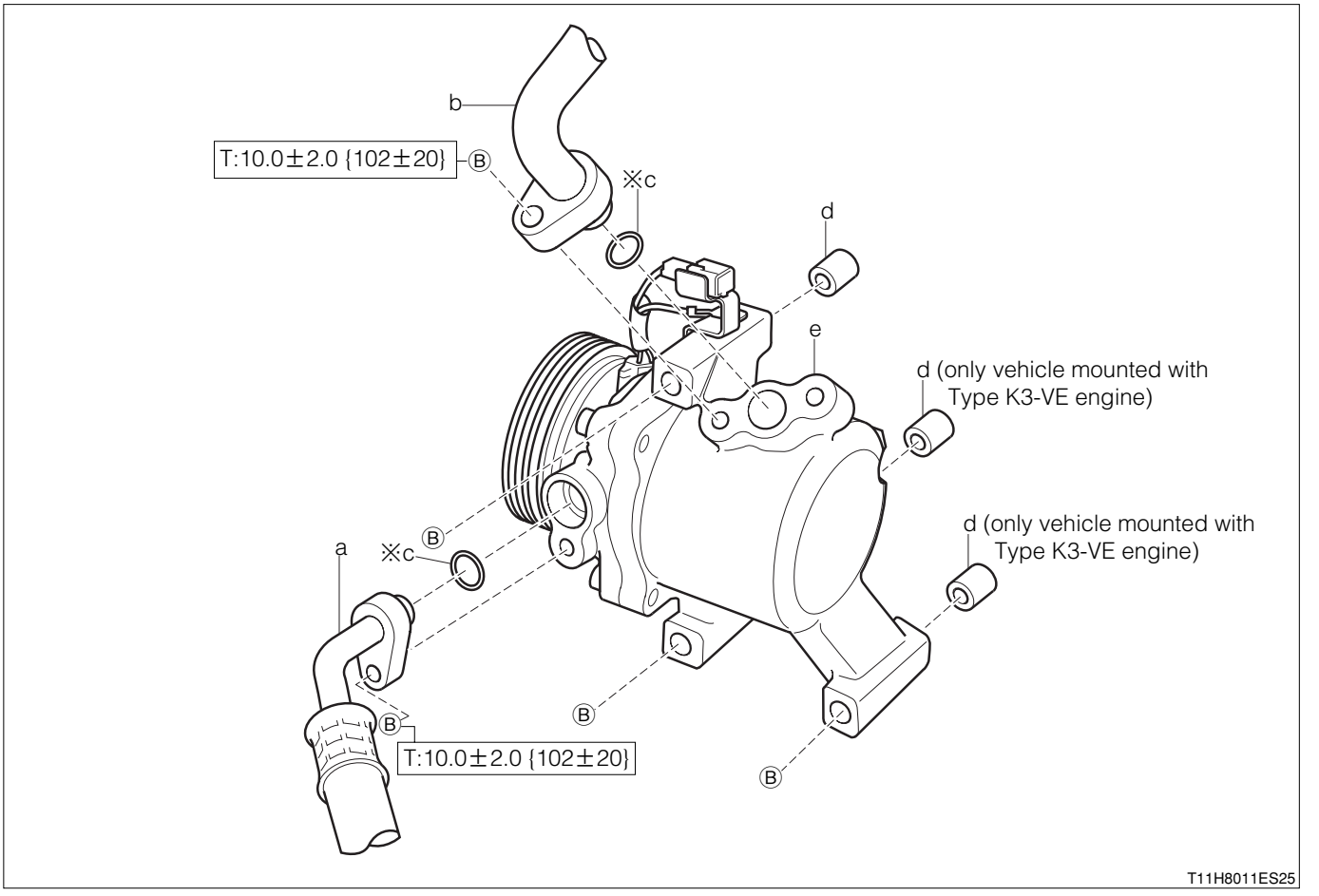
1.Drain refrigerant.
Refer to Page K1-6.

2.Remove the cover, front bumper.
Refer to Page I2-2.

3.Remove the V-ribbed belt.

6-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit: N·m{kgf·cm}
※: Non-reusable parts

(2) Removal and installation procedures

1 a Hose, suction
2 b Hose, discharge
3 c Ring, O
4 d Stay, compressor
▲ 5 e Compressor Ay, W/magnet clutch

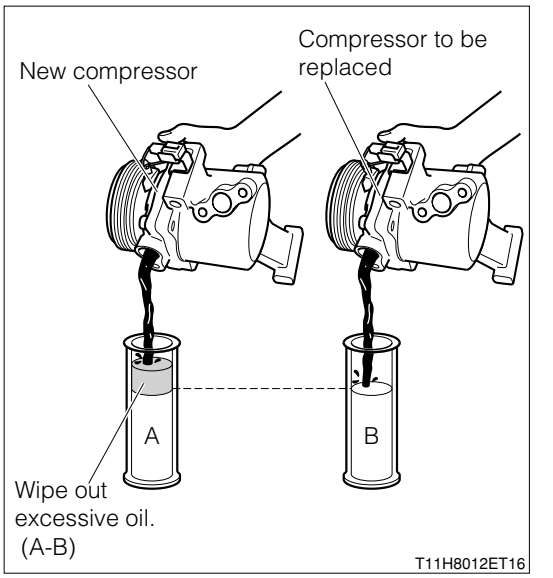
6-1-4 POINTS OF INSTALLATION

(1) Compressor Ay, W/magnet clutch

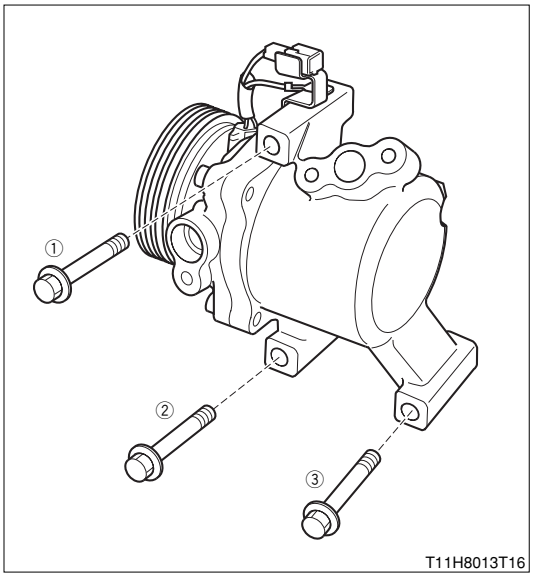
1.When a new compressor assembly is installed, drain the excessive oil of the new compressor so that the amount of the oil may become the same as that of the oil inside the compressor to be replaced.

NOTE

- The new compressor Ay contains the amount of oil required for the full air-conditioning cycle. Therefore, if only the compressor Ay is to be replaced, it is necessary to drain the excess oil which remains in the condenser and the cooling unit.



2.Make sure to tighten the mounting bolts for mounting the compressor Ay in the sequence of ①→②→③ in order to prevent abnormal sound and/or loosing of a belt.



6-1-5 OPERATION AFTER INSTALLATION

1.Replenish refrigerant.
Refer to Page K1-6.

2.Reinstall the V-ribbed belt.

3.When a new belt has been assembled, operate the compressor for five minutes or more. Then, adjust the belt tension (deflection amount) again.
Refer to Page K1-4.

4.Install the front bumper cover.
Refer to Page I2-2.

6-2 DISASSEMBLING AND ASSEMBLING

6-2-1 ARTICLES TO BE PREPARED

Tool

Snap ring pliers

Instrument

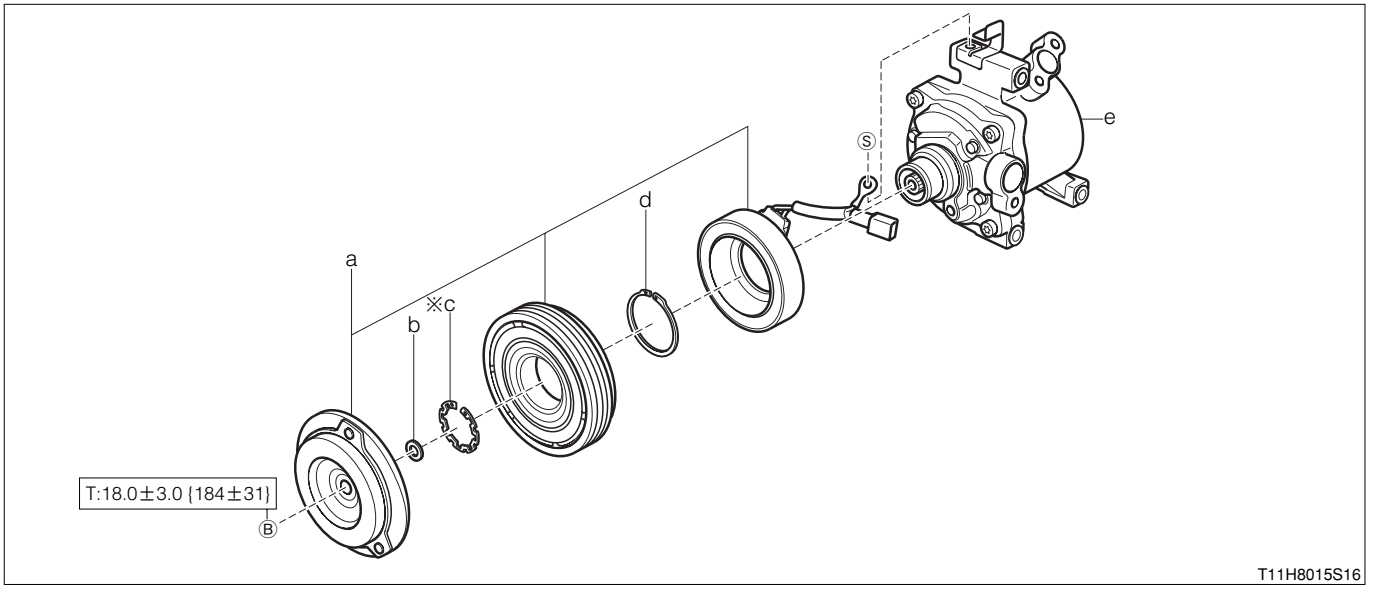
Torque wrench

6-2-2 OPERATION BEFORE DISASSEMBLY

1.Remove the compressor Ay, w/magnet clutch.
Refer to Page K1-22.

6-2-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Components



Unit: N·m{kgf·cm}
※: Non-reusable parts

(2) Disassembling and assembling procedure

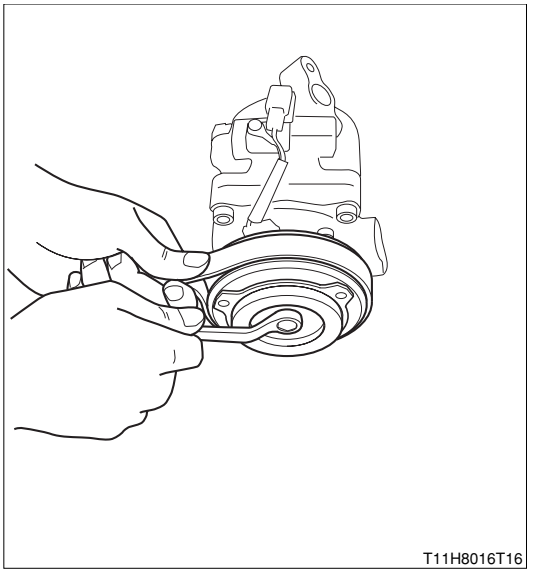
▼ ▲ 1 a Clutch Ay, magnet
2 b Washer, plate
3 c Ring, snap
▲ 4 d Ring, snap
▲ 5 e Compressor Ay

6-2-4 POINTS OF DISASSEMBLY

(1) Clutch Ay, magnet

1.Energize the clutch assembly, thus securing the hub and rotor.

2.Wind the V-belt around the pulley section and secure it by your hand.
3.Remove the bolt.



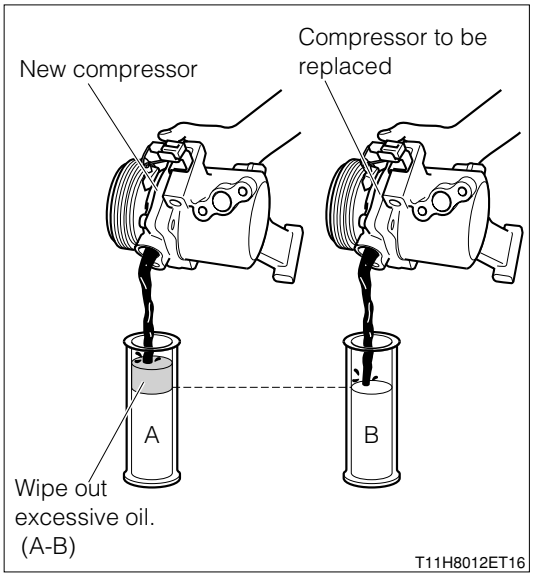
6-2-5 POINTS OF ASSEMBLY

(1) Compressor Ay

1.When a new compressor assembly is installed, drain the excessive oil of the new compressor so that the amount of the oil may become the same as that of the oil inside the compressor to be replaced.

NOTE

- The new compressor Ay contains the amount of oil required for the full air-conditioning cycle. Therefore, if only the compressor Ay is to be replaced, it is necessary to drain the excess oil which remains in the condenser and the cooling unit.



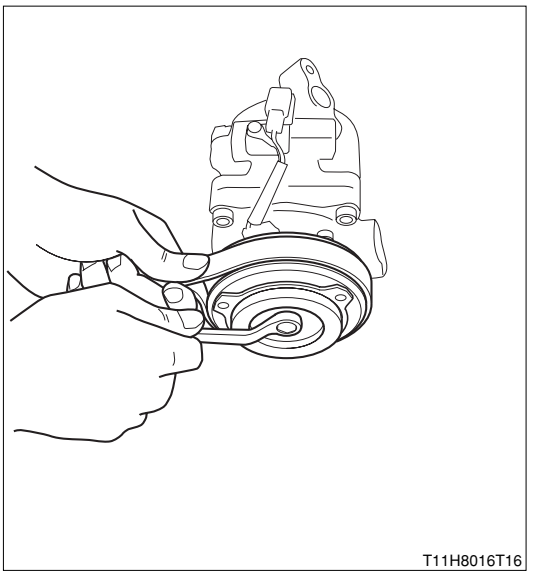
(2) Snap ring

1.Assemble the ring with a chamfered surface on the pulley side.
TOOL: Snap ring pliers

(3) Magnet clutch Ay

1.Tighten the clutch assembly attaching bolt as far as it can be tightened.
2.Energize the clutch assembly, thus securing the hub and rotor.

3.Wind the V-belt around the pulley section and secure it by your hand.
4.Securely tighten the bolt.
5.Check the air gap of the clutch assembly. If the check results fail to conform to the specified value, remove the magnet clutch hub and perform the adjustment by means of the washer.
Refer to Page K1-5.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6-2-6 OPERATION AFTER ASSEMBLY

1.Install the compressor Ay W/magnet clutch .
Refer to Page K1-22.

7 CONDENSER

7-1 REMOVAL AND INSTALLATION

7-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

Compressor oil (ND—OIL8)

7-1-2 OPERATION BEFORE REMOVAL

1.Drain refrigerant.
Refer to Page K1-6.

2.Remove the front bumper cover.
Refer to Page I2-2.

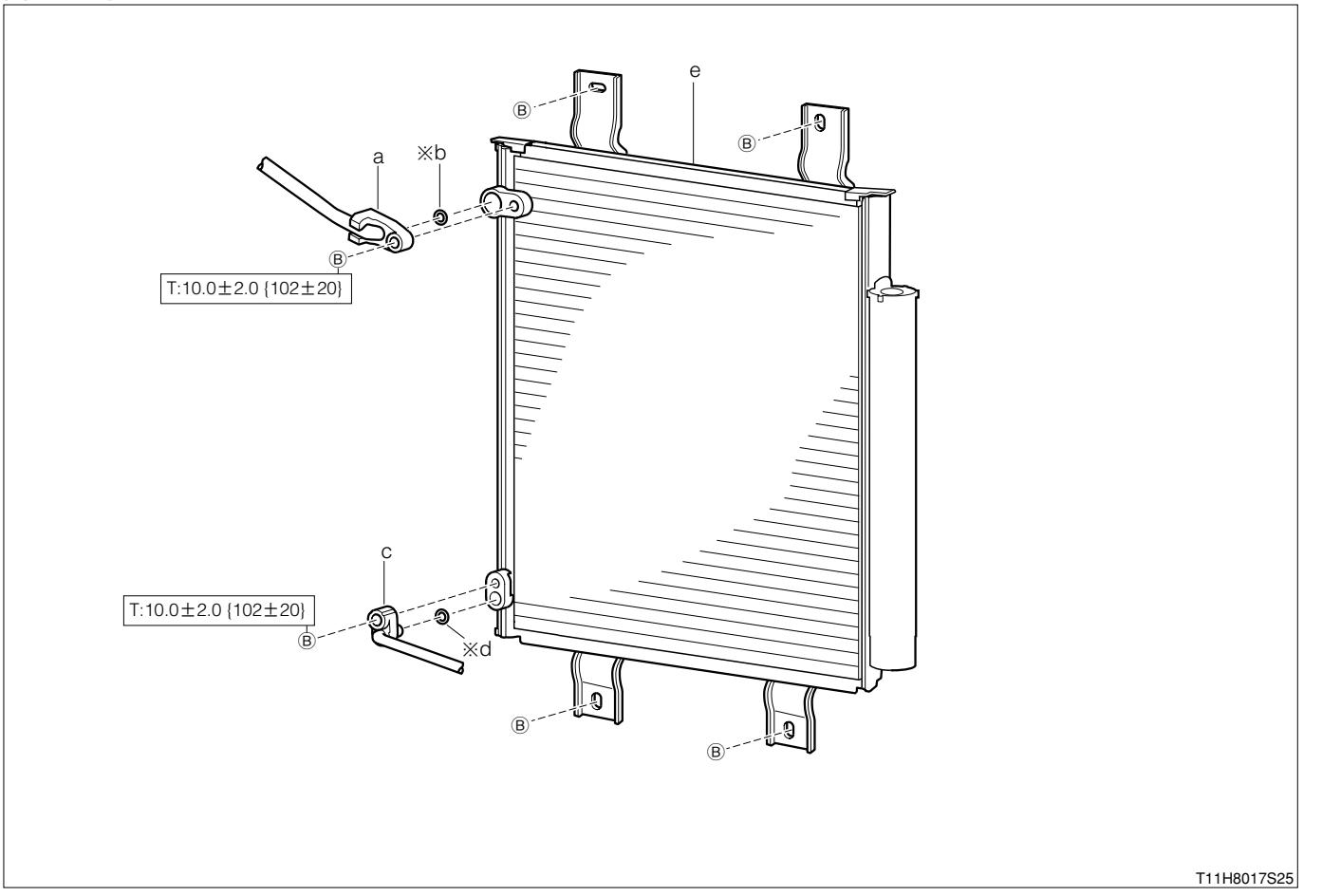
3.Remove the upper radiator support.

Vehicle with Type 1KR-FE engine
Refer to Page B6-5.

Vehicle with Type K3-VE engine
Refer to Page B6-13.

7-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



Unit: N·m{kgf·cm}
※: Non-reusable parts

(2) Removal and installation procedures

1 a Hose, suction
2 b Ring, O
3 c Hose, discharge
4 d Ring, O
▲ 5 e Condenser Ay

7-1-4 POINTS OF INSTALLATION

(1) Condenser Ay

1.When the condenser is replaced with a new one, replenish the following amount of compressor oil.

REPLACEMENT PARTS	Condenser
Replenishing amount of compressor oil	20

LUBRICANT: Compressor oil (ND—OIL8)

7-1-5 OPERATION AFTER INSTALLATION

1.Install the upper radiator support.

Vehicle with Type 1KR-FE engine

Refer to Page B6-5.

Vehicle with Type K3-VE engine

Refer to Page B6-13.

2.Install the front bumper cover.

Refer to Page I2-2.

3.Replenish refrigerant.

Refer to Page K1-6.

8 BLOWER MOTOR

8-1 REMOVAL AND INSTALLATION (RHD VEHICLES)

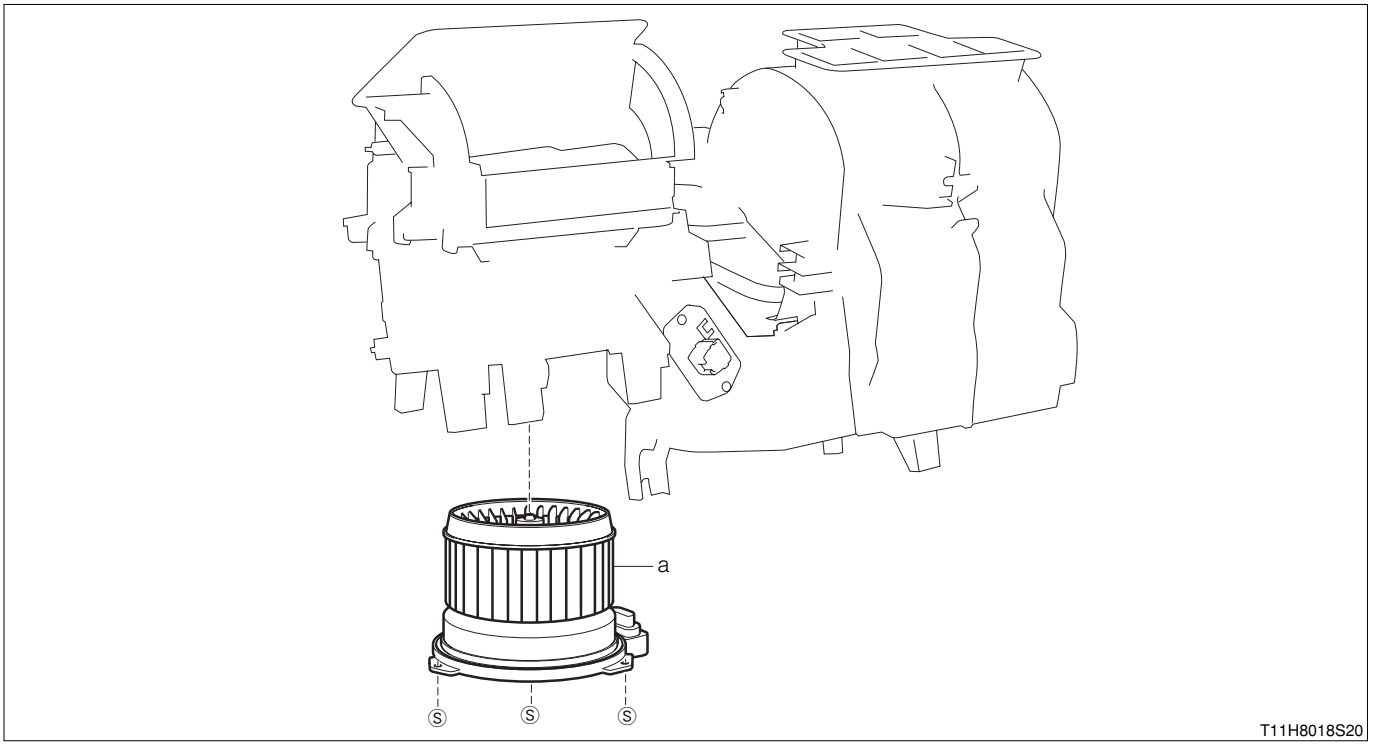
8-1-1 OPERATION BEFORE REMOVAL

1.Remove the No.1instrument panel under cover.
Refer to Page I2-23.

2.Remove the fuel injection computer Ay.
Refer to Page B8-1.

8-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Motor Ay, W/fan

8-1-3 OPERATION AFTER INSTALLATION

1.Install the fuel injection computer Ay.
Refer to Page B8-1.

2.Install the No.1 instrument panel under cover.
Refer to Page I2-23.

8-2 REMOVAL AND INSTALLATION

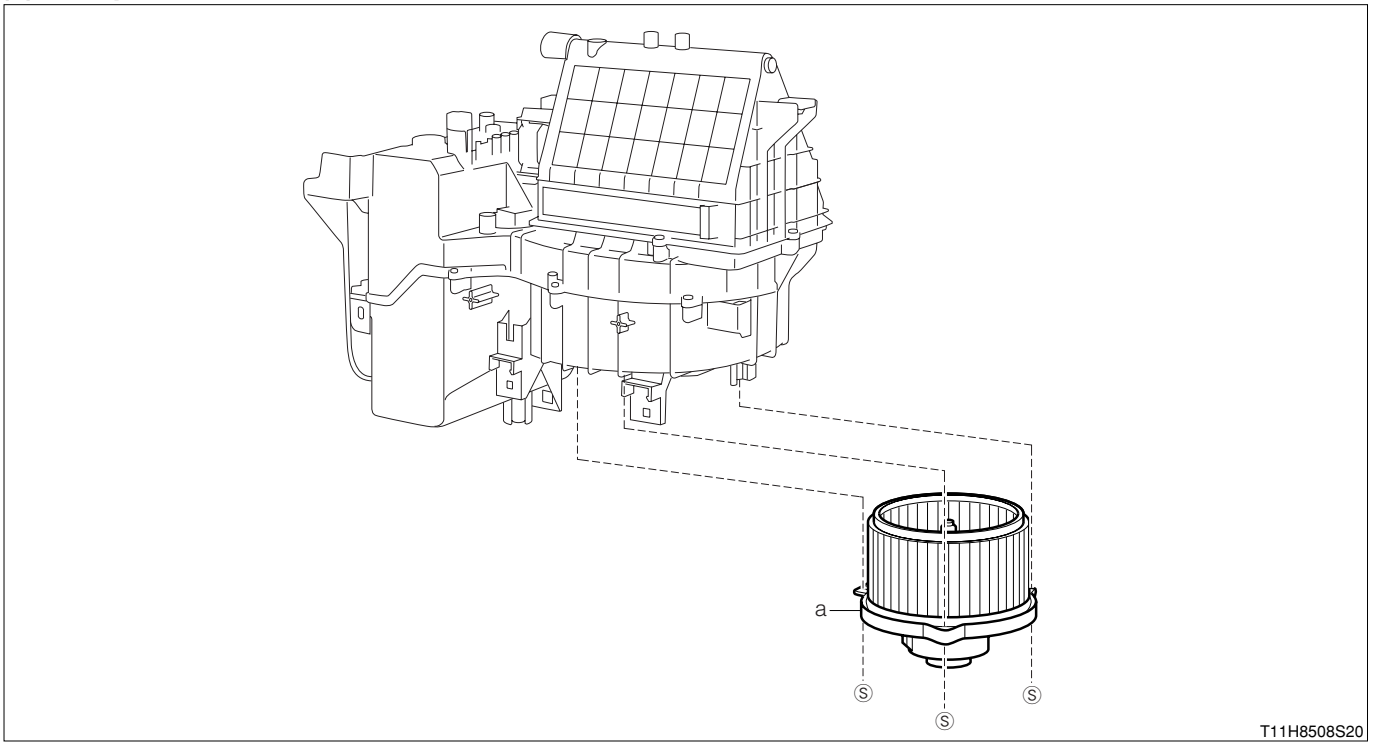
8-2-1 OPERATION BEFORE REMOVAL

1.Remove the No.1instrument panel under cover.
Refer to Page I2-23.

2.Remove the fuel injection computer Ay.
Refer to Page B8-1.

8-2-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Motor S/A, blower W/fan

8-2-3 OPERATION AFTER INSTALLATION

1.Install the fuel injection computer Ay.
Refer to Page B8-1.

2.Install the No.1 instrument panel under cover.
Refer to Page I2-23.

9 BLOWER RESISTOR

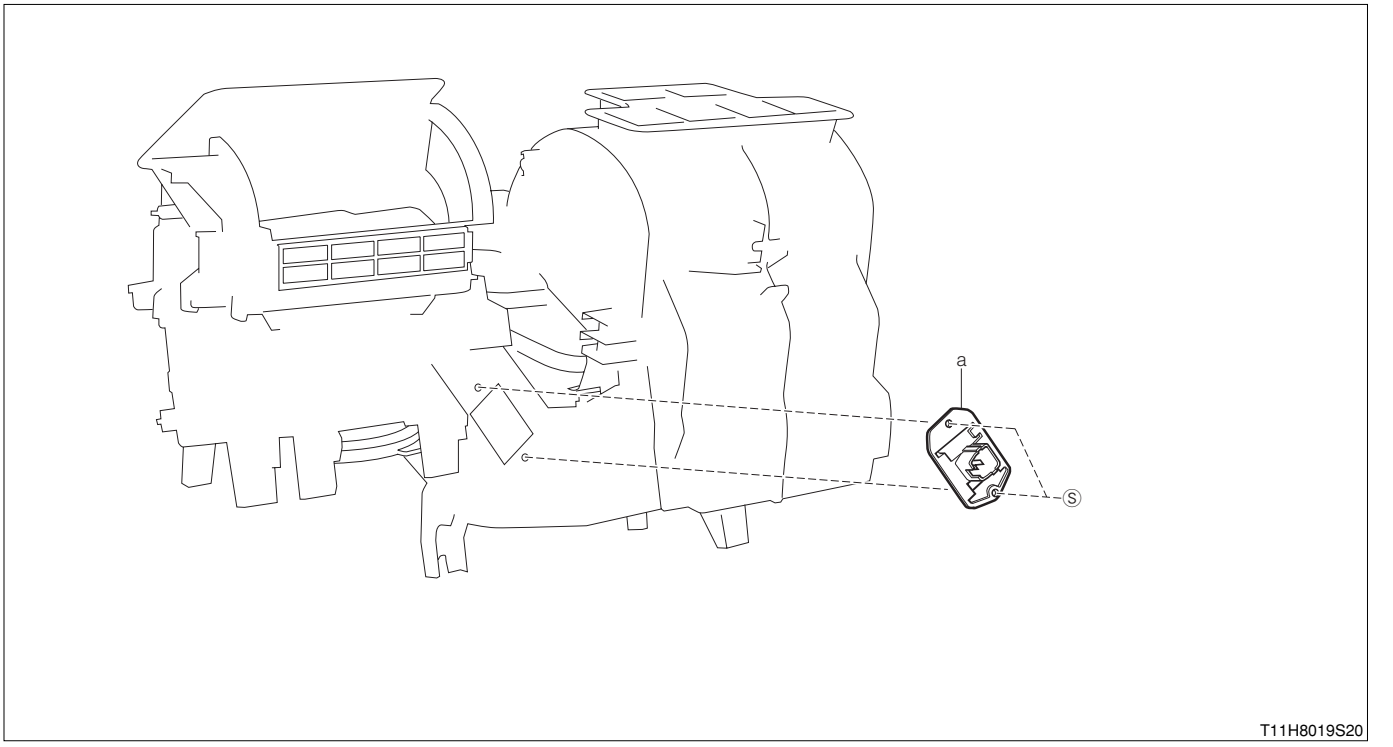
9-1 REMOVAL AND INSTALLATION

9-1-1 OPERATION BEFORE REMOVAL

1.Remove the No.1 instrument panel under cover.
Refer to Page I2-23.

9-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Resistor, blower

9-1-3 OPERATION AFTER INSTALLATION

1.Install the No.1 instrument panel under cover.
Refer to Page I2-23.

9-2 REMOVAL AND INSTALLATION

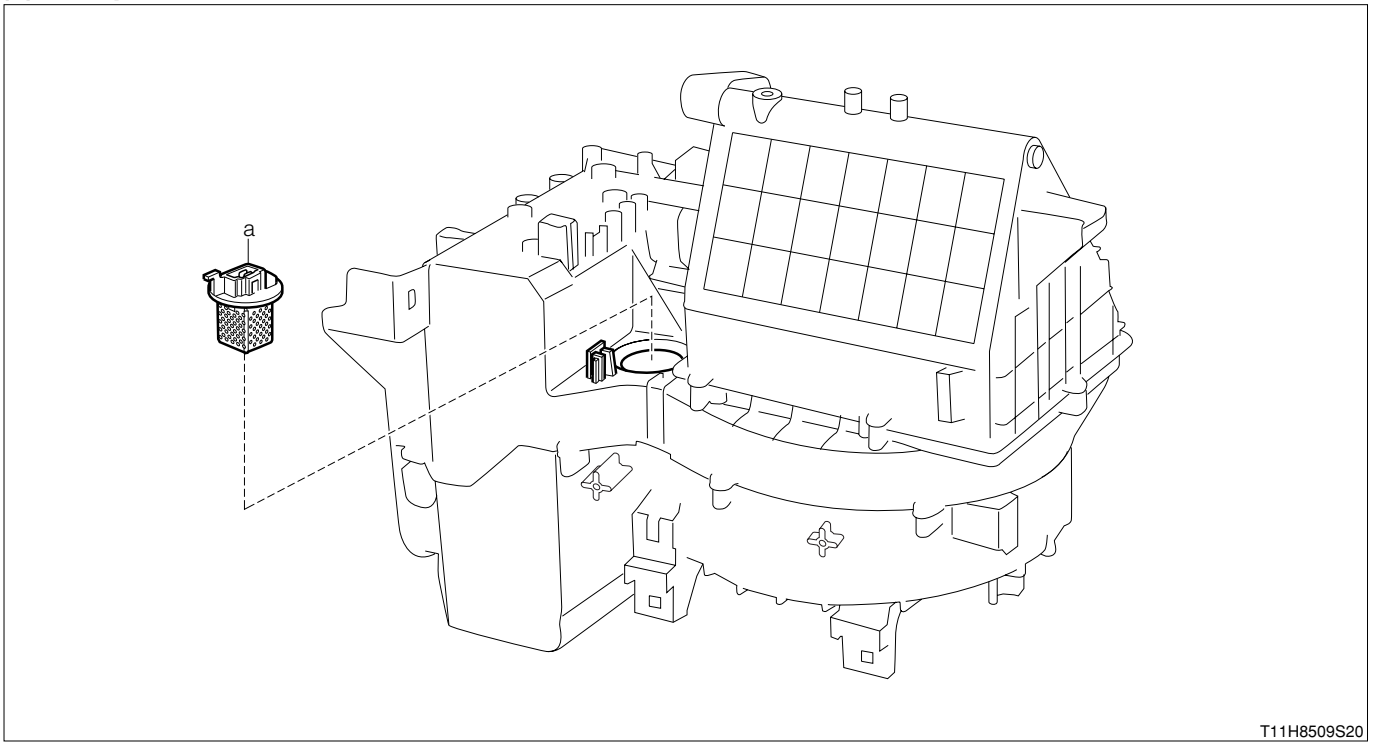
9-2-1 OPERATION BEFORE REMOVAL

1.Remove the instrument panel door.
Refer to Page I2-23.

2.Remove the No.1 instrument panel box.
Refer to Page I2-23.

9-2-2 REMOVAL AND INSTALLATION PROCEDURES

(1) Components



(2) Removal and installation procedures

1 a Resistor, blower

9-2-3 OPERATION AFTER INSTALLATION

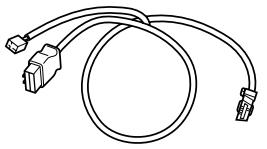
1.Install the No.1 instrument panel box.
Refer to Page I2-23.

2.Install the instrument panel door.
Refer to Page I2-23.

10 MANUAL AIR CONDITIONER SYSTEM

10-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09991-87404-000 (09991-87401-000)	Wire,engine control system inspection
	09991-87403-000	Wire,diagnosis check

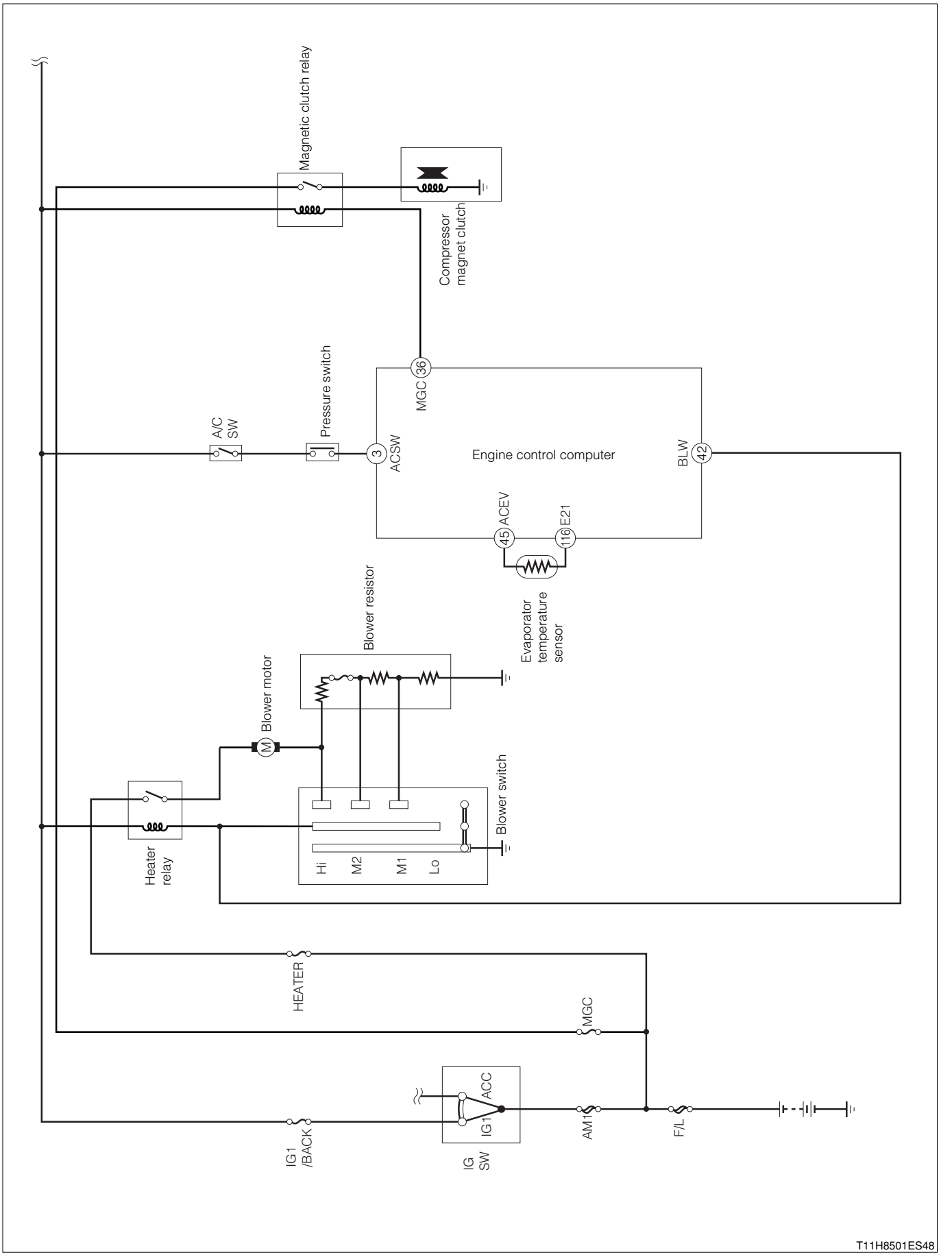
Instrument

Electrical Tester

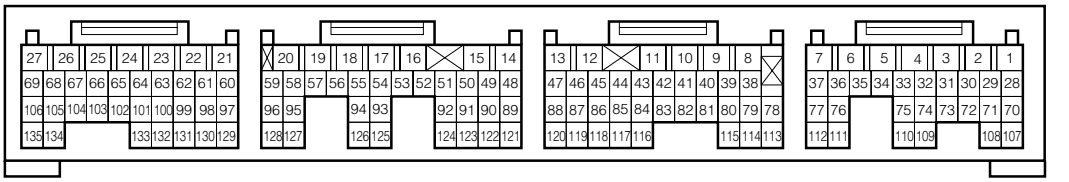
Tool

Manifold gauge

10-2 SYSTEM WIRING DIAGRAM



10-3 ARRANGEMENT OF ECU TERMINAL



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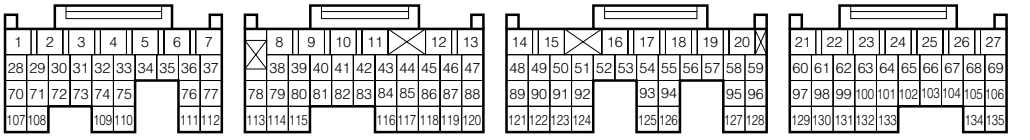
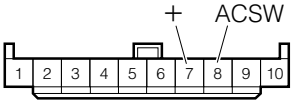
Engine Control Computer terminal name

Terminal No.	Terminal code	Terminal name
3	ACSW	A/C switch input
36	MGC	Magnet clutch drive output
42	BLW	Heater blower operation input
45	ACEV	Evaporator temperature sensor input
116	E21	Sensor earth

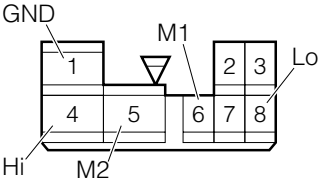
10-4 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS



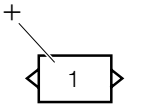
Engine control computer



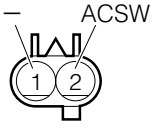
A/C switch



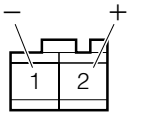
Blower switch



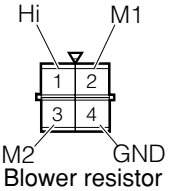
Compressor magnet clutch



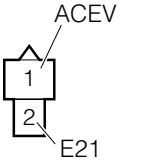
Pressure switch



Blower motor



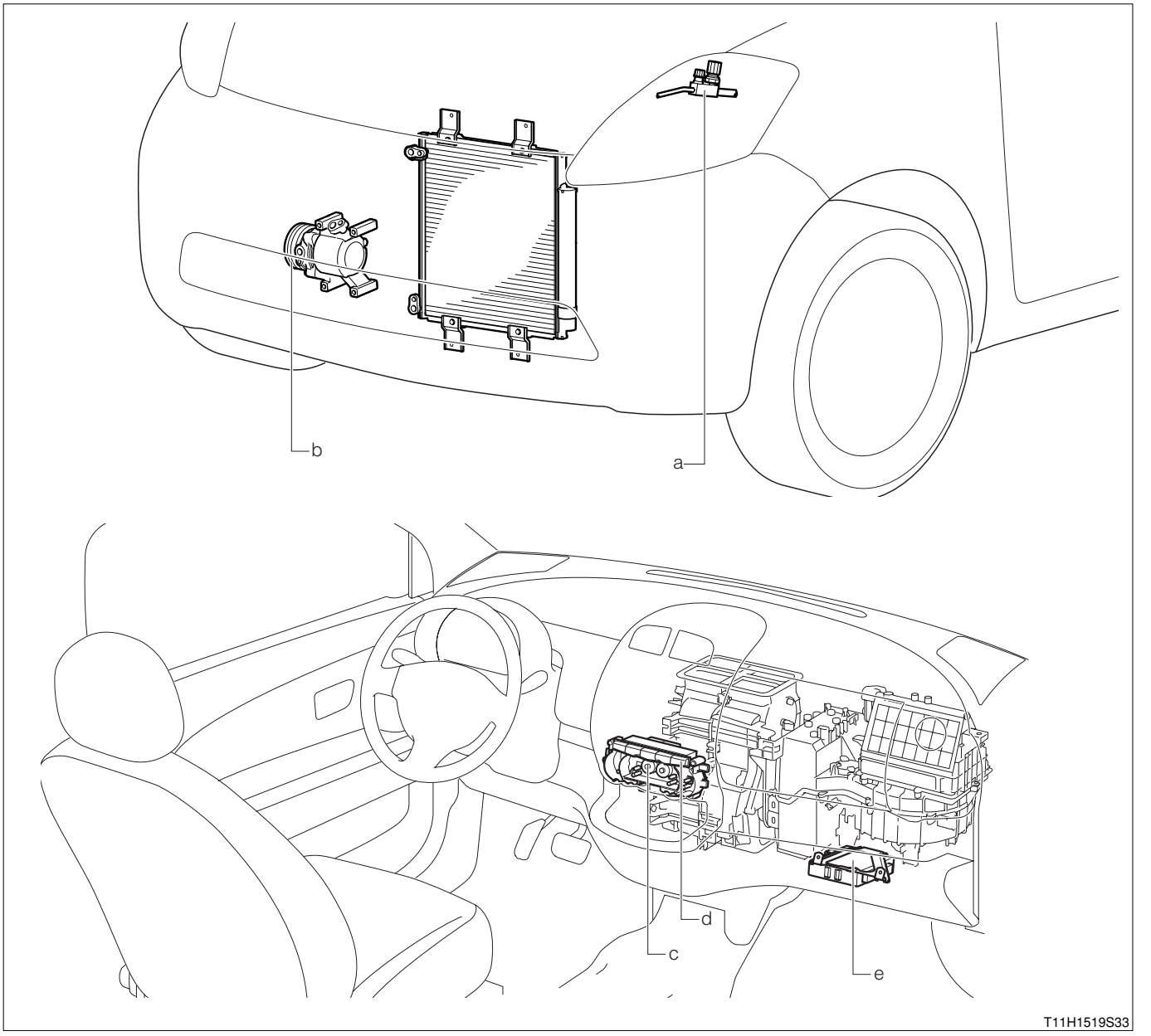
Blower resistor



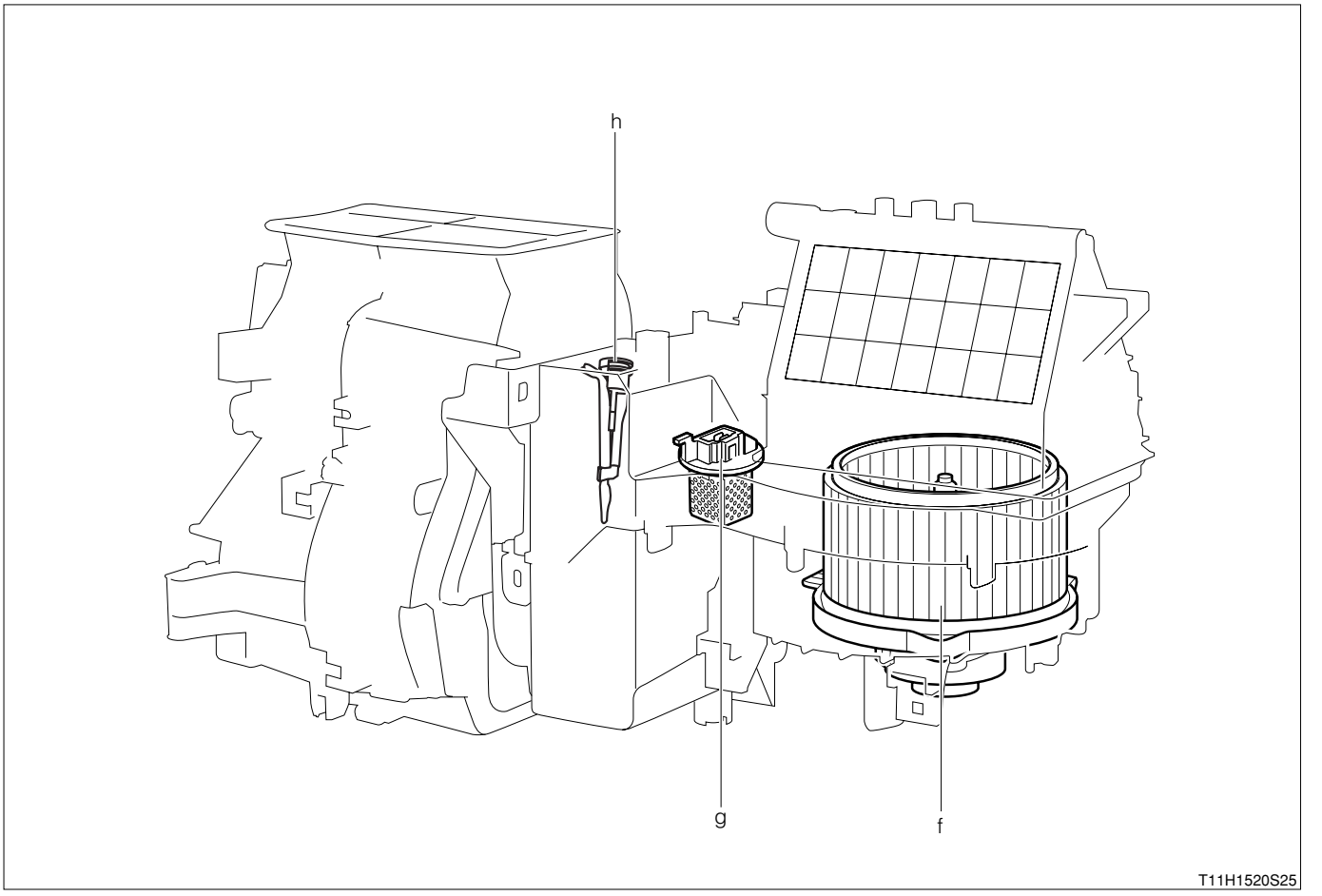
Evaporator temperature sensor

T11H8502ES25

10-5 LOCATION OF COMPONENTS (LHD)

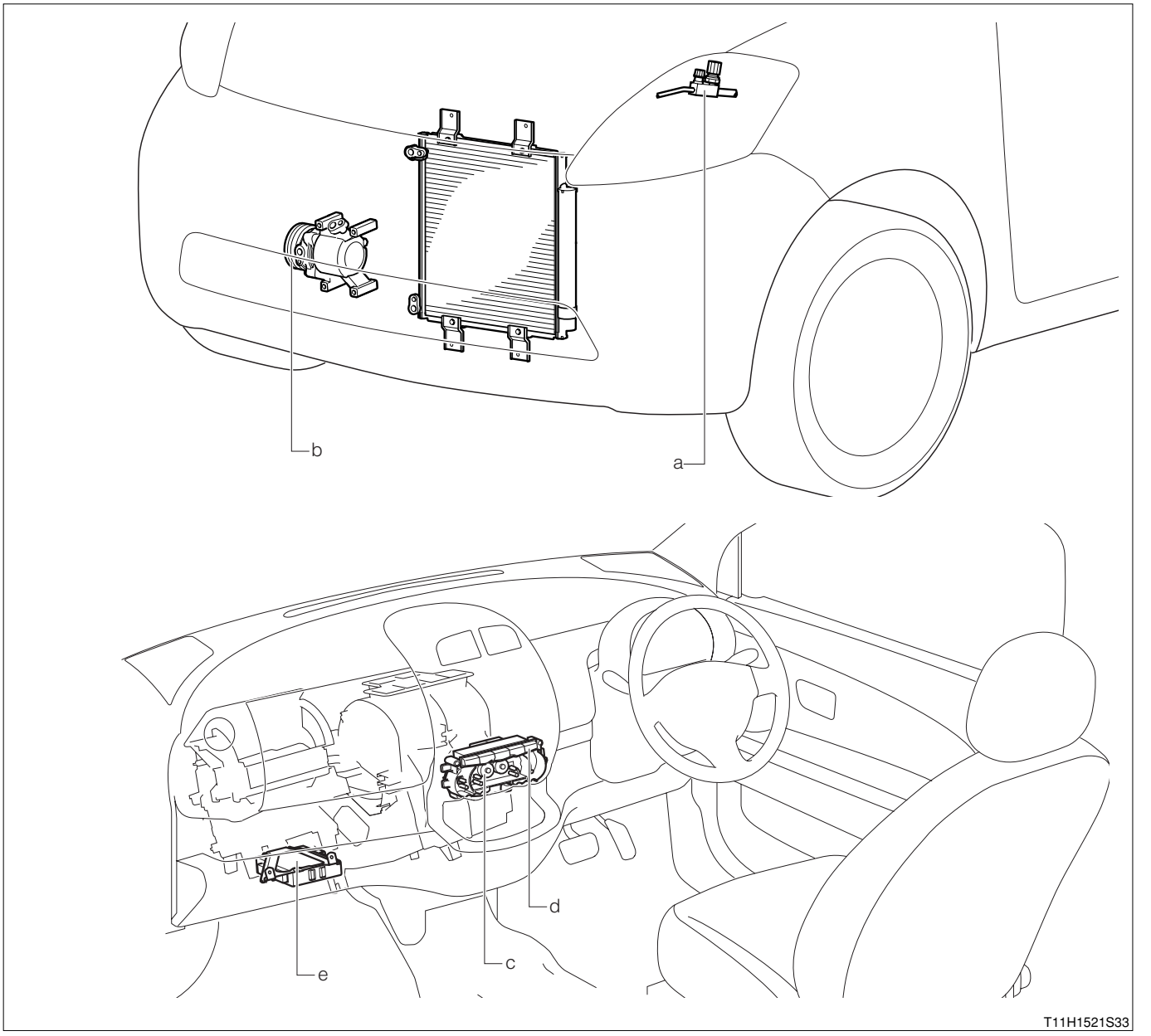


a	Pressure switch
b	Compressor magnet clutch
c	Blower switch
d	A/C switch
e	Engine control computer

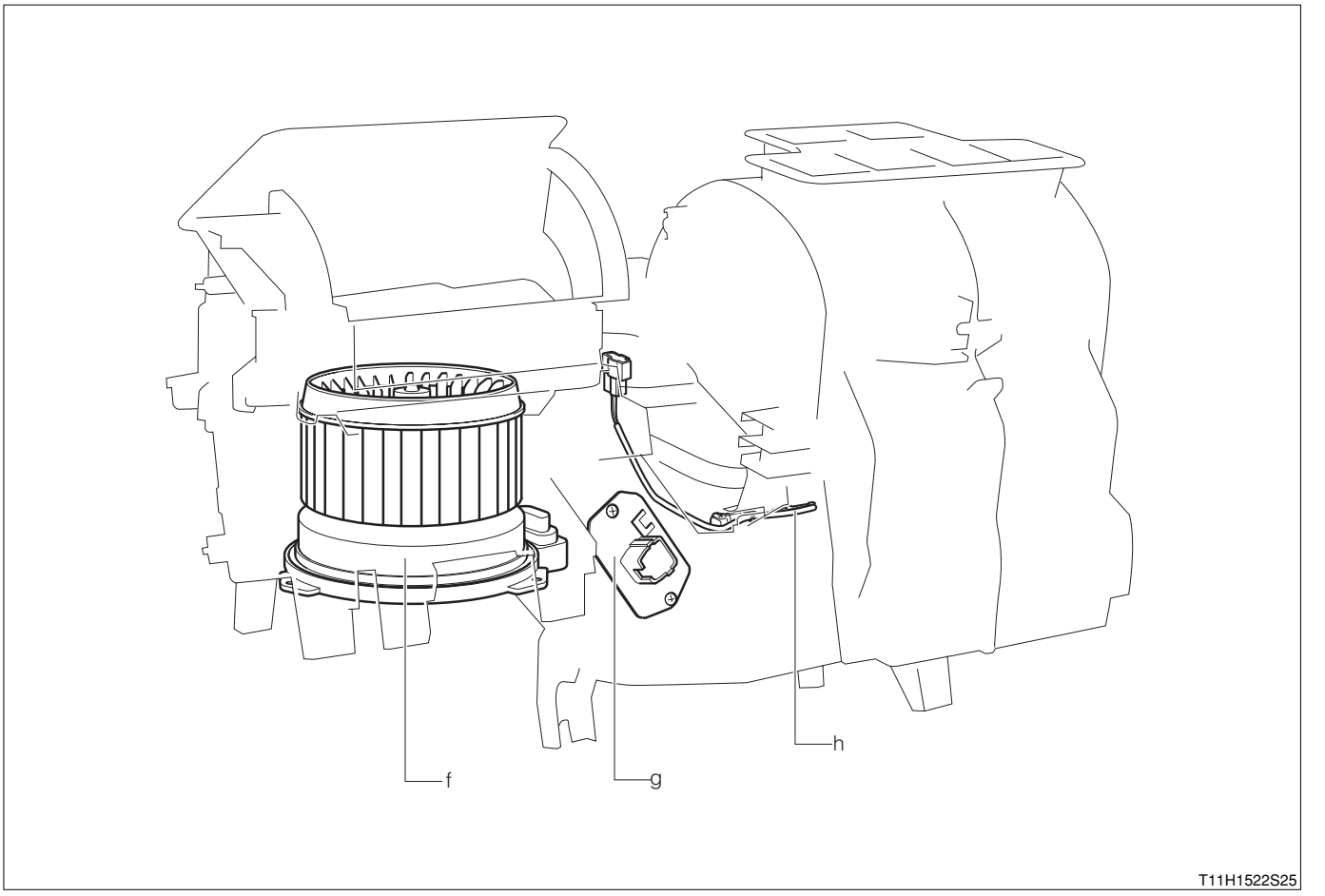


f	Blower motor
g	Blower resistor
h	Evaporator temperature sensor

10-6 LOCATION OF COMPONENTS (RHD)



a	Pressure switch
b	Compressor magnet clutch
c	Blower switch
d	A/C switch
e	Engine control computer



f	Blower motor
g	Blower resistor
h	Evaporator temperature sensor

10-7 HOW TO PROCEED WITH TROUBLE SHOOTING

10-7-1 INQUIRY

1. In your attempt to remove the causes for a malfunction of the vehicle, you will not able to remove the causes unless you actually confirm the malfunctioning phenomenon. No matter how long you continue operations, the vehicle may not resume the normal state unless you confirm the malfunctioning phenomenon. The inquiry with the customer is a vital information collecting activity which is to be conducted previous to the confirmation of malfunctioning phenomenon.
2. This inquiry will provide you with an important clue in an effort to reproduce the malfunctioning phenomenon. Furthermore, the information obtained by the inquiry can be referred to during the troubleshooting. Hence, instead of making general questions, it is necessary to focus your questions on the items related to the malfunction.

(1) DIAGNOSIS BY INTERVIEW SHEET FOR HEATER AND AIR CONDITIONER SYSTEM

Checked by		Check date	Day Month (day of week)

Customer information

Name of customer	Mr./Ms.	Gender of customer (Male, female)	Age [approx.]	Occupation [ ]	
		Area where vehicle is mainly used	Urban, suburb, seashore, mountain, others	Parking place	Outdoor, indoor

Details of vehicle

Date when vehicle was brought to workshop	Day Month (day of week)	Date when malfunction took place	Day Month (day of week)	Repair history	No,Yes (How many times?)
Frame No.		Registration date	Day Month Year	Vehicle model	
Engine type		Transmission	5M/T·3A/T·4A/T·CVT electronically-controlled 4A/T	Driving	2WD·4WD
Running distance	km	Equipment	Tire [ ]· Wheel [Steel · Aluminum]		

Weather

☐ Fine	☐ Cloudy	☐ Rainy	☐ Snow	☐ Other( )
Temperature(Approx. °C)				

Frequency of malfunction

☐ Always ☐ Under certain condition( ) ☐ Sometimes( )

Phenomenon

☐ Poor cooling performance.
☐ The blower motor will not rotate.
☐ The blower motor will not change its speed.
☐ The temperature of the air outlet does not change.
☐ The air outlet can not be switched.
☐ No switching can be made between the indoor air and outdoor air.
☐ The compressor magnet clutch will not be turned ON.
☐
☐ Other

10-8 TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA

10-8-1 LIST OF POINTS TO BE CHECKED ACCORDING TO MALFUNCTION PHENOMENA

Malfunction phenomena	Check points	Reference page
Poor cooling performance.	1. Check of cooling performance. 2. Confirmation of normal operation of compressor 3. Confirmation of normal operation of radiator fan 4. Confirmation of normal operation of blower motor 5. Measurement of refrigerant pressure	※1
The blower motor will not rotate.	1. Check of fuse 2. Check of heater relay system 3. Check of blower motor system 4. Check of blower switch system 5. Check of blower register system 6. Check of wire harness and connector	1. — 2. ※2 3. ※2 4. ※2 5. ※2 6. —
The blower motor will not change its speed.	1. Check of blower switch system 2. Check of blower register system 3. Check of wire harness and connector	1. ※2 2. ※2 3. —
The compressor magnet clutch will not be turned ON.	1. Check of fuse 2. Check of magnet clutch relay system 3. Check of compressor magnet clutch system 4. Check of engine control computer switch signal system (Air conditioner switch system) 5. Check of pressure switch system 6. Check of air conditioner switch system 7. Check of evaporator temperature sensor 8. Check of engine control computer 9. Check of wire harness and connector	1. — 2. ※2 3. ※2 4. ※4 5. ※2 6. ※2 7. ※5 8. ※3 9. —

※1

Refer to Page K1-42.

※2

Refer to Page K1-45.

※3

Refer to Page K1-47.

※4

Vehicle with Type 1KR-FE engine

Refer to Page B8-150.

Vehicle with Type K3-VE engine

Refer to Page B8-375.

※5

Vehicle with Type 1KR-FE engine

Refer to Page B8-156.

Vehicle with Type K3-VE engine

Refer to Page B8-382.

10-8-2 TROUBLE-SHOOTING ACCORDING TO MALFUNCTION PHENOMENON ITEMS

(1) Poor cooling performance

∑>1.Check of cooling performance

1.Check cooling performance.

Refer to Page K1-2.

▼If it is OK, the cooling performance is satisfactory.

▼If it is NG, go to step ∑>2.

∑>2. Compressor operation check

1.Check the operation of the compressor when the A/C switch is turned "ON".

SPECIFIED VALUE: The magnet clutch is turned "ON" and the compressor is activated.

▼If it is OK, go to step ∑>3.

▼In the case of NG, perform the troubleshooting for the problem "Compressor magnet clutch is not turned ON."

Refer to Page K1-41.

∑>3. Radiator fan operation check

1.Check the operation of the radiator fan when the compressor is turned "ON".

SPECIFIED VALUE: The fan shall rotate.

▼If it is OK, go to step ∑>4.

▼In the case of NG, check the radiator fan circuit.

Vehicle with Type 1KR-FE engine

Refer to Page B8-211.

Vehicle with Type K3-VE engine

Refer to Page B8-457.

∑>4. Blower motor operation check

1.Check the operation of the blower motor.

SPECIFIED VALUE: Air volume shall change according to the blower switch operation.

▼If it is OK, go to step ∑>5.

▼In the case of NG, perform the troubleshooting for the problem "Blower motor does not change speed".

Refer to Page K1-41.

⊳5. Measurement of refrigerant pressure

1.Install a manifold gauge.

2.After warming up the engine, set the vehicle to the following conditions.

Detected item	Condition
Vehicle body	Vehicle stopped in a shaded place with no wind
Hood door	Fully opened
A/C switch (magnet clutch)	ON
Engine revolution speed	1500rpm
Switching of inside and outside air	Inside air
Set temperature	MAX COOL
Blower speed	HI
Outside air temperature	30°C
Humidity	0.5

3.Measure the pressure of refrigerant.

Normal pressure (reference value)

Gauge	Pressure value
High-pressure side	1.4 - 1.8MPa
Low-pressure side	0.21 - 0.28MPa

NOTE

- The values given above are provided just for reference only, since the pressures change according to environmental conditions (outside temperature, solar radiation, ground heat, wind), vehicle conditions (engine heat, vehicle heat load), etc.

(1) Based on the measurement results, determine the action by referring to the following table.

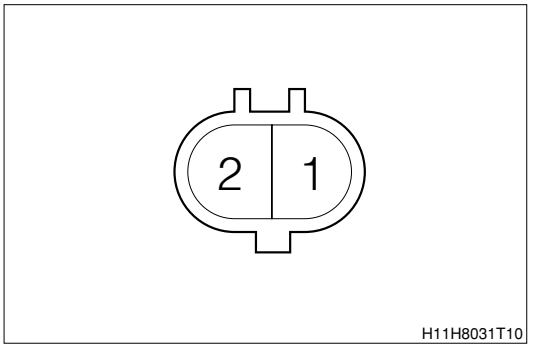
Phenomena	Causes	Diagnosis	Remedies
∗ During the operation, the pressure at the low-pressure side becomes vacuum at one time and normal at another time.	∗ The moisture admitted into the cooler system is frozen at the expansion valve port. As a result, the refrigerant will not circulate temporarily. However, the normal condition is restored.	∗The drier is supersaturated. ∗The moisture of the cooler system is frozen at the expansion valve port, thus shutting the circulation of the refrigerant gas.	1 Remove the moisture from the cycle by performing the vacuum evacuation repeatedly. 2 If the problem persists, replace the condenser.
∗ The pressure at both high-pressure side and low-pressure side is low. ∗ The cooling performance is not enough.	∗ The gas is leaking from somewhere in the cooler system.	∗The refrigerant gas is not enough. ∗Leakage of refrigerant gas	1 Check that the refrigerant gas is not leaking. Repair, as required. 2 If the repair has been carried out, perform the vacuum evacuation and check the air tightness positively. 3 After all refrigerant has been recovered, replenish an optimum amount of refrigerant again.
∗ The low-pressure side becomes negative pressure.	∗ Dust, etc. admitted into the expansion valve and condenser is blocking the flow of refrigerant.	∗The expansion valve is clogged. ∗The condenser is clogged.	1 Check the expansion valve. 2 Check the condenser.
∗ The pressures at both high-pressure side and low-pressure side are too high.	∗ Excessive refrigerant ∗ The condenser is not cooled adequately. ∗ Air has been admitted into the cooler system.	∗Excessive refrigerant ∗The condenser is not cooled adequately. ∗Air has been admitted into the cooler system. ∗The vacuum evacuation is not enough.	1 Clean the condenser fin. 2 If Item 1 is normal, recover all refrigerant and check that the compressor oil is not smeared or insufficient. Then, replenish an optimum amount of refrigerant.
∗ There is almost no difference between the pressure at the low-pressure side and that at the high-pressure side.	∗ Leakage inside compressor	∗Poor compression ∗Leakage at valve or breakage of sliding parts	1 Repair or replace the compressor.
∗ The pressure exhibits no abnormality.	∗ There is the possibility that the pressure value has fluctuated because of the slight difference between the normal condition and the measurement environment, changes in the vehicle due to passage of time, etc.	∗There is the possibility that the pressure value has fluctuated because of the slight difference between the normal condition and the measurement environment, changes in the vehicle due to passage of time, etc.	1 Observe for a while. If the condition will not improve, recover all refrigerant. Then, replenish an optimum amount of refrigerant.

10-9 UNIT CHECK

10-9-1 PRESSURE SWITCH

1.Check continuity between the respective terminals of the connector of the pressure switch (on the liquid tube).

SPECIFIED VALUE: The condition becomes as indicated in the figure, depending on the refrigerant pressure.



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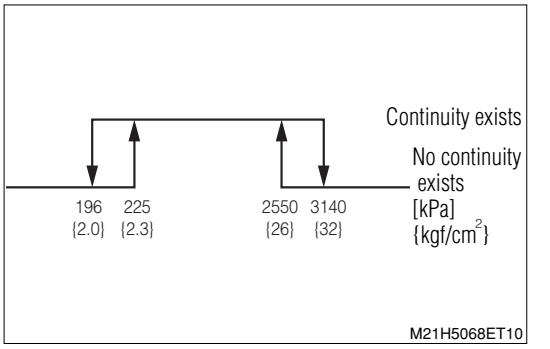


M21H5068ET10

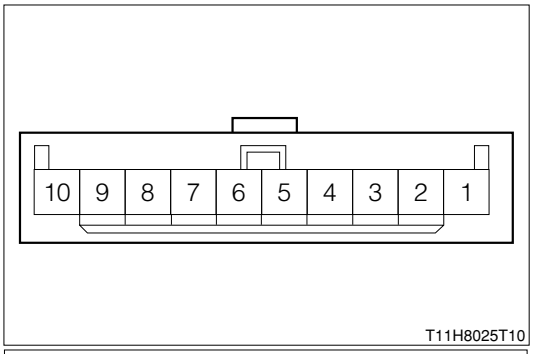
10-9-2 HIATER CONTROL

(1) Air conditioner switch

1.Operate the air conditioner switch. At this time, check continuity between the terminals 8 and 9.

2.With the switch turned "ON".

SPECIFIED VALUE: Illuminates.



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(2) Blower switch

1.Check that continuity exists between the blower switch connector terminals as per the continuity table.

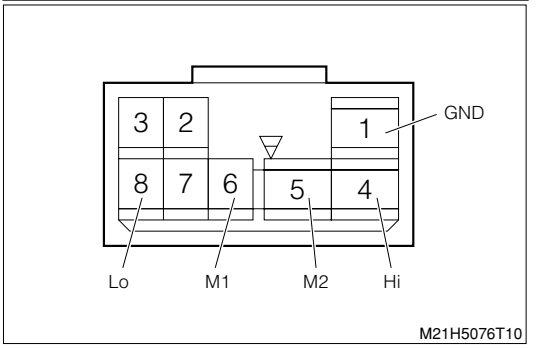
○—○:Continuity exists

Terminal / Position	GND	Lo	M1	M2	Hi
OFF	○				
1	○	○			
2	○	○	○		
3	○	○		○	
4	○	○			○

M21H5077EL08

2.Check the illumination status when the battery positive (+) terminal is connected to the terminal 2 and the battery negative (-) terminal to the terminal 3.

SPECIFIED VALUE: Illuminates.

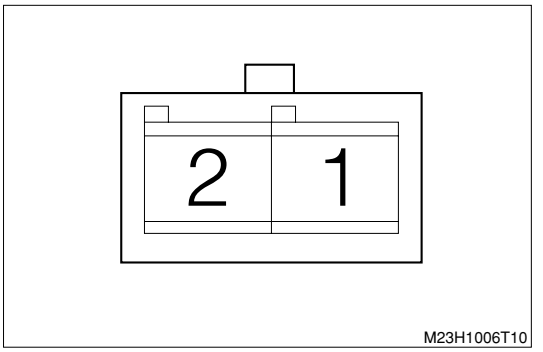


M21H5076T10

10-9-3 BLOWER MOTOR

1.Check operation of the motor when the battery positive (+) terminal is connected to the blower motor connector terminal 2 and the battery negative (-) terminal to the terminal 1.

SPECIFIED VALUE: Shall rotates normally without an abnormal noise.



10-9-4 BLOWER RESISTOR

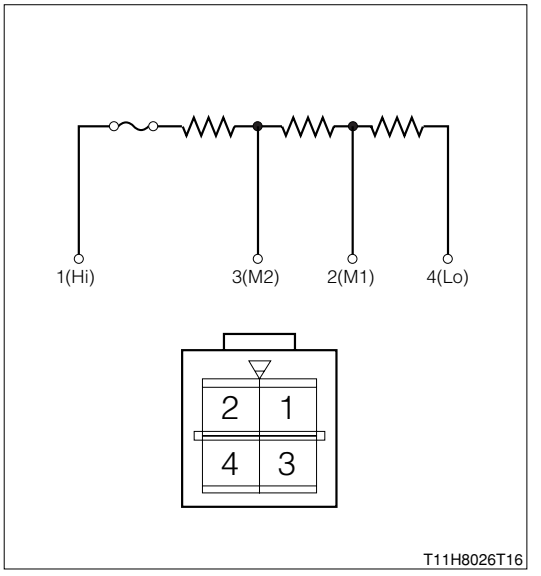
1.Check resistance between the connector terminals of the resister.

RHD vehicles

SPECIFIED VALUE: HI－M2 : 0.44 - 0.50(Ω)
HI－M1 : 0.96 - 1.10(Ω)
HI－LO : 3.19 - 3.67(Ω)

LHD vehicles

SPECIFIED VALUE: HI－M2 : 0.50(Ω)
M1－M2 : 0.82(Ω)
M1－LO : 1.8(Ω)



10-9-5 MAGNET CLUTCH

1.Check operation of the magnet clutch when the battery positive (+) terminal is connected to the magnet clutch connector terminal and the battery negative (-) terminal to the compressor unit.

SPECIFIED VALUE: The magnet clutch hub is locked with the rotor, emitting operating sound.

10-9-6 EVAPORATOR TEMPEREATURE SENSOR

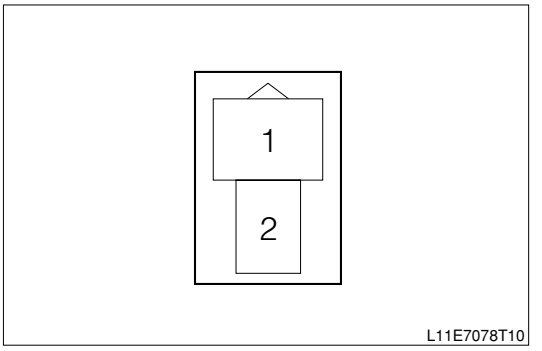
1.Check resistance between the connector terminals of the thermistor.

RHD vehicles

Temperature (°C)	Resistance (kΩ)
0	4.6 - 5.1
15	2.1 - 2.6

LHD vehicles

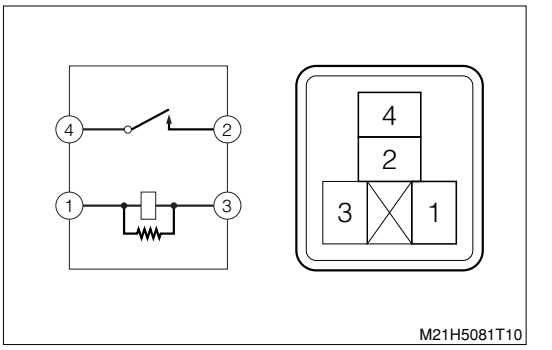
Temperature (°C)	Resistance (kΩ)
0	4.6 - 5.1
15	2.1 - 2.6



10-9-7 MAGNET CLUTCH RELAY AND HEATER RELAY

1.Check continuity between each connector terminal.

Terminal No.	Standard
2 - 4	No continuity exists
1 - 3	Continuity exists.



2.Apply the battery voltage between the terminals 1 and 3. At this time, check continuity between the terminals 2 and 4.

SPECIFIED VALUE: Continuity exists.

10-10 ECU INPUT/OUTPUT SIGNAL CHECK

10-10-1 CHECKING METHOD

1.Check voltage and continuity between each connector terminal.

CAUTION

- With the connector connected, perform the check from behind the connector at the vehicle harness side.

10-10-2 SPECIFIED VALUE FOR INPUT/ OUTPUT SIGNAL

(1) Engine control computer

Check system	Terminal No. (Nomenclature of terminal)	Input and output	Detected item	Measurement condition	Specified value
AIR CONDITIONER RELAY	36(MGC) - 125(E1)	Output	Voltage	When the air-conditioner relay is "ON".	Approx. 0V
				When the air-conditioner relay is "OFF".	Battery voltage
Air conditioner switch	3(ACSW) - 125(E1)	Input	Voltage	When the air-conditioner is in operation.	Battery voltage
				When the air-conditioner is not in operation.	0 - 0.5V
Blower	42(BLW) - 125(E1)	Input	Voltage	When the heater blower switch is "ON".	0 - 0.5V
				When the heater blower switch is "OFF".	Battery voltage
Evaporator temperature sensor	45(ACEV) - 116(E21)	Input	Voltage	When the air-conditioner is "ON".	0.15 - 4.8V

L2 MULTIPLEX COMMUNICATION SYSTEM

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CAN COMMUNICATION SYSTEM -------- L2 - 1
ARTICLES TO BE PREPARED ---------- L2 - 1
HANDLING INSTRUCTIONS OF CONTROL SYSTEM ---------- L2 - 1
SYSTEM WIRING DIAGRAM ---------- L2 - 3
ARRANGEMENT OF ECU TERMINAL ---------- L2 - 4
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LIN COMMUNICATION SYSTEM -------- L2 - 38
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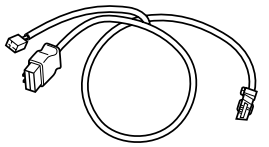
TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE ---------- L2 - 45

■ CAN COMMUNICATION SYSTEM
1 CAN COMMUNICATION SYSTEM
1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09991-87403-000	Wire,diagnosis check
	09991-87404-000 (09991-87401-000)	Wire,engine control system inspection

Instrument

Electrical Tester

1-2 HANDLING INSTRUCTIONS OF CONTROL SYSTEM
1-2-1 MAINTENANCE INSTRUCTION

1.Pay attention to the following points when performing checking and maintenance of the CAN.

CAUTION

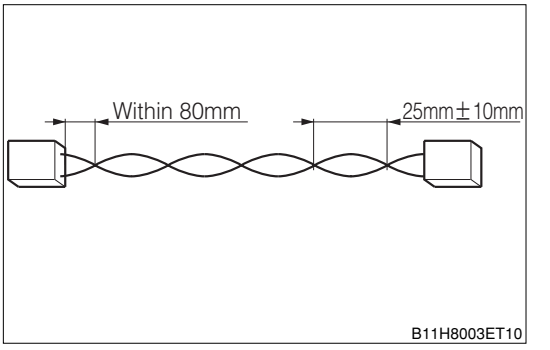
- When repairing the communication failure, perform repairing without disconnecting the negative terminal of the battery until the checking of the connection condition of the connector is finished.
- When disconnecting the negative terminal of the battery, record all of the diagnosis codes memorized.
- When performing checking and repairing of the CAN line, perform the operation after discharging the static electricity charged in the body.
- When measuring the resistance value of the CAN line, turn IG switch to "LOCK".
- There is a risk of damaging the ECU if the terminals are mistaken, when measuring the resistance within the CAN line and ECU.
- When measuring the resistance within the ECU, do not apply voltage of 7.0V or above to the measuring terminals.
- Perform measurements swiftly.

1-2-2 PRECAUTIONS DURING HARNESS REPAIR

1.Perform tape wind after soldering the repair section.

CAUTION

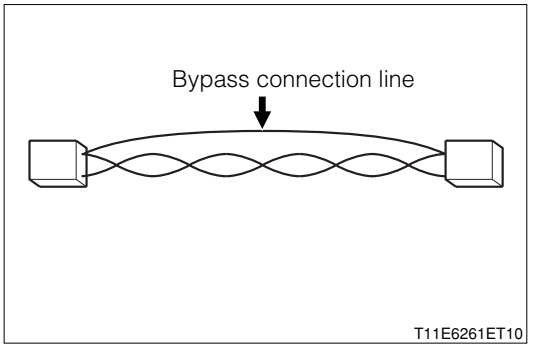
- Make sure that the bus (communication wire) is twisted when assembling. In so doing, do not make any gap between the CAN-H and CAN-L.
- Keep the difference of length of the CAN-H and CAN-L within 100 mm.
- Keep the fray of the twist of the connector connection within 80 mm.
- The pitch of the twist shall be set to 25mm±10mm.



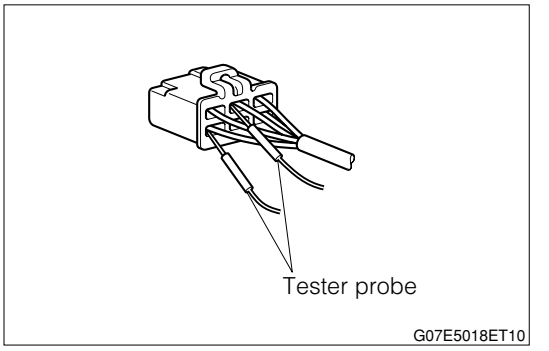
2.Do not connect the bypass wiring of the repaired section.

CAUTION

- If bypass wiring is connected, the characteristic features of the twist line will be lost.

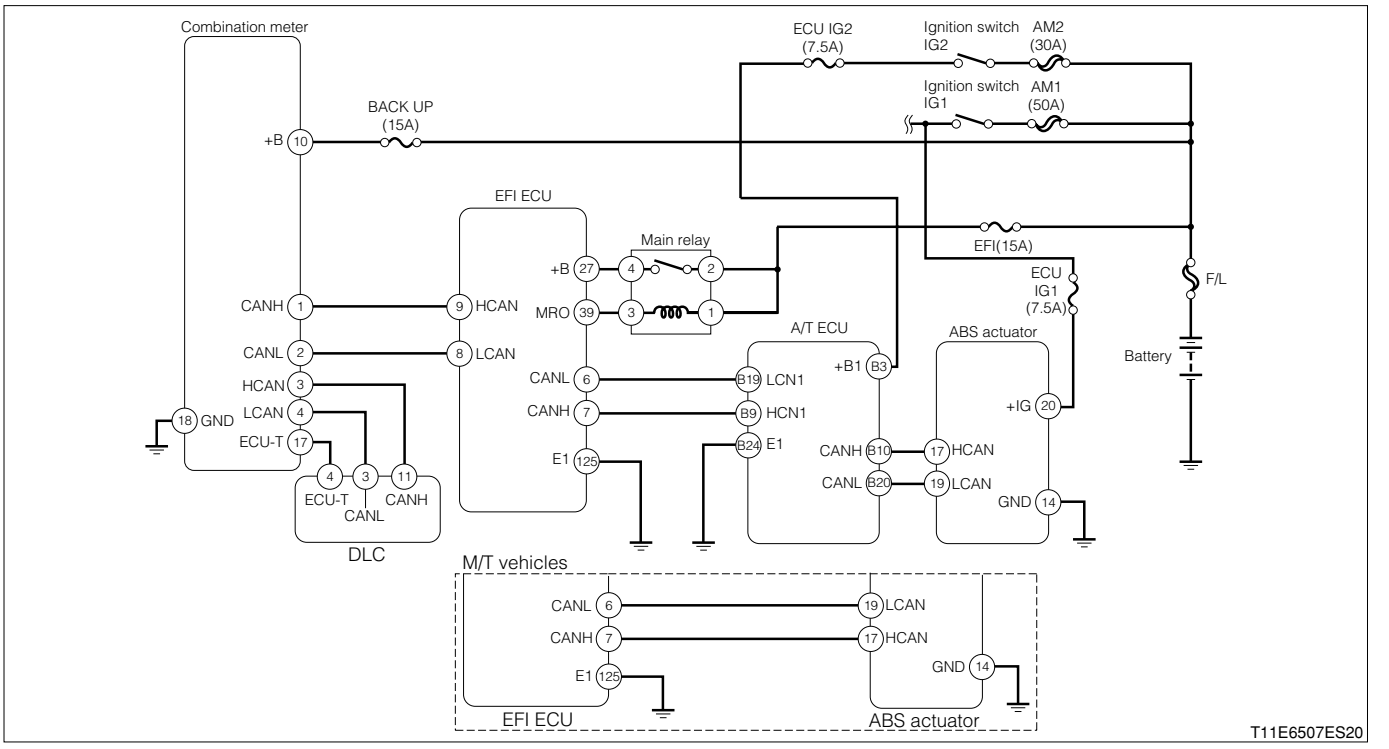


3.Generally, continuity check is performed by applying a tester from behind the connector.

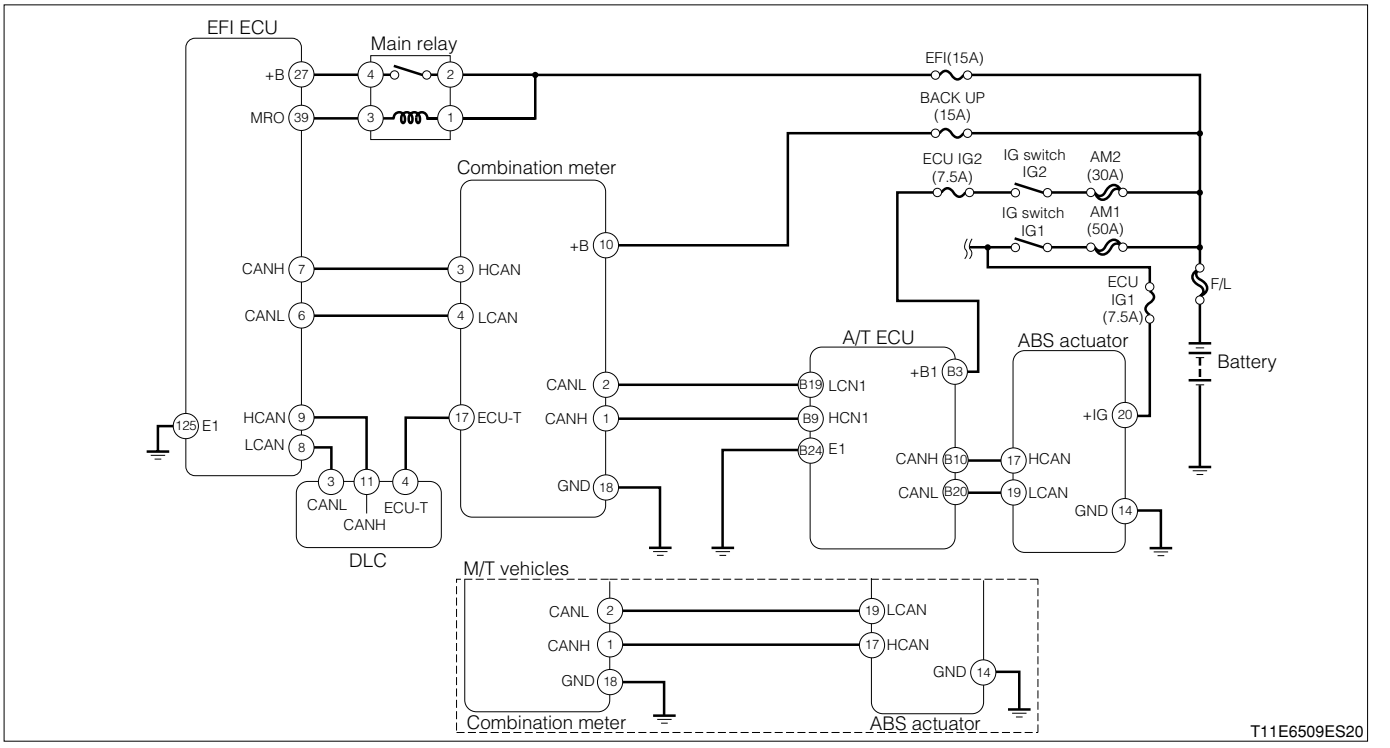


1-3 SYSTEM WIRING DIAGRAM

RHD vehicles

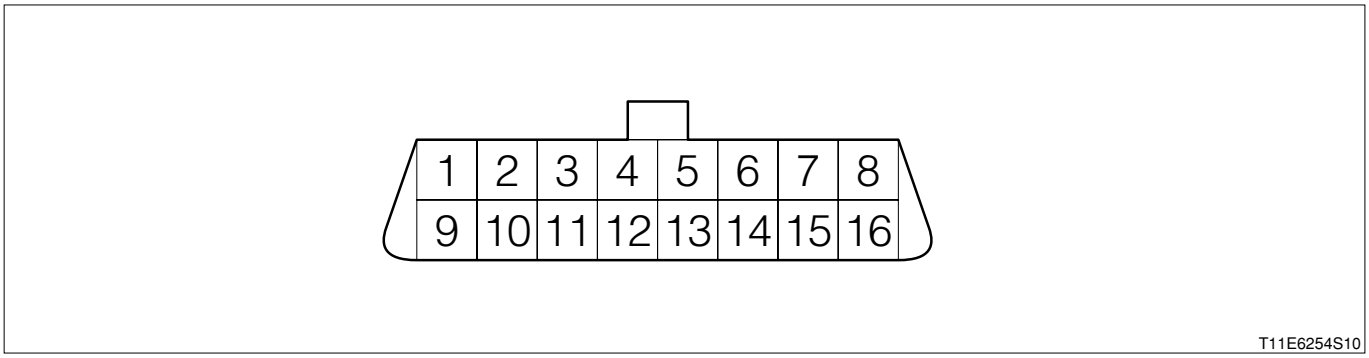


LHD vehicles



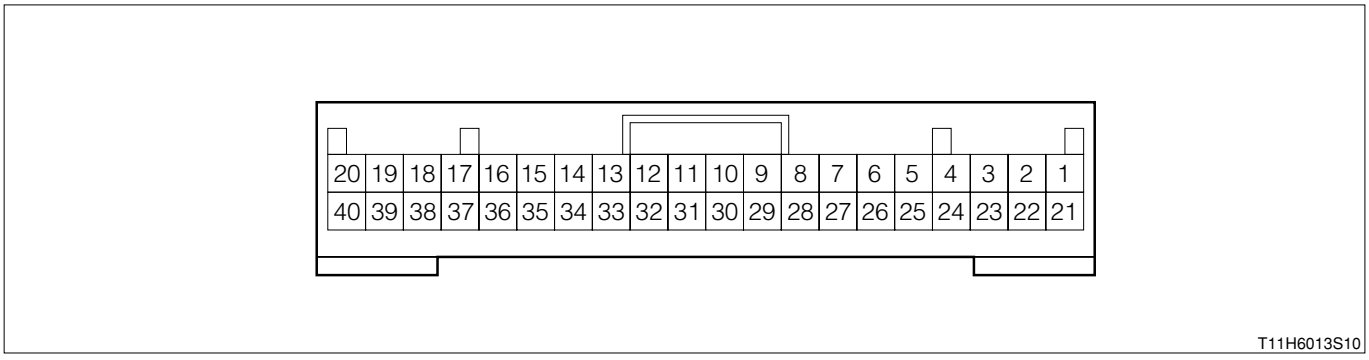
1-4 ARRANGEMENT OF ECU TERMINAL

DLC terminal arrangement diagram



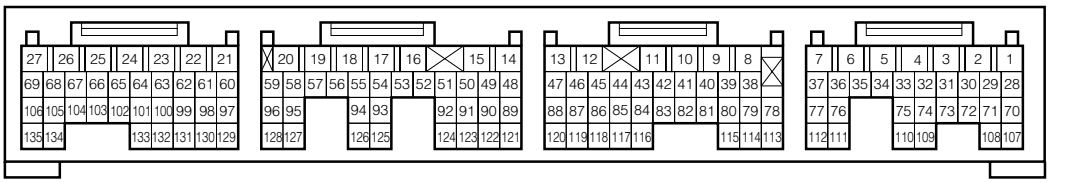
Terminal No.	Terminal code	Terminal name
3	CANL	CAN communication LO
11	CANH	CAN communication HI

Combination meter side terminal arrangement diagram



Terminal No	Terminal code	Terminal name
1	CANH	CAN communication HI (1)
2	CANL	CAN communication LO (1)
3	HCAN	CAN communication HI (2)
4	LCAN	CAN communication LO (2)
10	+B	+B power supply
18	GND	Earth

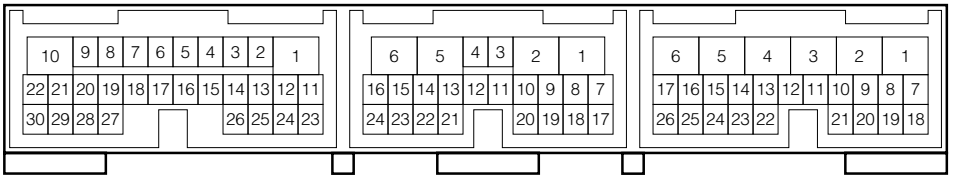
EFI ECU side terminal arrangement diagram



H11E6091S10

Terminal No	Terminal code	Terminal name
6	CANL	CAN communication LO (1)
7	CANH	CAN communication HI (1)
8	LCAN	CAN communication LO (2)
9	HCAN	CAN communication HI (2)
27	+B	EFI ECU power supply
125	E1	Computing system earth

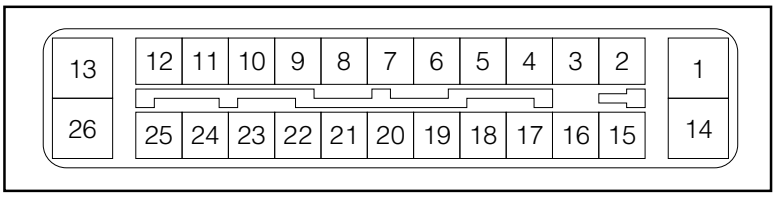
A/T ECU side terminal arrangement diagram



T11K5006S10

Terminal No	Terminal code	Terminal name
B3	+B	A/T ECU power supply
B9	HCN1	CAN communication HI (1)
B10	CANH	CAN communication HI (2)
B19	LCN1	CAN communication LO (1)
B20	CANL	CAN communication LO (2)
B24	E1	Sensor earth

ABS actuator side terminal arrangement diagram

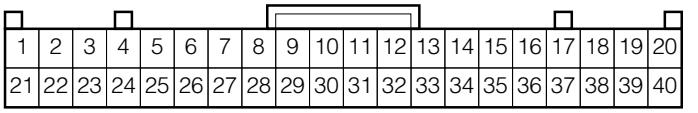


T11C5001S10

Terminal No	Terminal code	Terminal name
14	GND	Earth
17	HCAN	CAN communication HI
19	LCAN	CAN communication LO
20	+IG	IG power supply

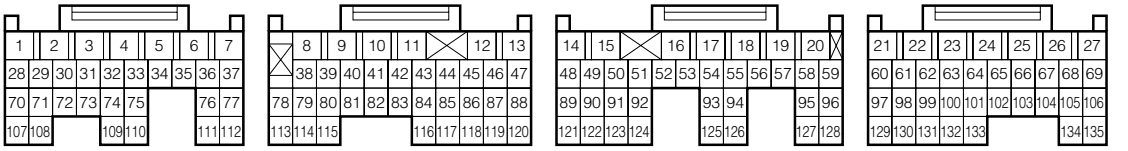
1-5 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS

Combination meter connection vehicle harness side connector



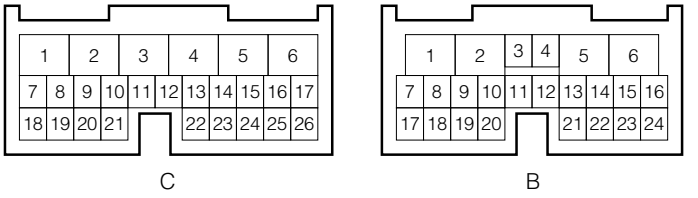
T11E6255S10

EFI ECU connection vehicle harness side connector



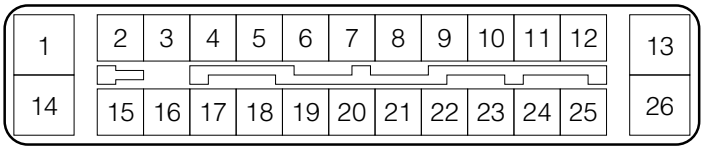
H11E6051S10

A/T ECU connection vehicle harness side connector



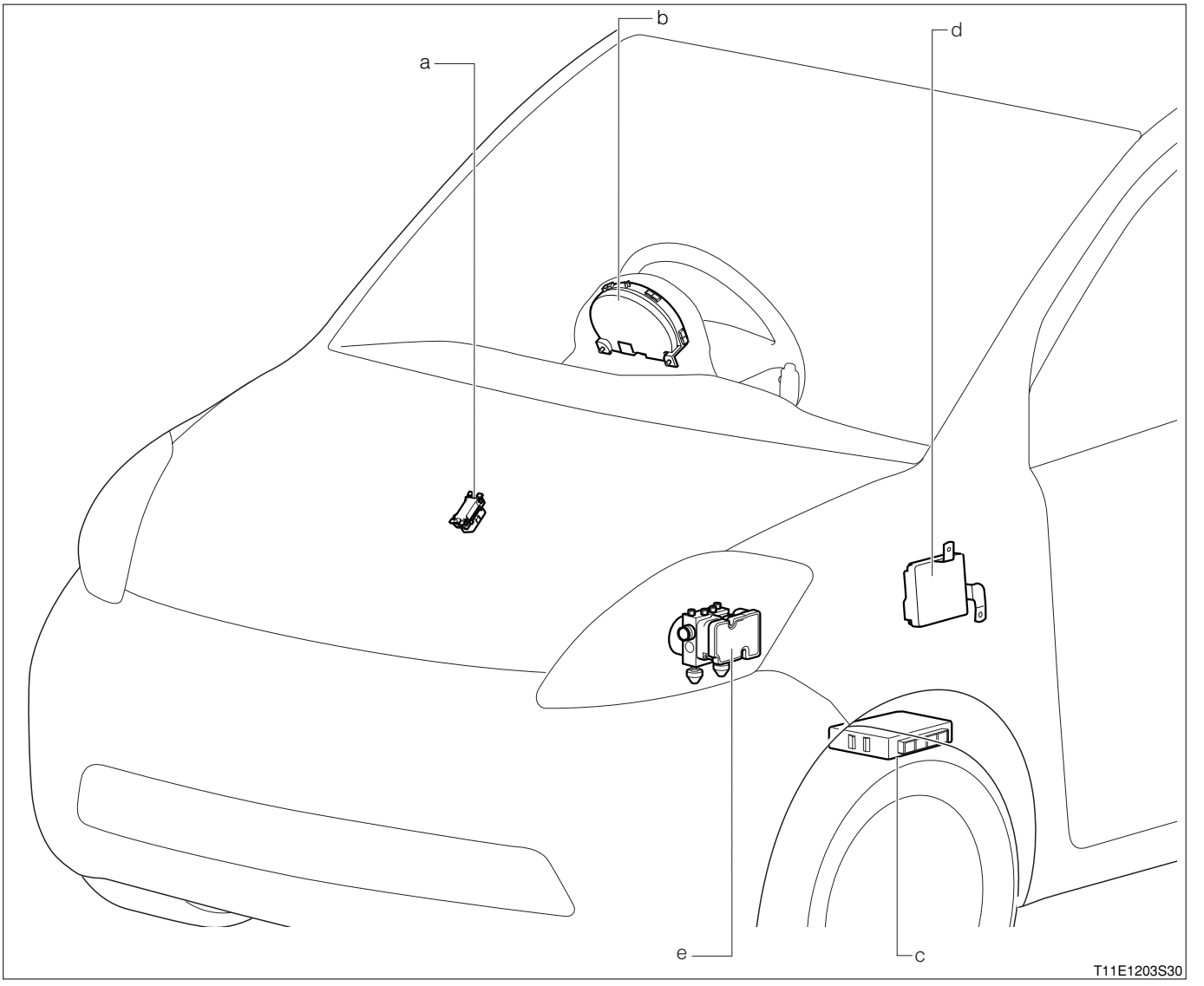
T11E6253S10

ABS actuator connection vehicle harness side connector



T11C5002S10

1-6 LOCATION OF COMPONENTS



	Part name
a	DLC
b	Combination meter (meter ECU)
c	Engine control computer (EFI ECU)
d	Transmission control computer (A/T ECU) (A/T vehicles)
e	ABS actuator (ABS ECU) (ABS-equipped vehicles)

1-7 HOW TO PROCEED WITH TROUBLE SHOOTING

1.This system incorporates diagnosis functions that will locate malfunctioning parts, thus providing a vital clue in trouble shooting.

∑1. Bringing malfunctioning vehicle to workshop

▼Go to ∑2.

∑2. Diagnosis by interview

1.Gather enough information from the customer on conditions, environment, and phenomenon in which the malfunction took place.

▼Go to ∑3.

∑3. Normal operation confirmation of the diagnosis code indication of the LCD in meter

1.Use the SST to short-circuit the DLC terminals between 4(ECU-T) - 13(E).

SST: 09991-87403-000
09991-87404-000

2.Check that the meter LCD indicates the diagnosis code (including the normal codes).

SPECIFIED VALUE: It indicates.

NOTE

- It is fine even if the codes that are not related to CAN are outputted.

▼If it is OK, proceed to ∑4.

▼If it is NG, perform following checks of the meter. Replace the meter if there are no problems.

(1) Harness check between the meter - DLC and DLC - body earth.

(2) Meter power supply system and earth system check

∑4. Confirmation and recording of diagnostic code of meter LCD (CAN related)

1.Check and record the CAN-related diagnostic code (codes 0051 - 0053) outputted on the meter LCD.

SPECIFIED VALUE: Codes 0051 - 0053 are not indicated.

▼If it is OK, proceed to ∑8.

▼If it is NG, proceed to ∑5.

∑5. Basic check

1.Perform basic check.

Refer to Page L2-14.

▼Proceed to ∑6.

∑6. Reconfirmation of diagnosis code of meter LCD (CAN related)

1.Reconfirm the diagnosis codes (codes 0051 - 0053) related to CAN indicated in the meter LCD.

SPECIFIED VALUE: Codes 0051 - 0053 are not indicated.

▼If it is OK, proceed to ∑8.

▼If it is NG, proceed to ∑7.

Σ7. Trouble shooting according to diagnosis code

1.Perform troubleshooting for the outputted diagnostic code.
Refer to Page L2-20.

▼Go to Σ8.

Σ8. Diagnosis code erasure

1.Erase the diagnosis code of the CAN communication employed system.
(1) Erasing procedures of diagnosis code of combination meter
(2) Erasing procedures of diagnosis code of EFI ECU
Refer to Page B8-36.

(3) Erasing procedures of diagnosis code of A/T ECU
Refer to Page F5-27.

(4) Erasing procedures of diagnosis code of ABS actuator
Refer to Page E3-20.

▼Proceed to Σ9.

Σ9. Reconfirmation of diagnosis code of meter LCD (CAN related)

1.Reconfirm the diagnosis codes (codes 0051 - 0053) related to CAN indicated in the meter LCD.
SPECIFIED VALUE: Codes 0051 - 0053 are not indicated.

▼If it is OK, proceed to Σ10.
▼If it is NG, proceed to Σ5 for a recheck.

Σ10. Confirmation test

1.Ensure that the problem that the customer described has been completely corrected and the operation is back to normal.
▼If it is OK, finish the trouble shooting.
▼In the case of NG, go back to Σ3 for a recheck.

1-8 INQUIRY

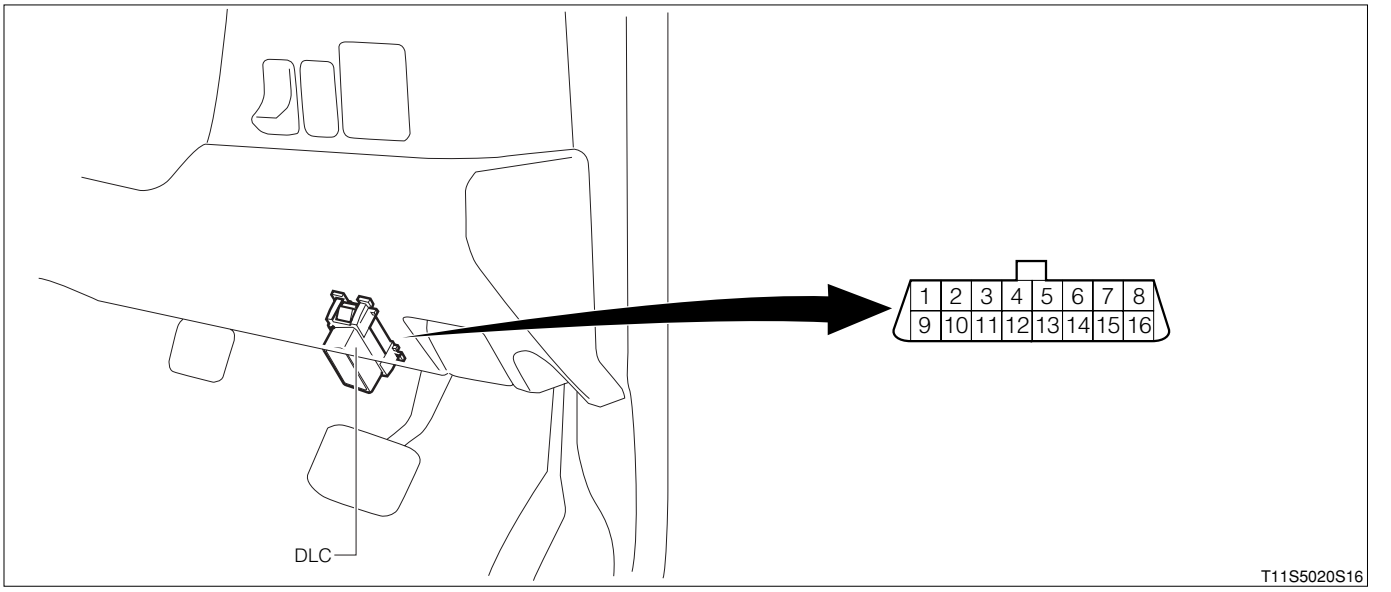
1.In an effort to remove causes for malfunction from the vehicle concerned, it is impossible to determine the cause without confirming the malfunction phenomenon. If the phenomenon is not confirmed, the vehicle may not be able to return to the normal conditions even if you continue your work. The diagnosis through interviews is to collect information from the customer before confirming the malfunction phenomena. The diagnosis through interviews provides very important clues in reproducing malfunction phenomena.
2.Since the information obtained by the diagnosis through interviews is referred to during the trouble shooting, it is imperative to make an inquiry of the customer, centering on the items related to the malfunction, instead of simply asking general questions.

1-9 CONFIRMATION, RECORD AND ERASURE OF DIAGNOSIS CODE

1.The diagnostic code remains displayed as long as the communication failure exists, and will be erased when the communication is back to the normal state. It is necessary, therefore, to record diagnostic codes before removing the battery negative (-) terminal.

1-9-1 CHECKING METHOD OF DIAGNOSIS

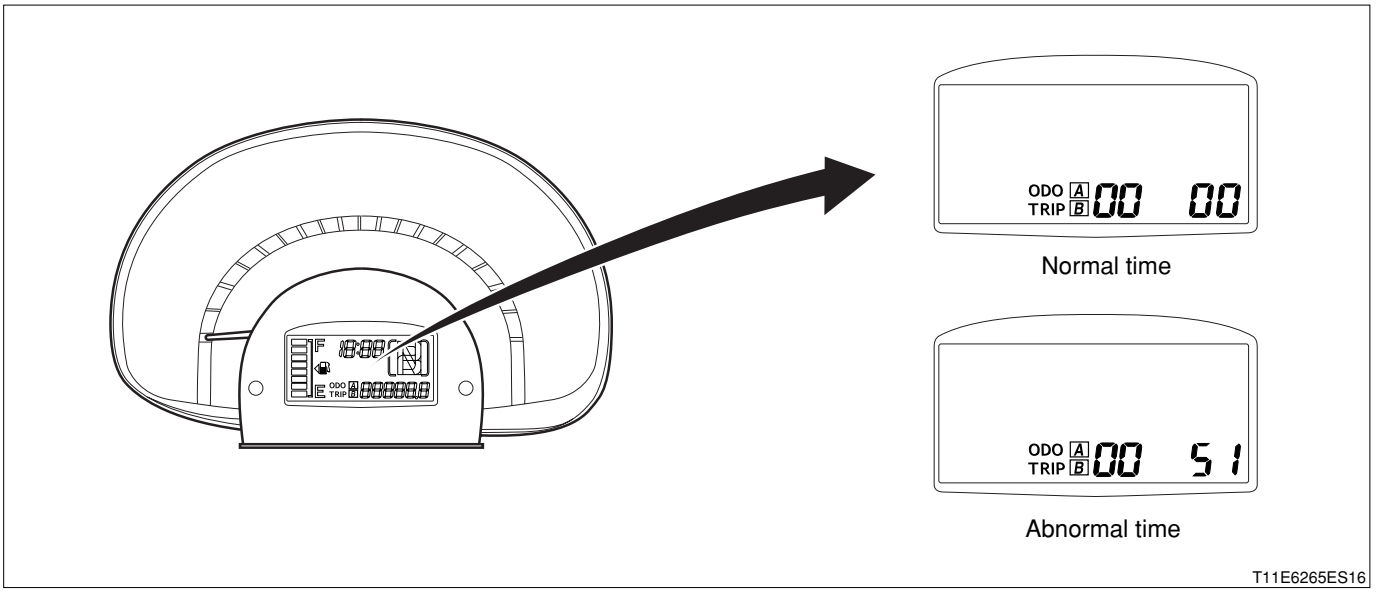
1.Stop the vehicle.
2.Turn IG switch to "LOCK".
3.Short the terminals 4 (ECU-T) and 13 (E) of DLC, using SST.
SST: 09991-87403-000
09991-87404-000



CAUTION

- Do not mistake the connection position of the connectors since it may cause malfunction.

4.Turn ON the IG switch and read the diagnosis code indicated in figures on the meter LCD.



NOTE

- Other than the diagnosis codes related to the CAN communication system, diagnosis codes of the Immobilizer system, meter, LIN communication system are also indicated on the meter LCD.
- When plural codes are to be outputted, they are outputted, starting from a smaller code number. Furthermore, when one cycle of indications is completed, these codes are repeatedly outputted at intervals of four seconds.

1-9-2 CANCELING METHOD OF DIAGNOSIS

1.There are following two ways to erase diagnostic codes.

(1) The communication error diagnosis code will be erased automatically when the communication problem has been solved.

(2) Turn the IG switch to "LOCK"

1-9-3 CONTENTS OF DIAGNOSIS

Code No.		Warning indication (Provided: ○, Not provided: ×)	(Provided: ○, Not provided: ×)	Contents of diagnosis
LCD	4-digit			
0	–	×	×	Normal
51	–	×	×	Communication failure with EFI ECU
52	–	×	×	Communication failure with A/T ECU
53	–	×	×	Communication failure with ABS ECU

NOTE

- The meter LCD displays diagnosis codes for the meter, and LIN communication system, in addition to those for the CAN communication system.

Meter (0041 - 0041, 0061)

Refer to Page J3-14.

LIN communication system (0011 - 0021)

Refer to Page L2-44.

1-10 BASIC CHECK

∑1. CAN line resistance value check

1.Measure the resistance value between the following terminals.

(1) Between DLC3 (CANL) - DLC11 (CANH)

SPECIFIED VALUE: 55 - 65Ω

NOTE

- When the wires between DLC3 (CANL) - DLC11 (CANH) are short circuited, the resistance value is about 0Ω.
  When the CAN line has open wire between the combination meter - EFI ECU, the resistance value is about 120Ω.

Measured value	SPECIFICATIONS	Judgment
In the case of OK	—	a
If the reading is 55Ω or below.	RHD vehicles	b
	LHD vehicles	c
If the reading is 65Ω or above.	RHD vehicles	d
	LHD vehicles	e

▼In case of a, proceed to ∑6.
▼In case of b, proceed to ∑2.
▼In case of c, proceed to ∑3.
▼In case of d, proceed to ∑4.
▼In case of e, proceed to ∑5.

∑2. Short-circuit check with CAN line (RHD vehicles)

1.Perform checking of the harness and connectors between the following terminals.

(1) Between DLC3 (CANL) - combination meter connection vehicle harness side connector 4 (LCAN)

(2) Between DLC11 (CANH) - combination meter connection vehicle harness side connector 3 (HCAN)

(3) Between combination meter connection vehicle harness side connector 1 (CANH) - EFI ECU connection vehicle harness side connector 9 (HCAN)

(4) Between combination meter connection vehicle harness side connector 2 (CANL) - EFI ECU connection vehicle harness side connector 8 (LCAN)

2.Check the harness and connector between the following terminals on the A/T vehicle.

(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - A/T ECU connection vehicle harness side connector B19 (LCN1)

(2) Between EFI ECU connection vehicle harness side connector 7 (CANH) - A/T ECU connection vehicle harness side connector B9 (HCN1)

(3) Between A/T ECU connection vehicle harness side connector B10 (CANH) - ABS actuator connection vehicle harness side connector 17 (HCAN)

(4) Between A/T ECU connection vehicle harness side connector B20 (CANL) - ABS actuator connection vehicle harness side connector 19 (LCAN)

3.Check the harness and connector between the following terminals on the M/T vehicle.

(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) 14 (GND) ABS actuator connection vehicle harness side connector 19 (LCAN)

(2) Between EFI ECU connection vehicle harness side connector 7 (CANH) - ABS actuator connection vehicle harness side connector 17 (HCAN)

⊃3. Check of CAN line for short-circuit (LHD vehicles)

1.Perform checking of the harness and connectors between the following terminals.
(1) Between DLC3 (CANL) - combination meter connection vehicle harness side connector 4 (LCAN)
(2) Between DLC11 (CANH) - combination meter connection vehicle harness side connector 9 (HCAN)
(3) Between EFI ECU connection vehicle harness side connector 6 (CANL) - combination meter connection vehicle harness side connector 4 (LCAN)
(4) Between EFI ECU connection vehicle harness side connector 7 (CANH) - combination meter connection vehicle harness side connector 3 (HCAN)

2.Check the harness and the connector between the following terminals on the A/T vehicle.
(1) Between combination meter connection vehicle harness side connector 1 (CANH) - A/T ECU connection vehicle harness side connector B9 (HCN1)
(2) Between combination meter connection vehicle harness side connector 2 (CANL) - A/T ECU connection vehicle harness side connector B19 (LCN1)
(3) Between A/T ECU connection vehicle harness side connector B10 (CANH) - ABS actuator connection vehicle harness side connector 19 (LCAN)
(4) Between A/T ECU connection vehicle harness side connector B20 (CANL) - ABS actuator connection vehicle harness side connector 19 (LCAN)

3.Check the harness and the connector between the following terminals on the M/T vehicle.
(1) Between combination meter connection vehicle harness side connector 1 (CANH) - ABS actuator connection vehicle harness side connector 19 (LCAN)
(2) Between combination meter connection vehicle harness side connector 2 (CANL) - ABS actuator connection vehicle harness side connector 19 (LCAN)

⊃4. Check of CAN line for open wire (RHD vehicles)

1.Perform checking of the harness and connectors between the following terminals.
(1) Between DLC3 (CANL) - combination meter connection vehicle harness side connector 4 (LCAN)
(2) Between DLC11 (CANH) - combination meter connection vehicle harness side connector 3 (HCAN)
(3) Between combination meter connection vehicle harness side connector 1 (CANH) - EFI ECU connection vehicle harness side connector 9 (HCAN)
(4) Between combination meter connection vehicle harness side connector 2 (CANL) - EFI ECU connection vehicle harness side connector 8 (LCAN)

⊃5. Check of CAN line for open wire (LHD vehicls)

1.Check the harness and the connector between the following terminals.
(1) Between DLC3 (CANL) - EFI ECU connection vehicle harness side connector 8 (LCAN)
(2) Between DLC11 (CANH) - EFI ECU connection vehicle harness side connector 9 (HCAN)
(3) Between EFI ECU connection vehicle harness side connector 6 (CANL) - combination meter connection vehicle harness side connector 4 (LCAN)
(4) Between EFI ECU connection vehicle harness side connector 7 (CANH) - combination meter connection vehicle harness side connector 3 (HCAN)

⊳6. Check of CAN line for short-circuit

1.Perform continuity check between the following terminals.0252
(1) Between DLC3 (CANL) - battery positive (+) terminal
(2) Between DLC11 (CANH) - battery positive (+) terminal
(3) Between DLC3 (CANL) - body earth
(4) Between DLC11 (CANH) - body earth
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to ⊳7.
▼If it is NG, repair or replace the malfunctioning sections

⊳7. Connector connection check

1.Check the connecting conditions of the connectors in the following sections.
NOTE
• Check connectors especially for loosening or half fit.

(1) DLC
(2) Combination meter
(3) EFI ECU
(4) A/T ECU
(5) ABS actuator
SPECIFIED VALUE: No failure exists.

▼If it is OK, proceed to ⊳8.
▼If it is NG, repair or replace the malfunctioning sections.

⊳8. Connector condition check

1.Turn IG switch to "LOCK".
2.Disconnect the negative terminal of the battery.
NOTE
• Record the diagnosis codes of all the systems before disconnecting the negative terminal of the battery.

3.Disconnect all the connectors of the ECU of the CAN communication employed system.
4.Perform the following checks for the ECU connection vehicle harness side connector of the CAN communication employed system and the DLC connector and each terminal.
(1) Falling off
(2) Bend
(3) Poor fit
SPECIFIED VALUE: No failure exists.

▼If it is OK and the vehicle is a RHD vehicle, go to ⊳9.
▼If it is OK and the vehicle is a LHD vehicle, go to ⊳10.
▼If it is NG, repair or replace the malfunctioning sections.

⊳9. Harness check (RHD vehicles)

1.Disconnect all the connectors of the combination meter, EFI ECU, A/T ECU and ABS actuator.
2.Perform continuity check between the following terminals.
(1) Between DLC3 (CANL) - combination meter connection vehicle harness side connector 4 (LCAN)
(2) Between DLC11 (CANH) - combination meter connection vehicle harness side connector 3 (HCAN)
(3) Between combination meter connection vehicle harness side connector 1 (CANH) - EFI ECU connection vehicle harness side connector 9 (HCAN)
(4) Between combination meter connection vehicle harness side connector 2 (CANL) - EFI ECU connection vehicle harness side connector 8 (LCAN)
3.Check continuity between the following terminals on the A/T vehicle.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - A/T ECU connection vehicle harness side connector B19 (LCN1)
(2) Between EFI ECU connection vehicle harness side connector 7 (CANH) - A/T ECU connection vehicle harness side connector B9 (HCN1)
(3) Between A/T ECU connection vehicle harness side connector B10 (CANH) - ABS actuator connection vehicle harness side connector 17 (HCAN)
(4) Between A/T ECU connection vehicle harness side connector B20 (CANL) - ABS actuator connection vehicle harness side connector 19 (LCAN)
4.Check continuity between the following terminals on the M/T vehicle.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - ABS actuator connection vehicle harness side connector 19 (LCAN)
(2) Between EFI ECU connection vehicle harness side connector 7 (CANH) - ABS actuator connection vehicle harness side connector 19 (LCAN)

SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to ⊳11.
▼If it is NG, repair or replace the malfunctioning sections.

⊳10. Wire harness check (LHD vehicle)

1.Remove all the connectors on the EFI ECU, combination meter, A/T ECU, and ABS actuator.
2.Check continuity between the following terminals.
(1) Between DLC3 (CANL) - EFI ECU connection vehicle harness side connector 8 (LCAN)
(2) Between DLC4 (HCAN) - EFI ECU connection vehicle harness side connector 9 (HCAN)
(3) Between EFI ECU connection vehicle harness side connector 6 (CANL) - combination meter connection vehicle harness side connector 4 (LCAN)
(4) Between EFI ECU connection vehicle harness side connector 7 (CANH) - combination meter connection vehicle harness side connector 3 (HCAN)
3.Check continuity between the following terminals on the A/T vehicle.
(1) Between combination meter connection vehicle harness side connector 1 (CANH) - A/T ECU connection vehicle harness side connector B9 (HCN1)
(2) Between combination meter connection vehicle harness side connector 2 (CANL) - A/T ECU connection vehicle harness side connector B19 (LCN1)
(3) Between A/T ECU connection vehicle harness side connector B10 (CANH) - ABS actuator connection vehicle harness side connector 17 (HCN1)
(4) Between A/T ECU connection vehicle harness side connector B20 (CANL) - ABS actuator connection vehicle harness side connector 19 (LCAN)

4.Check continuity between the following terminals on the M/T vehicle.
(1) Between combination meter connection vehicle harness side connector 1 (CANH) - ABS actuator connection vehicle harness side connector 17 (HCAN)
(2) Between combination meter connection vehicle harness side connector 2 (CANL) - ABS actuator connection vehicle harness side connector 19 (LCAN)
SPECIFIED VALUE: Continuity exists

▼If it is OK, go to ⊳11.
▼In the case of NG, repair or replace the malfunctioning sections.

⊳11. Combination meter voltage check
1.Connect the connectors of the EFI ECU and A/T ECU.
NOTE
• When connecting, connect so that there are no half fit connectors.

2.Turn "ON"the IG switch.
3.Measure the voltage between the following terminals.
(1) Between combination meter connection vehicle harness side connector 10 (+B) - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to ⊳12.
▼If it is NG, check the power supply system of the combination meter.

⊳12. Combination meter earth check
1.Turn the IG switch to "LOCK".
2.Perform continuity check between the following terminals.
(1) Between combination meter connection vehicle harness side connector 18 (GND) - body earth
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to ⊳13.
▼If it is NG, repair or replace the malfunctioning section.

⊳13. ECU power supply voltage check
1.Turn "ON" the IG switch.
2.Measure the voltage between the terminals of the CAN communication employed system.
(1) Between EFI ECU connection vehicle harness side connector 27 (+B) - body earth
(2) Between A/T ECU connection vehicle harness side connector B3 (+B) - body earth
(3) Between ABS actuator connection vehicle harness side connector 20 (+IG) - body earth
SPECIFIED VALUE: Battery voltage

▼If it is OK, proceed to ⊳14.
▼If it is NG, repair or replace the malfunctioning section.

⊳14. ECU earth check

1.Turn the IG switch to "LOCK".

2.Perform continuity check between the terminals of the CAN communication employed system.

(1) Between EFI ECU connection vehicle harness side connector 125 (E1) - body earth

(2) Between A/T ECU connection vehicle harness side connector B24 (E1) - body earth

(3) Between ABS actuator connection vehicle harness side connector 14 (GND) - body earth

SPECIFIED VALUE: Continuity exists

▼If it is OK, perform circuit check of each ECU.

▼If it is NG, repair or replace the malfunctioning section.

1-11 TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE

1-11-1 NO.0051 (EFI ECU COMMUNICATION FAILURE)

(1) Output conditions

1.When the CAN communication (meter reception) between the combination meter - EFI ECU has been disrupted for 12 seconds or more.

(2) Checking points

1.Is the harness between the combination meter - EFI ECU normal?
2.Is there any abnormality in the connectors of the EFI ECU?
3.Is the combination meter normal?
4.Is the EFI ECU normal?

(3) Checking method

Σ>1. Diagnosis code confirmation

1.Check if the diagnosis codes related to CAN are outputted in the meter LCD.

▼If No.0052 is outputted simultaneously, refer to the trouble shooting of "No.0051, No.0052 simultaneous output".
Refer to Page L2-28.

▼If No.0053 is outputted simultaneously, refer to the trouble shooting of "No.0051, No.0053 simultaneous output".
Refer to Page L2-31.

▼If No.0052 and No.0053 are outputted simultaneously, refer to the trouble shooting of "No.0051, No.0052 and No.0053 simultaneous output".
Refer to Page L2-35.

▼If only No.0051 is output, proceed to Σ>2.

Σ>2. CAN basic check

1.Perform basic check of CAN.
Refer to Page L2-14.

▼Proceed to Σ>3.

Σ>3. EFI ECU internal resistance check

1.Disconnect all connectors of the EFI ECU.
2.Measure the resistance value between the following terminals.
(1) Between EFI ECU side connector 6 (CANL) - EFI ECU side connector 7 (CANH)
(2) Between EFI ECU side connector 8 (LCAN) - EFI ECU side connector 9 (HCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to Σ>4.
▼If it is NG, replace the EFI ECU.

⊃4. Combination meter internal resistance check

1.Disconnect all the connectors of the combination meter.

2.Measure the resistance value between the following terminals.

(1) Between combination meter side connector 1 (CANH) - combination meter side connector 2 (CANL)

(2) Between combination meter side connector 3 (HCAN) - combination meter side connector 4 (LCAN)

SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, perform circuit check of the combination meter and the EFI ECU.

▼If it is NG, replace the combination meter.

1-11-2 NO.0052 (A/T ECU COMMUNICATION FAILURE)

(1) Output conditions

1.When the CAN communication (meter reception) between the combination meter - A/T ECU has been disrupted for 12 seconds or more.

(2) Checking points

1.Is the harness between the EFI ECU - A/T ECU normal (RHD vehicle)?
2.Is the harness between the combination meter - A/T ECU normal (LHD vehicle)?
3.Is the harness between the A/T ECU - ABS ECU normal?
4.Is there any abnormality in the connectors of the A/T ECU?
5.Is the ABS ECU normal?
6.Is the A/T ECU normal?
7.Is the ABS actuator normal?

(3) Checking method

Σ>1. Diagnosis code confirmation

1.Check if the diagnosis codes related to CAN are outputted in the meter LCD.

▼If No.0051 is outputted simultaneously, refer to the trouble shooting of "No.0051, No.0052 simultaneous output".

Refer to Page L2-28.

▼If No.0053 is outputted simultaneously, refer to the trouble shooting of "No.0052, No.0053 simultaneous output".

Refer to Page L2-33.

▼If No.0051 and No.0053 are outputted simultaneously, refer to the trouble shooting of "No.0051, No.0052 and No.0053 simultaneous output".

Refer to Page L2-35.

▼If only No.0052 is outputted, proceed to Σ>2.

Σ>2. CAN basic check

1.Perform basic check of CAN.

Refer to Page L2-14.

▼If the vehicle is RHD, go to Σ>3.
▼If the vehicle is LHD, go to Σ>4.

Σ>3. Short-circuit check between CAN lines (RHD vehicles)

1.Turn IG switch to "LOCK".
2.Disconnect the negative terminal of the battery.
3.Disconnect all connectors of the EFI ECU and A/T ECU.
4.Perform continuity check between the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - A/T ECU connection vehicle harness side connector B19 (LCN1)

SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>5.
▼If it is NG, repair or replace the malfunctioning section.

∑4. Short-circuit check between CAN lines (LHD vehicles)

1.Set the IG switch to LOCK.
2.Remove the battery negative (-) terminal.
3.Remove all the connectors on the combination meter and the A/T ECU.
4.Check for continuity between the following terminals.
(1) Between combination meter connection vehicle harness side connector 1 (CANH) - combination meter connection vehicle harness side connector 2 (CANL)
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - A/T ECU connection vehicle harness side connector B19 (LCN1)
SPECIFIED VALUE: No continuity exists

▼If it is OK, go to ∑5.
▼In the case of NG, repair or replace the malfunctioning sections.

∑5. CAN line short-circuit check

1.Perform continuity check between the following terminals.
(1) Between A/T ECU connection vehicle harness side connector B19 (LCN1) - battery positive (+) terminal
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - battery positive (+) terminal
(3) Between A/T ECU connection vehicle harness side connector B19 (LCN1) - body earth
(4) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - body earth
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to ∑6.
▼If it is NG, repair or replace the malfunctioning section.

∑6. EFI ECU internal resistance check

1.Disconnect all the connectors of the EFI ECU.
2.Measure the resistance value between the following terminals.
(1) Between EFI ECU side connector 6 (CANL) - EFI ECU side connector 7 (CANH)
(2) Between EFI ECU side connector 8 (LCAN) - EFI ECU side connector 9 (HCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to ∑7.
▼If it is NG, replace the EFI ECU.

∑7. Combination meter internal resistance check

1.Disconnect the connectors of the combination meter.
2.Measure the resistance value between the following terminals.
(1) Between combination meter side connector 1 (CANH) - combination meter side connector 2 (CANL)
(2) Between combination meter side connector 3 (HCAN) - combination meter side connector 4 (LCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to ∑8.
▼If it is NG, replace the combination meter.

⊳8. A/T ECU internal circuit check

1.Disconnect all the connectors of the A/T ECU.

2.Perform continuity check between the following terminals.

(1) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B19 (LCN1)

(2) Between A/T ECU side connector B10 (CANH) - A/T ECU side connector B20 (CANL)

(3) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B10 (CANH)

(4) Between A/T ECU side connector B19 (LCN1) - A/T ECU side connector B20 (CANL)

SPECIFIED VALUE:

Between measured terminals	Continuity
Between B9 (HCN1) - B19 (LCN1)	Continuity exists (less than 1MΩ)
Between B10 (CANH) - B20 (CANL)	
Between B9 (HCN1) - B10 (CANH)	Continuity exists (1Ω or less)
Between B19 (LCN1) - B20 (CANL)	

▼If everything is OK, perform circuit check of the EFI ECU, the A/T ECU and the combination meter.

▼If even one of them is NG, replace the A/T ECU.

1-11-3 NO.0053 (ABS ECU COMMUNICATION FAILURE)

(1) Output conditions

1.When the CAN communication (meter reception) between the combination meter - ABS actuator has been disrupted for 12 seconds or more.

(2) Checking points

① Right hand drive vehicles

1.Is the harness between the EFI ECU - A/T ECU normal?
2.Is the harness between the A/T ECU - ABS ECU normal? (A/T vehicles)
3.Is the harness between EFI ECU - ABS ECU normal? (M/T vehicle).
4.Is there any abnormality in the connectors of the A/T ECU?
5.Is there any abnormality in the connectors of the ABS ECU?
6.Is the A/T ECU normal?
7.Is the ABS ECU normal?

② Left hand drive vehicles

1.Is the harness between the combination meter and A/T ECU normal?
2.Is the harness between A/T ECU - ABS ECU normal? (A/T vehicle).
3.Is the harness between the combination meter and ABS ECU normal? (M/T vehicle).
4.Is the A/T ECU connector normal?
5.Is the ABS ECU connector normal?
6.Is the A/T ECU normal?
7.Is the ABS ECU normal?

(3) Checking method

Σ>1. Diagnosis code confirmation

1.Check if the diagnosis codes related to CAN are outputted in the meter LCD.

▼If No.0051 is outputted simultaneously, refer to the trouble shooting of "No.0051, No.0053 simultaneous output".

Refer to Page L2-31.

▼If No.0052 is outputted simultaneously, refer to the trouble shooting of "No.0052, No.0053 simultaneous output".

Refer to Page L2-33.

▼If No.0051 and No.0052 are outputted simultaneously, refer to the trouble shooting of "No.0051, No.0052 and No.0053 simultaneous output".

Refer to Page L2-35.

▼If only No.0053 is outputted, proceed to Σ>2.

Σ>2. CAN basic check

1.Perform basic check of CAN.

Refer to Page L2-14.

▼Proceed to Σ>3.

Σ3. Short-circuit check between CAN lines

1.Turn IG switch to "LOCK".
2.Disconnect the negative terminal of the battery.
3.Disconnect all connectors of the EFI ECU, A/T ECU and ABS actuator.
4.Perform continuity check between the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)
(2) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - ABS actuator connection vehicle harness side connector 19 (LCAN)
5.Check for continuity between the following terminals on the A/T vehicle.
(1) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - A/T ECU connection vehicle harness side connector B19 (LCN1)
(2) Between A/T ECU connection vehicle harness side connector B10 (CANH) - A/T ECU connection vehicle harness side connector B20 (CANL)
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ4.
▼If it is NG, repair or replace the malfunctioning section.

Σ4. CAN line short-circuit check

1.Perform continuity check between the following terminals.
(1) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - battery positive (+) terminal
(2) Between ABS actuator connection vehicle harness side connector 19 (LCAN) - battery positive (+) terminal
(3) Between ABS actuator connection vehicle harness side connector 17 HCAN) - body earth
(4) Between ABS actuator connection vehicle harness side connector 19 (LCAN) - body earth
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ5.
▼If it is NG, repair or replace the malfunctioning section.

Σ5. EFI ECU internal resistance check

1.Disconnect all the connectors of the EFI ECU.
2.Measure the resistance value between the following terminals.
(1) Between EFI ECU side connector 6 (CANL) - EFI ECU side connector 7 (CANH)
(2) Between EFI ECU side connector 8 (LCAN) - EFI ECU side connector 9 (HCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to Σ6.
▼If it is NG, replace the EFI ECU.

∑6. Combination meter internal resistance check

1.Disconnect the connectors of the combination meter.
2.Measure the resistance value between the following terminals.
(1) Between combination meter side connector 1 (CANH) - combination meter side connector 2 (CANL)
(2) Between combination meter side connector 3 (HCAN) - combination meter side connector 4 (LCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to ∑7.
▼If it is NG, replace the combination meter.

∑7. ABS actuator internal circuit check

1.Disconnect the connectors of the ABS actuator.
2.Perform continuity check between the following terminals.
(1) Between ABS actuator side connector 17 (HCAN) - ABS actuator side connector 19 (LCAN)
SPECIFIED VALUE: Continuity exists (less than 1MΩ)

▼If it is OK, proceed to ∑8.
▼If it is OK and the vehicle is a M/T vehicle, check circuits of the EFI ECU, ABS actuator, and combination meter.
Refer to Page A1-24.

▼If it is NG, replace the ABS actuator.
Refer to Page E3-1.

∑8. A/T ECU internal circuit check

1.Disconnect all the connectors of the A/T ECU.
2.Perform continuity check between the following terminals.
(1) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B19 (LCN1)
(2) Between A/T ECU side connector B10 (CANH) - A/T ECU side connector B20 (CANL)
(3) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B10 (CANH)
(4) Between A/T ECU side connector B19 (LCN1) - A/T ECU side connector B20 (CANL)
SPECIFIED VALUE:

Between measured terminals	Continuity
Between B9 (HCN1) - B19 (LCN1)	Continuity exists (less than 1MΩ)
Between B10 (CANH) - B20 (CANL)	
Between B9 (HCN1) - B10 (CANH)	Continuity exists (1Ω or less)
Between B19 (LCN1) - B20 (CANL)	

▼If everything is OK, perform circuit check of the EFI ECU, the A/T ECU, the ABS actuator and the combination meter.
▼If even one of them is NG, replace the A/T ECU.

1-11-4 NO.0051, NO.0052 SIMULTANEOUS OUTPUT

(1) Checking points

1.Is the EFI ECU normal?
2.Is the A/T ECU normal?
3.Is the harness between the combination meter - EFI ECU normal?
4.Is the harness between the EFI ECU - A/T ECU normal? (RHD vehicles)
5.Is the harness between the A/T ECU - ABS actuator normal? (ABS-equipped vehicles)
6.Is the harness between the combination meter - DLC normal? (RHD vehicles)
7.Is the harness between the A/T ECU - combination meter normal? (LHD vehicles)
8.Is the harness between the EFI ECU - DLC normal? (LHD vehicles)

(2) Checking method

Σ>1. CAN basic check

1.Perform basic check of CAN.
Refer to Page L2-14.

▼In the case of vehicles not equipped with ABS, proceed to Σ>2.
▼In the case of vehicles equipped with ABS, proceed to Σ>5.

Σ>2. Short-circuit check between CAN lines

1.Turn IG switch to "LOCK".
2.Disconnect the negative terminal of the battery.
3.Disconnect all the connectors of the combination meter, the EFI ECU, the A/T ECU.
4.In the case of RHD vehicles, perform continuity check between the following terminals.
(1) Between combination meter connection vehicle harness side connector 3 (HCAN) - combination connection vehicle harness side connector 4 (LCAN)
(2) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)
5.In the case of LHD vehicles, perform continuity check between the following terminals.
(1) Between combination meter connection vehicle harness side connector 1 (CANH) - combination connection vehicle harness side connector 2 (CANL)
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - A/T ECU connection vehicle harness side connector B19 (LCN1)
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>3.
▼If it is NG, repair or replace the malfunctioning section.

Σ>3. CAN line earth side short-circuit check

1.Perform continuity check between the following terminals.
(1) Between combination meter connection vehicle harness side connector 1 (CANH) - body earth terminal
(2) Between combination meter connection vehicle harness side connector 2 (CANL) - body earth terminal
(3) Between EFI ECU connection vehicle harness side connector 6 (CANL) - body earth terminal
(4) Between A/T ECU connection vehicle harness side connector 7 (CANH) - body earth terminal
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ>4.
▼If it is NG, repair or replace the malfunctioning section.

∑4. CAN line +B side short-circuit check

1.Perform continuity check between the following terminals.

(1) Between combination meter connection vehicle harness side connector 1 (CANH) - battery positive (+) terminal

(2) Between combination meter connection vehicle harness side connector 2 (CANL) - battery positive (+) terminal

(3) Between A/T ECU connection vehicle harness side connector B19 (LCN1) - battery positive (+) terminal

(4) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - battery positive (+) terminal

SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to ∑5.

▼If it is NG, repair or replace the malfunctioning section.

∑5. EFI ECU internal resistance check

1.Disconnect all the connectors of the EFI ECU.

2.Measure the resistance value between the following terminals.

(1) Between EFI ECU side connector 6 (CANL) - EFI ECU side connector 7 CANH)

(2) Between EFI ECU side connector 8 (LCAN) - EFI ECU side connector 9 (HCAN)

SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to ∑6.

▼If it is NG, replace the EFI ECU.

∑6. Combination meter internal resistance check

1.Disconnect the connectors of the combination meter.

2.Measure the resistance value between the following terminals.

(1) Between combination meter side connector 1 (CANH) - combination meter side connector 2 (CANL)

(2) Between combination meter side connector 3 (HCAN) - combination meter side connector 4 (LCAN)

SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to ∑7.

▼If it is NG, replace the combination meter.

⊃7. A/T ECU internal circuit check

1.Disconnect all the connectors of the A/T ECU.

2.Perform continuity check between the following terminals.

(1) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B19 (LCN1)

(2) Between A/T ECU side connector B10 (CANH) - A/T ECU side connector B20 (CANL)

(3) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B10 (CANH)

(4) Between A/T ECU side connector B19 (LCN1) - A/T ECU side connector B20 (CANL)

SPECIFIED VALUE:

Between measured terminals	Continuity
Between B9 (HCN1) - B19 (LCN1)	Continuity exists (less than 1MΩ)
Between B10 (CANH) - B20 (CANL)	
Between B9 (HCN1) - B10 (CANH)	Continuity exists (1Ω or less)
Between B19 (LCN1) - B20 (CANL)	

▼If everything is OK, perform circuit check of the combination meter, the EFI ECU, and the A/T ECU.

▼If even one of them is NG, replace the A/T ECU.

1-11-5 NO.0051, NO.0053 SIMULTANEOUS OUTPUT

(1) Checking points

1.Is the EFI ECU normal?
2.Is the ABS actuator normal?
3.Is the harness between the combination meter - EFI ECU normal?
4.Is the harness between the EFI ECU - A/T ECU normal? (RHD vehicles, A/T vehicles)
5.Is the harness between the A/T ECU - ABS actuator normal? (RHD vehiles, A/T vehicles)
6.Is the harness between the combination meter - DLC normal? (RHD vehicles)
7.Is the harness between the EFI ECU - DLC normal? (LHD vehicles)

(2) Checking method

Σ>1. CAN basic check

1.Perform basic check of CAN.
Refer to Page L2-14.

▼In the case of M/T vehicles, proceed to Σ>2.
▼In the case of A/T vehicles, proceed to Σ>5.

Σ>2. Short-circuit check between CAN lines

1.Turn IG switch to "LOCK".
2.Disconnect the negative terminal of the battery.
3.Disconnect all the connectors of the combination meter, the EFI ECU, the A/T ECU and the ABS actuator.
4.In the case of RHD vehicles, perform continuity check between the following terminals.
(1) Between combination meter connection vehicle harness side connector 3 (HCAN) - combination connection vehicle harness side connector 4 (LCAN)
(2) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)
(3) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - ABS actuator connection vehicle harness side connector 19 (LCAN)
5.In the case of LHD vehicles, perform continuity check between the following terminals.
(1) Between combination meter connection vehicle harness side connector 1 (CANH) - combination connection vehicle harness side connector 2 (CANL)
(2) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - ABS actuator connection vehicle harness side connector 19 (LCAN)
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>3.
▼If it is NG, repair or replace the malfunctioning section.

Σ>3. CAN line earth side short-circuit check

1.Perform continuity check between the following terminals.
(1) Between combination meter connection vehicle harness side connector 1 (CANH) - body earth terminal
(2) Between combination meter connection vehicle harness side connector 2 (CANL) - body earth terminal
SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to Σ>4.
▼If it is NG, repair or replace the malfunctioning section.

∑4. CAN line +B side short-circuit check

1.Perform continuity check between the following terminals.

(1) Between combination meter connection vehicle harness side connector 1 (CANH) - battery positive (+) terminal

(2) Between combination meter connection vehicle harness side connector 2 (CANL) - battery positive (+) terminal

SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to ∑5.

▼If it is NG, repair or replace the malfunctioning section.

∑5. EFI ECU internal resistance check

1.Disconnect all the connectors of the EFI ECU.

2.Measure the resistance value between the following terminals.

(1) Between EFI ECU side connector 6 (CANL) - EFI ECU side connector 7 (CANH)

(2) Between EFI ECU side connector 8 (LCAN) - EFI ECU side connector 9 (HCAN)

SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to ∑6.

▼If it is NG, replace the EFI ECU.

Refer to Page B8-1.

∑6. ABS actuator internal circuit check

1.Disconnect the connectors of the ABS actuator.

2.Perform continuity check between the following terminals.

(1) Between ABS actuator side connector 17 (HCAN) - ABS actuator side connector 19 (LCAN)

SPECIFIED VALUE: Continuity exists (less than 1MΩ)

▼If it is OK, perform circuit check of the EFI ECU and the ABS actuator.

▼If it is NG, replace the ABS actuator.

1-11-6 NO.0052, NO.0053 SIMULTANEOUS OUTPUT

(1) Checking points

1.Is the EFI ECU normal?
2.Is the A/T ECU normal?
3.Is the harness between EFI ECU - A/T ECU normal?

(2) Checking method

Σ>1. CAN basic check

1.Perform basic check of CAN.
Refer to Page L2-14.

▼Proceed to Σ>2.

Σ>2. Harness check

1.Turn IG switch to "LOCK".
2.Disconnect the negative terminal of the battery.
3.Disconnect all the connectors of the EFI ECU and the A/T ECU.
4.Perform continuity check between the following terminals.
(1) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - A/T ECU connection vehicle harness side connector B19 (LCN1)
SPECIFIED VALUE: No continuity exists

▼If it is OK, proceed to Σ>3.
▼If it is NG, repair or replace the malfunctioning section.

Σ>3. CAN line short-circuit check

1.Perform continuity check between the following terminals.
(1) Between A/T ECU connection vehicle harness side connector B19 (LCN1) - battery positive (+) terminal
(2) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - battery positive (+) terminal
(3) Between A/T ECU connection vehicle harness side connector B19 (LCN1) - body earth
(4) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - body earth
SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>4.
▼If it is NG, repair or replace the malfunctioning section.

Σ>4. EFI ECU internal resistance check

1.Disconnect all the connectors of the EFI ECU.
2.Measure the resistance value between the following terminals.
(1) Between EFI ECU side connector 6 (CANL) - EFI ECU side connector 7 (CANH)
(2) Between EFI ECU side connector 8 (LCAN) - EFI ECU side connector 9 (HCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to Σ>5.
▼If it is NG, replace the EFI ECU.

∑5. Combination meter internal resistance check.

1.Disconnect the connectors of the combination meter.

2.Measure the resistance value between the following terminals.

(1) Between combination meter side connector 1 (CANH) - combination meter side connector 2 (CANL)

(2) Between combination meter side connector 3 (HCAN) - combination meter side connector 4 (LCAN)

SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to ∑6.

▼If it is NG, replace the combination meter.

∑6. A/T ECU internal circuit check

1.Disconnect the connectors of the A/T ECU.

2.Perform continuity check between the following terminals.

(1) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B19 (LCN1)

(2) Between A/T ECU side connector B10 (CANH) - A/T ECU side connector B20 (CANL)

(3) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B10 (CANH)

(4) Between A/T ECU side connector B19 (LCN1) - A/T ECU side connector B20 (CANL)

SPECIFIED VALUE:

Between measured terminals	Continuity
Between B9 (HCN1) - B19 (LCN1)	Continuity exists (less than 1MΩ)
Between B10 (CANH) - B20 (CANL)	
Between B9 (HCN1) - B10 (CANH)	Continuity exists (1Ω or less)
Between B19 (LCN1) - B20 (CANL)	

▼If everything is OK, perform circuit check of the combination meter, the EFI ECU, and the A/T ECU.

▼If even one of them is NG, replace the A/T ECU.

1-11-7 NO.0051, NO.0052, NO.0053 SIMULTANEOUS OUTPUT

(1) Checking points

1.Is the EFI ECU normal?
2.Is the A/T ECU normal?
3.Is the ABS actuator normal?
4.Is the harness between the combination meter - EFI ECU normal?
5.Is the harness between the EFI ECU - A/T ECU normal?
6.Is the harness between the A/T ECU - ABS actuator normal?
7.Is the harness between the combination meter - DLC normal?

(2) Checking method

Σ>1. CAN basic check

1.Perform basic check of CAN.
Refer to Page L2-14.

▼Proceed to Σ>2.

Σ>2. Short-circuit check between CAN lines

1.Turn IG switch to "LOCK".
2.Disconnect the negative terminal of the battery.
3.Disconnect all the connectors of the combination meter, the EFI ECU, the A/T ECU and the ABS actuator.
4.Perform continuity check between the following terminals.
(1) Between combination meter connection vehicle harness side connector 3 (HCAN) - combination connection vehicle harness side connector 4 (LCAN)
(2) Between EFI ECU connection vehicle harness side connector 6 (CANL) - EFI ECU connection vehicle harness side connector 7 (CANH)
(3) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - A/T ECU connection vehicle harness side connector B19 (LCN1)
(4) Between A/T ECU connection vehicle harness side connector B10 (CANH) - A/T ECU connection vehicle harness side connector B20 (CANL)
(5) Between ABS actuator connection vehicle harness side connector 17 (HCAN) - ABS actuator connection vehicle harness side connector 19 (LCAN)

SPECIFIED VALUE: No continuity exists.

▼If it is OK, proceed to Σ>3.
▼If it is NG, repair or replace the malfunctioning section.

∑3. CAN line earth side short-circuit check

1.Perform continuity check between the following terminals.

(1) Between combination meter connection vehicle harness side connector 1 (CANH) - body earth terminal

(2) Between combination meter connection vehicle harness side connector 2 (CANL) - body earth terminal

(3) Between A/T ECU connection vehicle harness side connector B19 (LCN1) - body earth terminal

(4) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - body earth terminal

(5) Between A/T ECU connection vehicle harness side connector B10 (CANH) - body earth terminal

(6) Between A/T ECU connection vehicle harness side connector B20 (CANL) - body earth terminal

SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to ∑4.

▼If it is NG, repair or replace the malfunctioning section.

∑4. CAN line +B side short-circuit check

1.Perform continuity check between the following terminals.

(1) Between combination meter connection vehicle harness side connector 1 (CANH) - battery positive (+) terminal

(2) Between combination meter connection vehicle harness side connector 2 (CANL) - battery positive (+) terminal

(3) Between A/T ECU connection vehicle harness side connector B19 (LCN1) - battery positive (+) terminal

(4) Between A/T ECU connection vehicle harness side connector B9 (HCN1) - battery positive (+) terminal

(5) Between A/T ECU connection vehicle harness side connector B10 (CANH) - battery positive (+) terminal

(6) Between A/T ECU connection vehicle harness side connector B20 (CANL) - battery positive (+) terminal

SPECIFIED VALUE: Continuity exists.

▼If it is OK, proceed to ∑5.

▼If it is NG, repair or replace the malfunctioning section.

∑5. EFI ECU internal resistance check

1.Disconnect all the connectors of the EFI ECU.

2.Measure the resistance value between the following terminals.

(1) Between EFI ECU side connector 6 (CANL) - EFI ECU side connector 7 (CANH)

(2) Between EFI ECU side connector 8 (LCAN) - EFI ECU side connector 9 (HCAN)

SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to ∑6.

▼If it is NG, replace the EFI ECU.

⊃6. Combination meter internal resistance check

1.Disconnect the connectors of the combination meter.
2.Measure the resistance value between the following terminals.
(1) Between combination meter side connector 1 (CANH) - combination meter side connector 2 (CANL)
(2) Between combination meter side connector 3 (HCAN) - combination meter side connector 4 (LCAN)
SPECIFIED VALUE: 110 - 130Ω

▼If it is OK, proceed to ⊃7.
▼If it is NG, replace the combination meter.

⊃7. A/T ECU internal circuit check

1.Disconnect all the connectors of the A/T ECU.
2.Perform continuity check between the following terminals.
(1) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B19 (LCN1)
(2) Between A/T ECU side connector B10 (CANH) - A/T ECU side connector B20 (CANL)
(3) Between A/T ECU side connector B9 (HCN1) - A/T ECU side connector B10 (CANH)
(4) Between A/T ECU side connector B19 (LCN1) - A/T ECU side connector B20 (CANL)
SPECIFIED VALUE:

Between measured terminals	Continuity
Between B9 (HCN1) - B19 (LCN1)	Continuity exists (less than 1MΩ)
Between B10 (CANH) - B20 (CANL)	
Between B9 (HCN1) - B10 (CANH)	Continuity exists (1Ω or less)
Between B19 (LCN1) - B20 (CANL)	

▼If everything is OK, proceed to ⊃8.
▼If even one of them is NG, replace the A/T ECU.

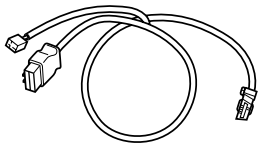
⊃8. ABS actuator internal circuit check

1.Disconnect the connectors of the ABS actuator.
2.Perform continuity check between the following terminals.
(1) Between ABS actuator side connector 17 (HCAN) - ABS actuator side connector 19 (LCAN)
SPECIFIED VALUE: Continuity exists (less than 1MΩ)

▼If it is OK, perform circuit check of the combination meter, the EFI ECU, A/T ECU and the ABS actuator.
▼If it is NG, replace the ABS actuator.

■ LIN COMMUNICATION SYSTEM
1 LIN COMMUNICATION SYSTEM
1-1 ARTICLES TO BE PREPARED

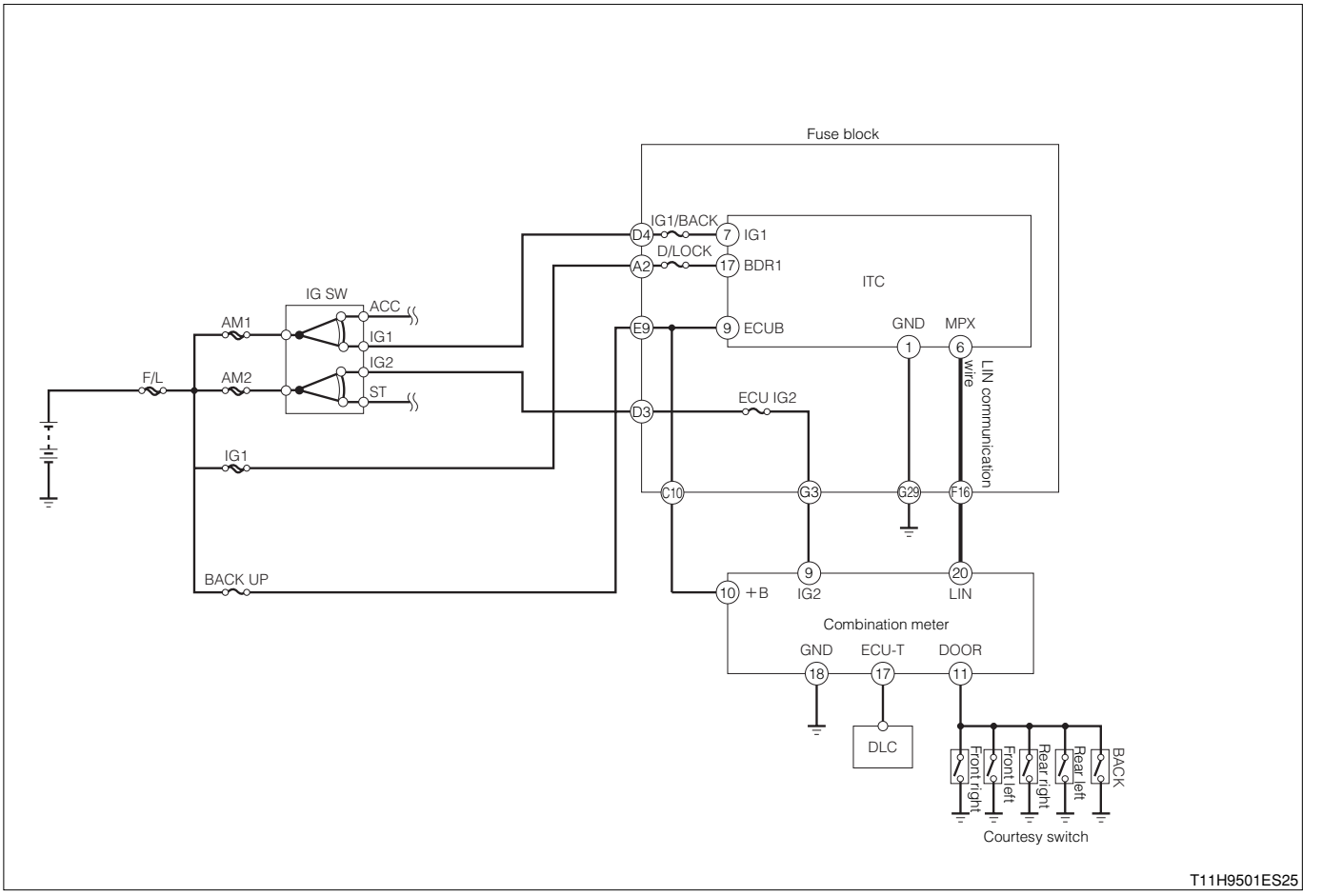
SST

Shape	Part No.	Part name
	09991-87403-000	Wire,diagnosis check
	09991-87404-000 (09991-87401-000)	Wire,engine control system inspection

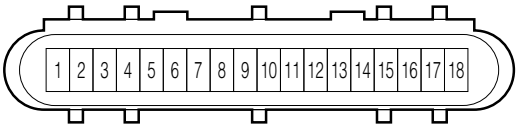
Instrument

Electrical Tester

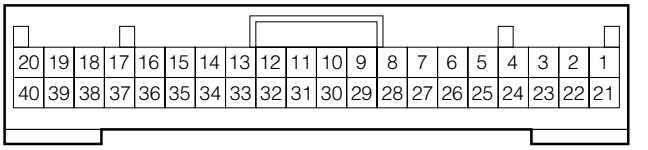
1-2 SYSTEM WIRING DIAGRAM



1-3 ARRANGEMENT OF ECU TERMINAL



ITC



Combination meter

T11H9502ES20

Meter terminal name (Multiplex communication system)

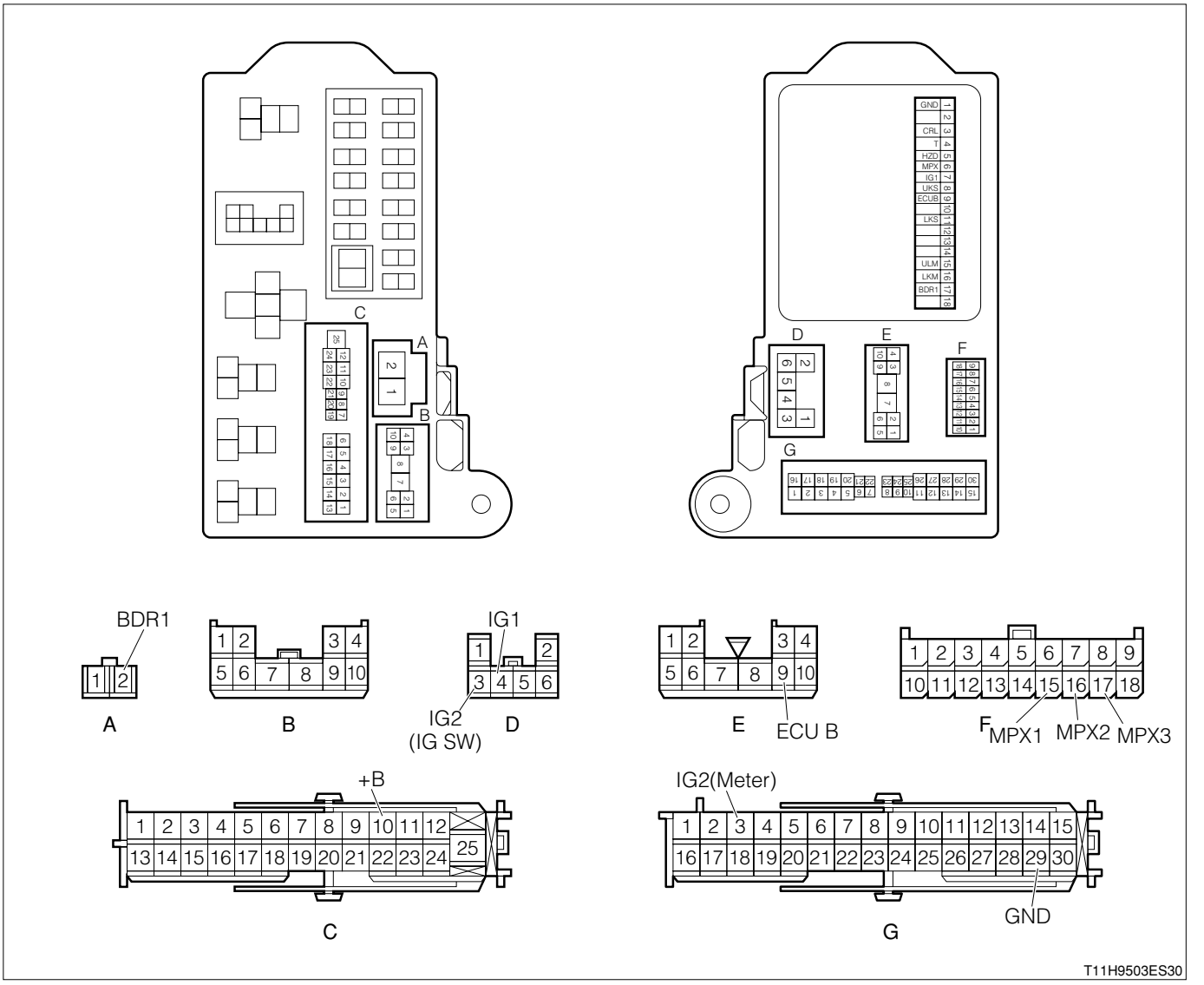
Terminal No.	Terminal code	Terminal name
9	IG2	IG power supply
10	+B	+B power supply
11	DOOR	Input of courtesy switch signal
17	ECU-T	ECU-T terminal signal input
18	GND	Earth
20	LIN	LIN communication input/output

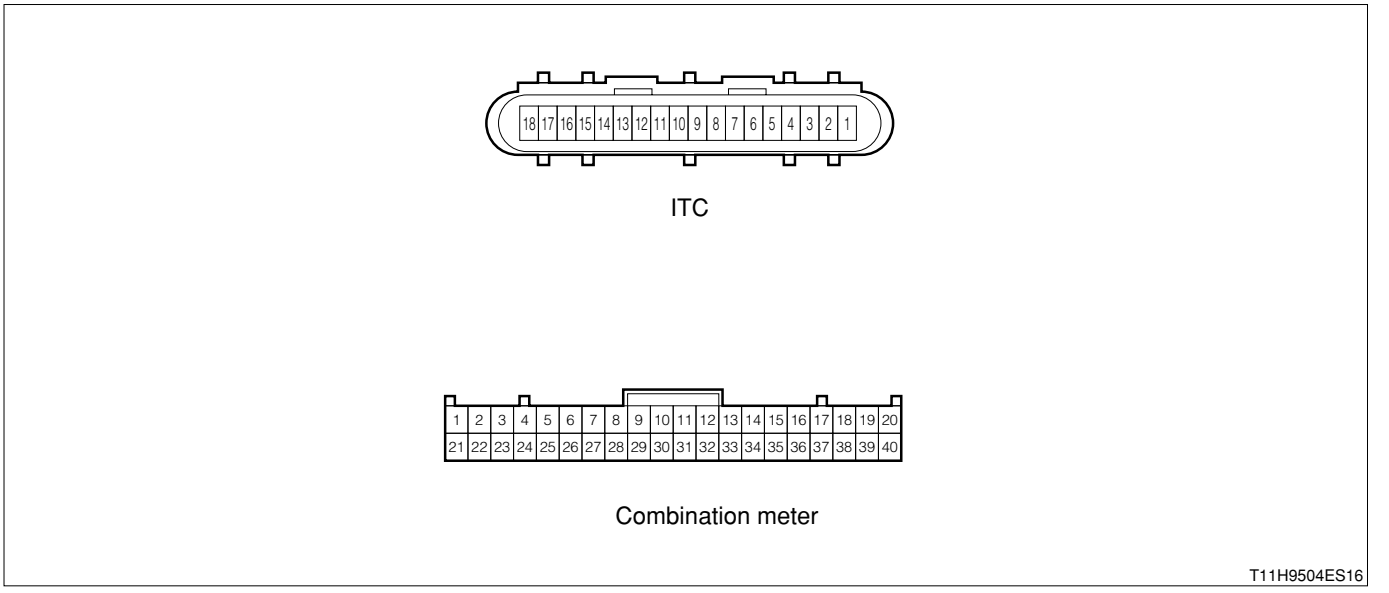
ITC terminal name (Multiplex communication system)

Terminal No.	Terminal code	Terminal name
1	GND	Earth
6	MPX	Multiple communication input/output
7	IG1	ECU power supply
9	ECU B	ECU power supply
17	BDR1	Power supply

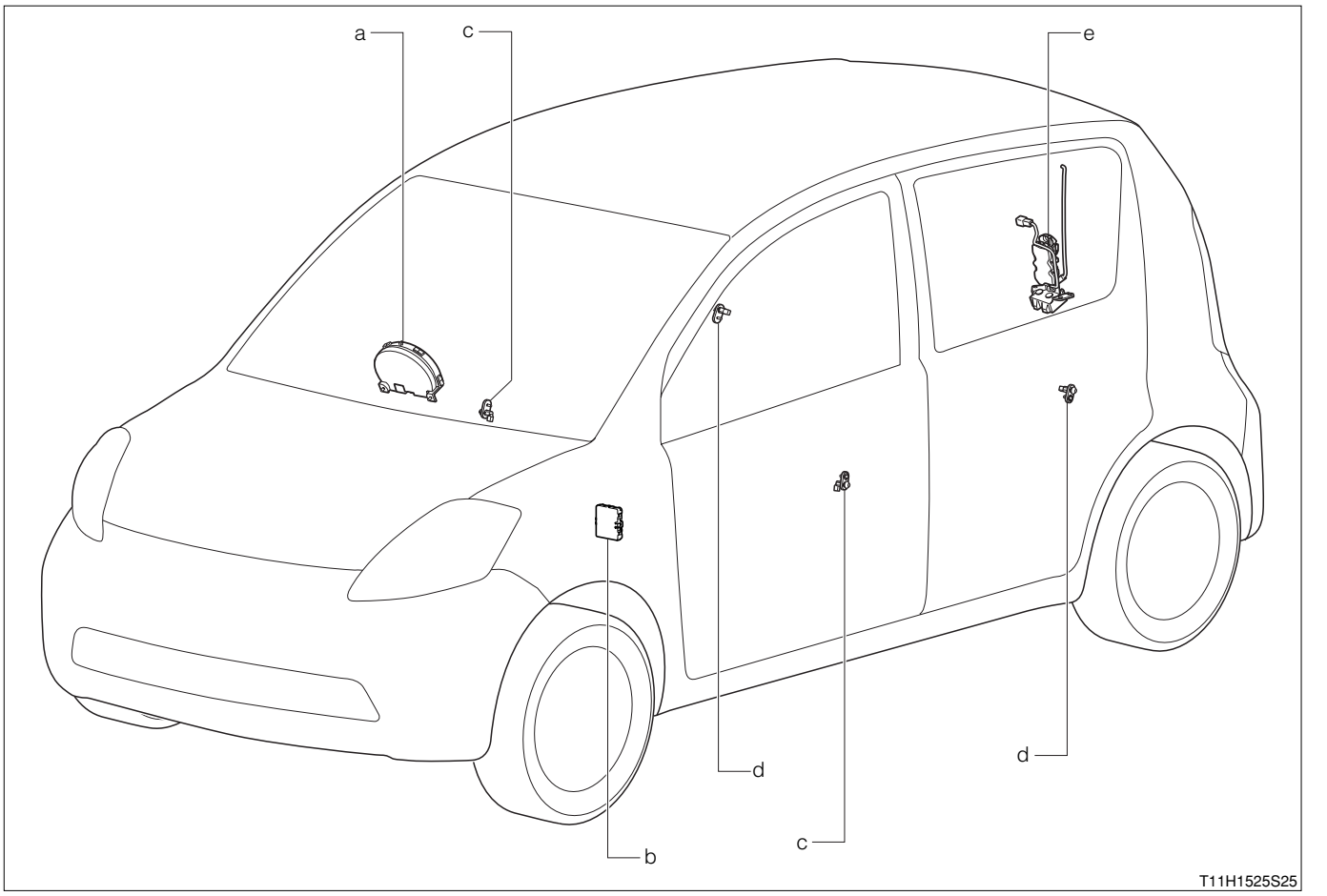
1-4 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS

Fuse block





1-5 LOCATION OF COMPONENTS



The illustration represents the RHD vehicle. In the case of the LHD vehicle, the combination meter is located at the left side.

a	Meter ECU (inside the combination meter)
b	ITC
c	Front door courtesy switch
d	Rear door courtesy switch
e	Back door courtesy switch (inside the back door lock Ay)

1-6 HOW TO PROCEED WITH TROUBLE SHOOTING

1.This system incorporates diagnosis functions that will locate malfunctioning parts, thus providing a vital clue in trouble shooting.

∑1. Bringing malfunctioning vehicle to workshop

▼Go to Step ∑2.

∑2. Diagnosis by interview

1.Gather enough information from the customer on conditions, environment, and phenomenon in which the malfunction took place.

▼Go to Step ∑3.

∑3. Diagnostic code check and record

1.Use the SST to short-circuit the DLC terminals between 4(ECU-T) - 13(E).
SST: 09991-87403-000

2.Check and record the diagnostic code outputted on the meter LCD.

▼Go to Step ∑4.

∑4.Reproduction and confirmation of malfunction phenomenon

1.Check the problems and their conditions.

▼Go to Step ∑5.

∑5.Trouble-shooting according to diagnosis code

1.Perform troubleshooting for the outputted diagnostic code.

▼Go to Step ∑6.

∑6.Confirmation test

1.Ensure that the problem that the customer described has been completely corrected and the operation is back to normal.

▼If it is OK, finish the trouble shooting.

▼In the case of NG, go back to Step ∑3 for a recheck.

1-7 INQUIRY

1.In an effort to remove causes for malfunction from the vehicle concerned, it is impossible to determine the cause without confirming the malfunction phenomenon. If the phenomenon is not confirmed, the vehicle may not be able to return to the normal conditions even if you continue your work. The diagnosis through interviews is to collect information from the customer before confirming the malfunction phenomena. The diagnosis through interviews provides very important clues in reproducing malfunction phenomena.

2.Since the information obtained by the diagnosis through interviews is referred to during the trouble shooting, it is imperative to make an inquiry of the customer, centering on the items related to the malfunction, instead of simply asking general questions.

1-8 CONFIRMATION, RECORD AND ERASURE OF DIAGNOSIS CODE

1.The error message of the diagnostic code remains displayed as long as the communication failure exists, and will be erased when the communication is back to normal. If the battery negative (-) terminal is disconnected during the communication failure, any of the diagnostic error codes for communication with the exception of short-circuit will not be displayed again. It is necessary, therefore, to record diagnostic codes before removing the battery negative (-) terminal.

1-8-1 CHECKING METHOD OF DIAGNOSIS

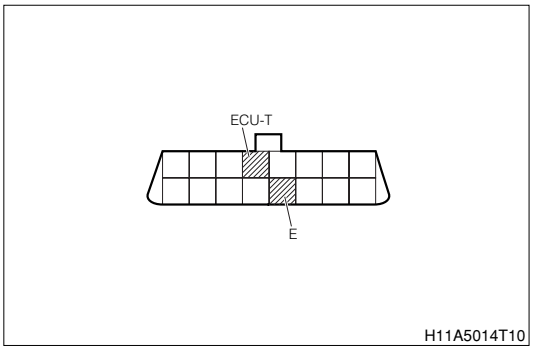
1.Stop the vehicle.

2.Turn the IG switch to "LOCK".

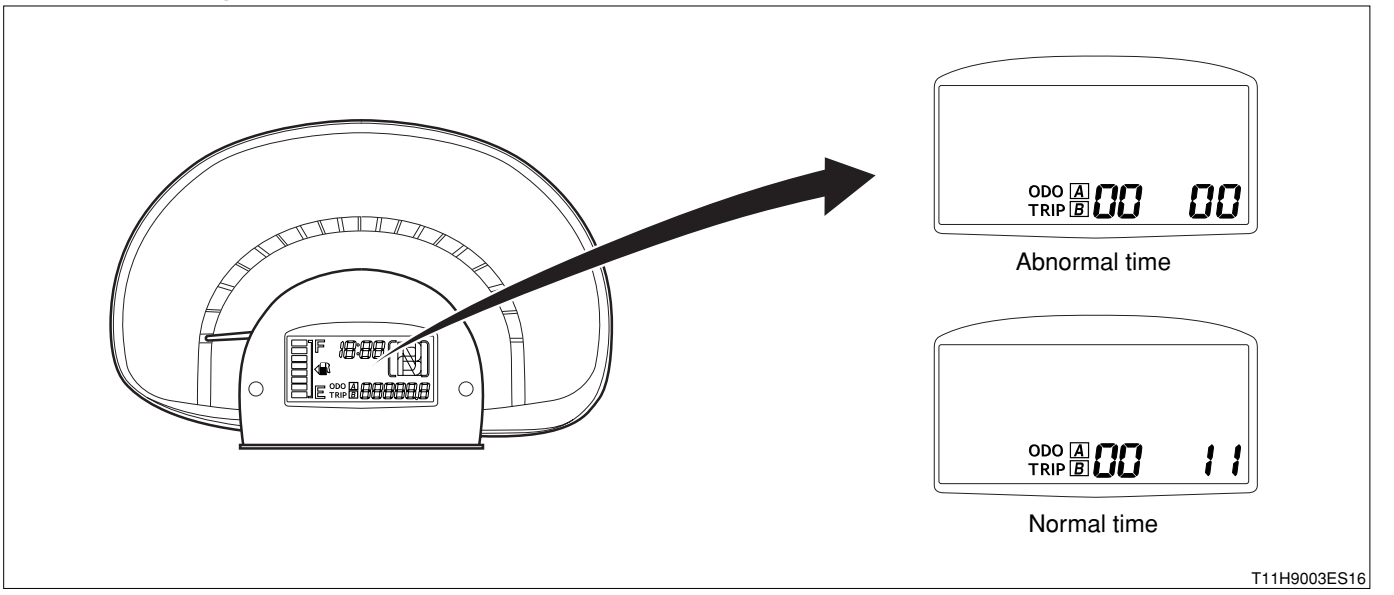
CAUTION

- Connecting the connector in the wrong location could cause a malfunction. Therefore, make sure the connection is correct.

SST: 09991-87403-000
09991-87404-000



3.With the IG switch turned ON, read the diagnosis code that is indicated on the LCD (Liquid Crystal Display) using numerals.



CAUTION

- If battery power has been restored while ECU communication fails, or the ECU is removed, the ITC will not display a malfunction code, but will display the normal code of "00 00".

NOTE

- The meter LCD displays diagnosis codes for the meter, and CAN communication system, in addition to those for the LIN communication system.
- When plural codes are to be outputted, they are outputted, starting from a smaller code number. Furthermore, when one cycle of indications is completed, these codes are repeatedly outputted at intervals of four seconds.

1-8-2 CANCELING METHOD OF DIAGNOSIS

There are following two ways to erase diagnostic codes.

1.The diagnosis error code will be erased automatically when the communication problem has been solved.

2.Turn the IG switch to "LOCK".

CAUTION

- During the repair work of communication failures with the exception of short-circuit repair, keep the battery negative (-) terminal connected until connection of the connector has been checked. (Code No.00 11)

1-8-3 CONTENTS OF DIAGNOSIS

Code No.		Warning indication (Provided: ○, Not provided: ×)	Code memory (Provided: ○, Not provided: ×)	Contents of diagnosis
LCD	4 digits			
00 00	–	×	×	The status is normal, or diagnostic codes 00 11 is not re-outputted due to the battery negative (-) terminal being disconnected.
00 11	–	×	×	ITC communication failure (except for short-circuit)
00 21	–	×	×	Short-circuit in communication wire/short-circuit in ECU internal communication circuit

NOTE

- The meter LCD displays diagnosis codes for the meter, and CAN communication system, in addition to those for the LIN communication system.

Meter (00 41 - 00 43, 00 61)

Refer to Page J3-14.

CAN communication system (00 51 - 00 53)

Refer to Page L2-13.

1-9 TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE

1-9-1 NO.00 11 (ITC COMMUNICATION FAILURE (EXCEPT FOR SHORT-CIRCUIT))

CAUTION

- During the repair work of communication failures, keep the battery negative (-) terminal connected until connection of the connector has been checked.

Σ>1.Check of ITC connector connecting state

1.Short-circuit the ECU-T terminal to the E terminal of the DLC, and turn the IG switch to "ON" to display a diagnostic code.

2.With the battery negative (-) terminal connected, shake the ITC lightly in an up-and-down direction and a right-and-left direction. Check the display status of the diagnostic code.

SPECIFIED VALUE: Code No.00 11 shall disappear.

▼If it is OK, plug the connector securely and see what happens.

▼If it is NG, go to step Σ>2.

Σ>2. Check of meter connector connecting state

1.With the battery negative (-) terminal connected, shake the meter connecting connector lightly in an up-and-down direction and a right-and-left direction. Check the display status of the diagnostic code.

SPECIFIED VALUE: Code No.00 11 shall disappear.

▼If it is OK, plug the connector securely and see what happens.

▼If it is NG, go to step Σ>3.

Σ>3. Check of fuse block connector connecting state

1.With the battery negative (-) terminal connected, shake the fuse block connecting connector lightly in an up-and-down direction and a right-and-left direction. Check the display status of the diagnostic code.

SPECIFIED VALUE: Code No.00 11 shall disappear.

▼If it is OK, plug the connector securely and see what happens.

▼If it is NG, go to step Σ>4.

Σ>4. Wiring harness check

1.Check the following wire harness for continuity.

(1) The vehicle harness side connector terminal F16(MPX2) of the fuse block - the vehicle harness side connector terminal 20(LIN) of the meter.

SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to step Σ>5.

▼If it is NG, repair or replace the wire harness.

Σ>5. Fuse block check

1.Check the following fuse block terminals for continuity.

(1) The ITC fuse block side connector terminal 6 (MPX) - the fuse block connector terminal F16(MPX2).

SPECIFIED VALUE: Continuity exists.

▼If it is OK, go to step Σ>6.

▼If it is NG, replace the fuse block.

⊳6. Check of ITC power supply system and earth system

1.Disconnect the ITC from the fuse block.

2.Check voltage between the ITC fuse block side connector power supply terminal, earth terminal, and the body earth.

SPECIFIED VALUE: 10 - 14V

▼If it is OK, go to step ⊳7.

▼In the case of NG, repair or replace the fuse block and wire harness.

⊳7. Check of meter power supply system and earth system

1.Disconnect the connector from the meter.

2.Check voltage between the vehicle harness side connector power supply terminal of the meter, earth terminal, and the body earth.

SPECIFIED VALUE: 10 - 14V

▼If it is OK, replace the ITC. If the problem is not solved after the replacement, replace the meter, too.

▼If it is NG, repair or replace the wire harness.

1-9-2 NO.00 21 SHORT-CIRCUIT IN COMMUNICATION WIRE/SHORT-CIRCUIT IN ECU INTERNAL COMMUNICATION CIRCUIT

NOTE

- When the code No.0021 is outputted, if abnormality takes place in an ECU, it is impossible to identify the malfunctioning ECU. Therefore, remove the ECU other than the meter ECU to identify the malfunctioning ECU.
- If the code can not be erased, there may be a short circuit in the harness.
- If there is no abnormality given above, the meter ECU might be causing the abnormality.

Σ1. Diagnosis code confirmation (at time of ITC removal)

1.After removing the battery negative (-) terminal, remove the ITC from the fuse block.Install the battery negative (-) terminal.
2.Install the battery negative (-) terminal.
3.After short circuiting the terminals ECU-T and E of the DLC, turn ON the IG switch to indicate the diagnosis code.
4.Check the indicating condition of the diagnosis code.
SPECIFIED VALUE: Code No.00 21 shall disappear.

▼If it is OK, go to step Σ2.
▼If it is NG, go to step Σ3.

Σ2. Check of ITC power supply system and earth system

1.Check the voltage between the ITC fuse block side connector power supply terminal, earth terminal and body earth.
SPECIFIED VALUE: 10 - 14V

▼If OK, replace the ITC.
▼If NG, repair or replace the fuse block and wire harness.

Σ3. Wiring harness check

1.Check the following wire harness for continuity.
(1) The vehicle harness side connector terminal F16(MPX2) of the fuse block - the vehicle harness side connector terminal 20(LIN) of the meter.
SPECIFIED VALUE: Between the wire harness connecter terminal concerned and body earth: No short circuit exists.
Between the wire harness connecter terminal concerned and other terminal in the same connector: No short circuit exists.

▼If it is OK, go to step Σ3.
▼If it is NG, repair or replace the wire harness.

∑>4. Fuse block check

1.Check the following fuse block terminals for continuity.

(1) ITC fuse block side connector terminal 6(MPX) - fuse block connector terminal F16(MPX2) - F15(MPX1) - F17(MPX3)

SPECIFIED VALUE: Between the connecter terminal concerned and body earth: No short circuit exists.
Between the connecter terminal concerned and other terminal in the same connector:
(Except between terminals 16(MPX2) - F15(MPX1) - F17(MPX3)): No short circuit exists.

▼If it is OK, go to step ∑>5.

▼If it is NG, replace the fuse block.

∑>5. Check of meter power supply system and earth system

1.Disconnect the connector from the meter.

2.Check voltage between the vehicle harness side connector power supply terminal of the meter, earth terminal, and the body earth.

SPECIFIED VALUE: 10 - 14V

▼If OK, replace the meter.

▼If it is NG, repair or replace the wire harness.

TO INDEX

A GENERAL INFORMATION

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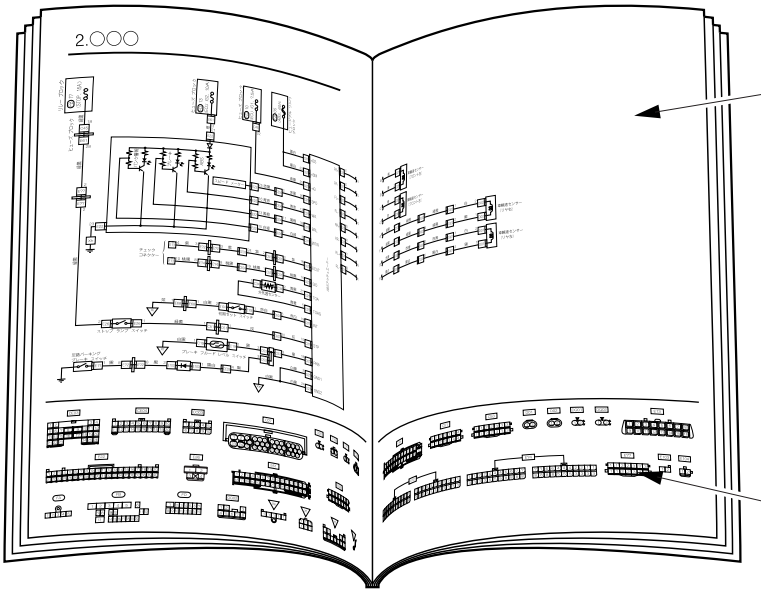
HANDLING OF HARNESS AND CONNECTOR---------- A - 5
RELEASE OF CONNECTOR LOCK----- A - 7
INSPECTION ---------- A - 8
CAUTIONS ON HANDLING OF SRS AIRBAG---------- A - 10
ITEMS OMITTED IN THIS MANUAL------ A - 11
ABBREVIATION CODES---------- A - 11
SYMBOL MARK---------- A - 12
MODEL VARIATION---------- A - 13
WIRE HARNESS CODE TABLE---------- A - 13

1 CONFIGURATION OF THIS MANUAL

1.This wiring diagram manual consists of the following five sections given below.

Section		Contents of configuration
A	GENERAL INFORMATION	This section explains the configuration of this manual, how to read this manual, handling instructions, cautions on handling of SRS airbags, items omitted in this manual, abbreviation, symbol marks, table of vehicle models and table of harness codes.
B	POWER SUPPLY SYSTEM DIAGRAM	This diagram explains systems (functions) which the wirings from the positive terminal of the battery to the main fuse as well as to various fuses are used for.
C	EARTH SYSTEM DIAGRAM	This diagram explains the earth route of each system (function).
D	CIRCUIT DIAGRAM BY FUNCTION	This section consists of two portions, namely circuit diagrams and equipment diagrams. The circuit diagrams show electric circuits from the battery or fuse of each system (function) to the earth. Also the circuit diagrams explain the shapes of the connectors used in that system (function) and connector terminal arrangement. The equipment diagrams explain the installing positions of all the connectors used in that system (function), the number of connector pins, connector colors and connector names.
E	INDEX	The index shows page which each part can be found at.

2 HOW TO READ THIS MANUAL

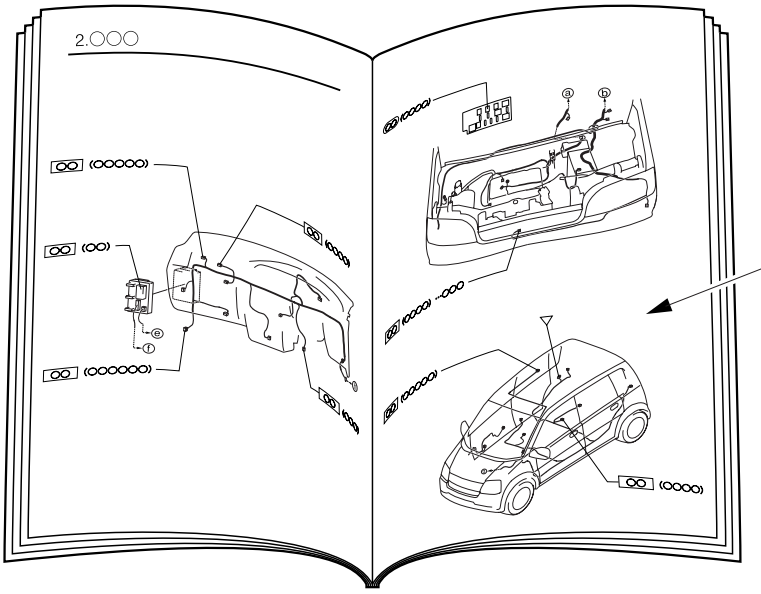


Circuit diagram by function

Circuits from each fuse to the earth are posted according to the system.

Connector diagram

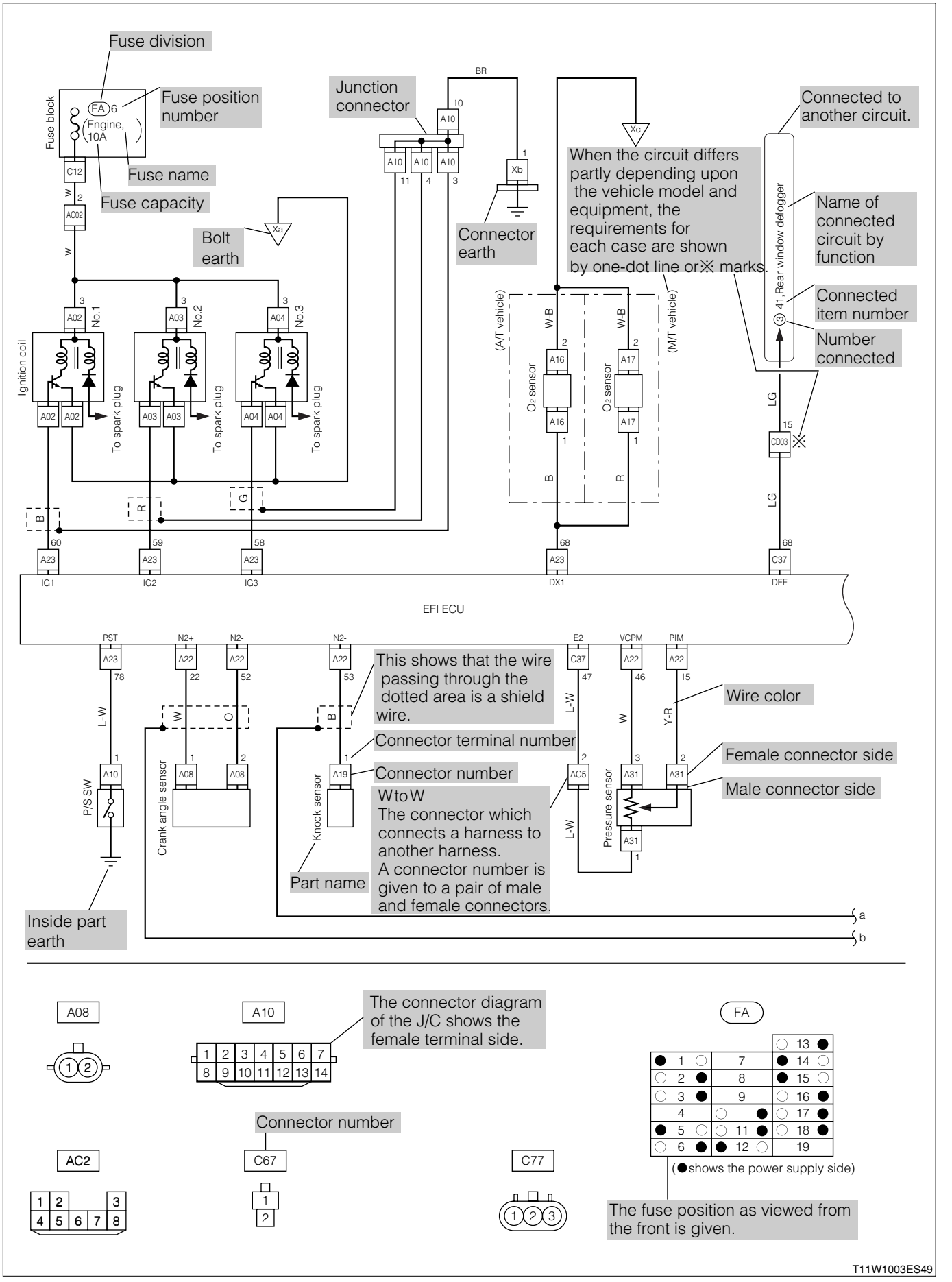
The connector diagram indicates the connector numbers and connector terminal arrangement of the circuit diagram by function of that particular page.



Equipment diagram

Concerning the engine compartment, portions related to the instrument panel and the whole body, the equipment diagrams indicate the positions of the connectors and earth posted in the circuit by function.

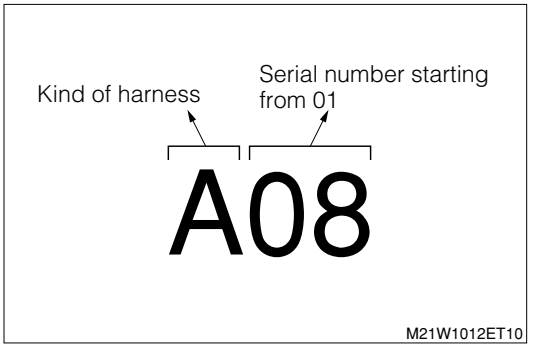
M21W1010ES49



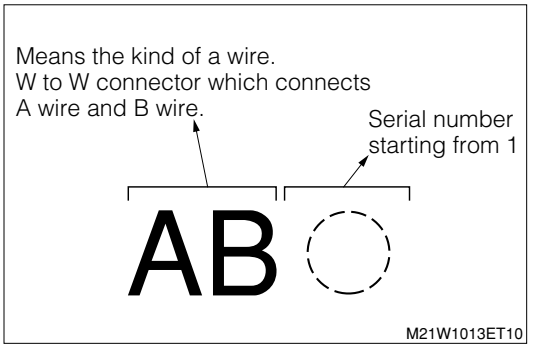
T11W1003ES49

1.CONNECTOR NUMBER

(1) The part connector is indicated by a combination of single-digit alphabet and number. The alphabet represents the kind of harness, thus indicating harness which the part belongs to. The wire harness code is given at "9. WIRE HARNESS CODE TABLE" of this chapter. The number is a serial number, starting from 01.

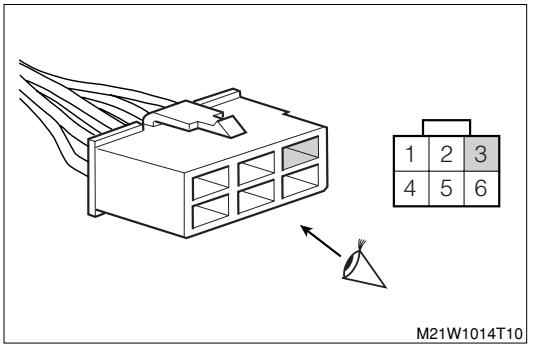


(2) W to W is a combination of two-digit alphabets and two-digit numbers. The alphabets indicate the kind of harness, thus indicating which harness is connected to which harness. The wire harness code is given at "9. WIRE HARNESS CODE TABLE" of this chapter. The number is a serial number. The connector diagram indicates only the female connector side.

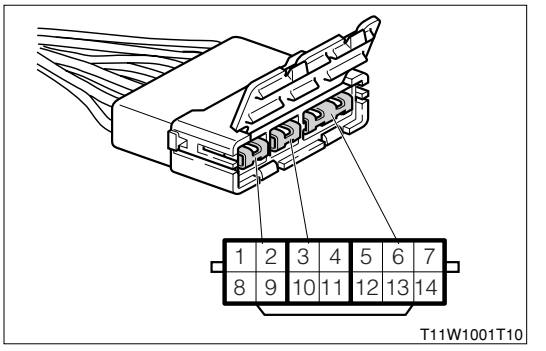


2.CONNECTOR TERMINAL NUMBER

(1) The connector terminal position indicates a position when the connector is viewed from the joint surface direction. Only the female connector side is indicated. Blank terminals are also given numbers.



(2) Those terminals shorted with the same short pin are enclosed with a heavy line in the J/C.



3.WIRE COLOR CODE

(1) The wire color in the circuit diagram is indicated by a code. The table showing the relationship between the code and color is given at right table.

Code	Color	Code	Color
B	Black	V	Violet
G	Green	W	White
L	Blue	Y	Yellow
O	Orange	BR	Brown
P	Pink	GR	Gray
R	Red	LG	Light green

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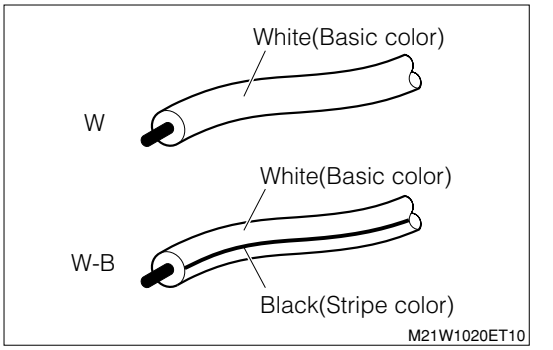
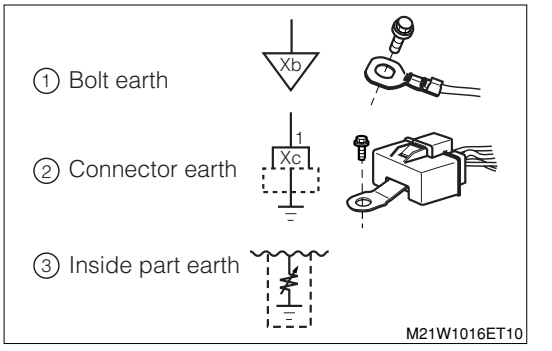
(2) The wires come in two kinds; mono-color wires and dual color wires. The mono-color wire has only a basic color, whereas the dual color wire has stripes on the basic color background.



4.EARTH

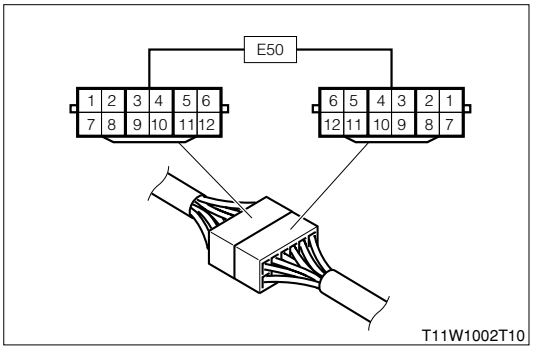
(1) The circuit diagram by function in this manual explains three kinds of earth.

Bolt earth	The terminal is directly bolted to the vehicle body.
Connector earth	More than one harness are combined to one connector, then which is bolted to the vehicle body.
Inside part earth	Earth connection is made within a part, and this part is directly bolted to the vehicle body.



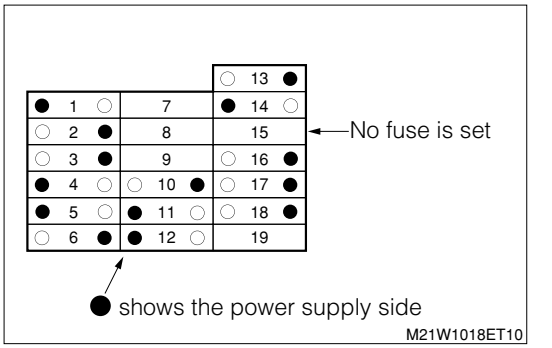
5.WIRE TO WIRE JUNCTION CONNECTOR (W to W J/C)

(1) This connector is a junction connector in which a shorting pin shorts two connectors. The connector diagram of the W to W J/C is given at the right figure.



6.FUSE BLOCK, RELAY BLOCK

(1) The position of each fuse is indicated when the fuse block or relay block is viewed from the front. The ●mark indicates the power supply plus side of the fuse and the ○mark indicates the power supply minus side of the fuse. No fuse is provided where no ● ○mark is provided.

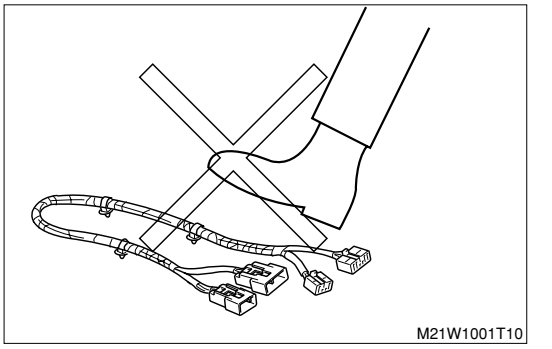


3 HANDLING INSTRUCTIONS

3-1 HANDLING OF HARNESS AND CONNECTOR

1.When assembling the wire harness, do not pull or step on the connectors. Be careful not to allow the harness to be damaged by burrs or edges.

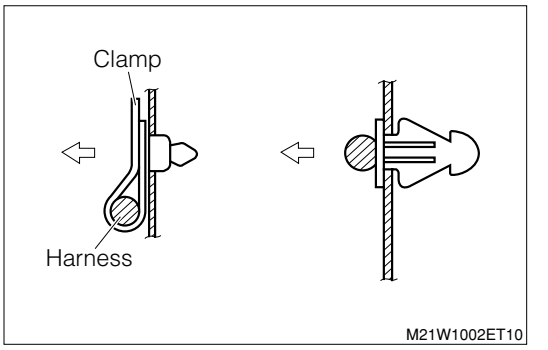
2.When installing the harness, be careful not to allow the harness to wind or twist.



3.Ensure that the clamp section of the resin clamp has been inserted into the body hole.

CAUTION

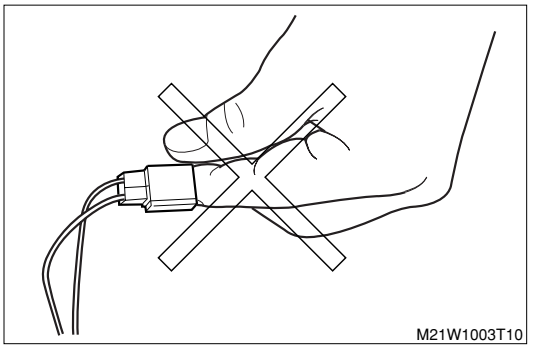
- Ensure that the clamp section cannot be pulled out by lightly pulling it.



4.Never touch the terminal of connector directly by hand.

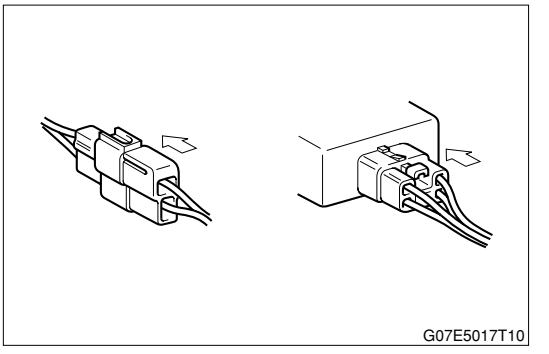
5.Modification of wire harness. The wire diameter and capacity of each harness have been determined to assure the normal operation of the electrical system. Hence, do not take power for accessories carelessly through the original wiring harness. Failure to observe this caution may cause system malfunction or fire.

6.When a band type resin clamp is used, never use tools, such as pliers or radio pliers.

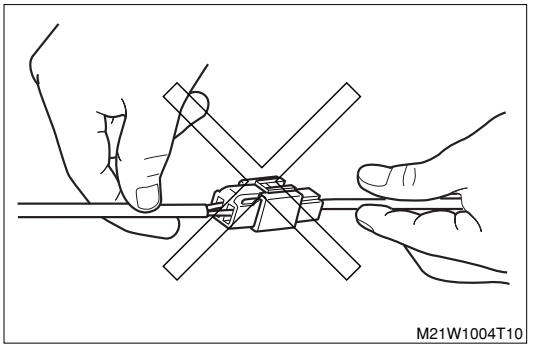


7.In the case of a locking connector, be sure to connect it firmly by pushing and inserting it. After connecting the connector, confirm that it has been locked by lightly pulling it.

8.Be careful not to pull out the connected connector by forcibly pulling the harness.



9.When disconnecting connectors, be sure to hold the connector itself with the connector unlocked.

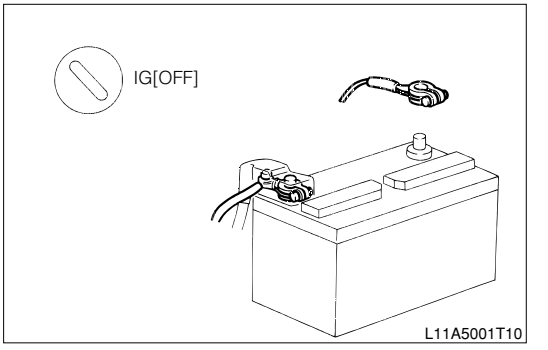


10.Connection or disconnection of the connector and each terminal shall be performed basically after the removal of negative terminal of the battery.

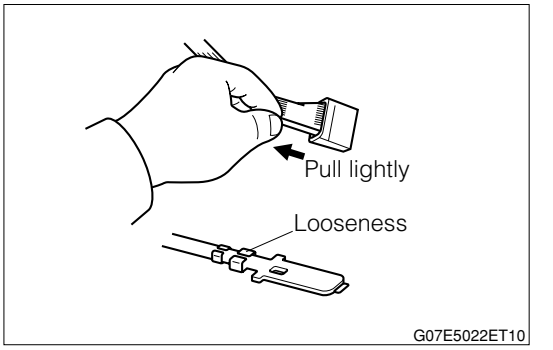
CAUTION

- However, there may be the case that diagnosis code is erased when remove the negative terminal of battery, so confirm the diagnosis code first before the removal of battery negative terminal when need to confirm.

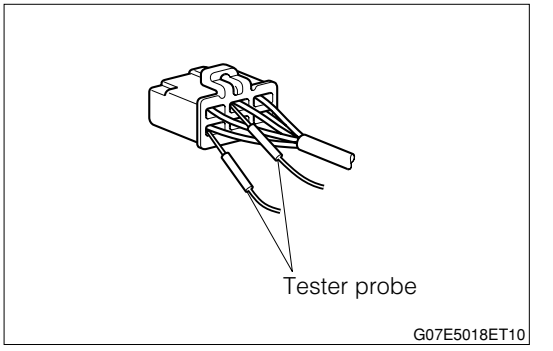
11.Check visually the rust generation or mixing of the foreign material at connector terminal portion.



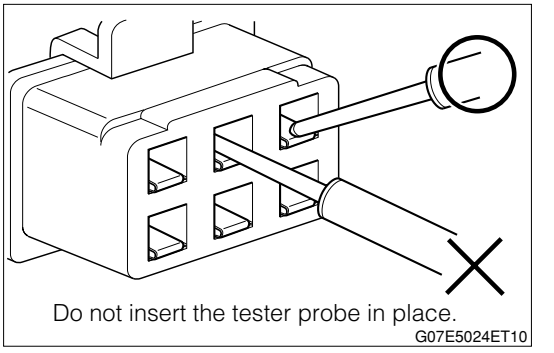
12.Check whether there are looseness, damage at the staking portion and check coming out from the coupler by pulling the wire harness lightly.



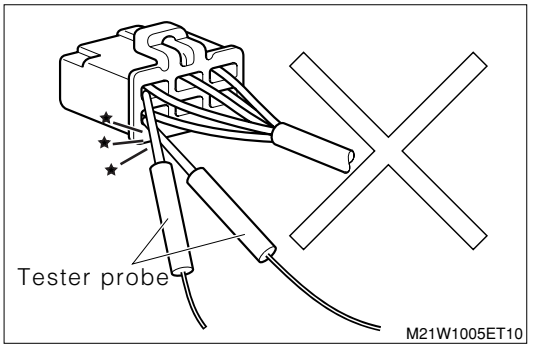
13.When inserting tester probes into a connector, insert them from the rear side of the connector.



14.For water-proof connectors which cannot be accessed from behind, take good care not to deform the connector terminals.



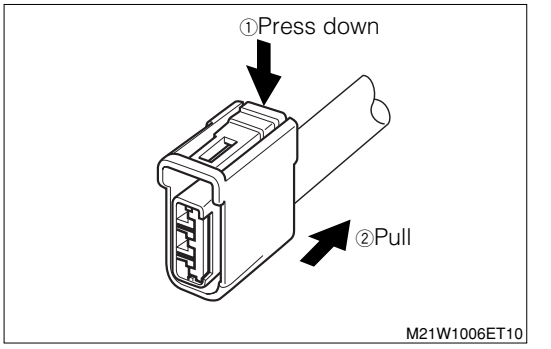
15.When a tester probe is applied to a terminal to which voltage is applied, care must be exercised so that two tester probes may not come in contact with each other so that short circuit may not take place.



3-2 RELEASE OF CONNECTOR LOCK

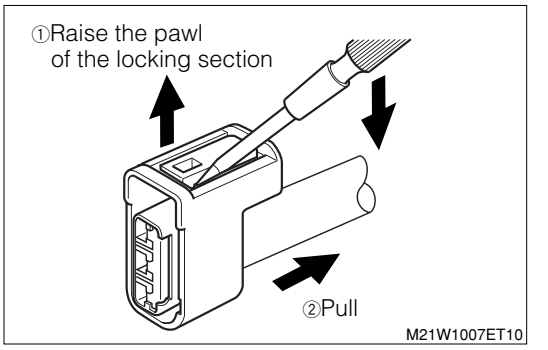
3-2-1 PUSH TYPE

1.To pull out the connector, unlock the connector by pushing down the pawl of the locking section in the arrow direction with your finger or a tool.



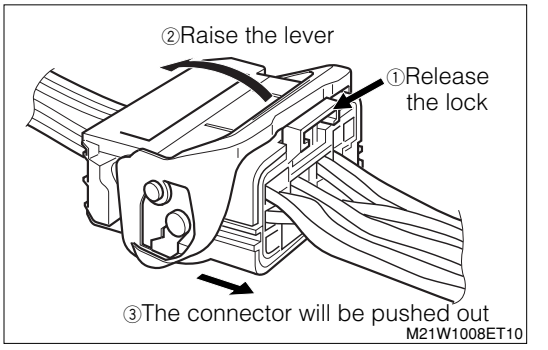
3-2-2 PULL-UP TYPE

1.To pull out the connector, unlock the connector by pushing up the pawl of the locking section in the arrow direction with your finger or a tool.



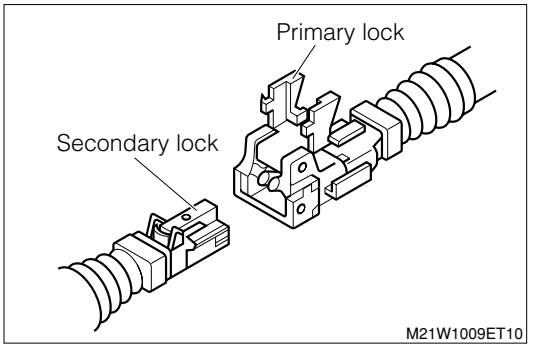
3-2-3 LEVER TYPE

1.Detach the pawl and raise the lock lever in the arrow direction. Then, the mating connector will be pushed out.



3-2-4 DOUBLE LOCK TYPE

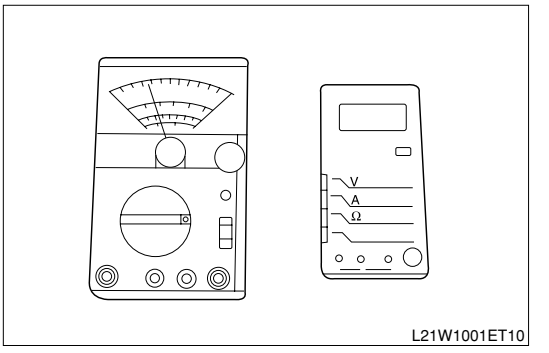
1.First unlock the primary locking. Then, disconnect the connector by unlocking the secondary locking in the same way as the aforesaid push type connector.



3-3 INSPECTION

3-3-1 TESTER (VOLT/OHM METER)

1.For the inspection, use a tester having an internal resistance of more than 10 kilo-ohms/V. Use of a tester with a low internal resistance may cause wrong measurement or secondary troubles.

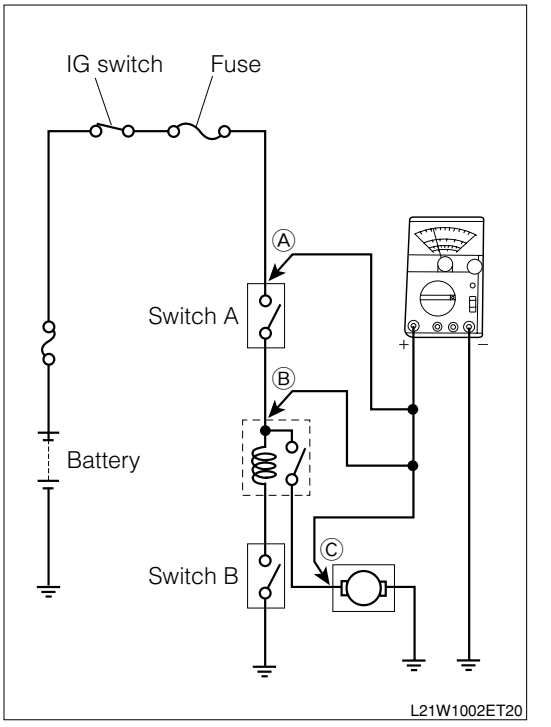


3-3-2 VOLTAGE CHECK

1.When conducting this check, let the voltage apply to the check point.
2.Connect the (−) line of the voltmeter to the ground or (−) terminal of the battery; the (+) line to the connector terminal. This check can be performed by using a test lamp instead of a voltmeter.

Example

Check point	Connecting condition
A	Ignition switch:ON
B	Ignition switch:ON, Switch A:ON
C	Ignition switch:ON, Switch A:ON, Switch B:ON, Relay:ON

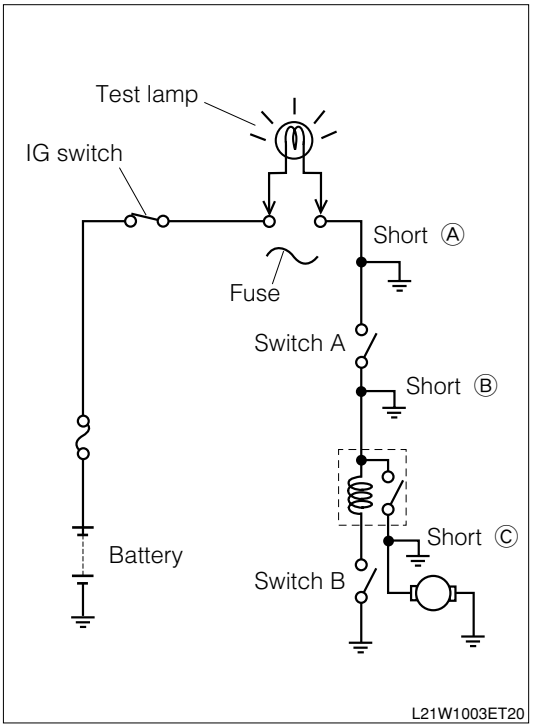


3-3-3 INSPECTION OF SHORT CIRCUIT

1.Remove a melt fuse or fusible link.
2.Disconnect all connectors for loads being applied to the melt fuse.
3.Connect a test lamp at the position where the melt fuse or fusible link was installed.
4.Search for the short circuit by providing the minimum conditions which make the test lamp glow.
5.Perform repairs or wiring harness replacement, as required.

Example

Short section	Connecting condition
A	Ignition switch:ON
B	Ignition switch:ON, Switch A:ON
C	Ignition switch:ON, Switch A:ON, Switch B:ON, Relay:ON

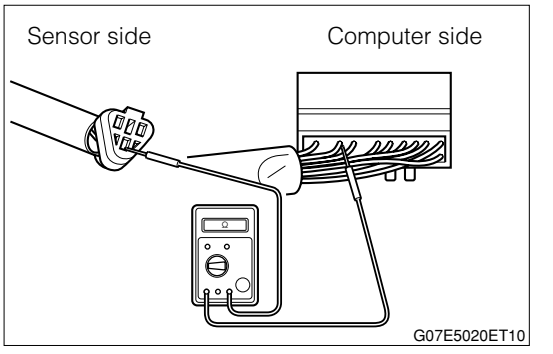


3-3-4 RESISTANCE AND CONTINUITY CHECK

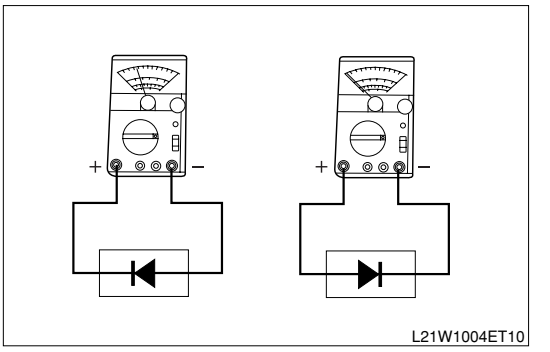
1.Remove the connector of corresponding harness on both ends.
2.Measure the electrical resistance between corresponding terminals of connector on both end.

CAUTION

- Measure the electrical resistance while shaking wire harness in top and down and right and left lightly.



3.If a diode is built in the circuit, perform continuity test by changing the polarities of the measuring terminals. In case of a general type tester, ensure that continuity exists when the negative (−) lead of the tester is connected to the positive (+) side of the diode; the positive (+) lead of the tester to the negative (−) side of the diode. Also ensure that no continuity exists when the polarities are changed. Since some testers have different polarities, be sure to read the instruction manual of a tester to be used for the check before using it. The inspection procedure for light emitting diodes (LED) is the same as normal diodes. However, there may be cases where the LED emits no light, unless a tester with LED check mode is used. If an adequate tester is not available, apply the battery voltage to the LED and ensure that the LED emits light.



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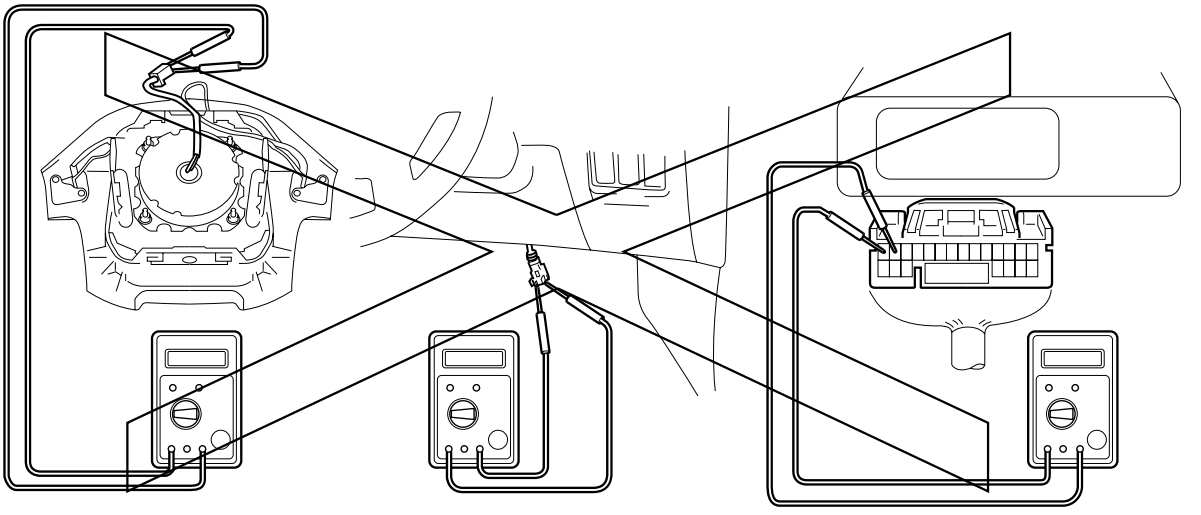
4 CAUTIONS ON HANDLING OF SRS AIRBAG

1.If the SRS airbag is not handled with the correct procedure and method, the airbag may be deployed unexpectedly during the operation, resulting in a serious accident. Moreover, if wrong repairs are made, there is the possibility that the airbag fails to operate when it should operate. Therefore, the airbag-related service (installation, check and replacement of parts) should be performed with the correct procedure and method. For that purpose, please read the repair manual carefully. Also, strictly observe the cautions about the airbag service.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5 ITEMS OMITTED IN THIS MANUAL

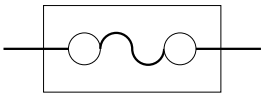
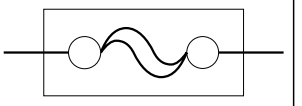
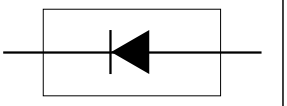
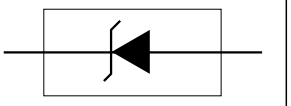
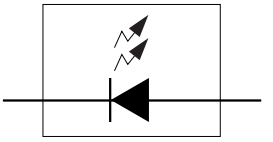
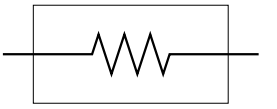
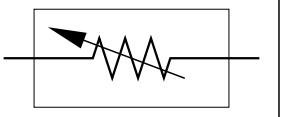
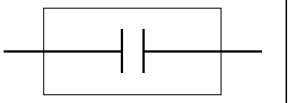
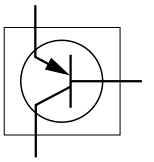
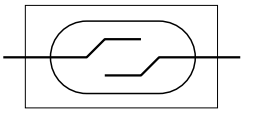
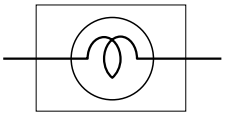
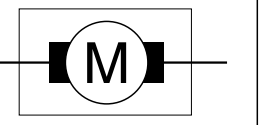
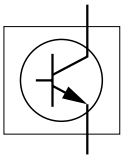
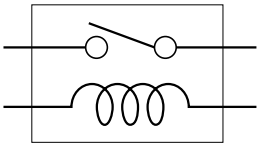
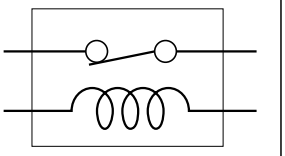
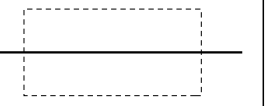
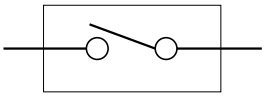
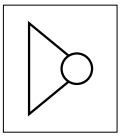
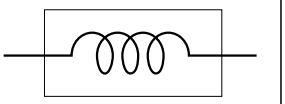
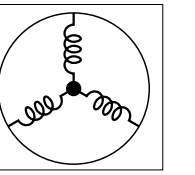
1.This manual does not cover the following item given below. When performing the electric system checks and service, please read the General section of this manual and related repair manuals. Moreover, before starting the check operations and service, be sure to be well versed in those operations by reading the General sections of the repair manuals.

(1) GENERAL SERVICE INSTRUCTION
(2) SUPPORTING POINTS FOR JACKS AND SAFETY STANDS
(3) SUPPORTING POINTS OF LIFTS
(4) SERVICE INSTRUCTIONS FOR FOUR WHEEL DRIVE VEHICLES
(5) DATA LINK CONNECTOR
(6) INSTRUCTIONS FOR SYSTEM INSPECTION
(7) INSTRUCTIONS FOR RADIO INSTALLATION

6 ABBREVIATION CODES

ABBREVIATION CODE	ORIGINAL WORD
2WD	Two wheel drive
4WD	Four wheel drive
ABS	Anti-lock brake system
ABV	Air bypass valve
A/B	Airbag
ACC	Accessory
ACV	Air control valve
A/C	Air conditioner
A/T	Automatic transaxle, Automatic transmission
DLC	Data link connector
E-A/T	Electronic automatic transaxle, Electronic automatic transmission
EBD	Electronic brake force distribution
ECU	Electronic control unit
EFI	Electronic fuel injection
EPS	Electronic power steering
FR	Front
F/L	Fusible link
G	Gravity
GND	Ground
IG	Ignition
ILL	Illumination
ISC	Idle speed control
J/C	Junction connector
LCD	Liquid crystal display
LED	Light emitting diode
LH	Left-hand
MIL	Malfunction indicator lamp
M/T	Manual transaxle, Manual transmission
P/S	Power steering
RAD	Radiator
RH	Right-hand
RR	Rear
R/B	Relay block
SRS	Supplemental restrain system
SW	Switch
TEMP.	Temperature
VSV	Vacuum switching valve
W to W	Wire to wire connector

7 SYMBOL MARK

Fuse	Fusible link	Diode	Zener diode
			
LED	Resistor	Variable resistor	Condenser
			
PNP transistor	Reed switch	Bulb	Motor
			
NPN transistor	Relay(Normally open)	Relay(Normally closed)	Shielding wire
			
Switch	Horn	Solenoid	Stator coil
			

M21W1019ES40

8 MODEL VARIATION

GENERAL SPECIFICATION

Model code	Steering position	Engine	Drive	Transmission	Body type
M300RS−GMNE	RHD	1KR−FE	2WD	5M/T	5−door
M301RS−GMGE	RHD	K3−VE	2WD	5M/T	5−door
M301RS−GQGE	RHD	K3−VE	2WD	Electronic control 4A/T	5−door
M300LS−GMNE	LHD	1KR−FE	2WD	5M/T	5−door
M301LS−GMGE	LHD	K3−VE	2WD	5M/T	5−door
M301LS−GQGE	LHD	K3−VE	2WD	Electronic control 4A/T	5−door

EUROPEAN SPECIFICATION

Model code	Steering position	Engine	Drive	Transmission	Body type
M300RS−GMNEW	RHD	1KR−FE	2WD	5M/T	5−door
M301RS−GMGEW	RHD	K3−VE	2WD	5M/T	5−door
M301RS−GQGEW	RHD	K3−VE	2WD	Electronic control 4A/T	5−door
M300LS−GMNEW	LHD	1KR−FE	2WD	5M/T	5−door
M301LS−GMGEW	LHD	K3−VE	2WD	5M/T	5−door
M301LS−GQGEW	LHD	K3−VE	2WD	Electronic control 4A/T	5−door

AUSTRALIAN SPECIFICATION

Model code	Steering position	Engine	Drive	Transmission	Body type
M300RS−GMNEW	RHD	1KR−FE	2WD	5M/T	5−door
M301RS−GMGEW	RHD	K3−VE	2WD	5M/T	5−door
M301RS−GQGEW	RHD	K3−VE	2WD	Electronic control 4A/T	5−door

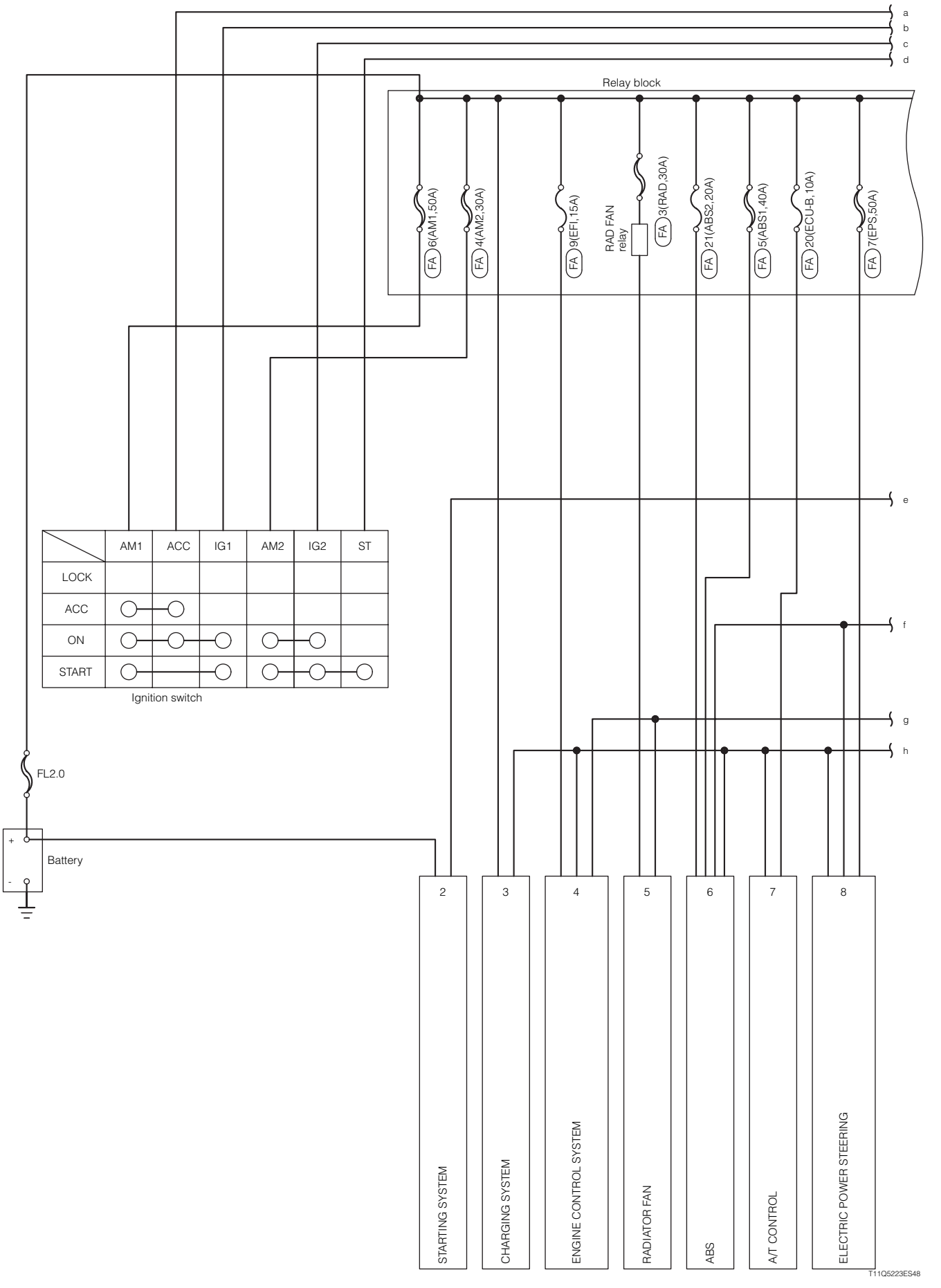
9 WIRE HARNESS CODE TABLE

A	Wire, Engine	J	−	S	Wire, Roof
B	Wire, Engine No.2 / Wire, Engine No.3	K	−	T	Wire, Backdoor, No.1
C	Wire, Engine room main	L	Wire, Front door (RHD)	U	−
D	Wire, Speed sensor	M	Wire, Front door (LHD)	V	−
E	Wire, Instrument panel (RHD)	N	Wire, Rear door	W	Wire, Rear window
F	Fuse, Relay	O	Wire, Floor	X	Earth
G	Wire, Instrument panel (LHD)	P	Wire, Floor, No.2	Y	−
H	Wire, Lamp	Q	−	Z	−
I	−	R	−		

B POWER SUPPLY SYSTEM DIAGRAM

POWER SUPPLY SYSTEM DIAGRAM---- B - 1

1 POWER SUPPLY SYSTEM DIAGRAM



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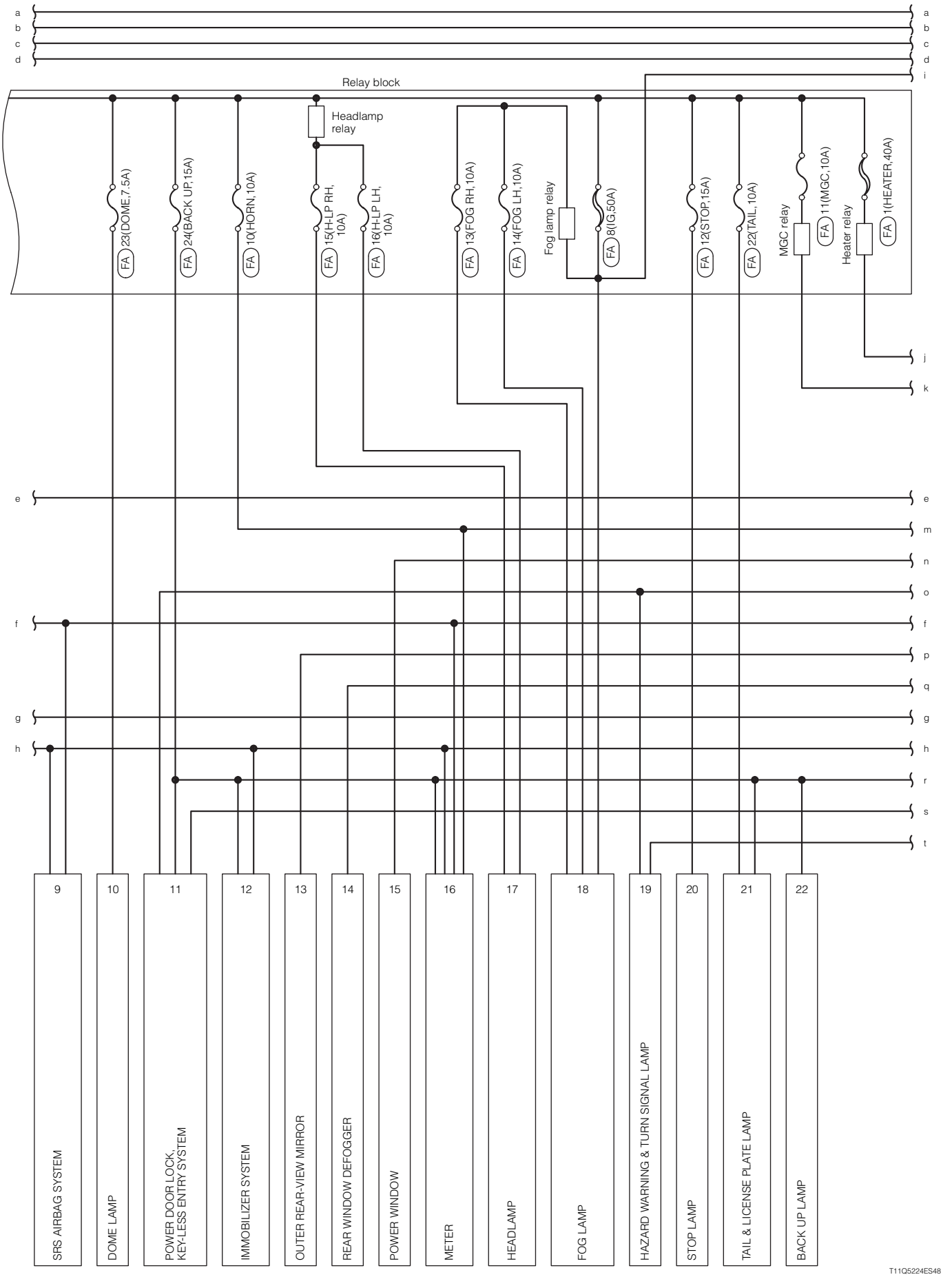

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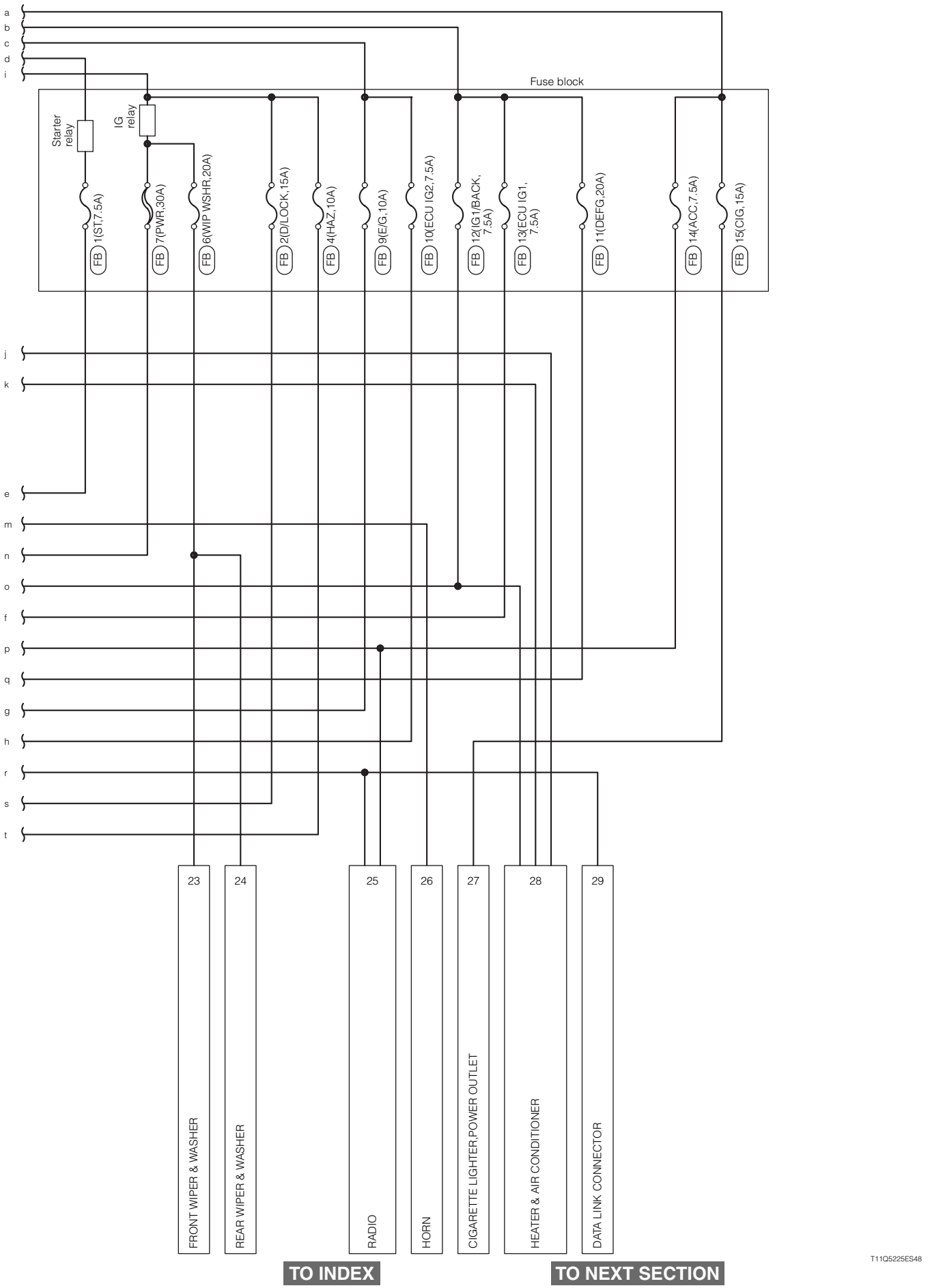

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TO NEXT SECTION

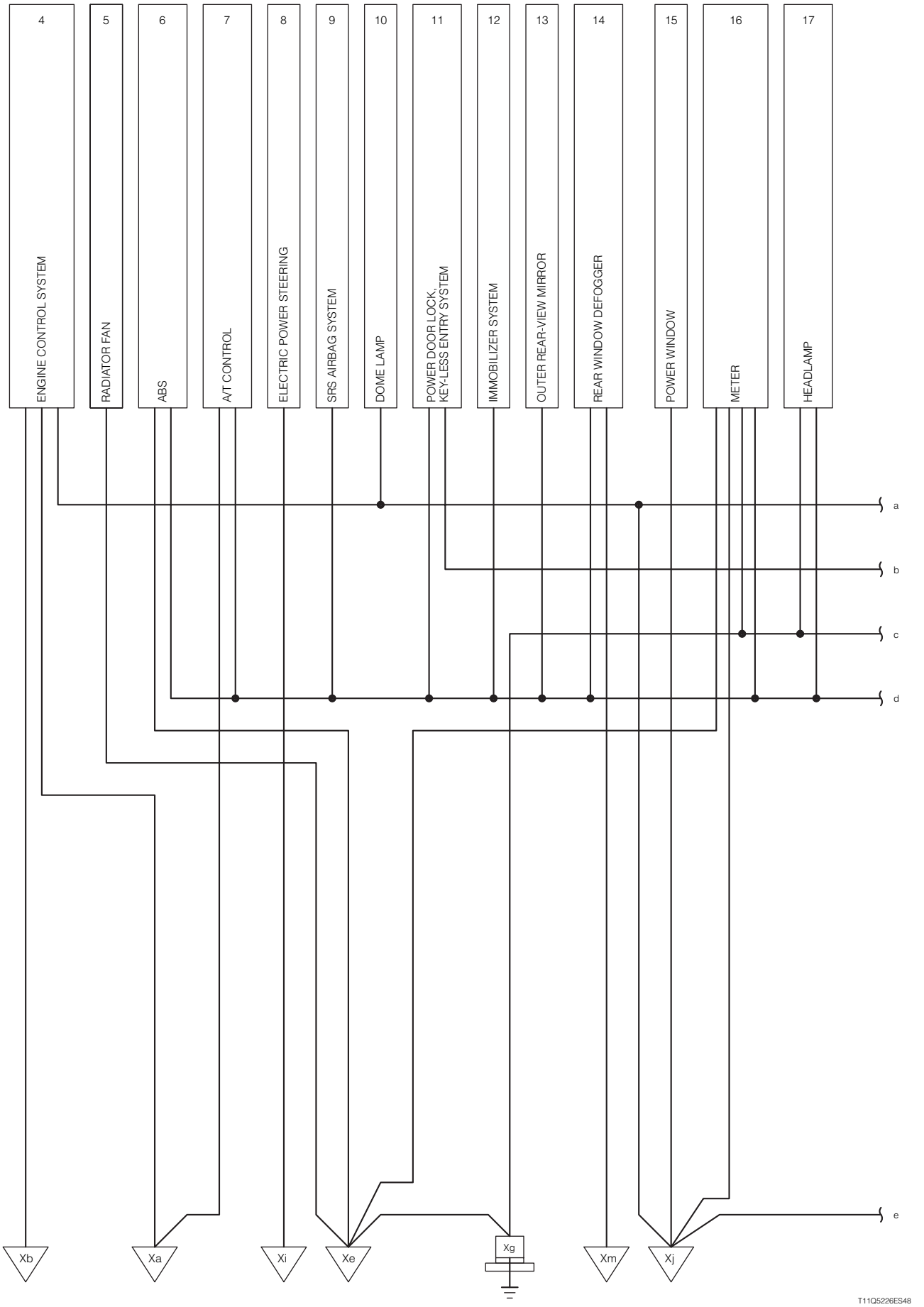
T11Q5225ES48

C EARTH SYSTEM DIAGRAM

EARTH SYSTEM DIAGRAM ---------- C - 1

C–1

1 EARTH SYSTEM DIAGRAM



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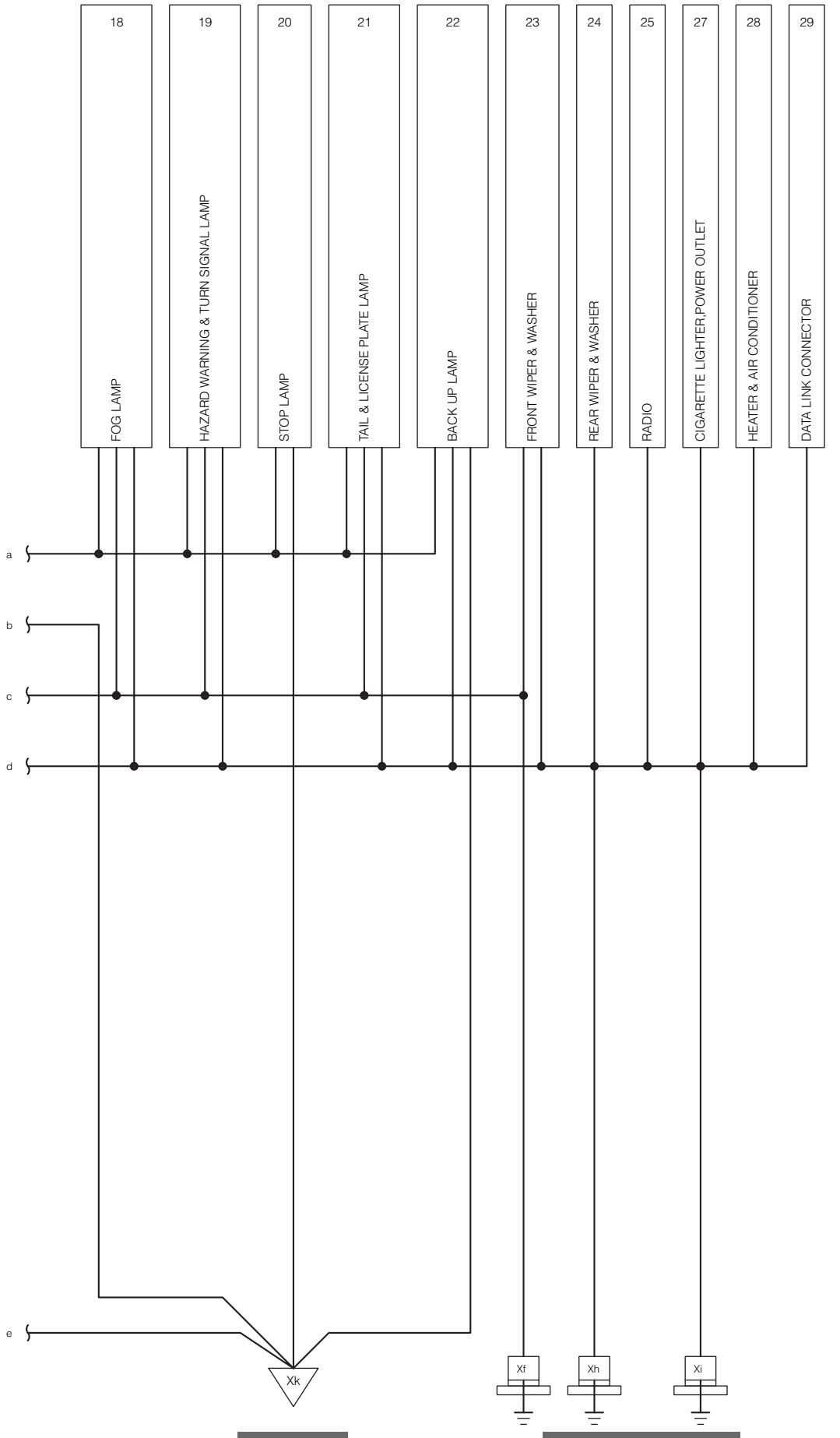

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TO NEXT SECTION

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LHD VEHICLE ---------- D - 7
STARTING SYSTEM ---------- D - 13
RHD VEHICLE ---------- D - 13
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RHD VEHICLE ---------- D - 117
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RHD VEHICLE ---------- D - 125
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RHD VEHICLE ---------- D - 249
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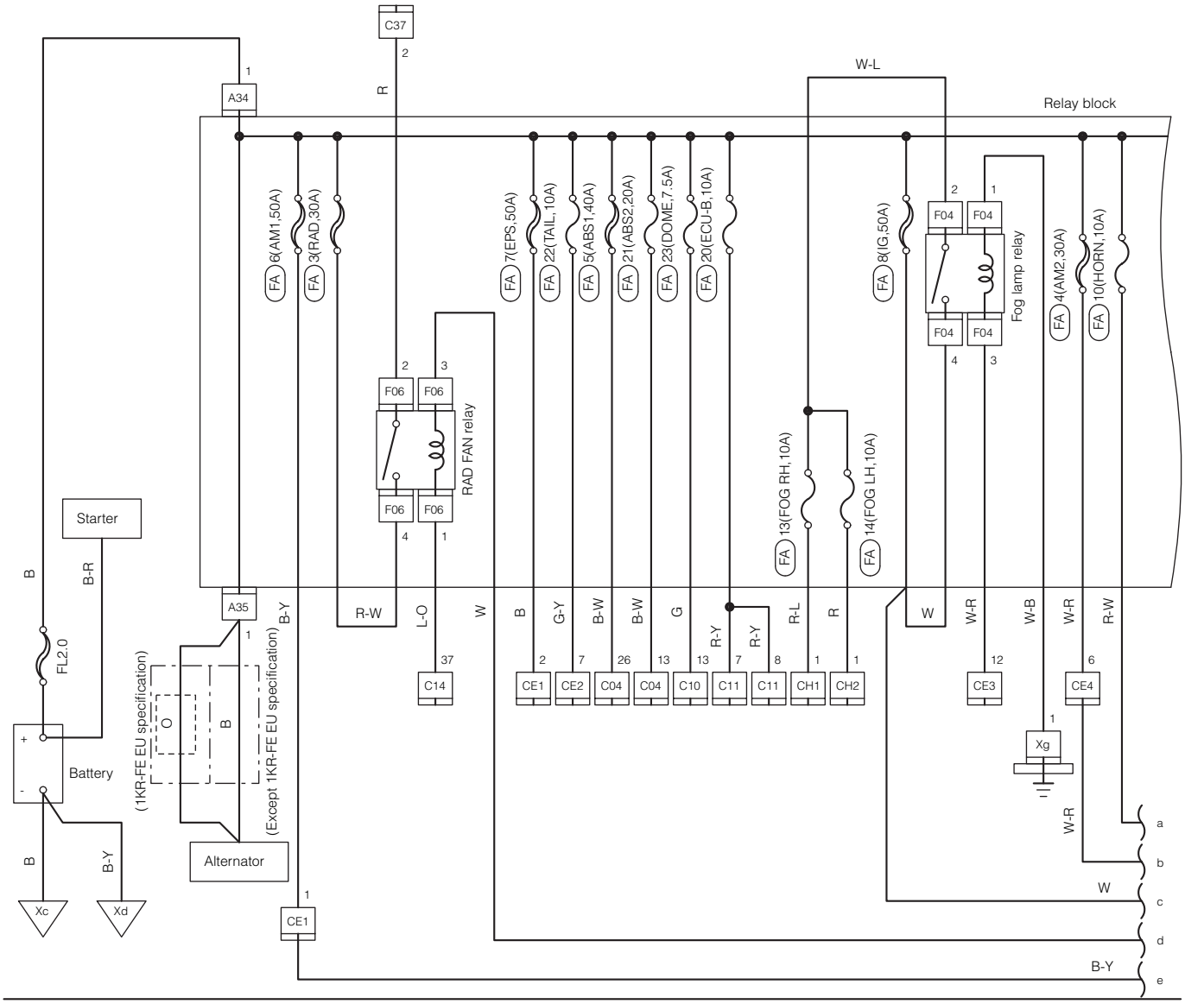
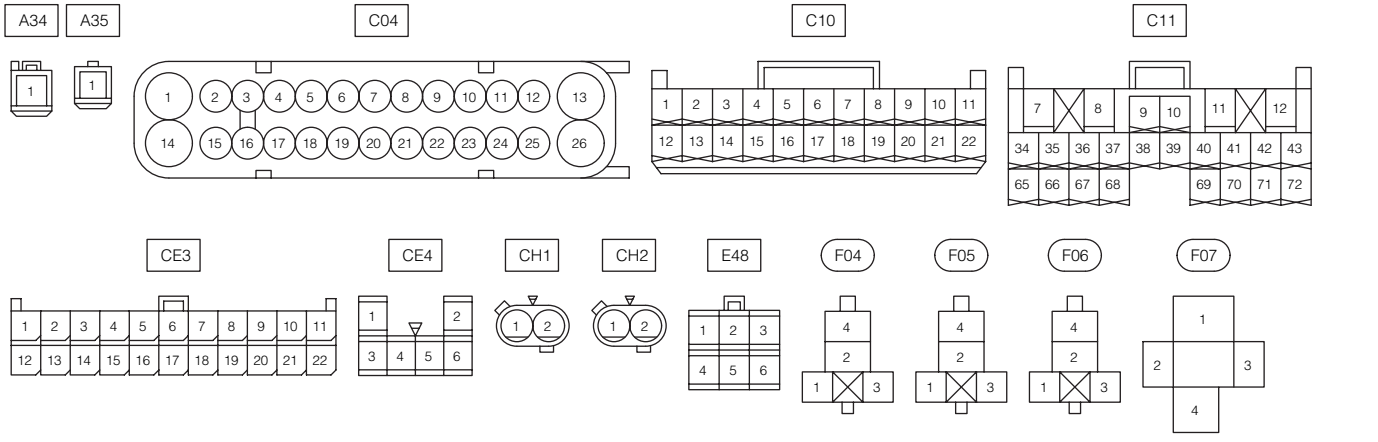
1 POWER SOURCE

1-1 RHD VEHICLE





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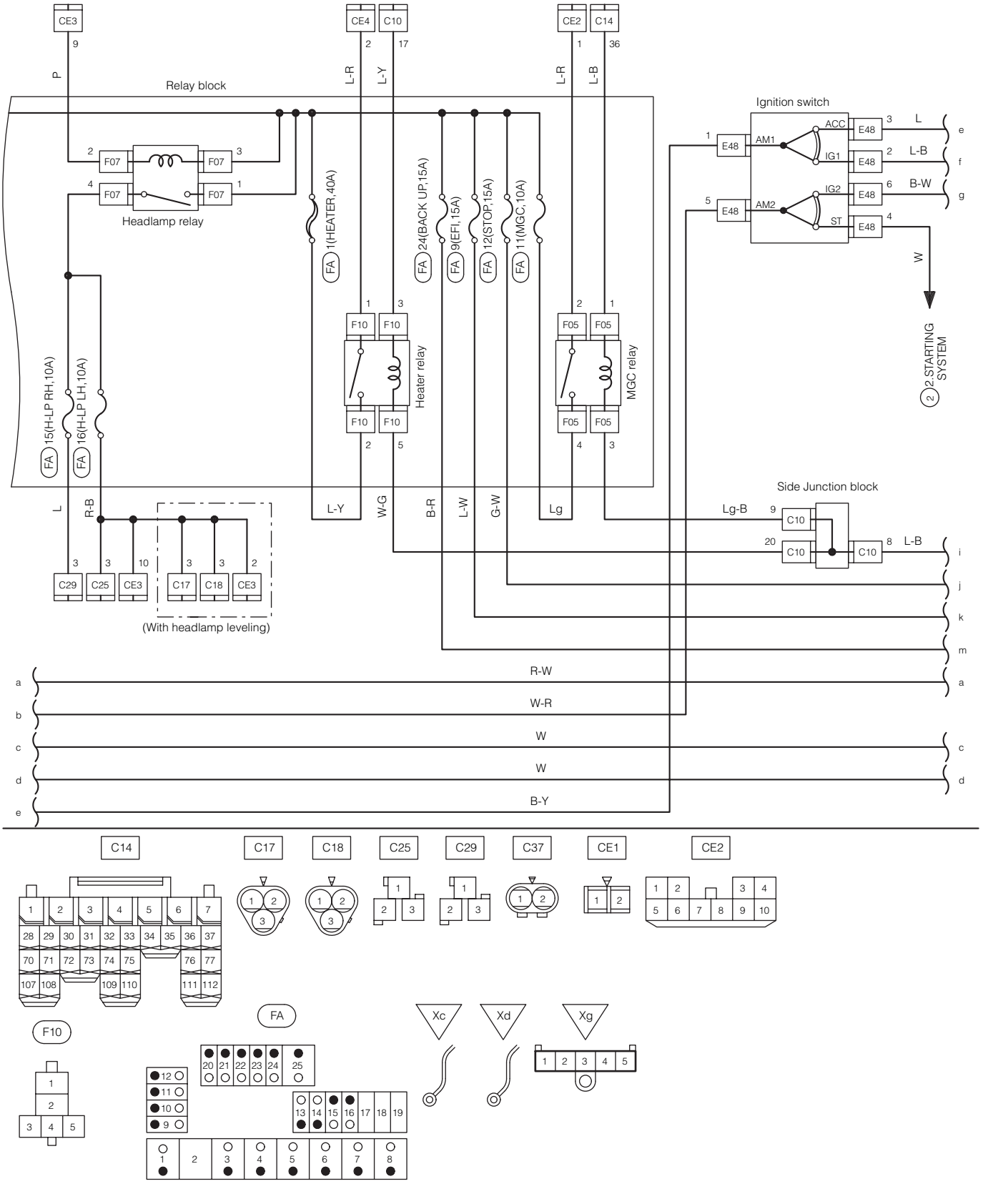

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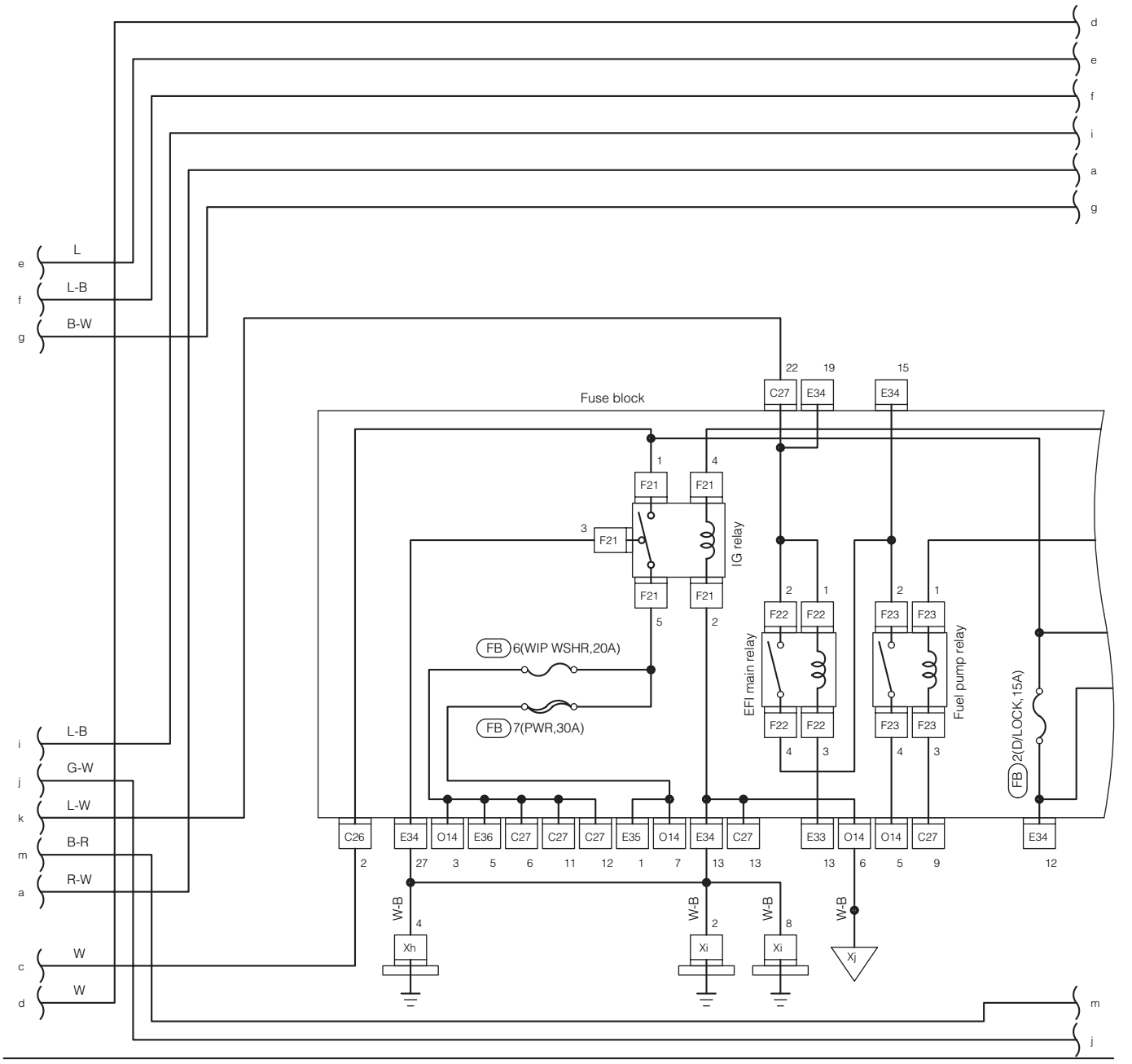

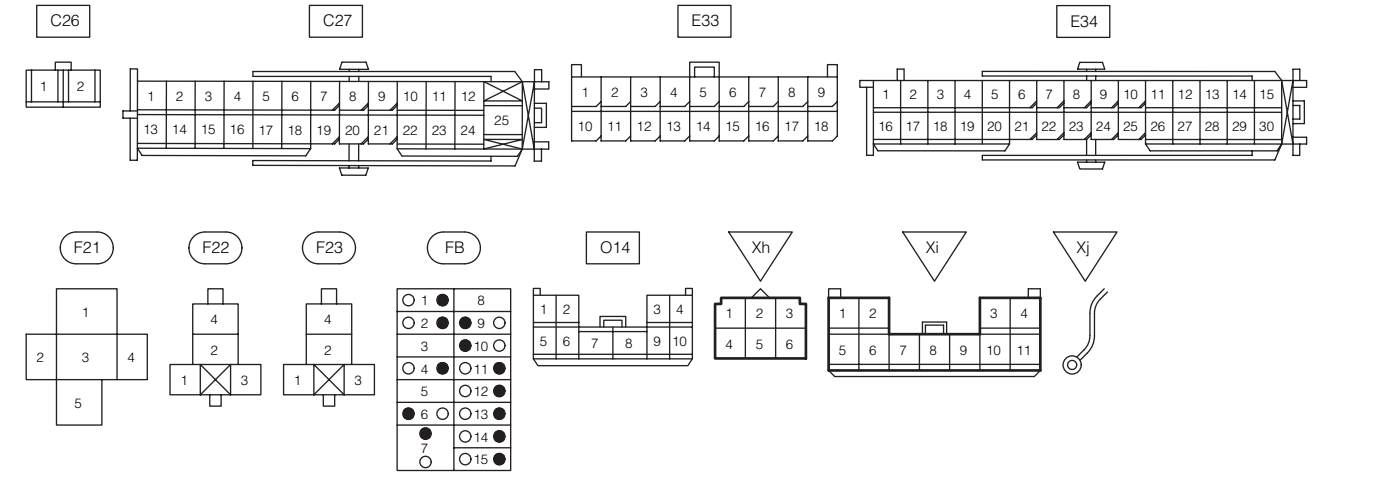

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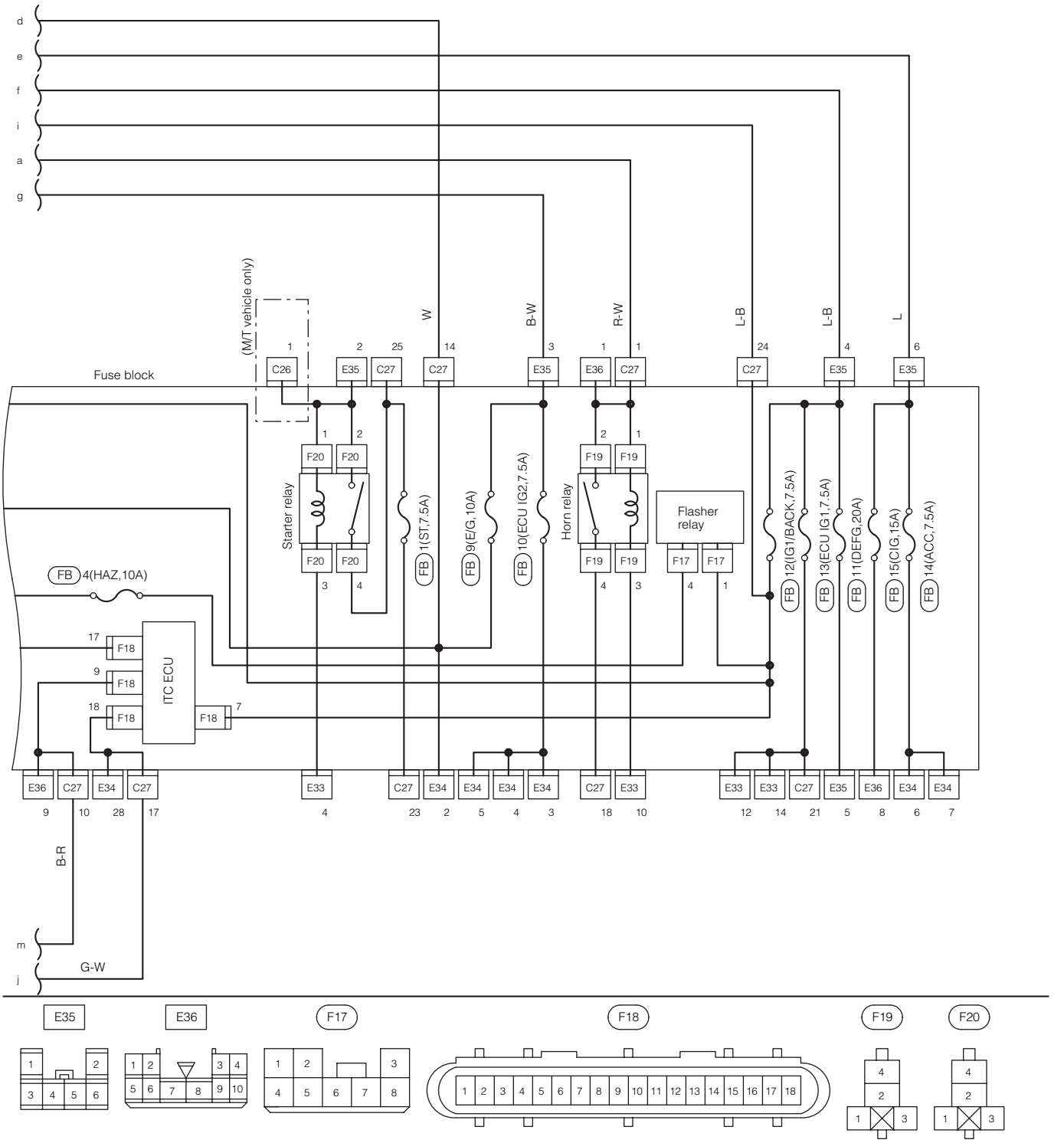

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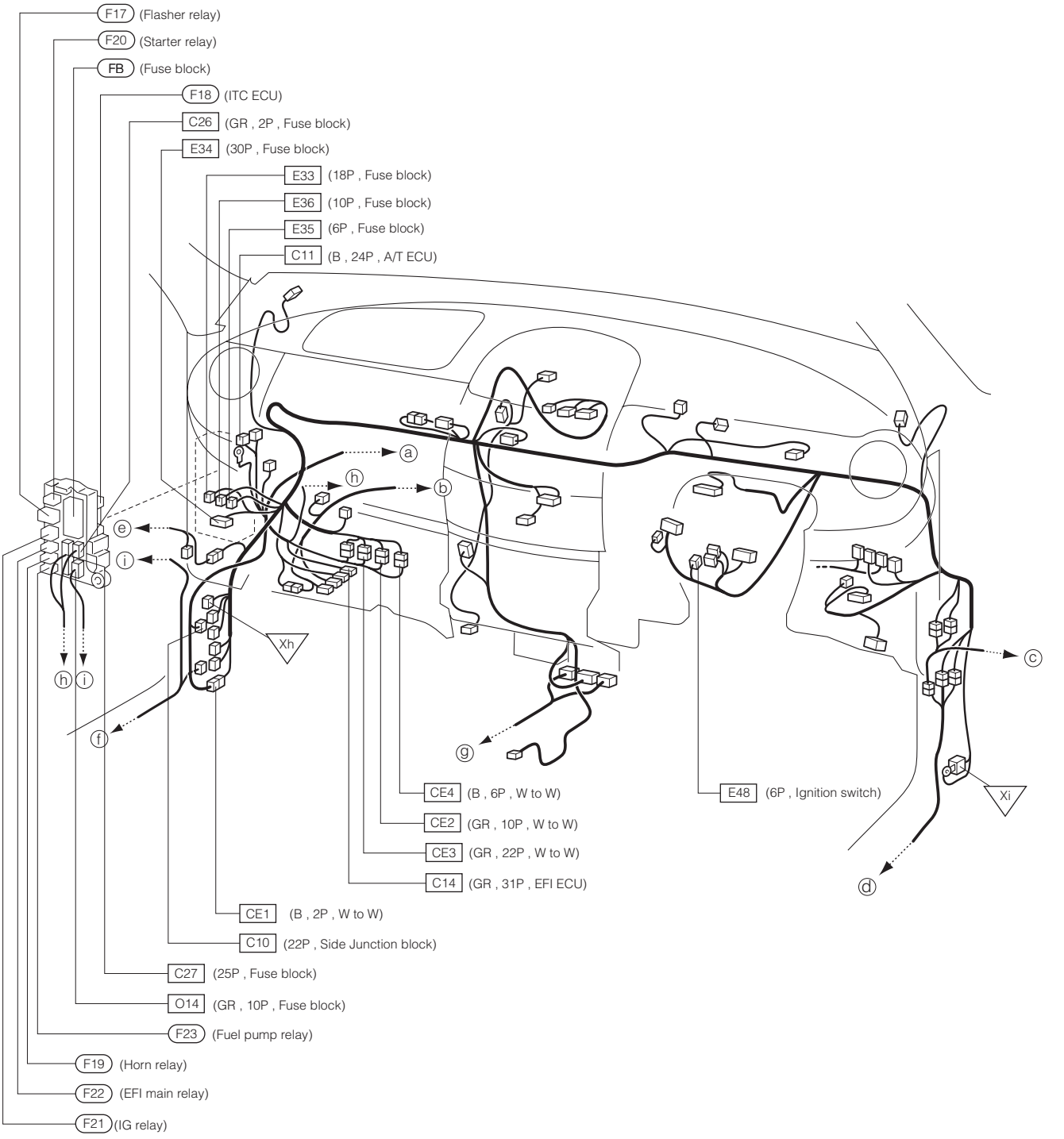

