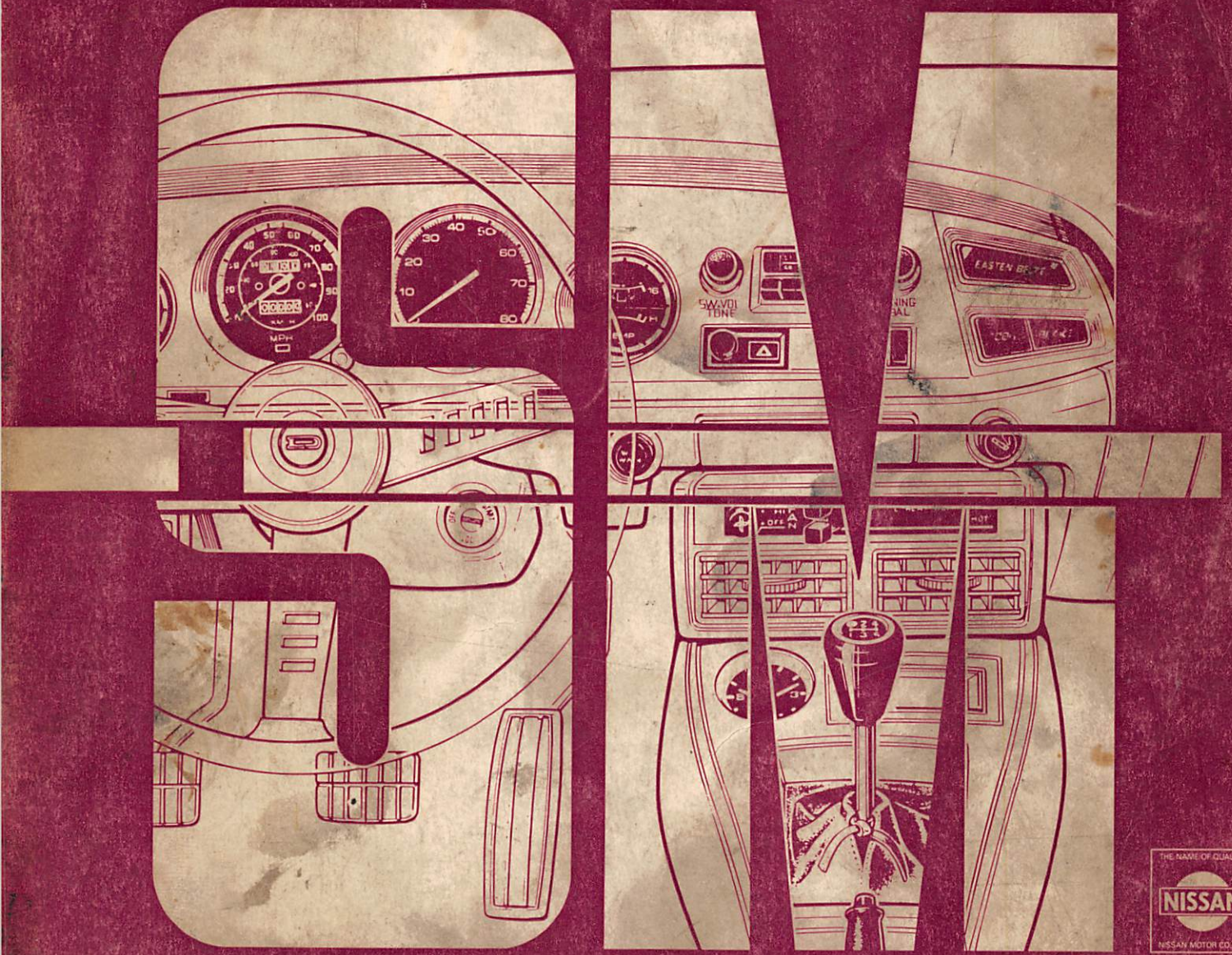
DATSUN 200SX

SERVICE MANUAL 1979



THE NAME OF QUALITY

NISSAN

NISSAN MOTOR CO.,LTD.

DATSUN 200SX

SERVICE MANUAL

MODEL S10 SERIES



NISSAN MOTOR CO., LTD.
17-1, Ginza 6-Chome, Chuo-ku, Tokyo 104, Japan

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FOREWORD

This service manual has been prepared for the purpose of assisting service personnel of authorized NISSAN/DATSUN dealers in providing effective service and maintenance of the 1979 DATSUN 200SX.

Since proper maintenance and service are absolutely essential in satisfying the DATSUN owners, this manual should be kept in a handy place for ready reference and should be carefully studied.

This manual includes procedures for maintenance adjustments, minor service operations, removal and installation, and for disassembly and assembly of components.

Some of these service operations require the use of Special Tools especially designed for effective performance of service operations.
The special tools are presented at the end of each section.

As you read through the maintenance procedures in this service manual, you will occasionally come across paragraphs headed NOTE, CAUTION or WARNING. A NOTE is supplemental information that is important to a particular procedure. CAUTION and WARNING warn of steps that must be followed to prevent damage to some part of the car and/or personal injury.

The Quick Reference Index on the first page enables the user to quickly locate the desired section. At the beginning of each individual section is a table of contents, which gives the page number on which each major subject begins.

All information, illustrations and specifications contained in this manual are based on the latest product information available at the time of publication approval. If your DATSUN model differs from the specifications contained in this manual, consult your NISSAN/DATSUN dealer for information.

Rights for alteration at any time of specifications and methods are reserved.

Liability for any personal injury or property damage occasioned by the use of this service manual in effecting maintenance or repair of your DATSUN is in no way assumed by Nissan Motor Co., Ltd.

Accordingly, anyone using a service procedure or tool which is not specifically recommended by NISSAN must first completely satisfy himself that neither his safety nor the car's safety will be jeopardized by the service method selected.

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SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION GI

GI

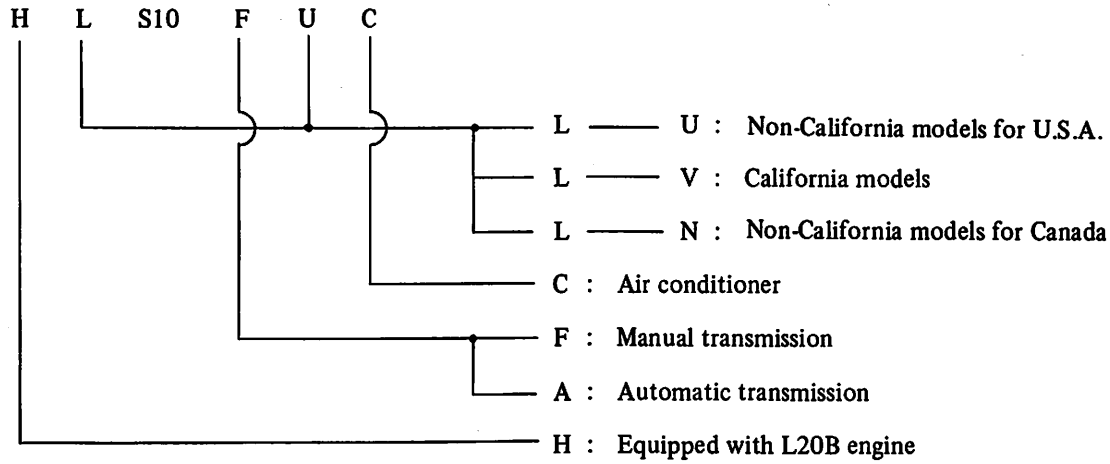
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MODEL VARIATION

Destination		Class	Model		Engine	Transmission	Differential carrier	
							Model	Gear ratio
U.S.A.	California and high altitude counties *	Hardtop	California models	HLS10FV	L20B	FS5W63A	H165B	3.889
				HLS10AV		3N71B		3.700
	All low altitude counties except for California		Non-California models	HLS10FU		FS5W63A		3.889
				HLS10AU		3N71B		3.700
Canada				HLS10FN		FS5W63A		3.889
				HLS10AN		3N71B		3.700

* Specified by Emission regulations.



IDENTIFICATION NUMBERS

The unit and car numbers are stamped and registered at the factory.

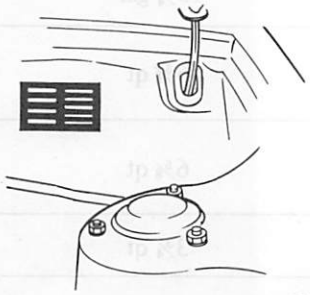
The engine and car identification numbers are used on legal documents.

These numbers are used for factory communication such as Technical Report, Warranty Claim, Service Journal and other information.

CAR IDENTIFICATION PLATE

The car identification plate is located on the left hoodledge panel at the back of strut housing.

The plate contains the car type, engine capacity, maximum horsepower, wheelbase and engine type and car serial numbers.



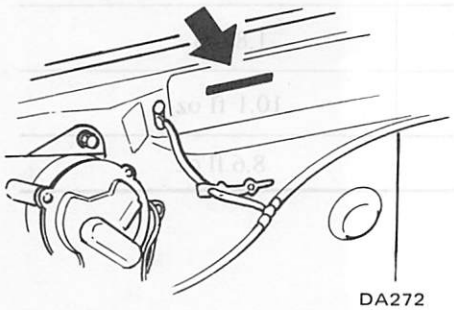
DA271

Fig. GI-1 Car identification plate location

CAR SERIAL NUMBER

The car serial number is stamped on the upper face of the left dash panel and is broken down as shown in the following figure.

HLS10-XXXXXX



DA272

Fig. GI-2 Car serial number location

IDENTIFICATION NUMBER PLATE

The identification number plate is located on the upper surface of the instrument panel and can be seen from outside through the windshield glass. The identification number consists of the car model and the serial number.

(HLS10-XXXXXX)



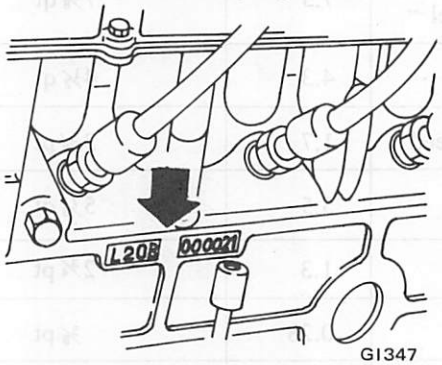
GI337

Fig. GI-3 Identification number plate location

ENGINE SERIAL NUMBER

The engine serial number is stamped on the right side of the cylinder block.

The number is broken down as shown in the following Figure GI-4.

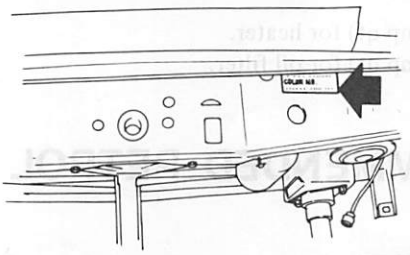


GI347

Fig. GI-4 Engine serial number location

COLOR CODE NUMBER LABEL

The body color code number label is attached to the top face of the radiator core support.

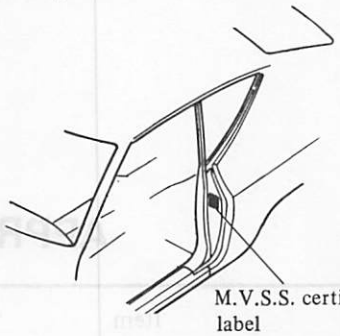


GI338

Fig. GI-5 Body color code number label location

M.V.S.S. CERTIFICATION LABEL

The M.V.S.S. certification label is affixed to the upper portion of the left lock pillar.

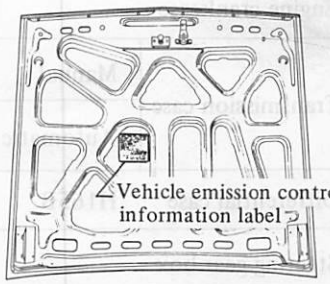


DA273

Fig. GI-6 M.V.S.S. certification label location

EMISSION CONTROL INFORMATION LABEL

The emission control information label is stuck on the inside panel of the hood.

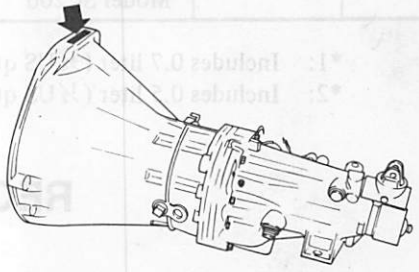


DA274

Fig. GI-7 Emission control information label location

MANUAL TRANSMISSION NUMBER

The transmission serial number is stamped on the front upper face of the transmission case.

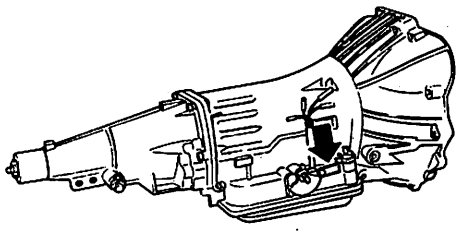


GI345

Fig. GI-8 Manual transmission number location

AUTOMATIC TRANSMISSION NUMBER

The transmission serial number plate is attached on the right-hand side of the transmission case.



AT344

Fig. GI-9 Automatic transmission number location

APPROXIMATE REFILL CAPACITIES

Item			Liter	US measure	Imp measure
Fuel tank			60	15⅞ gal	13¼ gal
Engine cooling system *1		Manual transmission model	7.5	7⅞ qt	6⅝ qt
		Automatic transmission model	7.5	7⅞ qt	6⅝ qt
Engine crankcase		*2	4.3	4½ qt	3¾ qt
Transmission case		Manual 5-speed	1.7	3⅝ pt	3 pt
		Automatic	5.5	5⅞ qt	4⅞ qt
Differential case		H165B	1.3	2¾ pt	2¼ pt
Steering gear box			0.28	⅝ pt	½ pt
Windshield washer tank			2.2	2⅜ qt	2 qt
Air conditioning system	Refrigerant	Model SWP123	0.85 kg	1.87 lb	1.87 lb
		Model SC206	0.85 kg	1.87 lb	1.87 lb
	Compressor oil	Model SWP123	287 cc	9.7 fl oz	10.1 fl oz
		Model SC206	244 cc	8.2 fl oz	8.6 fl oz

*1: Includes 0.7 liter (¾ US qt, ⅝ Imp qt) for heater.
*2: Includes 0.5 liter (½ US qt, ½ Imp qt) for oil filter.

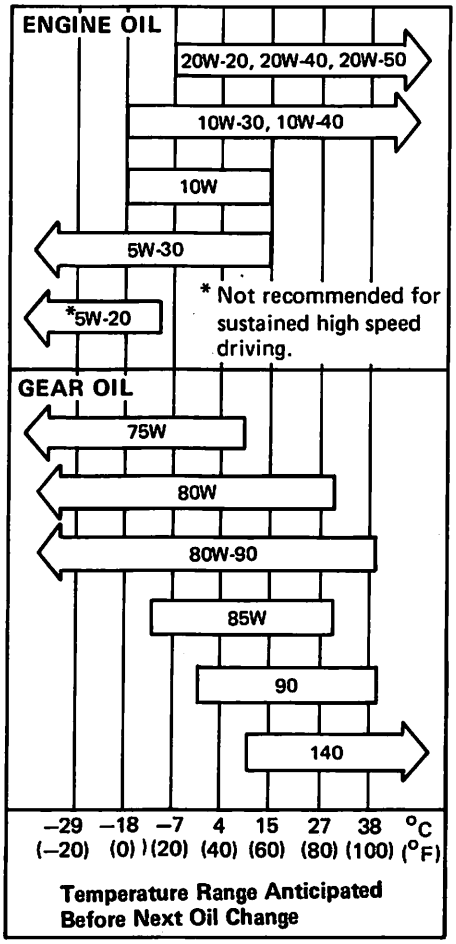
RECOMMENDED PETROL (Fuel)

Use an unleaded or low-lead gasoline with a minimum octane rating of 91 RON (Research Octane Number).

On California models, use only unleaded gasoline to protect the catalytic converter from contamination.

RECOMMENDED LUBRICANTS

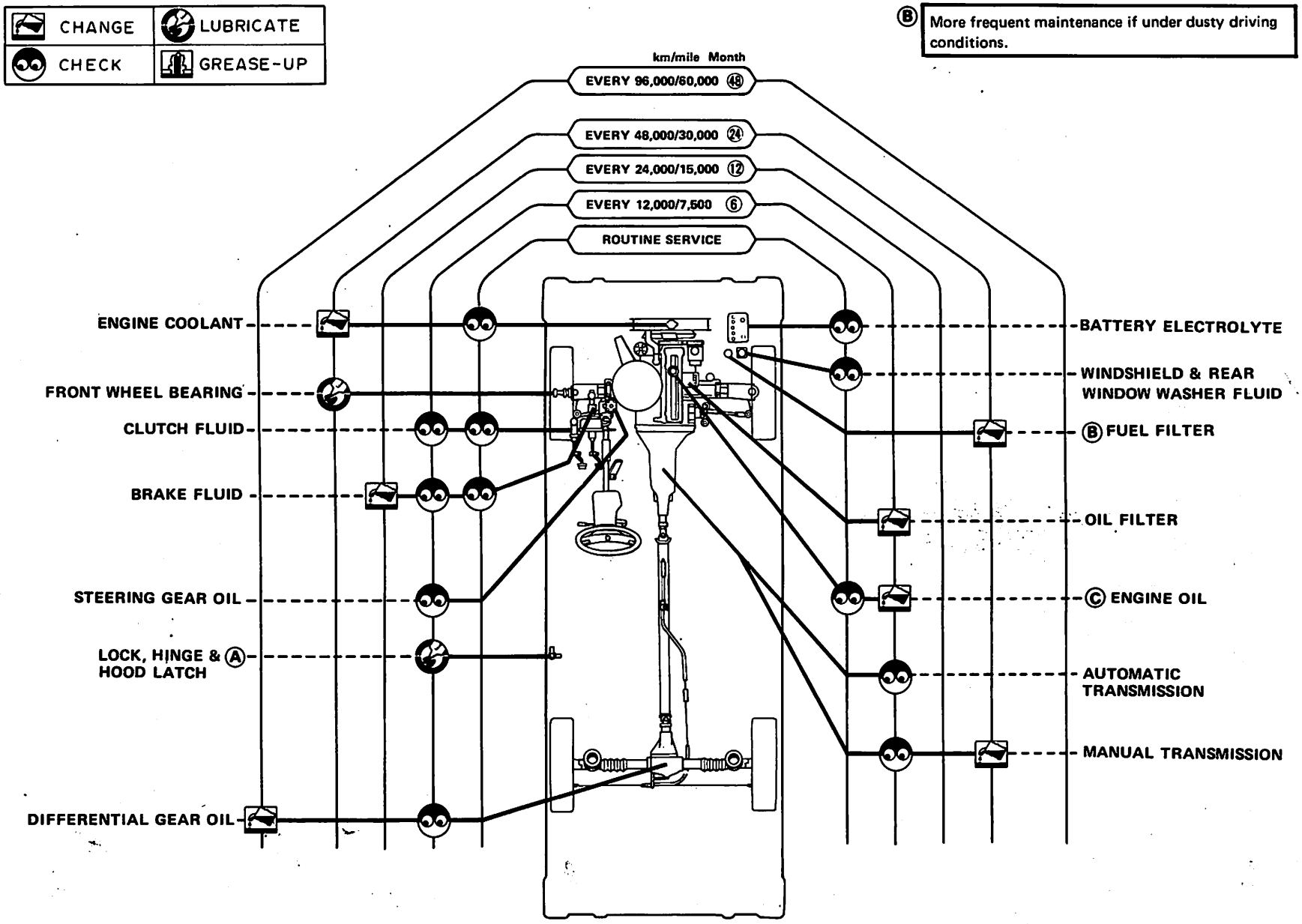
RECOMMENDED SAE VISCOSITY NUMBER



LUBRICANT SPECIFICATIONS

Lubricant		Specifications	Remarks
Gasoline engine oil		API SE	Further details, refer to recommended SAE viscosity chart.
Gear oil	Transmission and steering	API GL-4	
	Differential	API GL-5	
Automatic T/M fluid		Type DEXRON	———
Multi-purpose grease		NLGI 2	Lithium soap base
Brake and clutch fluid		DOT 3	US FMVSS No. 116
Anti-freeze		———	Ethylene glycol base

LUBRICATION CHART



(B) More frequent maintenance if under dusty driving conditions.

(A) If vehicle is operated in areas using road salt or other corrosive materials, inspect every 5,000 km (3,000 miles) or 3 months, whichever comes first.

(C) If vehicle is operated under severe conditions: short distance driving, extensive idling or driving in dusty conditions, change engine oil every 5,000 km (3,000 miles) or 3 months, whichever comes first.

Fig. GI-10 Lubrication Chart

The following tables list the periodic maintenance servicing required to ensure good emission control performance, good engine performance and good mechanical condition in DATSUN.

The first 1,600 km (1,000 miles) service is one of the most important services required to ensure the maximum emission control performance and optimum engine condition.

MAINTENANCE OPERATION Periodic maintenance should be performed at number of kilometers, miles or months, whichever comes first.		MAINTENANCE INTERVAL						
	Kilometers x 1,000	1.6	12	24	36	48	60	72
	(Miles x 1,000)	(1)	(7.5)	(15)	(22.5)	(30)	(37.5)	(45)
	Months	–	6	12	18	24	30	36

EMISSION CONTROL MAINTENANCE

Intake & exhaust valve clearance		A		A		A		A
Drive belts		A		I		I		I
Engine oil & oil filter	(1)		R	R	R	R	R	R
Engine coolant						R		
Cooling system hoses & connections				I		I		I
Vacuum fitting hoses & connections				I		I		I
Carburetor idle rpm & mixture ratio	idle rpm	A		A		A		A
	mixture ratio	I		I		I		I
Choke mechanism (choke plate & linkage)				A		A		A
Fuel filter	(2)					R		
Fuel lines (hoses, piping, connections, etc.)						I		
Carburetor & air pump air cleaner filter	(2)					R		
Automatic temperature control air cleaner				I		I		I
Ignition timing				A		A		A
Spark plugs				R		R		R
Ignition wiring				I		I		I
Positive crankcase ventilation (P.C.V.) valve & filter	(2)					R		
Ventilation hoses						I		
Vapor lines						I		
Fuel tank vacuum relief valve (if so equipped)						I		
Carbon canister filter						R		

MAINTENANCE OPERATION		MAINTENANCE INTERVAL						
Periodic maintenance should be performed at number of kilometers, miles or months, whichever comes first.	Kilometers x 1,000	1.6	12	24	36	48	60	72
	(Miles x 1,000)	(1)	(7.5)	(15)	(22.5)	(30)	(37.5)	(45)
	Months	–	6	12	18	24	30	36
UNDERHOOD MAINTENANCE								
Brake, clutch, automatic transmission & steering gear fluid or oil level & leaks			I	I	I	I	I	I
Brake fluid				R		R		R
Brake booster vacuum hoses, connections & check valve						I		
Air conditioning system hoses, connections & refrigerant leaks						I		
UNDER VEHICLE MAINTENANCE								
Brake, clutch, fuel & exhaust systems for proper attachment, leaks, cracks, chafing, abrasion, deterioration, etc.			I	I	I	I	I	I
Manual transmission oil			I	I	I	R	I	I
Differential gear oil	(3)		I	I	I	I	I	I
Steering gear box & linkage, suspension parts & propeller shaft for damaged, loose & missing parts		I		I		I		I
OUTSIDE AND INSIDE MAINTENANCE								
Rotate wheel position & inspect wheel balance & wheel alignment				I		I		I
Disc brake pads & other brake components for wear, deterioration & leaks	(4)		I	I	I	I	I	I
Brake drums, linings & other brake components for wear, deterioration & leaks	(4)			I		I		I
Front wheel bearing						L		
Locks, hinges & hood latch	(4)		L	L	L	L	L	L
Seat belts, buckles, retractors, anchors & adjuster				I		I		I
Foot brake, parking brake & clutch for free play & operation			I	I	I	I	I	I

The above charts show the normal maintenance schedule. Depending upon weather and atmospheric conditions, varying road surfaces, individual driving habits and vehicle usage, additional or more frequent maintenance may be required.

Abbreviations: A = Adjust R = Replace
I = Inspect, correct, replace if necessary
L = Lubricate

NOTE: (1) If vehicle is operated under severe conditions: short distance driving, extensive idling or driving in dusty conditions, change engine oil every 5,000 km (3,000 miles) or 3 months, whichever comes first.

(2) More frequent maintenance if under dusty driving conditions.

(3) Replace differential gear oil every 96,000 km (60,000 miles) or 4 years, whichever comes first.

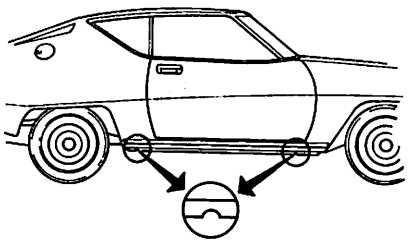
(4) If vehicle is operated in areas using road salt or other corrosive materials, inspect every 5,000 km (3,000 miles) or 3 months, whichever comes first.

LIFTING POINTS AND TOWING

JACK UP

PANTOGRAPH JACK

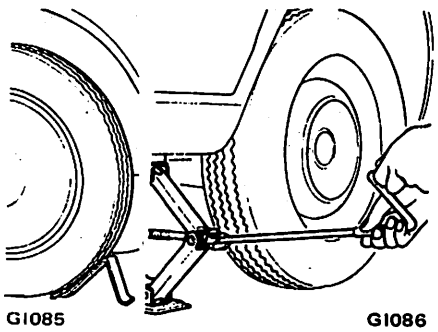
Place a jack under the position where sill flange is cut for identification. Do not jack up other positions.



DA270

Fig. GI-10 Jacking point

WARNING:
a. Never get under the car while it is supported only by the jack. Always use safety stands to support frame when you have to get under the car.
b. Block the wheels diagonally with wheel chocks.



GI085 GI086

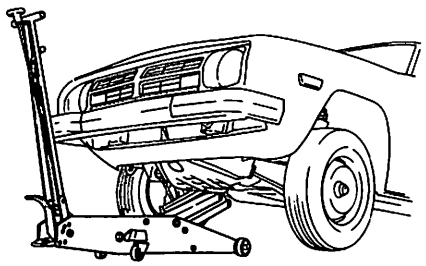
Fig. GI-11 Wheel chocks and jack

GARAGE JACK

WARNING:
a. When jacking up the front of the car, place the chocks behind the rear wheels to hold them.
b. When jacking up the rear of the car, place the chocks at the front side of the front wheels to hold them.
c. When carrying out operations with the garage jack, be sure to support the car with safety stands.

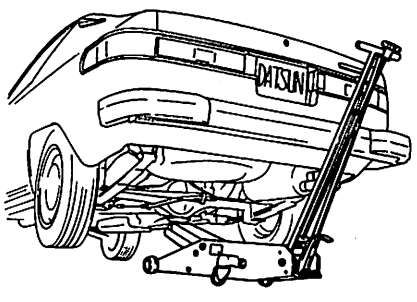
The front jacking point is at the recessed portion of the under cover under the front suspension member and rear is differential gear carrier.

Do not place a jack on the center portion of front suspension transverse link.



GI339

Fig. GI-12 Front jacking point

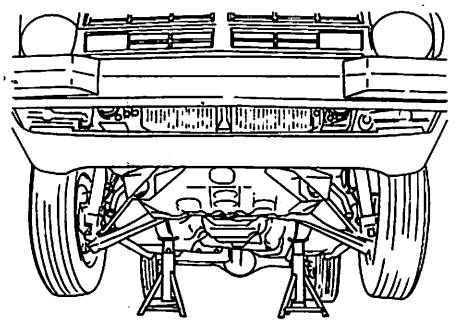


GI340

Fig. GI-13 Rear jacking point

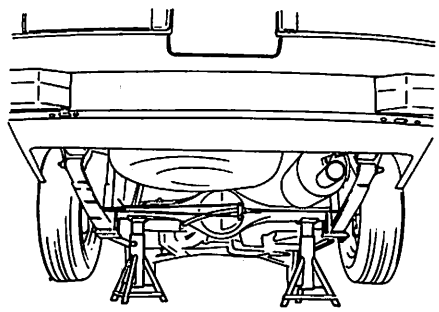
SUPPORTABLE POINT

Front supportable points for stand are both front side members. Rear supportable points are on both sides of the rear axle case.



GI341

Fig. GI-14 Front supportable points



GI342

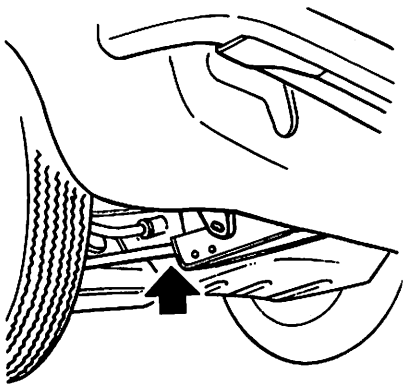
Fig. GI-15 Rear supportable points

TOWING

CAUTION:
a. It is necessary to use proper towing equipment to avoid possible damage to the car during a towing operation.
Towing is in accordance with Towing Procedure Manual at dealer side.
b. All applicable State or Provincial (in Canada) laws and local laws regarding the towing operation must be obeyed.

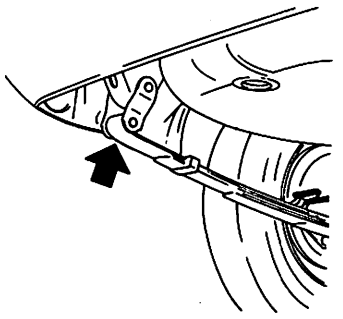
Front towing points are tension rods.

Rear towing points are rear leaf spring shackles.



GI425

Fig. GI-16 Front towing



GI426

Fig. GI-17 Rear towing

CAUTION:

a. Before towing, make sure that the transmission, axles, steering system and power train are in good order. If any unit is damaged, a dolley must be used.

b. If the transmission is inoperative, tow the car with the rear wheels off the ground, or with the propeller shaft removed.

c. When the car is towed with its front wheels on the ground, secure the steering wheel in a straight ahead position with the ignition key turned in "OFF" position.

d. When towing an automatic transmission model on its rear wheels, do not exceed 30 km/h (20 MPH) and a distance of 30 km (20 miles).

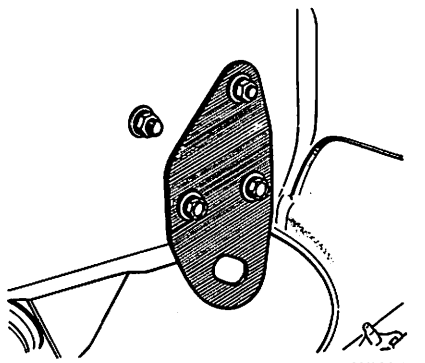
e. Release the parking brake and set the gearshift lever in "Neutral" position before starting to tow the car.

TIE-DOWN HOOK

The tie-down hook is located at the lower portion in front of the hood ledge panel. It is provided for transportation by sea or by rail. Never use it to tow the car, as the car body may be damaged.

CAUTION:

Do not tow the car with the tie-down hook.



WH232

Fig. GI-18 Tie-down hook

SPECIAL SERVICE TOOLS

Special Tools play very important role in the maintenance of cars. These are essential to the safe, accurate and speedy servicing.

The working times listed in the column under FLAT RATE TIME in FLAT RATE SCHEDULE are computed based on the use of Special Tools.

The identification code of maintenance tools is made up of 2 alphabetical letters and 8-digital figures.

The heading two letters roughly classify tools or equipment as:

ST00000000:	Special Tool
KV00000000:	Special Tool
EM00000000:	Engine Overhauling Machine
GG00000000:	General Gauge
LM00000000:	Garage Tool
HT00000000:	Hand Tool

Refer to Service Bulletin DATSUN 200SX for Special Tool List and further information on Special Tools.

SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION ET

ET

ENGINE TUNE-UP

EMISSION CONTROL DEVICES ..... ET- 2
BASIC MECHANICAL SYSTEM ..... ET- 3
IGNITION AND FUEL SYSTEM ..... ET- 5
EMISSION CONTROL SYSTEM ..... ET- 9
SERVICE DATA AND SPECIFICATIONS ET-12
TROUBLE DIAGNOSES AND CORRECTIONS ET-14
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EMISSION CONTROL DEVICES

Item		Engine model	L20B					
		Car model	200SX, 510					
			U.S.A.				Canada	
			California		Non-California			
		Transmission	M/T	A/T	M/T	A/T	M/T	A/T
AIR CLEANER	A.T.C. air cleaner		X	X	X	X	X	X
	Idle compensator (Dual type)		X	X	X	X	X	X
	Fresh air duct		X	X	X	X	–	–
ENGINE BASE	Early fuel evaporative system (Hot water type)		X	X	X	X	X	X
	Exhaust port liner		X	X	X	X	X	X
CARBURETOR	P.T.C. auto choke		X	X	X	X	X	X
	B.C.D.D. (with speed detecting switch)		–	–	X	X	X	X
	B.C.D.D. (with altitude compensator)		X	X	–	–	–	–
	Dash pot		X	X	X	X	X	X
IGNITION SYSTEM	H.I.C. ignitor*1		X	X	X	X	X	X
	Spark timing control system (T.C.S.)		X	–	X	–	–	–
A.I.S.	Air pump, Air pump air cleaner, check valve, A.B. valve		X	X	X	X	X	X
	Combined air control (C.A.C.) valve		X	X	–	–	–	–
	Relief valve		–	–	X	X	X	X
E.G.R. SYSTEM	Exhaust gas recirculation (E.G.R.) valve		X	X	X	X	X	X
	Thermal vacuum valve		X	X	X	X	X	X
	Vacuum delay valve		X	X	–	–	–	–
	Back pressure transducer (B.P.T.) valve		X	X	X	X	X	X
CATALYZER	Catalytic converter		X	X	–	–	–	–

*1: Newly equipped unit on 1979 models
Remarks: X . . . Available
– . . . Not available

M/T : Manual transmission
A/T : Automatic transmission
A.T.C. : Automatic temperature control
P.T.C. : Positive temperature coefficient
A.I.S. : Air injection system
A.B. valve : Anti-backfire valve

BASIC MECHANICAL SYSTEM

CONTENTS

ADJUSTING INTAKE AND EXHAUST VALVE CLEARANCE ET-3
CHECKING AND ADJUSTING DRIVE BELTS ET-3
CHANGING ENGINE OIL ET-3
REPLACING OIL FILTER ET-4
CHANGING ENGINE COOLANT ET-4
PERMANENT ANTI-FREEZE COOLANT ET-4
CHECKING COOLING SYSTEM HOSES AND CONNECTIONS ET-4
INSPECTION OF RADIATOR CAP ET-4
COOLING SYSTEM PRESSURE TEST ET-4
CHECKING ENGINE COMPRESSION ET-4

ADJUSTING INTAKE AND EXHAUST VALVE CLEARANCE

Note:
Valve clearance adjustment cannot be made while engine is in operation.

To adjust, proceed as follows:

1. Start engine and warm up engine until water temperature indicator points to middle of gauge.
2. Rotate crankshaft to bring No. 1 cylinder to top dead center of its compression stroke.
3. Remove valve rocker cover.
4. Using Pivot Adjuster ST10640001, loosen pivot locking nut and turn pivot screw until specified clearance is obtained.

Tighten pivot locking nut securely after adjustment, and recheck clearance.

Order of valve clearance adjustments is as follows:

Note:
When turning crankshaft with starter, remove high tension cable from ignition coil, then turn it.

(1) Exhaust valve of No. 1 cylinder
(2) Intake valve of No. 1 cylinder
(3) Intake valve of No. 2 cylinder
(5) Exhaust valve of No. 3 cylinder

5. Again, rotate crankshaft one turn so that No. 4 piston is at top dead center of its compression stroke. Adjust the following valves:

(4) Exhaust valve of No. 2 cylinder
(6) Intake valve of No. 3 cylinder
(7) Intake valve of No. 4 cylinder
(8) Exhaust valve of No. 4 cylinder

Adjustment should be made while engine is hot.

Ⓣ Tightening torque:
Pivot lock nut
5.0 to 6.0 kg-m
(36 to 43 ft-lb)

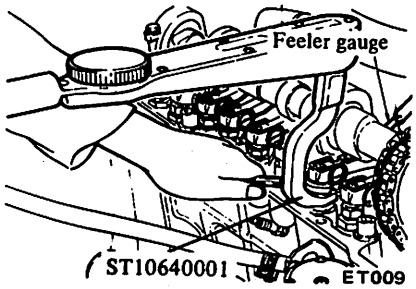


Fig. ET-1 Adjusting Valve Clearance

Valve clearance

Unit: mm (in)

Hot	Intake	0.25 (0.010)
	Exhaust	0.30 (0.012)

CHECKING AND ADJUSTING DRIVE BELTS

1. Check for cracks or damage. Replace if necessary.
2. Normal drive belt deflection is shown in figure below, when moderate thumb pressure is applied midway between pulleys.

Thumb pressure: 10 kg (22 lb)

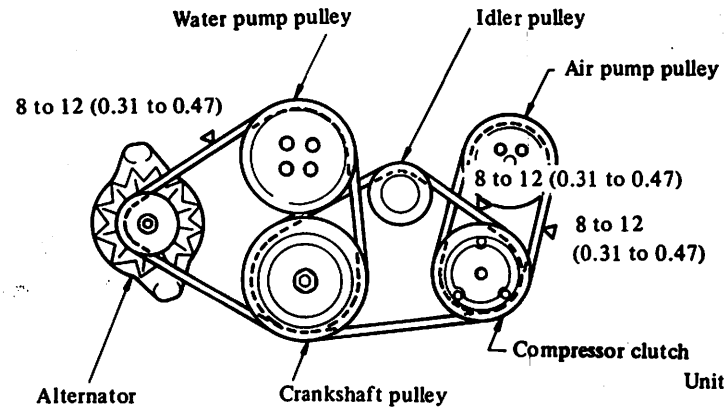


Fig. ET-2 Checking Drive Belts for Deflection

CHANGING ENGINE OIL

1. Check if oil is diluted with water or gasoline. Drain and refill oil if necessary.

Note:
a. A milky oil indicates the presence of cooling water. Isolate the cause and take corrective measure.
b. An oil with extremely low viscosity indicates dilution with gasoline.

2. Check oil level. If below the specified level, raise it up to the H level.
3. Change engine oil in accordance with the maintenance schedule.

Engine oil capacity:
With oil filter
4.4 liters
(4 5/8 US qt, 3 7/8 Imp qt)
Without oil filter
3.9 liters
(4 1/8 US qt, 3 3/8 Imp qt)

REPLACING OIL FILTER

The oil filter is a cartridge type and can be removed using Oil Filter Wrench ST19320000.
1. Check for oil leaks past gasketed flange. If leakage is found, retighten just enough to stop leakage. If retightening is no longer effective, replace filter as an assembly.
2. When installing oil filter, tighten by hand.

Note:
Do not overtighten oil filter, lest leakage should occur.

CHANGING ENGINE COOLANT

PERMANENT ANTI-FREEZE COOLANT

Note:
The permanent anti-freeze coolant is an ethylene glycol base product containing chemical inhibitors to protect the cooling system from rusting and corrosion. The anti-freeze does not contain any glycerine or ethyl alcohol. It will not evaporate or boil away and can be used with either high or low temperature thermostats. It flows freely, transfers heat efficiently, and will not clog the passages in the cooling system. The anti-freeze must not be mixed with other product. This coolant can be used throughout the seasons of the year.

Whenever coolant is changed, the cooling system must be flushed and refilled with a new coolant. Check the coolant level.

Water capacity:
Without heater
7.1 liters
(7 1/2 US qt, 6 1/4 Imp qt)
With heater
7.7 liters
(8 1/8 US qt, 6 3/4 Imp qt)

See instructions attached to the anti-freeze container for mixing ratio of anti-freeze to water.

CHECKING COOLING SYSTEM HOSES AND CONNECTIONS

Check hoses and fittings for loose connections or deterioration. Retighten or replace if necessary.

INSPECTION OF RADIATOR CAP

Apply reference pressure [0.9 kg/cm^2 (13 psi)] to radiator cap by means of a cap tester to see if it is satisfactory. Replace cap assembly if necessary.

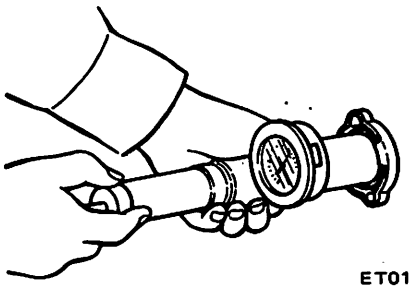

ET012

Fig. ET-3 Testing Radiator Cap

COOLNG SYSTEM PRESSURE TEST

With radiator cap removed, apply reference pressure [1.6 kg/cm^2 (23 psi)] to the cooling system by means of a tester to detect any leakage.

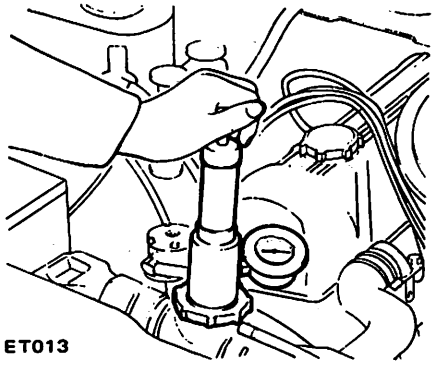

ET013

Fig. ET-4 Cooling System Pressure Test

CHECKING ENGINE COMPRESSION

Note:
a. **To check cylinder compression, it is essential to remove all spark plugs. The purpose of this test is to determine whether there is excessive leakage past piston rings, head gasket, etc. To test, engine should be heated to the operating temperature and throttle valve opened.**
b. **Cylinder compression in cylinders should not be less than 80% of the highest reading. Different compression in two or more cylinder usually indicates an improperly seated valve or broken piston ring.**
c. **Low compression in cylinders can result from worn piston rings. This trouble may usually be accompanied by excessive fuel consumption.**

1. Warm up engine sufficiently.
2. Disconnect all spark plugs.
3. Disconnect anti-dieseling solenoid valve connector.
4. Properly attach a compression tester to spark plug hole in cylinder being tested.

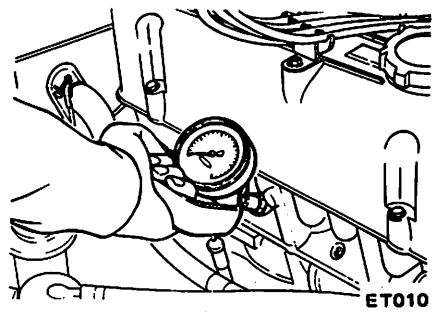

ET010

Fig. ET-5 Testing Compression Pressure

5. Depress accelerator pedal to open throttle and choke valves.

Note:
Do not "pump" pedal.

6. Start engine as quickly as possible.

Compression pressure:

	kg/cm² (psi)/at rpm
Standard	**12.0 (171)/350**
Minimum	**9.0 (128)/350**

If cylinder compression in one or more cylinders is low, pour a small quantity of engine oil into cylinders through the spark plug holes and retest compression.

(1) If adding oil helps the compression pressure, the chances are that piston rings are worn or damaged.

(2) If pressure stays low, the likelihood is that valve is sticking or seating improperly.

(3) If cylinder compression in any two adjacent cylinders is low, and if adding oil does not help the compression, there is leakage past the gasketed surface.

Oil and water in combustion chambers can result from this trouble.

IGNITION AND FUEL SYSTEM

CONTENTS

CHECKING BATTERY ET-5
CHECKING AND ADJUSTING IGNITION TIMING ET-6
CHECKING AND REPLACING SPARK PLUGS ET-6
CHECKING IGNITION WIRING ET-6
CHECKING AND ADJUSTING CARBURETOR IDLE RPM AND MIXTURE RATIO ET-7
CHECKING CHOKE MECHANISM (Choke plate and linkage) ET-8
REPLACING FUEL FILTER ET-8
CHECKING FUEL LINES (Hoses, piping, connections, etc.) ET-8
REPLACING AIR CLEANER FILTER ET-8
CHECKING AUTOMATIC TEMPERATURE CONTROL AIR CLEANER ET-8

CHECKING BATTERY

1. Remove six vent plugs and check electrolyte level in each battery cell. If necessary, pour distilled water.

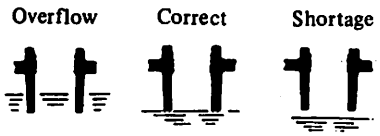
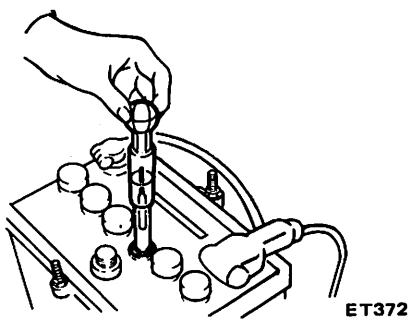


Fig. ET-6 Checking Electrolyte Level

2. Measure the specific gravity of battery electrolyte.



Fie. ET-7 Checking Specific Gravity of Battery Electrolyte

Note:

a. Clean top of battery and terminals with a solution of baking soda and water. Rinse off and dry with compressed air. Top of battery must be clean to prevent current leakage between terminals and from positive terminal to hold-down clamp.

b. In addition to current leakage, prolonged accumulation of acid and dirt on top of battery may cause blistering of the material covering connector straps and corrosion of straps.

c. After tightening terminals, coat them with petrolatum (vaseline) to protect them from corrosion.

	Permissible value	Full charge value [at 20°C (68°F)]
NS70	Over 1.22	1.28
N50Z	Over 1.20	1.26

CAUTION:
If the battery cables are disconnected, they should be tightly clamped to the battery terminals to secure a good contact.

CHECKING AND ADJUSTING IGNITION TIMING

1. Check spark plugs for condition.
2. Thoroughly remove dirt and dust from crank pulley at timing mark location and front cover at timing indicator.
3. Warm up engine sufficiently.
4. Connect engine tachometer and timing light in their proper positions.
5. Adjust idling speed to the specified value.

Idling speed:
Manual transmission
600 rpm
Automatic transmission
600 rpm
(in "D" position)

WARNING:
When selector lever is shifted to "D" position, apply parking brake and block both front and rear wheels with chocks.

6. Check ignition timing with a timing light to ensure that it is adjusted to specifications indicated below.

Ignition timing:
Manual transmission
California & Canada models
12°B.T.D.C./600 rpm
Non-California models except Canada
9°B.T.D.C./600 rpm
Automatic transmission
(in "D" position)
12°B.T.D.C./600 rpm

If necessary, adjust it as follows:
(1) Loosen set screw until distributor can be moved by hand.
(2) Adjust ignition timing to specifications.
(3) Lock distributor set screw, and make sure that timing is correct.

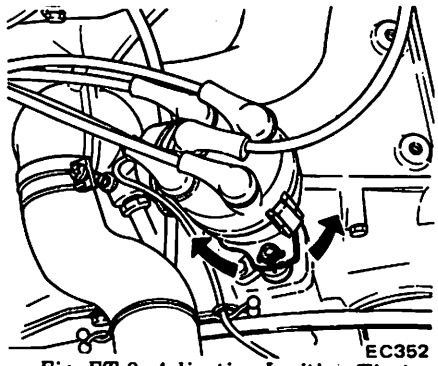


Fig. ET-8 Adjusting Ignition Timing

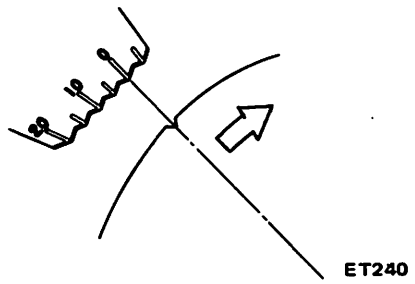


Fig. ET-9 Ignition Timing Indicator

CHECKING AND REPLACING SPARK PLUGS

1. Remove and clean plugs in a sand blast cleaner. Inspect each spark plug. Make sure that they are of the specified heat range.
2. Inspect insulator for cracks or chips. Check both center and ground electrodes.
3. If they are excessively worn, replace with new spark plugs.
4. Replace spark plugs in accordance with the maintenance schedule.

Type	U.S.A. models	Standard	BP6ES-11, L45PW-11 BPR6ES-11*
		Hot type	BP4E-11, BP5ES-11 BPR4E-11*, BPR5ES-11* L46PW-11, L47PW-11
		Cold type	BP7ES-11, BPR7ES-11* L44PW-11
	Canada models	Standard	BPR6ES
		Hot type	BPR4ES, BPR5ES
		Cold type	BPR7ES
Plug gap mm (in)	U.S.A. models		1.0 to 1.1 (0.039 to 0.043)
	Canada models		0.8 to 0.9 (0.031 to 0.035)
Tightening torque kg-m (ft-lb)			1.5 to 2.0 (11 to 14)

*: Option

CHECKING IGNITION WIRING

Use an ohmmeter to check resistance on high tension cables.
1. Disconnect cables from spark plugs and remove distributor together with high tension cables.

Note:
Do not remove cables from cap.

2. Connect the ohmmeter between cable terminal on the spark plug side and the corresponding electrode inside cap.
3. If the resistance is more than 30,000 ohms, remove cable from cap and check the cable resistance only. If resistance is still more than 30,000 ohms, replace cable assembly.

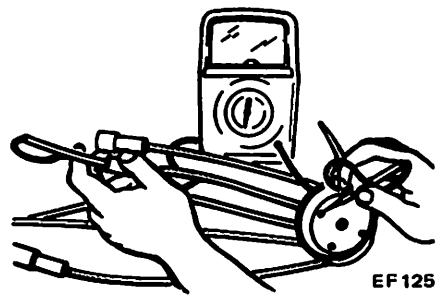


Fig. ET-10 Checking High Tension Cable

CHECKING AND ADJUSTING CARBURETOR IDLE RPM AND MIXTURE RATIO

WARNING:
a. On automatic transmission models, checks should be performed with the lever shifted to the "D" position. Be sure to engage parking brake and to lock both front and rear wheels with wheel chocks.
b. Depress brake pedal while accelerating the engine to prevent forward surge of car.
c. After idle adjustment has been made, shift the lever to the "N" or "P" position and remove wheel chocks.

CAUTION:
Do not attempt to screw the idle adjusting screw down completely. Doing so could cause damage to tip, which in turn will tend to cause malfunctions.

Note:
a. When measuring CO percentage, insert probe into tail pipe more than 40 cm (15.7 in).
b. In the case of air conditioner equipped models, the idle adjustment should be carried out while the air conditioner is "OFF".

"CO" idle adjustment with CO-meter

Idle mixture adjustment requires the use of a CO-meter (especially for California models). When preparing to adjust idle mixture, it is essential to have the meter thoroughly warmed up and calibrated.

1. Check carburetor pipes for proper connection.
2. Warm up engine until water temperature indicator points to the middle of gauge. The procedure to warm up engine is not specifically recommended. Either driving vehicle or operating engine at no load will be good.
3. Make sure that water temperature indicator points to the middle. Further keep engine running at about 2,000 rpm for about 5 minutes without applying load to engine in order to stabilize engine condition. Engine hood should be open.
4. Run engine for about 10 minutes at idling speed. During this 10 minutes, proceed as described in steps 5 to 9 below.
5. Remove air hose between 4-way connector (or 3-way connector) and air check valve as shown in Figure below. Plug the disconnected hose at air check valve side.

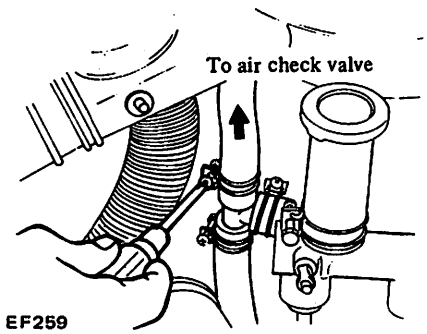


Fig. ET-11 Disconnecting Air Hose

6. Race engine (1,500 to 2,000 rpm) two or three times under no load, then run engine for one minute at idling speed.
7. Adjust throttle adjusting screw until engine is at specified speed.

Engine speed:
Manual transmission
600 rpm
Automatic transmission
(in "D" position)
600 rpm

8. Check ignition timing. If necessary, adjust it to specifications.

This operation need not be carried out at 1,600 km (1,000 miles) service.

Ignition timing:
Manual transmission
California & Canada models
12° B.T.D.C./600 rpm
Non-California models except Canada
9° B.T.D.C./600 rpm
Automatic transmission
(in "D" position)
12° B.T.D.C./600 rpm

9. At about 10 minutes after engine is run at idling speed, adjust idle adjusting screw so that CO percentage is at specified level.

CO percentage:
Manual transmission
1% $^{+1}_{-0.7}$ at 600 rpm
Automatic transmission
(in "D" position)
1% $^{+1}_{-0.7}$ at 600 rpm

10. Repeat procedures as described in steps 6, 7 and 9 above so that CO percentage is at specified level. Checking idle CO in step 9 can be carried out right after step 7.
11. Race engine (1,500 to 2,000 rpm) two or three times under no load and make sure that specified CO percentage is obtained.
12. Remove plug, and connect air hose to connector.

If engine speed increases, readjust it to the specified speed with throttle adjusting screw.

"CO" idle adjustment without CO-meter (Non-California models)

If CO-meter is not available, the following procedures may be used:

1. Check carburetor pipes for proper connection.
2. Warm up engine until water temperature indicator points to the middle of gauge. The procedure to warm up engine is not specifically recommended. Either driving vehicle or operating engine at no load will be good.
3. Make sure that water temperature indicator points to the middle. Further keep engine running at about 2,000 rpm for about 5 minutes without applying load to engine in order to stabilize engine condition. Engine hood should be open.
4. Run engine for about 10 minutes at idling speed. During this 10 minutes, proceed as described in steps 5 to 9 below.
5. Remove air hose between 4-way connector (or 3-way connector) and air check valve shown in Fig. ET-11. Plug the disconnected hose at air check valve side.

6. Race engine (1,500 to 2,000 rpm) two or three times under no load, then run engine for one minute at idling speed.
7. Adjust throttle adjusting screw so that engine speeds are as indicated below.

Engine speed:
Manual transmission
650 rpm
Automatic transmission
(in "D" position)
630 rpm

8. Check ignition timing, if necessary adjust it to the value required by specifications. This operation need not be carried out at 1,600 km (1,000 miles) service.
9. At about 10 minutes after engine is run at idling speed, adjust idle adjusting screw until maximum rpm is obtained.
10. Repeat procedures as described in steps 6, 7 and 9 above until engine speed, at best idle mixture, is as specified in step 7. Adjustment in step 9 can be carried out right after step 7.
11. Turn the idle adjusting screw clockwise until engine speed drops by value shown below.

Engine speed drops:
Manual transmission
45 to 55 rpm
Automatic transmission
(in "D" position)
25 to 35 rpm

12. Remove plug, and connect air hose to connector.

If engine speed increases, readjust it to the specified speed with throttle adjusting screw.

Idle limiter cap

Do not remove this idle limiter cap unless necessary. If this unit is removed, it is necessary to readjust it at the time of installation. To adjust proceed as follows:

1. After adjusting throttle or idle speed adjusting screws, check to be sure that the amount of "CO" contained in exhaust gases meets the established standard.
2. Install idle limiter cap in position, making sure that the adjusting screw further turns 1/8 rotation in the "CO-RICH" direction.

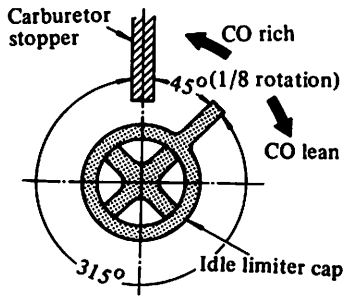
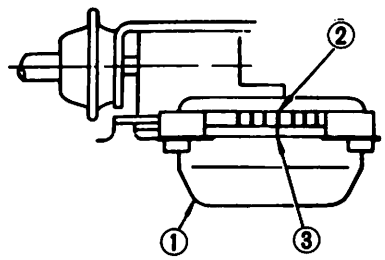


Fig. ET-12 Setting Idle Limiter Cap

CHECKING CHOKE MECHANISM (Choke plate and linkage)

1. Check choke valve and mechanism for free operation, and clean or replace if necessary. A binding can result from petroleum gum formation on choke shaft or from damage.
2. Before starting engine, fully depress accelerator pedal to ensure that choke valve closes properly.
3. Push choke valve with a finger, and check for binding.
4. Check to be sure that bi-metal cover index mark is set at the center of choke housing index mark as shown below.

NOTE:
Do not set bi-metal cover index mark at any position except the center of choke housing index mark.



1 Thermostat cover (Bi-metal chamber)
2 Thermostat housing
3 Groove ET034

Fig. ET-13 Bi-metal Setting

REPLACING FUEL FILTER

1. Check for a contaminated filter, and water deposit.

All engines use a replaceable cartridge type fuel filter as an assembly.

2. Replace fuel filter in accordance with the maintenance schedule.

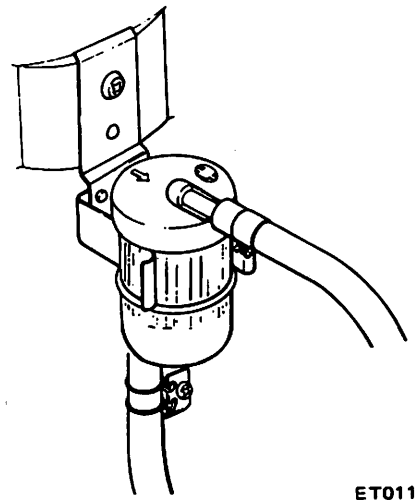


Fig. ET-14 Fuel Filter

CHECKING FUEL LINES (Hoses, piping, connections, etc.)

Check fuel lines for loose connections, cracks and deterioration. Retighten loose connections and replace any damaged or deformed parts.

REPLACING AIR CLEANER FILTER

Viscous paper type air cleaner filter does not require any cleaning operation until it is replaced periodically. Brushing or blasting operation will cause clogging and result in enrichment of carburetor mixture, and should never be conducted.

Replace air cleaner filter in accordance with the maintenance schedule.

CHECKING AUTOMATIC TEMPERATURE CONTROL AIR CLEANER

1. Check that vacuum hoses (Intake manifold to 3-way connector, 3-way connector to temperature sensor,

3-way connector to idle compensator, temperature sensor to vacuum motor) are securely connected in correct position.

2. Check each hose for cracks or distortion.

3. Check A.T.C. system for function by proceeding as follows.

Confirm that engine is cold before starting test.

With engine stopped, disconnect fresh air duct if so equipped.

Place a mirror at the end of air cleaner inlet pipe as shown, and check to see if air control valve is in correct position.

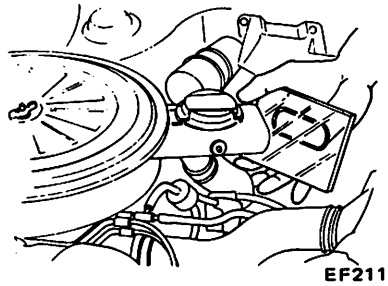


Fig. ET-15 Inspecting Valve Position

Air control valve is in correct position if its cold air inlet is open and hot air inlet is closed.

4. Start engine and keep idling.

Immediately after engine starting, check air control valve for correct position as described above. In this case, correct position of air control valve is the reverse of step 3; underhood air inlet is closed, and hot air inlet is open.

5. Check that air control valve gradually opens to cold air inlet side as engine warms up. When environmental temperature around temperature sensor is low, spend more time for engine warning up operation to facilitate smooth operation of air control valve.

If the above test reveals any problem in the operation of air control valve, carry out the further inspection described in Section EF.

EMISSION CONTROL SYSTEM

CONTENTS

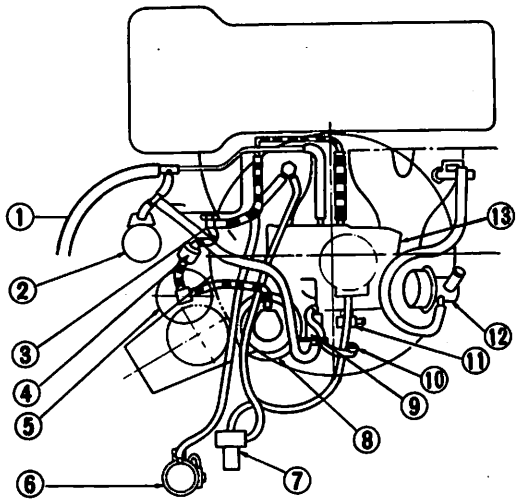
CHECKING VACUUM FITTING HOSES AND CONNECTIONS ..... ET- 9
REPLACING AIR PUMP AIR CLEANER FILTER ET-10
REPLACING P.C.V. VALVE AND FILTER ET-10
CHECKING VENTILATION HOSES ET-11
CHECKING VAPOR LINES ET-11
CHECKING FUEL TANK VACUUM RELIEF VALVE ET-11
REPLACING CARBON CANISTER FILTER ... ET-12

CHECKING VACUUM FITTING HOSES AND CONNECTIONS

Check fittings and hoses for loose connections or damage. Retighten loose parts or replace parts that are not suitable for further use.

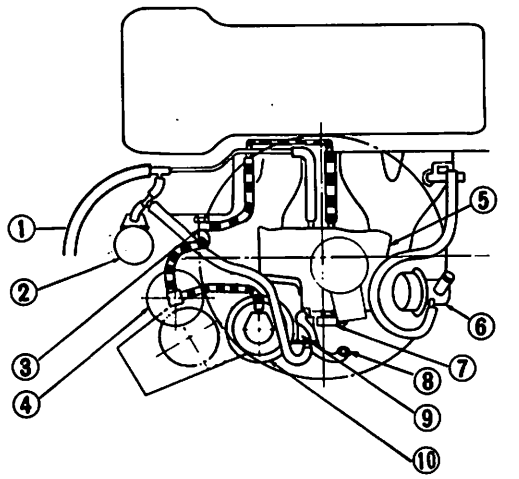
- Carburetor to vacuum tube
- Vacuum tube to thermal vacuum valve
- Thermal vacuum valve to B.P.T. valve (Non-California models)
- Thermal vacuum valve to vacuum delay valve (California models)
- Vacuum delay valve to B.P.T. valve (California models)
- B.P.T. valve to E.G.R. control valve
- Carburetor to vacuum tube
- Vacuum tube to distributor (Except M/T models for U.S.A.)
- Vacuum tube to 3-way connector (M/T models for U.S.A.)
- 3-way connector to distributor (M/T models for U.S.A.)
- 3-way connector to vacuum switching valve (M/T models for U.S.A.)
- A.B. valve to intake manifold
- Intake manifold to C.A.C. valve (California models)
- Intake manifold to B.C.D.D. control valve (California models)
- Vacuum tube to carbon canister
- Intake manifold to brake booster
- Intake manifold to dash pot (Air conditioner equipped models)

California models



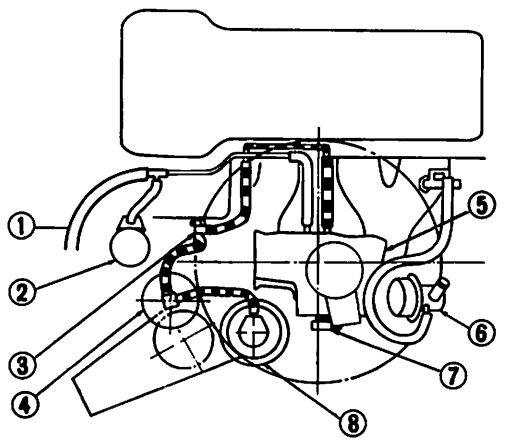
1 To canister purge control valve
2 Distributor
3 Thermal vacuum valve
4 Vacuum delay valve
5 B.P.T. valve
6 C.A.C. valve
7 B.C.D.D. vacuum control valve
8 E.G.R. control valve
9 Vacuum switching valve (M/T only)
10 To air cleaner (M/T only)
11 Intake manifold vacuum takeout port
12 A.B. valve
13 Carburetor

Non-California models except Canada



1 To canister purge control
2 Distributor
3 Thermal vacuum valve
4 B.P.T. valve
5 Carburetor
6 A.B. valve
7 Intake manifold vacuum takeout port (Idle compensator)
8 To air cleaner (M/T only)
9 Vacuum switching valve (M/T only)
10 E.G.R. control valve

Canada models



1 To canister purge control
2 Distributor
3 Thermal vacuum valve
4 B.P.T. valve
5 Carburetor
6 A.B. valve
7 Intake manifold vacuum takeout port
8 E.G.R. control valve

Fig. ET-16 Vacuum Fitting Hoses

REPLACING AIR PUMP AIR CLEANER FILTER

Remove air hose, then detach air cleaner from hoodlege. Air cleaner filter and air cleaner lower body are built into a unit construction. Replace air cleaner filter and lower body as an assembly.

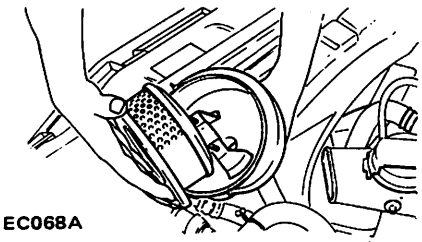


Fig. ET-17 Replacing Air Cleaner Filter

REPLACING P.C.V. VALVE AND FILTER

1. Checking P.C.V. valve in accordance with the following method.

With engine running at idle, remove the ventilator hose from P.C.V. valve, if the valve is working, a hissing noise will be heard as air passes through the valve and a strong vacuum should be felt immediately when a finger is placed over valve inlet.

2. Replace P.C.V. valve and filter in accordance with the maintenance schedule.

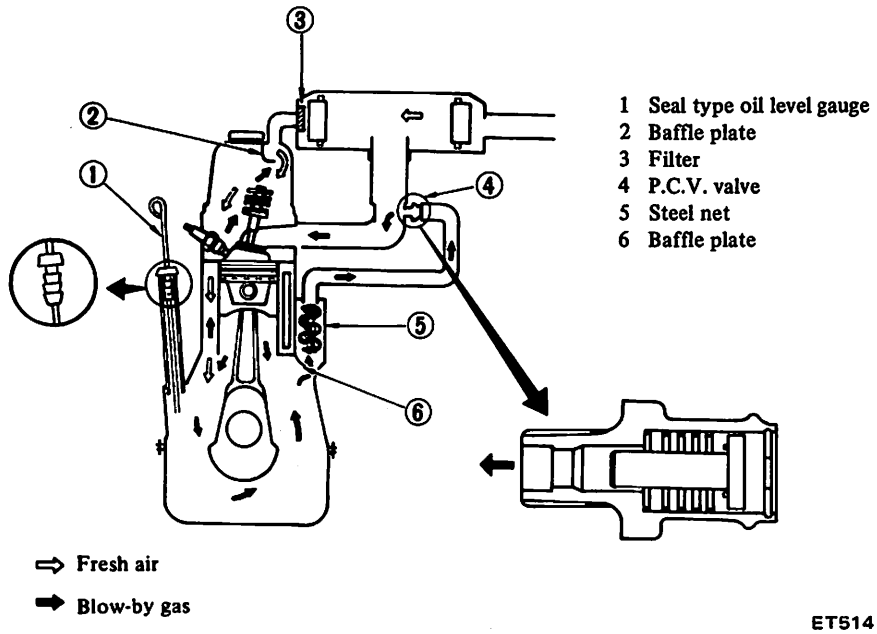


Fig. ET-18 Crankcase Emission Control System

CHECKING VENTILATION HOSES

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air.

If any hose cannot be free of obstructions, replace.

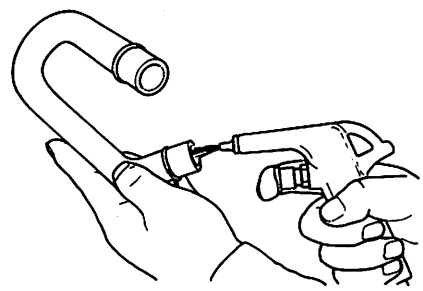


Fig. ET-19 Cleaning Ventilation Hose

CHECKING VAPOR LINES

1. Check all hoses and fuel tank filler cap.
2. Disconnect the vapor vent line connecting carbon canister to fuel tank.
3. Connect a 3-way connector, a manometer and a cock (or an equivalent 3-way charge cock) to the end of the vent line.
4. Supply fresh air into the vapor vent line through the cock little by little until pressure becomes 400 mmH_2O (15.75 inH_2O).
5. Shut the cock completely and leave it unattended.
6. After 2.5 minutes, measure the height of the liquid in the manometer.
7. Variation in height should remain with 25 mmH_2O (0.98 inH_2O).
8. When filler cap does not close completely, the height should drop to zero in a short time.
9. If the height does not drop to zero in a short time when filler cap is removed, it is the cause of a stuffy hose.

NOTE:
In case the vent line is stuffy, the breathing in fuel tank is not thoroughly made, thus causing insufficient delivery of fuel to engine or vapor lock. It must, therefore, be repaired or replaced.

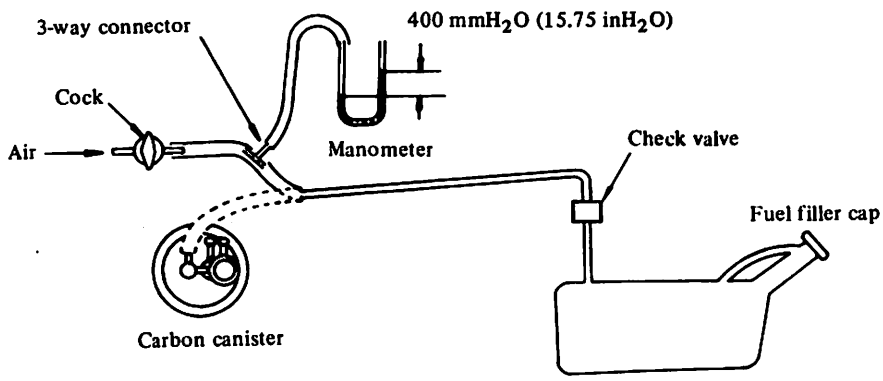
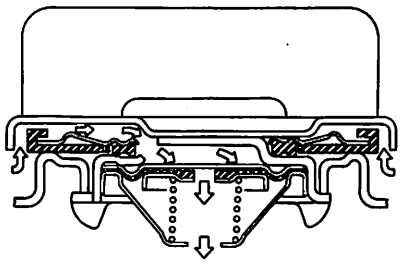


Fig. ET-20 Checking Evaporative Emission Control System

CHECKING FUEL TANK VACUUM RELIEF VALVE

Remove fuel filler cap and see it functions properly.

1. Wipe clean valve housing and have it in your mouth.
2. Inhale air. A slight resistance accompanied by valve indicates that valve is in good mechanical condition. Note also that, by further inhaling air, the resistance should be disappeared with valve clicks.
3. If valve is clogged, or if no resistance is felt, replace cap as an assembled unit.

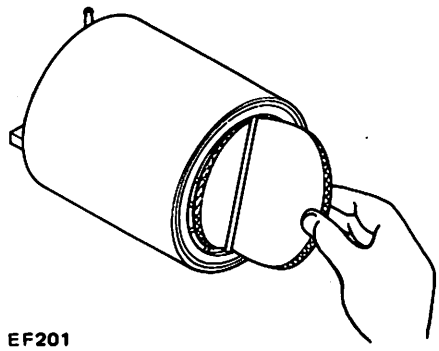


ET500

Fig. ET-21 Fuel Filler Cap

REPLACING CARBON CANISTER FILTER

1. Check for a contaminated filter. Filter can be removed at the bottom of canister installed on car body.
2. Replace filter in accordance with the maintenance schedule.



EF201

Fig. ET-22 Replacing Carbon Canister Filter

SERVICE DATA AND SPECIFICATIONS

INSPECTION AND ADJUSTMENT

Basic mechanical system

Valve clearance			
Hot	Intake	mm (in)	0.25 (0.010)
	Exhaust	mm (in)	0.30 (0.012)
Drive belt deflection			
Fan		mm (in)	8 to 12 (0.31 to 0.47)
Air pump		mm (in)	8 to 12 (0.31 to 0.47)
Air conditioner compressor		mm (in)	8 to 12 (0.31 to 0.47)
Applied thumb pressure		kg (lb)	10 (22)
Engine oil capacity		liters (US qt, Imp qt)	
With oil filter			4.4 (4 5/8, 3 7/8)
Without oil filter			3.9 (4 1/8, 3 3/8)
Radiator cap relief pressure		kg/cm^2 (psi)	0.9 (13)
Cooling system leakage testing pressure		kg/cm^2 (psi)	1.6 (23)
Water capacity			
Without heater:		liters (US qt, Imp qt)	7.1 (7 1/2, 6 1/4)
With heater:		liters (US qt, Imp qt)	7.7 (8 1/8, 6 3/4)
Compression pressure at 350 rpm			
Standard		kg/cm^2 (psi)	12.0 (171)
Minimum		kg/cm^2 (psi)	9.0 (128)
Battery specific gravity at 20°C (68°F)			
Frigid climates			1.28
Other climates			1.26

Ignition and fuel system

Ignition timing		
Manual transmission models		
California & Canada models	degree/rpm	12°B.T.D.C./600
Non-California models except Canada	degree/rpm	9°B.T.D.C./600
Automatic transmission models (in "D" position)	degree/rpm	12°B.T.D.C./600
Spark plug		
Gap U.S.A. models	mm (in)	1.0 to 1.1 (0.039 to 0.043)
Canada models	mm (in)	0.8 to 0.9 (0.031 to 0.035)
High tension cable resistance	ohm	less than 30,000
"CO" percentage at idling speed (No air)		
Manual transmission models	%/rpm	$1\ ^{+1}_{-0.7}$ /600
Automatic transmission models (in "D" position)	%/rpm	$1\ ^{+1}_{-0.7}$ /600

Evaprative emission control system

Supplied pressure	mmH_2O (inH_2O)	400 (15.75)
Pressure variation	mmH_2O (inH_2O)	less than 25 (0.98)

TIGHTENING TORQUE

Pivot lock nut	kg-m (ft-lb)	5.0 to 6.0 (36 to 43)
Spark plug	kg-m (ft-lb)	1.5 to 2.0 (11 to 14)

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
CANNOT CRANK ENGINE OR SLOW CRANKING	Improper grade oil.	Replace with proper grade oil.
	Discharged battery.	Charge battery.
	Faulty battery.	Replace.
	Loose fan belt.	Adjust.
	Malfunction in charging system	Inspect.
	Wiring connection loose in starting circuit.	Correct.
	Faulty ignition switch	Repair or replace.
	Faulty starting motor.	Repair or replace.

(Trouble-shooting procedure on starting circuit)
Switch on the starting motor with light "ON".

When light goes off or dims considerably,

a. Check battery.
b. Check connection and cable.
c. Check starting motor.

When light stays bright,

a. Check wiring connection between battery and starting motor.
b. Check ignition switch.
c. Check starting motor.

ENGINE WILL CRANK NORMALLY BUT WILL NOT START

In this case, the following trouble causes may exist, but in many cases ignition system or fuel system is in trouble.

Ignition system in trouble
Fuel system in trouble
Valve mechanism does not work properly
Low compression

(Trouble-shooting procedure)
Check spark plug firstly by following procedure.
Disconnect high tension cable from one spark plug and hold it about 10 mm (0.39 in) from the engine metal part and crank the engine.

Good spark occurs.

a. Check spark plug.
b. Check ignition timing.
c. Check fuel system.
d. Check cylinder compression.

No spark occurs. — Check the current flow in primary circuit.

Very high current. — Inspect primary circuit for short.

Condition	Probable cause	Corrective action
	Low or no current.	Check for loose terminal or disconnection in primary circuit.
Ignition system out of order	Leak at rotor cap and rotor..	Clean or replace.
	Faulty spark plug.	Clean, adjust plug gap or replace.
	Improper ignition timing.	Adjust.
	Faulty ignition coil.	Replace.
	Disconnection of high tension cable.	Replace.
	Loose connection or disconnection in primary circuit.	Repair or replace.
Fuel system out of order	Lack of fuel.	Supply.
	Dirty fuel filter.	Replace.
	Dirty or clogged fuel pipe.	Clean.
	Fuel pump will not work properly.	Repair or replace.
	Carburetor choke will not work properly.	Check and adjust.
	Improper adjustment of float level.	Correct.
	Improper idling.	Adjust.
	Dirty or clogged carburetor.	Disassemble and clean.
	Clogged breather pipe of fuel tank.	Repair and clean.
	Malfunctioning anti-dieseling solenoid valve.	Check for loose terminal or wire harness.
Low compression	Incorrect spark plug tightening or faulty gasket.	Tighten to normal torque or replace gasket.
	Improper grade engine oil or low viscosity.	Replace with proper grade oil.
	Incorrect valve clearance.	Adjust.
	Compression leak from valve seat.	Remove cylinder head and lap valves.
	Sticky valve stem.	Correct or replace valve and valve guide.
	Weak or damaged valve springs.	Replace valve springs.
	Compression leak at cylinder head gasket.	Replace gasket.
	Sticking or damaged piston ring.	Replace piston rings.
	Worn piston ring or cylinder.	Overhaul engine.
(Trouble-shooting procedure) Pour the engine oil from plug hole, and then measure cylinder compression.		
Compression increases.		Malfunctioning cylinder or piston ring.
Compression does not change.		Compression leaks from valve, cylinder head or head gasket.

Condition	Probable cause	Corrective action
IMPROPER ENGINE IDLING (Low engine idle speed)		
Fuel system out of order	Clogged or damaged carburetor jets.	Clean or replace.
	Incorrect idle adjustment.	Adjust.
	Clogged air cleaner filter.	Replace filter.
	Damaged manifold gaskets or carburetor insulator.	Replace gasket or insulator.
	Improper float level adjustment.	Adjust.
	Loose or cracked vacuum hoses or air hoses from carburetor and intake manifold.	Check for loose connections or cracks.
	Malfunctioning carburetor choke.	Check and adjust.
	Malfunctioning anti-backfire valve.	Check for loose connection of vacuum hose.
	Malfunctioning automatic temperature control air cleaner.	Check A.T.C. air cleaner for loose hoses or faulty components.
	Inoperative idle compensator.	Check for connection of idle compensator hose or replace idle compensator.
	Carbon canister purge line hose damaged or disconnected.	Correct or replace.
Low compression		Previously mentioned.
Others	Incorrect valve clearance.	Adjust.
	Extremely low revolution.	Adjust.
	Malfunction of the ignition system (spark plug, high tension cable, ignition coil, etc.).	Replace.
	Incorrect basic ignition timing.	Adjust.
	Malfunction of E.G.R. control valve.	Clean or replace.
	Loose manifold and cylinder head bolts.	Retighten bolts.
IMPROPER ENGINE IDLING (High engine idle speed)	Dragged accelerator linkage.	Check and correct accelerator linkage.
	Incorrect idle adjustment.	Adjust idle speed.
	Malfunction of B.C.D.D.	Adjust operating pressure of B.C.D.D.
		Adjust or replace if necessary.
	Malfunction of B.C.D.D. solenoid valve.	Check harness connections and B.C.D.D. solenoid valve.
	Malfunction of speed switch, inhibitor switch and harness.	Check for loose connections or check switch. Repair or replace if necessary.
	Malfunctioning carburetor choke	Check and adjust.
	Improper dashpot adjustment.	Check and adjust.

Condition	Probable cause	Corrective action
ENGINE POWER NOT UP TO NORMAL		
Low compression		Previously mentioned.
Ignition system out of order	Incorrect ignition timing.	Adjust.
	Damaged spark plugs.	Clean, adjust or replace plugs.
	Malfunction of spark timing control system.	Check or replace.
Fuel system out of order	Malfunction of choke system.	Adjust.
	Clogged fuel pipe or floating valve.	Clean.
	Dirty or clogged fuel filter.	Replace.
	Fuel pump will not work properly.	Repair or replace.
	Clogged carburetor jets.	Disassemble and clean.
	Malfunction of A.T.C. air cleaner.	Check or replace.
Air intake system out of order	Clogged air cleaner.	Replace filter.
	Air inhaling from manifold gasket or carburetor gasket.	Replace gasket.
Emission control	Malfunction of E.G.R. valve.	Check and replace.
Overheating	Insufficient coolant.	Replenish.
	Loose fan belt.	Adjust fan belt.
	Worn or oiled fan belt.	Replace.
	Inoperative thermostat.	Replace.
	Worn water pump.	Replace.
	Clogged or leaky radiator.	Flush, repair or replace.
	Worn radiator filler cap.	Replace.
	Air in cooling system.	Retighten each part of cooling system.
	Improper engine oil grade.	Replace with proper grade oil.
	Incorrect ignition timing.	Adjust.
	Clogged carburetor (lean mixture).	Overhaul carburetor.
Overcooling	Inoperative thermostat.	Replace.
Others	Improper octane fuel.	Replace with specified octane fuel.
	Improper tire pressure.	Inflate to specified pressure.
	Dragging brake.	Adjust.
	Clutch slipping.	Adjust.

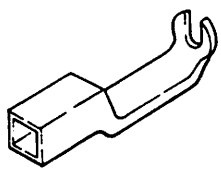
Condition	Probable cause	Corrective action
NOISY ENGINE		
Car knocking	Overloaded engine.	Use right gear in driving.
	Carbon knocking.	Disassemble cylinder head and remove carbon.
	Timing knocking.	Adjust ignition timing.
	Fuel knocking.	Use specified octane fuel.
	Preignition (misusing of spark plug).	Use specified spark plug.
Mechanical knocking		
Crankshaft bearing knocking	This strong dull noise increases when engine is accelerated. To locate the place, cause a misfire on each cylinder. If the noise stops by the misfire, this cylinder generates the noise.	This is caused by worn or damaged bearings, or unevenly worn crankshaft. Renew bearings and adjust or change crankshaft. Check lubrication system.
Connecting rod bearing knocking	This is a little higher-pitched noise than the crankshaft knocking, and also increases when engine is accelerated. Cause a misfire on each cylinder and if the noise deminishes almost completely, this crankshaft bearing generates the noise.	Same as the case of crankshaft bearings.
Piston cylinder noise	When you hear an overlapping metallic noise which increases its magnitude with the revolution of engine and which decreases as engine is warmed up, this noise is caused by piston and cylinder. To locate the place, cause a misfire on each cylinder.	This may cause an abnormal wearing of cylinder and lower compression which in turn will cause a lower out-put power and excessive consumption of oil. Overhaul engine.
Piston pin noise	This noise is heard at each highest and lowest dead end of piston. To locate the place, cause a misfire on each cylinder.	This may cause a wear on piston pin, or piston pin hole. Renew piston and piston pin assembly.
Water pump noise	This noise may be caused by worn or damaged bearings, or by the uneven surface of sliding parts.	Replace water pump with a new one.
Air pump noise	Damaged air pump.	Repair or replace.
Others	An improper adjustment of valve clearance.	Adjust.
	Noise of timing chain.	Adjust the tension of chain.
	An excessive end-play on crankshaft.	Disassemble engine and renew main bearing.
	Wear on clutch pilot bushing. **NOTE:** **This noise will be heard when clutch is disengaged.**	Renew bush and adjust drive shaft.

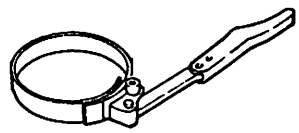
Condition.	Probable cause	Corrective action
ABNORMAL COMBUSTION (Backfire, afterfire, run-on, etc.)		
Improper ignition timing	Improper ignition timing.	Adjust ignition timing.
	Improper heat range of spark plugs.	Use specified spark plugs.
Fuel system out of order	Improper idle adjustment.	Adjust.
	Damaged carburetor or manifold gasket. (backfire, afterfire)	Replace them with new parts.
	Clogged carburetor jets.	Disassemble carburetor and check it.
	Improper function of the float.	Adjust the level, and check needle valve.
	Improperly adjusted B.C.D.D. operating pressure.	Adjust.
	Malfunction of anti-dieseling solenoid valve.	Check or replace.
	Malfunction of auto-choke.	Adjust.
Faulty cylinder head, etc.	Improperly adjusted valve clearance.	Adjust.
	Excess carbon in combustion chamber.	Remove head and get rid of carbon.
	Damaged valve spring (backfire, afterfire).	Replace it with a new one.
Others	Malfunction of A.T.C. air cleaner.	Check for loose vacuum hoses. Replace if necessary.
	Inoperative anti-backfire valve.	Replace.
	Malfunction of C.A.C. valve.	Check for loose hoses. Replace if necessary.
EXCESSIVE OIL CONSUMPTION		
Oil leakage	Loose oil drain plug.	Tighten it.
	Loose or damaged oil pan gasket.	Renew gasket or tighten it.
	Loose or damaged chain cover gasket.	Renew gasket or tighten it.
	Worn oil seal in front and rear of crankshaft.	Renew oil seal.
	Loose or damaged locker cover gasket.	Renew gasket or tighten it (but not too much).
	Improper tightening of oil filter.	Renew gasket and tighten it with the proper torque.
	Loose or damaged oil pressure switch.	Renew oil pressure switch or tighten it.
Excessive oil consumption	Cylinder and piston wear.	Overhaul cylinder and renew piston.
	Improper location of piston ring gap or reversely assembled piston ring.	Remount piston rings.
	Damage piston rings.	Renew rings. Repair or renew piston and cylinder.
	Worn piston ring groove and ring.	Renew piston and piston ring.
	Fatigue of valve oil seal lip.	Replace seal lip with a new one.
	Worn valve stem.	Renew valve or guide.

Condition	Probable cause	Corrective action
Others	Inadequate quality of engine oil.	Use the designated oil.
	Engine overheat.	Previously mentioned.
	Malfunction of P.C.V. system.	Check or replace.

SPECIAL SERVICE TOOLS

Tool number & tool name	Kent-Moore No. / Reference page or Fig. No. / Unit application	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No. / Unit application
ST10640001 Pivot adjuster	J 25615-01 / Fig. ET-1 / *	ST19320000 Oil filter wrench	J 25664 / Page ET-3 / *





*: Applicable to all S10 series models

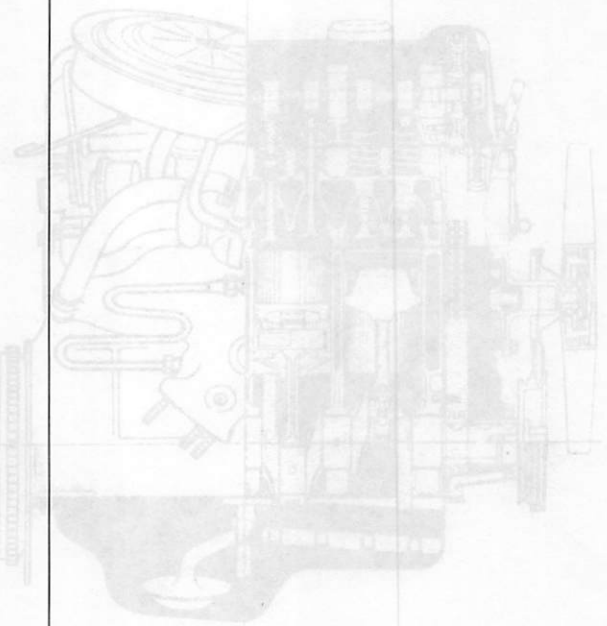
SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION EM

EM

ENGINE MECHANICAL



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ENGINE DISASSEMBLY ..... EM- 4
INSPECTION AND REPAIR ..... EM- 8
ENGINE ASSEMBLY EM-20
SERVICE DATA AND SPECIFICATIONS EM-26
TROUBLE DIAGNOSES AND CORRECTIONS EM-31
SPECIAL SERVICE TOOLS EM-33

GENERAL DESCRIPTION

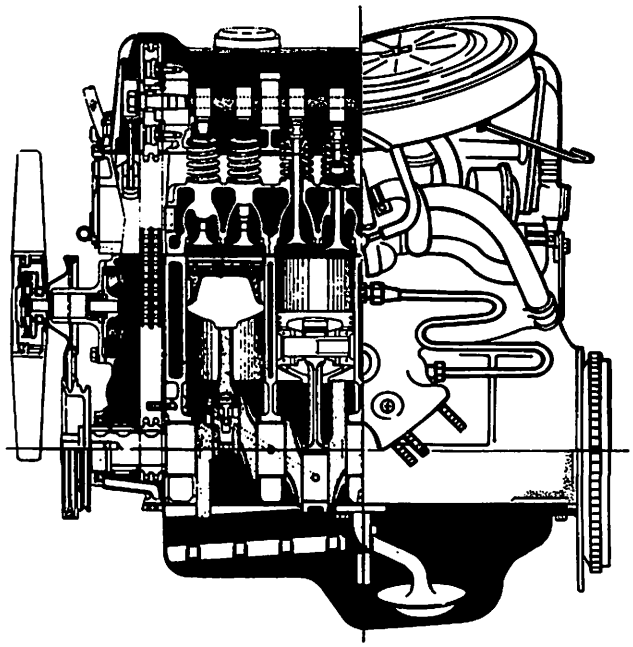
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CAMSHAFT EM-3
VALVE MECHANISM EM-3
CAMSHAFT DRIVE EM-3
MANIFOLDS EM-3

MODEL L20B ENGINE

The L20B engine features O.H.C. valves, wedge-shaped combustion chamber, aluminum head and a fully balanced 5-bearing crankshaft to turn out smooth, dependable power.

The cylinder block is cast as a single unit, and features deep skirting. This engine is equipped with a single, 2-barrel downdraft carburetor that incorporates a special device to control emissions. See Fig. EM-1.



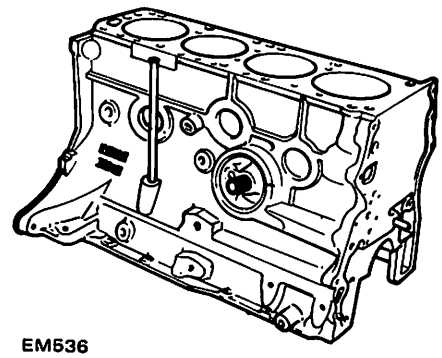
EM664

Fig. EM-1 Cross Sectional View

CYLINDER BLOCK

The cylinder block, a monoblock special casting structure, employs a five-bearing-support system for quietness and higher durability.

The cylinder bores are surrounded by cooling jackets and machined directly in the block. The oil ways in the block are arranged so that the full-flow oil filter is directly attached to the right hand side of the block.



EM536

Fig. EM-2 Cylinder Block

Main specifications

		L20B
Displacement	cc (cu in)	1,952 (119.11)
Bore x stroke	mm (in)	85.0 x 86.0 (3.346 x 3.386)
Compression ratio		8.5

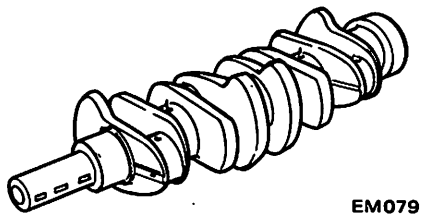
M/T: Manual Transmission A/T: Automatic Transmission

CRANKSHAFT

The crankshaft is a special steel forging. Fully balanced, it turns out smooth, dependable power at high speed.

The L20B engine uses eight balance weights.

Main bearings are lubricated by oil pumped through the main oil gallery and the oil holes which run in parallel with cylinder bores. There are oilways drilled in the crankshaft for the lubricating oil. The center main bearing is equipped with thrust washers to take up end thrust of the crankshaft.



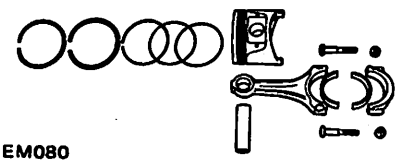
EM079

Fig. EM-3 Crankshaft

PISTON AND CONNECTING ROD

The pistons are of a special aluminum casting and have struts to control thermal expansion, two compression rings and one combined oil ring. The piston heads are slightly dished. The piston pins are a special hollow steel shaft. They are full-floating fit to the piston and press fit to the connecting rods.

The connecting rods are of a special forged steel. Oil is sprayed to the connecting rod small ends through drilled passages in the large ends of rod. Oil holes in the connecting rods are located so as to insure optimum lubrication under heavy load.

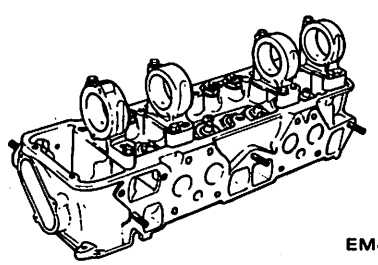


EM080

Fig. EM-4 Piston and Connecting Rod

CYLINDER HEAD

The cylinder head is made of a light, strong aluminum alloy with good cooling efficiency; it contains wedge type combustion chambers. A special aluminum bronze valve seat is used on the intake valve, while a heat resistant steel valve seat is installed on the exhaust valve. These parts are all hot press-fitted.



EM407

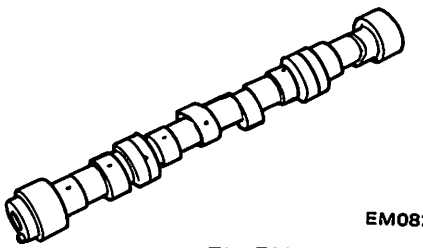
Fig. EM-5 Cylinder Head

CAMSHAFT

The camshaft is made of a special cast iron and is located inside the rocker cover. Four aluminum alloy brackets support it. Camshaft bearings are lubricated from oil holes which lead to the main oil gallery of the cylinder head.

Concentric passages are drilled in the front and rear parts of the camshaft.

Oil to each cam lobe is supplied through an oil hole drilled in the base circle of each lobe. Lubricant is supplied to the front oil gallery from the 2nd camshaft bearing and to the rear oil gallery from the 3rd camshaft bearing. These holes on the base circle of the lobe supply lubricant to the cam pad surface of the rocker arm and to the valve tip end. The cams feature a long-overlap profile to reduce NOx emission.



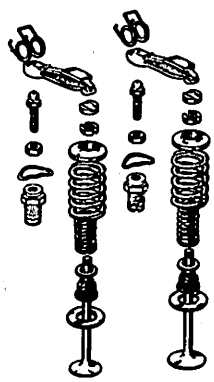
EM082

Fig. EM-6 Camshaft

VALVE MECHANISM

The valve system has the pivot type rocker arms that are activated directly by the cam mechanism; this has made its moving parts considerably lighter and provides ideal high speed performance.

Dual type valve springs are installed.

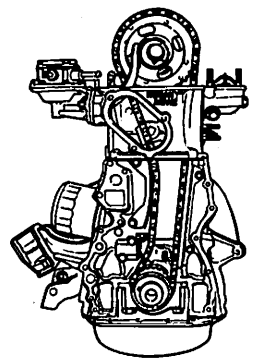


Exhaust Intake EM084

Fig. EM-7 Valve Mechanism

CAMSHAFT DRIVE

The camshaft is driven by a double row roller chain driven by the crankshaft. The tension of the chain is controlled by a chain tensioner which is operated by spring and oil pressure. The rubber shoe type tensioner damps vibration of the chain and controls its tension.



EM537

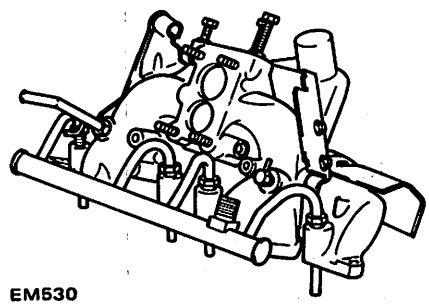
Fig. EM-8 Chain Driving System

MANIFOLDS

The intake manifold is made of cast aluminum alloy. Coolant from the cylinder head passes through the riser portion of the intake manifold, heating this portion and returns to the water pump.

The exhaust manifold is made of cast iron. No. 1/No. 4 and No. 2/No. 3 cylinders are grouped together.

The semi-dual system which combines exhaust gas flow at the point of exhaust pipe connection produces good exhausting efficiency.



EM530

Fig. EM-9 Intake and Exhaust Manifolds

ENGINE DISASSEMBLY

CONTENTS

PRELIMINARY CLEANING AND INSPECTION EM-4
DISASSEMBLY EM-4
PISTONS AND CONNECTING RODS EM-6
CYLINDER HEAD EM-7

PRELIMINARY CLEANING AND INSPECTION

Before disassembling engine, note the following:

1. Fuel, oil or water may leak past cylinder head and block. Prior to disassembling, check cylinder head, front chain cover, oil pan and oil filter gaskets and crankshaft and water pump seals for signs of leakage past their gasketed surfaces.
2. Check carburetor and fuel pump for condition; fuel hoses for deterioration, cracks or leakage of fuel past their jointed or connected surfaces.
3. Remove carburetor air cleaner.
(1) Disconnect hot air duct from air cleaner.
(2) Disconnect air cleaner-to-air pump hose at air cleaner.
(3) Disconnect air cleaner-to-rocker cover hose at rocker cover.
(4) Disconnect air cleaner-to-C.A.C. valve hose at air cleaner (for California).
(5) Disconnect air cleaner-to-A.B. valve hose at air cleaner.
(6) Disconnect air cleaner-to-related part vacuum hoses at air cleaner.
(7) Loosen air cleaner band bolt and remove carburetor air cleaner assembly from carburetor.
4. Plug up carburetor air-horn to prevent entry of foreign matter.
5. Remove alternator drive belt, alternator and alternator bracket.
6. Remove air pump drive belt, cooler compressor and idler pulley (if so equipped).
7. Remove starter motor from transmission.
8. Visually inspect cylinder head, cylinder block, rocker cover, front chain cover, oil pan and all other outer parts for oil, water and fuel leaks, breakage or missing parts such as bolts and nuts.
9. Check piping and electrical circuits for deterioration, breakage, fittings, discontinuity or insulation.

DISASSEMBLY

To remove engine from car, refer to the instructions under the "Engine Removal and Installation" (ER) section.
1. Remove transmission from engine.
2. Remove clutch assembly from flywheel.
3. Thoroughly drain engine oil and coolant by removing drain plugs.
Store engine oil and coolant, if they are to be used again.
4. Place engine assembly on engine stand.
(1) Remove cooling fan.
(2) Remove right engine mounting bracket.
(3) Remove oil filter with Oil Filter Wrench ST19320000.
(4) Remove oil pressure switch.
(5) Install engine attachment to cylinder block utilizing bolt holes in alternator bracket and water drain hole.
(6) Set engine on stand.

"Engine Attachment KV10105000"
"Engine Stand ST0501S000"

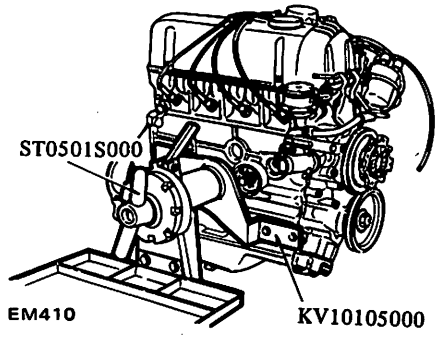


Fig. EM-10 Engine on Engine Stand

5. Remove oil level gauge.
6. Remove carburetor from intake manifold.
(1) Disconnect cylinder block-to-P.C.V. valve hose at P.C.V. valve.
(2) Disconnect A.B. valve-to-E.G.R. passage hose at E.G.R. passage.
(3) Disconnect vacuum tube-to-carburetor hoses at vacuum tube.
(4) Disconnect fuel hose from carburetor.
(5) Remove dash pot bracket from intake manifold (if so equipped).
(6) Remove carburetor attaching nuts and remove carburetor assembly and gasket.
7. Disconnect distributor high tension cables from spark plugs.
8. Disconnect vacuum hose from distributor and remove distributor assembly.
9. Disconnect fuel hose from fuel pump and remove fuel and vacuum hoses (combined) from cylinder head.
10. Remove fuel pump assembly from cylinder head.

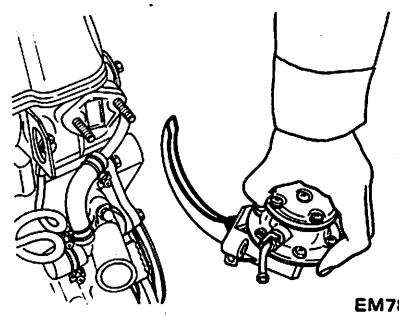
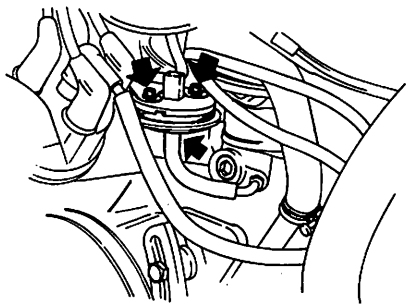


Fig. EM-11 Removing Fuel Pump

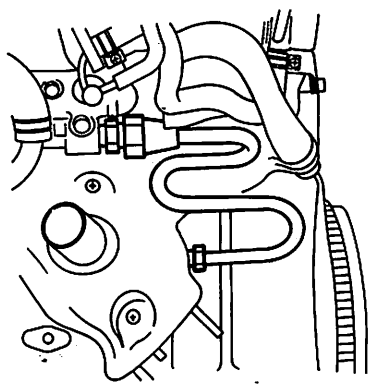
11. Remove intake and exhaust manifolds from cylinder head.
(1) Disconnect vacuum hose from B.P.T. valve and remove B.P.T. valve from air cleaner bracket.



ECO82A

Fig. EM-12 Removing B.P.T. Valve

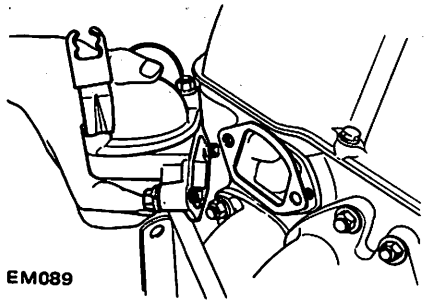
(2) Remove carburetor air cleaner bracket.
(3) Disconnect vacuum hose from E.G.R. valve.
(4) Remove check valve from air gallery pipe.
(5) Disconnect E.G.R. tube from E.G.R. passage and exhaust manifold.
(6) Remove E.G.R. passage and E.G.R. valve from intake manifold.



EM661

Fig. EM-13 Removing E.G.R. Tube and Passage

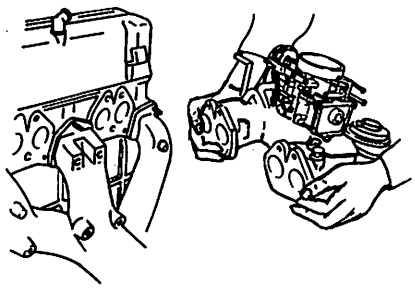
(7) Disconnect vacuum hoses from thermal vacuum valve and remove thermostat housing and gasket from cylinder head.



EM089

Fig. EM-14 Removing Thermostat Housing

(8) Remove cylinder block-to-P.C.V. valve hose (blow-by gas hose) from cylinder block.
(9) Remove manifold attaching bolts and remove intake manifold and gasket from cylinder head.



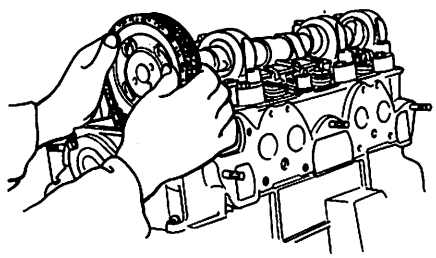
EM662

Fig. EM-15 Removing Intake Manifold

(10) Remove air gallery pipes from exhaust manifold.
(11) Remove exhaust manifold attaching nuts and remove exhaust manifold.

12. Remove left engine mounting bracket from cylinder block.
13. Remove air pump and cooler compressor bracket.
14. Remove crankshaft pulley locking bolt and washer and then remove pulley with a two-jaw puller.
15. Remove water pump assembly.
16. Remove rocker cover.
17. Remove spark plugs.
18. Remove fuel pump drive cam.
19. Remove camshaft sprocket.

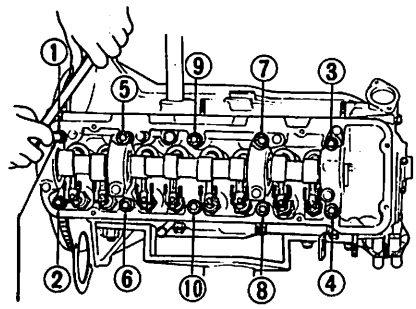
Refer to the following note during operation when removing camshaft sprocket from engine installed on car.



EM091

Fig. EM-16 Removing Camshaft Sprocket

20. Remove cylinder head assembly. Use Cylinder Head Bolt Wrench ST10120000 to remove cylinder head bolts. Loosen bolts from ① to ⑩ as shown in Fig. EM-17.

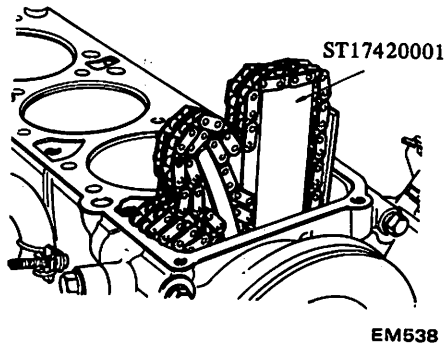


ST10120000 EM092

Fig. EM-17 Cylinder Head Bolt Loosening Sequence

Note: When removing cylinder head from engine installed on car, follow the instructions below.

a. Turn crankshaft until No. 1 piston is at T.D.C. on its compression stroke.
b. Remove rocker cover and fuel pump.
c. To facilitate assembling operation, scribe a mark on timing chain and camshaft sprocket with paint before removal.
d. Loosen camshaft bolt and remove fuel pump drive cam.
e. Support timing chain by utilizing Chain Stopper ST17420001 between timing chains as shown in Fig. EM-18.
This operation eliminates the problem of realigning timing marks on timing chain and crankshaft sprocket.



EM538

Fig. EM-18 Supporting Timing Chain

f. Remove camshaft sprocket.
g. Loosen cylinder head bolts and remove cylinder head.

21. Invert engine.
22. Remove oil pan and oil strainer.
23. Remove oil pump and its drive spindle.

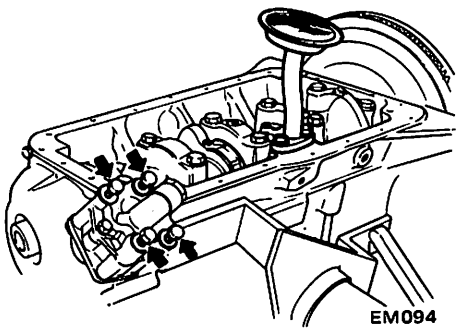


Fig. EM-19 Removing Oil Strainer and Oil Pump

24. Remove front cover.
25. Remove chain tensioner and chain slack side guide.
26. Remove timing chain.

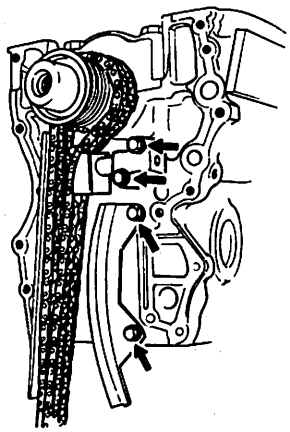


Fig. EM-20 Removing Chain Tensioner and Timing Chain

27. Remove oil thrower, crankshaft worm gear and chain drive sprocket.

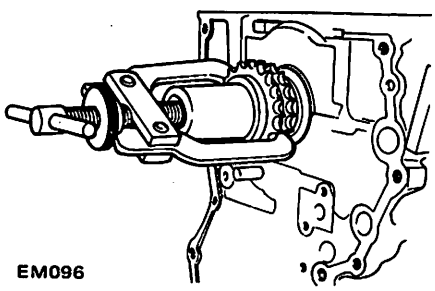


Fig. EM-21 Removing Chain Drive Sprocket

28. Remove piston and connecting rod assembly. Extract connecting rod bearings, keeping them in order.

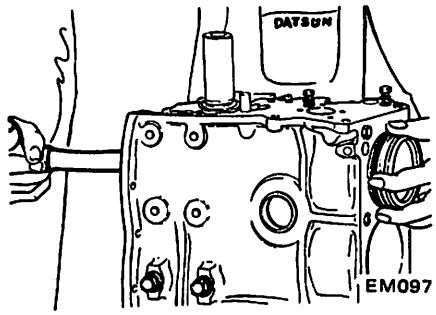


Fig. EM-22 Removing Piston and Connecting Rod Assembly

29. Remove flywheel and rear plate. Be careful not to drop them.

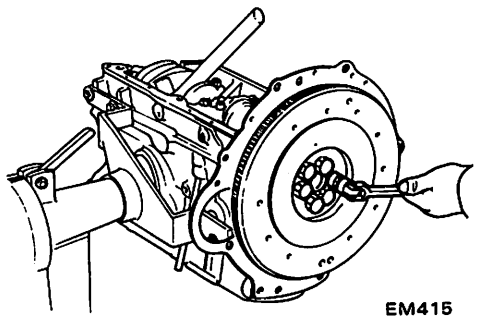


Fig. EM-23 Removing Flywheel

30. Remove main bearing caps.
Use Crankshaft Main Bearing Cap Puller KV101041S0 to remove center and rear main bearing caps. Keep them in order.

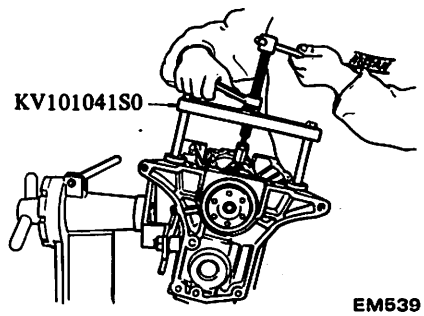


Fig. EM-24 Removing Rear Main Bearing Cap

31. Remove two side seals from rear main bearing cap.
32. Remove rear oil seal.

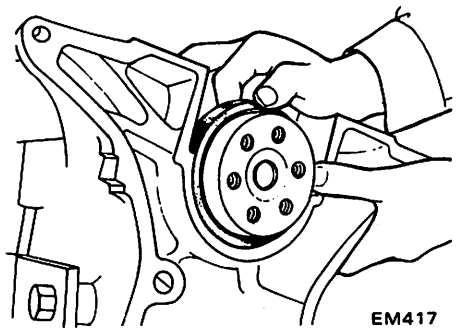


Fig. EM-25 Removing Rear Oil Seal

33. Remove crankshaft.
34. Remove baffle plate and cylinder block net.

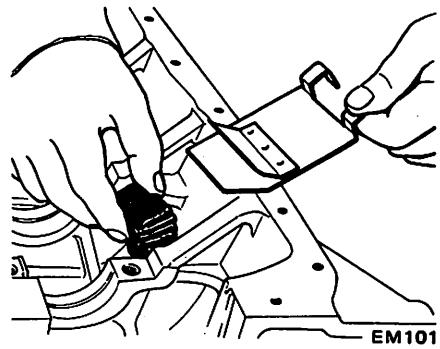


Fig. EM-26 Removing Baffle Plate and Net

PISTONS AND CONNECTING RODS

1. Remove piston rings with a ring remover.

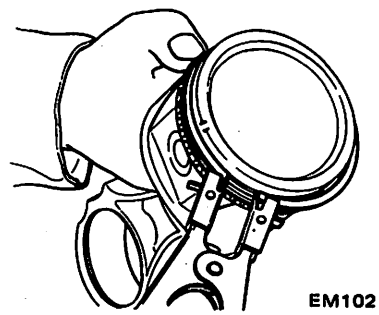


Fig. EM-27 Removing Piston Rings

2. Press piston pin out with Piston Pin Press Stand ST13030001.

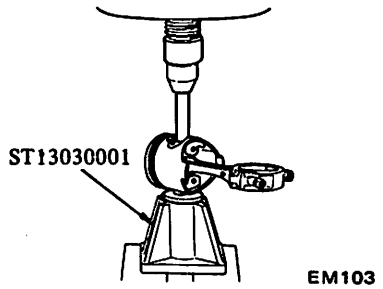


Fig. EM-28 Removing Piston Pin

3. Keep disassembled parts in order.

CYLINDER HEAD

1. Remove valve rocker springs. Loosen valve rocker pivot lock nut and remove rocker arm by pressing valve spring down.

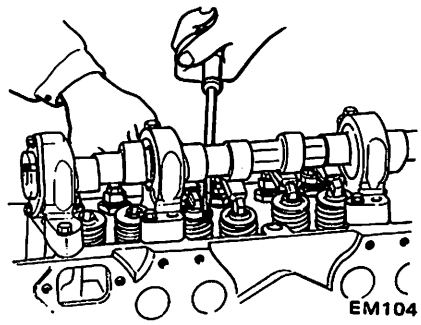


Fig. EM-29 Removing Rocker Arms

2. Remove locate plate, and remove camshaft.

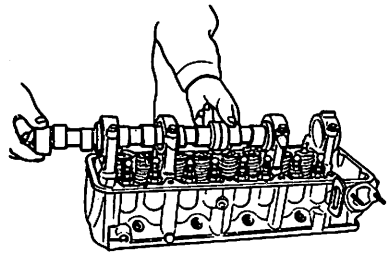


Fig. EM-30 Removing Camshaft

CAUTION:
Be careful not to damage camshaft bearings and cam lobes.

3. Remove valves using Valve Lifter ST12070000.

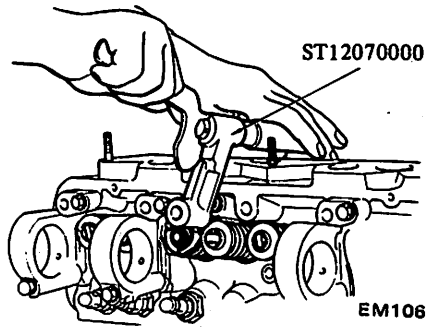


Fig. EM-31 Removing Valves

Note:

a. Take care not to lose valve spring seat, oil seal, valve collet, and valve rocker guide.

b. Be sure to keep camshaft bearings intact, or the bearing center is liable to come out of alignment.

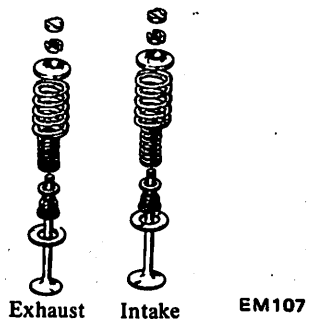


Fig. EM-32 Valve Components

INSPECTION AND REPAIR

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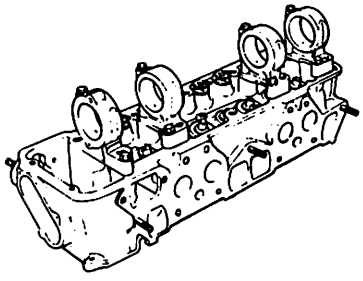
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PREPARATION FOR INSPECTION

1. Before cleaning, check for signs of water and oil leaks in cylinder block and head.
2. Clean oil, carbon deposits and sealant from all parts. Remove gasket.
3. Clean all oil holes with solvent and dry with compressed air. Make sure that they are not restricted.

CYLINDER HEAD AND VALVE

CHECKING CYLINDER HEAD MATING FACE

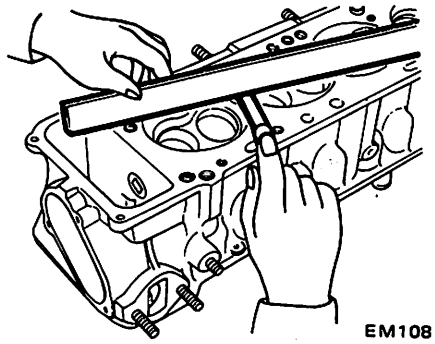


EM407

Fig. EM-33 Cylinder Head

CAUTION:
Never remove camshaft bearings unless you have a suitable machine for boring camshaft bearing in line. If you once remove camshaft bearings, bearing centers will come out of alignment; reconditioning is very difficult without center borings.

1. Make a visual check for cracks and flaws.
2. Measure the surface of cylinder head (on cylinder block side) for warpage. If it is found to be beyond the limit designated below, regrind the affected surface with a surface grinder.



EM108

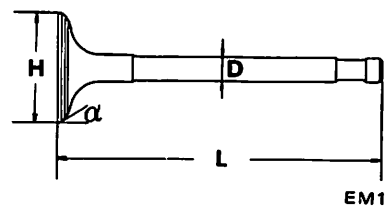
Fig. EM-34 Checking Cylinder Head Surface

Head surface flatness

Standard	Maximum
less than 0.05 mm (0.0020 in)	0.1 mm (0.004 in)

VALVE ASSEMBLY

1. Check each intake and exhaust valve for worn, damaged or deformed valve caps or stems. Correct or replace any valve that is faulty.
2. Valve face or valve stem end surface should be refaced with a valve grinder.



EM109

Fig. EM-35 Intake and Exhaust Valve Dimensions

H	Valve head diameter mm (in)	In.	42.0 to 42.2 (1.654 to 1.661)
		Ex.	35.0 to 35.2 (1.378 to 1.386)
L	Valve length mm (in)	In.	114.9 to 115.2 (4.52 to 4.54)
		Ex.	115.7 to 116.0 (4.56 to 4.57)
D	Valve stem diameter mm (in)	In.	7.965 to 7.980 (0.3136 to 0.3142)
		Ex.	7.945 to 7.960 (0.3128 to 0.3134)
α	Valve face angle Intake and Exhaust	In.	45°30′
		Ex.	45°30′

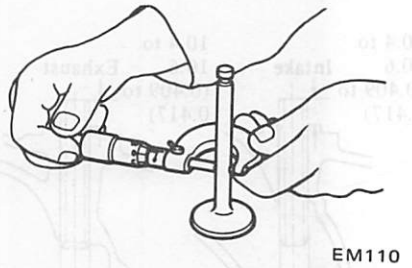


Fig. EM-36 Checking Valve Stem Diameter

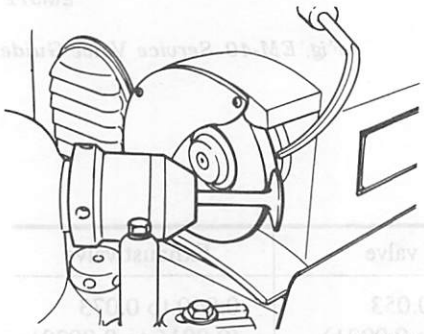


Fig. EM-37 Regrinding Valve Face

Note: When valve head has been worn down to 0.5 mm (0.020 in) in thickness, replace the valve.
Grinding allowance for valve stem end surface is 0.5 mm (0.020 in) or less.

VALVE SPRING

1. Check valve spring for squareness using a steel square and surface plate. If spring is out of square more than 1.6 mm (0.063 in), replace.
2. Measure the free length and tension of each spring. If the measured value exceeds specified limit, replace spring.

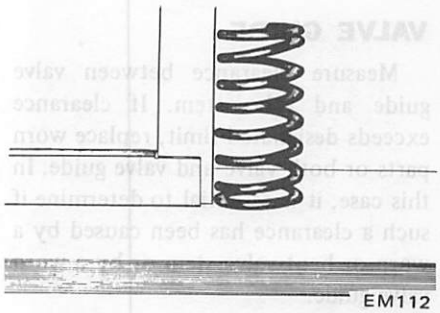


Fig. EM-38 Measuring Spring Squareness

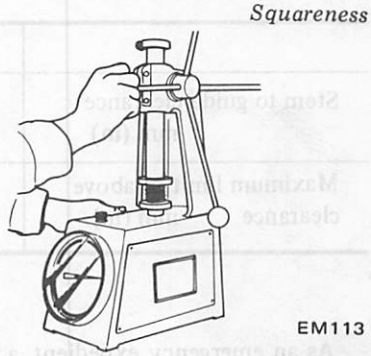


Fig. EM-39 Measuring Spring Tension

Spring specifications

Valve spring free length mm (in)

Intake and exhaust

Outer 49.98 (1.9677)

Inner 44.85 (1.7657)

Valve spring pressured length (valve open) mm/kg (in/lb)

Intake and exhaust

Outer 29.5/49.0 (1.161/108.0)

Inner 24.5/25.5 (0.965/56.2)

Valve spring assembled height (valve close) mm/kg (in/lb)

Intake and exhaust

Outer 40.0/21.3 (1.575/47.0)

Inner 35.0/12.3 (1.378/27.1)

ROCKER ARM AND VALVE ROCKER PIVOT

Check pivot head and cam contact and pivot contact surfaces of rocker arm for damage or wear. If damage is found, replace them. A faulty pivot must be replaced together with its corresponding rocker arm.

VALVE GUIDE

Measure clearance between valve guide and valve stem. If clearance exceeds designated limit, replace worn parts or both valve and valve guide. In this case, it is essential to determine if such a clearance has been caused by a worn or bent valve stem or by a worn valve guide.

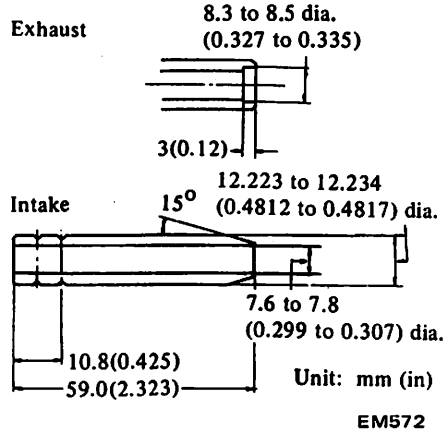


Fig. EM-40 Service Valve Guide

	Intake valve	Exhaust valve
Stem to guide clearance mm (in)	0.020 to 0.053 (0.0008 to 0.0021)	0.040 to 0.073 (0.0016 to 0.0029)
Maximum limit of above clearance mm (in)	0.10 (0.0039)	

As an emergency expedient, a valve can be pushed into valve guide and moved to the right and left. If its tip deflects about 0.2 mm (0.008 in) or more, it indicates that the clearance between stem and guide exceeds the maximum limit of 0.10 mm (0.0039 in).

Note: Valve should be moved in parallel with rocker arm. (Generally, a large amount of wear occurs in this direction.)

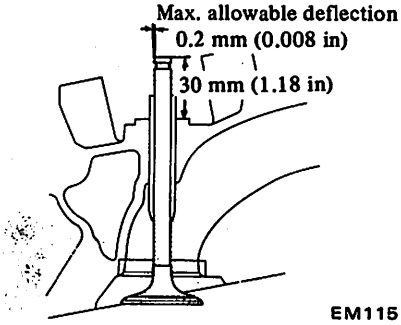


Fig. EM-41 Measuring Clearance between Valve Stem and Valve Guide

Replacement of valve guide

1. To remove old guides, use a drift and a press (under a 2-ton pressure) or a hammer.

Drive them out from combustion chamber side toward rocker cover. Heated cylinder head will facilitate the operation.

2. Ream cylinder head side guide hole at room temperature.

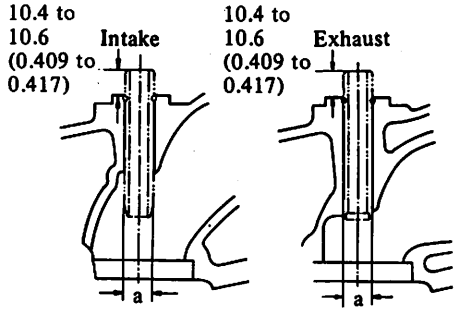


Fig. EM-42 Valve Guide Hole

Guide hole inner diameter "a" mm (in)	For factory standard valve guide	11.985 to 11.996 (0.4718 to 0.4723)
	For service valve guide	12.185 to 12.196 (0.4797 to 0.4802)

3. Carefully press new valve guide into valve so that it will fit smoothly after heating cylinder head to 150 to 200°C (302 to 392°F).

Valve guide of 0.2 mm (0.008 in) oversize diameter is available for service as indicated above.

Interference fit of valve guide to guide hole:
0.027 to 0.049 mm
(0.0011 to 0.0019 in)

4. Ream bore with valve guide pressed in, using Valve Guide Reamer ST11032000.

Reaming bore:
8.000 to 8.018 mm
(0.3150 to 0.3157 in)

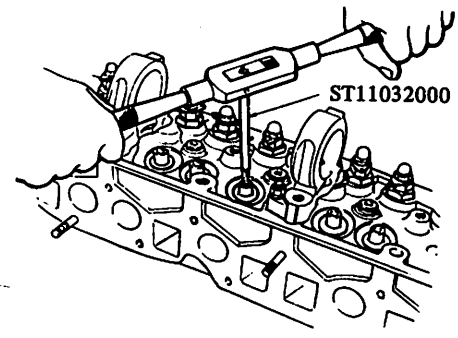


Fig. EM-43 Removing Valve Guide

5. Correct valve seat surface with new valve guide as the axis.

VALVE SEAT INSERTS

Check valve seat inserts for any evidence of pitting at valve contact surface. and reseat or replace if worn excessively.

Valve seat insert of 0.5 mm (0.020 in) oversize is available for service as shown below.

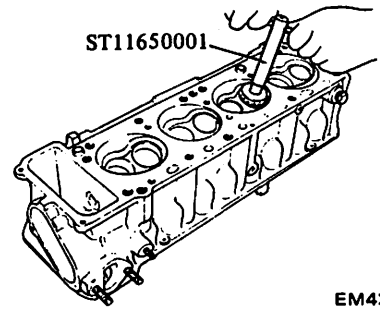


Fig. EM-44 Correcting Valve Seat

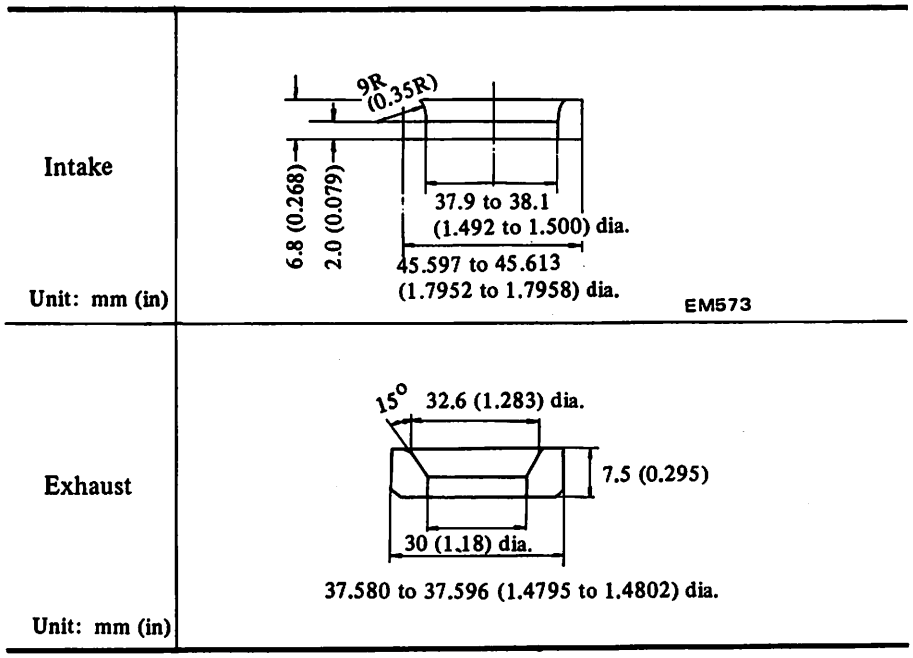


Fig. EM-45 Service Valve Seat Dimensions

Cylinder head recess diameter

Unit: mm (in)

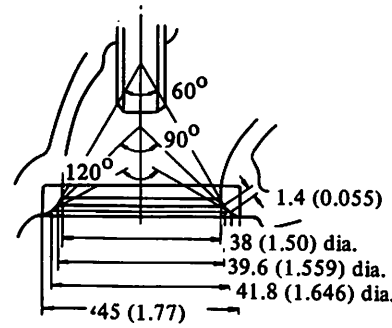
Intake	For factory standard insert	45.000 to 45.016 (1.7717 to 1.7723)
	For service insert	45.500 to 45.516 (1.7913 to 1.7920)
Exhaust	For factory standard insert	37.000 to 37.016 (1.4567 to 1.4573)
	For service insert	37.500 to 37.516 (1.4764 to 1.4770)

Interference fit mm (in)	Intake	0.081 to 0.113 (0.0032 to 0.0044)
	Exhaust	0.064 to 0.096 (0.0025 to 0.0038)

Replacing valve seat insert

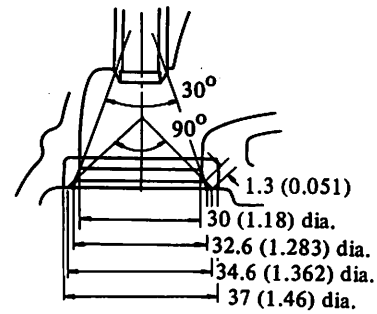
1. Old insert can be removed by boring it out until it collapses. The machine depth stop should be set so that boring cannot continue beyond the bottom face of the insert recess in cylinder head.
2. Select a suitable valve seat insert and check its outside diameter.
3. Machine cylinder head recess to the concentric circles in valve guide center so that insert will have the correct fit.
4. Heat cylinder head to a temperature of 150 to 200°C (302 to 392°F).
5. Fit insert ensuring that it beds on the bottom face of its recess, and caulk more than 4 points.
6. Newly fitted valve seats should be cut or ground at the specified dimensions as shown in Fig. EM-46.
7. Apply small amount of fine grinding compound to valve contacting face and put valve into guide. Lap valve against its seat until proper valve seating is obtained. Remove valve and then clean valve and valve seat.

Intake



Unit: mm (in)

Exhaust



EM121

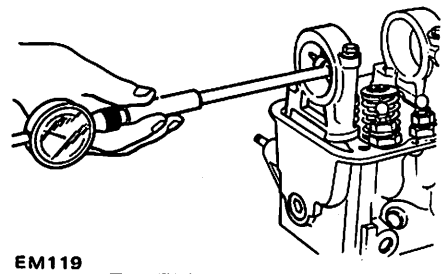
Unit: mm (in)

Fig. EM-46 Standard Valve Seat Dimensions

CAMSHAFT AND CAMSHAFT BEARING

CAMSHAFT BEARING CLEARANCE

Measure inside diameter of camshaft bearing with an inside dial gauge and outside diameter of camshaft journal with a micrometer. If wear is found inside of bracket, replace cylinder head assembly.



EM119

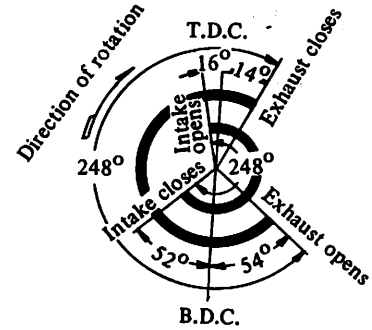
Fig. EM-47 Checking Camshaft Bearing

Camshaft journal to bearing clearance

	Standard	Wear limit
Oil clearance mm (in)	0.038 to 0.067 (0.0015 to 0.0026)	0.10 (0.0039)
Inner diameter of cam shaft bearing mm (in)	48.000 to 48.016 (1.8898 to 1.8904)	—

VALVE TIMING

This diagram applies to all cylinders. If any valve is found out of specifications, one possibility is that cam lobe is worn or damaged. This calls for replacement of camshaft.



EM421

Fig. EM-48 Valve Timing Diagram

	Standard	Bend limit
Camshaft bend mm (in)	0.02 (0.0008)	0.05 (0.0020)

CAMSHAFT ALIGNMENT

1. Check camshaft, camshaft journal and cam surface for bend, wear or damage. If damage is beyond limits, replace affected parts.
2. A bend value is one-half of the reading obtained when camshaft is turned one full revolution with a dial gauge applied to 2nd and 3rd journals.

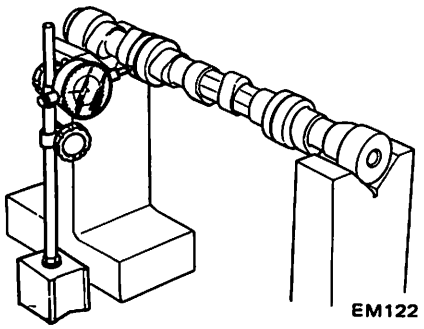


Fig. EM-49 Checking Camshaft Bend

Standard height of cam mm (in)	Intake	40.30 to 40.35 (1.5866 to 1.5886)
	Exhaust	
Wear limit of cam height mm (in)		0.25 (0.0098)
Allowable difference in diameter between max. worn and min. worn parts of camshaft journal mm (in)		0.05 (0.0020)
Maximum tolerance in journal diameter mm (in)		0.10 (0.0039)
Camshaft end play mm (in)		0.08 to 0.38 (0.0031 to 0.0150)

CYLINDER BLOCK

1. Visually check cylinder block for cracks or flaws.
2. Measure top of cylinder block (cylinder head mating face) for warpage. If warpage exceeds limits, correct it.

Note: Surface grinding limit:
Grinding limit of cylinder block can be determined by cylinder head grinding in an engine.
Depth of cylinder head grinding is "Hh".
Depth of cylinder block grinding is "Hb".

The limit is as follows:
Hh + Hb = 0.20 mm (0.0079 in)

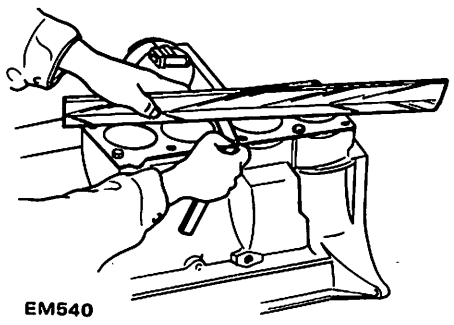


Fig. EM-50 Checking Cylinder Block Surface

	Standard	Maximum tolerance
Surface flatness mm (in)	less than 0.05 (0.0020)	0.10 (0.0039)

3. Using a bore gauge, measure cylinder bore for out-of-round or taper. If out-of-round or taper is excessive, rebore cylinder walls with a boring machine. Measurement should be taken along bores for taper and around bores for out-of-round.

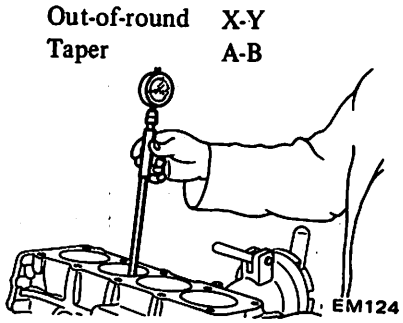


Fig. EM-51 Measuring Cylinder Bore Diameter

4. When wear, taper or out-of-round is minor and within limits, remove step at topmost portion of cylinder using a ridge reamer or other similar tool.

HOW TO MEASURE CYLINDER BORE

A bore gauge is used. Measure cylinder bore at top, middle and bottom positions toward A and B directions as shown in Fig. EM-52 and record the measured values.

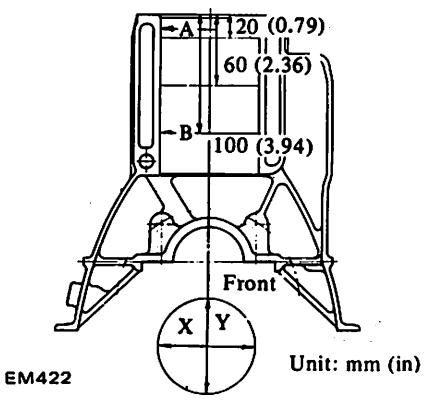


Fig. EM-52 Cylinder Bore Measuring Positions

		Standard	Wear limit
Cylinder bore mm (in)	Inner diameter	85.000 to 85.050 (3.3465 to 3.3484)	0.20 (0.0079)
	Out-of-round	0.015 (0.0006)	
	Taper	0.015 (0.0006)	
Difference in cylinder bore mm (in)		0.05 (0.0020)	0.20 (0.0079)

CYLINDER BORING

1. When any cylinder needs boring, all other cylinders must also be bored at the same time.

2. Determine piston oversize according to amount of wear of cylinder.

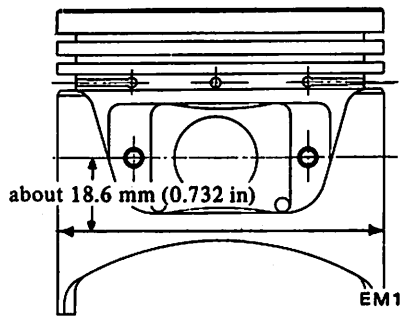


Fig. EM-54 Measuring Piston Skirt Diameter

Oversize pistons specifications

Piston diameter mm (in)	
Service standard	84.985 to 85.035 (3.3459 to 3.3478)
0.50 (0.0197) Oversize	85.465 to 85.515 (3.3648 to 3.3667)
1.00 (0.0394) oversize	85.965 to 86.015 (3.3844 to 3.3864)

Rebored size calculation

D = A + B – C = A + [0.005 to 0.025 mm (0.0002 to 0.0010 in)]

where,
- D: Honed diameter
- A: Skirt diameter as measured
- B: Piston-to-wall clearance
- C: Machining allowance (0.02 mm) (0.0008 in)

3. The size to which cylinders must be honed is determined by adding piston-to-cylinder clearance to the largest piston diameter (at piston skirt in thrust direction).

Standard clearance	mm (in)	0.025 to 0.045 (0.0010 to 0.0018)
Feeler gauge	mm (in)	0.04 (0.0016)
Extracting force	kg (lb)	0.2 to 1.5 (0.4 to 3.3)

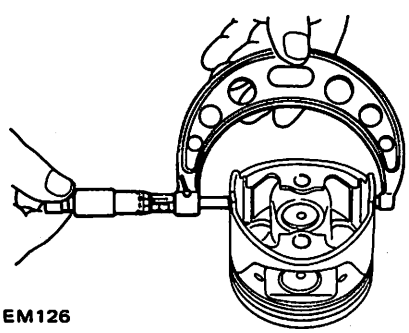


Fig. EM-53 Measuring Piston Diameter

CAUTION:
- **a. To prevent strain due to cutting heat, bore the cylinders in the order of 2-4-1-3.**
- **b. Before boring any cylinder, install main bearing caps in place and tighten to the specification so that the crankshaft bearing bores will not become distorted from the boring operation.**

4. Do not cut too much out of cylinder bore at a time. Cut only 0.05 mm (0.0020 in) or so in diameter at a time.

5. Measurement of a just machined cylinder bore requires utmost care since it is expanded by cutting heat.

6. As a final step, cylinders should be honed to size.

7. Measure the finished cylinder bore for out-of-round or tapered part.

8. Measure piston-to-cylinder clearance.

This clearance can be checked easily by using a feeler gauge and a spring balance hooked on feeler gauge, measuring the amount of force required to pull gauge out from between piston and cylinder.

Note:
a. When measuring clearance, slowly pull feeler gauge straight upward.
b. It is recommended that piston and cylinder be heated to 20°C (68°F).

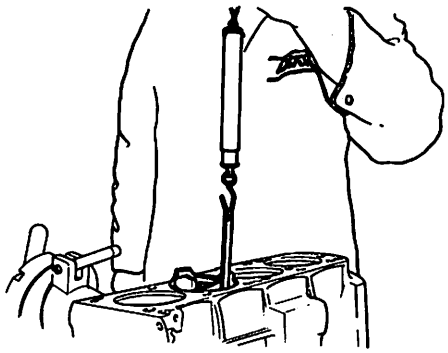

EM541

Fig. EM-55 Measuring Piston Fit in Cylinder

PISTONS, PISTON PINS AND PISTON RINGS

1. Remove carbon from piston and ring grooves with a carbon scraper and a curved steel wire. Clean out oil slots in bottom land of oil ring groove.
2. Check for damage, scratches and wear. Replace if necessary.
3. Measure side clearance of rings in ring grooves as each ring is installed. Side clearance should be as follows.

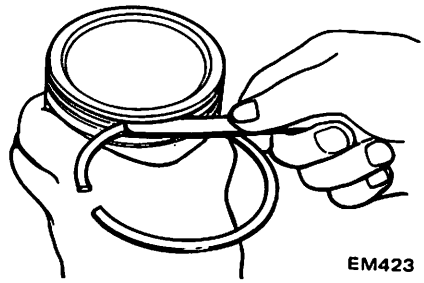

EM423

Fig. EM-56 Measuring Piston Ring Side Clearance

Side clearance

Unit: mm (in)

	Standard	Wear limit
Top ring	0.040 to 0.073 (0.0016 to 0.0029)	0.10 (0.0039)
Second ring	0.030 to 0.070 (0.0012 to 0.0028)	
Oil ring	–	–

4. Push ring into cylinder with piston so as to place it squarely in cylinder; measure ring gap with a feeler gauge.

Ring should be placed to diameter at upper or lower limit of ring travel.

Ring gap

Unit: mm (in)

	Standard	Wear limit
Top ring	0.25 to 0.40 (0.0098 to 0.0157)	1.00 (0.0394)
Second ring	0.30 to 0.50 (0.0118 to 0.0197)	
Oil ring	0.30 to 0.90 (0.0118 to 0.0354)	

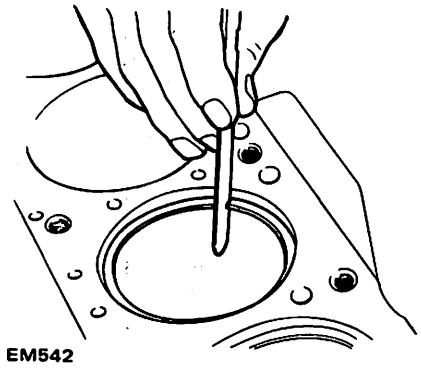

EM542

Fig. EM-57 Measuring Ring Gap

Note:
a. When piston ring only is to be replaced, without cylinder bore being corrected, measure gap at bottom of cylinder where wear is minor.
b. Oversize piston rings are available for service.

Oversize:
0.5 mm (0.020 in) and
1.0 mm (0.039 in)

5. Measure piston pin hole in relation to outer diameter of pin. If wear exceeds limit, replace each piston pin together with the piston on which it is installed.
6. Determine the fitting of piston pin into piston pin hole to such an extent that it can be finger pressed at room temperature. This piston pin must be a tight press fit into connecting rod.

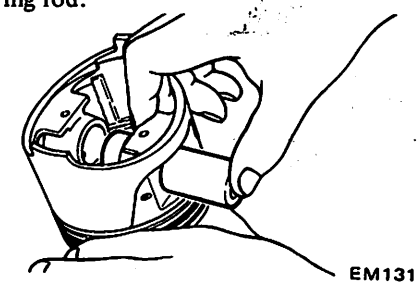

EM131

Fig. EM-58 Piston Pin Fitting

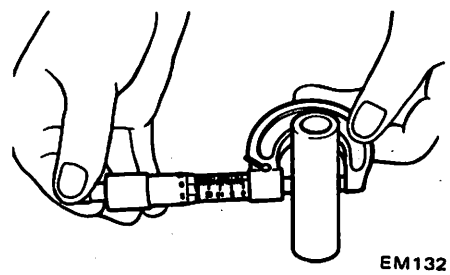

EM132

Fig. EM-59 Measuring Piston Pin Diameter

Unit: mm (in)

Piston pin outside diameter	20.993 to 20.998 (0.8265 to 0.8267)
Piston pin hole diameter	21.001 to 21.008 (0.8268 to 0.8271)
Piston pin to piston clearance	0.006 to 0.013 (0.0002 to 0.0005)
Interference fit of piston pin to connecting rod	0.015 to 0.033 (0.0006 to 0.0013)

CONNECTING ROD

1. If a connecting rod has any flaw on either side of the thrust face or the large end, correct or replace it.

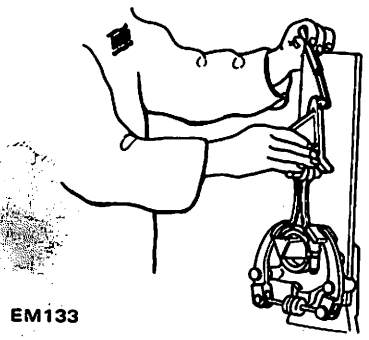


Fig. EM-60 Checking Rod Alignment

2. Check connecting rod for bend or torsion using a connecting rod aligner. If bend or torsion exceeds the limit, correct or replace.

	Standard	Maximum
Connecting rod bend or torsion (per 100 mm or 3.94 in length) mm (in)	less than 0.03 (0.0012)	0.05 (0.0020)

3. When replacing connecting rod, select rod so that weight difference between new and old ones is within 7 gr (0.25 oz).
4. Install connecting rods with bearings on to corresponding crank pins and measure thrust clearance. If measured value exceeds limit, replace.

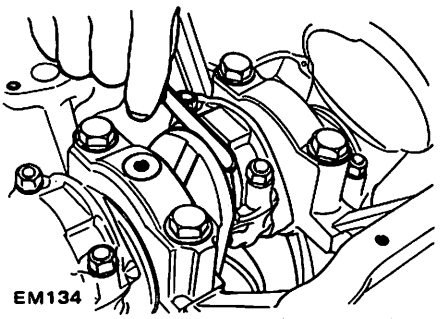


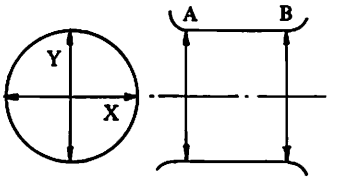
Fig. EM-61 Checking Big End Play

	Standard	Maximum
Big end play mm (in)	0.2 to 0.3 (0.008 to 0.012)	0.6 (0.024)

CRANKSHAFT

1. Whenever crankshaft is removed from engine, it should be cleaned thoroughly in a suitable solvent. After cleaning, check crankshaft journal and crank pin for score, bias wear or cracks. Repair or replace as required. If damage is minor, dress with fine crocus cloth.
2. Check journals and crank pins for taper and out-of-round with a micrometer. Measurement should be taken along journals for taper and around journals for out-of-round. See Figure EM-62 for detailed information.

If journals or crank pins are tapered or out-of-round beyond limits, replace with a new shaft.



Out-of-round X-Y
Taper A-B

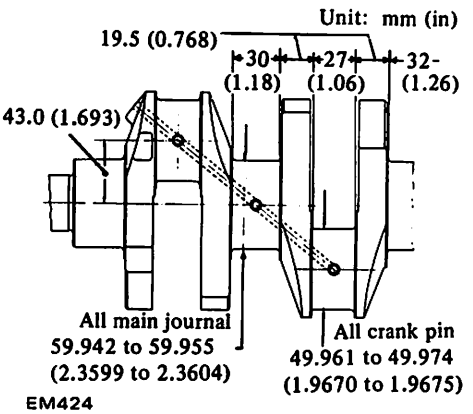


Fig. EM-62 Crankshaft and Journal Dimensions

	Standard	Maximum
Taper and out-of-round of journal and crank pin mm (in)	less than 0.01 (0.0004)	0.025 (0.0010)

3. Crankshaft bend can be checked by placing it on V-blocks and using a dial gauge with its indicating finger resting on center journal.

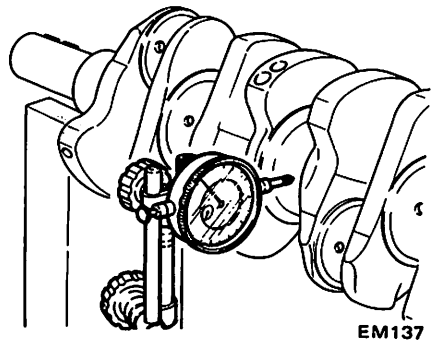


Fig. EM-63 Checking Crankshaft Bend

	Standard	Maximum
Crankshaft bend mm (in)	less than 0.05 (0.0020)	0.10 (0.0039)

Note: When measuring bend, use a dial gauge. Bend value is half of the reading obtained when crankshaft is turned one full revolution with a dial gauge attached to its center journal.

4. After regrinding crankshaft, finish it to the necessary size indicated on page EM-18 by using an adequate undersize bearing according to the extent of required repair.
5. Install crankshaft in cylinder block and measure crankshaft free end play.

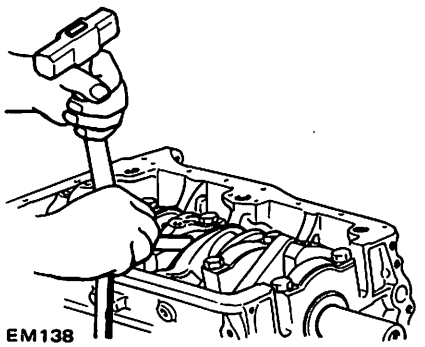


Fig. EM-64 Checking Crankshaft End Play

	Standard	Wear limit
Crankshaft free end play mm (in)	0.05 to 0.18 (0.0020 to 0.0071)	0.30 (0.0118)

6. At the rear end of crankshaft, check crankshaft pilot bushing for wear or damage. Replace it if any fault is detected.

To replace crankshaft rear pilot bushing, proceed as follows:
(1) Pull out bushing using Pilot Bushing Puller ST16610001.

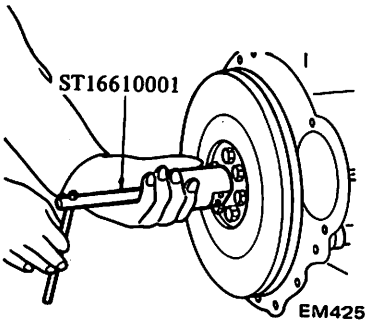


Fig. EM-65 Pulling Out Pilot Bushing

(2) Before installing a new bushing, thoroughly clean bushing hole. Press fit bushing so that its height above flange end is 4.5 to 5.0 mm (0.177 to 0.197 in). Do not oil bushing.

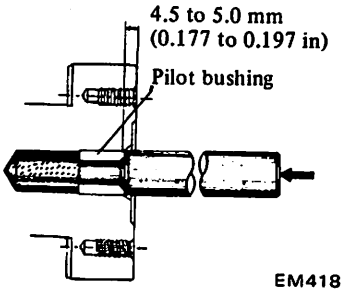


Fig. EM-66 Press-Fitting New Pilot Bushing

BUSHING AND BEARING

MEASUREMENT OF MAIN BEARING CLEARANCE

1. Thoroughly clean all bearings and check for scratches, melting score or wear.

Replace bearings if any fault is detected.

2. Crankshaft journals and bearings should be clean and free from dust and dirt before oil clearance is measured.
3. Set main bearing on cap block.
4. Cut a plastigage to width of bearing and place it in parallel with crank pin, getting clear of the oil hole. Install cap on the assembly and tighten them together to the specified torque.

Ⓣ Tightening torque:
Main bearing cap
4.5 to 5.5 kg-m
(33 to 40 ft-lb)

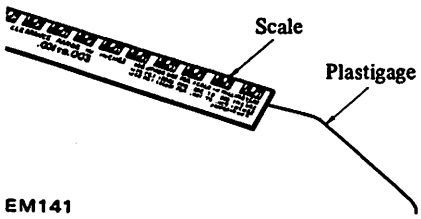


Fig. EM-67 Plastigage

Note: Do not turn crankshaft while plastigage is being inserted.

5. Remove cap, and compare width of the plastigage at its widest part with the scale printed in plastigage envelope.

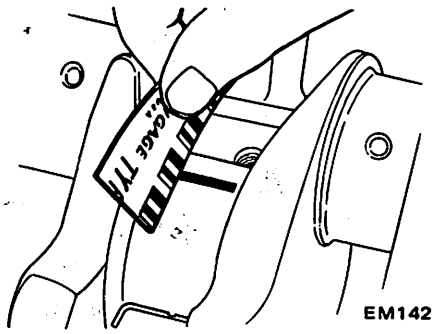


Fig. EM-68 Measuring Bearing Clearance

MEASUREMENT OF CONNECTING ROD BEARING CLEARANCE

1. Measure connecting rod bearing clearance in the same manner as above.

Ⓣ **Tightening torque:**
Main bearing cap
4.5 to 5.5 kg-m
(33 to 40 ft-lb)

2. If clearance exceeds specified value, replace bearing with an undersize bearing and grind crankshaft journal adequately.

Bearing oil clearance

	Standard	Wear limit
Main bearing clearance mm (in)	0.020 to 0.066 (0.0008 to 0.0026)	0.12 (0.0047)
Connecting rod bearing clearance mm (in)	0.024 to 0.066 (0.0009 to 0.0026)	0.12 (0.0047)

Main bearing undersize Unit: mm (in)

	Bearing top thickness	Crank journal diameter
STD	1.825 to 1.835 (0.0719 to 0.0722)	59.942 to 59.955 (2.3599 to 2.3604)
0.25 (0.0098) Undersize	1.952 to 1.960 (0.0769 to 0.0772)	59.692 to 59.705 (2.3501 to 2.3506)
0.50 (0.0197) Undersize	2.077 to 2.085 (0.0818 to 0.0821)	59.442 to 59.455 (2.3402 to 2.3407)
0.75 (0.0295) Undersize	2.202 to 2.210 (0.0867 to 0.0870)	59.192 to 59.205 (2.3304 to 2.3309)

Connecting rod bearing undersize Unit: mm (in)

	Bearing top thickness	Crank pin diameter
STD	1.493 to 1.501 (0.0588 to 0.0591)	49.961 to 49.974 (1.9670 to 1.9675)
0.25 (0.0098) Undersize	1.618 to 1.631 (0.0637 to 0.0642)	49.711 to 49.724 (1.9571 to 1.9576)
0.50 (0.0197) Undersize	1.743 to 1.756 (0.0686 to 0.0691)	49.461 to 49.474 (1.9473 to 1.9478)
0.75 (0.0295) Undersize	1.868 to 1.881 (0.0735 to 0.0741)	49.211 to 49.224 (1.9374 to 1.9379)

MISCELLANEOUS COMPONENTS

CRANKSHAFT AND CAMSHAFT SPROCKETS

1. Check tooth surface for flaws or wear. Replace sprocket if fault is found.
2. Install camshaft sprocket in position and check for runout. If it exceeds 0.10 mm (0.0039 in) total indicator reading, replace camshaft sprocket. Also check for end play.

Camshaft end play:
0.08 to 0.38 mm
(0.0032 to 0.0150 in)

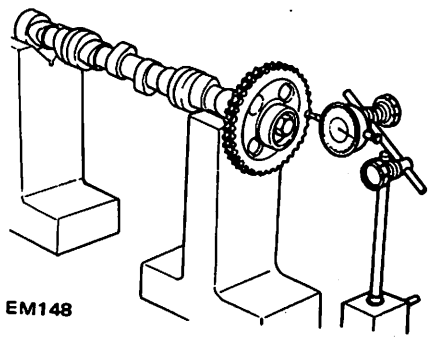


Fig. EM-69 Checking Camshaft Sprocket Runout

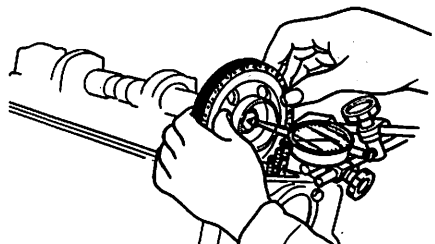


Fig. EM-70 Checking Camshaft End Play

3. Check chain for damage, excessive wear or stretch at roller links. Replace if faulty.
4. To properly adjust chain tension (or valve timing), camshaft sprocket has a cam locating plate and three location holes (Nos. 1, 2 and 3).

Camshaft sprocket is preset at No. 2 hole at the factory. If chain becomes loose, adjust it by setting camshaft sprocket at No. 3 hole.

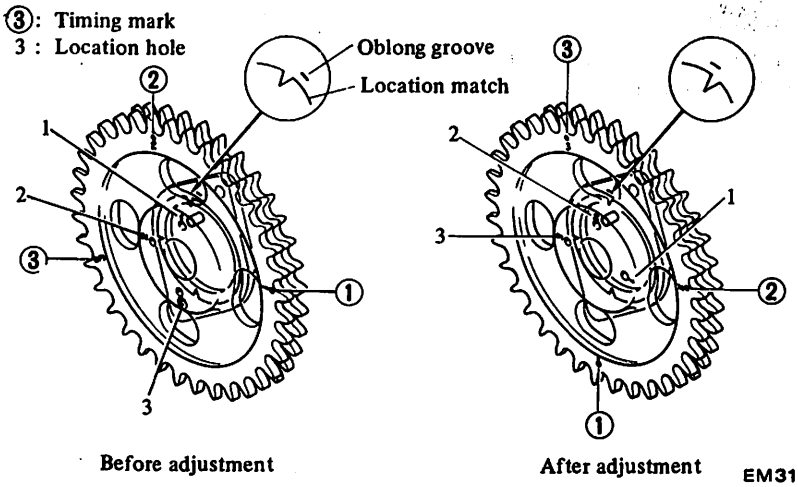


Fig. EM-71 Adjusting Camshaft Sprocket Location

(1) Turn engine until No. 1 piston is at T.D.C. on its compression stroke. Determine whether camshaft sprocket location notch comes off the left end of the oblong groove on camshaft locating plate. (If the location notch is off the left end of the oblong groove, chain stretch is beyond limits.)

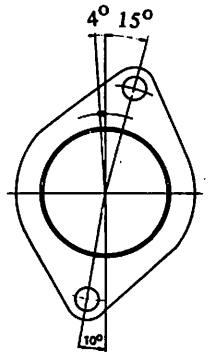


Fig. EM-72 Camshaft Locating Plate

(2) Turn engine until No. 1 piston is at T.D.C. on its compression stroke, setting camshaft on No. 2 location hole in camshaft sprocket. This No. 2 notch should then be on the right end of the oblong groove. When No. 2 hole is used, No. 2 timing mark must also be used. The amount of the modification is a 4° rotation of crankshaft.

(3) When modification becomes impossible even by transferring camshaft location hole, replace chain assembly.

CHAIN TENSIONER AND CHAIN GUIDE

Check for wear and breakage. Replace if necessary.

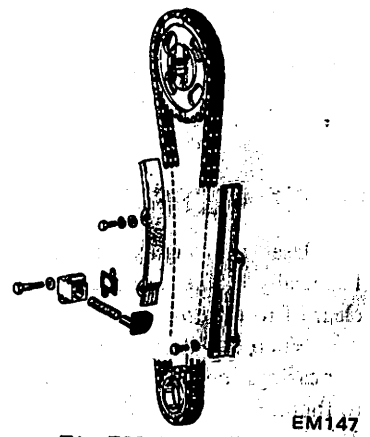


Fig. EM-73 Camshaft Drive Mechanism

FLYWHEEL

1. Check clutch disc contact surface with flywheel for damage or wear. Repair or replace if necessary.
2. Measure runout of clutch disc contact surface with a dial gauge. If it exceeds 0.15 mm (0.0059 in) total indicator reading, replace it.

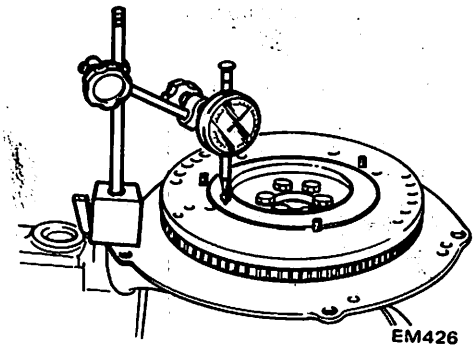


Fig. EM-74 Checking Flywheel Deviation

3. Check tooth surfaces of ring gear for flaws or wear.

Replace if necessary.

Note:
Replace ring gear at about 180 to 220°C (356 to 428°F).

FRONT COVER AND REAR OIL SEAL

First check front cover and rear oil seal for worn or folded over sealing lip or oil leakage. If necessary, install a new seal. When installing a new seal, pay attention to mounting direction.

Note: It is good practice to replace oil seal whenever engine is overhauled.

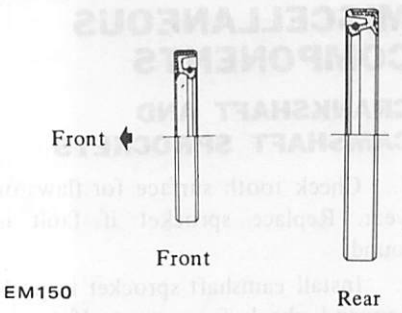


Fig. EM-75 Oil Seals of Crankshaft

ENGINE ASSEMBLY

CONTENTS

PRECAUTIONS EM-20
CYLINDER HEAD EM-20
PISTON AND CONNECTING ROD EM-21
ENGINE ASSEMBLY EM-21

PRECAUTIONS

1. Use thoroughly cleaned parts. Especially, make sure that oil holes are clear of foreign matter.
2. When installing sliding parts such as bearings, be sure to apply engine oil to them.
3. Use new packings and oil seals.
4. Do not reuse lock washers.
5. Keep tools and work benches clean.
6. Keep necessary parts and tools near at hand.
7. Be sure to follow specified tightening torque and order.
8. Applying sealant

Use sealant to eliminate water and oil leaks. Parts requiring sealant are:

(1) Front cover and corners of cylinder block:

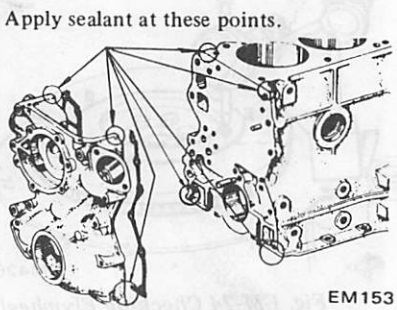


Fig. EM-76 Applying Sealant (Front cover and cylinder block)

(2) Main bearing cap and cylinder block: Each side of rear main bearing cap and each corner of cylinder block.

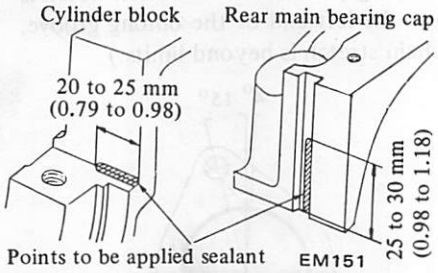


Fig. EM-77 Applying Sealant (Main bearing cap and cylinder block)

(3) Cylinder block: Step portions at four mating surfaces (cylinder block to front chain cover and cylinder block to rear main bearing cap).

Note: Do not apply too much sealant.

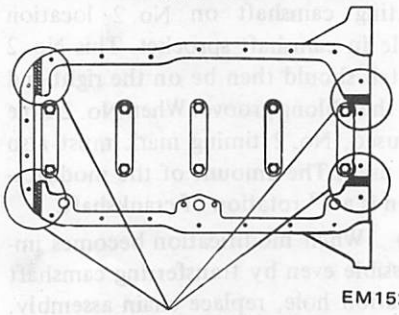


Fig. EM-78 Applying Sealant (Cylinder block)

CYLINDER HEAD

1. Valve assembly and valve spring

Using Valve Lifter ST12070000, set valve spring seat in position, and fit valve guide with oil seal.

Assemble valve in the order shown below: valve, inner and outer valve springs, spring retainer, valve collet and valve rocker guide.

Ⓣ Tightening torque:
Camshaft bracket
1.8 to 2.0 kg-m
(13 to 14 ft-lb)

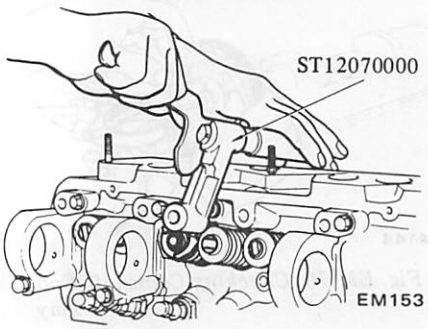


Fig. EM-79 Installing Valves

Note:
a. **Ensure that valve face is free from foreign matter.**
b. **Outer valve spring is of an uneven pitch type.**
Install spring facing painted side to cylinder head surface.

2. Valve rocker pivot assembly

Screw valve rocker pivots joined with lock nuts into pivot bushing.

3. Camshaft assembly

Set locating plate and carefully install camshaft in cylinder head. Do not damage the bearing inside. Oblong groove of locating plate must be directed toward front side of engine.

4. Install camshaft sprocket on camshaft and tighten it together with fuel pump drive cam to specified torque.

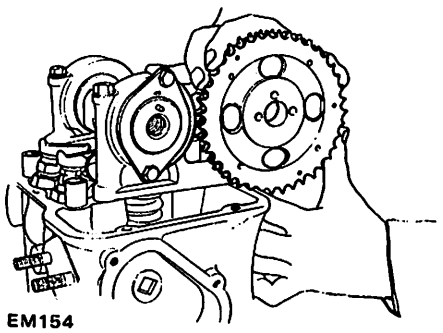


Fig. EM-80 Installing Camshaft Sprocket

Ⓣ Tightening torque:
Camshaft bracket
1.8 to 2.0 kg-m
(13 to 14 ft-lb)

At this time, check camshaft end play.

5. Install rocker arms by pressing valve springs down with a screwdriver.
6. Install valve rocker springs.
7. After assembling cylinder head, turn camshaft until No. 1 piston is at T.D.C. on its compression stroke.

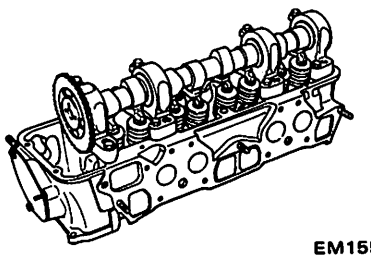


Fig. EM-81 Assembling Cylinder Head

PISTON AND CONNECTING ROD

1. Assemble pistons, piston pins and connecting rods on the designated cylinder.

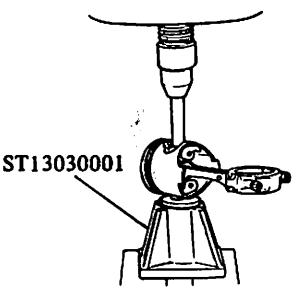


Fig. EM-82 Installing Piston Pin

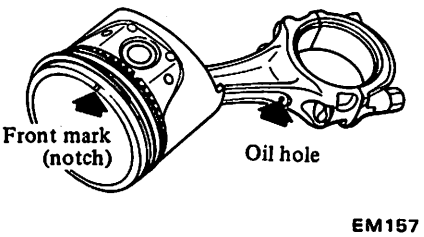


Fig. EM-83 Assembling Piston and Connecting Rod

Note:

a. Piston is pressed into connecting rod, with fitting force of 0.5 to 1.5 tons; aid of Piston Pin Press Stand ST13030001 is necessary. When pressing piston pin into connecting rod, apply engine oil to pin and small end of connecting rod.
b. Arrange so that oil jet of connecting rod big end is directed toward right side of cylinder block.
c. Be sure to install piston in cylinders with notch mark of piston head toward front of engine.

2. Install piston rings

Install top and second rings in right position, with marked side up.

Note:

a. Top ring is chromium-plated on liner contacting face.
b. Second ring has larger taper surface than top ring.
c. In the combined oil ring, upper rail is the same as lower one.

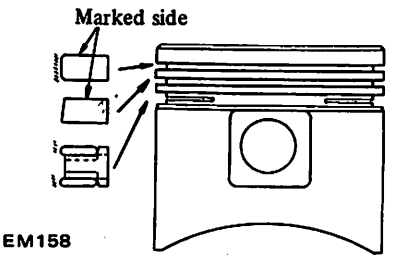


Fig. EM-84 Installing Piston Rings

3. Fix bearings on connecting rod and connecting rod cap.

Note: Clean back side of bearing carefully.