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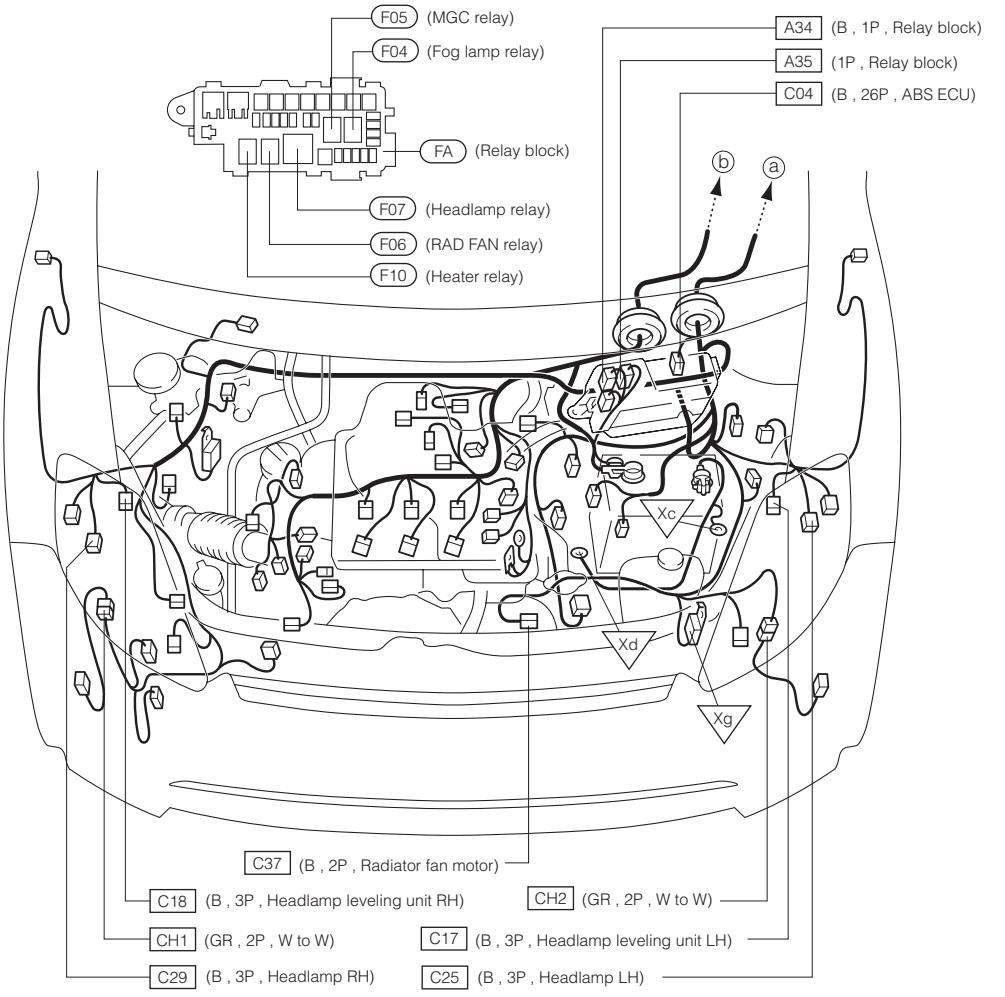
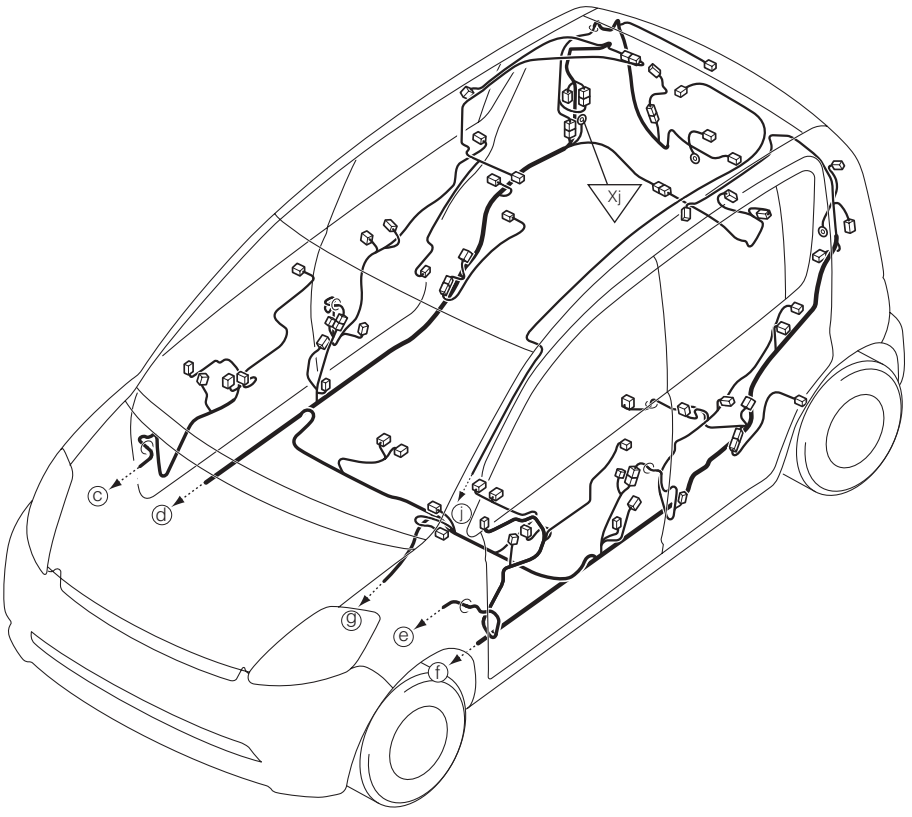
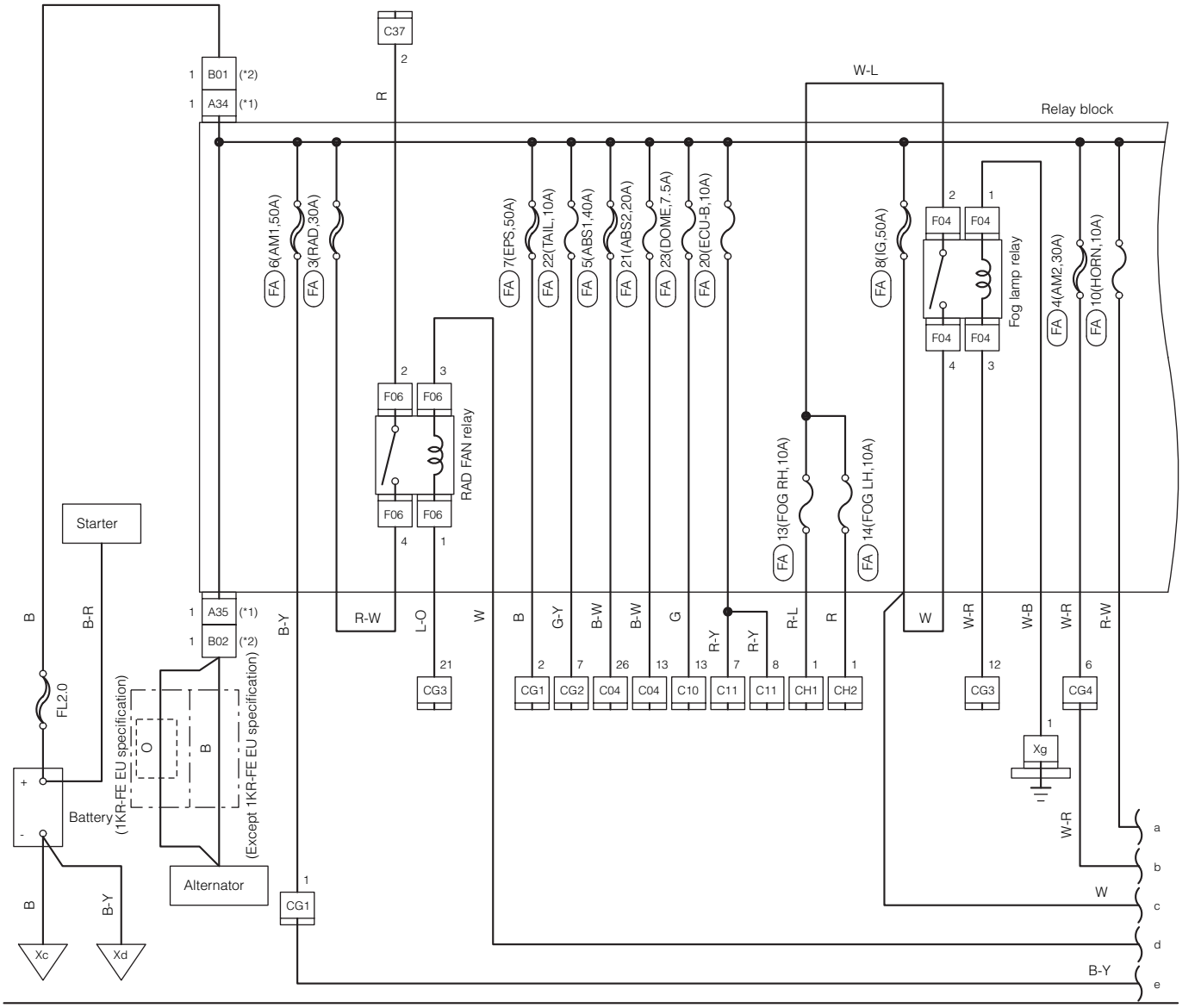


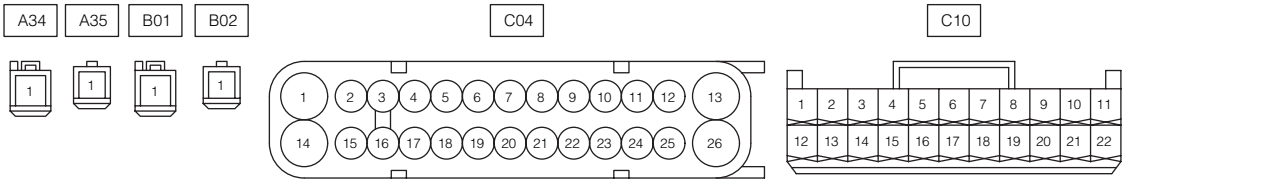


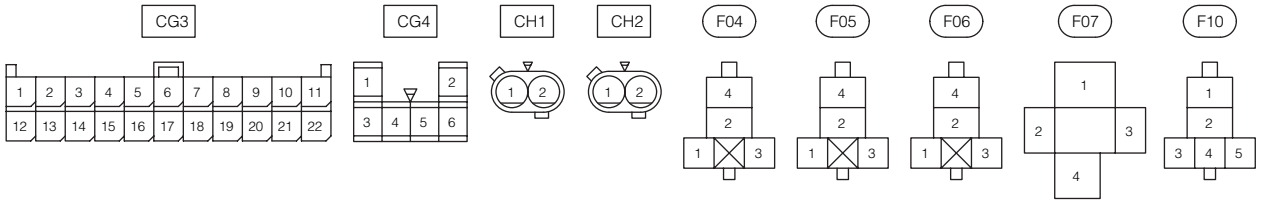
T11Q5002ES48

1-2 LHD VEHICLE

*1:1KR-FE
*2:K3-VE







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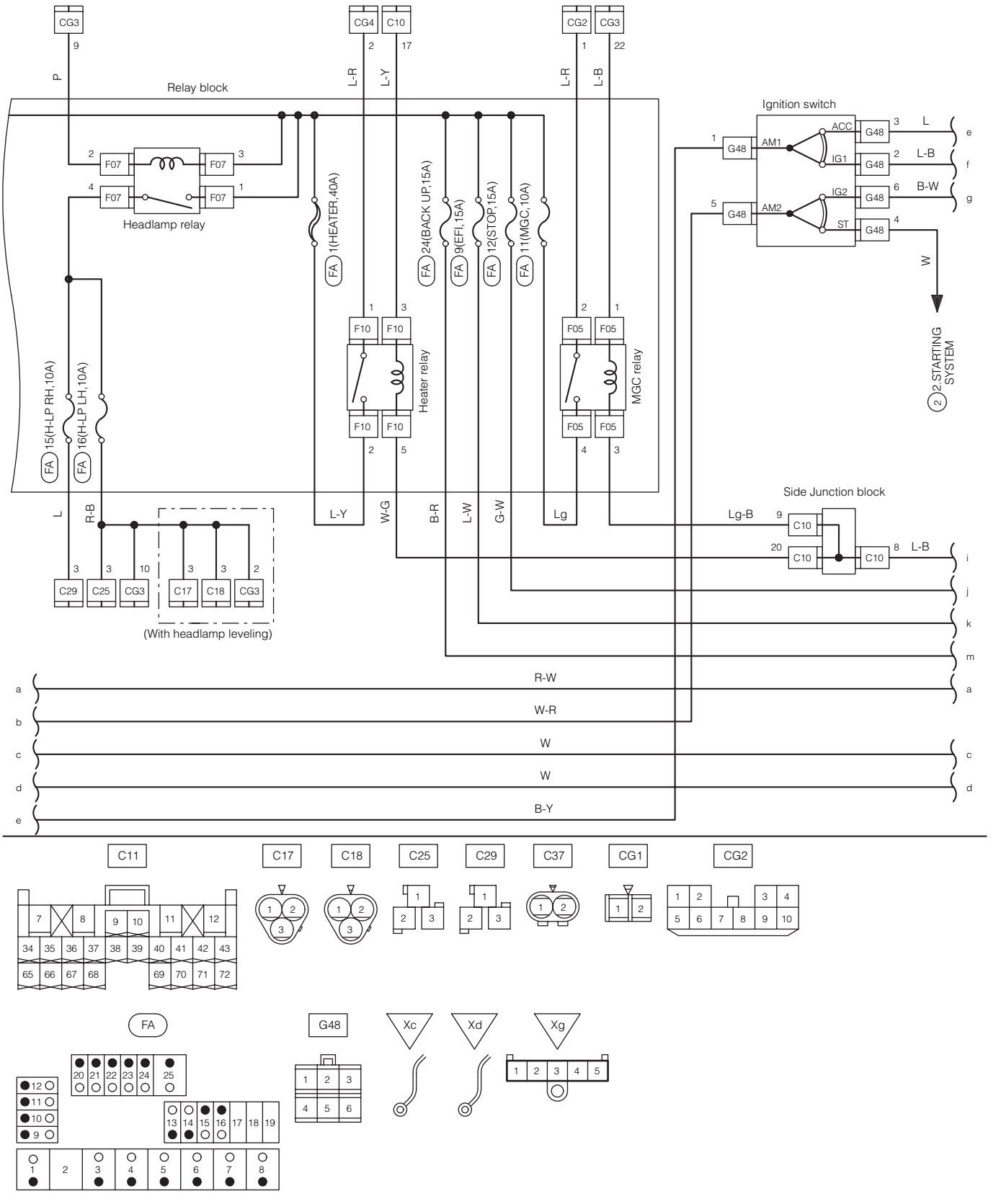

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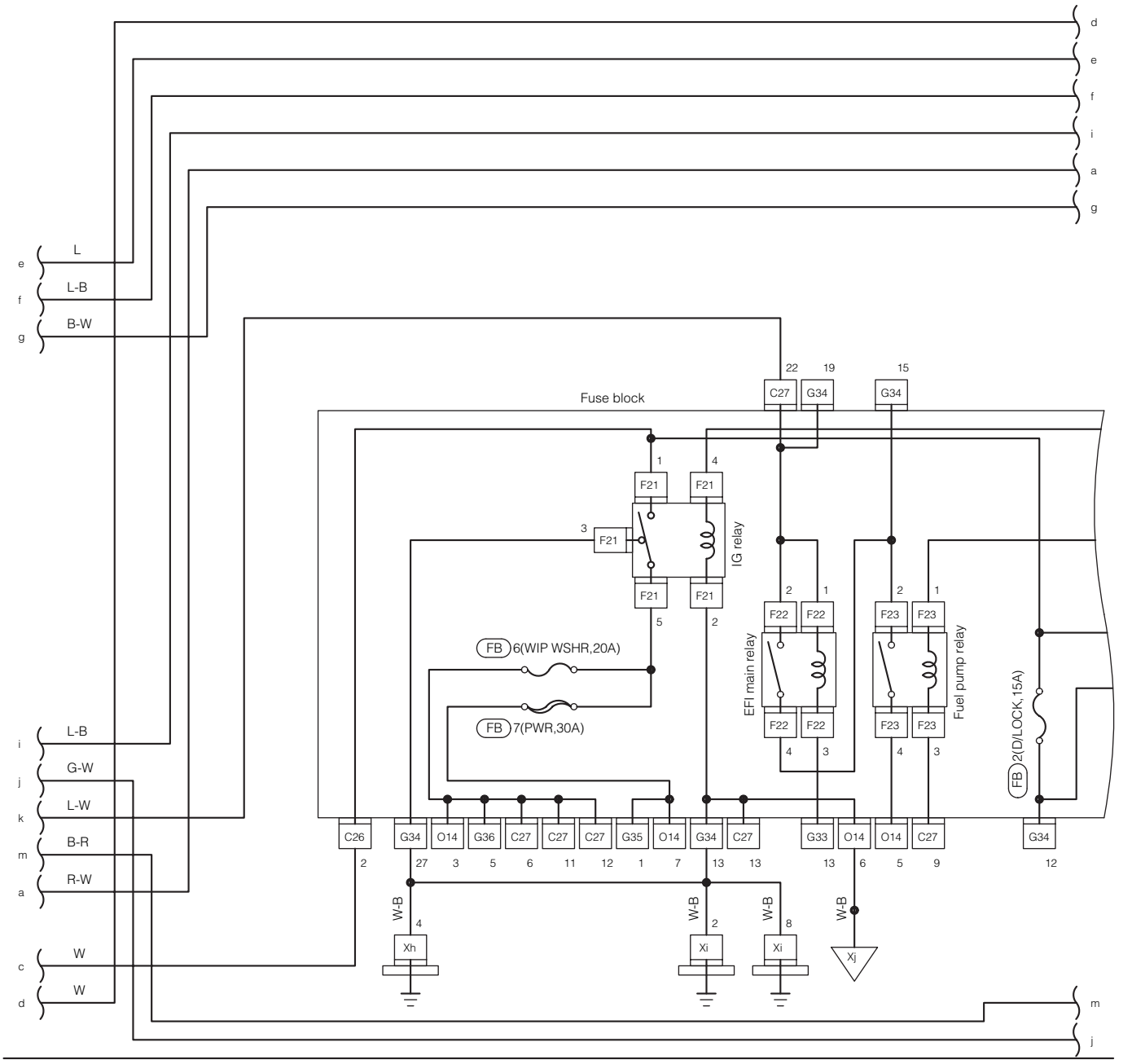

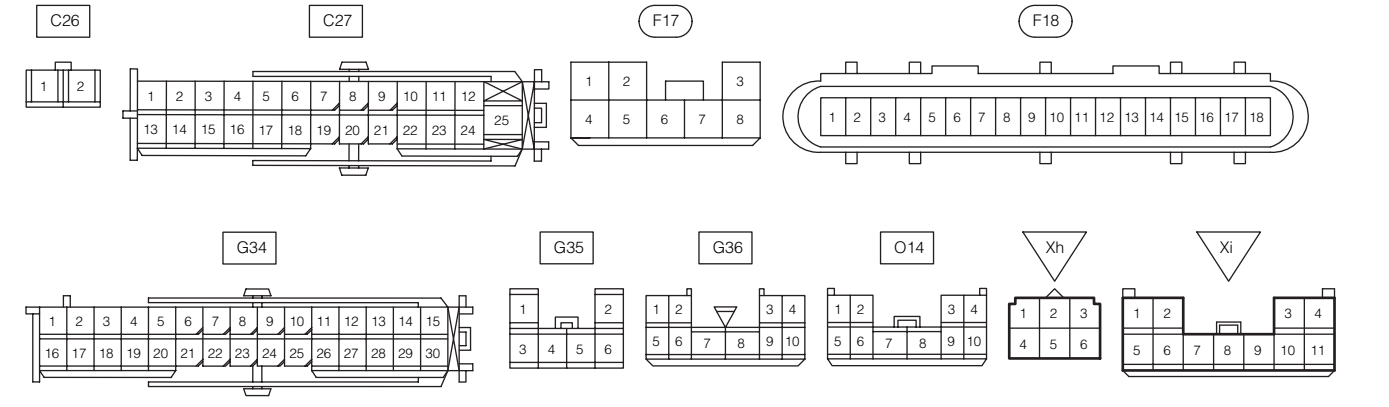

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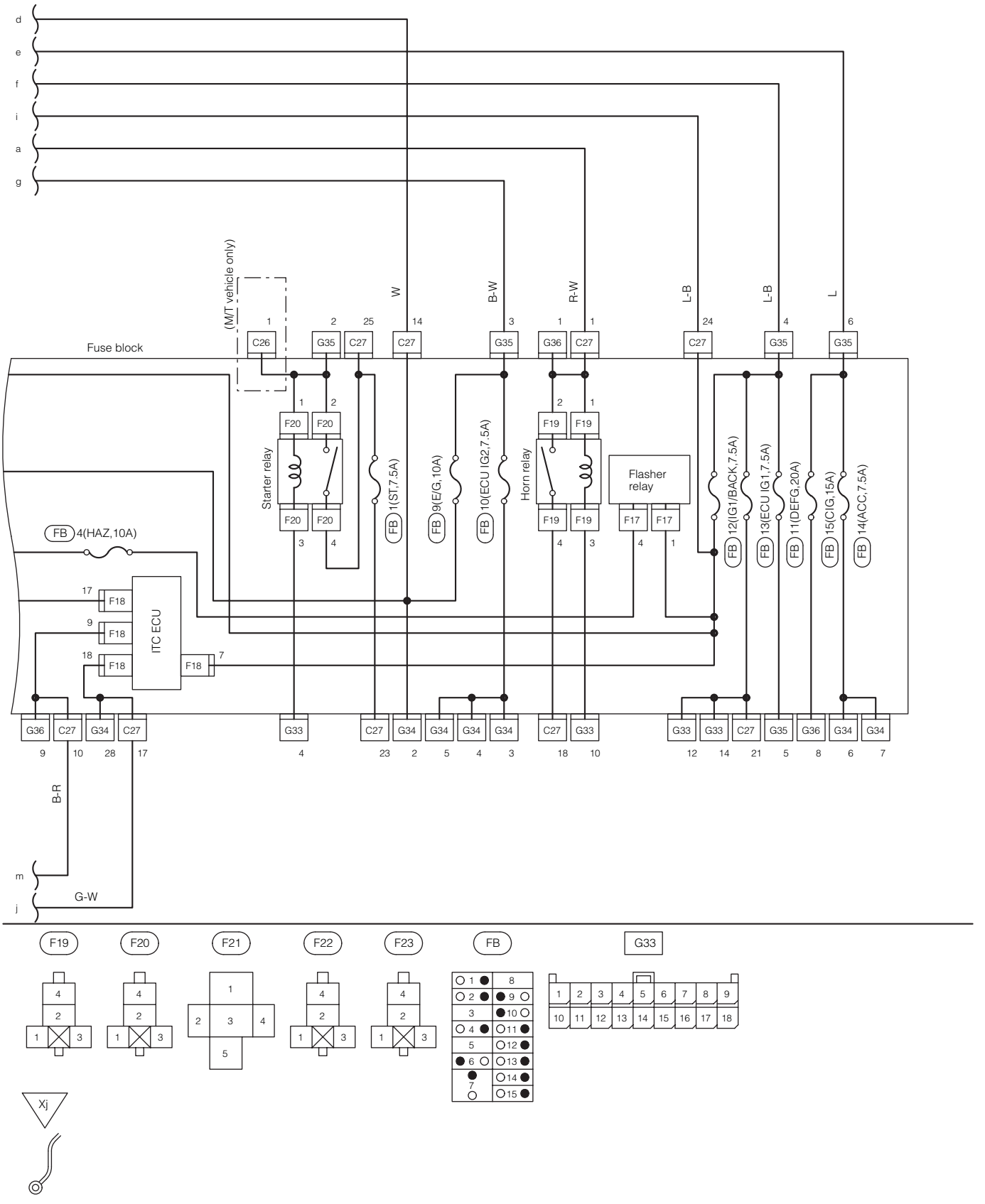
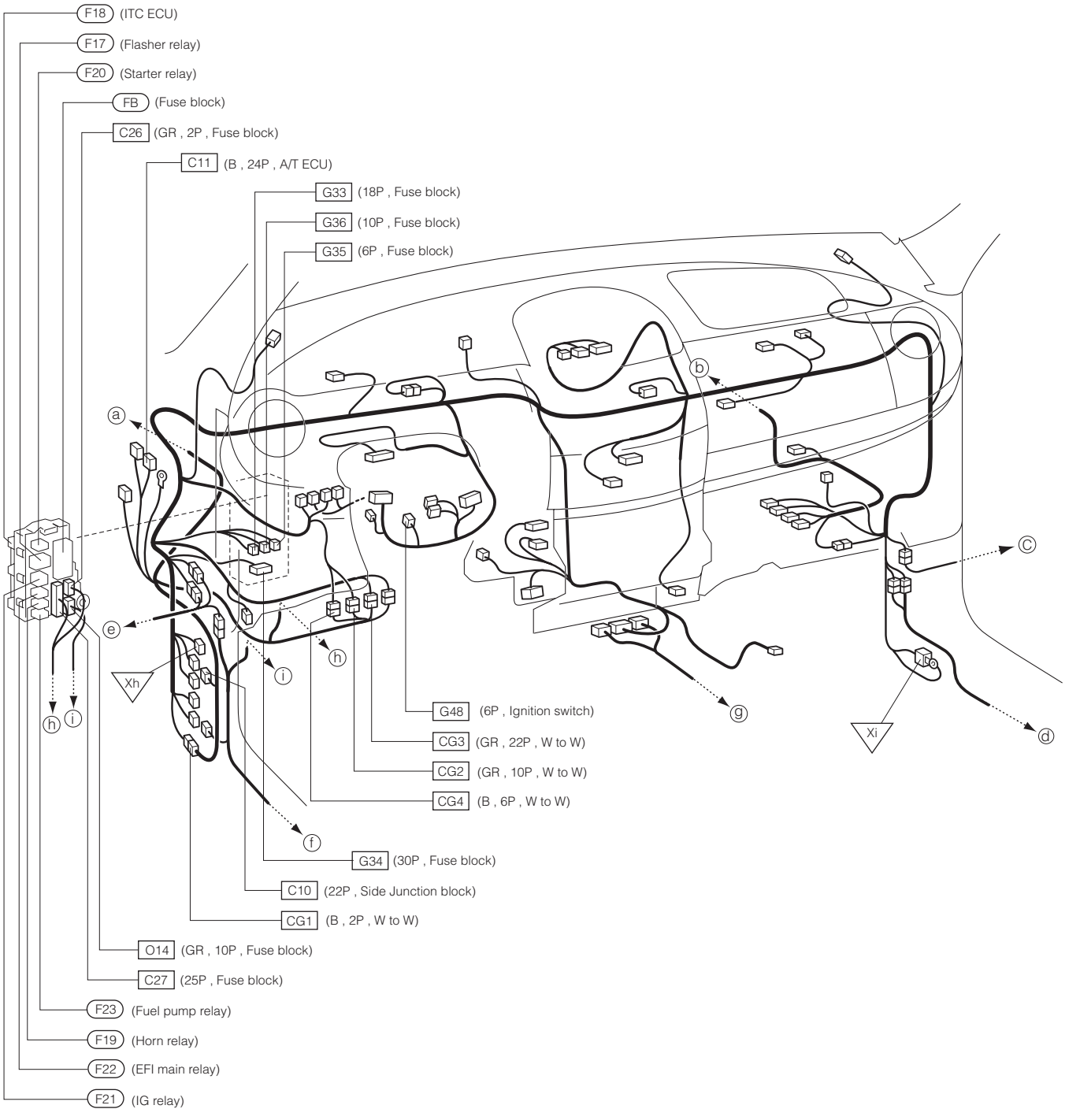
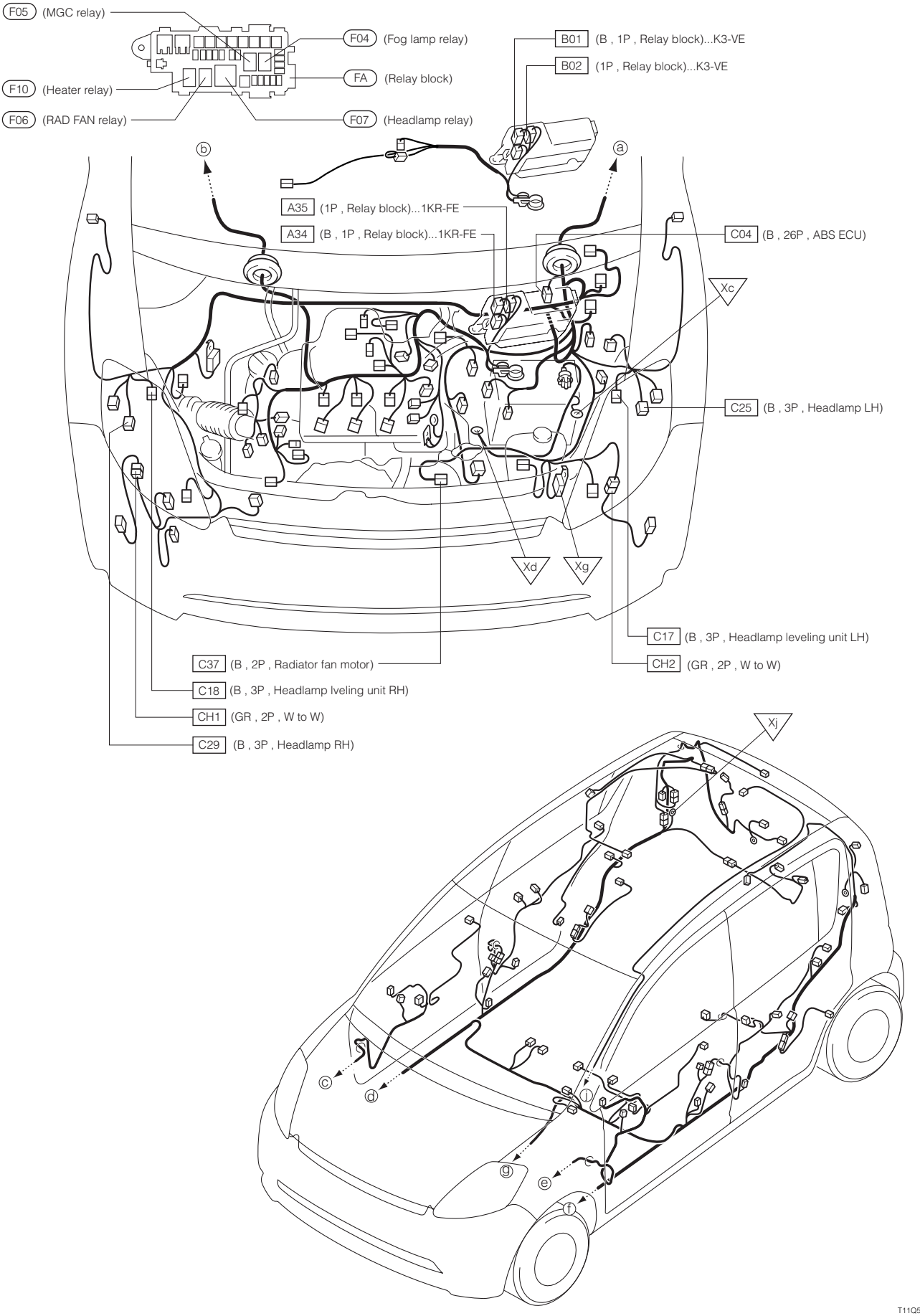

d
e
f
i
a
g
(M/T vehicle only)
W
B-W
R-W
L-B
L-B
L
Fuse block
C26
G35
C27
C27
G35
G36
C27
C27
G35
G35
F20
F20
Starter relay
F19
F19
Horn relay
Flasher relay
F17
F17
FB 4(HAZ,10A)
FB 1(ST,7.5A)
FB 9(E/G,10A)
FB 10(ECU IG2,7.5A)
FB 12(IG1/BACK,7.5A)
FB 13(ECU IG1,7.5A)
FB 11(DEFG,20A)
FB 15(CIG,15A)
FB 14(ACC,7.5A)
ITC ECU
F18
F18
F18
F18
G36
C27
G34
C27
G33
C27
G34
G34
G34
C27
G33
G33
G33
C27
G35
G36
G34
G34
B-R
G-W
m
j
F19
F20
F21
F22
F23
FB
G33
Xj


F18 (ITC ECU)
F17 (Flasher relay)
F20 (Starter relay)
FB (Fuse block)
C26 (GR , 2P , Fuse block)
C11 (B , 24P , A/T ECU)
G33 (18P , Fuse block)
G36 (10P , Fuse block)
G35 (6P , Fuse block)
a
b
c
d
e
f
g
h
i
Xh
Xi
G48 (6P , Ignition switch)
CG3 (GR , 22P , W to W)
CG2 (GR , 10P , W to W)
CG4 (B , 6P , W to W)
G34 (30P , Fuse block)
C10 (22P , Side Junction block)
CG1 (B , 2P , W to W)
O14 (GR , 10P , Fuse block)
C27 (25P , Fuse block)
F23 (Fuel pump relay)
F19 (Horn relay)
F22 (EFI main relay)
F21 (IG relay)



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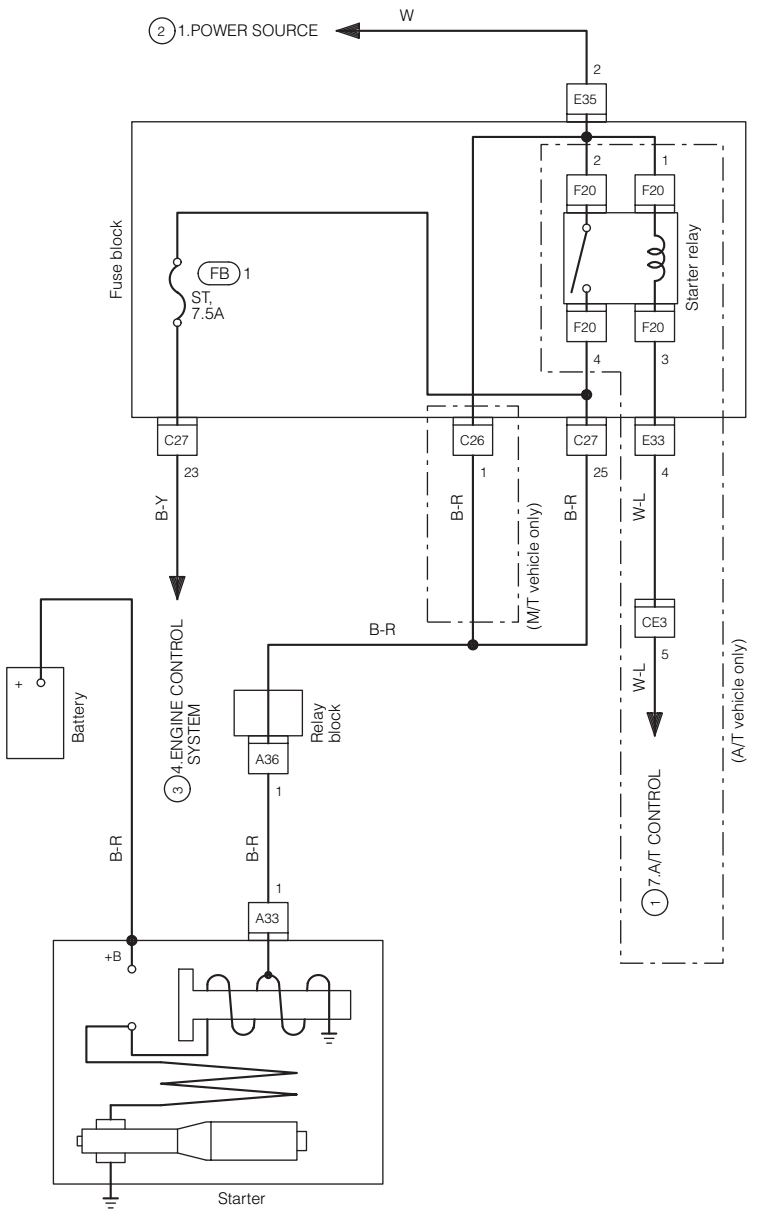
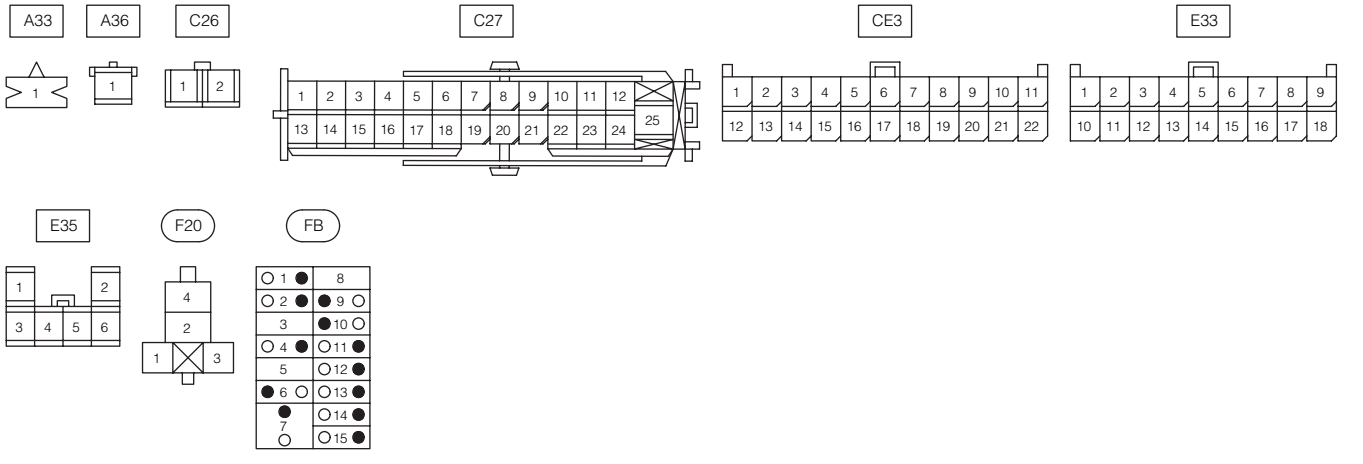
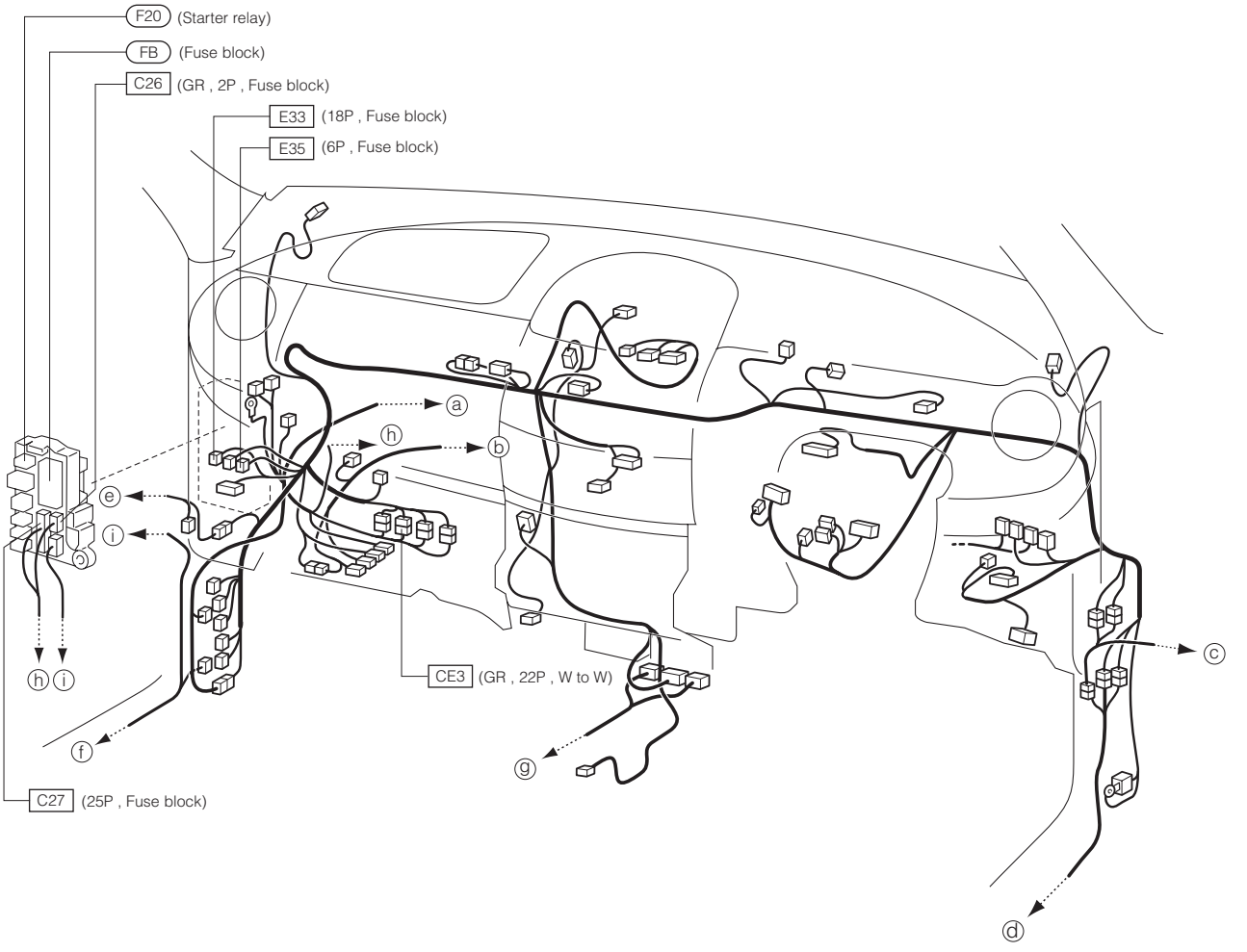
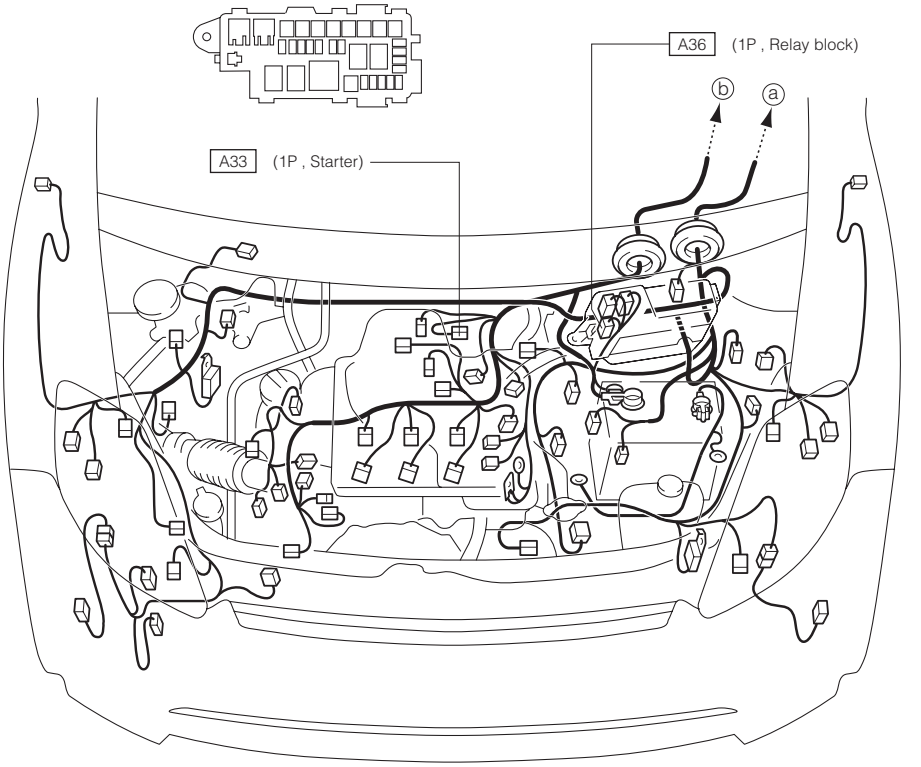
2 STARTING SYSTEM
2-1 RHD VEHICLE



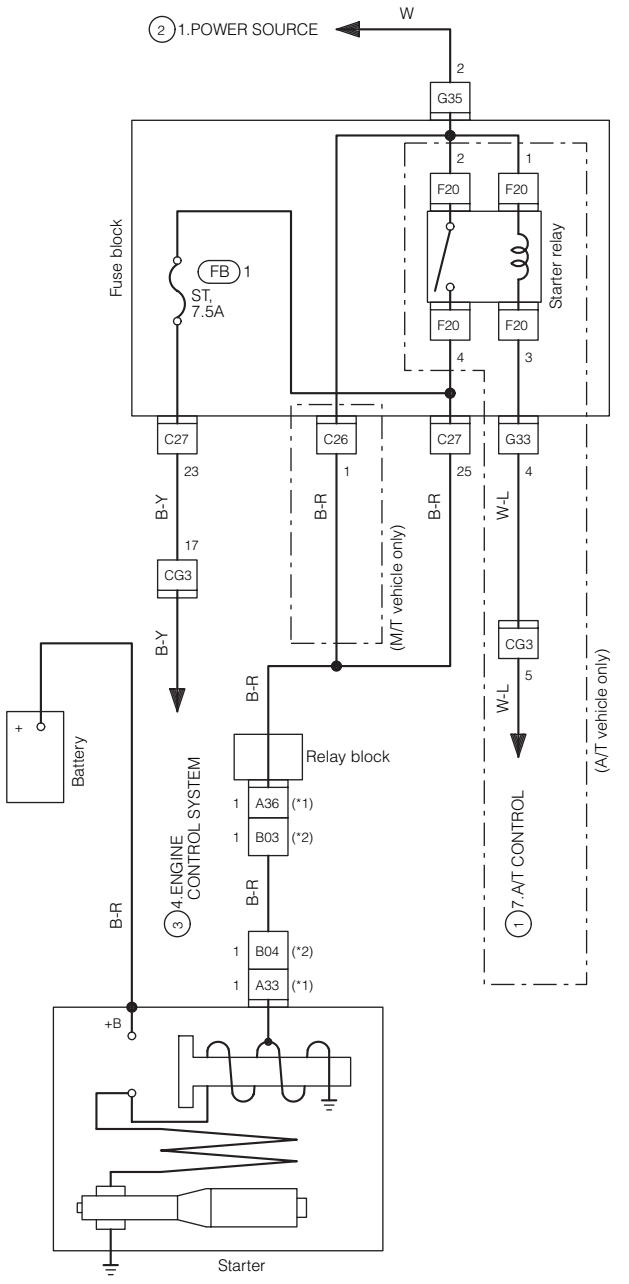


(MEMO)

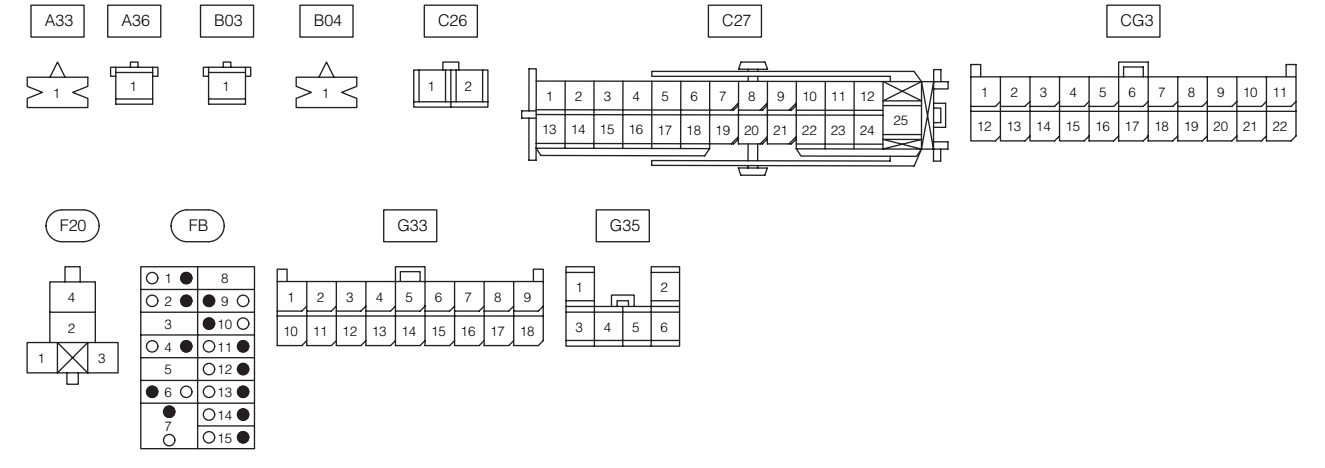

F20 (Starter relay)
FB (Fuse block)
C26 (GR , 2P , Fuse block)
E33 (18P , Fuse block)
E35 (6P , Fuse block)
a
h
b
e
i
h i
f
CE3 (GR , 22P , W to W)
g
c
d
C27 (25P , Fuse block)


A36
(1P , Relay block)
b
a
A33
(1P , Starter)

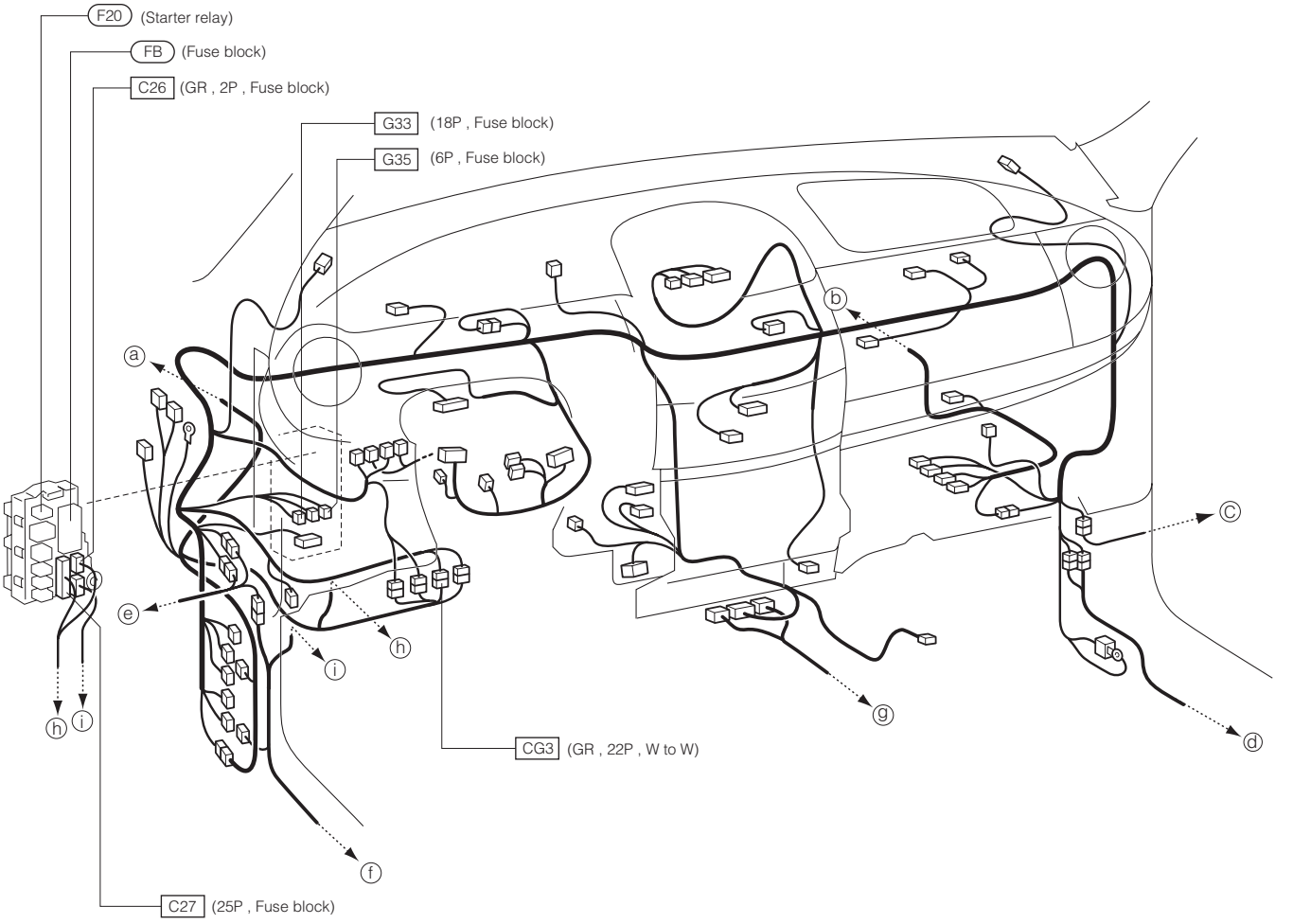
2-2 LHD VEHICLE

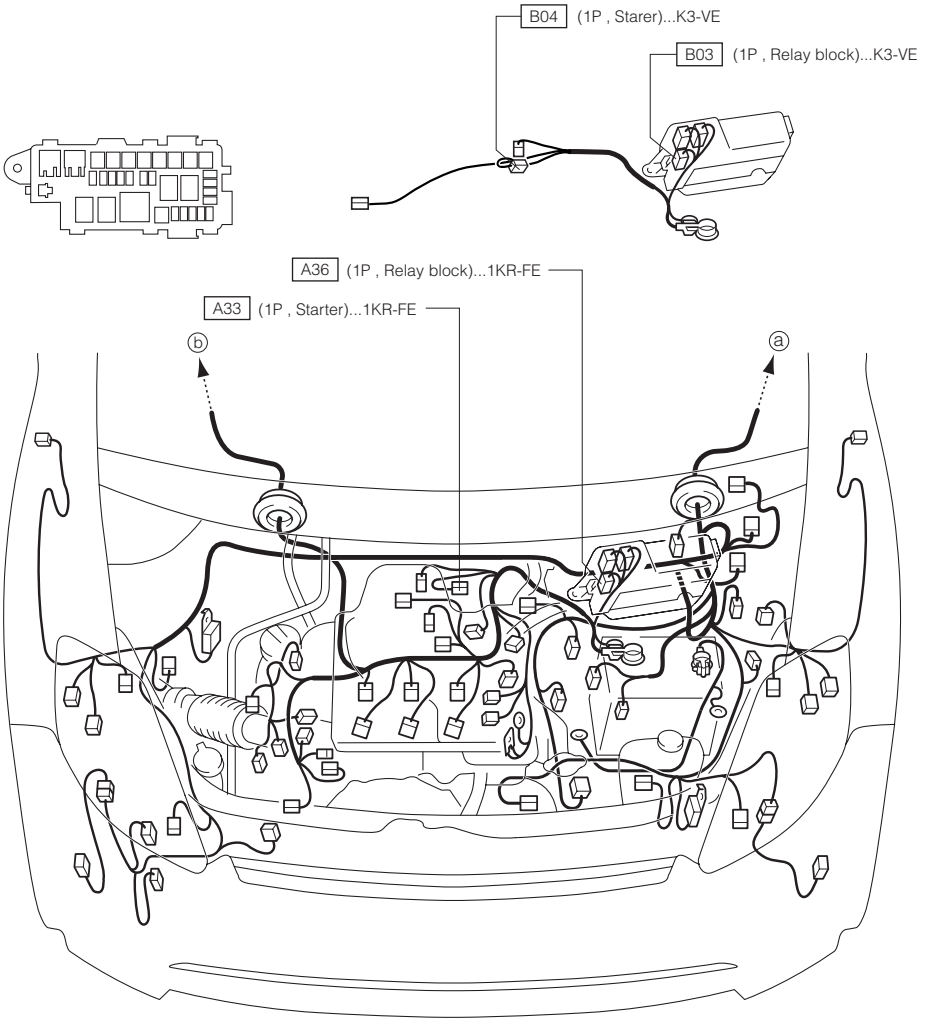


*1:1KR-FE
*2:K3-VE

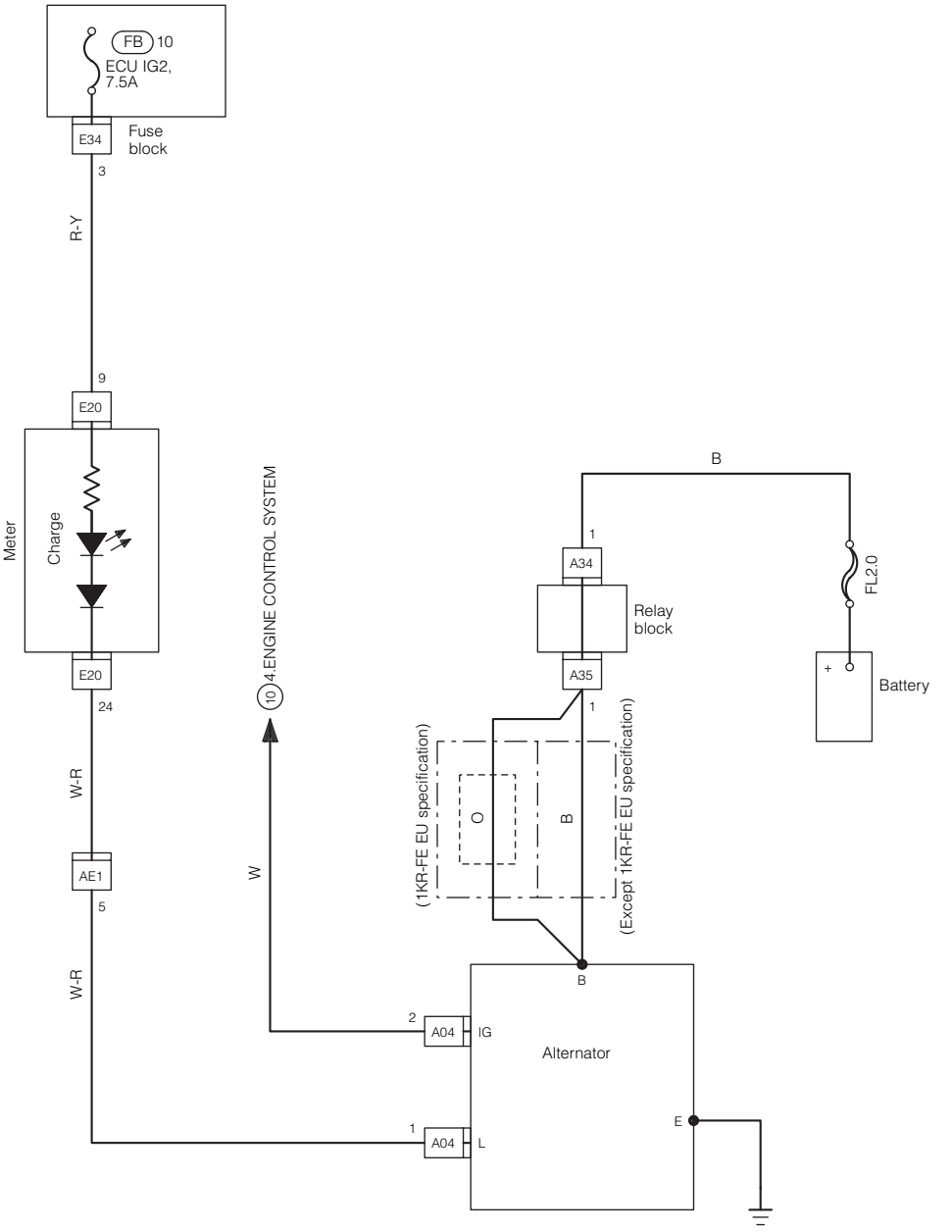


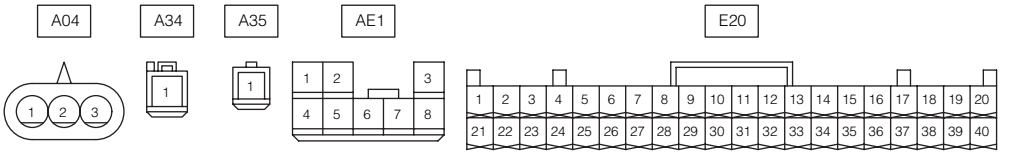
(MEMO)

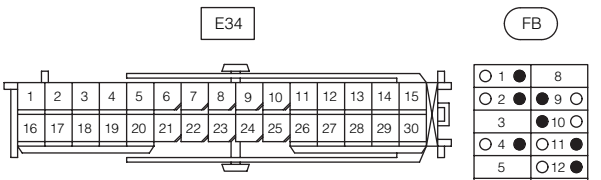

F20 (Starter relay)
FB (Fuse block)
C26 (GR , 2P , Fuse block)
G33 (18P , Fuse block)
G35 (6P , Fuse block)
a
b
c
d
e
f
g
h
i
CG3 (GR , 22P , W to W)
C27 (25P , Fuse block)


B04 (1P , Starer)...K3-VE
B03 (1P , Relay block)...K3-VE
A36 (1P , Relay block)...1KR-FE
A33 (1P , Starter)...1KR-FE
b
a

3 CHARGING SYSTEM
3-1 RHD VEHICLE







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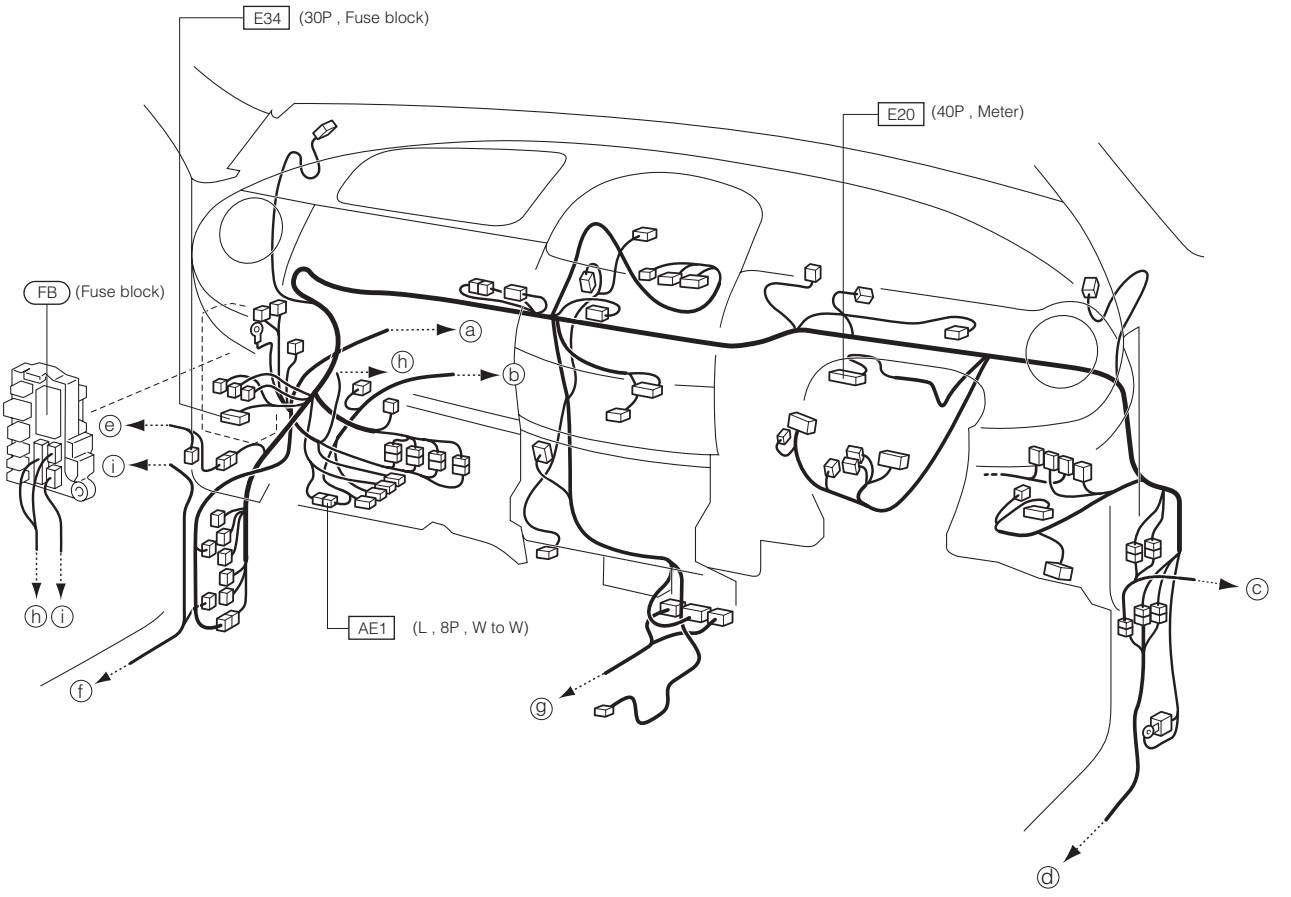
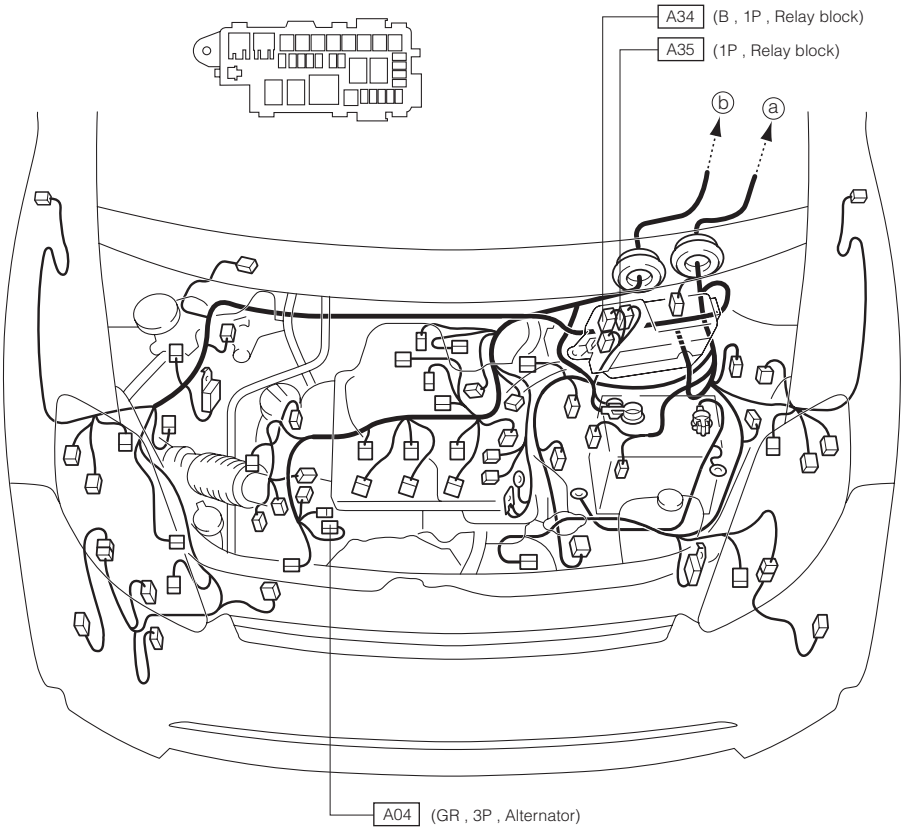
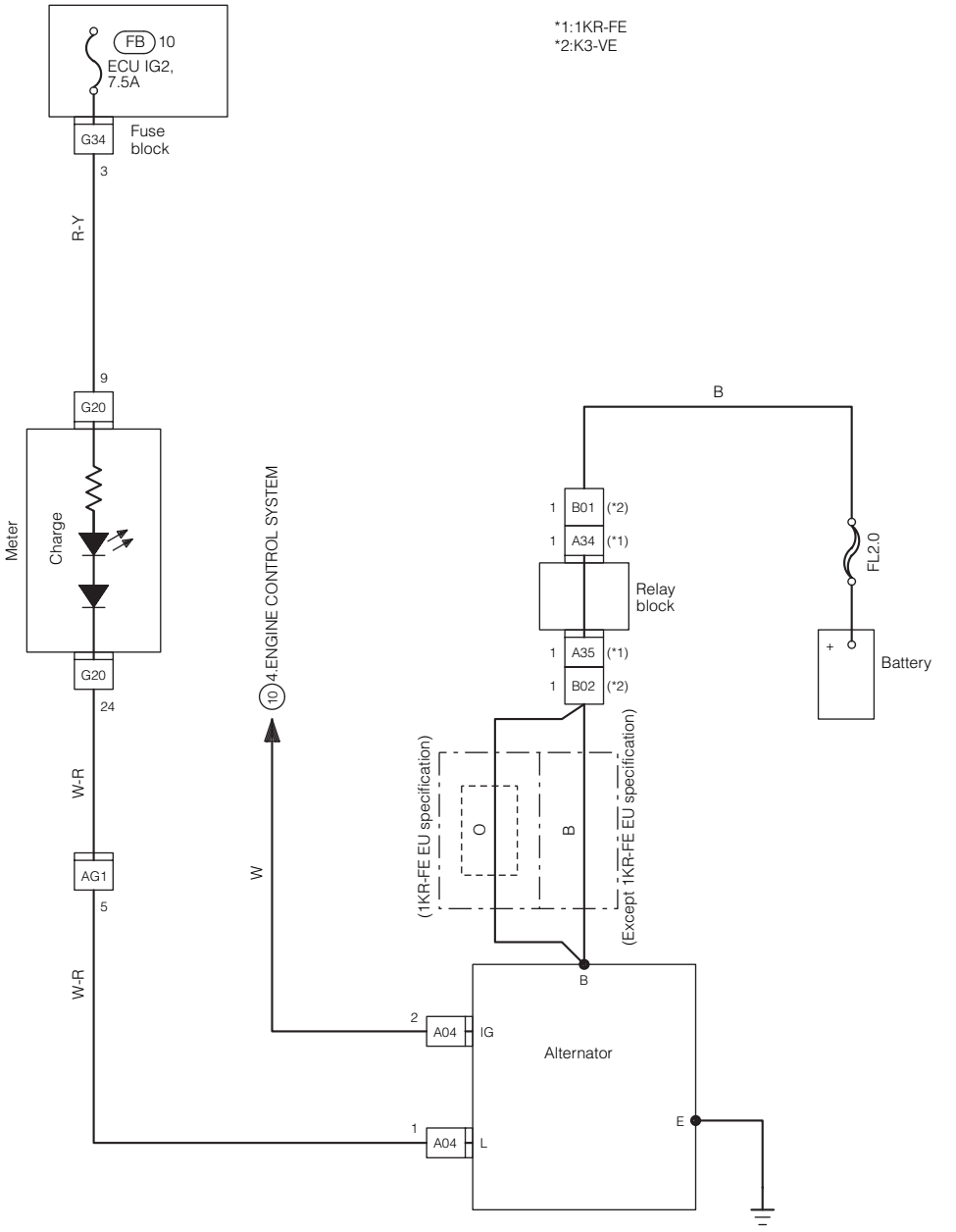
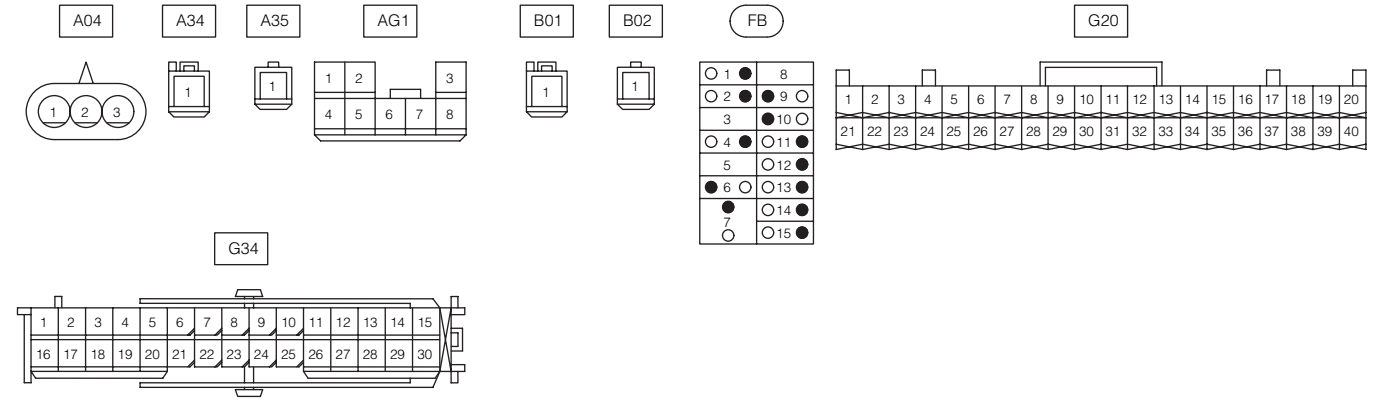

E34 (30P , Fuse block)
E20 (40P , Meter)
FB (Fuse block)
AE1 (L , 8P , W to W)
a
b
c
d
e
f
g
h
i


A34 (B , 1P , Relay block)
A35 (1P , Relay block)
b
a
A04 (GR , 3P , Alternator)

3-2 LHD VEHICLE





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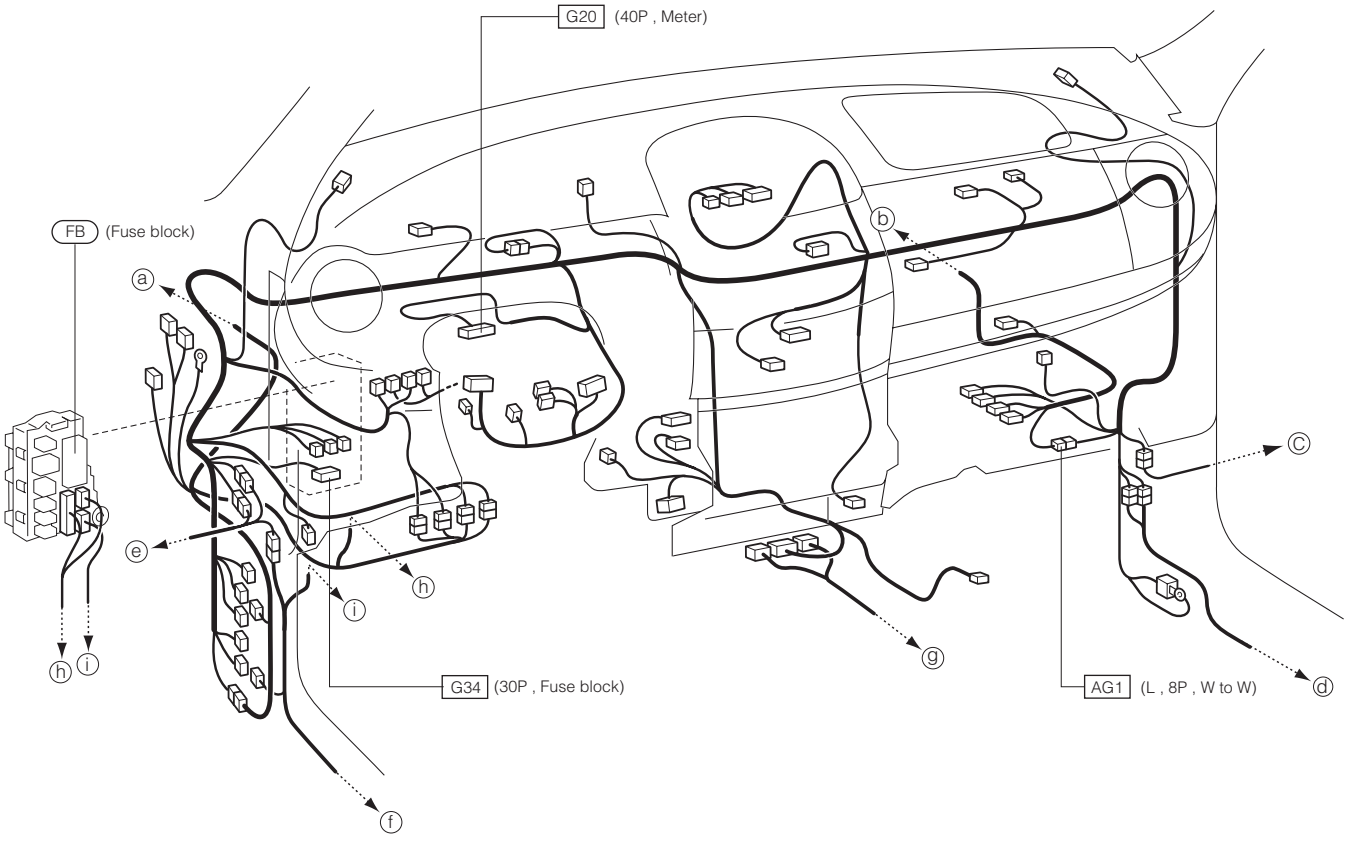
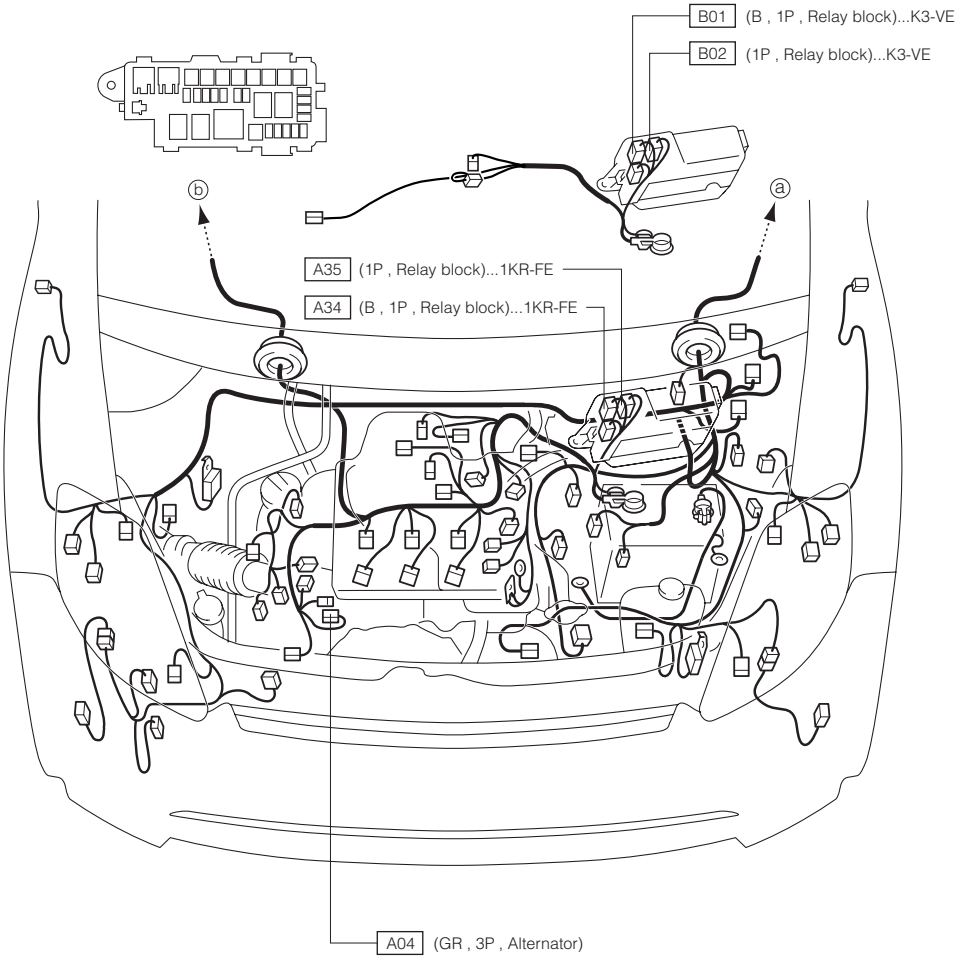
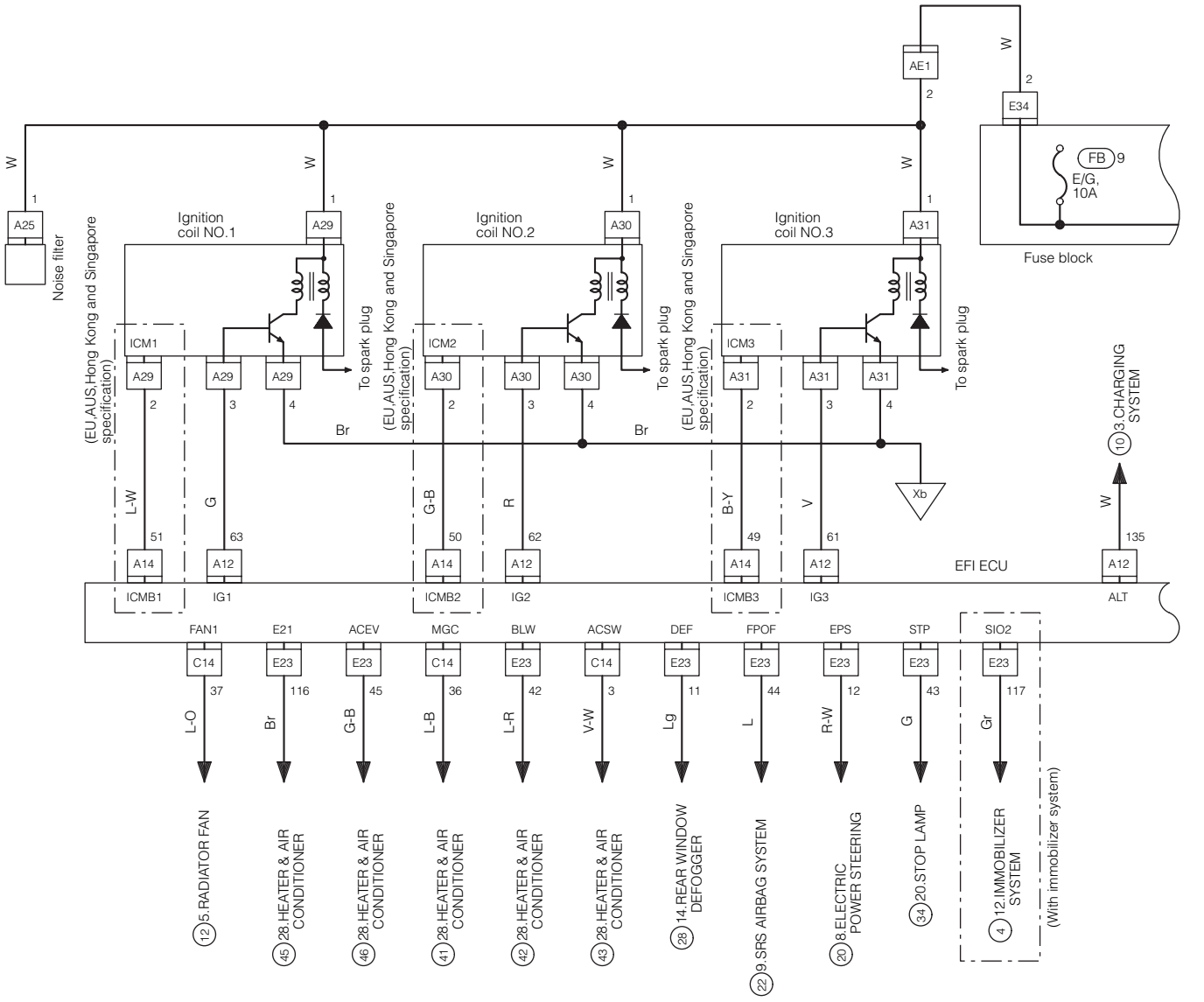
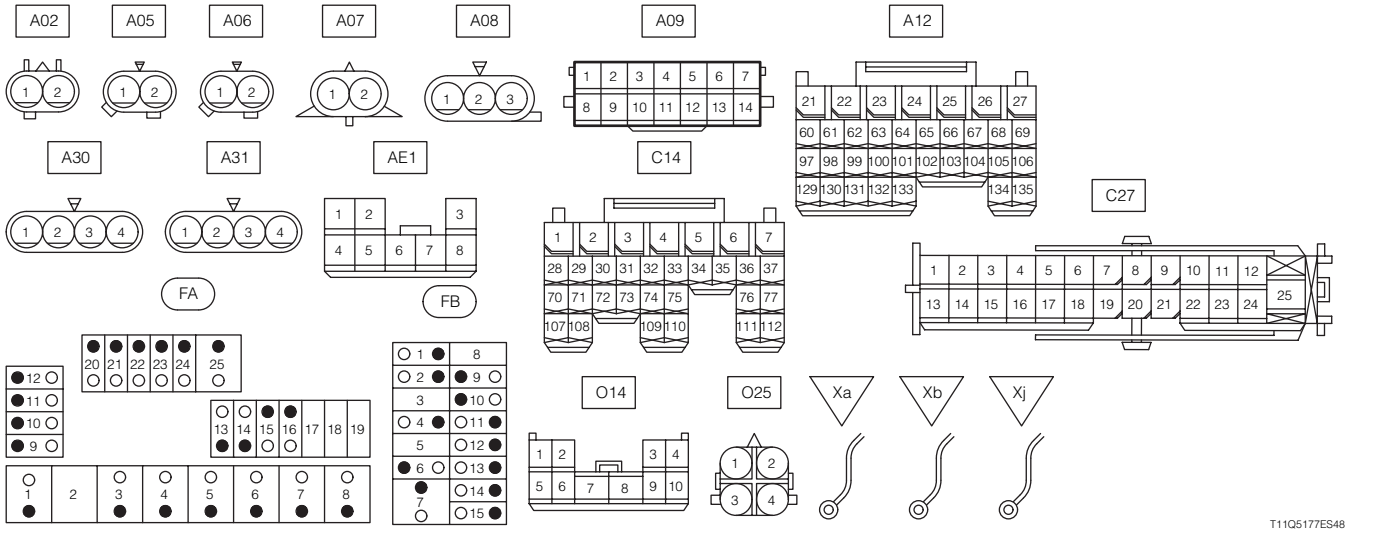

G20 (40P , Meter)
FB (Fuse block)
a
b
c
d
e
f
g
h
i
G34 (30P , Fuse block)
AG1 (L , 8P , W to W)


B01 (B , 1P , Relay block)...K3-VE
B02 (1P , Relay block)...K3-VE
ⓑ
ⓐ
A35 (1P , Relay block)...1KR-FE
A34 (B , 1P , Relay block)...1KR-FE
A04 (GR , 3P , Alternator)

4 ENGINE CONTROL SYSTEM
4-1 RHD VEHICLE(1KR-FE ENGINE)





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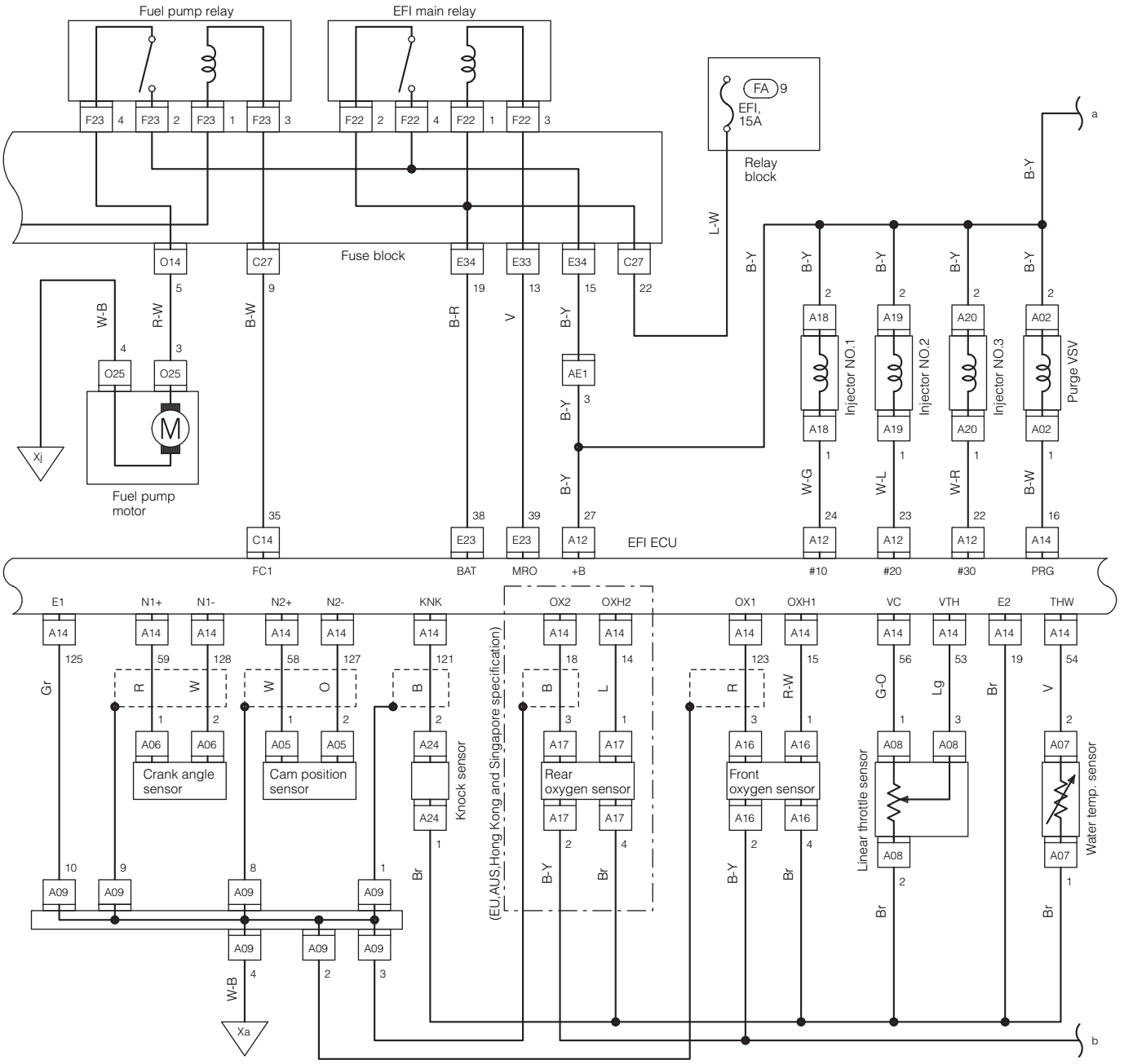
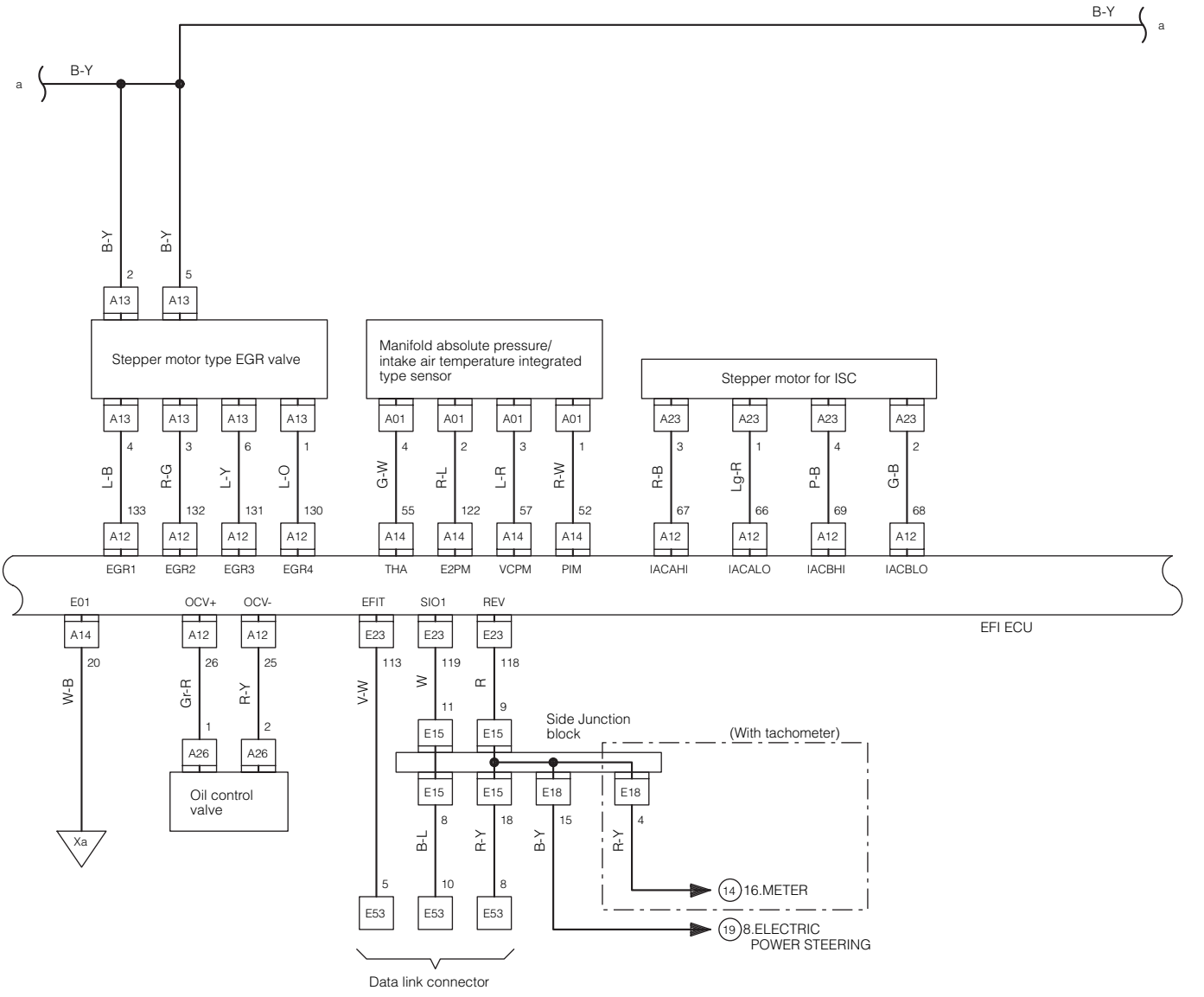
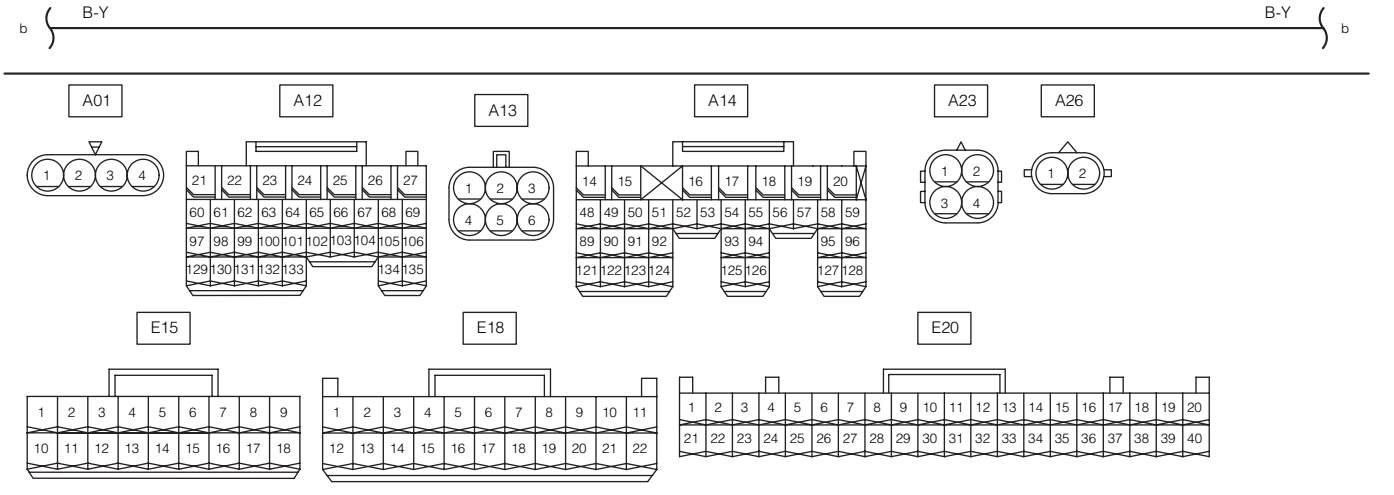
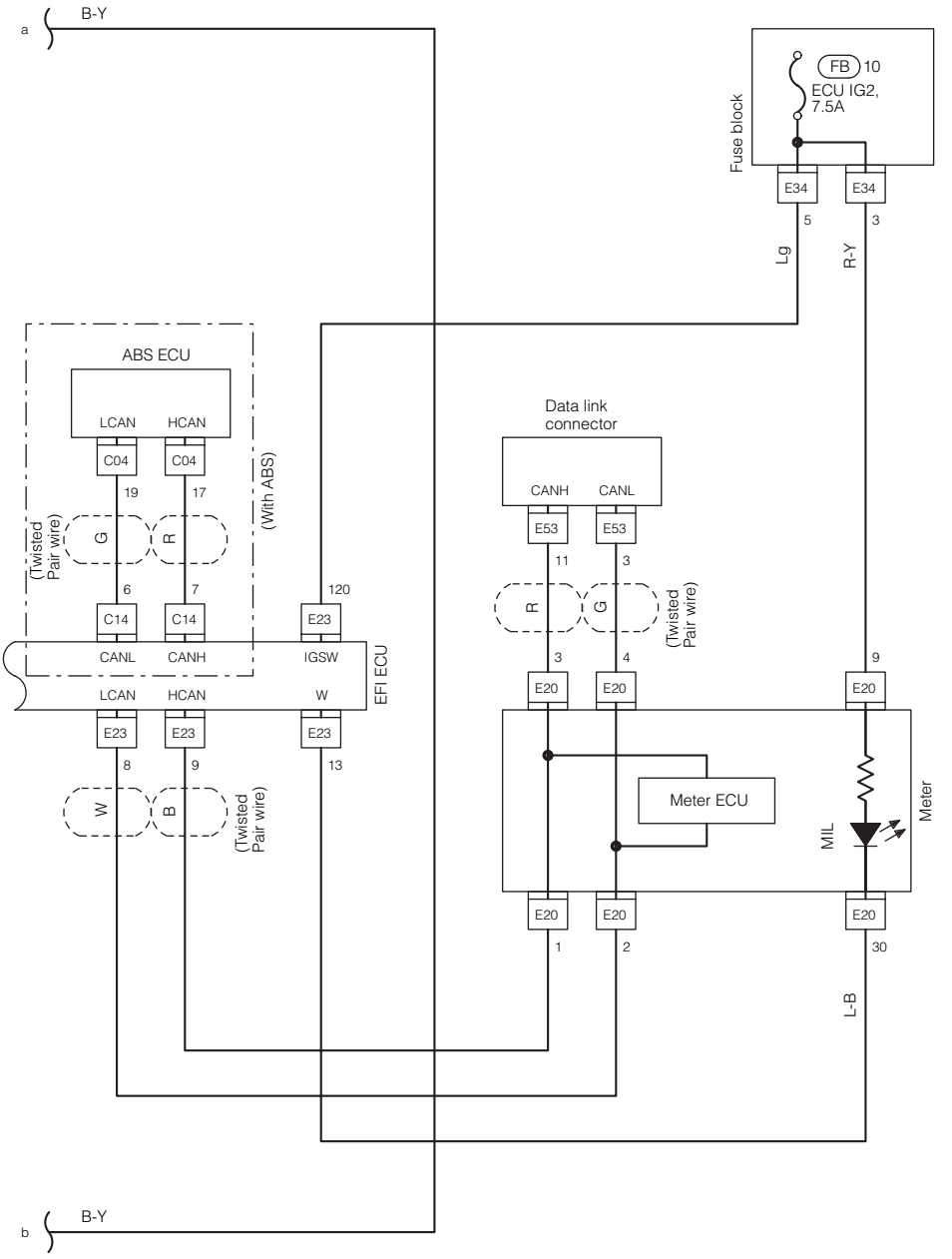
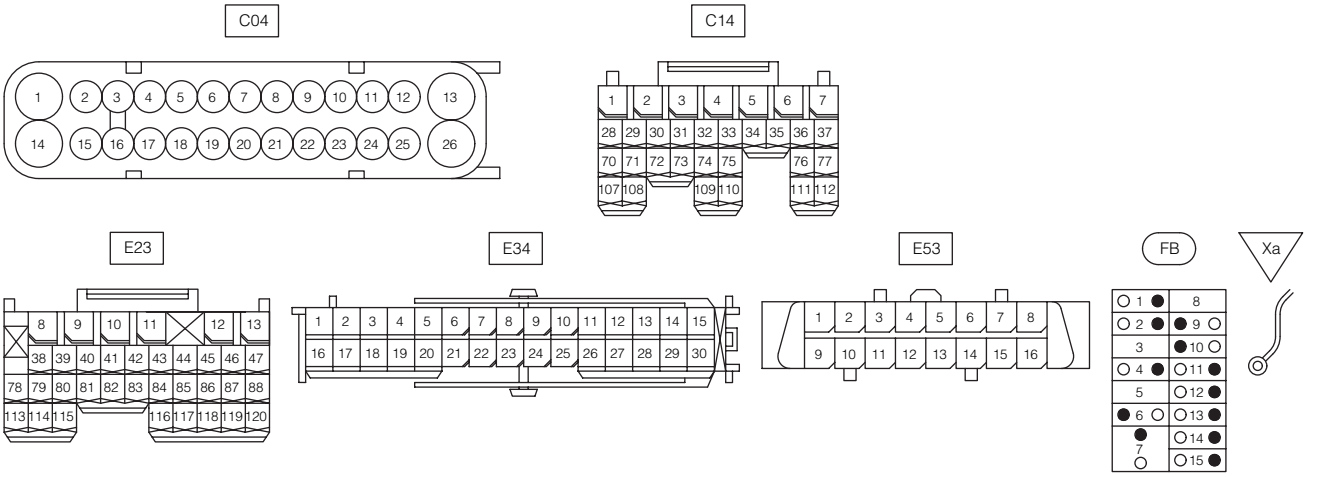

Fuel pump relay
EFI main relay
FA 9
EFI, 15A
Relay block
Fuse block
F23 4
F23 2
F23 1
F23 3
F22 2
F22 4
F22 1
F22 3
L-W
B-Y
O14
C27
E34
E33
E34
C27
5
9
19
13
15
22
W-B
R-W
B-W
B-R
V
B-Y
4
3
O25
O25
AE1
3
Xj
M
Fuel pump motor
35
38
39
27
C14
E23
E23
A12
EFI ECU
FC1
BAT
MRO
+B
A18
A19
A20
A02
Injector NO.1
Injector NO.2
Injector NO.3
Purge VSV
W-G
W-L
W-R
B-W
24
23
22
16
#10
#20
#30
PRG
a
b
E1
N1+
N1-
N2+
N2-
KNK
OX2
OXH2
OX1
OXH1
VC
VTH
E2
THW
A14
125
59
128
58
127
121
18
14
123
15
56
53
19
54
Gr
R
W
W
O
B
B
L
R
R-W
G-O
Lg
Br
V
A06
A06
A05
A05
A24
A17
A17
A16
A16
A08
A08
A07
Crank angle sensor
Cam position sensor
Knock sensor
Rear oxygen sensor
Front oxygen sensor
Linear throttle sensor
Water temp. sensor
(EU,AUS,Hong Kong and Singapore specification)
10
9
8
1
A09
W-B
Xa
A14
A16
A17
A18
A19
A20
A24
A25
A29
E23
E33
E34
F22
F23


B-Y
a
B-Y
a
B-Y
2
B-Y
5
A13
A13
Stepper motor type EGR valve
Manifold absolute pressure/ intake air temperature integrated type sensor
Stepper motor for ISC
L-B
R-G
L-Y
L-O
G-W
R-L
L-R
R-W
R-B
Lg-R
P-B
G-B
EGR1
EGR2
EGR3
EGR4
THA
E2PM
VCPM
PIM
IACAHI
IACALO
IACBHI
IACBLO
EFI ECU
E01
OCV+
OCV-
EFIT
SIO1
REV
W-B
Gr-R
R-Y
V-W
W
R
Oil control valve
Xa
Side Junction block
(With tachometer)
B-L
R-Y
B-Y
R-Y
16.METER
8.ELECTRIC POWER STEERING
Data link connector


b
B-Y
B-Y
b
A01
A12
A13
A14
A23
A26
E15
E18
E20





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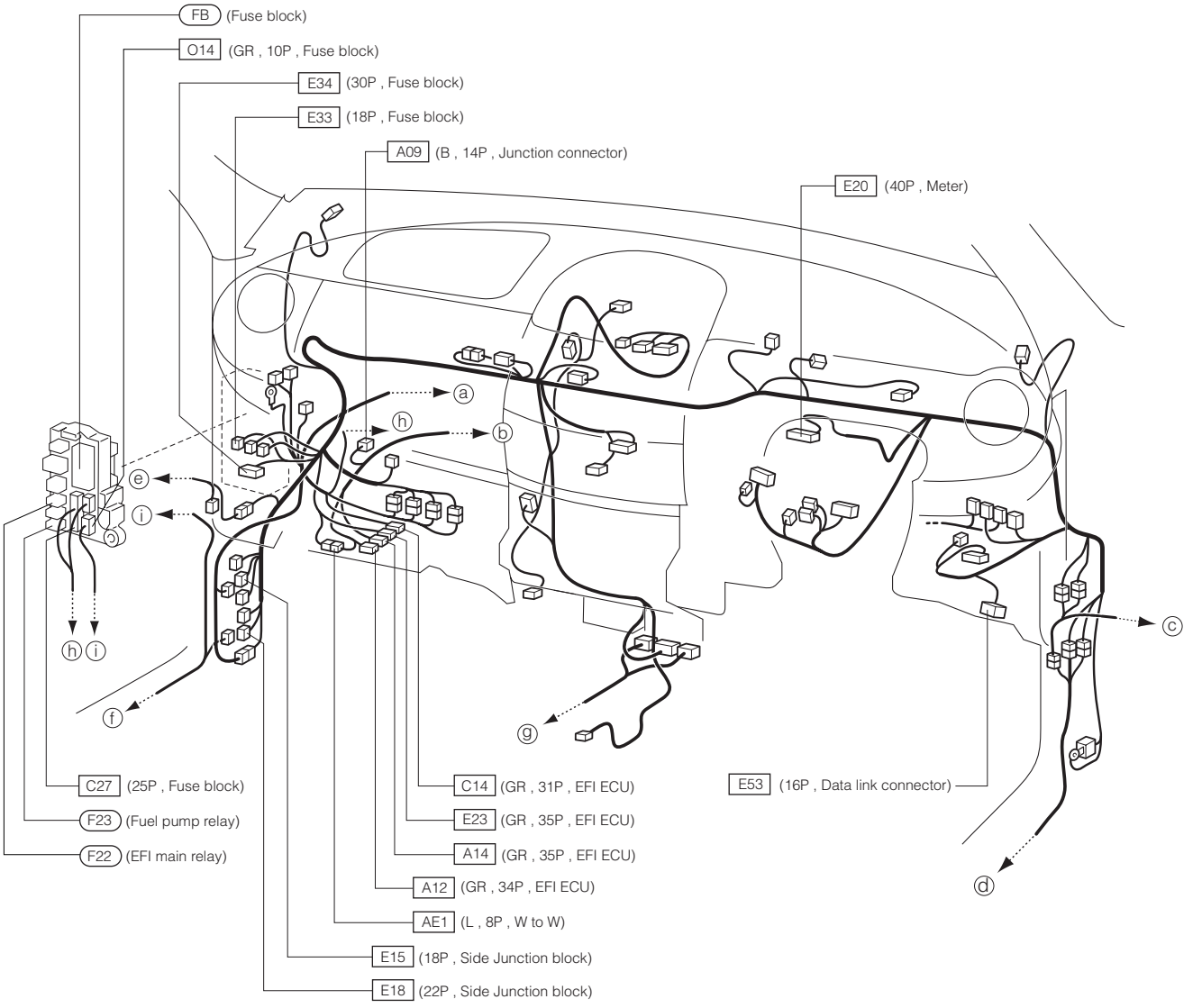
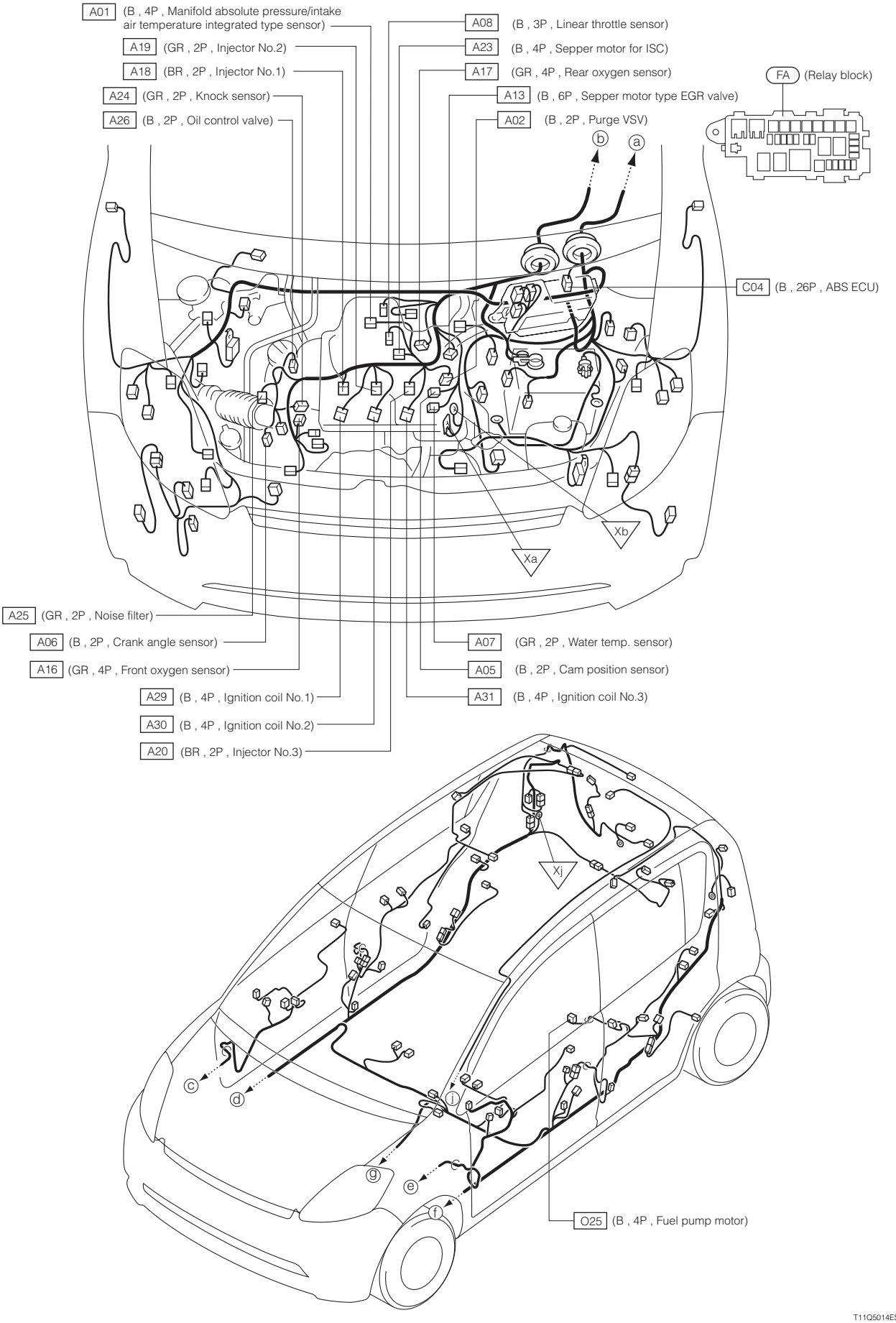

FB (Fuse block)
O14 (GR , 10P , Fuse block)
E34 (30P , Fuse block)
E33 (18P , Fuse block)
A09 (B , 14P , Junction connector)
E20 (40P , Meter)
a
b
c
d
e
f
g
h
i
C27 (25P , Fuse block)
F23 (Fuel pump relay)
F22 (EFI main relay)
C14 (GR , 31P , EFI ECU)
E23 (GR , 35P , EFI ECU)
A14 (GR , 35P , EFI ECU)
A12 (GR , 34P , EFI ECU)
AE1 (L , 8P , W to W)
E15 (18P , Side Junction block)
E18 (22P , Side Junction block)
E53 (16P , Data link connector)



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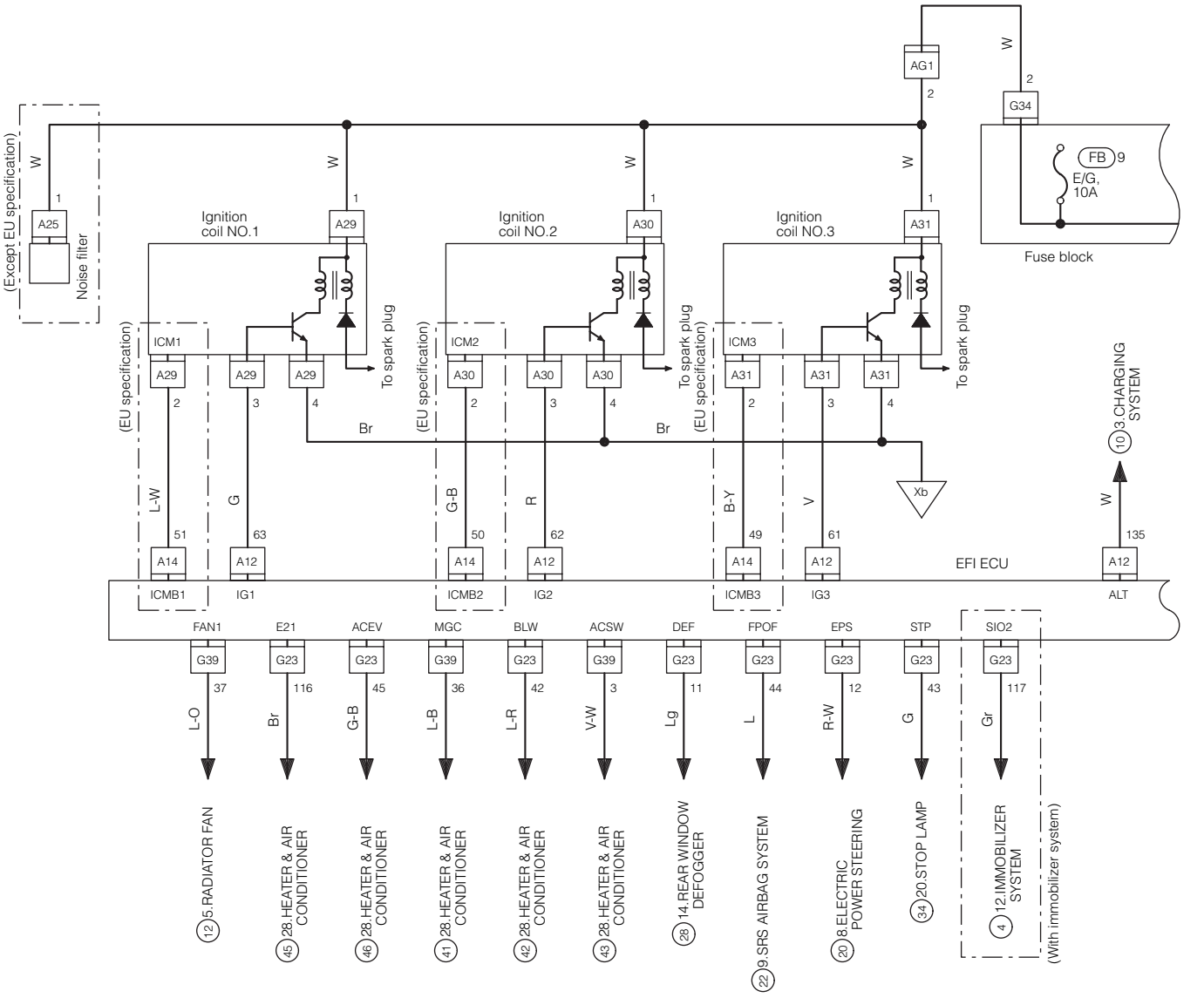
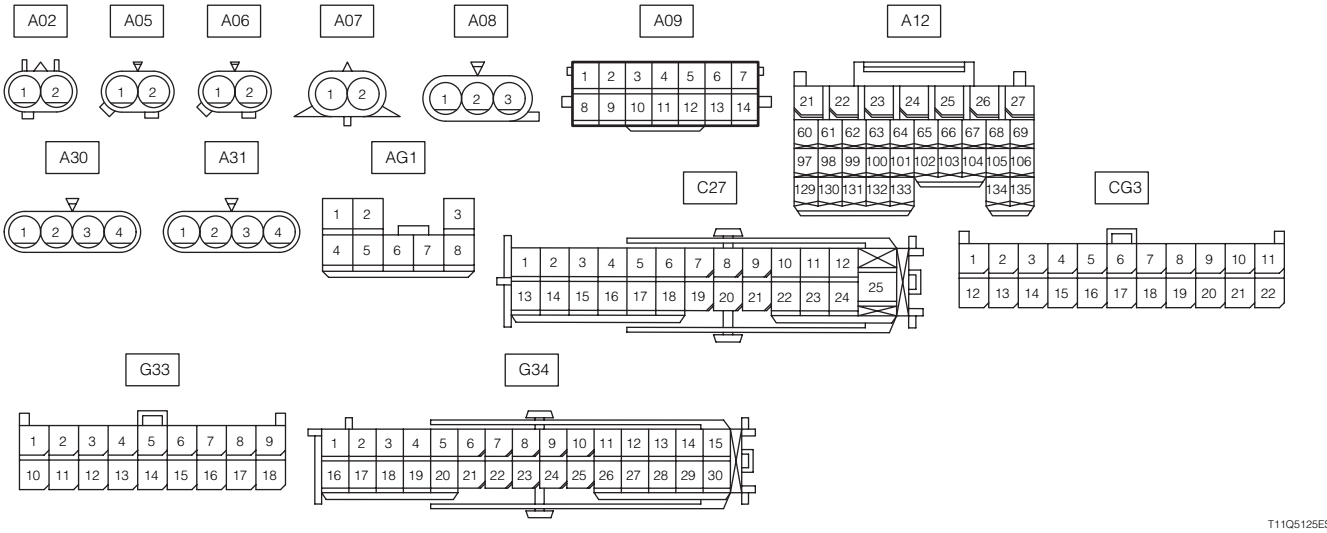
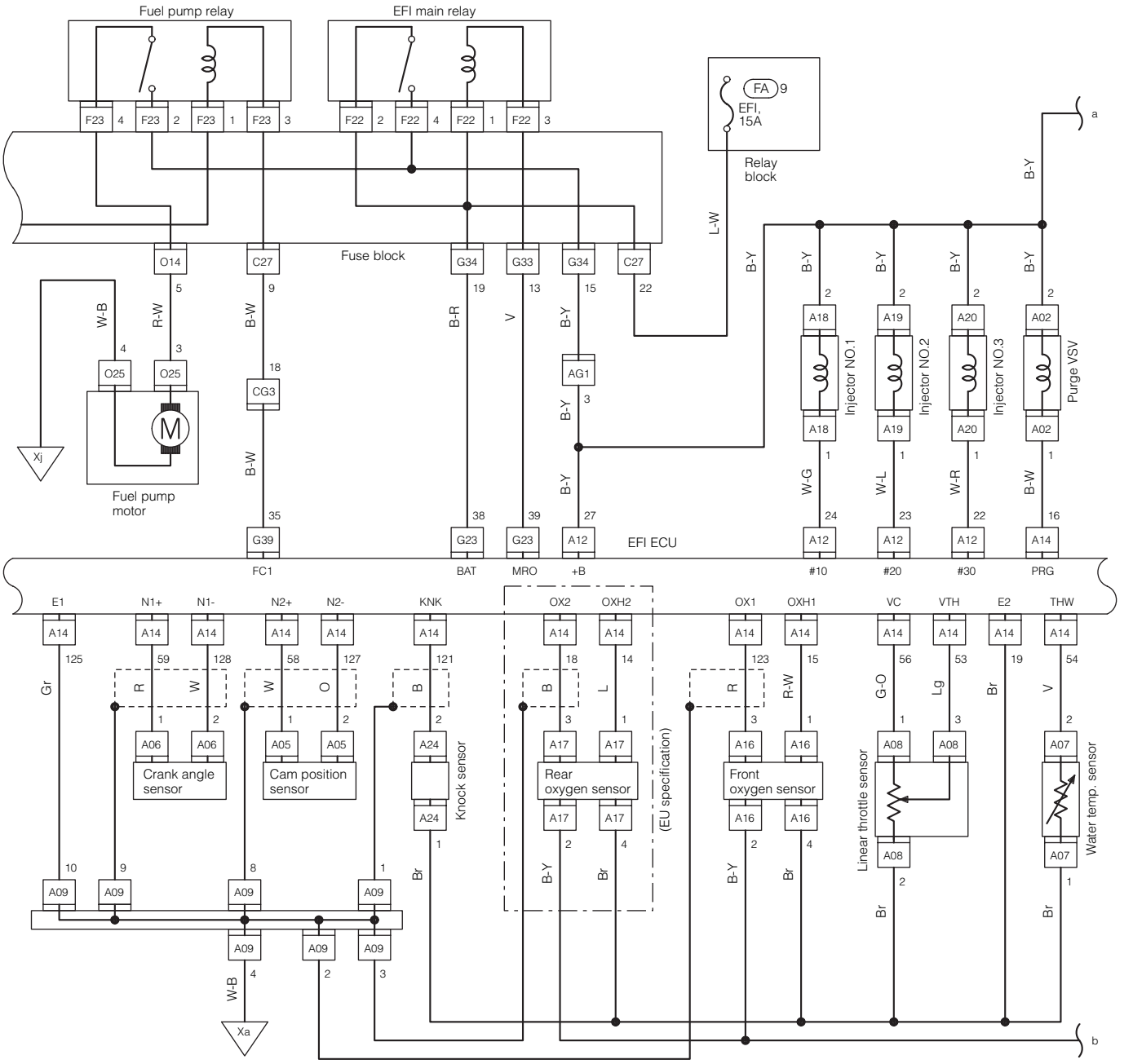
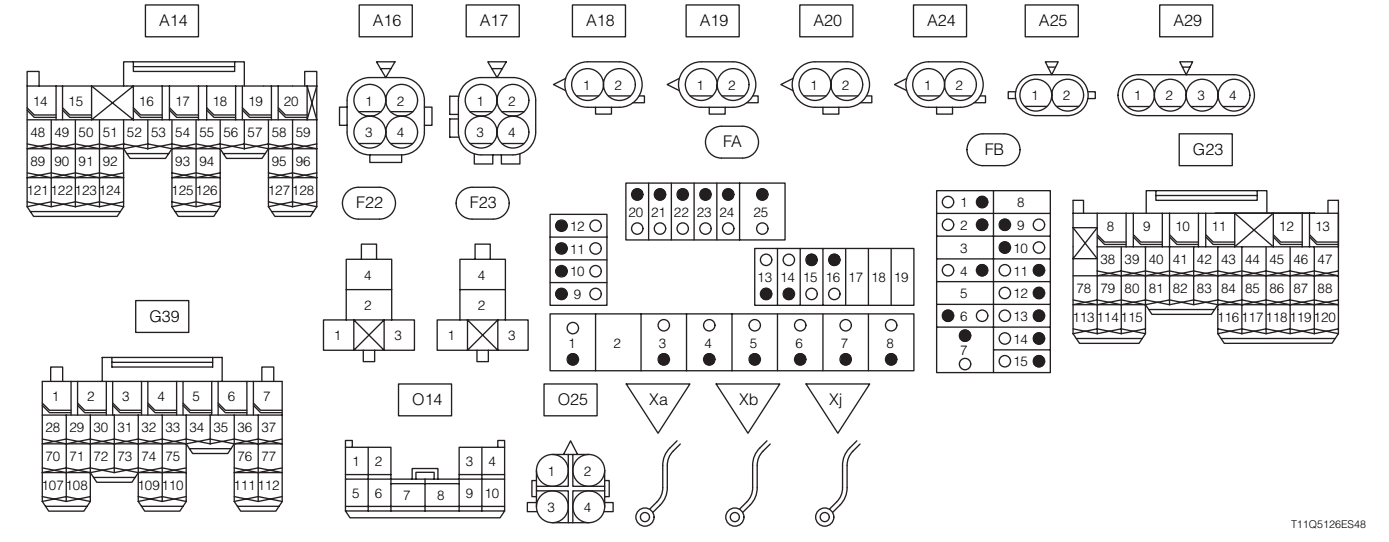
4-2 LHD VEHICLE(1KR-FE ENGINE)



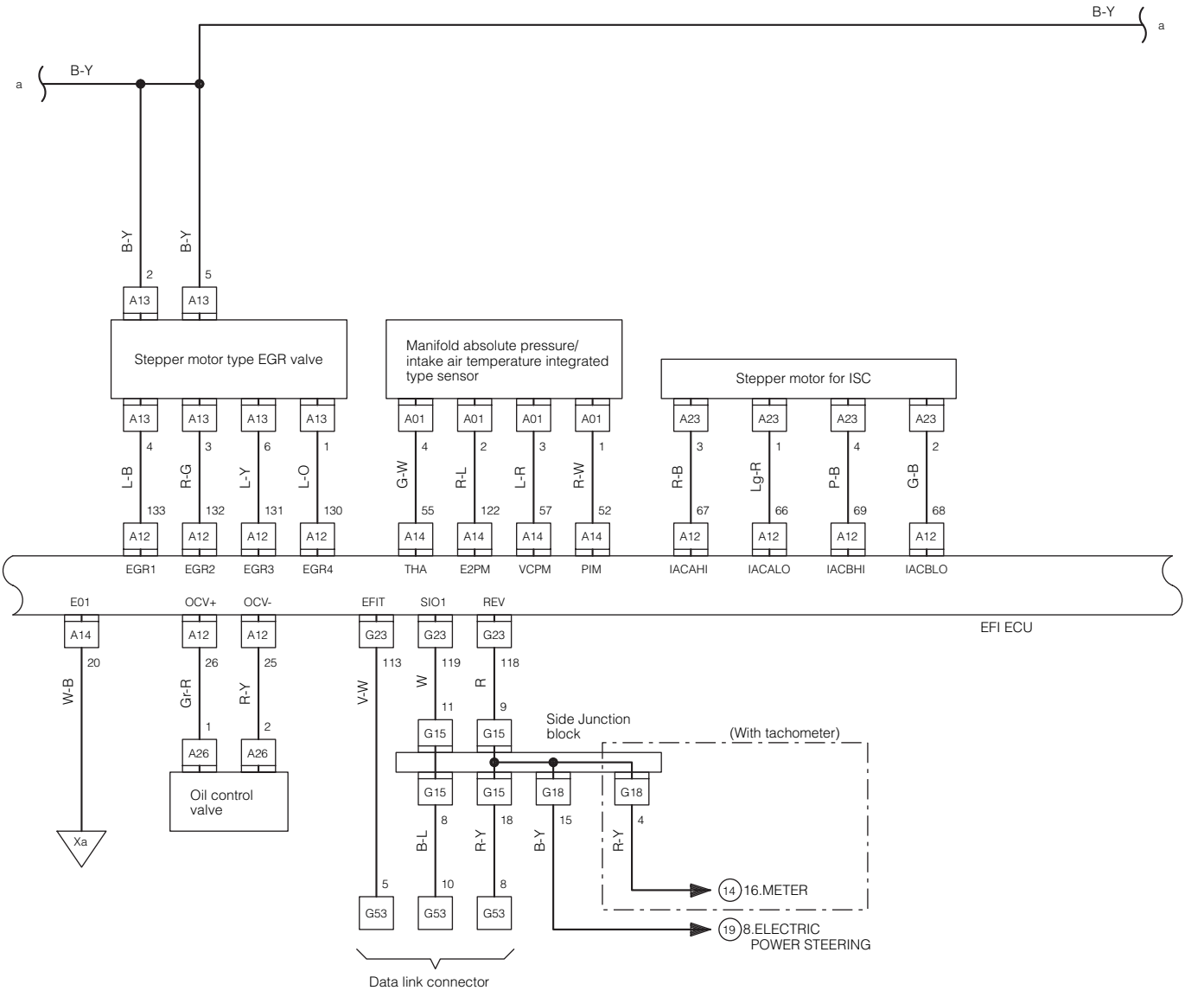


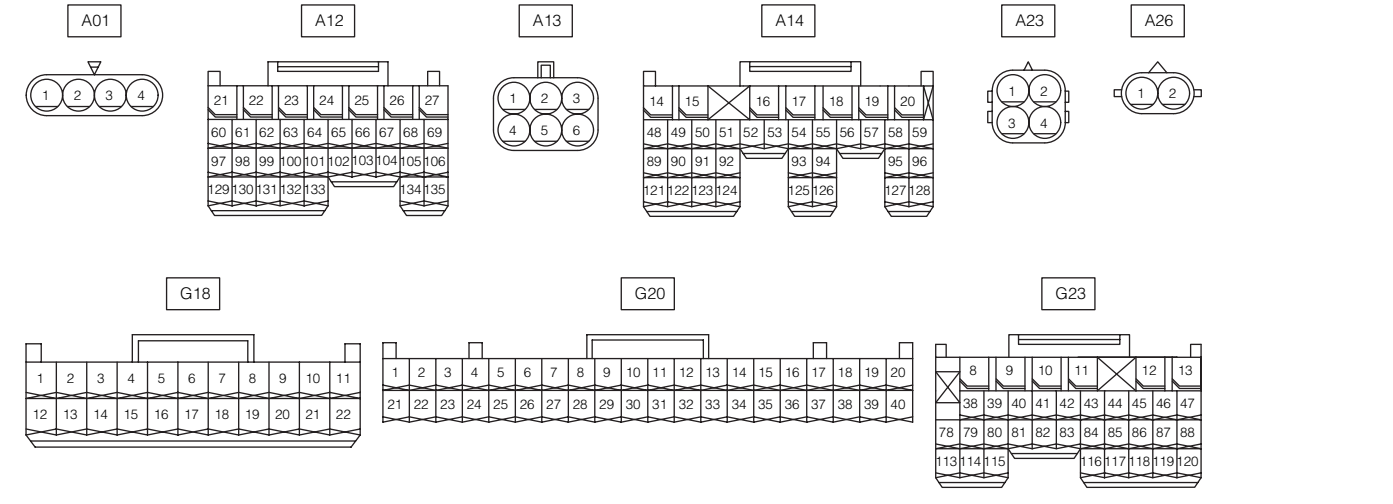
T11Q5125ES48



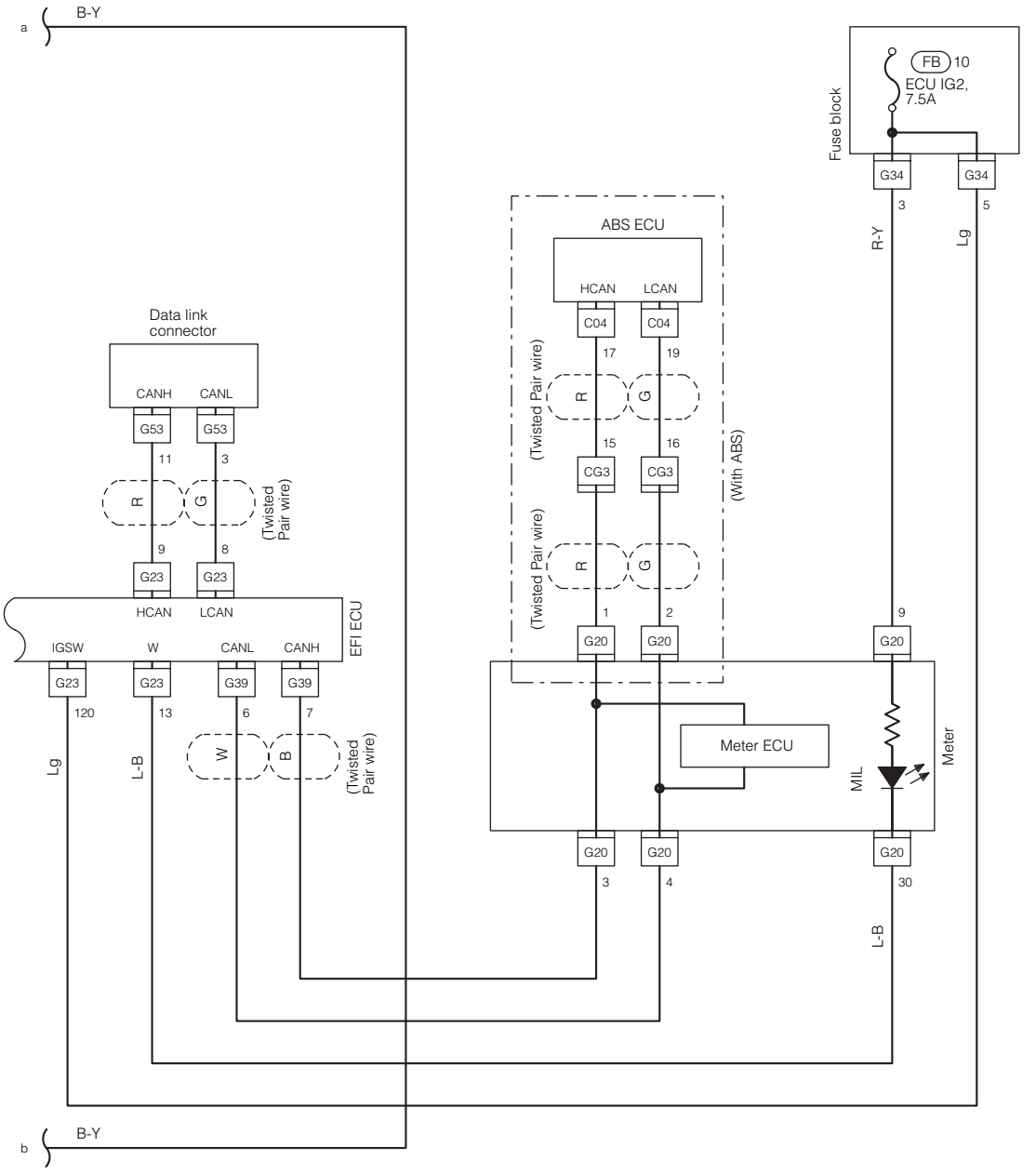


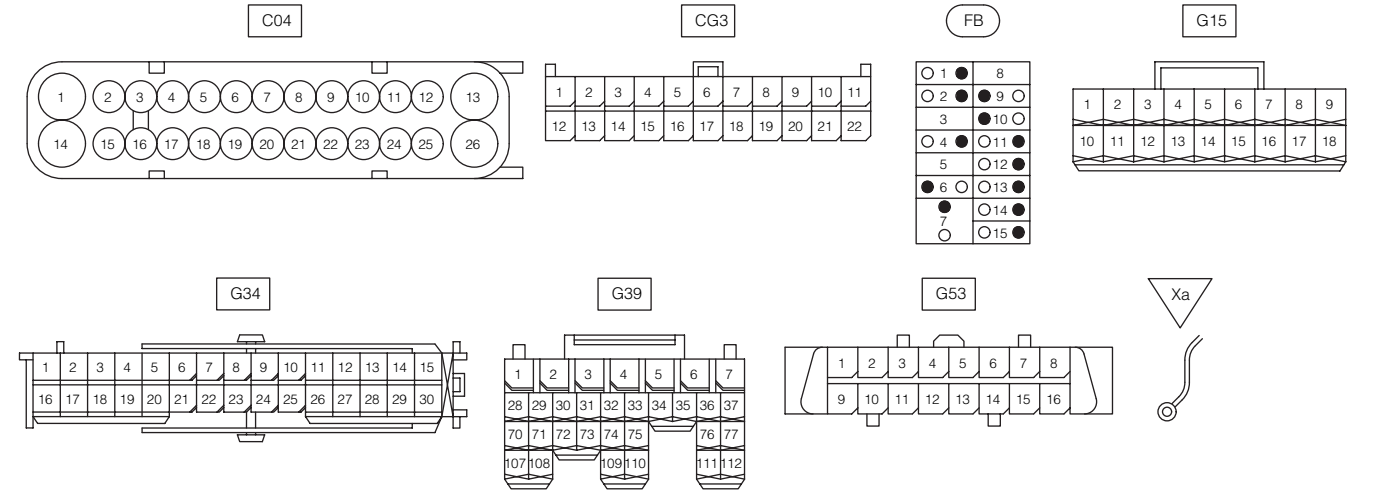
T11Q5126ES48

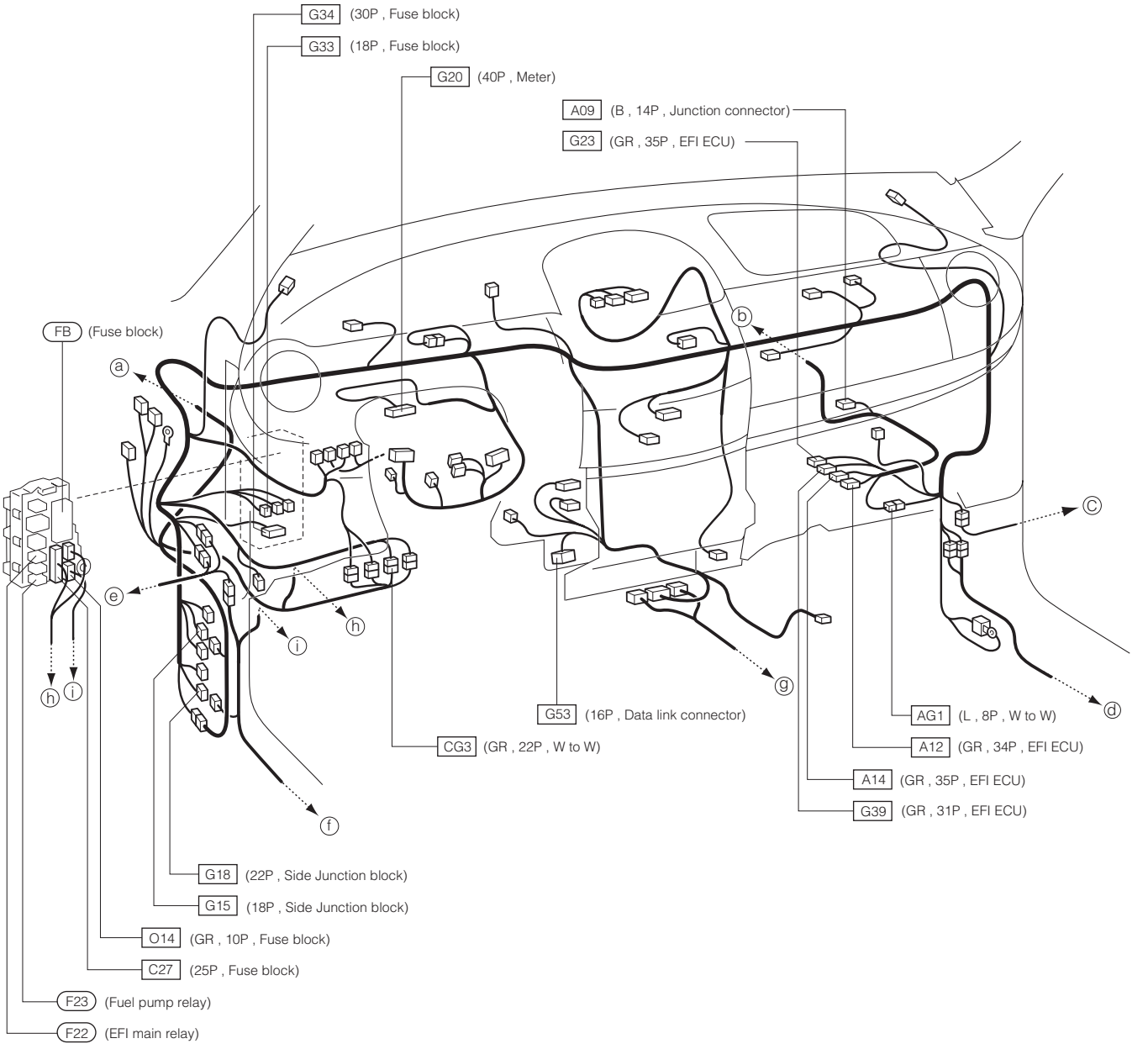




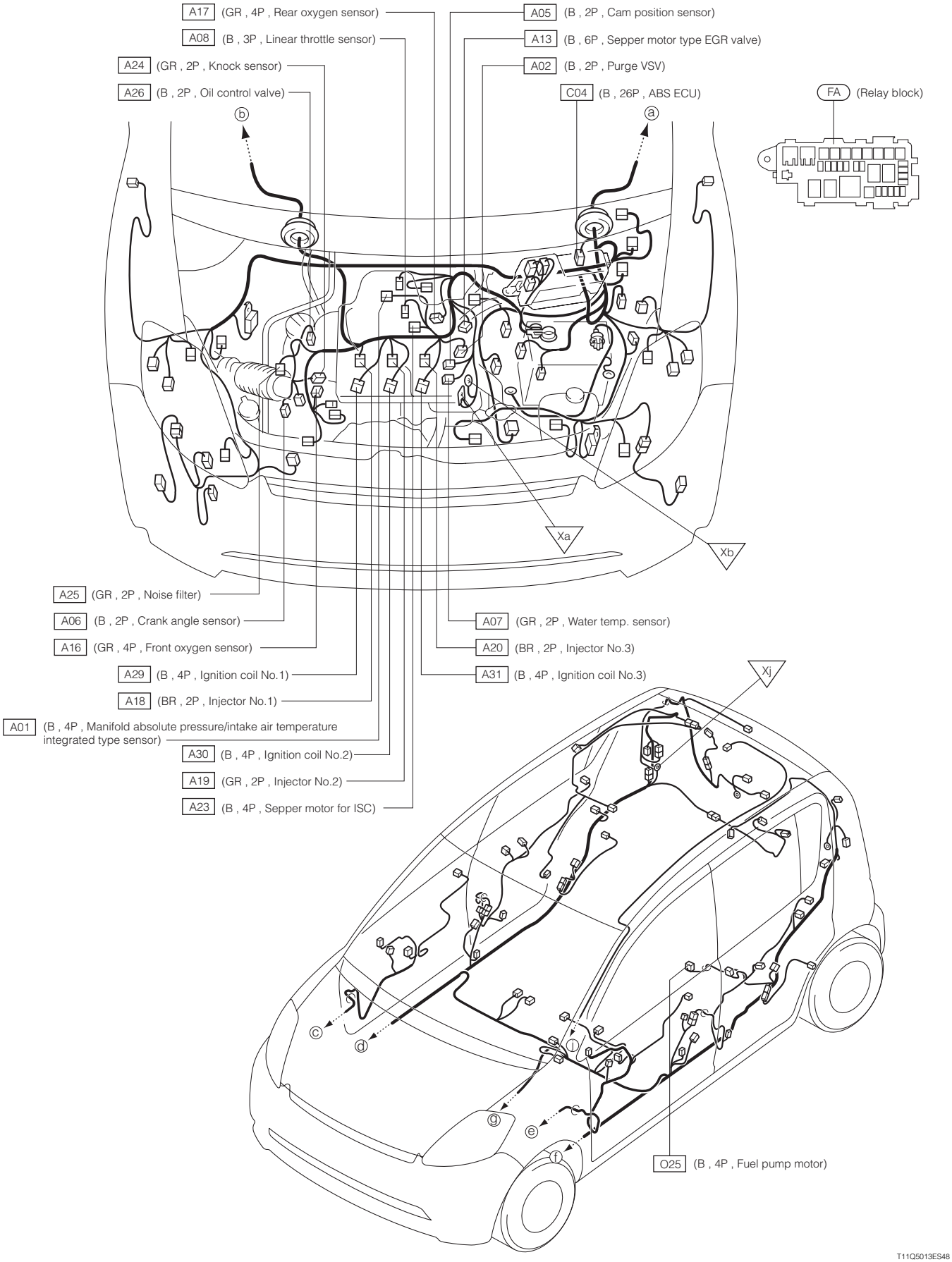
T11Q5127ES48


a
B-Y
b
B-Y
Fuse block
FB 10
ECU IG2, 7.5A
G34
G34
3
5
R-Y
Lg
ABS ECU
HCAN
LCAN
C04
C04
17
19
(Twisted Pair wire)
R
G
15
16
CG3
CG3
(With ABS)
1
2
G20
G20
9
G20
Data link connector
CANH
CANL
G53
G53
11
3
9
8
G23
G23
HCAN
LCAN
EFI ECU
IGSW
W
CANL
CANH
G23
G23
G39
G39
120
13
6
7
Lg
L-B
W
B
Meter ECU
MIL
Meter
G20
G20
G20
3
4
30
L-B


C04
CG3
FB
G15
G34
G39
G53
Xa

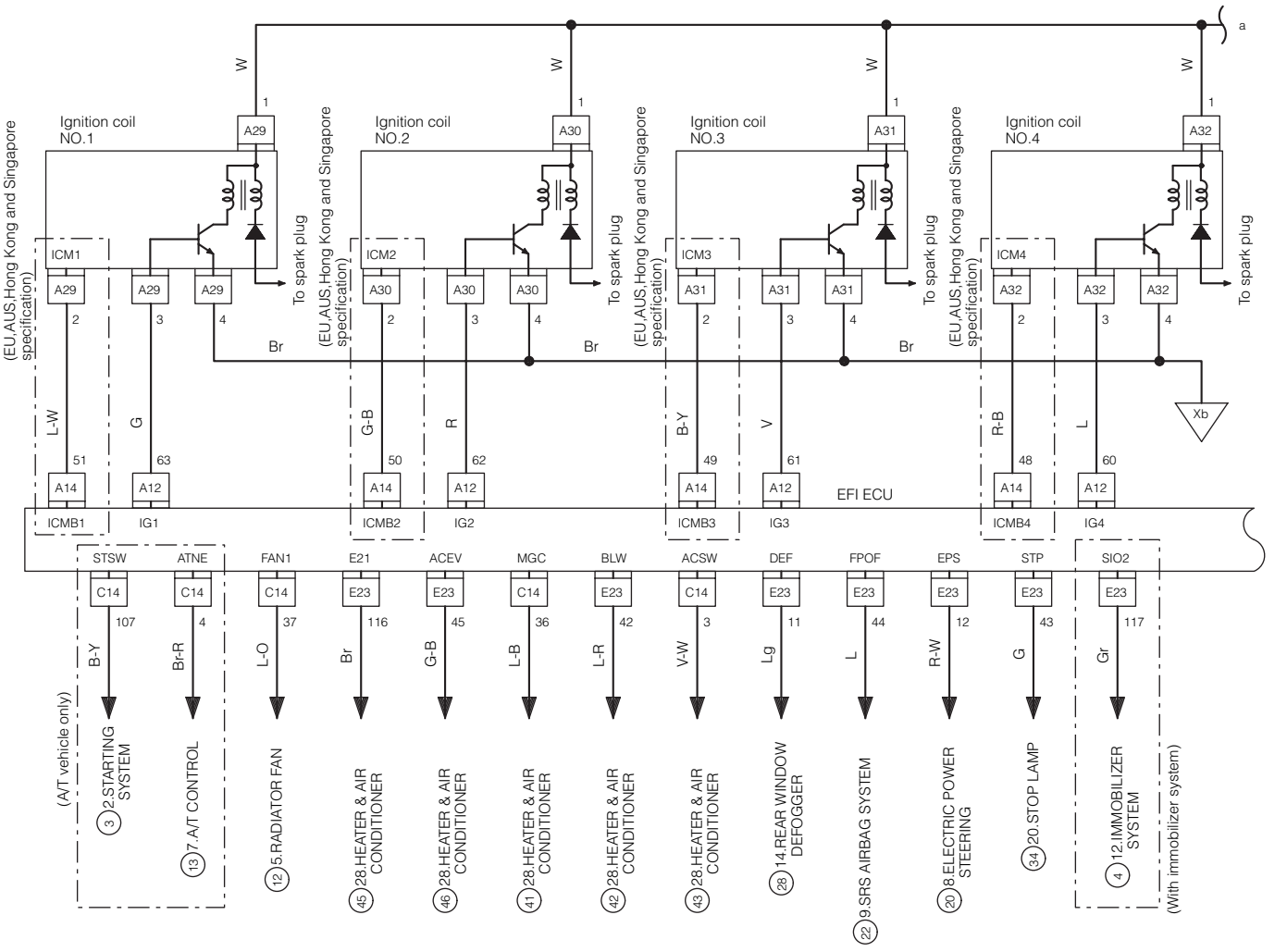


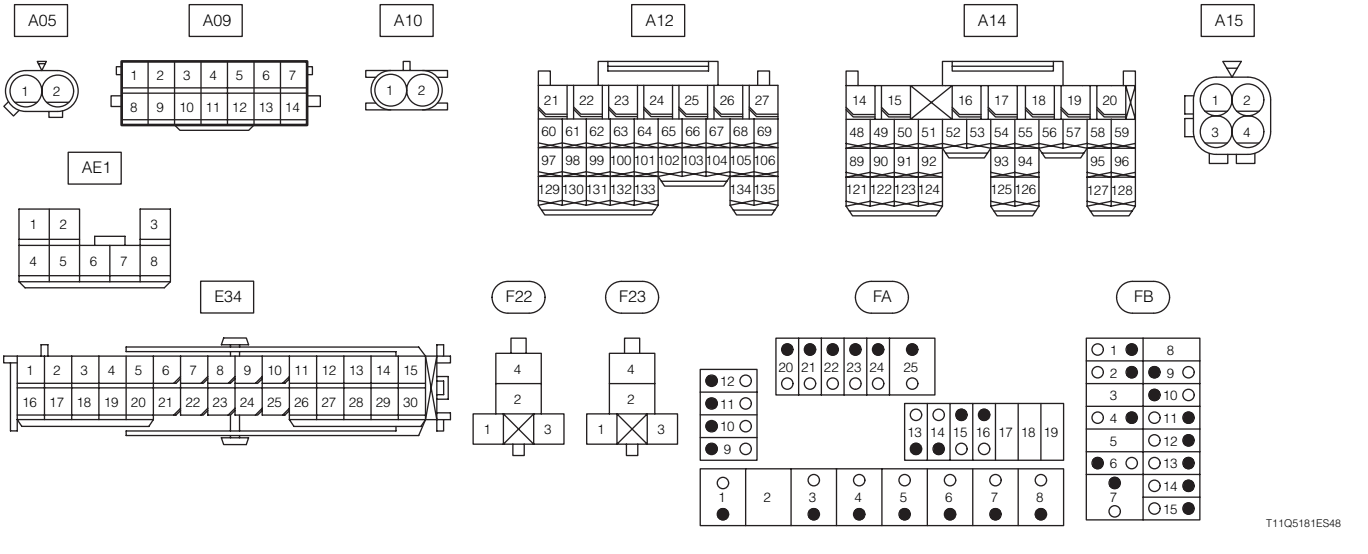
T11Q5015ES48



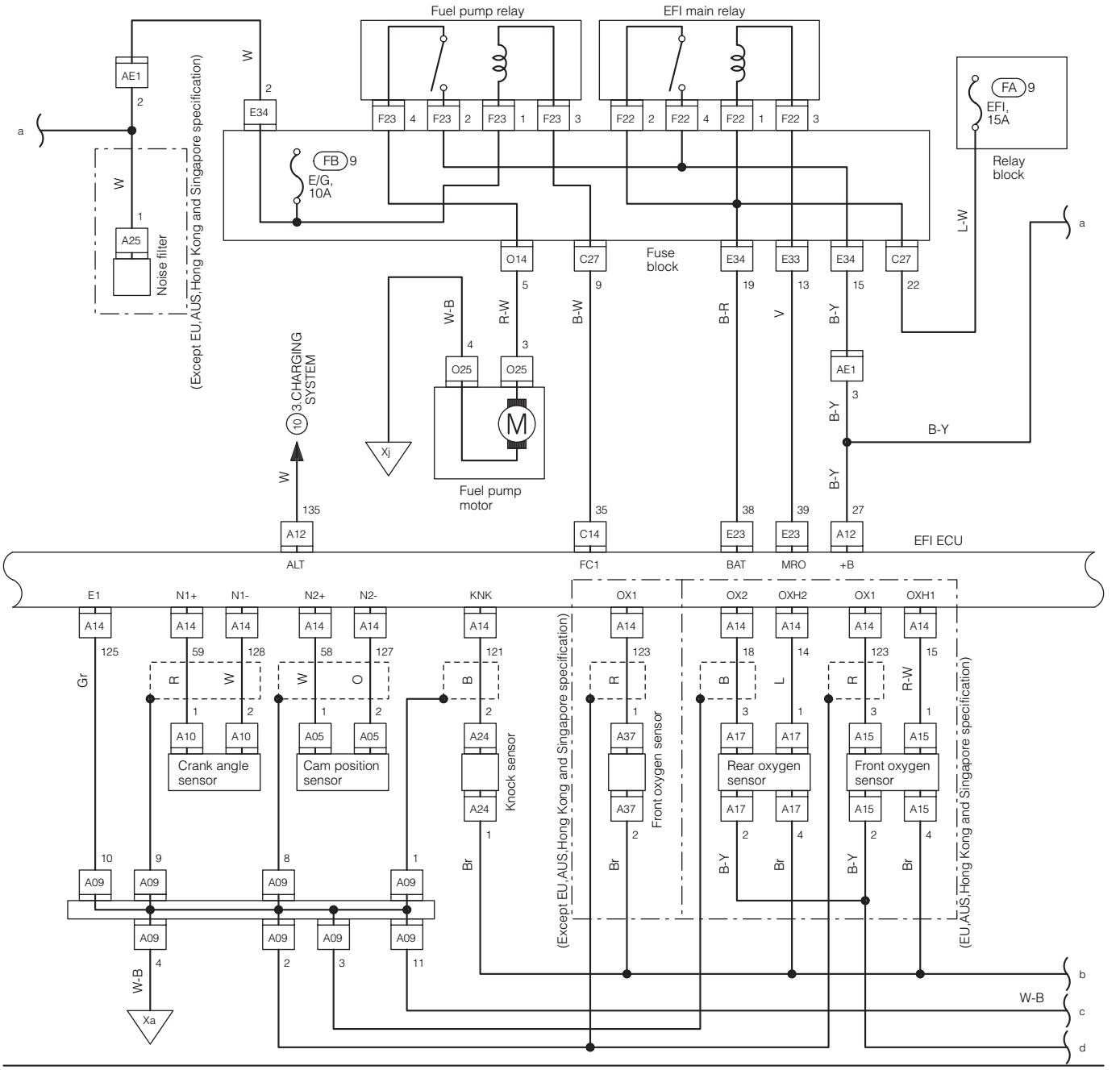
T11Q5013ES48

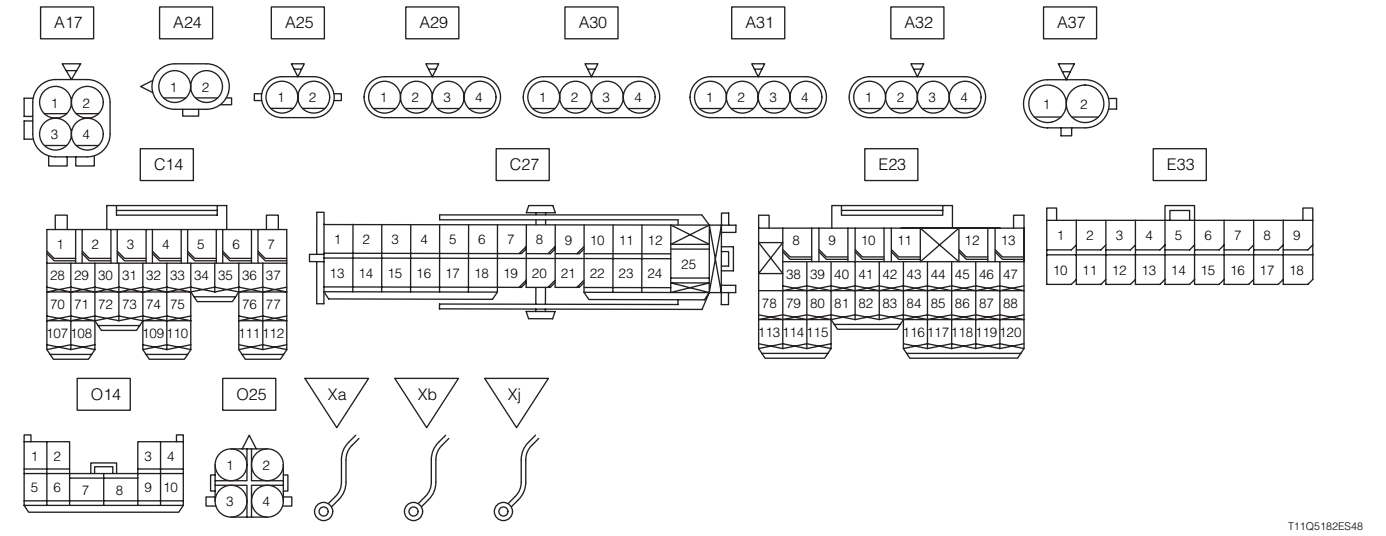
4-3 RHD VEHICLE(K3-VE ENGINE)



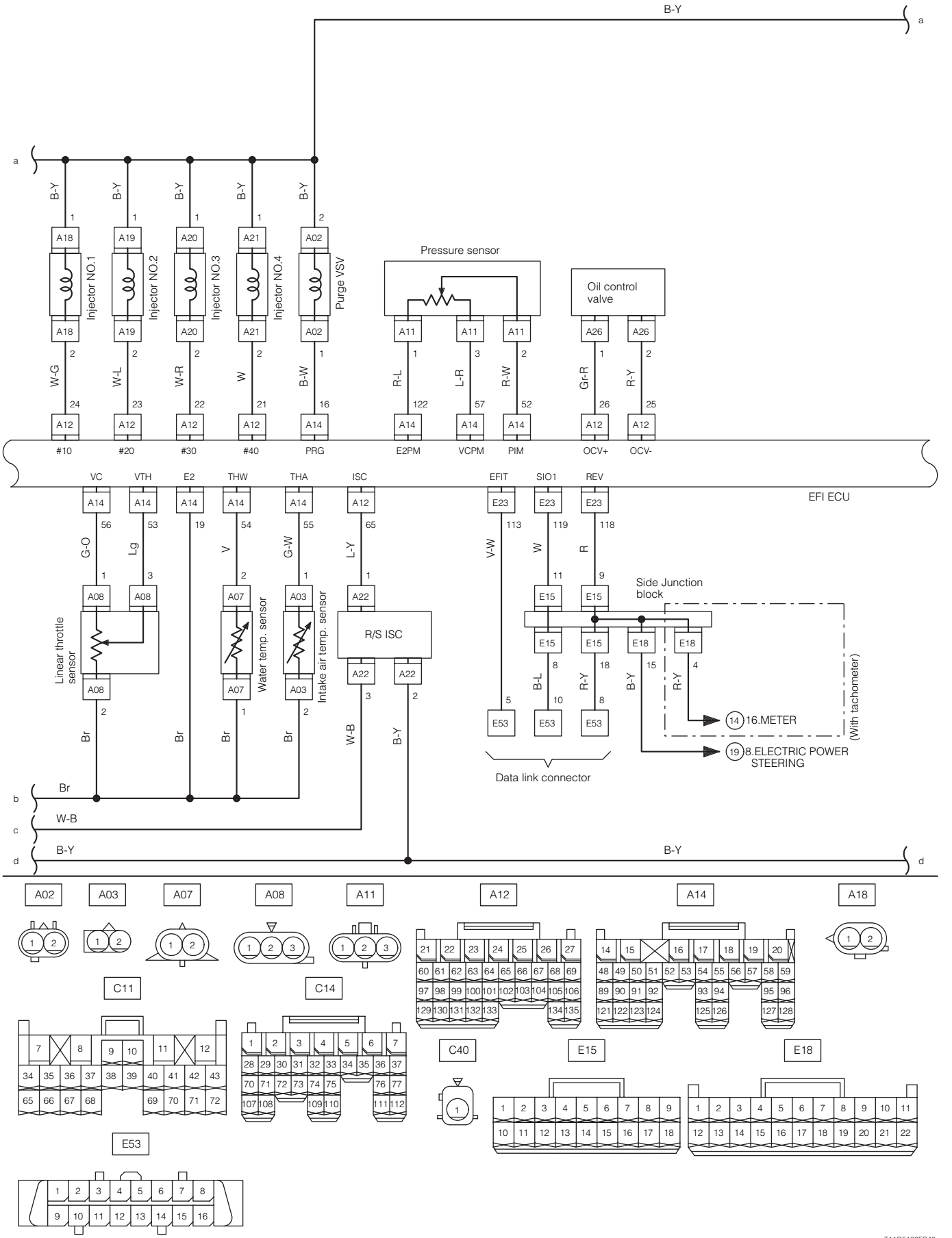


T11Q5181ES48

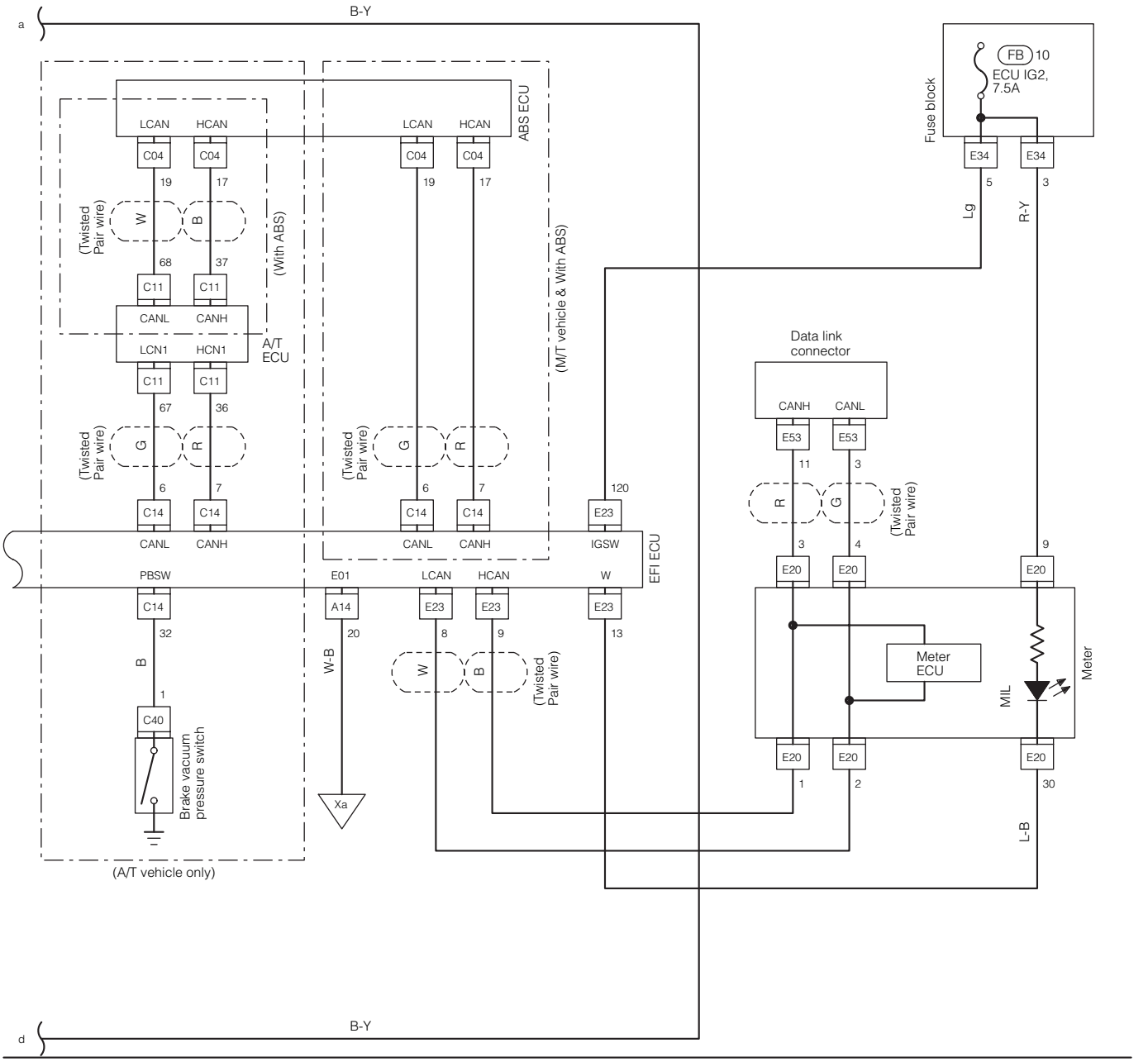


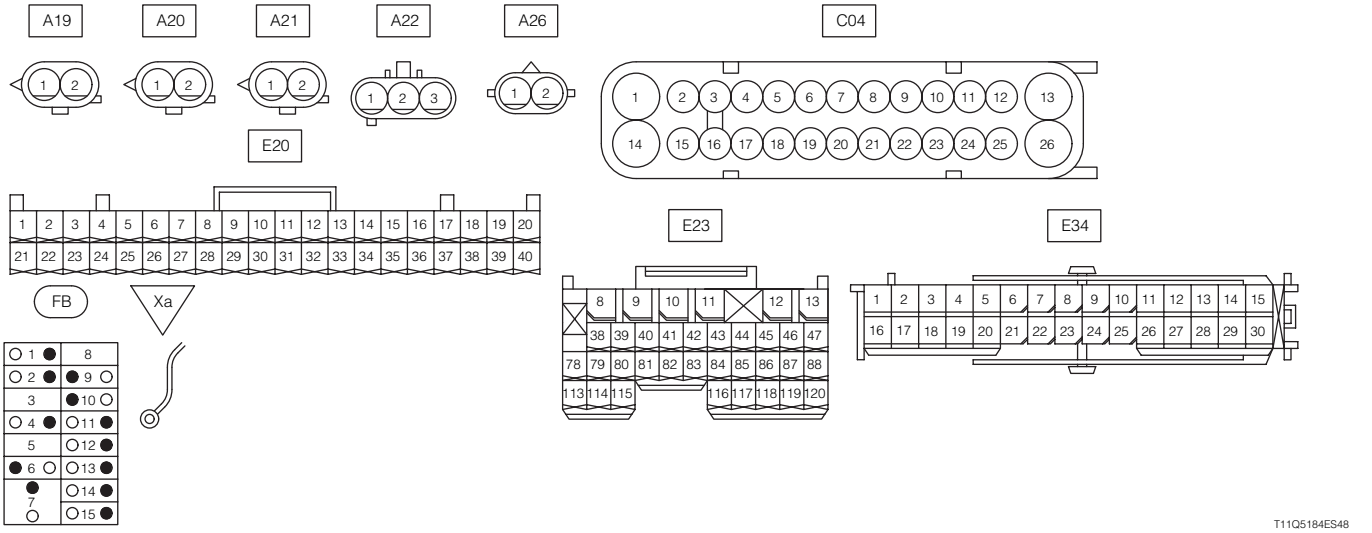


T11Q5182ES48

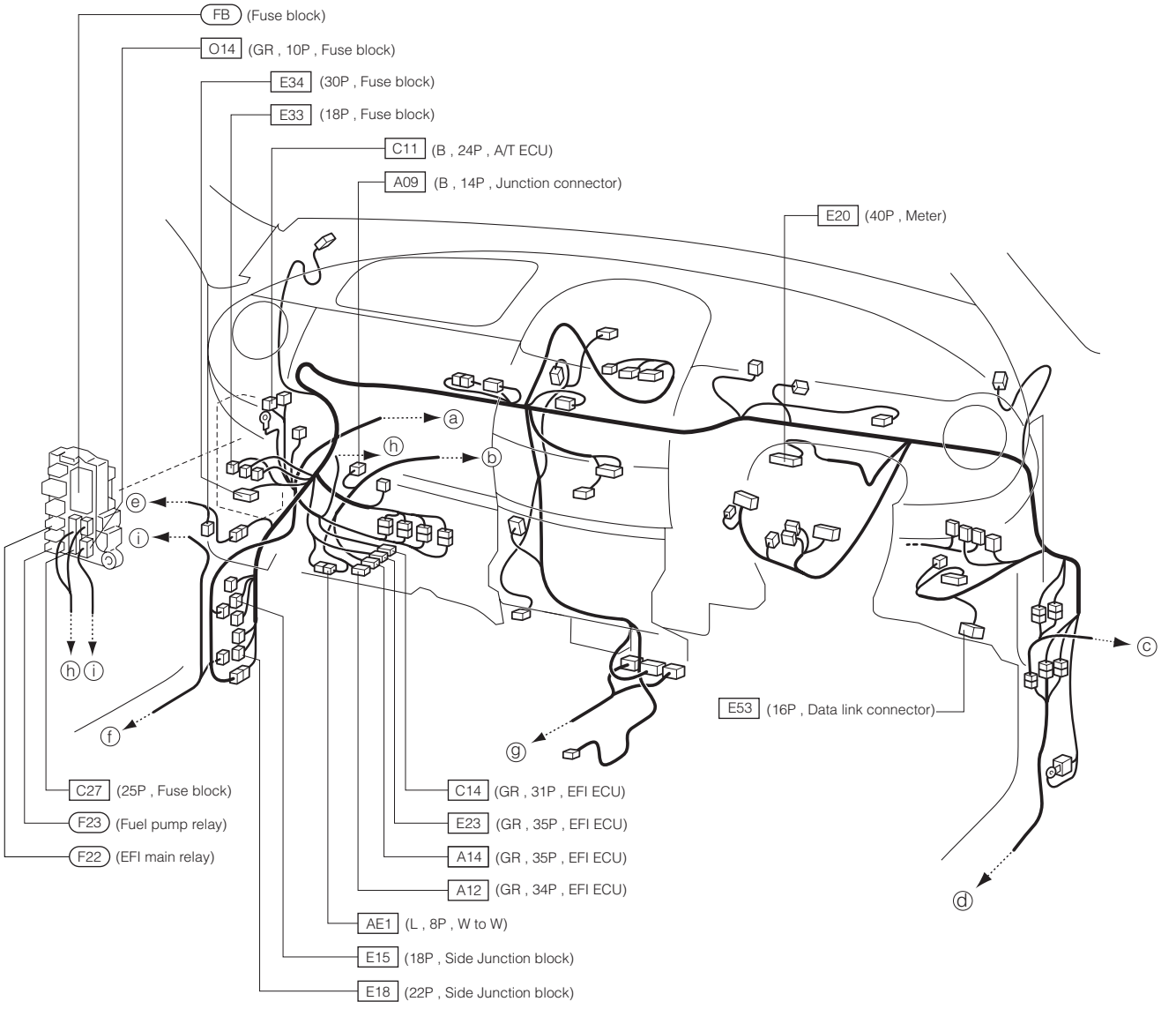


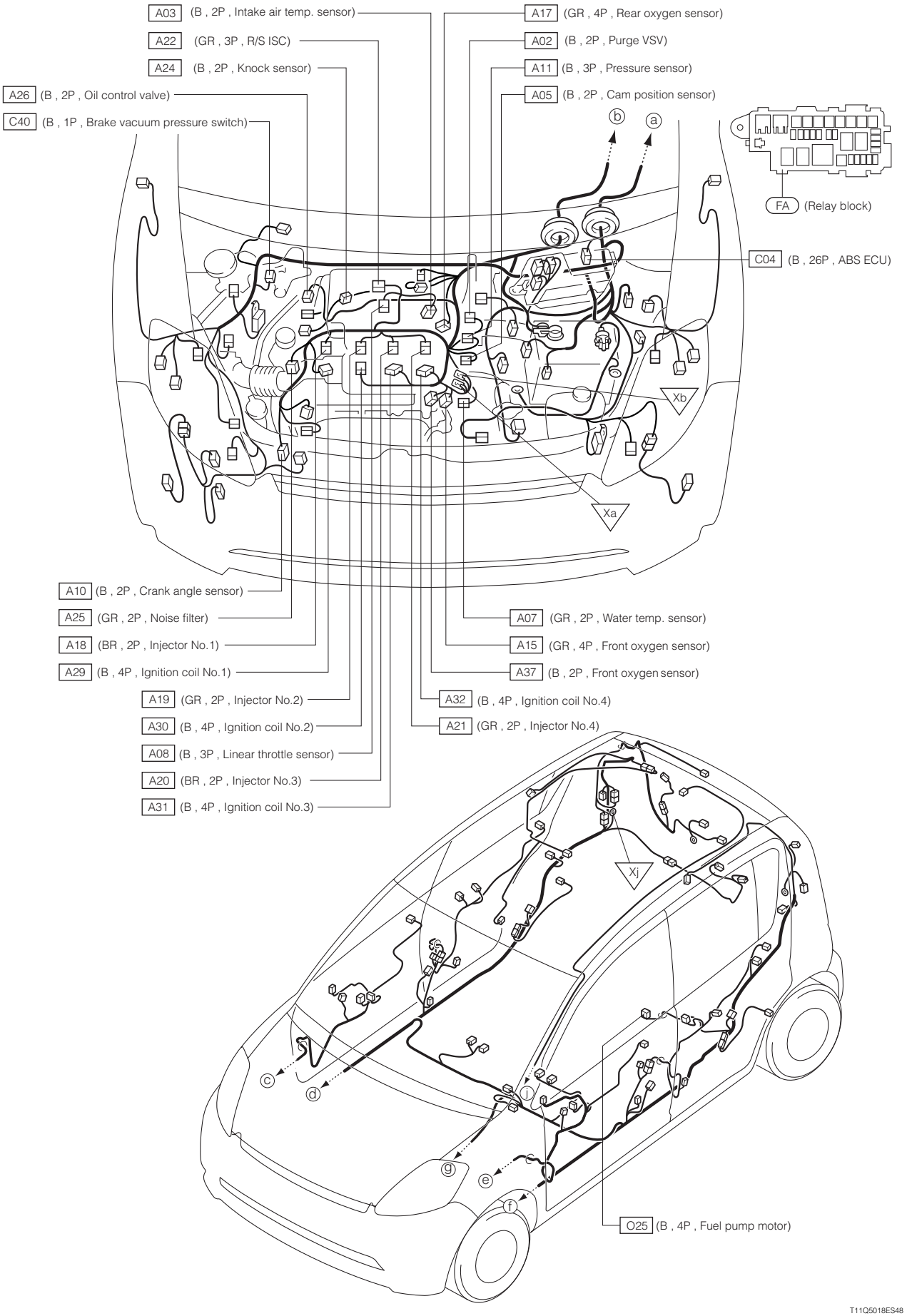
T11Q5183ES48





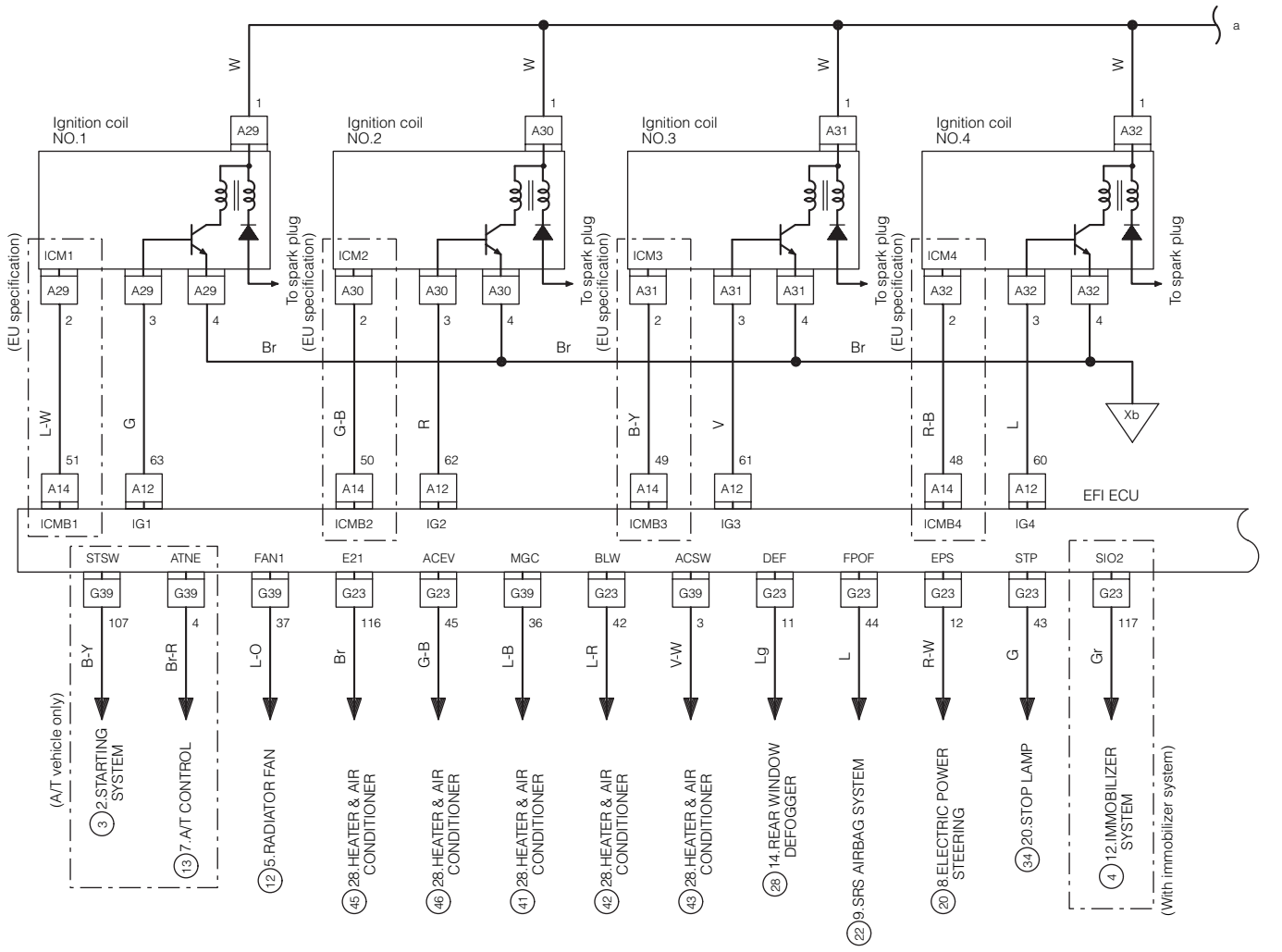
T11Q5184ES48

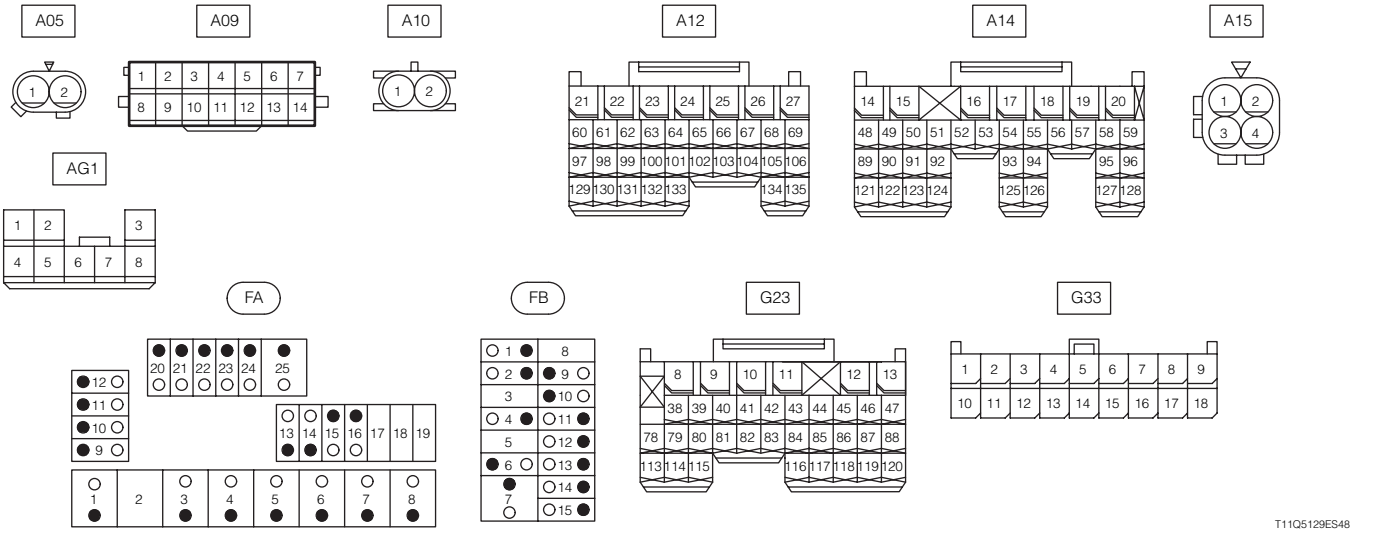

FB (Fuse block)
O14 (GR , 10P , Fuse block)
E34 (30P , Fuse block)
E33 (18P , Fuse block)
C11 (B , 24P , A/T ECU)
A09 (B , 14P , Junction connector)
E20 (40P , Meter)
E53 (16P , Data link connector)
C27 (25P , Fuse block)
F23 (Fuel pump relay)
F22 (EFI main relay)
C14 (GR , 31P , EFI ECU)
E23 (GR , 35P , EFI ECU)
A14 (GR , 35P , EFI ECU)
A12 (GR , 34P , EFI ECU)
AE1 (L , 8P , W to W)
E15 (18P , Side Junction block)
E18 (22P , Side Junction block)
a
b
c
d
e
f
g
h
i
j



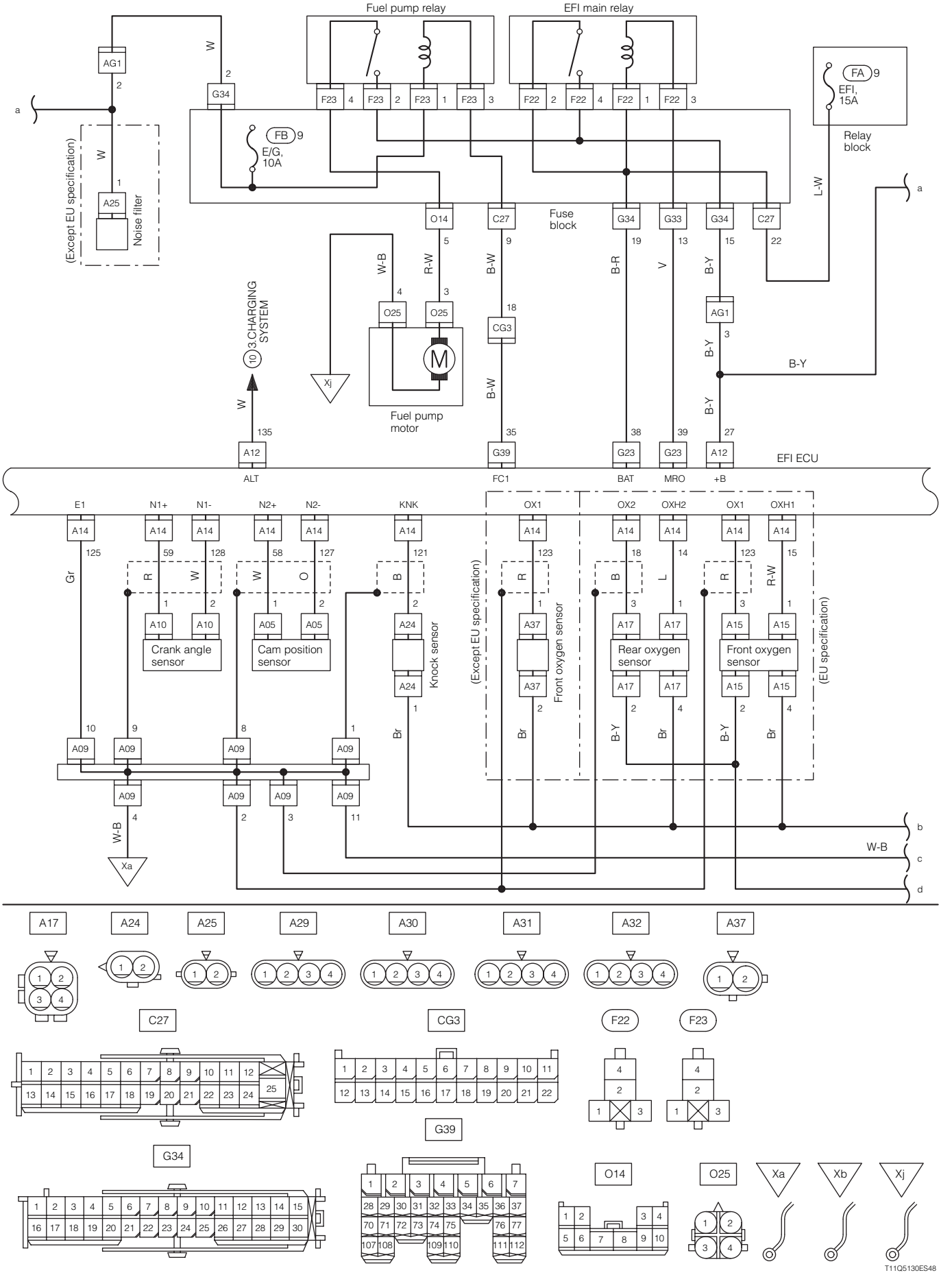
T11Q5018ES48

4-4 LHD VEHICLE(K3-VE ENGINE)





T11Q5129ES48



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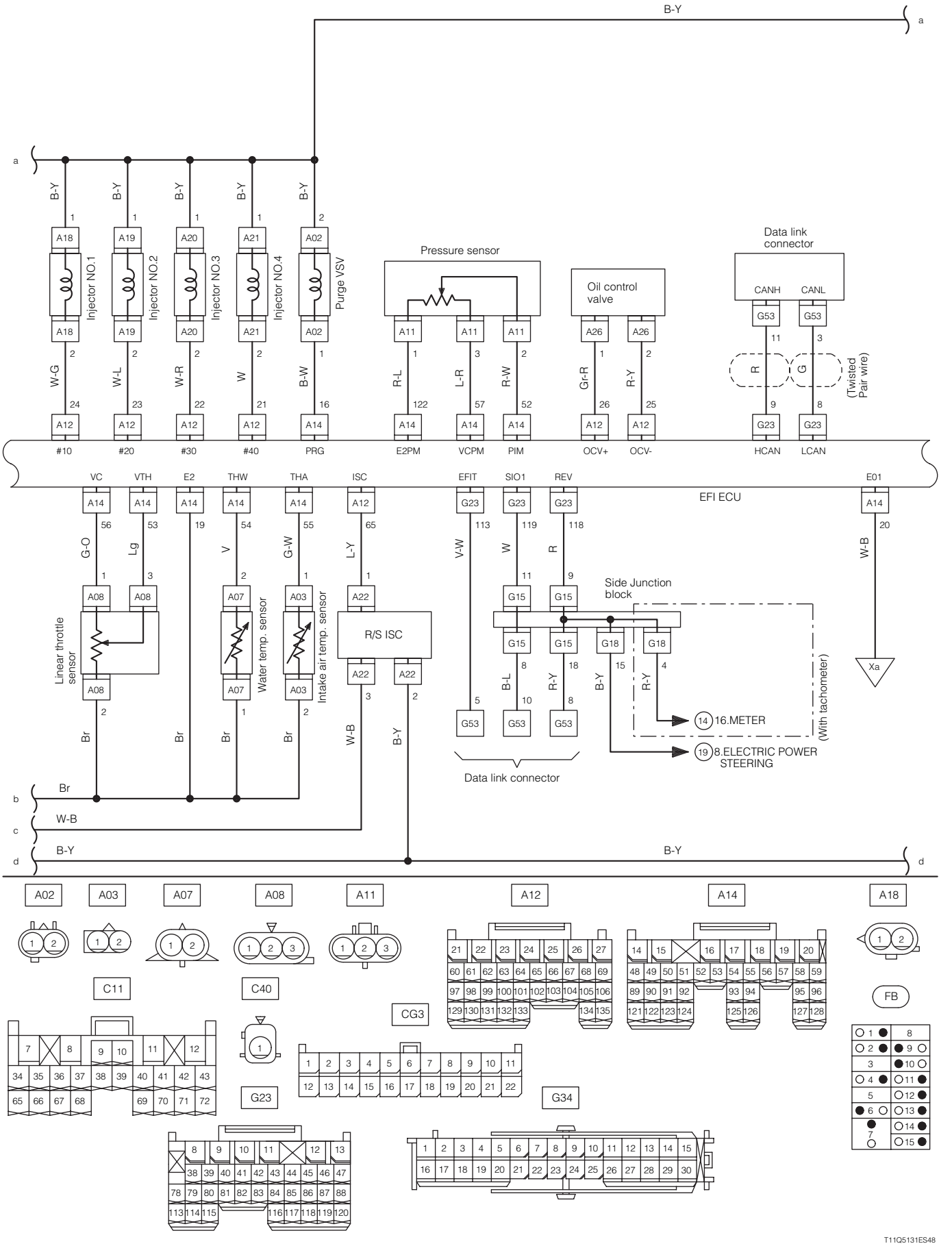
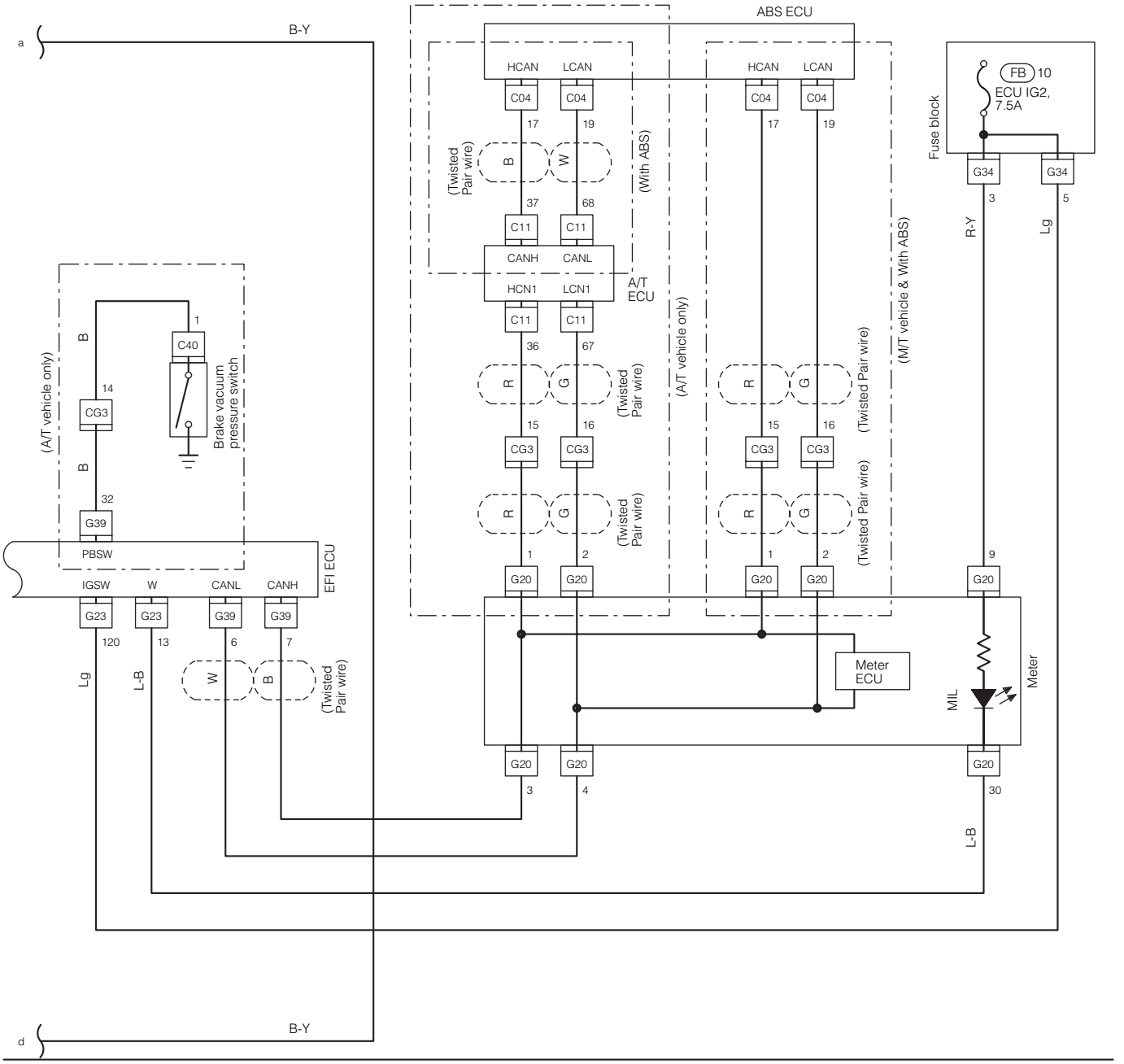
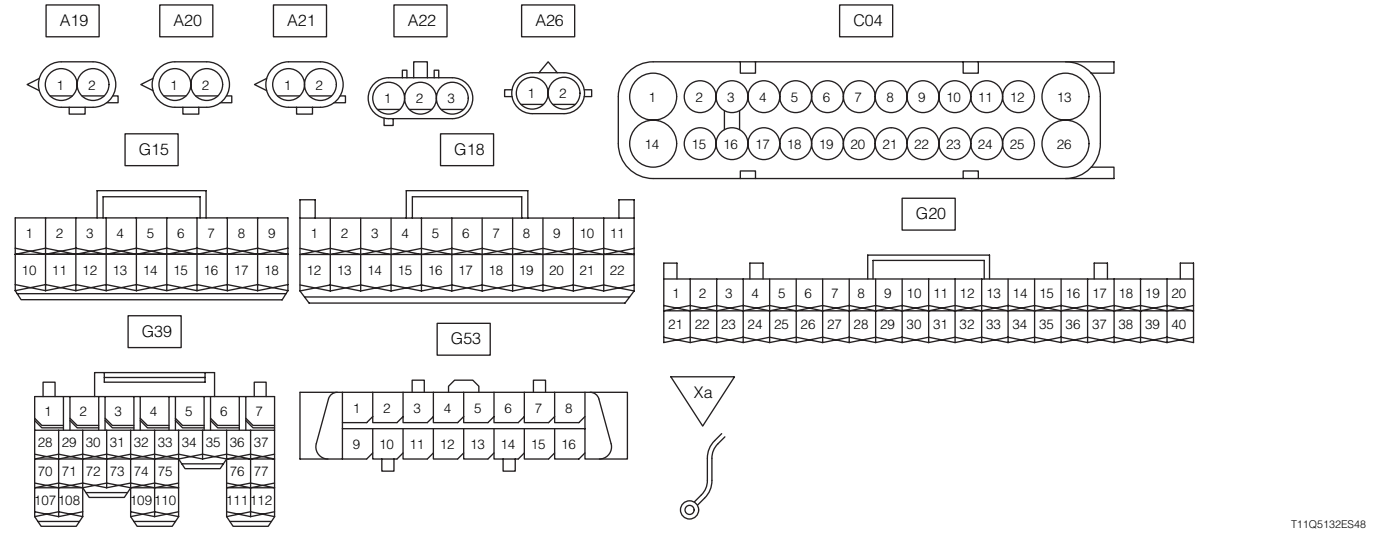
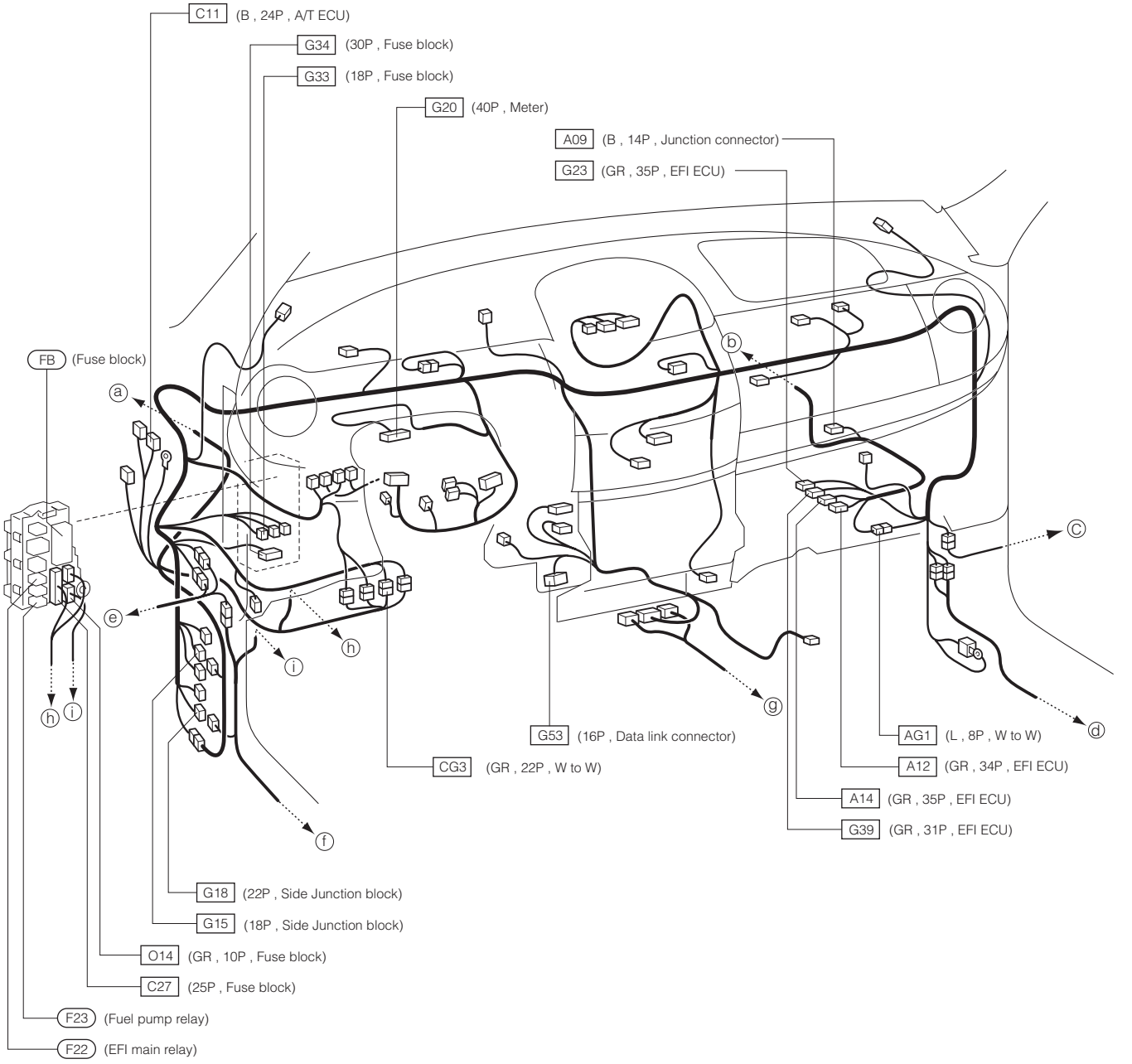


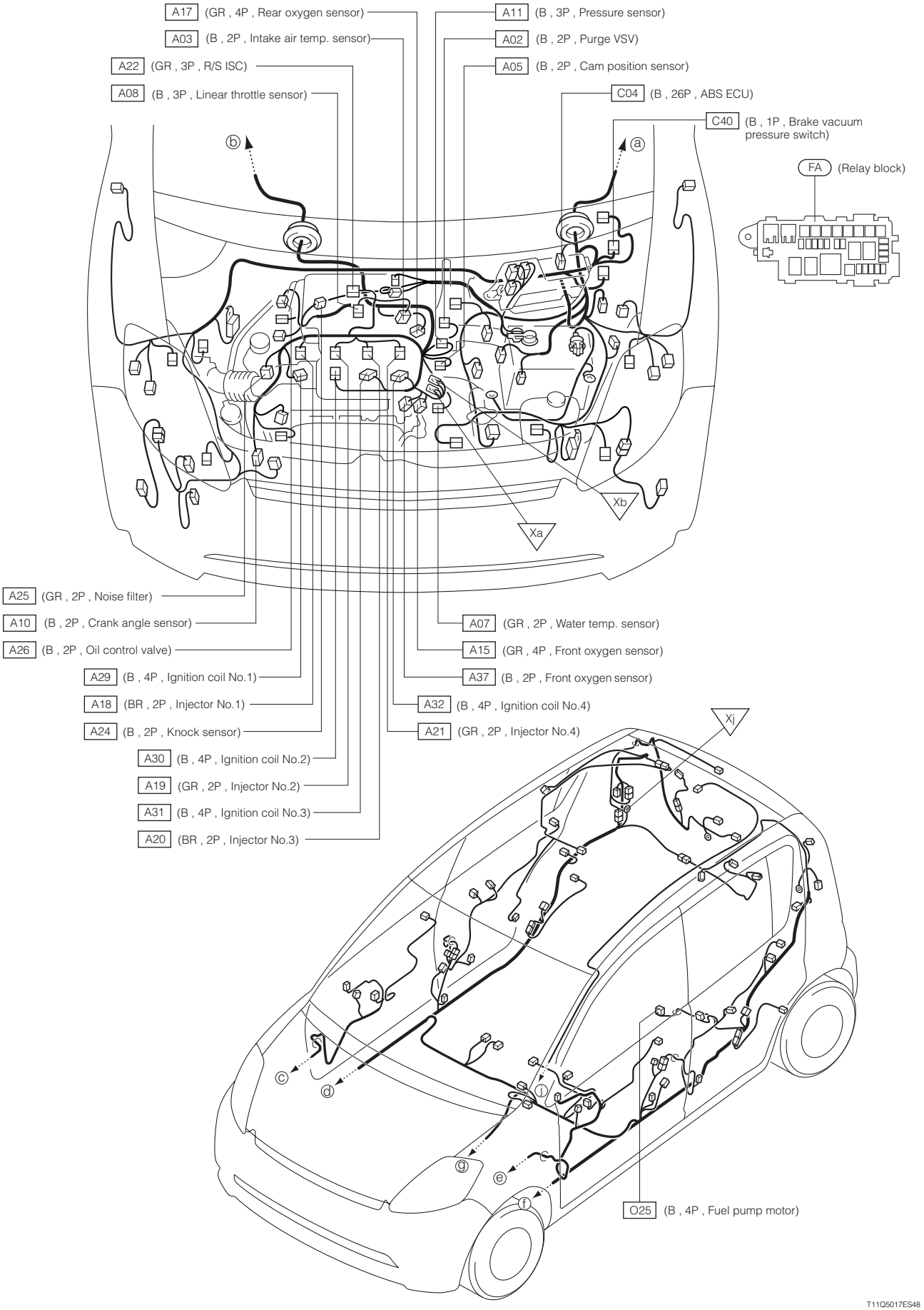
T11Q5131ES48





T11Q5132ES48

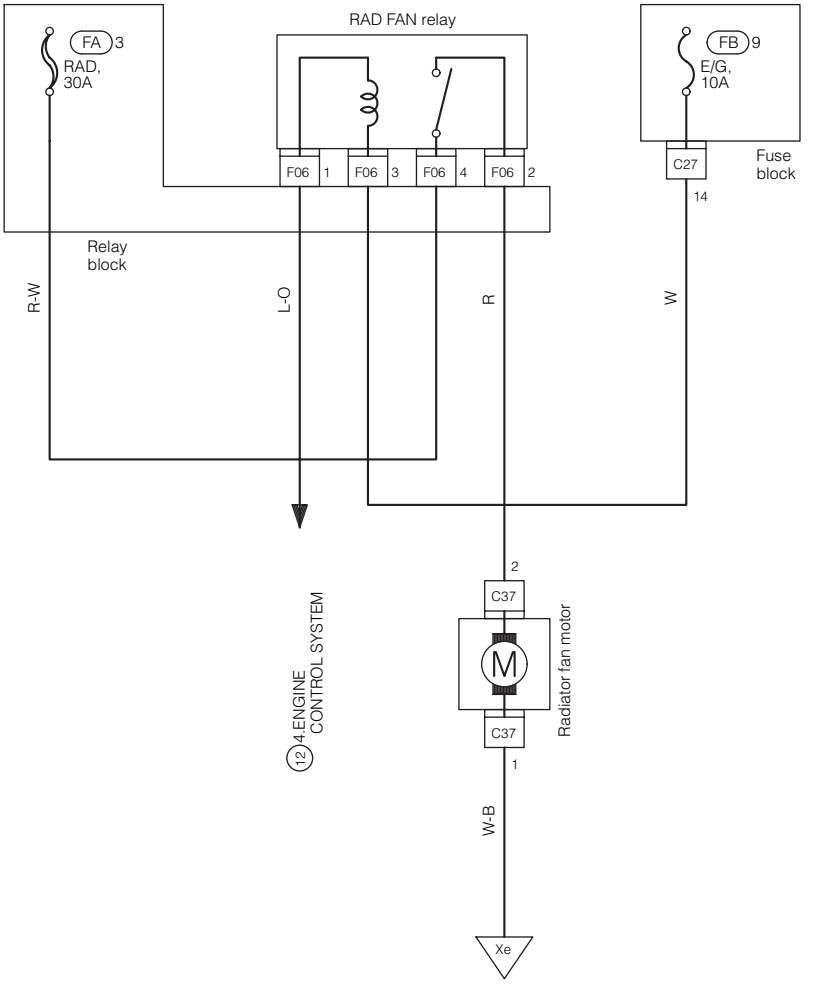

C11 (B , 24P , A/T ECU)
G34 (30P , Fuse block)
G33 (18P , Fuse block)
G20 (40P , Meter)
A09 (B , 14P , Junction connector)
G23 (GR , 35P , EFI ECU)
FB (Fuse block)
a
b
c
d
e
f
g
h
i
G53 (16P , Data link connector)
CG3 (GR , 22P , W to W)
AG1 (L , 8P , W to W)
A12 (GR , 34P , EFI ECU)
A14 (GR , 35P , EFI ECU)
G39 (GR , 31P , EFI ECU)
G18 (22P , Side Junction block)
G15 (18P , Side Junction block)
O14 (GR , 10P , Fuse block)
C27 (25P , Fuse block)
F23 (Fuel pump relay)
F22 (EFI main relay)

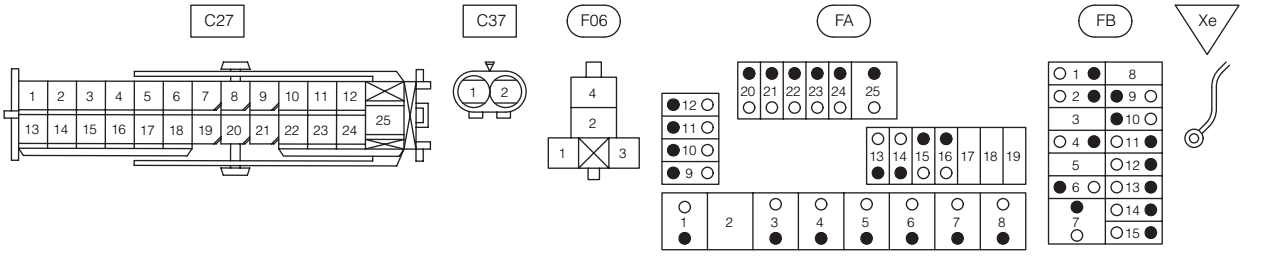


T11Q5017ES48

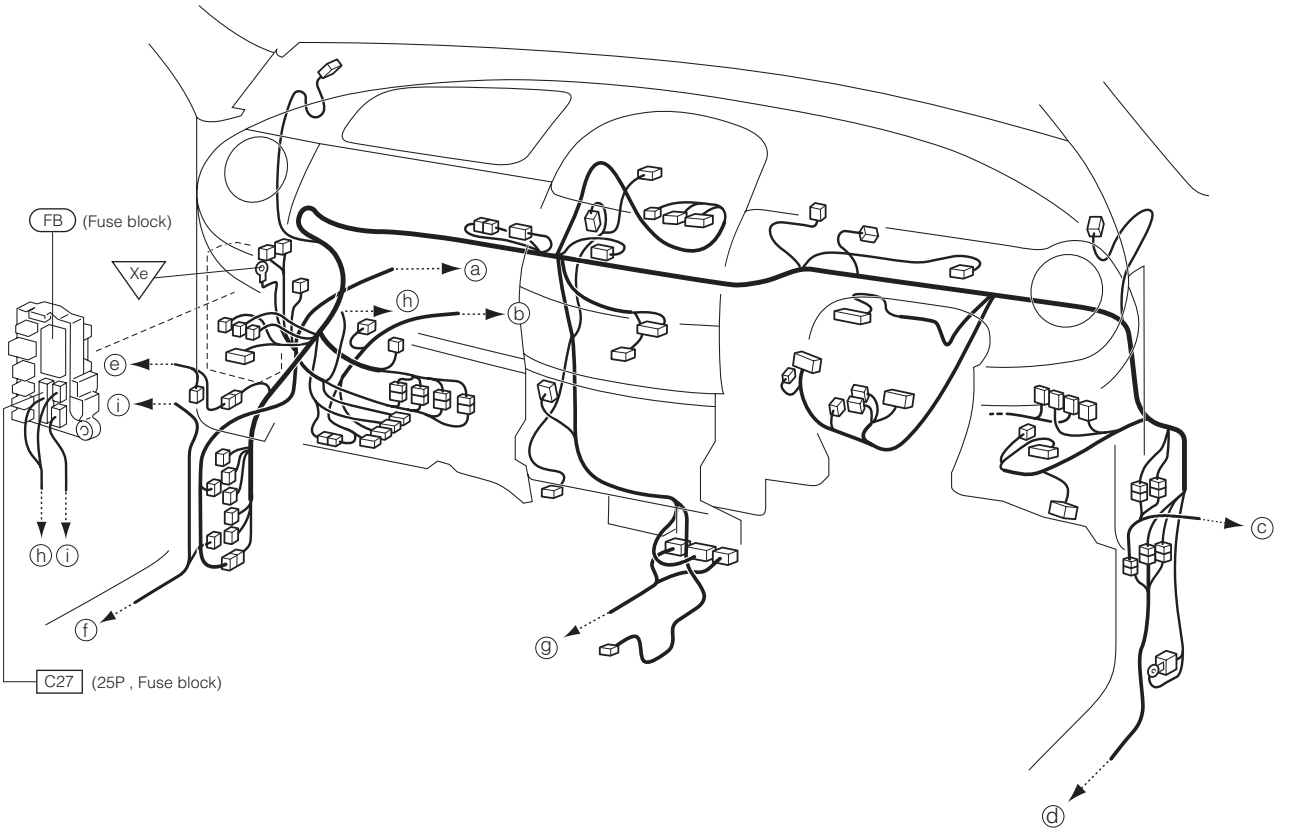
5 RADIATOR FAN

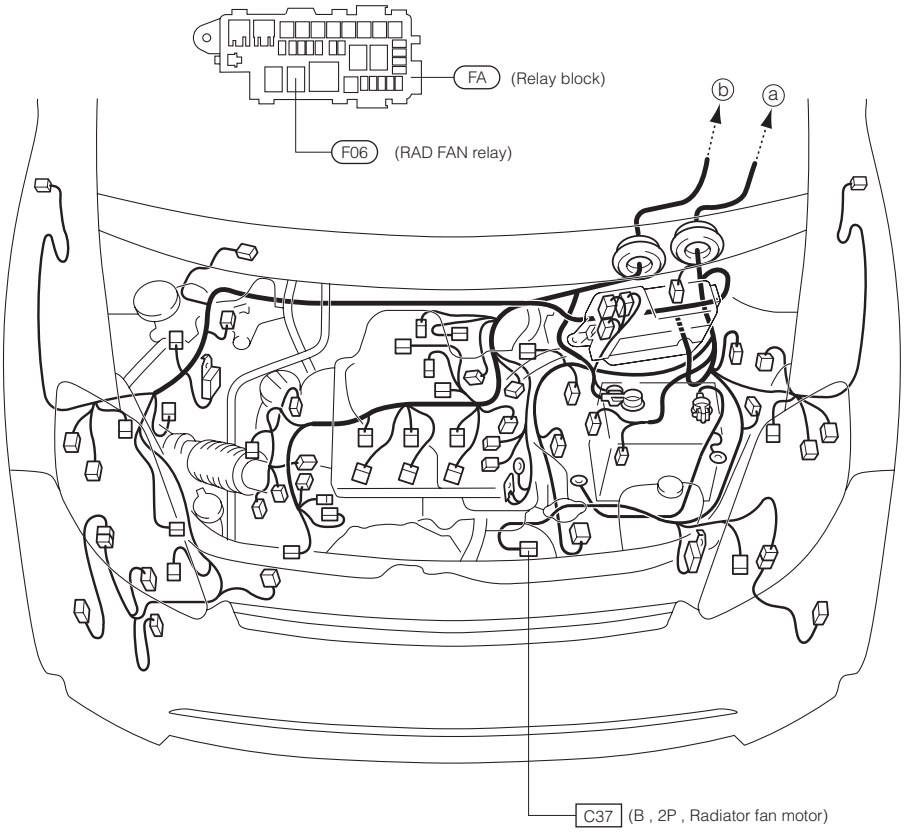
5-1 RHD VEHICLE



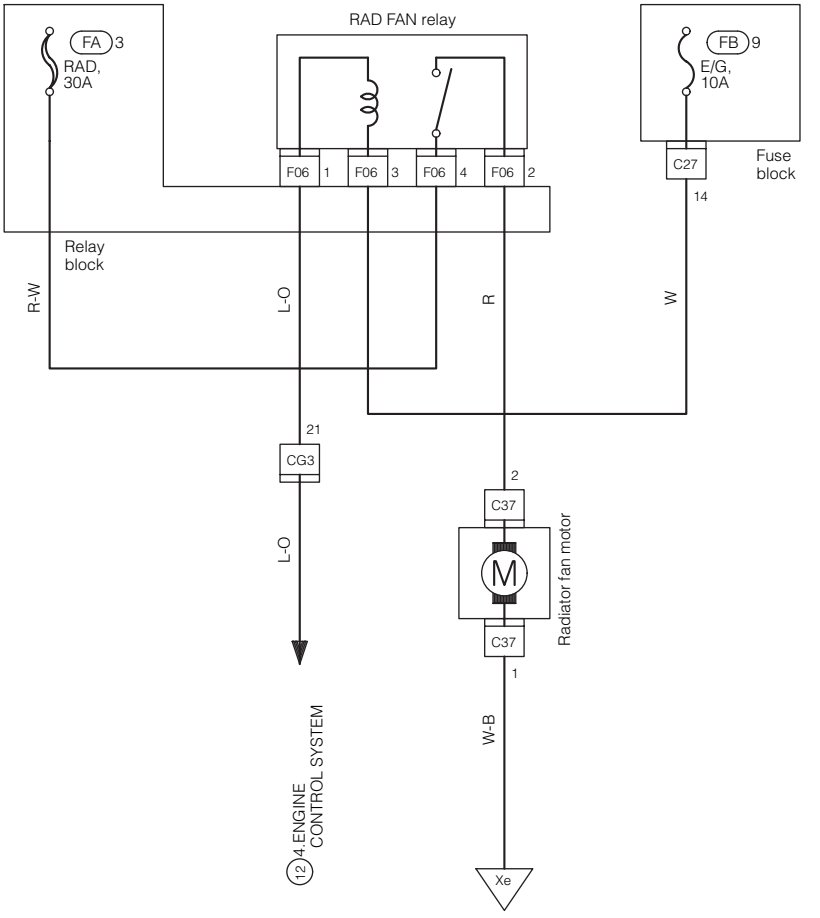


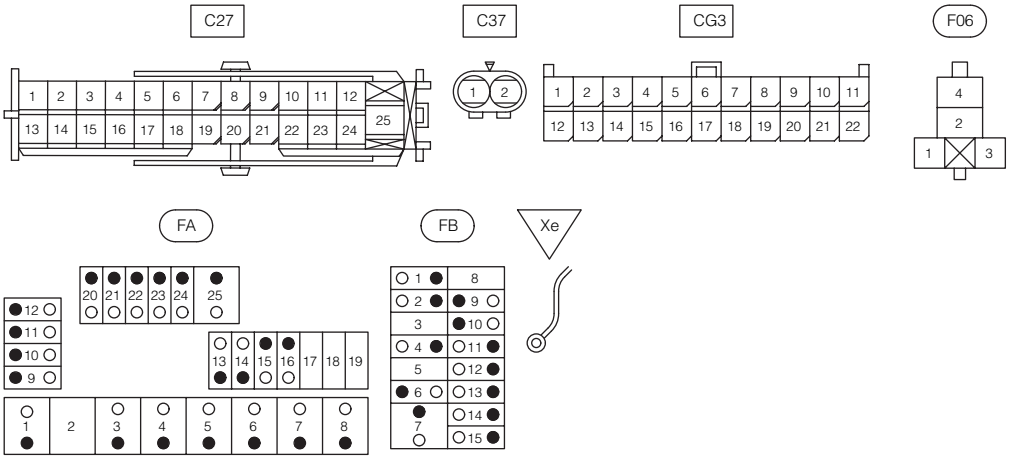
(MEMO)


FB (Fuse block)
Xe
a
h
b
e
i
c
h i
f
g
C27 (25P , Fuse block)
d


FA
(Relay block)
F06
(RAD FAN relay)
b
a
C37
(B , 2P , Radiator fan motor)

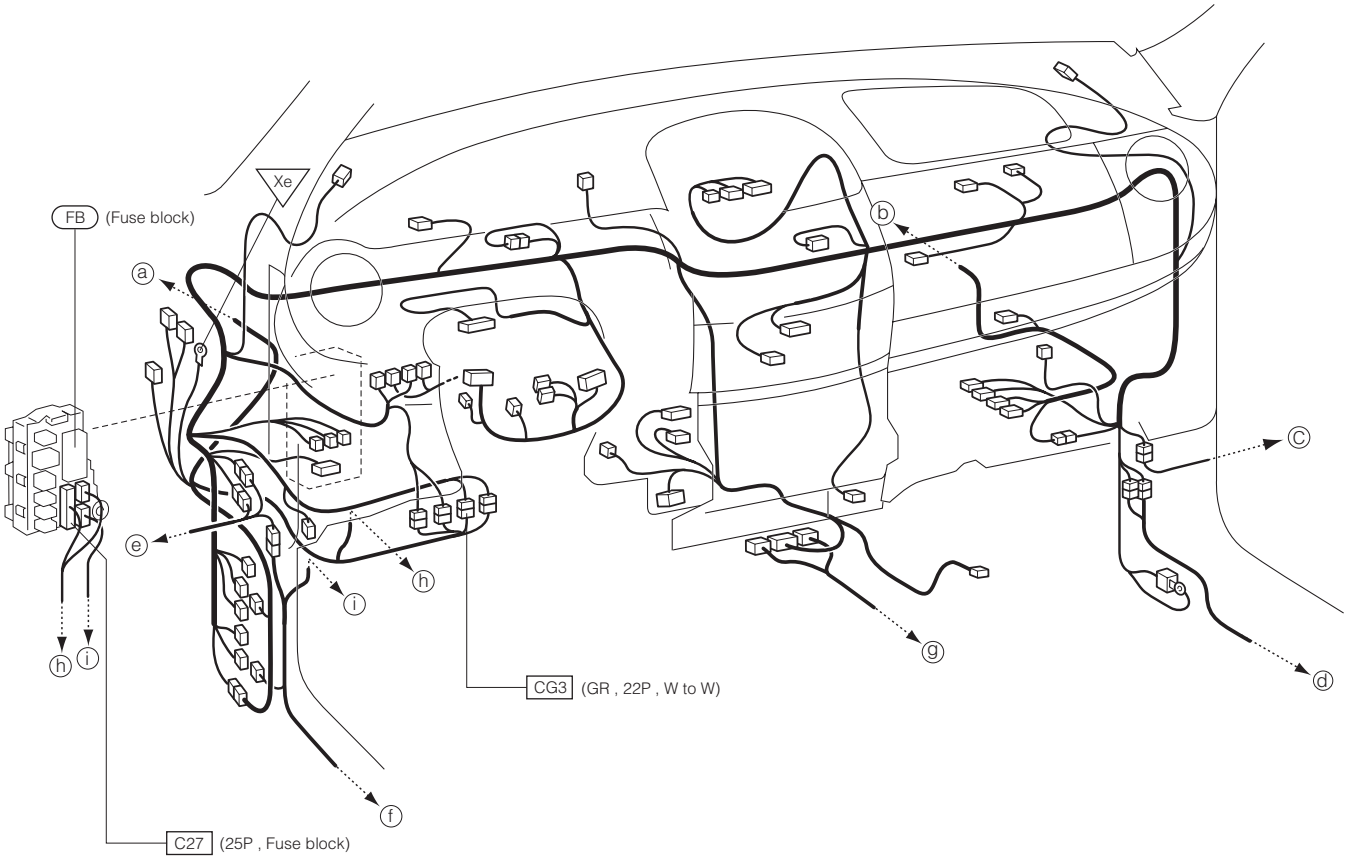
5-2 LHD VEHICLE

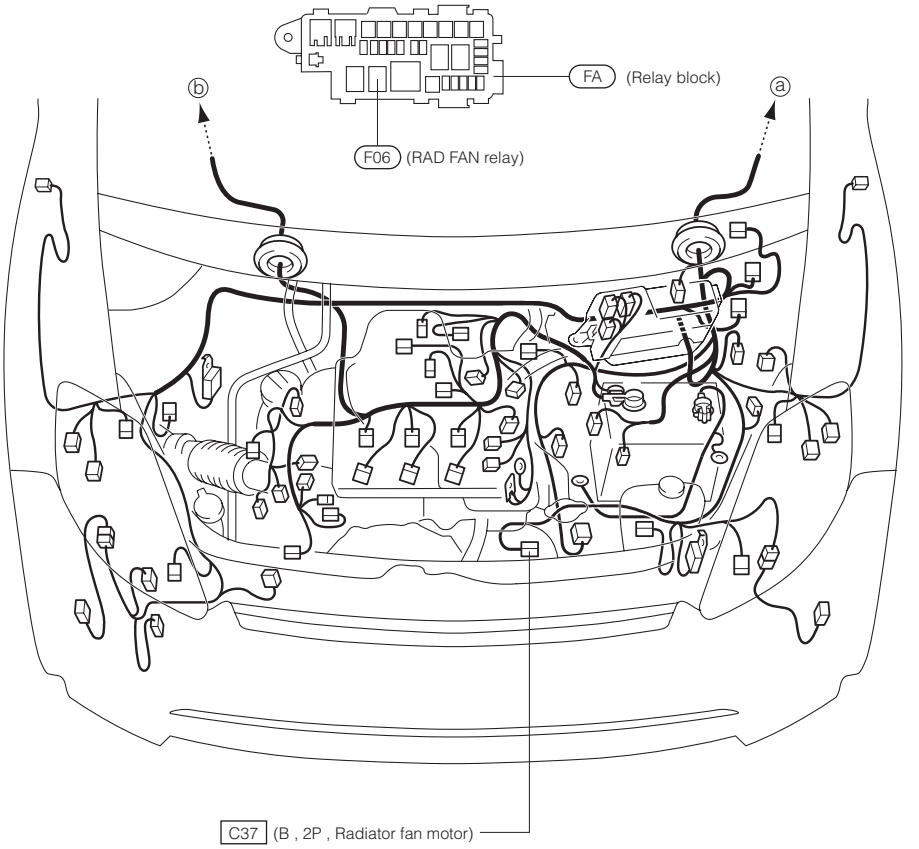




T11Q5133ES48

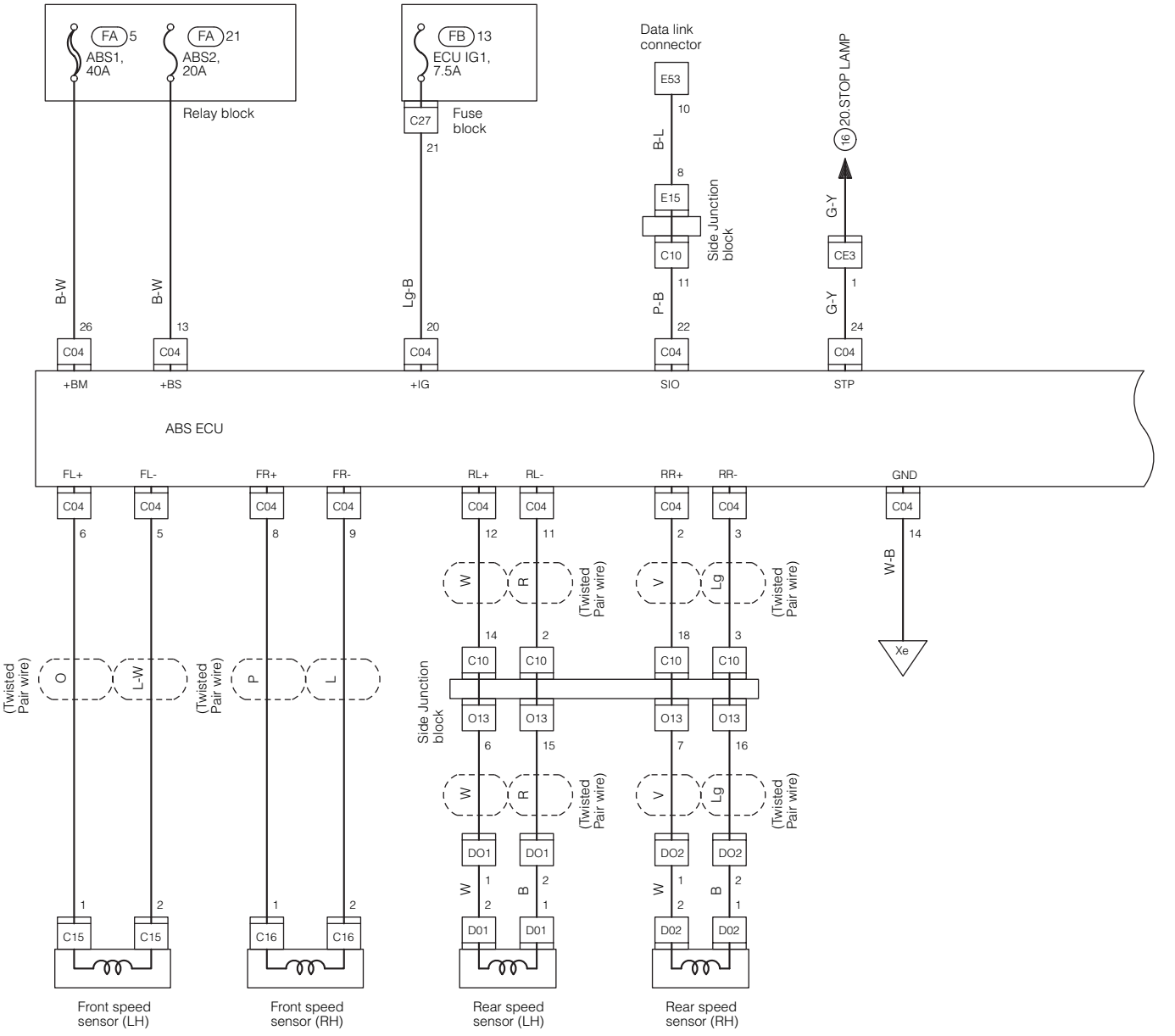
(MEMO)

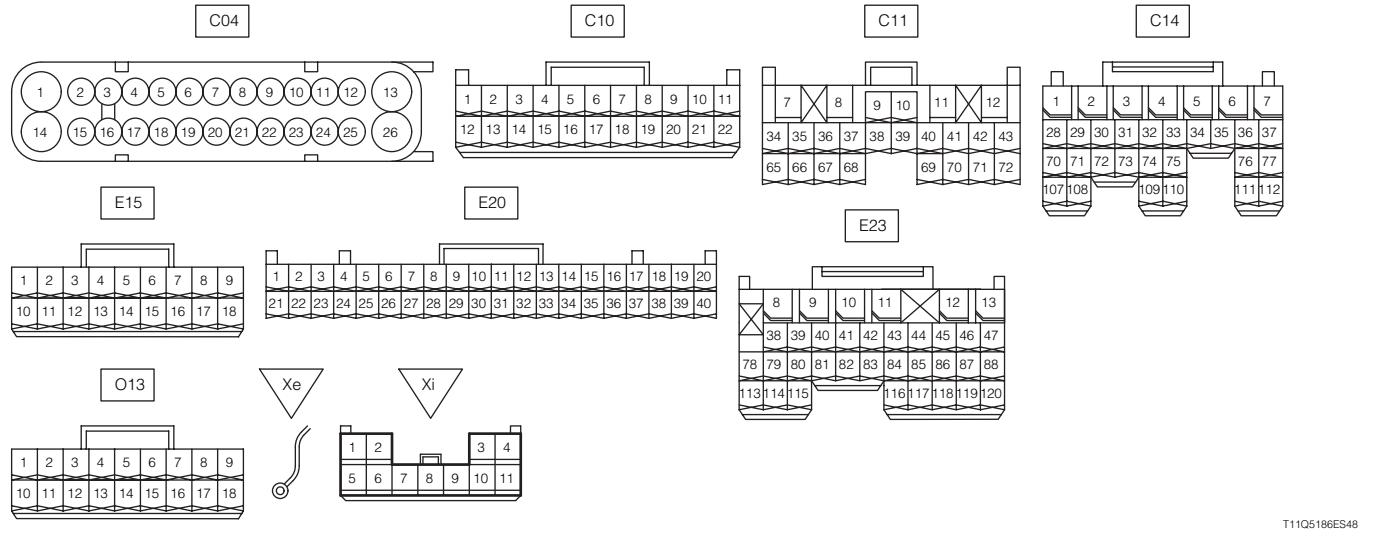

Xe
FB (Fuse block)
a
b
c
d
e
f
g
h
i
CG3 (GR , 22P , W to W)
C27 (25P , Fuse block)


FA (Relay block)
ⓑ
ⓐ
F06 (RAD FAN relay)
C37 (B , 2P , Radiator fan motor)

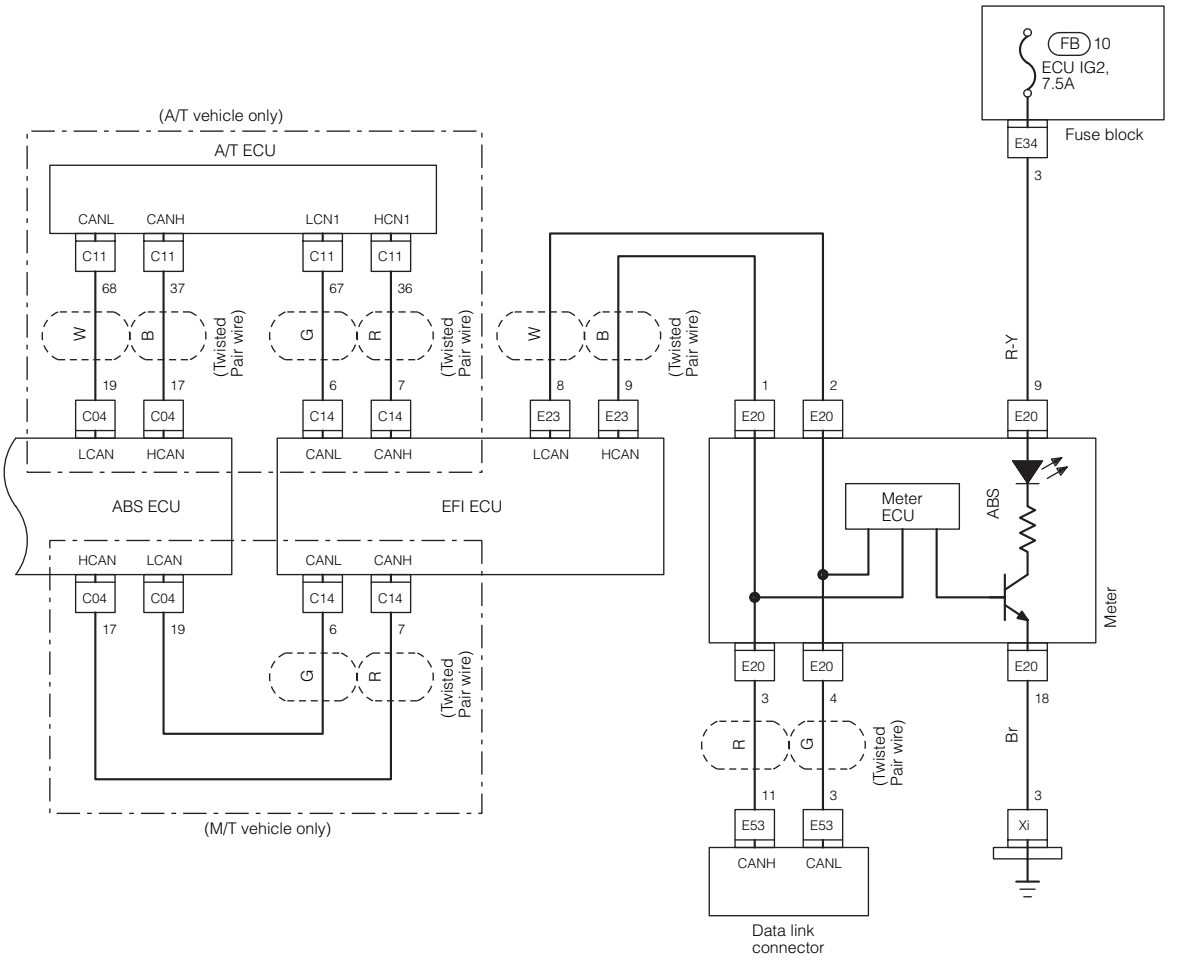
6 ABS

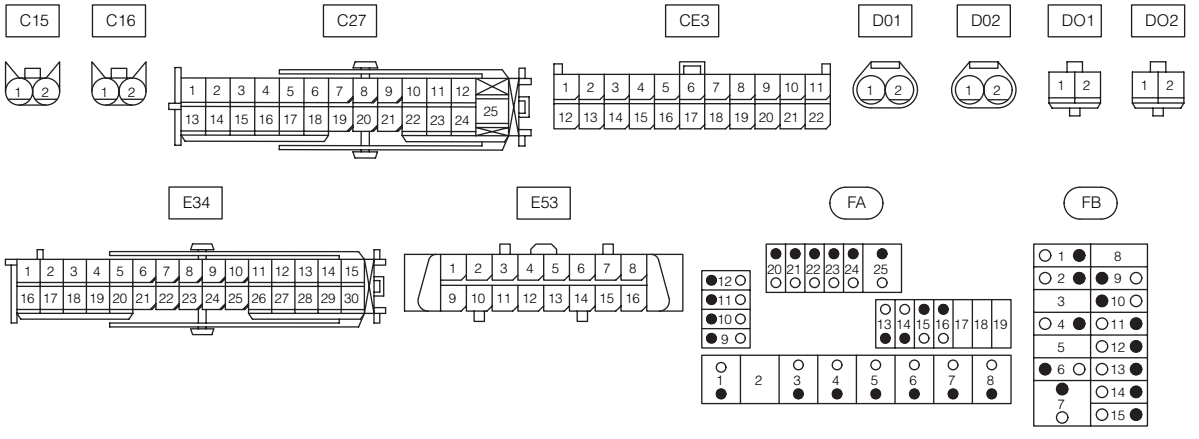
6-1 RHD VEHICLE

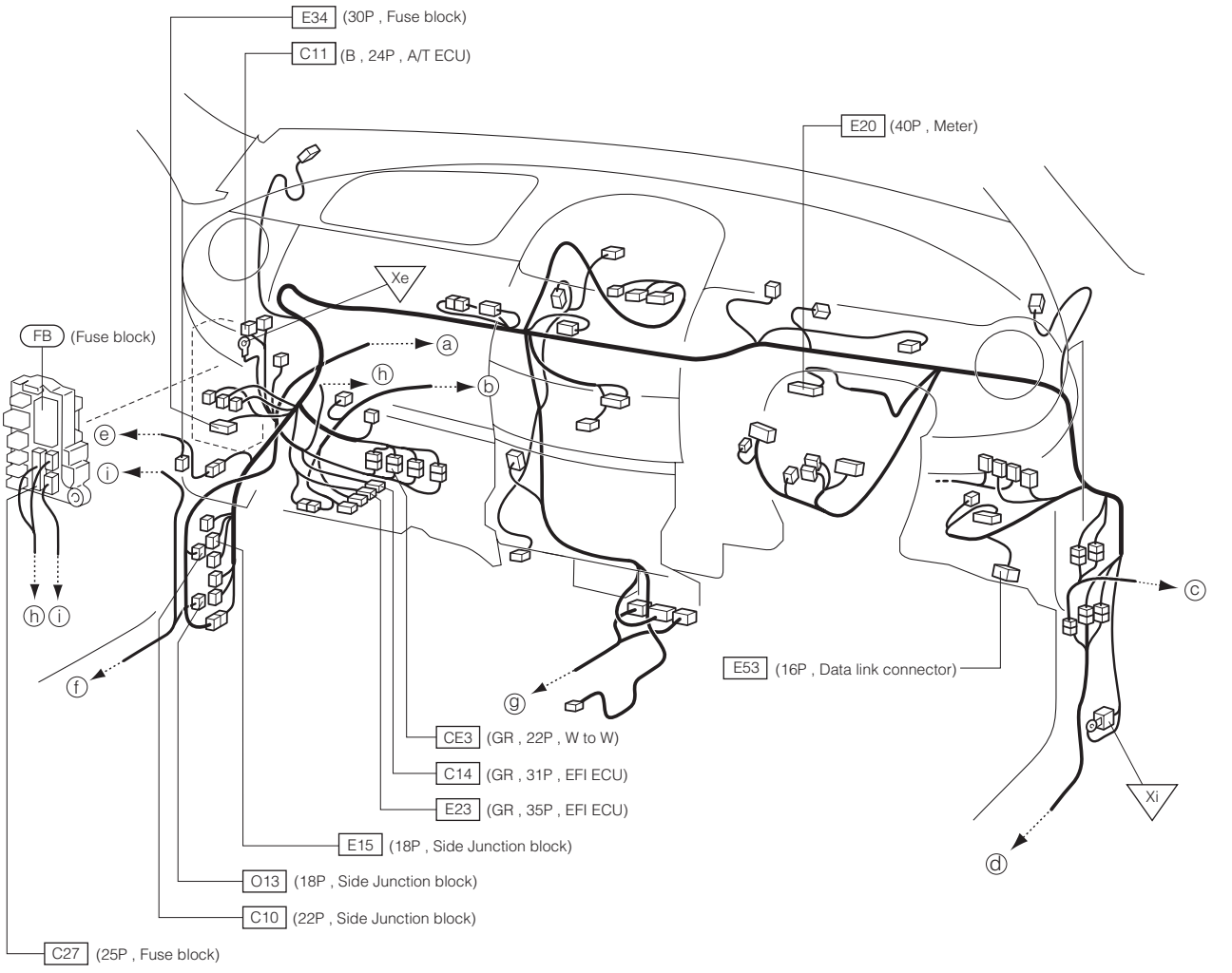


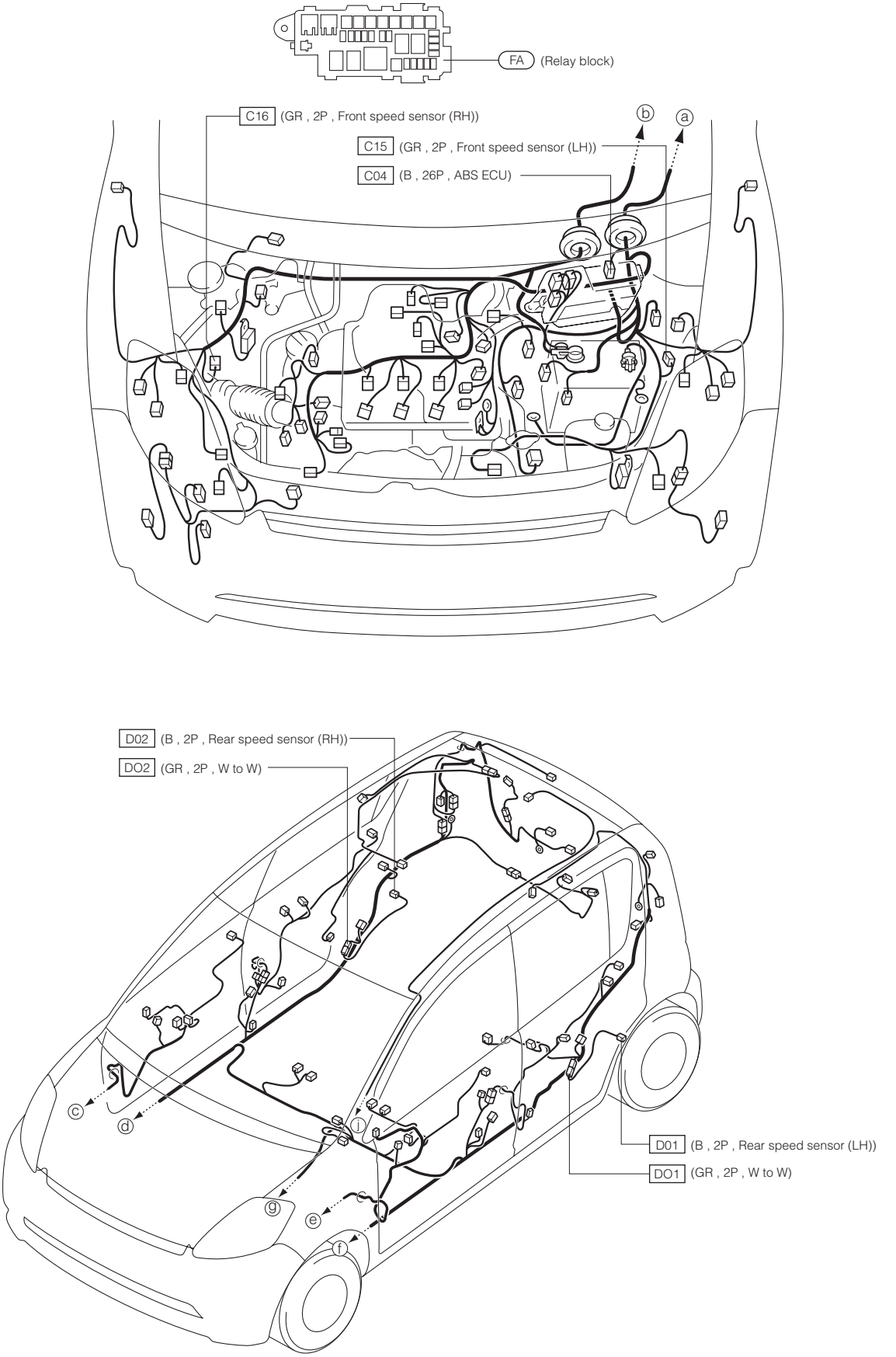


T11Q5186ES48


FB 10
ECU IG2, 7.5A
Fuse block
E34
3
R-Y
9
E20
(A/T vehicle only)
A/T ECU
CANL
CANH
LCN1
HCN1
C11
68
37
67
36
W
B
G
R
(Twisted Pair wire)
19
17
6
7
C04
C14
LCAN
HCAN
CANL
CANH
8
9
E23
1
2
ABS ECU
EFI ECU
Meter ECU
ABS
Meter
HCAN
LCAN
CANL
CANH
17
19
6
7
3
4
18
R
G
Br
11
3
E53
Xi
CANH
CANL
Data link connector
(M/T vehicle only)

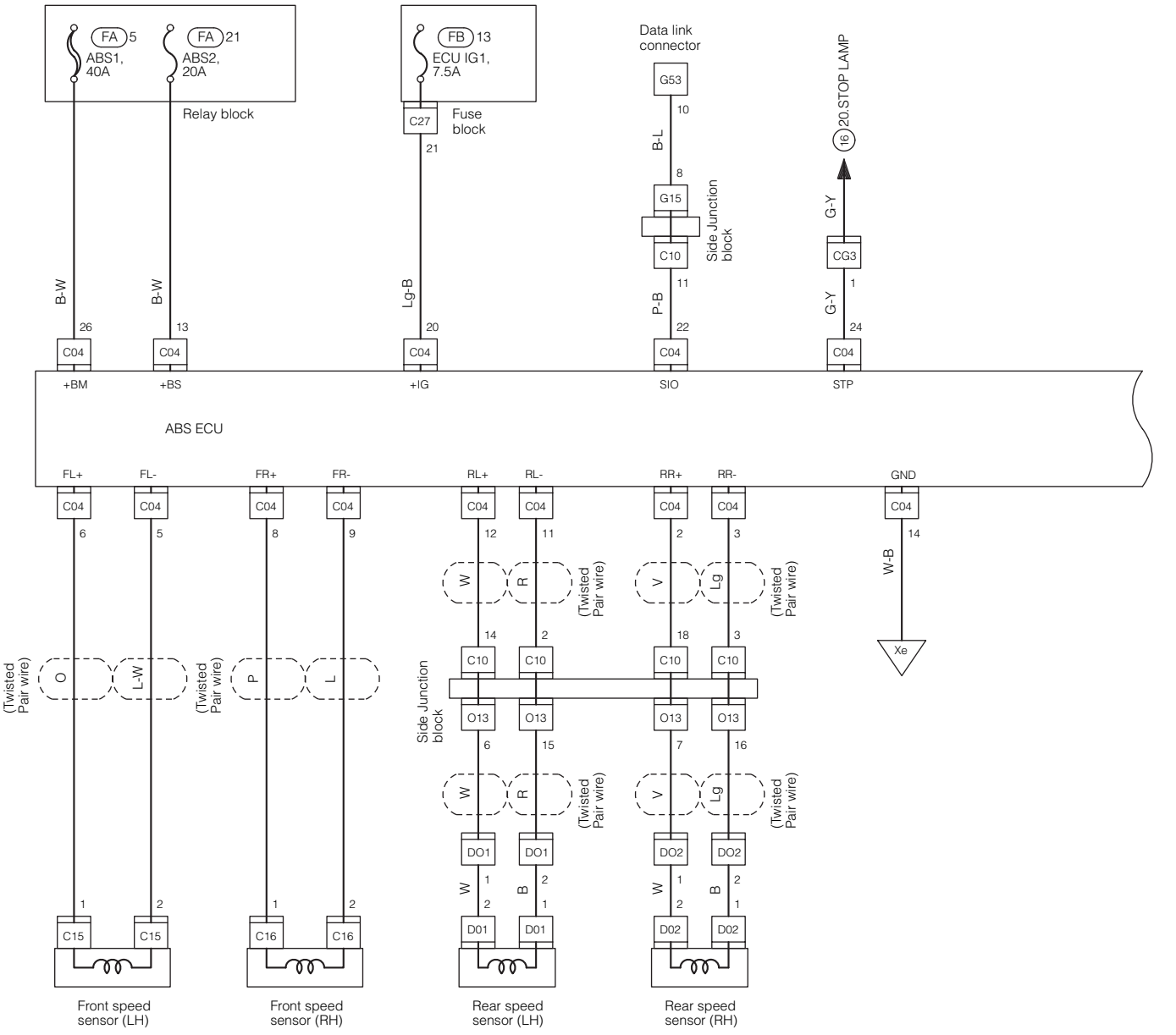

C15
C16
C27
CE3
D01
D02
DO1
DO2
E34
E53
FA
FB

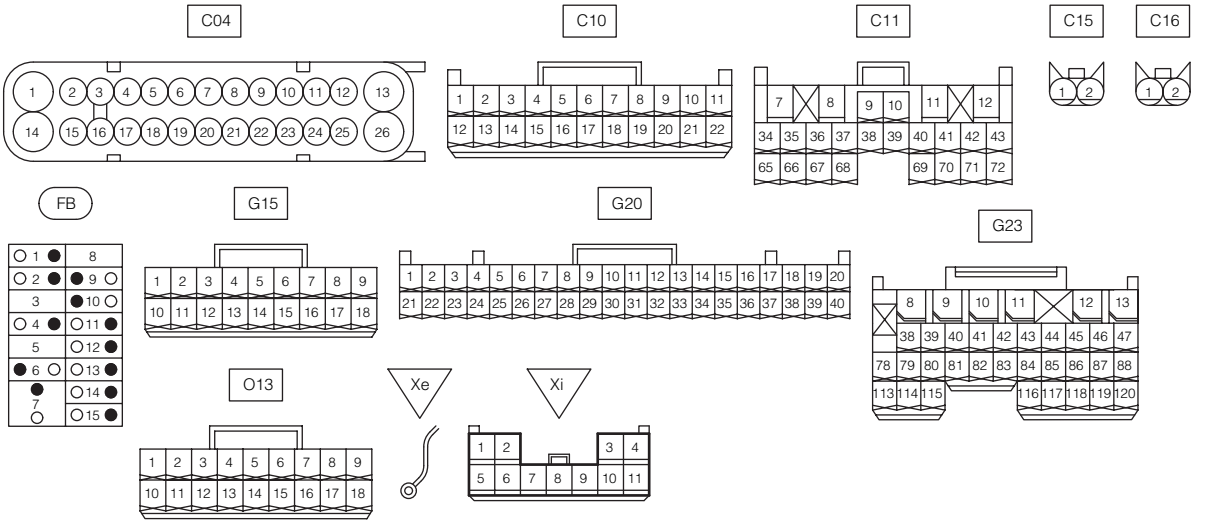

E34 (30P , Fuse block)
C11 (B , 24P , A/T ECU)
E20 (40P , Meter)
Xe
FB (Fuse block)
a
b
c
d
e
f
g
h
i
E53 (16P , Data link connector)
CE3 (GR , 22P , W to W)
C14 (GR , 31P , EFI ECU)
E23 (GR , 35P , EFI ECU)
E15 (18P , Side Junction block)
O13 (18P , Side Junction block)
C10 (22P , Side Junction block)
C27 (25P , Fuse block)
Xi



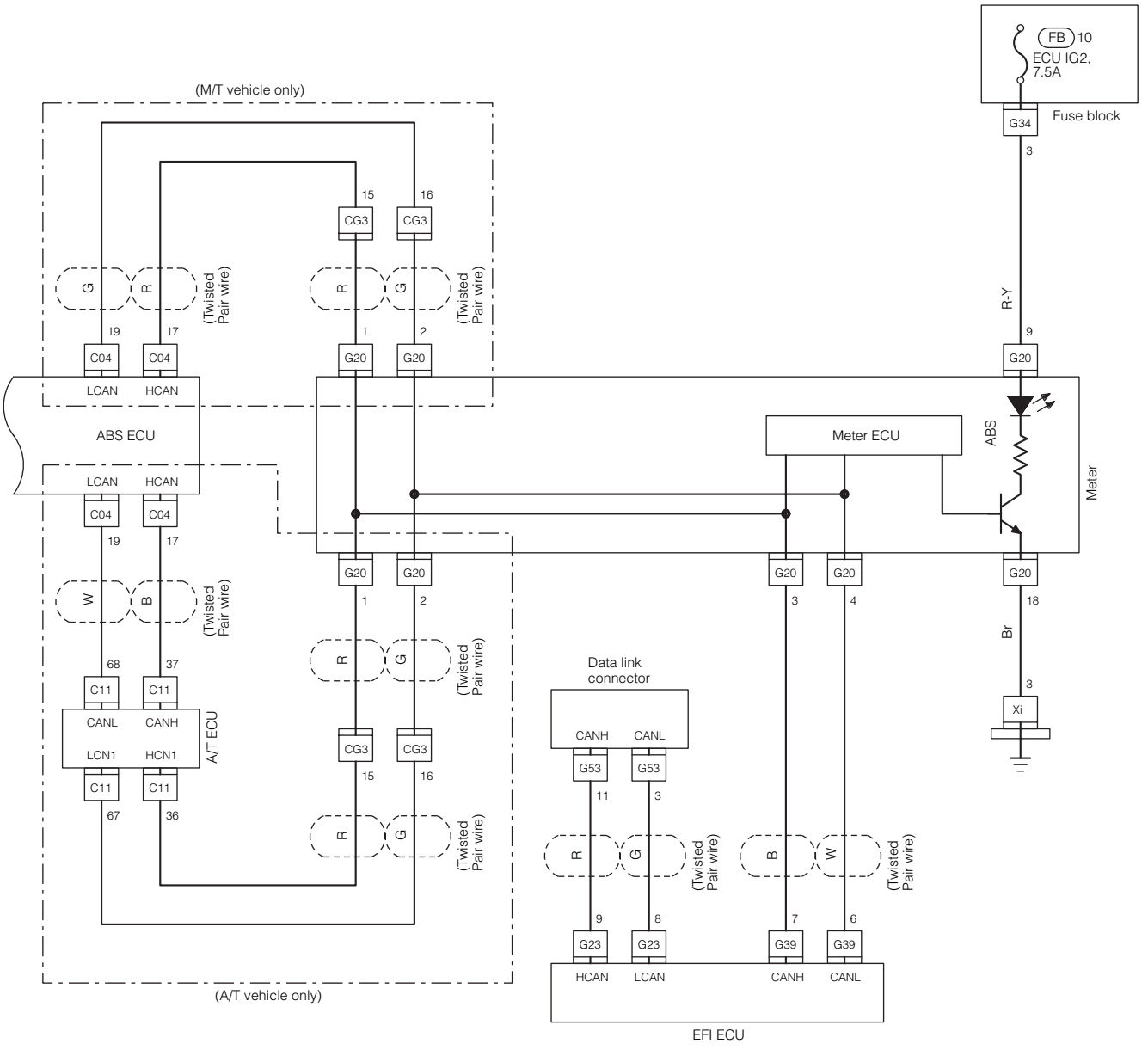
T11Q5026ES48

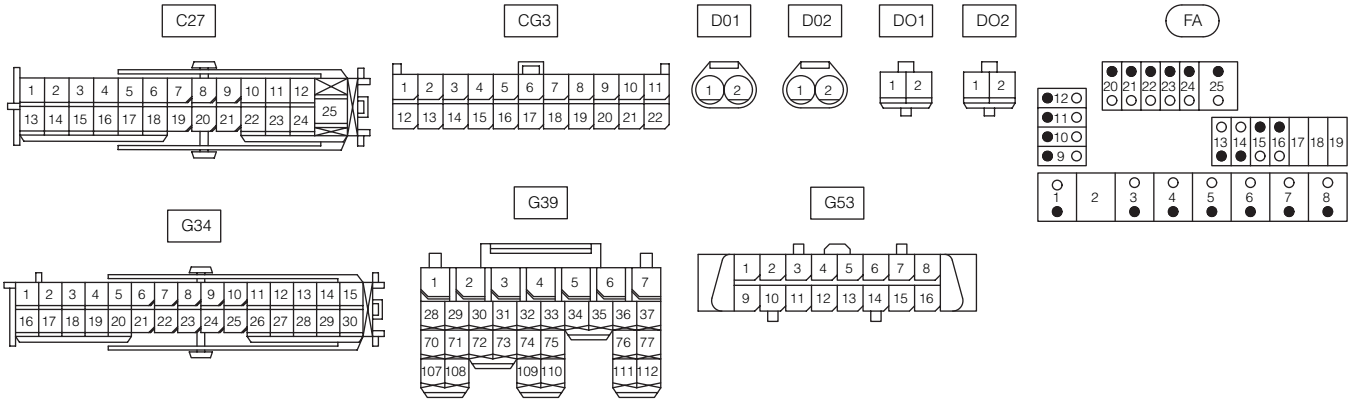
6-2 LHD VEHICLE

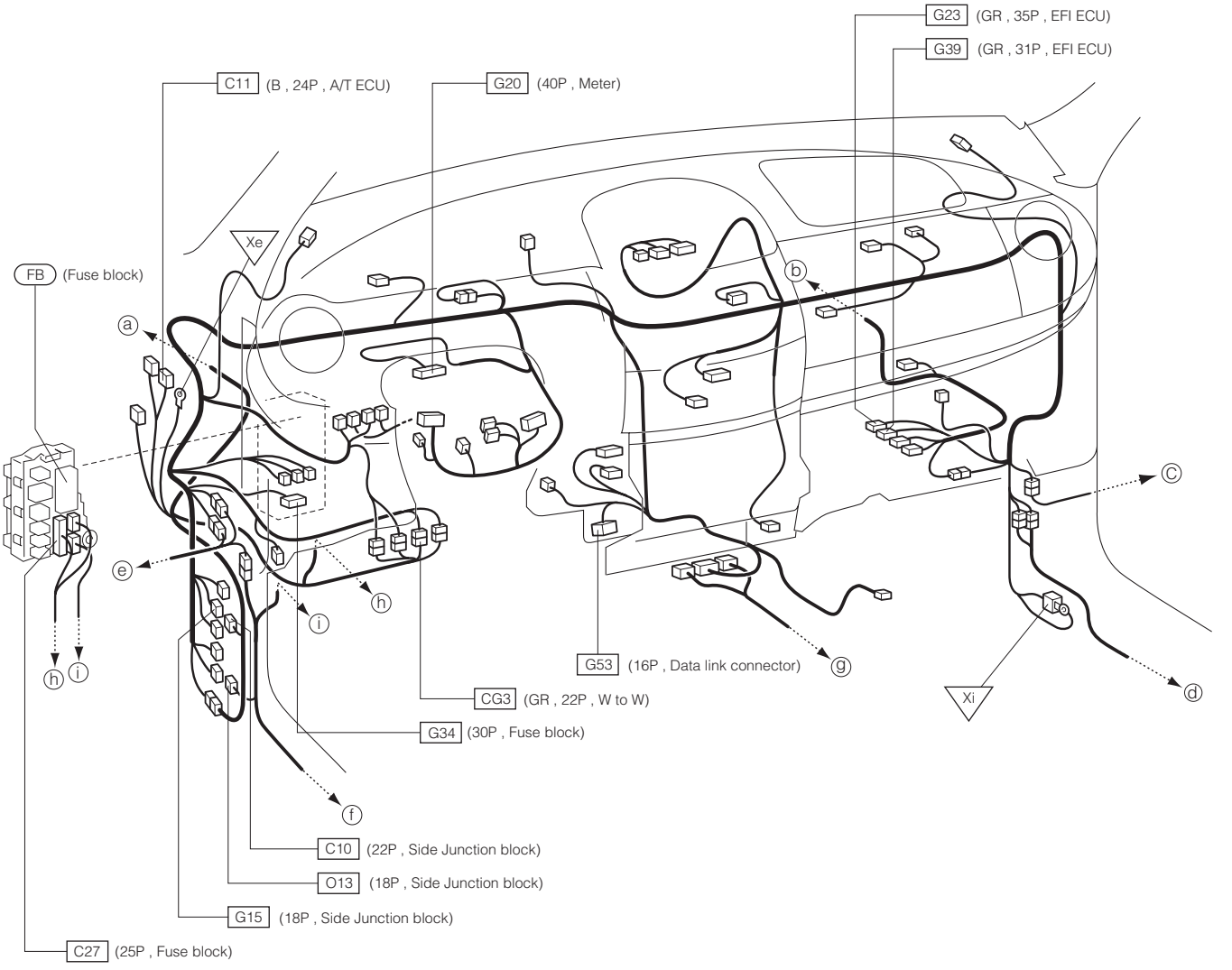


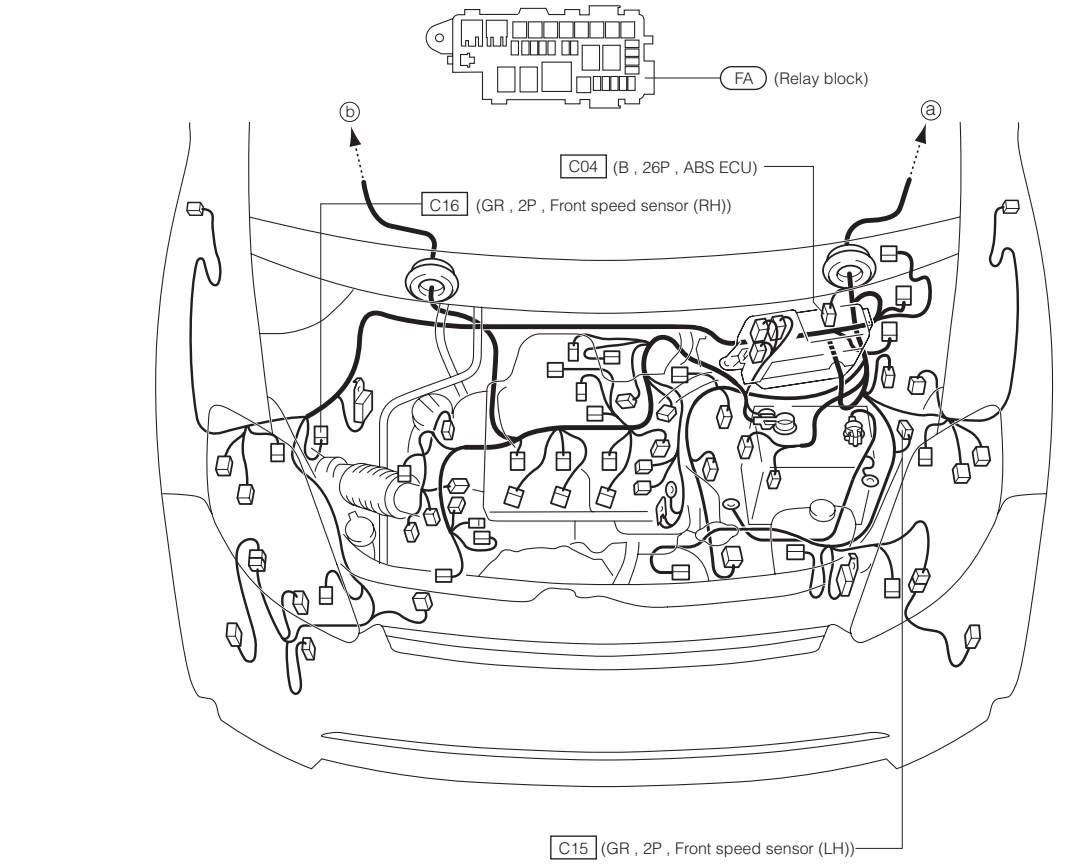


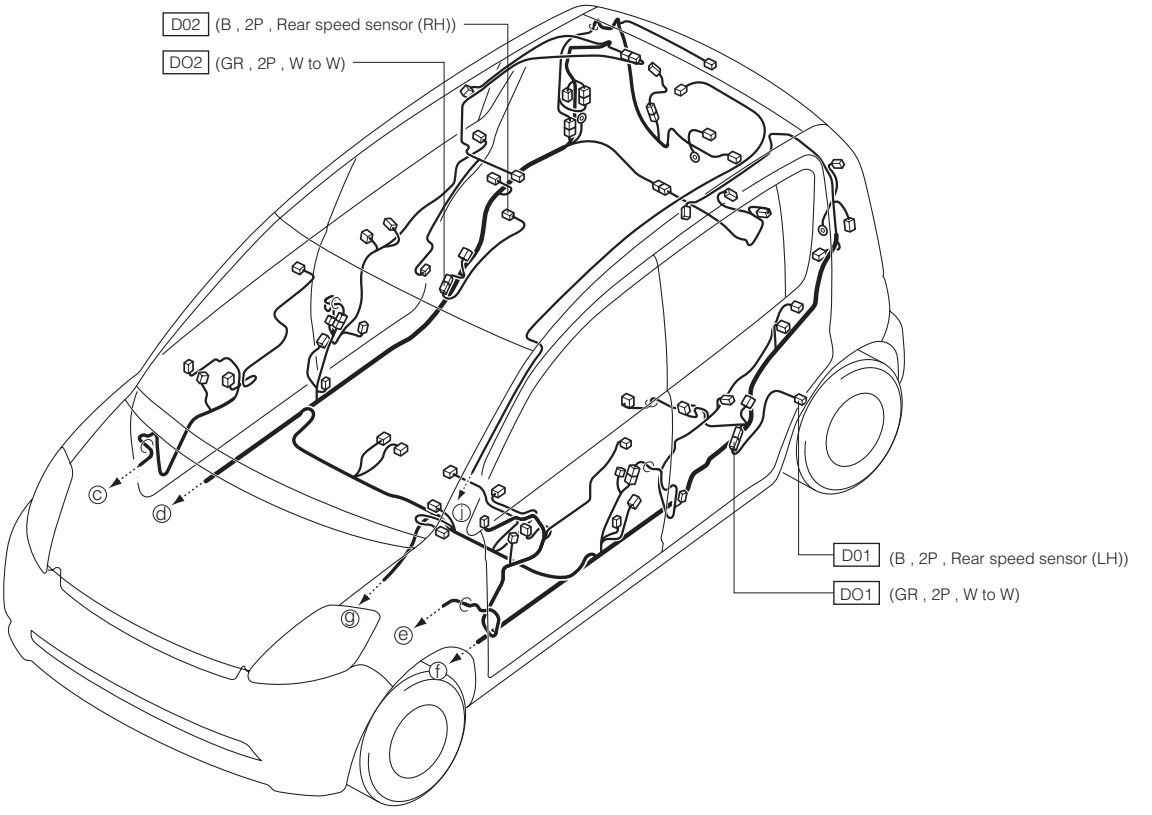
T11Q5134ES48


(M/T vehicle only)
FB 10
ECU IG2, 7.5A
Fuse block
G34
3
R-Y
9
G20
ABS
Meter
Meter ECU
ABS ECU
LCAN
HCAN
C04
19
17
G
R
(Twisted Pair wire)
CG3
15
16
1
2
W
B
68
37
C11
CANL
CANH
LCN1
HCN1
A/T ECU
67
36
(A/T vehicle only)
Data link connector
CANH
CANL
G53
11
3
9
8
G23
HCAN
LCAN
7
6
G39
CANH
CANL
EFI ECU
Br
18
Xi