ENGINE ASSEMBLY

1. The first step in engine assembly is to bolt Engine Attachment KV10105000 to right hand side of cylinder block. Next, install block on another Engine Stand ST0501S000 with engine bottom up.
2. Set main bearings at the proper portion of cylinder block.

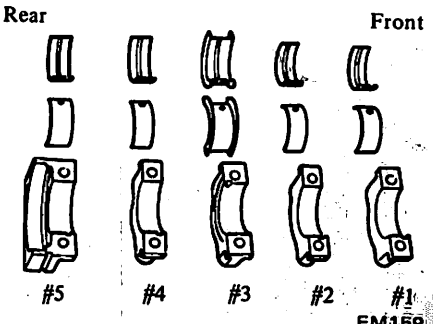


Fig. EM-85 Main Bearings

3. Install baffle plate including cylinder block net.

Note:

a. Only center bearing (No. 3) is a flanged type.
b. All inter-bearings (No. 2 and No. 4) are the same type.
c. Front bearing (No. 1) is also the same type as rear bearing (No. 5). The difference is that an oil hole is provided in the front bearing.
d. All upper and lower bearings are interchangeable.

4. Apply engine oil to main bearing surfaces on both sides of cylinder block and cap and then install crankshaft.
5. Install main bearing cap and tighten bolts to specified torque.

Ⓣ Tightening torque:
Main bearing cap
4.5 to 5.5 kg-m
(33 to 40 ft-lb)

Note:

a. Apply sealant to each side of rear main bearing cap and each corner

of cylinder block as shown in Fig. EM-73.

b. Arrange parts so arrow mark on bearing cap faces toward front of engine.
c. Prior to tightening bearing cap bolts, place bearing cap in proper position by shifting crankshaft in the axial direction.
d. Tighten bearing cap bolts gradually, in two to three stages outwardly from center bearing in the sequence as shown in Fig. EM-86.
e. After securing bearing cap bolts, ascertain that crankshaft turns smoothly.

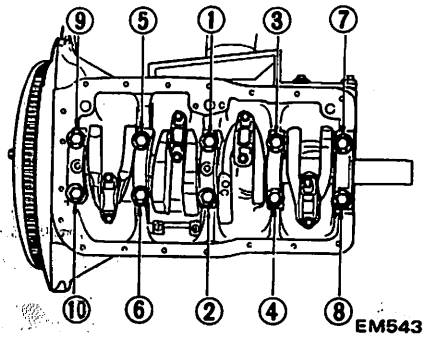


Fig. EM-86 Torque Sequence of Cap Bolts

6. Make sure that crankshaft has proper end play.

Crankshaft end play:
0.05 to 0.18 mm
(0.0020 to 0.0071 in)

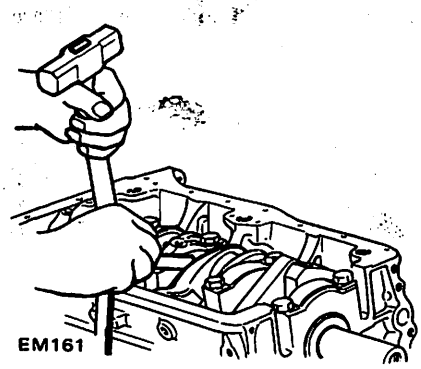


Fig. EM-87 Checking Crankshaft End Play

7. Install side oil seals into rear main bearing cap. Prior to installing, apply sealant to seals.

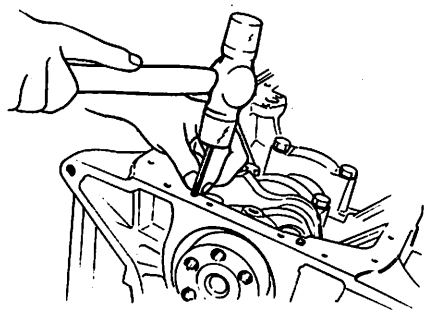


Fig. EM-88 Driving Side Oil Seal

8. Install rear oil seal using Crankshaft Rear Oil Seal Drift ST15310000.

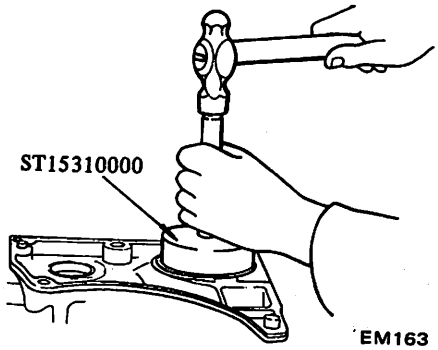


Fig. EM-89 Installing Rear Oil Seal

Note: When installing oil seal, give coating of engine oil to mating shaft to prevent scratches and folded lip. Also give coating of oil to periphery of oil seal.

9. Install rear end plate.
10. Install flywheel securely, and tighten bolts to specified torque.

Ⓣ Tightening torque:
Flywheel fixing bolts
14 to 16 kg-m
(101 to 116 ft-lb)

11. Insert pistons in corresponding cylinder using Piston Ring Compressor EM03470000.

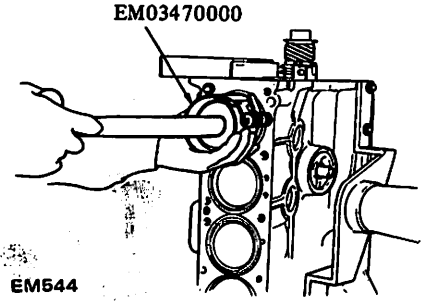


Fig. EM-90 Installing Piston Rod Assembly

Note:
a. Apply engine oil to sliding parts.
b. Arrange so that notch mark on piston head faces to front of engine.
c. Install piston rings at 180° to each other, avoiding their fit in the thrust and piston pin directions.

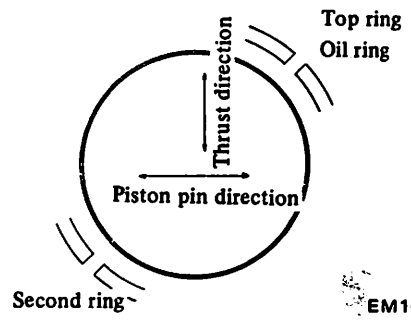


Fig. EM-91 Piston Ring Direction

12. Install connecting rod caps.

Ⓣ Tightening torque:
Connecting rod end nuts
4.5 to 5.5 kg-m
(33 to 40 ft-lb)

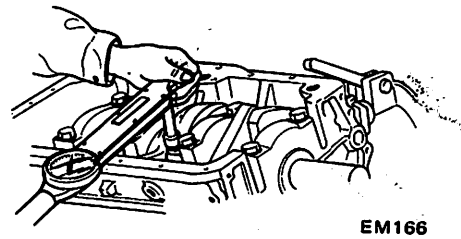


Fig. EM-92 Installing Connecting Rod Cap

Note: Arrange connecting rods and connecting rod caps so that the cylinder numbers face in the same direction.

13. Make sure that connecting rod big end has proper end play.

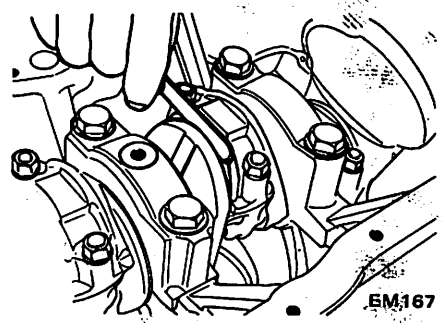


Fig. EM-93 Checking Big End Play

Big end play:
0.2 to 0.3 mm
(0.008 to 0.012 in)

14. Install cylinder head assembly.

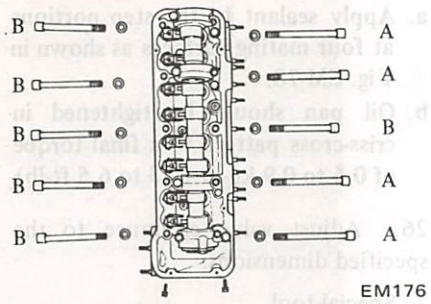


Fig. EM-94 Cylinder Head Bolts

(1) Thoroughly clean cylinder block and head surface.

Do not apply sealant to any other part of cylinder block and head surface.

(2) Turn crankshaft until No. 1 piston is at T.D.C. on its compression stroke.

(3) Make sure that camshaft sprocket location notch and plate oblong groove are aligned at their correct positions.

(4) When installing cylinder head, make sure that all valves are apart from heads of pistons.

(5) Do not rotate crankshaft and camshaft separately, or valves will hit heads of pistons.

(6) Temporarily tighten two bolts ①, ② shown in Fig. EM-100.

Ⓣ Tightening torque:
Cylinder head bolts
2 kg-m (14 ft-lb)

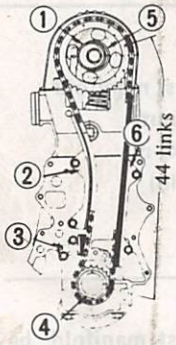
15. Install crankshaft sprocket and oil pump drive gear, and fit oil thrower.

Note: Make sure that mating marks of crankshaft sprocket face to front.

16. Install timing chain.

Note:

a. Make sure that crankshaft and camshaft keys point upwards.



1 Fuel pump drive cam
2 Chain guide
3 Chain tensioner
4 Crank sprocket
5 Cam sprocket
6 Chain guide

Fig. EM-95 Installing Timing Chain

b. Set timing chain by aligning its mating marks with those of crankshaft sprocket and camshaft sprocket at the right hand side. There are forty-four chain links between two mating marks of timing chain.

c. No. 2 hole is factory adjusted. When chain stretches excessively, adjust camshaft sprocket at No. 3 hole.

d. Use a set of timing marks and location hole numbers.

17. Install chain slack side guide to cylinder block.

18. Install chain tensioner.

Note: Adjust protrusion of chain tensioner spindle to 0 mm (0 in).

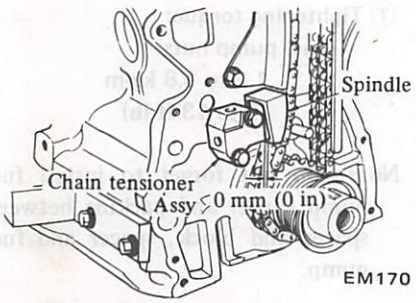


Fig. EM-96 Installing Chain Tensioner

19. Press new oil seal in front cover.

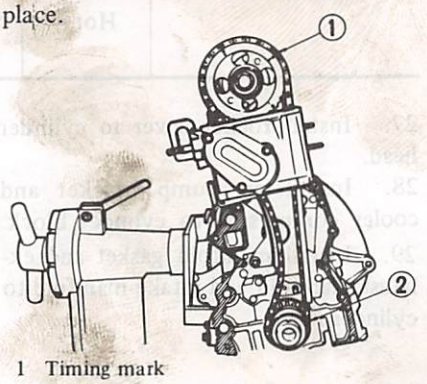
Note:

a. Front cover oil seal should be replaced when front cover is disassembled.

b. Before pressing oil seal into front cover, give coating of engine oil to periphery of oil seal.

c. This oil seal is a threaded seal type which has improved sealing characteristics. Do not apply grease to sealing lip.

20. Install front cover with gasket in place.



1 Timing mark
2 Timing mark

Fig. EM-97 Installing Front Cover

Note:

a. Apply sealant to front cover and corners of upper section of cylinder block as shown in Fig. EM-76.

b. Install front cover with head gasket in place.

c. Check height difference between cylinder block upper face and front cover upper face. Difference must be less than 0.15 mm (0.0059 in).

d. Note that different types of bolts are used.

e. Before installing front cover on cylinder block, apply coating of engine oil to sealing lip of oil seal.

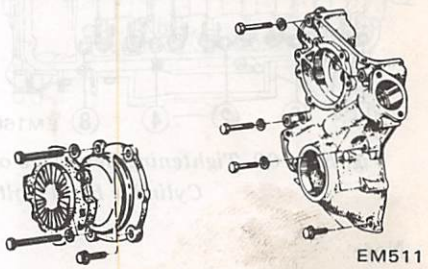


Fig. EM-98 Front Cover Bolts

Ⓣ Tightening torque:
Front cover bolts
Size M8
1.0 to 1.3 kg-m
(7 to 9 ft-lb)
Size M6
0.4 to 0.6 kg-m
(2.9 to 4.3 ft-lb)

21. Install crankshaft pulley and water pump assembly, then set No. 1 piston at T.D.C. on its compression stroke.

Ⓣ Tighten torque:
Crankshaft pulley locking bolt
12 to 16 kg-m
(87 to 116 ft-lb)

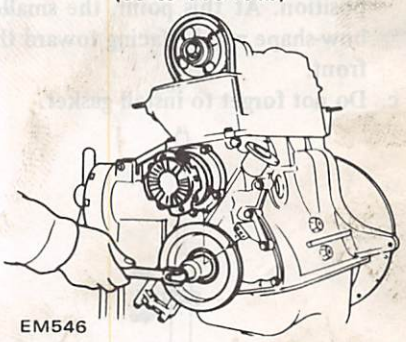


Fig. EM-99 Installing Crankshaft Pulley and Water Pump

22. Finally, tighten head bolts to the specified torque in several steps according to the tightening sequence

shown in Fig. EM-100.

Note that two types of bolts are used.

Special tool Cylinder Head Bolt Wrench ST10120000

Ⓣ **Tightening torque:**
Cylinder head bolts
6.5 to 8.5 kg-m
(47 to 61 ft-lb)

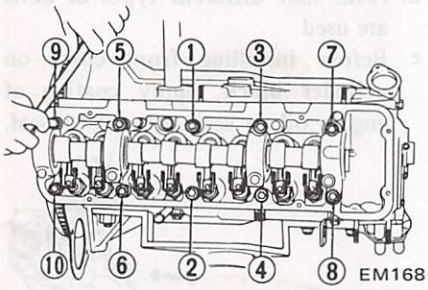


Fig. EM-100 Tightening Sequence of Cylinder Head Bolts

Note:

a. **Be sure to tighten two small bolts.**
b. **After engine has been operated for several minutes retighten if necessary.**

23. Install oil pump and distributor driving spindle in front cover.

Ⓣ **Tightening torque:**
Oil pump bolts
1.1 to 1.5 kg-m
(8 to 11 ft-lb)

Note:

a. **Assemble oil pump and drive spindle, aligning driving spindle face with oil pump hole.**
b. **Install oil pump together with drive spindle so that the projection on its top is located at the 11:25 a.m. position. At this point, the smaller bow-shape will be facing toward the front.**
c. **Do not forget to install gasket.**



Fig. EM-101 Setting Distributor Driving Spindle

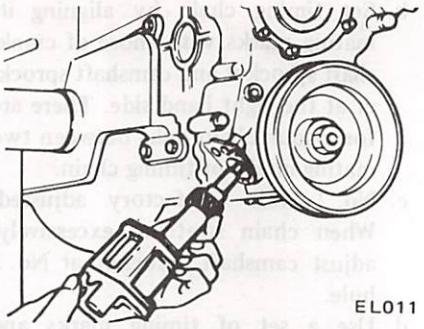


Fig. EM-102 Installing Oil Pump

24. Install fuel pump, water inlet elbow and front engine slinger in their positions.

Ⓣ **Tightening torque:**
Fuel pump nuts
1.2 to 1.8 kg-m
(9 to 13 ft-lb)

Note: Do not forget to install fuel pump spacer and packing between spacer and block, spacer and fuel pump.

25. Install oil strainer, oil pan gasket and oil pan.

Ⓣ **Tightening torque:**
Oil strainer bolts
0.8 to 1.1 kg-m
(5.8 to 8.0 ft-lb)
Oil pan bolts
0.6 to 0.9 kg-m
(4.3 to 6.5 ft-lb)

Note:

a. **Apply sealant to the step portions at four mating surfaces as shown in Fig. EM-78.**
b. **Oil pan should be tightened in criss-cross pattern to a final torque of 0.6 to 0.9 kg-m (4.3 to 6.5 ft-lb).**

26. Adjust valve clearance to the specified dimensions.

Special tool
Pivot Adjuster ST10640001

Ⓣ **Tightening torque:**
Pivot adjuster locking nut
5.0 to 6.0 kg-m
(36 to 43 ft-lb)

Note:

a. **First set clearance to the cold specifications.**

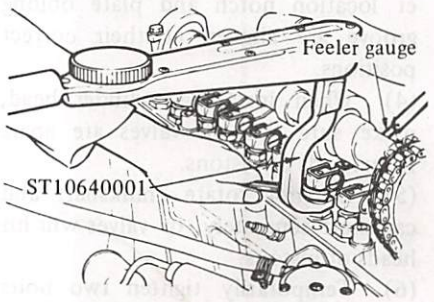


Fig. EM-103 Adjusting Valve Clearance

b. **After engine has been assembled, warm up engine until water temperature indicator points to middle of gauge and finally adjust clearance to hot specifications.**

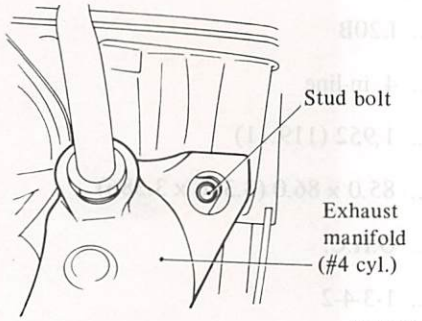
Valve clearance mm (in)	Cold	Intake	0.20 (0.008)
		Exhaust	0.25 (0.010)
	Hot	Intake	0.25 (0.010)
		Exhaust	0.30 (0.012)

27. Install rocker cover to cylinder head.
28. Install air pump bracket and cooler compressor to cylinder block.
29. Install manifold gasket and exhaust manifold and intake manifold to cylinder head.

Ⓣ **Tightening torque:**
Intake and exhaust manifold securing bolts or nuts
1.2 to 1.6 kg-m
(9 to 12 ft-lb)

CAUTION:
When installing exhaust manifold, be careful that stud bolt is inserted into

center of outermost guide hole in manifold.



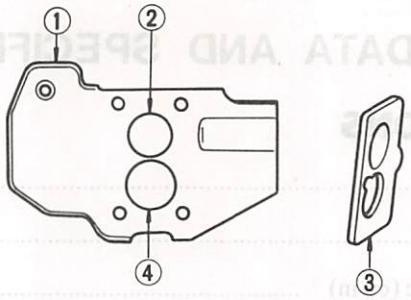
EM663

Fig. EM-104 Installing Exhaust Manifold

30. Install coolant hose from intake manifold to water pump.
31. Install air gallery pipe on exhaust manifold.
32. Install heatshield plate on exhaust manifold.
33. Install blow-by gas pipe on cylinder block and tighten with rear engine slinger.
34. Install thermostat housing gasket, thermostat housing and thermostat.
35. Install thermal vacuum valve on thermostat housing. Before installing, apply a liquid packing slightly to the threads.
36. Install E.G.R. passage and E.G.R. valve on intake manifold.
37. Connect E.G.R. tube to E.G.R. tube and exhaust manifold.
38. Install check valve on air gallery pipe.
39. Install air cleaner bracket on intake manifold.
40. Install air control valve on air cleaner bracket (if so equipped).
41. Install vacuum and fuel tubes (combined) on cylinder head.
42. Install distributor assembly.
43. Install heatshield plate, joint seat and carburetor.

Ⓣ Tightening torque:
Carburetor nuts
0.5 to 1.0 kg-m
(3.6 to 7.2 ft-lb)

Note: When installing joint seat, be sure to put the duct into primary hole in intake manifold. (Canada models)



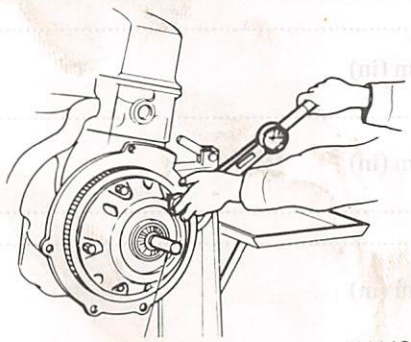
1 Heatshield plate
2 Primary hole
3 Joint seat
4 Secondary hole

EM534

Fig. EM-105 Installing Carburetor Joint Seat

44. Install dash pot bracket and dash pot to intake manifold.
45. Connect all air, vacuum and fuel hoses and then secure with clamps.
46. Install carburetor air cleaner on carburetor and then connect air and vacuum hoses .
47. Install spark plugs in place.
48. Connect all distributor high tension cables to spark plugs.
49. Install air pump, drive belt, cooler compressor and idler pulley.
50. Install left engine mounting bracket.
51. Install clutch assembly on flywheel with Clutch Aligning Bar KV30100100.

Ⓣ Tightening torque:
Clutch cover securing bolts
1.6 to 2.1 kg-m
(12 to 15 ft-lb)



KV30100100

EM440

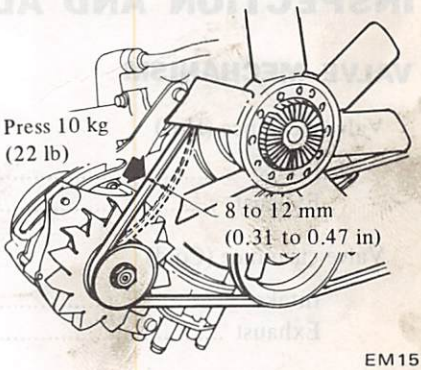
Fig. EM-106 Installing Clutch Assembly

52. Using an overhead hoist and lifting cable, hoist engine away from engine stand and then down onto engine carrier.
53. Install right engine mounting bracket, oil filter, oil pressure switch, oil level gauge and water drain plug. When installing oil filter, fasten it to cylinder block by hand.

Note: Do not overtighten filter, or oil leakage may occur.

54. Install alternator bracket adjusting bar, alternator, cooling fan and belt.
55. Adjust the deflection of drive belts when thumb pressure is applied midway between pulleys [A pressed force is above 10 kg (22 lb).]

Deflection of drive belts:
8 to 12 mm
(0.31 to 0.47 in)



EM157

Fig. EM-107 Fan Belt Tension

56. Fill engine oil up to specified level.

SERVICE DATA AND SPECIFICATIONS

GENERAL SPECIFICATIONS

Engine model		L20B
Cylinder arrangement		4, in-line
Displacement	cc (cu in)	1,952 (119.11)
Bore and stroke	mm (in)	85.0 x 86.0 (3.346 x 3.386)
Valve arrangement		O.H.C.
Firing order		1-3-4-2
Number of piston rings		
Compression		2
Oil		1
Number of main bearing		5
Compression ratio		8.5

INSPECTION AND ADJUSTMENT

VALVE MECHANISM

Valve clearance (Hot)	mm (in)	
Intake		0.25 (0.010)
Exhaust		0.30 (0.012)
Valve clearance (Cold)	mm (in)	
Intake		0.20 (0.008)
Exhaust		0.25 (0.010)
Valve head diameter	mm (in)	
Intake		42.0 to 42.2 (1.654 to 1.661)
Exhaust		35.0 to 35.2 (1.378 to 1.386)
Valve length	mm (in)	
Intake		114.9 to 115.2 (4.52 to 4.54)
Exhaust		115.7 to 116.0 (4.56 to 4.57)
Valve lift	mm (in)	
Intake and exhaust		10.5 (0.413)
Valve stem diameter	mm (in)	
Intake		7.965 to 7.980 (0.3136 to 0.3142)
Exhaust		7.945 to 7.960 (0.3128 to 0.3134)
Valve spring free length	mm (in)	
Intake and exhaust		
Outer		49.98 (1.9677)
Inner		44.85 (1.7657)

Valve spring pressured length (valve open)	mm/kg (in/lb)	
Intake and exhaust		
Outer		29.5/49.0 (1.161/108.0)
Inner		24.5/25.5 (0.965/56.2)
Valve spring assembled height (valve close)	mm/kg (in/lb)	
Intake and exhaust		
Outer		40.0/21.3 (1.575/47.0)
Inner		35.0/12.3 (1.378/27.1)
Valve spring out-of-square	mm (in)	
Outer		less than 2.2 (0.087)
Inner		less than 1.2 (0.047)
Valve guide length	mm (in)	
Intake and exhaust		59.0 (2.323)
Valve guide height from head surface	mm (in)	10.4 to 10.6 (0.409 to 0.417)
Valve guide inner diameter (Standard)	mm (in)	
Intake and exhaust		8.000 to 8.018 (0.3150 to 0.3157)
Valve guide outer diameter (Oversize) ts)	mm (in)	
Intake and exhaust		12.223 to 12.234 (0.4812 to 0.4817)
Valve guide interference fit	mm (in)	0.027 to 0.049 (0.0011 to 0.0019)
Valve guide to stem clearance	mm (in)	
Intake		0.020 to 0.053 (0.0008 to 0.0021)
Exhaust		0.040 to 0.073 (0.0016 to 0.0029)
Valve seat width	mm (in)	
Intake		1.4 to 1.6 (0.055 to 0.063)
Exhaust		1.8 to 2.2 (0.071 to 0.087)
Valve seat angle	degree	
Intake and exhaust		45°
Valve face angle	degree	
Intake and exhaust		45°30′
Valve seat interference fit	mm (in)	
Intake		0.081 to 0.113 (0.0032 to 0.0044)
Exhaust		0.064 to 0.096 (0.0025 to 0.0038)

CAMSHAFT AND TIMING CHAIN

Camshaft bend	mm (in)	0.02 (0.0008)
Camshaft bearing inner diameter	mm (in)	
1st, 2nd, 3rd and 4th		48.000 to 48.016 (1.8898 to 1.8904)
Camshaft journal to bearing clearance	mm (in)	0.038 to 0.067 (0.0015 to 0.0026)
Camshaft end play	mm (in)	0.08 to 0.38 (0.0032 to 0.0150)
Camshaft lobe lift	mm (in)	
Intake and exhaust		7.0 (0.276)
Camshaft journal diameter	mm (in)	
1st, 2nd, 3rd and 4th		47.949 to 47.962 (1.8878 to 1.8883)

CRANKSHAFT AND MAIN BEARING

Journal diameter	mm (in)	59.942 to 59.955 (2.3599 to 2.3604)
Journal taper & out-of-round	mm (in)	less than 0.01 (0.0004)
Maximum limit of dittoed clearance	mm (in)	0.12 (0.0047)
Crankshaft free end play	mm (in)	0.05 to 0.18 (0.0020 to 0.0071)
Wear limit of dittoed play	mm (in)	0.30 (0.0118)
Crank pin diameter	mm (in)	49.961 to 49.974 (1.9670 to 1.9675)
Crank pin out-of-round	mm (in)	less than 0.01 (0.0004)
Main bearing clearance	mm (in)	0.020 to 0.066 (0.0008 to 0.0026)
Wear limit of dittoed clearance	mm (in)	0.12 (0.0047)
Crankshaft bend	mm (in)	less than 0.05 (0.0020)
Flywheel runout at clutch disc contact face	mm (in)	less than 0.15 (0.0059)

CONNECTING ROD

Center distance	mm (in)	146 (5.75)
Big end play	mm (in)	0.2 to 0.3 (0.008 to 0.012)
Connecting rod bearing clearance	mm (in)	0.024 to 0.066 (0.0009 to 0.0026)
Connecting rod bend (per 100 mm or 3.94 in)	mm (in)	less than 0.03 (0.0012)

PISTON

Piston diameter (Service standard)	mm (in)	84.985 to 85.035 (3.3459 to 3.3478)
(Service parts)		
0.50 mm (0.0197 in) Oversize	mm (in)	85.465 to 85.515 (3.3648 to 3.3667)
1.00 mm (0.0394 in) Oversize	mm (in)	85.965 to 86.015 (3.3844 to 3.3864)
Ellipse difference	mm (in)	0.39 to 0.42 (0.0154 to 0.0165)
Ring groove width	mm (in)	
Top		2.030 to 2.050 (0.0799 to 0.0807)
Second		2.020 to 2.040 (0.0795 to 0.0803)
Oil		4.015 to 4.040 (0.1581 to 0.1591)
Piston to bore clearance	mm (in)	0.025 to 0.045 (0.0010 to 0.0018)
Pin diameter	mm (in)	20.993 to 20.998 (0.8265 to 0.8267)
Side clearance	mm (in)	
Top ring		0.040 to 0.073 (0.0016 to 0.0029)
Second ring		0.030 to 0.070 (0.0012 to 0.0028)
Ring gap width	mm (in)	
Top ring		0.25 to 0.40 (0.0098 to 0.0157)
Second ring		0.30 to 0.50 (0.0118 to 0.0197)
Oil ring		0.30 to 0.90 (0.0118 to 0.0354)

CYLINDER BLOCK

Cylinder bore inner diameter	mm (in)	85.000 to 85.050 (3.3465 to 3.3484)
Wear limit of dittoed inner diameter	mm (in)	0.20 (0.0079)
Cylinder bore taper and out-of-round	mm (in)	less than 0.015 (0.0006)
Surface flatness	mm (in)	less than 0.05 (0.0020)

CYLINDER HEAD

Surfaces flatness	mm (in)	less than 0.05 (0.0020)

TIGHTENING TORQUE

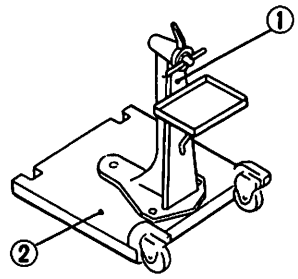
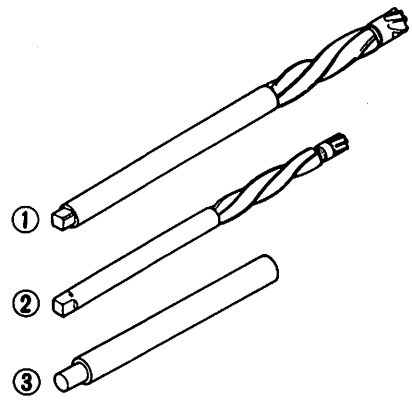
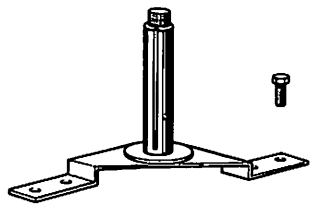
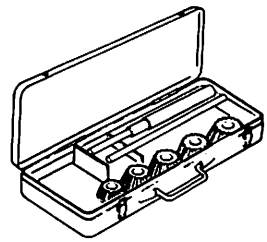
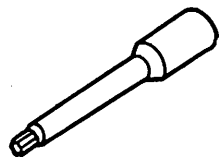
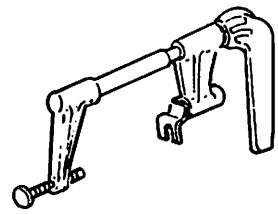
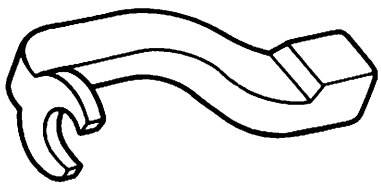
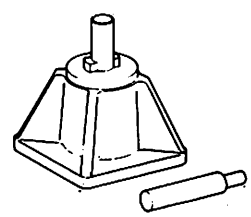
Cylinder head bolts	kg-m (ft-lb)	6.5 to 8.5 (47 to 61)
Connecting rod big end nuts	kg-m (ft-lb)	4.5 to 5.5 (33 to 40)
Flywheel fixing bolts	kg-m (ft-lb)	14 to 16 (101 to 116)
Main bearing cap bolts	kg-m (ft-lb)	4.5 to 5.5 (33 to 40)
Camshaft bracket bolts	kg-m (ft-lb)	1.8 to 2.0 (13 to 14)
Camshaft sprocket bolt	kg-m (ft-lb)	12 to 16 (87 to 116)
Rocker pivot lock nuts	kg-m (ft-lb)	5.0 to 6.0 (36 to 43)
Camshaft locating plate bolts	kg-m (ft-lb)	0.6 to 0.9 (4.3 to 6.5)
Oil pump bolts	kg-m (ft-lb)	1.1 to 1.5 (8 to 11)
Oil strainer bolts	kg-m (ft-lb)	0.8 to 1.1 (5.8 to 8.0)
Oil pan bolts	kg-m (ft-lb)	0.6 to 0.9 (4.3 to 6.5)
Oil pan drain plug	kg-m (ft-lb)	2.0 to 3.0 (14 to 22)
Front cover bolts	kg-m (ft-lb)	
M8		1.0 to 1.3 (7 to 9)
M6		0.4 to 0.6 (2.9 to 4.3)
Intake and exhaust manifold securing bolts or nuts	kg-m (ft-lb)	1.2 to 1.6 (9 to 12)
Carburetor nuts	kg-m (ft-lb)	0.5 to 1.0 (3.6 to 7.2)
Crankshaft pulley locking bolt	kg-m (ft-lb)	12 to 16 (87 to 116)
Fuel pump nuts	kg-m (ft-lb)	1.2 to 1.8 (9 to 13)
Water pump bolts	kg-m (ft-lb)	0.4 to 0.5 (2.9 to 3.6)
Alternator securing bolts	kg-m (ft-lb)	
Adjusting bar		1.0 to 1.6 (7 to 12)
Mounting bracket		2.0 to 3.0 (14 to 22)
Air pump securing bolts	kg-m (ft-lb)	
Adjusting bar		1.8 to 2.4 (13 to 17)
Mounting bracket		4.5 to 5.5 (33 to 40)

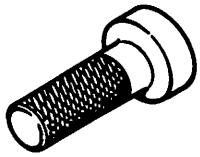
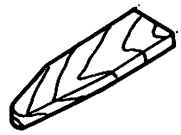
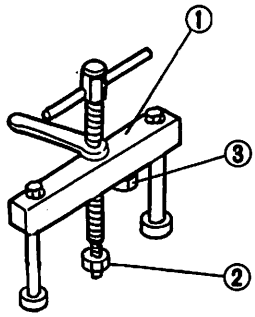
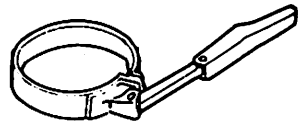
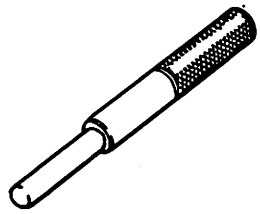
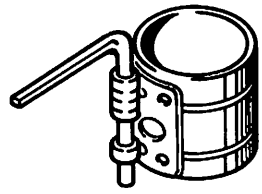
TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
I. Noisy engine		
Knocking of crankshaft and bearing	Loose main bearing.	Replace.
	Seized bearing.	Replace.
	Bent crankshaft.	Repair or replace.
	Uneven wear of journal.	Correct.
	Excessive crankshaft end play.	Replace center bearing.
Knocking of piston and connecting rod	Loose bearing.	Replace.
	Seized bearing.	Replace.
	Loose piston pin.	Replace pin or bushing.
	Loose piston in cylinder.	Recondition cylinder.
	Broken piston ring.	Replace.
	Improper connecting rod alignment.	Realign.
Camshaft knocking	Loose bearing.	Replace.
	Excessive axial play.	Replace bearing thrust plate.
	Rough gear teeth.	Repair.
	Broken cam gear.	Replace.
Timing chain noise	Improper chain tension.	Adjust.
	Worn and/or damaged chain.	Replace.
	Worn sprocket.	Replace.
	Worn and/or broken tension adjusting mechanism.	Replace.
	Excessive camshaft and bearing clearance.	Replace.
Camshaft and valve mechanism knocking	Improper valve clearance.	Adjust.
	Worn adjusting screw.	Replace.
	Worn rocker face.	Replace.
	Loose valve stem in guide.	Replace guide.
	Weakened valve spring.	Replace.
	Seized valve.	Repair or replace.
Water pump knocking	Improper shaft end play.	Replace.
	Broken impeller.	Replace.
II. Other mechanical troubles		
Stuck valve	Improper valve clearance.	Adjust.
	Insufficient clearance between valve stem and guide.	Clean stem or ream guide.
	Weakened or broken valve spring.	Replace.
	Biting or damage of valve stem.	Replace or clean.
	Poor quality of fuel.	Use good fuel.

Condition	Probable cause	Corrective action
Seized valve seat	Improper valve clearance.	Adjust.
	Weakened valve spring.	Replace.
	Thin valve head edge.	Replace valve.
	Narrow valve seat.	Reface.
	Overheating.	Repair or replace.
	Over speeding.	Drive at proper speeds.
	Stuck valve guide.	Repair.
Excessively worn cylinder and piston	Shortage of engine oil.	Add or replace oil.
	Dirty engine oil.	Clean crankcase, replace oil and oil filter element.
	Poor quality of oil.	Use right oil.
	Overheating.	Repair or replace.
	Wrong assembly of piston with connecting rod.	Repair or replace.
	Improper piston ring clearance.	Adjust.
	Broken piston ring.	Replace.
	Dirty air cleaner.	Clean.
	Mixture too rich.	Adjust.
	Engine over run.	Drive at proper speeds.
	Stuck choke valve.	Clean and adjust.
	Overchoking.	Start correct way.
Faulty connecting rod	Shortage of engine oil.	Add oil.
	Low oil pressure.	Correct.
	Poor quality of engine oil.	Use proper oil.
	Rough surface of crankshaft.	Grind and replace bearing.
	Clogged oil passage.	Clean.
	Bearing worn or eccentric.	Replace.
	Bearing improperly assembled.	Correct.
	Loose bearing.	Replace.
	Connecting rod alignment incorrect.	Repair or replace.
Faulty crankshaft bearing	Shortage of engine oil.	Add or replace.
	Low oil pressure.	Correct.
	Poor quality of engine oil.	Use proper oil.
	Crankshaft journal worn or out-of-round.	Repair.
	Clogged oil passage in crankshaft.	Clean.
	Bearing worn or eccentric.	Replace.
	Bearing improperly assembled.	Correct.
	Eccentric crankshaft or bearing.	Replace.

SPECIAL SERVICE TOOLS

Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.
ST0501S000 Engine stand assembly ① ST05011000 Engine stand ② ST05012000 Base 	J 26023 ① J 26023-2 ② J 26023-1 Fig. EM-10 Page EM-21	KV101039S0 Valve guide reamer set ① ST11081000 Reamer [12.2 mm (0.480 in)] dia. ② ST11032000 Reamer [8.0 mm (0.315 in)] dia. ③ ST11320000 Drift 	J 25618 ① J 25618-3 ② J 25618-2 ③ J 25618-1 Fig. EM-43
KV10105000 Engine attachment 	—— Fig. EM-10 Page EM-21	ST11650001 Valve seat cutter set 	—— Fig. EM-44
ST10120000 Cylinder head bolt wrench 	J 25613 Fig. EM-17 Page EM-24	ST12070000 Valve lifter set 	J 25631 Fig. EM-31 Fig. EM-79
ST10640001 Pivot adjuster 	J 25615-01 Fig. EM-103 Page EM-24	ST13030001 Piston pin press stand 	J 25634 Fig. EM-28 Fig. EM-82

Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.
ST15310000 Crankshaft rear oil seal drift 	J 25640-01 / Fig. EM-89	ST17420001 Chain stopper 	J 25660-01 / Fig. EM-18
KV101041S0 Crankshaft main bearing cap puller ① ST16511000 Crankshaft main bearing cap puller ② ST16512000 Adapter ③ ST16701001 Adapter 	J 25647 / Fig. EM-24	ST19320000 Oil filter wrench 	J 25664 / Page EM-4
		KV30100100 Clutch aligning bar. 	—— / Fig. EM-106
ST16610001 Pilot bushing puller 	J 23907 / Fig. EM-65	EM03470000 Piston ring compressor 	—— / Fig. EM-90

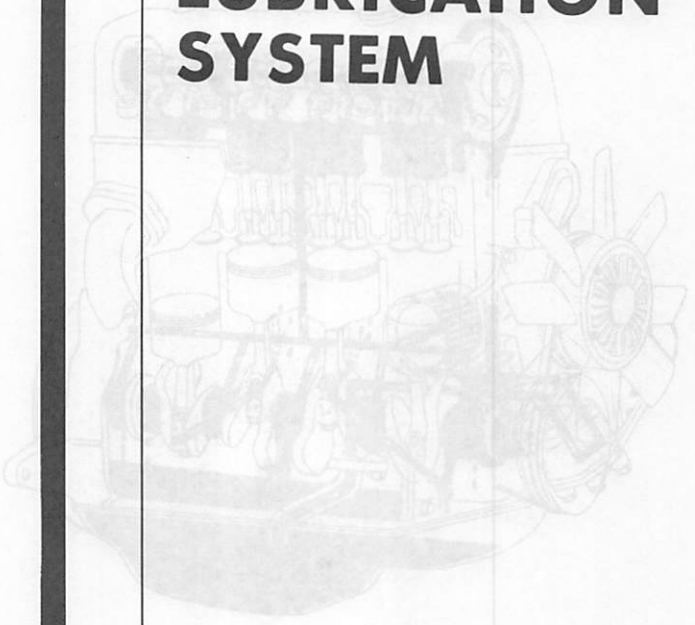
SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION EL

ENGINE LUBRICATION SYSTEM

EL



ENGINE LUBRICATION SYSTEM ..... EL- 2

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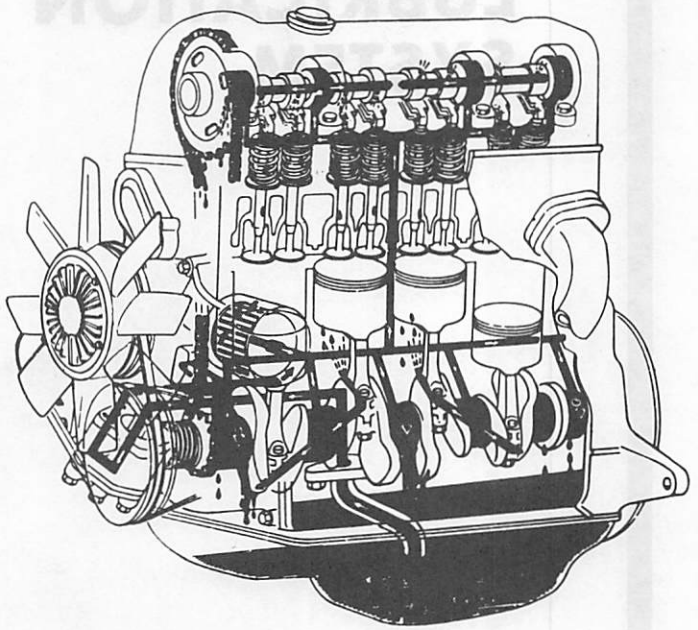
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ENGINE LUBRICATION SYSTEM

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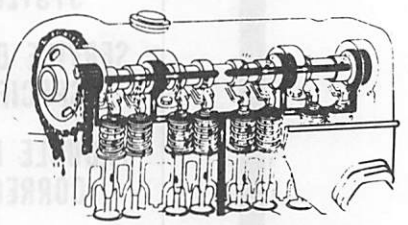


EL079

Fig. EL-1 Lubricating Circuit

LUBRICATION CIRCUIT

The pressure lubrication of the engine is accomplished by a trochoid-type oil pump. This pump draws the oil through the oil strainer into pump housing and then forces it through the full flow type oil filter into the main oil gallery. Part of the oil is supplied to all crankshaft bearings, chain tensioner and timing chain. Oil supplied to crankshaft bearings is fed to connecting rod bearings through the drilled passages in the crankshaft. Oil injected from jet holes on connecting rods lubricates the cylinder walls and piston pins. The other part of the oil is brought to the oil gallery in the cylinder head to provide lubrication of the valve mechanism and timing chain as shown in Figs. EL-1 and EL-2.



EL050

Fig. EL-2 Lubricating Valve Mechanism

From this gallery, oil holes go directly to all camshaft bearings through cam brackets.

Oil supplied through the No. 2 and No. 3 camshaft bearings is then fed to the rocker arm, valve and cam lobe through the oil gallery in the camshaft and the small channel at the base circle portion of each cam.

OIL PUMP

The oil pump is secured on the bottom of the front cover with four bolts and driven by the oil pump drive spindle assembly which is driven by the helical gear on the crankshaft.

The oil pump assembly consists of an oil pressure regulator valve and outer and inner rotors.

The spring-loaded oil pressure regulator valve limits the oil pressure to a maximum of 5.6 kg/cm² (80 psi).

REMOVAL

1. Remove distributor.
2. Remove splash shield board.
3. Remove oil pump body with drive spindle assembly.

INSTALLATION

1. Before installing oil pump on engine, turn crankshaft so that No. 1 piston is at T.D.C.

2. Fill pump housing with engine oil, then align punch mark of spindle with hole in oil pump as shown in Fig. EL-3.

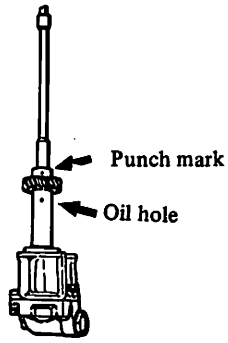


Fig. EL-3 Aligning Punch Mark and Oil Hole

3. Using a new gasket, install oil pump and drive spindle assembly so that the projection on its top is located in 11 : 25 a.m. position, at this time, the smaller bow-shape will be placed toward the front as shown in Fig. EL-4.

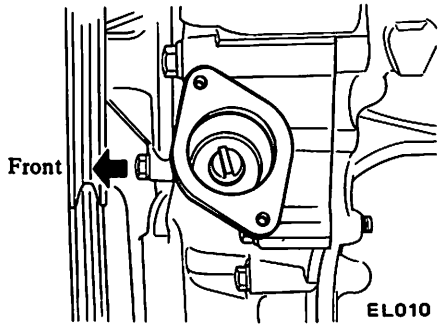


Fig. EL-4 Setting Drive Spindle

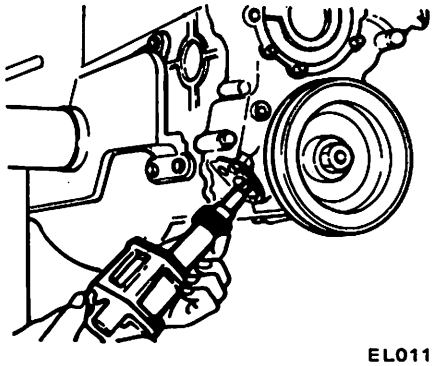


Fig. EL-5 Installing Oil Pump

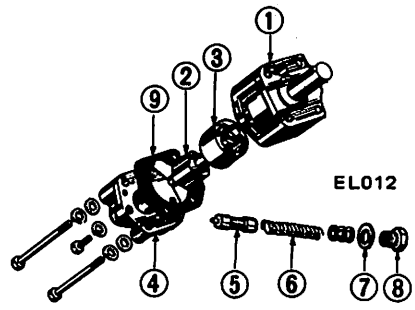
Ascertain whether or not the engagement is in order by checking the top of spindle through distributor fitting hole.

4. Tighten bolts securing oil pump to front cover.

DISASSEMBLY AND ASSEMBLY

1. Remove pump cover attaching bolts, pump cover and cover gasket, and slide out pump rotors.
2. Remove regulator cap, regulator valve and spring.
3. Install pressure regulator valve and related parts.
4. Install outer rotor, inner rotor and shaft in pump body and do not turn cover gasket up.

Note:
The marks dotted on outer and inner rotors should face to oil pump body.



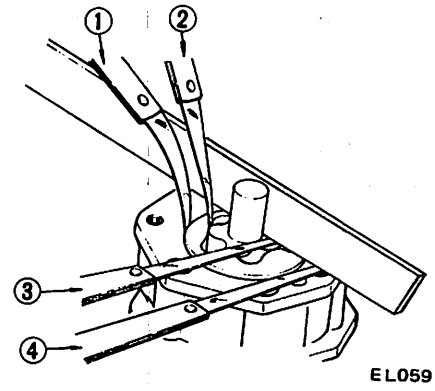
1 Oil pump body
2 Inner rotor and shaft
3 Outer rotor
4 Oil pump cover
5 Regulator valve
6 Regulator spring
7 Washer
8 Regulator cap
9 Cover gasket

Fig. EL-6 Oil Pump

INSPECTION

Wash all parts in cleaning solvent and dry with compressed air.

1. Inspect pump body and cover for cracks or excessive wear.
2. Inspect pump rotors for excessive wear.
3. Check inner rotor shaft for looseness in pump body.
4. Inspect regulator valve for wear or scoring.
5. Check regulator spring to see that it is not worn on its side or collapsed.
6. Using a feeler gauge, check tip clearance ② and outer rotor-to-body clearance ① shown in Fig. EL-7.



1 Outer rotor to body clearance
2 Tip clearance
3 Gap between rotor and straight edge
4 Gap between body and straight edge

Fig. EL-7 Checking Rotor Clearances

7. Place a straight edge across the face of pump and depress it slightly as shown in Fig. EL-7. Check gap ④ between body and straight edge or gap ③ between rotor and straight edge.

Gap:
–0.03 to 0.06 mm
(–0.0012 to 0.0024 in)

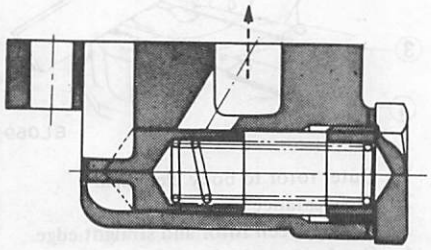
Rotor side clearance (rotor to bottom cover clearance) with gasket should satisfy the specifications.

		Standard	Wear limit
Rotor side clearance (rotor to bottom cover)	mm (in)	0.04 to 0.08 (0.0016 to 0.0031)	0.20 (0.0079)
Rotor tip clearance ②	mm (in)	Less than 0.12 (0.0047)	0.20 (0.0079)
Outer rotor to body clearance ①	mm (in)	0.15 to 0.21 (0.0059 to 0.0083)	0.50 (0.0197)

Note:
Pump rotors and body are not serviced separately. If pump rotors or body are damaged or worn, replacement of the entire oil pump assembly is necessary.

OIL PRESSURE REGULATOR VALVE

The oil pressure regulator valve is not adjustable. At the released position, the valve permits the oil to by-pass through the passage in the pump cover to the inlet side of the pump. Check regulator valve spring to ensure that spring tension is correct.



EL014

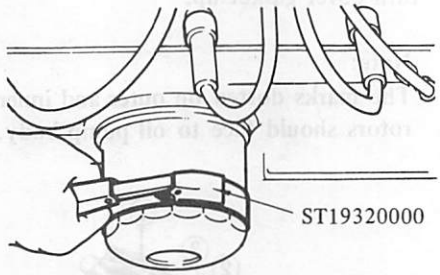
Fig. EL-8 Regulator Valve

OIL FILTER

The oil filter is a cartridge type. The oil filter element should be replaced periodically, with the use of Oil Filter Wrench ST19320000.

When installing an oil filter, fasten it to cylinder block by hand.

Note:
Do not overtighten filter, or oil leakage may occur.



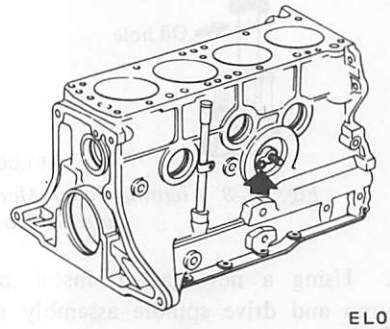
EL015

Fig. EL-9 Removing Oil Filter

RELIEF VALVE

The relief valve located at the center portion securing oil filter to the cylinder block by-passes the oil into the main gallery when the oil filter element is excessively clogged.

With oil filter removed, check valve unit for operation. Inspect for a cracked or broken valve. If replacement is necessary, remove valve by prying it out with a screwdriver. Install a new valve in place by tapping it.



EL016

Fig. EL-10 Relief Valve

SERVICE DATA AND SPECIFICATIONS

Oil pump

		Standard	Wear limit
Rotor side clearance (rotor to bottom cover)	mm (in)	0.04 to 0.08 (0.0016 to 0.0031)	0.20 (0.0079)
Rotor tip clearance	mm (in)	less than 0.12 (0.0047)	0.20 (0.0079)
Outer rotor to body clearance	mm (in)	0.15 to 0.21 (0.0059 to 0.0083)	0.50 (0.0197)

Oil pressure regulator valve

Oil pressure at idling	kg/cm^2 (psi)	0.8 to 2.8 (11 to 40)
Regulator valve spring:		
Free length	mm (in)	52.5 (2.067)
Pressured length	mm (in)	34.8 (1.370)
Regulator valve opening pressure	kg/cm^2 (psi)	3.5 to 5.0 (50 to 71)

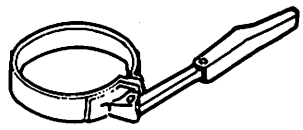
Tightening torque

Oil pump bolt	kg-m (ft-lb)	1.1 to 1.5 (8 to 11)
Oil pump cover bolt	kg-m (ft-lb)	0.7 to 1.0 (5.1 to 7.2)
Regulator valve cap nut	kg-m (ft-lb)	4 to 5 (29 to 36)

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable causes	Corrective actions
Oil leakage	Damaged or cracked body cover.	Replace.
	Oil leakage from gasket.	Replace.
	Oil leakage from regulator valve.	Tighten or replace.
	Oil leakage from blind plug.	Replace.
Decreased oil pressure	Leak of oil in engine oil pan.	Correct.
	Dirty oil strainer.	Clean or replace.
	Damaged or worn pump rotors.	Replace.
	Faulty regulator.	Replace.
	Use of poor quality engine oil.	Replace.
Warning light remains "on"- engine running	Decreased oil pressure.	Previously mentioned.
	Oil pressure switch unserviceable.	Replace.
	Electrical fault.	Check circuit.
Noise	Excessive backlash in pump rotors.	Replace.

SPECIAL SERVICE TOOL

Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.
ST19320000 Oil filter wrench 	J 25664 / Fig. EL-9		

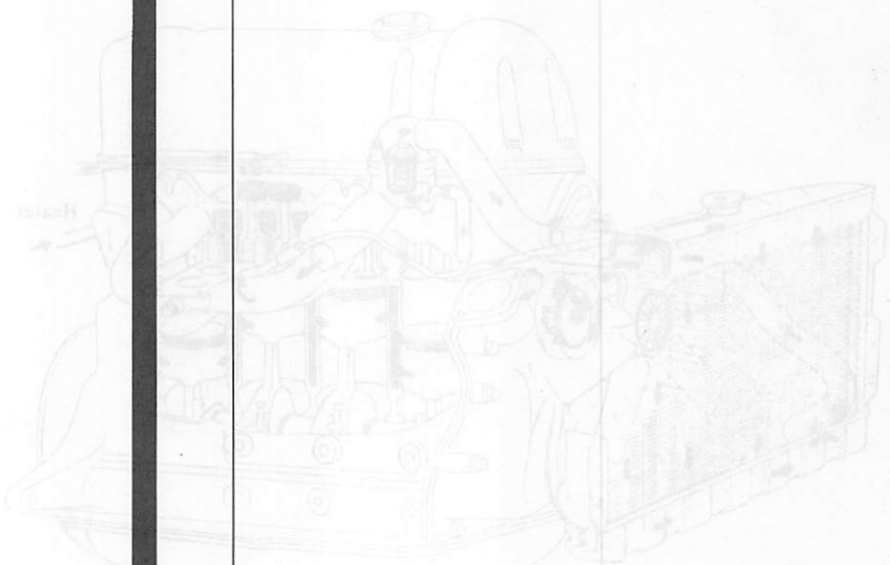
SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION CO

COOLING SYSTEM

CO



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COOLING SYSTEM

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INSPECTION CO-6

DESCRIPTION

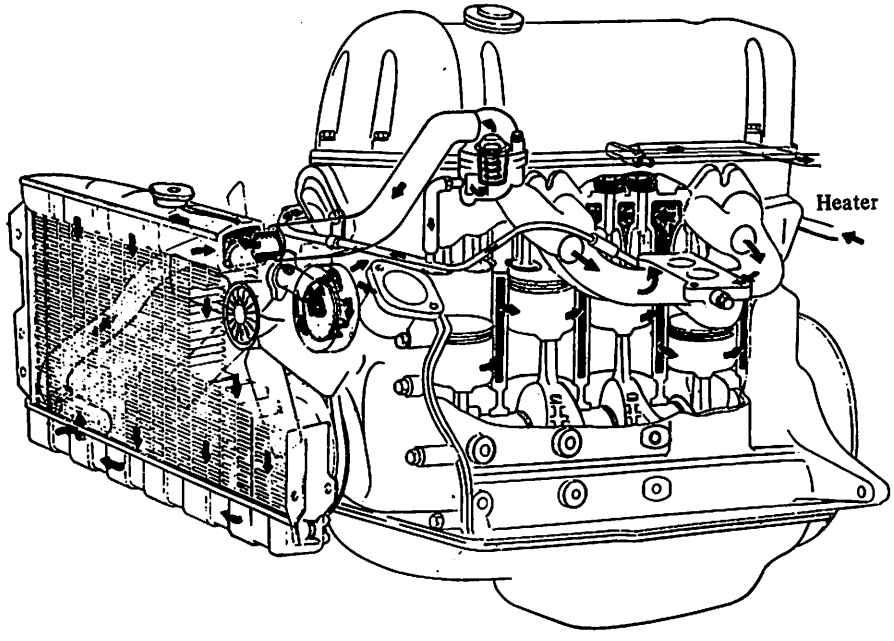
The cooling system is of the conventional pressure type. A centrifugal pump installed on the timing chain cover serves to circulate the coolant.

The pressure type radiator filler cap installed on the radiator operates the cooling system at higher than atmospheric pressure.

The higher pressure raises the boiling point of the coolant and increases the cooling efficiency of the radiator.

When the thermostat is closed, the coolant remains in the cylinder head and block for swift warming up of the engine. After it reaches normal operating temperature, the coolant circulates through the radiator.

The cooling fan drive is of a coupling type. See Fig. CO-1.



CO123

Fig. CO-1 Cooling System

WARNING:
To avoid serious personal injury, never remove radiator cap quickly when engine is hot. Sudden release of cooling system pressure is very dangerous.
If it is necessary to remove radiator cap when radiator is hot, turn cap slowly counterclockwise to the first step. After all pressure in the cooling system is released, turn cap passing the stop and remove it.

COOLANT LEVEL

The coolant level should be checked and maintained at 50 mm (1.97 in) below the upper face of filler neck, when the engine is cold.

DRAINING AND FLUSHING THE COOLING SYSTEM

To drain the cooling system, remove radiator cap, release drain cock at the bottom of radiator and drain plug on the right side of cylinder block. If the heater system is installed, set heater temperature control valve to open position. After the coolant is drained completely, close drain cock and plug and refill the system with clean soft water.

WATER PUMP

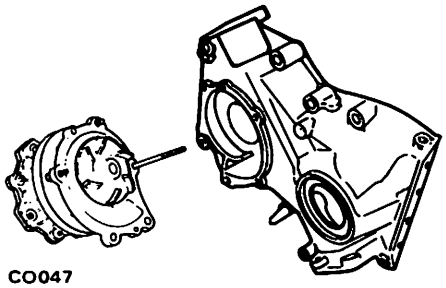
The water pump, cooling fan pulley and torque coupling are a unitized construction.

The water pump is of a centrifugal type, which is mounted on the engine front cover.

The pump shaft is supported by a double row of ball bearings press fit in an aluminum die cast pump body. The bearings are permanently lubricated and sealed to prevent loss of lubricant and entry of dirt.

The pump is provided with an impeller which turns on a steel shaft. The steel shaft rotates together with the torque coupling wheel. The volute chamber is built in the engine front cover assembly.

The inlet of the pump is connected to the radiator's lower tank by a hose.



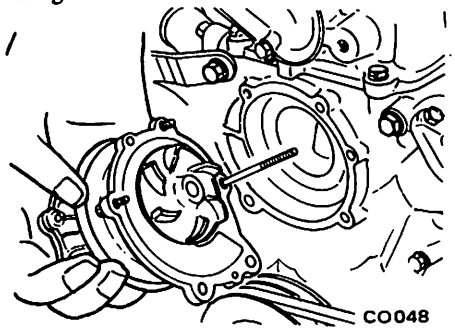
CO047

Fig. CO-2 Water Pump and Engine Front Cover

REMOVAL AND INSTALLATION

Removal

1. Drain coolant into a clean container.
2. Remove upper and lower radiator shrouds.
3. Remove fan blade.
4. Loosen fan belt.
5. Remove water pump assembly and gasket from front cover.



CO048

Fig. CO-3 Removing Water Pump

Installation

1. Be sure to clean the gasket surfaces in contact with pump and front cover. Always use new gaskets when installing pump assembly. Be sure to tighten bolts.

Ⓣ Tightening torque:
Water pump securing bolts
0.4 to 0.5 kg-m
(2.9 to 3.6 ft-lb)

2. Fill cooling system and check for leaks at pump.
3. Install fan blade, and tighten attaching bolts securely. Install belt and adjust for specified tension.
4. Operate the engine at fast idling and recheck for leaks.
5. Install fan shrouds.

Note:
Ensure that clearance between shroud and fan is even at any place.

DISASSEMBLY

Water pump is made of aluminum and its bearing outer race is of a press fit type. For this reason, water pump should not be disassembled.

INSPECTION AND ADJUSTMENT

Inspection

Inspect pump assembly for the following conditions and replace if necessary.

1. Badly rusted or corroded body assembly and vane
2. Excessive end play or roughness of bearings in operation
3. Reduced cooling efficiency due to deteriorated silicone oil
4. Oil leakage in torque coupling

Adjustment

Fan belt should be properly adjusted at all times. A tight belt causes wear of alternator and water pump bearings. A loose belt brings about improper cooling fan, water pump, and alternator operation.

Check the belt deflection between alternator and fan pulley by a force of 10 kg (22 lb).

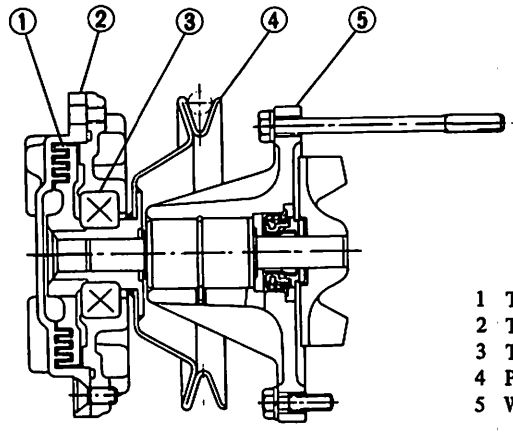
Fan belt deflection:
8 to 12 mm
(0.31 to 0.47 in)

If adjustment is necessary, loosen bolt retaining alternator adjusting bar to alternator. Move alternator toward or away from engine until the correct tension is obtained.

TORQUE COUPLING

The torque coupling keeps the fan speed at 2,500 rpm (rated) or below to conserve horsepower at high engine speed. It also helps reduce fan noise to a minimum during high speed operation.

This unit is filled with a special silicone oil used as a fluid coupling which controls the fan speed. (Silicone oil can not be replenished.) See Fig. CO-4.



1 Torque coupling wheel
2 Torque coupling cover
3 Torque coupling bearing
4 Pulley
5 Water pump

CO060

Fig. CO-4 Torque Coupling and Water Pump

REMOVAL AND INSTALLATION

To replace the torque coupling, follow the same procedure as in the water pump. The torque coupling can not be separated from the water pump.

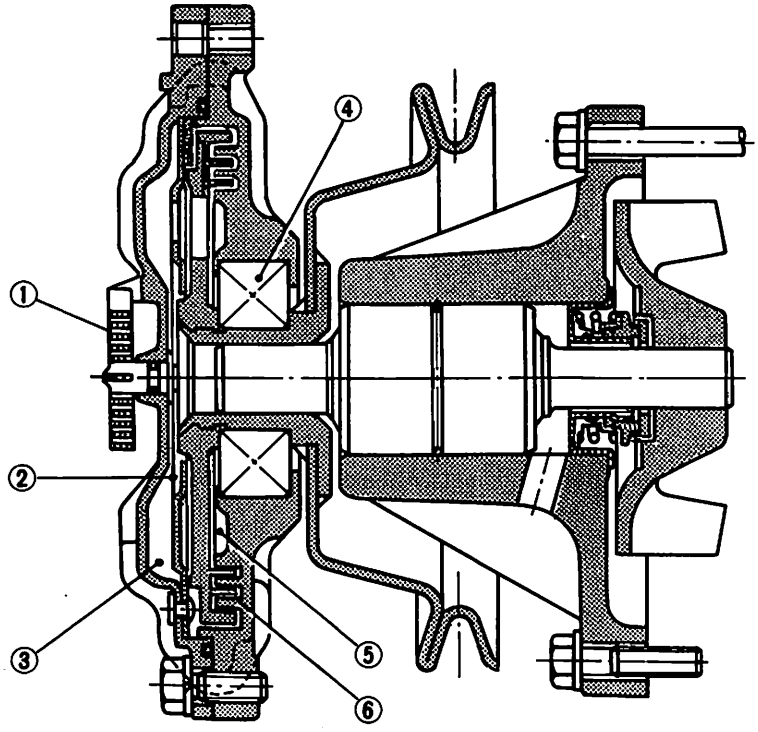
DISASSEMBLY

The torque coupling is so designed that it can not be disassembled.

INSPECTION

Inspect torque coupling for oil leakage. If necessary, replace.

TEM-COUPLING



1 Bi-metal thermostat
2 Slide valve
3 Reserve chamber for "OFF"
4 Bearing
5 Driving chamber for "ON"
6 Coupling part (labyrinth)

CO077

Fig. CO-5 Tem-Coupling

Tem-coupling is a type of fan coupling which is provided with a temperature control system.

The conventional coupling always slips the fan at a high speed under a constant ratio regardless of the engine cooling requirement.

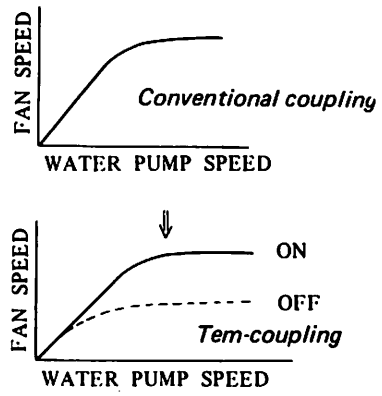
The slipping ratio of the Tem-coupling, however, is properly changed with the cooling requirement.

"ON" denotes that cooling is required and the fan operates up to about 2,450 rpm. When high cooling is not required (during cold season, with the engine warmed up, etc.), the operation is placed under "OFF" condition and the fan slips at about 1,650 rpm.

The coiled bimetal thermostat installed on the front center portion of the Tem-coupling detects temperature of air passing through the radiator (The air temperature is directly relative to the engine coolant temperature.) and the inside slide valve is opened or closed as required, and thus, the ON-OFF control is performed. When the air temperature rises, the bimetal is expanded, and the valve is opened, silicon oil is forwarded to the groove that transmits torque, and the system is placed under "ON" condition.

When the valve closes, silicone oil is not supplied to the driving chamber, oil in the driving chamber is accumulated on periphery due to the centrifugal force, and led into the reserve chamber. Now, oil is eliminated from the driving chamber, and the system is placed under "OFF" condition.

With this system, when fan cooling is not required, the output loss is minimized and noise can be far reduced. See Fig. CO-5.



CO029

Fig. CO-6 Characteristic of Tem-Coupling

INSPECTION

Check Tem-coupling for oil leakage or bend of bimetal.

If the above symptoms are found, replace it with a new one as an assembly.

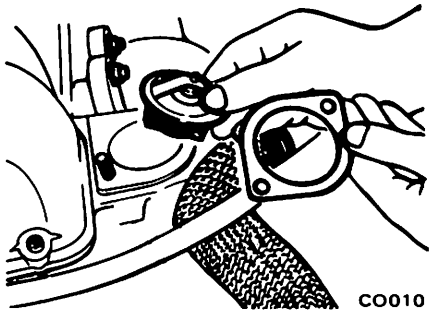
THERMOSTAT

A wax pellet type thermostat is mounted in the thermostat housing at the cylinder head water outlet.

The function of the thermostat is to control the flow of coolant, facilitating fast engine warm up and regulating coolant temperature. The thermostat is designed to open and close at predetermined temperatures and, if not operating properly, should be removed and tested as described below.

REMOVAL AND INSTALLATION

1. Drain coolant partially.
2. Disconnect upper radiator hose at water outlet.
3. Remove bolts and remove water outlet, gasket, and thermostat from thermostat housing.



CO010

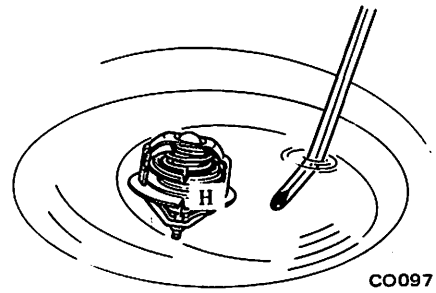
Fig. CO-7 Removing Thermostat

4. After checking thermostat, reinstall with a new gasket in place.
5. Reinstall water outlet.
6. Replenish coolant and check for leaks.

INSPECTION

A sticking thermostat will prevent the cooling system from functioning properly. If the thermostat sticks in the open position, the engine warms up very slowly. If the thermostat sticks in the closed position, overheating will result. Therefore, the thermostat should be inspected to make sure that it is in good condition.

1. Submerge thermostat in water of max. valve lift temperature. (Refer to Service Data and Specifications.)
2. After preparing for the marked screwdriver at about 8 mm (0.31 in) from the tip, inspect the lift height "H" of valve by inserting it.
3. Now, place thermostat in water 5°C (9°F) below the specified temperature.



CO097

Fig. CO-8 Inspecting Thermostat

If thermostat does not operate at the above specified temperature, it must be replaced because it cannot be repaired.

Note: It is necessary to check a new thermostat before installing it in the engine.

	Standard type	Frigid type	Tropical type
Valve opening temperature °C (°F)	82 (180)	88 (190)	76.5 (170)
Maximum valve lift mm/°C (in/°F)	8/95 (0.31/203)	8/100 (0.31/212)	8/90 (0.31/194)

RADIATOR

The radiator is a conventional down flow type having top and bottom tanks to distribute the coolant flow uniformly through the vertical tube of radiator core.

The radiator filler cap is designed to maintain a pre-set pressure 0.9 kg/cm² (13 psi) above atmospheric pressure.

The relief valve consisting of a blow-off valve and a vacuum valve, helps to prevent the coolant from boiling by giving pressure to it. However, when the pressure is reduced below atmospheric pressure, the vacuum valve allows air to re-enter the radiator preventing the formation of a vacuum in the cooling system.

On models equipped with automatic transmission, the oil cooler is combined with the radiator to cool transmission fluid.

REMOVAL AND INSTALLATION

1. Drain coolant into a clean container.
2. Disconnect radiator upper and lower hoses. On models with automatic transmissions, disconnect cooler inlet and outlet lines from radiator.
3. Remove fan shroud retaining bolts and remove fan shroud.
4. Remove front grille.
5. Remove radiator retaining bolts and then remove radiator upward.
6. Install radiator in the reverse sequence of removal. Note the following:

(1) Insert hoses in their positions until they bottom.

(2) Ensure that arrow marks on hoses are clearly visible from upper

direction when hoses are assembled.
(3) Ensure that clearance between radiator hose and any adjacent parts is 30 mm (1.18 in) minimum. On models equipped with air conditions, a minimum clearance of 18 mm (0.71 in) should exist between compressor and hose.
(4) Ensure that clearance between shroud and fan is even at any place.

Note:
Be careful not to damage radiator fins and core tube when installing.

INSPECTION

Radiator cap should be checked for working pressure at regular tune-up intervals. First, check rubber seal on cap for tears, cracks or deterioration after cleaning it. Then, install radiator cap on a tester. If cap does not hold or will not release at the specified pressure, replace cap.

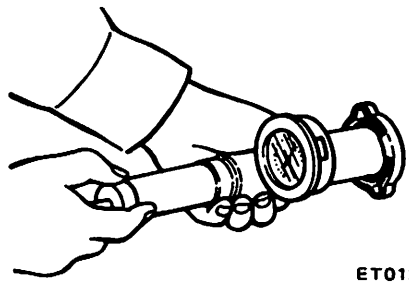


Fig. CO-9 Testing Radiator Cap

Also, inspect radiator for leakage using cap tester and applying a pressure of 1.6 kg/cm² (23 psi).

If a leakage is detected, repair or replace radiator.

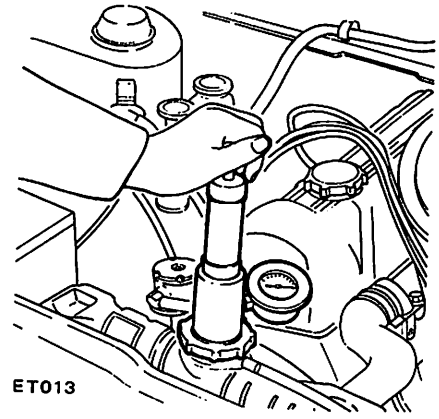


Fig. CO-10 Testing Cooling System Pressure

SERVICE DATA AND SPECIFICATIONS

Thermostat

		Standard type	Frigid type	Tropical type
Valve opening temperature	°C (°F)	82 (180)	88 (190)	76.5 (170)
Maximum valve lift	mm/°C (in/°F)	8/95 (0.31/203)	8/100 (0.31/212)	8/90 (0.31/194)

Radiator

Type		
Manual transmission		Corrugated fin type
Automatic transmission		Corrugated fin type equipped with oil cooler
Cap relief pressure	kg/cm² (psi)	0.9 (13)
Leakage testing pressure	kg/cm² (psi)	1.6 (23)

Fan

Fan belt deflection	mm (in)	8 to 12 (0.31 to 0.47)

Tightening torque

Water pump securing bolts	kg-m (ft-lb)	0.4 to 0.5 (2.9 to 3.6)

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Loss of water	Damaged radiator seams.	Repair.
	Leaks at heater connections or plugs.	Repair.
	Leak at water temperature gauge.	Tighten.
	Loose joints.	Tighten.
	Damaged cylinder head gasket.	Replace. Check engine oil for contamination and refill as necessary.
	Cracked cylinder block.	Replace. Check engine oil in crankcase for mixing with water by pulling oil level gauge.
	Cracked cylinder head.	Replace.
	Loose cylinder head bolts.	Tighten.
Poor circulation	Restriction in system.	Check hoses for crimps, and clear the system of rust and sludge by flushing radiator.
	Insufficient coolant.	Replenish.
	Inoperative water pump.	Replace.
	Loose fan belt.	Adjust.
	Inoperative thermostat.	Replace.
Corrosion	Excessive impurity in water.	Use soft, clean water. (Rain water is satisfactory.)
	Infrequent flushing and draining of system.	Cooling system should be drained and flushed periodically. Permanent anti-freeze (Ethylene glycol base) can be used throughout the seasons of the year, and change periodically at intervals recommended.
Overheating	Inoperative thermostat.	Replace.
	Radiator fin choked with mud, chaff, etc.	Clean out air passage thoroughly by using air pressure from engine side of radiator.
	Incorrect ignition and valve timing.	Adjust.
	Dirty oil and sludge in engine.	Refill.
	Inoperative water pump.	Replace.
	Loose fan belt.	Adjust.
	Restricted radiator.	Flush radiator.
	Inaccurate temperature gauge.	Replace.
	Impurity in water.	Use soft, clean water.
Overcooling	Inoperative thermostat.	Replace.
	Inaccurate temperature gauge.	Replace.

SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION EF

ENGINE FUEL

EF

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IDLE COMPENSATOR ..... EF- 6
FUEL FILTER ..... EF- 7
FUEL PUMP ..... EF- 8
CARBURETOR EF-10
SERVICE DATA AND SPECIFICATIONS EF-33

AUTOMATIC TEMPERATURE CONTROL (A.T.C.) AIR CLEANER

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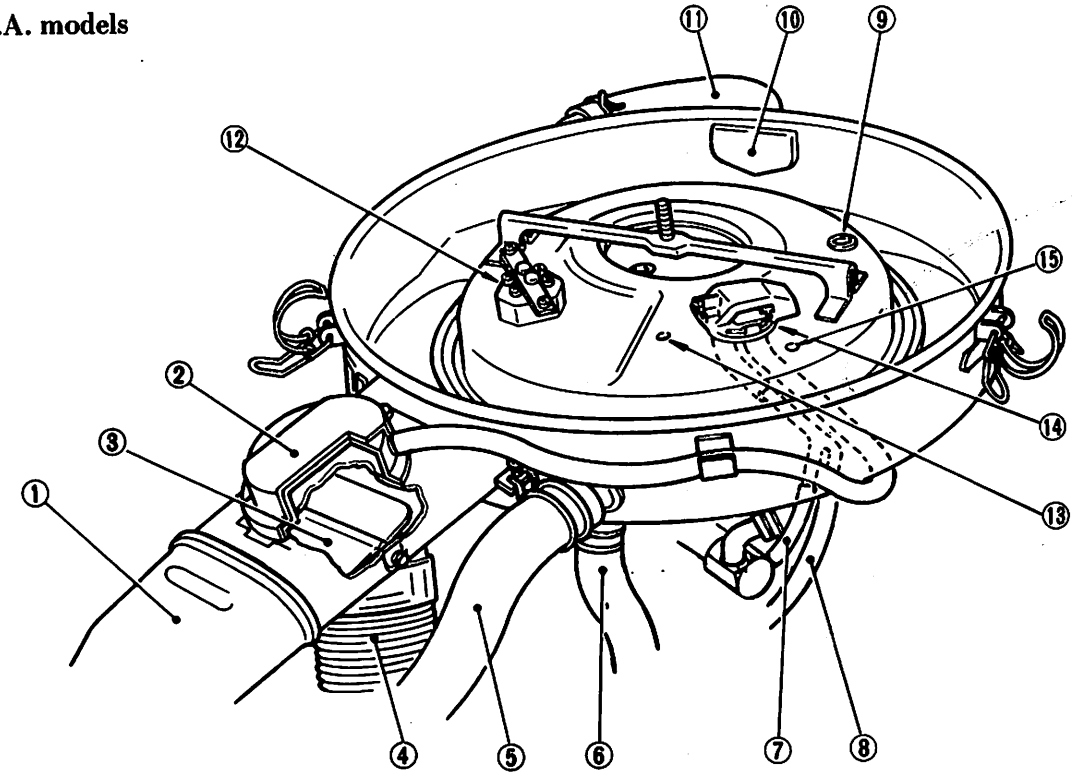
DESCRIPTION EF-2
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COLD AIR OPERATION EF-4
TEMPERATURE SENSOR EF-4
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DESCRIPTION

The automatic temperature control system maintains the temperature of air to be sucked in the carburetor within the constant range, thereby enabling lean setting for carburetor calibration. In addition to this, the automatic temperature control system is effective to improve warm-up characteristics of the engine and to remove carburetor icing.

In addition, idle compensator, vacuum hose for B.C.D.D. and some hoses for A.I.S. system are connected to the air cleaner. As for these devices, refer to Section EC or related parts of this section.

U.S.A. models

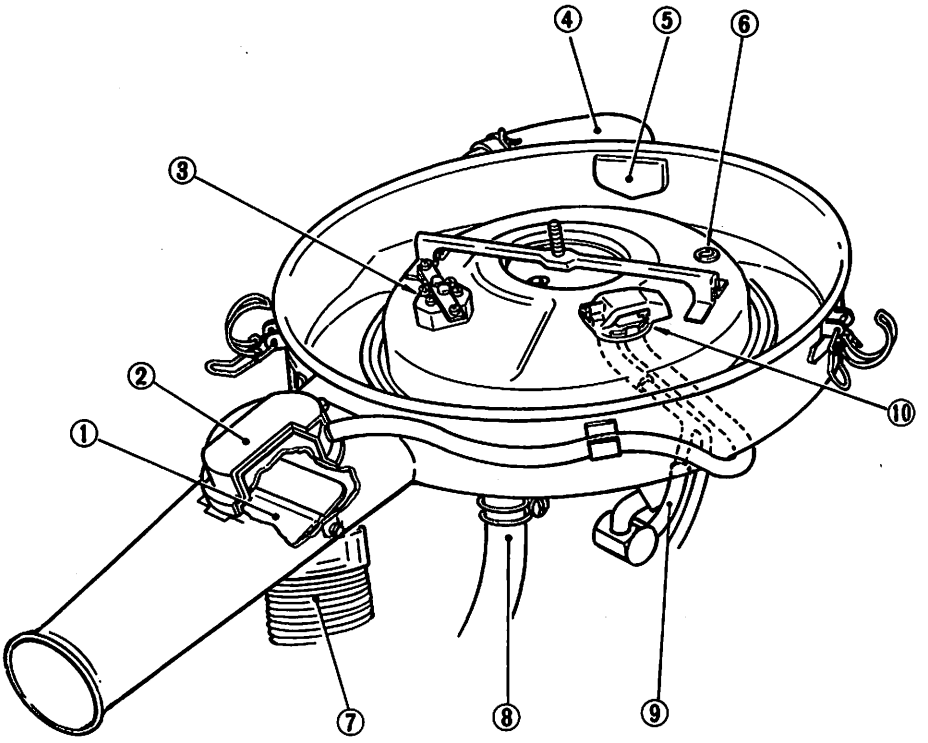


1 Fresh air duct
2 Vacuum motor
3 Air control valve
4 Hot air duct
5 Air hose for A.I.S.
From CAC valve – California models
6 Air relief valve for air pump (Non-California models)
7 Vacuum tube from intake manifold
8 Vacuum tube from Carbon canister
9 Air inlet for A.B. valve
10 Blow by gas filter
11 Blow by hose
12 Idle compensator
13 Air hole for T.C.S. system – M/T only (From vacuum switching valve)
14 Temperature sensor assembly
15 Air hole for B.C.D.D. (Non-California models)

EF538A

Fig. EF-1 A.T.C. Air Cleaner (U.S.A. models)

Canada models



EF977

Fig. EF-2 A.T.C. Air Cleaner (Canada models)

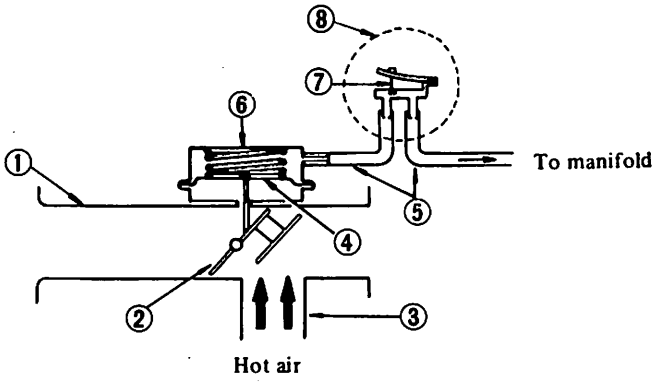
OPERATION

The automatic temperature control system of the air cleaner is controlled by the inlet air temperature and the load condition of the engine. The inlet air temperature is detected by the sensor, and the vacuum motor is actuated by the engine intake vacuum.

Engine intake air temperature	Sensor vacuum at vacuum motor side	Air control valve operation	Sensor operation
Below 30°C (86°F)	Below 60 mmHg (2.36 inHg)	Open (cold air)	Closed
	Above 190 mmHg (7.48 inHg)	Closed (hot air)	
30 to 54°C (86 to 129°F)	———	Partially open (cold air + hot air)	Partially open
Above 55°C (131°F)	———	Open (cold air)	Open

HOT AIR OPERATION

When the engine intake air temperature is low, the sensor air bleed valve remains in the closed position, and establishes vacuum passage between the intake manifold and vacuum motor. With this condition, the vacuum at the intake manifold side actuates the air control valve attached to the vacuum motor diaphragm to introduce hot air into the air cleaner through the hot air duct on the exhaust manifold. See Fig. EF-3.



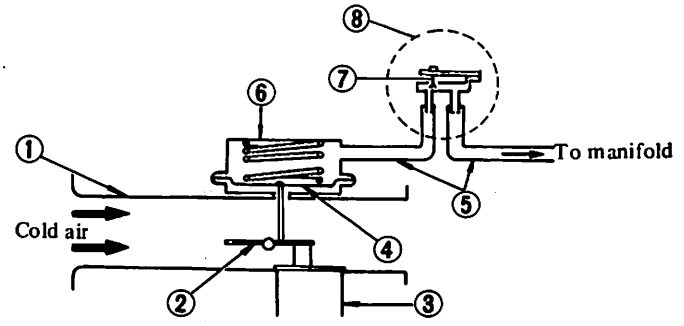
1 Air inlet pipe
2 Air control valve
3 Hot air pipe
4 Diaphragm
5 Vacuum hose
6 Diaphragm spring
7 Air bleed valve (closed)
8 Temperature sensor assembly

Fig. EF-3 Hot Air Delivery Mode (During cold engine operation)

COLD AIR OPERATION

1. When the vacuum is small, or when the engine is operating under heavy load, the air control valve opens widely, irrespective of the temperature around the sensor, to introduce the cold air for increased power of the engine.
2. When the engine intake air temperature is high:

The sensor air bleed valve opens fully to break the vacuum passage between the intake manifold and the vacuum motor. Due to the force of the vacuum motor diaphragm spring, the air control valve closes the hot air pipe of the air cleaner, and introduces the cold air.

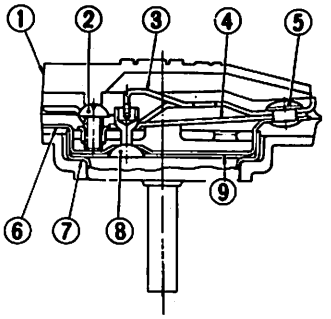


1 Air inlet pipe
2 Air control valve
3 Hot air pipe
4 Diaphragm
5 Vacuum hoses
6 Diaphragm spring
7 Air bleed valve (fully open)
8 Temperature sensor assembly

Fig. EF-4 Cold Air Delivery Mode (During hot engine operation)

TEMPERATURE SENSOR

The temperature sensor is attached to the inside of the air cleaner. The bi-metal built in the sensor detects the engine intake air temperature and opens or closes the vacuum passage in the sensor.

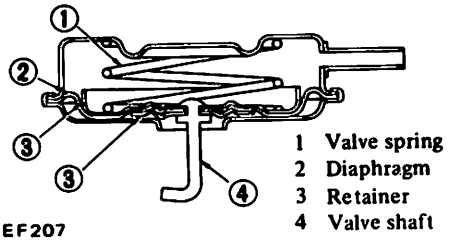


1 Protector cover
2 Screw
3 Adjusting frame
4 Air temperature bi-metal
5 Rivet
6 Valve seat frame
7 Lower frame
8 Air bleed valve
9 Gasket

Fig. EF-5 Temperature Sensor

VACUUM MOTOR AND AIR CONTROL VALVE

The vacuum signal from the temperature sensor acts upon the vacuum motor diaphragm. The valve shaft attached to the diaphragm is then moved up or down in response to the vacuum on the diaphragm. This movement of the valve shaft actuates the air control valve to control the temperature of the air to be introduced into the air cleaner.



1 Valve spring
2 Diaphragm
3 Retainer
4 Valve shaft

Fig. EF-6 Vacuum Motor

REMOVAL AND INSTALLATION

AIR CLEANER

1. Loosen bolts securing air cleaner to air cleaner bracket.
2. Loosen air cleaner lock bolt and remove air cleaner from carburetor. Disconnect the following hoses when dismounting air cleaner.

1) Fresh air duct
2) Hot air duct
3) Vacuum hose (Sensor and idle compesnator to intake manifold)
4) Hose (Intake manifold to carbon canister)
5) Hose (C.A.C. valve to air cleaner) . . . California models
6) Hose (Air pump to air cleaner) . . . Non-California models
7) Hose (A.B. valve to air cleaner)
8) Hose (B.C.D.D. to air cleaner) . . . Non-California models except Canada
9) Blow-by hose (Air cleaner to rocker cover)

3. To install, reverse the removal procedure.

TEMPERATURE SENSOR

Removal

1. Using pliers, flatten clip connecting vacuum hose to sensor vacuum tube.

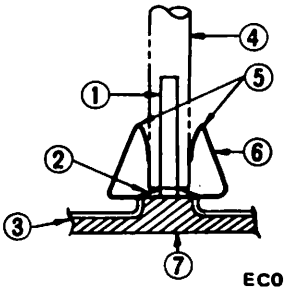


Fig. EF-7 Removal of Sensor

2. Disconnect hose from sensor.
3. Take off clip from sensor vacuum tube, and dismount sensor body from air cleaner.

Note: The gasket between sensor and air cleaner is bonded to the air cleaner side, and should not be removed.

Installation

1. Mount sensor on the specified position.
2. Insert clip into vacuum tube of sensor. After installing each vacuum hose, secure hose with the clip.

Note: Be sure to install vacuum hose correctly. Correct position is: R.H. side to "Nissan" mark at the top face of sensor for intake manifold; L.H. side for vacuum motor.

VACUUM MOTOR

1. Remove screws securing vacuum motor to air cleaner.
2. Disconnect valve shaft attached to vacuum motor diaphragm from air control valve, and remove vacuum motor assembly from air cleaner.
3. To install, reverse the removal procedures.

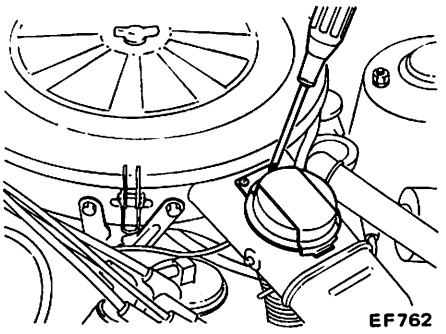


Fig. EF-8 Removing Vacuum Motor

INSPECTION

AIR CLEANER FILTER

Viscous paper type air cleaner filter does not require any cleaning operation until it is replaced periodically. Brushing or blasting operation will cause clogging and result in enrichment of carburetor mixture, and should never be conducted. For replacement interval of air cleaner filter, refer to "Maintenance Schedule".

AUTOMATIC TEMPERATURE CONTROL SYSTEM

Engine failures resulting from a malfunctioning A.T.C. system are manifest during cold weather operation. Such failures include:

- Engine stall or hesitation
- Increase in fuel consumption
- Lack of power

If these phenomena should occur, check A.T.C. system as described in the following before carrying out inspection of carburetor.

1. Check that vacuum hoses are securely connected in correct position.
2. Check each hose for cracks or distortion.
3. Check A.T.C. system for proper function, as follows. Confirm that engine is cold before starting test:

With engine stopped, disconnect fresh air duct if so equipped.

Place a mirror at the end of air cleaner inlet pipe as shown, and check to see if air control valve is in correct position.

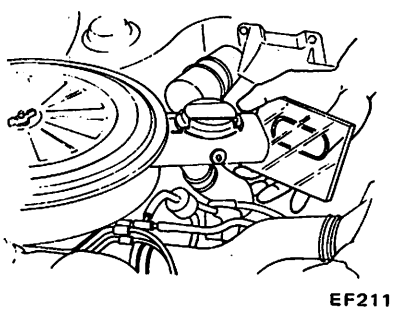


Fig. EF-9 Inspecting Valve Position

Air control valve is in correct position if its cold air inlet is open and hot air inlet is closed.

4. Start engine and keep idling.

Immediately after engine starting, check air control valve for correct position as described above. In this case, correct position of air control valve is the reverse of step 3, underhood air inlet is closed, and hot air inlet is open.

5. Check that air control valve gradually opens to cold air inlet side as engine warms up. When environmental temperature around temperature sensor is low, spend more time for engine warming up operation to facilitate smooth operation of air control valve.

If the above test reveals any problem in the operation of air control valve, carry out the following test:

VACUUM MOTOR

1. With engine stopped, confirm that cold air inlet is open and hot air inlet is closed.

If not, check air control valve linkage for proper operation.

2. Disconnect vacuum motor inlet vacuum hose, and connect another hose to the inlet to apply vacuum to vacuum motor. Vacuum can be applied by breathing in the hose end as shown. Then, confirm that the air control valve moves.
3. With hot air inlet in open position, as described in step 2 above, pinch vacuum hose with fingers and cut off air from vacuum hose. In this condition, check that air control valve maintains the condition described in step 2 for more than 30 seconds, and that hot air inlet is open. If diaphragm spring actuates the air control valve by

its spring force to close within 30 seconds, replace vacuum motor as an assembly since this may be resulted from air leak at vacuum motor diaphragm.

TEMPERATURE SENSOR

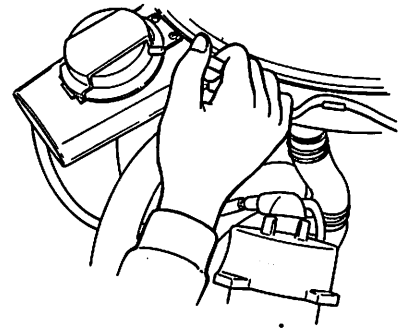
If tests indicate that A.T.C. system is malfunctioning and motor is functioning properly, check temperature sensor for proper operation.

Confirm that engine is cold before starting tests.

1. Start engine and keep idling.

Immediately after starting engine, disconnect vacuum motor inlet vacuum hose and make sure that intake vacuum is present at end of vacuum hose.

If vacuum is weak or is not present at all, check vacuum hoses for leakage. Replace temperature sensor if vacuum hoses are in good order.



EF978

Fig. EF-10 Checking for Presense of Intake Vacuum

2. Reconnect vacuum hose to vacuum motor, and warm up engine.
3. Check that air control valve gradually opens to cold air inlet side as engine warms up. When environmental temperature around temperature sensor is low, spend more time for engine warming up operation to facilitate smooth operation of air control valve.

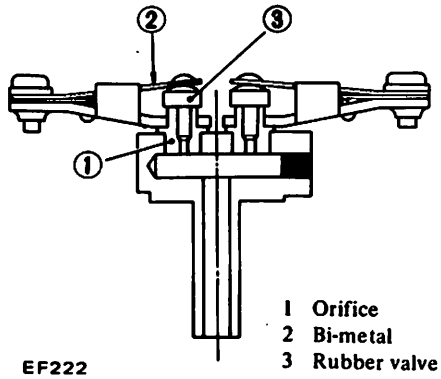
If air control valve does not open, check air control valve linkage for binding. Replace temperature sensor if air control valve linkage is functioning properly.

IDLE COMPENSATOR

DESCRIPTION

The idle compensator is basically a thermostatic valve which functions to introduce the air directly from the air cleaner to the intake manifold to compensate for abnormal enrichment of mixture in high idle temperature.

The bi-metal attached to the idle compensator detects the temperature of intake air, and opens or closes the valve. Two idle compensators having different temperature characteristics are installed; one opens at an intake air temperature of 60 to 70°C (140 to 158°F), and the other at 70 to 90°C (158 to 194°F).



1 Orifice
2 Bi-metal
3 Rubber valve

EF222

Fig. EF-11 Structure of Idle Compensator

REMOVAL AND INSTALLATION

1. Remove air cleaner cover.
2. Remove hose connecting idle compensator and 4-way connector.
3. Loosen screws securing idle compensator to air cleaner, then remove idle compensator.

Note:

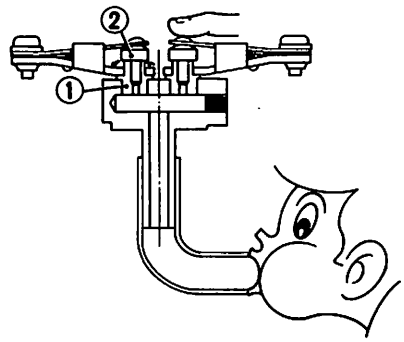
a. When removing idle compensator, remove gasket and plate.

b. When removing screw securing idle compensator to air cleaner, be careful not to miss the screw.

4. To install, reverse the removal procedure.

INSPECTION

1. Check that valve is in closed position when bi-metal temperature is lower than operating temperature. To check, breathe air into tube or suck air. If excessive air leakage is found at the valve, replace idle compensator as an assembly. Note that two idle compensators are mounted to air cleaner, and that it is necessary to plug the valve of one of these idle compensators so as to prevent air leak while chekcing the other one.



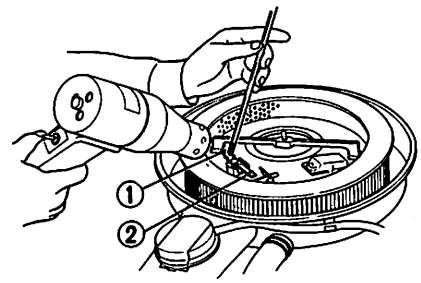
EF225

Fig. EF-12 Checking Idle Compensator

Note: When checking idle compensator on car, disconnect hose leading to idle compensator, and connect other hose, then carry out check as described above.

2. Warm up engine completely.
3. Open engine hood and remove air cleaner cover.
4. Direct warm air to idle compensator with a heat gun.

   And measure operating temperature of idle compensator.



1 No. 1 Bi-metal
2 No. 2 Bi-metal

EF979

Fig. EF-13 Checking Idle Compensator for Operation

Note: Locate stick temperature gauge as close to sensor as possible so that warm air from dryer is directed to these parts evenly.

5. Idle compensator is in good order if a "hissing" sound is heard when its temperature reaches operating temperature.

   If not, replace idle compensator.

Idle compensator opening temperature

No. 1	60 to 70°C (140 to 158°F)
No. 2	70 to 90°C (158 to 194°F)

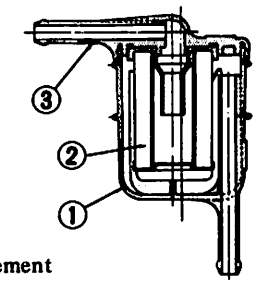
6. Others

1) Check hoses for correct installation, distortion, or cracks.
2) Check rubber valve seat of idle compensator for sticking or any other faulty conditions.

FUEL FILTER

DESCRIPTION

The fuel filter is a cartridge type. It uses a paper element which can be checked for condition from the outside.



1 Body
2 Paper element
3 Cover

EF005

Fig. EF-14 Fuel Filter

REMOVAL

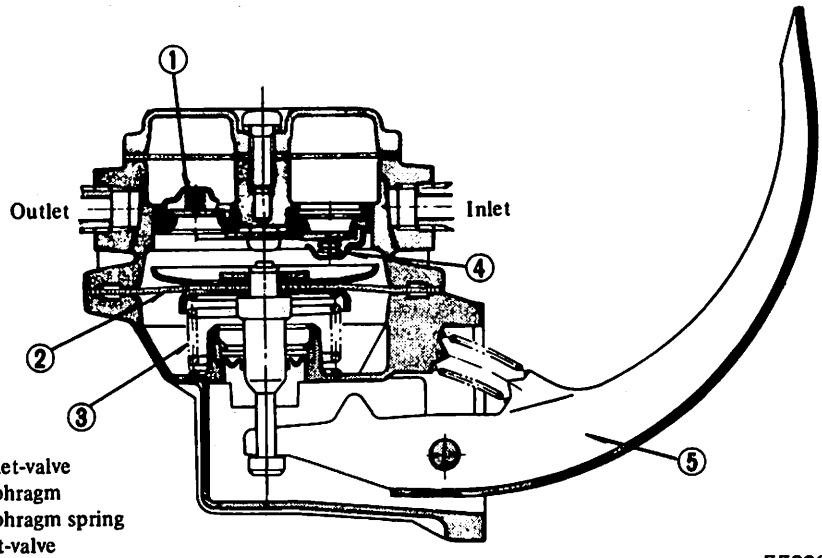
Disconnect inlet and outlet fuel lines from fuel filter, and remove fuel filter.

Note: Before disconnecting fuel lines, use a container to receive the fuel remaining in lines.

FUEL PUMP

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ASSEMBLY ..... EF- 9



1 Outlet-valve
2 Diaphragm
3 Diaphragm spring
4 Inlet-valve
5 Rocker arm

EF006

Fig. EF-15 Fuel Pump

OPERATING TEST

Note: When disconnecting fuel hoses, use a container to receive fuel remaining in fuel hoses.

STATIC PRESSURE TEST

The static pressure test should be conducted as follows:

1. Disconnect fuel hose between carburetor and fuel pump.
2. Connect a rubber hose to each open end of a T-connector, and connect this connector-hose assembly between carburetor and fuel pump.

Note: Locate this T-connector as close to carburetor as possible.

3. Connect a suitable pressure gauge to the opening of T-connector, and fasten the hose between carburetor and T-connector securely with a clip.
4. Start and run the engine at various speeds.
5. The pressure gauge indicates static fuel pressure in the line. The gauge reading should be within the specified value.

Fuel pump pressure:
0.21 to 0.27 kg/cm² (3.0 to 3.85 psi)

Note: If the fuel in the carburetor float chamber has run out and engine has stopped, remove clip and pour fuel into carburetor. Fasten clip securely and repeat static pressure test.

If pressure is not within the specified limit, remove pump as an assembly.

CAPACITY TEST

The capacity test is conducted only when static pressure is within the specification. To conduct this test, proceed as follows:

1. Disconnect pressure gauge from T-connector and, in its vacant place, install a suitable container as a fuel sump.
2. Start engine and run at 1,000 rpm.
3. Pump should deliver the specified amount of fuel.

If little or no fuel flows from open end of pipe, it is an indication that fuel line is clogged or pump is malfunctioning.

Fuel pump capacity:
1,700 cc (103.73 cu in)/min. at 1,000 rpm

REMOVAL AND INSTALLATION

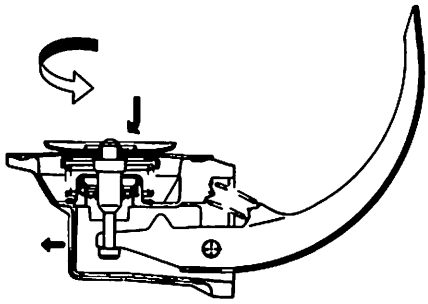
Note: When disconnecting fuel lines, use a container to receive fuel remaining in fuel hoses.

1. Disconnect inlet and outlet fuel hoses from fuel pump.
2. Remove fuel pump.
3. To install, reverse the order of removal.

DISASSEMBLY

1. Remove screws and detach upper and lower bodies.
2. Remove screws and take off cap and cap gasket from upper body.
3. Remove inlet and outlet connectors.
4. Remove valve retainer screws and take off valve retainer.
5. To remove diaphragm, press down its center against spring force. With diaphragm pressed down, rotate it about 90°. Then, release diaphragm to unhook push rod.

Note: Be careful not to damage diaphragm or oil seal.



EF980

Fig. EF-16 Removing Pull Rod

6. Drive rocker arm pin out with a press or hammer.

INSPECTION

Check all components for cracks, wear or any abnormalities and replace with new parts if necessary.

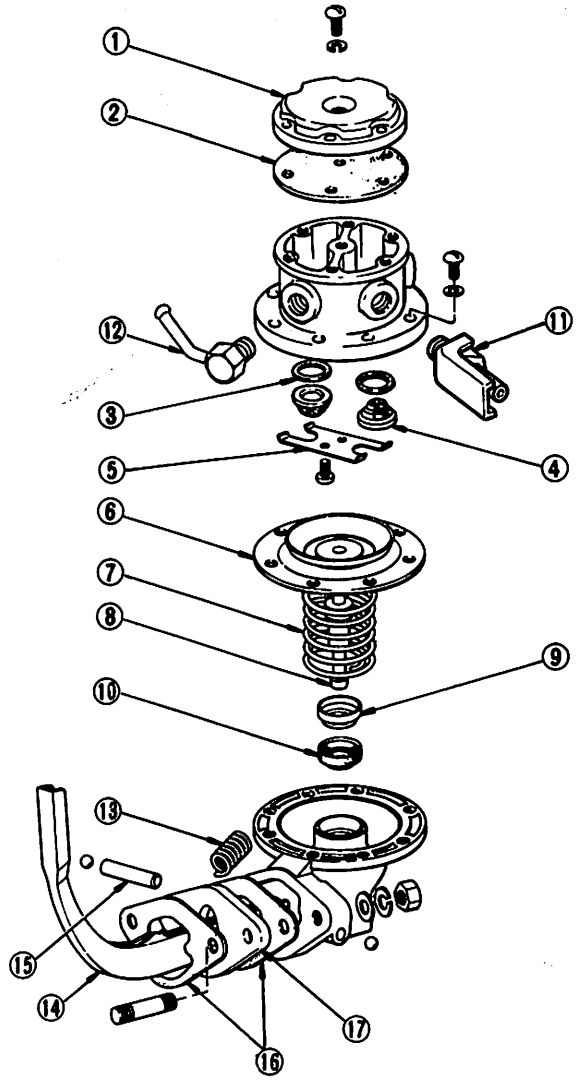
ASSEMBLY

1. To assemble, reverse the order of disassembly. Closely observe the following instructions:
- Use new gaskets.
- Lubricate rocker arm, rocker arm link and rocker arm pin before installation.

2. After assembly, test the function as follows.

a. Position fuel pump assembly about 1 meter (3.3 ft) above fuel level of fuel strainer and connect a pipe from strainer to fuel pump.

b. Operate rocker arm by hand. If fuel is drawn up soon after rocker arm is released, fuel pump is functioning properly.



1 Fuel pump cap
2 Cap gasket
3 Valve packing assembly
4 Fuel pump valve assembly
5 Valve retainer
6 Diaphragm assembly
7 Diaphragm spring
8 Pull rod
9 Lower body seal washer
10 Lower body seal
11 Inlet connector
12 Outlet connector
13 Rocker arm spring
14 Rocker arm
15 Rocker arm side pin
16 Fuel pump packing
17 Spacer-fuel pump to cylinder block

EF539A

Fig. EF-17 Fuel Pump

CARBURETOR

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DESCRIPTION

The carburetors are of down-draft two-barrel types which produce the optimum air-fuel mixture under all operating conditions.

They present several distinct features of importance to the car owners.

A summary of the features is as follows:

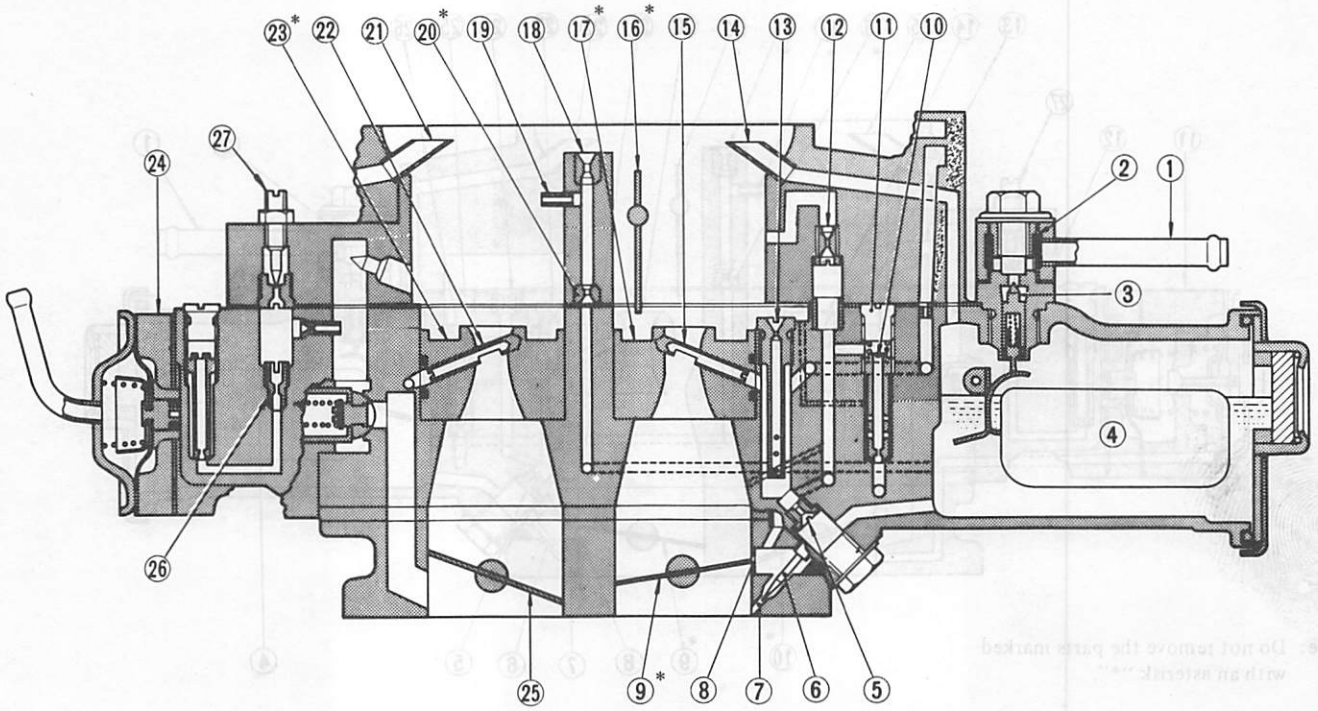
1. A slow economizer to make a smooth connection with acceleration or deceleration during light load running. It also assures stable low speed performance.
2. An idle limiter to reduce harmful exhaust emissions to a minimum.
3. A B.C.D.D. device for reducing hydrocarbon (HC) emissions.
4. An electric automatic choke to facilitate cold starting and to reduce exhaust emissions.
5. An anti-dieseling solenoid to eliminate dieseling (run-on).
6. A power valve, or vacuum actuated booster, to ensure smooth high-speed operation.
7. The carburetor comes equipped with dash pot, which ensures smooth deceleration, without engine stall under all operating conditions.

STRUCTURE AND OPERATION

These carburetors consist of a main system for normal running, a slow system for idling, and an accelerating and power mechanism.

Some emission control devices are added.

California models



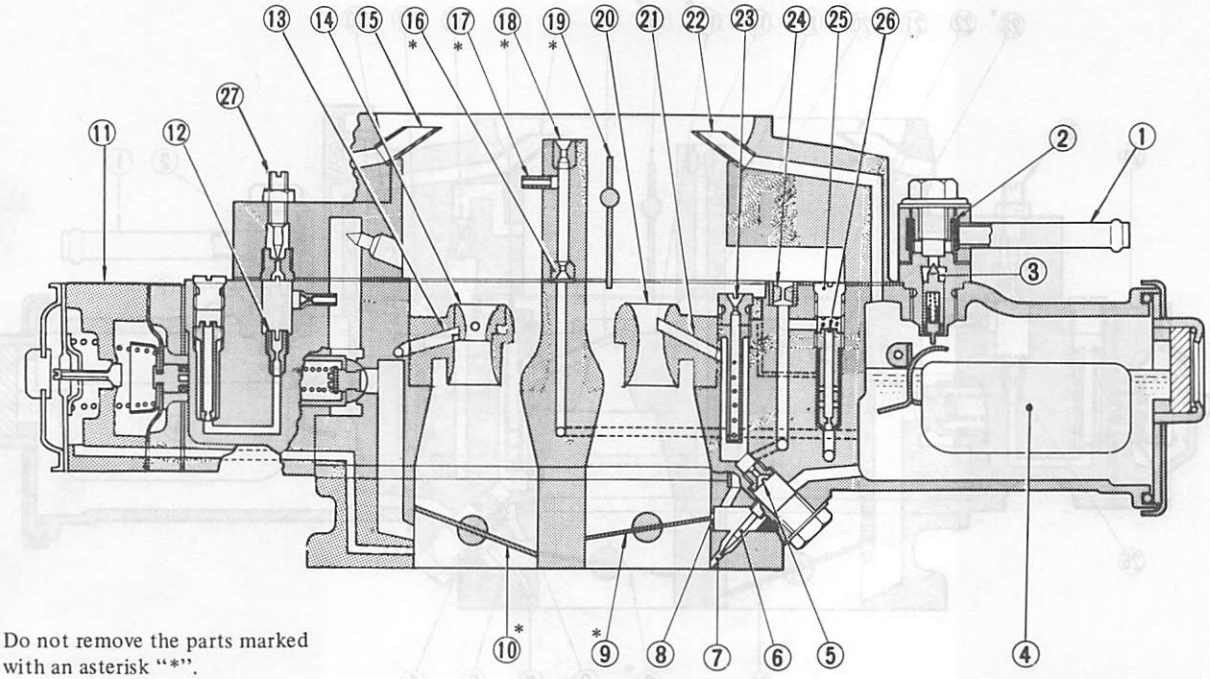
Note: Do not remove the parts marked with an asterisk "*".

1 Fuel nipple
2 Fuel filter
3 Needle
4 Float
5 Primary main jet
6 Idle adjusting screw
7 Idle hole
8 Primary by-pass hole
9* Primary throttle valve
10 Primary slow jet
11 Plug
12 Primary slow air bleed
13 Primary main air bleed
14 Primary air vent pipe
15 Primary main nozzle
16* Choke valve
17* Primary small venturi
18* High speed enricher air bleed
19* High speed enricher nozzle
20* High speed enricher jet
21 Secondary air vent pipe
22 Secondary main nozzle
23* Secondary small venturi
24 B.C.D.D.
25* Secondary throttle valve
26 Coasting jet (for B.C.D.D.)
27 B.C.D.D. mixture adjusting screw

EF540A

Fig. EF-18 Carburetor (California models)

Non-California models



Note: Do not remove the parts marked with an asterisk "*".

1 Fuel nipple
2 Fuel filter
3 Needle
4 Float
5 Primary main jet
6 Idle adjusting screw
7 Idle hole
8 Primary by-pass hole
9* Primary throttle valve
10* Secondary throttle valve
11 B.C.D.D.
12 Coasting jet (for B.C.D.D.)
13 Secondary main nozzle
14 Secondary small venturi
15 Secondary air vent pipe
16* High speed enricher jet
17* High speed enricher nozzle
18* High speed enricher air bleed
19* Choke valve
20 Primary small venturi
21 Primary main nozzle
22 Air vent pipe
23 Primary main air bleed
24 Primary slow air bleed
25 Plug
26 Primary slow jet
27 B.C.D.D. mixture adjusting screw

EF983

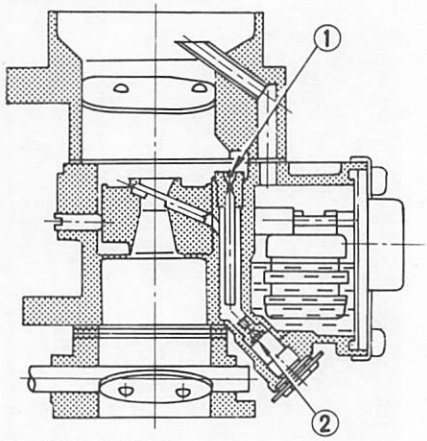
Fig. EF-19 Carburetor (Non-California models)

PRIMARY SYSTEM

Primary main system

Fuel flows as shown below through the main jet, mixing with air which comes in from the main air bleed and passes through the emulsion tube, and is pulled out into the venturi through the main nozzle.

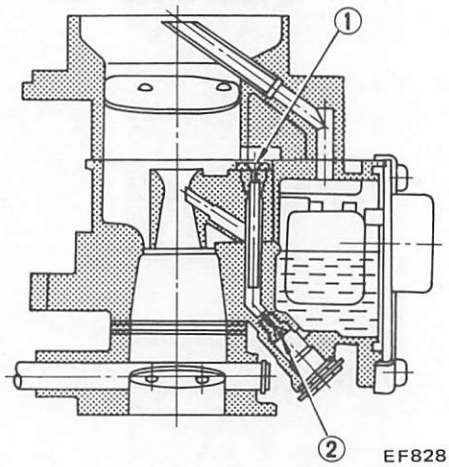
California models



1 Main air bleed
2 Main jet

EF890

Non-California models



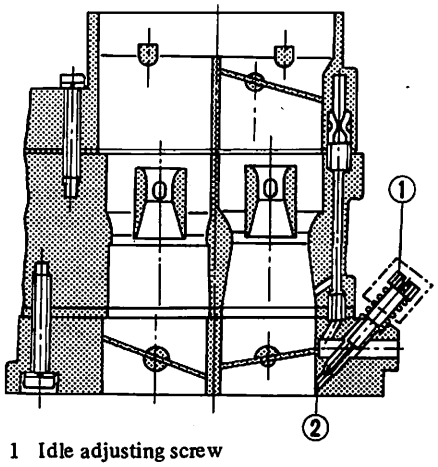
EF828

Fig. EF-20 Primary Main System

Idling and slow system

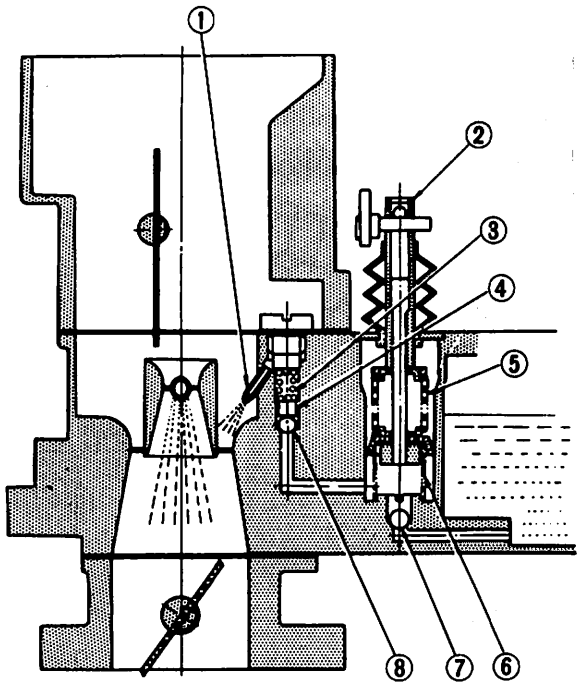
During low engine speed, as shown below, fuel flows through the slow jet located on rear right side of main nozzle, mixing with air coming from the slow economizer bleed, again mixing with air coming from the slow air bleed and then is pulled out into the engine through the idle hole and by-pass hole.

Slow economizer system obtains smooth deceleration at high speeds.



1 Idle adjusting screw
2 Idle hole EF769

Fig. EF-21 Slow System



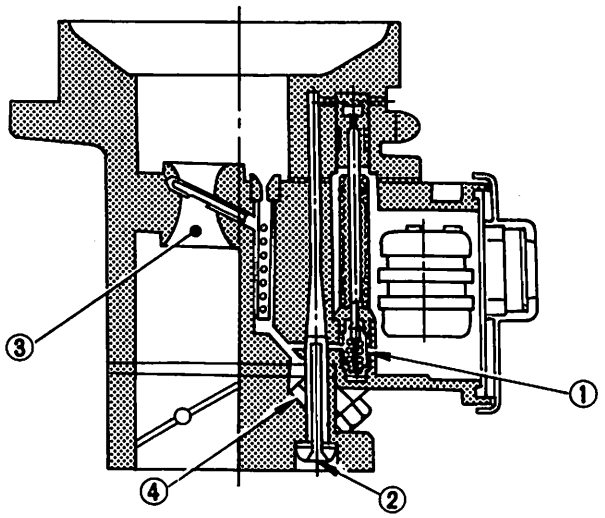
1 Pump injector
2 Piston
3 Weight
4 Spring
5 Damper spring
6 Piston return spring
7 Inlet valve
8 Outlet valve

ET023

Fig. EF-22 Accelerating Mechanism

Accelerating mechanism

The carburetor is equipped with the piston type accelerating mechanism linked to the throttle valve. When the primary throttle valve is closed, the piston goes up, and fuel flows from the float chamber through the inlet valve into the space under the piston. When the throttle valve is opened, the piston goes down, opening the outlet valve, and fuel is forced out through the injector. See Fig. EF-22.



1 Power valve
2 Vacuum take out port
3 Primary main nozzle
4 Main jet

Fig. EF-23 Power Valve Mechanism

Power valve mechanism

The power valve mechanism supplies additional fuel to primary main system during heavy load driving.

When the throttle valve is slightly opened during light load running, high vacuum is created in the intake manifold. This vacuum pulls the vacuum piston upward against the spring, leaving the power valve closed. When the vacuum below the throttle valve is lowered during full load or accelerating running, the spring pushes the vacuum piston downward, opening the power valve to furnish fuel. See Fig. EF-23.

SECONDARY SYSTEM

Secondary main system

When the primary throttle valve is wide open and engine produces high power, the secondary throttle valve begins to open by the diaphragm.

Fuel-air mixture produced by the functions of the main jet, main air bleed and emulsion tube, in the same manner as in the primary system, is pulled out through the main nozzle into the venturi.

The structure is almost the same as the primary main system.

Secondary switchover mechanism

The secondary throttle valve is linked to the diaphragm which is actuated by the vacuum created in the venturi. A vacuum port is provided at each of the primary and secondary venturis, and the composite vacuum of these ports actuates the diaphragm.

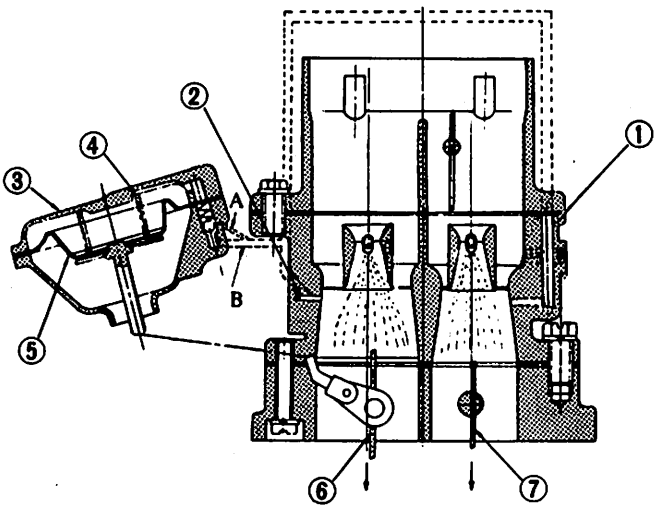
As the linkage causes the secondary throttle valve to close until the primary throttle valve opening reaches approximately 50°, fuel consumption during normal operation is not exces-

sive.

During high speed running, as the vacuum at the venturi is increased, the diaphragm is pulled against the diaphragm spring force, and then secondary throttle valve is opened.

The other side, during low speed running (as the primary throttle valve opening does not reach 50°), the secondary throttle valve is locked to close completely by the locking arm which is interlocked with primary throttle arm by linkage.

When the primary throttle valve opening reaches wider position than 50°, the secondary throttle valve is ready to open, because the locking arm revolves and leaves from the secondary throttle arm. See Fig. EF-24.



1 Primary vacuum port
2 Secondary vacuum port
3 Diaphragm chamber cover
4 Diaphragm spring
5 Diaphragm
6 Secondary throttle valve
7 Primary throttle valve

EF512

Fig. EF-24 Full Throttle at High Speed

Secondary slow system (Step system)

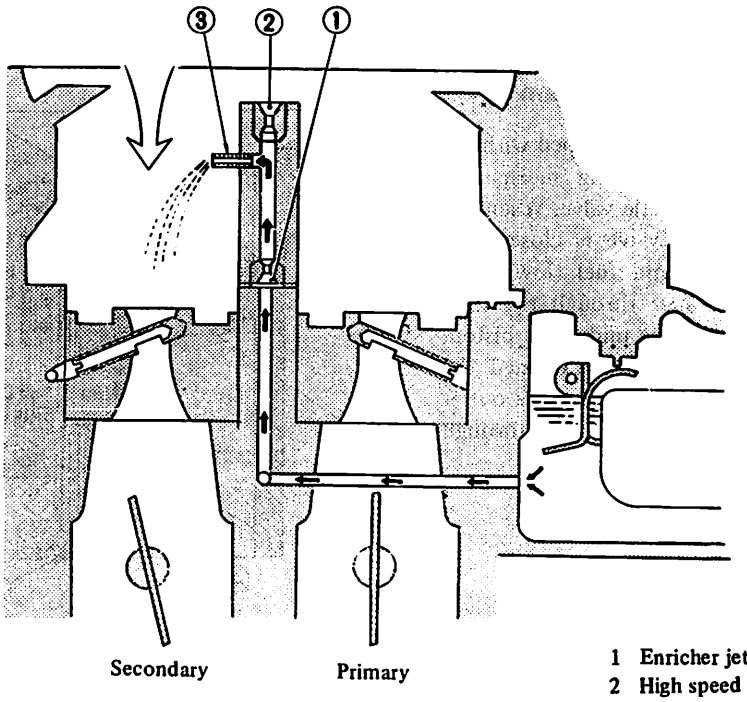
The construction of this system may correspond to the idling and slow system of the primary system.

This system aims at the proper filling up of the gap when fuel supply is transferred from the primary system to the secondary system. The step port is located near the secondary throttle valve edge in its fully closed state.

High speed enricher

The high speed enricher improves high engine output performance during high speed driving.

This enricher operates only when driving at high speed. It consists of an enricher jet, high speed enricher air bleed, and enricher nozzle. When the velocity of suction air flowing through the carburetor secondary bore increases, additional fuel is drawn out of the enricher nozzle. See Fig. EF-25.



EF234

1 Enricher jet
2 High speed enricher air bleed
3 Enricher nozzle

Fig. EF-25 High Speed Enricher

FLOAT SYSTEM

There is only one float chamber, while two carburetor systems, primary and secondary, are provided.

Fuel fed from the fuel pump flows through the filter and needle valve into the float chamber. A constant fuel level is maintained by the float and needle valve.

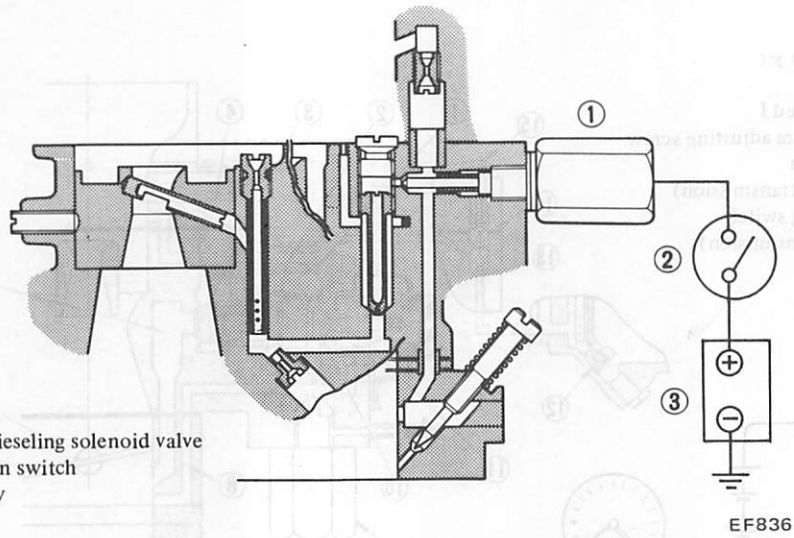
Because of the inner air vent type of the float chamber ventilation, the fuel consumption will not be influenced by some dirt accumulated in the air cleaner.

The needle valve includes special hard needle and will not wear for all its considerably long use. Besides, the insertion of a spring will prevent the flooding at rough road running.

ANTI-DIESELING SYSTEM

The carburetor is equipped with an anti-dieseling solenoid valve. As the ignition switch is turned off, the valve is brought into operation, shutting off the supply of fuel to the slow circuit.

The following figure shows a sectional view of this control. See Fig. EF-26.



1 Anti-dieseling solenoid valve
2 Ignition switch
3 Battery

Fig. EF-26 Anti-Dieseling System

BOOST CONTROLLED DECELERATION DEVICE (B.C.D.D.)

A Boost Controlled Deceleration Device (B.C.D.D.) serves to reduce the hydrocarbons (HC) emitted from engine during coasting.

The high manifold vacuum during coasting prevents the mixture from complete combustion because of the reduced amount of mixture per cylinder per rotation of engine, with the result that a large amount of hydrocarbons is emitted into the atmosphere.

The B.C.D.D. has been designed to correct this problem.

It operates as follows: when the manifold vacuum exceeds a predetermined value, the B.C.D.D. introduces an additional mixture of optimum mixture ratio and quantity into the manifold by opening a separate mixture passage in the carburetor. Complete combustion of fuel is assisted by this additional mixture, and the amount of HC contained in exhaust gases is substantially reduced.

On California models, the vacuum control valve is separated from the carburetor body. And the altitude compensator for the operating pressure of B.C.D.D. is installed.

On non-California models, the B.C.D.D. is installed on the side face of the carburetor body and a solenoid valve is added except for Canada models. See Figs. EF-27 and EF-28.

B.C.D.D. operation

Diaphragm I ⑪ monitors the manifold vacuum and, when the vacuum exceeds a pre-determined value, acts so as to open the vacuum control valve ⑩. This causes the manifold vacuum to be introduced into the second vacuum chamber and actuates diaphragm II②.

When diaphragm II operates, the mixture control valve ③ opens the passage and introduces the additional mixture into the manifold.

The amount of the mixture is controlled by the servo-action of the mixture control valve ③ and vacuum control valve ⑩ so that the manifold vacuum may be kept at the predetermined value.

The amount of mixture depends mainly upon the coasting air bleed II④, while the mixture ratio is determined by the coasting jet ⑬ and coasting air bleed I ⑭. See Fig. EF-27.

B.C.D.D. solenoid valve operation (Non-California models except Canada)

Manual transmission models:

The B.C.D.D. solenoid valve is controlled by a speed detecting switch that is actuated by the speedometer needle.

As the car speed falls below 16 km/h (10 MPH) this switch is activated, producing a signal. This signal actuates the amplifier to open the vacuum control solenoid valve.

Automatic transmission models:

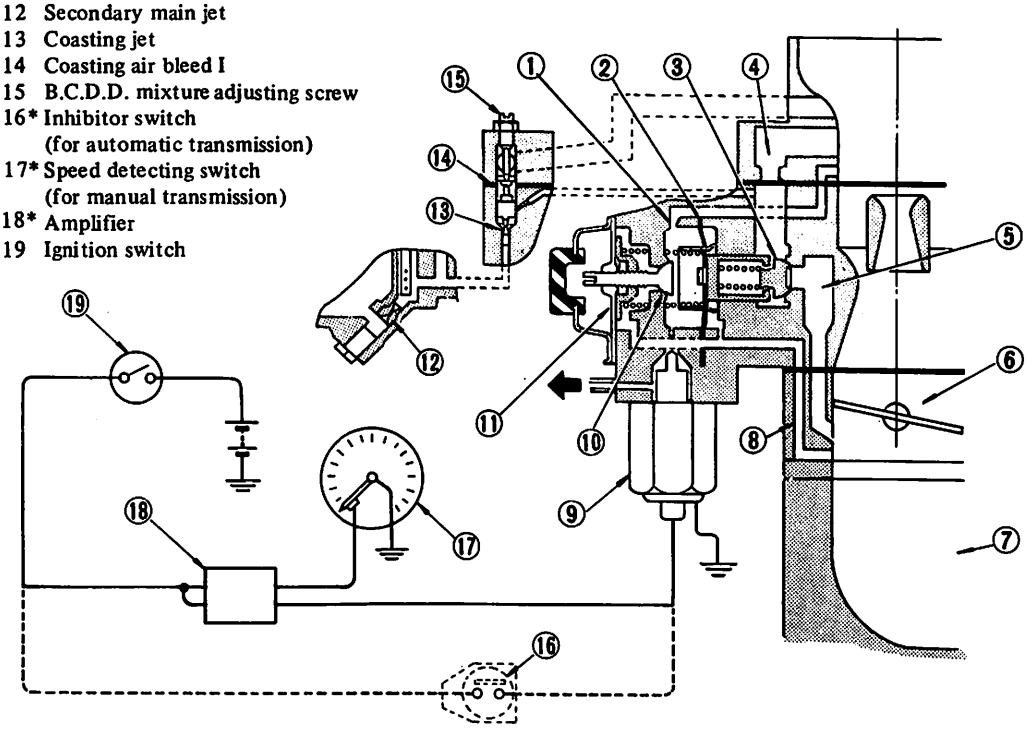
When the shift lever is in "N" or "P" position, the inhibitor switch mounted on the transmission turns on to open the vacuum control solenoid valve.

Non-California models

1 Air jet
2 Diaphragm II
3 Mixture control valve
4 Coasting air bleed II
5 Mixture air passage
6 Secondary barrel
7 Intake manifold
8 Vacuum passage
9* B.C.D.D. solenoid valve
10 Vacuum control valve
11 Diaphragm I

* Except for Canada

12 Secondary main jet
13 Coasting jet
14 Coasting air bleed I
15 B.C.D.D. mixture adjusting screw
16* Inhibitor switch
(for automatic transmission)
17* Speed detecting switch
(for manual transmission)
18* Amplifier
19 Ignition switch

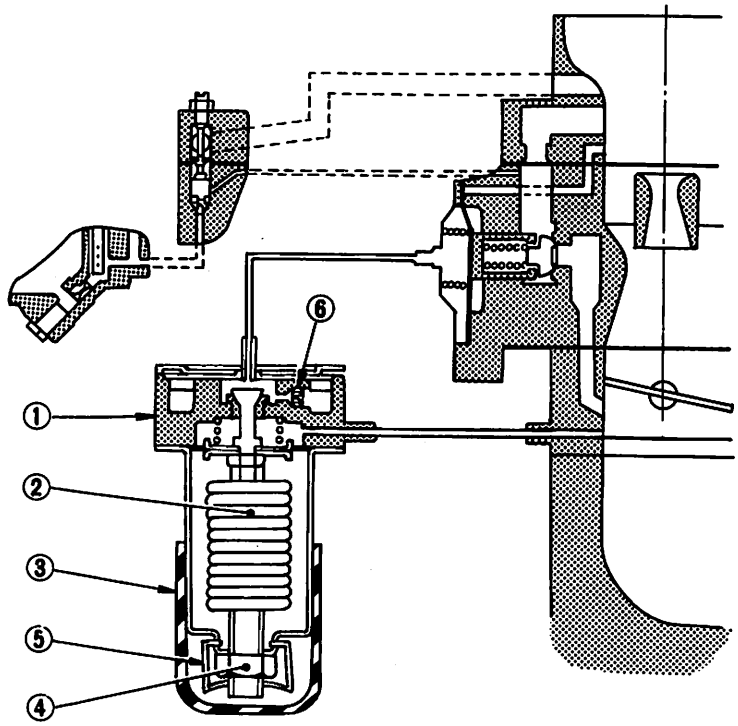


Note: Broken line applies only to Automatic Transmission.

EF984

Fig. EF-27 B.C.D.D. (Non-California models)

California models



1 Vacuum control valve assembly
2 Bellows
2 Rubber cap
4 Adjusting nut
5 Retaining spring
6 Orifice

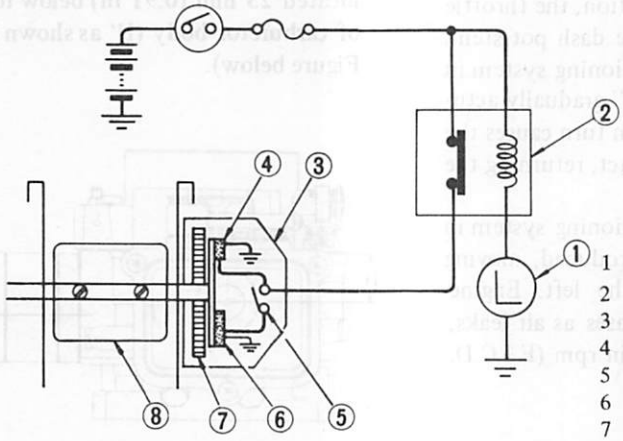
EF985

Fig. EF-28 B.C.D.D. (California models)

ELECTRIC AUTOMATIC CHOKE

An electric heater warms a bi-metal interconnected to the choke valve, and controls the position of the choke valve and throttle valve in accordance with the time elapsed, the warm-up condition of the engine, and the outside ambient temperature.

The construction and function of each part of this carburetor are as follows (See Fig. EF-29.):



1 Alternator "L" terminal
2 Automatic-choke relay
3 Automatic-choke cover
4 P.T.C. heater (A)
5 Bi-metal switch
6 P.T.C. heater (B)
7 Bi-metal
8 Choke valve

Fig. EF-29 Electric Automatic Choke Heater

1. Electric heater.

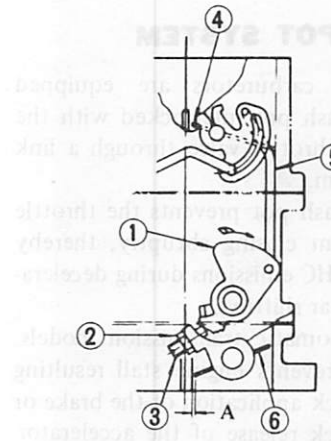
The double stage heating system is provided to obtain an optimum heating capacity. This system consists of a first and second stage heater. The first stage heater (A) always operates to heat the bi-metal during the time when electric current flows through the auto-choke circuit, and in addition to the first stage operation, the second stage heater (B) begins to operate when the bi-metal temperature reaches to the level of about 10°C (50°F) so that the choke valve opens more early. This operation of the second stage heater is controlled by a thermo switch attached to the bi-metal.

2. Bi-metal

Electric current flows through the heater as the engine starts, and warms the bi-metal. The deflection of the bi-metal is transmitted to the choke valve through the choke valve lever.

3. Fast idle cam

The fast idle cam determines the opening of the throttle valve so that the proper amount of mixture corresponding to the opening of the choke valve will be obtained. The opening of the choke valve is dependent upon the warm-up condition of the engine.



1 Fast idle cam
2 Nut
3 Fast idle screw
4 Choke valve
5 Choke connecting rod
6 Throttle valve

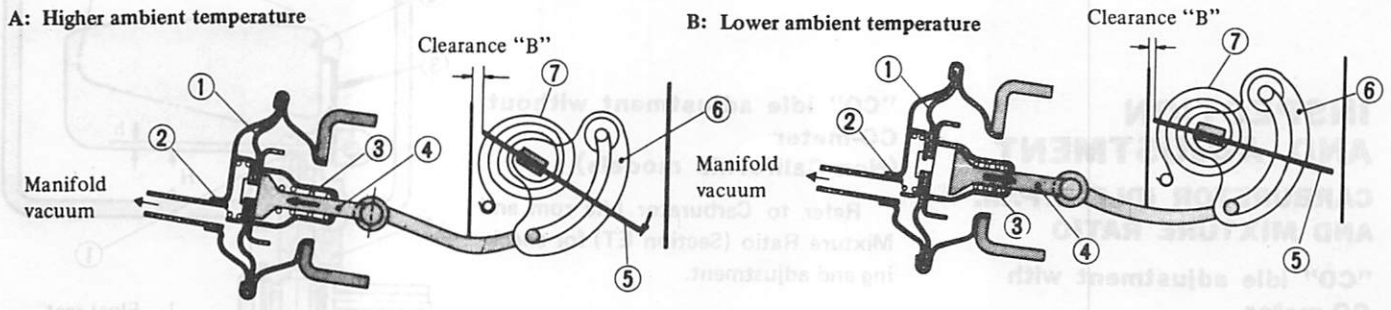
Fig. EF-30 Fast Idle System

4. Choke unloader

When accelerating the engine during the warm-up period, that is, before the choke valve opens sufficiently, this unloader forces the choke valve open a little so as to obtain an adequate air-fuel mixture.

5. Vacuum break diaphragm

After the engine has been started by cranking, this diaphragm forces the choke valve open to the predetermined extent so as to provide the proper air-fuel ratio. A two stage acting type vacuum diaphragm is employed.



1 Diaphragm
2 Spring I
3 Spring II
4 Rod
5 Choke valve
6 Plate
7 Bi-metal

Fig. EF-31 Electric Automatic Choke

6. Bi-metal case index mark

The bi-metal case index mark is used for setting the moment of the bi-metal which controls the air-fuel mixture ratio required for starting.

DASH POT SYSTEM

These carburetors are equipped with a dash pot interlocked with the primary throttle valve through a link mechanism.

The dash pot prevents the throttle valve from closing abruptly, thereby reducing HC emissions during deceleration or gear shifting.

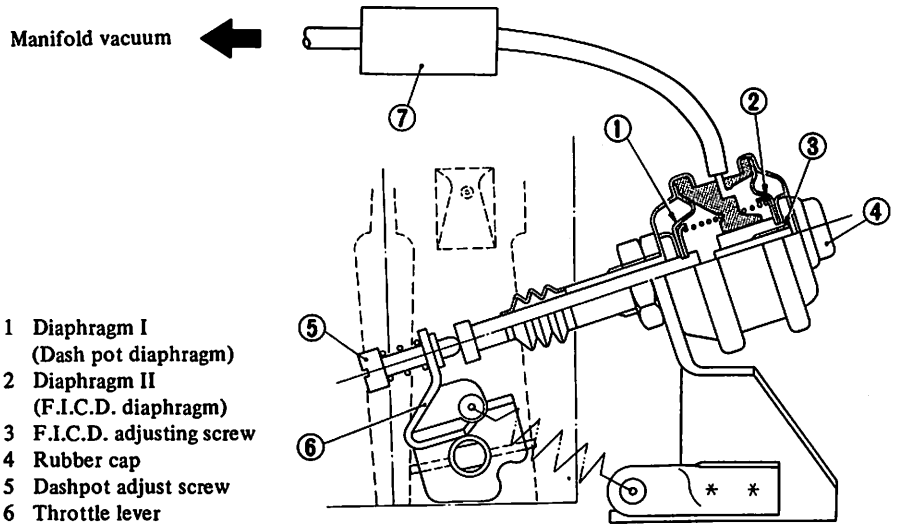
In automatic transmission models, it also prevents engine stall resulting from quick application of the brake or from quick release of the accelerator pedal after it has been tread upon slightly.

On models equipped with an air conditioning system, the dash pot is a combination type which also serves as an F.I.C.D. actuator. See Fig. EF-32.

When the accelerator pedal is released during deceleration, the throttle valve lever taps on the dash pot stem.

With the air conditioning system in "OFF", diaphragm "I" gradually actuates as air leaks. This in turn causes the dash pot stem to retract, returning the engine to idling speed.

With the air conditioning system in "ON", vacuum is introduced, moving diaphragm "II" to the left. Engine speed gradually decreases as air leaks, and is held at a certain rpm (F.I.C.D. set revolution).



1 Diaphragm I (Dash pot diaphragm)
2 Diaphragm II (F.I.C.D. diaphragm)
3 F.I.C.D. adjusting screw
4 Rubber cap
5 Dashpot adjust screw
6 Throttle lever
7 F.I.C.D. vacuum solenoid valve

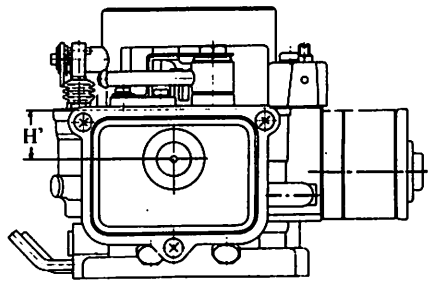
EF986

Fig. EF-32 Dash Pot (for air conditioner equipped models)

FUEL LEVEL

1. With engine idling, visually check fuel level through sight window of float chamber. Fuel level is correct if it is at the indicator point.

Note: Fuel level indicator point is located 23 mm (0.91 in) below top of carburetor body (H' as shown in Figure below).



EF260

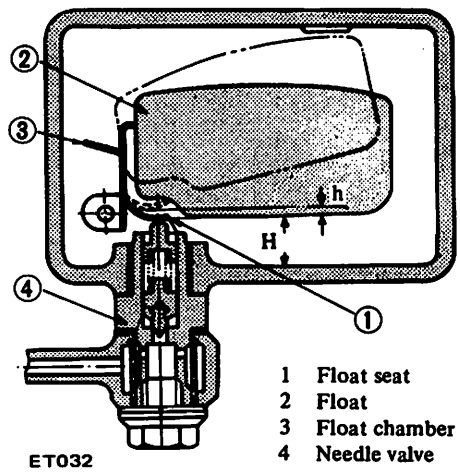
Fig. EF-33 Checking Fuel Level

To adjust fuel level, proceed as follows:

2. Remove level gauge cover.
3. Turn down float chamber to allow float to come into contact with needle valve, and measure "H" shown below.

When "H" is approximately 7.2 mm (0.283 in), top float position is correct.

The top float position can be adjusted by bending float seat.



1 Float seat
2 Float
3 Float chamber
4 Needle valve

ET032

Fig. EF-34 Adjusting Float Level

INSPECTION AND ADJUSTMENT

CARBURETOR IDLE-R.P.M. AND MIXTURE RATIO

"CO" idle adjustment with CO-meter

Refer to Carburetor Idle rpm and Mixture Ratio (Section ET) for checking and adjustment.

"CO" idle adjustment without CO-meter (Non-California models)

Refer to Carburetor Idle rpm and Mixture Ratio (Section ET) for checking and adjustment.

Idle limiter cap

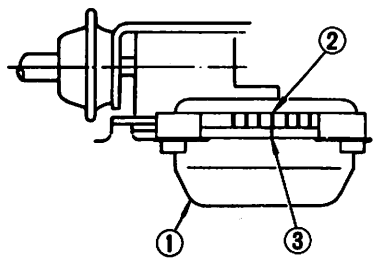
Refer to Idle Limiter Cap (Section ET) for checking and adjustment.

4. Adjust bottom float position so that clearance "h" between float seat and needle valve stem is 1.3 to 1.7 mm (0.051 to 0.067 in) when float is fully raised. Bend float stopper as required.
5. Install level gauge cover.
6. After adjustments in steps 3 and 4 above have been made, make sure that when fuel is delivered to the float chamber, the fuel level is maintained within the specified value H'.

AUTOMATIC CHOKE MECHANISM

1. Before starting engine, fully depress accelerator pedal to ensure that choke valve closes properly.
2. Push choke valve with a finger, and check for binding.
3. Check to be sure that bi-metal cover index mark is set at the center of choke housing index mark as shown below.

Note: Do not set bi-metal cover index mark at any position except the center of choke housing index mark.



1 Thermostat cover (Bi-metal chamber)
2 Thermostat housing
3 Groove

ET034

Fig. EF-35 Bi-Metal Setting

4. Check automatic choke heater source wiring for proper connection, then start engine.
5. After warming up the engine, see that choke valve is fully open.
6. If automatic choke heater source wiring is normal and choke valve does not operate after warm-up, replace bi-metal cover.

AUTOMATIC CHOKE HEATER CIRCUIT

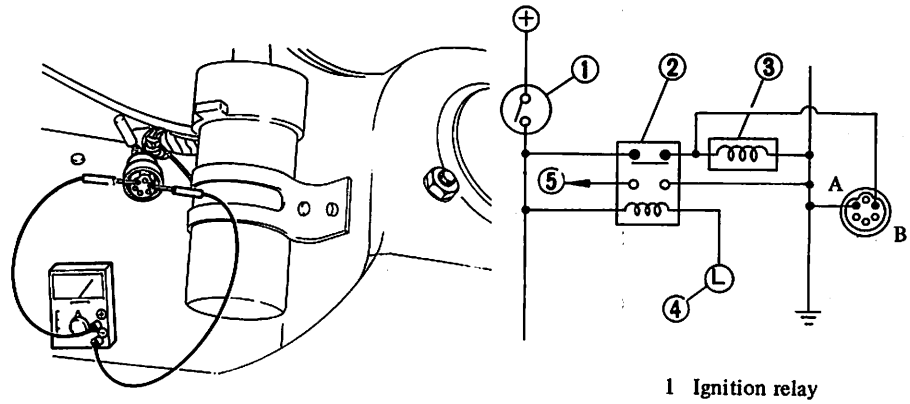
Checking heater circuit with function connector

CAUTION:
Do not attach test leads of a circuit tester to those other than designated.

1. With engine not running, check for continuity between A and B as shown in Figure below.
- If continuity exists, heater is functioning properly.
- If continuity does not exist, check for disconnected connector or open P.T.C. heater circuit.

2. With engine running at idle, check for presence of voltage across A and B as shown in Figure below.
- If voltmeter reading is 12 volts (d-c), heater circuit is functioning properly.
- If voltmeter reading is zero, check for disconnected connector, open circuit, or faulty automatic choke relay.

3. Replace faulty parts.



1 Ignition relay
2 Automatic choke relay
Engine stops: OFF
Engine starts: ON
3 Automatic choke heater
4 Alternator
5 To brake warning lamp

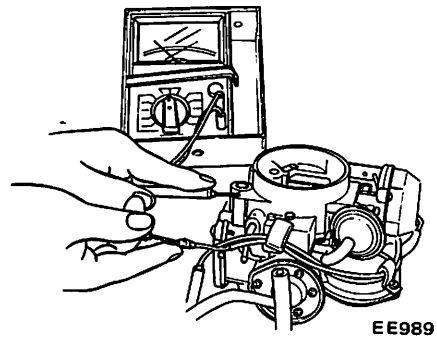
EF133A

Fig. EF-36 Checking Automatic Choke Heater Circuit

AUTOMATIC CHOKE HEATER

1. Measure resistance of choke heater as shown in Figure below.

Resistance of choke heater:
3.7 to 8.9 ohms



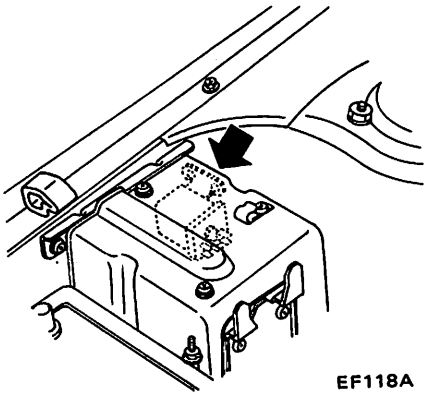
EE989

Fig. EF-37 Automatic Choke Heater Check

2. If measured value is not within the specification, replace bi-metal cover with auto-choke heater.

AUTOMATIC CHOKE RELAY

1. Remove automatic choke relay. The relay is located in the relay bracket.



EF118A

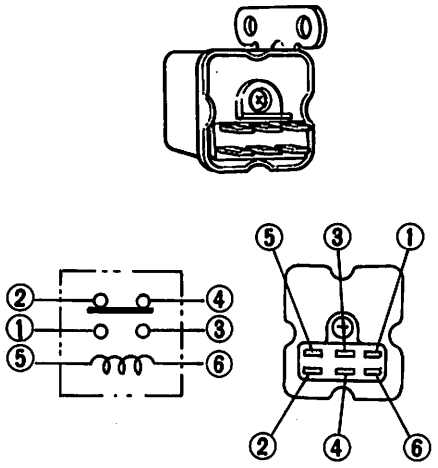
Fig. EF-38 Automatic Choke Relay

2. Make an operational check of automatic choke relay as shown in Figure below.

Check that continuity exists between terminals "②" and "④" when no voltage is applied across them.

Apply 12 volts (d-c) across terminals "⑤" and "⑥" to ensure that continuity does not exist between terminals "②" and "④".

If results satisfy the above, automatic choke relay is functioning properly; if not, replace choke relay.

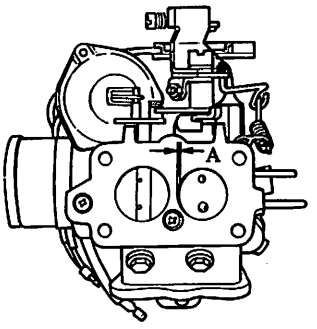


EF119A

Fig. EF-39 Checking Automatic Choke Relay

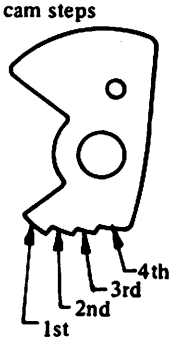
FAST IDLE

1. With carburetor assembly removed from engine, measure throttle valve clearance "A" with a wire gauge, placing the upper side of fast idling screw on the first step on the fast idling cam.



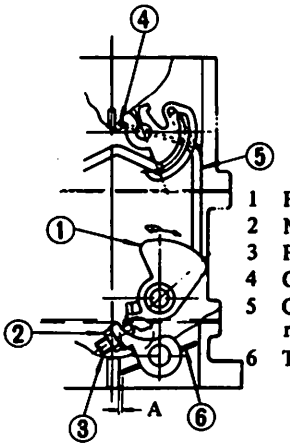
EF109A

Fast idling cam steps



EC528

Fig. EF-40 Measuring Throttle Valve Clearance



ET033

Fig. EF-41 Adjusting Clearance of Throttle Valve

2. The clearance should be specified value in the following table. If not, adjust the clearance by turning fast idling screw.

3. To check fast idling cam setting by engine speed, proceed as follows:

Warm up engine sufficiently. Set fast idling cam at 2nd step and read engine speed. Fast idling cam is properly set, if engine speed is within specifications below.

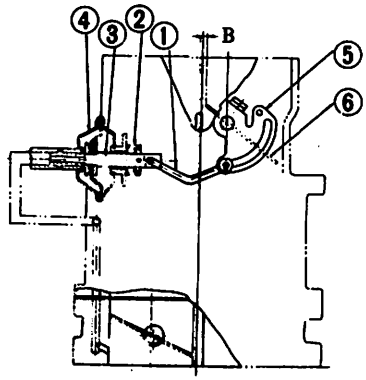
Clearance A in second step is reference value.

Cam step		Clearance "A" mm (in)	Engine speed rpm
M/T	1st	1.33 to 1.47 (0.0524 to 0.0579)	–
	2nd	0.94 to 1.18 (0.0370 to 0.0465)	1,900 to 2,800
A/T	1st	1.58 to 1.72 (0.0622 to 0.0677)	–
	2nd	1.16 to 1.40 (0.0457 to 0.0551)	2,200 to 3,200 ("N" position)

(Fast idling cam 1st step)

VACUUM BREAK

1. Close choke valve completely.
2. Hold choke valve by stretching a rubber band between vacuum break lever and stationary part of carburetor.
3. Push vacuum break stem with pliers, and pull fully straight.
4. Under this condition, adjust gap (shown at "B" in illustration) between choke valve and carburetor body.



1 Vacuum break rod
2 Choke spring
3 Vacuum break piston
4 Diaphragm cover
5 Vacuum break lever
6 Choke valve

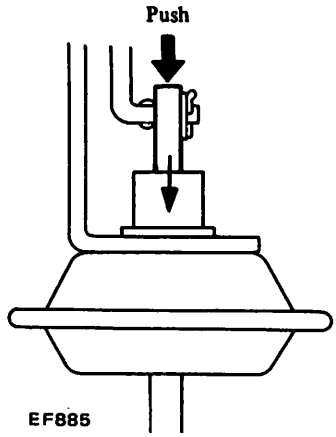


Fig. EF-42 Checking Vacuum Break

Choke valve to carburetor body clearance (Vacuum break) B:
California models
B = 2.20 to 2.70 mm (0.0866 to 0.1063 in)
Non-California models except Canada
B = 2.51 to 3.01 mm (0.0988 to 0.1185 in)
Canada models
B = 1.65 to 2.15 mm (0.0650 to 0.0846 in)

Note: Clearance B should be measured at room temperature.

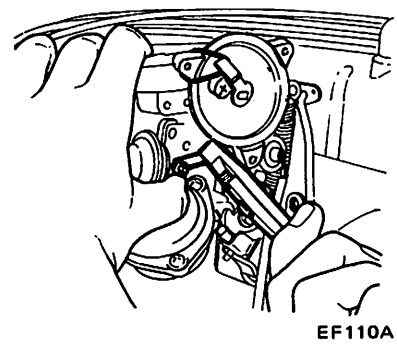


Fig. EF-43 Adjusting Vacuum Break Rod

CHOKE UNLOADER

1. Close choke valve completely.
2. Hold choke valve by stretching a rubber band between vacuum break lever and stationary part of carburetor.
3. Pull throttle lever until full open.

Under this condition, adjust clearance between choke valve and carburetor body to the specification by bending unloader tongue.

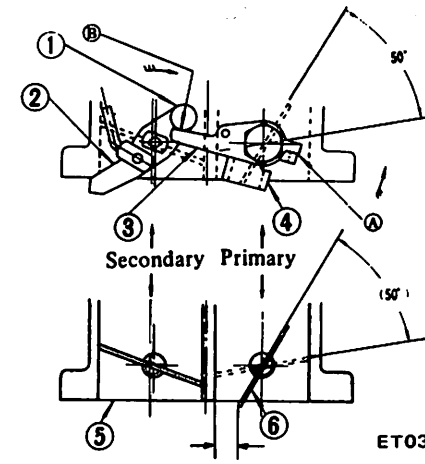
Choke valve to carburetor body clearance (Choke unloader):
B = 2.05 to 2.85 mm (0.0807 to 0.1122 in)

Note: Make sure that throttle valve opens when carburetor is mounted on the car.
If throttle valve fails to open, unloader becomes inoperative, resulting in poor acceleration just after engine is started.

INTERLOCK OPENING OF PRIMARY AND SECONDARY THROTTLE VALVE

Fig. EF-44 shows primary throttle valve opened 50°. When primary throttle valve is opened 50° the adjust plate integrated with throttle valve is in contact with return plate at Ⓐ.

When throttle valve is opened further, locking arm Ⓑ is detached from secondary throttle arm, permitting secondary system to start operation.



7.38 mm (0.2906 in)

1 Roller
2 Connecting lever
3 Return plate
4 Adjust plate
5 Throttle chamber
6 Throttle valve

Fig. EF-44 Adjusting Interlock Opening

Linkage between primary and secondary throttles will function properly if distance between throttle valve and inner wall of throttle chamber is 7.38 mm (0.2906 in).

Adjustment is made by bending connecting link.

DASH POT

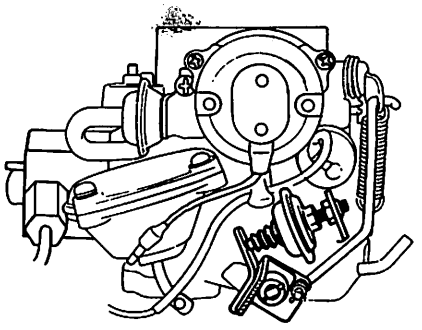
Note: Check dash pot with air conditioning system (if equipped) "OFF".

1. Idling speed of engine and mixture must be well tuned up and engine sufficiently warm.
2. Turn throttle valve by hand, and read engine speed when dash pot just touches stopper lever.
3. Adjust position of dash pot by adjusting screw until engine speed is in the specified range.

Specified engine speed:
Manual transmission
1,900 to 2,100 rpm
Automatic transmission
1,650 to 1,850 rpm

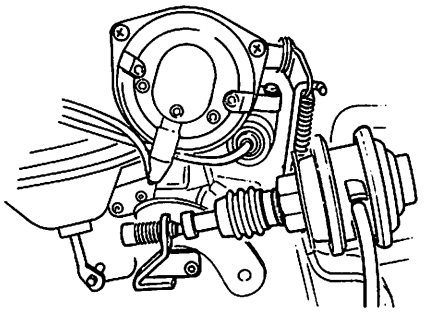
Note: Location of adjusting screws differs between models equipped with air conditioning system and those without it. Refer to Fig. EF-45 and adjust adjusting screw.

Models not equipped with air conditioner



EF111A

Air conditioner equipped models



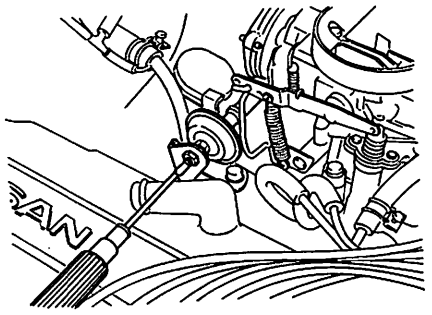
EF992

Fig. EF-45 Adjusting Dash Pot

4. Tighten lock nuts.
(Models not equipped with air conditioner)
5. Make sure that engine speed drops smoothly from 2,000 to 1,000 rpm in about three seconds.

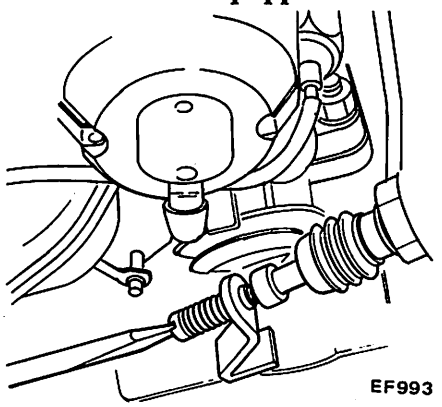
Note: For adjustment of F.I.C.D., refer to Section AC.

Models not equipped with air conditioner



EF112A

Air conditioner equipped models



EF993

Fig. EF-46 Adjusting Dash Pot

ACCELERATING PUMP

1. Visually inspect accelerating pump cover for any sign of fuel leaks.
2. If fuel leaks are found, check gasket, and replace if necessary.
3. Turn throttle valve by hand; make sure fuel is injected through injector nozzle.

Note: To check for fuel injection, peep into nozzle from upper side while directing flashlight beam toward primary barrel.

ANTI-DIESELING SOLENOID VALVE

Check this valve if engine continues to turn over after ignition switch has been turned off or if engine does not continue to run at idle.

1. Disconnect anti-dieseling solenoid connector to see if engine stops. If it does not, replace anti-dieseling solenoid valve assembly.
2. Make sure 12-volt d-c power is applied at harness side when ignition switch is turned on. If it is not, check harness.
If harness is in good condition, replace solenoid valve as a unit.

Ⓣ Tightening torque:
Anti-dieseling solenoid valve
1.8 to 3.5 kg-m
(13 to 25 ft-lb)

Note: After replacement, start engine and check to be sure that fuel is not leaking, and that anti-dieseling solenoid is in good condition.

B.C.D.D. OPERATING PRESSURE

Generally, it is unnecessary to adjust the B.C.D.D., however, if it should become necessary to adjust it, the procedure is as follows:

Note: This adjustment should be carried out with the automatic transmission lever in the "N" position.

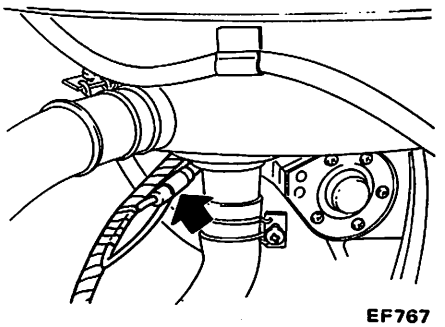
Prepare the following tools

1. Tachometer to measure the engine speed while idling.
2. A vacuum gauge and connecting pipe.

Note: A quick-response type boost gauge such as Bourdon's type is recommended; a mercury-type manometer should not be used.

1. Disconnect the harness of B.C.D.D. solenoid valve (Non-California models except Canada).

Note: Be sure to reconnect harness of solenoid after inspection or adjustment is completed.



EF767

Fig. EF-47 Disconnecting Harness of B.C.D.D. Solenoid Valve (Non-California models except Canada)

2. Connect rubber hose between vacuum gauge and intake manifold as shown.

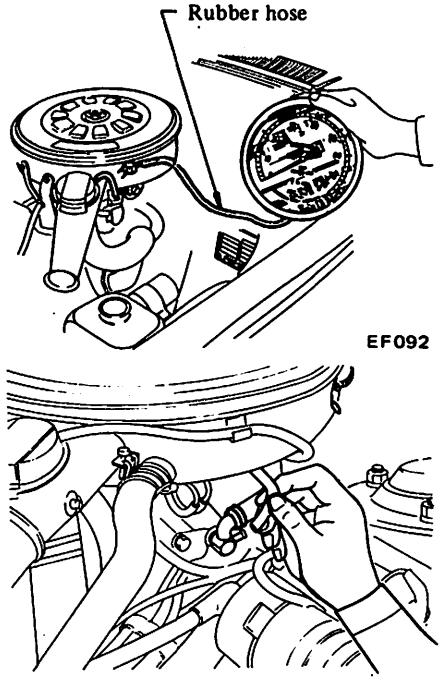


Fig. EF-48 Connecting Vacuum Gauge

3. Warm up the engine until it is heated to operating temperature.

Then adjust the engine at normal idling setting. (Refer to the Item "Idling Adjustment".)

4. Run the engine under no load. Increase engine speed to 3,000 to 3,500 rpm, then quickly close throttle valve.

5. At that time, the manifold vacuum pressure will change as follows:

1) It will abruptly rise up to −600 mmHg (−23.62 inHg) or above.
2) It will decrease gradually to a certain level and stay there for a while. This is so called operating pressure.
3) In most cases, it will drop to idling pressure.

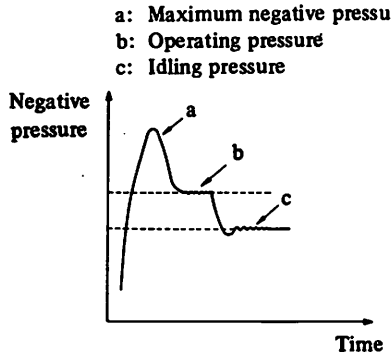


Fig. EF-49 Characteristic Curve of B.C.D.D.

6. Check that the B.C.D.D. operating pressure is within the specified range.

B.C.D.D. operating pressure
[0 m, sea level and 760 mmHg (29.9 inHg), atmospheric pressure]:
California models
−570 ±20 mmHg
(−22.44 ±0.79 inHg)
Non-California models
(Except Canada)
−550 ±20 mmHg
(−21.65 ±0.79 inHg)
Canada models
−560 ±20 mmHg
(−22.05 ±0.79 inHg)

Note: In California models, the operating pressure varies in proportion to altitude.
When atmospheric pressure is known, operating pressure will be found by tracing the arrow line "A". See Fig. EF-51. When altitude is known, operating pressure will be found by tracing the arrow line "B". See Fig. EF-51. For example, if the car is located at an altitude of 1,000 m (3,280 ft), the specified operating pressure for B.C.D.D. is −510 mmHg (−20.08 inHg).

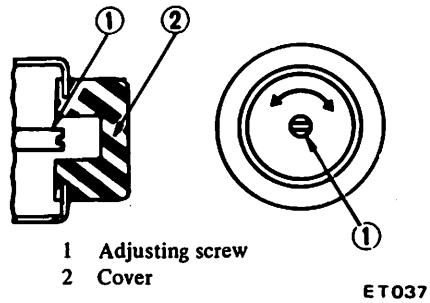
7.
(1) If it is lower than the specified level, turn the adjusting screw or nut in the following direction until correct adjustment is made.

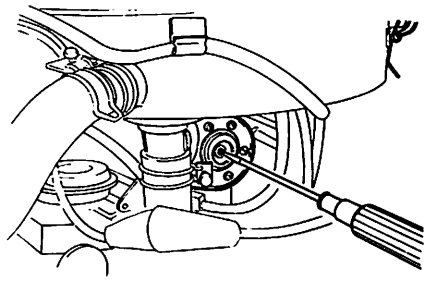
Non-California models:
Adjusting screw
Counterclockwise
California models:
Adjusting nut
Clockwise

(2) If it is higher than the specified level, turn the adjusting screw or nut in the following direction until correct adjustment is made.

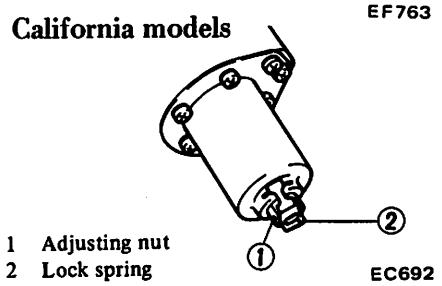
Non-California models:
Adjusting screw
Clockwise
California models:
Adjusting nut
Counterclockwise

Non-California models





California models



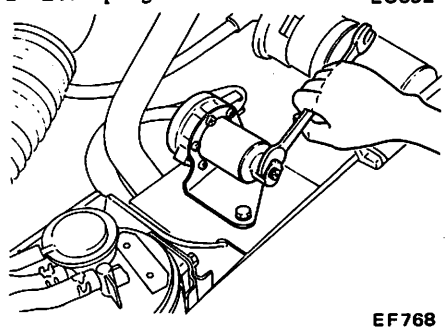


Fig. EF-50 Adjusting Operating Pressure

Note: When adjusting B.C.D.D. for California models, turn adjusting nut in or out with lock spring in place. Always set lock spring properly to prevent changes in operating pressure.