C27
CG3
D01
D02
DO1
DO2
FA
G34
G39
G53

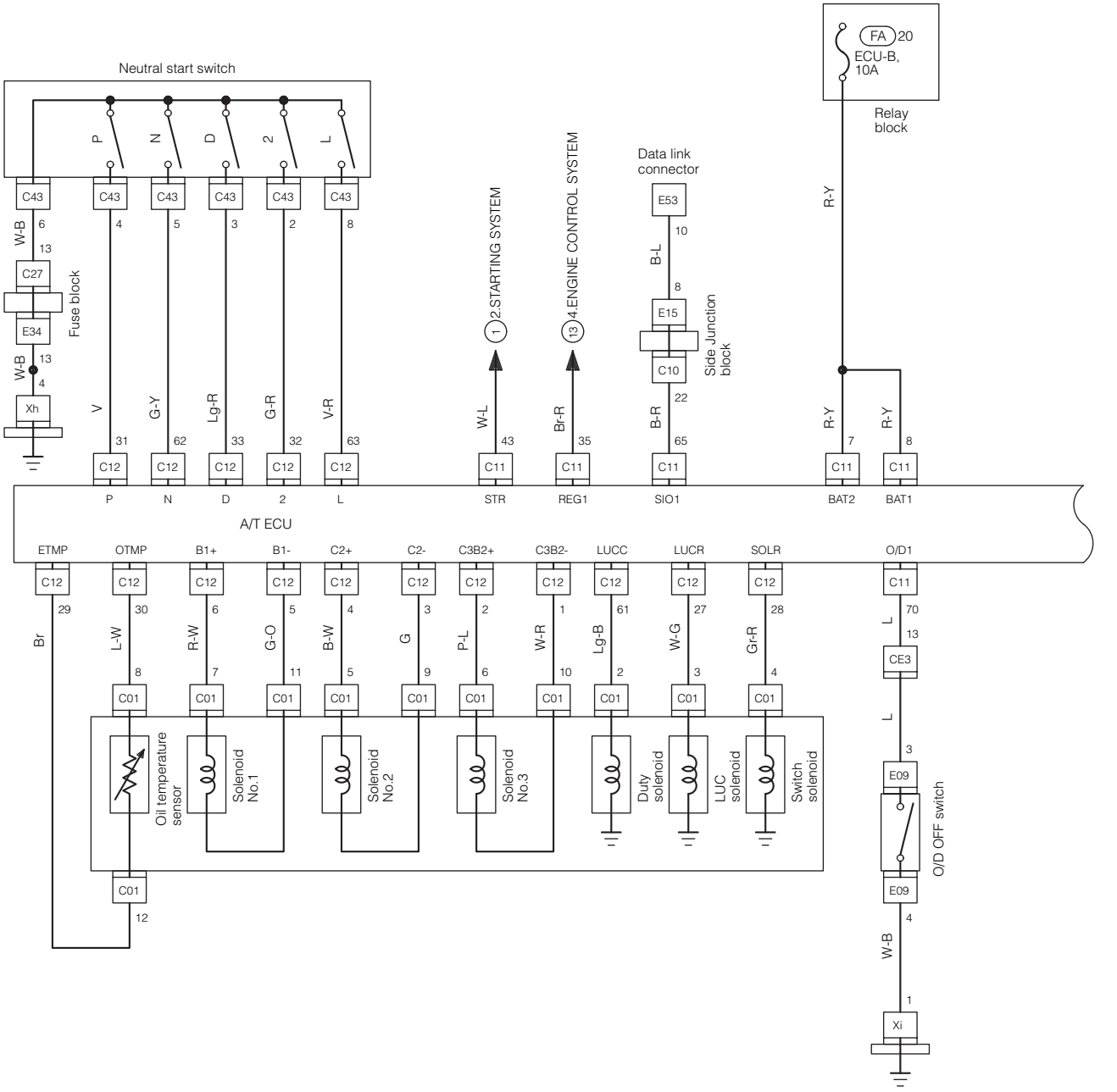

G23 (GR , 35P , EFI ECU)
G39 (GR , 31P , EFI ECU)
C11 (B , 24P , A/T ECU)
G20 (40P , Meter)
Xe
FB (Fuse block)
a
b
c
d
e
f
g
h
i
G53 (16P , Data link connector)
CG3 (GR , 22P , W to W)
G34 (30P , Fuse block)
Xi
C10 (22P , Side Junction block)
O13 (18P , Side Junction block)
G15 (18P , Side Junction block)
C27 (25P , Fuse block)

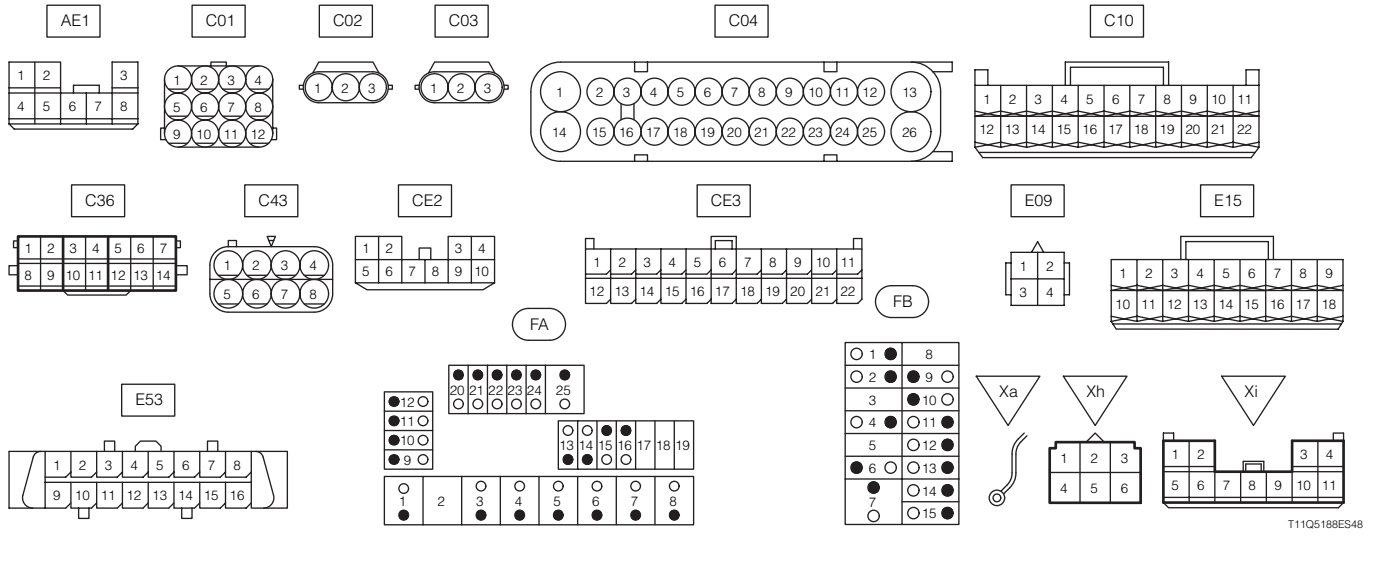




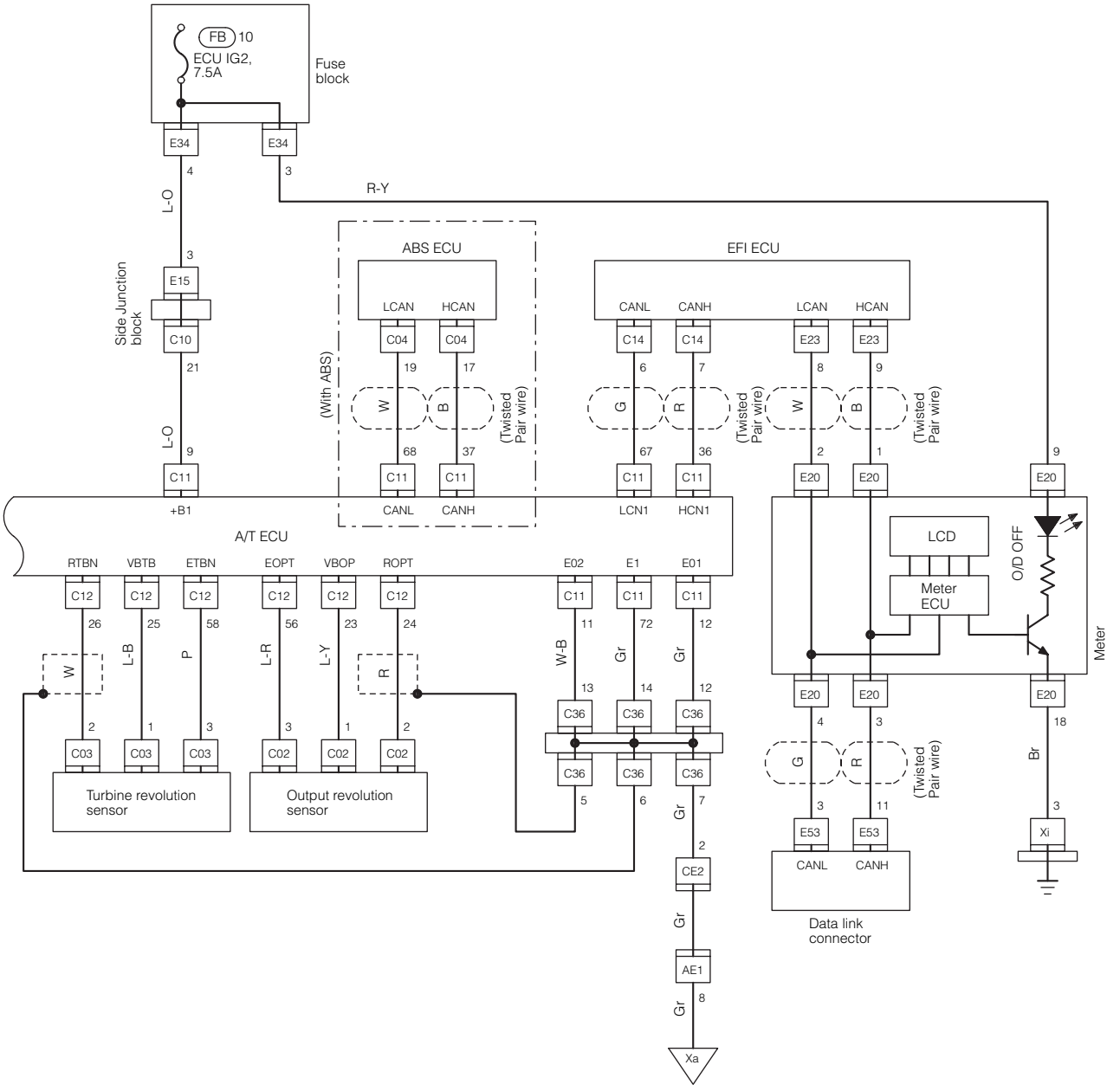
T11Q5025ES48

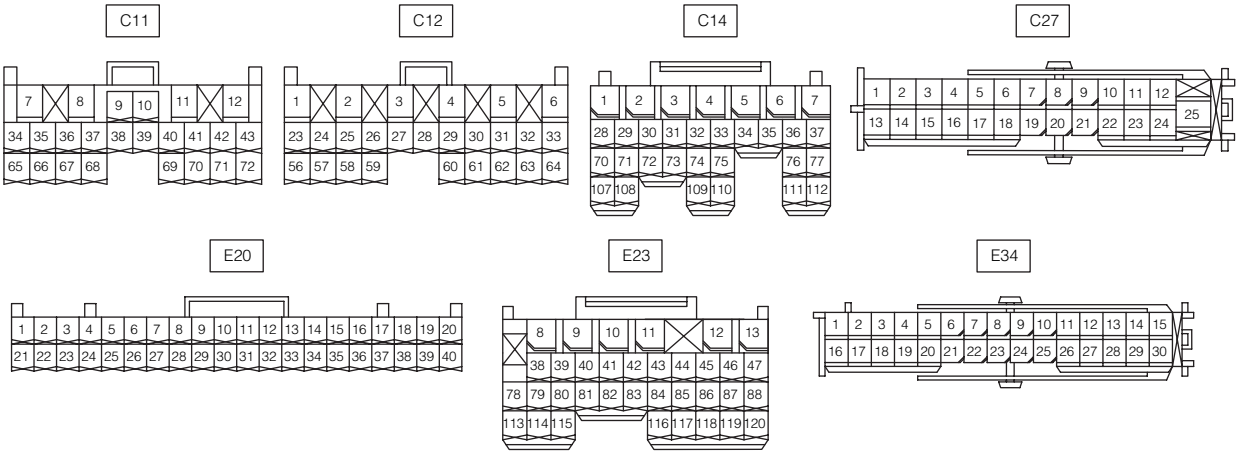
7 A/T CONTROL
7-1 RHD VEHICLE

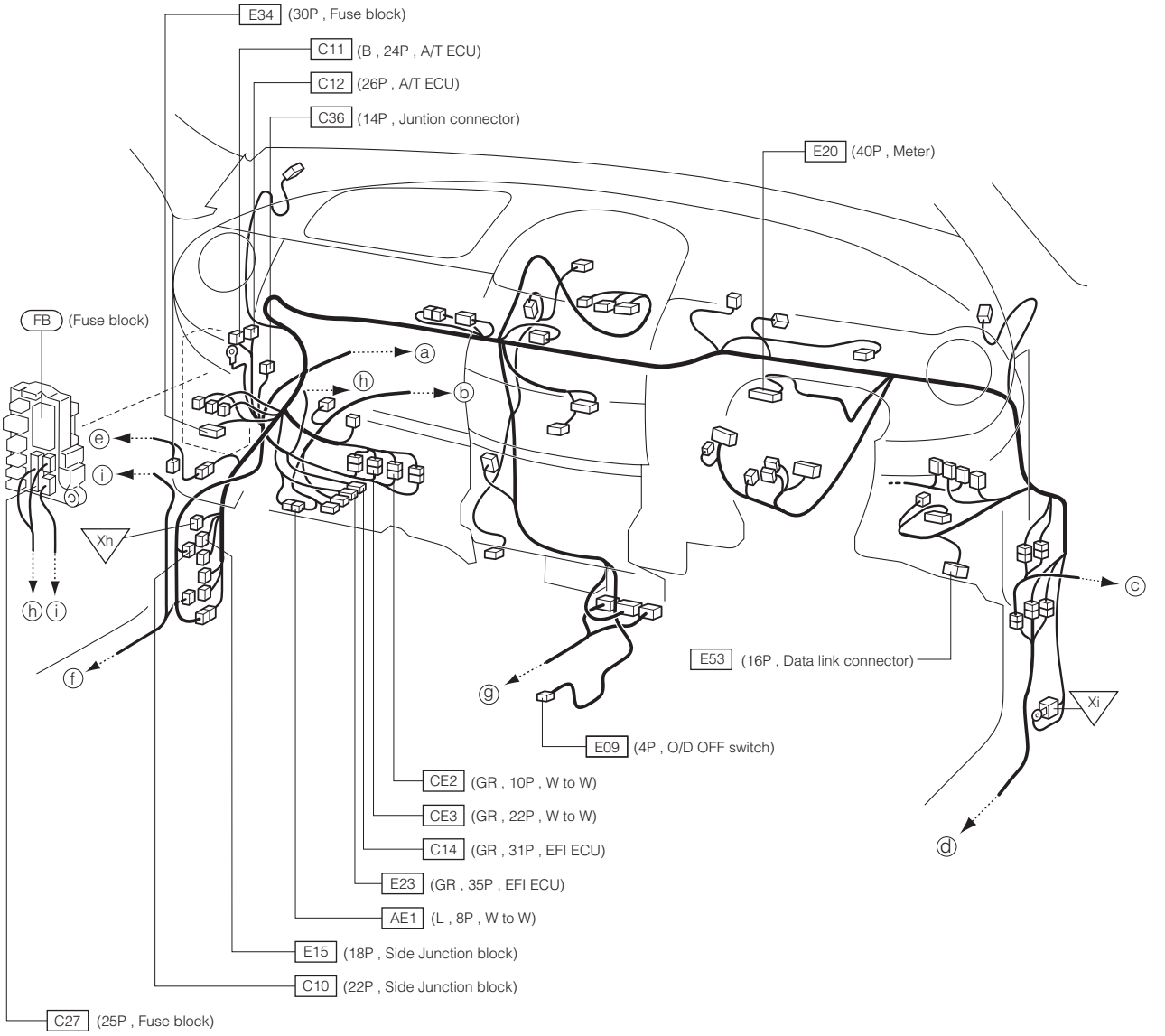




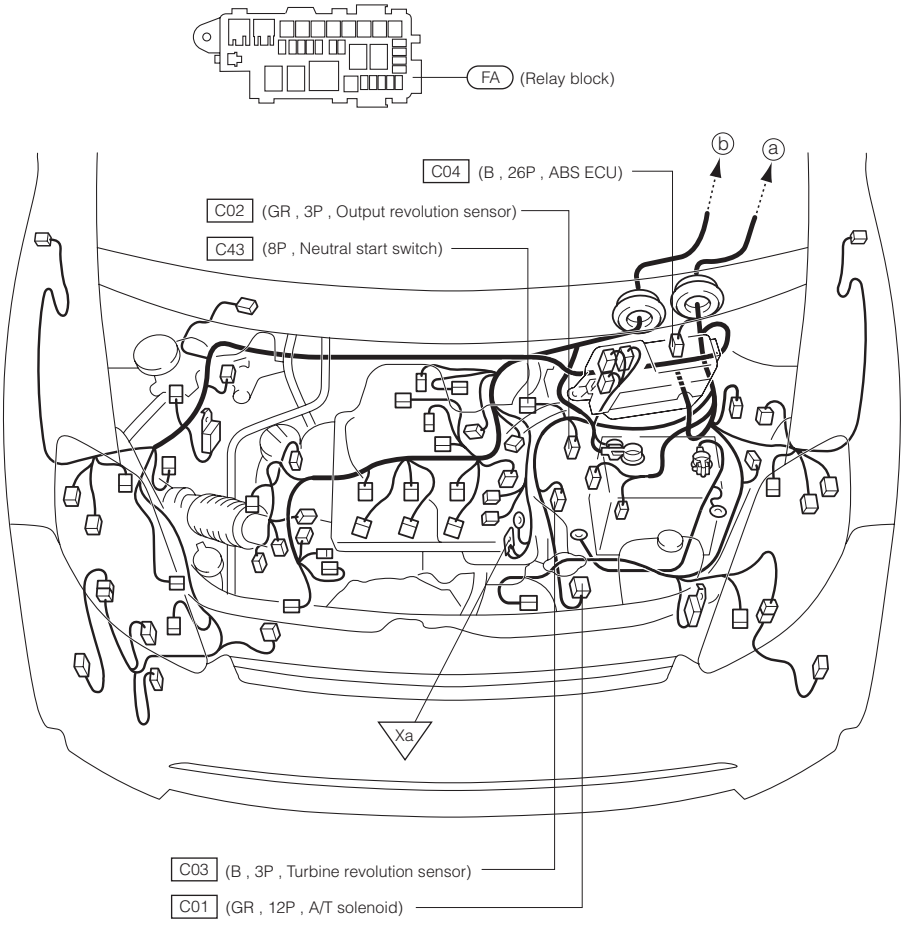
T11Q5188ES48


FB 10
ECU IG2, 7.5A
Fuse block
E34
E34
4
3
L-O
R-Y
3
E15
Side Junction block
C10
21
L-O
9
C11
+B1
ABS ECU
(With ABS)
LCAN
HCAN
C04
C04
19
17
W
B
(Twisted Pair wire)
68
37
C11
C11
CANL
CANH
EFI ECU
CANL
CANH
LCAN
HCAN
C14
C14
E23
E23
6
7
8
9
G
R
W
B
(Twisted Pair wire)
67
36
2
1
C11
C11
E20
E20
LCN1
HCN1
A/T ECU
RTBN
VBTB
ETBN
EOPT
VBOP
ROPT
E02
E1
E01
C12
C12
C12
C12
C12
C12
C11
C11
C11
26
25
58
56
23
24
11
72
12
W
L-B
P
L-R
L-Y
R
W-B
Gr
Gr
13
14
12
C36
C36
C36
2
1
3
3
1
2
C03
C03
C03
C02
C02
C02
C36
C36
C36
5
6
7
Turbine revolution sensor
Output revolution sensor
Gr
2
CE2
Gr
AE1
Gr
8
Xa
LCD
Meter ECU
O/D OFF
Meter
E20
E20
E20
4
3
18
G
R
(Twisted Pair wire)
Br
3
11
3
E53
E53
Xi
CANL
CANH
Data link connector

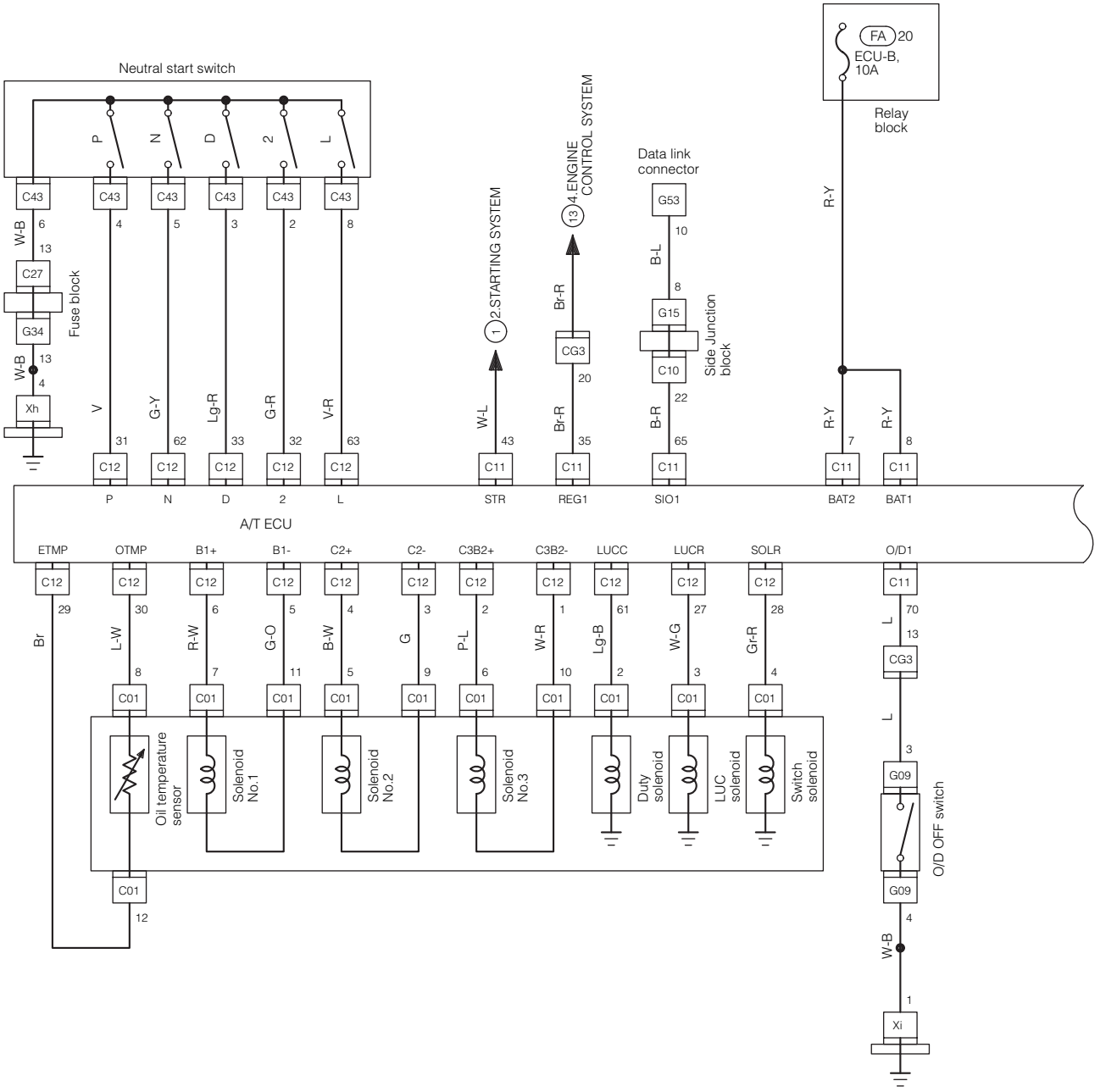

C11
C12
C14
C27
E20
E23
E34

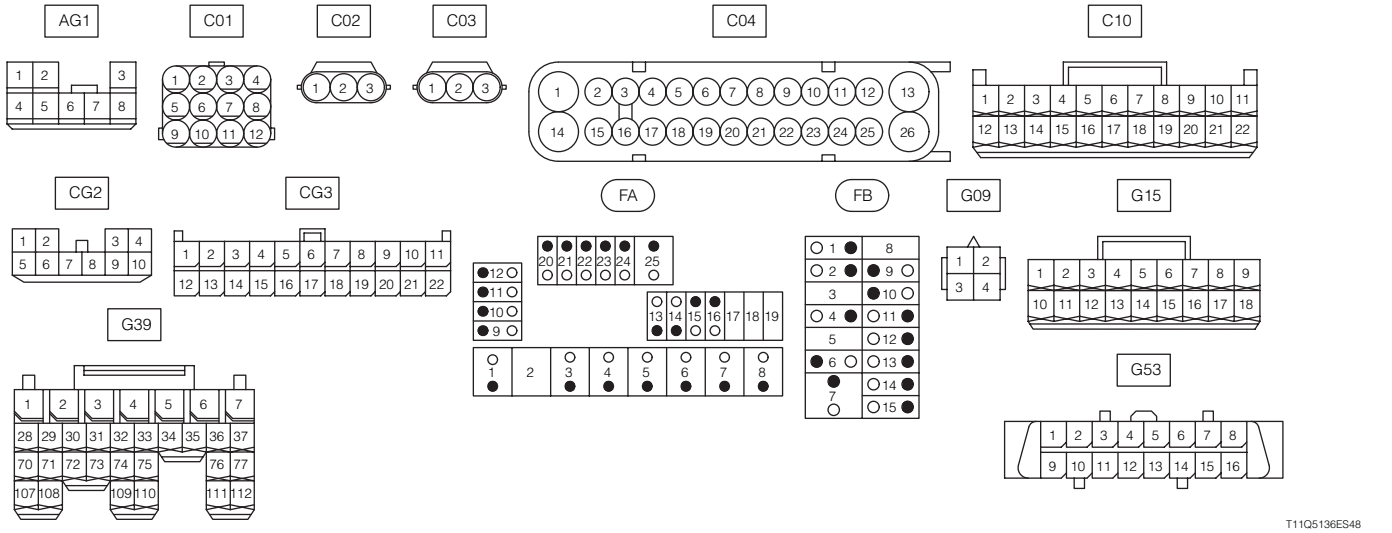


T11Q5032ES48

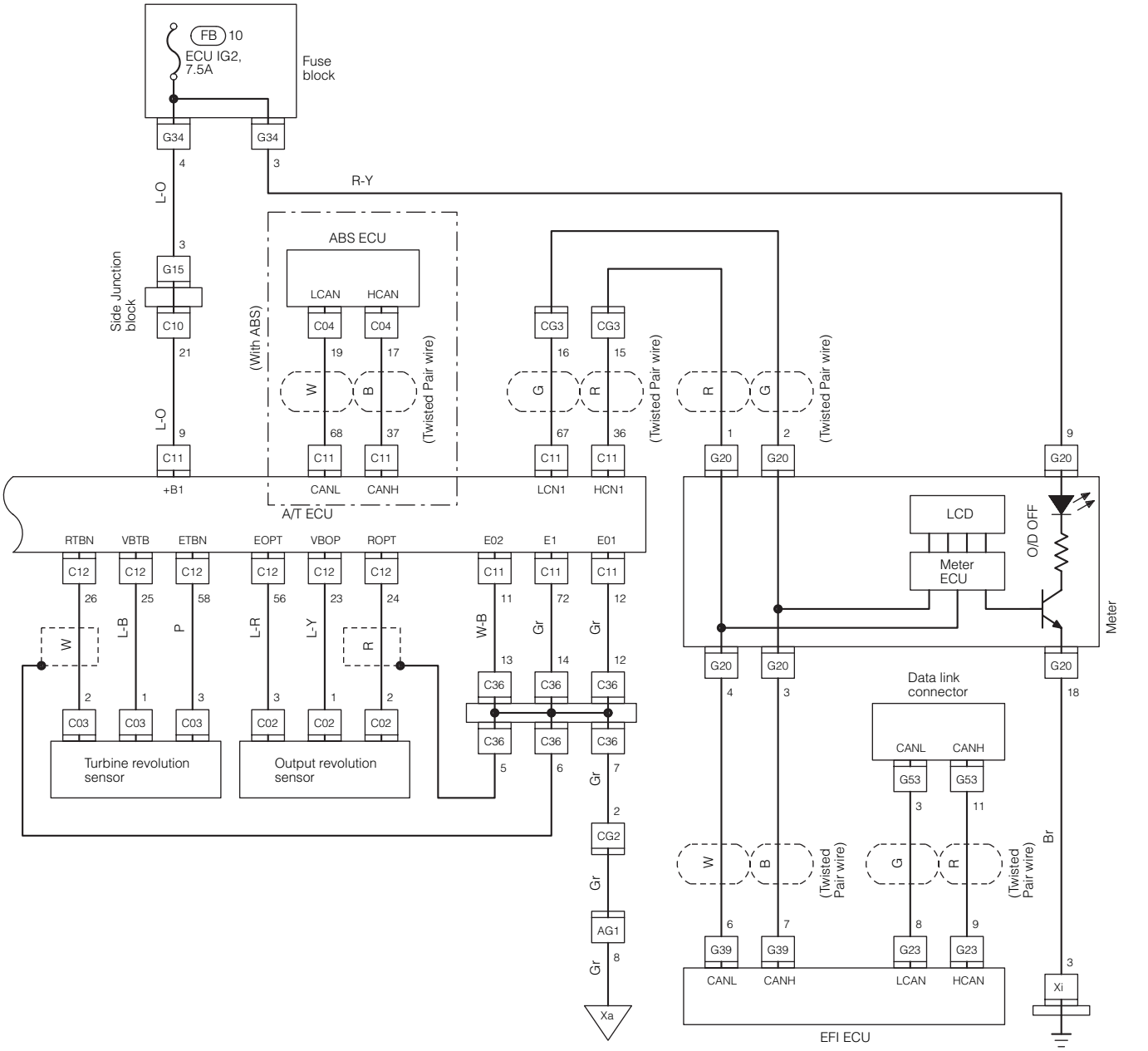

FA (Relay block)
b
a
C04 (B , 26P , ABS ECU)
C02 (GR , 3P , Output revolution sensor)
C43 (8P , Neutral start switch)
Xa
C03 (B , 3P , Turbine revolution sensor)
C01 (GR , 12P , A/T solenoid)

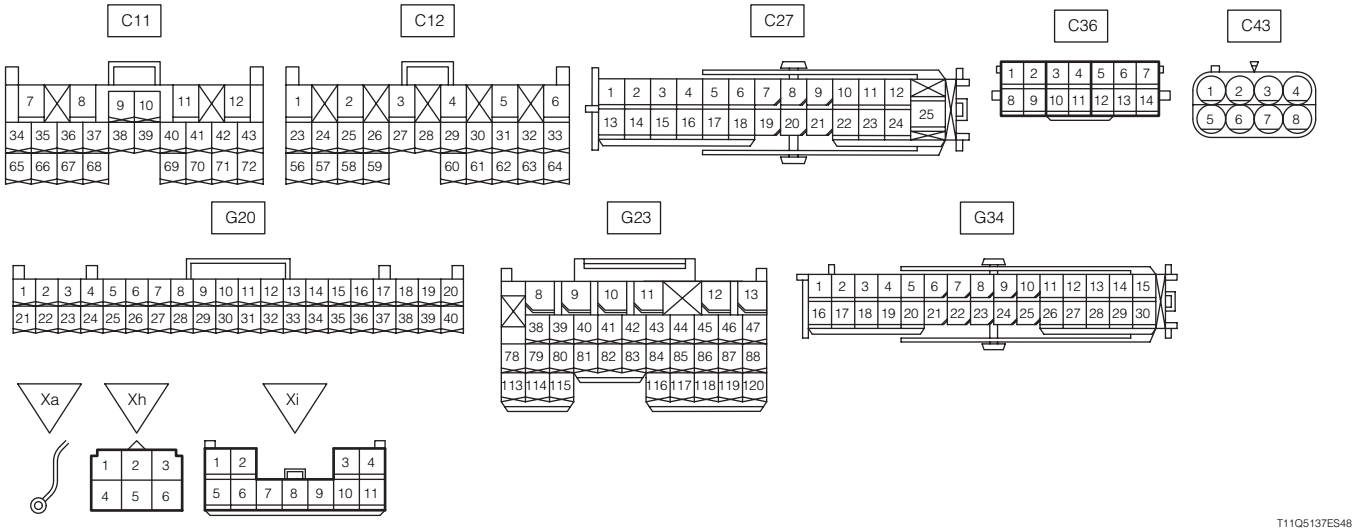
7-2 LHD VEHICLE



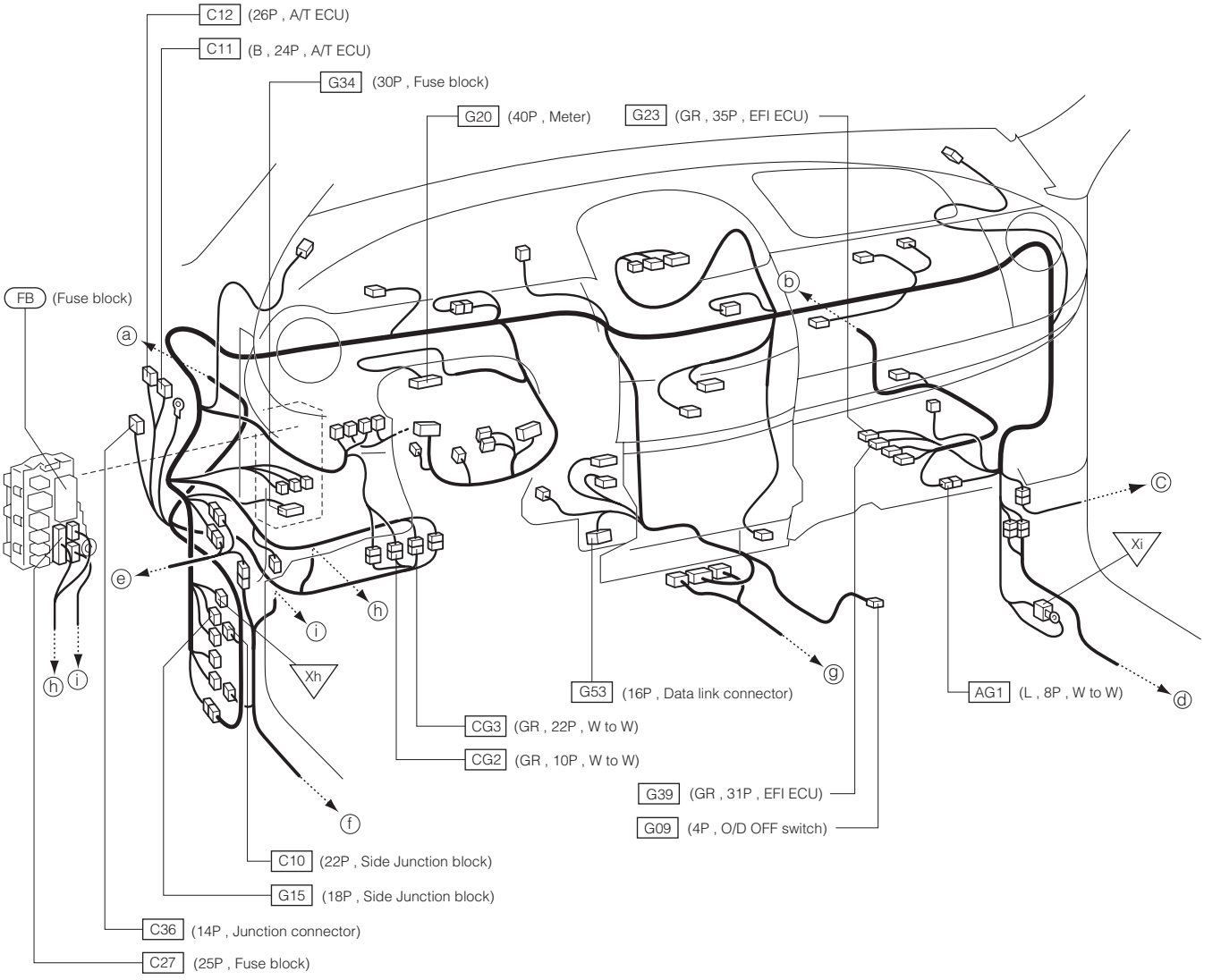


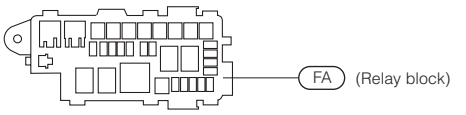
T11Q5136ES48

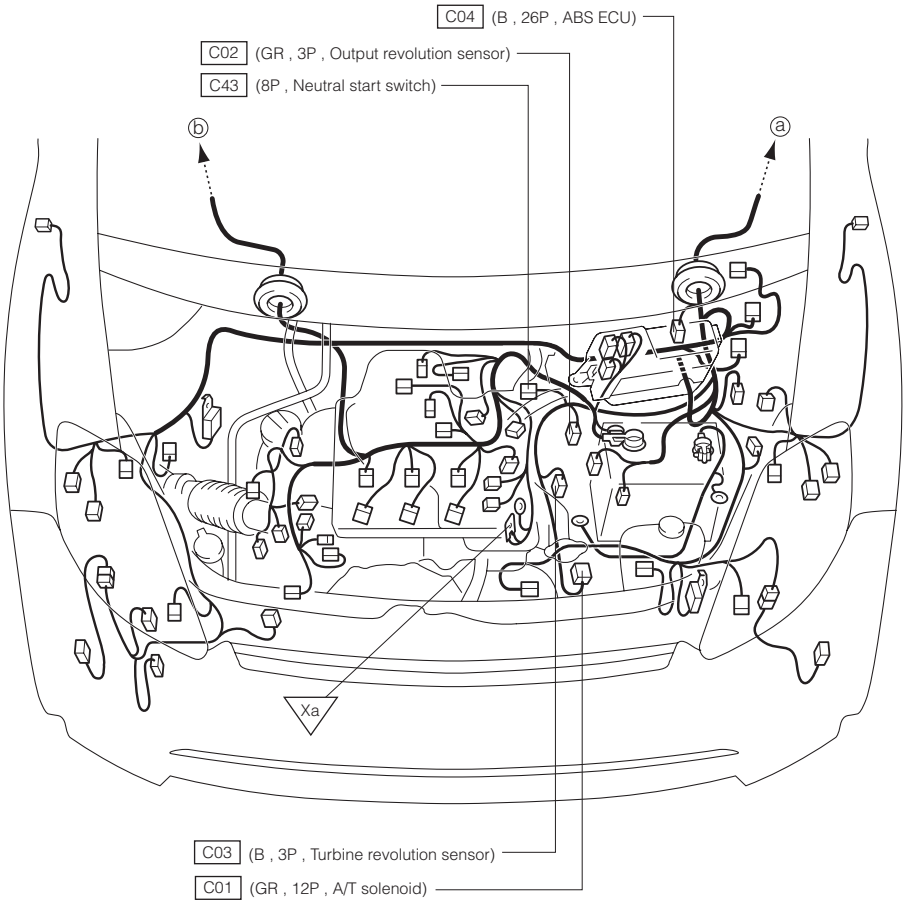




T11Q5137ES48

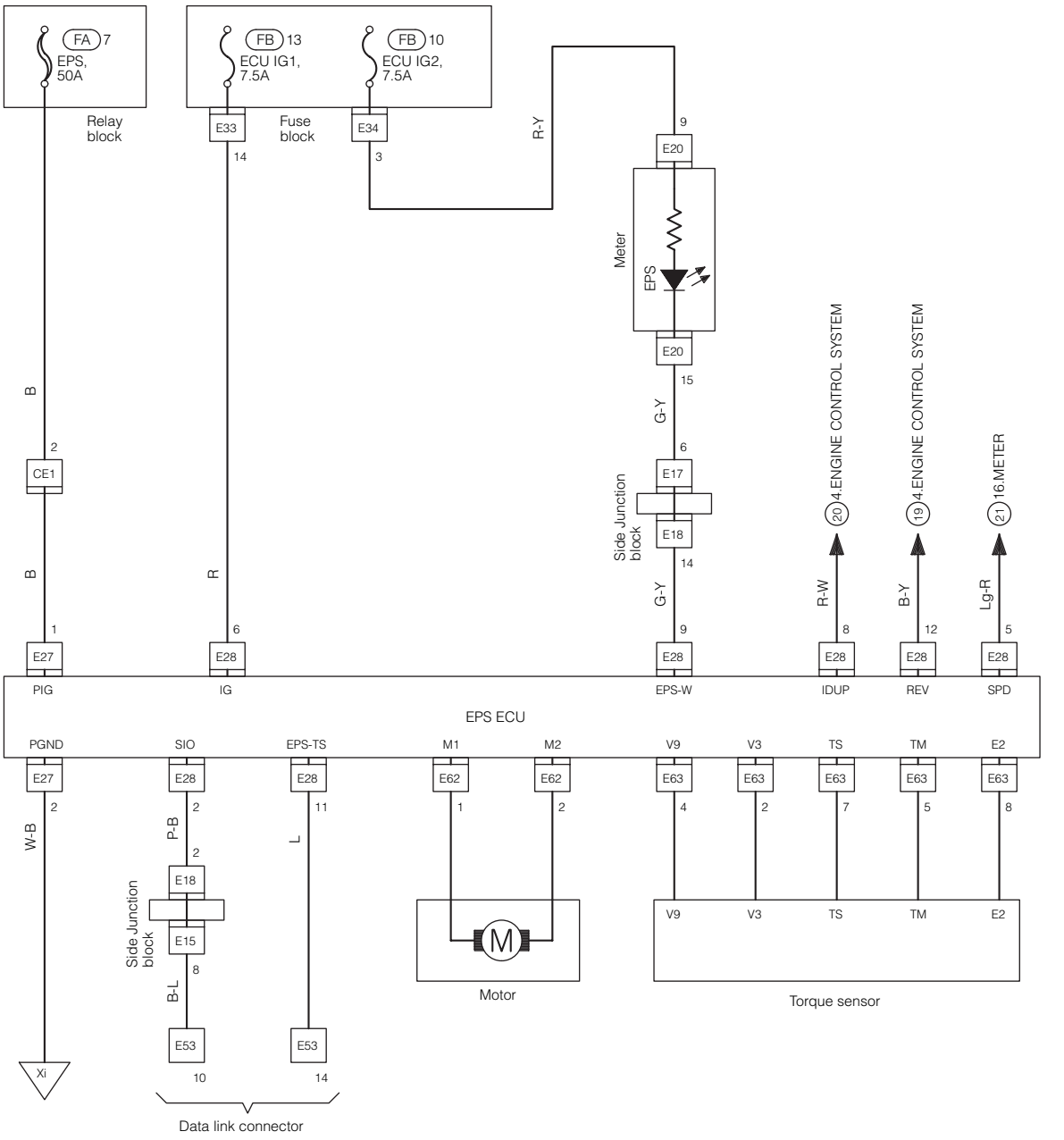

C12 (26P , A/T ECU)
C11 (B , 24P , A/T ECU)
G34 (30P , Fuse block)
G20 (40P , Meter)
G23 (GR , 35P , EFI ECU)
FB (Fuse block)
a
b
c
d
e
f
g
h
i
Xh
Xi
G53 (16P , Data link connector)
AG1 (L , 8P , W to W)
CG3 (GR , 22P , W to W)
CG2 (GR , 10P , W to W)
G39 (GR , 31P , EFI ECU)
G09 (4P , O/D OFF switch)
C10 (22P , Side Junction block)
G15 (18P , Side Junction block)
C36 (14P , Junction connector)
C27 (25P , Fuse block)

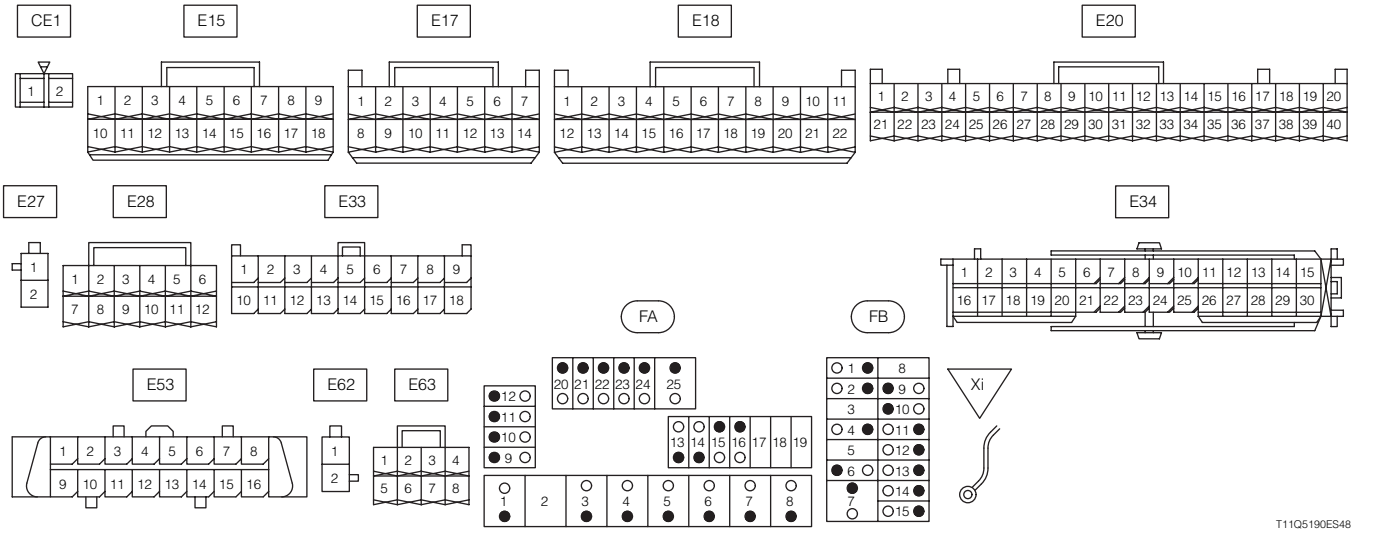

FA
(Relay block)


C04 (B , 26P , ABS ECU)
C02 (GR , 3P , Output revolution sensor)
C43 (8P , Neutral start switch)
ⓑ
ⓐ
Xa
C03 (B , 3P , Turbine revolution sensor)
C01 (GR , 12P , A/T solenoid)

8 ELECTRIC POWER STEERING

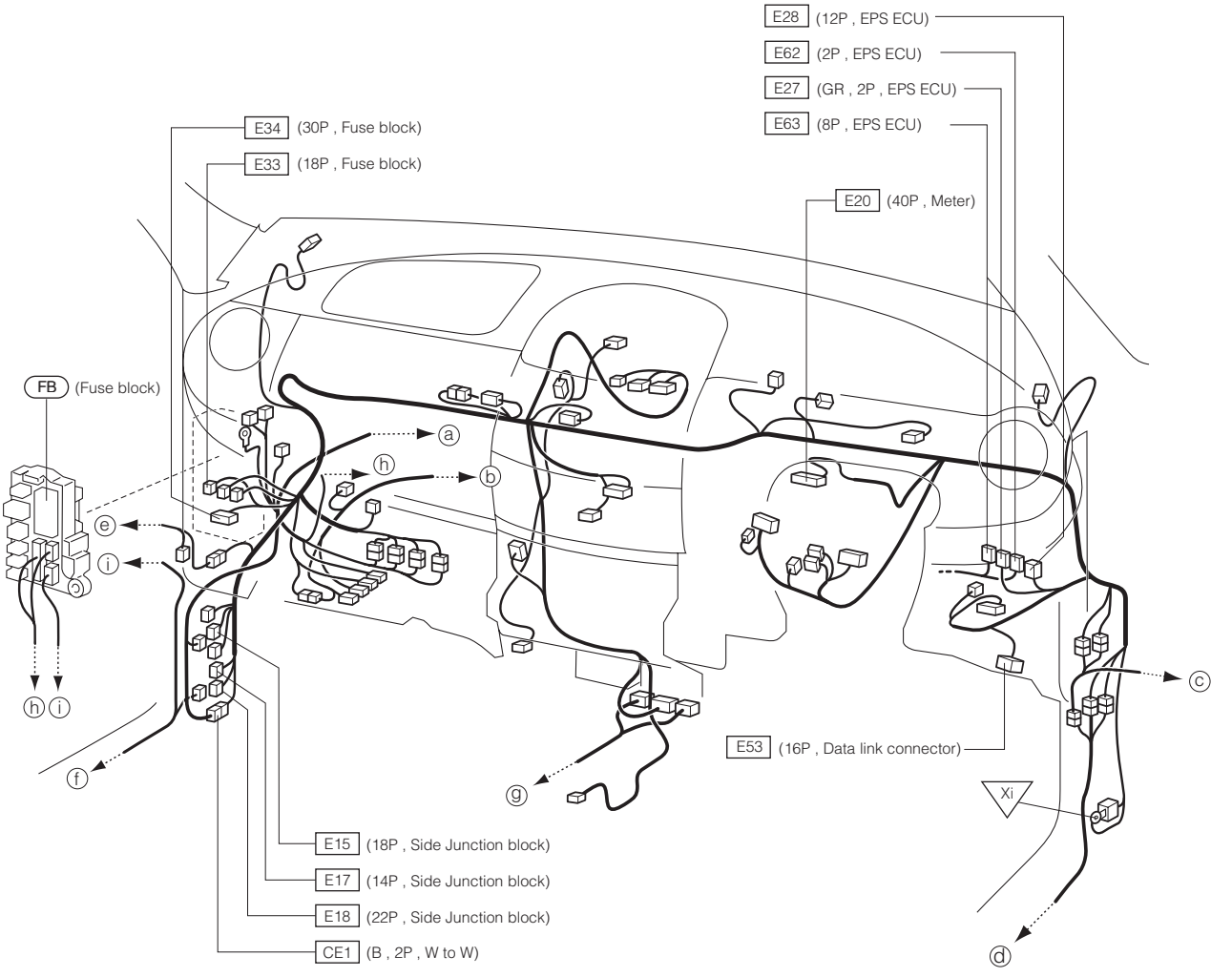
8-1 RHD VEHICLE

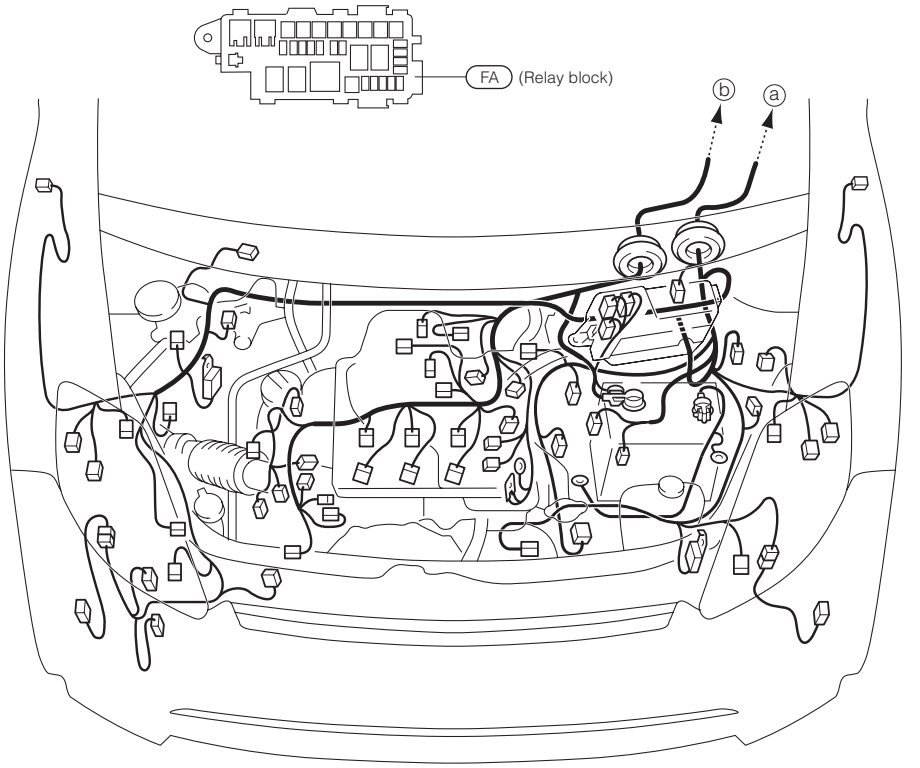




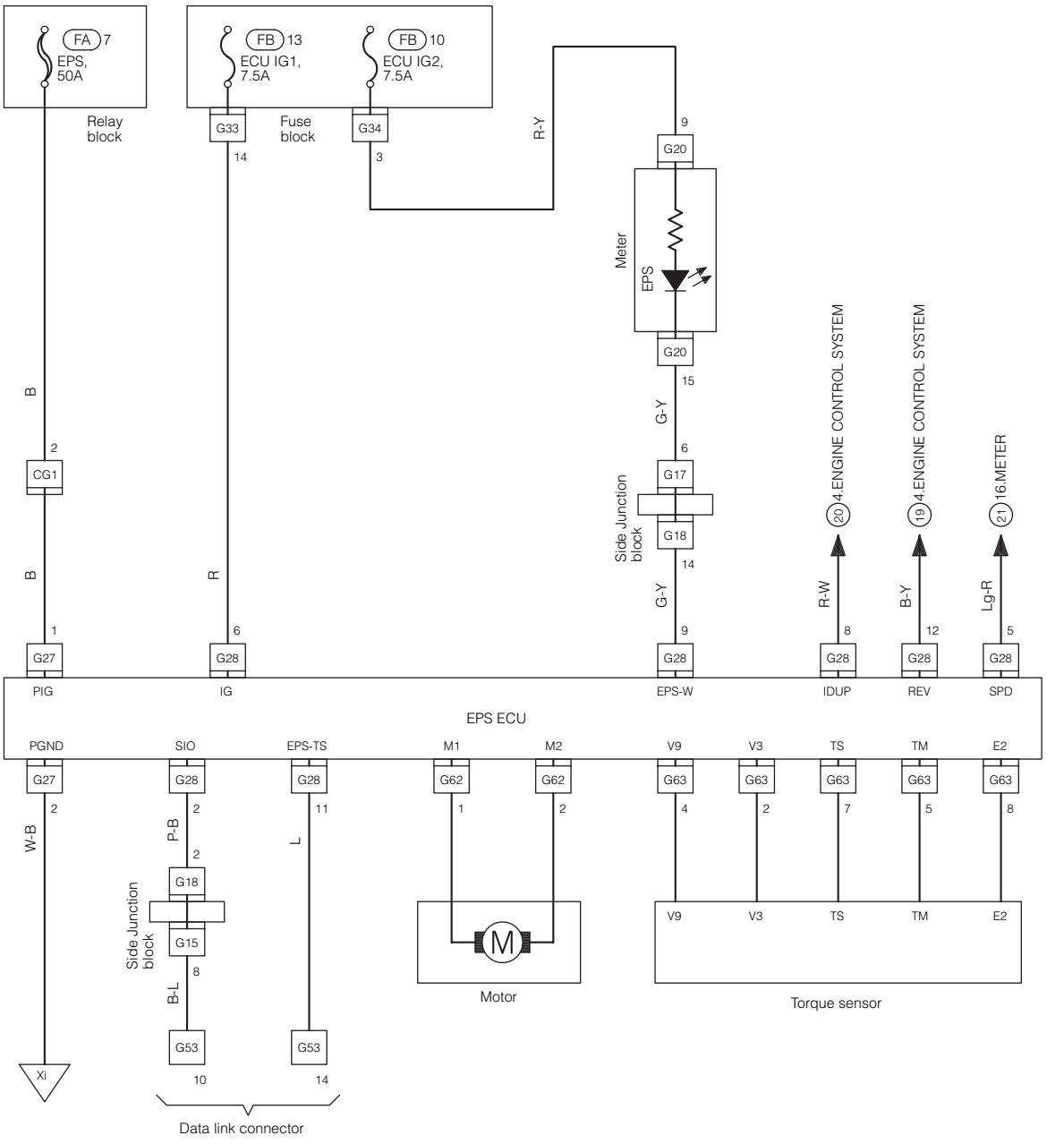
T11Q5190ES48

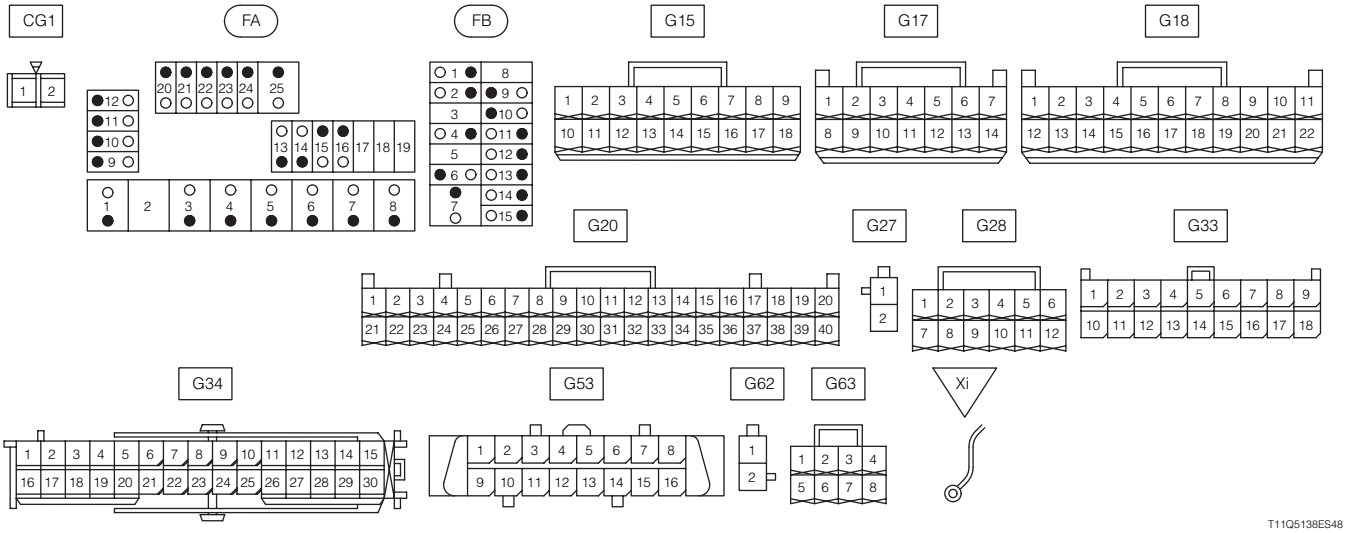
(MEMO)


E28 (12P , EPS ECU)
E62 (2P , EPS ECU)
E27 (GR , 2P , EPS ECU)
E63 (8P , EPS ECU)
E34 (30P , Fuse block)
E33 (18P , Fuse block)
E20 (40P , Meter)
FB (Fuse block)
a
b
c
d
e
f
g
h
i
E53 (16P , Data link connector)
Xi
E15 (18P , Side Junction block)
E17 (14P , Side Junction block)
E18 (22P , Side Junction block)
CE1 (B , 2P , W to W)


FA
(Relay block)
b
a

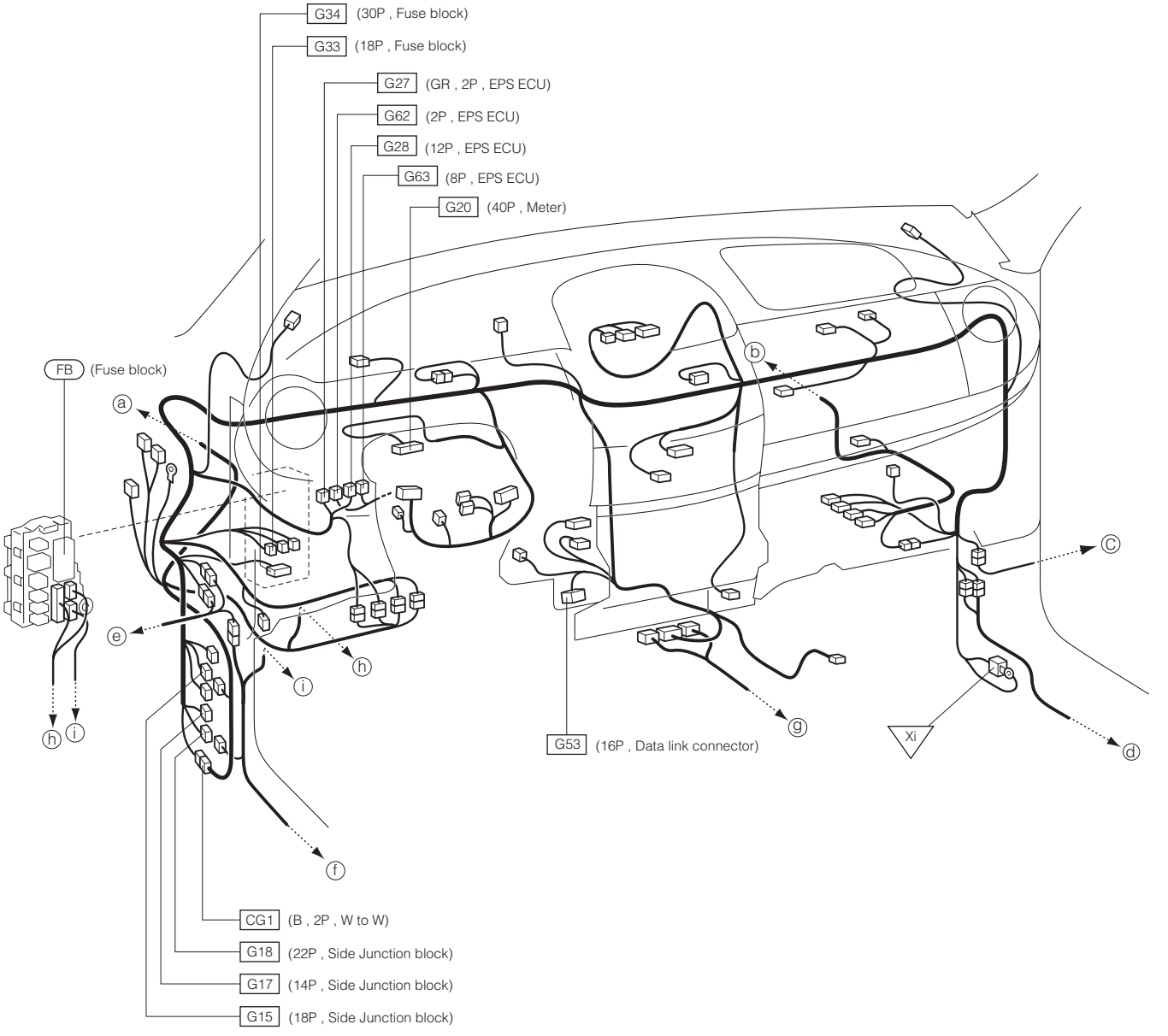
8-2 LHD VEHICLE

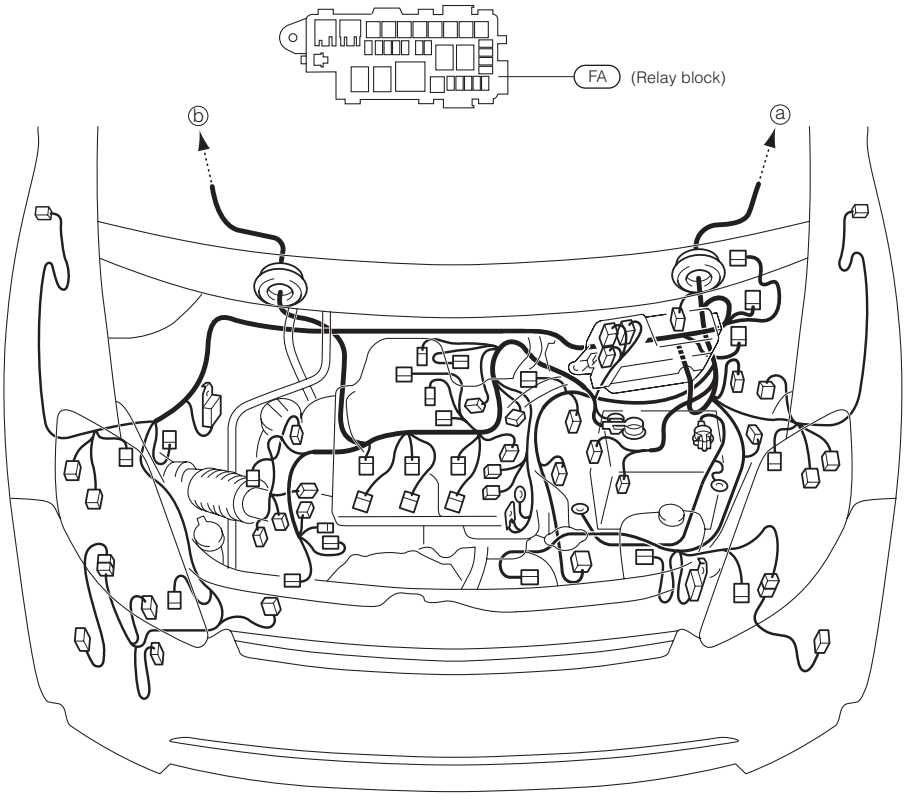




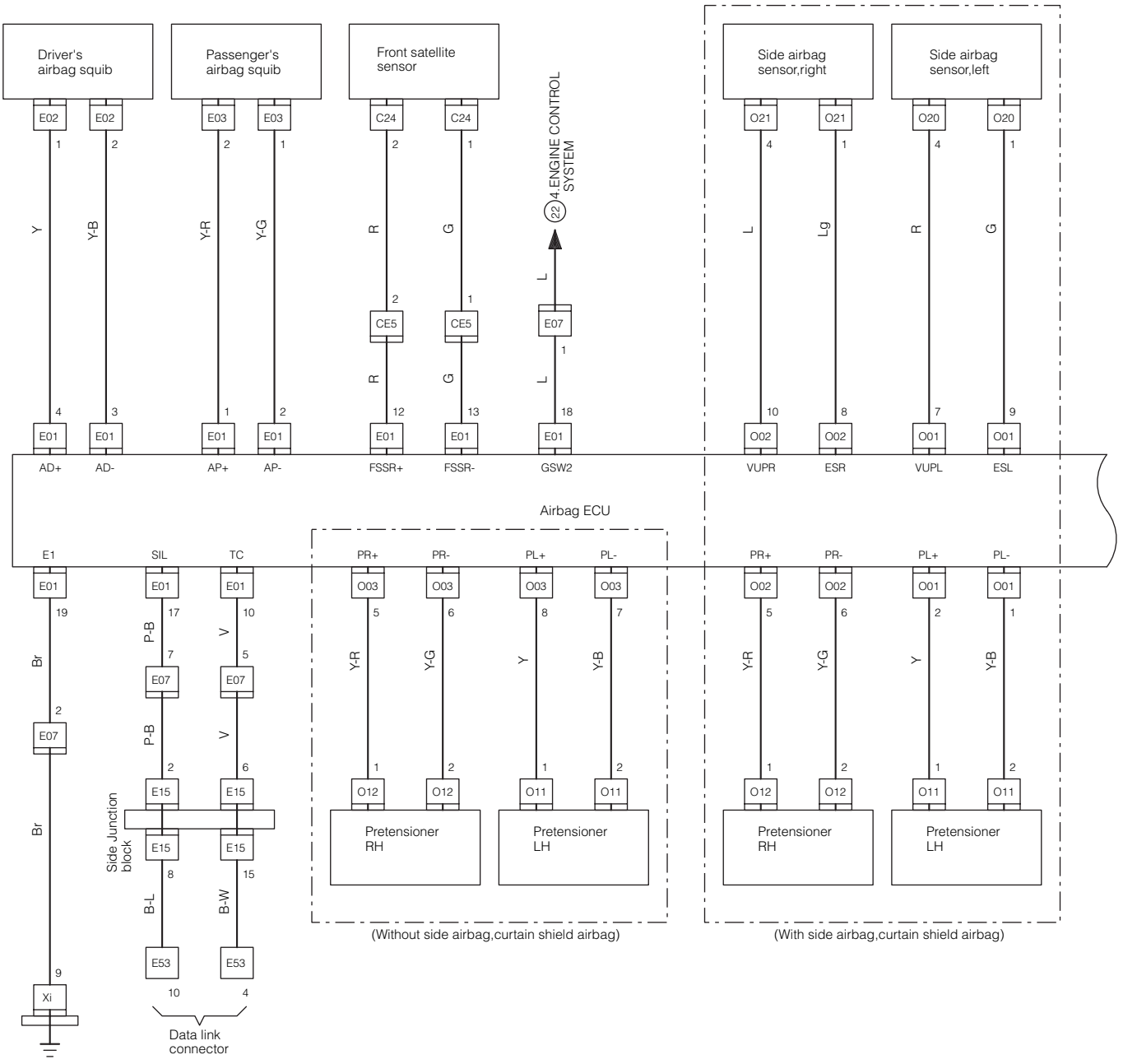
T11Q5138ES48

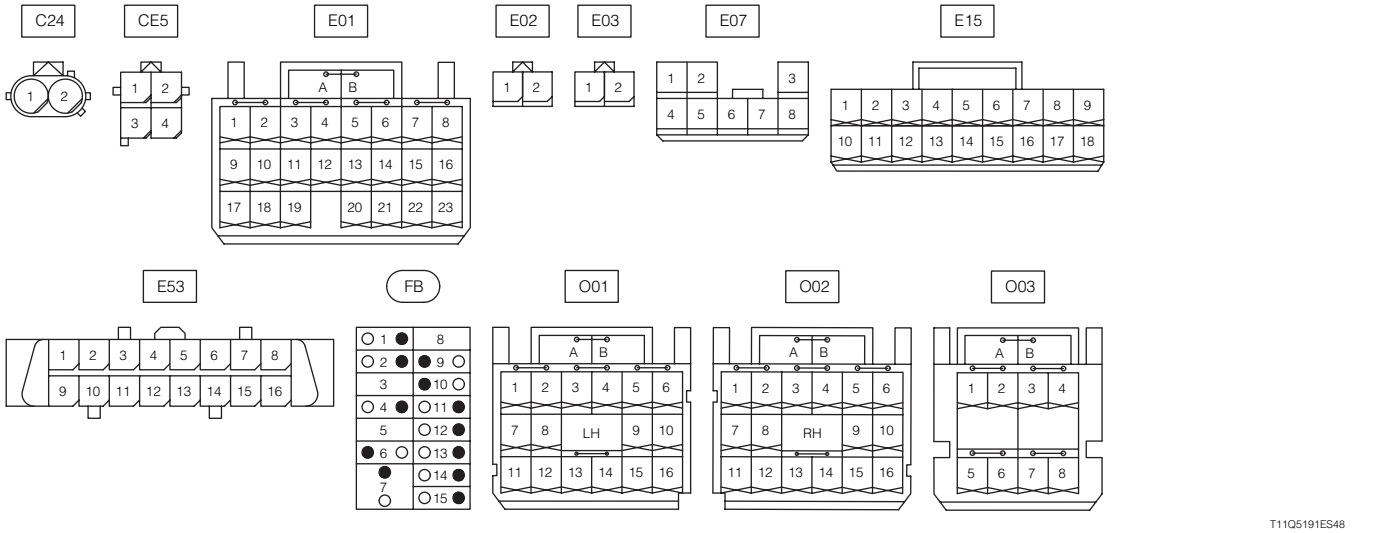
(MEMO)


G34 (30P , Fuse block)
G33 (18P , Fuse block)
G27 (GR , 2P , EPS ECU)
G62 (2P , EPS ECU)
G28 (12P , EPS ECU)
G63 (8P , EPS ECU)
G20 (40P , Meter)
FB (Fuse block)
a
b
c
d
e
f
g
h
i
Xi
G53 (16P , Data link connector)
CG1 (B , 2P , W to W)
G18 (22P , Side Junction block)
G17 (14P , Side Junction block)
G15 (18P , Side Junction block)

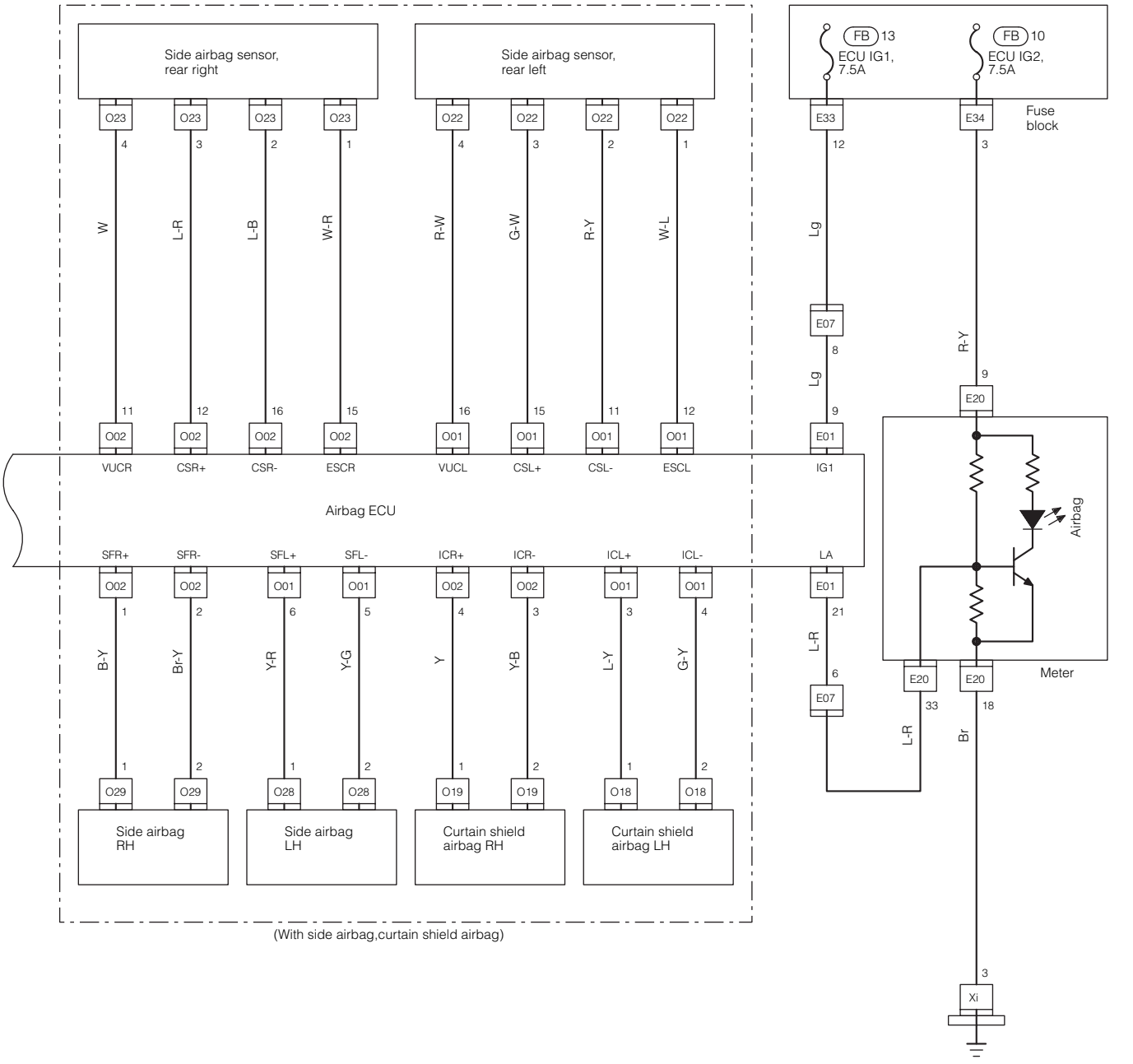

FA
(Relay block)
ⓑ
ⓐ

9 SRS AIRBAG SYSTEM
9-1 RHD VEHICLE

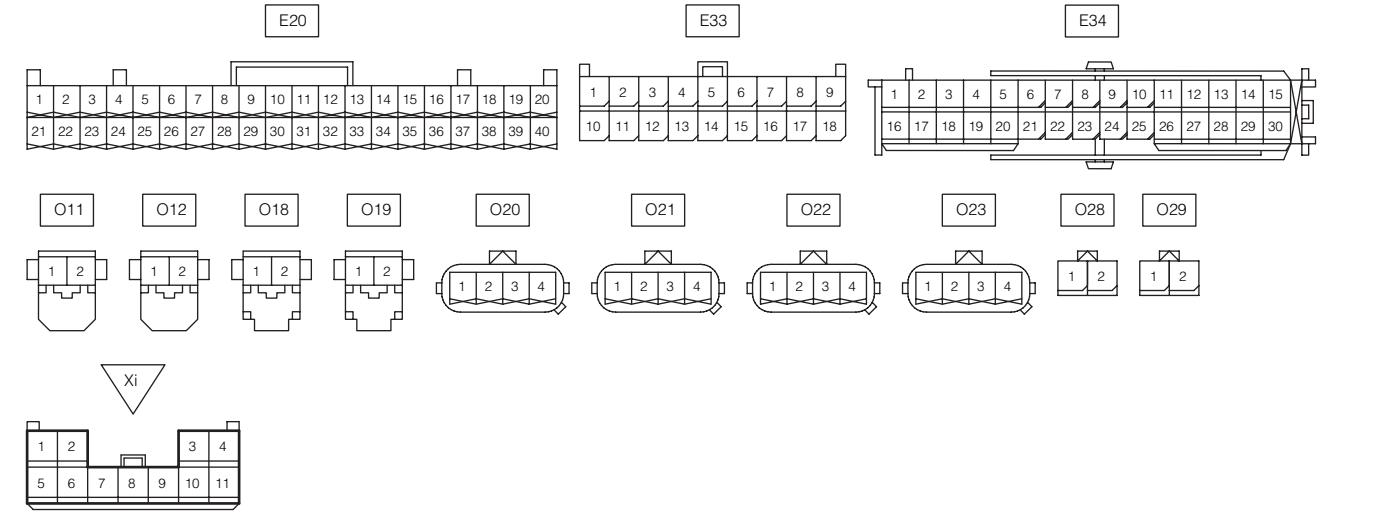




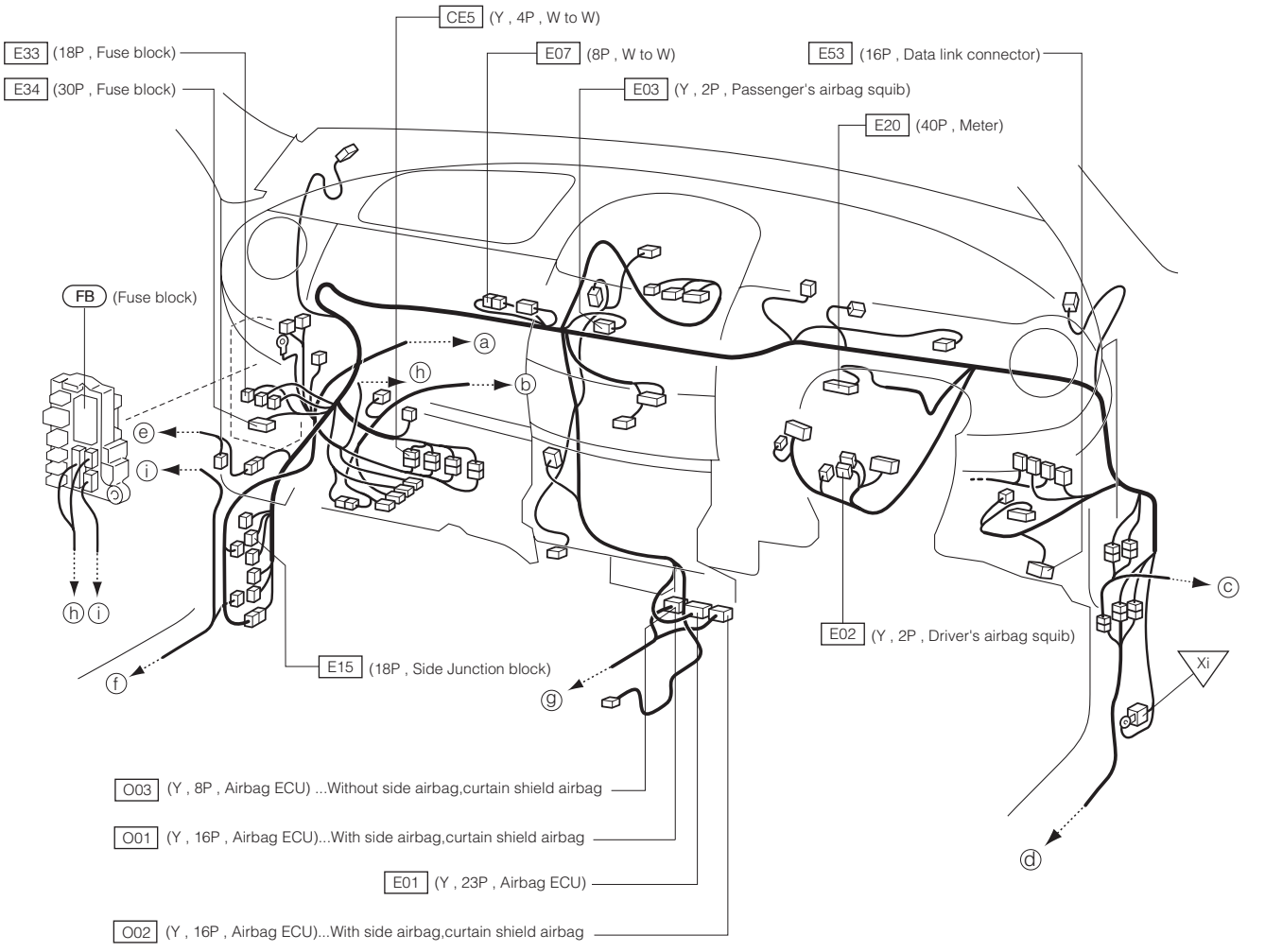
T11Q5191ES48



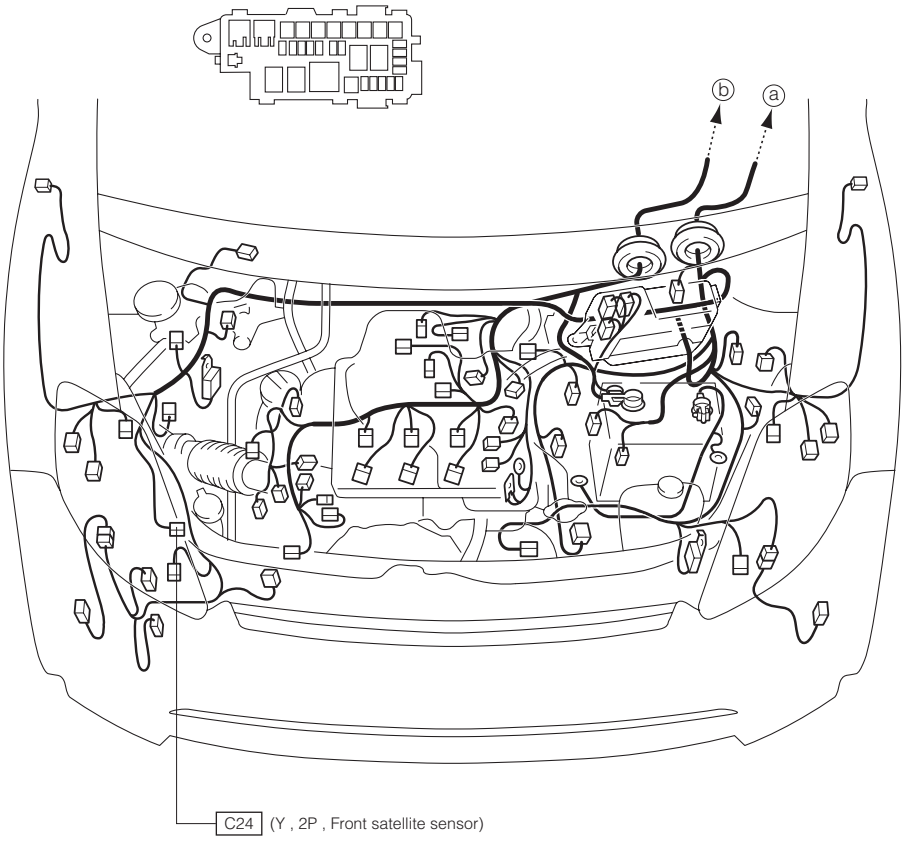
(With side airbag,curtain shield airbag)

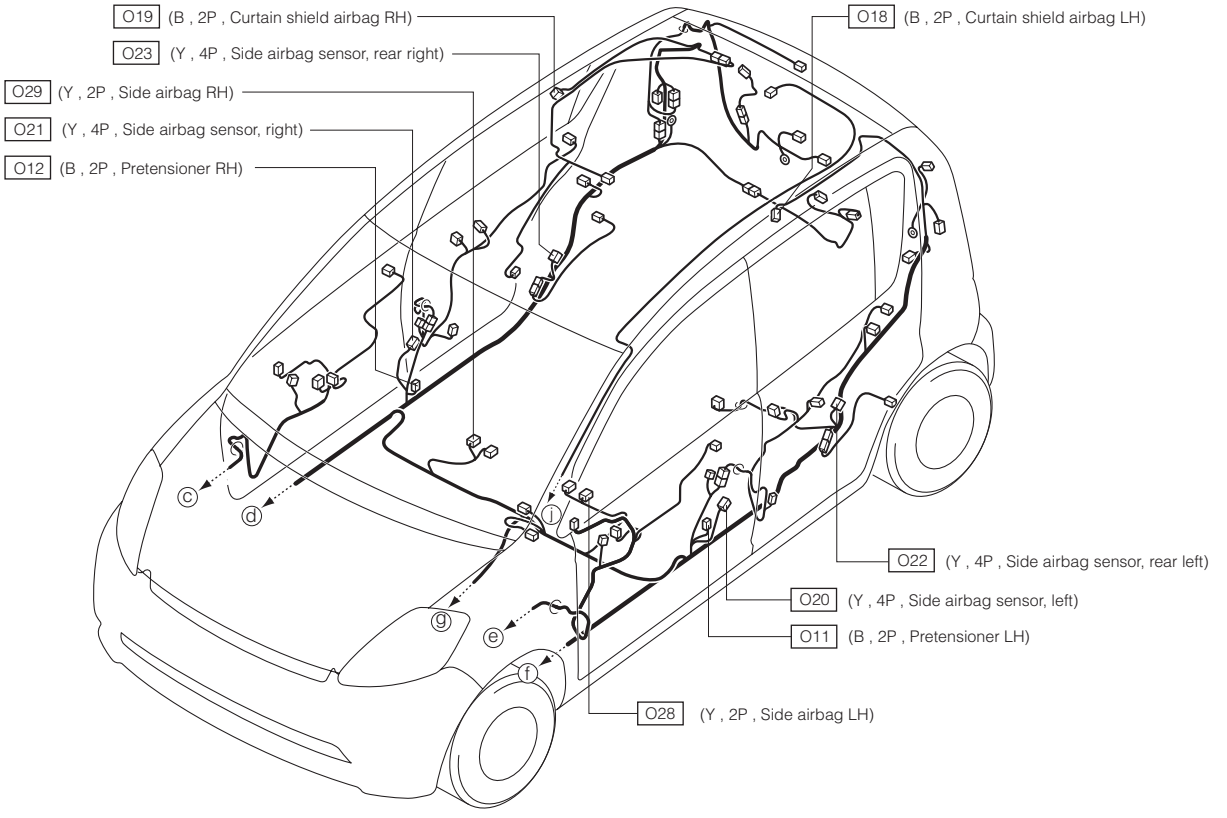


T11Q5192ES48



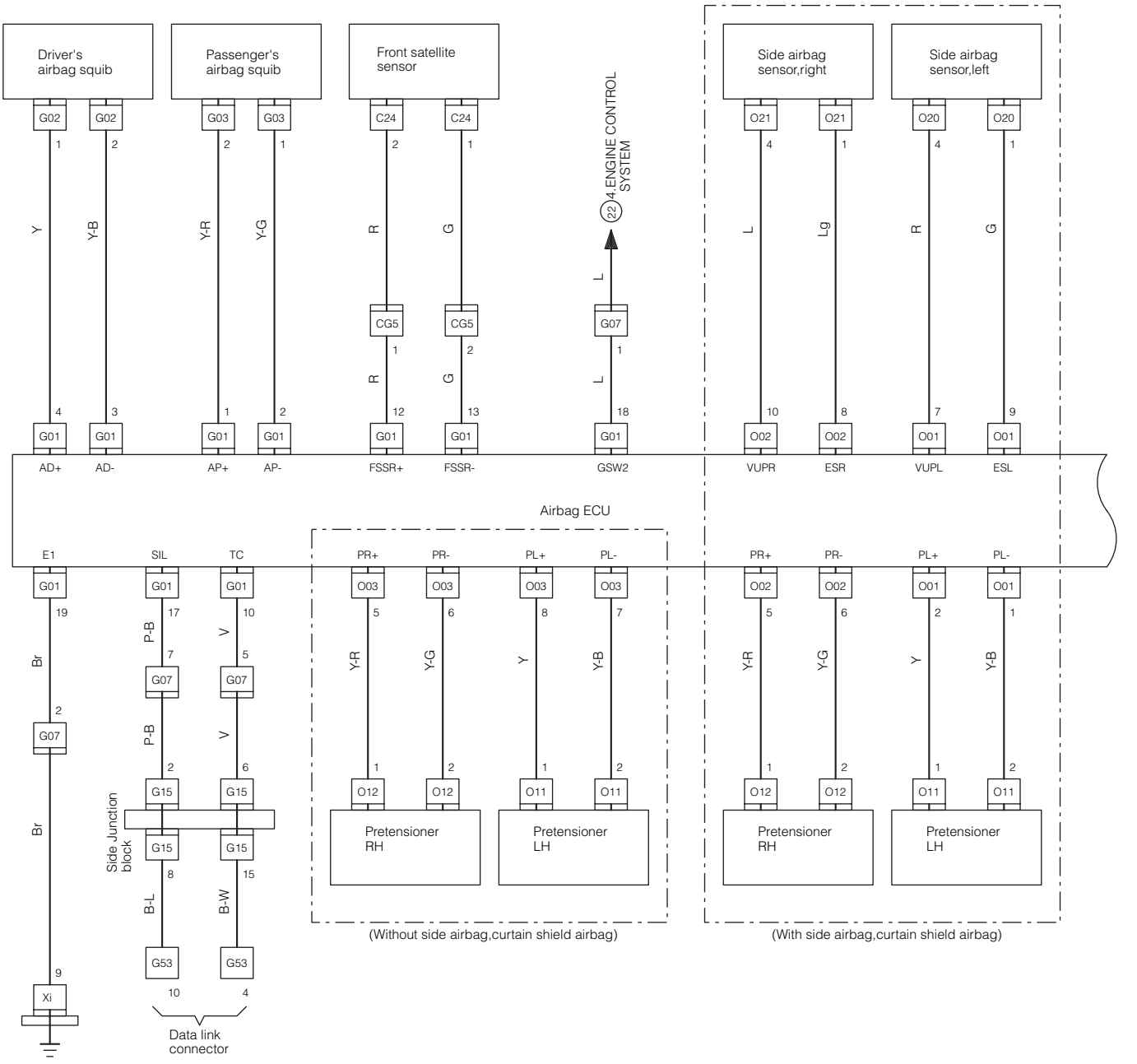
T11Q5040ES48

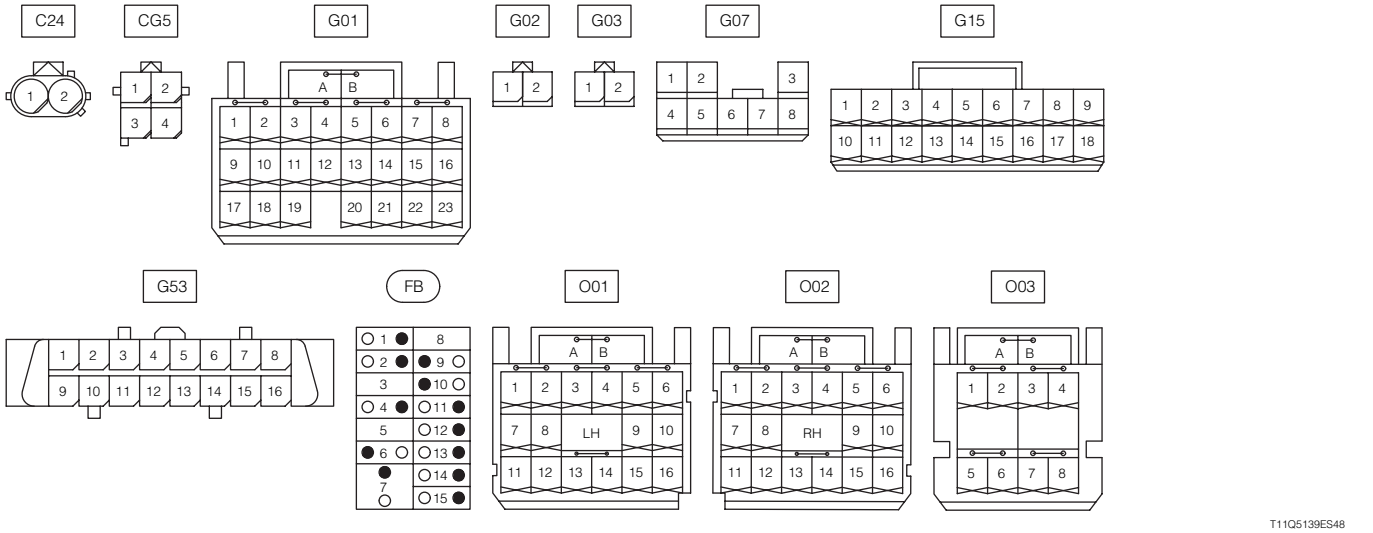




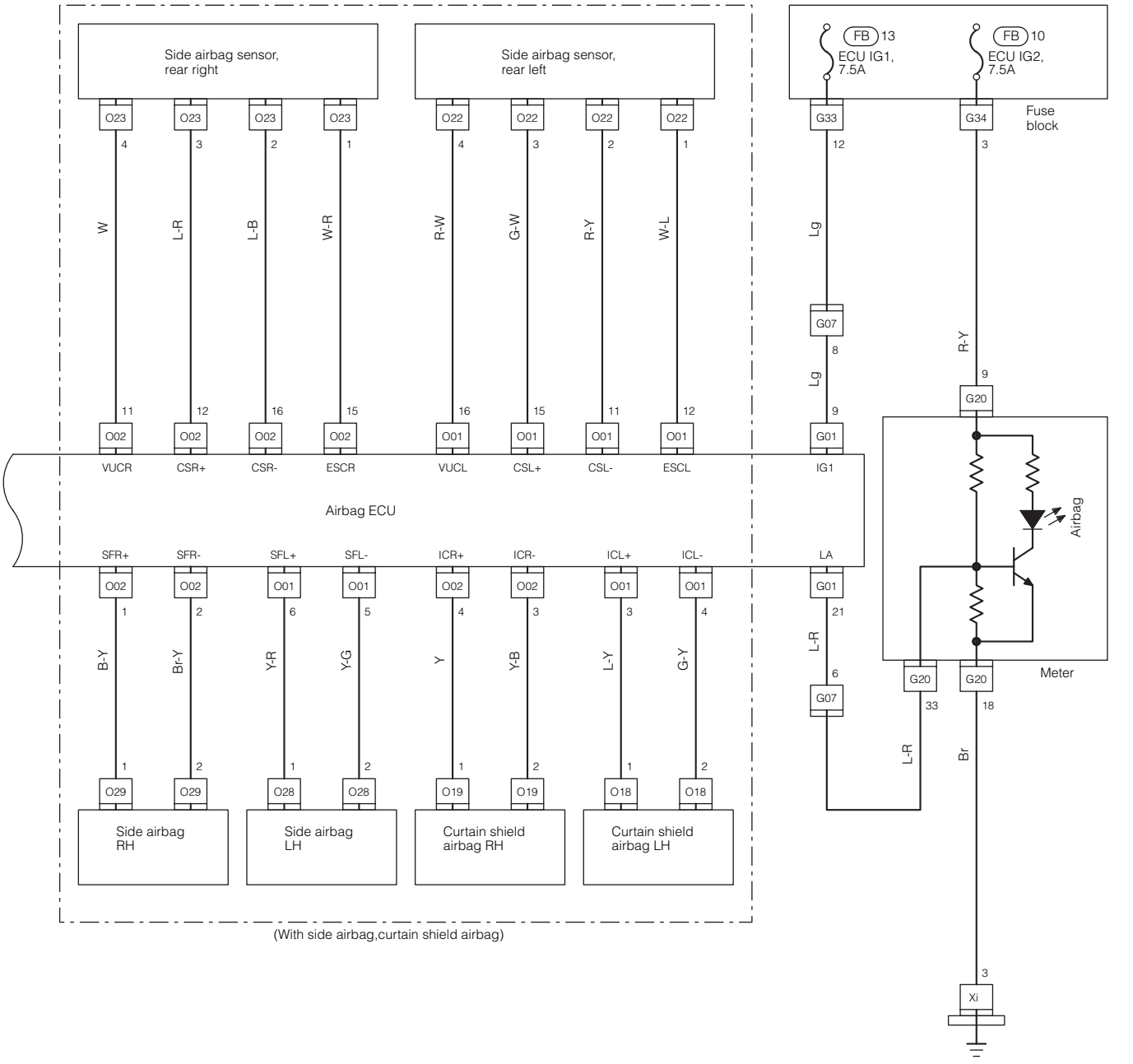
T11Q5038ES48

9-2 LHD VEHICLE

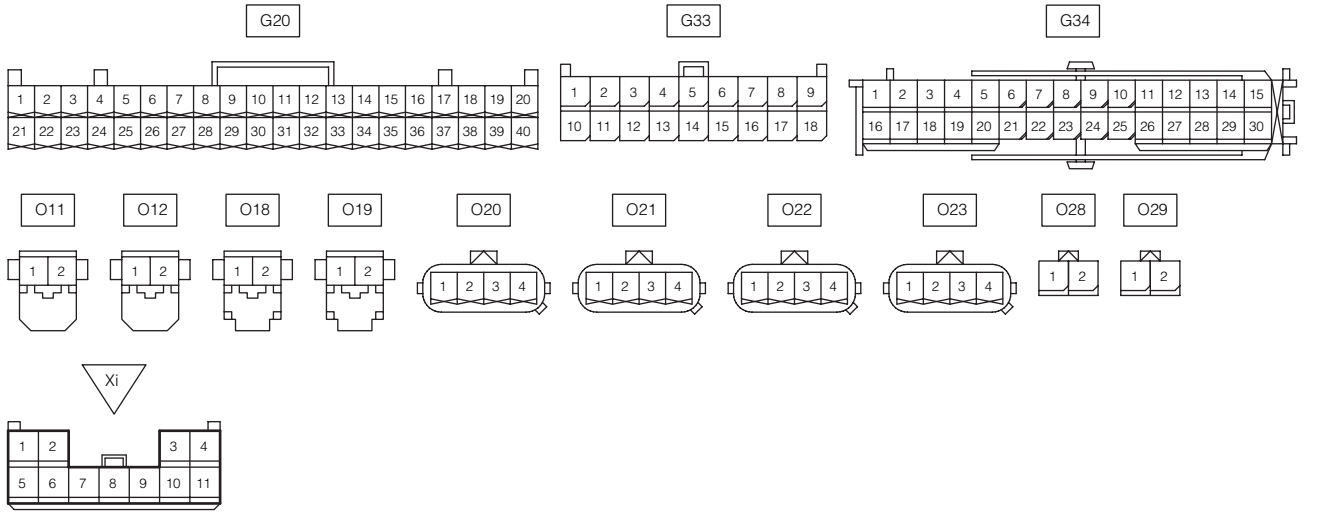




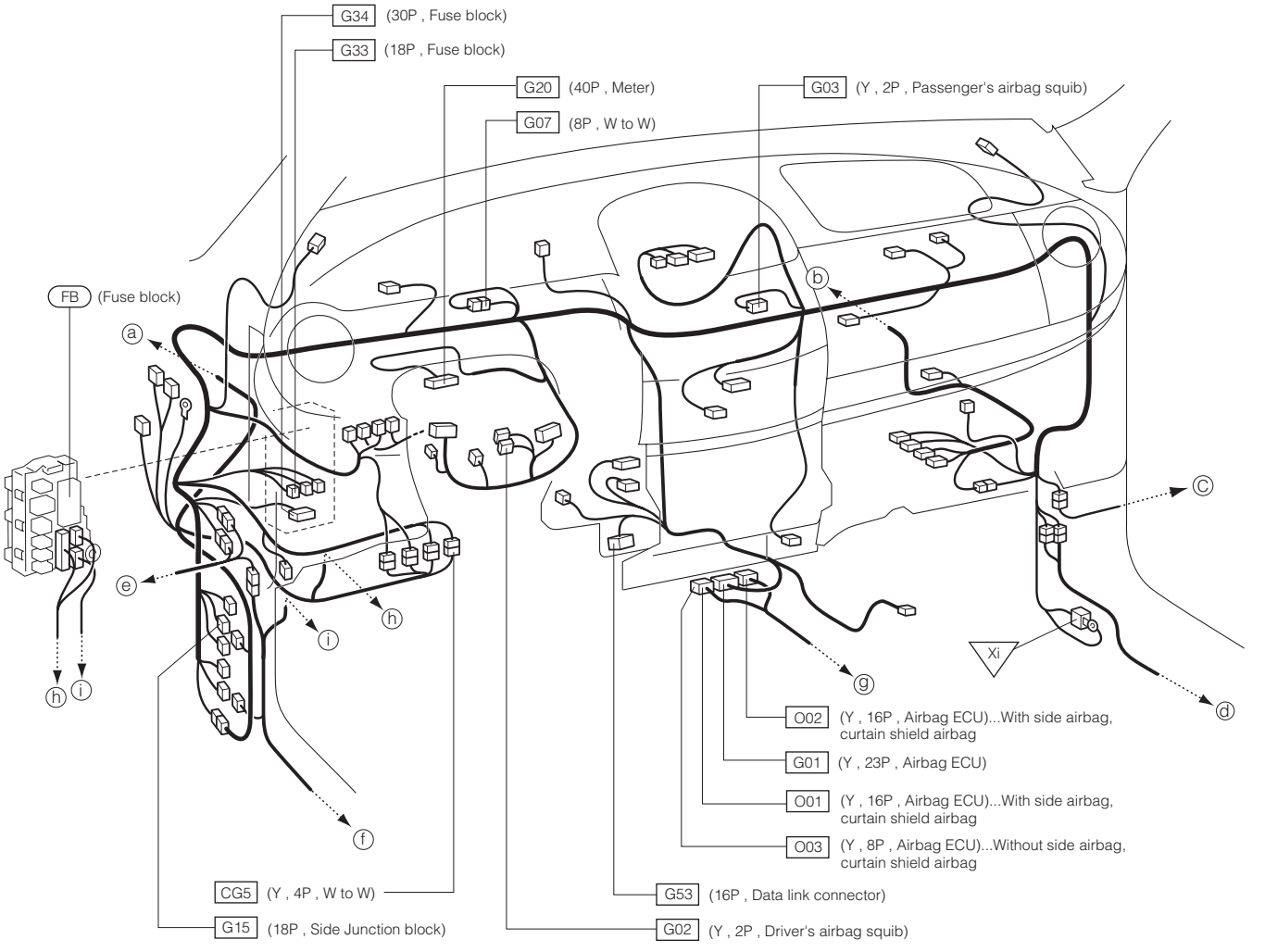
T11Q5139ES48

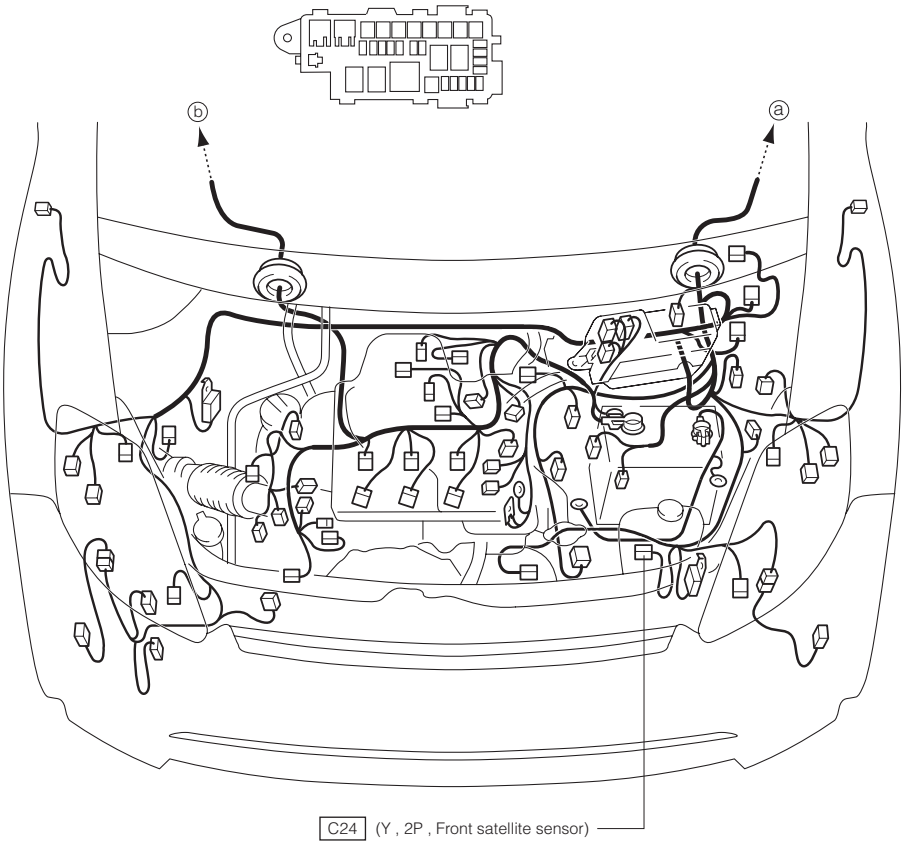


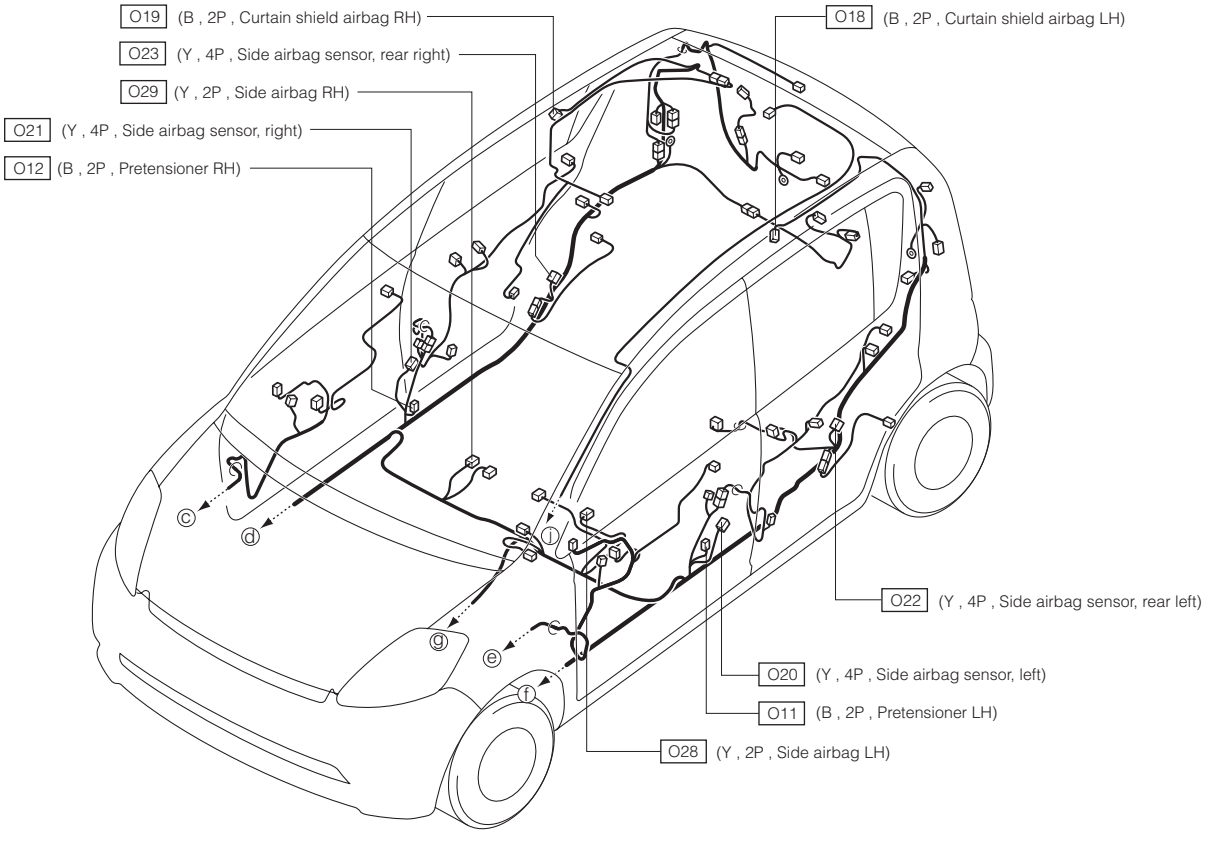
(With side airbag,curtain shield airbag)



T11Q5140ES48

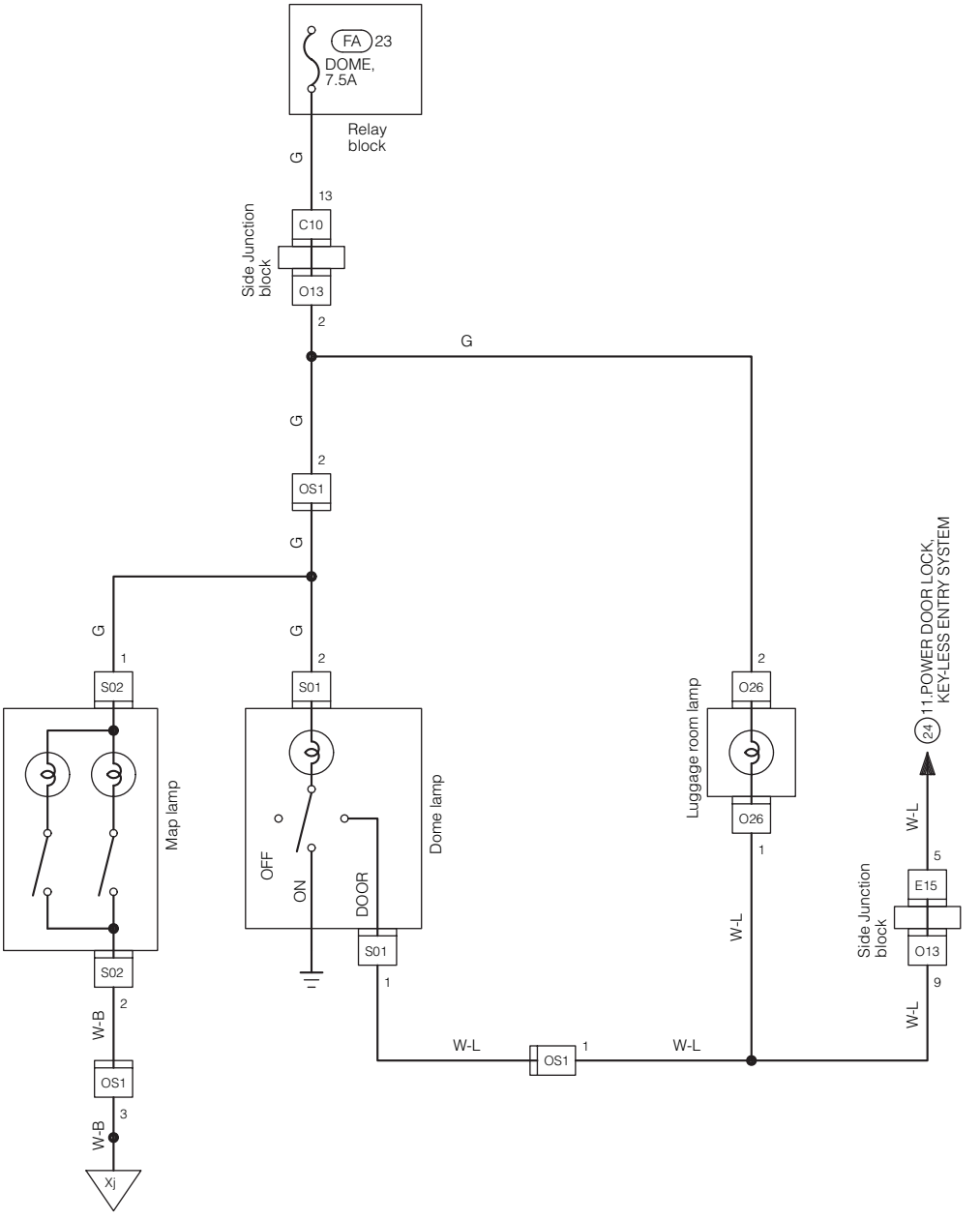

G34 (30P , Fuse block)
G33 (18P , Fuse block)
G20 (40P , Meter)
G07 (8P , W to W)
G03 (Y , 2P , Passenger's airbag squib)
FB (Fuse block)
a
b
c
d
e
f
g
h
i
Xi
O02 (Y , 16P , Airbag ECU)...With side airbag, curtain shield airbag
G01 (Y , 23P , Airbag ECU)
O01 (Y , 16P , Airbag ECU)...With side airbag, curtain shield airbag
O03 (Y , 8P , Airbag ECU)...Without side airbag, curtain shield airbag
CG5 (Y , 4P , W to W)
G15 (18P , Side Junction block)
G53 (16P , Data link connector)
G02 (Y , 2P , Driver's airbag squib)

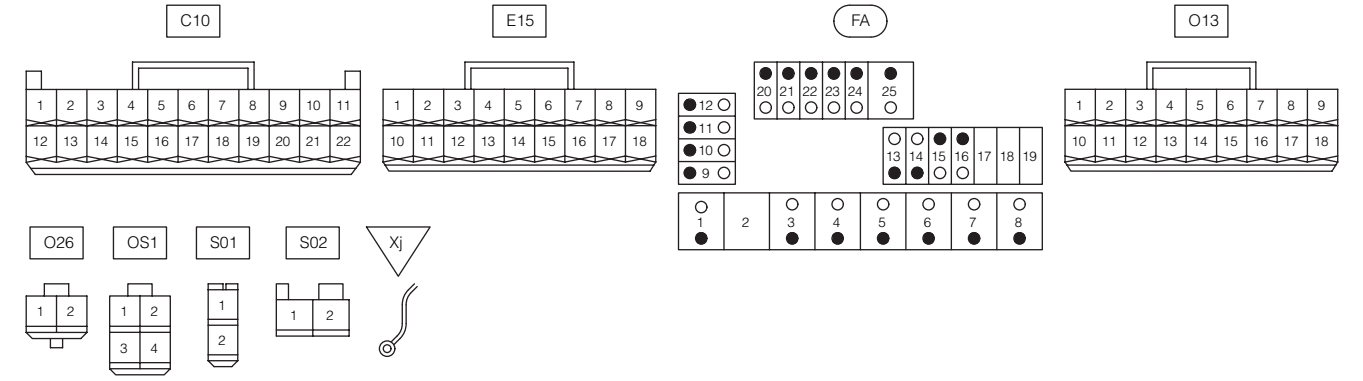




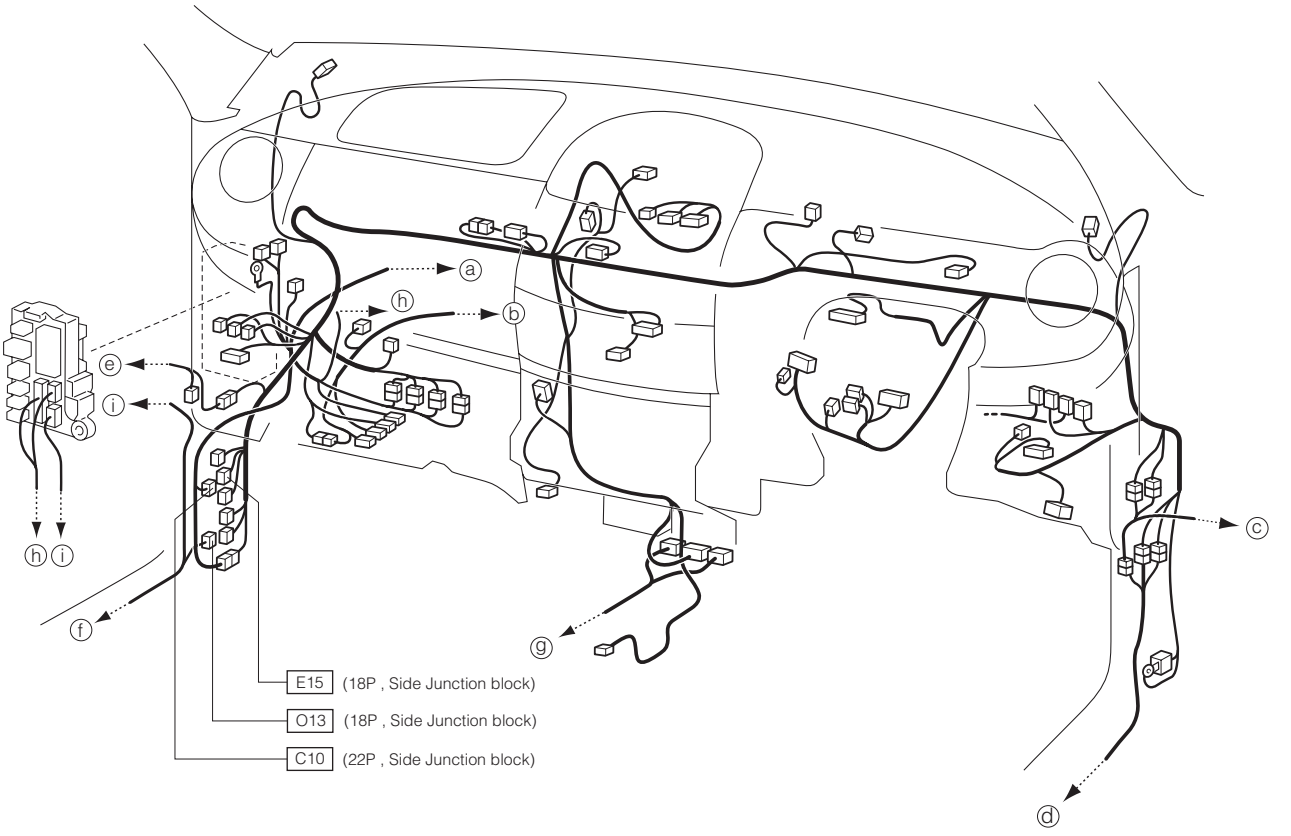
T11Q5037ES48

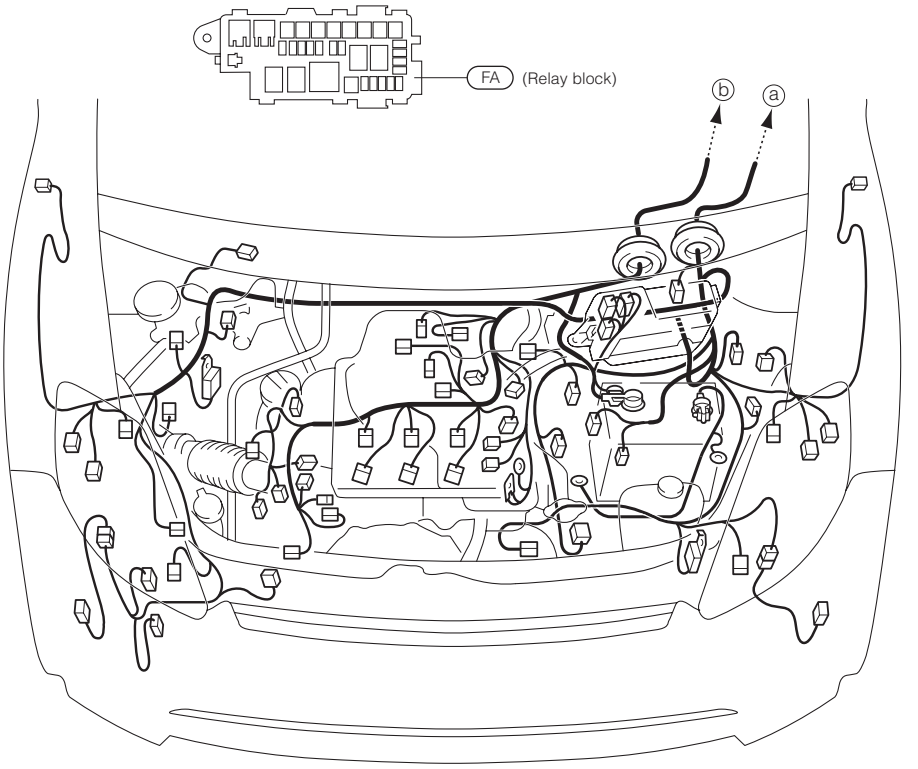
10 DOME LAMP
10-1 RHD VEHICLE

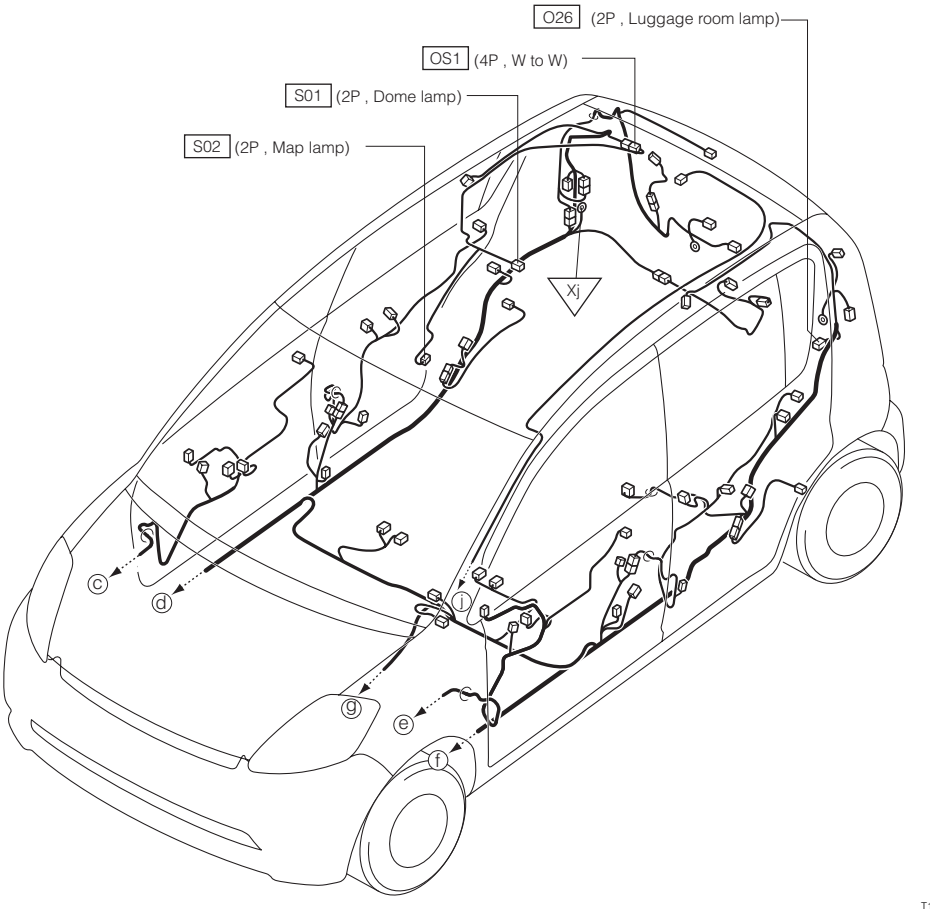




(MEMO)

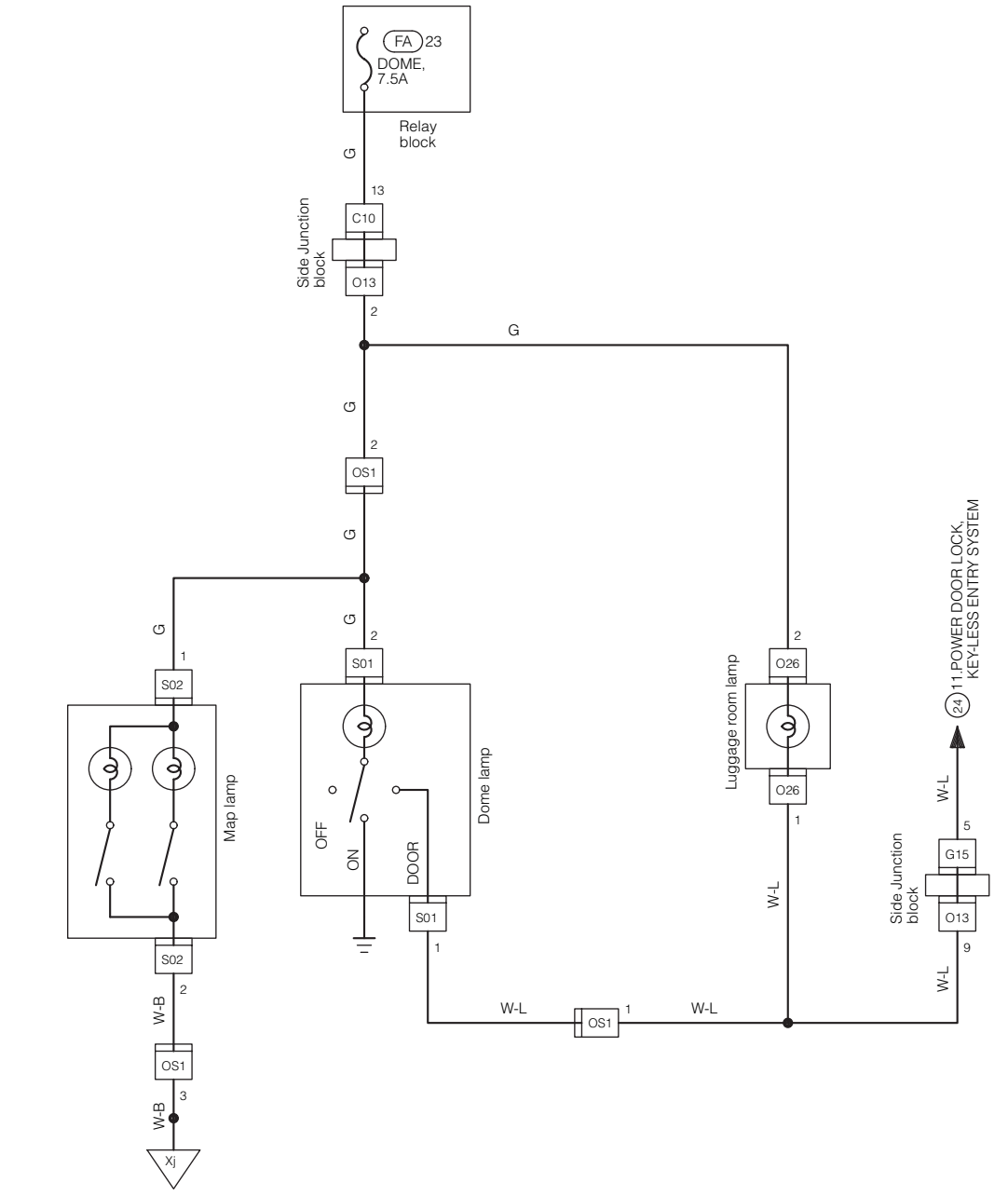

a
h
b
e
i
h i
f
g
c
d
E15 (18P , Side Junction block)
O13 (18P , Side Junction block)
C10 (22P , Side Junction block)

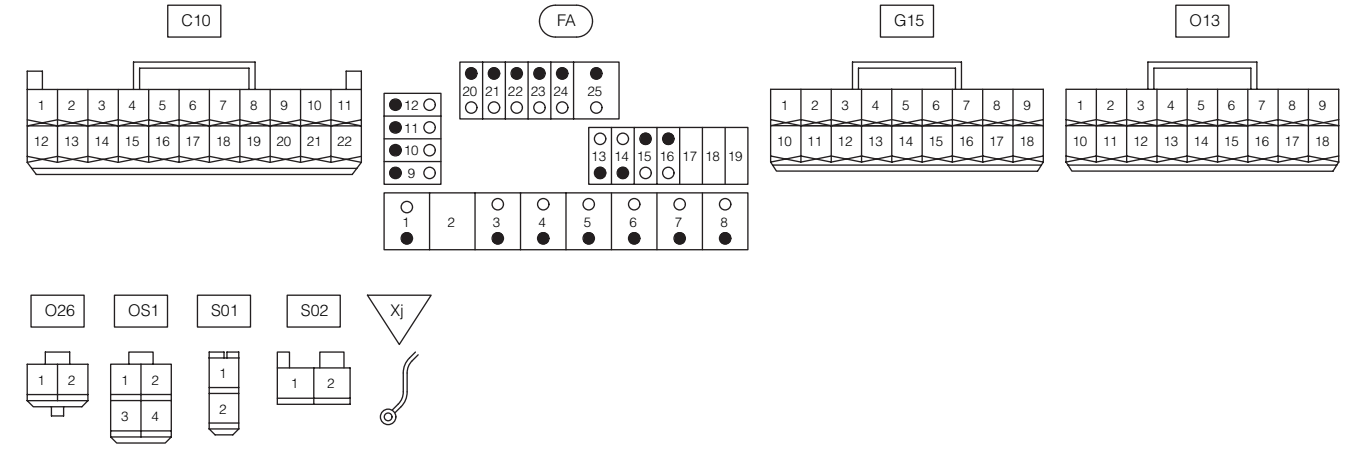




T11Q5042ES48

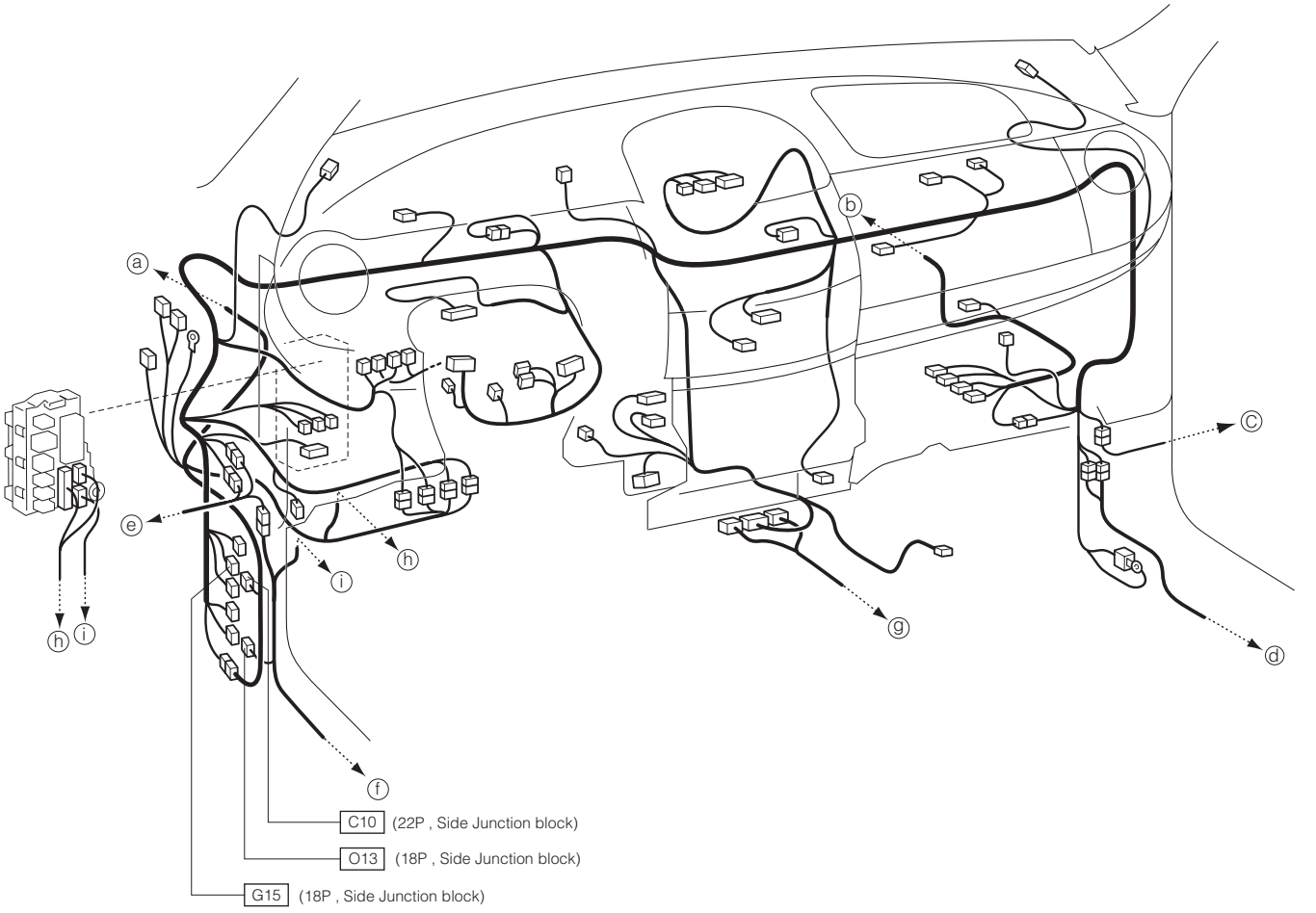
10-2 LHD VEHICLE

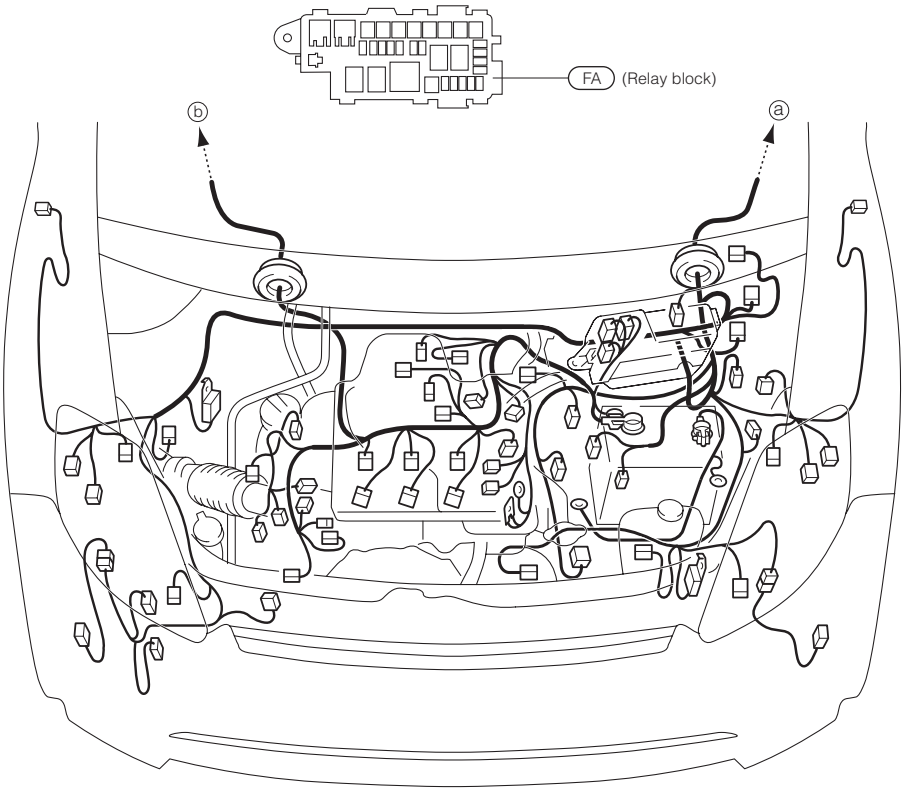


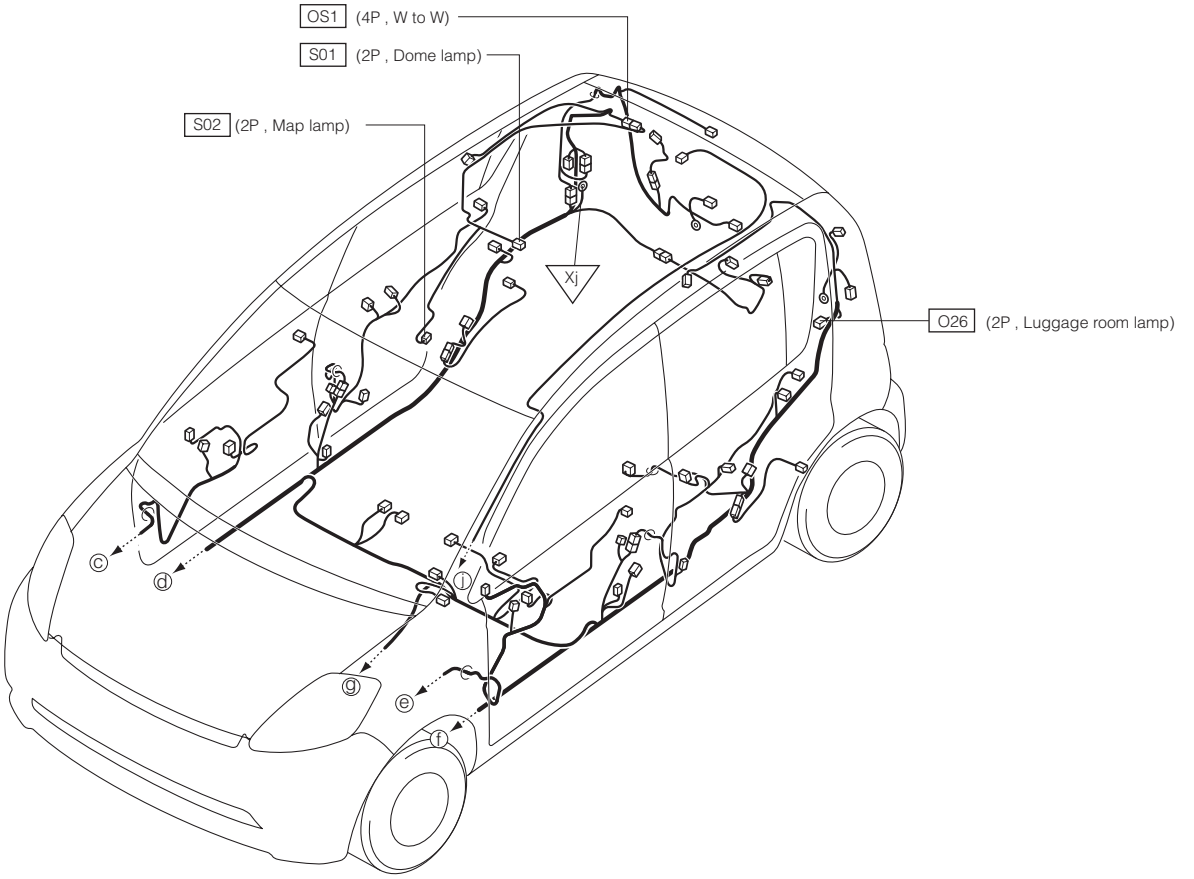


T11Q5141ES48

(MEMO)

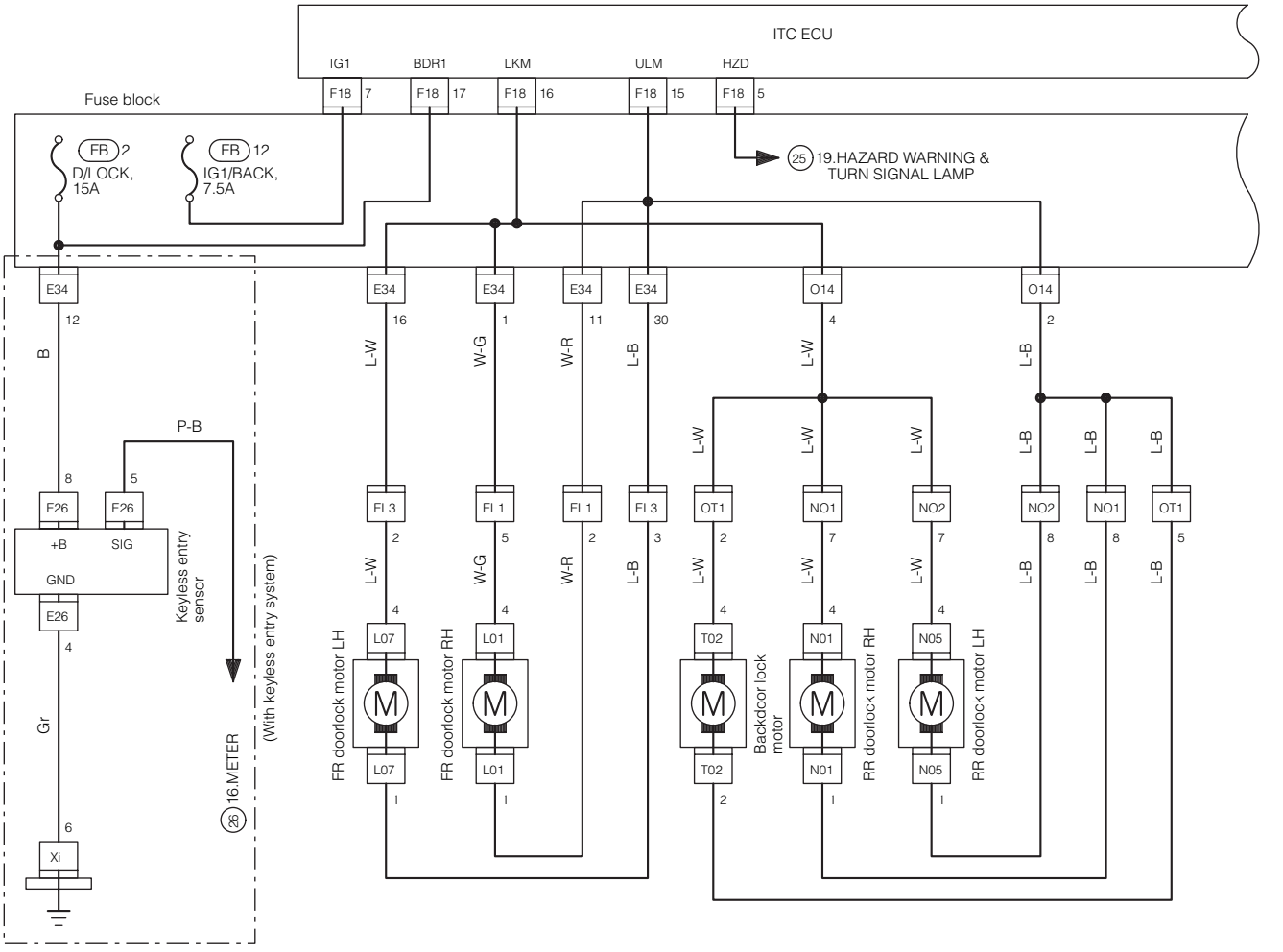

a
b
c
d
e
f
g
h
i
h
i
C10 (22P , Side Junction block)
O13 (18P , Side Junction block)
G15 (18P , Side Junction block)



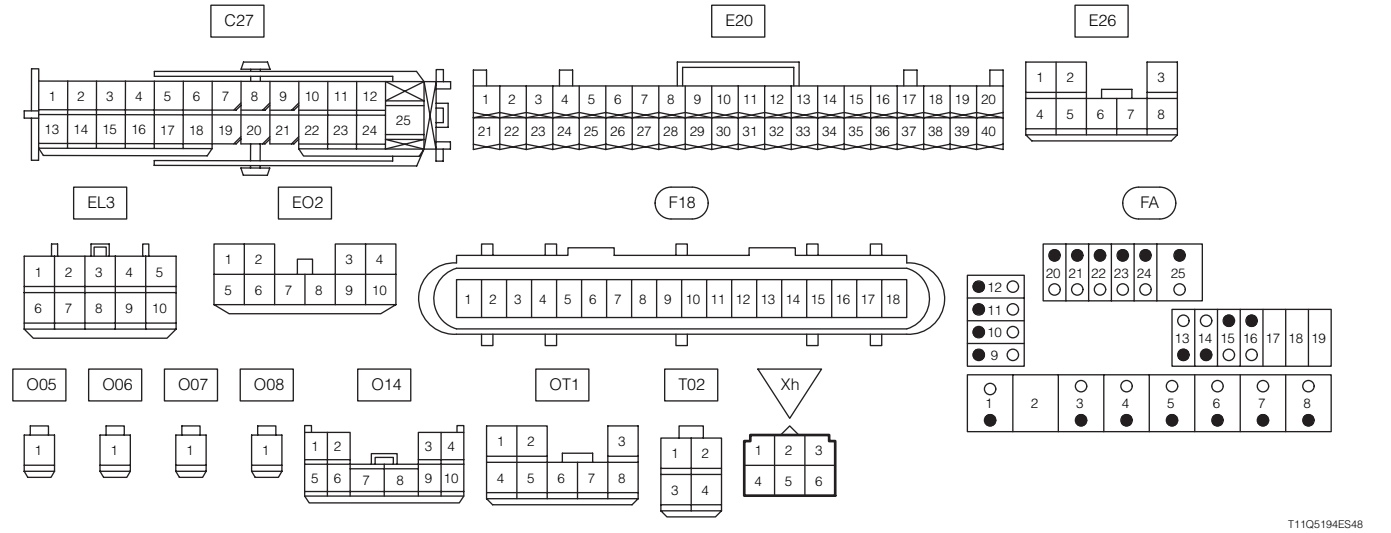


T11Q5041ES48

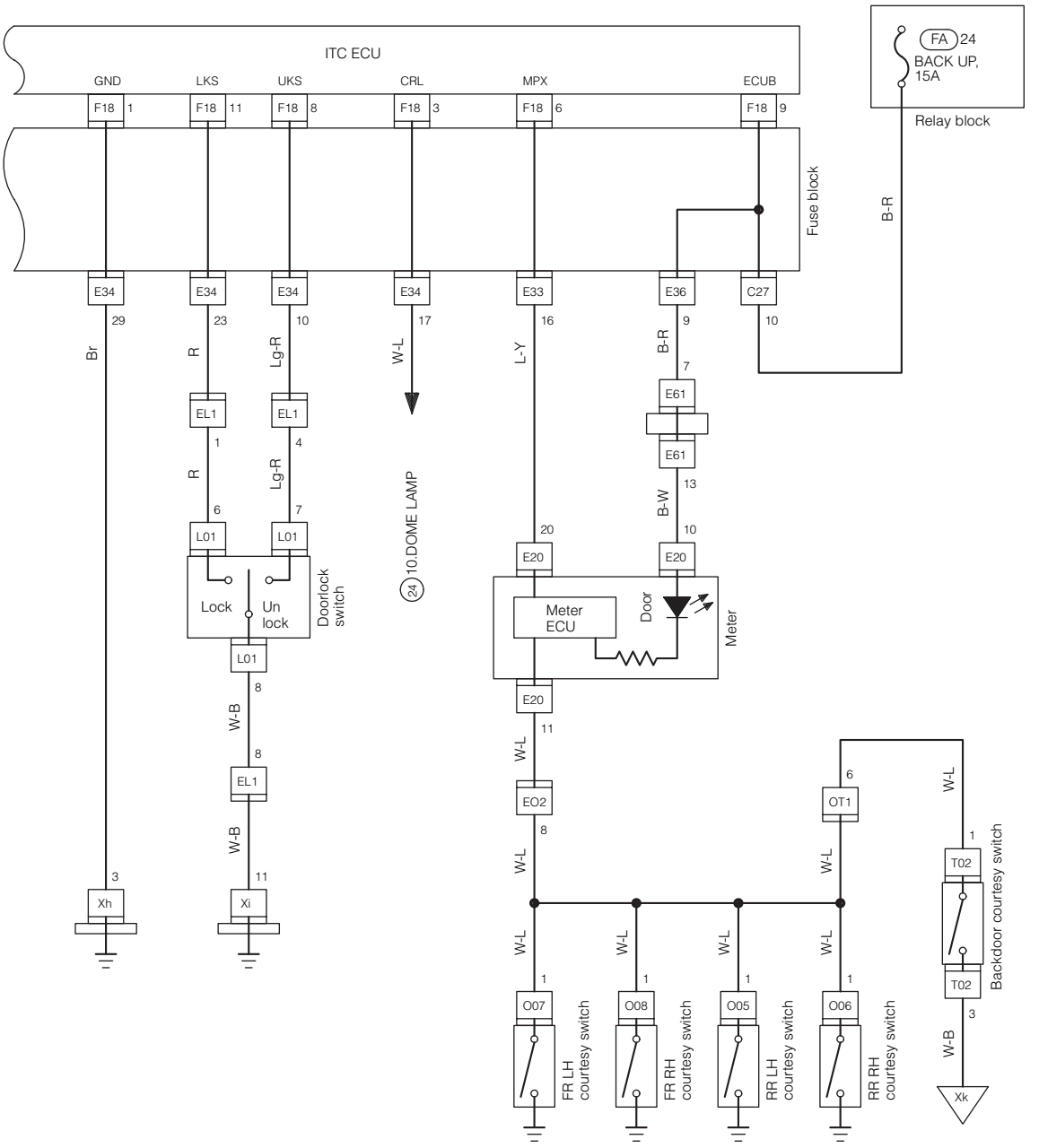
11 POWER DOOR LOCK,KEY-LESS ENTRY SYSTEM
11-1 RHD VEHICLE

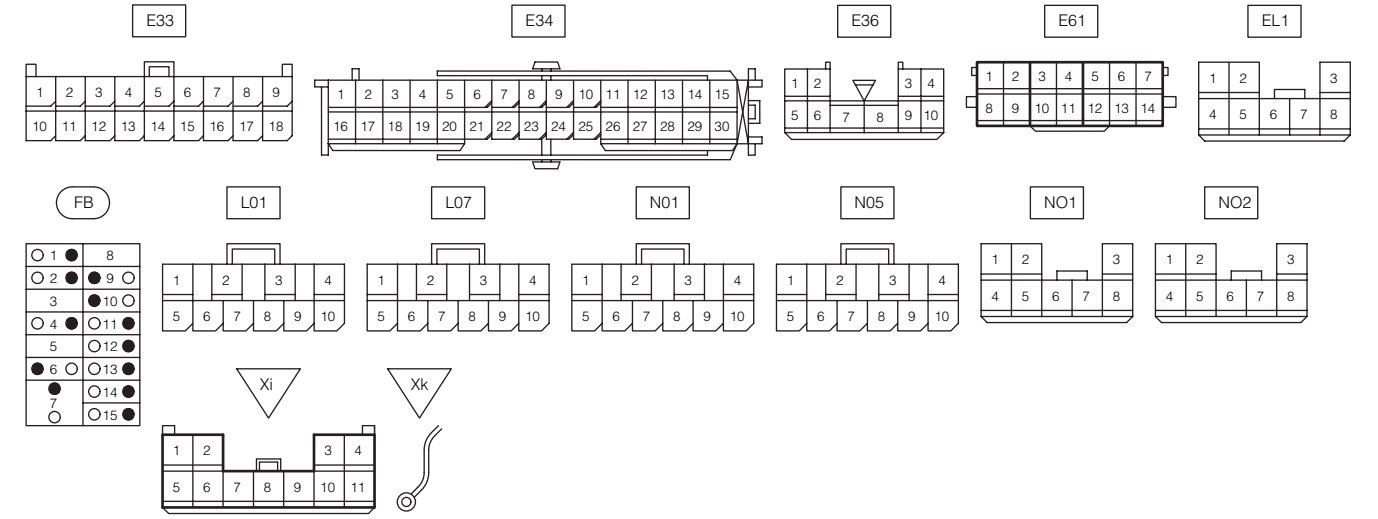


The hazard lamp having the answer back function is described in "19.Hazard Warning & Turn Signal Lamp."

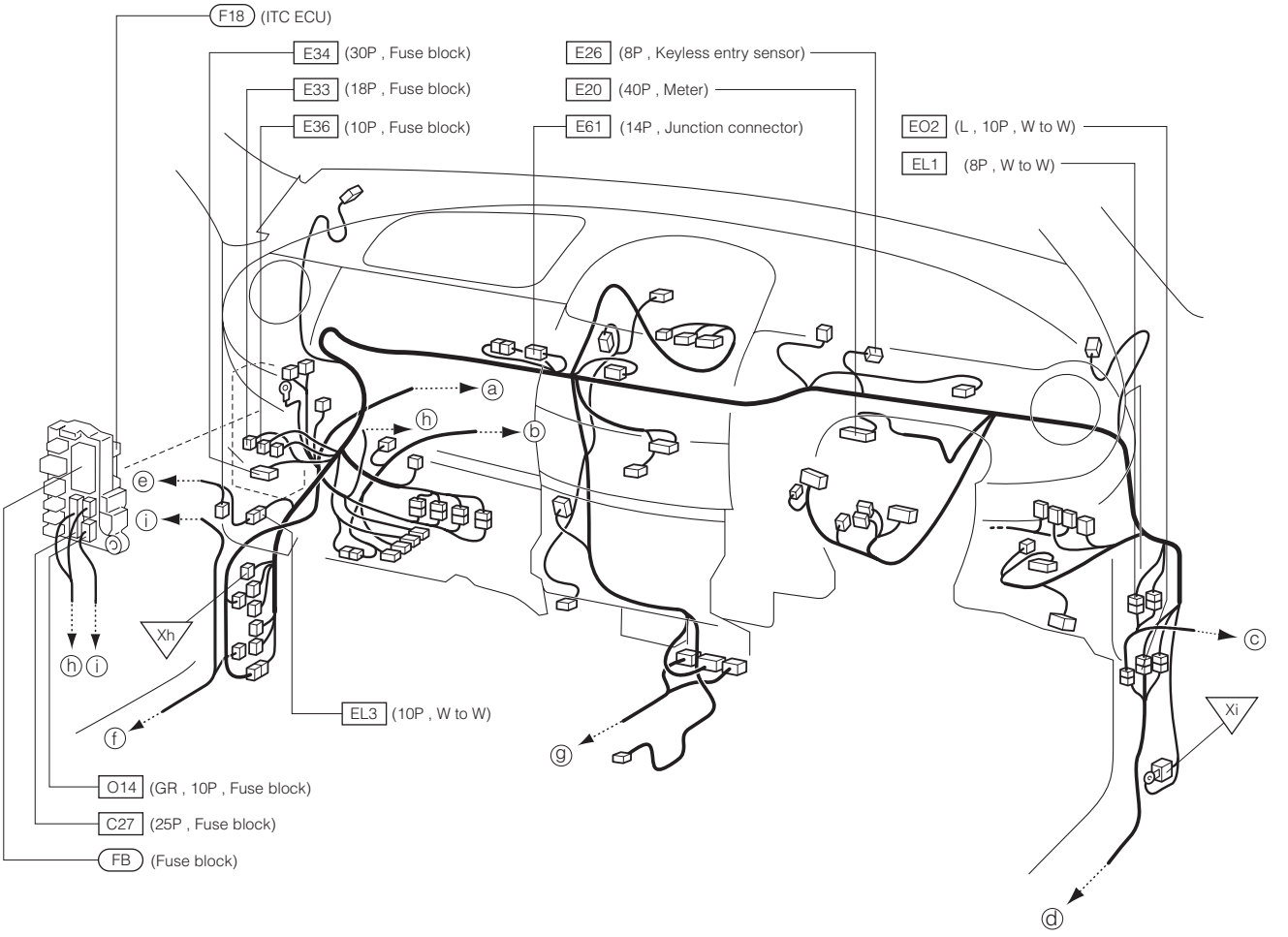


T11Q5194ES48

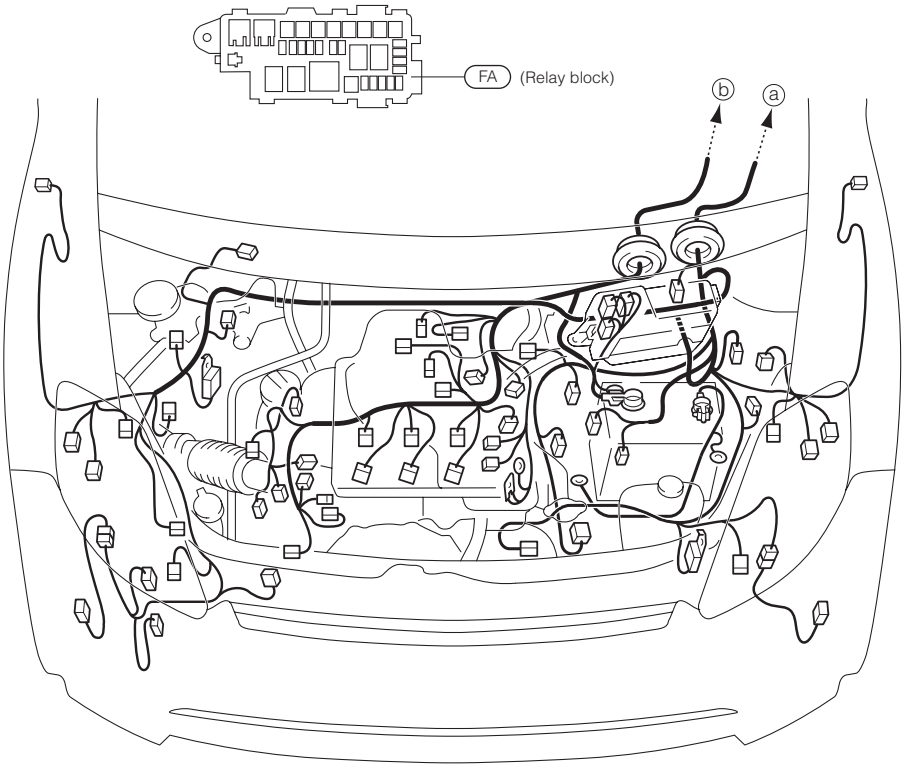


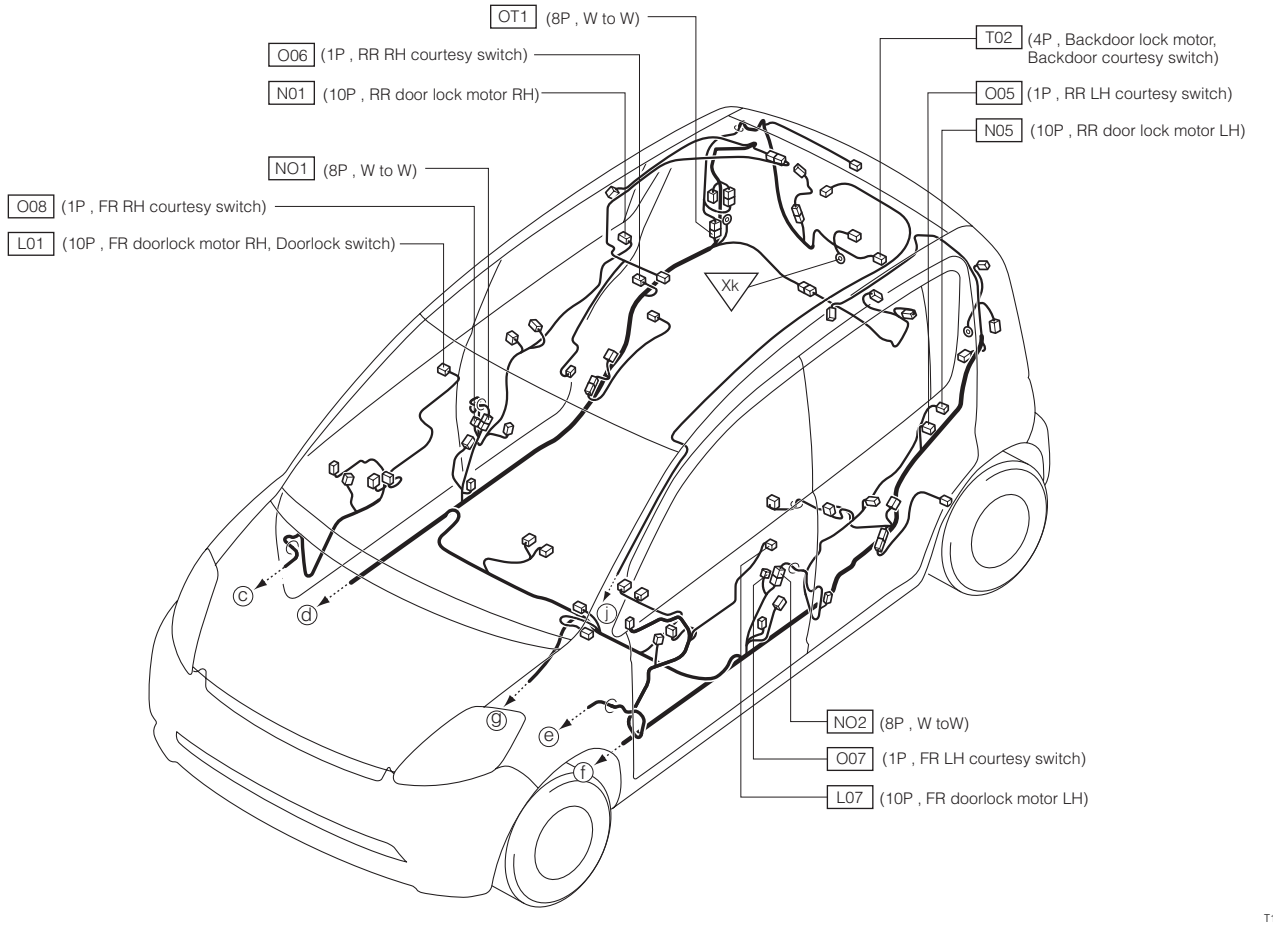


T11Q5195ES48

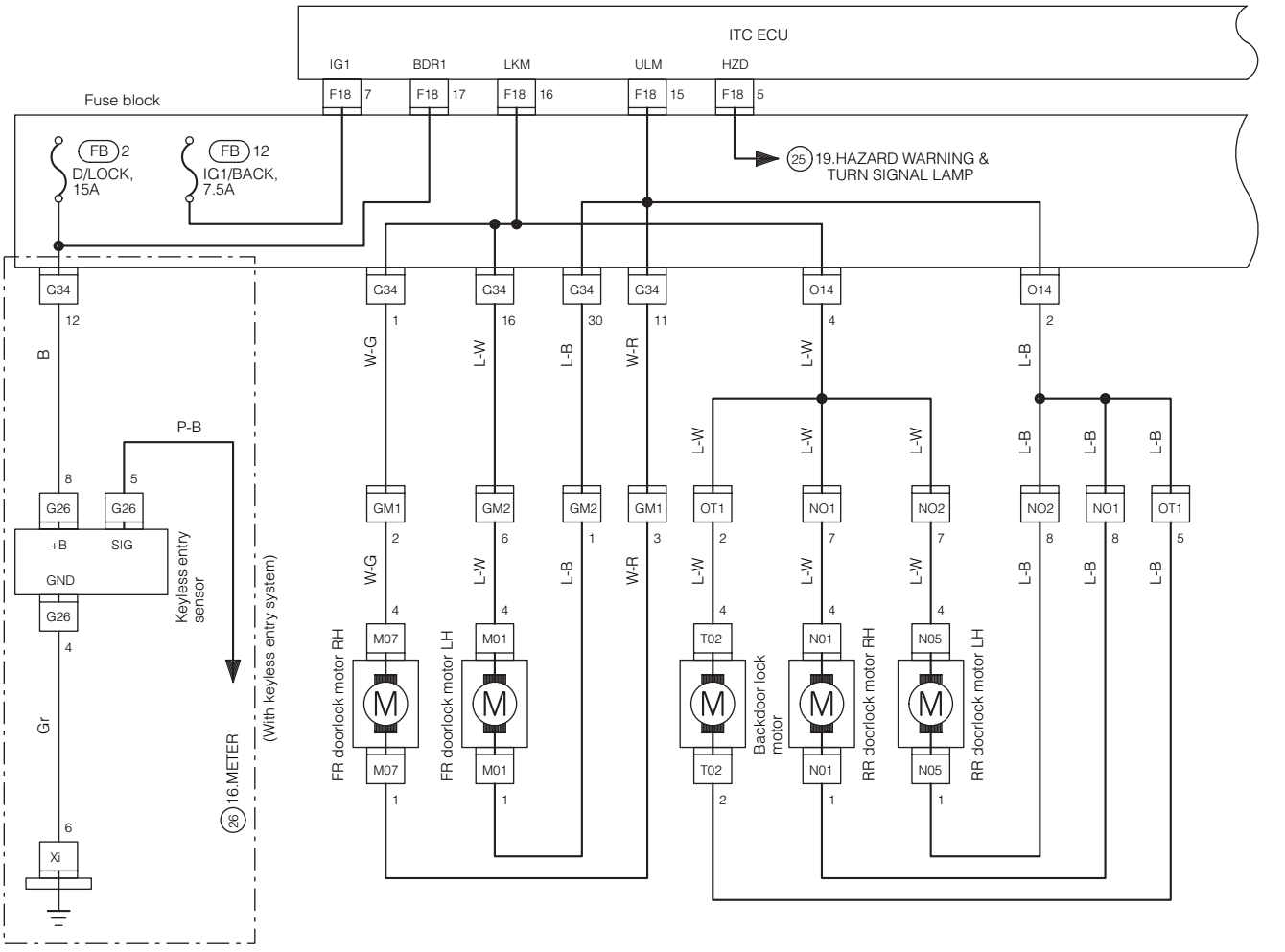


T11Q5048ES48

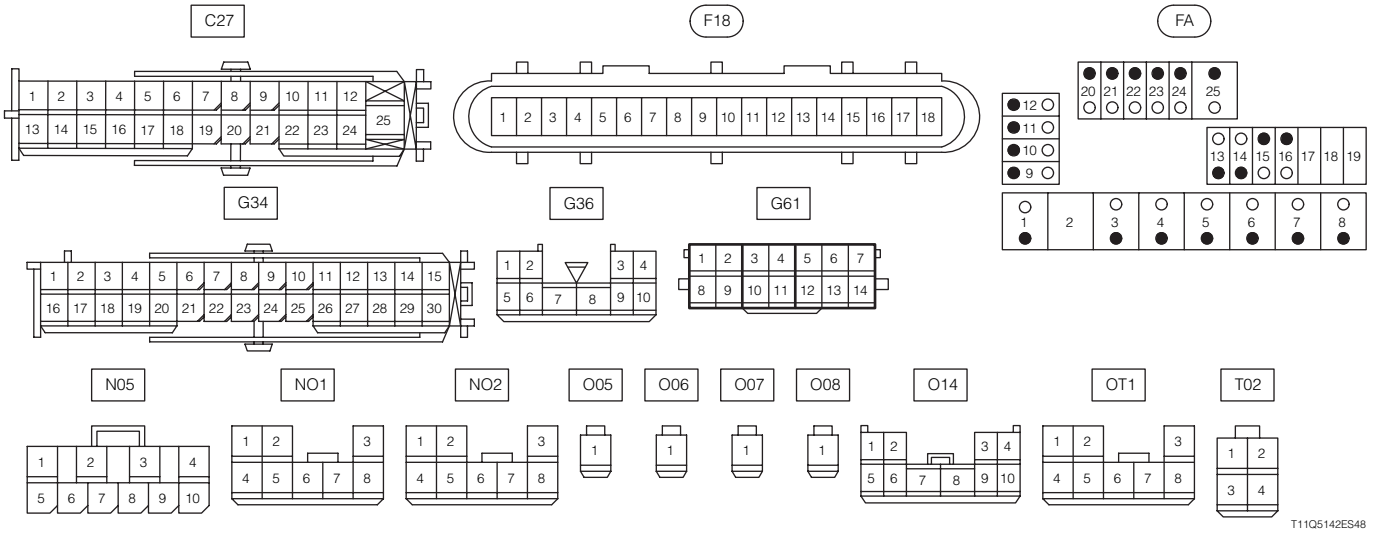

FA (Relay block)
b
a

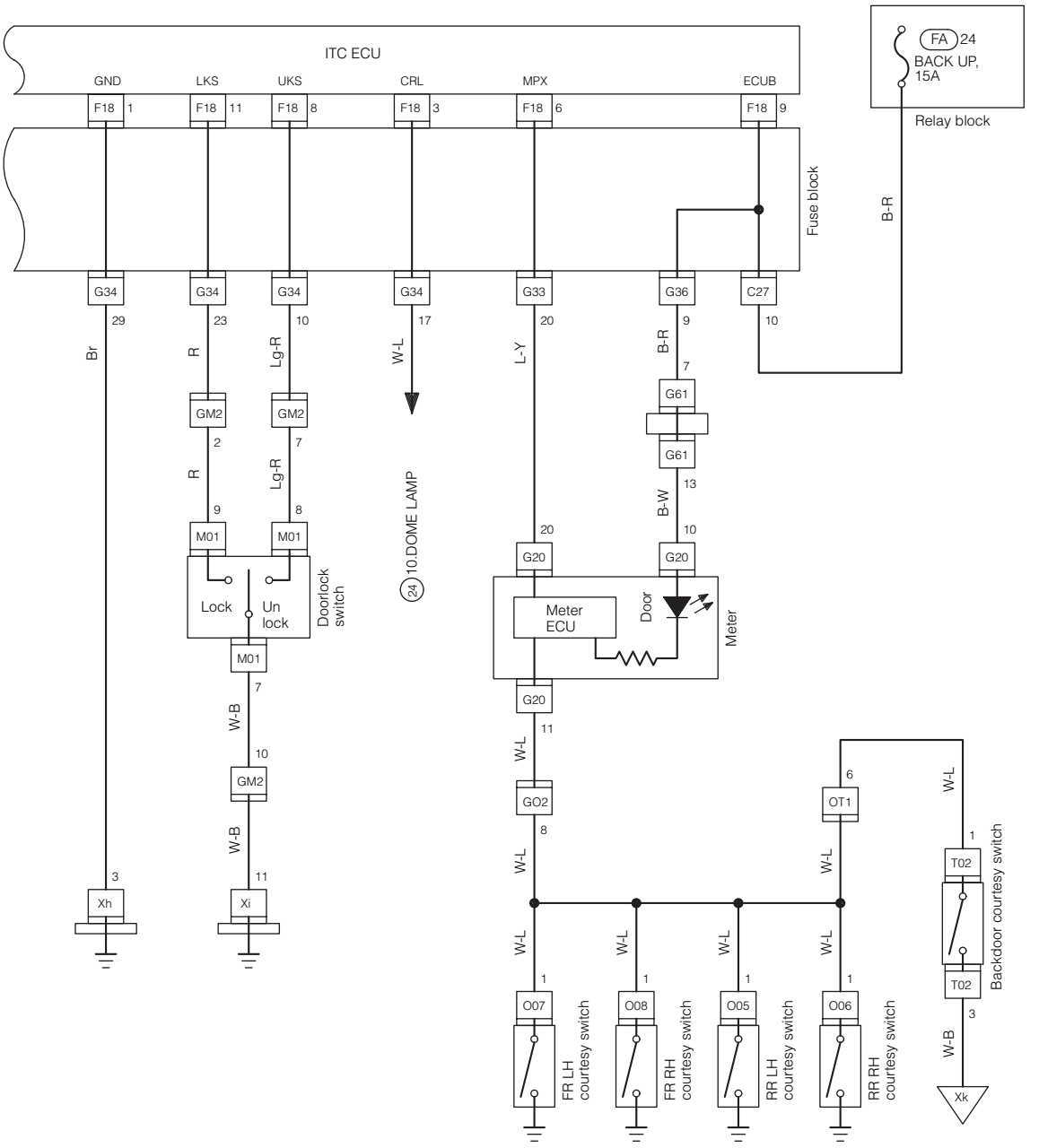

OT1 (8P , W to W)
O06 (1P , RR RH courtesy switch)
N01 (10P , RR door lock motor RH)
NO1 (8P , W to W)
O08 (1P , FR RH courtesy switch)
L01 (10P , FR doorlock motor RH, Doorlock switch)
T02 (4P , Backdoor lock motor, Backdoor courtesy switch)
O05 (1P , RR LH courtesy switch)
N05 (10P , RR door lock motor LH)
Xk
c
d
j
g
e
f
NO2 (8P , W toW)
O07 (1P , FR LH courtesy switch)
L07 (10P , FR doorlock motor LH)

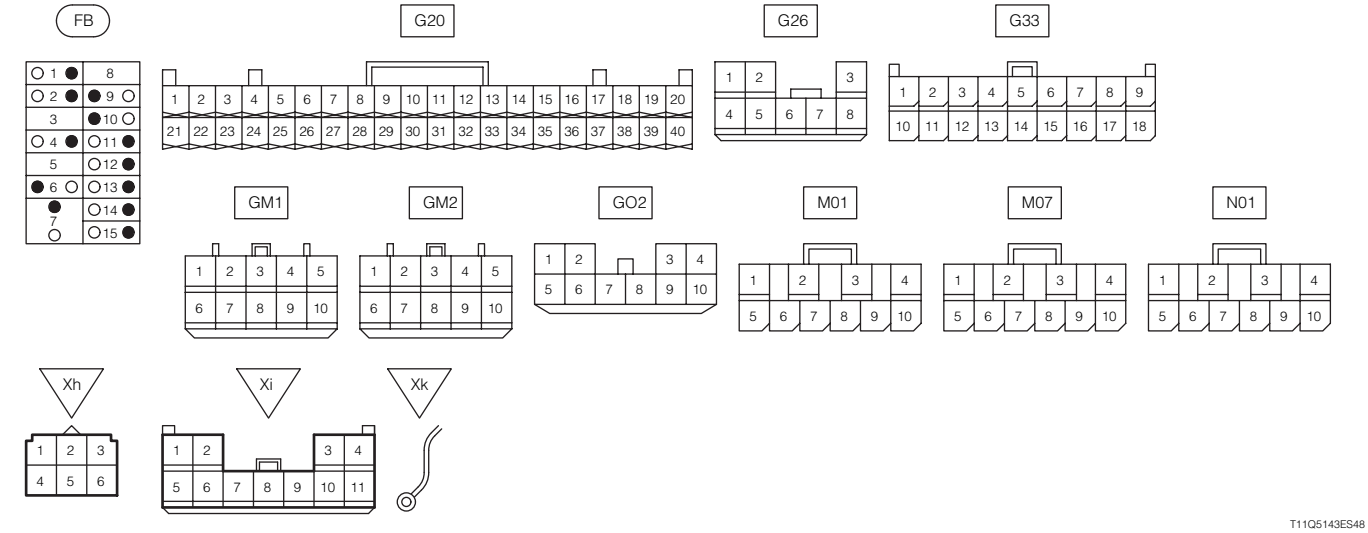
11-2 LHD VEHICLE



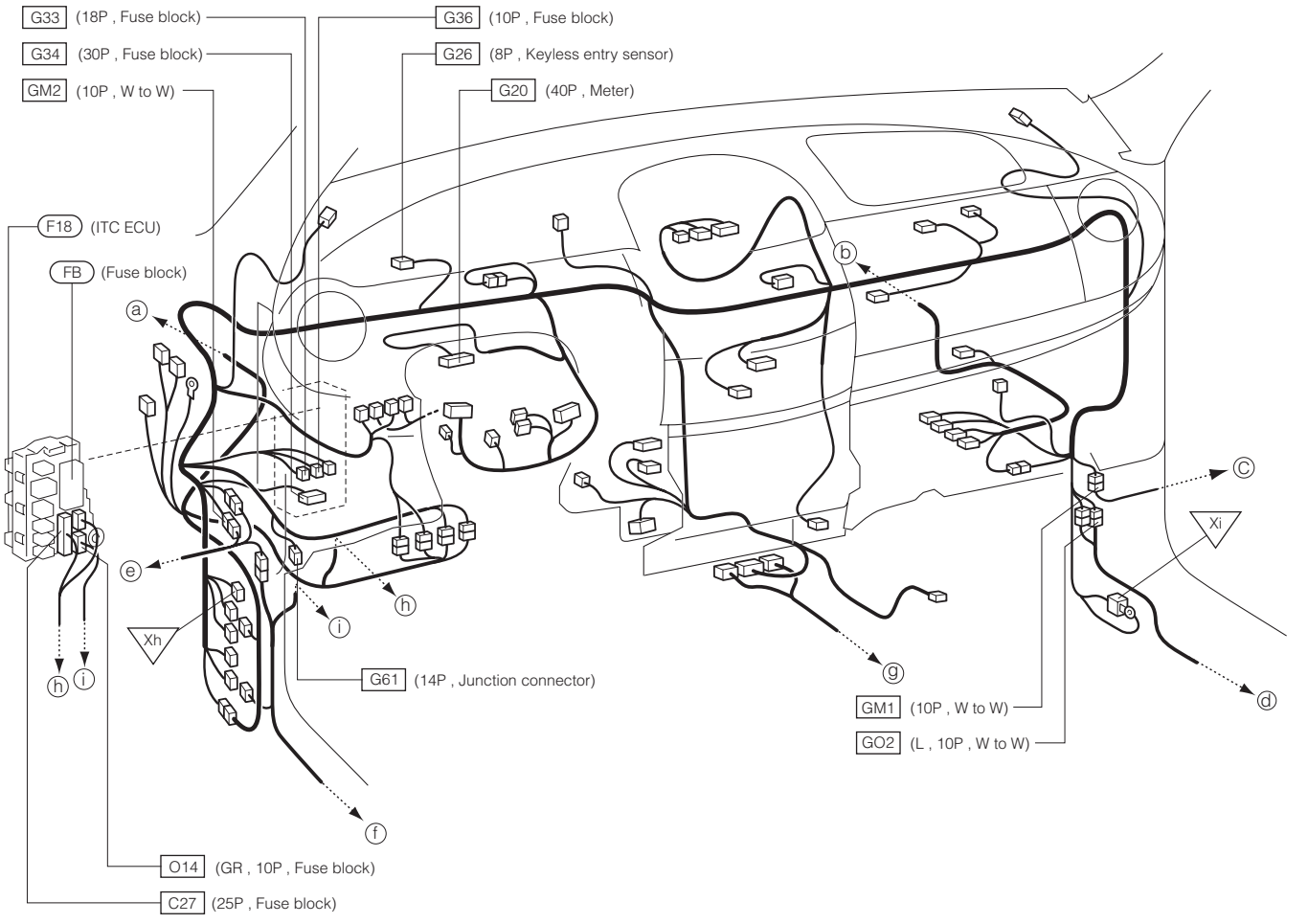
The hazard lamp having the answer back function is described in "19.Hazard Warning & Turn Signal Lamp."

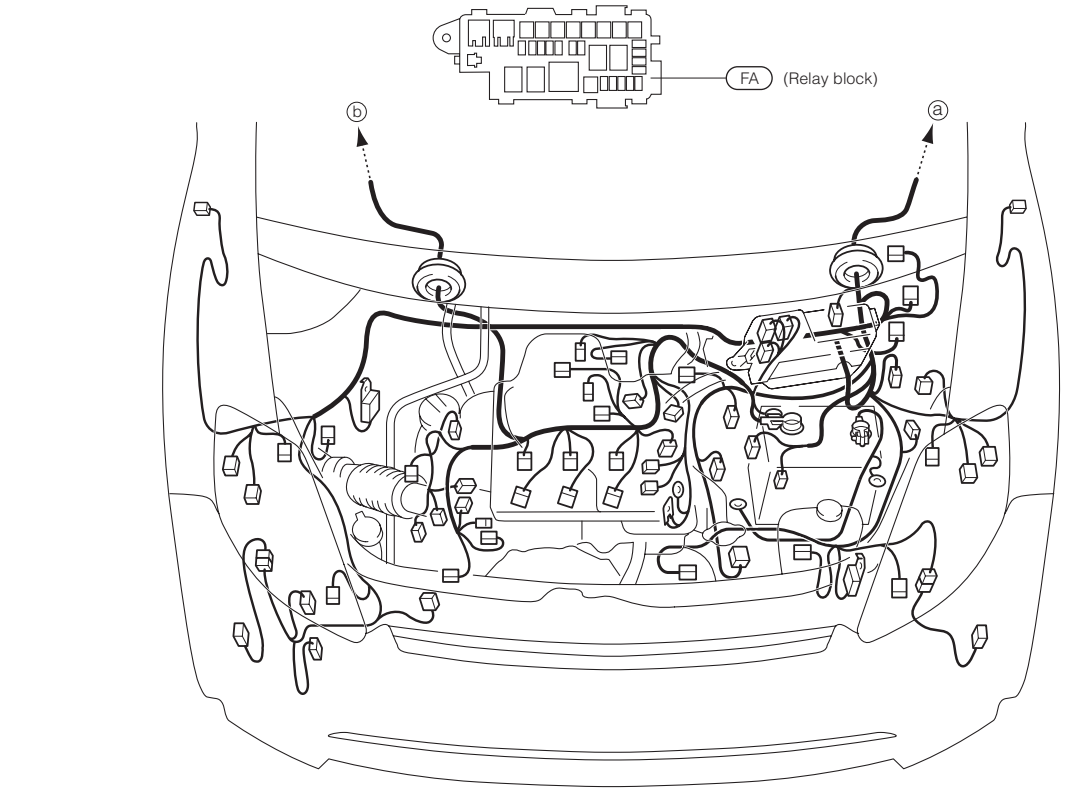


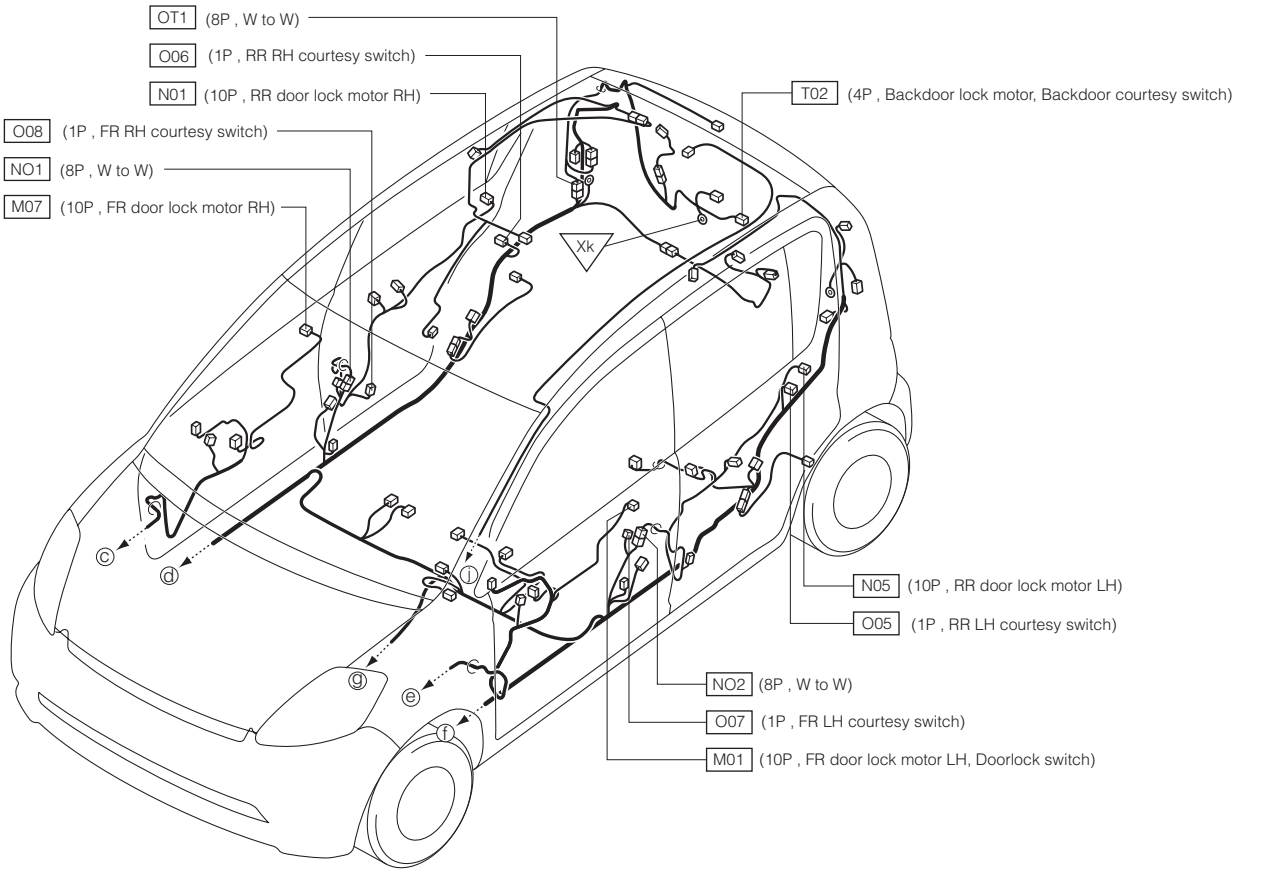




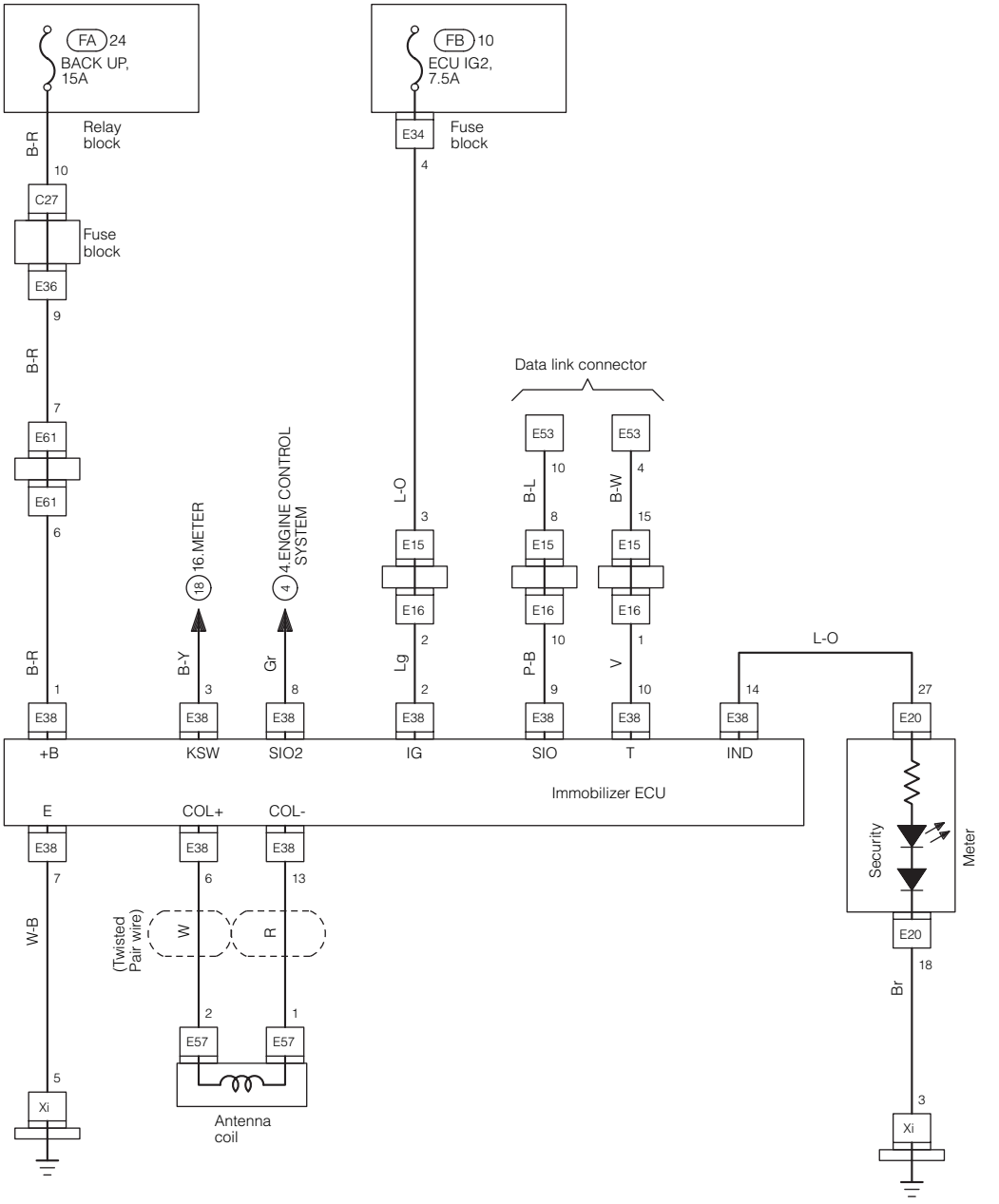
T11Q5143ES48

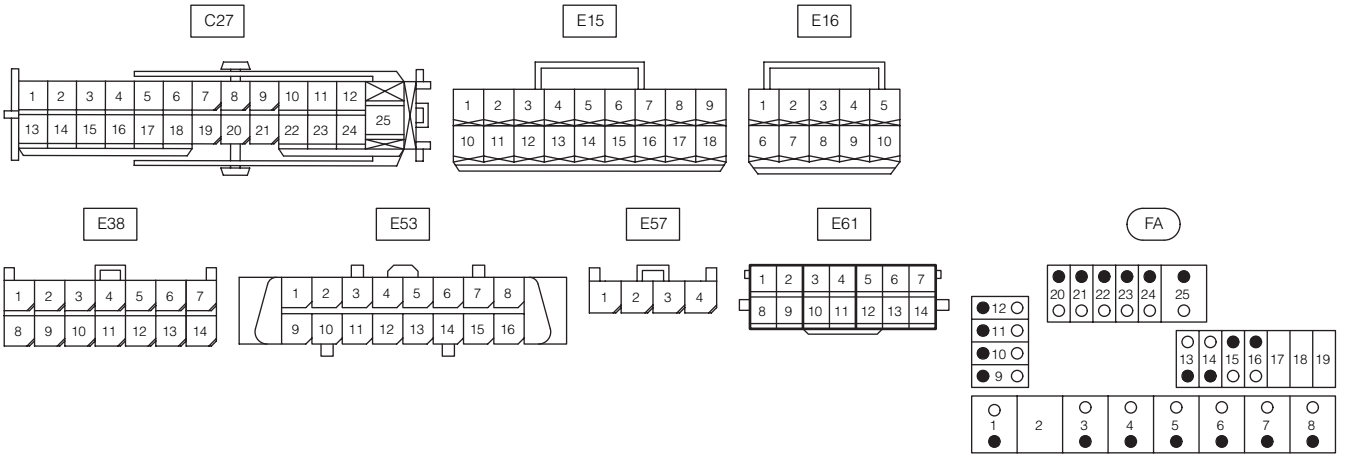

G33 (18P , Fuse block)
G34 (30P , Fuse block)
GM2 (10P , W to W)
F18 (ITC ECU)
FB (Fuse block)
G36 (10P , Fuse block)
G26 (8P , Keyless entry sensor)
G20 (40P , Meter)
a
b
c
d
e
f
g
h
i
Xh
Xi
G61 (14P , Junction connector)
GM1 (10P , W to W)
GO2 (L , 10P , W to W)
O14 (GR , 10P , Fuse block)
C27 (25P , Fuse block)

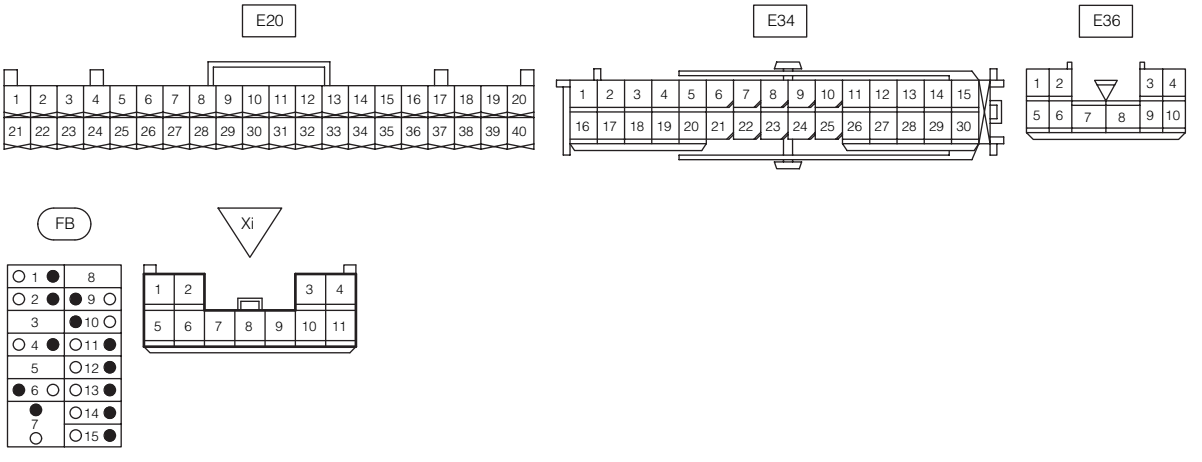

FA (Relay block)
ⓑ
ⓐ

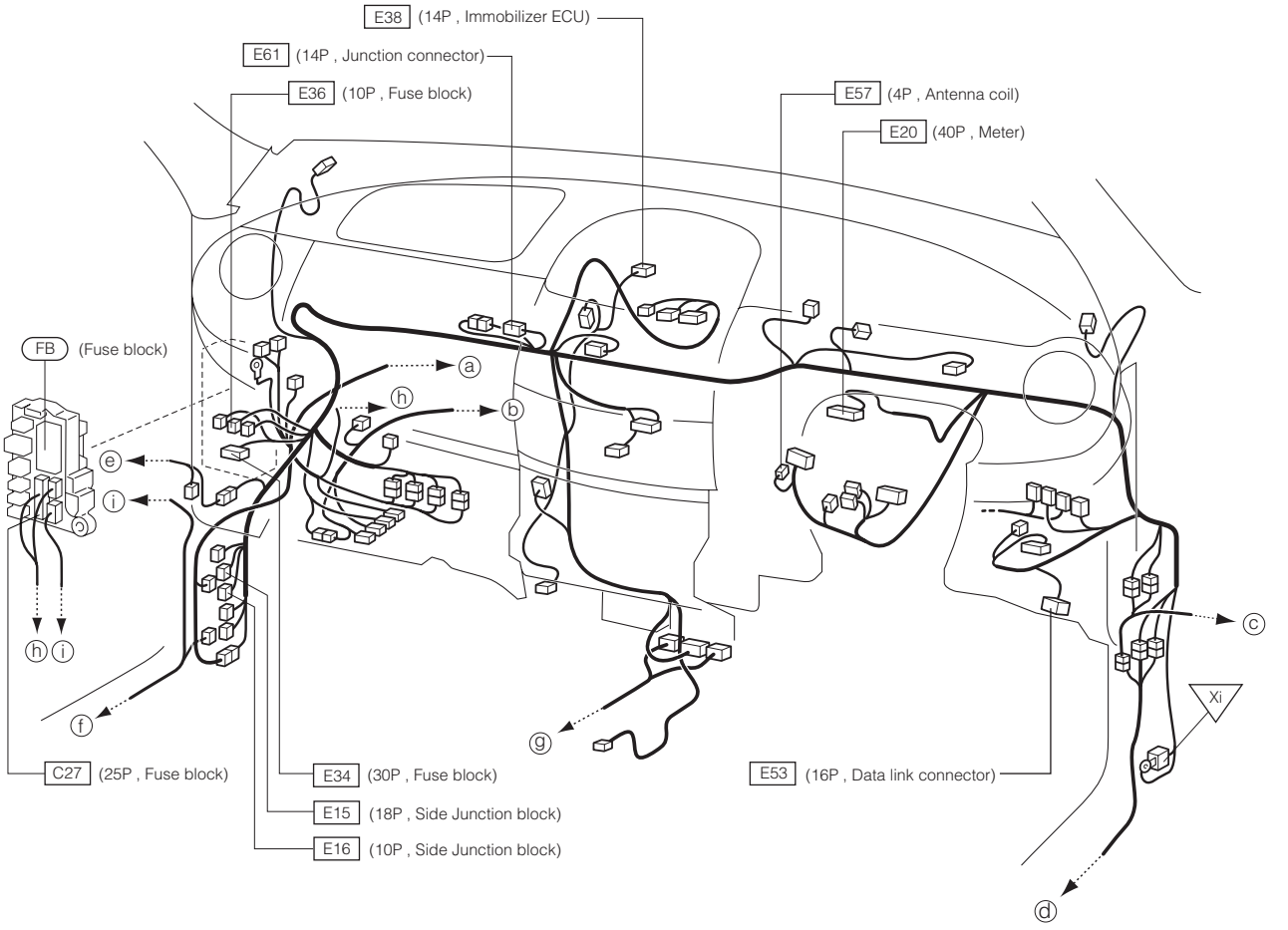

OT1 (8P , W to W)
O06 (1P , RR RH courtesy switch)
N01 (10P , RR door lock motor RH)
O08 (1P , FR RH courtesy switch)
NO1 (8P , W to W)
M07 (10P , FR door lock motor RH)
T02 (4P , Backdoor lock motor, Backdoor courtesy switch)
Xk
ⓒ
ⓓ
ⓘ
ⓖ
ⓔ
ⓕ
N05 (10P , RR door lock motor LH)
O05 (1P , RR LH courtesy switch)
NO2 (8P , W to W)
O07 (1P , FR LH courtesy switch)
M01 (10P , FR door lock motor LH, Doorlock switch)

12 IMMOBILIZER SYSTEM
12-1 RHD VEHICLE

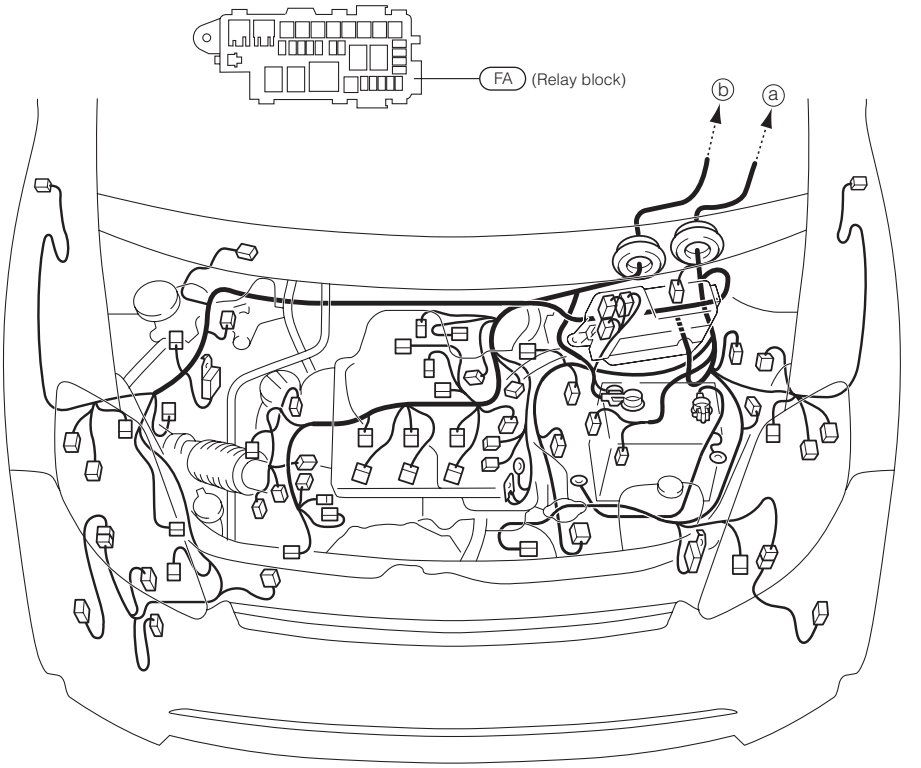




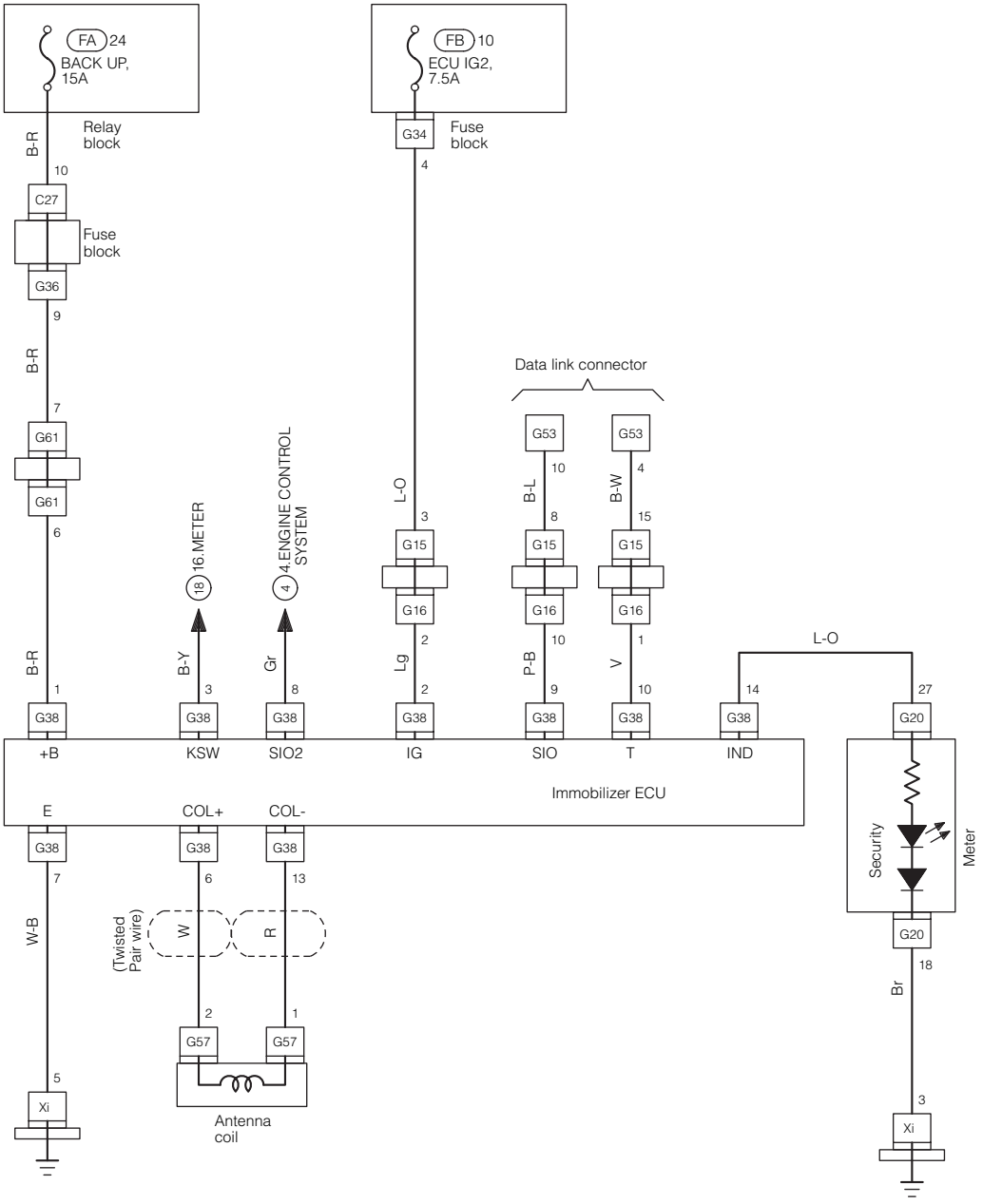

E20
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
E34
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
E36
1 2 3 4
5 6 7 8 9 10
FB
1 8
2 9
3 10
4 11
5 12
6 13
7 14
15
Xi
1 2 3 4
5 6 7 8 9 10 11

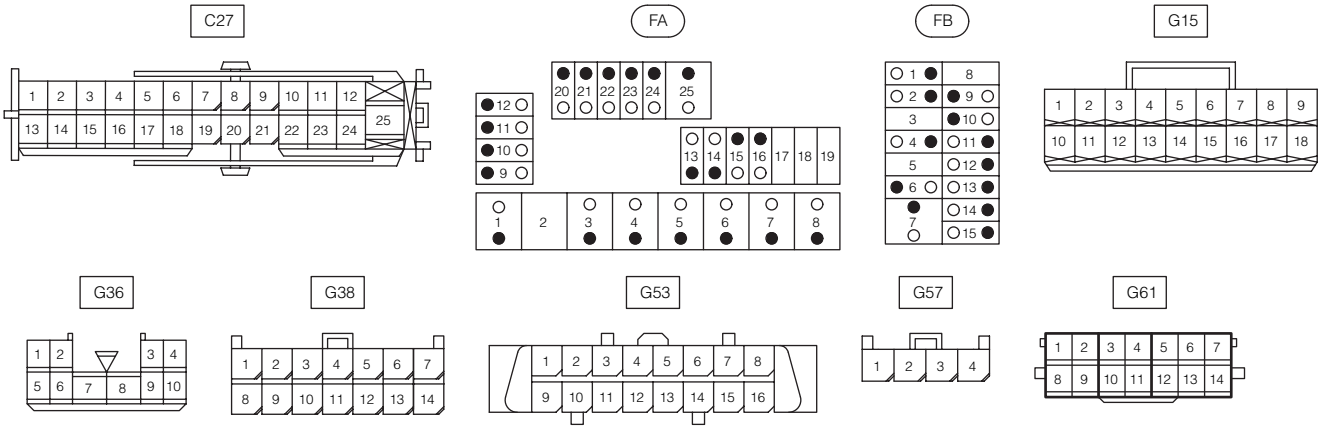


T11Q5052ES48

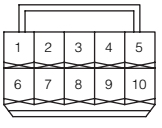

FA
(Relay block)
b
a

12-2 LHD VEHICLE

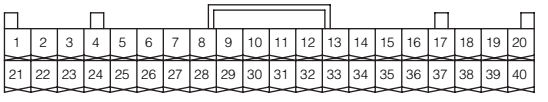




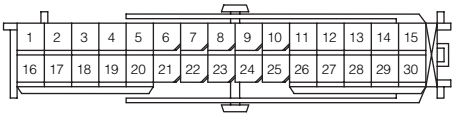
G16



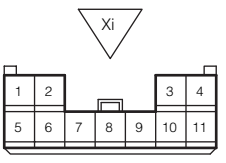
G20

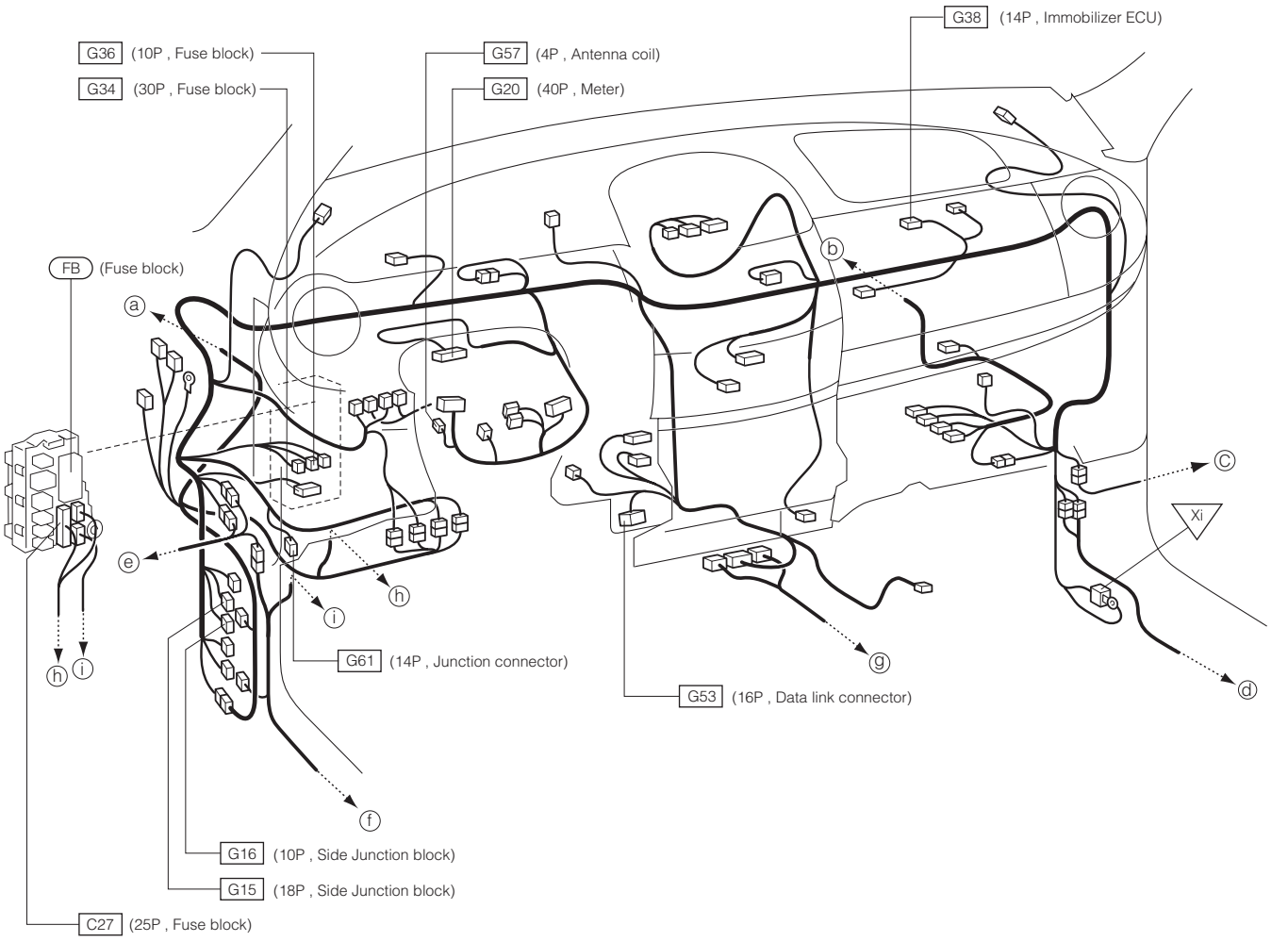


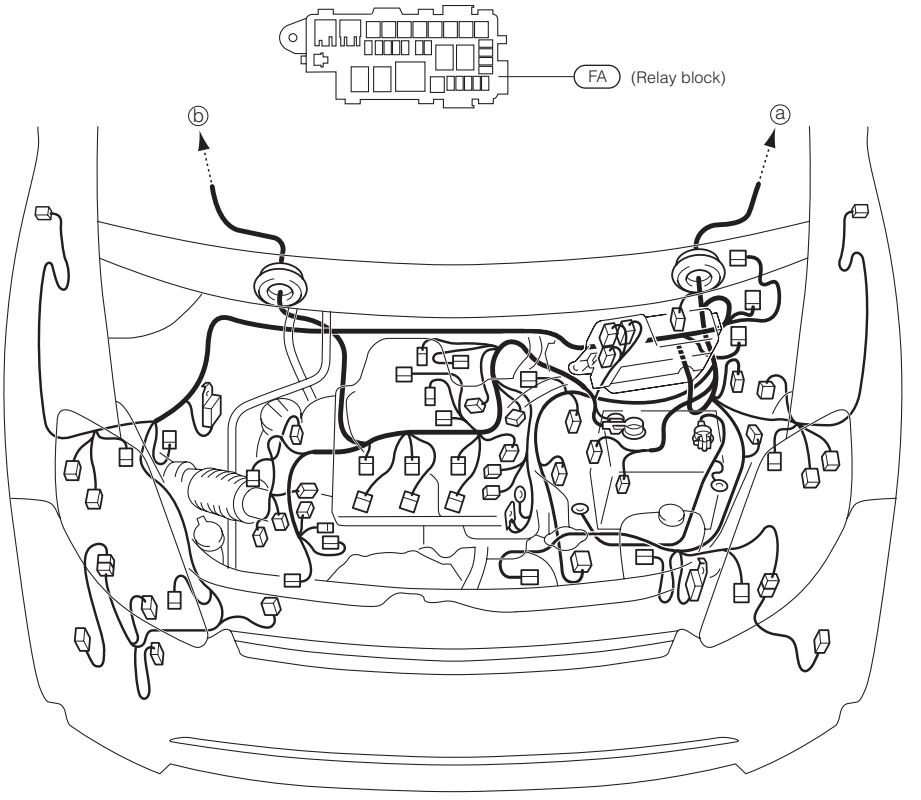
G34



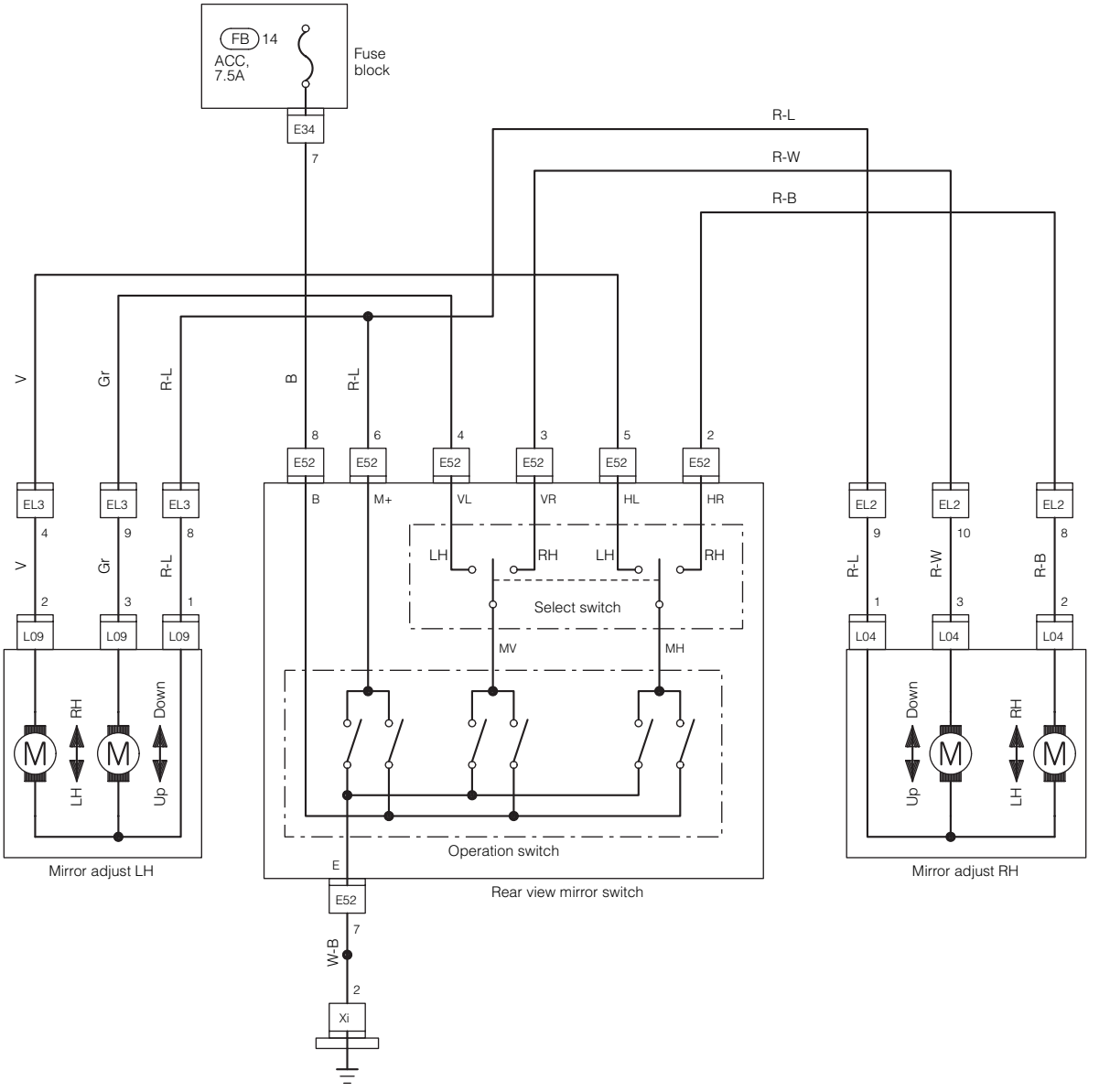
Xi

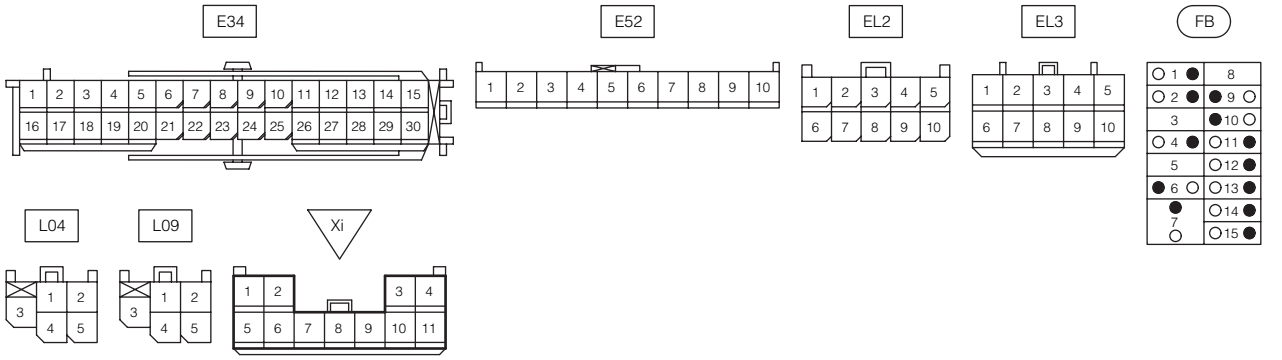



G38 (14P , Immobilizer ECU)
G36 (10P , Fuse block)
G34 (30P , Fuse block)
G57 (4P , Antenna coil)
G20 (40P , Meter)
FB (Fuse block)
a
b
C
Xi
e
h
i
G61 (14P , Junction connector)
G53 (16P , Data link connector)
g
d
f
G16 (10P , Side Junction block)
G15 (18P , Side Junction block)
C27 (25P , Fuse block)


FA
(Relay block)
ⓑ
ⓐ

13 OUTER REAR-VIEW MIRROR
13-1 RHD VEHICLE





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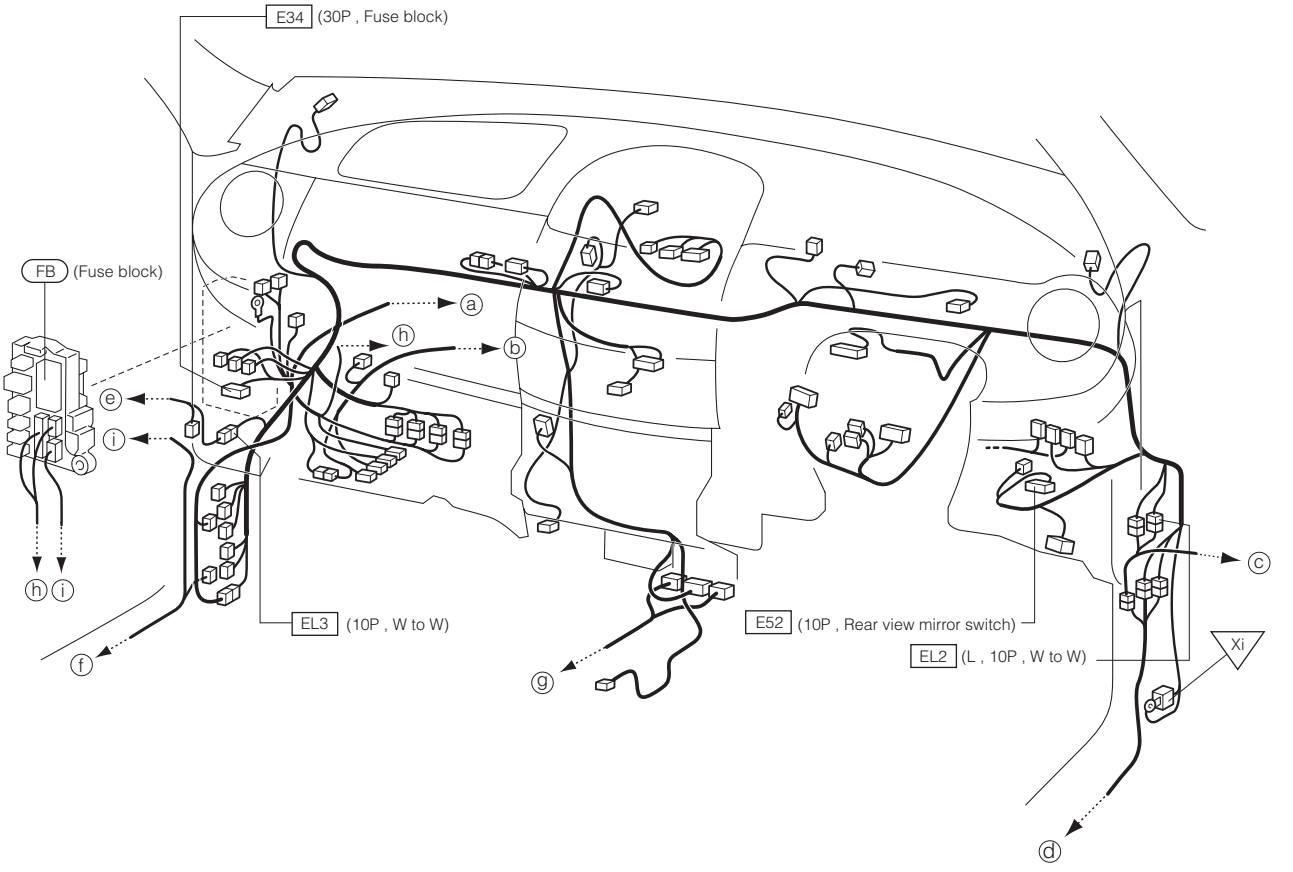
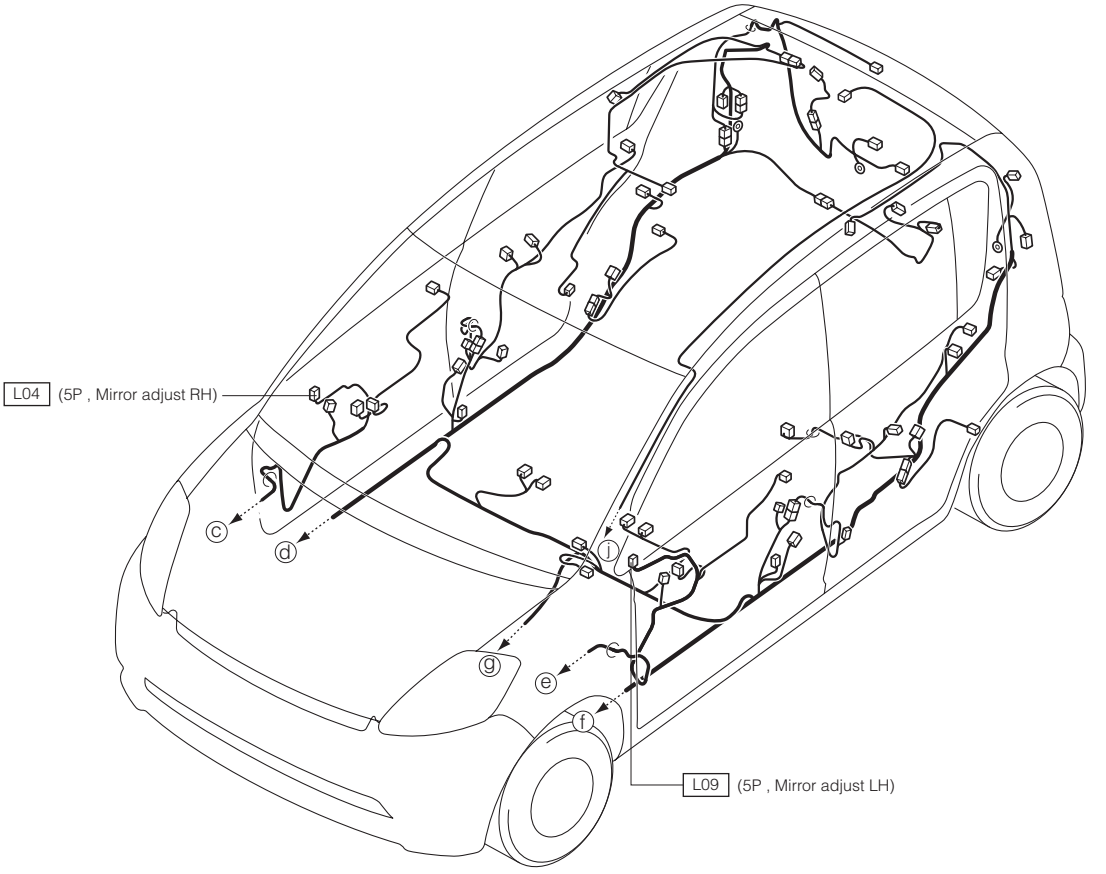
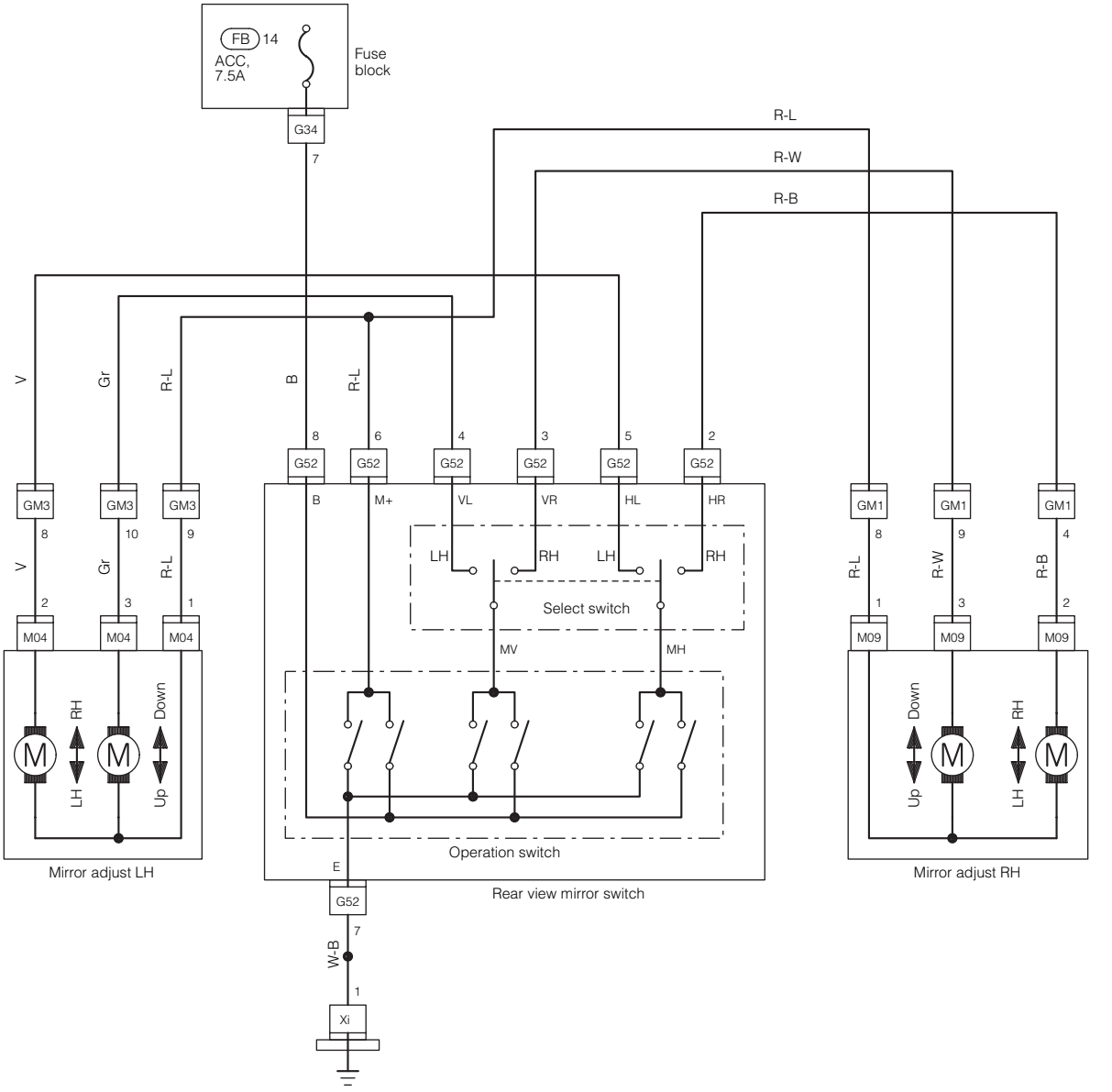
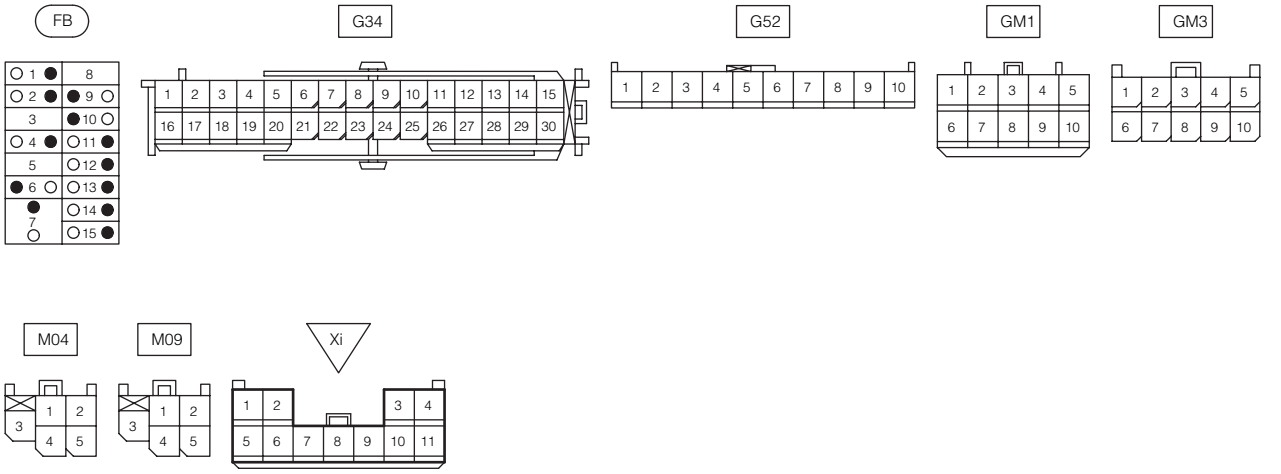


T11Q5056ES48


L04 (5P , Mirror adjust RH)
ⓒ
ⓓ
ⓖ
ⓔ
ⓕ
ⓙ
L09 (5P , Mirror adjust LH)

13-2 LHD VEHICLE





T11Q5146ES48

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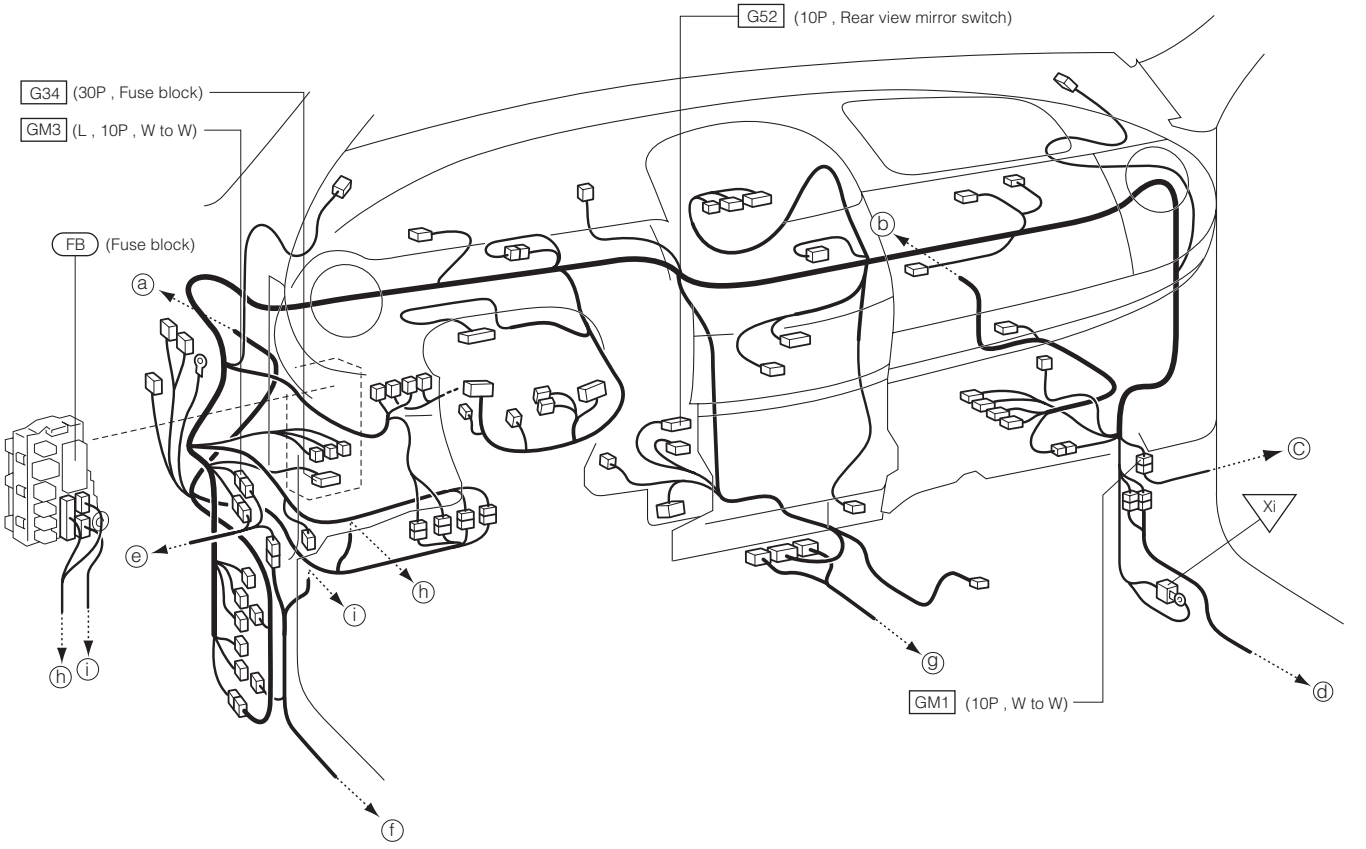
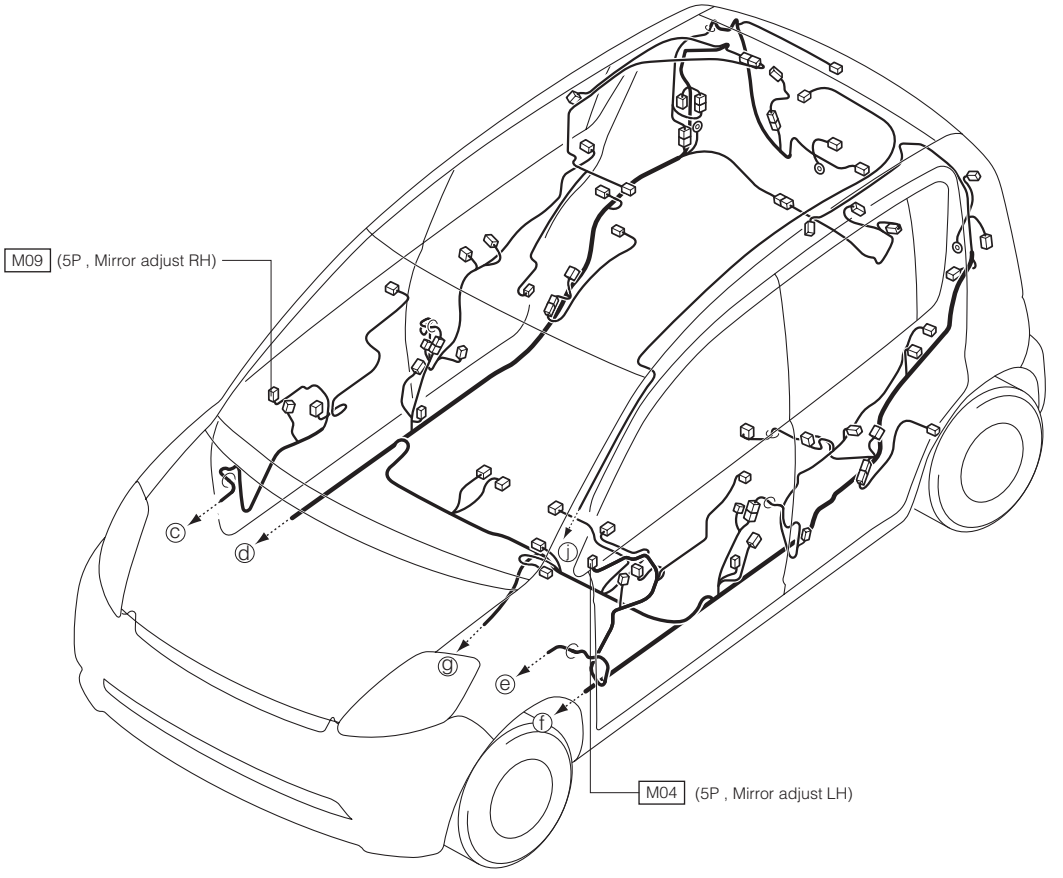
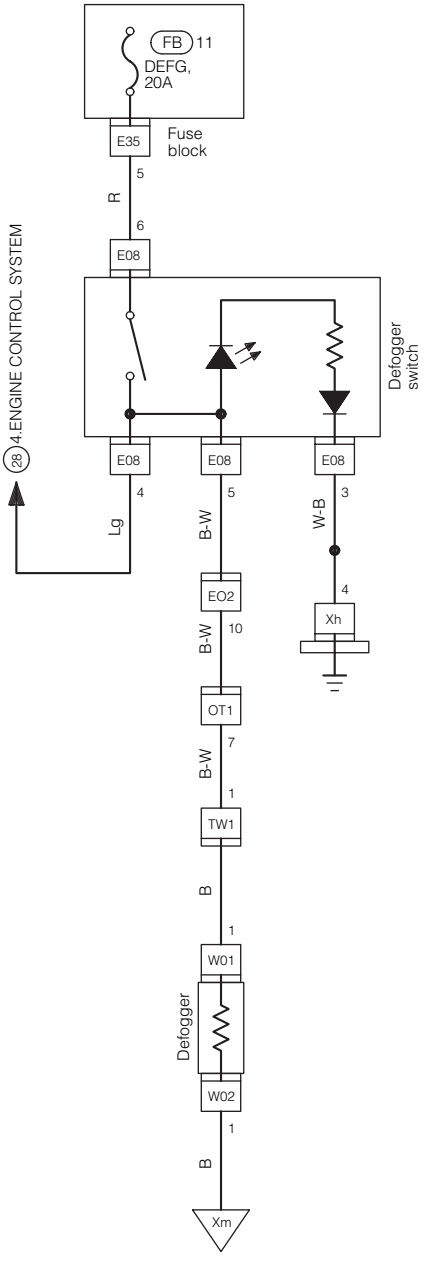
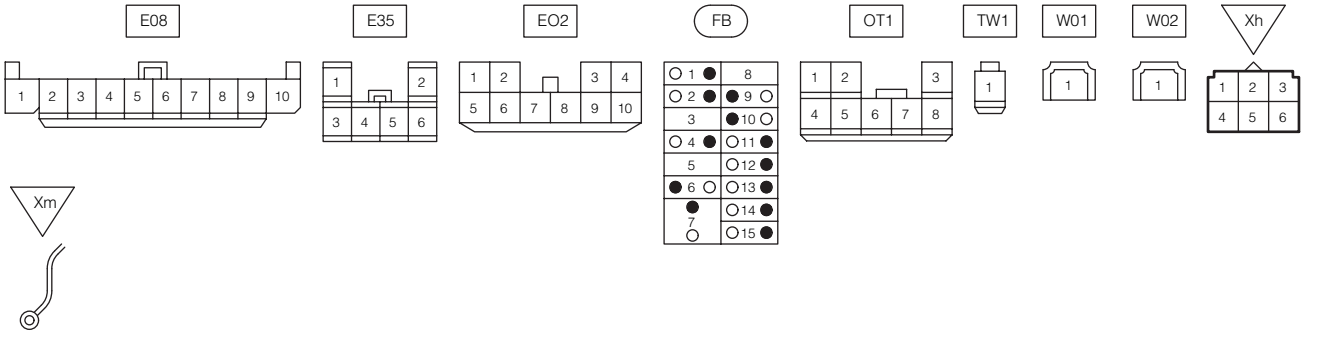

G52 (10P , Rear view mirror switch)
G34 (30P , Fuse block)
GM3 (L , 10P , W to W)
FB (Fuse block)
a
b
c
d
e
f
g
h
i
Xi
GM1 (10P , W to W)


M09 (5P , Mirror adjust RH)
ⓒ
ⓓ
ⓘ
ⓖ
ⓔ
ⓕ
M04 (5P , Mirror adjust LH)

14 REAR WINDOW DEFOGGER
14-1 RHD VEHICLE





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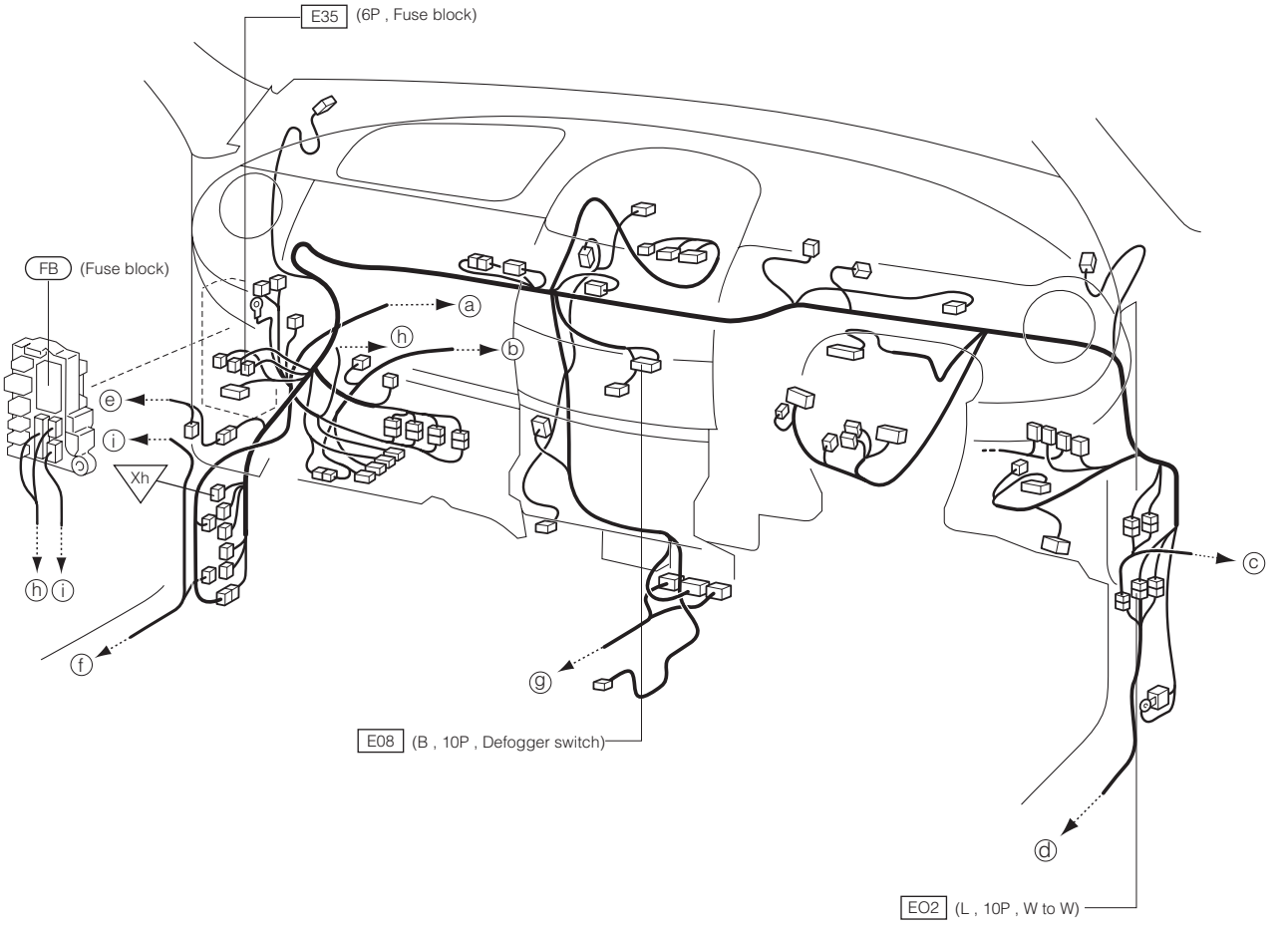
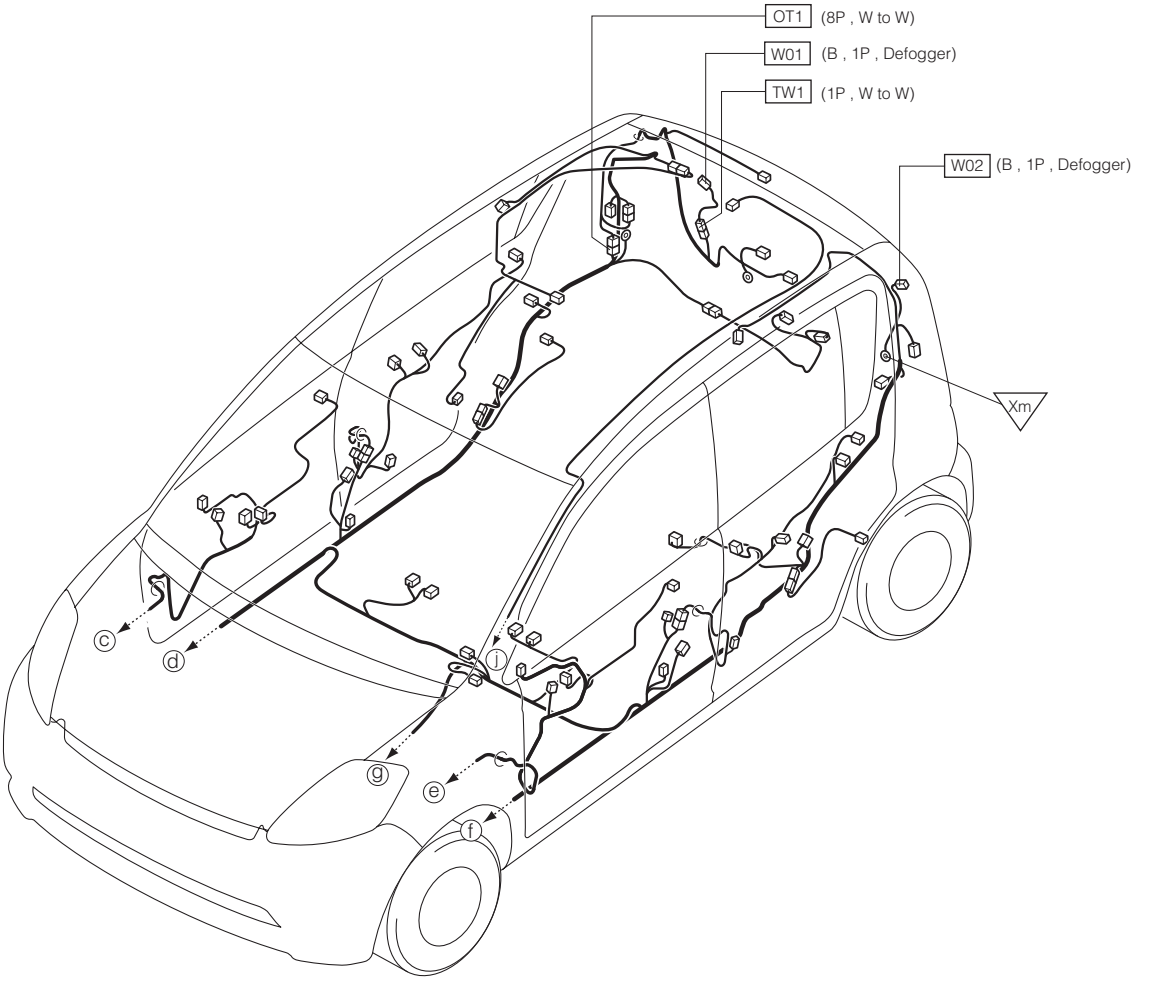
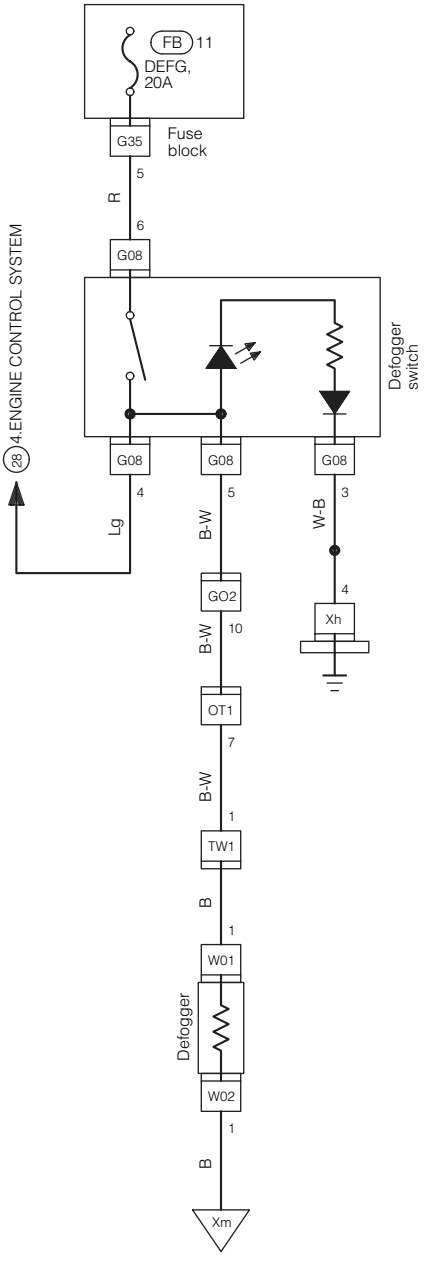
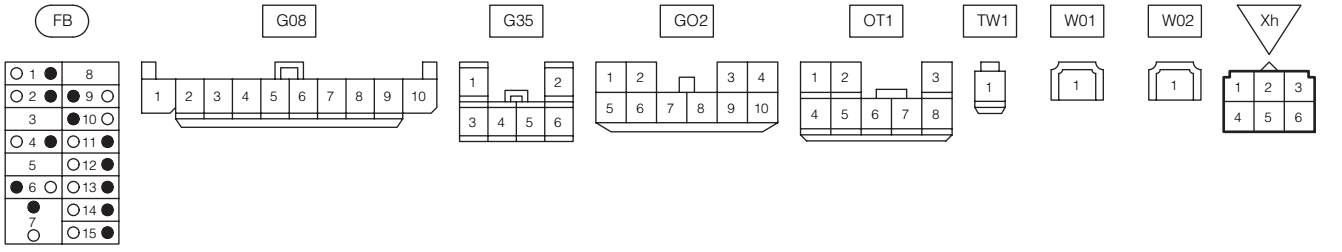

E35 (6P , Fuse block)
FB (Fuse block)
Xh
E08 (B , 10P , Defogger switch)
EO2 (L , 10P , W to W)


OT1 (8P , W to W)
W01 (B , 1P , Defogger)
TW1 (1P , W to W)
W02 (B , 1P , Defogger)
Xm
c
d
j
g
e
f

14-2 LHD VEHICLE





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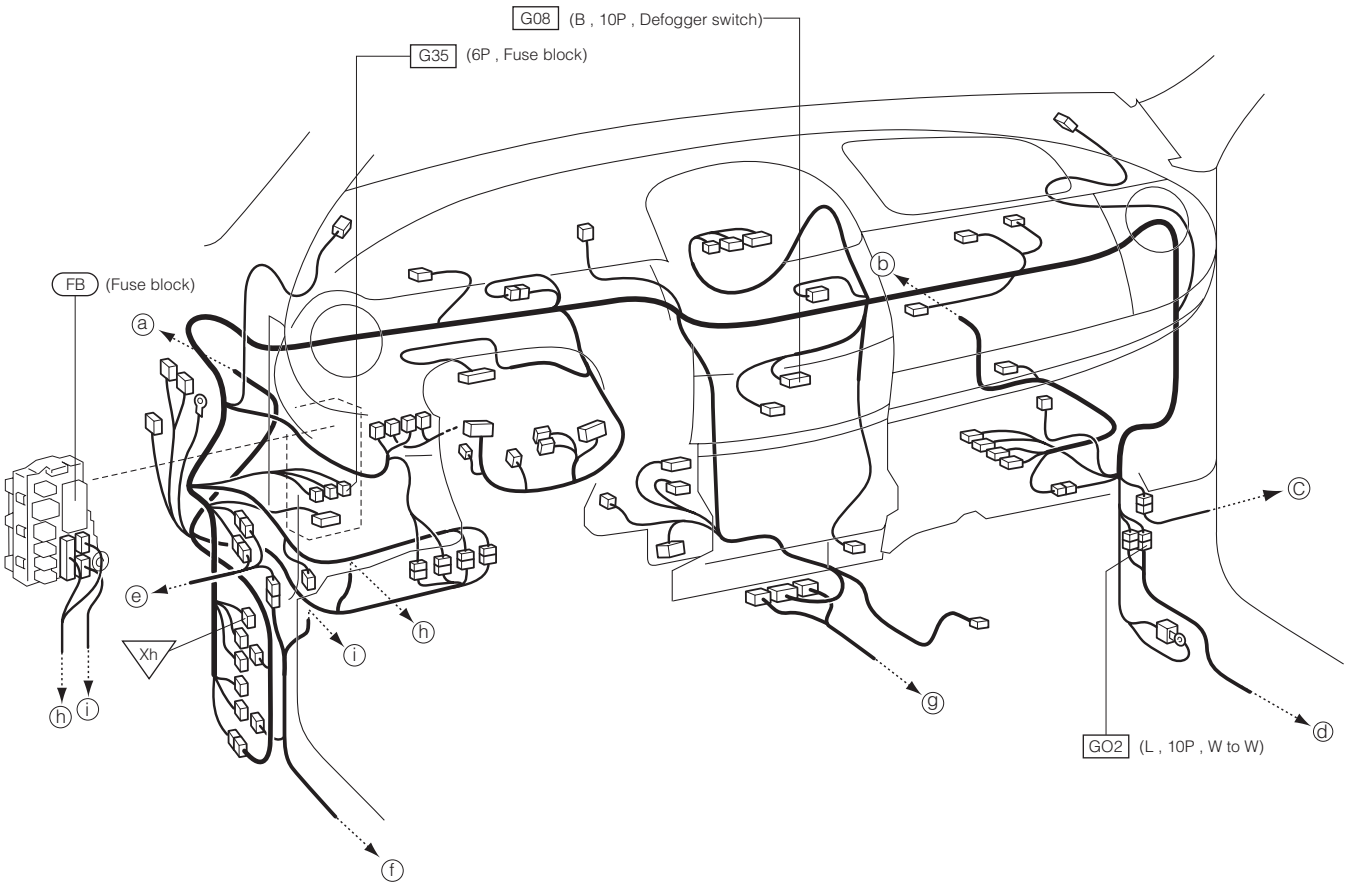