8. Race the engine and check for adjustment.
9. If it is lower than the set level, turn the adjusting screw or nut until correct adjustment is made.
10. Race the engine and check for adjustment.

If engine speed cannot be decreased to idling when checking B.C.D.D. operating pressure of non-California

models except Canada, proceed as follows.

11.
(1) Turn adjusting screw counterclockwise so that B.C.D.D. operating pressure is on high vacuum side, 25 mmHg (0.98 inHg) away from the specified value.
(2) Turn adjusting screw ¼ of a turn clockwise so that B.C.D.D. operating pressure drops by 25 mmHg (0.98 inHg).

If B.C.D.D. operating pressure cannot be observed clearly even in step 11(1), proceed as follows.

12.
(1) Turn adjusting screw counterclockwise so that B.C.D.D. operating pressure is on the high vacuum side, 50 mmHg (1.97 inHg) away from the specified valve.
(2) Turn the adjusting screw ½ of a turn clockwise.

Note: The B.C.D.D. operating pressure should be correctly set within the specified range after the above adjustments, even if the engine speed cannot be decreased to idling.

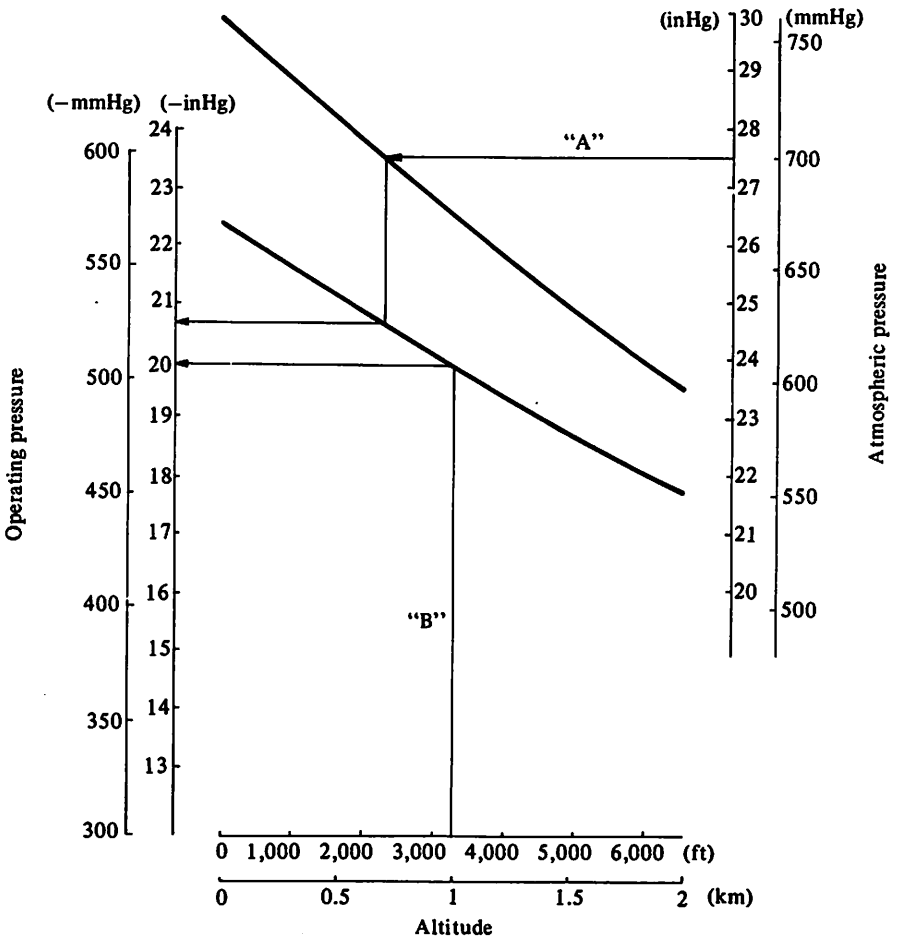


Fig. EF-51 Changes in Operating Pressure versus Changes in Atmospheric Pressure and Altitude (California models)

B.C.D.D. SOLENOID CONTROL CIRCUIT (Non-California models)

CAUTION:
Do not attach test leads of circuit tester to those other than designated. See Fig. EF-52.

Manual transmission models

1. Check for voltage across A and B when car is brought to a complete stop.

B.C.D.D. circuit is functioning properly if the voltmeter reading is 12 volt (d-c).

If voltage does not exist, check for disconnected connector and/or faulty amplifier, speed detecting switch or B.C.D.D. solenoid valve.

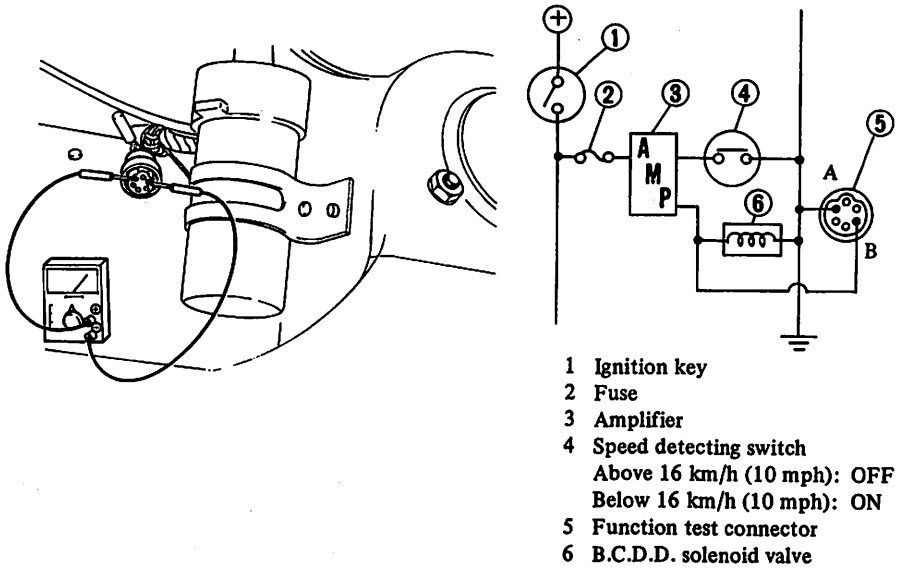
Note: Pay attention to use only volt range or the amplifier get damaged.

2. Check for presence of voltage across A and B [at a speed of more than 16 km/h* (10 MPH)]. See Fig. EF-52.

* Conduct this test by one of the following two methods.

1) Raising up rear axle housing with stand.
2) Chassis dynamometer test
- If voltmeter reading is 0 volt at a speed of more than 16 km/h (10 MPH), circuit is functioning properly.
- If voltmeter reading is not 0 volt, the amplifier may be damaged.

3. If, by above checks, faulty part or unit is located, it should be removed and tested again. If necessary, replace.



1 Ignition key
2 Fuse
3 Amplifier
4 Speed detecting switch
Above 16 km/h (10 mph): OFF
Below 16 km/h (10 mph): ON
5 Function test connector
6 B.C.D.D. solenoid valve

EF019A

Fig. EF-52 Checking B.C.D.D. for Manual Transmission

Automatic transmission models

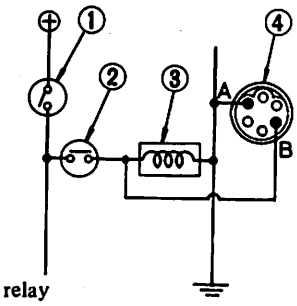
1. With inhibitor switch "ON" ("N" or "P" position), check for presence of voltage across "A" and "B". See Fig. EF-53.

- If voltmeter reading is 12 volts (d-c), B.C.D.D. circuit is functioning properly.
- If voltmeter reading is zero, check for disconnected connector, faulty solenoid valve or inhibitor switch.

2. With inhibitor switch "OFF" ("1", "2", "D" or "R" position), check for resistance between "A" and "B". See Fig. EF-53.

- If ohmmeter reading is 25 ohms or below, circuit is functioning properly.
- If ohmmeter reading is 32 ohms or above, check for poor connection of connector, faulty B.C.D.D. solenoid valve or inhibitor relay.

3. If, by above checks, faulty part or unit is located, it should be removed and tested again. If necessary, replace.



1 Ignition relay
2 Inhibitor switch
N, P positions: ON
1, 2, D, R positions: OFF
3 B.C.D.D. solenoid valve
4 Function test connector

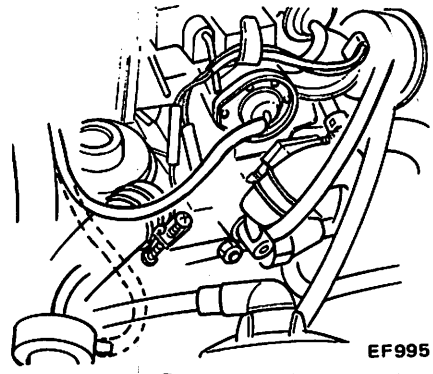
Fig. EF-53 Checking B.C.D.D. Circuit (For automatic transmission)

B.C.D.D. MIXTURE

As a general rule, it is not necessary to adjust the B.C.D.D. mixture. However, if it should become necessary to adjust it, the proceed as follows:

1. Shift gears into "N" position.
2. Warm up engine, and make sure engine idling speed and CO percentage are correct, referring to "Adjusting Carburetor Idle RPM and Mixture Ratio".
3. With A.I.S. air hose opening plugged at air check valve side, forcibly actuate B.C.D.D.

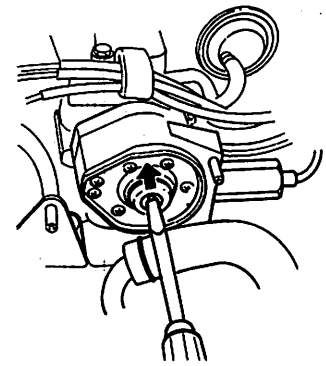
(1) On California models, disconnect vacuum hose from vacuum control valve and connect it to B.C.D.D. mixture control valve as shown in Figure below.



EF995

Fig. EF-54 Connecting Vacuum Hose of B.C.D.D. (California models)

(2) On non-California models, remove rubber cap from B.C.D.D. adjusting screw and directly depress adjusting screw with a screwdriver.



EF996

Fig. EF-55 Pushing B.C.D.D. Adjusting Screw

4. Measure CO percentage to see if it is within specified range.

B.C.D.D. mixture
CO percentage: 2.0 ±1%

5. If CO percentage is not within specifications, remove air cleaner.

Loosen B.C.D.D. mixture adjusting screw lock nut and turn adjusting screw located on upper side of carburetor to adjust it.

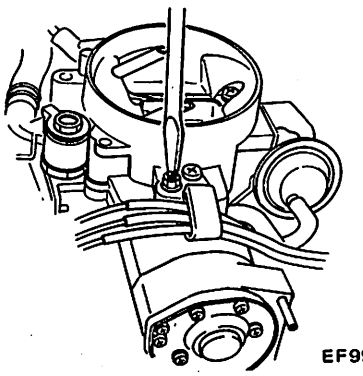


Fig. EF-56 Adjusting B.C.D.D. Mixture

(1) Turn adjusting screw counterclockwise to reduce CO percentage.
(2) Turn adjusting screw clockwise to increase CO percentage.

6. Temporarily install air cleaner and repeat steps 3 through 5 until correct CO percentage is obtained.
7. Tighten B.C.D.D. mixture adjusting screw lock nut.
8. Securely install air cleaner. Remove A.I.S. air hose plug and connect air hose to connector. Connect vacuum hoses to proper position.

MAJOR SERVICE OPERATION

The perfectly adjusted carburetor delivers the proper fuel and air ratios at all speeds for the particular engine for which it was designed. By completely disassembling which will allow cleaning of all parts and passages, the carburetor can be maintained its original condition and will continue to deliver the proper ratios.

To maintain accurate carburetion of passages and discharge holes, extreme care must be taken in cleaning.

CAUTION:
Use only carburetor solvent and compressed air to clean all passages and discharge holes. Never use wire or other pointed instrument to clean or carburetor calibration will be affected.

REMOVAL AND INSTALLATION

Remove carburetor from engine, taking sufficient care to the following:

CAUTION:
a. When disconnecting fuel lines, do not spill fuel from fuel pipe.
b. When removing carburetor, do not drop any nut or bolt into intake manifold.
c. Be careful not to bend or scratch any part.

1. Remove air cleaner housing.
2. Disconnect fuel lines or vacuum line.
3. Disconnect lead wires for autochoke heater, anti-dieseling solenoid and B.C.D.D. solenoid valve. (Non-California models except Canada)
4. Disconnect accelerator wire from throttle lever.
5. Remove screws securing carburetor body to intake manifold.

Carburetor assembly can then be taken out.
6. Installation is in the reverse sequence of removal.

DISASSEMBLY AND ASSEMBLY

Following instructions should be observed.

Disassembly

1. Properly fitting wrenches and screwdrivers must be used on the nozzles and jets as well as on the screws and nuts, and care must be exercised not to damage any parts.
2. Clean the carburetor thoroughly before disassembly.
3. Do not attempt to remove any parts marked with an asterisk (*) in the following illustrations.

Assembly

To assemble, reverse the disassembly procedure, noting the following:

1. Thoroughly wash all the parts before assembling.
2. Inspect gaskets to see if they appear hard or brittle or if edges are torn or distorted.

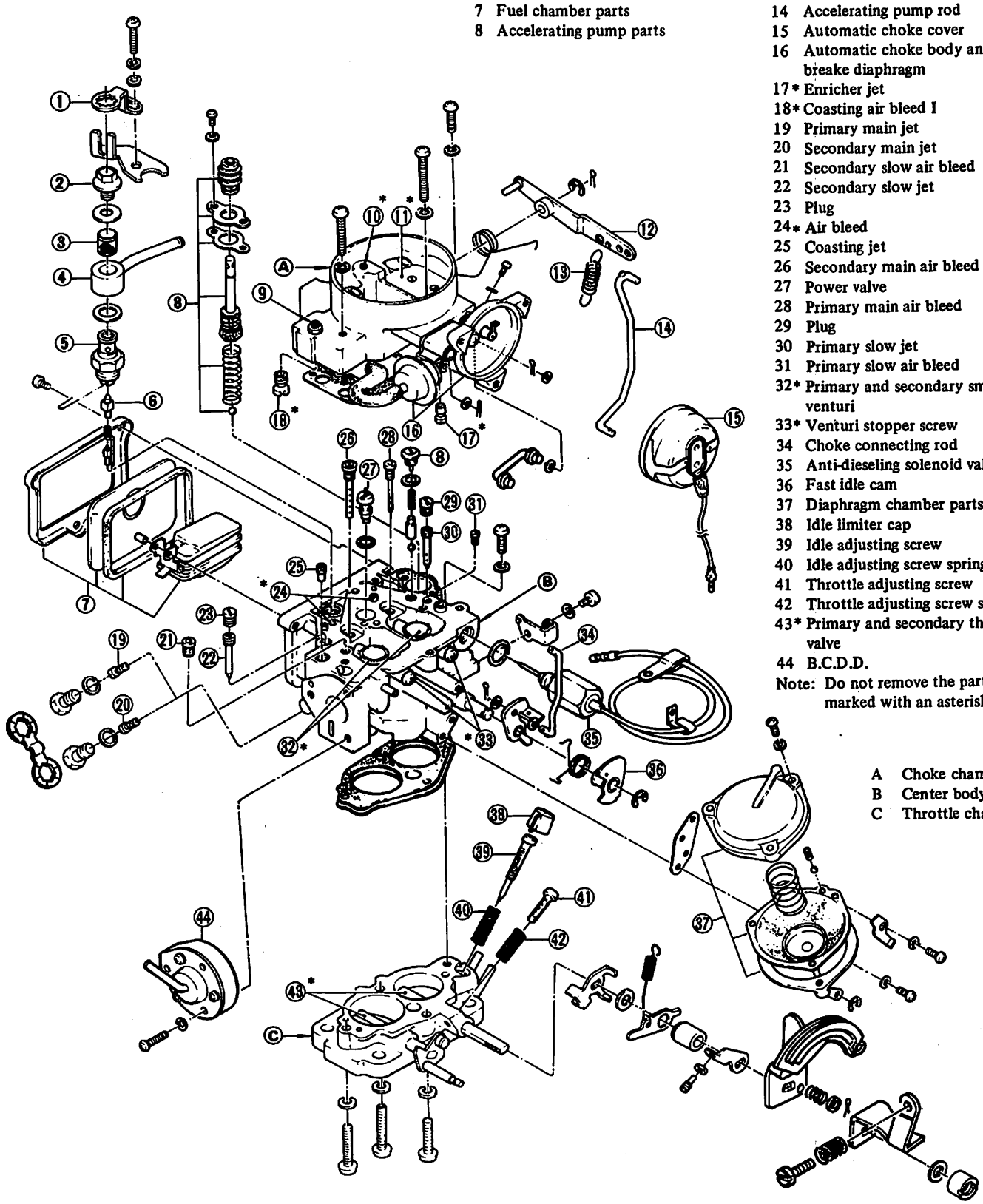
If any of such undesirable conditions is noted, they must be replaced.
3. Install jet and air bleed having the same size number as that of original one.
4. After reassembling carburetor, check each rotating portion or sliding portion for smooth operation.

California models

1 Lock lever
2 Filter set screw
3 Fuel filter
4 Fuel nipple
5 Needle valve body
6 Needle valve
7 Fuel chamber parts
8 Accelerating pump parts
9 B.C.D.D. mixture adjusting screw
10* High speed enricher air bleed
11* Choke valve
12 Accelerating pump lever
13 Throttle return spring
14 Accelerating pump rod
15 Automatic choke cover
16 Automatic choke body and vacuum breake diaphragm
17* Enricher jet
18* Coasting air bleed I
19 Primary main jet
20 Secondary main jet
21 Secondary slow air bleed
22 Secondary slow jet
23 Plug
24* Air bleed
25 Coasting jet
26 Secondary main air bleed
27 Power valve
28 Primary main air bleed
29 Plug
30 Primary slow jet
31 Primary slow air bleed
32* Primary and secondary small venturi
33* Venturi stopper screw
34 Choke connecting rod
35 Anti-dieseling solenoid valve
36 Fast idle cam
37 Diaphragm chamber parts
38 Idle limiter cap
39 Idle adjusting screw
40 Idle adjusting screw spring
41 Throttle adjusting screw
42 Throttle adjusting screw spring
43* Primary and secondary throttle valve
44 B.C.D.D.

Note: Do not remove the parts marked with an asterisk "*".

A Choke chamber
B Center body
C Throttle chamber

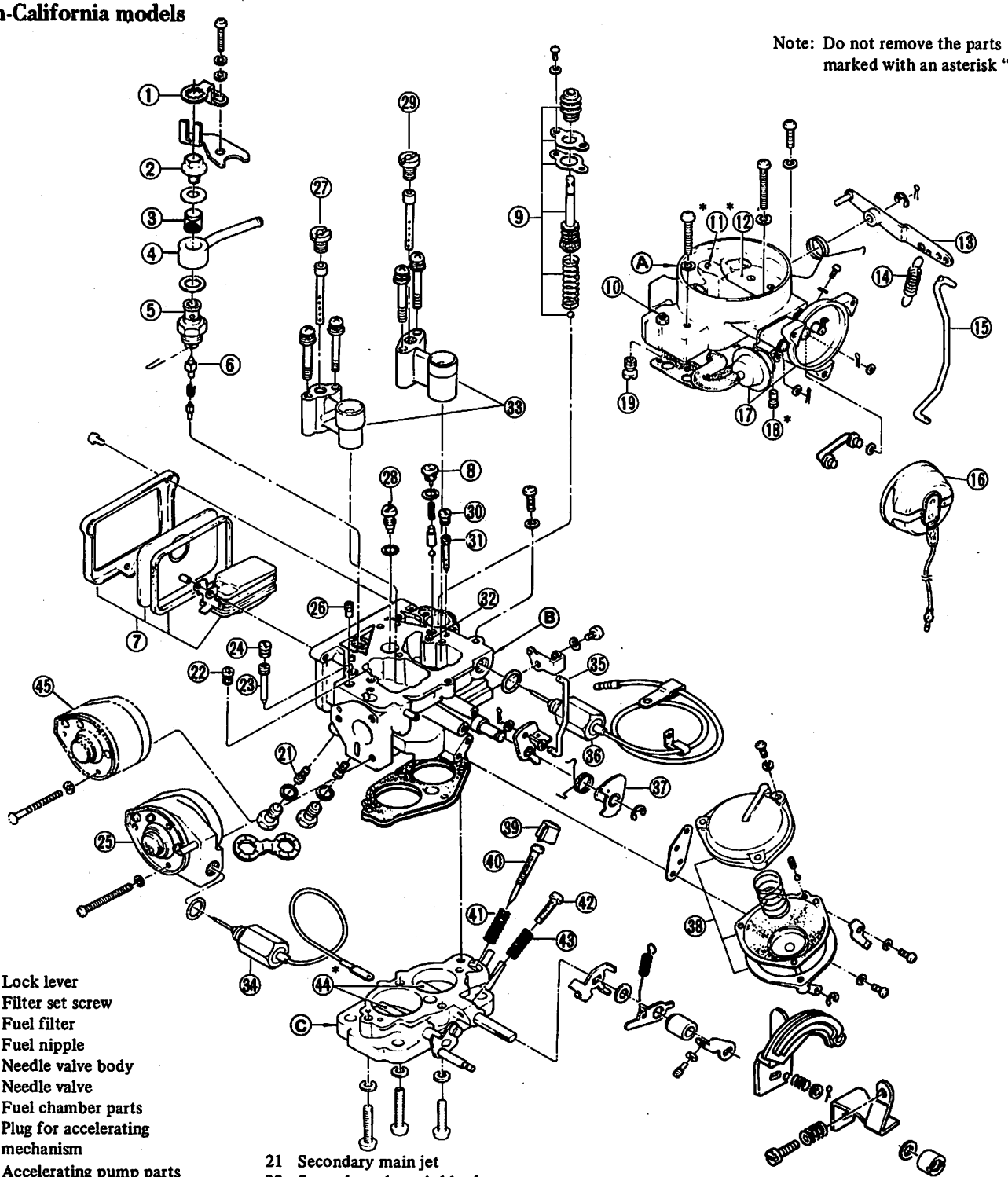


EF541A

Fig. EF-57 Carburetor Parts (California models)

Non-California models

Note: Do not remove the parts marked with an asterisk "*".



1 Lock lever
2 Filter set screw
3 Fuel filter
4 Fuel nipple
5 Needle valve body
6 Needle valve
7 Fuel chamber parts
8 Plug for accelerating mechanism
9 Accelerating pump parts
10 B.C.D.D. mixture adjusting screw
11* High speed enricher air bleed
12* Choke valve
13 Accelerating pump lever
14 Throttle return spring
15 Accelerating pump rod
16 Automatic choke cover
17 Automatic choke body and vacuum break diaphragm
18* Enricher jet
19 Coasting air bleed I
20 Primary main jet
21 Secondary main jet
22 Secondary slow air bleed
23 Secondary slow jet
24 Plug
25 B.C.D.D. (for U.S.A.)
26 Coasting jet
27 Secondary main air bleed
28 Power valve
29 Primary main air bleed
30 Plug
31 Primary slow jet
32 Primary slow air bleed
33 Primary and secondary small venturi
34 B.C.D.D. solenoid (for U.S.A.)
35 Choke connecting rod
36 Anti-dieseling solenoid valve
37 Fast idle cam
38 Diaphragm chamber parts
39 Idle limiter cap
40 Idle adjusting screw
41 Idle adjusting screw spring
42 Throttle adjusting screw
43 Throttle adjusting screw spring
44* Primary and secondary throttle valve
45 B.C.D.D. (for Canada)
A Choke chamber
B Center body
C Throttle chamber

EF114A

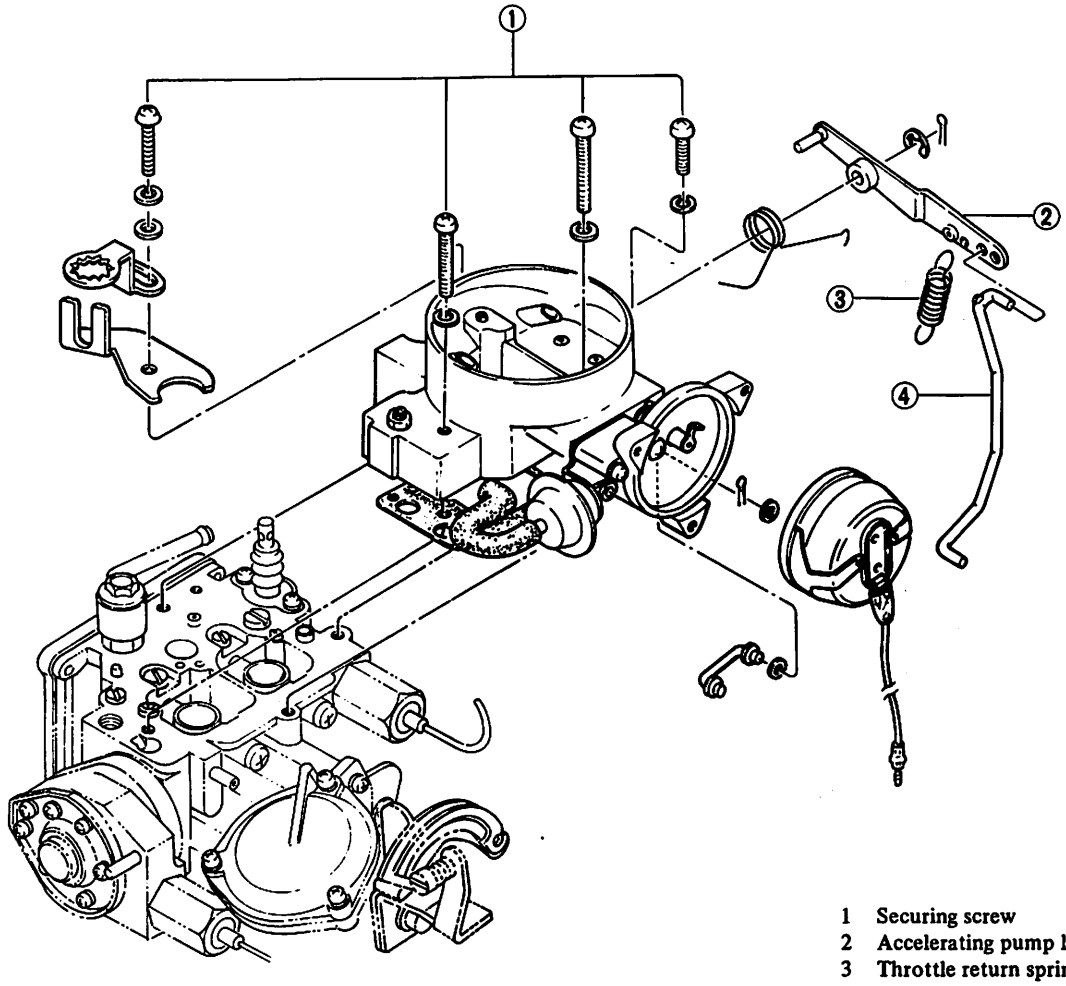
Fig. EF-58 Carburetor Parts (Non-California models)

Choke chamber parts

1. Disconnect accelerating pump rod and choke connecting rod.
2. Remove throttle return spring and vacuum hose for vacuum break diaphragm.
3. Remove four screws securing choke chamber to center body.

Choke chamber parts can then be taken out.

4. Installation is in the reverse sequence of removal.



1 Securing screw
2 Accelerating pump lever
3 Throttle return spring
4 Accelerating pump rod

EF115A

Fig. EF-59 Choke Chamber Parts

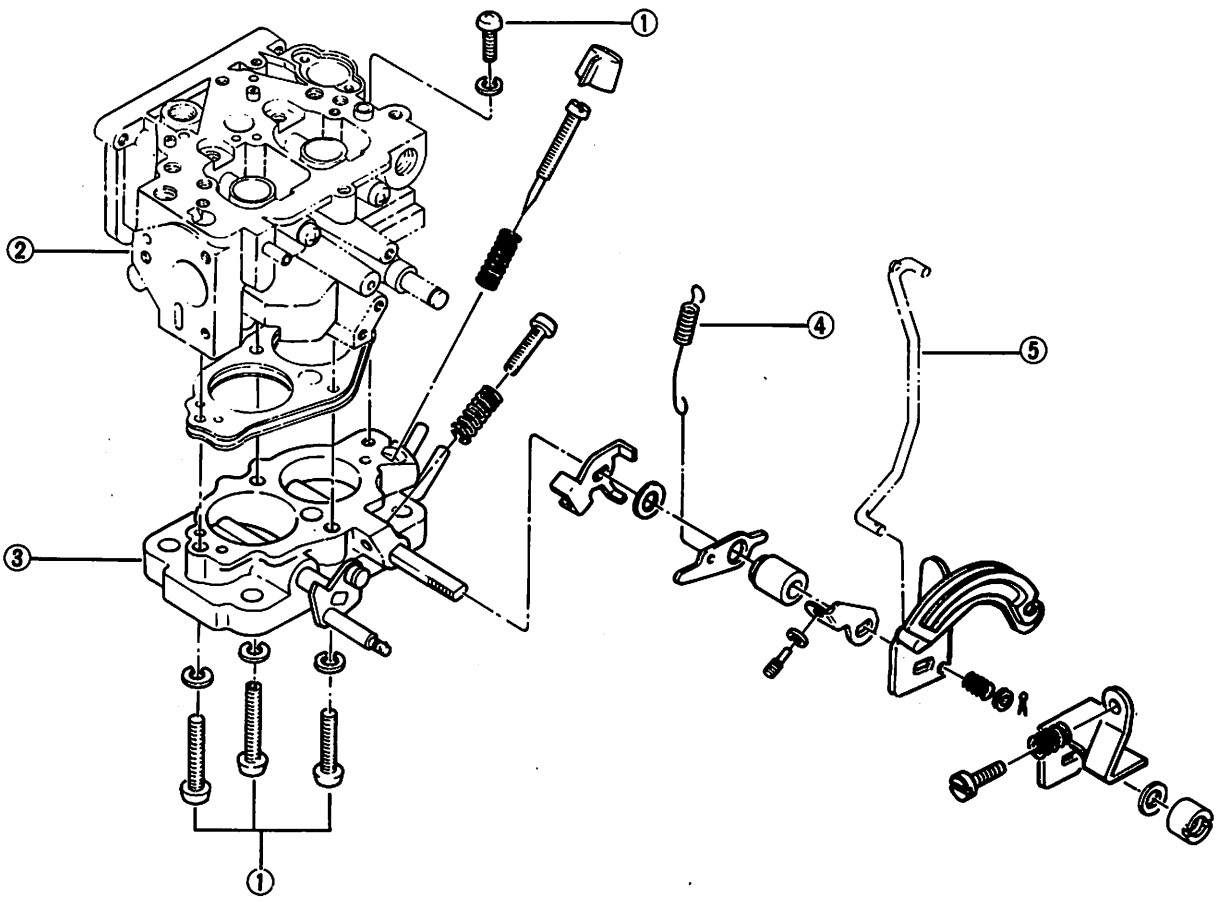
Throttle chamber parts

1. Remove three screws securing diaphragm chamber for secondary throttle valve.
2. Loosen four screws securing throttle chamber parts.

Throttle chamber can then be taken out.

3. Installation is in the reverse sequence of removal.

Note: One of three screws has a hole for power valve mechanism in itself. Take care not to confuse them.



1 Throttle chamber securing screws
2 Center body
3 Throttle chamber
4 Spring
5 Accelerating pump rod

EF002A

Fig. EF-60 Throttle Chamber Parts

TROUBLE DIAGNOSES AND CORRECTIONS

In the following table, the symptoms and causes of carburetor troubles and remedies for them are listed to facilitate quick repairs.

There are various causes of engine malfunctions. It sometimes happens that a carburetor which has no fault appears to have some problems, when actually the electric system is at fault. Therefore, whenever the engine is malfunctioning, the electrical system should be checked first, before adjusting carburetor.

Condition	Probable cause	Corrective action
Overflow	Dirt accumulated on needle valve.	Clean needle valve.
	Fuel pump pressure too high.	Repair pump.
	Fuel return tube clogged.	Replace.
	Needle valve improperly seated.	Replace.
	Float damaged.	Replace.
Excessive fuel consumption	Fuel overflow.	See condition "overflow".
	Slow jet too large on each main jet.	Replace.
	Main air bleed clogged.	Clean.
	Choke valve does not open fully.	Adjust.
	Outlet valve seat of accelerator pump improper.	Lap.
	Linked opening of secondary throttle valve opens too early.	Adjust.
Power shortage	Main jets clogged.	Clean.
	Every throttle valve does not open fully.	Adjust.
	Idling adjustment incorrect.	Adjust.
	Fuel filter clogged.	Repair.
	Vacuum jet clogged.	Clean.
	Air cleaner clogged.	Clean.
	Diaphragm damaged.	Replace.
	Power valve operating improperly.	Adjust.
Improper idling	Slow jet clogged.	Clean.
	Every throttle valve does not close.	Adjust.
	Secondary throttle valve operating improperly.	Overhaul and clean.
	Throttle valve shafts worn.	Replace.
	Packing between manifold/carburetor faulty.	Replace packing.
	Manifold/carburetor tightening improper.	Correct tightening.
	Fuel overflow.	See condition "overflow".
	B.C.D.D. adjustment incorrect.	Adjust.
	B.C.D.D. solenoid damaged.	Replace.
	Stuck anti-stall dash pot.	Replace.

Condition	Probable cause	Corrective action
Engine hesitation	Main jet or slow jet clogged.	Clean.
	By-pass hole, idle passage clogged.	Clean tube.
	Emulsion tube clogged.	Clean.
	Idling adjustment incorrect.	Adjust.
	Secondary throttle valve operating improperly.	Overhaul and clean.
Engine does not start.	Fuel overflows.	See condition "overflow".
	No fuel.	Check pump, fuel pipe and needle valve.
	Idling adjustment incorrect.	Adjust.
	Fast idle adjustment incorrect.	Adjust.
	Damaged anti-dieseling solenoid.	Replace.
Fuel filter	Fuel filter clogged.	Replace.
Air cleaner	Air cleaner filter clogged.	Replace filter.
Fuel tank	No fuel.	Refuel.

SERVICE DATA AND SPECIFICATIONS

GENERAL SPECIFICATIONS

CARBURETOR

	California models				Non-California models			
	Manual transmission		Automatic transmission		Manual transmission		Automatic transmission	
Type	DCH340-91C		DCH340-92C		DCH340-69 (DCH340-57A)*		DCH340-94B (DCH340-58A)*	
	Primary	Secondary	Primary	Secondary	Primary	Secondary	Primary	Secondary
Outer diamter mm (in)	30 (1.18)	34 (1.34)	30 (1.18)	34 (1.34)	30 (1.18)	34 (1.34)	30 (1.18)	34 (1.34)
Venturi diameter mm (in)	24 (0.94)	31 (1.22)	24 (0.94)	31 (1.22)	23 (0.91)	30 (1.18)	23 (0.91)	30 (1.18)
Main jet	#102	#158	#102	#158	#104(#106)*	#160	#104(#106)*	#160
Main air bleed	#70	#60	#70	#60	#60	#60	#60	#60
Slow jet	#48	#70	#48	#70	#48	#70	#48	#70
Power valve	#40		#40		#35 (#43)*		#43	

Note: ( )* means Canada models.

INSPECTION AND ADJUSTMENT

A.T.C. AIR CLEANER

Air control valve partially opens	°C (°F)	30 to 54 (86 to 129)
Air control valve fully opens	°C (°F)	Above 55 (131)

IDLE COMPENSATOR

Idle compensator partially opens	°C (°F)	
Bi-metal No. 1		60 to 70 (140 to 158)
Bi-metal No. 2		70 to 90 (158 to 194)
Idle compensator fully opens	°C (°F)	
Bi-metal No. 1		Above 70 (158)
Bi-metal No. 2		Above 90 (194)

FUEL PUMP

Fuel pressure	kg/cm² (psi)	0.21 to 0.27 (3.0 to 3.85)
Fuel pump capacity	cc (cu in)/min. at rpm	1,700 (103.73)/1,000

CARBURETOR

Model	California models		Non-California models	
	Manual transmission	Automatic transmission	Manual transmission	Automatic transmission
Fuel level adjustment				
Fuel level (from top of carburetor body) mm (in)				
H'	23 (0.91)	23 (0.91)	23 (0.91)	23 (0.91)
Gap between valve stem and float seat mm (in)				
H	7.2 (0.283)	7.2 (0.283)	7.2 (0.283)	7.2 (0.283)
h	1.3 to 1.7 (0.051 to 0.067)	1.3 to 1.7 (0.051 to 0.067)	1.3 to 1.7 (0.051 to 0.067)	1.3 to 1.7 (0.051 to 0.067)
Bi-metal setting				
Bi-metal setting	Center of the index mark		Center of the index mark	
Bi-metal resistance [at 21°C (70°F)] Ω	3.7 to 8.9	3.7 to 8.9	3.7 to 8.9	3.7 to 8.9
Fast idle adjustment (Fast idle cam, first step)				
Gap between throttle valve and carburetor body mm (in)	1.33 to 1.47 (0.0524 to 0.0579)	1.58 to 1.72 (0.0622 to 0.0677)	1.33 to 1.47 (0.0524 to 0.0579)	1.58 to 1.72 (0.0622 to 0.0677)
Fast idle speed (at 2nd cam step) rpm	1,900 to 2,800	2,200 to 3,200 (in "N" position)	1,900 to 2,800	2,200 to 3,200 (in "N" position)
Vacuum break adjustment				
Gap between choke valve and carburetor body mm (in)	2.20 to 2.70 (0.0866 to 0.1063)	2.20 to 2.70 (0.0866 to 0.1063)	2.51 to 3.01 (0.0988 to 0.1185) [1.65 to 2.15 (0.0650 to 0.0846)]*	2.51 to 3.01 (0.0988 to 0.1185) [1.65 to 2.15 (0.0650 to 0.0846)]*
Choke unloader adjustment				
Gap between choke valve and carburetor body mm (in)	2.05 to 2.85 (0.0807 to 0.1122)	2.05 to 2.85 (0.0807 to 0.1122)	2.05 to 2.85 (0.0807 to 0.1122)	2.05 to 2.85 (0.0807 to 0.1122)
Interlock opening of primary and secondary throttle valves mm (in)	7.38 (0.2906)	7.38 (0.2906)	7.38 (0.2906)	7.38 (0.2906)
Dash pot adjustment (without loading) rpm	1,900 to 2,100	1,650 to 1,850	1,900 to 2,100	1,650 to 1,850
B.C.D.D. operating pressure [0 m, sea level and 760 mmHg (29.9 inHg), atmospheric pressure] mmHg (inHg)	−570 ±20 (−22.44 ±0.79)	−570 ±20 (−22.44 ±0.79)	−550 ±20 (−21.65 ±0.79) [−560 ±20 (−22.05 ±0.79)]*	−550 ±20 (−21.65 ±0.79) [−560 ±20 (−22.05 ±0.79)]*
B.C.D.D. mixture adjustment CO % at air off	2 ±1	2 ±1	2 ±1	2 ±1

Note: ( )* means Canada models.

TIGHTENING TORQUE

Anti-dieseling solenoid valve	kg-m (ft-lb)	1.8 to 3.5 (13 to 25)
B.C.D.D.	kg-cm (in-lb)	20 to 40 (17 to 35)

SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION EC

EMISSION CONTROL SYSTEM

EC

GENERAL DESCRIPTION ..... EC- 2
CRANKCASE EMISSION CONTROL SYSTEM ..... EC- 5
EXHAUST EMISSION CONTROL SYSTEM ..... EC- 6
EVAPORATIVE EMISSION CONTROL SYSTEM EC-25
SERVICE DATA AND SPECIFICATIONS EC-28
SPECIAL SERVICE TOOLS EC-29

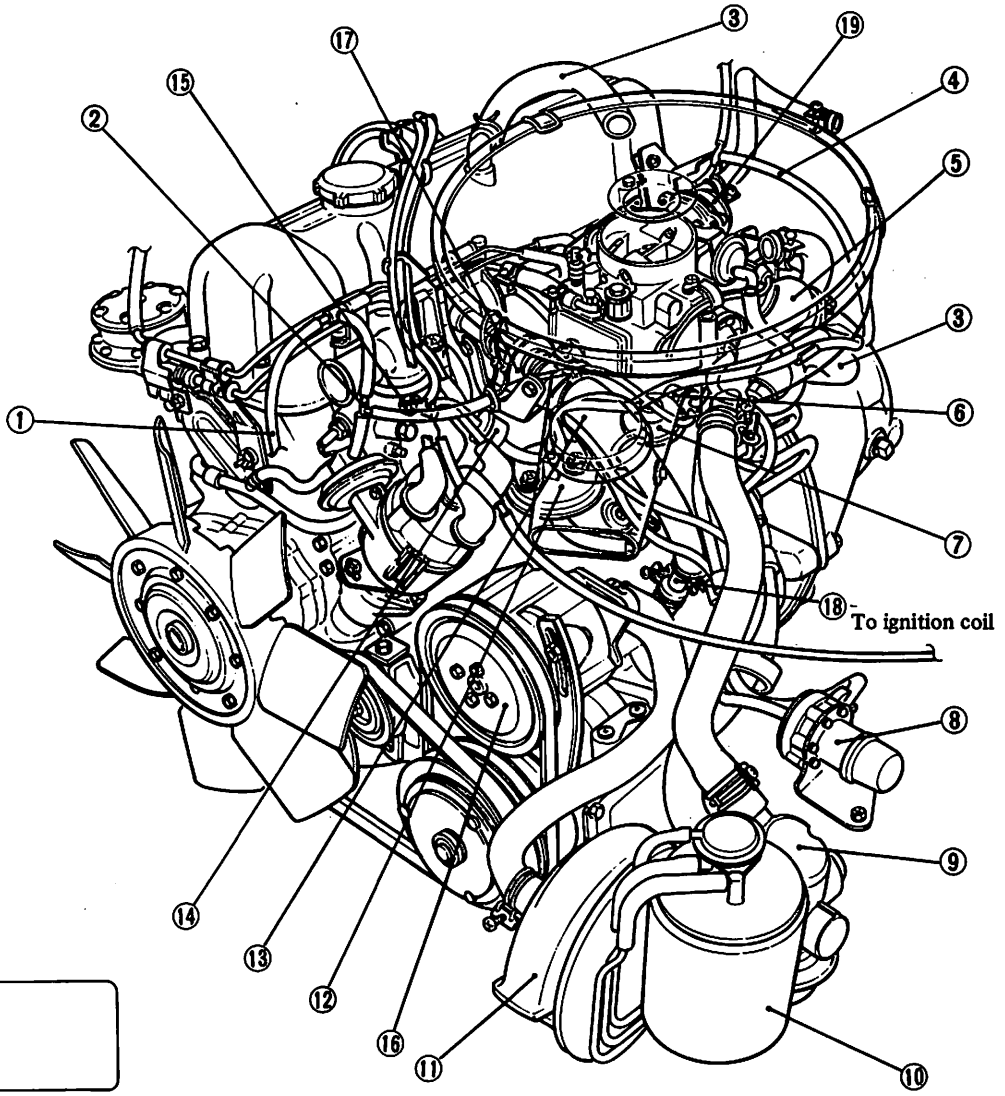
GENERAL DESCRIPTION

There are three types of control system. These are:

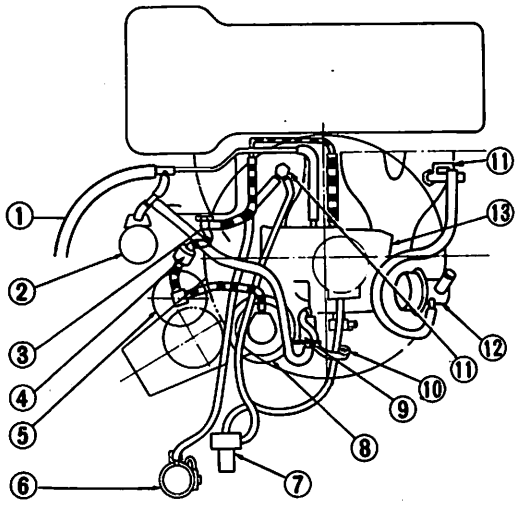
1. Closed type crankcase emission control system
2. Exhaust emission control system
3. Evaporative emission control system

Periodic inspection and required servicing of these systems should be carried out to reduce harmful emissions to a minimum.

CALIFORNIA MODELS



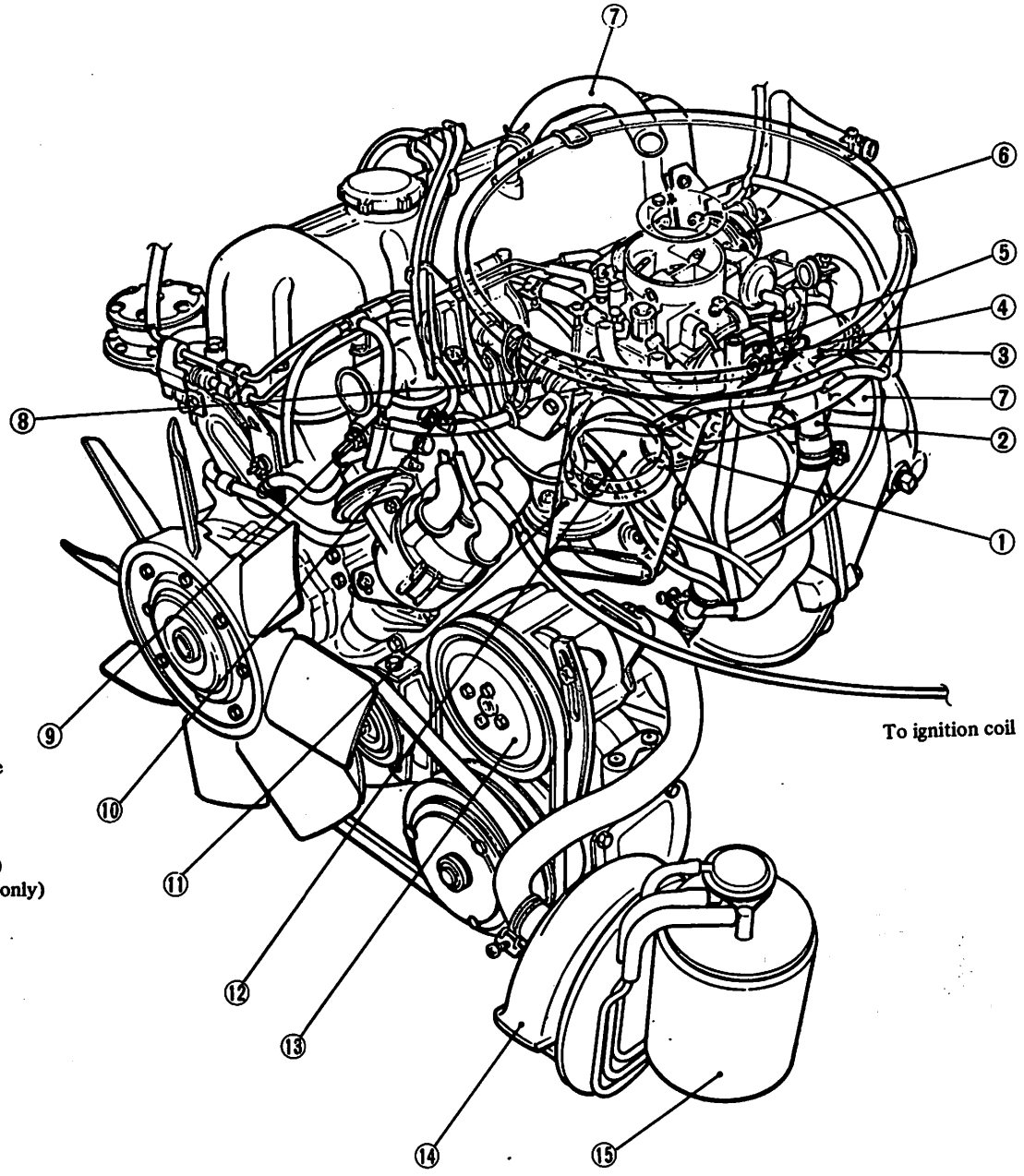
1 Vacuum tube for carbon canister
2 3-way connector (M/T only)
3 P.C.V. hose
4 Vacuum tube for A.B. valve
5 A.B. valve
6 Vacuum switching valve (M/T only)
7 E.G.R. control valve
8 B.C.D.D. vacuum control valve
9 C.A.C. valve
10 Carbon canister
11 Air pump air cleaner
12 B.P.T. valve
13 A.T.C. air cleaner
14 Vacuum delay valve
15 Thermal vacuum valve
16 Air pump for A.I.S.
17 Check valve (For A.I.S.)
18 3-way connector for A.I.S.
19 Auto-choke



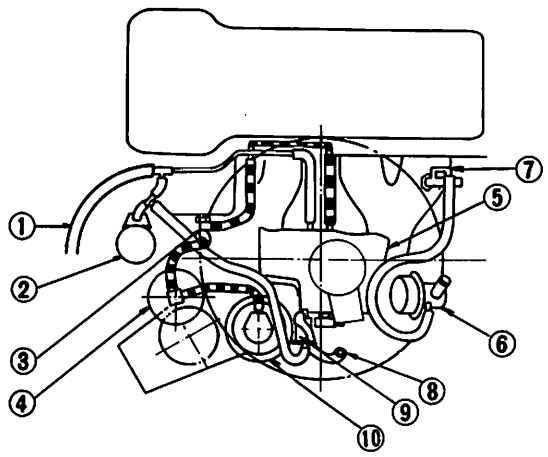
1 To canister purge control valve
2 Distributor
3 Thermal vacuum valve
4 Vacuum delay valve
5 B.P.T. valve
6 C.A.C. valve
7 B.C.D.D. vacuum control valve
8 E.G.R. control valve
9 Vacuum switching valve (M/T only)
10 To air cleaner (M/T only)
11 Intake manifold vacuum takeout port
12 A.B. valve
13 Carburetor

Fig. EC-1 Emission Control System (California models)

NON-CALIFORNIA MODELS (Except Canada)



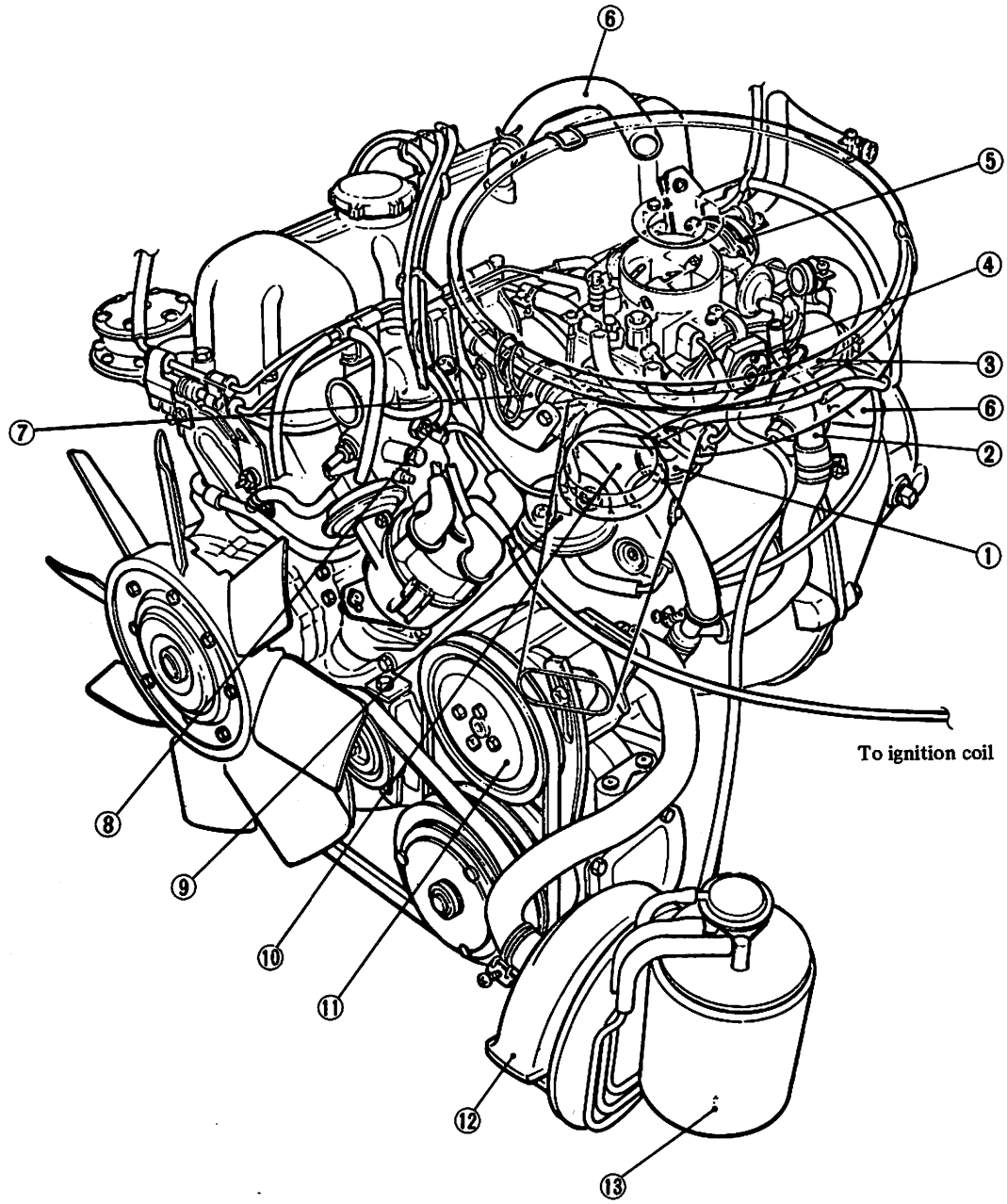
1 E.G.R. control valve
2 Air relief valve
3 A.B. valve
4 B.C.D.D. solenoid valve
5 B.C.D.D.
6 Auto-choke
7 P.C.V. hose
8 Check valve (for A.I.S.)
9 3-way connector (M/T only)
10 Thermal vacuum valve
11 B.P.T. valve
12 A.T.C. air cleaner
13 Air pump for A.I.S.
14 Air pump air cleaner
15 Canister



1 To canister purge control
2 Distributor
3 Thermal vacuum valve
4 B.P.T. valve
5 Carburetor
6 A.B. valve
7 Intake manifold vacuum takeout port
8 To air cleaner (M/T only)
9 Vacuum switching valve (M/T only)
10 E.G.R. control valve

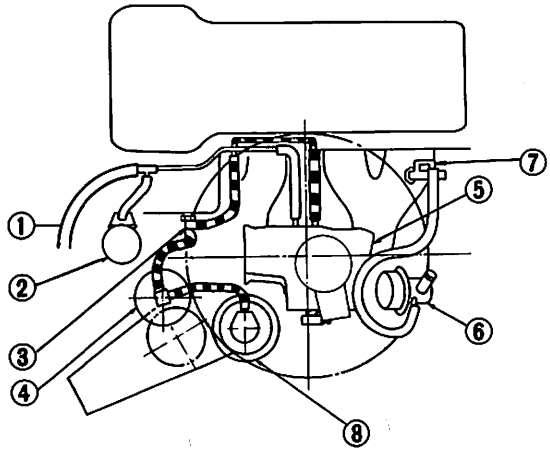
Fig. EC-2 Emission Control System (Non-Califronia models except Canada)

CANADA MODELS



1 E.G.R. control valve
2 Air relief valve
3 A.B. valve
4 B.C.D.D.
5 Automatic choke
6 P.C.V. hose
7 Check valve (for A.I.S.)
8 Thermal vacuum valve
9 B.P.T. valve
10 A.T.C. air cleaner
11 Air pump (for A.I.S.)
12 Air pump air cleaner
13 Canister

EC061A



1 To canister purge control
2 Distributor
3 Thermal vacuum valve
4 B.P.T. valve
5 Carburetor
6 A.B. valve
7 Intake manifold vacuum takeout port
8 E.G.R. control valve

EC062A

Fig. EC-3 Emission Control System (Canada models)

CRANKCASE EMISSION CONTROL SYSTEM

DESCRIPTION

This system returns blow-by gas to both the intake manifold and carburetor air cleaner.

The positive crankcase ventilation (P.C.V.) valve is provided to conduct crankcase blow-by gas to the intake manifold.

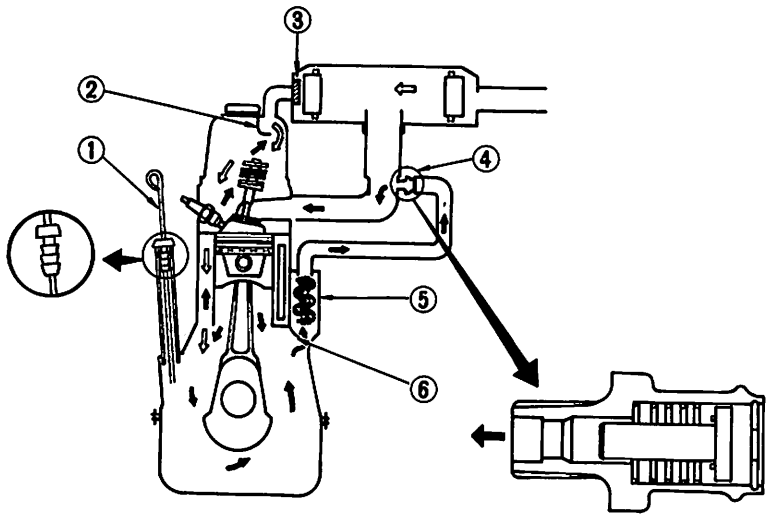
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the P.C.V. valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

The ventilating air is then drawn through the tube connecting carburetor air cleaner to rocker cover, into the crankcase.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve, and its flow goes through the tube connection in the reverse direction.

On cars with an excessively high blow-by some of the flow will go through the tube connection to carburetor air cleaner under all conditions. See Fig. EC-4.



⇨ Fresh air

➡ Blow-by gas

1 Seal type oil level gauge
2 Baffle plate
3 Filter
4 P.C.V. valve
5 Steel net
6 Baffle plate

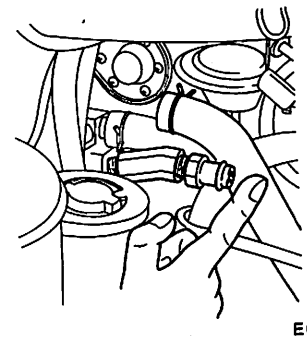
EC377A

Fig. EC-4 Crankcase Emission Control System

INSPECTION

P.C.V. VALVE AND FILTER

With engine running at idle, remove the ventilation hose from P.C.V. valve, if the valve is working, a hissing noise will be heard as air passes through the valve and a strong vacuum should be felt immediately when a finger is placed over valve inlet.



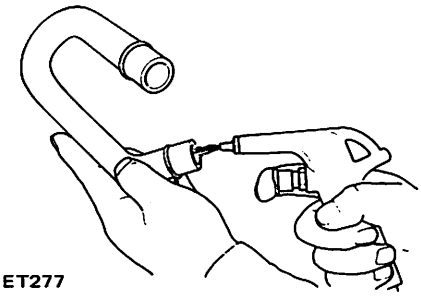
EC241A

Fig. EC-5 Checking P.C.V. Valve

VENTILATION HOSE

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air.

If any hose cannot be free of obstructions, replace.



ET277

Fig. EC-6 Cleaning Ventilation Hose

EXHAUST EMISSION CONTROL SYSTEM

CONTENTS

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EXHAUST GAS RECIRCULATION (E.G.R.) CONTROL SYSTEM EC-16
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SPARK TIMING CONTROL SYSTEM (U.S.A. models) EC-21
DESCRIPTION EC-21
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REMOVAL AND INSTALLATION EC-22
INSPECTION EC-23
CATALYTIC CONVERTER (California models) EC-24
DESCRIPTION EC-24
OPERATION EC-24
REMOVAL AND INSTALLATION EC-24
INSPECTION EC-24

DESCRIPTION

The exhaust emission control system is made up of the following:

Emission control system	California models	Non-California models (Except Canada)	Canada models
Air injection system	Air pump Check valve A.B. valve C.A.C. valve	Air pump Check valve A.B. valve Air relief valve	
E.G.R. system	E.G.R. control valve Thermal vacuum valve B.P.T. valve Vacuum delay valve	E.G.R. control valve Thermal vacuum valve B.P.T. valve	
Spark timing control system M/T model	Vacuum switching valve Top detecting switch	Vacuum switching valve Top detecting switch	–
A/T model	–	–	–
Catalyst	Catalytic converter	–	–

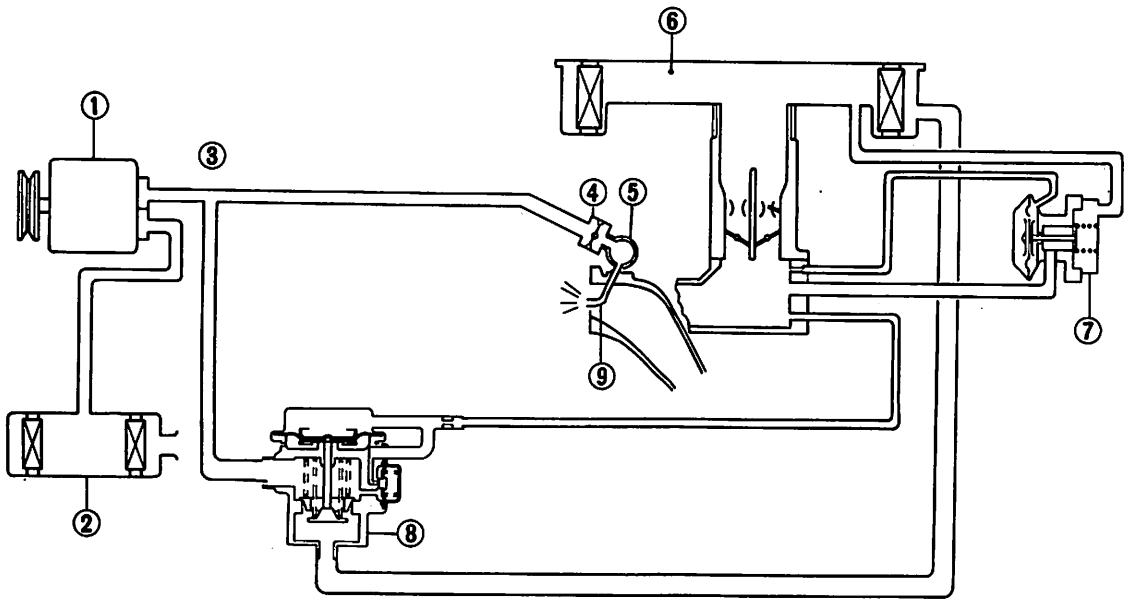
AIR INJECTION SYSTEM (A.I.S.)

DESCRIPTION

The Air Injection System (A.I.S.) is designed to inject compressed air (secondary air) coming from the air pump into the exhaust manifold to reduce hydrocarbons (HC) and carbon monoxide (CO) in exhaust gas through recombustion.

Fresh outside air is drawn by the air pump through the air pump air cleaner. Compressed air is injected into the exhaust manifold through the check valve.

California models

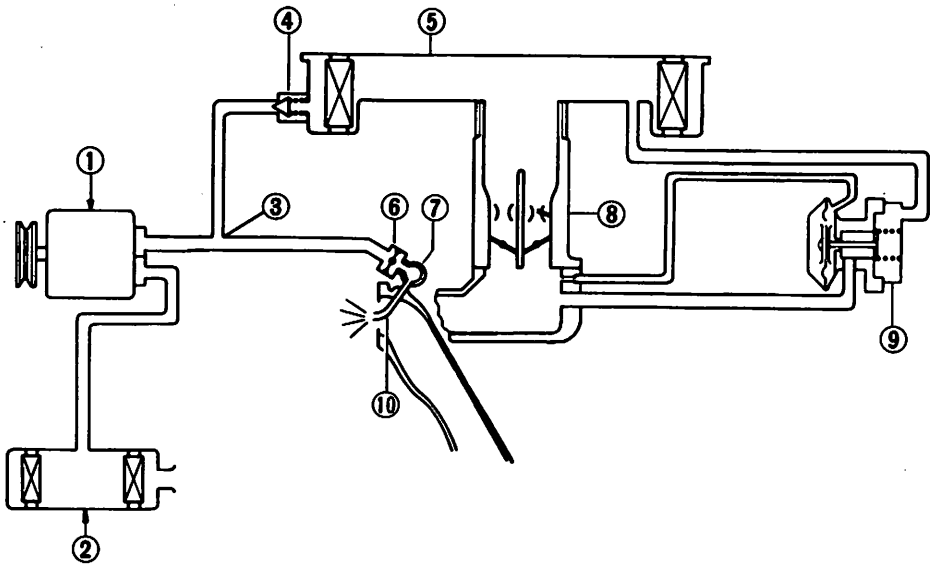


1 Air pump
2 Air pump air cleaner
3 3-way connector
4 Check valve
5 Air gallery pipe
6 Air cleaner
7 A.B. valve
8 C.A.C. valve
9 Injection nozzle

EC873

Fig. EC-7 Air Injection System (California models)

Non-California models



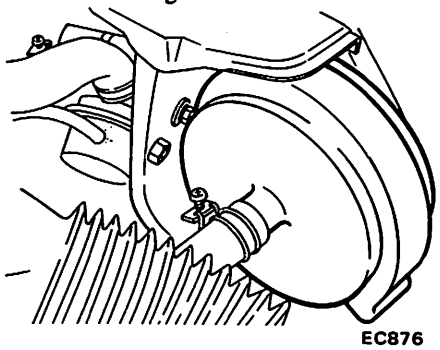
1 Air pump
2 Air pump air cleaner
3 3-way connector
4 Air relief valve
5 Air cleaner
6 Check valve
7 Air gallery pipe
8 Carburetor
9 A.B. valve
10 Injection nozzle

EC065A

Fig. EC-8 Air Injection System (Canada models)

Air pump air cleaner

The air cleaner filter is a viscous paper type, and requires periodic replacement. The air pump air cleaner is installed on a bracket at the left front of the hoodledge.



EC876

Fig. EC-9 Air Pump Air Cleaner

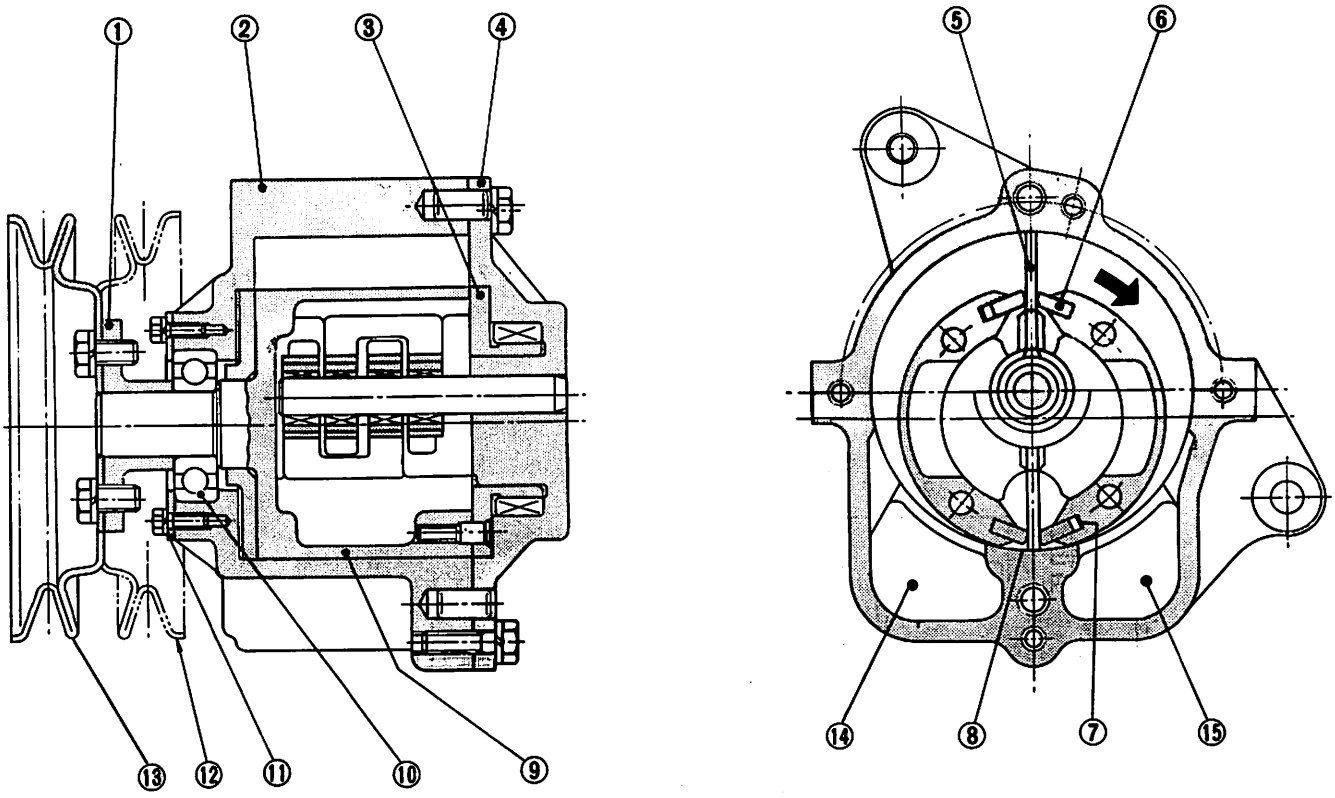
Air pump

The air pump has two positive displacement vanes which requires no lubricating service.

The vanes rotate freely around the off-center pivot pin, and follow the circular-shaped pump bore. The vanes form two chambers in the housing. Each vane completes a pumping cycle in every revolution of the rotor. Air is drawn into the inlet cavity through a tube connected to the air pump air cleaner. Air is sealed between the vanes and moved into a smaller cavity (the compression area).

After compression, a vane passes the outlet cavity. Subsequently it passes the stripper and a section of the housing that separates the outlet and inlet cavities and again reaches the inlet cavity to repeat the pumping cycle.

Carbon shoes (in the slots of the rotor) support the vanes. They are designed to permit sliding of the vanes and to seal the rotor interior from the air cavities.



1 Air pump drive hub
2 Housing
3 Rotor ring
4 End cover (with needle bearing)
5 Vane
6 Carbon shoe
7 Shoe spring
8 Stripper
9 Rotor shaft
10 Ball bearing
11 Front bearing cover
12 Pulley
13 Pulley (for air conditioner)
14 Inlet cavity
15 Outlet cavity

EC066A

Fig. EC-10 Air Pump

Anti-backfire (A.B.) valve

This valve is actuated by intake manifold vacuum to prevent backfire in the exhaust system at the initial period of deceleration.

At this period, the mixture in the intake manifold becomes too rich to ignite and burn in the combustion chamber and burns easily in the exhaust system with injected air in the exhaust manifold.

The A.B. valve provides air to the intake manifold to make the air-fuel mixture leaner and prevents backfire.

The correct function of this valve reduces hydrocarbon emission during deceleration.

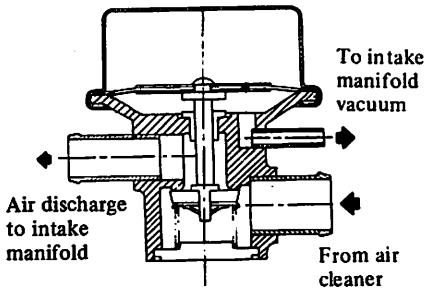


Fig. EC-11 A.B. Valve

Check valve

A check valve is located in the air pump discharge lines. The valve prevents the backflow of exhaust gas which occurs in one of the following cases.

1. When the air pump drive belt fails.
2. When relief valve spring fails.

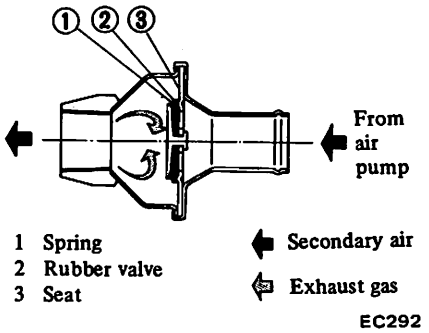
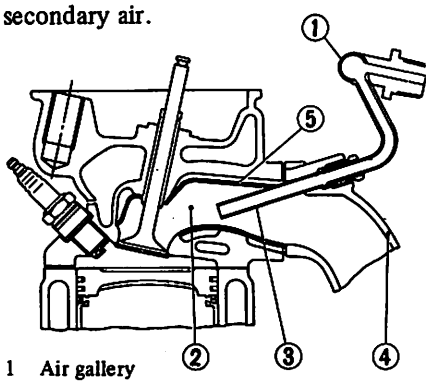


Fig. EC-12 Check Valve

Air gallery pipe, air injection nozzle and exhaust port liner

The secondary air fed from the air pump goes through the check valve to the air gallery pipe where it is distributed to each exhaust port. The secondary air is then injected from the air injection nozzle into the exhaust port near the exhaust valve. A stainless steel liner is cast with each exhaust port to help maintain a high exhaust gas temperature and to promote burning of remaining HC and CO with secondary air.



1 Air gallery
2 Exhaust port
3 Air injection nozzle
4 Exhaust manifold
5 Port liner

Fig. EC-13 Air Injection into Exhaust Port

Air pump relief valve (Non-California models)

The air pump relief valve controls the injection of the secondary air into the exhaust system when the engine is running at high speed under a heavily loaded condition. It accomplishes the following functions without affecting the effectiveness of the exhaust emission control system.

1. Minimizes horsepower losses resulting from air injection into the exhaust system.
2. Protects pump from excessive back pressure.

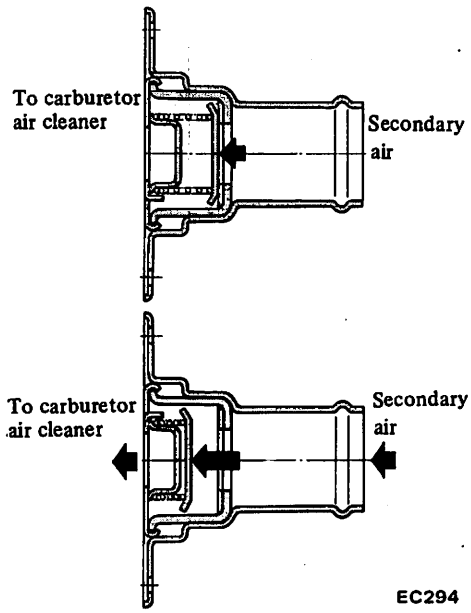


Fig. EC-14 Air Pump Relief Valve

Combined air control (C.A.C.) valve (California models)

The combined air control (C.A.C.) valve controls the amount of secondary air injected into the exhaust manifold according to engine condition and keeps the catalytic converter temperature in proper range.

This valve is operated by intake manifold vacuum and air pump discharge pressure. When intake manifold vacuum is small or in the high-load range, the No. 2 valve opens; when it is great or in the low-load range, the No. 1 valve opens. If air pump discharge pressure is large or the engine is running at a high speed, the No. 3 valve opens, admitting the air pump discharge pressure to the No. 2 diaphragm chamber of the C.A.C. valve and opening the No. 2 valve. At this point, the No. 2 valve serves as a relief valve.

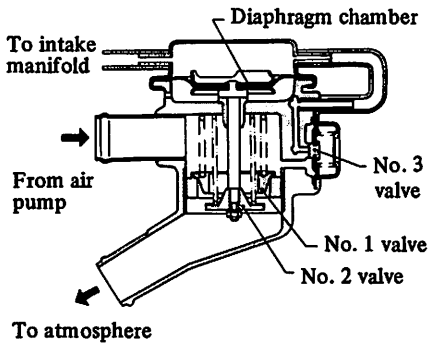
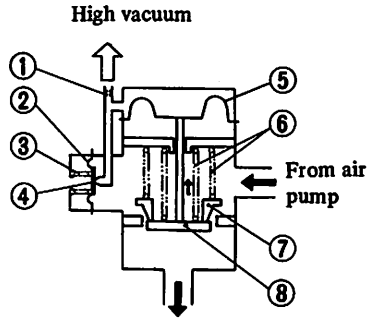


Fig. EC-15 C.A.C. Valve

(1) Engine in "low speed" and "light load"

When the engine is operating under these conditions, intake vacuum is high. The No. 2 valve (unitized with the No. 1 diaphragm) is lifted by the intake manifold vacuum, pushing up the No. 1 valve. These valves will then stop at a position where a balanced condition exists between air pump discharge pressure and spring tension acting on the No. 1 and No. 2 valves. The No. 2 diaphragm, however, does not move due to low engine speed, low air pump discharge pressure and spring tension acting on the No. 3 valve. For this reason, these valves are brought to a balanced condition.



1 Orifice
2 Diaphragm No. 2
3 Spring
4 Valve No. 3
5 Diaphragm No. 1
6 Spring
7 Valve No. 1
8 Valve No. 2

Fig. EC-16 Operation of C.A.C. Valve (Low speed and light load)

(2) Engine in "low speed" and "heavy load"

When the engine is operating under these conditions, intake manifold vacuum is low, and all valves are balanced at a position shown below.

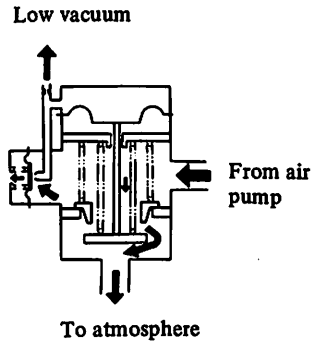


Fig. EC-17 Operation of C.A.C. Valve (Low speed and heavy load)

(3) Engine in "high speed" and "light load"

When the engine is operating under these conditions, intake manifold vacuum is low. The No. 3 valve moves to the left because of high air pump discharge pressure. All valves are balanced at a position shown below.

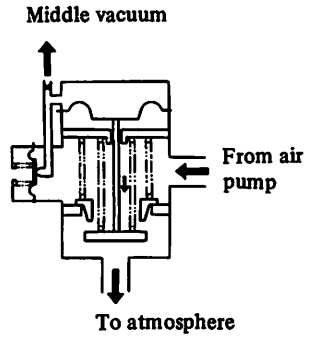


Fig. EC-18 Operation of C.A.C. Valve (High speed and light load)

REMOVAL AND INSTALLATION

Air pump air cleaner

Loosen nuts securing air pump air cleaner to bracket, then detach air cleaner from bracket. Air cleaner filter and air cleaner lower body are built into a unit construction. Replace air cleaner filter and lower body as an assembly.

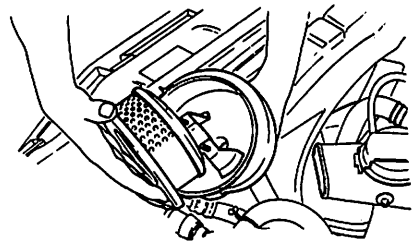


Fig. EC-19 Replacing Air Cleaner Filter

Air pump

1. Remove air hoses from air pump.
2. Remove air pump pulley.
3. Loosen air pump adjusting bar mounting bolts and air pump mounting bolts, then remove air pump drive belt.
4. Air pump assembly can be taken out from bracket.
5. Installation is in the reverse sequence of removal.

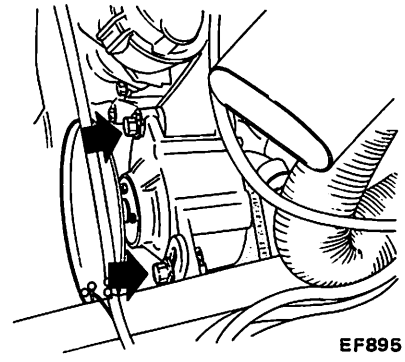


Fig. EC-20 Removing Air Pump

Ⓣ Tightening torque:
Air pump pulley bolts
0.75 to 0.90 kg-m
(5.4 to 6.5 ft-lb)

Check valve

1. Remove air cleaner assembly. Check valve can then be seen.
2. Disconnect air hose from check valve.
3. Remove check valve from air gallery pipe.

Note:
Double wrench action is necessary for this stage.

4. Installation is in the reverse sequence of removal.

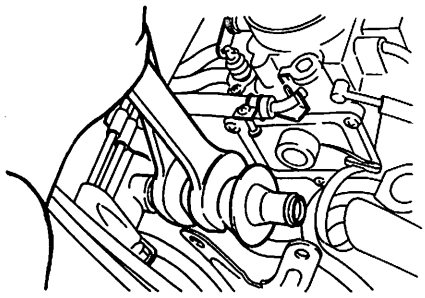

EC863

Fig. EC-21 Removing Check Valve

Air gallery pipe and injection nozzles

It is very difficult to remove the air gallery pipe from the exhaust manifold without bending the pipe, which could result in fractures or leakage. Therefore, removal of the air gallery pipe and injection nozzles should be undertaken only when they are damaged.

1. Remove air cleaner.
2. Lubricate around the connecting portion of air injection nozzle and air gallery with engine oil.
3. Remove flare nuts connecting air gallery to exhaust manifold. Air gallery with check valve can then be taken out.

Note:

a. Apply engine oil to screws several times during above work.

b. Be careful not to damage other parts.

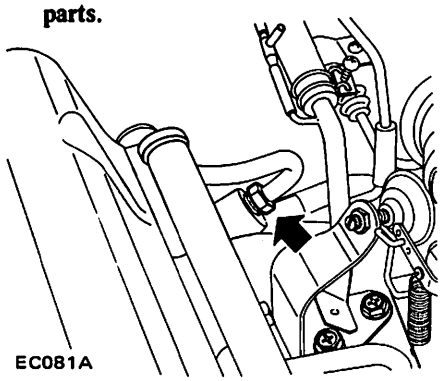

EC081A

Fig. EC-22 Removing Air Gallery

4. Injection nozzle is located in threaded hole where air gallery is fastened. Injection nozzle can be picked up from exhaust manifold.
5. Installation is in the reverse sequence of removal.

Check cylinder head, air injection nozzle and air gallery pipe for leaks with engine running.

Ⓣ Tightening torque:
Air gallery flare nuts
5.0 to 5.9 kg-m
(36 to 43 ft-lb)

A.B. valve

A.B. valve is located at the rear side of air cleaner. Remove air hoses and vacuum tube. Then the A.B. valve can be taken out.

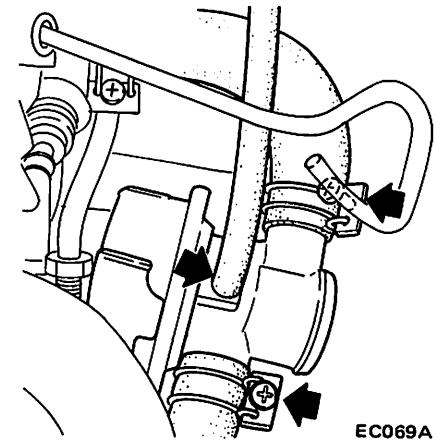

EC069A

Fig. EC-23 Removing A.B. Valve

Air pump relief valve (Non-California models)

1. Loosen clamp of air hose and disconnect air hose from relief valve.
2. Remove screws securing relief valve to air cleaner. Relief valve can then be taken out easily.
3. Installation is in the reverse sequence of removal.

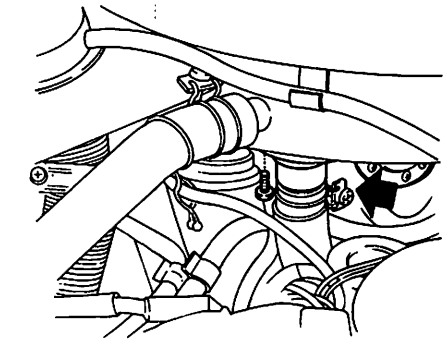

EC866

Fig. EC-24 Removing Air Pump Relief Valve

Identification color: Yellow

Note:
The identification color is added at the inner wall of relief valve.

C.A.C. valve (California models)

C.A.C. valve is located beneath control device bracket.

1. Remove clamps and disconnect air hoses and vacuum tube.
2. Remove screws securing C.A.C. valve, C.A.C. valve can then be taken out easily.
3. Installation is in the reverse sequence of removal.

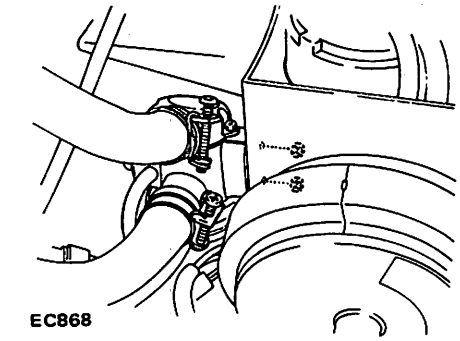
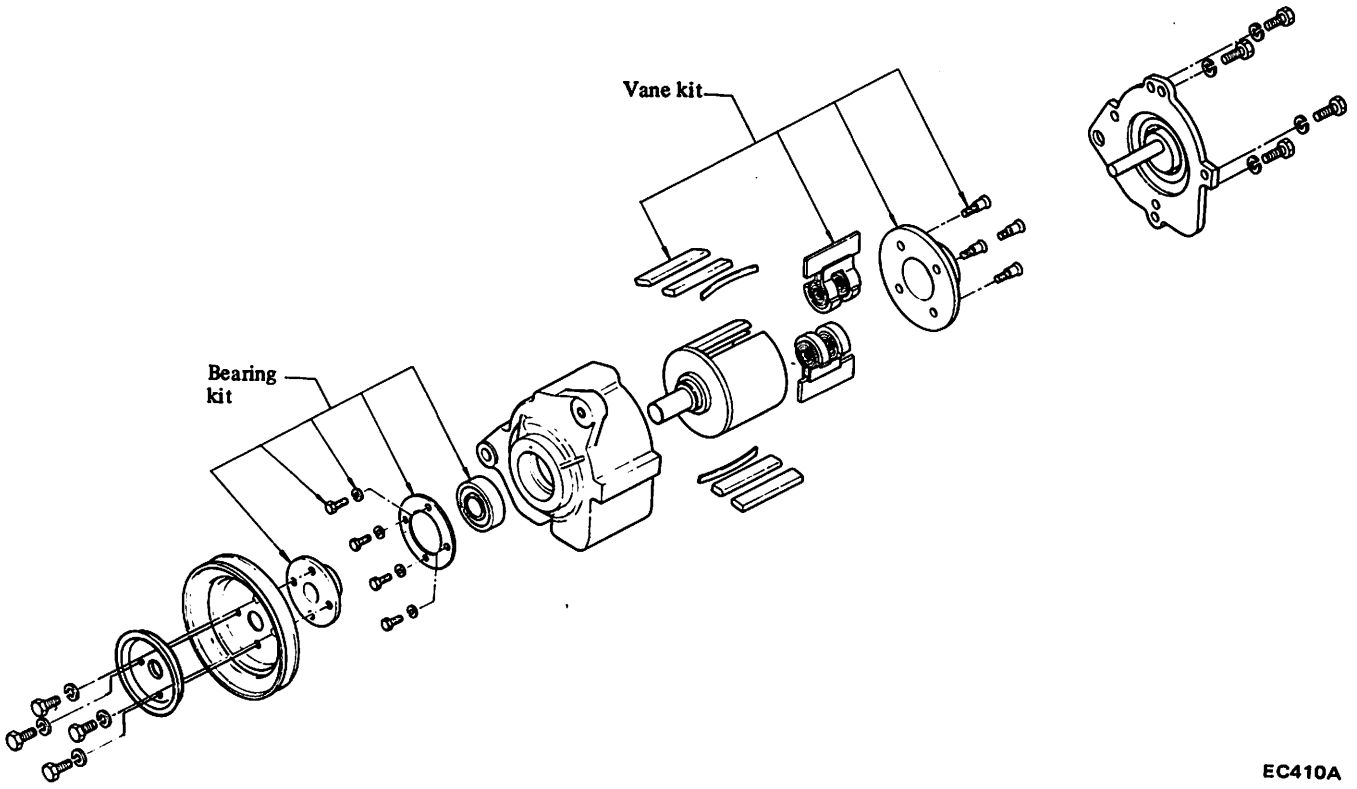

EC868

Fig. EC-25 Removing C.A.C. Valve

DISASSEMBLY AND ASSEMBLY OF AIR PUMP



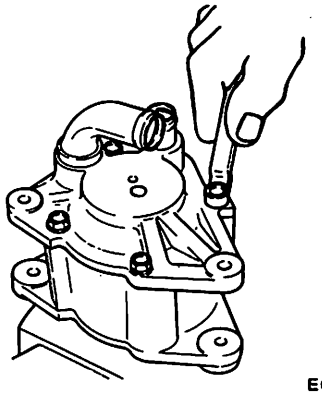
EC410A

Fig. EC-26 Components of Air Pump

Disassembly

1. Remove pulley drive bolts and remove pulley from hub.
2. Secure air pump drive hub in a vise, and remove end cover bolts.

CAUTION:
Never clamp on the aluminum housing.



EC302

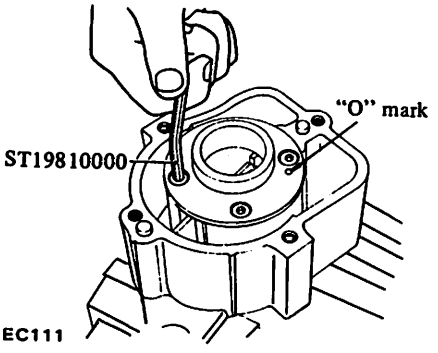
Fig. EC-27 Removing Cover

3. Remove end cover by carefully tapping around dowel pin with a plastic mallet and lift up straight.

4. Put match marks "O" on rotor ring and side of rotor to ensure correct reassembly and remove screws that retain rotor ring to rotor, using a Hexagon Wrench ST19810000.

Note:

a. **Generally, match marks are indicated on both rotor ring and rotor by the manufacturer.**

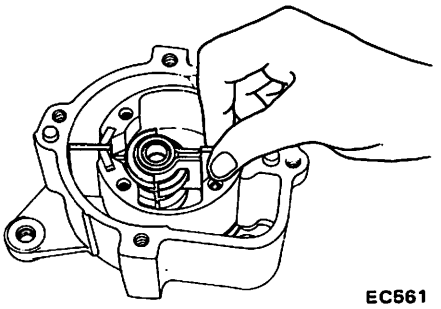


EC111

Fig. EC-28 Removing Rotor Ring

b. **Discard screws which were removed. Always use new ones when installing.**

5. Remove vanes from rotor.



EC561

Fig. EC-29 Removing Vanes

6. Remove carbon shoes and shoe springs from rotor using needle nose pliers or tweezers.

Note:

Carbon shoe "A" is 1 mm (0.04 in) wider than "B". Do not confuse them.

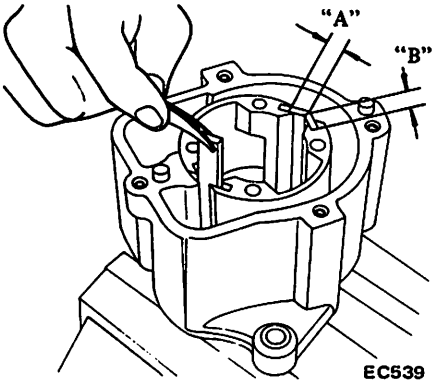


Fig. EC-30 Removing Shoe Springs

If replacement of front bearing is necessary, proceed as follows:

7. Remove air pump drive hub with standard puller.

8. Remove screws securing front bearing cover in place, and detach bearing cover.

9. Support the rear end face of air pump housing with Rotor Adapter ST19890000. Drive rotor out by pushing rotor shaft with Bearing Pressing Tool ST19940000.

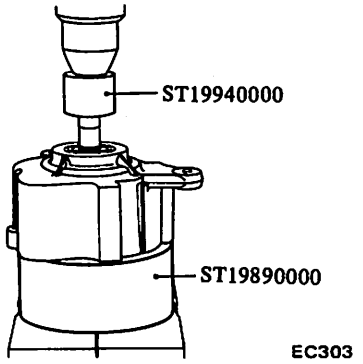


Fig. EC-31 Removing Rotor Shaft

10. Support the front end face of housing with Bearing Stand ST19930000. Attach Bearing Driver ST19910000 to front bearing on the inside of air pump housing, and press out.

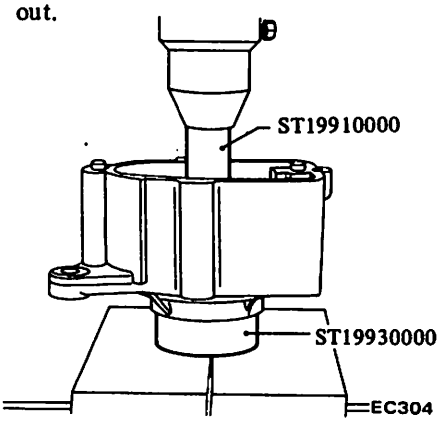


Fig. EC-32 Removing Ball Bearing

11. Keep disassembled parts in order.

Assembly

1. Front bearing

Support the rear end face of air pump housing with Rotor Adapter ST19890000. Press front bearing into place with a press and Bearing Pressing Tool ST19940000.

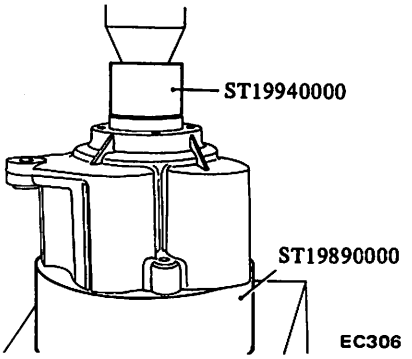


Fig. EC-33 Pressing Ball Bearing

2. Bearing cover

Tighten bearing cover securing bolts.

Ⓣ Tightening torque:
Bearing cover securing bolts
0.1 to 0.2 kg-m
(0.7 to 1.4 ft-lb)

3. Rotor shaft

Support the inward bottom of rotor with Rotor Stand ST19920000.

Press rotor into place with a press and Bearing Driver ST19910000 until the stepped portion of rotor shaft touches front bearing inner race.

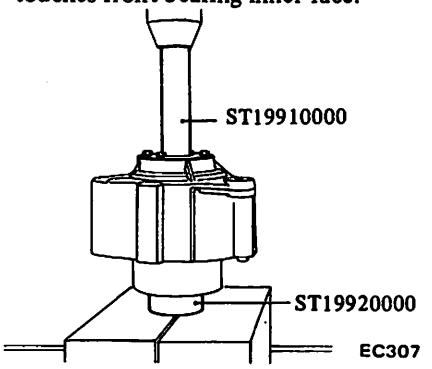


Fig. EC-34 Pressing Rotor Shaft

Note:

a. Be sure to drive front bearing inner race in.

b. After rotor is installed in place, ensure that the rotor end is positioned below the end face of air pump housing.

Position of rotor end below air pump housing:
0.050 to 0.150 mm
(0.0020 to 0.0059 in)

4. Air pump drive hub

Support the inward bottom of rotor with Rotor Stand ST19920000.

Press drive hub into place with a press and Bearing Driver ST19910000 until the end face of drive hub touches front bearing inner race.

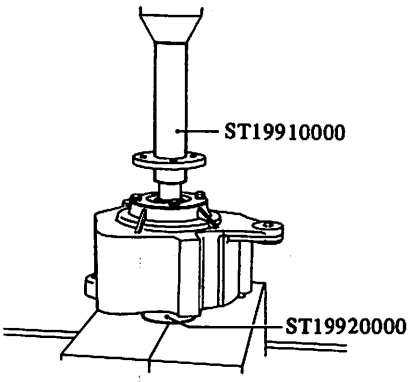


Fig. EC-35 Pressing Air Pump Drive Hub

5. Carbon shoe

(1) Place air pump drive hub in a vise.

(2) Clean carbon, dust, etc. from shoe grooves.

(3) Align rotor with housing properly. Then insert carbon shoes into place, noting their directions.

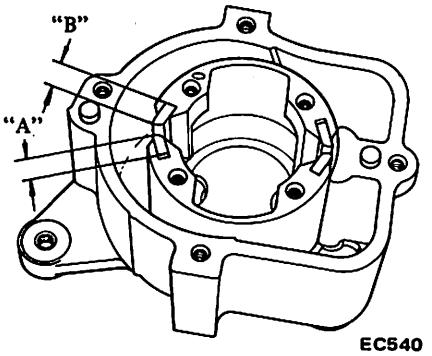


Fig. EC-36 Install Carbon Shoe

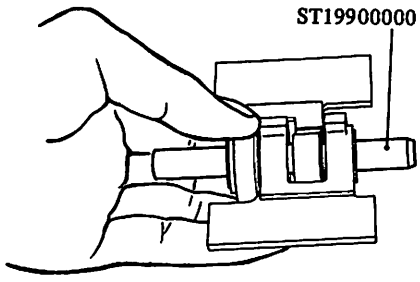
Note:

a. Carbon shoe "A" is 1 mm (0.04 in) wider than "B". Do not confuse them.

b. If carbon shoes are exposed beyond the rotor end face, remove carbon shoes and clean shoe grooves. Reassemble carbon shoes.

6. Vane

(1) Pack vane bearing with high melting-point grease (MIL-G-3545 A, Esso ANDOK260 or equivalent), and insert dummy shaft into the vane bearing.



EC563

Fig. EC-37 Vane Assembly

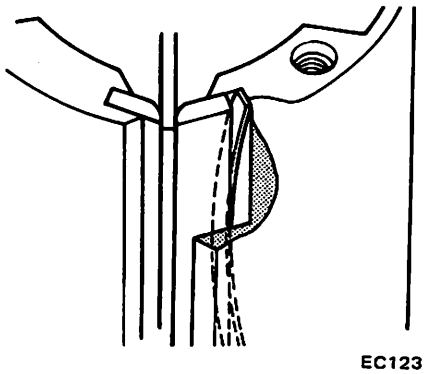
(2) Install vane in place on rotor, using Dummy Shaft ST19900000 as a guide.

Note:

The vanes may require 6 to 16 km (4 to 10 miles) wear-in running time. In the event a slight squeaking still remains, drive the car about 64 to 80 km/h (40 to 50 MPH). In most cases 6 to 16 km (4 to 10 miles) will be sufficient for wear-in.

7. Shoe spring

Place shoe springs in deeper groove of shoe.



EC123

Fig. EC-38 Installing Shoe Spring

Note:

When installing a shoe spring, make sure that the outward bending side faces in shoe and that both ends of spring face in the wall of shoe groove. Be sure to push spring in so that spring end face is flush with rotor.

8. Rotor ring

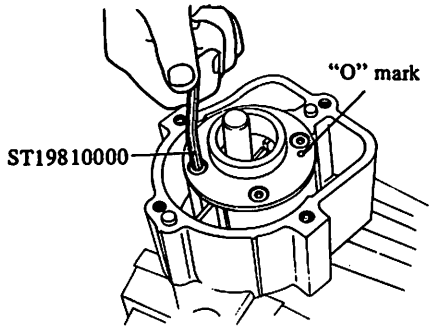
Install rotor ring by correctly aligning the rear end face of rotor with the "O" mark in rotor ring, and tighten screws with Hexagon Wrench ST19810000.

Ⓣ Tightening torque:

Rotor ring screw

0.5 to 0.7 kg-m

(3.6 to 5.1 ft-lb)



EC124

Fig. EC-39 Installing Rotor Ring

9. Removal of dummy shaft

Carefully withdraw dummy shaft from vane.

10. Vane shaft

Pack rear bearing with high melting-point grease (MIL-G-3545 A, Esso ANDOK 260 or equivalent). Apply thin coating of grease to vane shaft and rotor ring, and insert vane shaft into its bearing.

Note:

a. **Do not apply an undue stress to vane shaft when inserting.**
b. **If two vanes are dislocated when inserting vane shaft, correctly align vanes by inserting dummy shaft. Then, draw out dummy shaft and insert vane shaft.**
c. **When wear occurs on vane shaft or when replacement of rear bearing is necessary, replace rear cover assembly.**

11. End cover

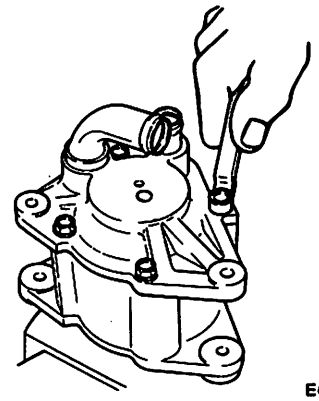
Position end cover in place. Snugly tighten the bolt close to the dowel. Then tighten end cover bolts.

Ⓣ Tightening torque:

End cover bolts

0.7 to 0.9 kg-m

(5.1 to 6.5 ft-lb)



EC302

Fig. EC-40 Installing End Cover

12. Pulley

Tighten pulley securing bolts.

Ⓣ Tightening torque:

Pulley securing bolts

0.75 to 0.90 kg-m

(5.4 to 6.5 ft-lb)

INSPECTION

The following procedures are recommended for checking and/or ascertaining that the various components of the exhaust emission control system are operating properly.

The engine and all components must be at normal operating temperatures when the tests are performed. Prior to performing any extensive diagnosis of the exhaust control system, it must be determined that the engine as a unit is functioning properly.

Air injection system hoses

Check air system hoses for loose connections, cracks, or deterioration. Retighten or replace if necessary.

Air system manifold

Check air gallery pipe and injection nozzles for loose connections and cracks. Retighten or replace if necessary.

Air pump

1. Operate engine until it reaches normal operating temperature.
2. Inspect all hose, hose connections, and air gallery for leaks and correct, if necessary, before checking air injection pump.

3. Check air injection pump belt tension and adjust to specifications if necessary.
4. Plug up air discharging hose from C.A.C. valve (California models).

California models

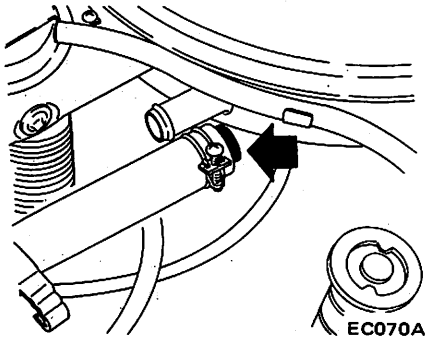


Fig. EC-41 Plugging Air Discharging Hose

5. Disconnect air supply hose at check valve.
6. Insert open pipe end of Air Pump Test Gauge Adapter ST19870000 in air supply hose. Clamp hose securely to adapter to prevent it from blowing out. Position adapter and test gauge so that air blast emitted through drilled pipe plug will be harmlessly dissipated.
7. Install a tachometer on engine. With engine speed at 2,600 rpm, observe air pressure "A" produced at test gauge.

Air pressure "A":
More than 100 mmHg (3.94 inHg)

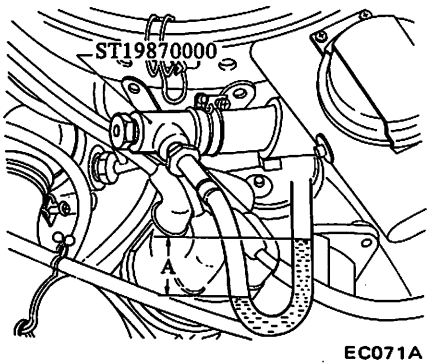


Fig. EC-42 Testing Air Pump

8. If air pressure does not meet above specifications, proceed as follows:

Non-California models

(1) Repeat 2 and 3 above.
(2) With engine speed at 1,500 rpm, disconnect tube from adapter and close hole of test gauge with finger. If a leaking sound is heard or leaking air is felt by finger at relief valve, relief valve is malfunctioning. Relief valve should be replaced or repaired.
(3) If air injection pump does not meet minimum requirement of pressure test, it should be repaired.

California models

Disassemble the air pump and repair it.

Check valve

1. Warm up engine thoroughly.
2. Disconnect hose leading to check valve from air hose connector.
3. Check hose opening for any indication of exhaust gas leaks. If leaks are detected, replace check valve.
4. Race the engine lightly (at about 2,000 rpm) and then return it to idling. Visually check the hose for any indication of exhaust gas leaks before the engine returns to idling speed. If leaks are detected, replace check valve.

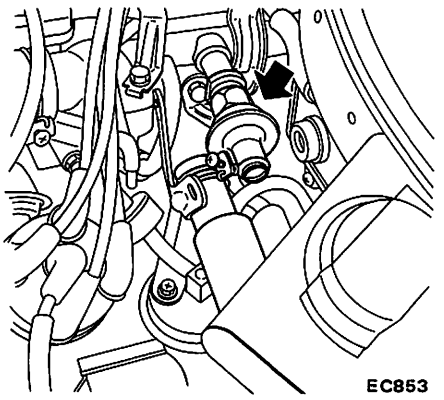


Fig. EC-43 Checking Check Valve

Air pump relief valve (Non-California mooels)

After completing inspection of air pump, check air pump relief valve in the following steps:

1. Disconnect hoses leading to check valve and air control valve from air hose connector, and install blind cap to the connector.
2. With engine running at about 3,000 rpm under no load, place your hand on the air outlet of air pump relief valve to check for discharged air. If no air is felt, replace the air pump relief valve.

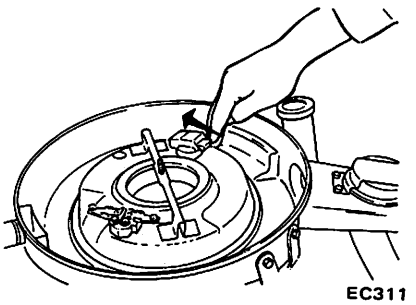


Fig. EC-44 Checking Air Pump Relief Valve

A.B. valve

1. Warm up engine thoroughly.
2. Disconnect hose from air cleaner, and place a finger near the outlet.
3. Run engine at about 3,000 rpm under no load, then quickly return it to idling. If you feel a pull or suction force on your finger, the anti-backfire valve is functioning normally. If no suction is felt, replace the anti-backfire valve.

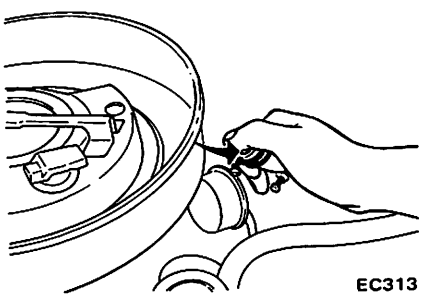


Fig. EC-45 Checking Anti-Backfire Valve

C.A.C. valve (California models)

1. Make sure that C.A.C. valve vacuum hose and air hose are not cracked.
2. Warm up engine thoroughly.
3. With engine at idle, place your finger over relief air opening in the air cleaner to check for presence of air.

4. Disconnect vacuum hoses at C.A.C. valve. Then make sure that air is discharged from C.A.C. valve at engine idling.

Note:
When the vacuum hose is disconnected, plug it up or engine will stumble.

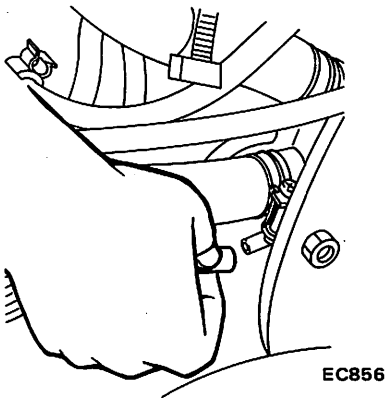


Fig. EC-46 Disconnecting Vacuum Hose

5. Connect hand-operated vacuum pump in place as shown below, and manipulate it in order to apply a pressure of −200 to −250 mmHg (−7.87 to −9.84 inHg) to C.A.C. valve. Then increase engine speed to 3,000 rpm and confirm that no air leaks from C.A.C. valve.

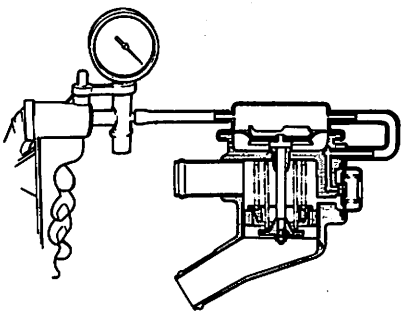


Fig. EC-47 Checking C.A.C. Valve

6. With the above condition, disconnect air hose at check valve and plug it up. At this point, confirm the air leaks from C.A.C. valve.

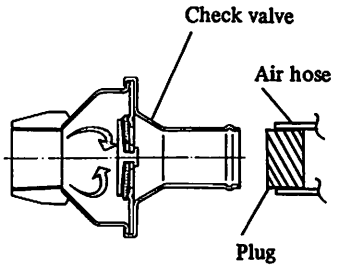


Fig. EC-48 Disconnecting Air Hose

7. If test results satisfy 3, 4, 5 and 6, the C.A.C. valve is properly functioning.

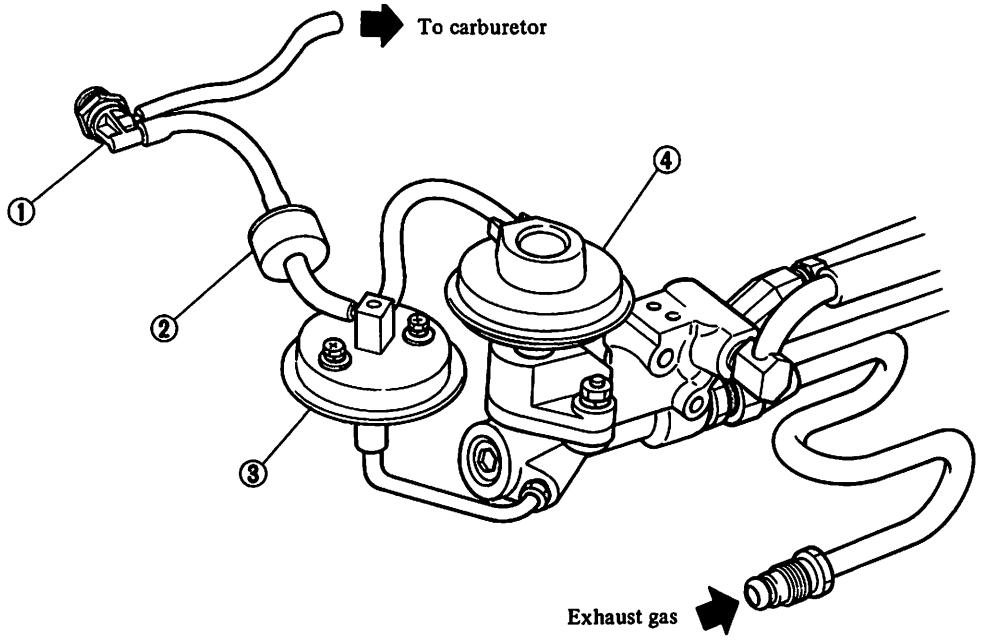
EXHAUST GAS RECIRCULATION (E.G.R.) CONTROL SYSTEM

DESCRIPTION

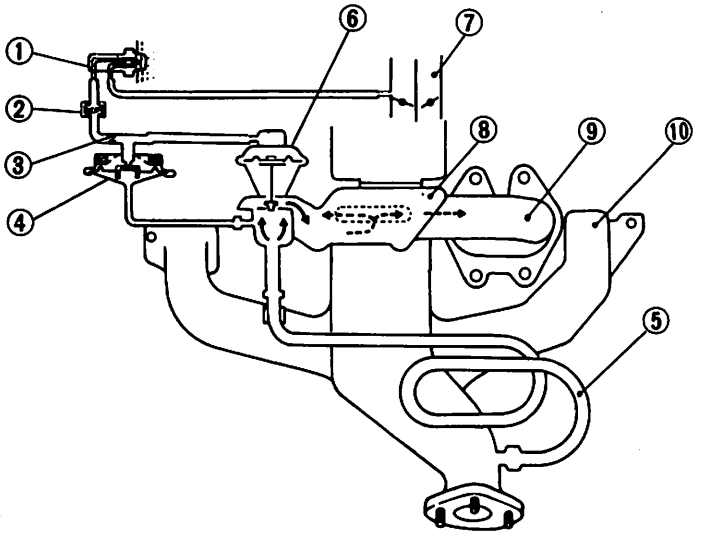
In the exhaust gas recirculation system, a part of the exhaust gas is returned to the combustion chamber to lower the spark flame temperature during combustion. This results in a reduction of the nitrogen oxide (NOx) content in the exhaust gas.

When the E.G.R. control valve is open, some of the exhaust gas is led from the exhaust manifold to the E.G.R. chamber through the E.G.R. passage. The exhaust gas is then controlled in quantity by the E.G.R. valve, and is introduced into the intake manifold.

On California models, a vacuum delay valve is installed on the midway of the vacuum line between the thermal vacuum valve and B.P.T. valve. See Fig. EC-49.



1 Thermal vacuum valve
2 Vacuum delay valve (California models)
3 B.P.T. valve
4 E.G.R. control valve



1 Thermal vacuum valve
2 Vacuum delay valve (California models)
3 Orifice
4 B.P.T. valve
5 E.G.R. tube
6 E.G.R. control valve
7 Carburetor
8 E.G.R. passage
9 Intake manifold
10 Exhaust manifold

EC409A

Fig. EC-49 E.G.R. Control System

OPERATION

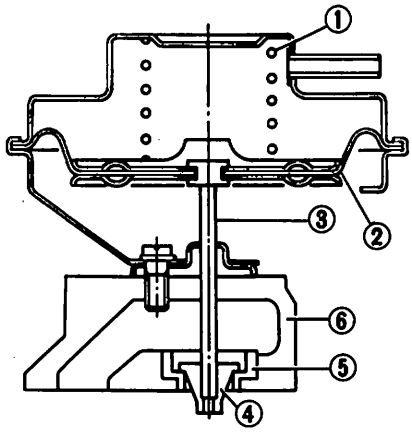
The operation of the system is as follows:

Water temperature °C (°F)	Thermal vacuum valve	B.P.T. valve mmH_2O (inH_2O)		E.G.R. control system
Below 40 to 53 (104 to 127) max.	Closed	Exhaust pressure Below 21 to 33 (0.82 to 1.30)	Open	Not actuated
		Above 21 to 33 (0.82 to 1.30)	Closed	Not actuated
Above 40 to 53 (104 to 127) min.	Open	Exhaust pressure Below 21 to 33 (0.82 to 1.30)	Open	Not actuated
		Above 21 to 33 (0.82 to 1.30)	Closed	Actuated

Note:
With the engine at idle or at full throttle, the E.G.R. control valve closes to deactivate the E.G.R. system regardless of water temperature (operation of the thermal vacuum valve) and B.P.T. valve.

E.G.R. control valve

The E.G.R. control valve controls the quantity of exhaust gas to be led to the intake manifold through vertical movement of the taper valve connected to the diaphragm, to which vacuum is applied in response to the opening of the carburetor throttle valve.



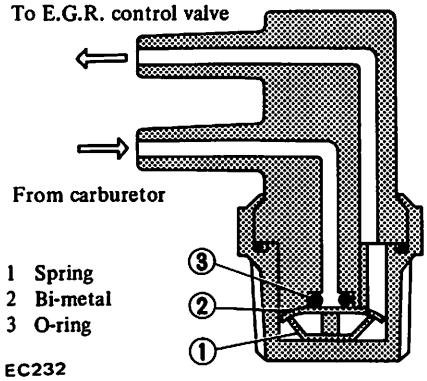
1 Diaphragm spring
2 Diaphragm
3 Valve shaft
4 Valve
5 Valve seat
6 Valve chamber

Fig. EC-50 E.G.R. Control Valve

E.G.R. control valve construction and type vary with transmission type and car destination. For identification purposes, the part number is stamped on the recessed portion at the top of the valve.

Thermal vacuum valve

The thermal vacuum valve is mounted on the engine thermostat housing. It detects engine coolant temperature by means of a built-in bi-metal, and opens or closes the vacuum passage in the thermal vacuum valve.



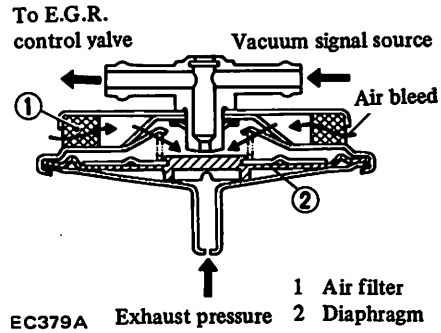
1 Spring
2 Bi-metal
3 O-ring

Fig. EC-51 Thermal Vacuum Valve

When the vacuum passage is open, the carburetor vacuum signal is applied to the diaphragm of the E.G.R. control valve to actuate the taper valve connected to the diaphragm.

B.P.T. valve

The B.P.T. valve monitors exhaust pressure to activate the diaphragm, controlling intake manifold vacuum applied to the E.G.R. control valve. In other words, the amount of recirculated exhaust gas varies with the position of the E.G.R. valve regulated by the operating condition of the engine.

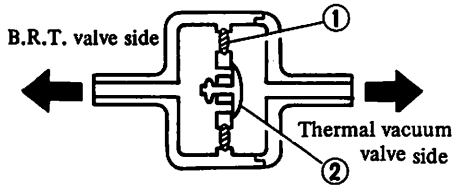


1 Air filter
2 Diaphragm

Fig. EC-52 B.P.T. Valve

Vacuum delay valve (California models)

The vacuum delay valve prevents a rapid vacuum drop of the E.G.R. control line. The valve is designed for one-way operation and consists of a one-way umbrella valve and a sintered steel fluidic restrictor.



1 Sintered metric disc.
2 One-way unbrella valve

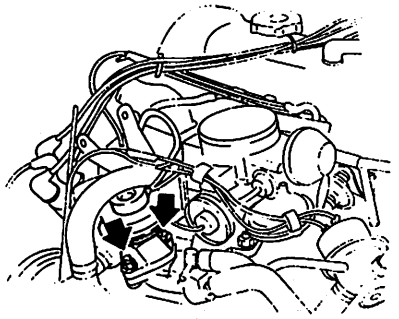
EC860

Fig. EC-53 Vacuum Delay Valve

REMOVAL AND INSTALLATION

E.G.R. control valve

1. Remove air cleaner. Refer to Removal and Installation (Secton EF).
2. Disconnect vacuum hose and remove nuts securing E.G.R. control valve to E.G.R. passage. Then the E.G.R. control valve can be taken out.



EC234

Fig. EC-54 Removing E.G.R. Control Valve

CAUTION:
Pay attention not to give damage to packing of E.G.R. control valve.

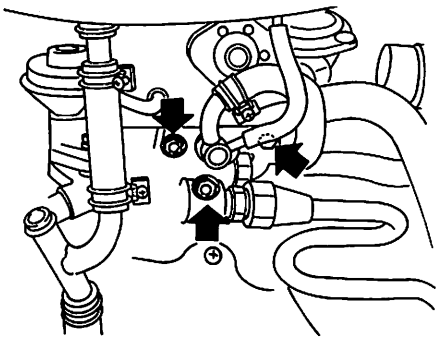
3. Installation is in the reverse sequence of removal.

Note:
In installing new E.G.R. control valve, confirm that the model number and identification marks at the top of valve are as follows:

E.G.R. passage and E.G.R. tube

1. E.G.R. tube can be removed by loosening securing nuts.
2. Disconnect blow-by gas hose and remove securing bolts and nuts. E.G.R. passage can then be taken out.
3. Installation is in the reverse sequence of removal.

Note:
New gasket should be used in installing E.G.R. passage.



EC380A

Fig. EC-55 Removing E.G.R. Passage

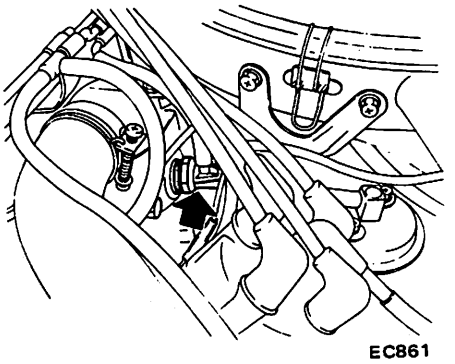
Thermal vacuum valve

The thermal vacuum valve is made of plastic. Consequently pay attention not to give damage to it.

1. Drain engine coolant about one liter.
2. Disconnect two vacuum hoses and unscrew the thermal vacuum valve. Then, the valve can be taken out.
3. Installation is in the reverse sequence of removal.

Note:
- **a. Be sure to apply sealer to threads of the valve prior to installing new valve.**
- **b. When installing new thermal vacuum valve, make sure it is black.**

Ⓣ Tightening torque:
Thermal vacuum valve
Less than 2.2 kg-m (16 ft-lb)



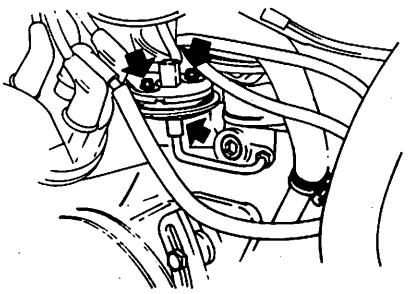
EC861

Fig. EC-56 Removing Thermal Vacuum Valve

B.P.T. valve

1. Remove vacuum tubes on the B.P.T. valve.
2. Remove screws securing B.P.T. valve to the bracket.
3. Disconnect back pressure tube from B.P.T. valve.

The B.P.T. valve can then be taken out.



EC239A

Fig. EC-57 Removing B.P.T. Securing Screws

4. Installation is in the reverse sequence of removal.

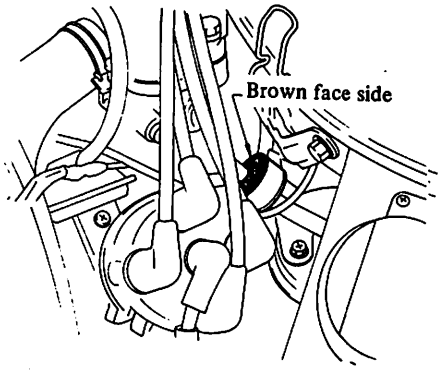
Note:
In replacing the B.P.T. valve with new one, confirm that the type number on new part is the same as that on former one.

Ⓣ Tightening torque:
B.P.T. valve mounting screw
0.38 to 0.51 kg-m
(2.7 to 3.7 ft-lb)

Vacuum delay valve (California models)

The vacuum delay valve is installed on the midway of the vacuum tube between the B.P.T. valve and thermal vacuum valve.

In installing vacuum delay valve, make sure that the brown colored face side is connected to thermal vacuum valve side.



EC879

Fig. EC-58 Installing Vacuum Delay Valve

INSPECTION

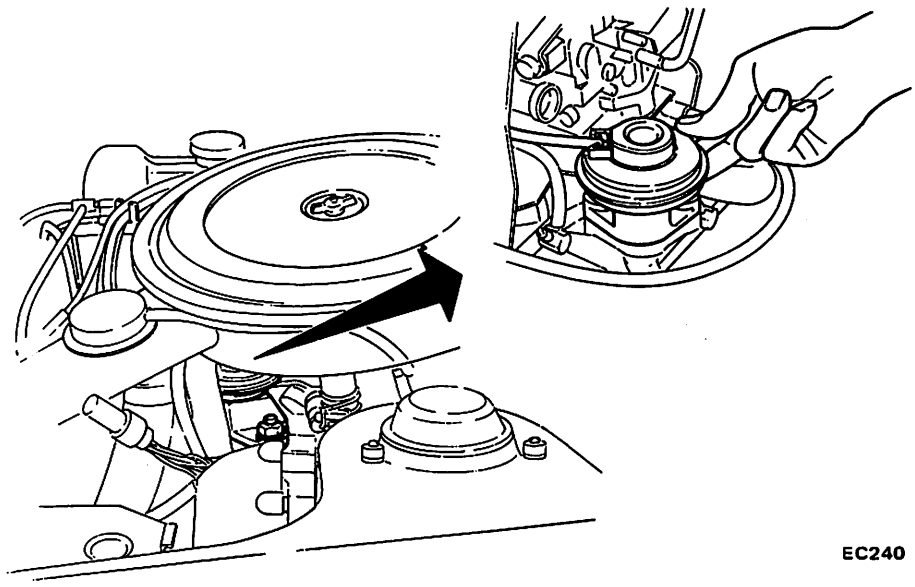
Entire system

1. Make a thorough visual check of E.G.R. control system. If necessary, wipe away oil to facilitate inspection. If any hoses are cracked or broken, replace.
2. With engine stopped, inspect E.G.R. control valve for any indication of binding or sticking by moving diaphragm of control valve upwards with a finger.
3. With engine running, inspect E.G.R. control valve and thermal vacuum valve for normal operation.

(1) When engine coolant temperature is low: [Below 40°C (104°F)]

Make sure that E.G.R. control valve does not operate when engine speed is increased from idling to 3,000 to 3,500 rpm.

Place a finger on the diaphragm of E.G.R. control valve to check for valve operation. See Fig. EC-59.



EC240

Fig. EC-59 Checking E.G.R. Control Valve

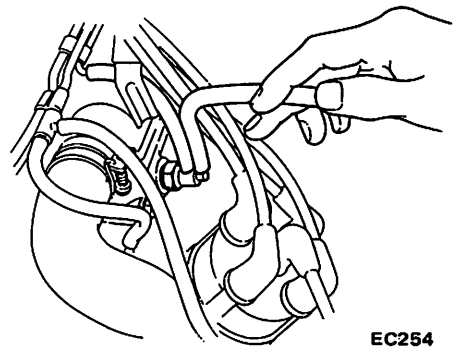
(2) When engine coolant temperature is high: [Above 53°C (127°F)]

1) Make sure that E.G.R. control valve operates when engine speed is increased from idling to 3,000 to 3,500 rpm. Place fingers on the diaphragm of E.G.R. control valve to check for valve operation.
2) If E.G.R. control valve does not operate, check as follows:

- Disconnect one end (E.G.R. control valve side) of vacuum hose connecting thermal vacuum valve to E.G.R. control valve.
- Increase engine speed from idling to 3,000 to 3,500 rpm.
- Make sure that thermal vacuum valve is open, and that carburetor vacuum is present at the end (E.G.R. control valve side) of vacuum hose.

  If vacuum is weak or not present at all, replace thermal vacuum valve. If vacuum is present, replace E.G.R. control valve.

If any difficulty is encountered in judging the condition of any component during above inspection, check the questionable component independently as follows:



EC254

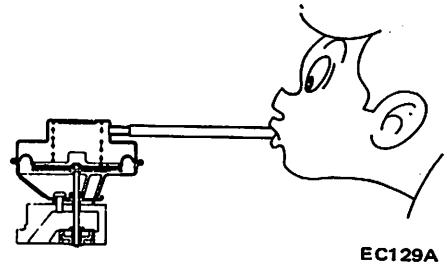
Fig. EC-60 Checking Thermal Vacuum Valve

E.G.R. control valve

Dismount E.G.R. control valve from engine.

1. Apply vacuum to E.G.R. control valve, referring to the following figure. If the valve moves to full position, it is normal.

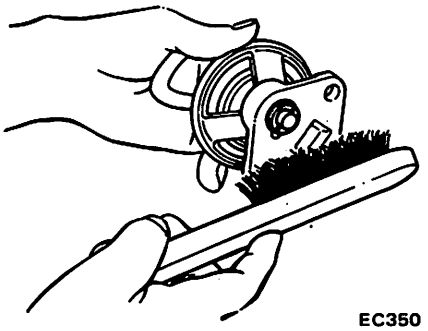
E.G.R. control valve will remain open for more than 30 seconds after vacuum has cut off.



EC129A

Fig. EC-61 Checking E.G.R. Control Valve

2. Visually check E.G.R. control valve for damage, wrinkle or deformation.
3. Clean the seating surface of E.G.R. control valve with a brush and compressed air, and remove foreign matter from around the valve and port.



EC350

Fig. EC-62 Cleaning E.G.R. Control Valve

Thermal vacuum valve

Dismount thermal vacuum valve from engine.

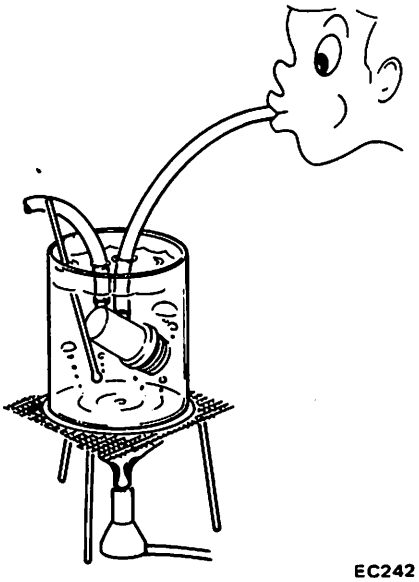
Note:
Before dismounting, drain engine coolant from engine.

Apply vacuum to thermal vacuum valve and check to be sure that thermal vacuum valve opens or closes in response to engine coolant temperature as specified.

Thermal vacuum valve should open at a temperature specified below, completing the vacuum passage.

Thermal vacuum valve opening temperature:
40 to 53°C (104 to 127°F)

CAUTION:
Do not allow water to get inside the thermal vacuum valve.



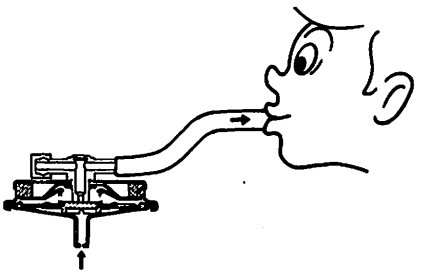
EC242

Fig. EC-63 Checking Thermal Vacuum Valve

B.P.T. valve

1. Disconnect two vacuum hoses on B.P.T. valve.
2. Plug one of two ports of B.P.T. valve.

Apply a pressure above 50 mmH_2O (1.97 inH_2O) to B.P.T. valve and orally such back other port of B.P.T. valve as shown below to check for leakage. If a leak is noted, replace valve.



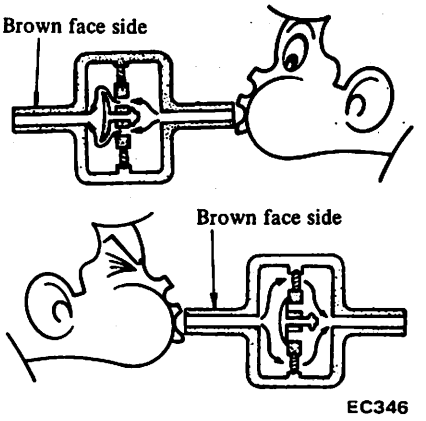
Apply pressure above
50 mmH_2O (1.97 inH_2O)

EC381A

Fig. EC-64 Checking B.P.T. Valve

Vacuum delay valve (California models)

1. Remove vacuum delay valve.
2. Blow air from the port of the E.G.R. control valve side. The vacuum delay valve is in good condition if the air flows through the valve.
3. Try again from the opposite side of the valve. The valve is in good condition if the air flow resistance is greater than the step 2 above.

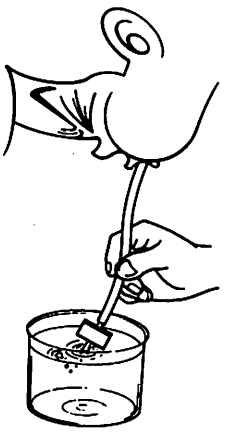


EC346

Fig. EC-65 Checking Vacuum Delay Valve

4. If the condition of spark delay valve is questionable, dip port into a cup filled with water. Blow air from brown face side. Small air bubbles should appear.

CAUTION:
Be careful to avoid entry of oil or dirt into valve.



EC279

Fig. EC-66 Checking Vacuum Delay Valve

SPARK TIMING CONTROL SYSTEM (U.S.A. models)

DESCRIPTION

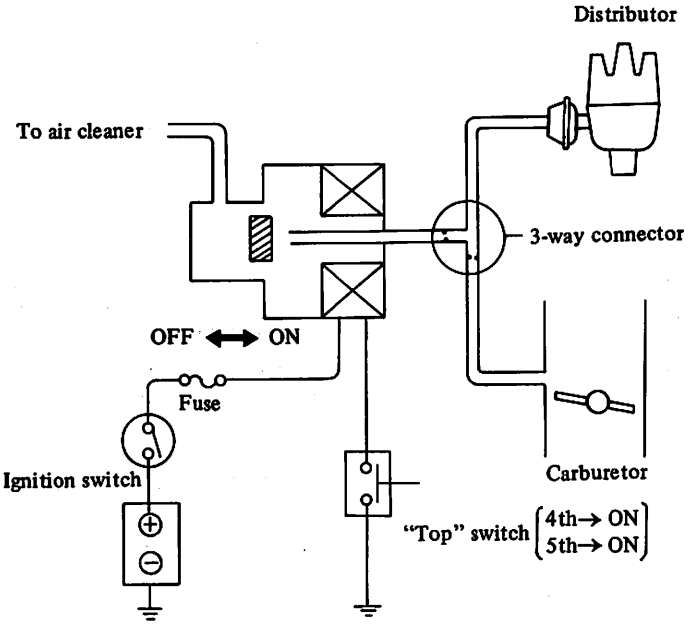
The spark timing control system is designed to control the distributor vacuum advance under varying driving conditions so as to reduce HC and NOx emissions.

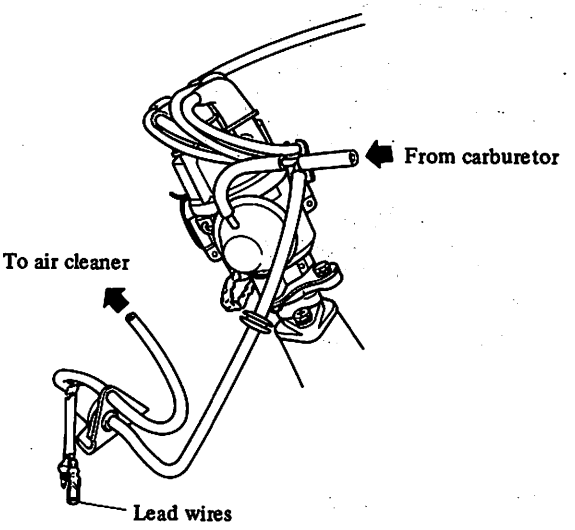
This system is installed on the manual transmission models for the U.S.A.

OPERATION

When the transmission is shifted into the 4th or 5th gear, the electric current flows into the vacuum switching valve. The vacuum switching valve is then actuated and closes the vacuum passage. As a result, the distributor fully advances its ignition timing.

When the transmission is shifted into any gear other than 4th and 5th, current flow is interrupted. The vacuum switching valve is then deactuated and the vacuum leak passage is opened. This weakens the vacuum signal transmitted from the carburetor. As a result, the ignition timing of the distributor is slightly advanced.





Gear position	Top switch	Vacuum switching valve	Ignition timing
4th and 5th	ON	ON	Advance
Other than 4th and 5th	OFF	OFF	Partially advance

EC083A

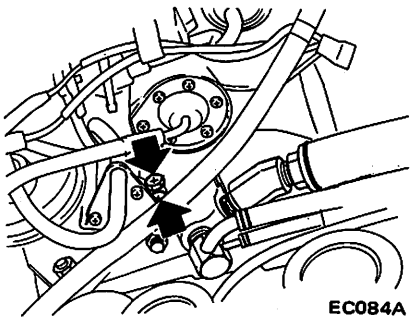
Fig. EC-67 Spark Timing Control System

REMOVAL AND INSTALLATION

Vacuum switching valve

The vacuum switching valve is installed on the E.G.R. passage.

1. Remove air cleaner, referring to Section EF.
2. Disconnect a pair of lead wires for vacuum switching valve.
3. Loosen screws securing valve on the E.G.R. passage. Taking out the vacuum switching valve, disconnect vacuum hoses. The vacuum switching valve can then be taken out.
4. Installation is in the reverse sequence of removal.



EC084A

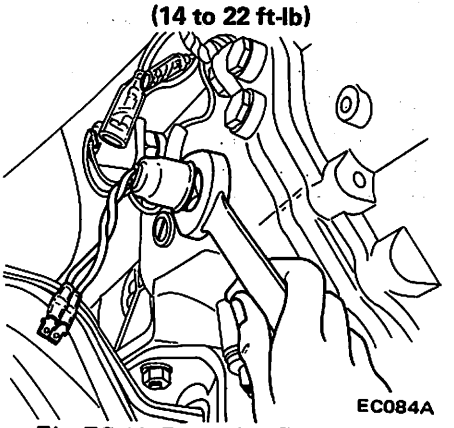
Fig. EC-68 Removing Vacuum Switching Valve

Top detecting switch

The top detecting switch is located beside the transmission gear box.

1. Disconnect a pair of lead wires.
2. Unscrew the switch body itself. The switch can then be taken out.
3. Installation is in the reverse sequence of removal.

Ⓣ Tightening torque:
Top detecting switch
2.0 to 3.0 kg-m
(14 to 22 ft-lb)



EC084A

Fig. EC-69 Removing Gear Detecting Switch

3-way connector

In replacing or reinstalling the 3-way connector, comfirm that installing direction and identification marks are correct.

California model	Yellow
Non-California model	Orange

CAUTION:
Directions for the 3-way connector are indicated. Be sure to connect correctly.

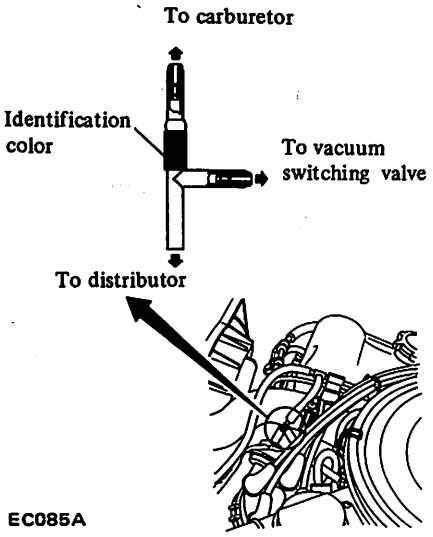


Fig. EC-70 3-Way Connector

INSPECTION

Entire system

1. Ensure that wiring connectors are tight in place.
2. Ensure that vacuum hoses are properly connected to their positions.
3. Ensure that distributor vacuum controller properly functions.
4. Set timing light.
5. Run engine and keep it at approximately 2,000 rpm.
6. Disengage clutch. Shift gears in 5th, 4th, 3rd, then neutral positions. Read spark timing in respective shift positions.

The system is properly functioning if spark timing varies when the transmission is shifted into 4th or 5th from other gear position.

7. If correct spark timing is not obtained in step 6 above, check control circuit or vacuum switching valve.

WARNING:
To protect against accidental forward surge, engage parking brake firmly while above check is being made.

Vacuum switching valve

If spark timing does not vary at all in entire system test, proceed as follows:

1. Disconnect vacuum switching valve wire connectors.
2. Set timing light.
3. Run engine and keep it at approximately 2,000 rpm. Read spark timing.
4. Connect vacuum switching valve wire connectors directly to battery (+) and (–) terminals and read spark timing.

- Vacuum switching valve is normal if spark timing varies. If spark timing does not vary at all in test above, replace vacuum switching valve.

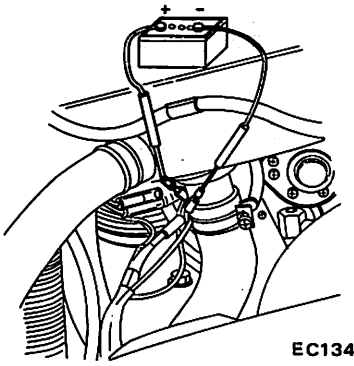
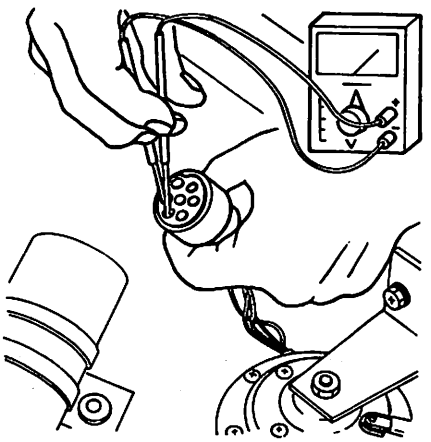


Fig. EC-71 Checking Vacuum Switching Valve



Note:
Be sure to connect (+) and (–) terminals correctly.

Top detecting switch

1. To check top detecting switch for proper "ON-OFF" operation, contact leads of an ohmmeter with switch lead wires and shift transmission from "TOP" to other forward gear, and vice versa. If switch does not operate properly, replace.
2. Install new top detecting switch.

Electrical wiring

Check for continuity in electrical wiring with a function test connector.

Turn ignition switch on, but do not run engine. Check for voltage across terminals (A) and (B) as shown in the following figure.

Electrical wiring circuit is normal if voltmeter readings are as shown in chart below.

If readings are not as shown, check for loose harness and burned fuse.

Gear position	Voltmeter indication
Other than 4th and 5th	12V
4th and 5th	0V

1 Ignition relay
2 Vacuum switching valve
3 Top detecting switch

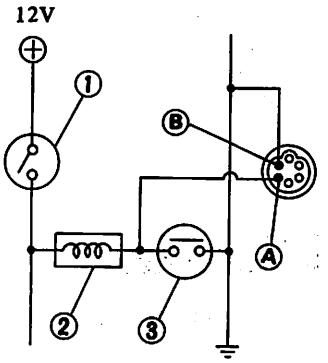


Fig. EC-72 Checking for Continuity in Electrical Wiring with Function Test Connector

CATALYTIC CONVERTER (California models)

DESCRIPTION

The catalytic converter accelerates the chemical reaction of hydrocarbons (HC) and carbon monoxide (CO) in the exhaust gas, and changes them into non-harmful carbon dioxide (CO_2) and water (H_2O). This chemical reaction process requires the proper amount of air, which is supplied by the air pump (Refer to the item "A.I.S."). This air is called "secondary air".

The catalytic converter is mounted on the models destined for California.

OPERATION

Exhaust gas emitted from the engine contains some harmful substances due to incomplete combustion in the combustion chamber. The air injection system is designed to reduce the content of such substances in the exhaust gas. In this system, the secondary air is led from the check valve and injected into the exhaust manifold. With this injection of the secondary air, hydrocarbons (HC) and carbon monoxide (CO) in the exhaust gas are gradually oxidized with oxygen (O_2) in the secondary air and converted into non-harmful carbon dioxide (CO_2) and water (H_2O).

The catalytic converter further cleans engine exhaust gas. Through catalytic action, it changes residual hydrocarbons and carbon monoxide contained in exhaust gas into carbon dioxide and water before exhaust gas is discharged to the atmosphere.

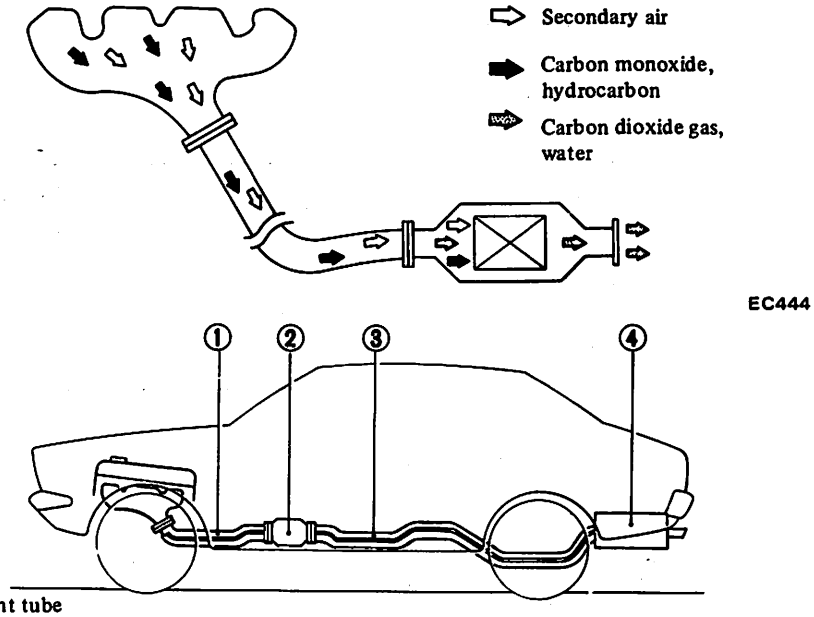


Fig. EC-73 Function of Catalytic Converter

REMOVAL AND INSTALLATION

1. Jack up the car.

Note:
Apply parking brake and place wheel chocks.

2. Remove screws securing lower shelter of catalytic converter.

Loosen flange bolts connecting catalytic converter to front and rear exhaust tubes.

Catalytic converter assembly can then be taken out.

3. Installation is in the reverse sequence of removal.

CAUTION:
a. Be careful not to damage catalytic converter when handling.
b. Never wet catalyzer with water, oil, etc.

Ⓣ Tightening torque:
Catalytic converter bolts
2.6 to 3.4 kg-m
(19 to 25 ft-lb)

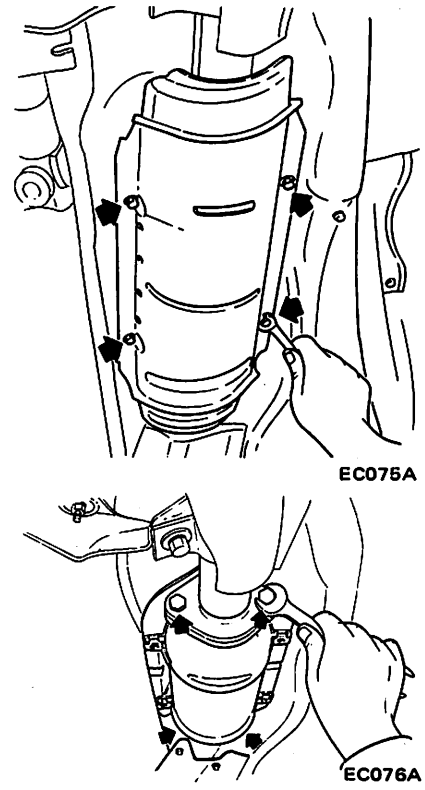


Fig. EC-74 Removing Catalytic Converter

INSPECTION

Preliminary Inspection

Visually check condition of all component parts including hoses, tubes, and wires, replace if necessary.

Refer to Air Injection System for inspection.

Catalytic converter

Whether catalytic converter is normal or not can be checked by observing variation in CO percentage. The checking procedure is as follows:

Apply parking brake. Shift gears into "Neutral" (for manual transmission) and "N" or "P" (for automatic transmission) position.

1. Visually check catalytic converter for damage or cracks.
2. Adjust engine idling speed and CO percentage. Refer to Adjusting Carburetor Idle RPM and Mixture Ratio for adjustment.
3. Race engine (1,500 to 2,000 rpm) two or three times under no load and make sure that specified CO percentage is obtained.
4. Remove cap and connect air hose to air check valve.

If idling speed increases, readjust it to specified speed with throttle adjusting screw.

5. Warm up engine for about four minutes at 2,000 rpm under no load.
6. Measure CO percentage at idling speed. After step 5 has been completed, wait for one minute before making CO percentage measurement.
7. If CO percentage measured in step 6 is less than 0.3%, the catalytic converter is normal.
8. If CO percentage measured in step 6 is over 0.3%, recheck A.I.S. and replace air check valve. Then, perform inspection steps 5 and 6.
9. If CO percentage is still over 0.3% in step 8, catalytic converter is malfunctioning. Replace catalytic converter.

EVAPORATIVE EMISSION CONTROL SYSTEM

CONTENTS

DESCRIPTION EC-25
OPERATION EC-26
INSPECTION EC-27
FUEL TANK AND VAPOR VENT LINE EC-27
CARBON CANISTER PURGE CONTROL VALVE EC-27
CARBON CANISTER FILTER EC-27
FUEL TANK VACUUM RELIEF VALVE ... EC-27
FUEL CHECK VALVE EC-28

DESCRIPTION

The evaporative emission control system is used to reduce hydrocarbons emitted to the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the carbon canister.

This system is made up of the following:

1. Fuel tank with positive sealing filler cap
2. Check valve
3. Vapor vent line
4. Carbon canister
5. Vacuum signal line
6. Canister purge line

Removal and installation of above components are described in Section FE.

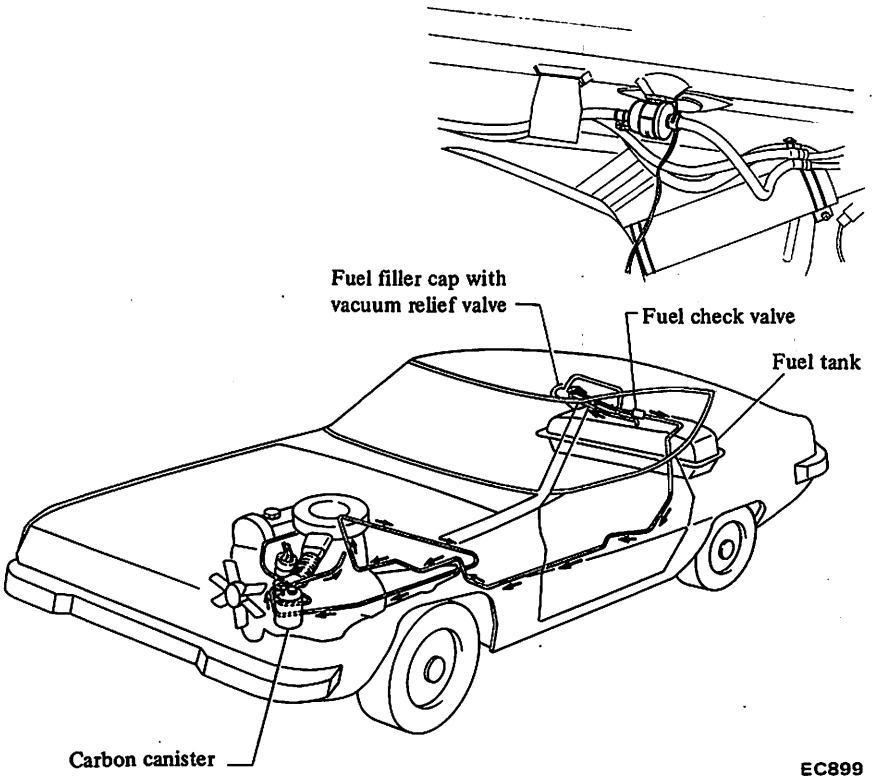


Fig. EC-75 Evaporative Emission Control System

OPERATION

Fuel vapors from the sealed fuel tank are led into the carbon canister. The canister is filled with activated charcoals to absorb the fuel vapors when the engine is at rest or at idling.

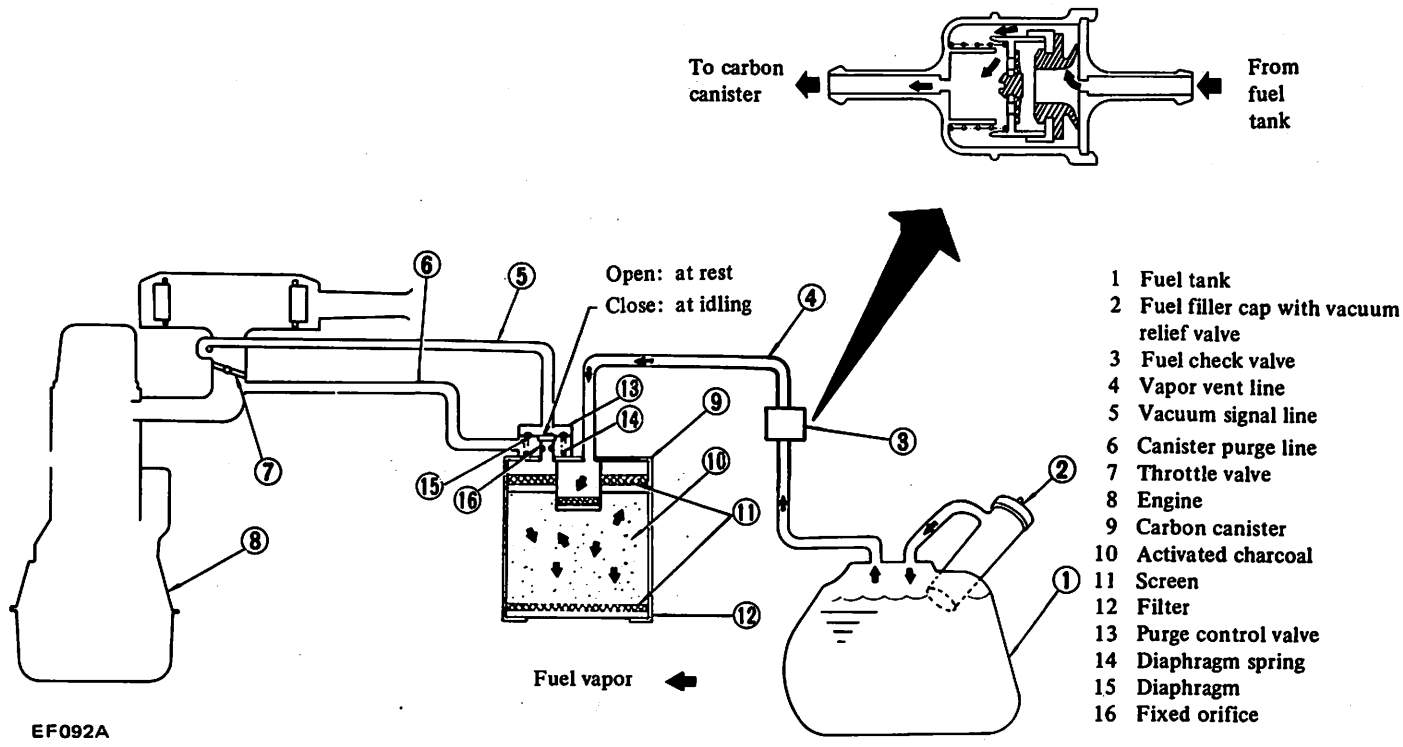


Fig. EC-76 Evaporative Emission Control System (Fuel vapor flow when engine is at rest or idling.)

As the throttle valve opens and car speed increases, vacuum pressure in the vacuum signal line forces the purge control valve to open, and admits an orifice to intake manifold and fuel vapor is then drawn into the intake manifold through the canister purge line. See Fig. EC-75.

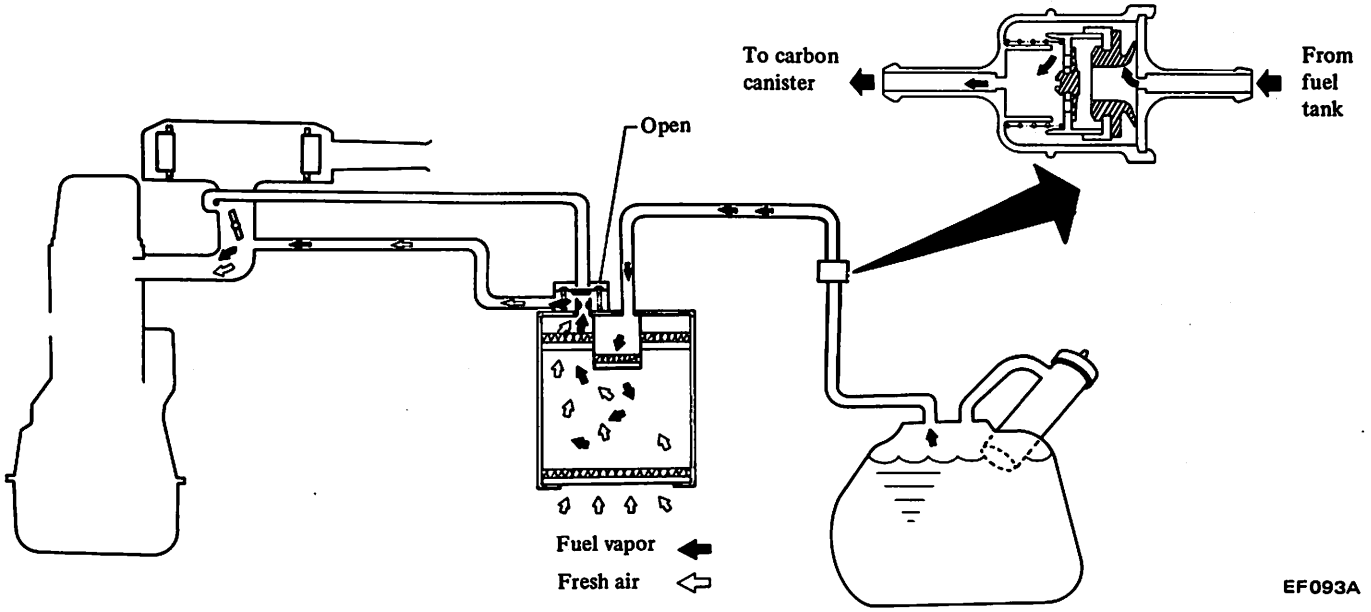


Fig. EC-77 Evaporative Emission Control System (Fuel vapor flow when engine is running.)

INSPECTION

FUEL TANK AND VAPOR VENT LINE

1. Check all hoses and fuel tank filler cap.
2. Disconnect the vapor vent line connecting carbon canister to fuel tank.
3. Connect a 3-way connector, a manometer and a cock (or an equivalent 3-way charge cock) to the end of the vent line.
4. Supply fresh air into the vapor vent line through the cock little by little until pressure becomes 400 mmH_2O (15.75 inH_2O). See Fig. EC-78.
5. Shut the cock completely and leave it unattended.
6. After 2.5 minutes, measure the height of the liquid in the manometer.
7. Variation in height should remain with 25 mmH_2O (0.98 inH_2O).
8. When filler cap does not close completely, the height should drop to zero in a short time.
9. If the height does not drop to zero in a short time when filler cap is removed, it is the cause of a stuffy hose.

Note:
In case the vent line is stuffy, the breathing in fuel tank is not thoroughly made, thus causing insufficient delivery of fuel to engine or vapor lock. It must, therefore, be repaired or replaced.

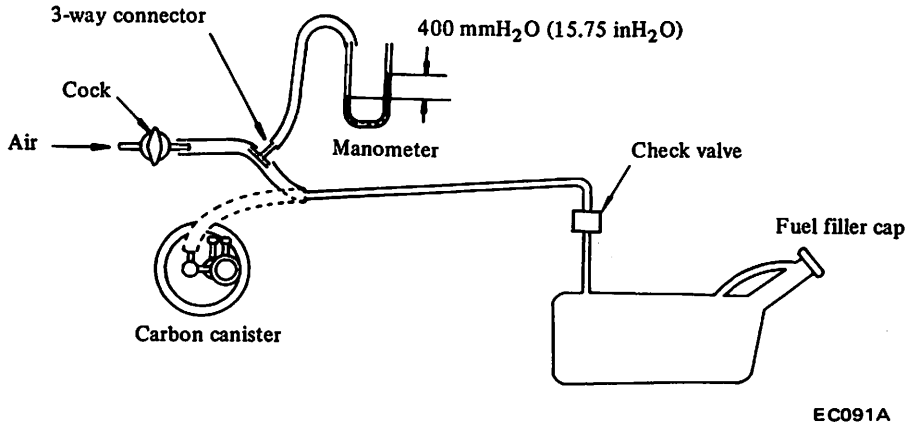


Fig. EC-78 Checking Evaporative Emission Control System

CARBON CANISTER PURGE CONTROL VALVE

Check for fuel vapor leakage, in the distributor vacuum line, at diaphragm of carbon canister purge control valve.

To check for leakage, proceed as follows:

1. Disconnect rubber hose, in the line, between T-connector and carbon canister at T-connector.
2. Inhale air into the opening of rubber hose running to vacuum hole in carbon canister and ensure that there is no leak.

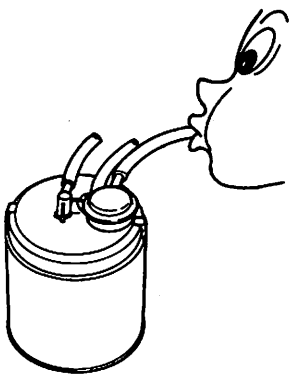
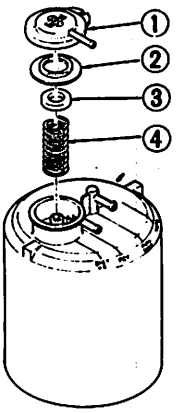


Fig. EC-79 Checking Carbon Canister Purge Control Valve

3. If there is a leak, remove top cover from purge control valve and check for dislocated or cracked diaphragm. If necessary, replace diaphragm kit (which is made up of a retainer, diaphragm and spring).



1 Cover
2 Diaphragm
3 Retainer
4 Diaphragm spring

EF200

Fig. EC-80 Carbon Canister Purge Control Valve

CARBON CANISTER FILTER

Check for a contaminated filter.

Filter can be removed at the bottom of canister installed on car body.

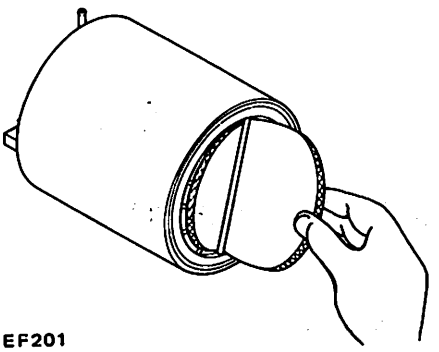
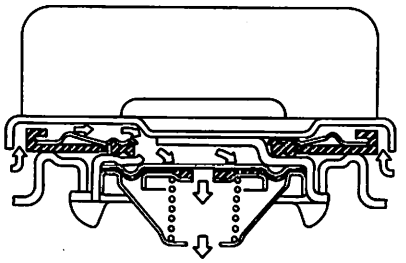


Fig. EC-81 Replacing Carbon Canister Filter

FUEL TANK VACUUM RELIEF VALVE

Remove fuel filler cap and see it functions properly.

1. Wipe clean valve housing and have it in your mouth.
2. Inhale air. A slight resistance accompanied by valve indicates that valve is in good mechanical condition. Note also that, by further inhaling air, the resistance should be disappeared with valve clicks.
3. If valve is clogged, or if no resistance is felt, replace cap as an assembled unit.



ET500

Fig. EC-82 Fuel Filler Cap

FUEL CHECK VALVE

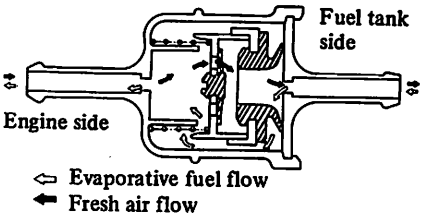
1. Blow air through connector on fuel tank side.

A considerable resistance should be felt at the mouth and a portion of air flow be directed toward the engine.

2. Blow air through connector on engine side.

Air flow should be smoothly directed toward fuel tank.

3. If fuel check valve is suspected of not being properly functioning in steps 1 and 2 above, replace.



EC090A

Fig. EC-83 Checking Fuel Check Valve

SERVICE DATA AND SPECIFICATIONS

INSPECTION AND ADJUSTMENT

AIR PUMP

Air pressure (With engine speed at 2,600 rpm)	mmHg (inHg)	More than 100 (3.94)

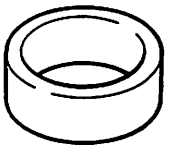
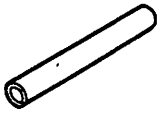
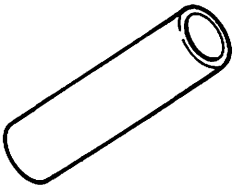
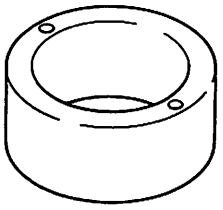
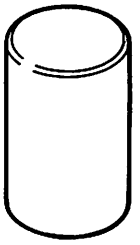
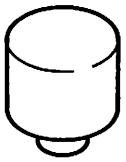
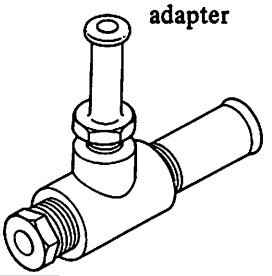
E.G.R. SYSTEM

Thermal vacuum valve opening temperature	°C (°F)	40 to 53 (104 to 127)

TIGHTENING TORQUE

Air gallery flare nut	kg-m (ft-lb)	5.0 to 5.9 (36 to 43)
Air pump		
Bearing cover securing bolt	kg-m (ft-lb)	0.1 to 0.2 (0.7 to 1.4)
Rotor ring screw	kg-m (ft-lb)	0.5 to 0.7 (3.6 to 5.1)
End cover bolt	kg-m (ft-lb)	0.7 to 0.9 (5.1 to 6.5)
Pulley securing bolt	kg-m (ft-lb)	0.75 to 0.90 (5.4 to 6.5)
Thermal vacuum valve	kg-m (ft-lb)	Less than 2.2 (16)
B.P.T. valve mounting screw	kg-m (ft-lb)	0.38 to 0.51 (2.7 to 3.7)
Top detecting switch	kg-m (ft-lb)	2.0 to 3.0 (14 to 22)
Catalytic converter bolt	kg-m (ft-lb)	2.6 to 3.4 (19 to 25)

SPECIAL SERVICE TOOLS

Tool number & tool name	Kent-Moore No. Reference page or Fig. No. Unit application	Tool number & tool name	Kent-Moore No. Reference page or Fig. No. Unit application
ST19810000 Hexagon wrench 	—— Fig. EC-28 Fig. EC-39 *	ST19930000 Bearing stand 	—— Fig. EC-32 *
ST19900000 Dummy shaft 	J 26021 Fig. EC-37 *	ST19910000 Bearing driver 	—— Fig. EC-32 Fig. EC-34 Fig. EC-35 *
ST19890000 Rotor adapter 	—— Fig. EC-31 Fig. EC-33 *	ST19920000 Rotor stand 	—— Fig. EC-34 Fig. EC-35 *
ST19940000 Bearing pressing tool 	—— Fig. EC-31 Fig. EC-33 *	ST19870000 Air pump test gauge adapter 	J 25667-01 Fig. EC-42 *

*: Applicable to all S10 series models

SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION EE

ENGINE ELECTRICAL SYSTEM

EE

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ALTERNATOR EE-13
REGULATOR EE-18
IGNITION CIRCUIT EE-20
DISTRIBUTOR EE-22
IC IGNITION UNIT EE-24
IGNITION COIL EE-28
SPARK PLUG EE-29
SERVICE DATA AND SPECIFICATIONS EE-30
TROUBLE DIAGNOSES AND CORRECTIONS EE-34

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CHECKING SPECIFIC GRAVITY ..... EE- 2
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II. STARTING MOTOR EE-35
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BATTERY

WARNING:
Never touch positive and negative terminals at the same time with bare hands. This could result in injury.

CHECKING ELECTROLYTE LEVEL

Remove six vent plugs and check for electrolyte level in each cell.

If necessary, pour distilled water.

CHECKING SPECIFIC GRAVITY

Specific gravity of battery electrolyte is tested by a hydrometer. If the state of charge of battery is below 70%, battery must be recharged or battery-electrolyte concentration adjusted.

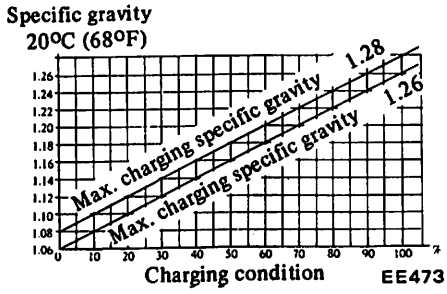


Fig. EE-1 Charging Condition

The gravity of electrolyte changes 0.0007 for every 1°C (1.8°F) temperature. Converted specific gravity at 20°C (68°F) can then be made by using the following formula:

$$S_{20} = St + 0.0007 (t - 20)$$

Where,

St: Specific gravity of electrolyte at t°C

S_{20}: Specific gravity of electrolyte corrected at 20°C (68°F)

t: Electrolyte temperature

For example: A hydrometer reading of 1.260 at 30°C (86°F) would be 1.267 corrected to 20°C (68°F), indicating fully charged battery. On the other hand, a hydrometer reading of 1.220 at −10°C (14°F) would be 1.199 corrected to 20°C (68°F), indicating a partially charged battery.

The state of charge of battery can be determined by the following table if the specific gravity of electrolyte is known. Before checking, be sure that cells are filled to correct level.

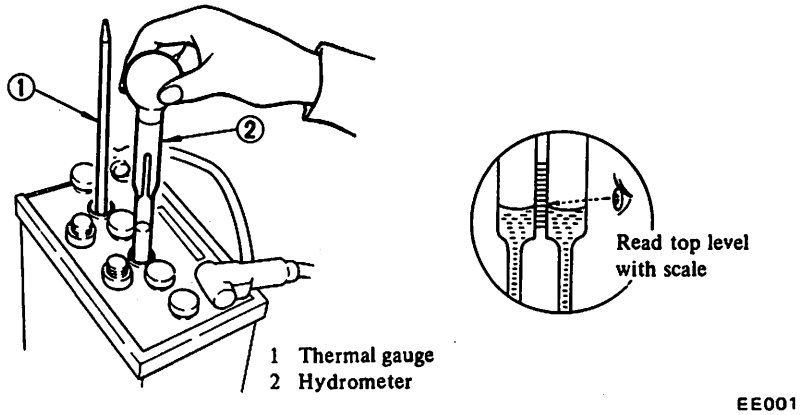


Fig. EE-2 Checking Specific Gravity

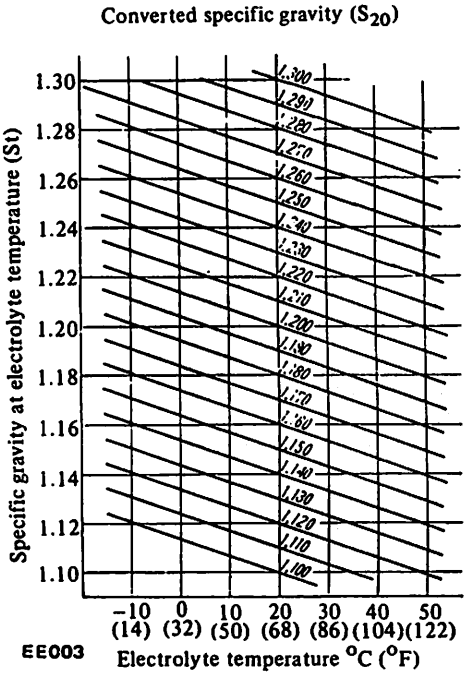


Fig. EE-3 Conversion of Specific Gravity

BATTERY FREEZING

Battery electrolyte freezing point varies with acid concentration or its specific gravity. A battery with an insufficient charge will freeze at lower temperatures. If specific gravity of a battery falls below 1.1, this is an indication that battery is completely discharged and will freeze readily when temperatures fall below freezing.

Note: Use extreme caution to avoid freezing battery since freezing will generally ruin the battery.

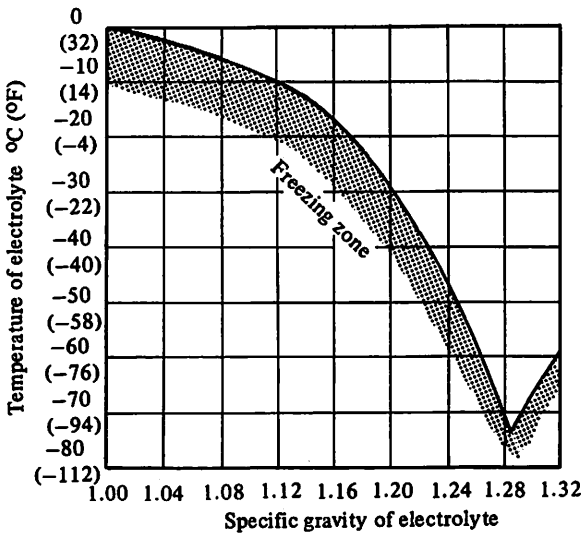


Fig. EE-4 Freezing Point of Electrolyte

CHARGING

If electrolyte level is satisfactory, battery must be charged when electrolyte-gravity reading falls below 1.20 or 1.22 (NS70). If battery on car is quick-charged to bring it up to full charge, the operation should be carried out with negative cable removed.

Prior to charging, corroded terminals should be cleaned with a brush and common baking-soda solution. In addition, the following items should be observed while battery is being charged.

1. Be sure that electrolyte level is above top of each plate.
2. Keep removed plugs in a safe place.
3. Do not allow electrolyte temperature to go over 45°C (113°F).
4. After charging, check to be certain that specific gravity does not exceed maximum charging specific gravity at 20°C (68°F). Correction can be made by adding distilled water into cells as necessary.
5. Keep battery away from open flame while it is being charged.
6. After all vent plugs have been tightened, clean all sprayed electrolyte off upper face of battery.

INSTALLATION

1. Install and tighten clamps securely.
2. After clamps have been tightened, clean battery cable terminals and apply grease to retard formation of corrosion.

STARTING MOTOR

STARTING CIRCUIT

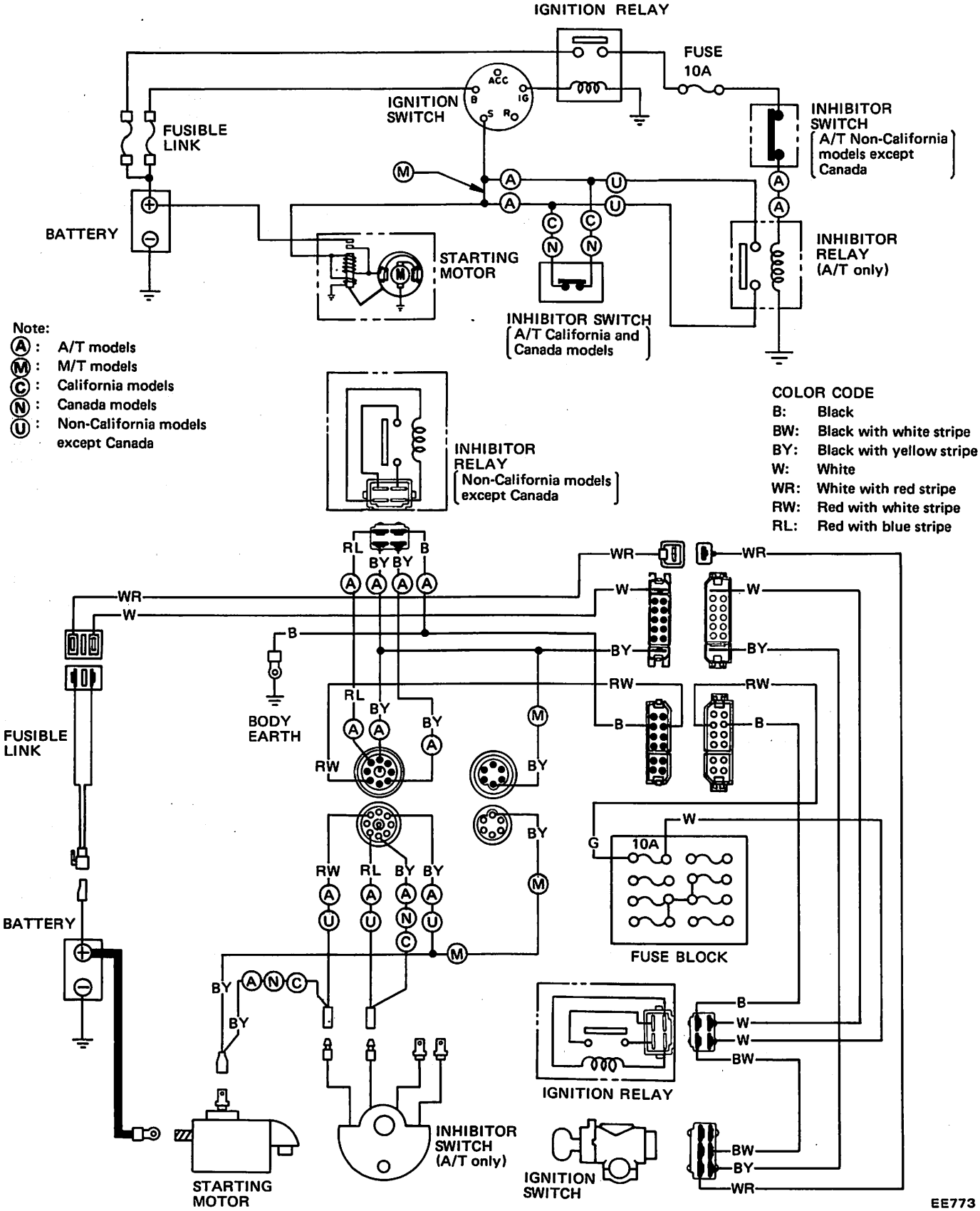
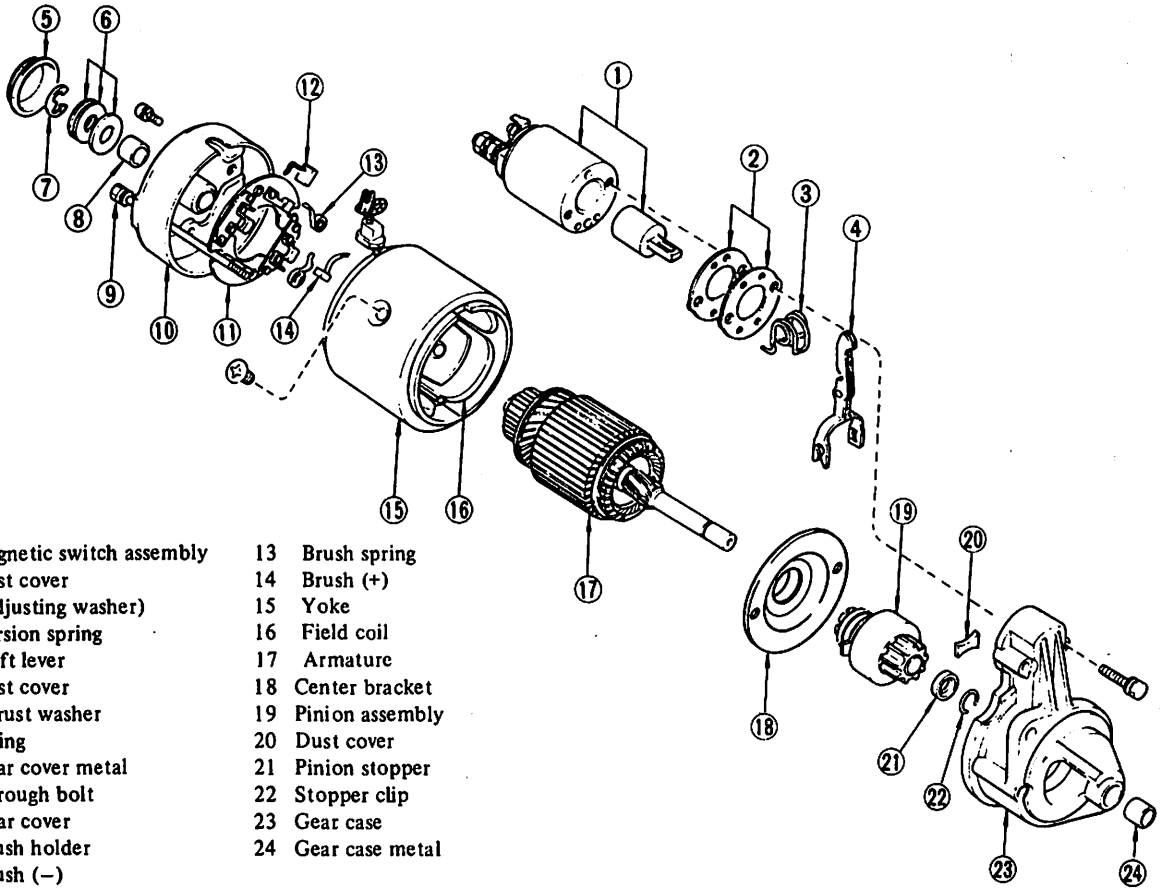


Fig. EE-5 Circuit Diagram of Starting System

CONSTRUCTION

NON-REDUCTION GEAR TYPE

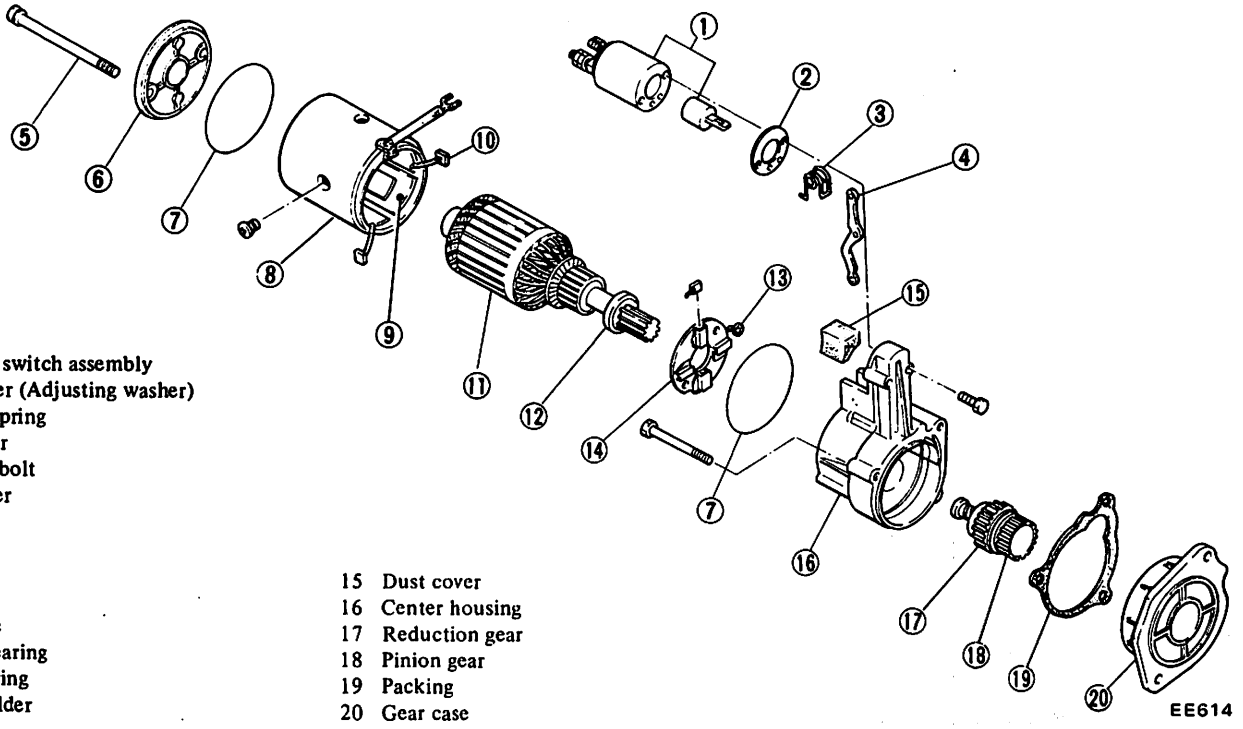


1 Magnetic switch assembly
2 Dust cover (Adjusting washer)
3 Torsion spring
4 Shift lever
5 Dust cover
6 Thrust washer
7 E-ring
8 Rear cover metal
9 Through bolt
10 Rear cover
11 Brush holder
12 Brush (−)
13 Brush spring
14 Brush (+)
15 Yoke
16 Field coil
17 Armature
18 Center bracket
19 Pinion assembly
20 Dust cover
21 Pinion stopper
22 Stopper clip
23 Gear case
24 Gear case metal

EE660

Fig. EE-6 Non-Reduction Gear Type Starting Motor

REDUCTION GEAR TYPE



1 Magnetic switch assembly
2 Dust cover (Adjusting washer)
3 Torsion spring
4 Shift lever
5 Through bolt
6 Rear cover
7 O-ring
8 Yoke
9 Field coil
10 Brush
11 Armature
12 Center bearing
13 Brush spring
14 Brush holder
15 Dust cover
16 Center housing
17 Reduction gear
18 Pinion gear
19 Packing
20 Gear case

EE614

Fig. EE-7 Reduction Gear Type Starting Motor

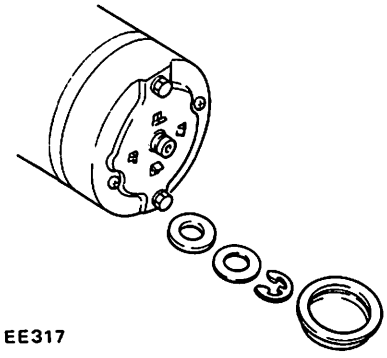
REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
Disconnect harness connector and battery cable at magnetic switch.
2. Remove bolts securing starting motor to transmission case. Pull starting motor forward and remove it.
3. Install starting motor in reverse order of removal.

DISASSEMBLY

NON-REDUCTION GEAR TYPE

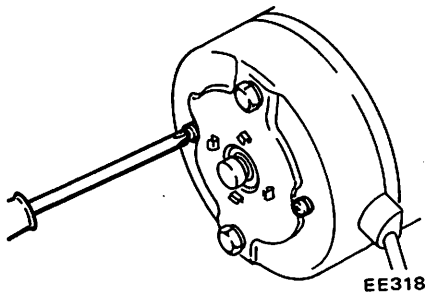
1. Disconnect connecting plate from "M" terminal of magnetic switch. Remove two screws securing magnetic switch and remove magnetic switch assembly.
2. Remove dust cover, E-ring and thrust washer(s).



EE317

Fig. EE-8 Removing Dust Cover, E-ring and Thrust Washer(s)

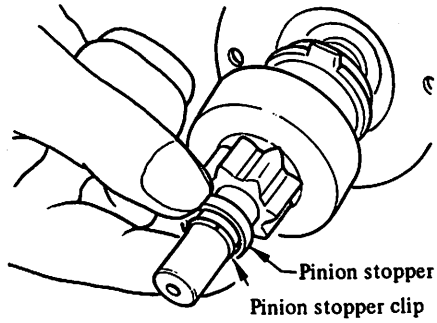
3. Remove two screws securing brush holder assembly.



EE318

Fig. EE-9 Removing Brush Holder Setscrews

4. Remove two through bolts and rear cover.
5. Remove brushes from their holder by moving each brush spring away from brush with a hook.
Remove brush holder.
6. Remove yoke assembly and withdraw armature assembly and shift lever.
7. Remove pinion stopper located at the end of armature shaft. To remove stopper, first move stopper toward pinion and after removing stopper clip, remove stopper with overrunning clutch assembly from armature shaft.



EE277

Fig. EE-10 Removing Pinion Stopper

REDUCTION GEAR TYPE

1. Disconnect connecting plate from "M" terminal of magnetic switch. Remove two screws securing magnetic switch and remove magnetic switch assembly.

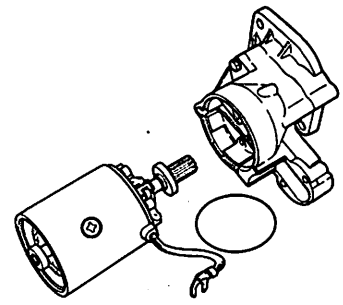
Note: Torsion spring can be pulled off magnetic switch.

2. Remove through bolts and rear cover.

Note: Rear cover can be pried off with a flat-blade screwdriver inserted between it and yoke. Be careful not to damage packing while removing rear cover.

3. Remove yoke, armature and brush holder as an assembly from center housing.

CAUTION:
When removing, be careful not to knock brush, commutator or coil against any adjacent part.



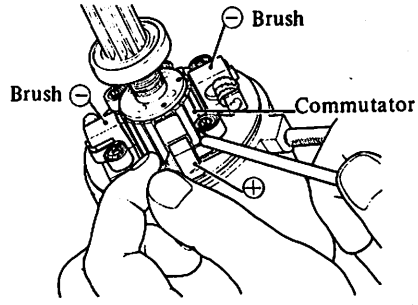
EE615

Fig. EE-11 Removing Yoke and Armature

4. To remove brush holders, proceed as follows:
(1) Remove brush (on positive side) from its holder.

Note: Brush on positive side differs in that it is isolated from brush holder and its lead wire is connected to field coil.

(2) Carefully lifting brush (on negative side) away from commutator surface, remove it from brush holder.



EE616

Fig. EE-12 Removing Brush

5. Remove bolts securing center housing to gear case, and detach center housing.
6. Remove pinion gear.

CLEANING AND INSPECTION

Clean all disassembled parts, but do not use grease dissolving solvents for cleaning overrunning clutch, armature assembly, magnetic switch assembly and field coils since such a solvent would dissolve grease packed in clutch mechanism and would damage coils or other insulators.

Check them for excessive damage or wear, and replace if necessary.

TERMINAL

Check terminal for damage and wear, and replace magnetic switch assembly if necessary.

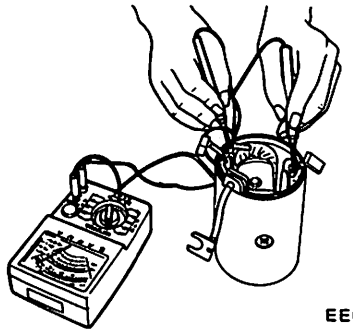
FIELD COIL

Check field coil for insulation. If the insulation of coil is damaged or worn it should be replaced.

Testing field coil for continuity:

Connect the probe of a circuit tester or an ohmmeter to field coil two positive terminal of positive brush holder.

If tester shows no continuity, field circuit or coil is open. Replace it.



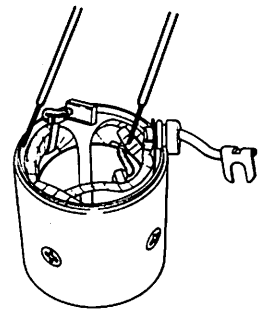
EE016

Fig. EE-13 Testing Field Coil for Continuity

Testing field coil for ground:

Place one probe of circuit tester onto yoke and the other onto field coil lead (positive terminal).

If very little resistance is read, field coil is grounded. Replace it.



EE017

Fig. EE-14 Testing Field Coil for Ground

BRUSHES AND BRUSH LEAD WIRE

Check the surface condition of brush contact and wear of brush. If a loose contact is found it should be replaced.

If brush is worn so that its length is less than specified value, replace.

Minimum length of brush:
Non-reduction gear type
12 mm (0.47 in)
Reduction gear type
11 mm (0.43 in)

Check the connection of lead clip and lead wire.

Check brush holders and spring clip to see if they are not deformed or bent, and will properly hold brushes against the commutator.

If brushes or brush holders are dirty, they should be cleaned.

BRUSH SPRING TENSION

Check brush spring tension by a spring scale as shown in Fig. EE-15.

If it is faulty, replace it

Spring tension:
Non-reduction gear type
1.4 to 1.8 kg (3.1 to 4.0 lb)
Reduction gear type
1.6 to 2.0 kg (3.5 to 4.4 lb)

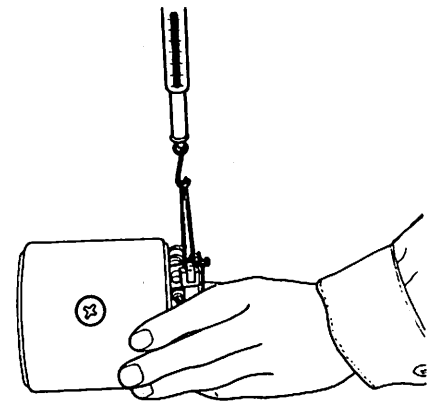
ARMATURE ASSEMBLY

Check external appearance of armature and commutator.

1. Inspect commutator. If the surface of commutator is rough, it must be sanded lightly with No. 500 sandpaper. If the depth of insulating mica is less than 0.2 mm (0.008 in) from commutator surface, insulating mica should also be undercut so that its depth is 0.5 to 0.8 mm (0.020 to 0.031 in).

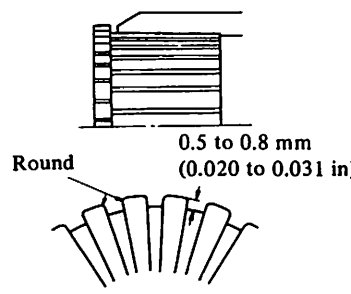
The wear limit of commutator diameter is 1 mm (0.04 in). If the diameter of commutator is less than specified value, replace armature assembly.

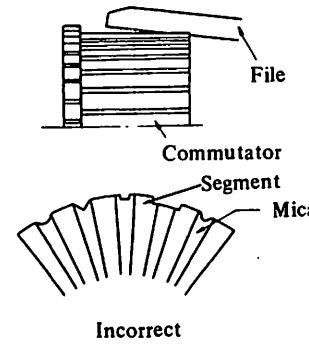
Diameter limit:
Non-reduction gear type
32 mm (1.26 in)
Reduction gear type
29 mm (1.14 in)



EE018

Fig. EE-15 Inspecting Brush Spring Tension





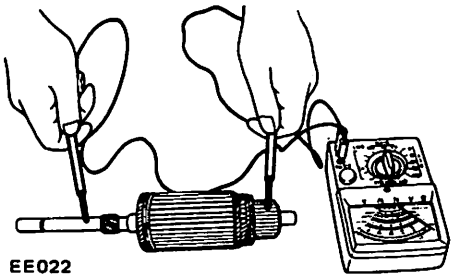
EE021

Fig. EE-16 Undercutting Insulating Mica

2. Inspect soldered connection of armature lead and commutator. If loose connection is found, solder it using resin flux.
3. Armature test for ground

Using a circuit tester, place one test probe onto armature core or shaft and other onto each commutator bar.

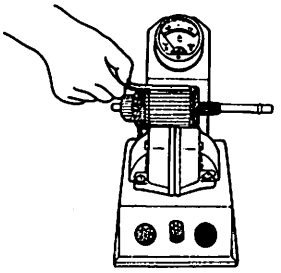
If tester shows continuity, armature is grounded and must be replaced.



EE022

Fig. EE-17 Testing Armature for Ground

4. Check armature for short by placing it on armature tester (growler) with a piece of iron over armature core, rotating armature. If the plate vibrates, armature is shorted.



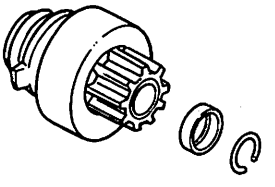
EE023

Fig. EE-18 Testing Armature for Short

5. Check armature for continuity by placing probes of tester on two segments side by side. If tester shows no continuity, the circuit is open.

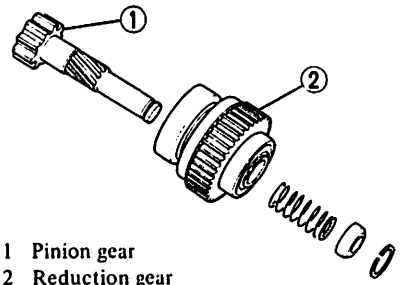
OVERRUNNING CLUTCH ASSEMBLY

Inspect pinion assembly and screw sleeve or reduction gear. Screw sleeve must slide freely along armature shaft splines or pinion gear shaft must slide freely through reduction gear. If damage is found or resistance except normal resistance due to spring felt when sliding, it must be repaired. Inspect pinion teeth. If excessive rubbing is found on teeth, replace. Flywheel ring gear also must be inspected.



EE278

Fig. EE-19 Overrunning Clutch Assembly



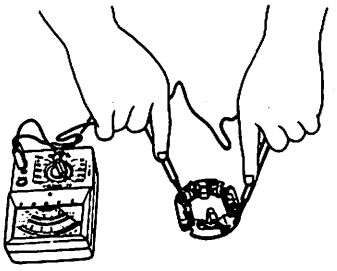
1 Pinion gear
2 Reduction gear

EE617

Fig. EE-20 Pinion and Reduction Gear Overrunning Clutch Assembly

BRUSH HOLDER TEST FOR GROUND

Using a circuit tester, place one test probe onto negative side of brush holder and another onto positive side. If tester shows continuity, brush holder is shorted to ground. Replace brush holder.



EE025

Fig. EE-21 Testing Brush for Ground

BEARING METAL (Non-reduction gear type)

Inspect bearing metal for wear or side play. If the clearance between bearing metal and armature shaft is more than 0.2 mm (0.008 in), replace metal.

BALL BEARING (Reduction gear type)

Holding outer race with finger, rotate bearing to see if there is any play or bind. If necessary, replace bearing.

MAGNETIC SWITCH ASSEMBLY

1. Using a circuit tester, check continuity between "S" terminal of magnetic switch and switch body metal. If continuity does not exist, shunt coil is opened.

Replace switch assembly.

2. In the same manner as above, check continuity between terminals "S" and "M". If continuity does not exist, series coil is opened.

Replace switch assembly.

ASSEMBLY

Reassemble starting motor in reverse sequence of disassembly.

When assembling, be sure to apply grease to gear case and rear cover bearing metal, and apply oil lightly to pinion.

TEST

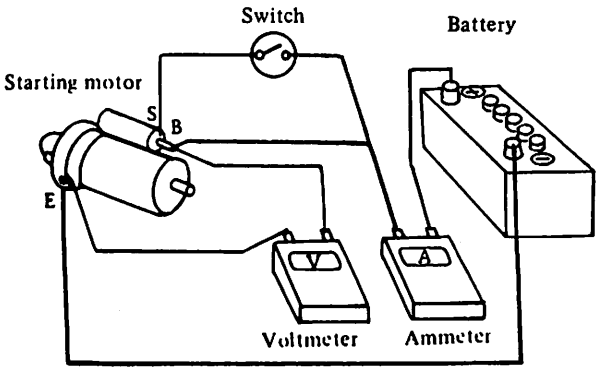
PERFORMANCE TEST

Starter motor should be subjected to a "no-load" test whenever it has been overhauled to ensure that its performance will be satisfactory when installed on engine. Starter motor should also be subjected to the test when the cause of abnormal operation is to be determined. A brief outline of the test is given below.

No-load test

Connect starting motor in series with specified (12 volts) battery and an ammeter capable of indicating 1,000 amperes.

Specified current draw and revolution in this test are shown in "Specifications".



EE738

Fig. EE-22 No-load Testing

DIAGNOSES OF TEST

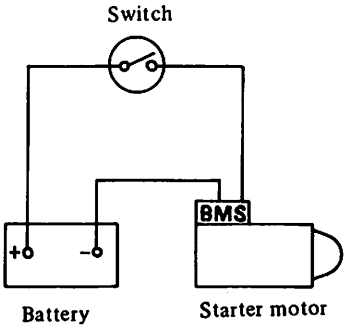
1. Low speed with no-load and high current draw may result from the following:
(1) Tight, dirty or worn bearings.
(2) Bent armature shaft or loosened field probe.
(3) Shorted armature;
Check armature further.
(4) A grounded armature or field;
a. Remove input terminal.
b. Raise two negative side brushes from commutator.
c. Using a circuit tester, place one probe onto input terminal and the other onto yoke.
d. If tester indicates continuity, raise the other two brushes and check field and armature separately to determine whether field or armature is grounded.

2. Failure to operate with high current draw may be caused by the following:
(1) A grounded or open field coil:
Inspect the connection and trace circuit with a circuit tester.
(2) Armature coil does not operate:
Inspect commutator for excessive burning. In this case, arc may occur on damaged commutator when motor is operated with no-load.

(3) Burned out commutator bar:
Weak brush spring tension, broken brush spring, rubber bush, thrust out of mica in commutator or a loose contact between brush and commutator would cause commutator bar to burn.

3. Low current draw and low no-load speed would cause high internal resistance due to loose connections, damaged leads, dirty commutator and causes listed on item 2-(3).

MAGNETIC SWITCH ASSEMBLY TEST



EE351

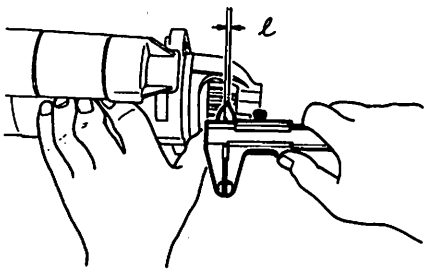
Fig. EE-23 Circuit of Magnetic Switch Assembly Test

If the starting motor check is "OK", check magnetic switch assembly. Connect cables between "negative" battery terminal and starting motor "M" terminal, "positive" battery terminal and starting motor "S" terminal connecting a switch in series as shown above.

(Non-reduction gear type)

With the switch on, push pinion back to remove all slack and measure the clearance "ℓ" between pinion front edge and pinion stopper.

Clearance "ℓ":
0.3 to 2.5 mm
(0.012 to 0.098 in)



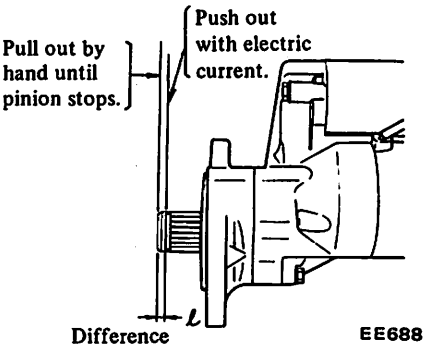
EE644

Fig. EE-24 Measuring Clearance "ℓ"

(Reduction gear type)

Compare difference "ℓ" in height of pinion when it is pushed out with magnetic switch energized and when it is pulled out by hand until it touches stopper.

Difference "ℓ":
0.3 to 1.5 mm
(0.012 to 0.059 in)



EE688

Fig. EE-25 Measuring Difference "ℓ"

If necessary, adjust it by changing or adding adjusting washer(s). Adjusting washers are available into two different sizes, 0.5 mm (0.020 in) and 0.8 mm (0.031 in).

CHARGING CIRCUIT

The charging circuit consists of a battery, an alternator incorporating an IC voltage regulator and wiring that connects these parts.

The purpose of this system is to convert mechanical energy from the engine into electrical energy which is used to operate all electrically operated units and to keep the battery fully charged.

With the ignition switch in ON, the circuit between transistor "Tr_1" of the IC voltage regulator and ground is closed. Current from the battery then flows along the route shown by the arrow in Fig. EE-26, turning on the charge warning lamp and flowing on through terminal "L" to excite the rotor.

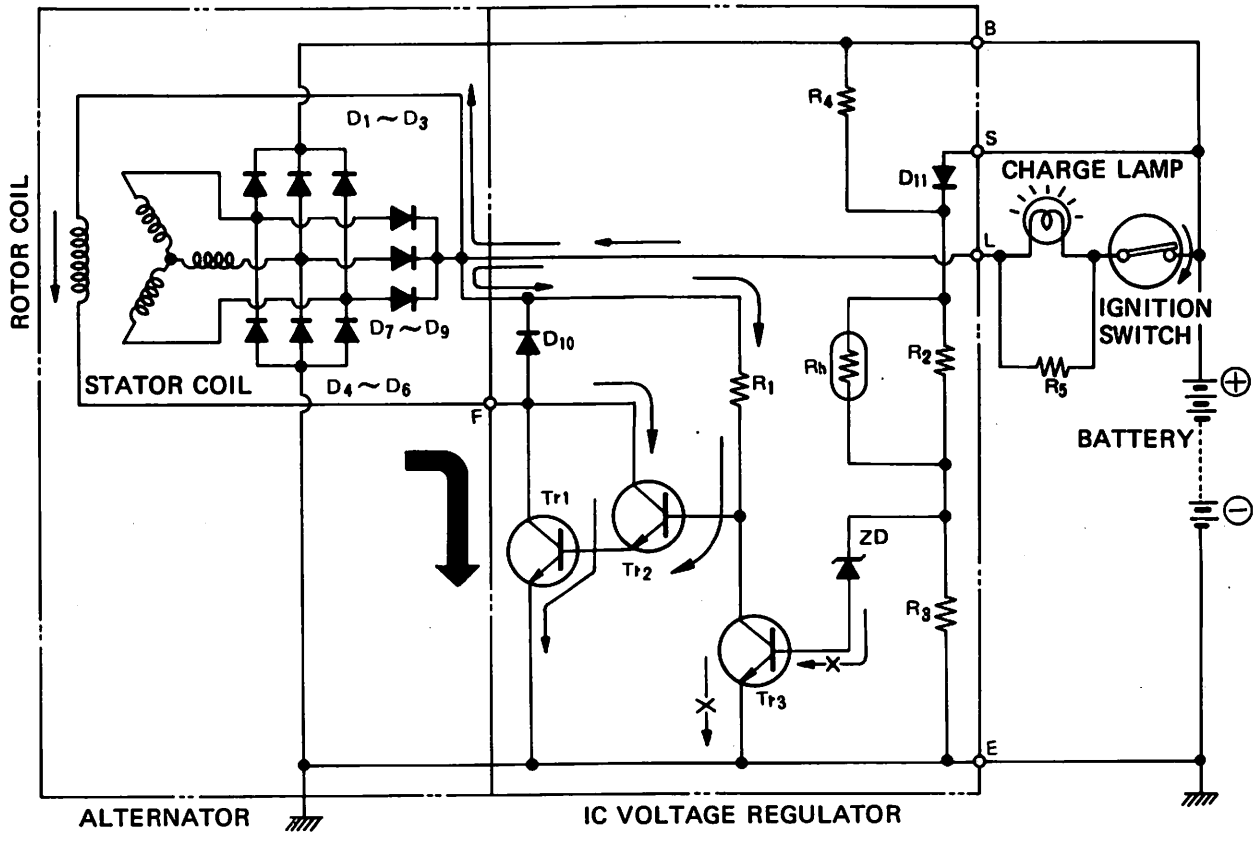
When the alternator begins to operate, three-phase alternating current is indicated in the stator coil. This alternating current is rectified by the positive and negative silicon diodes.

When the voltage at terminal "B" is higher than battery voltage, current produced at the stator flows to recharge the battery. While the battery is being re-charged, the voltage at terminal "L" is equal to that of terminal "B". At this point, there is no voltage differential on either side of the charge warning lamp, which causes the charge warning lamp to turn off. In other words, current does not flow from the battery to terminal "L". Accordingly, current flow through the rotor as shown in Fig. EE-27, is taken over by current produced at the stator. The circuit between terminal "F" and "Tr_1" is then closed. See Fig. EE-27.

The IC voltage regulator monitors generating voltage to be applied to the battery at terminal "S". When current exceeds the specified value, it then flows through the zener diode (ZD), closing the circuit consisting of transistor "Tr_3" and resistor "R_1". At this point, current neither flows through transistor "Tr_1" to ground nor to the rotor, thereby reducing the voltage generated at the stator. See Fig. EE-28.

When voltage generated at terminal "S" is reduced to the specified value, transistor allows current to flow through the rotor, increasing the generating voltage.

In this manner, output voltage from the alternator does not rise above the specified value by the ON-OFF operation of the rotor coil through the IC voltage regulator.



EE760

Fig. EE-26 Simplified Charging Circuit (Initial excitation current)

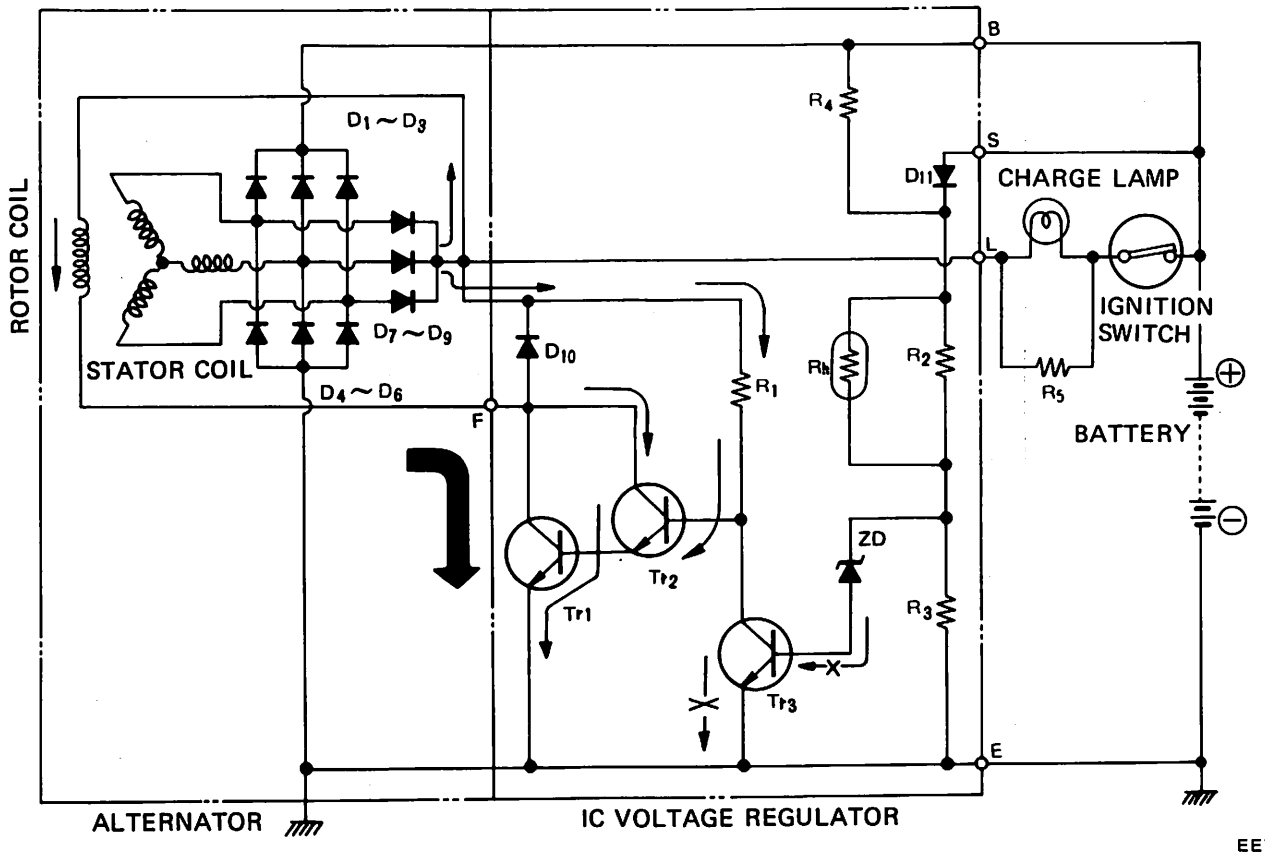


Fig. EE-27 Simplified Charging Circuit (When battery voltage is lower than regulating voltage)

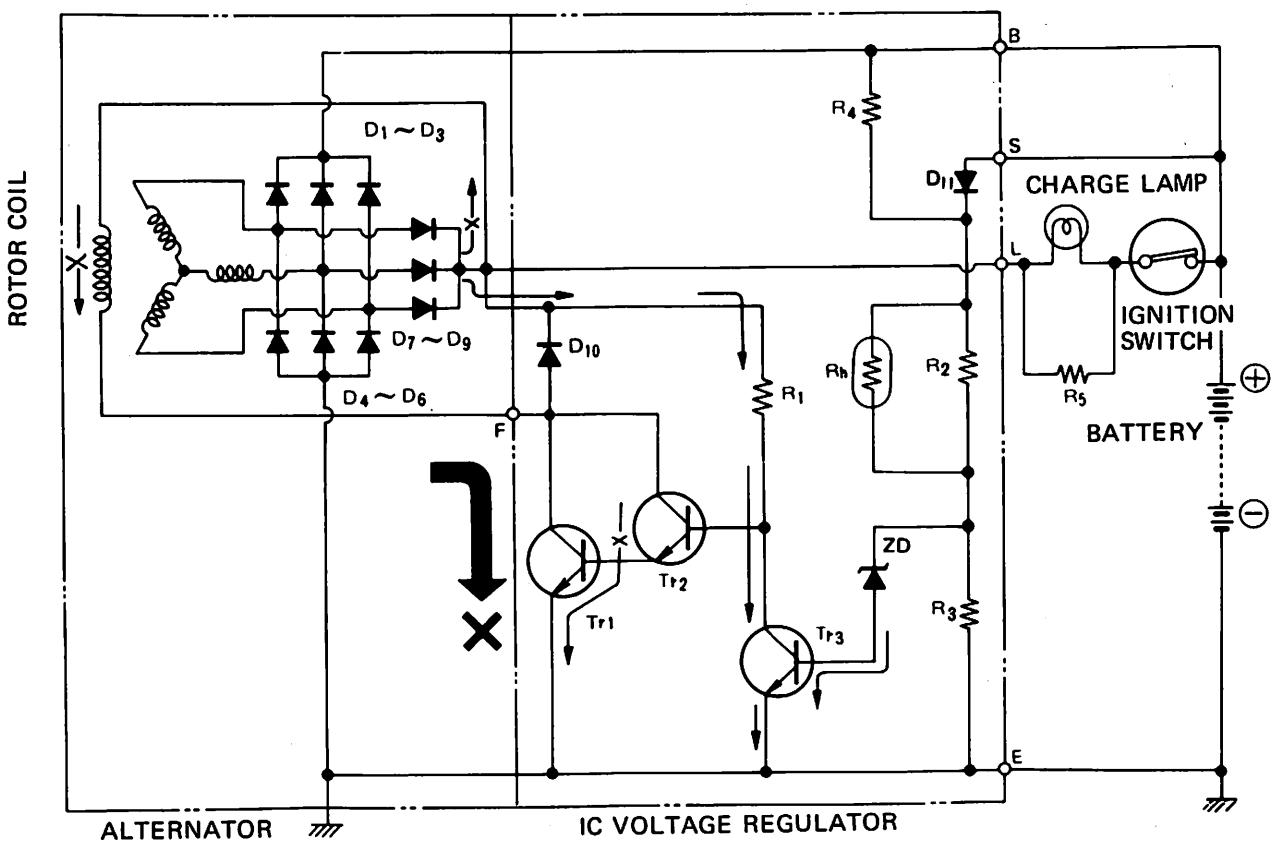


Fig. EE-28 Simplified Charging Circuit (When battery voltage is higher than regulating voltage)

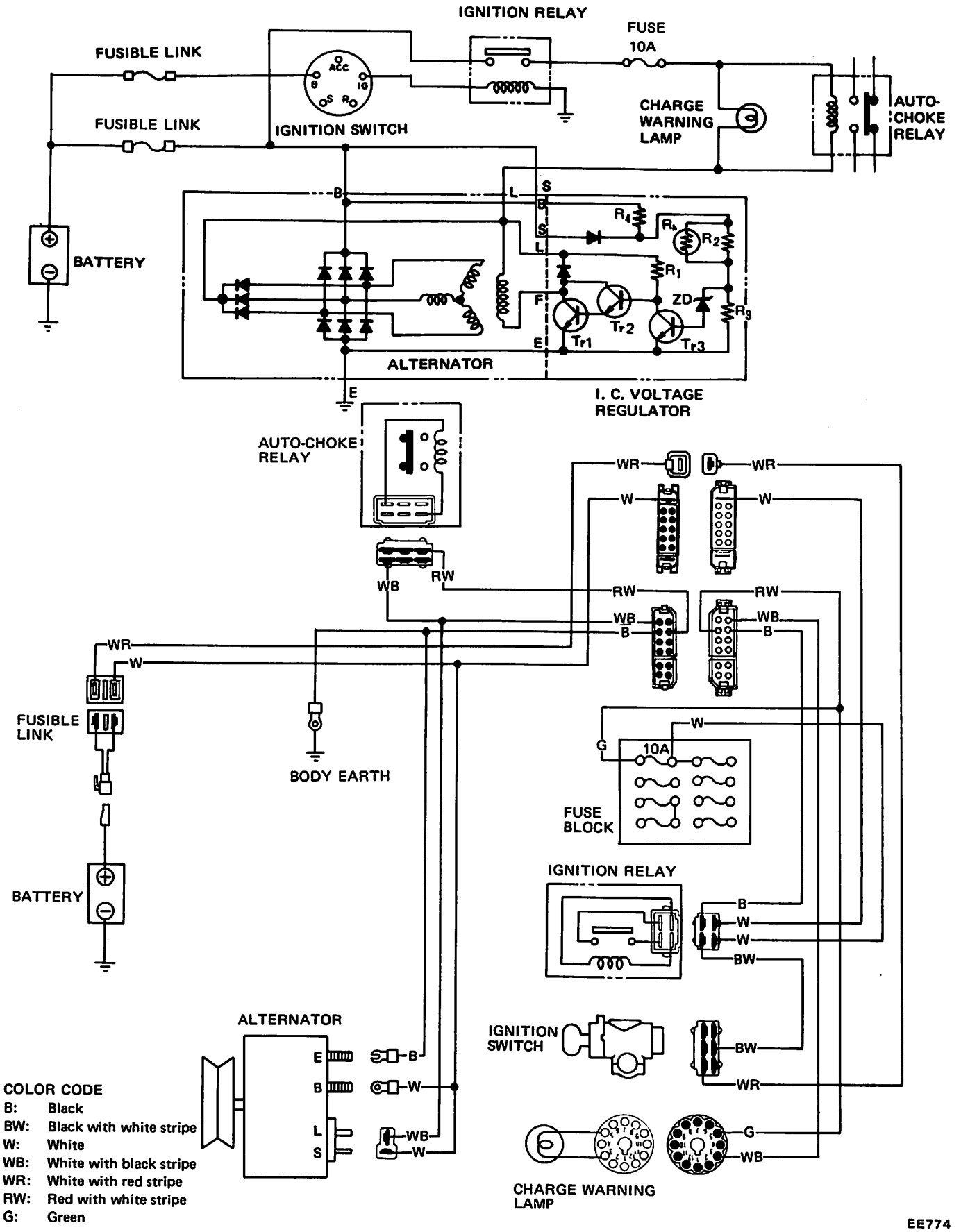


Fig. EE-29 Circuit Diagram of Charging System

ALTERNATOR

DESCRIPTION

The alternator incorporates an IC voltage regulator which maintains voltage within the specified range and prevents output voltage from rising higher than the specified value. Except for the IC circuit, alternator parts are essentially the same as those of the conventional type alternator.

Service procedures outlined in this section are restricted to information on other than the voltage regulator.

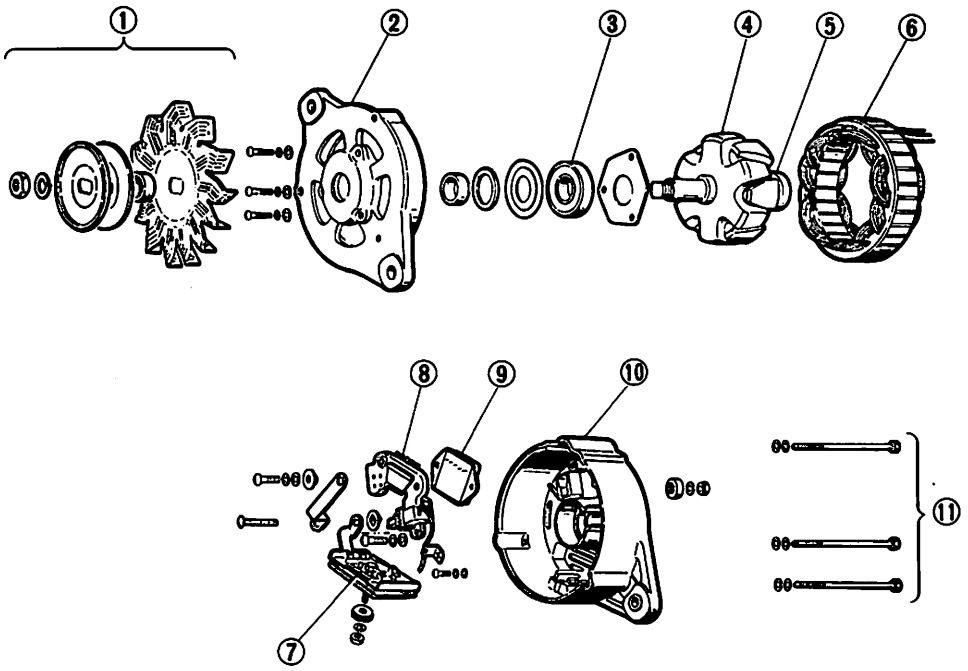
In the alternator, a magnetic field is produced by the rotor which consists of alternator shaft, field coil, pole pieces, and slip rings. The slip rings pressed in the shaft conduct only a small field current. Output current is generated in the armature coils located in the stator. The stator has three windings and generates three-phase alternating current. Silicon diodes act like a one-way valve for electricity so that charging current passes easily but reverse current is shut out.

In this alternator, pack type silicon diodes are used as main diodes.

Nine diodes (three negative, three positive and three sub-diodes), are installed in positive and negative plates as an assembly.

These diodes are direct-soldered at their tips, and constructed with positive and negative conjunction.

They are mounted on the two plates which combine the function of heat-dissipating plate and positive/negative terminals and are light in weight and easy to service.



EE647

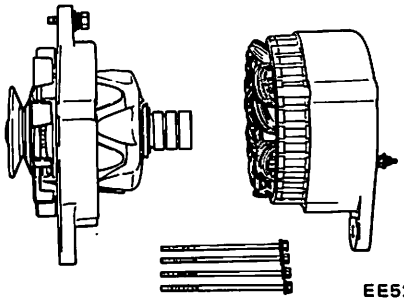
Fig. EE-30 Alternator

REMOVAL

1. Disconnect battery negative cable.
2. Disconnect two lead wires and connector from alternator.
3. Loosen adjusting bolt.
4. Remove alternator drive belt.
5. Remove parts associated with alternator from engine.
6. Remove alternator from car.

DISASSEMBLY

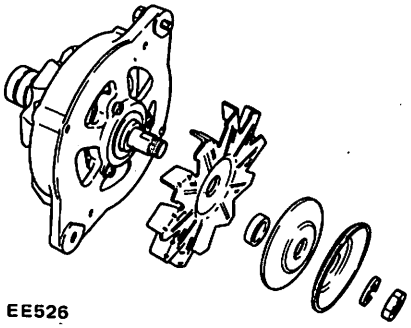
1. Remove through bolts. Separate front cover with rotor from rear cover with stator by lightly tapping front bracket with a wooden mallet.



EE525

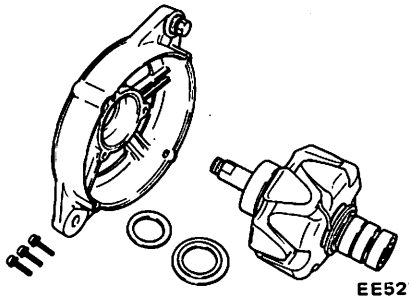
Fig. EE-31 Separating Front Cover

2. Place rear cover side of rotor in a vise with soft jaw, and remove pulley nuts. Then remove pulley and fan from rotor shaft.
3. Remove setscrews from bearing retainer, and separate rotor from front cover.



EE526

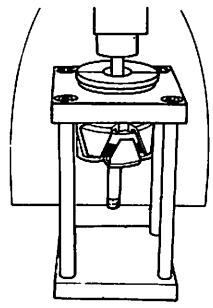
Fig. EE-32 Removing Pulley and Fan



EE527

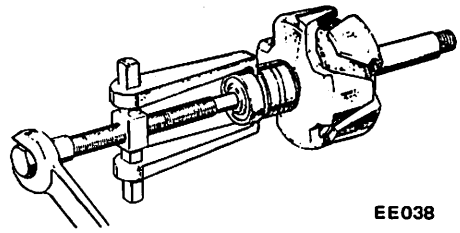
Fig. EE-33 Removing Rotor

4. Pull rear bearing off rotor assembly with a bearing puller or press.



EE037

Fig. EE-34 Pressing Out Rear Bearing



EE038

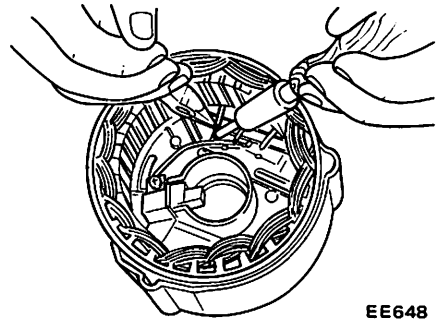
Fig. EE-35 Pulling Out Rear Bearing

5. When removing IC regulator only, proceed as follows:

(1) Using soldering iron, disconnect wire connecting diode set plate to brush at brush terminal.
(2) Remove bolt securing diode set plate to rear cover side face.
(3) Remove nut securing battery terminal bolt.
(4) To facilitate removal, slightly lift stator coil together with diode set plate from rear cover. Then remove screw connecting diode set plate with brush.
(5) Separate stator coil and diode together with rear cover, and remove brush and IC regulator.

6. Disconnect stator coil lead wires from diode terminals with a soldering iron.

Remove screws securing brush; remove stator from rear cover.



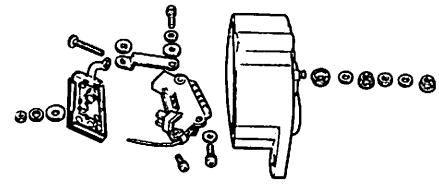
EE648

Fig. EE-36 Removing Stator Coil

7. Disconnect wire from diode terminal at brush terminal with soldering iron.

Remove brush assembly with IC regulator by loosening screws.

8. Remove diode holder by loosening screws.



EE649

Fig. EE-37 Removing Diode Holder

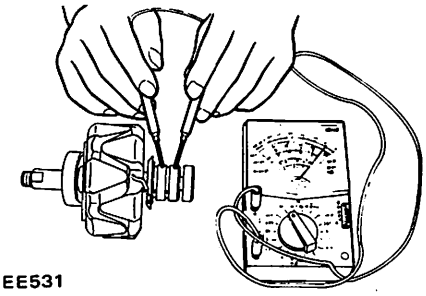
INSPECTION AND REPAIR

ROTOR INSPECTION

1. Continuity test of rotor coil

Apply tester between slip rings of rotor. If there is no continuity field coil is open.

Replace rotor assembly.

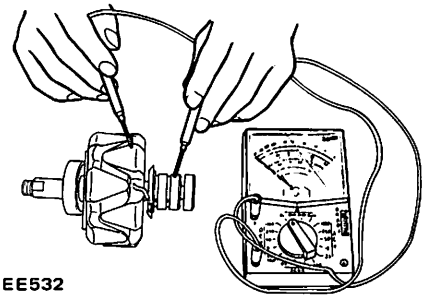


EE531

Fig. EE-38 Continuity Test of Rotor Coil

2. Ground test of rotor coil

Check continuity between slip ring and rotor core. If continuity exists, replace rotor assembly, because rotor coil or slip ring may be grounded.



EE532

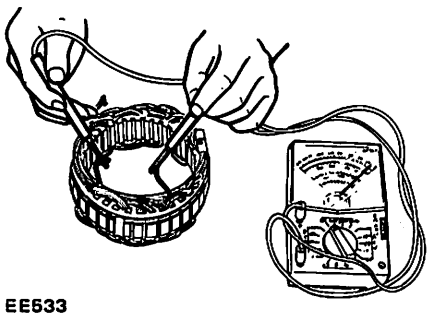
Fig. EE-39 Testing Rotor Coil for Ground

INSPECTION OF STATOR

1. Continuity test

Stator is normal when there is continuity between individual stator coil terminals. When there is no continuity between individual terminals, cable is broken.

Replace stator assembly.

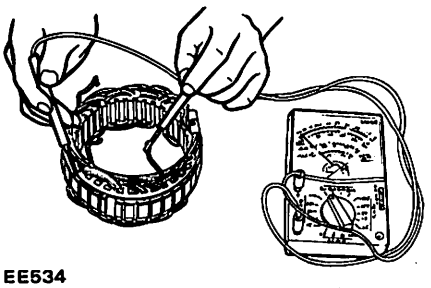


EE533

Fig. EE-40 Testing Stator for Continuity

2. Ground test

If each lead wire of stator coil (including neutral wire) is not conductive with stator core, condition is satisfactory. If there is continuity, stator coil is grounded.



EE534

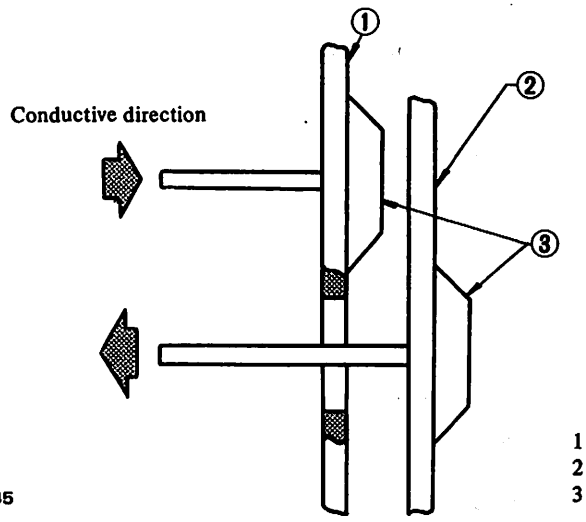
Fig. EE-41 Testing Stator for Ground

INSPECTION OF DIODE

Perform a continuity test on diodes in both directions, using an ohmmeter.

There are six main diodes and three sub-diodes attached to set plate. Three main diodes are attached to positive ⊕ plate and three others to negative ⊖ plate. Three sub-diodes are attached to terminals.

The continuity test should be performed on each diode, between the terminal and plate.

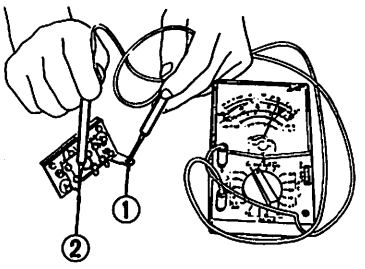


EE045

1 (+) plate
2 (−) plate
3 Diode

Fig. EE-42 Conductive Direction of Diode

1. Main diode installed on ⊕ plate is a positive diode which allows current to flow from terminal to ⊕ plate only. In other words, current does not flow from ⊕ plate to terminal.

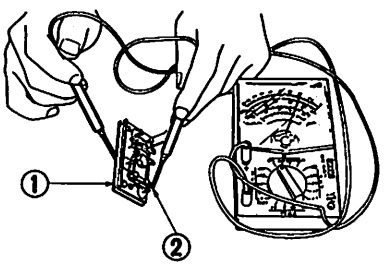


1 (+) plate
2 Terminal

EE046

Fig. EE-43 Inspecting Positive Diode

2. Main diode installed on ⊖ plate is a negative diode which allows current to flow from ⊖ plate to terminal only. In other words, current does not flow from terminal to ⊖ plate.

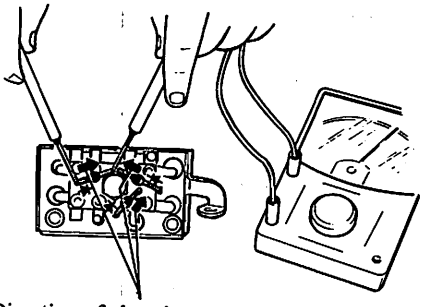


1 (−) plate
2 Terminal

EE047

Fig. EE-44 Inspecting Negative Diode

3. Correct direction of current flow for three sub-diodes is shown in Fig. EE-45.



EE650

Fig. EE-45 Sub-Diode

If current flows in both positive and negative directions, diode is short-circuited. If current flows in one direction only, diode is in good condition. If there is a faulty main diode, replace all diodes as an assembly. (See table below.) These diodes are unserviceable.

Test probe of a circuit tester		Conduction
⊖	⊕	
terminal	⊕ plate	O
⊕ plate	terminal	–
terminal	⊖ plate	–
⊖ plate	terminal	O
⊖ plate	⊕ plate	O
⊕ plate	⊖ plate	–

Sub-diodes can be replaced individually.

CAUTION:
If it is necessary to remove sub-diode, pinch diode lead wire with a pair of pliers to prevent heat transfer from soldering iron to diode when unsoldering connection.

INSPECTION OF BRUSH

Check movement of brush and if movement is not smooth, check brush holder and clean if necessary.

Check brush for wear. If it is worn down to less than the specified limit, replace brush assembly.

Check brush pig tail and, if damaged, replace.

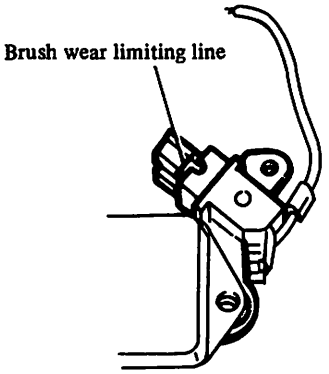


Fig. EE-46 Brush Wear Limit

SPRING PRESSURE TEST

With brush projected approximately 2 mm (0.08 in) from brush holder, measure brush spring pressure by the use of a spring balance. Normally, the rated pressure of a new brush spring is 255 to 345 gr (8.99 to 12.17 oz).

Moreover, when brush is worn, pressure decreases approximately 20 gr (0.71 oz) per 1 mm (0.04 in) wear.

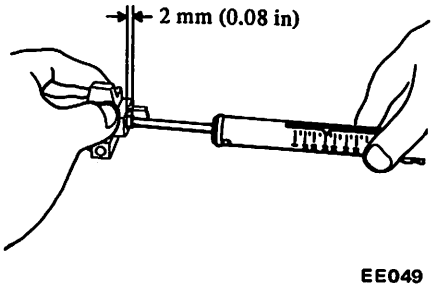


Fig. EE-47 Measuring Spring Pressure

ASSEMBLY

Assemble alternator in the reverse sequence of disassembly, noting the following:

1. When soldering each stator coil lead wire to diode assembly terminal, carry out the operation as fast as possible.
2. When installing diode A terminal, install insulating bushing correctly.
3. Tighten pulley nut.

Ⓣ Tightening torque:
Pulley nut
4.5 to 6.0 kg-m
(33 to 43 ft-lb)

When pulley is tightened, make sure that deflection of V-groove.

V-groove deflection:
0.3 mm (0.012 in)

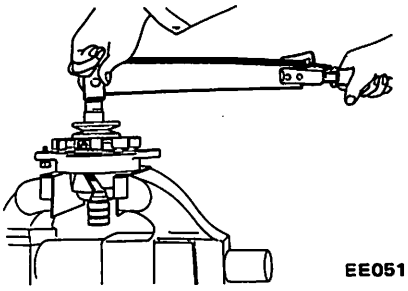


Fig. EE-48 Tightening Pulley Nut

4. Before installing front and rear sides of alternator, push rear cover brush up with fingers and retain brush, as shown in Fig. EE-49, by inserting brush lift into brush lift hole from outside.

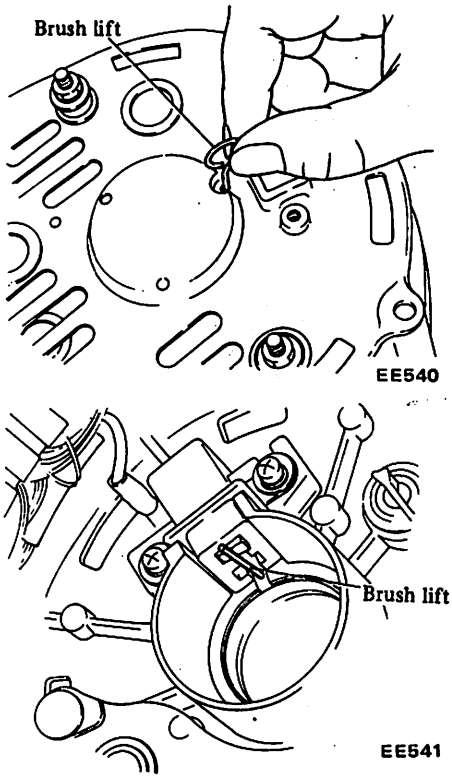


Fig. EE-49 Inserting Brush Lift

5. After installing front and rear sides of alternator, pull brush lift by pushing toward center.

Note: Do not pull brush lift by pushing toward outside of cover as it will damage slip ring sliding surface.

6. Tighten through bolts.

Ⓣ Tightening torque:
Through bolts
60 to 70 kg-cm
(52 to 61 in-lb)

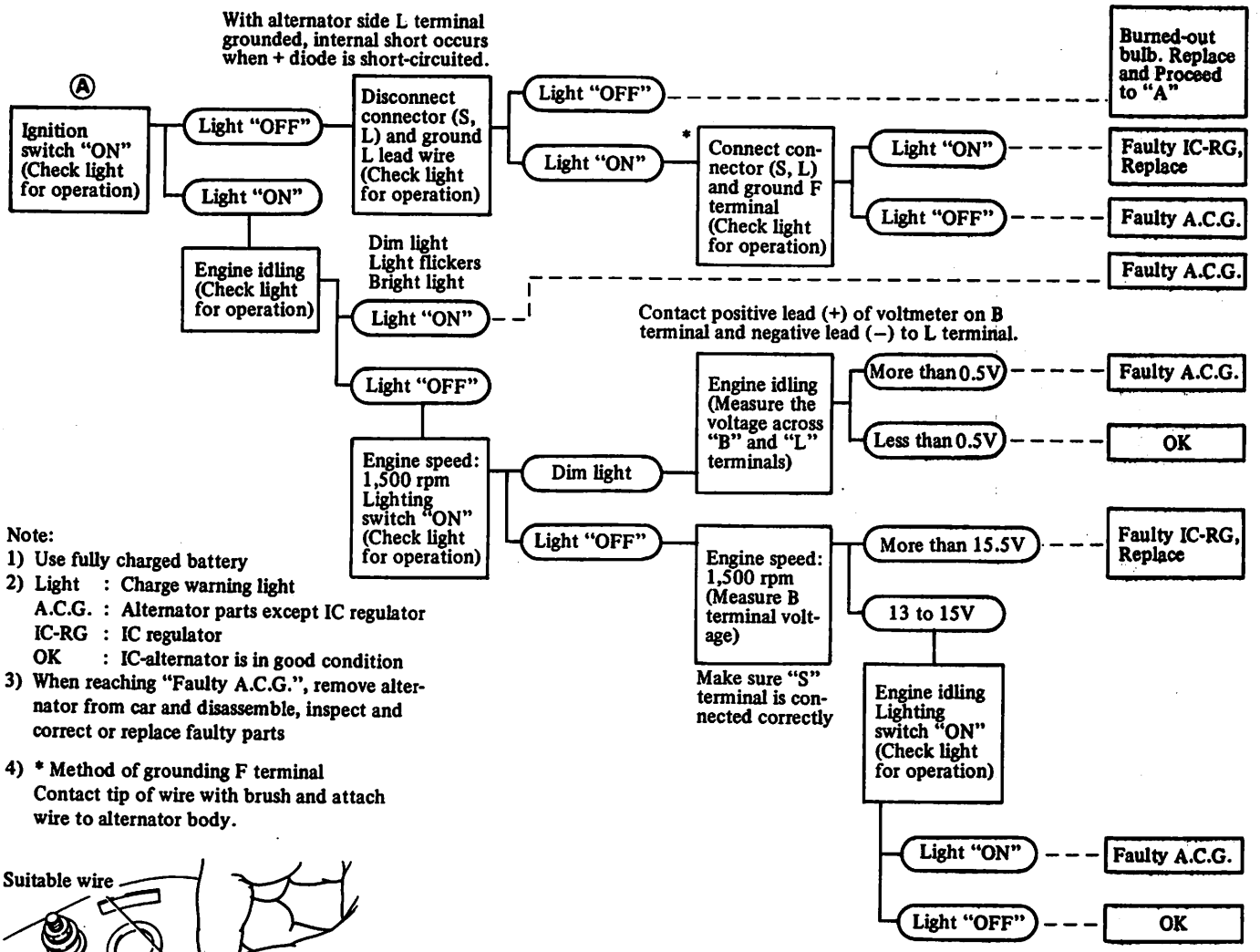
ALTERNATOR TEST

Before conducting an alternator test, make sure that the battery is fully charged.

A 30-Volt voltmeter and suitable test probes are necessary for the test.

The alternator can be checked easily by referring to the Inspection Table.

INSPECTION TABLE



Note:
1) Use fully charged battery
2) Light : Charge warning light
   A.C.G. : Alternator parts except IC regulator
   IC-RG : IC regulator
   OK : IC-alternator is in good condition
3) When reaching "Faulty A.C.G.", remove alternator from car and disassemble, inspect and correct or replace faulty parts
4) * Method of grounding F terminal
   Contact tip of wire with brush and attach wire to alternator body.

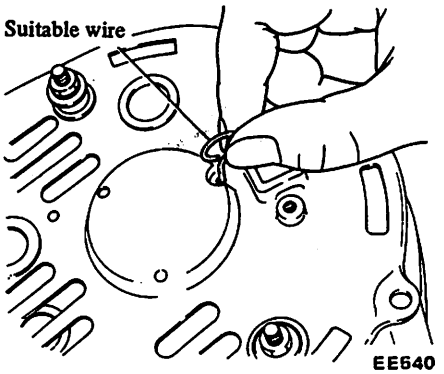


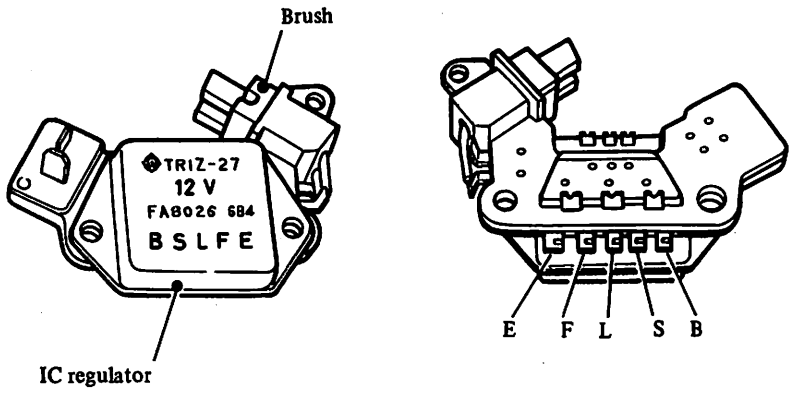
Fig. EE-50 Grounding F Terminal

5) Terminals "S", "L", "BAT" and "E" are marked on rear cover of alternator.

REGULATOR

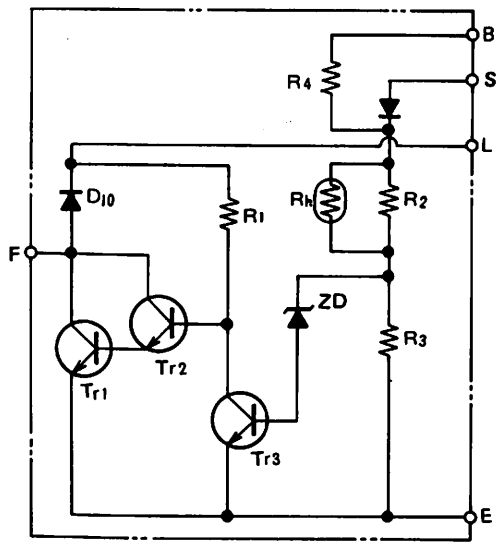
DESCRIPTION

The regulator consists essentially of integrated circuits incorporating transistors. These transistors interrupt and admit current flow to the alternator rotor coil, thus maintaining its output voltage at a constant value. Unlike in a mechanical type regulator, an electronic relay employing transistors is utilized. These transistors are enclosed in a very compact, sealed case. The electronic relay is soldered to the brush assembly inside the alternator. Should any problem with the relay arise, it should be replaced together with the brush assembly. In the charge warning lamp circuit, a diode is attached to the stator coil to monitor generating voltage at the stator so that when the monitored voltage and charging voltage are equal during recharging, the charge warning lamp is turned off. Accordingly, a charge warning relay is not employed in this circuit.



EE629

Fig. EE-51 IC Voltage Regulator



B.S.L.E.F. .. Terminal
R ..... Resistor
Rh..... Thermistor
Tr ..... Transistor
ZD ..... Zener diode

EE766

Fig. EE-52 Circuit of Regulator

INSPECTION

To check the IC regulator, proceed as follows:

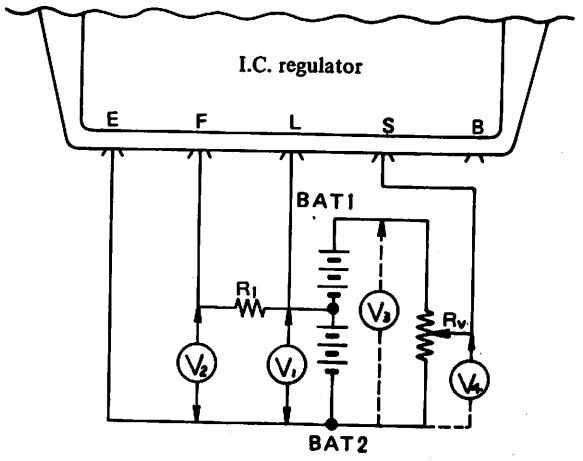
Remove IC regulator and brushes as an assembly, as outlined in "Disassembly and Assembly" section under the heading "Alternator".

CAUTION:
When performing test continuously, resistor may generate heat. If it becomes high temperature, stop testing for a while to avoid burning.

1. The following test equipment and accessories are required.

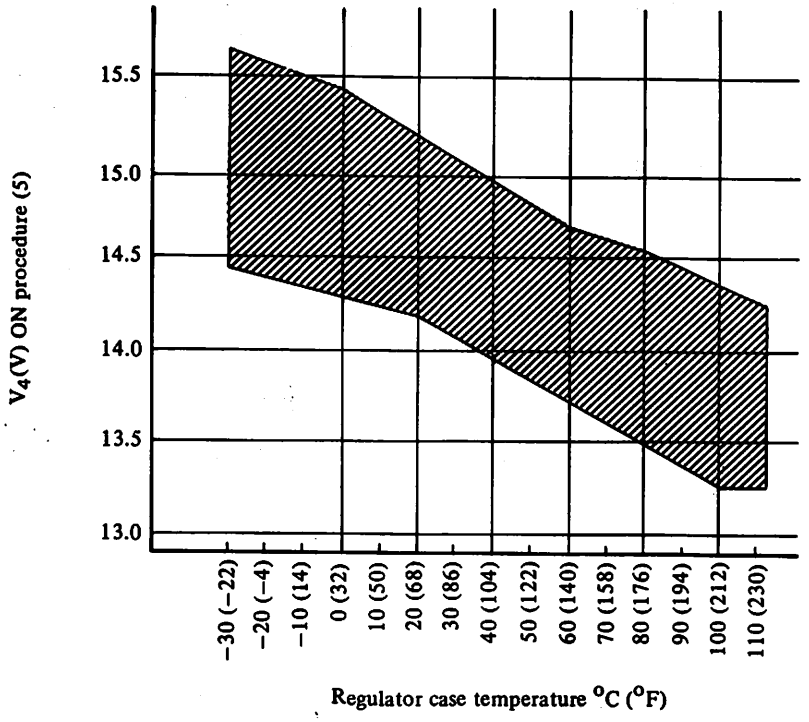
(1) Resistor (R_1), 10 ohms, 20 watts ..... x 1
(2) Variable resistor (R_v) 0 to 300 ohms, 20 watts ..... x 1
(3) Batteries (1 and 2), 12 volts .... x 2
(4) DC voltmeter, 0 to 30 volts .... x 1

2. Connect wiring as shown in Fig. EE-53, and perform tests as follows:
(1) Measure voltage V_1 at battery. If it is not within 10 to 13 volts, re-charge or replace battery as necessary.
(2) Disconnect lead wire at terminal "S"; measure voltage V_2 between terminals "F" and "E". If it is below 2.0 volts, regulator is functioning properly. Connect lead wire to terminal S.
(3) Measure voltage V_3 (total voltage of batteries 1 and 2). If it is not within 20 to 26 volts, re-charge or replace either or both batteries.
(4) Gradually decrease resistance of variable resistor Rv from 300 ohms, and measure voltage V_2 between terminals "E" and "F". As resistance



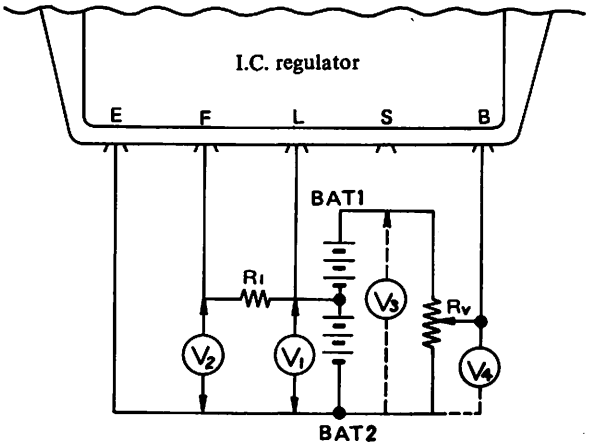
EE631

Fig. EE-53 Testing Regulator (1)



EE632

Fig. EE-54 Testing Regulator (5)



EE633

Fig. EE-55 Testing Regulator (6)

varies, voltage V_2 should at a certain point increase to as high as voltage V_1 which is measured in Step (1). If there is such a variation, the regulator is functioning properly. Hold variable resistor Rv at the same voltage as V_1. If there is no voltage variation, regulator is out of order and must be replaced.

(5) Measure voltage V_4 between center tap of variable resistor Rv and terminal "E".

With Rv resistance set at a value obtained in step (4) above, measure voltage V_4 to see if it is within specified range indicated in Fig. EE-54. If it is not, regulator is not functioning properly. Replace.

(6) Reconnect wiring as shown in Fig. EE-55, and repeat steps (4) and (5). If voltage V_4 is 0.5 to 2.0 volts higher than that in step (5), regulator is functioning properly. If it is not, replace.

IGNITION CIRCUIT

DESCRIPTION

The ignition circuit consists of ignition switch, IC ignition unit, distributor, wiring, spark plugs and battery.

The distributor is equipped with a pick-up coil which electrically detects the ignition timing signal in place of the circuit breaker of the conventional distributor. The IC ignition unit is a new addition, which generates the signal required for the make and break of the primary current for the ignition coil.

The primary current is supplied by the battery or alternator and flows through the primary circuit.

It consists of the ignition switch, primary winding of the ignition coil, IC ignition unit and all connecting low tension wiring.

The secondary current is produced by the ignition coil and flows through the secondary circuit, resulting in high voltage spark between the electrodes of the spark plugs in engine cylinders.

This circuit contains the secondary winding of the ignition coil, distributor high tension wires to coil and spark plugs, distributor rotor and cap.

When the ignition switch is turned on and the distributor reluctor rotates, the primary current flows through the primary winding of the coil and through IC ignition unit to ground.

When the primary circuit is opened by circuit of IC ignition unit, the magnetic field built up in the primary winding of the coil moves through the secondary winding of the coil, inducing high voltage. This high voltage is produced every time the primary circuit opens.

The secondary current flows through the high tension wire to the distributor cap, then the rotor distributes the current to one of the spark plug terminals in the distributor cap.

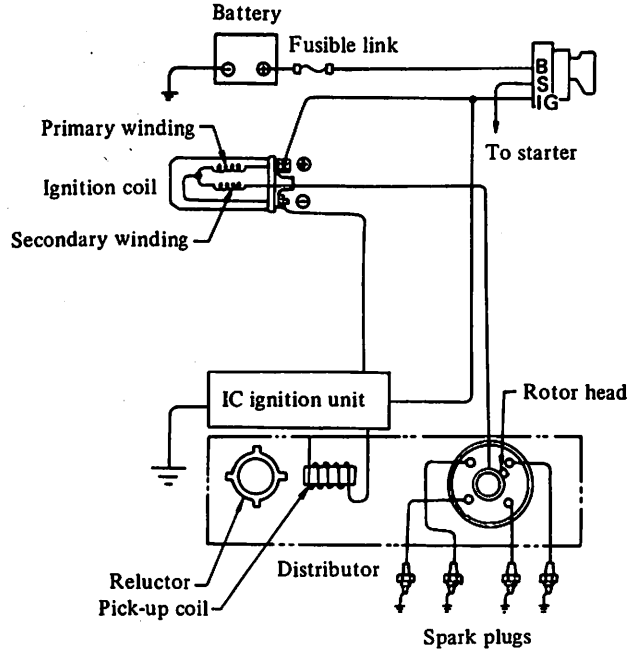
Then the spark occurs while the secondary current jumps the gap between the insulated electrode and the ground side electrode of the spark plug. This process is repeated for each power stroke of the engine.

The spark plug should be inspected, cleaned and regapped at tune up. Spark plugs should also be replaced periodically as specified in the "Maintenance Schedule".

The remainder of the ignition component parts should be inspected for only their operation, air gap of distributor, tightness of electrical terminals, and wiring condition.

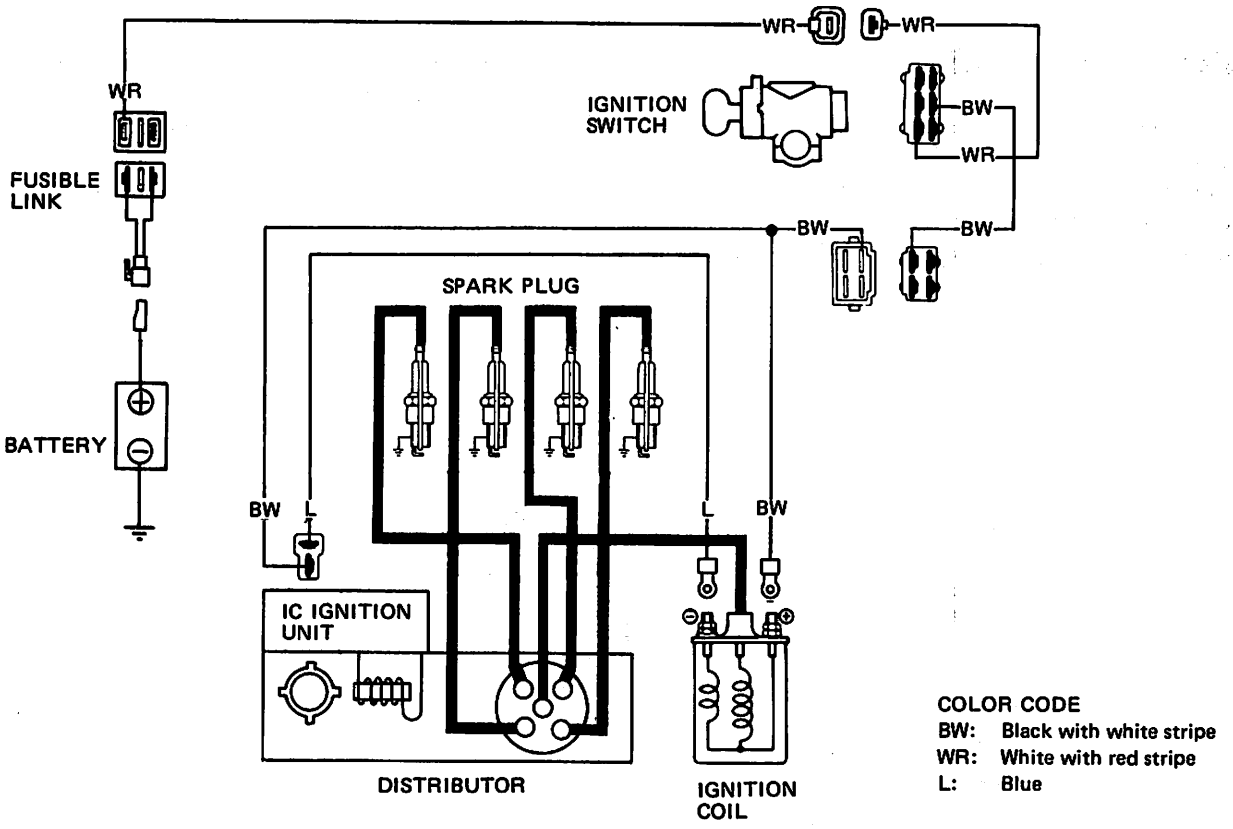
Apply grease (NLGI consistency No. 1 containing MoS_2 or equivalent) to distributor rotor shaft as required.

WARNING:
When current is flowing, never touch with bare hand high tension cables or any other parts with high voltage. If parts are moist, touching them could cause an electric shock, even if they are insulated. Always wear dry, well-insulated gloves or wrap affected parts with dry cloth before handling.



EE743

Fig. EE-56 Ignition System Circuit Diagram



EE775

Fig. EE-57 Circuit Diagram of Ignition System

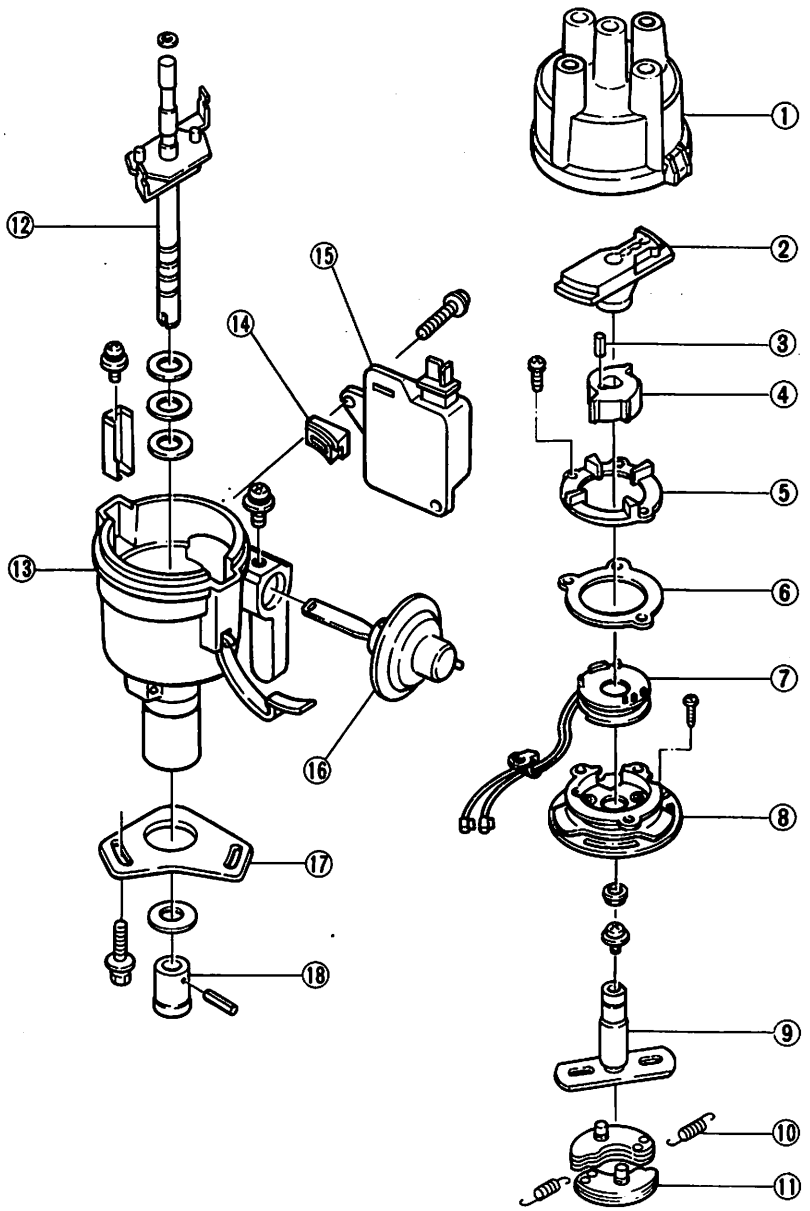
DISTRIBUTOR

CONSTRUCTION

In the conventional distributor the ignition timing is detected by the cam and breaker arm, while in this distributor it is detected by the reluctor on the shaft and the pick-up coil provided in place of the breaker. The amount of magnetic flux passing through the pick-up coil is changed when the reluctor rotates, and then the electrical signal is generated in the pick-up coil.

This electric signal is conducted into the IC ignition unit, which makes and breaks the primary coil current running through the ignition coil and generates high voltage in the secondary winding.

The centrifugal and vacuum advance mechanisms employ the conventional mechanical type.



1 Cap assembly
2 Rotor head assembly
3 Roll pin
4 Reluctor
5 Stator
6 Magnet assembly
7 Pick-up coil assembly
8 Breaker plate assembly
9 Rotor shaft assembly
10 Governor spring
11 Governor weight
12 Shaft assembly
13 Housing assembly
14 Grommet
15 IC ignition unit
16 Vacuum controller
17 Fixing plate
18 Collar

EE745

Fig. EE-58 Distributor

CHECKING AND ADJUSTMENT

CAP AND ROTOR HEAD

Cap and rotor head should be inspected periodically as specified in the "Maintenance Schedule". Remove cap and clean all dust and carbon deposits from cap and rotor from time to time. If cap is cracked or is leaking, replace with a new one.

ADVANCE MECHANISMS

Specifications

Refer to Service Data and Specifications for distributor.

Vacuum advance mechanism mechanical parts

If vacuum advance mechanism fails to operate properly, check for the following items and correct the malfunction as required.

1. Check vacuum inlet for signs of leakage at its connection. If necessary, retighten or replace with a new one.
2. Check vacuum diaphragm for air leak.

If leak is found, replace vacuum controller assembly.

3. Inspect breaker plate for smooth moving.

If plate does not move smoothly, this condition could be due to sticky steel balls or pivot. Apply grease to steel balls or, if necessary, replace breaker plate as an assembly.

Centrifugal advance mechanical parts

When cause of engine malfunction is traced to centrifugal advance mechanical parts, use distributor tester to check its characteristics.

If nothing is wrong with its characteristics, conceivable causes are faulty or abnormal wear of driving part or others. So do not disassemble it.

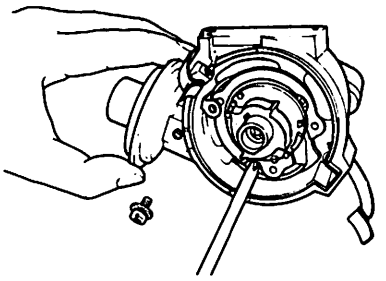
In the event of improper characteristics, check closely rotor shaft assembly, governor weight and shaft.

If any of the above parts are malfunctioning, replace the parts.

DISASSEMBLY AND ASSEMBLY

DISASSEMBLY

1. Take off cap and remove rotor head.
2. Remove IC ignition unit. Refer to IC Ignition Unit for removal and installation.
3. Remove stator and magnet by removing stator securing screws.
4. Remove vacuum controller by removing securing screws.



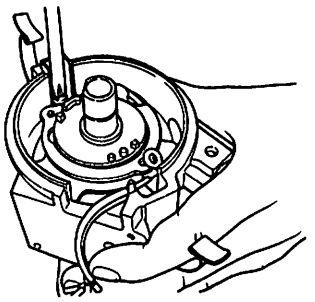
EE746

Fig. EE-59 Removing Vacuum Controller

5. Using two pry bars or suitable puller, pry reluctor from shaft.

CAUTION:
When removing reluctor, be careful not to distort or damage the teeth.

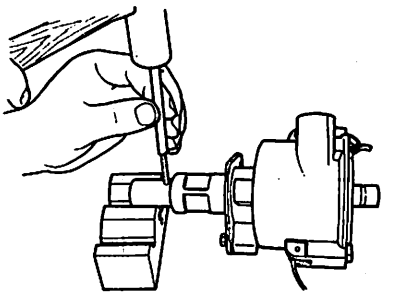
6. Remove roll pin.
7. Remove pick-up coil assembly.
8. Remove breaker plate setscrews and remove breaker plate assembly.



EE703

Fig. EE-60 Removing Breaker Plate Setscrews

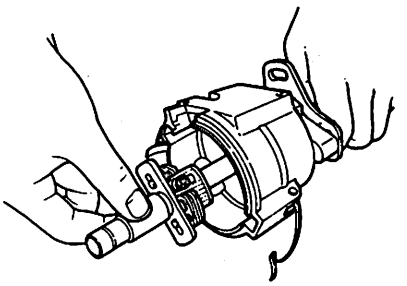
9. Punch knock pin out and remove pinion.



EE704

Fig. EE-61 Removing Knock Pin

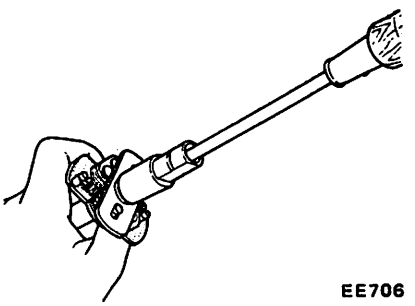
10. Remove rotor shaft and drive shaft assembly.



EE705

Fig. EE-62 Removing Rotor Shaft and Drive Shaft Assembly

11. Mark rotor shaft and drive shaft. Remove packing from the top of rotor shaft and unscrew rotor shaft setscrew. Remove rotor shaft.



EE706

Fig. EE-63 Removing Rotor Shaft

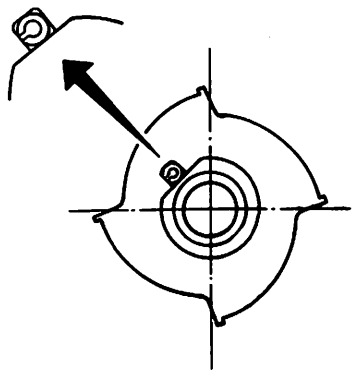
12. Mark one of the governor springs and its bracket. Also mark one of the governor weights and its pivot pins.
13. Carefully unhook and remove governor springs.
14. Remove governor weights. Apply grease to governor weights, after disassembling.

ASSEMBLY

To assemble, reverse the order of disassembly. Carefully observe the following instructions.

CAUTION:
Before installing IC ignition unit, make sure mating surfaces of IC ignition unit and distributor are clean and free from dust, sand and moisture.

1. Align match marks so that parts are assembled to their original positions.
2. Ensure that reluctor is properly oriented when installing on shaft. Always drive in roll pin with its slit toward the outer end of shaft. See Fig. EE-64. Be sure to use a new roll pin.

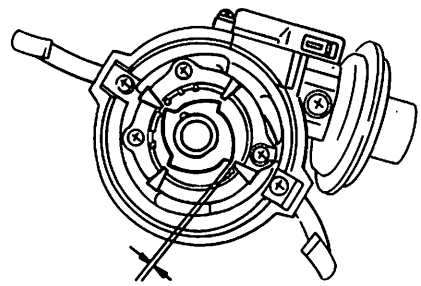


EE747

Fig. EE-64 Driving in Roll Pin

3. When installing pinion on shaft, be sure to install pinion gear correctly to position where it was installed.
4. Apply grease to the top of rotor shaft as required.
5. Check the operation of governor before installing distributor on engine.
6. Properly center stator and reluctor before tightening.

Standard air gap:
0.3 to 0.5 mm
(0.012 to 0.020 in)



EE748

Fig. EE-65 Air Gap

7. Adjust ignition timing after distributor is installed on engine.

IC IGNITION UNIT

DESCRIPTION

The IC ignition unit utilizes a semiconductor IC device, and is mounted on the side surface of the distributor.

The IC ignition unit has the following circuits:

1. Spark timing signal monitoring circuit

This circuit detects the ignition signal sent from the distributor pick-up coil, and amplifies the signal.

2. Lock-preventing circuit

This circuit cuts off the ignition coil primary current when the ignition switch is ON and the engine is stationary.

If the ignition coil primary current is allowed to flow under such conditions, excessive current will be drawn because of low internal resistance of the ignition coil. This can result in an abnormal temperature rise in the ignition coil or discharged battery. These malfunctions can be prevented by this lock-preventing circuit.

3. Duty control circuit

This circuit controls the ratio of the ignition coil primary current ON-OFF time periods, in one cycle of ignition operation.

This is equivalent to the dwell angle of the conventional point type distributor. In order to provide high-performance spark firing over a wide-range of driving speeds, this duty can be controlled by the source voltage and the ambient temperature, as well as by the engine rpm.

4. Power switching circuit

This circuit is used to make or break directly the primary circuit current of the ignition coil.

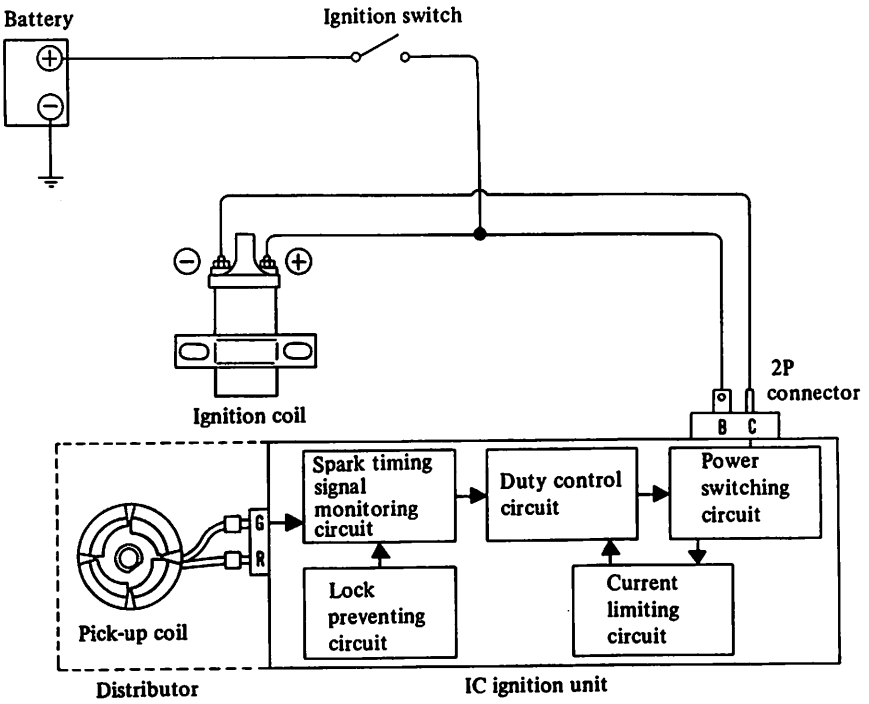
5. Current limiting circuit

This circuit controls the current value so that excessive current will not flow through the power switching circuit.

To ensure efficient operation of the IC ignition unit, these five circuits are manufactured in one assembly, as shown in Fig. EE-66.

The semi-conductor IC is utilized for all these circuits, except the power switching circuit. The power switching circuit uses one power transistor, and the circuit is arranged on the ceramic substrate together with resistors, capacitors and diodes.

Each component part of this unit is highly reliable, however, should any part be found faulty, the entire assembly must be replaced.

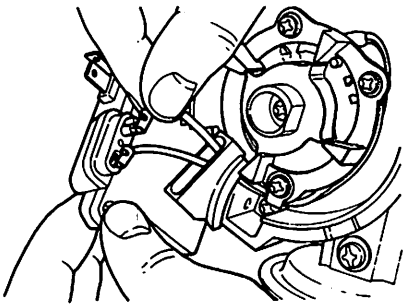


EE749

Fig. EE-66 IC Ignition Unit Circuit Diagram

CAUTION:
Before installing IC ignition unit, make sure mating surfaces of IC ignition unit and distributor are clean and free from dust, sand and moisture.

Note:
a. When connecting lead wires to unit, insert lead wire terminal with fingers as shown in Fig. EE-69.
b. Connect lead wires according to color marked on upper face of grommet.

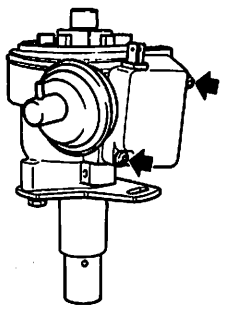


EE752

Fig. EE-69 Connecting Pick-up Coil Terminal

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Take off distributor cap and remove rotor head.
3. Disconnect harness connector.
4. Remove IC ignition unit securing screws.

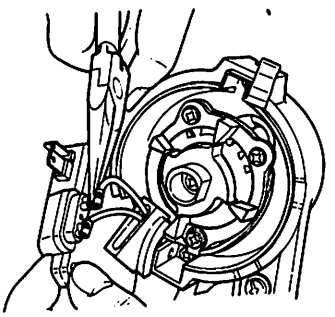


EE750

Fig. EE-67 Removing IC Ignition Unit

5. Disconnect pick-up coil wire from IC ignition unit.

Note: **Holding connector with needle nose pliers as shown in Fig. EE-68, disconnect pick-up coil terminal. Be careful not to pull lead wire.**



EE751

Fig. EE-68 Disconnecting Pick-up Coil Terminal

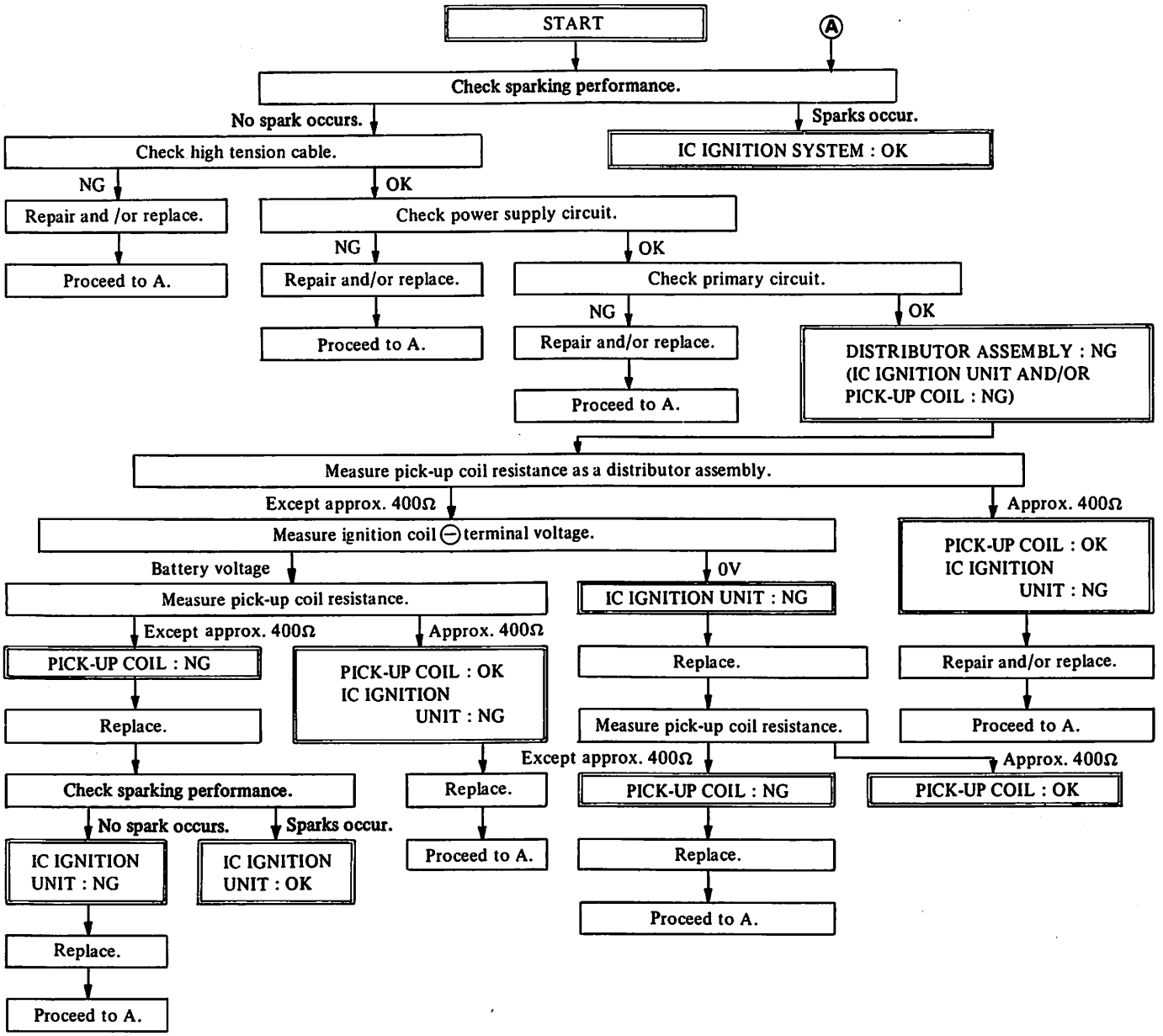
6. Install IC ignition unit in the reverse order of removal.

CHECKING IC IGNITION SYSTEM

DESCRIPTION

To check the IC ignition system, use a circuit tester. The ignition performance of the ignition system at a high speed cannot be measured directly. However, it can be checked by operating a vehicle actually at a high speed. The IC ignition system can be checked easily by referring to the Inspection Table. For the method of inspection, refer to respective items.

INSPECTION TABLE



CHECKING PROCEDURE

Sparking performance check

1. Turn ignition switch to "OFF" position.
2. Disconnect anti-dieseling solenoid valve connector to cut off supply of fuel to engine.
3. Disconnect high tension cable from spark plug.
4. Keeping high tension cable end 4 to 5 mm (0.16 to 0.20 in) away from engine block, rotate starter motor and check whether sparks occur across the clearance.

≪ JUDGMENT ≫

- Sparks occur.
  IC ignition system ..... OK

In this case, IC ignition system and component parts need not be checked beyond this.

- No spark occurs.
  IC ignition system ..... NG

In case of NG, check High Tension Cables.

Note: This check is designed to determine only ignition spark performance when cranking engine. If test results are satisfactory, this does not always indicate performance sufficient for high-speed operation.

High tension cable check

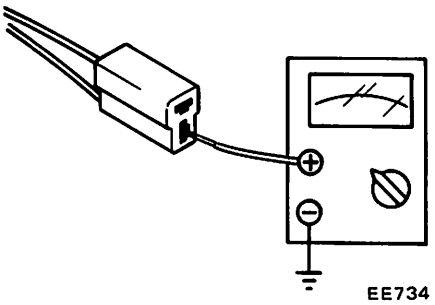
Refer to Engine Tune-up for Checking Ignition Wiring, Distributor Cap and Rotor.

≪ JUDGMENT ≫

- If high tension cable is OK, check Power Supply Circuit.
- If high tension cable is NG, replace cable assembly.

Power supply circuit check

1. Make sure that ignition switch is in "OFF" position.
2. Disconnect IC ignition unit connector from unit.
3. Turn ignition switch to "ON" position.
4. Measure voltage at the terminal as shown in Fig. EE-70.



EE734

Fig. EE-70 Checking Power Supply Circuit

5. Turn ignition switch to "OFF" position.

≪ JUDGMENT ≫

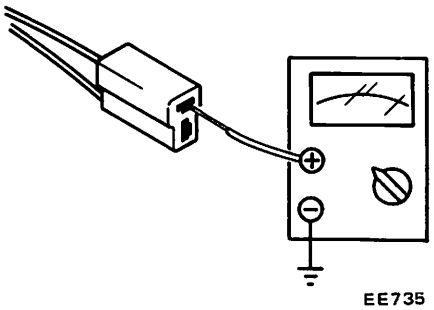
- Battery voltage is indicated .. OK

  In this case, check Primary Circuit.
- Battery voltage is not indicated ..... NG

In case of NG, check power supply wirings, ignition switch and connectors for condition and continuity.

Primary circuit check

1. Make sure that ignition switch is in "OFF" position.
2. Disconnect IC ignition unit connector from unit.
3. Turn ignition switch to "ON" position.
4. Measure voltage at the terminal as shown in Fig. EE-71.



EE735

Fig. EE-71 Checking Primary Circuit

5. Turn ignition switch to "OFF" position.

≪ JUDGMENT ≫

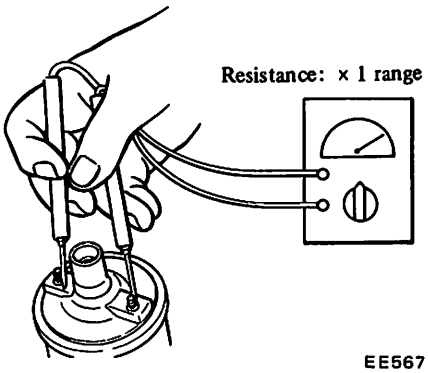
- Battery voltage is indicated .. OK

  In this case, proceed to the step for IC Ignition Unit and Pick-up Coil Check.
- Battery voltage is not indicated ..... NG

If NG, check condition and continuity of primary circuit wirings and connectors. If results of these inspections are satisfactory, check Ignition Coil.

Ignition coil check

1. Make sure that ignition switch is in "OFF" position.
2. Disconnect harness connector from ignition coil ⊖terminal.
3. Measure resistance between⊕and ⊖terminals.



EE567

Fig. EE-72 Checking Ignition Coil Assembly

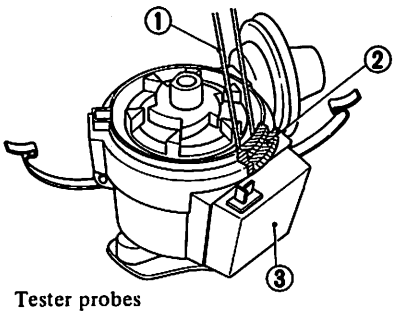
≪ JUDGMENT ≫

- If resistance value is 0.84 to 1.02Ω ..... OK
- If resistance value is other than the specified value ..... NG

IC ignition unit and pick-up coil check

If power supply circuit, primary circuit and high tension cables are in good order, IC ignition unit and/or pick-up coil are malfunctioning.

1. Make sure that ignition switch is in "OFF" position.
2. Remove distributor cap and rotor.
3. Measure resistance between two terminals of pick-up coil as a distributor assembly with a circuit tester.



1 Tester probes
2 Grommet
3 IC ignition unit

EE736

Fig. EE-73 Measuring Pick-up Coil Resistance

4. Measure resistance by reversing polarity of circuit tester probes.

≪ JUDGMENT ≫

- Approx. 400Ω are indicated.
  Pick-up coil ..... OK
  IC ignition unit ..... NG

  In this case, replace faulty IC ignition unit with new one.
- Approx. 400Ω are not indicated ..... Condition cannot be judged.

  Thus, proceed to item 5.

Note: If resistance is approx. 400Ω, no further inspection is required; replace IC ignition unit.

5. Make sure 2-pin IC ignition unit connector is securely connected to unit.
6. Turn ignition switch to "ON" position.
7. Measure voltage at ignition coil ⊖ terminal.
8. Turn ignition switch to "OFF" position.

CAUTION:
Turn ignition switch off after releasing test probe of circuit tester from negative terminal of ignition coil. Failure to do this could result in damage to circuit tester.

≪ JUDGMENT ≫

- 0V is indicated.
  IC ignition unit ..... NG

But condition of pick-up coil cannot be judged. Proceed to the item for Pick-up Coil Check.

- Battery voltage is indicated
  ..... Condition cannot be judged.

Proceed to item 9.

9. Remove IC ignition unit.
   Refer to IC ignition Unit for removal.
10. Measure resistance between two terminals of pick-up coil.

≪ JUDGMENT ≫

- Approx. 400Ω are indicated.
  Pick-up coil ..... OK
  IC ignition unit ..... NG
- Approx. 400Ω are not indicated.
  Pick-up coil ..... NG

Condition of IC ignition unit cannot be judged. Proceed to item 11.

11. Replace faulty pick-up coil with new one.
12. Install original IC ignition unit.
13. Check sparking performance.

≪ JUDGMENT ≫

- Sparks occur.
  IC ignition system (IC ignition unit)
  ..... OK
- No spark occurs.
  IC ignition unit ..... NG

If NG, replace faulty IC ignition unit with new one.

Pick-up coil check

1. Make sure that ignition switch is in "OFF" position
2. Remove IC ignition unit. Refer to IC Ignition Unit for removal.
3. Measure resistance between two terminals of pick-up coil.

≪ JUDGMENT ≫

- Approx. 400Ω are indicated .. OK
- Approx. 400Ω are not indicated
  ..... NG

If NG, replace faulty pick-up coil with new one.

IGNITION COIL

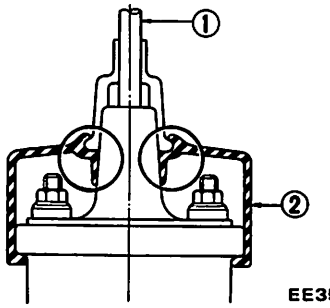
The ignition coil is an oil-filled type. The ignition coil case is filled with oil which has good insulating and heat-radiating characteristics.

The ignition coil has a greater ratio between the primary and secondary windings to step up battery voltage to high voltage. This causes stronger sparks to jump the spark plug gap.

The cap is made of alkyd resin which offers high resistance to electric arc and increased insulation.

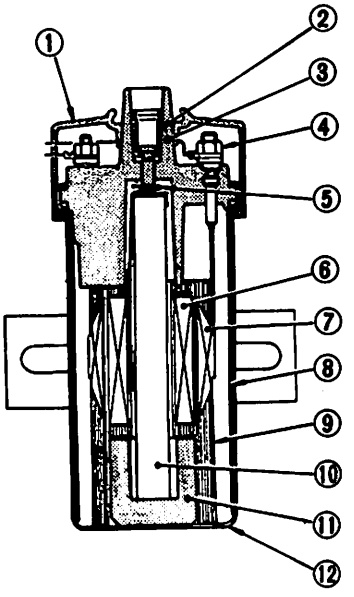
When high tension wire is installed to ignition coil, there should be no clearance between their caps.

Note: Do not disconnect high tension wires from spark plugs during engine running.



1 High tension wire
2 Rubber cap

Fig. EE-74 Correct Installation of High Tension Wire



1 Rubber cap for ignition coil
2 Secondary terminal
3 Cap
4 Primary terminal
5 Spring
6 Secondary winding
7 Primary winding
8 Side core
9 Insulator
10 Center core
11 Segment
12 Case

Fig. EE-75 Ignition Coil

SPARK PLUG

INSPECTION

1. Remove spark plug wire by pulling on boot, not on wire itself.
2. Remove spark plugs.
3. Check electrodes and inner and outer porcelains of plugs, noting the type of deposits and the degree of electrode erosion. Refer to Fig. EE-76.

Normal: Brown to grayish-tan deposits and slight electrode wear indicate correct spark plug heat range.

Carbon fouled: Dry fluffy carbon deposits on the insulator and electrode are mostly caused by slow speed driving in city, weak ignition, too rich fuel mixture, dirty air cleaner, etc.
It is advisable to replace with plugs having hotter heat range.

Oil fouled: Wet black deposits show excessive oil entrance into combustion chamber through worn rings and pistons or excessive clearance between valve guides and stems. If the same condition remains after repair, use a hotter plug.

Overheating: White or light gray insulator with black or gray brown spots and bluish burnt electrodes indicate engine overheating. Moreover, the appearance results from incorrect ignition timing, loose spark plugs, low fuel pump pressure, wrong selection of fuel, a hotter range plug, etc.
It is advisable to replace with plugs having colder heat range.

4. After cleaning, dress electrodes with a small fine file to flatten the surfaces of both center and side electrodes in parallel. Set spark plug gap to specification.
5. Install spark plugs and torque each plug.
6. Connect spark plug wires.

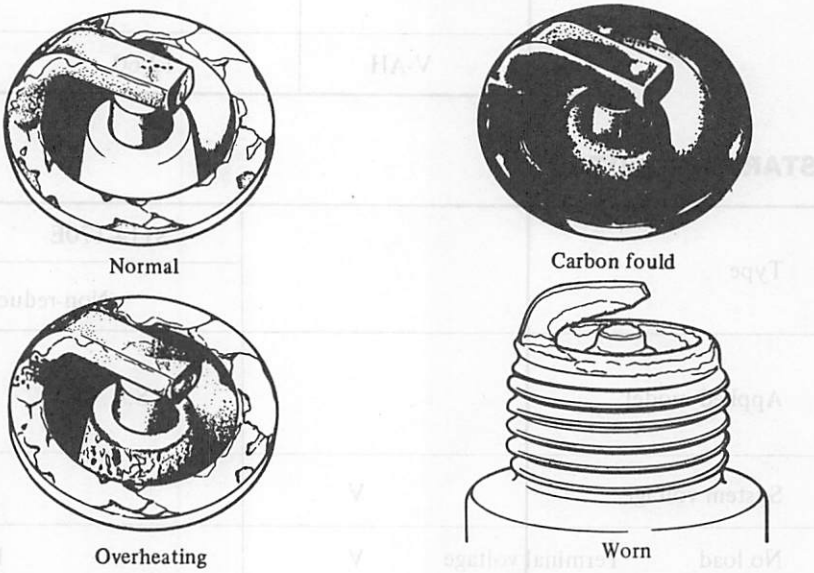


Fig. EE-76 Spark Plug

CLEANING AND REGAP

Clean spark plugs in a sand blast type cleaner. Avoid excessive blasting. Clean and remove carbon or oxide deposits, but do not wear away porcelain. If deposits are too stubborn, discard plugs.

After cleaning spark plugs, renew firing surface of electrodes with file mentioned above. Then check spark plug gap with wire feeler gauge. All spark plugs new or used should have the gap checked and reset by bending ground electrode.

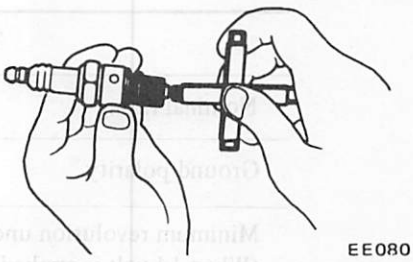


Fig. EE-77 Setting Spark Plug Gap

SERVICE DATA AND SPECIFICATIONS

GENERAL SPECIFICATIONS

BATTERY

Type	N50Z	NS70
Applied model	U.S.A.	Canada, U.S.A. (Optional)
Capacity V-AH	12-60	12-65

STARTING MOTOR

			S114-170E	S114-180F	S114-254B
Type			Non-reduction gear type		Reduction gear type
Applied model			U.S.A. M/T	U.S.A. A/T, U.S.A. M/T (Optional)	Canada, U.S.A. (Optional)
System voltage		V	12		
No load	Terminal voltage	V	11.5		11.0
	Current	A	Less than 60		Less than 100
	Revolution	rpm	More than 7,000	More than 6,000	More than 3,900

ALTERNATOR

Type		LR150-51
Nominal rating	V-A	12-50
Ground polarity		Negative
Minimum revolution under no load (When 14 volt is applied)	rpm	Less than 1,000
Hot output current	A/rpm	More than 40/2,500, 50/5,000
Pulley ratio		2.09
Regulated output voltage	V	14.4 to 15.0

DISTRIBUTOR

Type	D4K8-03	D4K8-04	D4K8-05	D4K8-06	D4K8-07
Applied model	U.S.A.	Non-California models	California models	Canada	
Transmission	M/T	A/T	A/T	M/T	A/T
Firing order	1-3-4-2				
Rotating direction	Counterclockwise				

IGNITION COIL

Type		CIT-30	STC-30
Applied model		All	
Primary voltage	V	12	
Spark gap	mm (in)	More than 7 (0.28)	

SPARK PLUG

Type	Standard	BP6ES-11 BPR6ES-11* L45PW-11	BPR6ES
	Hot	BP4E-11, BPR4E-11* BP5ES-11, BPR5ES-11* L46PW-11 L47PW-11	BPR4ES BPR5ES
	Cold	BP7ES-11 BPR7ES-11* L44PW-11	BPR7ES
Applied model		U.S.A.	Canada
Size (screw dia. x reach) mm (in)		14 x 19 (0.55 x 0.75)	

*: Option

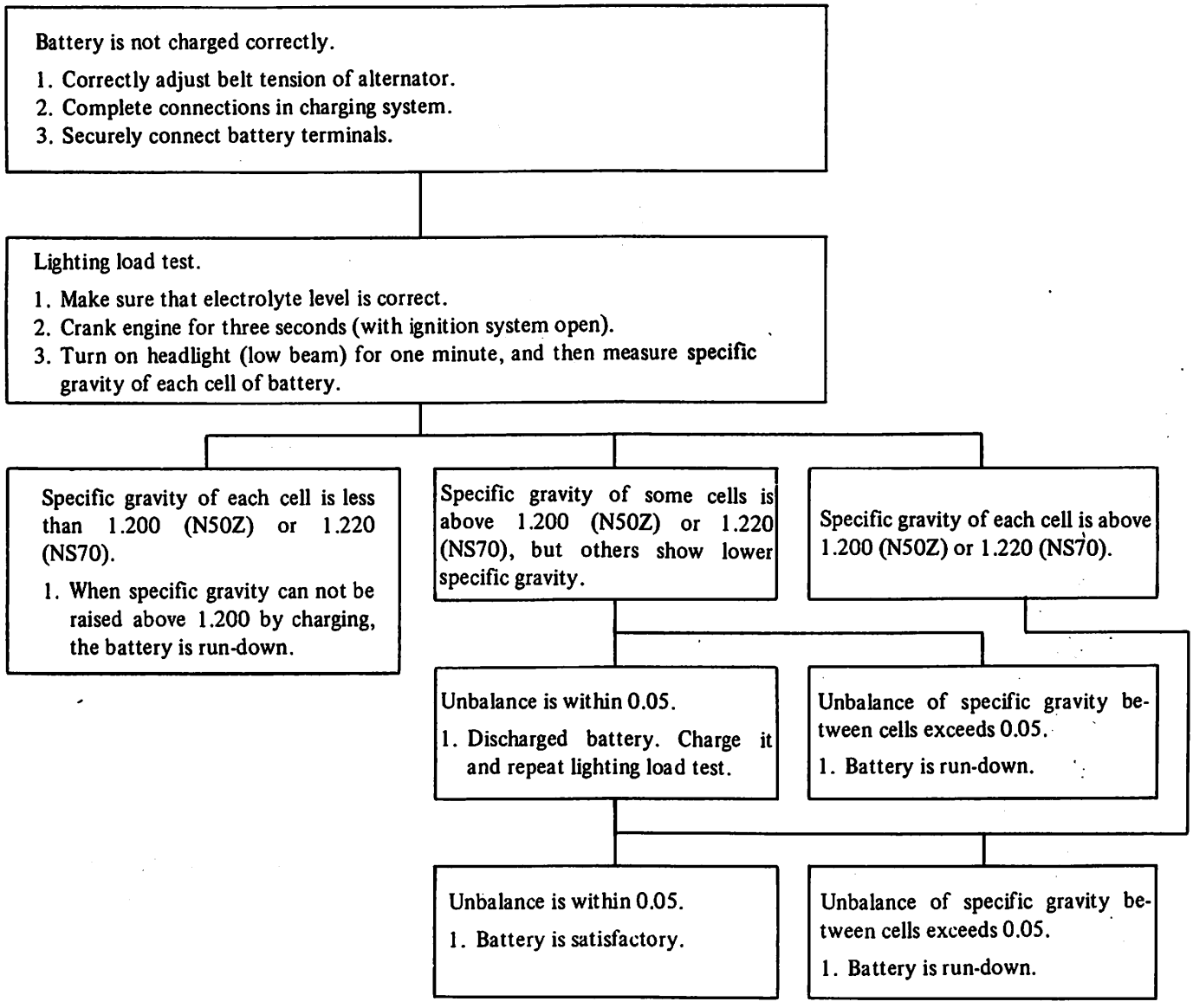
INSPECTION AND ADJUSTMENT

BATTERY

Type	N50Z	NS70
Full charging specific gravity	1.26	1.28

TROUBLE DIAGNOSES AND CORRECTIONS

I. BATTERY



II. STARTING MOTOR

Condition	Probable cause	Corrective action
Starting motor will not operate.	Discharged battery.	Charge or replace battery.
	Damaged solenoid switch.	Repair or replace solenoid switch.
	Loose connections of terminal.	Clean and tighten terminal.
	Damaged field coil.	Replace yoke.
	Damaged brushes.	Replace brushes.
	Damaged bearing.	Replace bearing.
	Starting motor inoperative	Remove starting motor and make test.
	Damaged armature.	Replace armature.
Noisy starting motor.	Loose securing bolt.	Tighten.
	Worn pinion gear.	Replace.
	Poor lubrication.	Add oil.
	Worn commutator.	Replace.
	Worn brushes.	Replace.
Starting motor cranks slowly.	Discharged battery.	Charge.
	Loose connection of terminal.	Clean and tighten.
	Worn brushes.	Replace.
	Locked brushes.	Inspect brush spring tension or repair brush holder.
	Loose connections of terminal.	Clean and tighten terminal.
	Damaged field coil.	Replace yoke.
	Damaged brushes.	Replace brushes.
	Damaged bearing.	Replace bearing.
	Starting motor inoperative.	Remove starting motor and make test.
	Damaged armature.	Replace armature.
Starting motor cranks slowly.	Dirty or worn commutator.	Clean and repair.
	Armature rubs field coil.	Repalce assembly.
	Damaged solenoid switch.	Repair or replace.
Starting motor operates but does not crank engine.	Worn pinion.	Replace.
	Locked pinion guide.	Repair.
	Worn ring gear.	Replace.
Starting motor will not disengage even if ignition switch is turned off.	Damaged solenoid switch.	Repair or replace.
	Damaged gear teeth.	Replace damaged gear.

2. Engine rotates but does not run smoothly.

This may be caused by the ignition system or other engine conditions not related to ignition. Therefore, first a complete inspection of ignition system should be carried out.

Condition	Location	Probable cause	Corrective action
Engine misses.	Distributor	Foreign matter on pick-up coil.	Clean.
		Improper air gap.	Correct.
		Leak of electricity at cap and rotor head.	Repair or replace.
		Breakage of pick-up coil lead wire.	Replace.
		Worn or shaky breaker plate.	Replace assembly.
		Worn or shaky distributor driving shaft.	Replace assembly.
	Ignition coil	Layer short circuit or inferior quality coil.	Replace with good one.
	High tension wire	Deterioration of insulation with consequent leak of electricity.	Replace.
	Spark plugs	Fouled.	Clean.
		Leak of electricity at upper porcelain insulator.	Repair or replace.
		Spark plug gap too narrow.	Correct or replace.
	IC ignition unit	Faulty IC ignition unit.	Replace.
		Breakage of circuit.	Replace.
		Detached connection.	Repair.
Engine causes knocking very often.	Distributor	Improper ignition timing (too advanced).	Correct.
		Coming off or breakage of governor spring.	Correct or replace.
		Worn pin or hole of governor.	Replace.
	Spark plugs	Burnt too much.	Replace.
Engine does not deliver enough power.	Distributor	Improper ignition timing (too retarded).	Correct.
		Improper functioning governor.	Replace assembly.
		Foreign particles stuck in air gap.	Clean.
	Spark plugs	Fouled.	Clean.

SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION ER

ENGINE REMOVAL & INSTALLATION

ER

ENGINE REMOVAL AND INSTALLATION ..... ER- 2

SERVICE DATA AND SPECIFICATIONS ..... ER- 6

ENGINE REMOVAL AND INSTALLATION

CONTENTS

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INSTALLATION ER-5
ENGINE MOUNTING INSULATORS ER-5
FRONT INSULATORS ER-5
REAR INSULATOR ER-5

REMOVAL

It is much easier to remove engine and transmission as a single unit than to remove only engine from the engine compartment. After removal, the engine can be separated from the transmission assembly.

Note: Fender covers should be used to prevent damage to car body.

WARNING:
a. Place wheel chocks in front of front wheels and in rear of rear wheels.
b. Be sure to hoist engine in a safe manner.
c. Do not remove engine until exhaust system has completely cooled off.
Otherwise, you may burn yourself and/or fire may break out in fuel line.

1. Disconnect negative battery cable at battery.
2. Drain engine coolant by loosening radiator drain plug.
3. Drain engine oil by removing drain plug.

On automatic transmission models:
(1) Remove splash board.
(2) Disconnect oil cooler hoses at oil cooler installed at the lower end of radiator and drain automatic transmission fluid at connectors. See Figure ER-1.

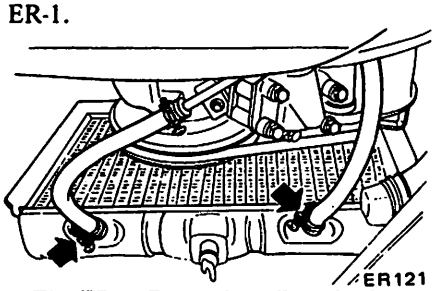


Fig. ER-1 Removing oil cooler hoses

4. Remove engine hood as follows:
(1) Mark hood hinge locations on hood to facilitate proper reinstallation.
(2) Support hood with hand and remove bolts securing it to hood hinge, being careful not to let hood slip when bolts are removed. See Figure ER-2.
(3) Remove hood from hood hinge.

CAUTION:
Have an assistant help you so as to prevent damage to body.

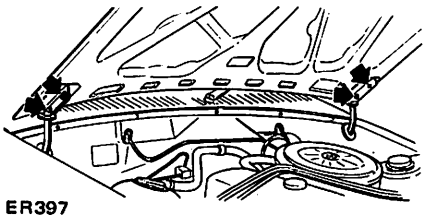


Fig. ER-2 Removing engine hood

5. Remove carburetor air cleaner as follows:
(1) Remove fresh air duct from air cleaner. (U.S.A. models)
(2) Remove hot air duct from air cleaner.
(3) Loosen air cleaner band.
(4) Disconnect one or two air hoses connected to air cleaner.
(5) Disconnect air cleaner-to-rocker cover hose at rocker cover.
(6) Disconnect A.B. valve air hose connected to air cleaner.

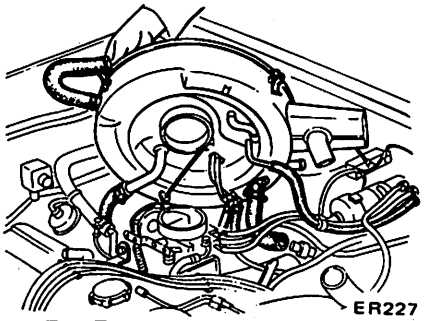
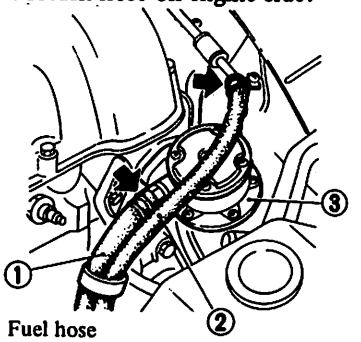


Fig. ER-3 Removing carburetor air cleaner

6. Plug up carburetor air-horn to prevent entry of foreign matter.
7. Disconnect fuel pump-to-fuel strainer hose at fuel pump and disconnect return hose on engine side.



1 Fuel hose
2 Fuel return hose
3 Fuel pump

Fig. ER-4 Removing fuel hoses

8. Disconnect carbon canister hose on engine side.
9. Disconnect air pump air cleaner-to-air pump hose at air cleaner.

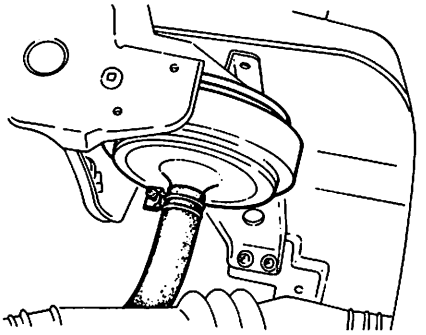


Fig. ER-5 Removing air pump air cleaner hose

10. Disconnect the following electrical leads:
(1) Distributor terminal wire.

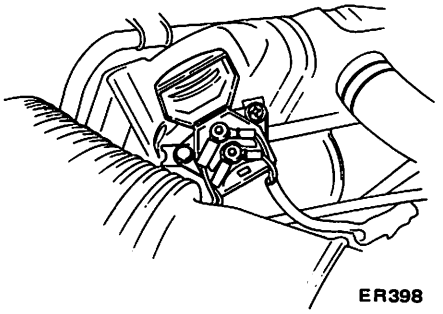


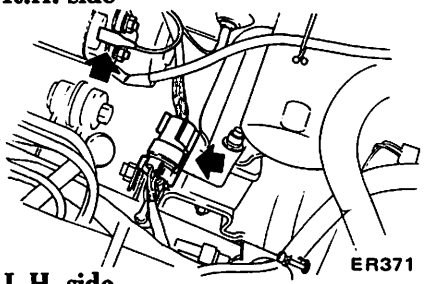
Fig. ER-6 Disconnecting distributor terminal

Note: Distributor wires can be disconnected at terminal block.

(2) High tension cable between distributor and ignition coil at distributor.
(3) Negative battery cable at engine slinger.
(4) Starting motor "E" terminal wire.
(5) The following two mold type connectors.

One connector is located above front right engine mounting bracket, and the other is beside ignition coil.

R.H. side



L.H. side

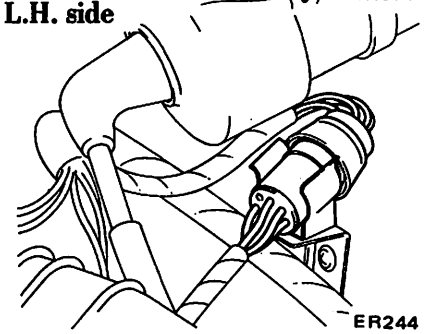
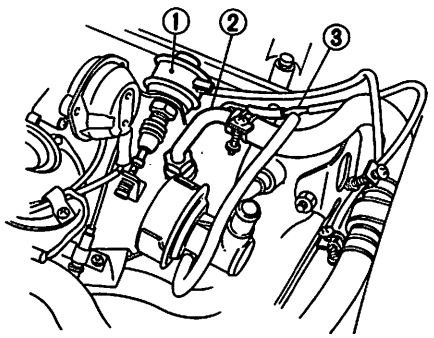


Fig. ER-7 Disconnecting electric wires

11. Disconnect brake booster-to-intake manifold connector vacuum hose at intake manifold. Also disconnect vacuum hose for air conditioner F.I.C.D. actuator. Then, remove F.I.C.D. actuator from bracket.



1 F.I.C.D. actuator
2 Vacuum hose for brake booster
3 Vacuum hose for A.B. valve

Fig. ER-8 Disconnecting vacuum hose for brake booster

12. Disconnect accelerator wire from carburetor.
13. Disconnect heater inlet and outlet hoses from engine compartment side.

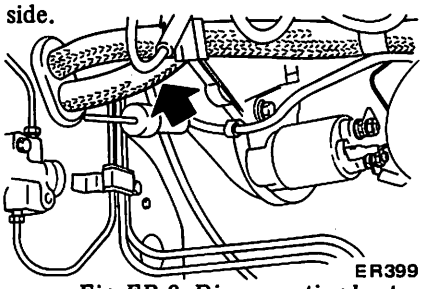
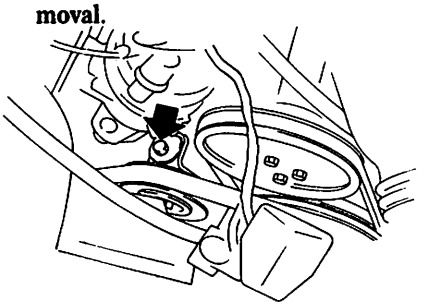
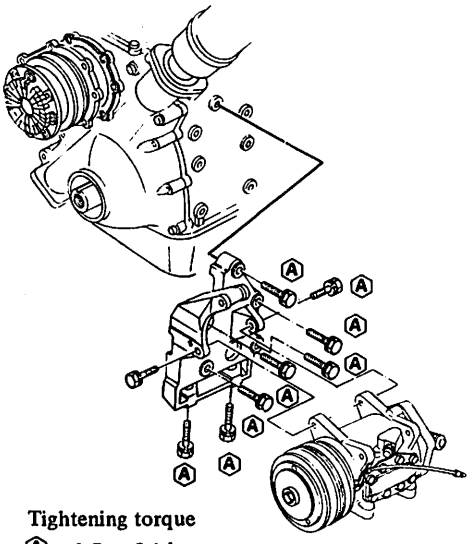


Fig. ER-9 Disconnecting heater hoses

14. On air conditioner equipped models, dismount air conditioner compressor; do not disconnect refrigerant hoses as follows:
(1) Loosen compressor pulley and disconnect drive belts.
(2) Remove four compressor mounting bolts and one bolt securing adjusting bar to compressor. Compressor can then be dismounted from engine.

Note: After dismounting compressor, hold compressor with wire to prevent interference with engine removal.



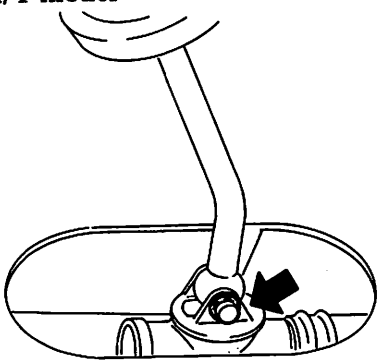


Tightening torque
Ⓐ 3.7 to 5.1 kg-m (27 to 37 ft-lb)

Fig. ER-10 Dismounting compressor

15. Remove upper and lower radiator hoses.
16. Remove radiator shrouds from radiator.
17. Remove radiator grille.
18. Remove radiator assembly from radiator support.
19. Remove transmission control linkage as follows:
(1) Manual transmission models
Detach rubber boot.
Remove E-ring and withdraw control lever pin. Control lever can then be taken out.
(2) Automatic transmission models
Disconnect joint between control lever and selector rod.

M/T model



A/T model

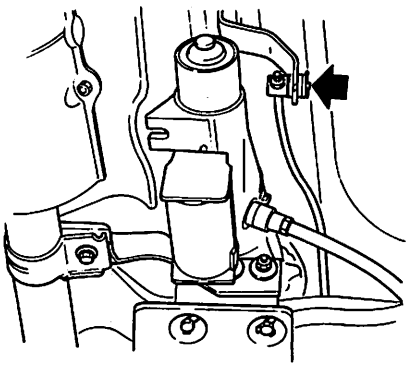


Fig. ER-11 Removing transmission control linkage

20. Disconnect speedometer cable from transmission rear extension.
21. Remove clutch operating cylinder attaching bolts and remove operating cylinder from clutch housing. (Manual transmission models)

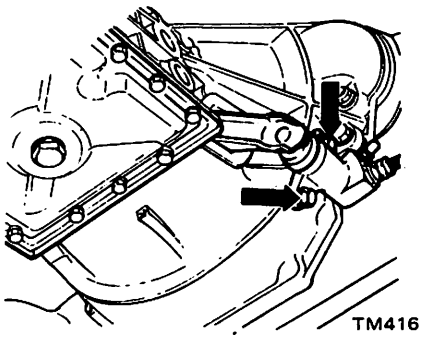


Fig. ER-12 Removing clutch operating cylinder

22. Remove heat shield insulators of front exhaust tube and catalytic converter (California model).
23. On California models, separate front exhaust tube from catalytic converter.

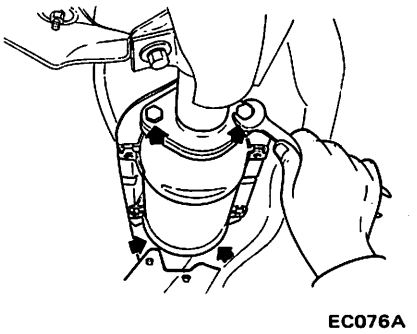
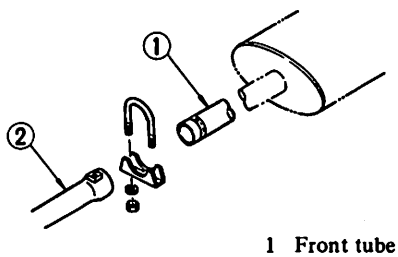


Fig. ER-13 Separating front exhaust tube from catalytic converter

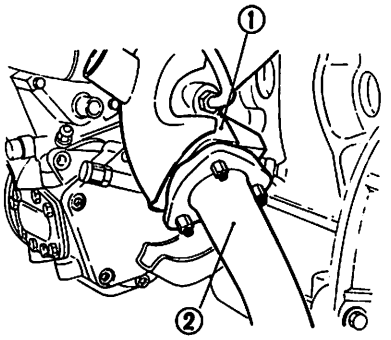
24. For non-California models, separate front exhaust tube from rear tube by loosening rear tube connector.



1 Front tube
2 Rear tube

Fig. ER-14 Separating front exhaust tube from rear tube

25. Remove front exhaust tube mounting.
26. Remove front exhaust tube from exhaust manifold.



1 Exhaust manifold
2 Front exhaust tube

Fig. ER-15 Removing front exhaust tube from exhaust manifold

27. Remove propeller shaft center bearing bracket.

Note: One bolt can be removed from outside of cabin and the other bolt from inside.

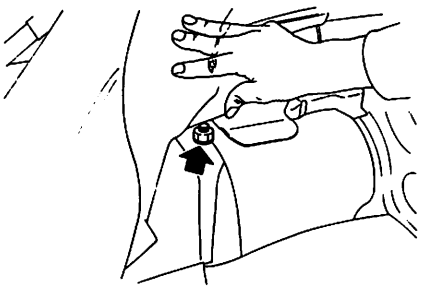


Fig. ER-16 Removing center bearing securing bolts

28. Supporting propeller shaft by hand, remove propeller shaft at companion flange of gear carrier.
29. Withdraw sleeve yoke of propeller shaft from rear extension housing.

It is good practice to release parking brake lever to facilitate removal of propeller shaft. Plug up rear end of rear extension housing to prevent oil leakage.

30. Support transmission with a jack.
31. Remove damper attaching bolts and remove damper from rear engine mounting support (California models).
32. Remove rear engine mounting insulator-to-rear engine mounting support attaching bolts.
33. Connect suitable wires to engine slingers and raise engine with a hoist to take weight off front and rear mounting insulators.

WARNING:
Before raising engine, try loosening wires two or three times to make sure it is safe to do so.

34. Remove rear engine mounting support-to-body attaching bolts.

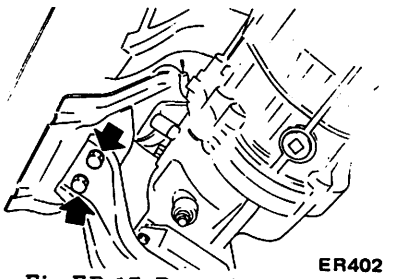
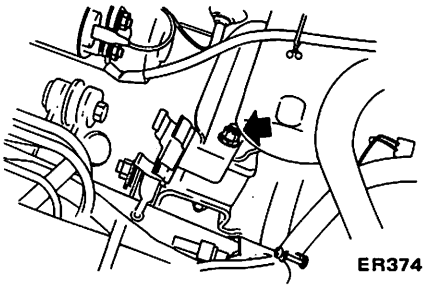
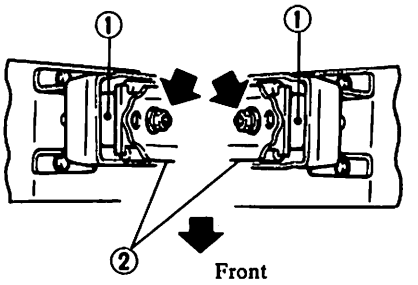


Fig. ER-17 Removing rear engine mount

35. Remove front engine mounting bolts.





1 Front engine mounting insulator
2 Front engine mounting bracket

Fig. ER-18 Removing front insulator

36. Raise engine and transmission and remove from car as a single unit.

CAUTION:
When raising engine, be especially careful not to knock it against adjacent parts.

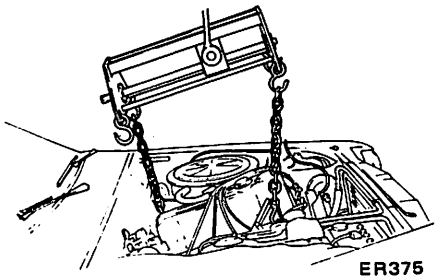

ER375

Fig. ER-19 Lifting engine and transmission

37. Place engine and transmission on engine stand.

INSTALLATION

Install engine and transmission in the reverse order of removal, observing the following:

Note: When installing, be sure to check that electrical harnesses are connected correctly.

1. When installing, first secure rear engine mounting support to body.
2. Refer to applicable section when installing and adjusting any parts.
3. When installing engine hood, be sure that it is properly aligned and that hood lock operates securely. Refer to Section BF for "Adjustment".

ENGINE MOUNTING INSULATORS

Three insulators are used to mount the engine and transmission; two are located at the right and left front ends of the cylinder block and one at the transmission rear extension housing.

Replace insulator if it shows signs of separation or deterioration.

Be sure to keep insulator free from oil or grease.

Inspection

If there is damage, deterioration or separation of bounded surface, replace.

Installation

Install front insulator in the reverse order of removal, observing the following instructions.

Front insulator can be adjusted sideways. After mounting the engine on front insulators, make sure that the engine is properly aligned.

Note: When connecting front insulator to engine mounting bracket, align the projection on front insulator with the notch in engine mounting bracket.

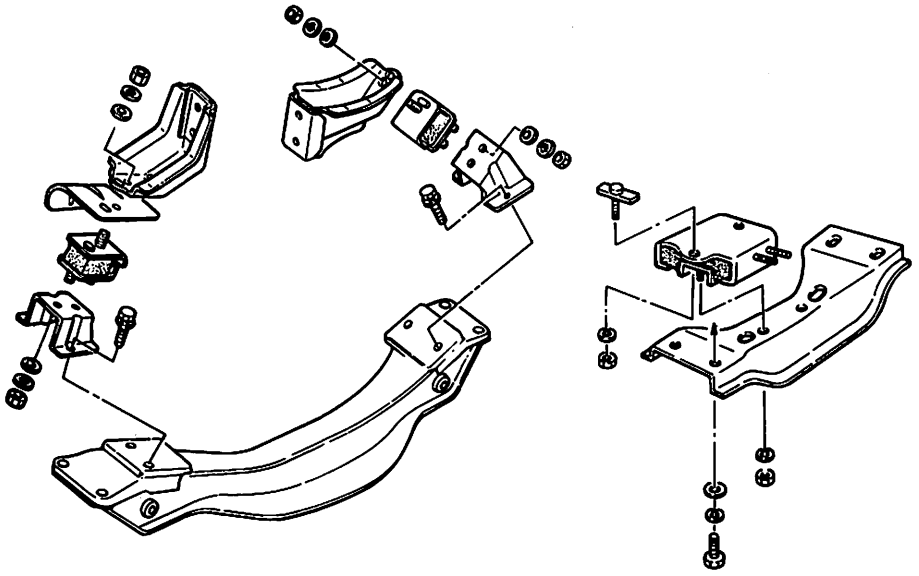
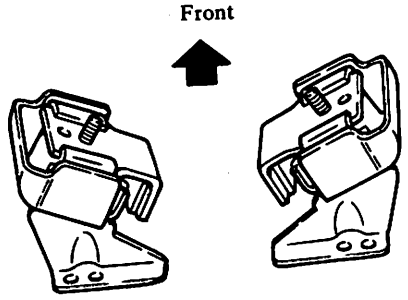

ER376

Fig. ER-20 Structural view of engine mounting

FRONT INSULATORS



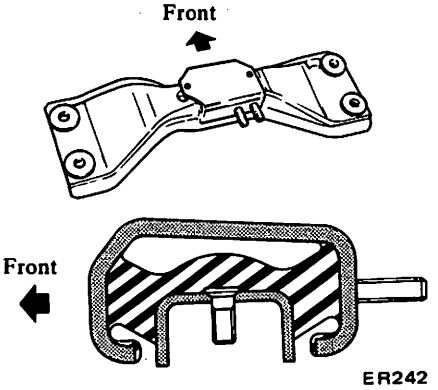
ER241

Fig. ER-21 Front insulators

Removal

1. Support engine with a jack or a hoist.
2. Remove front engine mounting insulator-to-front suspension member attaching bolts.
3. Remove engine mounting insulator-to-engine mounting bracket attaching bolts.
4. Raise engine slightly and remove insulators with heat shield plate.

REAR INSULATOR



ER242

Fig. ER-22 Rear insulator

Removal

1. Support transmission with a jack.
2. Remove damper attaching bolts and remove damper from rear engine mounting support (California models).
3. Remove rear engine mounting insulator-to-mounting support attaching bolts.
4. Remove rear engine mounting insulator-to-rear extension housing attaching bolts.
5. Raise transmission slightly and remove insulator.

Inspection

If there is damage, deterioration or separation of bounded surface, replace.

Installation

Install rear engine mounting insulator in the reverse order of removal.

SERVICE DATA AND SPECIFICATIONS

Tightening torque

Engine-to-engine mounting bracket	kg-m (ft-lb)	3.0 to 4.0 (22 to 29)
Engine mounting bracket to front insulator	kg-m (ft-lb)	2.6 to 3.2 (19 to 23)
Front insulator to mounting bracket	kg-m (ft-lb)	1.6 to 2.2 (12 to 16)
Mounting bracket to front suspension member	kg-m (ft-lb)	1.3 to 1.7 (9 to 12)
Rear mounting support-to-body	kg-m (ft-lb)	3.2 to 4.3 (16 to 31)
Rear insulator-to-rear mounting support	kg-m (ft-lb)	0.9 to 1.2 (6.5 to 8.7)
Transmission-to-rear insulator	kg-m (ft-lb)	0.9 to 1.2 (6.5 to 8.7)
Rear insulator to exhaust tube mounting bracket	kg-m (ft-lb)	0.8 to 1.2 (5.8 to 8.7)
Clutch operating cylinder-to-clutch housing	kg-m (ft-lb)	3.1 to 4.1 (22 to 30)
Front exhaust tube-to-exhaust manifold	kg-m (ft-lb)	2.0 to 2.6 (14 to 19)
Propeller shaft to companion flange	kg-m (ft-lb)	2.4 to 3.3 (17 to 24)

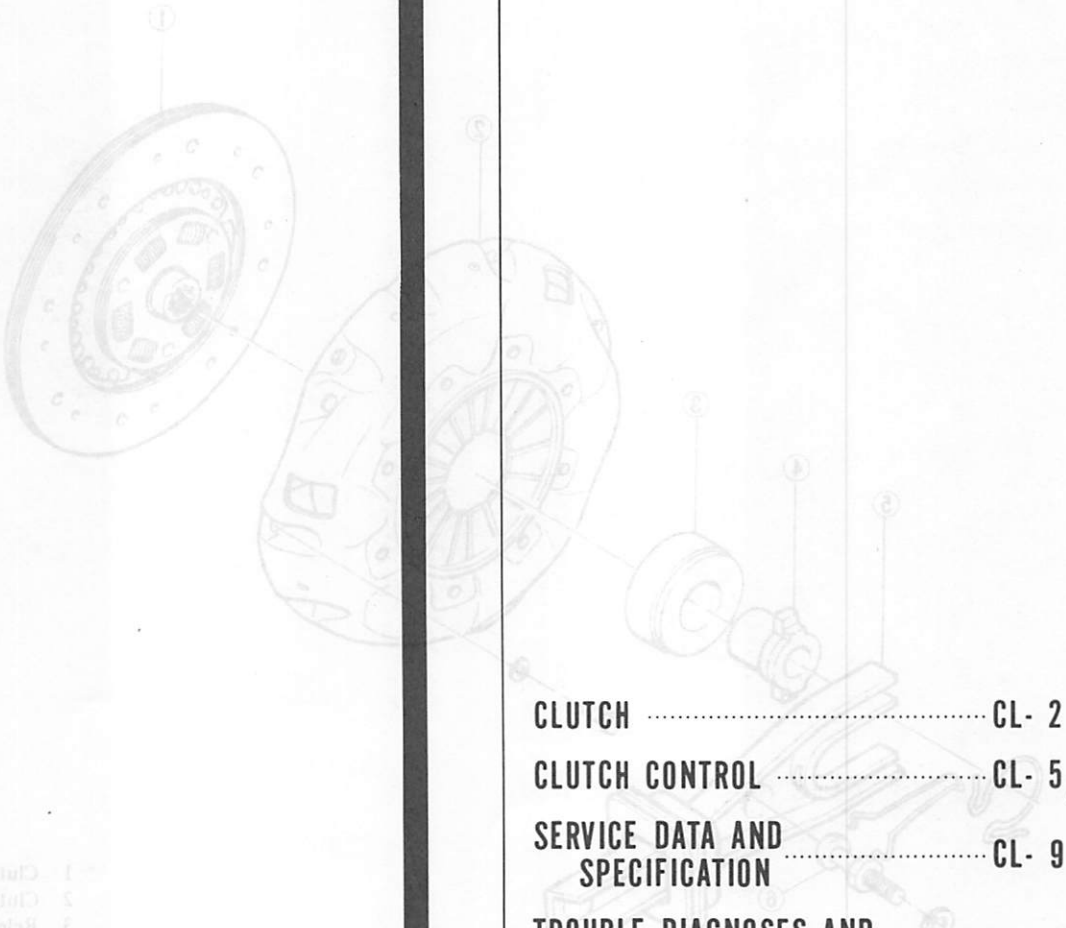
SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION CL

CLUTCH

CL



CLUTCH ..... CL- 2
CLUTCH CONTROL ..... CL- 5
SERVICE DATA AND SPECIFICATION ..... CL- 9
TROUBLE DIAGNOSES AND CORRECTIONS CL-10
SPECIAL SERVICE TOOLS CL-12

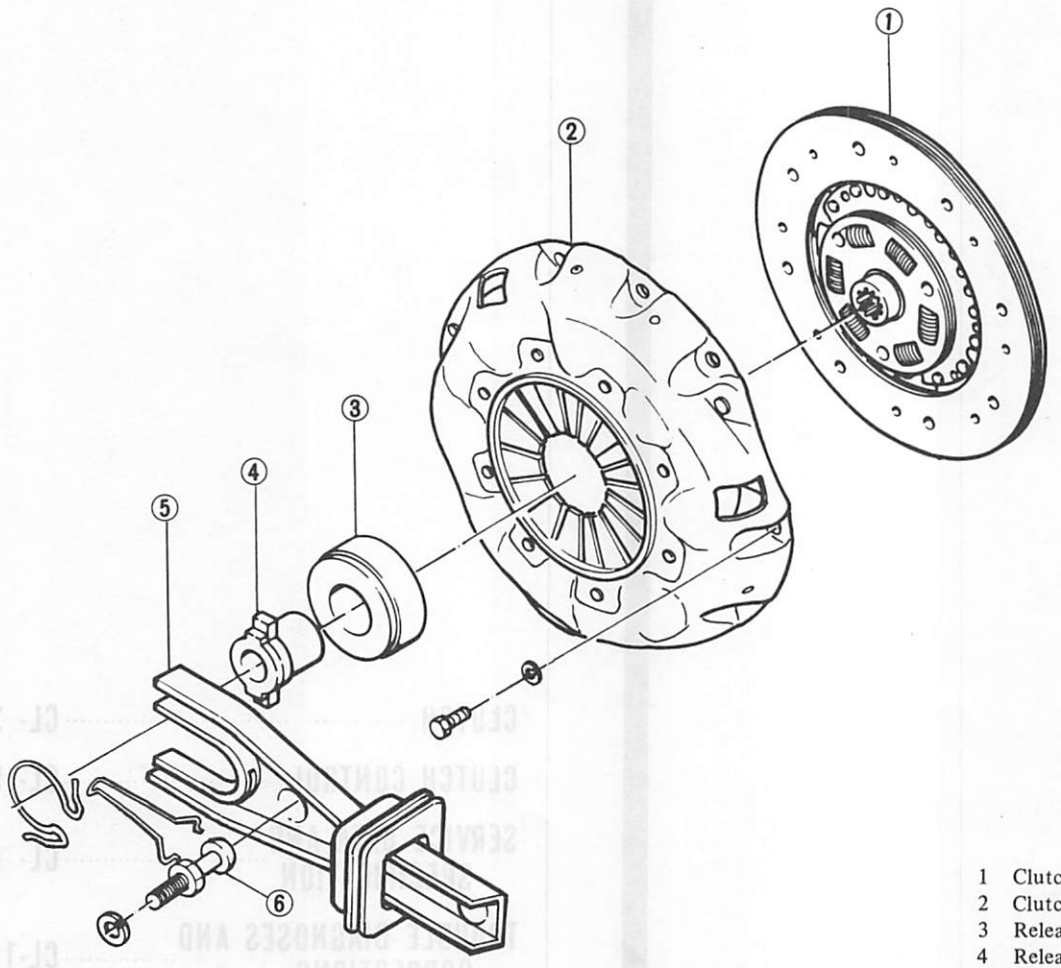
CLUTCH

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RELEASE BEARING CL-4
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INSTALLATION CL-4
PILOT BUSHING CL-5
REMOVAL CL-5
INSPECTION CL-5
INSTALLATION CL-5

DESCRIPTION

The clutch is a single dry disc type using a diaphragm spring. It consists of a clutch disc, pressure plate, diaphragm spring, thrust rings, clutch cover and clutch release bearing.



1 Clutch disc assembly
2 Clutch cover assembly
3 Release bearing
4 Release sleeve
5 Withdrawal lever
6 Withdrawal lever ball pin

CL307

Fig. CL-1 Exploded view of clutch assembly

CLUTCH DISC AND COVER

REMOVAL

1. Remove transmission from engine. For details of transmission removal, refer to Section MT for Removal.
2. Insert Clutch Aligning Bar ST20660000 into clutch disc hub until it will no longer go. It is important to support weight of clutch disc in the steps that follow.

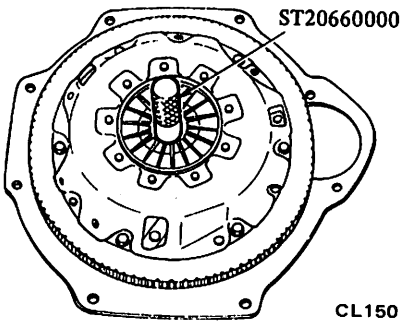


Fig. CL-2 Supporting clutch

3. Loosen bolts attaching clutch cover to flywheel, one turn each at a time, until spring pressure is released. Be sure to turn them out in a crisscross fashion.
4. Remove clutch disc and cover assembly.

INSPECTION

Wash all the disassembled parts except disc assembly in suitable cleaning solvent to remove dirt and grease before making inspection and adjustment.

Flywheel and pressure plate

Check friction surface of flywheel and pressure plate for scoring or roughness. Slight roughness may be smoothed by using fine emery cloth. If surface is deeply scored or grooved, the part should be replaced.

Clutch disc assembly

Inspect clutch disc for worn or oily facings, loose rivets and broken or loose torsional springs.

1. If facings are oily, the disc should be replaced. In this case, inspect transmission front cover oil seal, pilot bushing, engine rear oil seal and other points for oil leakage.
2. The disc should also be replaced when facings are worn locally or worn down to less than 0.3 mm (0.012 in) at rivet.

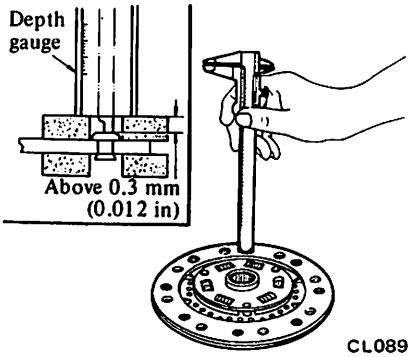


Fig. CL-3 Measuring clutch facing

3. Check disc plate for runout whenever the old disc or a new one is installed.
4. Check the fit of disc hub on transmission main drive gear splines for smooth sliding. If splines are worn, clutch disc or main drive gear should be replaced; that is, backlash exceeds 0.4 mm (0.016 in) at the outer edge of clutch disc.

Clutch cover assembly

1. Check the end surface of diaphragm spring for wear. If excessive wear is found, replace clutch cover assembly.
2. Measure the height of diaphragm spring as outlined below:

(1) Place Distance Piece ST20050100 on Base Plate ST20050010 and then tighten clutch cover assembly on the base plate by using Set Bolts ST20050051.

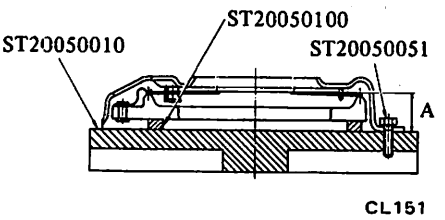


Fig. CL-4 Measuring the height of diaphragm spring

(2) Measure the height "A" at several points with a vernier caliper depth gauge. See Figure CL-4. If the height "A" of spring end is beyond the specified value, adjust the spring height with Diaphragm Spring Adjusting Wrench ST20050240 as shown in Figure CL-5.

Engine equipped models
A: 31.0 to 33.0 mm
(1.220 to 1.299 in)
Inner diameter of diaphragm spring

If necessary, replace clutch cover assembly. Also, unevenness of diaphragm spring toe height should be less than 0.5 mm (0.020 in).

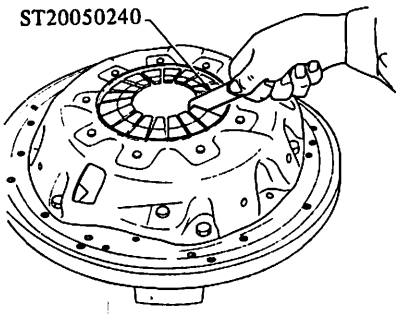


Fig. CL-5 Adjusting spring height

3. Inspect thrust rings for wear or damage. As these parts are invisible from outside, shake cover assembly up and down to listen for chattering noise, or lightly hammer on rivets for a slightly cracked noise. Any of these noises indicates need of replacement as a complete assembly.

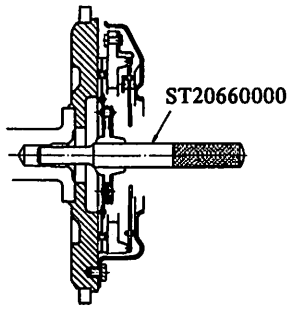
INSTALLATION

1. Apply a light coat of grease (including Molybdenum Disulphide) to transmission main drive gear splines. Slide clutch disc on main drive gear several times. Remove clutch disc and wipe off excess lubricant pushed off by disc hub.

Note: **Take special care to prevent grease or oil from getting on clutch facing.**

2. Reinstall clutch disc and clutch cover assembly. Support clutch disc and cover assemblies with Clutch Aligning Bar ST20660000.

Note: **Be sure to keep disc facings, flywheel and pressure plate clean and dry.**



CL153

Fig. CL-6 Installing clutch cover assembly

3. Install bolts to tighten clutch cover assembly to flywheel squarely. Each bolt should be tightened one turn at a time in a crisscross fashion.

Tightening torque:
1.6 to 2.1 kg-m
(12 to 15 ft-lb)

Note: **Dowels are used to locate clutch cover on flywheel properly.**

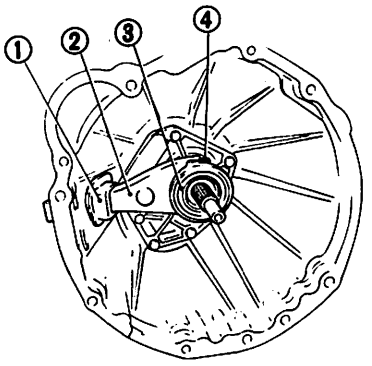
4. Remove Clutch Aligning Bar.

5. Reinstall transmission as described in Section MT for Installation.

RELEASE BEARING

REMOVAL

1. Remove transmission from engine. For details of transmission removal, refer to Section MT.
2. Remove holder spring from bearing sleeve; disconnect clutch withdrawal lever from bearing sleeve.
3. Remove release bearing and sleeve as an assembly from mainshaft.