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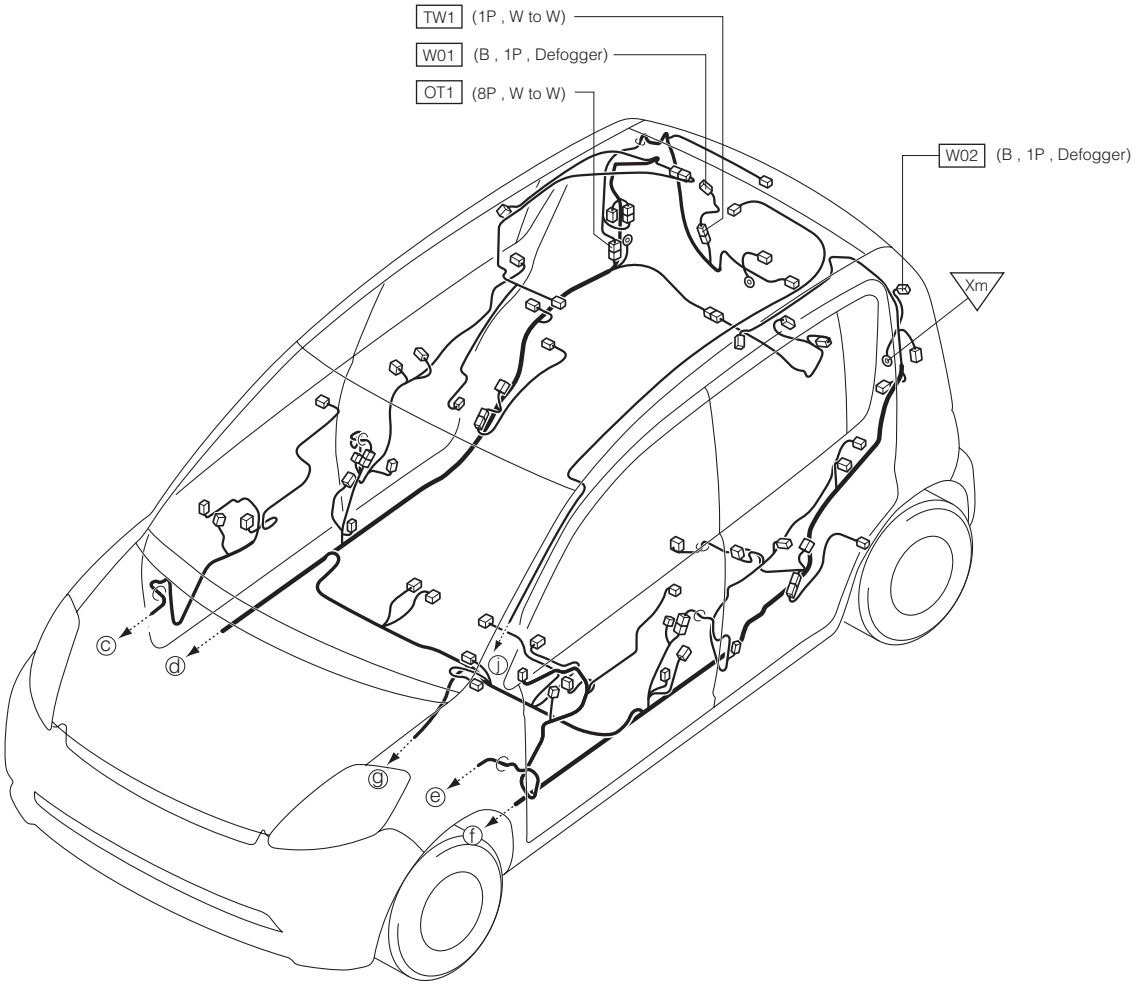
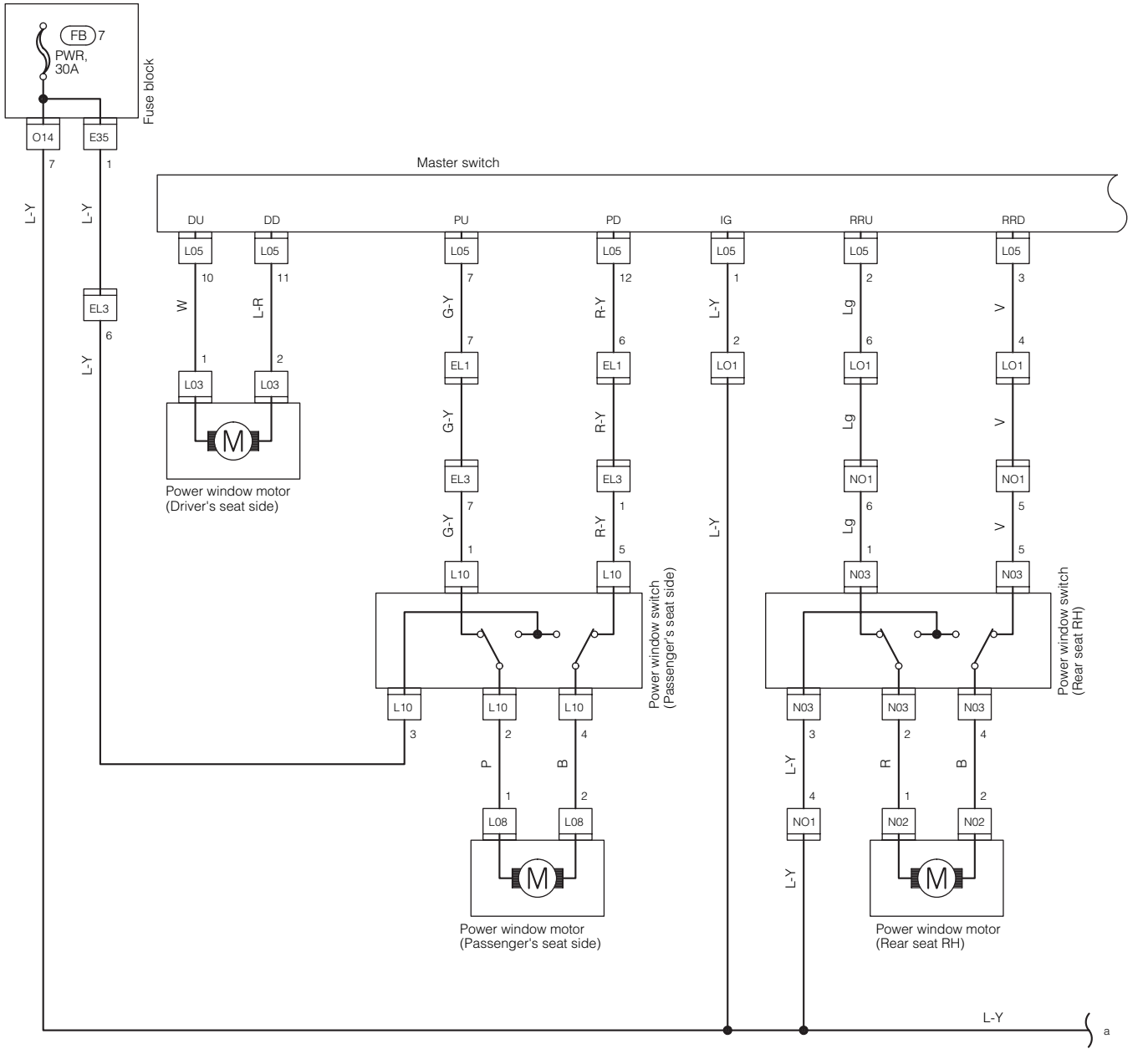
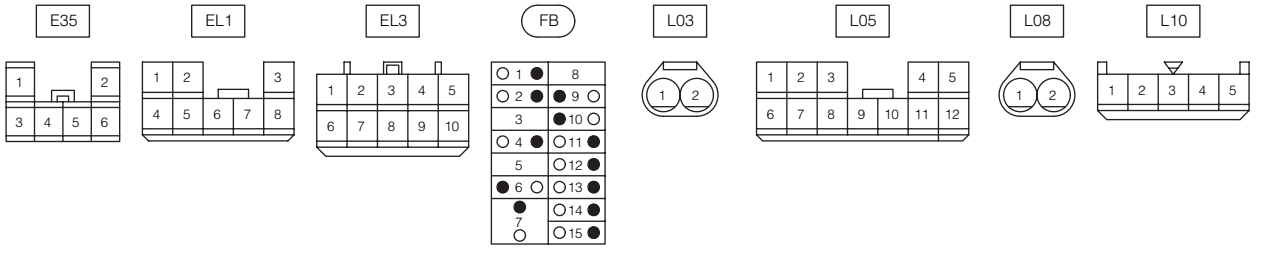
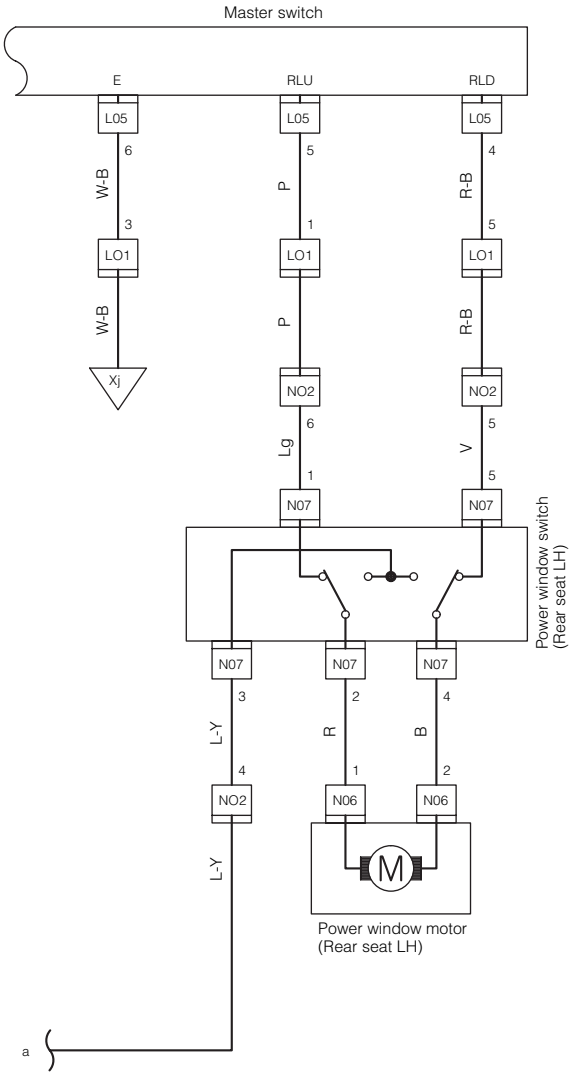
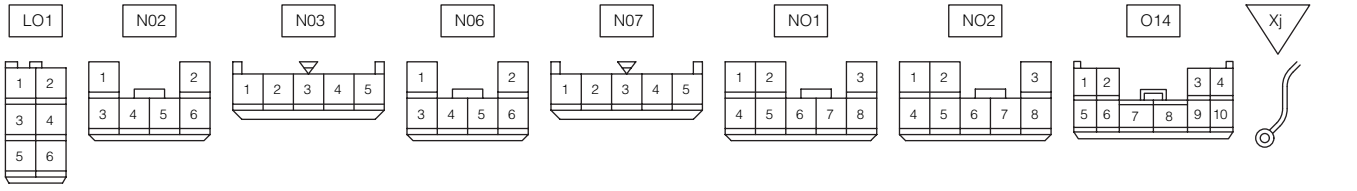

TW1 (1P , W to W)
W01 (B , 1P , Defogger)
OT1 (8P , W to W)
W02 (B , 1P , Defogger)
Xm
ⓒ
ⓓ
ⓘ
ⓖ
ⓔ
ⓕ

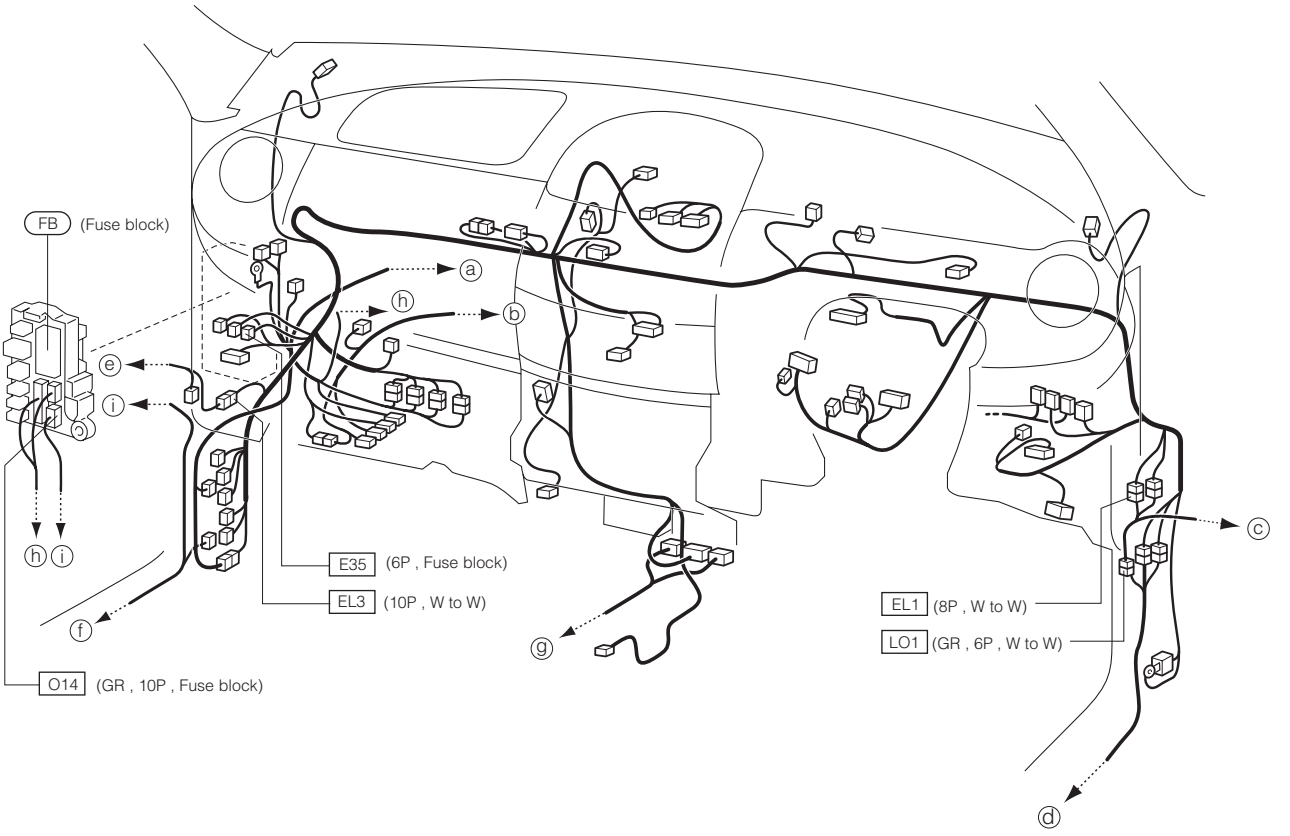
15 POWER WINDOW
15-1 RHD VEHICLE

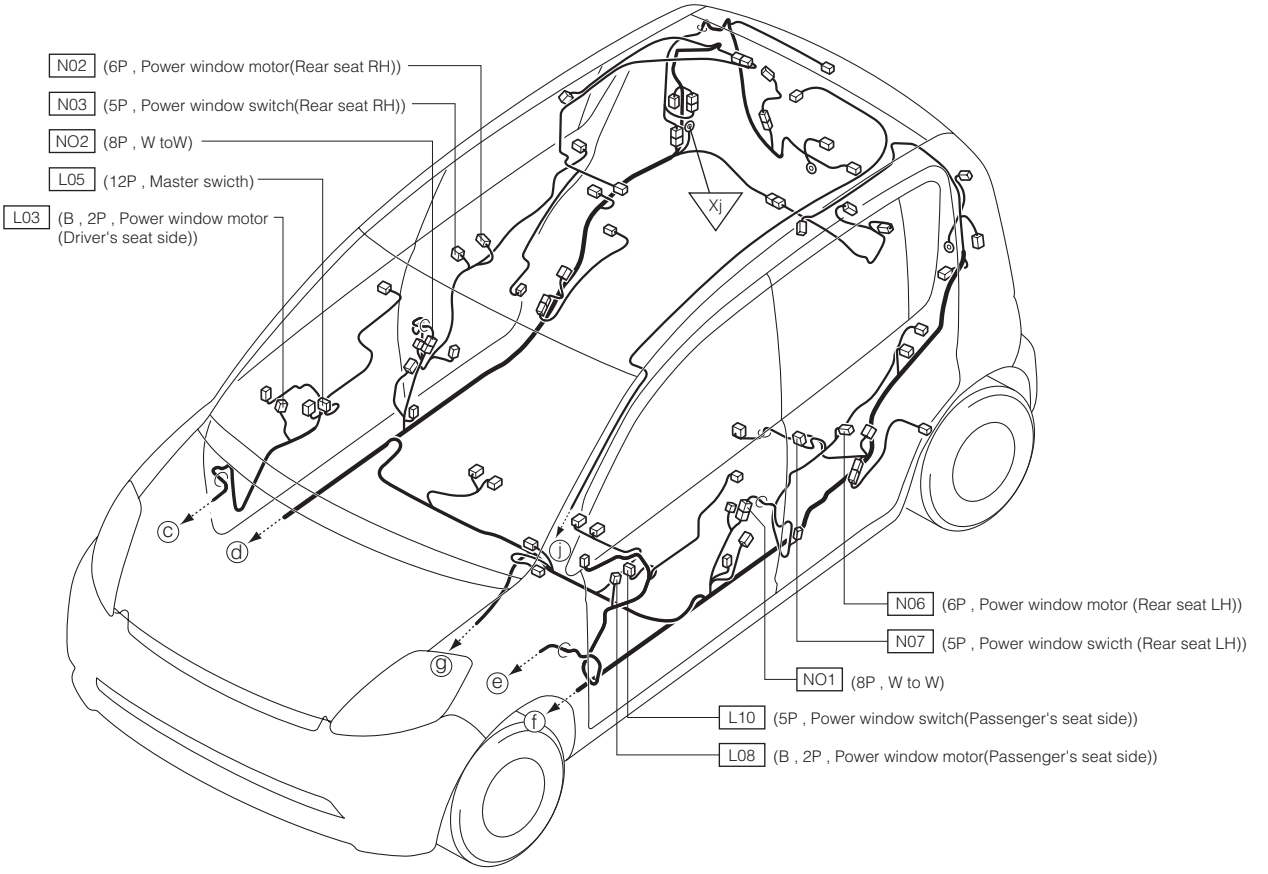




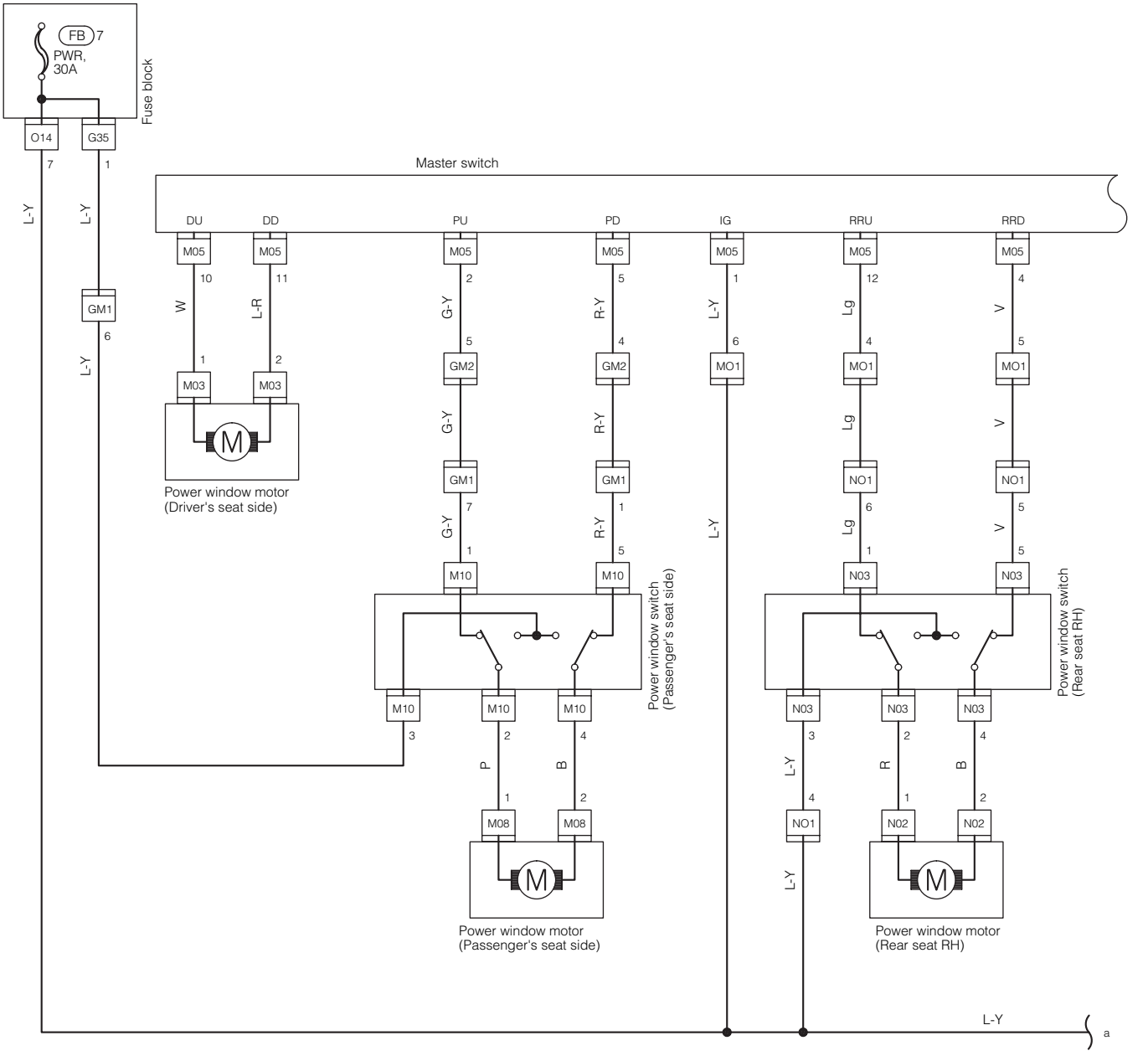

Master switch
E
RLU
RLD
L05
6
5
4
W-B
P
R-B
3
1
5
LO1
W-B
P
R-B
Xj
NO2
6
5
Lg
V
1
5
N07
Power window switch
(Rear seat LH)
3
2
4
L-Y
R
B
4
1
2
NO2
N06
L-Y
M
Power window motor
(Rear seat LH)
a

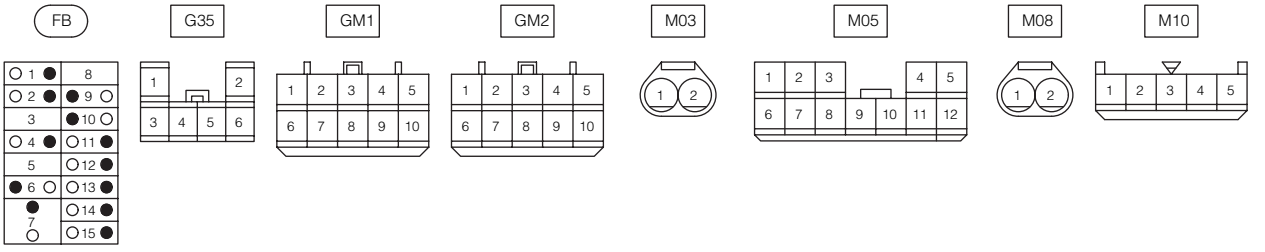

LO1
N02
N03
N06
N07
NO1
NO2
O14
Xj

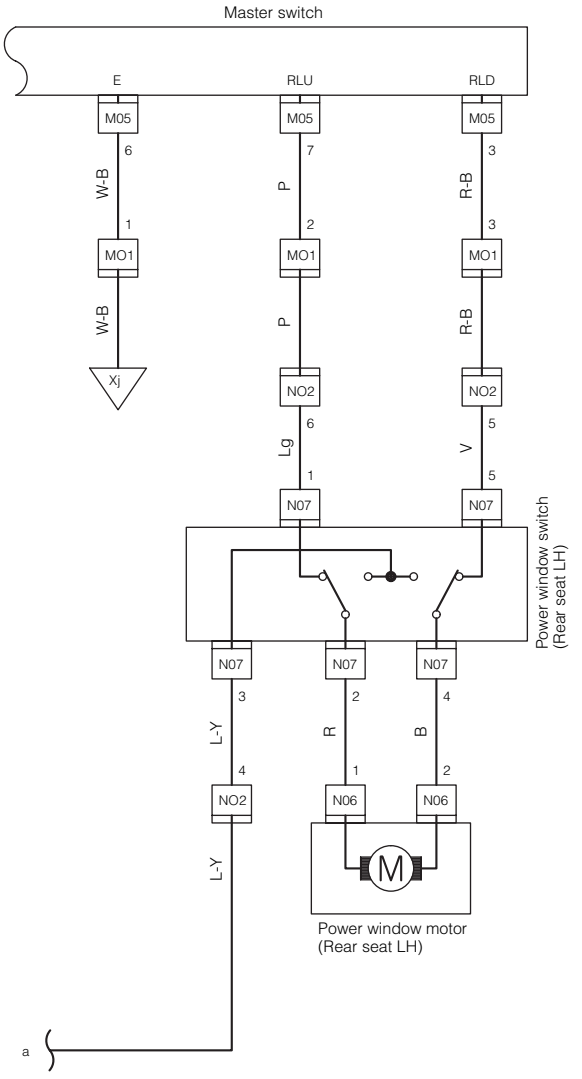

FB (Fuse block)
a
h
b
e
i
h i
f
E35 (6P , Fuse block)
EL3 (10P , W to W)
g
O14 (GR , 10P , Fuse block)
EL1 (8P , W to W)
LO1 (GR , 6P , W to W)
c
d

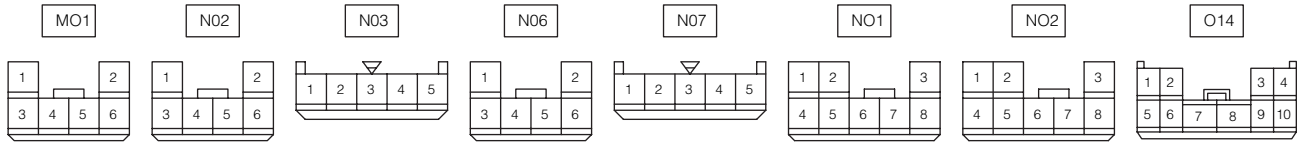

N02 (6P , Power window motor(Rear seat RH))
N03 (5P , Power window switch(Rear seat RH))
NO2 (8P , W toW)
L05 (12P , Master swicth)
L03 (B , 2P , Power window motor (Driver's seat side))
Xj
c
d
j
g
e
f
N06 (6P , Power window motor (Rear seat LH))
N07 (5P , Power window swicth (Rear seat LH))
NO1 (8P , W to W)
L10 (5P , Power window switch(Passenger's seat side))
L08 (B , 2P , Power window motor(Passenger's seat side))

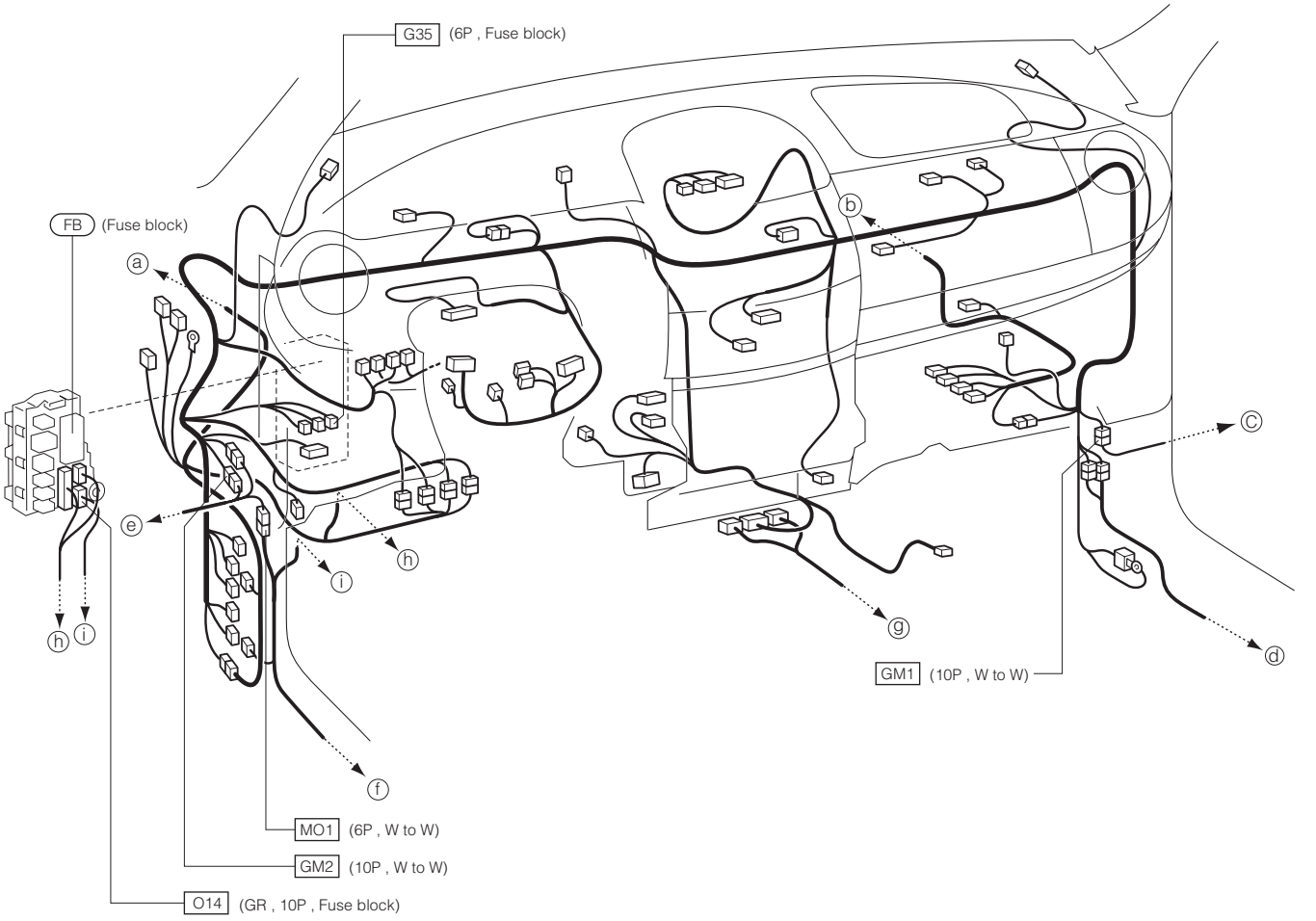
15-2 LHD VEHICLE

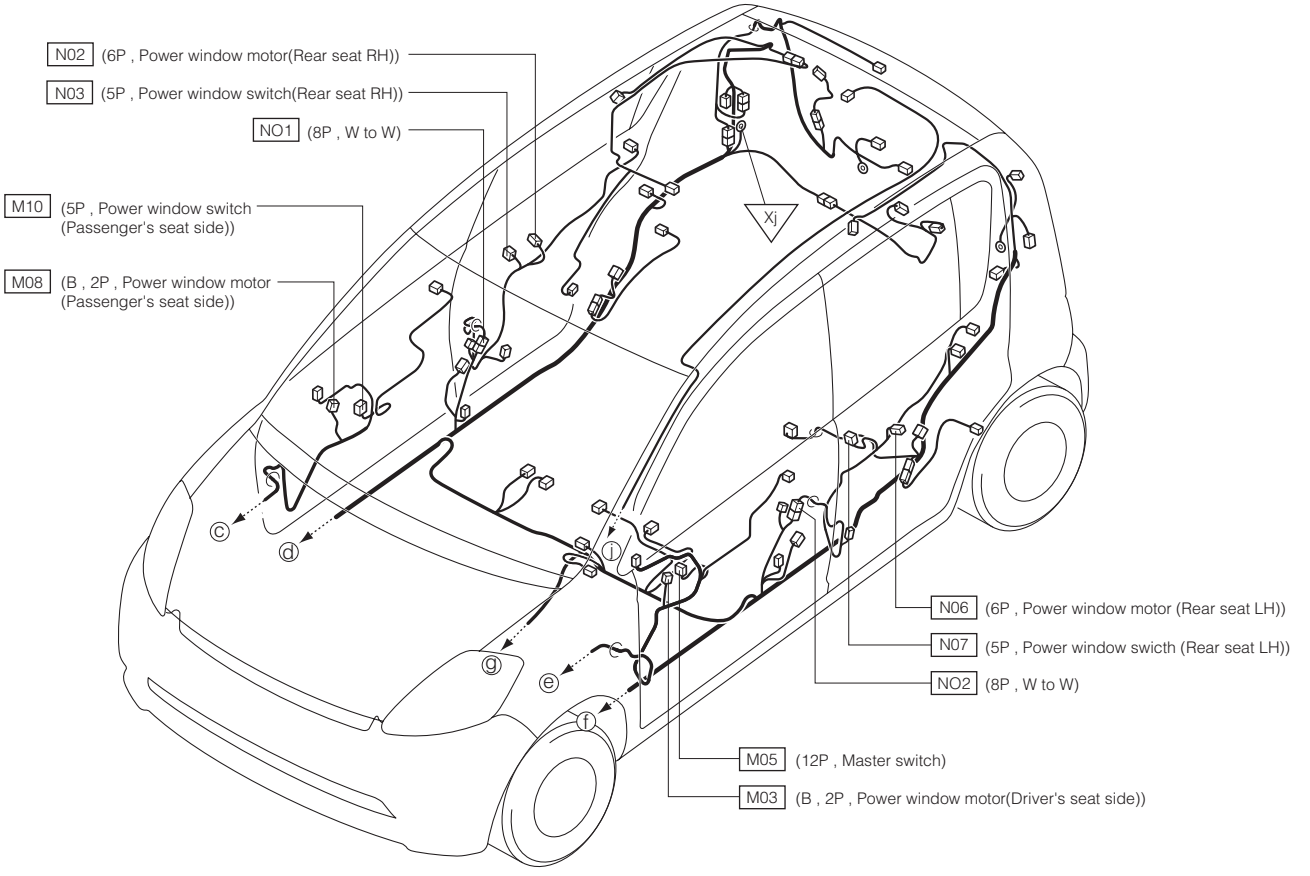




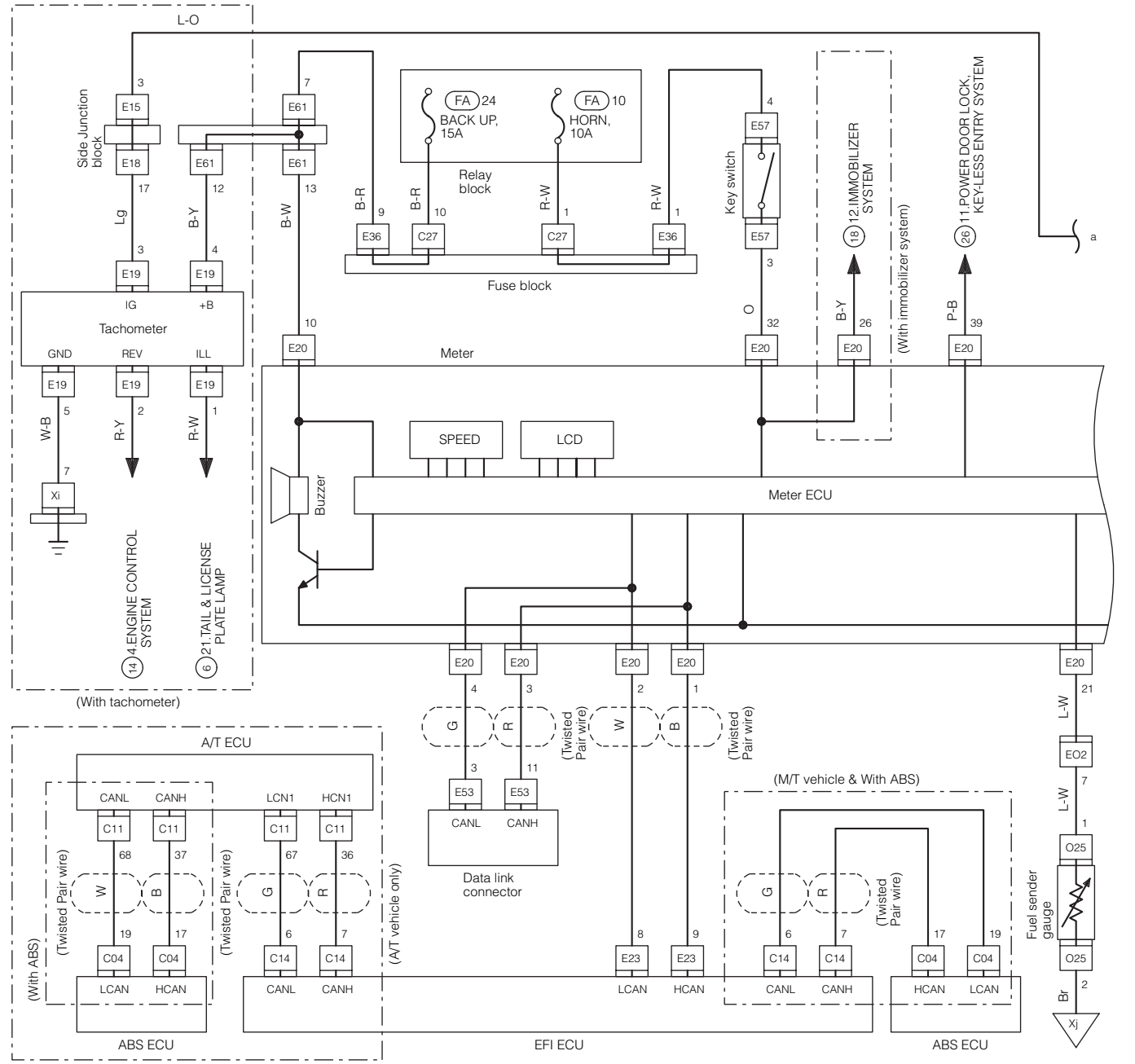

Master switch
E
RLU
RLD
M05
M05
M05
6
7
3
W-B
P
R-B
1
2
3
MO1
MO1
MO1
W-B
P
R-B
Xj
NO2
NO2
6
5
Lg
V
1
5
N07
N07
Power window switch
(Rear seat LH)
N07
N07
N07
3
2
4
L-Y
R
B
4
1
2
NO2
N06
N06
L-Y
M
Power window motor
(Rear seat LH)
a

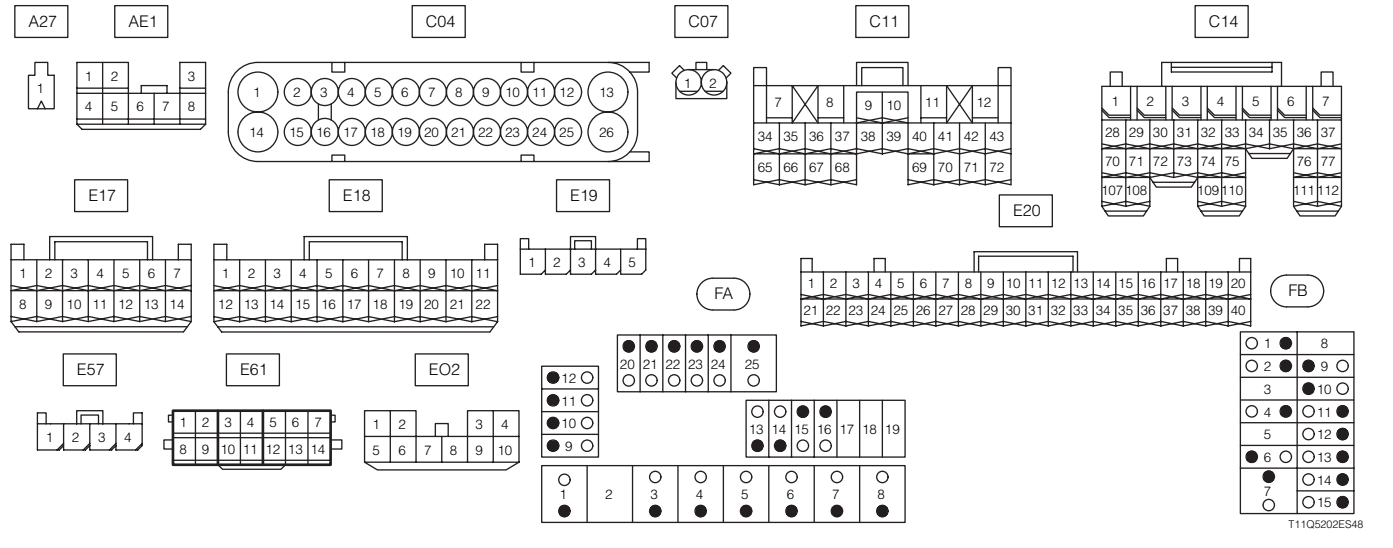

MO1
N02
N03
N06
N07
NO1
NO2
O14


G35 (6P , Fuse block)
FB (Fuse block)
a
b
c
d
e
f
g
h
i
GM1 (10P , W to W)
MO1 (6P , W to W)
GM2 (10P , W to W)
O14 (GR , 10P , Fuse block)

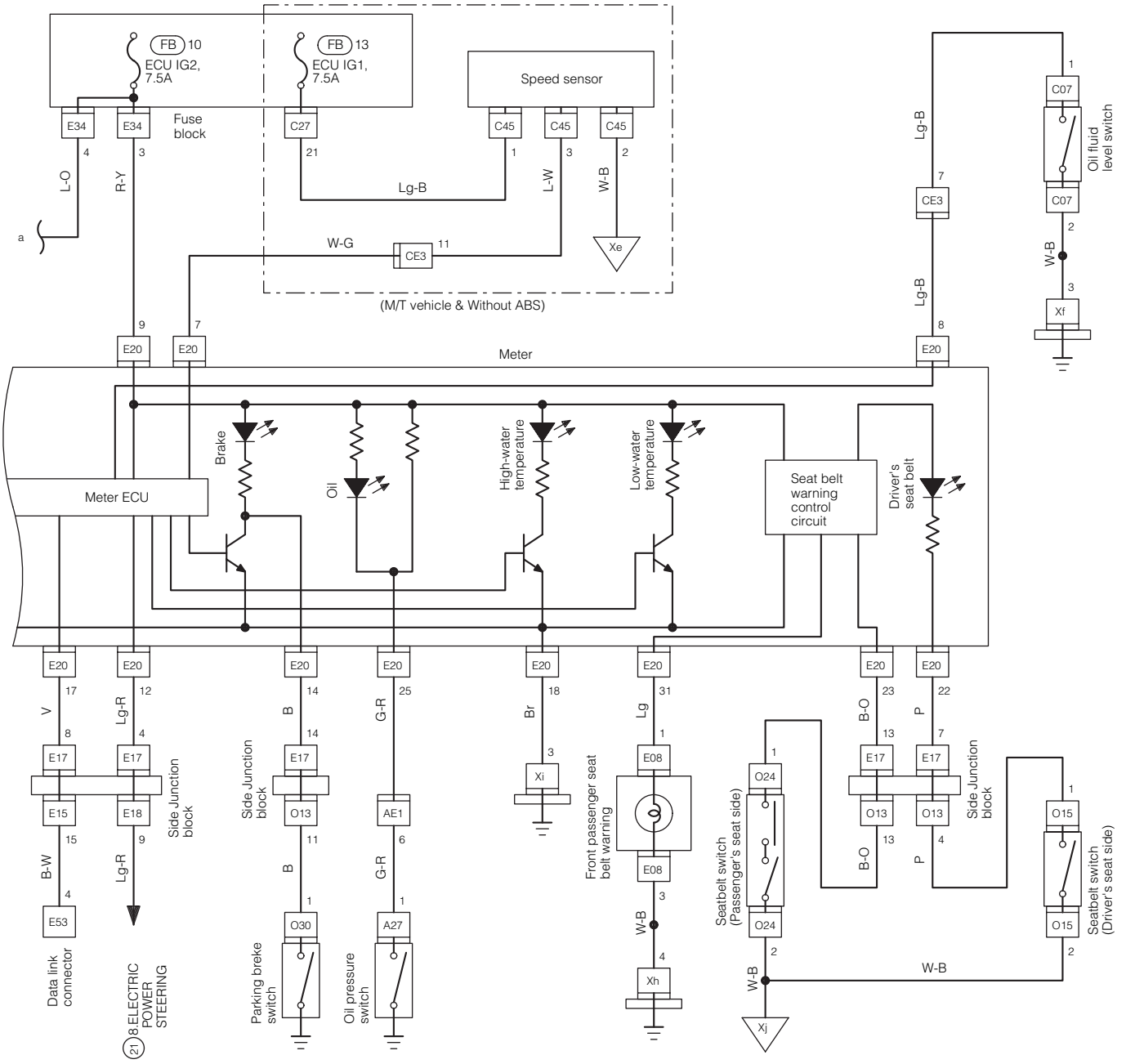

N02 (6P , Power window motor(Rear seat RH))
N03 (5P , Power window switch(Rear seat RH))
NO1 (8P , W to W)
M10 (5P , Power window switch (Passenger's seat side))
M08 (B , 2P , Power window motor (Passenger's seat side))
Xj
ⓒ
ⓓ
ⓘ
ⓖ
ⓔ
ⓕ
N06 (6P , Power window motor (Rear seat LH))
N07 (5P , Power window swicth (Rear seat LH))
NO2 (8P , W to W)
M05 (12P , Master switch)
M03 (B , 2P , Power window motor(Driver's seat side))

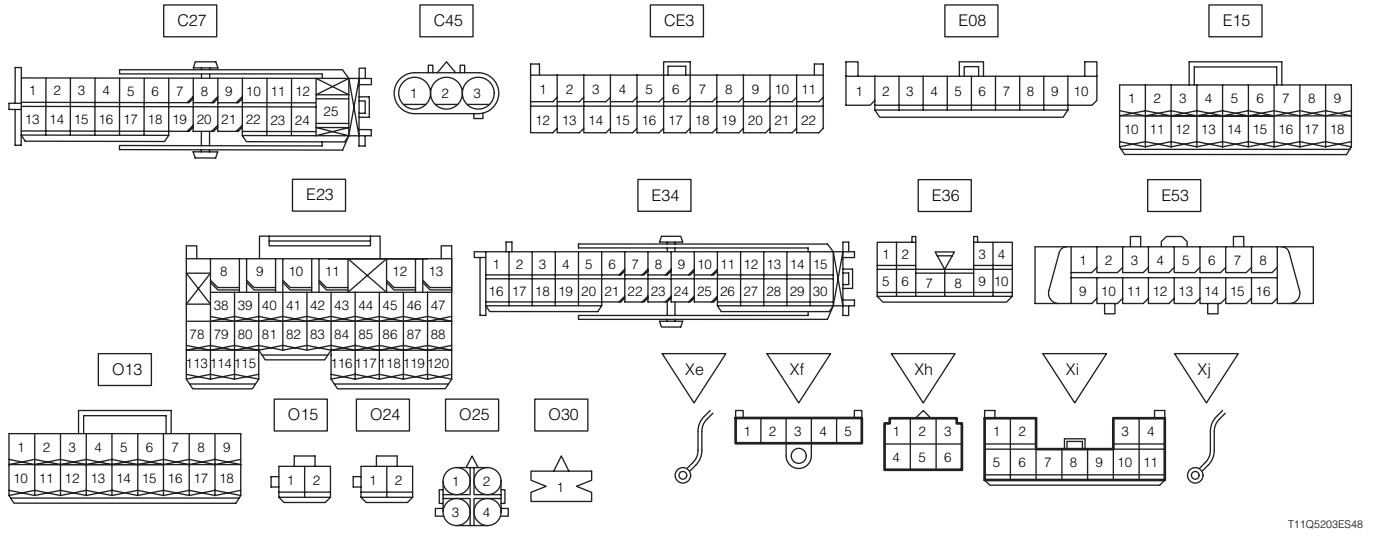
16 METER
16-1 RHD VEHICLE



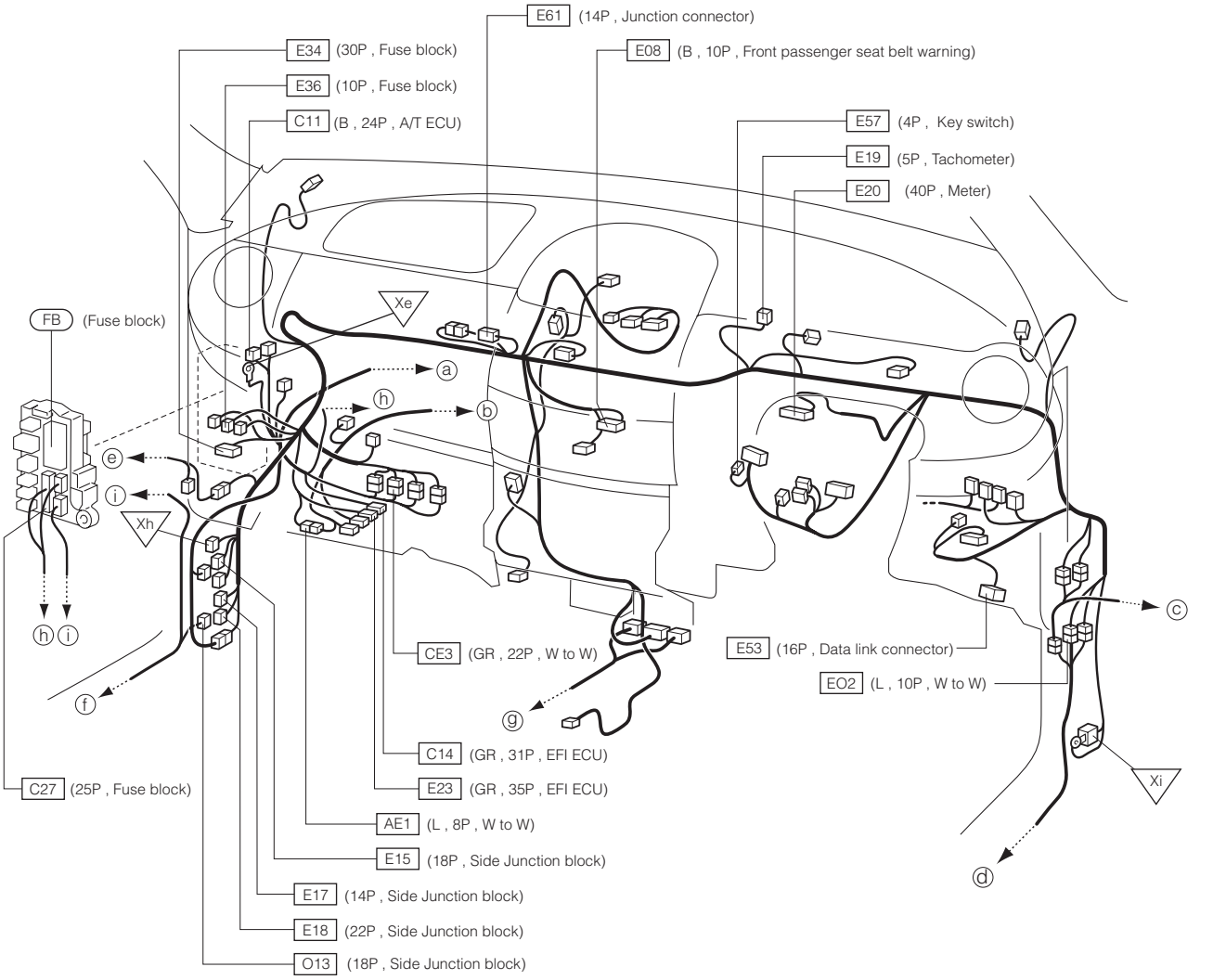


T11Q5202ES48

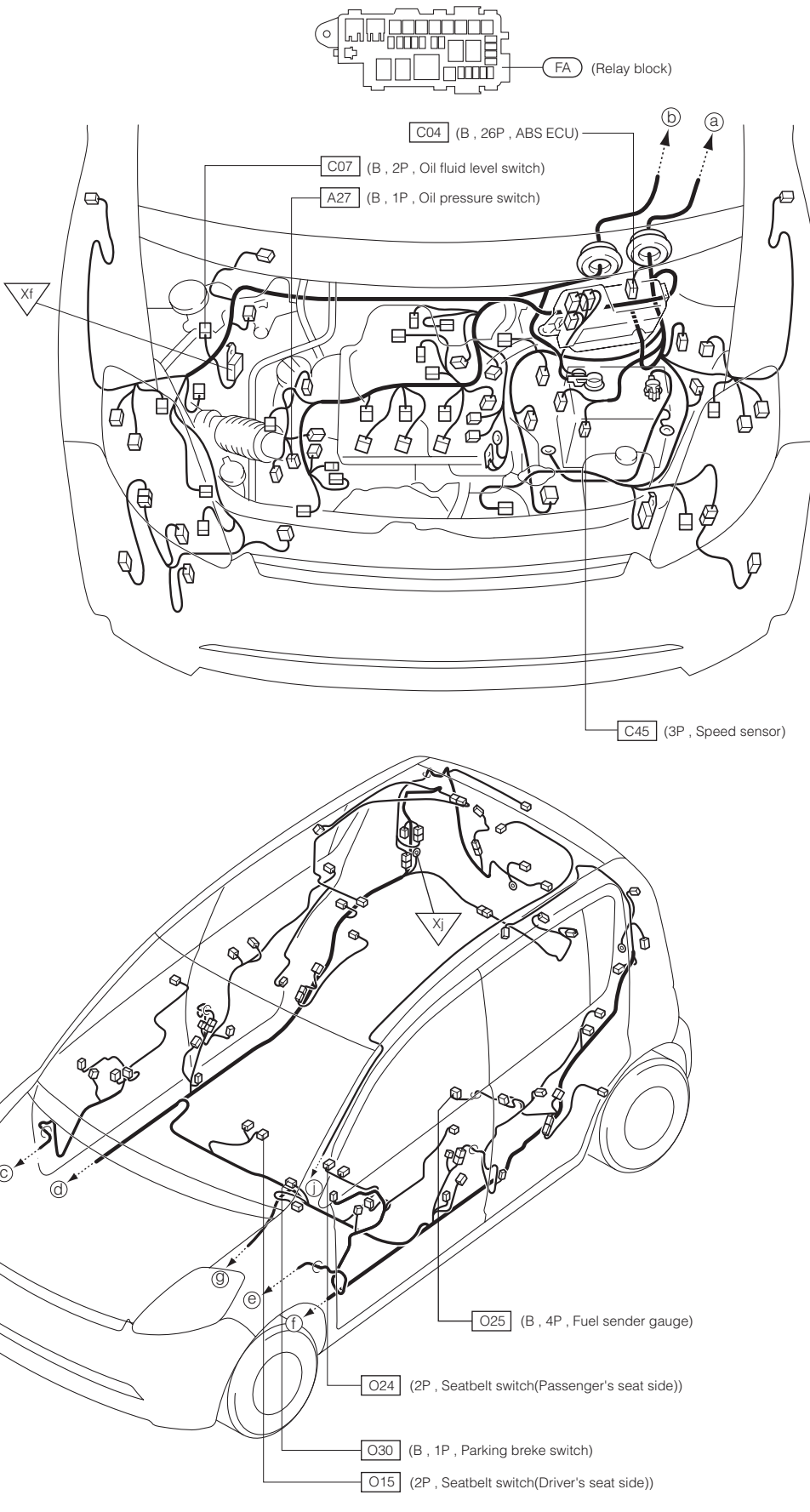




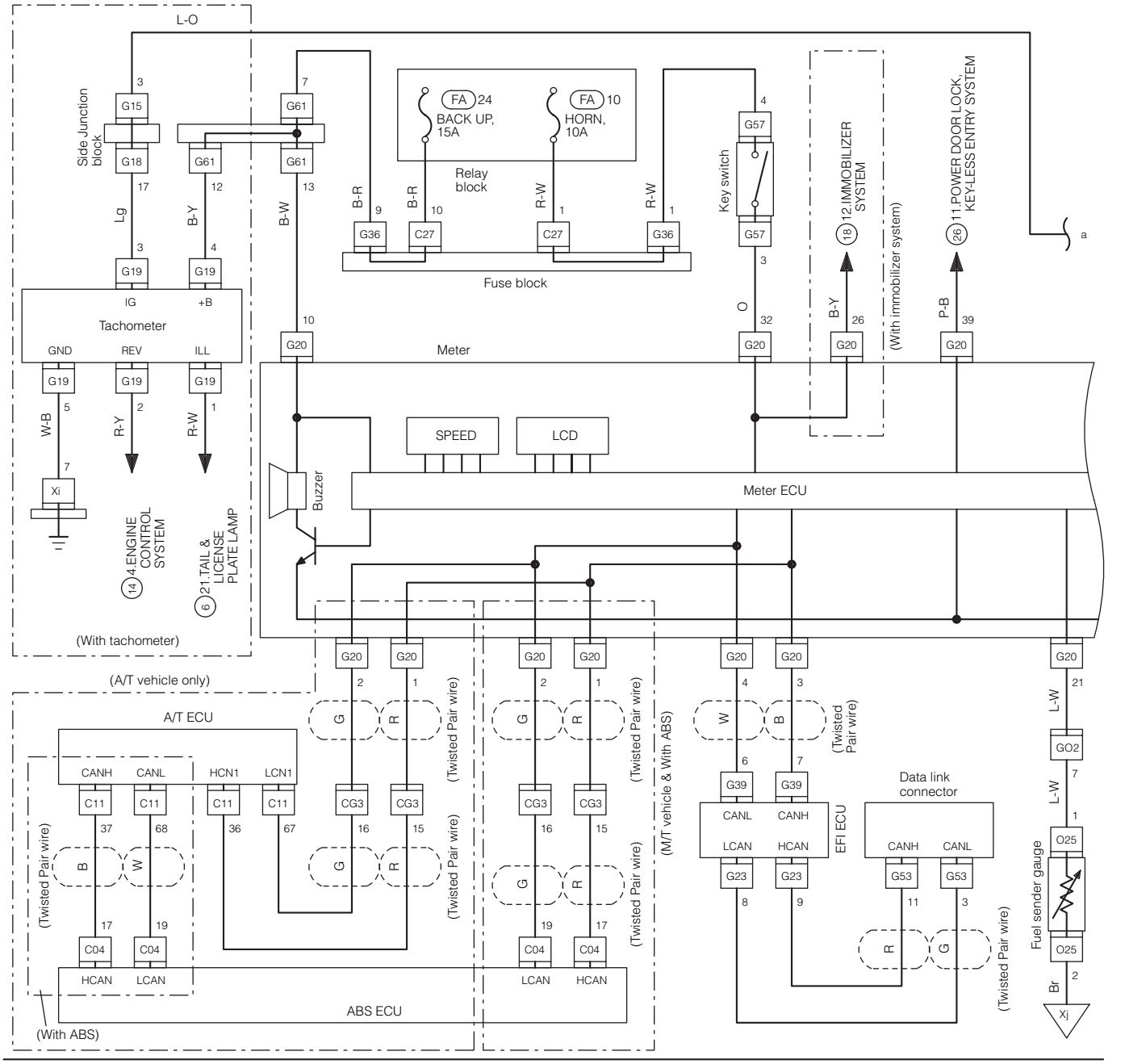
T11Q5203ES48

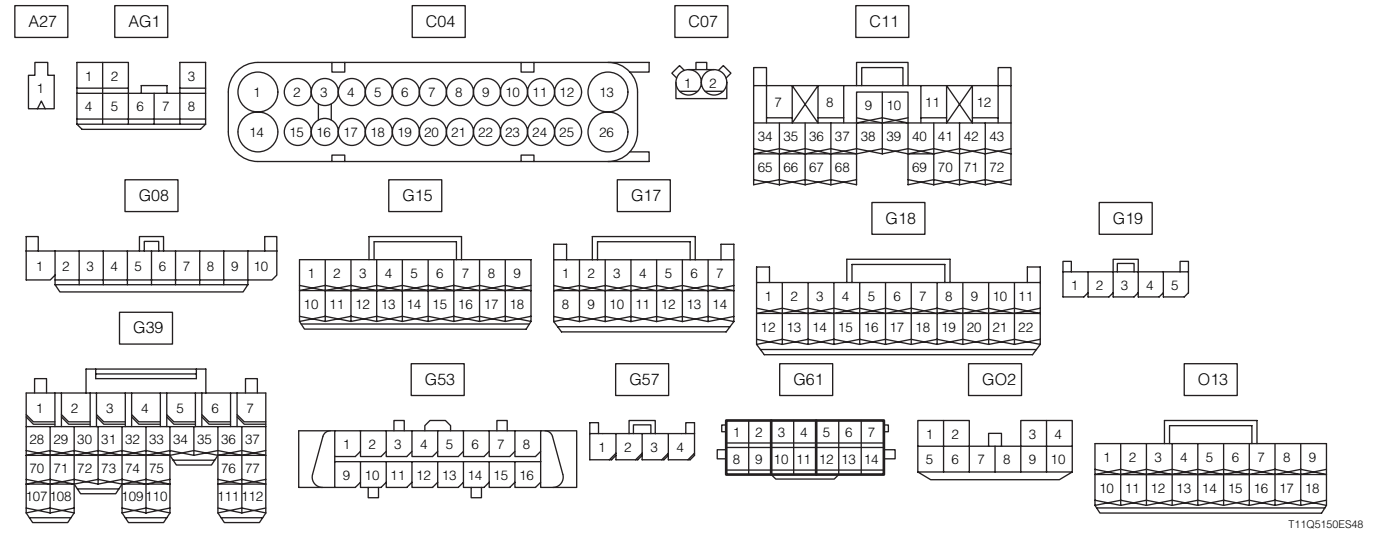


T11Q5068ES48

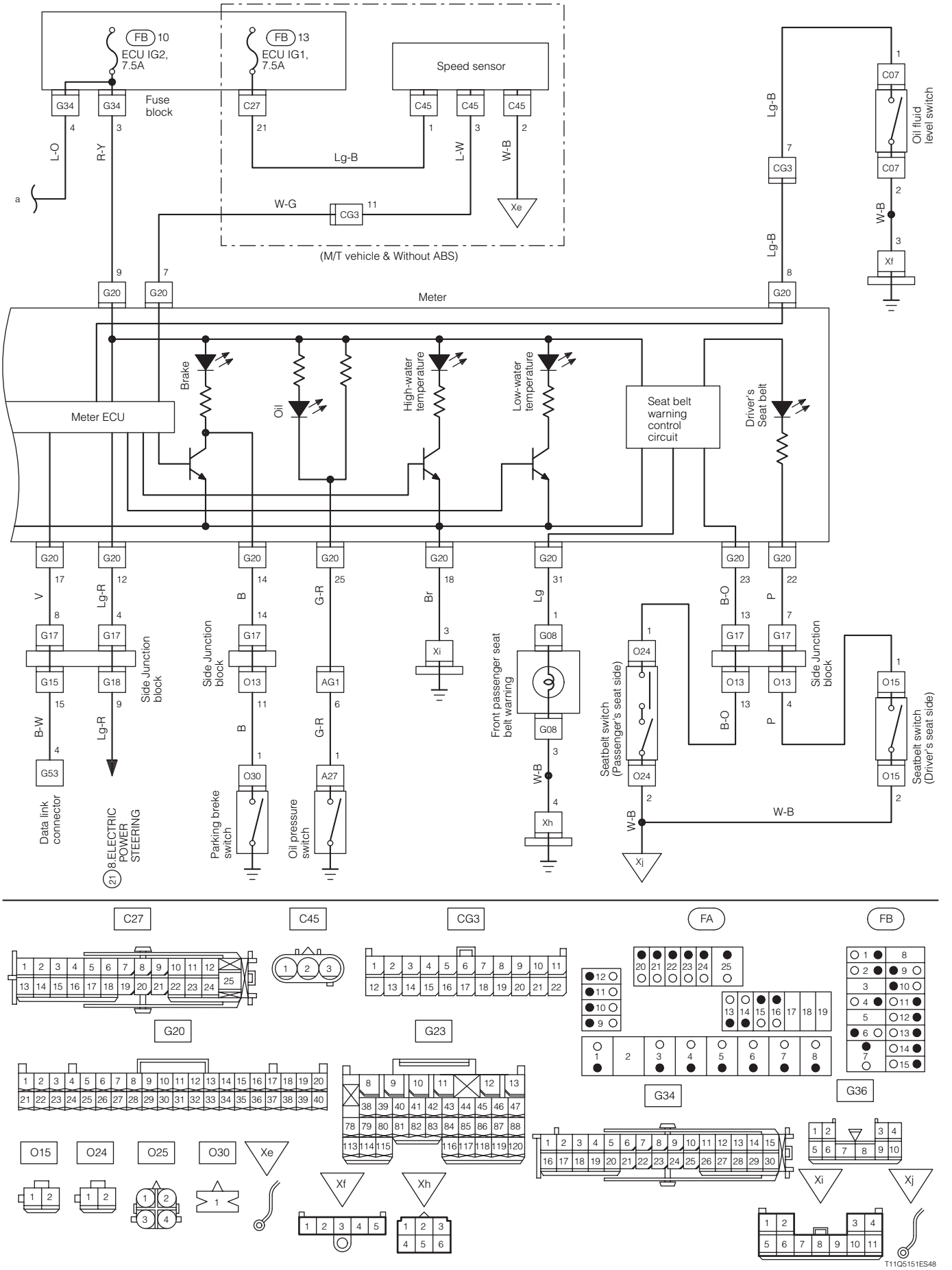

FA (Relay block)
C04 (B , 26P , ABS ECU)
C07 (B , 2P , Oil fluid level switch)
A27 (B , 1P , Oil pressure switch)
Xf
b
a
C45 (3P , Speed sensor)
Xj
c
d
j
g
e
f
O25 (B , 4P , Fuel sender gauge)
O24 (2P , Seatbelt switch(Passenger's seat side))
O30 (B , 1P , Parking breke switch)
O15 (2P , Seatbelt switch(Driver's seat side))

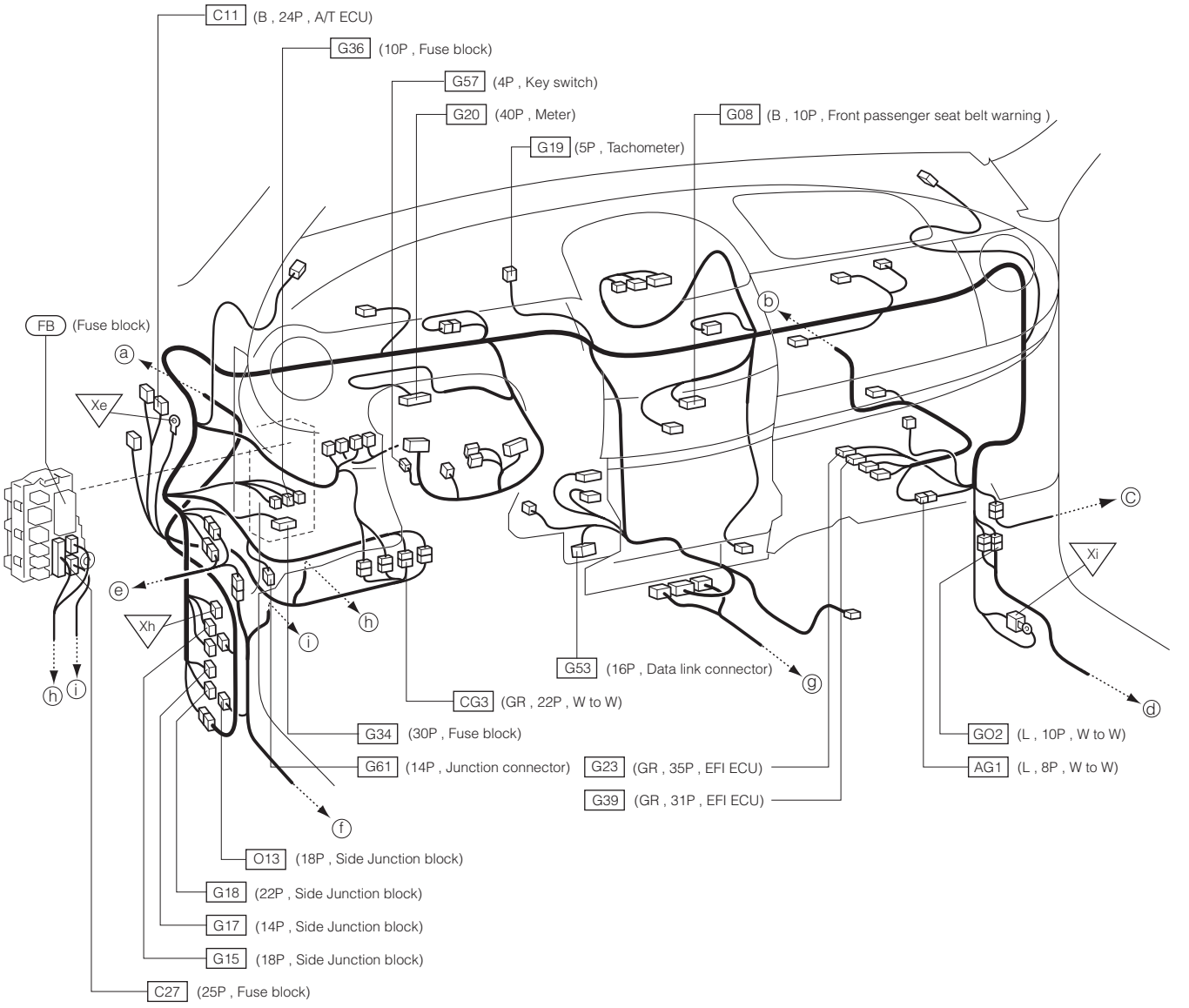
16-2 LHD VEHICLE

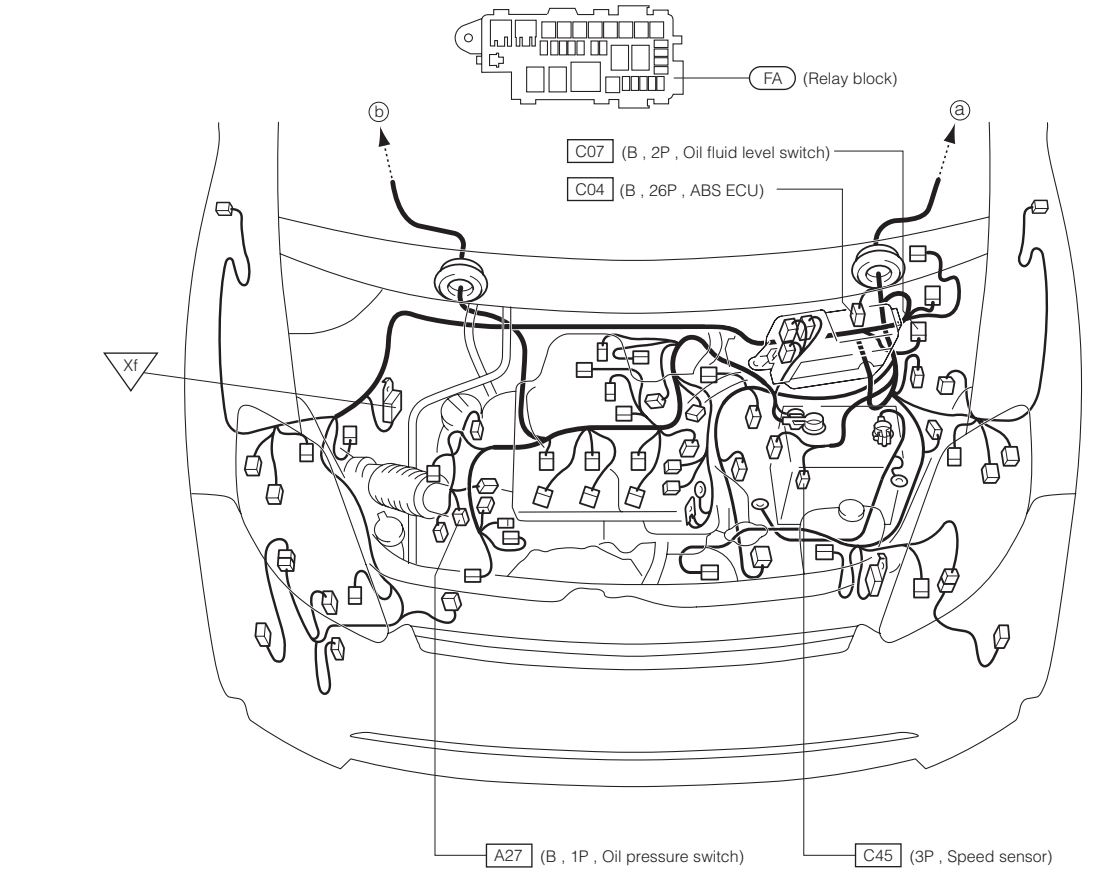


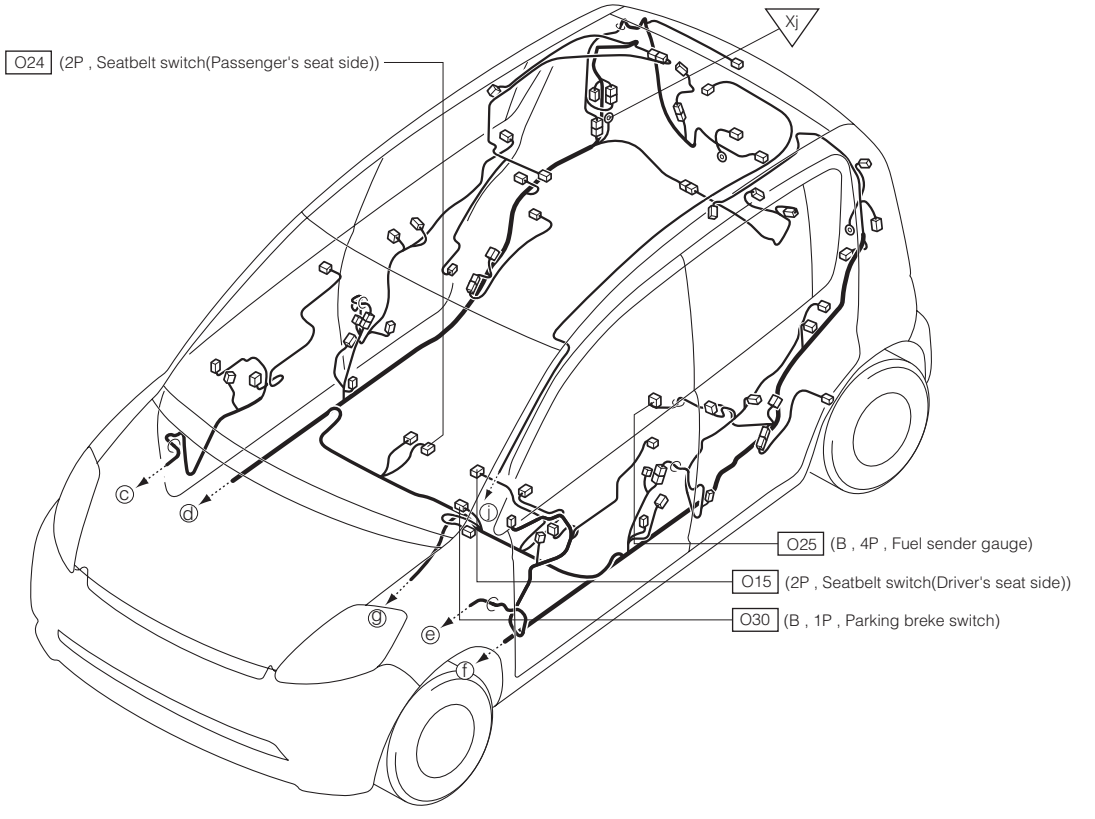


T11Q5150ES48


FB 10
ECU IG2, 7.5A
FB 13
ECU IG1, 7.5A
Fuse block
Speed sensor
G34
G34
C27
C45
C45
C45
L-O
R-Y
Lg-B
L-W
W-B
W-G
CG3
Xe
a
(M/T vehicle & Without ABS)
Lg-B
C07
Oil fluid level switch
CG3
C07
W-B
Xf
Lg-B
G20
G20
G20
Meter
Meter ECU
Brake
Oil
High-water temperature
Low-water temperature
Seat belt warning control circuit
Driver's Seat belt
G20
G20
G20
G20
G20
G20
G20
G20
V
Lg-R
B
G-R
Br
Lg
B-O
P
G17
G17
G17
G17
G17
G17
G15
G18
O13
AG1
Xi
G08
O13
O13
Side Junction block
Side Junction block
Side Junction block
B-W
Lg-R
B
G-R
G08
O24
O24
O15
O15
G53
O30
A27
W-B
Xh
W-B
W-B
Xj
Data link connector
8.ELECTRIC POWER STEERING
Parking brake switch
Oil pressure switch
Front passenger seat belt warning
Seatbelt switch (Passenger's seat side)
Seatbelt switch (Driver's seat side)
C27
C45
CG3
FA
FB
G20
G23
G34
G36
O15
O24
O25
O30
Xe
Xf
Xh
Xi
Xj
T11Q5151ES48

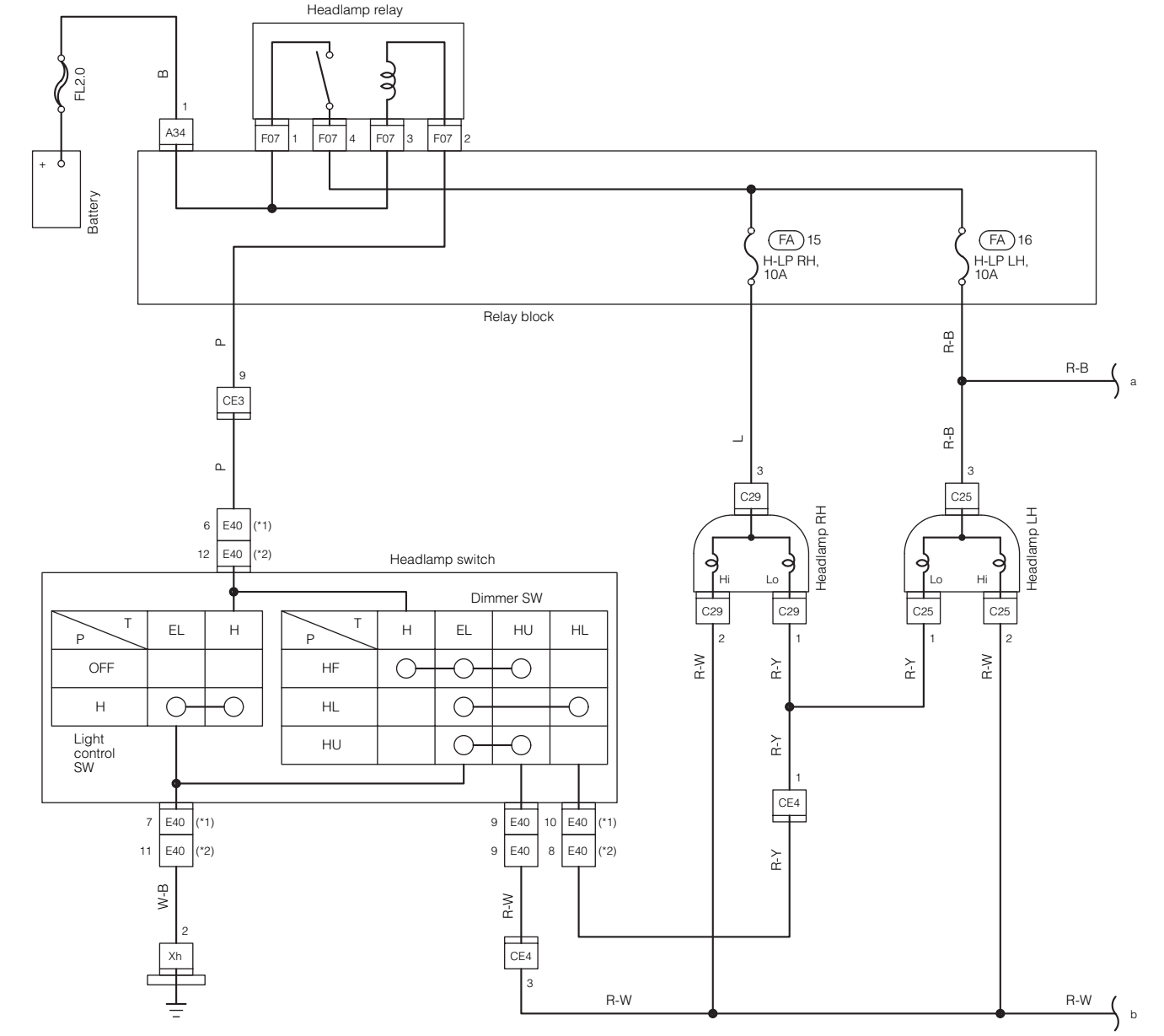

C11 (B , 24P , A/T ECU)
G36 (10P , Fuse block)
G57 (4P , Key switch)
G20 (40P , Meter)
G08 (B , 10P , Front passenger seat belt warning)
G19 (5P , Tachometer)
FB (Fuse block)
a
b
Xe
c
C
Xi
e
Xh
h
i
f
g
d
G53 (16P , Data link connector)
CG3 (GR , 22P , W to W)
G34 (30P , Fuse block)
G61 (14P , Junction connector)
G23 (GR , 35P , EFI ECU)
G39 (GR , 31P , EFI ECU)
GO2 (L , 10P , W to W)
AG1 (L , 8P , W to W)
O13 (18P , Side Junction block)
G18 (22P , Side Junction block)
G17 (14P , Side Junction block)
G15 (18P , Side Junction block)
C27 (25P , Fuse block)

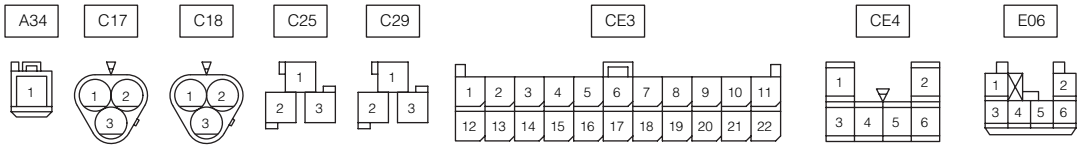

FA (Relay block)
ⓑ
ⓐ
C07 (B , 2P , Oil fluid level switch)
C04 (B , 26P , ABS ECU)
Xf
A27 (B , 1P , Oil pressure switch)
C45 (3P , Speed sensor)

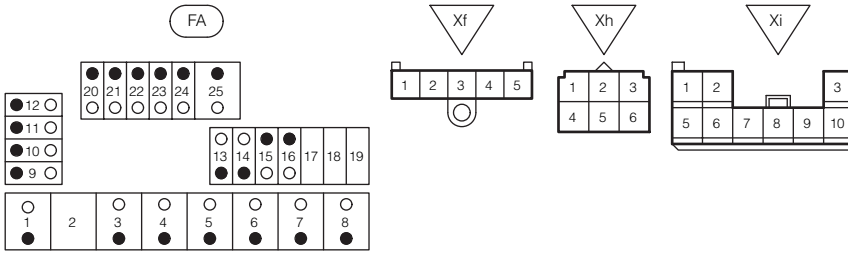

Xj
O24 (2P , Seatbelt switch(Passenger's seat side))
ⓒ
ⓓ
ⓘ
O25 (B , 4P , Fuel sender gauge)
O15 (2P , Seatbelt switch(Driver's seat side))
O30 (B , 1P , Parking breke switch)
ⓖ
ⓔ
ⓕ

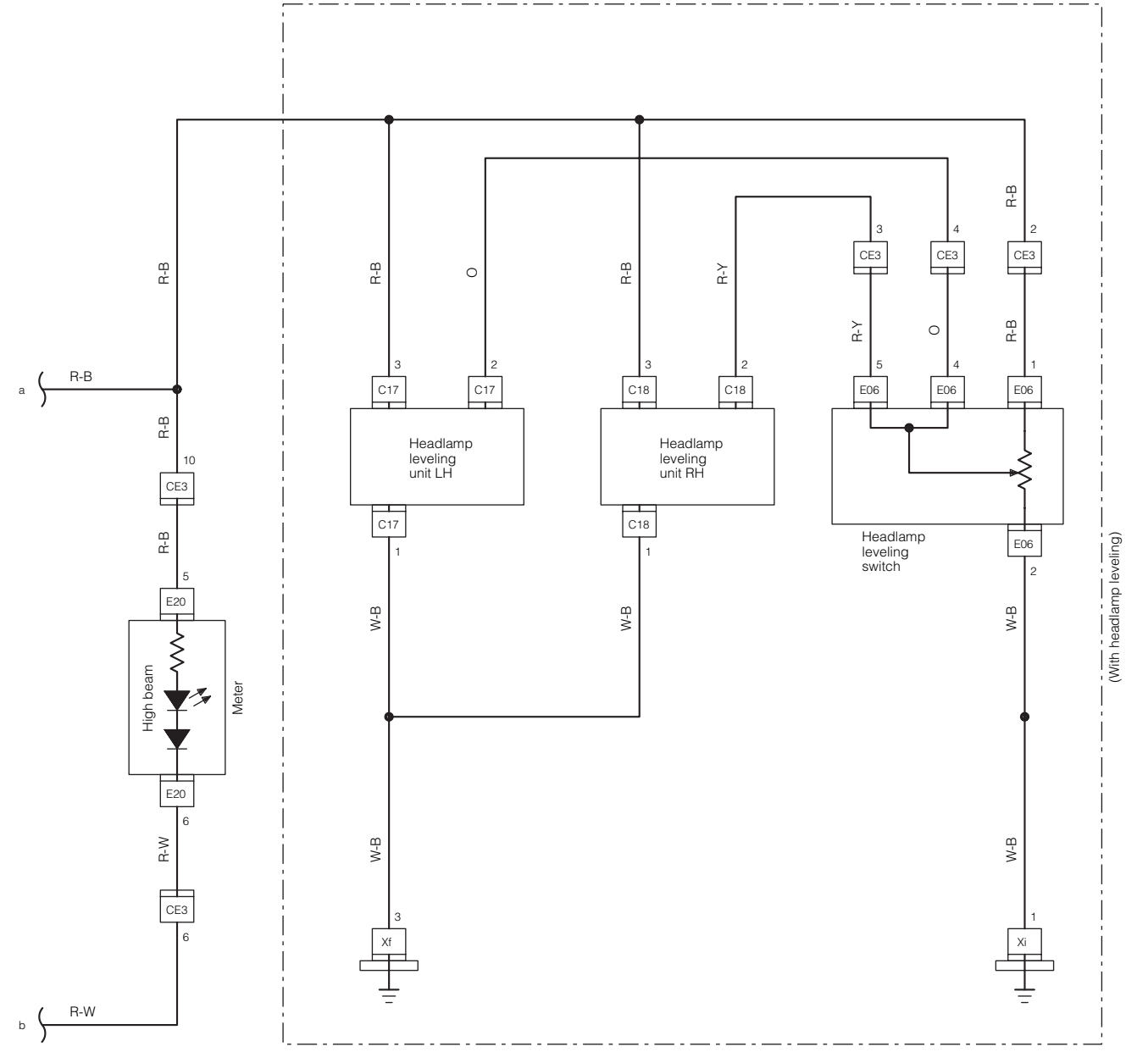
17 HEAD LAMP
17-1 RHD VEHICLE

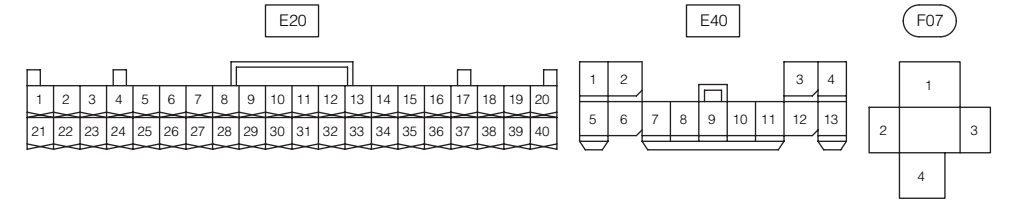
*1:General export and AUS specification
*2:Except General export and AUS specification

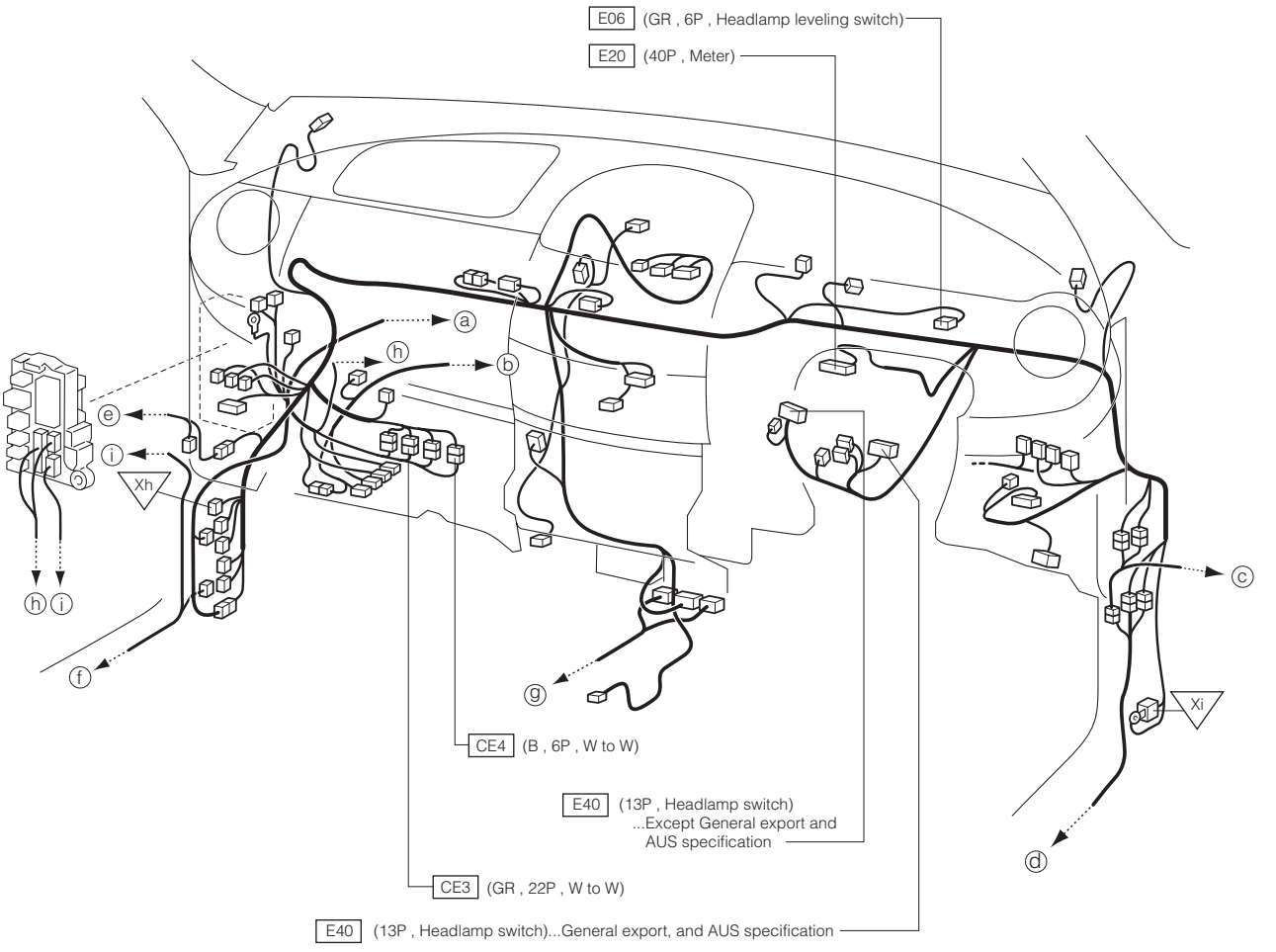


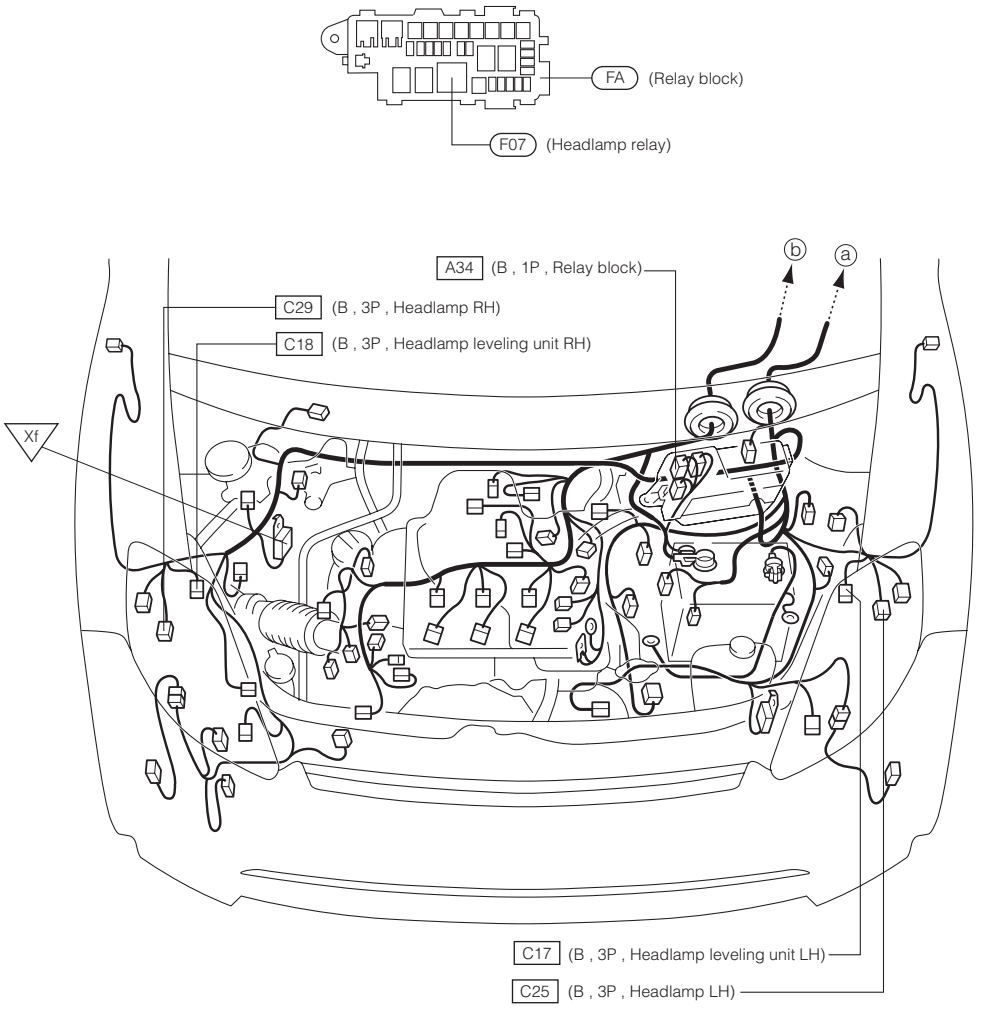




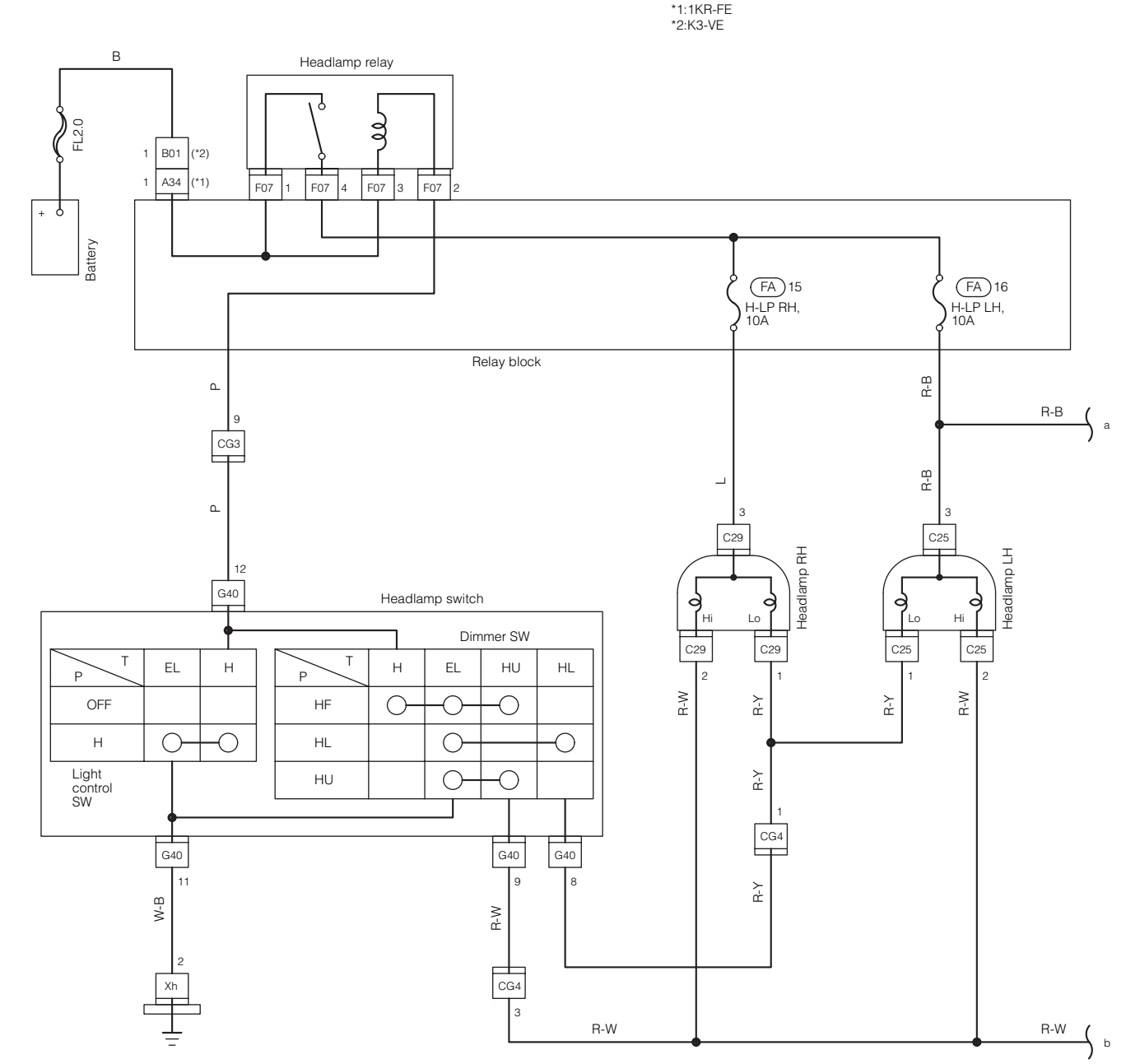

a
b
R-B
R-W
CE3
E20
High beam
Meter
C17
C18
E06
Headlamp leveling unit LH
Headlamp leveling unit RH
Headlamp leveling switch
W-B
R-Y
O
Xf
Xi
(With headlamp leveling)

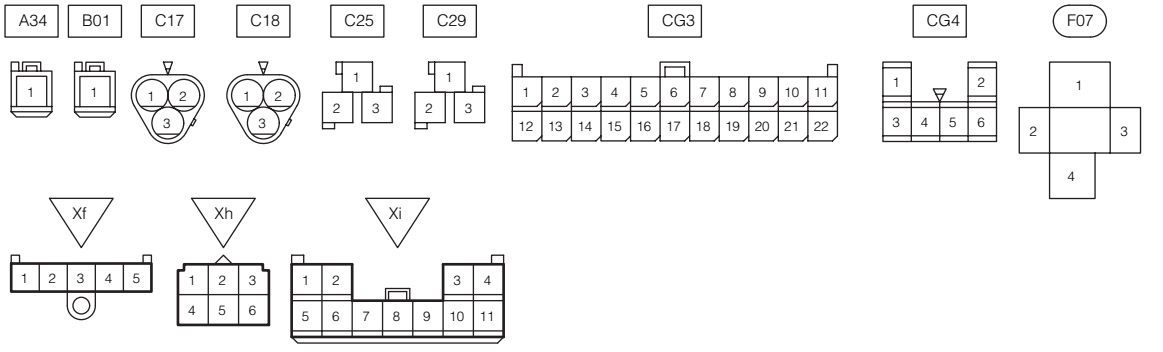

E20
E40
F07

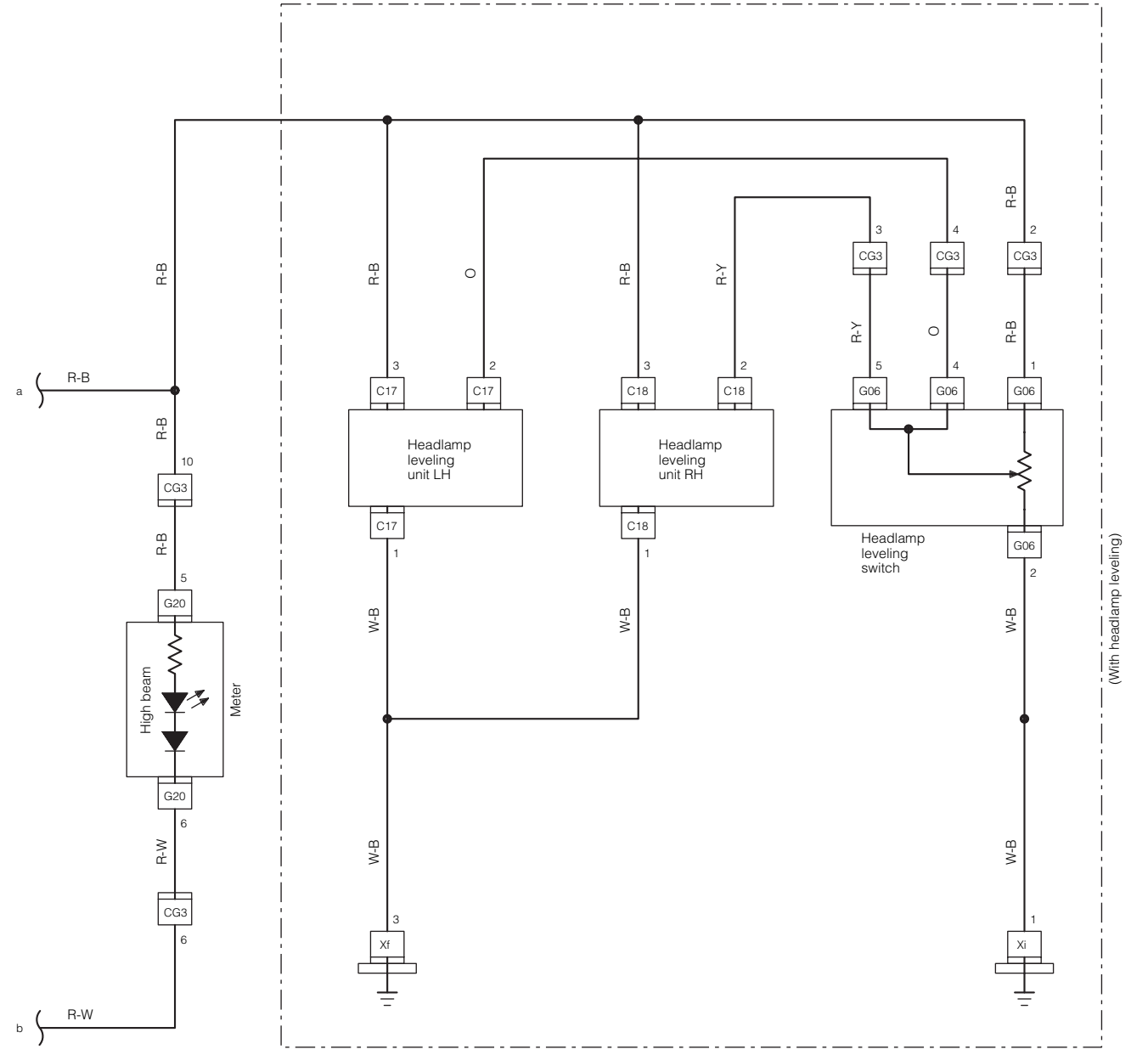

E06 (GR , 6P , Headlamp leveling switch)
E20 (40P , Meter)
a
h
b
e
i
Xh
h i
f
g
c
Xi
d
CE4 (B , 6P , W to W)
E40 (13P , Headlamp switch)
...Except General export and
AUS specification
CE3 (GR , 22P , W to W)
E40 (13P , Headlamp switch)...General export, and AUS specification

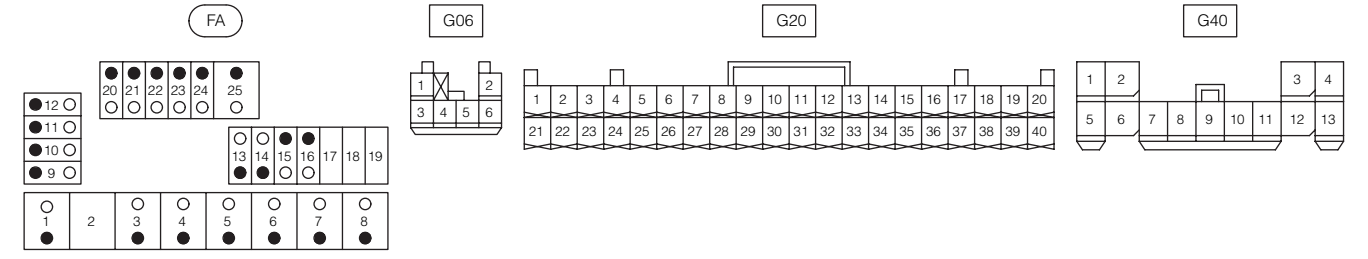

FA (Relay block)
F07 (Headlamp relay)
A34 (B , 1P , Relay block)
C29 (B , 3P , Headlamp RH)
C18 (B , 3P , Headlamp leveling unit RH)
Xf
b
a
C17 (B , 3P , Headlamp leveling unit LH)
C25 (B , 3P , Headlamp LH)

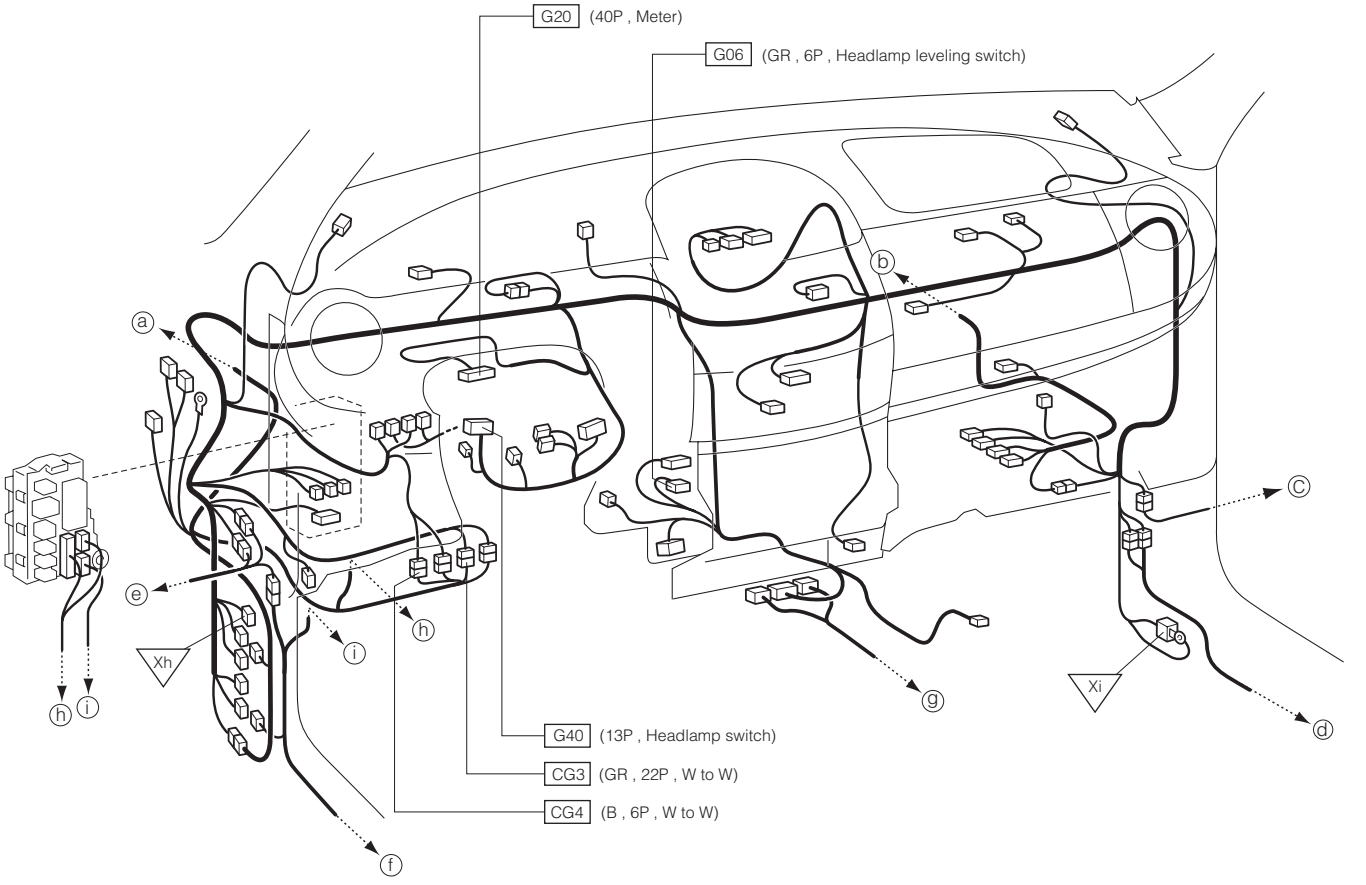
17-2 LHD VEHICLE

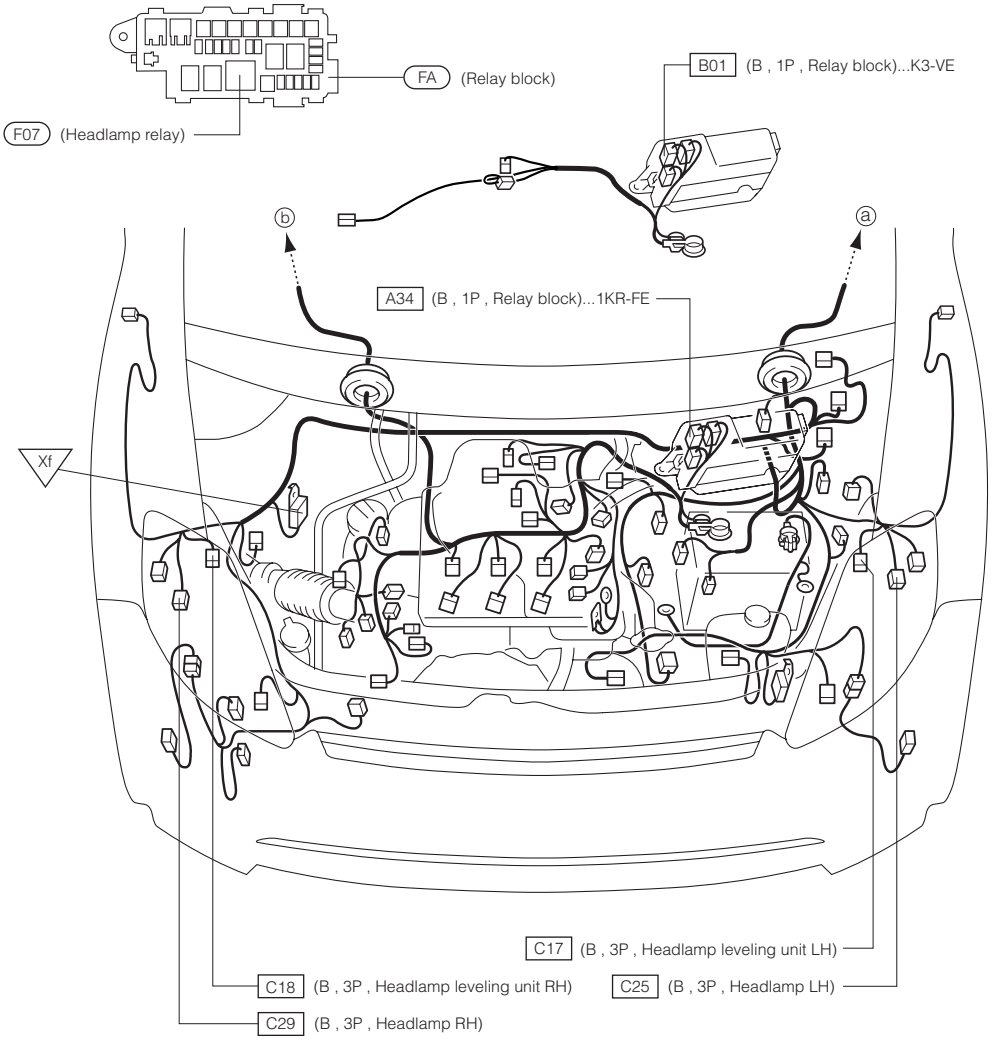




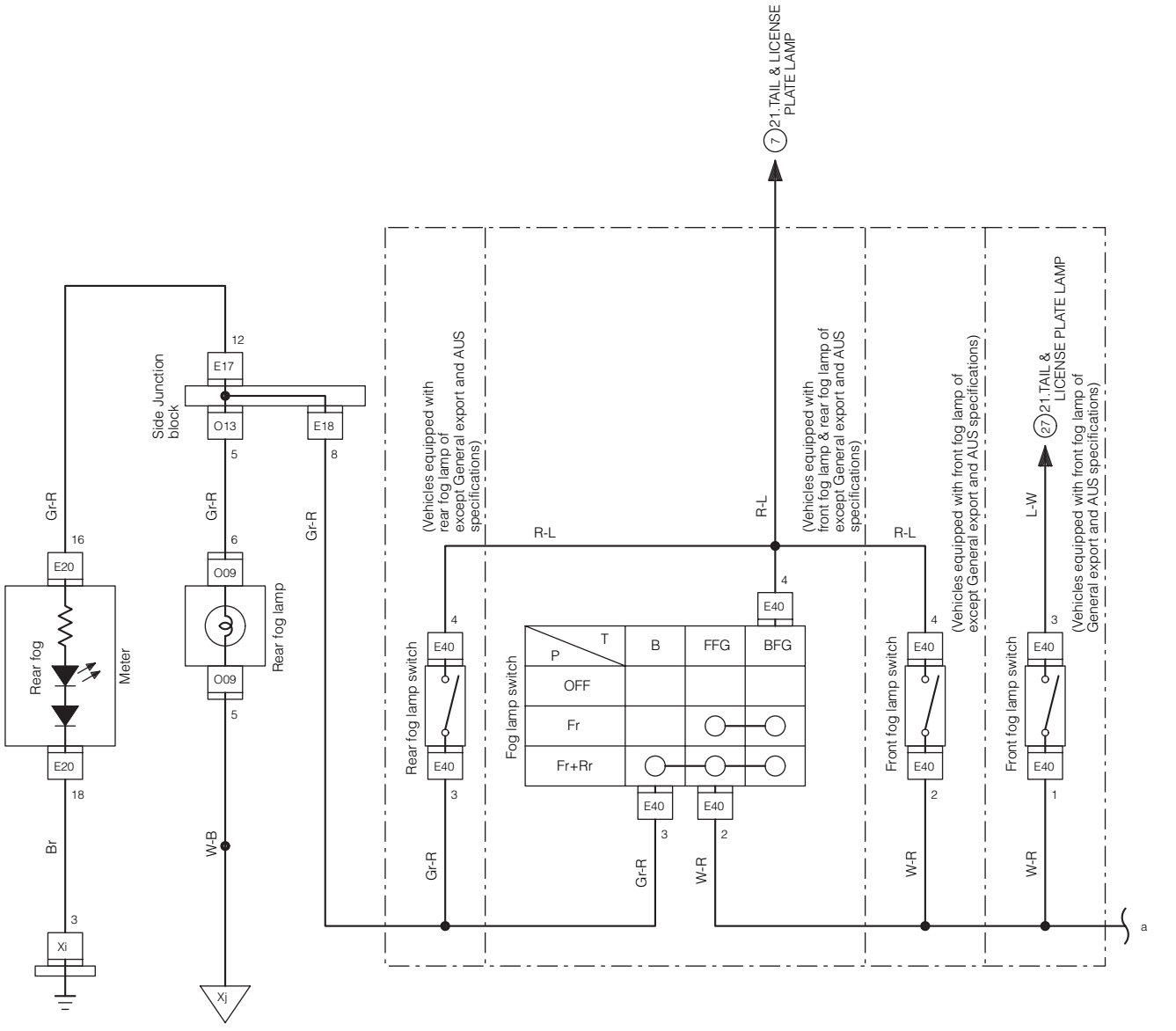

a
R-B
R-B
10
CG3
R-B
5
G20
High beam
Meter
G20
6
R-W
CG3
6
b
R-W
R-B
R-B
O
R-B
R-Y
3
CG3
4
CG3
2
CG3
R-Y
O
R-B
3
C17
2
C17
3
C18
2
C18
5
G06
4
G06
1
G06
Headlamp leveling unit LH
Headlamp leveling unit RH
Headlamp leveling switch
C17
1
C18
1
G06
2
W-B
W-B
W-B
W-B
3
Xf
1
Xi
(With headlamp leveling)

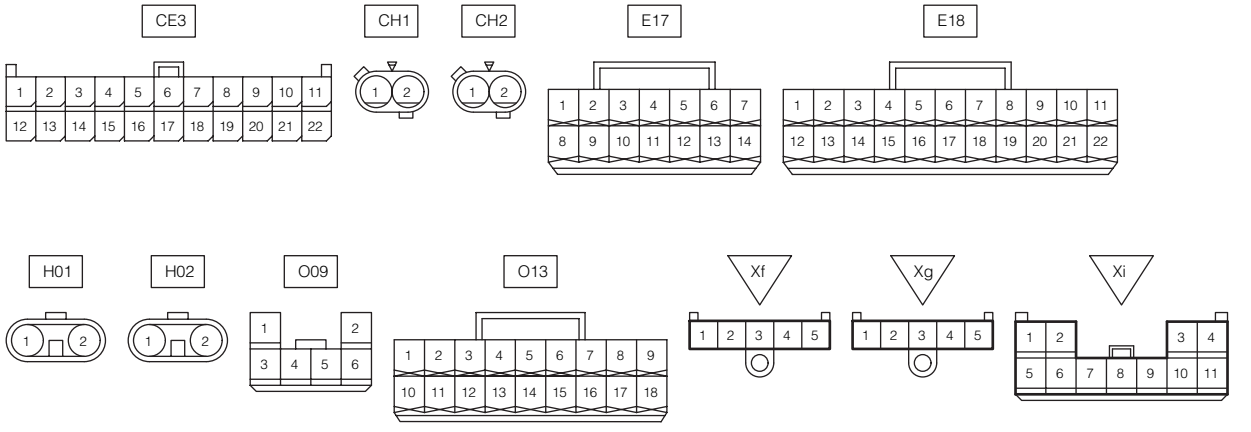

FA
G06
G20
G40
20 21 22 23 24 25
12 11 10 9
13 14 15 16 17 18 19
1 2 3 4 5 6 7 8
1 2 3 4 5 6
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
1 2 3 4
5 6 7 8 9 10 11 12 13

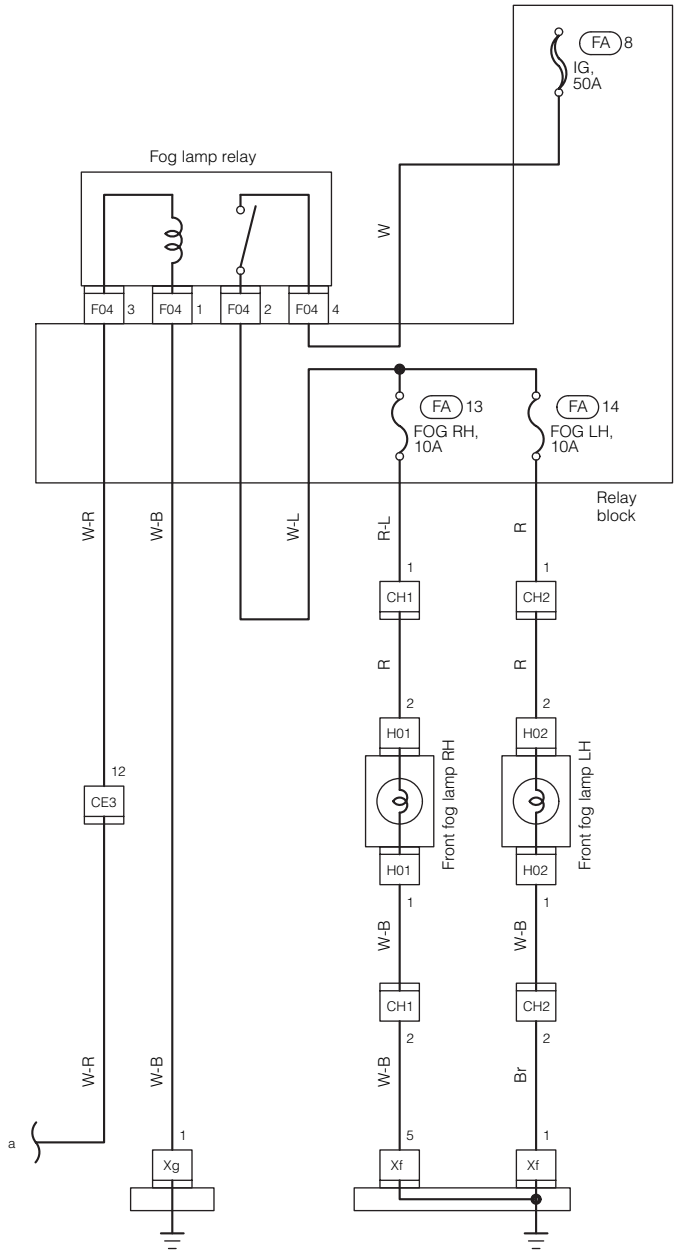

G20 (40P , Meter)
G06 (GR , 6P , Headlamp leveling switch)
a
b
c
d
e
f
g
h
i
Xh
Xi
G40 (13P , Headlamp switch)
CG3 (GR , 22P , W to W)
CG4 (B , 6P , W to W)

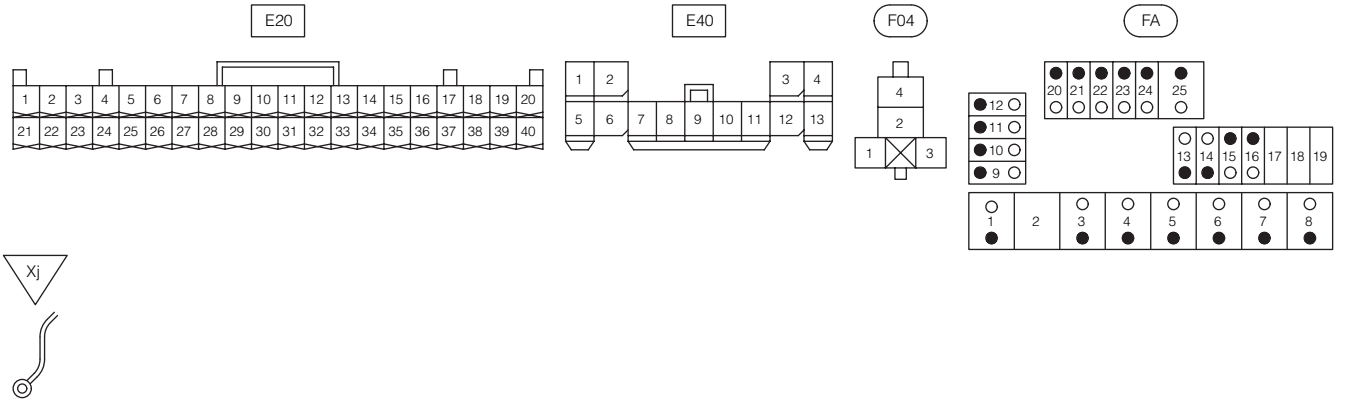

FA (Relay block)
F07 (Headlamp relay)
B01 (B , 1P , Relay block)...K3-VE
ⓑ
ⓐ
A34 (B , 1P , Relay block)...1KR-FE
Xf
C17 (B , 3P , Headlamp leveling unit LH)
C18 (B , 3P , Headlamp leveling unit RH)
C25 (B , 3P , Headlamp LH)
C29 (B , 3P , Headlamp RH)

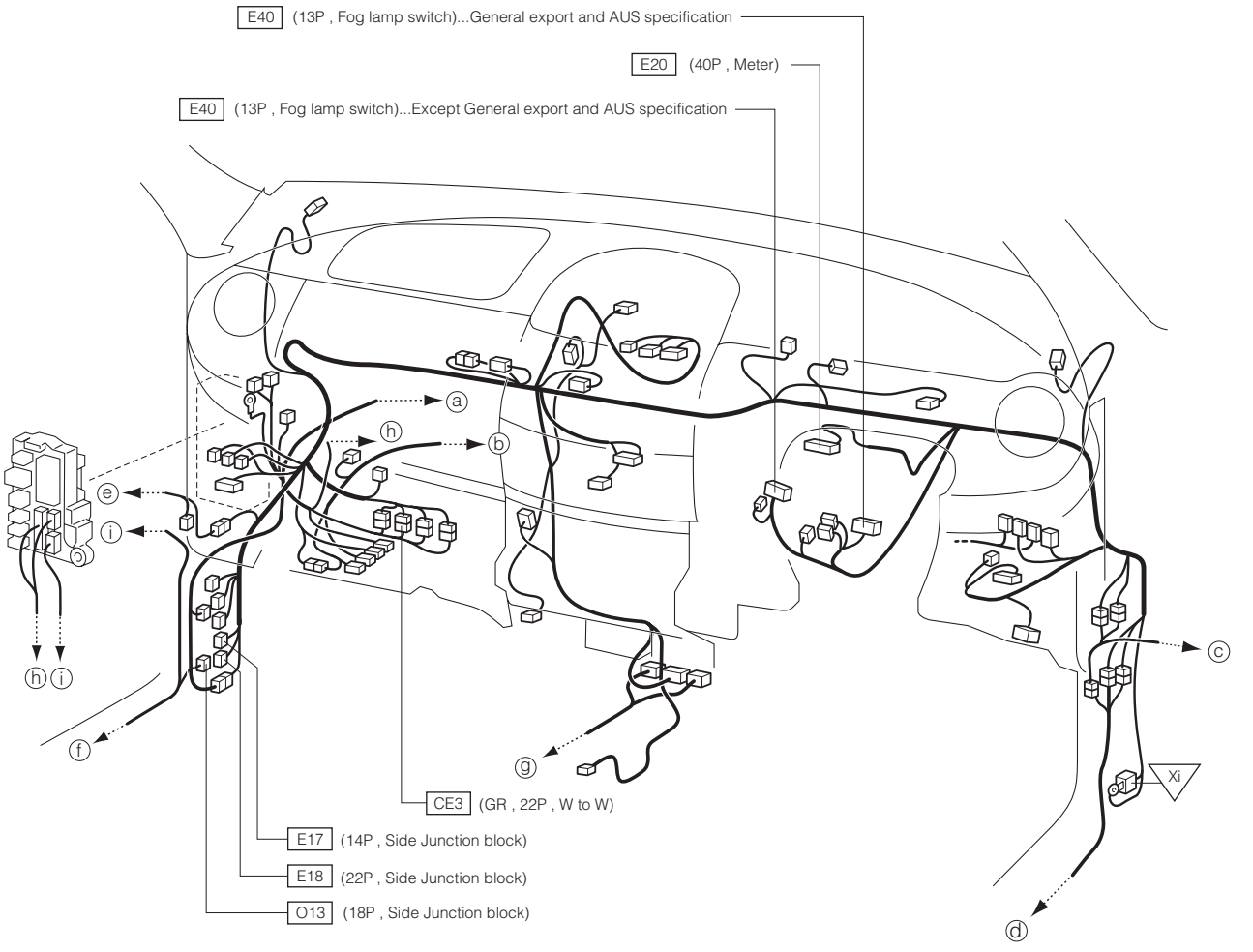
18 FOG LAMP
18-1 RHD VEHICLE



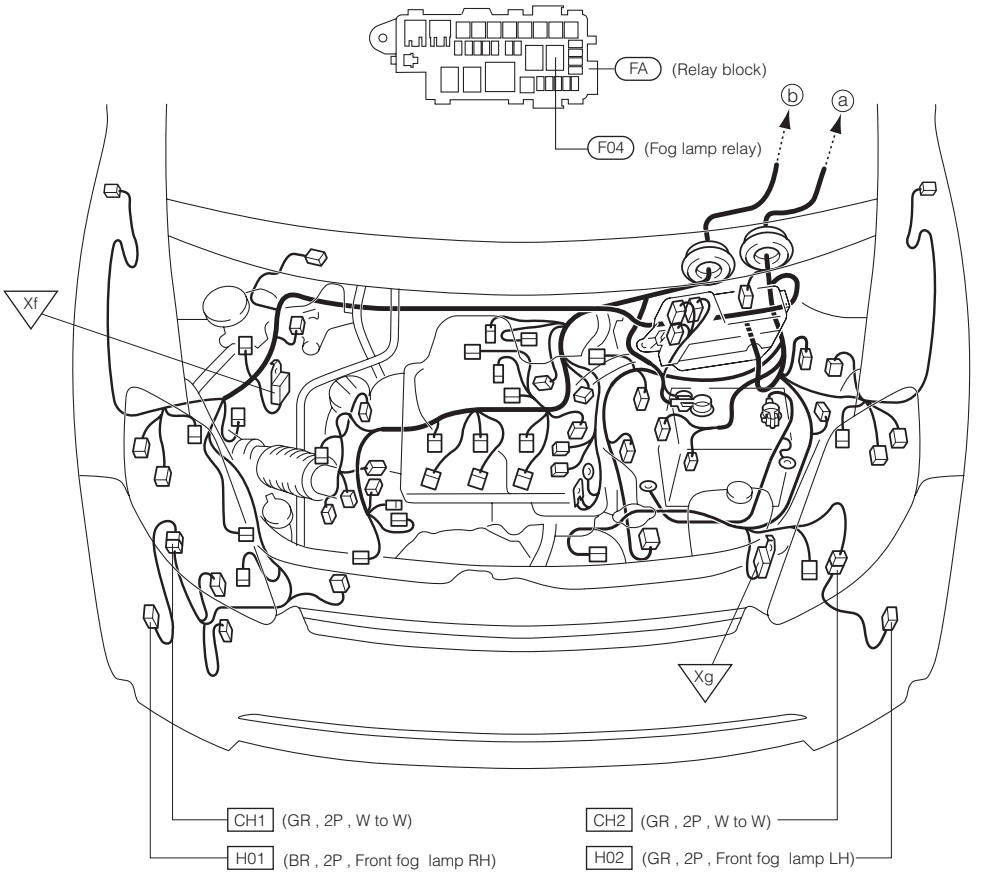


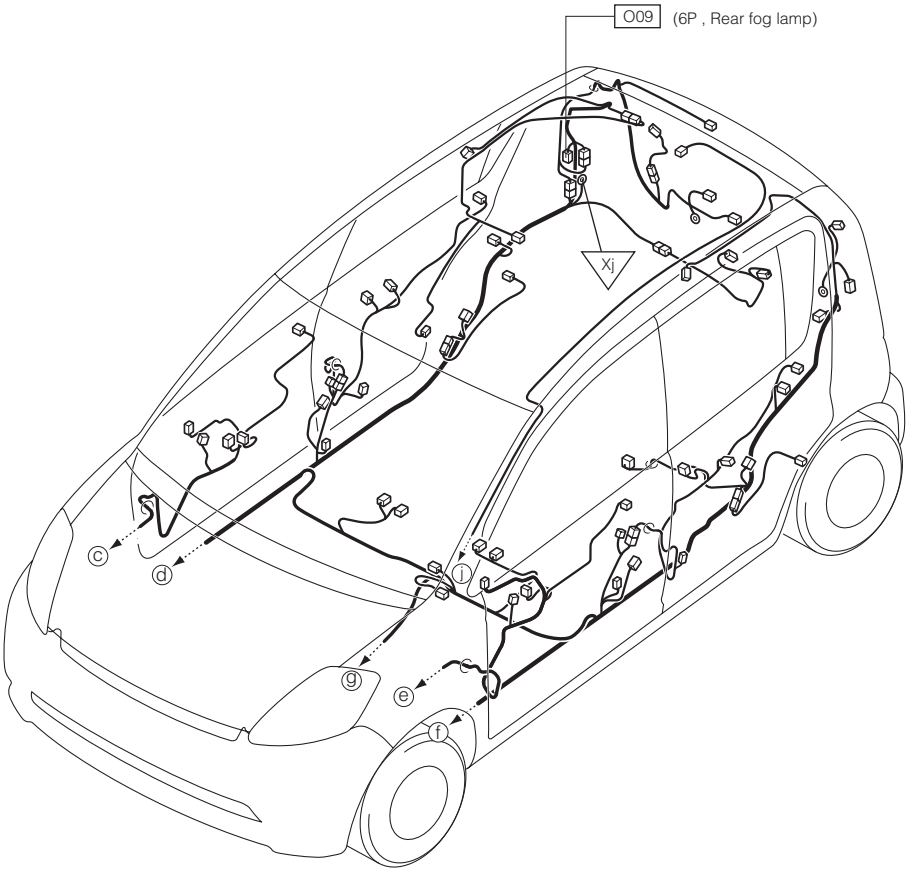

FA 8
IG,
50A
Fog lamp relay
W
F04 3
F04 1
F04 2
F04 4
FA 13
FOG RH,
10A
FA 14
FOG LH,
10A
Relay
block
W-R
W-B
W-L
R-L
R
CH1
CH2
H01
H02
Front fog lamp RH
Front fog lamp LH
CE3
Br
a
Xg
Xf


E20
E40
F04
FA
Xj

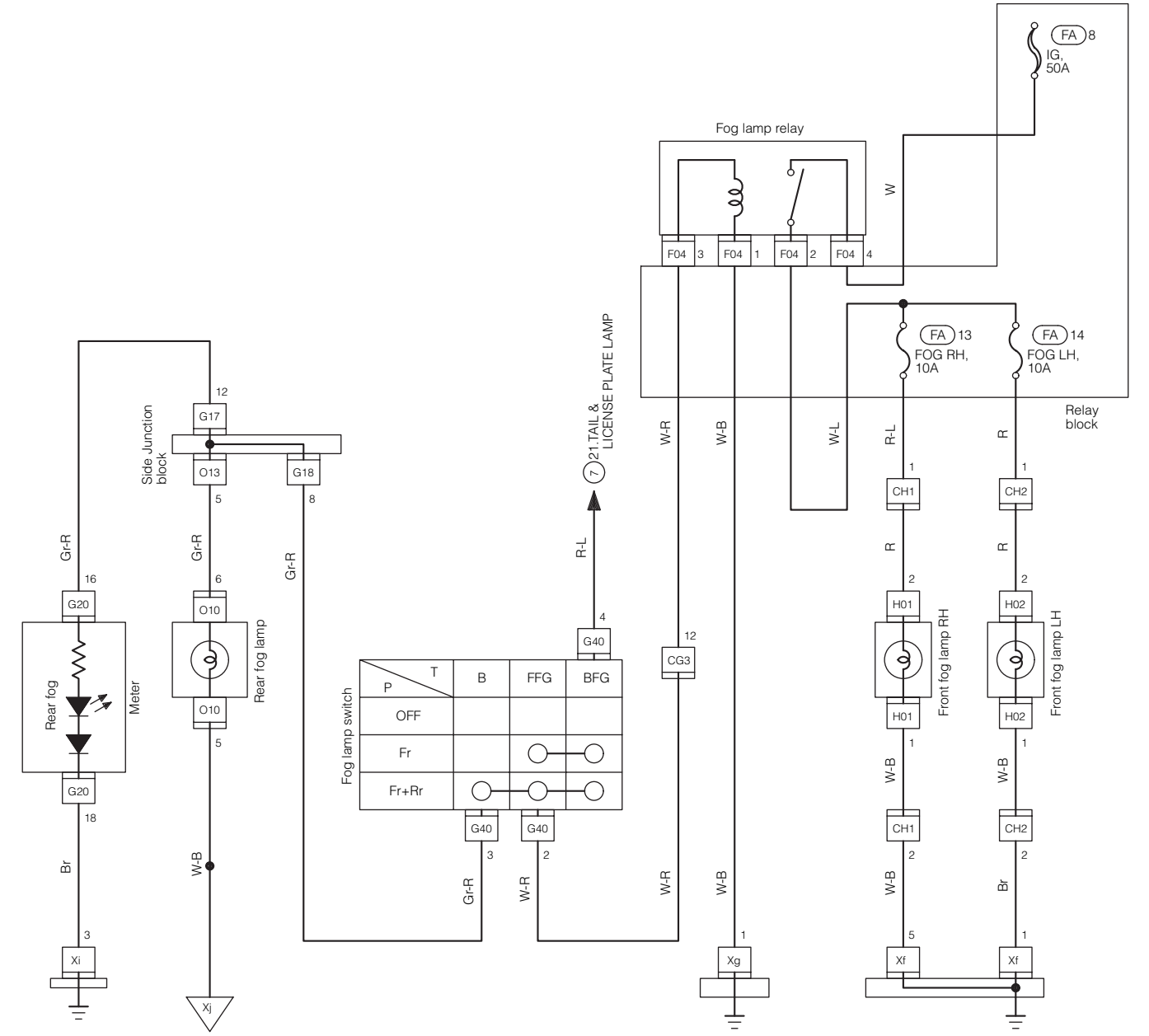


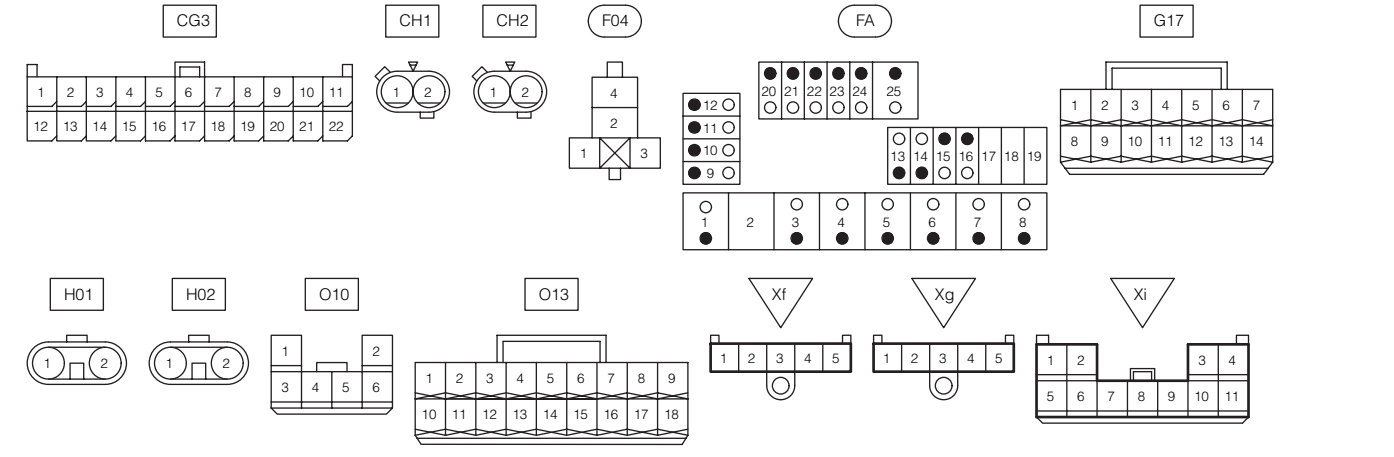
T11Q5076ES48

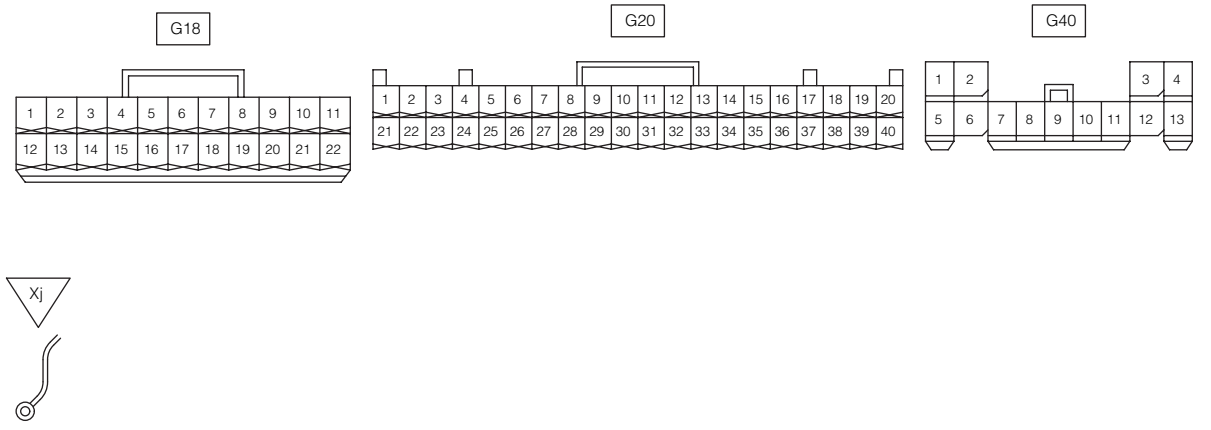

FA (Relay block)
F04 (Fog lamp relay)
b
a
Xf
Xg
CH1 (GR , 2P , W to W)
H01 (BR , 2P , Front fog lamp RH)
CH2 (GR , 2P , W to W)
H02 (GR , 2P , Front fog lamp LH)

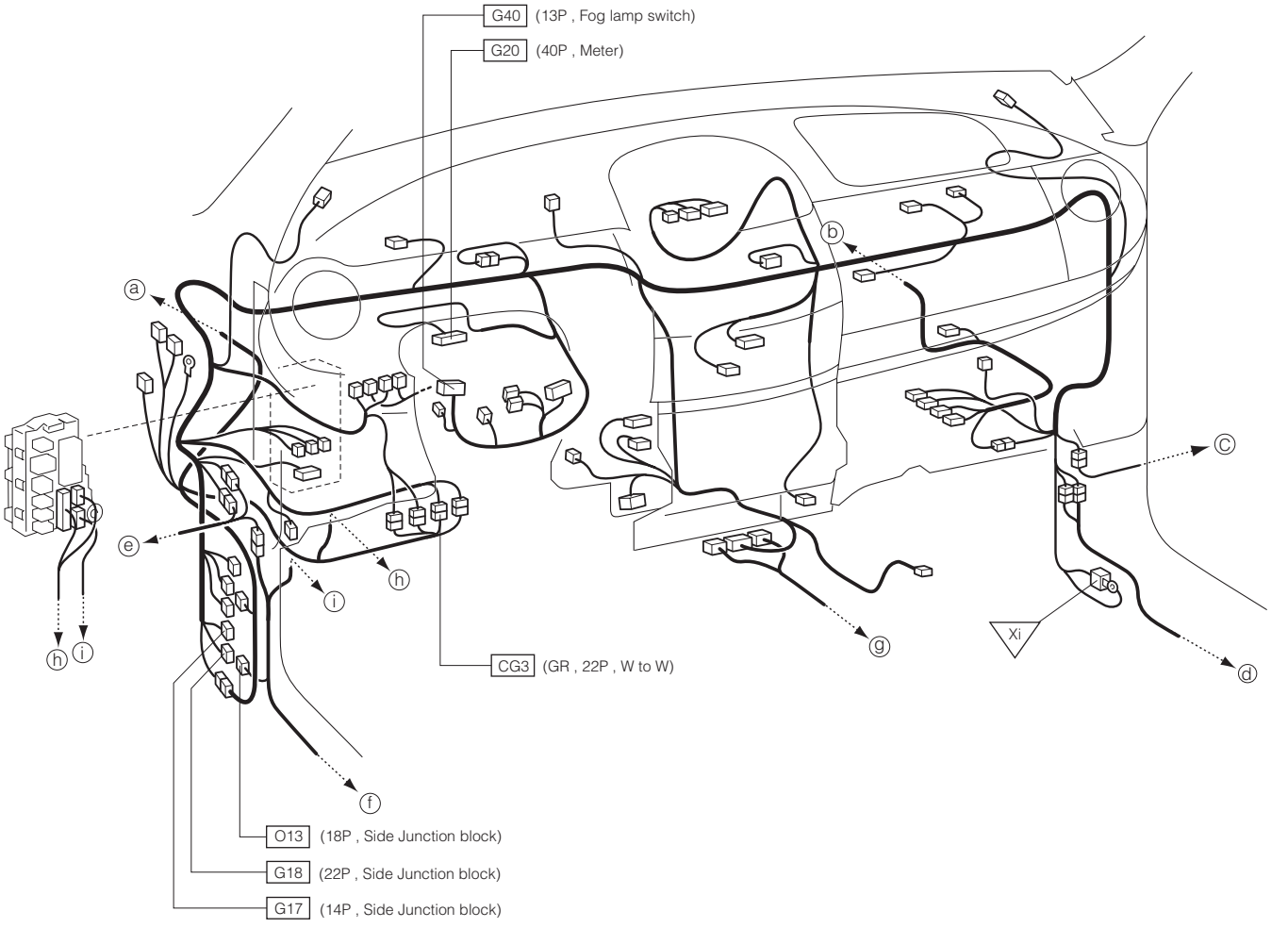

O09 (6P , Rear fog lamp)
Xj
c
d
j
g
e
f

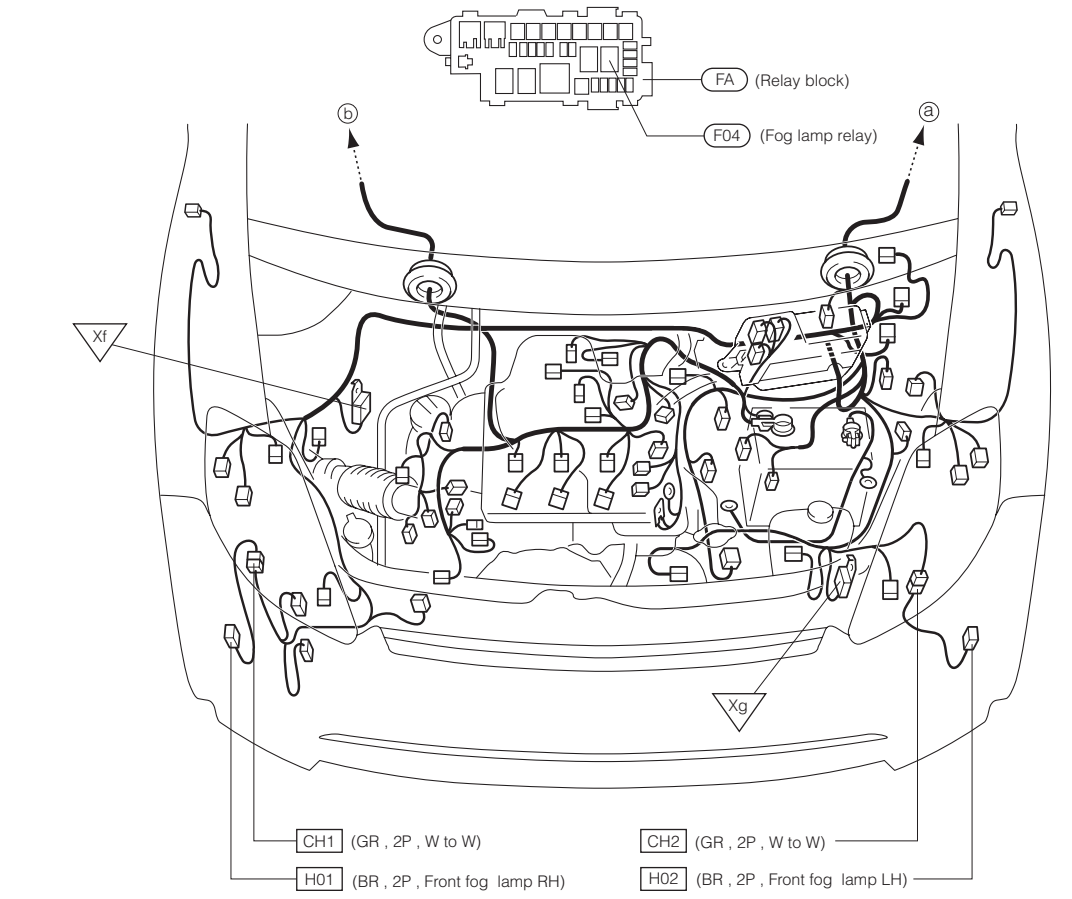
18-2 LHD VEHICLE

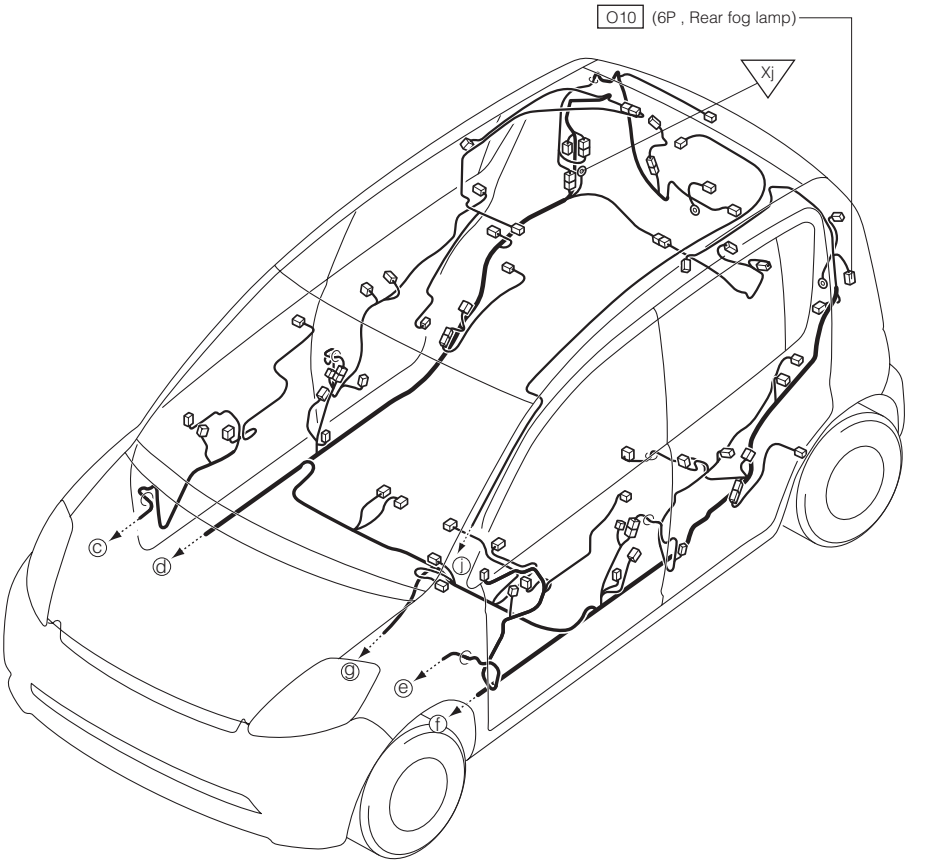





G18
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22
G20
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
G40
1 2 3 4
5 6 7 8 9 10 11 12 13
Xj


G40 (13P , Fog lamp switch)
G20 (40P , Meter)
a
b
C
d
e
f
g
h
i
Xi
CG3 (GR , 22P , W to W)
O13 (18P , Side Junction block)
G18 (22P , Side Junction block)
G17 (14P , Side Junction block)

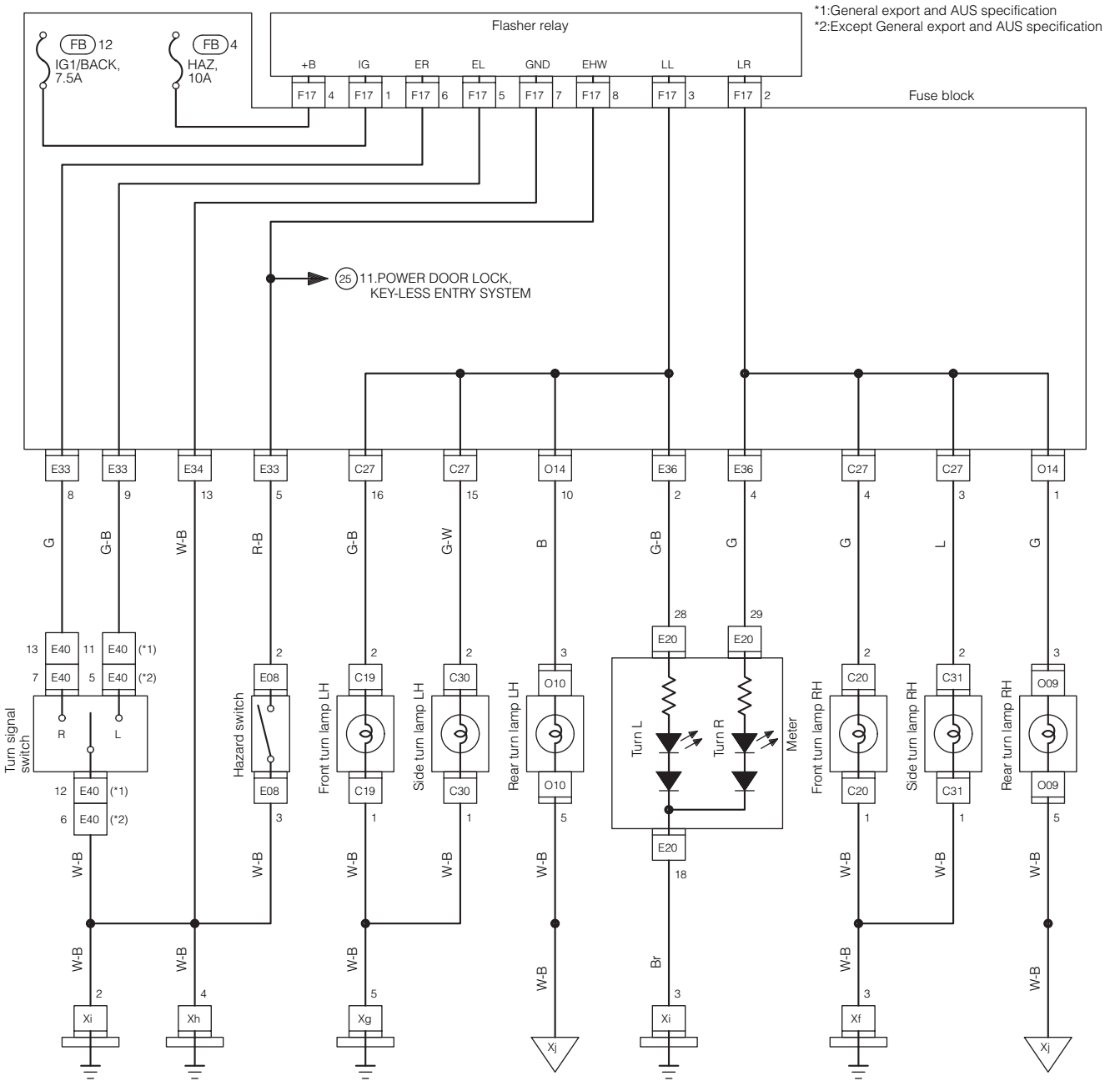


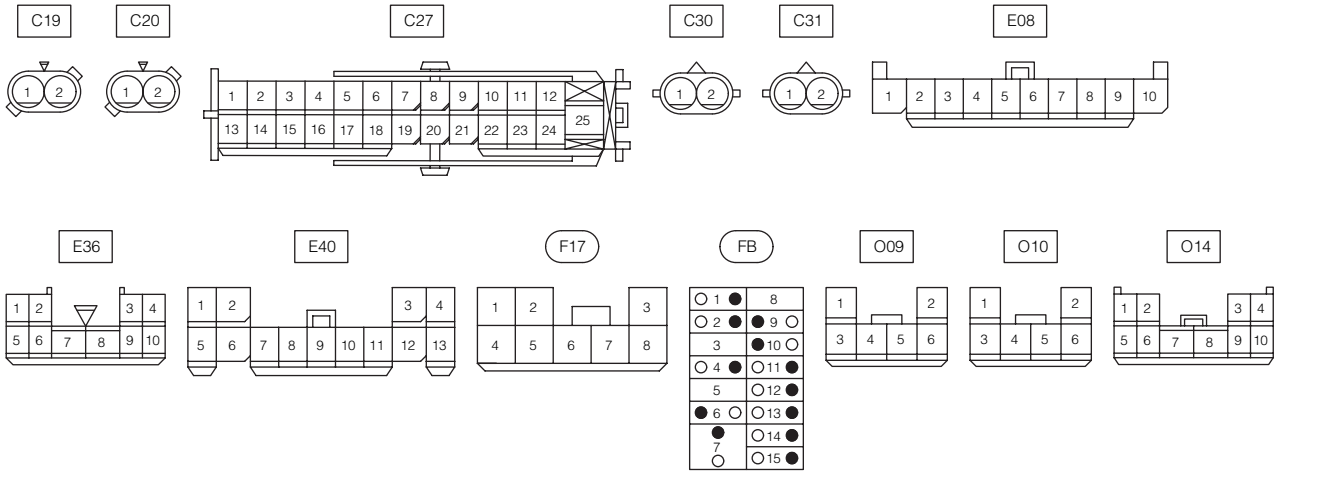


T11Q5073ES48

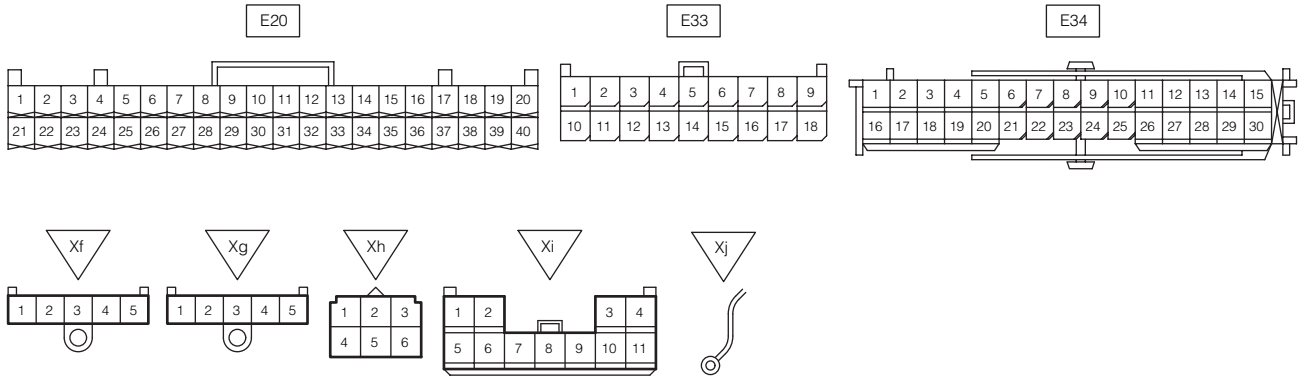
19 HAZARD WARNING & TURN SIGNAL LAMP

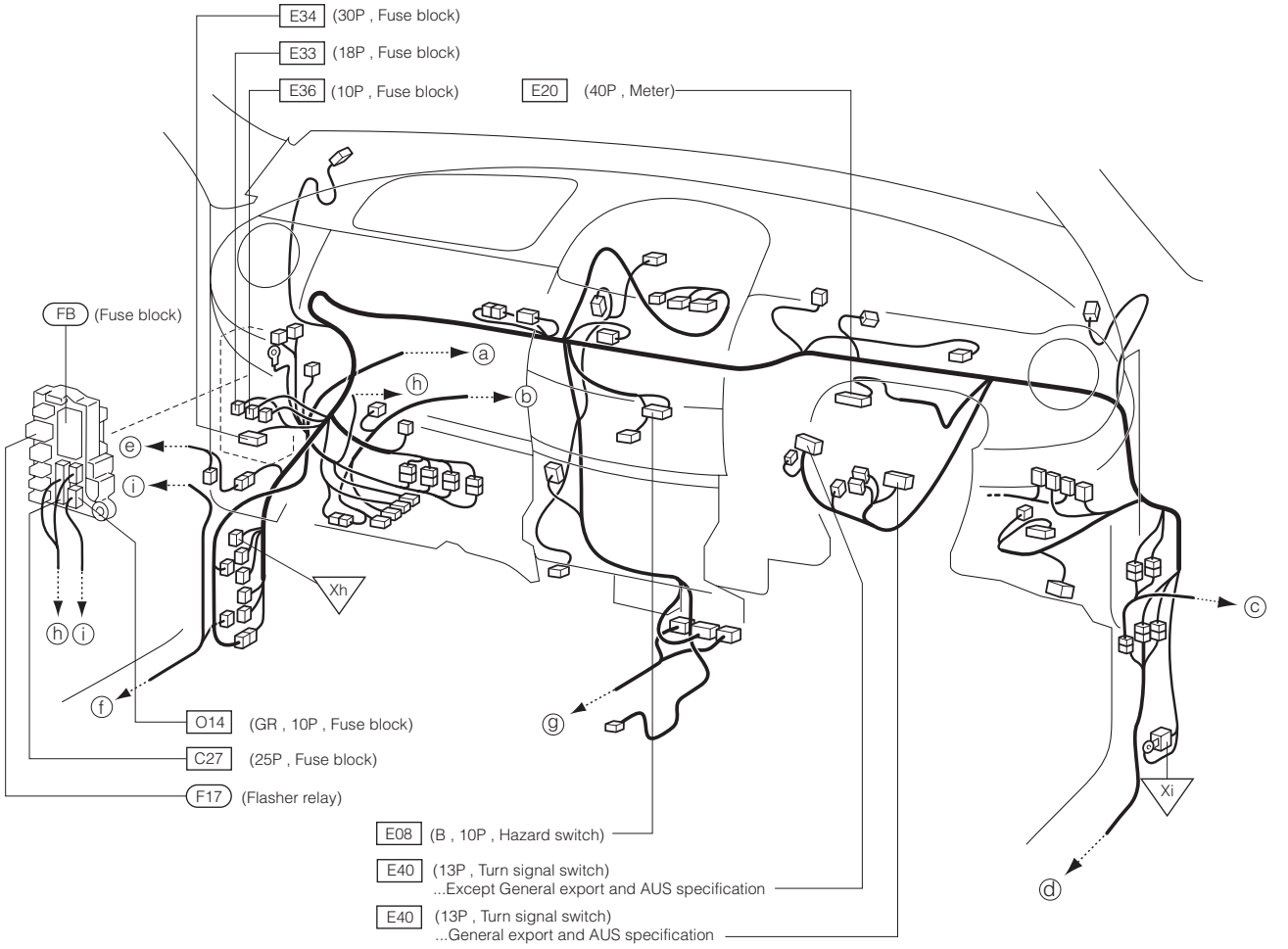
19-1 RHD VEHICLE

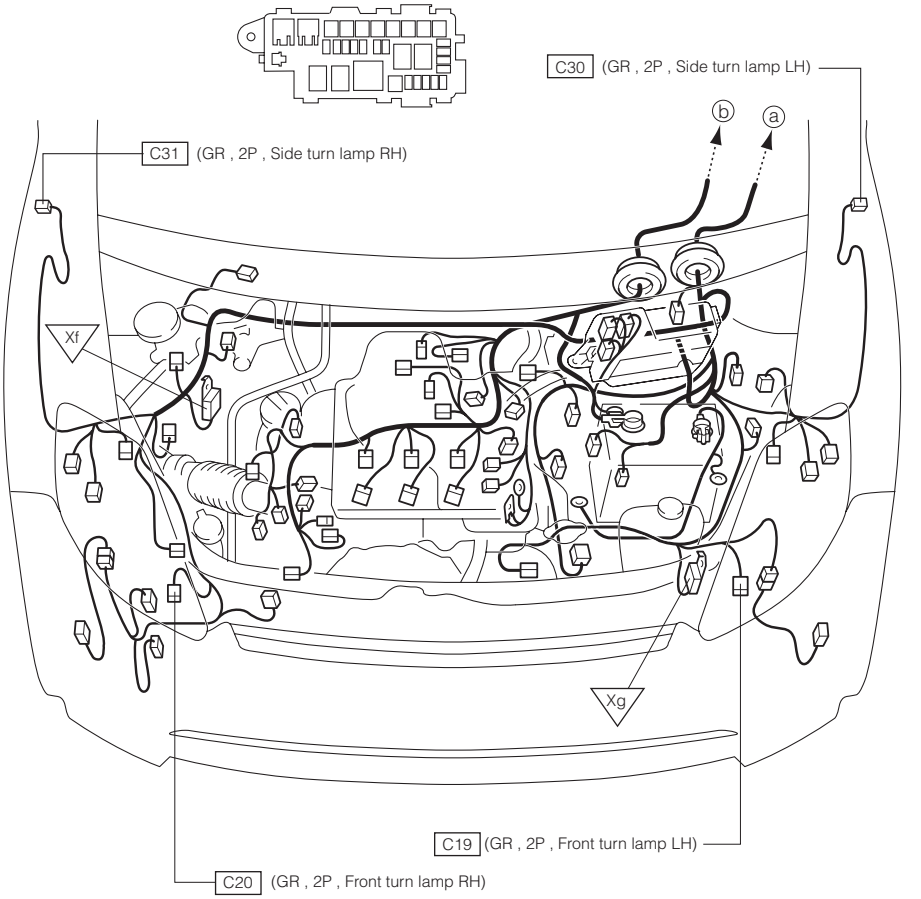


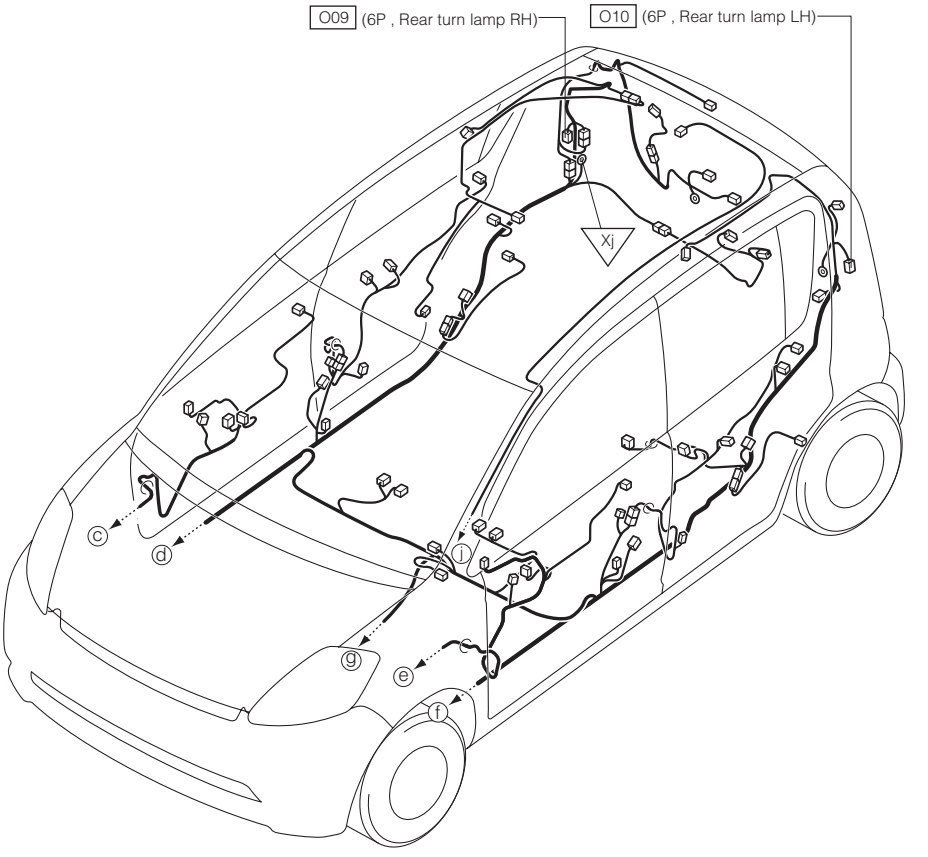


T11Q5208ES48


E20
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
E33
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18
E34
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Xf
1 2 3 4 5
Xg
1 2 3 4 5
Xh
1 2 3
4 5 6
Xi
1 2 3 4
5 6 7 8 9 10 11
Xj

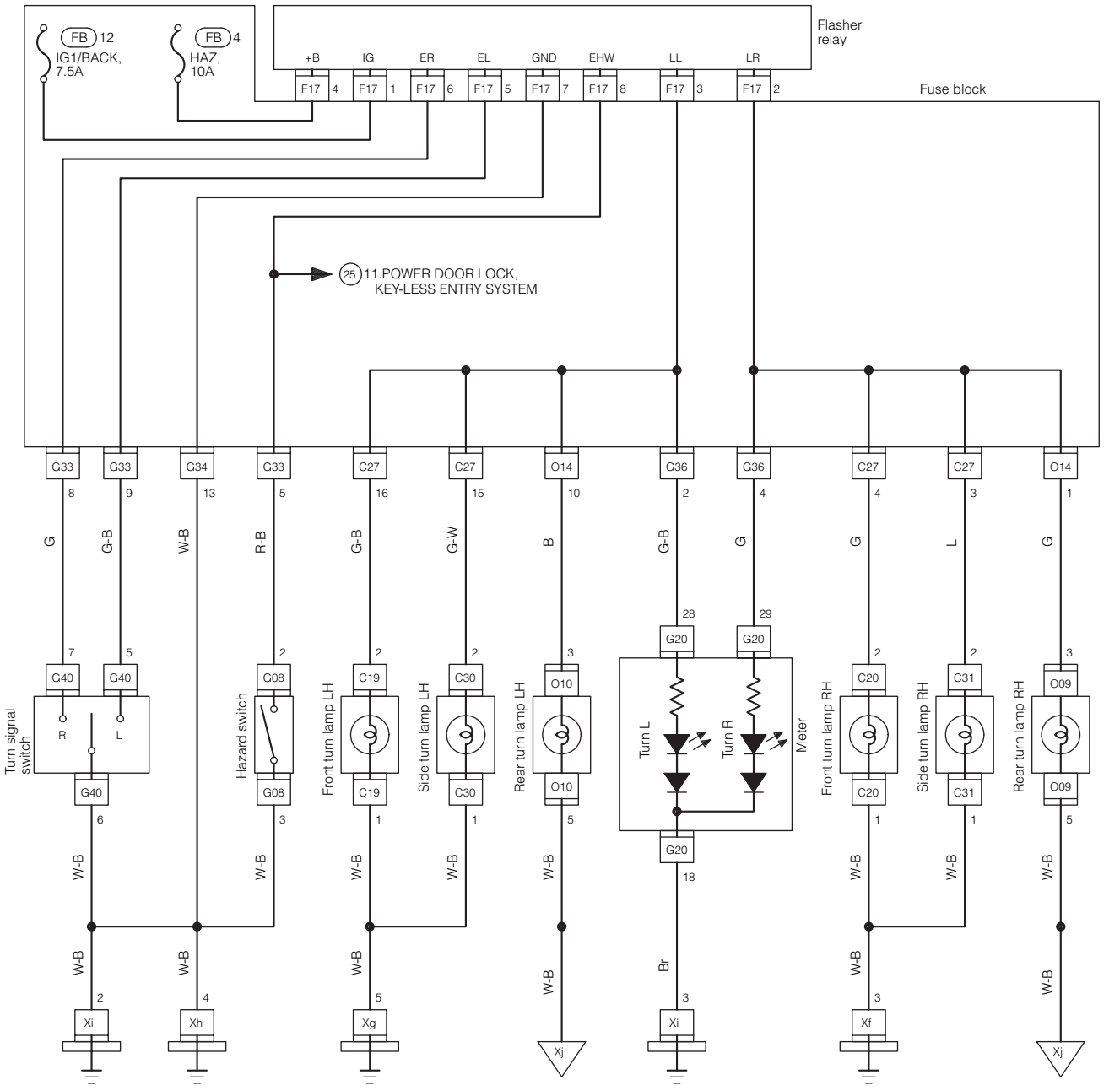

E34 (30P , Fuse block)
E33 (18P , Fuse block)
E36 (10P , Fuse block)
E20 (40P , Meter)
FB (Fuse block)
a
h
b
e
i
Xh
h i
f
g
c
Xi
d
O14 (GR , 10P , Fuse block)
C27 (25P , Fuse block)
F17 (Flasher relay)
E08 (B , 10P , Hazard switch)
E40 (13P , Turn signal switch)
...Except General export and AUS specification
E40 (13P , Turn signal switch)
...General export and AUS specification

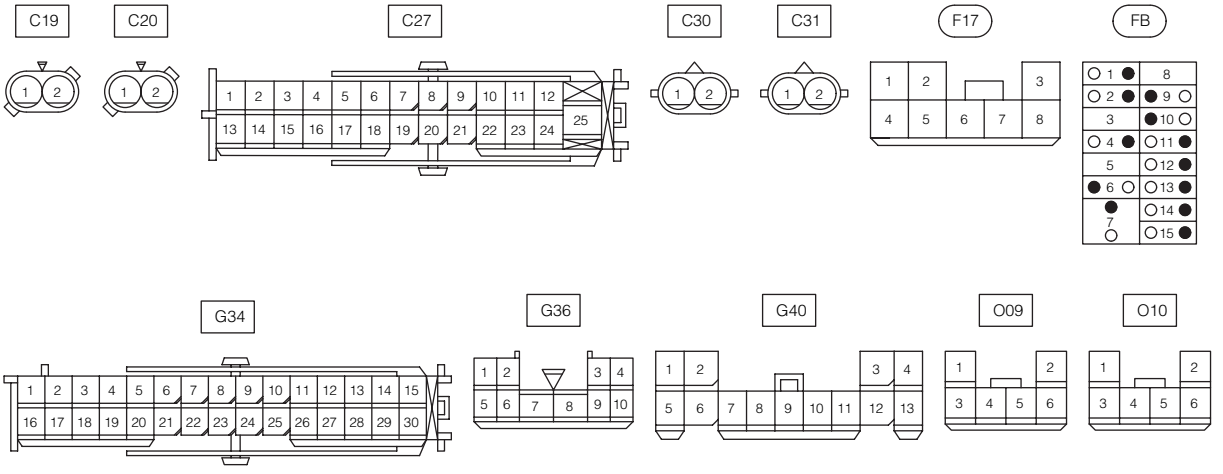




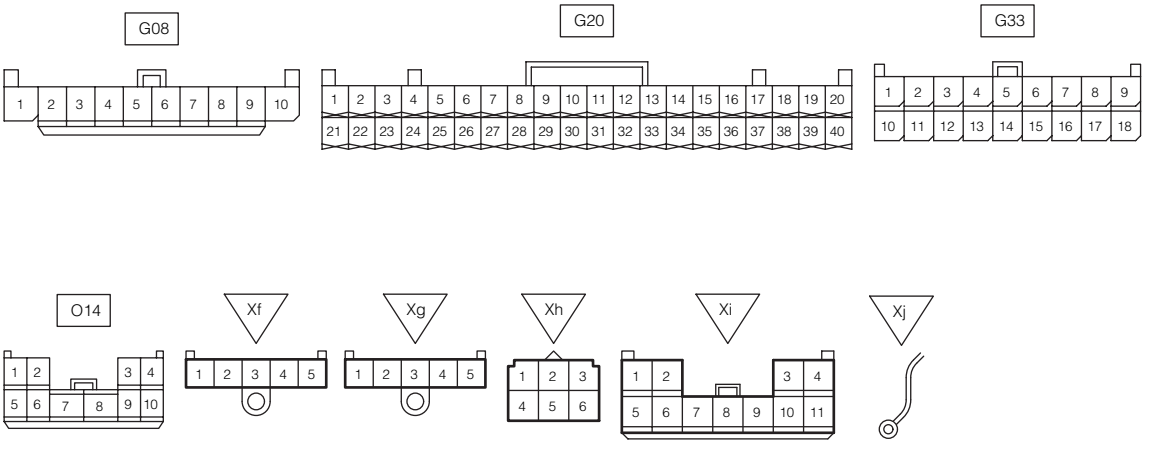
T11Q5078ES48

19-2 LHD VEHICLE

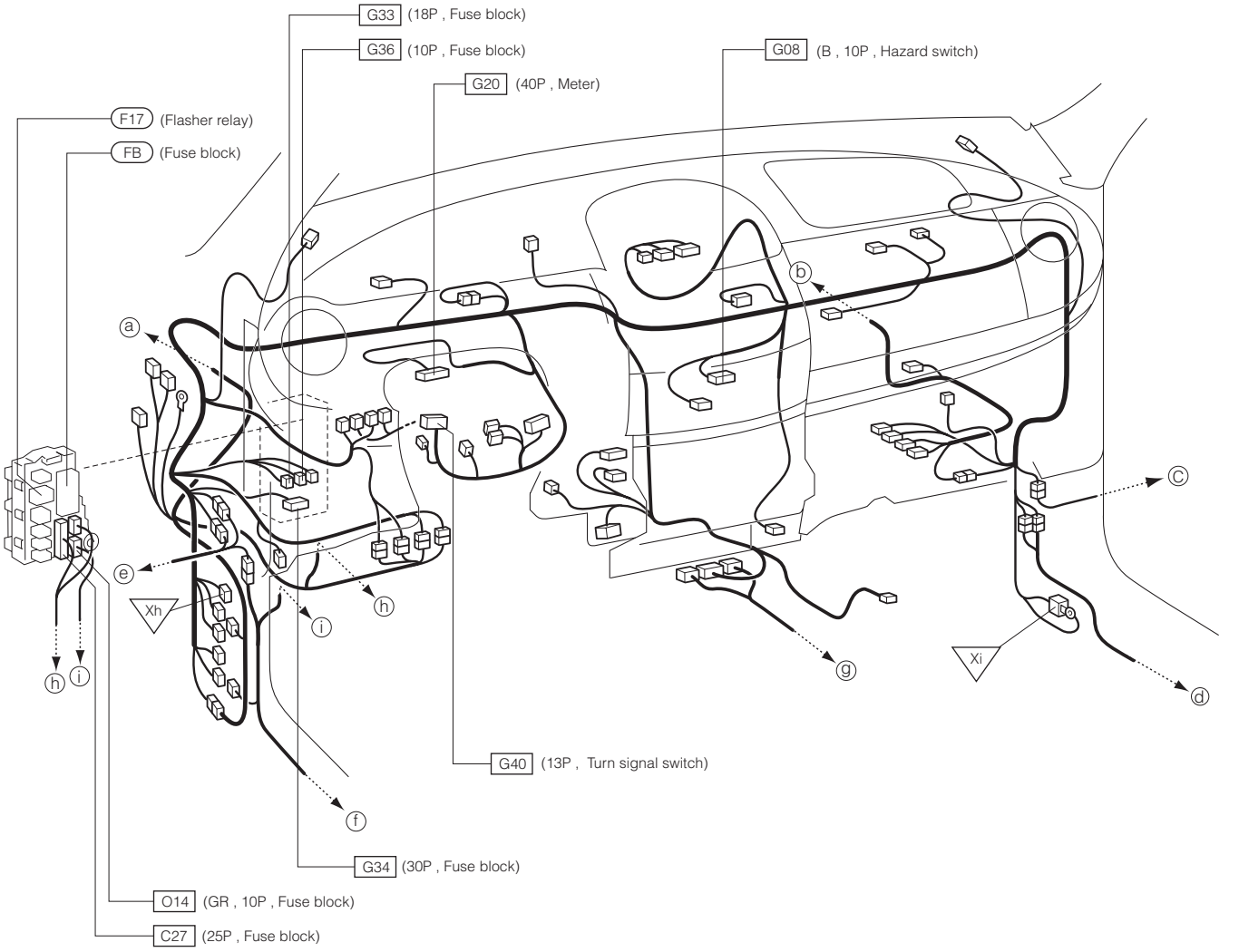


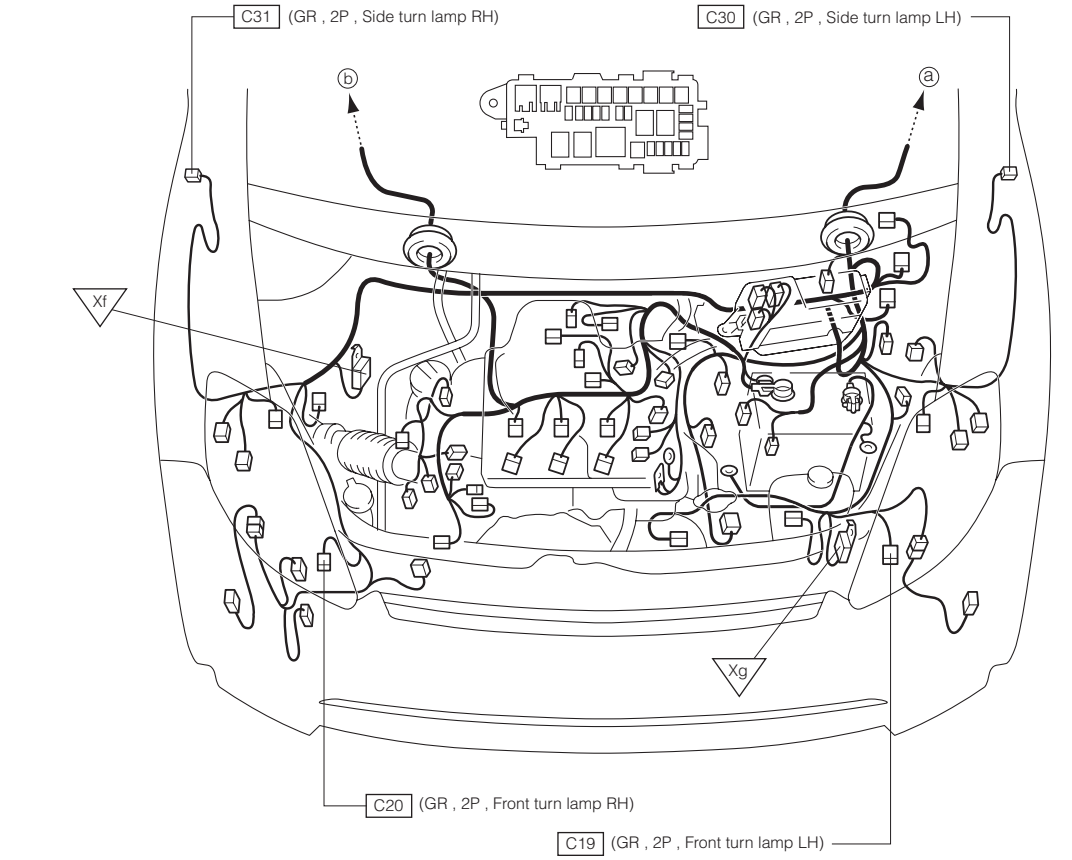


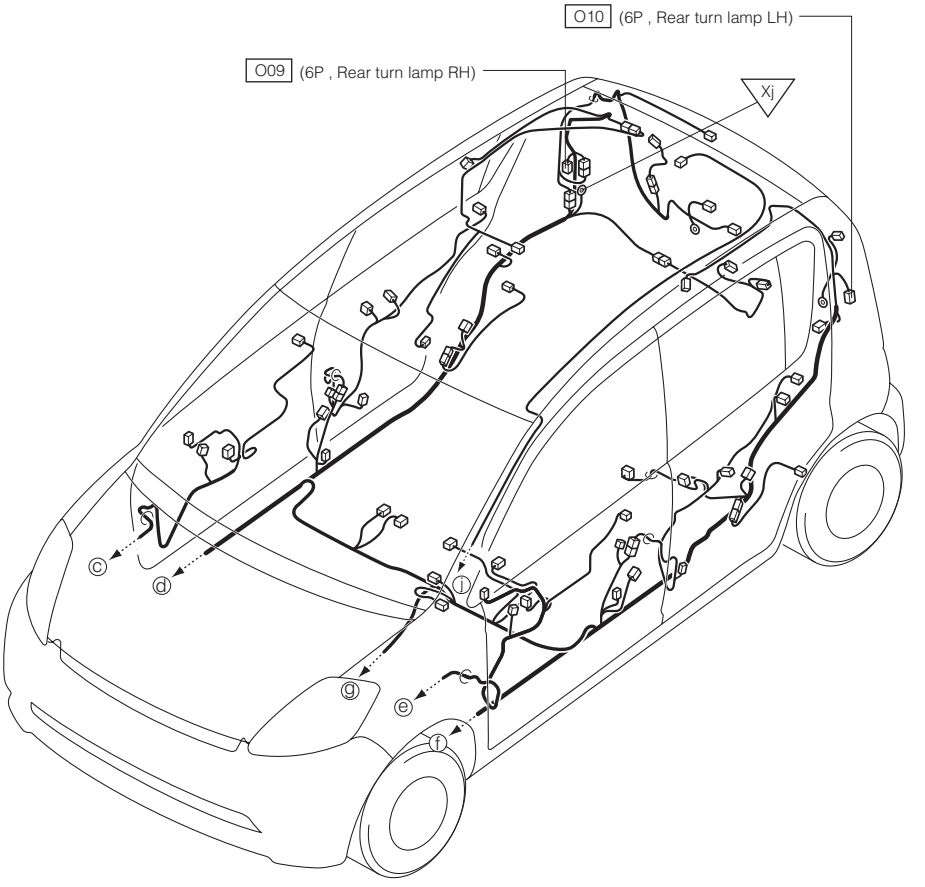
T11Q5156ES48



T11Q5157ES48

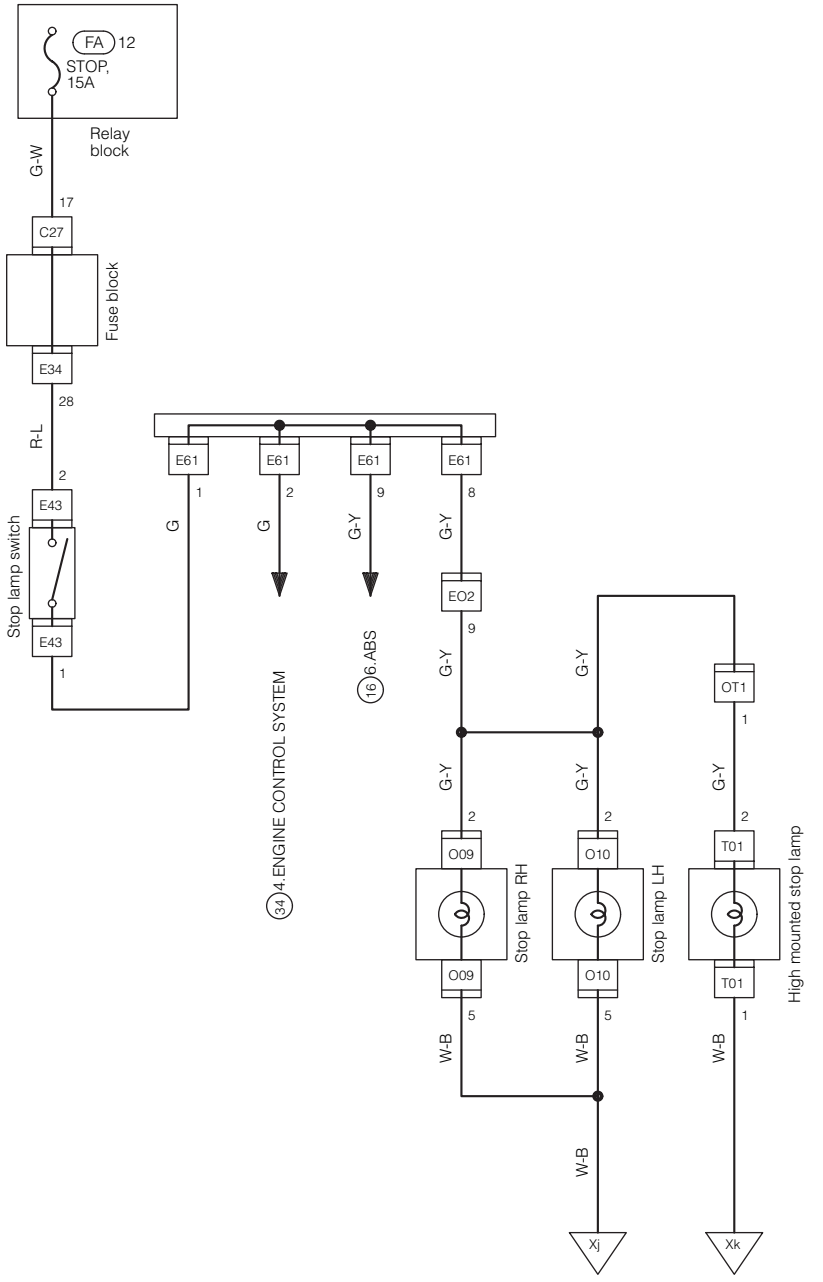

G33 (18P , Fuse block)
G36 (10P , Fuse block)
G20 (40P , Meter)
G08 (B , 10P , Hazard switch)
F17 (Flasher relay)
FB (Fuse block)
a
b
C
d
e
f
g
h
i
Xh
Xi
G40 (13P , Turn signal switch)
G34 (30P , Fuse block)
O14 (GR , 10P , Fuse block)
C27 (25P , Fuse block)

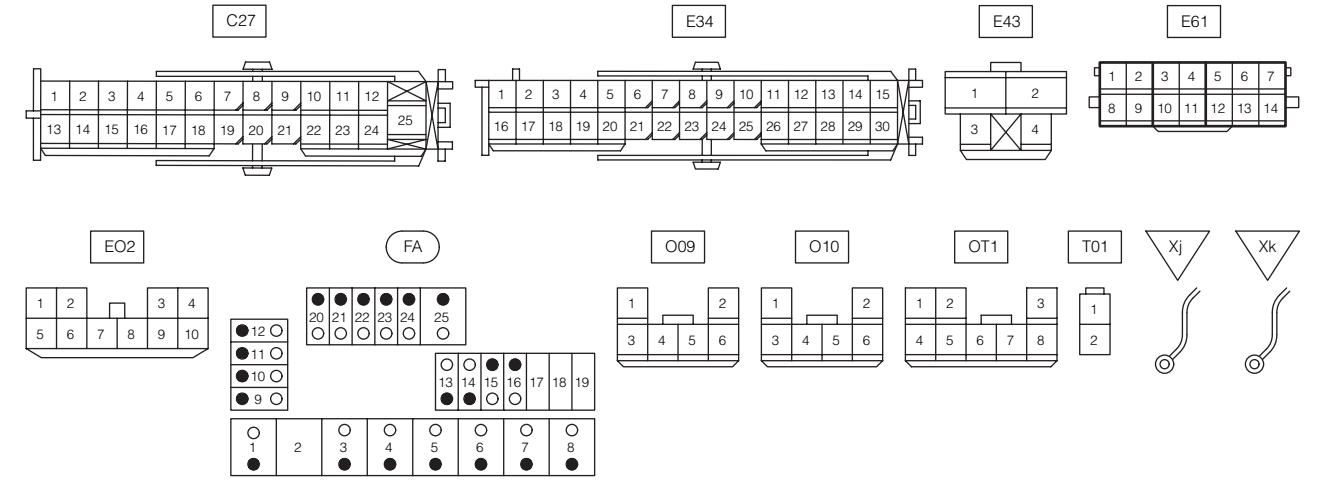




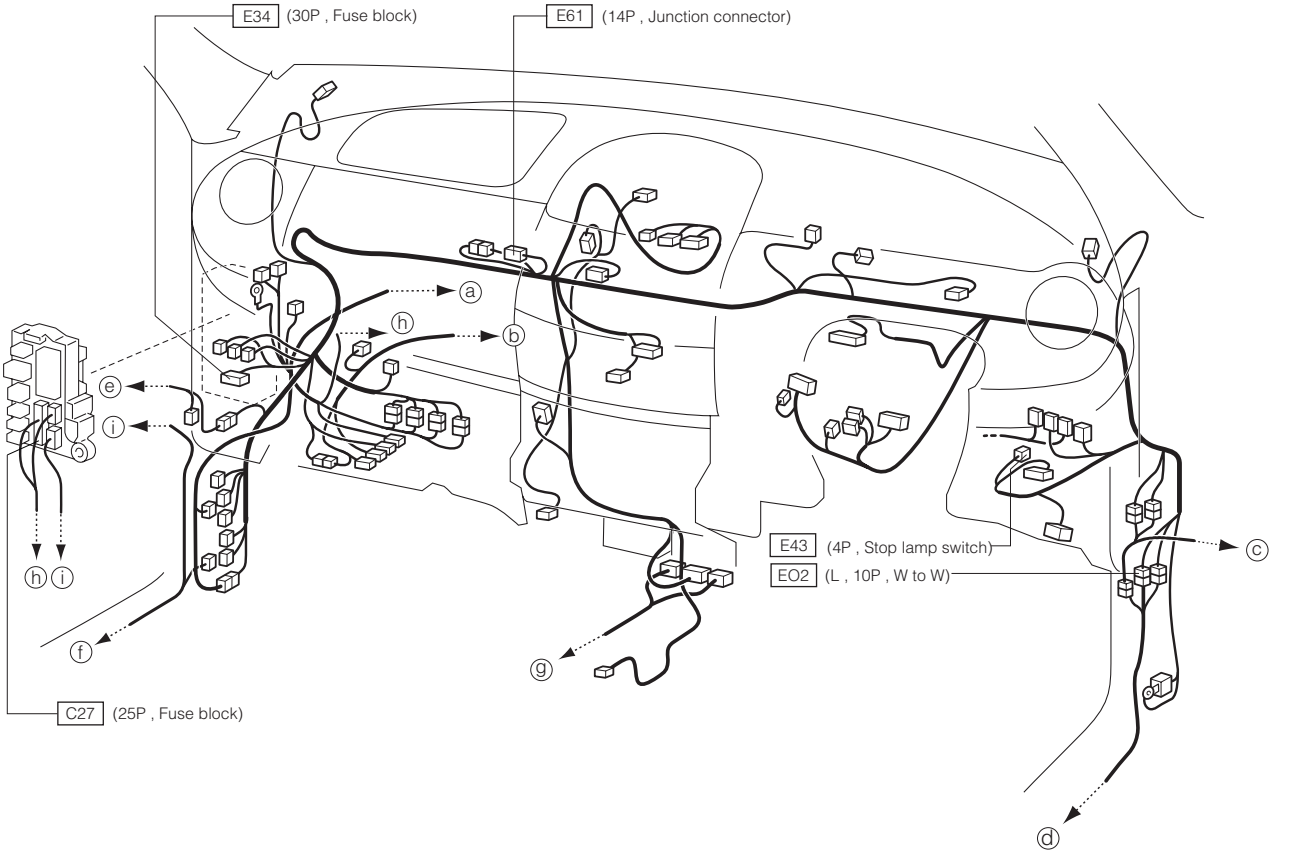
T11Q5077ES48

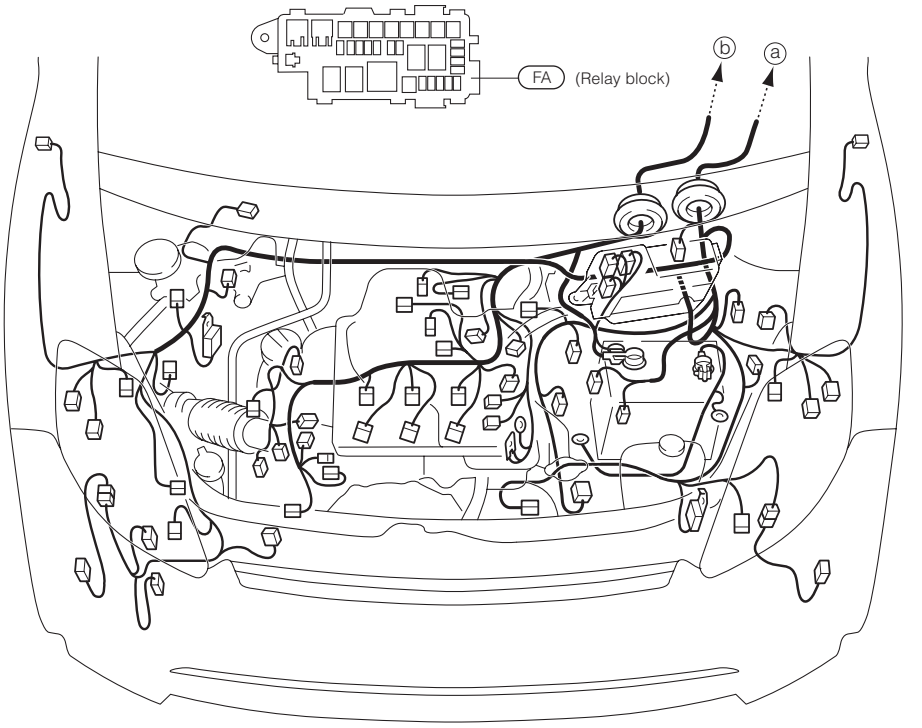
20 STOP LAMP
20-1 RHD VEHICLE

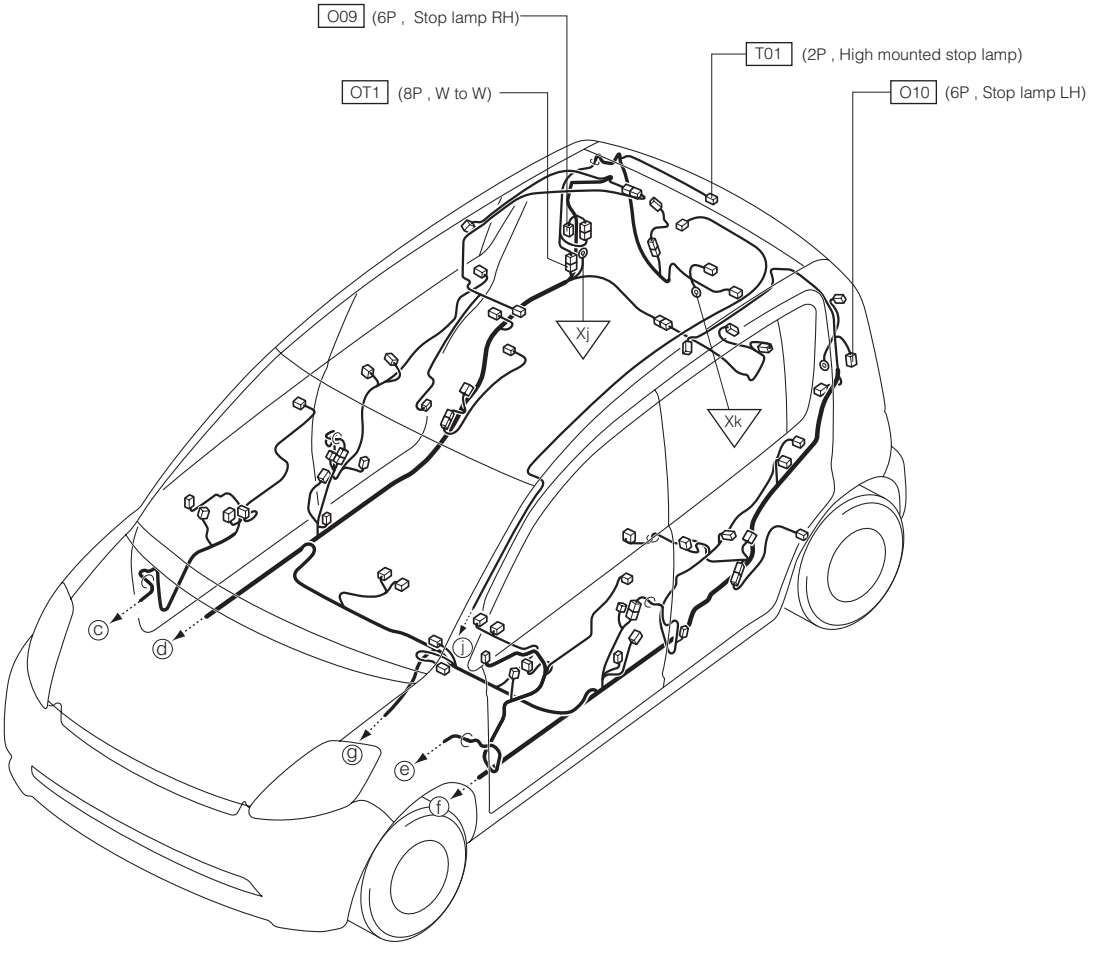




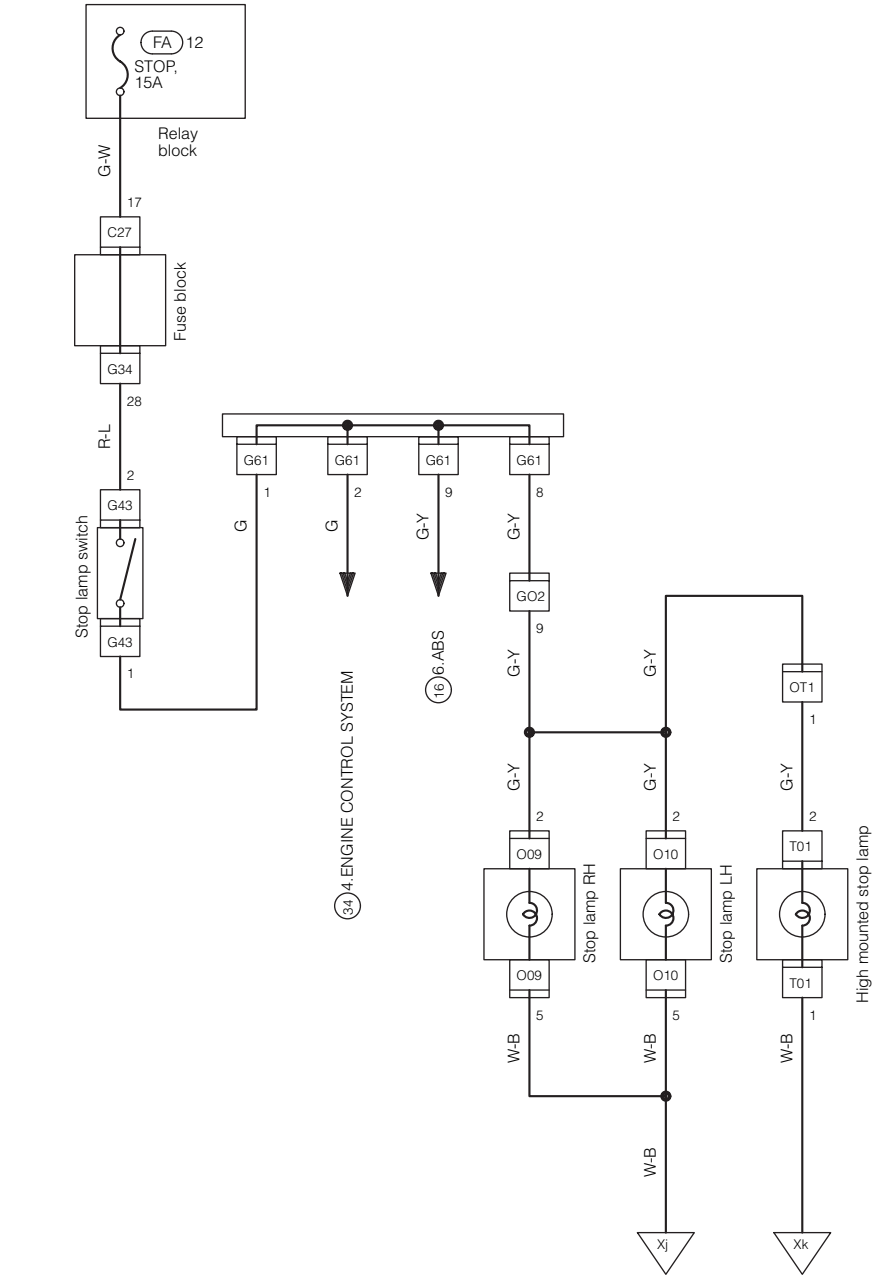
(MEMO)

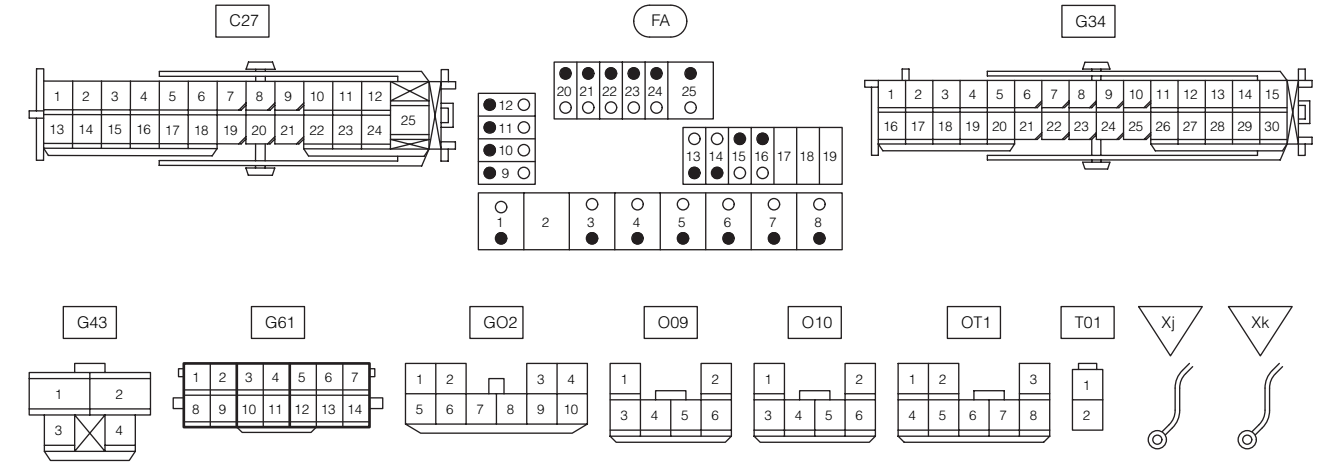

E34 (30P , Fuse block)
E61 (14P , Junction connector)
E43 (4P , Stop lamp switch)
EO2 (L , 10P , W to W)
C27 (25P , Fuse block)
a
b
c
d
e
f
g
h
i


FA
(Relay block)
b
a


O09 (6P , Stop lamp RH)
T01 (2P , High mounted stop lamp)
OT1 (8P , W to W)
O10 (6P , Stop lamp LH)
Xj
Xk
c
d
i
g
e
f

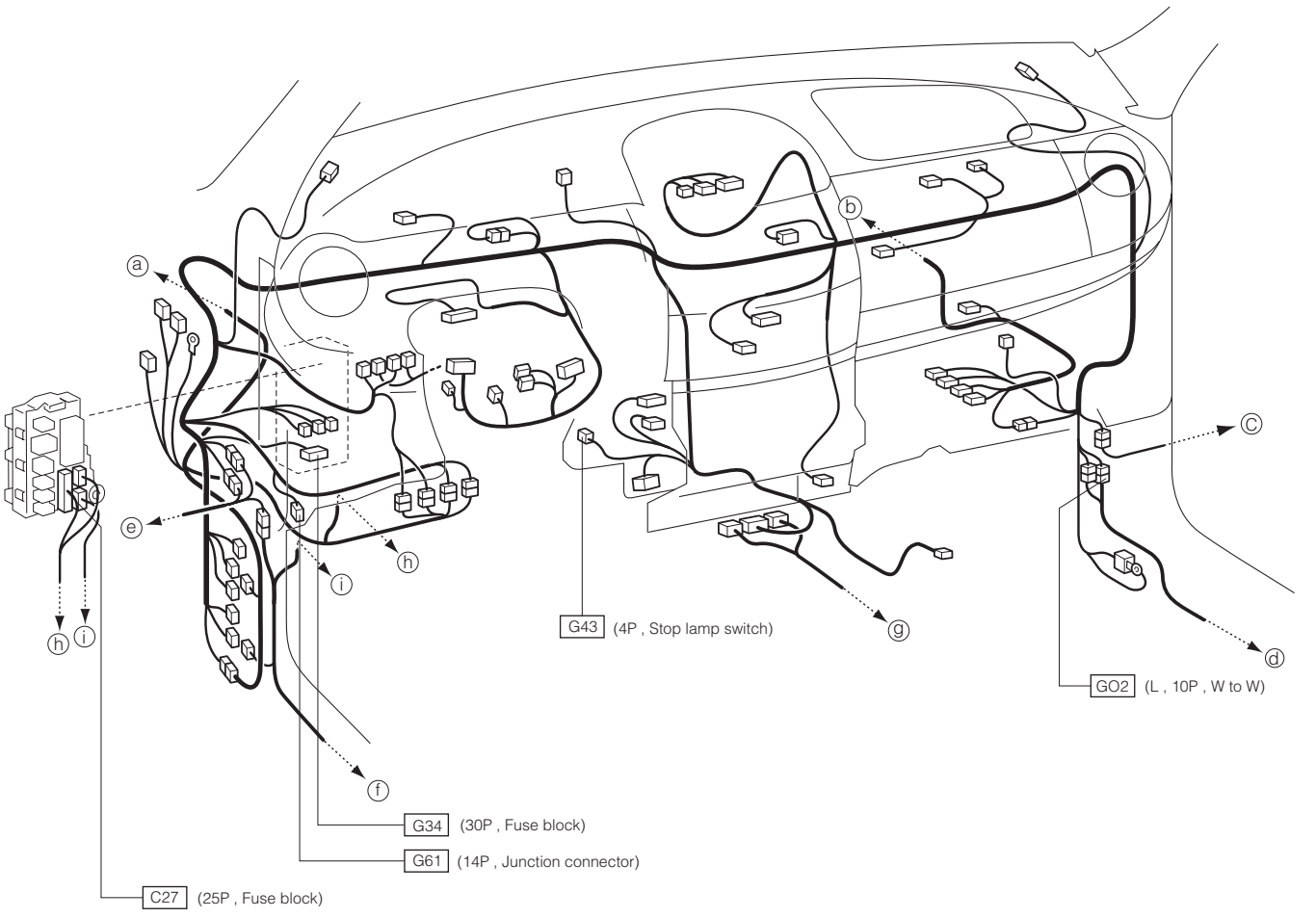
20-2 LHD VEHICLE

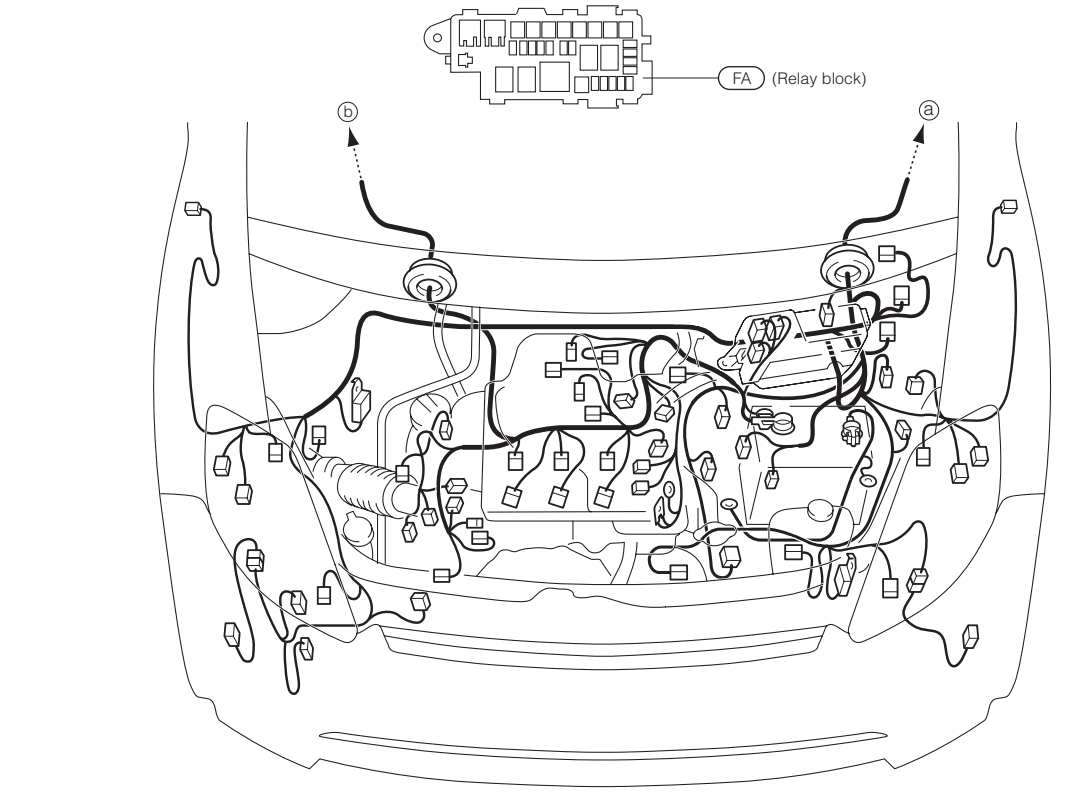


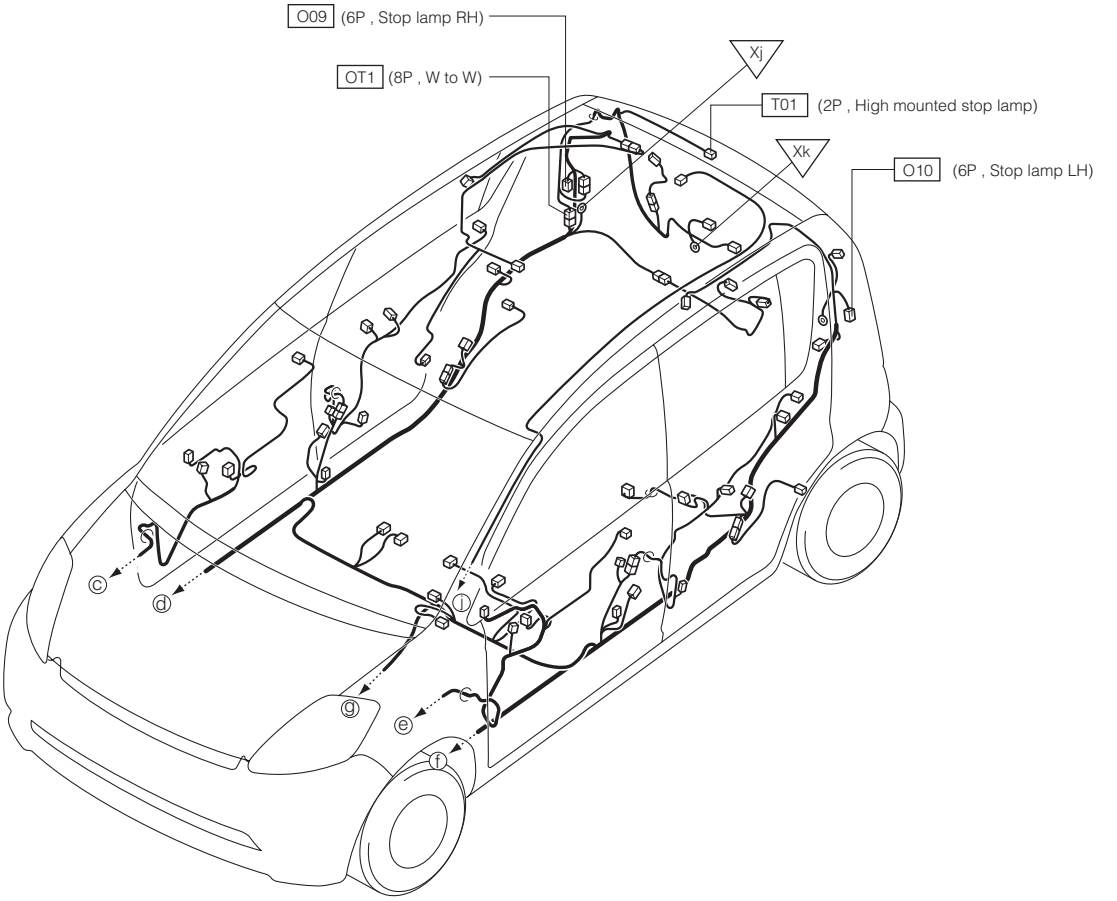


T11Q5158ES48

(MEMO)


a
b
C
d
e
f
g
h
i
G43 (4P , Stop lamp switch)
GO2 (L , 10P , W to W)
G34 (30P , Fuse block)
G61 (14P , Junction connector)
C27 (25P , Fuse block)



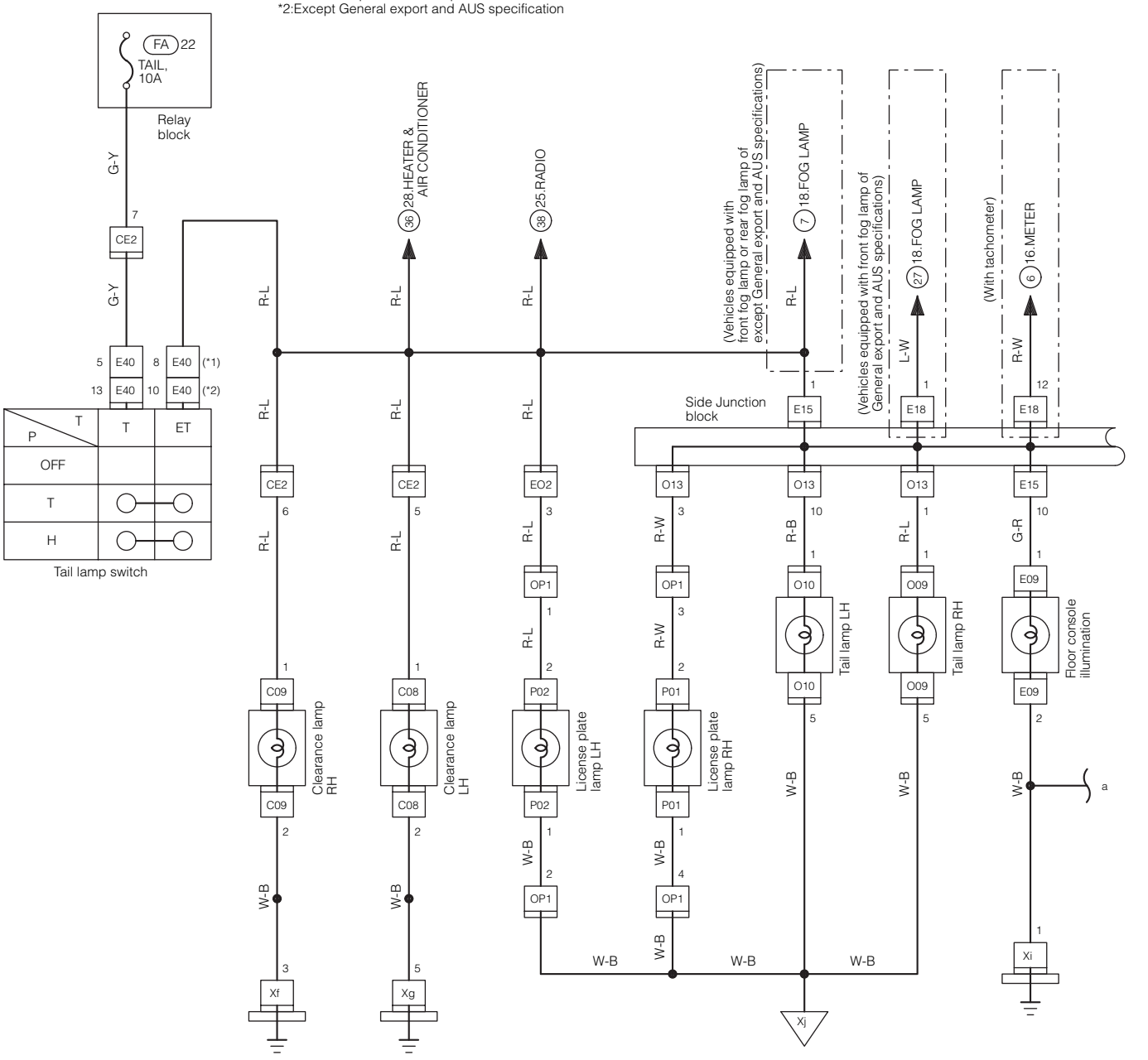


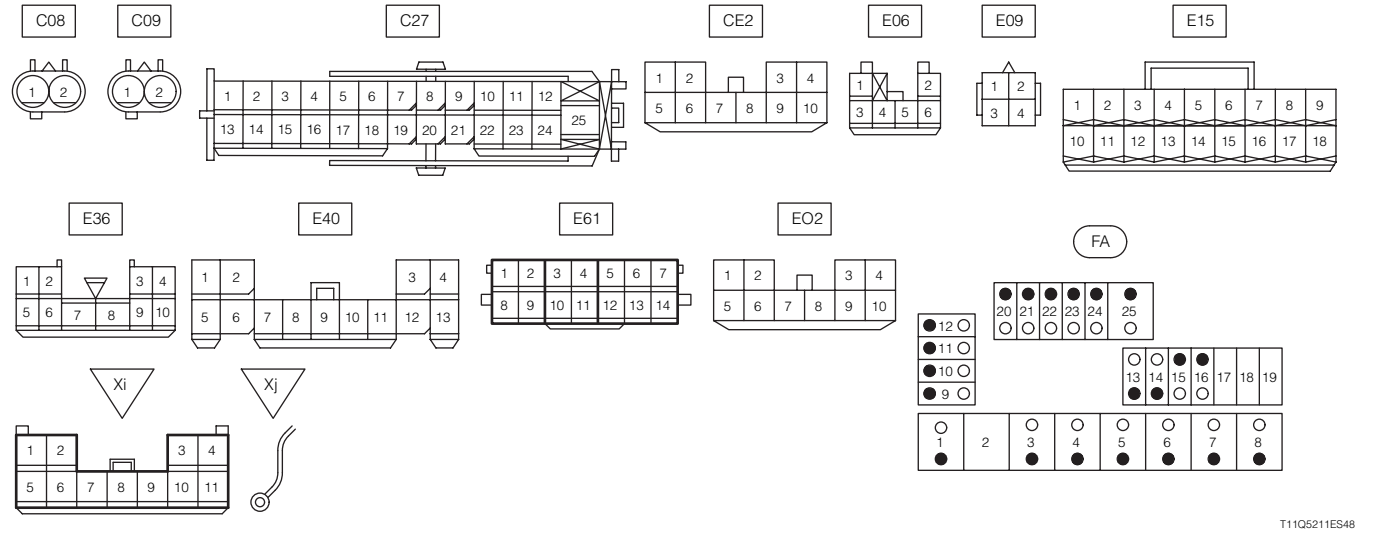
T11Q5081ES48

21 TAIL & LICENSE PLATE LAMP

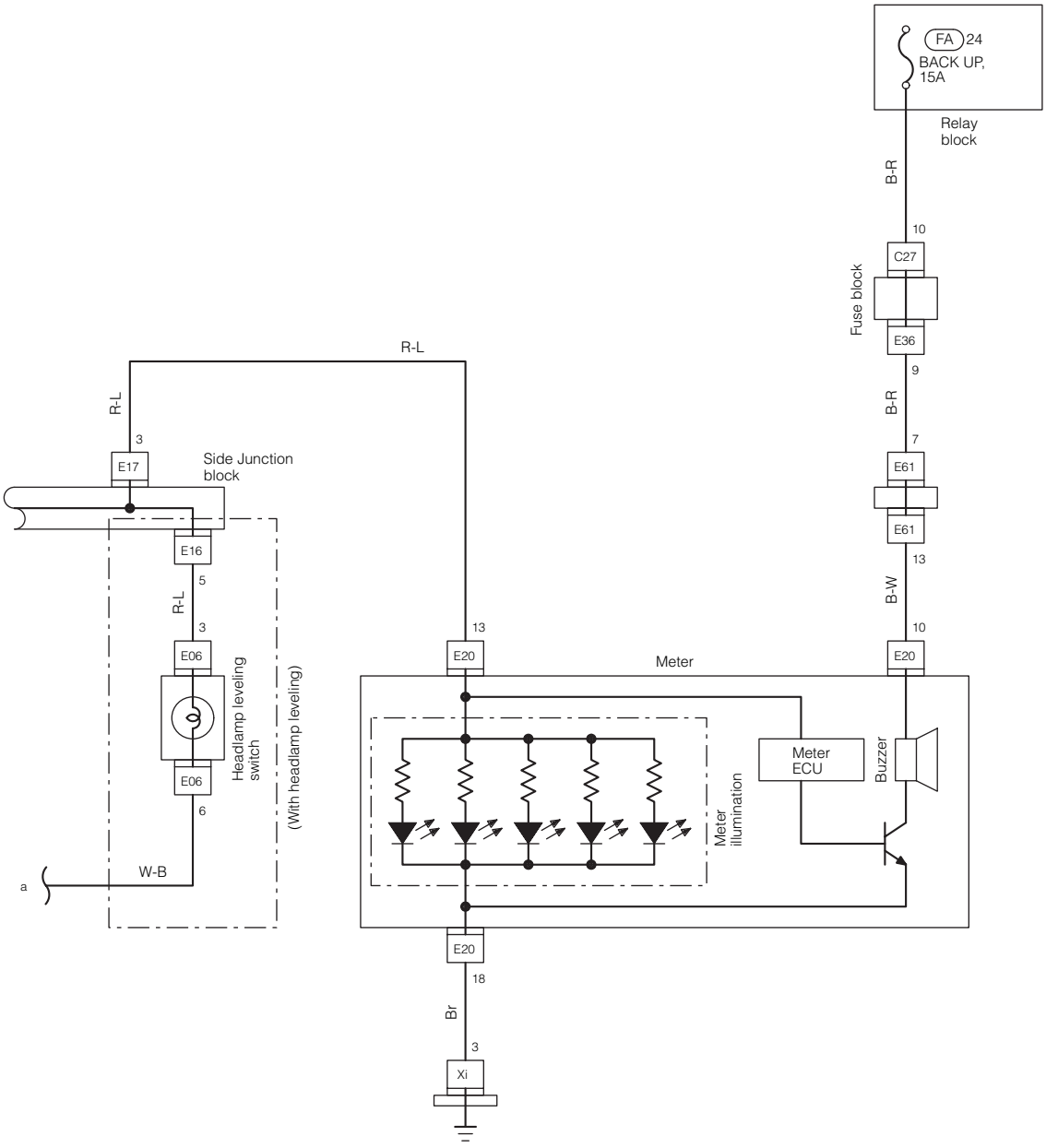
21-1 RHD VEHICLE

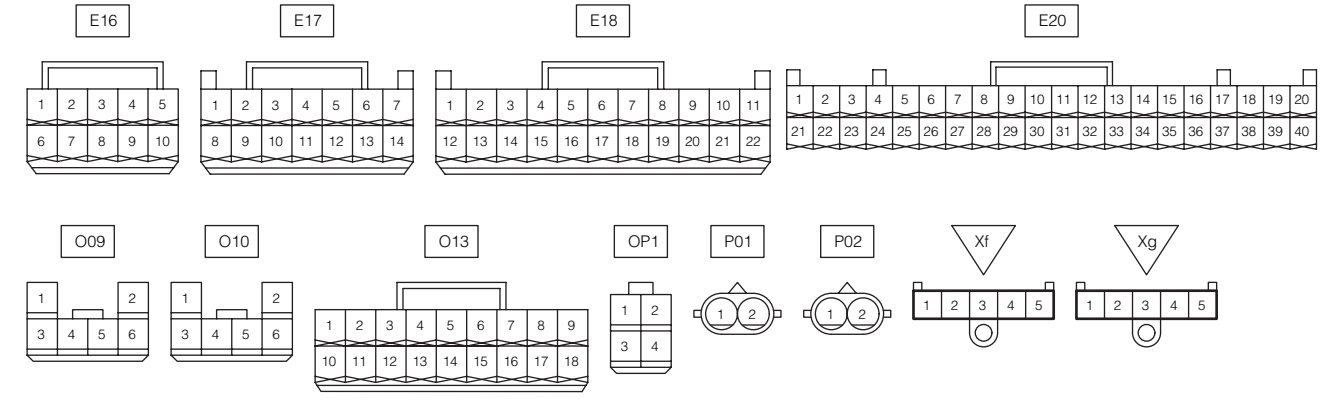
*1:General export and AUS specification
*2:Except General export and AUS specification

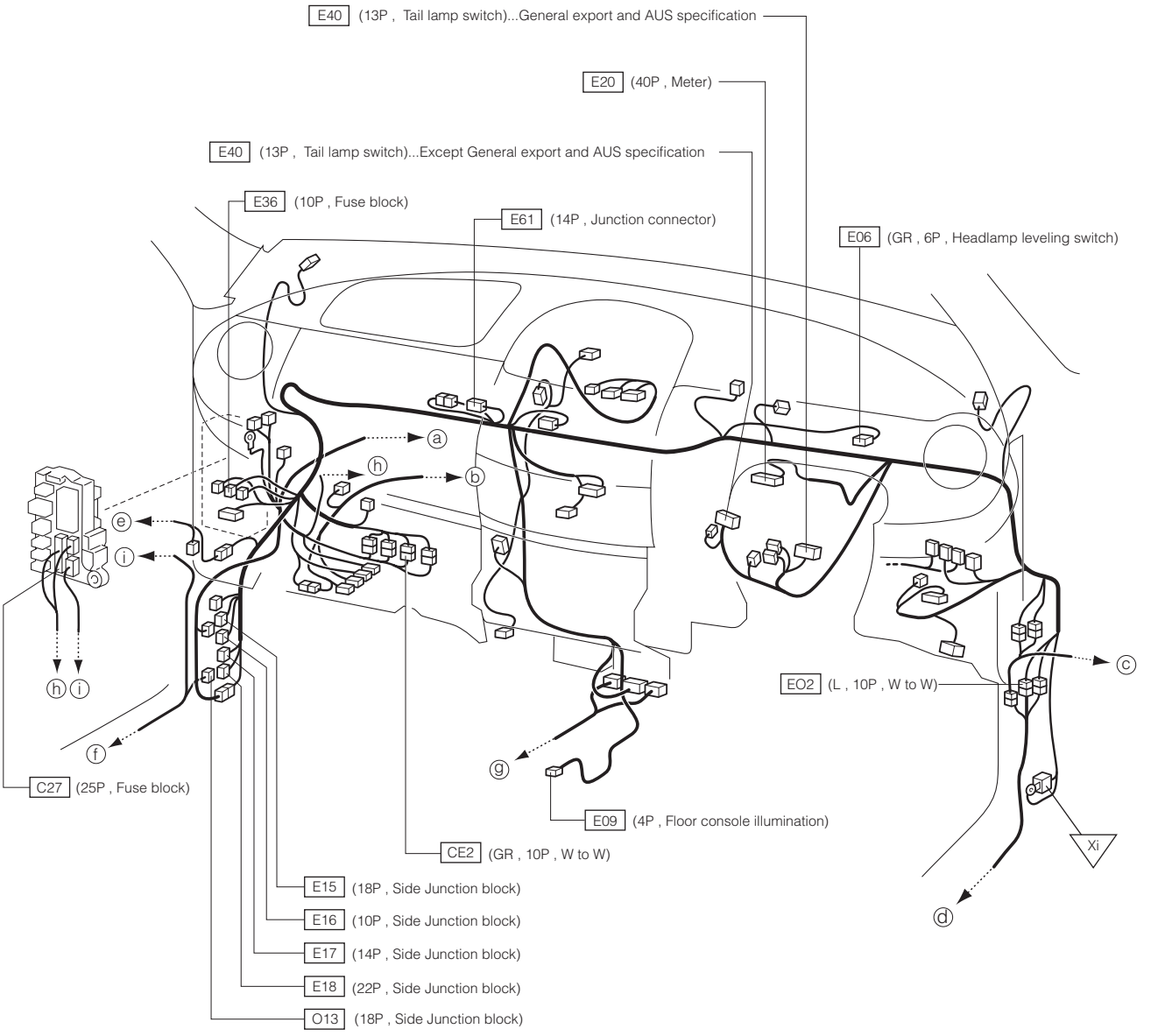


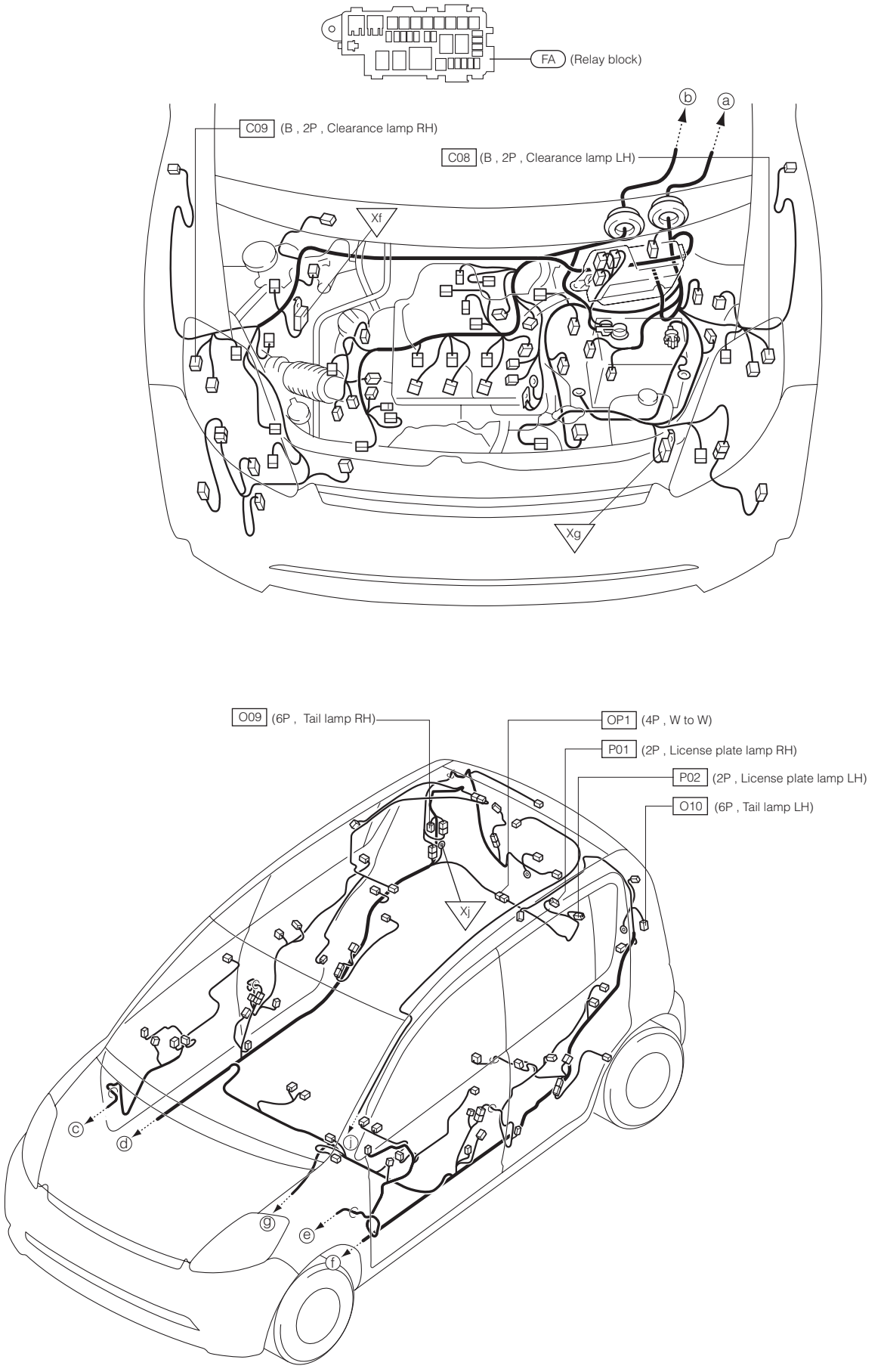


T11Q5211ES48

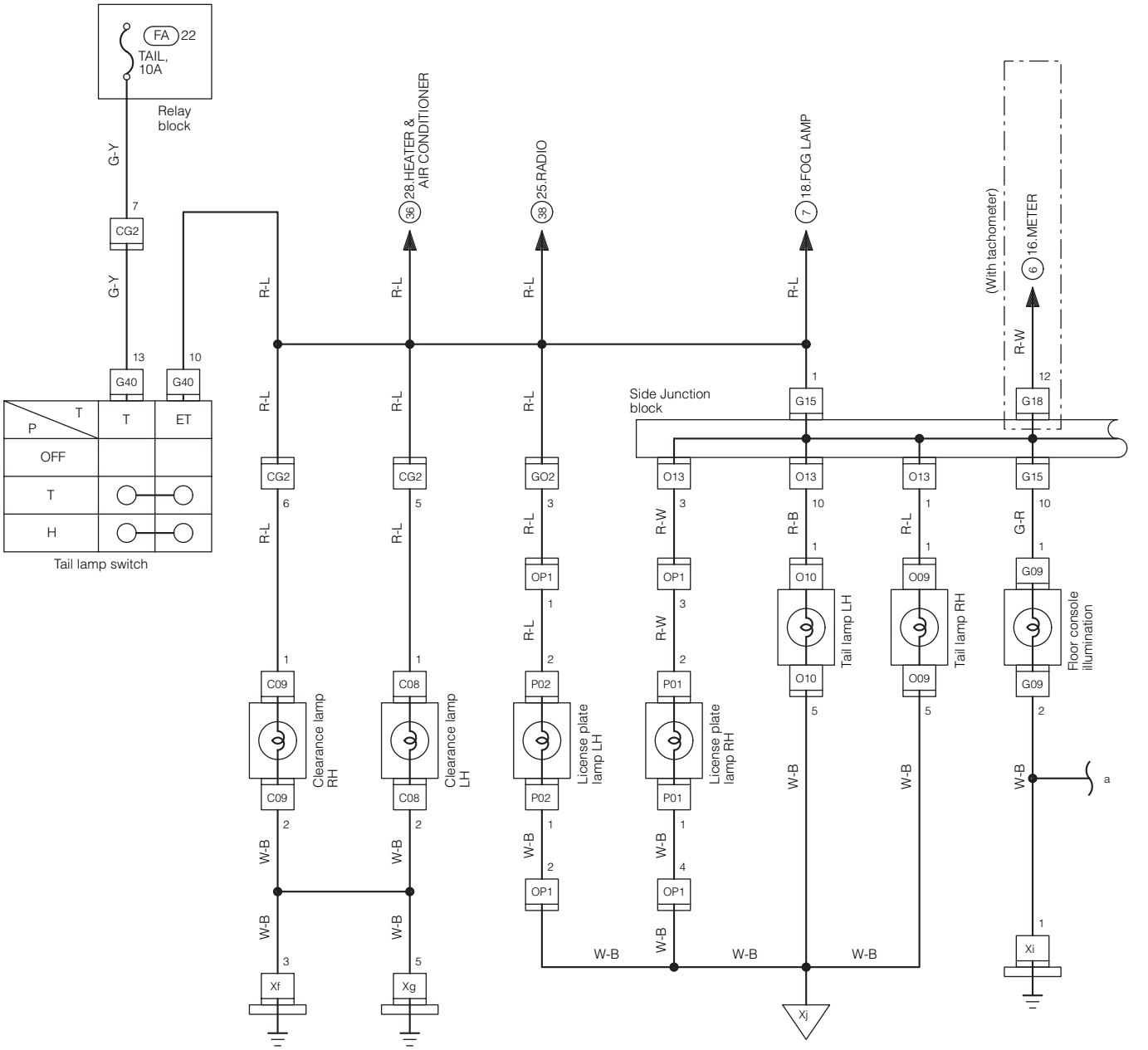

FA 24
BACK UP, 15A
Relay block
B-R
10
C27
Fuse block
E36
9
B-R
7
E61
E61
13
B-W
10
E20
Meter
R-L
R-L
3
E17
Side Junction block
E16
5
R-L
3
E06
Headlamp leveling switch
E06
6
W-B
a
(With headlamp leveling)
13
E20
Meter ECU
Buzzer
Meter illumination
E20
18
Br
3
Xi

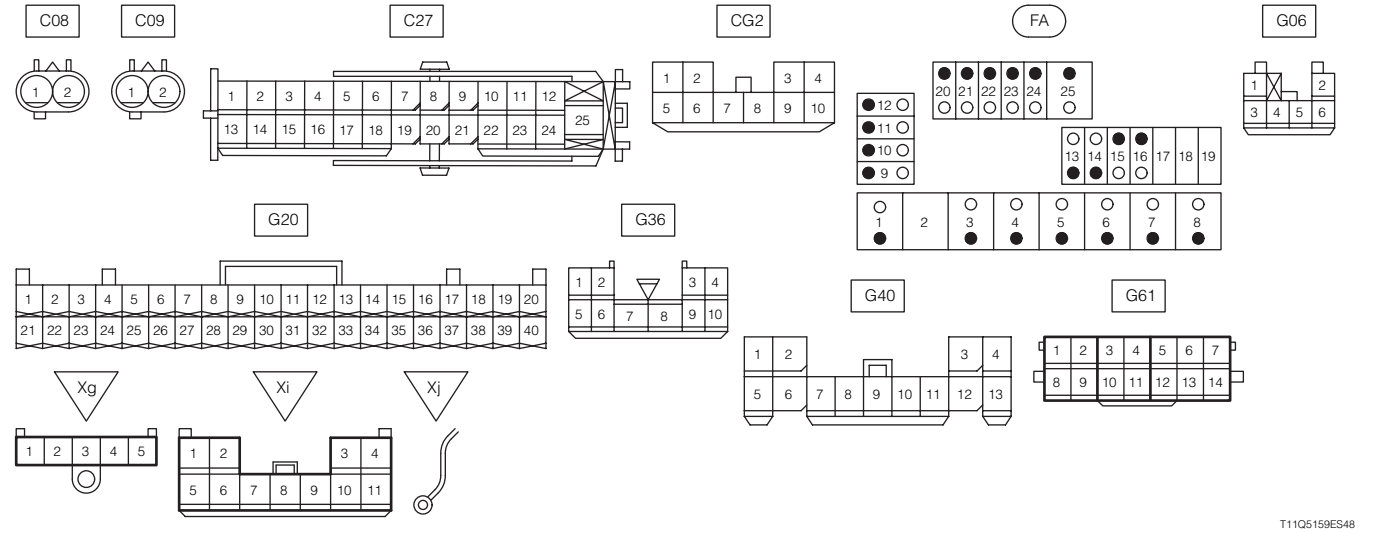

E16
E17
E18
E20
O09
O10
O13
OP1
P01
P02
Xf
Xg


E40 (13P , Tail lamp switch)...General export and AUS specification
E20 (40P , Meter)
E40 (13P , Tail lamp switch)...Except General export and AUS specification
E36 (10P , Fuse block)
E61 (14P , Junction connector)
E06 (GR , 6P , Headlamp leveling switch)
a
b
c
d
e
f
g
h
i
EO2 (L , 10P , W to W)
C27 (25P , Fuse block)
E09 (4P , Floor console illumination)
CE2 (GR , 10P , W to W)
Xi
E15 (18P , Side Junction block)
E16 (10P , Side Junction block)
E17 (14P , Side Junction block)
E18 (22P , Side Junction block)
O13 (18P , Side Junction block)


FA (Relay block)
C09 (B , 2P , Clearance lamp RH)
C08 (B , 2P , Clearance lamp LH)
b
a
Xf
Xg
O09 (6P , Tail lamp RH)
OP1 (4P , W to W)
P01 (2P , License plate lamp RH)
P02 (2P , License plate lamp LH)
O10 (6P , Tail lamp LH)
Xj
c
d
i
g
e
f

21-2 LHD VEHICLE





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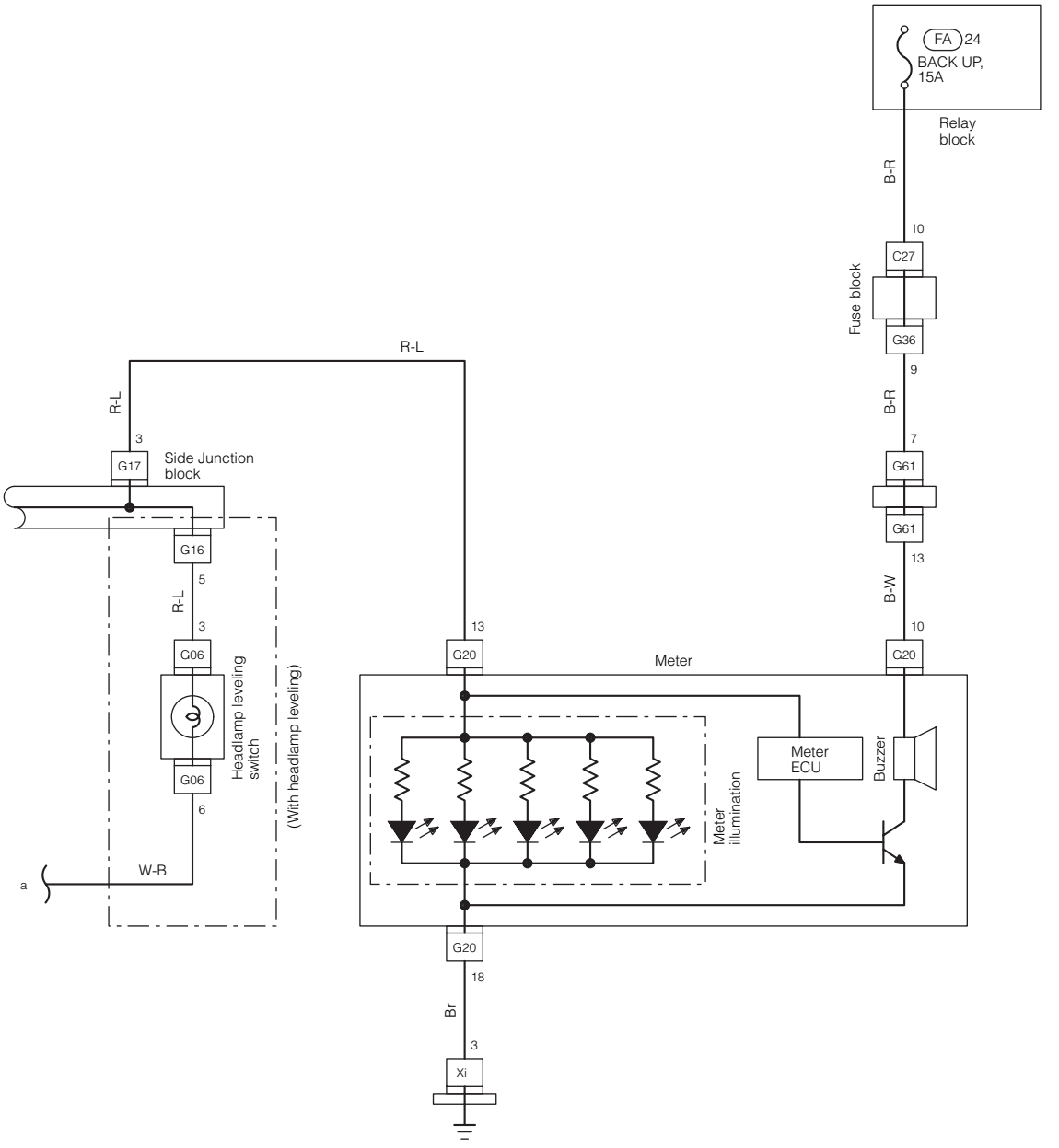
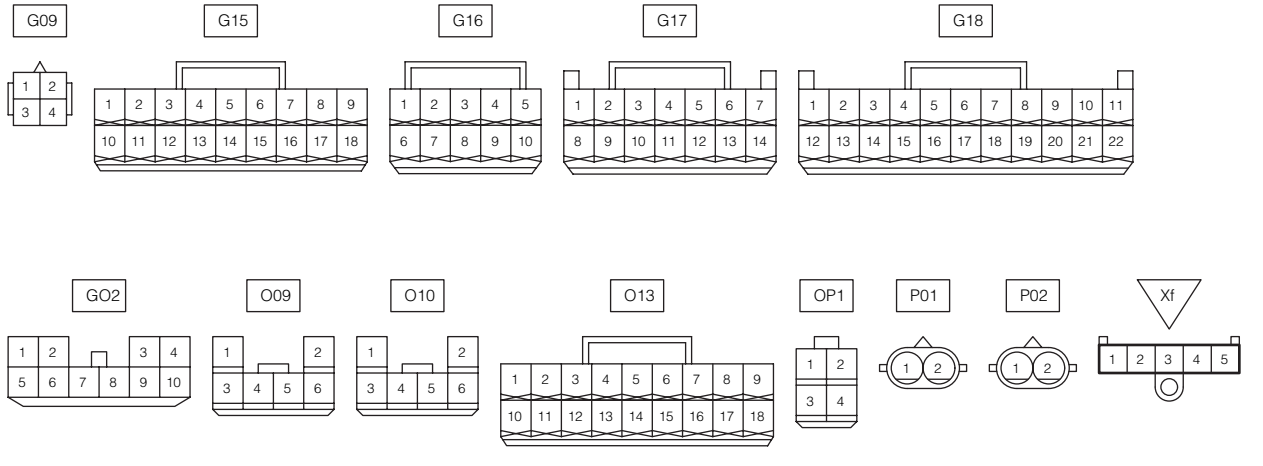
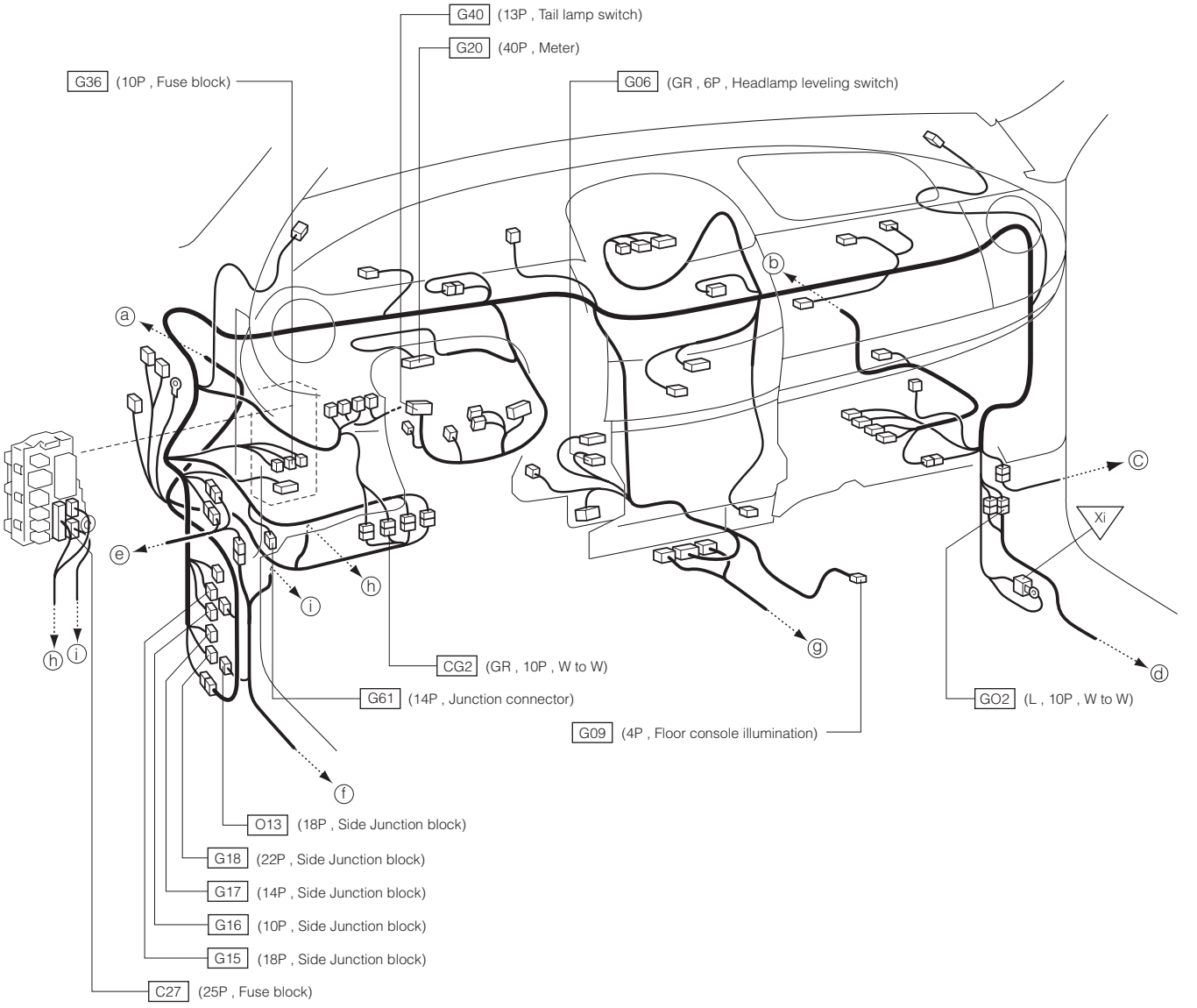
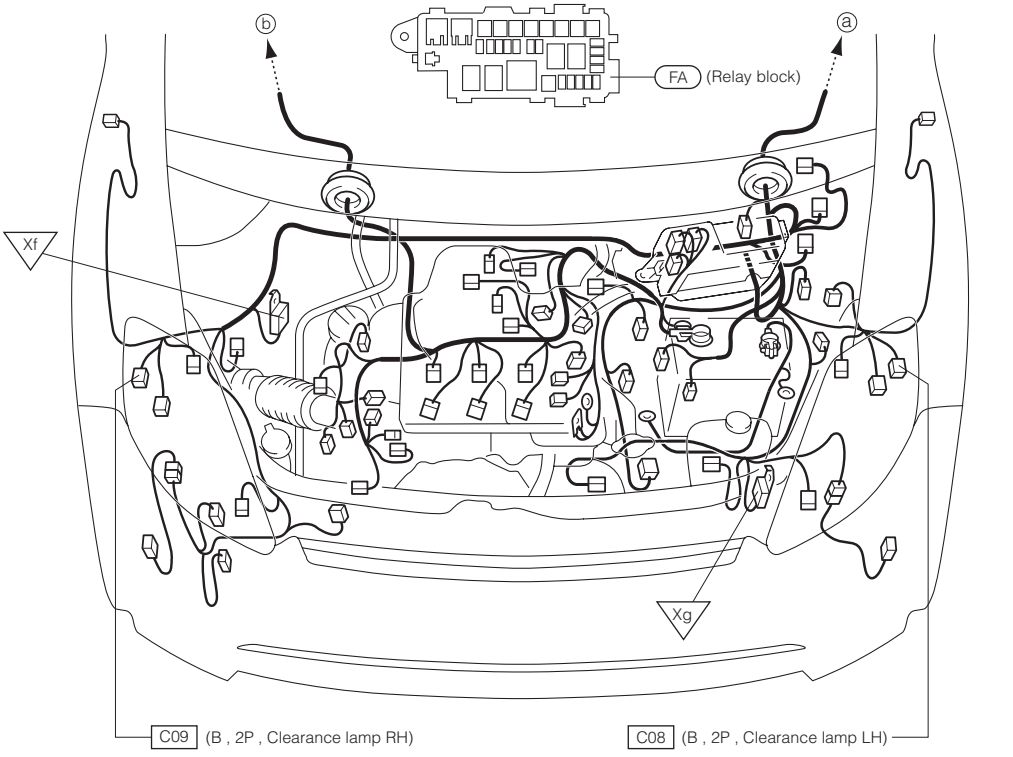
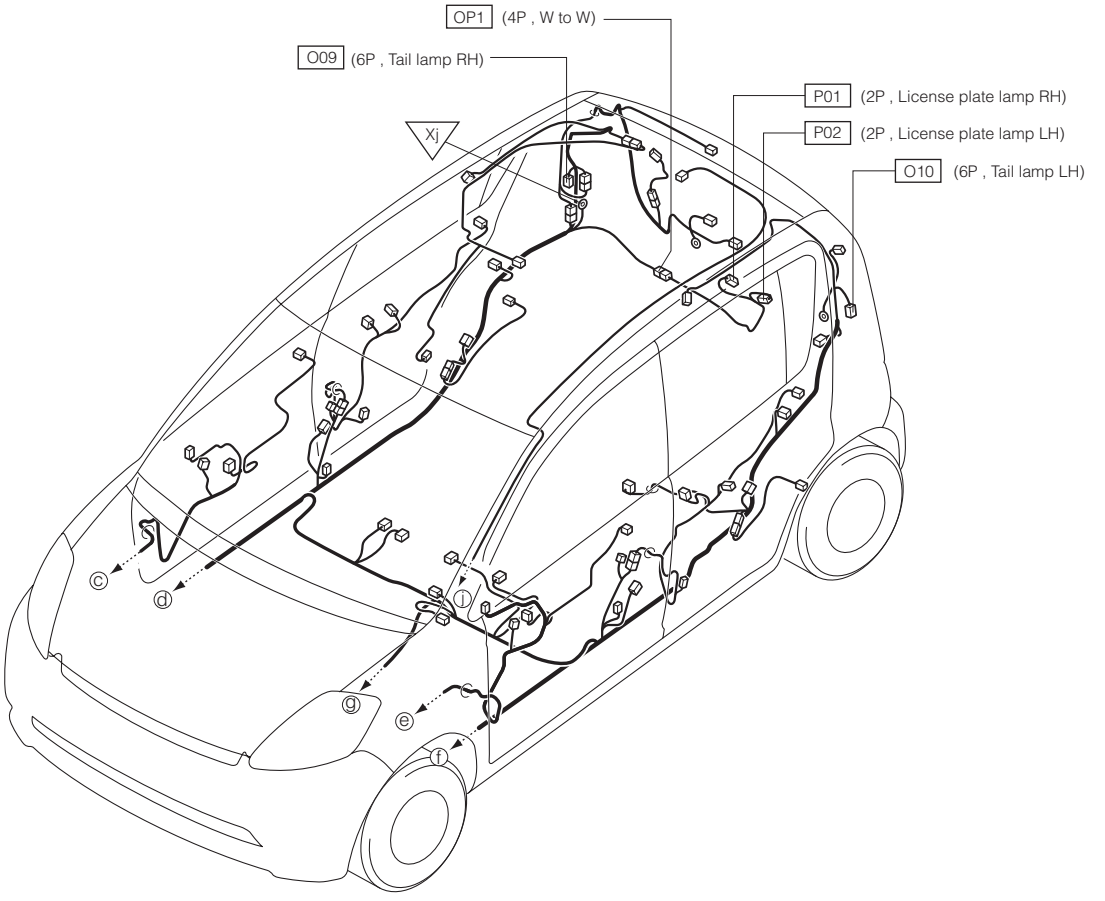

FA 24
BACK UP, 15A
Relay block
B-R
10
C27
Fuse block
G36
9
B-R
7
G61
G61
13
B-W
10
G20
Meter
R-L
R-L
3
G17
Side Junction block
G16
5
R-L
3
G06
Headlamp leveling switch
G06
6
(With headlamp leveling)
a
W-B
13
G20
Meter illumination
Meter ECU
Buzzer
G20
18
Br
3
Xi