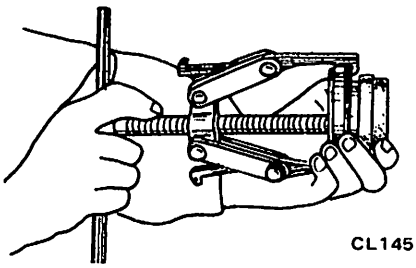


CL311

1 Dust cover
2 Withdrawal lever
3 Release bearing
4 Holder spring

Fig. CL-7 Clutch release mechanism

4. Take out clutch release bearing from bearing sleeve, using a universal puller and a suitable adapter.



CL145

Fig. CL-8 Disassembling release bearing

INSPECTION

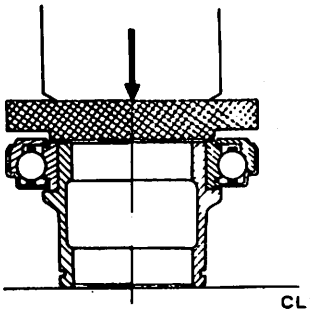
Check for abnormal wear on contact surface of withdrawal lever, ball pin and bearing sleeve.

Hold bearing inner race and rotate outer race while applying pressure to it. If the bearing rotation is rough or noisy, replace bearing.

INSTALLATION

1. Assemble release bearing on sleeve, using a press.

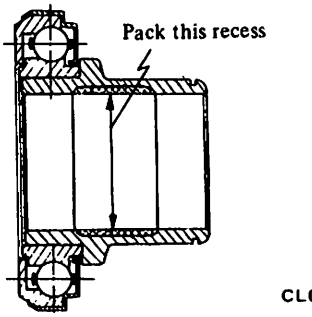
Note: **Do not depress outer race.**



CL117

Fig. CL-9 Installing release bearing

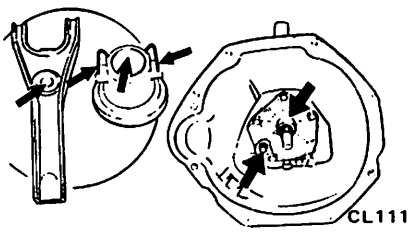
2. Before or during assembling, lubricate the following points with a light coat of multi-purpose grease.
(1) Inner groove of release bearing sleeve.



CL093

Fig. CL-10 Lubricating recess of bearing sleeve

(2) Contact surfaces of withdrawal lever, lever ball pin and bearing sleeve.
(3) Contact surfaces of transmission front cover.



CL111

Fig. CL-11 Lubricating points of withdrawal lever and front cover

(4) Contact surfaces of transmission main drive gear splines. Apply grease including Molybdenum Disulphide.

Note: Very small amount of grease should be applied to the above points. If too much lubricant is applied, it will run out on the friction plates when hot, resulting in damaged clutch disc facings.

3. After lubricating, install withdrawal lever, release bearing and bearing sleeve on clutch housing. After connecting them with holder spring, install dust cover on clutch housing.
4. Reinstall transmission as described in Section MT.

PILOT BUSHING

REMOVAL

1. Remove transmission from engine. For details of transmission removal, refer to Section MT for Removal.
2. Remove clutch disc and cover assembly.
3. Remove pilot bushing in crankshaft by Pilot Bushing Puller ST16610001.

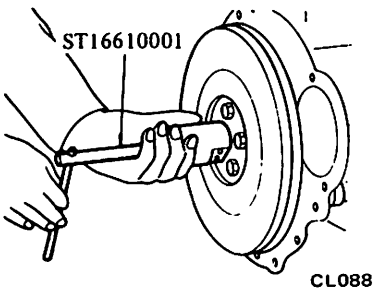


Fig. CL-12 Removing pilot bushing

INSPECTION

Check the fit of pilot bushing in the bore of crankshaft.

Check pilot bushing in crankshaft for wear, roughness or bell-mounted condition. If necessary, replace it. When bushing is damaged, be sure to check transmission main drive gear at the same time.

INSTALLATION

1. Before installing a new bushing, thoroughly clean bushing hole. Install bushing in crankshaft using a soft hammer. Bushing need not be oiled.

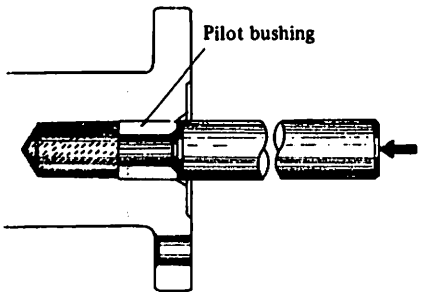


Fig. CL-13 Installing pilot bushing

2. Install clutch disc and clutch cover assembly.
3. Install transmission as described in Section MT for Installation.

CLUTCH CONTROL

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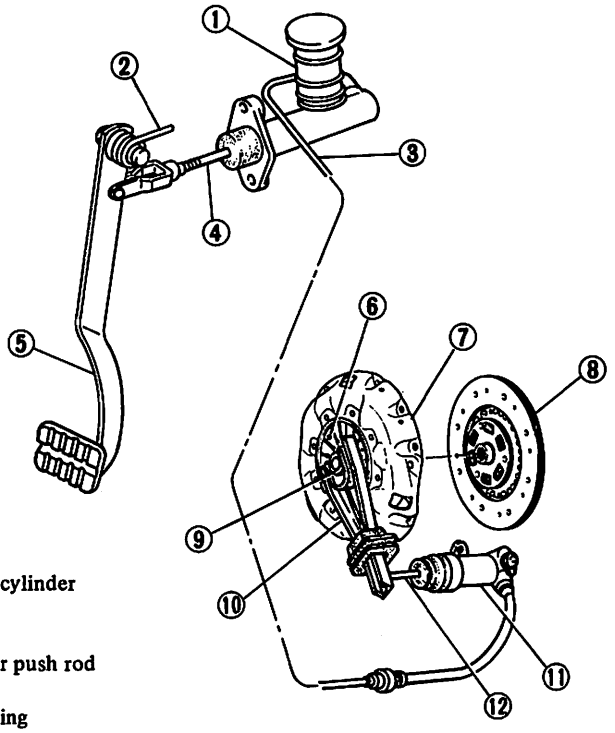
DESCRIPTION CL-5
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INSTALLATION CL-8
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REMOVAL CL-8
DISASSEMBLY CL-8
INSPECTION CL-8
ASSEMBLY CL-8
INSTALLATION CL-9

DESCRIPTION

The hydraulic clutch control consists of a pendent pedal, master cylinder, operating cylinder and withdrawal lever.

When the clutch pedal is depressed, the piston of the master cylinder forwards brake fluid to the operating cylinder via a pipe line. The movement of the operating cylinder piston is transmitted to the withdrawal lever through the push rod, thus disengaging the clutch.

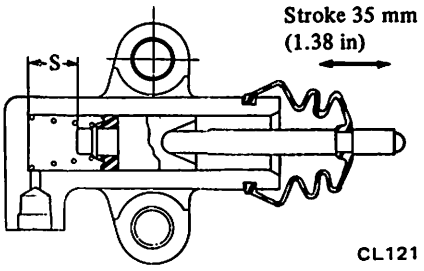
The operating cylinder is a non-adjustable type that uses no return spring. In this unit, the withdrawal-to-push rod play adjustment is not necessary since the "S" shown in Figure CL-15 serves to automatically compensate for wear on clutch disc.



1 Clutch master cylinder
2 Return spring
3 Clutch piping
4 Master cylinder push rod
5 Clutch pedal
6 Diaphragm spring
7 Clutch cover
8 Clutch disc
9 Release bearing
10 Withdrawal lever
11 Operating cylinder
12 Operating cylinder push rod

CL309

Fig. CL-14 Clutch operating system



CL121

Fig. CL-15 Non-adjustable operating cylinder

BLEEDING CLUTCH SYSTEM

To bleed clutch system, use the same procedures as described in Section BR for Bleeding Hydraulic System.

1. Fill oil reservoir of operating cylinder with brake fluid.
2. Detach cap from bleeder screw on operating cylinder and, in its place, connect a vinyl tube.
3. Pour a small amount of brake fluid into a clean container and insert the open end of the vinyl tube into it.
4. Have a co-worker depress clutch pedal two or three times. With clutch pedal depressed fully, loosen bleeder screw to bleed air out of clutch system.
5. Tighten bleeder screw and release the pedal.
6. Repeat above steps until no air bubbles appear in vinyl tube.

CAUTION:

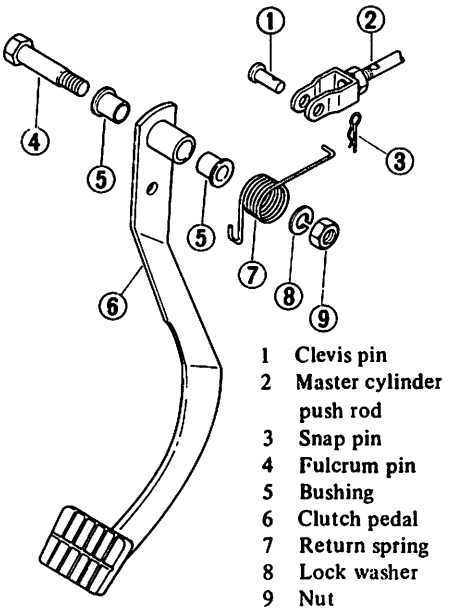
a. Do not re-use brake fluid drained during bleeding operation.
b. Use care not to allow brake fluid coming into contact with painted surfaces.
c. When tightening flare nut, use Flare Nut Torque Wrench GG94310000.

Note:

a. Always keep brake fluid in oil reservoir so that it flows into the line continuously.
b. Make sure that no leak occurs at connections.
c. Pour brake fluid into oil reservoir up to the specified level.

CLUTCH PEDAL

REMOVAL



1 Clevis pin
2 Master cylinder push rod
3 Snap pin
4 Fulcrum pin
5 Bushing
6 Clutch pedal
7 Return spring
8 Lock washer
9 Nut

CL200

Fig. CL-16 Exploded view of clutch pedal

1. Remove snap pin from end of clevis pin. Pull out clevis pin and separate master cylinder push rod from clutch pedal.
2. Remove nut securing fulcrum pin and pull out fulcrum pin. Clutch pedal can then be taken out along with return spring.

INSPECTION

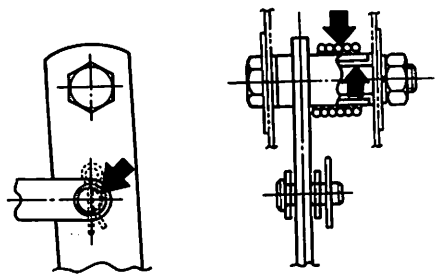
Check clutch pedal parts for the following items, correcting as necessary.

1. Bent pedal.
2. Weakened return spring.
3. Worn or deformed clevis pin and fulcrum bushings.
4. Cracks at welded part.

INSTALLATION

To install clutch pedal reverse the procedure of removal. Observe the following:

1. Apply coating of recommended multi-purpose grease to sliding portions and return spring. See Figure CL-17.



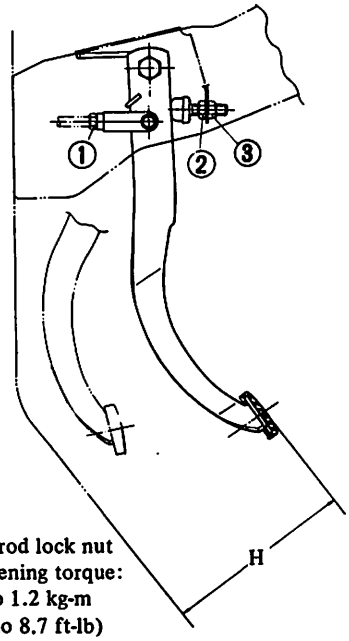
CL201

Fig. CL-17 Lubricating points

2. Be careful not to allow head of fulcrum pin to get on lock tongue of pedal bracket. Tighten nut to 1.9 to 2.4 kg-m (14 to 17 ft-lb).
3. Insert clevis pin through clutch pedal from left to right side.
4. After installing clutch pedal, check the clutch pedal height.

CLUTCH PEDAL HEIGHT

1. Adjust the clutch pedal height to 187 to 193 mm (7.36 to 7.60 in) by turning pedal stopper adjusting nut in or out. Then tighten lock nut to the specified torque of 0.8 to 1.2 kg-m (5.8 to 8.7 ft-lb).



1 Push rod lock nut
Tightening torque:
0.8 to 1.2 kg-m
(5.8 to 8.7 ft-lb)
2 Adjusting nut
3 Pedal stopper lock nut
Tightening torque:
0.8 to 1.2 kg-m
(5.8 to 8.7 ft-lb)
H: Pedal height 187 to 193 mm
(7.36 to 7.60 in)

CL310

Fig. CL-18 Adjusting pedal height

2. Adjust the clutch pedal free play. Adjust it to 1 to 5 mm (0.04 to 0.20 in) at the pedal pad by turning clutch master cylinder push rod in or out. Then tighten lock nut to the specified torque of 0.8 to 1.2 kg-m (5.8 to 8.7 ft-lb). See Figure CL-18.

Note:

a. **Pedal free play appeared due to clearance among pedal hole, push rod and piston should be measured on top face of pedal pad.**
b. **Depress and release clutch pedal over its entire stroke to ensure that the clutch linkage operates smoothly without squeak noise, interference and binding.**

CLUTCH MASTER CYLINDER

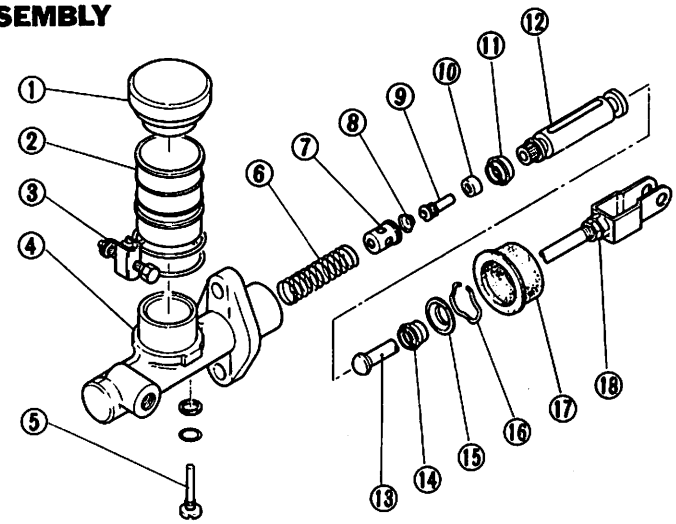
REMOVAL

1. Remove snap pin from clevis pin.
2. Pull out clevis pin.
3. Disconnect clutch tube from master cylinder.
4. Remove nuts securing master cylinder to dash panel and remove master cylinder.

Note: When disconnecting clutch tube, be sure to receive draining clutch fluid into a container. Use of rags is also suggested to keep adjacent parts and area clean.

CAUTION:
When disconnecting clutch tube, use suitable flare nut wrench.
Never use an open end wrench or adjustable wrench.

DISASSEMBLY



1 Reservoir cap	6 Return spring	11 Primary cup	16 Stopper ring
2 Reservoir	7 Spring seat	12 Piston	17 Dust cover
3 Reservoir band	8 Valve spring	13 Push rod	18 Lock nut
4 Cylinder body	9 Supply valve rod	14 Secondary cup	
5 Supply valve stopper	10 Supply valve	15 Stopper	

CL265

Fig. CL-19 Exploded view of clutch master cylinder

1. Remove dust cover and take off stopper ring from body.
2. Remove push rod and piston assembly.
3. Take off piston cups.
4. Remove spring seat from piston and take off supply valve, if necessary. See Figure CL-19.

Note: Discard piston cup, supply valve, spring seat and dust cover.

CAUTION:
Never detach reservoir. If it is removed for any reason, discard it and install new one.

INSPECTION

CAUTION:
To clean or wash all parts of master cylinder, clean brake fluid must be used. Never use mineral oils such as gasoline and kerosene. It will ruin the rubber parts of the hydraulic system.

1. Check cylinder bore and piston for score or rust and if found, replace.
2. Check cylinder bore and piston for wear. If the clearance between cylinder bore and piston is more than 0.15 mm (0.0059 in), replace piston assembly or master cylinder assembly.
3. Check the condition of piston cup and dust cover. Always replace them after disassembly.
4. Check all recesses, openings and internal passages to ensure that they are clean and free from foreign matters.

ASSEMBLY

Assemble clutch master cylinder in the reverse procedures of disassembly. Observe the following:

1. Dip piston cup in brake fluid before installing. Make sure that it is correctly faced in position.
2. Apply a coating of brake fluid to cylinder and piston when assembling.
3. Press piston into spring seat when assembling.

Note: **The clutch master cylinder is available in both NABCO make and TOKICO make. There is no interchangeability of repair kits or component parts between NABCO and TOKICO makes.**
When replacing the repair kit or component parts, ascertain the brand of the clutch master cylinder body. Be sure to use parts of the same make as the former ones.

INSTALLATION

Install clutch master cylinder in the reverse procedures of removal. Observe the following:

1. Adjust the pedal play by changing the length of push rod. Refer to page CL-7.
2. Bleed air out of hydraulic system. Refer to page CL-6.

Tightening torque:
Master cylinder to dash panel securing nut:
0.8 to 1.2 kg-m
(5.8 to 8.7 ft-lb)
Clutch tube flare nut:
1.5 to 1.8 kg-m
(11 to 13 ft-lb)

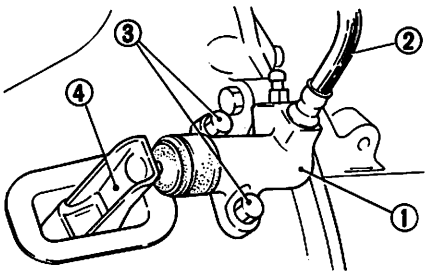
CAUTION:
When connecting clutch tube, use Flare Nut Torque Wrench GG94310000.

OPERATING CYLINDER

REMOVAL

1. Disconnect clutch tube from clutch hose.
2. Detach clutch hose from operating cylinder.
3. Remove two bolts securing operating cylinder to clutch housing.

Tightening torque:
Operating cylinder to clutch housing bolt:
3.1 to 4.1 kg-m
(22 to 30 ft-lb)



1 Clutch operating cylinder
2 Clutch hose
3 Bolts
Tightening torque:
3.1 to 4.1 kg-m
(22 to 30 ft-lb)
4 Withdrawal lever
CL308

Fig. CL-20 Operating cylinder

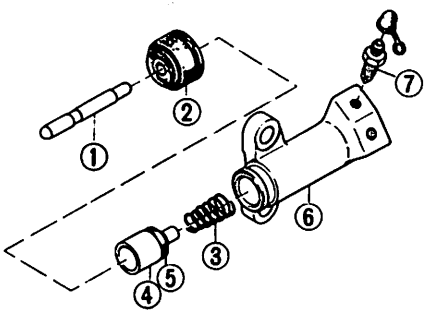
DISASSEMBLY

Take the following steps, referring to Figure CL-21.

1. Remove push rod and dust cover.
2. Remove piston and piston spring.

Note: **Discard piston cup and dust cover.**

3. Remove bleeder screw.



1 Push rod
2 Dust cover
3 Piston spring
4 Piston
5 Piston cup
6 Operating cylinder
7 Bleeder screw
CL222

Fig. CL-21 Exploded view of operating cylinder

INSPECTION

Visually inspect all disassembled parts, replacing those found worn or damaged too badly beyond specifications.

CAUTION:
To clean or wash all parts of operating cylinder, clean brake fluid must be used.
Never use mineral oils such as gasoline or kerosene. It will ruin the rubber parts of the hydraulic system.

1. Check cylinder and piston for uneven wear or damage, and replace if necessary.
2. Renew piston cup when disassembled. It must also be replaced when wear or deformation due to fatigue or damage is found.
3. Damaged dust cover should be replaced. Return spring must also be replaced when it is broken or weak.

ASSEMBLY

Assemble operating cylinder in the reverse procedures of disassembly, observing closely the following instructions.

1. Prior to assembly, dip a new piston cup in clean brake fluid. In installing piston cup, pay particular attention to its direction.
2. Dip cylinder and piston in clean brake fluid before assembly.

Note:

a. Be sure to install piston assembly with piston spring in place.

b. The clutch operating cylinder is available in both NABCO make and TOKICO make. There is no interchangeability of repair kits or component parts between NABCO and TOKICO makes.
When replacing the repair kit or component parts, ascertain the brand of the clutch operating cylinder body. Be sure to use parts of the same make as the former ones.

INSTALLATION

Install operating cylinder in the reverse procedures of removal.

Note: Bleed air thoroughly from clutch hydraulic system, referring to Bleeding Clutch System.

Tightening torque:
- Operating cylinder to clutch housing securing bolts: 3.1 to 4.1 kg-m (22 to 30 ft-lb)
- Clutch hose connector: 1.7 to 2.1 kg-m (12 to 15 ft-lb)
- Bleeder screw: 0.7 to 0.9 kg-m (5.1 to 6.5 ft-lb)

SERVICE DATA AND SPECIFICATIONS

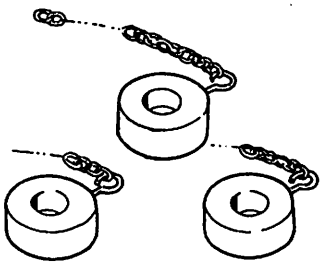
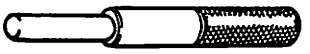
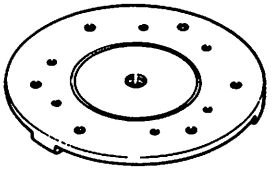
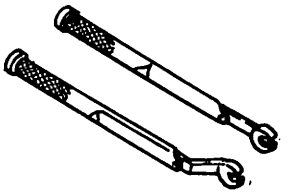
Type		C200S
Diaphragm spring		
Distance to flywheel	mm (in)	31.0 to 33.0 (1.220 to 1.299)
Unevenness of spring height	mm (in)	less than 0.5 (0.020)
Installed load	kg (lb)	400 (882)
Clutch disc		
Facing size Outer dia. x inner dia. x thickness	mm (in)	200 x 130 x 3.5 (7.87 x 5.12 x 0.138)
Allowable minimum depth of rivet head from surface	mm (in)	0.3 (0.012)
Allowable free play of spline at the outer edge of disc	mm (in)	0.4 (0.016)
Clutch pedal		
Height	mm (in)	187 to 193 (7.36 to 7.60)
Free play	mm (in)	1 to 5 (0.04 to 0.20)
Clutch master cylinder		
Diameter	mm (in)	15.87 (5/8)
Clutch operating cylinder		
Diameter	mm (in)	17.46 (11/16)
Tightening torque		
Clutch assembly bolt	kg-m (ft-lb)	1.6 to 2.1 (12 to 15)
Pedal fulcrum pin	kg-m (ft-lb)	1.9 to 2.4 (14 to 17)
Master cylinder push rod lock nut	kg-m (ft-lb)	0.8 to 1.2 (5.8 to 8.7)
Pedal stopper lock nut	kg-m (ft-lb)	0.8 to 1.2 (5.8 to 8.7)
Master cylinder to dash panel	kg-m (ft-lb)	0.8 to 1.2 (5.8 to 8.7)
Clutch tube connector (Flare nut)	kg-m (ft-lb)	1.5 to 1.8 (11 to 13)
Operating cylinder to clutch housing bolt	kg-m (ft-lb)	3.1 to 4.1 (22 to 30)
Operating cylinder bleeder screw	kg-m (ft-lb)	0.7 to 0.9 (5.1 to 6.5)
Clutch hose connector	kg-m (ft-lb)	1.7 to 2.1 (12 to 15)
Flywheel bolt	kg-m (ft-lb)	14 to 16 (101 to 116)

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause and testing	Corrective action
Clutch slips	Slipping of clutch may be noticeable when any of the following symptoms is encountered during operation. (1) Car will not respond to engine speed during acceleration. (2) Insufficient car speed. (3) Lack of power during uphill driving. Some of the above conditions may also be attributable to engine problem. First determine whether engine or clutch is causing the problem. If slipping clutch is left unheeded, wear and/or overheating will occur on clutch facing to such an extent that it is no longer serviceable. TO TEST FOR SLIPPING CLUTCH, proceed as follows: During upgrade travelling, run engine at about 40 to 50 km/h (25 to 31 MPH) with gear shift lever in 3rd-speed position, shift into highest gear and at the same time rev up engine. If clutch is slipping, car will not readily respond to depression of accelerator pedal.	
	• Clutch facing worn excessively.	Replace.
	• Oil or grease on clutch facing.	Replace.
	• Warped clutch cover or pressure plate.	Repair or replace.
Clutch drags	Dragging clutch is particularly noticeable when shifting gears, especially into low gear. TO TEST FOR DRAGGING CLUTCH, proceed as follows: (1) Start engine. Disengage clutch. Shift into reverse gear, and then into Neutral. Gradually increase engine speed, and again shift into reverse gear. If clutch is dragging, gear "grating" is heard when shifting gears from Neutral into Reverse. (2) Stop engine and shift gears. (Conduct this test at each gear position.) (3) Each gear is smoothly shifted in step (2) above, but grates when shifted to 1st speed position at idling. a. If dragging is encountered at the end of shifting, check condition of synchro-mechanism in transmission. b. If dragging is encountered at the beginning of shifting, proceed to step (4) below. (4) Push change lever toward Reverse side, depress pedal to check for free travel of pedal. a. If pedal can be depressed further, check clutch for condition. b. If pedal cannot be depressed further, proceed to step (5) below. (5) Check clutch control. (pedal height, free pedal play, free travel withdrawal lever play, etc.) If any abnormal condition does not exist and if pedal cannot be depressed further, check clutch for condition.	
	• Clutch disc runout or warped.	Replace.
	• Wear or rust on hub splines in clutch disc.	Clean and lubricate with grease, or replace.
	• Diaphragm spring toe height out of adjustment or toe tip worn.	Adjust or replace.
	• Worn or improperly installed parts.	Repair or replace.

Condition	Probable cause and testing	Corrective action
Clutch chatters	Clutch chattering is usually noticeable when car is just rolled off with clutch partially engaged.	
	• Weak or broken clutch disc torsion spring.	Replace.
	• Oil or grease on clutch facing.	Replace.
	• Clutch facing out of proper contact or clutch disc runout.	Replace.
	• Loose rivets.	Replace.
	• Warped pressure plate or clutch cover surface.	Repair or replace.
	• Unevenness of diaphragm spring toe height.	Adjust or replace.
	• Loose engine mounting or deteriorated rubber.	Retighten or replace.
Noisy clutch	A noise is heard after clutch is disengaged.	
	• Damaged release bearing.	Replace.
	A noise is heard when clutch is disengaged.	
	• Insufficient grease on the sliding surface of bearing sleeve.	Apply grease.
	• Clutch cover and bearing are not installed correctly.	Adjust.
	A noise is heard when car is suddenly rolled off with clutch partially engaged.	
	• Damaged pilot bushing.	Replace.
Clutch grabs	When grabbing of clutch occurs, car will not roll off smoothly from a standing start or clutch will be engaged before clutch pedal is fully depressed.	
	• Oil or grease on clutch facing.	Replace.
	• Clutch facing worn or loose rivets.	Replace.
	• Wear or rust on splines in drive shaft and clutch disc.	Clean or replace.
	• Warped flywheel or pressure plate.	Repair or replace.
	• Loose mountings for engine or power train units.	Retighten.

SPECIAL SERVICE TOOLS

Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.
ST20050100 Distance piece 	——— / Fig. CL-4	ST20660000 Clutch aligning bar 	See J 25672 & J 25673 / Fig. CL-2 Fig. CL-6
ST20050010 Base plate 	——— / Fig. CL-4	ST16610001 Pilot bushing puller 	J 23907 / Fig. CL-12
ST20050051 Set bolt 	——— / Fig. CL-4	GG94310000 Flare nut torque wrench 	——— / Page CL-8
ST20050240 Diaphragm spring adjusting wrench 	——— / Fig. CL-5		

SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION MT

TRANSMISSION

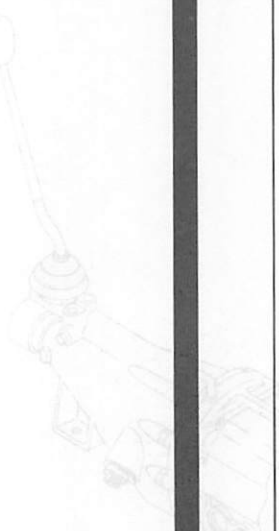
MT

5-SPEED TRANSMISSION (Type : FS5W63A) ..... MT- 2

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TROUBLE DIAGNOSES AND CORRECTIONS MT-20

SPECIAL SERVICE TOOLS MT-21



5-SPEED TRANSMISSION (Type : FS5W63A)

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DESCRIPTION

The transmission is a 5-speed forward with overdrive (4 + OD - speed), fully synchronized constant mesh type that uses helical gears.

The reverse gear is a sliding mesh type using spur gear provided on the outer side of 1st & Reverse coupling sleeve.

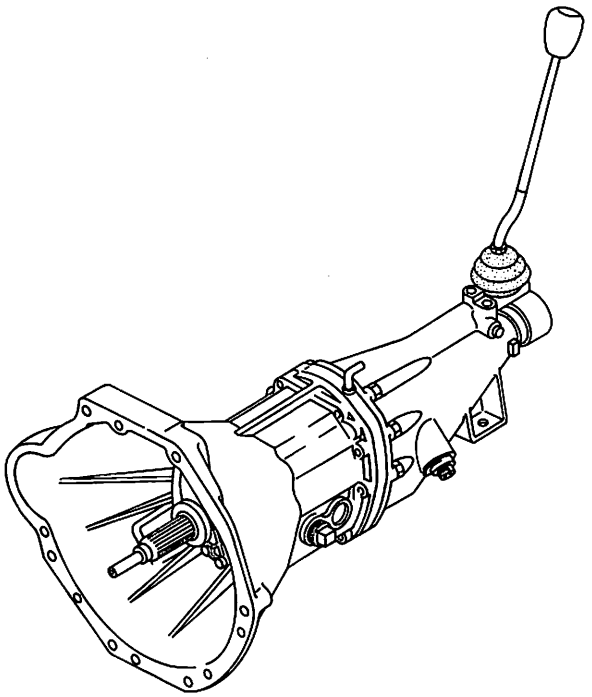
In construction, the main drive gear is meshed with the counter drive gear. The forward speed gears provided on the countershaft are in constant mesh with the main gears which ride on the mainshaft freely through the needle bearings.

When the transmission is shifted, the action causes the coupling sleeve to slide on the synchronizer hub. This engages its inner teeth with the other teeth formed on the mainshaft gear. The synchronizer hub is fitted to the mainshaft by splines so they turn together as a unit as the mainshaft is rotated. The transmission is a Warner type. On Warner types, the baulk rings synchronize the coupling sleeve with the mainshaft gear. When the transmission is shifted into reverse position, the mainshaft reverse gear provided on the outer side of 1st & Reverse coupling sleeve, moves to mesh with the reverse idler gear; the transmission is reversed.

The transmission assembly consists of three main parts; a transmission case with clutch housing, an adapter plate to which all gears and shafts are installed, and a rear extension.

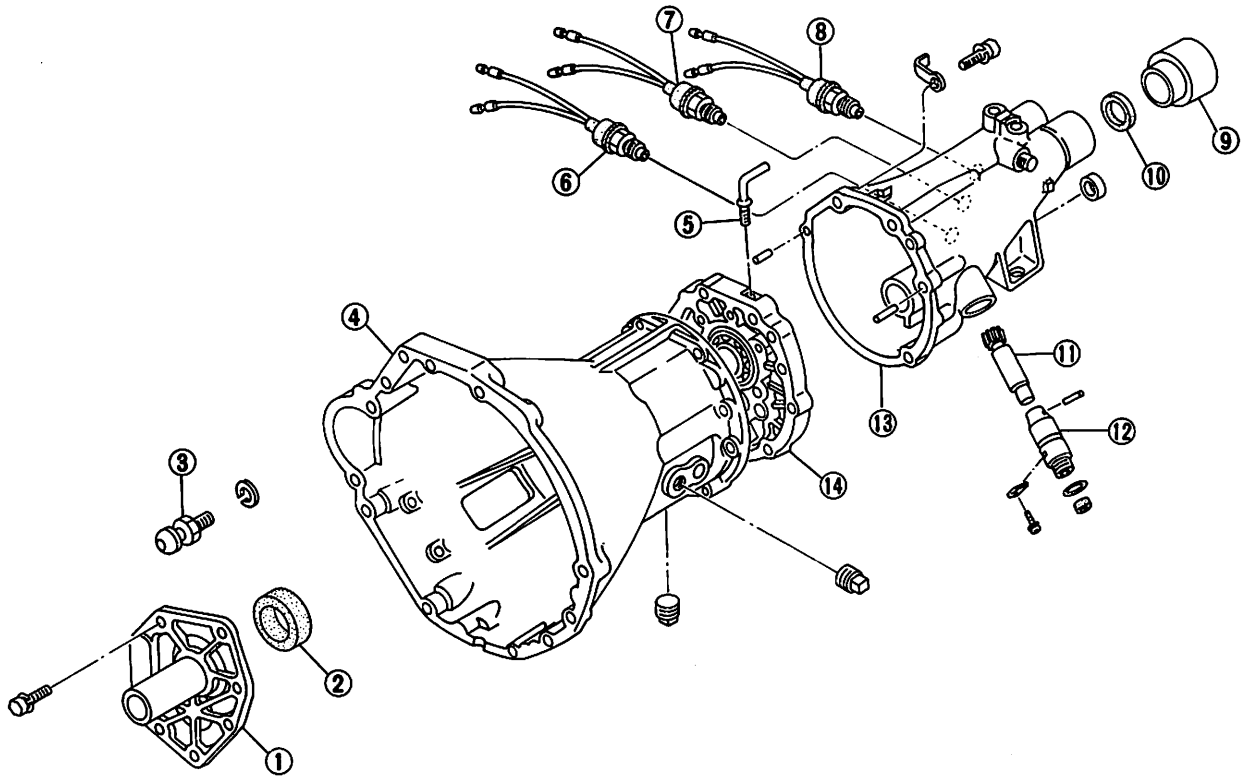
The cast-iron adapter plate supports the mainshaft, countershaft, reverse idler shaft and three fork rods, and is bolted at the front to the transmission case and, at the rear, to the rear extension by means of through-bolts.

By removing these through-bolts all gears and shafts are stripped.



TM057A

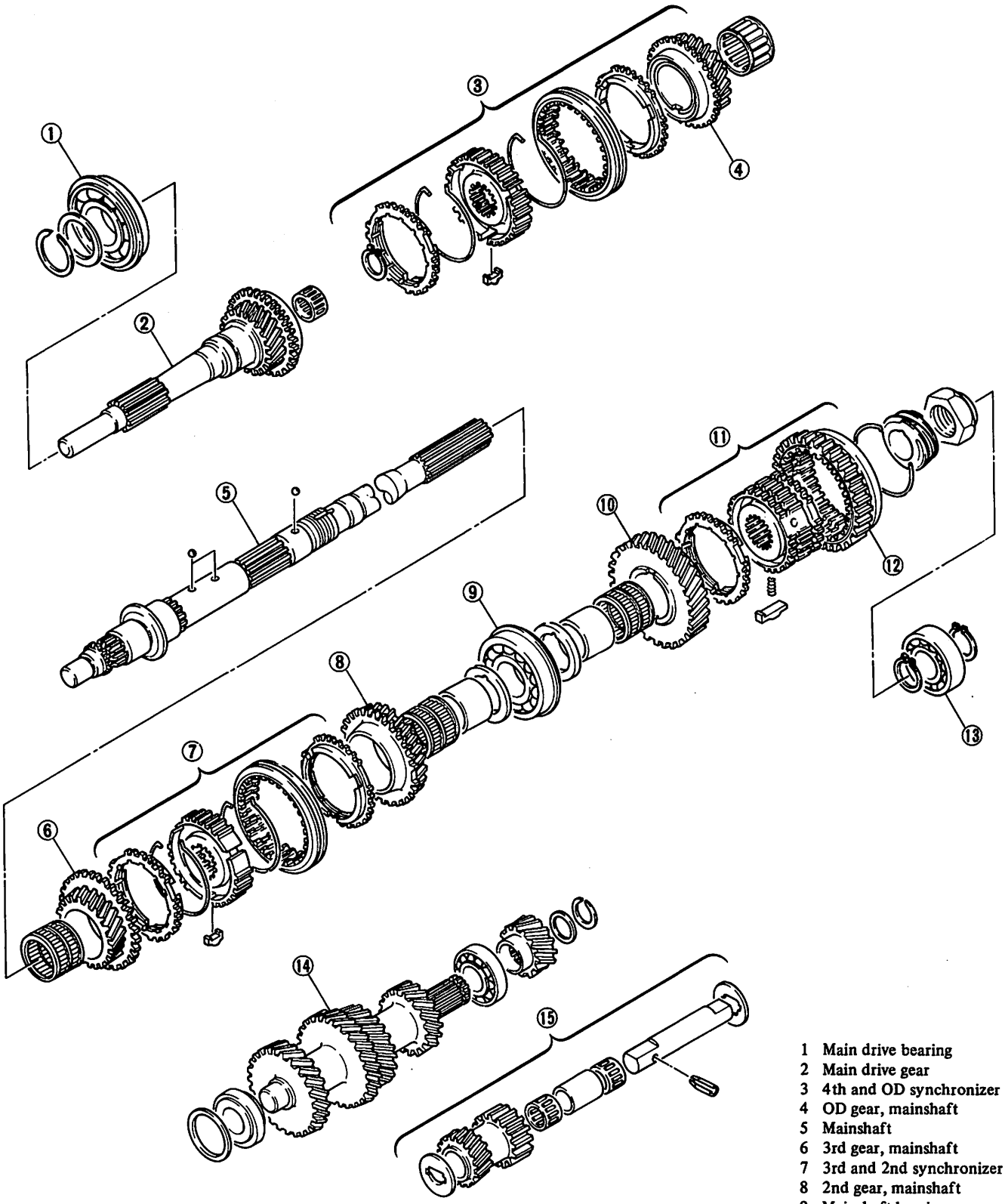
Fig. MT-1 FS5W63A transmission



1 Front cover
2 Front cover oil seal
3 Withdrawal lever ball pin
4 Transmission case
5 Breather
6 Top switch
7 Back-up lamp switch
8 Neutral switch (Canada models)
9 Sleeve yoke dust cover
10 Rear extension oil seal
11 Speedometer pinion
12 Speedometer sleeve
13 Rear extension
14 Adapter plate

TM058A

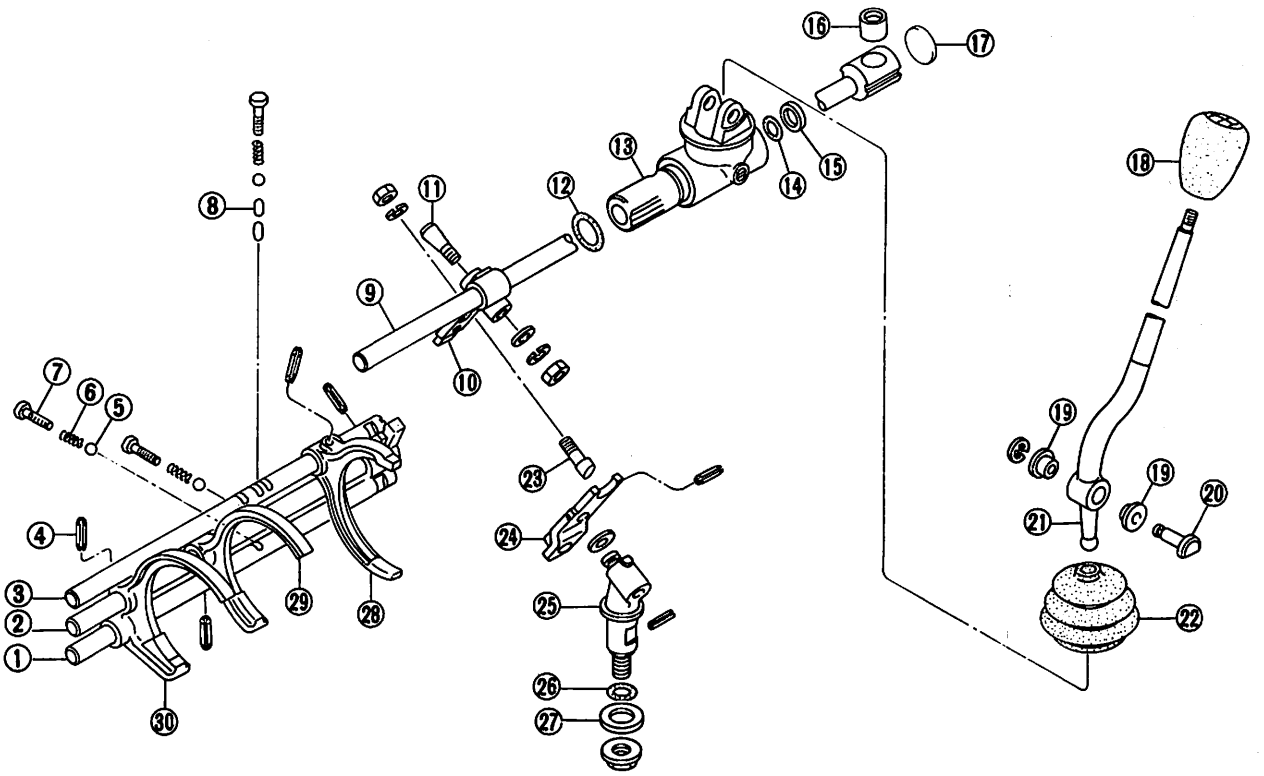
Fig. MT-2 FS5W63A transmission case components



1 Main drive bearing
2 Main drive gear
3 4th and OD synchronizer
4 OD gear, mainshaft
5 Mainshaft
6 3rd gear, mainshaft
7 3rd and 2nd synchronizer
8 2nd gear, mainshaft
9 Mainshaft bearing
10 1st gear, mainshaft
11 Reverse and 1st synchronizer
12 Reverse gear, mainshaft
13 Mainshaft end bearing
14 Counter gear assembly
15 Idler gear assembly

TM059A

Fig. MT-3 FS5W63A transmission gear components



1 4th and OD fork rod
2 2nd and 3rd fork rod
3 1st and reverse fork rod
4 Retaining pin
5 Checking ball
6 Poppet spring
7 Checking ball plug
8 Interlock plunger
9 Striking rod
10 Striking lever
11 Lock pin
12 O-ring
13 Striking guide
14 O-ring
15 O-ring cap
16 Control lever bushing
17 Expansion plug
18 Control lever knob
19 Control pin bushing
20 Control arm pin
21 Control lever
22 Control lever boot
23 Striking pin
24 Shift arm
25 Shift arm bracket
26 Arm bracket O-ring
27 Arm bracket plain washer
28 1st and reverse shift fork
29 2nd and 3rd shift fork
30 4th and OD shift fork

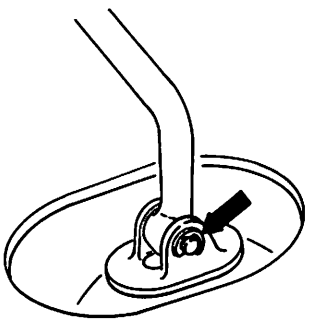
TM060A

Fig. MT-4 FS5W63A transmission shift control components

REMOVAL

To dismount transmission from the car, proceed as follows:

1. Disconnect battery ground cable from terminal.
2. Remove console box and floor hole cover. Detach rubber boots.
3. Place transmission control lever in neutral position.
4. Remove snap ring and control lever pin from transmission striking rod guide, and remove control lever.



TM0013A

Fig. MT-5 Removing control lever

5. Jack up the car and support its weight on safety stands. Use a hydraulic hoist or open pit, if available.

Note: Confirm that safety is insured.

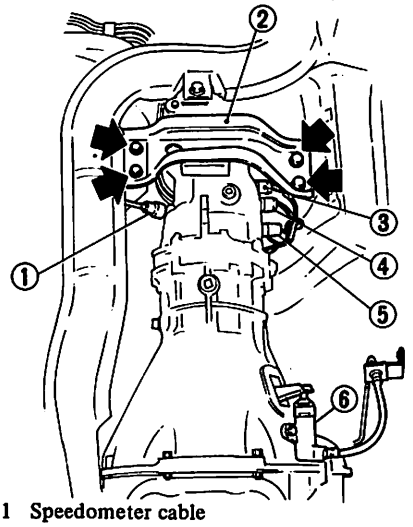
6. Disconnect front exhaust tube from exhaust manifold.
7. Remove bolts securing front exhaust tube to rear engine mounting member.
8. Remove wire for Neutral switch (Canada models), Back-up lamp switch and Top switch. See Figure MT-6.
9. Disconnect speedometer cable from rear extension housing. See Figure MT-6.
10. Remove clutch operating cylinder from transmission case.
11. Remove propeller shaft. Refer to Section PD for Removal.

Note: Plug up the opening in the rear extension housing to prevent oil from flowing out.

12. Support engine by locating a jack under oil pan with a wooden block placed between oil pan and jack.

CAUTION:
Do not place jack under oil pan drain plug.

13. Support transmission with a transmission jack.
14. Remove bolts securing rear engine mounting member to body.



1 Speedometer cable
2 Rear engine mounting member
3 Neutral switch (Canada models)
4 Buck-up lamp switch
5 Top switch
6 Clutch operating cylinder TM061A

Fig. MT-6 Bottom view of car

15. Remove starter motor.
16. Remove bolts securing transmission to engine.
17. After removing these bolts.
(1) Support the engine and transmission with jacks.
(2) Slide transmission to the rear, away. from engine.
(3) Remove transmission from the car.

CAUTION:
Take care in dismounting transmission not to strike any adjacent parts or main drive shaft.

DISASSEMBLY

TRANSMISSION CASE DISASSEMBLY

1. Prior to disassembling transmission, thoroughly wipe off dirt and grease from it.
2. Drain oil thoroughly.
3. Remove dust cover from transmission case.

Remove release bearing and withdrawal lever.

4. Remove Neutral switch (Canada models), Back-up lamp switch and Top switch.
5. Remove speedometer pinion and pinion sleeve by taking off lock plate.
6. Remove front cover securing bolts and remove front cover.

Detach countershaft front bearing thrust washer.

7. Remove main drive bearing snap ring with Expander.

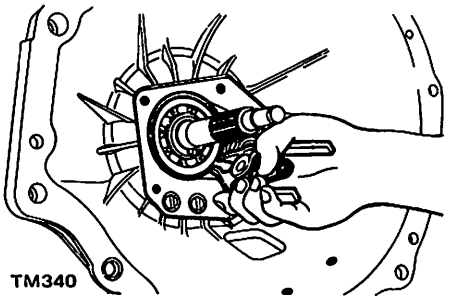


Fig. MT-7 Removing main drive bearing snap ring

8. Remove reverse select return plug, reverse select return spring and plunger from rear extension.

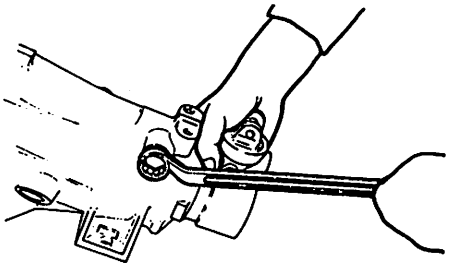


Fig. MT-8 Removing reverse select return plug

9. Remove rear extension securing bolts. Extract rear extension backward using a standard puller.

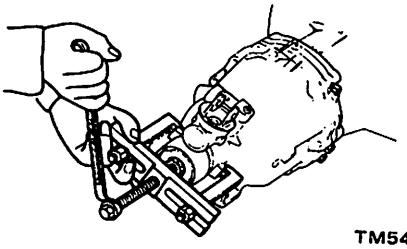


Fig. MT-9 Removing rear extension

10. Separate transmission case from adapter plate with a soft hammer.

CAUTION:
Do not pry transmission case or rear extension from adapter plate with screwdriver.

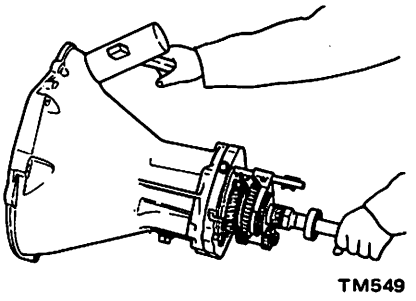


Fig. MT-10 Removing transmission case

11. Install Adapter Setting Plate ST22490000 on adapter plate.

With countershaft side up, place this assembly in a vise.

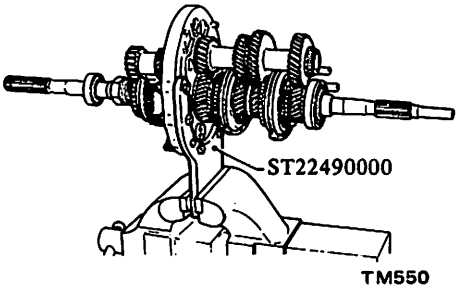


Fig. MT-11 Attaching gear assembly to special tool

DISASSEMBLY OF GEAR ASSEMBLY

Shift forks and fork rods

1. Drive out retaining pins from each fork rod with Fork Rod Pin Punch ST23540000.

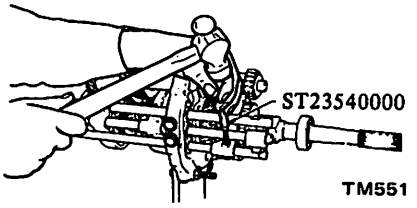


Fig. MT-12 Driving out retaining pins

2. Remove three(3) check ball plugs, and drive out fork rods from adapter plate by lightly tapping on the front end. See Figure MT-13.

Notes:

a. **Be careful not to lose the three(3) check balls and two(2) interlock plungers.**

b. **Each gear and shaft can be detached from adapter plate without removing each fork rod.**

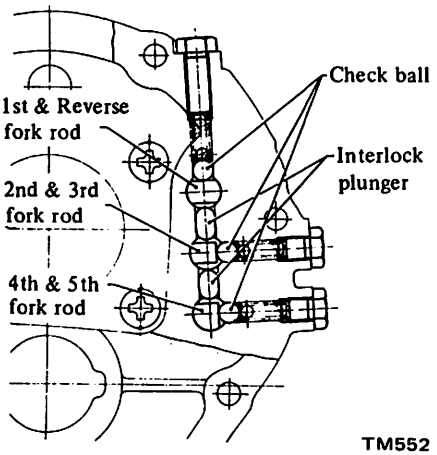


Fig. MT-13 Layout of check ball and interlock plunger

Gear assembly

Note: It is necessary to measure end play before disassembling mainshaft and after reassembling mainshaft. Refer to Inspection of Gears and Shaft.

1. Remove reverse idler gear together with shaft.

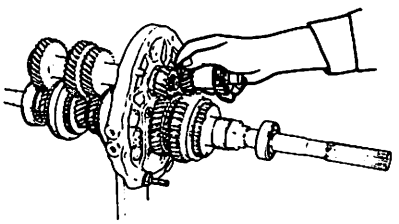


Fig. MT-14 Removing reverse idler gear

2. Remove following parts from end of mainshaft:

(1) Snap ring from mainshaft end bearing.
(2) Mainshaft end bearing, using Rear Bearing Puller KV32101330.
(3) Another snap ring from mainshaft end bearing.

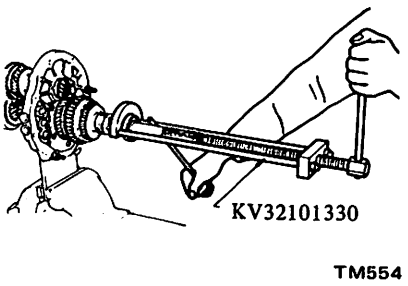


Fig. MT-15 Removing mainshaft end bearing

3. With 1st and 2nd gears doubly engaged, release caulking on mainshaft nut and loosen it.

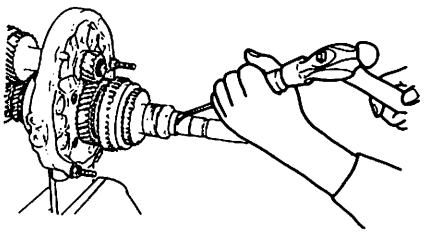


Fig. MT-16 Releasing caulking on mainshaft nut

4. Remove following parts from mainshaft in rear extension side:

(1) Mainshaft nut.
(2) Speedometer drive gear and steel ball.
(3) Synchro-hub with reverse gear.
(4) 1st gear together with needle bearing and bushing.
(5) Thrust washer and steel ball.

Note: Be careful not to lose steel ball retaining speedometer drive gear and thrust washer.

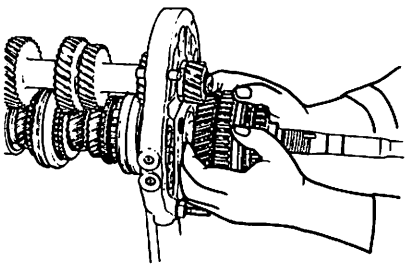


Fig. MT-17 Removing reverse and 1st gears

5. Remove following parts from counter gear rear end:

(1) Snap ring and thrust washer.
(2) 1st counter gear, using Gear Puller ST22480000.

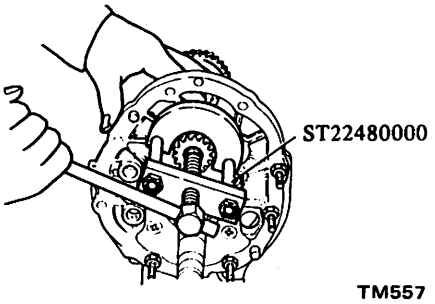


Fig. MT-18 Removing 1st counter gear

6. Drive out mainshaft as follows, using Mainshaft Puller KV32101310.
(1) Install Mainshaft Puller on adapter plate, holding the front of mainshaft gear assembly and counter gear assembly by hand. See Figure MT-19.
(2) Remove main drive gear and counter gear after driving out mainshaft roughly 10 mm (0.39 in). See Figure MT-20.
(3) Remove mainshaft and mainshaft gear as an assembly.

CAUTION:
Be careful not to drop gears.

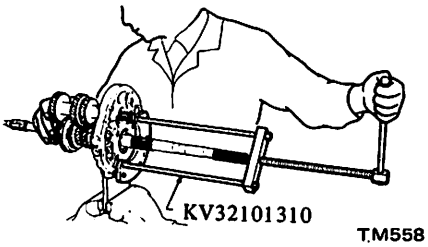


Fig. MT-19 Removing mainshaft gear

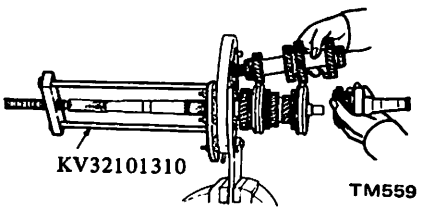


Fig. MT-20 Removing main drive gear and counter gear

Mainshaft

1. Remove following parts from the area in the vicinity of the 2nd gear:

(1) Thrust washer and steel ball.
(2) 2nd gear and needle bearing.

Note: Be careful not to lose steel ball retaining thrust washer.

2. Press following parts out together from 2nd and 3rd gear segment using Bearing Puller ST30031000:

(1) 2nd gear mainshaft bushing.
(2) 3rd gear and 2nd & 3rd speed synchronizer. See Figure MT-21.

CAUTION:
When pressing out bushing, hold mainshaft by hand so as not to drop it.

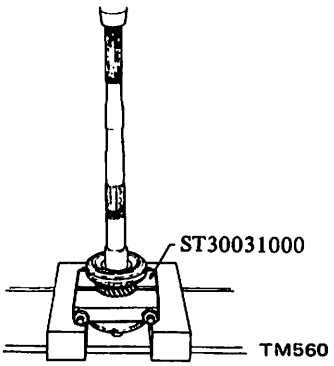


Fig. MT-21 Removing 2nd gear mainshaft bushing

3. Pry off snap ring on the front end of mainshaft, and remove 4th & 5th speed synchronizer and 5th gear.

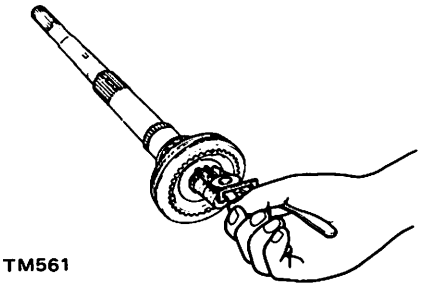
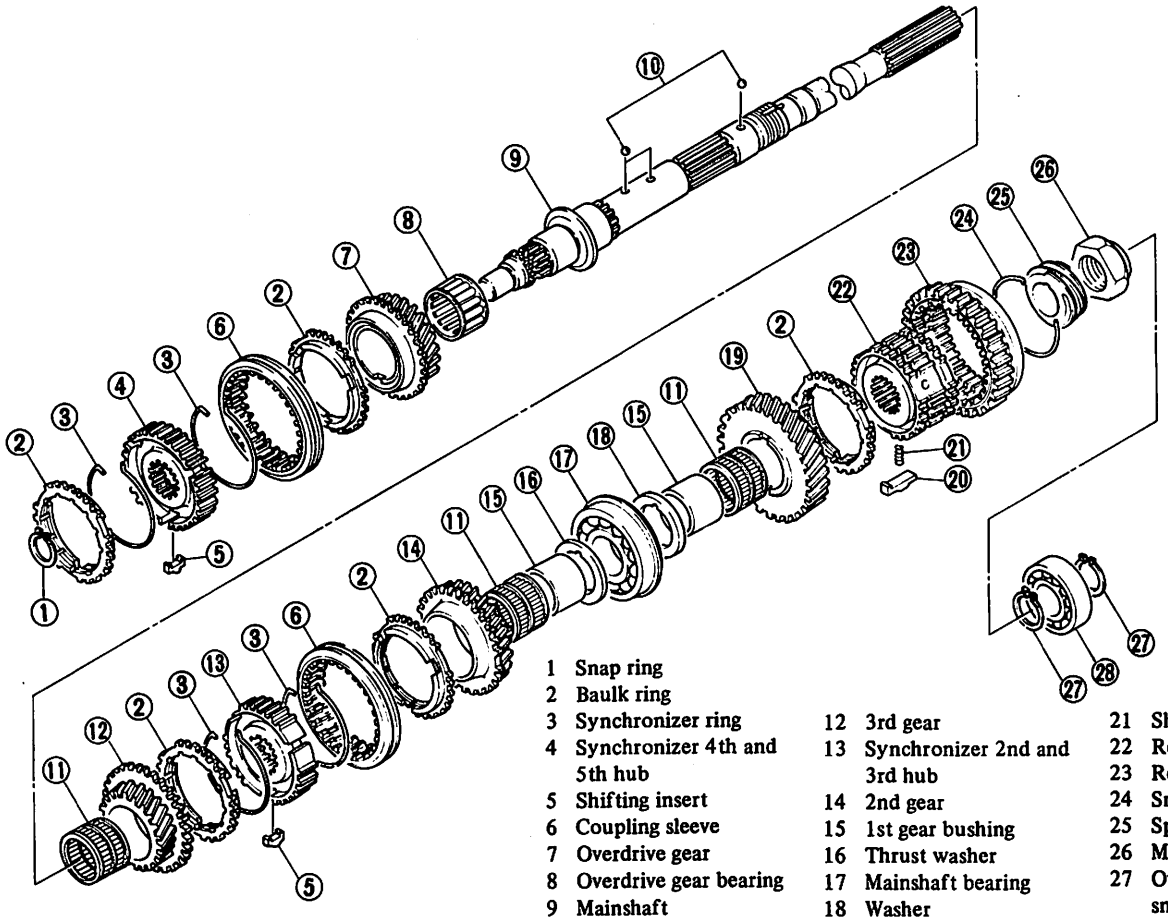


Fig. MT-22 Removing snap ring



1 Snap ring
2 Baulk ring
3 Synchronizer ring
4 Synchronizer 4th and 5th hub
5 Shifting insert
6 Coupling sleeve
7 Overdrive gear
8 Overdrive gear bearing
9 Mainshaft
10 Steel ball
11 Needle bearing
12 3rd gear
13 Synchronizer 2nd and 3rd hub
14 2nd gear
15 1st gear bushing
16 Thrust washer
17 Mainshaft bearing
18 Washer
19 1st gear
20 Shifting insert
21 Shifting insert spring
22 Reverse mainshaft hub
23 Reverse gear
24 Snap shifting insert ring
25 Speedometer drive gear
26 Mainshaft nut
27 Overdrive bearing front snap ring
28 Mainshaft end bearing

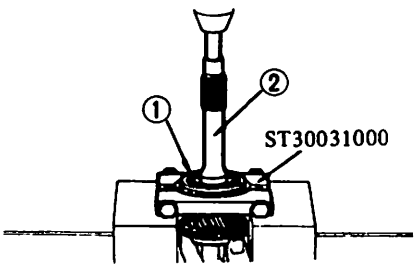
TM062A

Fig. MT-23 Exploded view of mainshaft assembly

Main drive gear

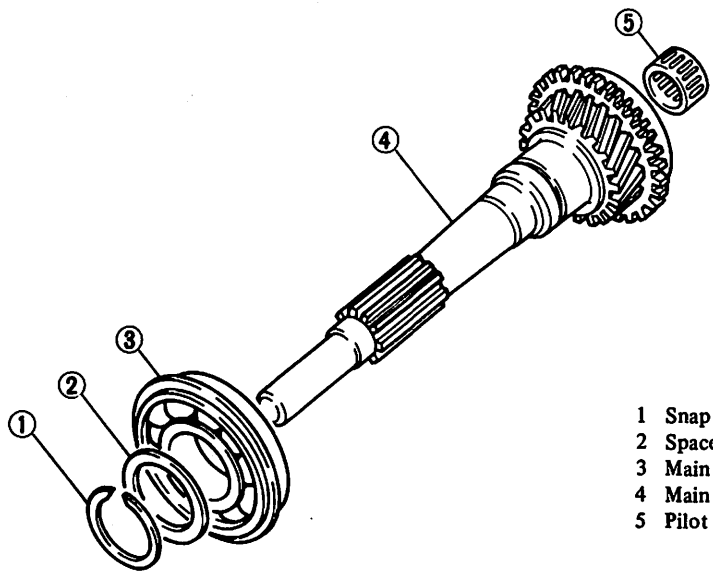
1. Pry off snap ring and remove spacer.
2. Press out main drive bearing using Bearing Puller ST30031000. See Figure MT-24.

CAUTION:
When pressing out bearing, hold gear by hand so as not to drop gear onto floor.



1 Main drive bearing
2 Main drive gear

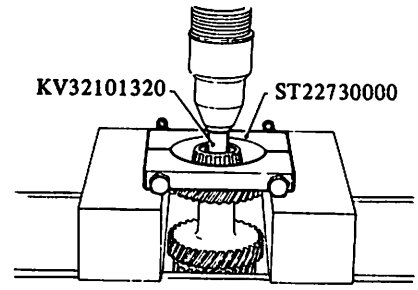
Fig. MT-24 Remvoing main drive bearing



1 Snap ring
2 Spacer
3 Main drive bearing
4 Main drive gear
5 Pilot bearing

TM063A

Fig. MT-25 Exploded view of main drive gear assembly

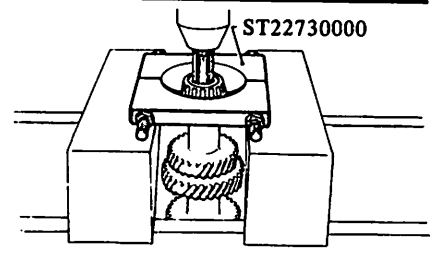


TM564

Fig. MT-26 Removing counter gear front bearing

2. Press out counter gear rear bearing using Bearing Puller ST22730000. See Figure MT-27.

CAUTION:
Be careful not to drop off counter gear.



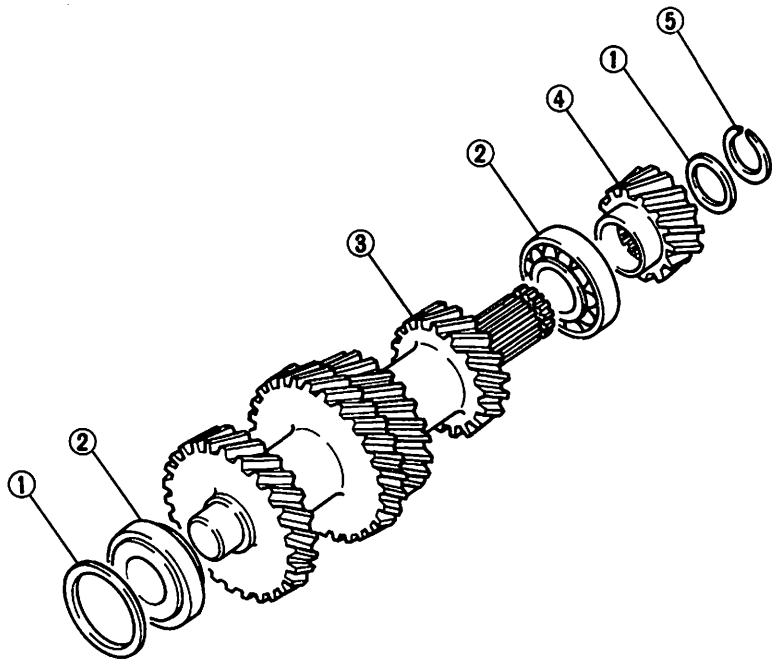
TM565

Fig. MT-27 Removing counter gear rear bearing

Counter gear

1. Press out counter gear front bearing using Bearing Puller ST22730000 and Adapter KV32101320. See Figure MT-26.

CAUTION:
When pressing out bearing, hold gear by hand so as not to drop gear onto floor.



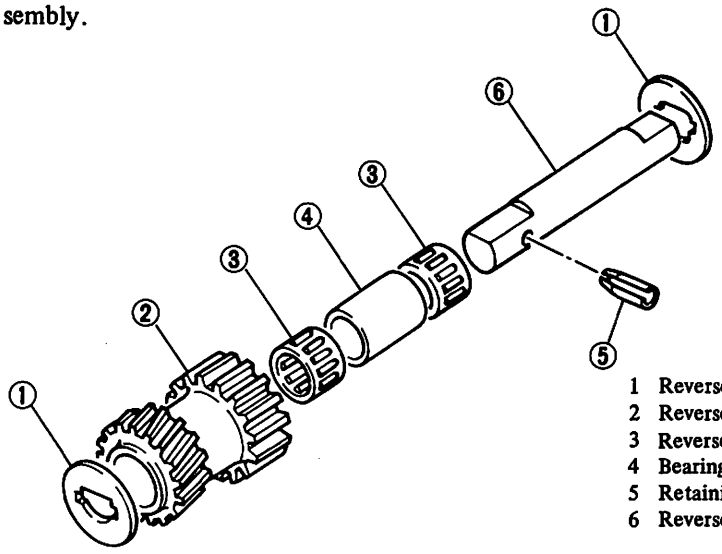
1 Thrust washer
2 Bearing
3 Counter gear
4 1st counter gear
5 Snap ring

TM064A

Fig. MT-28 Exploded view of counter gear assembly

Reverse idler gear

Disassemble reverse idler gear assembly.



1 Reverse idler thrust washer
2 Reverse idler gear
3 Reverse idler gear bearing
4 Bearing needle spacer
5 Retaining pin
6 Reverse idler shaft

TM065A

Fig. MT-29 Exploded view of reverse idler gear assembly

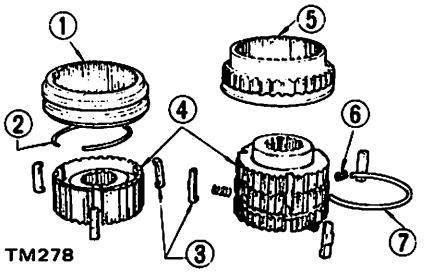
Synchronizer

1. 2nd & 3rd, 4th & 5th speed synchronizer:

Remove spread springs ② and take out shifting inserts ③. Separate coupling sleeve ① from synchronizer hub ④. See Figure MT-30.

2. 1st & reverse synchronizer:

Separate reverse main gear ⑤ from synchronizer hub ④. Take out shifting inserts ③ and synchro springs ⑥. Pry off stopper ring ⑦.



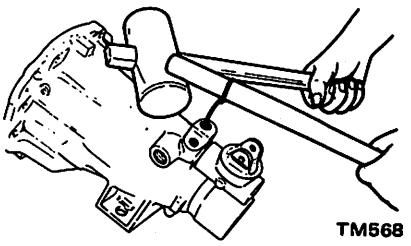
TM278

1 Coupling sleeve
2 Spread spring
3 Shifting insert
4 Synchro hub
5 Reverse gear
6 Synchro spring
7 Stopper ring

Fig. MT-30 Exploded view of synchronizer assembly

REAR EXTENSION DISASSEMBLY

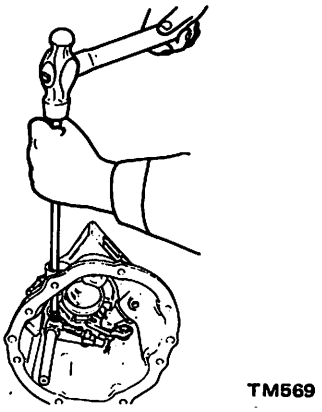
1. Remove screw and stopper pin from rear extension.



TM568

Fig. MT-31 Removing stopper pin

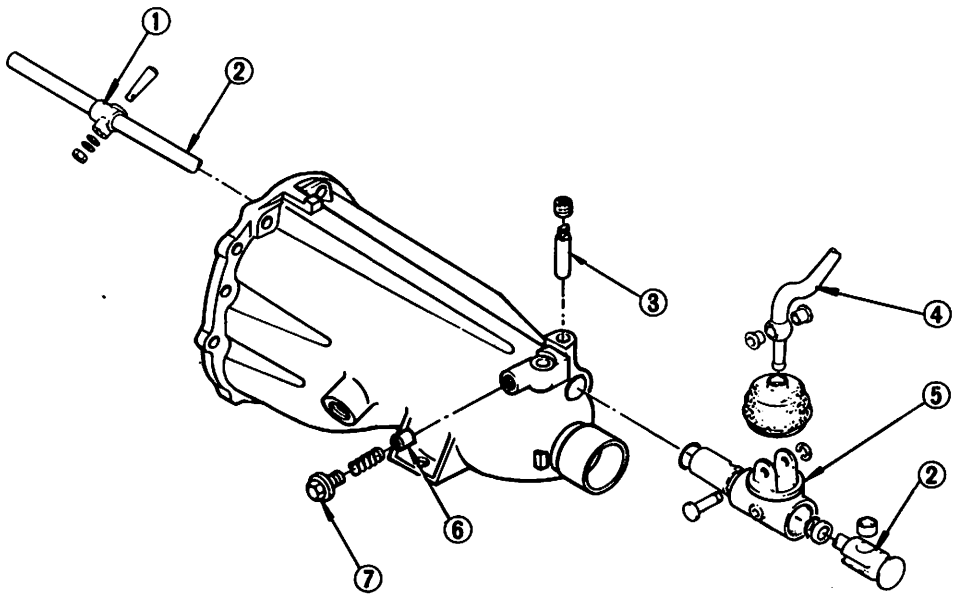
2. Remove lock pin from striking lever, and remove striking rod.



TM569

Fig. MT-32 Removing lock pin

Note: Do not disassemble rear extension bushing from rear extension.



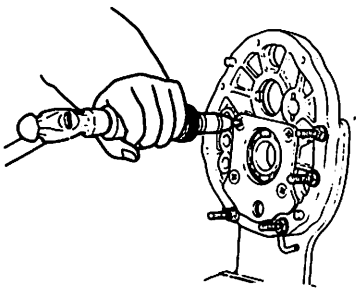
1 Striking lever
2 Striking rod
3 Stopper pin
4 Control lever
5 Striking rod guide
6 Reverse select plunger
7 Reverse select plug

TM570

Fig. MT-33 Exploded view of shifting mechanism

ADAPTER PLATE DISASSEMBLY

1. Remove four bearing retainer attaching screws with an impact driver and remove bearing retainer from adapter plate.



TM571

Fig. MT-34 Removing screws

2. Remove mainshaft bearing from the rear extension side.
3. To remove outer race of counter gear rear bearing, apply a brass drift to race side surface, and withdraw it by tapping the top of drift with a hammer.

INSPECTION

Wash all parts in a suitable cleaning solvent and check for wear, damage or other faulty conditions.

CAUTION:
a. Be careful not to damage any parts with scraper.
b. Do not clean, wash or soak oil seals in solvent.

TRANSMISSION CASE AND REAR EXTENSION HOUSING

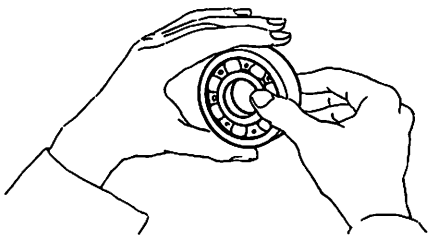
1. Clean thoroughly with solvent and check for cracks which might cause oil leak or other faulty conditions.
2. Check mating surface of case to engine or adapter plate for small nicks, projection or sealant.

Remove all nicks, projection or sealant with a fine stone.

3. If rear extension bushing is worn or cracked, replace it as an assembly of bushing and rear extension housing.

BEARING

1. Thoroughly clean bearing and dry with compressed air.
2. When race and ball surfaces are worn or rough, or when balls are out-of-round or rough, replace bearing with a new one.



TM372

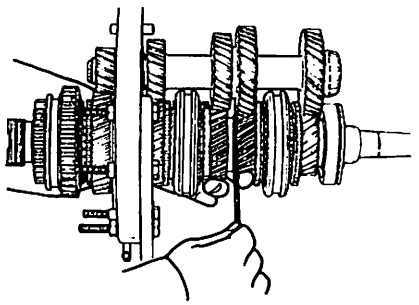
Fig. MT-35 Inspecting ball bearing

3. Replace needle bearing and taper roller bearing if worn or damaged.

GEARS AND SHAFTS

1. Check all gears for excessive wear, chips or cracks; replace as required.
2. Check shaft for bending, cracks, wear, or worn spline; if necessary, replace.
3. It is necessary to measure end play, before disassembling mainshaft and after reassembling mainshaft. Tighten mainshaft lock nut to specified limit and measure end play to insure that it is within specified limit. If end play is not within specified limit, disassemble and check parts for condition. Replace any part which is worn or damaged.

Standard end paly:
1st gear:
0.27 to 0.37 mm
(0.0106 to 0.0146 in)
2nd gear:
0.20 to 0.30 mm
(0.0079 to 0.0118 in)
3rd and 5th gear:
0.05 to 0.15 mm
(0.0020 to 0.0059 in)



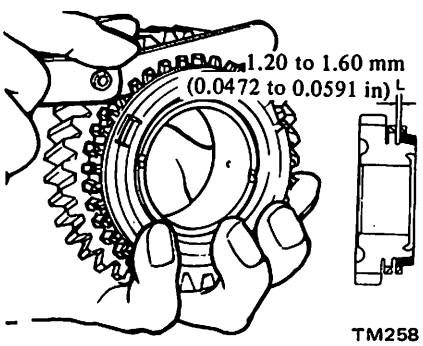
TM572

Fig. MT-36 Measuring end play

4. Check for stripped or damaged speedometer pinion gear. If necessary, replace.

BAULK RINGS

1. Replace any baulk ring which is deformed or cracked.
2. Position baulk ring in place on gear cone, and measure the baulk ring-to-gear clearance with baulk ring pushed toward gear. See Figure MT-37. If the clearance is smaller than the specified value 1.20 to 1.50 mm (0.0472 to 0.0591 in), replace baulk ring.



TM258

Fig. MT-37 Measuring baulk ring-to-gear clearance

OIL SEALS

It is advisable not to reuse oil seals that have been removed. Always install new oil seals.

Replace oil seal if sealing lip is deformed or cracked. Also discard seal if spring is out of position. Check the oil seal lip contact face on shaft; if necessary, replace seal and shaft as a set.

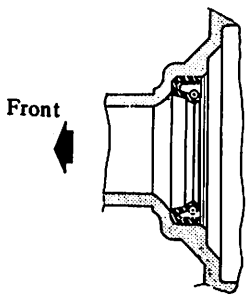
ASSEMBLY

To assemble, reverse the order of disassembly. Observe the following instructions.

FRONT COVER ASSEMBLY

1. Wipe clean seal seat in front cover, then press fit oil seal in place.

Coat oil seal with gear oil to provide initial lubrication.



TM354

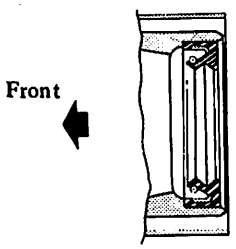
Fig. MT-38 Front cover oil seal

2. Apply sealant to withdrawal lever ball pin screw. Install withdrawal lever ball pin to front cover and tighten screw to 3.0 to 5.0 kg-m (22 to 36 ft-lb) torque.

REAR EXTENSION ASSEMBLY

1. Wipe clean seal seat in rear extension housing; press fit oil seal in place.

Coat oil seal and bushing with gear oil for initial lubrication.



TM355

Fig. MT-39 Rear extension oil seal

2. Apply multi-purpose grease to O-ring and plunger grooves in striking rod.

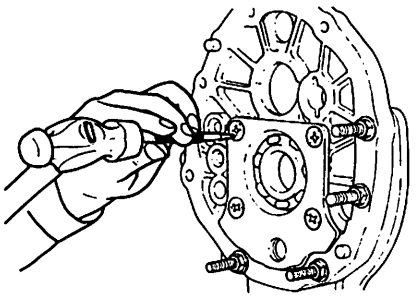
Insert striking rod with striking rod guide through rear extension.

3. Install striking lever on front end of striking rod. Install lock pin and tighten screw to 0.9 to 1.2 kg-m (6.5 to 8.7 ft-lb).

ADAPTER PLATE ASSEMBLY

1. Install outer race of counter gear rear bearing by lightly tapping around it with a brass drift and a hammer.
2. Install mainshaft bearing by lightly tapping around it with a soft hammer.
3. Install bearing retainer in adapter plate.

Tighten screws to 0.8 to 1.3 kg-m (5.8 to 9.4 ft-lb) and stake each screw at two points with a punch.



TM573

Fig. MT-40 Staking screw

ASSEMBLY OF GEAR ASSEMBLY

Clean all parts in solvent and dry with compressed air.

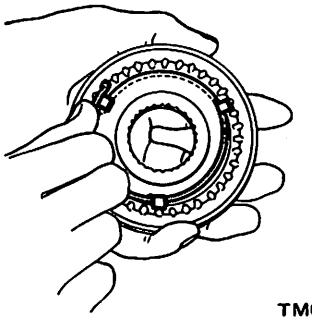
Synchronizers

1. 2nd & 3rd, 4th & 5th speed synchronizers:

(1) Place synchro-hub into coupling sleeve.

(2) Fit shifting inserts in three grooves in synchronizer hub.

(3) Locate one spread spring on the lower side of shifting inserts to secure them to the inner side of coupling sleeve. Properly install the other spring on the opposite side of coupling sleeve. Make sure that they are installed opposite each other.



TM077

Fig. MT-41 Installing spread spring

2. 1st & reverse synchronizer:

(1) Position shifting insert springs and shifting inserts in three slots in synchronizer hub.

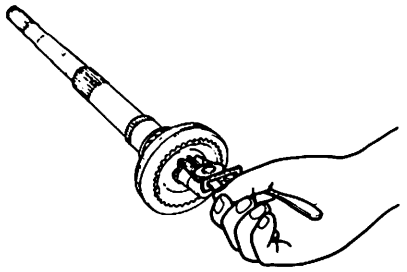
(2) Put coupling sleeve on synchronizer hub.

Mainshaft

1. Position 5th gear needle bearing, mainshaft 5th gear, baulk ring and 4th & 5th speed synchronizer on the front of mainshaft.
2. Fit snap ring of proper thickness so that it will fit the groove in mainshaft.

Available snap ring

Thickness mm (in)
1.40 to 1.45 (0.0551 to 0.0571)
1.45 to 1.50 (0.0571 to 0.0591)
1.50 to 1.55 (0.0591 to 0.0610)
1.55 to 1.60 (0.0610 to 0.0630)
1.60 to 1.65 (0.0630 to 0.0650)

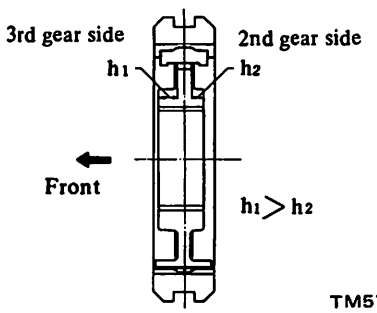


TM574

Fig. MT-42 Installing snap ring

3. Install the following parts on mainshaft in the order listed: 3rd gear needle roller bearing, 3rd gear, 3rd gear baulk ring, 2nd & 3rd speed synchronizer. Then fit 2nd gear bushing onto mainshaft and mainshaft bearing thrust washer by lightly tapping with soft hammer.
4. Install 2nd gear baulk ring, needle bearing, 2nd gear, steel ball and thin thrust washer.

Note: Assemble 2nd & 3rd speed synchronizer, paying attention to its direction. See Figure MT-43.

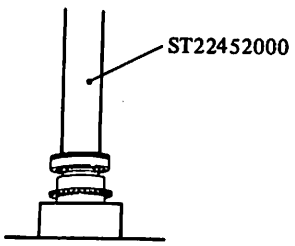


TM576

Fig. MT-43 Installing 2nd & 3rd speed synchronizer

Main drive gear

1. Press main drive bearing onto the shaft of main drive gear using Mainshaft Bearing Drift ST22452000. Make sure that snap ring groove on shaft clears bearing.



TM139A

Fig. MT-44 Installing main drive bearing

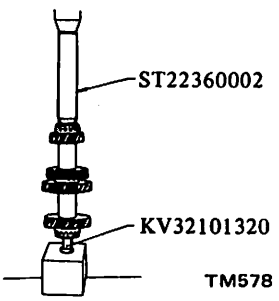
2. Place main drive bearing spacer on main drive bearing and secure main drive bearing with a new thicker snap ring that will eliminate end play.

Available snap ring

Thickness mm (in)
1.49 to 1.55 (0.0587 to 0.0610)
1.56 to 1.62 (0.0614 to 0.0638)
1.62 to 1.68 (0.0638 to 0.0661)
1.68 to 1.74 (0.0661 to 0.0685)
1.74 to 1.80 (0.0685 to 0.0709)
1.80 to 1.86 (0.0709 to 0.0732)
1.86 to 1.92 (0.0732 to 0.0756)

Counter gear

1. Press counter gear front bearing onto counter gear using Drift ST22360002.
2. Press counter gear rear bearing onto counter gear using Drift ST22360002 and Adapter KV32101320.



TM578

Fig. MT-45 Installing counter gear rear bearing

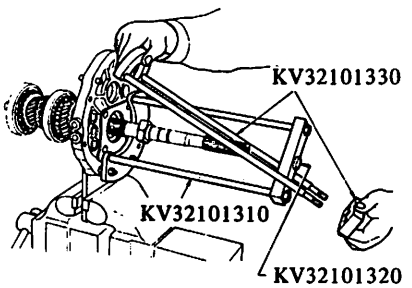
Reverse idler gear

Assemble reverse idler gear assembly.

Note: When positioning thrust washers on shaft, make sure that the brown surfaces are facing toward gears.

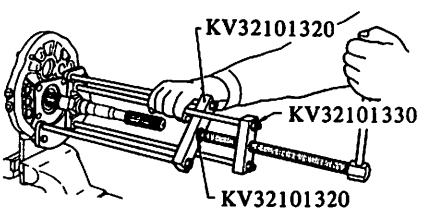
Gear assembly

1. Attach Setting Plate Adapter ST22490000 to adapter plate and place it in a vise.
2. Place mainshaft assembly into adapter plate assembly. Place mainshaft nut onto mainshaft.
3. Pull mainshaft assembly into adapter plate using Mainshaft Puller KV32101310, Mainshaft Rear Bearing Puller KV32101330 and Adapter KV32101320 until the thrust washer-to-bearing clearance reaches approximately 10 mm (0.39 in).



TM579

Fig. MT-46 Setting special tools



TM580

Fig. MT-47 Installing mainshaft assembly

4. Position baulk ring on cone surface of main drive gear. Apply gear oil to mainshaft pilot bearing and install it on mainshaft.

Assemble main drive gear assembly on the front end of mainshaft.

Assemble counter gear assembly on mainshaft and main drive gear.

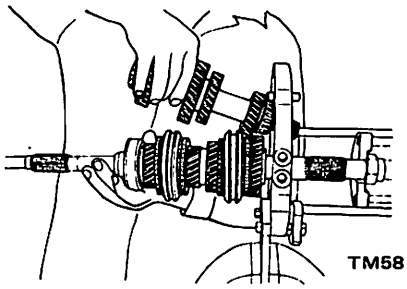


Fig. MT-48 Installing main drive gear and counter gear

5. Pull mainshaft assembly into adapter plate together with main drive gear and counter gear.

CAUTION:
When installing mainshaft, hold gears carefully by hand and do not drop gears on floor.

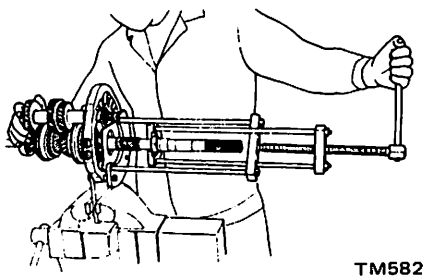


Fig. MT-49 Installing mainshaft assembly

6. Press 1st counter gear onto counter shaft using Drift ST22360002 and Adapter KV32101320.

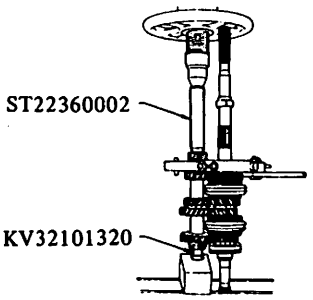


Fig. MT-50 Installing 1st counter gear

7. Place spacer on the rear end of 1st counter gear and secure it with a new snap ring.

8. Install the following parts to the rear of mainshaft in the order listed: Steel ball, thick thrust washer, 1st gear bushing, needle bearing, 1st gear, 1st gear baulk ring, 1st synchronizer together with reverse main gear, steel ball, speedometer drive gear and mainshaft nut.

Tighten mainshaft nut temporarily.

9. With 1st and 2nd gears doubly engaged, tighten mainshaft nut to the converted torque "C" (See Figure MT-51) using Wrench ST22520000.

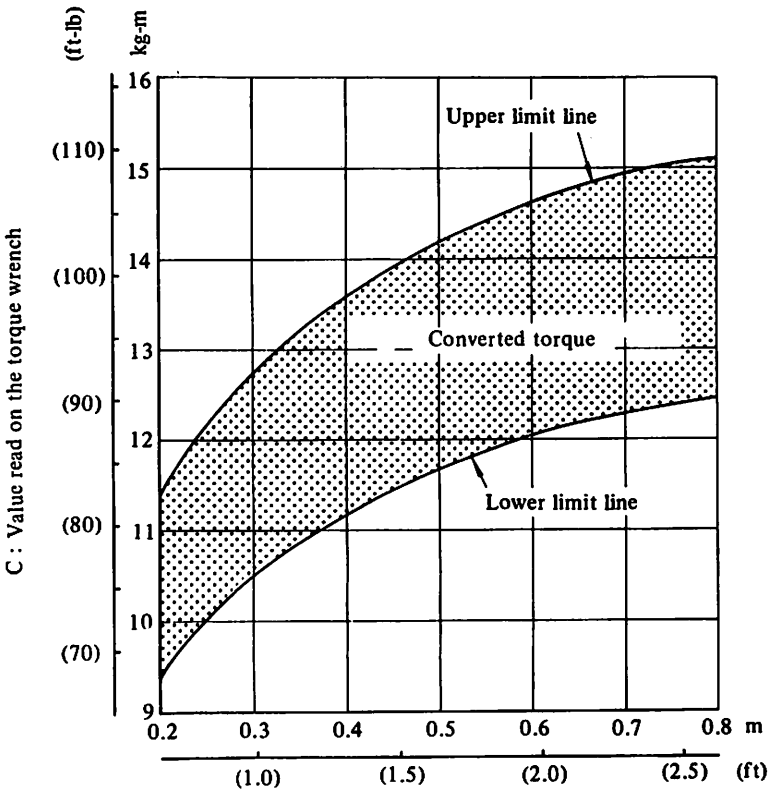


Fig. MT-51 Converted torque

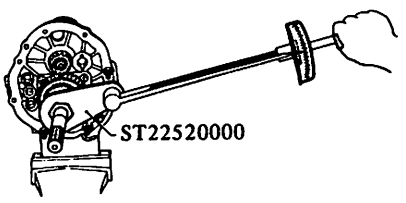


Fig. MT-52 Tightening mainshaft nut

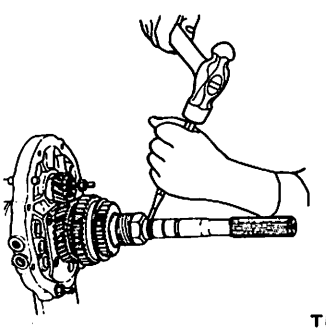


Fig. MT-53 Staking mainshaft nut

Stake mainshaft nut to groove of mainshaft with a punch. See Figures MT-52 and MT-53.

Explanation of converted torque

Mainshaft nut should be tightened to 14.0 to 17.0 kg-m (101 to 123 ft-lb) torque with the aid of Wrench ST22520000. When doing so, the amount of torque to be read on wrench needle should be modified according to the following formula:

$$C \text{ kg-m} = 14 \times \left(\frac{L}{L+0.1}\right) \text{ to } 17 \times \left(\frac{L}{L+0.1}\right)$$

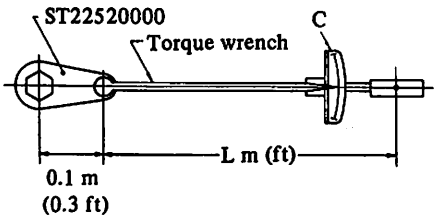
or

$$C \text{ (ft-lb)} = 101 \times \left(\frac{L}{L+0.33}\right) \text{ to } 123 \times \left(\frac{L}{L+0.33}\right)$$

Where,

C: Value read on the torque wrench kg-m (ft-lb)

L: Effective length of torque wrench m (ft)



TM587

Fig. MT-54 Setting wrench

Example,

When a 0.4 m-long torque wrench is used, the "C" in Figure MT-51 will be 11.2 to 13.6 kg-m (81 to 98 ft-lb).

10. Measure gear end play.

Make sure that they are held within the specified values.

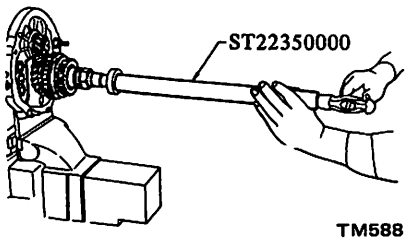
For details, refer to Page MT-11 for Inspection.

11. Fit 1.1 mm (0.043 in) thick snap ring to the front side of mainshaft end bearing.

12. Install mainshaft end bearing using Bearing Drift ST22350000. Fit thick snap ring to the rear side of bearing to eliminate end play.

Available snap ring.

Thickness mm (in)
1.1 (0.043)
1.2 (0.047)
1.3 (0.051)
1.4 (0.055)



TM588

Fig. MT-55 Installing mainshaft end bearing

13. Install reverse idler gear assembly.

Shift forks and fork rods

1. Place three(3) shift forks in groove in each coupling sleeve. Be careful not to drop off shift forks.

2. Install 1st & reverse fork rod through 1st & reverse shift fork and adapter plate.

Secure 1st & reverse fork rod to shift fork with new retaining pin.

3. Install check ball, check ball spring, and check ball plug. Prior to tightening check ball plug, apply sealant to check ball plug.

Align center notch in 1st & reverse fork rod with check ball.

Note: Ball plug for 1st & reverse fork rod is longer than those for 2nd & 3rd fork rod and 4th & 5th fork rod. See Figure MT-13.

4. Install interlock plunger on adapter plate. See Figure MT-13.

5. Install 2nd & 3rd fork rod through adapter plate, 2nd & 3rd shift fork and 4th & 5th shift fork, and secure with new retaining pin.

6. Install check ball and check ball spring.

Apply sealant to check ball plug and install it in place.

Align center notch in 2nd & 3rd fork rod with check ball.

7. Install interlock plunger on adapter plate.

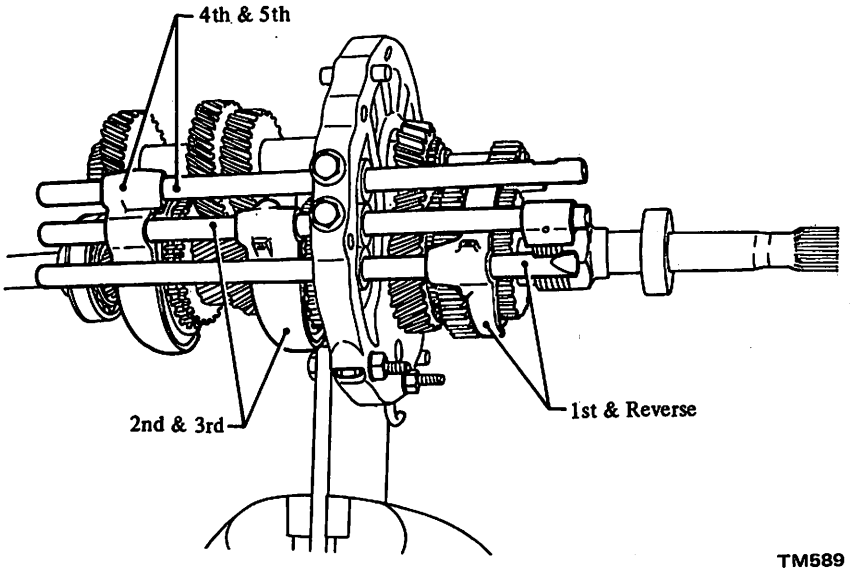
8. Install 4th & 5th fork rod through adapter plate and 4th & 5th shift fork, and secure with new retaining pin.

9. Install check ball and check ball spring.

Apply sealant to check ball plug and install it in place.

10. Torque each check ball plug to 1.6 to 2.2 kg-m (12 to 16 ft-lb).

11. Apply gear oil to all sliding surfaces and check to see that shift rods operate correctly and gears engage smoothly.



TM589

Fig. MT-56 Installing shift forks and fork rods

TRANSMISSION ASSEMBLY

Rear extension assembly

1. Clean mating surfaces of adapter plate and rear extension.

Apply sealant to mating surfaces of adapter plate and rear extension.

2. Assemble rear extension assembly as follows:

(1) Set fork rod at 5th position.

(2) Position striking rod at Neutral position, turn striking guide clockwise, and then set striking lever and shift arm as shown in Figure MT-57.

(3) In this state, align shift arm pin with groove in fork rod and assemble rear extension assembly on adapter plate.

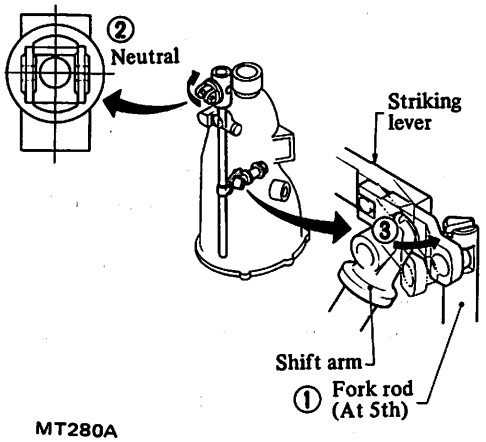


Fig. MT-57 Installing rear extension assembly

Note:

a. **Use care when installing rear extension assembly. Do not allow shift arm to come out of the striking lever.**

b. **Install shift arm onto 4th & 5th fork rod, and then fit striking lever pin into other fork rods.**

3. Check to see that shift rods operate correctly.

Transmission case assembly

1. Clean mating surfaces of adapter plate and transmission case.

Apply sealant to mating surfaces of adapter plate and transmission case.

2. Slide transmission case onto adapter plate by lightly tapping with a soft hammer until case presses against adapter plate.

Carefully install main drive bearing and countershaft front bearing.

Make certain that mainshaft rotates freely.

3. Install washers and through-bolts and tighten to 1.3 to 1.8 kg-m (9 to 13 ft-lb).

4. Fit main drive bearing snap ring to groove in main drive bearing by using Expander.

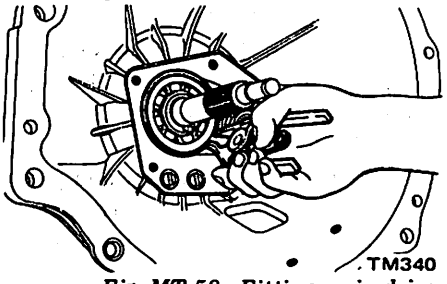


Fig. MT-58 Fitting main drive bearing snap ring

Front cover assembly

1. Select countershaft front bearing shim as follows:

(1) Support transmission assembly with its front side up.

(2) Place Counter Bearing Setting Gauge ST22500000 on countershaft front bearing, and turn main drive shaft until bearing is settled down.

(3) Measure the clearance (B) between the setting gauge and the front end of transmission case, using a thickness gauge.

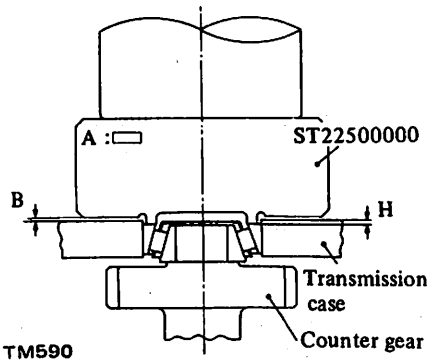


Fig. MT-59 Adjusting countershaft front bearing shim

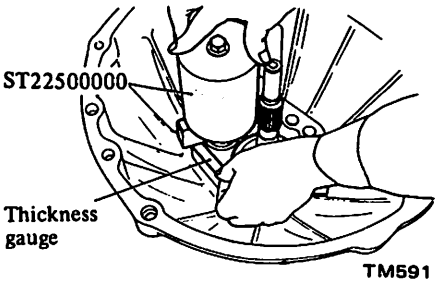


Fig. MT-60 Measuring clearance

(4) The depth (H) can be obtained from the following formula:

$H = A - B$

Where,

H: Depth from front end of transmission case to countershaft front bearing. mm (in)
A: Figure marked on the setting gauge mm (in)
B: Measured value using thickness gauge mm (in)

(5) Select a shim of thickness "H" measured.

Available shim

"H" mm (in)	Thickness of countershaft front bearing shim mm (in)
1.185 to 1.210 (0.0467 to 0.0476)	1.200 (0.0472)
1.210 to 1.235 (0.0476 to 0.0486)	1.225 (0.0482)
1.235 to 1.260 (0.0486 to 0.0496)	1.250 (0.0492)
1.260 to 1.285 (0.0496 to 0.0506)	1.275 (0.0502)
1.285 to 1.310 (0.0506 to 0.0516)	1.300 (0.0512)
1.310 to 1.335 (0.0516 to 0.0526)	1.325 (0.0522)
1.335 to 1.360 (0.0526 to 0.0535)	1.350 (0.0531)
1.360 to 1.385 (0.0535 to 0.0545)	1.375 (0.0541)
1.385 to 1.410 (0.0545 to 0.0555)	1.400 (0.0551)
1.410 to 1.435 (0.0555 to 0.0565)	1.425 (0.0561)
1.435 to 1.460 (0.0565 to 0.0575)	1.450 (0.0571)
1.460 to 1.485 (0.0575 to 0.0585)	1.475 (0.0581)
1.485 to 1.510 (0.0585 to 0.0594)	1.500 (0.0591)
1.510 to 1.535 (0.0594 to 0.0604)	1.525 (0.0600)
1.535 to 1.560 (0.0604 to 0.0614)	1.550 (0.0610)
1.560 to 1.585 (0.0614 to 0.0624)	1.575 (0.0620)
1.585 to 1.610 (0.0624 to 0.0634)	1.600 (0.0630)
1.610 to 1.635 (0.0634 to 0.0644)	1.625 (0.0640)
1.635 to 1.660 (0.0644 to 0.0654)	1.650 (0.0650)

Example,

A = 1.75 mm, B = 0.22 mm

H = A – B
= 1.75 – 0.22
= 1.53 mm

The correct shim is 1.525 mm thick.

2. Clean mating surfaces of front cover and transmission case.

Apply grease to shim selected to retain it on countershaft front bearing; install front cover to transmission case. Apply sealant to both surfaces of front cover and transmission case before installation.

Install through-bolts with washers under them and tighten to 1.3 to 1.8 kg-m (9 to 13 ft-lb) torque.

Apply sealant to threads of through-bolts before installation.

3. Apply grease to reverse select return plunger; install it in rear extension.

Install reverse select return springs, and install reverse select return plug with sealant in place and tighten to 0.8 to 1.0 kg-m (5.8 to 7.2 ft-lb).

4. Install speedometer pinion assembly on rear extension. After making sure that lock plate is lined up with groove in speedometer pinion sleeve, install through-bolts and torque to 0.32 to 0.44 kg-m (2.3 to 3.2 ft-lb).

5. Install back-up lamp switch and tighten to 2.0 to 3.0 kg-m (14 to 22 ft-lb).

6. Apply a light coat of multi-purpose grease to withdrawal lever, release bearing and bearing sleeve; install them on clutch housing.

After connecting them with holder spring, install dust cover on clutch housing.

7. Install control lever temporarily, and shift control lever through all gears to make sure that gears operate smoothly.

INSTALLATION

Install the transmission in the reverse order of removal, paying attention to the following points.

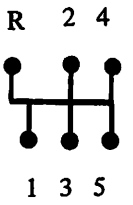
1. Before installing, clean mating surfaces of engine rear plate and transmission case.

2. Before installing, lightly apply grease to spline parts of clutch disc and main drive gear.

3. Remove filler plug and fill transmission with recommended gear oil to the level of the plug hole. [Approximately 1.7 liters (3 5/8 US pt, 3 Imp pt)].

SERVICE DATA AND SPECIFICATIONS

GENERAL SPECIFICATIONS

Transmission type	FS5W63A
No. of speeds	5
Synchromesh type	Warner
Control system	Floor shift
Shift pattern	
Gear ratio	
1st	3.382
2nd	2.013
3rd	1.312
4th	1.000
5th	0.854
Reverse	3.570
Speedometer gear ratio	
Standard	17/5
Final gear ratio	3.889
Oil capacity liters (US pt, Imp pt)	1.7 (3⅝, 3)

TIGHTENING TORQUE

Installation

Engine to transmission installation bolt	kg-m (ft-lb)	3.7 to 5.0 (27 to 36)
Engine rear plate to transmission installation bolt	kg-m (ft-lb)	0.32 to 0.44 (2.3 to 3.2)
Clutch operating cylinder installation bolt	kg-m (ft-lb)	3.1 to 4.1 (22 to 30)
Rear mounting insulator to transmission installation bolt	kg-m (ft-lb)	2.6 to 3.2 (19 to 23)
Crossmember mounting bolt	kg-m (ft-lb)	3.2 to 4.0 (23 to 29)
Starter motor to transmission installation bolt	kg-m (ft-lb)	3.0 to 4.0 (22 to 29)
Propeller shaft to diff. installation bolt	kg-m (ft-lb)	2.4 to 3.3 (17 to 24)

Gear assembly

Rear extension installation bolt	kg-m (ft-lb)	1.3 to 1.9 (9 to 14)
Front cover installation bolt	kg-m (ft-lb)	1.3 to 1.8 (9 to 13)
Speedometer pinion installation bolt	kg-m (ft-lb)	0.32 to 0.44 (2.3 to 3.2)
Back-up lamp switch	kg-m (ft-lb)	2.0 to 3.0 (14 to 22)
Top switch	kg-m (ft-lb)	2.0 to 3.0 (14 to 22)
Neutral switch	kg-m (ft-lb)	2.0 to 3.0 (14 to 22)
Gear oil filler plug	kg-m (ft-lb)	2.5 to 3.5 (18 to 25)
Gear oil drain plug	kg-m (ft-lb)	2.5 to 3.5 (18 to 25)
Withdrawal lever ball pin	kg-m (ft-lb)	3.0 to 5.0 (22 to 36)
Striking lever lock pin	kg-m (ft-lb)	0.9 to 1.2 (6.5 to 8.7)
Striking lever pin	kg-m (ft-lb)	0.33 to 0.45 (2.4 to 3.3)
Check ball plug	kg-m (ft-lb)	1.6 to 2.2 (12 to 16)
Bearing retainer to adapter plate screw	kg-m (ft-lb)	0.8 to 1.3 (5.8 to 9.4)
Mainshaft lock nut	kg-m (ft-lb)	14.0 to 17.0 (101 to 123)
Return spring plug	kg-m (ft-lb)	0.8 to 1.0 (5.8 to 7.2)
Shift arm bracket	kg-m (ft-lb)	8.2 to 10.0 (59 to 72)

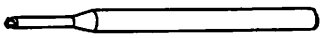
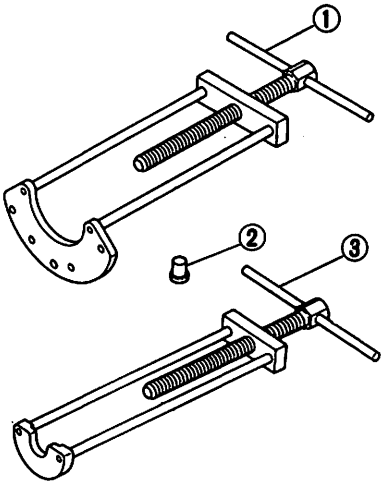
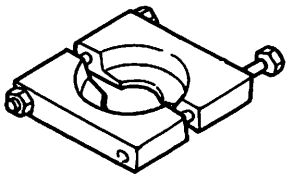
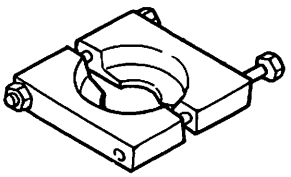
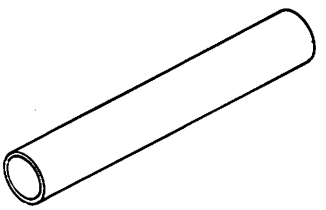
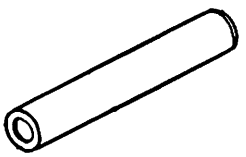
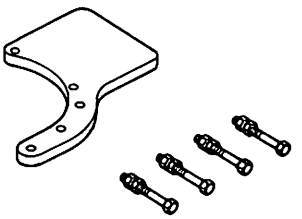
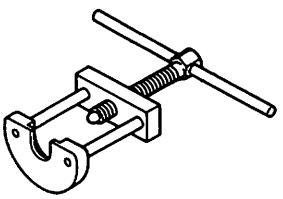
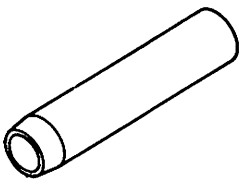
SPECIFICATIONS

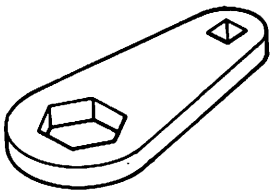
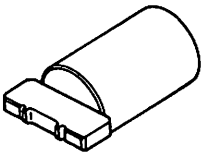
Gear backlash		
1st, 2nd, 3rd, OD, Reverse and Drive	mm (in)	0.05 to 0.20 (0.0020 to 0.0079)
Gear end play		
1st gear	mm (in)	0.27 to 0.37 (0.0106 to 0.0146)
2nd gear	mm (in)	0.20 to 0.30 (0.0079 to 0.0118)
3rd gear	mm (in)	0.05 to 0.15 (0.0020 to 0.0059)
5th gear	mm (in)	0.05 to 0.15 (0.0020 to 0.0059)
Reverse idler	mm (in)	0.15 to 0.40 (0.0059 to 0.0157)
Clearance between baulk ring and gear	mm (in)	1.20 to 1.50 (0.0472 to 0.0591)

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Difficult to intermesh gears Causes for difficult gear shifting are classified to malfunctions concerning control system and transmission. When gear shift lever is heavy and it is difficult to shift gears, clutch disengagement may also be unsmooth. First, make sure that clutch operates correctly, and inspect transmission.	Worn gears, shaft, and/or bearing. Insufficient operating stroke due to worn or loose sliding part. Worn or damaged synchronizer.	Replace. Repair or replace. Replace.
Gear slips out of mesh. In most cases, this malfunction occurs, when interlock plunger, check ball, and/or spring is worn or weakened, or when control system is inoperative. In this case, the malfunction cannot be corrected by replacing gears, and therefore, trouble diagnoses must be carried out carefully. It should also be noted that gear slips out of mesh due to vibration generated by weakened front and rear engine mounts.	Worn interlock plunger. Worn check ball and/or weakened or broken spring. Worn fork rod ball groove. Worn or damaged bearing. Worn or damaged gear.	Replace. Replace. Replace. Replace. Replace.
Noise When noise occurs with engine idling and ceases when clutch is disengaged, or when noise occurs while shifting gears, it is an indication that the noise is from transmission. (Transmission may rattle during engine idling. Check air-fuel mixture and ignition timing. After above procedure, readjust engine idling.)	Insufficient or improper lubricant. Oil leaking due to faulty oil seal or sealant, clogged breather, etc. Worn bearing (High humming occurs at a high speed.). Damaged bearing (Cyclic knocking sound occurs also at a low speed.). Worn spline. Worn bushing.	Add oil or replace with designated oil. Clean or replace. Replace. Replace. Replace. Replace, as a rear extension housing assembly.

SPECIAL SERVICE TOOLS

Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.
ST23540000 Fork rod pin punch 	J 25689 Fig. MT-12	KV321013S0 Puller set ① KV32101310 Mainshaft puller ② KV32101320 Adapter ③ KV32101330 Bearing puller 	——— Fig. MT-15 Fig. MT-19 Fig. MT-20 Fig. MT-26 Fig. MT-45 Fig. MT-46 Fig. MT-47 Fig. MT-50
ST30031000 Bearing puller 	J 25733-1 Fig. MT-21 Fig. MT-24		
ST22730000 Bearing puller 	J 25681 Fig. MT-26 Fig. MT-27	ST22452000 Mainshaft bearing drift 	——— Page MT-13
ST22350000 Mainshaft bearing drift 	J 25678 Fig. MT-55	ST22490000 Setting plate adapter 	——— Fig. MT-11 Page MT-13
ST22480000 Gear puller 	——— Fig. MT-18	ST22360002 Bearing drift 	J 25679 Fig. MT-44 Fig. MT-50

Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.
ST22520000 Wrench 	——— / Fig. MT-52 Fig. MT-54	ST22500000 Counter bearing setting tool 	——— / Fig. MT-59 Fig. MT-60

SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION AT

AUTOMATIC TRANSMISSION

AT

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HYDRAULIC CONTROL CIRCUITS ..... AT- 6
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DESCRIPTION

The 3N71B transmission is a fully automatic unit consisting primarily of a 3 element hydraulic torque converter and two planetary gear sets. Two multiple-disc clutches, a multiple-disc brake, brake band, and one-way clutch provide the friction elements necessary to obtain the desired function of the two planetary gear-sets.

A hydraulic control system is used to operate the friction elements and automatic shift controls.

TORQUE CONVERTER

The torque converter is attached to the crankshaft through a flexible drive plate. Heat generated in the torque converter is dissipated by circulating the transmission fluid through an oil-to-water type cooler in the radiator lower tank.

The welded construction of the torque converter prevents disassembly or service unless highly specialized equipment is available.

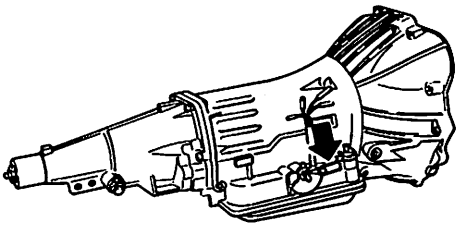
FLUID RECOMMENDATION

Use "DEXRON" type automatic transmission fluid only.

IDENTIFICATION NUMBER

Stamped position :

The plate is attached to the right hand side of transmission case.



AT344

Fig. AT-1 Identification Number

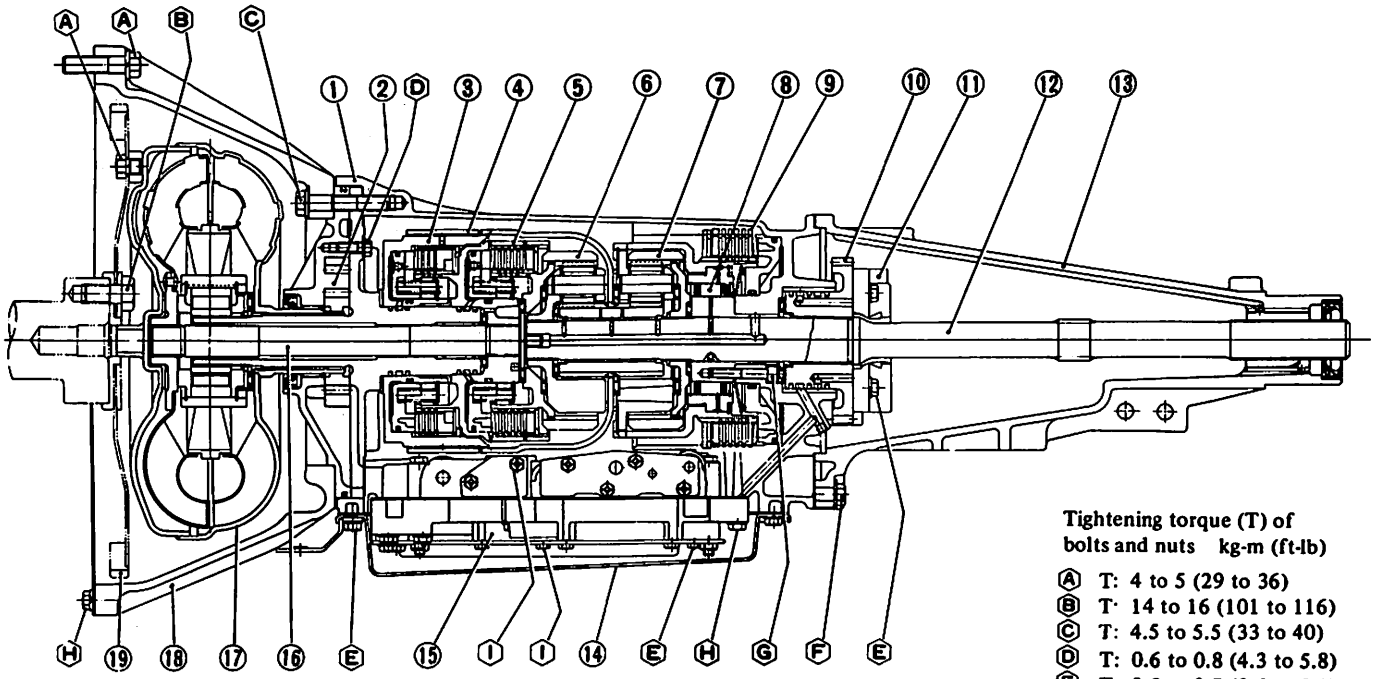
Identification of number arrangements :

JAPAN AUTOMATIC TRANSMISSION CO.,LTD
MODEL X0123
NO. 7601234

Number designation

7 6 0 1 2 3 4

- 7 — Last figure denoting the year (A.D.)
- 6 — Month of production (1: Jan., 2: Feb., ... X: Oct., Y: Nov., Z: Dec.)
- 0 1 2 3 4 — Serial production number for the month



1 Transmission case
2 Oil pump
3 Front clutch
4 Band brake
5 Rear clutch
6 Front planetary gear
7 Rear planetary gear
8 One-way clutch
9 Low & Reverse brake
10 Oil distributor
11 Governor
12 Output shaft
13 Rear extension
14 Oil pan
15 Control valve
16 Input shaft
17 Torque converter
18 Converter housing
19 Drive plate

Tightening torque (T) of bolts and nuts kg-m (ft-lb)

- Ⓐ T: 4 to 5 (29 to 36)
- Ⓑ T: 14 to 16 (101 to 116)
- Ⓒ T: 4.5 to 5.5 (33 to 40)
- Ⓓ T: 0.6 to 0.8 (4.3 to 5.8)
- Ⓔ T: 0.5 to 0.7 (3.6 to 5.1)
- Ⓕ T: 2.0 to 2.5 (14 to 18)
- Ⓖ T: 1.3 to 1.8 (9 to 13)
- Ⓗ T: 0.55 to 0.75 (4.0 to 5.4)
- Ⓘ T 0.25 to 0.35 (1.8 to 2.5)

AT312

Fig. AT-2 3N71B Automatic Transmission

HYDRAULIC CONTROL UNIT AND VALVES

The hydraulic, or automatic control system is comprised of four (4) basic groups: the pressure supply system, the pressure regulating system, the flow control valves, and the friction elements.

PRESSURE SUPPLY SYSTEM

The pressure supply system consists of a gear type oil pump driven by the engine through the torque converter. The pump provides pressure for all hydraulic and lubrication needs.

PRESSURE REGULATOR VALVES

The pressure regulating valves control the output pressure of the oil pump.

Pressure regulator valve

The pressure regulator valve controls mainline pressure, based on throttle opening, for the operation of the band, clutches and brake.

Governor valve

The governor valve transmits regulated pressure, based on car speed, to the shift valves to control upshifts and downshifts.

Vacuum throttle valve

The vacuum throttle valve transmits regulated pressure, based on engine load (vacuum). This pressure controls the pressure regulator valve. Also this pressure is applied to one end of the shift valves in opposition to governor pressure, which acts on the other end of the shift valves, controlling upshift and downshift speeds.

FLOW CONTROL VALVES

Manual valve

The manual valve is moved manually by the car operator to select the different drive ranges.

1-2 Shift valve

The 1-2 shift valve automatically shifts the transmission from first to second or from second to first depending upon governor and throttle pressure along with accelerator position (solenoid downshift valve). See Hydraulic Control Circuits, "Drive 2".

2-3 Shift valve

The 2-3 shift valve automatically shifts the transmission from second to top gear or from top to second depending upon governor and throttle pressure, or accelerator position (solenoid downshift valve). See Hydraulic Control Circuits "Drive 3" Range.

2-3 Timing valve

For 2-3 shifts, a restrictive orifice slows the application fluid to the front clutch, while the slower reacting band is allowed to release. This prevents a hard 2-3 or 3-2 shift. Under heavy load, however, the engine will tend to run away during the 2-3 or 3-2 shift pause, therefore a 2-3 timing valve, using throttle and governor pressure, is used to bypass the restrictive orifice during such heavy load conditions.

Solenoid downshift valve

The solenoid downshift valve is activated electrically when the accelerator is "floored", causing a forced downshift from top to second, top to first, or second to first gear depending upon car speed (governor pressure).

Pressure modified valve

The pressure modifier valve assists the mainline pressure regulator valve in lowering mainline pressure during high speed light load conditions, such as steady speed cruise. Governor pressure, working against a spring, opens the valve which allows modified throttle pressure to work against the pressure regulator valve spring, lowering mainline pressure. Lower operating pressure under light load reduces oil temperature, and increases transmission life.

Throttle back-up valve

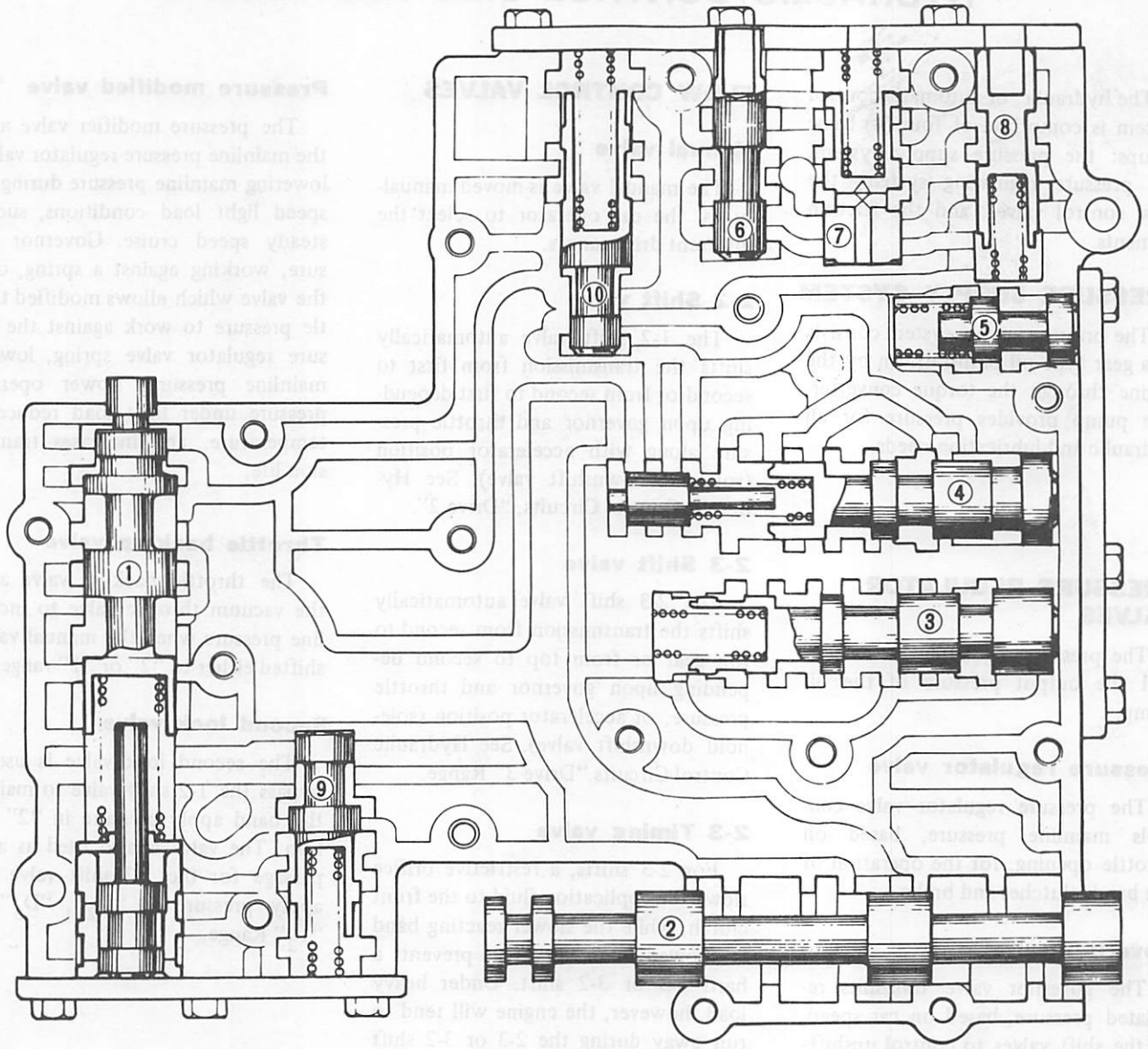
The throttle back-up valve assists the vacuum throttle valve to increase line pressure when the manual valve is shifted either to "2" or "1" range.

Second lock valve

The second lock valve is used to bypass the 1-2 shift valve to maintain the band apply pressure in "2" position. The valve is also used as an oil passage for the 1-2 shift valve band apply pressure in "D_2", "D_3" and "1_2" Range.

CLUTCHES AND BAND SERVOS

The servo pistons of the clutches, low reverse brake, and band are moved hydraulically to engage the clutches, brake, and apply the band. The clutch and brake pistons are released by spring tension, and band piston is released by spring tension and hydraulic pressure.



AT094

1 Pressure regulating valve
2 Manual valve
3 1st-2nd shift valve
4 2nd-3rd shift valve
5 Pressure modifier valve
6 Vacuum throttle valve
7 Throttle back-up valve
8 Solenoid down shift valve
9 Second lock valve
10 2 - 3 timing valve

Fig. AT-3 Control Valve

"P" range (Park)

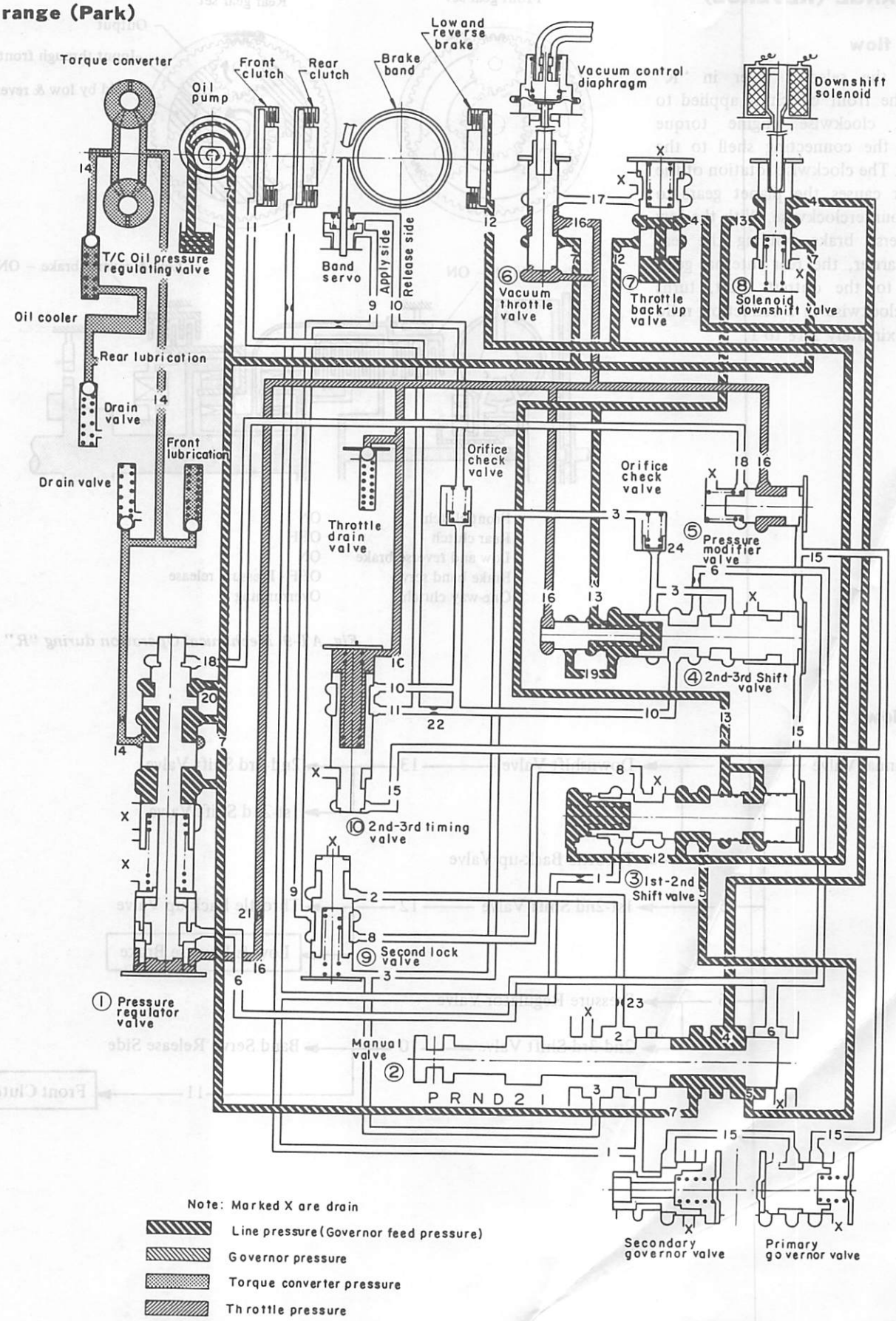
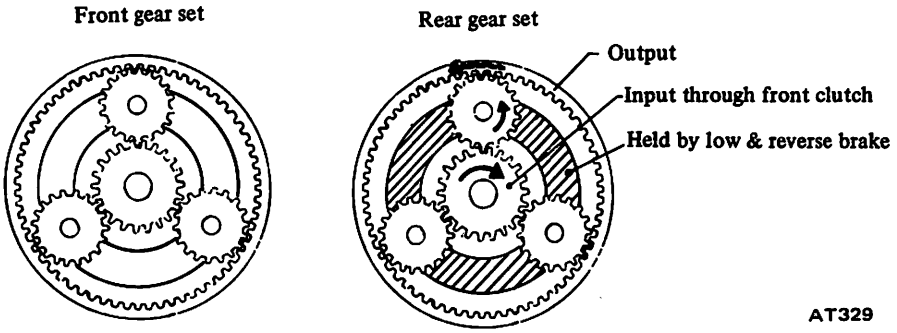


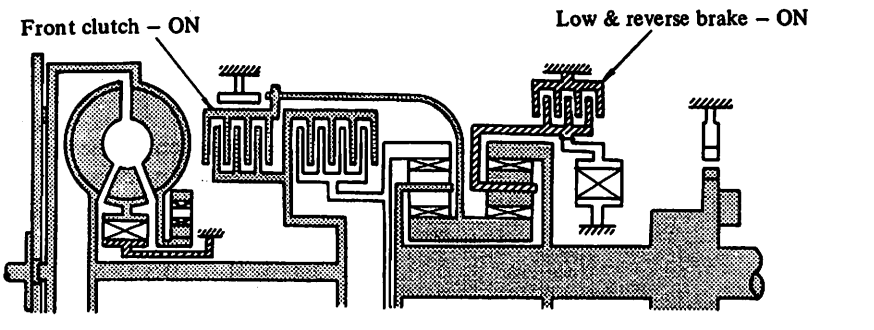
Fig. AT-8 Oil Pressure Circuit Diagram — "P" range (Park)

"R" RANGE (REVERSE)

Power flow

With the selector lever in "R" range, the front clutch is applied to transmit clockwise engine torque through the connecting shell to the sun gear. The clockwise rotation of the sun gear causes the planet gears to rotate counterclockwise. With the low and reverse brake holding the rear planet carrier, the rear internal gear, splined to the output shaft, turns counterclockwise in a reduction ratio of approximately 2.18 to 1.

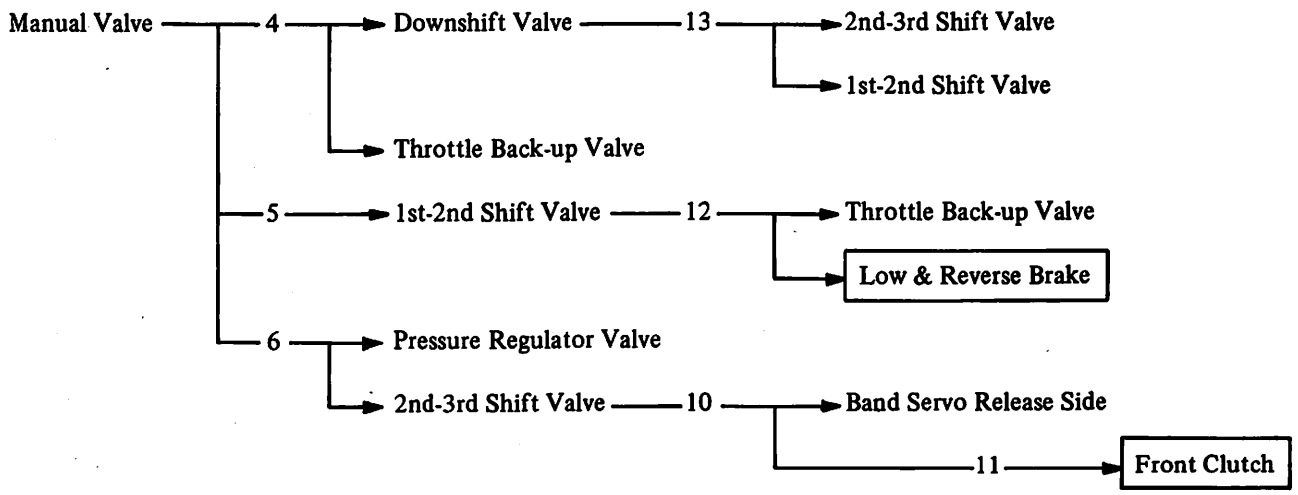




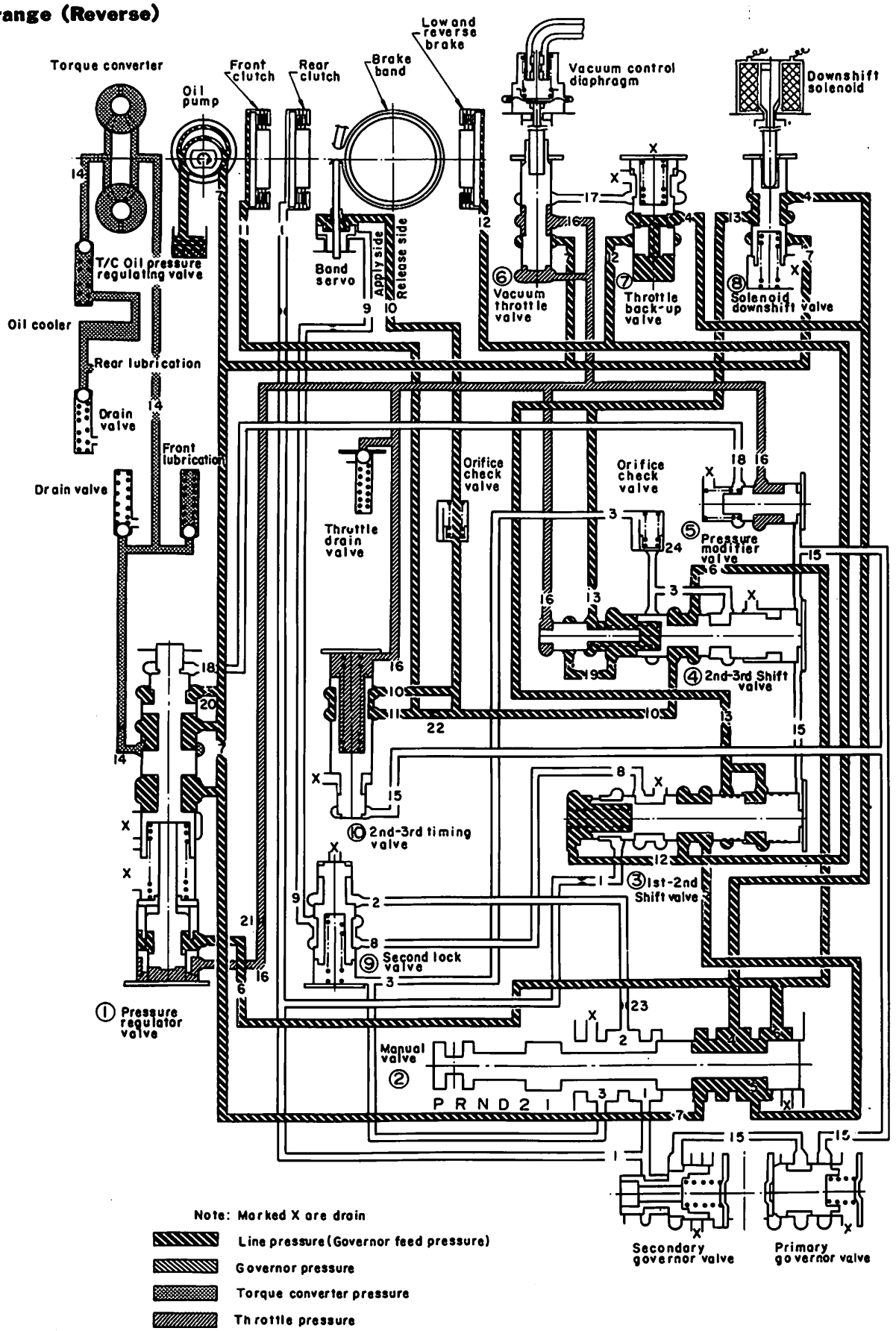
Front clutch	ON
Rear clutch	OFF
Low and reverse brake	ON
Brake band servo	OFF - Pressure release
One-way clutch	Overrunning

Fig. AT-9 Mechanical Operation during "R" Range

Fluid flow



"R" range (Reverse)



AT444

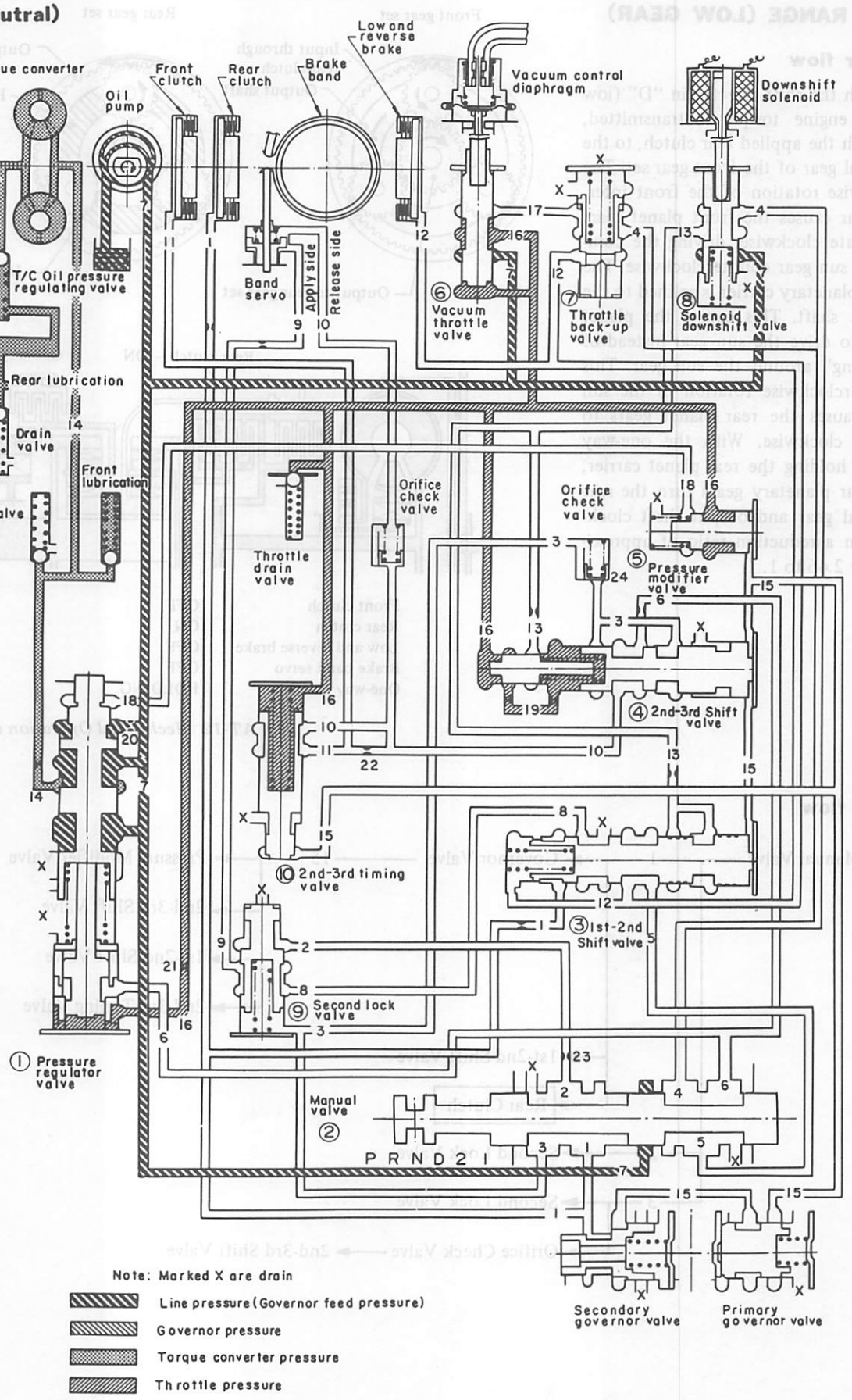
Fig. AT-10 Oil Pressure Circuit Diagram — "R" range (Reverse)

"N" RANGE (NEUTRAL)

Power flow

In "N" range no friction elements are in use, thus no power is transmitted to the output shaft.

"N" range (Neutral)



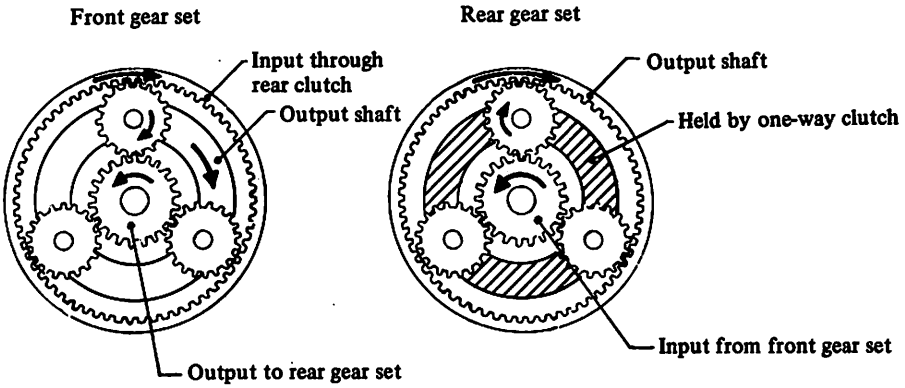
AT445

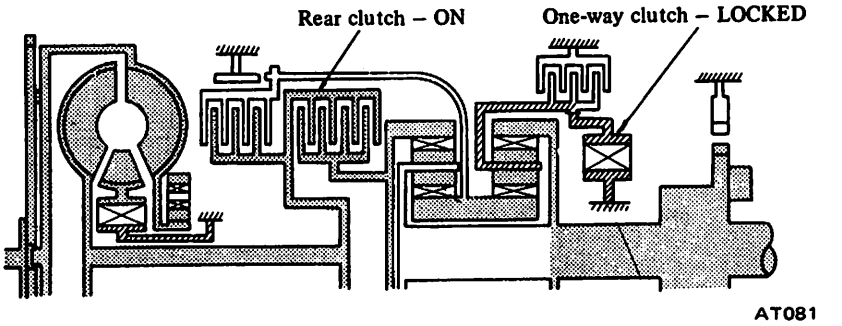
Fig. AT-11 Oil Pressure Circuit Diagram — "N" range (Neutral)

"D_1" RANGE (LOW GEAR)

Power flow

With the shift selector in "D" (low gear), engine torque is transmitted, through the applied rear clutch, to the internal gear of the front gear set. The clockwise rotation of the front internal gear causes the front planet gears to rotate clockwise, driving the compound sun gear counterclockwise. The front planetary carrier is splined to the output shaft. This causes the planet gears to drive the sun gear instead of "walking" around the sun gear. This counterclockwise rotation of the sun gear causes the rear planet gears to rotate clockwise. With the one-way clutch holding the rear planet carrier, the rear planetary gears turn the rear internal gear and output shaft clockwise in a reduction ratio of approximately 2.46 to 1.

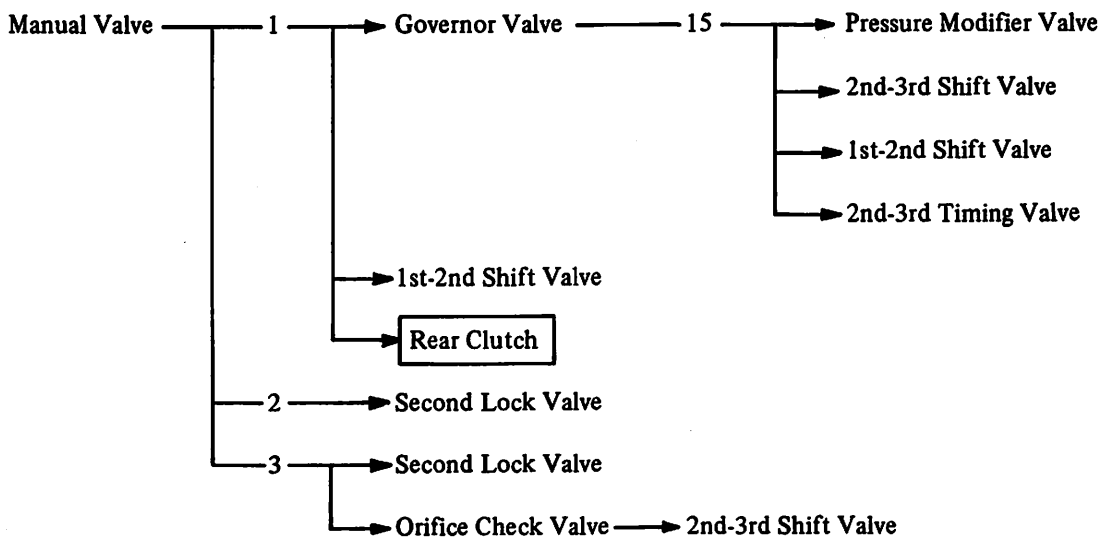




Front clutch	OFF
Rear clutch	ON
Low and reverse brake	OFF
Brake band servo	OFF
One-way clutch	HOLDING

Fig. AT-12 Mechanical Operation during "D_1" Range

Fluid flow



"D_1" range (Low gear)

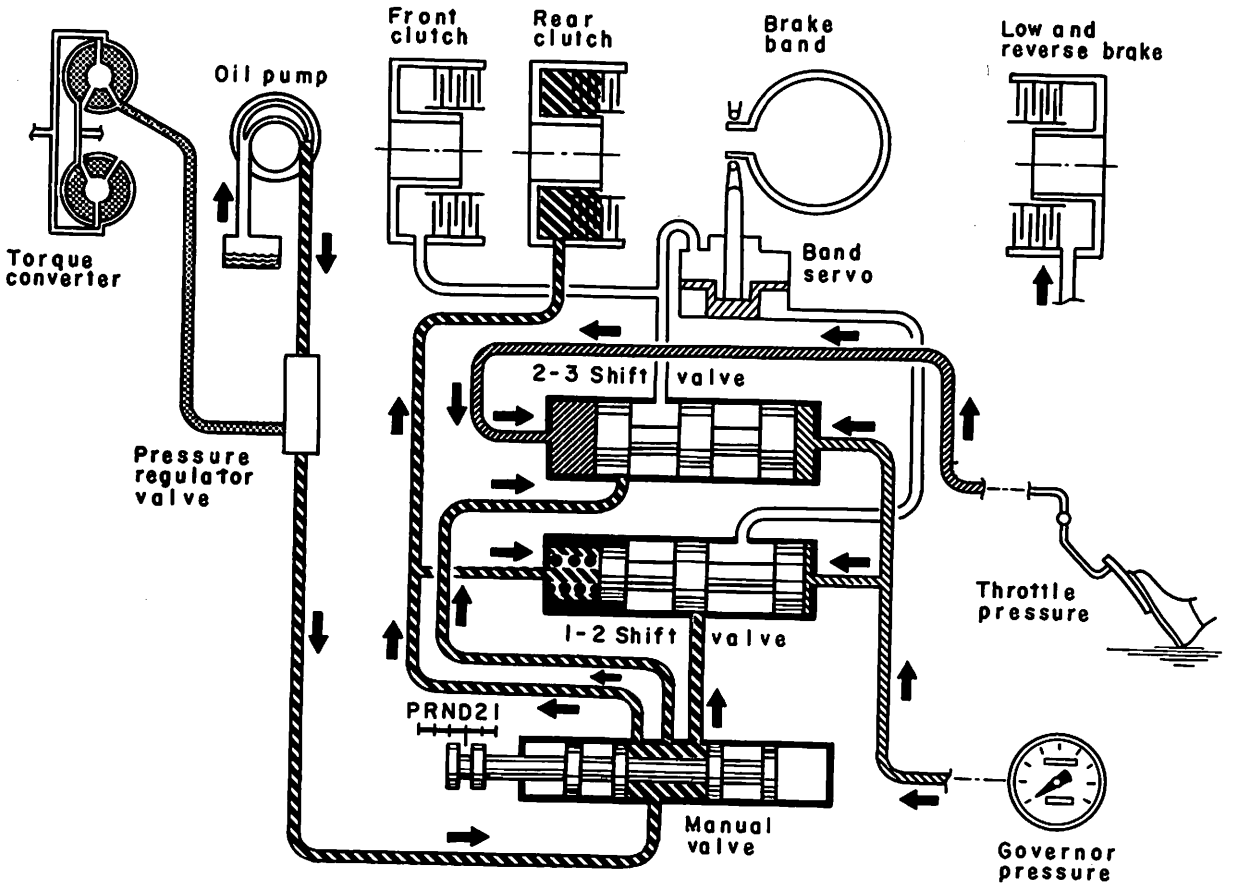
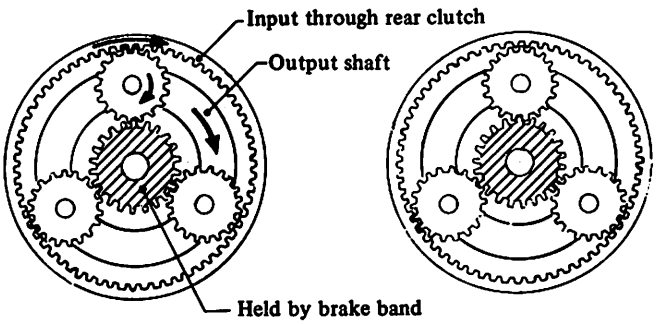


Fig. AT-13 Oil Pressure Circuit Diagram — "D_1" range (Low gear)

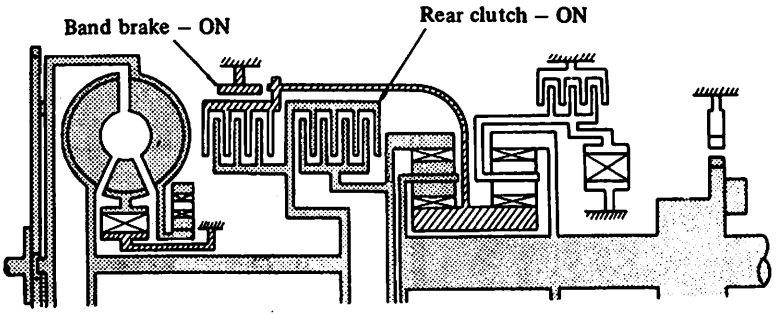
"D_2" RANGE (2ND GEAR)

Power flow

In "D_2" range, the brake band is applied to hold the connecting shell and sun gear stationary. Engine torque, through the applied rear clutch is delivered to the internal gear of the front gear set in a clockwise rotation. Clockwise rotation of the internal gear causes the planet gears to "walk" around the stationary sun gear in a clockwise direction. This causes the output shaft, which is splined to the front planet carrier to turn in a clockwise direction with a reduction ratio of about 1.46 to 1.



AT331



AT079

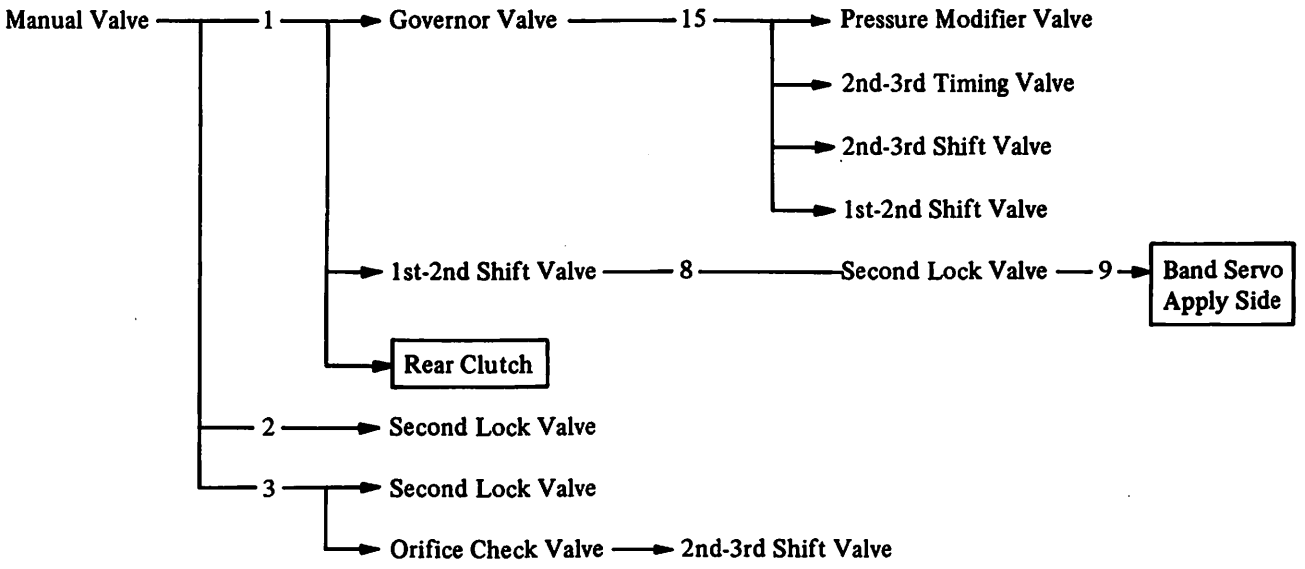
Front clutch	OFF
Rear clutch	ON
Low and reverse brake	OFF
Brake band	ON
One-way clutch	OFF

AT447

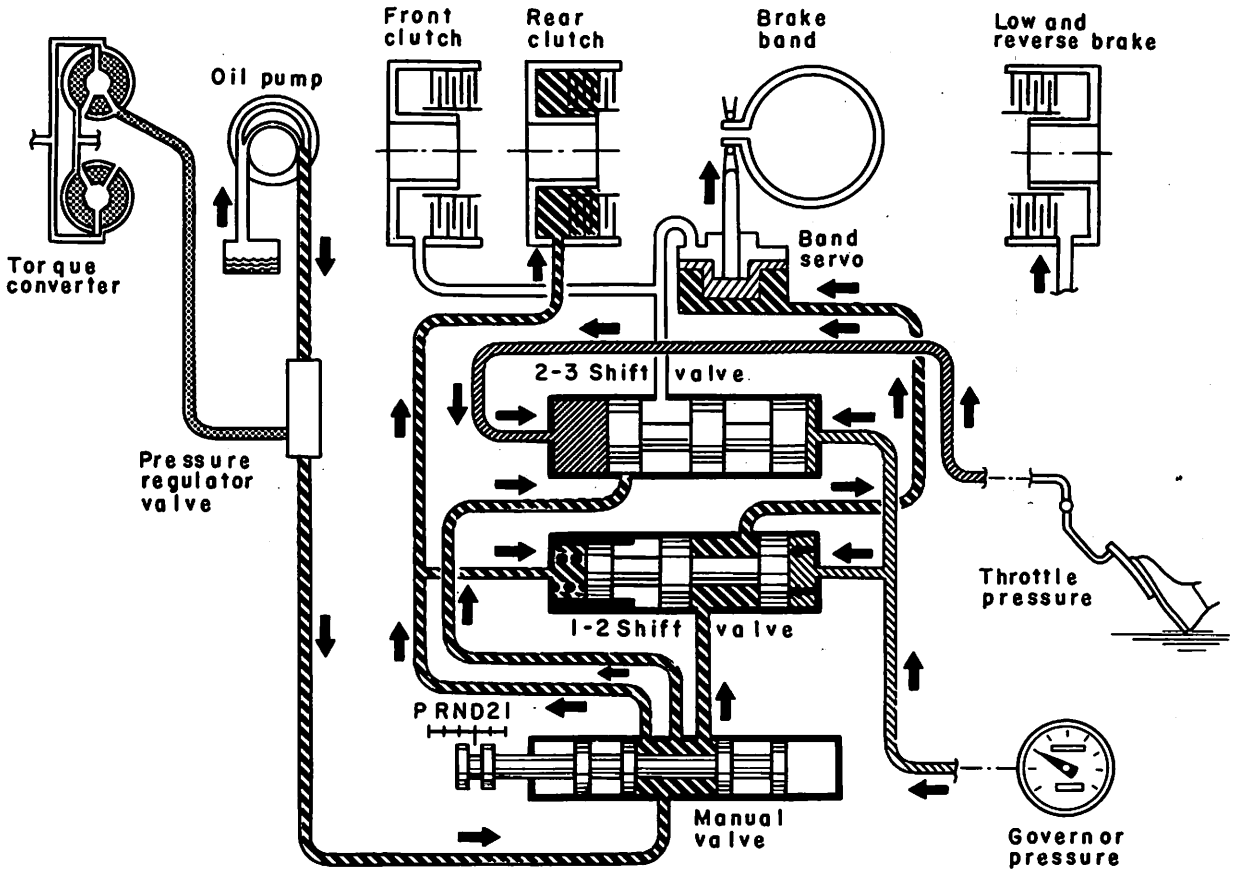
Fig. AT-14 Mechanical Operation during "D_2" Range

Fluid flow

As car speed and governor pressure increase, the governor pressure acting on the end of the 1-2 shift valve overcomes the force of the 1-2 shift valve spring and line pressure. This allows the 1-2 shift valve to move to the upshift position which directs line pressure through the 2nd lock valve and on to the brake band.



"D_2" range (2nd gear)



Line pressure

Governor pressure

Torque converter pressure

Throttle pressure

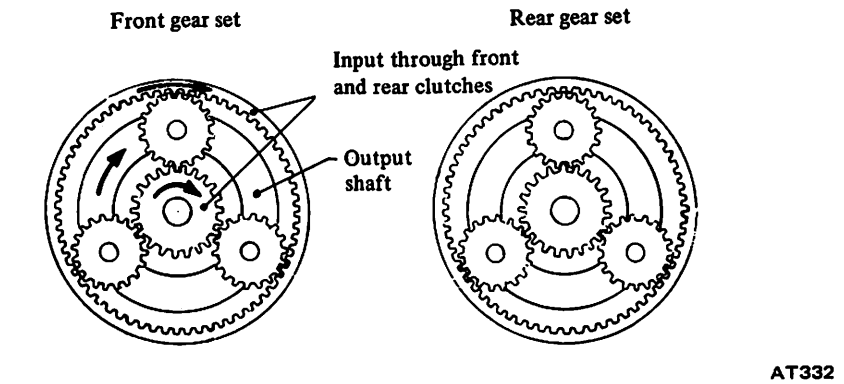
AT448

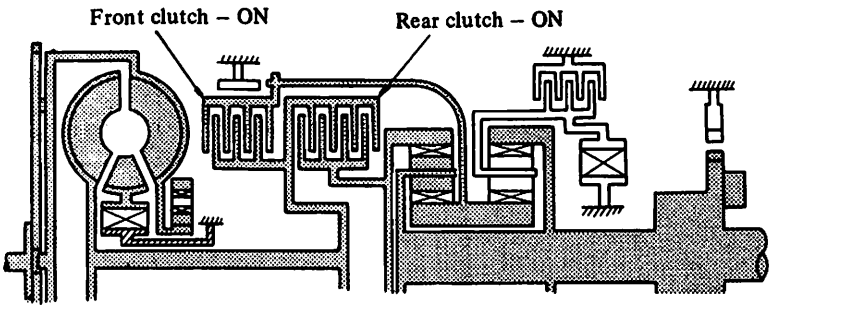
Fig. AT-15 Oil Pressure Circuit Diagram — "D_2" range (2nd gear)

"D_3" RANGE (3RD GEAR)

Power flow

In "D_3" range, engine troque is transmitted through both clutches. The front clutch turns the internal gear of the forward gear set clockwise. The rear clutch turns the sun gears in a clockwise direction also. With both the internal gear and the sun gear of the forward gear set turning in the same direction at the same speed, the planet gears are locked in position, and turn as a unit. The output shaft, splined to the forward planet carrier, turns at a ratio of 1 : 1.



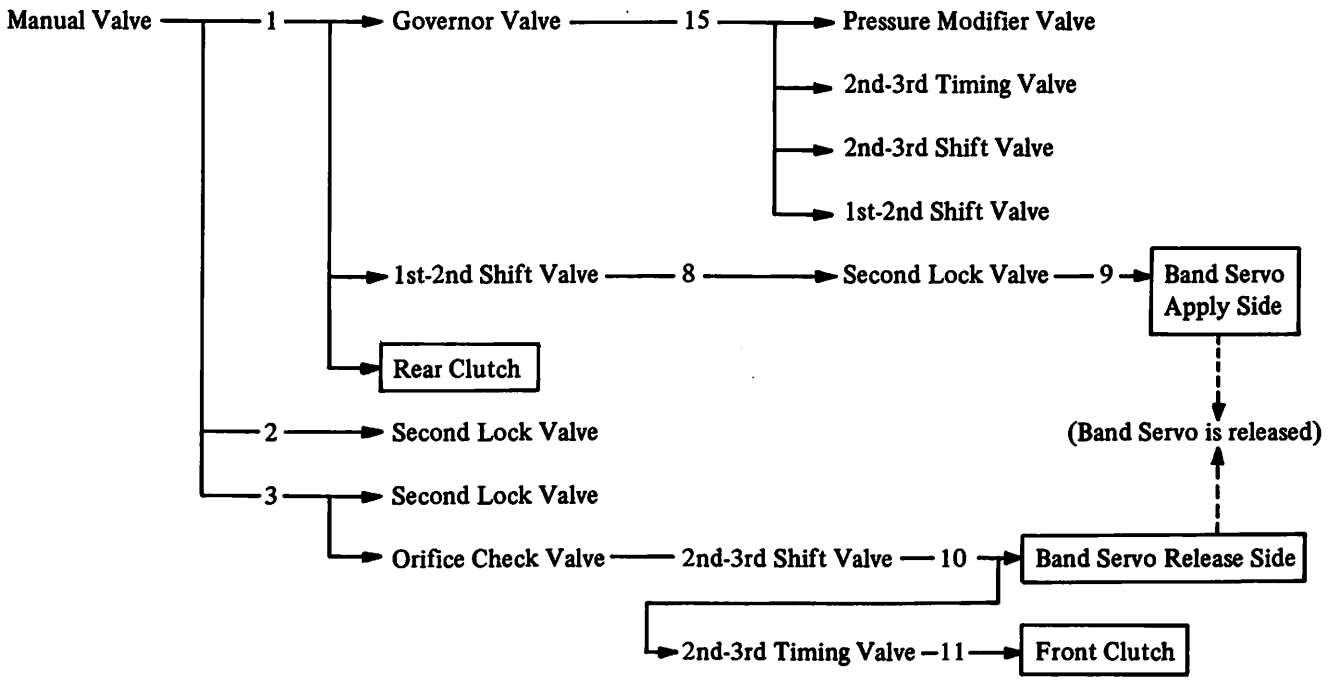


Front clutch	ON
Rear clutch	ON
Low-reverse brake	OFF
Brake band	OFF-Pressure release
One-way clutch	OFF

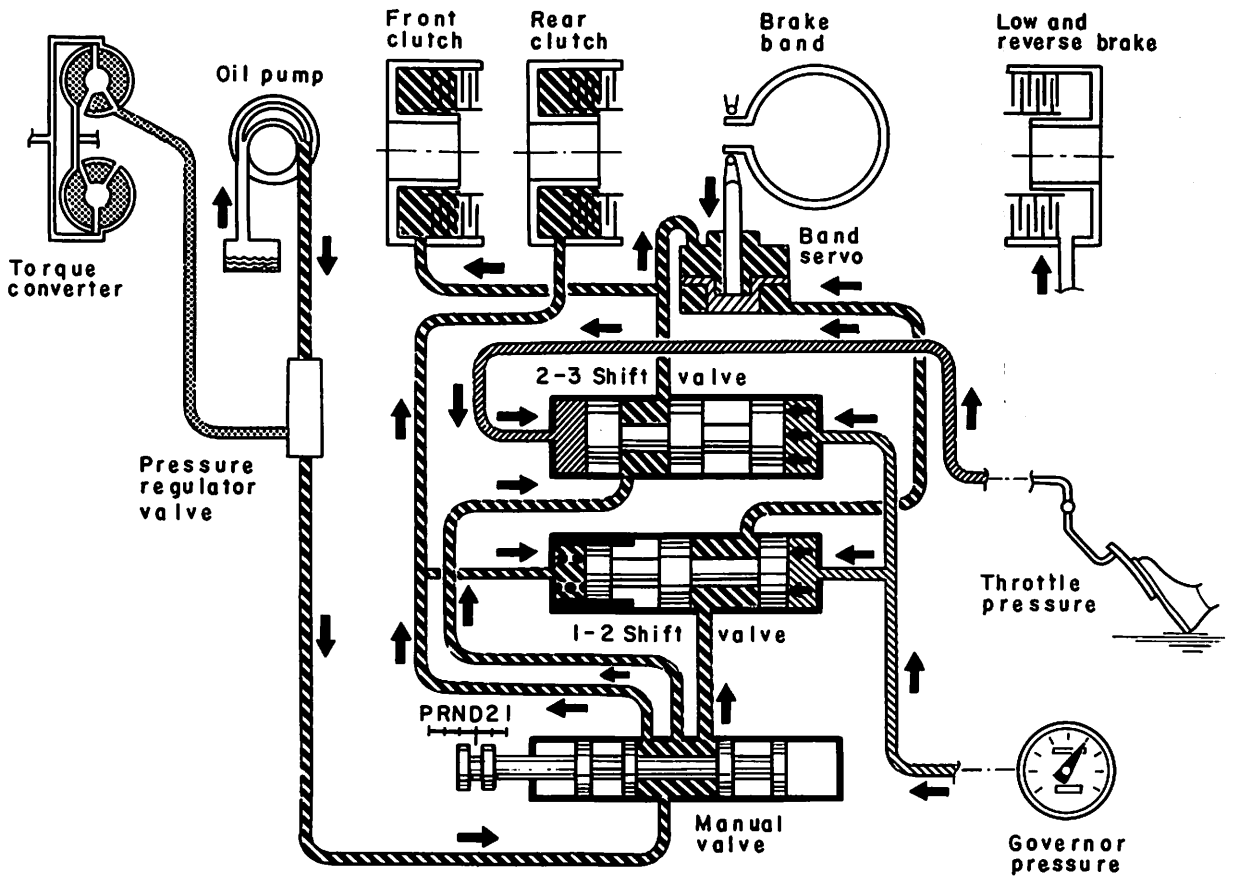
Fig. AT-16 Mechanical Operation during "D_3" Range

Fluid flow

Governor pressure increases to the point that it can overcome the combined forces of spring and throttle pressure and move the 2nd-3rd shift valve. When the 2nd-3rd shift valve opens, pressure passes through the valve lands to the 2-3 timing valve and on to apply the front clutch and release the brake band. The car is now in D_3 or direct drive (the rear clutch was already applied).



"D_3" range (3rd gear)



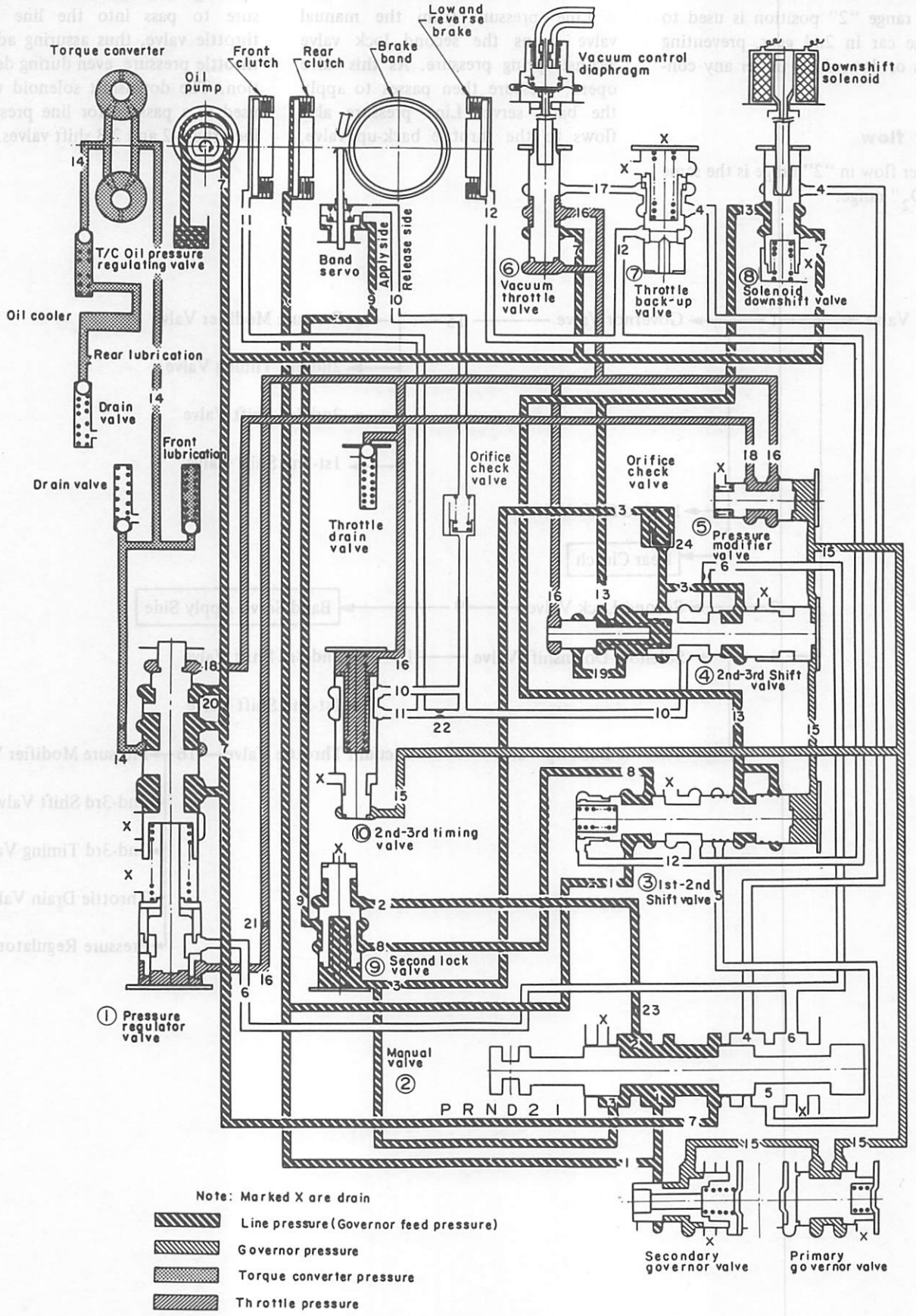
AT449

Fig. AT-17 Oil Pressure Circuit Diagram — "D_3" range (3rd gear)

"D" RANGE KICKDOWN

To achieve a forced downshift from 3rd to 2nd, the car speed must be under approximately 100 km/h (60 mph); from 2nd to 1st, it must be under approximately 50 km/h (30 mph). Fully depressing the accelerator pedal energizes the downshift solenoid, which opens the solenoid downshift valve. Oil pressure is then exerted against the shift valves. Between 50 and 100 km/h (30 and 60 mph), this pressure will close the 2nd-3rd shift valve against governor pressure and the car downshifts. When the car speed is below 50 km/h (30 mph), the 1st-2nd shift valve will be closed and the transmission will be in 1st gear. As car speed and governor pressure increase, the shift valves automatically reopen.

"D" range kickdown (Shift valves in 2nd gear position)



AT450

Fig. AT-18 Oil Pressure Circuit Diagram — "D" range kickdown (shift valves in 2nd gear position)

"2" RANGE (2ND GEAR)

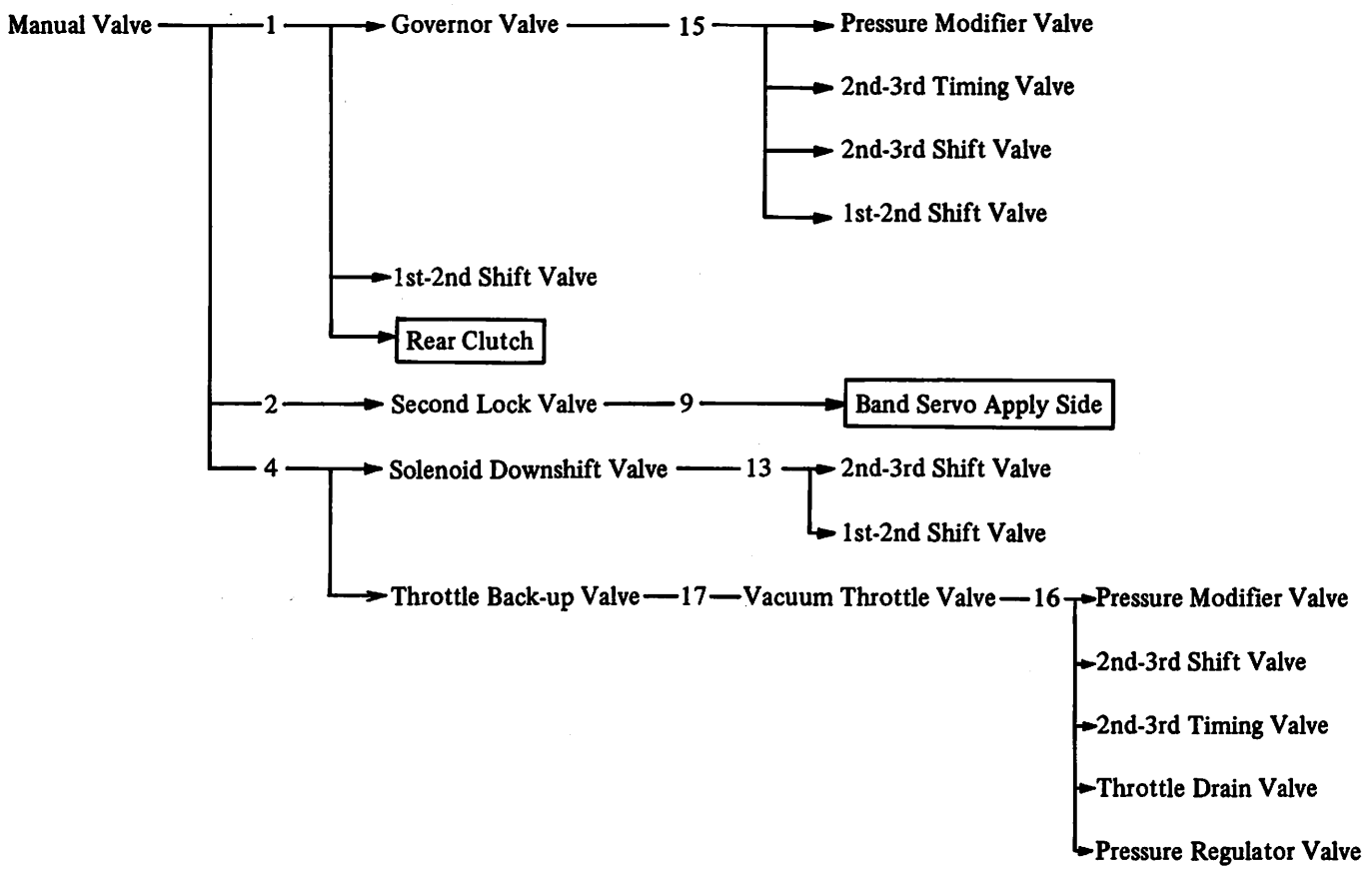
The range "2" position is used to lock the car in 2nd gear, preventing upshifts or downshifts under any conditions.

Power flow

Power flow in "2" range is the same as in "D_2" range.

Fluid flow

Line pressure from the manual valve opens the second lock valve against spring pressure. As this valve opens, pressure then passes to apply the band servo. Line pressure also flows to the throttle back-up valve, opening the valve and allowing pressure to pass into the line of the throttle valve, thus assuring adequate throttle pressure, even during deceleration. The downshift solenoid valve is used as a passage for line pressure to lock the 1-2 and 2-3 shift valves.



"2" range (2nd gear)

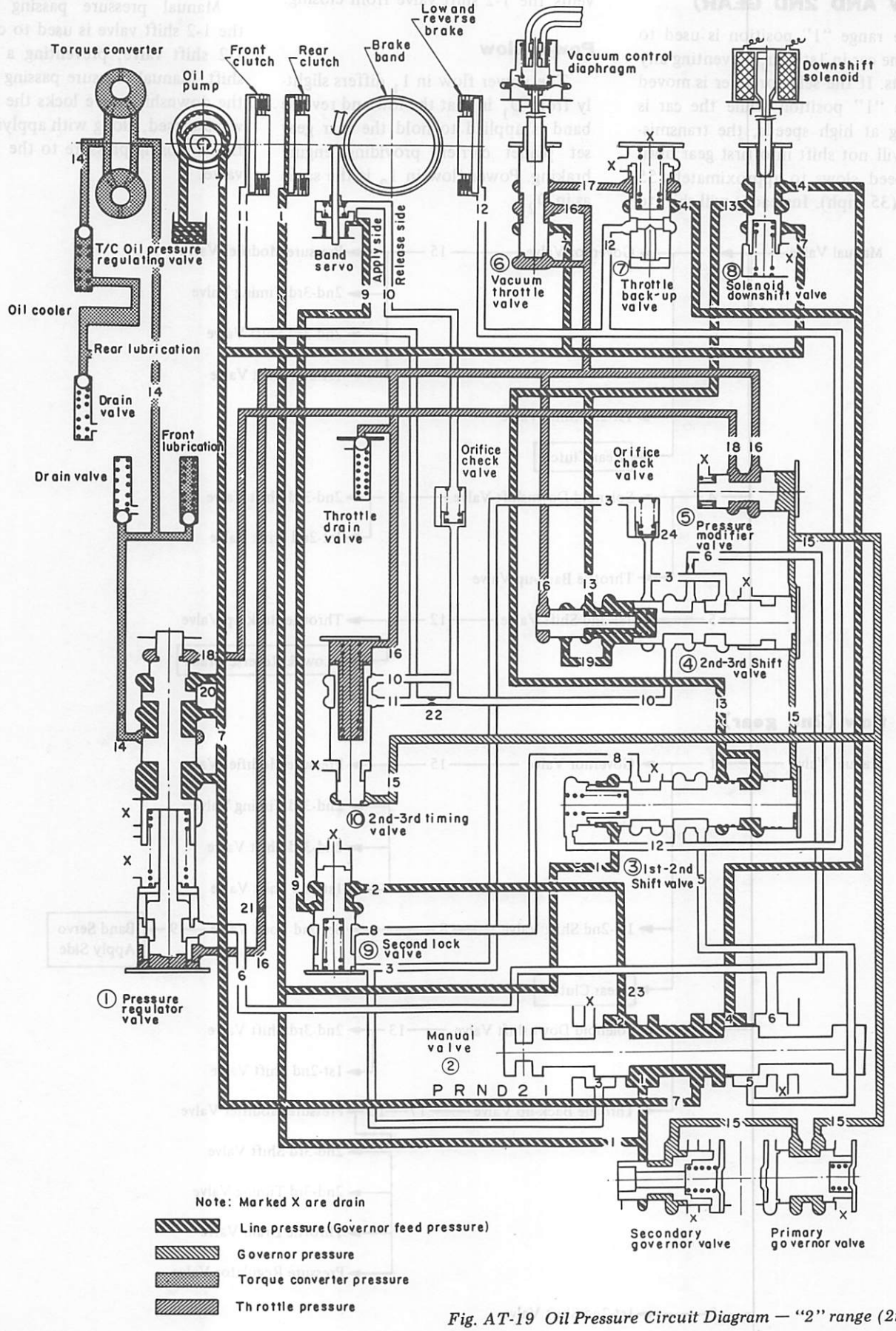


Fig. AT-19 Oil Pressure Circuit Diagram — "2" range (2nd gear)

"1" RANGE (LOW AND 2ND GEAR)

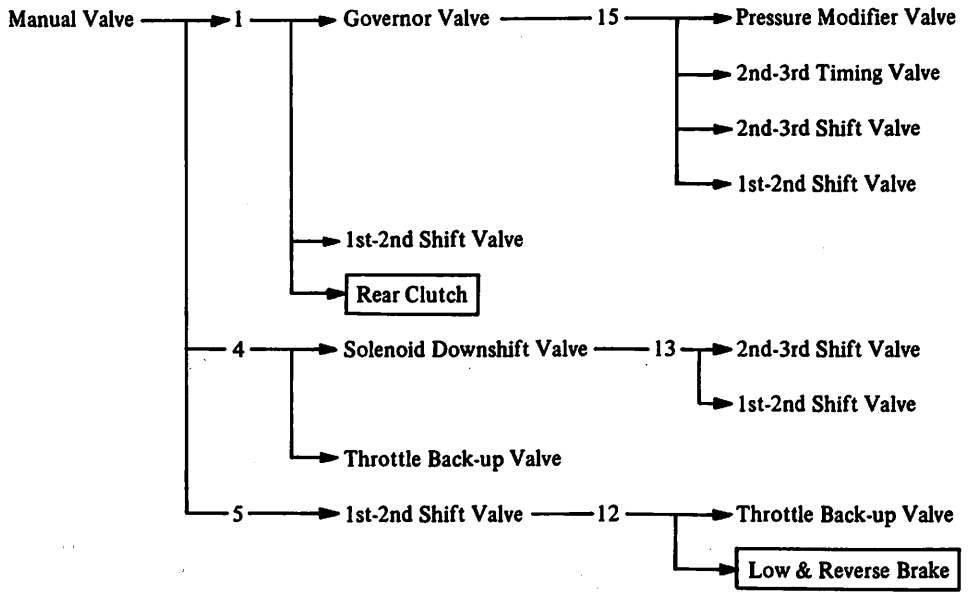
The range "1" position is used to lock the car in 1st gear, preventing any upshifts. If the selector lever is moved to the "1" position while the car is moving at high speeds, the transmission will not shift into first gear until car speed slows to approximately 55 km/h (35 mph). Instead it will shift to second (1_2), as governor pressure prevents the 1-2 shift valve from closing.

Power flow

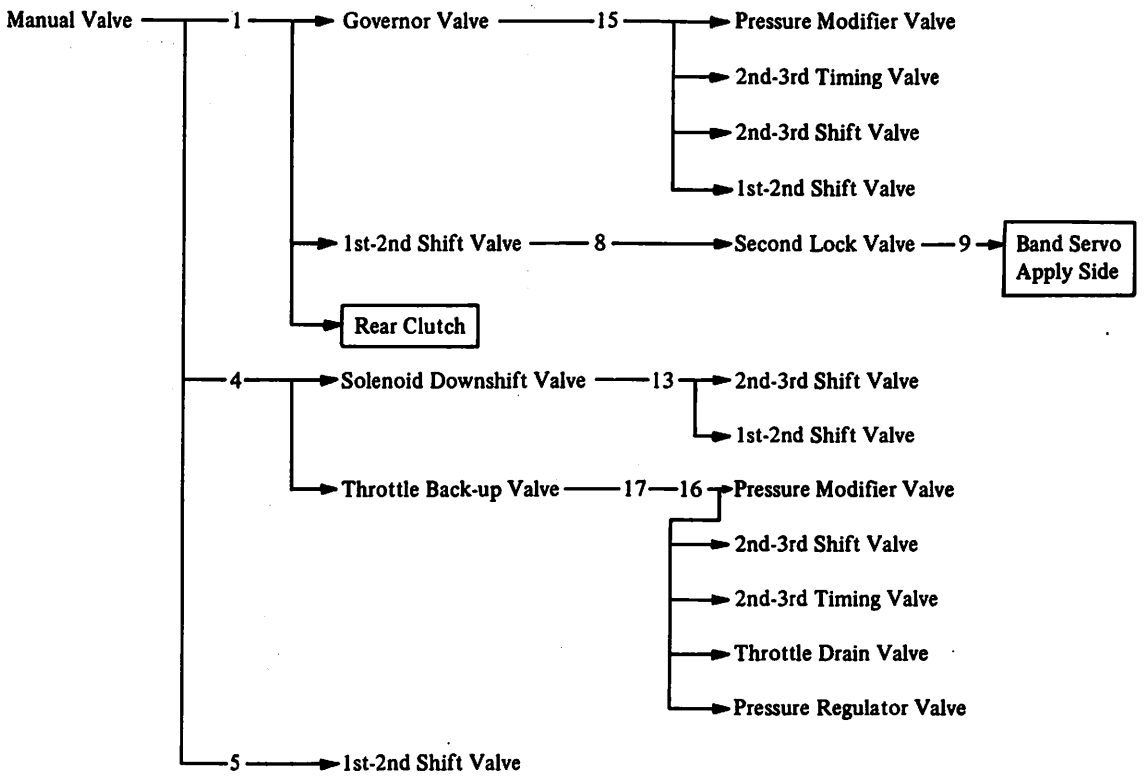
The power flow in 1_1 differs slightly from D_1 in that the low and reverse band is applied to hold the rear gear set planet carrier, providing engine braking. Power flow in 1_2 is the same as in D_2.

Fluid flow (Low gear)

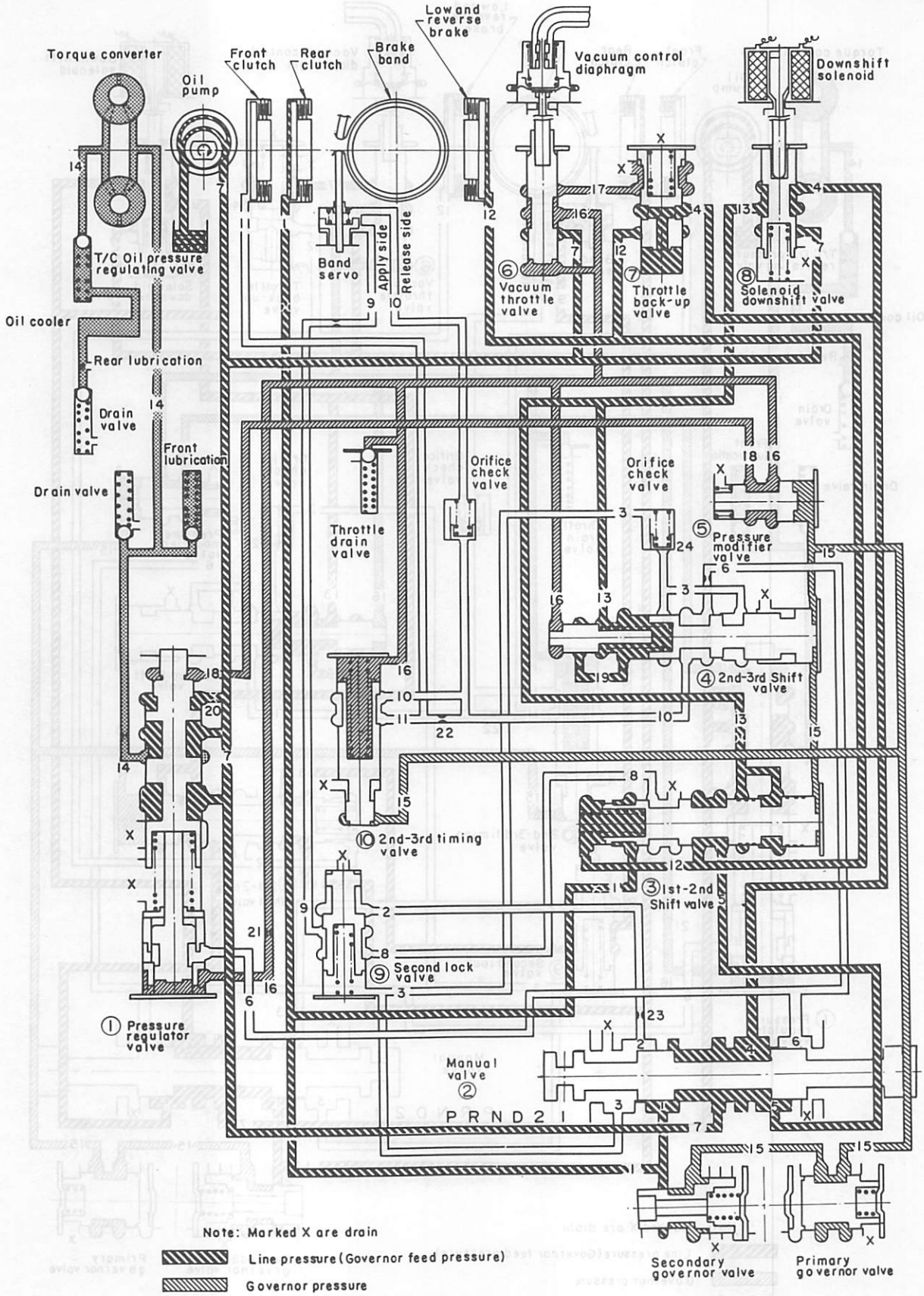
Manual pressure passing through the 1-2 shift valve is used to close the 1-2 shift valve, preventing a 1-2 upshift. Manual pressure passing through the downshift valve locks the 2-3 shift valve closed, along with applying additional closing pressure to the 1-2 shift valve.



Fluid flow (2nd gear)



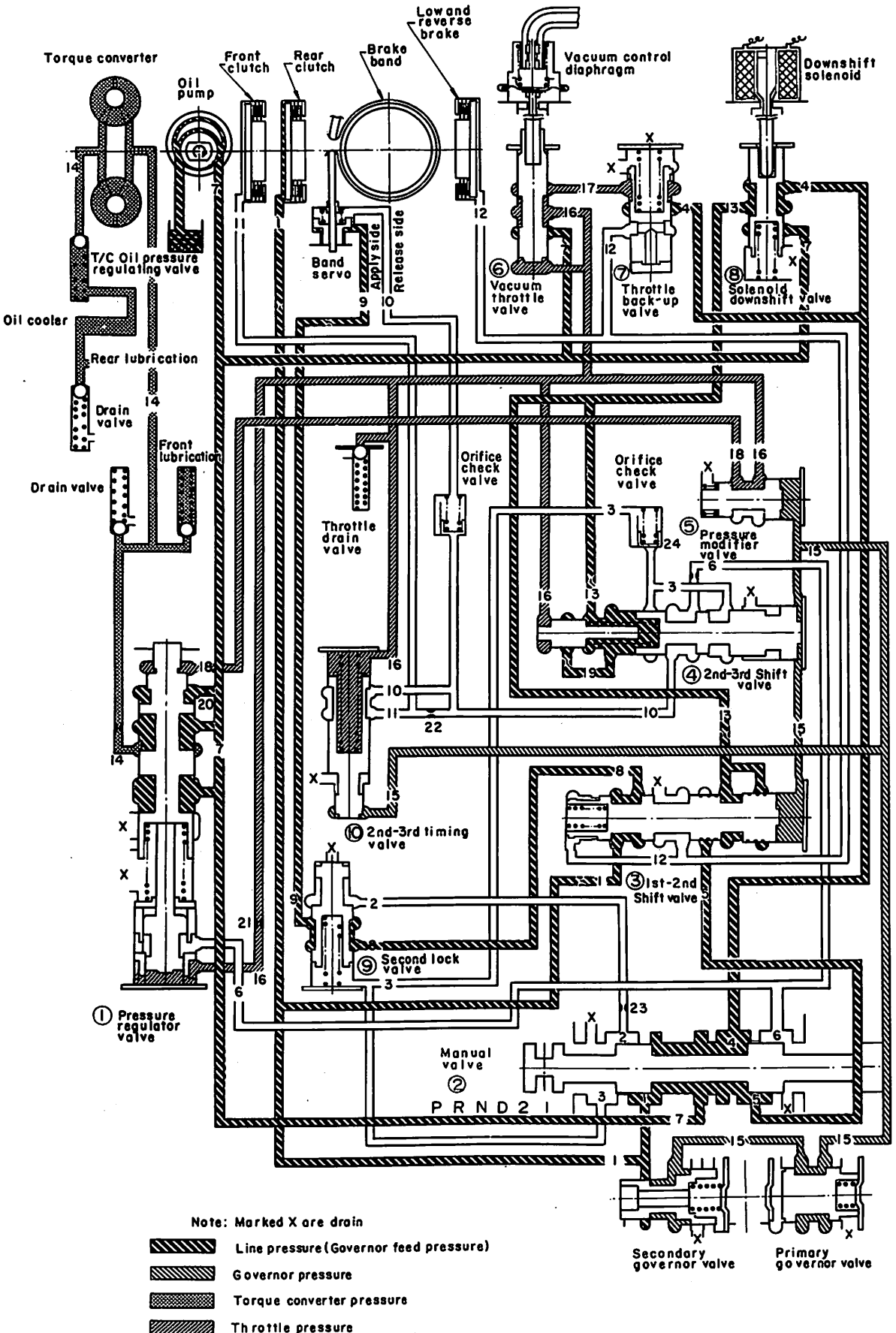
"1_1" range (Low gear)



AT452

Fig. AT-20 Oil Pressure Circuit Diagram — "1_1" range (Low gear)

"1_2" range (2nd gear)



AT453

Fig. AT-21 Oil Pressure Circuit Diagram — "1_2" range (2nd gear)

REMOVAL AND INSTALLATION

TRANSMISSION ASSEMBLY

When dismounting the automatic transmission from a car, pay attention to the following points:

1. Before dismounting the transmission, rigidly inspect it by aid of the "Trouble-shooting Chart", and dismount it only when considered to be necessary.
2. Dismount the transmission with utmost care; and when mounting, observe the tightening torque indicated on another table, not to exert excessive force.

REMOVAL

In dismounting automatic transmission from car, proceed as follows:

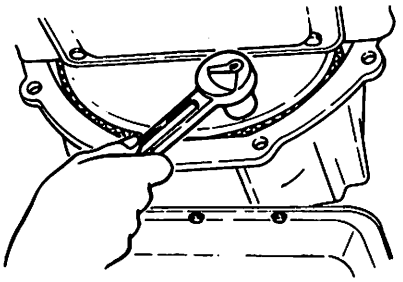
1. Disconnect battery ground cable from terminal.
2. Disengage torsion shaft from accelerator linkage.
3. Jack up vehicle and support its weight on safety stands. Recommend a hydraulic hoist or open pit be utilized, if available.
   Make sure that safety is insured.
4. Remove propeller shaft.

Note: Plug up the opening in the rear extension to prevent oil from flowing out.

5. Disconnect front exhaust tube.
6. Disconnect selector range lever from manual shaft.
7. Disconnect wire connections at inhibitor switch.
8. Disconnect vacuum tube from vacuum diaphragm, and wire connections at downshift solenoid.
9. Disconnect speedometer cable from rear extension.
10. Disconnect oil charging pipe.
11. Disconnect oil cooler inlet and outlet tubes at transmission case.
12. Support engine by locating a jack under oil pan with a wooden block used between oil pan and jack. Support transmission by means of a transmission jack.

CAUTION:
Do not place the jack under the oil pan drain plug.

13. Detach converter housing dust cover. Remove bolts securing torque converter to drive plate.



AT261

Fig. AT-22 Removing Torque Converter Attaching Bolts

Note: Before removing torque converter, scribe match marks on two parts so that they may be replaced in their original positions at assembly.

14. Remove rear engine mount securing bolts and crossmember mounting bolts.
15. Remove starter motor.
16. Remove bolts securing transmission to engine. After removing these bolts, support engine and transmission with jack, and lower the jack gradually until transmission can be removed and take out transmission under the car.

Note: Plug up the opening such as oil charging pipe, oil cooler tubes, etc.

CAUTION:
Take care in dismounting transmission not to strike any adjacent parts.

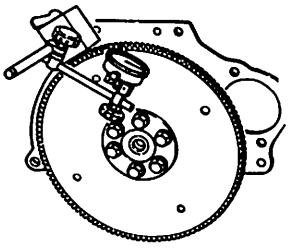
INSTALLATION

Installation of automatic transmission on car is reverse order of removal. However, observe the following installation notes.

1. Drive plate runout

Turn crankshaft one full turn and measure drive plate runout with indicating finger of a dial gauge rested against plate.

Maximum allowable runout:
0.5 mm (0.020 in)

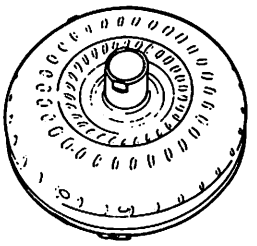


AT268

Fig. AT-23 Measuring Drive Plate Runout

2. Installation of torque converter

Line up notch in torque converter with that in oil pump. Be extremely careful not to cause undue stresses in parts in installing torque converter.

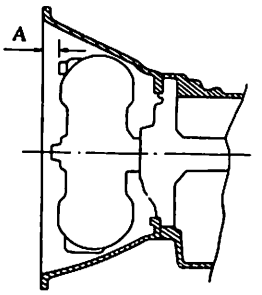


AT116

Fig. AT-24 Torque Converter Aligning Cut

3. When connecting torque converter to transmission, measure distance "A" to be certain that they are correctly assembled.

Distance "A":
More than 21.5 mm (0.846 in)



AT117

Fig. AT-25 Installing Torque Converter

4. Bolt converter to drive plate.

Note: Align chalk marks painted across both parts during disassembling processes.

5. After converter is installed, rotate crankshaft several turns and check to be sure that transmission rotates freely without binding.

6. Pour recommended automatic transmission fluid up to correct level through oil charge pipe.

7. Connect manual lever to shift rod. Operation should be carried out with manual and selector levers in "N".

8. Connect inhibitor switch wires.

Note:

a. **Refer to page AT-40 for Checking and Adjusting Inhibitor Switch.**

b. **Inspect and adjust switch as above whenever it has to be removed for service.**

9. Check inhibitor switch for operation:

Starter should be brought into operation only when selector lever is in "P" and "N" positions (it should not be started when lever is in "D", "2", "1" and "R" positions).

Back-up lamp should also light when selector lever is placed in "R" position.

10. Check level of oil in transmission. For detailed procedure, see page AT-39.

11. Move selector lever through all positions to be sure that transmission operates correctly.

With hand brake applied, rotate engine at idling. Without disturbing the above setting, move selector lever through "N" to "D", to "2", to "1" and to "R". A slight shock should be felt by hand gripping selector each time transmission is shifted.

Note: See page AT-40 for Checking Engine Idling Revolution.

12. Check to be sure that line pressure is correct. To do this, refer to page AT-43 for Line Pressure Test.

13. Perform stall test as described in page AT-41.

MAJOR REPAIR OPERATION

SERVICE NOTICE FOR DISASSEMBLY AND ASSEMBLY

1. It is advisable that repair operations be carried out in a dust-proof room.
2. Due to the differences of the engine capacities, the specifications of component parts for each model's transmission may be different. They do, however, have common adjustment and repair procedures as well as cleaning and inspection procedures, outlined hereinafter.
3. During repair operations, refer to "Service Data and Specifications" section for the correct parts for each model.
4. Before removing any of subassemblies, thoroughly clean the outside of the transmission to prevent dirt from entering the mechanical parts.
5. Do not use a waste rag. Use a nylon or paper cloth.
6. After disassembling, wash all disassembled parts, and examine them to see if there are any worn, damaged or defective parts, and how they are affected. Refer to "Service Data" for the extent of damage that justifies replacement.
7. As a rule, packings, seals and similar parts once disassembled should be replaced with new ones.

TORQUE CONVERTER

The torque converter is a welded construction and can not be disassembled.

INSPECTION

1. Check torque converter for any sign of damage, bending, oil leak or deformation. If necessary, replace.
2. Remove rust from pilots and bosses completely.

If torque converter oil is fouled or contaminated due to burnt clutch, flush the torque converter as follows:

(1) Drain oil in torque converter.
(2) Pour non lead gasoline or kerosene into torque converter [approximately 0.5 liter (1 ⅛ U.S.pt., ⅞ Imp. pt.)].
(3) Blow air into torque converter and flush and drain out gasoline.
(4) Fill torque converter with torque converter oil [approximately 0.5 liter (1 ⅛ U.S.pt., ⅞ Imp.pt.)].
(5) Again blow air into torque converter, and drain torque converter oil.

TRANSMISSION

DISASSEMBLY

1. Drain oil from the end of rear extension. Mount transmission on Transmission Case Stand ST07870000 or ST07860000. Remove oil pan.

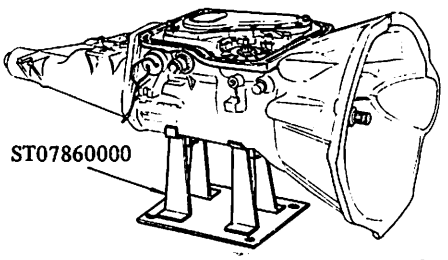


Fig. AT-26 Removing Oil Pan

2. Remove bolts securing converter housing to transmission case. Remove torque converter housing.
3. Remove speedometer pinion sleeve bolt. Withdraw pinion.
4. Remove downshift solenoid and vacuum diaphragm. Do not leave diaphragm rod at this stage of disassembly. Rod is assembled in top of vacuum diaphragm.

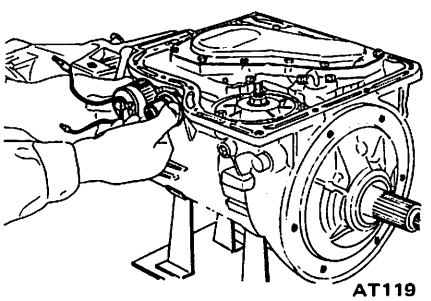


Fig. AT-27 Downshift Solenoid and Vacuum Diaphragm

5. Remove bolts which hold valve body to transmission case.

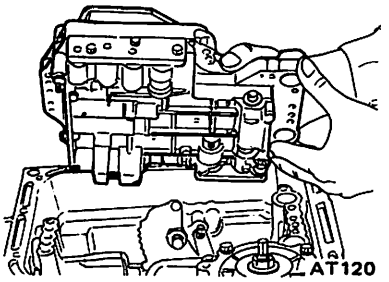


Fig. AT-28 Removing Valve Body

6. Loosen lock nut ② on piston stem ①.

Then tighten piston stem in order to prevent front clutch drum from falling when oil pump is withdrawn.

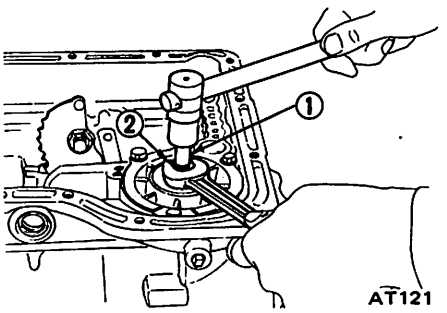


Fig. AT-29 Loosening Band Servo

7. Pull out input shaft.
8. Withdraw oil pump using Sliding Hammer ST25850000. Do not allow front clutch to come out of position and drop onto floor.

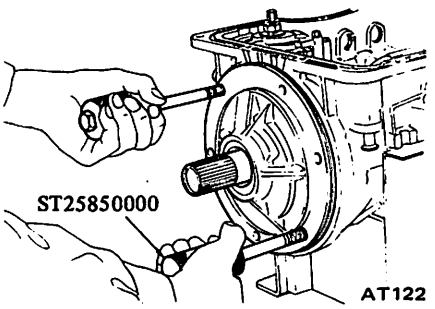


Fig. AT-30 Removing Oil Pump

9. Remove band strut. This can be done by loosening piston stem further.

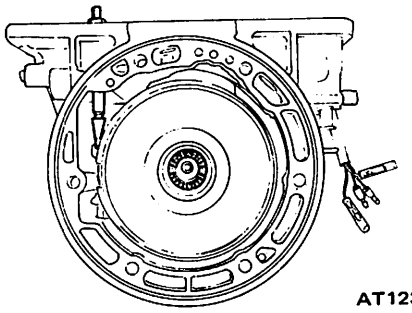


Fig. AT-31 Removing Band Strut

10. Remove brake band, front clutch and rear clutch as an assembled unit.

11. Remove connecting shell, rear clutch hub and front planetary carrier as a unit.

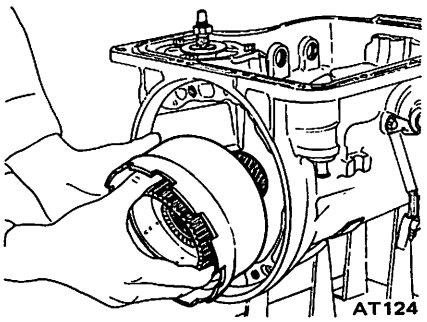


Fig. AT-32 Removing Connecting Shell

12. With the aid of Snap Ring Remover HT69860000, pry snap ring off output shaft.

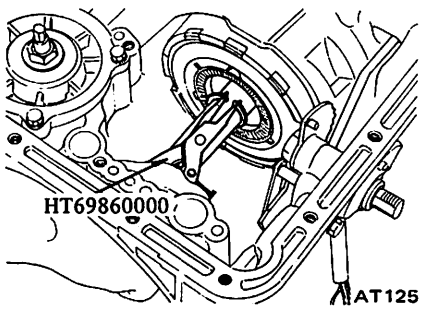


Fig. AT-33 Removing Snap Ring

13. Remove connecting drum and inner gear of rear planetary carrier as an assembly.

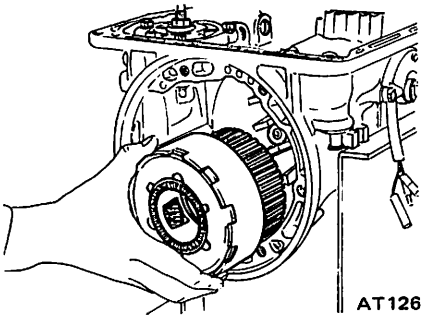


Fig. AT-34 Removing Connecting Drum

14. Remove snap rings and then remove rear planetary carrier, internal gear, connecting drum, one-way clutch outer race and one-way clutch in that order.

15. Remove rear extension by loosening securing bolts.

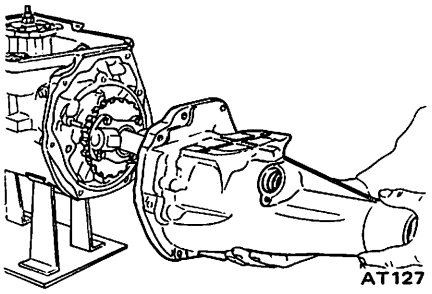


Fig. AT-35 Removing Rear Extension

16. Pull out output shaft; remove oil distributor ② together with governor valve ①.

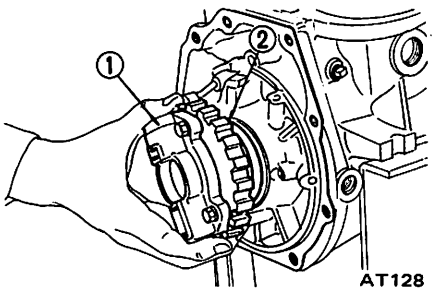


Fig. AT-36 Removing Governor and Oil Distributor

17. Pry off snap ring using a pair of pliers. Remove retaining plate, drive plate, driven plate and dish plate in that order.

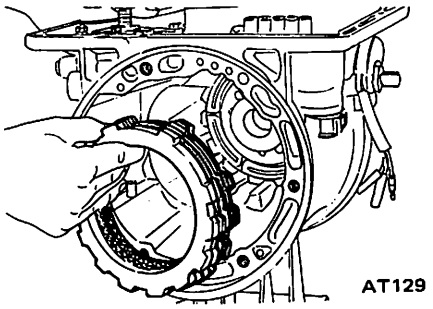


Fig. AT-37 Removing Drive and Driven Plates

18. Reaching through back side of transmission case, remove hex-head slotted bolts. To do this, use Hex-head Extension ST25570001 (ST25570000). One-way clutch inner race, thrust washer, piston return spring and thrust spring ring can now be removed.

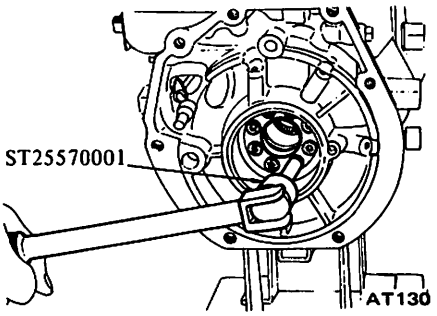


Fig. AT-38 Removing Hex-head Slotted Bolt

19. Blow out low and reverse brake piston by directing a jet of air into hole in cylinder.

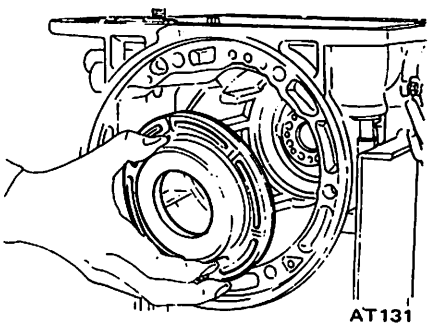


Fig. AT-39 Removing Piston

20. Remove band servo loosening attaching bolts.

Note: If difficulty is encountered in removing retainer, direct a jet of air toward release side.

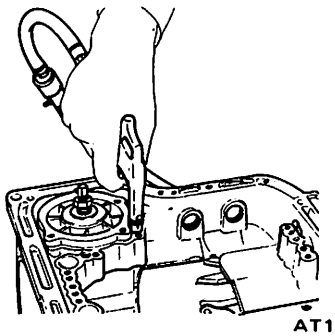
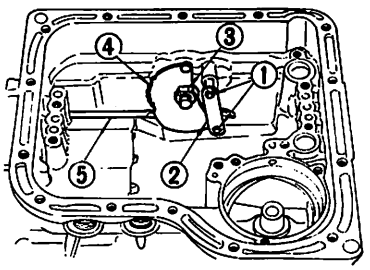

AT132

Fig. AT-40 Removing Band Servo

21. Pry snap rings ① from both ends of parking brake lever ② and remove the lever. Back off manual shaft lock nut ③ and remove manual plate ④ and parking rod ⑤.



AT133

Fig. AT-41 Removing Manual Plate

22. Remove inhibitor switch and manual shaft by loosening two securing bolts.

INSPECTION

Torque converter housing, transmission case and rear extension

1. Check for damage or cracking; if necessary, replace.
2. Check for dents or score marks on mating surfaces. Repair as necessary.
3. If rear extension bushing is worn or cracked, replace it as an assembly of bushing and rear extension housing.

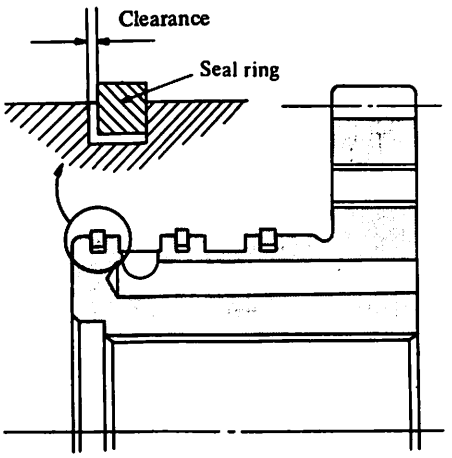
Gaskets and O-ring

1. Always use new gaskets when the units are to be disassembled.
2. Check O-rings for burrs or cracking. If necessary, replace with new rings.

Oil distributor

1. Check for signs of wear on seal ring and ring groove, replacing with new ones if found worn beyond use.
2. Check that clearance between seal ring and ring groove is correct. If out of specification, replace whichever is worn beyond limits.

Clearance between seal ring and ring groove:
0.04 to 0.16 mm
(0.0016 to 0.0063 in)



AT134

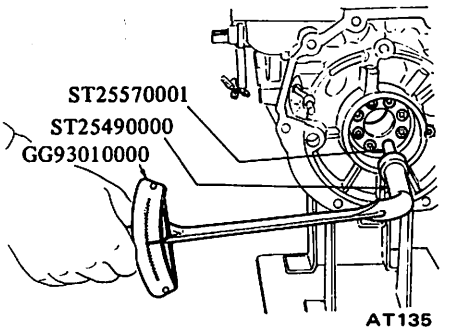
Fig. AT-42 Measuring Seal Ring to Ring Groove Clearance

ASSEMBLY

Assembly is in reverse order of disassembly. However, observe the following assembly notes.

1. After installing piston of low and reverse brake, assemble thrust spring ring, return spring, thrust washer and one-way clutch inner race. Tighten hex-head slotted bolt, using Hex-head Extension ST25570001 (ST25570000), Torque Wrench GG93010000 and Socket Extension ST25490000 (ST25512001).

Ⓣ Tightening torque:
One-way clutch inner race to transmission case
1.3 to 1.8 kg-m
(9 to 13 ft-lb)

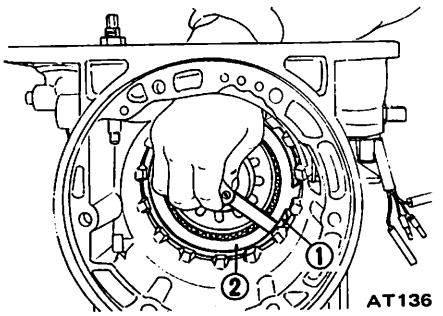


AT135

Fig. AT-43 Installing One-way Clutch Inner Race

2. After low and reverse brake has been assembled, measure the clearance between snap ring ① and retaining plate ②. Select proper thickness of retaining plate to give correct ring to plate clearance.

Low and reverse brake clearance:
0.80 to 1.25 mm
(0.031 to 0.049 in)

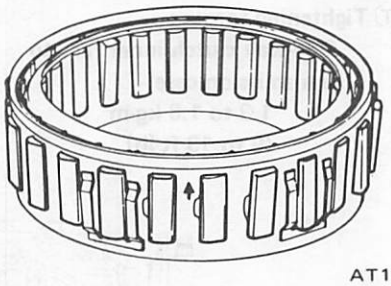


AT136

Fig. AT-44 Measuring Ring to Plate Clearance

Available retaining plate:
Refer to Service Data and Specifications.

3. Install one-way clutch so that the arrow mark "→" is toward front of vehicle. It should be free to rotate only in clockwise direction.



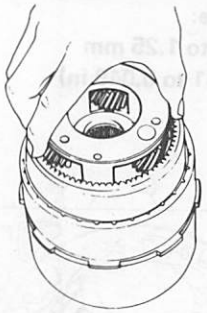
AT137

Fig. AT-45 One-way Clutch

4. After installing rear extension, tighten attaching bolts. Place manual lever in "P" range and check to be sure that rear output shaft is securely blocked.

Ⓣ Tightening torque:
Transmission case to rear extension
2.0 to 2.5 kg-m
(14 to 18 ft-lb)

5. Tighten servo retainer temporarily at this stage of assembly.
6. Place rear clutch assembly with needle bearing on front assembly.
7. Install rear clutch hub and front planetary carrier.



AT142

Fig. AT-46 Installing Planetary Carrier

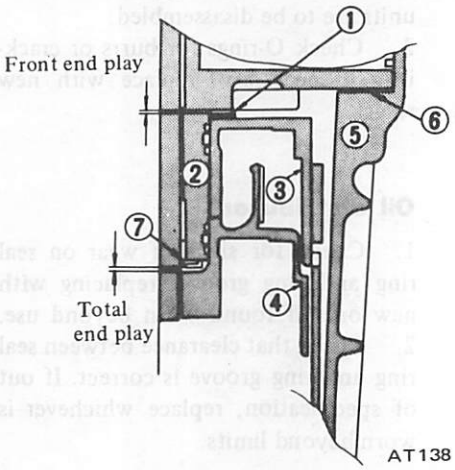
8. Assemble connecting shell and other parts up to front clutch in reverse order of disassembly.



AT143

Fig. AT-47 Installing Connecting Shell

9. Adjust total end play and front end play as follows:

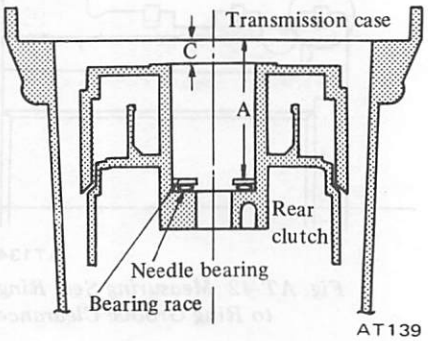


AT138

1	Front clutch thrust washer	5	Transmission case
2	Oil pump cover	6	Oil pump gasket
3	Front clutch	7	Oil pump cover bearing race
4	Rear clutch		

Fig. AT-48 End Play

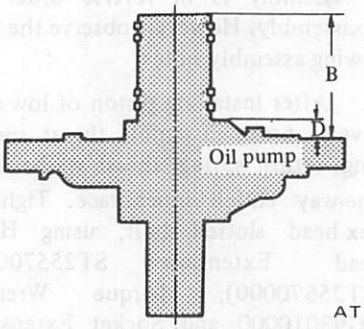
(1) Measure the distance "A" and "C" by vernier calipers.



AT139

Fig. AT-49 Measuring the Distance "A" and "C"

(2) Measure the distance "B" and "D" of oil pump cover.



AT140

Fig. AT-50 Measuring the Distance "B" and "D"

Adjustment of total end play

Select oil pump cover bearing race by calculating the following formula:

$$T_T = A - B + W$$

where,

T_T : Required thickness of oil pump cover bearing race mm (in)
A : Measured distance A mm (in)
B : Measured distance B mm (in)
W : Thickness of bearing race temporarily inserted mm (in)

Available oil pump cover bearing race

Thickness mm (in)
1.2 (0.047)
1.4 (0.055)
1.6 (0.063)
1.8 (0.071)
2.0 (0.079)
2.2 (0.087)

Specified total end play:
0.25 to 0.50 mm
(0.010 to 0.020 in)

Adjustment of front end play

Select front clutch thrust washer by calculating the following formula:

$$T_F = C - D - 0.2 \text{ (mm)}$$

where,

T_F: Required thickness of front clutch thrust washer mm (in)
C : Measured distance C mm (in)
D : Measured distance D mm (in)

Available front clutch thrust washer

Thickness mm (in)
1.5 (0.059)
1.7 (0.067)
1.9 (0.075)
2.1 (0.083)
2.3 (0.091)
2.5 (0.098)
2.7 (0.106)

Specified front end play:
0.5 to 0.8 mm
(0.020 to 0.031 in)

Note:

a. Correct thickness of bearing race and thrust washer is always the one which is nearest the calculated one.

b. Installed thickness of oil pump gasket is 0.4 mm (0.016 in).

10. Check to be sure that brake servo piston moves freely. For detailed procedure, refer to page AT-33 for Servo Piston. Use care to prevent piston from coming out of place during testing since servo retainer is not tightened at this point of assembly.

11. Make sure that brake band strut is correctly installed. Tighten piston stem. Back off two full turns and secure with lock nut.

Ⓣ Tightening torque:

Piston stem

1.2 to 1.5 kg-m

(9 to 11 ft-lb)

Piston stem lock nut

1.5 to 4.0 kg-m

(11 to 29 ft-lb)

12. After inhibitor switch is installed, check to be sure that it operates properly in each range. For detailed procedure, refer to page AT-40 for Checking and Adjusting Inhibitor Switch.

13. Check the length "L" between case end to rod end of vacuum throttle valve fully pushed in. Then select adequate diaphragm rod of corresponding measured length.

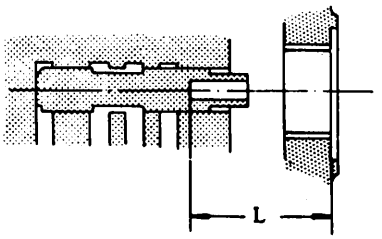


Fig. AT-51 Measuring the Distance "L"

Available diaphragm rod

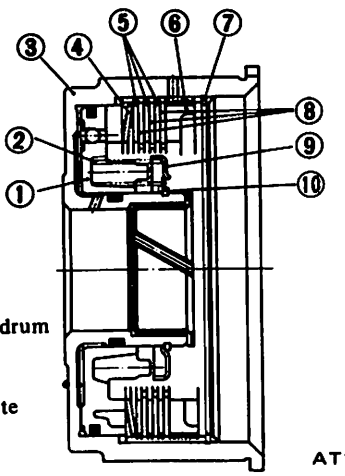
Distance measured "L" mm (in)	Diaphragm rod length mm (in)
Under 25.55 (1.0059)	29.0 (1.142)
25.65 to 26.05 (1.0098 to 1.0256)	29.5 (1.161)
26.15 to 26.55 (1.0295 to 1.0453)	30.0 (1.181)
26.65 to 27.05 (1.0492 to 1.0650)	30.5 (1.201)
Over 27.15 (1.0689)	31.0 (1.220)

COMPONENT PARTS

The transmission consists of many small parts that are quite alike in construction yet machined to very close tolerances. When disassembling parts, be sure to place them in order in part rack so they can be restored in the unit in their proper positions. It is also very important to perform functional test whenever it is designated.

FRONT CLUTCH

Disassembly



1 Piston
2 Coil spring
3 Front clutch drum
4 Dished plate
5 Driven plate
6 Retaining plate
7 Snap ring
8 Drive plate
9 Spring retainer
10 Snap ring

Fig. AT-52 Sectional View of Front Clutch

1. Pry off snap ring ⑦ with a suitable screwdriver or a pair of pliers. Remove a retaining plate ⑥, drive plate ⑧, driven plate ⑤ and dished plate ④ in the order listed, as shown in Fig. AT-52.

2. Compress clutch springs, using Clutch Spring Compressor ST25420001 (or ST25420000). Remove snap ring ⑩ from spring retainer, using Snap Ring Remover ST25320001.

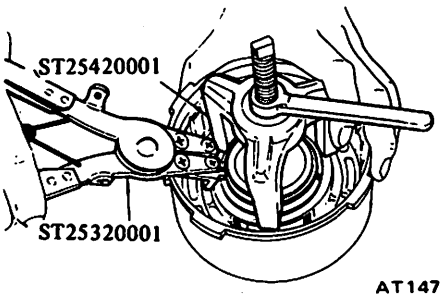


Fig. AT-53 Removing Snap Ring

Note: When Clutch Spring Compressor ST25420000 is to be used, cut the toe-tips of three legs by a grinding wheel.

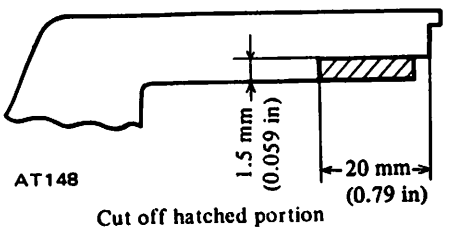


Fig. AT-54 Modifying Coil Spring Compressor

3. Take out spring retainer ⑨ and spring ②. See Fig. AT-52.

4. Blow out piston by directing a jet of air into hole in clutch drum.

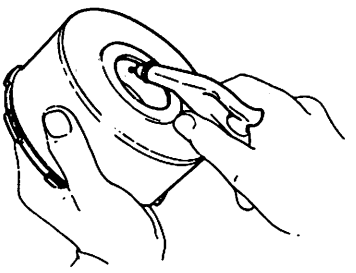


Fig. AT-55 Blowing Out Piston

Inspection

1. Check for signs of wear or damage to clutch drive plate facing. If found worn or damaged excessively, discard.

Drive plate thickness:
Standard
1.5 to 1.65 mm
(0.059 to 0.065 in)
Allowable limit
1.4 mm (0.055 in)

2. Check for wear on snap ring and for weakened or broken coil spring.
If necessary, replace with new ones.
Spring retainer should also be inspected for warpage.

Assembly

1. Assembly is in reverse the order of disassembly. Dip all parts in clean automatic transmission fluid before installing.

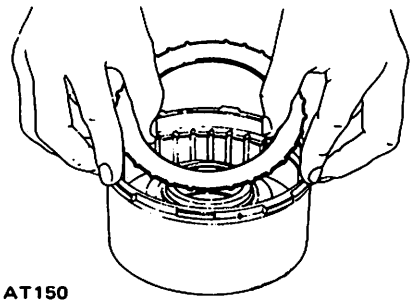


Fig. AT-56 Inserting Clutch Plate

2. After clutch is assembled, make sure that clearance between snap ring ① and retaining plate ② is held within specified limits. If necessary, try with other retaining plate having different thickness until correct clearance is obtained.

Specified clearance:
1.6 to 2.0 mm
(0.063 to 0.079 in)

Available retaining plate

Thickness mm (in)
10.6 (0.417)
10.8 (0.425)
11.0 (0.433)
11.2 (0.441)
11.4 (0.449)
11.6 (0.457)

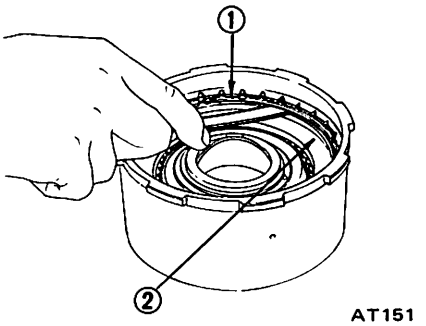


Fig. AT-57 Measuring Ring to Plate Clearance

3. Testing front clutch
With front clutch assembled on oil pump cover, direct a jet of air into hole in clutch drum for definite clutch operation.

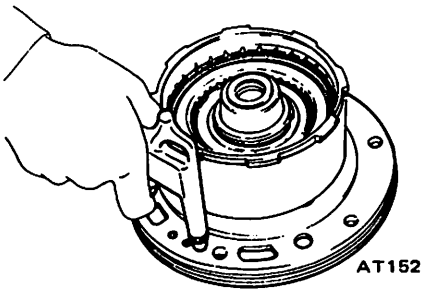
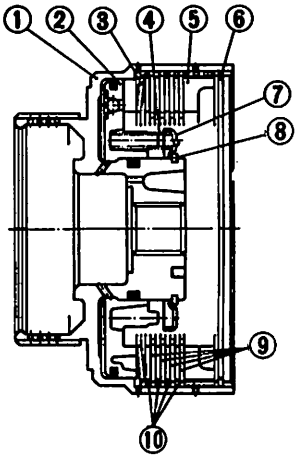


Fig. AT-58 Testing Front Clutch

REAR CLUTCH

Disassembly



1	Rear clutch drum	6	Snap ring
2	Piston	7	Spring retainer
3	Dished plate	8	Snap ring
4	Coil spring	9	Drive plate
5	Retaining plate	10	Driven plate

Fig. AT-59 Sectional View of Rear Clutch

1. Take out snap ring ⑥, retaining plate ⑤, drive plate ⑨, driven plate ⑩ and dished plate ③. Same technique can be applied as in disassembling front clutch.
2. Remove snap ring from coil spring retainer.

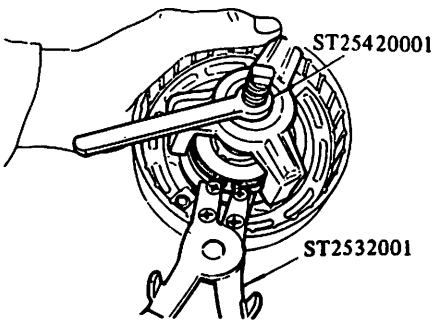


Fig. AT-60 Removing Snap Ring

3. Blow out piston by directing a jet of air into hole in clutch drum.

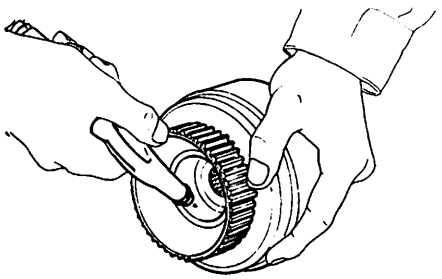


Fig. AT-61 Blowing out Piston

Inspection

Refer to page AT-32 for Inspection of Front Clutch.

Assembly

Assemble in reverse the order of disassembly. Dip all parts in clean automatic transmission fluid before assembling. Note that the number of drive and driven plates varies with type of vehicle. For details, refer to "Service Data & Specifications".

1. After rear clutch is assembled, check to be sure that clearance between snap ring ① and retaining plate ② is held within specified clearance.

Specified clearance:
0.8 to 1.6 mm
(0.031 to 0.063 in)

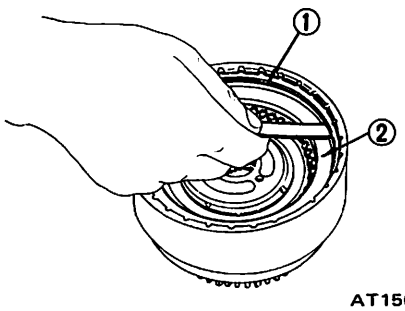


Fig. AT-62 Measuring Ring to Plate Clearance

2. Testing rear clutch

Install rear clutch on oil pump cover.

Blow compressed air into oil hole to test for definite clutch operation.

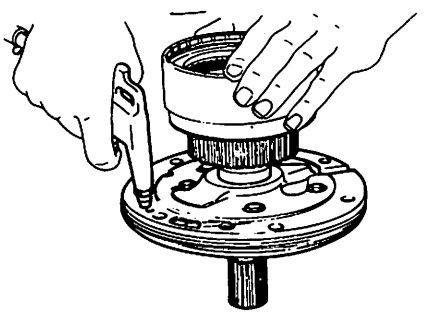


Fig. AT-63 Testing Rear Clutch

3. Without disturbing the above setting, check to be sure that clearance between snap ring and retaining plate is within specified limits. If necessary, use other plates of different thickness until correct clearance is obtained.

Specified clearance:
0.80 to 1.25 mm
(0.031 to 0.049 in)

4. Blow compressed air into oil hole in low & reverse brake to test for definite brake operation.

LOW & REVERSE BRAKE

Disassembly

1. Follow steps as described in page AT-27 for Transmission Disassembly.
2. Blow out piston by directing a jet of air into oil hole in clutch piston.

Inspection

1. Check drive plate facing for wear or damage; if necessary, replace.

Drive plate thickness:
Standard
1.9 to 2.05 mm
(0.075 to 0.081 in)
Allowable limit
1.8 mm (0.071 in)

2. Test piston return spring for weakness. Discard if weakened beyond use.
3. Replace defective parts with new ones.

Assembly

1. After low & reverse piston is installed, assemble thrust spring ring, return spring, thrust washer and one-way clutch inner race. Refer to Assembly in Transmission (Page AT-29) for tightening torque and special service tools.
2. Insert dished plate, driven plate, drive plate and retaining plate into transmission case in that order. Install snap ring to secure the installation.

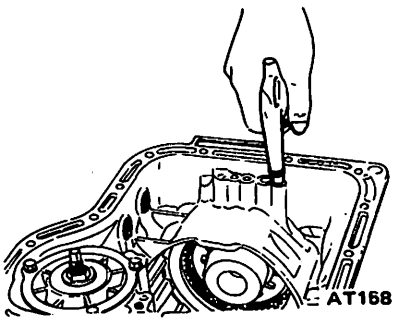


Fig. AT-64 Testing Low & Reverse Brake

SERVO PISTON

Disassembly

1. Blow out piston by directing a jet of air into hole in release-side of piston.
2. Remove servo piston return spring.

Inspection

Check piston for wear, damage or other defects which might interfere with proper brake operation.

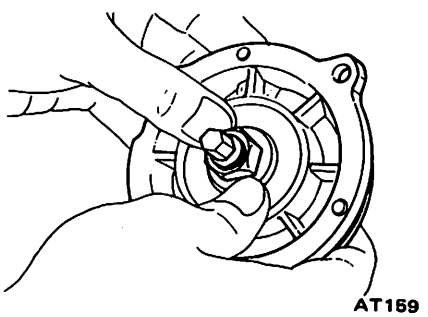
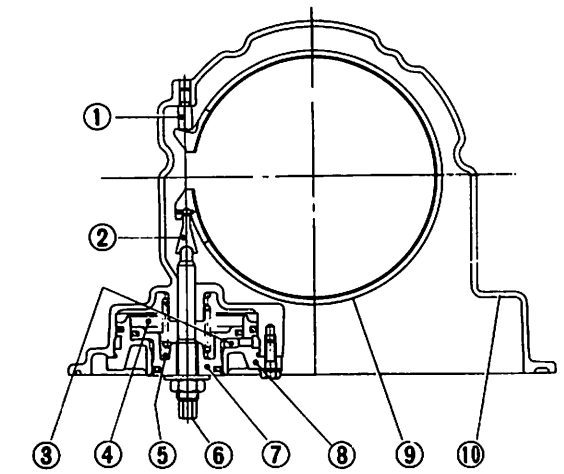


Fig. AT-65 Removing Piston



1 Anchor end pin
2 Band strut
3 Apply
4 Release
5 Return spring
6 Band servo piston stem
7 Band servo piston
8 Servo retainer
9 Brake band assembly
10 Transmission case

Fig. AT-66 Sectional View of Servo Piston

Assembly

1. Prior to assembly, dip all parts in clean automatic transmission fluid.

Reverse disassembly procedure to assemble brake.

2. Use extreme care to avoid damaging rubber ring when installing seal lace.
3. Blow compressed air from apply-side of piston to test for definite piston operation.

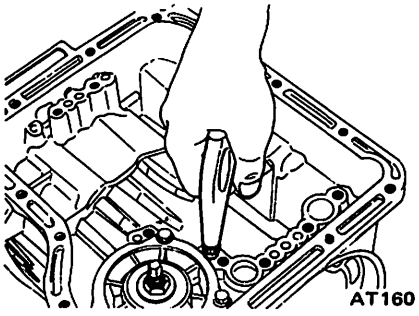


Fig. AT-67 Testing Piston (Apply Side)

4. With apply-side of piston plugged with thumb, blow compressed air into cylinder from release-side. If retainer is raised a little, it is an indication that attaching bolts are loose, calling for retightening.

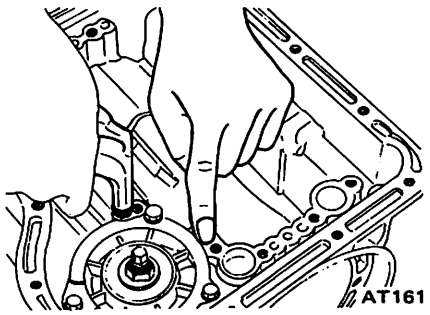
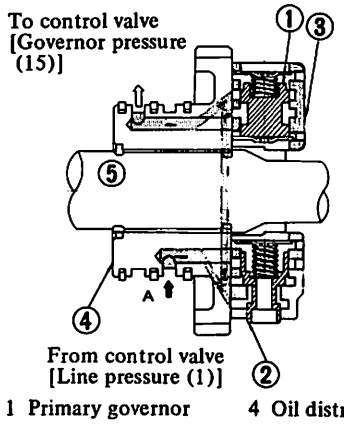


Fig. AT-68 Testing Piston (Release side)

GOVERNOR

Disassembly

1. Separate governor from oil distributor by unscrewing attaching bolts.
2. To disassemble secondary governor, remove spring seat, spring and secondary governor valve from valve body in that order.



1 Primary governor
2 Secondary governor
3 Governor valve body
4 Oil distributor
5 Output shaft

Fig. AT-69 Testing Secondary Governor

3. If primary governor is to be disassembled for any purpose, remove spring seat, primary governor valve, spring and spring seat.

Inspection

1. Check valve for defective condition. Replace spring if found weakened beyond use. Defective piston should also be replaced with a new one.
2. Examine to see if primary governor slides freely without binding.
3. To determine if secondary governor is in good condition, blow air under light pressure into hole at "A" and listen for noise like that of a model plane.

Assembly

Reverse disassembly procedure to assemble governor.

Note: Do not confuse springs. Secondary governor spring is stronger than primary governor spring. After installation, check that spring is not deflected.

OIL PUMP

Disassembly

1. Free pump cover from pump housing by removing attaching bolts.
2. Take out inner and outer gears from pump housing.

Note: Be careful not to confuse respective sides of inner and outer gears.

Inspection

1. Inspect for wear or damage to gear teeth. Replace rubber ring if found damaged beyond use.
2. Using a straight edge and feelers, measure pump and gear clearances as follows:

- Clearance between inner (or outer) gear and pump cover.

Standard clearance:
0.02 to 0.04 mm
(0.001 to 0.002 in)

[Replace if over 0.08 mm (0.0031 in).]

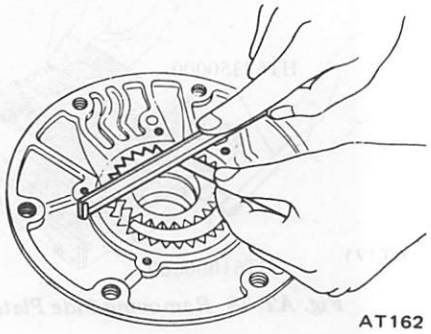


Fig. AT-70 Measuring Clearance

- Clearance between seal ring and ring groove.

Standard clearance:
0.04 to 0.16 mm
(0.002 to 0.006 in)

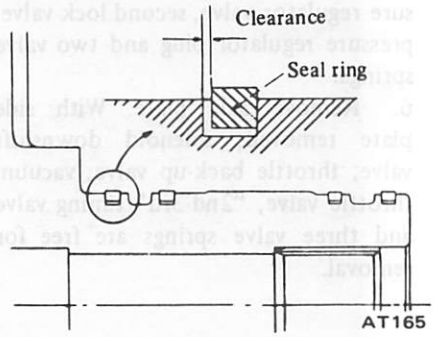


Fig. AT-71 Measuring Clearance

Assembly

1. Set up pump housing with inner and outer pump gears on it.
2. Using Oil Pump Assembling Gauge ST25580001, install pump cover to pump housing.

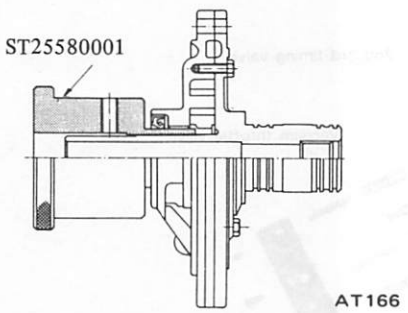


Fig. AT-72 Centering Oil Pump

3. **Temporarily tighten pump securing bolts.**
4. Set the runout of oil pump cover within specified total indicator reading.

Total indicator reading:
Less than 0.07 mm (0.0028 in)

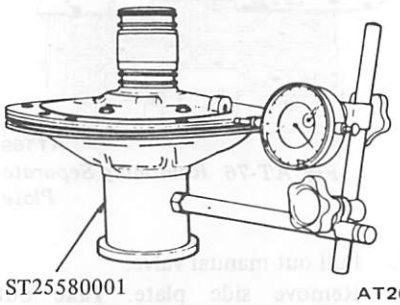


Fig. AT-73 Measuring Runout

5. Tighten pump securing bolts to specified torque.

Ⓣ Tightening torque:
Oil pump housing to oil pump cover
0.6 to 0.8 kg-m
(4.3 to 5.8 ft-lb)

Note: Be sure to align converter housing securing bolt holes.

6. Again, check the runout of oil pump cover.

Note: When former Oil Pump Assembling Gauge is to be used, make a screw hole in side of it.

PLANETARY CARRIER

The planetary carrier cannot be divided into its individual components.

If any part of component is defective, replace the carrier as a unit.

Inspection

Check clearance between pinion washer and planetary carrier with a feeler.

Standard clearance:
0.20 to 0.70 mm
(0.008 to 0.028 in)

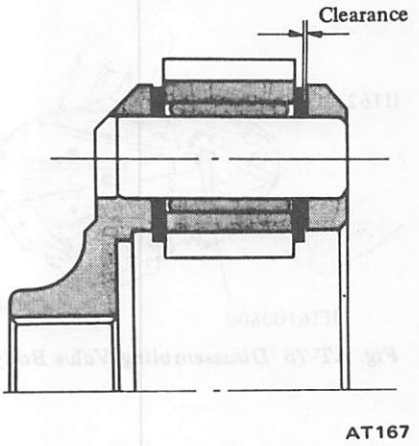


Fig. AT-74 Measuring Pinion Washer to Carrier Clearance

[Replace if over 0.80 mm (0.031 in).]

CONTROL VALVE

The control valve assembly consists of many precision parts and requires extreme care when it has to be removed and serviced. It is good practice to place parts in a part rack so that they can be reassembled in valve body in their proper positions. Added care should also be exercised to prevent springs and other small parts from being scattered and lost.

Before assembly, dip all parts in clean automatic transmission fluid and check to be certain that they are free of lint and other minute particles. If clutch or band is burnt or if oil becomes fouled, the control valve assembly should be disassembled and flushed.

Disassembly

1. Remove bolts and nuts which retain oil strainer. Bolts may be removed with a screwdriver, but it is recommended that Hexagon Wrench HT61000800 and Spinner Handle HT62350000 be used.

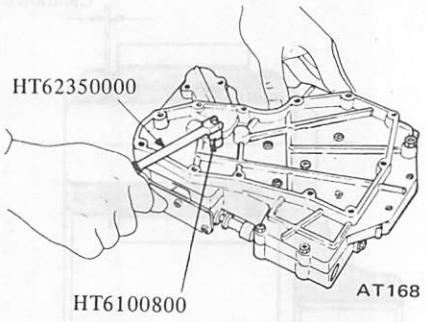


Fig. AT-75 Disassembling Valve Body

2. Remove attaching bolts. With bolts removed, lower valve body, separate plate, and upper valve body are free for removal.

CAUTION:
Do not allow orifice check valve and valve spring in lower valve body to be scattered and lost when removing separate plate.

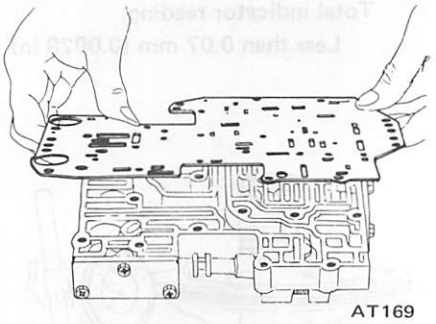


Fig. AT-76 Removing Separate Plate

3. Pull out manual valve.
4. Remove side plate. Take out "1st-2nd" shift valve, "2nd-3rd" shift valve, pressure modifier valve and three valve springs.

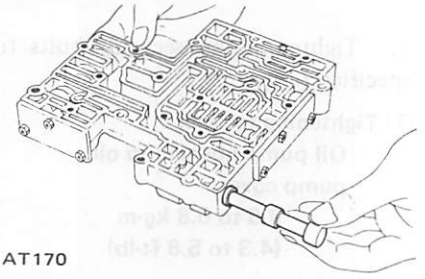


Fig. AT-77 Removing Manual Valve

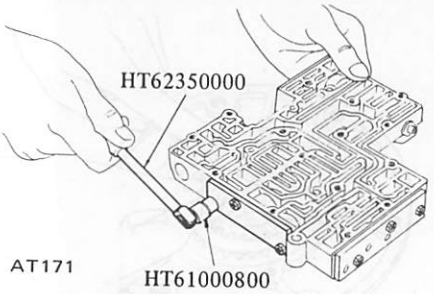


Fig. AT-78 Removing Side Plate

CAUTION:
Do not work it off with screwdrivers. To avoid damaging machine screws do not work it off with screwdriver.

5. Remove side plate; pull out pressure regulator valve, second lock valve, pressure regulator plug and two valve springs.
6. Remove side plate. With side plate removed, solenoid downshift valve; throttle back-up valve, vacuum throttle valve, "2nd-3rd" timing valve and three valve springs are free for removal.

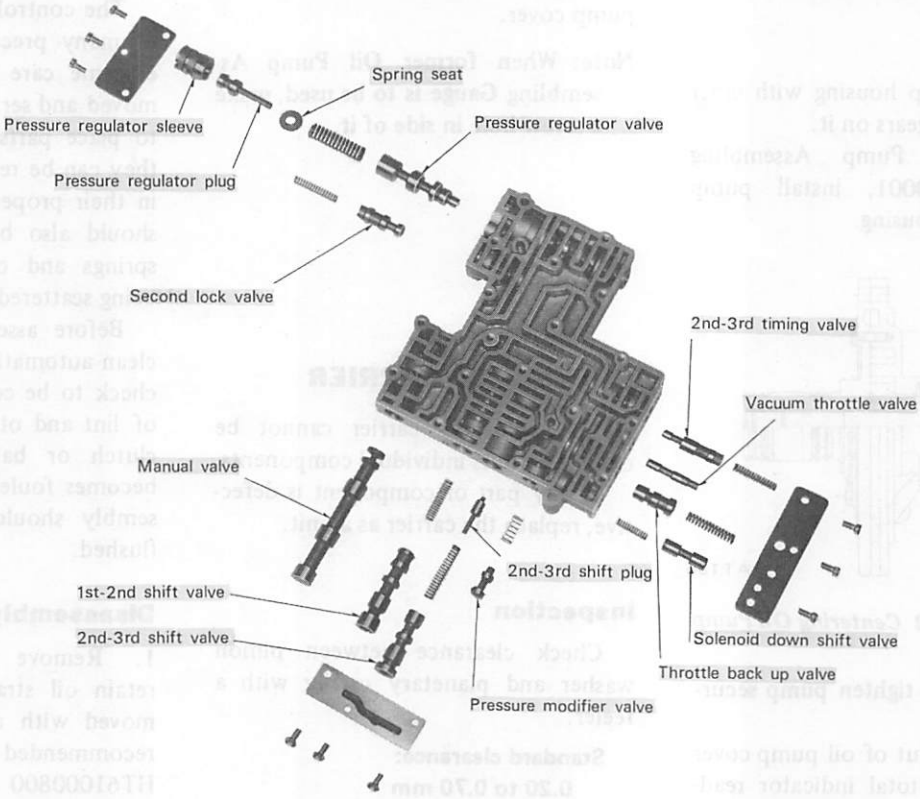


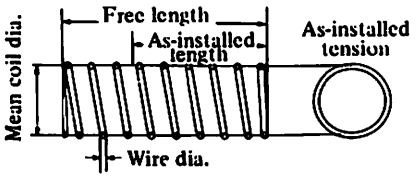
Fig. AT-79 Components Parts of Control Valve

Inspection

1. Check valves for sign of burning and, if necessary, replace.
2. Check to be certain that oil strainer is in good condition. If found damaged in any manner, discard.
3. Test valve springs for weakened tension; if necessary replace.
4. Examine for any sign of damage or score marks on separate plate. If left unheeded, oil will bypass correct oil passages causing many types of abnormalities in the system.
5. Check oil passages in valve body for sign of damage and other conditions which might interfere with proper valve operation.
6. Check bolts for stripped threads. Replace as required.

Valve spring chart

Valve spring	Wire dia. mm (in)	Mean coil dia. mm (in)	No. of active coil	Free length mm (in)	Installed	
					Length mm (in)	Load kg (lb)
Manual detent	1.3 (0.051)	6.0 (0.236)	15.0	32.4 (1.276)	26.5 (1.043)	5.5 (12.1)
Pressure regulator	1.2 (0.047)	10.5 (0.413)	13.0	43.0 (1.693)	23.5 (0.925)	2.8 (6.2)
Pressure modifier	0.4 (0.016)	8.0 (0.315)	5.0	18.5 (0.728)	9.0 (0.354)	0.1 (0.2)
1st - 2nd shift	0.6 (0.024)	6.0 (0.236)	16.0	32.0 (1.260)	16.0 (0.630)	0.625 (1.378)
2nd - 3rd shift	0.7 (0.028)	6.2 (0.244)	18.0	41.0 (1.614)	17.0 (0.669)	1.40 (3.09)
2nd - 3rd timing	0.7 (0.028)	5.5 (0.217)	15.0	32.5 (1.280)	27.0 (1.063)	0.55 (1.21)
Throttle back-up	0.8 (0.031)	6.5 (0.256)	14.0	36.0 (1.417)	18.8 (0.740)	1.92 (4.23)
Solenoid downshift	0.55 (0.0217)	5.0 (0.197)	12.0	22.0 (0.866)	12.5 (0.492)	0.60 (1.32)
Second lock	0.55 (0.0217)	5.0 (0.197)	16.0	33.5 (1.319)	21.0 (0.827)	0.60 (1.32)
Throttle relief	0.9 (0.035)	5.6 (0.220)	14.0	26.8 (1.055)	19.0 (0.748)	2.19 (4.83)
Orifice check	0.23 (0.0091)	4.77 (0.1878)	12.0	15.5 (0.610)	11.5 (0.453)	0.01 (0.02)
Primary governor	0.45 (0.0177)	8.3 (0.327)	5.0	21.8 (0.858)	7.5 (0.295)	0.215 (0.474)
Secondary governor	0.7 (0.028)	8.5 (0.335)	5.5	25.2 (0.992)	10.5 (0.413)	1.10 (2.43)



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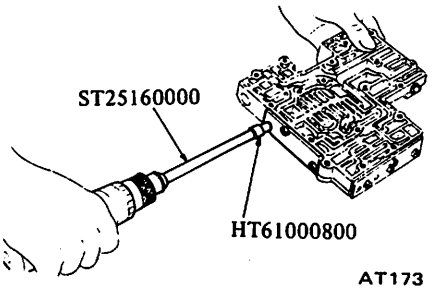
Fig. AT-80 Valve Spring

Assembly

Assemble in reverse order of disassembly. However, observe the following assembly notes. Refer to "Valve Spring Chart" and illustration in assembling valve springs. Dip all parts in clean automatic transmission fluid before assembly. Tighten parts to specifications when designated.

1. Slide valve into valve body and be particularly careful that they are not forced in any way.
2. Install side plates using Torque Driver · ST25160000 and Hexagon Wrench HT61000800.

Ⓣ Tightening torque:
0.25 to 0.35 kg-m
(1.8 to 2.5 ft-lb)



AT173

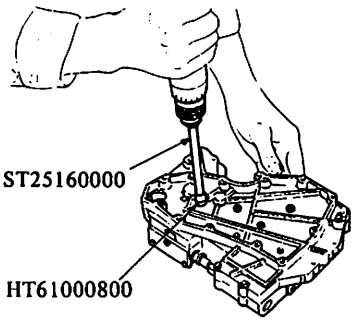
Fig. AT-81 Installing Side Plate

3. Install orifice check valve, valve spring, throttle relief valve spring and steel ball in valve body.

CAUTION:
Install check valve and relief spring so that they are properly positioned in valve body. See Figure AT-83.

4. Install upper and lower valve bodies.

Ⓣ Tightening torque:
Reamer bolt
0.5 to 0.7 kg-m
(3.6 to 5.1 ft-lb)
Other bolts
0.25 to 0.35 kg-m
(1.8 to 2.5 ft-lb)

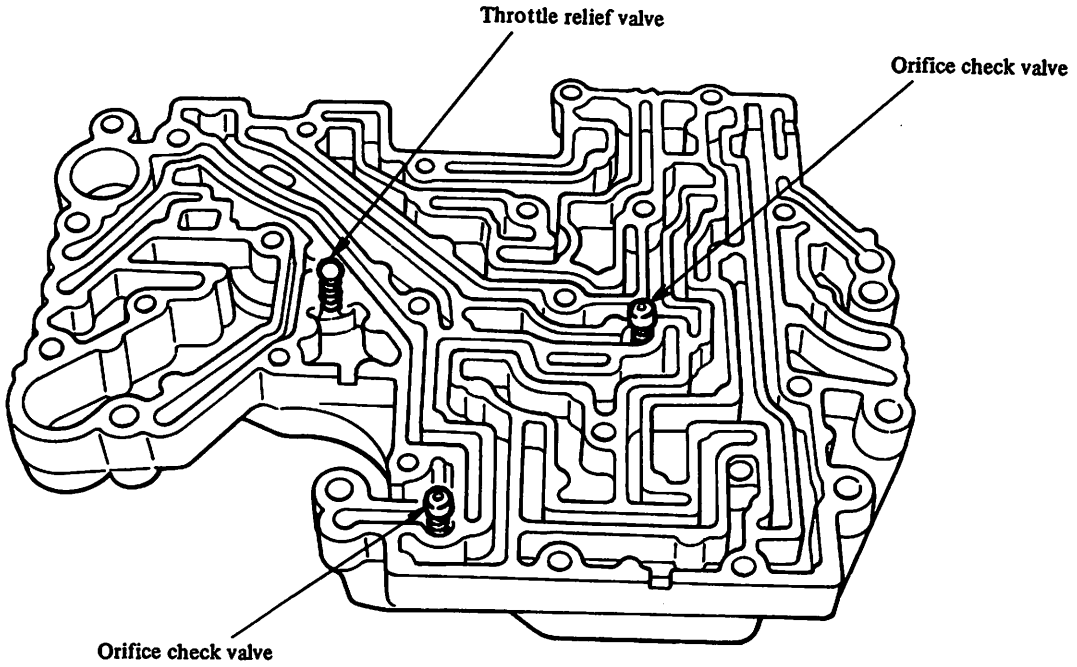


AT174

Fig. AT-82 Installing Valve Body

5. Install oil strainer.

Ⓣ Tightening torque:
0.3 to 0.4 kg-m
(2.2 to 2.9 ft-lb)



AT339

Fig. AT-83 Position of Check Valve and Spring

TROUBLE DIAGNOSIS AND ADJUSTMENT

Since most automatic transmission troubles can be repaired by simple adjustment, do not disassemble immediately.

Firstly inspect and adjust the automatic transmission in place utilizing the "Trouble Shooting Chart".

If the trouble can not be solved by this procedure, remove and disassemble the automatic transmission. It is advisable to check, overhaul and repair each part in the order listed in the "Trouble Shooting Chart".

1. In the "Trouble Shooting Chart" the diagnosis items are arranged according to difficulty from easy to difficult, therefore please follow these items. The transmission should not be removed, unless necessary.
2. Tests and adjustments should be made on the basis of standard values and the data should be recorded.

INSPECTION AND ADJUSTMENT BEFORE TROUBLE DIAGNOSIS

TESTING INSTRUMENT FOR INSPECTION

1. Engine tachometer
2. Vacuum gauge
3. Oil pressure gauge

It is convenient to install these instruments in a way that allows measurements to be made from the driver's seat.

CHECKING OIL LEVEL

In checking the automatic transmission the oil level and the condition of oil around the oil level gauge should be examined every 5,000 km (3,000 miles). This is an easy and effective trouble shooting procedure since some changes in oil condition are often linked with developed troubles.

For instance:

Lack of oil causes defective operation by making the clutches and brakes slip, resulting in severe wear.

This is because the oil pump sucks air causing oil foaming, thus rapidly deteriorating the oil quality and producing sludge and varnish.

Excessive oil is also bad because of oil foaming caused by the gears stirring up the oil. During high speed driving excessive oil in the transmission often blows out from the breather.

Measuring oil level

To check the fluid level, start the engine and run it until normal operating temperatures [oil temperature: 50 to 80°C (122 to 176°F). Approximately ten-minute of operation will raise the temperature to this range.] and engine idling conditions are stabilized. Then, apply the brakes and move the transmission shift lever through all drive positions and place it in park "P" position. In this inspection, the car must be placed on a level surface.

The amount of the oil varies with the temperature. As a rule the oil level must be measured after its temperature becomes sufficiently high.

1. Fill the oil to the line "H". The difference of capacities between both "H" and "L" is approximately 0.4 liter (⅞ U.S.pt., ¾ Imp.pt.) and, therefore, do not fill beyond the line "H".
2. When topping-up and changing oil, care should be taken to prevent mixing the oil with dust and water.

Inspecting oil condition

The condition of oil sticking to the level gauge indicates whether to overhaul and repair the transmission or look for the defective part.

If the oil has deteriorated to a varnish-like quality, it causes the control valve to stick. Blackened oil indicates a burned clutch, brake band, etc. In these cases, the transmission must be repaired.

CAUTION:

a. In checking oil level, use special paper cloth to handle the level gauge and be careful not to let the scraps of paper and cloth stick to the gauge.

b. Use automatic transmission fluid having "DEXRON" identifications only in the 3N71B automatic transmission.

c. Pay attention because the oil to be used differs from that used in the Nissan Full Automatic Transmission 3N71A. Never mix the oils.

Note: Insert the gauge fully and take it out quickly before splashing oil adheres to the gauge. Then observe the level.

INSPECTION AND REPAIR OF OIL LEAKAGE

When oil leakage takes place, the portion near the leakage is covered with oil, presenting difficulty in detecting the spot. Therefore, the places where oil seals and gaskets are equipped are enumerated below:

1. Converter housing
- Rubber ring of oil pump housing.
- Oil seal of oil pump housing.
- Oil seal of engine crankshaft.
- Bolts of converter housing to case.

2. Transmission and rear extension
- Junction of transmission and rear extension.
- Oil cooler tube connectors.
- Oil pan.
- Oil-pressure inspection holes (See Fig. AT-87).
- Mounting portion of vacuum diaphragm and downshift solenoid.
- Breather and oil charging pipe.
- Speedometer pinion sleeve.
- Oil seal of rear extension.

To exactly locate the place of oil leakage, proceed as follows:

• Place the vehicle in a pit, and by sampling the leaked oil, determine if it is the torque converter oil. The torque converter oil has a color like red wine, so it is easily distinguished from engine oil or gear oil.

• Wipe off the leaking oil and dust and detect the spot of oil leakage. Use nonflammable organic solvent such as carbon tetrachloride for wiping.

• Raise the oil temperature by operating the engine and shift the lever to "D" to increase the oil pressure. The spot of oil leakage will then be found more easily.

Note: As oil leakage from the breather does not take place except when running at high speed, it is impossible to locate this leakage with vehicle stationary.

CHECKING ENGINE IDLING REVOLUTION

The engine idling revolution should be properly adjusted.

If the engine revolution is too low, the engine does not operate smoothly, and if too high, a strong shock or creep develops when changing over from "N" to "D" or "R".

CHECKING AND ADJUSTING KICKDOWN SWITCH AND DOWNSHIFT SOLENOID

When the kickdown operation is not made properly or the speed changing point is too high, check the kickdown switch, downshift solenoid, and wiring between them. When the ignition key is positioned at the 1st stage and the accelerator pedal is depressed deeply, the switch contact should be closed and the solenoid should click. If it does not click, it indicates a defect. Then check each part with the testing instruments.

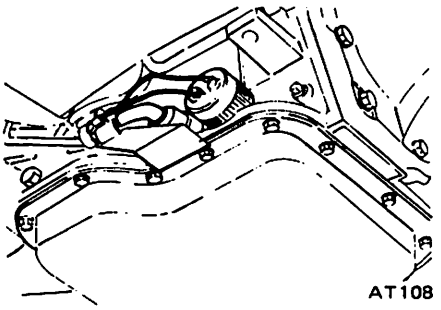


Fig. AT-84 Downshift Solenoid

Note: Watch for oil leakage from transmission case.

INSPECTION AND ADJUSTMENT OF MANUAL LINKAGE

The adjustment of manual linkage is equally important as "Inspection of Oil Level" for the automatic transmission. Therefore, great care should be exercised because incorrect adjustment will result in the breakdown of the transmission.

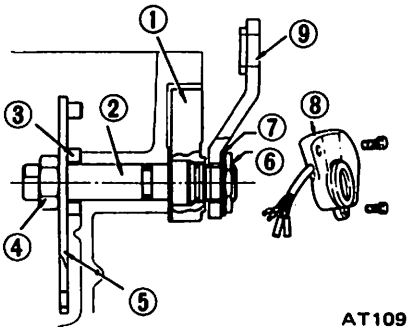
Inspection

Pull the selector lever toward you and turn it as far as "P" to "1" range, where clicks will be felt by the hand. This is the detent of manual valve in the valve body, and indicates the correct position of the lever.

Inspect whether the pointer of selector dial corresponds to this point, and also whether the lever comes in alignment with the stepping of position plate when it is released.

CHECKING AND ADJUSTING INHIBITOR SWITCH

The inhibitor switch lights the reverse lamp in the range "R" of the transmission operation and also rotates the starter motor in the ranges "N" and "P".



1 Inhibitor switch
2 Manual shaft
3 Washer
4 Nut
5 Manual plate
6 Nut
7 Washer
8 Inhibitor switch
9 Range select lever

Fig. AT-85 Construction of Inhibitor Switch

Check whether the reverse lamp and the starter motor operate normally in these ranges. If there is any trouble, first check the linkage. If no defect is found in the linkage, check the inhibitor switch.

Separate the manual lever from the remote control selector rod and turn the range select lever to "N".

Note: In the position "N" the slot of the manual shaft is vertical.

Using the tester, check the two black-yellow (BY) wires from the inhibitor switch in the ranges "N" and "P" and the two red-black (RB) wires in the range "R" for continuity. Turn range select lever in both directions from each lever set position and check each continuity range. It is normal if the electricity is on while the lever is within an angle of about 3° on both sides from each lever set line. However, if its continuity range is obviously unequal on both sides, adjustment is required.

If any malfunction is found, unscrew the fastening nut of the range selector lever and two fastening bolts of the switch body and then remove the machine screw under the switch body. Adjust the manual shaft correctly to the position "N" by means of the selector lever. (When the slot of the shaft becomes vertical, the detent works to position the shaft correctly with a clicking sound.)

Move the switch slightly aside so that the screw hole will be aligned

with the pin hole of the internal rotor combined with the manual shaft and check their alignment by inserting a 1.5 mm (0.059 in) diameter pin into the holes. If the alignment is correct, fasten the switch body with the bolts, pull out the pin, tighten up the screw in the hole, and fasten the selector lever as before. Check the continuity again with the tester. If the malfunction still remains, replace the inhibitor switch.

STALL TEST

The purpose of this test is to check the transmission and engine for trouble by measuring the maximum numbers of revolutions of the engine while vehicle is held in a stalled condition. The carburetor is in full throttle operation with the selector lever in ranges "D", "2" and "1" respectively. Compare the measured results with the standard values.

Components to be tested and test items

1. Clutches, brake and band in transmission for slipping
2. Torque converter for proper functioning
3. Engine for overall properly

STALL TEST PROCEDURES

Before testing, check the engine oil and torque converter oil; warm up the engine cooling water to suitable temperature by running at 1,200 rpm with the selector lever in the range "P" for several minutes. Warm up the torque converter oil to suitable temperature [60 to 100°C (140 to 212°F)].

1. Mount the engine tachometer at a location that allows good visibility from the driver's seat and put a mark on specified revolutions on the meter.
2. Secure the front and rear wheels with chocks and apply the hand brake. Be sure to depress the brake pedal firmly with the left foot before depressing the accelerator pedal.
3. Throw the selector lever into the range "D".
4. Slowly depress the accelerator pedal until the throttle valve is fully opened. Quickly read and record the engine revolution when the engine begins to rotate steadily and then release the accelerator pedal.
5. Shift the selector lever to "N" and operate the engine at approximately 1,200 rpm for more than one minute to cool down the torque converter oil and coolant.
6. Make similar stall tests in ranges "2", "1" and "R".

CAUTION:
The stall test operation as specified in item (4) should be made within five seconds. If it takes too long, the oil deteriorates and the clutches, brake and band are adversely affected. Sufficient cooling time should be given between each test for the four ranges "D", "2", "1" and "R".

JUDGEMENT

1. High stall revolution more than standard revolution

If the engine revolution in stall condition is higher than the standard values, it indicates that one or more clutches in the transmission are slipping and, therefore, no further test is required.

For the following abnormalities, the respective causes are presumed.

- High rpm in all ranges . . . Low line pressure
- High rpm in "D", "2" and "1" and normal rpm in "R" . . . Rear clutch slipping
- High rpm in "D" and "2" and normal rpm in "1" . . . One-way clutch slipping
- High rpm in "R" only . . . Front clutch or low and reverse brake slipping

To determine which is slipping, front clutch or low and reverse brake, a road test is needed.

If, while coasting, after starting with the lever in "1" range, engine braking does not work properly, the low and reverse brake is slipping. Otherwise, the front clutch is slipping.

Slipping of the band brake is difficult to ascertain. However, if it occurs with the lever in "2" range, engine revolution increases up to the same level as in "1st" range. It is impossible to check it in the stall test.

2. Standard stall revolution

If the engine revolution in stall condition is within the standard values, the control elements are normally operating in the ranges "D", "2", "1" and "R".

Also, the engine and one-way clutch of the torque converter are normal in performance and operation.

The one-way clutch of the torque converter, however, sometimes sticks. This is determined in the road test.

3. Lower stall revolution than standard revolution

If the engine revolution in stall condition is lower than the standard values, it indicates that the engine is in abnormal condition or the torque converter's one-way clutch is slipping.

4. Others

(1) If the accelerating performance is poor until vehicle speed of approximately 50 km/h (30 MPH) is attained and then normal beyond that speed, it can be judged that the torque converter's one-way clutch is slipping.
(2) If the torque converter's one-way clutch sticks, vehicle speed can not exceed approximately 80 km/h (50 MPH) in the road test. In such a case, the torque converter oil temperature rises abnormally and so special care is required.
(3) If the transmission does not operate properly at all vehicle speeds, it indicates poor engine performance.

ROAD TEST

An accurate knowledge of the automatic transmission is required for an exact diagnosis.

It is recommended that a diagnosis guide chart with the standard vehicle speeds for each stage of the up- and down-shiftings be prepared. Measured vehicle speeds are to be filled in the adjoining column after each testing.

Also it is advisable to mount a stopper for positioning the throttle opening.

CAR SPEED AND LINE PRESSURE WHEN SHIFTING GEARS

Intake manifold vacuum –mmHg (–inHg)	Gear shift	Car speed ** km/h (MPH)	Propeller shaft rpm	Line pressure kg/cm² (psi)
0 (0) (Kickdown)	$D_1 \rightarrow D_2$	54 to 60 (34 to 37)	1,970 to 2,220	5.4 to 7.0 (77 to 100)
	$D_2 \rightarrow D_3$	95 to 102 (59 to 63)	3,480 to 3,730	
	$D_3 \rightarrow D_2$	86 to 93 (53 to 58)	3,160 to 3,410	
	$D_2 \rightarrow D_1$	40 to 47 (25 to 29)	1,470 to 1,720	
100 (3.94)	$D_1 \rightarrow D_2$	20 to 27 (12 to 17)	750 to 1,000	4.5 to 6.1 (64 to 87)
	$D_1 \rightarrow D_3$	60 to 67 (37 to 42)	2,210 to 2,460	
	$D_3 \rightarrow D_2$	37 to 44 (23 to 27)	1,350 to 1,600	
	$D_2 \rightarrow D_1$	9.5 to 16 (6 to 10)	350 to 600	
0 (0) (Full throttle)	$1_2 \rightarrow 1_1$*	41 to 44 (25 to 27)	1,500 to 1,750	5.6 to 7.2 (80 to 102)
300 (11.81)	$1_2 \rightarrow 1_1$*	41 to 44 (25 to 27)	1,500 to 1,750	5.6 to 7.2 (80 to 102)

*: Reduce the speed by shifting to "1" range from "D" range (output shaft 2,000 rpm).

**: Car speed can be calculated by the following formula:

$$V = \frac{2 \times \pi \times r \times N_P \times 60}{R_F \times 1{,}000}$$

where, V = Car speed (km/h)
N_P = Propeller shaft revolution (rpm)
R_F = Final gear ratio
r = Tire effective radius (m)
π = The ratio of circumference of a circle to its diameter: 3.14

Note: R_F = 3.700
r = 0.267 m [175/70SR13]

CHECKING SPEED CHANGING CONDITION

The driver's feeling during gear changes should also be checked attentively.

1. A sharp shock or unsmoothness is felt during a gear change.

This indicates that the throttle pressure is too high or some valve connected to the throttle is faulty.

2. A gear change is made with a long and dragging feeling.

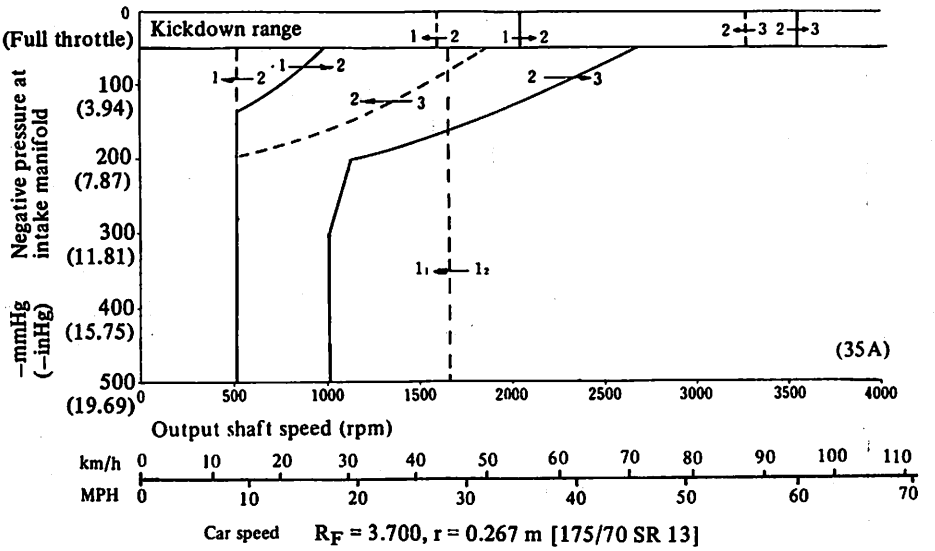
This indicates that the throttle pressure is too low or some valve connected to the throttle is faulty.

CHECKING ITEMS DURING SPEED CHANGE

1. In "D" range, gear changes, $D_1 \rightarrow D_2 \rightarrow D_3$ are effected. In "R" range, the speed does not increase.
2. The kickdown operates properly.
3. By moving the lever from "D" to "1", gear changes $D_3 \rightarrow 2(1_2) \rightarrow 1_1$ are effected. In the ranges "1_2" and "1_1", the engine braking works properly.
4. In "1", the speed does not increase.
5. Should be quickly fixed at "2" range.
6. In "P", vehicle can be parked properly.

If any malfunction occurs in second gear during the road test, that is, if vehicle shakes, drags or slings while shifting up from "D_1", directly to "D_3" or in shifting up from "D_1" to "D_2", the brake band should be adjusted. If these troubles remain after the brake band is adjusted, check the servo piston seal for oil leakage.

SHIFT SCHEDULE



AT110

Fig. AT-86 Shift Schedule

LINE PRESSURE TEST

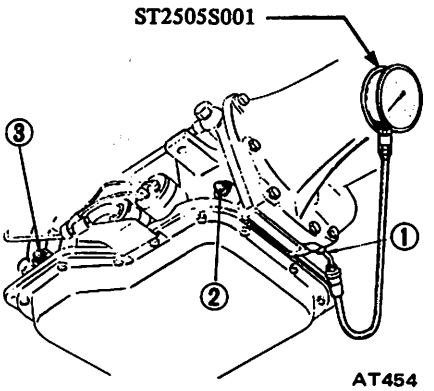
When any slipping occurs in clutch or brake, or the feeling during a speed change is not correct, the line pressure must be checked.

Measuring line pressure is done by a pressure gauge attached to pressure measuring holes after removing blind plugs located at transmission case.

The line pressure measurement is begun at idling and taken step by step by enlarging the throttle opening.

For line pressure data when shifting gears, refer to "Road Test".

1. A sharp shock in up-shifting or too high changing speeds are caused mostly by too high throttle pressure.
2. Slipping or incapability of operation is mostly due to oil pressure leakage within the gear trains or spool valve.



1 Line pressure
2 Governor pressure
3 Servo release pressure

Fig. AT-87 Measuring Line Pressure

LINE PRESSURE (GOVERNOR FEED PRESSURE)

At idling

Range	Line pressure kg/cm² (psi)
R	4.2 to 5.6 (60 to 80)
D	3.2 to 3.8 (46 to 54)
2	6.0 to 11.7 (85 to 166)
1	3.2 to 3.8 (46 to 54)

At stall test

Range	Line pressure kg/cm² (psi)
R	14.3 to 16.2 (203 to 230)
D	9.9 to 11.1 (141 to 158)
2	10.2 to 11.7 (145 to 166)
1	9.9 to 11.1 (141 to 158)

JUDGEMENT IN MEASURING LINE PRESSURE

1. Low idling line pressure in the ranges "D", "2", "1", "R" and "P".

This can be attributed to trouble in the pressure supply system or too low output of power caused by:

(1) A worn oil pump
(2) An oil pressure leak in the oil pump, valve body or case
(3) A sticking regulator valve

2. Low idling, line pressure in certain ranges only

This is presumably caused by an oil leak in the devices or circuits connected to the relevant ranges.

(1) When there is an oil leak in the rear clutch and governor, the line pressure in "D", "2" and "1" are low but the pressure is normal in "R".
(2) When an oil leak occurs in the low and reverse brake circuit, the line pressure in "R" and "P" are low but the pressure is normal in "D", "2" and "1".

3. High idling line pressure

This is presumably caused by an increased vacuum throttle pressure owing to a leak in the vacuum tube or diaphragm or by an increased line pressure due to a sticking regulator valve.

Vacuum leakage is checked by directly measuring the negative pressure after removing the vacuum pipe.

A puncture of the vacuum diaphragm can be easily ascertained because the torque converter oil is absorbed into the engine and the exhaust pipe emits white smoke.

4. Items to be checked when the line pressure is increasing

In this check, the line pressure should be measured with vacuums of 300 mmHg (11.81 inHg) and 0 mmHg (0 inHg) in accordance with the stall test procedure.

(1) If the line pressure does not increase despite the vacuum decrease, check whether the vacuum rod is incorporated.
(2) If the line pressure does not meet the standard, it is caused mostly by a sticking pressure regulating valve, pressure regulating valve plug, or amplifier.

TROUBLE-SHOOTING CHART

INSPECTING ITEMS

1. Inspection with automatic transmission on vehicle.

A Oil level
B Range select linkage
C Inhibitor switch and wiring
D Vacuum diaphragm and piping
E Downshift solenoid, kickdown switch and wiring
F Engine idling rpm
G Oil pressure (throttle)
H Engine stall rpm
I Rear lubrication
J Control valve (manual)
K Governor valve
L Band servo
M Transmission air check
N Oil quality
O Ignition switch and starter motor
P Engine adjustment and brake inspection

2. Inspection after inspecting automatic transmission on vehicle.

m Rear clutch
n Front clutch
q Band brake
r Low and reverse brake
s Oil pump
t Leakage of oil passage
u One-way clutch of troque converter
v One-way clutch of transmission
w Front clutch check ball
x Parking linkage
y Planetary gear

TROUBLE-SHOOTING CHART FOR 3N71B AUTOMATIC TRANSMISSION

(The number shown below indicates the sequence in which the checks should be taken up.)

Trouble	A B C D	E F G H	I J K L	M N O P	m n q r	s t u v	w x y
Engine does not start in "N", "P" ranges.	. 2 3 .	. . . .	. . . .	. . 1 .	. . . .	. . . .	. . .
Engine starts in other range than "N" and "P".	. 1 2 .	. . . .	. . . .	. . . .	. . . .	. . . .	. . .
Sharp shock in shifting from "N" to "D" range.	. . . 2	. 1 3 .	. 4 . .	. . . .	⑤. . .	. . . .	. . .
Vehicle will not run in "D" range (but runs in "2", "1" and "R" ranges).	. 1 . .	. . 2 .	. 3 . .	. . . .	. . . .	. . . ④	. . .
Vehicle will not run in "D", "1", "2" ranges (but runs in "R" range). Clutch slips. Very poor acceleration.	1 2 . .	. . 4 .	. 5 . .	6 3 . 7	⑧. . .	. ⑨. .	. . .
Vehicle will not run in "R" range (but runs in "D", "2" and "1" ranges.) Clutch slips. Very poor acceleration.	1 2 . .	. . 3 .	. 5 . .	6 4 . .	⑨⑧. ⑦	. ⑩. .	⑪. .
Vehicle will not run in any range.	1 2 . .	. . 3 .	. 5 . .	6 4 . .	. . . .	⑦⑧. .	. ⑨.
Clutches or brakes slip somewhat in starting.	1 2 . 6	. . 3 .	. 5 . .	7 4 . .	. . . .	⑧⑨. .	. . .
Vehicle runs in "N" range.	. 1 . .	. . . .	. 3 . .	. 2 . .	④. . .	. . . .	
Maximum speed not attained. Acceleration poor.	1 2 . .	. . 4 5	. 7 . 6	. 3 . 8	⑪⑫⑨⑩	⑬. . .	. . .
Vehicle braked when shifting into "R" range.	. . . .	. . . .	. . . 3	2 1 . .	④. ⑤.	. . . .	. ⑥.
Excessive creep.	. . . .	. 1 . .	. . . .	. . . .	. . . .	. . . .	. . .
No creep at all.	1 2 . .	. 3 . .	. 5 . .	. 4 . .	⑧⑨. .	⑥⑦. .	. . .
Failure to change gear from "2nd" to "3rd".	. 1 . 2	3 . . .	. 5 6 8	7 4 . .	. . ⑨.	. ⑩. .	. . .
Failure to change gear from "1st" to "2nd",	. 1 . 2	3 . . .	. 5 6 8	7 4 . .	. ⑨. .	. ⑩. .	⑬. .
Too high a gear change point from "1st" to "2nd", from "2nd" to "3rd".	. . . 1	2 . 3 .	. 5 6 .	. 4 . .	. . . .	. ⑦. .	. . .
Gear change directly from "1st" to "3rd" occurs.	. . . .	. . . .	. 2 4 .	3 1 . .	. . ⑤.	. ⑥. .	. . .

Trouble	A B C D	E F G H	I J K L	M N O P	m n q r	s t u v	w x y
Too sharp a shock in change from "1st" to "2nd".	. . . 1	. . . 2	. 4 . 5	. 3 . .	. . ⑥ .	. . . .	. . .
Too sharp a shock in change from "2nd" to "3rd".	. . . 1	2 . 3 .	. 3 . 5	4 . . .	. ⑥ . .	. . . .	. . .
Almost no shock or clutches slipping in change from "1st" to "2nd".	1 2 . 3	. . 4 .	. 6 . 8	7 5 . .	. . ⑨ .	. ⑩ . .	. . .
Almost no shock or slipping in change from "2nd" to "3rd". Engine races extremely.	1 2 . 3	. . 4 .	. 6 . 8	7 5 . :	. ⑨ . .	. ⑩ . .	⑪ . .
Vehicle braked by gear change from "1st" to "2nd".	. . . .	. . . .	. 2 . .	. 1 . .	. ④ . ③	. . . ⑤	. . .
Vehicle braked by gear change from "2nd" to "3rd".	. . . .	. . . .	. 3 . 2	. 1 . .	. . ④ .	. . . .	. . .
Failure to change gear from "3rd" to "2nd".	. . . 1	. . . .	. 3 4 6	5 2 . .	. ⑦⑧ .	. ⑨ . .	. . .
Failure to change gear from "2nd" to "1st" or from "3rd" to "1st".	. . . 1	. . . .	. 3 4 6	5 2 . .	. . ⑦ .	. . . ⑧	. . .
Gear change shock felt during deceleration by releasing accelerator pedal.	. 1 . 2	3 . 4 .	. 5 6 .	. . . .	. . . .	. ⑦ . .	. . .
Too high a change point from "3rd" to "2nd", from "2nd" to "1st".	. 1 . 2	3 . 4 .	. 5 6 .	. . . .	. . . .	. ⑦ . .	. . .
Kickdown does not operate when depressing pedal in "3rd" within kickdown vehicle speed.	. . . 2	1 . . .	. 4 5 .	. 3 . .	. . ⑥ .	. ⑦ . .	. . .
Kickdown operates or engine over-runs when depressing pedal in "3rd" beyond kickdown vehicle speed limit.	. 1 . 2	. . 3 .	. 5 6 .	7 4 . .	. ⑧ . .	. ⑨ . .	. . .
Races extremely or slips in changing from "3rd" to "2nd" when depressing pedal.	. . . 1	. . 2 .	. 4 . 6	5 3 . .	. ⑦⑧ .	. ⑨ . .	⑩ . .
Failure to change from "3rd" to "2nd" when changing lever into "2" range.	. 1 . .	. . 2 .	. 4 . 5	. 3 . .	. . ⑥ .	. ⑦ . .	. . .
Gear change from "2nd" to "1st" or from "2nd" to "3rd" in "2" range.	. 1 . .	. . 2 .	. 3 . .	. . . .	. . . .	. . . .	. . .

Trouble	A B C D	E F G H	I J K L	M N O P	m n q r	s t u v	w x y
No shock at change from "1" to "2" range or engine races extremely.	1 2 . 3	. 4 . 1	. 6 . .	7 5 . .	. . ⑨ .	⑩ . . .	. . .
Failure to change from "3rd" to "2nd" when shifting lever into "1" range.	. 1 . .	. . 2 .	. 4 5 7	6 3 . .	. ⑧⑨ .	. ⑩ . .	. . .
Engine brake does not operate in "1" range.	. 1 . .	. . 2 .	. 4 . .	5 3 . .	. . . ⑥	. ⑦ . .	. . .
Gear change from "1st" to "2nd" or from "2nd" to "3rd" in "1" range.	. 1 . .	. . . .	. 2 . .	. . . .	. . . .	. ③ . .	. . .
Does not change from "2nd" to "1st" in "1" range.	1 2 . .	. . . .	. 4 5 6	7 3 . .	. . . ⑧	. ⑨ . .	. . .
Large shock changing from "2nd" to "1st" in "1" range.	. . . 1	. . . 2	. 4 . .	. 3 . .	. . . ⑤	. . . .	. . .
Vehicle moves when changing into "P" range or parking gear does not disengage when shifted out of "P" range.	. 1 . .	. . . .	. . . .	. . . .	. . . .	. . . .	. ② .
Transmission overheats.	1 . . .	. . 3 4	2 6 . 8	7 5 . .	. ⑨⑩⑪	⑫⑬⑭ .	. . ⑮
Oil shoots out during operation. White smoke emitted from exhaust pipe during operation.	1 . . 3	. . 5 6	2 7 . .	8 4 . .	. ⑨⑩⑪	⑫⑬⑭ .	. . ⑮
Offensive smell at oil charging pipe.	1 . . .	. . . .	. . . .	. 2 . .	③④⑤⑥	⑦⑧⑨ .	. . ⑩
Transmission noise in "P" and "N" ranges.	1 . . .	. . 2 .	. . . .	. . . .	. . . .	③ . . .	. . .
Transmission noise in "D", "2", "1" and "R" ranges.	1 . . .	. . 2 .	. . . .	. . . .	③ . . .	④ . . ⑤	. . ⑥

TROUBLE-SHOOTING GUIDE FOR 3N71B AUTOMATIC TRANSMISSION

Order	Test item	Procedure
Checking	1. Oil level gauge	Check gauge for oil level and leakage before and after each test.
	2. Downshift solenoid	Check for sound of operating solenoid when depressing accelerator pedal fully with ignition key "ON".
	3. Manual linkage	Check by shifting into "P", "R", "N", "D", "2" and "1" ranges with selector lever.
	4. Inhibitor switch	Check whether starter operates in "N" and "P" ranges only and whether reverse lamp operates in "R" range only.
	5. Engine idling rpm.	Check whether idling rpm meet standard.
	6. Vacuum pressure of vacuum pipe.	Check whether vacuum pressure is more than 450 mmHg (17.72 inHg) in idling and whether it decreases with increasing rpm.
	7. Operation in each range.	Check whether transmission engages positively by shifting "N"→"D", "N"→"2", "N"→"1" and "N"→"R" range while idling with brake applied.
	8. Creep of vehicle.	Check whether there is any creep in "D", "2", "1" and "R" ranges.
Stall test	1. Oil pressure before testing.	Measure line pressures in "D", "2", "1" and "R" range while idling.
	2. Stall test.	Measure engine rpm and line pressure in "D", "2", "1" and "R" ranges during full throttle operation. **Note: Temperature of torque converter oil used in test should be from 60° to 100°C (140° to 212°F) i.e., sufficiently warmed up but not overheated.** **CAUTION:** **To cool oil between each stall test for "D", "2", "1" and "R" ranges, idle engine, i.e., rpm at about 1,200 rpm for more than 1 minute in "P" range. Measurement time must not be more than 5 seconds.**
	3. Oil pressure after testing	Same as item 1.
Road test	1. Slow acceleration, 1st→2nd 2nd→3rd	Check vehicle speeds and engine rpm in shifting up 1st → 2nd range and 2nd → 3rd range while running with lever in "D" range and engine vacuum pressure of about 200 mmHg (7.87 inHg).
	2. Quick acceleration, 1st→2nd 2nd→3rd	Same as item 1 above except with engine vacuum pressure of 0 mmHg (0 inHg) (i.e., in position just before kickdown.).
	3. Kick-down operation, 3rd→2nd or 2nd→1st	Check whether the kickdown operates and measure the time delays while running at 30, 40, 50, 60, 70 km/h (19, 25, 31, 37, 43 MPH) in "D_3" range.

Order	Test item	Procedure
	4. Shift down, $D_3 \rightarrow D_2 \rightarrow D_1$	Check vehicle speeds and engine rpm in shifting down from 3rd → 2nd → 1st (sequentially) while coasting with accelerater pedal released in "D_3" range and engine vacuum pressure of about 450 mmHg (17.72 inHg).
	5. Shift down, $D_3 \rightarrow 1_2 \rightarrow 1_1$	Check for shifting down $D_3 \rightarrow 1_2$ and engine braking, and further for shifting down $1_2 \rightarrow 1_1$ and engine braking, after shifting the lever into "1" range with the accelerator pedal released and the engine vacuum pressure of 0 mmHg (0 inHg) while driving at about 50 km/h (30 MPH) in "D_3" range.
	6. Shift down, $D_3 \rightarrow 2$	Check for quick shifting down $D_3 \rightarrow 2$ and engine braking, after shifting the lever into "2" range while driving at about 50 km/h (30 MPH) in "D_3" range. Further, check for locking of the transmission in 2nd gear ratio regardless of vehicle speed.
	7. Shift up, $1_1 \rightarrow 1_2$	Check for failure of the transmission to shift up during acceleration, when starting in "1" range.
	8. Shift up or down when starting in "2" range.	Check the transmission for not shifting up or down during acceleration or deceleration, when starting in "2" range.
	9. Parking.	Confirm that vehicle will not move on grade when shifting to "P" range.
Others	Abnormal shock, oil leakage.	Enter into record conditions observed during these tests such as gear noise, abnormal clutch noise and acceleration performance.

SERVICE DATA AND SPECIFICATIONS

General specifications

Automatic transmission model	3N71B
Stall torque ratio	2.0 : 1
Transmission gear ratio	
1st	2.458
2nd	1.458
Top	1.000
Reverse	2.182
Oil	Automatic transmission fluid "Dexron" type
Oil capacity	5.5 liters (5⅞ US qt, 4⅞ Imp qt) Approximately 2.7 liters (2⅞ US qt, 2⅜ Imp qt) in torque converter

Specifications and adjustment

Automatic transmission assembly		
Model code number		X2461
Torque converter assembly		
Stamped mark on the T/C		16-B
Front clutch		
Number of drive plates		3
Number of driven plates		3
Clearance	mm (in)	1.6 to 2.0 (0.063 to 0.079)
Thickness of retaining plate	mm (in)	10.6 (0.417) 10.8 (0.425) 11.0 (0.433) 11.2 (0.441) 11.4 (0.449) 11.6 (0.457)
Rear clutch		
Number of drive plates		4
Number of driven plates		4
Clearance	mm (in)	0.8 to 1.6 (0.031 to 0.063)
Thickness of retaining plate	mm (in)	4.8 (0.189)

Low & reverse brake

Number of drive plates		4
Number of driven plates		4
Clearance	mm (in)	0.80 to 1.25 (0.031 to 0.049)
Thickness of retaining plate	mm (in)	11.8 (0.465) 12.0 (0.472) 12.2 (0.480) 12.4 (0.488) 12.6 (0.496) 12.8 (0.504)

Brake band

Piston size	mm (in)	
Big dia.		60 (2.36)
Small dia.		40 (1.57)

Control valve assembly

Stamped mark on strainer	LEK

Governor assembly

Stamped mark on governor body	35

Stall revolution rpm ..... 1,900 to 2,200

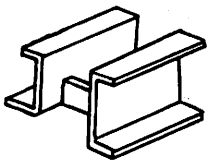
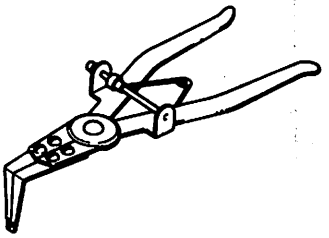
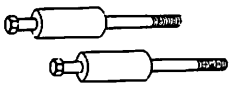
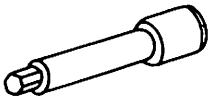
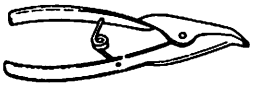
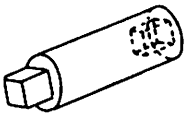
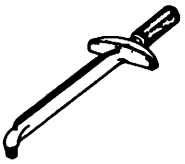
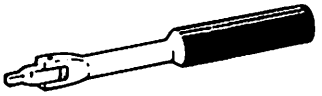
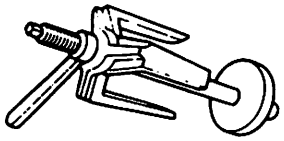
Tightening torque kg-m(ft-lb)

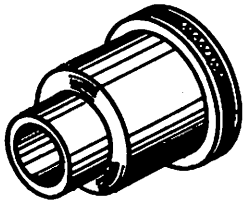
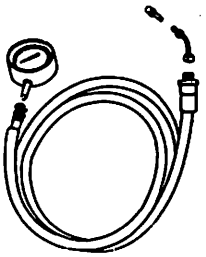
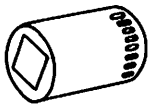
Drive plate to crankshaft	14.0 to 16.0	(101 to 116)
Drive plate to torque converter	4.0 to 5.0	(29 to 36)
Converter housing to engine	4.0 to 5.0	(29 to 36)
Transmission case to converter housing	4.5 to 5.5	(33 to 40)
Transmission case to rear extension	2.0 to 2.5	(14 to 18)
Oil pan to transmission case	0.5 to 0.7	(3.6 to 5.1)
Servo piston retainer to transmission case	0.5 to 0.7	(3.6 to 5.1)
Piston stem (when adjusting band brake)	*1.2 to 1.5	(9 to 11)
Piston stem lock nut	1.5 to 4.0	(11 to 29)
One-way clutch inner race to transmission case	1.3 to 1.8	(9 to 13)
Control valve body to transmission case	0.55 to 0.75	(4.0 to 5.4)
Lower valve body to upper valve body	0.25 to 0.35	(1.8 to 2.5)
Side plate to control valve body	0.25 to 0.35	(1.8 to 2.5)
Nut for control valve reamer bolt	0.5 to 0.7	(3.6 to 5.1)

Oil strainer to lower valve body	0.3 to 0.4	(2.2 to 2.9)
Governor valve body to oil distributor	0.5 to 0.7	(3.6 to 5.1)
Oil pump housing to oil pump cover	0.6 to 0.8	(4.3 to 5.8)
Inhibitor switch to transmission case	0.5 to 0.7	(3.6 to 5.1)
Manual shaft lock nut	3.0 to 4.0	(22 to 29)
Oil cooler pipe to transmission case	3.0 to 5.0	(22 to 36)
Test plug (oil pressure inspection hole)	1.4 to 2.1	(10 to 15)
Support actuator (parking rod inserting position) to rear extension	0.8 to 1.1	(5.8 to 8.0)

* Turn back two turns after tightening.

SPECIAL SERVICE TOOLS

Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.
ST07870000 (ST07860000) Transmission case stand 	J 25607 Fig. AT-26	ST25320001 Snap ring remover 	J 25710 Fig. AT-53 Fig. AT-60
ST25850000 Sliding hammer 	J 25721 Fig. AT-30	ST25570001 (ST25570000) Hex-head extension 	J 25718 Fig. AT-38 Fig. AT-43
HT69860000 Snap ring remover 	—— Fig. AT-33	ST25490000 (ST25512001) Socket extension 	J25713 Fig. AT-43
GG93010000 Torque wrench 	J 25703 Fig. AT-43	HT62350000 Spinner handle 	—— Fig. AT-75 Fig. AT-78
ST25420001 (ST25420000) Clutch spring compressor 	J 26063 Fig. AT-53 Fig. AT-60	ST25160000 Torque driver 	—— Fig. AT-81 Fig. AT-82

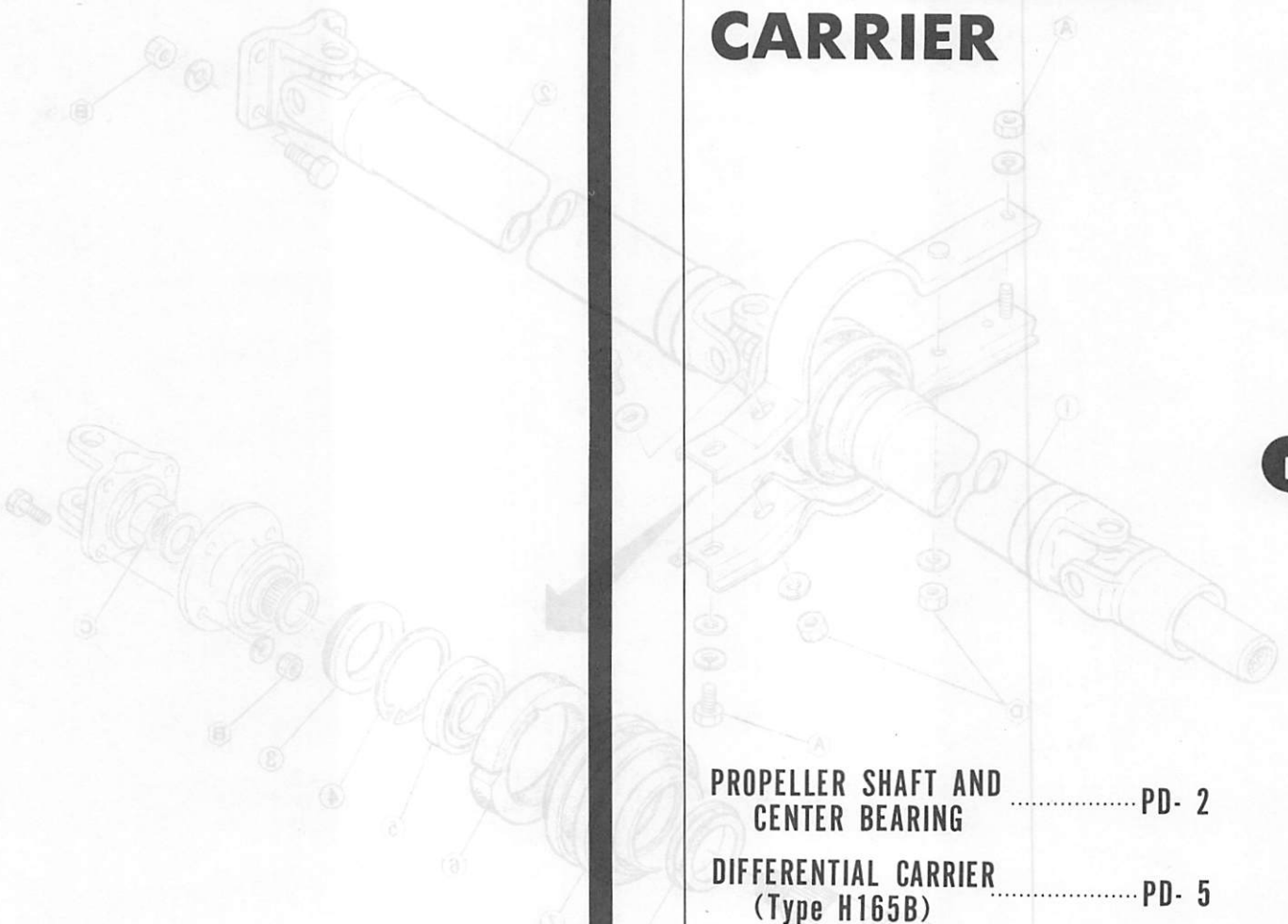
Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.
ST25580001 Oil pump assembling gauge 	J 25719 Fig. AT-72 Fig. AT-73	ST2505S001 Oil pressure gauge set 	J 25695 Fig. AT-87
HT61000800 Hexagon wrench 	Fig. AT-75 Fig. AT-78 Fig. AT-81 Fig. AT-82		

SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION PD

PROPELLER SHAFT & DIFFERENTIAL CARRIER



PD

PROPELLER SHAFT AND CENTER BEARING ..... PD- 2

DIFFERENTIAL CARRIER (Type H165B) ..... PD- 5

SERVICE DATA AND SPECIFICATIONS PD-14

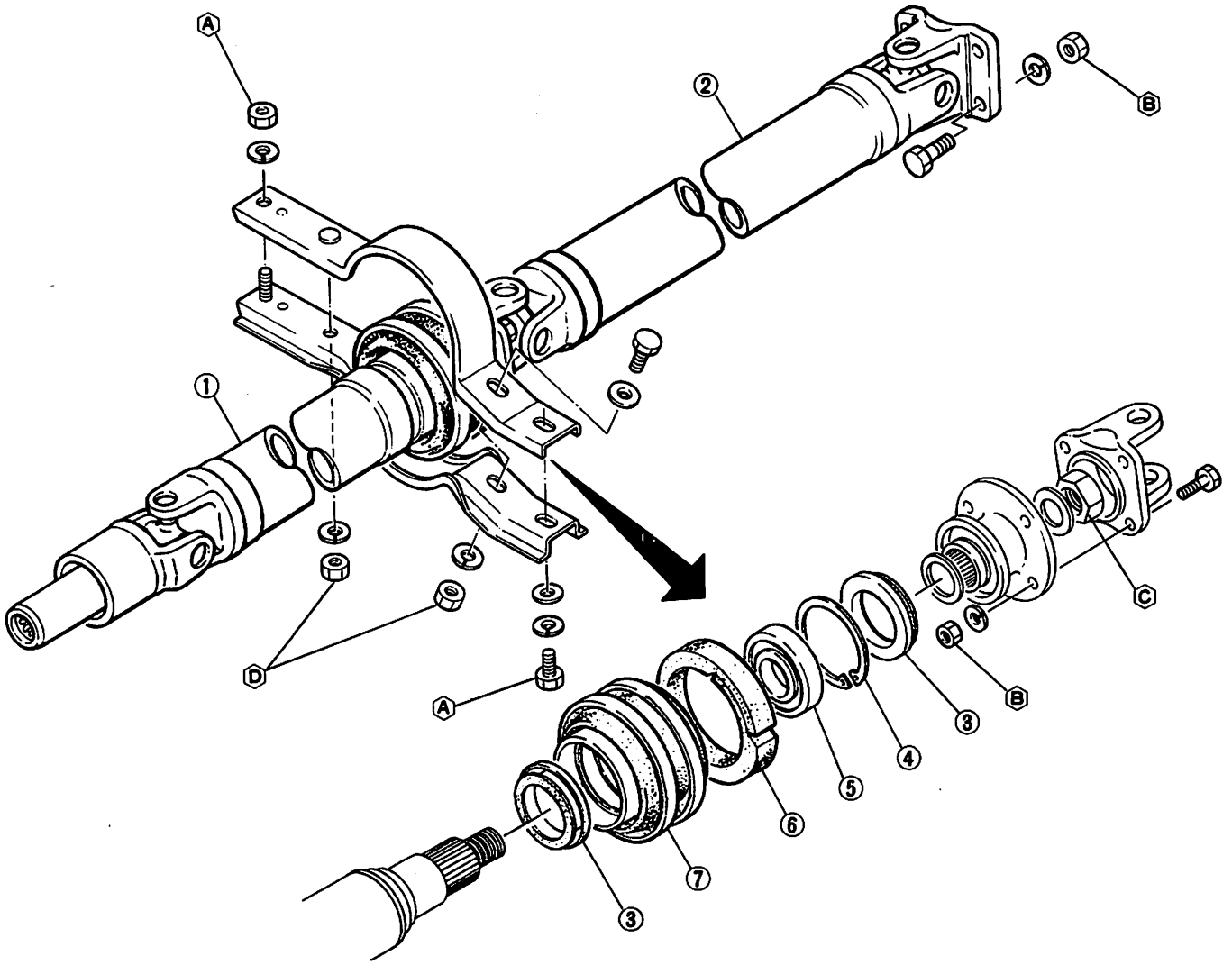
TROUBLE DIAGNOSES AND CORRECTIONS PD-17

SPECIAL SERVICE TOOLS PD-20

PROPELLER SHAFT AND CENTER BEARING

CONTENTS

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CENTER BEARING PD-3
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PROPELLER SHAFT VIBRATION PD-4

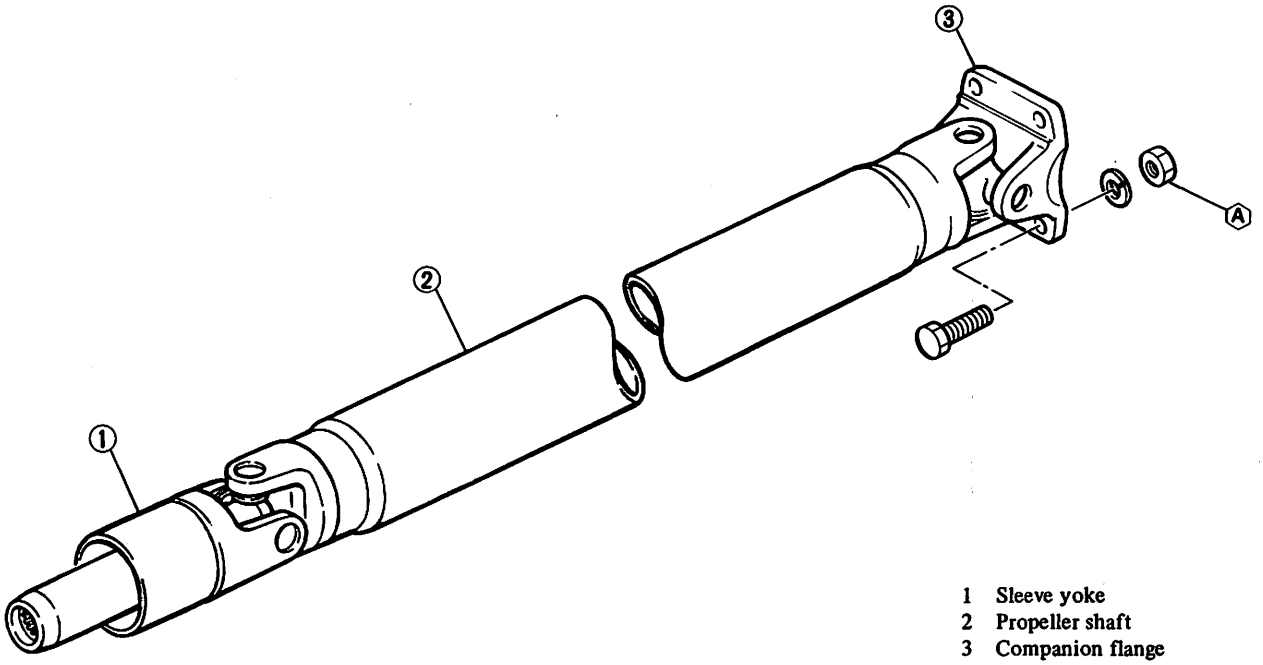


1 Front propeller shaft
2 Rear propeller shaft
3 Dust seal
4 Snap ring
5 Ball bearing
6 Cushion
7 Center bearing insulator

Tightening torque kg-m (ft-lb)
Ⓐ : 3.2 to 4.0 (23 to 29)
Ⓑ : 2.4 to 3.3 (17 to 24)
Ⓒ : 20.0 to 24.0 (145 to 174)
Ⓓ : 1.9 to 2.6 (14 to 19)

PD426

Fig. PD-1 3-joint type propeller shaft for manual transmission



1 Sleeve yoke
2 Propeller shaft
3 Companion flange

Tightening torque kg-m (ft-lb)
Ⓐ : 2.4 to 3.3 (17 to 24)

PD427

Fig. PD-2 2-joint type propeller shaft for automatic transmission

DESCRIPTION

On cars equipped with manual transmission, the propeller shaft is a 3-joint type. And on cars equipped with automatic transmission, the propeller shaft is a 2-joint type. The propeller shaft and universal joint is carefully balanced in original assembly, so that the dynamic unbalance is below 35 gr-cm (0.49 in-oz) at 5,800 rpm. Therefore when the car is to be undercoated, cover the propeller shaft and universal joints to prevent application of the undercoating material.

The 3-joint shaft utilizes a center bearing complete with a rubber insulator to keep noise and vibration to a minimum.

The universal joint is a nondisassembly type. If it appears demaged, replace it with the propeller shaft assembly.

REMOVAL

1. Raise rear axle and support it with safety stands.
2. On 3-joint type, remove assistant seat and nut securing center bearing support to floor panel.
3. Put match marks both on propeller shaft and companion flange so that the original balance will be restored at assembly.
4. Remove upper and lower converter shelters on 3-joint California models.
5. Remove bolts connecting shaft to companion flange, and then remove bolt retaining center bearing support on 3-joint type.
6. Draw out propeller shaft sleeve yoke from transmission by moving shaft rearward, passing it under rear axle.

   Plug up rear end of rear extension housing to prevent oil leakage.

Note: Remove propeller shaft carefully so as not to damage the spline, sleeve yoke and rear oil seal.

7. Remove center bearing heat insulator.

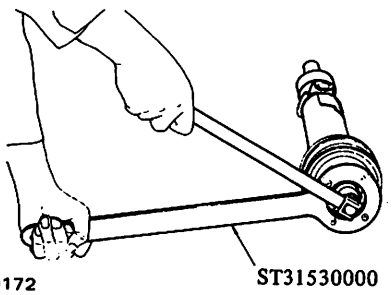
DISASSEMBLY

Note: Journal cannot be disassembled.

CENTER BEARING

When disassembling and repairing center bearing are required, the following procedures are applied:

1. Put match marks on flange and front propeller shaft. Remove bolts connecting flange yoke to companion flange.
2. Release caulking on locking nut.
3. Applying Drive Pinion Flange Wrench ST31530000, loosen off locking nut and remove center bearing.



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Fig. PD-3 Removing lock nut

INSPECTION

1. Check journal for axial play. If play exists, replace propeller shaft assembly.

Note: **Journal cannot be disassembled.**

2. Check the propeller shaft tube surface for dents or cracks. Replace with an assembly.
3. Check center bearing by rotating bearing race. Discard if it is rough, noisy or damaged. Cracked bearing insulator cannot be tolerated here. Replace with service kit if necessary.

ASSEMBLY

CENTER BEARING

Center bearing assembling procedures are as follows:
1. Install center bearing in center bearing insulator.
2. Install center bearing assembly and companion flange on front shaft using reference marks put in disassembly procedure.
3. Install washer and lock nut on front shaft and tighten nut using Drive Pinion Flange Wrench ST31530000 to specified torque.

Tightening torque:
20 to 24 kg-m
(145 to 174 ft-lb)

4. Using punch, collapse the upper part of lock nut into the groove of shaft.
5. Join companion flange of front shaft with flange yoke of rear shaft and tighten connecting bolts to specified torque.

Tightening torque:
2.4 to 3.3 kg-m
(17 to 24 ft-lb)

6. Install cushion rubber, bearing bracket and bearing support. When installing, note position of cushion connection and bracket.

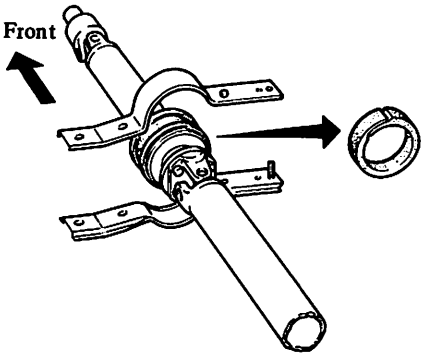


Fig. PD-4 Center bearing

Tighten nut to 1.9 to 2.6 kg-m (14 to 19 ft-lb).
7. Install heat insulator on center bearing support.

INSTALLATION

To install, reverse the foregoing removal procedure.
1. Install center bearing assembly with joint portion.

Tighten bolt to 3.2 to 4.0 kg-m (23 to 29 ft-lb) on California model.

CAUTION:
Align propeller shaft with companion flange using reference marks prescribed in "Removal" procedure and tighten them with bolts.

Tightening torque:
2.4 to 3.3 kg-m
(17 to 24 ft-lb)

PROPELLER SHAFT VIBRATION

To check and correct an unbalanced propeller shaft, proceed as follows:
1. Remove undercoating and other foreign material which could upset shaft balance, and check shaft vibration by road test.
2. If shaft vibration is noted during road test, disconnect propeller shaft at differential carrier companion flange, rotate companion flange 180 degrees and reinstall propeller shaft.
3. Again check shaft vibration. If vibration still persists, replace propeller shaft assembly.

DIFFERENTIAL CARRIER (Type H165B)

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DESCRIPTION

The differential gear carrier assembly has a hypoid type drive pinion and ring gear set with two gear ratios.

The drive pinion is mounted in two tapered roller bearings which are preloaded by collapsible spacer.

The drive pinion is positioned by a washer located between a shoulder of the drive pinion and the rear bearing.

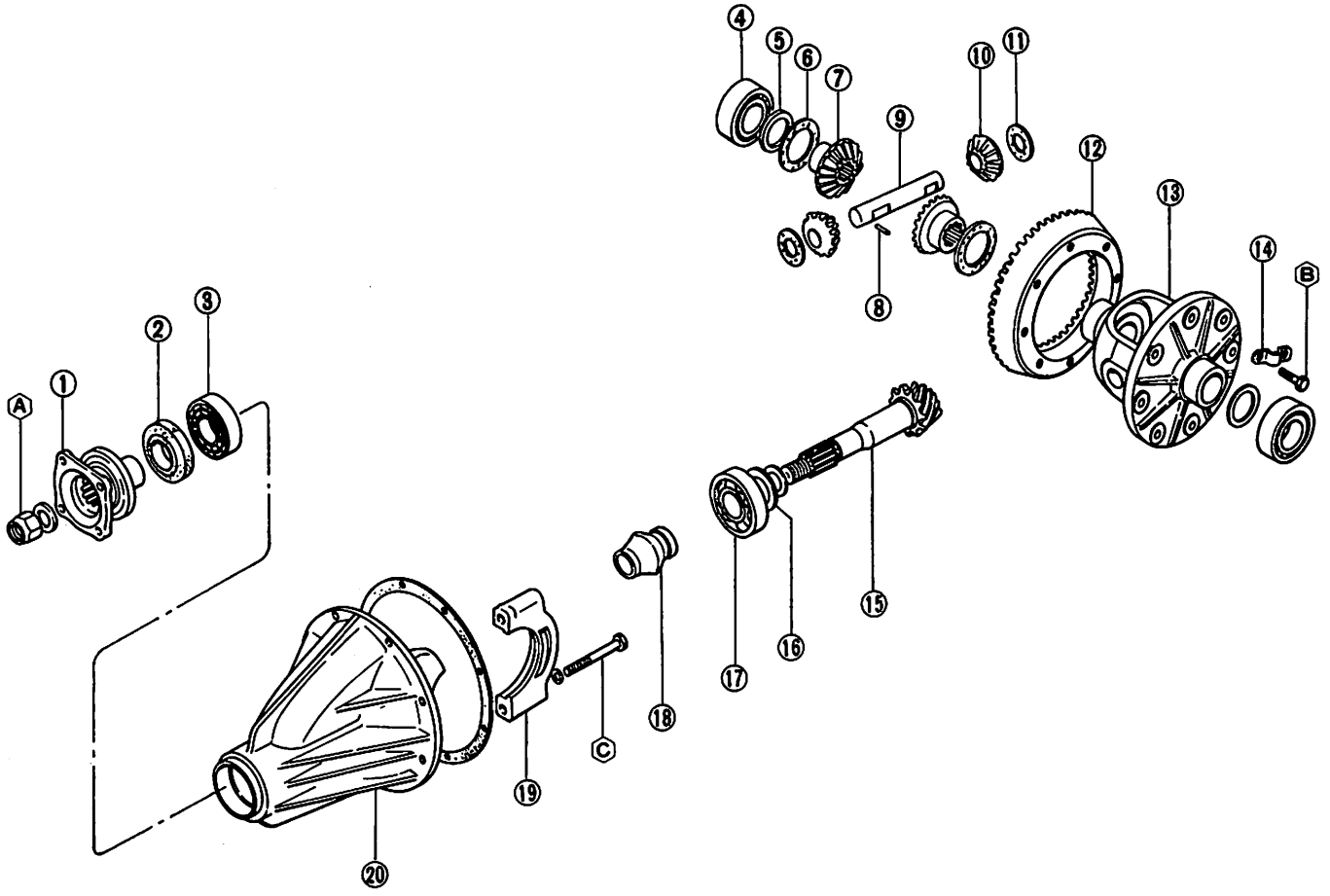
The differential case is supported in the carrier by two tapered roller side bearings. These are preloaded by inserting shims between the bearings and the differential case. The differential case assembly is positioned for proper ring gear-to-drive pinion backlash by varying these shims. The ring gear is bolted to the differential case. The case houses two side gears in mesh with two pinions mounted on a pinion shaft. The pinion shaft anchored in the case by lock pin. The pinions and side gears are backed by thrust washers.

The carrier is of malleable cast iron.

The oil should be inspected and changed at intervals referring to Section GI.

CAUTION:
Replacement of front oil seal with differential carrier assembly installed on the car must not be allowed due to used collapsible spacer on its model.

Applied model	Gear ratio
Model with manual transmission	3.889 (35/9)
Model with automatic transmission	3.700 (37/10)



1 Companion flange
2 Oil seal
3 Pinion front bearing
4 Side bearing
5 Side bearing adjusting shim
6 Thrust washer
7 Side gear
8 Lock pin
9 Pinion mate shaft
10 Pinion
11 Thrust washer
12 Ring gear
13 Differential gear case
14 Lock strap
15 Drive pinion
16 Pinion height adjusting washer
17 Pinion rear bearing
18 Collapsible spacer
19 Side bearing cap
20 Differential housing

Tightening torque kg-m (ft-lb)
Ⓐ : 14.0 to 30.0 (101 to 217)
Ⓑ : 7.0 to 8.0 (51 to 58)
Ⓒ : 5.0 to 6.0 (36 to 43)

PD411

Fig. PD-5 Exploded view of differential gear carrier

REMOVAL

1. Jack up rear of car and support it by placing a safety stand under rear axle case. Drain gear oil.
2. Remove propeller shaft and rear axle shafts. These works can be done as described in Section RA for Removal.
3. Loosen off bolts securing differential carrier to rear axle case, and take out differential gear carrier assembly.

PRE-DISASSEMBLY INSPECTION

Differential case or carrier should be inspected before any parts are removed from it.

These inspections are helpful in finding the cause of the malfunction and in determining the corrections needed.

1. Mount carrier on Gear Carrier Attachment ST06360001.

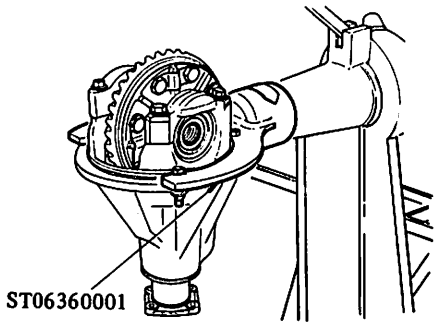


Fig. PD-6 Holding differential carrier

2. Visually inspect parts for wear or damage.
3. Rotate gears to see if there is any roughness which would indicate damaged bearings or chipped gears. Check the gear teeth for scoring or signs of abnormal wear. Measure preload of drive pinion.
4. Set up a dial indicator and check the backlash at several points around ring gear. Backlash should be 0.10 to 0.15 mm (0.0039 to 0.0059 in).
5. Check the gear tooth contact with a mixture of powdered ferric oxide and oil applied sparingly to all ring gear teeth.

For the tooth contact pattern, see page PD-10 for Contact Pattern.

DISASSEMBLY

1. Put match marks on side bearing caps and carrier, and remove side bearing caps and take out differential case assembly using Slide Hammer HT72400000.

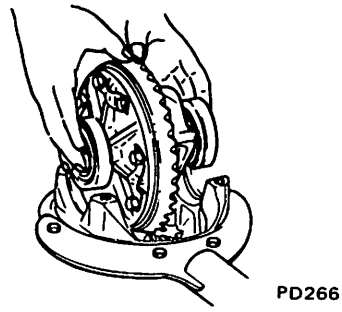


Fig. PD-7 Removing differential case assembly

Note: Care should be taken not to confuse the left and right hand bearing caps and bearing outer races so that reassembly will be easily carried out with the same parts in the original position.

2. Remove drive pinion nut using Drive Pinion Flange Wrench ST31530000, and pull off companion flange using a suitable puller.

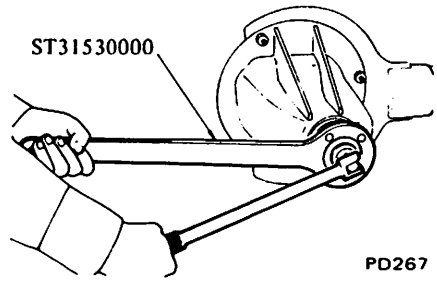


Fig. PD-8 Removing drive pinion nut

3. Extract drive pinion assembly to the rearwards by tapping the front end with a soft hammer. Drive pinion can be taken out together with rear bearing inner race, bearing spacer and washer.
4. Remove oil seal and take out front bearing inner race.

Note: Oil seal must not be reused.

5. Hold rear bearing inner race with Drive Pinion Rear Bearing Inner Race Puller ST30031000 and extract from drive pinion with a press.

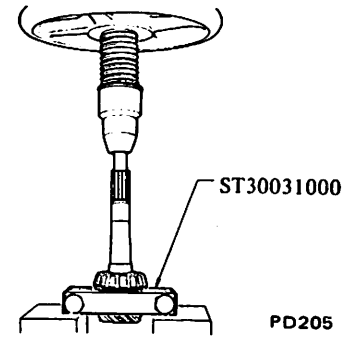


Fig. PD-9 Removing pinion rear bearing inner race

6. To remove outer races of both front and rear bearings, apply a brass drift to race side surface, and withdraw them by lightly tapping the top of drift with a hammer.

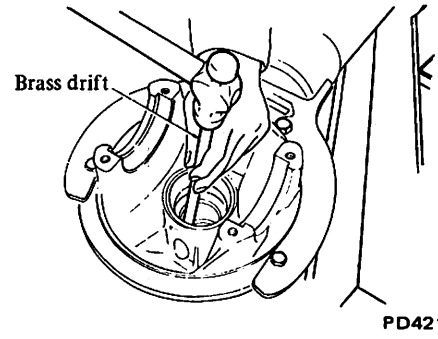


Fig. PD-10 Removing pinion front and rear bearing outer races

7. When removing side bearing, use Gear Carrier Side Bearing Puller ST3305S001 (set of ST33051001 and ST33052000).

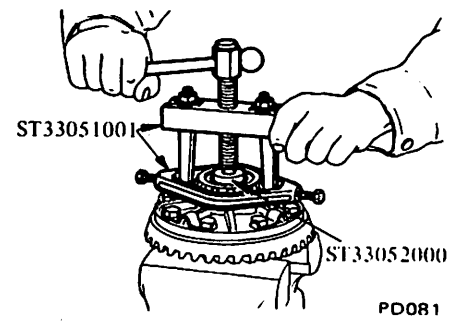


Fig. PD-11 Removing side bearing

Note:
a. Puller should be handled with care in catching the edge of bearing inner race.
b. Be careful not to confuse left and right hand parts.

8. Remove ring gear by spreading out lock strap and loosening ring gear bolts in diagonally.
9. Punch off pinion mate shaft lock pin from ring gear side using Solid Punch KV31100300.

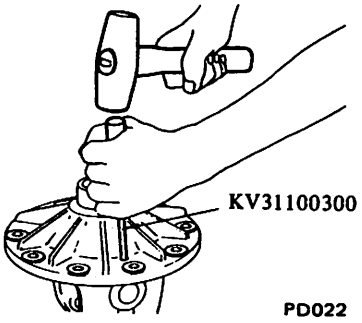


Fig. PD-12 Removing lock pin

Note: Lock pin is caulked at pin hole mouth on differential case. Do not punch it off forcibly without checking how it is caulked.

10. Draw out pinion mate shaft and remove pinion mate gears, side gears and thrust washers.

Note: Put marks on gear and thrust washer so that they can be re-installed in their original positions from which they were removed.

INSPECTION

Thoroughly clean all disassembled parts, and examine them to see if they are worn, damaged or otherwise faulty, and how they are affected. Repair or replace all faulty parts.

1. Check gear teeth for scoring, cracking or chipping, and make sure that tooth contact pattern indicates correct meshing depth. If any fault is evident, replace parts if necessary.

Note: Drive pinion and ring gear are supplied for replacement as a set, therefore, should either part be damaged, replace as a set.

2. Check pinion gear shaft, and pinion gear for scores and signs of wear, and replace if necessary.

Follow the same procedure for side gear and their seats on differential case.

3. Inspect all bearing races and rollers for scoring, chipping or evidence of excessive wear. Replace if either condition is evident, since an incorrect bearing operation may result in noises and gear seizure.
4. Inspect thrust washer faces. Small damage can be corrected with sand paper. Inspect pinion mate-to-side gear backlash. If the clearance between side gear and thrust washer exceeds limits 0.10 to 0.20 mm (0.0039 to 0.0079 in), replace thrust washers.
5. Inspect carrier and differential case for cracks or distortion. If either condition is evident, replace faulty parts.
6. As a general rule, oil seal should be replaced at each disassembly.

ASSEMBLY AND ADJUSTMENT

Assembly can be done in the reverse order of disassembly. The following directions for adjustment and usage of special tools make it easy to obtain a perfect differential operation.

PRECAUTIONS IN ASSEMBLY

1. Arrange shims, washers and the like to install them correctly.
2. Thoroughly clean the surfaces on which shims, washers, bearings and bearing caps are installed.
3. Apply gear oil when installing bearings.
4. Pack recommended multi-purpose grease cavity between lips when fitting oil seal.

ASSEMBLY OF DIFFERENTIAL GEAR CASE

1. Assemble pinion mates, side gears and thrust washers in differential case.
2. Fit pinion shaft to differential case so that it meets lock pin holes.
3. Adjust pinion mate-to-side gear backlash by selecting side gear thrust washers.

Normal clearance between side gear rear face and thrust washer:
0.10 to 0.20 mm
(0.0039 to 0.0079 in)

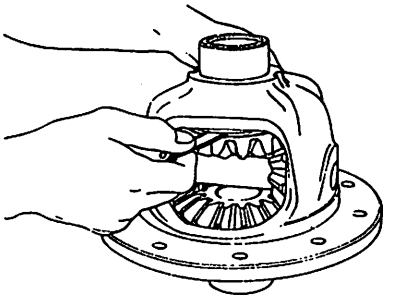


Fig. PD-13 Measuring clearance

Side gear thrust washer

Thickness mm (in)
0.785 (0.0309)
0.835 (0.0329)
0.885 (0.0348)
1.035 (0.0407)
1.185 (0.0467)

4. Drive in pinion shaft lock pin using a punch after it is secured into place.
5. Apply oil to gear tooth surfaces and thrust surfaces and check if they turn properly.
6. Place ring gear on differential case and install bolts and lock washers. Tighten bolts to the specified torque, and bend up lock washers.

Tightening torque:
7.0 to 8.0 kg-m
(51 to 58 ft-lb)

CAUTION:
a. Use new lock washers.
b. Tighten bolts in criss-cross fashion lightly tapping around bolt heads with a hammer.

SELECTION OF DRIVE PINION HEIGHT ADJUSTING WASHER

Determine the pinion height with washer provided between rear bearing inner race and the back of pinion gear.

The required thickness of adjusting washer can be calculated as follows:

1. Press fit front and rear bearing outer races into gear carrier using Drive Pinion Outer Race Drift Set ST30611000, ST30701000 and ST30613000.

Front:	ST30611000 and ST30701000
Rear:	ST30611000 and ST30613000

2. Fit rear bearing on carrier, and install Dummy Shaft ST31942000 on rear bearing, and place Height Gauge ST31141000 on carrier.

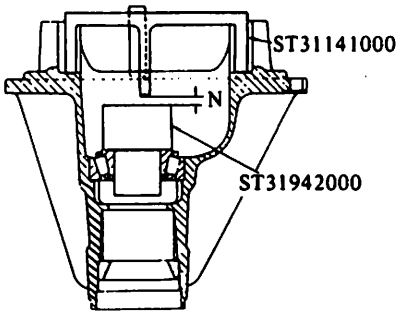


Fig. PD-14 Adjusting pinion height

3. Measure the clearance (N) between the tip end of height gauge and the end surface of dummy shaft, using a thickness gauge.

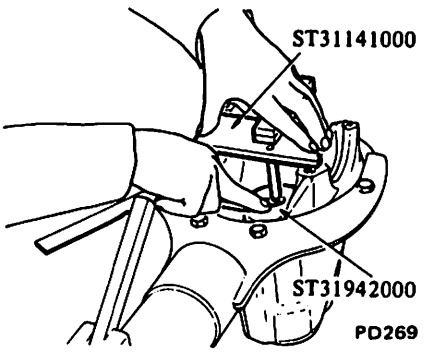


Fig. PD-15 Measuring clearance

4. The thickness of drive pinion height adjusting washer can be obtained from the following formula:

$$T = N - [(H - D' - S) \times 0.01] + 2.98$$

Where,

- T : Required thickness of pinion height adjusting washer (mm).
- N : Measured value with thickness gauge (mm).
- H : Figure marked on the drive pinion head. See Figure PD-16.
- D' : Figure marked on the dummy shaft.
- S : Figure marked on the height gauge.

Figures for H, D' and S are dimensional variations in a unit of 1/100 mm against each standard measurement.

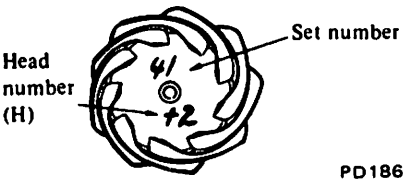


Fig. PD-16 Variation number on drive pinion

Examples of calculation

Ex. 1 ---

$N = 0.42$ mm, $H = +2$, $D' = -1$
$S = +1$

$$T = N - [(H - D' - S) \times 0.01] + 2.98$$
$$= 0.42 - [((+2) - (-1) - (+1)) \times 0.01] + 2.98$$
$$= 0.42 - [(2 + 1 - 1) \times 0.01] + 2.98$$
$$= 0.42 - [2 \times 0.01] + 2.98$$
$$= 0.42 - 0.02 + 2.98$$
$$= 3.38 \text{ mm}$$

The correct washer is 3.39 mm thick.

Ex. 2 ---

$N = 0.35$ mm, $H = -3$, $D' = +1$
$S = -2$

$$T = N - [(H - D' - S) \times 0.01] + 2.98$$
$$= 0.35 - [((-3) - (+1) - (-2)) \times 0.01] + 2.98$$
$$= 0.35 - [(-3 - 1 + 2) \times 0.01] + 2.98$$
$$= 0.35 - [-2 \times 0.01] + 2.98$$
$$= 0.35 + 0.02 + 2.98$$
$$= 3.35 \text{ mm}$$

The correct washer is 3.36 mm thick.

Ex. 3 ---

$N = 0.51$ mm, $H = 0$, $D' = 0$
$S = 0$

$$T = N - [(H - D' - S) \times 0.01] + 2.98$$
$$= 0.51 - [(0 - 0 - 0) \times 0.01] + 2.98$$
$$= 0.51 - [0 \times 0.01] + 2.98$$
$$= 0.51 - 0 + 2.98$$
$$= 0.51 + 2.98$$
$$= 3.49 \text{ mm}$$

The correct washer is 3.48 mm thick.

Note: If values signifying H, D' and S are not given, regard them as zero and compute. After assembly, check to see that tooth contact is correct. If not, readjust.
For the tooth contact pattern, see pages PD-12 and PD-13 for Contact Pattern.

Pinion height adjusting washer

Thickness mm (in)
3.09 (0.1217)
3.12 (0.1228)
3.15 (0.1240)
3.18 (0.1252)
3.21 (0.1264)
3.24 (0.1276)
3.27 (0.1287)
3.30 (0.1299)
3.33 (0.1311)
3.36 (0.1323)
3.39 (0.1335)
3.42 (0.1346)
3.45 (0.1358)
3.48 (0.1370)
3.51 (0.1382)
3.54 (0.1394)
3.57 (0.1406)
3.60 (0.1417)
3.63 (0.1429)
3.66 (0.1441)

5. Fit determined pinion height adjusting washer in drive pinion, and press fit rear bearing inner race in it, using Base ST30032000.

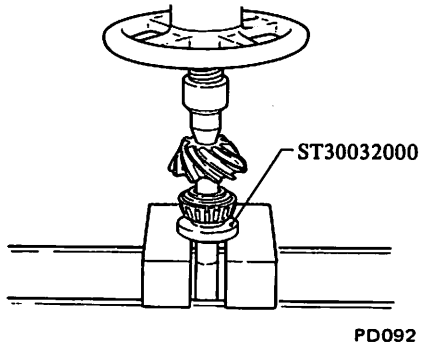


Fig. PD-17 Pressing rear bearing cone

ADJUSTMENT OF DRIVE PINION PRELOAD

Adjust the preload of drive pinion with collapsible spacer.

This procedure has nothing to do with thickness of pinion height adjusting washer.

Note: Reuse of a collapsible spacer must not be allowed.

1. After adjusting pinion height, lubricate front bearing with gear oil and place it in carrier.
2. Install a new oil seal in carrier using Oil Seal Drift ST33400001. Lubricate cavity between seal lips with recommended multi-purpose grease when installing.
3. Place a new collapsible spacer on drive pinion and lubricate pinion rear bearing with gear oil.
4. Insert companion flange into oil seal and hold it firmly against pinion front bearing cone. From the rear of the carrier, insert drive pinion into companion flange.
5. Ascertain that threaded portion of drive pinion and a new pinion nut are free from oil or grease.
6. Holding companion flange with Drive Pinion Flange Wrench ST31530000, tighten nut and then drive pinion is pulled into front bearing cone and into flange.

As drive pinion is pulled into front bearing cone, drive pinion end play is reduced. While there is still end play in drive pinion, companion flange and cone will be felt to bottom. This indicates that bearing cone and companion flange have bottomed on collapsible spacer.

From this point, a much greater torque must be applied to turn pinion nut since spacer must be compressed. From this point, nut should also be tightened very slowly and drive pinion end play checked often so that pinion bearing preload does not exceed the limits.

When the drive pinion end play is eliminated, the specified preload is being approached. Replace collapsible spacer if this specification is exceeded.

CAUTION:
Do not decrease preload by loosening pinion nut. This will release compression between pinion front and rear bearing cones and collapsible spacer and may permit front bearing cone to turn on drive pinion, moreover, nut becomes loose.

7. Turn drive pinion in both directions several times to set bearing rollers. And adjust bearing preload to specifications using Preload Gauge ST3127S000.

Tightening torque of pinion nut:
14.0 to 30.0 kg-m
(101 to 217 ft-lb)
Preload (with oil seal):
7.0 to 10.0 kg-cm
(6.1 to 8.7 in-lb)
At companion flange bolt hole:
2.0 to 2.9 kg (4.4 to 6.4 lb)

Note: Preload of used bearing is the same value as that of a new bearing.

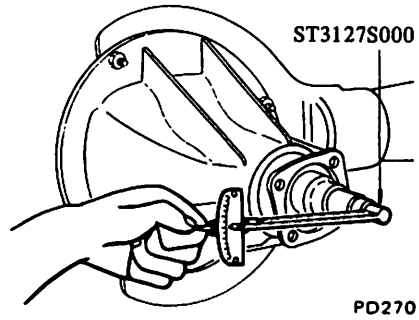


Fig. PD-18 Measuring pinion preload

SELECTION OF SIDE BEARING SHIMS

Adjust the side bearing preload with adjusting shim.

The required thickness of adjusting shim can be calculated by the following formulas.

$$T_1 = (A - C + D - H') \times 0.01 + 0.20 + E$$

$$T_2 = (B - D + H') \times 0.01 + 0.09 + F$$

Where,

T_1 : Required thickness of left side bearing adjusting shim (mm).
T_2 : Required thickness of right side bearing adjusting shim (mm).

A : Figure marked on the left side bearing housing of gear carrier.
B : Figure marked on the right side bearing housing of gear carrier.
C & D : Figures marked on the differential case.
E & F : These are differences in width of left or right side bearing against the standard width (18.50 mm).

If bearing width is 18.39 mm, the difference will be as follows:

18.50 – 18.39 = 0.11 mm

Measure bearing width using Master Gauge ST33741000 and Weight Block ST32501000.

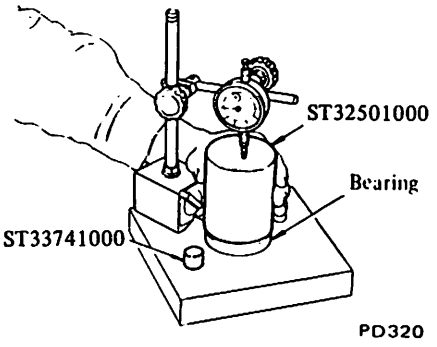


Fig. PD-19 Measuring bearing width

H' : Figure marked on the ring gear. See Figures PD-20 and PD-21.

Figures for A, B, C, D and H' are dimensional variations in a unit of 1/100 mm against each standard measurement.

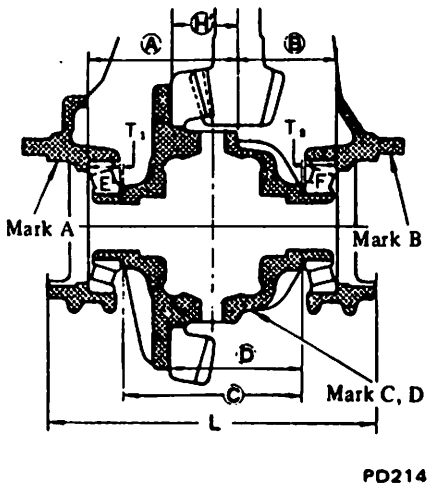


Fig. PD-20 Thickness of shim on right and left sides

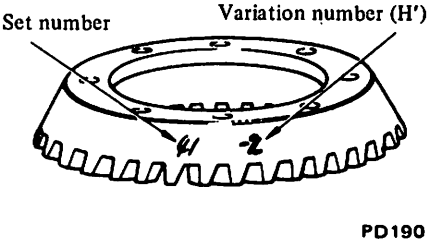


Fig. PD-21 Variation number on ring gear

Examples of calculation

Ex. 1 ---

A = 1, B = 2, C = 2, D = 3
E = 0.11 mm, F = 0.15 mm
H' = –2

Left side:

$T_1 = (A - C + D - H') \times 0.01 + 0.20 + E$
$= (1 - 2 + 3 - (-2)) \times 0.01 + 0.20 + 0.11$
$= (1 - 2 + 3 + 2) \times 0.01 + 0.20 + 0.11$
$= 4 \times 0.01 + 0.20 + 0.11$
$= 0.04 + 0.20 + 0.11$
$= 0.35$ mm

The correct shims are 0.05 plus 0.10 plus 0.20 mm thick.