G09
G15
G16
G17
G18
GO2
O09
O10
O13
OP1
P01
P02
Xf



T11Q5087ES48

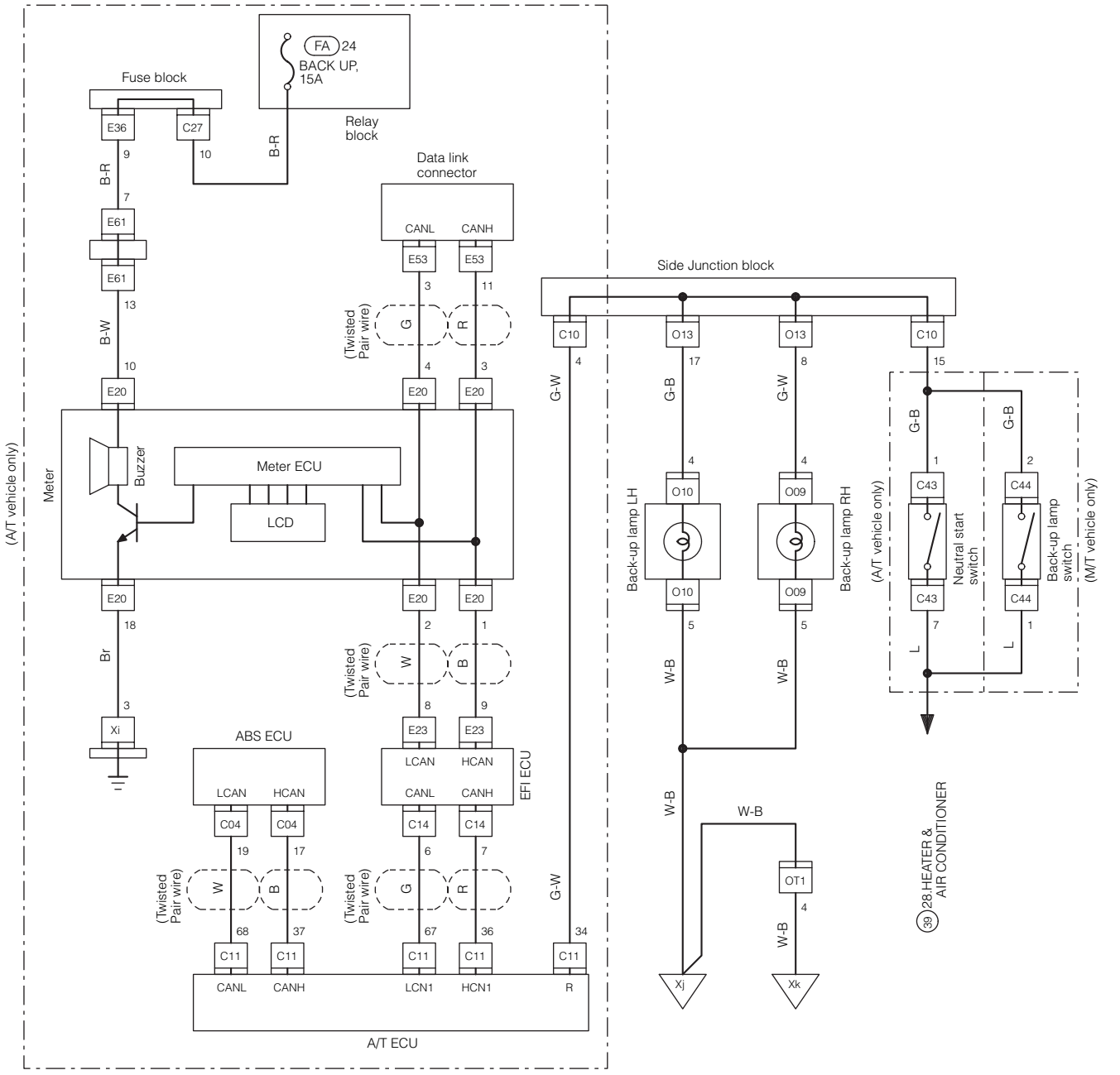


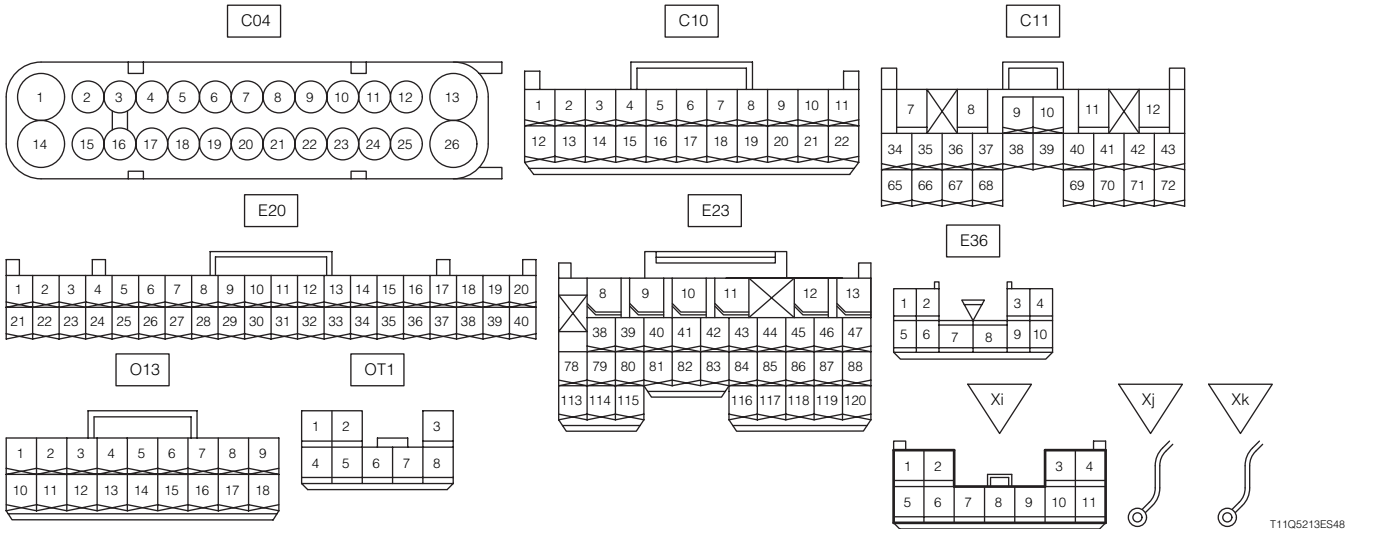


T11Q5085ES48

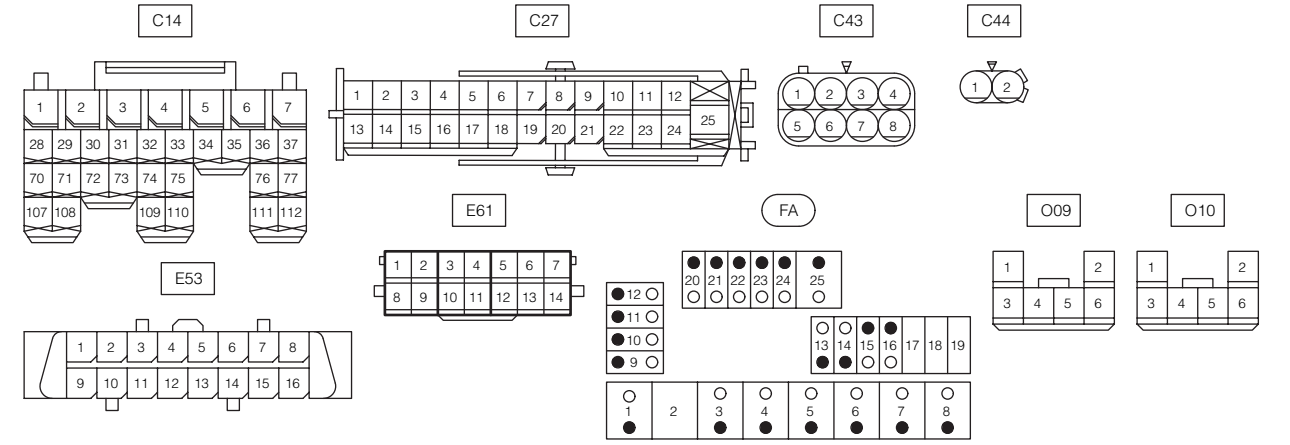
22 BACK UP LAMP

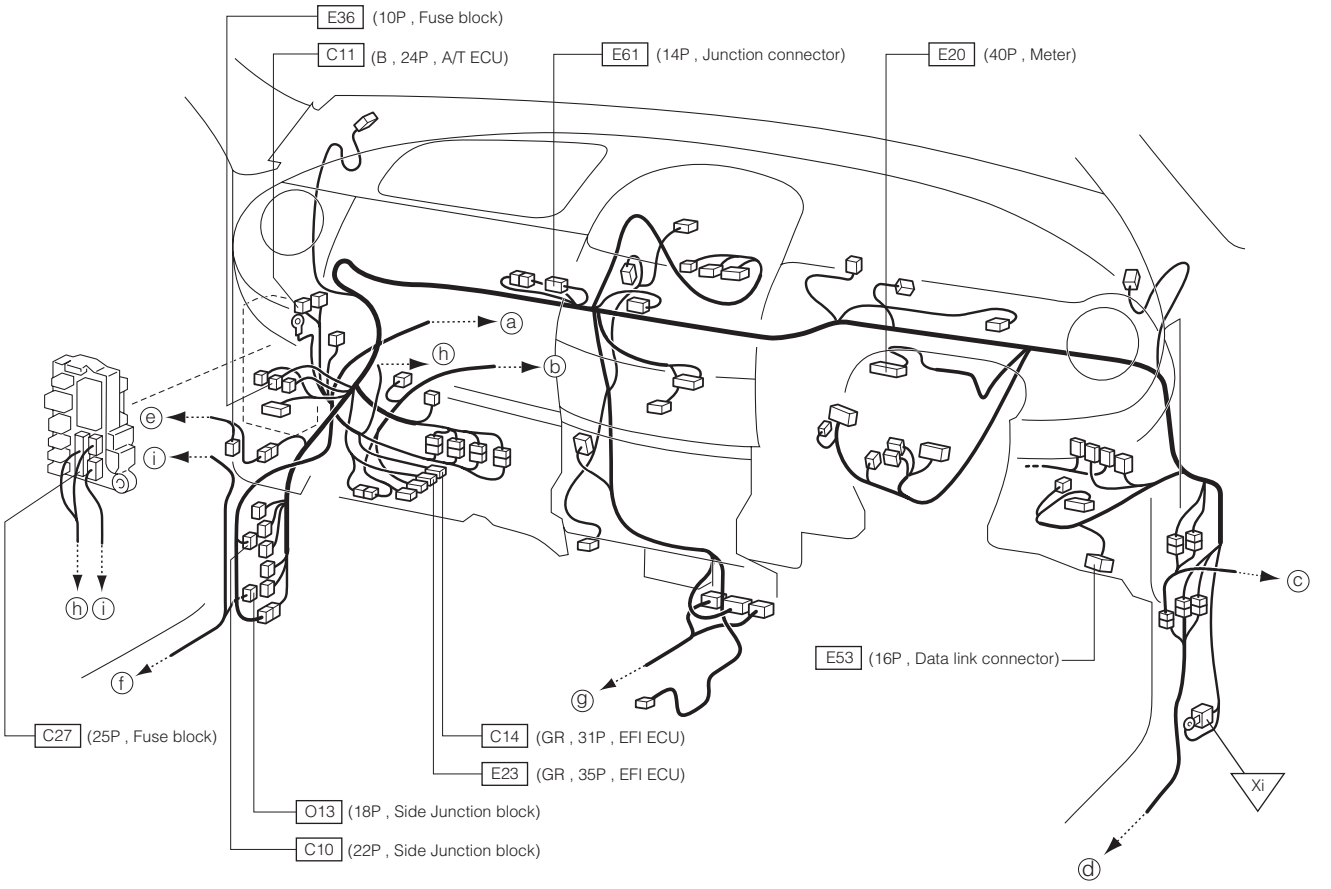
22-1 RHD VEHICLE



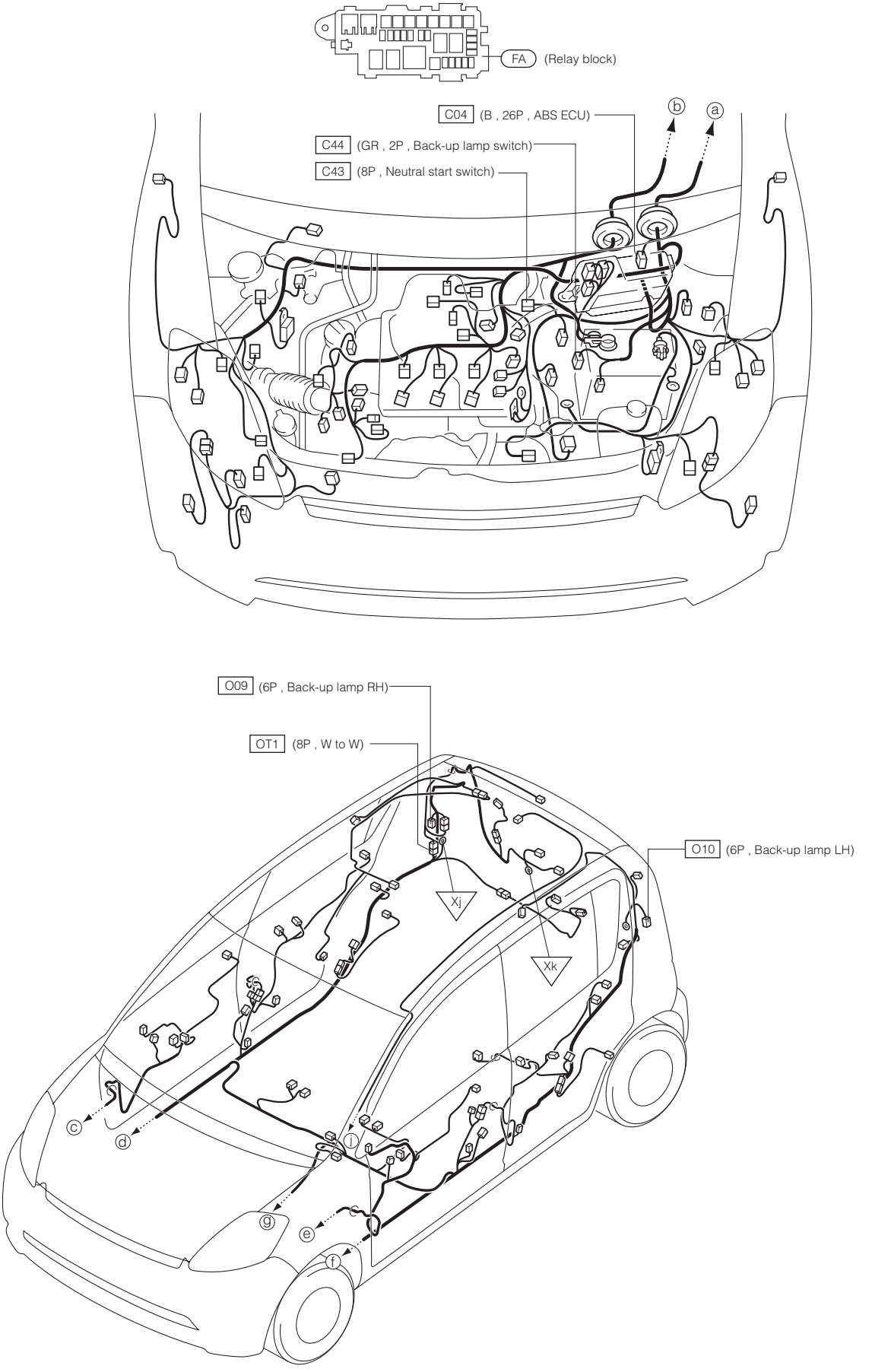


T11Q5213ES48


C14
1 2 3 4 5 6 7
28 29 30 31 32 33 34 35 36 37
70 71 72 73 74 75 76 77
107 108 109 110 111 112
C27
1 2 3 4 5 6 7 8 9 10 11 12
13 14 15 16 17 18 19 20 21 22 23 24 25
C43
1 2 3 4
5 6 7 8
C44
1 2
E53
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
E61
1 2 3 4 5 6 7
8 9 10 11 12 13 14
FA
12 11 10 9
20 21 22 23 24 25
13 14 15 16 17 18 19
1 2 3 4 5 6 7 8
O09
1 2
3 4 5 6
O10
1 2
3 4 5 6

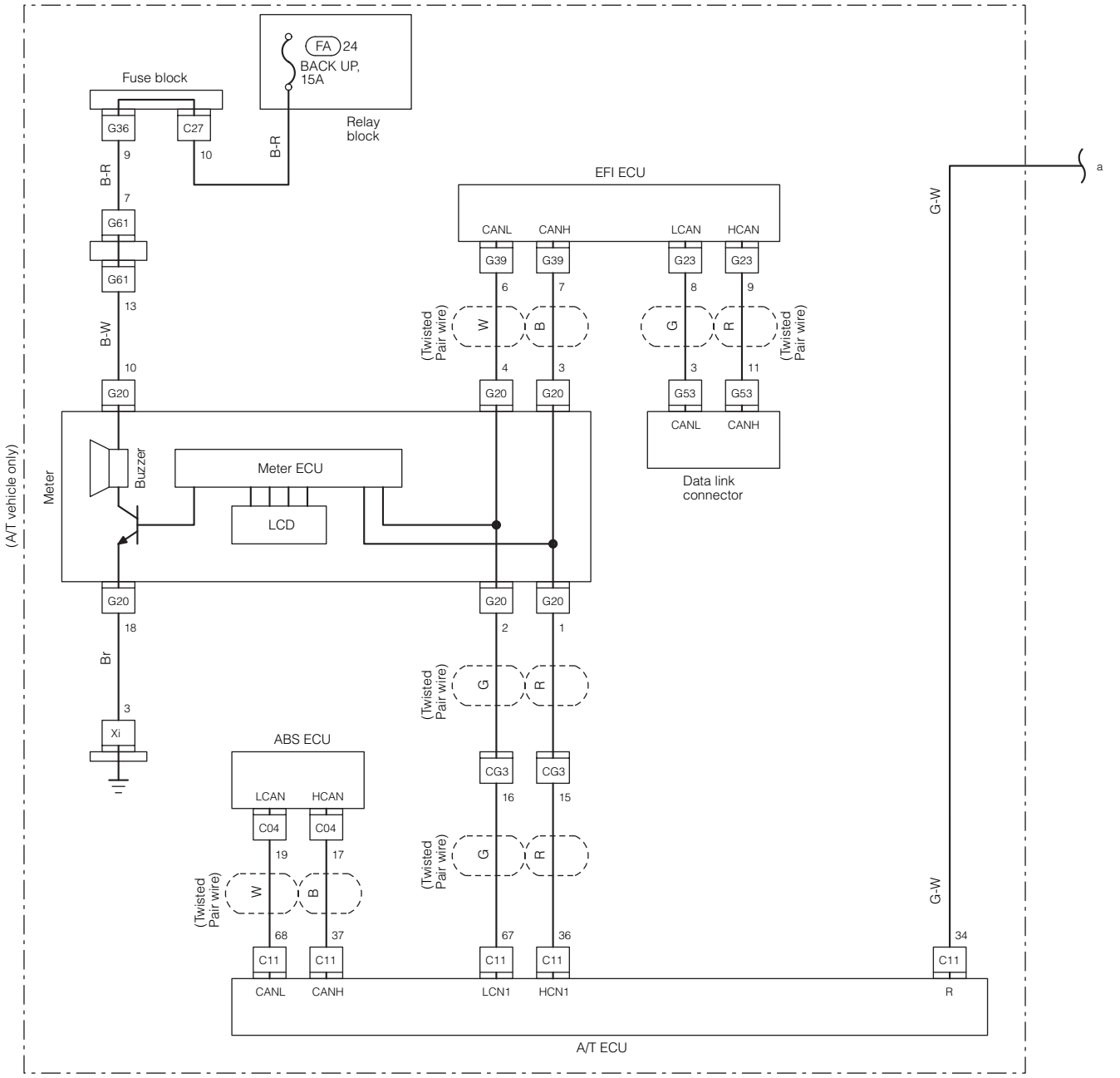


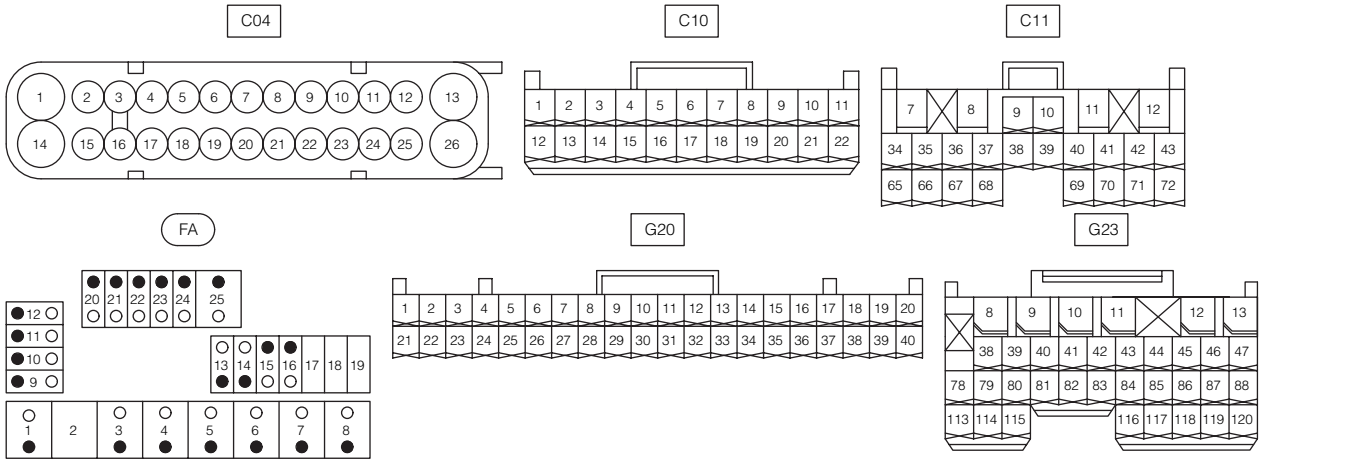
T11Q5092ES48

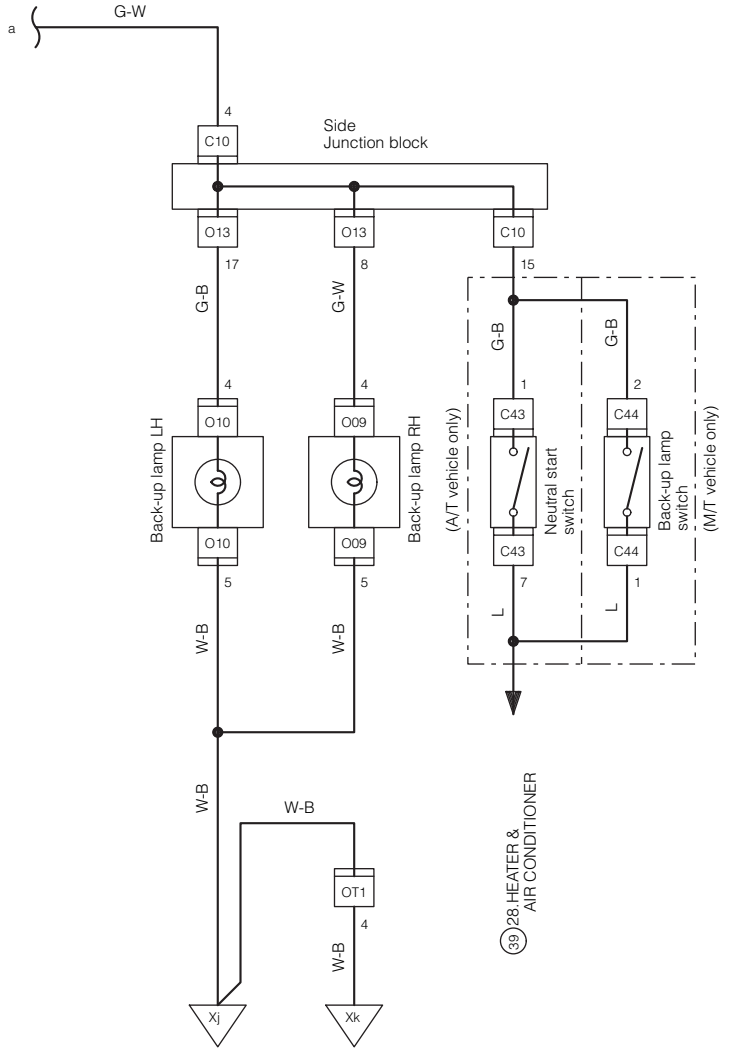


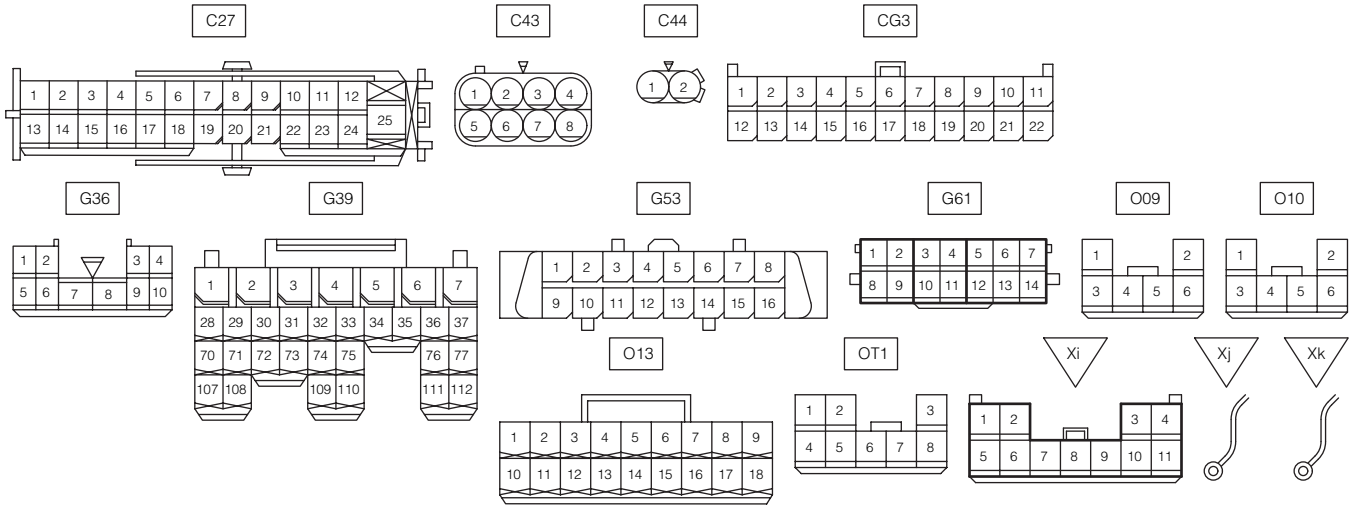
T11Q5090ES48

22-2 LHD VEHICLE

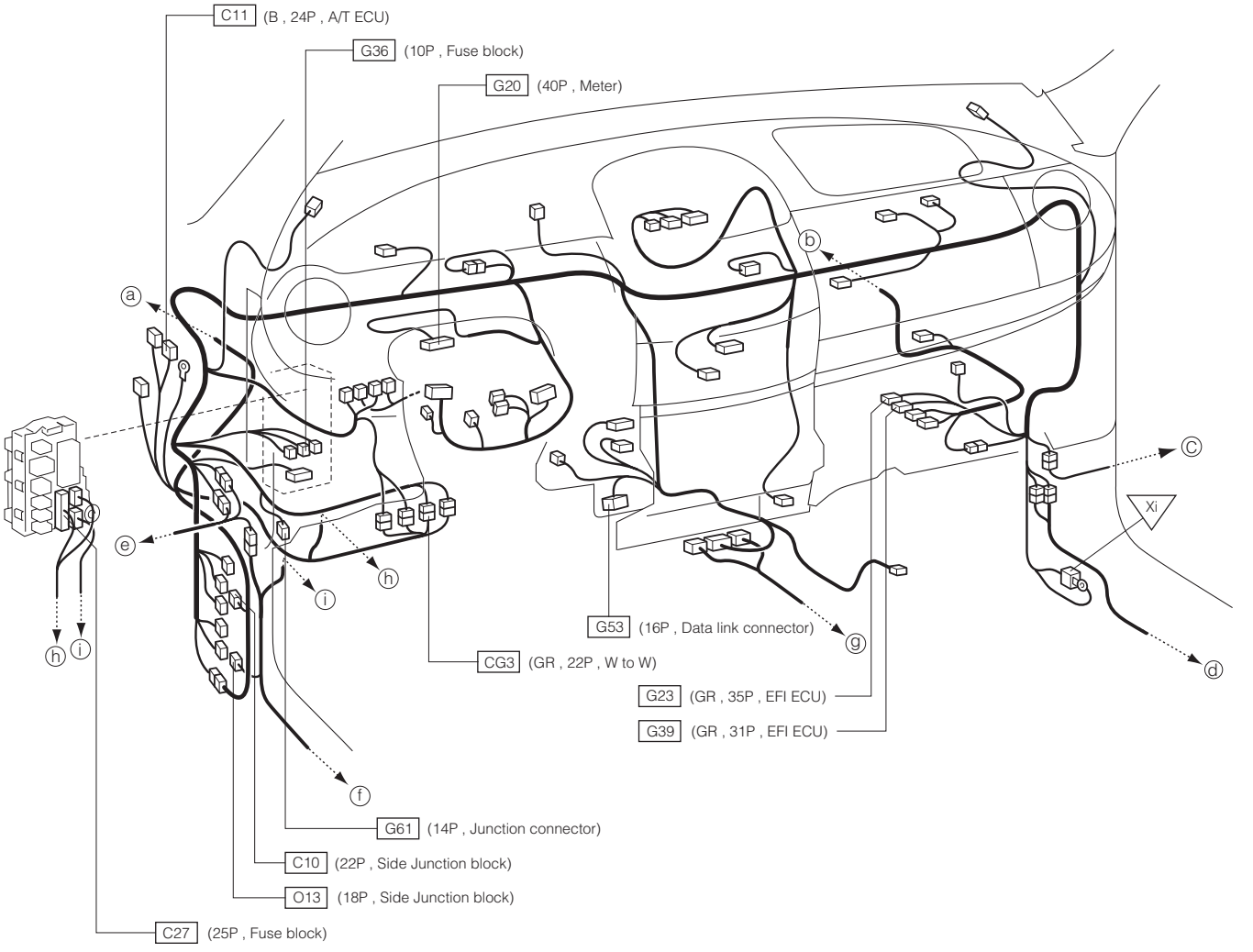




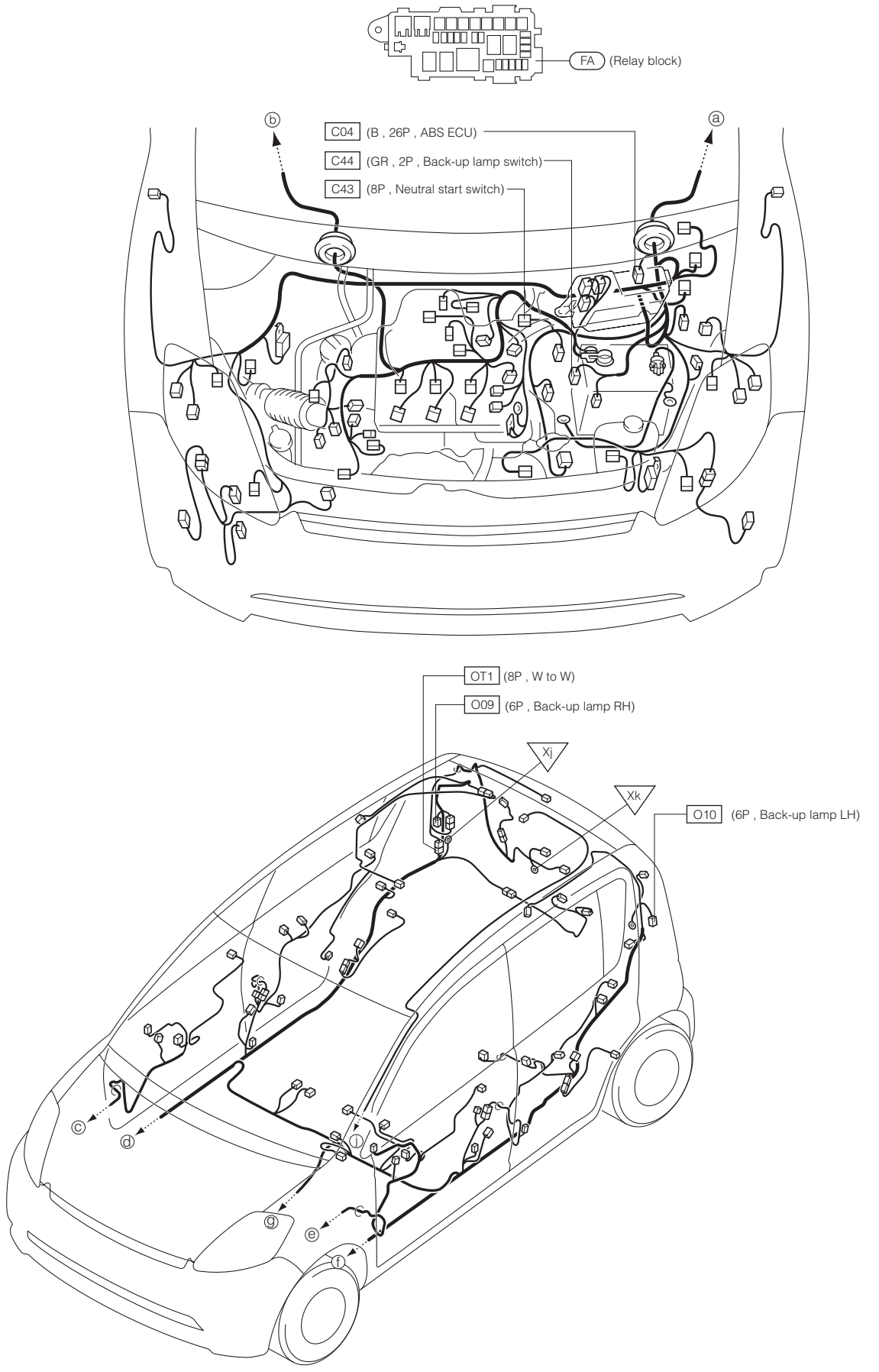




T11Q5162ES48



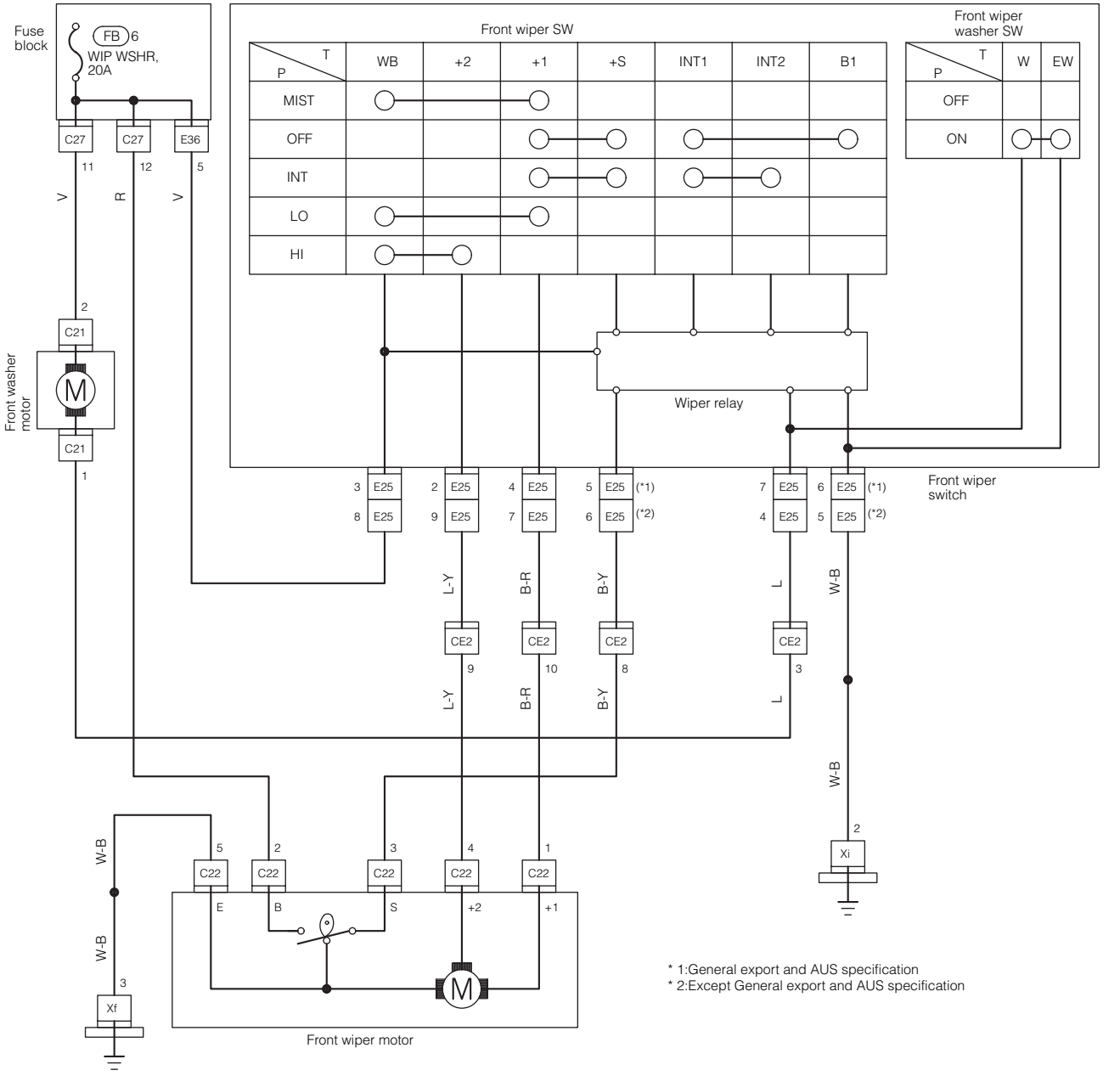
T11Q5091ES48

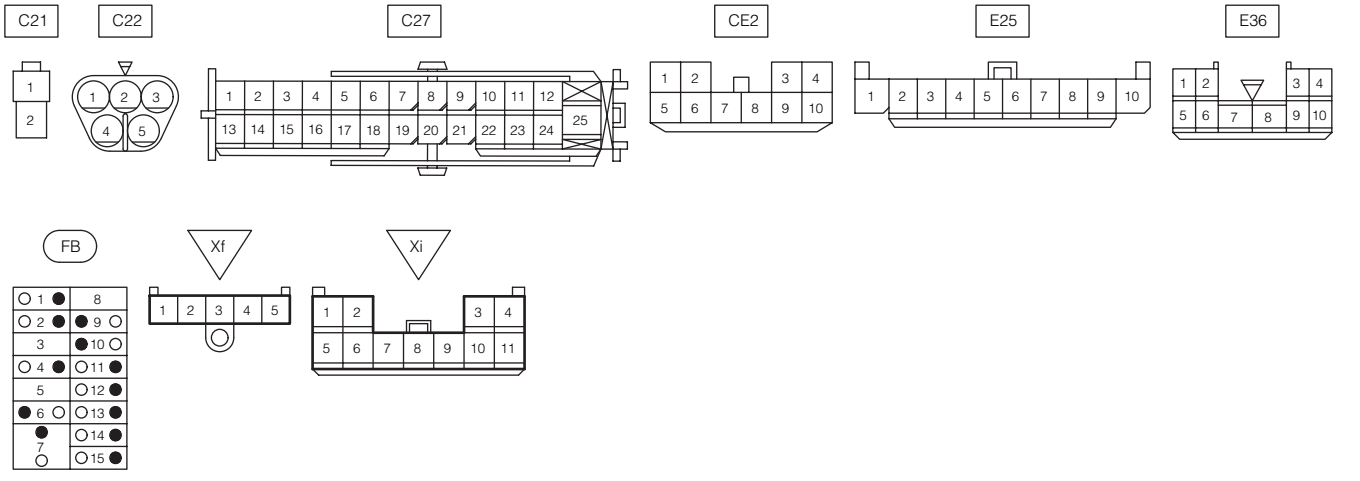


T11Q5089ES48

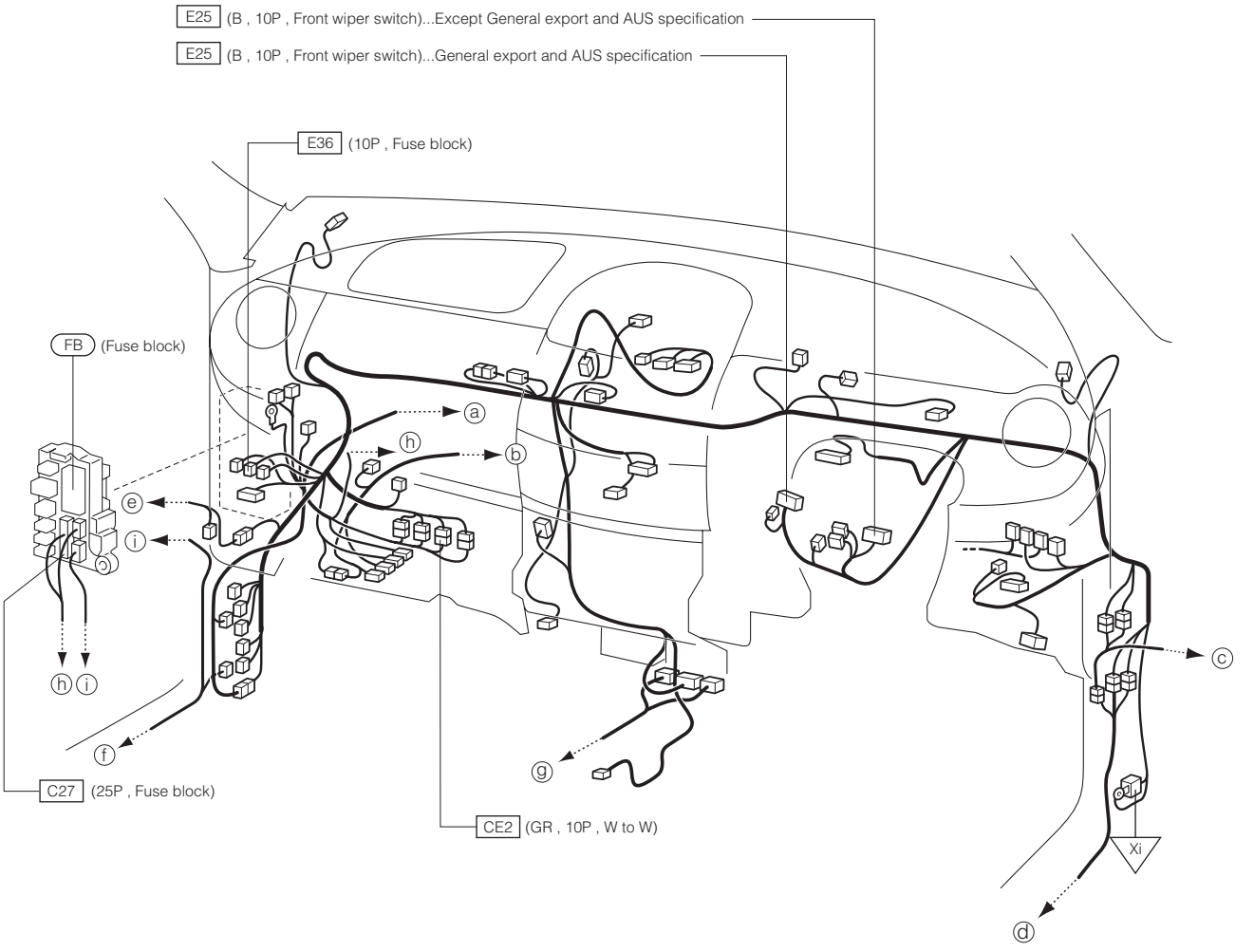
23 FRONT WIPER & WASHER

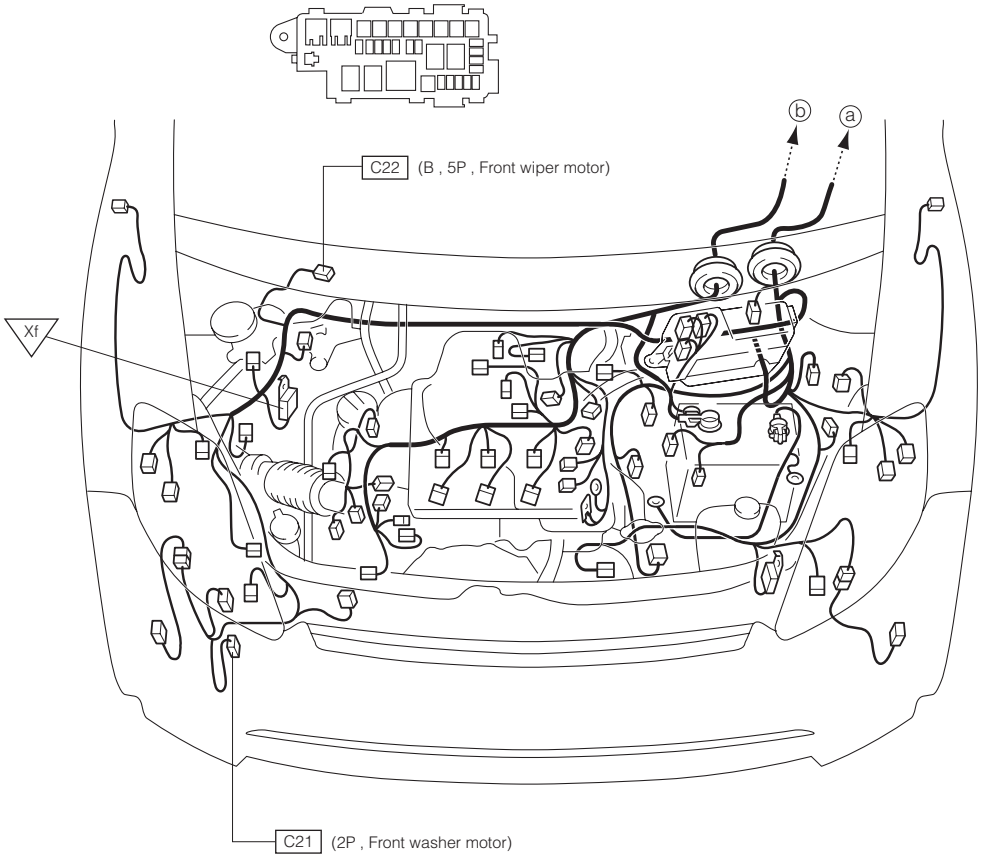
23-1 RHD VEHICLE



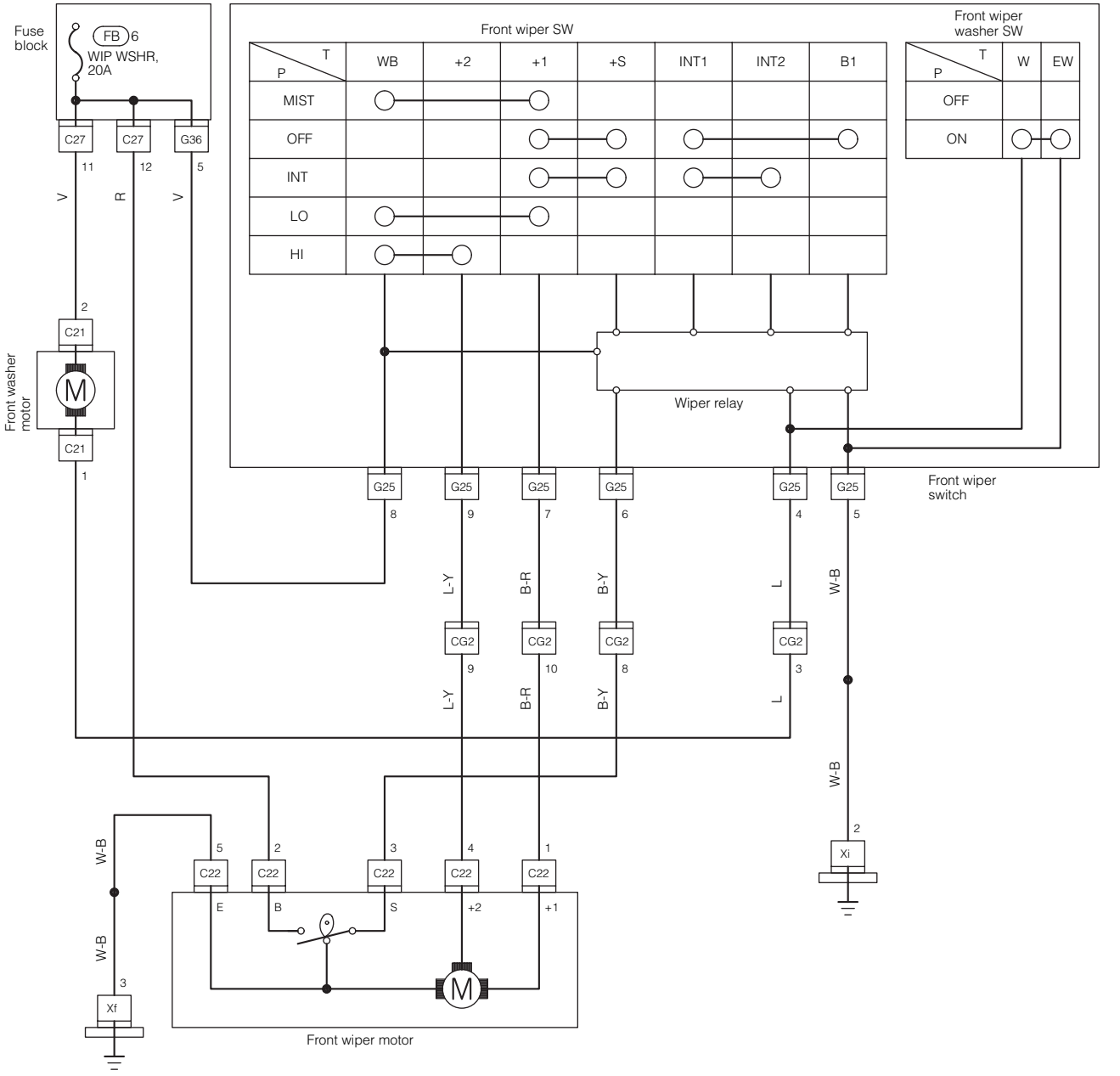


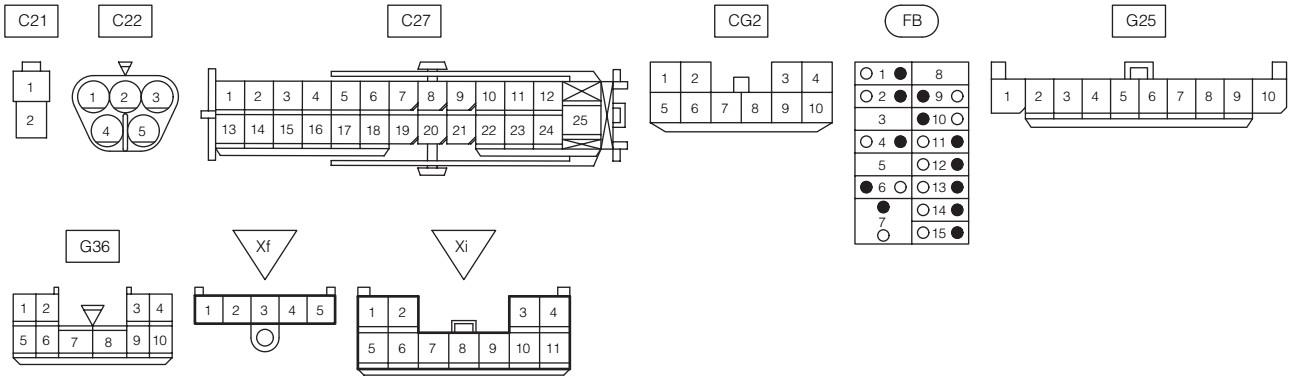
(MEMO)


E25 (B , 10P , Front wiper switch)...Except General export and AUS specification
E25 (B , 10P , Front wiper switch)...General export and AUS specification
E36 (10P , Fuse block)
FB (Fuse block)
a
b
c
d
e
f
g
h
i
C27 (25P , Fuse block)
CE2 (GR , 10P , W to W)
Xi


b
a
C22 (B , 5P , Front wiper motor)
Xf
C21 (2P , Front washer motor)

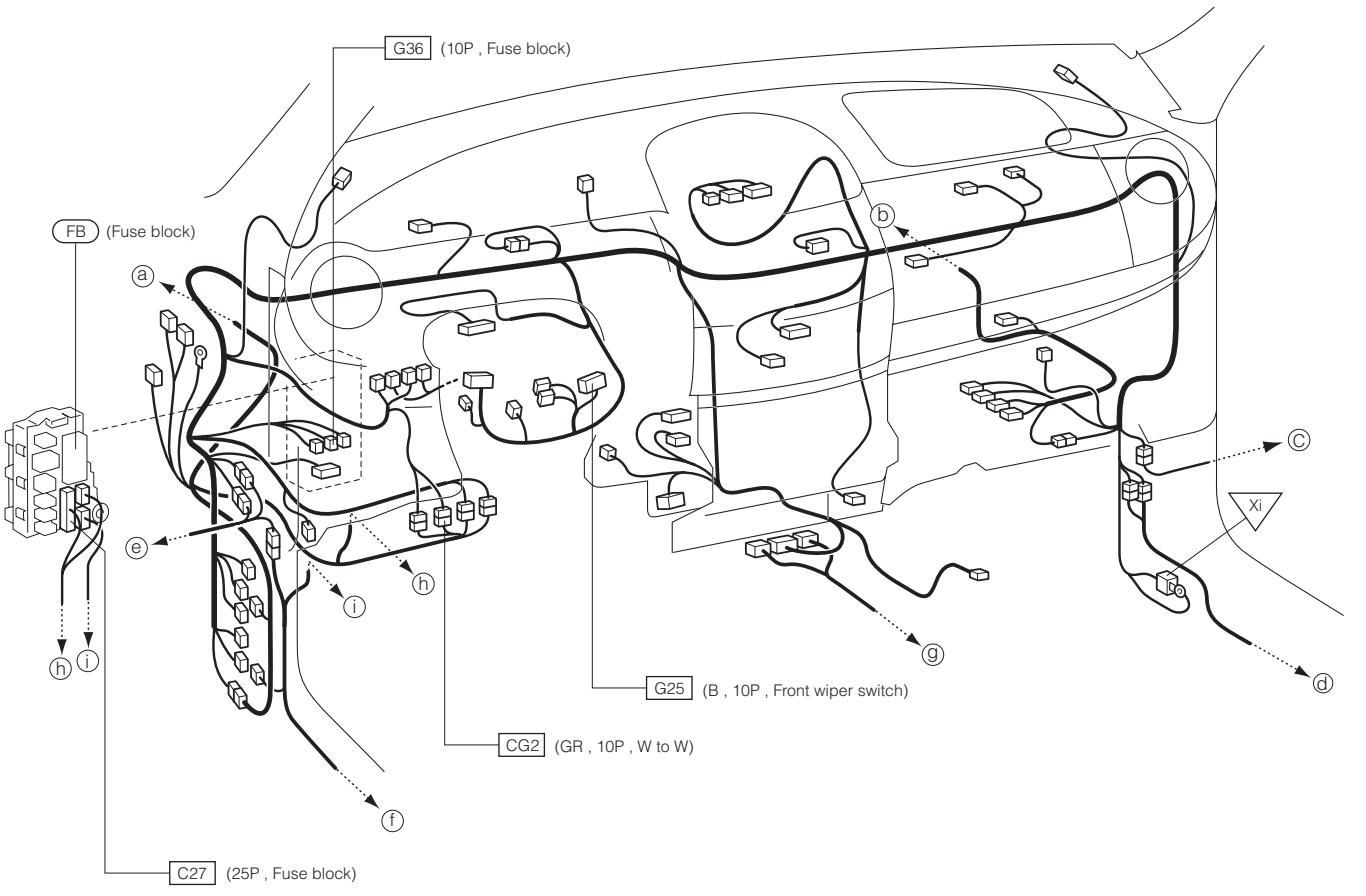
23-2 LHD VEHICLE

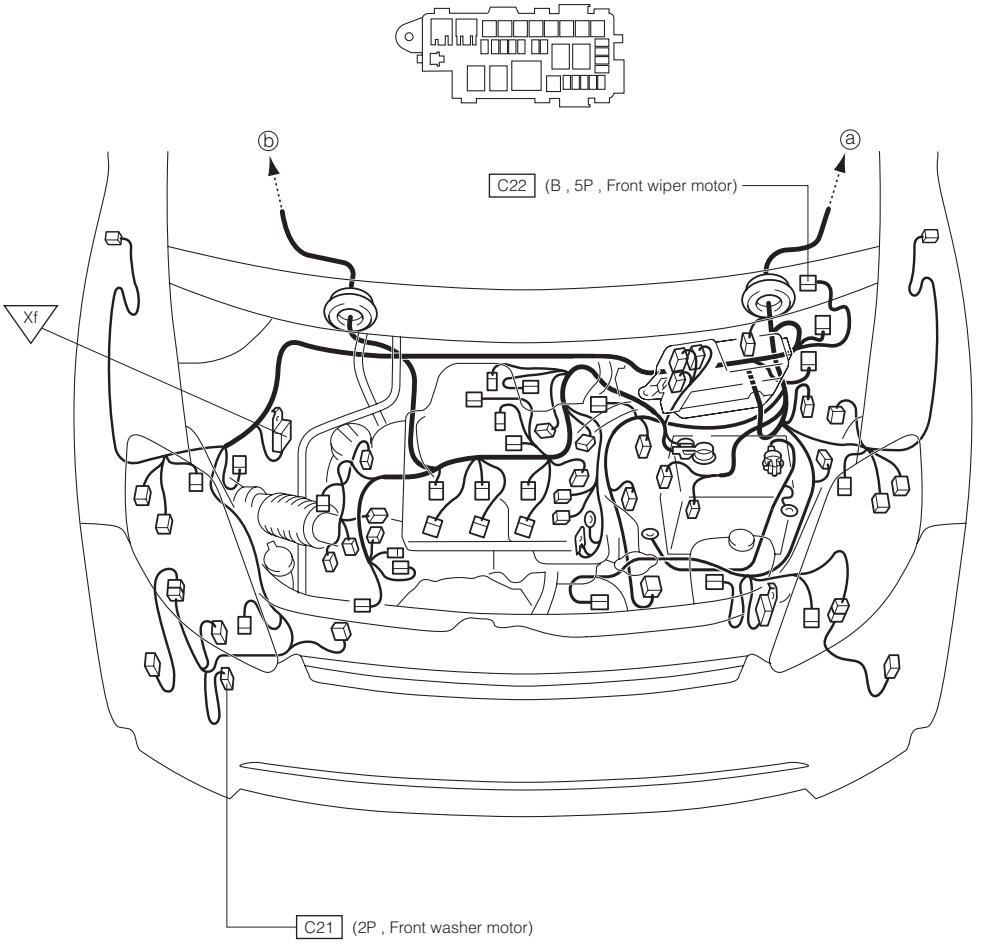




T11Q5163ES48

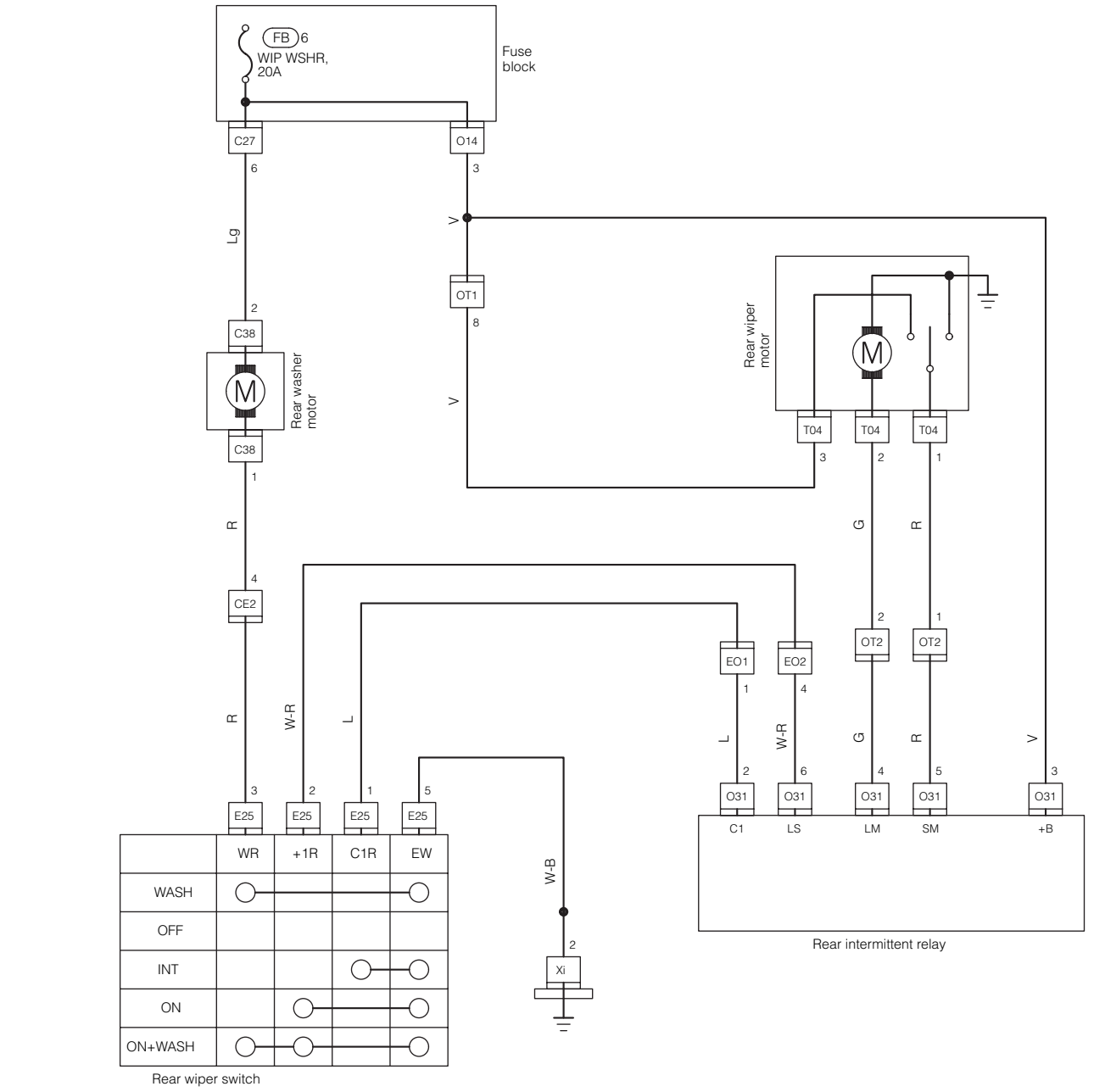
(MEMO)

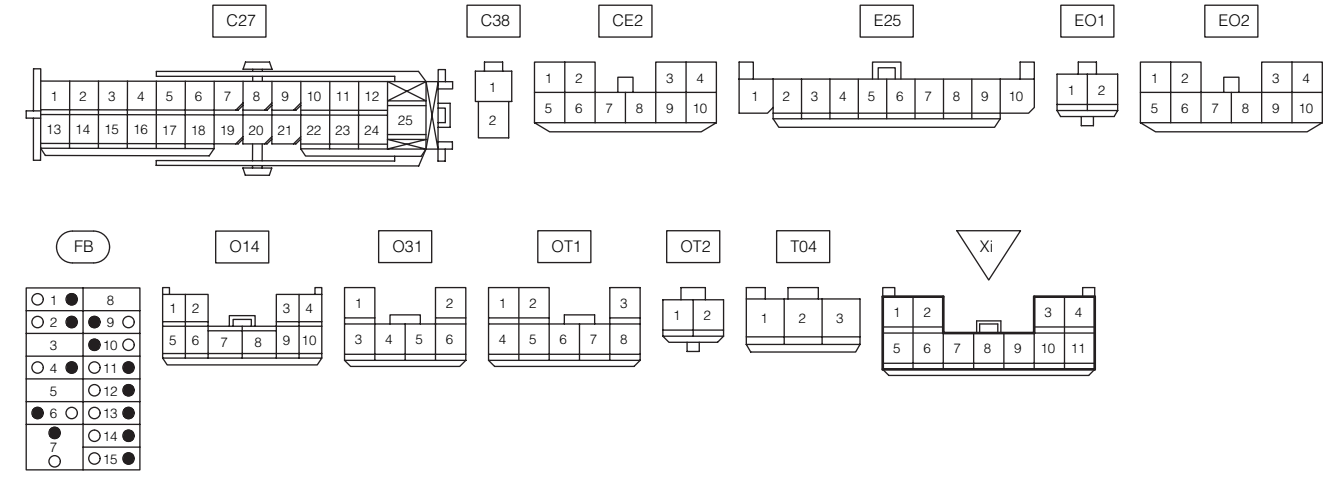

G36 (10P , Fuse block)
FB (Fuse block)
a
b
c
d
e
f
g
h
i
Xi
G25 (B , 10P , Front wiper switch)
CG2 (GR , 10P , W to W)
C27 (25P , Fuse block)


ⓑ
ⓐ
C22 (B , 5P , Front wiper motor)
Xf
C21 (2P , Front washer motor)

24 REAR WIPER & WASHER

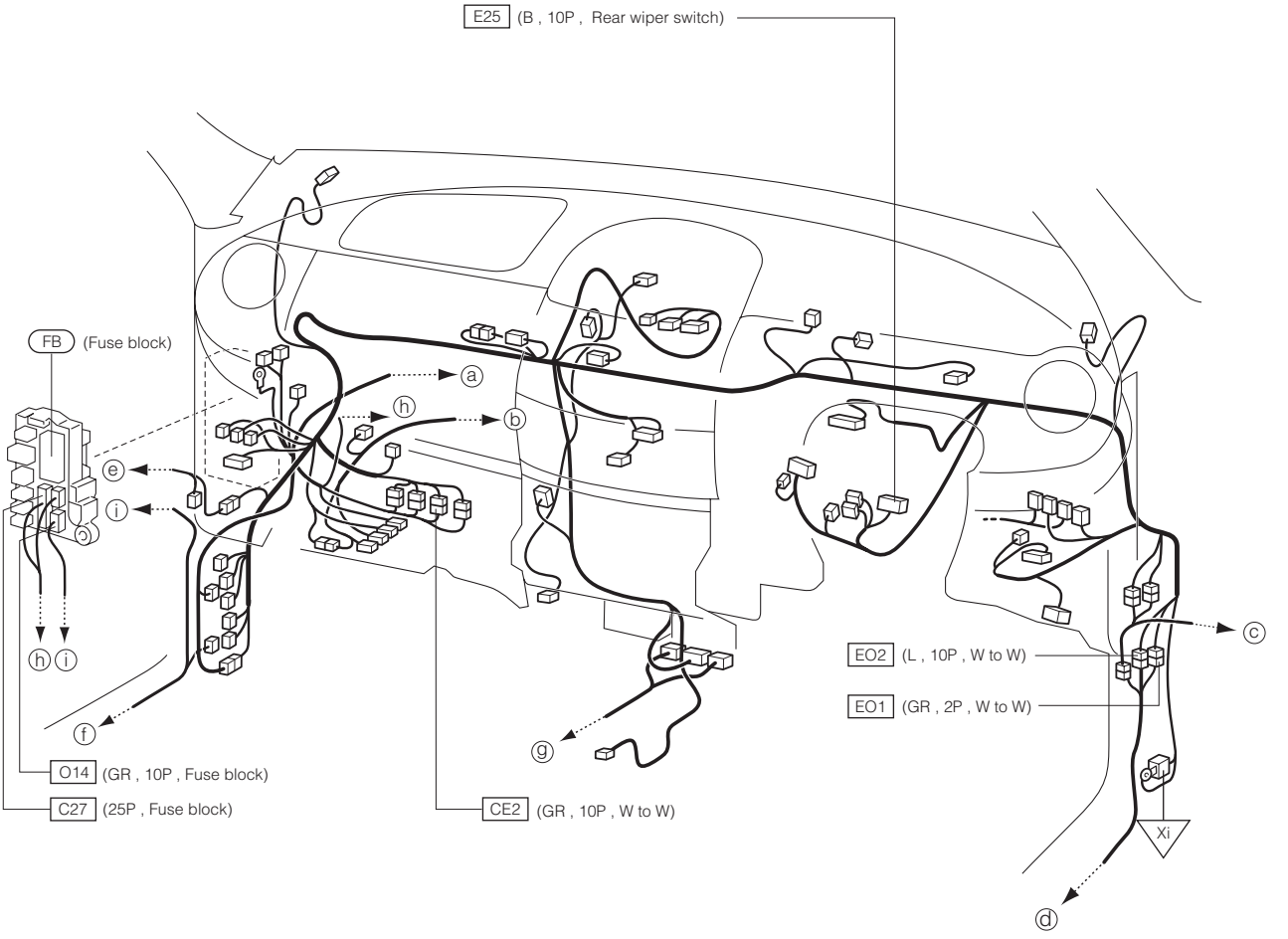
24-1 RHD VEHICLE(WITH INT SYSTEM)

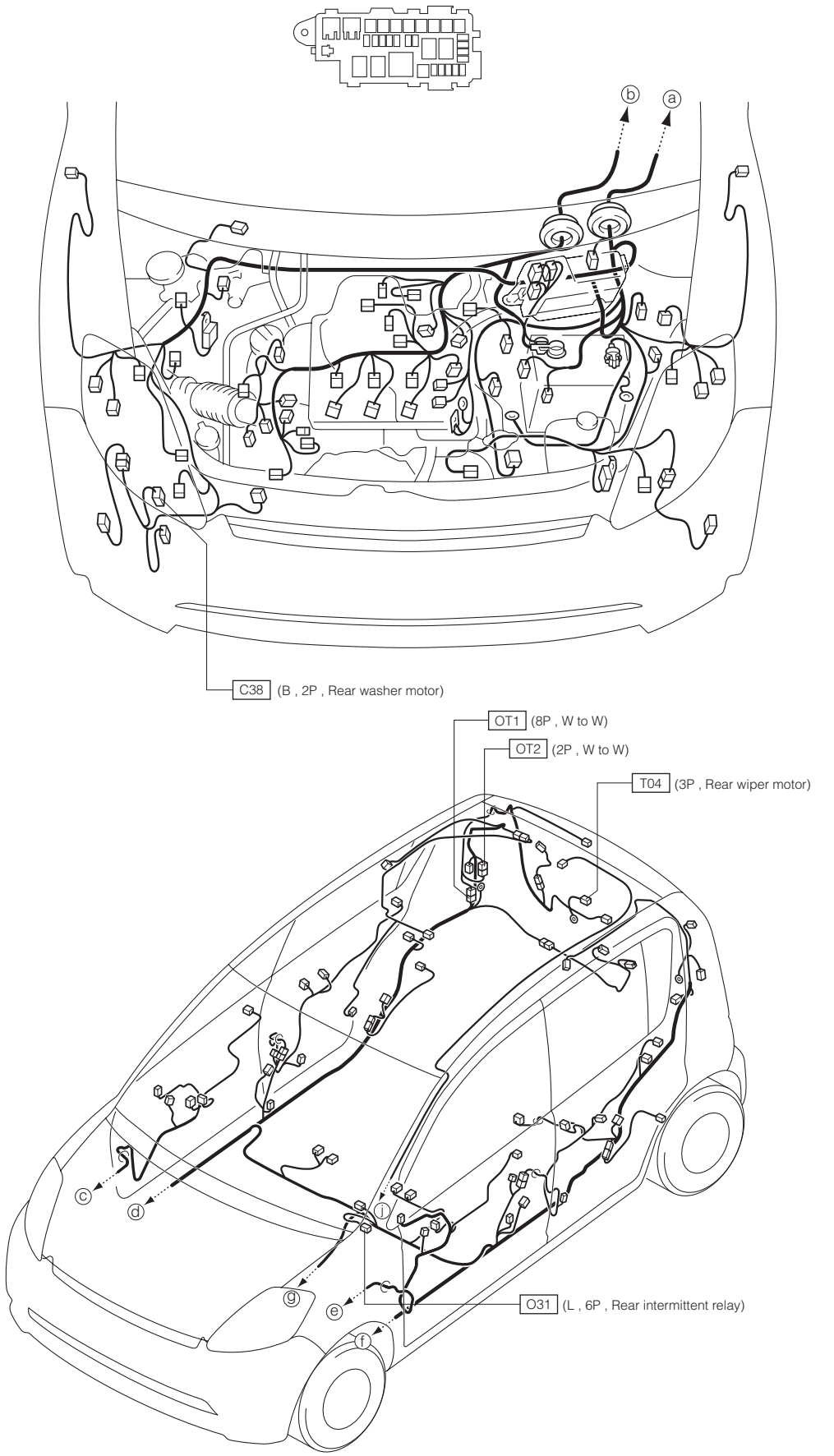




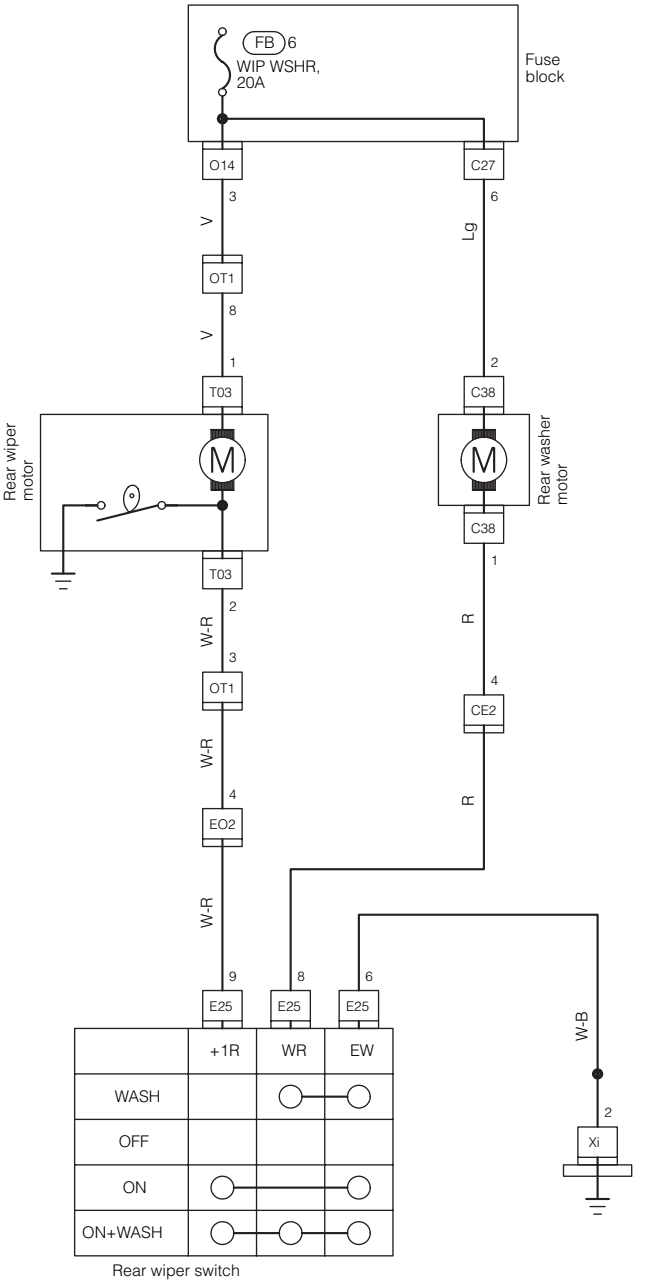
T11Q5228ES48

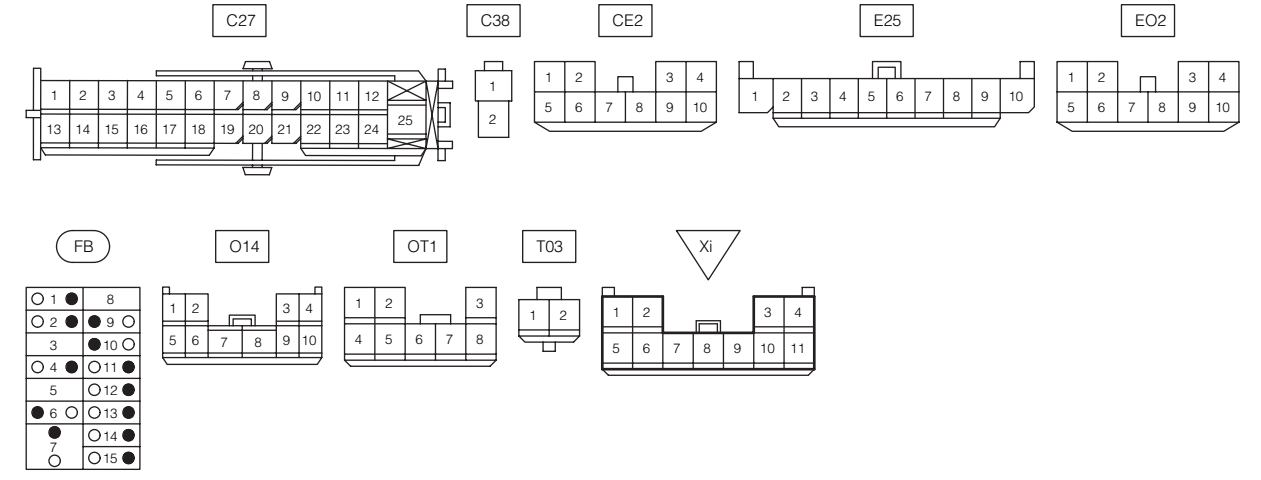
(MEMO)


E25 (B , 10P , Rear wiper switch)
FB (Fuse block)
a
b
c
d
e
f
g
h
i
EO2 (L , 10P , W to W)
EO1 (GR , 2P , W to W)
O14 (GR , 10P , Fuse block)
C27 (25P , Fuse block)
CE2 (GR , 10P , W to W)
Xi


b
a
C38 (B , 2P , Rear washer motor)
OT1 (8P , W to W)
OT2 (2P , W to W)
T04 (3P , Rear wiper motor)
c
d
i
g
e
f
O31 (L , 6P , Rear intermittent relay)

24-2 RHD VEHICLE(WITHOUT INT SYSTEM)





T11Q5216ES48

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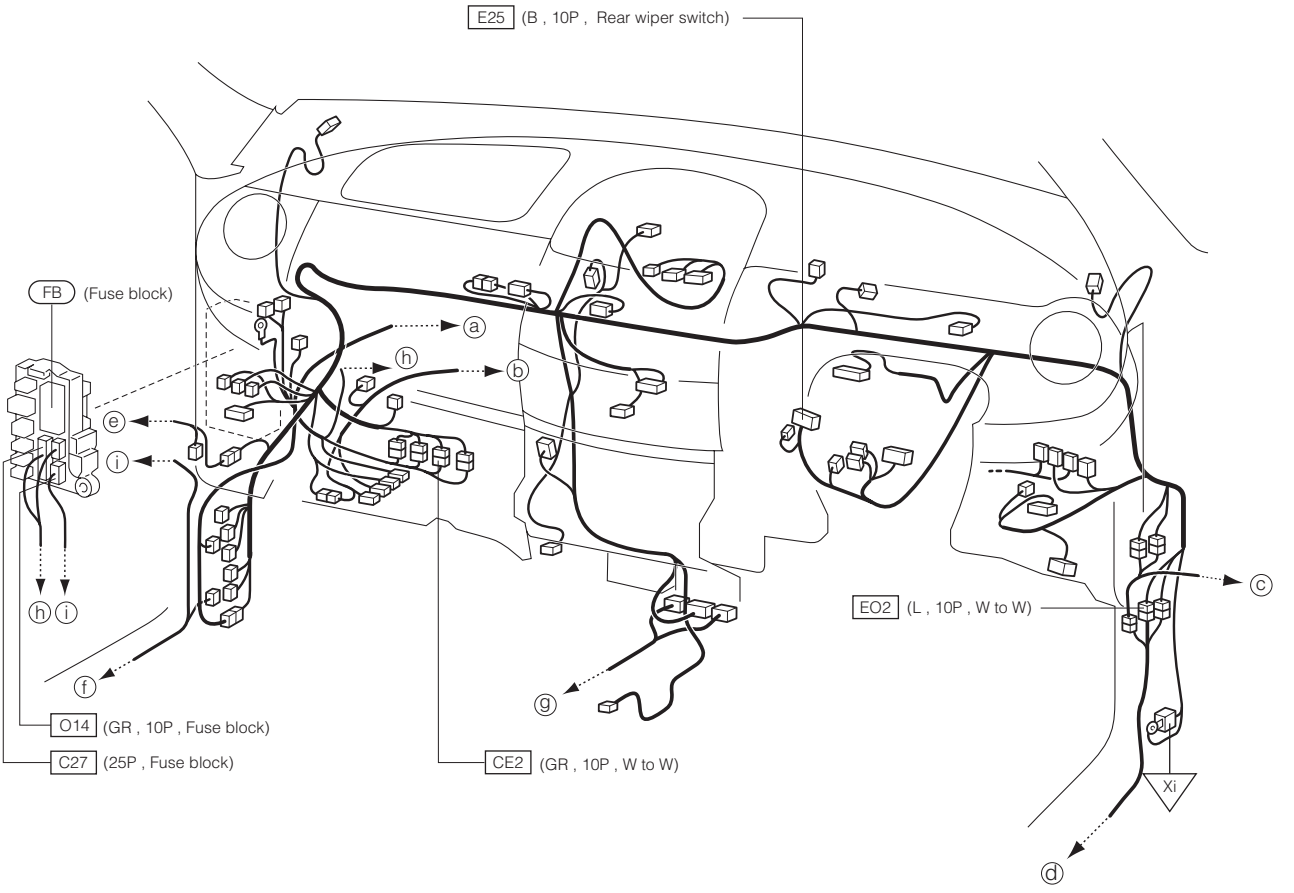
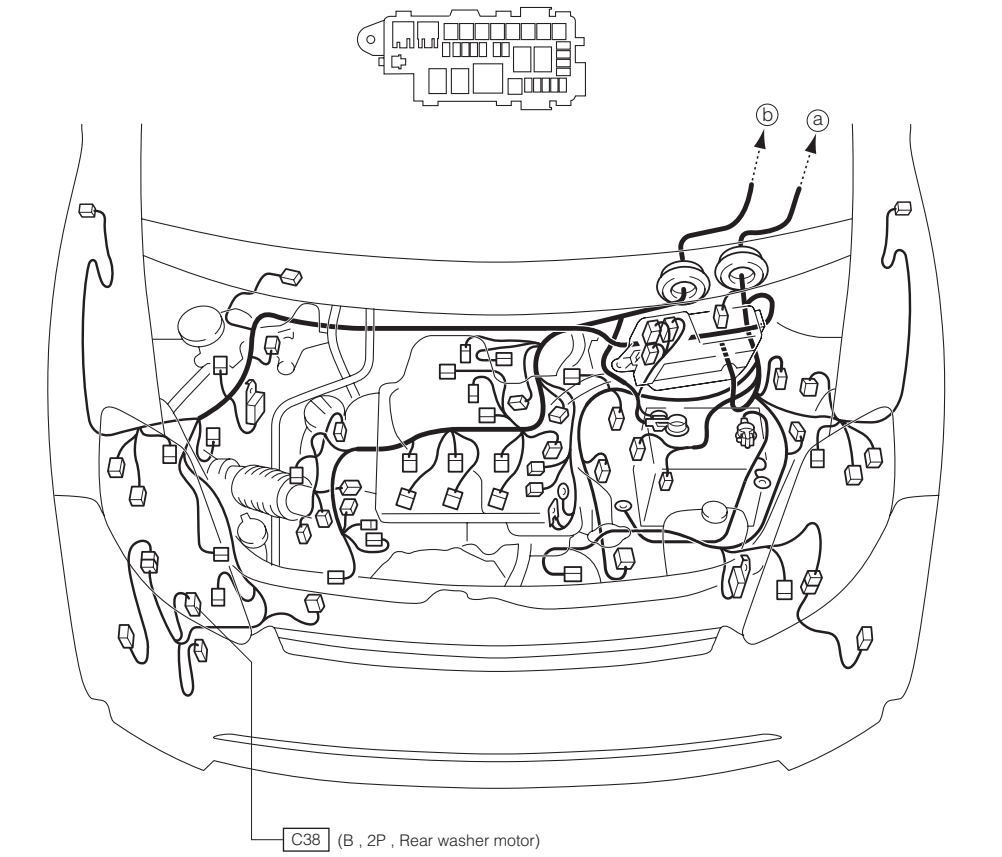
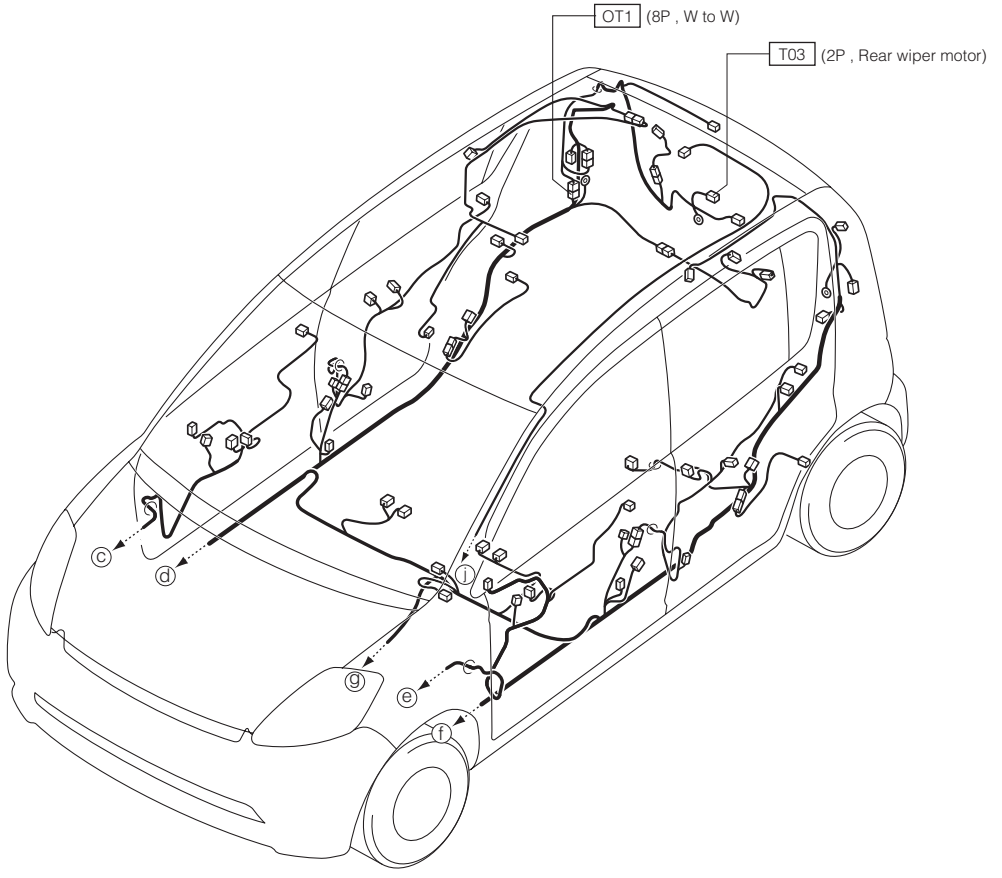
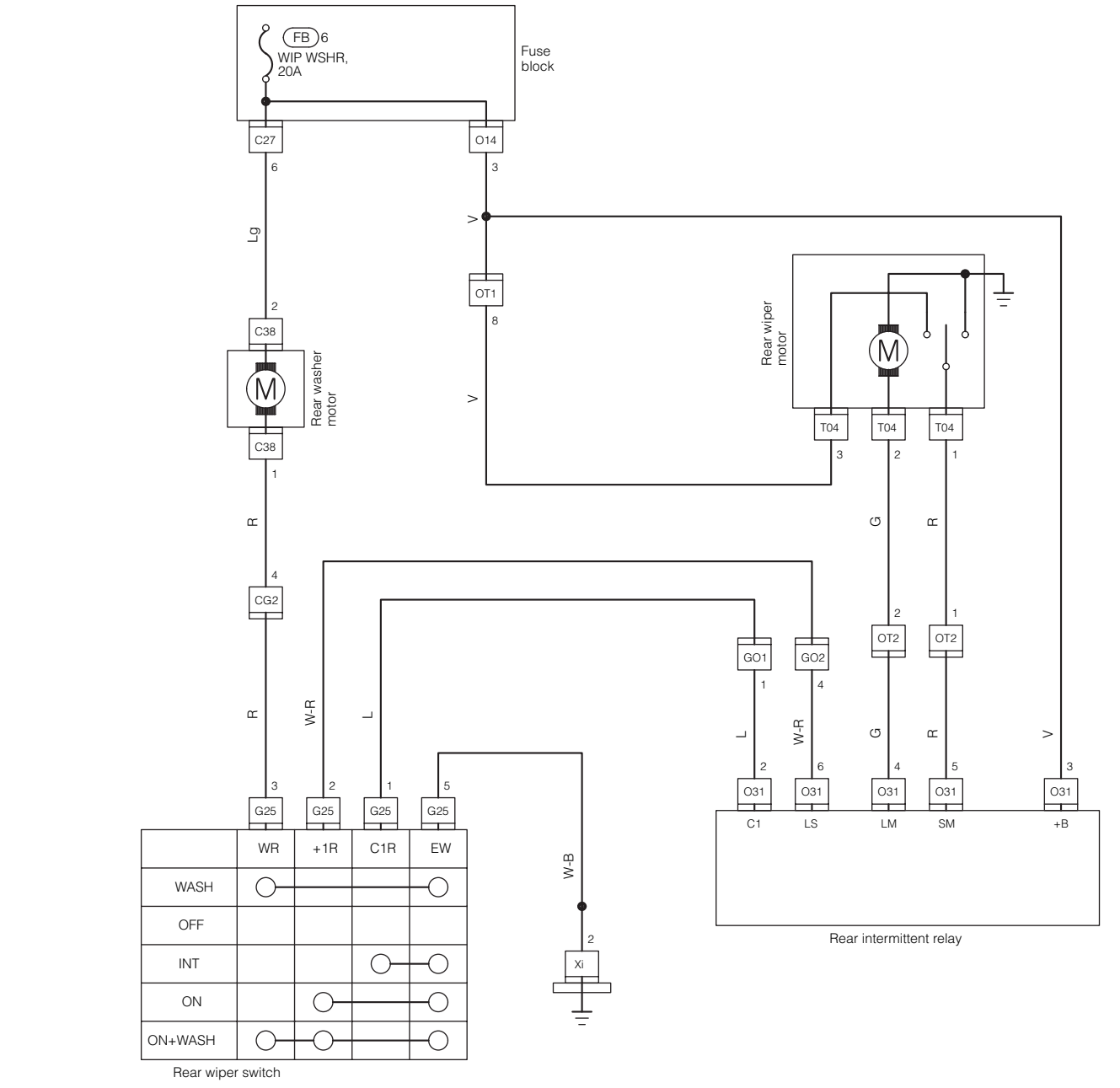

E25 (B , 10P , Rear wiper switch)
FB (Fuse block)
a
h
b
e
i
h i
f
g
c
EO2 (L , 10P , W to W)
O14 (GR , 10P , Fuse block)
C27 (25P , Fuse block)
CE2 (GR , 10P , W to W)
Xi
d

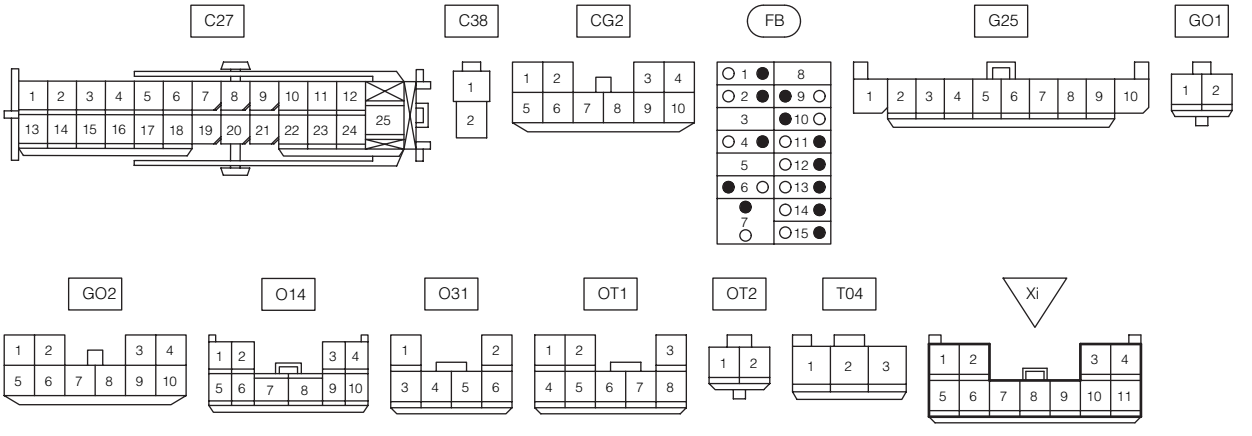




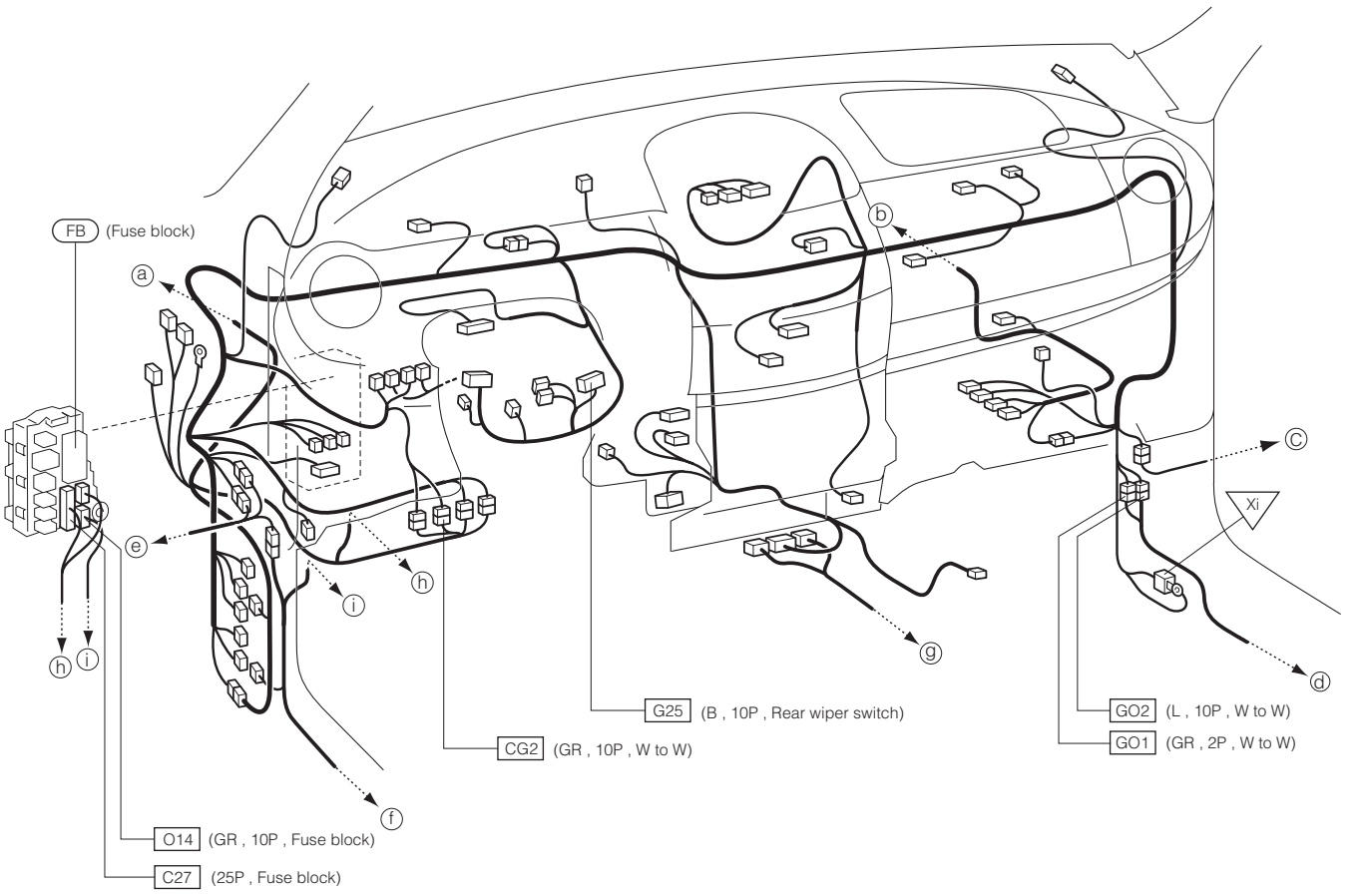
T11Q5098ES48

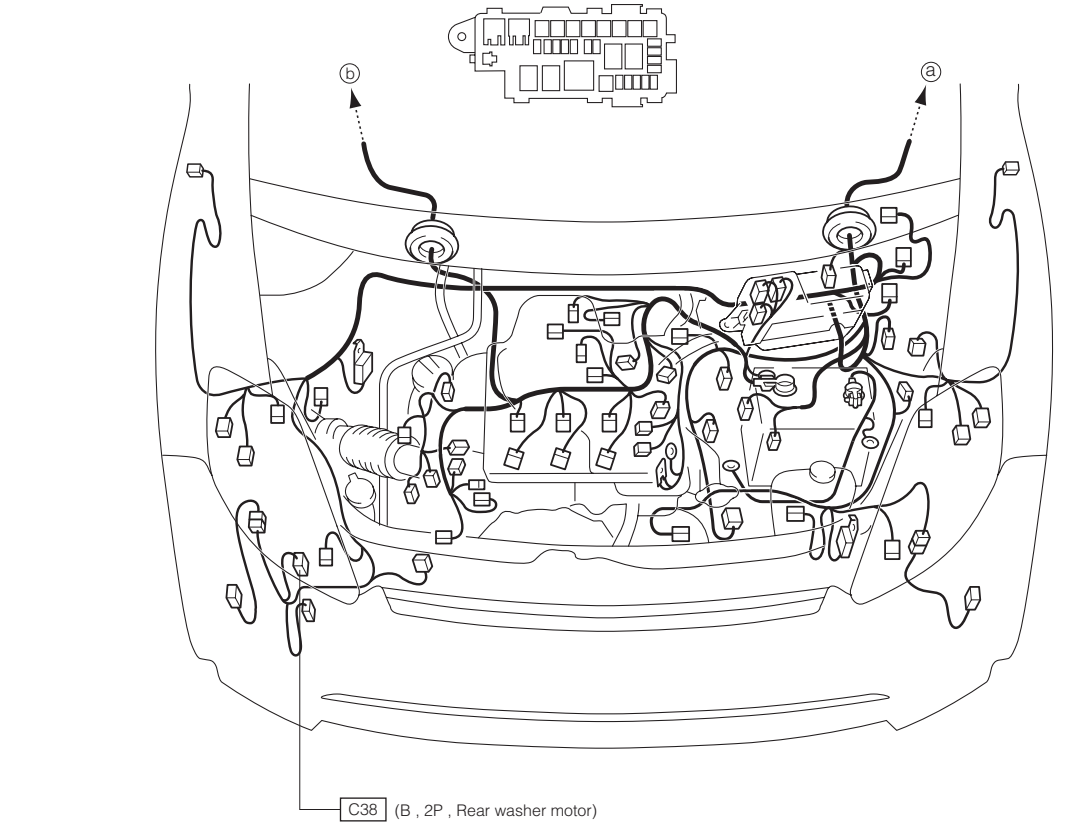
24-3 LHD VEHICLE(WITH INT SYSTEM)

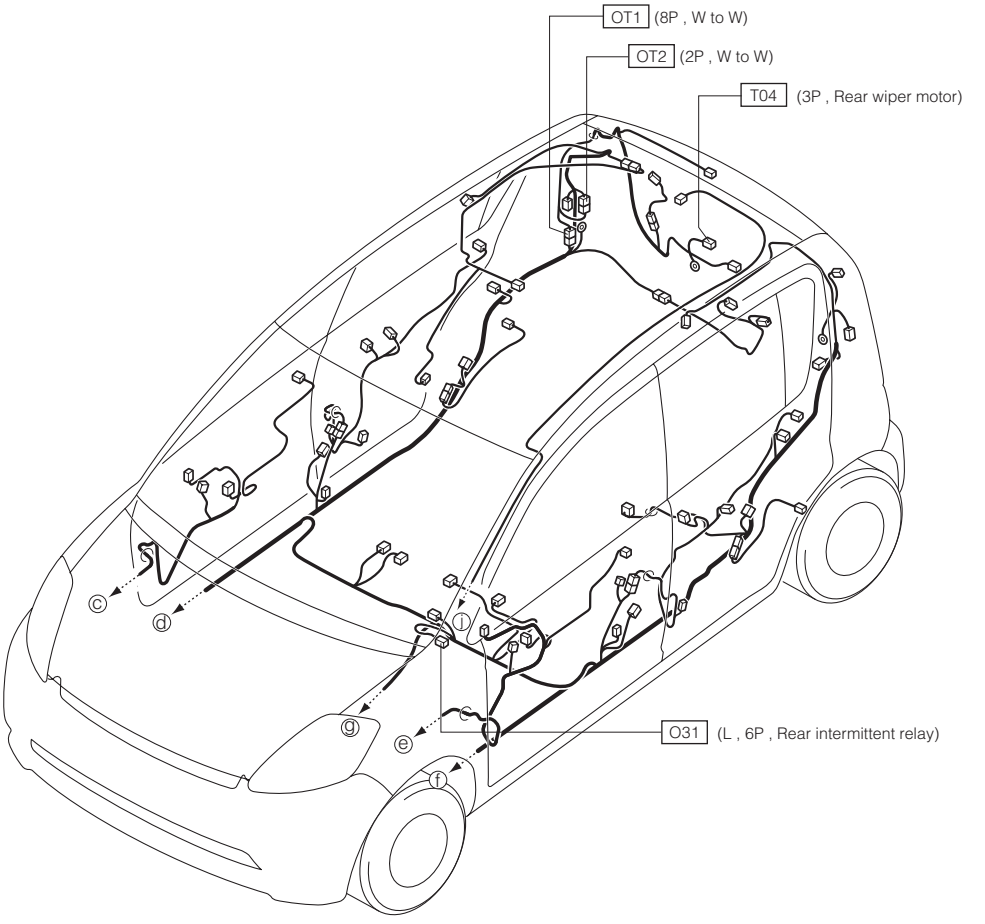




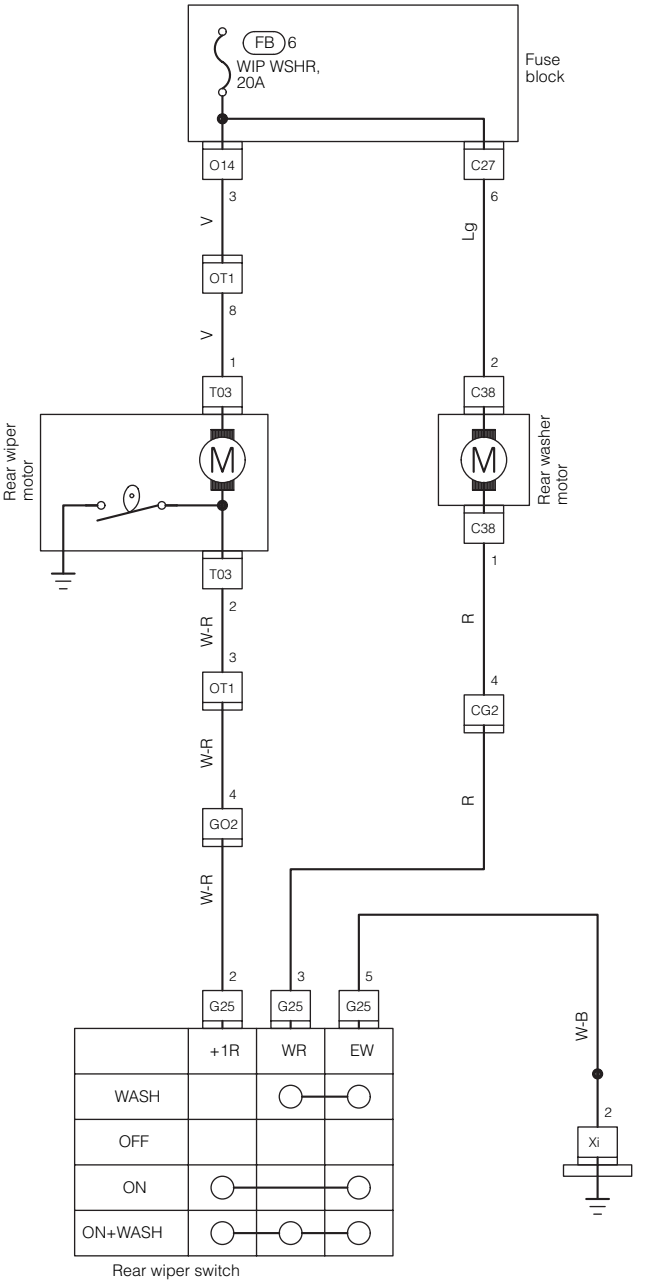
(MEMO)

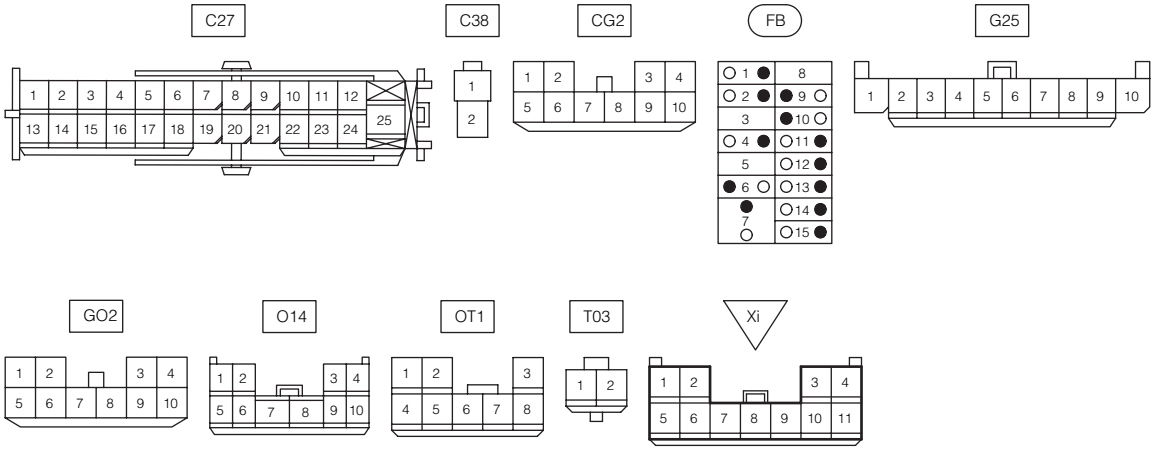

FB (Fuse block)
a
b
c
d
e
f
g
h
i
Xi
G25 (B , 10P , Rear wiper switch)
CG2 (GR , 10P , W to W)
GO2 (L , 10P , W to W)
GO1 (GR , 2P , W to W)
O14 (GR , 10P , Fuse block)
C27 (25P , Fuse block)


ⓑ
ⓐ
C38 (B , 2P , Rear washer motor)


OT1 (8P , W to W)
OT2 (2P , W to W)
T04 (3P , Rear wiper motor)
ⓒ
ⓓ
ⓖ
ⓔ
ⓕ
O31 (L , 6P , Rear intermittent relay)

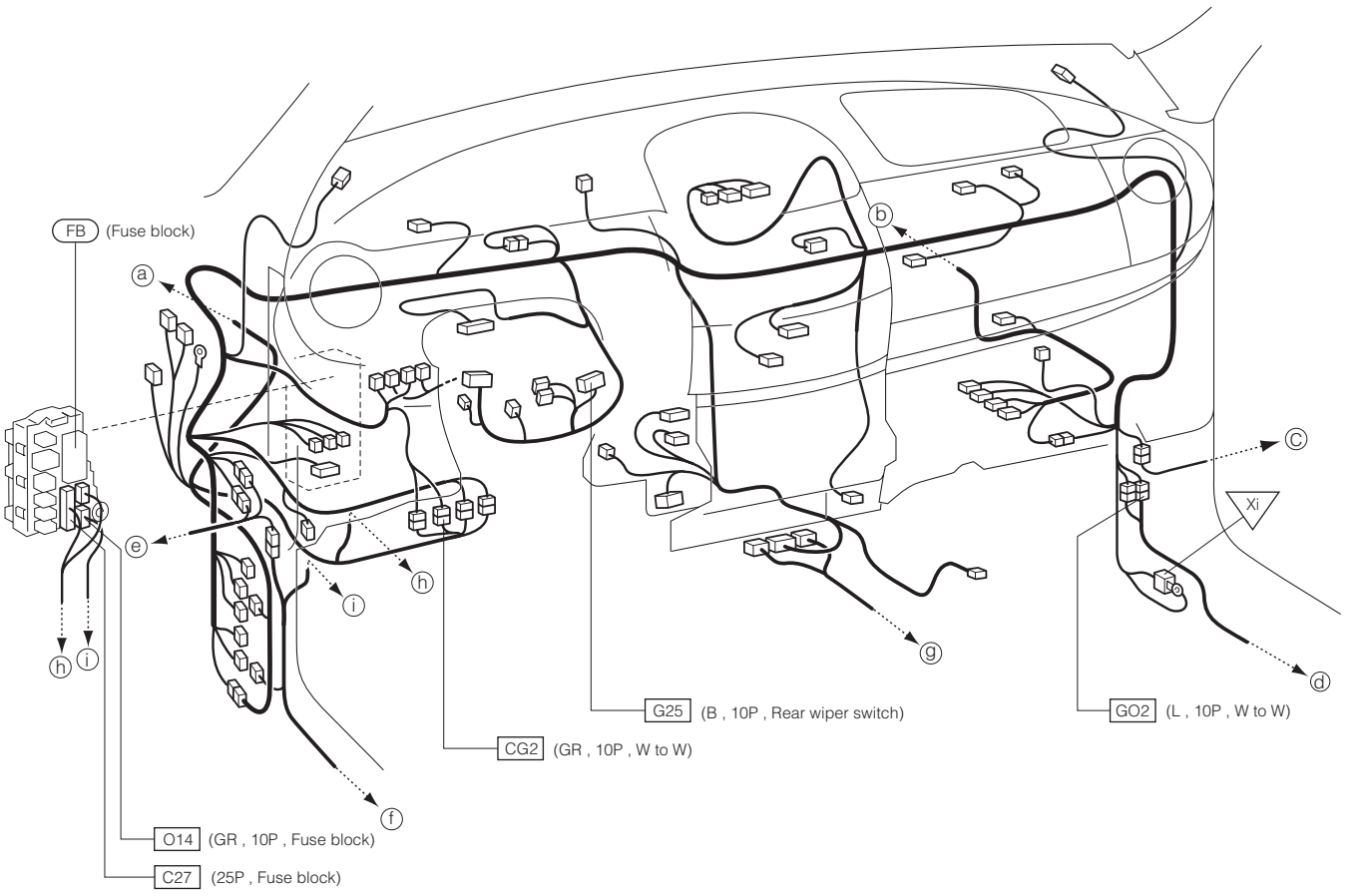
24-4 LHD VEHICLE(WITHOUT INT SYSTEM)

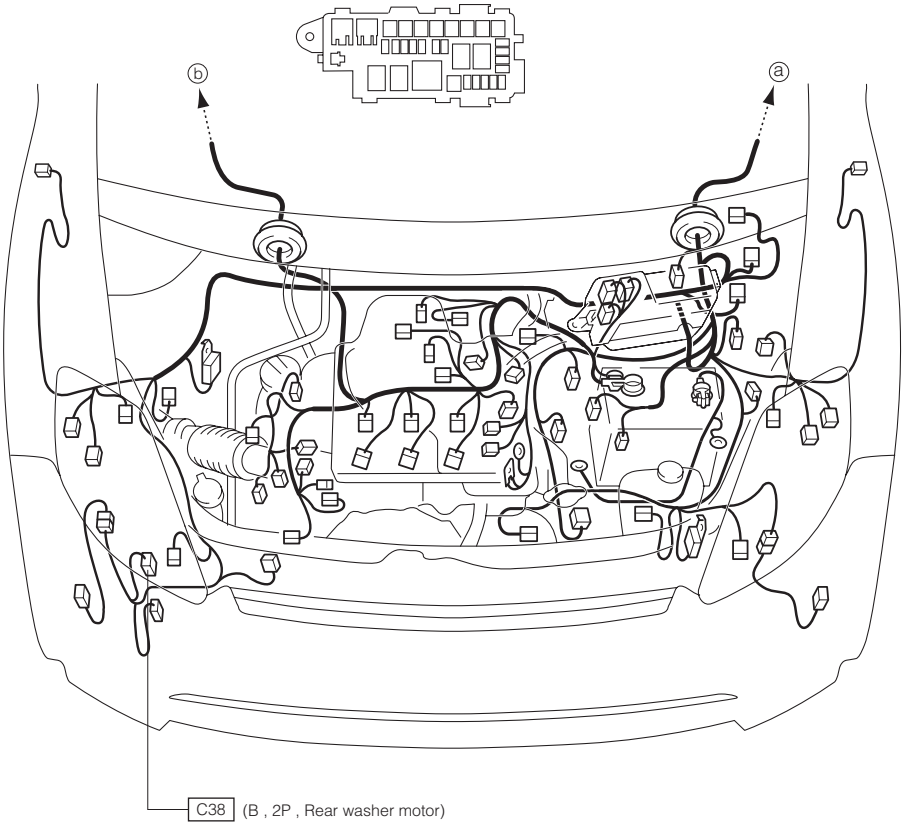


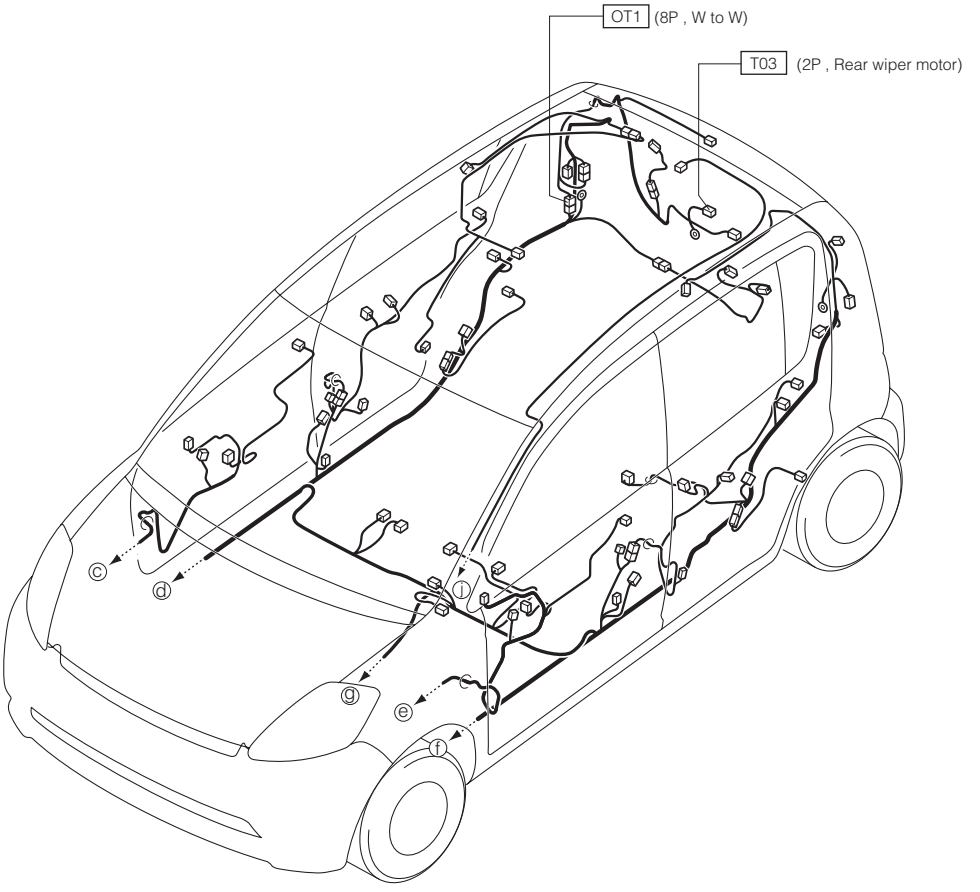


T11Q5164ES48

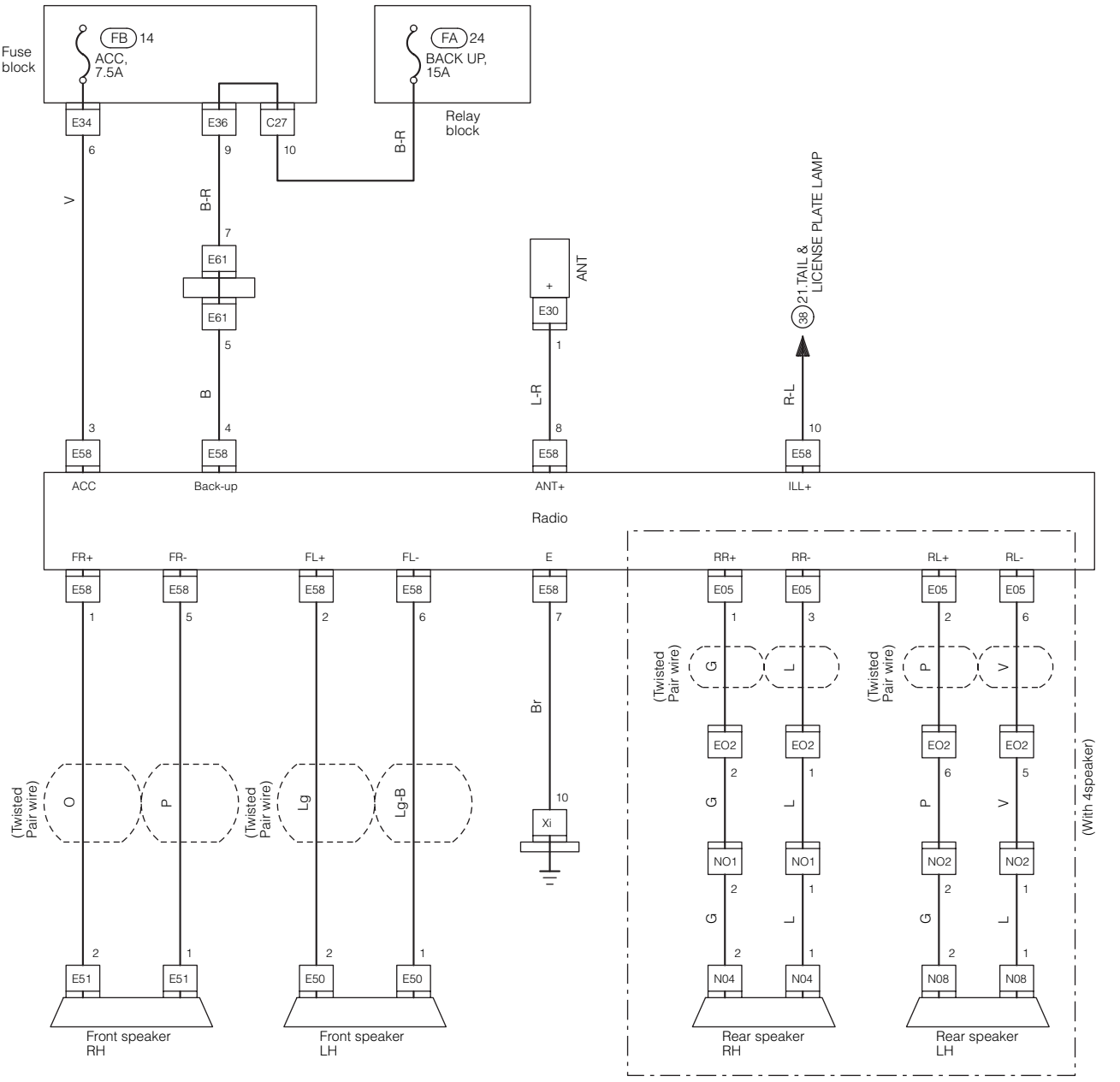
(MEMO)

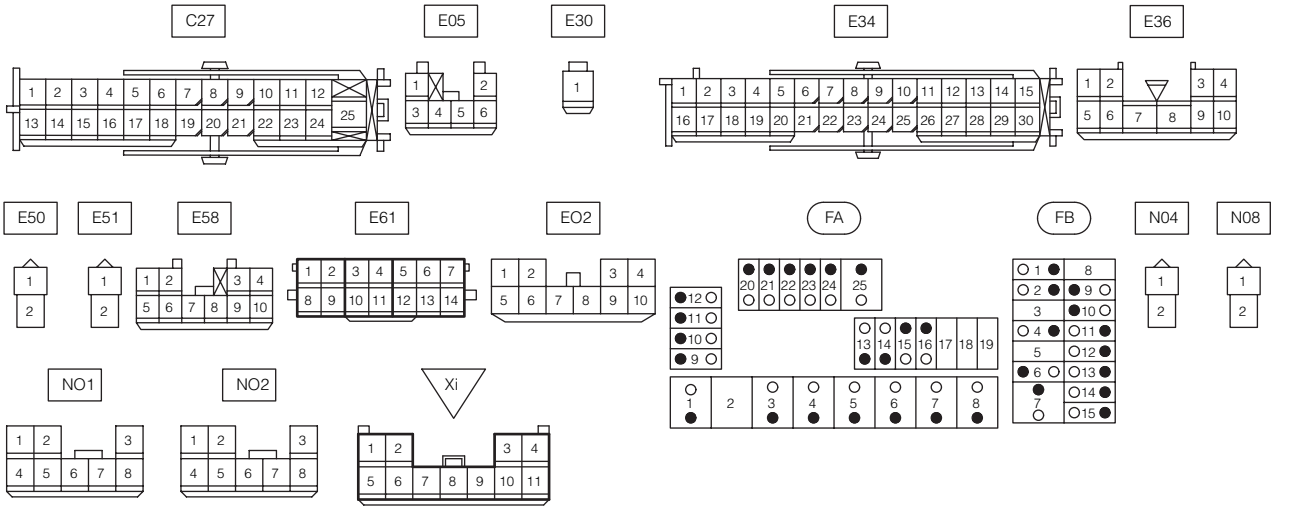

FB (Fuse block)
a
b
c
d
e
f
g
h
i
Xi
G25 (B , 10P , Rear wiper switch)
GO2 (L , 10P , W to W)
CG2 (GR , 10P , W to W)
O14 (GR , 10P , Fuse block)
C27 (25P , Fuse block)


b
a
C38 (B , 2P , Rear washer motor)


OT1 (8P , W to W)
T03 (2P , Rear wiper motor)
c
d
g
e
f

25 RADIO
25-1 RHD VEHICLE





T11Q5217ES48

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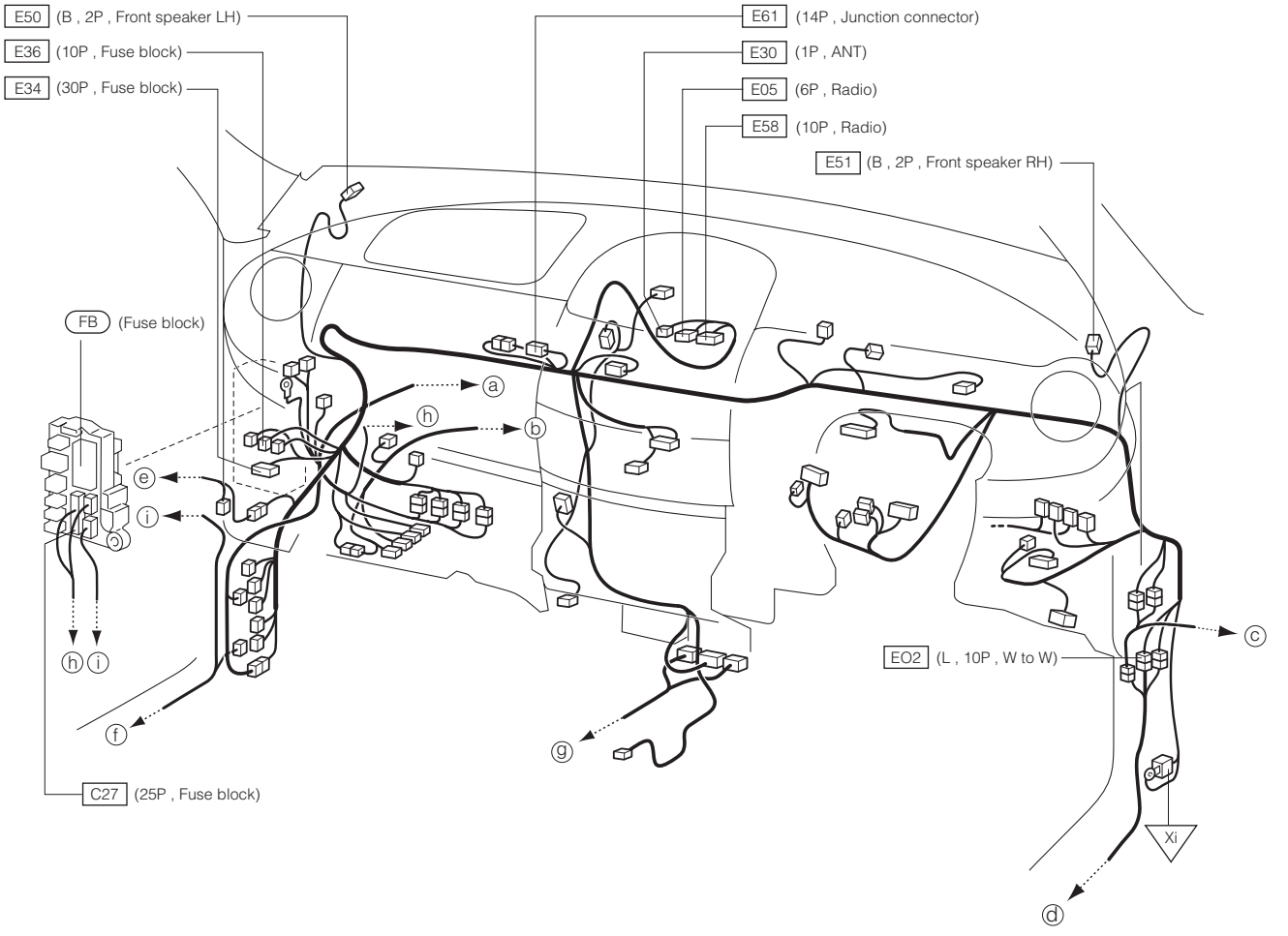
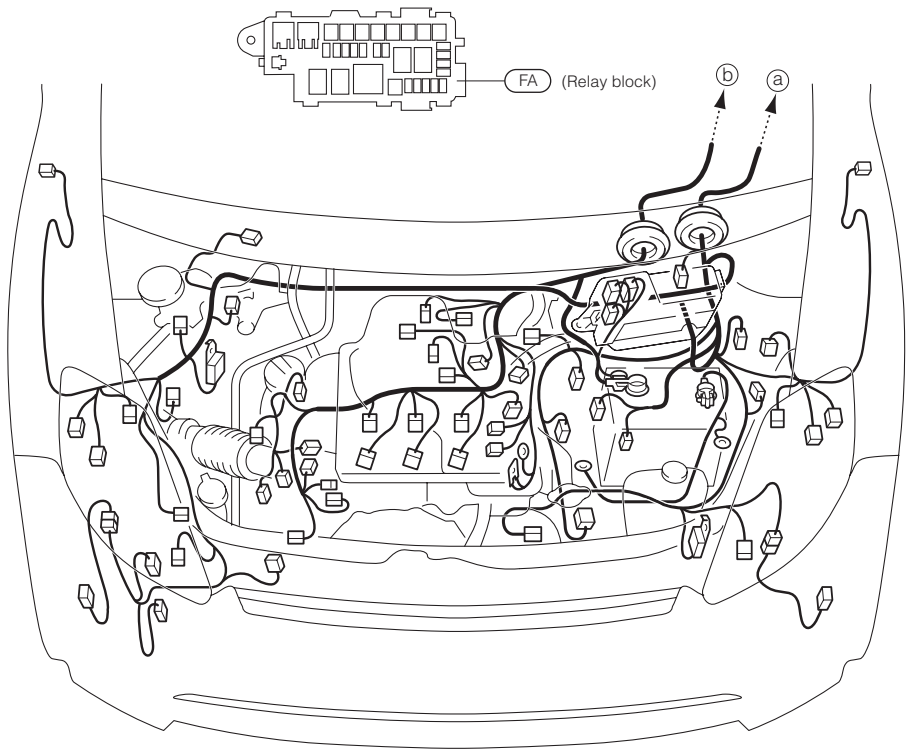
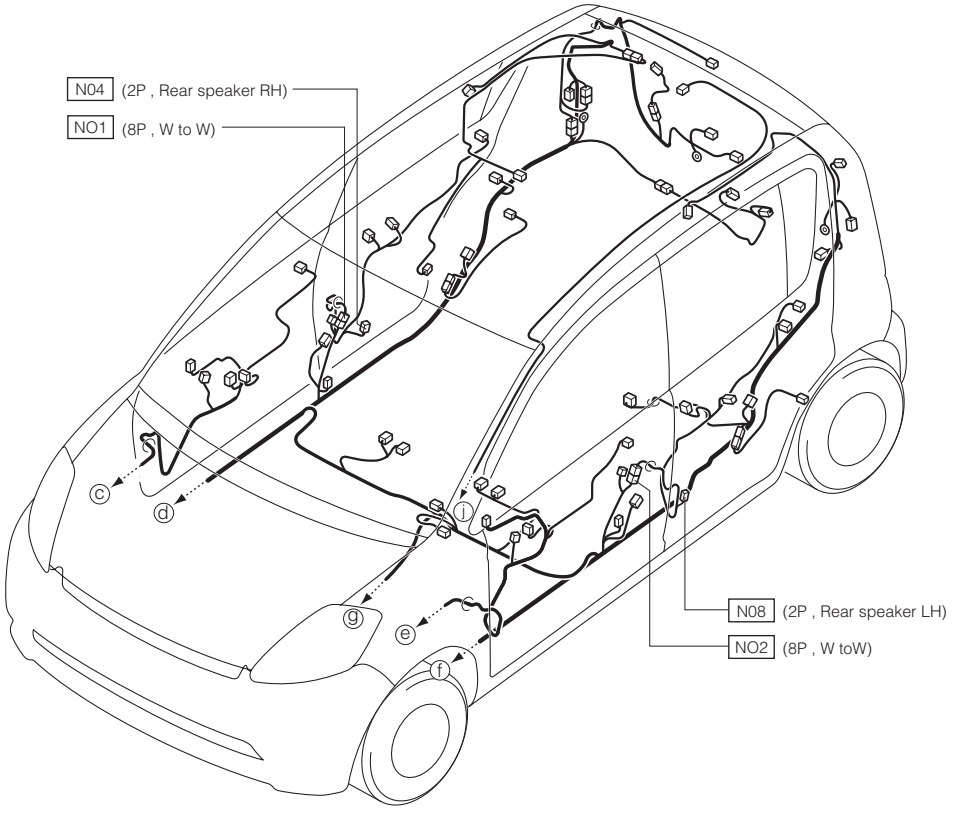
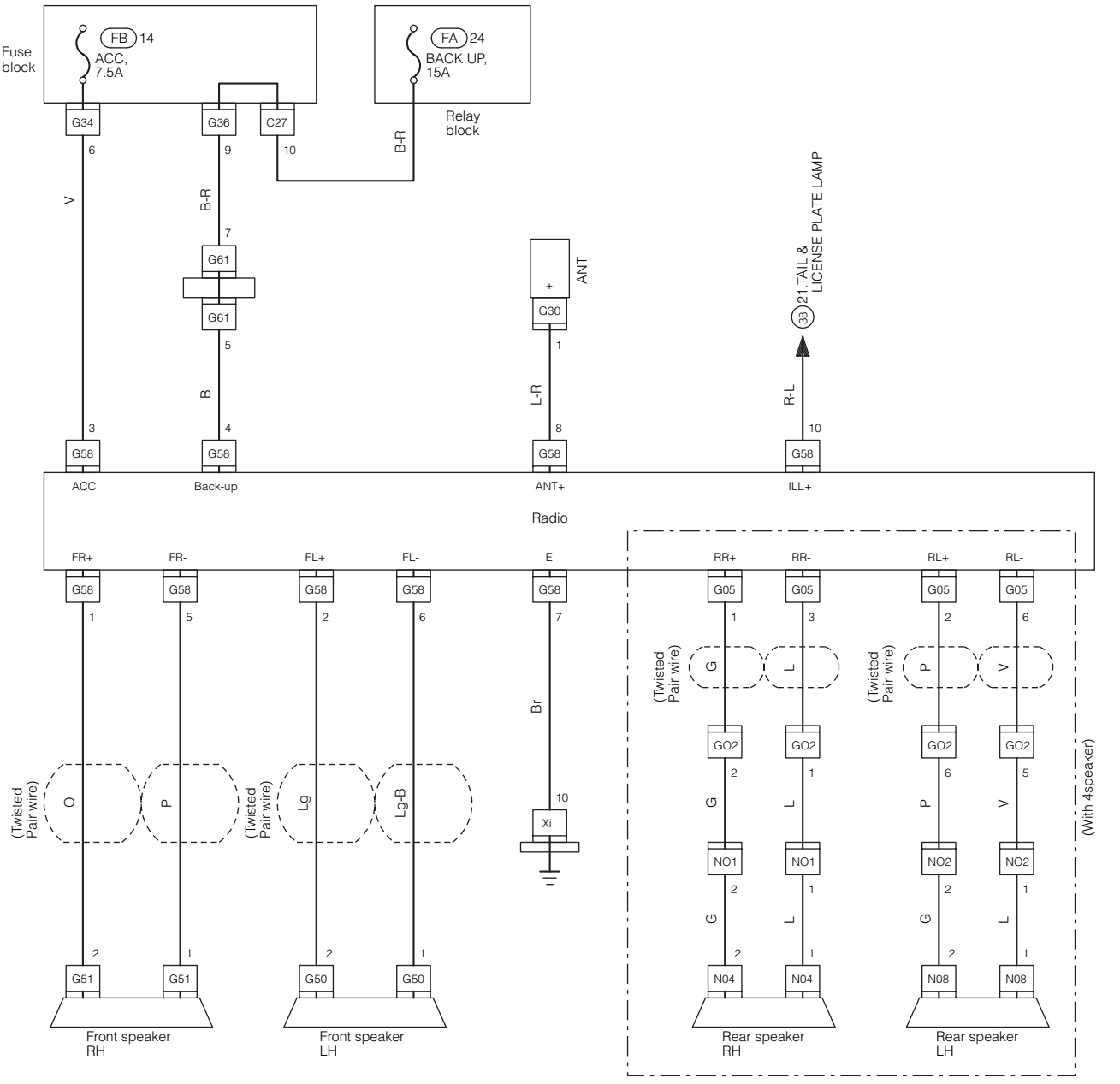

E50 (B , 2P , Front speaker LH)
E36 (10P , Fuse block)
E34 (30P , Fuse block)
E61 (14P , Junction connector)
E30 (1P , ANT)
E05 (6P , Radio)
E58 (10P , Radio)
E51 (B , 2P , Front speaker RH)
FB (Fuse block)
EO2 (L , 10P , W to W)
C27 (25P , Fuse block)
Xi
a
b
c
d
e
f
g
h
i

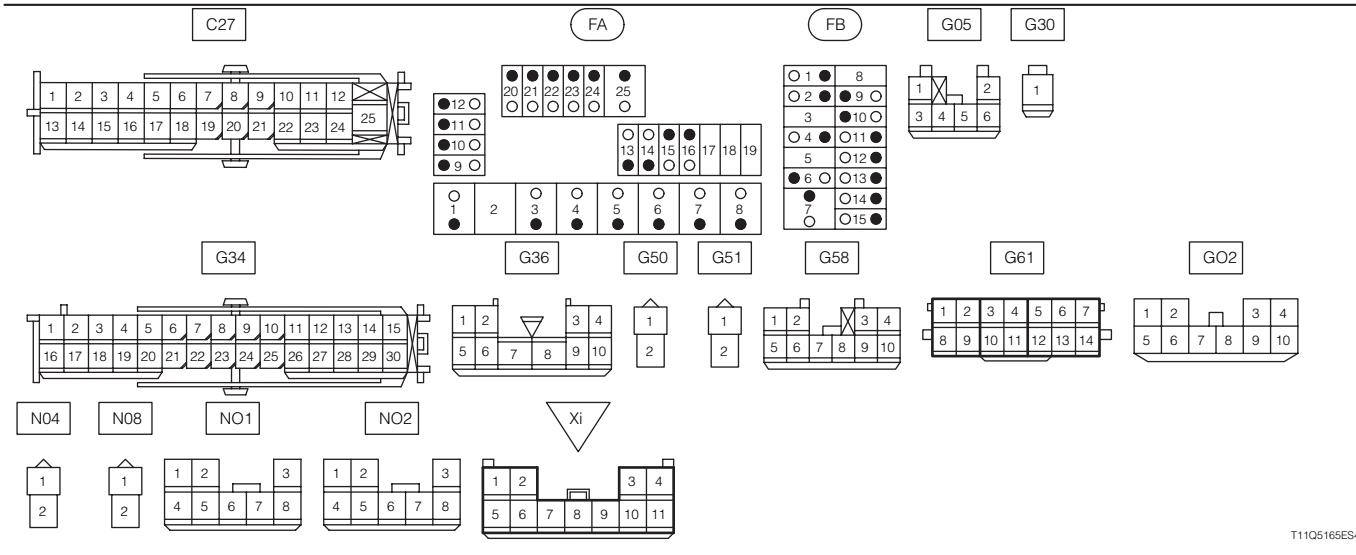




T11Q5102ES48

25-2 LHD VEHICLE





T11Q5165ES48

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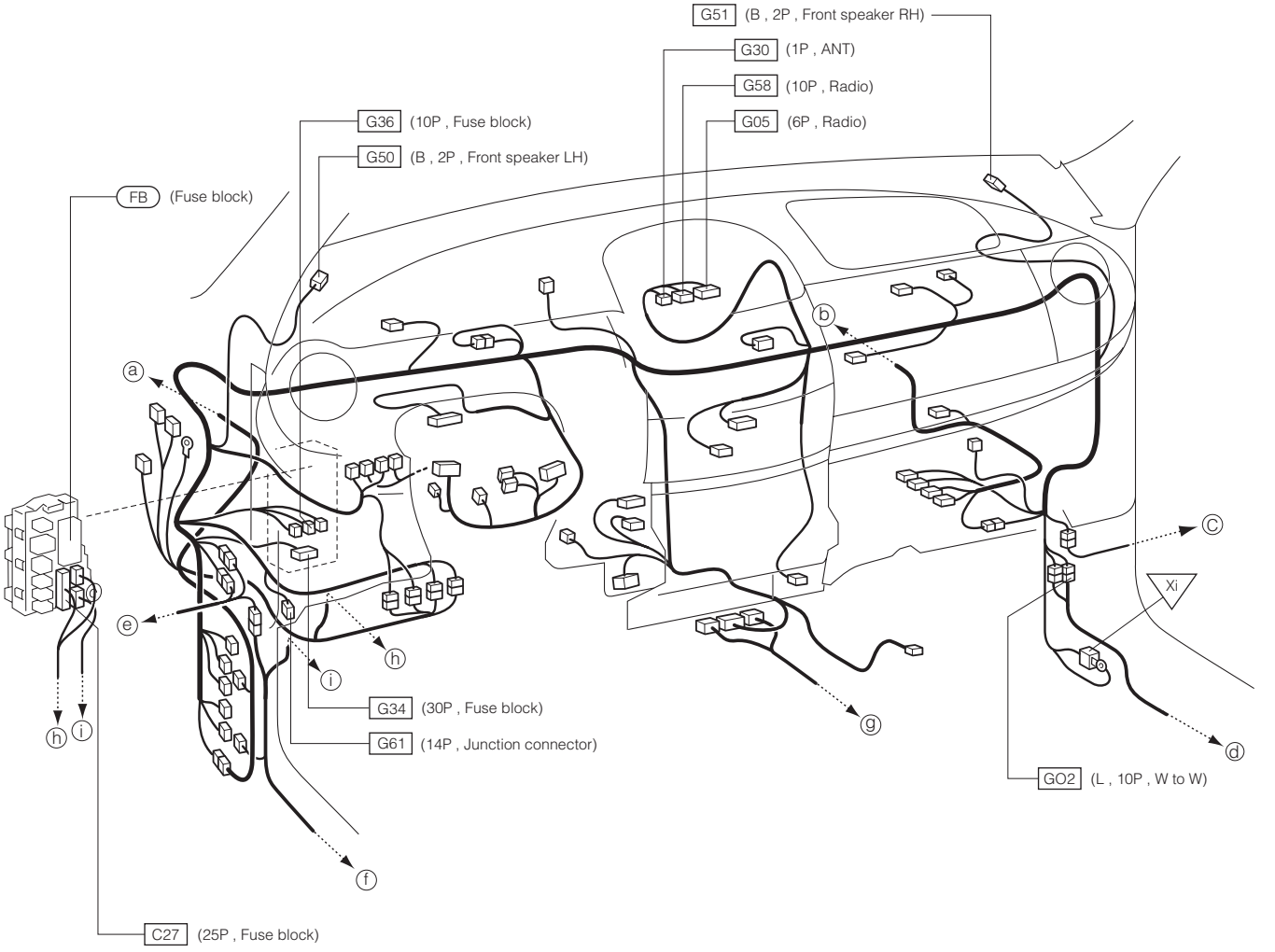
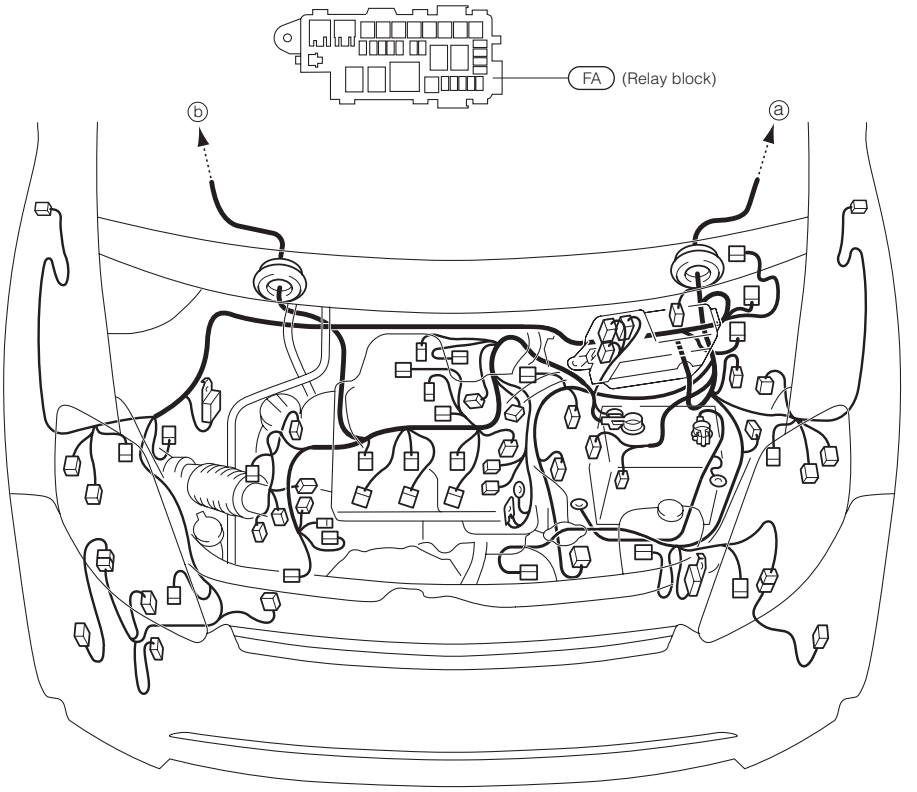
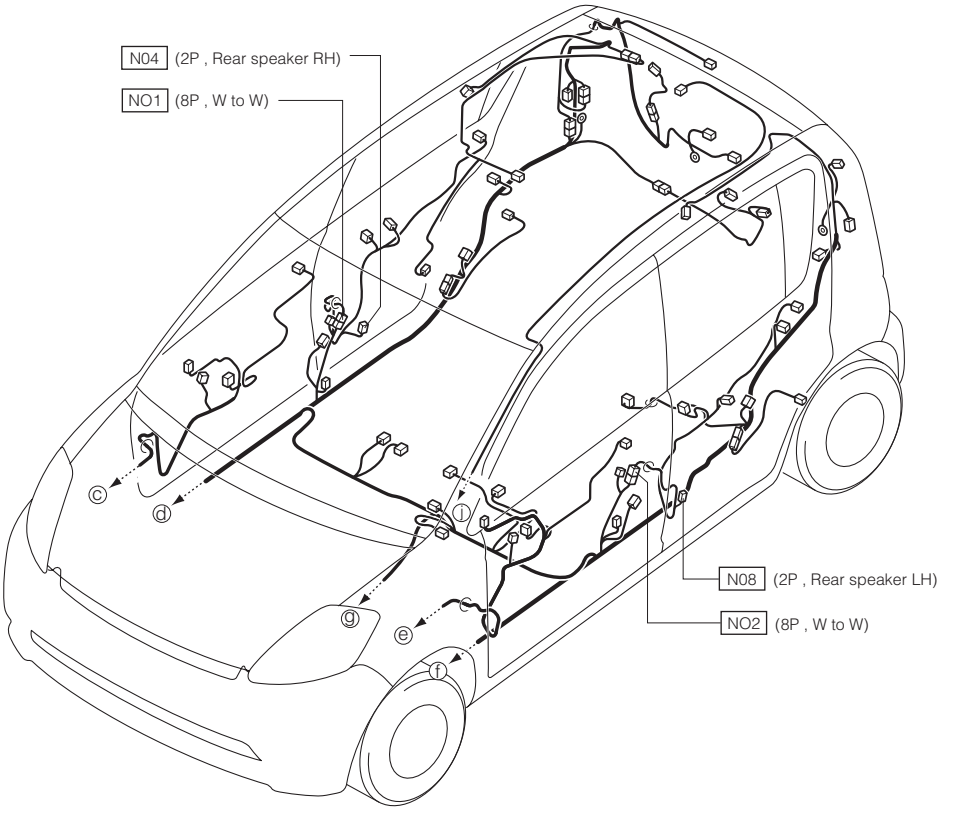


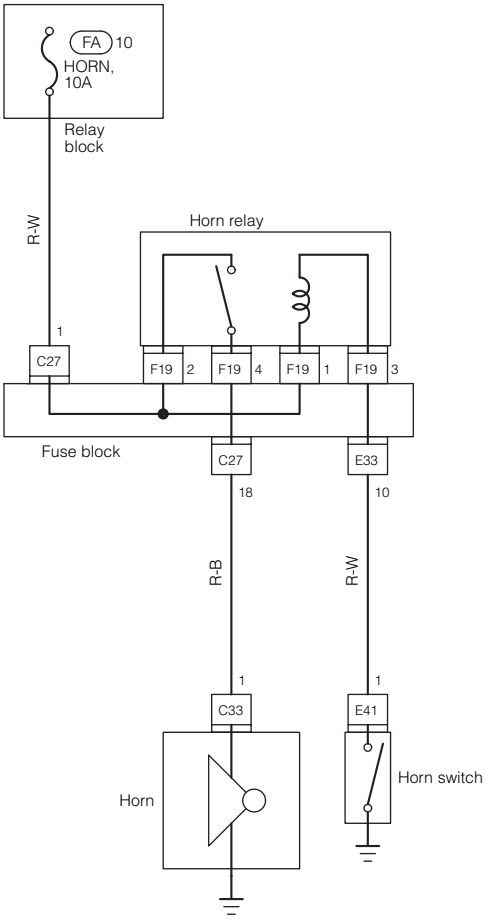
T11Q5103ES48

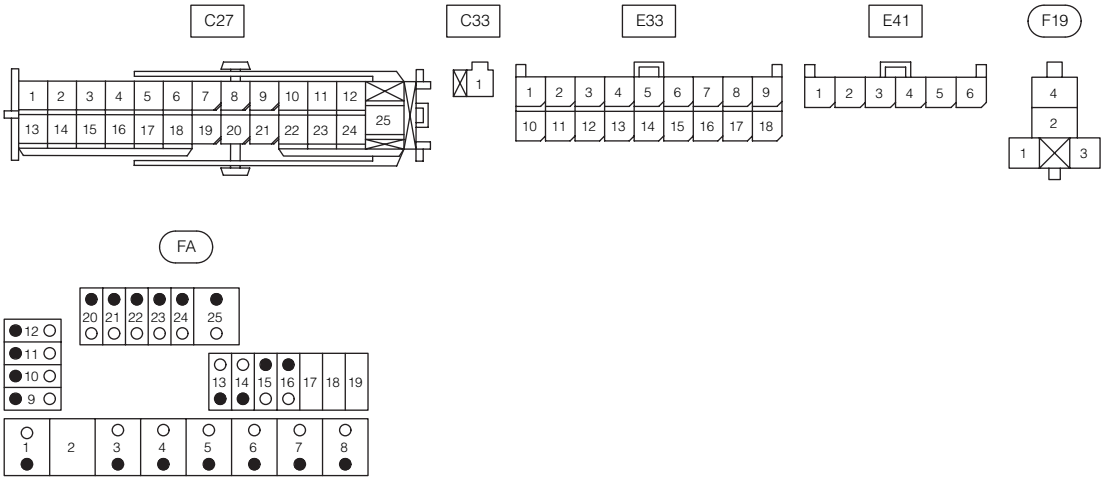




T11Q5101ES48

26 HORN
26-1 RHD VEHICLE





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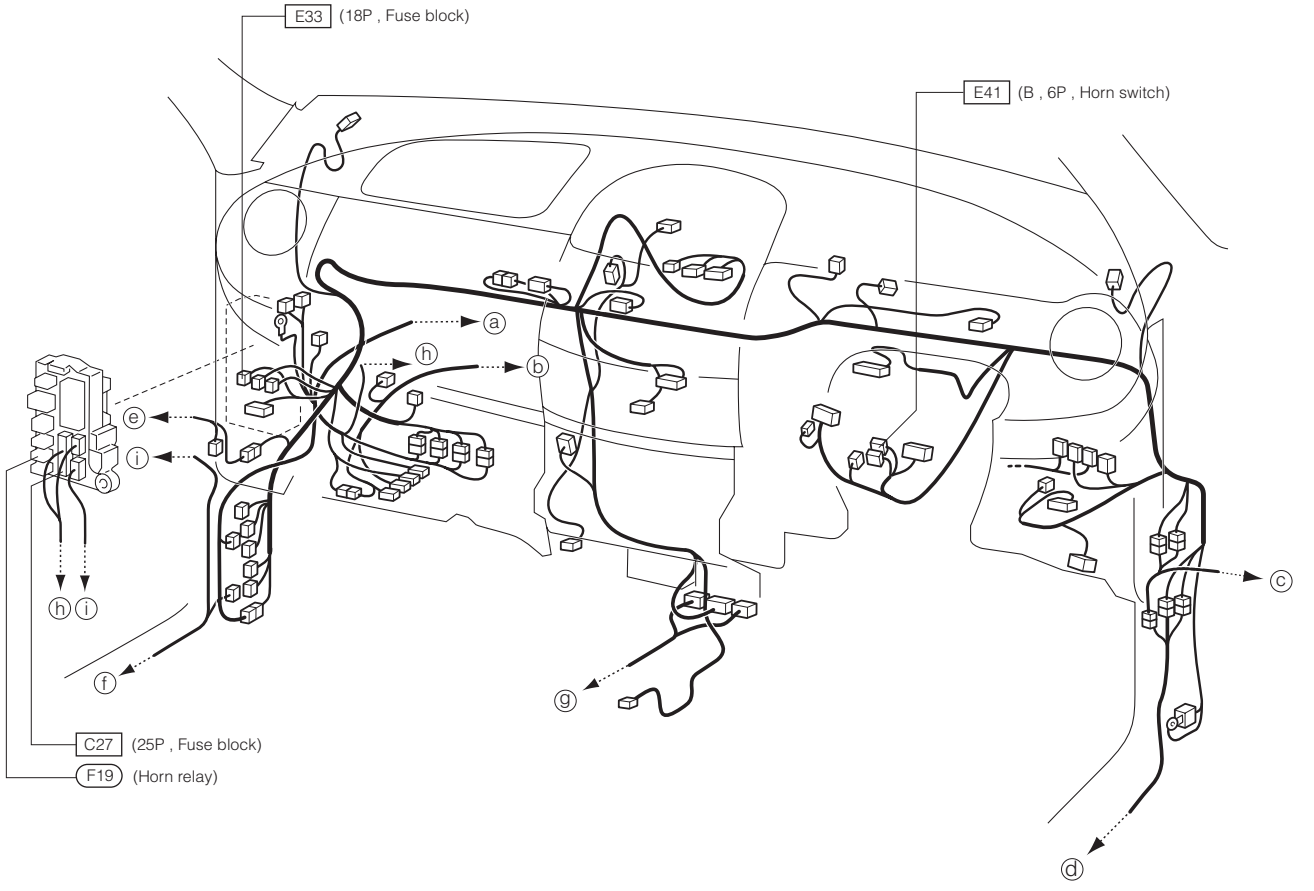
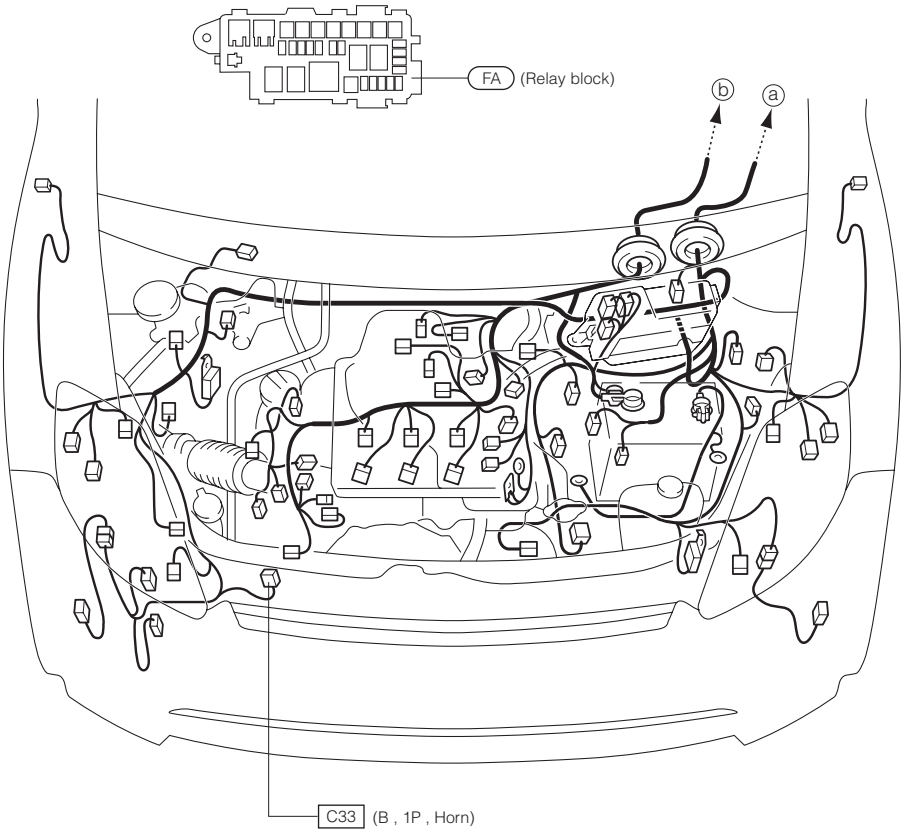
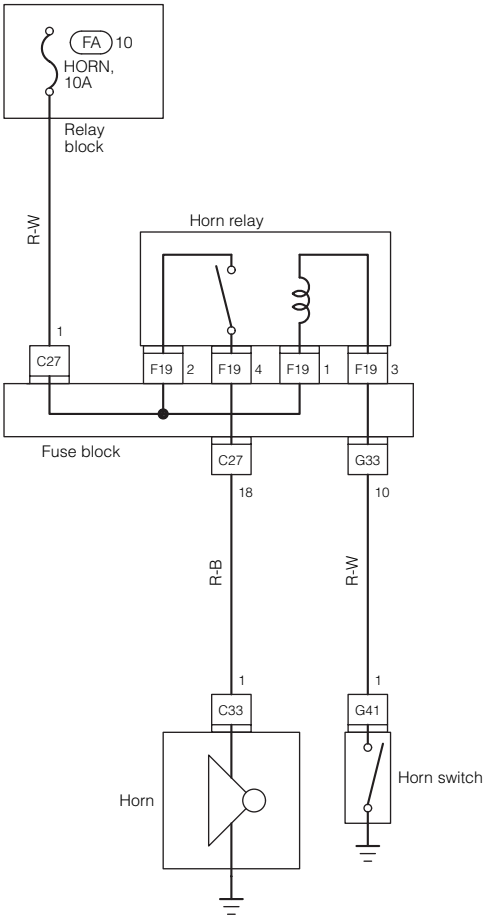
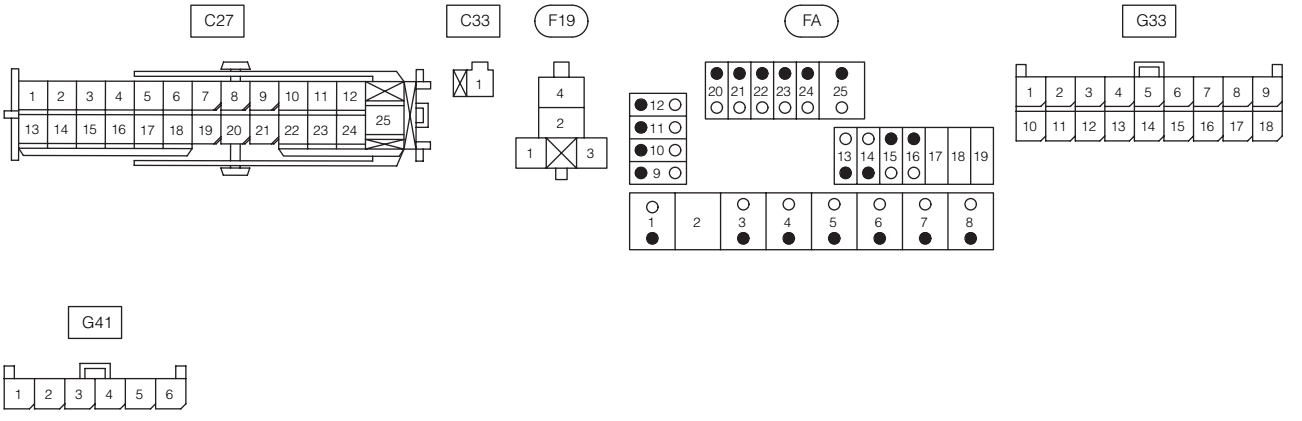

E33 (18P , Fuse block)
E41 (B , 6P , Horn switch)
a
b
c
d
e
f
g
h
i
C27 (25P , Fuse block)
F19 (Horn relay)


FA (Relay block)
b
a
C33 (B , 1P , Horn)

26-2 LHD VEHICLE





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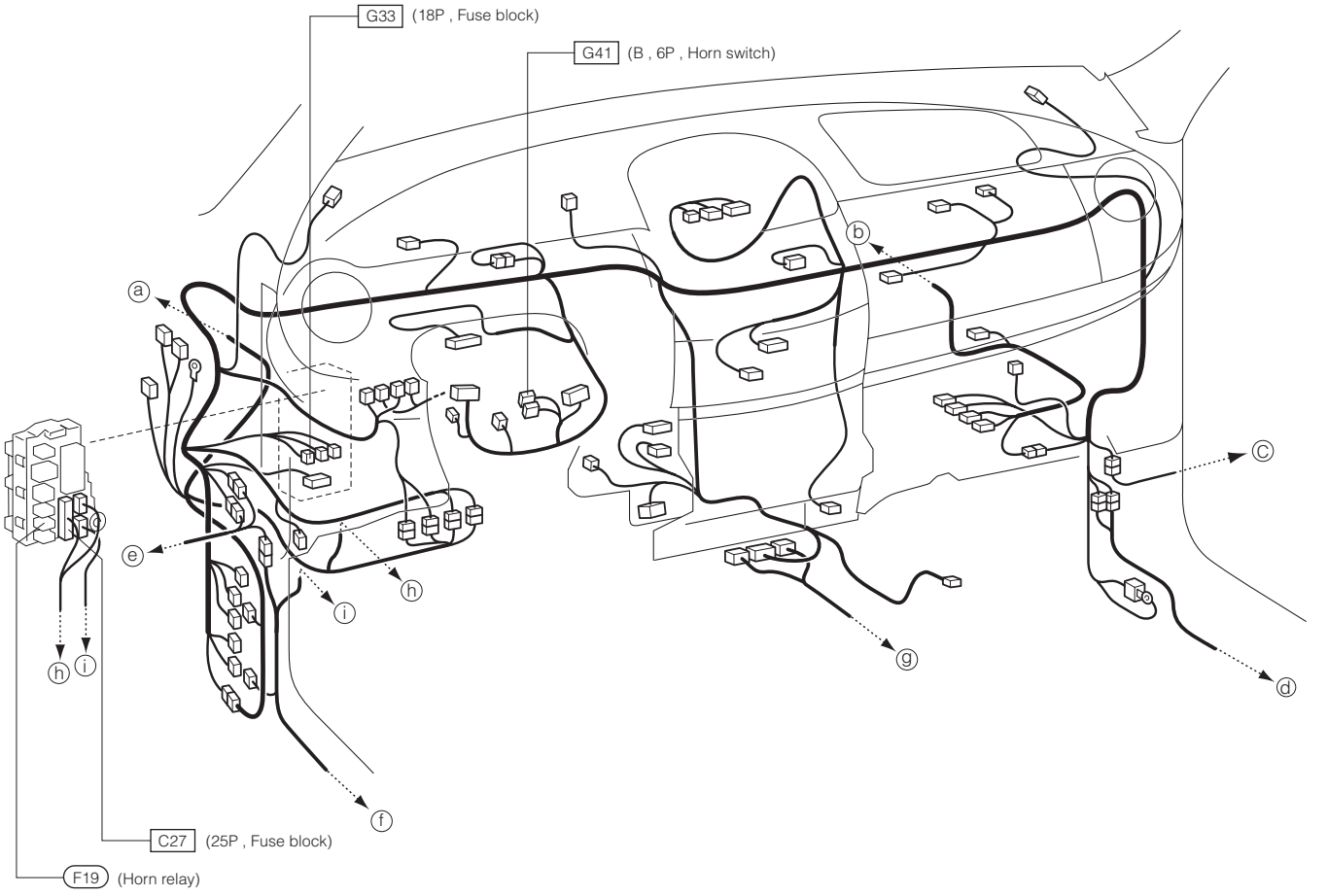
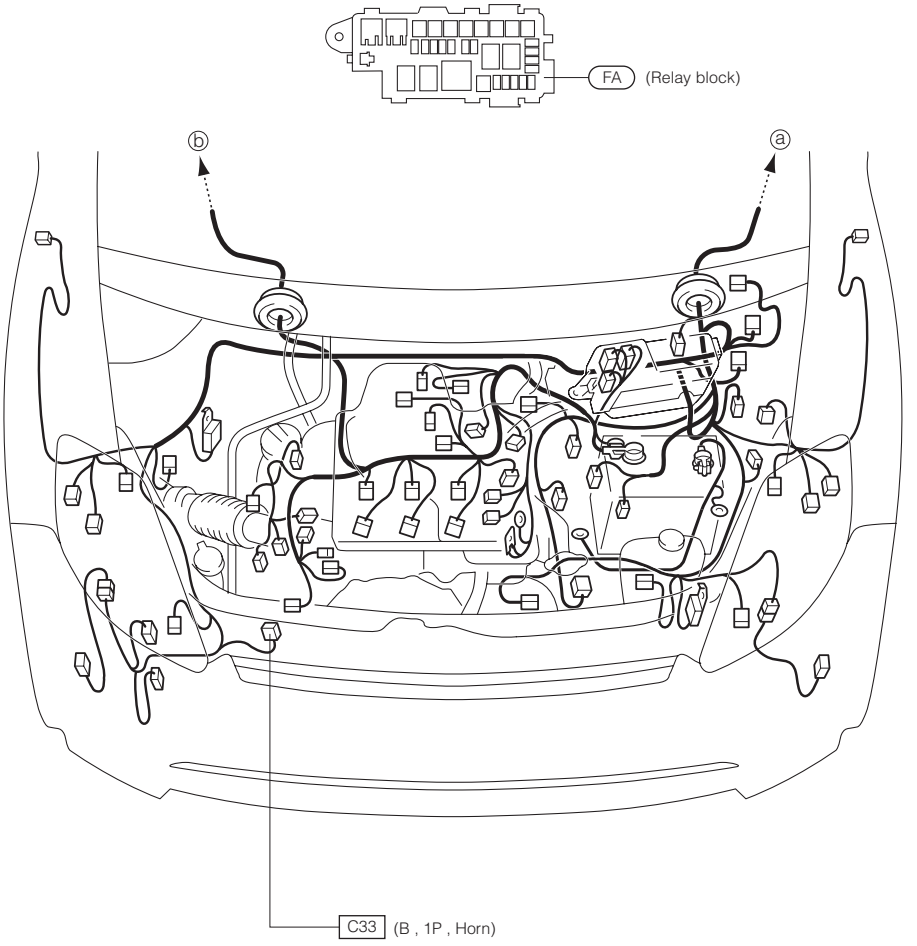
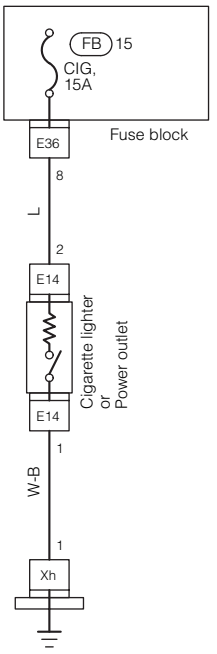
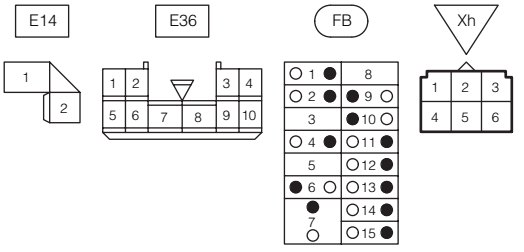

G33 (18P , Fuse block)
G41 (B , 6P , Horn switch)
a
b
c
d
e
f
g
h
i
C27 (25P , Fuse block)
F19 (Horn relay)

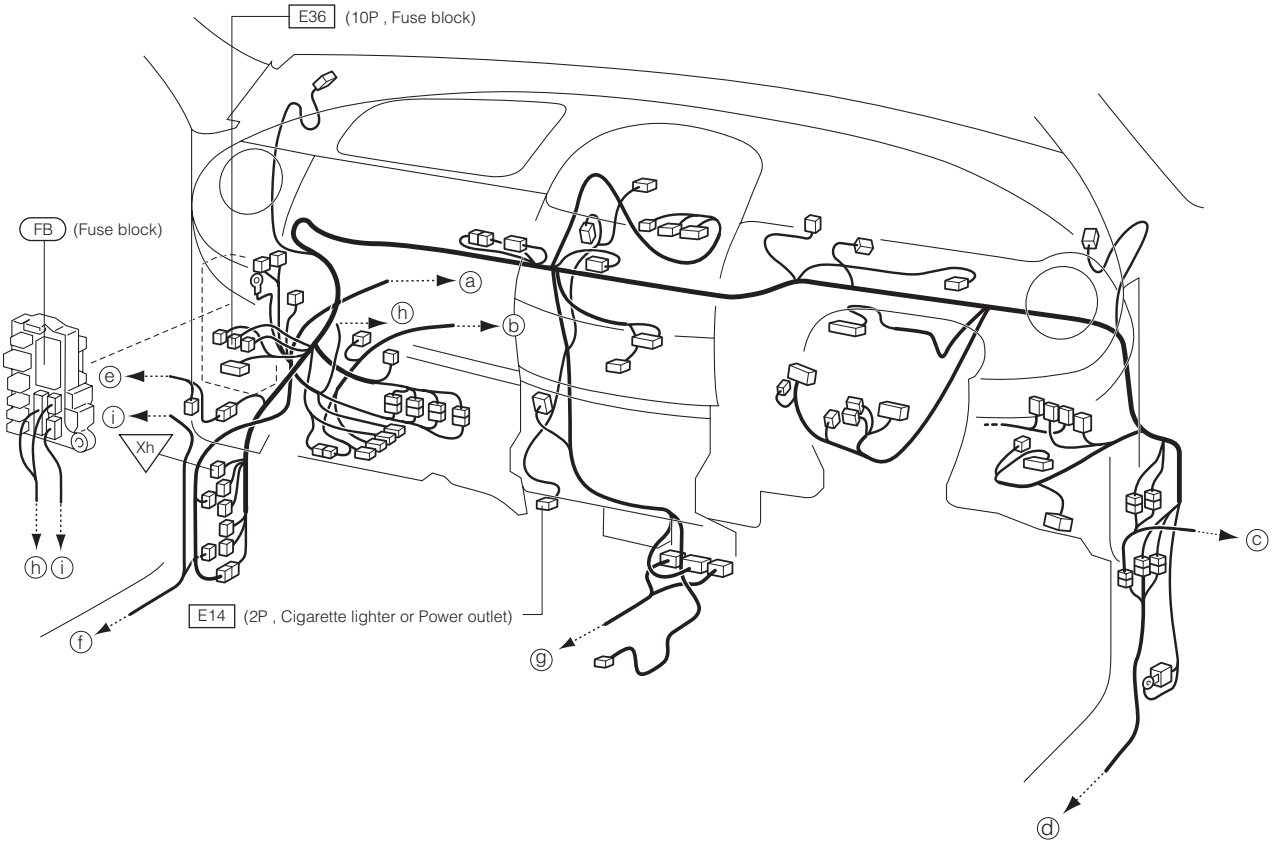

FA
(Relay block)
ⓑ
ⓐ
C33
(B , 1P , Horn)

27 CIGARETTE LIGHTER,POWER OUTLET

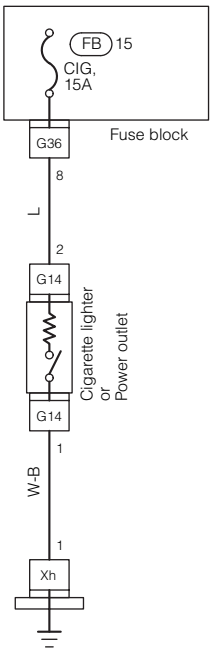
27-1 RHD VEHICLE

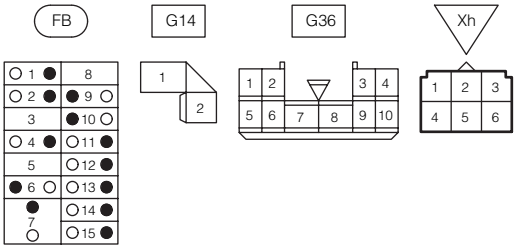


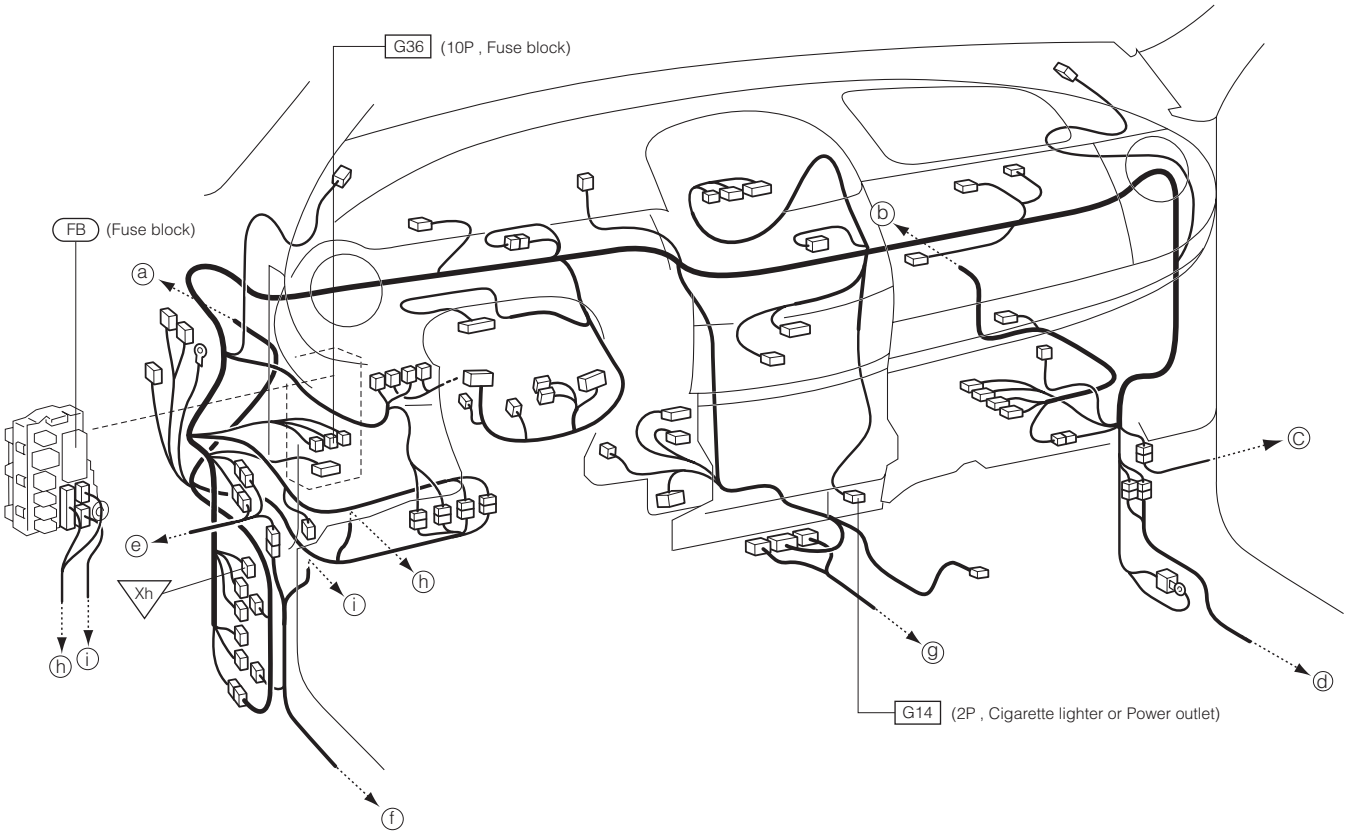



E36 (10P , Fuse block)
FB (Fuse block)
a
h
b
e
i
Xh
h i
E14 (2P , Cigarette lighter or Power outlet)
f
g
c
d

27-2 LHD VEHICLE

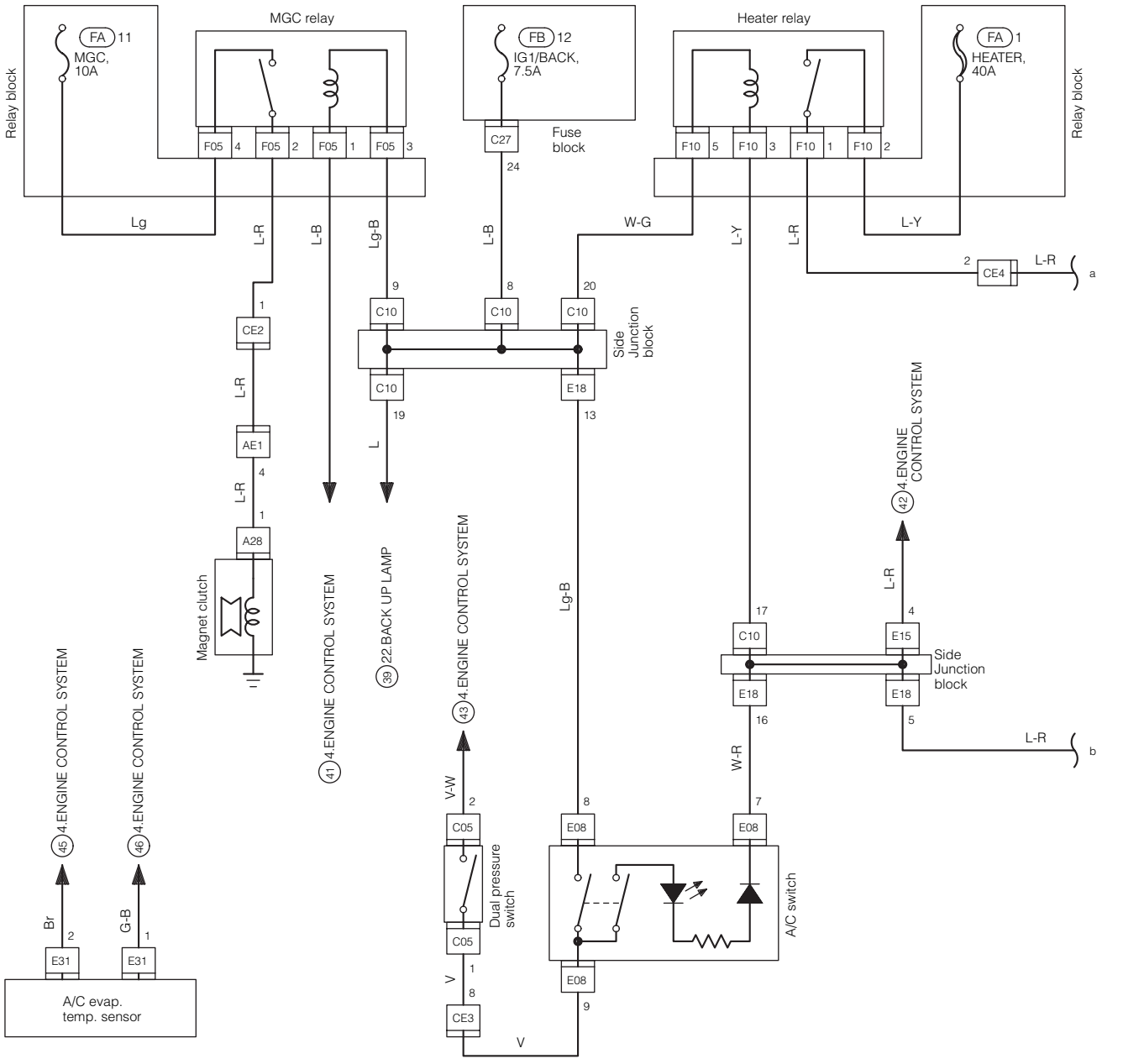


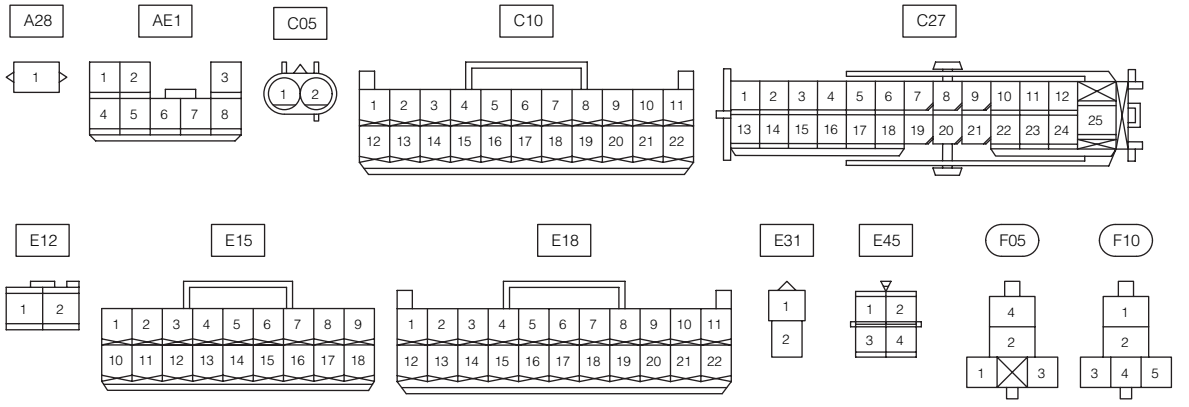



G36 (10P , Fuse block)
FB (Fuse block)
a
b
C
d
e
f
g
h
i
Xh
G14 (2P , Cigarette lighter or Power outlet)

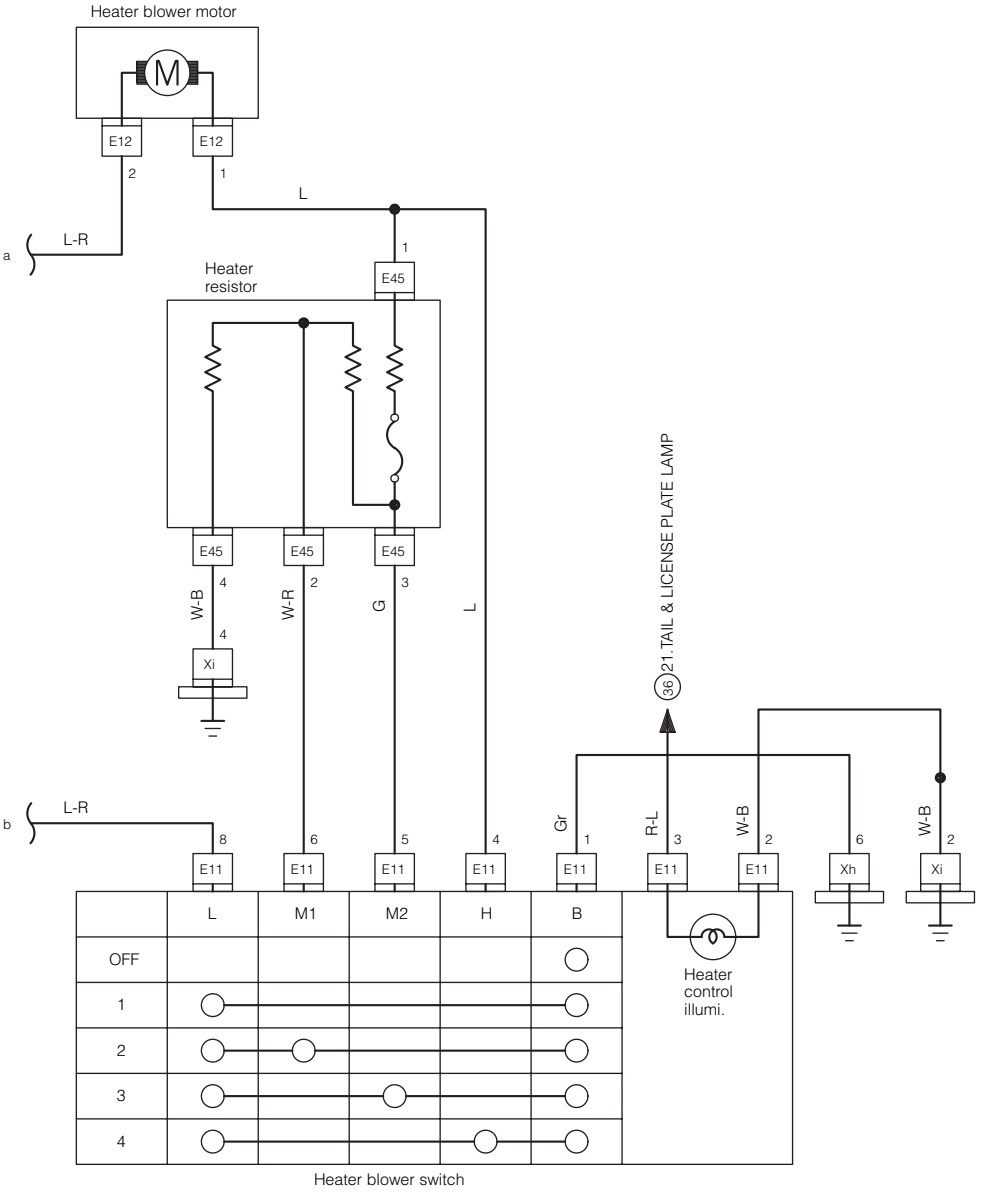
28 HEATER & AIR CONDITIONER

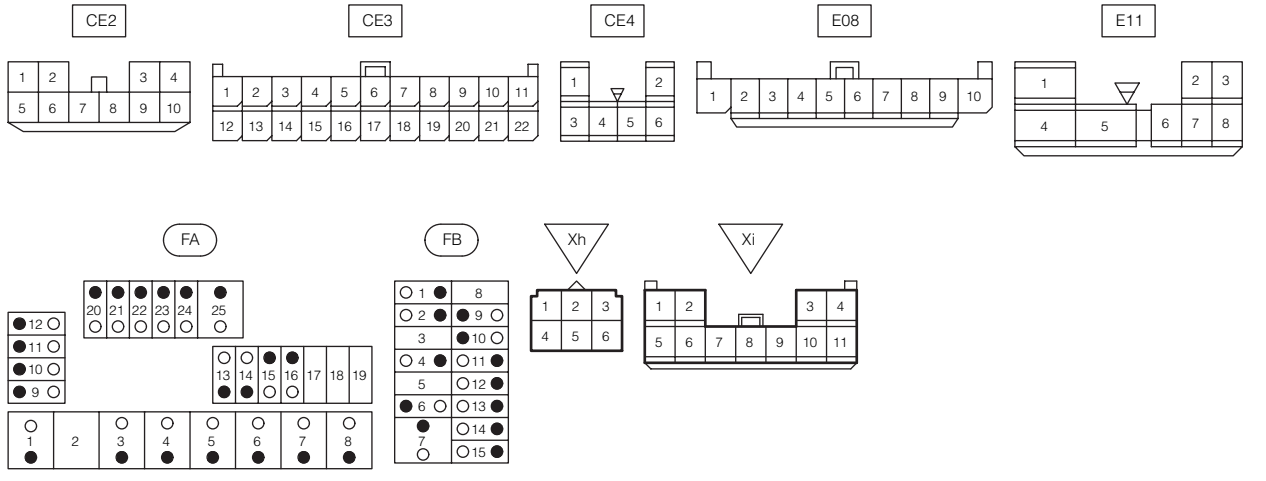
28-1 RHD VEHICLE

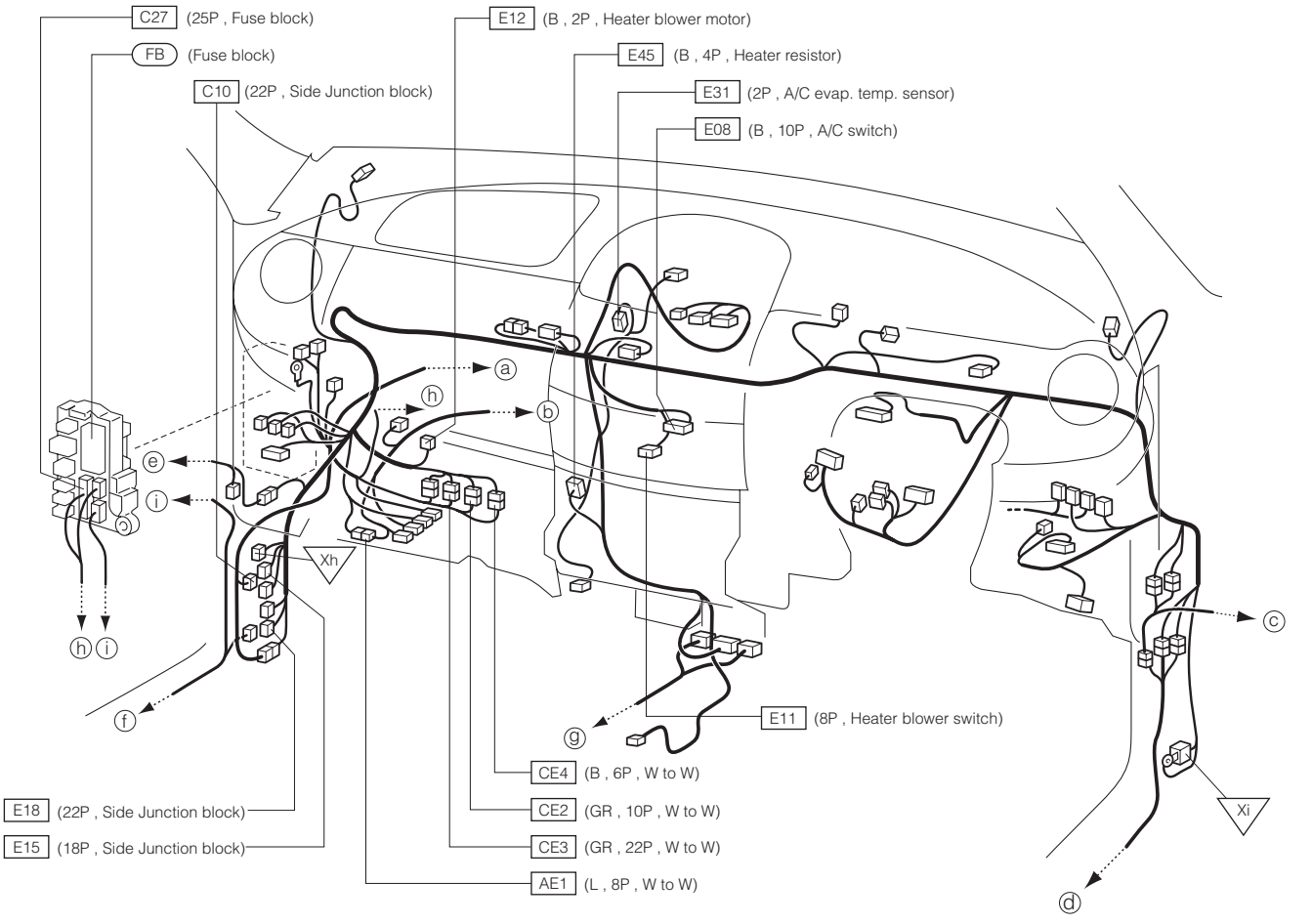




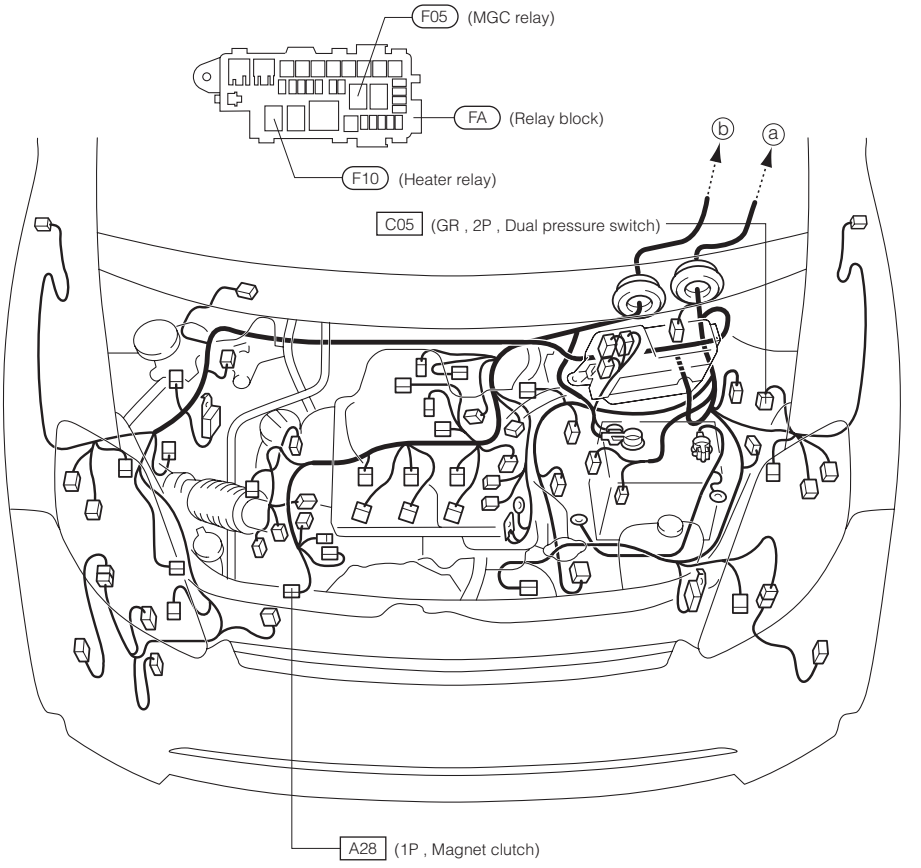
T11Q5220ES48


Heater blower motor
M
E12
E12
2
1
L
a
L-R
1
E45
Heater
resistor
E45
E45
E45
4
2
3
W-B
W-R
G
L
4
Xi
36
21. TAIL & LICENSE PLATE LAMP
b
L-R
8
6
5
4
E11
E11
E11
E11
Gr
R-L
W-B
W-B
1
3
2
6
2
E11
E11
E11
Xh
Xi
L
M1
M2
H
B
OFF
1
2
3
4
Heater
control
illumi.
Heater blower switch

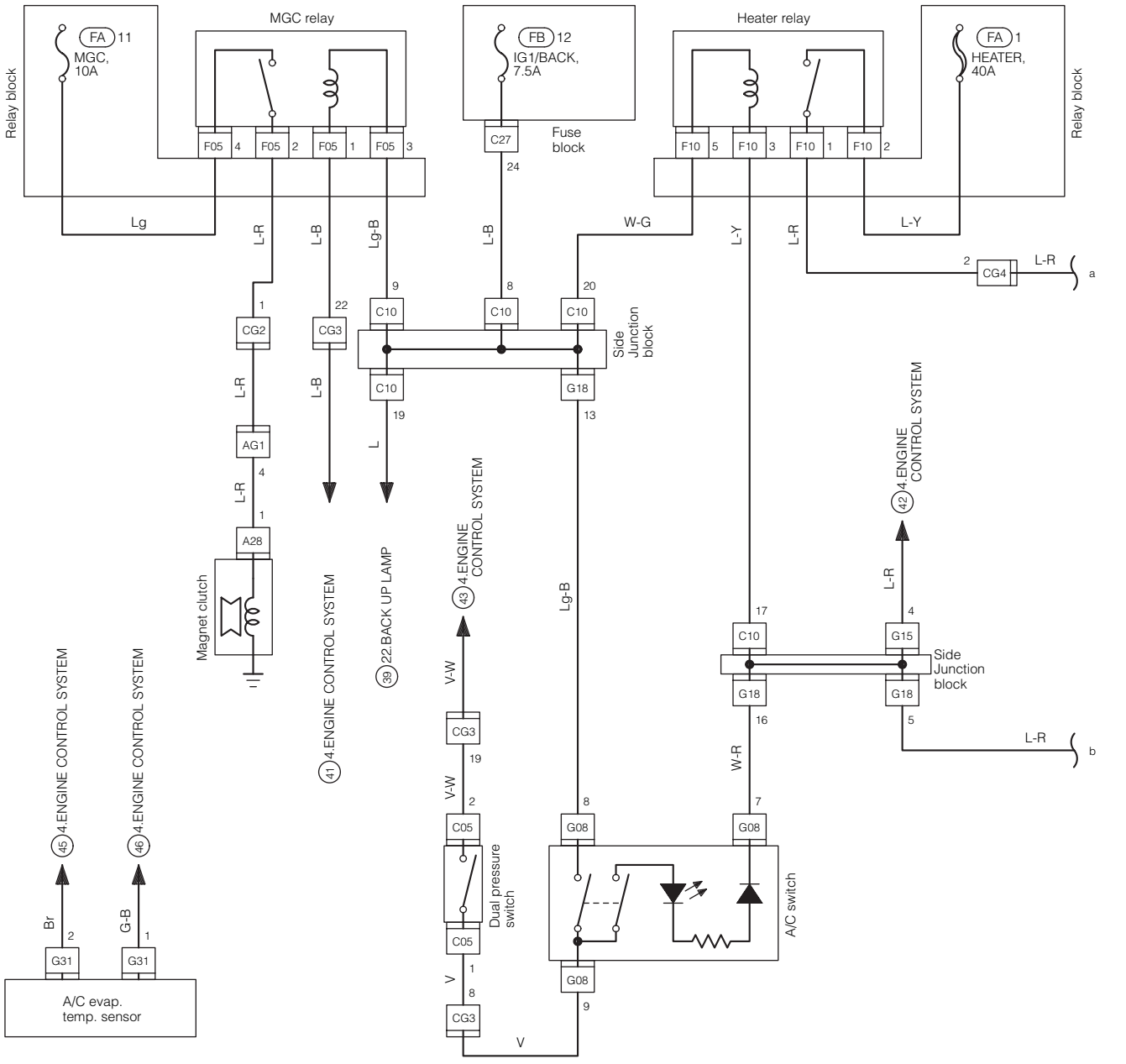

CE2
CE3
CE4
E08
E11
FA
FB
Xh
Xi

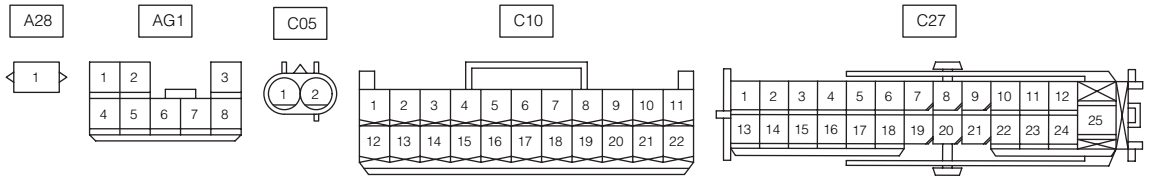


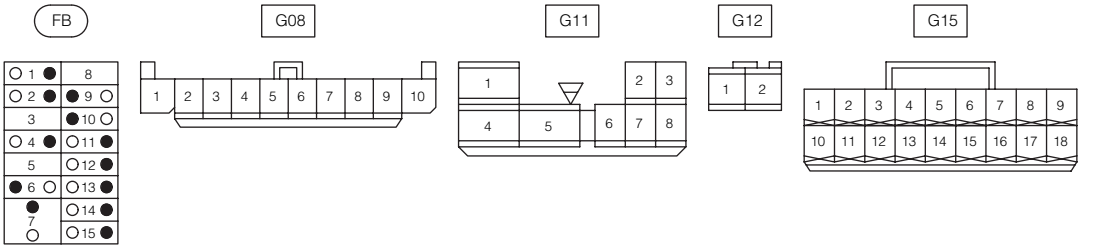
T11Q5114ES48


F05 (MGC relay)
FA (Relay block)
F10 (Heater relay)
b
a
C05 (GR , 2P , Dual pressure switch)
A28 (1P , Magnet clutch)

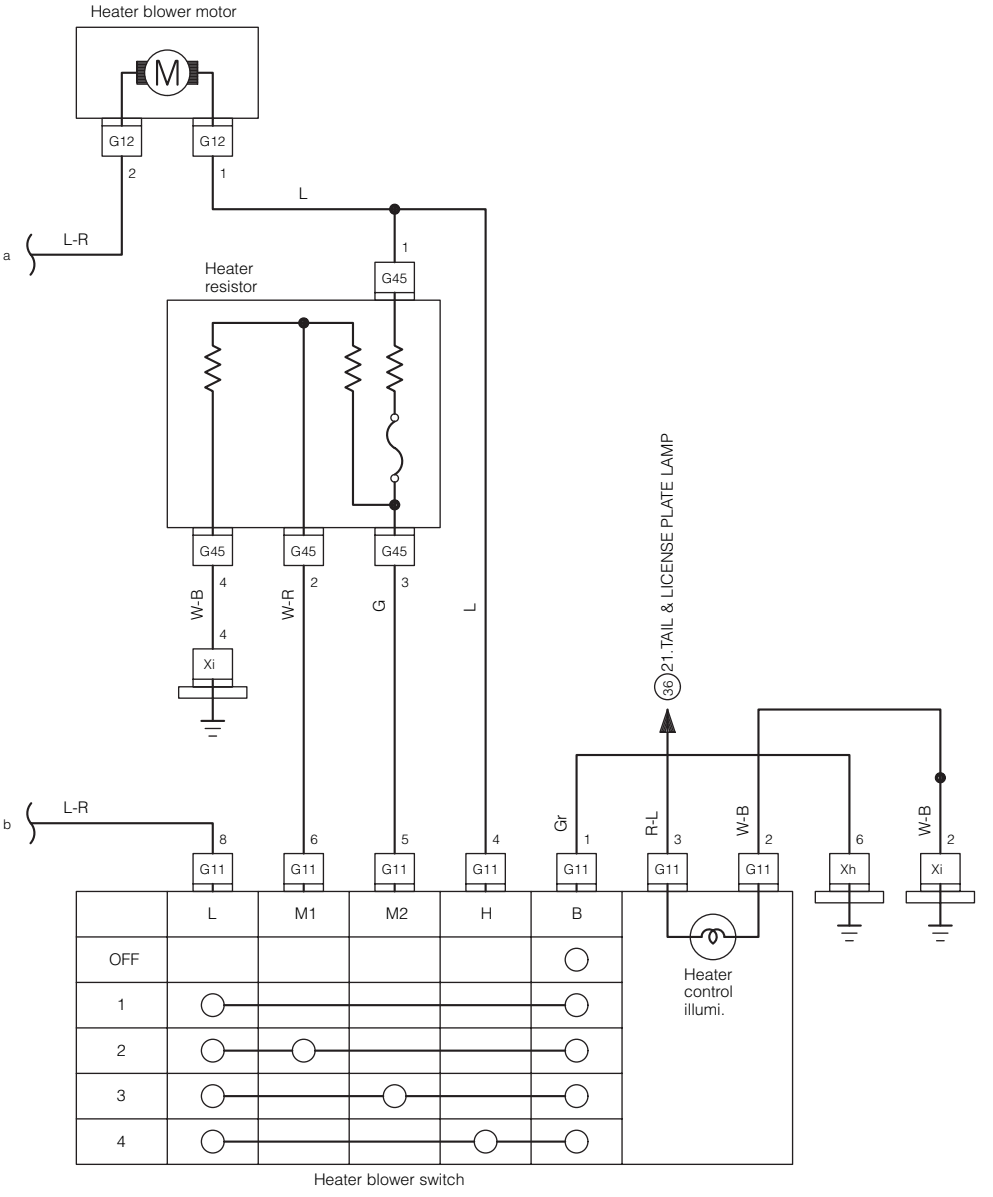
28-2 LHD VEHICLE

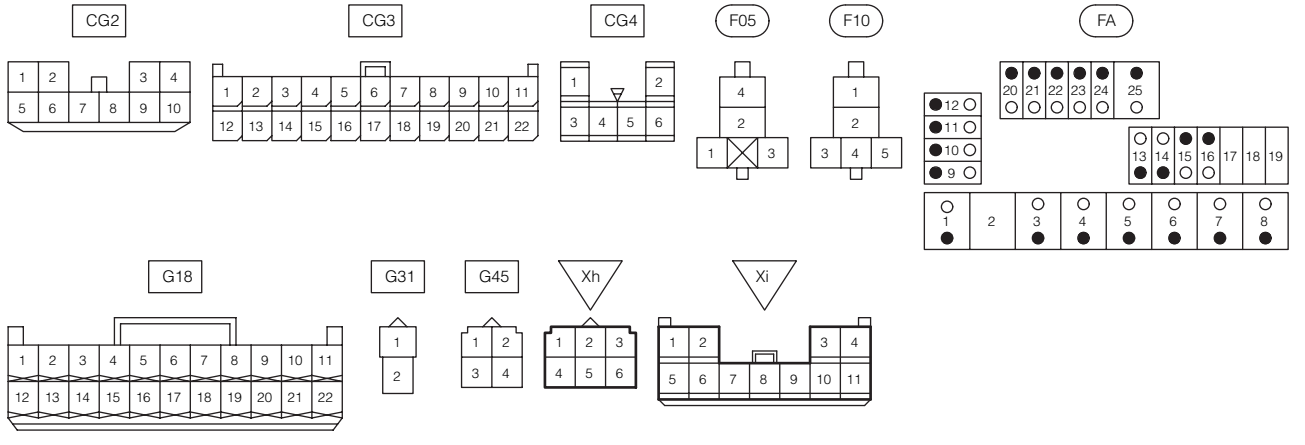


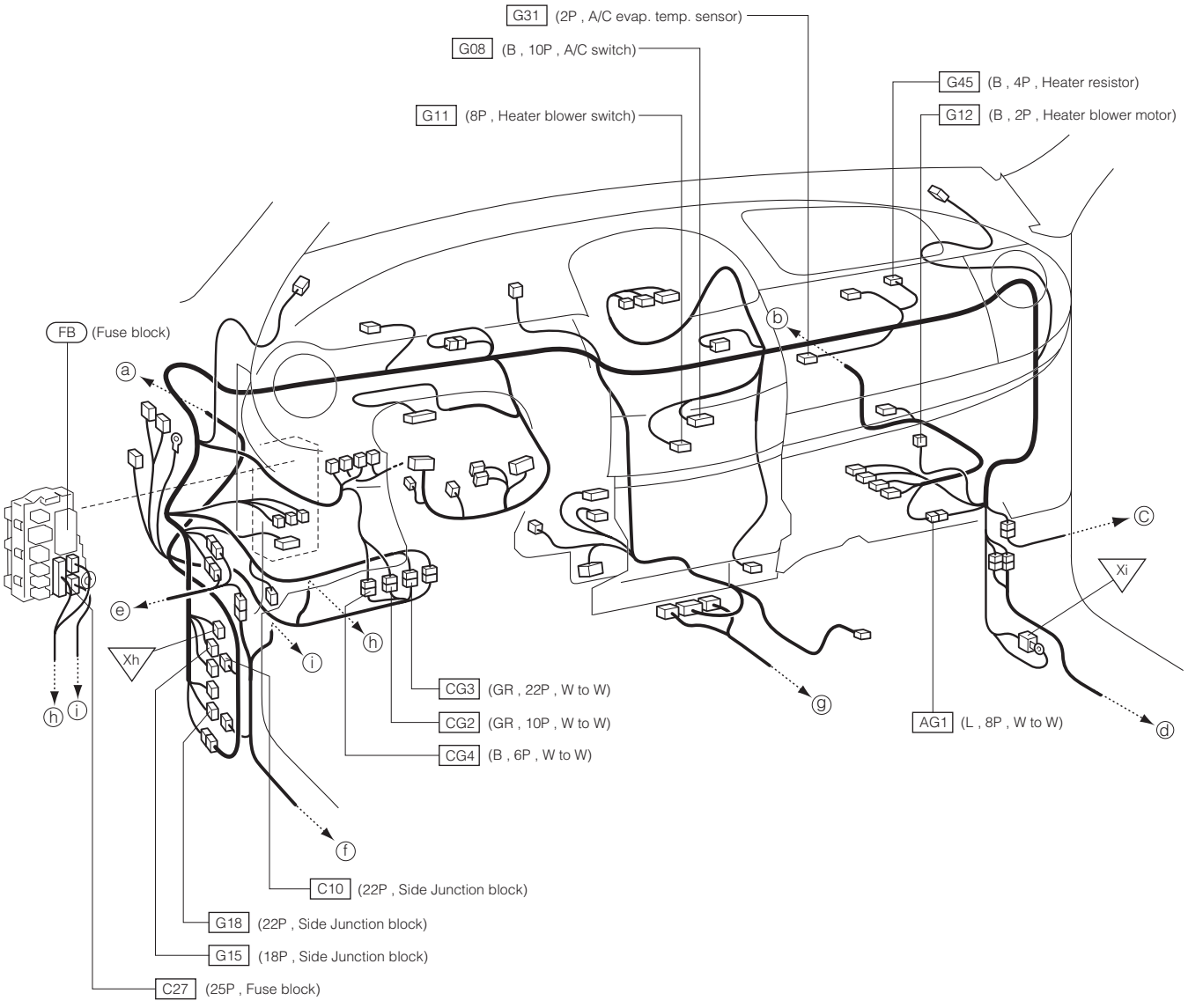


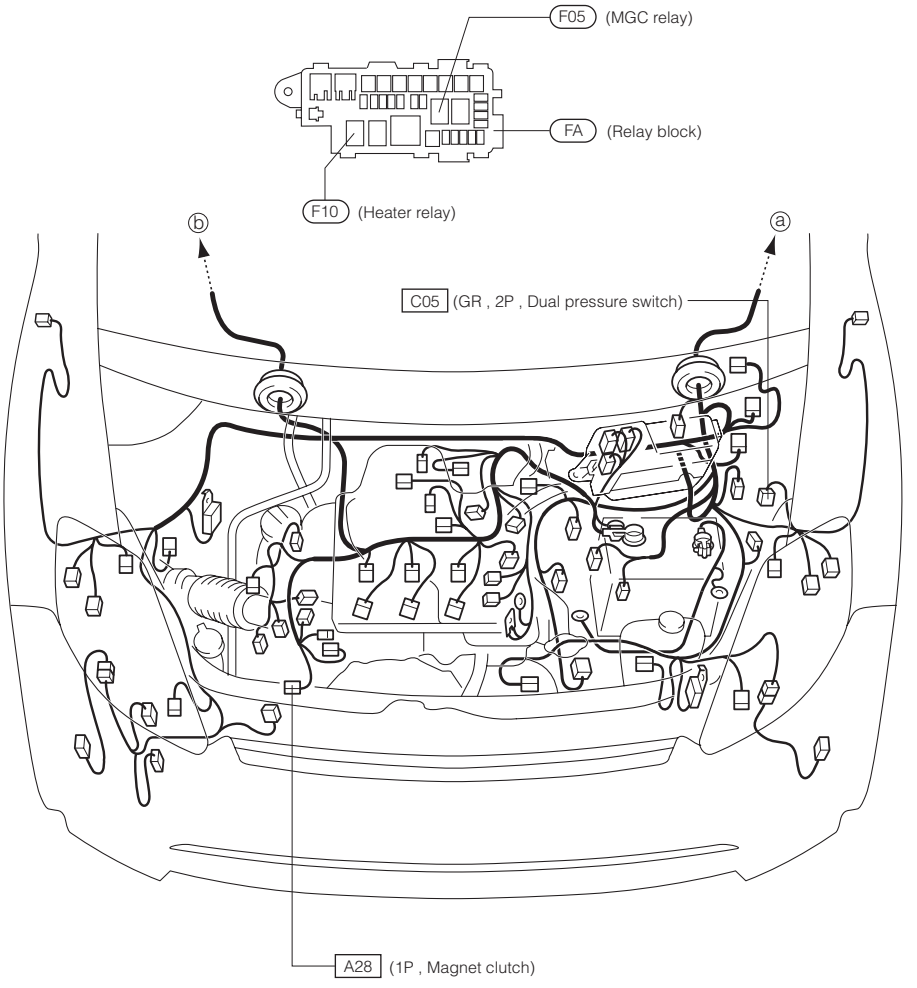


T11Q5168ES48


Heater blower motor
M
G12
G12
2
1
L
a
L-R
1
G45
Heater resistor
G45
G45
G45
4
2
3
W-B
W-R
G
L
4
Xi
36
21. TAIL & LICENSE PLATE LAMP
b
L-R
8
6
5
4
G11
G11
G11
G11
Gr
R-L
W-B
W-B
1
3
2
6
2
G11
G11
G11
Xh
Xi
L
M1
M2
H
B
OFF
1
2
3
4
Heater control illumi.
Heater blower switch

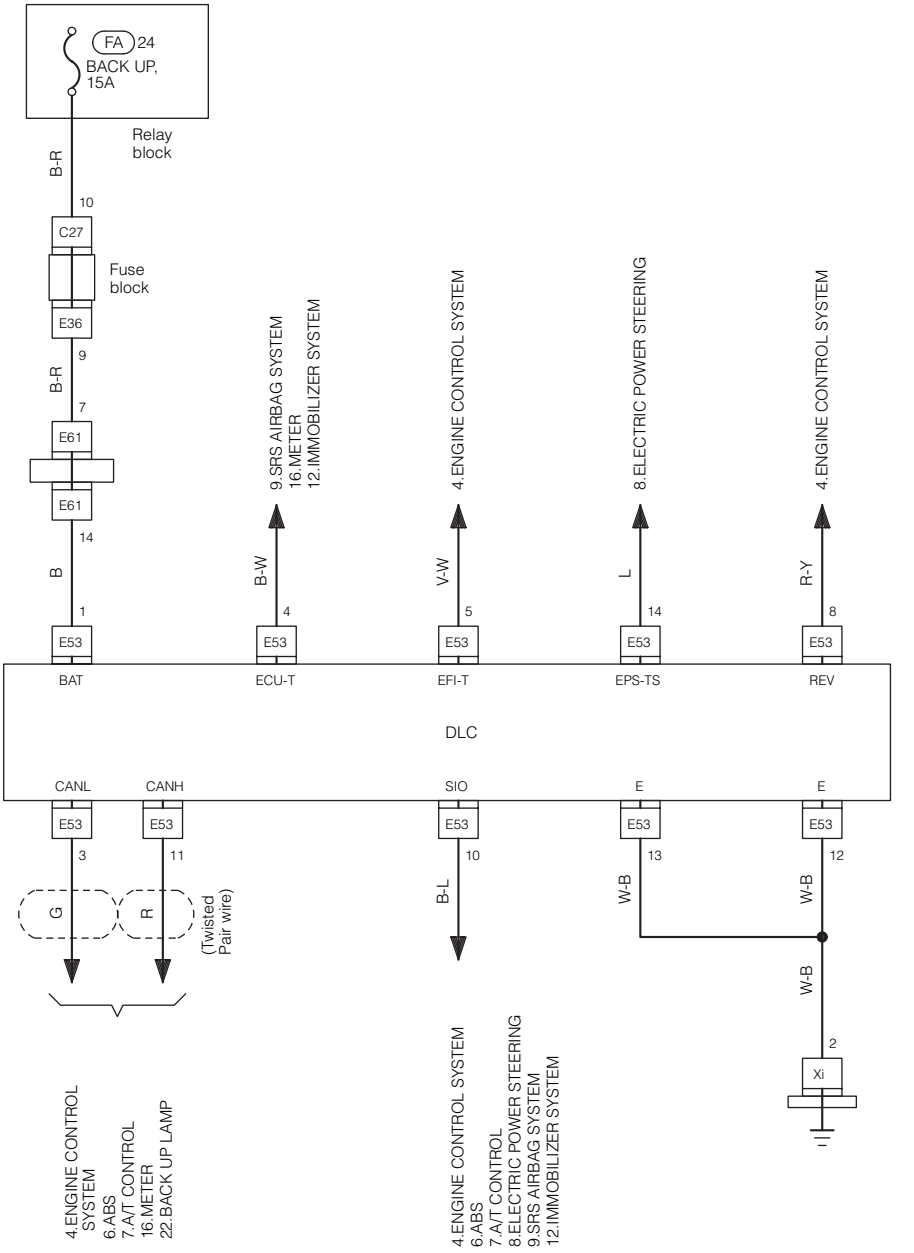

CG2
CG3
CG4
F05
F10
FA
G18
G31
G45
Xh
Xi

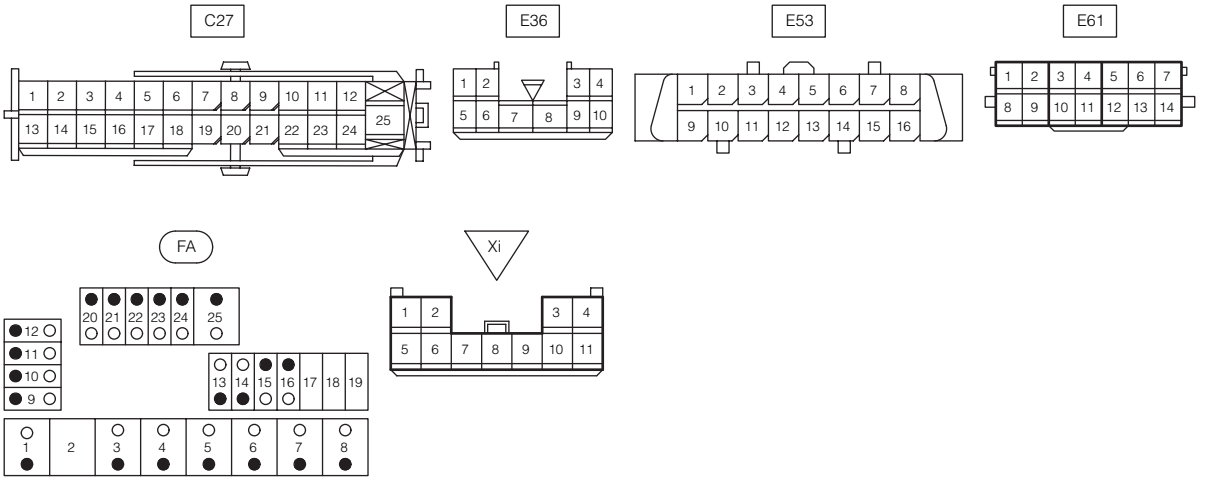

G31 (2P , A/C evap. temp. sensor)
G08 (B , 10P , A/C switch)
G11 (8P , Heater blower switch)
G45 (B , 4P , Heater resistor)
G12 (B , 2P , Heater blower motor)
FB (Fuse block)
a
b
c
d
e
f
g
h
i
Xh
Xi
CG3 (GR , 22P , W to W)
CG2 (GR , 10P , W to W)
CG4 (B , 6P , W to W)
AG1 (L , 8P , W to W)
C10 (22P , Side Junction block)
G18 (22P , Side Junction block)
G15 (18P , Side Junction block)
C27 (25P , Fuse block)


F05 (MGC relay)
FA (Relay block)
F10 (Heater relay)
ⓑ
ⓐ
C05 (GR , 2P , Dual pressure switch)
A28 (1P , Magnet clutch)

29 DATA LINK CONNECTOR

29-1 RHD VEHICLE





T11Q5222ES48

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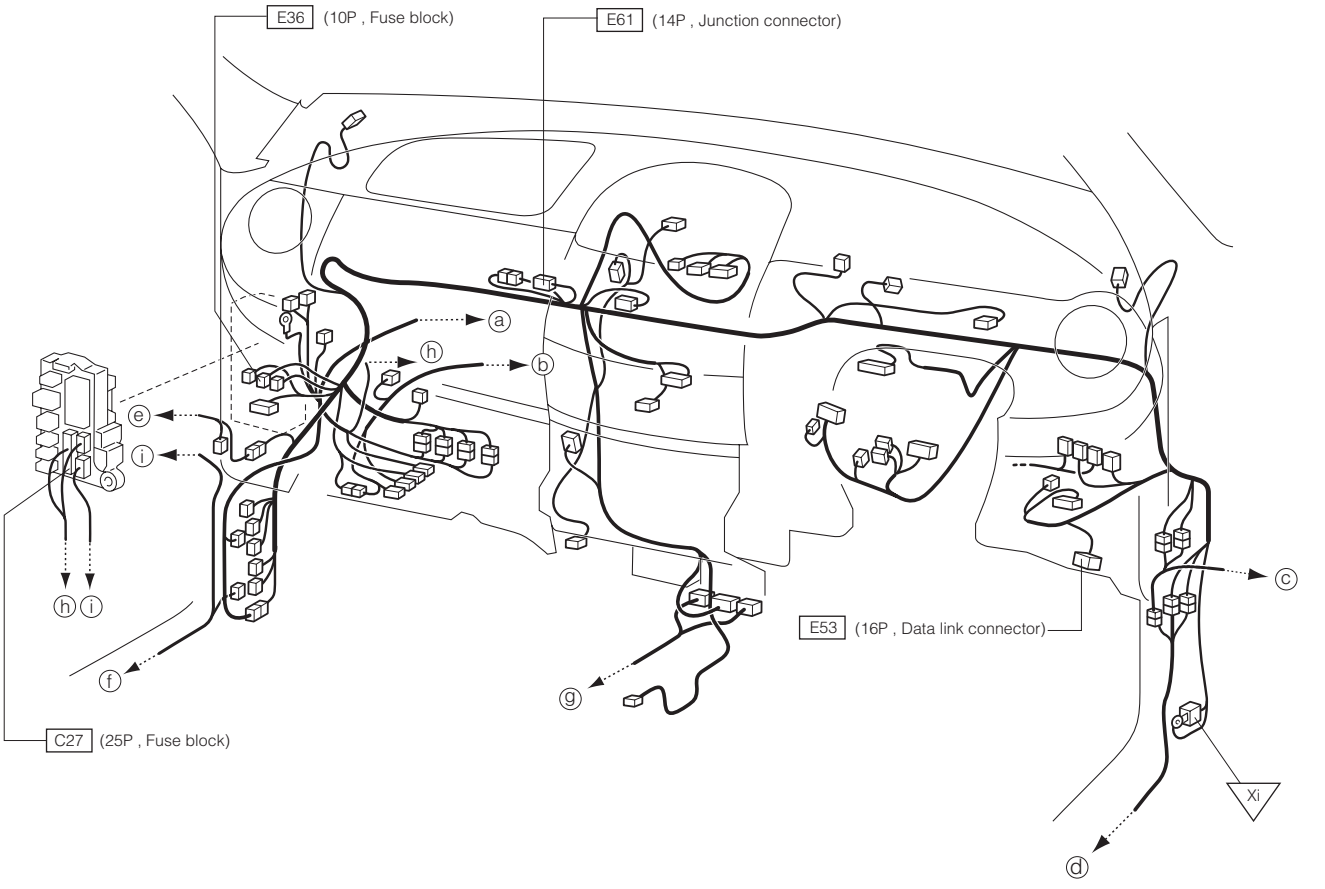
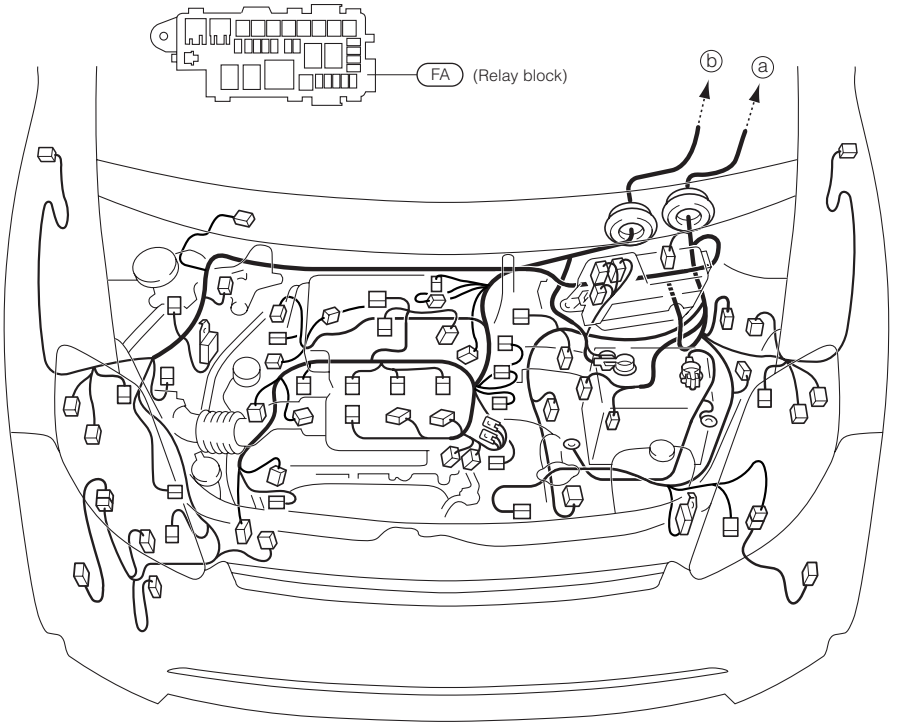
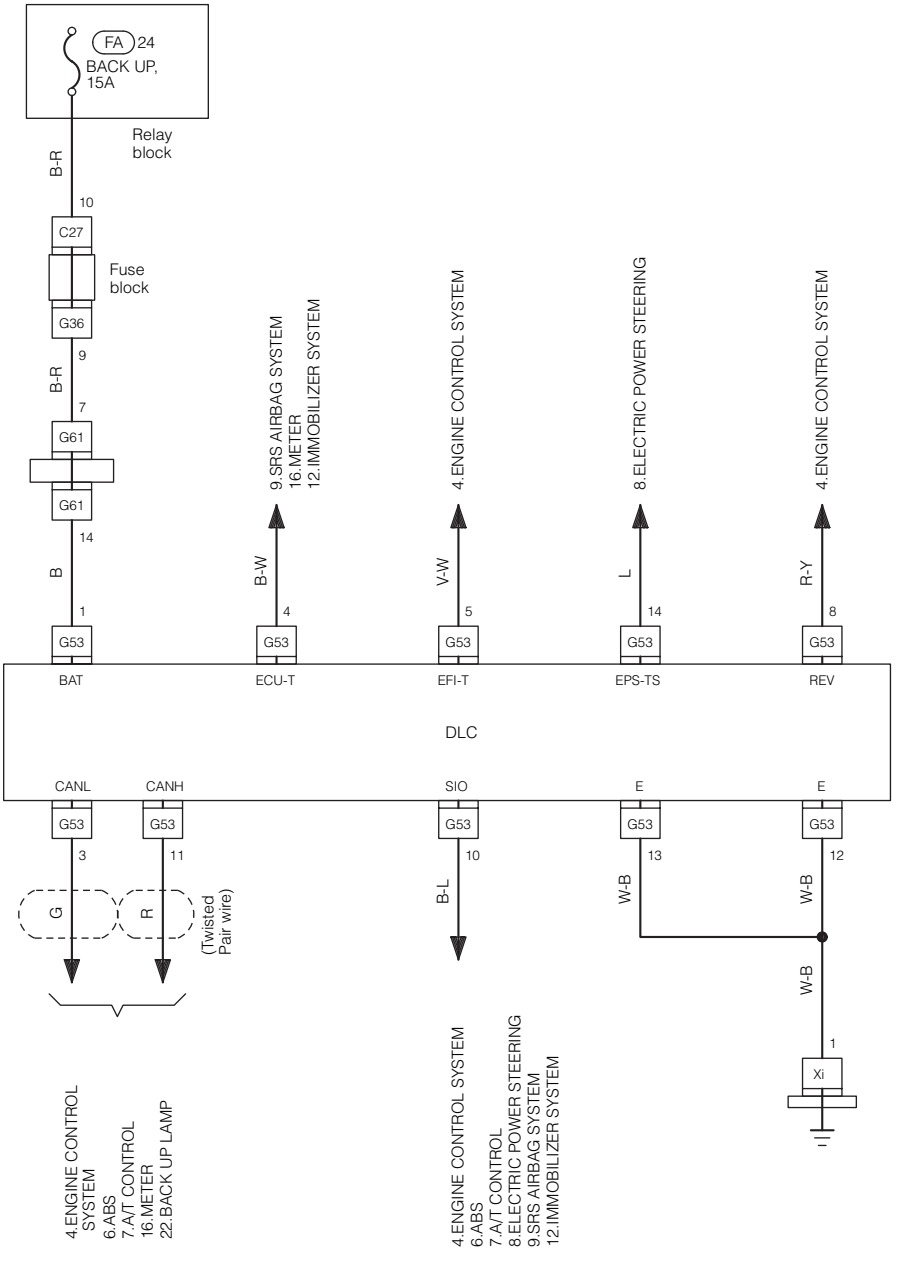
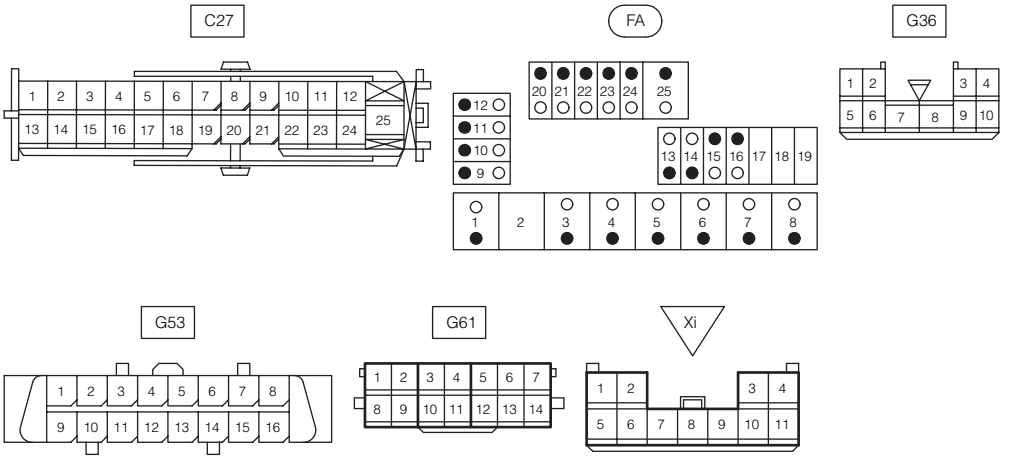

E36 (10P , Fuse block)
E61 (14P , Junction connector)
a
b
c
d
e
f
g
h
i
E53 (16P , Data link connector)
C27 (25P , Fuse block)
Xi


FA
(Relay block)
b
a

29-2 LHD VEHICLE





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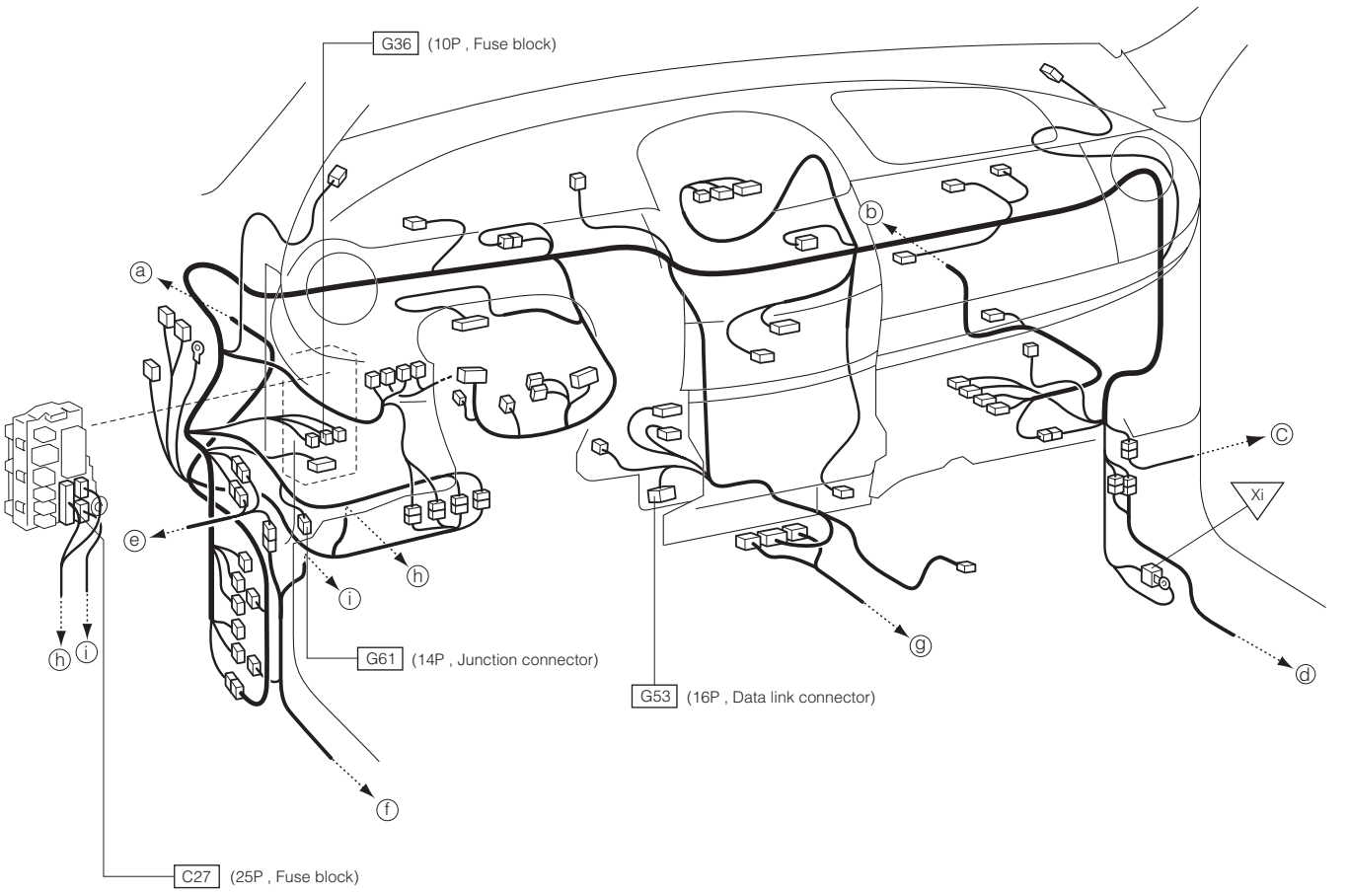
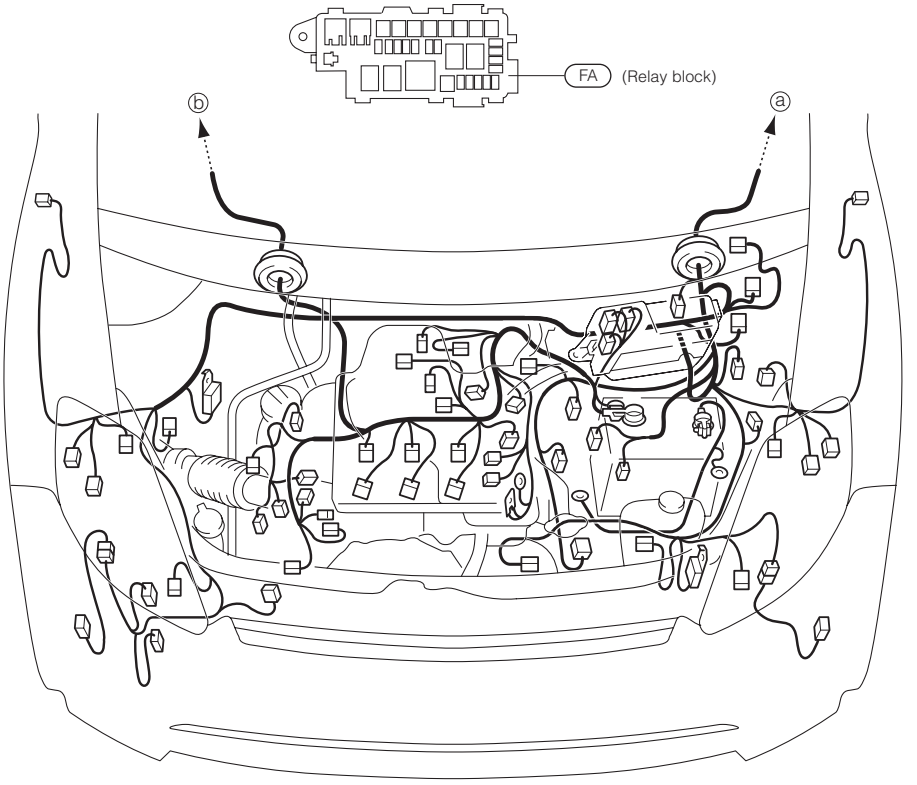

G36 (10P , Fuse block)
a
b
c
d
e
f
g
h
i
Xi
G61 (14P , Junction connector)
G53 (16P , Data link connector)
C27 (25P , Fuse block)


FA
(Relay block)
ⓑ
ⓐ

E INDEX

INDEX---------- E - 1
RHD VEHICLE---------- E - 1
LHD VEHICLE ---------- E - 4

1 INDEX

1-1 RHD VEHICLE

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	A/C switch	D-241
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	A/T ECU(ABS)	D-62
	A/T ECU(Back up lamp)	D-189
	A/T ECU(Engine)[K3-VE engine]	D-44
	A/T ECU(Meter)	D-141
	ABS ECU(A/T)	D-70
	ABS ECU(ABS)	D-61
	ABS ECU(Back up lamp)	D-189
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	ABS ECU(Engine)[K3-VE engine]	D-44
	ABS ECU(Meter)	D-141
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	ANT	D-221
	Antenna coil	D-109
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	EFI ECU(A/T)	D-70
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	EFI ECU(Engine)[1KR-FE engine]	D-29
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	EFI main relay(1KR-FE engine)	D-30
	EFI main relay(K3-VE engine)	D-42
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FOREWORD

This service manual has been prepared to provide information covering the wiring diagrams and connector terminal arrangement diagrams for various electric systems mounted on the model M300 series manufactured in November 2004 afterward.

All information used in this service manual was in effect at time when the manual was printed. However, the specifications and procedures may be revised owing to continuing improvements in design without advance notice and without incurring any obligation to us.

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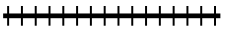
1 HOW TO READ BODY REPAIR MANUAL

1-1 HOW TO READ SYMBOLS

The following symbols are used in the section of the body panel replacement of this body repair manual.

Symbol	Contents of operation
	Cut
	Removal of brazing or arc brazing
	Spot welding position
	Plug welding position
	Butt welding or fillet welding
	Brazing

1-2 RANGE OF EXPLANATION OF REPAIR WORK

This manual explains the body panel replacing procedure for vehicles having a white body.

In this manual, no explanation is made for the removal/installation procedure for equipment which will be necessary before the vehicle has the white body as well as assembling, check and adjustment for equipment after the body panel has been replaced.

1-3 ARTICLES TO BE PREPARED

When SST, tool, measuring instrument, a sort of fat and oil to be prepared before operation are necessary, those are described by compiling in the table as preparation tools at the beginning of each item. However, the general tools, jacks, fixtures as considered being equipped always at the service shop are usually omitted.

1-4 CONTENTS NOT DESCRIBED IN THIS MANUAL

The description of the next elemental operation may omit in this service manual, but please perform in an actual operation.

1.Jacking operation and lifting operation.
2.Cleaning and cleansing of removed parts to perform at need.
3.Visual inspection.
4.Basic check and adjustment after installation

1-5 DEFINITION OF TERMS

SPECIFIED VALUE	This refers to the allowable range at the time of checks and adjustments.
ALLOWABLE LIMIT	This refers to the maximum or minimum value that should not be exceeded at the time of checks and adjustments.
DEVIATION	This refers to the difference between the maximum gap and minimum gap.
WARNING	This section describes an operation procedure that could cause human injuries.
CAUTION	This section describes an operation procedure that could damage the vehicle and parts if adequate care is not paid.
NOTES	This section describes supplementary information that facilitates the operation. This section is separated from the text. This section may also indicate specified values in a simple measurement, in which the measurement to determine the specified value is difficult and most likely no malfunction may take place.

2 ABBREVIATION CODES

The abbreviation codes that appear in this manual stand for the following, respectively.

ABBREVIATION CODE	ORIGINAL WORD	ABBREVIATION CODE	ORIGINAL WORD
2WD	Two Wheel Drive	LHD	Left Hand Drive
4WD	Four Wheel Drive	LIN	Local Interconnect Network
ABS	Anti-lock Brake System	LSPV	Load Sensing Proportioning Valve
ABV	Air Bypass Valve	LWR	Lower
A/C	Air Conditioner	MIL	Malfunction Indicator Lamp
ACC	Accessory	MP	Multipurpose
API	American Petroleum Institute	M/T	Manual Transmission
A/T	Automatic Transmission	N/A	Natural Aspiration
ATDC	After Top Dead Center	NOx	Nitrogen Oxides
ATF	Automatic Transmission Fluid	OPT	Option
Ay	Assembly	O/S	Over Size
BDC	Bottom Dead Center	PCV	Positive Crankcase Ventilation
BTDC	Before Top Dead Center	PR	Ply Rating
BVSV	Bimetal Vacuum Switching Valve	PTO	Power Take Off
CAN	Controller Area Network	RH	Right Hand
CD	Compact Disc	RHD	Right Hand Drive
CO	Carbon Monoxide	RR	Rear
DLC	Data Link Connector	S/A	Sub-Assembly
DLI	Distributor Less Ignition	SAE	Society of Automotive Engineers
DTC	Diagnostic Trouble Code	SRS	Supplemental Restraint System
DVVT	Dynamic Variable Valve Timing	SST	Special Service Tool
EBD	Electronic Brake force Distribution	STD	Standard
ECU	Electronic Control Unit	SW	Switch
EFI	Electronic Fuel Injection	T	Torque
EGR	Exhaust Gas Recirculation System	T/C	Turbocharger
EPS	Electronic controlled Power Steering	TDC	Top Dead Center
ESA	Electronic Spark Advance	UPR	Upper
EX	Exhaust	U/S	Under Size
F/L	Fusible Link	VCV	Vacuum Control Valve
FR	Front	VSV	Vacuum Switching Valve
GND	Ground	VTV	Vacuum Transmitting Valve
HC	Hydro Carbon	W/	With
IG	Ignition	WVTA	Whole Vehicle Type Approval
IN	Intake	Ⓑ	Bolt
ISC	Idle Speed Control	Ⓢ	Screw
ISO	International Organization for Standardization	Ⓝ	Nut
LCD	Liquid Crystal Display	Ⓦ	Washer
LED	Light Emitting Diode	Ⓒ	Clip
LH	Left Hand		

3 UNIT

As for the units, the SI units (international unit system) have been posted. (The hitherto employed units, too, are posted.)

Example: 33.25±13.25N·m{340±135kgf·cm}

3-1 NEW UNIT BECAUSE OF THE INTRODUCTION OF THE SI UNIT

SI unit is the international unit system established by aiming to proceed the communication in technology smoothly by unifying the former unit system which were different internationally each other into one value by one unit. The specification value is described in accordance with SI unit system in this service manual.

Item	SI unit	Conventional units	Conversion table
Force	N	kgf	1 kgf = 9.80665N
Torque	N·m	kgf·cm	1 kgf·cm = 0.0980665N·m
Spring constant	N/mm	kgf/mm	1 kgf/mm = 9.80665N/mm
Pressure	Pa	kgf/cm^2	1 kgf/cm^2 = 98.0665kPa
		mmHg	1 mmHg = 0.133322kPa

3-2 PREFIX USED IN SI UNIT

The following are typical prefixes used in SI unit. (10 to the power of n)

M	10^6
K	10^3
h	10^2
da	10^1
d	$10^{-1}=0.1$
c	$10^{-2}=0.01$
m	$10^{-3}=0.001$
μ	$10^{-6}=0.000001$

4 TIGHTENING TORQUE

4-1 HOW TO KNOW TIGHTENING TORQUE FOR GENERAL STANDARD BOLTS AND NUTS

4-1-1 HOW TO KNOW TIGHTENING TORQUE FOR BOLTS

First, determine the strength division of the bolt from the table below. Then, find out the tightening torque for that bolt, using the tightening torque table.

4-1-2 HOW TO KNOW TIGHTENING TORQUE FOR NUTS

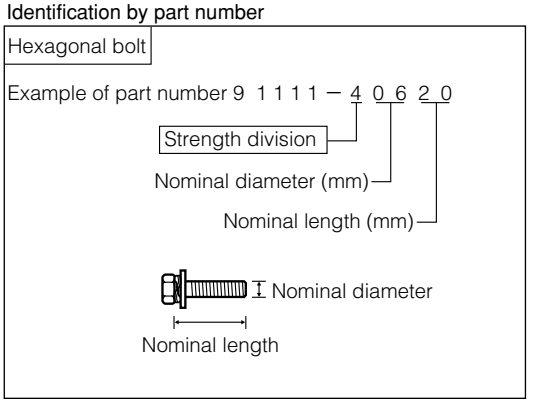
Find out the tightening torque for nuts in the same way as with the procedure given above, based on the mating bolts.

4-1-3 IDENTIFICATION

Identification of strength division by checking bolts themselves

Classification (Strength division)	Shape of head (how to know strength division)	
	Bolt without collar	Bolt with collar
4 T		
5 T		—
6 T	— —	
7 T		—

Identification by part number



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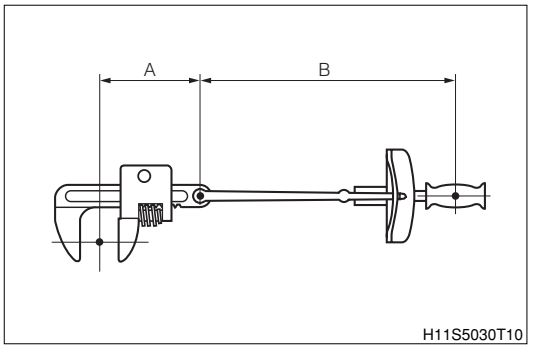
4-1-4 TIGHTENING TORQUE TABLE FOR GENERAL STANDARD BOLTS

Strength division	Nominal diameter (mm)	Pitch (mm)	Standard tightening torque (N·m{kgf·cm})	
			Bolt without collar	Bolt with collar
4 T	6	1.0	5.4 {55}	5.9 {60}
	8	1.25	13 {130}	14 {145}
	10	1.25	25 {260}	28 {290}
	12	1.25	47 {480}	53 {540}
	14	1.5	74 {760}	83 {850}
	16	1.5	113 {1150}	—
5 T	6	1.0	6.4 {65}	—
	8	1.25	16 {160}	—
	10	1.25	32 {330}	—
	12	1.25	59 {600}	—
	14	1.5	91 {930}	—
	16	1.5	137 {1400}	—
6 T	6	1.0	7.8 {80}	8.8 {90}
	8	1.25	19 {195}	20.5 {210}
	10	1.25	39 {400}	43 {440}
	12	1.25	72 {730}	79 {810}
	14	1.5	109 {1100}	123 {1250}
7 T	6	1.0	11 {110}	12 {120}
	8	1.25	25 {260}	28 {290}
	10	1.25	52 {530}	58 {590}
	12	1.25	95 {970}	103 {1050}
	14	1.5	147 {1500}	167 {1700}
	16	1.5	225 {2300}	—

4-1-5 WHEN AN EXTENSION TOOL IS USED

1. When tightening with the SST or a tool connected to the torque wrench for a drive-end extension, a higher tightening torque will result, if tightened until the reading on the torque wrench indicates the specified torque.
2. This manual contains specified torques only. When using the SST or an extension tool, the torque wrench reading must be computed using the following formula.
3. Calculation formula: $T' = T \times B / (A + B)$

Codes	Meaning	Unit
T′	Torque wrench reading	N·m{kgf·cm}
T	Specified tightening torque	N·m{kgf·cm}
A	Length of the SST or a tool	cm
B	Torque wrench length	cm



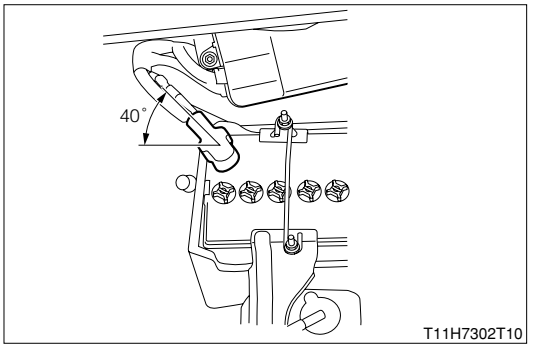
5 GENERAL SERVICE INSTRUCTION

5-1 JACK UP OR LIFT UP

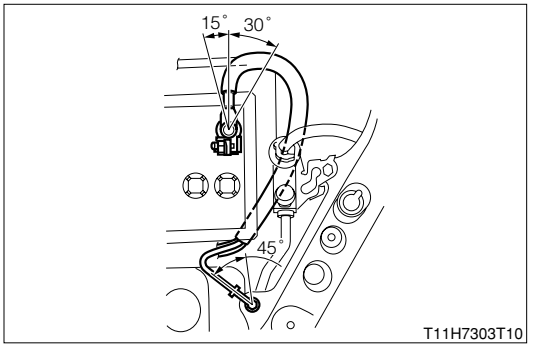
1.When only front section or rear section of a vehicle is jacked up, be sure to place chocks at the wheels so as to insure safe operations.
2.When the vehicle has been jacked up, be sure to support the vehicle at the specified section using the safety stands.
3.When the vehicle has been lifted up, be sure to set the cradle of the lift at the specified location, and lift it up. And after the jacking up, ensure to apply the protective safety device. And after the jacking up, ensure to apply the protective safety device.

5-2 INSTALLATION AND REMOVAL OF BATTERY TERMINAL

1.Disconnect the battery negative (-) terminal prior to repairing the electrical system, mounting/dismounting the engine, etc.
2.When connecting/disconnecting the battery terminal, turn the IG switch to "OFF" (LOCK position), and loosen the terminal nut completely. Do not pry the battery terminal off.
3.When the battery terminal is removed, clock, radio setup and the memory of diagnosis will be erased. Record the contents of the memory before disconnecting the battery terminal so that it can be restored as required after the work is complete.
4.When connecting the battery terminal, connect the positive (+) terminal first so that that the terminal wire will be placed in the marked area of the illustration, and tighten to the specified torque.
TIGHTENING TORQUE: 6.35±1.45N·m {65±15kgf·cm}



5.When connecting the battery negative (-) terminal, connect the terminal so that that the terminal wire will be placed in the marked area of the illustration, and tighten to the specified torque.
TIGHTENING TORQUE: 6.35±1.45N·m {65±15kgf·cm}
6.Securely install the cover, etc. on the terminal after work is complete.



5-3 CONNECTING/DISCONNECTING THE EARTH

1.When the earth was removed, check that the earth is securely in place and then turn "ON" the IG switch.

5-4 REPAIRING OF FUEL SYSTEM

1.Do not work near open flames.
2.Be certain to place a suitable container, a cloth, etc. under the connected section of the fuel line before disconnecting the fuel line.
3.Before the fuel line is disconnected, be sure to release the inner pressure of the fuel tank by detaching the fuel filler cap.
4.Be sure to prevent the fuel from splashing with a cloth or the like, when the union bolt or other connected section of the fuel line is loosened or slackened.
5.Tighten each connecting section to the specified torque.
6.Attach the specified clips to each connecting section.

5-5 USE OF THE SST

1.Utilize the SST (special tool) effectively in order to improve efficiency and accuracy of work operation.

5-6 REMOVAL, DISASSEMBLY

1.In case for the operation at the complicate place, the stamping and mating mark shall be put at the place where there is no influence to the function, so that the assembling operation becomes easy.
2.At every time when each parts are removed, check the condition when it was assembled, deformation, breakage, roughness and existence of scratch.
3.Arrange the removed parts in order, and divide them to the parts to replace and parts to reuse.
4.Each parts to be reused shall be performed enough cleaning and cleansing operation.

5-7 CHECK AND MEASUREMENT OF PARTS

1.As regards those parts to be used again, perform thorough checks and measurements, as required.

5-8 INSTALLATION, ASSEMBLING

1.Assemble the good parts with correct procedure following the specified standard (value for the adjusting, tightening torque).
2.Use the genuine parts when replace the parts.
3.Ensure to apply the seal packing and grease by a place.
4.Ensure to use new packing, gasket or the like, cotter pin etc.
5.When use the seal bolt, apply the specified liquid gasket and seal lock agent on.
6.As for bolts and nuts, use the specified ones. Unless otherwise specified, the side for which the torque is indicated should be tightened to the specified torque, using a torque wrench. If there is no means to prevent the turning at the opposite side, be sure to prevent turning with box wrenches, spanners or the like.

5-9 ADJUSTMENT, OPERATION CONFIRMATION

1.Adjust with the specified service standard value by using the gauge and the tester.

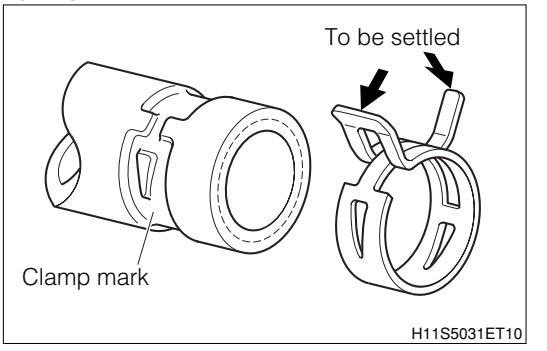
5-10 HANDLING OF HOSE OR THE LIKE

1.Check the plug depth and clamp position before removing the hose.
2.When re-using the hose, install the clamps so that they match the clamp marks remaining on the hose.

CAUTION

- Replace the clamps if they are deformed or flattened.
- Replace the hose a new one if the hose has a loose fitting with the joint.

3.Ensure that the spring type clamp is properly seated after installation.
4.Ensure to insert the fuel hose, water hose or the like without coming out or leakage.
5.Be careful that fuel shall not splash on the parts near by when remove the fuel hose. (Deep care shall be paid for engine mount rubber or the like, as there may be possibility to get material deterioration for liquid of gasoline series.)



5-11 TOUCH UP

1.When removed the bolt or the like during body fitting operation and others, the scratch of the paint finishing surface on the body and bolt shall be repaired by the body color.

6 SUPPORTING POINTS FOR JACKS AND SAFETY STANDS

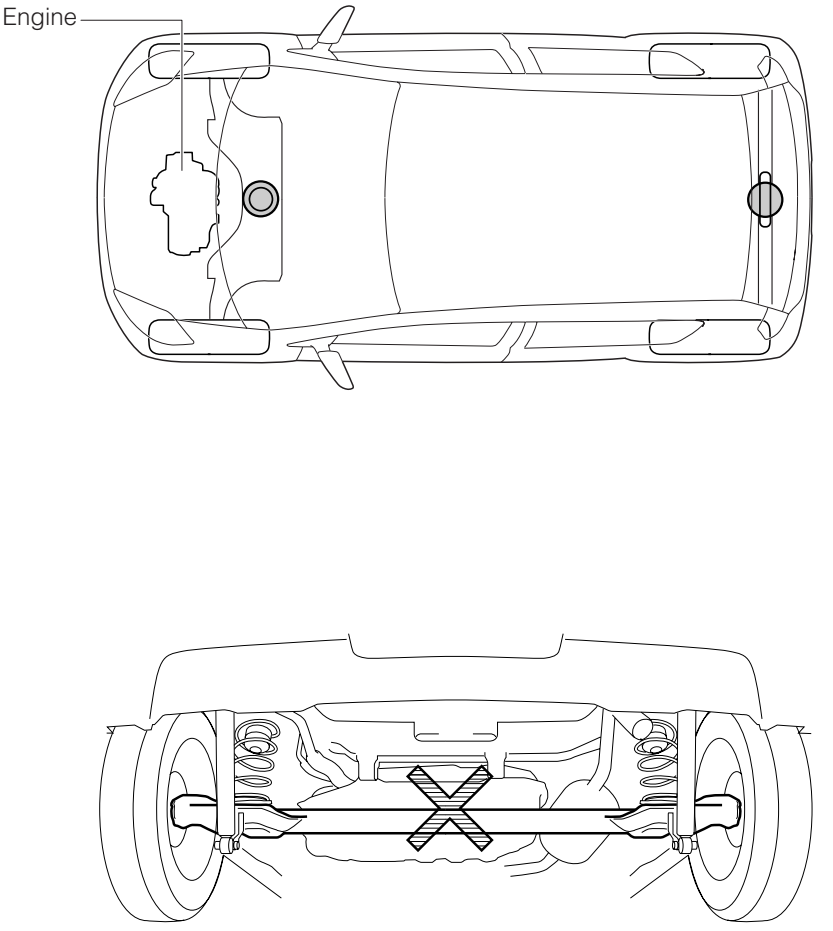
● Jack supporting point

Front side: Front suspension member center protruding section

Rear side: Rear floor cross member center section

CAUTION

- Do not jack up the rear suspension center beam portion.
  Deformation and/or damage to the beam might cause controllability problems.



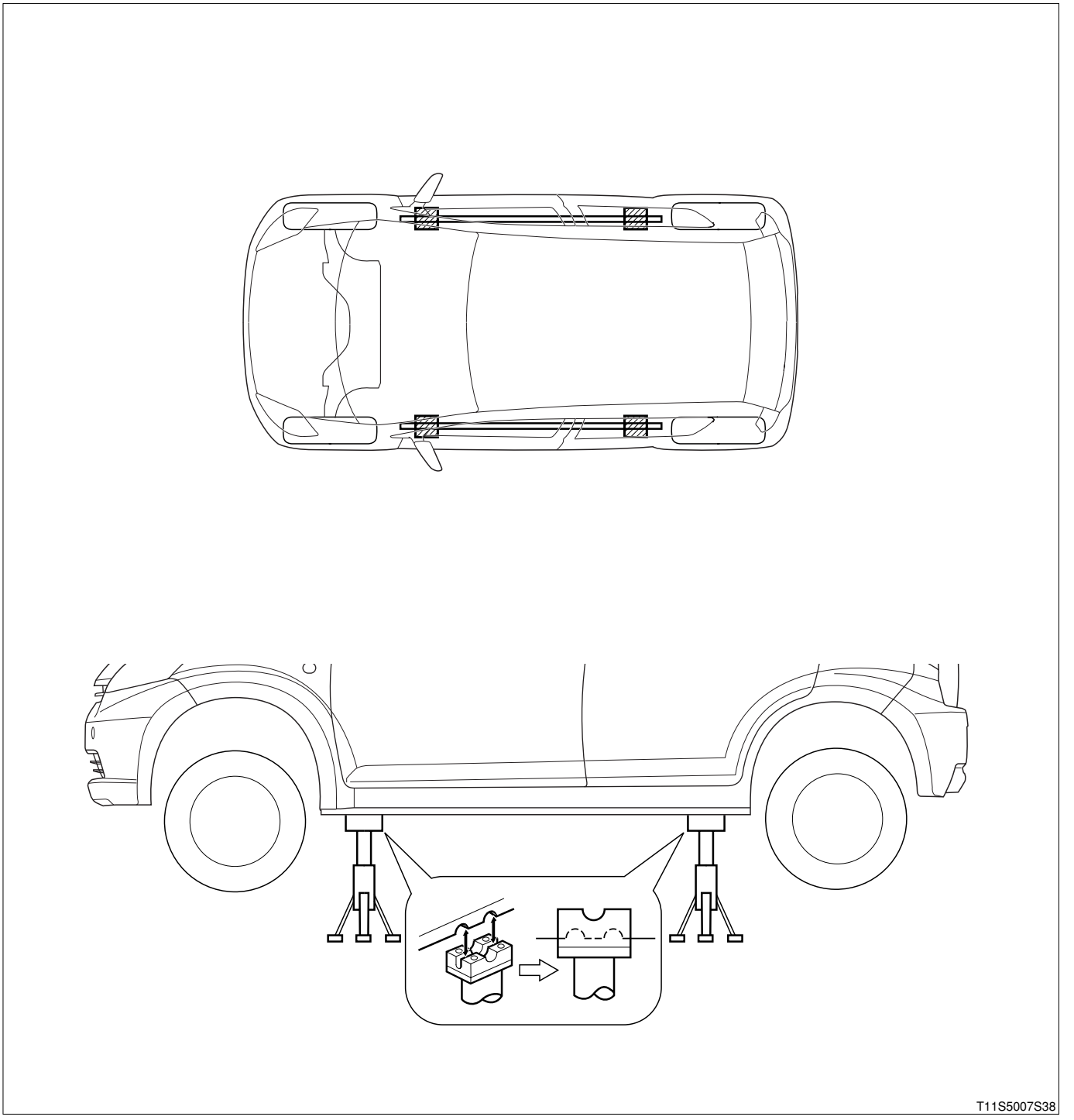
T11S5506ES30

● Rigid rack supporting points

Support 4 locations, namely front, rear, right and left as shown in the illustration below.

CAUTION

- The spot welded reinforcement plate provides adequate strength to the supporting points. Therefore, do not support the vehicle at points other than these supporting points.



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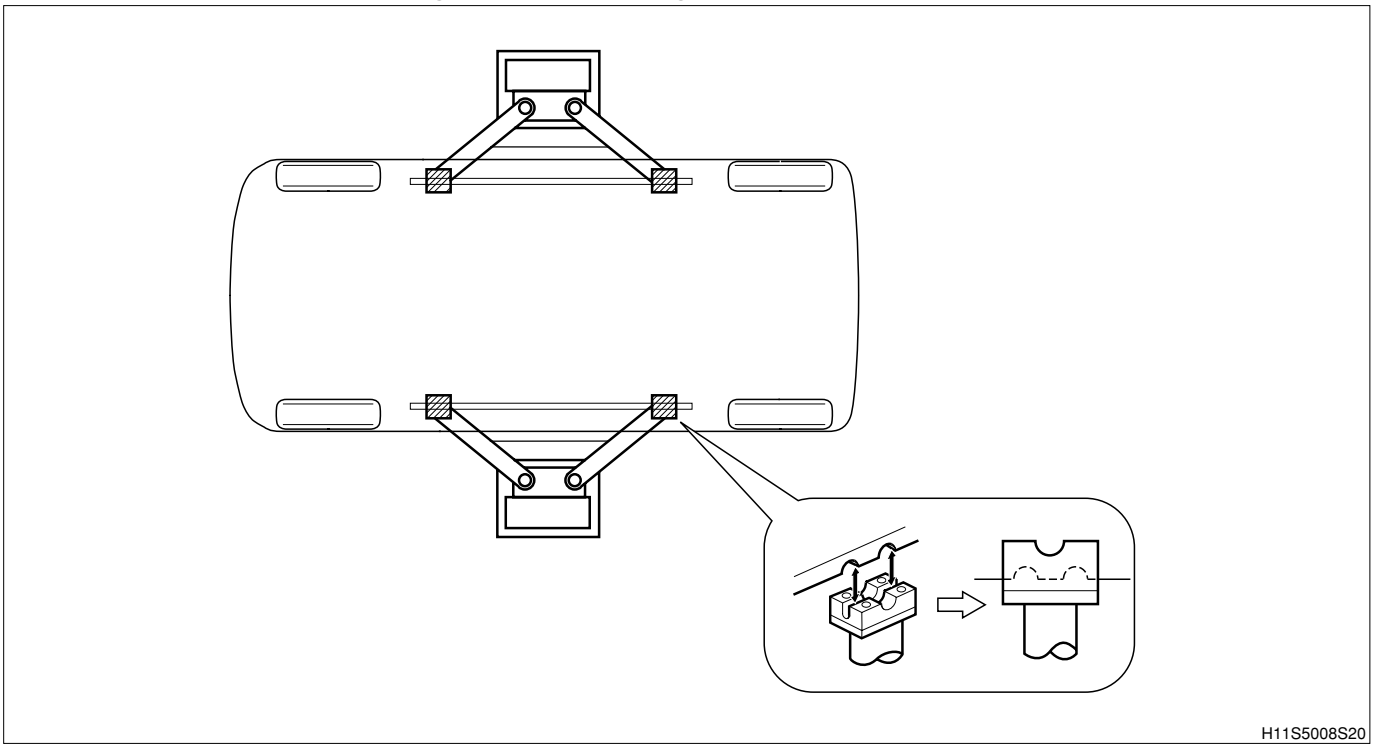
7 SUPPORTING POINTS OF LIFTS

● Swing Arm Type

Match the lift supports with the rigid rack supporting points.



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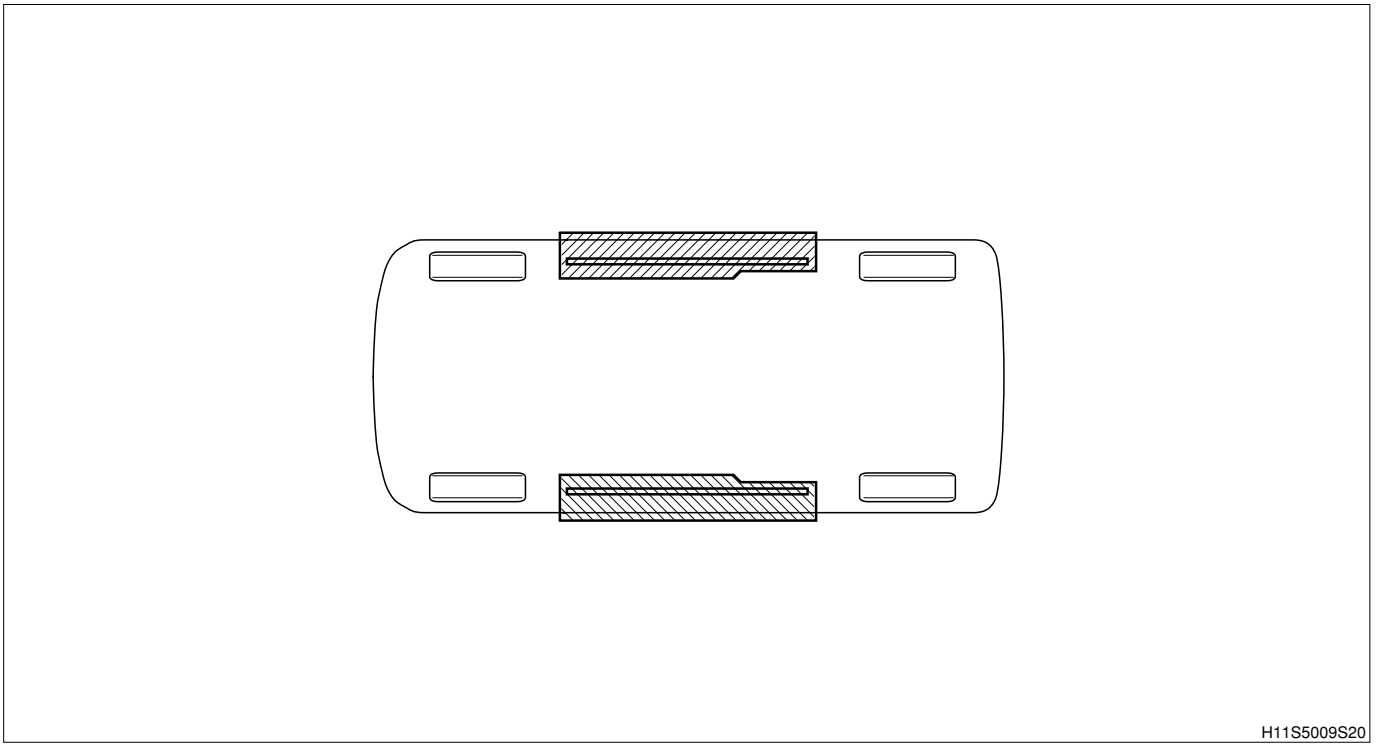
● Plate type

Drive the vehicle onto the center of the right and left supports.

Since the front part is heavier, lift up the vehicle at the front wherever possible.



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8 TOWING INSTRUCTIONS

1.Be certain to transfer the vehicle by using the flat deck truck when the running system and/or driving system seems to be abnormal.

2.Do not tow with the rope for an automatic transmission vehicle.

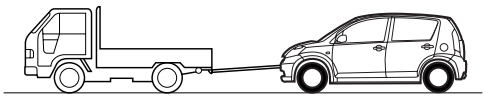
8-1 TOWING WITH ROPE(ONLY FOR EMERGENCY)

Release parking brake, and turn IG switch to "ACC" position, and then put the shift lever into neutral range.

CAUTION

- Do not tow with the rope for an automatic transmission vehicle.
- Do not tow with the rope when the running system and/or driving system seems to be abnormal.
- When drive with engine stopping, brake efficiency become less due to no functioning of the brake servo system. Depress the brake pedal more powerfully than the usual.

Towing by means of a rope



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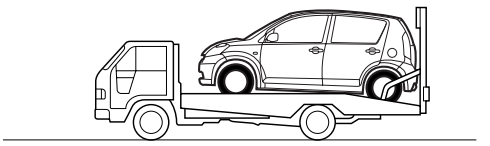
8-2 USING FLAT BED TRUCK

1.Transfer the vehicle with applying parking brake and fixing the vehicle firmly.

Transport on a track



T11S5017ET10

8-3 WHEEL LIFT TYPE

CAUTION

- Do not allow anyone to be in the vehicle being towed.

8-3-1 TO TOW WITH REAR WHEELS ON GROUND

1.Release the parking brake.

8-3-2 TO TOW WITH FRONT WHEELS ON GROUND

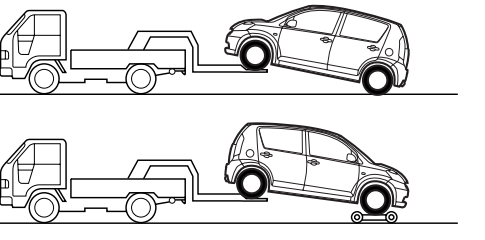
1.Use a towing dolly.

2.If a towing dolly is not available, and turn IG switch to "ACC" position, and then put the shift lever into neutral range (for manual transmission vehicle).

CAUTION

- For an automatic transmission vehicle, be sure to always use a towing dolly.

Wheel lift type



T11S5518ET10

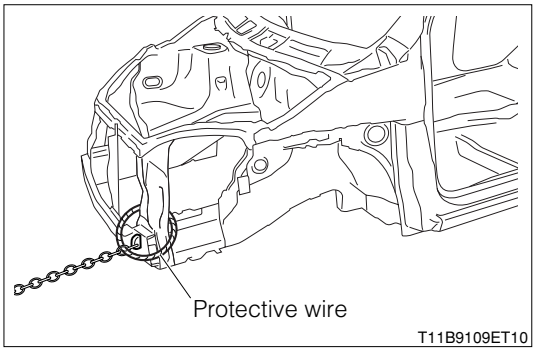
9 NOTES ON BODY REPAIRS

9-1 GENERAL INSTRUCTIONS ON OPERATION

9-1-1 SAFETY MEASURES

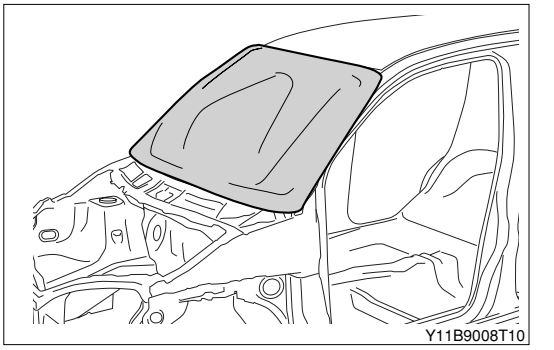
When you perform such an operation during which a body frame straighter is employed, be sure not to enter in the pulling direction. Moreover, make sure to use protective wire or chain.

Ensure that all of clamps and pullers are installed accurately.



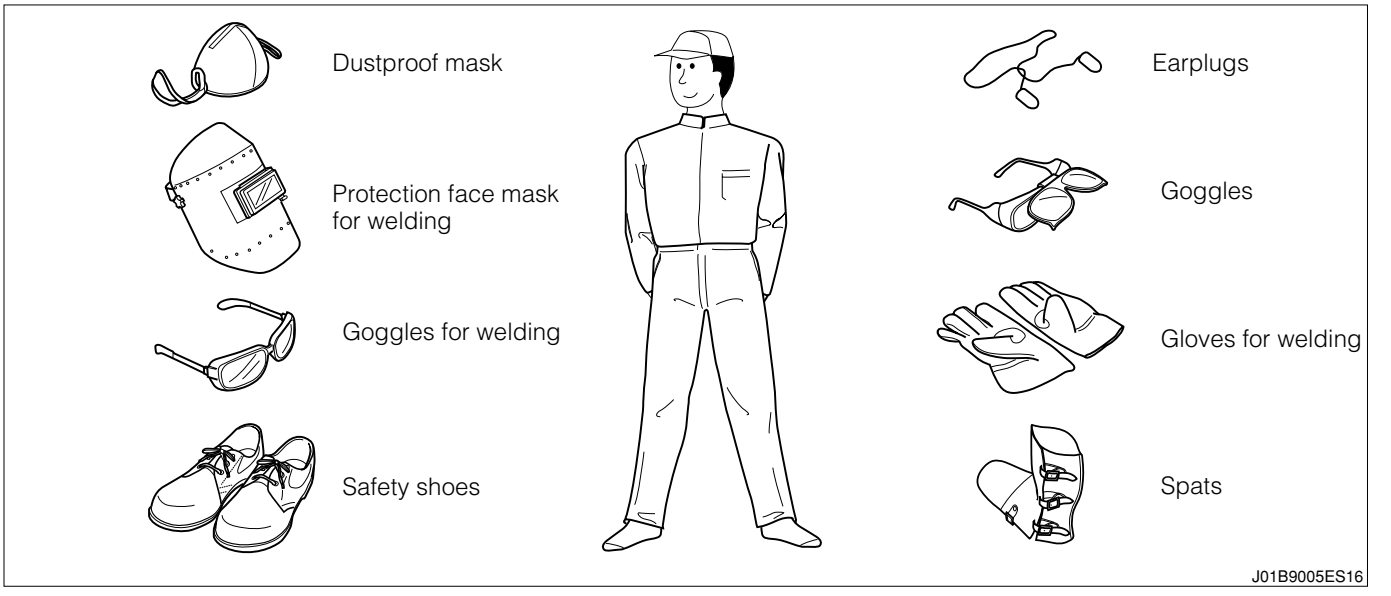
9-1-2 PROTECTION OF MOTOR VEHICLE

Be sure to use protective covers so that the motor vehicle may be protected from getting dirt. Make certain to employ heat resistant protective covers especially during welding operation so as to protect glass, seat and so forth.



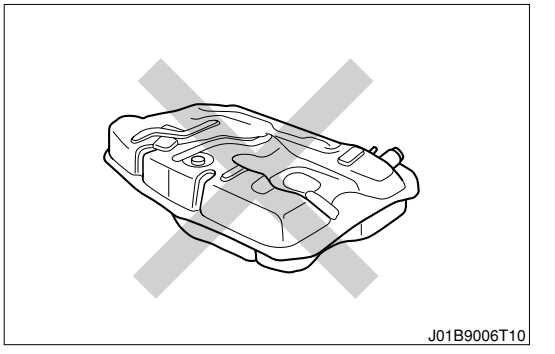
9-1-3 WEARING OF PROTECTIVE EQUIPMENT

Make sure to wear long-sleeved working dress, safety shoes and so forth. Also, correctly use protectors suitable to the operation.



9-1-4 REMOVAL OF DANGEROUS ARTICLES

When fire is used, for example, during welding in the vicinity of the fuel tank, make sure to remove the fuel tank. Moreover, be sure to plug the disconnected pipes of the removed fuel tank side so as to prevent fuel leakage. Prior to the operation, make certain to remove any residual fuel, etc. completely from the vehicle side pipe disconnected from the fuel tank.



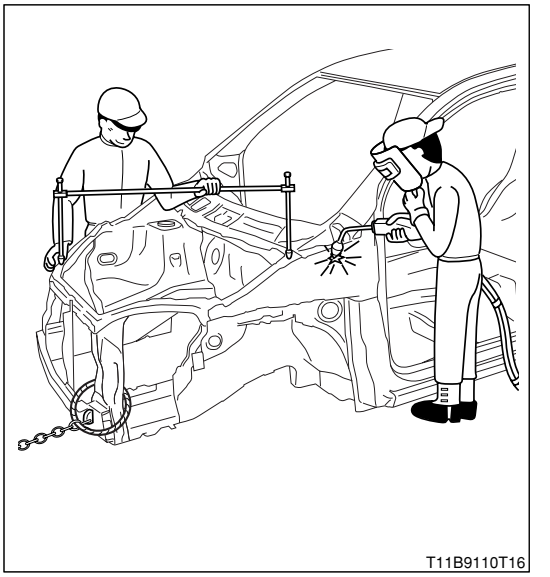
9-2 REMOVAL OPERATION

WARNING

- During the operation, make sure to wear protectors suitable to the operation. Moreover, utmost care must be exercised to ensure that your fingers or hands may not be pinched.

9-2-1 DIMENSION MEASUREMENT PRIOR TO OPERATION

Prior to operations such as removal and cutting, be sure to measure the related-sections in accordance with the body dimensional diagrams so as to evaluate the extent of damage. Then, proceed to carry out rough straightening by means of a body frame straighter.

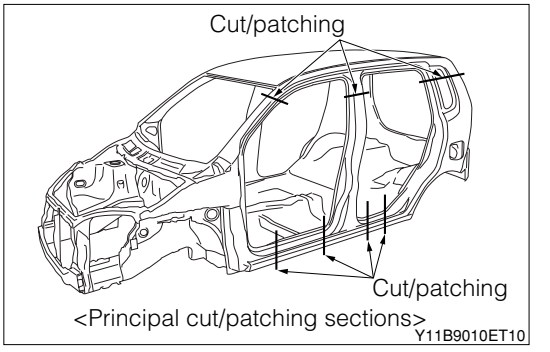

T11B9110T16

9-2-2 SELECTION OF CUT/PATCHING SECTION

As a cut/patching section of the panel, be sure to select adequate areas where strain due to welding is small, taking into consideration the strength of the body construction.

CAUTION

- Be sure to confirm the relationship with the part to be replaced. For example, ensure that the inside reinforcements, etc. have not been cut.



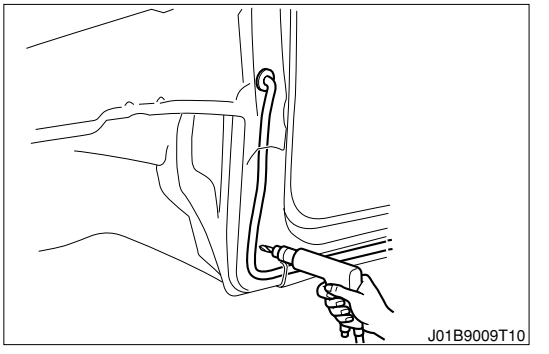
<Principal cut/patching sections>
Y11B9010ET10

9-2-3 DRILLING AND CUTTING OPERATION OF DAMAGED PANEL

When you perform drilling or cutting operations, make sure that no wire harness or hose, etc. is located at the backside.

CAUTION

- Be very careful not to damage any panel not to be replaced.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9-2-4 REMOVAL OF RELATED-PARTS

Prior to removal of related parts such as molding, be sure to affix protective tape to the body and tools so that no damage is made to the body and parts to be removed.

CAUTION

- If paint film is damaged, be sure to perform repairing painting.

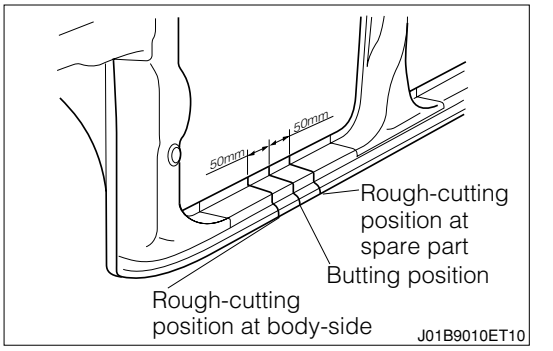
9-3 PREPARATION OF INSTALLATION

WARNING

- During the operation, make sure to wear protectors suitable to the operation. Moreover, utmost care must be exercised to ensure that your fingers or hands may not be pinched.
- Never use fires, such as welding operations, at those places where dangerous articles are stored.

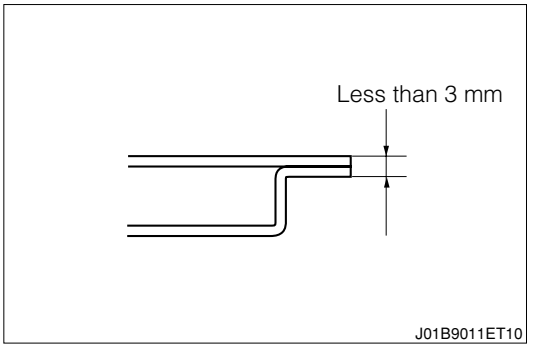
9-3-1 ROUGH CUTTING OF CUT/PATCHING SECTION

When performing rough cutting of a panel, be sure to take into consideration the overlapping width (approx 30-50 mm) for the butting welding section.



9-3-2 SPOT WELDING SECTION

If the sum of the sheet thickness at the welding section is less than 3 mm, perform spot welding. Conversely, if the sum of the sheet thickness is 3 mm or more, perform plug welding.



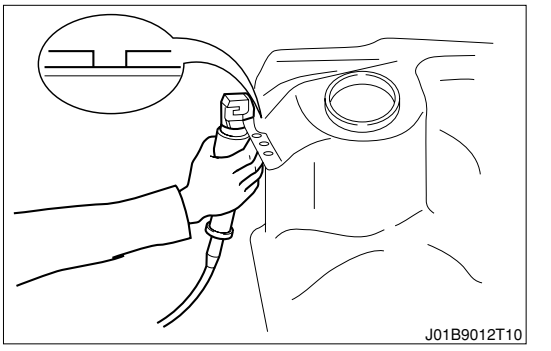
9-3-3 PLUG WELDING SECTION

At areas where spot welding can not be performed, make holes with a pin punch or a drill. Then, perform a plug welding.

NOTE

- BORE DIAMETER TABLE FOR PLUG WELDING

Sheet thickness of welded parts (mm)	Bore for plug welding (mm)
Less than 1.0	5.0 or more
1.0 or more to less than 1.5	6.5 or more
1.5 or more	8.0 or more



CAUTION

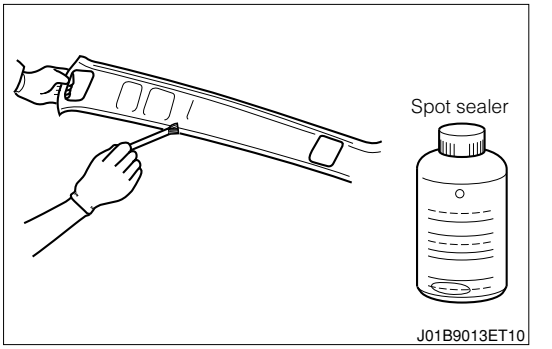
- As for the two steel sheets to be used at plug welding sections, they must be contacted closely each other. This is a rule to be observed to assure adequate welding strength.

9-3-4 SPOT SEALER APPLICATION

As for the mating surfaces of the spot welding points, be sure to completely remove the paint films so as to assure better flow of electricity. Also, apply spot sealer as a rust-preventive treatment.

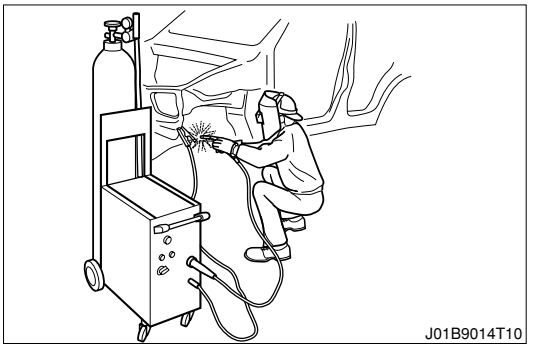
CAUTION

- Do not apply spot sealer to the surface to be painted.



9-3-5 PROTECTION OF ELECTRIC PRODUCTS

Prior to the welding operation, be sure to disconnect the cable from the battery negative (-) terminal. Then, make sure to connect the earth of the welder to a position near the body welding point.



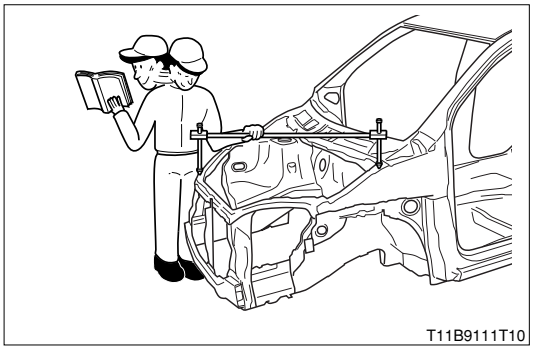
9-4 INSTALLATION OPERATION

WARNING

- During the operation, make sure to wear protectors suitable to the operation. Moreover, utmost care must be exercised to ensure that your fingers or hands may not be pinched.
- Never use fires, such as welding operations, at those places where dangerous articles are stored.

9-4-1 DIMENSION MEASUREMENT PRIOR TO OPERATION

1. When installing the main components of the underbody and engine compartment, perform the operations correctly, referring to the body dimensional diagram.
2. In the case of the door installation section (opening), etc., temporarily assemble the actual parts and confirm the gap, difference in height, etc.

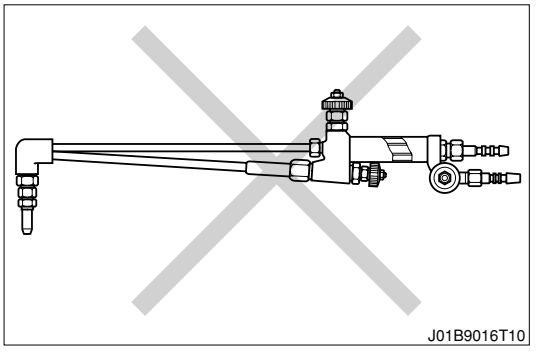


9-4-2 INSTRUCTIONS DURING WELDING

1. Perform welding at more points than performed by the manufacturer.

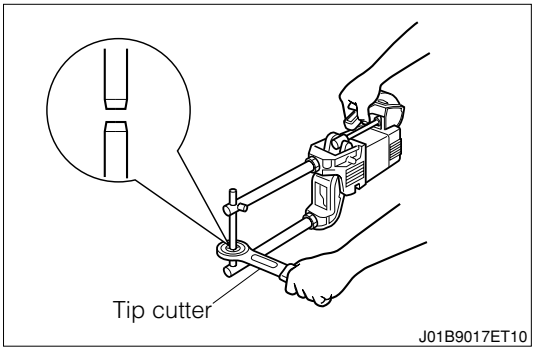
   SPECIFIED VALUE: Spot welding: At least 1.3 times as many as number performed by the manufacturer
   Plug welding: At least the same number as that performed by the manufacturer
   The distance between spot welding points should be at least 13 mm.

2. When welding the panel, gas welding or brazing is not allowed on areas except for those specified.

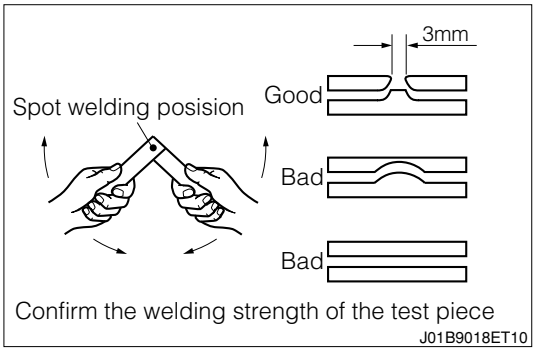


9-4-3 INSTRUCTIONS DURING SPOT WELDING

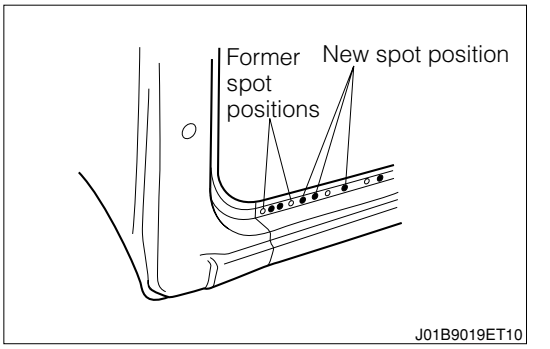
1. Be sure to keep the correct shape of the tip end of a spot welder at all times, for this will affect the welding strength. Install the arm and tip properly.



2.Prior to spot welding, perform trial run of spot welding on a test piece having the same thickness as the sheet. Confirm the strength of the test piece.



3.When selecting spot welding positions, avoid former spot positions.



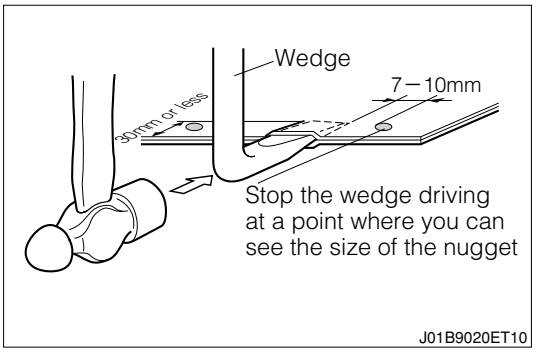
9-4-4 NONDESTRUCTIVE TEST

1.In order to inspect the welding conditions, drive a wedge as indicated in the right figure into the side of the nugget, according to the procedure indicated in the figure.

CAUTION

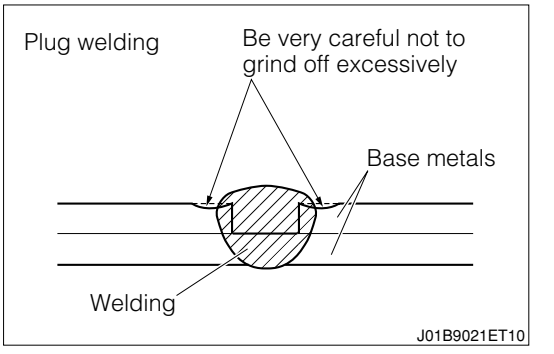
- Be sure to stop the wedge driving at a point where you can evaluate the deposit conditions. Do not drive the wedge more than 30 mm.
- After completion of the inspection, remedy the opened section properly.

2.In the case of spot welding of three-fold or four-fold sheet, carefully confirm the deposit conditions.



9-4-5 FINISH AFTER WELDING

When you use a sander to finish the welded zone after completion of the welding operation, be very careful not to grind off excessively.

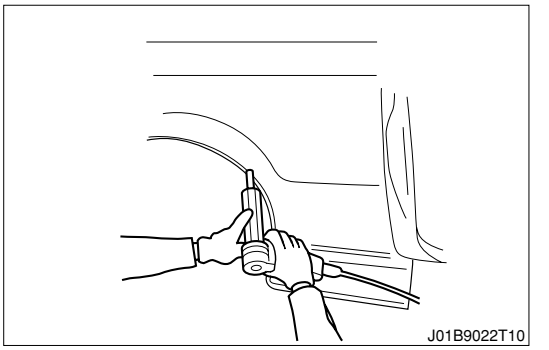


9-5 RUST PREVENTIVE TREATMENT

9-5-1 BODY SEALER APPLICATION

The body sealer prevents water or mud from entering through a panel joint section, thus preventing rust formation at the joint section. Therefore, this work should be done carefully. Also, it is necessary to apply the body sealer neatly where the finish state is important, such as an external panel.

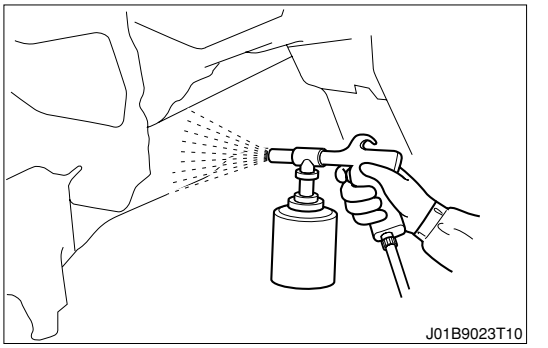
Refer to Page D-1



9-5-2 UNDERCOAT APPLICATION

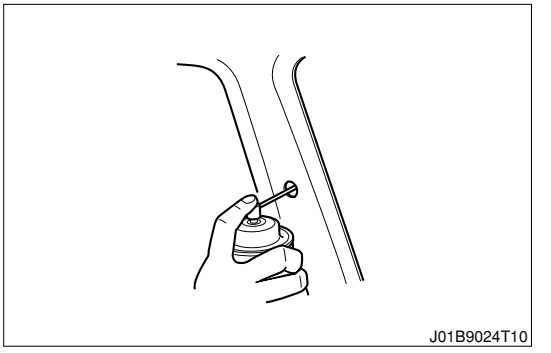
Since the inside of the wheel house and back of the floor are sections where rust formation takes place due to damage by flying stones, apply undercoats to those sections for rust prevention.

Refer to Page D-6



9-5-3 RUST PREVENTION OF ENCLOSED CONSTRUCTION

In the case where the welding section is of enclosed construction, perform the rust preventive treatment, using an aerosol type rust preventive agent through machined holes, etc.



10 INSTRUCTIONS ON HANDLING AND OPERATION OF SRS AIRBAG

10-1 INSTRUCTIONS FOR SERVICE OPERATION

Be sure to perform the service operation for the vehicle equipped with the airbag and seat belt pretensioner according to the correct procedure and method, otherwise, the airbag or pretensioner may occur the malfunction and lead serious accidents during the service operation. Be sure to perform the service operation according to the correct procedure and method described in this manual.

10-1-1 DISCONNECTING THE POWER SUPPLY

1. Check the diagnosis code, and then disconnect the battery negative (-) terminal with the IG switch in "LOCK" position. Wait for 60 seconds to start work operation.
   (1) The SRS airbag system is provided with a backup condenser (for the squib). Therefore, allow approx. 60 seconds for the backup condenser to discharge after the battery negative (-) terminal is removed. (Natural discharge)
   (2) If work is started within 60 seconds, the air bag and the pretensioner may be activated.
   (3) The memory of some systems will be erased when the battery negative (-) terminal is removed. Therefore, record memory contents of each system, as required, and input them after the work operation is complete.
2. Turn the IG switch to "LOCK" and connect the battery negative (-) terminal.

10-1-2 CAUTION TIPS BEFORE SERVICING

1. For electrical checks, ensure that a digital circuit tester is used that meets the following standard.

WARNING

- If the tester to be used exceeds the specified value, the airbag and the pretensioner may be activated or damaged.

SPECIFIED VALUE: About 50 mA (0.05A) or less

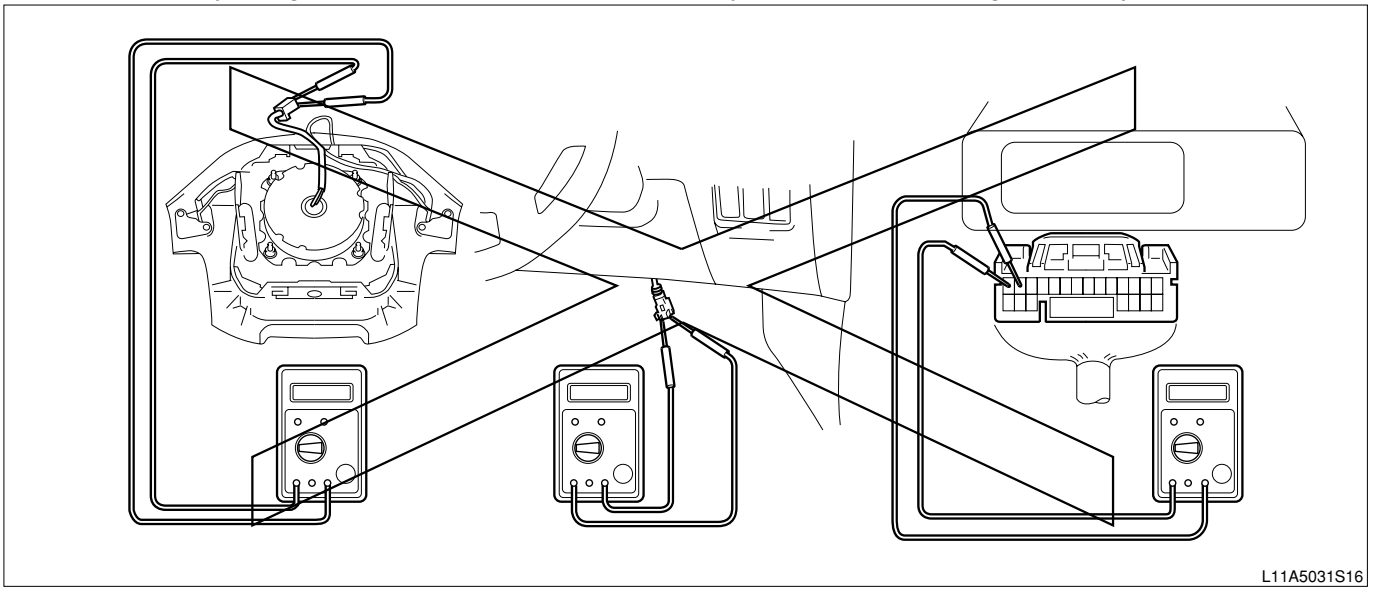
NOTE

- Always measure the current value of the tester to be used before starting work operation to ensure that the tester satisfies the specified value.
- When performing the current measurement for the tester, use the minimum range of the resistance (Ω).

2.When any of the components is removed from the air bag system (including disconnection of the connector), ensure that the connector is removed in advance so that no accident will be caused inadvertently.
3.Follow instructions given on the label. Replace a stained or damaged label with a new one.
4.Never disassemble.
5.If the part has been dropped or exhibits a crack, dent or chips, replace with a new part.
6.Never use the parts from other vehicles. Always install a new part for replacement.
7.Do not expose parts directly to high temperatures or fire.
8.Even if the airbag and/or the pretensioner have not been activated in a collision, always perform diagnostic checks.
9.Do not apply grease. Prevent detergent, oil, water, etc. from adhering. If this happens, wipe it off immediately with dry cloth.
10.Store in places which are less likely to be exposed to electrical noise, and are not exposed to high temperatures (85 ˚C or higher atmospheric temperatures), or high humidity.
11.Ensure that the airbag is activated with the SST, when the vehicle or the single part is discarded.
12.Never measure the resistance of the air bag components.

WARNING

- This is very dangerous, for the tester's current may activate the air bag and the pretensioner.



10-1-3 CAUTIONS WHEN DISCARDING THE AIR BAG AND THE PRETENSIONER

(1) Before deployment

1.Never scrap the system before activated and deployed.
2.The activation and deployment should be performed at an outdoor flat place where safety can be ensured. Avoid performing this operation in a residential area whenever possible.
3.Since the activating and deploying sound is fairly large, inform persons in the vicinity of the event before those devices are activated.
4.Use the SST and keep at least 5m away from the airbag and the pretensioner to perform a deployment operation.
5.Static electricity may activate deployment. Therefore touch steel frame, vehicle body, etc. that creates earth with bare hands to remove static electricity.
6.During deployment operation, carefully prevent the deployment side from facing down.

(2) After operation

1.The temperatures of some portions exceed a few hundred ˚C. Therefore, leave them at least 30 minutes after they are deployed.
2.Do not splash water.
3.Wear dust protective goggles and gloves during operation.
4.Place in a clear durable plastic bag and seal the bag to be scrapped.
5.After completion of the operation, be sure to wash your hands with water.

10-1-4 CAUTION TIPS FOR BODY REPAIR AND PAINT

1.When repairing components located close to the airbag system, ensure that the system will not be exposed to a strong hammering shock or high heat.
2.When using an electric welder, remove the air bag system before starting work.
3.When the system is expected to be exposed to a shock or high heat, remove the components from the airbag system before starting work.
4.When coating near the airbag system components is to be dried, ensure that temperature will not exceed 85 ˚C.
5.If the airbag system components have external damage or deformation, replace with new ones.

10-1-5 CASES WHERE THE AIRBAG AND THE PRETENSIONER NEED CHECKING

1.When the vehicle is damaged in a collision, including cases where no deployment or activation has occurred
2.When the diagnostic code is outputted:

10-1-6 CAUTIONS FOR THE AIRBAG AND THE PRETENSIONER

When temporarily placing the airbag during repair work, ensure that the deployment side faces upward. Do not put something on the airbag or lay one airbag on another.

WARNING

- If the airbag should be deployed with the metal side facing upward, a serious accident may result.

10-1-7 CAUTIONS FOR SPIRAL CABLE

When the spiral cable is installed, or the steering wheel is installed/removed, be sure to perform centering.

CAUTION

- If the steering wheel is operated without centering, the spiral cable may be cut.

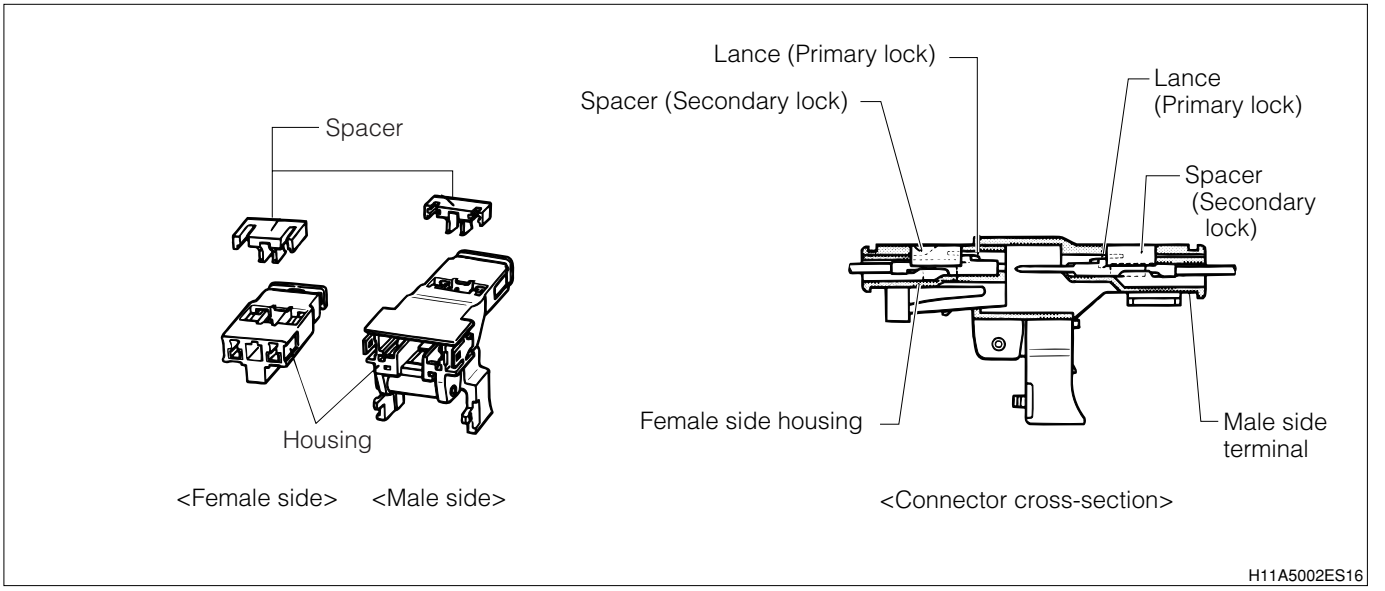
10-1-8 CAUTIONS FOR WIRE HARNESS AND CONNECTOR

All the connectors and the dedicated branch harnesses of the airbag system are colored in yellow, with the exception of exposed portions in the engine compartment. These connectors are special and require special care in handling in order to prevent any damage.

(1) Connector mechanism

① Terminal double lock mechanism

1.The mechanism provides better gripping force of the terminal so as to prevent the terminal from falling.
2.The connector has a two-piece construction consisting of a housing and a spacer, which doubly secures the terminal with the use of the lance (primary lock) and the spacer (secondary lock).

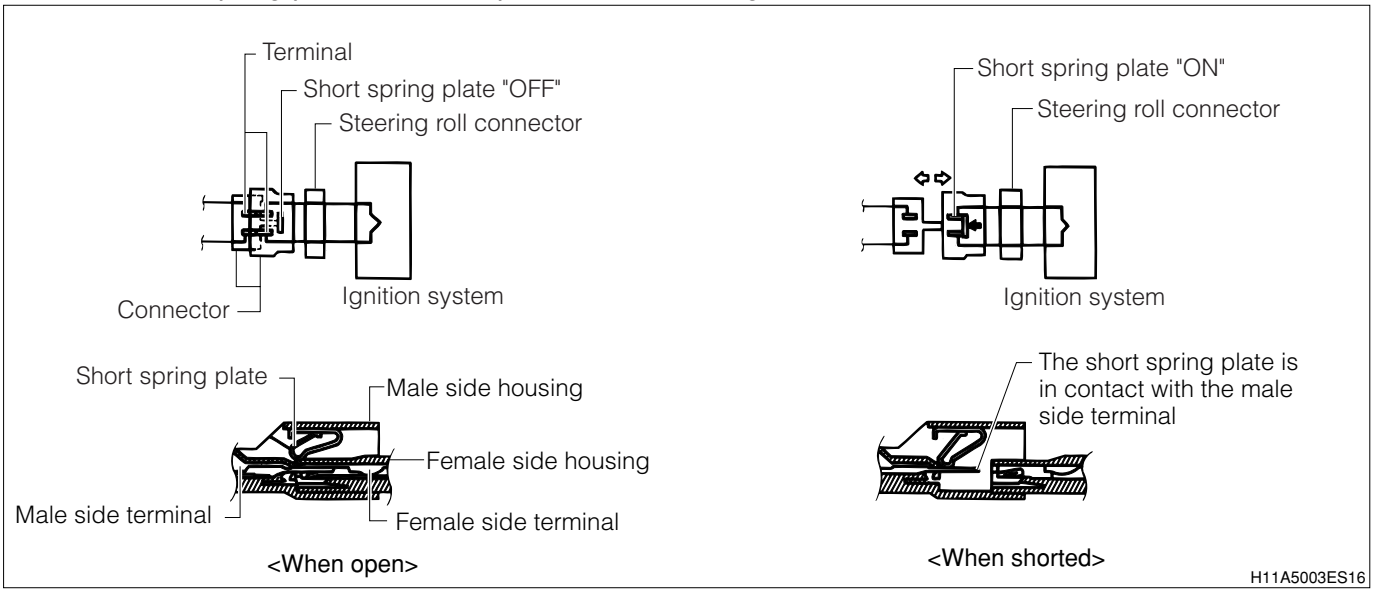


② Terminal short mechanism

1.The mechanism that automatically creates a short-circuit between the terminal on power supply side of the airbag and the terminal on the earth side, when the connector is removed.
2.The short spring plate is installed inside the connector, which creates a closed circuit on the airbag side (potential difference between the terminals is not created), thereby preventing wrong operation during servicing.

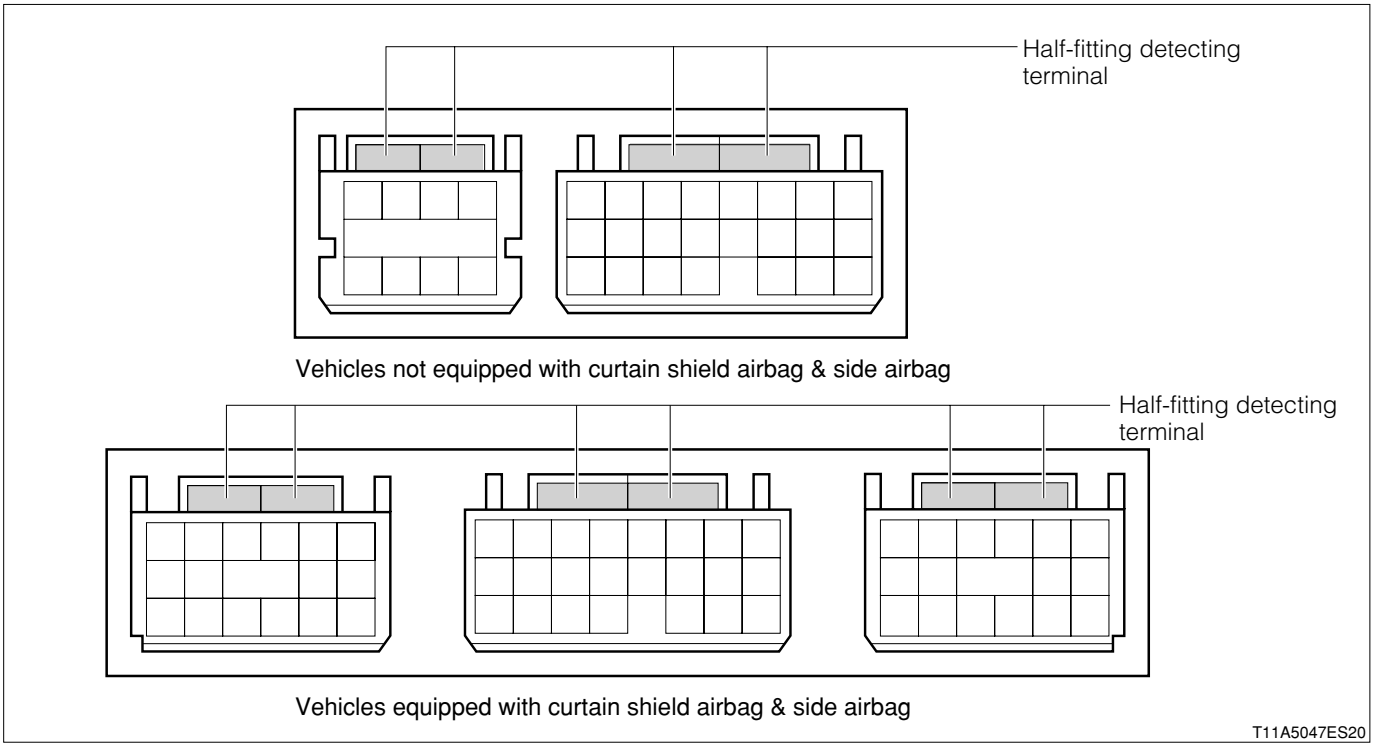
CAUTION

- When checking the harness, the terminal's short-circuit mechanism might lead to incorrect diagnosis, such as a short-circuit condition between the harnesses. When checking the harness, insert the airbag deployment SST (Part number: 09082-87710-000, 09082-00760-000) into the connector to be checked, and check the harness while the SST is connected. If this checking finds faulty condition in the harness, insert an insulator between the short spring plate and the terminal, or remove the short spring plate, and then proceed to checking.



③ Half fit detecting mechanism

1. This is a mechanism which detects whether the airbag ECU is firmly connected with the vehicle side harness connector.
2. When the IG SW is turned "ON" with the connector half-fit, the airbag warning lamp will remain illuminated.
3. When the airbag system is normal and the connector is firmly connected, the airbag warning lamp is turned off.



11 CAUTIONS ON PLASTIC COMPONENTS

Heat generated during work operations may cause deformation. Therefore check the characteristics of plastic and remove the components prior to starting work as required.

Table of the plastic characteristics

Symbol	Plastic name	* Allowable temperature limit (℃)	Resistance to solvents	Caution
AAS	Acrylonitrile-acrylic rubber styrene copolymer	80	Small amount of alcohol can be applied for a short time. (Such as wipe-off degreasing)	No organic solvents such as gasoline. No air freshener.
ABS	Acrylonitrile-butadiene styrene copolymer	80	Small amount of alcohol can be applied for a short time. (Such as wipe-off degreasing)	No organic solvents such as gasoline. No air freshener.
AES	Acrylonitrile-ethylene rubber styrene copolymer	80	Small amount of alcohol can be applied for a short time. (Such as wipe-off degreasing)	No organic solvents such as gasoline. No air freshener.
ASA	Acrylonitrile-styrene acrylate	80	Small amount of alcohol can be applied for a short time. (Such as wipe-off degreasing)	No organic solvents such as gasoline. No air freshener.
CAB	Cellulose acetate butyrate	80	Small amount of alcohol can be applied for a short time. (Such as wipe-off degreasing)	No organic solvents such as gasoline. No air freshener.
EPDM	Ethylene-propylene rubber	100	Small amount of alcohol can be applied for a short time. Gasoline possible. (Such as wipe-off degreasing)	Do not soak in organic solvents, such as gasoline and alcohol. Do not allow organic solvents to come into contact. Thoroughly rinse the remover in water.
EVA	Ethylene-viny acetate copolymer	70	Small amount of alcohol can be applied for a short time. (Such as wipe-off degreasing)	No organic solvents such as gasoline. No air freshener.
FRP	Fiber reinforced plastics	150	Alcohol or gasoline can be applied.	Most solvents may be applied.
PA	Polyamide	80	Alcohol or gasoline can be applied.	No battery fluid (sulfuric acid)
PBT	Polybutylene terephthalate	160	Alcohol or gasoline can be applied.	Most solvents may be applied.
PC	Polycarbonate	120	Small amount of alcohol can be applied for a short time.	No organic solvents such as brake fluid, wax, wax remover and gasoline can be used.
PE	Polyethylene	80	Alcohol or gasoline can be applied.	Most solvents may be applied.
PET	Polyethylene terephthalate	75	Alcohol or gasoline can be applied.	Do not soak in water.
PGM	Polypropylene glass fiber pulp	80	Alcohol or gasoline can be applied.	Most solvents may be applied.
PMMA	Polymethyl methacrylate (acryl)	80	Small amount of alcohol can be applied for a short time. (Such as wipe-off degreasing)	Do not soak in organic solvents, such as gasoline and alcohol. Do not allow organic solvents to come into contact. Thoroughly rinse the remover in water.

Symbol	Plastic name	* Allowable temperature limit (℃)	Solvent resistance	Caution
POM	Polyacetal	100	Alcohol or gasoline can be applied.	Most solvents may be applied.
PP	Polypropylene	80	Alcohol or gasoline can be applied.	Most solvents may be applied.
Degen-eration PPO	Polyphenylene oxide	100	Small amount of alcohol can be applied for a short time.	Do not soak in organic solvents, such as gasoline and alcohol. Do not allow organic solvents to come into contact.
PS	Polystyrene (styrol)	60	Small amount of alcohol can be applied for a short time.	Do not soak in organic solvents, such as gasoline and alcohol. Do not allow organic solvents to come into contact.
PUR	Thermosetting polyurethane	80	Small amount of alcohol can be applied for a very short time. (Such as wipe-off degreasing)	Do not soak in organic solvents, such as gasoline and alcohol. Do not allow organic solvents to come into contact.
PVC	Polyvinyl chloride	80	Small amount of alcohol or gasoline can be applied for a short time. (Such as wipe-off degreasing)	Do not soak in organic solvents, such as gasoline and alcohol. Do not allow organic solvents to come into contact.
SAN	Styrene-acrylonitrile copolymer	80	Alcohol can be applied to wipe-off for a short time.	Do not soak in organic solvents, such as gasoline and alcohol. Do not allow organic solvents to come into contact.
TPO	Olefin-based thermoplastic elastomer	80	Alcohol can be applied. Gasoline can be applied for a short time. (Such as wipe-off degreasing)	Do not soak in organic solvents, such as gasoline. Do not allow organic solvents to come into contact. Thoroughly rinse the remover in water.
TPU	Urethane-based thermo-plastic elastomer	80	Small amount of alcohol or gasoline can be applied for a short time. (Such as wipe-off degreasing)	Do not soak in organic solvents, such as gasoline. Do not allow organic solvents to come into contact. Thoroughly rinse the remover in water.
UP	Unsaturated polyester	110	Alcohol or gasoline can be applied.	No alkalies.
E/VAC	Ethylene-vinyl acetate vinyl copolymer	70	Small amount of alcohol can be applied for a short time. (Such as wipe-off degreasing.)	No organic solvents such as gasoline No air refresher.
PPF	Composite reinforced polypropylene	80	Alcohol or gasoline can be applied.	Most solvents may be applied.

*Allowable temperature limit here means "the temperatures that may cause deformation due to heat during work operations."

Material list for plastic components

Part name	Material
Front bumper cover	PP
Radiator grille	PP
Headlight	PP/PC
Side turn-signal lamp	PMMA/ABS
Outer rear view mirror	ABS/PBT
Door outer handle	PC/PBT
Side stone guard	PP
Rear bumper cover	PP
Rear combination lamp	PC/ASA/PMMA
LICENSE PLATE LAMP	PC/PBT

TO INDEX

B BODY CONSTRUCTION

OUTLINE ---------- B - 1
CONSTRUCTION AND OPERATION ------ B - 2
SAFETY PERFORMANCE ---------- B - 2
BODY SHELL ---------- B - 5

1 OUTLINE

1.The vehicle features compatibility body frame structure to enhance passive safety, offering protection in all directions in a collision with a vehicle weighing more.

NOTE

- Compatibility body: This refers to the body structure that is designed to pursue compatibility in a collision between two vehicles of different weights and offer optimum protection for both vehicles, through an improvement in passive safety for the lighter vehicle and a reduction in aggressiveness of the heavier vehicle.

2.The vehicle features Total Advanced Function "TAF" to secure cabin space for survival in the event of a collision and to protect the occupants. TAF meets the Japan's passive safety standard (50 km/h frontal, side, and rear collisions) and the European passive safety standard (40% offset frontal collision at 56 km/h, side collision at 50 km/h). Moreover, Daihatsu Motor sets up our own stricter target levels to provide a highest level of protection for occupants in this class of the vehicles.

NOTE

- "TAF"(Total Advanced Function body) refers to a collision safety body that has been evolved totally.

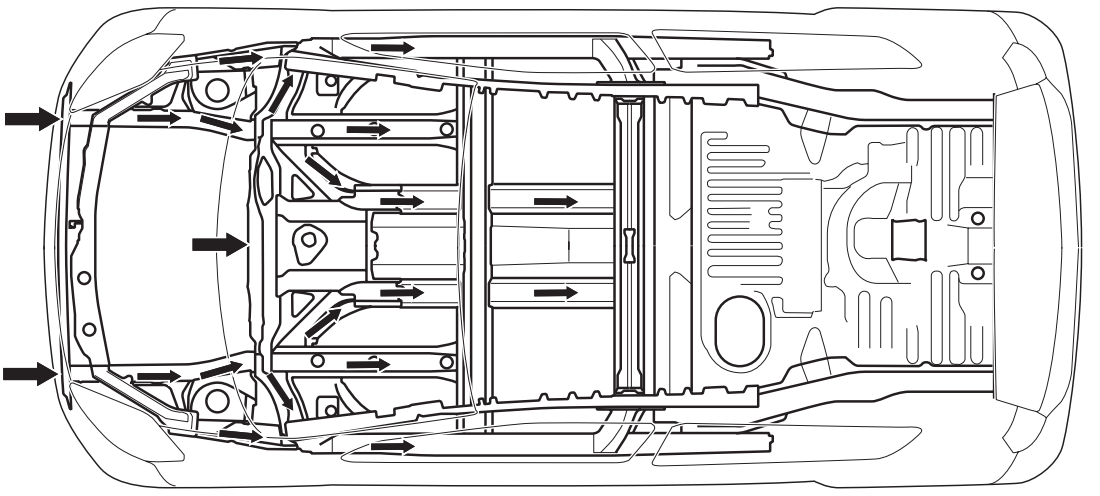
3.High-tension steel sheets have been employed on principal structure, thereby realizing a body that features light weight and high rigidity.

2 CONSTRUCTION AND OPERATION

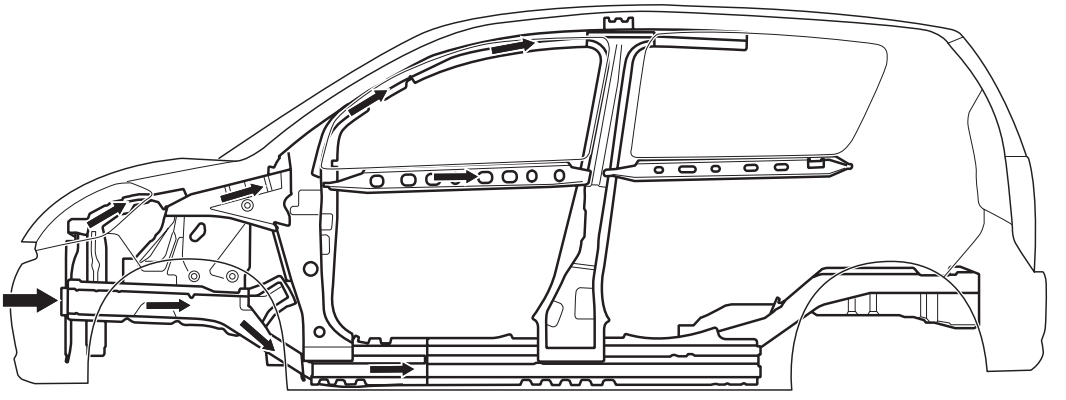
2-1 SAFETY PERFORMANCE

2-1-1 FRONT ENERGY ABSORPTION CONSTRUCTION

The vehicle features body frame structure that efficiently dissipates energy in a frontal impact from the front side member front to the front side member rear, front body pillar, locker panel, side door belt line, etc., to secure cabin space for occupant protection.



<Top view>

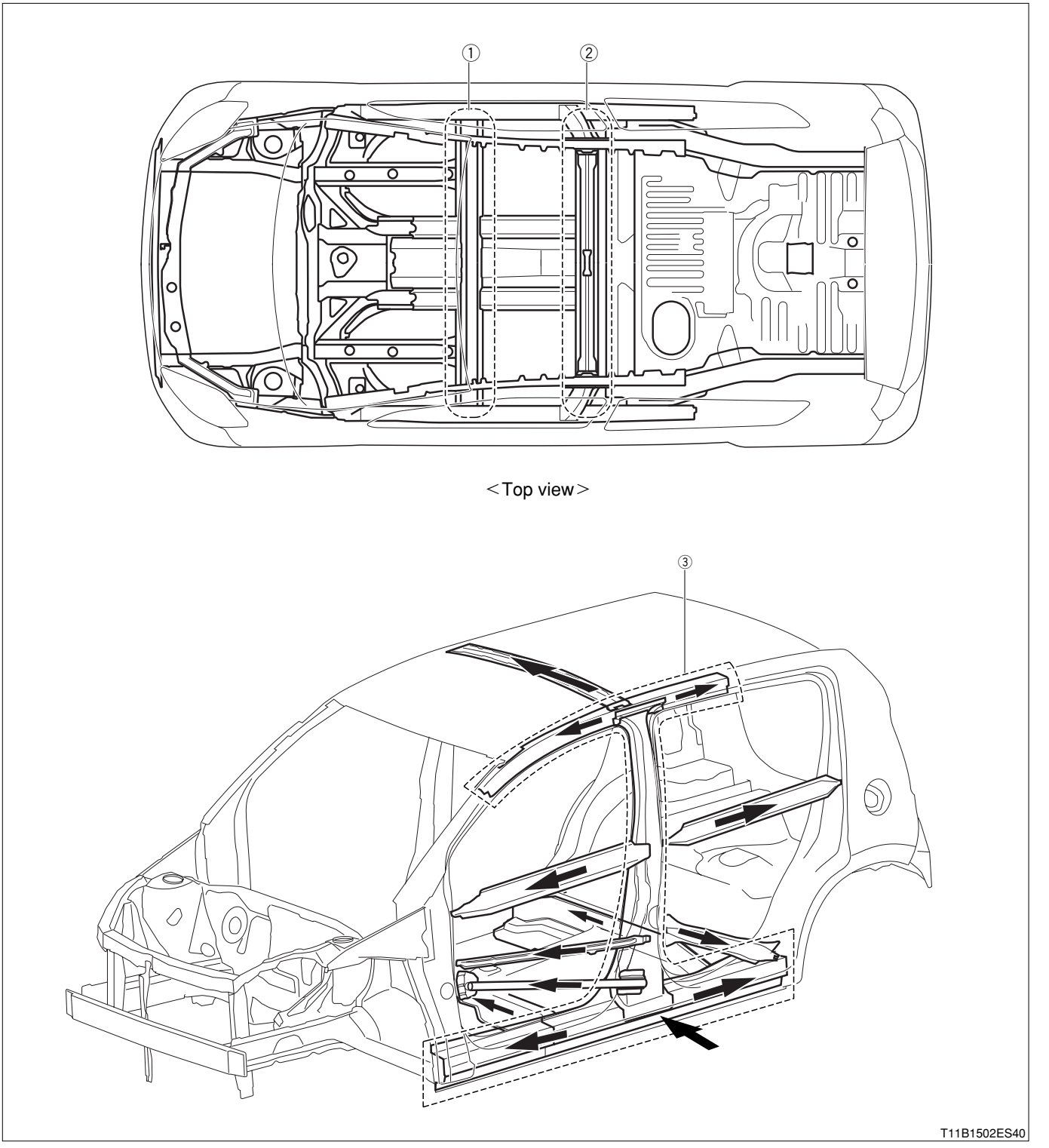


<Side view>

T11B1001ES45

2-1-2 SIDE ENERGY ABSORPTION CONSTRUCTION

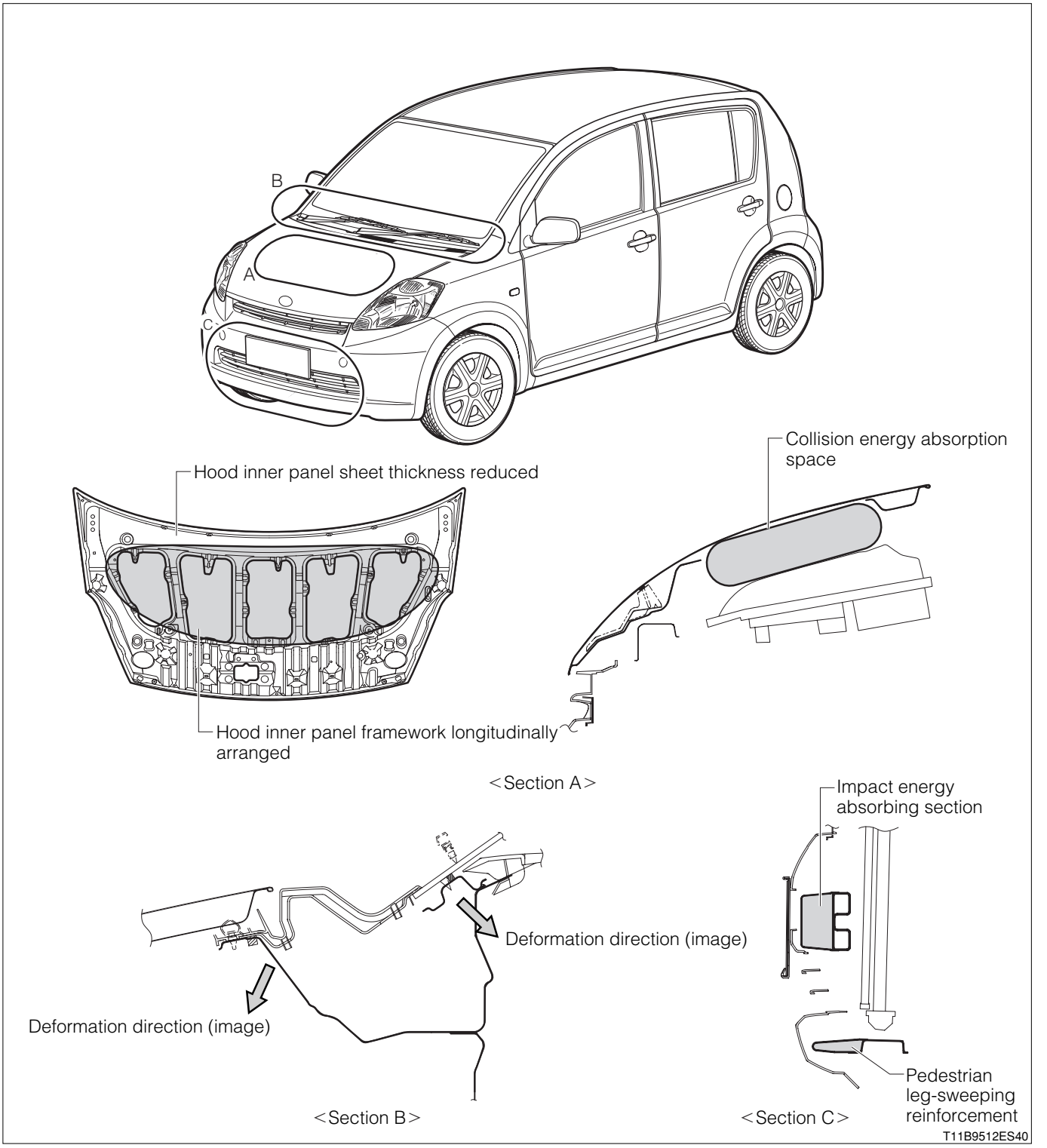
The collision energy from the side can be dispersed effectively to the center body pillars, roof side rails and locker panels. Consequently, the passenger compartment space for protecting occupants has been assured.



①	The front seat body mounting area (the joint section of the front floor cross member to the front floor tunnel, and the joint section of the front floor cross member to the rocker inner panel) has been reinforced in order to secure the cabin space for survival of the occupants in the event of a collision.
②	The rear floor cross member has been straightened to absorb side impact forces.
③	The bearing forces of the rocker panel, center pillar, and roof side rail are optimized to reduce the amount of body deformation and to secure survival space for occupants.

2-1-3 PEDESTRIAN INJURY REDUCTION BODY CONSTRUCTION

1.The vehicle features body structure to reduce the injuries to pedestrians in the event of a collision involving a pedestrian.
2.Regarding the hood panel, the thickness of the inner panel is reduced and the frame is arranged longitudinally, while allowing space to the components in the engine compartment so that the injuries to pedestrians can be reduced.
3.A crushable structure has been adopted for the cowl panel to reduce the injuries to pedestrians.
4.In order to reduce injury to the pedestrian legs, an impact energy absorbing section is provided on the upper reinforcement of the front bumper of certain specifications and a pedestrian leg-sweeping reinforcement is provided at the lower section.



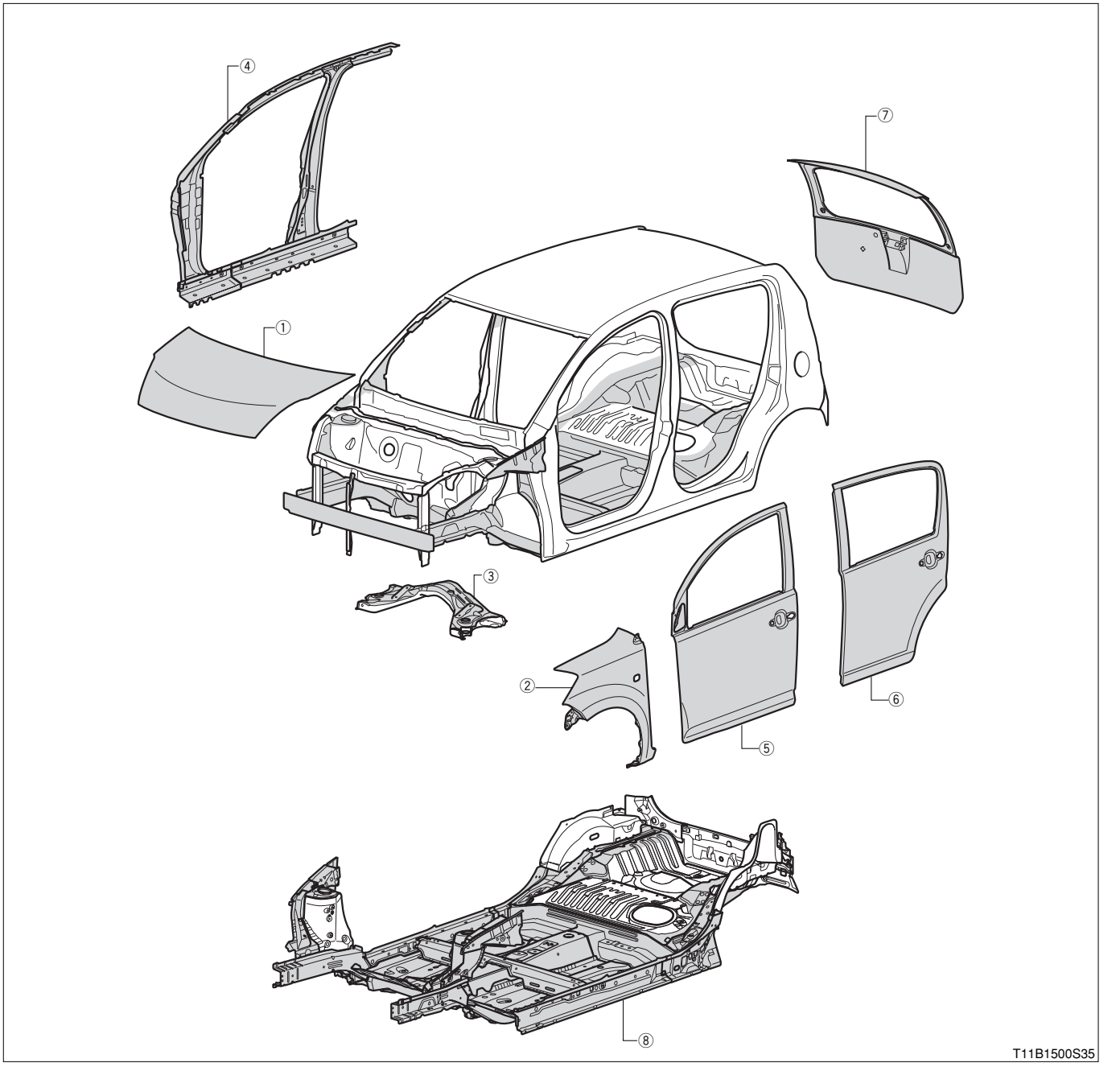
2-2 BODY SHELL

2-2-1 PARTS WHERE HIGH-TENSILE STEEL SHEETS ARE USED

High-tension steel sheets that features light weight and dent-resistance for local external forces have been employed at various sections so that weight reduction and high rigidity may be attained.

NOTE

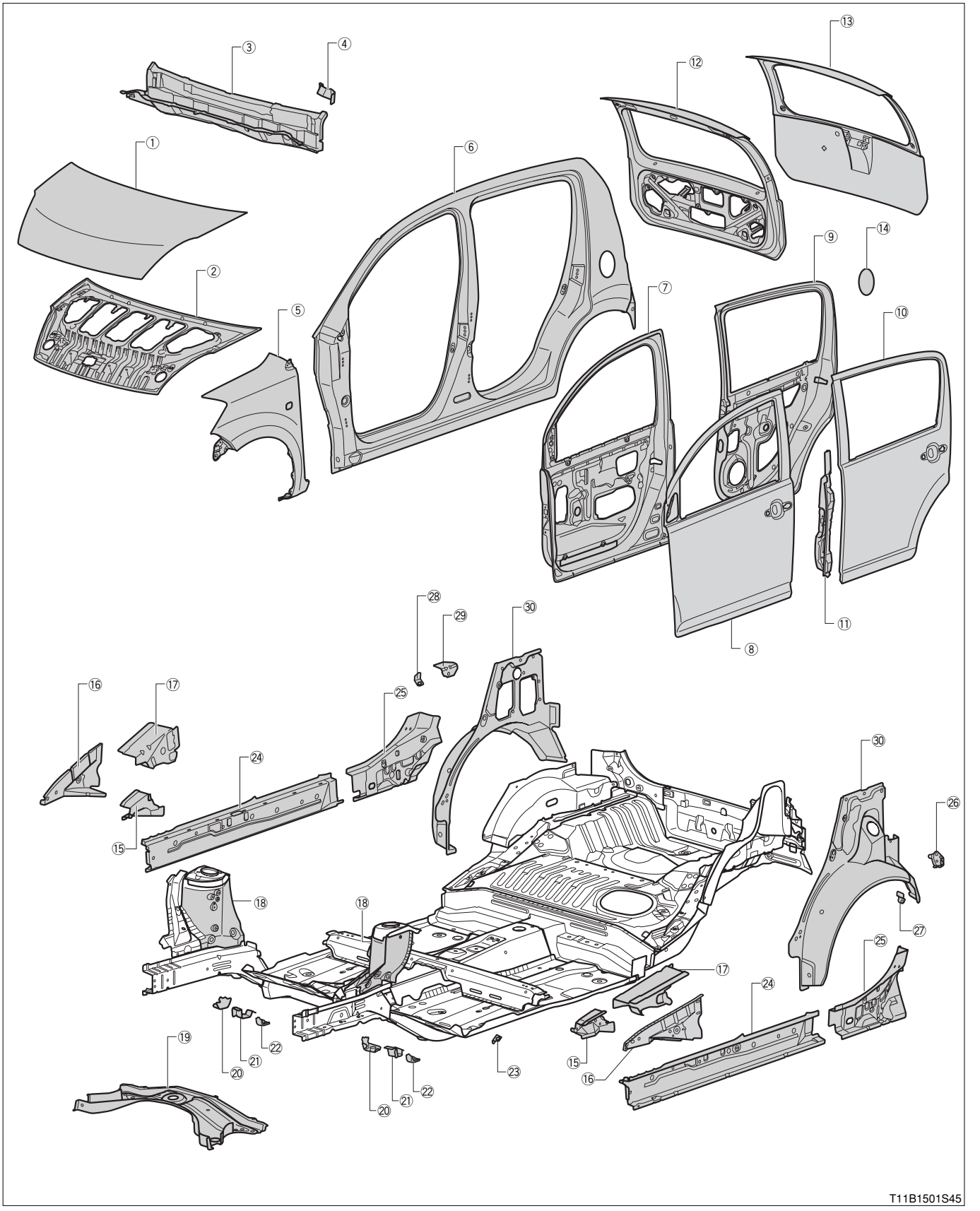
- Dent-resistance properties: When external forces (e.g. finger pressure during door opening or closing periods or flying stones) are locally applied to outer panels of motor vehicles, very small dents may be formed (Dentability). Properties that have resistance to these dents are called dent-resistance properties.



	Applicable components		Applicable components
①	Hood panel	⑤	Front door outside panel RH/LH
②	Front fender panel	⑥	Rear door outside panel RH/LH
③	Suspension Member	⑦	Back door outside panel
④	Reinforcement around front door	⑧	Front floor side member

2-2-2 PARTS WHERE ANTI-RUST STEEL SHEETS ARE USED

For better anti-rust effect, the corrosion-resistant steel plate has been adopted for components that require more stringent conditions concerning rust formation.



	Part name		Part name
①	Hood panel	⑯	Cowl top side panel RH/LH
②	Hood inner panel	⑰	Cowl top side inner panel RH/LH
③	Cowl top inner panel	⑱	Front fender apron RH/LH
④	Wiper shaft side retainer	⑲	Front suspension lower
⑤	Front fender panel RH/LH	⑳	Brake actuator mounting reinforcement No.1 RH/LH
⑥	Side outer panel RH/LH	㉑	Front suspension member mounting bracket RH/LH
⑦	Front door inside panel RH/LH	㉒	Suspension member spacer reinforcement RH/LH
⑧	Front door outside panel RH/LH	㉓	Flexible hose bracket No.1
⑨	Rear door inside panel RH/LH	㉔	Floor side inner member RH/LH
⑩	Rear door outside panel RH/LH	㉕	Floor side inner rear member RH/LH
⑪	Rear door hinge side panel RH/LH	㉖	Parking brake cable guide bracket No.2 LH
⑫	Back door inside panel	㉗	Parking brake cable guide bracket No.4
⑬	Back door outside panel	㉘	Floor brake hose rear bracket RH
⑭	Fuel filler opening outer lid	㉙	Rear absorber mounting reinforcement
⑮	Front apron to cowl side upper member RH/LH	㉚	Quarter inner panel lower RH/LH

C REPLACEMENT PROCEDURE FOR BODY PANELS

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REPLACEMENT ---------- C - 1
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FRONT FENDER APRON FRONT --------- C - 6
REPLACEMENT ---------- C - 6
FRONT FENDER APRON---------- C - 10
REPLACEMENT ---------- C - 10
FRONT SIDE MEMBER---------- C - 14
REPLACEMENT (CUTTING) ---------- C - 14
REPLACEMENT ---------- C - 18
COWL TOP SIDE PANEL ---------- C - 20
REPLACEMENT ---------- C - 20
FRONT BODY PILLAR---------- C - 22
REPLACEMENT ---------- C - 22
CENTER BODY PILLAR---------- C - 26
REPLACEMENT ---------- C - 26
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REPLACEMENT ---------- C - 33
QUARTER WHEEL HOUSE PANEL
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REPLACEMENT (CUTTING ON ONE
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REAR FLOOR CROSS MEMBER
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REPLACEMENT (CUTTING) ---------- C - 56
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REAR FLOOR MOUNTING BRACKET
NO.2 ---------- C - 64
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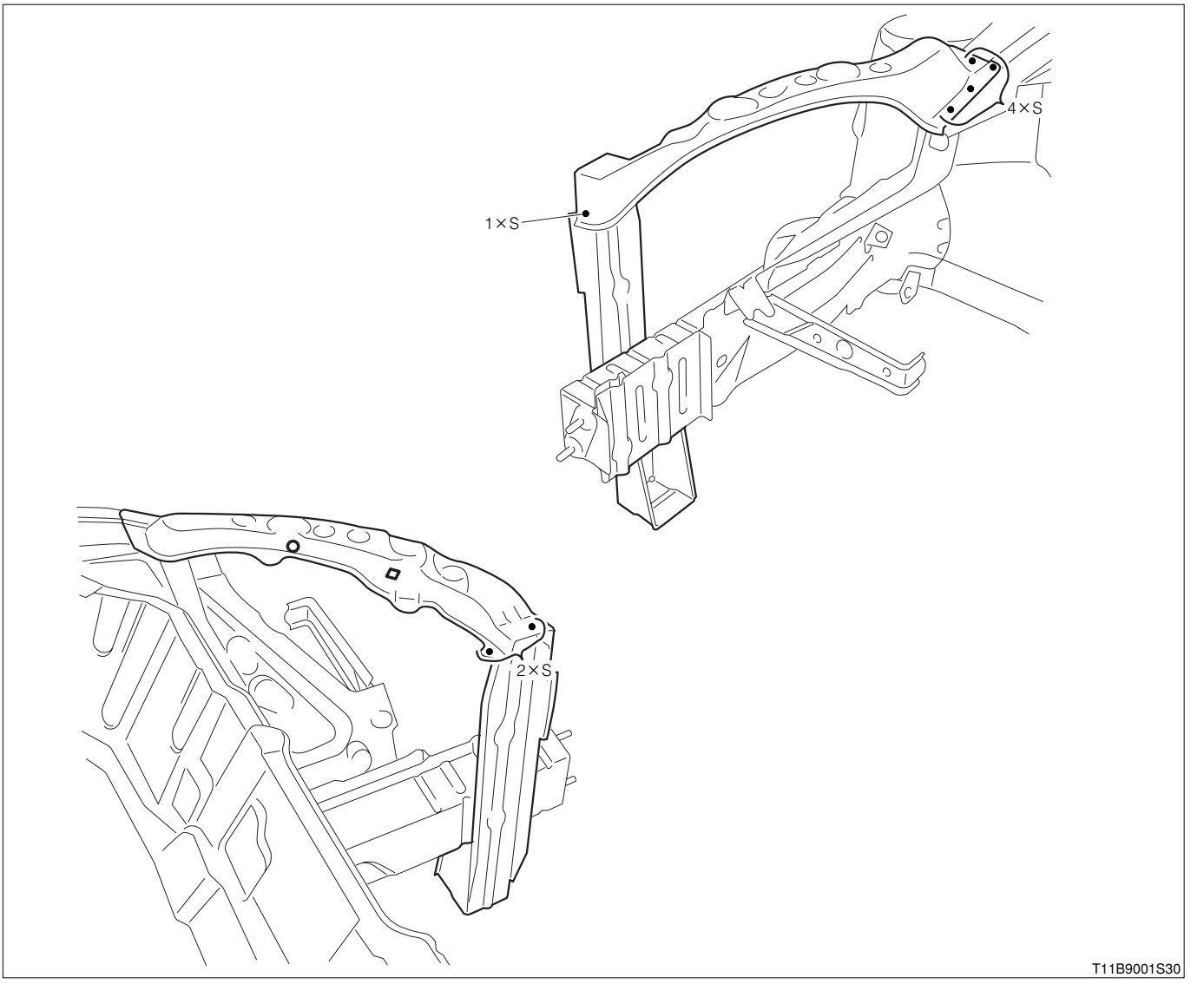
ROOF PANEL---------- C - 68
REPLACEMENT ---------- C - 68

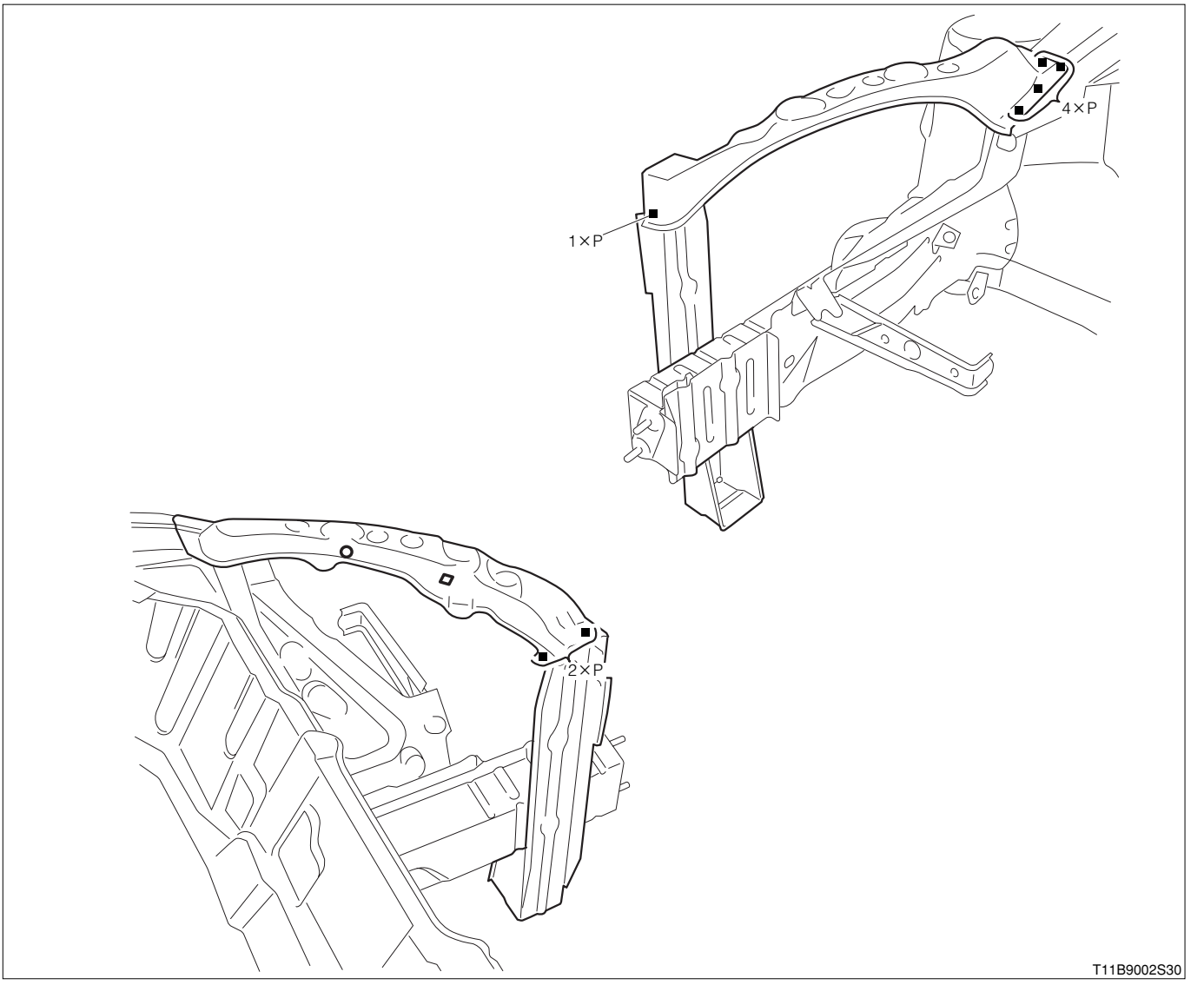
1 RADIATOR SUPPORT UPPER

1-1 REPLACEMENT

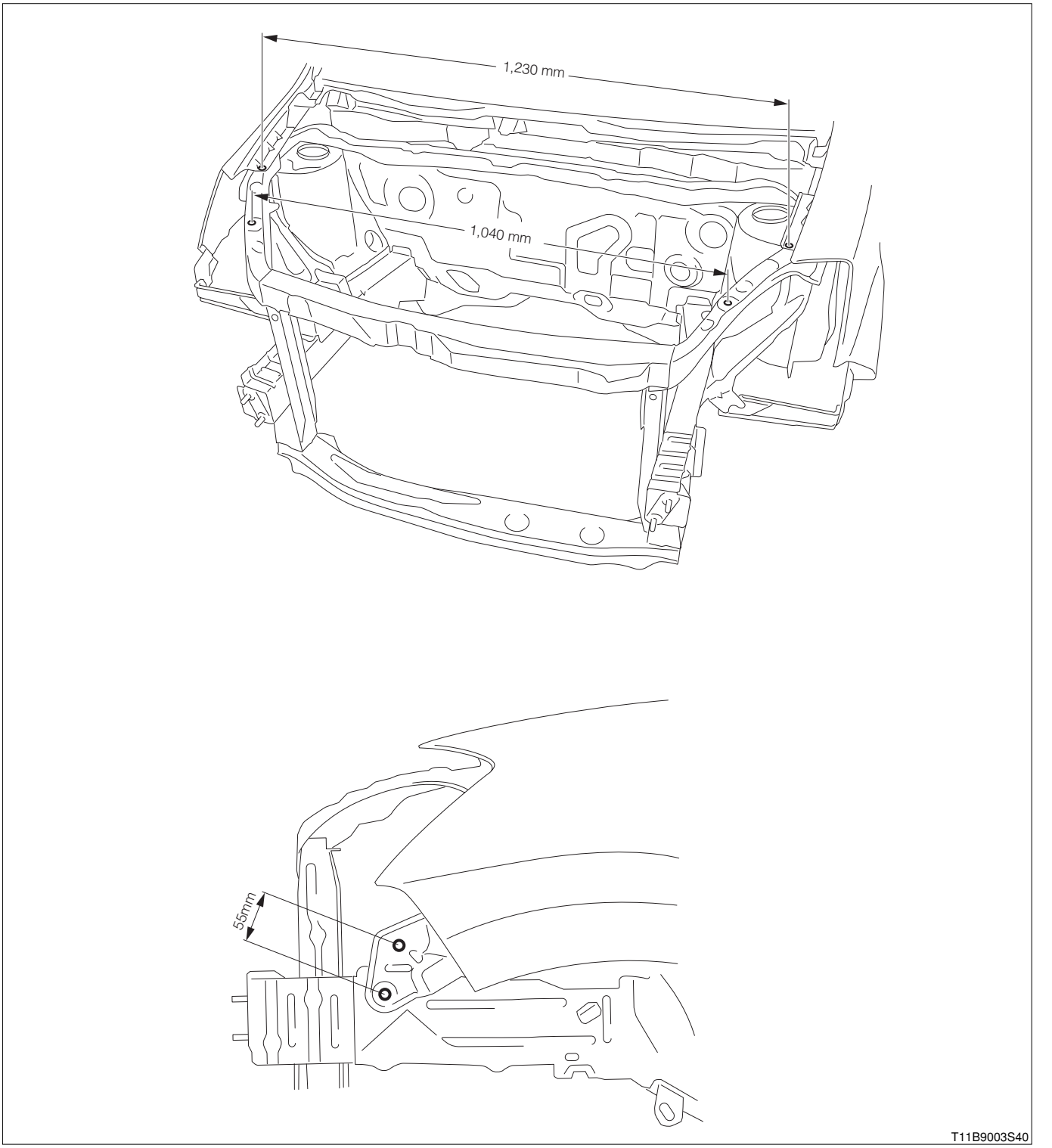
1-1-1 REMOVAL PROCEDURES



1-1-2 INSTALLATION PROCEDURES



1.Remove the part or component to be exchanged from the service parts and install to the vehicle.



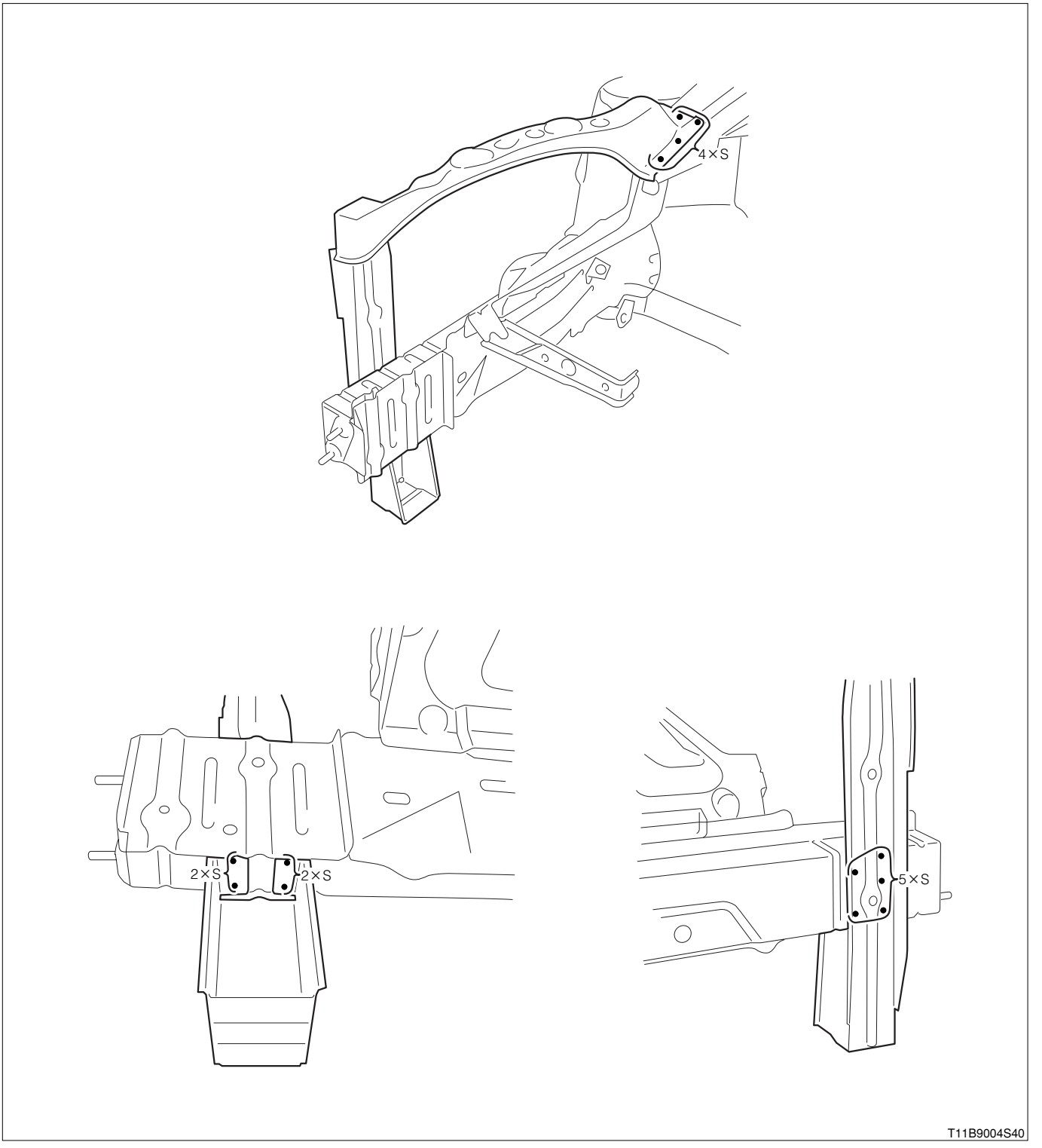
The figures are reference values.

2.Measure dimensions of the head lamp mounting hole before installing replacement parts.

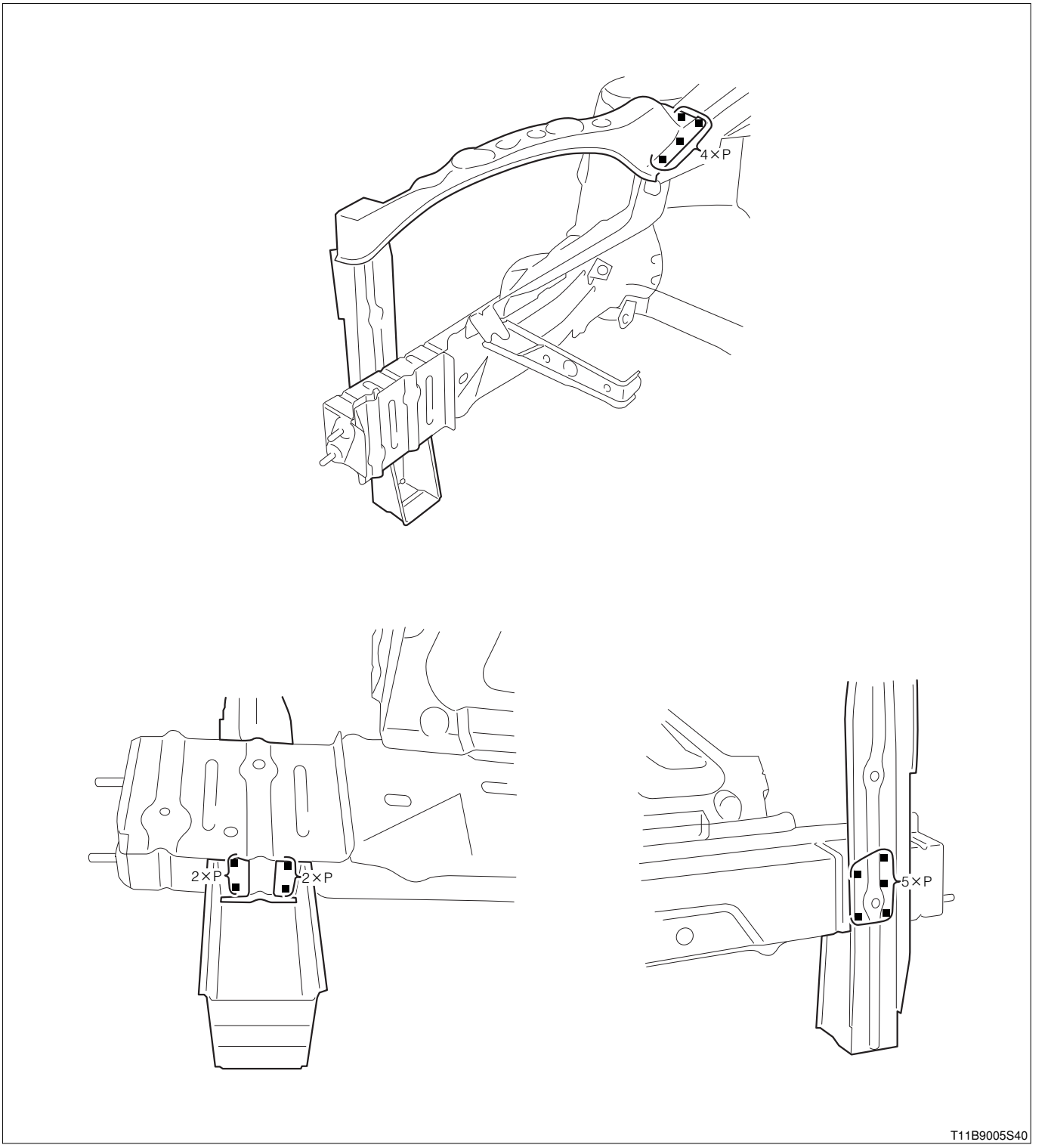
2 RADIATOR SUPPORT SIDE

2-1 REPLACEMENT

2-1-1 REMOVAL PROCEDURES



2-1-2 INSTALLATION PROCEDURES



3 FRONT FENDER APRON FRONT

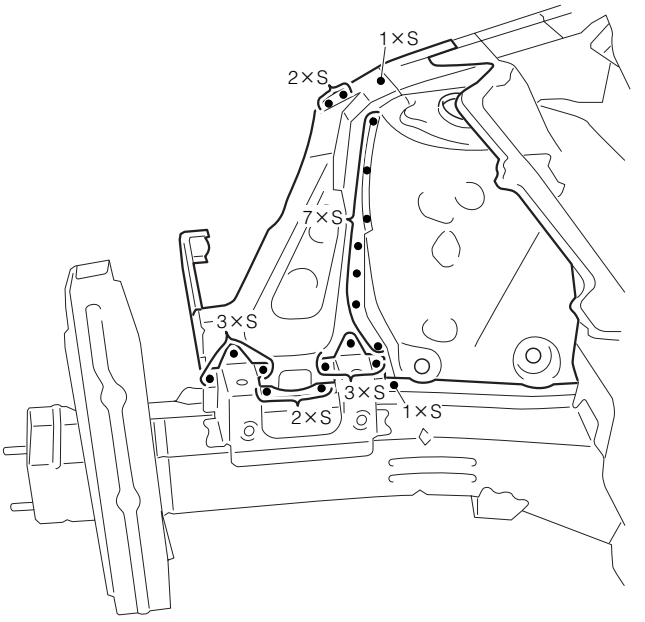
3-1 REPLACEMENT

3-1-1 OPERATION BEFORE REMOVAL

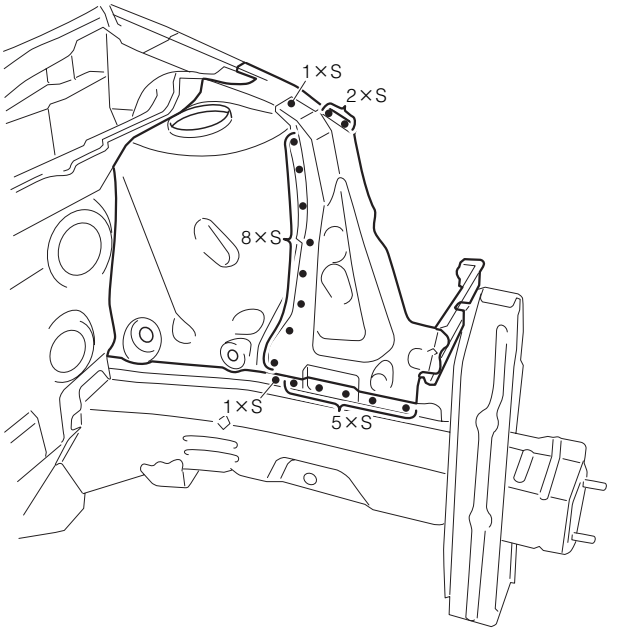
1.Remove the part or component to be exchanged from the radiator support upper.

3-1-2 REMOVAL PROCEDURES

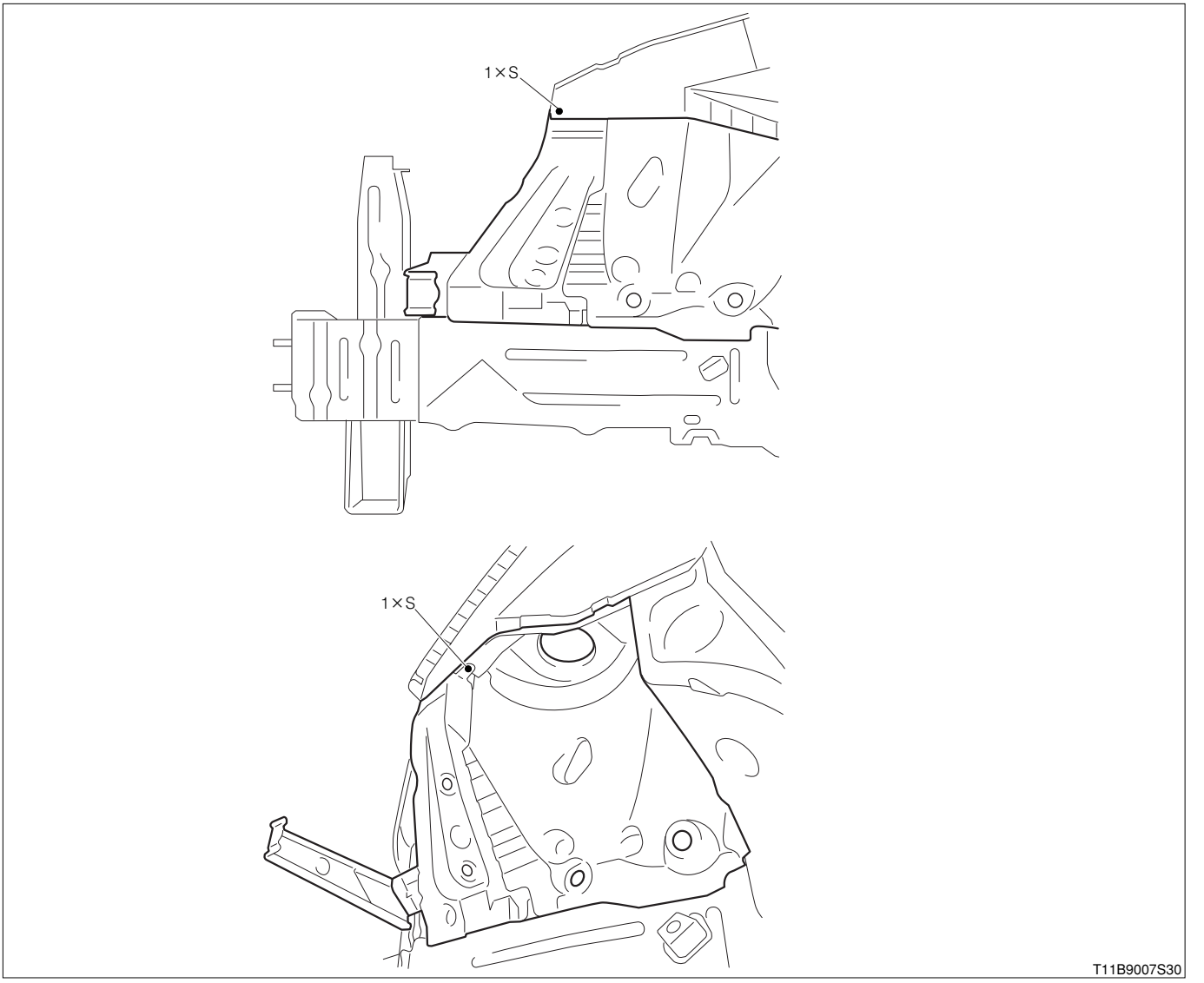
[RH]



[LH]

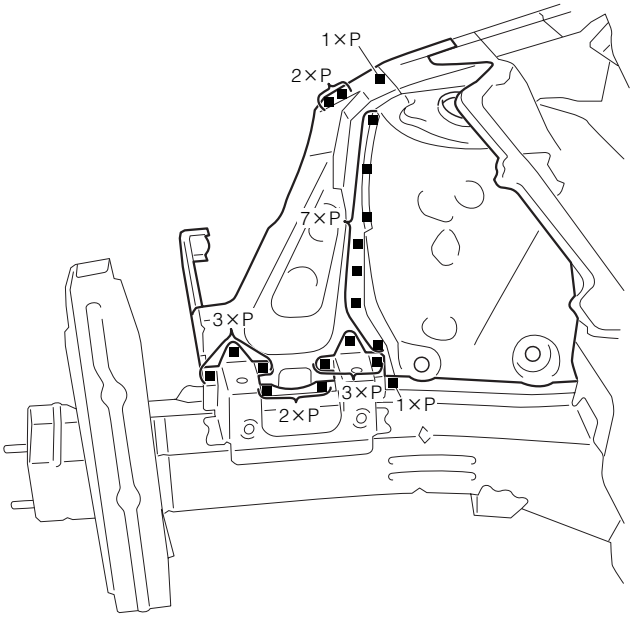


T11B9006S40

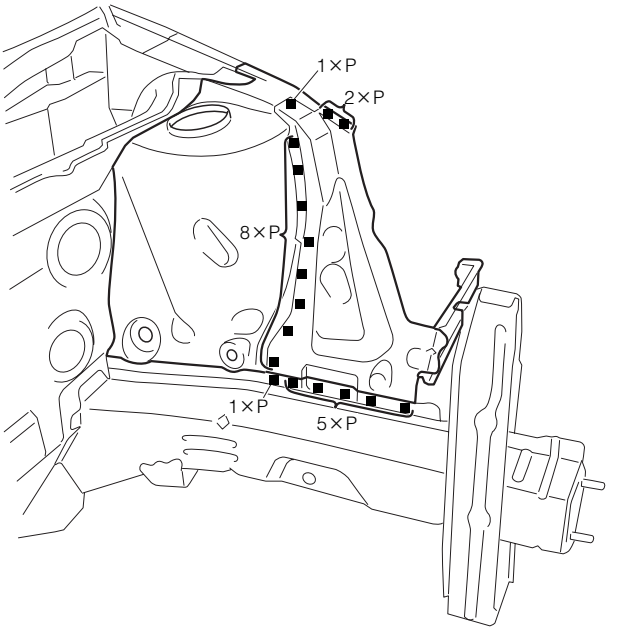

1×S
1×S
T11B9007S30

3-1-3 INSTALLATION PROCEDURES

[RH]

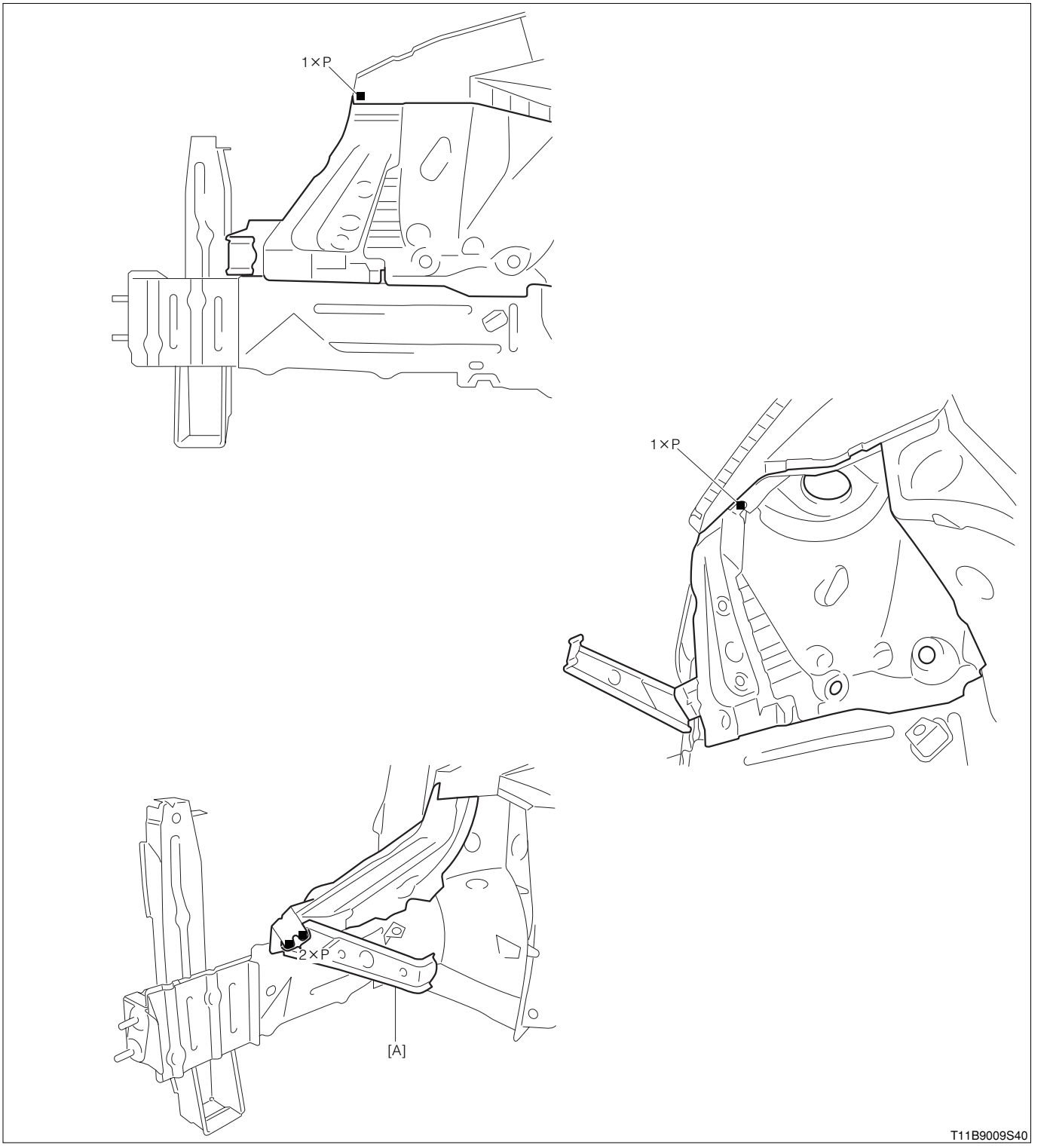


[LH]



T11B9008S40

1.Remove the part or component to be exchanged from the service parts and install to the vehicle.



[A] Front fender mounting bracket

3-1-4 OPERATION AFTER INSTALLATION

1.Install the radiator support upper.

4 FRONT FENDER APRON

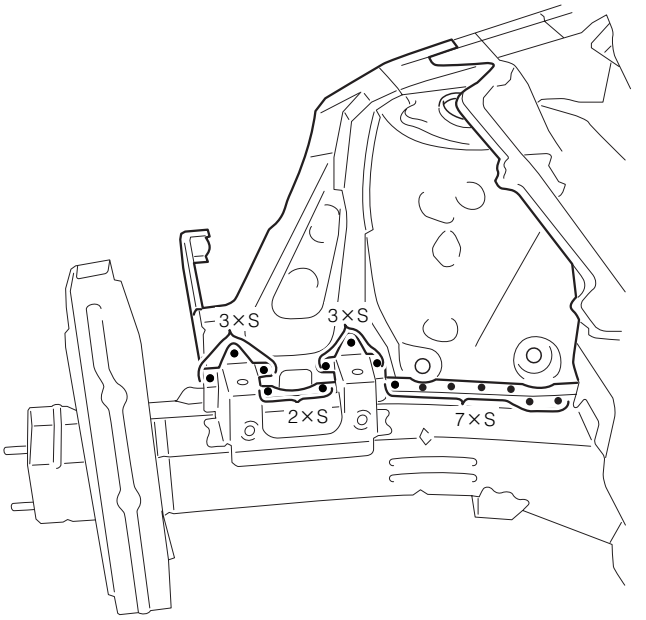
4-1 REPLACEMENT

4-1-1 OPERATION BEFORE REMOVAL

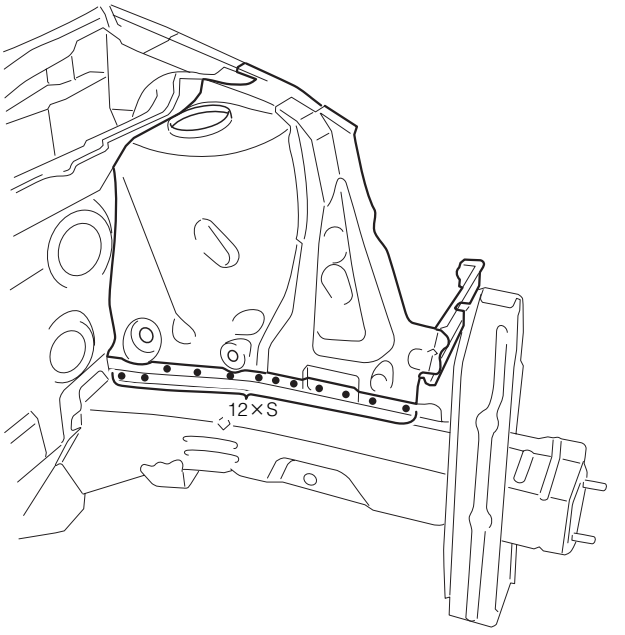
1.Remove the part or component necessary to remove the radiator support upper.
2.Remove the part or component necessary to remove the cowl top side panel.

4-1-2 REMOVAL PROCEDURES

[RH]



[LH]

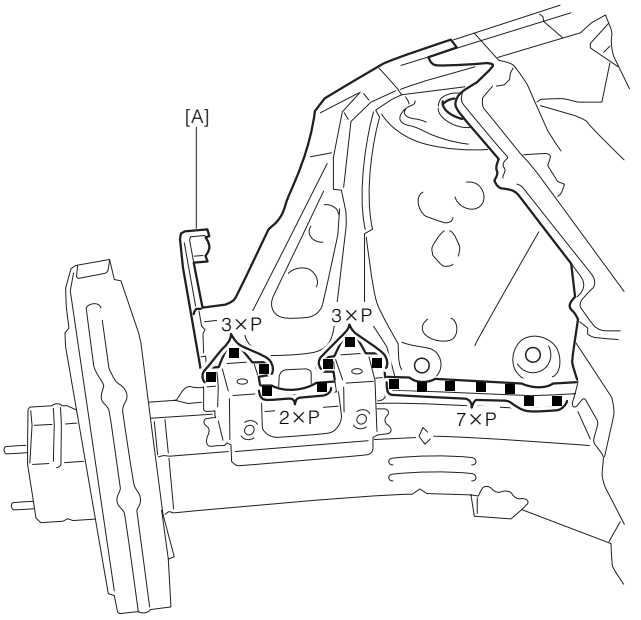


T11B9010S40

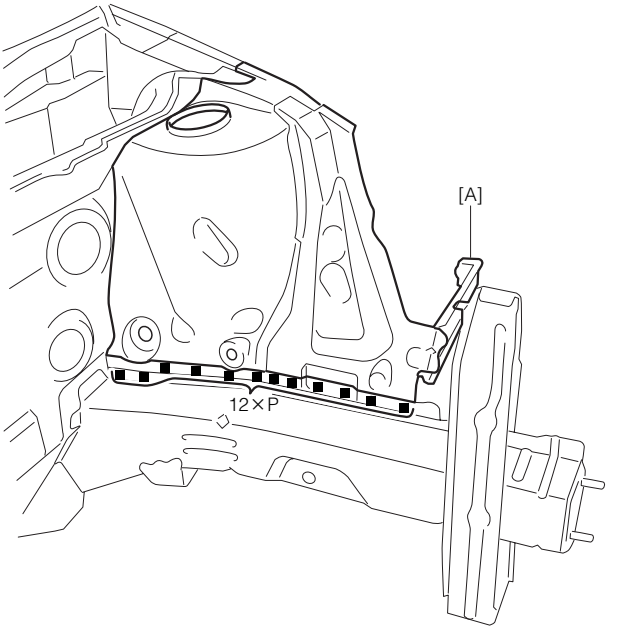
4×S
5×S
1×S
2×S
1×S
7×S
T11B9011S40

4-1-3 INSTALLATION PROCEDURES

[RH]

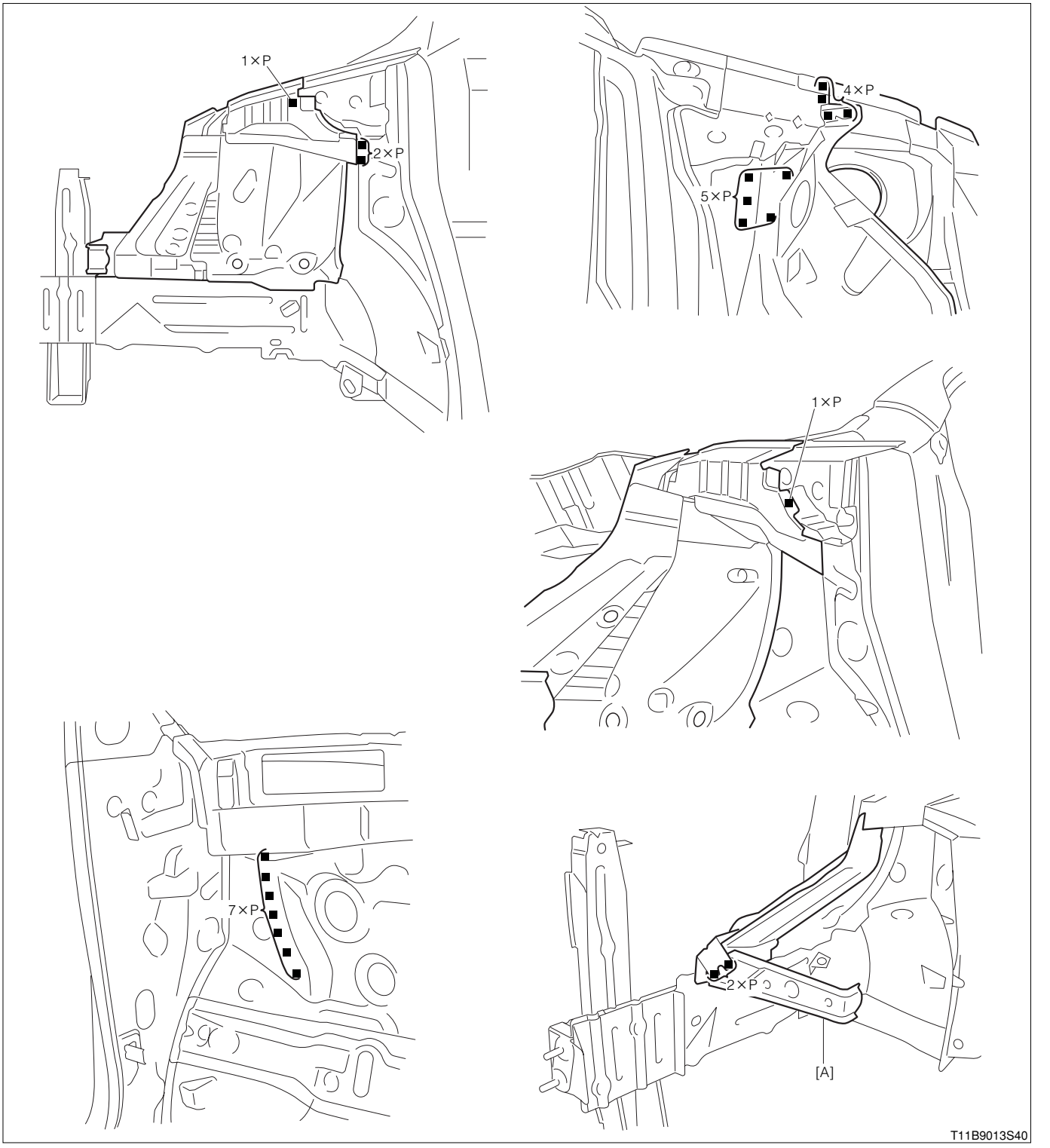


[LH]



T11B9012S40

[A] Front fender mounting bracket



[A] Front fender mounting bracket

4-1-4 OPERATION AFTER INSTALLATION

1.Install the cowl top side panel.
2.Install the radiator support upper.

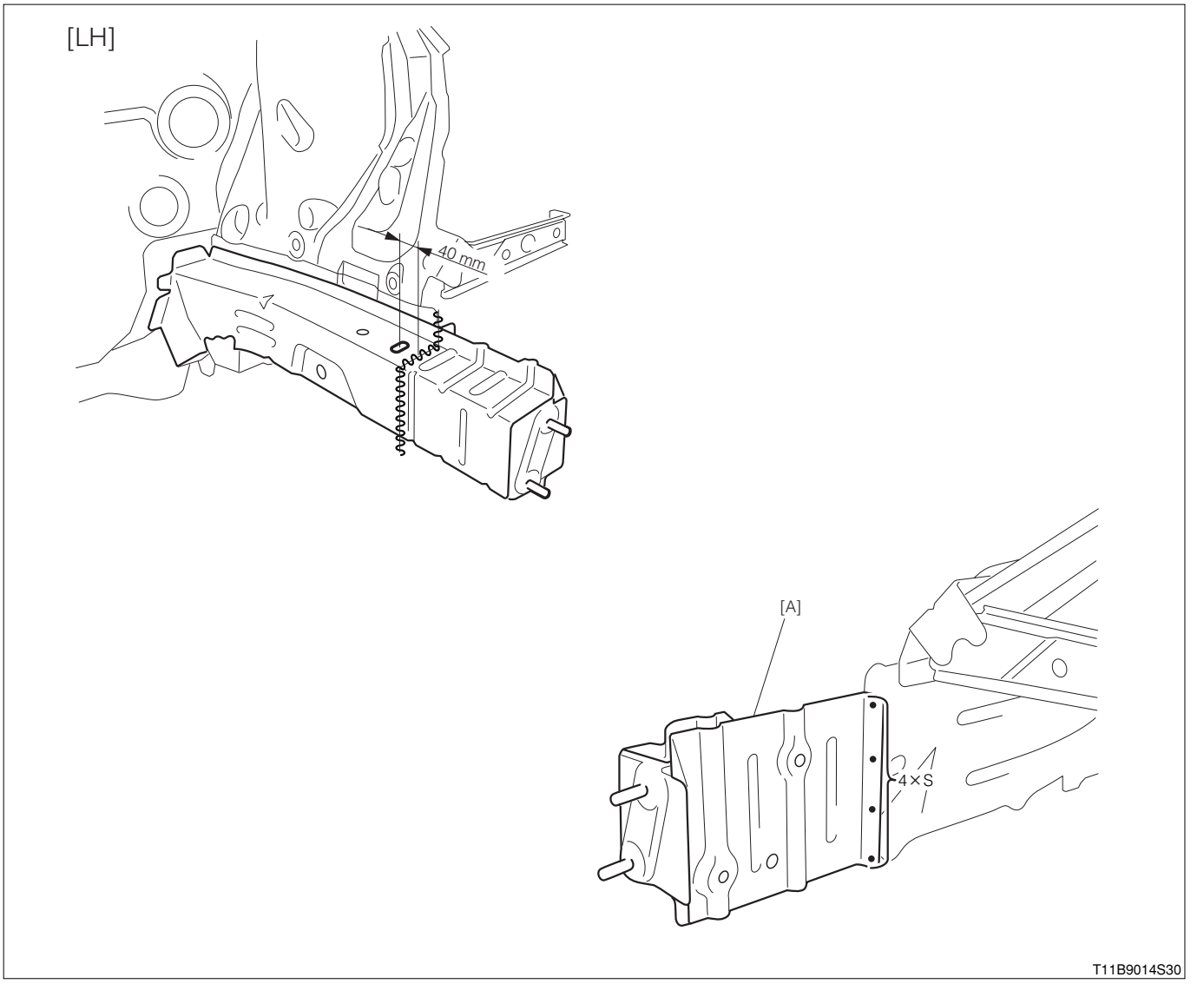
5 FRONT SIDE MEMBER

5-1 REPLACEMENT

5-1-1 OPERATION BEFORE REMOVAL

1.Remove the necessary part or component of the radiator support side.

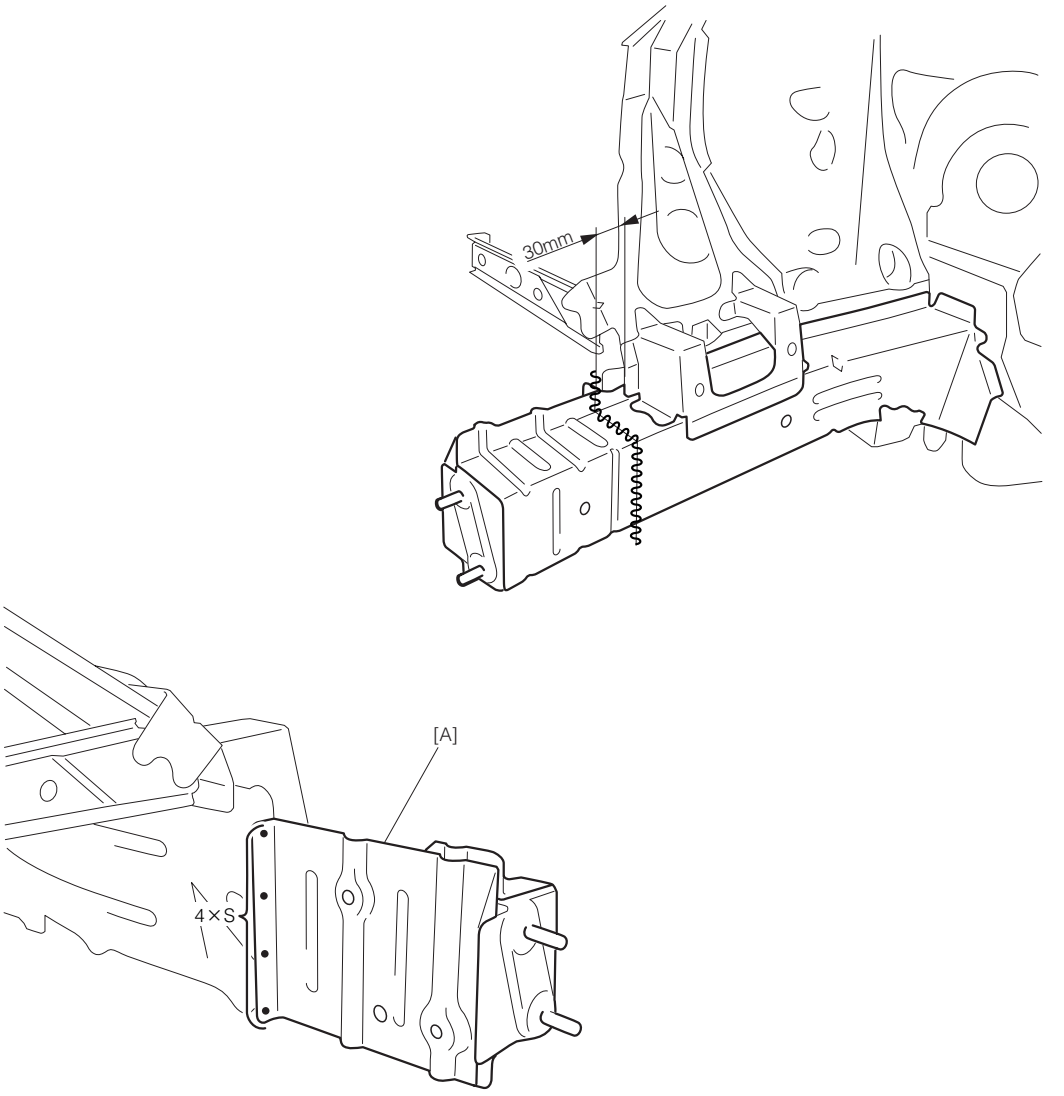
5-1-2 REMOVAL PROCEDURES



[A] Front side member plate No.2

1.Remove [A] together.

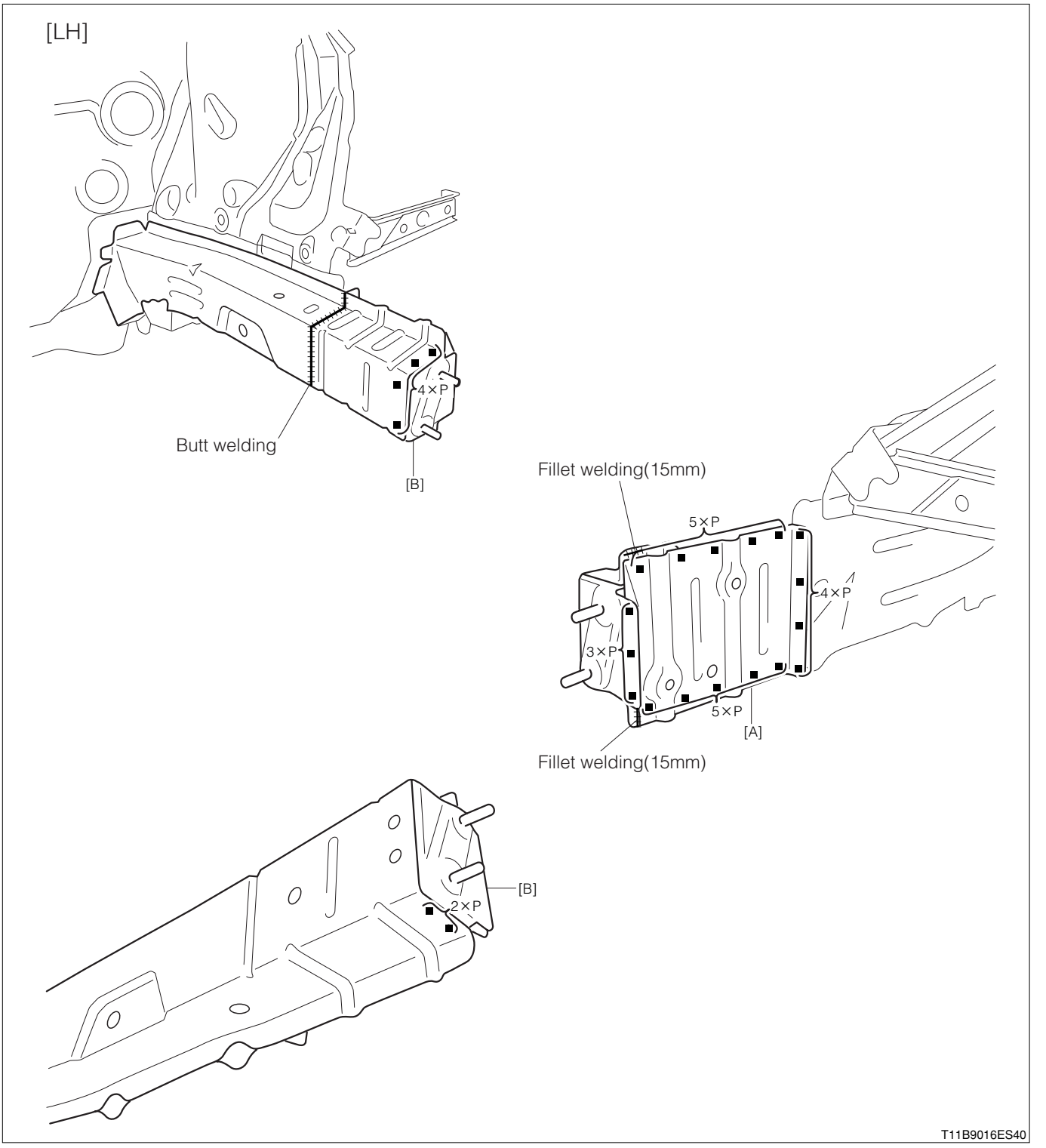
[RH]



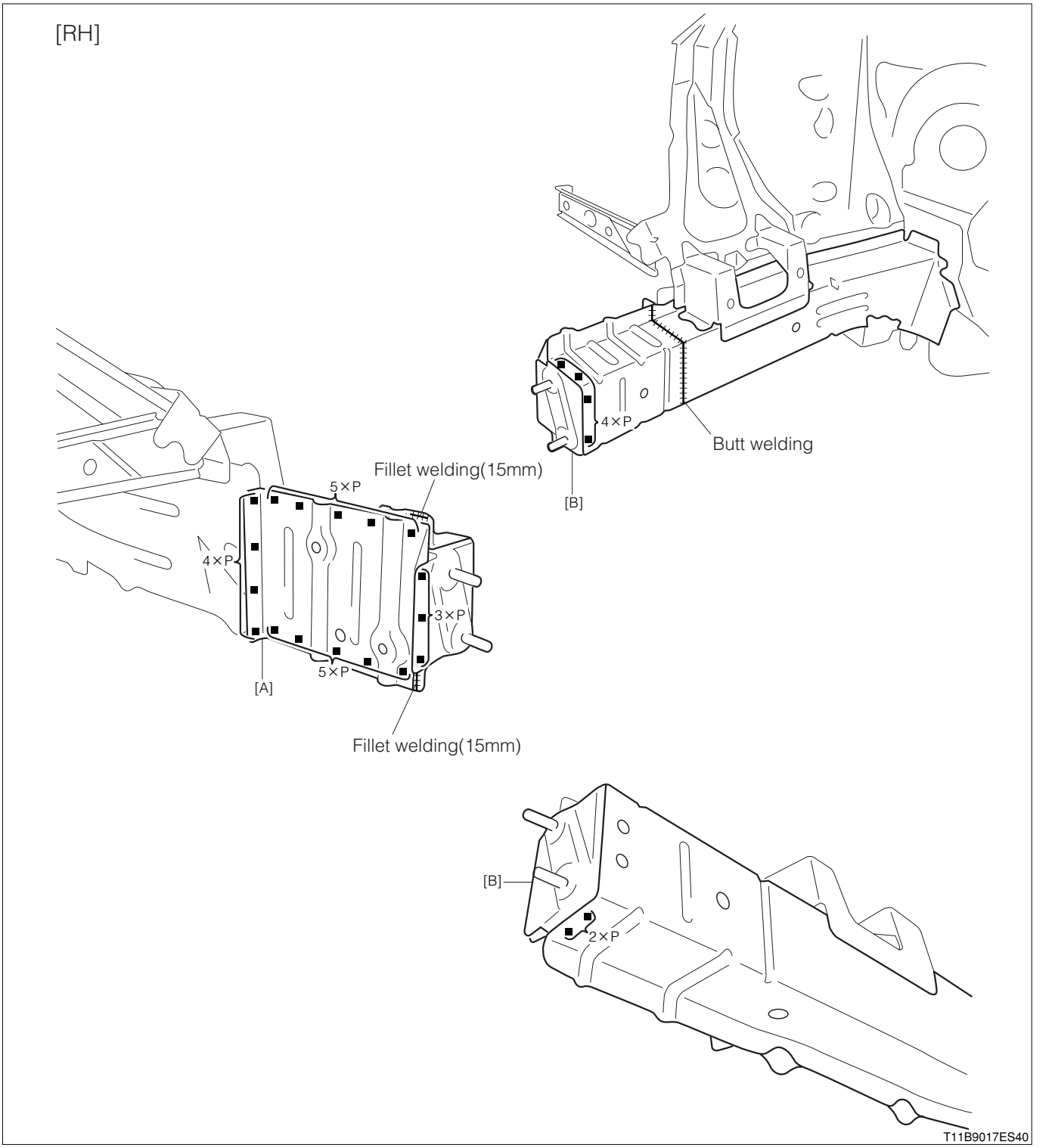
[A] Front side member plate No.2

2.Remove [A] together.

5-1-3 INSTALLATION PROCEDURES



[A] Front side member plate No.2
[B] Front bumper arm



[A] Front side member plate No.2
[B] Front bumper arm

5-1-4 OPERATION AFTER INSTALLATION

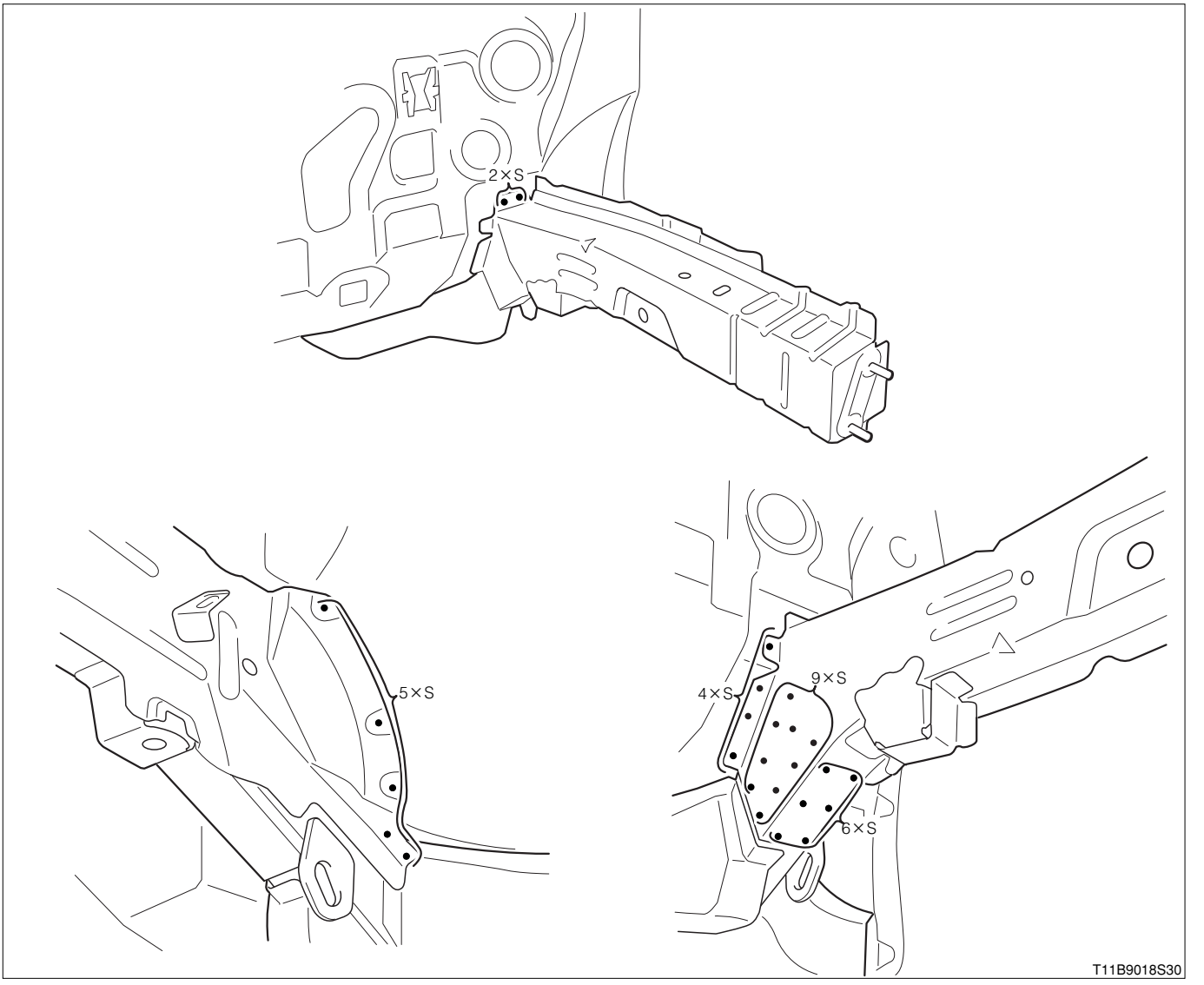
1.Install the radiator support side.

5-2 REPLACEMENT

5-2-1 OPERATION BEFORE REMOVAL

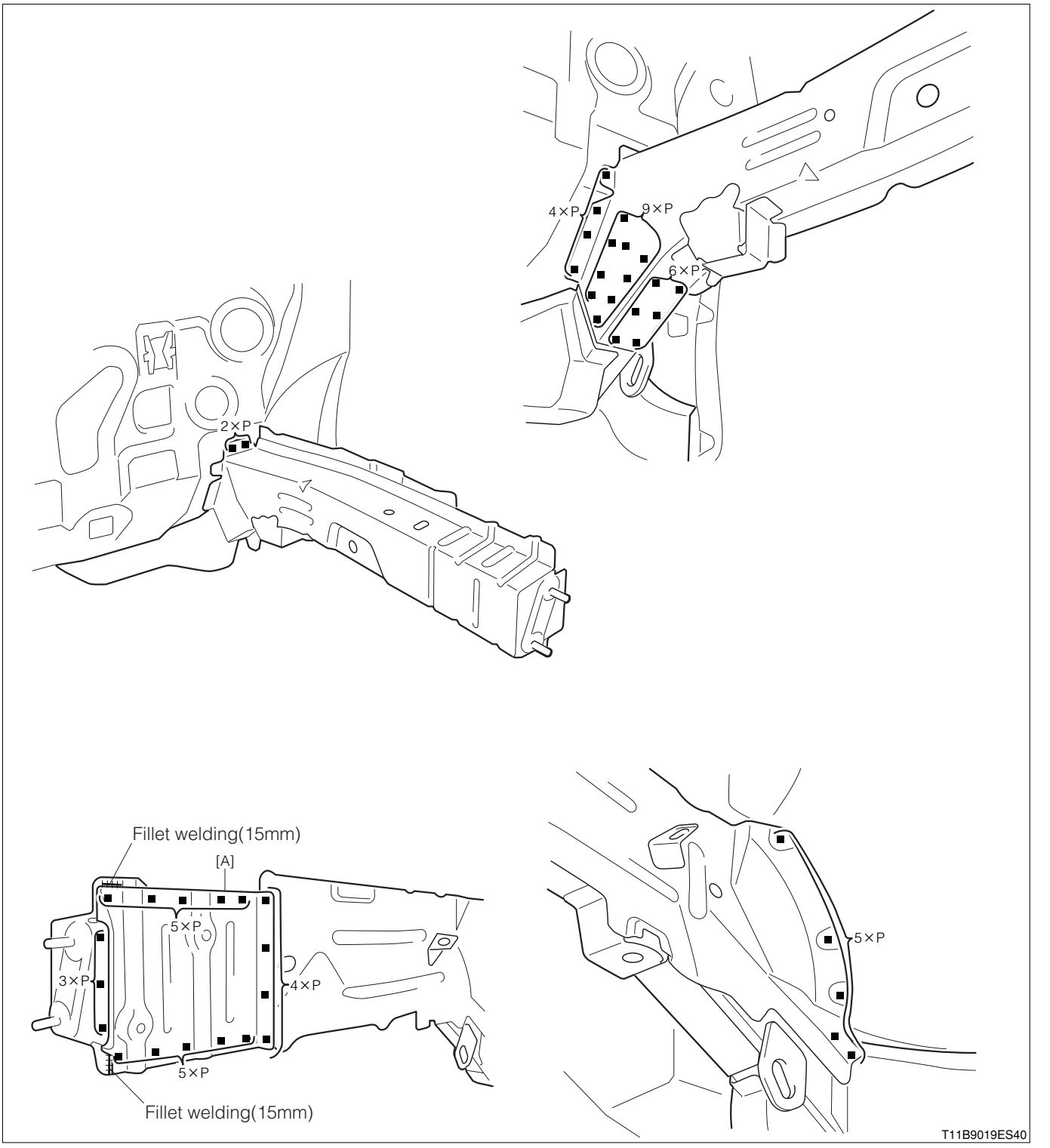
1.Remove the necessary part or component of the radiator support side.
2.Remove the necessary part or component of the front fender apron.

5-2-2 REMOVAL PROCEDURES



1.Replace the front side member while retaining the rear section of it on the vehicle side.

5-2-3 INSTALLATION PROCEDURES



[A] Front side member plate No.2

1.Remove the part or component to be exchanged from the replacement parts and install to the vehicle.

5-2-4 OPERATION AFTER INSTALLATION

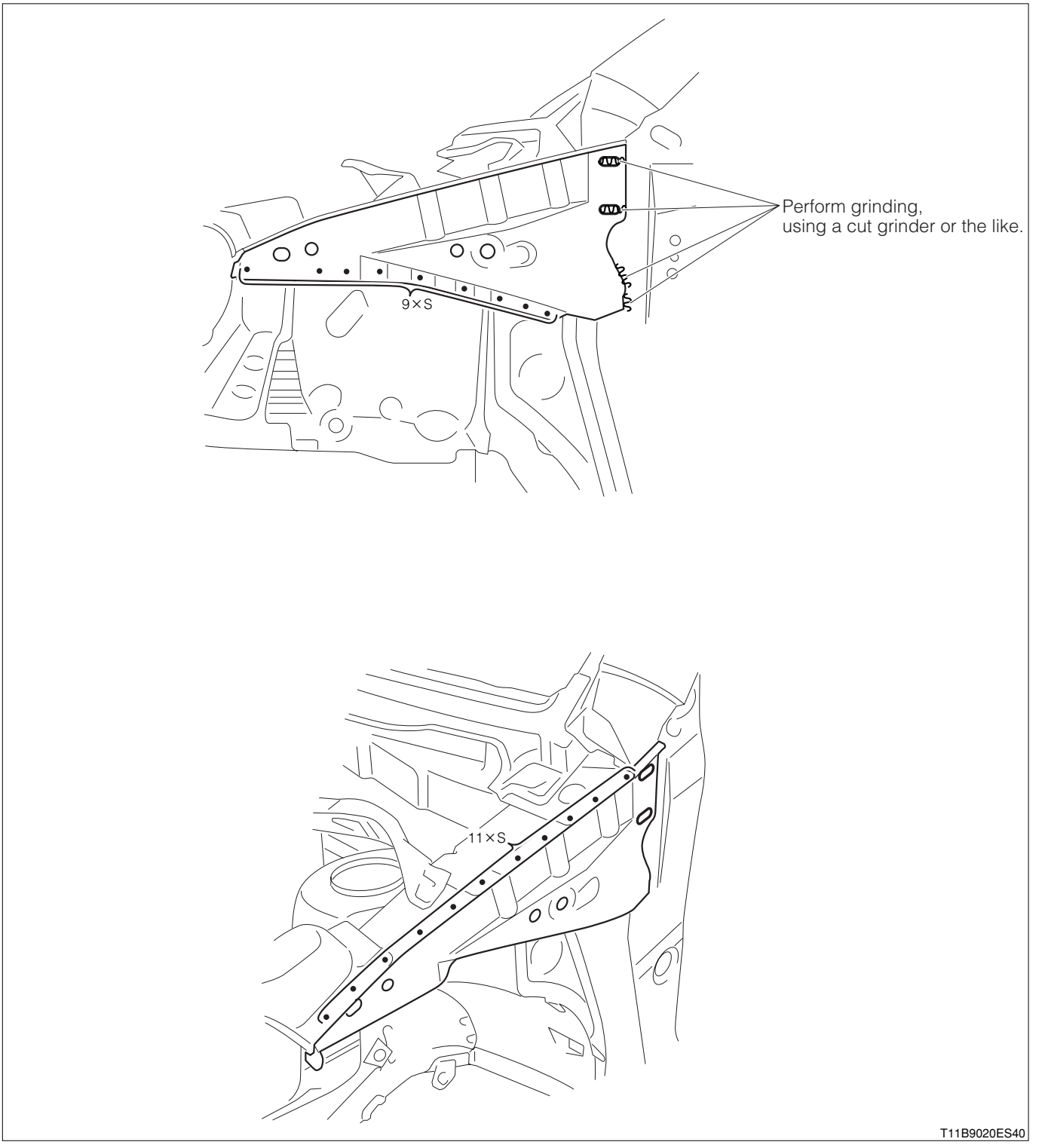
1.Install the front fender apron.

2.Install the radiator support side.

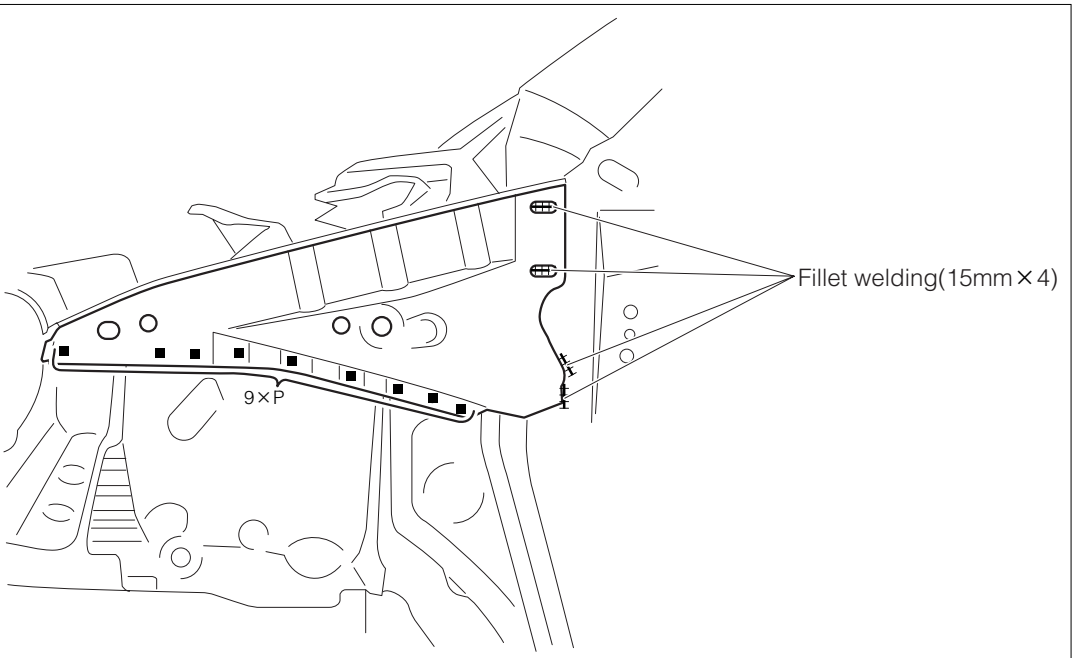
6 COWL TOP SIDE PANEL

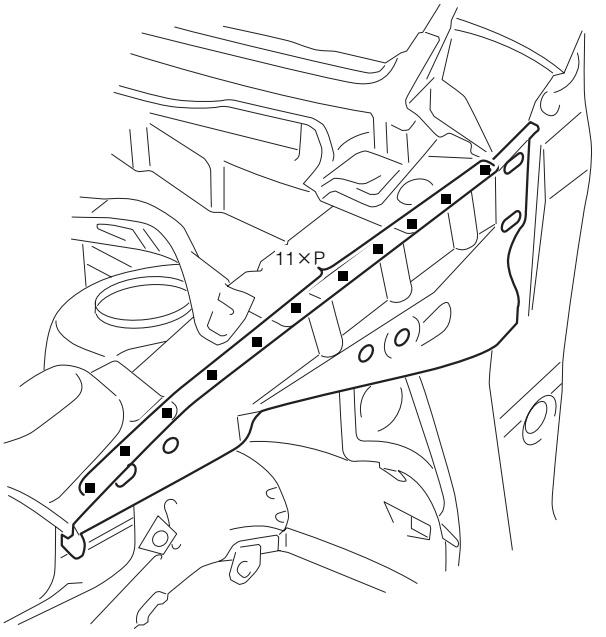
6-1 REPLACEMENT

6-1-1 REMOVAL PROCEDURES



6-1-2 INSTALLATION PROCEDURES





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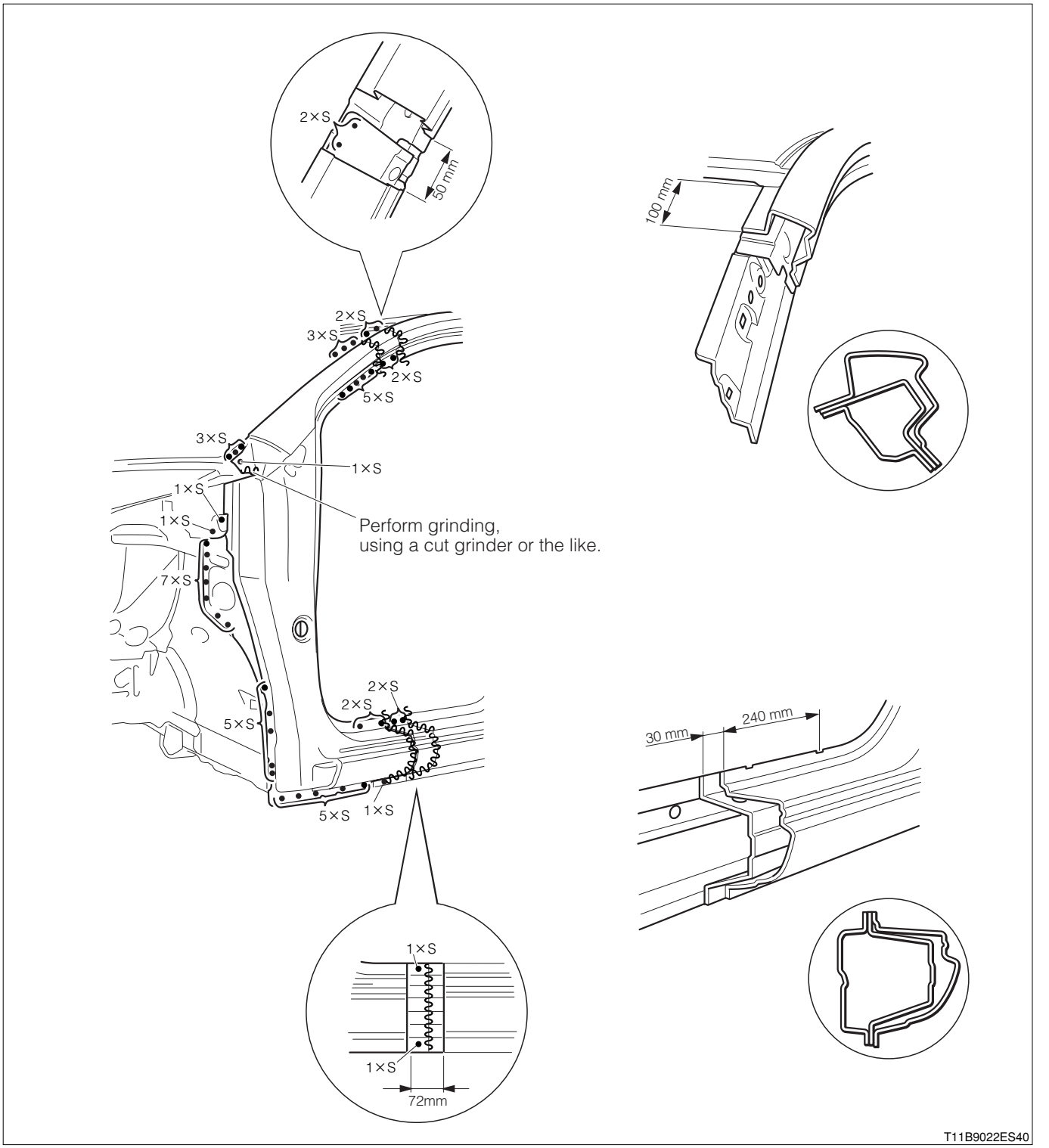
7 FRONT BODY PILLAR

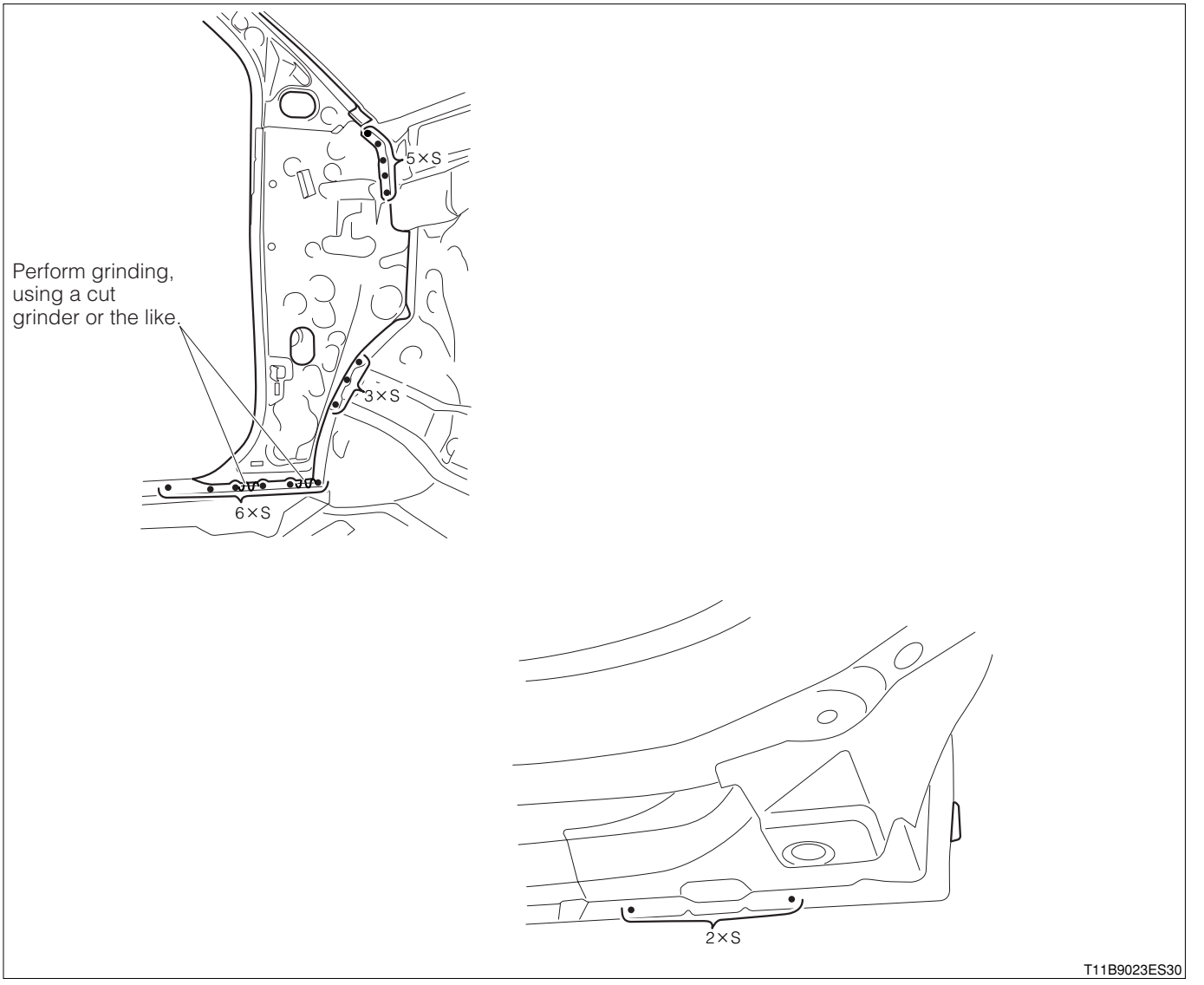
7-1 REPLACEMENT

7-1-1 OPERATION BEFORE REMOVAL

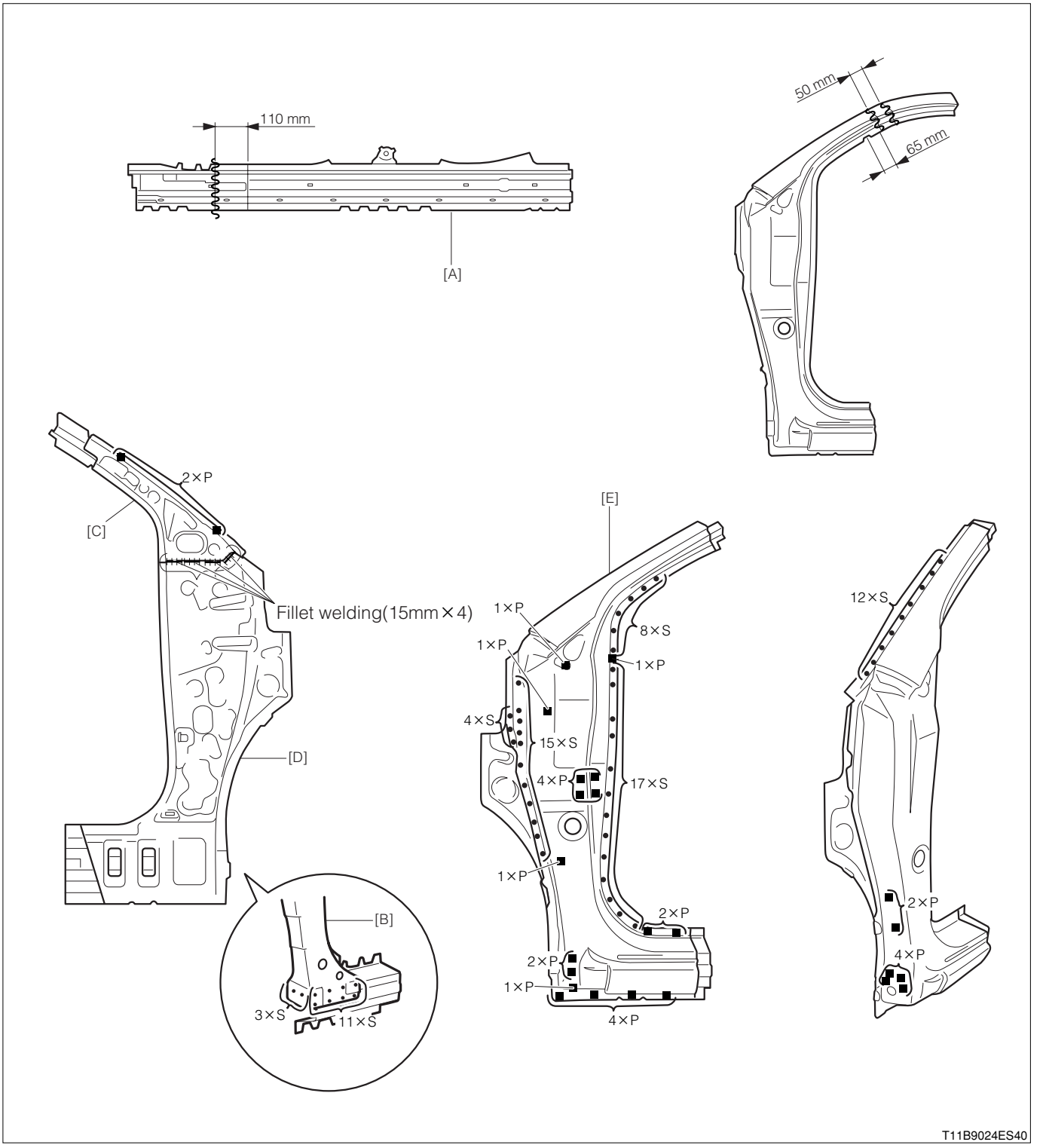
1.Remove the necessary part or component of the cowl top side panel.

7-1-2 REMOVAL PROCEDURES



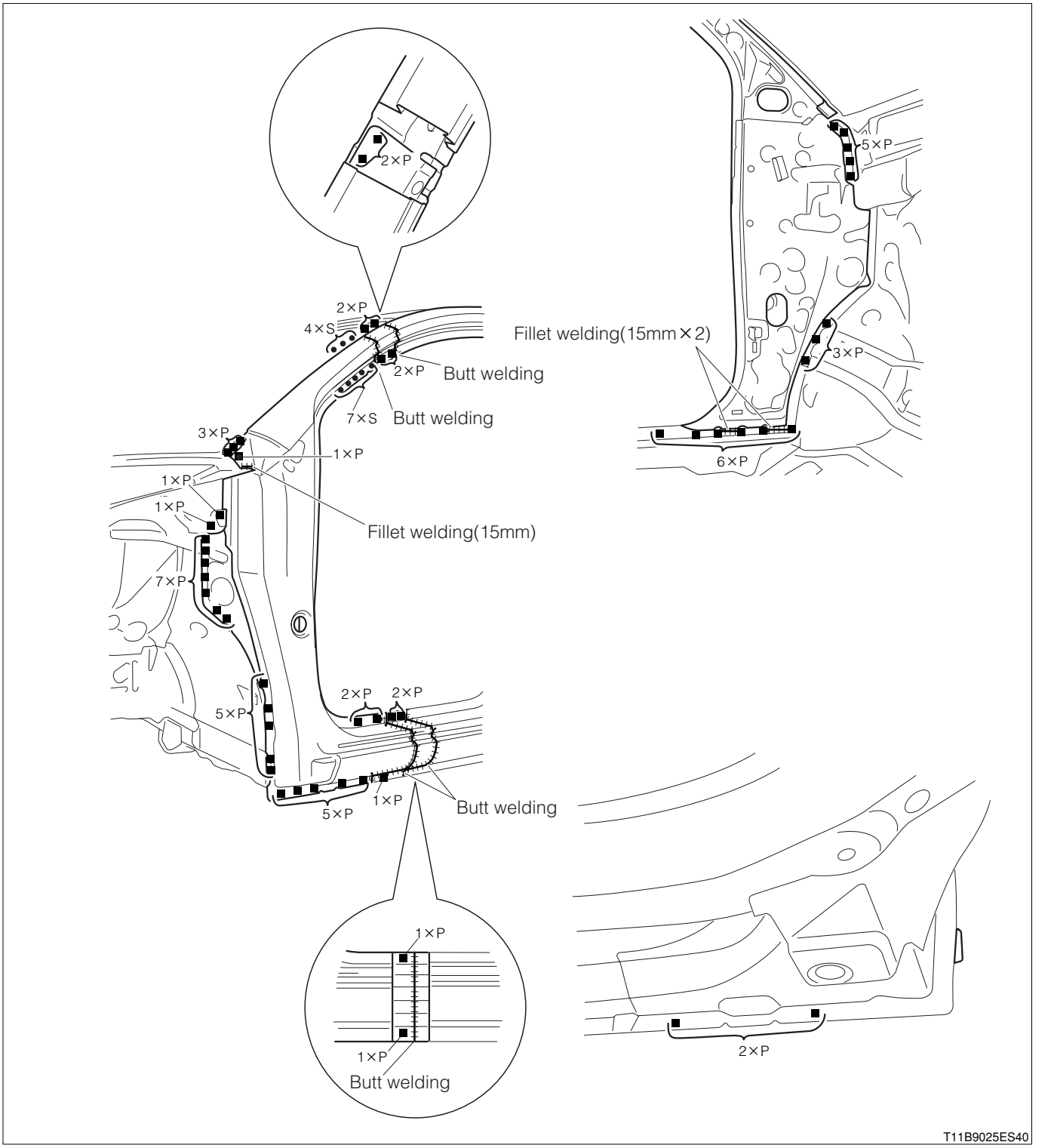

Perform grinding, using a cut grinder or the like.
5×S
3×S
6×S
2×S
T11B9023ES30

7-1-3 INSTALLATION PROCEDURES



[A] Rocker panel reinforcement
[B] Front pillar reinforcement lower
[C] Front pillar upper inner
[D] Front pillar inner
[E] Outer panel

1.Provide the specified number of welds to [A], [B], [C], [D], and [E] before the replacement parts are temporarily installed.



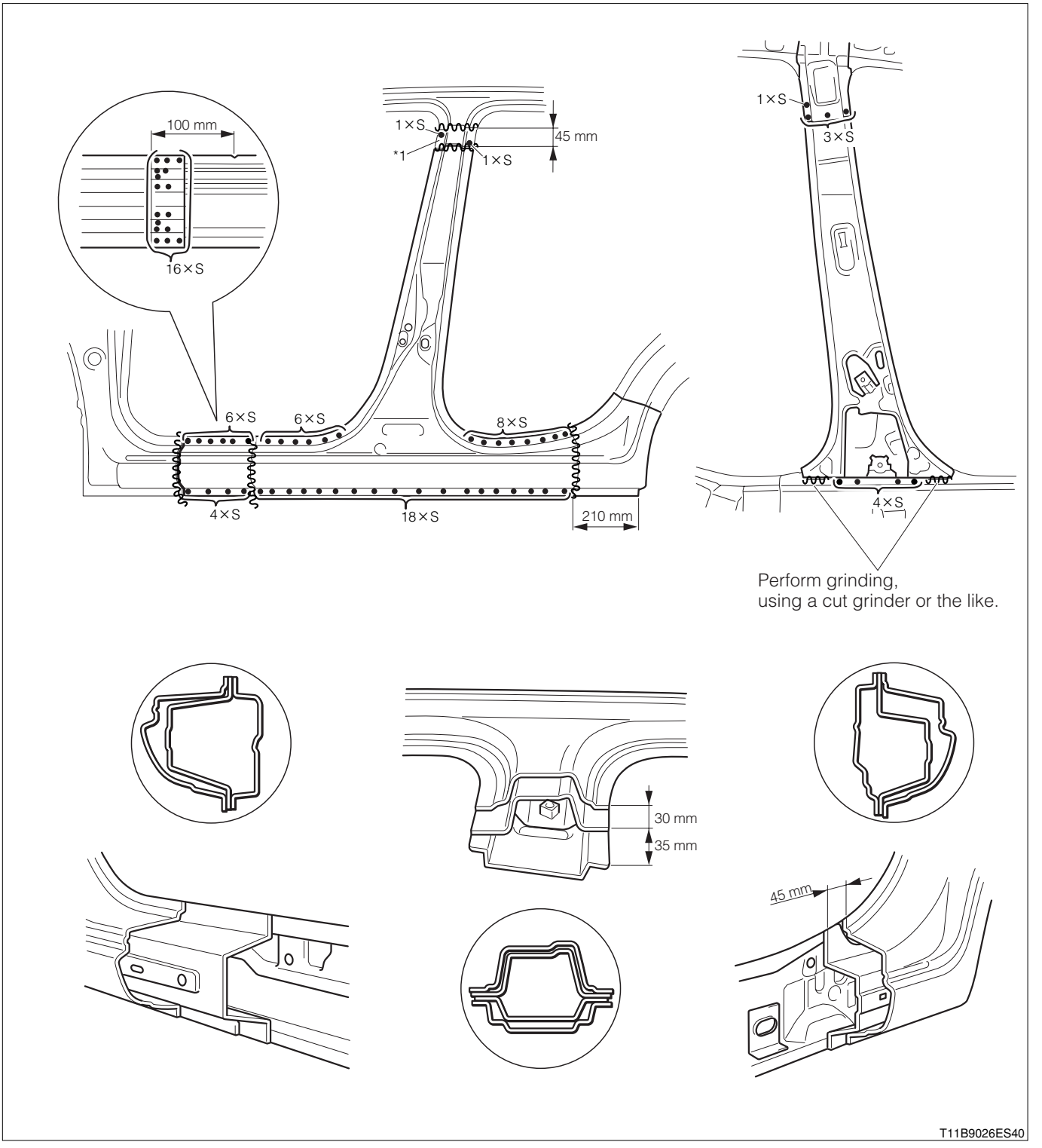
7-1-4 OPERATION AFTER INSTALLATION

1.Install the cowl top side panel.

8 CENTER BODY PILLAR

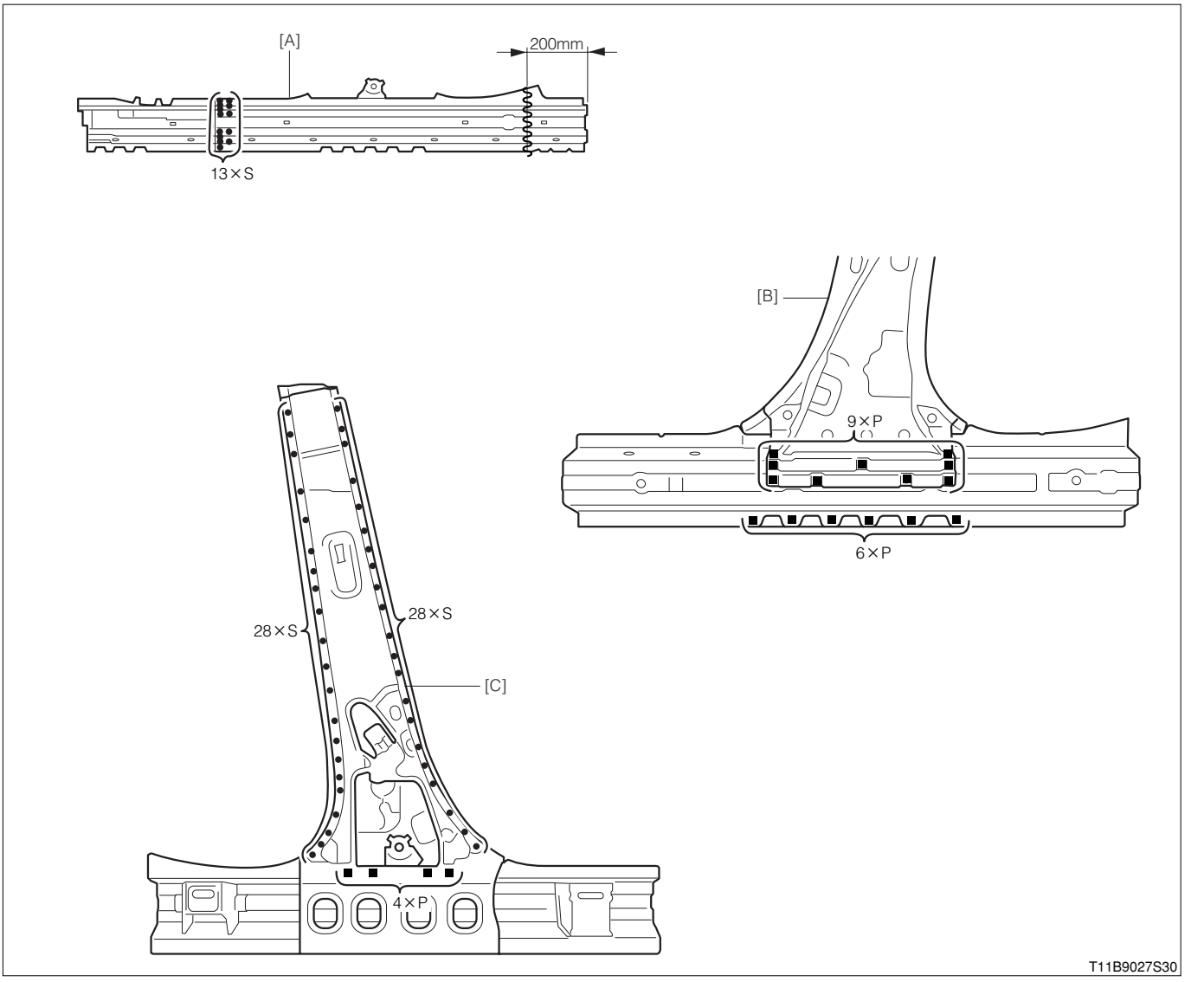
8-1 REPLACEMENT

8-1-1 REMOVAL PROCEDURES



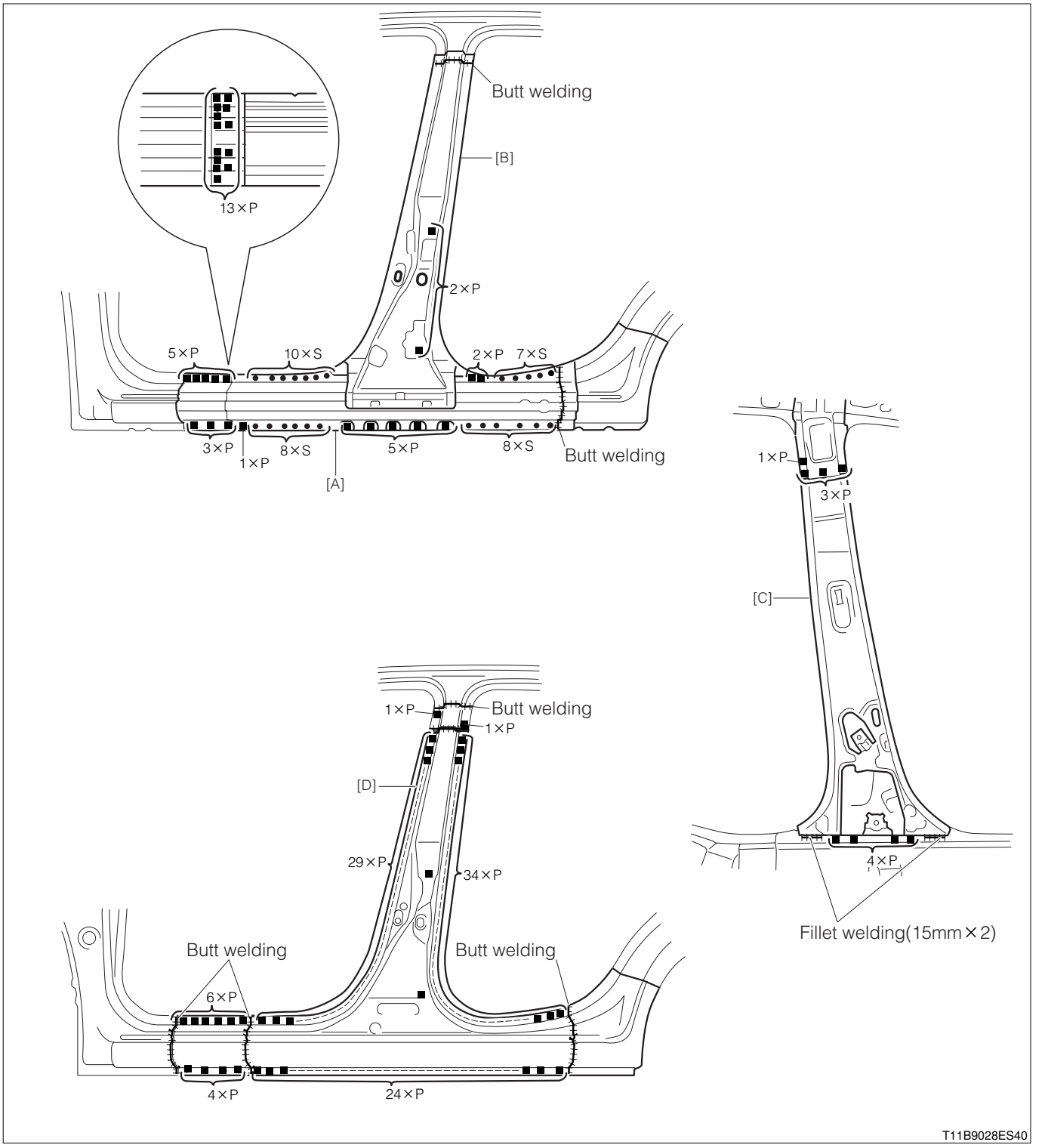
***1 is reused.**

8-1-2 INSTALLATION PROCEDURES



[A] Rocker panel reinforcement
[B] Center pillar reinforcement
[C] Center pillar inner

1.Provide the specified number of welds to [A], [B], and [C] before the replacement parts are temporarily installed.



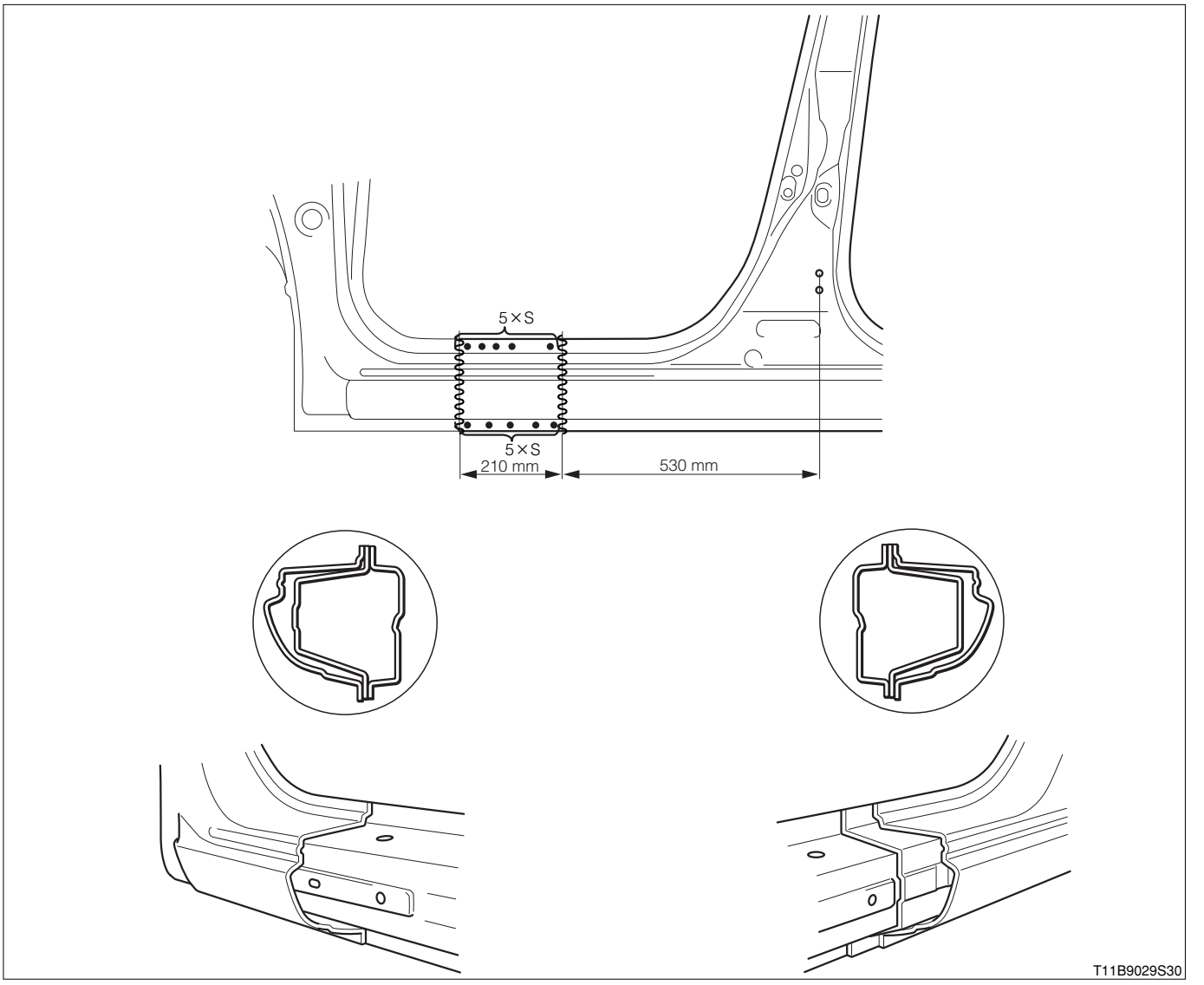
[A] Rocker panel reinforcement
[B] Center pillar reinforcement
[C] Center pillar inner
[D] Outer panel

2.Weld [A], [B], and [C] to the vehicle and then install [D].

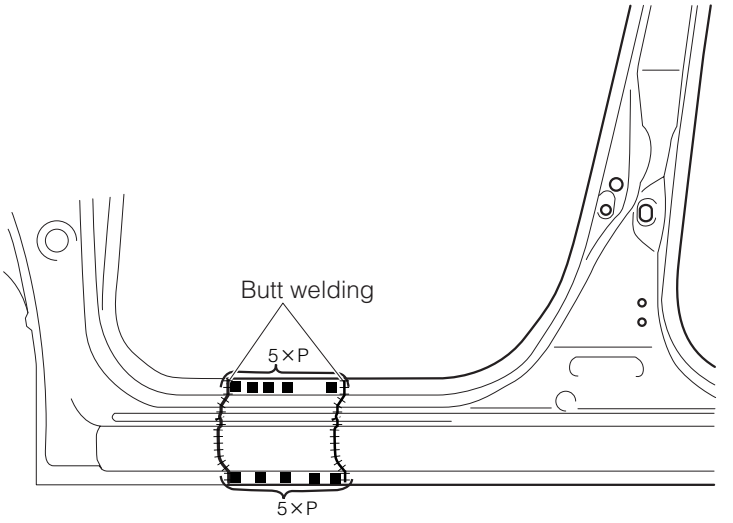
9 ROCKER PANEL OUTER

9-1 REPLACEMENT

9-1-1 REMOVAL PROCEDURES



9-1-2 INSTALLATION PROCEDURES



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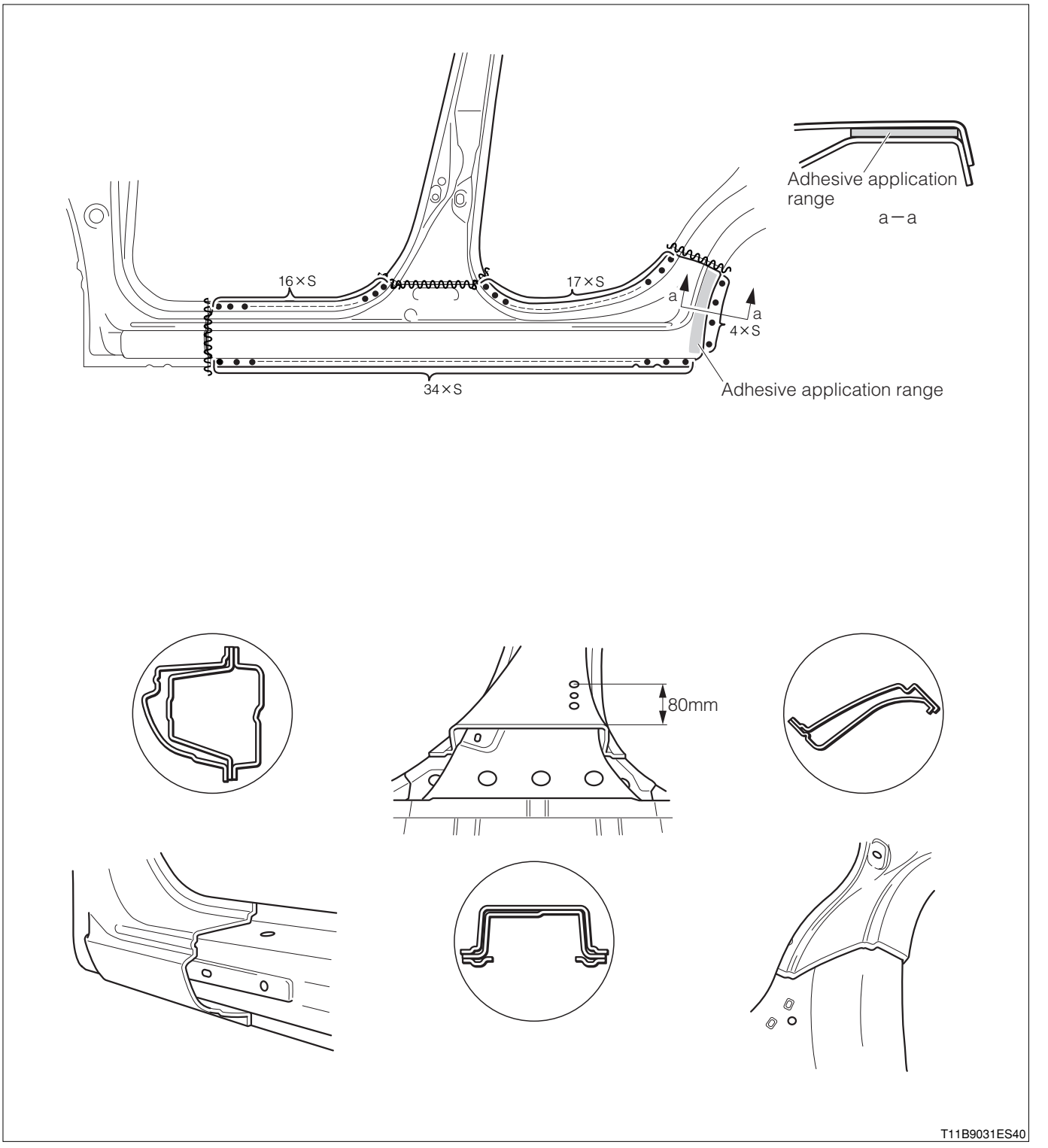
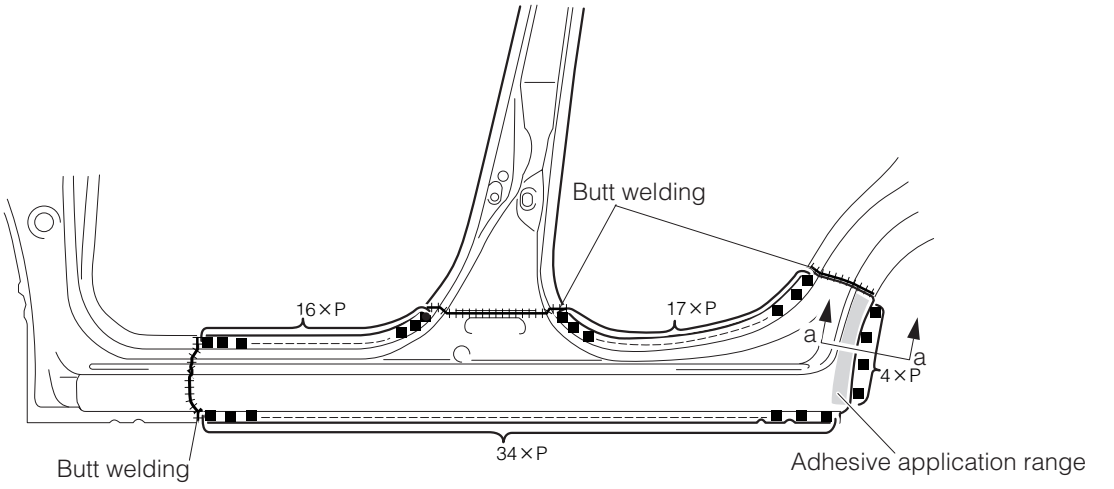
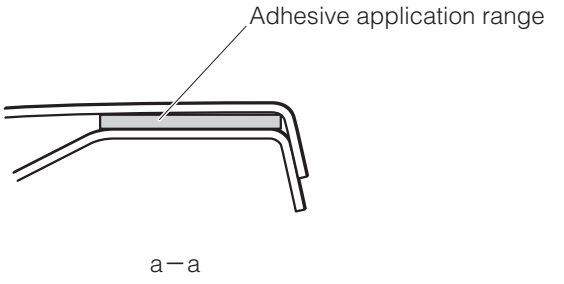
9-2 REPLACEMENT

9-2-1 REMOVAL PROCEDURES



9-2-2 INSTALLATION PROCEDURES





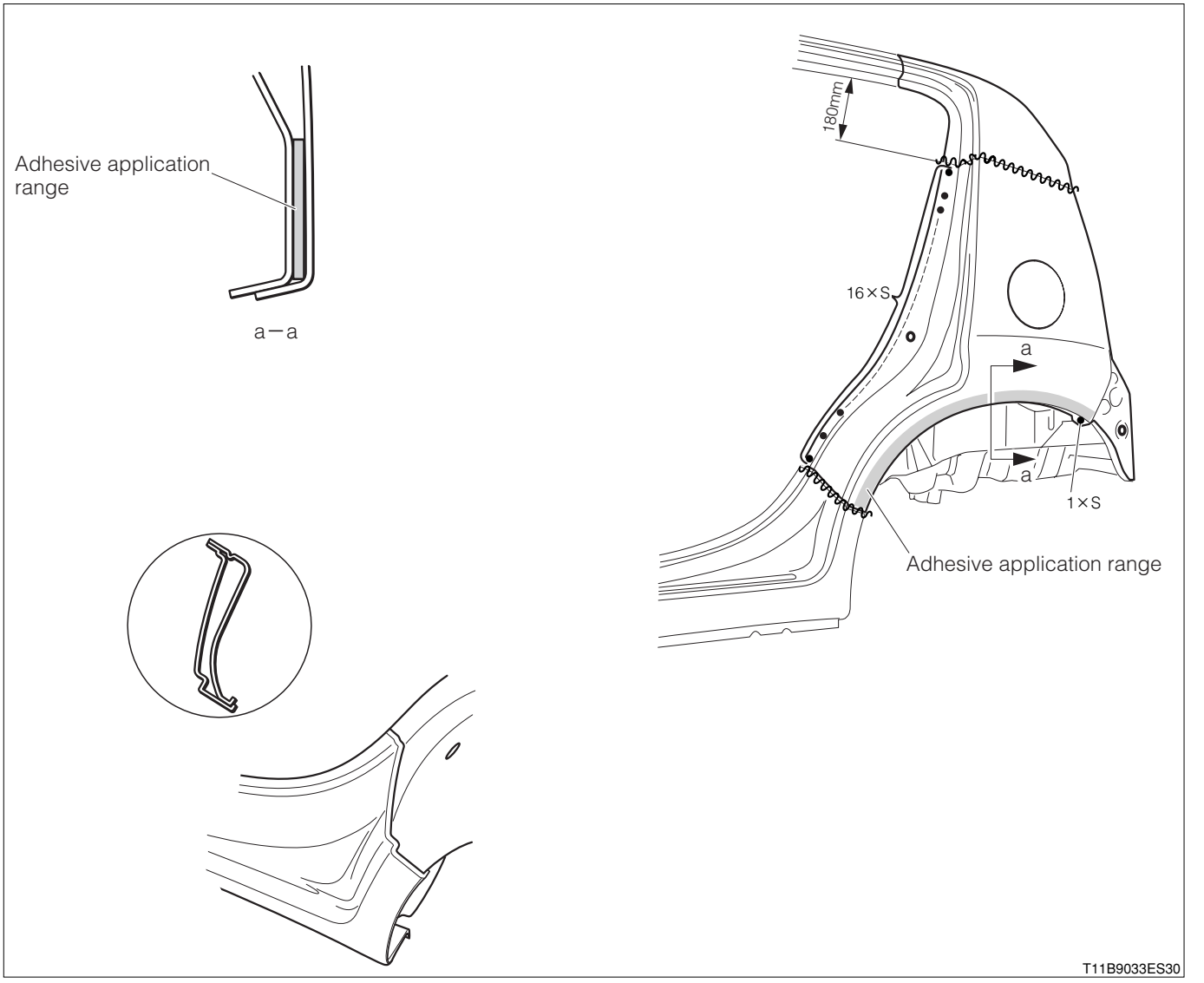
a—a

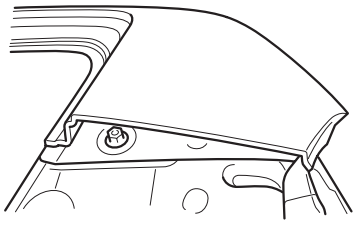
T11B9032ES30

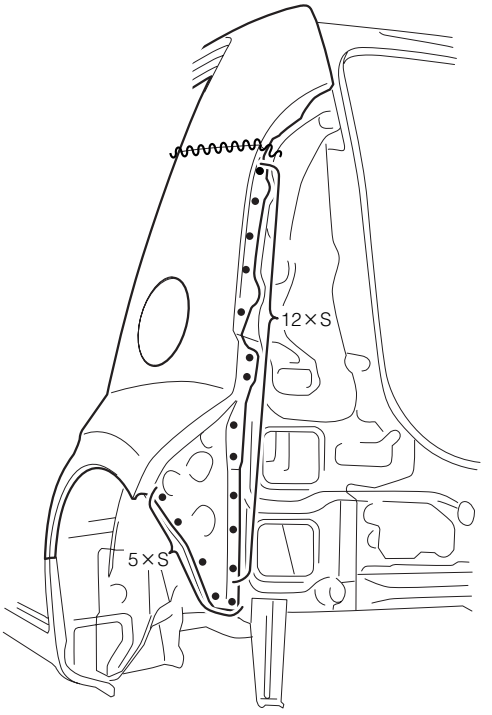
10 QUARTER PANEL

10-1 REPLACEMENT

10-1-1 REMOVAL PROCEDURES

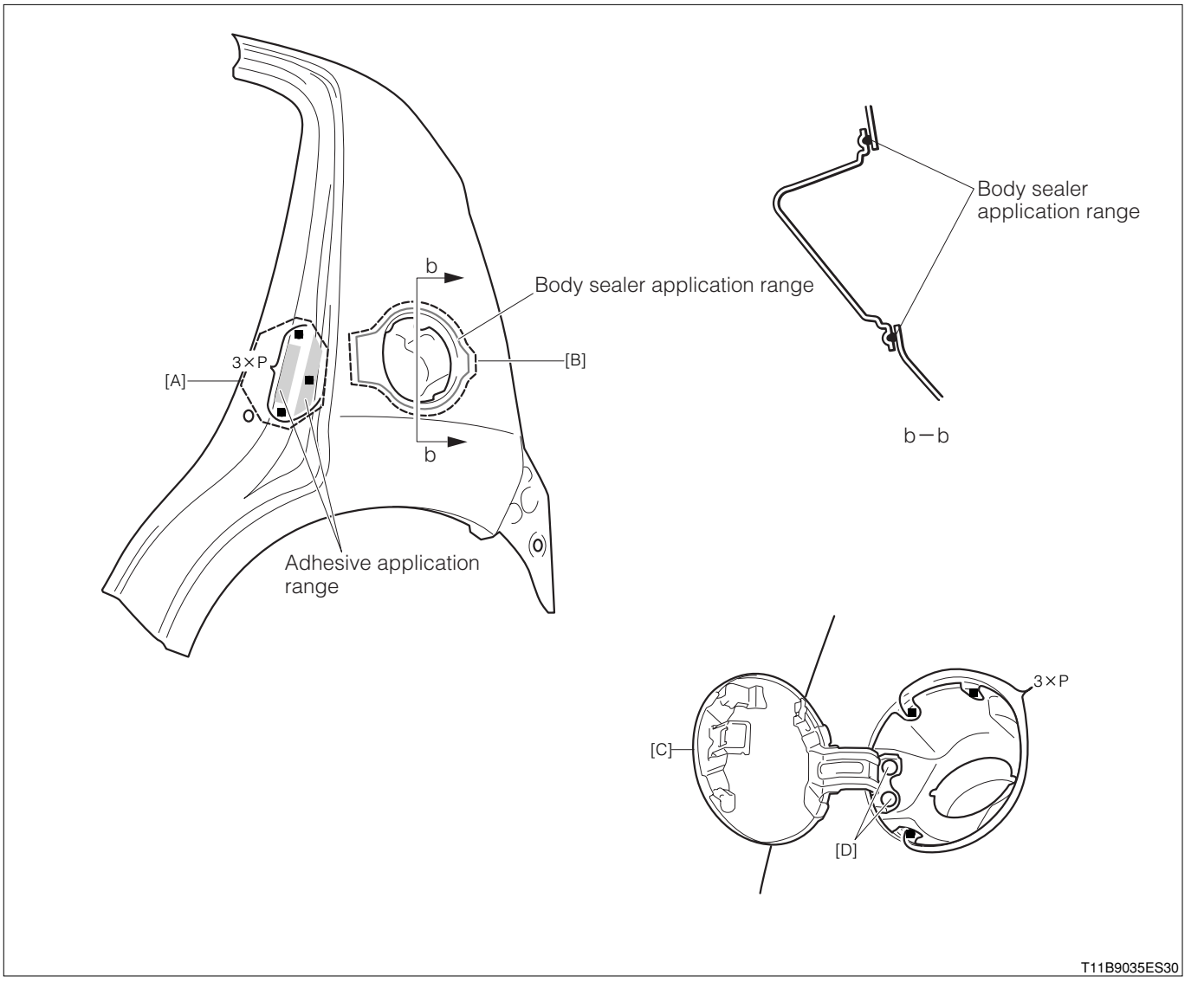






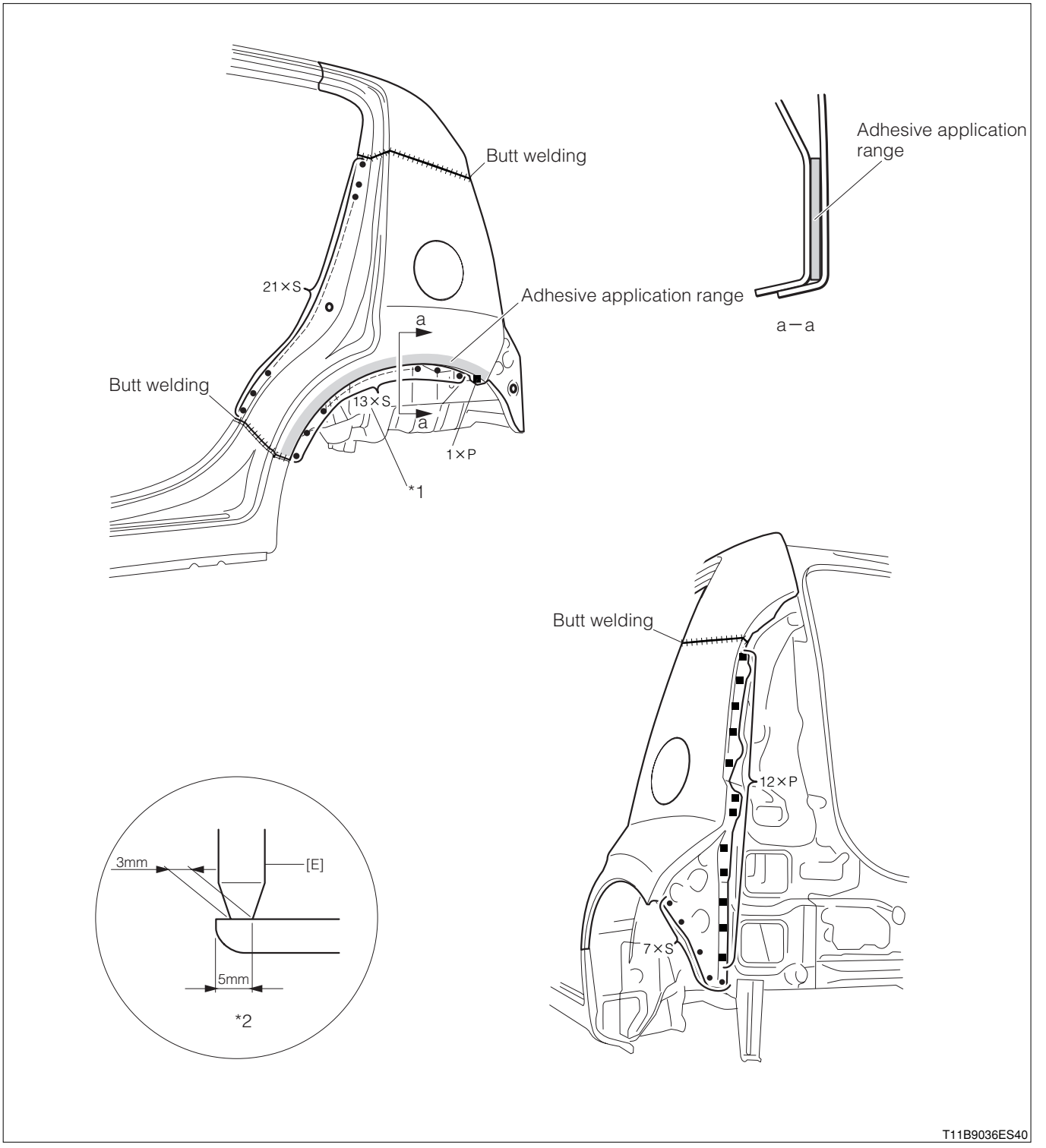
T11B9034S30

10-1-2 INSTALLATION PROCEDURES



[A] Quarter lock pillar reinforcement
[B] Fuel inlet box
[C] Fuel filler opening lid
[D] Waterproofing rivet

1.Apply the body sealer before the replacement parts are temporarily installed.



[E] Spot tip

2.As the flange width is narrow, work and adjust the end portion of [E] as in *2 when spot welding the section *1.

11 QUARTER WHEEL HOUSE PANEL OUTER

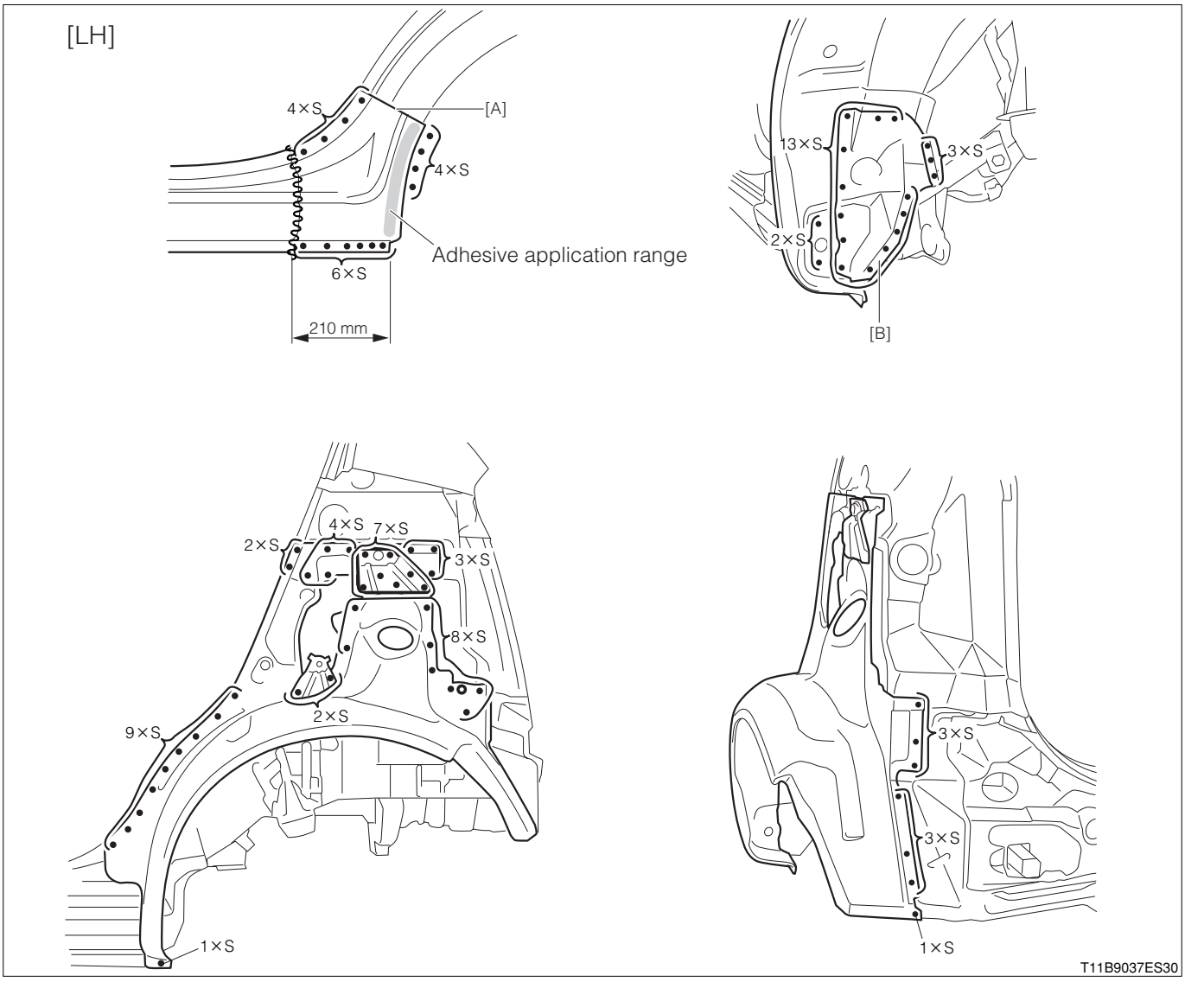
11-1 REPLACEMENT

11-1-1 OPERATION BEFORE REMOVAL

1.Remove the necessary part or component of the quarter panel.

2.Remove the necessary part or component of the quarter panel extension rear.

11-1-2 REMOVAL PROCEDURES

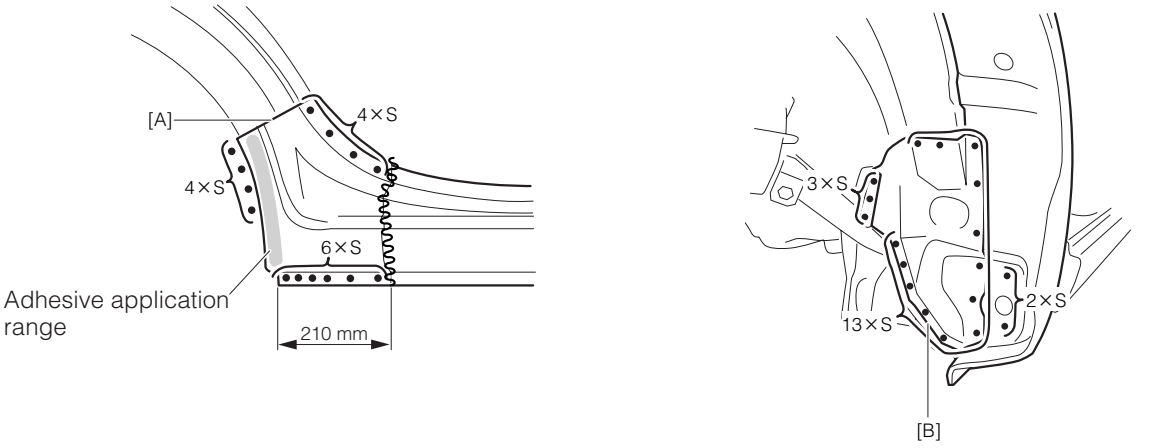


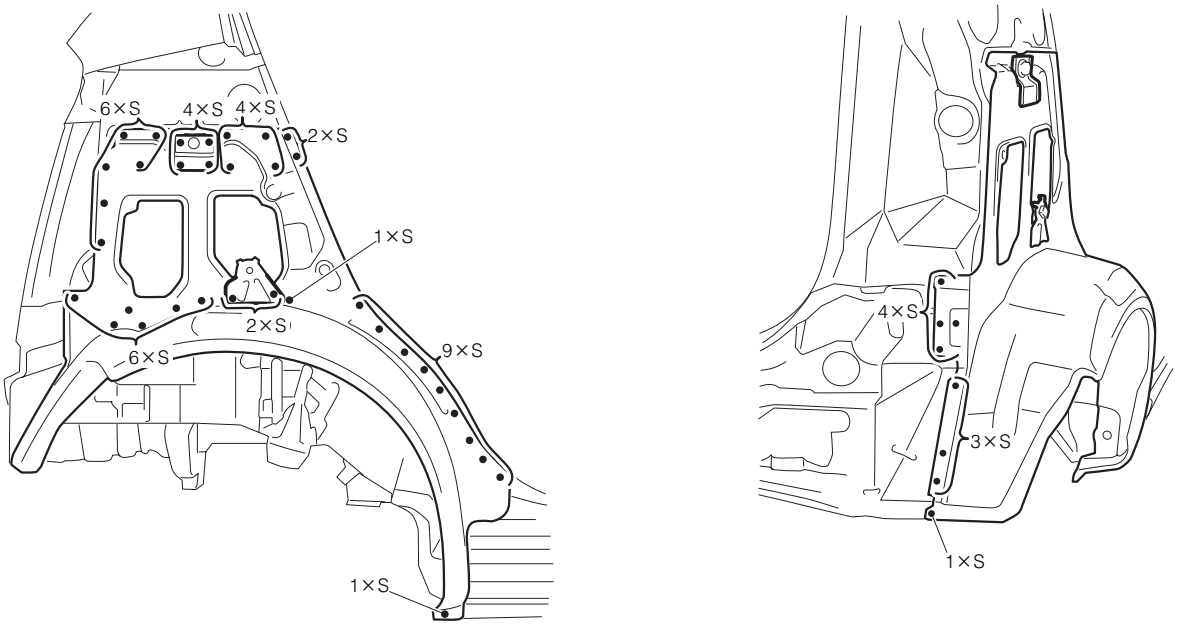
[A] Rocker panel outer

[B] Quarter wheel house gusset inner

1.Remove [A] and [B] to remove the replacement parts.

[RH]





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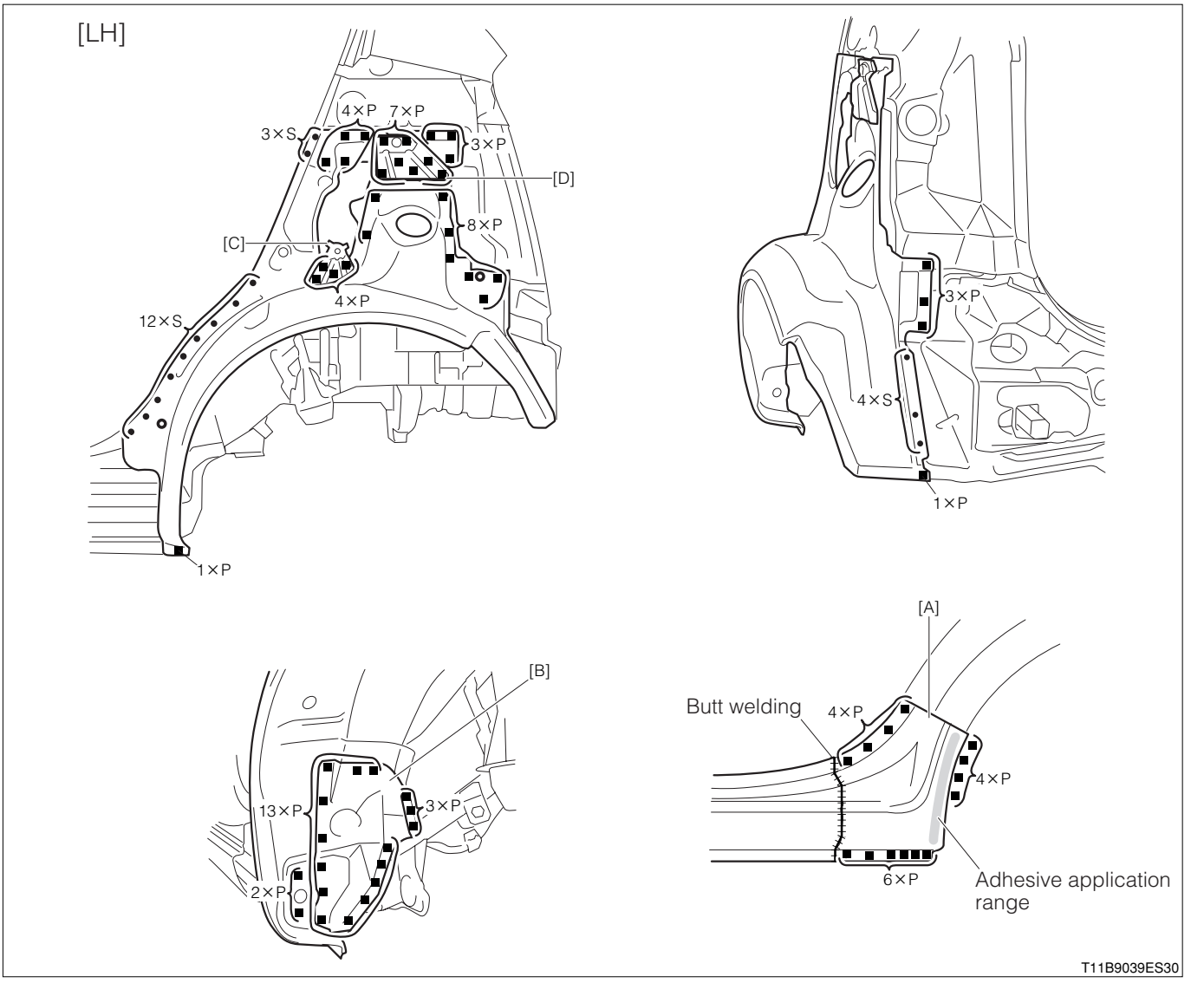
[A] Rocker panel outer
[B] Quarter wheel house gusset inner

2.Remove [A] and [B] to remove the replacement parts.

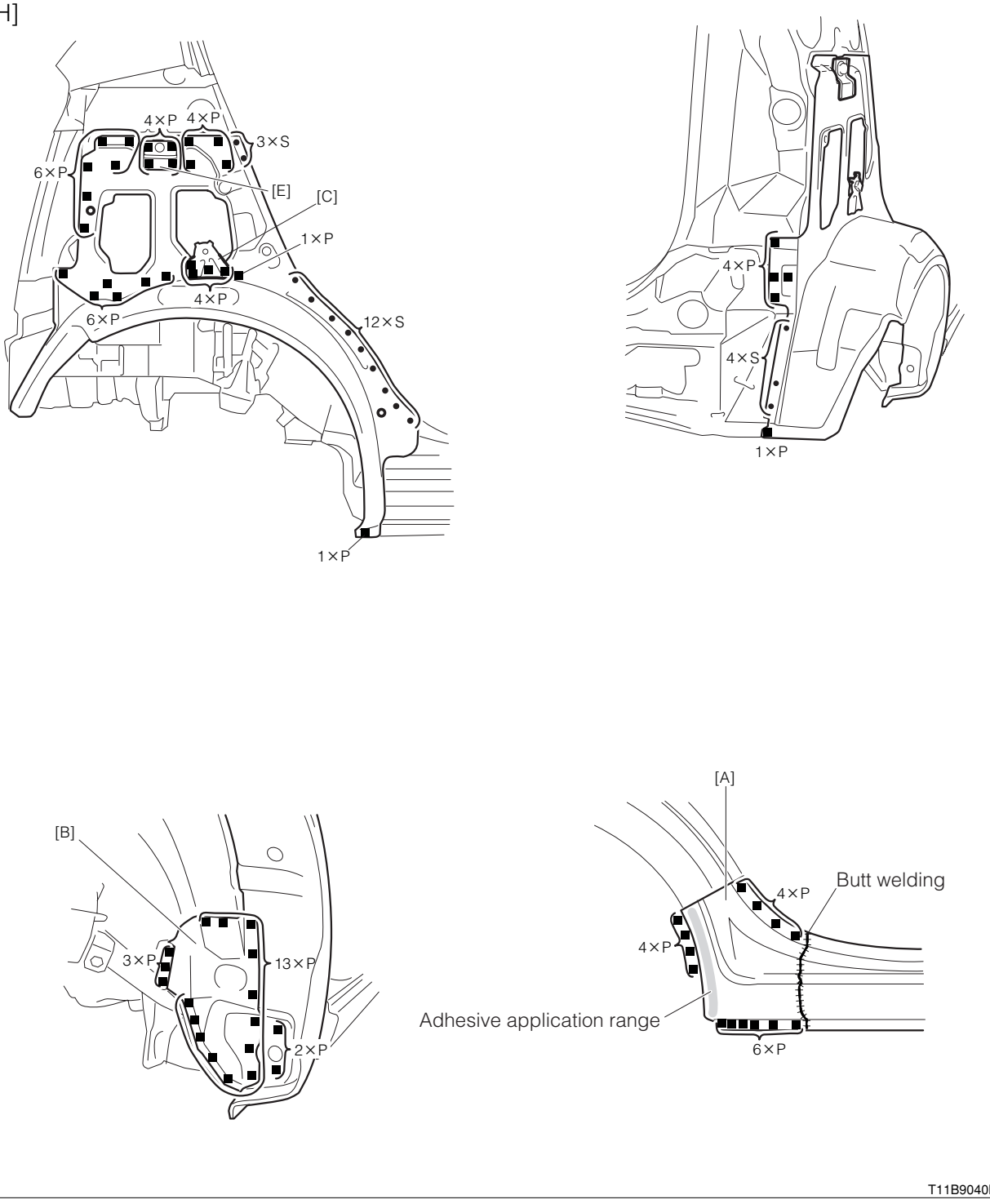
11-1-3 INSTALLATION PROCEDURES



[A] Rocker panel outer
[B] Quarter wheel house gusset inner
[C] Belt anchor to quarter reinforcement inner lower
[D] Rear seat back set retainer

1.Install the replacement parts, and then install [A] and [B].

[RH]



[A] Rocker panel outer
[B] Quarter wheel house gusset inner
[C] Belt anchor to quarter reinforcement inner lower
[E] Rear seat back set retainer

2.Install the replacement parts, and then install [A] and [B].

11-1-4 OPERATION AFTER INSTALLATION

1.Install the quarter panel extension rear.
2.Install the quarter panel.

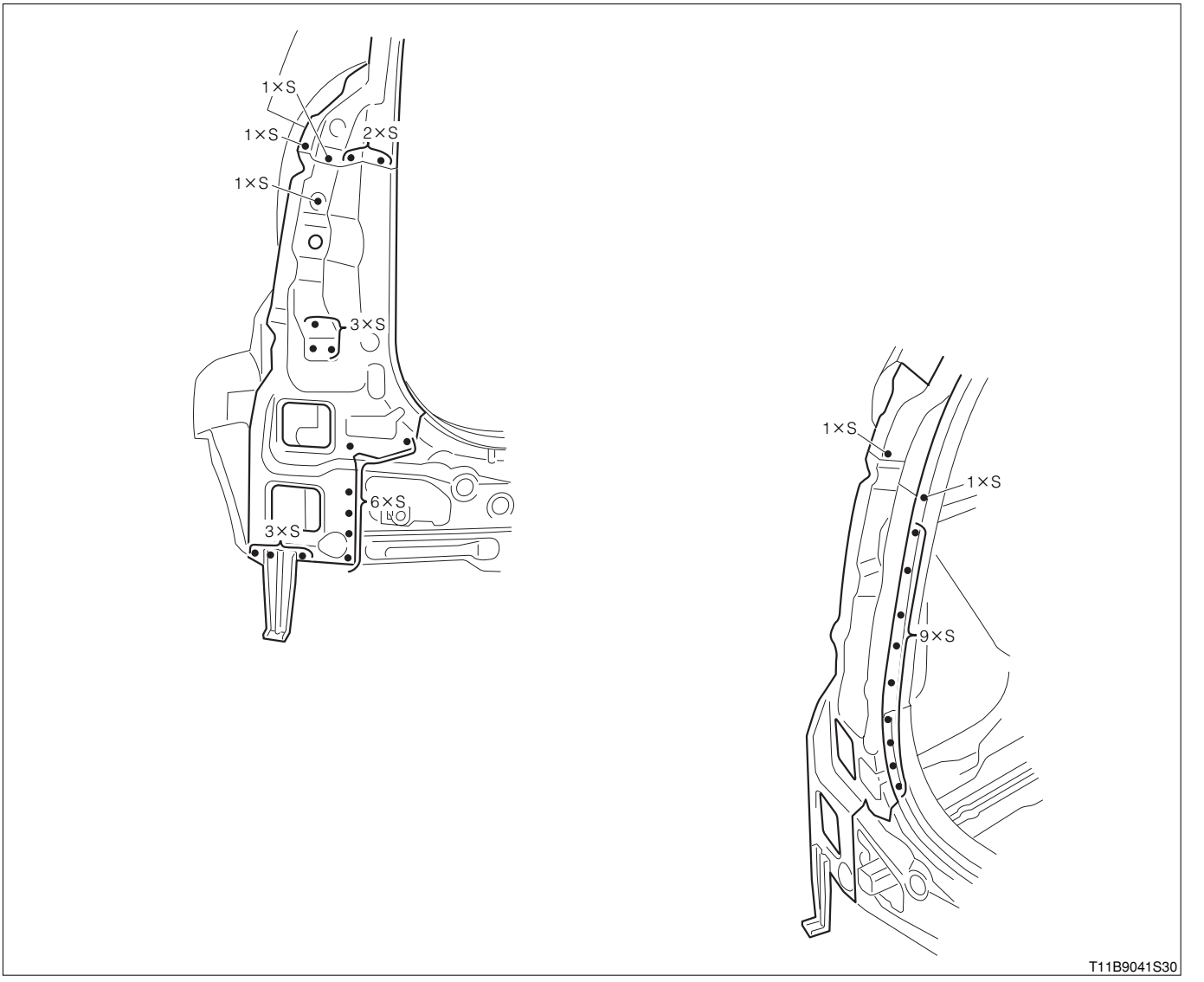
12 QUARTER PANEL EXTENSION REAR

12-1 REPLACEMENT

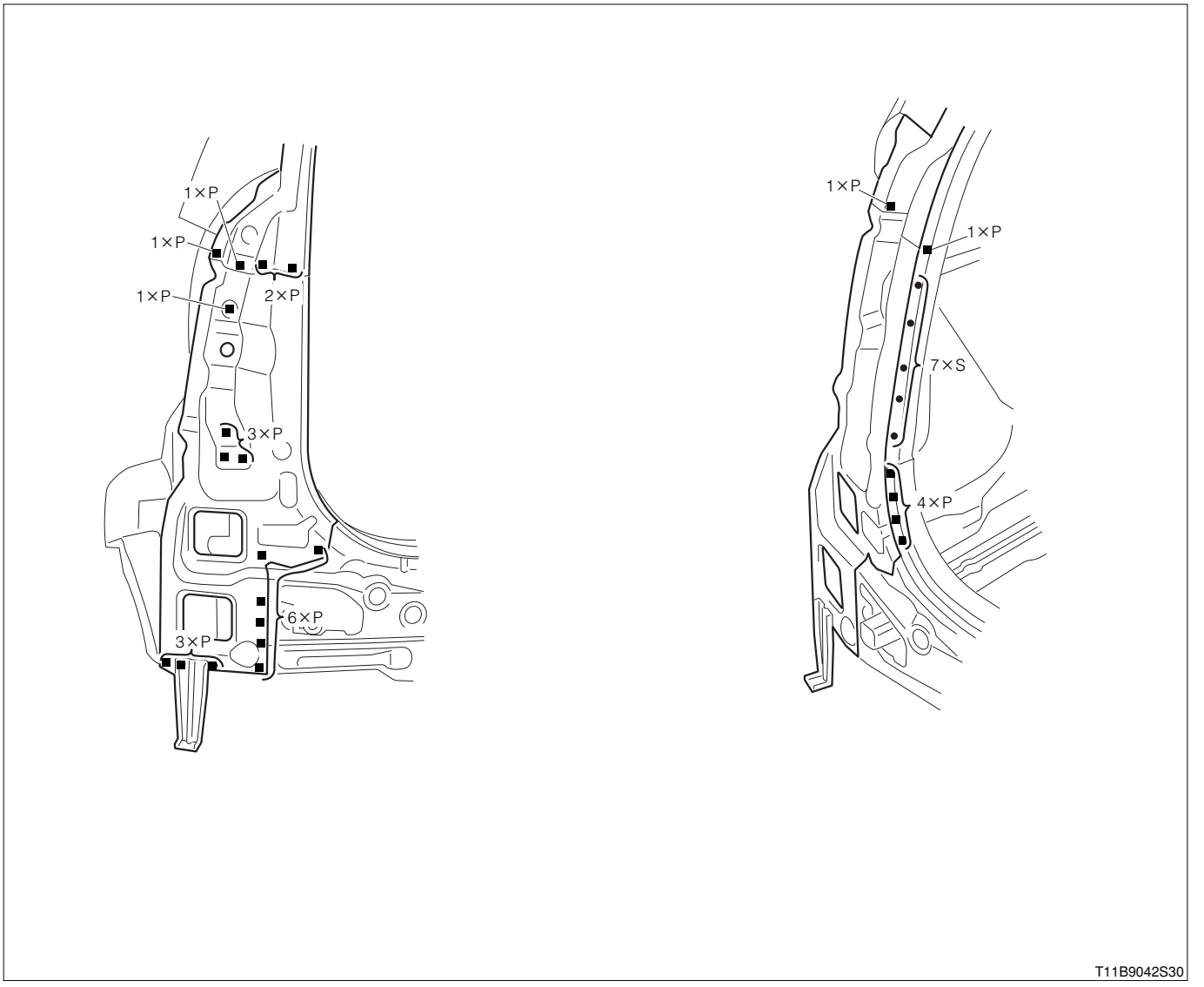
12-1-1 OPERATION BEFORE REMOVAL

1.Remove the necessary part or component of the quarter panel.

12-1-2 REMOVAL PROCEDURES



12-1-3 INSTALLATION PROCEDURES



1.Remove the part or component to be exchanged from the replacement parts and install to the vehicle.

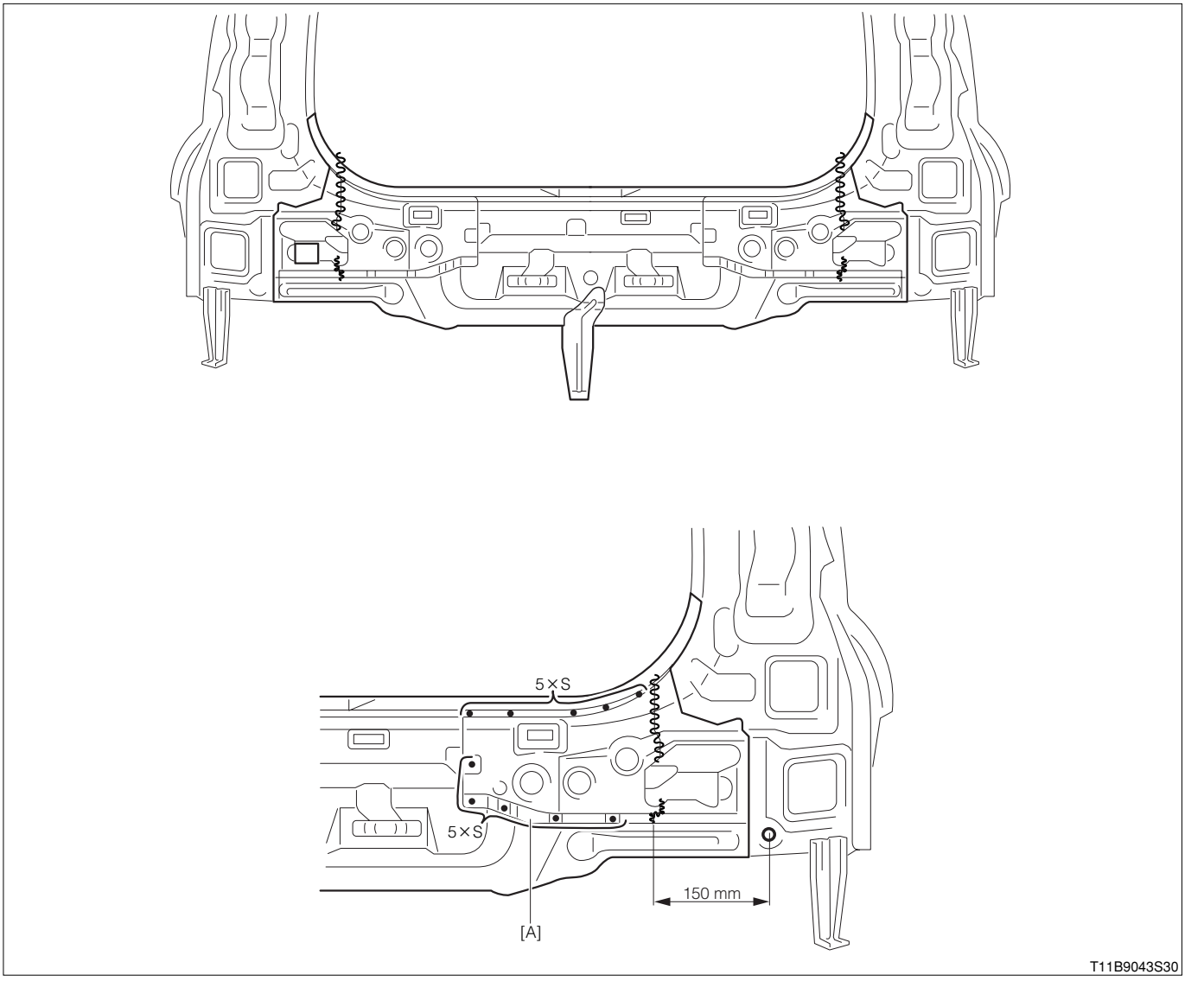
12-1-4 OPERATION AFTER INSTALLATION

1.Install the quarter panel.

13 BODY LOWER BACK PANEL

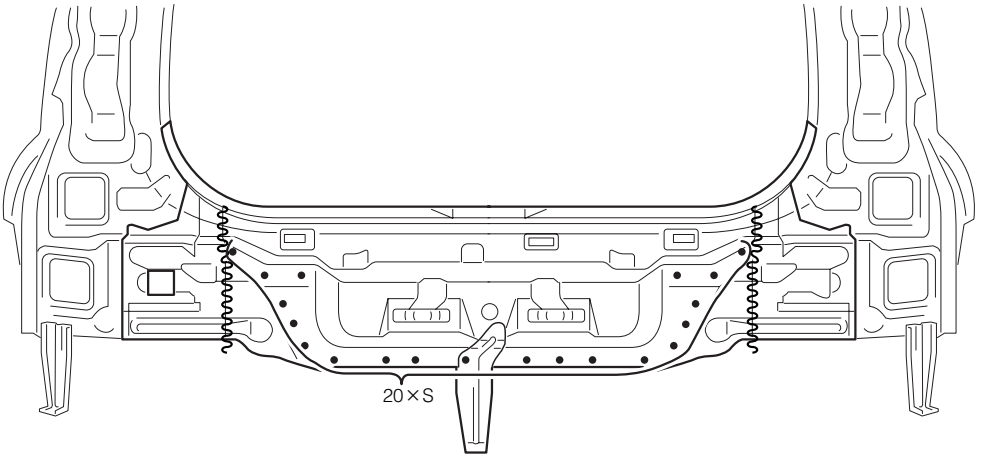
13-1 REPLACEMENT

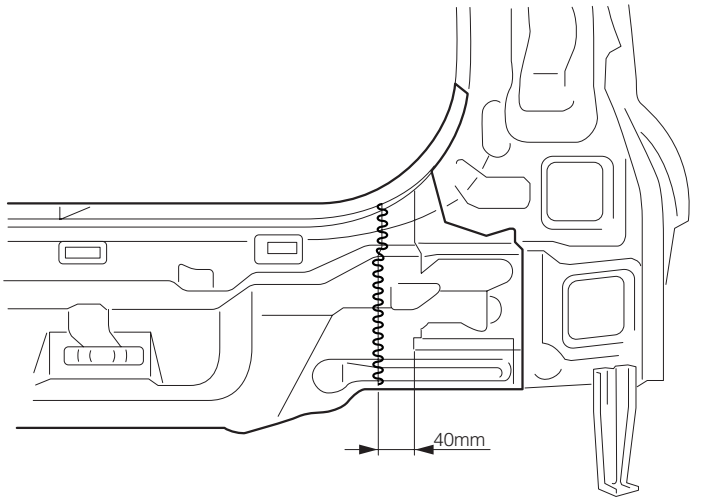
13-1-1 REMOVAL PROCEDURES

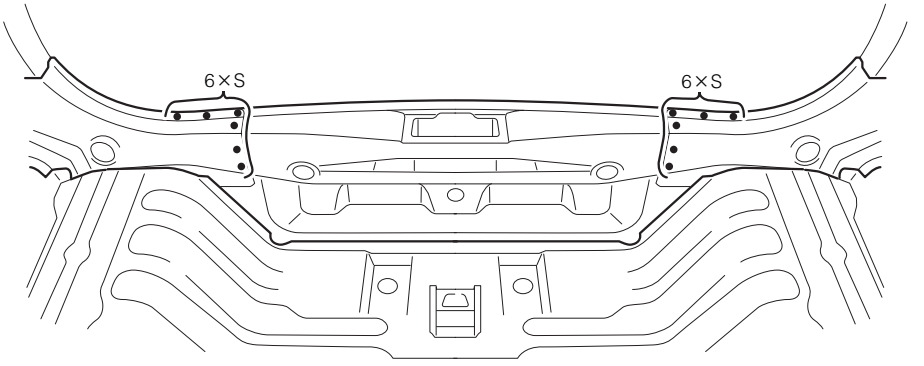


[A] Body lower back reinforcement

1.Remove [A] before starting the work.

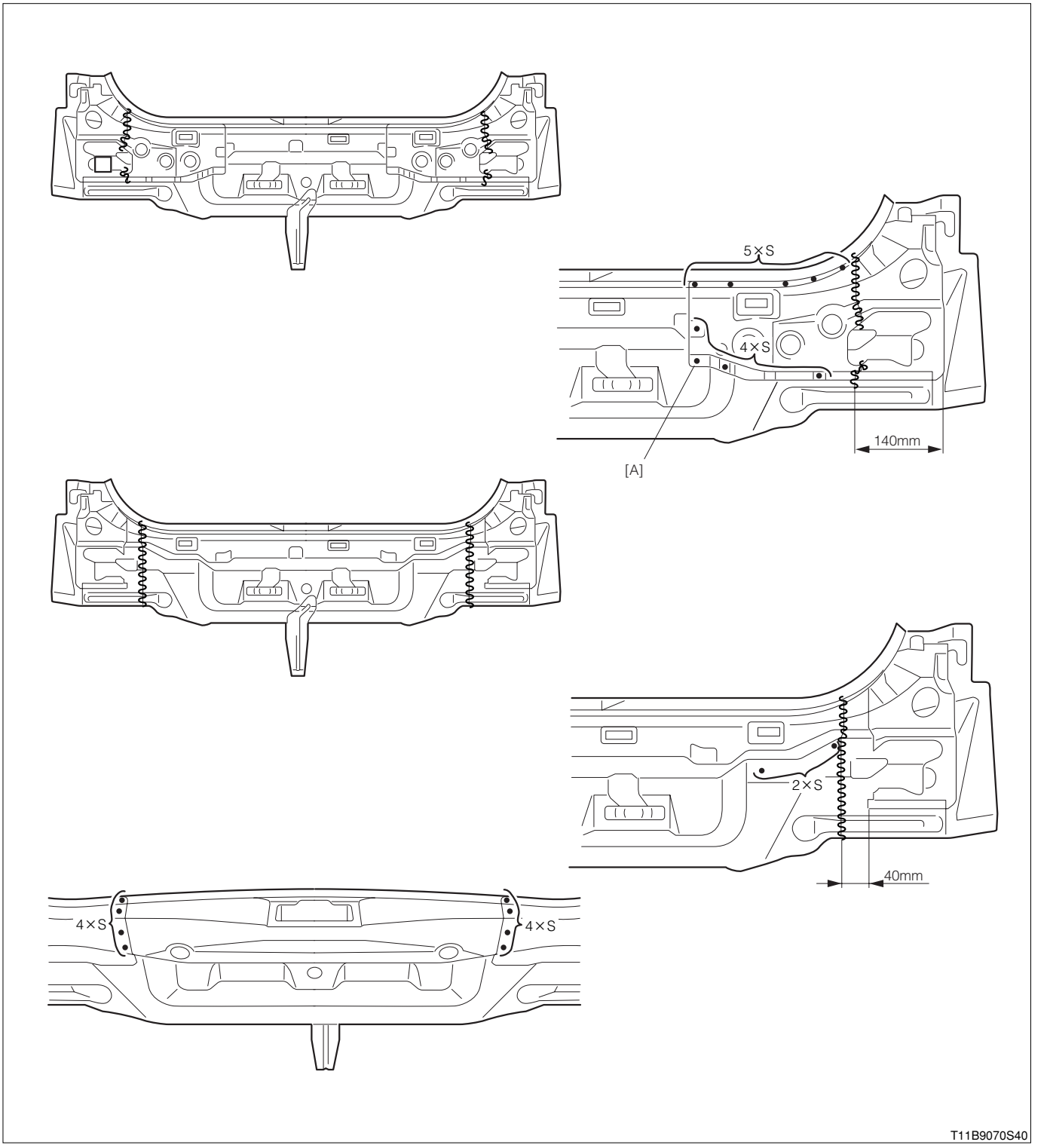






T11B9044S40

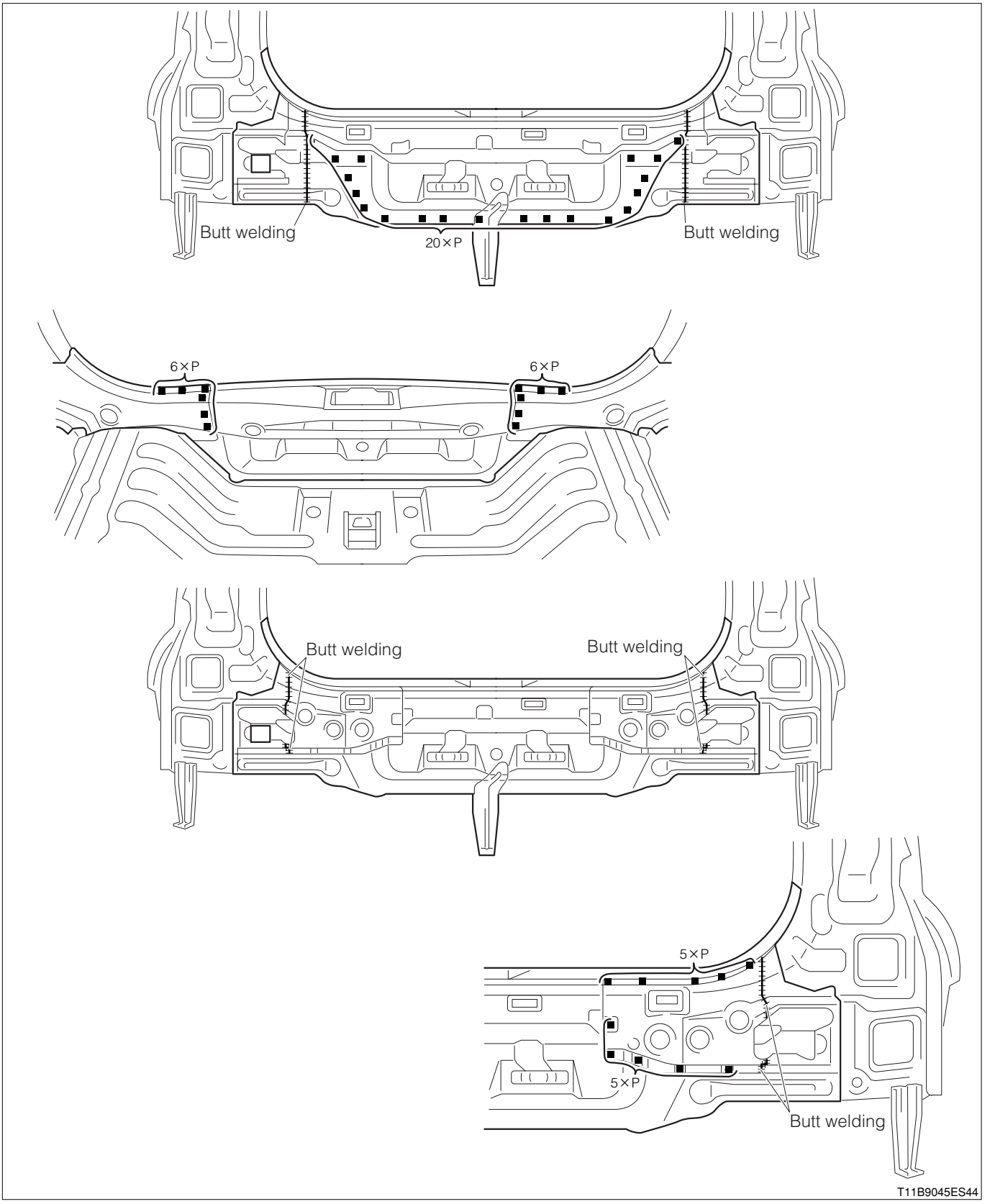
13-1-2 INSTALLATION PROCEDURES



[A] Body lower back reinforcement

1.Remove the part or component to be exchanged from the replacement parts and install to the vehicle.

2.Remove [A] before starting the work.

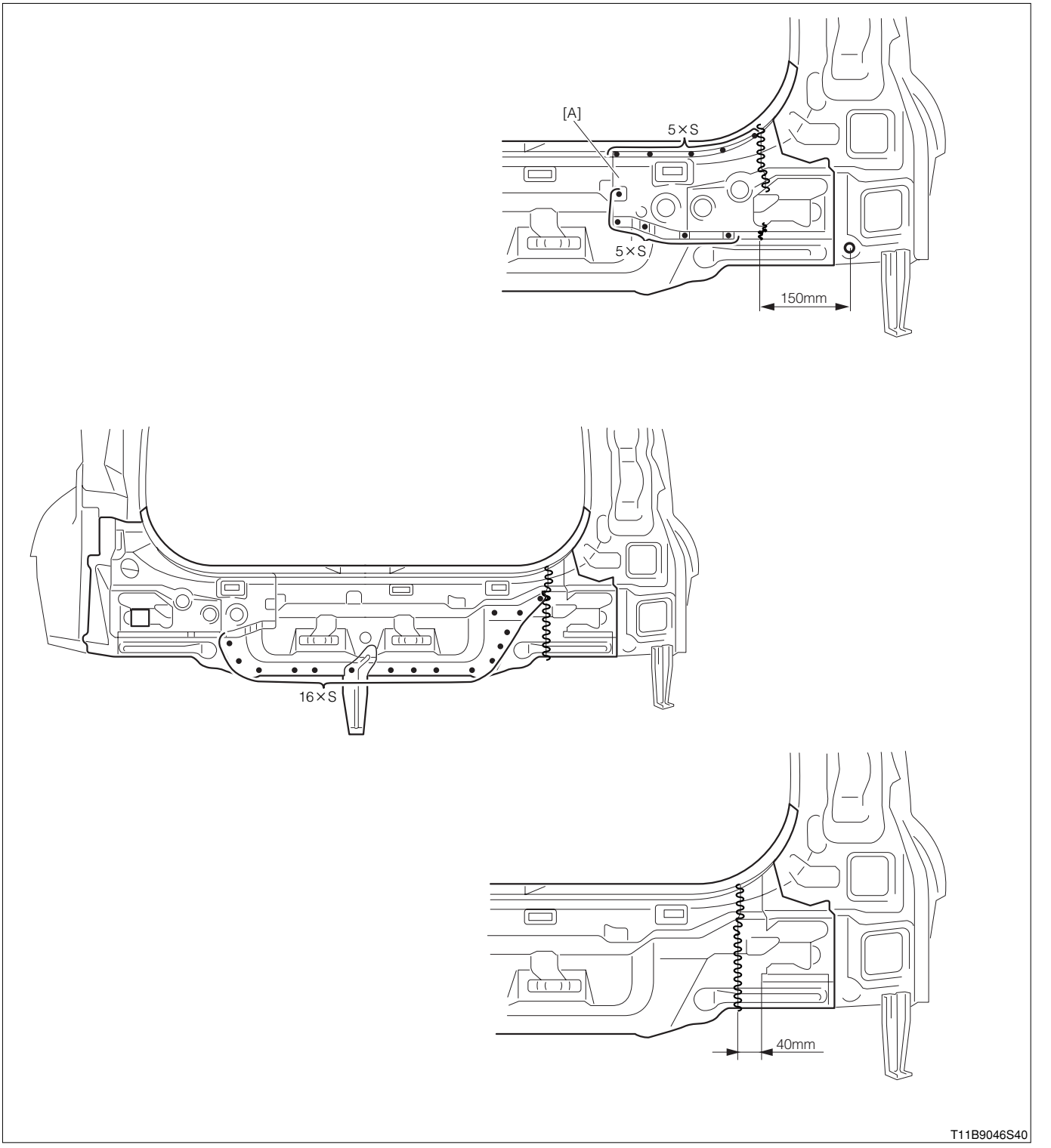

Butt welding
20×P
Butt welding
6×P
6×P
Butt welding
Butt welding
5×P
5×P
Butt welding
T11B9045ES44

13-2 REPLACEMENT

13-2-1 OPERATION BEFORE REMOVAL

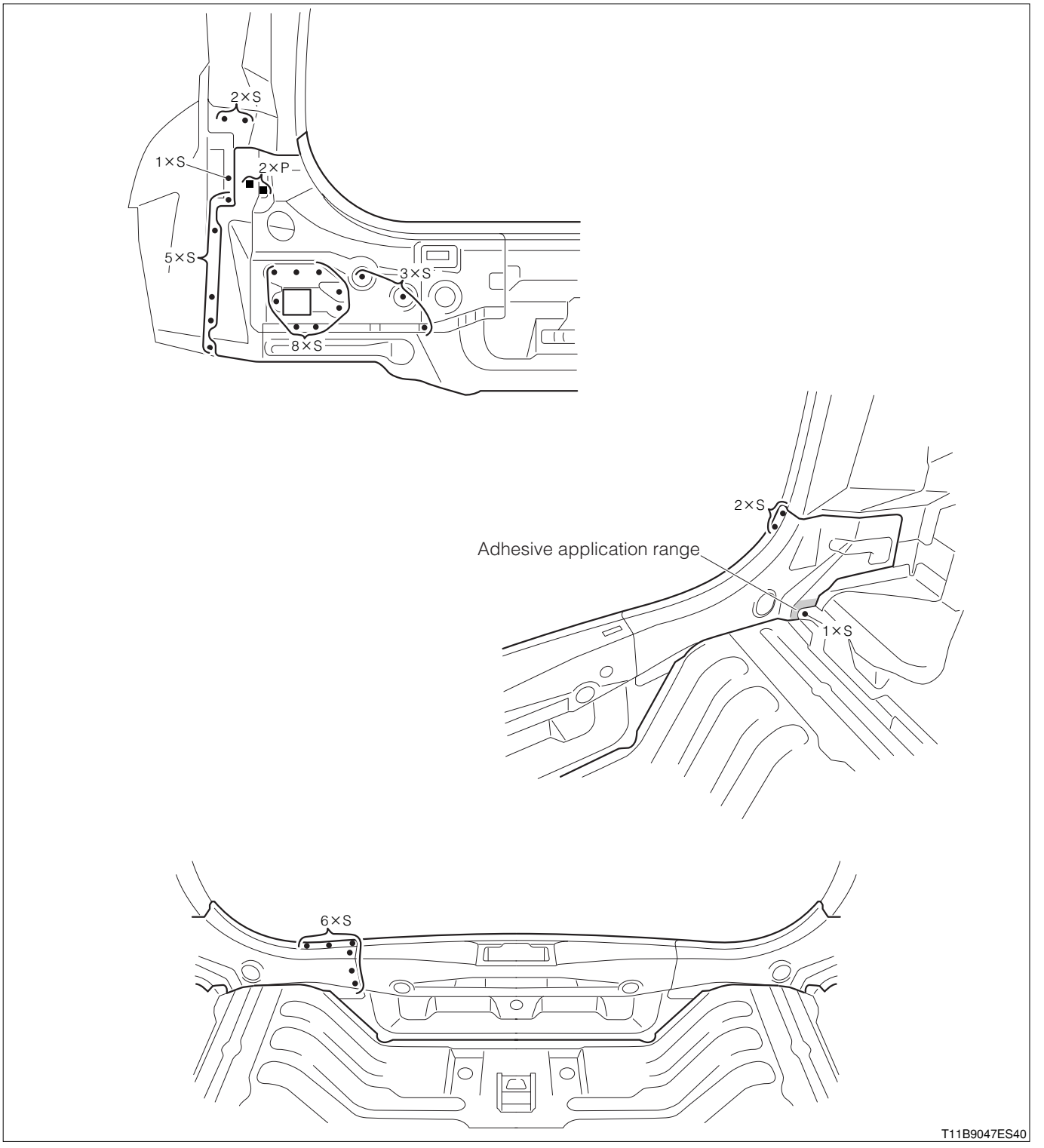
1.Remove the necessary part or component of the quarter panel extension rear.

13-2-2 REMOVAL PROCEDURES

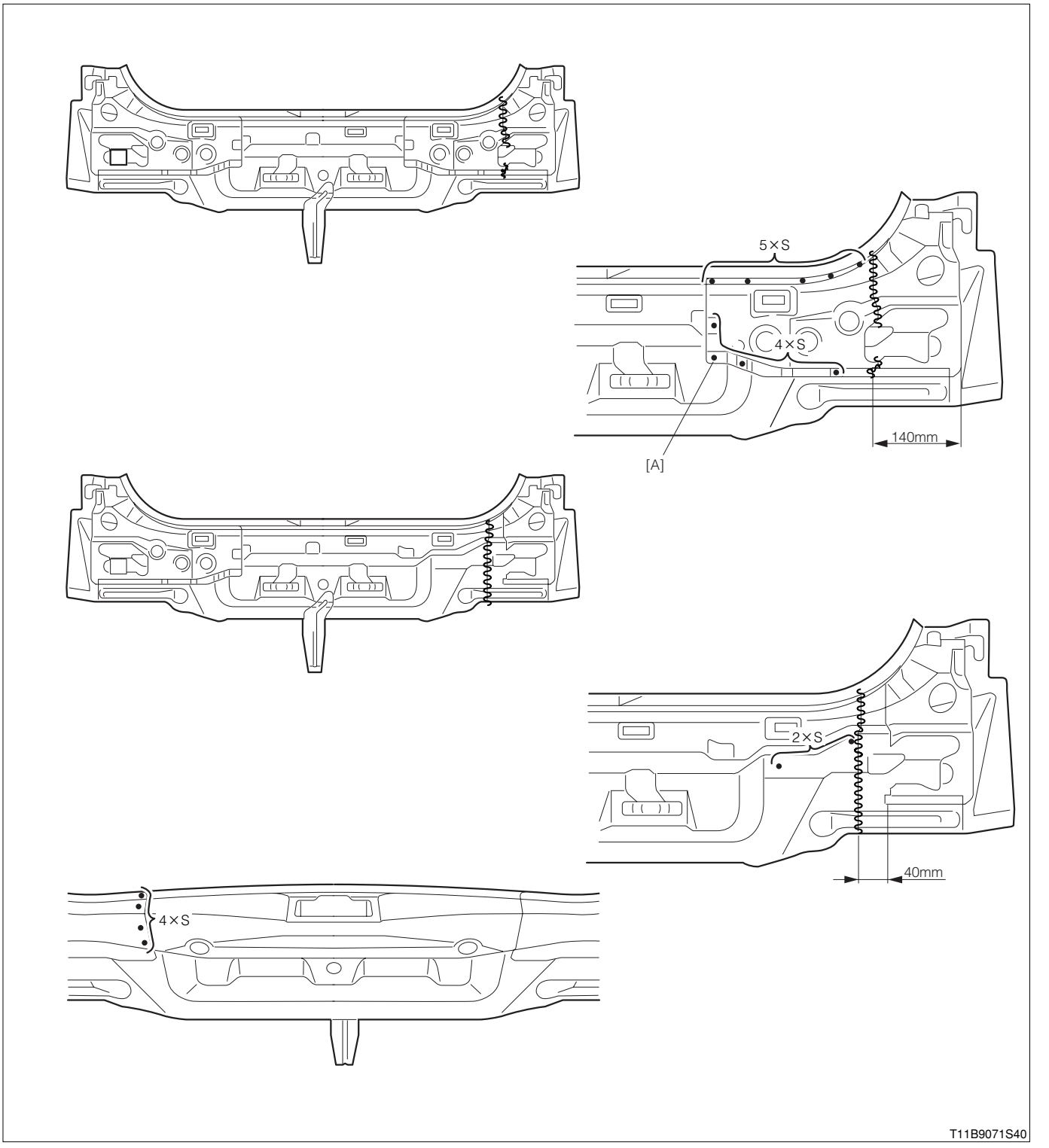


[A] Body lower back reinforcement

1.Remove [A] before starting the work.

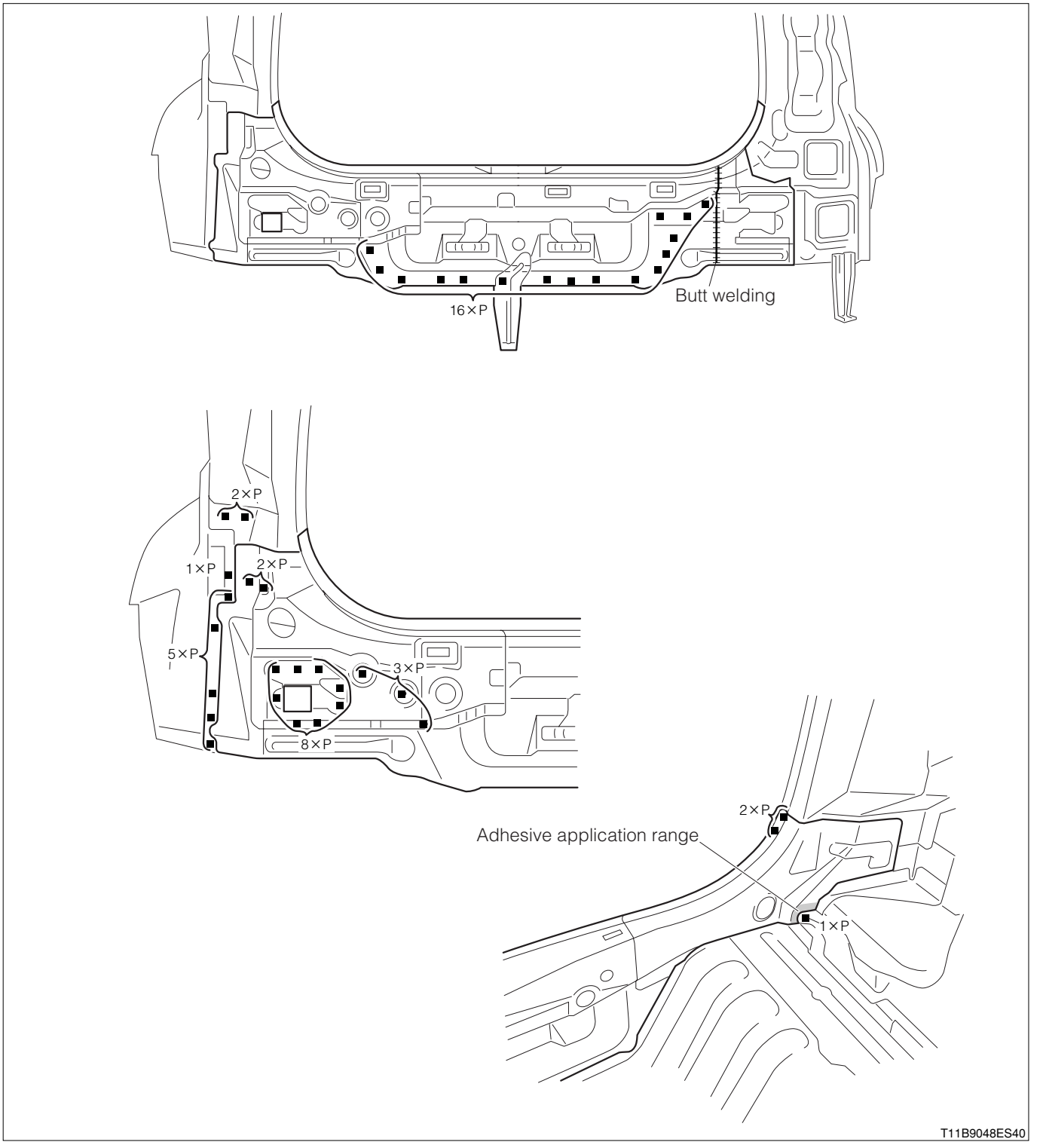

2×S
1×S
2×P
5×S
3×S
8×S
2×S
Adhesive application range
1×S
6×S
T11B9047ES40

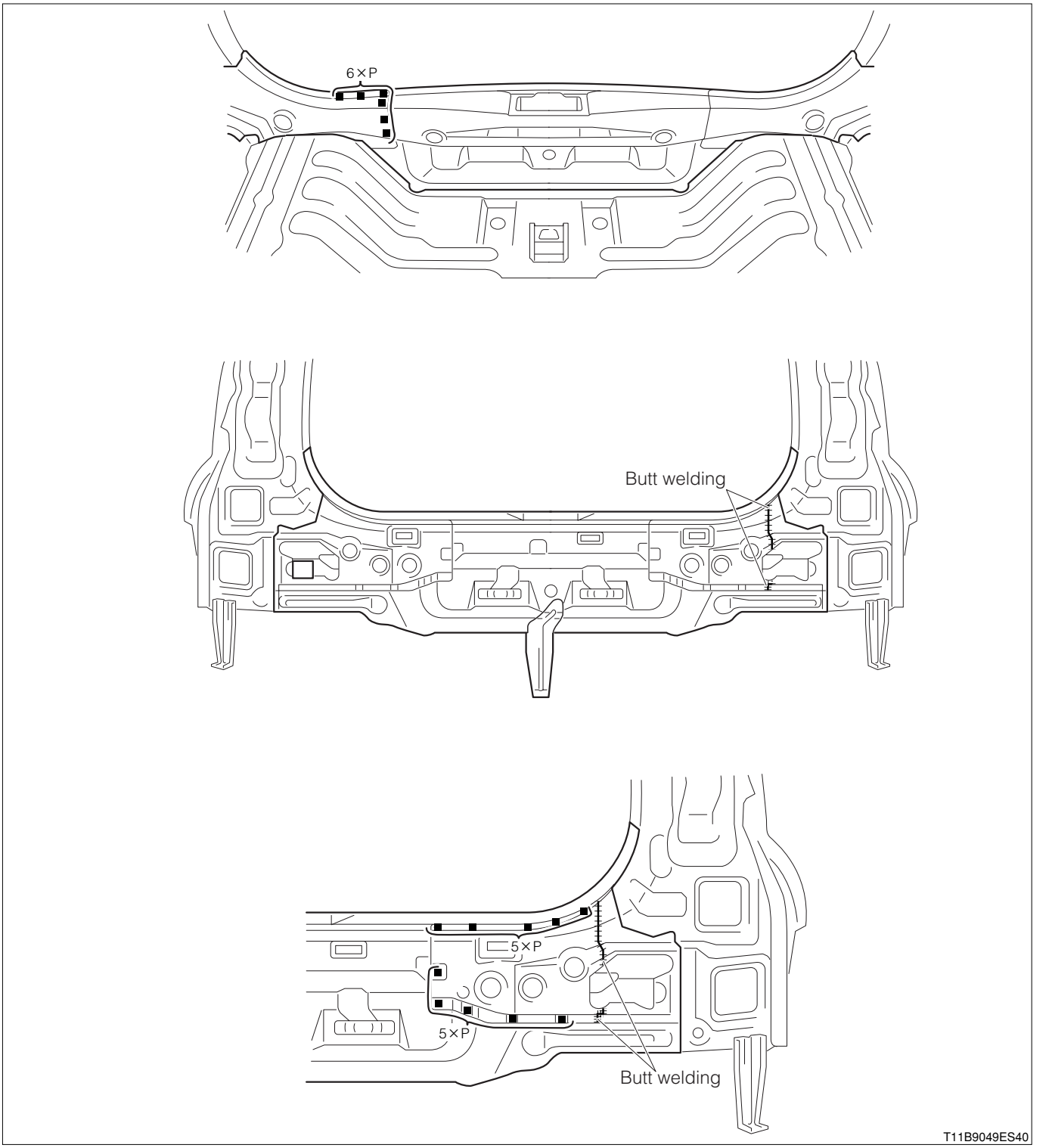
13-2-3 INSTALLATION PROCEDURES



[A] Body lower back reinforcement

1.Remove the part or component to be exchanged from the replacement parts and install to the vehicle.
2.Remove [A] before starting the work.


16×P
Butt welding
2×P
1×P
2×P
5×P
3×P
8×P
2×P
Adhesive application range
1×P
T11B9048ES40



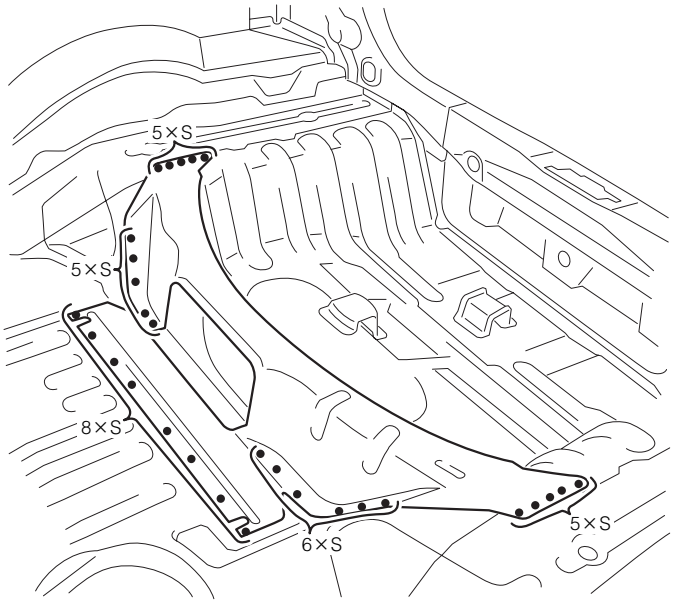
13-2-4 OPERATION AFTER INSTALLATION

1.Install the quarter panel extension rear.