Right side:

$T_2 = (B - D + H') \times 0.01 + 0.09 + F$
$= (2 - 3 + (-2)) \times 0.01 + 0.09 + 0.15$
$= (2 - 3 - 2) \times 0.01 + 0.09 + 0.15$
$= -3 \times 0.01 + 0.09 + 0.15$
$= -0.03 + 0.09 + 0.15$
$= 0.21$ mm

The correct shims are three pieces of 0.07 mm thick.

Ex. 2 ---

A = 0, B = 3, C = 1, D = 0
E = 0.20 mm, F = 0.17 mm
H' = 2

Left side:

$T_1 = (A - C + D - H') \times 0.01 + 0.20 + E$
$= (0 - 1 + 0 - (+2)) \times 0.01 + 0.20 + 0.20$
$= (0 - 1 + 0 - 2) \times 0.01 + 0.20 + 0.20$
$= -3 \times 0.01 + 0.20 + 0.20$
$= -0.03 + 0.20 + 0.20$
$= 0.37$ mm

The correct shims are 0.07 plus 0.10 plus 0.20 mm thick.

Right side:

$T_2 = (B - D + H') \times 0.01 + 0.09 + F$
$= (3 - 0 + (+2)) \times 0.01 + 0.09 + 0.17$
$= (3 - 0 + 2) \times 0.01 + 0.09 + 0.17$
$= 5 \times 0.01 + 0.09 + 0.17$
$= 0.05 + 0.09 + 0.17$
$= 0.31$ mm

The correct shims are as follows:

Thickness		Quantity	
0.07	x	3	= 0.21
0.10	x	1	= 0.10
Total thickness			= 0.31 mm

Note: If values signifying A, B, C, D and H' are not given, regard them as zero and compute.
After assembly, check to see that preload and backlash are correct. If not, readjust.

Side bearing adjusting shim

Thickness mm (in)
0.05 (0.0020)
0.07 (0.0028)
0.10 (0.0039)
0.20 (0.0079)
0.50 (0.0197)

ASSEMBLY AND ADJUSTMENT OF DIFFERENTIAL CARRIER

1. Fit determined side bearing adjusting shim on differential case, and press fit left and right side bearing inner races on it, using Side Bearing Drift KV38102100 and Adapter ST33052000.

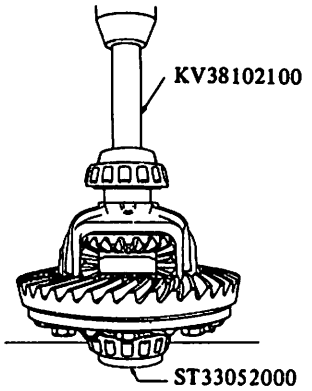


Fig. PD-22 Installing side bearing cone

2. Install differential case assembly into gear carrier, tapping with a soft hammer.
3. Align mark on bearing cap with that on gear carrier, and install bearing cap on carrier. And tighten bolts to specified torque.

Tightening torque:
5.0 to 6.0 kg-m
(36 to 43 ft-lb)

4. Measure "L" dimension (between left and right bearing cap edges) by a micrometer. See Figures PD-5 and PD-23.

"L" dimension:
173.23 to 173.29 mm
(6.8201 to 6.8224 in)

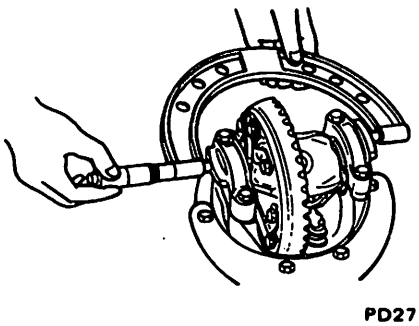


Fig. PD-23 Measuring "L" dimension

5. Measure ring gear-to-drive pinion backlash.

If backlash is too small, decrease thickness of left shim and increase thickness of right shim by the same amount.

If backlash is too great, reverse the above procedure.

Backlash:
0.10 to 0.15 mm
(0.0039 to 0.0059 in)

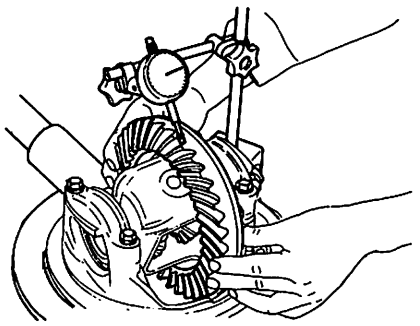


Fig. PD-24 Measuring backlash

6. At the same time, check side bearing preload. Bearing preload should read 9.0 to 17.0 kg-cm (7.8 to 14.8 in-lb) of rotating torque, [1.4 to 2.7 kg (3.1 to 6.0 lb) at ring gear bolt].

If preload does not accord with this specification, adjust it with side bearing shims.

7. Check and adjust the tooth contact pattern of ring gear and drive pinion.

(1) Thoroughly clean ring and drive pinion gear teeth.

(2) Paint ring gear teeth lightly and evenly with a mixture of powdered ferric oxide and oil of a suitable consistency to produce a contact pattern.

(3) Rotate pinion through several revolutions in the forward and reverse directions until a definite contact pattern is developed on ring gear.

(4) When contact pattern is incorrect, readjust thickness of adjusting shim.

Be sure to wipe off ferric oxide completely upon completion of adjustment.

(5) Incorrect contact pattern of teeth can be adjusted in the following manner.

Contact pattern

a. Heel contact

To correct, increase thickness of pinion height adjusting washer in order to bring drive pinion close to ring gear.

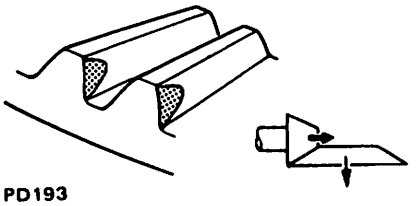


Fig. PD-25 Heel contact

b. Toe contact

To correct, reduce thickness of pinion height adjusting washer in order to make drive pinion go away from ring gear.

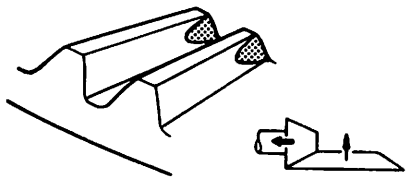


Fig. PD-26 Toe contact

c. Flank contact

Adjust in the same manner as in b.

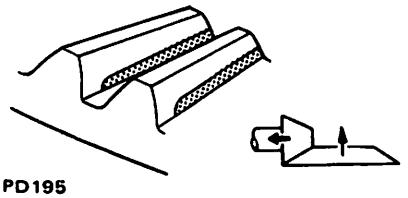
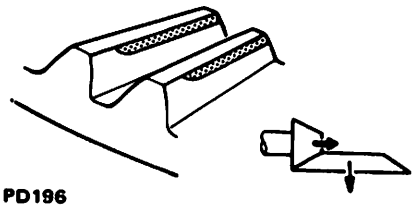


Fig. PD-27 Flank contact

d. Face contact

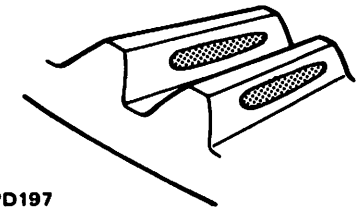
Adjust in the same manner as in a.



PD196

Fig. PD-28 Face contact

e. Correct tooth contact



PD197

Fig. PD-29 Correct contact

Note: Change in thickness of adjusting washer is accompanied by change in backlash. Check it when installing gear.

INSTALLATION

Installing can be done in the reverse order of removal.

Tightening torque:
Gear carrier to rear axle case:
2.0 to 2.5 kg-m
(14 to 18 ft-lb)
Drain and filler plug:
4.2 to 6.9 kg-m
(30 to 50 ft-lb)

Gear oil capacity: 1.1 liters
(2 3/8 US pt, 2 Imp pt)

REPLACEMENT OF FRONT OIL SEAL

When replacing front oil seal, do as follows:

1. Remove differential gear carrier assembly and mount it on Gear Carrier Attachment ST06360001.

This work can be done by referring to "Removal" procedure.

2. Remove side bearing caps and take out differential case assembly. Remove drive pinion nut and extract drive pinion assembly. Remove oil seal.

These works can be done by referring to "Disassembly" procedure.

3. Install a new oil seal in carrier using Oil Seal Drift ST33400001. Lubricate cavity between seal lips with recommended multi-purpose grease when installing.
4. Place a new collapsible spacer on drive pinion and lubricate pinion rear bearing with gear oil.
5. Insert companion flange into oil seal. Insert drive pinion into companion flange from the rear of the carrier and secure them in position by tightening nut to the given torque confirming specified preload.

These works can be done by referring to "Adjustment of Drive Pinion Preload" procedure.

6. Install differential case assembly into gear carrier. Check for "L" dimension and ring gear-to-drive pinion backlash.

These works can be done by referring to "Adjustment of Side Bearing Shims" procedure.

7. Reinstall differential gear carrier assembly, rear axle shafts and propeller shaft. Fill up differential carrier with correct gear oil.

CAUTION:
Whenever front oil seal is replaced, collapsible spacer must be replaced since collapsible spacer is of no use by loosening nut.

SERVICE DATA AND SPECIFICATIONS

PROPELLER SHAFT

Dynamic unbalance	gr-cm (in-oz)	less than 35 (0.49) at 5,800 rpm
Spider journal axial play	mm (in)	0 (0)
Tightening torque		
Propeller shaft to companion flange bolt (Differential carrier side)	kg-m (ft-lb)	2.4 to 3.3 (17 to 24)
Companion flange nut	kg-m (ft-lb)	20.0 to 24.0 (145 to 174)
Flange yoke (rear shaft) to companion flange (front shaft) bolt	kg-m (ft-lb)	2.4 to 3.3 (17 to 24)
Center bearing bracket fixing nuts (3-joint type)	kg-m (ft-lb)	1.9 to 2.6 (14 to 19)
Center bearing bracket-to-body bolts (3-joint type)	kg-m (ft-lb)	3.2 to 4.0 (23 to 29)

DIFFERENTIAL CARRIER

Final gear ratio (number of teeth)		
Manual transmission		3.889 (35/9)
Automatic transmission		3.700 (37/10)
Drive pinion preload adjusted by		Collapsible spacer
Oil capacity	liter (US pt, Imp pt)	1.3 (2¾, 2¼)
Drive pinion		
Preload (with oil seal)	kg-cm (in-lb)	7.0 to 10.0 (6.1 to 8.7)
At companion flange bolt hole (with oil seal)	kg (lb)	2.0 to 2.9 (4.4 to 6.4)
Thickness of pinion height adjusting washer	mm (in)	3.09 (0.1217) 3.12 (0.1228) 3.15 (0.1240) 3.18 (0.1252) 3.21 (0.1264) 3.24 (0.1276) 3.27 (0.1287) 3.30 (0.1299) 3.33 (0.1311) 3.36 (0.1323) 3.39 (0.1335) 3.42 (0.1346) 3.45 (0.1358) 3.48 (0.1370) 3.51 (0.1382) 3.54 (0.1394) 3.57 (0.1406) 3.60 (0.1417) 3.63 (0.1429) 3.66 (0.1441)
Length of drive pinion bearing adjusting spacer		Non adjustable Collapsible spacer
Side gear and pinion mate		
Thickness of side gear thrust washer	mm (in)	0.785 (0.0309) 0.835 (0.0329) 0.885 (0.0348) 1.035 (0.0407) 1.185 (0.0467)
Clearance between side gear and thrust washer	mm (in)	0.10 to 0.20 (0.0039 to 0.0079)
Ring gear		
Backlash between drive gear and pinion	mm (in)	0.10 to 0.15 (0.0039 to 0.0059)
Thickness of side bearing adjusting shim	mm (in)	0.05 (0.0020) 0.07 (0.0028) 0.10 (0.0039) 0.20 (0.0079) 0.50 (0.0197)

"L" dimension	mm (in)	173.23 to 173.29 (6.8201 to 6.8224)
Side bearing		
Preload	kg-cm (in-lb)	9.0 to 17.0 (7.8 to 14.8)
Preload at ring gear bolt	kg (lb)	1.4 to 2.7 (3.1 to 6.0)
Standard width	mm (in)	18.50 (0.7283)
Tightening torque		
Drive pinion nut	kg-m (ft-lb)	14.0 to 30.0 (101 to217)
Ring gear bolt	kg-m (ft-lb)	7.0 to 8.0 (51 to 58)
Side bearing cap bolt	kg-m (ft-lb)	5.0 to 6.0 (36 to 43)
Differential carrier to axle case nut	kg-m (ft-lb)	2.0 to 2.5 (14 to 18)
Companion flange to propeller shaft bolt	kg-m (ft-lb)	2.4 to 3.3 (17 to 24)
Adjusting methods		
Variable numbers expressed by	mm	1/100
Dummy shaft		Use
Drive pinion adjusting formula		$T = N - [(H - D' - S) \times 0.01] + 2.98$
Side bearing adjusting formula		$T_1 = (A - C + D - H') \times 0.01 + 0.20 + E$
		$T_2 = (B - D + H') \times 0.01 + 0.09 + F$

TROUBLE DIAGNOSES AND CORRECTIONS

PROPELLER SHAFT

Condition	Probable cause	Corrective action
Vibration during at medium or high speed.	Worn or damaged universal joint needle bearing.	Replace propeller shaft assembly.
	Unbalance due to bent or dented propeller shaft.	Replace propeller shaft assembly.
	Loose propeller shaft installation.	Retighten.
	Worn transmission rear extension bushing.	Replace.
	Damaged center bearing or insulator.	Replace.
	Undercoating or mud on the shaft causing unbalance.	Clean up shaft.
	Tire unbalance.	Balance wheel and tire assembly.
	Balance weights missing.	Replace.
Knocking sound during starting or noise during coasting on propeller shaft.	Worn or damaged universal joint.	Replace propeller shaft assembly.
	Worn sleeve yoke and mainshaft spline.	Replace propeller shaft assembly.
	Loose propeller shaft installation.	Retighten.
	Damaged center bearing or insulator.	Replace.
	Loose or missing bolts at center bearing bracket to body.	Replace or tighten bolts.
Scraping noise.	Dust cover on sleeve yoke rubbing on transmission rear extension. Dust cover on companion flange rubbing on differential carrier.	Straighten out dust cover to remove interference.
Whine or whistle.	Damaged center bearing.	Replace.

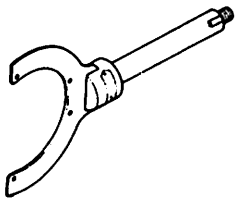
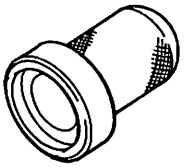
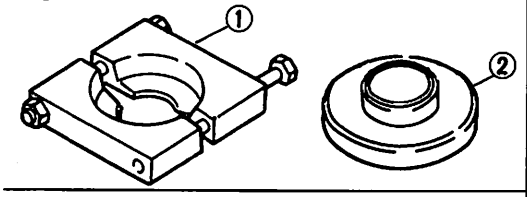
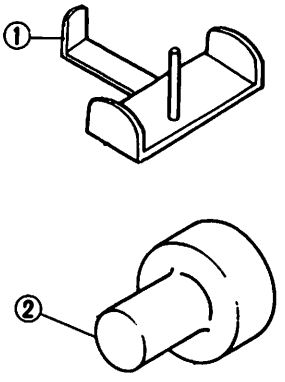
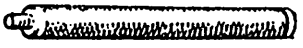
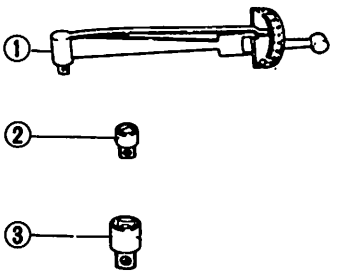
DIFFERENTIAL CARRIER

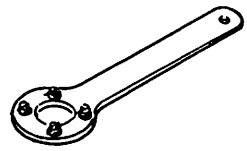
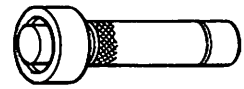
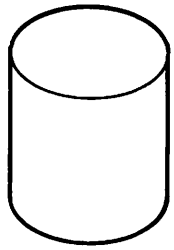
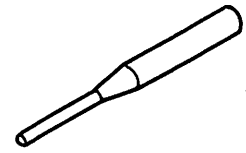
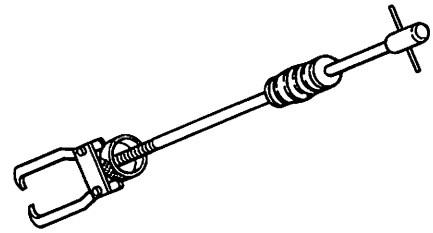
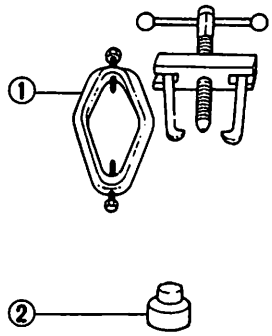
When a gear carrier is suspected of being noisy, it is advisable to make a thorough test to determine whether the noise originates in the tires, road surface, exhaust, universal joint, propeller shaft, wheel bearings, engine, transmission, or gear carrier. Noise which originates in other places cannot be corrected by adjustment or replacement of parts in the rear axle assembly.

Condition	Probable cause	Corrective action
Noise on drive, coast and float.	Shortage of oil.	Supply gear oil. Rebuild gear carrier if necessary.
	Incorrect tooth contact between ring gear and drive pinion.	Adjust tooth contact or replace the hypoid gear set.
	Incorrect backlash between ring gear and drive pinion.	Adjust backlash or replace the hypoid gear set if necessary.
	Seized up or damaged ring gear and drive pinion.	Replace the hypoid gear set.
	Seized up, damaged or broken drive pinion bearing.	Replace the pinion bearing and faulty parts.
	Seized up, damaged or broken side bearing.	Replace the side bearing and faulty parts.
	Loosen bolts or nuts fixing ring gear, bearing cap, etc.	Clamp them to specified torque, and replace faulty parts.
Noise on turn.	Seized up, damaged or broken side and pinion gear.	Replace faulty parts.
	Seized up, damaged or broken side gear and pinion thrust washer.	Replace faulty parts.
	Pinion gears too tight on their shaft.	Replace faulty parts.
Knocking sound during starting or gear shifting.	Excessive backlash.	
	Incorrect backlash ring gear-to-drive pinion backlash, or side-to-pinion gear.	Adjust backlash.
	Worn gears or case.	Replace worn parts.
	Worn side yoke (or rear axle shaft) and side gear spline.	Replace worn parts.
	Pinion bearing under preload.	Adjust preload.
	Loosened drive pinion nut.	Repair or replace.
	Loosen bolts or nuts fixing ring gear, bearing cap, etc.	Clamp them or replace if necessary.

Condition	Probable cause	Corrective action
Seizure of breakage.	Shortage of oil or use of unsuitable oil.	Replace faulty parts.
	Excessively small backlash.	Adjust backlash and replace as required.
	Incorrect adjustment of bearings or gears.	Replace faulty parts.
	Severe service due to an excessive loading, improper use of clutch.	Replace faulty parts.
	Loose bolts and nuts, such as ring gear bolts.	Replace faulty parts.
Oil leakage.	Worn-out, damaged or improperly driven front oil seal, or bruised, dented or abnormally worn slide face of companion flange.	Replace faulty oil seal. Repair the affected flange with sandpaper or replace if necessary.
	Worn, damaged or improperly driven side oil seal, or bruised, dented or abnormally worn slide face of side yoke.	Treat as above.
	Loose bolts such as gear carrier.	Tighten the bolts to specified torque.
	Faulty gasket.	Replace faulty parts with new ones.
	Loose filler or drain plug.	Tighten the plug.
	Clogged or damaged breather.	Repair or replace.

SPECIAL SERVICE TOOLS

Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.
ST06360001 Differential carrier attachment 	—— Fig. PD-6 Page PD-7	ST33400001 Front oil seal drift 	J 26082 Page PD-10 Page PD-13
ST3003S000 Drive pinion rear bearing inner race puller set ① ST30031000 Puller ② ST30032000 Base 	J 25733 ① J 25733 -1 ② J 25733 -2 Fig. PD-9 Fig. PD-17 Page PD-7 Page PD-10	ST3114S000 Drive pinion setting gauge set ① ST31410000 Height gauge ② ST31942000 Dummy shaft 	See J 25269-01 ② See J 25269-01 Fig. PD-14 Fig. PD-15
ST30611000 Drift bar 	J 25742-1 Page PD-9		
ST30701000 Drift 	J 25742-2 Page PD-9	ST3127S000 Preload gauge ① GG91030000 Torque wrench ② HT62940000 Socket adapter ③ HT62900000 Socket adapter 	See J 25765 ① See J 25765 Fig. PD-18 Page PD-10
ST30613000 Drift 	J 25742-3 Page PD-9		

Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.
ST31530000 Drive pinion flange wrench 	J 25774 Fig. PD-3 Fig. PD-8 Page PD-3 Page PD-4 Page PD-7 Page PD-10	KV38102100 Gear carrier side bearing drift 	J 25803 Fig. PD-22 Page PD-12
ST32501000 Weight block 	J 25407-3 Fig. PD-19 Page PD-11	KV31100300 Solid punch 	—— Fig. PD-12 Page PD-8
ST33741000 Master gauge 	See J 25407-1 Fig. PD-19 Page PD-11	HT72400000 Slide hammer 	—— Page PD-7
① ST33051001 Side bearing puller ② ST33052000 Adapter 	See J 22888 ② J 25797 -1 Fig. PD-11 Fig. PD-22 Page PD-7 Page PD-12		

SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION FA

FRONT AXLE & FRONT SUSPENSION

DESCRIPTION ..... FA- 2
INSPECTION AND ADJUSTMENT ..... FA- 3
FRONT AXLE ..... FA- 5
FRONT SUSPENSION ..... FA- 7
SERVICE DATA AND SPECIFICATIONS FA-13
TROUBLE DIAGNOSES AND CORRECTIONS FA-14
SPECIAL SERVICE TOOLS FA-17

DESCRIPTION

All models employ a strut type front suspension in which the shock absorber and spindle are assembled into a single unit. It is supported by a coil spring at the top and by the transverse link at the bottom.

The spindle and outer casing are of an integral design. The ball joint, located at the outer end of the transverse link, serves as a pivot for the movement of the spindle.

These are assembled on the suspension member through a rubber bushing to avoid metal to metal contact.

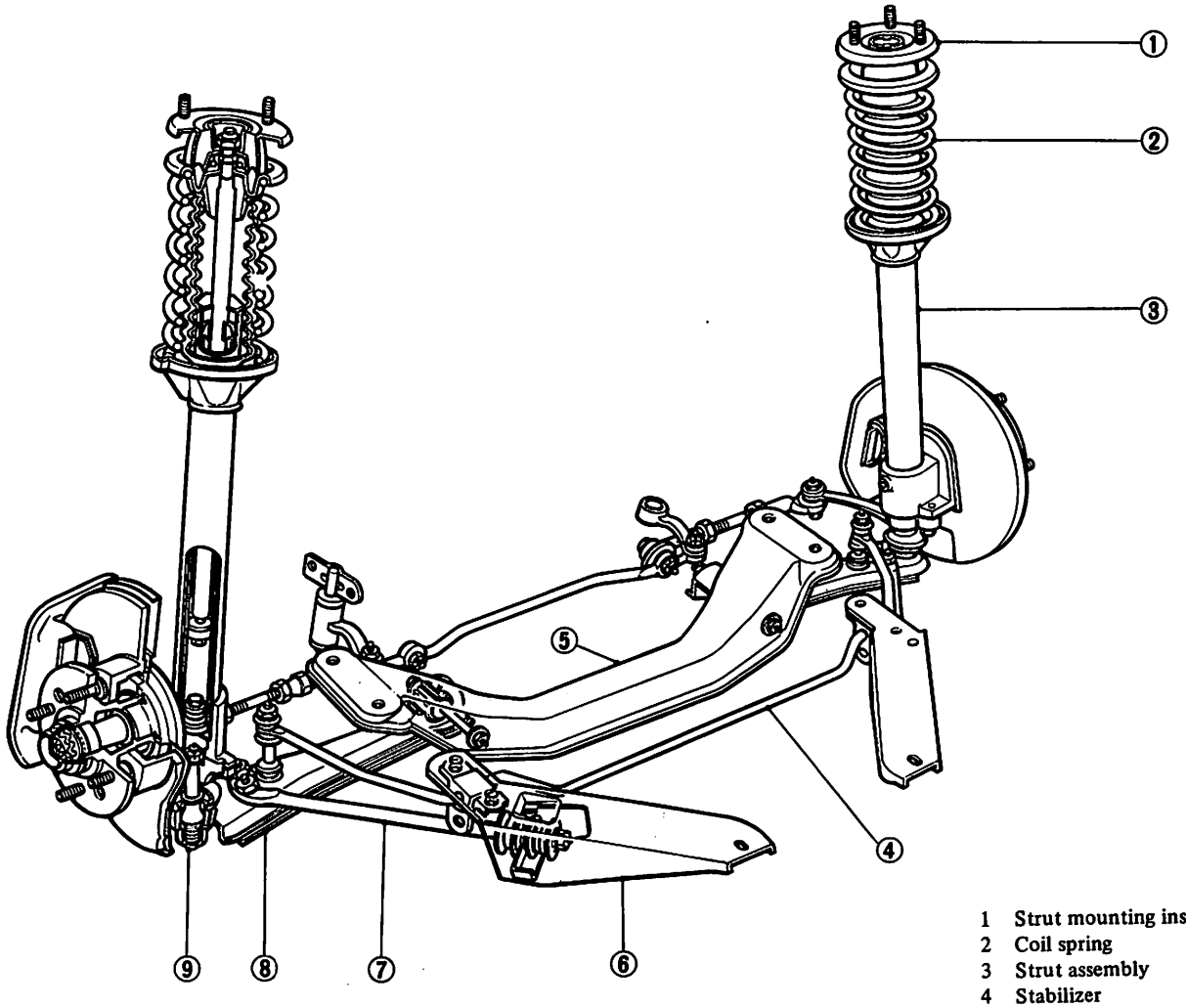
The shock absorber is basically a double-acting hydraulic ram consisting mainly of an outer casing, an inner casing, a piston and a piston rod.

The gland packing and piston guide keep the rod in place as well as prevent leakage.

The coil spring is placed on the piston rod with its seat on the bottom.

The seat is welded to the outer casing. These are mounted on the chassis frame through the thrust bearing at the top. The transverse link, tension rod and rubber bushing take thrusts from front and rear.

The stabilizer uses a torsion bar; it takes thrusts from either side of the car. Thus, the entire suspension handles thrusts from any angle: i.e. those from front and rear by the tension rod, those in a vertical direction with the strut, and those from either side of the car by means of the transverse link.



1 Strut mounting insulator
2 Coil spring
3 Strut assembly
4 Stabilizer
5 Suspension crossmember
6 Tension rod bracket
7 Tension rod
8 Transverse link
9 Lower ball joint

FA630

Fig. FA-1 Front axle and suspension assembly

INSPECTION AND ADJUSTMENT

CONTENTS

INSPECTION FA-3
SUSPENSION PARTS FA-3
ADJUSTMENT FA-3
WHEEL BEARING FA-3
WHEEL ALIGNMENT FA-4
CAR LEVEL FA-4

INSPECTION

Periodically inspect in accordance with a regular maintenance schedule.

SUSPENSION PARTS

1. Jack up the front of car until front wheels clear the floor.
2. Shaking each front wheel by grasping the upper and lower surfaces of the tire, check suspension parts for looseness, wear, or damage. Tighten all loose bolts and nuts to the specified torque. Replace all worn parts as described under "Front Suspension".
3. Check wheel bearings. If any axial end-play is present, adjust bearings to specifications. Replace worn or damaged bearings as described under "Front Axle".
4. Check the shock absorbers assembled into strut. If these are not in good condition, car posture and wheel alignment may be affected.

ADJUSTMENT

WHEEL BEARING

Improper adjustment of wheel bearings causes abnormal wear and score on the bearings and knuckle spindle.

To obtain proper preload on wheel bearings, proceed as follows:

Note: **In order to assure correct bearing preload and to extend service life of wheel bearings, be sure to prevent dirt and foreign particles from getting in bearings, grease seal and spindle nut.**

1. Jack up and support car on the stands at the side member in a safe manner, and remove wheel, hub cap, cotter pin and brake pads. Refer to Section BR for "Pad Replacement".
2. Tighten wheel bearing lock nut to specification, using a suitable torque wrench.

Tightening torque:
2.5 to 3.0 kg-m (18 to 22 ft-lb)

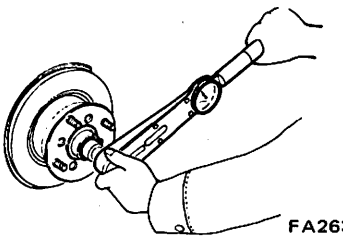


Fig. FA-2 Tightening wheel bearing lock nut

3. Rotate wheel hub a few turns in both directions to seat wheel bearing correctly. Then, retighten wheel bearing lock nut to the above torque.
4. Loosen wheel bearing lock nut 60 degrees.

Install adjusting cap and tighten within 15 degrees until grooves are aligned with hole in spindle.

5. Again spin wheel hub several turns in both directions to see if it rotates freely. Then, measure bearing preload using a spring balance as follows:

Wheel bearing preload:
- Adjustment with new grease seal:
  4.0 to 8.5 kg-cm
  (3.5 to 7.4 in-lb)
  As measured at wheel hub bolt:
  0.7 to 1.5 kg
  (1.5 to 3.3 lb)
- Adjustment with used grease seal:
  1.0 to 4.5 kg-cm
  (0.9 to 3.9 in-lb)
  As measured at wheel hub bolt:
  0.2 to 0.8 kg
  (0.4 to 1.8 lb)

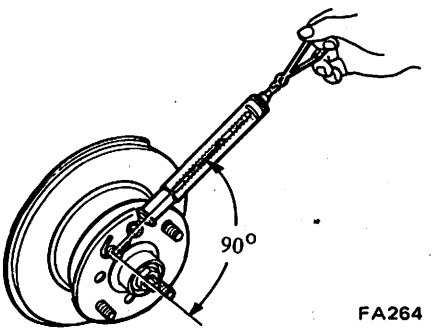


Fig. FA-3 Measuring bearing preload

Repeat above procedures until correct preload is obtained.

Note:
a. **To measure bearing preload, attach a spring balance to hub bolt and pull it at right angle to a line drawn through center of bearing and hub bolt to which it is attached.**
b. **The slightest shaft play cannot be tolerated here.**

6. Insert a new cotter pin with the legs through adjusting cap and spindle, spread legs away from each other against sides of adjusting cap to secure the installation.

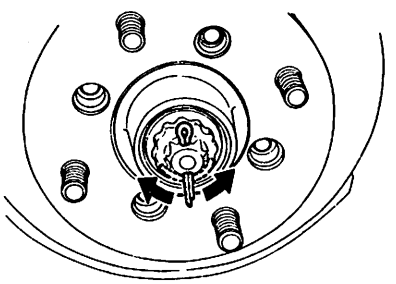


Fig. FA-4 Installing cotter pin

7. Install hub cap and wheel.

WHEEL ALIGNMENT

Correct front wheel alignment assures proper vehicle handling characteristics and minimum steering effort with the least amount of tire wear.

Before adjusting front wheel alignment, be sure to carry out a preliminary inspection of the front end parts as follows:

1. Tire pressure
2. Wheel bearings and spindle nuts
3 Steering gear play
4. Steering gear housing (loose at frame.)
5. Steering linkage and connections
6. Shock absorber action

When using the equipment for front wheel alignment inspection, follow the instructions furnished with the equipment.

Note: Inspection should be made with the car set level at curb weight.

Camber and caster

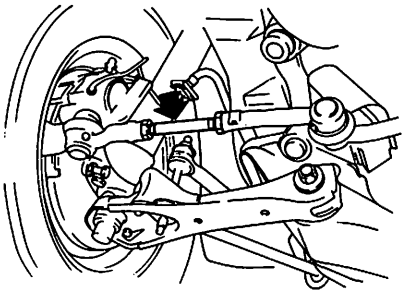
Camber and caster are preset at factory and cannot be adjusted.

Car requires only toe-in and leveling adjustments.

Toe-in

Measure toe-in and adjust if necessary. For adjustment, proceed as follows:

1. Turn steering wheel so that front wheels are pointed straight ahead. Then, check that steering gear is in straight ahead position.
2. The length of side adjusting rod (marked with an arrow) should be adjusted to specification by turning both side adjusting rods.



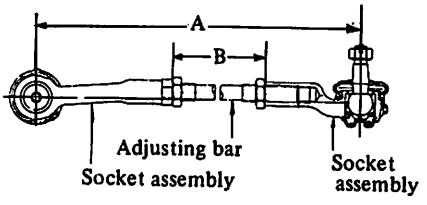
FA631

Fig. FA-5 Adjusting toe-in

Note: Both sides of the side rod ball joint center to center distances should be balanced first.

Standard distance between inner and outer ball stud centers:
A: 306 mm (12.05 in)

Standard distance between side rod ball joint sockets:
B: 102 mm (4.02 in)



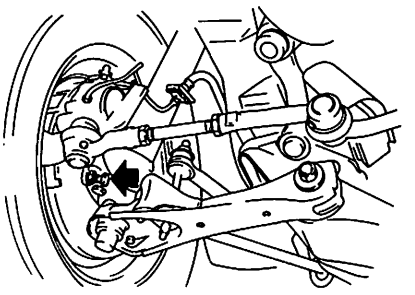
ST615

Fig. FA-6 Standard length of side rod

Steering angle

Check steering angle using the following procedures if necessary.

1. Place front wheels on turn table.
2. Turn adjusting bolts (indicated by arrow) in or out as required until correct turning angle is obtained.



FA632

Fig. FA-7 Adjusting steering angle

Steering angle

Inner wheel	33° to 37°
Outer wheel	28° to 32°

CAR LEVEL

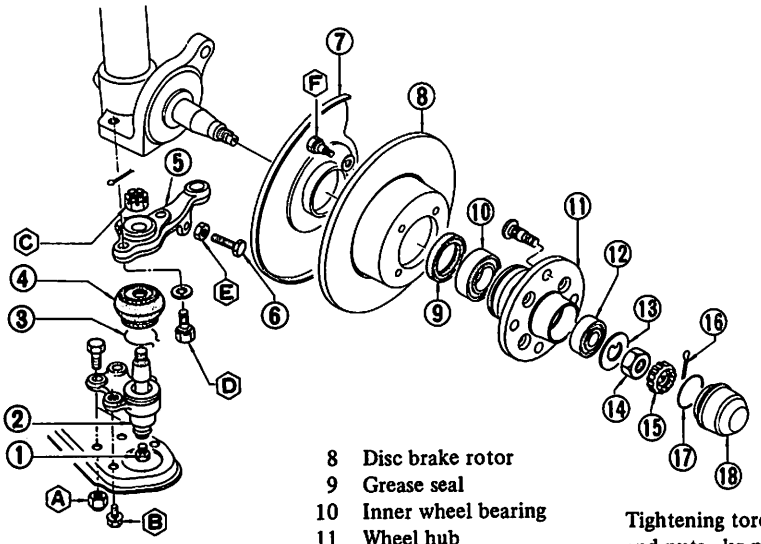
Adjustment can be made by selecting spring which will keep car in a normal, level position.

FRONT AXLE

CONTENTS

FRONT AXLE FA-5
REMOVAL FA-5
INSPECTION FA-6
INSTALLATION FA-6

FRONT AXLE



1 Filler plug
2 Lower ball joint
3 Dust cover clamp
4 Dust cover
5 Knuckle arm
6 Steering stopper bolt
7 Baffle plate
8 Disc brake rotor
9 Grease seal
10 Inner wheel bearing
11 Wheel hub
12 Outer wheel bearing
13 Wheel bearing washer
14 Wheel bearing lock nut
15 Adjusting cap
16 Cotter pin
17 O-ring
18 Hub cap

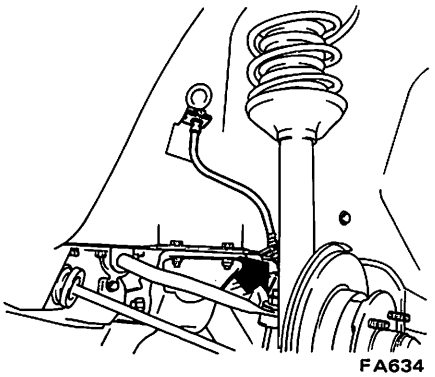
Tightening torque of bolts and nuts kg-m (ft-lb)
Ⓐ : 4.9 to 6.3 (35 to 46)
Ⓑ : 1.9 to 2.5 (14 to 18)
Ⓒ : 5.5 to 7.6 (40 to 55)
Ⓓ : 7.3 to 9.9 (53 to 72)
Ⓔ : 2.7 to 3.7 (20 to 27)
Ⓕ : 3.9 to 5.3 (28 to 38)

FA633

Fig. FA-8 Structural view of front axle

REMOVAL

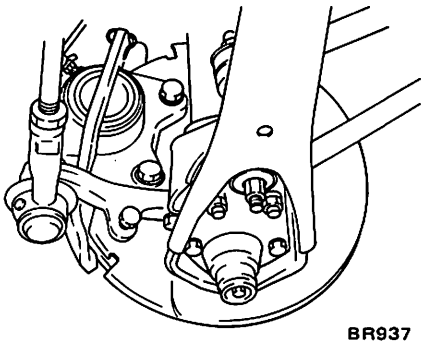
1. Jack up car until wheel drops to full down position; remove wheel.
2. Remove flare nut connecting brake hose to brake tube at the bracket on front strut; take out brake hose lock spring and plug up brake hose opening.



FA634

Fig. FA-9 Removing brake hose

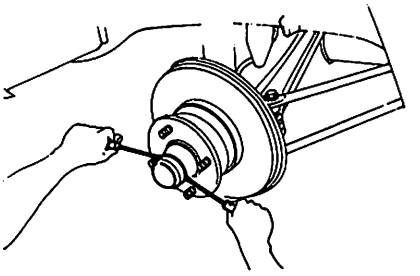
3. Remove bolts retaining brake caliper and take out caliper assembly.



BR937

Fig. FA-10 Removing brake caliper installation bolts

4. Work off hub cap from end of spindle using two screwdrivers or any other suitable tool as shown in Figure FA-11. If necessary, tap around it with a soft hammer while removing cap.

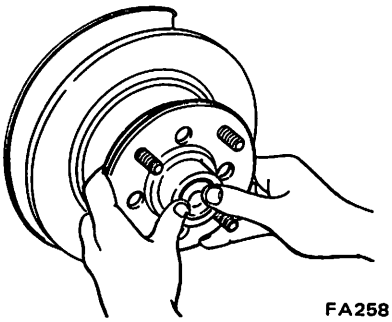


FA038

Fig. FA-11 Removing hub cap

Note: During this operation, use caution to avoid damaging O-ring.

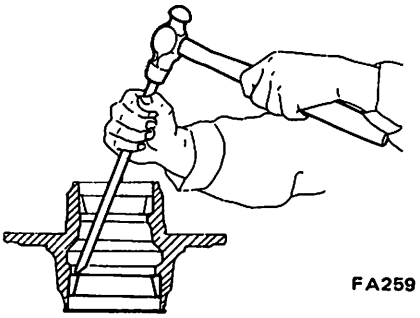
5. Pry off cotter pin; take out adjusting cap and wheel bearing lock nut.
6. Remove wheel hub from spindle with bearing installed.
7. Wheel hub may be removed together with disc rotor.



FA258

Fig. FA-12 Removing wheel hub

8. Utilizing two grooves inside hub, drive out wheel bearing outer race from hub with a brass drift.



FA259

Fig. FA-13 Removing wheel bearing outer race

9. Loosen four bolts securing brake disc in position; remove disc brake rotor from wheel hub assembly.

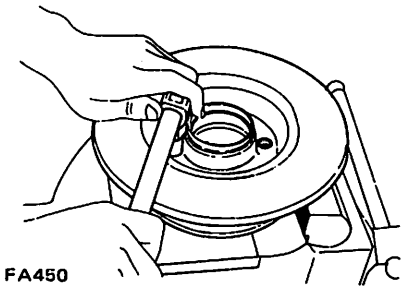


Fig. FA-14 Removing disc brake rotor

10. Loosen screws securing baffle plate in position; take out baffle plate.

INSPECTION

Wheel hub

Check hub for cracks by means of a magnetic exploration or dyeing test, and replace if cracked.

Grease seal

If grease leakage is detected during removal, replace seal.

Replace grease seal every disassembly even if it appears good.

Wheel bearing

Thoroughly clean grease and dirt from wheel bearing with cleaning solvent, and dry with compressed air free of moisture. Check wheel bearing to see that it rolls freely and is free from noise, crack, pitting, or wear. Also, check condition of outer race. Removal of outer race from hub is not necessary.

INSTALLATION

Install front axle in the reverse order of removal, noting the following:

1. Install baffle plate to knuckle spindle. Tighten screws to 0.32 to 0.44 kg-m (2.3 to 3.2 ft-lb).
2. Install disc brake rotor to wheel hub, tighten to 3.9 to 5.3 kg-m (28 to 38 ft-lb).
3. Install bearing outer race by tapping its outer periphery with a mallet, or using Front Wheel Bearing Drift ST35300000, until it is bottomed in hub.
4. Pack the inside of hub and hub cap with recommended multi-purpose grease to the described level.

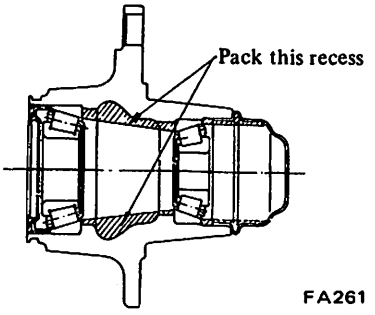


Fig. FA-15 Lubricating points of wheel hub

5. Pack cavities of each bearing cone with grease.



Fig. FA-16 Filling bearing cone with grease

6. Put inner bearing cone in hub and install a new grease seal. Be sure to lubricate sealing lips of the grease seal before installation.
7. Put hub assembly on spindle and then install outer bearing cone.
8. Apply sparingly grease to washer and threaded parts of spindle and spindle nut. Then, install washer and spindle nut. Adjust the installation as outlined under "Wheel Bearing Adjustment".

Note: In order to assure correct bearing preload and to extend service life of wheel bearings, be sure to avoid dirt and foreign particles getting in bearings, grease seal, washer and spindle nut.

9. After lowering car to the ground, tighten wheel nut, bleed brake.

FRONT SUSPENSION

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SPRING AND STRUT ASSEMBLY

DESCRIPTION

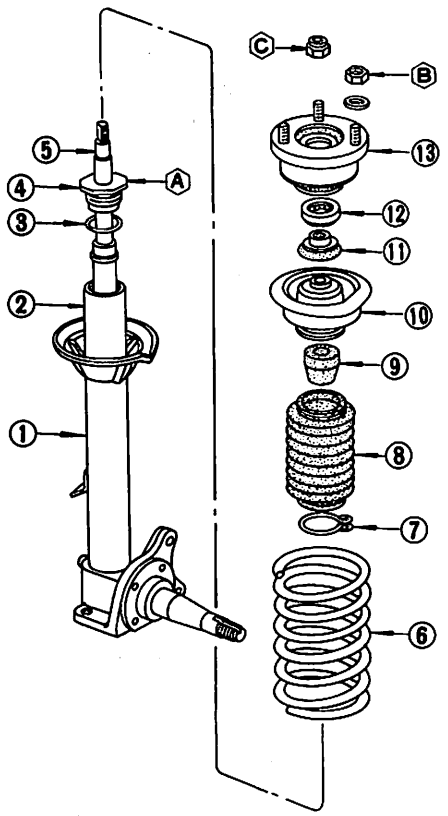
The front suspension employs struts right and left. Each strut consists of an outer casing, a piston, a piston rod and an inner cylinder.

The cylinder incorporates a piston rod guide at the top and a check valve at the bottom.

The piston rod, piston rod guide, cylinder and bottom valve should be handled as a matched set.

If any of these parts becomes faulty, all the parts must be replaced as a unit.

When a spring requires replacement, use the one having the same color identification. If this is not done, the car may not settle in a normal level posture.



1 Strut
2 Cylinder
3 O-ring
4 Gland packing
5 Piston rod
6 Coil spring
7 Ring
8 Dust cover
9 Bumper rubber
10 Spring seat
11 Dust seal
12 Bearing
13 Mounting insulator

Tightening torque of bolts and nuts kg-m (ft-lb)

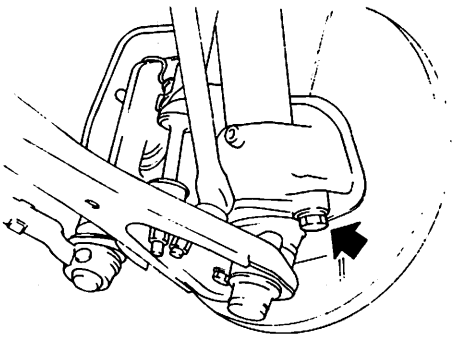
Ⓐ : 7.0 to 13.0 (51 to 94)
Ⓑ : 2.5 to 3.5 (18 to 25)
Ⓒ : 6.0 to 7.5 (43 to 54)

FA635

Fig. FA-17 Structural view of spring and strut assembly

REMOVAL

1. Jack up car and support it with safety stands. Remove wheel.
2. Loosen flare nut connecting brake hose to brake tube at the bracket on front strut. See Figure FA-9. Take out brake hose locking spring. Separate brake hose from brake tube.
3. Loosen flare nut securing brake tube to cylinder and then separate from brake cylinder.
4. Loosen bolts retaining caliper in place; take out caliper as an assembled unit.
5. Remove bolts connecting strut to knuckle arm.



FA636

Fig. FA-18 Removing bolts connecting knuckle arm

6. Detach knuckle arm from bottom of strut. This can be done by forcing transverse link down with a suitable bar.

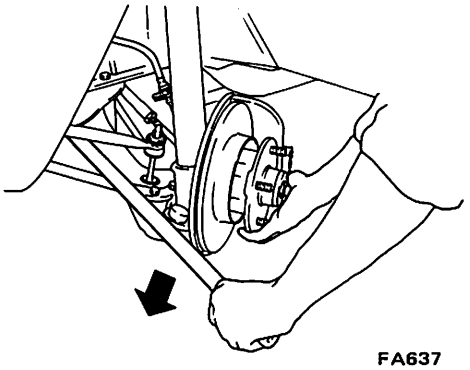

FA637

Fig. FA-19 Removing knuckle arm

7. Place jack under strut to receive its weight when nuts are removed.
8. Lift engine hood to gain access to nuts holding strut in place on car body.

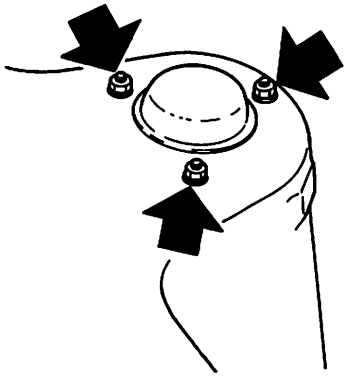

FA638

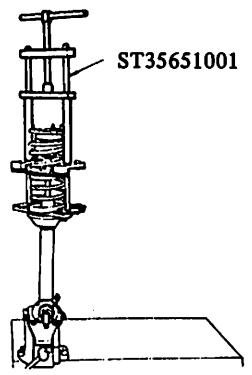
Fig. FA-20 Removing strut holding nuts

9. With springs attached, lower jack slowly while holding strut by hand; take out strut.

DISASSEMBLY

When disassembling a strut, caution should be exercised to prevent dirt and dust from getting inside strut. This dirt and dust is extremely abrasive and, if permitted to enter strut, causes internal leaks and premature wear of moving parts.

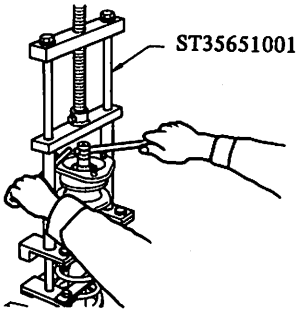
1. Install Strut & Steering Gear Housing Attachment KV48100300 on bottom of strut; secure above assembly in jaws of a suitable vise. See Figure FA-21.
2. Pry snap ring off dust cover.
3. Set up Spring Compressor ST35651001 on spring. Compress spring just far enough to permit turning of strut insulator by hand. See Figure FA-21.



FA273

Fig. FA-21 Installing strut in vise

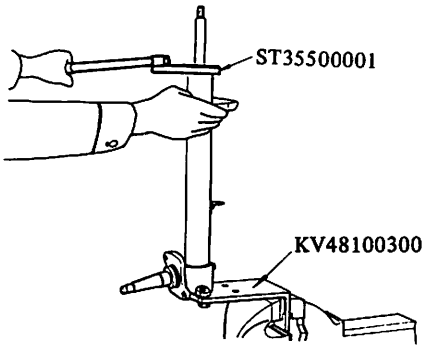
4. Remove self-locking nut.



FA433

Fig. FA-22 Removing self-locking nut

5. Take out strut insulator, strut bearing, oil seal, upper spring seat and bound bumper rubber in the order listed.
6. Remove spring from strut with Spring Compressor ST35651001 left on spring.
7. Retract piston rod by pushing it down until it bottoms. Without disturbing the above setting, remove gland packing with Gland Packing Wrench ST35500001.



FA274

Fig. FA-23 Removing gland packing

Note: Clean gland packing of mud and other accumulated foreign particles.

8. Remove O-ring from top of piston rod guide.
9. Lift out piston rod together with cylinder.

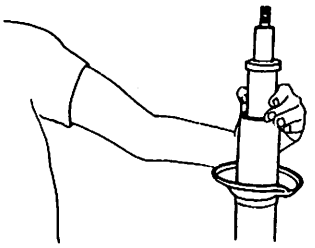

FA275

Fig. FA-24 Removing piston rod and cylinder

Note: Under no circumstances should piston and piston rod guide be removed from cylinder since these are adjusted to each other to provide precision mating surfaces and should be handled as a matched set.

10. Drain fluid thoroughly from inner cylinder. Use a suitable container to receive fluid drained.
11. Wash all metallic parts in cleaning solvent.
12. Drain fluid which collects inside outer casing thoroughly.

Note: This operation is very important since performance of strut varies with amount of fluid initially filled.

INSPECTION

1. Replace gland packing, O-ring and fluid with new ones or fresh oil whenever strut is disassembled.
2. Wash all parts, except for non-metallic parts, with solvent and dry with compressed air.
3. Blow dirt and dust off of non-metallic parts using compressed air.

(1) Outer casing

Check outer casing for evidence of deformation, cracking or other damage. If necessary, replace.

(2) Spindle

Check spindle for hair cracks on base and damaged threads. Replace strut if any of above conditions exceed limits.

(3) Strut mounting insulator

Replace if rubber and metal joints are melted or cracked. Rubber parts should be replaced if deteriorated.

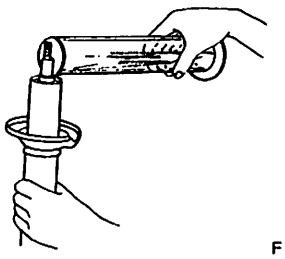
(4) Strut mounting bearing

Replace if inspection reveals abnormal noise or excessive rattle in axial direction.

ASSEMBLY

When assembling strut, be careful not to drop or scratch parts since they are precisely machined to very close tolerances. Before assembly, clean away all dirt to prevent any possible entry of dirt into strut.

1. Set Steering Gear Housing Attachment KV48100300 in place on bottom of strut and place attachment in jaws of a suitable vise.
2. Install piston rod and cylinder into place in outer casing.
3. Pour correct amount of fluid into outer casing.



FA330

Fig. FA-25 Filling outer casing with fluid

Note:

a. It is important that correct amount of fluid be poured into strut to assure correct damping force of shock absorber.

Amount of oil:

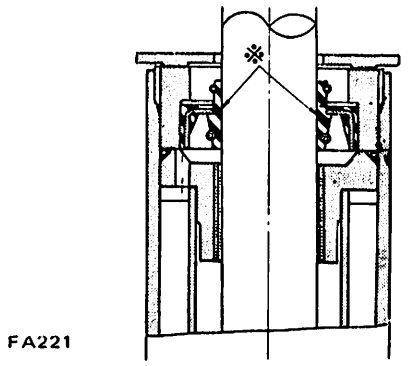
300 cc (18.31 cu in) for ATSUGI make

311 cc (18.98 cu in) for TOKICO make

b. Use "NISSAN GENUINE STRUT OIL" or equivalent.

4. Place rod guide on top of piston rod; install gland packing using Gland Packing Guide ST35530000.

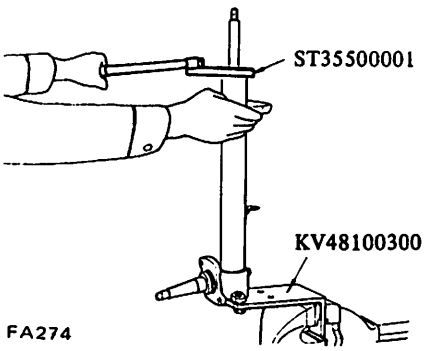
Lubricate sealing lip, asterisked in Figure FA-26, with recommended multi-purpose grease.



FA221

Fig. FA-26 Sectional view of gland packing

5. Tighten gland packing to 7 to 13 kg-m (51 to 94 ft-lb) torque.



FA274

Fig. FA-27 Tightening gland packing

Note:

a. When tightening gland packing, it is important that piston rod be extended approximately 120 mm (4.72 in) from end of outer casing to expel most of air out of strut.

b. Gland packing should be tightened to 7.0 to 13.0 kg-m (51 to 94 ft-lb) torque with the aid of Gland Packing Wrench ST35500001. When doing so, the amount of torque to be read beneath wrench needle should be modified according to the following formula:

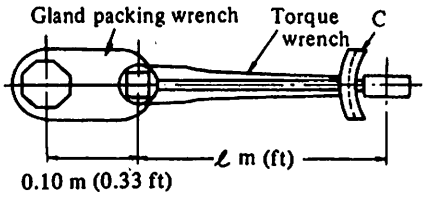
$$C\ \text{kg-m} = 7 \times \left(\frac{\ell}{\ell + 0.1}\right) \text{ or}$$

$$C\ \text{ft-lb} = 51 \times \left(\frac{\ell}{\ell + 0.33}\right)$$

Where,

C ..Value read on the torque wrench [kg-m (ft-lb)]

ℓ.. Effective length of torque wrench [m (ft)]



FA278

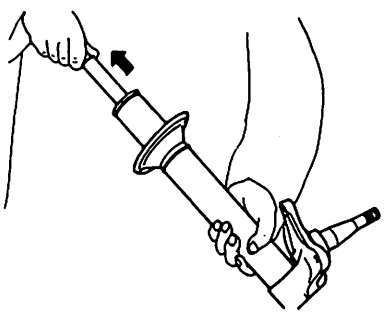
Fig. FA-28 Gland packing wrench

6. Remove Strut and Steering Gear Housing Attachment KV48100100.
7. After the above steps have been completed, air should be removed from shock absorber system in the following manner.

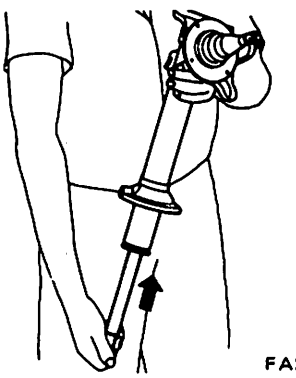
(1) Hold strut by hand with its spindle end facing down; without disturbing the above setting, pull out piston rod completely. Then, turn strut upside down so that spindle end is now facing up. Under this condition, retract piston rod all the way. See Figure FA-29.

(2) Repeat the above procedure several times so that air will be completely bled from strut.

(3) If, during the above step, an equal pressure is felt through the hand gripping piston rod on both strokes, it is an indication that air has been completely expelled from strut.



FA279



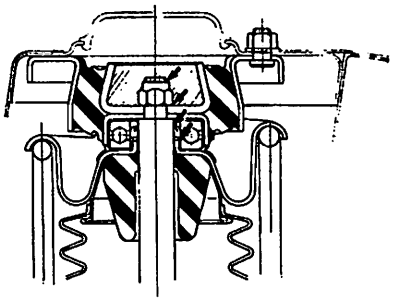
FA280

Fig. FA-29 Bleeding air from strut

8. Place Strut and Steering Gear Housing Attachment KV48100300 in jaws of a vise.
9. Before proceeding any further, pull piston rod all the way out to the limit of its stroke; install bound bumper rubber to prevent piston rod from falling by its own weight.
10. Place front spring on lower spring seat and compress spring with Spring Compressor ST35651001.

Install dust cover, upper spring seat, mounting bearing and insulator in the order listed.

11. Lubricate parts, indicated by arrow in Figure FA-30, with recommended multi-purpose grease.



FA211

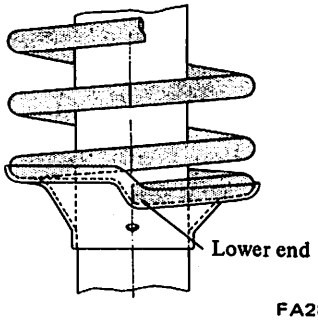
Fig. FA-30 Greasing mounting bearing and oil seal

Note:

a. Use care to avoid damaging piston rod during disassembly and assembly. Do not use pliers or the like to extract piston rod.

b. Install mounting bearing so that it points in correct direction. See Figure FA-30.

12. Tighten piston rod self-locking nut to 6.0 to 7.5 kg-m (43 to 54 ft-lb) torque.
13. After placing spring in position (Figure FA-31) between upper and lower spring seats, release compressor gradually.



FA282

Fig. FA-31 Installing front spring

Note: Ensure that spring is a correct one so as to obtain specified bumper height.

14. Raise bound bumper rubber to upper spring seat.

INSTALLATION

Install strut and spring assembly in the reverse order of removal, noting the following.

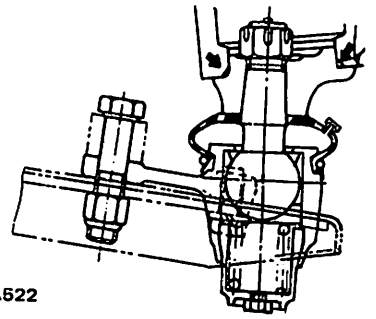
Tightening torque:
- Strut to body nuts:
  2.5 to 3.5 kg-m
  (18 to 25 ft-lb)
- Steering knuckle arm to strut:
  7.3 to 9.9 kg-m
  (53 to 72 ft-lb)
- Brake caliper to knuckle spindle:
  7.3 to 9.9 kg-m
  (53 to 72 ft-lb)
- Baffle plate to knuckle spindle:
  0.32 to 0.44 kg-m
  (2.3 to 3.2 ft-lb)

Note:

a. Replace self-locking nuts whenever strut is disassembled.

b. Make sure brake hose is secure and not twisted.

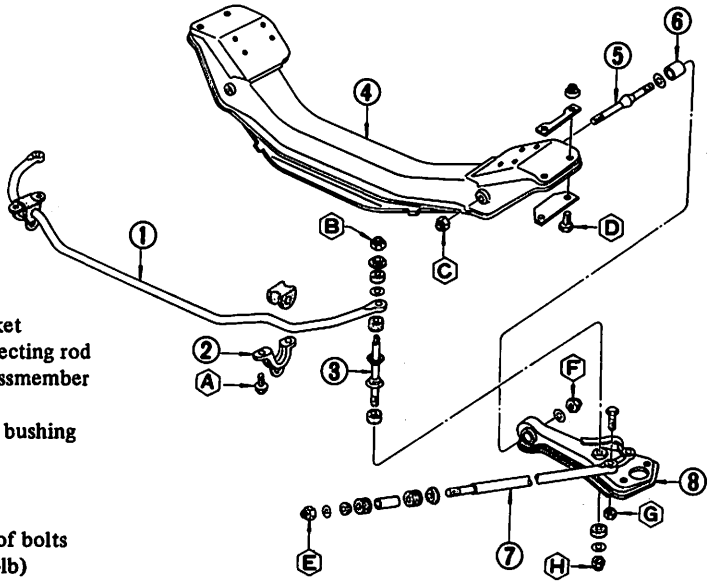
c. When installing steering knuckle arm to the bottom of strut assembly, apply the suitable sealing material to the portion indicated in Figure FA-32 so as to prevent ball stud from rust.



FA522

Fig. FA-32 Applying sealing material

TENSION ROD AND STABILIZER BAR



1 Stabilizer bar
2 Stabilizer bracket
3 Stabilizer connecting rod
4 Suspension crossmember
5 Spindle
6 Transverse link bushing
7 Tension rod
8 Transverse link

Tightening torque of bolts and nuts kg-m (ft-lb)

Ⓐ : 1.6 to 2.1 (12 to 15)
Ⓑ : 1.2 to 1.7 (9 to 12)
Ⓒ : 7.0 to 8.0 (51 to 58)
Ⓓ : 3.2 to 4.3 (23 to 31)
Ⓔ : 4.5 to 5.5 (33 to 40)
Ⓕ : 9.0 to 10.0 (65 to 72)
Ⓖ : 4.9 to 6.3 (35 to 46)
Ⓗ : 1.2 to 1.7 (9 to 12)

FA639

Fig. FA-33 Structural view of front suspension

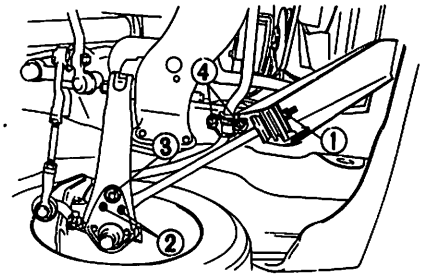
REMOVAL

1. Jack up car and support it with safety stands; remove wheel.
2. Remove under cover.
3. Back off nut ① securing tension rod to bracket, and remove bolts ②

which secure tension rod to transverse link. Tension rod can then be taken out.

4. Remove nut ③ connecting stabilizer connecting rod to transverse link.

5. Take out bolts ④ securing stabilizer bracket in position. Remove stabilizer from car frame.



FA640

Fig. FA-34 Removing stabilizer and tension rod

INSPECTION

1. Check tension rod, tension rod bracket and stabilizer for evidence of deformation and cracking; if necessary, replace.

2. Check rubber parts such as tension rod and stabilizer bushings to be sure they are not deteriorated or cracked.

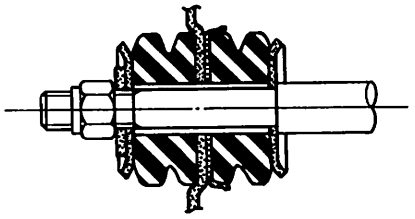
INSTALLATION

Install tension rod and stabilizer bar in the reverse order of removal, noting the following:

1. Ensure that stabilizer is correctly installed to the portion of the left and right sides.

2. Install stabilizer on tension rod brackets and tighten bolts securing tension rod bracket to body frame slightly.

3. Install tension rod and stabilizer connecting rod. Make sure that body side bushing is in correct position.



FA425

Fig. FA-35 Installing tension rod bushing

4. Examine if clearance between tension rod and stabilizer bar is equal on both sides.

5. Be sure that bolt attaching tension bracket is correctly tightened.

6. Do not tighten transverse link side bolt of tension rod without first tightening bolt securing tension rod to tension rod bracket.

Tightening torque:
- Stabilizer bracket bolt:
  1.6 to 2.1 kg-m
  (12 to 15 ft-lb)
- Stabilizer connecting rod nut:
  1.2 to 1.7 kg-m
  (9 to 12 ft-lb)
- Tension rod bracket bolt:
  3.2 to 4.3 kg-m
  (23 to 31 ft-lb)
- Tension rod installation nut:
  4.5 to 5.5 kg-m
  (33 to 40 ft-lb)
- Tension rod to transverse link bolt:
  4.9 to 6.3 kg-m
  (35 to 46 ft-lb)

TRANSVERSE LINK AND LOWER BALL JOINT

The transverse link is connected to the suspension member through a rubber bushing and to the strut through a ball joint.

The lower ball joint is assembled at the factory and cannot be disassembled. Lubricate ball joints with recommended multi-purpose grease every recommended maintenance interval.

REMOVAL

1. Jack up car and support it with safety stands; remove wheel.

2. Pry cotter pin off side rod socket ball joint. Remove castle nut and separate side rod socket from knuckle arm with Ball Joint Remover HT72520000.

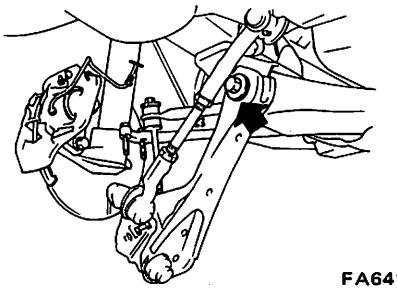
3. Loosen bolts holding knuckle arm in place. Separate knuckle arm from bottom end of strut. For details, refer to "Spring and Strut Assembly".

4. Separate tension rod, connecting rod and stabilizer bar from transverse link.

For detail, refer to section Tension Rod and Stabilizer (on preceding page) for Removal.

5. Remove bolt connecting transverse link to suspension crossmember after loosening nuts.

Remove transverse link with suspension ball joint and knuckle arm.



FA641

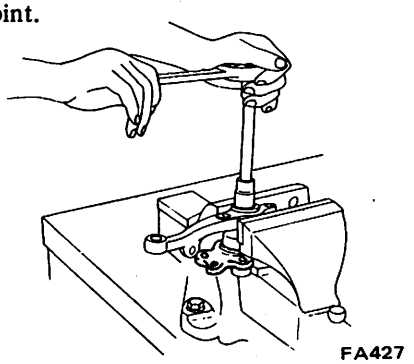
Fig. FA-36 Removing transverse link

6. Place transverse link in a vise, loosen bolt securing ball joint to transverse link and remove ball joint from transverse link with Ball Joint Remover HT72520000.

7. Place knuckle arm in a vise.

Pry cotter pin off castle nut on knuckle arm; loosen castle nut.

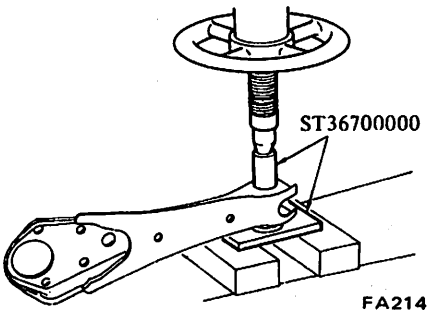
Remove knuckle arm from ball joint.



FA427

Fig. FA-37 Removing ball joint

8. Withdraw transverse link bushing from transverse link using Front Transverse Link Bushing Replacer Set ST36700000 and a press.



FA214

Fig. FA-38 Removing transverse link bushing

INSPECTION

Transverse link

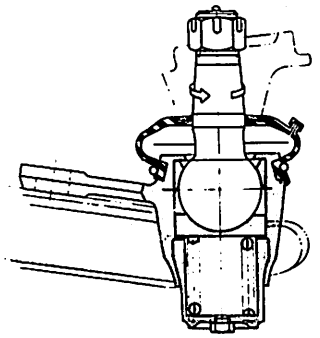
1. Check for signs of cracks, distortion or other damage. Replace if any of above conditions are beyond repair.
2. If rubber bushing shows evidence of cracking, replace with a new one.

Ball joint

1. Ball joint is assembled at the factory and cannot be disassembled. Check ball stud turning torque with nut in place on ball stud.

If excessively higher or lower than specifications and ball joint is properly lubricated, replace.

Turning torque:
New parts
75 to 125 kg-cm
(65 to 109 in-lb)
Used parts
More than 50 kg-cm (43 in-lb)



FA523

Fig. FA-39 Sectional view of lower ball joint

2. Check conditional dust cover. If found to be cracked excessively beyond use, replace ball joint with a new one.
3. Lubricate ball joint with recommended multi-purpose grease regularly.

To lubricate, remove plug and install grease nipple in its place.

Pump grease slowly until old grease is completely forced out. After greasing, reinstall plug.

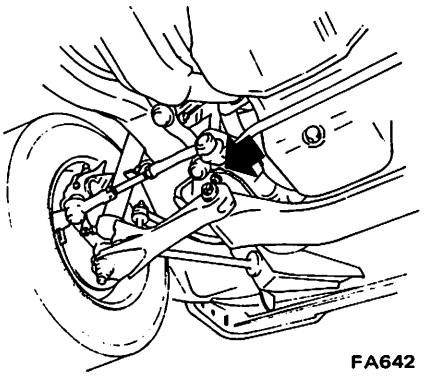
Note: When a high-pressure grease gun is used, operate the grease gun carefully so that grease is injected slowly and new grease does not come out from the clamp portion.

INSTALLATION

Install transverse link and lower ball joint in the reverse order of removal.
1. In rebushing link, use Front Transverse Link Bushing Replacer Set ST36700000.

Rebushing should also be in the manner that outer end of bushing is flush with end of link.
2. To install transverse link, first temporarily tighten nuts securing pin assembly which is connecting transverse link to suspension crossmember. Final tightening should be carried out with car under normal load.

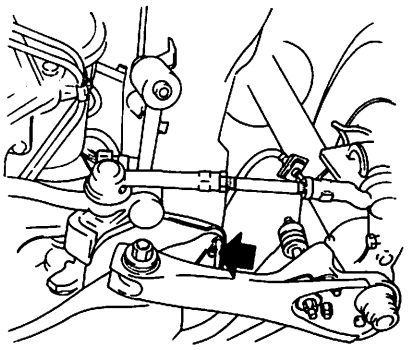
Tightening torque:
Ball joint to transverse link:
1.9 to 2.5 kg-m
(14 to 18 ft-lb)
Ball joint to transverse link with tension rod:
4.9 to 6.3 kg-m
(35 to 46 ft-lb)
Ball joint to knuckle arm:
5.5 to 7.6 kg-m
(40 to 55 ft-lb)
Transverse link to suspension crossmember securing nut:
9.0 to 10.0 kg-m
(65 to 72 ft-lb)
Knuckle arm securing bolt:
7.3 to 9.9 kg-m
(53 to 72 ft-lb)



FA642

Fig. FA-40 Removing engine mounting nuts

6. Using floor jack beneath center of suspension crossmember, raise car until wheel falls to full down position. Remove bolt, indicated by arrow, and separate suspension crossmember from car body.



FA643

Fig. FA-41 Removing suspension crossmember

SUSPENSION CROSSMEMBER

REMOVAL

1. Jack up car and support it with safety stands: remove wheels.
2. Remove under cover.
3. Remove transverse link. For details, refer to "Transverse Link and Lower Ball Joint".
4. With an overhead hoist and lifting cable, support weight of engine to remove load from mountings.
5. Remove engine mounting bolts and nuts indicated by arrows in the sketch below. Separete suspension crossmember from engine.

INSPECTION

Check suspension crossmember for evidence of deformation and cracking; if necessary, replace.

INSTALLATION

Install strut and spring assembly in the reverse order of removal, noting the following.

Tightening torque:
Suspension member to frame:
3.2 to 4.3 kg-m
(23 to 31 ft-lb)
Engine mounting nut:
1.3 to 1.7 kg-m
(9 to 12 ft-lb)

SERVICE DATA AND SPECIFICATIONS

Suspension type ..... Independent strut

Shock absorber type ..... Double-acting hydraulic

Wheel alignment (Unladen)

Camber	Caster	Kingpin inclination	Toe-in mm (in)
20′ to 1°50′	1°05′ to 2°35′	7°20′ to 8°20′	2 to 4 (0.08 to 0.16)

Turning angle of front wheel

Inside	33° to 37°
Outside	28° to 32°

Coil spring		Without air conditioner	With air conditioner
Wire diameter	mm (in)	12 (0.47)	12 (0.47)
Coil diameter	mm (in)	130 (5.12)	130 (5.12)
Free length	mm (in)	371 (14.61)	381 (15.00)
Spring constant	kg/mm (lb/in)	1.72 (96.3)	1.72 (96.3)
Install height/load	mm/kg (in/lb)	183/323 (7.20/712)	193/323 (7.60/712)

Strut assembly

Damping force at piston speed 0.3 m (1.0 ft)/sec.

Expansion	kg (lb)	32 to 48 (71 to 106)
Compression	kg (lb)	20 to 30 (44 to 66)

Wheel bearing

Rotation starting torque:		
Adjustment with new grease seal	kg-cm (in-lb)	4.0 to 8.5 (3.5 to 7.4)
As measured at wheel hub bolt	kg (lb)	0.7 to 1.5 (1.5 to 3.3)
Adjustment with used grease seal	kg-cm (in-lb)	1.0 to 4.5 (0.9 to 3.9)
As measured at wheel hub bolt	kg (lb)	0.2 to 0.8 (0.4 to 1.8)
Wheel bearing lock nut returning angle	degree	60

Tightening torque

Stabilizer bar		
Stabilizer bracket securing bolt	kg-m (ft-lb)	1.6 to 2.1 (12 to 15)
Stabilizer connecting rod nut	kg-m (ft-lb)	1.2 to 1.7 (9 to 12)
Tension rod		
Tension rod bracket bolt	kg-m (ft-lb)	3.2 to 4.3 (23 to 31)
Tension rod installation nut	kg-m (ft-lb)	4.5 to 5.5 (33 to 40)
Tension rod to transverse link bolt	kg-m (ft-lb)	4.9 to 6.3 (35 to 46)
Transverse link		
Transverse link to suspension crossmember securing nut	kg-m (ft-lb)	9.0 to 10.0 (65 to 72)

Ball joint		
Ball joint to transverse link	kg-m (ft-lb)	1.9 to 2.5 (14 to 18)
Ball joint to transverse link with tension rod	kg-m (ft-lb)	4.9 to 6.3 (35 to 46)
Ball joint to knuckle arm	kg-m (ft-lb)	5.5 to 7.6 (40 to 55)

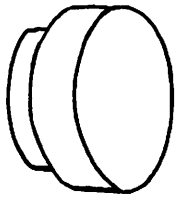
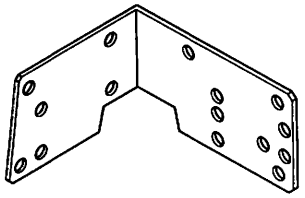
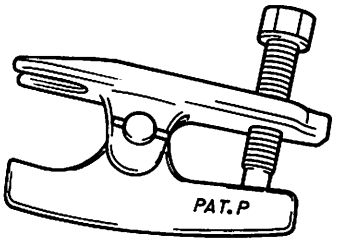
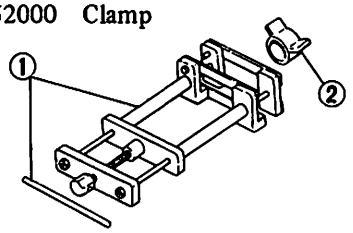
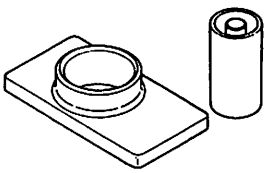
TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Vibration, shock and shimmying of steering wheel.	Improper tire pressure.	Adjust.
	Imbalance and deformation of roadwheel.	Correct the imbalance or replace.
Vibration: Loose connection of the serration parts and wear of each part of linkage cause vibration of front wheels, which in turn is transmitted to the steering wheel. This is very noticeable when travelling over rough roads.	Unevenly worn tire or insufficient lightening.	Replace or tighten.
	Improperly adjusted or worn front wheel bearing.	Adjust or tighten.
	Faulty wheel alignment.	Adjust.
	Worn fitting transverse link bushings.	Replace.
	Insufficiently tightened steering gear housing.	Retighten
Shock: When the front wheels are travelling over bumpy roads, the play of the steering linkage is transmitted to the steering wheel. This is especially noticeable when travelling on rough roads.	Wear of steering linkage.	Replace defective parts.
	Worn suspension ball-joint.	Replace.
	Excessive backlash due to improper adjustment of the retainer parts.	Adjust correctly.
Shimmying: Abnormal vibration of the front suspension group and the whole steering linkage, which occur when a specific speed is attained.	Damaged idler arm.	Replace.
	Worn column bearing, weakened column bearing spring, or loose clamp.	Replace or retighten.
	Malfunction of shock absorber (inside the strut) or loose installation bolts.	Replace or retighten.
	Imbalance of vehicle level.	Correct the imbalance.
Car pulls to right or left When driving with hands off the steering wheel over a flat road, the car gently swerves to right or left.	Improper tire pressure or insufficient tightening of wheel nuts.	Adjust or tighten.
	Difference in height of right and left tire treads.	Replace tires.
	Incorrect adjustment or abrasion of front wheel bearing.	Adjust or replace.
Note: A faulty rear suspension may also be the cause of this problem, therefore, see also the chapter dealing with the rear suspension.	Collapsed or twisted front spring.	Replace.
	Incorrect wheel alignment.	Adjust.
	Incorrect brake adjustment (binding).	Adjust.
	Worn rubber bushings for transverse link and tension rod.	Replace.
	Deformed steering linkage and suspension link.	Replace.
	Imbalance of car level.	Correct the imbalance.

Condition	Probable cause	Corrective action
Instability of car	Improper tire pressure.	Adjust.
	Worn rubber bushings for transverse link and tension rod.	Replace.
	Incorrect wheel alignment.	Adjust.
	Worn or deformed steering linkage and suspension link.	Replace.
	Incorrect adjustment of steering gear.	Adjust.
	Deformed or imbalanced wheel.	Correct or replace.
Stiff steering wheel (check-up procedure)	Improper tire pressure.	Adjust.
	Insufficient lubricants or mixing impurities in steering linkage or excessively worn steering linkage.	Replenish grease or replace the part.
Jack up front wheels, detach the steering gear arm and operate the steering wheel, and;	Stiff or damaged suspension ball-joint, or lack of grease.	Replace.
	Worn or incorrectly adjusted wheel bearing.	Replace or adjust.
If it is light, check steering linkage, and suspension groups.	Worn damaged steering gear and bearing.	Replace.
If it is heavy, check steering gear and steering column groups.	Incorrectly adjusted steering gear.	Adjust.
	Deformed steering linkage.	Replace.
	Incorrect wheel alignment.	Adjust.
	Damaged strut upper end bearing.	Replace.
	Damaged or stiff piston or shock absorber rod (in the strut).	Replace.
	Interference of steering column with turn signal switch.	Adjust.
Excessive steering wheel play	Incorrectly adjusted steering gear housing.	Adjust.
	Worn steering linkage.	Replace.
	Improperly fitted gear box.	Retighten.
	Incorrectly adjusted wheel bearing.	Adjust.
	Worn transverse link and tension rod fitting bushings.	Replace.
Noises	Improper tire pressure.	Adjust.
	Insufficient lubricating oil and grease for suspension ball joint and steering linkage, or their breakage.	Replenish lubricating oil and grease, or replace.
	Loose steering gear bolts, linkage and suspension groups.	Retighten.
	Damaged shock absorber (inside the strut).	Replace.
	Damaged wheel bearing.	Replace.
	Worn steering linkage and steering gear.	Replace.
	Worn transverse link and tension rod fitting bushings.	Replace.

Condition	Probable cause	Corrective action
	Broken or collapsed coil spring.	Replace.
	Loose strut mounting insulator tightening nuts.	Retighten.
	Loose stabilizer bolt.	Retighten.
Grating tire noise	Improper tire pressure.	Adjust.
	Incorrect wheel alignment.	Adjust.
	Deformed knuckle spindle and suspension linkage.	Replace.
Jumping of disc wheel	Improper tire pressure.	Adjust.
	Imbalance of wheels.	Adjust.
	Damaged shock absorber.	Replace.
	Damaged tire.	Replace.
	Deformed wheel rim.	Replace.
Excessively or partially worn tire.	Improper tire pressure.	Adjust.
	Incorrect wheel alignment.	Adjust.
	Worn wheel bearing.	Replace.
	Incorrect brake adjustment.	Adjust.
	Improper tire shifting (rotation).	Adjust.
	Rough and improper driving manner.	Drive more gently.

SPECIAL SERVICE TOOLS

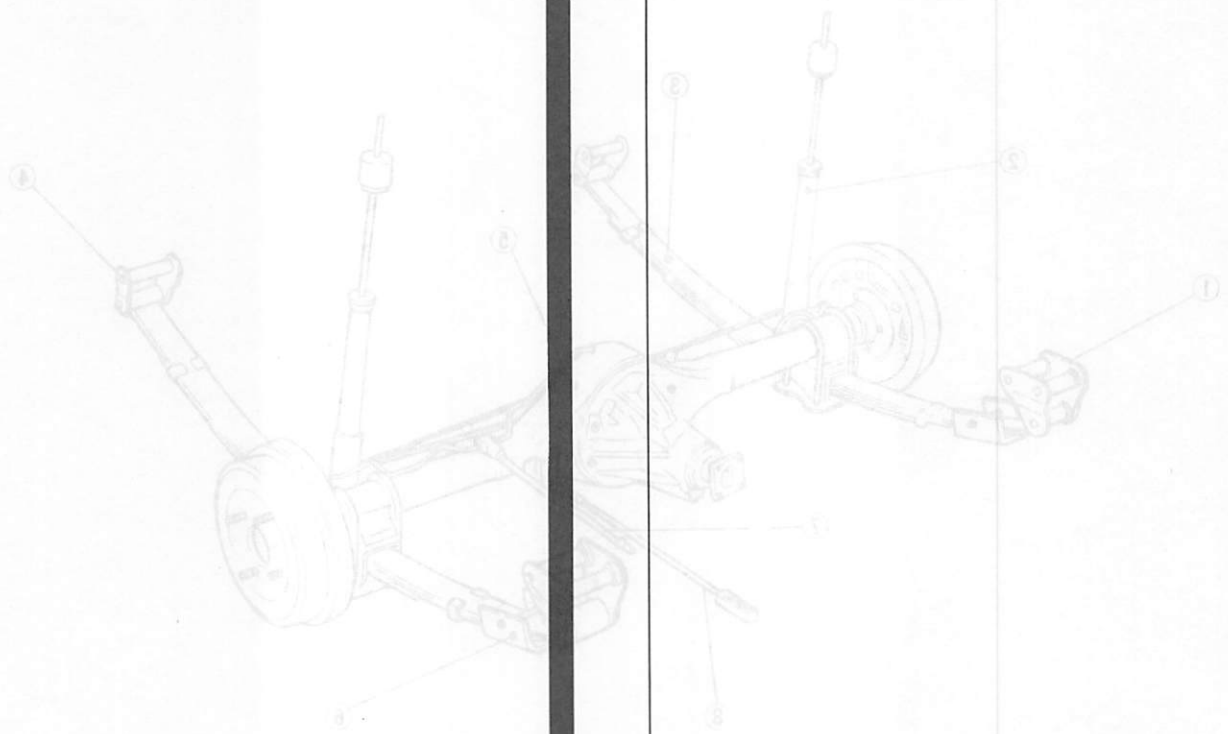
Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.
ST35300000 Front wheel bearing drift 	——— / Page FA-6	ST35530000 Gland packing guide 	J 25827 / Page FA-9
KV48100300 Strut and steering gear housing attachment 	J 25729 / Fig. FA-23 Fig. FA-27	HT72520000 Ball joint remover 	——— / Page FA-11
ST3565S001 Coil spring compressor set ① ST35651001 Coil spring compressor ② ST35652000 Clamp 	——— / Fig. FA-21 Fig. FA-22	ST36700000 Transverse link bushing replacer set 	J 25841 / Fig. FA-38 Page FA-12
ST35500001 Gland packing wrench 	J 25825 / Fig. FA-23 Fig. FA-27		

SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION RA

REAR AXLE & REAR SUSPENSION



RA

REAR AXLE AND SUSPENSION ..... RA- 2
REAR AXLE ..... RA- 3
REAR SUSPENSION ..... RA- 6
SERVICE DATA AND SPECIFICATIONS ..... RA- 8
TROUBLE DIAGNOSES AND CORRECTIONS ..... RA- 9
SPECIAL SERVICE TOOLS RA-10

REAR AXLE AND SUSPENSION

DESCRIPTION

The rear suspension is integrated with the rear axle assembly.

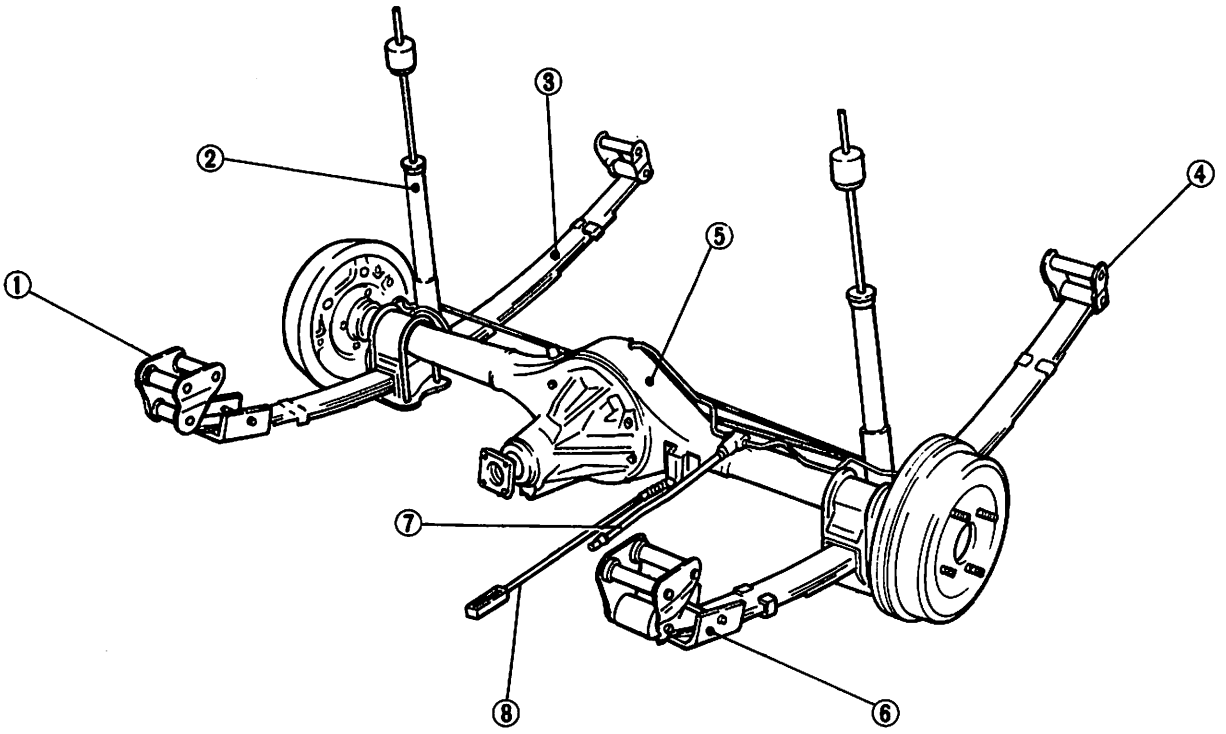
The rear axle assembly is of the semi-floating type in which the car weight is carried on the axle shafts through the bearings in the outer end of the rear axle case. The axle case is a "Banjo" type.

The rear axle assembly is attached to the frame through semi-elliptic leaf springs and shock absorbers.

Rubber bushings at each end of the leaf springs and shock absorbers, spring pad at spring seats and mass damper attached to leaf spring (on automatic transmission models), singly, or in combination, effectively absorb vibration and noise.

The rear axle shafts are floating fitted to the differential side gears through splines. The outer ends are supported at the ends of the rear axle case by a single set of sealed ball bearings.

The bearings are lubricated with recommended multi-purpose grease. The axle shaft oil seals are located inboard of the bearings. The bearings are secured against shaft shoulders by means of collars.



1 Front pin assembly
2 Shock absorber
3 Leaf spring
4 Shackle assembly
5 Rear axle case assembly
6 Mass damper (Automatic transmission models only)
7 Brake hose
8 Hand brake cable

RA423

Fig. RA-1 Rear axle and suspension assembly

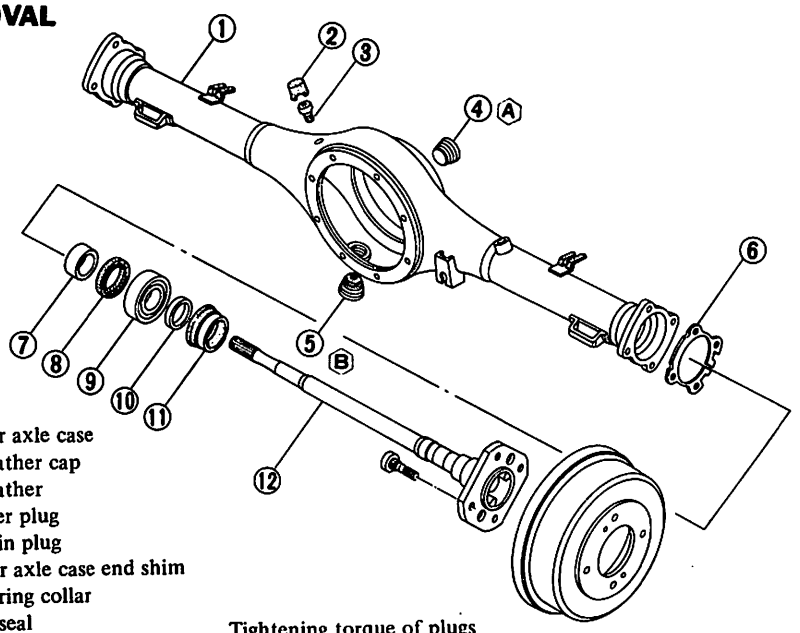
REAR AXLE

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REAR AXLE ASSEMBLY

REMOVAL



1 Rear axle case
2 Breather cap
3 Breather
4 Filler plug
5 Drain plug
6 Rear axle case end shim
7 Bearing collar
8 Oil seal
9 Rear axle bearing
10 Bearing spacer
11 Oil cutter
12 Rear axle shaft

Tightening torque of plugs
kg-m (ft-lb)
Ⓐ : 6.0 to 10.0 (43 to 72)
Ⓑ : 6.0 to 10.0 (43 to 72)

RA424

Fig. RA-2 Structural view of rear axle

It is not necessary to remove the rear axle assembly for minor repairs.

However, if the axle case is damaged, the rear axle assembly may be removed as follows.

1. Raise rear of car high enough to permit working under it. Place a jack under the center of axle case so it just starts to raise rear axle assembly.

Place stands under body member on both sides. Remove rear wheels.

2. Mark flange yoke of propeller shaft and companion flange of differential gear carrier for proper reassembly, then detach propeller shaft from differential carrier.

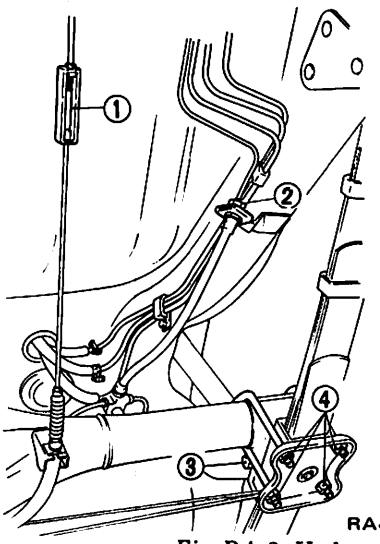
3. Disconnect hand brake cable by removing turn buckle ①. See Figure RA-3.

4. Remove flare nut ② connecting brake hose to brake pipe. Cover brake hose and pipe openings to prevent entrance of dirt. See Figure RA-3.

CAUTION:
When disconnecting brake tube, use suitable tube wrench. Never use open-end or adjustable wrench.

5. Disconnect shock absorbers at lower end ③ and push shock absorbers up out of the way. See Figure RA-3.

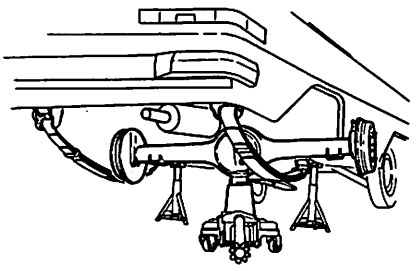
6. Lower jack under axle case. Remove U-bolts (spring clips) ④ to separate axle case from spring.



RA425

Fig. RA-3 Under view

7. Place a jack under the center of axle case. Pass axle case through space above spring, and take it out to the side.



RA426

Fig. RA-4 Removing rear axle assembly

INSTALLATION

Install the axle case assembly in the reverse order of removal, noting the following instructions.

CAUTION:
When installing brake tubes, use Flare Nut Torque Wrench GG94310000.

Tightening torque:
- U-bolt (spring clip):
  - 4.0 to 5.0 kg-m
  - (29 to 36 ft-lb)
- Shock absorber lower end bolt:
  - 3.6 to 4.5 kg-m
  - (26 to 33 ft-lb)
- Shock absorber upper end nut:
  - 1.9 to 2.4 kg-m
  - (14 to 17 ft-lb)
- Propeller shaft-to-companion flange connecting bolt:
  - 2.4 to 3.3 kg-m
  - (17 to 24 ft-lb)
- Flare nut:
  - 1.5 to 1.8 kg-m
  - (11 to 13 ft-lb)
- Wheel nut:
  - 8.0 to 9.0 kg-m
  - (58 to 65 ft-lb)

REAR AXLE SHAFT AND WHEEL BEARING

REMOVAL

Prior to removing rear axle, inspection should be made to determine if it has been working properly.

1. Raise rear end of car with jack and place stands under axle case on both sides. Remove road wheel and brake drum. Refer to Section BR for Removal of Brake Drum.
2. Pull off return spring ① and disconnect cross rod from lever by removing clevis pin ②. See Figure RA-5.
3. Disconnect flare nut ③.

CAUTION:
When disconnecting brake tube, use suitable tube wrench. Never use open-end or adjustable wrench.

Cover brake pipe openings to prevent entrance of dirt.

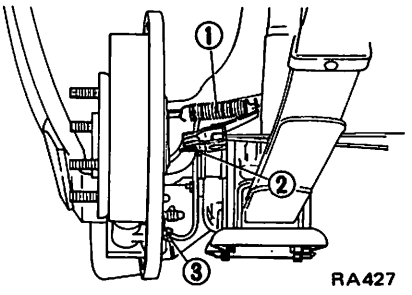


Fig. RA-5 Disassembling rear axle

4. Remove four nuts retaining brake disc to axle case.

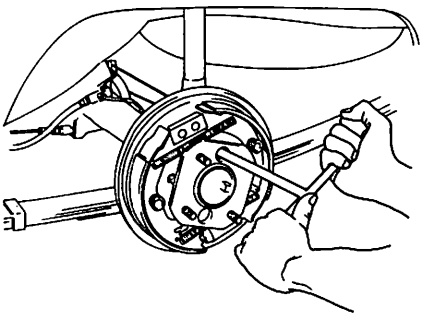


Fig. RA-6 Removing nuts

5. Pull out axle shaft assembly together with brake disc using Rear Axle Stand KV40101000 and Sliding Hammer ST36230000.

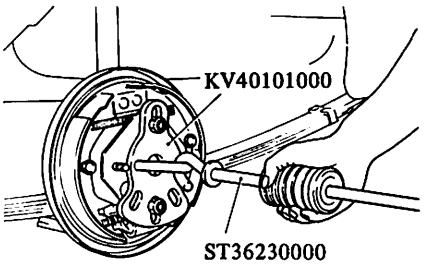


Fig. RA-7 Removing rear axle shaft assembly

6. Remove oil seal in axle case if necessary and install new seal. Insure against damaging the seal lip.
7. Cut bearing collar with cold chisel.

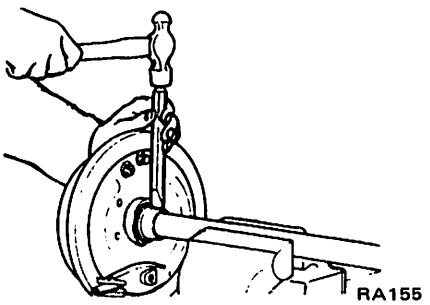


Fig. RA-8 Cutting bearing collar

CAUTION:
Take care not to damage axle shaft with cold chisel during operation.

8. Remove wheel bearing and collar using Rear Axle Shaft Bearing Puller HT72480000. Then take out brake disc.

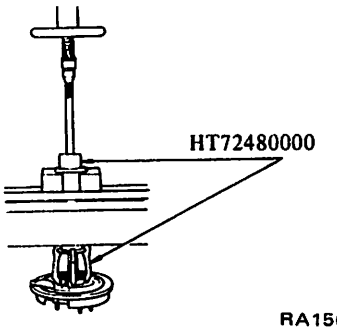


Fig. RA-9 Removing wheel bearing

INSPECTION

Inspect the following parts for fault and replace as necessary.

1. Check axle shaft for bending, cracks, damage, wear and distortion.
2. Check the lip of oil seal for damage, deformation and wear.
3. Check bearing for wear and damage.

INSTALLATION

Install in the reverse order of removal.

1. Install bearing spacer, bearing and new bearing collar onto axle shaft, and press bearing collar by specified load more than 4 tons using Rear Axle Shaft Bearing Collar Press Stand ST38210000. See Figure RA-10.

Note:
a. A new collar must be used. Before installing, clean collar and axle shaft.
b. Clean bearing, and pack with recommended multi-purpose grease.
c. Insert wheel bearing with seal side toward wheel.

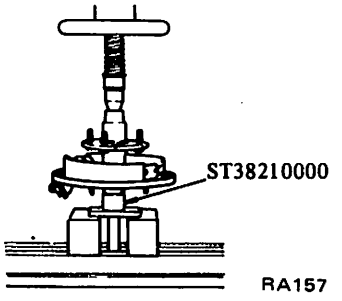


Fig. RA-10 Installing wheel bearing

2. Install oil seal using Rear Axle Oil Seal Drift KV40100300.
3. Pack cavity between seal lips with recommended multi-purpose grease when installing.
4. Use care not to damage oil seal when installing.
5. When inserting axle shaft into axle case, use Rear Axle Shaft Guide ST37840000 not to damage the sealing lips of oil seal.

To insert axle shaft into axle case, proceed as follows:

Install Rear Axle Shaft Guide ST37840000 on axle case.

Remove the guide when the distance "A" between the axle flange and bearing is 70 to 90 mm (2.76 to 3.54 in). See Figure RA-11.

Note: Apply multi-purpose grease to the outer periphery of the rear axle shaft bearing collar.

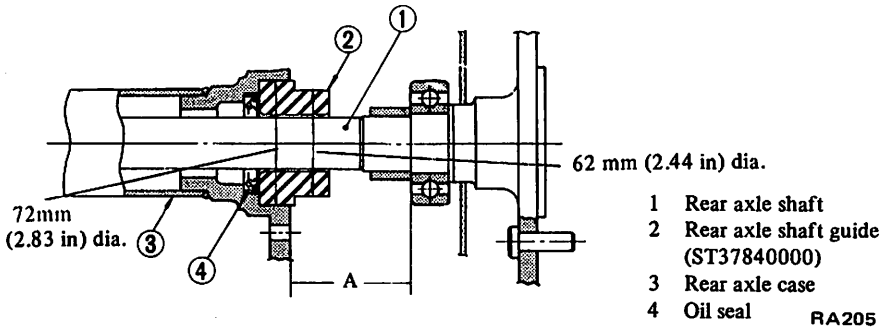


Fig. RA-11 Installing rear axle shaft

6. Adjust the gap "C" between wheel bearing and brake disc to within 0.1 mm (0.004 in) by use of shim.

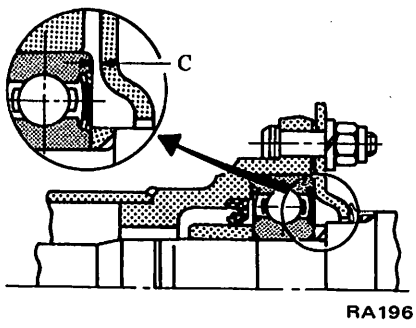


Fig. RA-12 Gap "C"

Rear axle case end shim

Thickness mm (in)
0.075 (0.0030)
0.150 (0.0059)
0.225 (0.0089)
0.300 (0.0118)

7. Measure axial end play of axle shaft with dial indicator. It should be within 0.45 mm (0.0177 in).

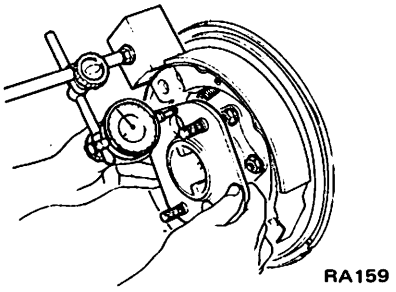


Fig. RA-13 Measuring end play

CAUTION:
When installing brake tube, use Flare Nut Torque Wrench GG94310000.

Tightening torque:

Brake disc fixing nut:
2.2 to 2.7 kg-m
(16 to 20 ft-lb)
Flare nut:
1.5 to 1.8 kg-m
(11 to 13 ft-lb)
Wheel nut:
8.0 to 9.0 kg-m
(58 to 65 ft-lb)

REAR AXLE CASE

REMOVAL

Rear axle case is removed and installed as follows:

1. Raise rear of car and place stands under body member on both sides.
2. Remove rear axle assembly (Refer to page RA-3 for Removal of Rear Axle Assembly).
3. Remove rear axle shaft on both sides (Refer to page RA-4 for Removal of Rear Axle Shaft and Wheel Bearing).
4. Remove differential gear carrier assembly.

An alternate procedure can be followed as listed below:

1. Raise rear of car and place stands under body member on both sides.
2. Remove rear axle shaft on both sides.
3. Remove differential gear carrier assembly.
4. Remove rear axle case.

INSPECTION

Check axle case for deformation or cracks and replace if necessary.

INSTALLATION

Installation can be accomplished following the reverse order of removal.

Tightening torque:

Differential carrier to axle case fix bolt:
1.7 to 2.5 kg-m
(12 to 18 ft-lb)
Oil drain and filler plug:
6.0 to 10.0 kg-m
(43 to 72 ft-lb)

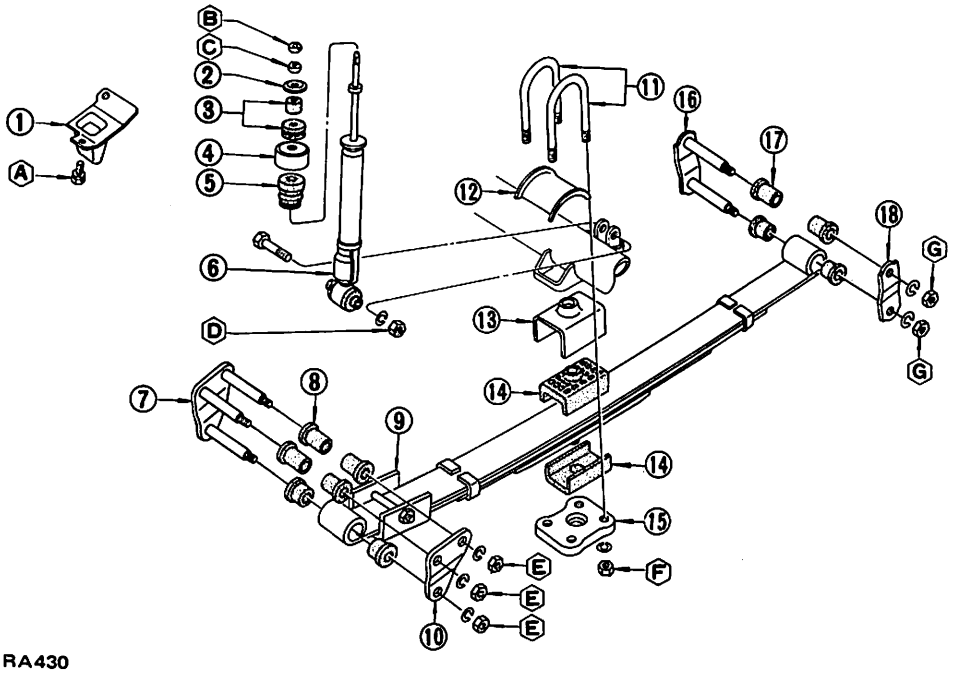
REAR SUSPENSION

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SHOCK ABSORBER RA-7
REMOVAL RA-7
INSPECTION RA-7
INSTALLATION RA-7

REAR SPRING

REMOVAL



1 Torque arrester
2 Special washer
3 Bushing
4 Bound bumper seat
5 Bound bumper
6 Shock absorber
7 Front pin assembly
8 Bushing
9 Mass damper (Automatic transmission only)
10 Front pin plate
11 U-bolt (Spring clip)
12 Rear axle plate
13 Location plate
14 Spring seat pad
15 Lower spring seat
16 Shackle pin assembly
17 Bushing
18 Shackle

Tightening torque kg-m (ft-lb)
Ⓐ : 0.6 to 0.8 (4.3 to 5.8)
Ⓑ : 1.9 to 2.4 (14 to 17)
Ⓒ : 1.5 to 2.0 (11 to 14)
Ⓓ : 3.6 to 4.5 (26 to 33)
Ⓔ : 1.6 to 2.0 (12 to 14)
Ⓕ : 4.0 to 5.0 (29 to 36)
Ⓖ : 1.6 to 2.0 (12 to 14)

Fig. RA-14 Structural view of rear suspension

1. Raise rear of car and place stands under body member on both sides.
2. Remove U-bolts (Spring clips).

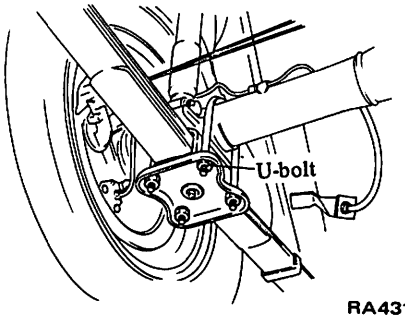


Fig. RA-15 Removing shock absorber lower end and U-bolts

3. Position jack under rear axle case. Raise jack and float axle case from spring.
4. Disconnect rear spring shackle by removing nuts. Suspend muffler with wire beforehand to facilitate removal as right shackle may hit muffler when removing bolt.

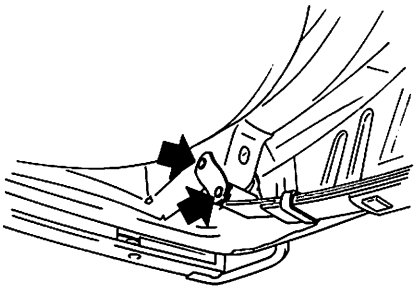


Fig. RA-16 Removing spring shackle

5. Disconnect spring front pin by removing nuts. Disconnecting spring from body.

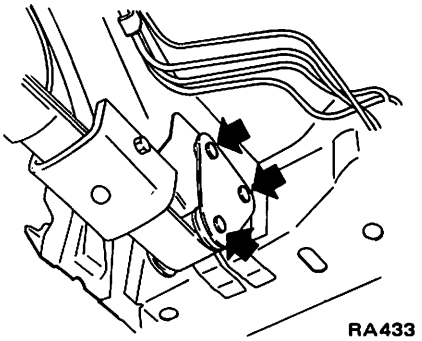


Fig. RA-17 Removing spring pin

6. Remove rubber bushing in spring if necessary and install new bushing.

INSPECTION

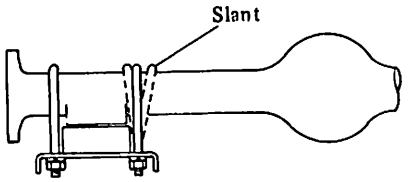
Clean all rust and dirt from spring leaves, using a wire brush if necessary.

1. Examine spring leaves for fractures or cracks.
2. Check front bracket and pin, shackle, U-bolts and spring seat for wear, cracks, bending and damaged threads. If faulty parts are found, replace with new ones.
3. Inspect all rubber parts for wear, damage, separation and deformation. Replace them if necessary.

INSTALLATION

Use the following procedure when tightening U-bolts (spring clips).

1. Apply soapy water to each side of spring pad.
2. Torque U-bolts to the specified setting, exercising care not to tilt U-bolts sideways.



RA434

Fig. RA-18 Installing U-bolt

3. Install four nuts in place by making them snug tight evenly (until the same number of threads is engaged), before tightening with a box wrench securely.
4. When tightening nuts with a box wrench, alternately turn them one full rotation at a time until the projection of each bolt head is within 3 mm (0.12 in) above the nut. Check again that the four nuts are torqued evenly.

Note:

a. Close adherence to the above instructions will add much to increased service life of U-bolts.

b. After installation, make sure that location plate and spring seat closely come into contact with each other.

Closely observe the following instructions.

c. Do not remove any particular U-bolt alone. Be sure to remove adjacent U-bolts too.

To install the part other than U-bolts, reverse the order of removal, closely observing the following.

Note:

a. Coat rubber bushes with soapy water, prior to assembly.

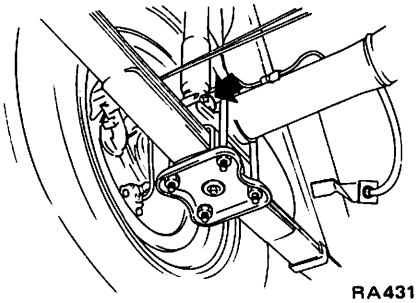
b. Car weight must be on rear wheels when tightening front pin, shackle and shock absorber lower end bolt in order to clamp rubber bushing in an unloaded position.

Tightening torque:
- Spring front pin nut:
  - 1.6 to 2.0 kg-m
  - (12 to 14 ft-lb)
- Spring shackle nut:
  - 1.6 to 2.0 kg-m
  - (12 to 14 ft-lb)
- U-bolt:
  - 4.0 to 5.0 kg-m
  - (29 to 36 ft-lb)

SHOCK ABSORBER

REMOVAL

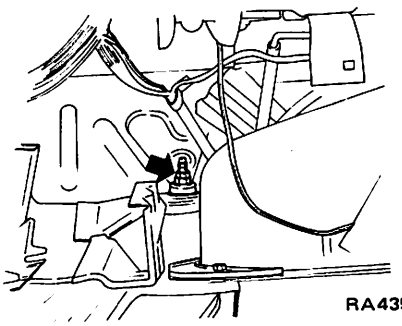
1. Raise rear of car and place stands under axle case on both sides.
2. Disconnect lower end of shock absorber by removing bolt at spring seat.



RA431

Fig. RA-19 Removing shock absorber

3. Disconnect upper end of shock absorber by removing nut at frame.



RA435

Fig. RA-20 Removing shock absorber

INSPECTION

1. Test shock absorber and compare with specifications given in "Service Data and Specifications." Replace if necessary.
2. Check for oil leakage and cracks. Also, check shaft for bending.
3. Inspect rubber bushings for damage, cracks and deformation. Replace parts if necessary.

INSTALLATION

Install shock absorber in the reverse order of removal, noting the following.

Note: **Car weight must be on rear wheels when tightening shock absorber upper and lower ends in order to clamp rubber bushings in an unloaded position.**

Tightening torque:
- Shock absorber upper end nut:
  - Securely tighten under side nut of double nuts until they will no longer go.
  - 1.9 to 2.4 kg-m
  - (14 to 17 ft-lb)
- Shock absorber lower end bolt:
  - 3.6 to 4.5 kg-m
  - (26 to 33 ft-lb)

CAUTION:

a. Shock absorber contains gas. When disposing of shock absorber, drill a hole at 50 to 60 mm (1.97 to 2.36 in) above lower part of shock absorber and let gas out of it.

b. Put on goggles during drilling operation as high pressure gas blows off.

c. Do not disassemble or throw shock absorber into flame.

SERVICE DATA AND SPECIFICATIONS

Rear leaf spring

Dimension		
Length x Width x Thickness Number of leaves	mm (in)	1,165 x 50 x 6 – 1 7 – 3 (45.87 x 1.97 x 0.24 – 1 0.28 – 3)
Free camber	mm (in)	131.5 (5.18)
Laden camber	mm/kg (in/lb)	35/233 (1.38/514)

Rear shock absorber

Stroke x Max. length	mm (in)	210 x 545 (8.27 x 21.46)
Damping force at 0.3 m/sec. (1.0 ft/sec.)		
Expansion	kg (lb)	50 to 70 (110 to 154)
Compression	kg (lb)	26 to 40 (57 to 88)

Rear axle shaft

End play	mm (in)	Within 0.45 (0.0177)
Thickness of rear axle case end shim	mm (in)	0.075 (0.0030) 0.150 (0.0059) 0.225 (0.0089) 0.300 (0.0118)

Tightening torque

Shock absorber upper end nut	kg-m (ft-lb)	1.9 to 2.4 (14 to 17)
Shock absorber lower end bolt	kg-m (ft-lb)	3.6 to 4.5 (26 to 33)
U-bolt (spring clip)	kg-m (ft-lb)	4.0 to 5.0 (29 to 36)
Spring front pin nut	kg-m (ft-lb)	1.6 to 2.0 (12 to 14)
Spring shackle nut	kg-m (ft-lb)	1.6 to 2.0 (12 to 14)
Mass damper nut	kg-m (ft-lb)	0.8 to 1.1 (5.8 to 8.0)
Brake disc (back plate) fixing nut	kg-m (ft-lb)	2.2 to 2.7 (16 to 20)
Differential gear carrier-to-axle case bolt	kg-m (ft-lb)	1.7 to 2.5 (12 to 18)
Propeller shaft-to-companion flange connecting bolt	kg-m (ft-lb)	2.4 to 3.3 (17 to 24)
Oil drain and filler plug	kg-m (ft-lb)	6.0 to 10.0 (43 to 72)
Wheel nut	kg-m (ft-lb)	8.0 to 9.0 (58 to 65)
Flare nut	kg-m (ft-lb)	1.5 to 1.8 (11 to 13)

TROUBLE DIAGNOSES AND CORRECTIONS

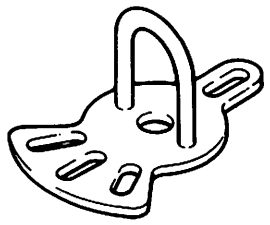
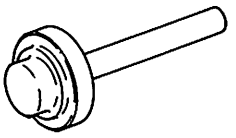
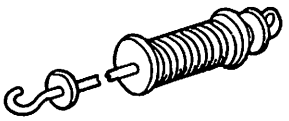
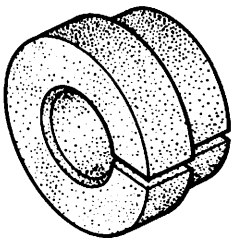
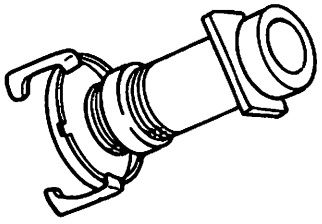
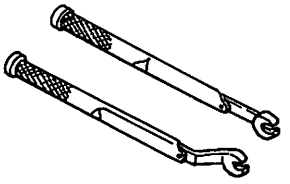
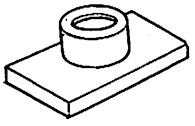
When rear axle and suspension are suspected of being noisy, it is advisable to make thorough test to determine whether the noise originates in the tires, road surface, exhaust, propeller shaft, engine, transmission, universal joint, wheel bearings or suspension.

Noise which originates in other places cannot be corrected by adjustment or replacement of parts in the rear axle and rear suspension.

In case of oil leak, first check to see if there is any damage or restriction in breather.

Condition	Probable cause	Corrective action
Noise	Loose wheel nuts.	Tighten.
	Loose securing bolts.	Tighten to the specified torque.
	Lack of lubricating oil or grease.	Lubricate.
	Broken shock absorber.	Replace.
	Incorrect adjustment of rear axle shaft end play.	Adjust.
	Damaged or worn wheel bearing.	Replace.
	Worn rear axle shaft spline.	Replace if necessary.
	Broken leaf spring.	Replace.
	Loose journal, connections, etc.	Tighten to the given torque.
	Imbalance of wheel and tire.	Balance.
	Damaged rubber parts such as leaf spring bush, shock absorber mounting bush, etc.	Replace.
	Deformed differential mounting member.	Replace.
Instability in driving	Loose wheel nuts.	Tighten.
	Worn shock absorber.	Replace.
	Spring wear.	Replace.
Oil leakage	Damaged or restricted air breather.	Clean or replace.
	Damaged oil seal on rear axle shaft.	Replace.
	Oil leakage from differential carrier.	Replace as required.
	Damaged grease seal of rear axle shaft.	Replace.

SPECIAL SERVICE TOOLS

Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.
KV40101000 Rear axle stand 	J 25604-01 Fig. RA-7	KV40100300 Rear axle oil seal drift 	J 25405 Page RA-5
ST36230000 Sliding hammer 	J 25840 Fig. RA-7	ST37840000 Rear axle shaft guide 	—— Fig. RA-11
HT72480000 Rear axle shaft bearing puller 	—— Fig. RA-9	GG94310000 Flare nut torque wrench 	—— Page RA-4 Page RA-5
ST38210000 Rear axle shaft collar press stand 	J 25869-01 Fig. RA-10		

SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION BR

BRAKE SYSTEM

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GENERAL DESCRIPTION

The S10 series models are equipped with hydraulically operated service brakes on all wheels and mechanically operated hand brakes on rear wheels.

The front brake is a single cylinder ANNETTE type disc brake.

The rear brake is a leading-trailing drum type with a fixed wheel cylinder and an auto-adjuster.

A brake booster, an NP (Nissan proportioning) valve and a fluid level warning device are installed in all models.

The tandem master cylinder is standard equipment on all models for increased safety.

The hand brake is a mechanical type which brakes the rear wheels. It is engaged or released through a center type lever. When this brake is engaged, the brake warning lamp, located on the instrument panel, will come on to indicate that the hand brake is in "engaged" condition.

ADJUSTMENT

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FIXED WHEEL CYLINDER REAR BRAKE BR-3
HAND BRAKE BR-3
HAND BRAKE WARNING LAMP SWITCH BR-3
BLEEDING HYDRAULIC SYSTEM BR-3

BRAKE PEDAL

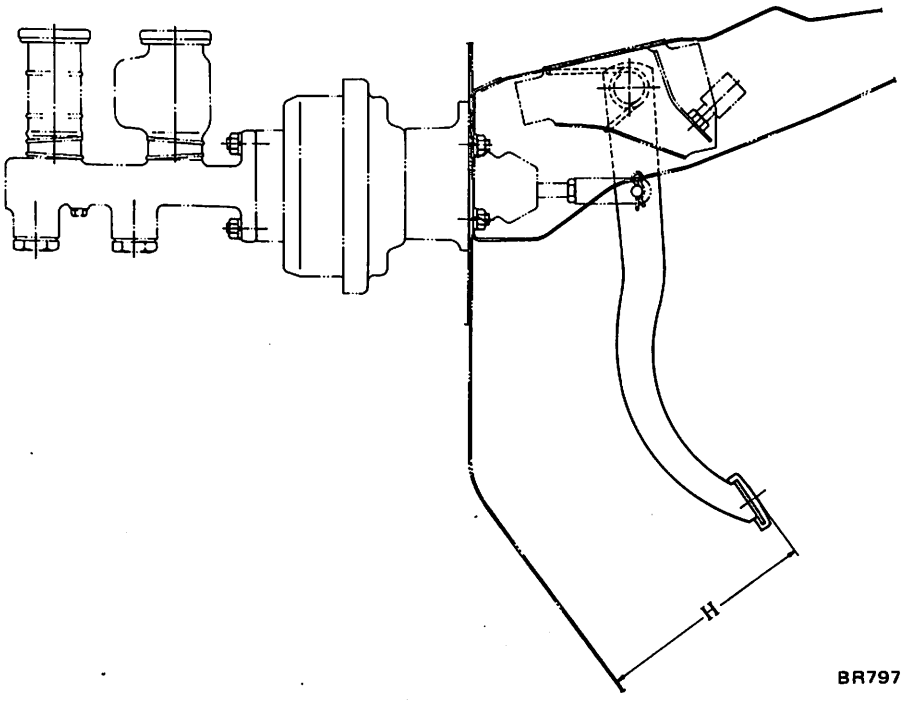


Fig. BR-1 Adjusting brake pedal

1. Adjust pedal height "H" to the specifications by moving stop lamp switch and operating rod.

Pedal height:
Manual transmission car:
175.5 mm (6.91 in)
Automatic transmission car:
177.5 mm (6.99 in)

Then secure stop lamp switch and operating rod.

Tightening torque:
Brake lamp switch lock nut
1.2 to 1.5 kg-m
(9 to 11 ft-lb)
Operating rod lock nut
1.6 to 2.2 kg-m
(12 to 16 ft-lb)

2. Check pedal free play is 1 to 5 mm (0.04 to 0.20 in).

If it exceeds the specification, adjust push rod length (refer to brake booster for adjustment) by removing master cylinder (refer to Master Cylinder for removal).

3. After adjustment, check "depressed" height is 75 mm (2.95 in) or more. If it is not, check brake system.

4. Make sure that no squeaking, twisting and interference does not occur.

FRONT DISC BRAKE

Front disc brake does not require adjustment under normal conditions since pad to rotor clearance is automatically adjusted by elasticity of piston seal.

REAR BRAKE

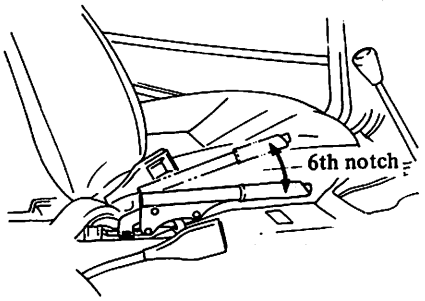
FIXED WHEEL CYLINDER REAR BRAKE

Adjustment is not necessary under normal conditions since brake drum-to-shoe clearance is automatically compensated for by operating hand brake.

When brake drum-to-shoe clearance is correct, operating noise of adjuster is not heard even if hand brake is operated.

HAND BRAKE

1. Adjust rear brake shoe to drum clearance before adjusting hand brake.
2. Adjust front cable adjusting nut at center lever so that when hand brake control lever is pulled by a force of 11 to 15 kg (24 to 33 lb) a lever stroke of 80 mm (3.15 in) (the sixth notch from the completely released lever position) is obtained.



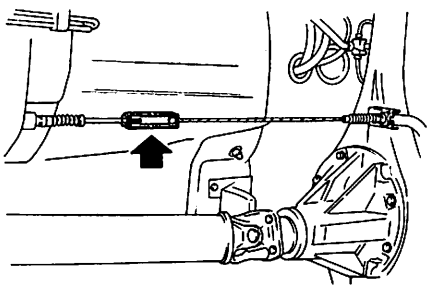
BR929

Fig. BR-2 Hand brake stroke

3. After the above adjustment has been made, operate the lever 2 times at a force of from 25 to 30 kg (55 to 66 lb) so as to seal it properly.

Adjust again as described above (item 2).

4. Then tighten lock nut securely.



BR930

Fig. BR-3 Adjusting hand brake

5. Replace front cable if adjustment is no longer effective on its threaded end.
6. After returning hand brake control lever to its position, ensure that:

- All rear brake toggle levers return to their original positions. (For fixed wheel cylinder on rigid axle models)
- Rear cables are not slack.

HAND BRAKE WARNING LAMP SWITCH

Bend hand brake warning lamp switch plate down so that brake warning light comes on when ratchet at hand brake lever is moved back one notch and goes out when returned to its original position.

BLEEDING HYDRAULIC SYSTEM

Hydraulic brake system must be bled whenever any line has been disconnected or air has in some way entered system.

"Spongy" pedal action is an indication that air has entered brake system.

Bleeding hydraulic system deserves much attention as it is an essential element in regular brake servicing.

1. Clean all dirt around master cylinder reservoir, remove cylinder cover and top up reservoir with recommended brake fluid.

CAUTION:
Do not mix two different brand brake fluid.

2. Thoroughly clean mud or dust from bleeder valve so that outlet hole is free from foreign materials. Install a bleeder hose on bleeder valve.

Dip other end of hose into brake fluid bled in a container.

3. Depress brake pedal two or three times and then keep pedal fully depressed.
4. With brake pedal fully depressed, open bleeder valve to exhaust air.

Note:

a. **Carefully monitor brake fluid level at master cylinder during bleeding operation.**
b. **Do not re-use brake fluid drained during bleeding operation.**
c. **Bleed air in the following sequence.**
   Master cylinder → Rear wheel → front wheel
d. **Be careful not to splash brake fluid on painted areas.**

5. Close bleeder valve quickly as brake pedal is on down stroke.
6. Allow brake pedal to return slowly with bleeder screw closed.
7. Repeat bleeding operations until no air bubbles show in hose.

Note:

a. **Brake fluid containing air is white and contains air bubbles.**
b. **Brake fluid containing no air runs out of bleeder valve in a solid stream free of air bubbles.**

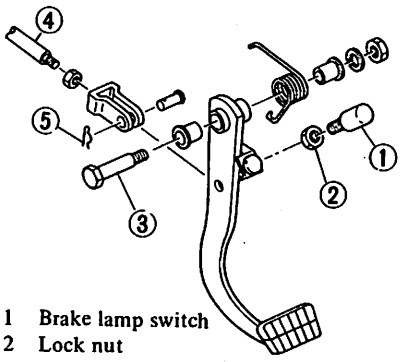
8. Repeat steps above on remaining brake line to expel air.

SERVICE BRAKE

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BRAKE PEDAL



1 Brake lamp switch
2 Lock nut
3 Fulcrum shaft
4 Brake operating rod
5 Snap-ring

BR549

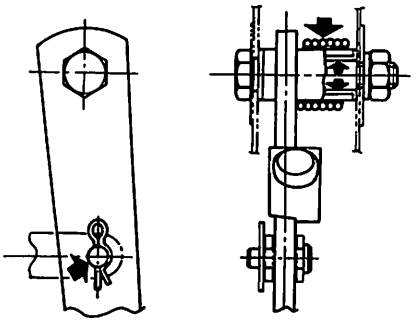
Fig. BR-4 Brake pedal

REMOVAL

1. Remove snap pin installed at the end of clevis pin. Draw out clevis pin and separate pedal from brake booster.
2. Remove nut securing fulcrum pin and draw out fulcrum pin. Then brake pedal can be taken out along with return coil spring.

INSPECTION

Check brake pedal for the following items, servicing as necessary.
1. Check brake pedal for bend.
2. Check return springs for fatigue.
3. Check clevis for deformation and crack at welded part.



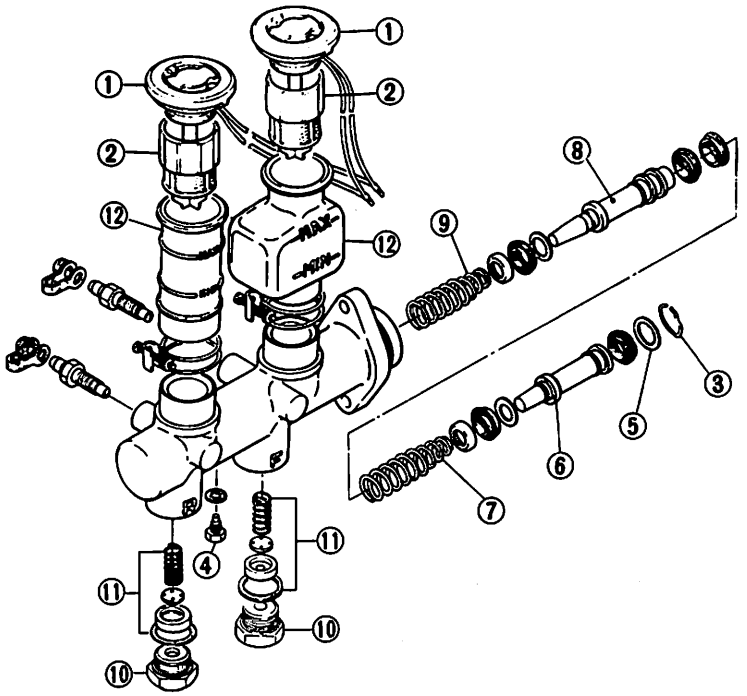
BR550

Fig. BR-5 Lubricating points

INSTALLATION

Install brake pedal following the reverse procedure of removal, paying attention to the following items.
1. Apply coating of recommended multi-purpose grease to sliding portion and return coil spring.
2. Be careful that head of fulcrum pin does not get on lock tongue of pedal bracket. Tighten nut to 1.9 to 2.4 kg-m (14 to 17 ft-lb).
3. Insert clevis pin through brake pedal from right to left side.
4. Adjust brake pedal, referring to Brake Pedal Adjustment, page BR-2.

MASTER CYLINDER



1 Reservoir cap
2 Filter
3 Stopper ring
4 Stopper screw
5 Stopper
6 Primary piston assembly
7 Primary piston return spring
8 Secondary piston assembly
9 Secondary piston return spring
10 Plug
11 Check valve
12 Reservoir

BR931

Fig. BR-6 Exploded view of master cylinder

REMOVAL

1. Disconnect wiring to brake fluid level gauge.
2. Disconnect front and rear brake tubes from master cylinder.

Note: **Before disconnecting brake tubes, be sure to use a container to receive draining brake fluid. Use of rags is also suggested to keep adjacent parts and area clean.**

CAUTION:
When removing brake tubes, use suitable tube wrench.

3. Remove master cylinder securing nut. Then master cylinder can be taken out.

DISASSEMBLY AND ASSEMBLY

Disassembly

1. Remove reservoir caps and filters and drain out brake fluid.
2. Pry off stopper ring, using a screwdriver.
3. Remove stopper screw and take out stopper, primary piston assembly, spring, and secondary piston assembly, in the order shown.

Note: **Discard caps if they are removed from piston assemblies and use new ones.**

4. Unscrew plugs to gain access to check valve for disassembling.

Notes:
a. **Never detach reservoir tanks. If they are removed for any reason, discard them and install new ones.**
b. **Do not remove or disassemble brake fluid level gauge.**

Assembly

Assemble master cylinder following the reverse procedure of disassembly, paying particular attention to the following notes:

Note:
a. **Replace gaskets and packing with new ones.**
b. **Apply brake fluid or rubber grease to sliding contact surfaces of parts to facilitate assembly of master cylinder.**
c. **The brake master cylinder is available in both NABCO make and TOKICO make. There is no interchangeability of repair kits or component parts between NABCO and TOKICO makes.**
When replacing the repair kit or component parts, ascertain the brand of the brake master cylinder body. Be sure to use parts of the same make as the former ones.

INSPECTION

Thoroughly clean all parts in a suitable solvent and check them for wear or damage. Replace any part that is faulty.

CAUTION:
Use brake fluid or alcohol. When alcohol is used for cleaning these parts, do not immerse them in it any longer than 30 seconds. After parts are cleaned, dry with compressed air.

1. Check cylinder and pistons for evidence of abnormal wear or damage. Replace if found faulty.
2. Check piston-to-cylinder clearance. If it is more than 0.15 mm (0.0059 in), replace either piston or cylinder.
3. Check springs for weakness, fatigue or damage. Replace if necessary.
4. When master cylinder is disassembled, be sure to discard caps and valves. Replace any other parts which show evidence of deformation, wear or other damage.
5. Replace damaged oil reservoirs and caps.

INSTALLATION

Install master cylinder following the reverse procedure of removal.

Bleed air out of master cylinder by loosening bleeder screw after it is installed in its original position.

Tightening torque:
Brake master cylinder securing nut:
0.8 to 1.0 kg-m
(5.8 to 7.2 ft-lb)
Brake tube connector:
1.5 to 1.8 kg-m
(11 to 13 ft-lb)

CAUTION:
When installing brake tubes, use Flare Nut Torque Wrench GG94310000.

BRAKE FLUID LEVEL GAUGE

Operation

The float lowers as brake fluid level becomes low. The magnet then closes the reed switch, lighting the brake fluid level warning lamp.

Inspection

1. Disengage hand brake control lever.
2. Raise cap and make sure that hand brake warning lamp goes on when float comes into contact with stopper.

BRAKE LINE

Hydraulic brake lines vary according to brake type and steering wheel position.

REMOVAL

1. Remove flare nuts on both ends, and remove retainers and clips.

CAUTION:
When removing brake tubes and hoses, use suitable tube wrench.
Never use open end or adjustable wrench.

2. To remove brake hose, first remove flare nut securing brake tube to brake hose and withdraw lock spring. End of hose can then be removed from bracket. Next remove brake hose. Do not twist brake hose.

INSPECTION

Check brake lines (tubes and hoses) for evidence of cracks, deterioration or other damage. Replace any faulty parts.

If leakage occurs at end around joints, re-tighten or, if necessary, replace faulty parts.

INSTALLATION

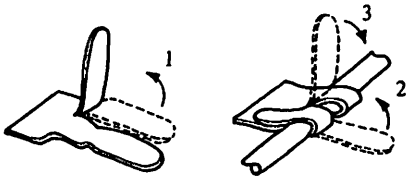
Pay particular attention to following instructions when installing brake lines.

1. Leave a sufficient space between brake lines and adjacent parts so that brake lines are completely free from vibration during driving.
2. Be careful not to warp or twist brake hoses.
3. When installing brake tube, observe the following:
- Brake booster to tube
  15 mm (0.59 in) min.
- Speedometer cable to tube
  10 mm (0.39 in) min.
- Body panel to tube
  2.5 mm (0.098 in) min.
- Rear shock absorber to tube
  10 mm (0.39 in) min.
- Hand brake return spring to tube
  10 mm (0.39 in) min.

4. Always fasten brake tubes to mounting clips where necessary.

Above rear axle are two double clips which should be used to secure brake tubes in manner described below.

Bend short clip straight up. With brake tube on long clip, bend clip up and around tube. Finally, wrap short clip around tube to secure the installation.



BR141

Fig. BR-7 Fastening brake tube securely with double clip

5. Do not tighten brake line mounting flare nut excessively.

Tightening torque:
Brake tube flare nut:
1.5 to 1.8 kg-m
(11 to 13 ft-lb)
Brake hose connector:
1.7 to 2.0 kg-m
(12 to 14 ft-lb)
3-way connector bolt:
1.7 to 2.0 kg-m
(12 to 14 ft-lb)

CAUTION:
When installing brake tubes, use Flare Nut Torque Wrench GG94310000.

6. Upon completion of installation of brake lines, bleed air out of brake lines.

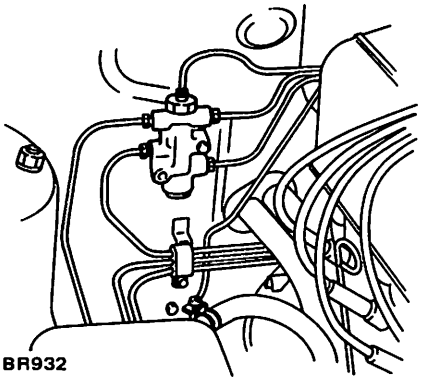
NP-VALVE

DESCRIPTION

The NP-valve completely separates the front and rear brake lines, allowing

them to function independently, and preventing the rear brakes from locking before the front brakes.

Damage, such as brake line leakage, in either the front or rear brake system will not affect the normal operation of the system.



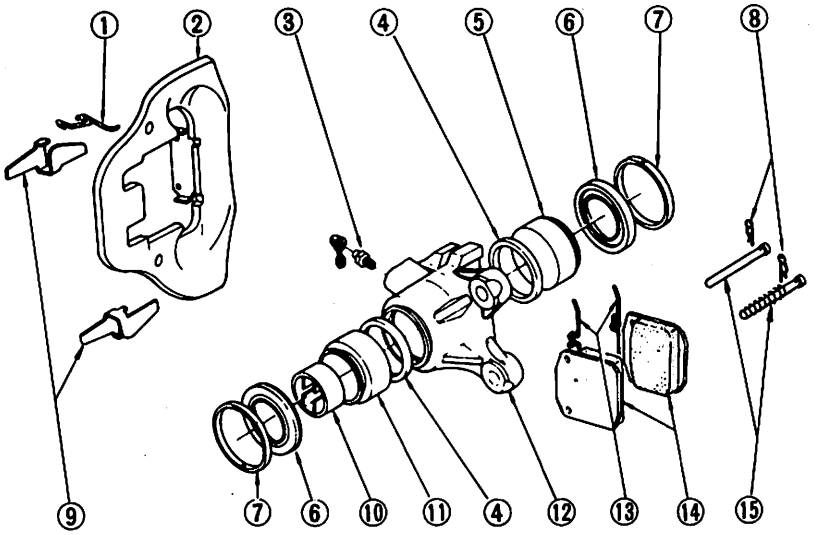
BR932

Fig. BR-8 NP-valve

FRONT DISC BRAKE

DESCRIPTION

The front disc brake is an ANNETTE type which has two pistons on one side of the brake rotor. With the aid of the yoke, the pads clutch the rotor equally from both sides. Brake adjustment is not necessary because pad clearance is automatically adjusted due to the elasticity of the piston seal.



1	Bias spring	5	Piston B	9	Yoke spring	13	Pad spring
2	Yoke	6	Boot	10	Bias ring	14	Pad
3	Bleeder	7	Retaining ring	11	Piston A	15	Pin
4	Piston seal	8	Clip	12	Cylinder body		

BR801

Fig. BR-9 Exploded view of front disc brake

PAD REPLACEMENT

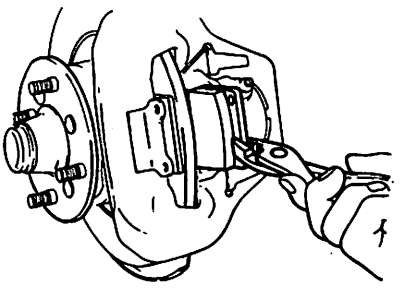
Removal

1. Jack up front of car and support it with safety stands. Remove front wheels.
2. Remove clips, and pull out pins, extracting coil spring and pad springs by hand.

Note: Check to ensure that pad springs rebound easily.

3. Detach pads from caliper assembly with pliers.

CAUTION:
After removing pads, do not depress brake pedal since piston will jump out.



BR933

Fig. BR-10 Removing pad

Inspection

1. Clean pads with cleaning solvent.

CAUTION:
Do not use mineral oil to clean pads.

2. When pads are heavily fouled with oil or grease or when pad is deteriorated or deformed, replace it.
3. When thickness of friction material is less than 1.6 mm (0.063 in), replace pads.

Note: **Always replace pads with 4-pad kit, using genuine parts or equivalent.**

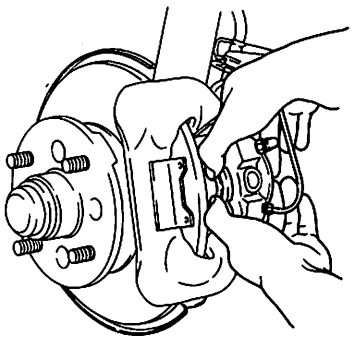
4. Check rotor, referring to following page BR-9 for Inspection.

Installation

1. Clean and apply P.B.C. grease to yoke guide groove of cylinder body, sliding contact portions of yoke, and end surface of piston.

Note:
a. **Do not use common brake grease.**
b. **Be careful not to get brake grease on rotor and pads.**

2. Loosen air bleeder and push piston B (outer piston) in cylinder until the end surface of piston B coincides with the end surface of retaining ring on boot. Then inner pad can be installed.

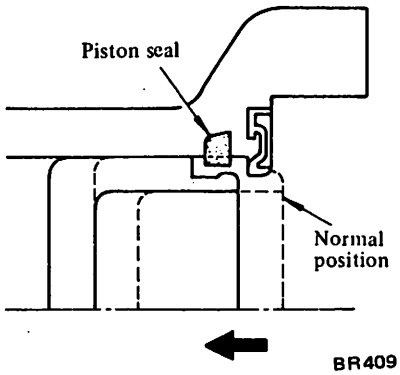


BR934

Fig. BR-11 Pushing piston

Note: When worn out pads are replaced with new ones, brake fluid may overflow reservoir. While replacing pads keep loosening bleeder to release brake fluid.

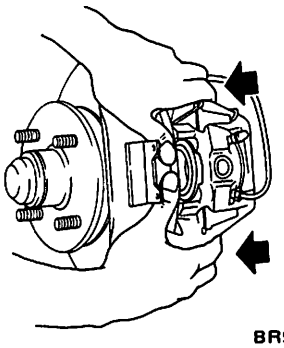
CAUTION:
Piston can be easily pushed in by hand, but if pushed too far, groove of piston will go inside of piston seal as shown in Figure BR-12. At this point, if piston is pressured or moved, piston seal will be damaged. If piston has been pushed in too far, remove caliper assembly and disassemble it. Then, push piston out in direction shown by arrow. Assemble it again, referring to following section.



BR409

Fig. BR-12 Position for pushing piston

3. Push piston A (inner piston) in cylinder by pulling yoke as shown in Figure BR-13. The outer pad can then be installed.

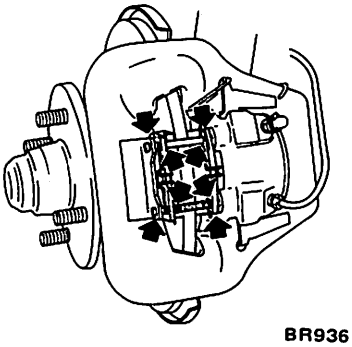


BR935

Fig. BR-13 Pulling in piston A

4. Coat the following points with pad grease.
- Yoke-to-pad clearance
- Pad pin-to-pad clearance

Note: Do not grease friction face of pad.



BR936

Fig. BR-14 Greasing points

5. After installing pads, install pad spring, pin and coil spring, and fix with clip.
6. Depress brake pedal several times, and pads will settle into proper position.

Add brake fluid to reservoir tank of master cylinder.

Note: If necessary, bleed brake system.

7. Install wheels and lower car to ground.

REMOVAL AND INSTALLATION

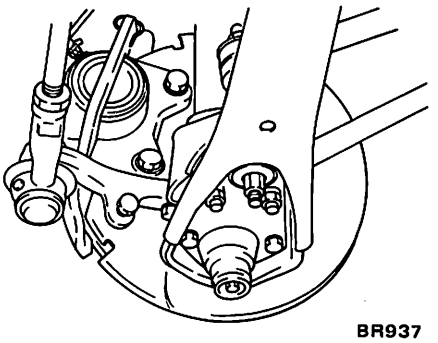
Removal

1. Jack up front of car and support it with safety stands. Remove front wheels.
2. Remove brake tube from caliper assembly.

Note: Plug up hole in caliper and brake tube so that brake fluid does not flow out.

CAUTION:
When removing brake tube, use suitable tube wrench. Never use open-end or adjustable wrench.

3. Remove claiper assembly from knuckle spindle.



BR937

Fig. BR-15 Detaching brake caliper assembly

4. If necessary, remove rotor as follows:
(1) Remove hub cap, cotter pin and adjusting cap.
(2) Loosen bearing lock nut and remove wheel hub with rotor.
(3) Secure wheel hub in a vice, loosen bolts and remove rotor from wheel hub.

Installation

1. Install rotor and wheel hub in reverse order of removal. Adjust wheel bearing preload correctly, referring to Section FA for Adjustment.

Tightening torque:
Rotor to wheel hub:
3.9 to 5.3 kg-m
(28 to 38 ft-lb)

2. Using a dial gauge, measure run-out of rotor at circumference of 200 mm (7.87 in). If it exceeds 0.12 mm (0.0047 in), machine reconditioning or replacement is required.

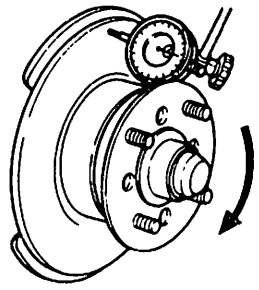

BR571

Fig. BR-16 Measuring runout of rotor

3. Install caliper assembly to knuckle spindle.

Tightening torque:
Caliper to knuckle spindle:
7.3 to 9.9 kg-m
(53 to 72 ft-lb)

4. Install brake tube and bleed brake system.

Tightening torque:
Brake tube flare nut:
1.5 to 1.8 kg-m
(11 to 13 ft-lb)
Air bleeder:
0.7 to 0.9 kg-m
(5.1 to 6.5 ft-lb)

CAUTION:
When installing brake tube, use Flare Nut Torque Wrench GG94310000.

DISASSEMLY

1. Drain brake fluid from cylinder body.
2. Wipe off dust and mud from caliper assembly.
3. Remove pad and push both pistons. Refer to page BR-7 for Pad Replacement.
4. Place yoke in a vise as sketched below, and tap the top of yoke lightly with a hammer. The cylinder will then separate from yoke.

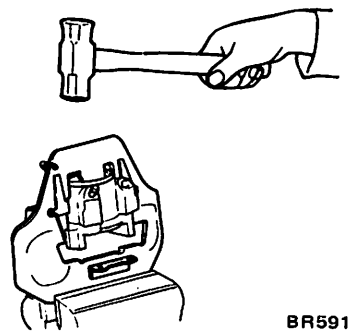
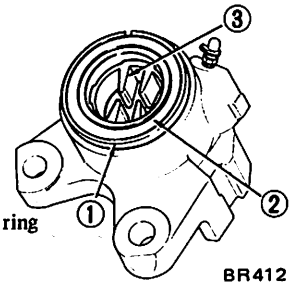

BR591

Fig. BR-17 Tapping yoke

5. Remove bias ring from piston A.
6. Remove retaining rings and boots at the end of both pistons A and B.
7. Push out pistons in one direction.
8. Remove piston seals.

CAUTION:
Be careful not to damage piston and cylinder body.

9. Remove yoke spring from yoke.



1 Retaining ring
2 Boot
3 Bias ring
BR412

Fig. BR-18 Cylinder body and piston

INSPECTION

Clean all parts and check as follows:

CAUTION:
Clean rubber parts with alcohol or brake fluid, not with mineral oil.

Cylinder body

1. Check inside surface of cylinder for score, rust, wear, damage or presence of foreign substances. If any surface fault is detected, replace cylinder body.
2. Minor damage from rust of foreign substances may be eliminated by polishing surface with a fine emery cloth. If damage is major, cylinder assembly must be replaced.

Yoke

Check for wear, cracks or other damage. Replace if any fault is detected.

Piston

Check piston for score, rust, wear, damage or presence of foreign substances. Replace if any fault is detected.

CAUTION:
Do not use emery cloth on piston surface.

Piston seal, dust cover and bias ring

Replace piston seal, dust cover and bias ring at each disassembly.

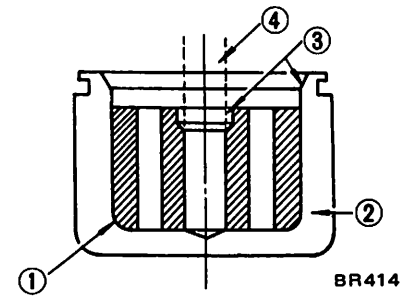
Roter

1. Check rotor for score and damage. If excessive, machine reconditioning will be required.
2. Measure thickness of rotor with a micrometer. If thickness of rotor is beyond wear limit of 8.4 mm (0.331 in), replace rotor.
3. Measure thickness around the entire periphery on same circumference. If parallelism is over 0.03 mm (0.0012 in), replace rotor.

ASSEMBLY

1. Apply rubber grease to cylinder bore and install piston seal.
2. Insert bias ring into piston A so that the roundish portion of it faces the bottom of piston A bore. See Figures BR-19 and BR-20.

CAUTION:
a. Be careful not to mistake piston B for piston A.
b. Pistons A and B are distinguished from each other by a dent at the inner bottom of piston A.



BR414
1 Roundish portion
2 Piston A
3 Chamfer
4 Yoke

Fig. BR-19 Assembly of bias ring to piston A

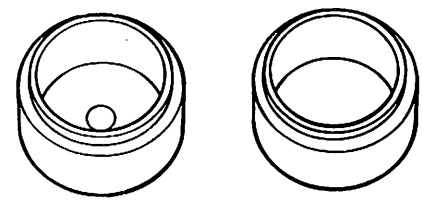

Piston A
Piston B
BR415

Fig. BR-20 Pistons A and B

Note: **Bias ring must be installed on the original position.**

3. Apply brake fluid lightly to the sliding portions of pistons and insert into cylinder.

Note:

a. **When inserting pistons, be careful not to insert too far. Refer to page BR-7 for Pad Replacement.**

b. **Install piston A so that the yoke groove of bias ring of piston A coincides with the yoke groove of cylinder.**

4. Install boot and retaining ring.
5. Install yoke springs on yoke.

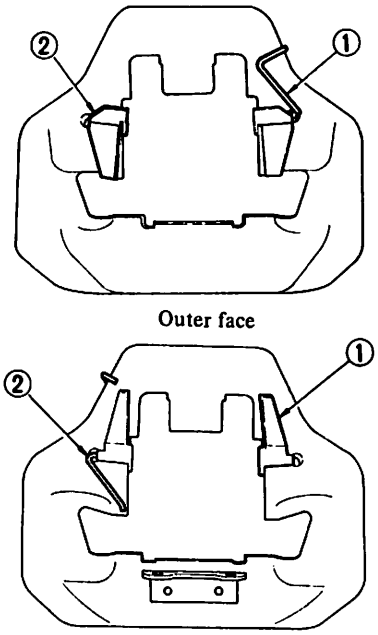


Fig. BR-21 Yoke with yoke spring and bias spring

6. Install bias spring to yoke.
7. Apply P.B.C. grease to the yoke sliding part of cylinder. Then reposition the bias ring so that the groove of bias ring coincides with yoke.
8. Leaving yoke springs inserted lightly into cylinder groove, assemble cylinder body and yoke by tapping yoke lightly. See Figure BR-22.

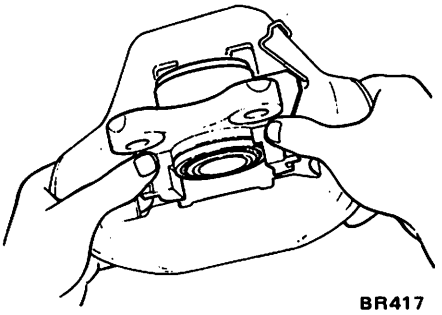


Fig. BR-22 Assembling yoke and cylinder

REAR BRAKE

DESCRIPTION

The rear brake is a leading-trailing type.

Brake shoe clearance is automatically compensated for by operation of the hand brake.

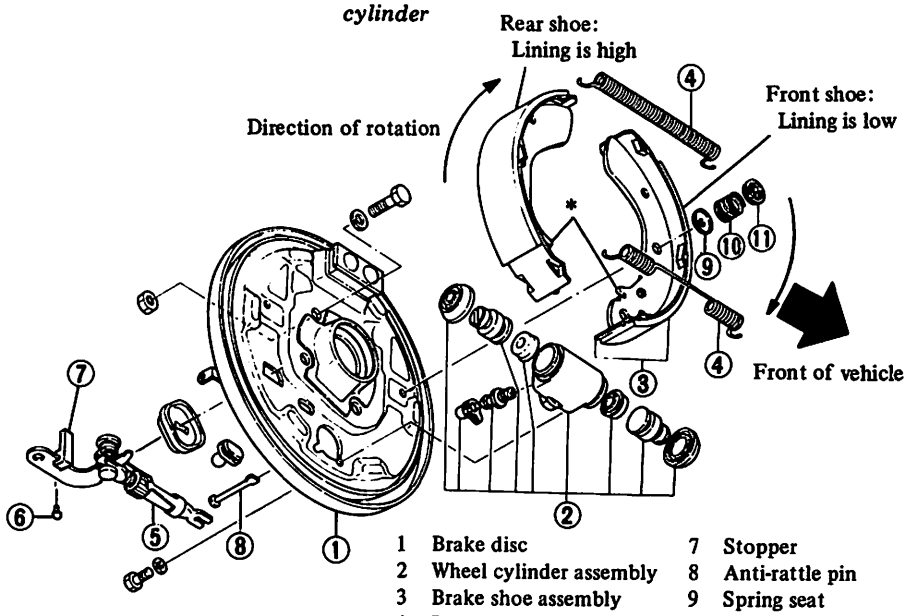


Fig. BR-23 Fixed wheel cylinder right rear brake

Removal

1. Jack up rear of car, and support it with safety stands.
2. Remove wheel and brake drum.
(1) Engage hand brake lever.
(2) Pull pin out, and remove stopper from toggle lever.
(3) Disengage hand brake lever.

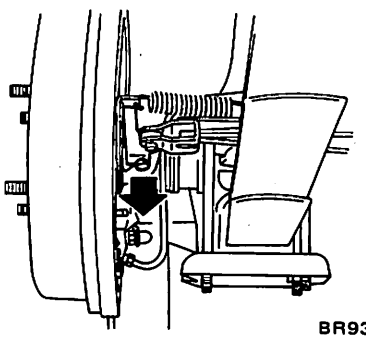


Fig. BR-24 Removing pin and stopper

If brake drum cannot be easily moved, install two bolts (8 mm diameter, 1.25 mm pitch) to drive it out.
3. Disconnect brake tube flare nut. Install a brake line plug in open end of brake tube.

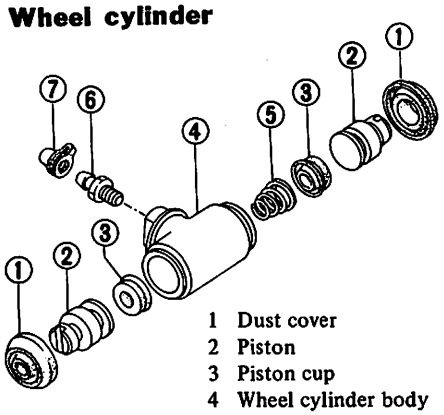
CAUTION:
When removing brake tube, use suitable tube wrench. Never use open ended or adjustable wrench.

4. Remove hand brake return spring and pull out clevis pin to separate hand brake cable and lever.
5. Remove rear axle shaft if necessary to remove brake disc. Refer to Section RA (page RA-4) for Removal of Rear Axle.
6. Remove anti-rattle spring and pin.
7. Remove return spring and brake shoes.

8. Remove dust cover and toggle lever with adjuster assembly.
9. Remove wheel cylinder.

DISASSEMBLY AND ASSEMBLY

Wheel cylinder



1 Dust cover
2 Piston
3 Piston cup
4 Wheel cylinder body
5 Spring
6 Bleeder
7 Bleeder cap

BR909

Fig. BR-25 Wheel cylinder

Remove dust cover and parts will be disassembled.

Thoroughly wash all parts in brake fluid or alcohol. Assemble wheel cylinder in reverse order of disassembly.

Note:

a. **Apply a coating of brake fluid to piston cup at assembly.**
b. **Charge with genuine Nissan disc brake grease KR60900010 or equivalent before installing dust cover.**
c. **The brake wheel cylinder is available in both NABCO make and TOKICO make. There is no interchangeability of repair kits or component parts between NABCO and TOKICO makes.**
When replacing the repair kit or component parts, ascertain the brand of the brake wheel cylinder body. Be sure to use parts of the same make as the former ones.

CAUTION:
Do not wash rubber parts with mineral oil, or they will deteriorate. Do not immerse rubber parts in alcohol longer than 30 seconds. After parts are cleaned, dry them with compressed air.

INSPECTION

Brake drum

1. Replace any brake drum whose diameter is beyond limit of 1.4 mm (0.055 in) with respect to standard inner diameter of 228.60 mm (9 in).
2. Allowable maximum "out-of-round" of brake drum is 0.02 mm (0.0008 in) and radial runout tolerance is 0.1 mm (0.004 in).

Re-condition or replace brake drum if specified limit is exceeded.

3. Measure for tapered brake drum. If specified limit of 0.02 mm (0.0008 in) is exceeded at a point 40 mm (1.57 in) from inlet, re-condition or replace brake drum.
4. Contact surface with which linings come into contact should be fine-finished with No. 120 to 150 sandpaper.
5. Using a drum racer, finish brake drum by machining if it shows any sign of score marks, partial wear or stepped wear on its contact surface.

Note: After brake drum has been completely re-conditioned or replaced, check drum and shoes for proper contact pattern.

Brake assembly

1. Replace any linings which are cracked, worn or oil-stained.
2. Replace linings if their thicknesses are worn down to less than 1.5 mm (0.059 in).
3. Replace any shoe return springs which are broken or fatigued.
4. Replace fatigued anti-rattle spring, damaged pin and/or retainer.

Wheel cylinder

1. Replace any cylinder or piston which is scratched, scored or worn on its sliding contact surface.
2. Replace worn parts if piston-to-cylinder clearance is beyond 0.15 mm (0.0059 in).
3. Replace any piston cup which is worn or otherwise damaged.
4. Replace if contacting face of cylinder and shoe is worn locally or in step.
5. Replace any damaged dust cover, fatigued piston spring or faulty threaded parts.
6. Replace any tube connector which is worn on its threaded portion.

INSTALLATION

Install rear brake in reverse order of removal, closely observing the following:

1. Tighten following parts to specified torque.

CAUTION:
When installing brake tube, use Flare Nut Torque Wrench GG94310000.

Tightening torque:
Flared nut:
1.5 to 1.8 kg-m
(11 to 13 ft-lb)
Air bleeder:
0.7 to 0.9 kg-m
(5.1 to 6.5 ft-lb)
Wheel cylinder mounting bolt:
0.6 to 0.8 kg-m
(4.3 to 5.8 ft-lb)

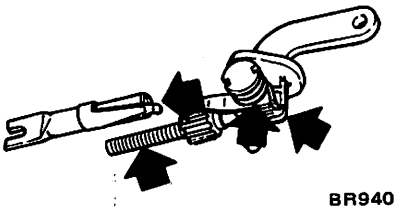
2. There are two types of adjusters which have right thread or left thread.

R.H. brake:
Right thread adjuster
L.H. brake:
Left thread adjuster

3. Sparingly apply a coat of brake grease to the following points. See Figure BR-26.

Lubricating points:

- Adjuster nut and rod threads
- Mating surfaces between adjuster and toggle lever, and pin and roller.



BR940

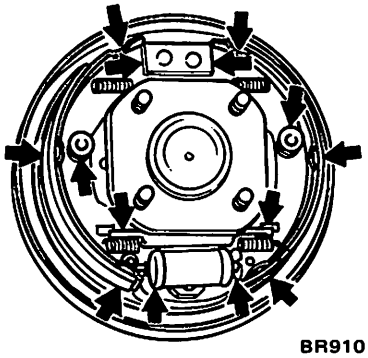
Fig. BR-26 Lubricating points of adjuster

4. Referring to Figure BR-27 for locations of lubricating points, apply a coat of brake grease to these points.

Exercise care not to allow grease to come into contact with lining or adjuster screws.

Lubricating points:

- Contact areas between wheel cylinder, anchor block and brake shoe
- Mating surfaces between brake shoe and brake disc
- Contact areas between hand brake adjuster and brake shoe
- Contact areas between brake disc, brake shoe and toggle lever
- Contact areas between anti-rattle pin spring seat and brake shoe



BR910

Fig. BR-27 Lubricating points

5. Make sure that entire brake shoe fits in place.
6. Make sure that adjuster operates properly.
7. After installation is completed, check and adjust shoe-to-drum clearance by operating hand brake for several times.
8. Install rear axle shaft, referring to Section RA.

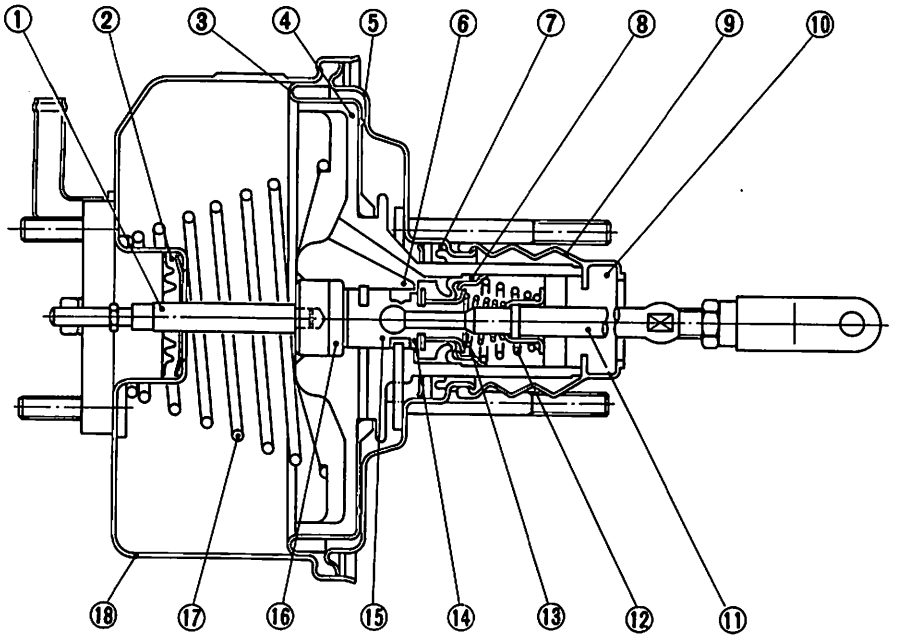
BRAKE BOOSTER

DESCRIPTION

A vacuum suspended brake booster is installed behind the master cylinder. As the brake pedal is depressed, fluid is forced under high pressure through the brake pipes to the wheel cylinders to retard or stop the car.

The brake booster contains a spring loaded diaphragm of 152.40 mm (6 in) in diameter. It operates on negative pressure produced in the engine intake manifold.

The tandem master cylinder is capable of producing high pressure even if the brake booster is inoperative.



1 Push rod
2 Plate and seal
3 Diaphragm
4 Diaphragm plate
5 Rear shell
6 Vacuum valve
7 Seal
8 Poppet assembly
9 Valve body guard
10 Air silencer filter
11 Valve operating rod
12 Valve return spring
13 Poppet return spring
14 Exhaust valve
15 Valve plunger
16 Reaction disc
17 Diaphragm return spring
18 Front shell

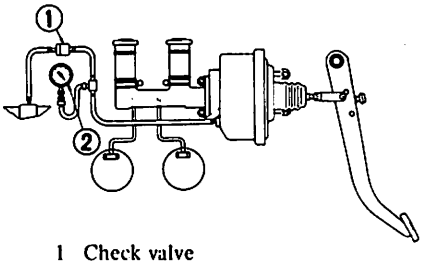
BR941

Fig. BR-28 Sectional view of brake booster

INSPECTION OF OPERATION

Checking vacuum pressure

1. Connect a vacuum gauge, in the line, between check valve and brake booster.



1 Check valve
2 Vacuum gauge

BR942

Fig. BR-29 Air-tight test set-up

2. Start engine and increase engine speed. Stop engine when vacuum gauge indicates 500 mmHg (19.69 inHg).

Air tight test

1. Fifteen seconds after engine is stopped, observe the rate of drop in air pressure registered by vacuum gauge. If a pressure drop of 25 mmHg (0.98 inHg) is exceeded, refer to the following chart to determine the cause of failure.

Probable cause	Corrective action
1. Air leakage at check valve.	Replace check valve.
2. Air leakage at push rod seal.	Replace seal.
3. Air leakage between valve body and seal.	Repair or replace faulty part(s).
4. Air leakage at valve plunger seat.	Repair or replace seat.
5. Damaged piping or joints.	Repair or replace.

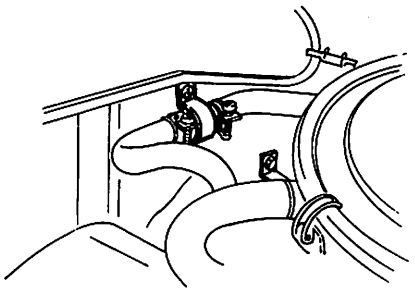
2. Fifteen seconds after engine is stopped and brake fully applied, observe the rate of drop in air pressure registered by vacuum gauge. If a pressure drop of 25 mmHg (0.98 inHg) is exceeded, refer to the following chart to determine the cause of failure.

Probable cause	Corrective action
1. Air leakage at check valve.	Replace check valve.
2. Damaged diaphragm.	Replace.
3. Reaction disc dropped off.	Reinstall and check push rod for proper turn.
4. Air leakage at poppet assembly seat and valve body.	Replace faulty part(s).

Note: Whenever brake booster is to be disassembled, rubber part must be replaced with a new one.

Inspecting check valve

1. Remove clip and disconnect hoses at connections. The check valve can now be removed.



BR943

Fig. BR-30 Location of check valve

2. Using a brake booster tester, apply a vacuum pressure of 500 mmHg (19.69 inHg) to the port of check valve on the brake booster side. If a pressure drop of 10 mmHg (0.39 inHg) is exceeded in 15 seconds, replace check valve with a new one.

3. When pressure is applied to the brake booster side of check valve and valve does not open, replace check valve with a new one.

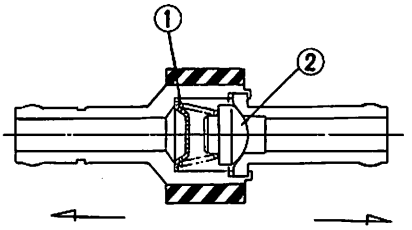


Fig. BR-31 Cross-sectional view of check valve

Operating test

1. Connect an oil pressure gauge to brake line, at connection on master cylinder.
2. Install a pedal force gauge on brake pedal.
3. Start engine, and increase engine speed until a vacuum pressure of 500 mmHg (19.69 inHg) in registered on vacuum pressure gauge. With a steady vacuum pressure of 500 mmHg (19.69 inHg), measure oil pressure with respect to each pedal operating force.

Relationship between oil pressure and pedal operating force is illustrated in Figure BR-32. If test results are not as specified in Figure BR-32, check brake booster for condition in manner described under "Inspection" before removal of this unit.

Also check brake line for evidence of fluid leakage.

Note: Determine whether source of problem is in brake booster or check valve. Before you reach a final conclusion, always inspect check valve first.

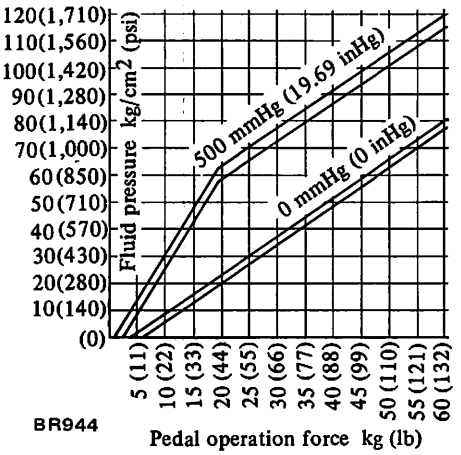


Fig. BR-32 Performance curves of brake booster

REMOVAL

Remove parts in numerical order enumerated.

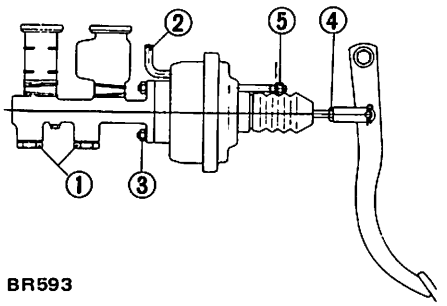
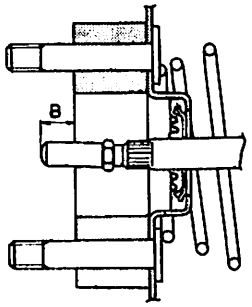


Fig. BR-33 Procedures for removing brake booster

ADJUSTMENT

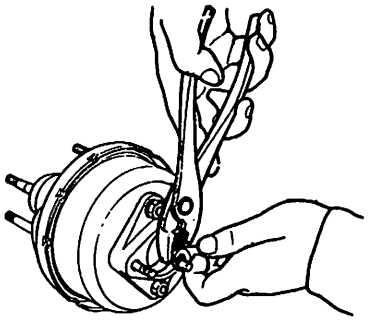
Adjust the length of push rod to the value indicated below. Length adjustment of push rod is made at the tip of push rod. See Figures BR-34 and BR-35.