14 REAR FLOOR CROSS MEMBER REINFORCEMENT NO.2

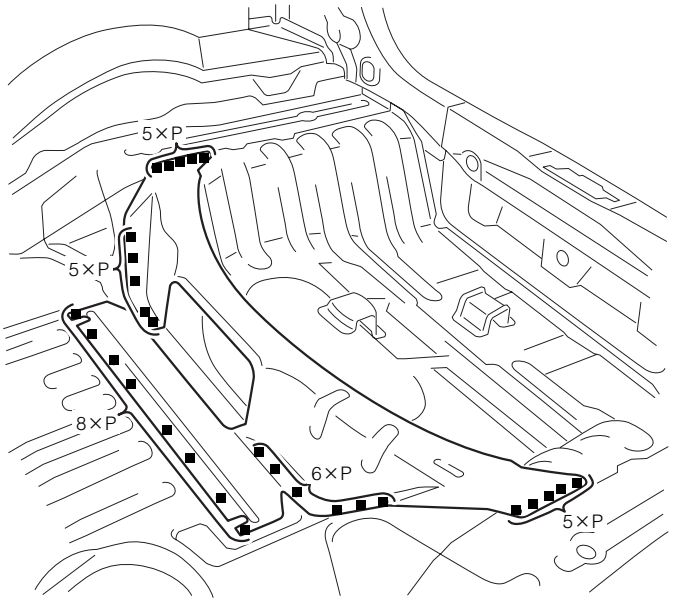
14-1 REPLACEMENT

14-1-1 REMOVAL PROCEDURES



T11B9050S30

14-1-2 INSTALLATION PROCEDURES



T11B9051S30

15 REAR FLOOR SIDE PANEL EXTENSION FRONT

15-1 REPLACEMENT

15-1-1 REMOVAL PROCEDURES

*1 is LH only.

15-1-2 INSTALLATION PROCEDURES

*1 is LH only.

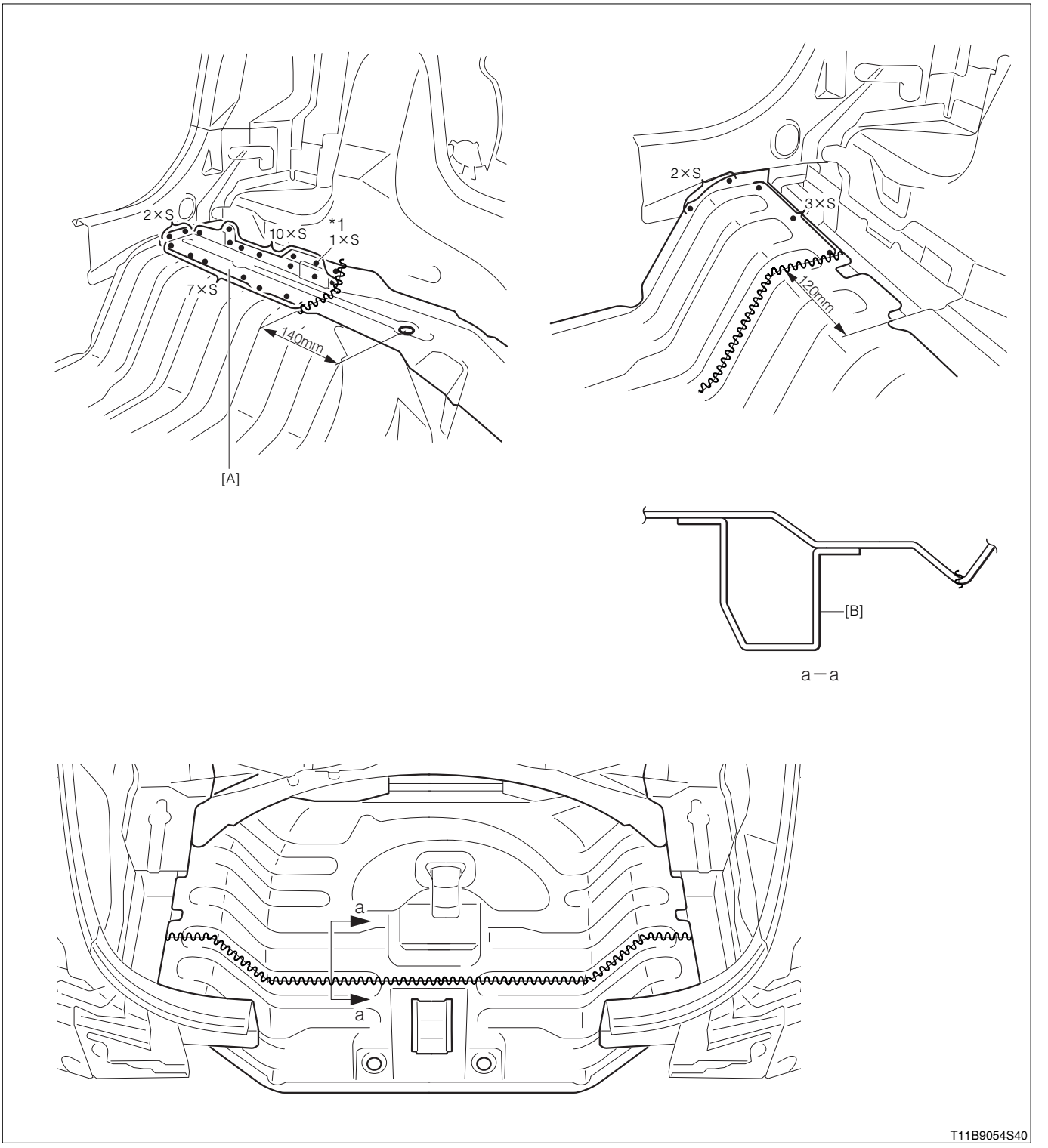
16 REAR FLOOR PAN

16-1 REPLACEMENT

16-1-1 OPERATION BEFORE REMOVAL

1.Remove the necessary part or component of the body lower back panel.

16-1-2 REMOVAL PROCEDURES

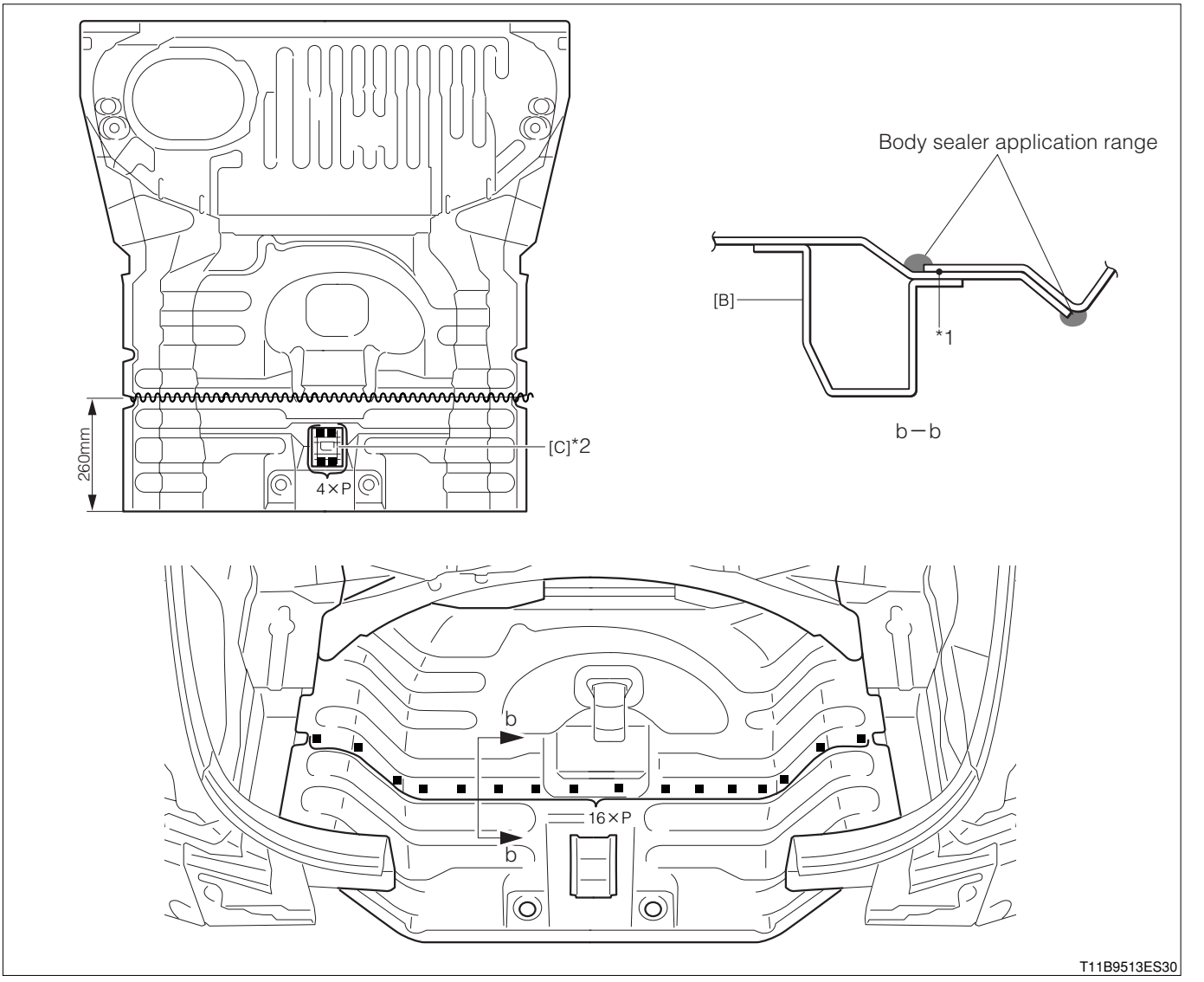


*1is LH only.

[A] Rear floor side panel extension front

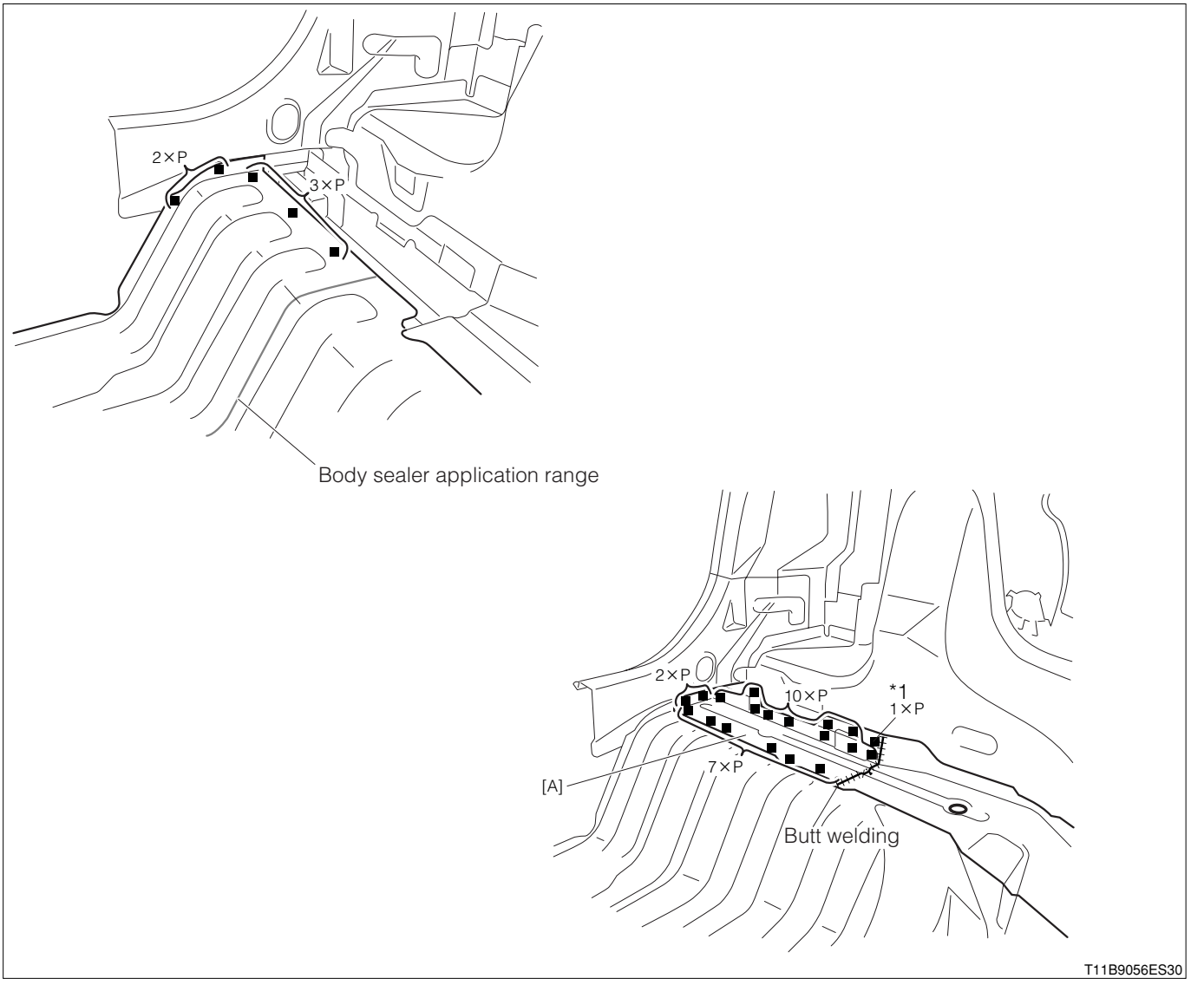
[B] Rear floor cross member No.2

16-1-3 INSTALLATION PROCEDURES



*2 is only for vehicles that have a compact tire as the spare tire.
[B] Rear floor cross member No.2
[C] Jack support bracket

1.Remove the part or component to be exchanged from the replacement parts and install to the vehicle.
2.Cut off the replacement part where it overlaps with the cut end by approx. 30mm.
3.Plug weld the overlapped portions of *1, and apply the body sealer on both sides.



*1 is LH only.

[A] Rear floor side panel extension front

16-1-4 OPERATION AFTER INSTALLATION

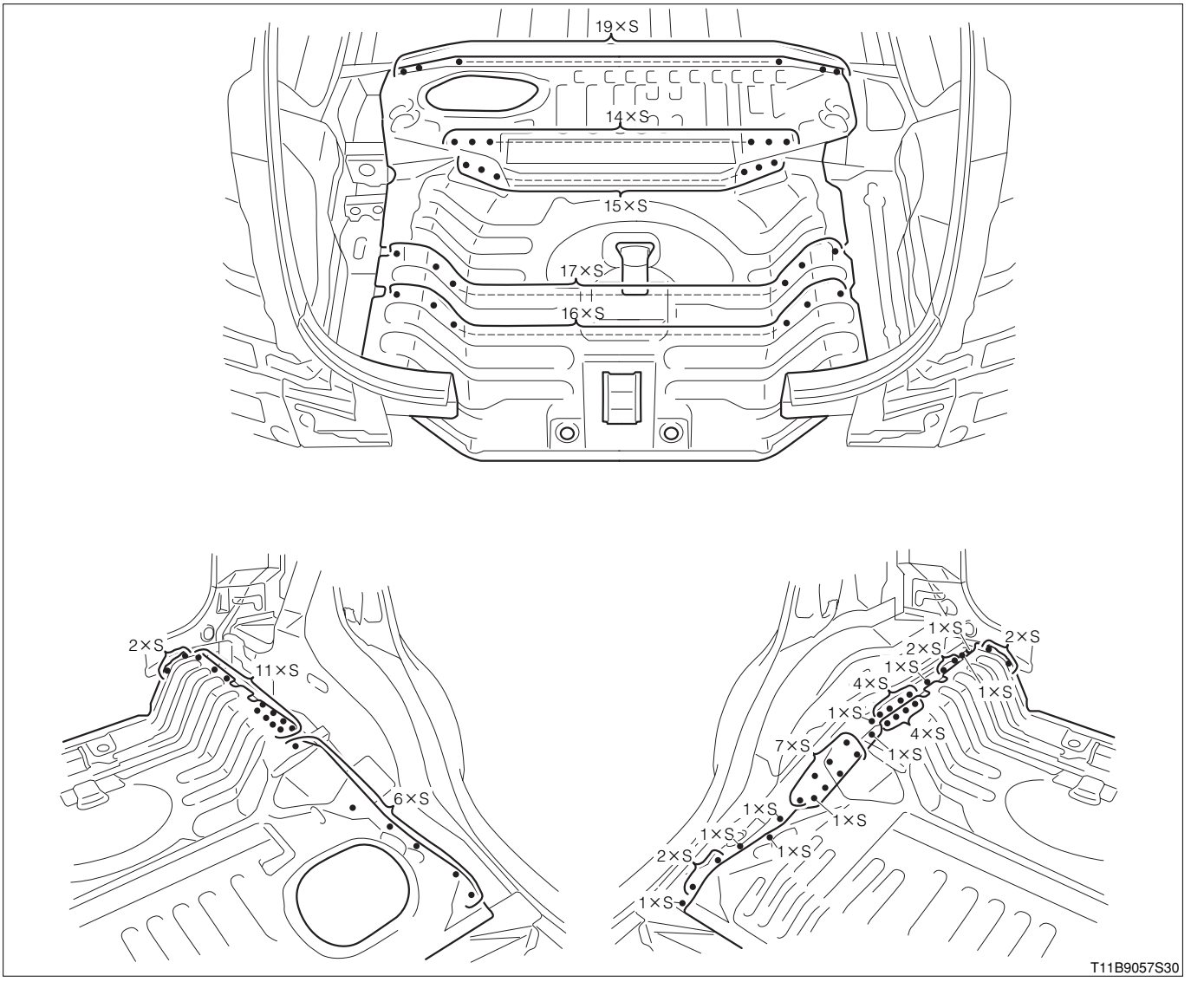
1.Install the body lower back panel.

16-2 REPLACEMENT

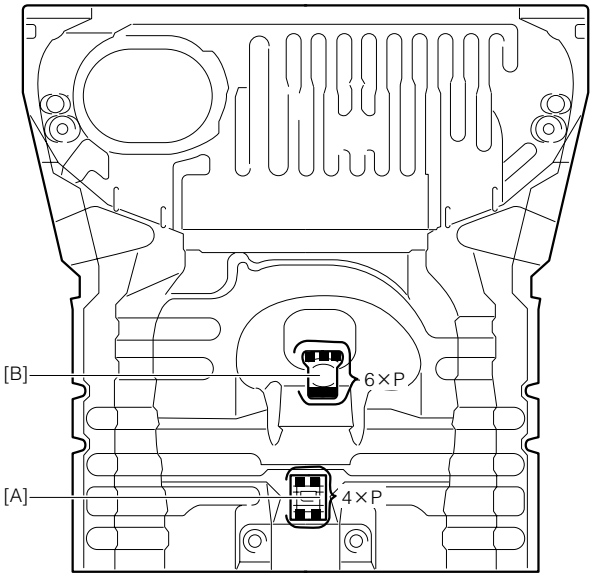
16-2-1 OPERATION BEFORE REMOVAL

1.Remove the necessary part or component of the body lower back panel.
2.Remove the necessary part or component of the rear floor cross member reinforcement No.2.
3.Remove the necessary part or component of the rear floor side panel extension front.

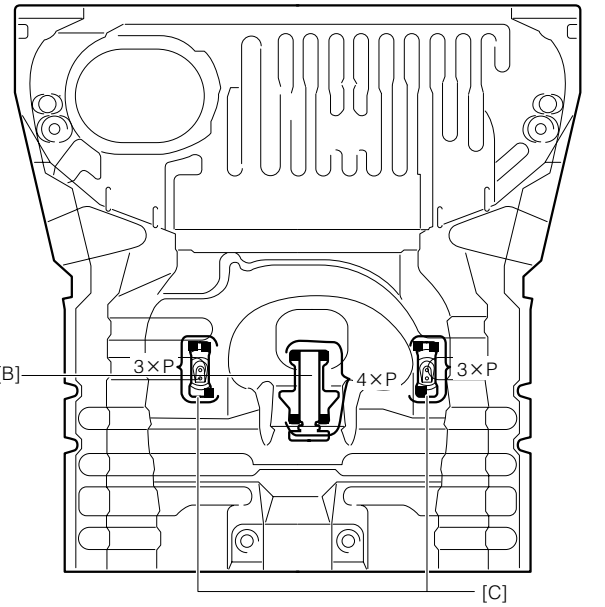
16-2-2 REMOVAL PROCEDURES



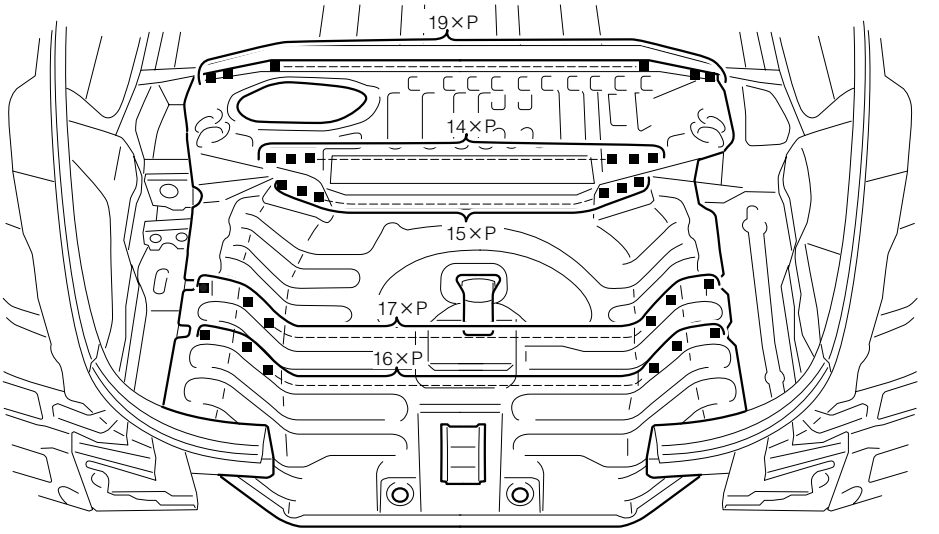
16-2-3 INSTALLATION PROCEDURES



＜Vehicles that have a compact tire as the spare tire＞



＜Vehicles that have a standard tire as the spare tire＞



T11B9510ES40

[A] Jack support bracket
[B] Spare wheel clamp bracket
[C] Spare wheel carrier bracket No.1

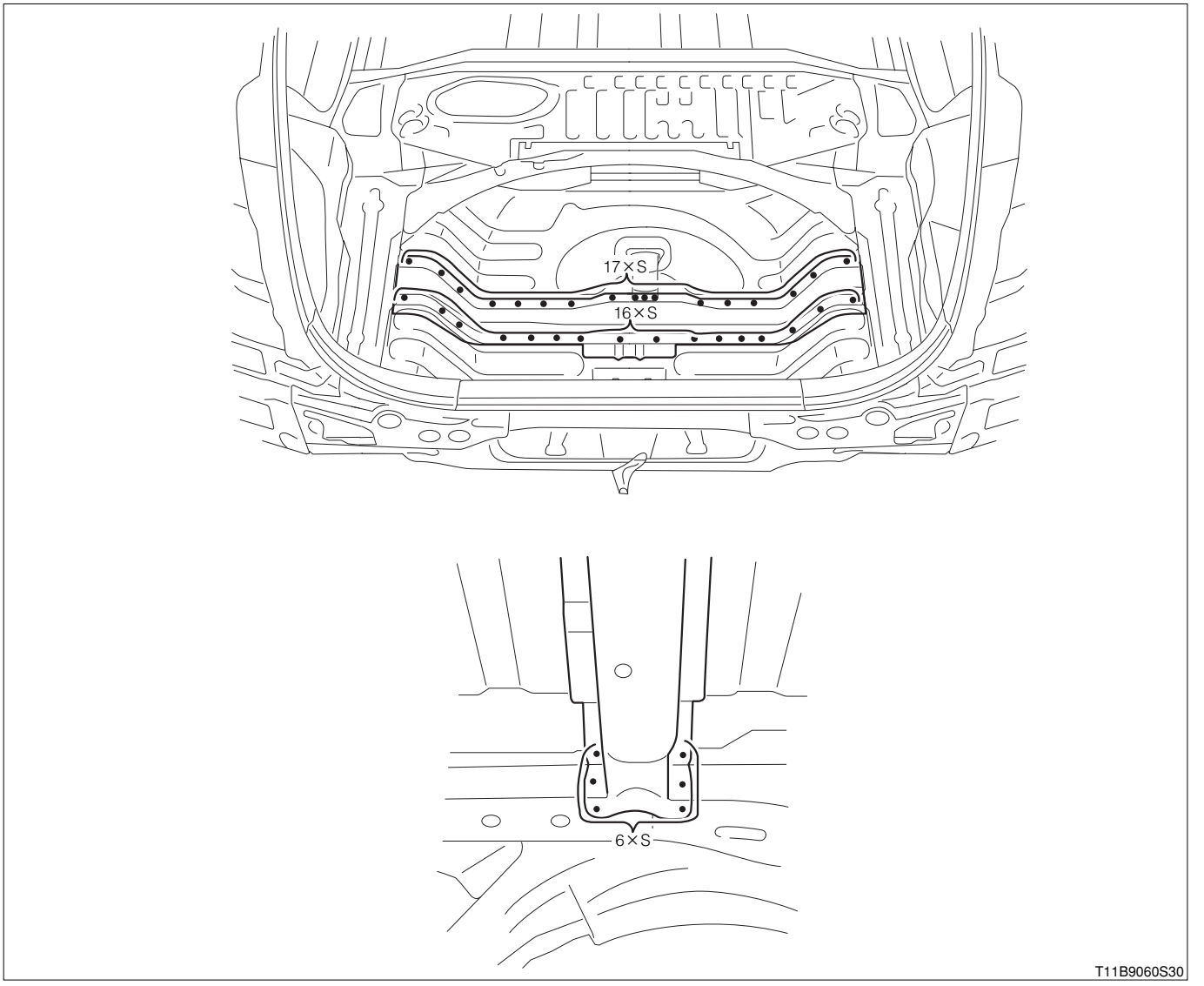
16-2-4 OPERATION AFTER INSTALLATION

1.Install the rear floor side panel extension front.
2.Install the rear floor cross member reinforcement No.2.
3.Install the body lower back panel.

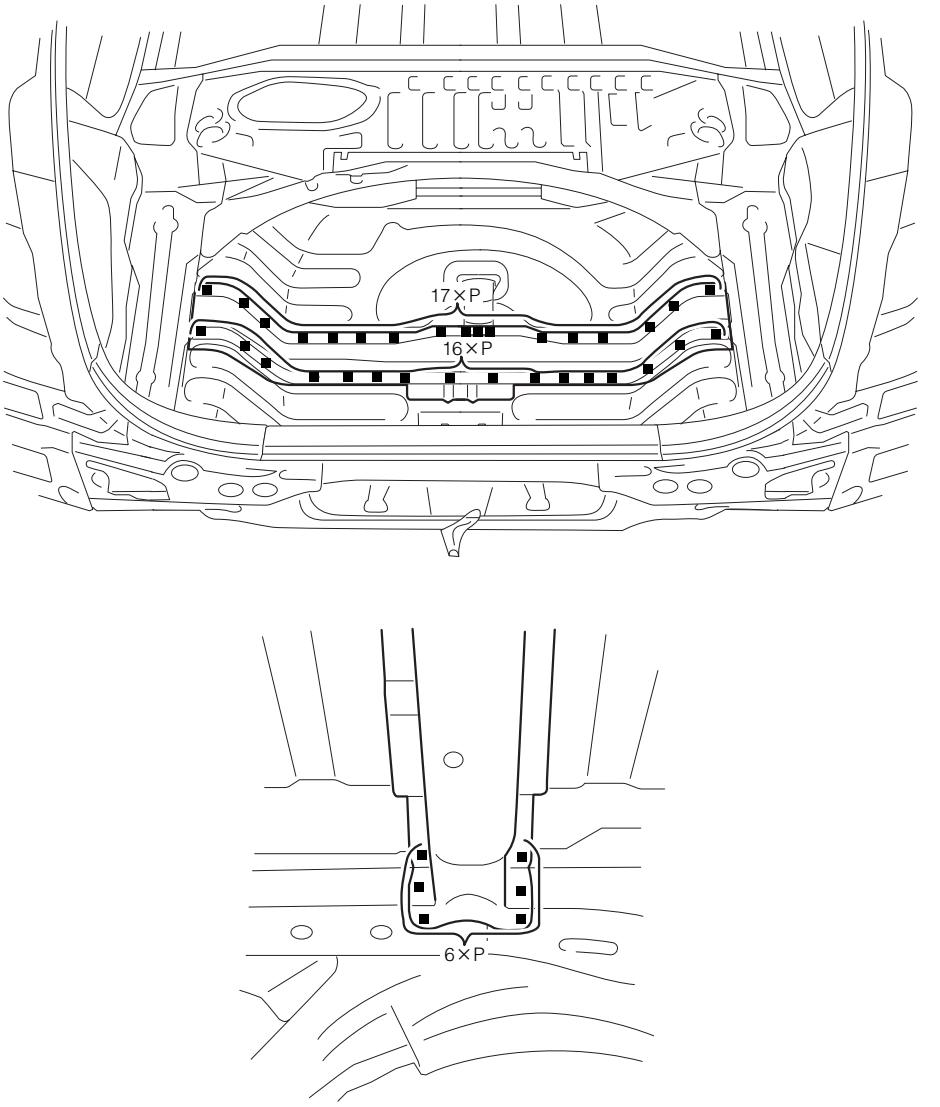
17 REAR FLOOR CROSS MEMBER NO.2

17-1 REPLACEMENT

17-1-1 REMOVAL PROCEDURES



17-1-2 INSTALLATION PROCEDURES



T11B9061S30

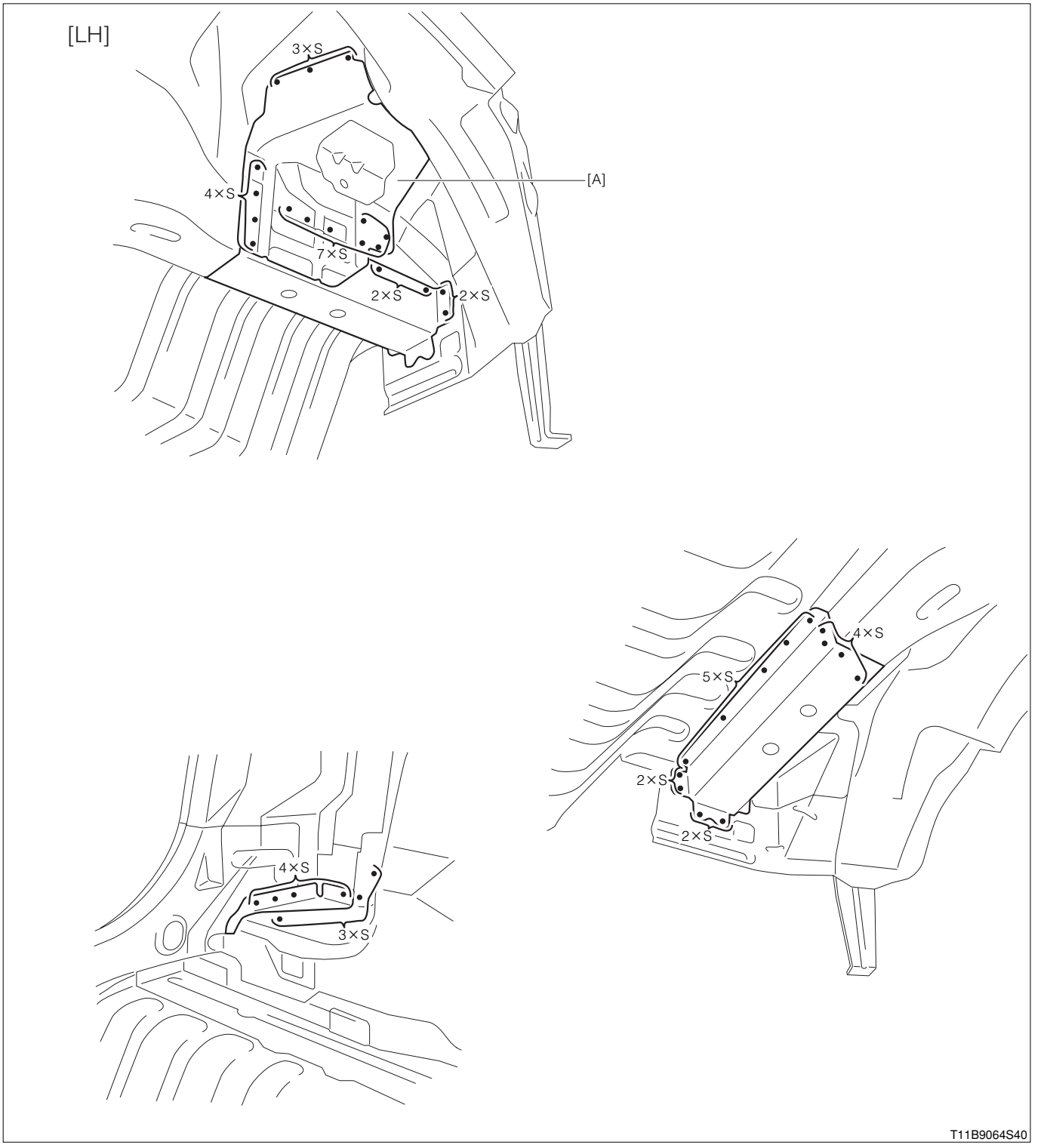
18 REAR FLOOR MOUNTING BRACKET NO.2

18-1 REPLACEMENT

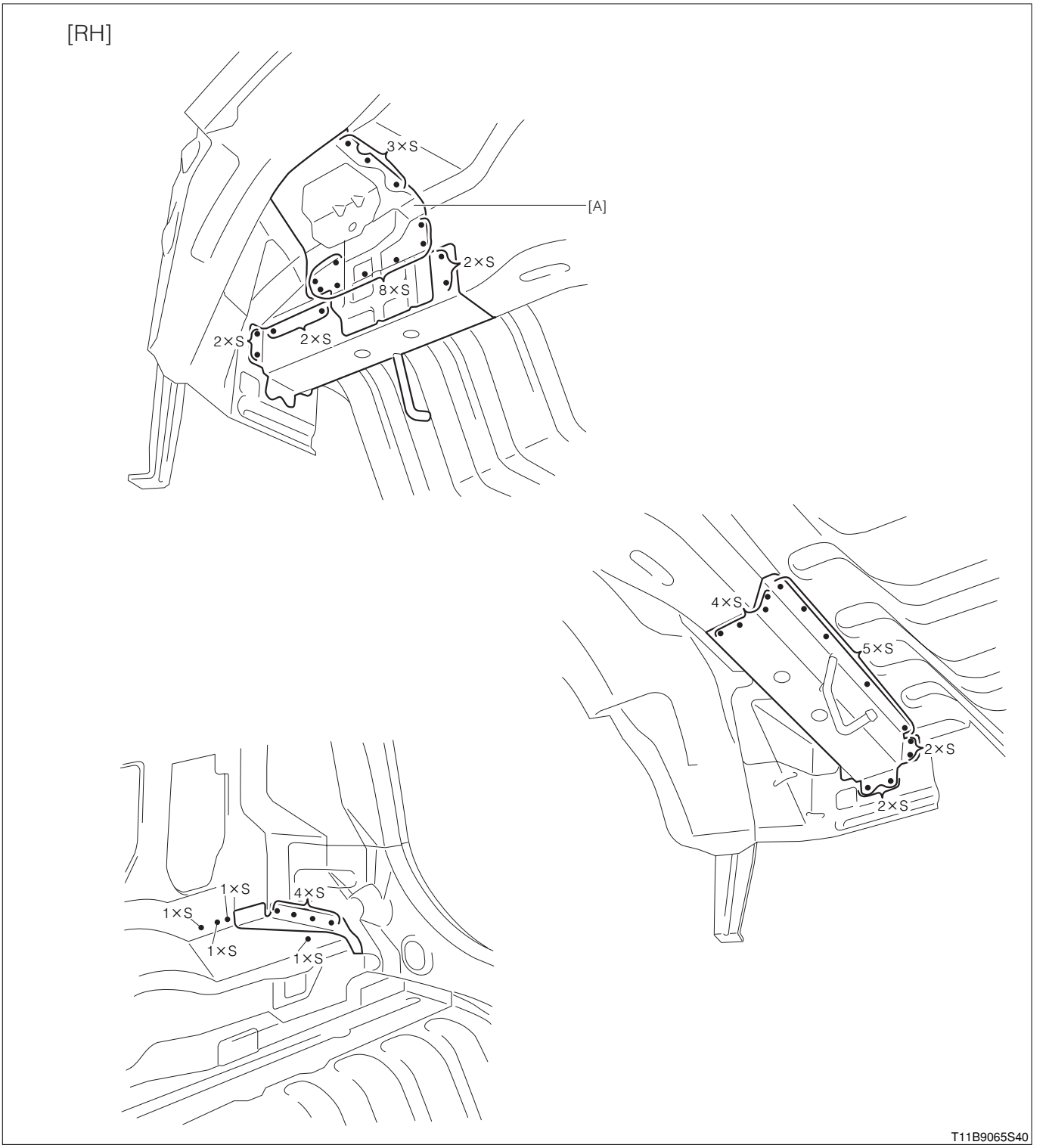
18-1-1 OPERATION BEFORE REMOVAL

1.Remove the necessary part or component of the body lower back panel.
2.Remove the necessary part or component of the rear floor cross member No.2.

18-1-2 REMOVAL PROCEDURES



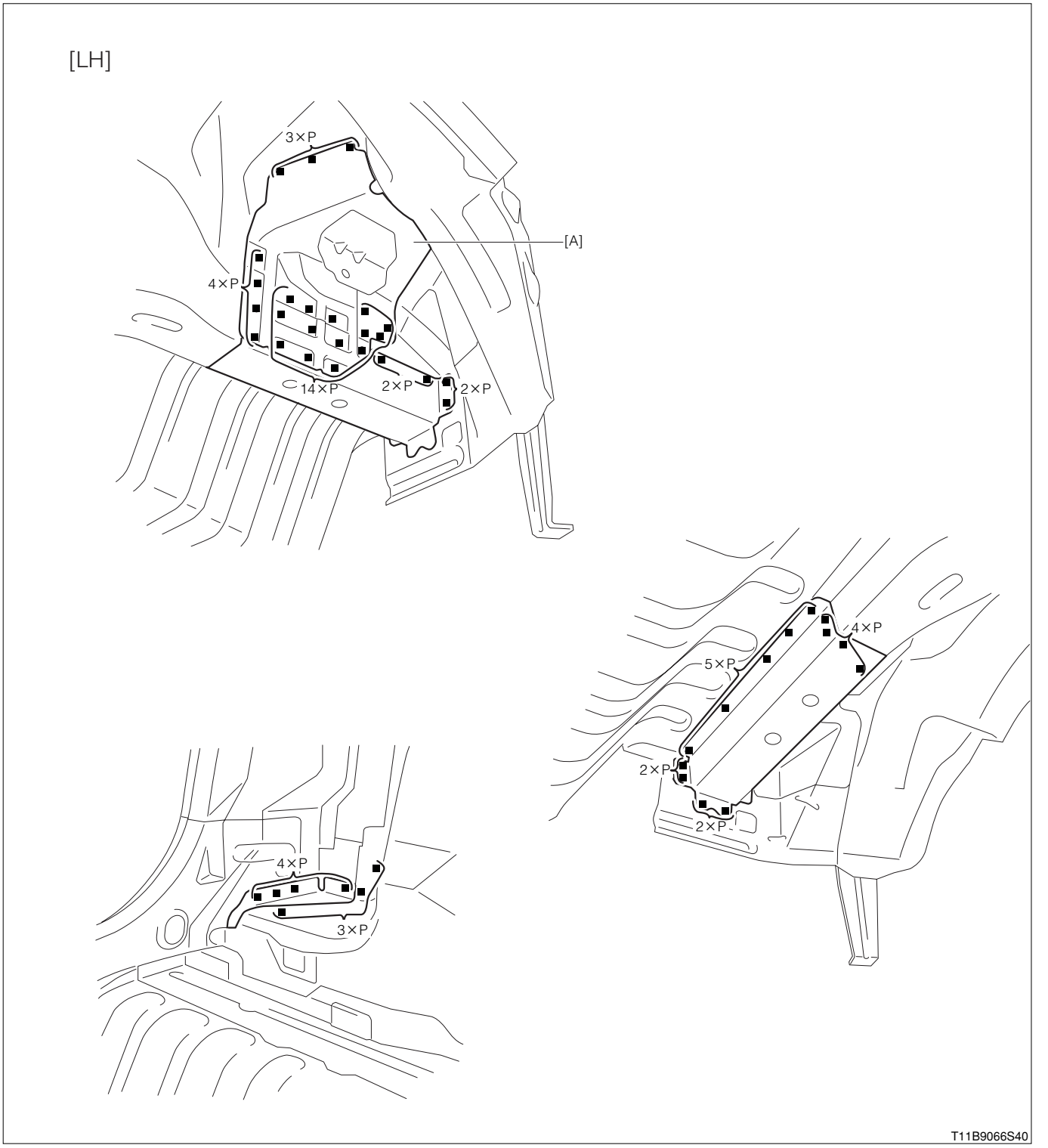
[A] Rear shock absorber bracket
1.Remove [A] together.



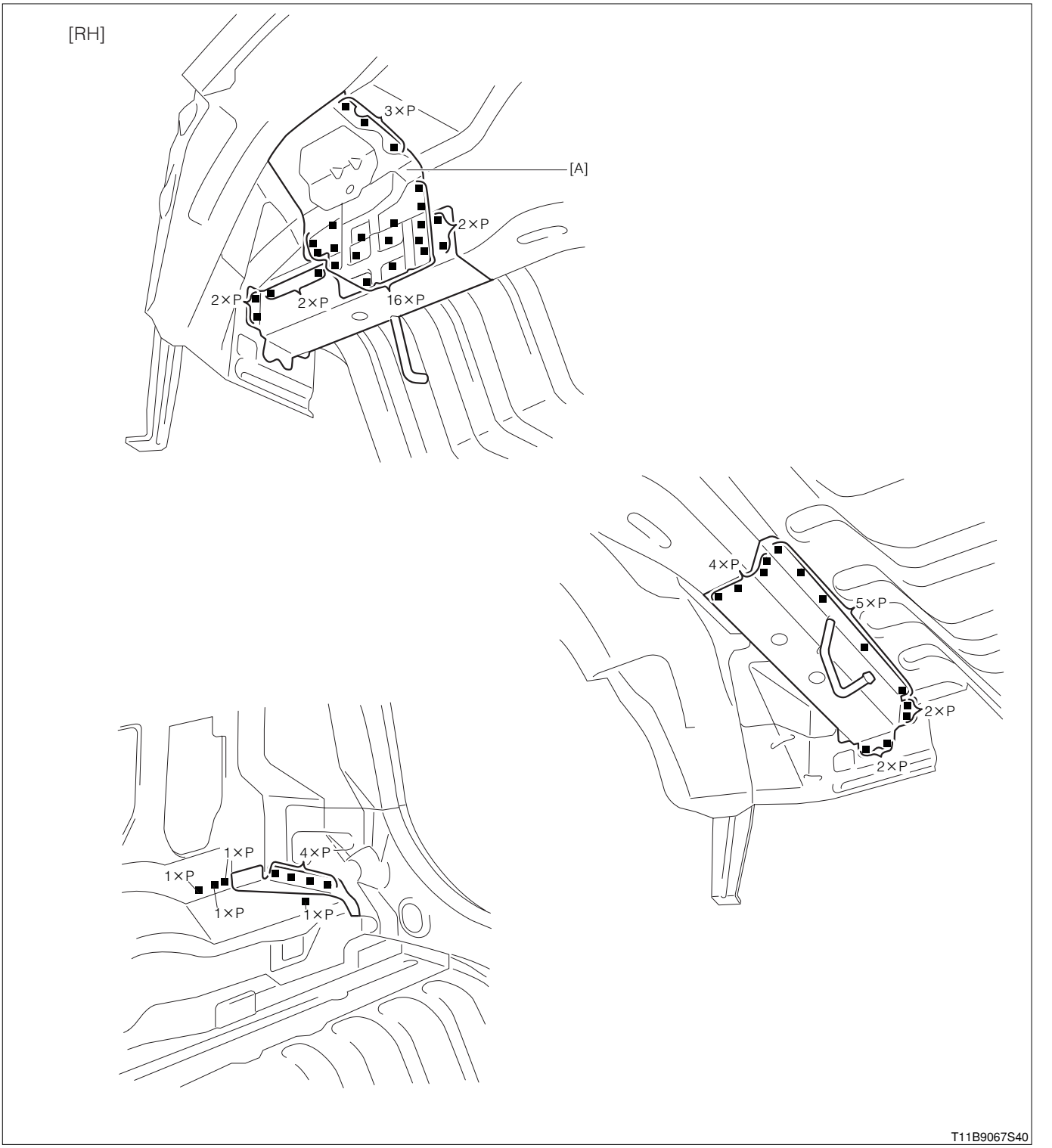
[A] Rear shock absorber bracket

2.Remove [A] together.

18-1-3 INSTALLATION PROCEDURES



[A] Rear shock absorber bracket

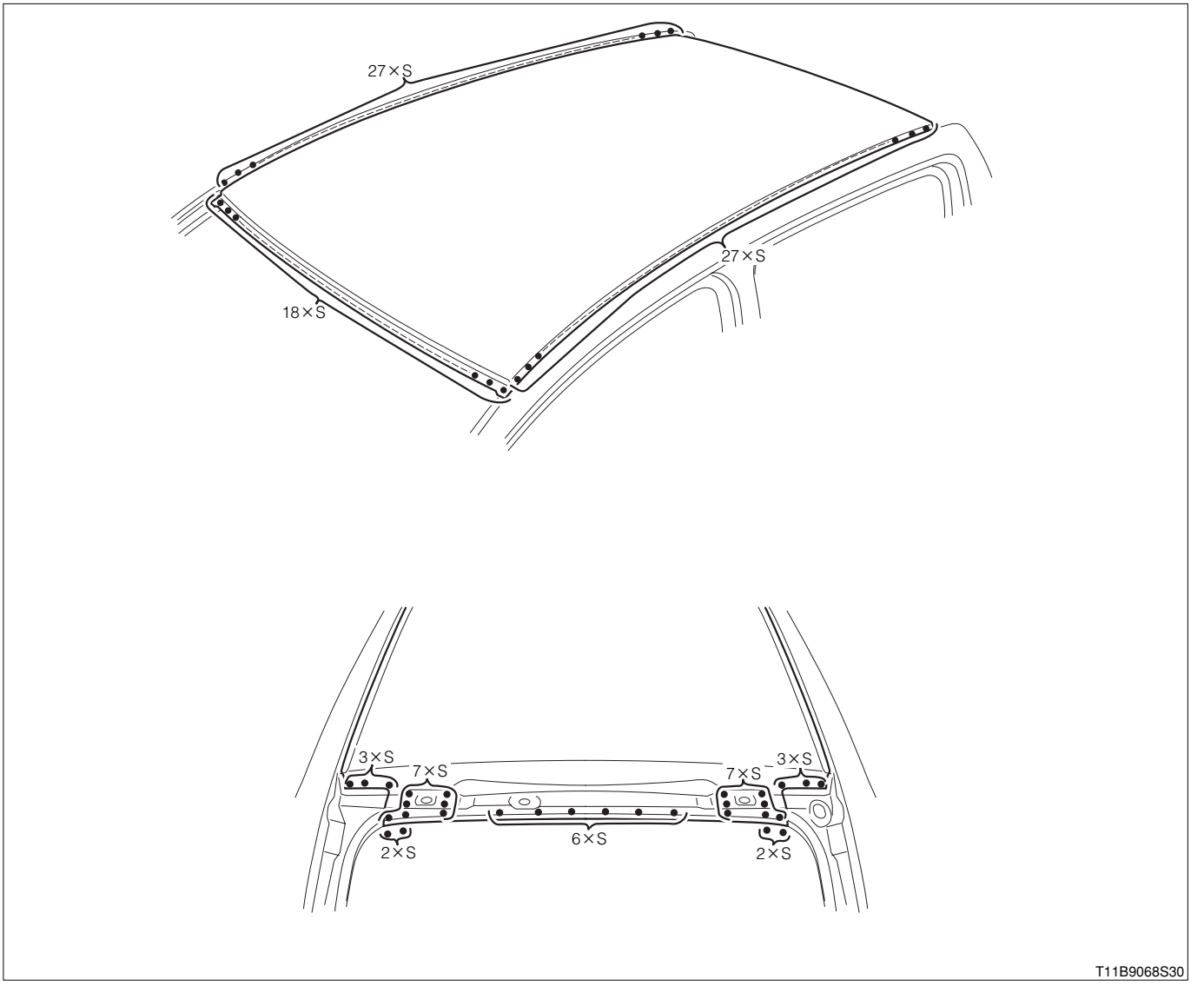


[A] Rear shock absorber bracket

18-1-4 OPERATION AFTER INSTALLATION

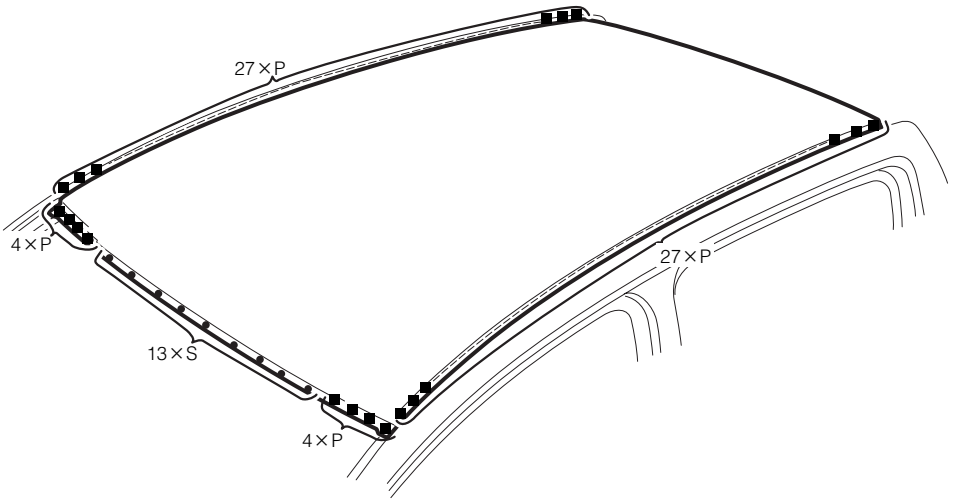
1.Install the rear floor cross member No.2.
2.Install the body lower back panel.

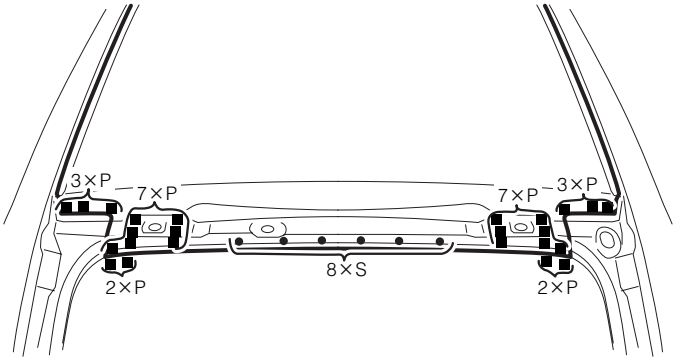
19 ROOF PANEL
19-1 REPLACEMENT
19-1-1 REMOVAL PROCEDURES



T11B9068S30

19-1-2 INSTALLATION PROCEDURES





T11B9069S30

TO INDEX

D RUST PREVENTIVE TREATMENT

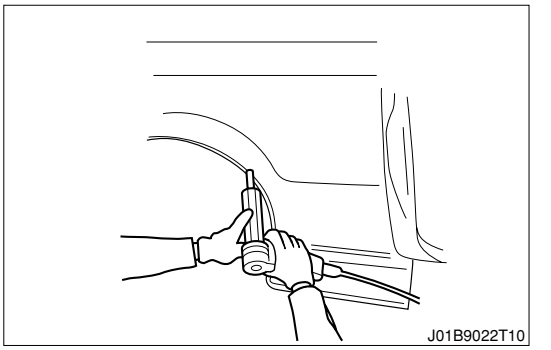
BODY SEALING ---------- D - 1
APPLICATION ---------- D - 1
UNDERCOATING ---------- D - 7
APPLICATION ---------- D - 7
RUST PREVENTIVE AGENT ---------- D - 8
APPLICATION ---------- D - 8

1 BODY SEALING

1-1 APPLICATION

1-1-1 INSTRUCTIONS FOR WORK

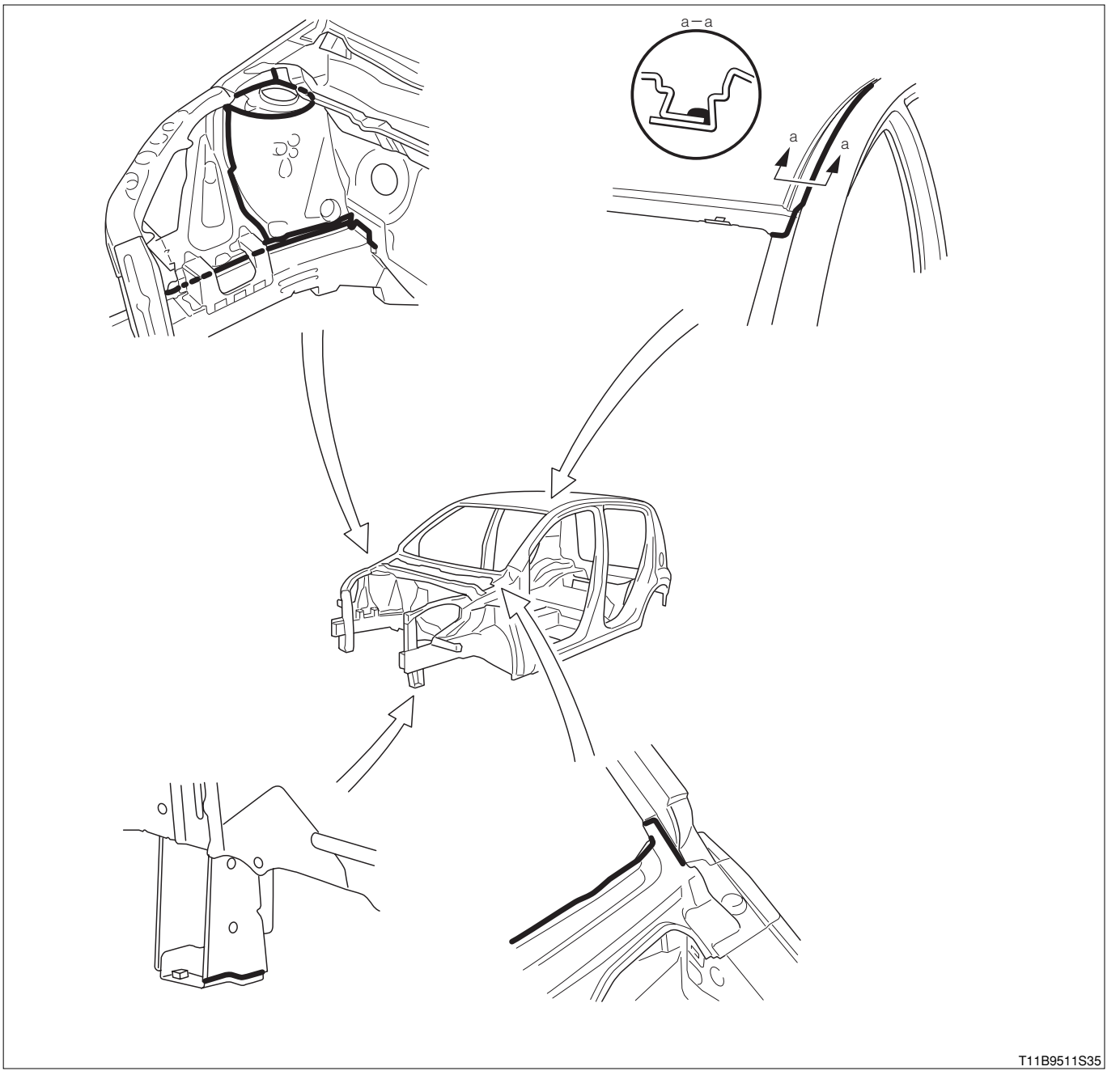
For the rust prevention and waterproofing, fill body sealer to the joint section of the body panel and panel's hemming section.



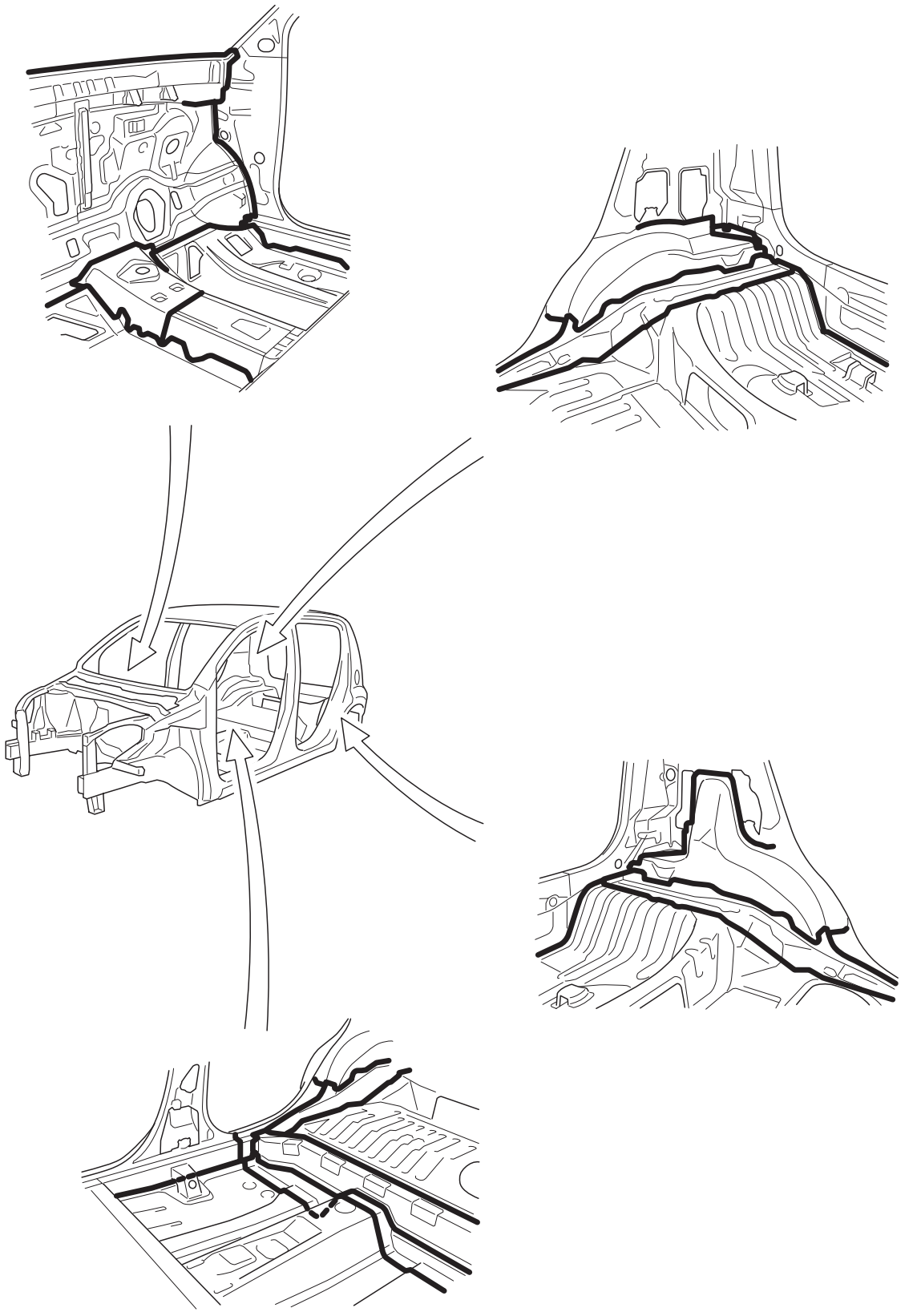
CAUTION

- Clean the sections to which the body sealer is applied, using a cloth dampened with white gasoline.
- Remove any body sealer adhering to those sections where such application is not required, using a cloth dampened with white gasoline.
- Remove spot sealer which adhered to the sealer applying section with thinner. Then, apply primer for rust prevention, and apply body sealer.

1-1-2 APPLICATION AREAS

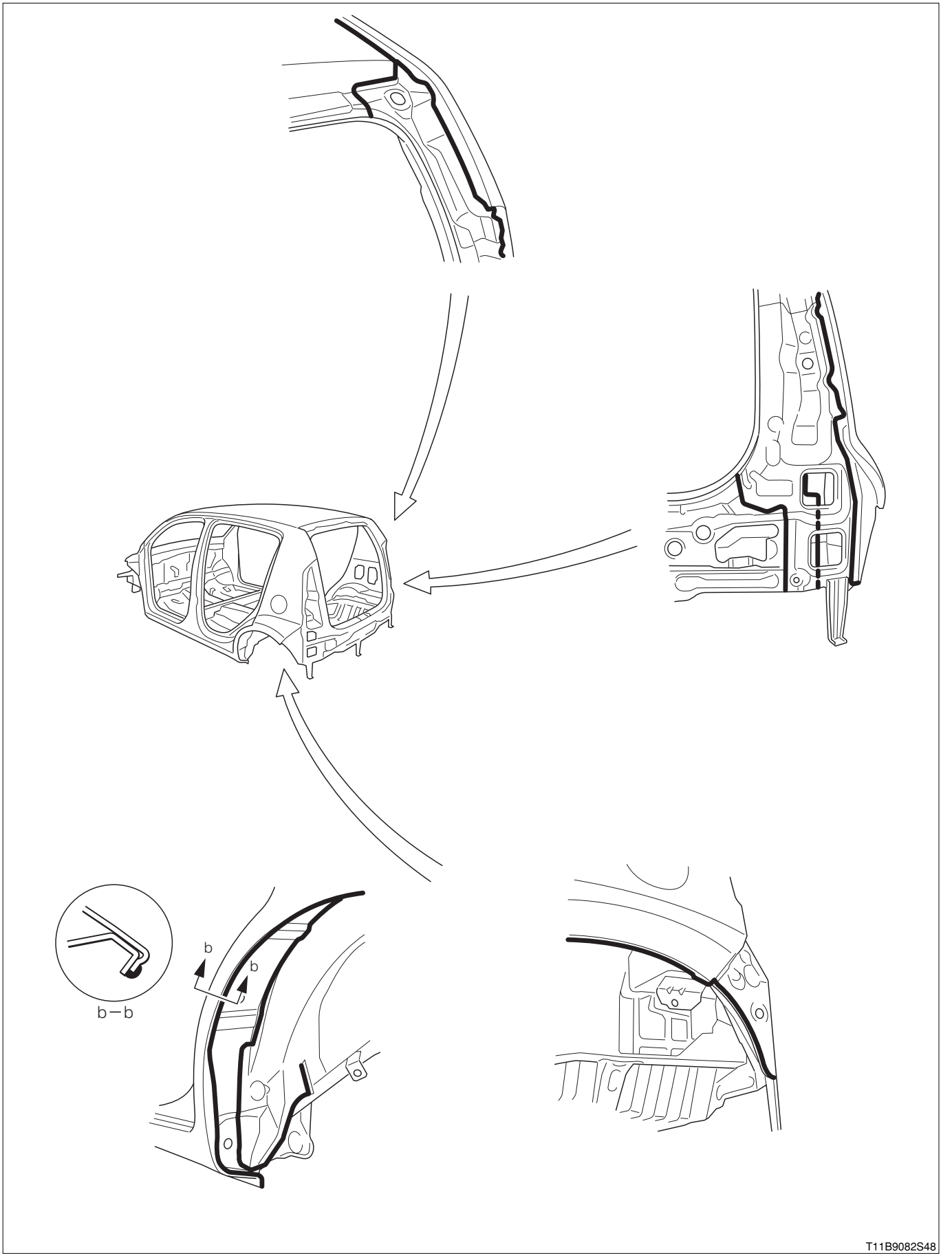


The illustration shows the applying sections for the vehicles of all specifications.

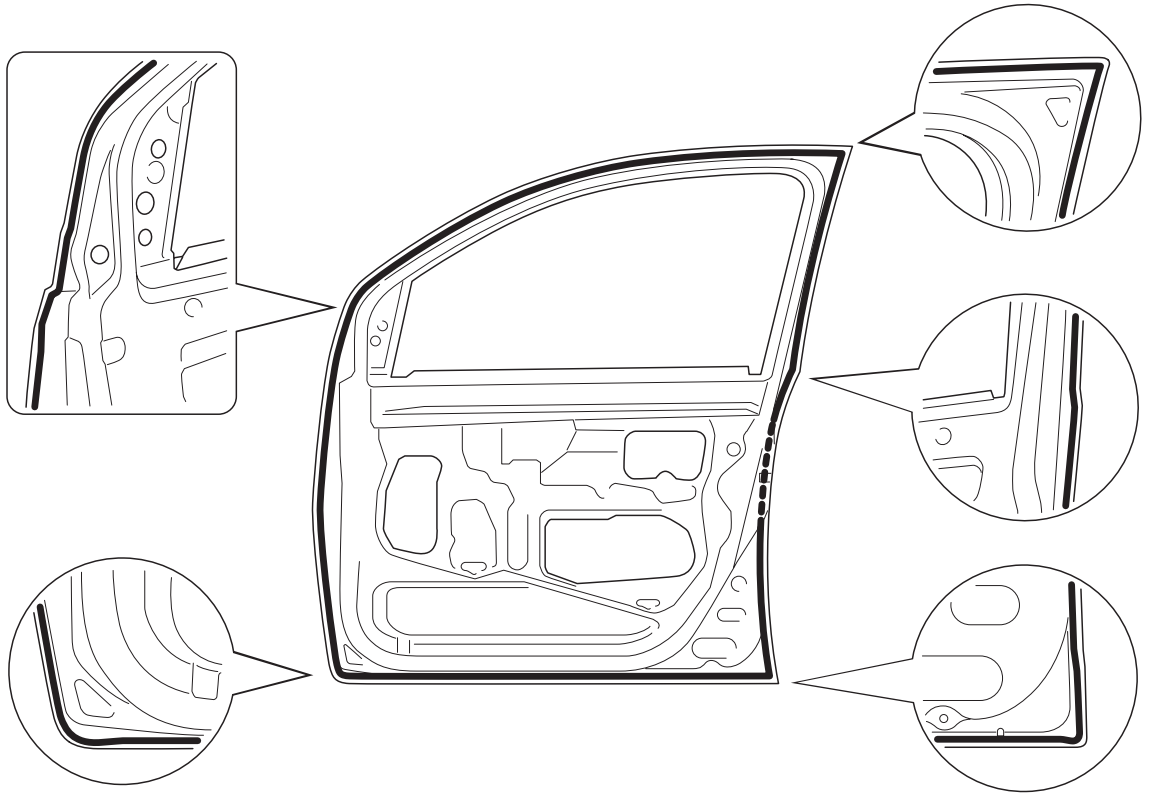


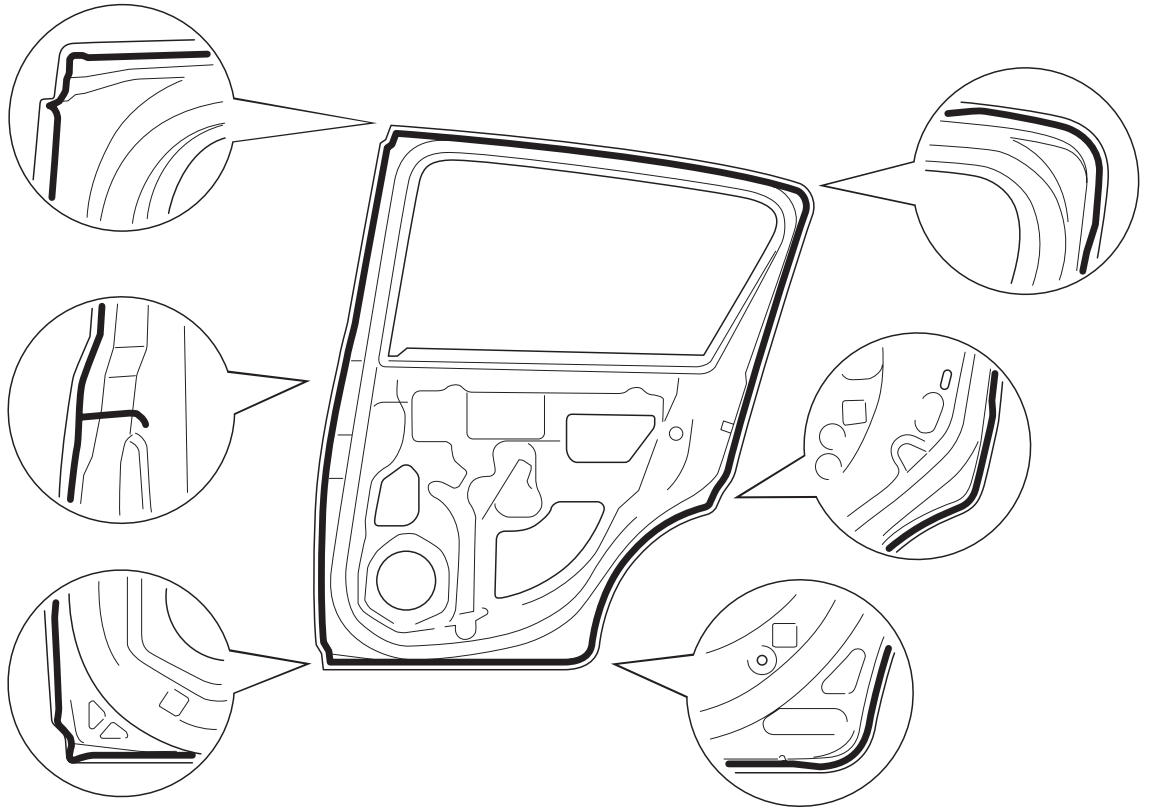
T11B9081S48

The illustration shows the applying sections for the vehicles of all specifications.



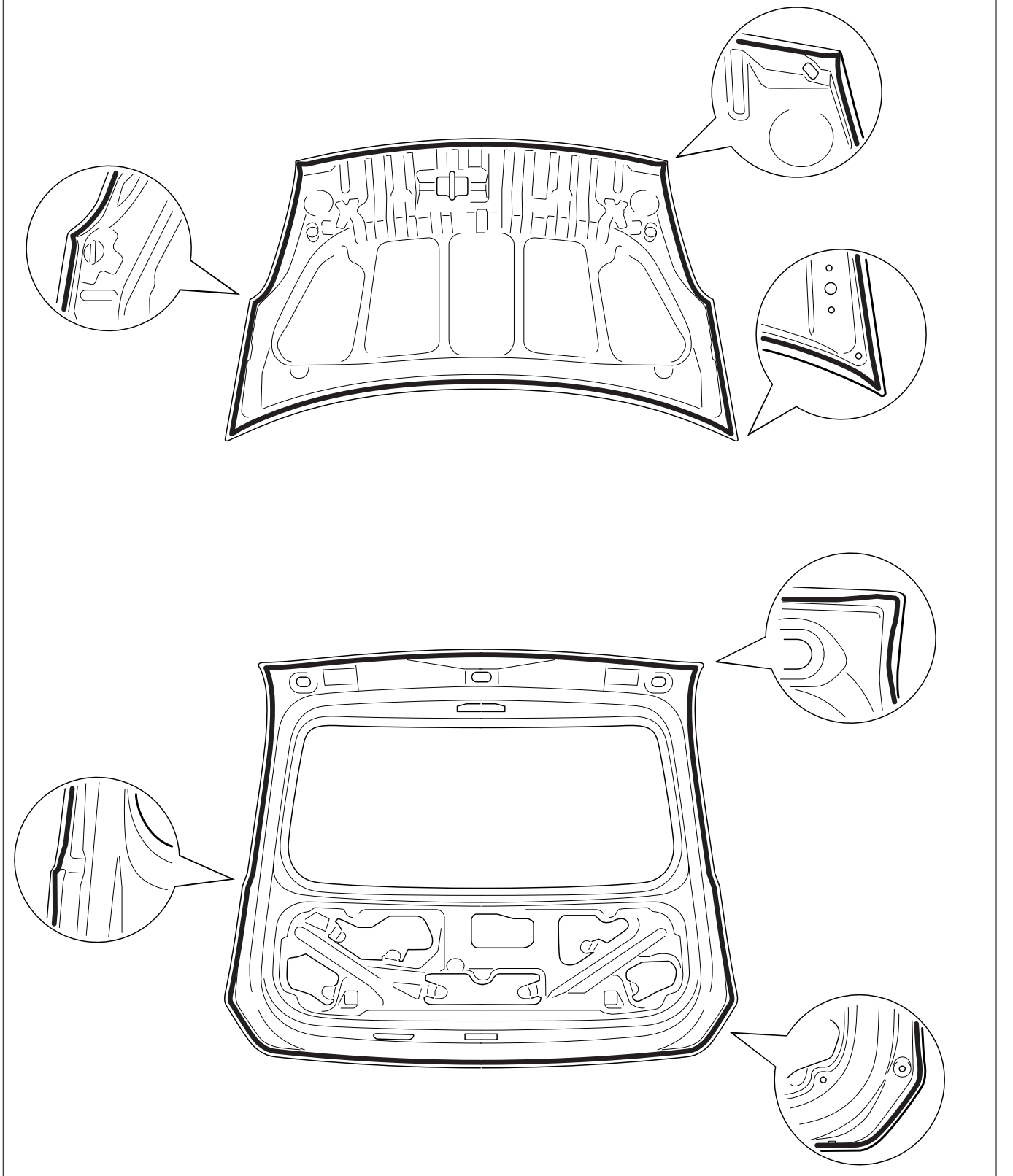
The illustration shows the applying sections for the vehicles of all specifications.





T11B9083S48

The illustration shows the applying sections for the vehicles of all specifications.



T11B9084S48

The illustration shows the applying sections for the vehicles of all specifications.

2 UNDERCOATING

2-1 APPLICATION

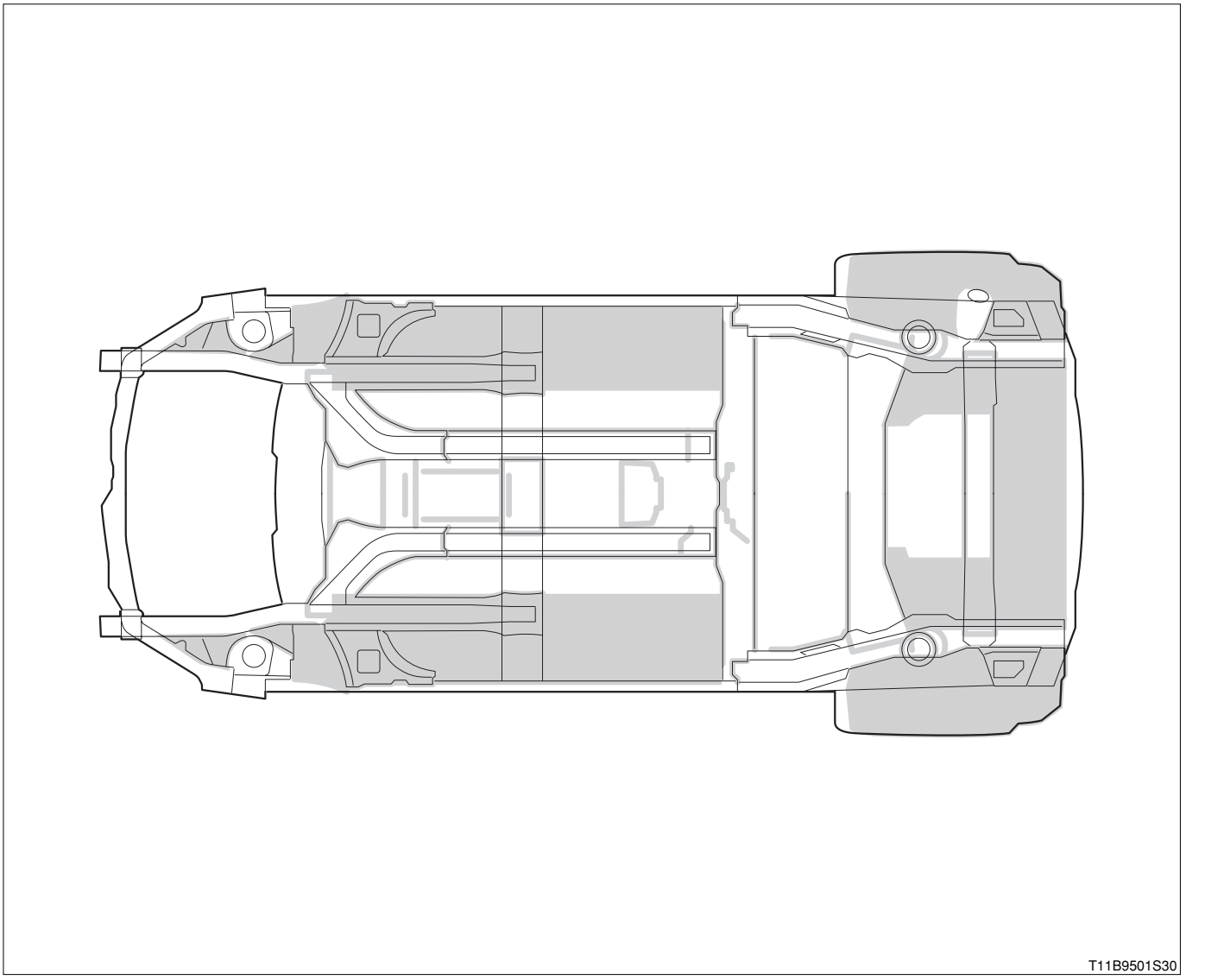
2-1-1 INSTRUCTIONS FOR WORK

For soundproof and rust prevention, apply the undercoat agent to the back side of the floor and the inside of the wheel house.

CAUTION

- Clean the sections to which the undercoat is applied, using a cloth dampened with white gasoline.
- Do not apply the undercoat to those sections where such application is not required; e.g. the muffler.
- If the back side of the floor has been welded, apply the undercoat for the purpose of rust prevention.
- Carefully close any clearance of a joint section between panels.

2-1-2 APPLICATION AREAS(UNDERCOAT)



T11B9501S30

The illustration shows the applying sections for the vehicles of all specifications.

2-1-3 APPLICATION AREAS(ANTICORROSIVE AGENT)

Apply the anticorrosive agent to the back of the floor and undercarriage parts except for the tires, driveshaft boots, exhaust pipes, brake discs, caution labels and the engine main body.

3 RUST PREVENTIVE AGENT

3-1 APPLICATION

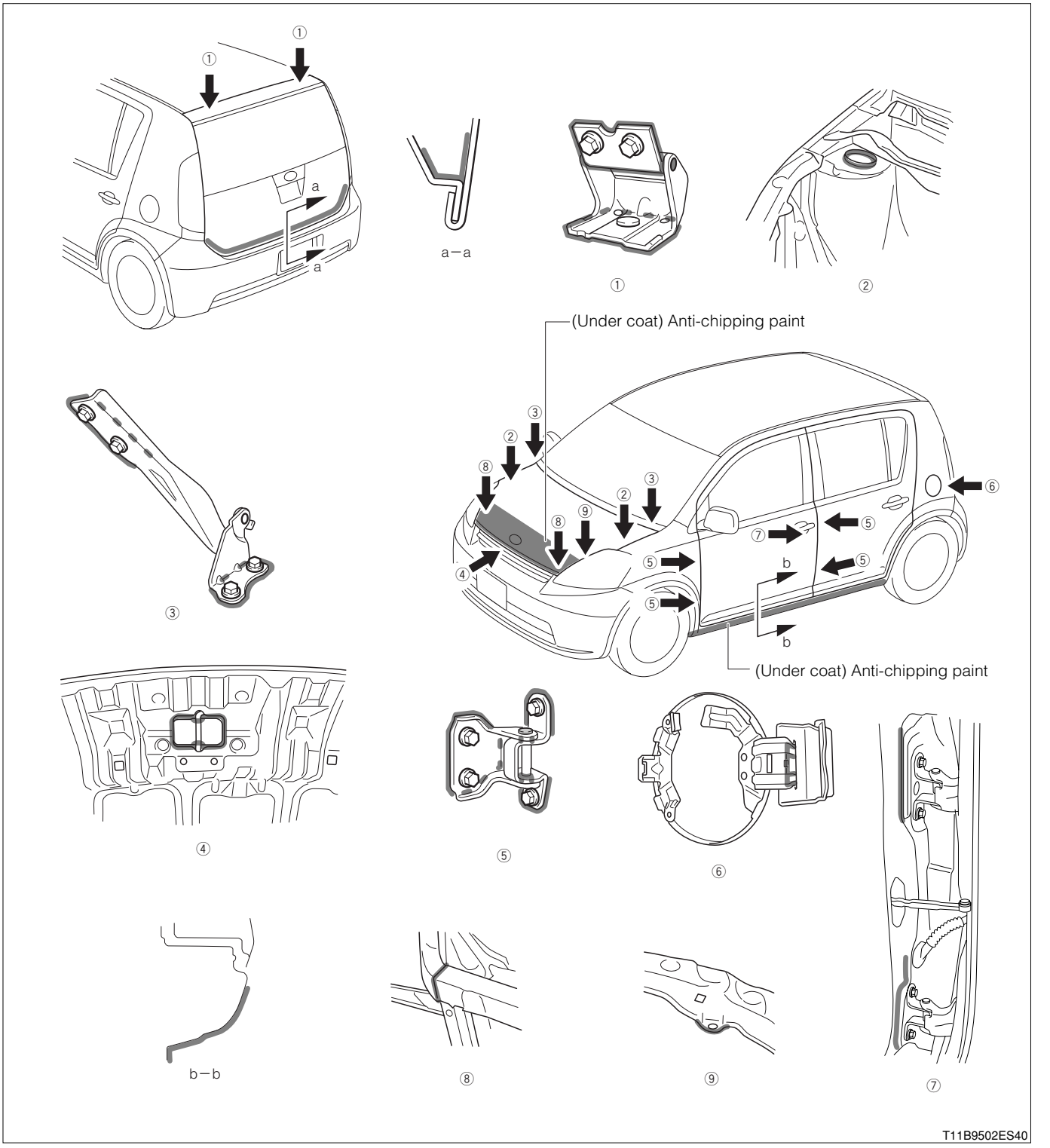
3-1-1 INSTRUCTIONS FOR WORK

Apply rust-preventive agent to the joint section of the body panel, the reverse side of the hemming section of the door and hood (the forward end of the bending section of the external sheet), and around the hinge.

CAUTION

- Remove any agent adhering to those sections where such application is not required, using a cloth dampened with white gasoline.

3-1-2 APPLICATION AREAS



The illustration shows the applying sections for the vehicles of all specifications.

E BODY DIMENSIONAL DIAGRAM

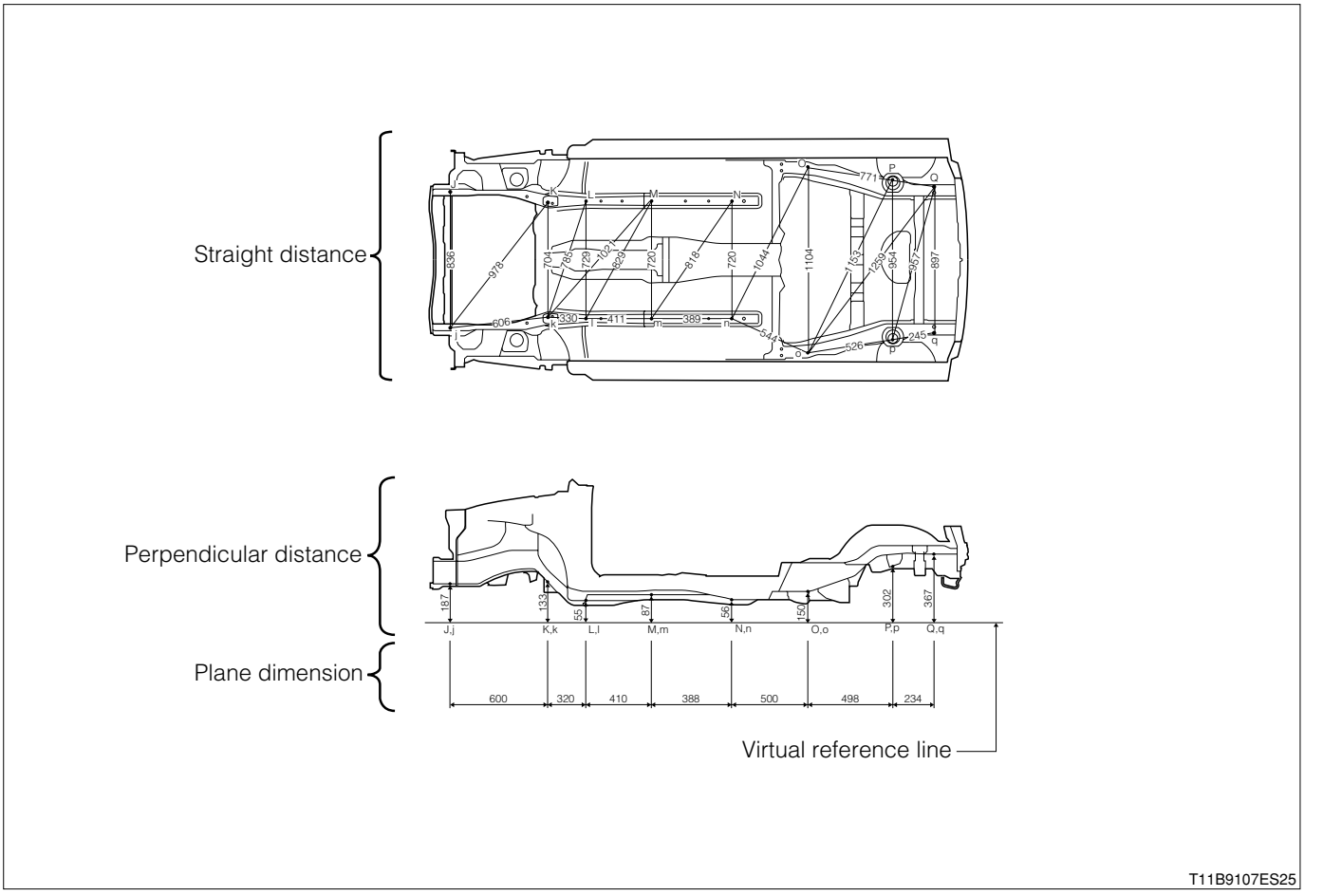
HOW TO READ DIMENSIONAL DIAGRAM---------- E - 1
INSTRUCTIONS ---------- E - 1
HOW TO READ DIMENSIONAL DIAGRAM---------- E - 1
INSTRUCTIONS TO BE OBSERVED DURING MEASURING OPERATION ------ E - 2
BODY DIMENSIONS ---------- E - 3

1 HOW TO READ DIMENSIONAL DIAGRAM

1-1 INSTRUCTIONS

This body dimensional diagram is based on the measurement of the body dimensions by means of a tracking gauge for the body shell. (Condition where all pieces of equipment have been removed.)

1-2 HOW TO READ DIMENSIONAL DIAGRAM

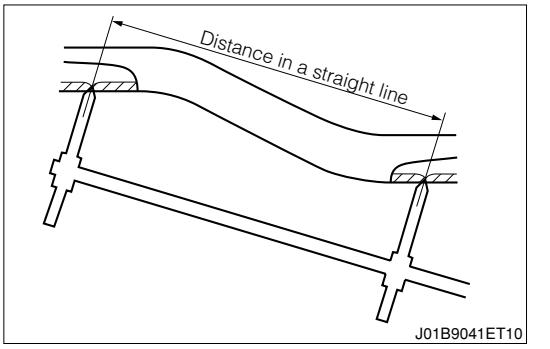


T11B9107ES25

1.Straight distance

Distance in a straight line

This indicates the distance in a straight line between the centers of the measuring points.

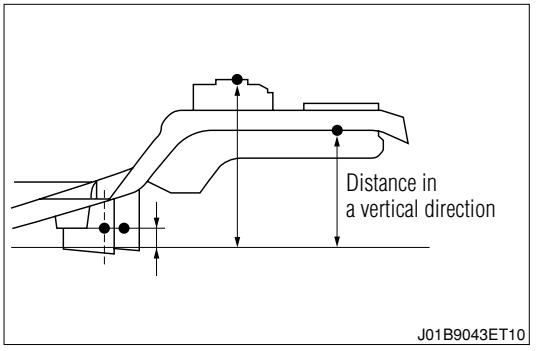


J01B9041ET10

2.Perpendicular distance

(1) Distance in a vertical direction

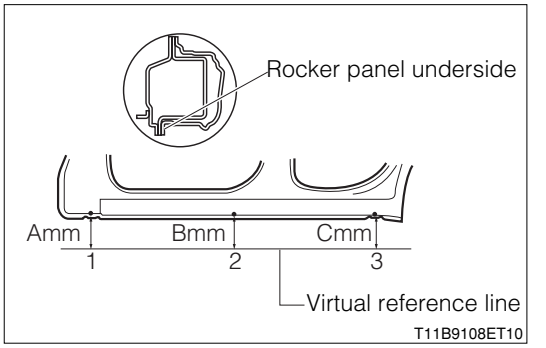
This indicates the distance in a vertical direction from the imagined line at the lower surface of the rocker panel or frame to the lower surface or center of the measuring point.



J01B9043ET10

(2) The virtual reference line used during the height measurement shall be a line connecting the following points.

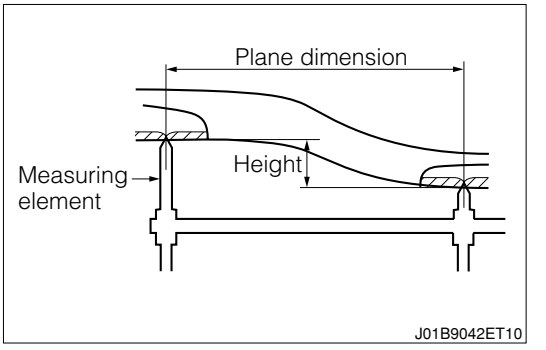
Code	Measuring point
1	Point A mm below the lower surface of the rocker panel at the center of the front jack up supporting section
2	Point B mm below the lower surface of the rocker panel at the center of points 1 and 3
3	Point C mm below the lower surface of the rocker panel at the center of the rear jack up supporting section



3.Plane dimension

Plane dimension

This indicates the dimension measured when the measuring points are projected on a plane.



2 INSTRUCTIONS TO BE OBSERVED DURING MEASURING OPERATION

1.The basic measuring method of the body dimensions is one which uses a tracking gauge.

2.When performing the measurement by a tracking gauge, ensure that the gauge proper and pointer, etc. exhibit no excessive looseness.

3.When performing the measurement by a tape measure, ensure that it exhibits no deflection, twist, bend and so forth.

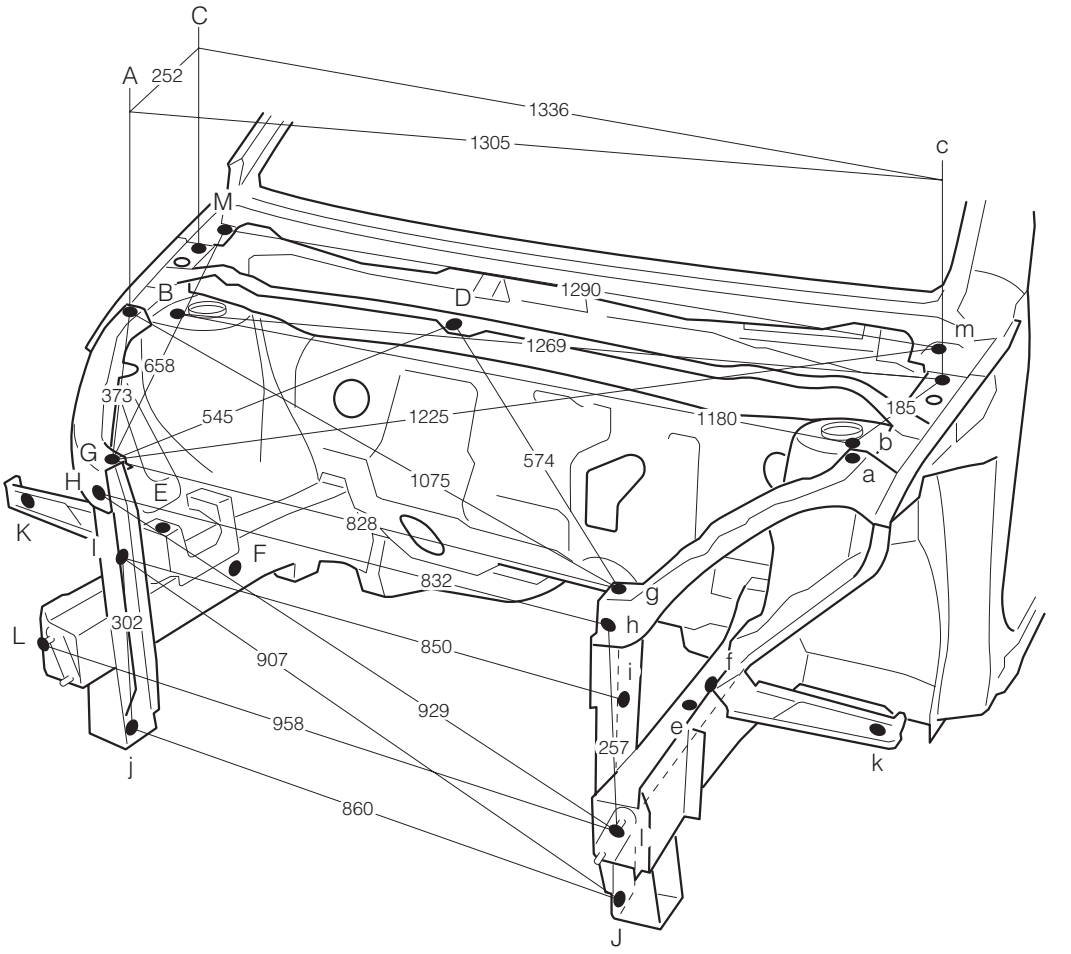
Especially, as for the red dimension line, it indicates the distance in a straight line. Hence, if a tape measure is interfered with the body during the measurement, use the tracking gauge to perform accurate measurements.

4.When the measuring points are covered with the undercoat, body sealer or the like, be sure to remove it completely and expose the measuring point. Then, proceed to the measurement.

3 BODY DIMENSIONS

SIRION

Applicable type
M300RS,M301RS,M300LS,M301LS



A–a	A–D	a–D	B–D	b–D	B–E	b–e
1228	599	638	578	617	389	432

B–e	b–E	B–F	b–f	B–f	b–F	C–M,c–m
1122	1110	448	439	1095	1100	64

C–m,c–M	D–E	D–e	D–F	D–f	K–k
1315	599	635	637	633	1472

[Height above the virtual reference line]

A, a	M, m	G, g
814	867	704

[Reference dimensions]

(Note) Symmetrical if dimensions are shown on either side only.

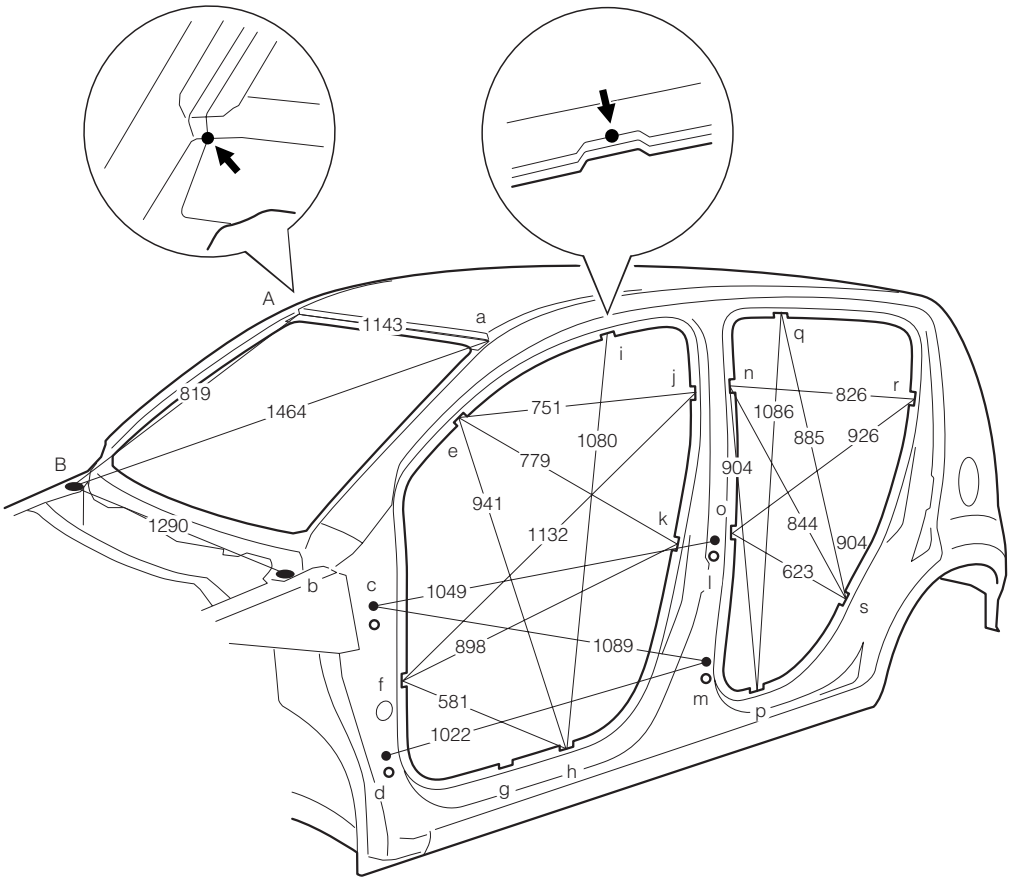
Unit: mm

Point codes	Nomenclature	Bore	Point codes	Nomenclature	Bore
A, a	Front fender attaching nut	6mm dia screw	H, h	Radiator support upper center attaching nut	6mm dia screw
B, b	Front spring support hole	8.5mm dia	I, i	Radiator support reference hole	10mm dia
C, c	Hood hinge attaching nut	6mm dia screw	J, j	Stabilizer bracket attaching hole	RH:9.5mm dia LH:11×9.5
D	Cowl top ventilator louver attaching hole	5.2mm dia	K, k	Front fender mounting bracket reference hole	10mm dia
E, e	Engine mounting attaching nut, front	10mm dia screw	L, l	Front bumper reinforcement attaching bolt	10 mm dia bolt end
F, f	Front side member reference hole	10mm dia	M, m	Front fender attaching nut	6mm dia screw
G, g	Radiator support upper center attaching nut	6mm dia screw	–	–	–

T11B9503ES48

SIRION

Applicable type
M300RS,M301RS,M300LS,M301LS



[Width dimension]

E–e	F–f	G–g	H–h	I–i	J–j	K–k
1262	1359	1364	1364	1170	1288	1354

N–n	O–o	P–p	Q–q	R–r	S–s
1287	1364	1364	1153	1289	1363

[Diagonal dimensions]

E–,e–F	E–h,e–H	E–j,e–J	F–j,f–J	F–k,f–K	G–n,g–N	H–i,h–I	G–p,g–P
1456	1615	1480	1742	1627	1777	1663	1635

I–q,i–Q	J–k,j–K	N–r,n–R	N–s,n–S	O–s,o–S	P–q,p–Q	R–s,r–S
1331	1383	1530	1570	1499	1659	1480

[Reference dimensions]

(Note) Symmetrical if dimensions are shown on either side only.

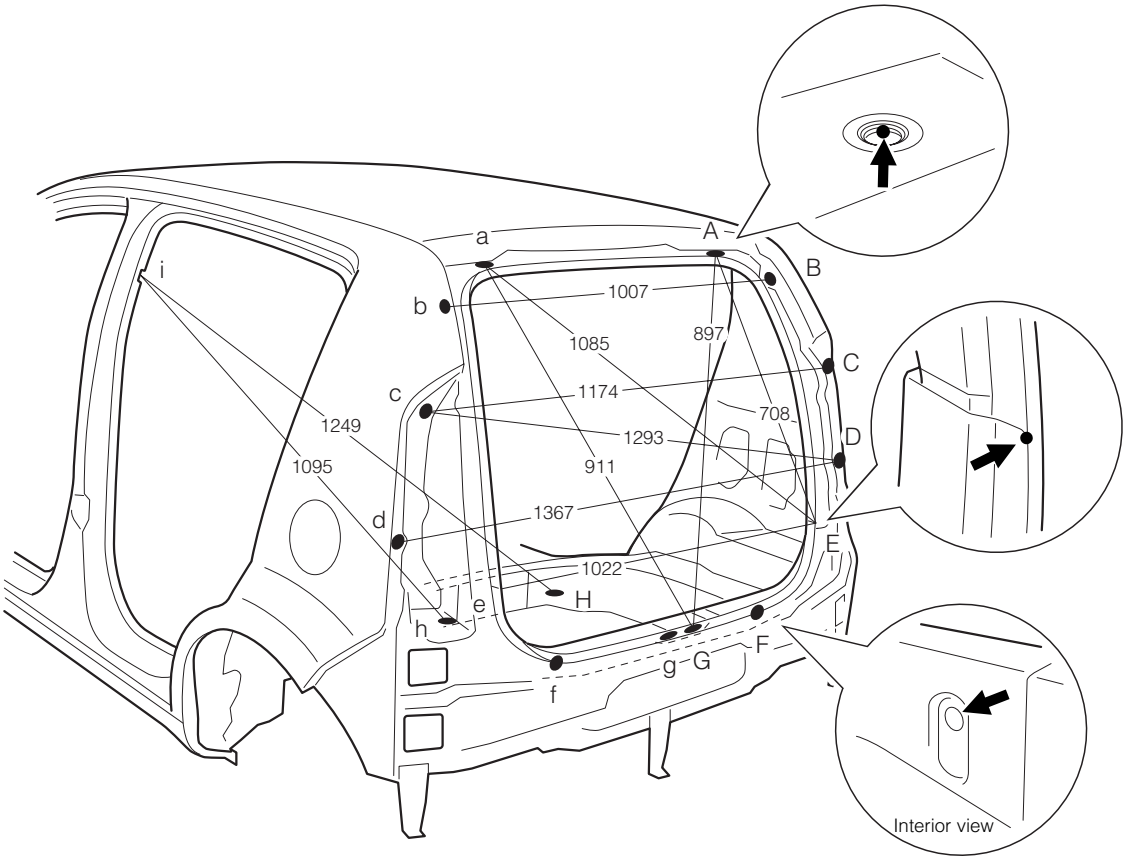
Unit: mm

Point codes	Nomenclature	Bore	Point codes	Nomenclature	Bore
A, a	Roof panel corner	–	K, k	Center body pillar mating mark	–
B, b	Front fender attaching nut	6mm dia screw	L, l	Rear door hinge attaching nut	8mm dia screw
C, c	Front door hinge attaching nut	8mm dia screw	M, m	Rear door hinge attaching nut	8mm dia screw
D,d	Front door hinge attaching nut	8mm dia screw	N, n	Center body pillar mating mark	–
E, e	Front body pillar mating mark	–	O, o	Center body pillar mating mark	–
F, f	Front body pillar mating mark	–	P, p	Rocker panel mating mark	–
G, g	Rocker panel mating mark	–	Q, q	Roof side rail mating mark	–
H, h	Rocker panel mating mark	–	R, r	Quarter panel mating mark	–
I, i	Roof side rail mating mark	–	S, s	Quarter panel mating mark	–
J, j	Center body pillar mating mark	–	–	–	–

T11B9504ES48

SIRION

Applicable type
M300RS,M301RS,M300LS,M301LS



C–D,c–d	F–f	F–H,f–h	F–h,f–H
260	650	719	836

G–H,g–h	G–h,g–H	I–G,i–g	I–g,i–G
742	749	1584	1600

[Reference dimensions]
(Note) Symmetrical if dimensions are shown on either side only.

Unit: mm

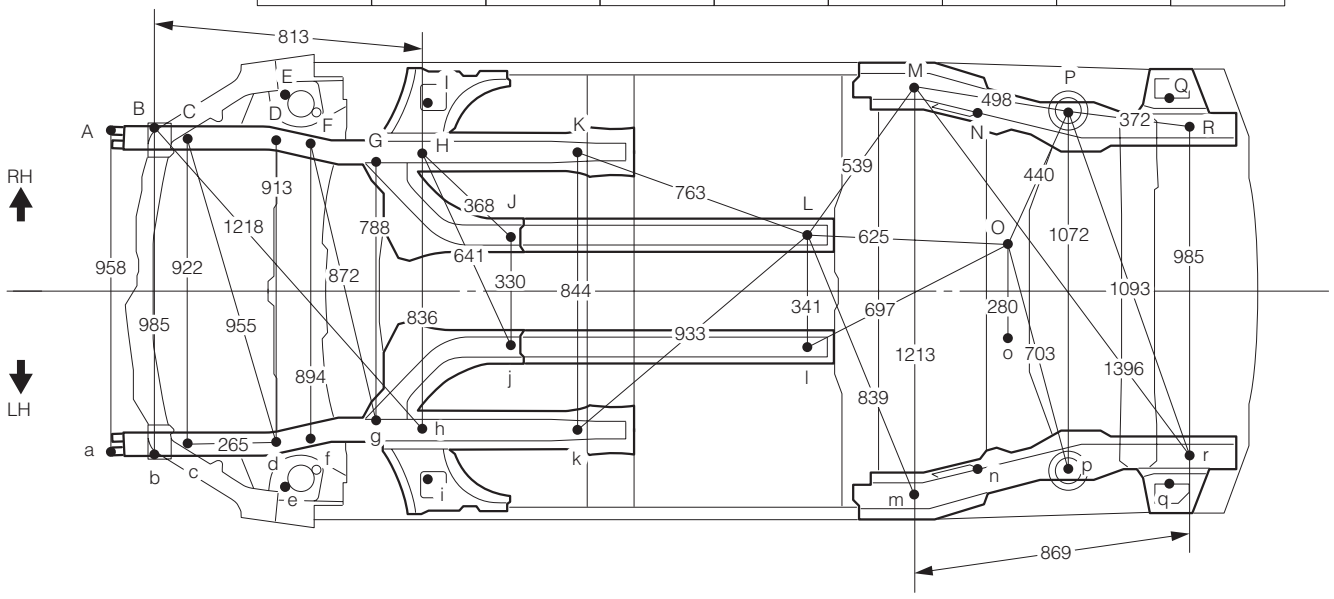
Point codes	Nomenclature	Bore	Point codes	Nomenclature	Bore
A, a	Back door hinge attaching hole	RH:8.1mm dia LH:11×8.1	F, f	Quarter panel inner reference hole	12mm dia
B, b	Back door damper stay attaching nut	6mm dia screw	G, g	Back door lock striker attaching nut	6mm dia screw
C, c	Quarter panel extension outer reference hole	10mm dia	H, h	Rear seat attaching nut	8mm dia screw
D, d	Rear combination lamp attaching hole	8.5mm dia	I, i	Center body pillar mating mark	–
E, e	Roof side panel inner/quarter panel inner mating section	–	–	–	–

T11B9505ES48

SIRION

Applicable type
M300RS,M301RS,M300LS,M301LS

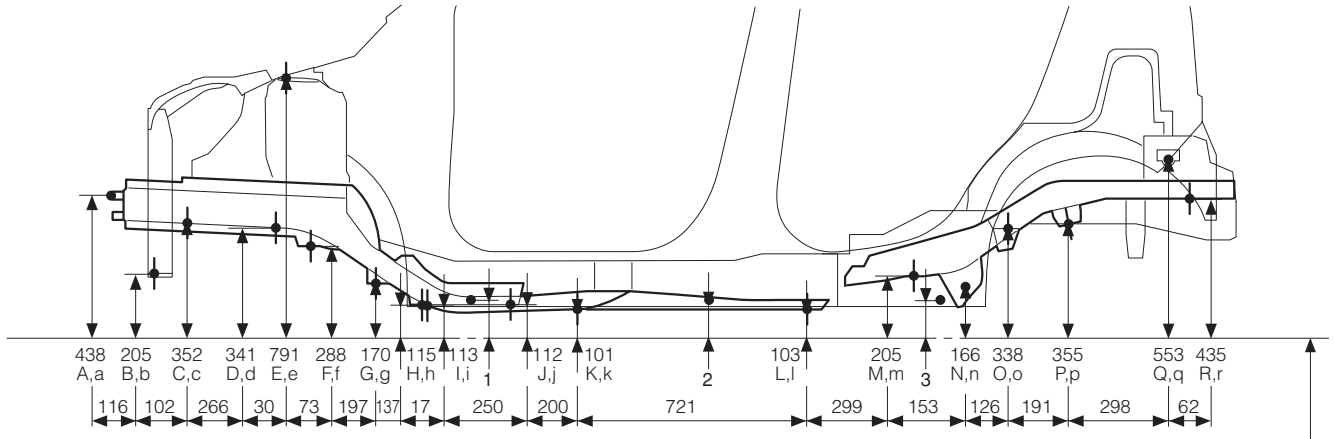
F–G,f–g	D–F,d–f	D–f,d–F	G–H,g–h	G–h,g–H	I–K,i–k	I–k,i–K	I–i	M–p,m–P
236	116	911	150	825	474	1090	1140	1244



Wheelbase	2440

1	2	3
101	100	103

Front



[Reference dimensions]
(Note) Symmetrical if dimensions are shown on either side only.

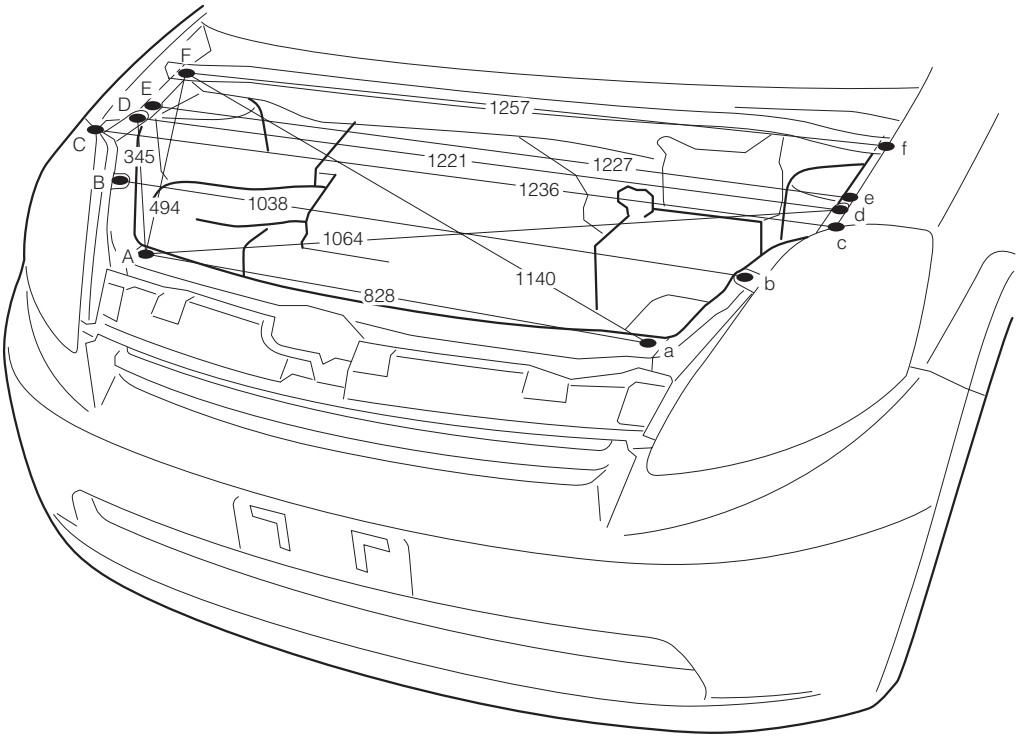
Unit: mm

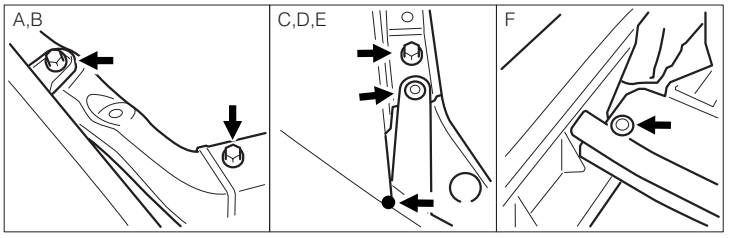
Point codes	Nomenclature	Bore	Point codes	Nomenclature	Bore
A, a	Front bumper reinforcement attaching bolt	10mm dia bolt end	J, j	Front side member reference hole	10mm dia
B, b	Stabilizer attaching nut	6mm dia screw	K, k	Front side member reference hole	18mm dia
C, c	Front side member reference hole	15mm dia	L, l	Front floor under reinforcement reference hole	10mm dia
D,d	Front side member reference hole	15mm dia	M, m	Rear floor side member reference hole	15mm dia
E, e	Front shock absorber attaching nut	8.5mm dia	N, n	Trailing arm attaching hole, inner	12.5mm dia
F, f	Front suspension cross member attaching nut	12mm dia screw	O, o	Rear floor cross member reference hole	15mm dia
G, g	Front suspension cross member attaching nut	12mm dia screw	P, p	Bump stopper attaching nut	8mm dia screw
H, h	Front suspension cross member brace attaching nut	10mm dia screw	Q, q	Rear shock absorber attaching hole	14.5mm dia
I, i	Torque box reference hole	10mm dia	R, r	Rear floor side member reference hole	20mm dia

T11B9506ES48

SIRION

Applicable type
M300RS,M301RS,M300LS,M301LS





[Reference dimensions]

(Note) Symmetrical if dimensions are shown on either side only.

Unit: mm

Point codes	Nomenclature	Bore	Point codes	Nomenclature	Bore
A, a	Radiator support upper center attaching bolt head end	–	D, d	Headlight attaching clip end	–
B, b	Headlight attaching bolt head end	–	E, e	Front fender attaching bolt head end	–
C, c	Front fender corner end	–	F, f	Cowl top ventilator louver attaching clip end	–

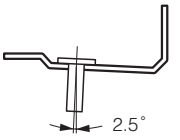
T11B9508ES48

SIRION

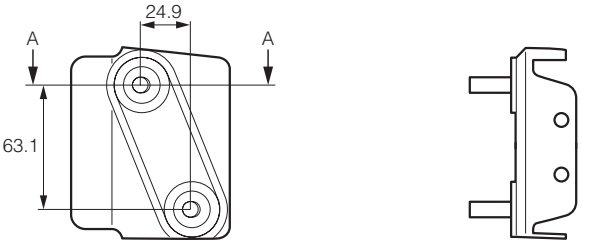
Applicable type
M300RS,M301RS,M300LS,M301LS

Plane dimension

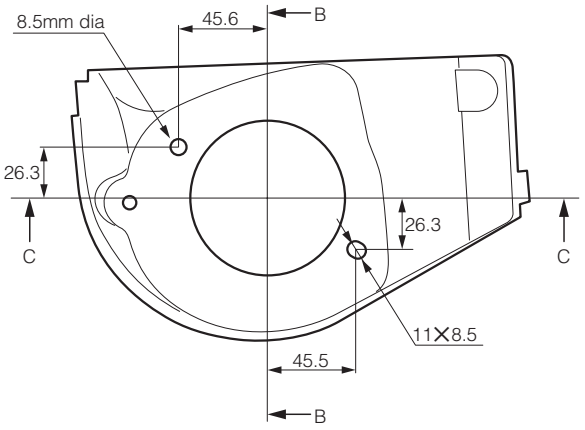
[Reference dimensions]

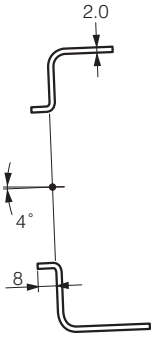


A–A

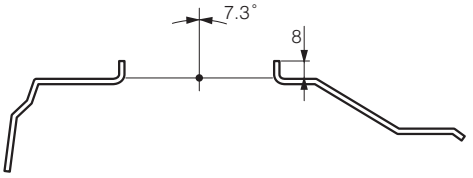


Front bumper reinforcement attaching section

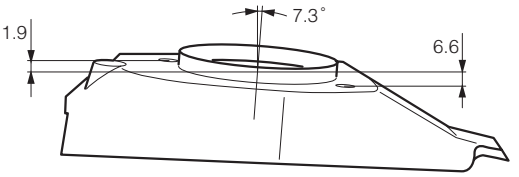




B–B



C–C



Front spring support attaching area

Unit: mm

T11B9509ES48

TO INDEX

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SILENT SHEET ---------- F - 8
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FORMED URETHANE---------- F - 9
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FRONT SUSPENSION ---------- F - 10
FRONT WHEEL ALIGNMENT ---------- F - 10
REAR SUSPENSION ---------- F - 10
REAR WHEEL ALIGNMENT ---------- F - 10

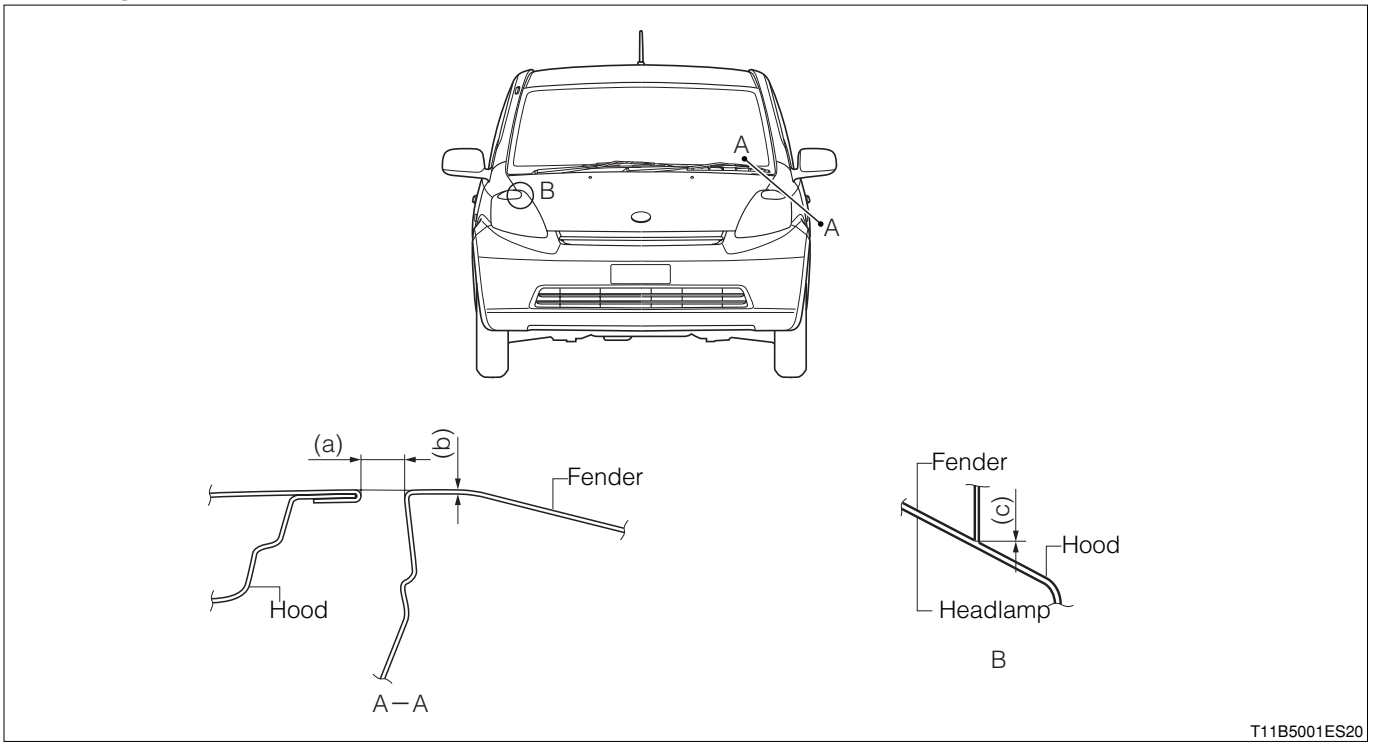
1 BODY

1-1 BASIC CHECK AND ADJUSTMENT

1-1-1 FITTING ADJUSTMENT

(1) Hood

① **Fitting dimensions**



Fitting dimensions of hood panel

Measuring point		Specified gap (a)	Difference in height (b)	Flatness (c)	Difference between right and left	Deviation value
A - A	Hood × Front fender	3.5 ± 1.5	0 ± 1.5	-	Not to exceed 1.5	Not to exceed 1.5
B	Hood end	-	-	0 ± 1.5	Not to exceed 1.5	-

Unit : mm

② **Fitting adjustment**

a. Adjustment of the hood in longitudinal direction, and in lateral direction at the rear end

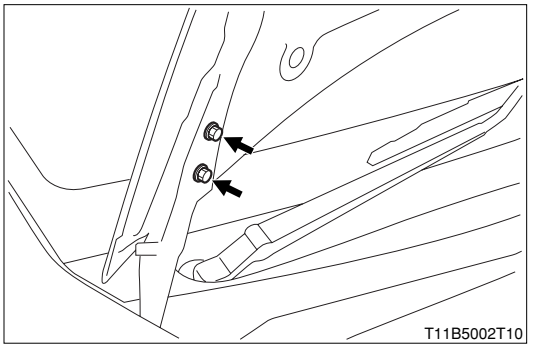
1.Loosen the hood hinge bolts to adjust.

CAUTION

- Since the centering bolt is used, adjustment must be done only after the centering bolt is replaced with the supplied bolt.

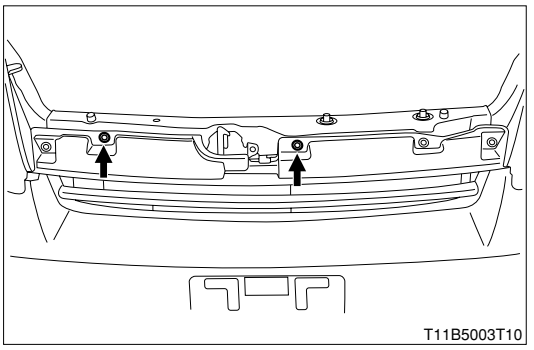
NOTE

- Part number of bolt:91631-60614-000



b. Adjustment of the hood in vertical and lateral direction at the front end

1.Remove two clips on the front bumper cover and pull the hood lock area of the front bumper cover to provide a gap for the tool.



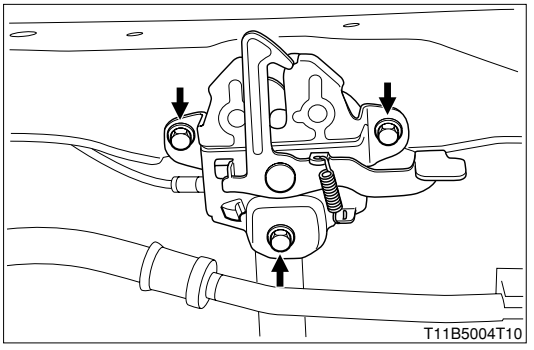
2.Loosen the hood lock bolt prior to adjustment.

CAUTION

- In cases where the centering bolt has been used, replace it with a bolt supplied for adjustment use in advance.

NOTE

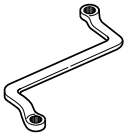
- Part number of bolt:91511-G0612-000



(2) Front & rear door

① Articles to be prepared

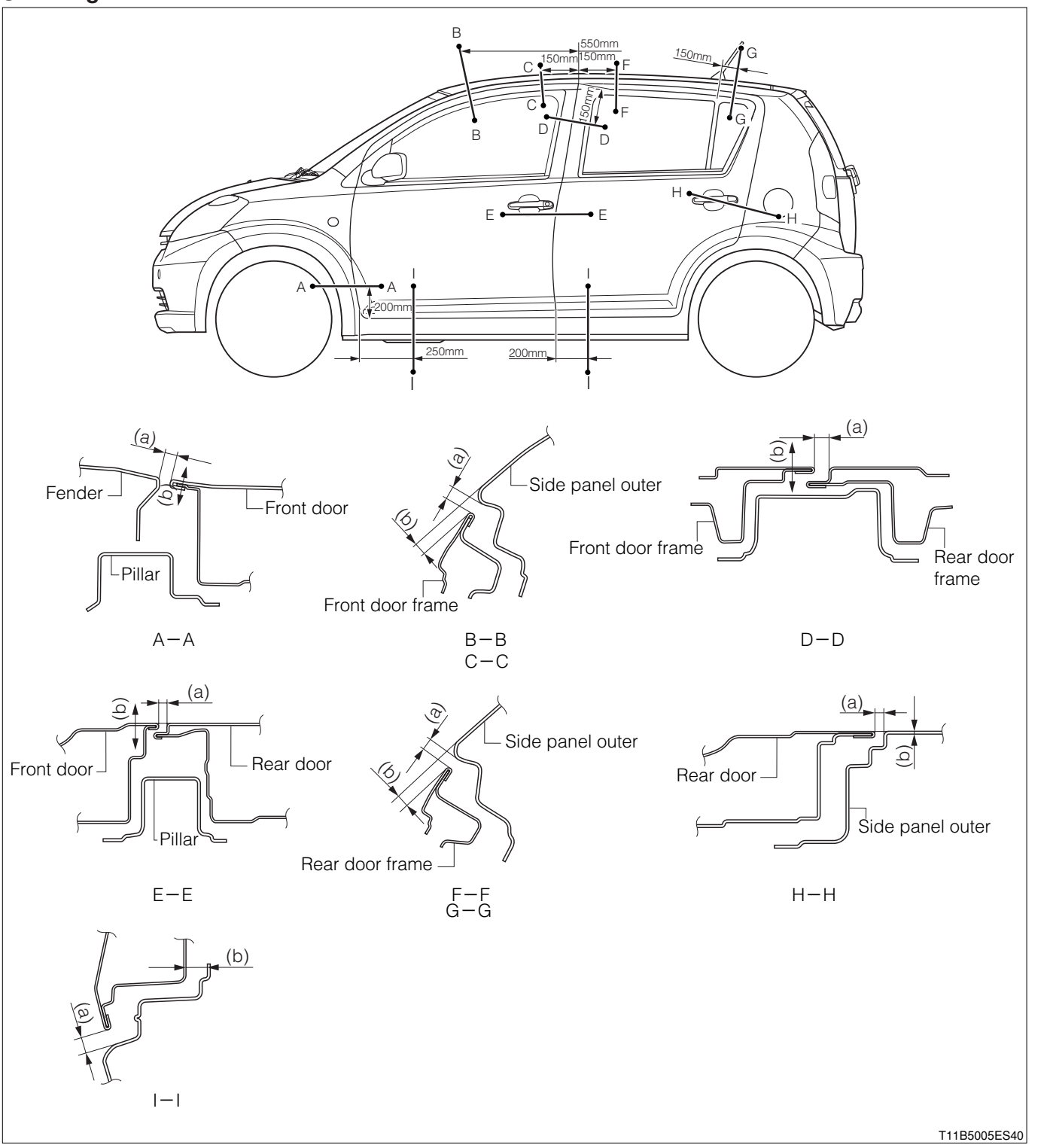
SST

Shape	Part No.	Part name
	09812-00010-000 (09812-22010-000)	Wrench door hinge set bolt

Tool

Long TORX® wrench T40

② Fitting dimensions



Fitting dimensions of door

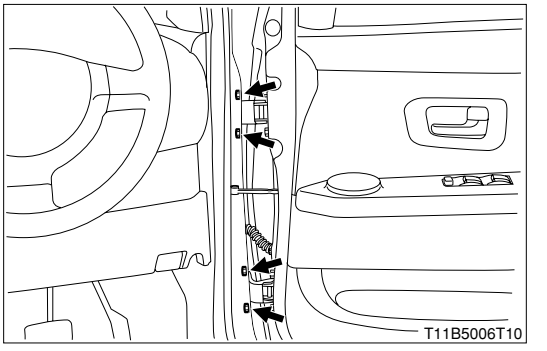
Measuring point		Specified gap (a)	Difference in height (b)	Difference between right and left	Deviation value
A - A	Front door ✕ Front fender	4.2 ± 1.2	0 ± 1.5	-	Not to exceed 1.5
B - B	Front door ✕ Side panel	4.8 ± 1.5	-3.7 ± 1.5	-	Not to exceed 1.5
C - C	Front door ✕ Side panel	4.8 ± 1.5	-3.8 ± 1.5	-	Not to exceed 1.5
D - D	Front door ✕ Rear door	4.2 ± 1.2	0 ± 1.5	Not to exceed 1.5	Not to exceed 1.5
E - E	Front door ✕ Rear door	4.2 ± 1.2	0 ± 1.5	-	Not to exceed 1.5
F - F	Rear door ✕ Side panel	4.8 ± 1.5	-3.5±1.5 (Side panel reference)	-	Not to exceed 1.5
G - G	Rear door ✕ Side panel	4.8 ± 1.5	-3.1±1.5 (Side panel reference)	-	Not to exceed 1.5
H - H	Rear door ✕ Quarter panel	4.2 ± 1.2	0±1.5 (Rear door reference)	-	Not to exceed 1.5
I - I	Front/Rear door ✕ Rocker panel	6.0 ± 1.5	-	-	Not to exceed 2.0

Unit : mm

③ **Fitting adjustment (Front door)**

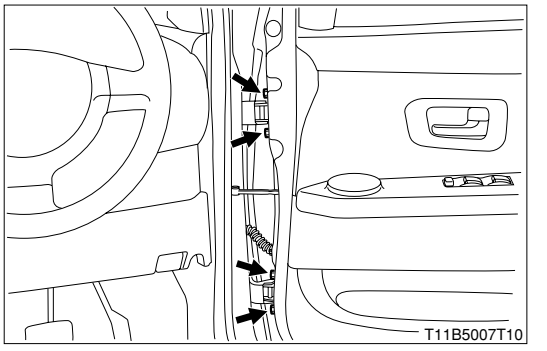
c. Adjustment of the door at the rear end, and in vertical and lateral directions

1.Loosen the bolt on the pillar side with the SST and perform adjustment.
SST: 09812-00010-000



d. Adjustment of the door in vertical direction, and in lateral direction at the front end

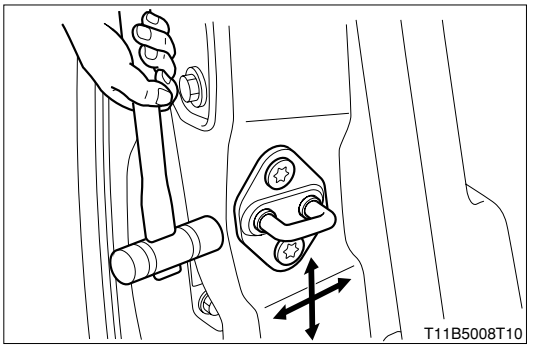
1.Loosen the bolt on the door side to adjust.



e. Adjustment of the door in longitudinal and lateral directions and the front door lock striker

1.Loosen the striker mounting screw until the striker gets loose.
TOOL: Long TORX® wrench T40

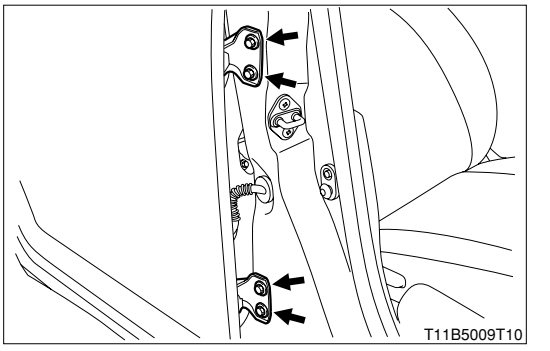
2.Adjust the striker by tapping lightly.



④ **Fitting adjustment (Rear door)**

f. Adjustment of the door at the rear end, and in vertical and lateral directions

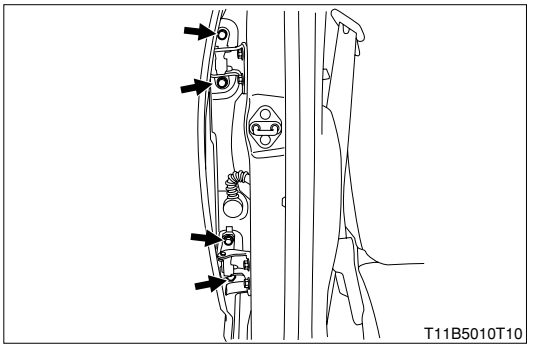
1.Loosen the bolt on the pillar side to adjust.



g. Adjustment of the door in vertical direction, and

lateral direction at the door front end

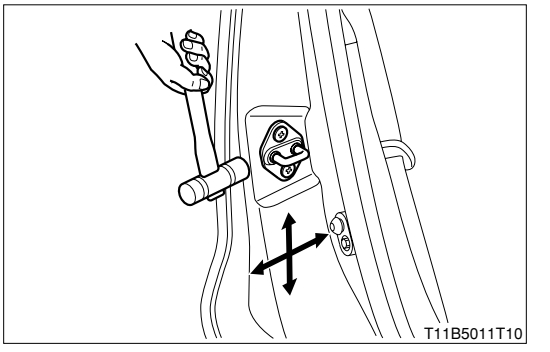
1.Loosen the bolt on the door side to adjust.



h. Adjustment of the door in longitudinal and lateral directions and the rear door lock striker.

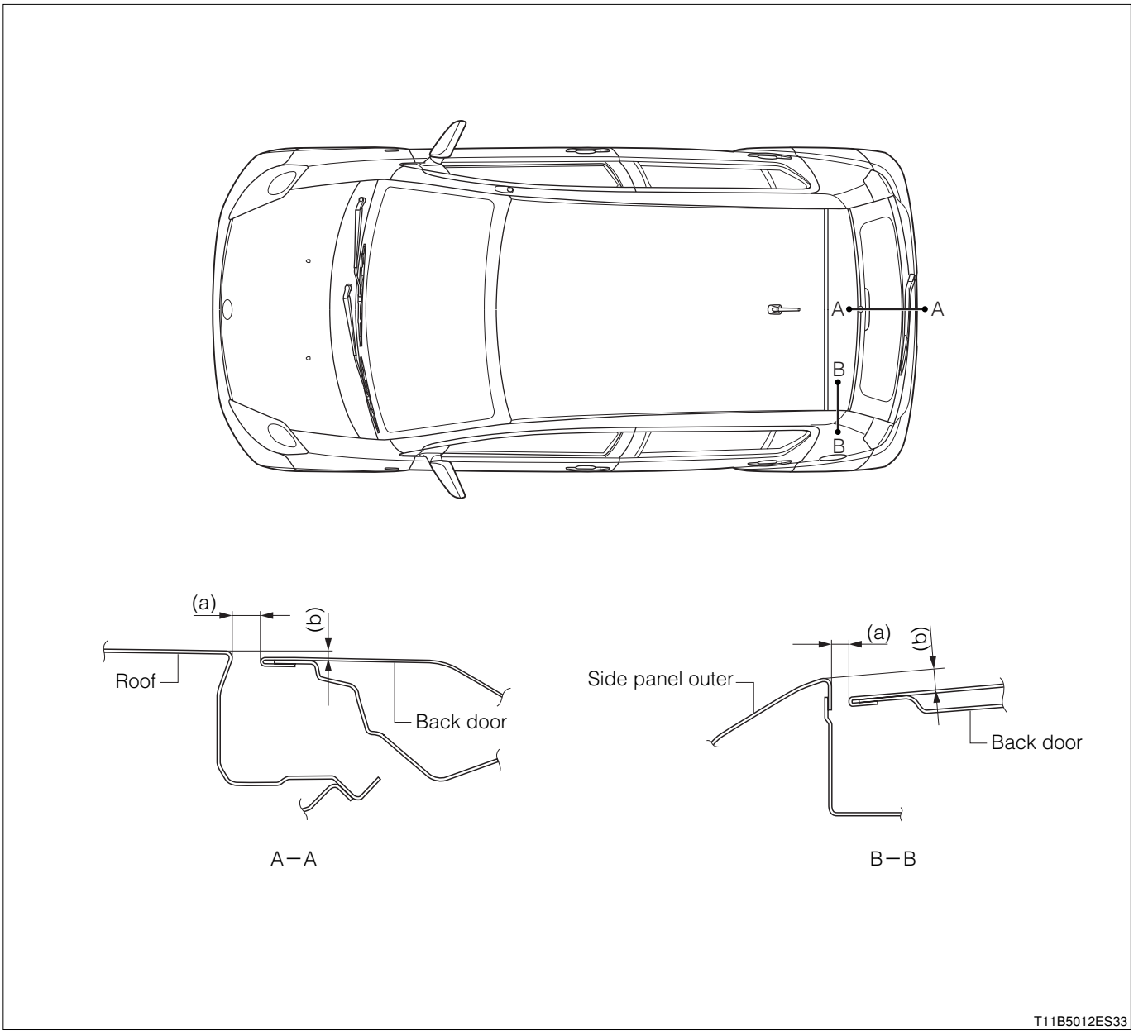
1.Loosen the striker mounting screw until the striker gets loose.
TOOL: Long TORX® wrench T40

2.Adjust the striker by tapping lightly.



(3) Back door

① Fitting dimensions



Fitting dimensions of back door

Measuring point		Specified gap (a)	Difference in height (b)	Difference between right and left	Deviation value
A - A	Back door ✕ Roof	7.5 ± 1.5	-1.0 ± 1.6	-	Not to exceed 1.5
B - B	Back door ✕ Quarter panel	5.0 ± 1.5	9.8 ± 1.5	Not to exceed 1.5	-

Unit : mm

② **Fitting adjustment**

i. Adjustment of the back door in vertical and lateral directions at the upper end

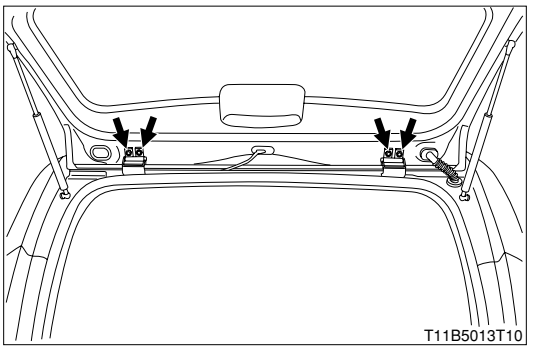
1.Loosen the hinge mounting bolt on the door side before the adjustment.

CAUTION

- Since the centering bolt is used, adjustment must be done only after the centering bolt is replaced with the supplied bolt.

NOTE

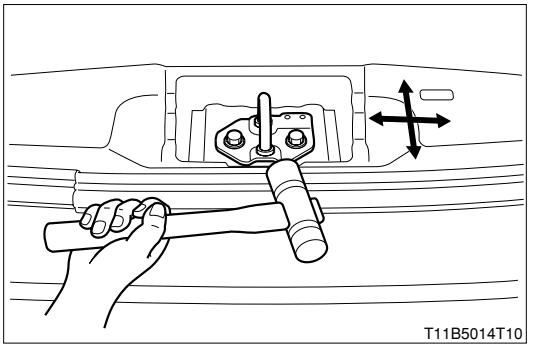
- Part number of bolt:91651-40816-000



j. Adjustment of the back door in longitudinal direction and the back door lock striker

1.Loosen the striker mounting screw until the striker gets loose.

2.Adjust the striker by tapping lightly.



1-1-2 CHECK THE FRAME AND THE BODY FOR ANY LOOSENING AND DAMAGE

1.Check the conditions of the tightening bolts, nuts and rivets for the frames and cross members with a spanner.

SPECIFIED VALUE: There shall be no loosening.

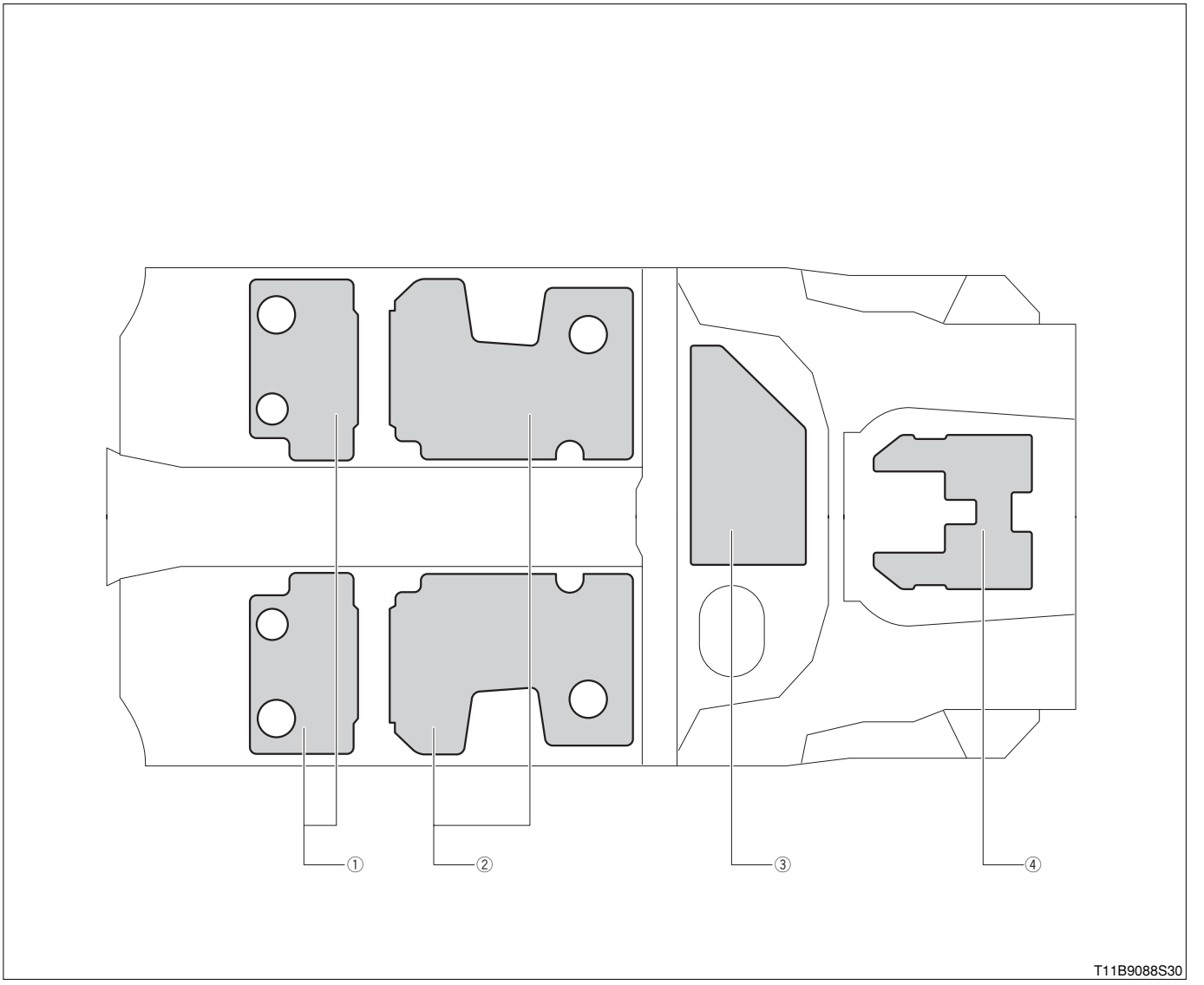
2.Check the body, frame and cross member for damage such as rust, crack, deformation, and peel-off of welding.

SPECIFIED VALUE: There shall be no damage, such as rust, crack, deformation, and peel-off of welding.

3.Move the door by hand to ensure there are no loose hinges due to excessive play.

SPECIFIED VALUE: There shall be no loosening.

2 SILENT SHEET
2-1 REPLACEMENT

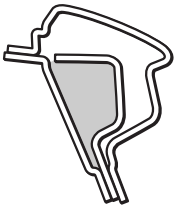


Measuring point	Part name	Thickness(mm)	Number of necessary sheets (pieces)
①	Sheet, front floor silencer, No.1	3.0	2
②	Sheet, front floor silencer, No.2	3.0	2
③	Sheet, rear floor silencer,No.1	1.5	1
④	Sheet, rear floor silencer,No.2	1.5	1

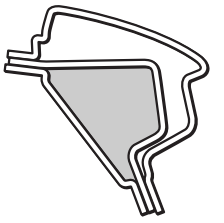
3 FORMED URETHANE

3-1 FILLING SECTION

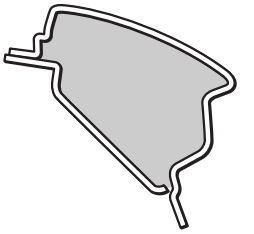
a–a



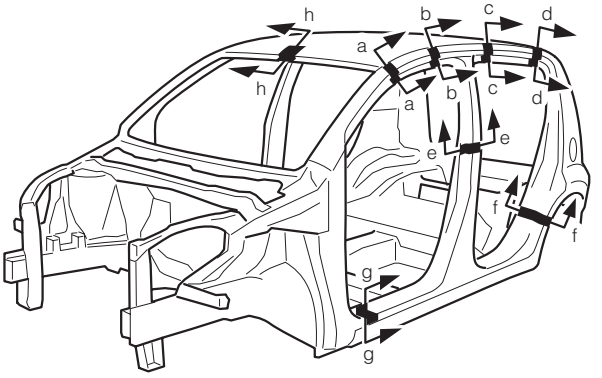
b–b

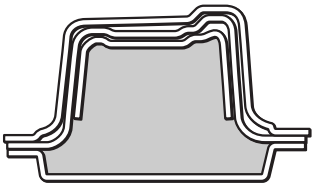


c–c

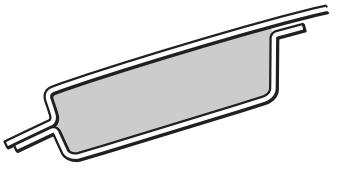


d–d

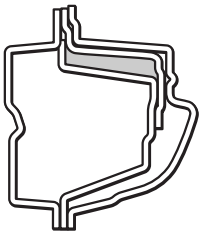




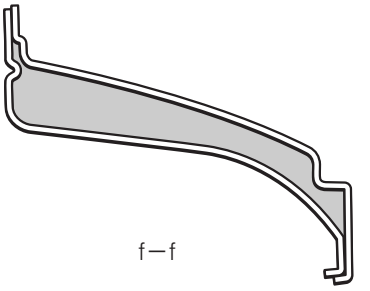
e–e



h–h



g–g



f–f

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4 FRONT SUSPENSION

4-1 FRONT WHEEL ALIGNMENT

1.As for the front wheel alignment values, refer to the [C1: Front suspension] of the repair manual.

5 REAR SUSPENSION

5-1 REAR WHEEL ALIGNMENT

1.As for the rear wheel alignment values, refer to the [C2: Rear suspension] of the repair manual.

FOREWORD

This body repair manual introduces to you fundamental knowledge necessary for servicing the bodies of Daihatsu vehicles and basic operations thereof. Furthermore, this manual describes the replacement procedures for principal sheet panels of the M300 series including thir welding methods as well as those seal applying points
It is urged that every body repair technician be acquatined with accurate operations by making the most of this body repair manual in order that rationalized, efficient repairs and reliable body servicing operations may be carried out.

All information used in this body repair manual was in effect at time when the manual was printed. However, the specifications and procedures may be revised owing to continuing improvements in design without advance notice and without incurring any obligation to us.

Published in November, 2004

No.9892

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DAIHATSU MOTOR CO.,LTD.

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C. REPLACEMENT PROCEDURE FOR BODY PANELS C
D. RUST PREVENTIVE TREATMENT D
E. BODY DIMENSIONAL DIAGRAM E
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1 HOW TO USE THIS MANUAL

1-1 SCOPE OF DESCRIPTION IN THIS MANUAL

This manual describes the "Disassembling and Assembling Procedure" for Type 1KR-FE engine assembly. As for the procedure for removal and installation from and to the vehicle as well as the procedures for oil supply, checks and adjustment after completion of mounting on the vehicle, these procedures are described in the repair manual of respective vehicle models.

1-2 ARTICLES TO BE PREPARED

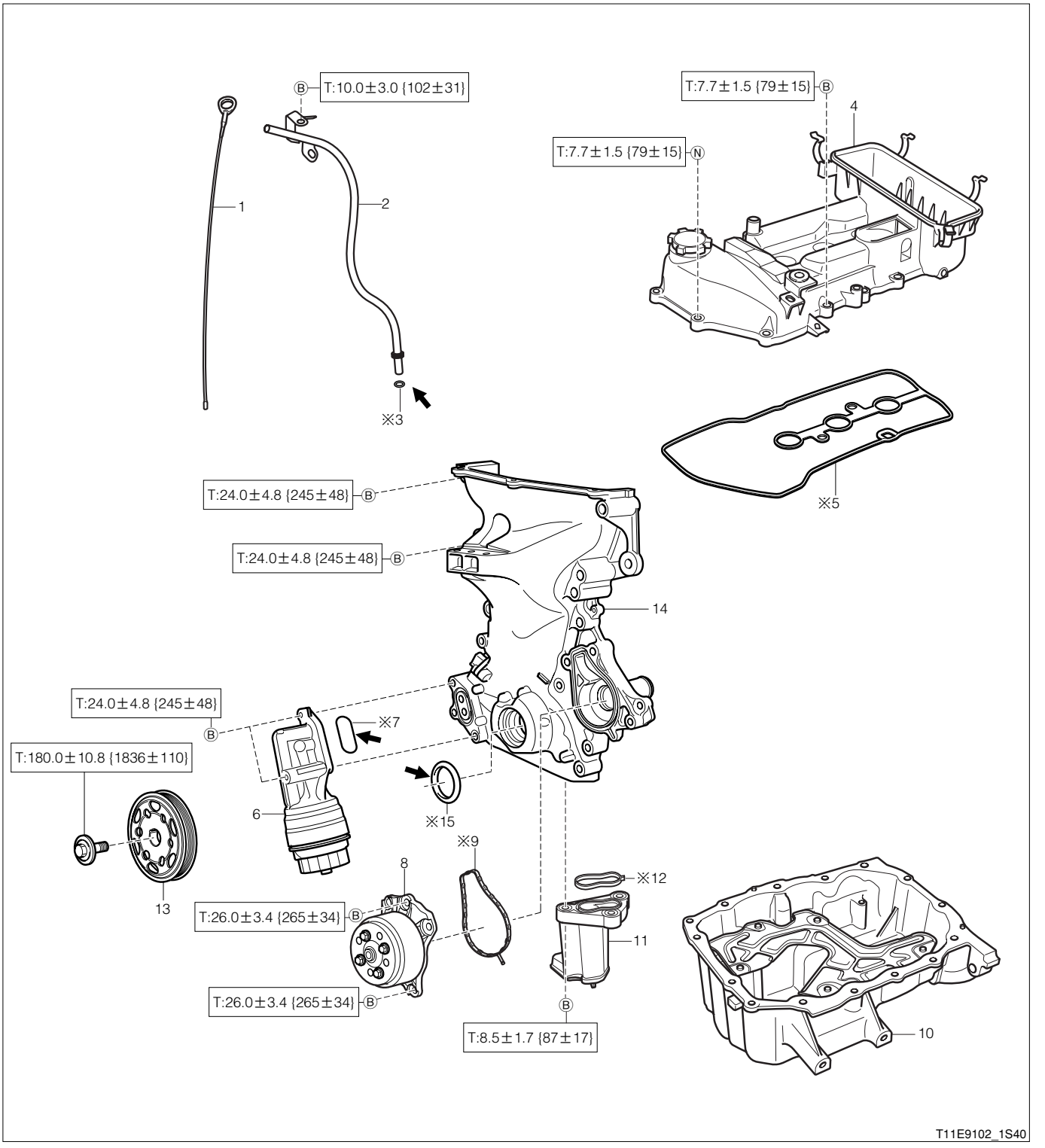
When SST, tool, measuring instrument, a sort of fat and oil to be prepared before operation are necessary, those are described by compiling in the table as preparation tools at the beginning of each item.

However, the general tools, jacks, fixtures as considered being equipped always at the service shop are usually omitted.

1-3 COMPONENTS

1. The cross-sectional views and component diagrams are provided, thus showing the installation condition of each part.
2. Non-reusable parts are also described in the component diagrams. The explanation of relevant numerals is given below the component diagrams.
3. The removal, disassembling and assembling procedure list is shown just beneath of components figure.

1-3-1 ENTRY EXAMPLE



➡Engine oil
Unit: N·m{kgf·cm}
※: Non-reusable parts

1	Gage S/A, oil level	9	Gasket, water pump
2	Guide S/A, oil level gage	10	Pan S/A, oil
3	Ring, O	11	Plate, oil pan baffle
4	Cover Ay, cylinder head	12	Strainer S/A, oil
5	Gasket, cylinder head cover	13	Gasket, oil strainer
6	Bracket, oil filter	14	Pulley, crankshaft
7	Gasket, oil filter	15	Cover Ay, timing chain
8	Pump Ay, water	16	Seal, type T oil

1-4 CONTENTS NOT DESCRIBED IN THIS MANUAL

The description of the next elemental operation may omit in this service manual, but please perform in an actual operation.

1.Jacking operation and lifting operation
2.Cleaning and cleansing of removed parts to perform at need
3.Visual inspection

1-5 DEFINITIONS OF TERMS

SPECIFIED VALUE	This mark shows the standard value at the time of the check or adjustment.
ALLOWABLE LIMIT	This mark shows the maximum or minimum value at the time of the check or adjustment.
DEVIATION	This value refers to the difference between the maximum clearance and the minimum clearance.
WARNING	This symbol means that there is the possibility of personal injury of the operator himself or the nearby workers if the operator fails to follow the operating procedure prescribed in this manual.
CAUTION	This symbol means that there is the possibility of damage to the component being repaired if the operator fails to follow the operating procedure prescribed in this manual.
NOTE	Supplementary explanation which facilitates the operation is posted separately from the explanation. Because of difficulties in measurements to determine specified values, there may be cases where the specified values for simple measurement methods are indicated if malfunctions are unlikely to take place actually.

1-6 ABBREVIATION CODES

The abbreviation codes that appear in this manual stand for the following, respectively.

Abbreviation codes	Original terms	Meaning
Ay	Assembly	Assembly
J	Journal	Journal
FR	Front	FRONT
LH	Left Hand	Left side
RH	Right Hand	Right side
S/A	Sub Assembly	Combined parts
SST	Special Service Tool	Special Service Tool
T	Torque	Tightening torque
Ⓑ	Bolt	BOLT
Ⓢ	Screw	Screw
Ⓝ	Nut	Nut
Ⓦ	Washer	Washer
Ⓒ	Clip	Clip

2 UNIT

The units are the SI units [International System of Units]. (The hitherto-employed units are also indicated.)

Example : 33.25±13.25N·m{340±135kgf·cm}

2-1 NEW UNIT BECAUSE OF THE INTRODUCTION OF THE SI UNIT

As a result of the introduction of the SI units, the hitherto-employed typical units will be changed as follows.

Detected item	New units	Conventional units	Convention table
Force	N (newton)	kgf	1 kgf = 9.80665N
Torque	N·m (newton meter)	kgf·cm	1 kgf·cm = 0.0980665N·m
Spring constant	N/mm	kgf/mm	1 kgf/mm = 9.80665N/mm
Pressure	Pa (Pascal)	kgf/cm^2	1 kgf/cm^2 = 98.0665kPa
		mmHg	1 mmHg = 0.133322kPa

2-2 PREFIX USER IN SI UNIT

The following are typical prefixes used in SI Unit (10 to the power of n).

M(mega)	10^6
k(kilo)	10^3
h(hecto)	10^2
da (deca)	10^1
d (deci)	$10^{-1}=0.1$
c(centi)	$10^{-2}=0.01$
m(milli)	$10^{-3}=0.001$
μ(micro)	$10^{-6}=0.000001$

3 HOW TO GRASP SPECIFIED TIGHTENING TORQUE FOR GENERAL STANDARD BOLT AND NUT

3-1 DETERMINING PROCEDURE FOR TIGHTENING TORQUE FOR GENERAL STANDARD BOLTS AND NUTS

3-1-1 DETERMINING PROCEDURE FOR TIGHTENING TORQUE FOR BOLTS

Determine the strength division of bolts, based on the table below.

Then, obtain the value, based on the tightening torque table.

3-1-2 DETERMINING PROCEDURE FOR TIGHTENING TORQUE FOR NUTS

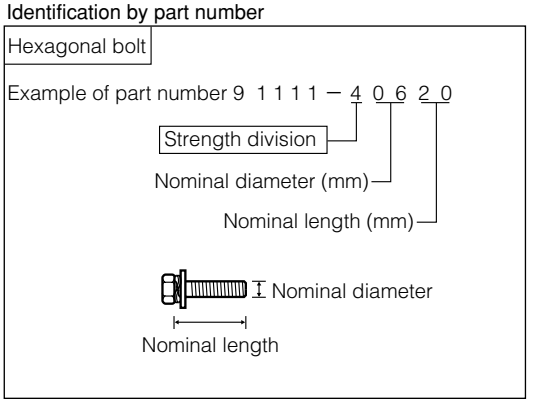
Determine with the aforesaid method, based on the mating bolt.

3-1-3 IDENTIFICATION

Identification of strength division by checking bolts themselves

Classification (Strength division)	Shape of head (how to know strength division)	
	Bolt without collar	Bolt with collar
4 T		
5 T		——
6 T	—— ——	
7 T		——

Identification by part number



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3-1-4 TIGHTENING TORQUE TABLE FOR GENERAL STANDARD BOLTS

Strength division	Nominal diameter (mm)	Pitch (mm)	Standard tightening torque (N·m{kgf·cm})	
			Bolt without flange	Bolt with flange
4 T	6	1	5.4 {55}	5.9 {60}
	8	1.25	13 {130}	14 {145}
	10	1.25	25 {260}	28 {290}
	12	1.25	47 {480}	53 {540}
	14	1.5	74 {760}	83 {850}
	16	1.5	113 {1150}	—
5 T	6	1	6.4 {65}	—
	8	1.25	16 {160}	—
	10	1.25	32 {330}	—
	12	1.25	59 {600}	—
	14	1.5	91 {930}	—
	16	1.5	137 {1400}	—
6 T	6	1	7.8 {80}	8.8 {90}
	8	1.25	19 {195}	20.5 {210}
	10	1.25	39 {400}	43 {440}
	12	1.25	72 {730}	79 {810}
	14	1.5	109 {1100}	123 {1250}
7 T	6	1	11 {110}	12 {120}
	8	1.25	25 {260}	28 {290}
	10	1.25	52 {530}	58 {590}
	12	1.25	95 {970}	103 {1050}
	14	1.5	147 {1500}	167 {1700}
	16	1.5	225 {2300}	—

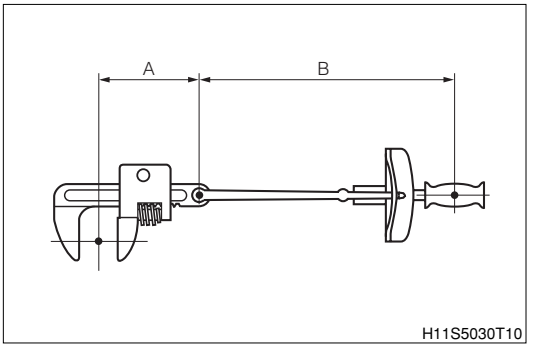
3-1-5 WHEN AN EXTENSION TOOL IS USED

1.When tightening with the SST or a tool connected to the torque wrench for a drive-end extension, a higher tightening torque will result, if tightened until the reading on the torque wrench indicates the specified torque.

2.This manual contains specified torques only. When using the SST or an extension tool, the torque wrench reading must be computed using the following formula.

3.Calculation formula: $T' = T \times B / (A + B)$

Abbreviation code	Meaning	UNIT
T′	Torque wrench reading	N·m{kgf·cm}
T	Specified tightening torque	N·m{kgf·cm}
A	Length of the SST or a tool	cm
B	Torque wrench length	cm



4 INSTRUCTIONS ON SERVICING OPERATIONS OF ENGINE AY

1.Prior to the disassembling, be sure to wash away sands and mud that have adhered to the external of the engine Ay so that they will not be admitted to the inside at the time of the disassembling and assembling.
2.When the joint section of light-alloy parts is to be disassembled, do not pry using a screwdriver or the like, but perform the disassembling by lightly tapping by means of a plastic hammer.
3.Place the disassembled parts in order at all times. Keep them away from dust.
4.Thoroughly wash each part before assembling. After drying, apply the designated oil.
5.Never wash aluminum and rubber parts with alkali chemicals.
6.Never wash rubber parts, such as O-rings and oil seals, with cleaning oil (white gasoline or the like).
7.Be sure to apply the designated oil to sliding surfaces and rotating surfaces before assembling them.
8.When a part is to be secured in a vise, be sure to secure it with aluminum sheets interposed.
9.Replace any snap ring that has been scratched or deformed with a new one.
10.Utmost care must be exercised so that the mating surface of the case will not be damaged, for the damaged mating surface will lead to oil leakage.
11.Prior to the application of seal agent, be sure to completely remove the oil seal agent remaining on the seal section. Then, wash the seal agent application section with white gasoline.
12.After the seal section has been assembled, wait for at least one hour, until the seal agent dries completely. Then, fill oil.

B ENGINE UNIT

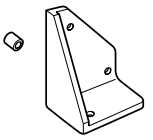
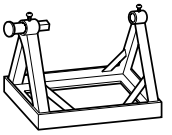
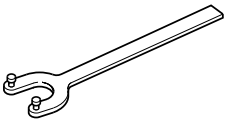
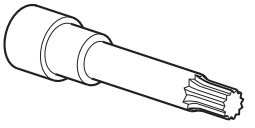
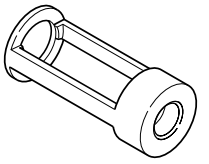
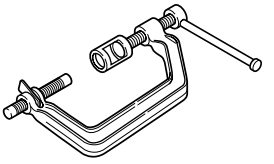
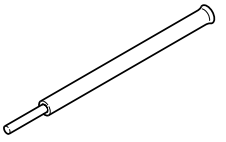
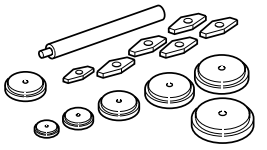
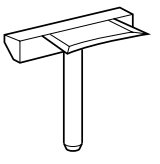
1KR-FE ---------- B - 1
ARTICLES TO BE PREPARED ---------- B - 1
SCHEMATIC DIAGRAM ---------- B - 3
TIMING CHAIN COVER ---------- B - 4
DISASSEMBLING AND
ASSEMBLING ---------- B - 4
TIMING CHAIN ---------- B - 12
DISASSEMBLING AND
ASSEMBLING---------- B - 12
CAMSHAFT ASSEMBLY---------- B - 17
DISASSEMBLING AND
ASSEMBLING---------- B - 17
CYLINDER HEAD AY ---------- B - 26
DISASSEMBLING AND
ASSEMBLING---------- B - 26
CYLINDER BLOCK AY ---------- B - 35
DISASSEMBLING AND
ASSEMBLING---------- B - 35

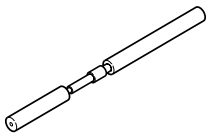
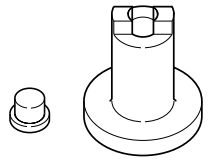
1 1KR-FE

1-1 ARTICLES TO BE PREPARED

1-1-1 ARTICLES TO BE PREPARED LIST

SST

Shape	Part No.	Part name
	09219-87101-000	Attachment,engine overhaul
	09219-87202-000	Stand,engine overhaul
	09278-87201-000	Tool,timing belt pulley holding
	09223-87202-000	Replacer,crankshaft front oil seal
	09043-97401-000	Wrench,double hexagon
	09202-87002-100	Attachment,valve cotter
	09202-87002-000 (09202-87001-000)	Remover & replacer,valve cotter
	09201-87203-000	Remover & replacer,valve guide bush
	09608-87302-000	Tool set,axle hub bearing & drive pinion bearing
	09032-00100-000	Cutter,oil pan seal

	09221-B1010-000	Remover & replacer
	09221-B1020-000	Remover & replacer

Tool

Scraper,Hexagonal rod wrench(Width across flats:2.5mm)

Instrument

Thickness gauge,Caliper gauge,Micrometer,Precision straightedge,Steel square,Dial gauge,Vernier calipers,Cylinder gauge,Press gauge,Torque wrench

Lubricant,adhesive,others

Engine oil,Three Bond1104,Three Bond1207B,Three Bond1207C

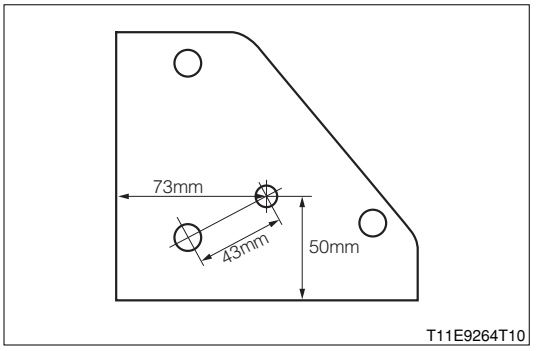
1-1-2 INSTALLATION TO ENGINE OVERHAUL STAND

(1) Connecting procedure

1.Install the engine Ay to the SST.

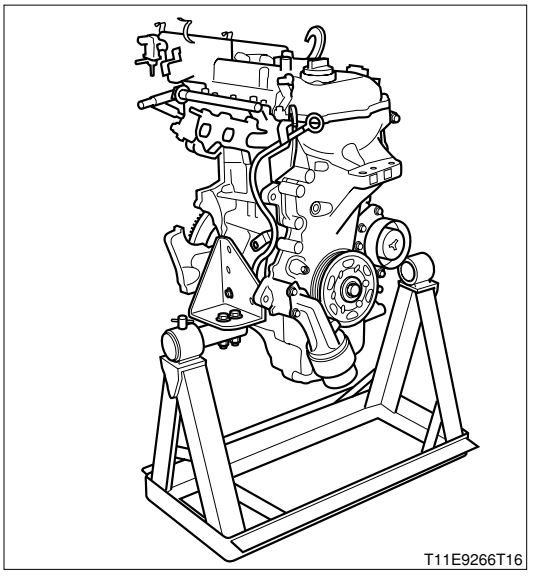
(1) Make a 10 mm dia hole on the engine overhaul stand attachment.

SST: 09219-87101-000

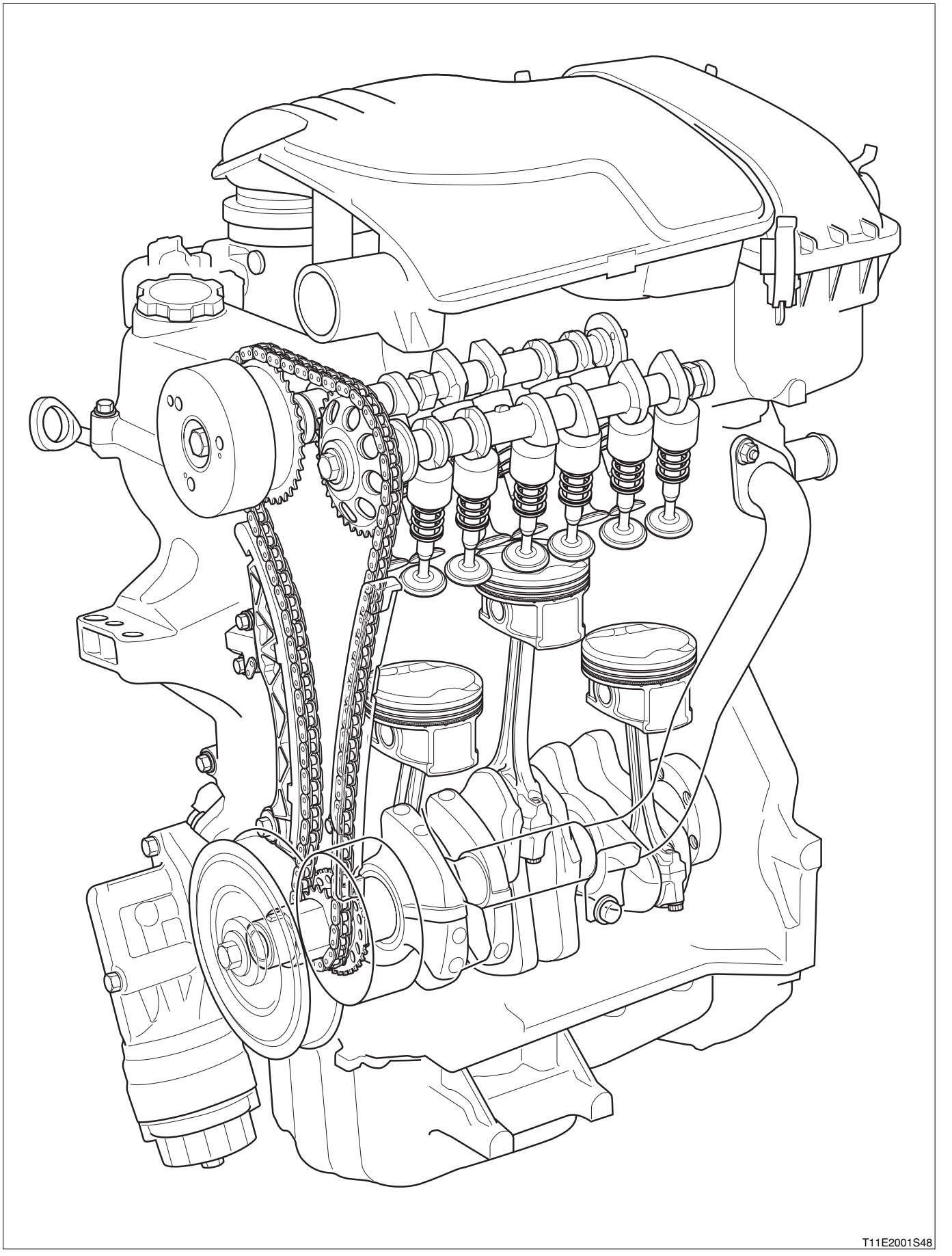


(2) Install the partial engine to the engine stand.

SST: 09219-87202-000



1-2 SCHEMATIC DIAGRAM



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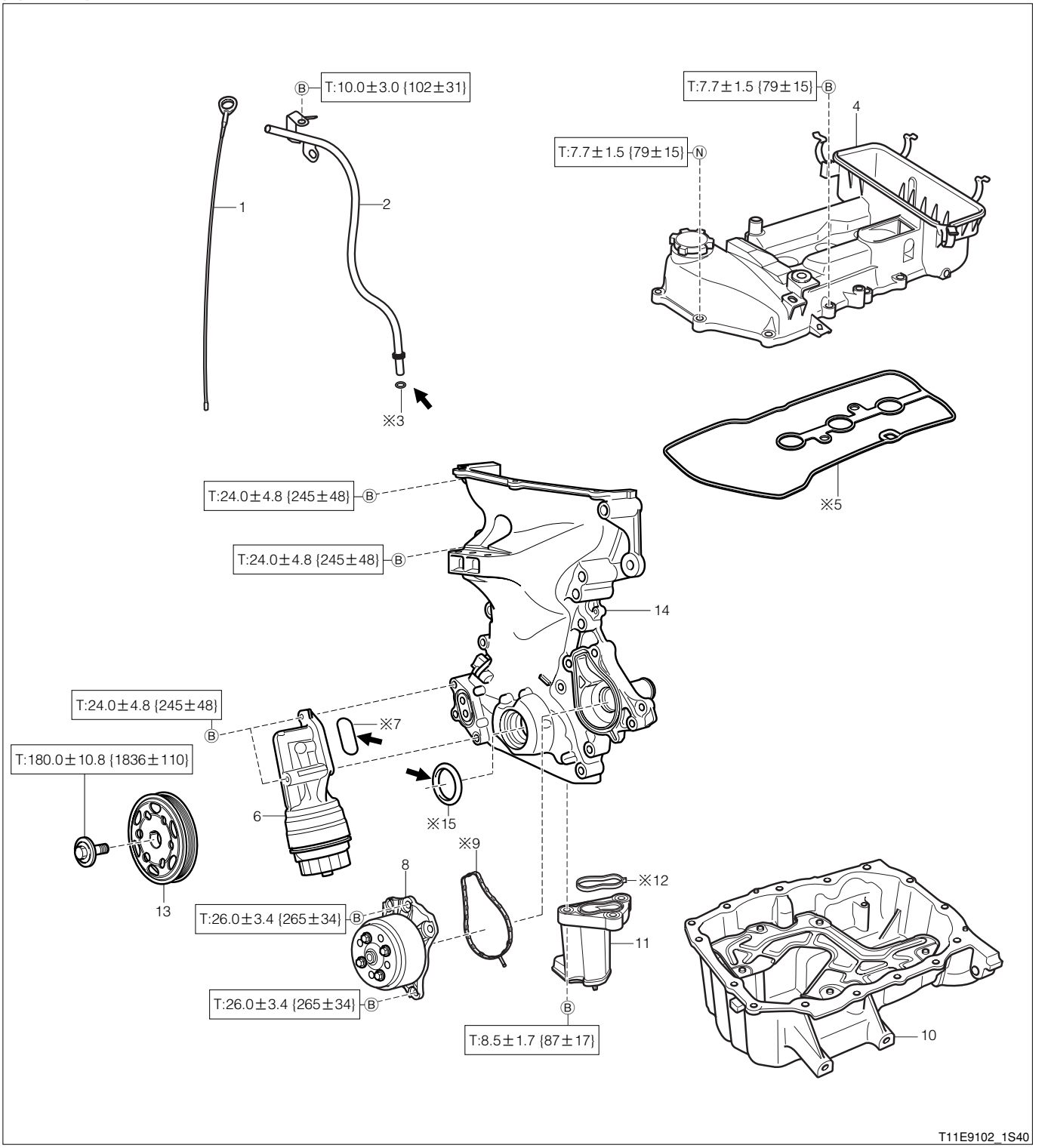
2 TIMING CHAIN COVER

2-1 DISASSEMBLING AND ASSEMBLING

2-1-1 DISASSEMBLING AND ASSEMBLING

(1) Components



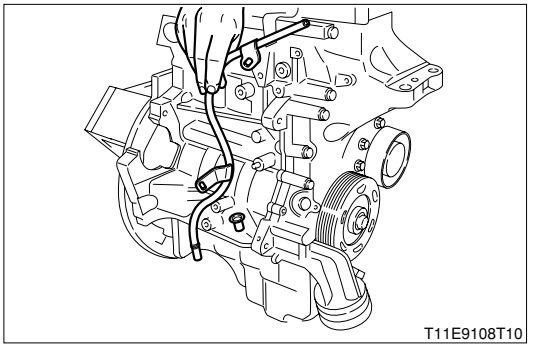
➡: Engin oil
Unit: N·m{kgf·cm}
※: Non-reusable parts

(2) Disassembling and assembling procedure

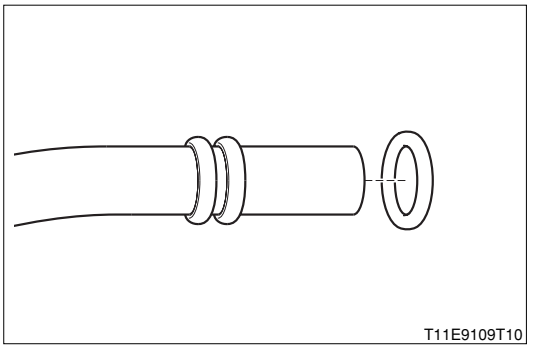
1 Gage S/A, oil level
2 Guide S/A, oil level gage
3 Ring, O
4 Cover Ay, cylinder head
5 Gasket, cylinder head cover
6 Bracket, oil filter
7 Gasket, oil filter
8 Pump Ay, water
9 Gasket, water pump
10 Pan S/A, oil
11 Strainer S/A, oil
12 Gasket, oil strainer
13 Pulley, crankshaft
14 CoverAy, timing chain
15 Seal, type T oil

2-1-2 POINTS OF DISASSEMBLY

1.Pull out the oil level gauge S/A. Remove the oil level gauge guide S/A.


T11E9108T10

2.Remove the O ring from the Oil level gage guide S/A.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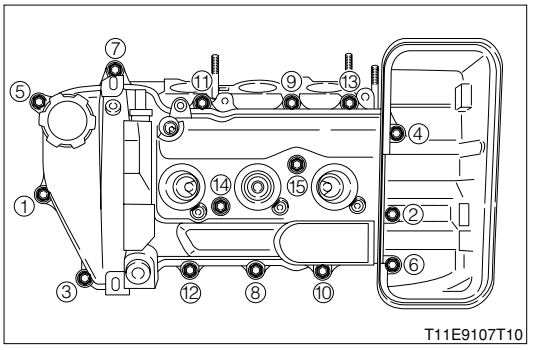
3.Remove the cylinder head cover Ay and cylinder head cover gasket by removing the attaching bolts and nuts in the sequence shown at the right figure.



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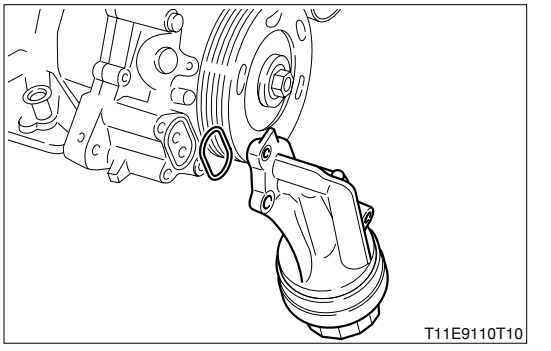
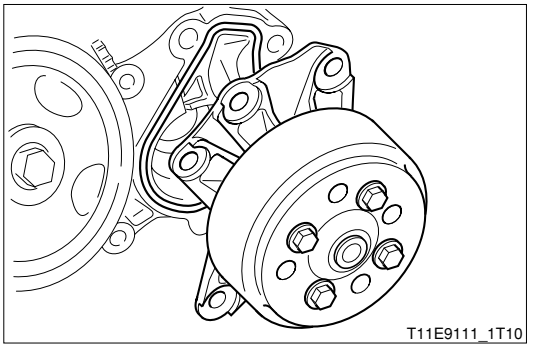
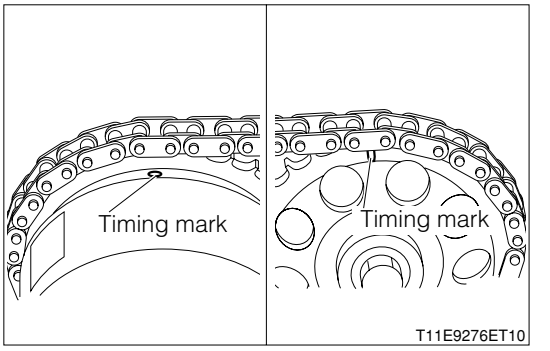
4.Remove the oil filter gasket by removing the oil filter bracket.


T11E9110T10

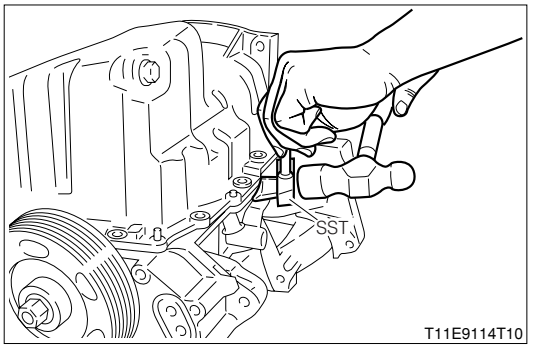
5.Remove the water pump gasket by removing the water pump Ay.



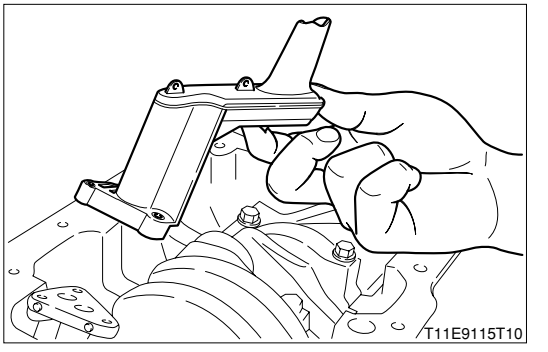
6.Set the No.1 cylinder to the top dead center under the compression stroke.
(1) Turn the crankshaft pulley in the normal direction, until the timing mark (0 degrees) of the crankshaft pulley is aligned with the timing point of the timing chain cover Ay.
(2) Ensure that the timing mark of the camshaft timing sprocket is at the top position.
If the timing mark is not at the top position, turn the pulley one turn so that the timing mark comes at the top.



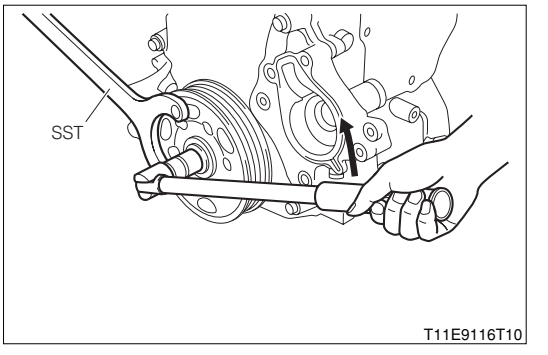
7.Remove the oil pan S/A from the cylinder block Ay, using the SST, by removing the attaching bolts and nuts of the oil pan S/A.
SST: 09032-00100-000
CAUTION
- Be very careful not to deform the flange section of the oil pan S/A during the removal.



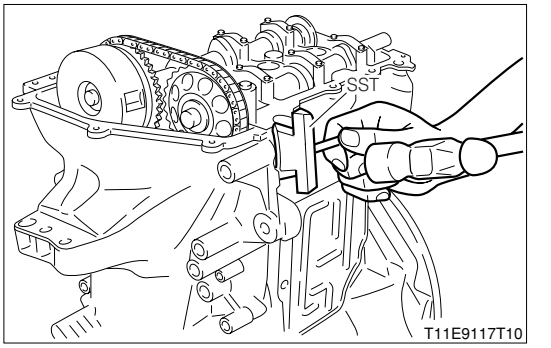
8.Remove the oil strainer gasket by removing the oil strainer S/A.



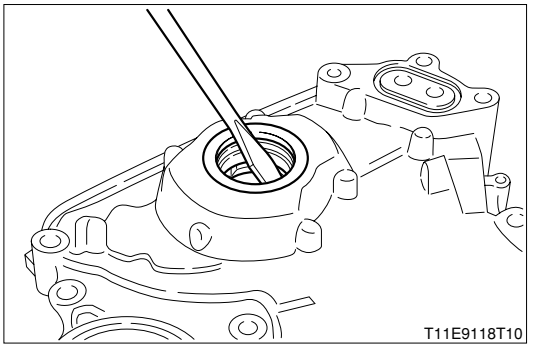
9.While preventing rotation, using the SST, remove the crankshaft pulley.
SST: 09278-87201-000



10.Remove the timing chain cover Ay, using the SST, by removing the attaching bolts and nuts.
SST: 09032-00100-000

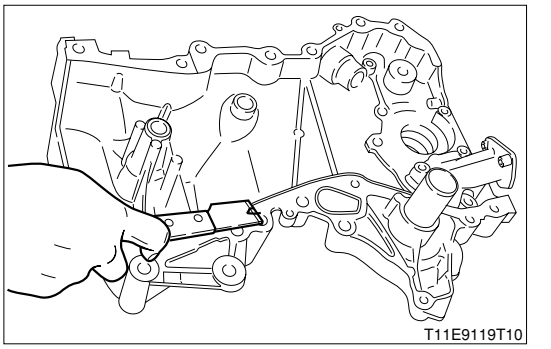


11.With a flat screwdriver, remove the type T oil seal.

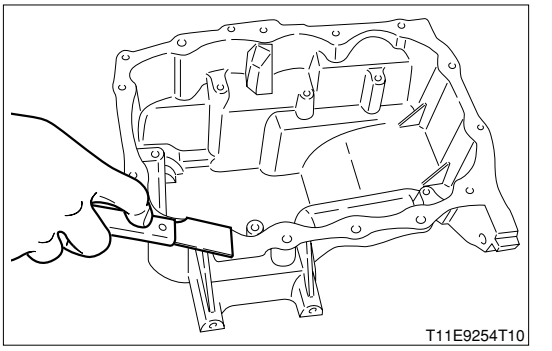


2-1-3 CLEANING

1.Clean the oil pan S/A and cylinder block Ay installation surfaces of the timing chain cover Ay.

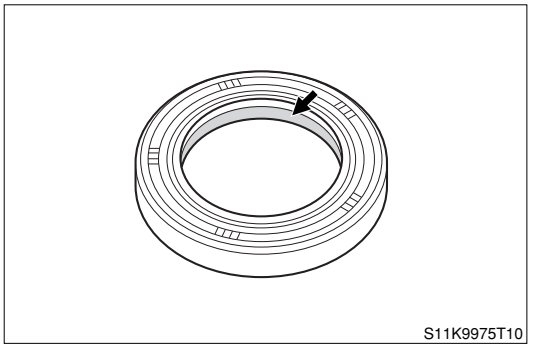


2.Clean the installation surface of the oil pan S/A.



2-1-4 POINTS OF ASSEMBLY

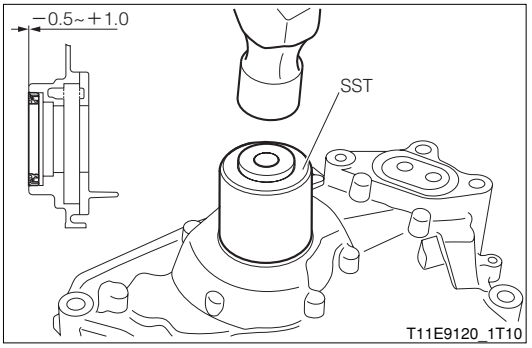
1.Install the type T oil seal to the timing chain cover Ay.
(1) Apply engine oil to the lip section of the type T oil seal.
LUBRICANT: Engine oil



(2) Drive the type T oil seal vertically, using the SST.

SPECIFIED VALUE: Press-fitting amount
from chain cover edge
Protruding amount: within 0.5 mm
Press-fitting depth: within 1 mm

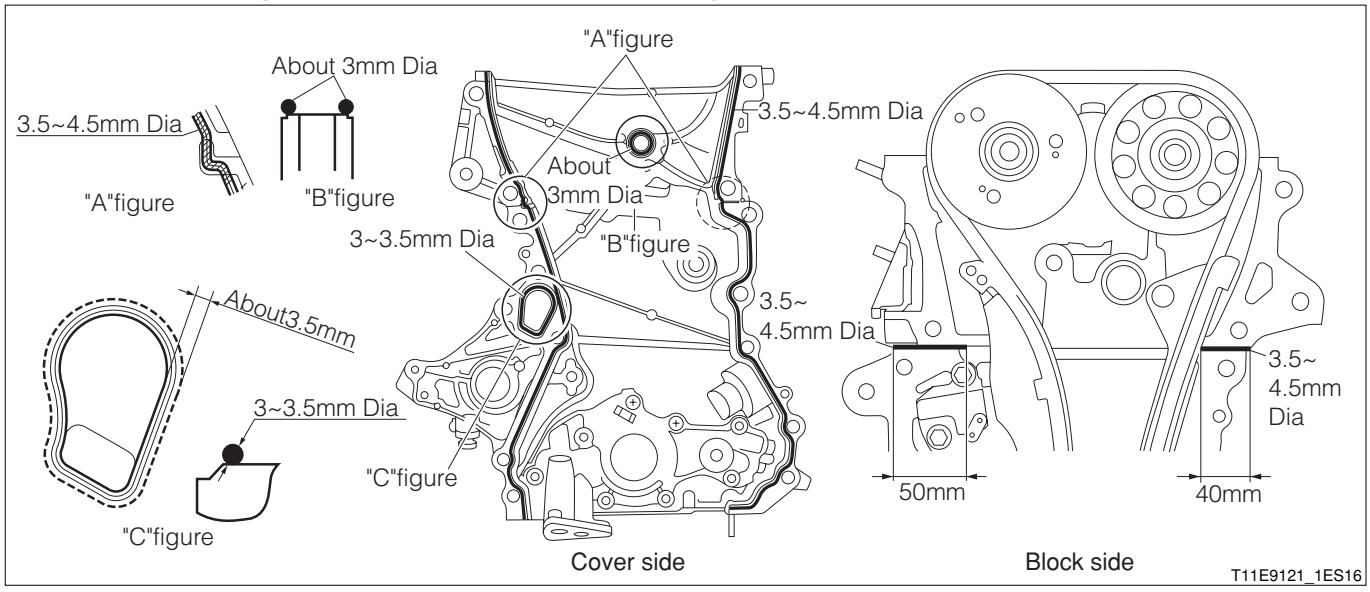
SST: 09223-87202-000



2.Install the timing chain cover Ay.

(1) Remove oil and grease from the installation surface of the cylinder block Ay and timing chain cover Ay.

(2) Apply liquid gasket at positions shown at the figure and perform the installation.



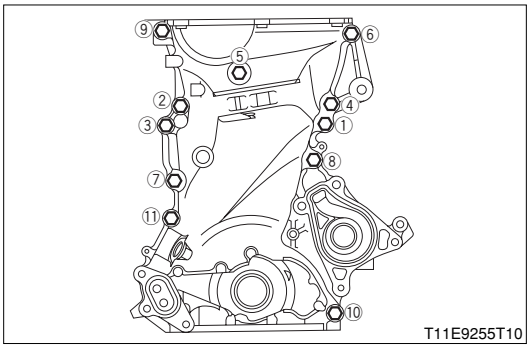
ADHESIVE: Three Bond1207C / Apply to the points in the figure C at the cover side as shown in the figure.

ADHESIVE: Three Bond1207B / Apply to the points in the figure A and B at the cover side as shown in the figure and at the block side.

CAUTION

- Completely remove foreign matters, oil and grease from the installation surface.

(3) Tighten the bolts in the sequence shown at the right figure.



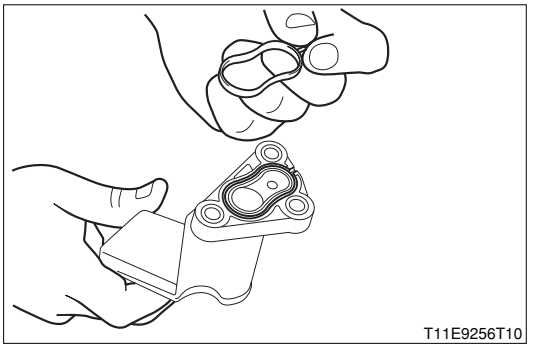
CAUTION

- Perform the assembling within three minutes after application of the liquid gasket.

(4) Wipe off any liquid gasket that has oozed out.

SPECIFIED VALUE: Permissible oozing amount: within 1.5 mm

3.Install the oil strainer gasket to the oil strainer S/A and install it to the timing chain cover Ay.



4.Installation of oil pan S/A.

(1) Ensure that no oil nor grease adheres to the oil pan S/A installation surface of the cylinder block Ay and the flange section of the oil pan S/A.

(2) Apply liquid gasket to the oil pan S/A and assemble it to the cylinder block Ay.

ADHESIVE: Three Bond1207B

CAUTION

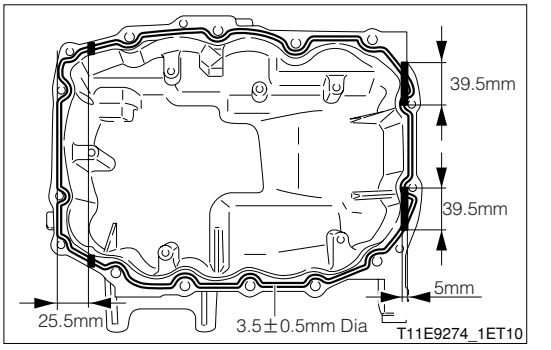
- Application of the liquid gasket should be started and finished at the seal surface with the cylinder block Ay.

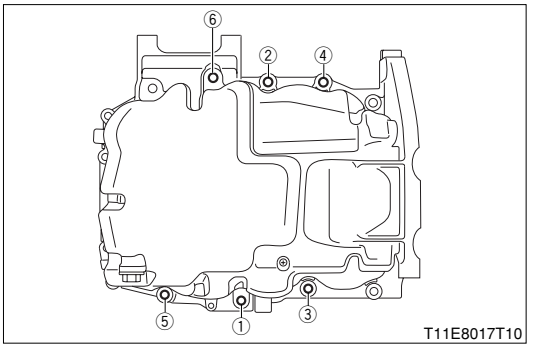
(3) Tighten the bolts in the sequence shown at the right figure.

As for other bolts, they can be tightened in any sequence.

CAUTION

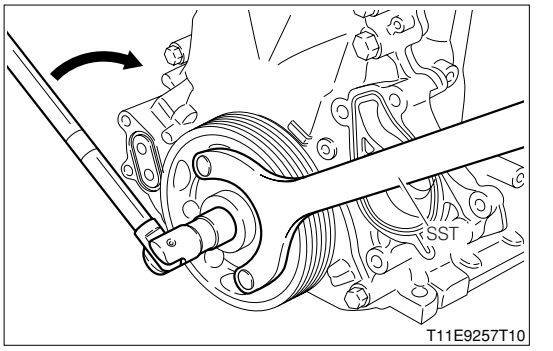
- Assembling should be started within three minutes after application of the liquid gasket and the oil pan S/A should be tightened within 15 minutes.





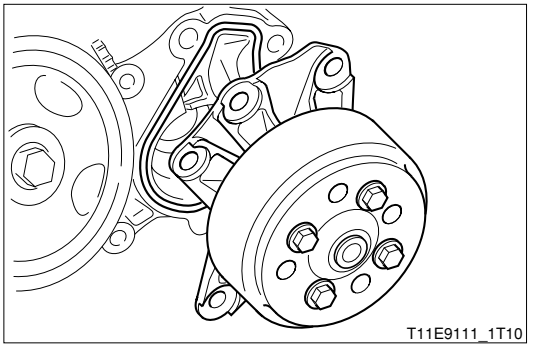
5.While preventing the crankshaft pulley with the SST, tighten the attaching bolt.

SST: 09278-87201-000

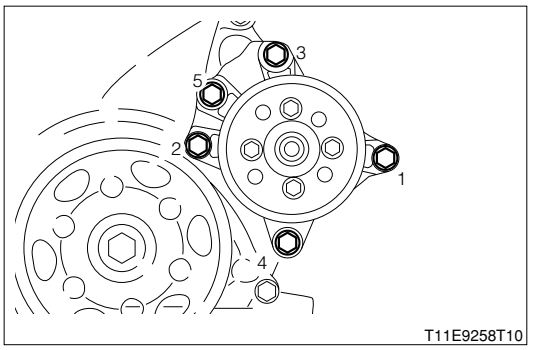


6.Installation of water pump Ay.

(1) Assemble the new water pump gasket to the timing chain cover Ay. Then, install the water pump Ay.

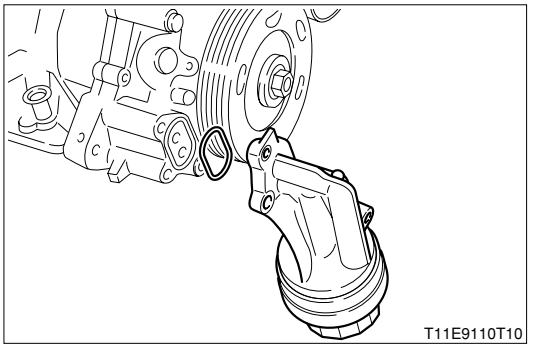


(2) Tighten the bolts in the sequence shown at the right figure.

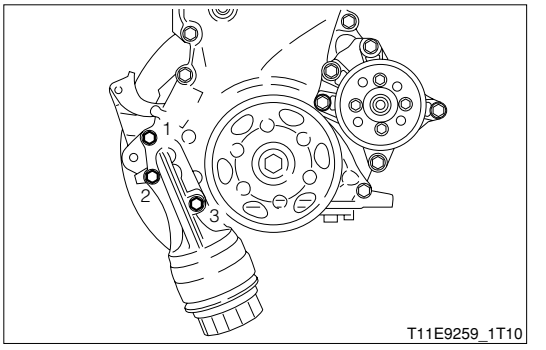


7.Installation of oil filter bracket.

(1) Install the oil filter gasket to the timing chain cover Ay and install the oil filter bracket.



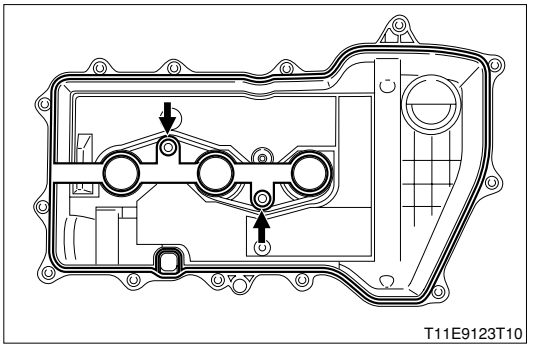
(2) Tighten the bolts in the sequence shown at the right figure.



8.Installation of cylinder head cover.

(1) Insert the cylinder head cover gasket to the gasket groove and central boss of the coil Ay with ignitor.

SPECIFIED VALUE: Insert the gasket completely until it contacts the end of the rib. (arrow marked)

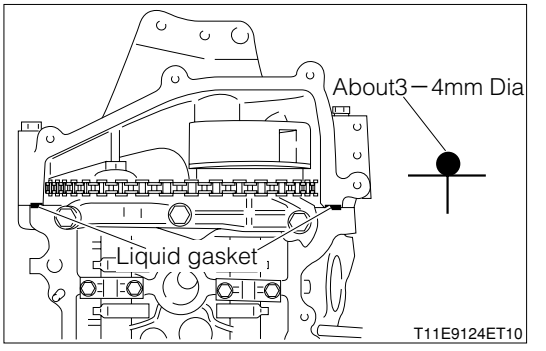


(2) Apply liquid gasket to the mating surface between the cylinder head Ay and timing chain cover.

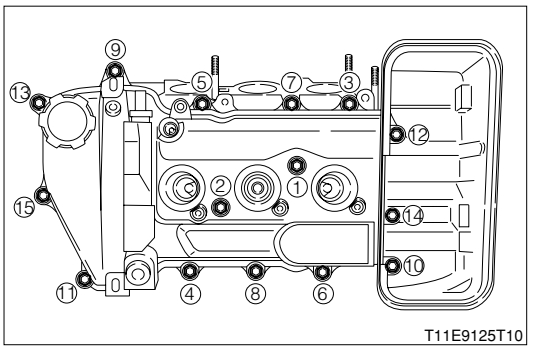
ADHESIVE: Three Bond1207B

CAUTION

- Assembling should be started within three minutes after application of the liquid gasket and the cylinder head cover should be tightened within 15 minutes.



(3) Tighten the attaching bolts in the sequence shown at the right figure. After tightening all the bolts to the specified torque, ensure again that the bolts ① and ② have been tightened to the specified torque.



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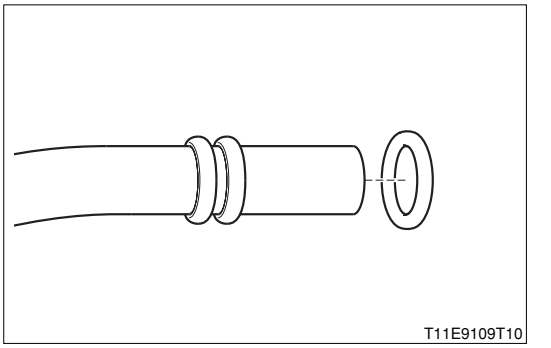
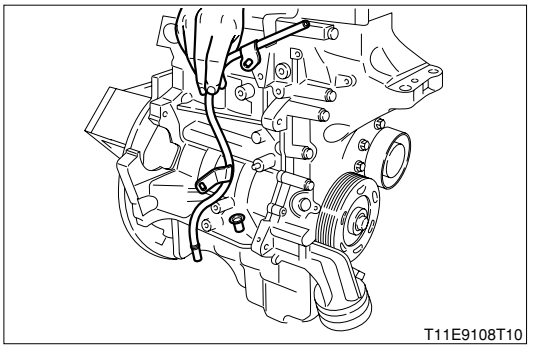
9.Install the O-ring to the oil level gage guide S/A.

(1) Apply engine oil to the O-ring, and install it to the guide S/A.

LUBRICANT: Engine oil


T11E9109T10

10.Install the oil level gauge guide S/A and insert the oil level gauge S/A.

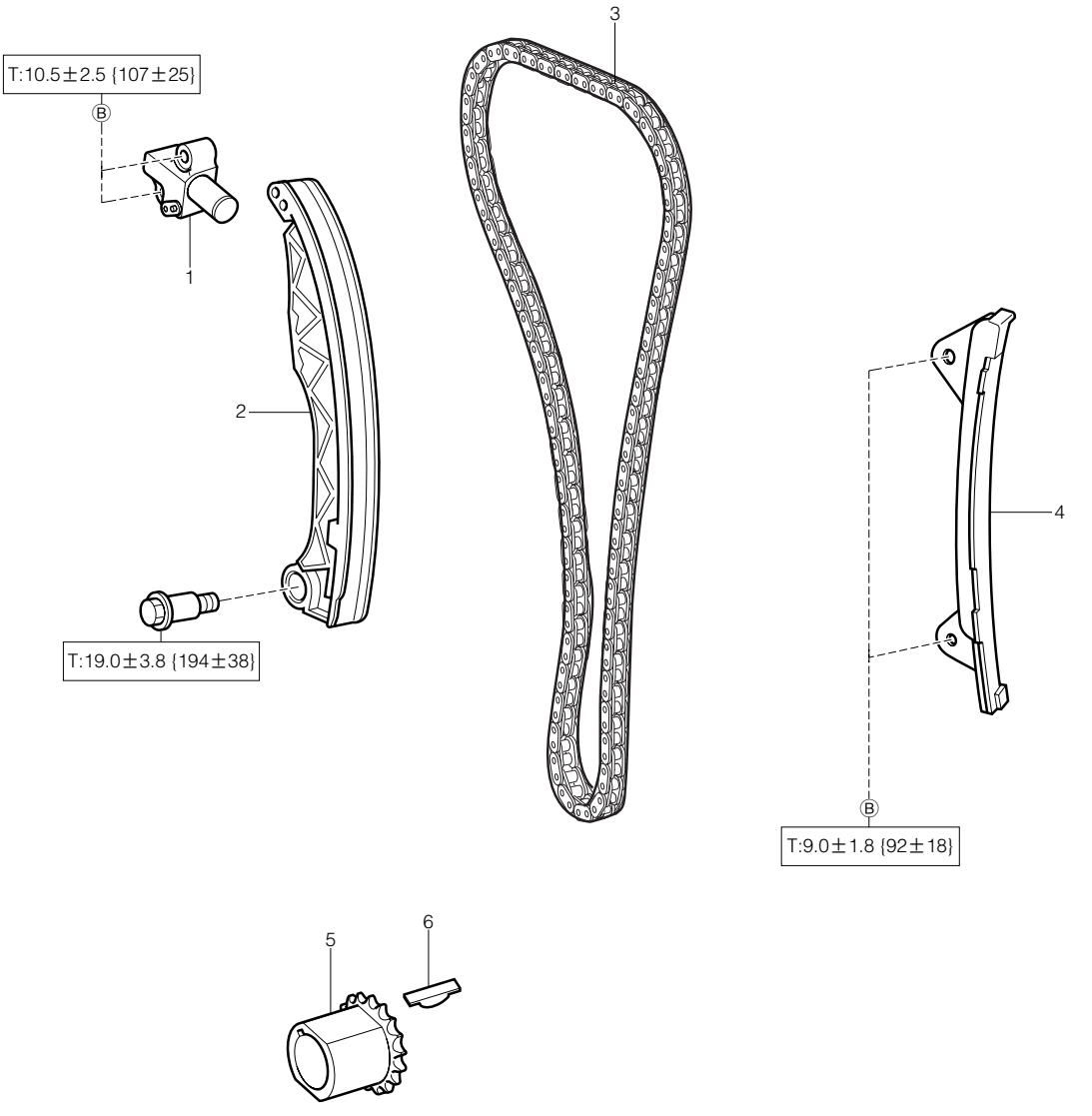

T11E9108T10

3 TIMING CHAIN

3-1 DISASSEMBLING AND ASSEMBLING

3-1-1 DISASSEMBLING AND ASSEMBLING

(1) Components



Unit: N·m{kgf·cm}

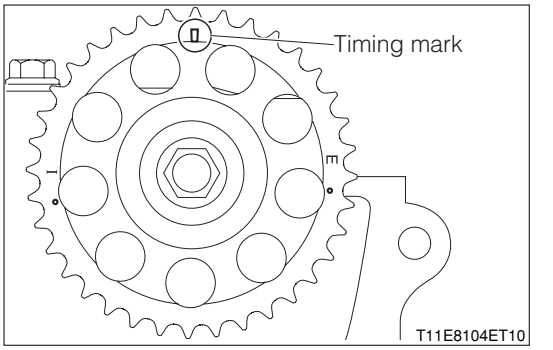
(2) Disassembling and assembling procedure

1 Tensioner Ay, chain
2 Arm, timing chain tension
3 Chain, timing
4 Guide, timing chain
5 Sprocket, crankshaft timing
6 Key, woodruff

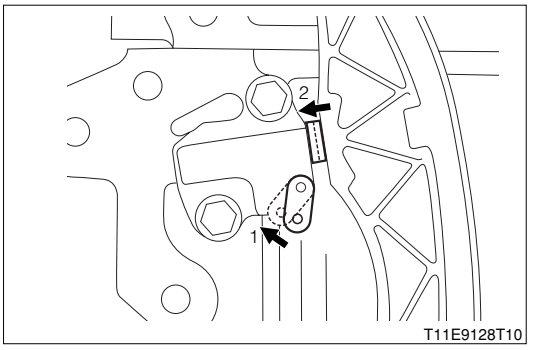
3-1-2 POINTS OF DISASSEMBLY

1.Remove the timing chain.

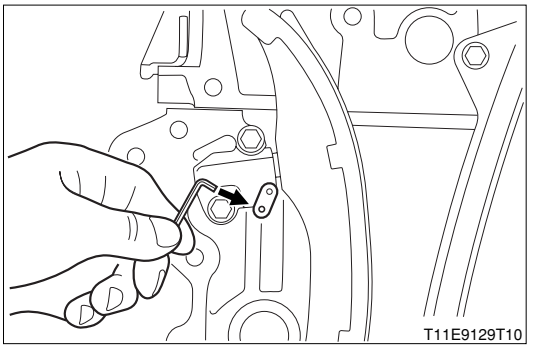
2.Ensure that the timing mark of the camshaft timing sprocket is at the top position.
If the timing mark is not at the top position, turn the pulley one turn so that the timing mark comes at the top. (Set to the top dead center under compression stroke of No.1 cylinder.)



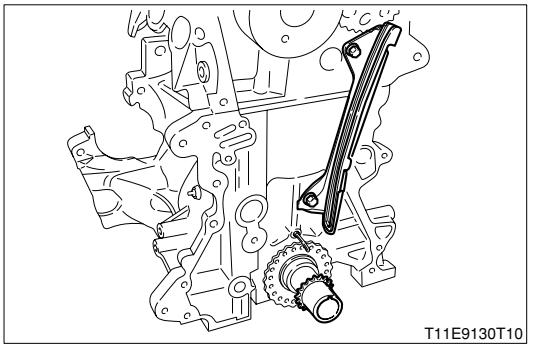
(1) Move the stopper plate of the chain tensioner Ay clockwise. Under the unlocked state, push the plunger as far as it will go.



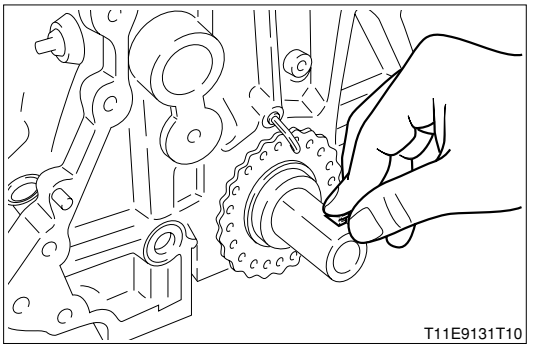
(2) With the plunger pushed in, lock the plunger in this pushed-in state by inserting an Allen wrench or the like into the hole of the stopper plate.
TOOL: Hexagonal rod wrench(Width across flats:2.5mm)
(3) Remove the timing chain tensioner Ay by removing the bolts.
(4) Remove the timing chain tensioner arm and timing chain by removing the bolts.



3.Remove the timing chain guide and crankshaft timing sprocket.



4.Remove the woodruff key.


T11E9131T10

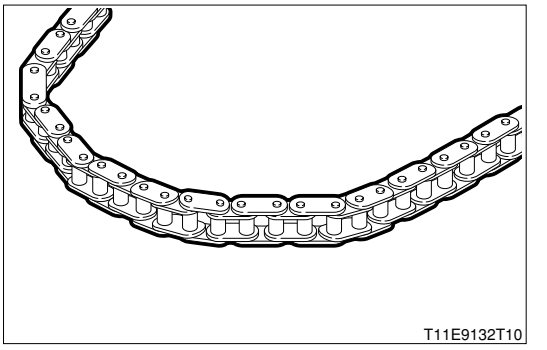
3-1-3 CHECK

(1) Check of chain, timing

1.Visually check the timing chain for wear, cracks, etc.

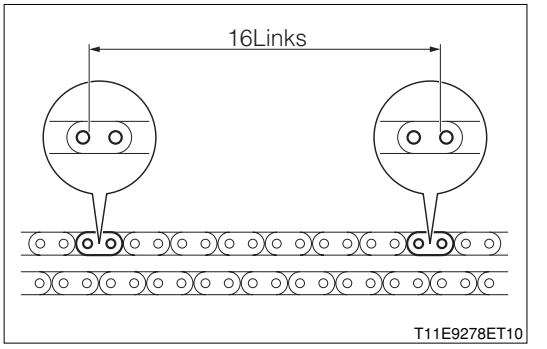
CAUTION

- If the timing chain exhibits any abnormality, check the sprocket side, too.


T11E9132T10

2.Using vernier calipers or the like, measure the inner pitch of the chain at any three points. Calculate the average value.

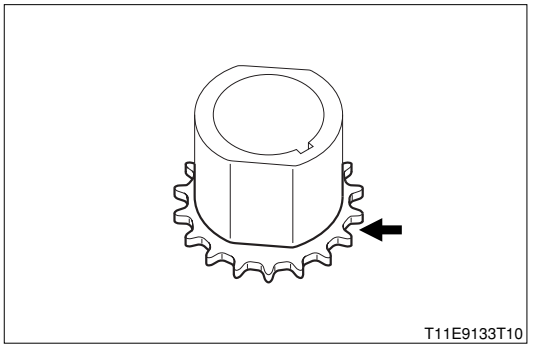
SPECIFIED VALUE: 128mm (16Links)



T11E9278ET10

(2) Check of sprocket, crankshaft timing

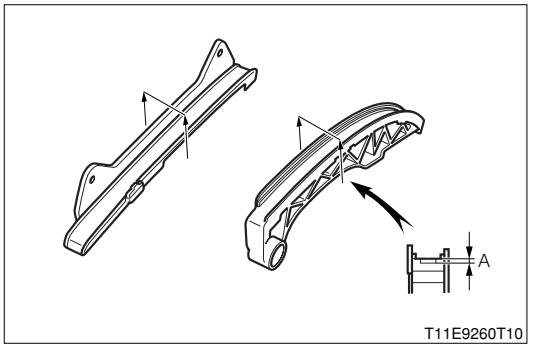
1.Check to see if the crankshaft timing sprocket is damaged.


T11E9133T10

(3) Check of guide, timing chain / Check of arm, timing chain tension

1.Check the timing chain guide and the section (A) of the timing chain tension arm for wear condition.

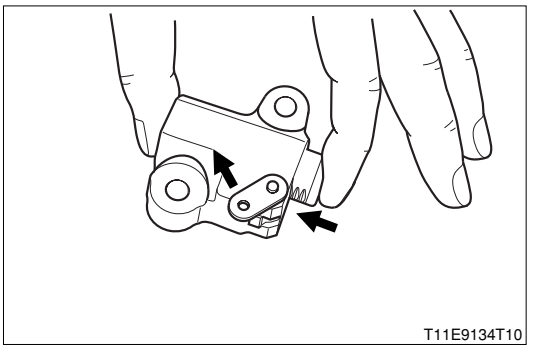
ALLOWABLE LIMIT: 0.5mm



T11E9260T10

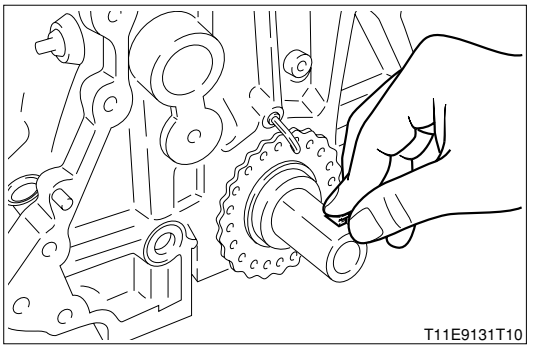
(4) Check of tensioner Ay, timing chain

1.With the stopper plate of the timing chain tensioner Ay held clockwise by your finger, ensure that the plunger operates smoothly.
2.With your finger released from the stopper plate, push the plunger while the stopper plate is locked. Ensure that the plunger will not operate.

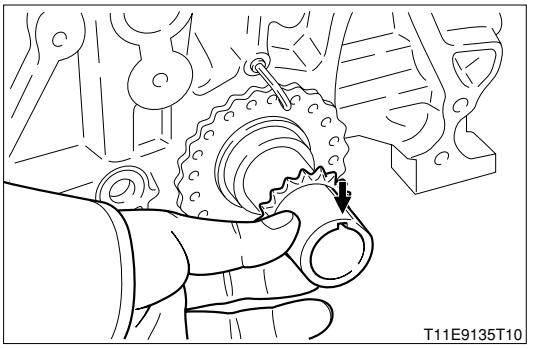


3-1-4 POINTS OF ASSEMBLY

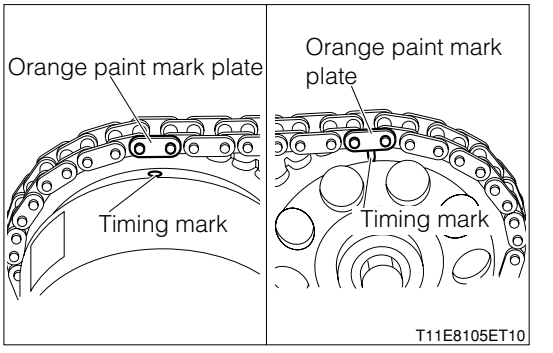
1.Install the woodruff key into the groove of the crankshaft.



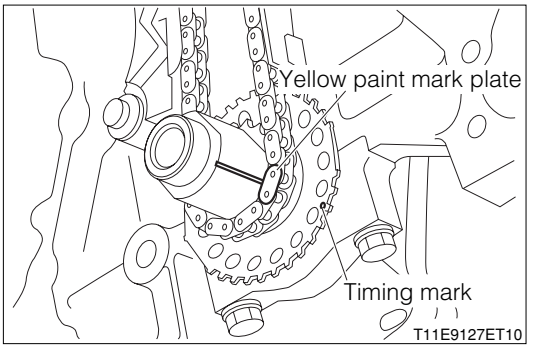
2.Install the crankshaft timing sprocket while aligning its groove with the crankshaft woodruff key.
3.Install the timing chain guide.



4.During the installation, align the two orange mark plates of the chain with the timing marks of the camshaft timing sprocket as shown in the figure.

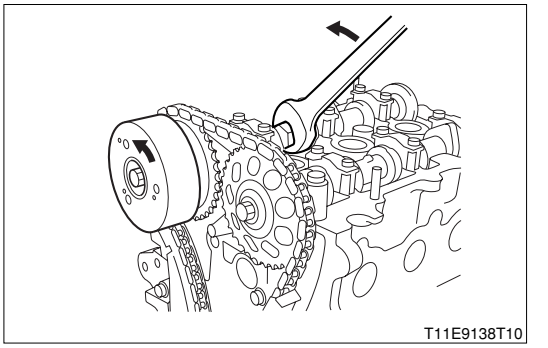


5.During the installation, align the yellow mark plate of the chain with the timing mark of the crankshaft timing sprocket as shown in the figure.
6.Install the timing chain tension arm.

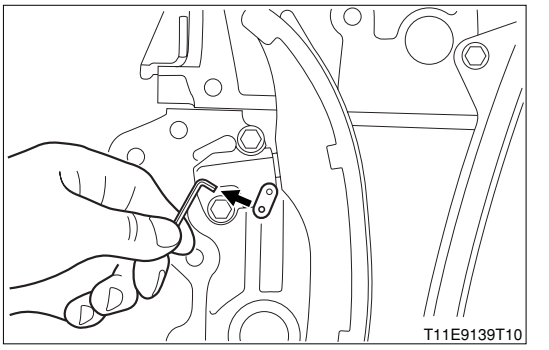


7.Install the chain tensioner Ay.

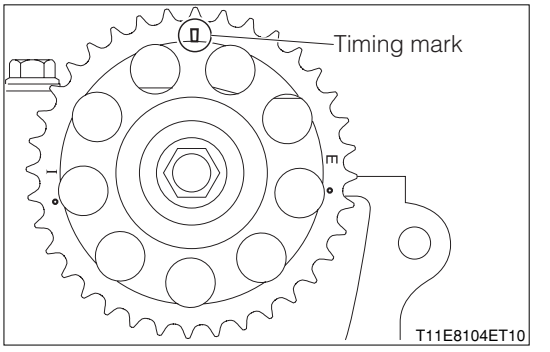
(1) Slightly turn the hexagonal section for servicing of the camshaft (IN side) counterclockwise (reverse rotation) so as to give a slack to the chain at the tensioner side. Under this state, install the tensioner.



(2) Pull out the Allen wrench of the tensioner and turn the crankshaft two turns to move the chain tensioner Ay.



(3) With the timing chain tensed, ensure that the timing mark of the camshaft timing sprocket is at the top position. (The cylinder No.1 is set to the top dead center under the compression stroke.)

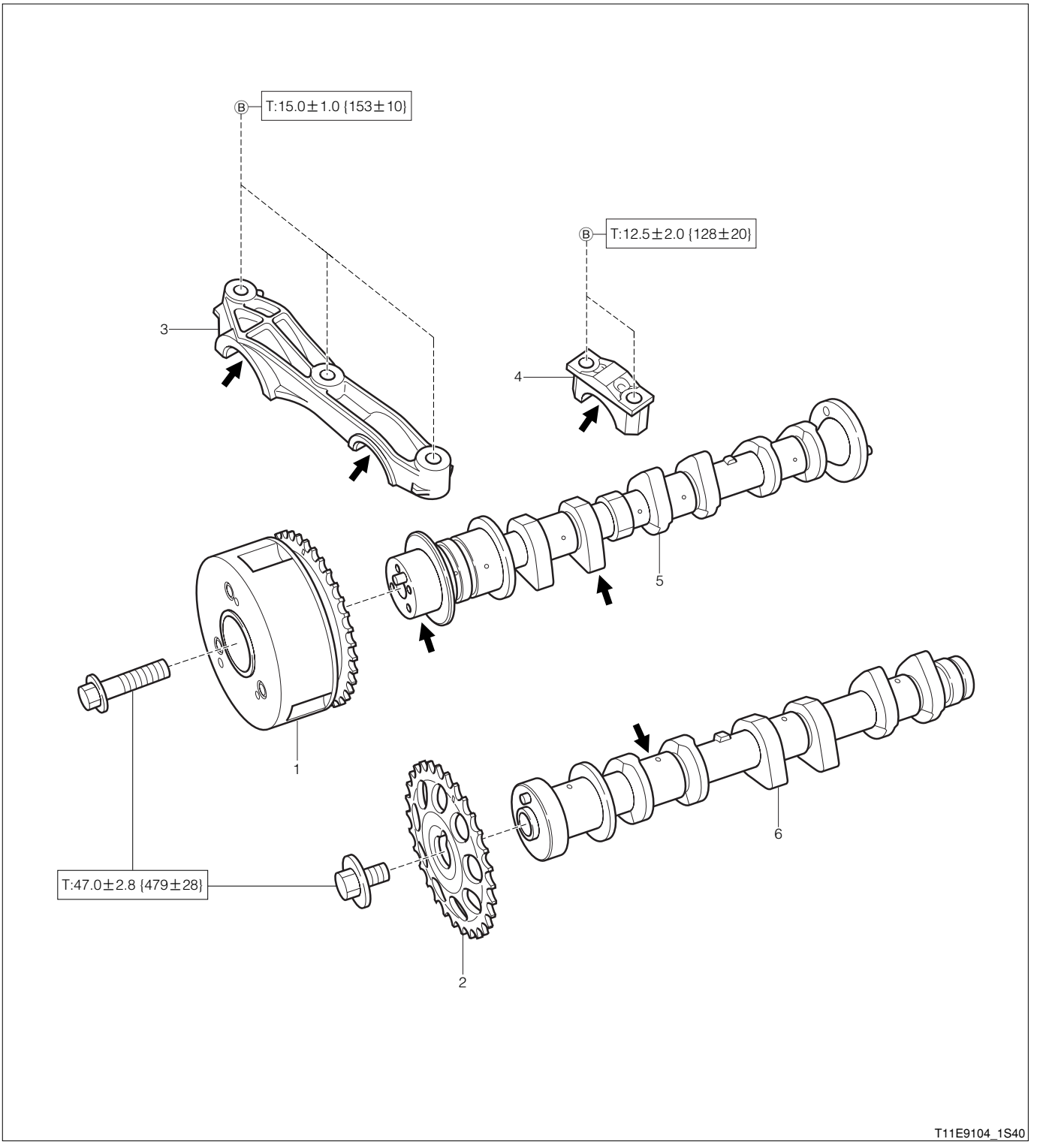


4 CAMSHAFT ASSEMBLY

4-1 DISASSEMBLING AND ASSEMBLING

4-1-1 DISASSEMBLING AND ASSEMBLING

(1) Components



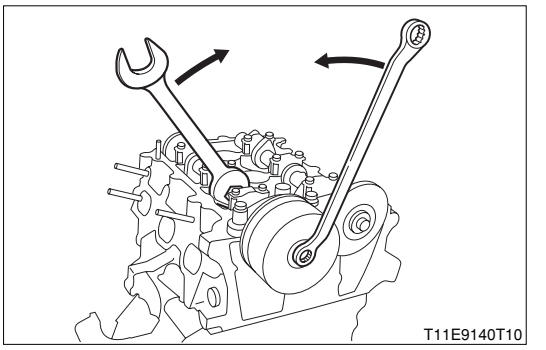
➡: Engin oil
Unit: N·m{kgf·cm}

(2) Disassembling and assembling procedure

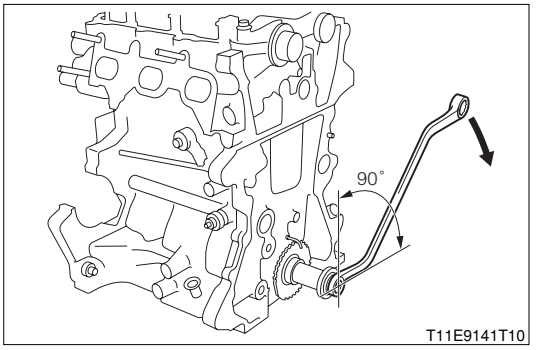
1 Sprocket Ay, camshaft timing(DVVT Controller)
2 Sprocket, camshaft timing No.2
3 Cap, camshaft bearing, No.1
4 Cap, camshaft bearing, No.2
5 Camshaft S/A, No.1(Intake side)
6 Camshaft S/A, No.2(Exhaust side)

4-1-2 POINTS OF DISASSEMBLY

1.With the hexagonal section for servicing of the camshaft Ay locked by means of a spanner or the like, loosen the attaching bolts of the camshaft timing sprocket Ay (DVVT controller) and camshaft timing No.2 sprocket. Remove each sprocket.

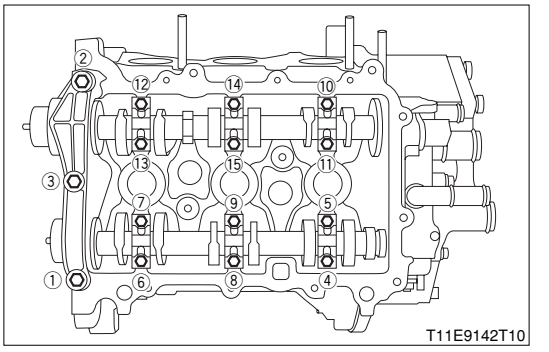

T11E9140T10

2.Temporarily install the attaching bolt of the crankshaft pulley. Turn the crankshaft 90 degrees (crank angle) in the engine rotation direction from the top dead center under the compression stroke of the cylinder No.1 so that the lifted valve will not interfere with the piston during the removal of the camshaft Ay.



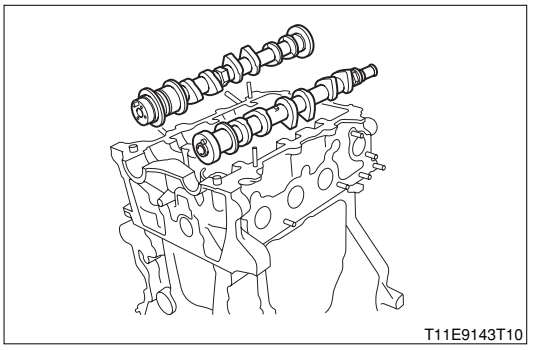
T11E9141T10

3.Remove the camshaft bearing No.1 and No.2 caps by removing the bolts in the sequence shown at the right figure.



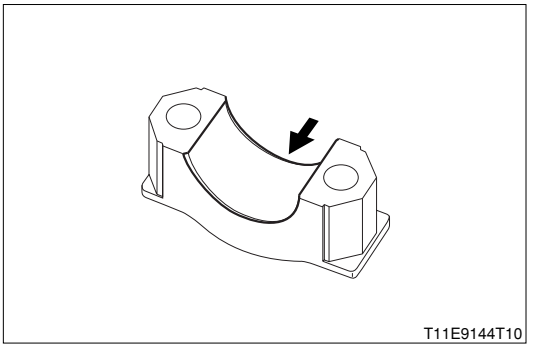
T11E9142T10

4.Remove the No.1/No.2 camshaft S/A.


T11E9143T10

4-1-3 CLEANING

1.Clean the installation surface of the camshaft bearing No.1/No.2 caps.


T11E9144T10

4-1-4 CHECK

(1) Check of camshaft

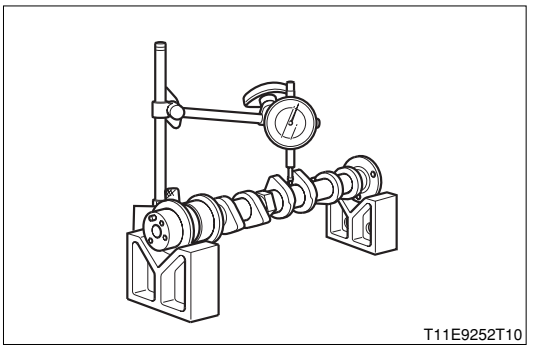
1.Check the camshaft for bending.

(1) Measure the No.3 journal section for bending, using a V-block and a dial gauge.

ALLOWABLE LIMIT: 0.03mm

NOTE

- The bend is a half of the gauge reading (runout) when the camshaft is turned one turn.

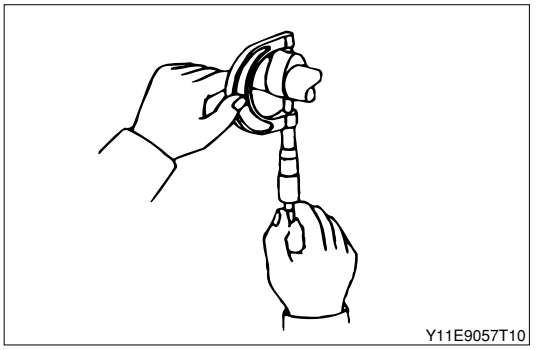

T11E9252T10

2.Check the height of the cam.

(1) Measure the cam height with a micrometer.

Camshaft specifications

Specified value (mm)	IN	41.54−41.64
	EX	40.97−41.07
Limit value (mm)	IN	41.44
	EX	40.87


Y11E9057T10

3.Check the thrust clearance of the camshaft.

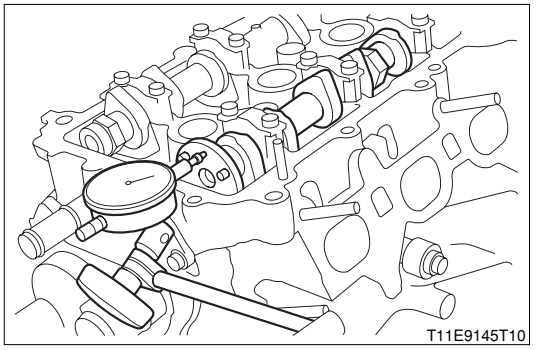
(1) Using a dial gauge, measure the thrust clearance.

SPECIFIED VALUE: 0.100−0.225mm for both IN and EX

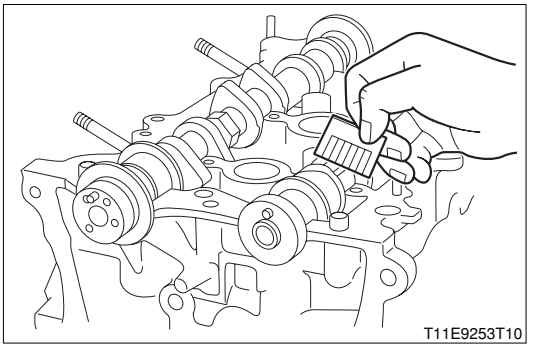
ALLOWABLE LIMIT: 0.24mm

Camshaft bearing cap/camshaft journal specifications

Detected item		No.1 CAMCAP	CAMSHAFT JOURNAL(J1)
Specified value (mm)	IN	(Side width) 33.175−33.200	(Thrust surface width) 33.3−33.4
	EX	(Side width) 23.175−23.200	(Thrust surface width) 23.3−23.4


T11E9145T10

4.Check the oil clearance of the camshaft.
(1) Set a plastigage in the axial direction of the journal section. Confirm the front mark of the camshaft bearing No.1/No.2 cap and journal number. Tighten the bolt to the specified torque.
(2) Remove the camshaft bearing cap. Measure the widest part of the plastigage.


T11E9253T10

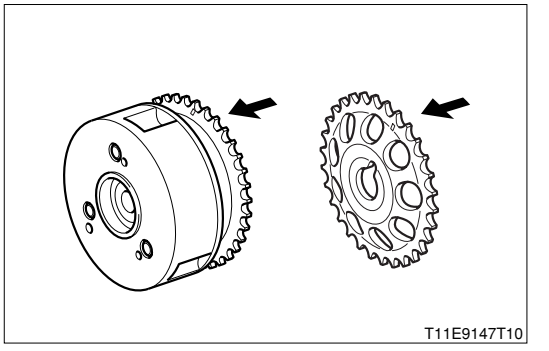
SPECIFIED VALUE: Camshaft oil clearances

Detected item			Specified value
Camshaft Journal diameter	IN	1J	33.984−34.000
		2−4J	22.949−22.965
	EX	1J	25.979−25.995
		2−4J	22.949−22.965
Cylinder head Journal inner diameter	IN	1J	34.025−34.045
		2−4J	23.000−23.021
	EX	1J	26.032−26.052
		2−4J	23.000−23.021
Camshaft oil clearances	IN	1J	0.025−0.061
		2−4J	0.035−0.072
	EX	1J	0.037−0.073
		2−4J	0.035−0.072

ALLOWABLE LIMIT: Camshaft oil clearances

Detected item			Limit value
Camshaft oil clearances	IN	1J	0.09
		2−4J	0.1
	EX	1J	0.1
		2−4J	0.1

5.Check the camshaft timing sprocket Ay and camshaft timing No.2 sprocket for wear and damage.

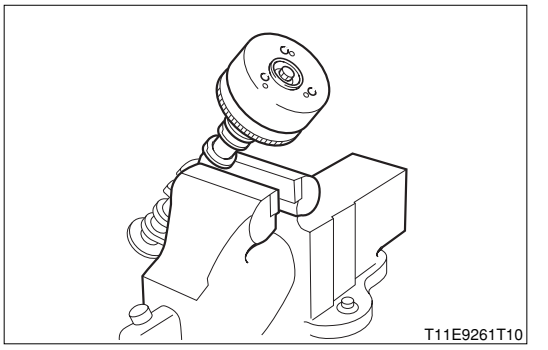

T11E9147T10

(2) Check of sprocket Ay, camshaft timing

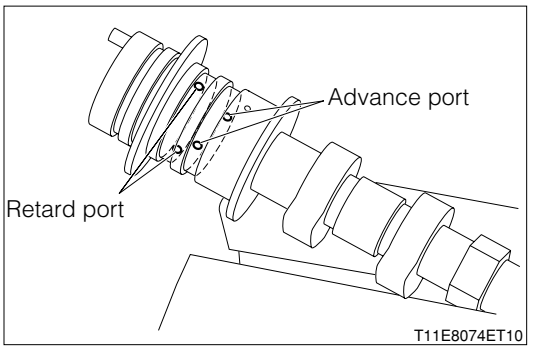
WARNING

- Do not disassemble the camshaft timing (DVVT controller) sprocket Ay.

1.Secure the hexagonal section provided for servicing the camshaft to a vice.
2.Temporarily install the camshaft timing sprocket Ay by means of the attaching bolt.


T11E9261T10

3.Hold one of the two advanced timing side ports at the camshaft with your finger.



4.Apply air pressure to the other advanced timing port by means of an air tool.

CAUTION

- Care must be exercised as to splashing oil.

NOTE

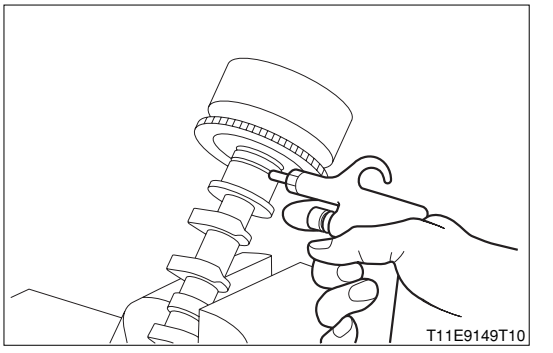
- The most retard timing lock is disengaged.

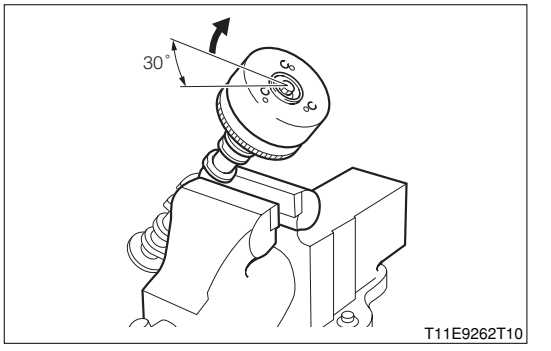
5.At this time, ensure that the most retard timing angle lock of the camshaft timing sprocket Ay is disengaged and the sprocket can be freely moved by your hand without any binding in the range of about 30 degrees.

NOTE

- The camshaft timing sprocket Ay is locked when it comes at the most retard angle position.

6.After the inspection, lock the camshaft timing sprocket Ay at the most retard timing position. Remove the sprocket.

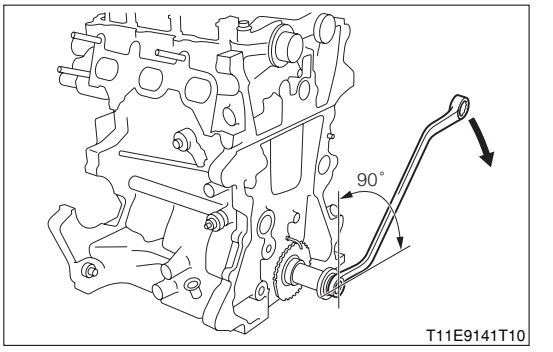




4-1-5 POINTS OF ASSEMBLY

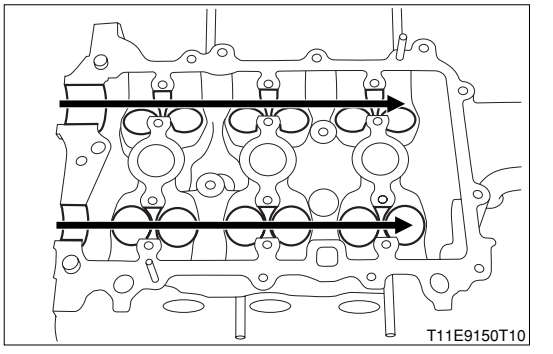
1.Install the No.1/No.2 camshaft.

(1) Turn the crankshaft about 90 degrees (crank angle) in the engine rotation direction from the top dead center of the cylinder No.1 so that the lifted valve will not interfere with the piston during the installation of the camshaft.

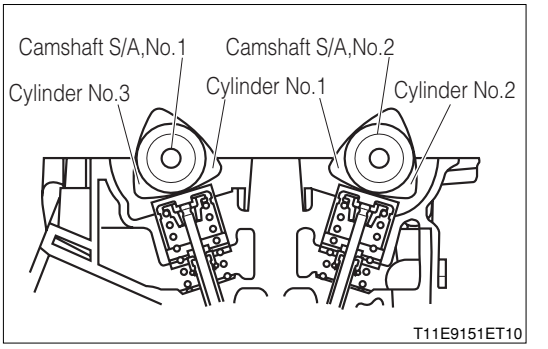


(2) Apply engine oil to where the cam sections of the No.1 and No.2 camshafts contact with the journal sections.

LUBRICANT: Engine oil



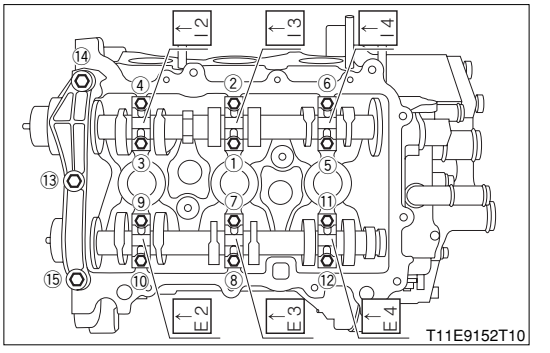
(3) Set the No.1 camshaft Ay so that the cam noses of the No.1 and No.3 cylinders may hold the valve lifters. Also, set the No.2 camshaft Ay (exhaust side) so that the cam noses of the No.1 and No.2 cylinders may hold the valve lifters.



(4) Set the camshaft bearing No.1/No.2 caps, respectively. Tighten the attaching bolts in the sequence shown at the right figure.

CAUTION

- During the installation, make sure that the front marks (arrow marks) indicated on the top of each bearing cap face the engine front side.
- As for the installation positions of the stamped number's indicated on the top of the bearing caps, refer to the table below.



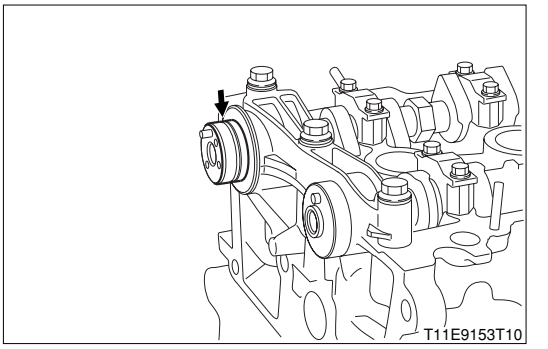
Installation positions of bearing cap No.2

Stamping No.	Installation position	
	Intake/exhaust	Cylinder No.
I2	Intake side	Cylinder No.1
I3		Cylinder No.2
I4		Cylinder No.3
E2	Exhaust side	Cylinder No.1
E3		Cylinder No.2
E4		Cylinder No.3

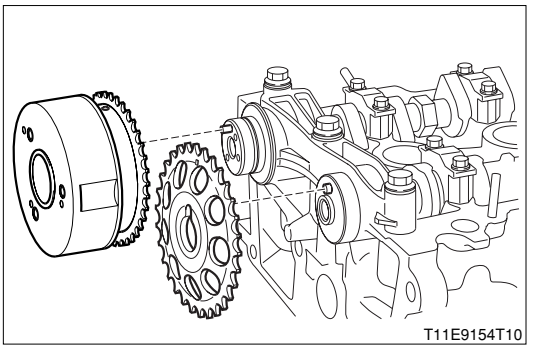
2.Assemble the camshaft timing sprocket Ay (DVVT controller) and camshaft timing No.2 sprocket.

(1) Apply engine oil to around the installation position of the camshaft timing sprocket Ay of the camshaft.

LUBRICANT: Engine oil



(2) Insert the knock pin at the forward end of the camshaft into the knock hole of the camshaft timing sprocket Ay.

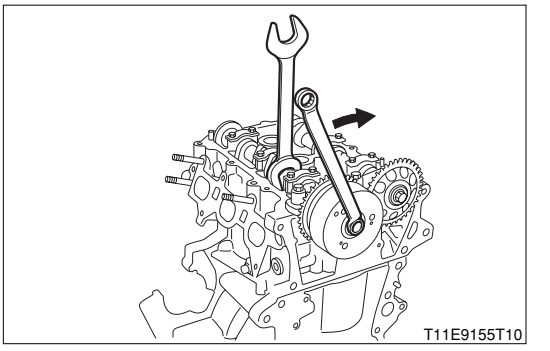

T11E9154T10

CAUTION

- After the insertion, lightly turn the sprocket to ensure that the knock pin has been completely inserted.
- If the knock pin is not inserted in position and the sprocket is strongly pushed and turned, the sprocket end surface may be damaged. Therefore, utmost care must be exercised in this regard.

(3) Assemble in such a way that the knock pin at the forward end of the camshaft may enter the groove of the camshaft timing No.2 sprocket.

(4) By utilizing the hexagonal section provided for servicing of the camshaft, tighten the attaching bolt for the camshaft timing sprocket Ay and camshaft timing No.2 sprocket.

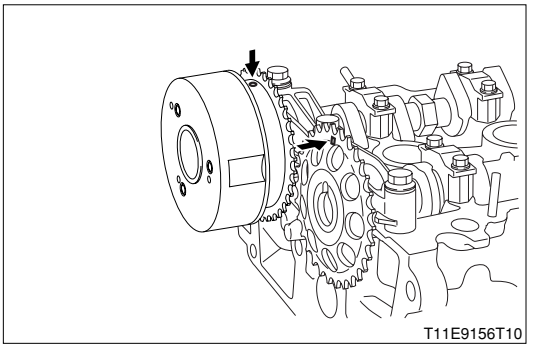

T11E9155T10

3.Check the valve clearances.

Specified value

	Valve clearance (mm)	
IN	During cold period	$0.18^{+0.055}_{-0.035}$
EX		$0.31^{+0.055}_{-0.035}$

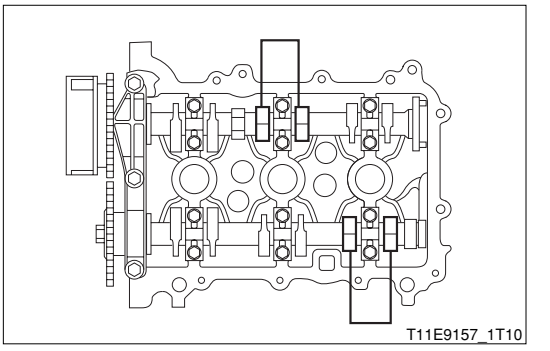
(1) By utilizing the hexagonal section provided for servicing of the camshaft, set the No.1 and No.2 camshafts in such a way that the mating marks of the sprockets face exactly upward.


T11E9156T10

(2) Using a thickness gauge, check the valve clearances shown in the right figure.

Valves to be checked when cylinder No.1 is at the top dead center under exhaust stroke

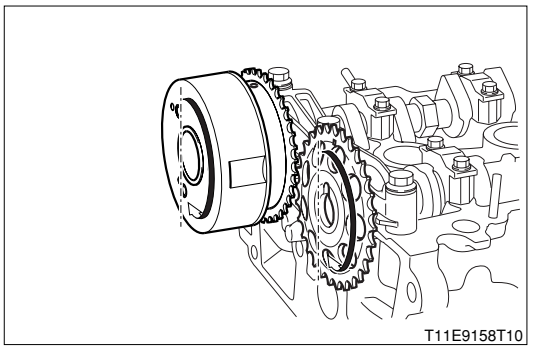
Cylinder No.1		Cylinder No.2		Cylinder No.3	
IN	EX	IN	EX	IN	EX
–	–	○	–	–	○


T11E9157_1T10

CAUTION

- The thickness gauge should be inserted from the spark plug side. (central side)

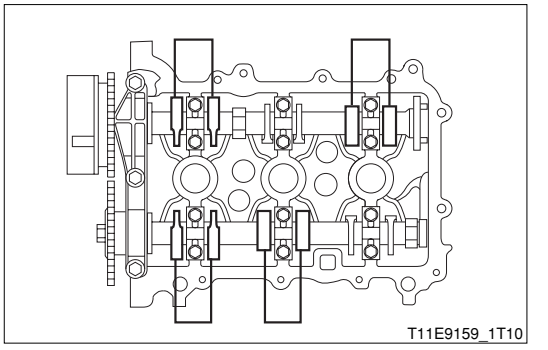
(3) By utilizing the hexagonal section provided for servicing the camshaft, turn the camshaft 180 degrees. Set the No.1 and No.2 camshafts in such a way that the mating mark of the timing sprocket may face exactly downward.


T11E9158T10

(4) Using a thickness gauge, check the valve clearances shown in the right figure.

Valves to be checked when cylinder No.1 is at the top dead center under compression stroke

Cylinder No.1		Cylinder No.2		Cylinder No.3	
IN	EX	IN	EX	IN	EX
○	○	–	○	○	–


T11E9159_1T10

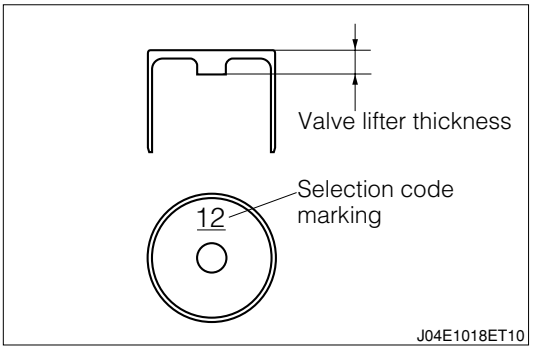
CAUTION

- The thickness gauge should be inserted from the spark plug side. (central side)

4.If the specified value is not obtained, remove the No.1 and No.2 camshafts. Replace the valve lifter as follows, in order to obtain the specified value.

CAUTION

- Record the position of the valve where the clearance deviates from the specification, as well as the their measurement results.



J04E1018ET10

(1) Select the valve lifter, using the following formula given below, so that the valve clearance becomes the specified value.

· Intake side

(Thickness of selected lifter) = (Thickness of removed lifter) + [(Measurement clearance) − 0.18mm]

·Exhaust side

(Thickness of selected lifter) = (Thickness of removed lifter) + [(Measurement clearance) − 0.31mm]

NOTE

- As for a new valve lifter, identification numbers have been written with indelible ink.

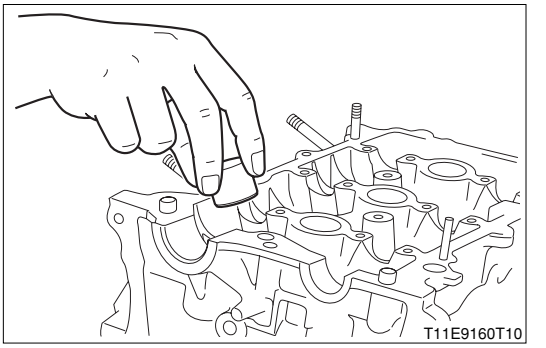
List of valve lifter

No.	Lifter thickness (mm)	No.	Lifter thickness (mm)	No.	Lifter thickness (mm)	No.	Lifter thickness (mm)
12	5.12	28	5.28	44	5.44	60	5.6
14	5.14	30	5.3	46	5.46	62	5.62
16	5.16	32	5.32	48	5.48	64	5.64
18	5.18	34	5.34	50	5.5	66	5.66
20	5.2	36	5.36	52	5.52	68	5.68
22	5.22	38	5.38	54	5.54	–	–
24	5.24	40	5.4	56	5.56	–	–
26	5.26	42	5.42	58	5.58	–	–

5.Apply engine oil to the circumference of the selected valve lifter. Insert the valve lifter straight into the lifter hole.
LUBRICANT: Engine oil

CAUTION

- After insertion, ensure that the valve lifter turns smoothly.

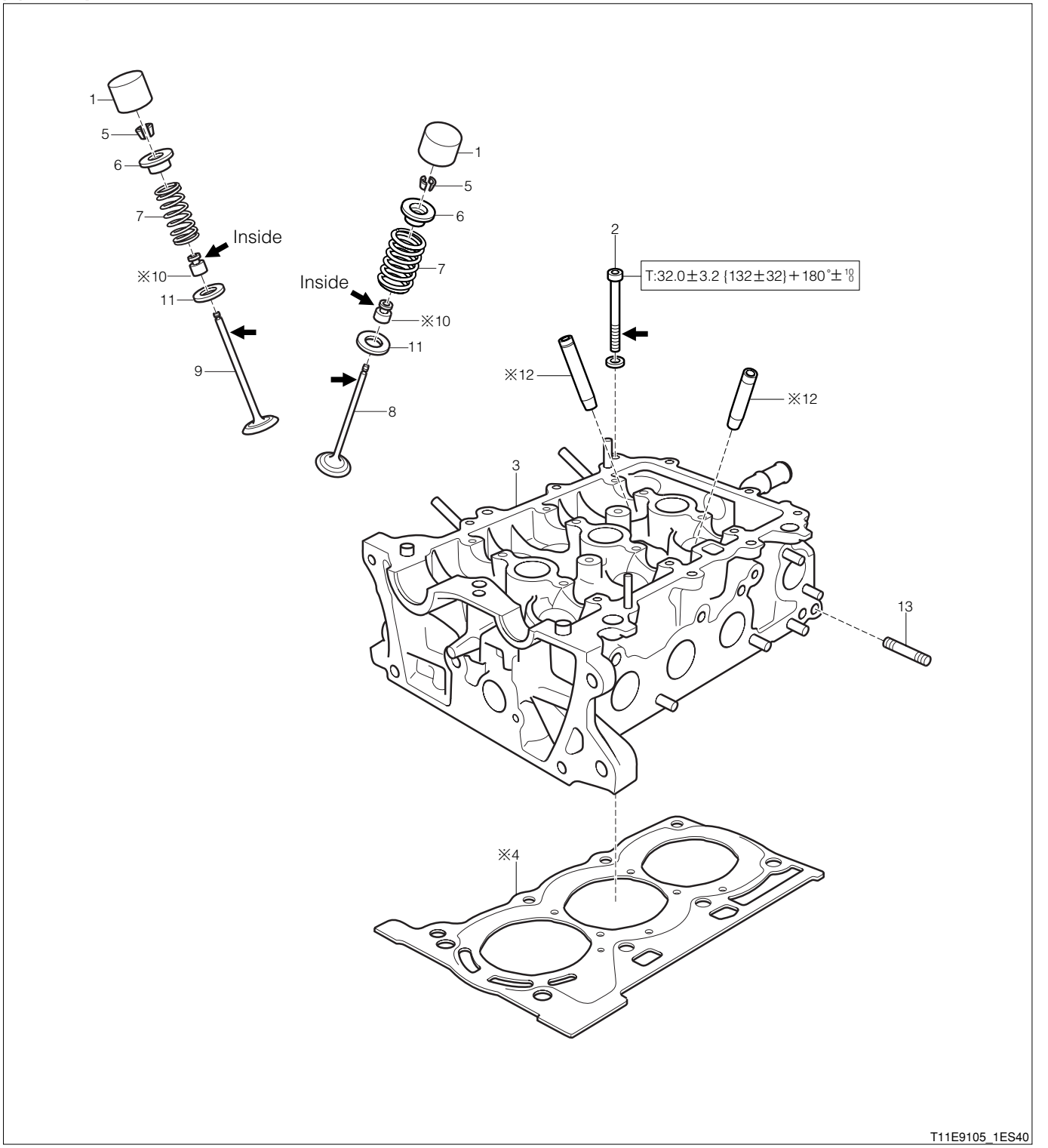


5 CYLINDER HEAD AY

5-1 DISASSEMBLING AND ASSEMBLING

5-1-1 DISASSEMBLING AND ASSEMBLING

(1) Components



➡: Engin oil
Unit: N·m{kgf·cm}
※: Non-reusable parts

(2) Disassembling and assembling procedure

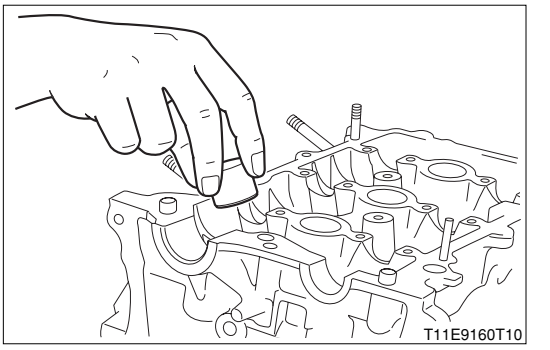
1 Lifter, valve
2 Bolt, cylinder head
3 Head Ay, cylinder
4 Gasket, cylinder head
5 Lock, valve spring retainer
6 Retainer, valve spring
7 Spring, compression
8 Valve, exhaust
9 Valve, intake
10 Seal, valve stem oil
11 Seat, valve spring
12 Bush, valve guide
13 Bolt, stud

5-1-2 POINTS OF DISASSEMBLY

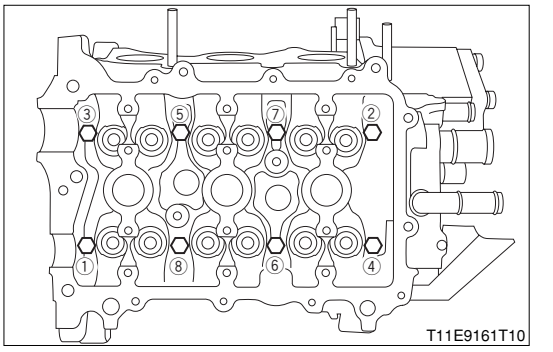
1.Remove the valve Lifter.

CAUTION

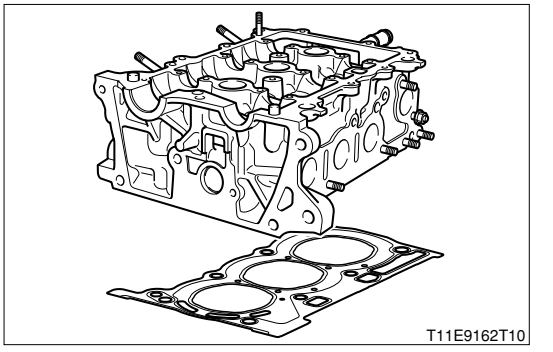
- When removing the valve lifters, record the stamped numbers of the valve lifters for each valve.
- Place the valve lifters in order by the cylinder.



2.Evenly loosen the cylinder head bolts in the sequence shown at the right figure over several stages and remove them.



3.Remove the cylinder head Ay and cylinder head gasket from the cylinder block Ay.

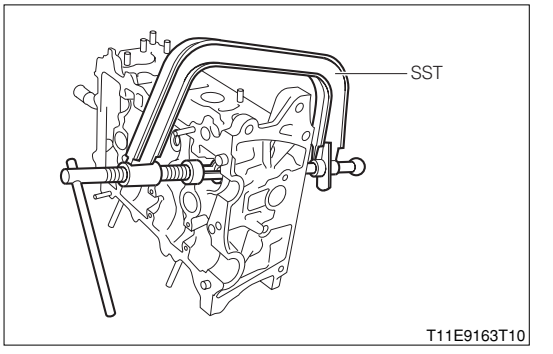


4.Using the SST, remove the valve spring retainer locks at the intake side and exhaust side. Then, remove the valve spring retainer and compression spring progressively.

SST: 09202-87002-000

CAUTION

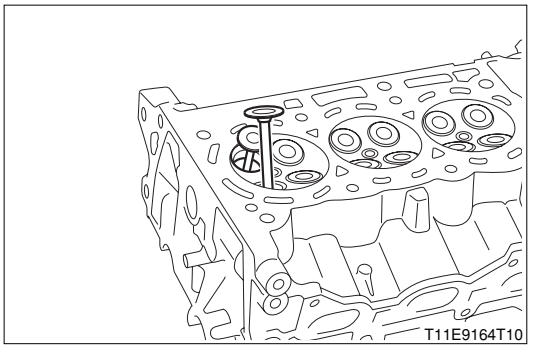
- Place each part in order by the cylinder.



5.Remove the intake valve and exhaust valve.

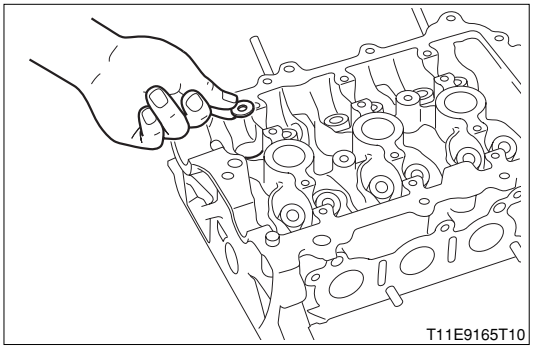
CAUTION

- Place each valve in order by the cylinder.



6.Remove the valve stem oil seal and valve spring seat.

7.Heat the cylinder head Ay in hot water or the like to 80−100℃.

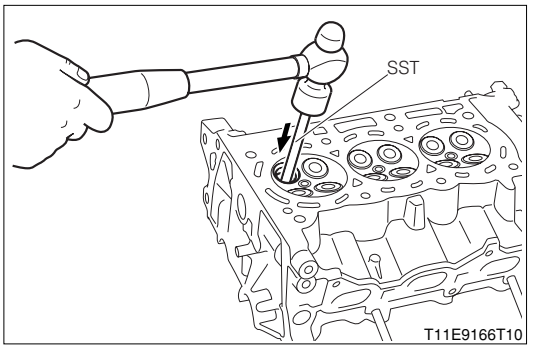


8.Using the SST, drive out the valve guide bush from the combustion chamber side.

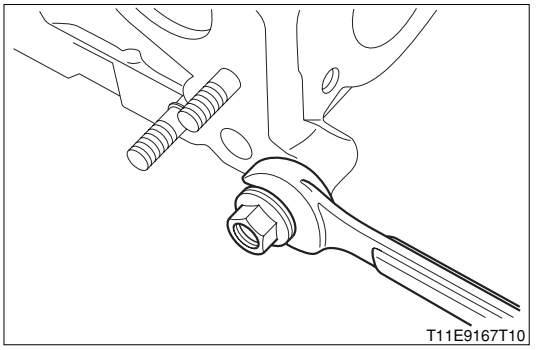
SST: 09201-87203-000

CAUTION

- The valve guide bush that has been once removed cannot be used again.



9.Put a double nut to the stud bolt and remove the bolt.



5-1-3 CLEANING

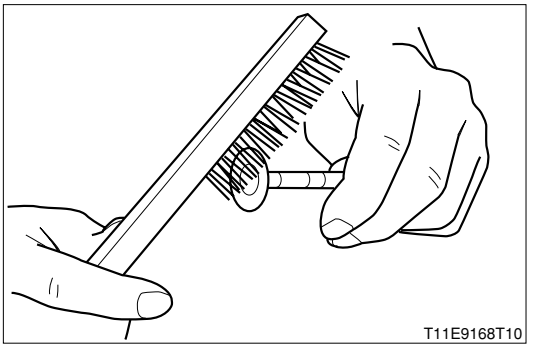
(1) Cleaning of valves

1.Remove carbon which gets to each valve.

TOOL: Wire brush

WARNING

- Wear safety goggles during the cleaning so as to protect your eyes.



(2) Cleaning of head, cylinder

1.Using a scraper, clean the cylinder block surface and manifold surface of the cylinder head.

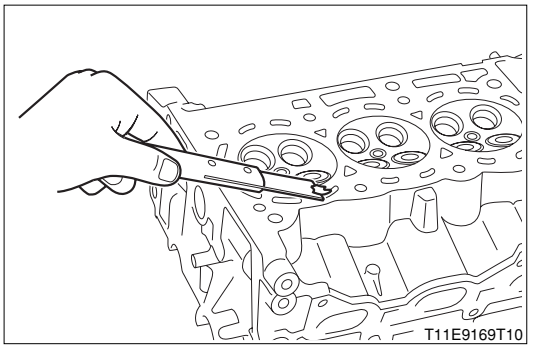
TOOL: Scraper

WARNING

- Wear safety goggles during the cleaning so as to protect your eyes.

CAUTION

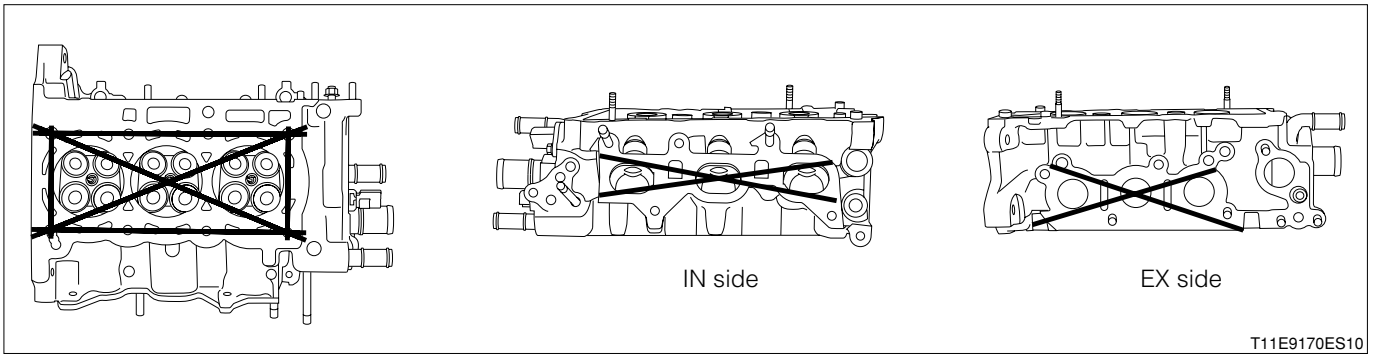
- Be very careful not to damage the cylinder head Ay during the cleaning.
- Be very careful not to allow the cylinder head gasket debris, etc. to fall into the water jacket.


T11E9169T10

5-1-4 CHECK

(1) Check of head, cylinder

1.Using a straightedge and thickness gauge, perform measurement at sections shown at the figure below.



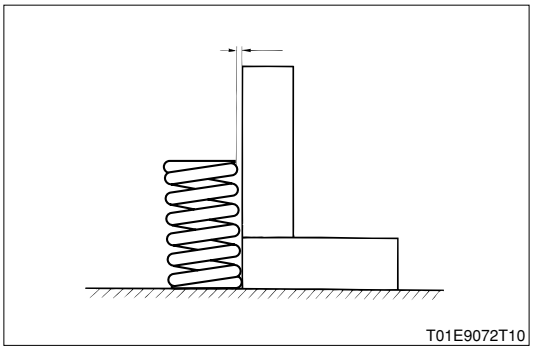
T11E9170ES10

ALLOWABLE LIMIT: 0.05mm

(2) Check of spring, compression

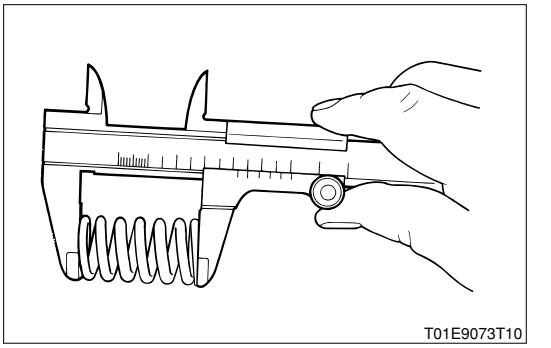
1.Using a straightedge, measure the squareness of the valve spring.

ALLOWABLE LIMIT: 1.5mm


T01E9072T10

2.Measure the free length of the spring.

ALLOWABLE LIMIT: 51.63mm


T01E9073T10

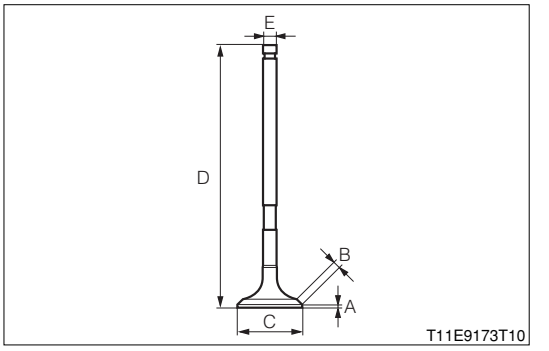
(3) Check of valve

① Unit check of valve

1.Check each valve for deformation and severe wear.

Unit check of valve

Detected item		Specified value	Limit value
Stock thickness of valve head section: A (mm)	IN	1.25±0.2	0.7
	EX	1.30±0.2	0.7
Contact width: B (mm)	IN	$1.30^{+0.4}_{-0.1}$	–
	EX	$1.26^{+0.35}_{-0.15}$	–



Valve specifications

Detected item	Valve, intake	Valve, exhaust
Valve head diameter: C (mm)	27.5±0.15	23.6±0.15
Overall length: D (mm)	88.39	89.11
Diameter of stem end section:E (mm)	4.2±0.3	4.2±0.3

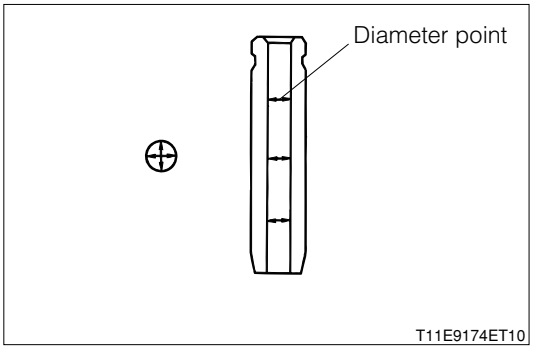
② Check of clearance between valve guide bush and valve stem

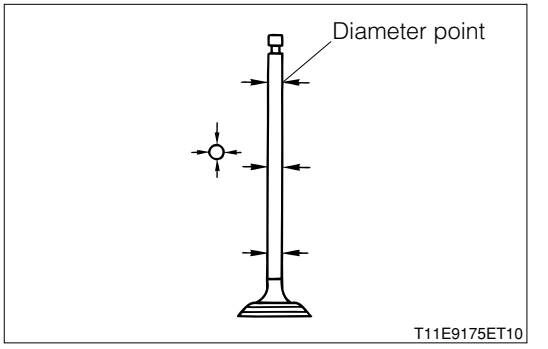
1.Using a caliper gauge, measure the inner diameter of the valve guide bush. Using a micrometer, measure the outer diameter of the valve stem.

CAUTION

- Perform the measurement at several sections. Calculate the clearance at the section where the wear is the greatest.

2.Calculate the difference between the measured values to obtain the clearance.





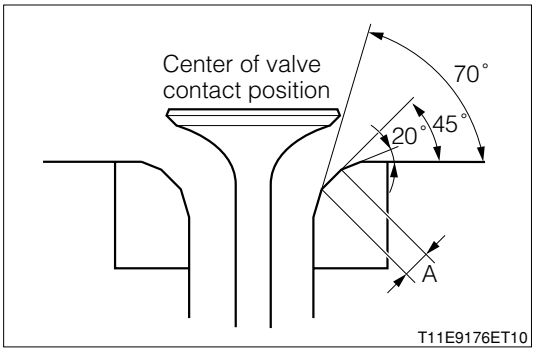
Check of clearance between valve guide bush and valve stem

Detected item		Specified value	Limit value
Valve guide bush inner diameter(mm)		5.01−5.03	–
Valve stem outer diameter (mm)	IN	4.970−4.985	–
	EX	4.965−4.980	–
Clearance (mm)	IN	0.025−0.060	0.08
	EX	0.030−0.065	0.1

③ Check of valve contact surface

1.Thinly apply read lead to the valve contact surface. Lightly bring the valve into contact with the valve seat without turning the valve. Check the contact and contact width.

Detected item		Specified value
Contact width: A (mm)	IN	$1.3^{+0.4}_{-0.1}$
	EX	$1.26^{+0.35}_{-0.15}$



(4) Correction of valve seat

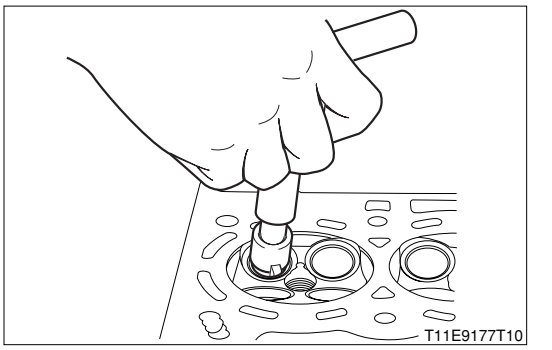
1.With a 45 degrees cutter, grind the seat so that the contact width can become greater than the specified value.

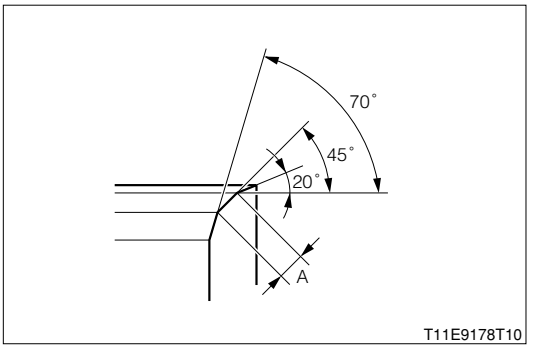
CAUTION

- Perform the seat correction, always checking the valve contact position.
- Reduce the grinding force gradually as reaching to the end of the grind so that no ridge may be formed at the corrected surface.

2.Check each valve for contact position. Perform grinding with a 45 degrees cutter so that the contact position may come to the center of the valve face.

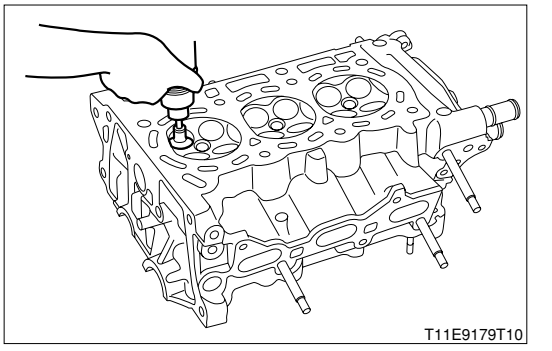
3.Perform grinding with a 20 degrees or 70 degrees cutter in such a way that the valve contact position comes at the center throughout the circumference and the contact width becomes the specified value.


T11E9177T10



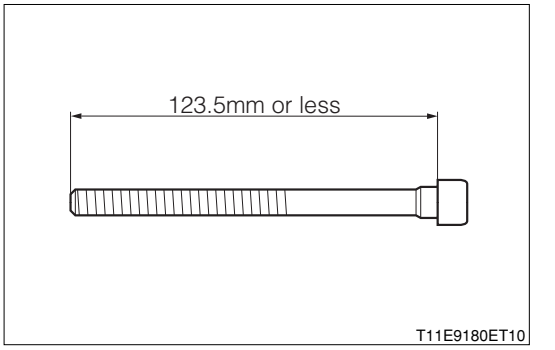
T11E9178T10

4.Rub the compound to the contact surface.


T11E9179T10

(5) Check of bolt, cylinder head

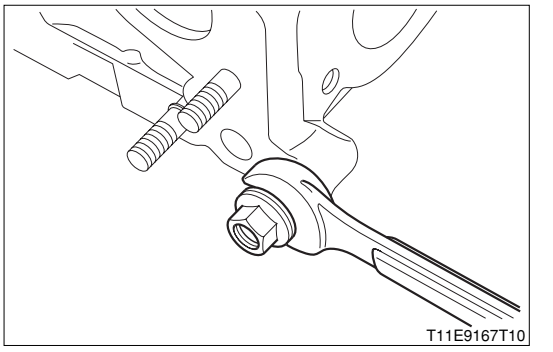
1.Measure the length of the cylinder head bolt.
ALLOWABLE LIMIT: Not to exceed 123.5mm



T11E9180ET10

5-1-5 POINTS OF ASSEMBLY

1.Install the double nut to the stud bolt.

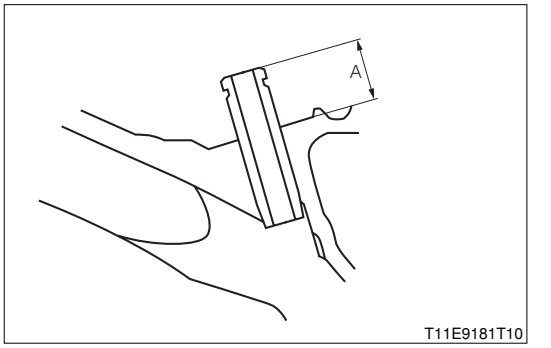

T11E9167T10

2.With the SST, drive the new valve guide bush until the protruding amount of it becomes the value indicated in the table.

SST: 09201-87203-000

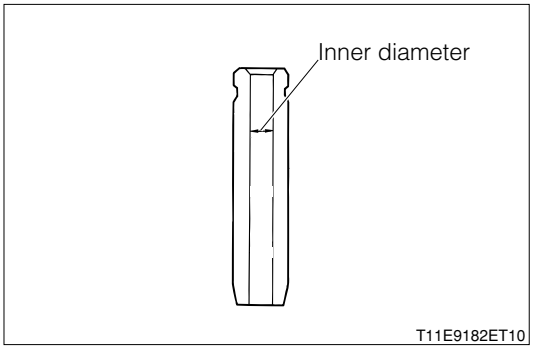
Driving valve guide bush into position

Bush-protruding amount from the driven-in surface (mm)	IN	10.1±0.3
	EX	9.7±0.3



3.Polish the inner diameter with a reamer to bring the clearance into the specified value.

SPECIFIED VALUE: IN : 0.025−0.06mm
EX : 0.03−0.065mm



4.Install the valve spring seat and valve stem oil seal.

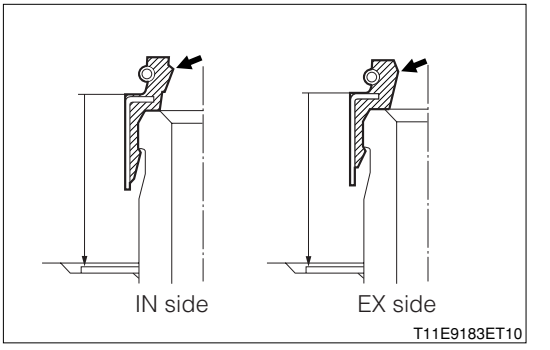
(1) Apply engine oil to the inside of the new valve stem oil seal. Install the valve stem oil seal by pushing its shoulder section.

NOTE

- After press-fitting, ensure that the valve stem oil seal has been press-fit to the specified dimension.

SPECIFIED VALUE: IN : 10.5±0.8mm
EX : 10.1±0.8mm

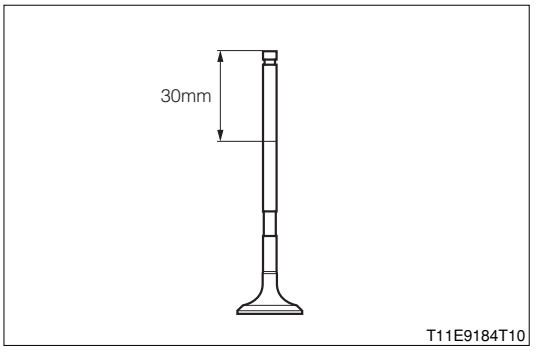
LUBRICANT: Engine oil



5.Install the exhaust valve and intake valve.

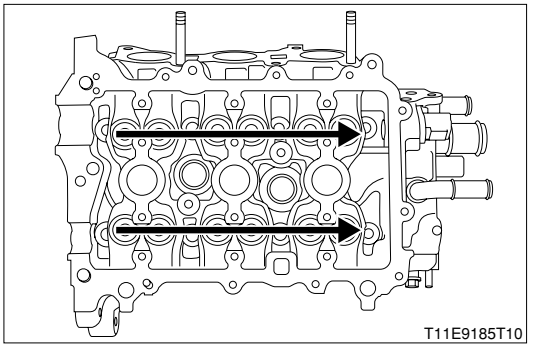
(1) Apply engine oil to the forward end of each valve over the length of 30 mm or more. Then, install the valve.

LUBRICANT: Engine oil

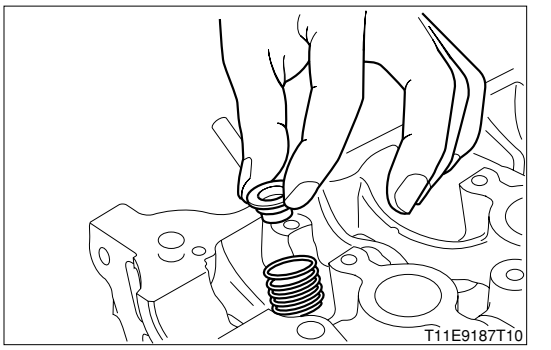


(2) After installing each valve, apply engine oil to the valve guide bush and the lip section of the valve stem oil seal.

LUBRICANT: Engine oil



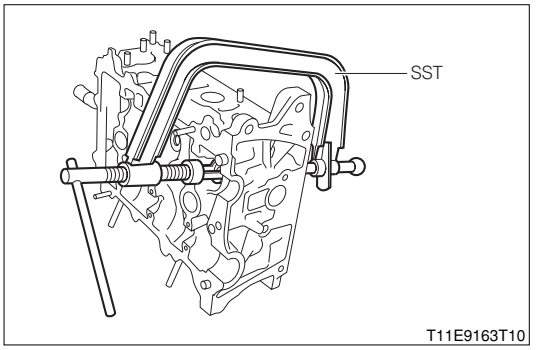
(3) Install the valve lifter.



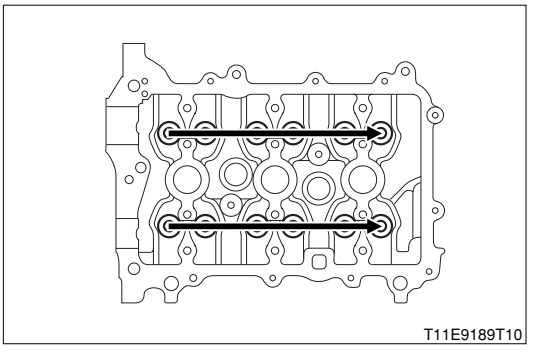
(4) Using the SST, install the valve spring retainer lock.
SST: 09202-87002-000

WARNING

- Wear safety goggles during the operation so as to protect your eyes.
- Be careful not to allow the compression spring, etc. to jump out.



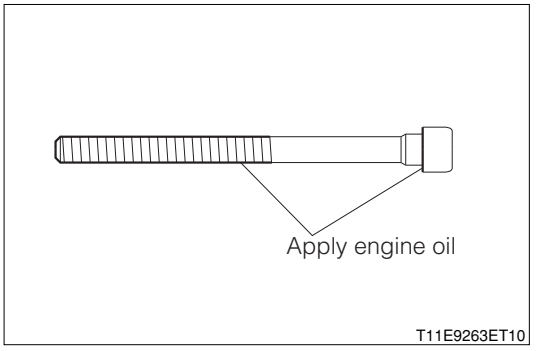
(5) After installing all the compression springs, apply engine oil to the top surface of the valve lifter as shown in the figure.
LUBRICANT: Engine oil



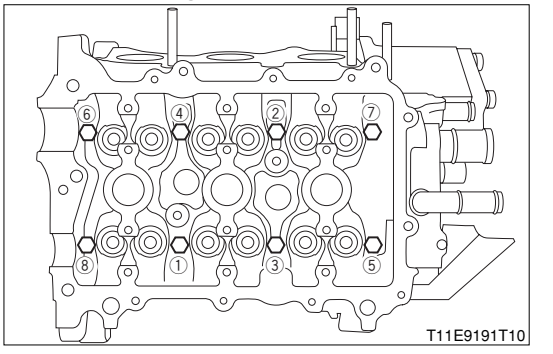
6.Install the cylinder head Ay to the cylinder block Ay.

(1) Set the cylinder head gasket and cylinder head Ay to the cylinder block Ay.

(2) Assemble the plate washer to the cylinder head Ay. Apply engine oil to the threaded portion of the bolt and bolt side seat surface. Then, assemble the bolts.
LUBRICANT: Engine oil



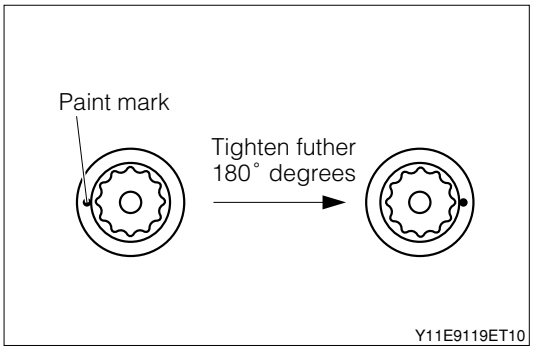
(3) To assemble the cylinder head Ay, tighten the bolts over two or three stages in the sequence shown at the right figure. Then, tighten them to the specified torque.



(4) After tightening to the specified torque, further tighten each of them 180 degrees in the same sequence.

NOTE

- Put a paint mark on the top of each cylinder head bolt in the same direction. After tightening the bolts 180 degrees in the sequence above, ensure that all the bolt marks have been turned 180 degrees.

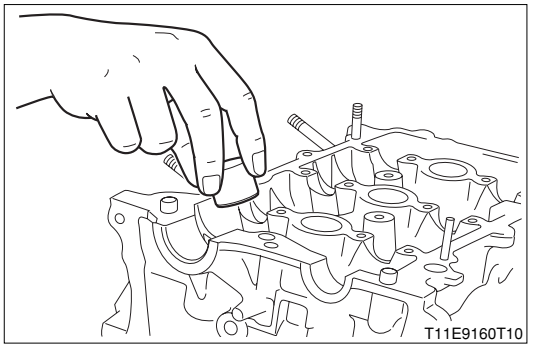


7.Apply engine oil to the circumference of the valve lifter. Insert the valve lifter straight into the lifter hole.

LUBRICANT: Engine oil

CAUTION

- Make sure that all the valves are assembled in position with their numbers returned to their original positions.
- After assembling the valve lifter, ensure that the lifter can turn lightly.

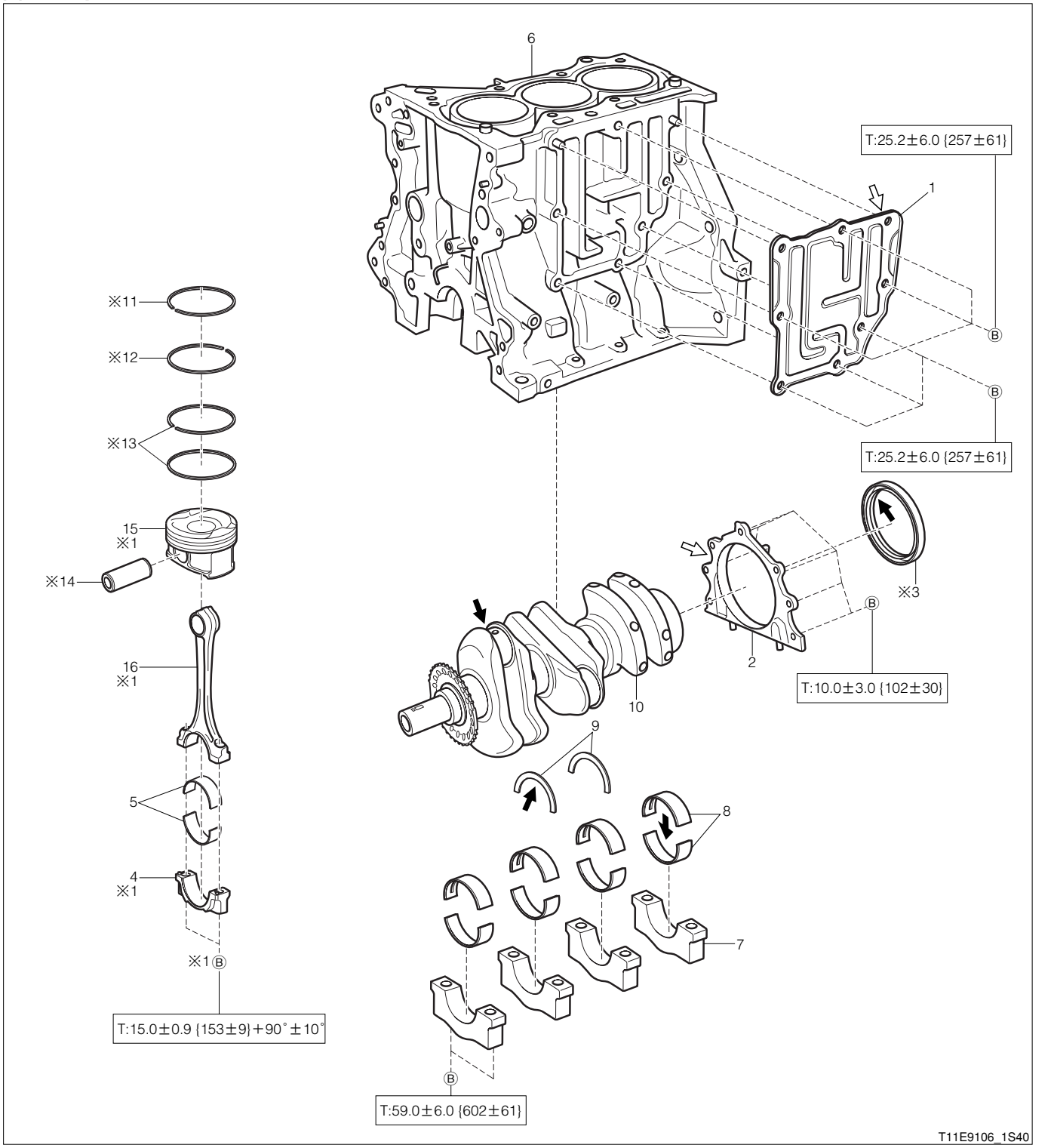


6 CYLINDER BLOCK AY

6-1 DISASSEMBLING AND ASSEMBLING

6-1-1 DISASSEMBLING AND ASSEMBLING

(1) Components



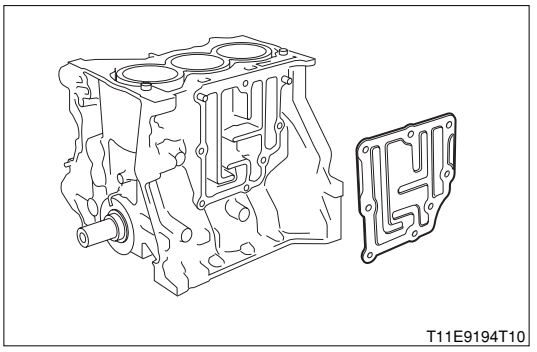
➡: Engin oil
⇨: Three Bond 1207B
Unit: N·m{kgf·cm}
※: Non-reusable parts
※1: Non-reusable parts during disassembling

(2) Disassembling and assembling procedure

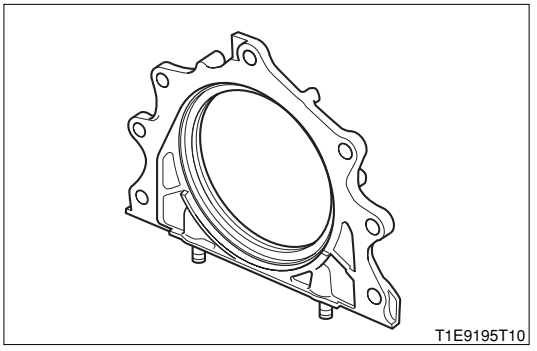
1 Plate, ventilation baffle
2 Retainer, oil seal
3 Seal, type T oil
4 Cap, connecting rod bearing
5 Bearing, connecting rod
6 Rod, piston W/ connecting
7 Cap, crankshaft bearing
8 Bearing, crankshaft
9 Washer, crankshaft thrust
10 Crankshaft
11 Ring, compression, No.1
12 Ring, compression, No.2
13 Ring, oil
14 Pin, piston
15 Piston
16 Rod, connecting

6-1-2 POINTS OF DISASSEMBLY

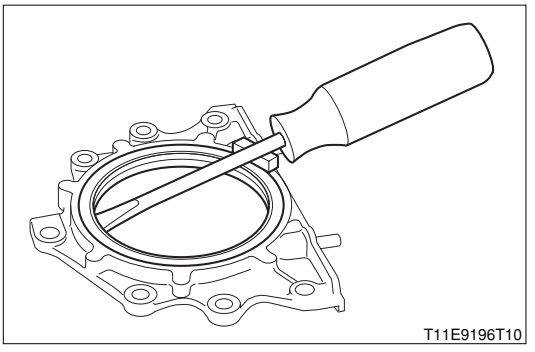
1.Remove the ventilation baffle plate.


T11E9194T10

2.Remove the oil seal retainer.

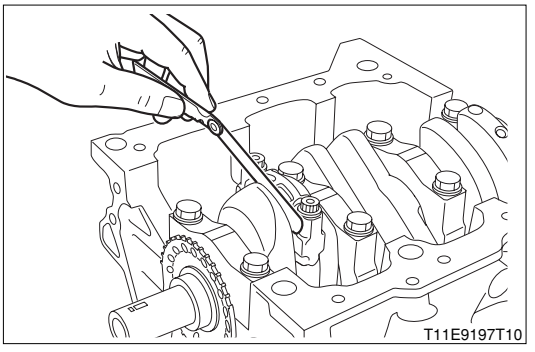

T1E9195T10

3.With a flat screwdriver, remove the type T oil seal.


T11E9196T10

4.Check the thrust clearance of the connecting rod.

SPECIFIED VALUE: Using a dial gauge or thickness gauge, measure the thrust clearance.
0.1—0.3mm
ALLOWABLE LIMIT: 0.35mm

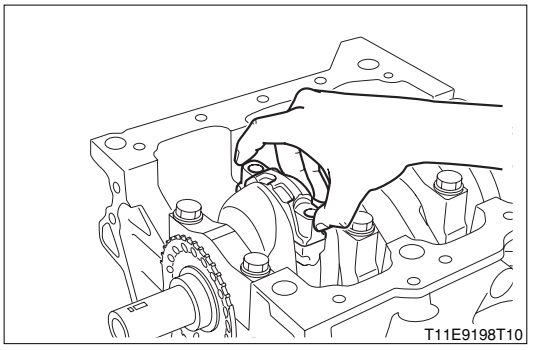

T11E9197T10

5.Check the oil clearance of the connecting rod bearing.

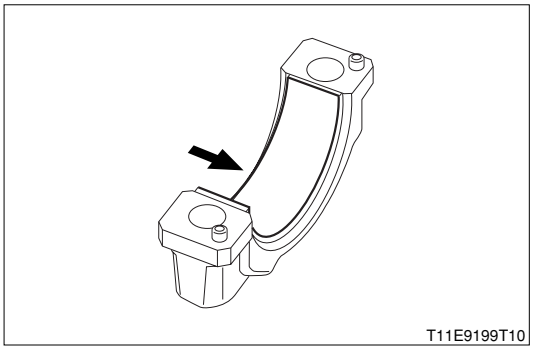
(1) Remove the connecting rod bearing caps and connecting rod bearings.

CAUTION

- Place them in order by the cylinder.



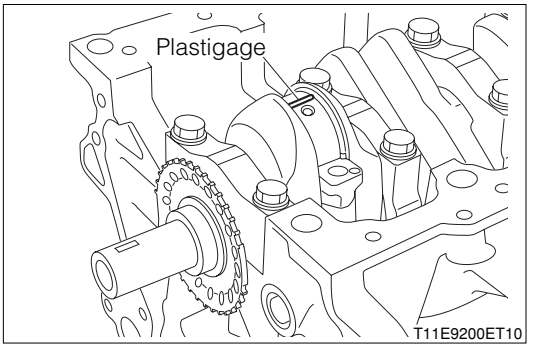
(2) Clean the connecting rod bearing and crank pin.



(3) Set the plastigage in the axial direction of the crank pin. Tighten the connecting rod bearing cap to the specified torque.

CAUTION

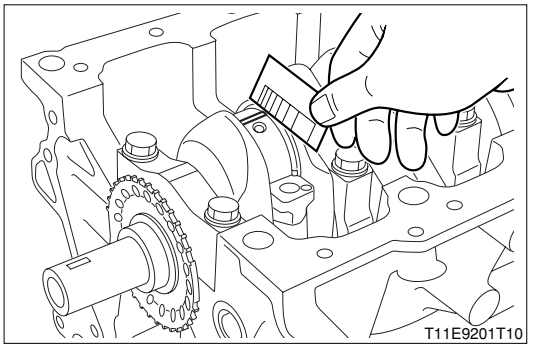
- Do not turn the crankshaft.



(4) Remove the connecting rod bearing cap. Measure the plastigage at a point where the width is the greatest.

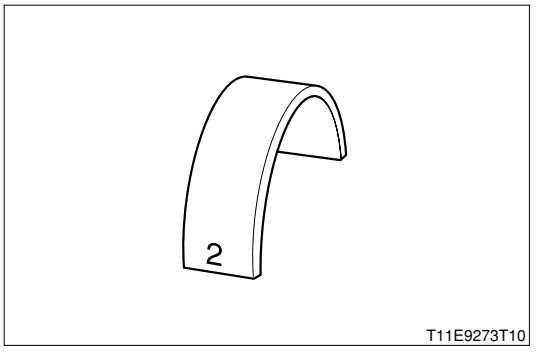
SPECIFIED VALUE: 0.016−0.042mm

ALLOWABLE LIMIT: 0.045mm



NOTE

- If the allowable limit is exceeded, install the bearing which has the same number as that indicated on the bearing back surface or connecting rod. (This bearing is supplied together with the connecting rod.) If the limit is still exceeded even after the bearing is replaced, replace the crankshaft.



Specified values

Fitting number	Bore diameter of connecting rod big end (mm Dia)	Central thickness of bearing (mm)	Crankshaft pin diameter (mm Dia)
1	43.000 or more −43.008 or less	1.492−1.495	39.992−40.000
2	more than 43.009 −43.016 or less	1.495−1.498	
3	more than 43.017 −43.024 or less	1.498−1.501	

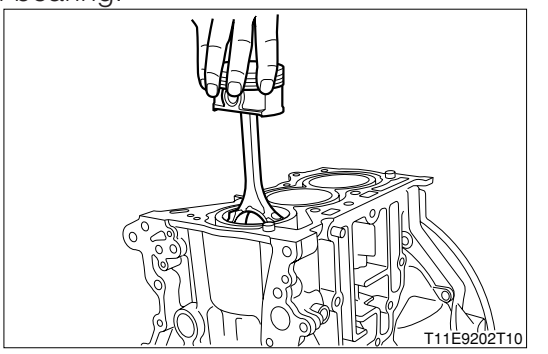
Measurement points for bore diameter of connecting rod big end and central thickness of bearing
Refer to Page B-44.

6.Remove the connecting rod bearing cap and connecting rod bearing.

7.Remove the piston Ay with the connecting rod by tapping it by the holder of a hammer or the like, being careful not to scratch the cylinder and crankshaft by the end of the connecting rod.

CAUTION

- Place the pistons in order by the cylinder.



8.Check the thrust clearance of the crankshaft.

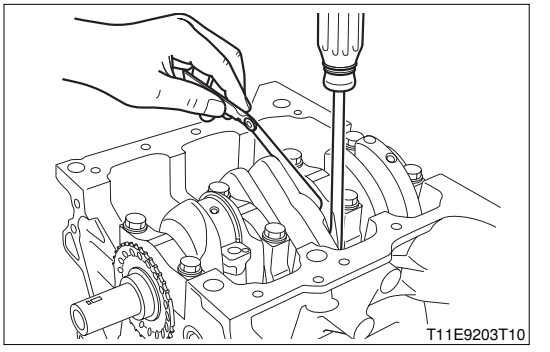
(1) With a thickness gauge, measure the thrust clearance.

SPECIFIED VALUE: 0.02−0.22mm

ALLOWABLE LIMIT: 0.30mm

NOTE

- If the thrust clearance exceeds the allowable limit, replace the thrust washer.
  If the clearance exceeds the limit even after the replacement, replace the crankshaft.



9.Check the oil clearance of the crankshaft.

(1) Remove the crankshaft bearing cap and crankshaft bearing.

CAUTION

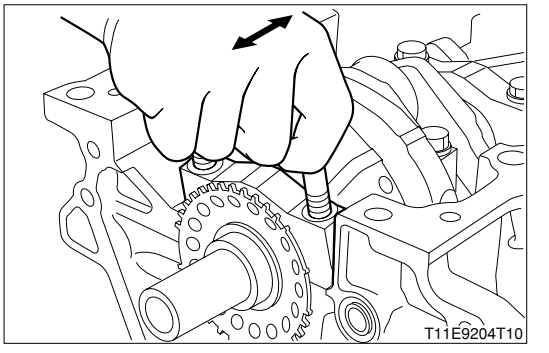
- Place the removed parts in the order of removal.

NOTE

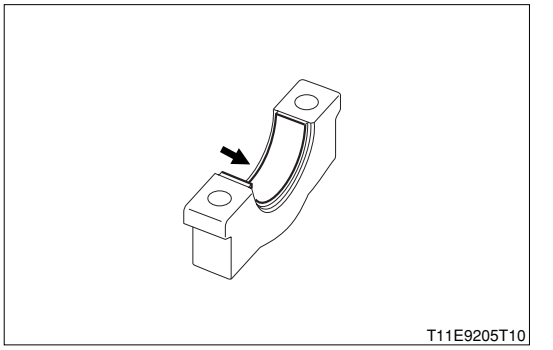
- If any difficulty is encountered in removing the crankshaft bearing cap, remove it by tapping with a plastic hammer.

CAUTION

- Move the upper section of the crankshaft bearing cap along the crankshaft.



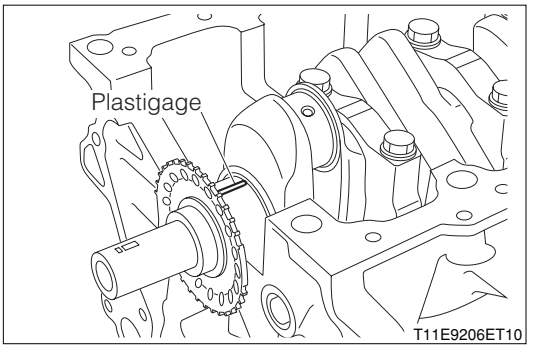
(2) Clean the inside of the crankshaft bearing, inside of the crankshaft bearing cap, journal section of the cylinder block, and journal section of the crankshaft. Check for severe wear or damage.



(3) Set the plastigage in the axial direction of the crankshaft journal. Tighten the crankshaft bearing cap to the specified torque.

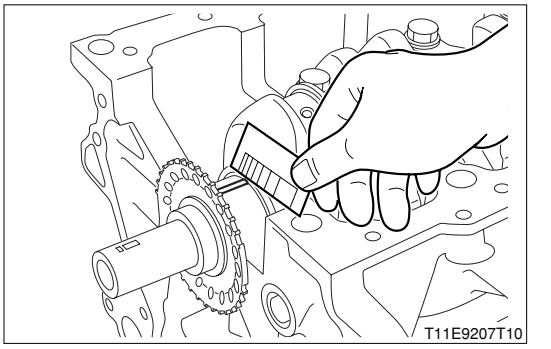
CAUTION

- Do not turn the crankshaft.



(4) Remove the crankshaft bearing cap. Measure the plastigage at a point where the width is the greatest.

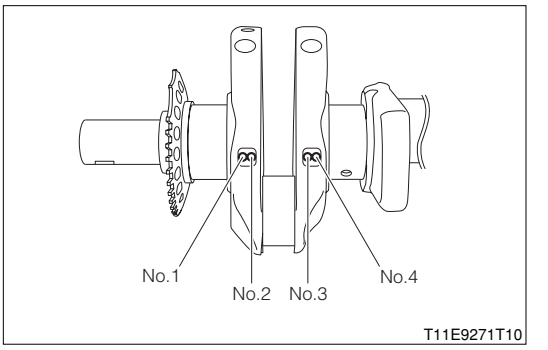
SPECIFIED VALUE: 0.021 − 0.046mm
ALLOWABLE LIMIT: 0.046mm



NOTE

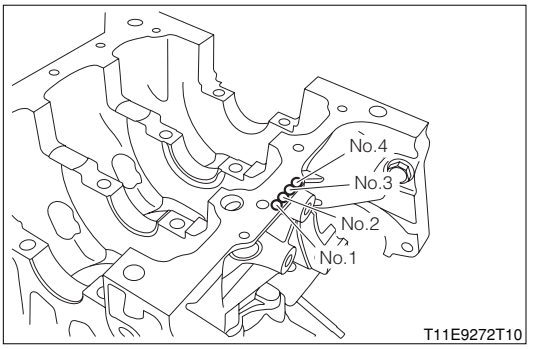
- If the oil clearance exceeds the allowable limit, install the bearing which has the same number as that indicated on the back surface of the bearing or crankshaft.

  If the oil clearance still exceeds the limit even after the bearing is replaced, replace the crankshaft.
- The following indicates the relationship between the crankshaft bearing number, crank journal number and cylinder block journal number.
  Crankshaft bearing number = Crank journal number + Cylinder block journal number



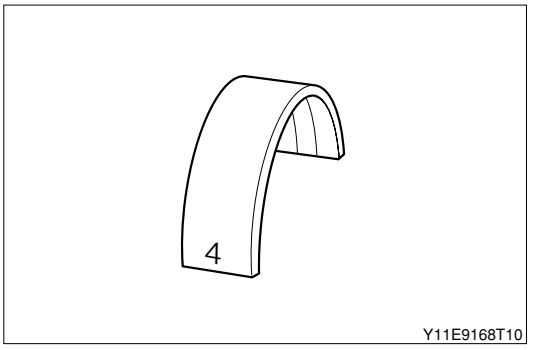
Cylinder block journal hole diameter

Cylinder block journal hole diameter (mm Dia)	
No.	48 tolerance
1	0 or more +0.006 or less
2	More than +0.006 +0.012 or less
3	More than +0.012 +0.018 or less



Crankshaft journal diameter

Crankshaft journal diameter (mm Dia)	
No.	44 tolerance
2	−0.012 or more −0.006 or less
1	More than −0.006 0 or less



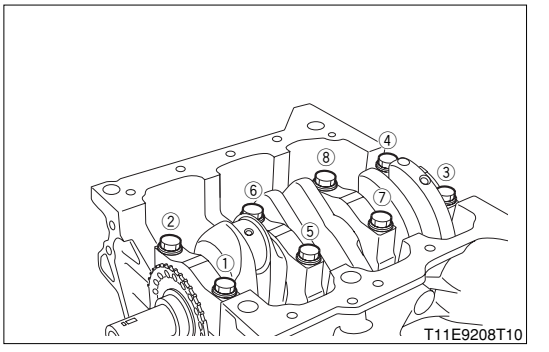
Crankshaft bearing thickness

Crankshaft bearing thickness (mm Dia)	
No.	2.0 tolerance
2	More than −0.008 −0.005 or less
3	More than −0.005 −0.002 or less
4	More than −0.002 +0.001 or less
5	More than +0.001 +0.004 or less

10.Remove the crankshaft bearing cap. Remove the crankshaft bearing, crankshaft thrust washer and crankshaft.

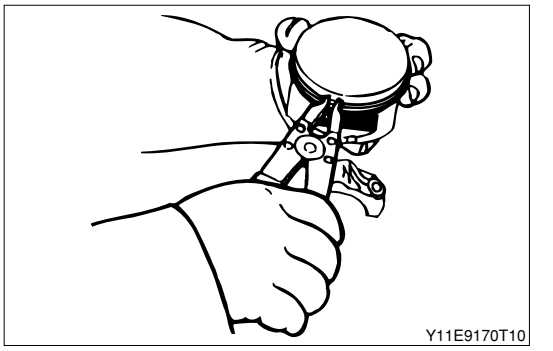
CAUTION

- Loosen the bolts of the crankshaft bearing cap over two or three stages in the sequence shown at the right figure.



11.Disassemble the piston and connecting rod.
(1) By using the piston ring tool, No.1 compression ring, No.2 compression ring and oil ring.

CAUTION
- Never reuse the removed piston ring.


Y11E9170T10

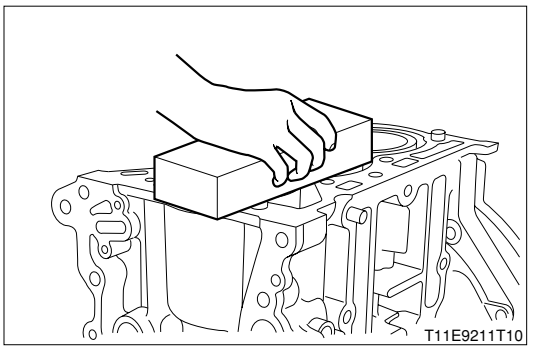
6-1-3 CLEANING

(1) Cleaning of block, cylinder

1.With an oil stone or the like, clean the chain cover surface of the cylinder block, cylinder head surface, oil pan S/A and ventilation baffle plate surface.

WARNING
- Wear safety goggles during the cleaning so as to protect your eyes.

CAUTION
- Be careful not to scratch the cylinder block during the cleaning.
- Be very careful not to allow the cylinder head gasket debris, etc. to fall into the water jacket.


T11E9211T10

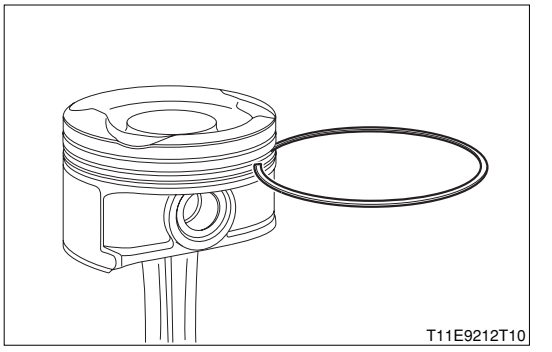
(2) Cleaning of piston

1.Using an old piston ring or the like, remove carbon.

WARNING
- Wear safety goggles during the cleaning so as to protect your eyes.

CAUTION
- Be careful not to scratch the piston during the cleaning.

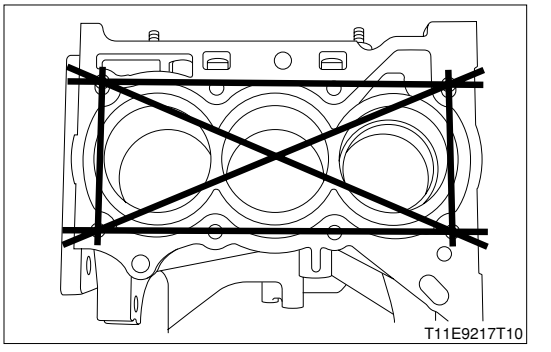
2.Remove carbon from various parts using cleaning fluid, etc.


T11E9212T10

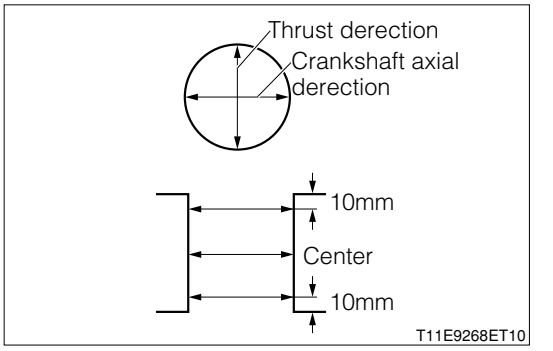
6-1-4 CHECK

(1) Check of block, cylinder

1.Using a straightedge and thickness gauge, perform measurement at sections shown at the right figure.
ALLOWABLE LIMIT: 0.05mm

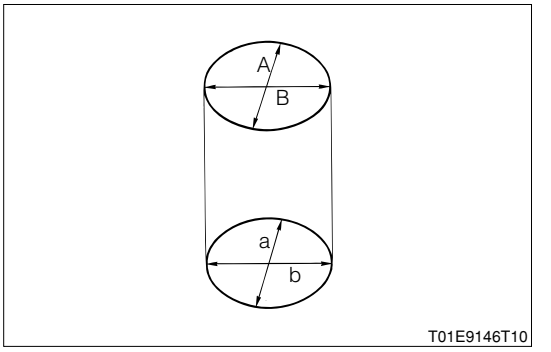

T11E9217T10

2.With the cylinder gauge, measure the points shown at the right figure and record them.
SPECIFIED VALUE: Specified inner diameter of cylinder block
71.000−71.013mm
ALLOWABLE LIMIT: 71.013mm



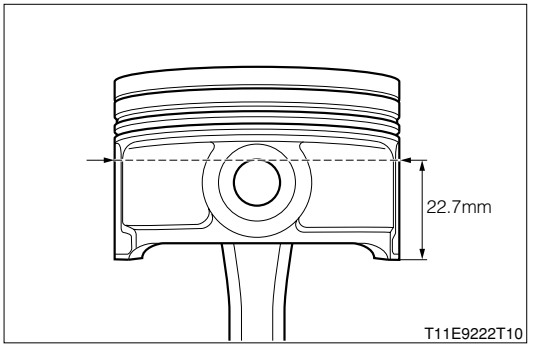
T11E9268ET10

3.Calculate the degree of ellipse and degree of taper.
ALLOWABLE LIMIT: 0.02mm
NOTE
- Degree of ellipse: A−B or a−b
- Degree of taper: A−a or B−b



(2) Check of piston

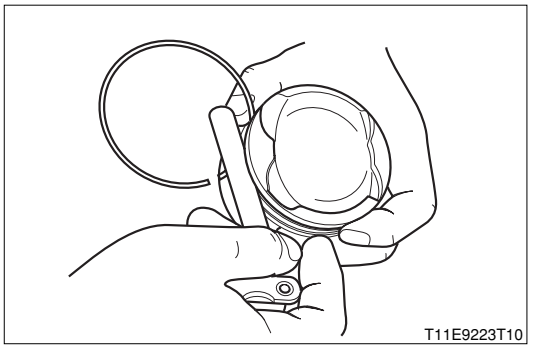
1.Measure the outer diameter of the piston.
(1) At a point 10 mm from the lower end of the piston skirt section, measure the outer diameter in a direction vertical to the pin bore.
SPECIFIED VALUE: 70.921−70.931mm
ALLOWABLE LIMIT: 70.921mm



2.Check the piston ring groove.
(1) With the thickness gauge and piston ring, check the piston clearance over the entire circumference.

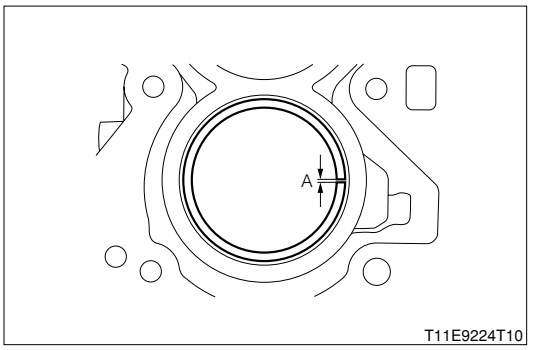
Ring groove clearance

Detected item	Specified value	Limit value
No.1	0.02−0.07	0.07
No.2	0.02−0.06	0.06
Oil	0.020−0.065	0.065



3.Check the clearance between the mating ends of the piston ring.

(1) Using the piston, push in the piston ring up to the position about 45 mm from the top surface of the cylinder block. With the thickness gauge, measure the clearance between the mating ends.



Clearance between mating ends of ring

Detected item	Specified value	Limit value
No.1	0.2—0.3	0.79
No.2	0.4—0.6	0.75
Oil	0.1—0.4	0.69

4.Measure the oil clearance between the cylinder and the piston.

(1) Measure the piston outer diameter and cylinder inner diameter to obtain the oil clearance. If the limit is exceeded, replace the piston or replace the cylinder block.

SPECIFIED VALUE: 0.080—0.103mm

ALLOWABLE LIMIT: 0.103mm

NOTE

- The oil clearance between the piston and the cylinder block is the difference between the minimum inner diameter of the cylinder in the thrust direction and the piston maximum outer diameter. (basic diameter)
- Since there is ridged wear at the upper end of the sliding range of the piston ring, be sure to measure the point with greater wear.

Specified values for cylinder block inner diameter and piston outer diameter

Cylinder block inner daimeter (mm Dia)	$71^{+0.013}_{-0}$
Piston outer daimeter (mm Dia)	70.915±0.05

(2) If the piston or cylinder block has been replaced, check the oil clearance once again after the replacement.

(3) Check of crankshaft

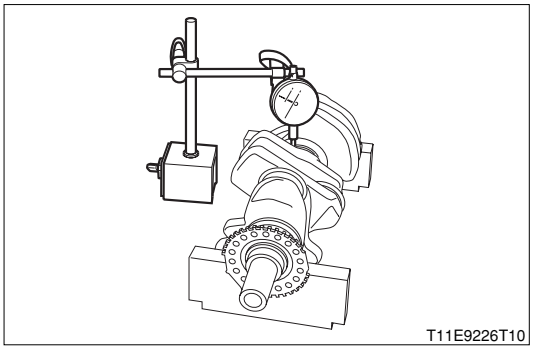
1.Check the crankshaft for bending.

(1) With a dial gauge, measure the bend of 2J.

ALLOWABLE LIMIT: 0.03mm

CAUTION

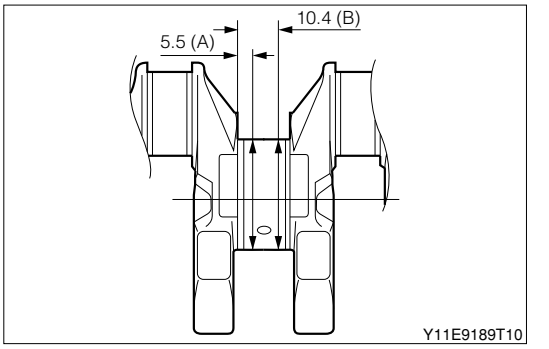
- The bend is a half of the gauge reading (runout) when the crankshaft is turned one turn.



2.Check the crankshaft for wear.

(1) Calculate the degree of ellipse and degree of taper for the points on the journal shown at the right figure, using a micrometer.

ALLOWABLE LIMIT: Crank journal outer diameter 0.03mm
Degree of ellipse and degree of taper 0.03mm

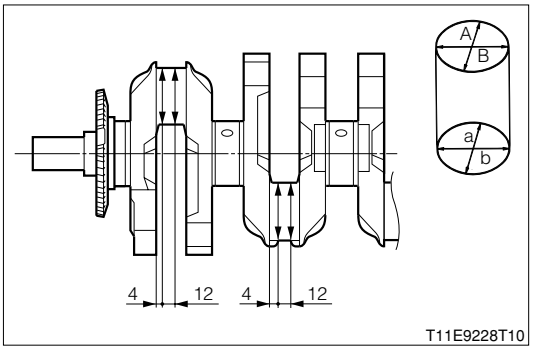


NOTE

- Degree of ellipse: A−B or a−b
- Degree of taper: A−a or B−b

(2) Calculate the degree of ellipse and degree of taper for the points on the pin shown at the right figure, by measuring the outer diameter with a micrometer.

ALLOWABLE LIMIT: Crank pin outer diameter 0.03mm
Degree of ellipse and degree of taper 0.03mm

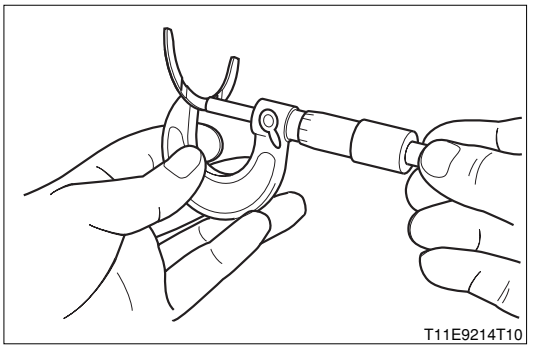


NOTE

- Degree of ellipse: A−B or a−b
- Degree of taper: A−a or B−b

3.Measure the thickness of the crankshaft thrust washer.

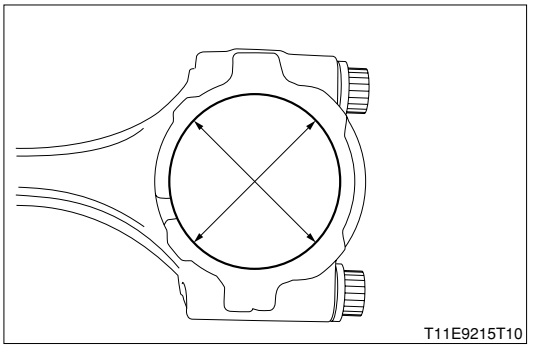
SPECIFIED VALUE: 1.94−1.99mm



(4) Check of rod, connecting

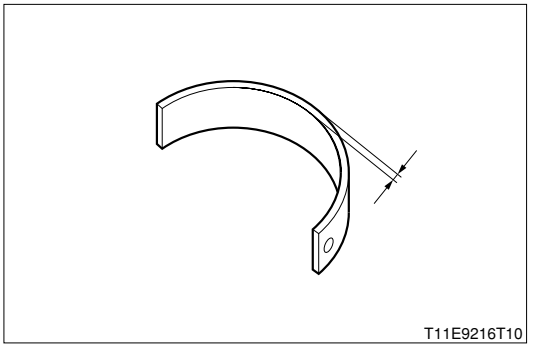
1.Check of oil level.

SPECIFIED VALUE: 43.000−43.024mm



2.Measure the stock thickness of the connecting rod bearing.

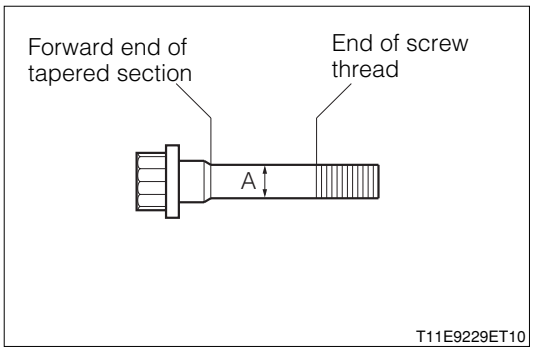
SPECIFIED VALUE: 1.492−1.501mm



(5) Check of bolt, connecting rod

1.Measure the outer diameter (A) of the connecting rod bolt at several points.

ALLOWABLE LIMIT: Outer diameter: 6.4 mm

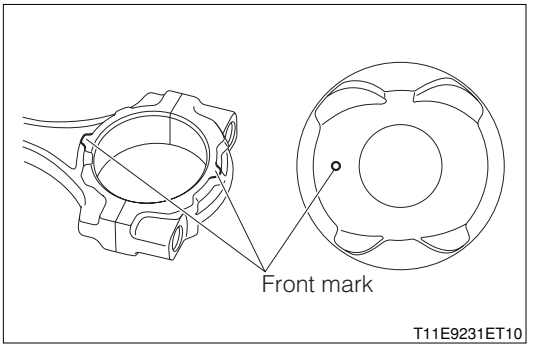


6-1-5 POINTS OF ASSEMBLY

1.Assemble the piston, connecting rod and piston pin.

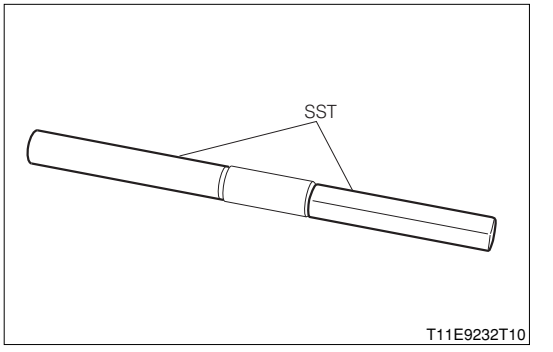
(1) Apply engine oil to the pin hole of the connecting rod. Temporarily assemble the piston and connecting rod with their front marks aligned with each other.

LUBRICANT: Engine oil



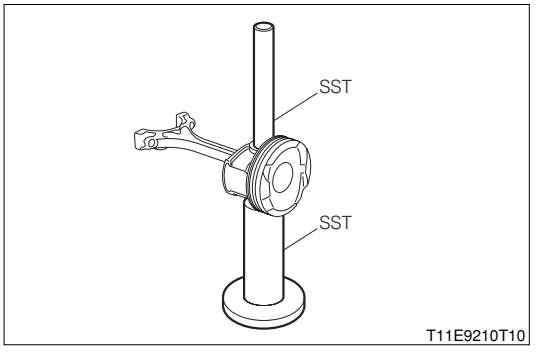
(2) Assemble the SST to the piston pin as shown at the right figure.

SST: 09221-B1010-000



(3) Insert the piston pin assembled with the SST to the piston and connecting rod. Then, set them to the SST.

SST: 09221-B1020-000



(4) Heat the piston side of the connecting rod. (Approx. 80−220℃)

CAUTION

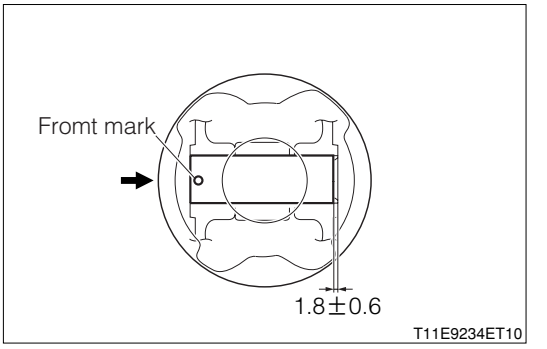
- If the temperature will not rise above 190 ℃, apply oil.

SPECIFIED VALUE: 1.8±0.6mm

(5) Using a press, assemble the piston pin into the piston and connecting rod.

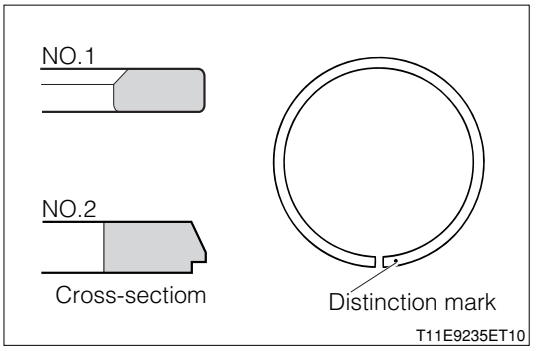
CAUTION

- Press fit the piston pin from the front mark side of the piston.
- During press-fitting, the piston pin should be pushed from exactly above. Never apply the force diagonally.

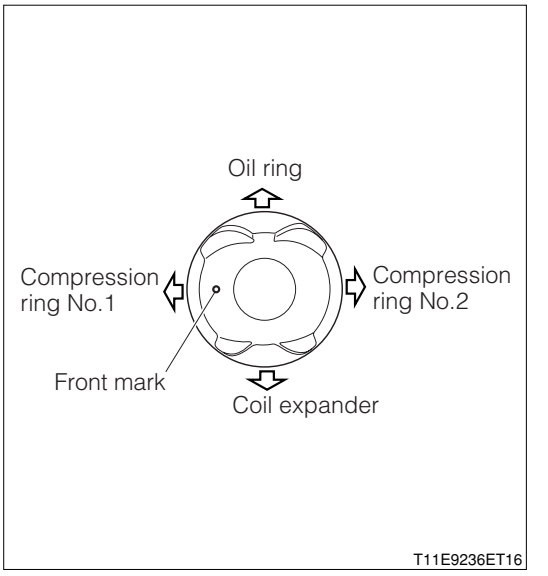


2.Assemble the oil ring, compression ring No.2 and compression ring No.1.

(1) The compression ring No.2 and compression ring No.1 should be installed using the piston ring tool with the identification mark T facing upward.



(2) Assemble the rings in such a way that the mating ends of each ring face in the direction indicated in the figure.

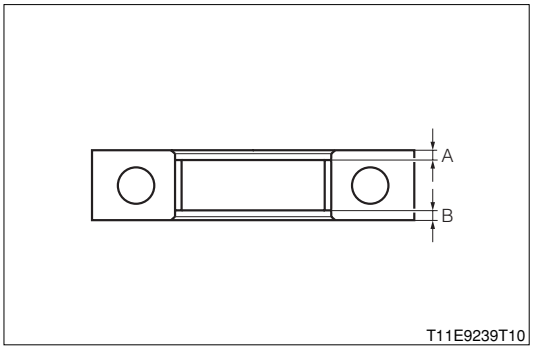


3.Assemble the crankshaft, crankshaft bearing cap, crankshaft bearing and crankshaft thrust washer.

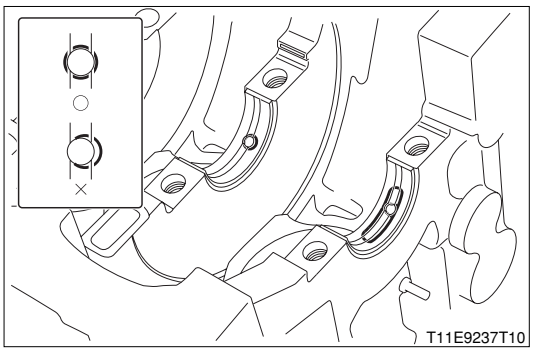
(1) With the crankshaft (lower) bearing positioned correctly, assemble it to the crankshaft bearing cap.

NOTE

- Assemble in such a way that the difference between A and B does not exceed 0.8 mm.



(2) Assemble the crankshaft (upper) bearing, while aligning with the oil hole of the cylinder block.



(3) Insert and install the crankshaft thrust washer into the No.3 journal at the block side in such a way that the oil groove faces toward the outside. (crank side)

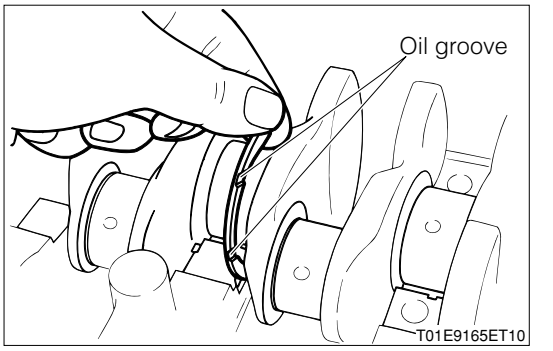
CAUTION

- Before assembling, apply engine oil to the oil groove side.

LUBRICANT: Engine oil

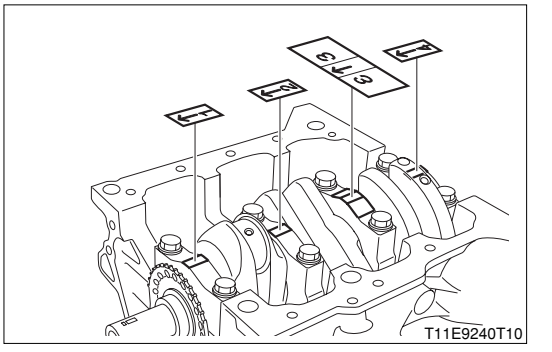
(4) After applying engine oil to the crankshaft sliding surface of the crankshaft (upper) bearing, assemble the crankshaft.

LUBRICANT: Engine oil



(5) After applying engine oil to the crankshaft sliding surface of the crankshaft (lower) bearing, assemble the crankshaft bearing cap with its front mark facing to the front.

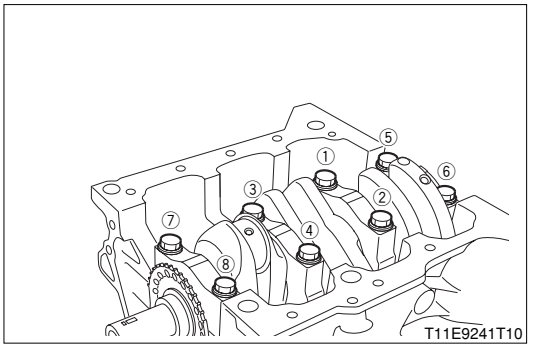
LUBRICANT: Engine oil



(6) After applying engine oil to the crankshaft bolt, tighten the bolts over two or three stages in the sequence shown at the right figure.

LUBRICANT: Engine oil

(7) After assembling, ensure that the crankshaft turns smoothly.

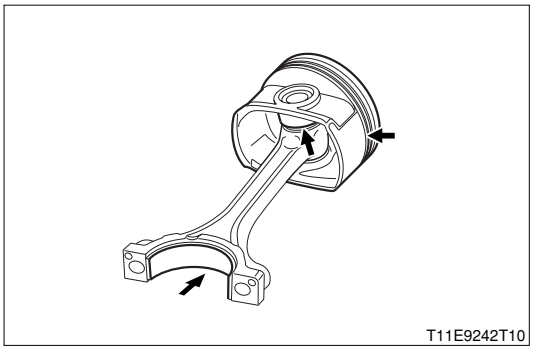


4.Assemble the piston Ay with connecting rod, connecting rod bearing and connecting rod bearing cap.

(1) Confirm the directions of the mating marks of the compression rings and oil ring.

(2) Apply engine oil to the sliding surface of the piston and connecting rod.

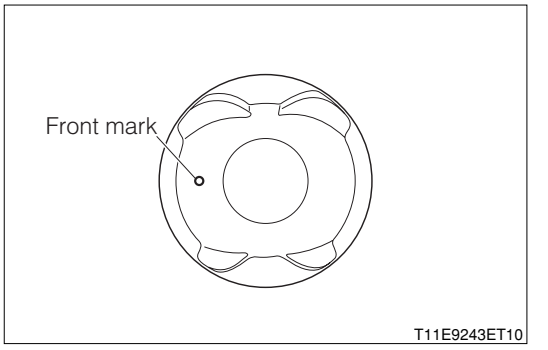
LUBRICANT: Engine oil



(3) With the front mark of the piston facing to the front, insert the piston into the cylinder block using the piston ring tool.

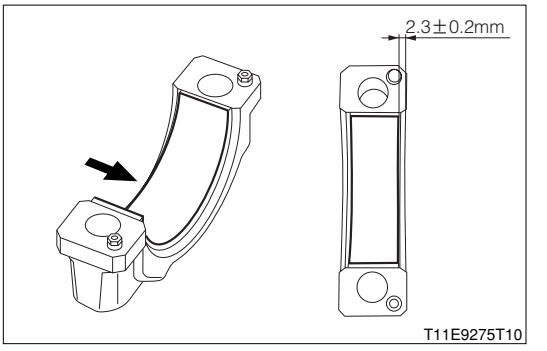
CAUTION

- Assemble the piston and cylinder in the same combination as that before disassembling.



(4) Assemble the connecting rod bearing to the connecting rod bearing cap at the position shown at the figure. Apply engine oil to the sliding surface of the connecting rod bearing.

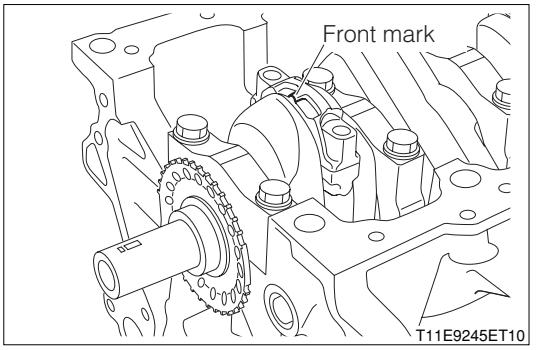
LUBRICANT: Engine oil



(5) Assemble the connecting rod to the front mark of the connecting rod bearing cap.

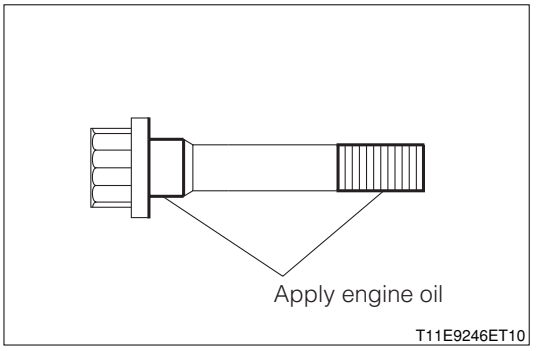
CAUTION

- Assemble in such a way that the front mark of the connecting rod bearing cap comes at the front direction. Ensure that the knock pin is aligned with the knock hole.
- Assemble the connecting rod and connecting rod bearing cap in the same combination as that before disassembling.



(6) Apply a thin film of engine oil to the seat surface and threaded portion of the connecting rod bolt and assemble it.

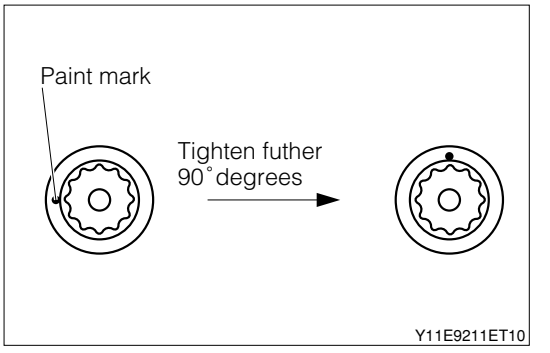
LUBRICANT: Engine oil



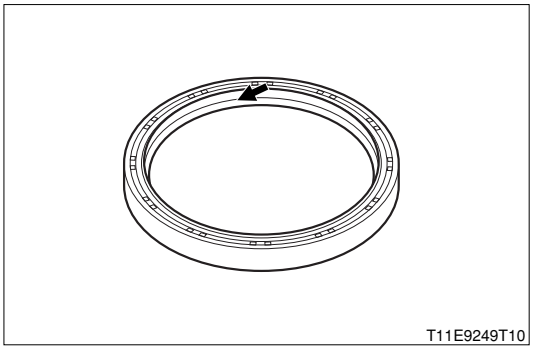
(7) Tighten the connecting rod bolts alternately over two or three stages. Also, retighten each of the bolts about 90 degrees in the same sequence.

NOTE

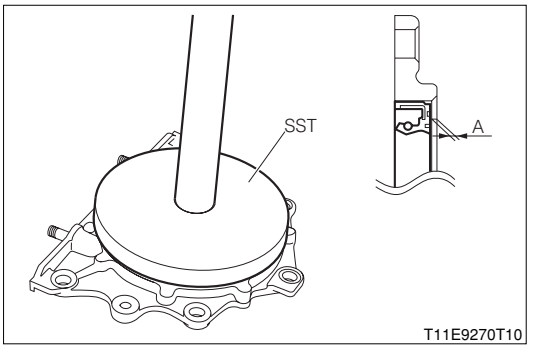
- Put a paint mark on the top of each connecting rod bolt in the same direction. After tightening the bolts 90 degrees in the sequence above, ensure that all the paint marks have been turned 90 degrees.



5.Install the type T oil seal to the oil seal retainer.
(1) Apply engine oil to the lip section of the type T oil seal.
LUBRICANT: Engine oil


T11E9249T10

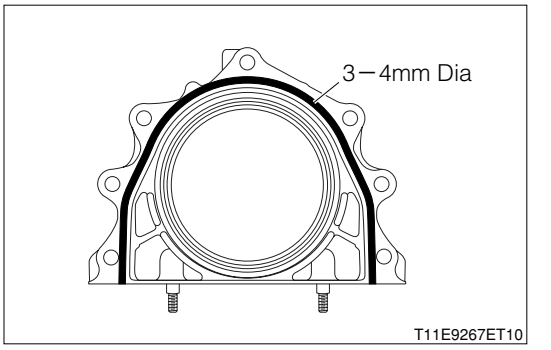
(2) Using the SST, assemble the type T oil seal vertically.
SPECIFIED VALUE: Press-fitting amount
from oil seal retainer
Protruding amount: within 0.5 mm
Press-fitting depth: within 1 mm
SST: 09608-87302-000



T11E9270T10

6.Apply liquid gasket to the oil seal retainer. Then, assemble it to the cylinder block Ay.
CAUTION
- Perform the assembling within three minutes after application of the liquid gasket.

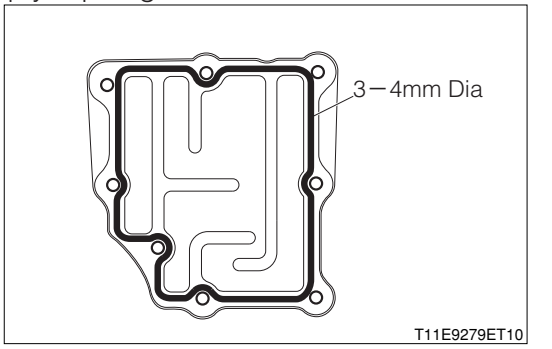
ADHESIVE: Three Bond1207B



T11E9267ET10

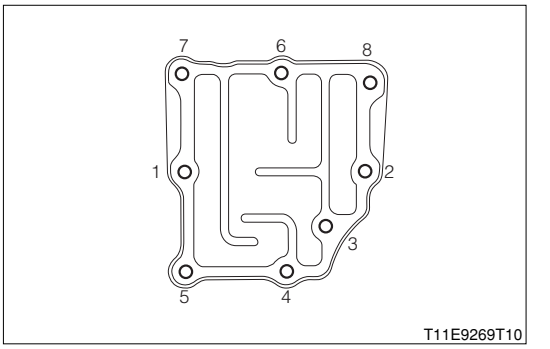
7.Clean the ventilation baffle plate and installation surface. Apply liquid gasket to the ventilation baffle plate.
CAUTION
- Assemble the ventilation baffle plate within three minutes after application of the liquid gasket.

ADHESIVE: Three Bond1207B



T11E9279ET10

8.Perform tightening in the sequence shown at the figure.



T11E9269T10

C ENGINE ELECTRICAL

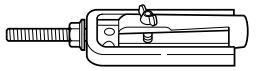
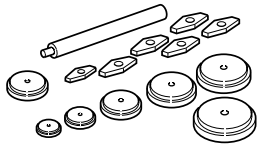
1KR-FE ---------- C - 1
ARTICLES TO BE PREPARED ---------- C - 1
STARTER ---------- C - 1
CIRCUIT DIAGRAM ---------- C - 1
UNIT CHECK ---------- C - 2
DISASSEMBLING AND ASSEMBLING ---------- C - 3
DISASSEMBLING AND ASSEMBLING ---------- C - 8
ALTERNATOR ---------- C - 21
DISASSEMBLING AND ASSEMBLING ---------- C - 21
CIRCUIT DIAGRAM ---------- C - 22

1 1KR-FE

1-1 ARTICLES TO BE PREPARED

1-1-1 ARTICLES TO BE PREPARED LIST

SST

Shape	Part No.	Part name
	09208-87701-000	Remover,oil seal
	09608-87302-000	Tool set,axle hub bearing & drive pinion bearing

Tool

Soldering iron

Instrument

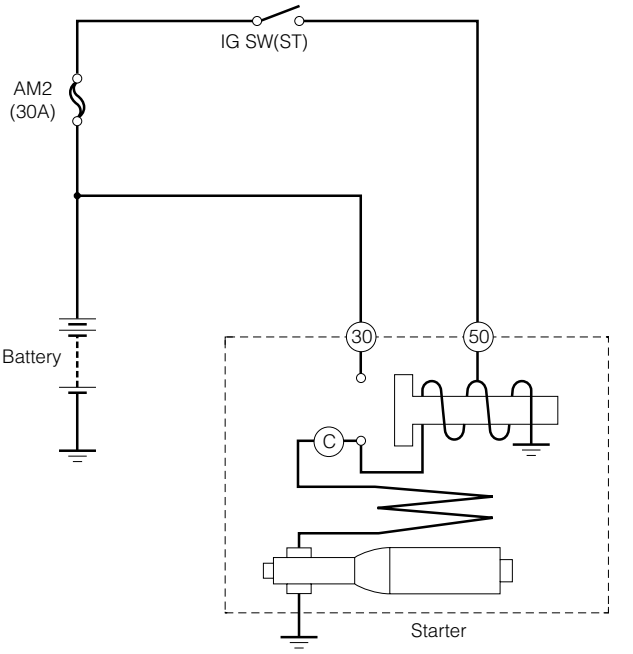
Torque wrench,Spring separates ,Dial gauge,Vernier calipers,Voltage tester,V-shaped blocks

Lubricant,adhesive,others

High-temperature grease

2 STARTER

2-1 CIRCUIT DIAGRAM



T11E8507ES20

Starter performance

Rated output (kW)	0.7	1
Non-loaded characteristics	50 A or less [at time of 11.5 V] 6000 rpm or more	90 A or less [at time of 11.5 V] 3000 rpm or more
Number of pinion teeth	9	9
Rotating direction	Clockwise as viewed from pinion side	Clockwise as viewed from pinion side
Weight (kg)	3.25	3.15

2-2 UNIT CHECK

CAUTION

- Each check should be performed within a short length of time (3-5 seconds).

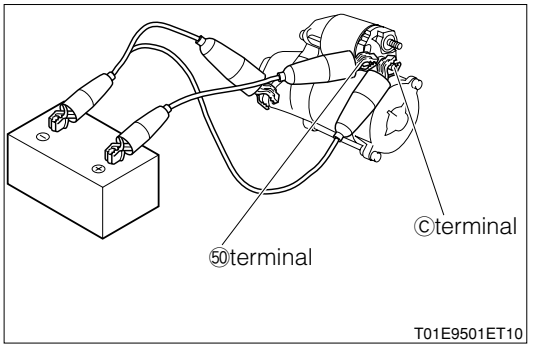
2-2-1 CHECK

(1) Pull-in check

1.Apply the battery voltage to the terminal ⑤⓪. Connect the earth wire to the terminal Ⓒ and the starter body. Ensure that the pinion gear jumps out.

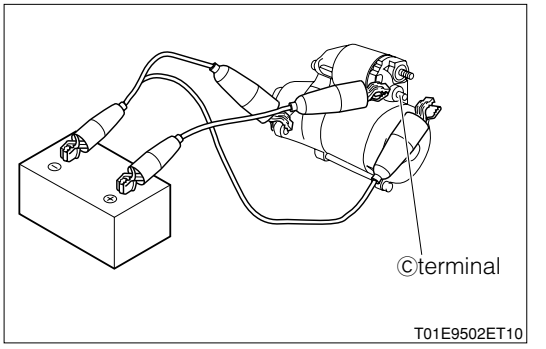
CAUTION

- This test should be carried out with the lead wire of the magnet switch disconnected.



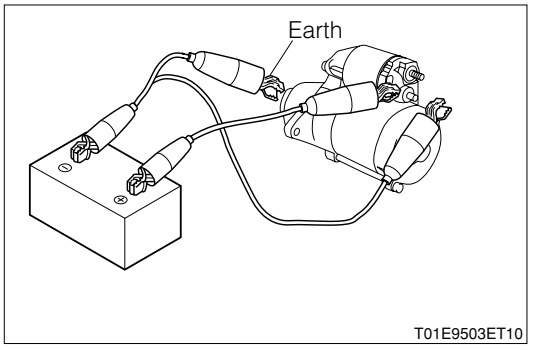
(2) Retention check of holding coil

1.Under the pull-in check state, disconnect the wire leading to the terminal Ⓒ. Ensure that the pinion gear remains in the jump-out state.



(3) Plunger return check

1.Under the retention check state of the holding coil, disconnect the earth wire from the starter body. Ensure that the pinion gear returns.



(4) No-load test

1.Clamp the starter in a vice, etc.

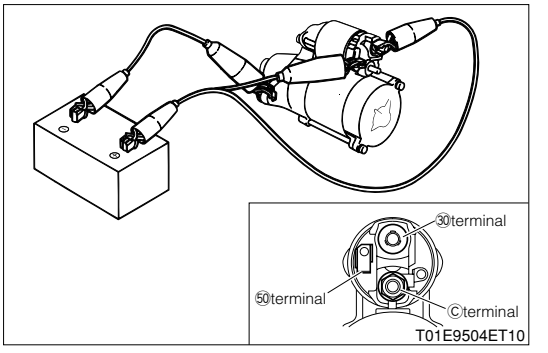
2.Hook up the cables and tester, as indicated in the figure. (At this time, do not connect a wire to the terminal ⑤⓪.)

3.Connect the terminal ⑤⓪ . When the ammeter reading has stabilized, take the reading of the ammeter.

SPECIFIED VALUE: 0.7 kW type: 50 A or less at 11.5 V
1.0 W type: 90 A or less at 11.5 V

CAUTION

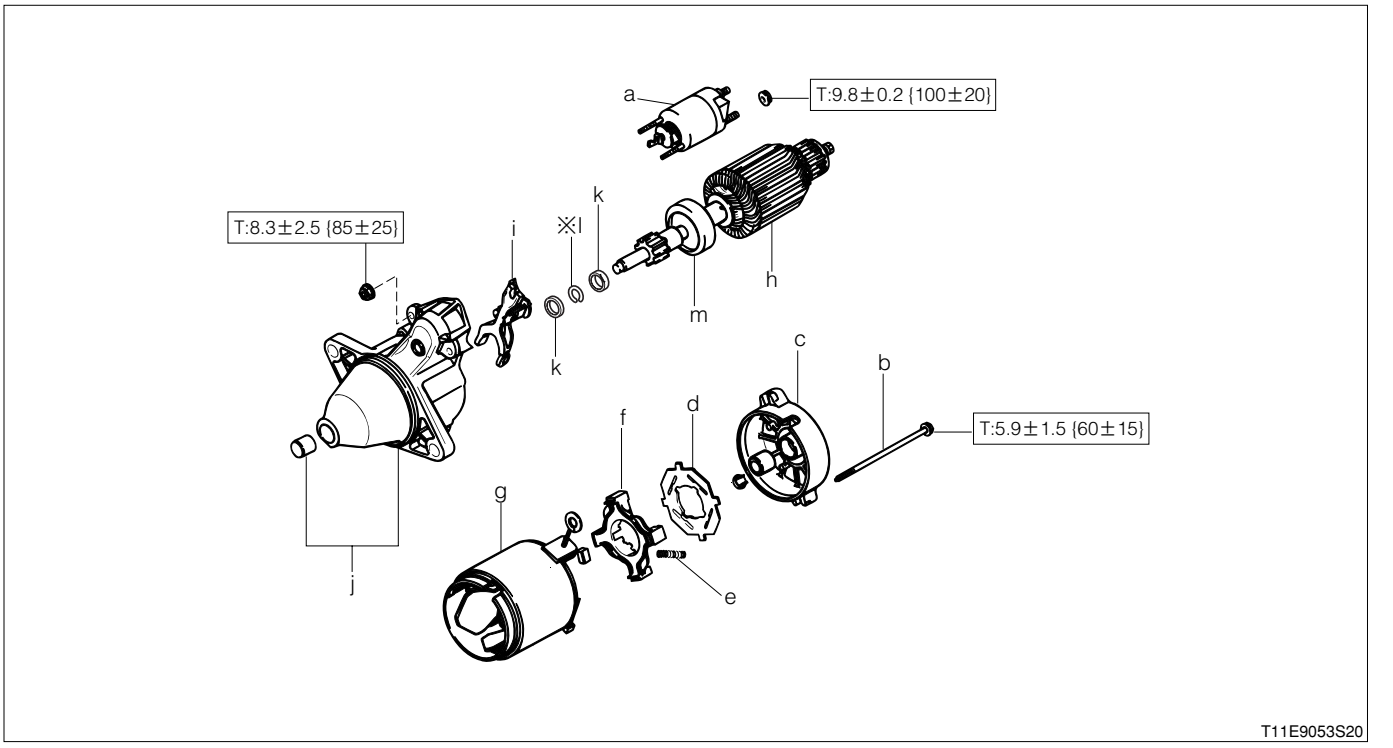
- A large current will flow during the test. Hence, be certain to employ a heavy lead wire.



2-3 DISASSEMBLING AND ASSEMBLING

2-3-1 DISASSEMBLING AND ASSEMBLING PROCEDURE(0.7 KW TYPE)

(1) Components



Unit: N·m{kgf·cm}

※: Non-reusable parts

(2) Disassembling and assembling procedure

1 a Switch Ay, magnet
2 b Bolt, through
3 c frame Ay, starter commutator end
4 d Insulator
5 e Brush, spring
6 f Brush, holder
7 g York Ay, starter
8 h Armature Ay, starter
9 i Lever, starter drive pinion
10 j Housing Ay, starter drive
11 k Nut, pinion stop
12 l Ring, snap
13 m Clutch S/A, starter

2-3-2 POINTS OF DISASSEMBLY

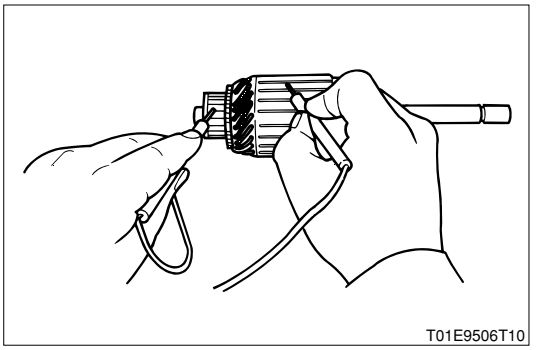
1.Remove the parts in the sequence of the Components diagram.

2-3-3 CHECK

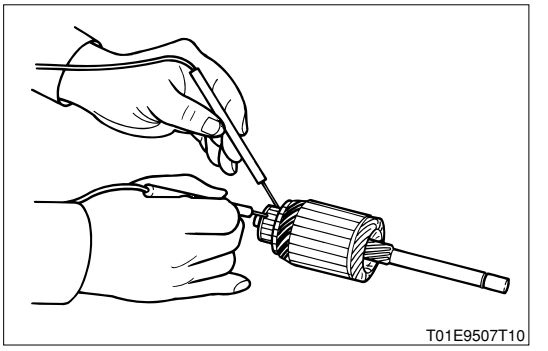
(1) Check of armature coil

1.Check the insulation between the commutator and armature coil core.

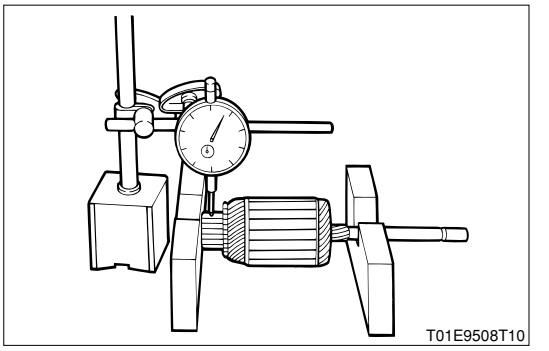
SPECIFIED VALUE: No continuity exists



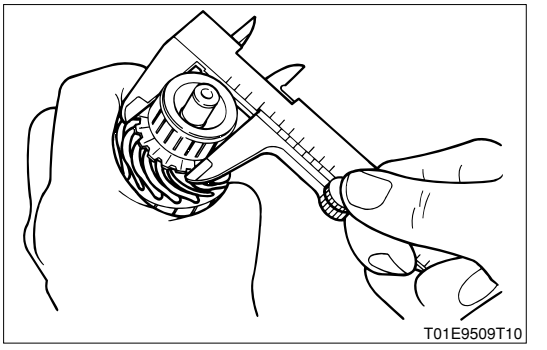
2.Check continuity between segments.
SPECIFIED VALUE: Continuity should exist between each segment.



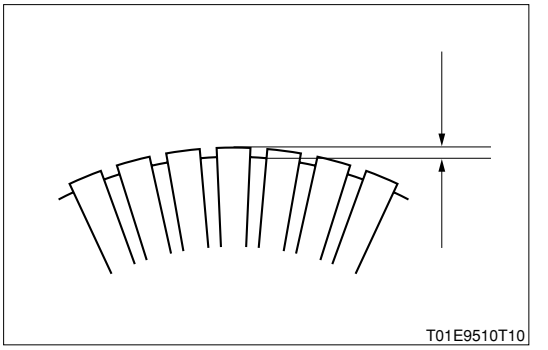
3.Check the run-out of the commutator.
ALLOWABLE LIMIT: 0.4 mm



4.Measure the outer diameter of the commutator.
SPECIFIED VALUE: 28 mm
ALLOWABLE LIMIT: 27 mm

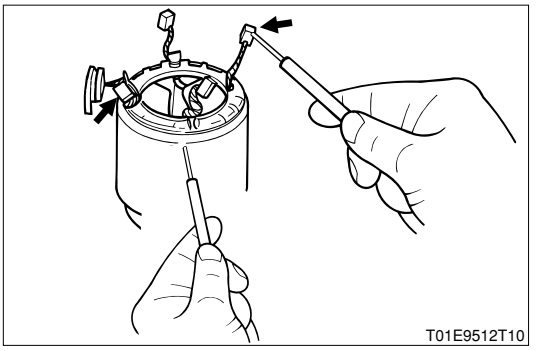


5.Check the under-cut depth of each segment.
SPECIFIED VALUE: 0.60±0.15 mm
ALLOWABLE LIMIT: 0.2 mm

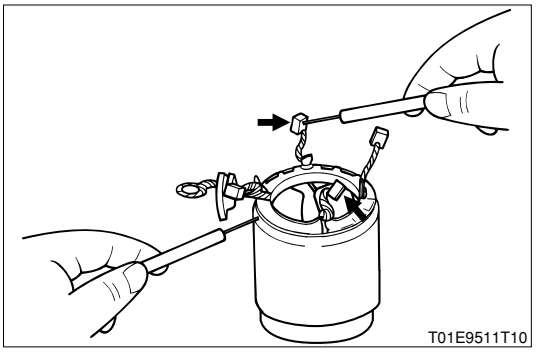


(2) Field coil check

1.Check the insulation between the yoke and the terminal C lead wire side brush.
SPECIFIED VALUE: No continuity exists



2.Check the continuity between the yoke and the field coil side brush.
SPECIFIED VALUE: Continuity exists



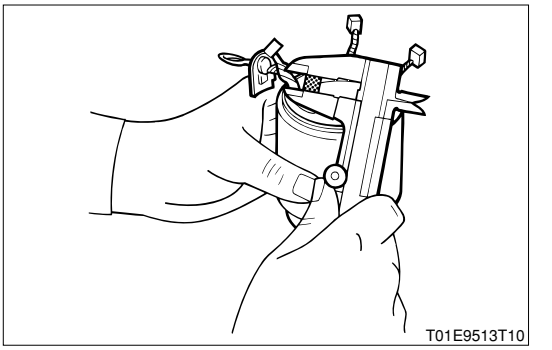
(3) Check of brush

1.Check the roughness of the contact surface and brush length.
SPECIFIED VALUE: 10.0 mm
ALLOWABLE LIMIT: 6.0 mm

CAUTION

- The measurement of brush length should be conducted at the center recessed section.

2.When the contact surface is corrected or replaced, wrap an abrasive paper (400#) around the commutator and remedy the contact surface.

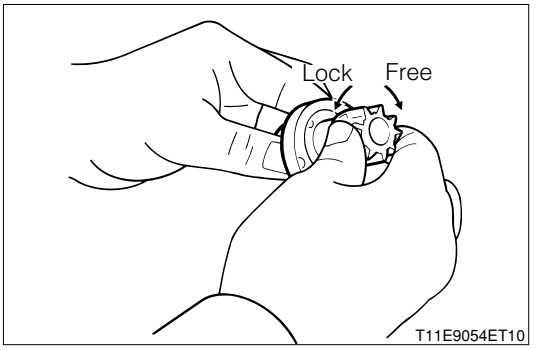


(4) Check of spring

1.Visually inspection for spring.

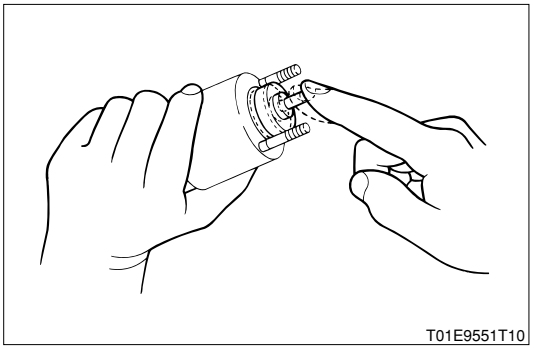
(5) Check of starter clutch

1.Check the gear for wear and damage.
2.Ensure that the gear locks when the gear is turned in the left turning direction (the counterclockwise direction). Furthermore, ensure that the gear turns smoothly when the gear is turned in the right turning direction (the clockwise direction).

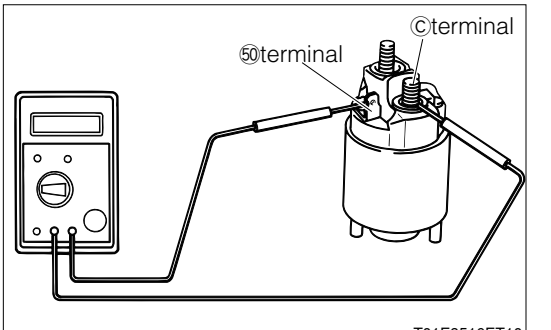


(6) Magnet clutch check

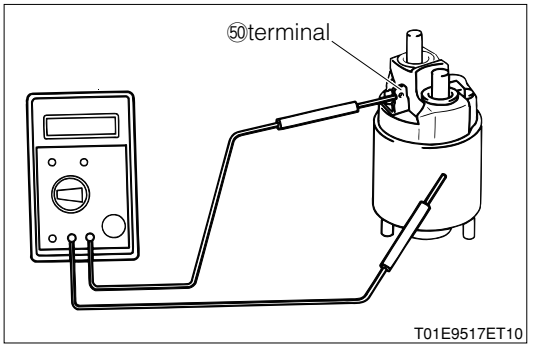
1.When the plunger is pushed in and released, ensure that the plunger returns quickly to the original position.



2.Check continuity between the terminal ⑤⓪ and the terminal Ⓒ.
SPECIFIED VALUE: Continuity exists.

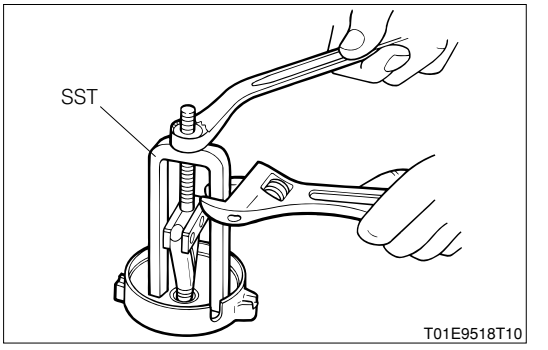


3.Check continuity between the terminal ⑤⓪ and the magnet switch body.
SPECIFIED VALUE: Continuity exists.

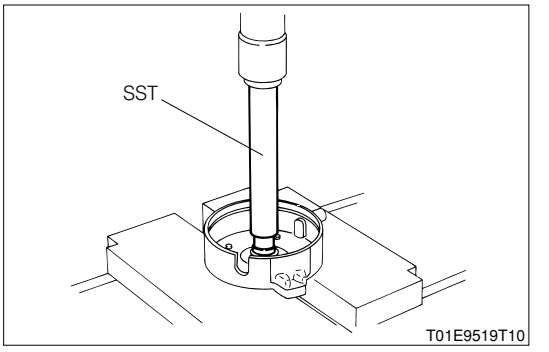


(7) Bush replacement

1.Remove the bush, using the SST.
SST: 09208-87701-000



2.Press the bush, using the SST in combination with a press.
SST: 09608-87302-000



2-3-4 POINTS OF ASSEMBLY

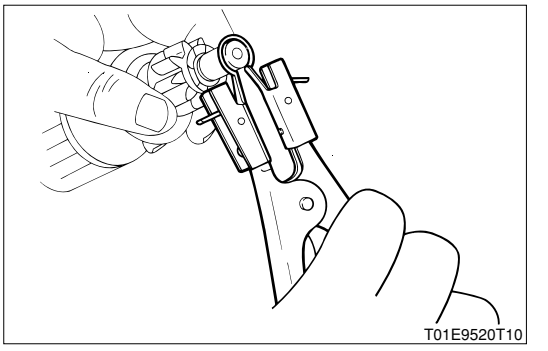
(1) Clutch S/A, starter

1.Apply the high-temperature grease to the inner bearing sections of the starter clutch S/A, shaft spindle, spline contact section, pinion stop nut and snap ring.
LUBRICANT: High-temperature grease

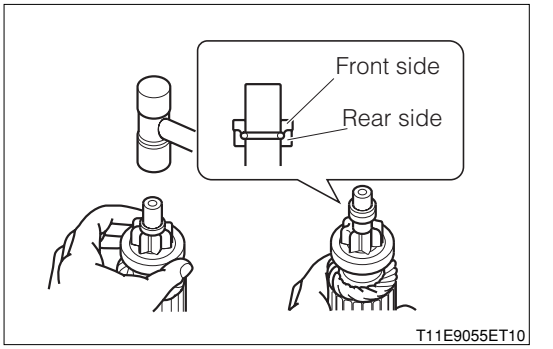
2.Pass the pinion stop nut at the rear side of the starter clutch S/A to the shaft of the starter armature.

(2) Ring,snap

1.Fit the snap ring into the shaft groove section of the starter armature, using circlip pliers or the like.



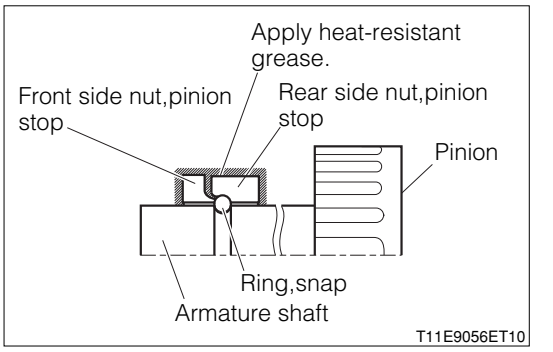
2.While holding the outer periphery of the clutch S/A, lightly tap the forward edge of the rear side shaft of the starter armature, using a plastic hammer so that the snap ring may be fitted into the inner groove of the pinion stop nut.



3.Pass the pinion stop nut at the front side to the starter armature.

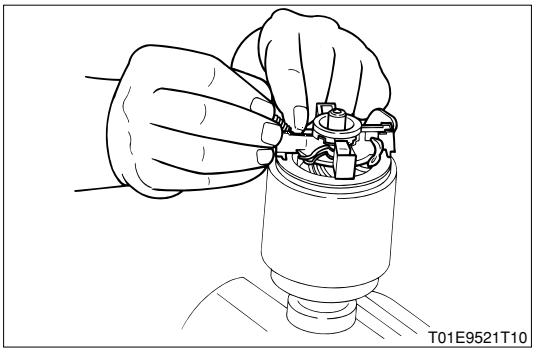
CAUTION

- Install the pinion stop nut to the shaft section of the starter armature, while confirming the correct direction of the pinion stop nut.
  (If the pinion stop nut should be installed in the opposite direction, it would cause abnormal noise.)



(3) Brush, holder

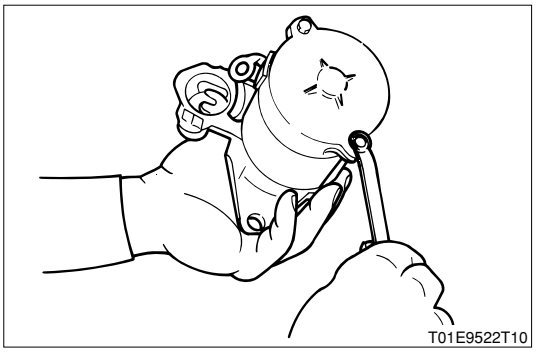
1.Set the spring brush to the brush holder. Then, assemble the insulator.



(4) Frame Ay, commutator end

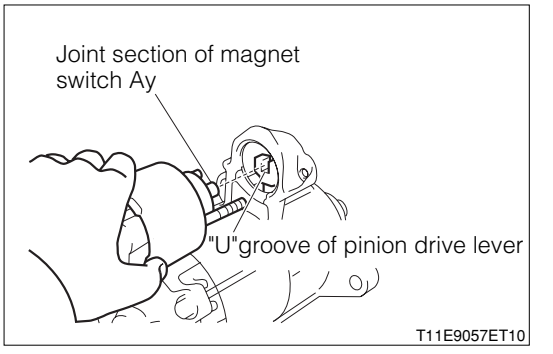
1.Set the starter drive housing Ay, pinion drive lever, starter armature, starter yoke Ay and frame Ay. Assemble them by means of the through bolts.

TIGHTENING TORQUE: 5.9±1.5N·m{60±15kgf·cm}



(5) Switch Ay, magnet

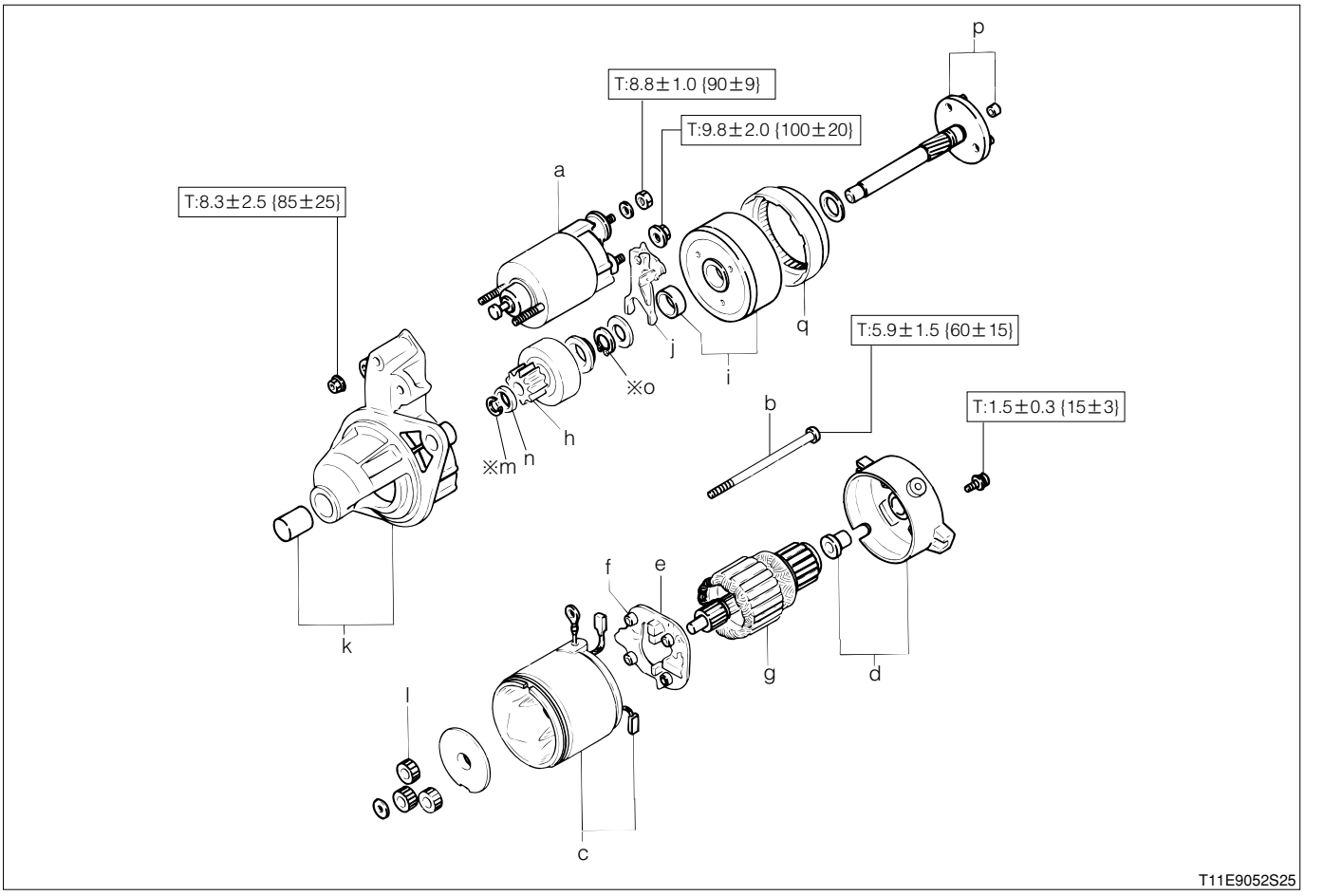
1.The installation should be made firmly with the joint section of the switch Ay fitted into the "U"groove of the pinion drive lever.



2-4 DISASSEMBLING AND ASSEMBLING

2-4-1 DISASSEMBLING AND ASSEMBLING PROCEDURE(1.0 KW TYPE)

(1) Components



Unit: N·m{kgf·cm}

※: Non-reusable parts

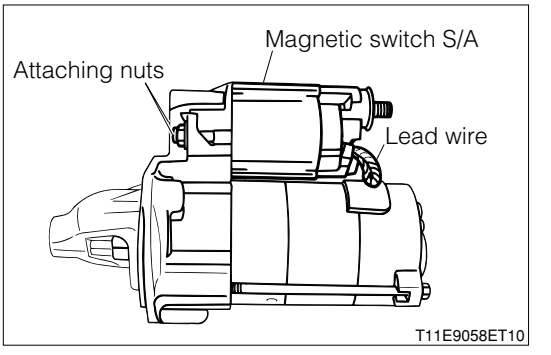
(2) Disassembling and assembling procedure

1 a Switch S/A, magnet
2 b Bolts, through
3 c Yoke Ay, starter
4 d Frame S/A, commutator end
5 e Holder S/A, starter brush
6 f Spring, starter brush
7 g Armature Ay, starter
8 h Clutch S/A, starter
9 i Bearing S/A, center
10 j Lever, pinion drive
11 k Housing Ay, starter drive
12 l Gear, starter planetary
13 m Ring, snap
14 n Nut, pinion stop
15 o Ring, snap
16 p Shaft S/A, starter planet
17 q Gear, starter internal

2-4-2 POINTS OF DISASSEMBLY

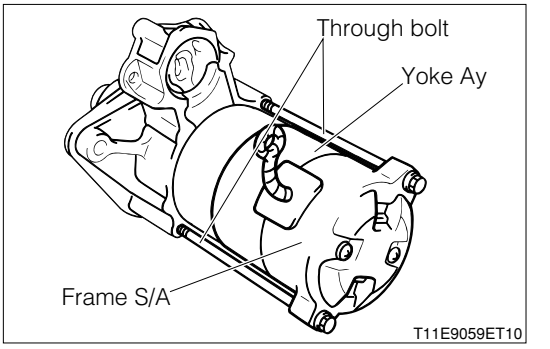
(1) Switch S/A, magnet

1.Remove the switch S/A.



(2) Yoke Ay, starter

1.Remove the two through bolts. Remove the yoke Ay and commutator end frame Ay as a set.

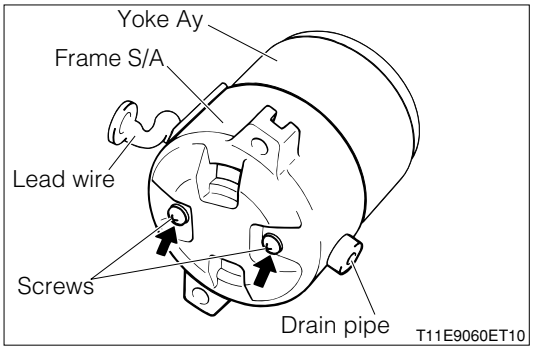


(3) Frame S/A, commutator end

1.Remove the frame S/A.

CAUTION

- Remove the frame S/A in a tilted way. This is necessary because the starter holder S/A and the water drain cover interfere each other inside.
- Remove the lead wire while pushing it toward the yoke Ay side so that it may not be pulled by the frame S/A.

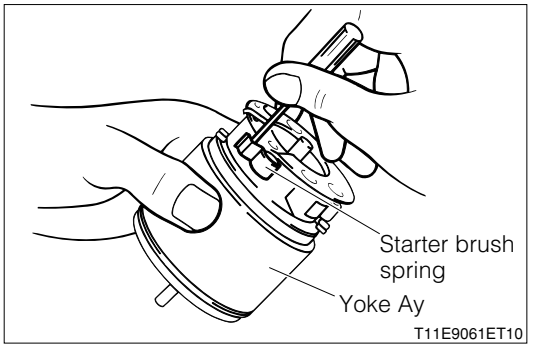


(4) Holder S/A, starter

1.Remove the holder S/A with the following procedure.

(1) Lift the starter brush spring and remove the starter brush.

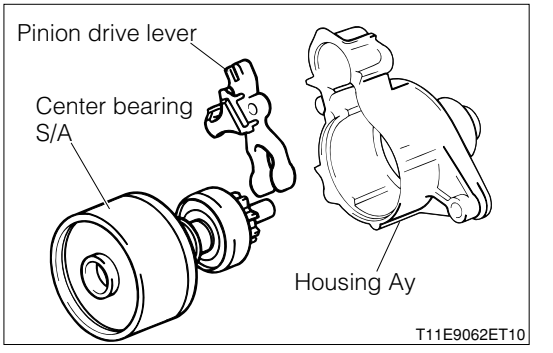
(2) Remove the holder S/A from the starter yoke Ay.



(5) Housing Ay, starter drive

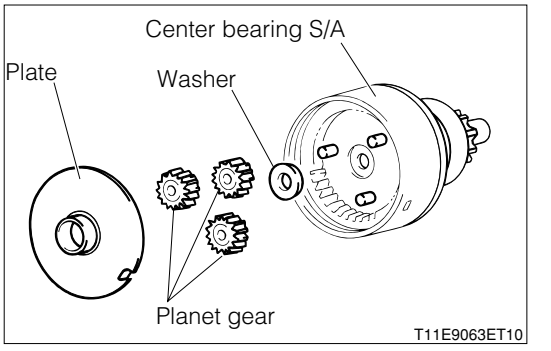
1.Remove the starter armature Ay and the starter clutch S/A.

2.Disassemble the center bearing S/A, pinion drive lever and housing Ay as shown in the right figure.



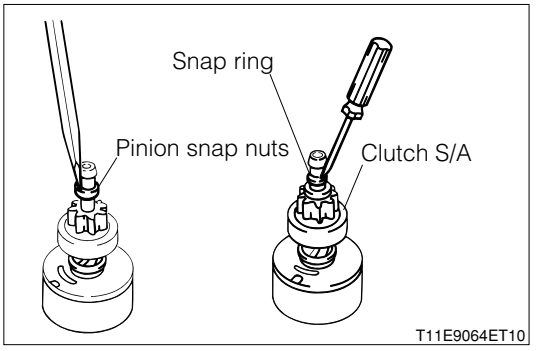
(6) Gear, starter planetary

1.Remove the plate as shown in the right figure and remove the gear (three gears).



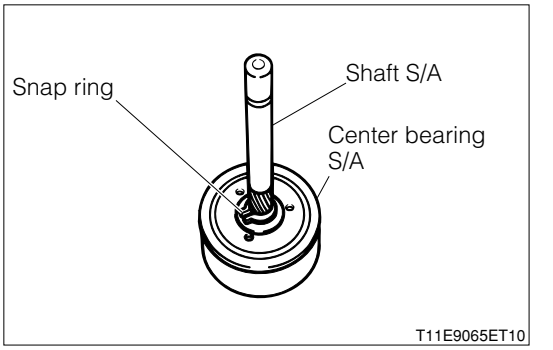
(7) Ring, snap

1.As shown in the right figure, remove the snap ring and pinion stop nut so as to separate the starter clutch S/A.



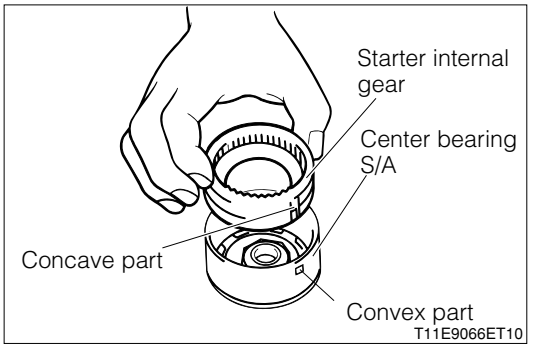
(8) Shaft S/A, starter planetary

1.Remove the snap ring and disassemble the center bearing S/A and shaft S/A.



(9) Gear S/A, starter internal

1.Disassemble the gear with the recessed section at the gear outer periphery aligned with the projected section at the inner periphery of the center bearing S/A.

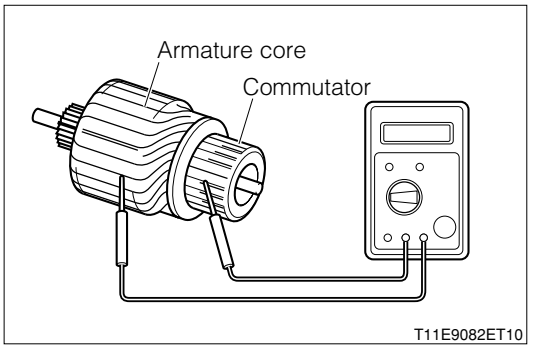


2-4-3 CHECK

(1) Check of starter armature Ay

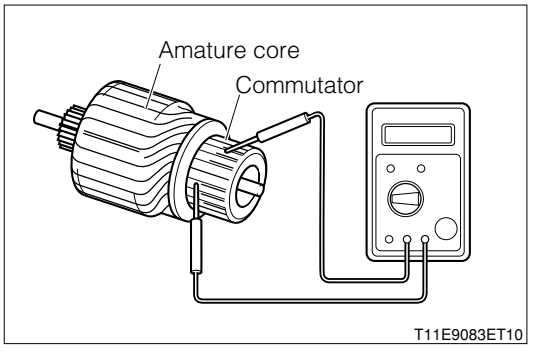
1.Check the insulation between the commutator and the armature core.

SPECIFIED VALUE: No continuity exists

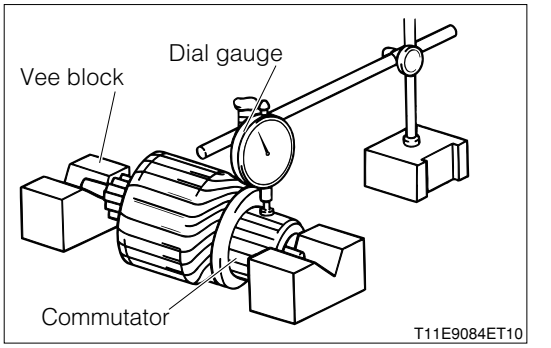


2.Check the continuity between segments.

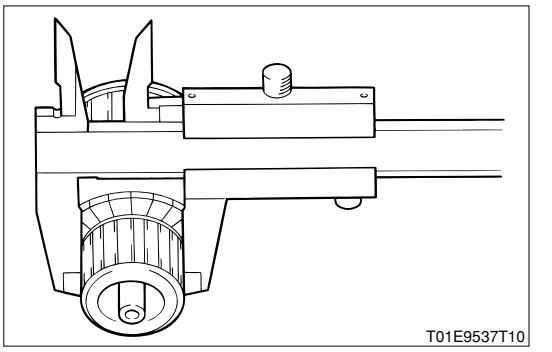
SPECIFIED VALUE: Continuity should exist between the segments.



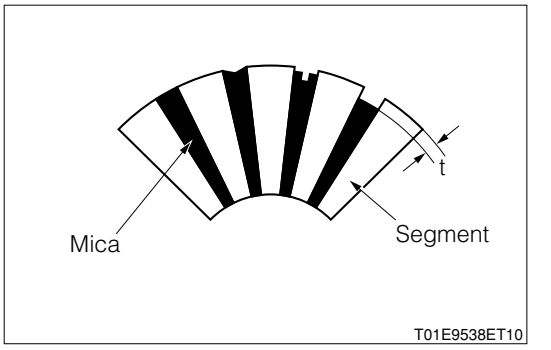
3.Check the commutator for runout.
ALLOWABLE LIMIT: 0.05 mm



4.Measure the outer diameter of the commutator.
SPECIFIED VALUE: 28.0 mm
ALLOWABLE LIMIT: 27.0 mm

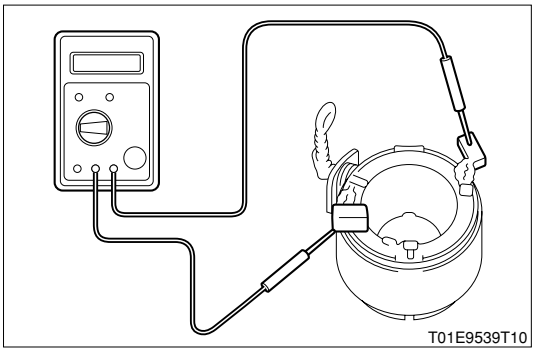


5.Check the under-cut depth of each segment.
SPECIFIED VALUE: 0.60±0.15 mm
ALLOWABLE LIMIT: 0.2 mm



(2) Check of starter yoke Ay

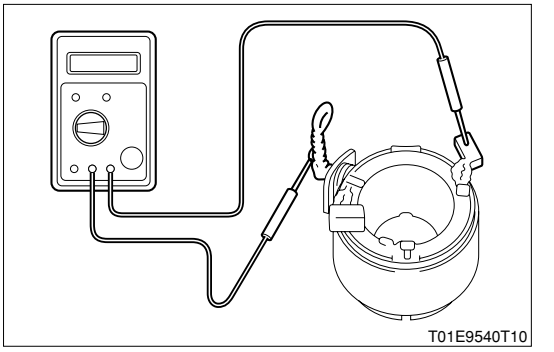
1.Check of field coil
(1) Confirm continuity between the brushes.
SPECIFIED VALUE: Continuity exists



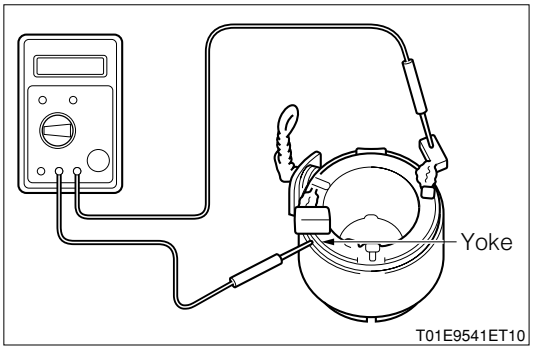
(2) Check continuity between the brush and the C terminal lead wire.
SPECIFIED VALUE: Continuity exists

CAUTION

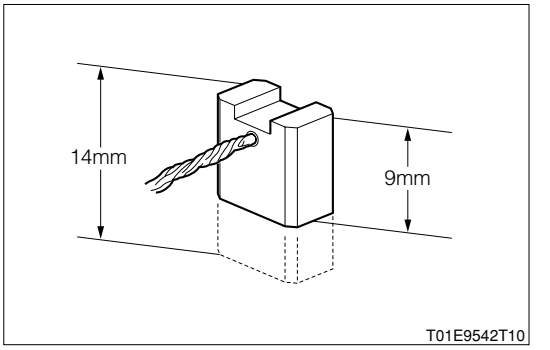
- Check the both brush.



(3) Check the insulation between the brush and yoke.
SPECIFIED VALUE: No continuity exists



2.Check of brush
(1) Check the roughness of the contact surface and brush length.
ALLOWABLE LIMIT: 9 mm

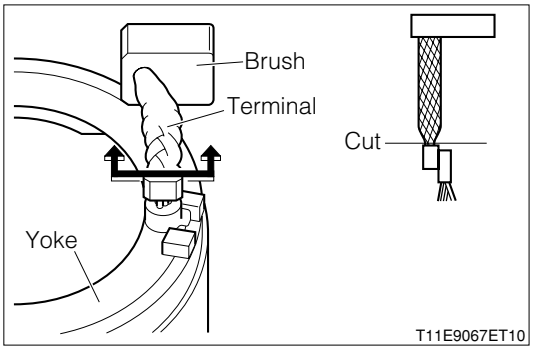


(3) Brush replacement procedure

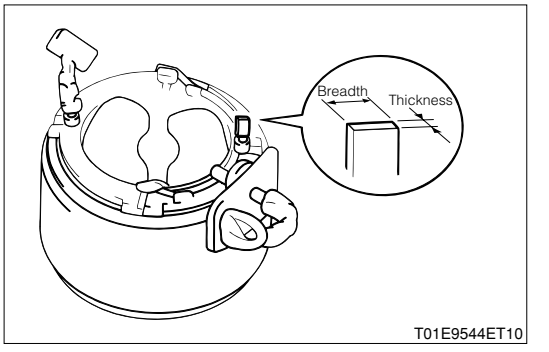
1.Cut the brush lead wire at the terminal side.

CAUTION

- It is possible to replace the two brushes only at the yoke side (⊕ side). As for the ⊖ side brush, however, the replacement can be made only by the brush holder unit.

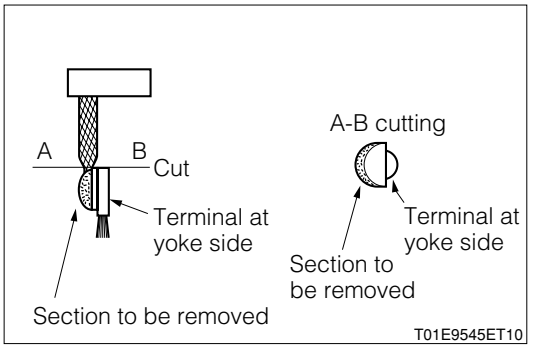


2.Grind the welding trace of the brush terminal by means of a file, etc. so that the terminal may be remedied to the specified dimensions.
SPECIFIED VALUE: Thickness 1.4±0.1 mm
Breadth 5 mm



CAUTION

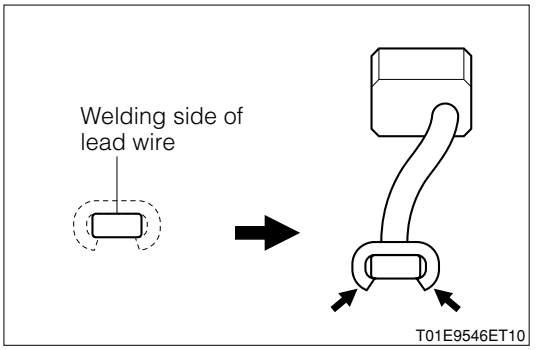
- Grind the area of the brush holder unit. as indicated in the right figure. Since the section to be ground is very narrow, care must be exercised not to scratch the field coil.



3.Overlap the plate section of the replacement brush onto the lead wire fusing side and press-fit the section with pliers.

CAUTION

- Make sure not to make a mistake concerning the removal direction of the brush lead wire.

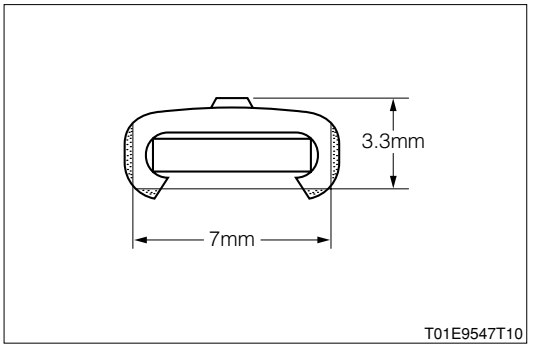


4.Solder the press-fitting section. Grind the area with a file or the like so as to attain the specified dimensions as indicated in the right figure.

TOOL: Soldering iron

CAUTION

- When performing the soldering, thoroughly heat the section to be soldered so that no solder may flow to the positive side lead wire.
- Make sure that the solder flows thoroughly to the inside of the plate.
- Ensure that the solder may not drip onto the field side.

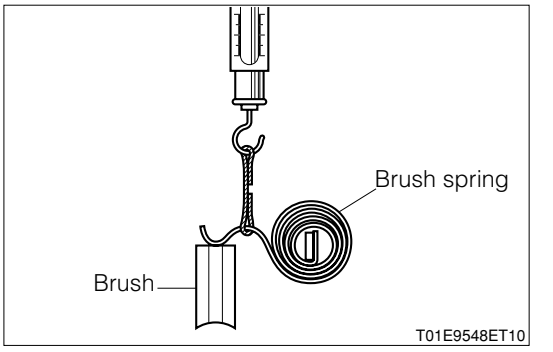


(4) Check of brush spring load

1.Using a spring scale, observe the reading at the moment when the spring separates from the brush.

SPECIFIED VALUE: 15.7±2.0 N·m {160±20 kgf·cm}

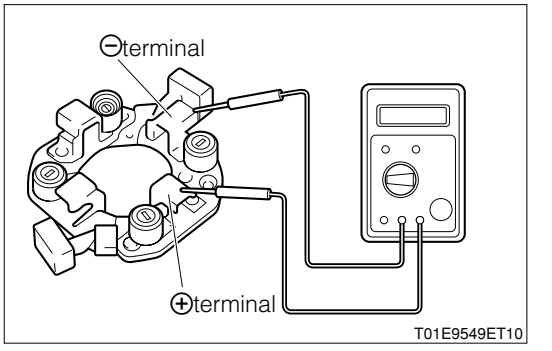
ALLOWABLE LIMIT: 8.8 N·m {90 kgf·cm}



(5) Check of brush holder.

1.Conduct an insulation check between the brush holder at the ⊕ side and the brush holder at the ⊖ side.

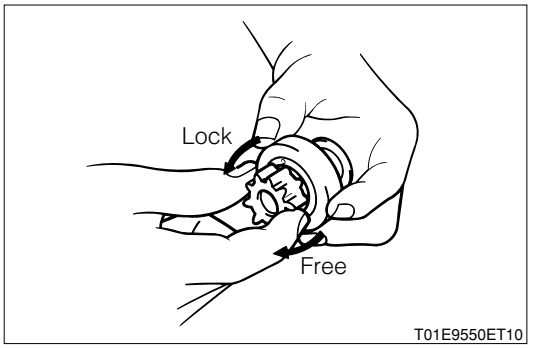
SPECIFIED VALUE: No continuity exists



(6) Check of clutch

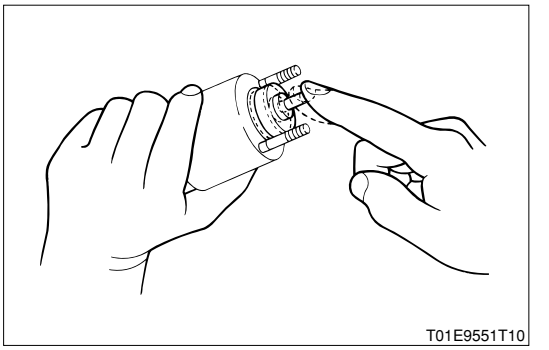
1.Check the gear for wear and damage.

2.Ensure that the gear locks when the gear is turned in the left turning direction (the counterclockwise direction). Furthermore, ensure that the gear turns smoothly when the gear is turned in the right turning direction (the clockwise direction).

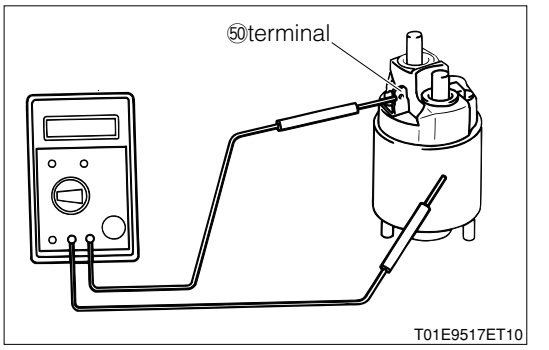


(7) Check of magnet switch

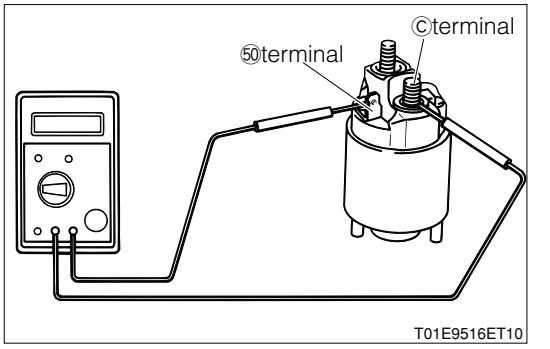
1.When the plunger is pushed in and released, ensure that the plunger returns quickly to the original position.



2.Check continuity between the terminal ⑤⓪ and the magnet switch body.
SPECIFIED VALUE: Continuity exists

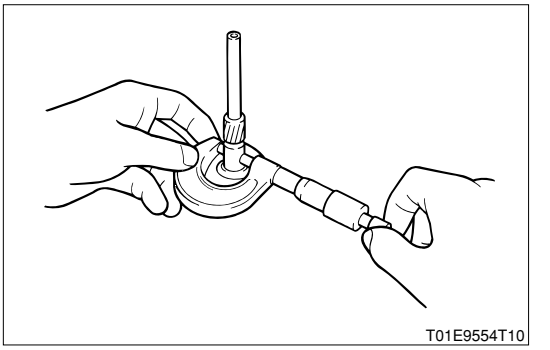


3.Check continuity between the terminal ⑤⓪ and the terminal Ⓒ.
SPECIFIED VALUE: Continuity exists



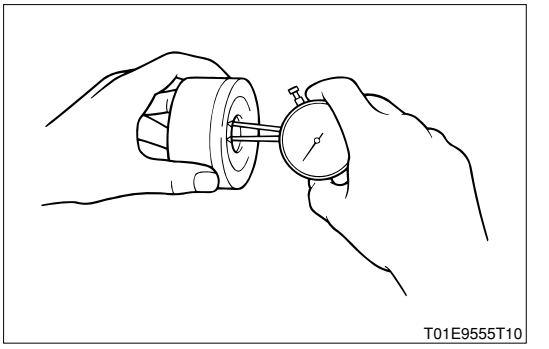
(8) Check of planetary carrier shaft

1.Measure the outer diameter of the center bearing sliding section of the planet carrier shaft.
SPECIFIED VALUE: 15 mm



(9) Bearing S/A bearing clearance check

1.Measure the inner diameter of the bearing S/A. Determine the clearance from the outer diameter of the planet carrier shaft obtained.
If the clearance exceeds the allowable limit, replace the oilless bearing or the planet carrier shaft, as required.
SPECIFIED VALUE: 0.03 mm
ALLOWABLE LIMIT: 0.10 mm



2.Replacement of bearing.

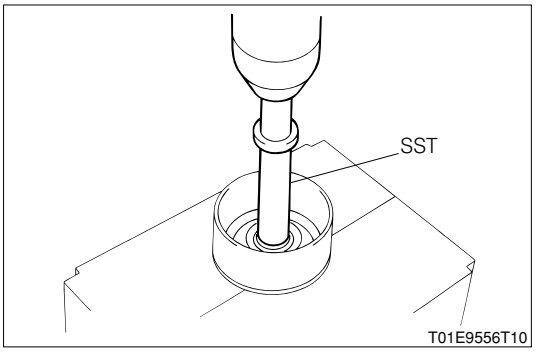
(1) Remove the bearing, using the SST in combination with a press, etc.

CAUTION

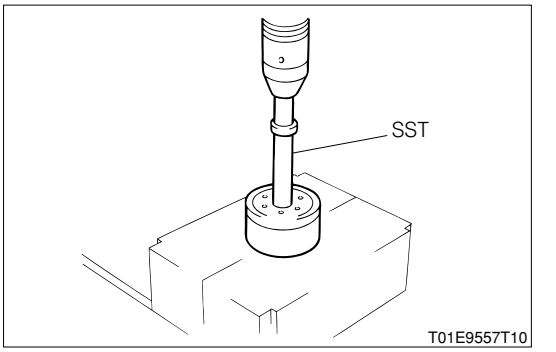
- When removing the bearing, be sure to remove it, starting from the inside, as indicated in the right figure.

NOTE

- The SST is handled by Denso. "95208−10090"



(2) Install a new bearing, using the SST in combination with a press, etc.

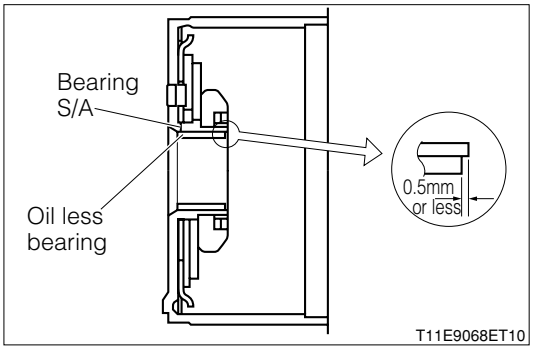


NOTE

- The SST is handled by Denso. "95208−10090"

CAUTION

- When installing the bearing, be sure to install it starting from the outside.
- Drive the bearing into place in such a way that the bearing is 0.5 mm or less in relation to the edge of the center bearing.

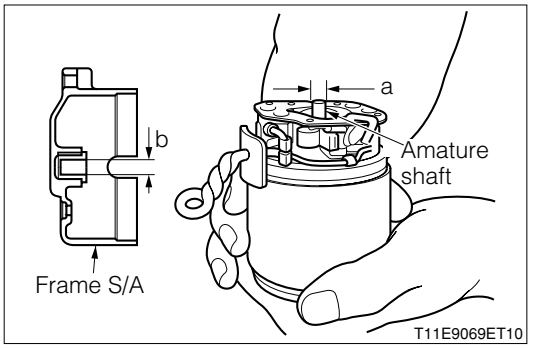


(10) Frame S/A bearing clearance check

1.In the same way as with the bearing S/A bearing clearance, measure the outer diameter a of the armature shaft frame S/A bearing section and the inner diameter b of the frame S/A so as to calculate the clearance. If the limit is exceeded, replace of one of these components.

SPECIFIED VALUE: a:0.035 mm

ALLOWABLE LIMIT: a-b:0.10 mm

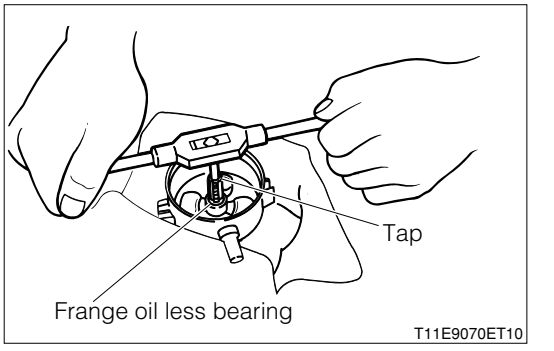


2.Replacement of flange oilless bearing.

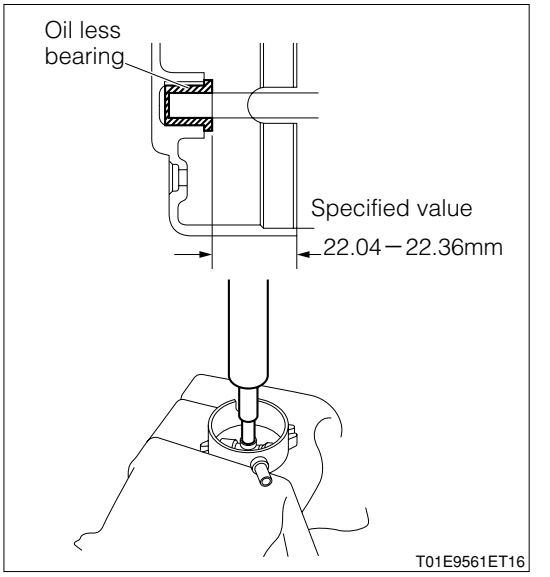
(1) Remove the oilless bearing, using a tap, as indicated in the right figure.

CAUTION

- hen clamping the end frame in a vice, care must be exercised not to deform or damage the fitting section.



(2) Press a new oilless bearing, as indicated in the right figure.

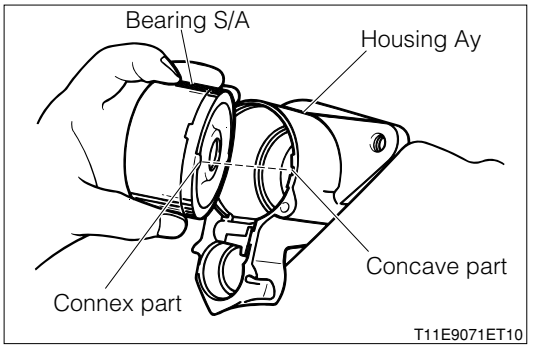


(11) Check of shock absorber of bearing

1.Clamp the flange section of the housing Ay in a vice. Install the bearing S/A, using the guide mark.

CAUTION

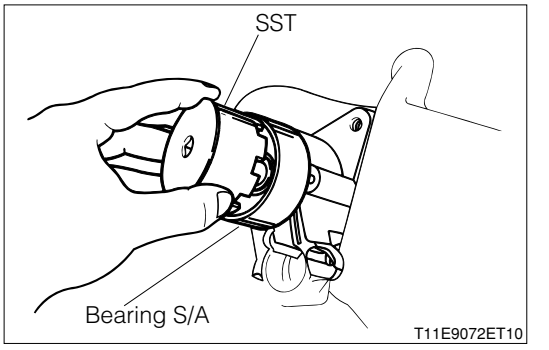
- When clamping the housing Ay in a vice, do not tighten the housing forcibly.
- Assemble the bearing S/A. Confirm that the bearing S/A will not turn.



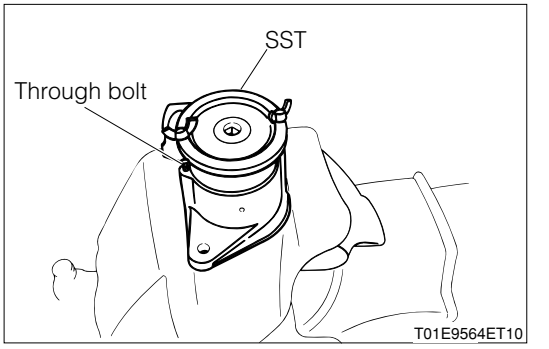
2.Assemble the SST, as indicated in the right figure. Turn the SST slightly so that it may engage with the shock absorber.

NOTE

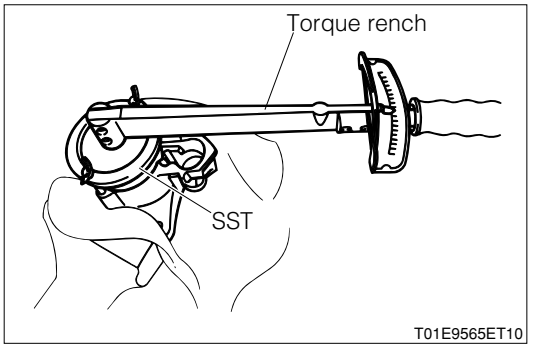
- The SST is handled by Denso. "95208 – 10100"



3.Working from above the bearing S/A, as indicated in the right figure, secure the SST to the through-bolt attaching section of the housing Ay.



4.As indicated in the right figure, using a torque wrench, apply torque through the SST. Observe a sliding torque reading at the moment when the rotation starts.
When the reading is deviated from the allowable limit, the replacement should be made together with the bearing S/A.
SPECIFIED VALUE: 29.4±3.9 N·m {300±40 kgf·cm}
ALLOWABLE LIMIT: 21.6 N·m {220kgf·cm}

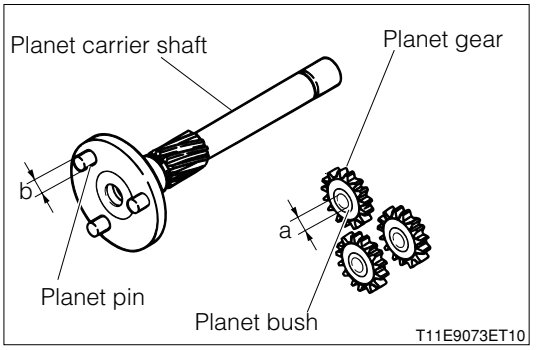


CAUTION
- Never disassemble or wash the shock absorber section. If it has been disassemble or washed, do not reuse it.

NOTE
- The SST is handled by Denso. "95208−10100"

(12) Check of planetary brush oil clearance.

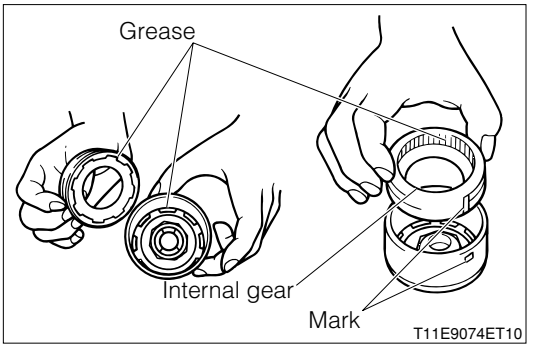
1.Calculate the clearance, based on the planetary diameter (b) press-fitted to the planetary carrier shaft and the planetary bush inner diameter (a).
If the limit is exceeded, replace the planetary gear or the planetary carrier shaft.
SPECIFIED VALUE: 0.03 mm
SPECIFIED VALUE: 0.10 mm



2-4-4 POINTS OF ASSEMBLY

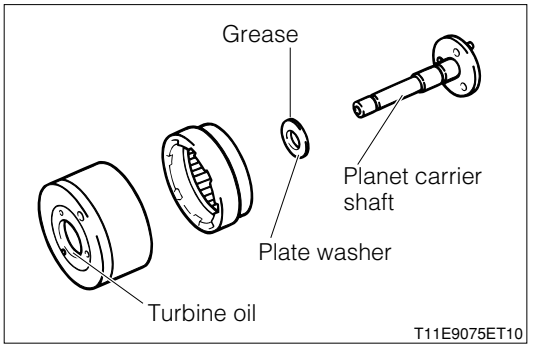
(1) Gear, starter internal

1.Apply high-temperature grease of 2 g or more to the fitting section of the gear and shock absorber as well as to the inner section of the gear, as indicated in the right figure. Perform the assembling with the mating marks aligned.
LUBRICANT: High-temperature grease



(2) Shaft S/A, starter planetary

1.Apply turbine oil to the inner periphery of the center bearing S/A. Apply high-temperature grease to the both sides of the plate washer. After installing it to the shaft S/A, install the center bearing S/A.
LUBRICANT: High-temperature grease

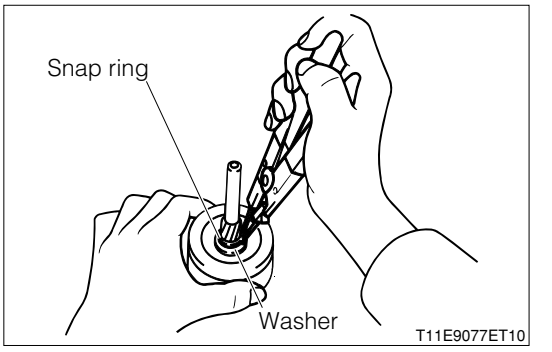


(3) Ring, snap

1.Install a new ring.

CAUTION

- Never reuse the ring.
- Ensure that the plate washer has been installed.



(4) Clutch S/A, starter

1.Remove the clutch S/A with the following procedure.

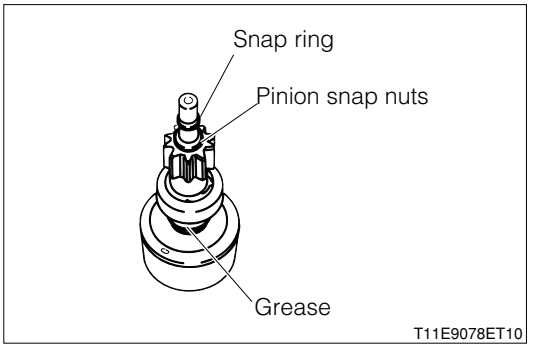
(1) Apply high-temperature grease to the inner periphery bearing section of the starter clutch S/A, shaft spindle, spline contact section, pinion stop nut and snap ring.

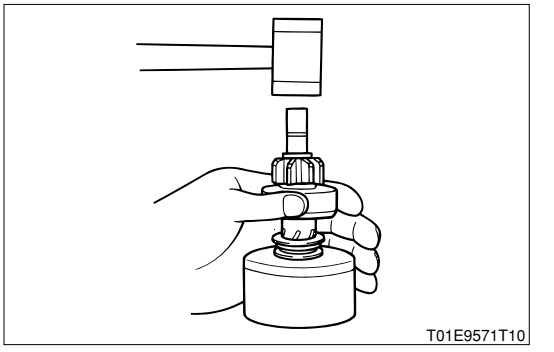
LUBRICANT: High-temperature grease

(2) Pass the rear side pinion stop nut of the starter clutch S/A to the shaft S/A.

(3) Fit the snap ring into the shaft S/A groove section, using circlip pliers or the like.

(4) While holding the outer periphery of the clutch S/A, lightly tap the starter planet gear, using a plastic hammer so that the snap ring may be fitted into the inner groove of the pinion stop nut.





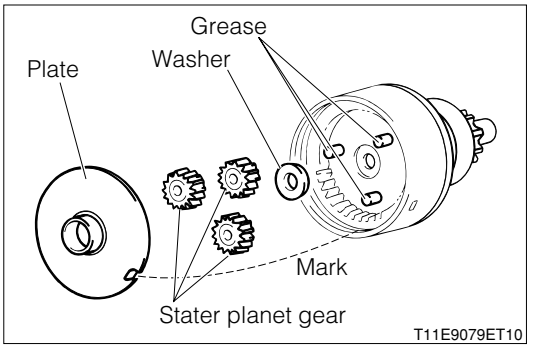
(5) Gear, starter planetary

1.Apply high-temperature grease of 0.5 g or more, as indicated in the right figure. Install the gears (three pieces) and plate washer.

LUBRICANT: High-temperature grease

CAUTION

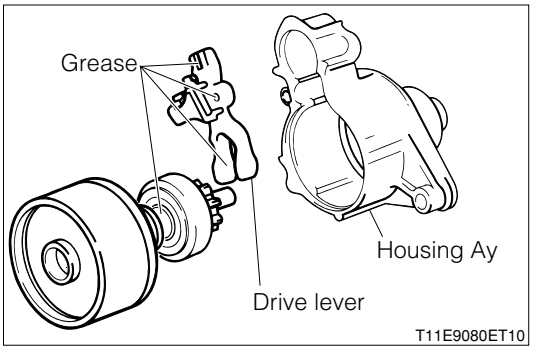
- Install the plate with the mating marks of the center bearing S/A aligned.



(6) Housing Ay, starter drive

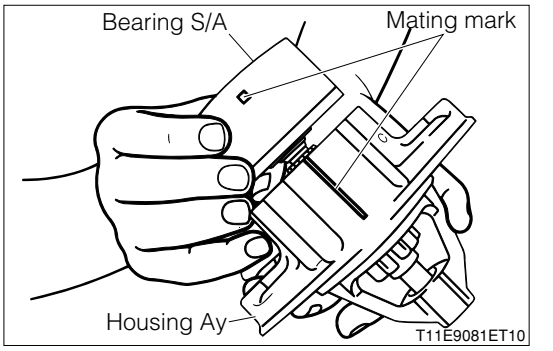
1.Apply high-temperature grease to each contact surface of the pinion drive lever and starter clutch S/A, as indicated in the right figure.

LUBRICANT: High-temperature grease



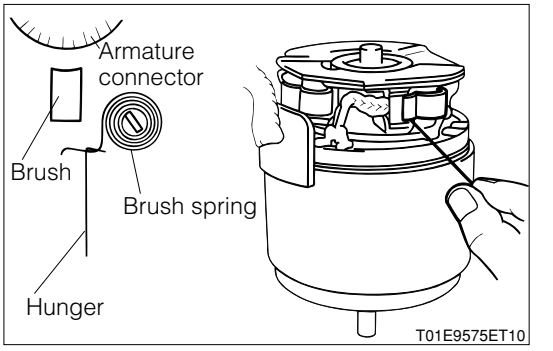
(7) Bearing S/A, center

1.Install the starter drive housing Ay and bearing S/A with the respective mating marks aligned, as indicated in the right figure.



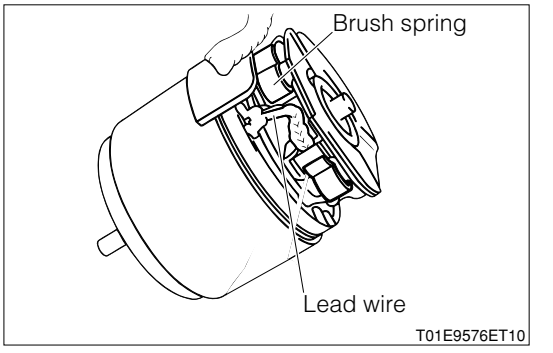
(8) Holder Ay, starter

1.Install the starter brush spring to the holder S/A. Raise the starter brush spring and install the starter brush to the starter armature Ay.



CAUTION

- Make sure that the lead wire of the starter brush is not interfering with the brush spring.



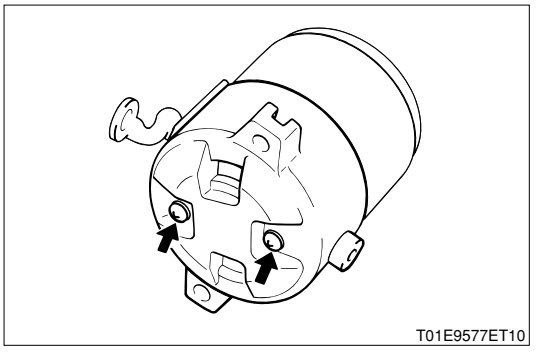
(9) Frame S/A, commutator end

1.Remove the frame S/A.

CAUTION

- Install the frame S/A in a tilted way. This is necessary because the starter holder S/A and the water drain cover interfere each other inside.

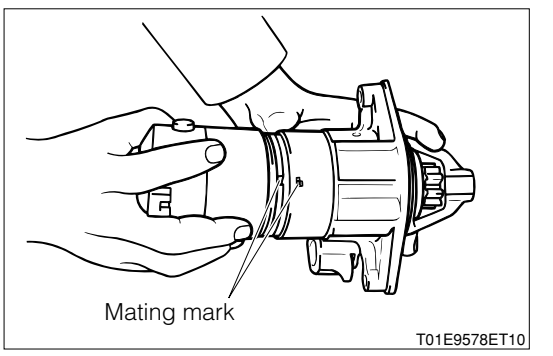
TIGHTENING TORQUE: 1.5±0.3 N·m{15±3 kgf·cm}



(10) Yoke Ay, starter

1.Perform the installation with the recessed section of the yoke Ay, the projected section of the plate, and the projected section of the center bearing S/A aligned. Afterward, install the through bolt.

TIGHTENING TORQUE: 5.9±1.5 N·m{60±15 kgf·cm}



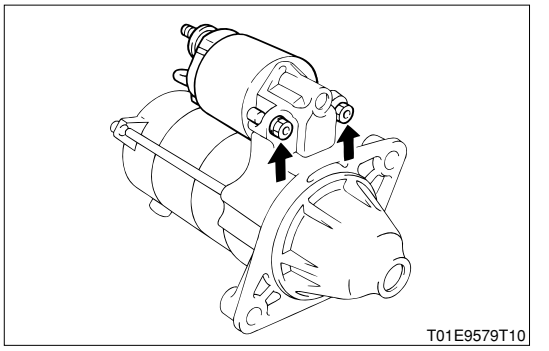
(11) Switch S/A, magnet

1.Hang the stud bolt of the switch S/A from the upper side of the pinion drive lever. Install and secure it with the two nuts.

TIGHTENING TORQUE: 8.3±2.5 N·m{85±25 kgf·cm}

2.Furthermore, install the terminal C of the switch S/A and lead wire.

TIGHTENING TORQUE: 9.8±2.0 N·m{100±20 kgf·cm}



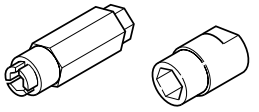
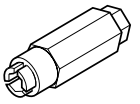
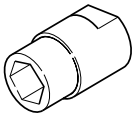
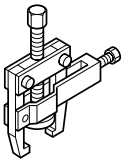
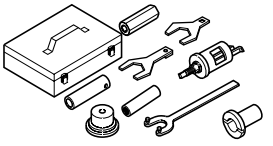
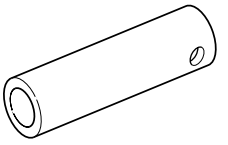
T01E9579T10

3 ALTERNATOR

3-1 DISASSEMBLING AND ASSEMBLING

3-1-1 ARTICLES TO BE PREPARED

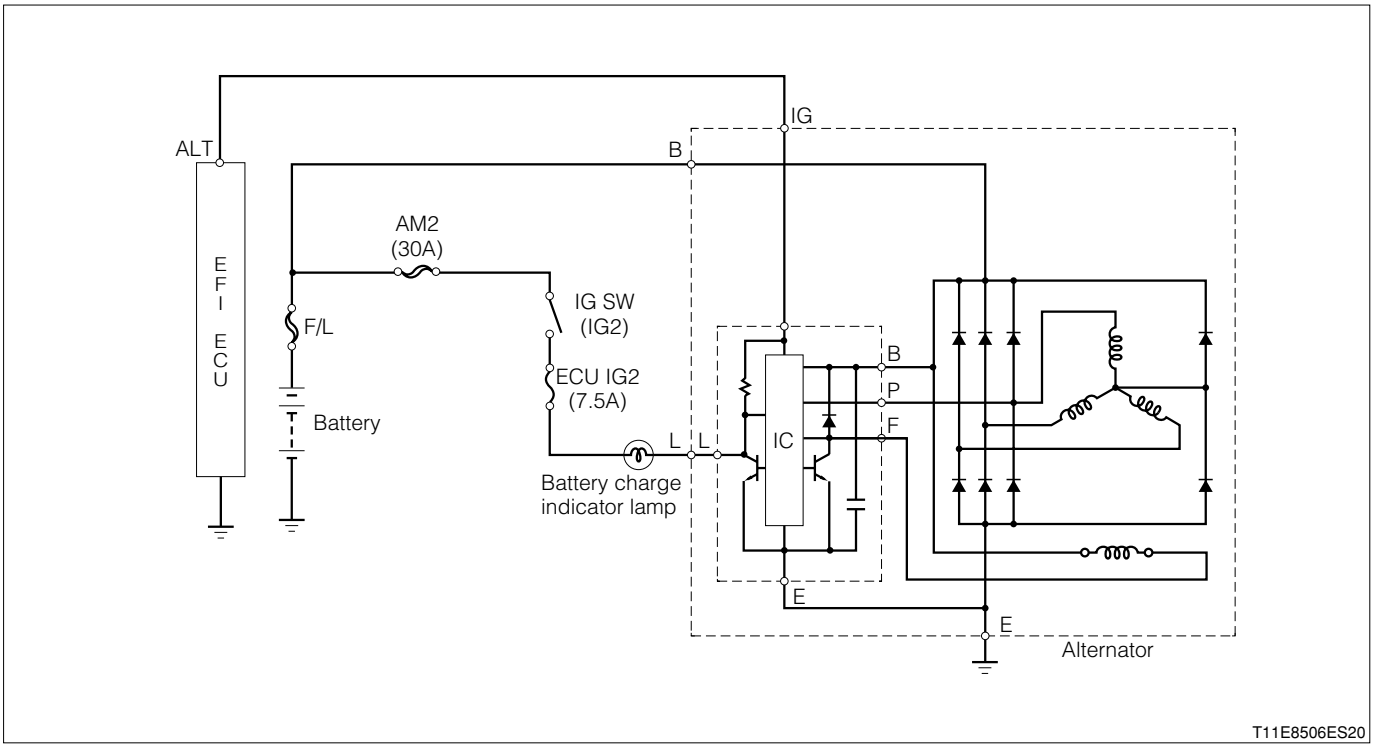
SST

Shape	Part No.	Part name
	09820-87201-000	Wrench set,alternator pulley set nut
	09820-06010-000	Wrench alternator rotor shaft
	09820-87202-000	Wrench alternator pulley set nut
	09820-00021-000	Puller,alternator bearing
	09612-87180-000	Tool set,steering gear housing overhaul
	09612-10061-000	Replacer,steering pinion bearing

Instrument

Torque wrench,Vernier calipers,Voltage tester

3-2 CIRCUIT DIAGRAM

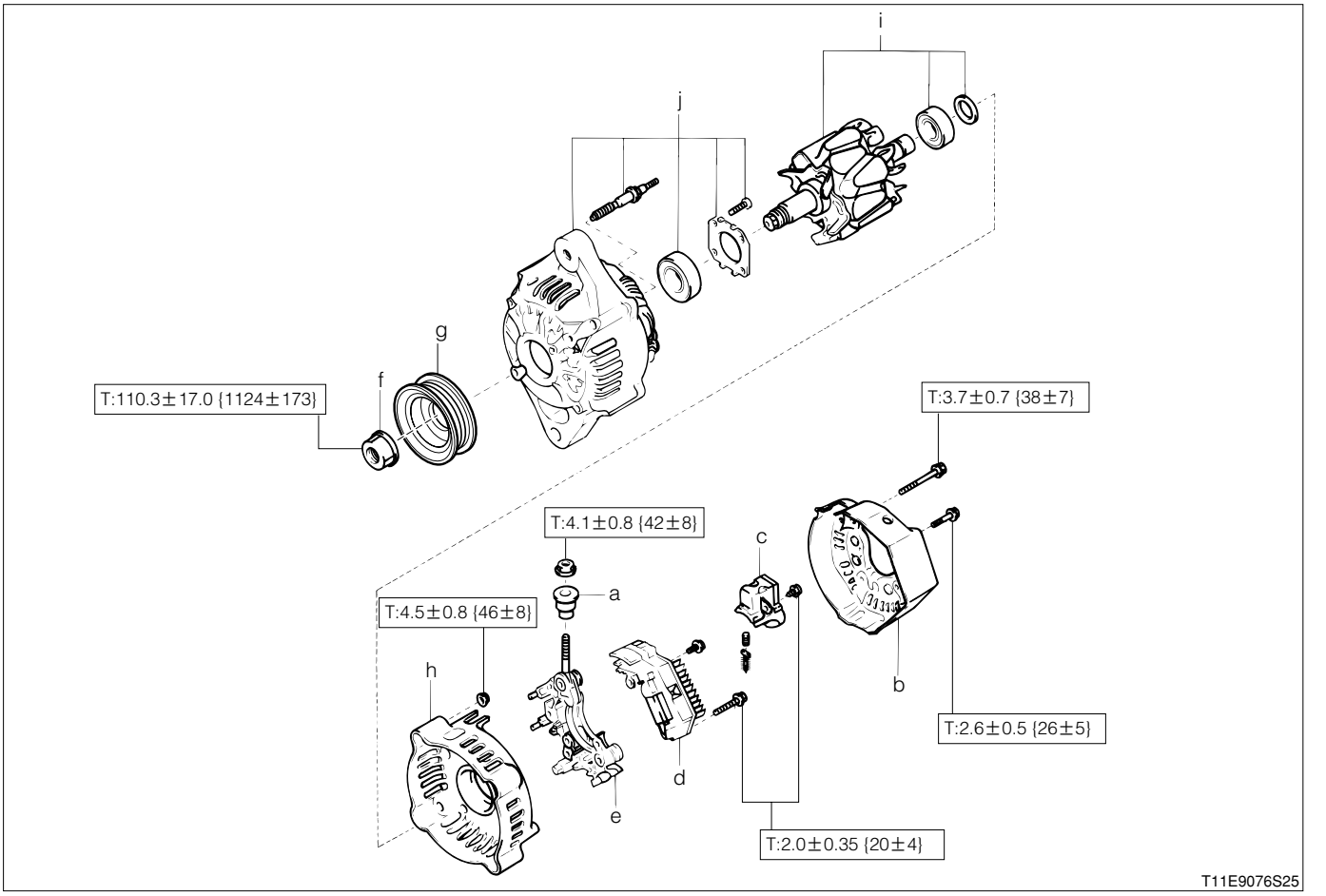


Alternator performance

Engine type / ITEM	1KR-FE
Rated voltage — Rated output (V—A)	12—65
Output characteristics [13.5V—5000rpm] (A)	67 or more
Permissible max. revolution speed (rpm)	18,000
Regulator regulating voltage [5,000rpm—10A—25] (V)	Hi:14.2-14.8 Lo:12.5-13.1
Rotational direction	Clockwise as viewed from pulley side
Pulley ratio [Crankshaft/alternator]	139.0/52.5
Weight (kg)	3.30

3-2-1 ALTERNATOR DISASSEMBLING & ASSEMBLING

(1) Components



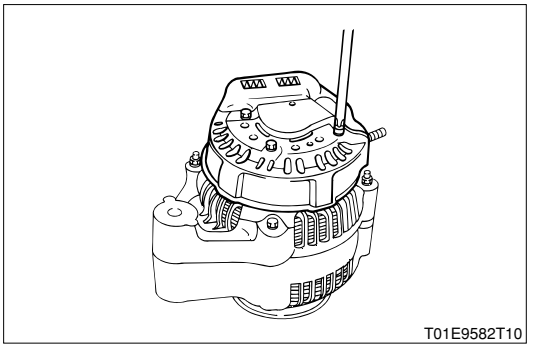
Unit :N·m {kgf·cm}

1 a Insulator, washer terminal
2 b Cover S/A, end, RR
3 c Holder Ay, alternator brush
4 d Regulator Ay, generator
5 e Holder, W/rectifier
6 f Nut, pulley lock
7 g Pulley, alternator
8 h Frame Ay, rectifier end
9 i Rotor Ay, alternator
10 j Frame Ay, alternator drive end

3-2-2 DISASSEMBLING

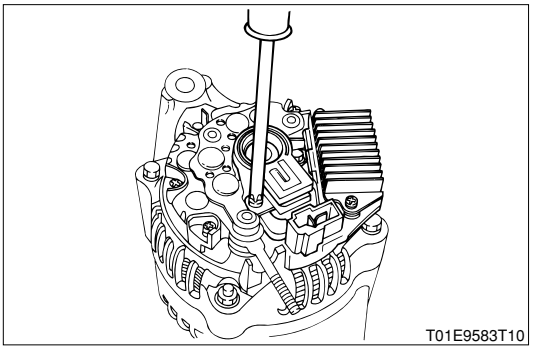
(1) Cover S/A, end, RR

1.Remove the washer terminal insulator.
2.Remove the cover S/A.



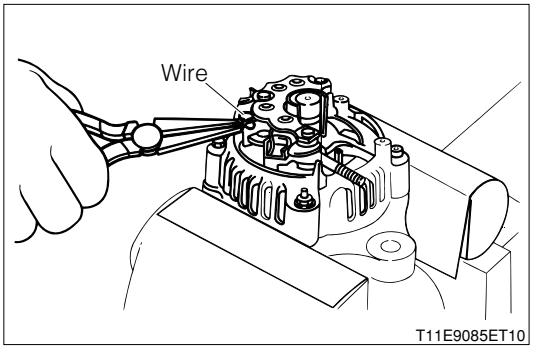
(2) Regulator Ay, generator

1.Remove the alternator brush holder Ay.
2.Remove the generator regulator Ay.



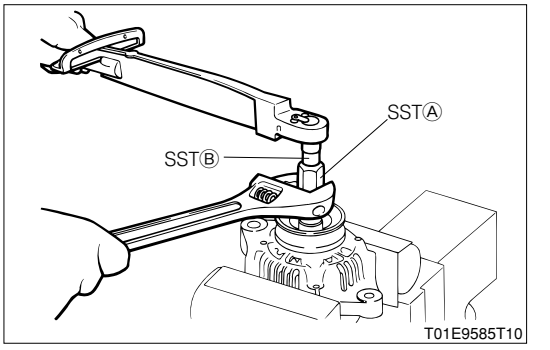
(3) Holder, w/rectifier

1.Remove the screws.
2.Remove the holder W/rectifier by extending the wire.

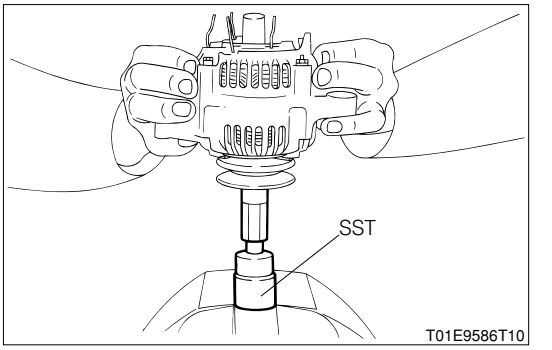


(4) Pulley, alternator

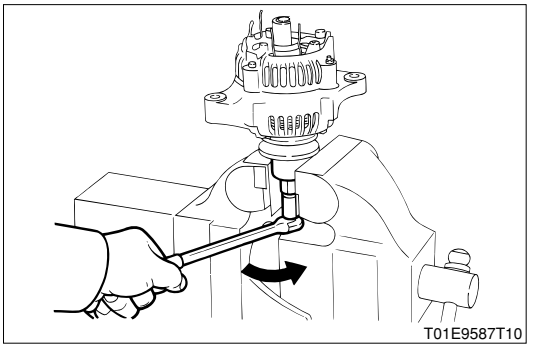
1.Secure the SST Ⓐ to the rotor shaft section by using the SST Ⓑ.
TIGHTENING TORQUE: 110.3N·m{1124kgf·cm}
NOTE
• Attach the SST to the pulley shaft section securely.
SST: 09820-87201-000 [09820-06010-000]: Ⓐ
SST: 09820-87201-000 [09820-87202-000]: Ⓑ



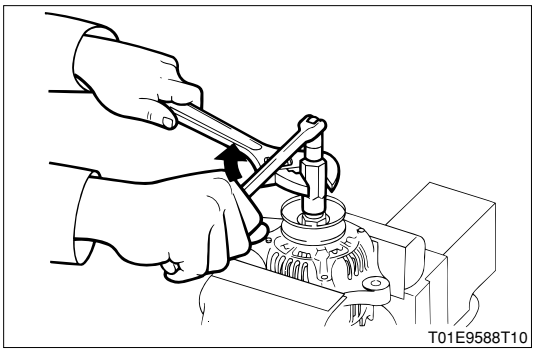
2.Clamp the SST in a vice. Under the state above, set the SST.
SST: 09820-87201-000 [09820-87202-000]



3.Turn the SST Ⓐ in the arrowheaded direction so as to slacken the pulley nut.



4.Turn the SST Ⓑ in the arrowheaded direction so as to remove the SST Ⓑ from the alternator.
5.Remove the alternator pulley.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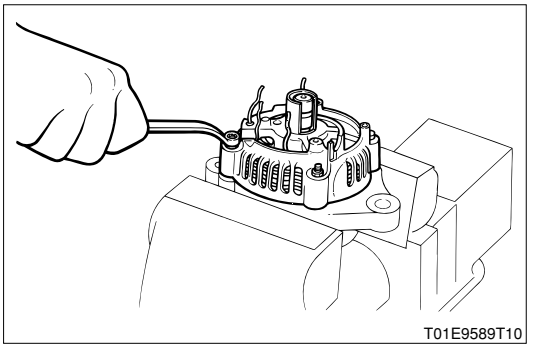
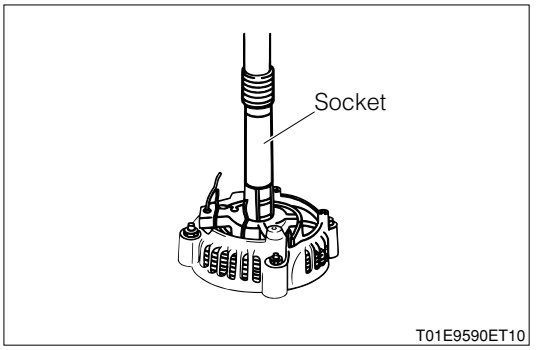
(5) Frame Ay, rectifier end

1.Remove the frame Ay.


T01E9589T10

(6) Frame Ay, alternator drive end

1.Separate the alternator rotor assembly from the frame assembly, using the SST and press.

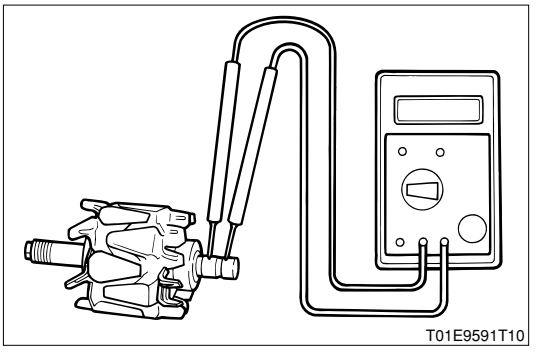


T01E9590ET10

3-2-3 INSPECTION

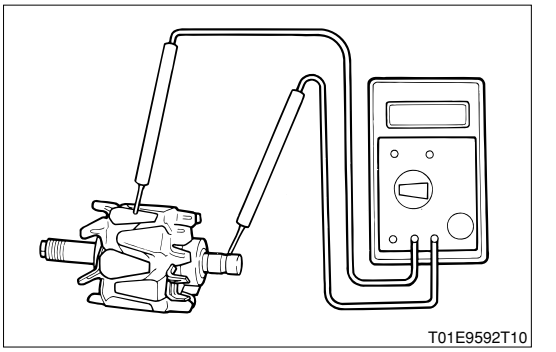
(1) Resistance check of alternator rotor Ay

1.Measure the resistance between the two slip rings.
SPECIFIED VALUE: 2.3Ω


T01E9591T10

(2) Continuity check of alternator rotor Ay

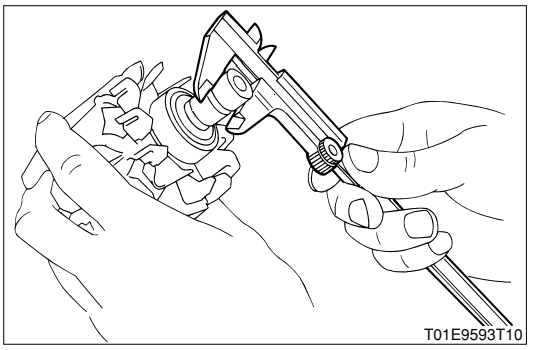
1.Measure the insulation resistance between the slip ring and the rotor core.
SPECIFIED VALUE: No continuity exists


T01E9592T10

(3) Slip ring check

1.Check the slip ring for damage.
If the slip ring exhibits damage, rectify it, using an abrasive paper (#400).

2.Measure the outer diameter of the slip ring.
SPECIFIED VALUE: 14.2−14.4mm
ALLOWABLE LIMIT: 12.8mm

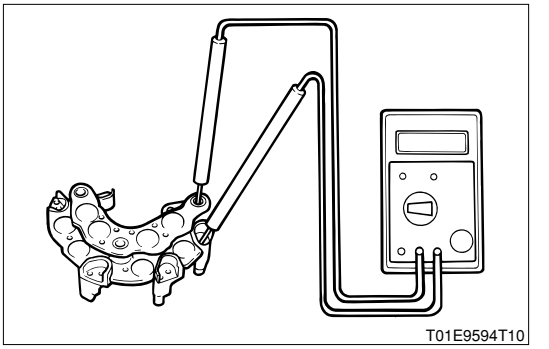


(4) Check of holder W/rectifier

1.Conduct the continuity test, using the kΩ range.
SPECIFIED VALUE: Change the polarity. There should be continuity in one direction, while there should be no continuity in the opposite direction.

CAUTION

- The diode has such a property that it allows current to flow in one direction only.
  When the test is conducted by means of an electrical tester or a circuit tester, a current flows from the internal cell of the tester to the diode.
  The continuity of a diode (good or bad) is judged based on whether or not that current flows. However, the value of resistance varies, for the current being flown differs depending upon testers.

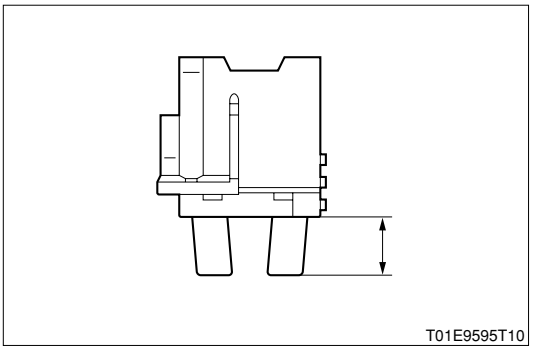


(5) Check of alternator brush

1.Check the brush length.
SPECIFIED VALUE: 9.5−11.5mm
ALLOWABLE LIMIT: 1.5mm

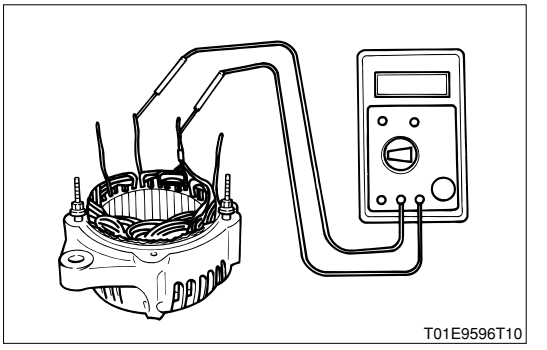
CAUTION

- Replace the brush, if it exceeds the allowable limit.



(6) Stator coil check

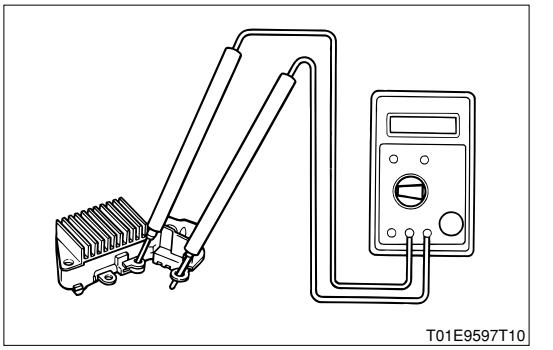
1.Measure the resistance between the phases.
SPECIFIED VALUE: 0.07Ω



(7) Check of regulator Ay, generator

1.Conduct the continuity test for the diode between the terminal B and the terminal F, using the kΩ range of the tester.

SPECIFIED VALUE: There should be continuity in one direction, while there should be no continuity in the opposite direction.



(8) Check of bearing (Rotor Ay, alternator rear side)

1.Check for wear and damage. Lightly turn to check that the part turns without any binding or abnormal noise.

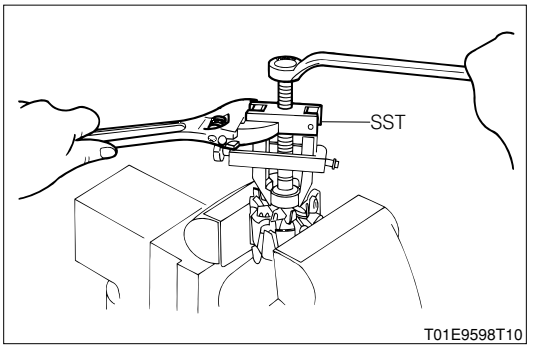
SPECIFIED VALUE: No wear nor damage.
No binding nor abnormal noise.

3-2-4 REPLACEMENT

(1) Replacement of bearing (Rotor Ay, alternator rear side)

1.Remove the bearing, using the SST.

SST: 09820-00021-000

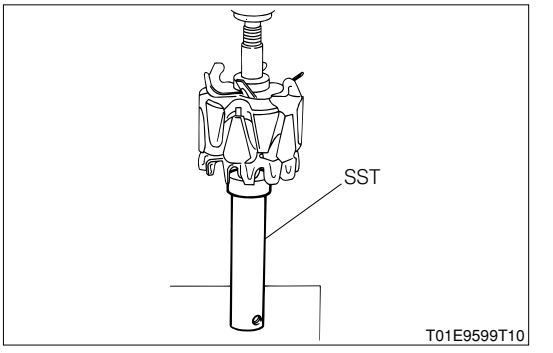


2.Press the bearing, using the SST in combination with a press.

SST: 09612-87180-000 [09612-10061-000]

CAUTION

- Perform the press-fitting at the inner race side of the bearing.



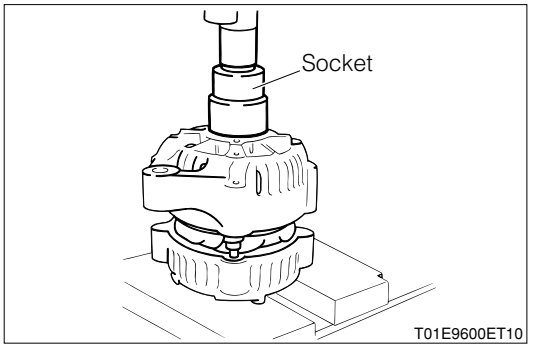
3-2-5 ASSEMBLING

(1) Rotor Ay, alternator

1.Attach the rotor assembly to the drive end frame assembly.

(2) Frame Ay, rectifier

1.Press the rectifier end frame assembly, using a 29 mm socket wrench in combination with a press.



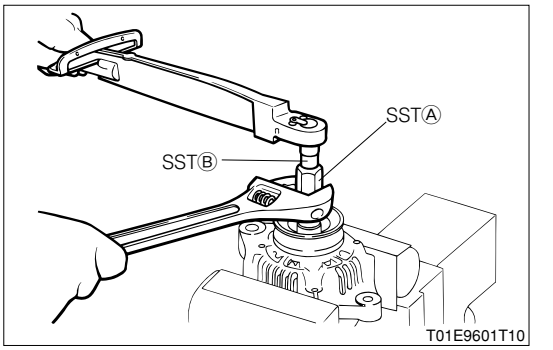
(3) Pulley, alternator

1.Install the pulley to the shaft section of the rotor. Tighten the pulley lock nut temporarily.

2.Tighten the SSTⒷ to the specified torque so that the SSTⒶ may be attached to the pulley shaft.
SST: 09820-87201-000 [09820-06010-000]: Ⓐ
SST: 09820-87201-000 [09820-87202-000]: Ⓑ
TIGHTENING TORQUE: 39 N·m{400 kgf·cm}

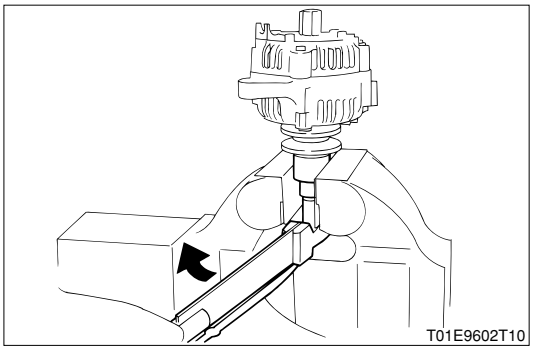
CAUTION

- Make sure that SST is securely installed to the shaft section of the rotor.

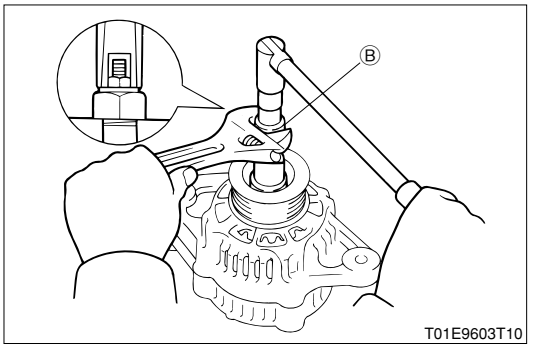


3.Clamp the SST in a vice. Set the alternator and the SST.
SST: 09820-87201-000 [09820-87202-000]

4.Tighten the pulley lock nut by using the SST Ⓐ.
TIGHTENING TORQUE: 110.3N·m {1124kgf·cm}

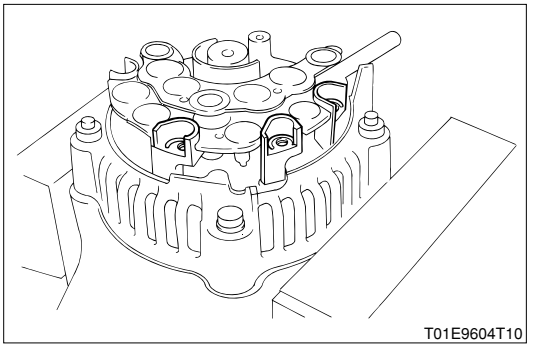


5.Remove the alternator from the SST. Slacken the SST Ⓑ so as to remove the SSTsⒶ and Ⓑ.



(4) Holder, w/rectifier

1.Install the alternator holder with rectifier wire, as indicated in the right figure.



(5) Cover S/A, end, RR

1.Assemble the generator regulator Ay.
2.Assemble the alternator brush Holder Ay.
3.Assemble the cover.
4.Assemble the washer terminal insulator.

TO INDEX

D SERVICE SPECIFICATIONS

MAINTENANS SPECIFIED VALUE---------- D - 1

1 MAINTENANS SPECIFIED VALUE

Cylinder head

			Specified value	Allowable limit	Applicable
Flatness (mm)	Cylinder Block Side		—	0.05	
	Manifold Side	IN	—	0.05	
		EX	—	0.05	
Valve seat	Contact width (mm)	IN	1.0—1.4	—	
		EX	1.0—1.4	—	
	Contact width (degree)	IN	—	20—45—70	
		EX	—	20—45—70	

Camshaft

				Specified value	Allowable limit	Applicable
Deformation(mm)				—	0.03 (runout)	
Cam height (mm)			IN	41.54—41.64	41.44	
			EX	40.97—41.07	40.87	
Thrust clearance (mm)				0.100—0.225	0.24	
Journal diameter (mm)	Camshaft	IN	1J	33.984—34.000	—	
			2—4J	22.949—22.965	—	
		EX	1J	25.979—25.995	—	
			2—4J	22.949—22.965	—	
	Cylinder head	IN	1J	34.025—34.045	—	
			2—4J	23.000—23.021	—	
		EX	1J	26.032—26.052	—	
			2—4J	23.000—23.021	—	
Oil clearance (mm)		IN	1J	0.025—0.061	0.09	
			2—4J	0.035—0.072	0.1	
		EX	1J	0.037—0.073	0.1	
			2—4J	0.035—0.072	0.1	

Valve spring

	Specified value	Allowable limit	Applicable
Squareness (mm)	—	1.5	
Free length (mm)	—	51.63	

Valve

		Specified value	Allowable limit	Applicable
Contact width	IN	$1.30^{+0.4}_{-0.1}$	—	
	EX	$1.26^{+0.35}_{-0.15}$	—	
Stock thickness of valve head	IN	1.25±0.2	0.7	
	EX	1.30±0.2	0.7	
Stem outer diameter	IN	4.97—4.985	—	
	EX	4.965—4.98	—	

Valve guide bush

		Specified value	Allowable limit	Applicable
Bush inner diameter(mm)	IN	5.01—5.03	—	
	EX	5.01—5.03	—	
Stem×Bush of clearance	IN	0.025—0.06	0.08	
	EX	0.03—0.065	0.1	

Cylinder block

	Specified value	Allowable limit	Applicable
Head for deformation (mm)	—	0.05	
Polish thecylinder head surface(The block height)(mm)	—	257	
Cylinder of ellipes (mm)	—	0.02	
Cylinder degree of taper (mm)	—	0.02	
Cylinder inner diameter (mm)	71.000—71.013	71.013	

Piston/Piston ring

		Specified value	Allowable limit	Applicable
Oil clearance(Cylinder×Piston)(mm)		0.08－0.103	0.103	
Oil clearance(Piston×Pin)(mm)		0.005－0.011	－	
Piston ring groove-to-ring clearance (mm)	Compression No.1	0.02－0.07	0.07	
	Compression No.2	0.02－0.06	0.06	
	Oil	0.02－0.065	0.065	
Ring end gap (mm)	Compression No.1	0.20－0.30	0.79	
	Compression No.2	0.40－0.60	0.75	
	Oil	0.10－0.40	0.69	
Piston outer diameter(mm)		70.915±0.05	－	
Piston pin outer diameter(mm)		17.999－18.002	－	
Piston pin installation position diameter (mm)		18.007－18.01	－	

Connecting rod

	Specified value	Allowable limit	Applicable
Thrust clearance (mm)	0.10－0.30	0.35	
Oil clearance (mm)	0.016－0.042	0.045	

Crankshaft

		Specified value	Allowable limit	Applicable
Thrust clearance (mm)		0.02－0.22	0.3	
Oil clearance (mm)		0.021－0.046	0.046	
Check of bend (mm)		－	0.03(runout)	
Check of journal wear (mm)	True ovality	－	0.003	
	Degree of taper	－	0.003	
Check of pin section wear	True ovality	－	0.003	
	Degree of taper	－	0.003	

FOREWORD

This manual describes the service procedure for Type 1KR-FE engine. It is expected that you make the most of this manual so that accurate and prompt operations may be assured always in your check and maintenance works.
Furthermore, the engine tune-up and in-vehicle service are explained in the Service Manual by Vehicle Models, Servicing Section. Please use that manual along with this manual.

This manual explains the specifications and construction as of November 2004.
Hence, refer to the reference materials given below, as required.
Moreover, it should be noted that some of the entry items may not apply to the latest vehicles due to improvements that may be made afterward.

Published in November, 2004

REFERENCE

MANUAL NAME	MANUAL NO.	PUBLISHED
SIRION(M300 series) TECHNICAL INFORMATION	No.9402	November, 2004
SIRION(M300 series) SERVICE MANUAL	No.9890	November, 2004

No.9893

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DAIHATSU MOTOR CO., LTD.

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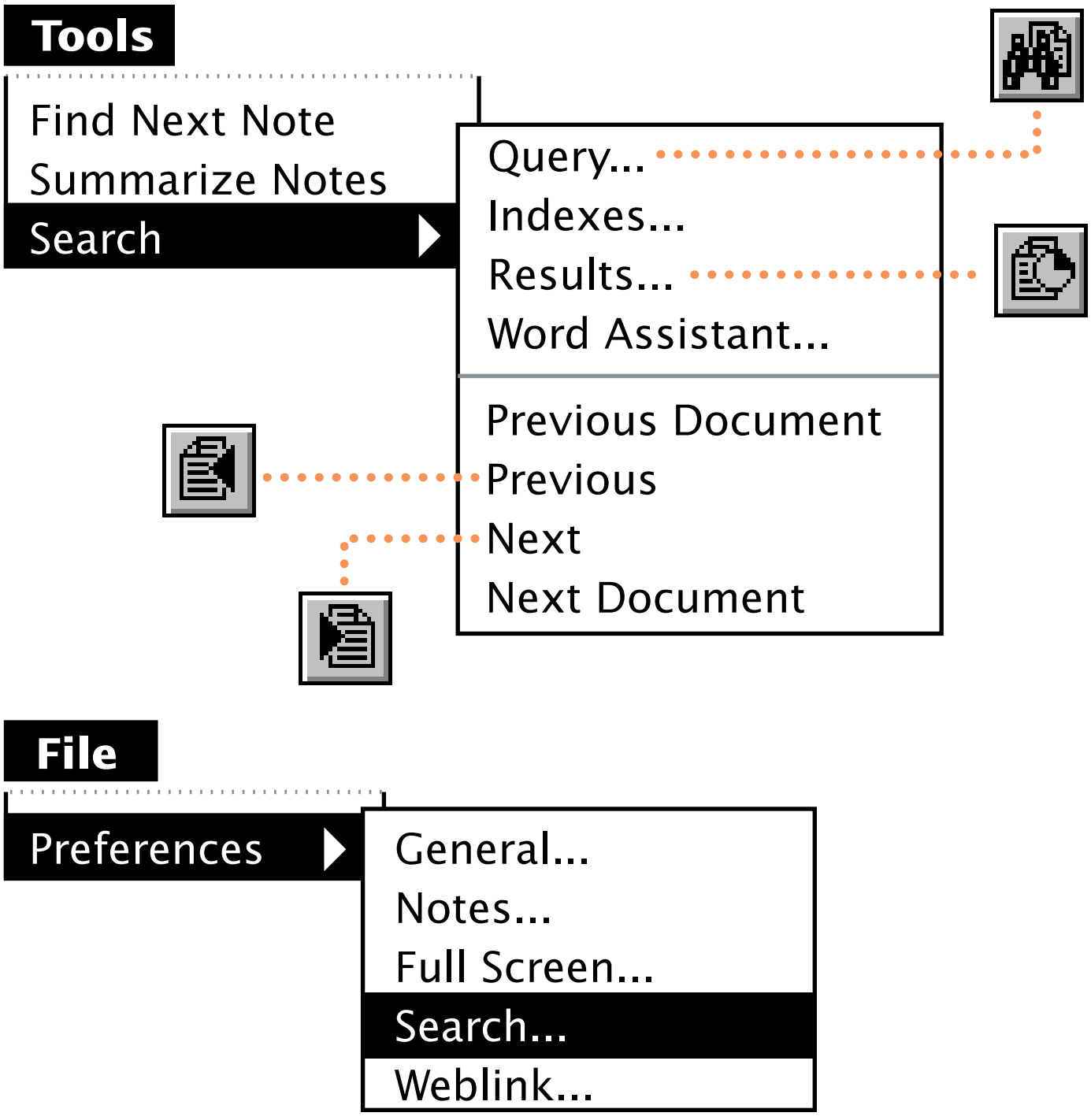
B. ENGINE UNIT B
C. ENGINE ELECTRICAL C
D. SERVICE SPECIFICATIONS D

Adobe® Acrobat® Search

Online Guide

- Tools and commands
- Using Acrobat Search
- Selecting indexes to search
- Defining search queries
- Viewing documents returned from a search
- Troubleshooting

Tools and commands



Using Acrobat Search

You use the Search command in Acrobat Exchange or Acrobat Reader to perform full-text searches of PDF document collections indexed with Acrobat Catalog. The Search command also has powerful tools for limiting and expanding the definition of the term for which you are searching.

A *full-text* index is a searchable database of all text in a document or collection of documents. Searches of full-text indexes are very quick; by contrast, the Find command works with a single document and reads every word on every page, a much slower process.

Searching a full-text index

Expanding a search

Limiting a search

Changing search preferences

Searching a full-text index

Performing a search is a four-step process:

1 Select the indexes you want to search.

2 Define a search query, and list documents that match the query. (A *search query* is text and other items that define the information you want.)

3 Choose documents to view from the list.

4 View occurrences of the text in the documents.

Instructions for performing these steps follow.

To perform a full-text search:

1 Choose Tools > Search > Indexes to list the document-collection indexes currently selected, add or deselect indexes as necessary, and click OK. For details, see **Selecting indexes to search**. ➤

2 Choose Tools > Search > Query or click the Search Query button on the toolbar to open the Search window. Type the text you want to find in the Find Results Containing Text box, and click Search.

The text can be a single word, a number, a term, or a phrase. (For details, see **Searching for a term or phrase**.) When you click Search, the Search window is hidden and documents that match your search query are listed in rank order in the Search Results window.

3 Double-click a document that seems likely to contain the relevant information, probably the first document in the list. (For details, see **Interpreting relevance ranking**.) The document opens on the first match for the text you typed. ➤

4 Use the Search Next button and Search Previous button to go to other matches in the document. Or choose another document to view. See **Viewing documents returned from a search** for details.

Alternatively, redefine the query by typing new text or by using other techniques to **expand the search** to more documents or to **limit the search** to fewer documents. If you want to do this without having to redisplay the Search windows, **change the default preference** that hides it "on view." ■

Expanding a search

If a search returns too few documents or no documents at all, make sure you are searching the appropriate indexes. Also, make sure that settings left over from a previous search aren't limiting the current one.

Then try any of these query techniques:

- **Wild-card** characters in the search text increase the number of matches for the text.
- A Boolean **OR** operator between two words returns documents containing either word.
- The **Word Stemming option** finds words that share a stem with a search word.
- The **Sounds Like option** finds different spellings of proper names.
- The **Thesaurus option** finds words that have meanings similar to the meaning of a search word.

For details, see **Defining search queries**.

Limiting a search

If a search returns too many documents or provides too many matches in individual documents, try any of these query techniques:

- **Refining** a search confines it to documents returned by a previous search, which may be a small set of the documents actually indexed.

- A Boolean **NOT** operator before a word excludes documents containing the word.

- A Boolean **AND** operator between two words returns only documents containing both words.

- The **Proximity option** limits AND searches so that words must be close to each other—within three pages or fewer.

- The **Match Case option** finds text only when it has the same capitalization as the text you type.

- Using **Document Info** field values returns only documents with those values.

- Using a **date range** returns only documents created or modified within that range.

For details, see **Defining search queries**. ■

Changing search preferences

You may need to change the default settings in the **Search Preferences dialog box** illustrated on the following page.

To change search preferences:

1. Choose File > Preferences > Search.
2. Change preferences in the dialog box as necessary.
3. Click OK.

Search Preferences dialog box

Click any preference for information on that preference. The illustration shows the default settings.

The Automount servers preference is available only on a Macintosh.

Selecting indexes to search

Choosing Tools > Search > Indexes lists the available indexes. On a Macintosh, the list may also include indexes on currently unavailable file server volumes or CD-ROMs.

To be searchable, an index must be in the search list and it must be selected. When you add an index to the list, it is automatically selected. You can deselect or reselect it for specific searches or remove it from the list altogether. You can view a description of any index in the list.

Opening a PDF document associated with an index automatically makes the index searchable. See the **Acrobat Exchange Guide** for details. ➤

To add an index to the search list:

1 Choose Tools > Search > Indexes. (If the Search window is open, click the Indexes button in it instead.)

2 Click Add.

3 Locate and select the index you want to use. Acrobat index-definition filenames usually end with .pdx.

4 Double-click the name of the index you want to use. The new index is added to the search list.

To select or deselect an index:

In the Index Selection dialog box, click the box of any index whose status you want to change and click OK.

Note: *Dimmed indexes are currently unavailable for searching, usually because the network connection has been lost. See* **Troubleshooting** *for more information.* ➤

To remove an index from the search list:

1 In the Index Selection dialog box, highlight the name of the index you want to remove.

2 Click Remove.

3 Click OK.

To view a description of an index:

1 In the Index Selection dialog box, highlight the name of the index you want information about.

2 Click Info to view the information.

3 Click OK. ■

Defining search queries

You can search for a word, a number, a term, or a phrase made up of several terms. You can also use the other techniques listed below to define a search query.

Searching for a term or phrase

Searching with wild-card characters

Refining a search

Searching with Document Info fields

Searching with document creation and modification dates

Using search options (Word Stemming, Sounds Like, Thesaurus, Match Case, Proximity)

Searching with Boolean expressions (AND, OR, and NOT)

Searching for a term or phrase

To find matches for a single term, type the term in the text box labeled Find Results Containing Text and click Search. The term can be a word, a word with **wild-card** characters, or any combination of letters, numbers, and symbols.

To find matches for a phrase, type the phrase and click Search.

- If the phrase includes the word *and*, *or*, or *not* used in its ordinary sense (not as a **Boolean operator***)*, put the phrase in quotes. The search phrase

  “once or twice”

finds all occurrences of the phrase *once or twice*, not all occurrences of *once* and all occurrences of *twice* as it would without the quotes. ➤

- If the phrase includes punctuation (other than the apostrophe) or special characters such as @ and *, they are ignored. For example, either of the terms

  son-in-law, son in law

  finds all occurrences of both *son-in-law* and *son in law.*

- When a word such as *an* or *the* is excluded from an index, you cannot search for the word or for a phrase that includes it. The author of the index can give you a list of such stopwords and tell you whether numbers have been excluded.

For more information about phrases in quotes, ignored characters, stopwords, and excluded numbers, see **Working around stopwords and other exclusions**. ■

Working around stopwords and other exclusions

If you are unsuccessful searching for a phrase that includes a common word such as *to* or *that*, it may be a *stopword*.

If the unsuccessful search phrase includes a number, numbers may also have been excluded from the index.

If you are unsuccessful searching for an alphanumeric term that includes a separator character such as a symbol or mark of punctuation, it is probably because numbers also have been excluded. Acrobat Catalog regularly excludes separator characters from indexes, and in the process sometimes reduces alphanumeric terms such as phone numbers to numbers. ➤

In these cases, do the following:

- Try constructing a search phrase that doesn't include a number, alphanumeric term, or possible stopword.
- If you can, get information about exclusions from the publisher of the index. Get a stopword list from the publisher.

For details, see the following:

How Acrobat Catalog treats separator characters

How Acrobat Catalog excludes numbers ■

How Acrobat Catalog treats separator characters

Separator characters include all symbols, the space character, and most punctuation characters: periods, commas, colons, semicolons, exclamation points, question marks, parentheses, and quotation marks, but not apostrophes.

When indexing a PDF document, Acrobat Catalog uses separator characters to recognize where one term ends and the next term starts. For example, in the sentence

> We have nothing to fear but fear itself.

the Catalog program uses the space characters and the period to identify seven terms: *we*, *have*, *nothing*, *to*, *fear*, *but*, and *itself*.

The program then discards the separator characters. The space and period don't appear in the index. ➤

Unless the discarded separator characters appear in an alphanumeric term, they have no effect on searches, because these characters are also removed from search terms in Acrobat Search. For details, see **How Acrobat Search treats separator characters**. ■

How Acrobat Search treats separator characters

Separator characters are automatically removed from the search terms you enter as well as from indexes created in Acrobat Catalog, so using these characters in searches usually produces no effect.

For example, the phone number

(415)555-1212

in a PDF document become a three-number phrase in the index:

415 555 1212

But searching for the phone number (415)555-1212 finds the phrase 415 555 1212 unless numbers are excluded from the index, because the parentheses and hyphen are disregarded for purposes of the search.

How Acrobat Catalog excludes numbers

Index publishers can exclude numbers from Acrobat Catalog indexes. Acrobat Catalog defines a number to be a sequence of one or more numeric digits [0 through 9] that are

- Optionally preceded by a minus sign [-].
- Optionally separated by one or more commas [,] or periods [.].
- Optionally containing a decimal point, which can be a period [.] or a comma [,].

Here are some examples of the kinds of numbers that Acrobat Catalog can exclude from an index:

23 23.54671 -37.1 3,012,222 44.223.835,5

Note that alphanumeric terms made up of numbers and separator characters such as $ can also be excluded, because the Catalog program removes the separator characters before determining whether the remaining characters constitute a number. For example,

($3,000.23)

becomes 3,000.23, which may be excluded as a number. ■

Searching with wild-card characters

You can use wild-card characters to find all the words that contain a word fragment or all the terms that match an arbitrary character pattern:

*	asterisk, matches zero, one, or more characters
?	question mark, matches any one character

You can use wild-card characters in a term that is part of a **Boolean expression**. You can also use wild cards to specify **Document Info** field values. You cannot use wild cards to represent separator characters such as the hyphen [-] and the slash [/]. ➤

Wild-card examples

geo*	matches *geodesic*, *Geoffrey*, and *geothermal*
*nym	matches *antonym*, *homonym*, and *synonym*
?ight	matches *fight* and *sight* but not *bright*
555-????	matches all seven-digit phone numbers with the 555 prefix
pr?m*	matches *premature*, *prim*, and *primate* ■

Refining a search

If you want to limit the search, you may also want to *refine* it—confine the search to the documents listed in the previous search. For example, you might first find all the documents that contain the phrase *Anaconda project*. Then, using the Refine option, you could search for the word *cost* in those documents only.

To refine a search:

1 Start with the Search Results window open, showing the result of a previous search. If the Search window is hidden, display it by choosing Tools > Search > Query or by clicking the Search Query button on the toolbar. ➤

2 In the Search window, change or replace the query that produced the list of documents.

3 Press Ctrl (Windows. OS/2, UNIX) or Option (Macintosh). The button label will change from Search to Refine. Click Refine. This produces a Search Results list composed of documents that are a subset of the previous list and that match the new query. ■

Searching with Document Info fields

Searching with Document Info fields

Using wild-card characters in fields

Using Boolean expressions in fields

Using operators for document information

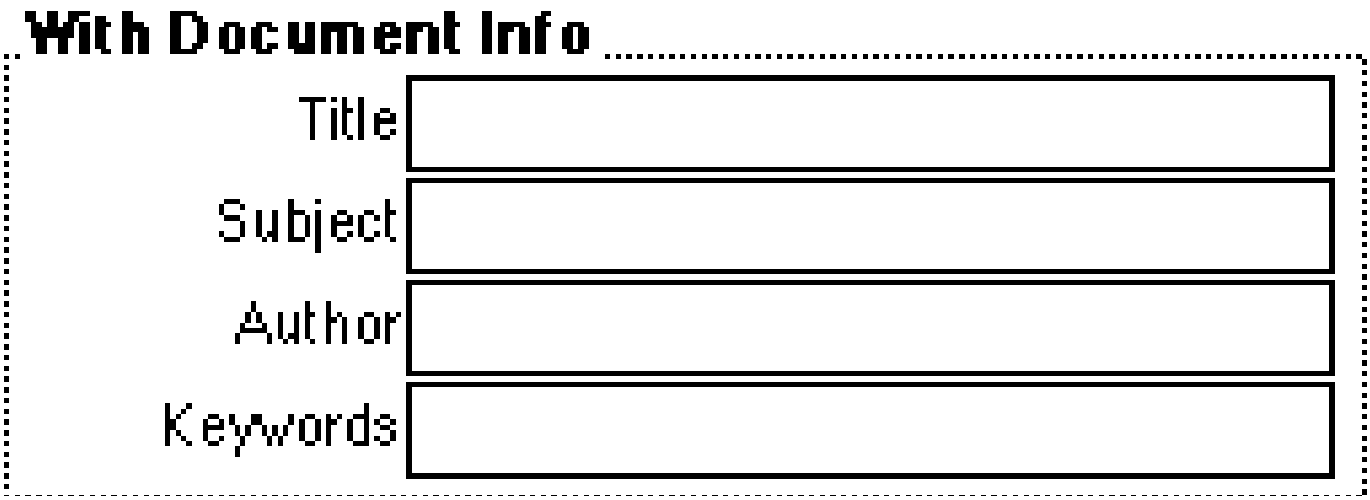
Searching with two or more fields

Searching with Document Info fields

If the PDF documents you are searching are provided with Document Info values, you can use the Document Info fields in the Search window to limit the results of your searches to documents that contain specific values.

The standard Document Info fields in PDF documents are Title, Subject, Author, and Keywords. For example, you could limit the search of an index of literature to just those documents with an Author field containing *Shakespeare* and a Title field containing *king*. ➤

To add the Document Info fields to the Search window, choose File > Preferences > Search and select Show Fields.



You may see additional custom fields if the creator of the PDF document included them.

If you want to keep the Search window small, you can hide (or keep hidden) the Document Info fields and **type their names** in the Find Results Containing Text box.

When you enter a Document Info field value and no search text, all documents with fields that contain the value are returned. ■

Using wild-card characters in fields

You can use wild-card characters in Document Info fields. For example, if you enter

Sm?th*

in the Author field, documents with Author field values that include Smith, Smyth, and Smythe can be returned with subsequent searches.

See **Searching with wild-card characters** for details.

Using Boolean expressions in fields

You can use Boolean expressions in Document Info fields. For example, if you enter

Shakespeare or Milton

in the Author field, only documents that include either *Shakespeare* or *Milton* in the Author field are found.

See **Searching with Boolean expressions** for details.

Using operators for document information

You can use operators in Document Info field values to expand or limit the search.

Operator	Meaning
=	matches exactly (for text, numeric, and date values)
~	contains (for text values)
!=	does not contain (for text, numeric, and date values)
<	is less than (for date or numeric values)
<=	is less than or equal to (for date or numeric values)
>	is greater than (for date or numeric values)
>=	is greater than or equal to (for date or numeric values)

You can use only the first three operators (=, ~, !=) with text. (The standard Document Info fields—Title, Subject, Author, and Keywords—are all text fields.) For example,

~ Guide

in the Title field would find the Acrobat Exchange Guide, the Acrobat Search Guide, and so on.

The four comparison operators (<, <=, >, and >=) can be used only with values of the same type. For example, a date value can be compared only with another date value. ■

Searching with two or more fields

Entering values for two or more fields specifies an **AND condition**. For example, if you enter ~ *Samuelson* in the Author field, ~ *cost analysis* in the Subject field, and ~ *spreadsheet* in the Keywords field, only documents that contain all these values in these fields are returned from subsequent searches.

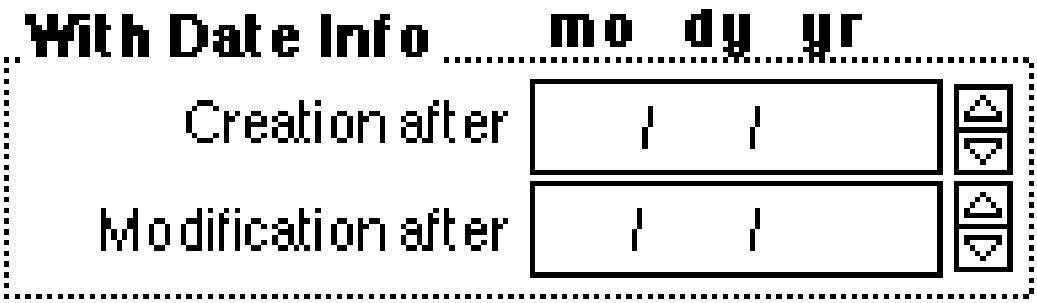
For **OR conditions** and **NOT conditions** between fields, you can use the Find Results Containing Text text box. For example,

> (Author ~ Raskin) NOT (Keywords ~ presentation)

finds all documents whose Author fields contain *Raskin* and whose Keywords fields do not contain *presentation*. You can also specify an AND condition with this method.

Searching with document creation and modification dates

You can use the Date Info fields in the Search window to limit search results to just those documents that were created or modified in a specific time period. To add the Date Info fields to the Search window, choose File > Preferences > Search and select Show Date.



If you want to keep the Search window small, you can hide (or keep hidden) the Date Info fields and **type their names** in the Find Results Containing Text box.

When you enter a Date Info field value and no search text, all documents with Date Info fields that contain the value are returned.

To specify a date:

1 Click the Month, Day, or Year field.

2 Enter a number or use the Up and Down Arrows to select a value.

To limit a search to documents created or modified after a specific date:

Specify the After date, and leave the Before date blank.

To limit a search to documents that were created or modified before a specific date:

Specify the Before date, and leave the After date blank.

To clear the date fields:

Click Clear.

To use both the creation and modification dates:

Entering time periods for both creation and modification dates specifies an **AND condition**. Only documents created in the specified period and modified in the specified period are returned from a search. ■

Typing field and options names

Instead of displaying Document Info fields, Date Info fields, or Options in the Search window, you can keep the Search window small and type fields and options in the Find Results Containing Text box. Along with the field names, you need to use **operators** such as = (equals) and > (greater than, after).

- For Document Info fields, type Title, Subject, Author, Keywords, Producer, or Creator. For example:

  Author = Shakespeare

- For Document Info fields, type CreationDate or ModificationDate. For example, for a creation date after October 9, 1996, type the following:

  CreationDate > 10/9/96

- For options, type /st (stemming), /so (sounds like), /th (thesaurus), /ca (match case), or /pr (proximity). For example, find synonyms for *publish* with

    publish /th ■

Using search options

Using search options

Word Stemming option

Thesaurus option

Sounds Like option

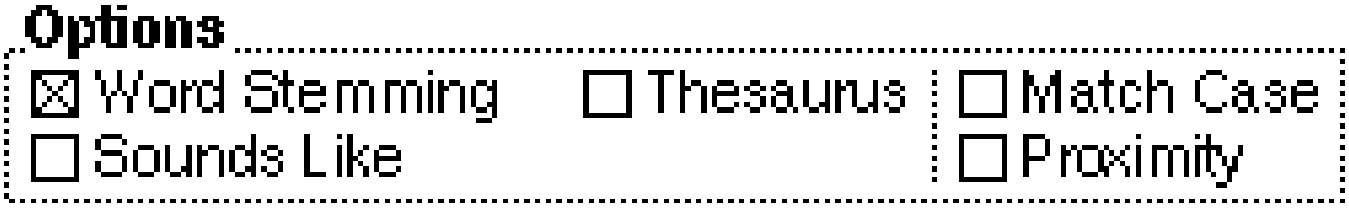
Match Case option

Proximity option

Using the Word Assistant

Using search options

The options in the Search window expand or limit the results of searches with **single terms and phrases** and with **Boolean expressions**. The options appear in the window by default. To restore them to the window if the default has been changed, choose File > Preferences > Search and select Show Options.



If you want to keep the Search window small, you can hide (or keep hidden) the options and **type their names** in the Find Results Containing Text box.

- **Word Stemming** finds words that share a stem with the search word.

- **Thesaurus** finds words that have meanings similar to the meaning of the search word. ➤

- **Sounds Like** finds different spellings of proper names.

- **Match Case** finds text only when it has the same capitalization as the text you type.

- **Proximity** limits AND searches so that words must be within three pages of each other.

The Word Stemming, Thesaurus, and Sounds Like options expand searches. (Before you perform a search with one of these options, you can see the effects of using it with the **Word Assistant**.) The Match Case and Proximity options limit searches. ■

Word Stemming option

The Word Stemming option expands the search by finding words that share a word stem with the search word you type. For example, with Word Stemming selected, searching for *building* finds *build* and *builds* as well as *building*.

Before searching with the Word Stemming option, consider using the **Word Assistant** to see whether the option would find too many irrelevant words to be practical.

The Word Stemming option

- Applies to single words, not phrases
- Does not apply to words that contain **wild-card characters** ➤

- Finds words that end in *ing*, *ed*, *s*, *ion*, and so on (but not *er*)
- Cannot be used with the Match Case option

If selecting the Word Stemming option seems to have no effect, the index you are searching probably was not built with the Word Stemming option. ■

Thesaurus option

The Thesaurus option expands the search by finding words with meanings similar to the meaning of the search word. For example, with Thesaurus selected, searching for *begin* finds *start*.

Searching for *begin* with the Thesaurus option also finds *attack* and *produce*. Before searching with the option, consider using the **Word Assistant** to see whether the option finds relevant words.

The Thesaurus option

- Applies to single words, not phrases
- Does not apply to words that contain **wild-card characters**
- Cannot be used with the Match Case option
- Finds only the similar words that appear in the documents you are searching, not all the similar words you might find in a complete Thesaurus

Sounds Like option

The Sounds Like option expands the search for a proper name by finding words that begin with the same letter as a search word and that share some phonetic feature with it. For example, with Sounds Like selected, searching for *Smith* also finds *Smyth* and *Smythe*.

Searching for *Smith* with the Sounds Like option also finds *send* and *somewhat*. Before searching with the option, consider using the **Word Assistant** to see whether the option finds relevant words.

The Sounds Like option

- Applies to single words, not phrases
- Does not apply to words that contain **wild-card characters** ➤

- Cannot be used with the Match Case option

If selecting the Sounds Like option seems to have no effect, the index you are searching probably was not built with the Sounds Like option. ■

Match Case option

The Match Case option limits the results of the search by finding only those documents that contain words with the same capitalization as the search word or phrase you type. With Match Case selected, for example, searching for *He* finds all occurrences of *He*, the symbol for Helium, but not occurrences of *he*, the common pronoun.

You can use the Match Case option with a **Boolean expression** or with terms that use **wild-card characters**. Characters matched by wild-card characters can be either uppercase or lowercase.

You cannot use the Match Case option with the Word Stemming, Thesaurus, or Sounds Like option.

If selecting the Match Case option seems to have no effect, the index you are searching probably was not built with the option.

Proximity option

The Proximity option limits the results of simple **AND searches** to one pair of matches per document—the pair closest together. The two matches must be within three pages or fewer of each other. The option is useful for locating a document that concentrates on some topic of interest. For example, searching a group of travel guides for information about Hawaiian cruises with

Hawaii AND cruise

would be less likely to locate information about cruises to other parts of the world or about shore visits to Hawaii if the Proximity option was used.

The Proximity option also affects **relevance ranking** in searches. When you use it, the closer the matches are within a document, the higher the ranking for the document.

Proximity won't work with complex AND searches—for example, Hawaii AND (cruise OR fly).

Using the Word Assistant

Use the Word Assistant to build a list of terms that will appear when the search of a document uses the **Sounds Like**, **Word Stemming**, or **Thesaurus** option. The list will show you whether the option you are using is likely to be helpful in the search.

If the list is too long or full of irrelevant words, you can quickly construct a list of words to find with the option turned off by copying words from the Word Assistant dialog box and pasting them into the Search window.

To look up the effects of a search option on a search word:

1 Choose Tools > Search > Word Assistant.

2 To check the available indexes and change the selection of indexes, click Indexes to display the Index Selection dialog box and **select the indexes** you want to use.

3 Select the **search option** from the Assist menu.

4 Enter the **search word** in the Word text box.

5 Click Look Up. All the words that will be found in a search for this word with this option are listed.

To search with words copied from the Word Assistant dialog box:

1 If the Search window is closed, click the Search Query button on the toolbar to open it.

2 Use the Word Assistant to look up the effects of a search option on a search word. And to display a list of related words.

3 In the list, double-click a word that you want to use in a search. The word appears in the Word text box.

4 Double-click the word to select it, and copy it to the Clipboard.

5 In the Search window, click the Find text box and paste the selected word into the text box.

6 Repeat steps 3 through 5 for each word you want to use; separate each pair of words in the Find text box with **AND** or **OR**. ■

Searching with Boolean expressions

You can use AND, OR, and NOT operators to build a Boolean expression that will search for specific words.

You can also use Boolean expressions in **Document Info** field text boxes to specify a combination of field values in a search.

- **Searching with Boolean AND**
- **Searching with Boolean OR**
- **Searching with Boolean NOT**
- **Combining Boolean operators**
- **Using operator names and symbols literally**

Searching with Boolean AND

Use AND to find documents containing two or more search terms. For example,

installation AND instructions

finds only those documents that contain both *installation* and *instructions.*

You can also use the ampersand [&] to specify an AND search. For example,

installation & instructions

Choosing the **Proximity option** changes the way AND searches work. Without the Proximity option, items in an AND search can be anywhere in a document. With the Proximity option, items in an AND search must be within three pages of each other to be found.

Searching with Boolean OR

Use OR to find documents containing any of two or more search terms. For example,

> television OR tv

finds all documents that contain either or both *television* and *tv*.

You can also use a comma [,] or a vertical bar [|] to separate items in an OR search. For example:

> television, tv

and

> television | tv

Although any document that contains any item used with an OR operator is returned from a search, documents that contain both items rank higher in the Search Results list. See **Interpreting relevance ranking** for more information.

Searching with Boolean NOT

Use NOT to exclude documents that contain a search term. For example,

not quarterly

finds all documents that do not contain the word *quarterly*.

You can also use an exclamation point [!] to specify a NOT search. (Be sure to place a space between the exclamation point and the search item.) For example:

! quarterly

Combining Boolean operators

Be careful when combining operators to build Boolean expressions. Unless you work with Boolean expressions frequently, it is easy to build an expression that does not mean what you think it means.

- When NOT is used with either or both of the AND and OR operators, it is evaluated before either the AND or OR. For example,

    evolution AND NOT darwin

finds all documents that contain the word *evolution* but not the word *darwin*.

- When you combine AND and OR in the same expression, AND is evaluated before OR. For example,

    darwin OR origin AND species

finds all documents that contain *darwin* or that contain both *origin* and *species*.

■ You can use parentheses to change the default order of evaluation for Boolean operators. For example,

(darwin OR origin) AND species

finds all documents that contain either *darwin* and *species* or that contain *origin* and *species*. Parentheses can be nested. ■

Using operator names and symbols literally

When you use a literal phrase that contains an operator name, a symbol for an operator name (such as & for AND), or parentheses, the phrase must be enclosed in quotation marks. For example:

"cats and dogs"

finds all documents that contain the phrase *cats and dogs*, not all documents that contain either the word *cats* or the word *dogs*. The phrase

cats & dogs

also needs quotes to be interpreted literally. ➤

In addition to *and*, *or*, *not*, and parentheses, the symbols that require quotation marks are *&* (ampersand, for AND), *|* and*,* (vertical bar and comma, for OR), and *!* (exclamation point, for NOT). However, quoted search phrases that contain parentheses or vertical bars can produce unexpected results. For details, see **How Acrobat Catalog treats separator characters**. ■

Viewing documents returned from a search

A search returns a list of indexed documents containing items that match your search query, displaying the list in the Search Results window. When you open a document in the list, you view only pages containing matches. All matches on a page are highlighted unless you **change the default**.

Documents more likely to contain relevant information are listed first, and the relevance ranking of each document is indicated by an icon. For details, see **Interpreting relevance ranking**.

To view a document returned from the search:

1 Double-click the document name to open the document.

2 Use the Search buttons on the toolbar to view all the occurrences of matches for your query. ➤

- To highlight the next occurrence of a match in the document, click the Search Next button .

- To highlight the previous occurrence of a match in a document, click the Search Previous button .

To view another returned document:

Choose one of the following:

- To highlight the first occurrence of a match in the next document listed or previous document listed, click the Search Next button or Search Previous button while pressing the Shift key. Or choose Tools > Search > Next Document or Tools > Search > Previous Document.

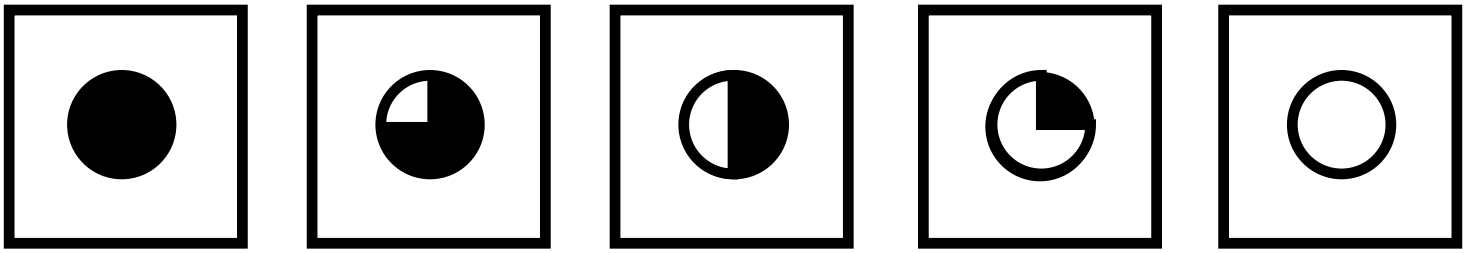
- To view any other document listed, click the Search Results button to redisplay the list, or choose Tools > Search > Results; then double-click the document name.

If you want to keep the Results list visible, deselect the Hide on View **preference**. ■

Interpreting relevance ranking

A relevance ranking is assigned to each document returned from a search. A document's relevance ranking indicates how likely it is that the document contains the information you are searching for.

Search uses five icons to indicate relevance ranking:



From left (full circle) to right (empty circle), they rank documents from highest to lowest likelihood of containing relevant information.

- With ordinary search text, the relevance ranking indicates how frequently the search word appears in the document, both in absolute terms and relative to the number of other words in the document.

- When you use a **Boolean OR operator** between two words or phrases in a search, documents that contain both the items have a relevance ranking higher than documents that contain just one of them.

- When you use the **Proximity option**, the closer the occurrences of matches for your query are within a document, the higher the relevance ranking for the document. ■

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Adobe Acrobat 3.0 Search Online Guide

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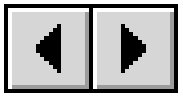
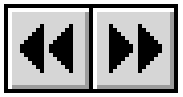
How to use this online guide



Page back or page forward.



Undoes a change of page or view, or redoes a change (Go Back/Go Forward).

Go to the Contents.

Go to the Index.

Go to the how-to page (this page).

Go to the “parent” of the current topic.

text Go to the indicated topic.

Go to the next page of a continued topic.

End of a continued topic.

For instructions on printing this guide, go to the next page.

How to print this online guide

You can print separate topics or the entire guide. Since the pages of the guide have been made small for online viewing, Windows and Macintosh users may prefer to print them two to a page of paper—"two up."

To print pages two up:

1 Choose File > Print Setup (Windows) or File > Page Setup (Macintosh).

2 Follow the instructions for your platform:

■ In Windows, click Options, select 2 up on the Paper tab, click OK to return to the Print Setup dialog box, and click OK again to close it. ➢

- On a Macintosh, choose 2 Up from the Layout menu and click OK.

Note: *If you can't perform step 2, you may not be using an Adobe or PostScript printer driver. If you are and you still can't perform the step, install the Adobe printer driver on the Acrobat CD-ROM. See the Acrobat Getting Started guide for installation instructions.*

3 Choose File > Print.

4 Indicate the page range.

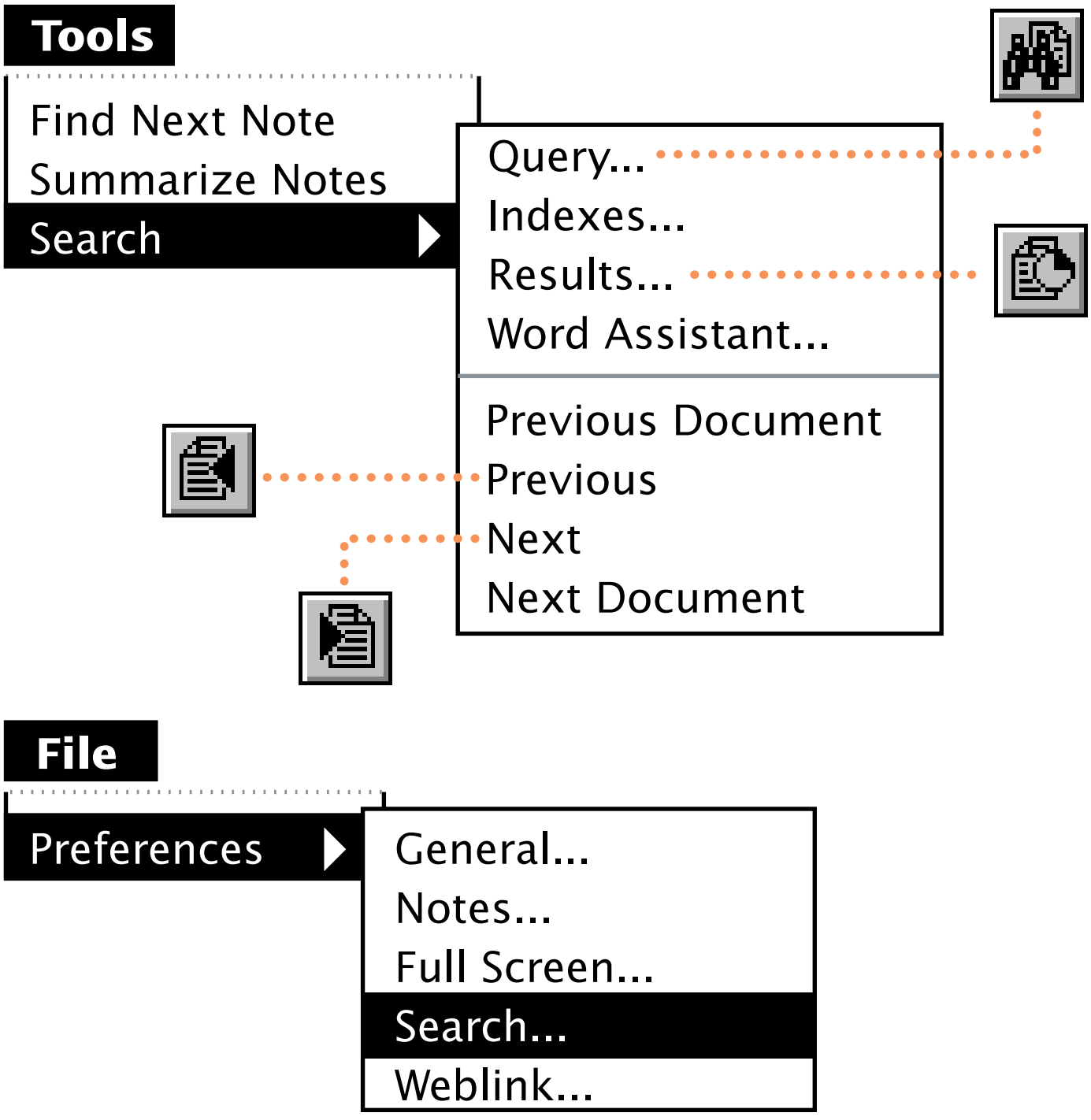
Click OK (Windows) or Print (Macintosh). ■

Adobe® Acrobat® Search

Online Guide

- Tools and commands
- Using Acrobat Search
- Selecting indexes to search
- Defining search queries
- Viewing documents returned from a search
- Troubleshooting

Tools and commands



Using Acrobat Search

You use the Search command in Acrobat Exchange or Acrobat Reader to perform full-text searches of PDF document collections indexed with Acrobat Catalog. The Search command also has powerful tools for limiting and expanding the definition of the term for which you are searching.

A *full-text* index is a searchable database of all text in a document or collection of documents. Searches of full-text indexes are very quick; by contrast, the Find command works with a single document and reads every word on every page, a much slower process.

Searching a full-text index

Expanding a search

Limiting a search

Changing search preferences

Searching a full-text index

Performing a search is a four-step process:

1 Select the indexes you want to search.

2 Define a search query, and list documents that match the query. (A *search query* is text and other items that define the information you want.)

3 Choose documents to view from the list.

4 View occurrences of the text in the documents.

Instructions for performing these steps follow.

To perform a full-text search:

1 Choose Tools > Search > Indexes to list the document-collection indexes currently selected, add or deselect indexes as necessary, and click OK. For details, see **Selecting indexes to search**. ➤

2 Choose Tools > Search > Query or click the Search Query button on the toolbar to open the Search window. Type the text you want to find in the Find Results Containing Text box, and click Search.

The text can be a single word, a number, a term, or a phrase. (For details, see **Searching for a term or phrase**.) When you click Search, the Search window is hidden and documents that match your search query are listed in rank order in the Search Results window.

3 Double-click a document that seems likely to contain the relevant information, probably the first document in the list. (For details, see **Interpreting relevance ranking**.) The document opens on the first match for the text you typed. ➤

4 Use the Search Next button and Search Previous button to go to other matches in the document. Or choose another document to view. See **Viewing documents returned from a search** for details.

Alternatively, redefine the query by typing new text or by using other techniques to **expand the search** to more documents or to **limit the search** to fewer documents. If you want to do this without having to redisplay the Search windows, **change the default preference** that hides it "on view." ■

Expanding a search

If a search returns too few documents or no documents at all, make sure you are searching the appropriate indexes. Also, make sure that settings left over from a previous search aren't limiting the current one.

Then try any of these query techniques:

- **Wild-card** characters in the search text increase the number of matches for the text.
- A Boolean **OR** operator between two words returns documents containing either word.
- The **Word Stemming option** finds words that share a stem with a search word.
- The **Sounds Like option** finds different spellings of proper names.
- The **Thesaurus option** finds words that have meanings similar to the meaning of a search word.

For details, see **Defining search queries**.

Limiting a search

If a search returns too many documents or provides too many matches in individual documents, try any of these query techniques:

- **Refining** a search confines it to documents returned by a previous search, which may be a small set of the documents actually indexed.

- A Boolean **NOT** operator before a word excludes documents containing the word.

- A Boolean **AND** operator between two words returns only documents containing both words.

- The **Proximity option** limits AND searches so that words must be close to each other—within three pages or fewer.

- The **Match Case option** finds text only when it has the same capitalization as the text you type.

- Using **Document Info** field values returns only documents with those values.

- Using a **date range** returns only documents created or modified within that range.

For details, see **Defining search queries**. ■

Changing search preferences

You may need to change the default settings in the **Search Preferences dialog box** illustrated on the following page.

To change search preferences:

1. Choose File > Preferences > Search.
2. Change preferences in the dialog box as necessary.
3. Click OK.

Search Preferences dialog box

Click any preference for information on that preference. The illustration shows the default settings.

The Automount servers preference is available only on a Macintosh.

Selecting indexes to search

Choosing Tools > Search > Indexes lists the available indexes. On a Macintosh, the list may also include indexes on currently unavailable file server volumes or CD-ROMs.

To be searchable, an index must be in the search list and it must be selected. When you add an index to the list, it is automatically selected. You can deselect or reselect it for specific searches or remove it from the list altogether. You can view a description of any index in the list.

Opening a PDF document associated with an index automatically makes the index searchable. See the **Acrobat Exchange Guide** for details. ➤

To add an index to the search list:

1 Choose Tools > Search > Indexes. (If the Search window is open, click the Indexes button in it instead.)

2 Click Add.

3 Locate and select the index you want to use. Acrobat index-definition filenames usually end with .pdx.

4 Double-click the name of the index you want to use. The new index is added to the search list.

To select or deselect an index:

In the Index Selection dialog box, click the box of any index whose status you want to change and click OK.

Note: *Dimmed indexes are currently unavailable for searching, usually because the network connection has been lost. See* **Troubleshooting** *for more information.* ➤

To remove an index from the search list:

1 In the Index Selection dialog box, highlight the name of the index you want to remove.

2 Click Remove.

3 Click OK.

To view a description of an index:

1 In the Index Selection dialog box, highlight the name of the index you want information about.

2 Click Info to view the information.

3 Click OK. ■

Defining search queries

You can search for a word, a number, a term, or a phrase made up of several terms. You can also use the other techniques listed below to define a search query.

Searching for a term or phrase

Searching with wild-card characters

Refining a search

Searching with Document Info fields

Searching with document creation and modification dates

Using search options (Word Stemming, Sounds Like, Thesaurus, Match Case, Proximity)

Searching with Boolean expressions (AND, OR, and NOT)

Searching for a term or phrase

To find matches for a single term, type the term in the text box labeled Find Results Containing Text and click Search. The term can be a word, a word with **wild-card** characters, or any combination of letters, numbers, and symbols.

To find matches for a phrase, type the phrase and click Search.

- If the phrase includes the word *and*, *or*, or *not* used in its ordinary sense (not as a **Boolean operator***)*, put the phrase in quotes. The search phrase

  “once or twice”

finds all occurrences of the phrase *once or twice*, not all occurrences of *once* and all occurrences of *twice* as it would without the quotes. ➤

- If the phrase includes punctuation (other than the apostrophe) or special characters such as @ and *, they are ignored. For example, either of the terms

  son-in-law, son in law

  finds all occurrences of both *son-in-law* and *son in law.*

- When a word such as *an* or *the* is excluded from an index, you cannot search for the word or for a phrase that includes it. The author of the index can give you a list of such stopwords and tell you whether numbers have been excluded.

For more information about phrases in quotes, ignored characters, stopwords, and excluded numbers, see **Working around stopwords and other exclusions**. ■

Working around stopwords and other exclusions

If you are unsuccessful searching for a phrase that includes a common word such as *to* or *that*, it may be a *stopword*.

If the unsuccessful search phrase includes a number, numbers may also have been excluded from the index.

If you are unsuccessful searching for an alphanumeric term that includes a separator character such as a symbol or mark of punctuation, it is probably because numbers also have been excluded. Acrobat Catalog regularly excludes separator characters from indexes, and in the process sometimes reduces alphanumeric terms such as phone numbers to numbers. ➤

In these cases, do the following:

- Try constructing a search phrase that doesn't include a number, alphanumeric term, or possible stopword.
- If you can, get information about exclusions from the publisher of the index. Get a stopword list from the publisher.

For details, see the following:

How Acrobat Catalog treats separator characters

How Acrobat Catalog excludes numbers ■

How Acrobat Catalog treats separator characters

Separator characters include all symbols, the space character, and most punctuation characters: periods, commas, colons, semicolons, exclamation points, question marks, parentheses, and quotation marks, but not apostrophes.

When indexing a PDF document, Acrobat Catalog uses separator characters to recognize where one term ends and the next term starts. For example, in the sentence

> We have nothing to fear but fear itself.

the Catalog program uses the space characters and the period to identify seven terms: *we*, *have*, *nothing*, *to*, *fear*, *but*, and *itself*.

The program then discards the separator characters. The space and period don't appear in the index. ➤

Unless the discarded separator characters appear in an alphanumeric term, they have no effect on searches, because these characters are also removed from search terms in Acrobat Search. For details, see **How Acrobat Search treats separator characters**. ■

How Acrobat Search treats separator characters

Separator characters are automatically removed from the search terms you enter as well as from indexes created in Acrobat Catalog, so using these characters in searches usually produces no effect.

For example, the phone number

(415)555-1212

in a PDF document become a three-number phrase in the index:

415 555 1212

But searching for the phone number (415)555-1212 finds the phrase 415 555 1212 unless numbers are excluded from the index, because the parentheses and hyphen are disregarded for purposes of the search.

How Acrobat Catalog excludes numbers

Index publishers can exclude numbers from Acrobat Catalog indexes. Acrobat Catalog defines a number to be a sequence of one or more numeric digits [0 through 9] that are

- Optionally preceded by a minus sign [-].
- Optionally separated by one or more commas [,] or periods [.].
- Optionally containing a decimal point, which can be a period [.] or a comma [,].

Here are some examples of the kinds of numbers that Acrobat Catalog can exclude from an index:

23 23.54671 -37.1 3,012,222 44.223.835,5

Note that alphanumeric terms made up of numbers and separator characters such as $ can also be excluded, because the Catalog program removes the separator characters before determining whether the remaining characters constitute a number. For example,

($3,000.23)

becomes 3,000.23, which may be excluded as a number. ■

Searching with wild-card characters

You can use wild-card characters to find all the words that contain a word fragment or all the terms that match an arbitrary character pattern:

*	asterisk, matches zero, one, or more characters
?	question mark, matches any one character

You can use wild-card characters in a term that is part of a **Boolean expression**. You can also use wild cards to specify **Document Info** field values. You cannot use wild cards to represent separator characters such as the hyphen [-] and the slash [/]. ➤

Wild-card examples

geo*	matches *geodesic*, *Geoffrey*, and *geothermal*
*nym	matches *antonym*, *homonym*, and *synonym*
?ight	matches *fight* and *sight* but not *bright*
555-????	matches all seven-digit phone numbers with the 555 prefix
pr?m*	matches *premature*, *prim*, and *primate* ■

Refining a search

If you want to limit the search, you may also want to *refine* it—confine the search to the documents listed in the previous search. For example, you might first find all the documents that contain the phrase *Anaconda project*. Then, using the Refine option, you could search for the word *cost* in those documents only.

To refine a search:

1 Start with the Search Results window open, showing the result of a previous search. If the Search window is hidden, display it by choosing Tools > Search > Query or by clicking the Search Query button on the toolbar. ➤

2 In the Search window, change or replace the query that produced the list of documents.

3 Press Ctrl (Windows. OS/2, UNIX) or Option (Macintosh). The button label will change from Search to Refine. Click Refine. This produces a Search Results list composed of documents that are a subset of the previous list and that match the new query. ■

Searching with Document Info fields

Searching with Document Info fields

Using wild-card characters in fields

Using Boolean expressions in fields

Using operators for document information

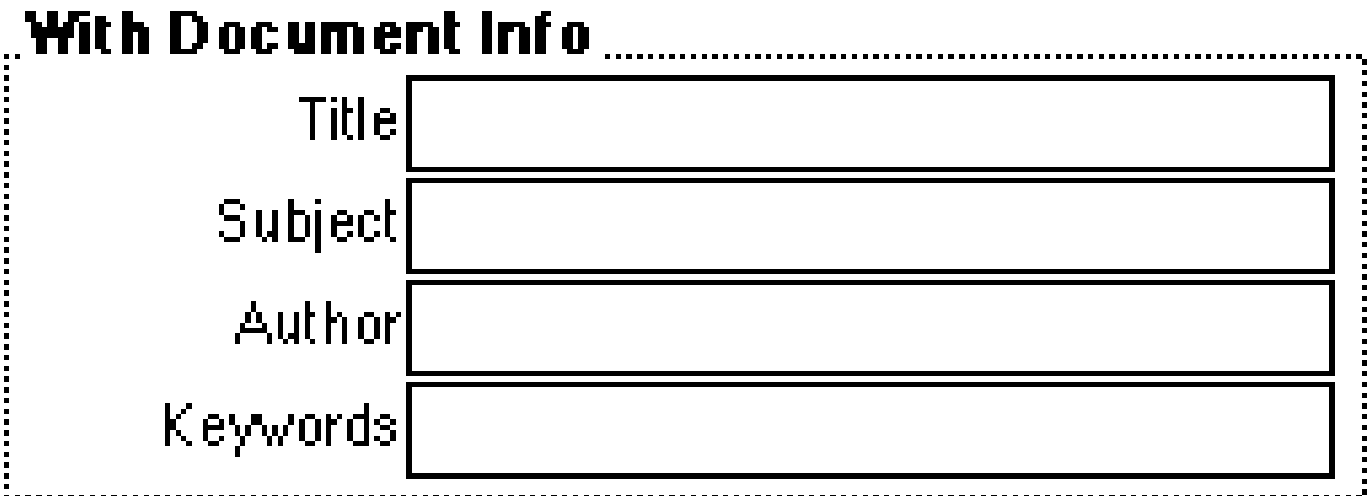
Searching with two or more fields

Searching with Document Info fields

If the PDF documents you are searching are provided with Document Info values, you can use the Document Info fields in the Search window to limit the results of your searches to documents that contain specific values.

The standard Document Info fields in PDF documents are Title, Subject, Author, and Keywords. For example, you could limit the search of an index of literature to just those documents with an Author field containing *Shakespeare* and a Title field containing *king*. ➤

To add the Document Info fields to the Search window, choose File > Preferences > Search and select Show Fields.



You may see additional custom fields if the creator of the PDF document included them.

If you want to keep the Search window small, you can hide (or keep hidden) the Document Info fields and **type their names** in the Find Results Containing Text box.

When you enter a Document Info field value and no search text, all documents with fields that contain the value are returned. ■

Using wild-card characters in fields

You can use wild-card characters in Document Info fields. For example, if you enter

Sm?th*

in the Author field, documents with Author field values that include Smith, Smyth, and Smythe can be returned with subsequent searches.

See **Searching with wild-card characters** for details.

Using Boolean expressions in fields

You can use Boolean expressions in Document Info fields. For example, if you enter

Shakespeare or Milton

in the Author field, only documents that include either *Shakespeare* or *Milton* in the Author field are found.

See **Searching with Boolean expressions** for details.

Using operators for document information

You can use operators in Document Info field values to expand or limit the search.

Operator	Meaning
=	matches exactly (for text, numeric, and date values)
~	contains (for text values)
!=	does not contain (for text, numeric, and date values)
<	is less than (for date or numeric values)
<=	is less than or equal to (for date or numeric values)
>	is greater than (for date or numeric values)
>=	is greater than or equal to (for date or numeric values)

You can use only the first three operators (=, ~, !=) with text. (The standard Document Info fields—Title, Subject, Author, and Keywords—are all text fields.) For example,

~ Guide

in the Title field would find the Acrobat Exchange Guide, the Acrobat Search Guide, and so on.

The four comparison operators (<, <=, >, and >=) can be used only with values of the same type. For example, a date value can be compared only with another date value. ■

Searching with two or more fields

Entering values for two or more fields specifies an **AND condition**. For example, if you enter ~ *Samuelson* in the Author field, ~ *cost analysis* in the Subject field, and ~ *spreadsheet* in the Keywords field, only documents that contain all these values in these fields are returned from subsequent searches.

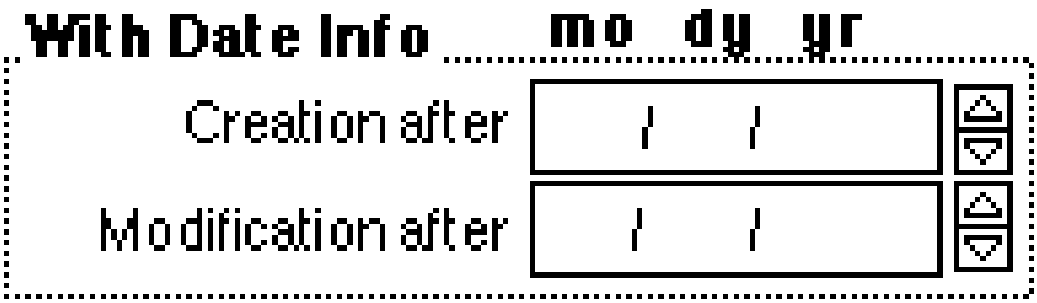
For **OR conditions** and **NOT conditions** between fields, you can use the Find Results Containing Text text box. For example,

> (Author ~ Raskin) NOT (Keywords ~ presentation)

finds all documents whose Author fields contain *Raskin* and whose Keywords fields do not contain *presentation*. You can also specify an AND condition with this method.

Searching with document creation and modification dates

You can use the Date Info fields in the Search window to limit search results to just those documents that were created or modified in a specific time period. To add the Date Info fields to the Search window, choose File > Preferences > Search and select Show Date.



If you want to keep the Search window small, you can hide (or keep hidden) the Date Info fields and **type their names** in the Find Results Containing Text box.

When you enter a Date Info field value and no search text, all documents with Date Info fields that contain the value are returned.

To specify a date:

1 Click the Month, Day, or Year field.

2 Enter a number or use the Up and Down Arrows to select a value.

To limit a search to documents created or modified after a specific date:

Specify the After date, and leave the Before date blank.

To limit a search to documents that were created or modified before a specific date:

Specify the Before date, and leave the After date blank.

To clear the date fields:

Click Clear.

To use both the creation and modification dates:

Entering time periods for both creation and modification dates specifies an **AND condition**. Only documents created in the specified period and modified in the specified period are returned from a search. ■

Typing field and options names

Instead of displaying Document Info fields, Date Info fields, or Options in the Search window, you can keep the Search window small and type fields and options in the Find Results Containing Text box. Along with the field names, you need to use **operators** such as = (equals) and > (greater than, after).

- For Document Info fields, type Title, Subject, Author, Keywords, Producer, or Creator. For example:

  Author = Shakespeare

- For Document Info fields, type CreationDate or ModificationDate. For example, for a creation date after October 9, 1996, type the following:

  CreationDate > 10/9/96

- For options, type /st (stemming), /so (sounds like), /th (thesaurus), /ca (match case), or /pr (proximity). For example, find synonyms for *publish* with

    publish /th ■

Using search options

Using search options

Word Stemming option

Thesaurus option

Sounds Like option

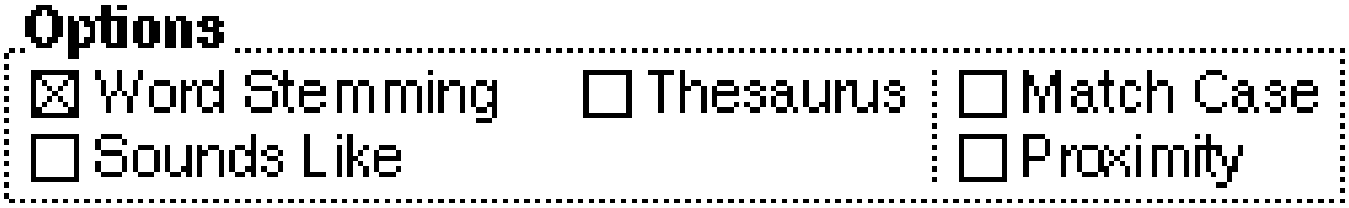
Match Case option

Proximity option

Using the Word Assistant

Using search options

The options in the Search window expand or limit the results of searches with **single terms and phrases** and with **Boolean expressions**. The options appear in the window by default. To restore them to the window if the default has been changed, choose File > Preferences > Search and select Show Options.



If you want to keep the Search window small, you can hide (or keep hidden) the options and **type their names** in the Find Results Containing Text box.

- **Word Stemming** finds words that share a stem with the search word.

- **Thesaurus** finds words that have meanings similar to the meaning of the search word. ➤

- **Sounds Like** finds different spellings of proper names.

- **Match Case** finds text only when it has the same capitalization as the text you type.

- **Proximity** limits AND searches so that words must be within three pages of each other.

The Word Stemming, Thesaurus, and Sounds Like options expand searches. (Before you perform a search with one of these options, you can see the effects of using it with the **Word Assistant**.) The Match Case and Proximity options limit searches. ■

Word Stemming option

The Word Stemming option expands the search by finding words that share a word stem with the search word you type. For example, with Word Stemming selected, searching for *building* finds *build* and *builds* as well as *building*.

Before searching with the Word Stemming option, consider using the **Word Assistant** to see whether the option would find too many irrelevant words to be practical.

The Word Stemming option

- Applies to single words, not phrases
- Does not apply to words that contain **wild-card characters** ➤

- Finds words that end in *ing*, *ed*, *s*, *ion*, and so on (but not *er*)
- Cannot be used with the Match Case option

If selecting the Word Stemming option seems to have no effect, the index you are searching probably was not built with the Word Stemming option. ■

Thesaurus option

The Thesaurus option expands the search by finding words with meanings similar to the meaning of the search word. For example, with Thesaurus selected, searching for *begin* finds *start*.

Searching for *begin* with the Thesaurus option also finds *attack* and *produce*. Before searching with the option, consider using the **Word Assistant** to see whether the option finds relevant words.

The Thesaurus option

- Applies to single words, not phrases
- Does not apply to words that contain **wild-card characters**
- Cannot be used with the Match Case option
- Finds only the similar words that appear in the documents you are searching, not all the similar words you might find in a complete Thesaurus

Sounds Like option

The Sounds Like option expands the search for a proper name by finding words that begin with the same letter as a search word and that share some phonetic feature with it. For example, with Sounds Like selected, searching for *Smith* also finds *Smyth* and *Smythe*.

Searching for *Smith* with the Sounds Like option also finds *send* and *somewhat*. Before searching with the option, consider using the **Word Assistant** to see whether the option finds relevant words.

The Sounds Like option

- Applies to single words, not phrases
- Does not apply to words that contain **wild-card characters** ➤

- Cannot be used with the Match Case option

If selecting the Sounds Like option seems to have no effect, the index you are searching probably was not built with the Sounds Like option. ■

Match Case option

The Match Case option limits the results of the search by finding only those documents that contain words with the same capitalization as the search word or phrase you type. With Match Case selected, for example, searching for *He* finds all occurrences of *He*, the symbol for Helium, but not occurrences of *he*, the common pronoun.

You can use the Match Case option with a **Boolean expression** or with terms that use **wild-card characters**. Characters matched by wild-card characters can be either uppercase or lowercase.

You cannot use the Match Case option with the Word Stemming, Thesaurus, or Sounds Like option.

If selecting the Match Case option seems to have no effect, the index you are searching probably was not built with the option.

Proximity option

The Proximity option limits the results of simple **AND searches** to one pair of matches per document—the pair closest together. The two matches must be within three pages or fewer of each other. The option is useful for locating a document that concentrates on some topic of interest. For example, searching a group of travel guides for information about Hawaiian cruises with

Hawaii AND cruise

would be less likely to locate information about cruises to other parts of the world or about shore visits to Hawaii if the Proximity option was used.

The Proximity option also affects **relevance ranking** in searches. When you use it, the closer the matches are within a document, the higher the ranking for the document.

Proximity won't work with complex AND searches—for example, Hawaii AND (cruise OR fly).

Using the Word Assistant

Use the Word Assistant to build a list of terms that will appear when the search of a document uses the **Sounds Like**, **Word Stemming**, or **Thesaurus** option. The list will show you whether the option you are using is likely to be helpful in the search.

If the list is too long or full of irrelevant words, you can quickly construct a list of words to find with the option turned off by copying words from the Word Assistant dialog box and pasting them into the Search window.

To look up the effects of a search option on a search word:

1 Choose Tools > Search > Word Assistant.

2 To check the available indexes and change the selection of indexes, click Indexes to display the Index Selection dialog box and **select the indexes** you want to use.

3 Select the **search option** from the Assist menu.

4 Enter the **search word** in the Word text box.

5 Click Look Up. All the words that will be found in a search for this word with this option are listed.

To search with words copied from the Word Assistant dialog box:

1 If the Search window is closed, click the Search Query button on the toolbar to open it.

2 Use the Word Assistant to look up the effects of a search option on a search word. And to display a list of related words.

3 In the list, double-click a word that you want to use in a search. The word appears in the Word text box.

4 Double-click the word to select it, and copy it to the Clipboard.

5 In the Search window, click the Find text box and paste the selected word into the text box.

6 Repeat steps 3 through 5 for each word you want to use; separate each pair of words in the Find text box with **AND** or **OR**. ■

Searching with Boolean expressions

You can use AND, OR, and NOT operators to build a Boolean expression that will search for specific words.

You can also use Boolean expressions in **Document Info** field text boxes to specify a combination of field values in a search.

- **Searching with Boolean AND**
- **Searching with Boolean OR**
- **Searching with Boolean NOT**
- **Combining Boolean operators**
- **Using operator names and symbols literally**

Searching with Boolean AND

Use AND to find documents containing two or more search terms. For example,

installation AND instructions

finds only those documents that contain both *installation* and *instructions.*

You can also use the ampersand [&] to specify an AND search. For example,

installation & instructions

Choosing the **Proximity option** changes the way AND searches work. Without the Proximity option, items in an AND search can be anywhere in a document. With the Proximity option, items in an AND search must be within three pages of each other to be found.

Searching with Boolean OR

Use OR to find documents containing any of two or more search terms. For example,

> television OR tv

finds all documents that contain either or both *television* and *tv*.

You can also use a comma [,] or a vertical bar [|] to separate items in an OR search. For example:

> television, tv

and

> television | tv

Although any document that contains any item used with an OR operator is returned from a search, documents that contain both items rank higher in the Search Results list. See **Interpreting relevance ranking** for more information.

Searching with Boolean NOT

Use NOT to exclude documents that contain a search term. For example,

not quarterly

finds all documents that do not contain the word *quarterly*.

You can also use an exclamation point [!] to specify a NOT search. (Be sure to place a space between the exclamation point and the search item.) For example:

! quarterly

Combining Boolean operators

Be careful when combining operators to build Boolean expressions. Unless you work with Boolean expressions frequently, it is easy to build an expression that does not mean what you think it means.

- When NOT is used with either or both of the AND and OR operators, it is evaluated before either the AND or OR. For example,

    evolution AND NOT darwin

finds all documents that contain the word *evolution* but not the word *darwin*.

- When you combine AND and OR in the same expression, AND is evaluated before OR. For example,

    darwin OR origin AND species

finds all documents that contain *darwin* or that contain both *origin* and *species*.

■ You can use parentheses to change the default order of evaluation for Boolean operators. For example,

(darwin OR origin) AND species

finds all documents that contain either *darwin* and *species* or that contain *origin* and *species*. Parentheses can be nested. ■

Using operator names and symbols literally

When you use a literal phrase that contains an operator name, a symbol for an operator name (such as & for AND), or parentheses, the phrase must be enclosed in quotation marks. For example:

"cats and dogs"

finds all documents that contain the phrase *cats and dogs*, not all documents that contain either the word *cats* or the word *dogs*. The phrase

cats & dogs

also needs quotes to be interpreted literally. ➤

In addition to *and*, *or*, *not*, and parentheses, the symbols that require quotation marks are *&* (ampersand, for AND), *|* and*,* (vertical bar and comma, for OR), and *!* (exclamation point, for NOT). However, quoted search phrases that contain parentheses or vertical bars can produce unexpected results. For details, see **How Acrobat Catalog treats separator characters**. ■

Viewing documents returned from a search

A search returns a list of indexed documents containing items that match your search query, displaying the list in the Search Results window. When you open a document in the list, you view only pages containing matches. All matches on a page are highlighted unless you **change the default**.

Documents more likely to contain relevant information are listed first, and the relevance ranking of each document is indicated by an icon. For details, see **Interpreting relevance ranking**.

To view a document returned from the search:

1 Double-click the document name to open the document.

2 Use the Search buttons on the toolbar to view all the occurrences of matches for your query. ➤

- To highlight the next occurrence of a match in the document, click the Search Next button .

- To highlight the previous occurrence of a match in a document, click the Search Previous button .

To view another returned document:

Choose one of the following:

- To highlight the first occurrence of a match in the next document listed or previous document listed, click the Search Next button or Search Previous button while pressing the Shift key. Or choose Tools > Search > Next Document or Tools > Search > Previous Document.

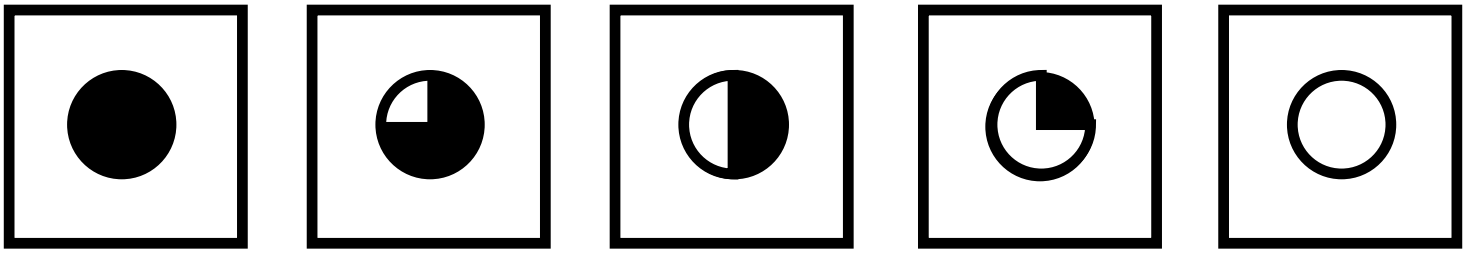
- To view any other document listed, click the Search Results button to redisplay the list, or choose Tools > Search > Results; then double-click the document name.

If you want to keep the Results list visible, deselect the Hide on View **preference**. ■

Interpreting relevance ranking

A relevance ranking is assigned to each document returned from a search. A document's relevance ranking indicates how likely it is that the document contains the information you are searching for.

Search uses five icons to indicate relevance ranking:



From left (full circle) to right (empty circle), they rank documents from highest to lowest likelihood of containing relevant information.

- With ordinary search text, the relevance ranking indicates how frequently the search word appears in the document, both in absolute terms and relative to the number of other words in the document.

- When you use a **Boolean OR operator** between two words or phrases in a search, documents that contain both the items have a relevance ranking higher than documents that contain just one of them.

- When you use the **Proximity option**, the closer the occurrences of matches for your query are within a document, the higher the relevance ranking for the document. ■

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Adobe Acrobat 3.0 Search Online Guide

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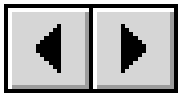
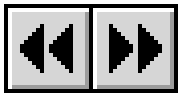
How to use this online guide



Page back or page forward.



Undoes a change of page or view, or redoes a change (Go Back/Go Forward).

Go to the Contents.

Go to the Index.

Go to the how-to page (this page).

Go to the “parent” of the current topic.

text Go to the indicated topic.

Go to the next page of a continued topic.

End of a continued topic.

For instructions on printing this guide, go to the next page.

How to print this online guide

You can print separate topics or the entire guide. Since the pages of the guide have been made small for online viewing, Windows and Macintosh users may prefer to print them two to a page of paper—"two up."

To print pages two up:

1 Choose File > Print Setup (Windows) or File > Page Setup (Macintosh).

2 Follow the instructions for your platform:

■ In Windows, click Options, select 2 up on the Paper tab, click OK to return to the Print Setup dialog box, and click OK again to close it. ➢

- On a Macintosh, choose 2 Up from the Layout menu and click OK.

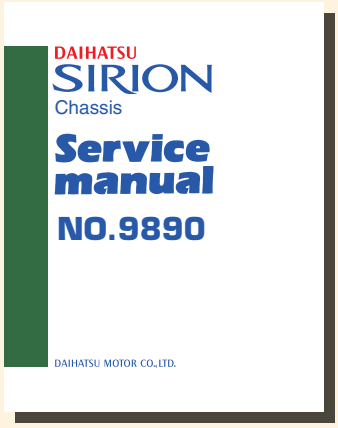
Note: *If you can't perform step 2, you may not be using an Adobe or PostScript printer driver. If you are and you still can't perform the step, install the Adobe printer driver on the Acrobat CD-ROM. See the Acrobat Getting Started guide for installation instructions.*

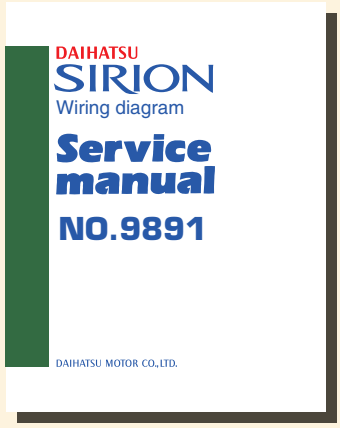
3 Choose File > Print.

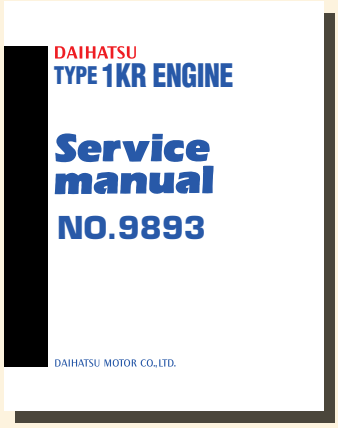
4 Indicate the page range.

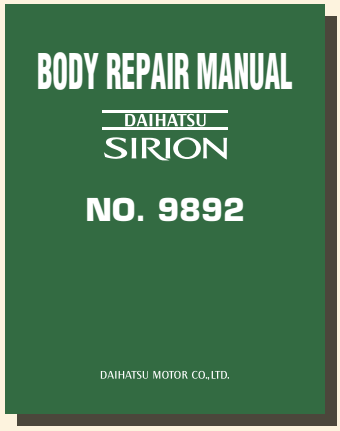
Click OK (Windows) or Print (Macintosh). ■

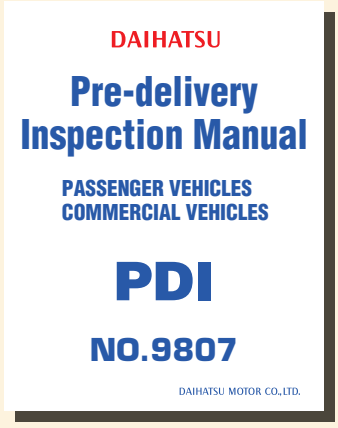
Service manual
& TECHNICAL INFORMATION & BODY REPAIR MANUAL & P.D.I MANUAL

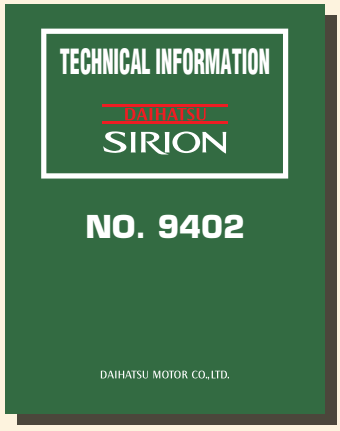












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