Length "B"
9.75 to 10.00 mm
(0.3839 to 0.3937 in)



BR290

Fig. BR-34 Length "B"

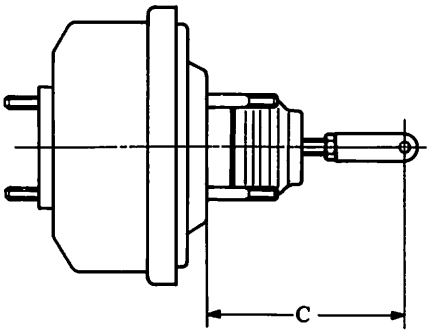


BR288

Fig. BR-35 Adjusting push rod length

5. Install clevis. Adjust length of operating rod to specified value.

Length "C"
165 mm (6.50 in)



BR947

Fig. BR-36 Length "C"

INSTALLATION

Install in the reverse sequence of removal.

Tightening torque:
Master cylinder to brake booster
0.8 to 1.0 kg-m
(5.8 to 7.2 ft-lb)
Brake booster to body:
0.8 to 1.0 kg-m
(5.8 to 7.2 ft-lb)

Note: After brake booster is properly installed in car, conduct an air-tight and operational tests as previously described.

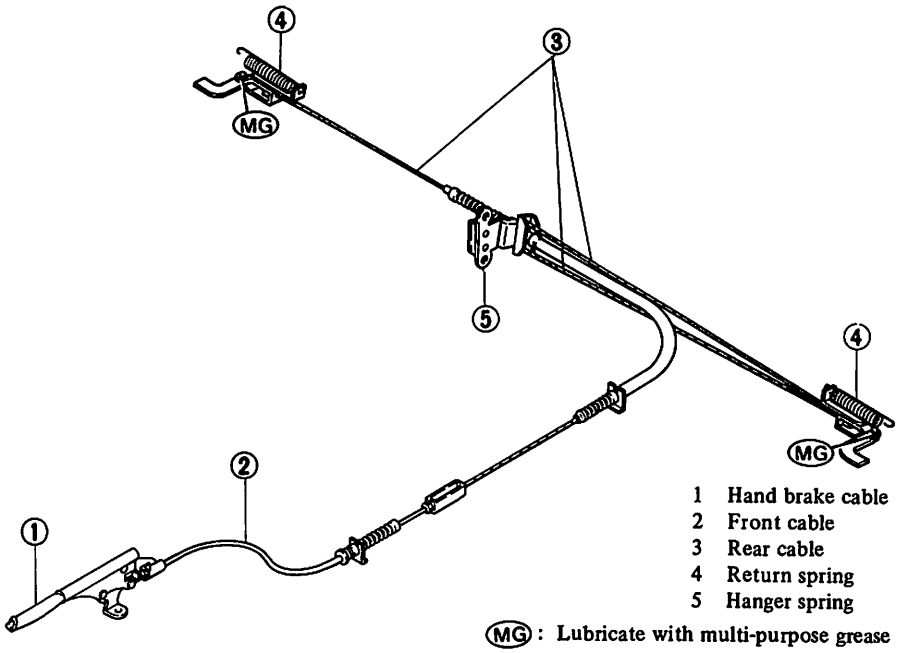
HAND BRAKE

CONTENTS

HAND BRAKE BR-14
REMOVAL BR-15
INSPECTION BR-15
INSTALLATION BR-16

HAND BRAKE

The center lever type hand brake is standard equipment on all models. The front cable is connected to the rear cable adjuster.



1 Hand brake cable
2 Front cable
3 Rear cable
4 Return spring
5 Hanger spring

(MG) : Lubricate with multi-purpose grease

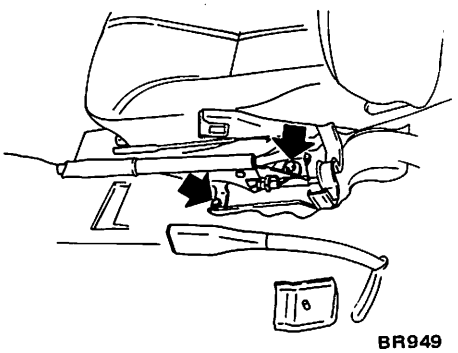
BR948

Fig. BR-37 Hand brake

REMOVAL

Control lever and front cable

1. Loosen turnbuckle adjusting nut, and separate front cable from rear cable.
2. Remove lock plate located immediately in front of turnbuckle.
3. Remove console box.
4. Disconnect terminal from hand brake warning switch.
5. Remove bolts securing hand brake control lever to floor.



BR949

Fig. BR-38 Removing control lever

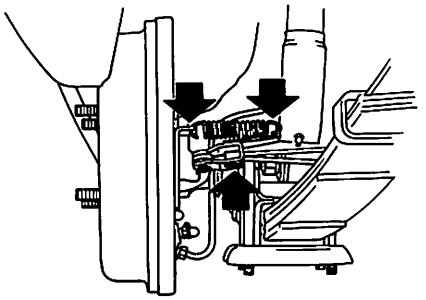
6. Pull front cable out into driver's compartment and remove it together with control assembly.
7. Separate front cable from hand brake lever by breaking pin and replace front cable.

Note: Front cable, clevis pin and cotter pin are available as service parts.

CAUTION:
Be careful not to deform or damage control lever.

Rear cable

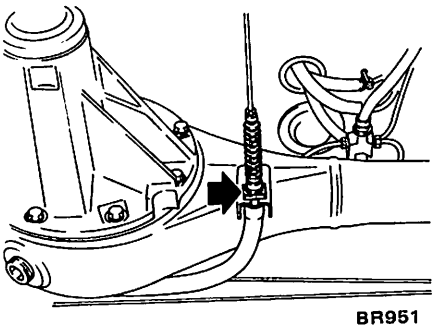
1. Jack up the rear of car and support it with safety stands. Remove wheel.
2. Separate rear cable from front cable.
3. Remove return spring and disconnect cable from cable shank.



BR950

Fig. BR-39 Removing return spring and disconnecting rear cable

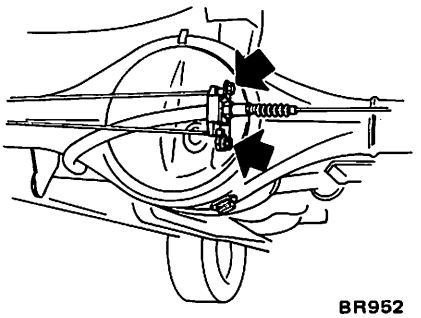
4. Withdraw lock plate from axle housing bracket unit, and detach rear cable from the bracket.



BR951

Fig. BR-40 Withdrawing lock plate

5. Loosen hanger strap unit bolt, and remove rear cable assembly.



BR952

Fig. BR-41 Removing hanger strap

6. Loosen nut securing outer casing to hanger strap, then separate the parts into nut, hanger strap washer, and bracket.

Note: Do not remove dust cover from cable. Leave it installed on cable.

7. Remove cotter pin from cable shank and withdraw clevis pin. Then, separate shank from rear wheel cylinder lever.

INSPECTION

1. Check control lever for wear or other damage. Replace if necessary.
2. Replace worn or fatigued springs.
3. Check wires for discontinuity or deterioration. Replace if necessary.
4. Replace malfunctioning warning light or switch.
5. Check parts at each connection and, if found deformed or damaged, replace.
6. Make sure cable dust cover is not damaged or warped.

INSTALLATION

Install hand brake assembly following the reverse procedure of removal. Closely observe the following items:

1. When installing, apply a coat of grease to sliding contact surfaces. See Figure BR-37.
2. Upon completion of installation of hand brake assembly, adjust the entire system as given on page BR-3. for Adjustment of Hand Brake.
3. Make sure that adjacent parts do not interfere with cables.

   Do not apply an undue stress to cables.
4. Tighten bolts and nut to the specification.

Tightening torque:
- Hand brake lever attaching bolts: 1.0 to 1.4 kg-m (7 to 10 ft-lb)
- Hanger strap attaching bolt: 0.3 to 0.4 kg-m (2.2 to 2.9 ft-lb)
- Outer case end nut: 0.8 to 1.0 kg-m (5.8 to 7.2 ft-lb)

SERVICE DATA AND SPECIFICATIONS

Brake pedal

Height		
Manual transmission	mm (in)	175.5 (6.91)
Automatic transmission	mm (in)	177.5 (6.99)
Free play at pedal pad	mm (in)	1 to 5 (0.04 to 0.20)
Depressed height	mm (in)	More than 75 (2.95)

Master cylinder

Inner diameter	mm (in)	19.05 (3/4)
Allowable clearance between cylinder and piston	mm (in)	0.15 (0.0059)

Brake booster

Type		M60
Diaphragm diameter	mm (in)	152.40 (6)
Maximum vacuum leakage (after 15 sec.)	mmHg (inHg)	25 (0.98)
Shell seal depth length A	mm (in)	7.3 (0.287)
Push rod length B	mm (in)	9.75 to 10.00 (0.3839 to 0.3937)

Parking brake

Type		Mechanically operated on rear wheels
Pull	kg (lb)	11 to 15 (24 to 33)
Stroke	mm (in)	80 (3.15)
Notch		6th notch

Front disc brake

Type		AN20
Wheel cylinder inner diameter	mm (in)	51.1 (2.012)
Pad (Width x thickness x length)	mm (in)	41.2 x 9.85 x 63.4 (1.622 x 0.388 x 2.496)
Pad wear limit (Min. thickness)	mm (in)	1.5 (0.059)

Rear drum brake

Type		Leading-trailing drum brake with auto-adjuster
Wheel cylinder diameter	mm (in)	20.64 (13/16)
Lining (Width x thickness x length)	mm (in)	40 x 4.5 x 219.4 (1.57 x 0.177 x 8.64)
Lining wear limit	mm (in)	1.5 (0.059)

Brake rotor

Outer diameter x thickness	mm (in)	245 x 10 (9.65 x 0.39)
Runout	mm (in)	0.12 (0.0047)
Repair limit of thickness (Min. thickness)	mm (in)	8.4 (0.331)

Rear brake drum

Inner diameter	mm (in)	228.60 (9)
Repair limit of inner diameter	mm (in)	230.0 (9.06)
Inside out-of-roundness	mm (in)	0.02 (0.0008)
Inside radial run-out	mm (in)	0.1 (0.004)

Tightening torque

Master cylinder to brake booster	kg-m (ft-lb)	0.8 to 1.1 (5.8 to 8.0)
Master cylinder to body	kg-m (ft-lb)	0.8 to 1.1 (5.8 to 8.0)
Brake tube flare nut	kg-m (ft-lb)	1.5 to 1.8 (11 to 13)
Brake hose connector	kg-m (ft-lb)	1.7 to 2.0 (12 to 14)
Air bleeder valve	kg-m (ft-lb)	0.7 to 0.9 (5.1 to 6.5)
Connector mounting bolt	kg-m (ft-lb)	
6 mm dia. bolt		0.5 to 0.7 (3.6 to 5.1)
8 mm dia. bolt		0.8 to 1.1 (5.8 to 8.0)
Fulcrum pin of brake pedal	kg-m (ft-lb)	3.1 to 4.1 (22 to 30)
Brake warning lamp switch lock nut	kg-m (ft-lb)	1.6 to 2.2 (12 to 16)
Caliper fixing bolt	kg-m (ft-lb)	7.3 to 9.9 (53 to 72)
Rotor fixing bolt	kg-m (ft-lb)	3.9 to 5.3 (28 to 38)
Rear brake wheel cylinder mounting bolts	kg-m (ft-lb)	0.6 to 0.8 (4.3 to 5.8)
Front brake baffle plate fixing bolts	kg-m (ft-lb)	0.34 to 0.44 (2.5 to 3.2)
Rear brake disc fixing bolts	kg-m (ft-lb)	2.2 to 2.7 (16 to 20)
Brake booster		
Brake booster to body	kg-m (ft-lb)	0.8 to 1.1 (5.8 to 8.0)
Operating rod lock nut	kg-m (ft-lb)	1.6 to 2.2 (12 to 16)
Flange to shell cover	kg-m (ft-lb)	0.8 to 1.1 (5.8 to 8.0)
Push rod adjusting nut	kg-m (ft-lb)	1.6 to 2.2 (12 to 16)

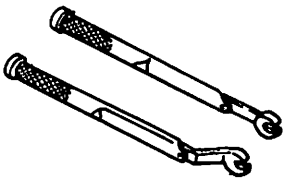
TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Excessive pedal travel	Low brake fluid level or empty master cylinder reservoir.	Fill and bleed as necessary. Test for source of leakage by examining all lines, connections and wheel cylinder.
	Leakage in master cylinder.	Overhaul master cylinder.
	Deteriorated check valve.	Replace check valve and bleed system.
	Air in system.	Bleed system.
	Faulty brake adjustment.	Adjust shoe-to-drum clearance. Inspect auto-adjuster operation.
	Excessive lateral play on disc caused by loose or worn wheel bearings or steering parts.	Replace or adjust faulty parts.
Spongy pedal	Low fluid level in master cylinder.	Top with fluid and inspect for leakage.
	Air in system.	Correct as necessary.
	Faulty brake adjustment.	Adjust shoe-to-drum clearance. Inspect auto-adjuster operation.
	Reservoir filler cap vent hole clogged.	Clean and bleed system.
	Swollen hose due to deterioration or use of poor quality hose.	Replace hose and bleed system.
	Distorted brake shoes, or excessively worn or cracked brake drum.	Replace faulty parts.
	Soft or swollen caliper seals.	Drain hydraulic system, flush with alcohol and replace all seals.
	Use of a brake fluid with too low boiling point.	Replace with specified brake fluid and bleed system.
Poor braking effect	Fluid leakage in brake lines.	Check master cylinder, piping and wheel cylinder for leaks, and repair.
	Low brake fluid level or empty master cylinder reservoir.	Fill and bleed as necessary.
	Air in brake lines.	Bleed system.
	Excessive shoe-to-drum clearance.	Adjust.
	Grease, oil, mud or water on linings or pads.	Clean brake mechanism and check for cause of problem. Replace linings or pads.
	Deterioration of linings or pads.	Replace.
	Local fit of linings or pads.	Shave or replace.
	Linings or pads excessively worn.	Replace.
	Master cylinder or wheel cylinders in poor condition.	Repair or replace.
	Frozen or seized caliper pistons on disc brakes.	Disassemble caliper and free up as required.
	Binding mechanical linkage at brake pedal and shoes.	Free up as required.

Condition	Probable cause	Corrective action
Unbalanced brakes	Improper tire inflation.	Inflate to correct pressure.
	Improper adjustment of shoe-to-drum clearance.	Readjust.
	Grease, oil, mud or water on linings or pads.	Clean brake mechanism and check for cause of problem. Replace linings or pads.
	Mud in brake drum.	Clean.
	Deterioration of linings or pads.	Replace.
	Excessive wear of linings or pads.	Replace.
	Wheel cylinder in poor condition.	Repair or replace.
	Poor sliding condition of brake shoe. pad.	Adjust.
	Looseness of cylinder body or back plate securing bolts.	Fasten or replace.
	Scored or out-of-round drums.	Recondition or replace brake drum as required. Check for improper lining contact with drum and grind lining if necessary.
	Sticking wheel-cylinder cups.	Recondition or replace cylinder.
	Deformation of back palte.	Replace.
	Incorrect adjustment of wheel bearings.	Adjust or replace.
	Incorrect adjustment of wheel alignment.	Adjust.
	Looseness of leaf spring securing U-bolts.	Tighten or replace.
Brakes fade	Brake fluid has too low boiling point.	Drain and fill system with approved fluid.
	Use of improper linings or brake linings are contaminated.	Replace linings.
	Brake drums are out-of-round.	Repair or replace as necessary.
	Hydraulic connections, master cylinder and wheel cylinders are corroded or damaged.	Repair as necessary.
	Bleed screw is open.	Close screw and bleed system.
Brakes drag	Pedal linkage is binding or push rod adjustment is too long.	Lubricate linkage, check pedal return spring for condition and adjust push rod as necessary.
	Master cylinder compensator part is obstructed.	Blow out foreign matter with compressed air.
	Seized master cylinder piston.	Disassemble master cylinder and replace piston. Bleed system.
	Poor shoe condition.	Clean and repair.
	Poor wheel cylinder condition.	Repair or replace.
	Deformation of piston cups.	Replace.
	Poor condition of caliper because of faulty piston seals.	Replace piston seals.
	Excessive runout of rotor.	Turn rotor on lathe or replace.
	Hand brake will not return.	Check and repair.
	Clogged master cylinder return port.	Clean.

Condition	Probable cause	Corrective action
(Brakes drag)	Clogged brake lines.	Check and clean.
	Incorrect adjustment of wheel bearings.	Adjust or repair.
	Improper shoe-to-drum clearance.	Adjust.
	Weak shoe return springs.	Replace.
	No free travel in brake shoe return.	Adjust pedal height.
Brake chatters	Groove or out-of-round brake drum or rotor.	Grind or replace as required.
	Loose or bent support plate.	Tighten support plate bolts to specified torque, or replace plate.
	Distorted brake shoes or pads.	Replace as necessary.
	Grease or brake fluid on linings.	Replace linings.
Brake squeals	Dirty or scored brake drums.	Blow out assembly with compressed air or refinish drum.
	Distorted brake shoes or bent support plate.	Replace faulty unit.
	Weak or broken brake shoe retaining spring or return spring.	Replace if faulty.
	Glazed or contaminated brake lining.	Cam ground lining to eliminate glaze. If it doesn't, replace linings.
Pedal pulsates	Out-of-round or off-center drum.	Turn drum or replace as necessary.
	On disc brakes, lateral runout of brake rotor is excessive.	Check with dial indicator, turning disc by hand. If runout exceeds specifications, replace disc.
	Excessive variation in thickness of brake rotor surfaces.	Measure around disc face with micrometer. Replace disc as required.
Rear lock. (Under light brake pedal force).	Improper tire pressures.	Check and adjust.
	Excessive wear of tires.	Check and replace.
	Faulty NP-valve.	Replace.
Rear lock. (Under heavy brake pedal force).	Improper tire pressures.	Check and adjust.
	Excessive wear of tires.	Check and replace.
	Poor front braking effect.	
	• Grease, oil, mud or water on linings or pads.	Clean or replace.
	• Excessive wear of linings or pads.	Replace.
	• Local fit of linings or pads.	Shave or replace.
	• Master cylinder or wheel cylinder in poor condition.	Repair or replace.

SPECIAL SERVICE TOOL

Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.
GG94310000 Flare nut torque wrench 	—— / Page BR-6 Page BR-9		

SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION WT

WHEEL AND TIRE

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SERVICE DATA AND SPECIFICATIONS ..... WT- 5
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WHEEL AND TIRE

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WHEEL AND TIRE WT-4

DESCRIPTION

TIRE AND WHEEL SIZE

Tire		Wheel	
Size	Remarks	Size	Remarks
175/70SR-13	Steel radial, tubeless	4½J-13	Steel wheel Offset 30 mm (1.18 in)
		5J-13	Aluminum wheel Offset 25 mm (0.98 in)

RECOMMENDED INFLATION PRESSURE

Tire	Pressure
175/70SR-13	1.8 kg/cm^2 (26 psi)

Notes:

a. **Inflation pressure is the same both in normal speed driving and high-speed driving.**

b. **Inflation pressure should be measured when the tire is cold.**

MAINTENANCE AND SERVICE

TIRE INFLATION

Correct tire pressure is very important for steering ease and riding comfort. Correct pressure also makes for a quieter ride and extends tire life; overinflation or underinflation promotes wear at center tread or shoulder of tire.

If all tires are inspected frequently and maintained at the correct pressure, any sharp objects can be quickly detected in the tread and abnormal wear, which invites serious problem, can be avoided.

After inflating tires, valves should be checked for leakage. Without valve caps, leakage will occur due to dirt and water, resulting in underinflation. Accordingly, whenever tire pressure is checked, be sure to tighten valve caps firmly by hand.

WARNING:
When, while tire is being inflated, bead snaps over safety hump, it might break. Thus, to avoid serious personal injury, never stand over tire when inflating it. Never inflate to a pressure greater than 2.8 kg/cm^2 (40 psi). If beads fail to seat at that pressure, deflate the tire, lubricate it again, and then reinflate it. If the tire is overinflated, the bead might break, possibly resulting in serious personal injury.

REPAIR

Tubeless tire

To check for leaks, apply soapy solution to tire or submerge tire and wheel in water after tire has been inflated to specified pressure. Special inspection for leaks should be carried out around the valve, wheel rim and along the tread. Note bead and rim where leakage occurs. Wipe water away from any area which leaks air bubbles and then mark the place with chalk.

After removing object which caused puncture, seal the point. When repairing a puncture, use a tire repair kit furnished by any tire dealer, following the instructions provided with the kit. If a puncture is too large or there is some damage to tire fabric, repair should be carried out by authorized tire dealer.

Wheel

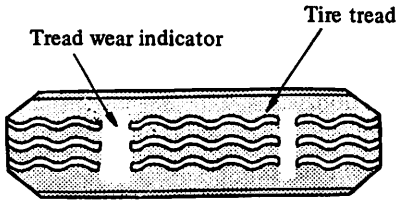
Inspect wheel rim flange for bent sections or dents. If any are detected, repair should be made to secure com-

plete sealing. The flange should be cleaned with a wire brush when rust is found on it. Furthermore, if there is excessive pitting on the rim, eliminate it with a file.

WEAR

Tread wear indicator

The tires are provided with "tread wear indicator" at six places around tire circumference, indicating 1.6 mm (1/16 in) tread depth. When the tires wear and then the marks appear, replace them with new ones. See Figure WT-1.



WH024

Fig. WT-1 Tread wear indicator

Misalignment

When the front wheels are aligned in an excessive toe-in or toe-out condition, the tires will tend to scrape the tread rubber off and the tread will develop a feathered edge.

Center wear

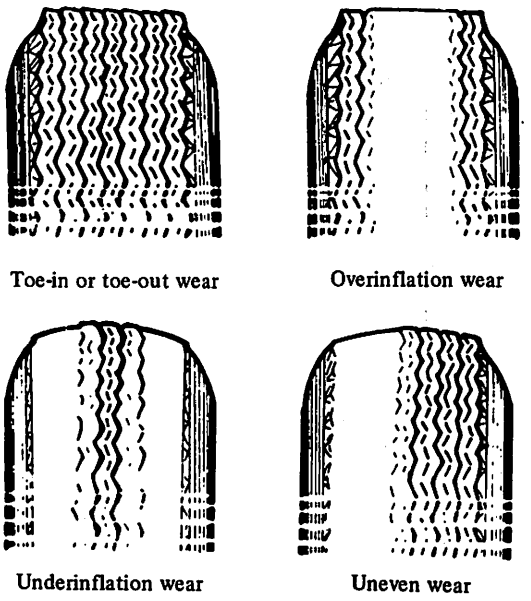
Center wear is caused by overinflation of the tire.

Shoulder wear

This wear may be caused by underinflation, incorrect wheel camber, or continued excessive speed around curves. In general, the first two causes are the most common. Underinflation causes wear on both sides of treads, while camber causes wear on only one side of tread.

Unven wear

Uneven wear is caused by incorrect camber or caster, malfunctioning suspension, unbalanced wheel, out-of-round brake drum, or other mechanical conditions. To stop this abnormal wear, correct the above faulty parts.



WT004

Fig. WT-2 Abnormal tire wear

RADIAL TIRE

Tires of radial ply construction roll with less camber thrust force and with greater cornering power on turns. This tends to cause local or rapid wear on the treads with excessive toe-in. Exercise special care in front wheel alignment during the life of tires.

Note:

a. **Radial ply tires should not be mixed with ordinary tires since their respective characteristics differ.**
b. **The same brand radial ply tires should be installed on all wheels.**
c. **Only tubes designed exclusively for radial tires should be used.**
d. **Snow chains should not be used because they cause damage to side walls.**

TIRE ROTATION

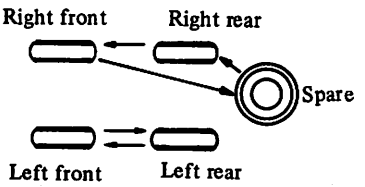
Tires tend to wear unevenly and become unbalanced after a certain running distance. Uneven tire wear often results in tire noise which is attributed to rear axle gears, bearing, etc. Front tires also tend to wear unevenly because of improperly aligned front wheels.

Accordingly, to equalize tire wear, it is necessary to rotate tires periodically as recommended in the "Periodic Maintenance". See Figures WT-3 and WT-4.

Radial ply tires

All the tires are of the same type.

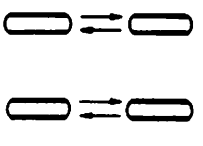
- 5-tire rotation



WH205

Fig. WT-3 Tire rotation

- 4-tire rotation



WH206

Fig. WT-4 Tire rotation

CHANGING TIRE

WARNING:
Never get under car while it is supported only by jack.
Always use safety stands to support side member of body construction when you must get beneath car.

CAUTION:
Bias, bias belted and radial ply tires must not be mixed except in an emergency. Mixed use of different types of tires can adversely affect car handling and may cause drive to lose control.

To change a tire and wheel with a jack in a safe manner, observe the following procedures:

1. Engage parking brake and block front wheels when rear wheel is being changed.
2. Remove wheel cap and wheel ring, and loosen wheel nuts.
3. Place jack at jacking point as described in Section GI and raise car until wheel clears ground.
4. Remove wheel nuts and wheel from drum.
5. To install wheel, reverse the above steps. Tighten wheel nuts in criss-cross fashion.

Tire wheel	Tightening torque
Steel wheel	8 to 9 kg-m (58 to 65 ft-lb)
Aluminum wheel	8 to 10 kg-m (58 to 72 ft-lb)

Note: Be sure to check the wheel nut torque, after the wheel has been run for the first 1,000 km (600 miles) (also in cases of repairing flat tires, tire rotation, etc.) and every 10,000 km (6,250 miles) thereafter. Retighten if necessary.

Care of aluminum wheel

CAUTION:
Use the wheel nut for exclusive use in aluminum wheels.

See Figure WT-5.

To install an aluminum wheel, proceed as follows:

1. Snugly tighten the four nuts after the wheel is positioned.
2. Slightly pull the wheel back to properly align the nuts with bolt holes in the wheel, and tighten the nuts as much as possible with your fingers.
3. Tighten the four nuts evenly with a wheel wrench in criss-cross fashion.

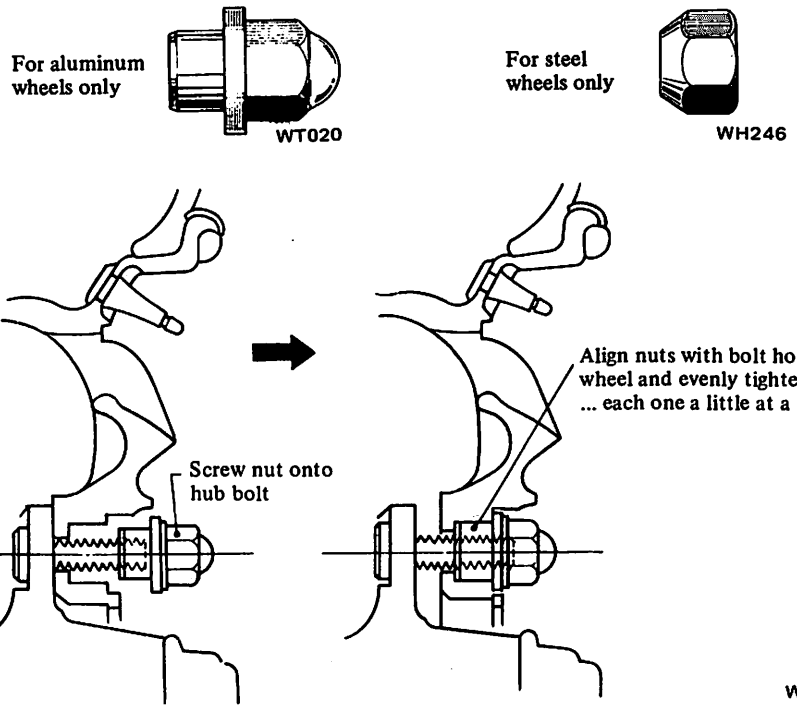


Fig. WT-5 Wheel nut

INSPECTION

WHEEL BALANCE

The wheel and tire assembly should be kept balanced statically and dynamically.

Proper tire balance is necessary when driving the car at high speeds. Consequently, the wheel and tire assembly should be properly rebalanced whenever puncture is repaired.

The wheel and tire assembly becomes out of balance according to uneven tire wear. Severe acceleration and braking, or fast cornering is the cause of wear on tire, resulting in unbalance of tire and wheel assembly.

The symptom of unbalance appears as tramp, car shake and steering malfunction.

To correct unbalance, use proper wheel balancer.

Maximum allowable unbalance
at rim flange
10 gr (0.35 oz)
Balance weight
10 to 60 gr (0.35 to 2.12 oz)
at 10 gr (0.35 oz) interval

Note:

a. **Be sure to place correct balance weights on inner edge of rim as shown in Figure WT-6.**
Do not put more than two weights on each side.
b. **Aluminum wheel**
Use balance weights for exclusive use in aluminum wheel.

WHEEL AND TIRE

In order to ensure satisfactory steering condition as well as maximum tire life, proceed as follows:

1. Check wheel rim, especially, rim flange and bead seat for rust, distortion, cracks or other defects which might cause air leaks. Function of tubeless tire depends on a good seal between tire bead and wheel rim. Thoroughly remove rust, dust, oxidized rubber or sand from wheel rim with wire brush, emery cloth or paper.

Use dial gauge to examine wheel rim for lateral and diametral runout. See Figure WT-6.

Lateral runout limit:
Less than 1.0 mm (0.039 in) total indicator reading

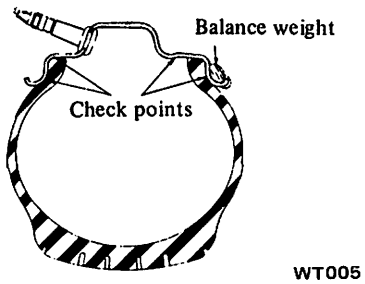


Fig. WT-6 Wheel rim run-out check points

2. Discard when any of the following conditions occur;
(1) Broken or damaged bead wire.
(2) Ply or tread separation.
(3) Worn fabric injuries on tubeless tire.
(4) Cracked or damaged sidewall, etc.

Note:
a. **In replacing tire, take extra care not to damage tire bead, rim-flange and bead seat.**
Do not use tire irons to force beads away from wheel rim-flange; that is, always use tire replacement device whenever tire is removed.
b. **Aluminum wheel**
Remove fragments of rubber, dust or sand from rim flange with cloth. Do not use abrasive cleaners when washing aluminum wheels. Always use a neutral cleaner.

SERVICE DATA AND SPECIFICATIONS

GENERAL SPECIFICATIONS

	Size	Remarks
Tire	175/70SR-13	Steel radial, tubeless
Wheel	4½J-13 Offset 30 mm (1.18 in)	Steel wheel
	5J-13 Offset 25 mm (0.98 in)	Aluminum wheel

INSPECTION AND ADJUSTMENT

Wheel balance
(Static at rim flange) gr (oz) 10 (0.35)
Tire balancing weight gr (oz) ..... 10 to 60 (0.35 to 2.12)
Spacing 10 gr (0.35 oz)

Recommended tire inflation pressure
kg/cm² (psi)
Front and Rear 1.8 (26)

Note: Inflation pressure should be measured when tire is cold.

TIGHTENING TORQUE

Wheel nut
Steel wheel kg-m (ft-lb) ..... 8.0 to 9.0 (58 to 65)
Aluminum wheel kg-m (ft-lb) ..... 8.0 to 10.0 (58 to 72)

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Wheel wobbles.	Improper tire pressure.	Measure and adjust correctly.
	Damaged tire or distorted wheel rim.	Repair or replace.
	Unbalanced wheel.	Balance or replace.
	Loose wheel nuts.	Tighten.
	Worn or damaged wheel bearing, or excessive play of wheel bearing.	Correct play or replace wheel bearing.
	Improper front wheel alignment.	Align correctly.
	Worn or damaged ball joint.	Replace.
	Excessive steering linkage play or worn steering linkage.	Adjust or replace.
	Loose steering linkage connection.	Tighten the nuts to the rated torque, or replace worn parts if any.
	Broken suspension spring.	Replace.
	Faulty shock absorber.	Replace.
Unevenly or excessively worn tire.	Improper tire rotation.	Conduct tire rotation periodically.
	Improper tire pressure.	Measure and adjust correctly.
	Unbalanced wheel.	Balance or replace.
	Improperly adjusted brake.	Adjust correctly.
	Improper wheel alignment.	Align correctly.
	Excessively distorted or improperly installed suspension link.	Repair or replace if necessary, or reinstall correctly.
	High speed on curves.	Reduce speed.
	Sudden start and improper speed due to rapid acceleration or improper brake application.	Follow correct and proper driving manner.
Tire squeals.	Improper tire pressure.	Measure and adjust correctly.
	Improper front wheel alignment.	Align correctly.
	Distorted knuckle or suspension link.	Repair or replace if necessary.

SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION ST

STEERING SYSTEM

ST

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STEERING SYSTEM

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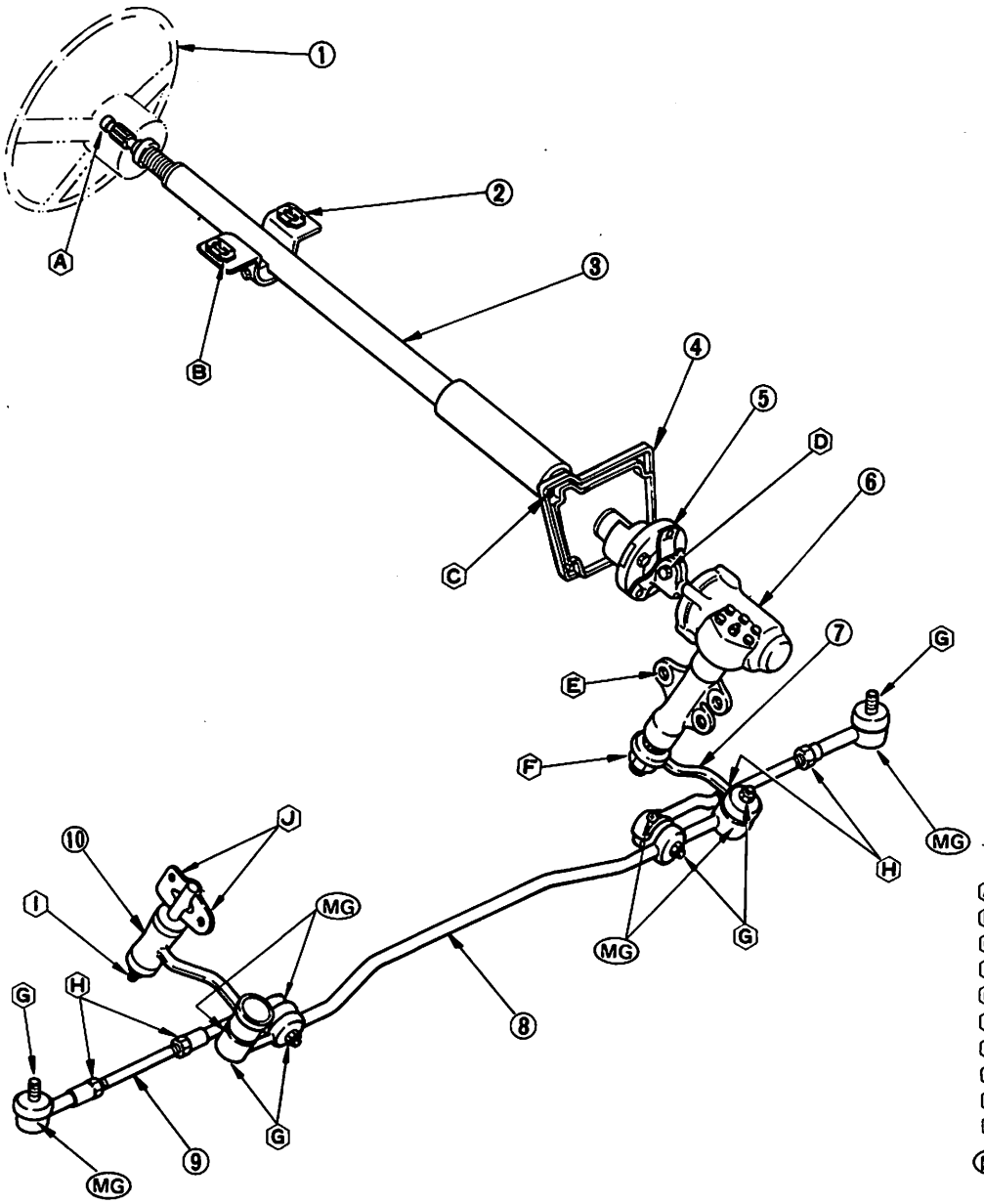
DESCRIPTION

The steering gear is of a recirculating type designed especially for easy operation and high durability. The steering linkage is of a relay design. The gear arm is connected to one end of the cross rod. The other end of the cross rod is linked to the idler arm connecting with the side member located on the opposite side of the steering gear.

The adjustable side rods connect the cross rod to the steering knuckle arms. The rubber coupling, located between the steering column and the steering gear box, prevents road shocks and linkage vibrations from imparting to the steering wheel during operation.

The collapsible steering column is used as standard equipment. This collapsible steering column is of a steel ball type, and collapses upon impact. Thus, if the car should become involved in a head-on collision that throws the driver forward, the steering column will absorb the energy of his forward movement and greatly reduce the possibility of his being injured.

The oil level in the gear housing should be checked and corrected at the intervals recommended in the Maintenance Schedule. Apply the recommended multi-purpose grease to idler body, idler side joint and ball joints in the steering linkage at the intervals recommended in the Maintenance Schedule.



1 Steering wheel
2 Column clamp
3 Steering column
4 Jacket tube flange
5 Rubber coupling
6 Steering gear
7 Gear arm
8 Cross rod
9 Side rod
10 Idler arm

Tightening torque (T) of bolts and nuts kg-m (ft-lb)

Ⓐ T : 3.0 to 3.5 (22 to 25)
Ⓑ T : 1.5 to 1.8 (11 to 13)
Ⓒ T : 0.35 to 0.45 (2.5 to 3.3)
Ⓓ T : 4.0 to 5.0 (29 to 36)
Ⓔ T : 7.0 to 8.0 (51 to 58)
Ⓕ T : 13.0 to 15.0 (94 to 108)
Ⓖ T : 5.5 to 10.0 (40 to 72)
Ⓗ T : 8.0 to 10.0 (58 to 72)
Ⓘ T : 4.0 to 5.0 (29 to 36)
Ⓙ T : 7.0 to 8.0 (51 to 58)

Ⓜ : Multi-purpose grease

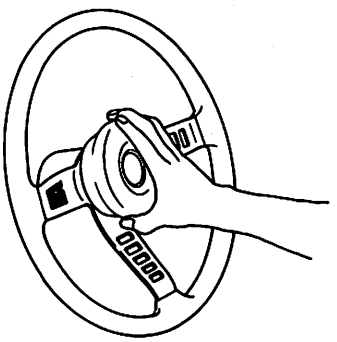
ST600

Fig. ST-1 Structural view of steering system

STEERING WHEEL

REMOVAL

1. Disconnect battery ground cable.
2. Remove horn pad by depressing and turning counterclockwise.



ST601

Fig. ST-2 Removing horn pad

3. Remove steering wheel nut.
4. Using Steering Wheel Puller ST27180001, install puller anchor screws in threaded holes in steering wheel. Turn center bolt of the special tool clockwise to remove steering wheel. See Figure ST-3.

CAUTION:
a. Do not strike the end of steering column shaft with a hammer. Striking shaft will damage bearing or collapsible shaft.
b. Be careful not to damage cancel pole.

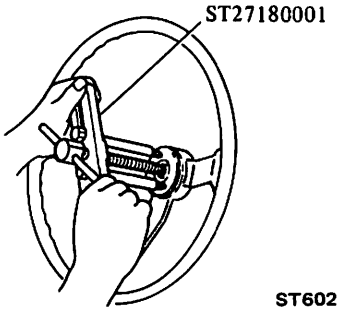


Fig. ST-3 Removing steering wheel

1. Apply grease to sliding portions.
2. Install steering wheel on column shaft in a straight ahead position after facing punch mark on the top of upper column shaft in that direction and tighten steering wheel nut to the specified torque.

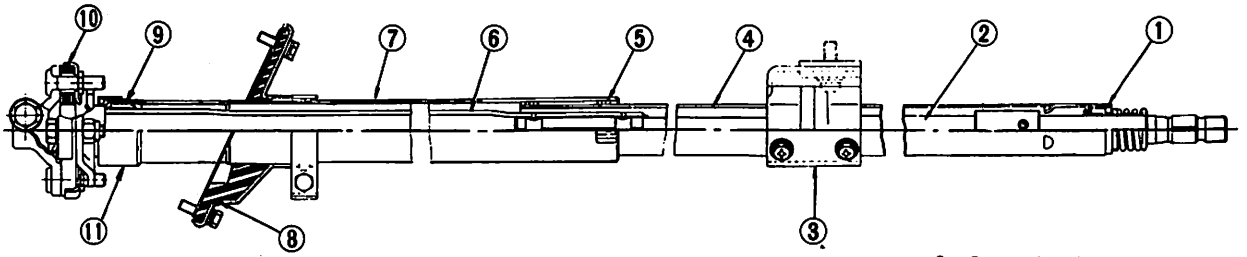
Tightening torque:
3.0 to 3.5 kg-m
(22 to 25 ft-lb)

INSTALLATION

Install steering wheel in the reverse order of removal. Observe the following instructions.

Note: After installing steering wheel, turn it clockwise and counterclockwise, checking for catch or drag. Also check horn for operation.

STEERING COLUMN (Collapsible type)



1 Upper bearing
2 Upper shaft
3 Steering column clamp
4 Upper jacket tube
5 Steel ball
6 Lower shaft
7 Lower jacket tube
8 Lower jacket tube flange
9 Lower bearing
10 Rubber coupling
11 Column dust cover

ST394
Fig. ST-4 Sectional view of collapsible type steering

CAUTION:
a. Never in any case should an undue stress be applied to steering column in axial direction.
b. When installing, do not apply bending force to steering column.

REMOVAL

1. Remove bolt securing worm shaft and rubber coupling. See Figure ST-5.

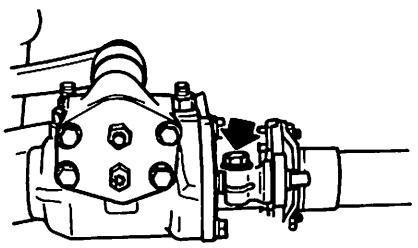


Fig. ST-5 Removing rubber coupling securing bolt

2. Remove steering wheel.
Refer to page ST-3 for Removal.
3. Loosen screws, and remove upper and lower steering column shell covers. See Figure ST-6.

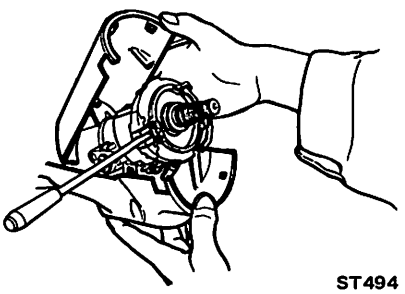


Fig. ST-6 Removing column shell covers

4. Remove turn signal switch assembly by loosening screws.
5. Remove four bolts securing jacket tube flange to dash panel. See Figure ST-8.

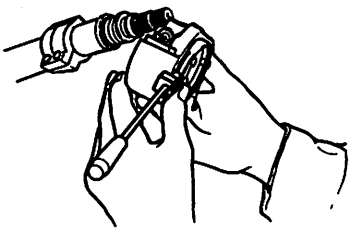


Fig. ST-7 Removing turn signal switch assembly

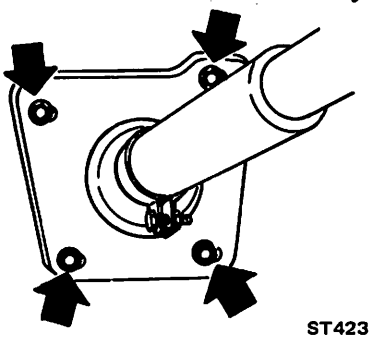


Fig. ST-8 Removing jacket tube flange securing bolts

6. Remove two bolts securing column clamp. See Figure ST-9.

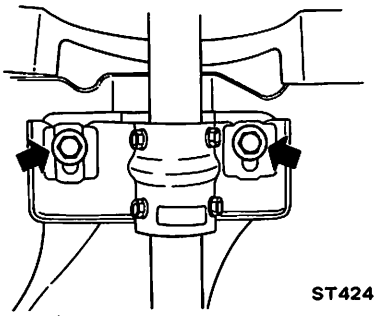


Fig. ST-9 Removing column clamp securing bolts

7. Draw out steering column assembly from the room side. See Figure ST-10.

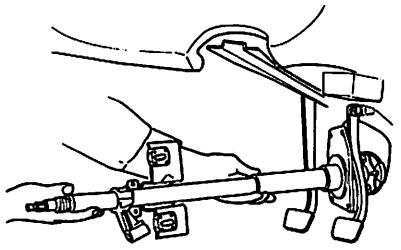


Fig. ST-10 Drawing steering column assembly

Note: When a head-on collision is encountered, inspect steering system as follows:

The steering system is very important unit for driving. The collapsible type steering should not be disassembled, and if necessary, replace it as an assembly.

INSPECTION

1. When steering wheel cannot be rotated smoothly but steering gear, steering linkage and suspension system are normal, check the steering system and replace damaged parts.

(1) Check column bearings for damage or unsmoothness.

If so, lubricate with recommended multi-purpose grease or replace steering column assembly.

(2) Check jacket tube for deformation or breakage, and replace if necessary.

(3) Check column spring, and replace if damaged and weakened.

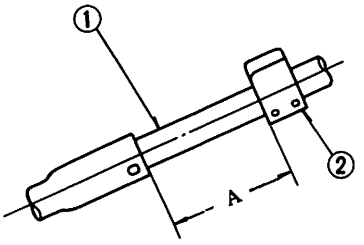
2. When the car is involved in a light front collision, check the following parts and replace if necessary.

(1) Jacket tube

Measure the dimension A as shown in Figure ST-11.

Standard installed dimension A; 178.7 mm (7.04 in).

When jacket tube is crushed, dimension A is reduced.



1 Jacket tube
2 Column clamp

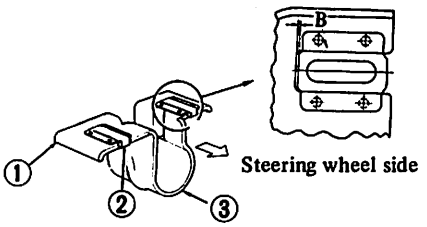
ST616

Fig. ST-11 Standard dimension between column clamp and the top end of lower jacket tube

(2) Column clamp

Measure dimension B as shown in Figure ST-12.

Standard B dimension B; 0 mm (0 in). When jacket tube is crushed, dimension B is increased.



1 Column clamp
2 Block
3 Jacket tube

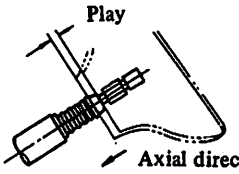
ST399

Fig. ST-12 Standard dimension B

(3) Steering wheel

Check steering wheel for axial play.

When steering jacket shaft is crushed, axial play exists. See Figure ST-13.

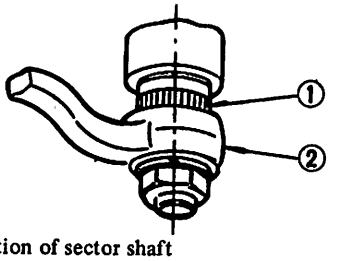


ST194

Fig. ST-13 Inspecting steering wheel for axial play

(4) Sector shaft

When collision occurs, abnormal strength is applied to gear arm. As a result of this, serration of sector shaft is apt to be distorted. See Figure ST-14.



1 Serration of sector shaft
2 Gear arm

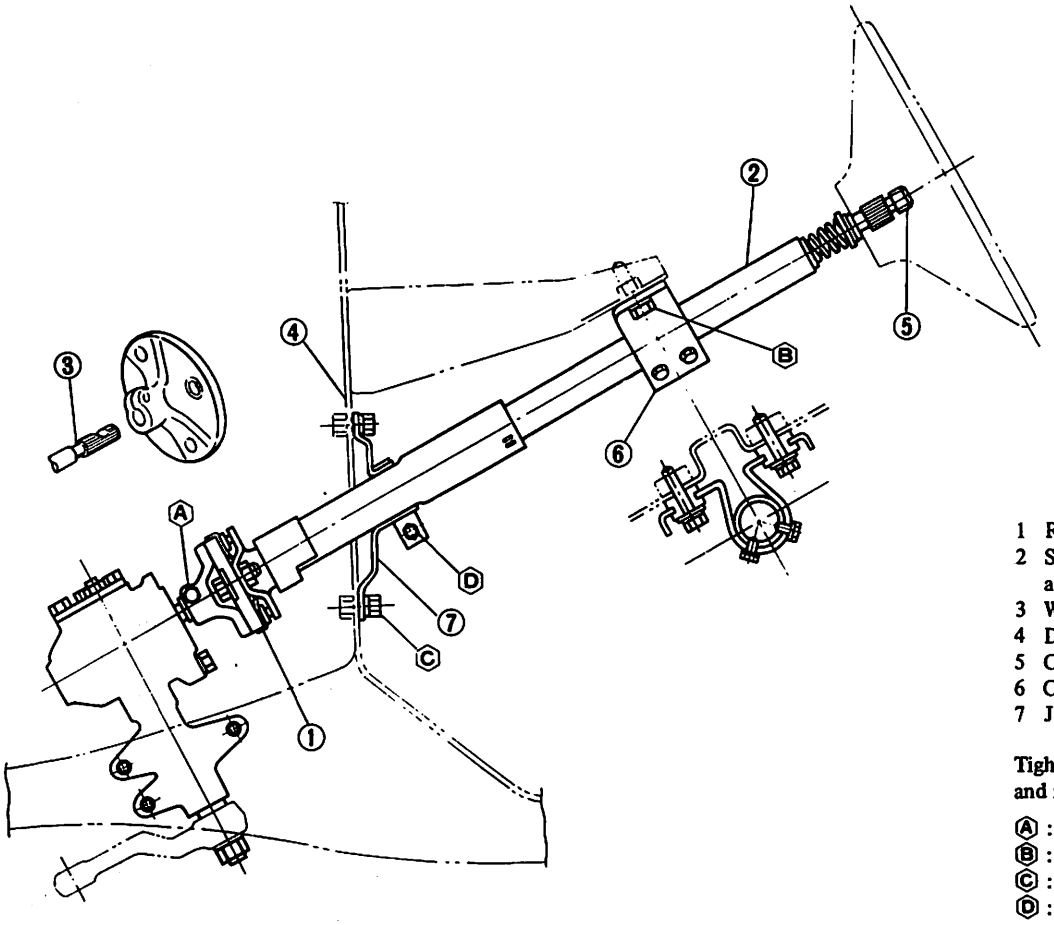
ST195

Fig. ST-14 Inspecting the serration of sector shaft for deformation

INSTALLATION

Install steering column in the reverse order of removal.

Observe the following instructions. See Figure ST-15.



1 Rubber coupling
2 Steering column assembly
3 Worm shaft
4 Dash panel
5 Column shaft
6 Column clamp
7 Jacket tube flange

Tightening torque of bolts and nuts kg-m (ft-lb)

Ⓐ : 4.0 to 5.0 (29 to 36)
Ⓑ : 1.5 to 1.8 (11 to 13)
Ⓒ : 0.35 to 0.45 (2.5 to 3.3)
Ⓓ : 0.35 to 0.45 (2.5 to 3.3)

ST605

Fig. ST-15 Installing steering column assembly

1. Set wheels in a straight ahead position.
2. Loosen bolt Ⓓ, fit steering column assembly on to worm shaft serration through dash panel and tighten bolt Ⓐ temporarily.

Note: Carefully install so that punch mark at top end of column shaft faces upward.

CAUTION:
a. Make sure that any undue stress is not applied to rubber coupling.
b. To avoid damaging bolt or serrations, align groove in worm shaft with bolt hole in rubber coupling.

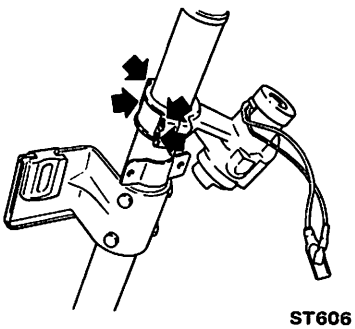
3. Tighten bolts Ⓑ, then bolt Ⓐ.
4. After sliding jacket tube flange to dash panel, tighten four bolts Ⓒ, then bolt Ⓓ.
5. After installation, make sure that steering wheel turns smoothly.

STEERING LOCK

To provide tamper-proof, self-shear type screws are used and their heads are sheared off, when installed so that the steering lock cannot be removed easily.

REMOVAL

1. Break two self-shear type screws with a drill or other proper tool.
2. Remove two screws and dismount steering lock from steering jacket tube. See Figure ST-16.



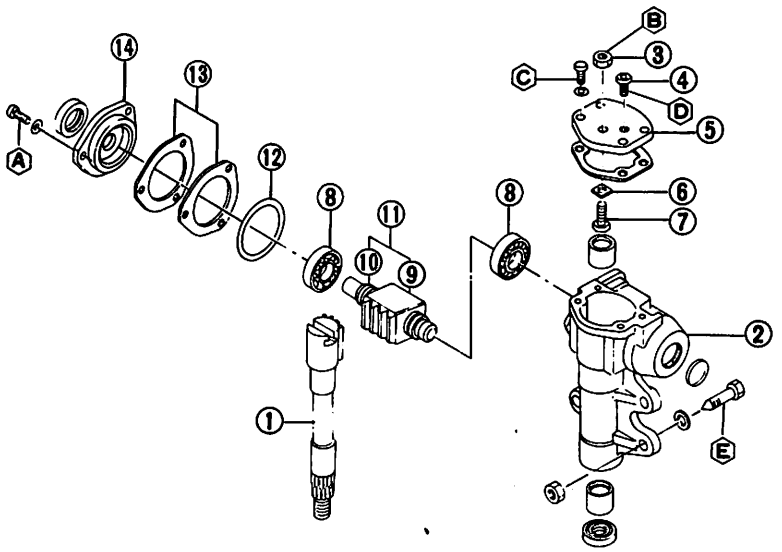
ST606

Fig. ST-16 Removing steering lock securing screws

INSTALLATION

1. Align steering lock hole in jacket tube with the mating portion of steering lock.
2. Install self-shear type screws and cut off their heads.

STEERING GEAR



1 Sector shaft
2 Steering gear housing
3 Lock nut
4 Filler plug
5 Sector shaft cover
6 Sector shaft adjusting shim
7 Sector shaft adjusting screw
8 Worm bearing
11 Steering worm assembly
— 9 Ball nut
— 10 Worm shaft
12 O-ring
13 Worm bearing shim
14 Rear cover

Tightening torque of bolts and nuts kg-m (ft-lb)

Ⓐ : 1.5 to 2.5 (11 to 18)
Ⓑ : 1.7 to 2.5 (12 to 18)
Ⓒ : 1.5 to 2.5 (11 to 18)
Ⓓ : 2.0 to 3.0 (14 to 22)
Ⓔ : 7.0 to 8.0 (51 to 58)

ST607

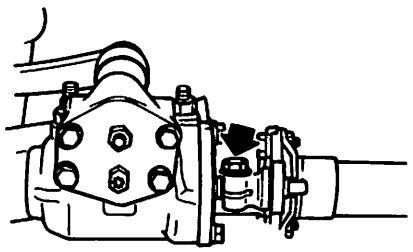
Fig. ST-17 Sectional view of steering gear

REMOVAL

1. Disconnect front exhaust tube from exhaust manifold.

Remove bolt securing front exhaust tube to transmission mounting insulator. Refer to Section FE.

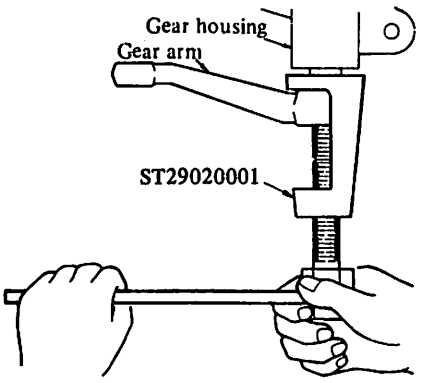
2. Remove bolt securing worm shaft to rubber coupling. See Figure ST-18.



ST603

Fig. ST-18 Removing rubber coupling securing bolt

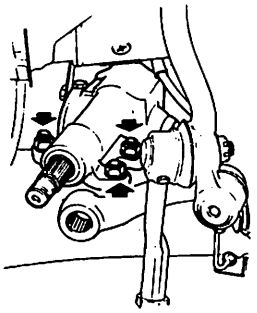
3. Remove nut and lock washer securing gear arm to sector shaft. Using Steering Gear Arm Puller ST29020001, remove steering gear arm from sector shaft. See Figure ST-19.



ST289

Fig. ST-19 Removing steering gear arm

4. Remove three bolts securing steering gear housing to body side member, and withdraw steering gear housing from engine compartment. See Figure ST-20.



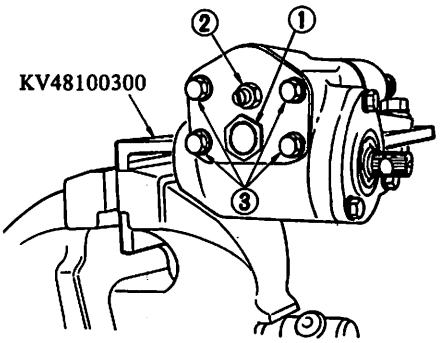
ST608

Fig. ST-20 Withdrawing steering gear housing

DISASSEMBLY

1. Thoroughly drain steering gear oil by removing filler plug ①. Place steering gear in a vise with Steering Gear Attachment KV48100300 in place.

2. Loosen lock nut ② and remove four sector shaft cover attaching bolts ③. See Figure ST-21.



1 Filler plug
2 Lock nut
3 Sector shaft cover attaching bolts

ST609

Fig. ST-21 Mounting steering gear in a vise

3. Turn sector shaft adjusting screw a few turns in clockwise direction and then remove cover and sector shaft. See Figure ST-22.

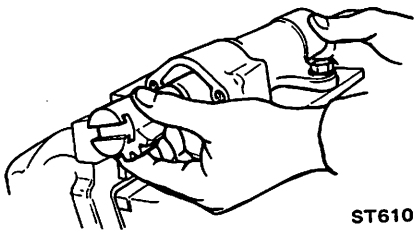

ST610

Fig. ST-22 Drawing out sector shaft

4. Remove three rear cover securing bolts and detach rear cover. See Figure ST-23.

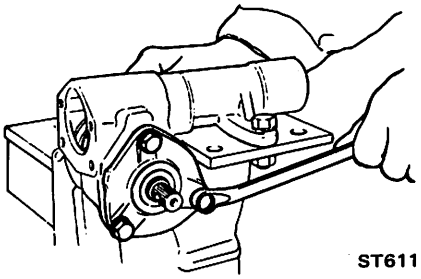

ST611

Fig. ST-23 Detaching rear cover

5. Remove bearing adjusting shim(s), and steering worm assembly. See Figure ST-24.

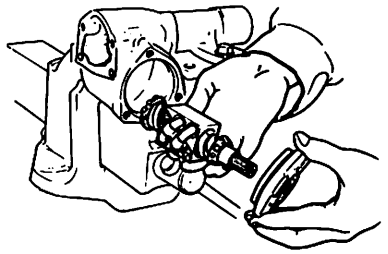

ST485

Fig. ST-24 Drawing out steering worm assembly

CAUTION:

a. Be careful not to allow ball nut to run down to either end of worm. The ends of ball guides will be damaged if nut is rotated until it stops at the end of worm.

b. Do not detach ball nut from worm shaft assembly. If necessary, replace assembly.

c. Do not remove sector shaft needle bearings from steering gear housing. If necessary, replace gear housing assembly.

d. Be careful not to allow penetration of any other material like dust or dirt.

INSPECTION

Wash clean all the disassembled parts in solvent and check for condition.

Sector shaft

1. Check gear tooth surface for pitting, burrs, cracks or any other damage, and replace if necessary.
2. Check sector shaft for distortion on its serration, and, if necessary, replace. Also check gear housing and steering worm assembly for deformation.

Steering worm assembly

1. Inspect ball nut gear tooth surface, and replace if pitting, burrs, wear or any other damage is found.
2. Ball nut must rotate smoothly on worm gear. If found too tight, assembly should be replaced.

Check rotation of ball nut as follows;

(1) Move ball nut to either end of worm gear, and gradually stand worm shaft and ball nut assembly until ball nut moves downward on worm gear under its own weight.

(2) If ball nut does not move freely over entire stroke, replace assembly.

Note: **Be careful not to damage ball nut guide tube while check is being made.**

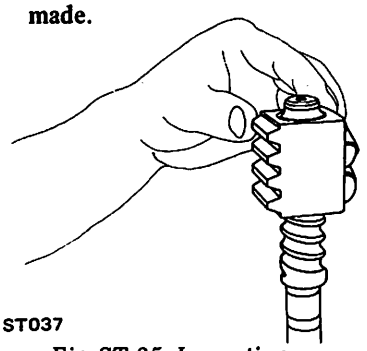

ST037

Fig. ST-25 Inspecting worm shaft and ball nut assembly

Bearings

1. Inspect worm bearing for wear, pitting or any other damage. Replace as required.

Note: **When replacing worm bearing, replace it as a set of bearing and outer race.**

2. If sector shaft needle bearings are found worn or damaged, replace as an assembly of gear housing and bearings.

Oil seal

Discard any oil seal which has once been removed. Replace oil seal if sealing lip is deformed or cracked. Also discard oil seal if spring is fatigued or dislocated.

ASSEMBLY AND ADJUSTMENT

Assemble steering gear in reverse order of disassembly. Observe following instructions:

1. Clean all parts.
2. Lubricate bearing turning surface, gear surface, gear tooth and other sliding parts with clean gear oil.
3. Fill space between sealing lips of new oil seal with recommended multipurpose grease, and fit it to gear housing and rear cover.

Note:

a. To facilitate installation, coat seal contacting face of oil seal with gear oil.

b. Press oil seal into place with its lettered side facing outside of gear housing or rear cover.

CAUTION:

Be careful not to assemble with any other material like dust or dirt.

Adjustment of worm bearing preload

4. Place steering worm assembly in position in gear housing with worm bearings. Install rear cover on gear housing with O-ring and worm bearing shims.

Tightening torque:
1.5 to 2.5 kg-m
(11 to 18 ft-lb)

Available worm bearing shims

No.	Thickness mm (in)
1	0.762 (0.0300)
2	0.254 (0.0100)
3	0.127 (0.0050)
4	0.050 (0.0020)

Note: Be sure to install the thickest shim on gear housing side.

Standard shim thickness: 1.5 mm (0.059 in)

5. Selecting suitable bearing shims, adjust worm bearing preload with Drive Pinion Preload Gauge ST3127S000 so that initial turning torque is 4.0 to 8.0 kg-cm (56 to 111 in-oz). See Figure ST-26.

Note:

a. **Rotate worm shaft a few turns in both directions to settle worm bearing in, and measure preload.**
b. **In case of readjustment, initial turning torque is 4.0 to 8.0 kg-cm (3.5 to 6.9 in-lb).**
c. **When adjusting worm bearing preload, add and then remove shim(s) until correct adjustment is achieved.**

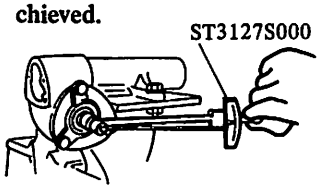


Fig. ST-26 Measuring initial turning torque

Adjustment of sector shaft end play

6. Insert adjusting screw with adjusting shim into T-shaped groove at sector shaft head and, choosing suitable adjusting shim, adjust the end play between sector shaft and adjusting screw until it is within 0.01 to 0.03 mm (0.0004 to 0.0012 in). See Figure ST-27.

Available sector shaft adjusting screw shims

No	Thickness mm (in)
1.	1.575 to 1.600 (0.0620 to 0.0630)
2.	1.550 to 1.575 (0.0610 to 0.0620)
3.	1.525 to 1.550 (0.0600 to 0.0610)
4.	1.500 to 1.525 (0.0591 to 0.0600)

Note: When installing adjusting shim, pay attention to which face is upper and which is lower. See Figure ST-27.

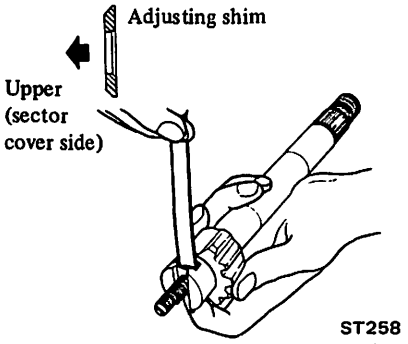


Fig. ST-27 Measuring end play between sector shaft and adjusting screw

7. Rotate worm shaft by hand until ball nut is in the center of travel, then install sector shaft together with adjusting screw in gear housing, ensuring that center gear of sector shaft engages with center gear of ball nut. See Figure ST-28.

CAUTION:
Be careful not to damage sealing lips of oil seal during this operation.

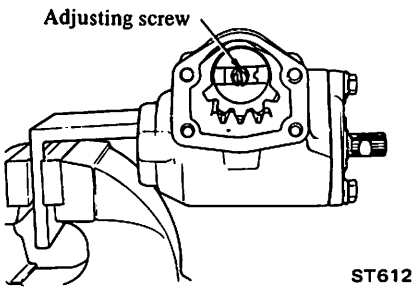


Fig. ST-28 Installing sector shaft

8. Install sector shaft cover on gear housing.

Be sure to apply sealant to each face of sector shaft cover packing when installing cover.

By turning adjusting screw counterclockwise, attach sector shaft cover to gear housing and then temporarily secure it with fixing bolts.

9. Pull sector shaft toward cover approximately 2 to 3 mm (0.08 to 0.12 in) after turning adjusting screw counterclockwise and tighten sector shaft cover fixing bolts to 1.5 to 2.5 kg-m (11 to 18 ft-lb).

10. Push sector shaft against ball nut gear by gradually turning adjusting screw clockwise until sector shaft gear lightly meshes with ball nut gear and then temporarily secure adjusting screw with lock nut.

11. Install gear arm on sector shaft and move sector shaft several times from the side of gear arm to see that it turns smoothly.

12. Adjust the backlash at the neutral position of gear arm by turning adjusting screw in or out so that the movement of the gear arm top end is less than 0.1 mm (0.004 in). See Figure ST-29.

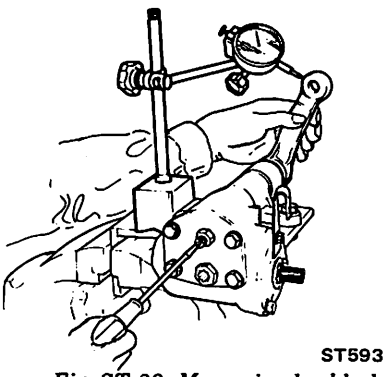


Fig. ST-29 Measuring backlash

13. Turn adjusting screw clockwise approximately 1/8 to 1/6 rotation and then tighten lock nut to 1.7 to 2.5 kg-m (12 to 18 ft-lb) after moving sector shaft several times. See Figure ST-30.

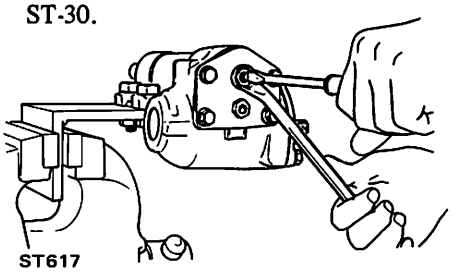


Fig. ST-30 Tightening lock nut

14. Measure initial turning torque of worm shaft assembly at center portion of its travel. Turning torque is 5 to 25 kg-cm (4.3 to 21.7 in-lb).

15. Fill gear housing with recommended gear oil of approximately 0.28 liter (⅝US pt, ½ Imp pt) through filler hole and install filler plug.

INSTALLATION

Install steering gear in the reverse order of removal.

Observe the following instructions.

1. Position steering gear and rubber coupling in place; then install and tighten bolts securing steering gear housing to body side member. Tighten to 7.0 to 8.0 kg-m (51 to 58 ft-lb).

Tighten bolt securing rubber coupling to worm shaft to 4.0 to 5.0 kg-m (29 to 36 ft-lb).

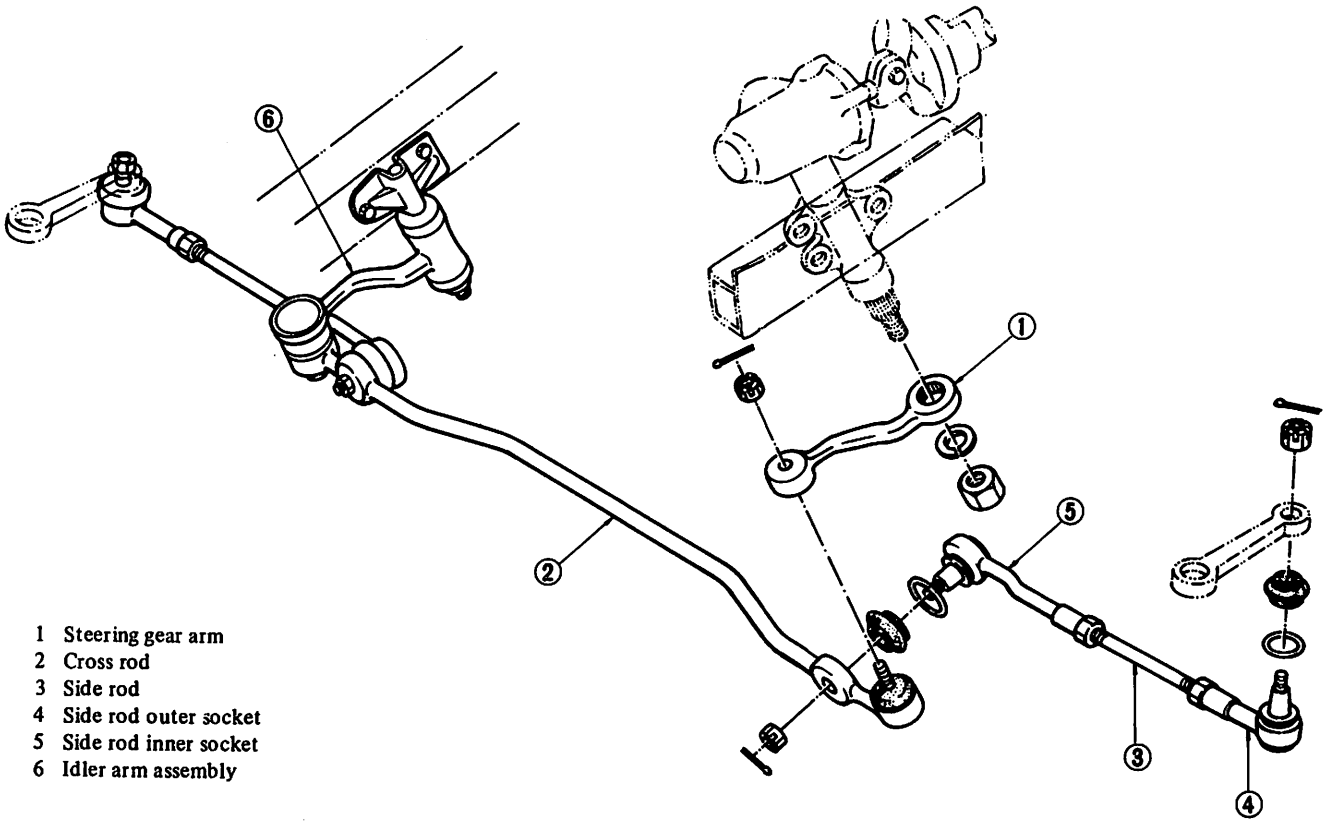
Note:

a. Align the groove in worm shaft with the bolt hole in rubber coupling flange yoke, and press coupling bolt through the undercut section of worm shaft.

b. Align four grooves of gear arm serrations with four projections of sector shaft serrations, and install and tighten lock washer and nut to a torque of 13 to 15 kg-m (94 to 108 ft-lb).

c. When installing front exhaust tube, refer to Section FE.

STEERING LINKAGE



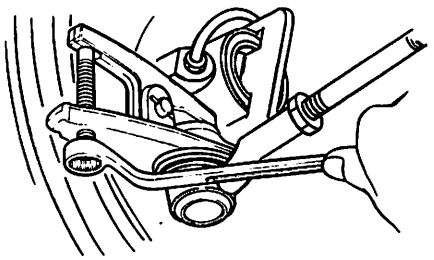
1 Steering gear arm
2 Cross rod
3 Side rod
4 Side rod outer socket
5 Side rod inner socket
6 Idler arm assembly

ST613

Fig. ST-31 Steering linkage

REMOVAL

1. Jack up the front of car and support it on safety stands.
2. Remove cotter pins and nuts fastening side rod ball studs to knuckle arms.
3. To detach side rod ball studs from knuckle arms, insert Steering Ball Joint Remover HT72520000 between them and separate them.



ST614

Fig. ST-32 Detaching side rod ball studs

4. Remove ball stud of cross rod from gear arm, and remove idler arm from cross rod in the same manner as described in step 3 above.
5. Remove idler assembly from side member by taking off two fixing bolts.

Note: Steering linkage assembly can be removed from car by removing gear arm from sector shaft with Steering Gear Arm Puller ST29020001 and by removing idler assembly from side member.

DISASSEMBLY

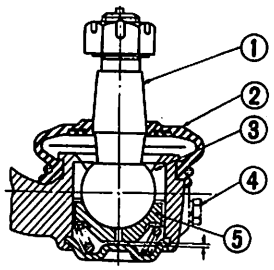
1. Disconnect both side rods from cross rod, following the procedure for removal of side rod ball joints on knuckle arm sides.
2. Remove idler arm nut and disassemble idler assembly.

INSPECTION AND REPAIR

Ball joint

1. When ball stud is worn and axial play is too excessive, replace.

Axial play:
0.1 to 0.5 mm
(0.004 to 0.020 in)
Initial turning torque:
Less than 0.6 kg-m (4.3 ft-lb)



1 Ball joint
2 Dust cover
3 Ball seat
4 Plug
5 Spring seat

ST179

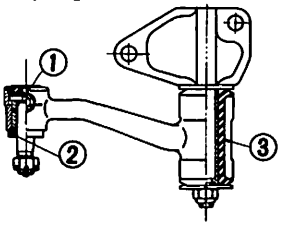
Fig. ST-33 Sectional view of ball stud (side rod)

2. When dust cover is broken or deformed, clamp on dust cover is fatigued or dislocated, or when grease leakage is found, repair as follows:
(1) Remove dust cover, check operation, axial play and turning torque of ball stud. Also check ball stud for rust or damage and neck portion for scratches. Replace ball joint assembly, if necessary.
(2) Clean internal portion of ball joint and install a new dust cover and clamp.
(3) Apply recommended multi-purpose grease to ball joint through grease nipple. Check operation of ball stud, replace as an assembly if necessary.

Note: At the recommended intervals, check grease and renew if necessary. To renew grease, replace plug with a grease nipple and apply recommended multi-purpose grease to ball joints through grease nipple until grease is forced out through dust cover-to-joint socket clearance.

Idler arm assembly

Check nylon bushing of cross rod joint and rubber bushing of idler arm for breakage, wear or play, and if necessary replace.



1 Nylon bushing
2 Dust cover
3 Torsion rubber

ST180

Fig. ST-34 Sectional view of idler assembly

Cross rod and side rod

Check side rods and cross rod for breakage, bend or crack, and replace if necessary.

Fixing location

Check fixing location (nuts and cotter pins) for looseness, play or breakage. When looseness or play is found, check for wear on tapered portion of ball stud, gear arm or idler arm.

Grease

Check dust or water in grease.

ASSEMBLY AND ADJUSTMENT

Assemble steering linkage in the reverse order of disassembly.
Observe the following instructions.

Ball joints

Before installing a new dust cover, be sure to pack with the recommended multi-purpose grease.

Tightening torque:
Ball stud:
5.5 to 10.0 kg-m
(40 to 72 ft-lb)

Note:
a. **When tightening ball stud, be careful not to allow grease to get on its tapered section.**
b. **Tighten nut to 5.5 to 6.0 kg-m (40 to 43 ft-lb), and align the cotter pin holes in the tightening directions.**
c. **Be sure to insert new cotter pin in place and bend it securely.**

Idler arm assembly

When assembling idler assembly, observe the following instructions.
1. Apply soapy water on the outer circumference of bushing.
Carefully press bushing into idler body until it protrudes.

Note: When installing rubber bushing, use care not to allow grease or oil getting on its sliding portion of idler arm and rubber bushing.

2. Tighten idler nut to 4.0 to 5.0 kg-m (29 to 36 ft-lb).

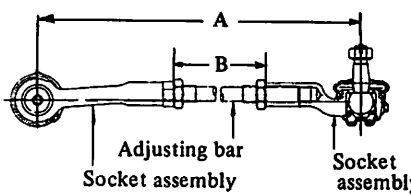
Cross rod and side rod

1. When side rod sockets and side rod adjusting bar are separated, adjust side rod length correctly.
Adjustment should be done between ball stud centers. See Figure ST-35.

Standard distance between
inner and outer ball stud centers:
A; 306 mm (12.05 in)
Standard distance between
side rod ball joint sockets:
B; 102 mm (4.02 in)

Note:
a. **Be sure to screw adjusting bar in socket evenly.**
b. **Make sure that adjusting bar is screwed in socket 22 mm (0.87 in) or more.**

2. Tightening torque:
Side rod adjusting bar lock nut:
8.0 to 10.0 kg-m
(58 to 72 ft-lb)



ST615

Fig. ST-35 Side rod

Note: Lock adjusting bar lock nut so that ball joint on outer socket (knuckle arm side) is 90° with respect to that on inner socket (cross rod side).

INSTALLATION

Install steering linkage in the reverse order of removal.

Observe the following instructions.

1. Tightening torque:

Ball stud:
5.5 to 10.0 kg-m
(40 to 72 ft-lb)

Idler body to frame bolts:
7.0 to 8.0 kg-m
(51 to 58 ft-lb)

Gear arm to sector shaft:
13.0 to 15.0 kg-m
(94 to 108 ft-lb)

Note: Tighten nut to 5.5 to 6.0 kg-m (40 to 43 ft-lb), and align the cotter pin holes in the tightening directions.

2. Check wheel alignment, and if necessary adjust. See Section FA.

Note: When adjusting toe-in, lock adjusting bar lock nut so that ball joint on outer socket (knuckle arm side) is 90° with respect to that on inner socket (cross rod side).

ACCIDENT (Collision)

When accident (collision) occurs unfortunately and the car, especially its front unit, is damaged, conduct inspection in accordance with the following instruction:

Inspect the steering system particularly carefully because it is a very important unit for driving.

(1) Check both side steering angles for correct balance.

(2) With the tires positioned at neutral, check the steering wheel bar for correct position.

(3) Operate the steering system, and check it for sliding noise.

(4) Check the operation for smoothness.

(5) Check the side rod and cross rod for bending.

(6) Check the gear arm for crack.

(7) Check the gear housing tightening bolt for slackness and installation boss for crack.

(8) Check the sector shaft serration for twisting.

(9) Check the sector gear for crack.

(10) Check the ball screw for pitting.

(11) For checking the collapsible type steering column, refer to page ST-5 for Inspection.

(12) Check the side member at steering unit for deformation.

(13) Check the portion of the steering post bracket installed on the steering post clamp for correct installation.

Note:

a. When damage is found through above checks, it is necessary to replace steering assembly.

b. When damage to steering system is found, check front axle and suspension system for condition.

SERVICE DATA AND SPECIFICATIONS

SPECIFICATIONS

Steering gear type		Recirculating ball type
Turns of steering wheel (Lock to lock)		3.4
Steering gear ratio		16.48 : 1
Turning angle of front wheel		
Inside		33° to 37°
Outside		28° to 32°
Minimum turning radius (Wall to wall)	m (ft)	5.25 (17.2)
Steering wheel axial play	mm (in)	0 (0)
Steering wheel play at outer circumference	mm (in)	Less than 35 (1.38)
Steering column type		Collapsible
Oil capacity	liters (US pt, Imp pt)	0.28 (⅝, ½)

SERVICE DATA

Ball joint		
Turning torque	kg-m (ft-lb)	Less than 0.6 (4.3)
Side rod length	mm (in)	306 (12.05)
Worm shaft turning torque at center portion of its travel		
Steering gear assembly	kg-cm (in-lb)	5 to 25 (4.3 to 21.7)
Worm bearing shim		
Total thickness	mm (in)	1.5 (0.059)
Adjusting shim thickness	mm (in)	0.762 (0.0300) 0.254 (0.0100) 0.127 (0.0050) 0.050 (0.0020)
Sector shaft		
End play between sector shaft and adjusting screw	mm (in)	0.01 to 0.03 (0.0004 to 0.0012)
Adjusting shim thickness	mm (in)	1.575 to 1.600 (0.0620 to 0.0630) 1.550 to 1.575 (0.0610 to 0.0620) 1.525 to 1.550 (0.0600 to 0.0610) 1.500 to 1.525 (0.0591 to 0.0600)
Backlash at gear arm top end	mm (in)	Less than 0.1 (0.004)
Cross rod length	mm (in)	540 (21.26)

TIGHTENING TORQUE

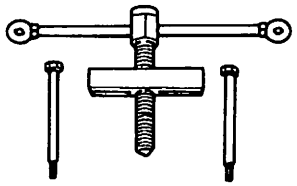
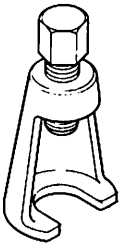
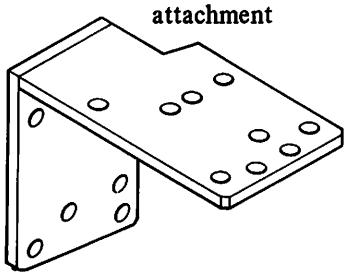
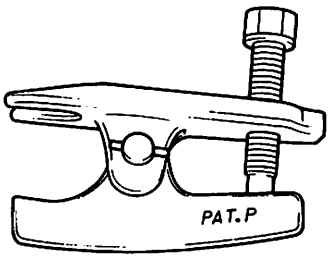
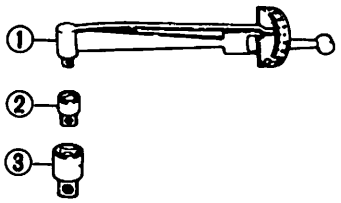
Column shaft		
Steering wheel nut	kg-m (ft-lb)	3.0 to 3.5 (22 to 25)
Column clamp bolt	kg-m (ft-lb)	1.5 to 1.8 (11 to 13)
Jacket tube bracket to dash panel	kg-m (ft-lb)	0.35 to 0.45 (2.5 to 3.3)
Rubber coupling to worm shaft	kg-m (ft-lb)	4.0 to 5.0 (29 to 36)

Steering gear			
Gear arm nut	kg-m (ft-lb)	.....	13 to 15 (94 to 108)
Steering gear housing to body	kg-m (ft-lb)	.....	7.0 to 8.0 (51 to 58)
Rear cover bolt	kg-m (ft-lb)	.....	1.5 to 2.5 (11 to 18)
Sector shaft cover bolt	kg-m (ft-lb)	.....	1.5 to 2.5 (11 to 18)
Sector shaft adjusting screw lock nut	kg-m (ft-lb)	.....	1.7 to 2.5 (12 to 18)
Steering linkage			
Side rod lock nut	kg-m (ft-lb)	.....	8.0 to 10.0 (58 to 72)
Idler arm (Idler shaft) nut	kg-m (ft-lb)	.....	4.0 to 5.0 (29 to 36)
Idler body to frame	kg-m (ft-lb)	.....	7.0 to 8.0 (51 to 58)
Ball joint stud nut	kg-m (ft-lb)	.....	5.5 to 10.0 (40 to 72)

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Steering wheel moves heavily.	Wheel alignment out of specifications or lower tire inflation pressure.	Re-align or inflate tires to correct pressure.
	Steering linkage out of adjustment.	Re-adjust and see relative topic under Front Suspension.
	Steering column out of alignment.	Repair.
Steering wheel returns but sluggishly.	Wheels out of alignment or lower tire inflation pressure.	Repair or inflate tires to correct air pressure.
	Faulty steering linkage.	Replace and see relative topic under Front Suspension.
Car pulls to one side.	Wheels out of proper alignment.	Re-align.
	Wheel bearing out of adjustment.	Readjust.
	Faulty steering linkage.	Replace and see relative topic under Front Suspension.

SPECIAL SERVICE TOOLS

Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.
ST27180001 Steering wheel puller 	J 25726 / Fig. ST-3	ST29020001 Steering gear arm puller 	J 25725 / Fig. ST-19
KV48100300 Strut & steering gear box attachment 	J 25729 / Fig. ST-21	HT72520000 Ball joint remover 	——— / Fig. ST-28
ST3127S000 Preload gauge ① GG91030000 Torque wrench ② HT62940000 Socket adapter ③ HT62900000 Socket adapter 	See J 25765 ① See J 25765 / Fig. ST-26 Page ST-9		

SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION FE

ENGINE CONTROL, FUEL & EXHAUST SYSTEMS

ENGINE CONTROL SYSTEM ..... FE- 2
FUEL SYSTEM ..... FE- 4
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ENGINE CONTROL SYSTEM

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INSTALLATION FE-3
ADJUSTMENT FE-3

ACCELERATOR SYSTEM

DESCRIPTION

The accelerator control system is of a wire type.

Its linkage is lightweight, and construction is such that the linkage operates smoothly and is unaffected by engine vibration.

REMOVAL

Accelerator wire

1. Disconnect accelerator wire from carburetor.
2. Remove screw securing accelerator wire to engine.
3. Remove ring nut from dash panel. See Figure FE-1.
4. Remove spring clamp and disconnect accelerator wire from accelerator pedal arm. See Figure FE-1.
5. Remove accelerator wire from engine compartment.

Accelerator pedal assembly

1. Remove spring clamp, then disconnect accelerator wire from the tip of pedal arm.
2. Remove three screws securing accelerator pedal bracket to body.
3. Remove accelerator pedal from dash panel. See Figure FE-1.

INSPECTION

1. Check accelerator pedal return spring for rust, fatigue or damage. Replace if necessary.
2. Check accelerator wire, cases, socket and fastening locations for rust, damage or looseness. Repair or replace if necessary.

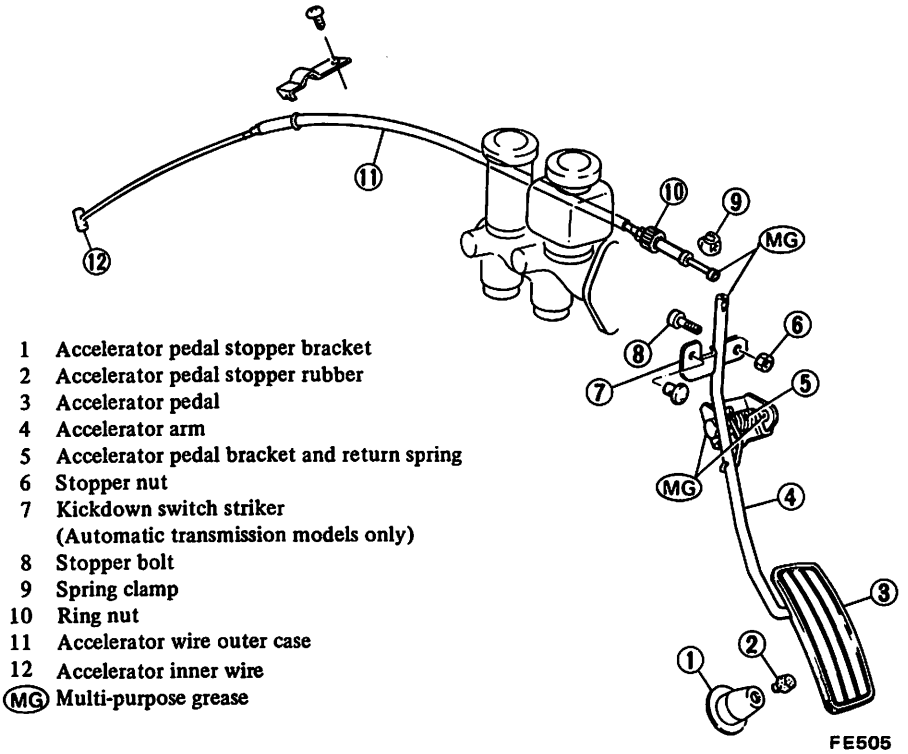


Fig. FE-1 Accelerator control system

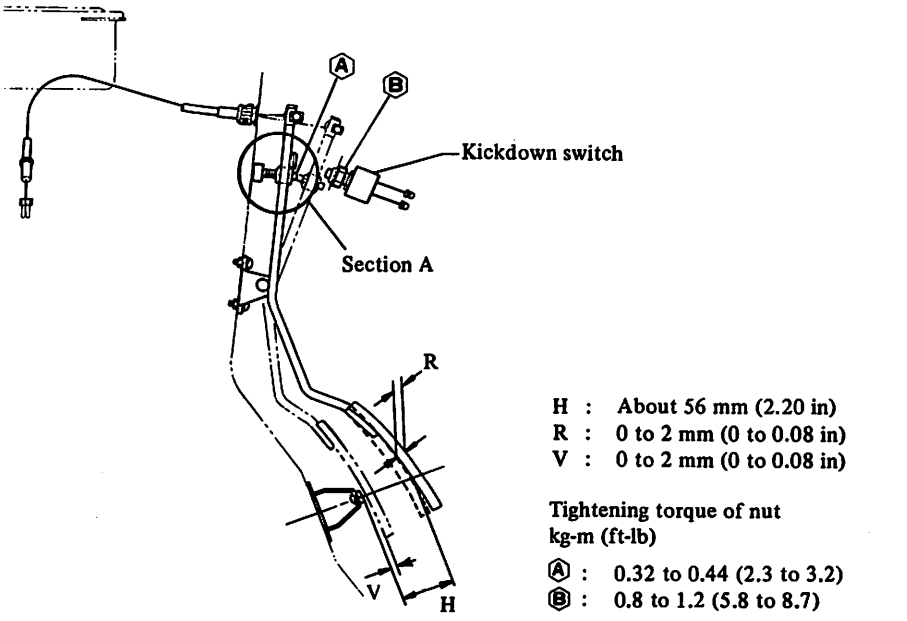


Fig. FE-2 Adjusting accelerator control system

INSTALLATION

To install, reverse the order of removal.

Note:

a. **Check accelerator control parts for improper contact with any adjacent parts.**

b. **Make sure that deviation between the center of accelerator pedal and that of stopper rubber is less than 3 mm (0.12 in). Repair or replace if necessary.**

ADJUSTMENT

Accelerator pedal and wire

1. Adjust stopper bolt (Section A) so as to obtain the specified height "H" between accelerator pedal reverse side and pedal stopper rubber head as shown in Figure FE-2. Secure stopper bolt with lock nut.

2. Release automatic choke effect, since throttle lever is opened by fast idle cam until engine warms up.

To release automatic choke effect, proceed as follows:

(1) Keep choke valve fully open with fingers.

(2) Pull throttle lever up by hand, then automatic choke effect will be released. See Figure FE-3.

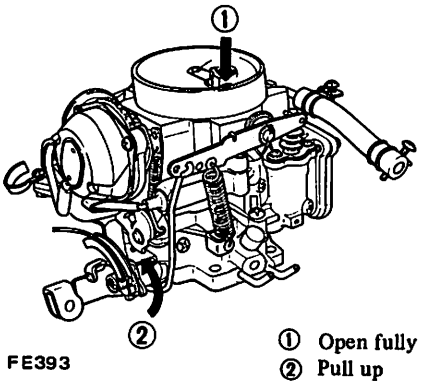


Fig. FE-3 Releasing automatic choke effect

3. Adjust play of accelerator wire as follows:

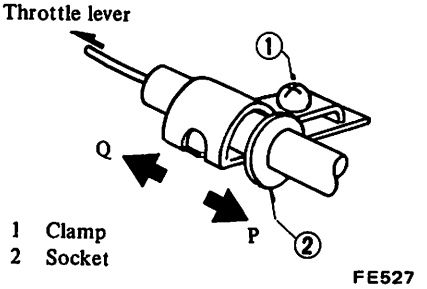


Fig. FE-4 Adjusting play of accelerator wire

(1) Pull socket down toward "P" direction until throttle valve is about to open.

(2) Then pull socket up 1.0 mm (0.04 in) from that position toward "Q" direction, and securely fasten socket with clamp.

4. After completing the adjustment as previously explained, check the following:

(1) Make sure that accelerator system functions smoothly and quietly without disturbing any adjacent parts.

(2) Depress accelerator pedal down until throttle valve fully opens. Make sure that the clearance "V" between accelerator pedal reverse side and stopper rubber head is 0 to 2 mm (0 to 0.08 in) as shown in Figure FE-2.

Adjust stopper bolt if beyond limits.

(3) Check throttle lever if it returns to its original position as soon as accelerator pedal is released.

(4) Apply recommended multipurpose grease to the friction surfaces as specified in the periodic maintenance schedule.

Kickdown switch

The kickdown switch adjustment is correct if it is actuated by kickdown switch striker when accelerator pedal is fully depressed.

Always tighten stopper nut securely after the proper adjustment is obtained.

FUEL SYSTEM

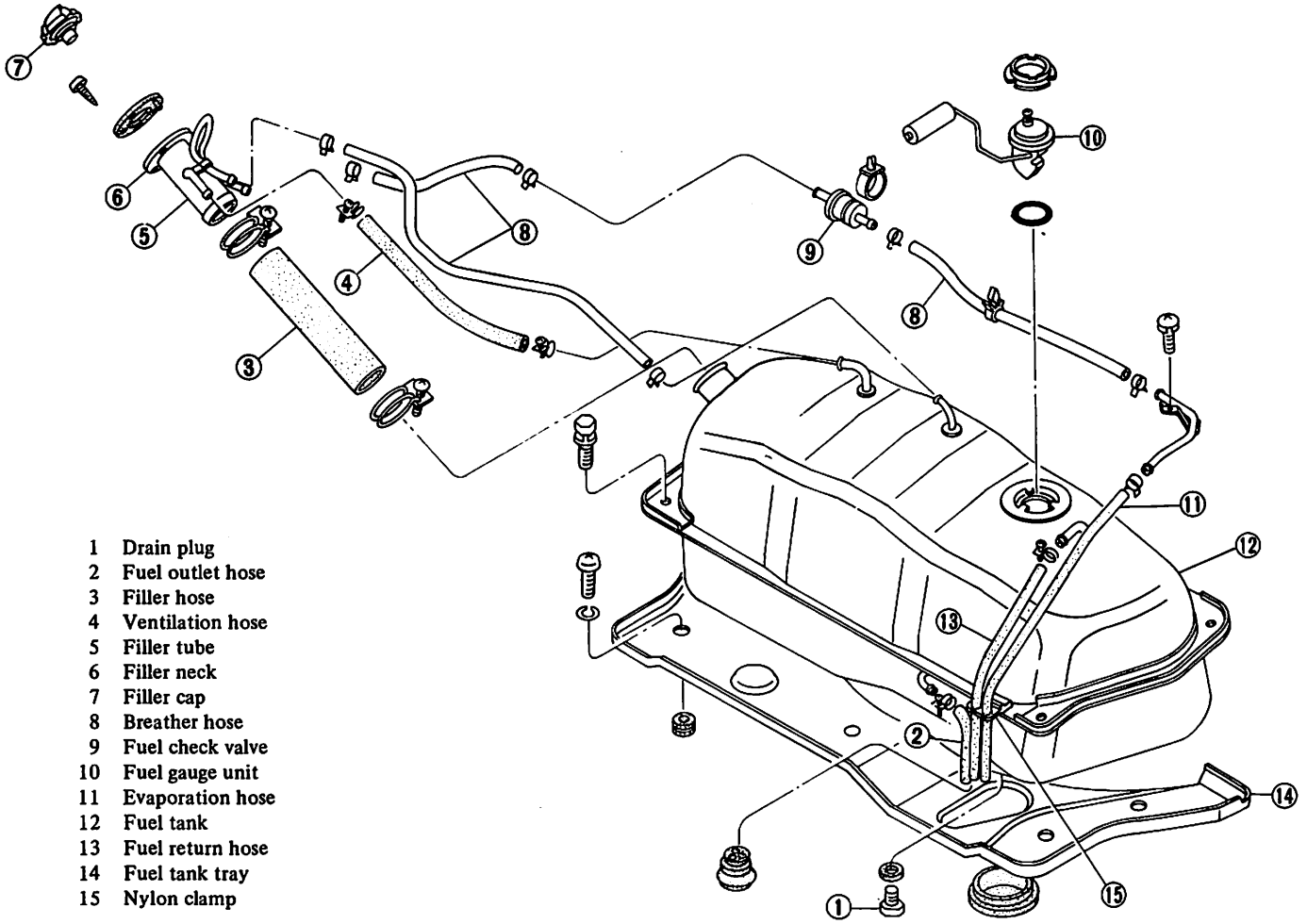
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FUEL GAUGE UNIT FE-5
FUEL PIPING FE-6
FUEL FILTER FE-6
INSPECTION FE-6
INSTALLATION FE-6

DESCRIPTION

The fuel tank is 60 liters (15⅞ US gal, 13¼ Imp gal) in capacity. The tank unit is located to the rear of the seat back and secured in place with four bolts.

The fuel filter is of a nylon, cartridge type.



1 Drain plug
2 Fuel outlet hose
3 Filler hose
4 Ventilation hose
5 Filler tube
6 Filler neck
7 Filler cap
8 Breather hose
9 Fuel check valve
10 Fuel gauge unit
11 Evaporation hose
12 Fuel tank
13 Fuel return hose
14 Fuel tank tray
15 Nylon clamp

FE395

Fig. FE-5 Fuel tank

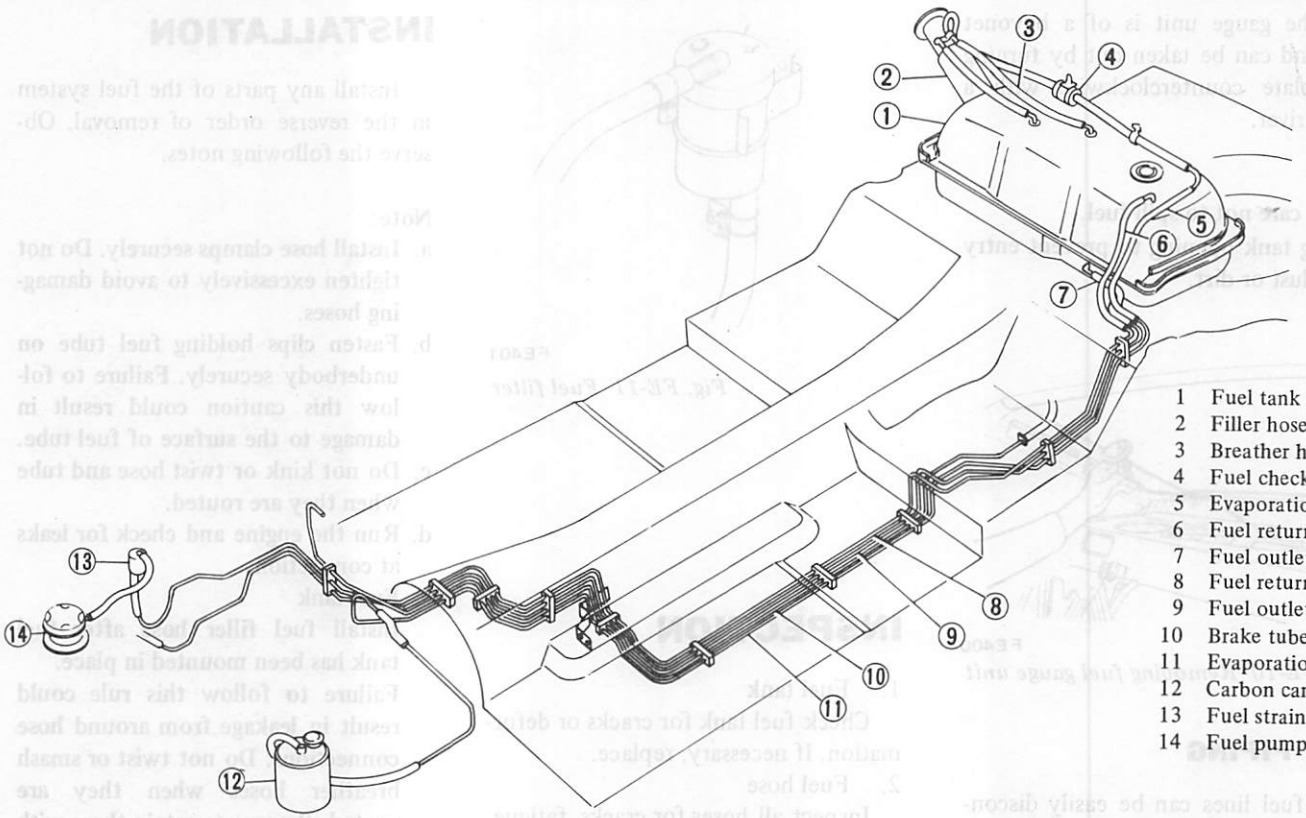


Fig. FE-6 Fuel piping

REMOVAL

WARNING:
When replacing fuel line parts, be sure to observe the following:
a. Put a "CAUTION" INFLAMMABLE" sign in workshop.
b. Be sure to furnish workshop with an asphyxiator.
c. Be sure to disconnect battery ground cable before conducting operations.
d. Put drained fuel in an explosion-proof container and put on lid securely.

FUEL TANK

1. Remove battery ground cable.
2. Remove rubber plug located on floor panel above left side rear axle.

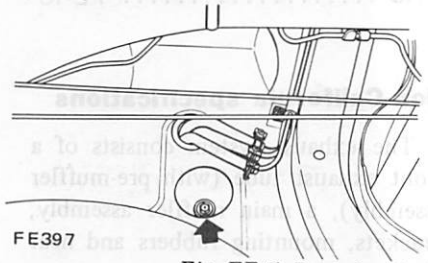


Fig. FE-7 Draining fuel

3. Place a suitable container under fuel tank drain plug to receive the remaining fuel in tank. Remove drain plug and then drain fuel into the container.
4. Detach rear seat cushion, seat back and rear seat backboard.

   Disconnect fuel hose.
5. Remove two bolts securing fuel tank in place.

Note: There are four securing bolts; two of them are at rear seat back side and the other at trunk compartment side.

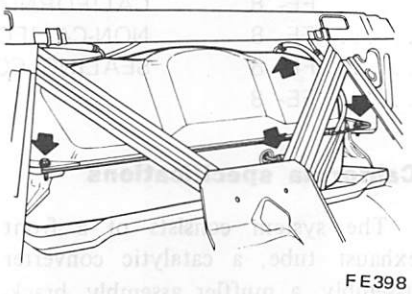


Fig. FE-8 Removing fuel tank (Rear seat side)

6. Detach trunk compartment front finisher.

   Disconnect ventilation hose, breather hose and filler hose.

   Disconnect wires from fuel tank gauge unit.
7. Remove two bolts securing fuel tank and take out fuel tank.

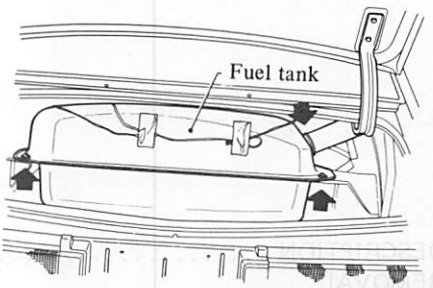


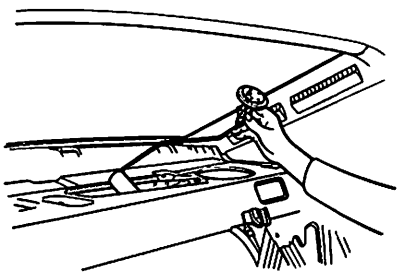
Fig. FE-9 Removing fuel tank (Trunk compartment side)

FUEL GAUGE UNIT

1. Detach rear seat cushion, seat back and rear parcel shelf finisher.

2. The gauge unit is of a bayonet type and can be taken out by turning lock plate counterclockwise with a screwdriver.

Note:
a. Use care not to spill fuel.
b. Plug tank opening to prevent entry of dust or dirt.



FE400

Fig. FE-10 Removing fuel gauge unit

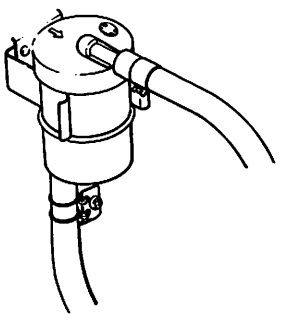
FUEL PIPING

All fuel lines can be easily disconnected by unfastening clamps and clips. Do not disconnect any fuel line unless necessary.

Note: Plug hose and tube opening to prevent entry of dust or dirt.

FUEL FILTER

1. Disconnect fuel hoses from fuel filter by removing clamps.
2. Remove fuel filter.



FE401

Fig. FE-11 Fuel filter

INSPECTION

1. Fuel tank
   Check fuel tank for cracks or deformation. If necessary, replace.
2. Fuel hose
   Inspect all hoses for cracks, fatigue, sweating or deterioration.
   Replace any hose that is damaged.
3. Fuel tube
   Replace any fuel tube that is cracked, rusted, collapsed or deformed.
4. Fuel filter
   Replace fuel filter at recommended maintenance intervals or if it becomes clogged or restricted.
   Fuel filter is of a cartridge type and cannot be cleaned. Always replace with a new one.

INSTALLATION

Install any parts of the fuel system in the reverse order of removal. Observe the following notes.

Note:
a. Install hose clamps securely. Do not tighten excessively to avoid damaging hoses.
b. Fasten clips holding fuel tube on underbody securely. Failure to follow this caution could result in damage to the surface of fuel tube.
c. Do not kink or twist hose and tube when they are routed.
d. Run the engine and check for leaks at connections.
e. Fuel tank
   Install fuel filler hose after fuel tank has been mounted in place.
   Failure to follow this rule could result in leakage from around hose connections. Do not twist or smash breather hoses when they are routed. Be sure to retain them with clips securely.
f. Install nylon clamp securely on the front side of fuel tank to prevent hoses from being damaged. See Figure FE-5.
g. Fuel tank gauge unit
   When installing fuel tank gauge unit, align the projection of tank gauge unit with the notch in fuel tank and tighten it securely. Be sure to install tank gauge unit with O-ring in place.

EXHAUST SYSTEM

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  NON-CALIFORNIA MODELS ..... FE- 8
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  CALIFORNIA MODELS ..... FE- 8
  NON-CALIFORNIA MODELS FE-12
  SEALING COMPOUND FE-13

DESCRIPTION

The exhaust systems differ in specification between California and Non-California models.

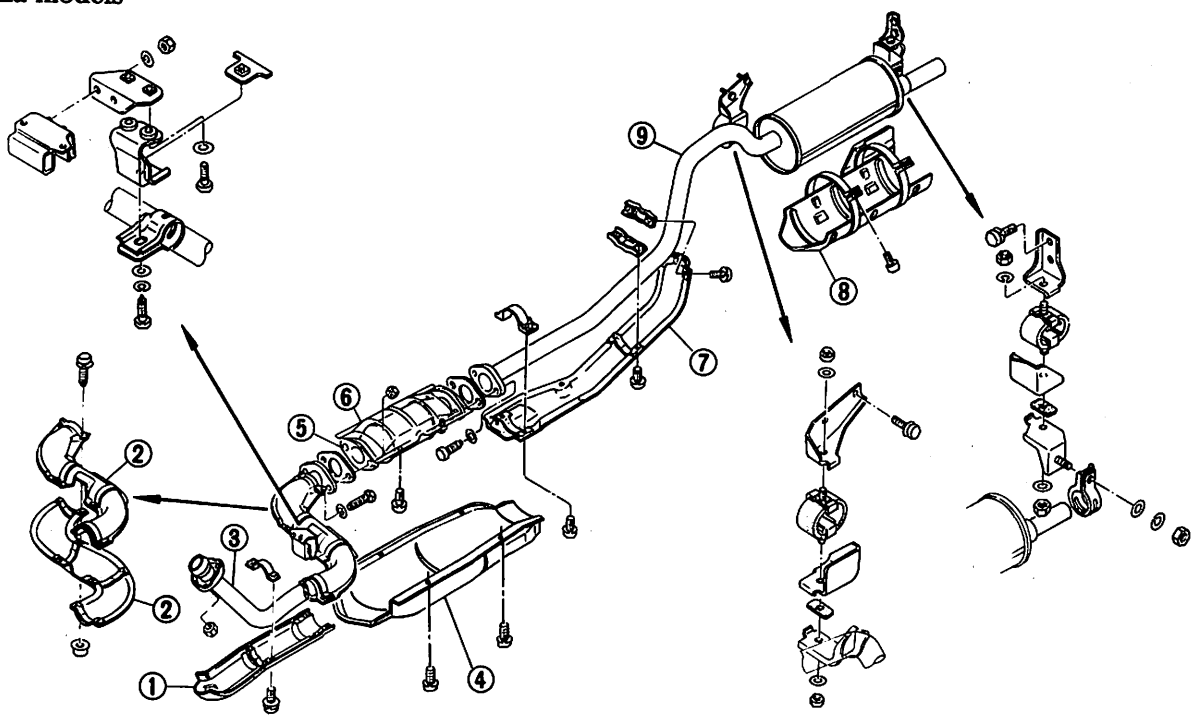
California specifications

The system consists of a front exhaust tube, a catalytic converter assembly, a muffler assembly, brackets, mounting rubbers and heat insulators.

Non-California specifications

The exhaust system consists of a front exhaust tube (with pre-muffler assembly), a main muffler assembly, brackets, mounting rubbers and heat insulators.

California models

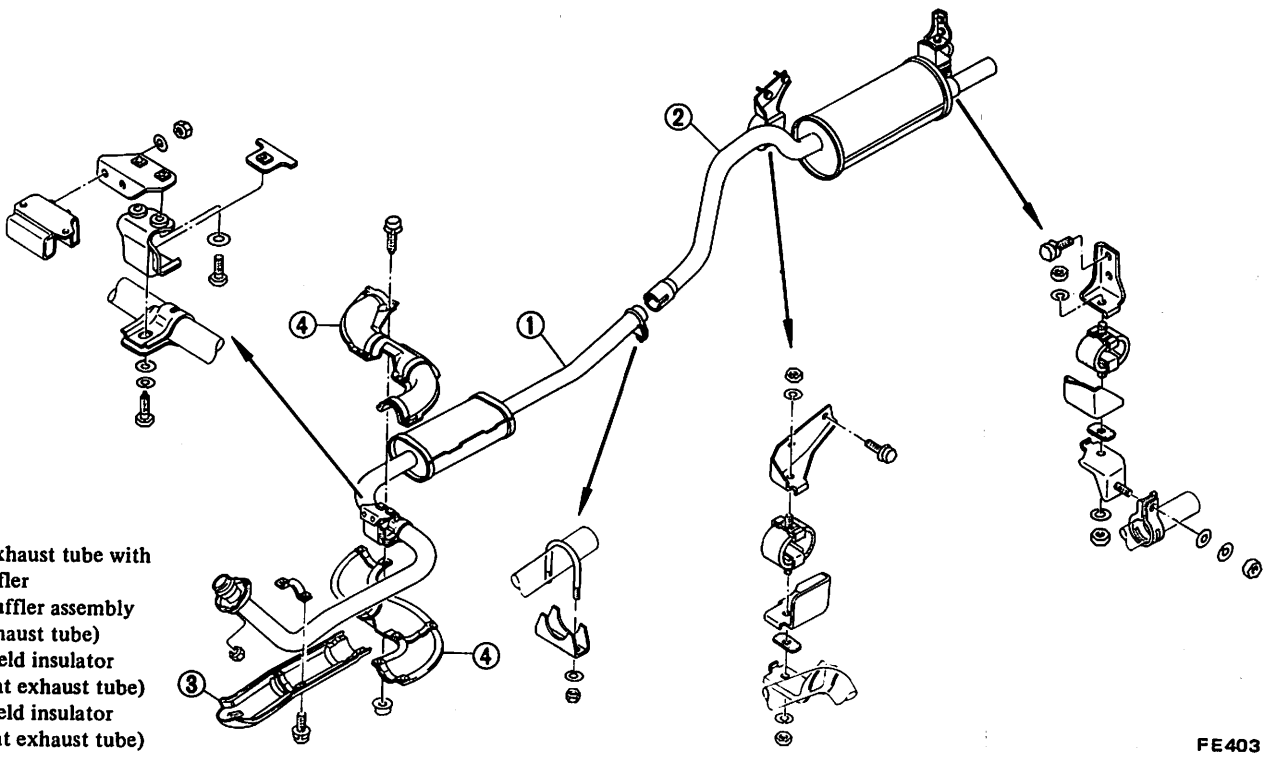


1 Heat shield insulator (for front exhaust tube)
2 Heat shield insulator (for front exhaust tube)
3 Front exhaust tube
4 Heat shield insulator (for catalytic converter lower side)
5 Catalytic converter
6 Catalytic converter upper shelter
7 Heat shield insulator (for rear exhaust tube)
8 Heat shield insulator (for muffler)
9 Muffler assembly (rear exhaust tube)

FE506

Fig. FE-12 Exhaust system (California models)

Non-California models



1 Front exhaust tube with pre-muffler
2 Main muffler assembly (rear exhaust tube)
3 Heat shield insulator (for front exhaust tube)
4 Heat shield insulator (for front exhaust tube)

FE403

Fig. FE-13 Exhaust system (Non-California models)

REMOVAL

CALIFORNIA MODELS

1. Remove heat shield insulator from catalytic converter.
2. Remove bolts securing catalytic converter to rear exhaust tube and disengage muffler assembly.
3. Remove nuts mounting muffler assembly, then remove muffler assembly from car body.
4. Remove nuts securing front tube to exhaust manifold.
5. Remove front tube mounting bolt, then remove front tube assembly with catalytic converter.

NON-CALIFORNIA MODELS

1. Remove exhaust tube U-bolt clamp.
2. Remove nuts mounting main muffler assembly.
3. Break sealant off at the front tube-to-rear tube connection.

Note: A sealant is applied to the tube connections to eliminate the leakage of exhaust gases. Observe the procedures outlined later in this section as a guide.

When disconnecting the exhaust tube connections, pay attention to the following points.

(1) Break old sealant off at the connection by lightly tapping around the tube with a hammer and twisting muffler.

(2) Using a rubber hammer, tap on the rear exhaust tube while pushing it toward rear. The muffler assembly can then be taken out.

4. Remove nuts securing front tube to exhaust manifold.
5. Remove front tube mounting bolt, then remove front tube assembly.

INSPECTION

1. Check muffler and tubes for cracks, damage or corrosion.

Replace any parts that is damaged beyond limits.

2. Replace bracket and hanger rubber parts that are cracked, fatigued or sweated.

INSTALLATION

CALIFORNIA MODELS

1. Assemble front tube and catalytic converter, and install front tube heat shield insulators.

Note:

a. Assemble catalytic converter, observing weld nuts side of catalytic converter flange to locate rearward.

b. Be sure to install catalytic converter upper shelter, observing "F" (Front) mark on shelter.

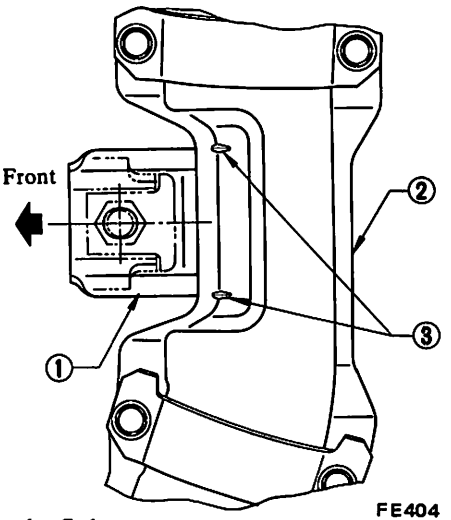
2. Assemble exhaust tube heat shield insulator and muffler heat shield insulator to muffler assembly. Insert C-clamp into tail of muffler assembly.

3. Subassemble front exhaust tube mounting bracket and install it to transmission mounting insulator.

4. Subassemble muffler mounting brackets and install them on car body.

5. Insert front tube subassembly into exhaust manifold connection, and supporting catalytic converter so that it is located in a proper position, tighten nuts at exhaust manifold. Tighten bolt at transmission mounting insulator.

Note: Be sure to locate C-clamp to locating mark at heat shield insulator as shown in Figure FE-14.



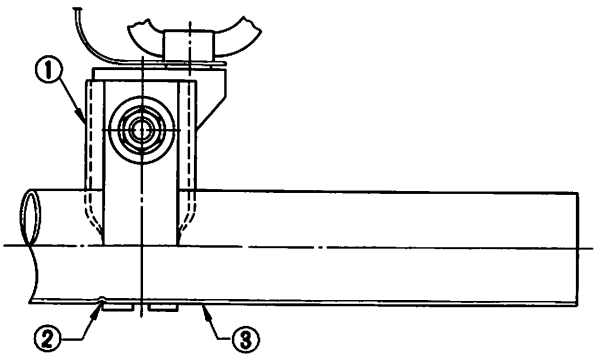
1 C-clamp
2 Heat shield insulator
3 Locating marks

Fig. FE-14 Locating mark at front exhaust tube C-clamp

6. Install muffler assembly on car body and tighten mounting nuts and catalytic converter flange bolts.

Note:

a. Be sure to locate front end of C-clamp to locating mark at tail tube as shown in Figure FE-15.



1 C-clamp
2 Locating mark
3 Tail tube

Fig. FE-15 Locating mark at tail tube C-clamp

b. Be sure to install C-clamp to be vertical.

7. Install heat shield insulator at catalytic converter lower side.

Note: A proper clearance should be maintained between rear exhaust tube heat shield insulator and catalytic converter heat shield insulator.

Installation precautions

1. When assembling, be careful not to let gas leak from around connections of exhaust system components. Evenly tighten nut securing exhaust manifold to front tube fixing plate.
2. When installing heat shield insulators, be sure not to allow of any play of heat shield insulators.
3. Always maintain a sufficient clearance between heat shield insulators and adjacent parts. See Figure FE-19.
4. When installing mounting insulators, observe the following precautions:

(1) Be sure that mounting insulators are not subject to undue stress due to misaligned piping as shown in Figure FE-16.

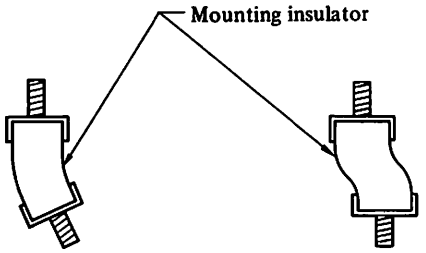


Fig. FE-16 Mounting insulators

(2) As for installation of muffler assembly, fore-and-aft offset of insulators should be as shown in Figure FE-17.

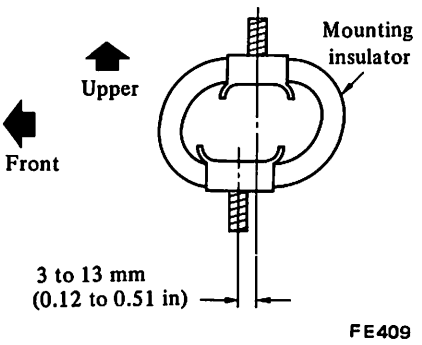


Fig. FE-17 Muffler mounting fore-and-aft adjustment

(3) Always locate mounting rubbers in such a way that preload applied to them is kept to a minimum.

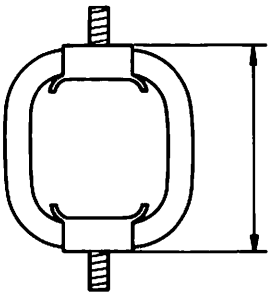


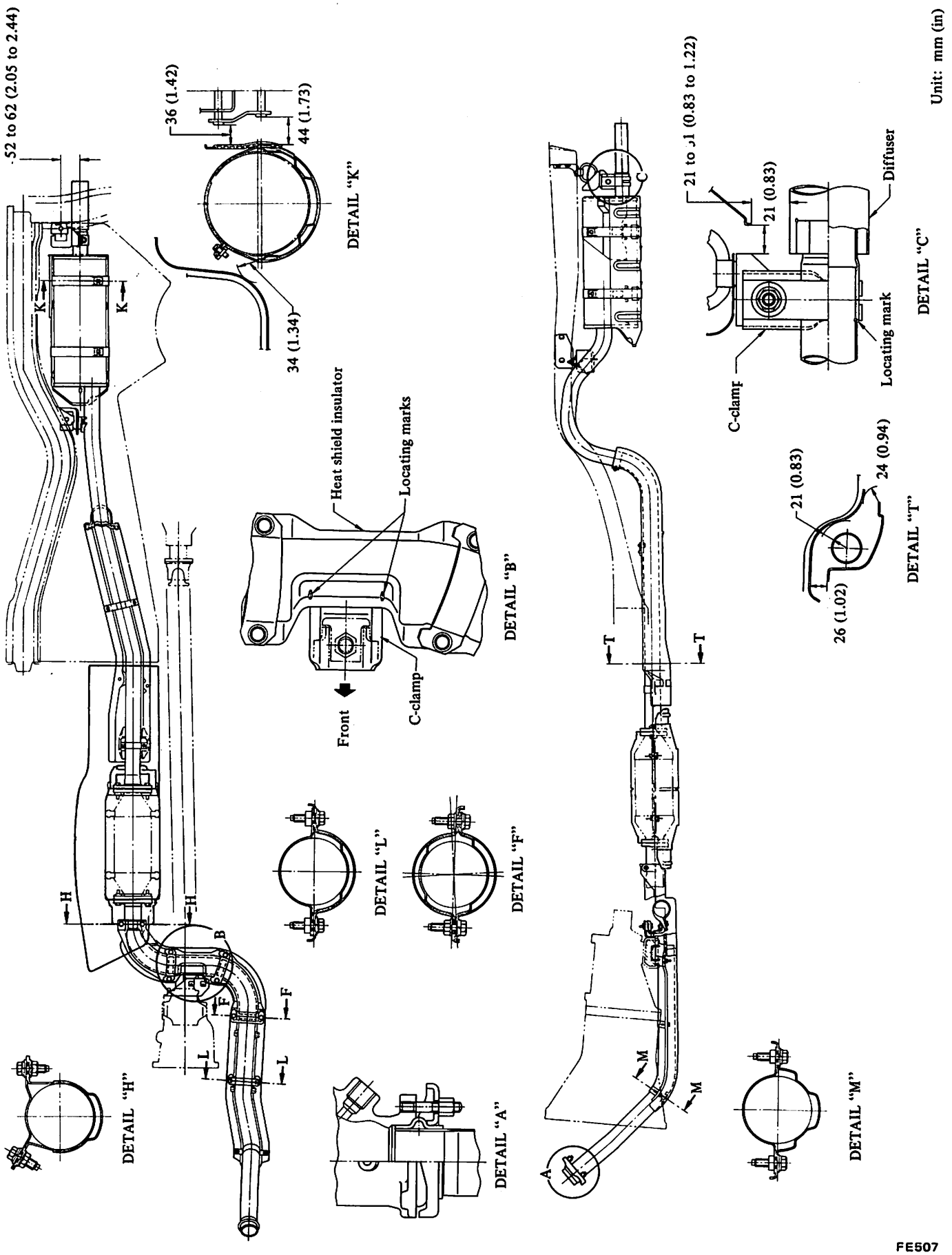
Fig. FE-18 Mounting insulators

5. Be sure to install new gaskets after removal of the following parts:
- Front exhaust tube
- Catalytic converter
- Muffler assembly

CAUTION:

a. After installation, check that mounting brackets and mounting rubbers are free from undue stress. If any of the above parts is not installed properly, excessive noises or vibrations may be transmitted to the car body.

b. Check all tube connections for exhaust gas leaks, and entire system for unusual noises, with the engine running.



FE507

Fig. FE-19 Proper clearance for exhaust system (California models)

Fig. FE-20 Proper clearance for exhaust system (Non-California models)

NON-CALIFORNIA MODELS

1. Install heat shield insulators to front exhaust tube.
2. Install C-clamp to tail pipe of muffler assembly.
3. Subassemble front exhaust tube mounting bracket and install it to transmission mounting insulator.
4. Subassemble muffler mounting brackets and install them on car body.
5. Insert front tube subassembly into exhaust manifold connection, and supporting front tube so that it is located in a proper position, tighten nuts at exhaust manifold.

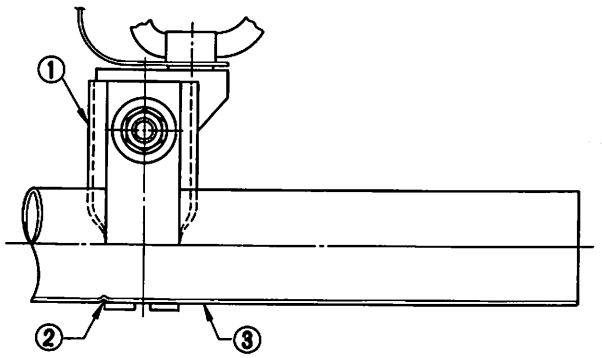
Tighten bolt at transmission mounting insulator.

Note: Be sure to locate C-clamp to locating mark at heat shield insulator as shown in Figure FE-14.

6. Install muffler assembly on car body and insert end of tube until it comes into contact with stopper. Then secure mounting nuts and U-bolt.

Note:

a. Be sure to locate the front end of C-clamp to locating mark at tail tube as shown in Figure FE-21.



1 C-clamp
2 Locating mark
3 Tail tube

FE413

Fig. FE-21 Locating mark at tail tube C-clamp

b. Be sure to install C-clamp to be vertical.

c. When installing muffler assembly on car body, take care not to touch diffuser to rear panel.

7. Inject a suitable sealing compound through slit in tube until it overflows.

Installation precautions

1. Always assemble parts so that no gas leaks from around connections. Evenly tighten nut securing exhaust manifold to front tube fixing plate.
2. When installing heat shield insulators, be sure not to allow of any play of heat shield insulators.
3. When installing exhaust tube and muffler, make sure that a proper clearance is maintained between these parts and parts on car body. See Figure FE-20.
4. Be sure to maintain clearance regardless of tilting of heat shield insulator.
5. When installing mounting insulators, observe the following precautions:

(1) Be sure that mounting insulators are not subject to undue stress due to misaligned piping as shown in Figure FE-16.

(2) As for installation of muffler assembly, fore-and-aft offset of insulators should be as shown in Figure FE-17.

(3) Always locate mounting rubbers in such a way that preload applied to them is kept to a minimum. See Figure FE-18.

Note:

a. After installation, check that mounting brackets and mounting rubbers are free from undue stress. If any of the above parts is not installed properly, excessive noises or vibrations may be transmitted to the car body.

b. Check all tube connections for exhaust gas leaks, and entire system for unusual noises, with the engine running.

Tightening torque

Exhaust manifold to front exhaust tube nuts	kg-m (ft-lb)	2.0 to 2.6 (14 to 19)
Catalytic converter to front exhaust tube bolts	kg-m (ft-lb)	3.2 to 4.3 (23 to 31)
Catalytic converter to rear exhaust tube (muffler assembly) bolts	kg-m (ft-lb)	3.2 to 4.3 (23 to 31)
U-bolt securing nuts	kg-m (ft-lb)	0.8 to 1.2 (5.8 to 8.7)
Mounting bracket securing nuts	kg-m (ft-lb)	0.8 to 1.2 (5.8 to 8.7)
C-clamp securing bolts	kg-m (ft-lb)	0.8 to 1.2 (5.8 to 8.7)
Heat shield insulator securing bolts	kg-m (ft-lb)	0.3 to 0.5 (2.2 to 3.6)
Heat shield insulator for catalytic converter securing bolts	kg-m (ft-lb)	0.6 to 0.8 (4.3 to 5.8)

SEALING COMPOUND

If exhaust tubes are separated at connection to renew muffler assembly, etc., use the Genuine Nissan Sealant "Exhaust Sealant Kit 20720-N2225" (see Figure FE-22) to eliminate gas leakage past the joint. Be sure to observe the following procedures.

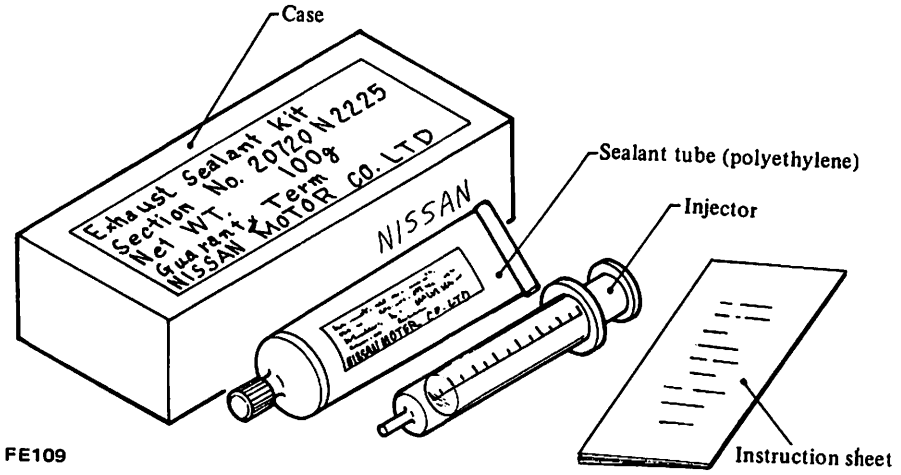


Fig. FE-22 Exhaust sealant kit

1. Wipe clean all the contact portions of tube joints; allow them to dry thoroughly.
2. Temporarily mount in place muffler assembly and front exhaust tube as an assembled unit on the car.
3. Insert the male tube into the female tube fully until the front end of the female tube touches the stopper on the male tube. See Figure FE-23.

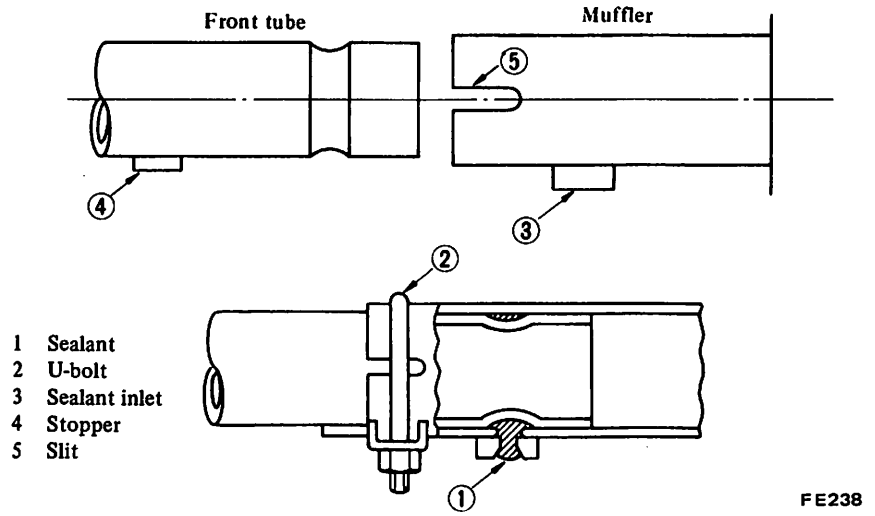


Fig. FE-23 Exhaust tube connections

4. Torque U-bolt securing nuts and exhaust tube mounting bolts to specifications.
5. Squeeze 5 to 6 cc (0.31 to 0.37 cu in) of sealant into injector from the sealant tube. See Figure FE-24.

Be sure to place the cap back to the sealant tube since sealant will dry.

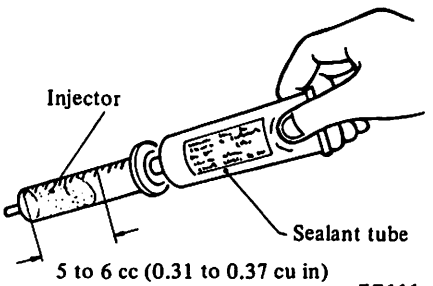


Fig. FE-24 Squeezing sealant to injector

6. Position the nozzle of injector to the guide and press it there firmly. Inject sealant slowly until sealant begins to flow out of the slit of the tube.

This indicates that the bead requires no further sealant. Excessive sealant can cause a clogged tube. See Figure FE-25.

After injecting, wash injector thoroughly in clean water to remove all traces of sealant.

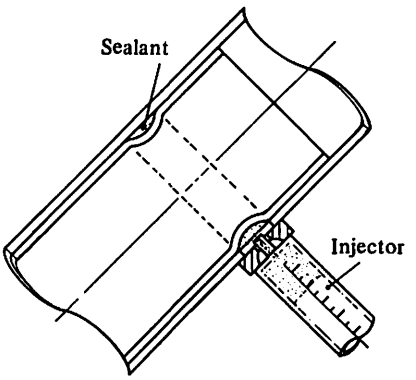


Fig. FE-25 Injecting sealant

7. Start the engine and let it idle slowly for ten minutes (minimum) to harden sealant with the heat of exhaust gas.
8. Check the condition of sealant before driving the car.

It is also essential that the car should not be accelerated sharply for 20 to 30 minutes subsequent to this operation.

Note:

a. The sealant should be used within guaranty term indicated on the kit case.

b. Exposure of sealant to the skin may cause a rash. Wash sealant off the skin with water.

c. Do not keep the sealant tube in a place where the ambient temperature is 40°C (104°F) or above.
A sealant hardened at 40°C (104°F) or above cannot be used. The most suitable storage temperature is from 15 to 35°C (59 to 95°F). If sealant becomes hardened because of low temperatures, warm the sealant tube with lukewarm water until the sealant is softened. Do not warm the tube at a temperature of over 40°C (104°F) for a

long period of time.

d. Thoroughly read the instruction sheet furnished with the kit before using the sealant.

SERVICE MANUAL

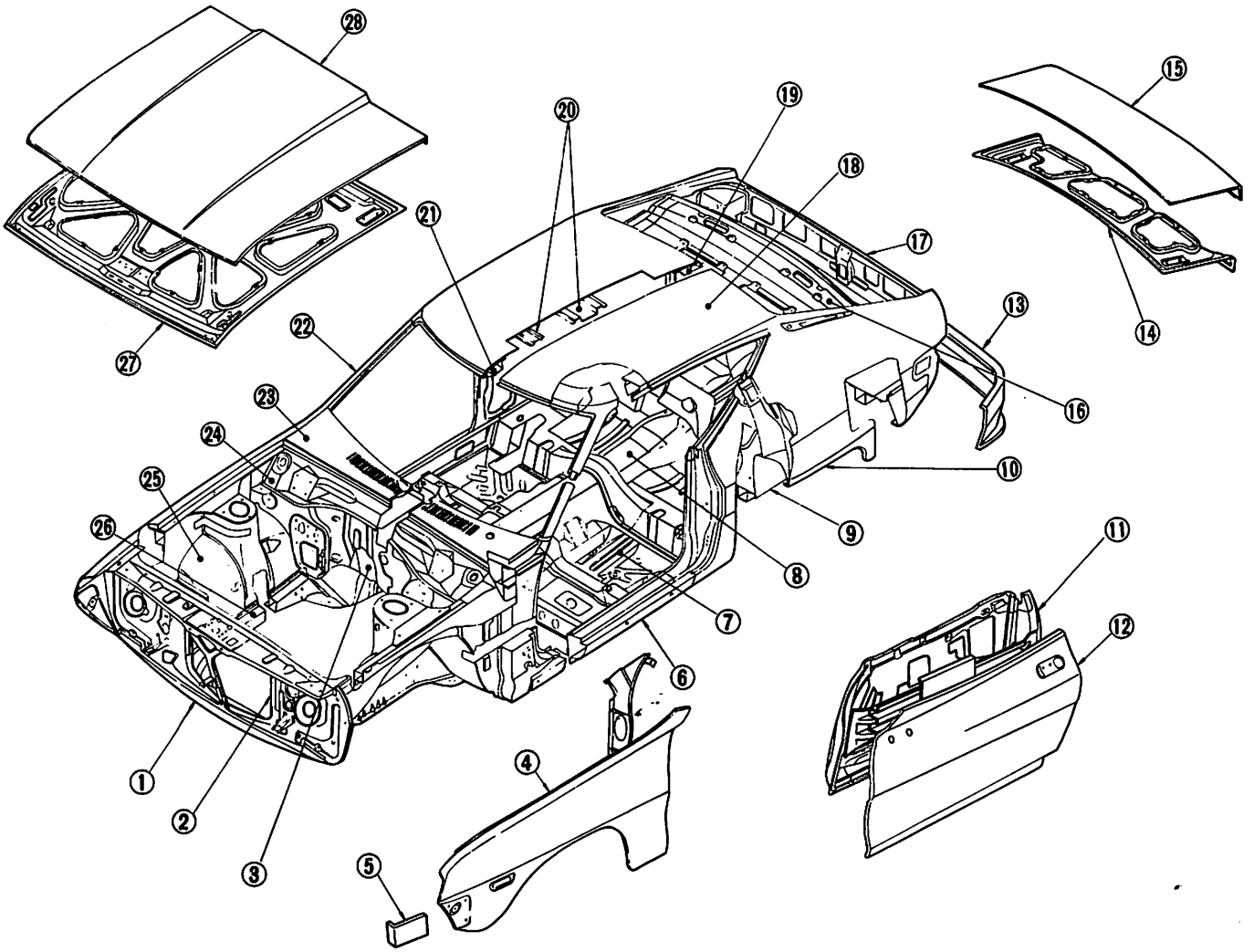
DATSUN 200SX
MODEL S10 SERIES

SECTION BF

BODY

BODY CONSTRUCTION ..... BF- 2
UNDERBODY ALIGNMENT ..... BF- 3
BUMPER ..... BF- 6
RADIATOR, COWL TOP AND AIR OUTLET GRILLE ..... BF- 9
FRONT FENDER BF-10
REAR BUMPER UPPER FINISHER BF-10
HOOD AND HOOD LOCK CONTROL BF-11
TRUNK LID BF-13
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SEAT BF-27
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BODY CONSTRUCTION



1 Front apron
2 Radiator core support
3 Lower dash assembly
4 Front fender assembly
5 Front fender finisher
6 Sill outer panel assembly
7 Front floor assembly
8 Rear floor assembly
9 Rear wheel house inner panel assembly
10 Rear fender assembly
11 Door inner panel assembly
12 Door outer panel
13 Rear upper finisher assembly
14 Trunk lid reinforce assembly
15 Trunk lid panel
16 Parcel shelf panel assembly
17 Rear panel assembly
18 Roof panel
19 Roof rear rail assembly
20 Roof bow
21 Roof front rail assembly
22 Front pillar assembly
23 Cowl top grille
24 Cowl top panel assembly
25 Hood ledge assembly
26 Front side member
27 Hood reinforce assembly
28 Hood panel

BF062B

Fig. BF-1 Body construction

UNDERBODY ALIGNMENT

UNDERBODY GENERAL SERVICE INFORMATION

Since each underbody component directly affects the overall strength of the body, it is essential that proper welding, sealing and rust-proofing techniques be observed during service operations.

Whenever the body is repaired, be sure to rust-proof the repaired body parts.

In the case of rust-proofing a critical underbody component, it is essential that a good quality type air dry primer such as corrosion resistant zinc chromate be used.

Do not use combination type primer surfacers.

ALIGNMENT CHECKING PROCEDURE

Misalignment in the underbody affects the front fender, door, trunk lid and window alignments. Underbody misalignment particularly affects the suspension system.

Accordingly, in the event of collision damage, it is essential that underbody be thoroughly rechecked, and if necessary, aligned within the specified dimensions given in Figure BF-2.

There are many tools that may be employed to correct collision damage such as frame straightening machines, external pulling equipment or other standard body jacks.

To assist in checking alignment of the underbody component, repairing minor underbody damage or locating replacement parts, the following underbody dimensions and alignment checking information are presented.

PRINCIPLES OF TRAMMING

Figures BF-2, and BF-3 show reference locations required to determine the extent of misalignment present in underbody structure; the reference locations are symmetrical along the center line of the car.

Tramming underbody correctly calls for two measurements: the vertical dimension from the datum line to the points to be measured, and the horizontal distance between any two points of measurement.

Note that precise measurement can be made only when the tram gauge is parallel to the underbody.

If two points of measurement are on a horizontal plane, the vertical pointer of the tram gauge should be extended equally to bring the gauge parallel to the center of the underbody. If one of the two reference points is included in misaligned area, the parallel plane between the body and tram gauge may not exist, indicating the necessity of underbody repair.

CAR PREPARATION

Preparing the car for the underbody alignment check involves the following:

1. Place car on a level surface.
2. The weight of car should be supported at wheel locations.
3. A visual damage inspection should be made to eliminate unnecessary measuring since obviously damaged or misaligned areas may often be located visually.

TRAMMING SEQUENCE

The tramming sequence will vary depending upon the nature and location of the misaligned area. Prior to performing any tramming operation, the accuracy of reference points to be used must be determined.

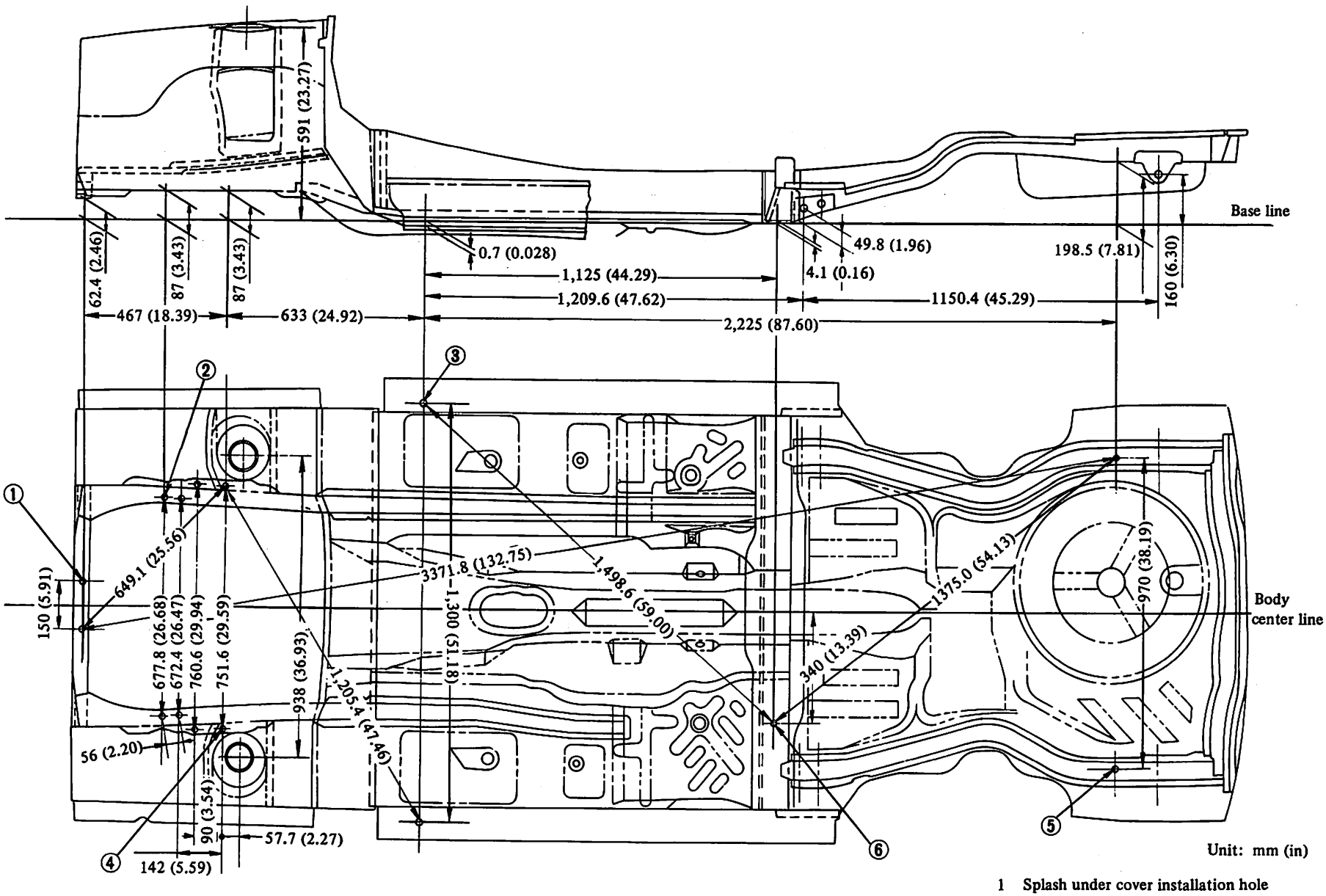
A measurement that originates from a reference point included in a damaged area will produce untrue results and confuse the evaluation of the underbody construction.

Unlike the conventional type of frame design, the utilized type of body construction seldom develops the condition of "diamond" in the floor pan area as a result of front or rear end collision. Therefore, underbody alignment checking can usually originate from the body floor pan area.

If inspection indicates that these locations have been disturbed and are not suitable for measuring, one of the undamaged suspension locations should be used as an initial reference point.

If all of these locations should be unsuitable as reference points, repair operations should begin with the body floor pan area. All other underbody components should be aligned progressively from this area.

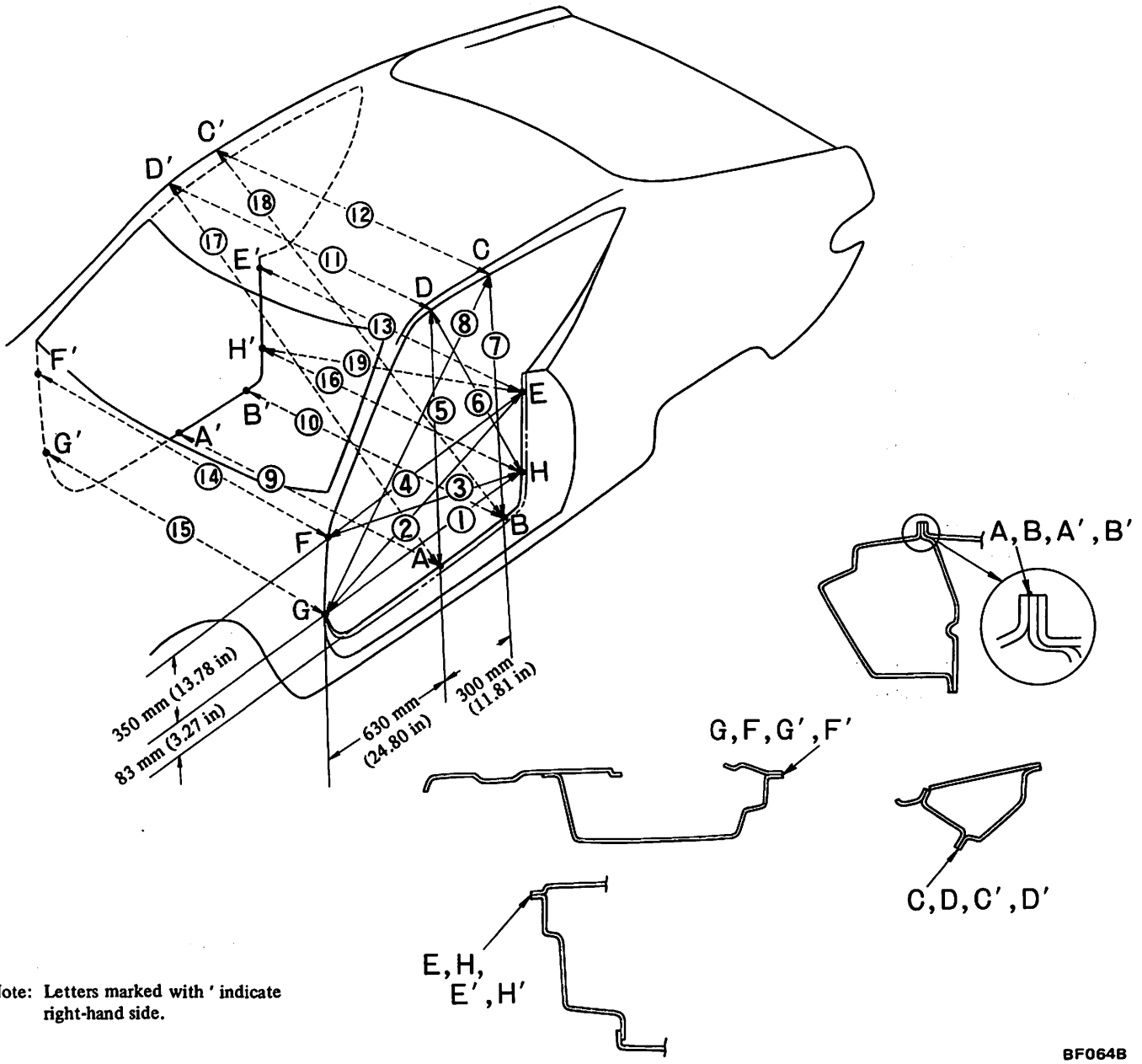
Furthermore, the door and surrounding body should be repaired according to the specifications as shown in Figure BF-3.



1 Splash under cover installation hole
2 Stabilizer bracket installation hole
3 Welded nut on sill for fender panel
4 Front suspension member drain hole
5 Rear side member drain hole
6 Rear seat crossmember location hole

Fig. BF-2 Underbody alignment

BF378B



Note: Letters marked with ' indicate right-hand side.

BF064B

No.	Measurement position	Length mm (in)	No.	Measurement position	Length mm (in)	No.	Measurement position	Length mm (in)
1.	G–H	1,022.3 to 1,026.3 (40.25 to 40.41)	8.	C–G	1,203.4 to 1,207.4 (47.38 to 47.54)	14.	F–F'	1,280.0 to 1,284.0 (50.39 to 50.55)
2.	G–E	1,094.4 to 1,098.4 (43.09 to 43.24)	9.	A–A'	1,266.0 to 1,270.0 (49.84 to 50.00)	15.	G–G'	1,276.4 to 1,280.4 (50.25 to 50.41)
3.	F–H	1,007.1 to 1,011.1 (39.65 to 39.81)	10.	B–B'	1,266.0 to 1,270.0 (49.84 to 50.00)	16.	H–H'	1,276.4 to 1,280.4 (50.25 to 50.41)
4.	E–F	959.2 to 963.2 (37.76 to 37.92)	11.	D–D'	1,020.6 to 1,024.6 (40.18 to 40.34)	17.	A–D'	1,425.0 to 1,429.0 (56.10 to 56.26)
5.	A–D	858.1 to 862.1 (33.78 to 33.94)	12.	C–C'	1,034.2 to 1,038.2 (40.72 to 40.87)	18.	B–C'	1,423.9 to 1,427.9 (56.06 to 56.22)
6.	D–H	871.0 to 875.0 (34.29 to 34.45)	13.	E–E'	1,283.8 to 1,287.8 (50.54 to 50.70)	19.	E–H'	1,327.1 to 1,331.1 (52.25 to 52.41)
7.	B–C	846.2 to 850.2 (33.31 to 33.47)						

Fig. BF-3 Side body alignment

BUMPER

CONTENTS

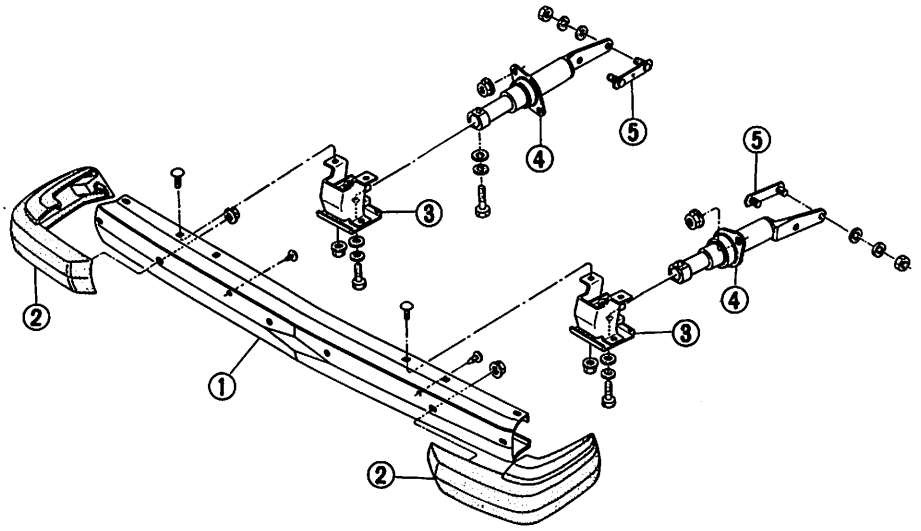
DESCRIPTION BF-6
INSPECTION BF-7
FRONT BUMPER BF-8
REMOVAL AND INSTALLATION BF-8
REAR BUMPER BF-8
REMOVAL AND INSTALLATION BF-8

DESCRIPTION

These bumpers consist basically of a center bumper, two side bumpers, and two shock absorbers.

Each bumper is secured to the car body through the two shock absorbers. These shock absorbers are designed to absorb impact energy in a light collision [8 km/h (5 MPH) front and rear impact] and to restore the bumper to the original position after a collision without damage to the car.

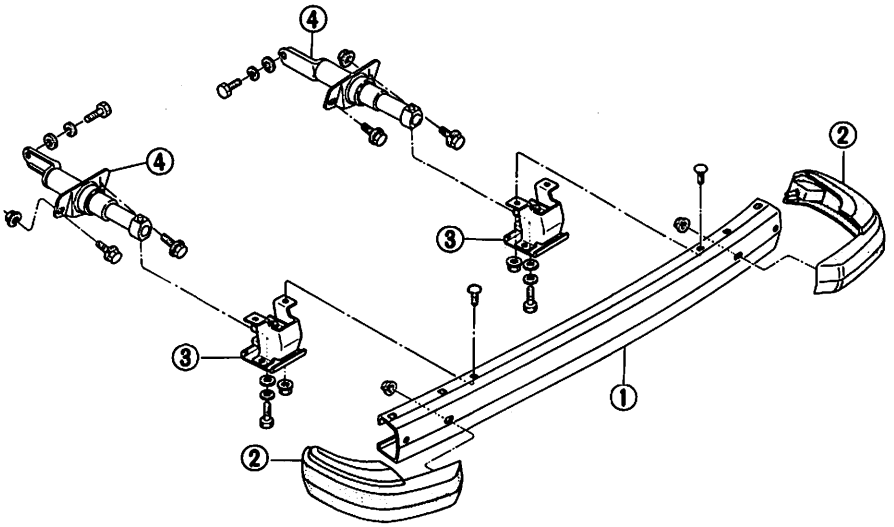
Note: The shock absorber is filled with a high pressure gas and should not be disassembled, drilled or exposed to an open flame.



1 Front center bumper
2 Front side bumper
3 Bumper mounting bracket
4 Shock absorber
5 Plate bolt

BF065B

Fig. BF-4 Exploded view of front bumper



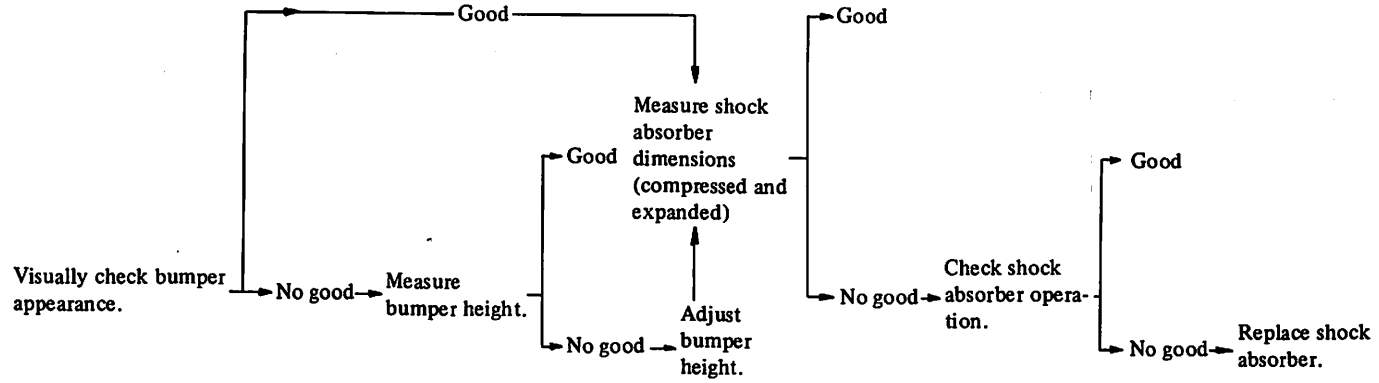
1 Rear center bumper
2 Rear side bumper
3 Bumper mounting bracket
4 Shock absorber

BF066B

Fig. BF-5 Exploded view of rear bumper

INSPECTION

To inspect bumper and shock absorber for condition, utilize the following chart as a guide and proceed to the indicated order in the chart.



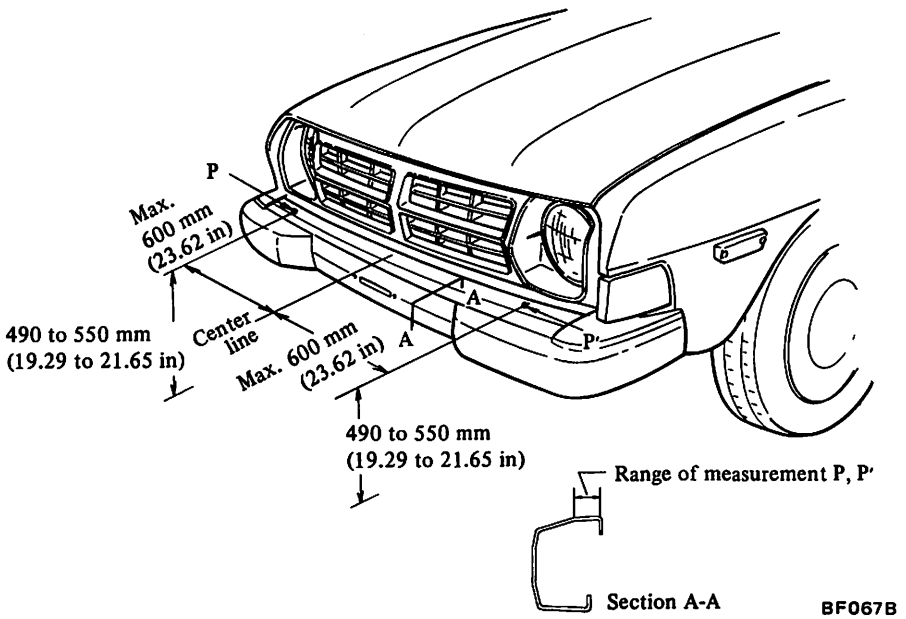


Fig. BF-6 Front bumper height

1. Bumper height

The bumper height for all models should be held within the range shown in Figures BF-6 and BF-7 in accordance with No. 215 of M.V.S.S.

To adjust bumper height properly, utilize the following procedure.

(1) Place car on a flat surface under curb weight condition. Tires must be kept inflated to rated pressure.

(2) Measure the height of bumper above ground at P and P' points as shown in Figures BF-6 and BF-7.

(3) If the bumper height is not held within the specification, loosen shock absorber attaching bolts and adjust bumper height. After adjustment, tighten bolts securely.

2. Length of shock absorber

The standard dimension of shock absorbers is shown in the Figure BF-8.

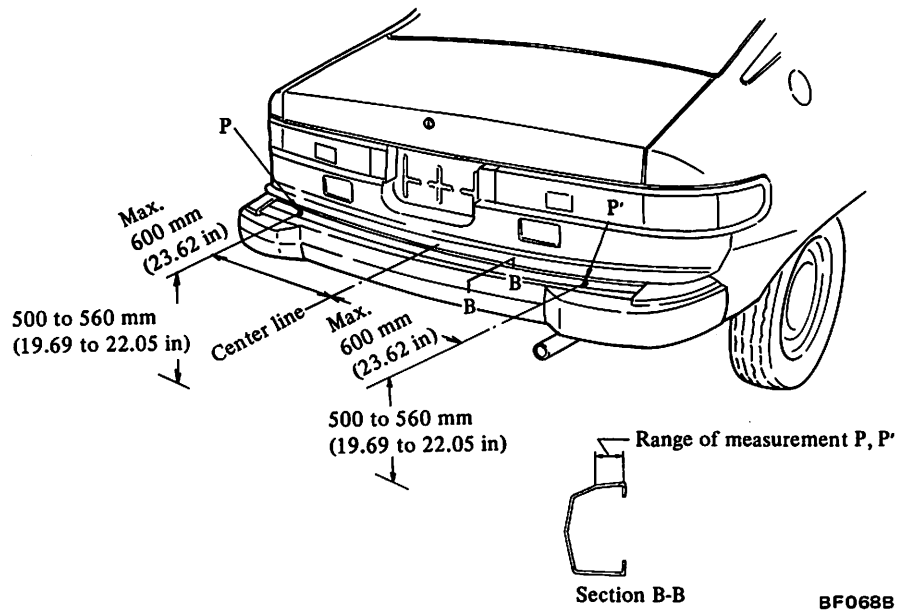


Fig. BF-7 Rear bumper height

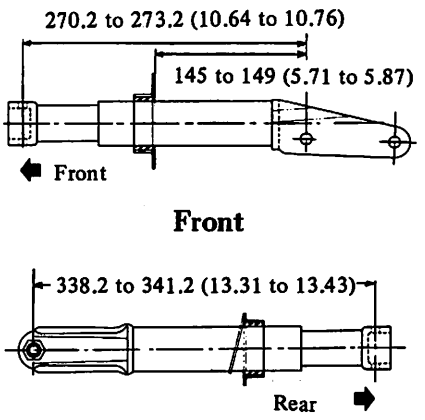
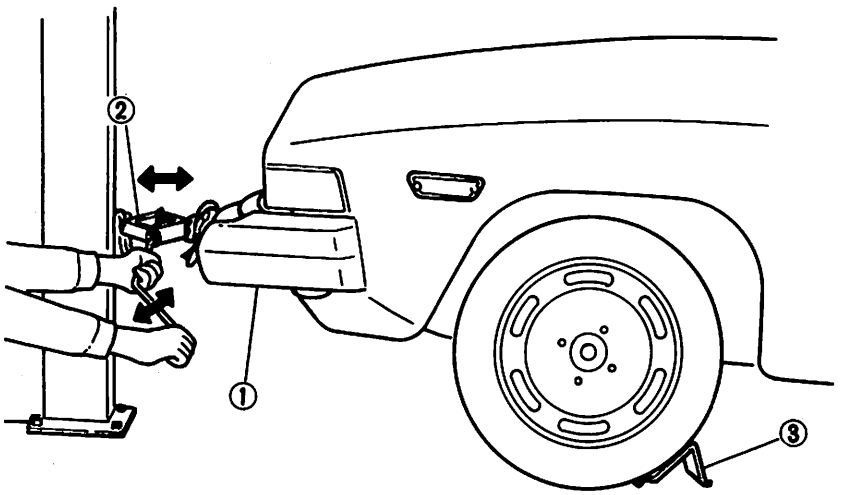


Fig. BF-8 Length of shock absorber

3. Checking the function of shock absorber.
(1) Locate the car in front of a wall. Apply hand brake and place wheel chocks securely.
(2) Place a jack between the wall and the center of front bumper. Gradually extend jack approx. 30 mm (1.18 in). [The bumper should move approx. 50 mm (1.97 in) backward through the shock absorber operation.] See Figure BF-8.

Note: Use a jack of more than 430 kg (948 lb) in capacity.

(3) Make sure that bumper returns to its original position when jack is retracted.
(4) On the rear bumper, utilize the same procedures as described for front bumper.



1 Front bumper
2 Jack
3 Wheel chock

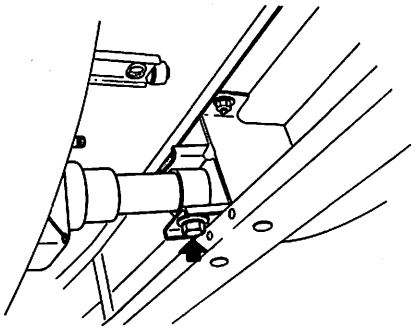
BF070B

Fig. BF-9 Checking shock absorber function

FRONT BUMPER

REMOVAL AND INSTALLATION

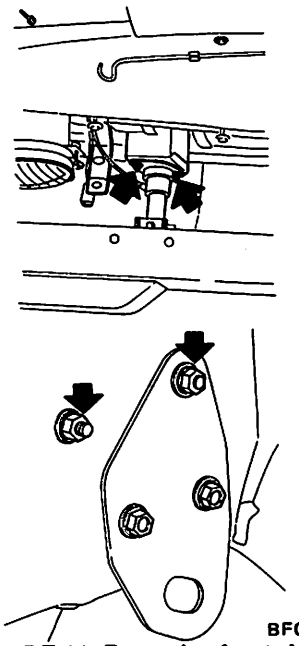
1. Remove bolts attaching front bumper to shock absorbers and remove bumper.



BF071B

Fig. BF-10 Removing front bumper

2. Remove plate bolts after loosening nuts attaching rear end shock absorbers, remove nuts attaching front end shock absorber, and remove shock absorbers.



BF072B

Fig. BF-11 Removing front shock absorber

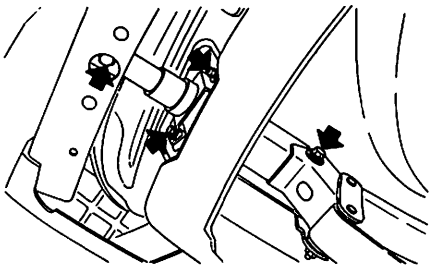
3. Install shock absorbers and bumper in the reverse order of removal, and adjust bumper height as shown in Figure BF-6.

Note: Securely insert side bumper boss into installation hole in fender.

REAR BUMPER

REMOVAL AND INSTALLATION

1. Remove bolts attaching bumper to shock absorber, and remove bumper. See Figure BF-12.
2. Remove bolts attaching shock absorber, and remove shock absorbers.



BF073B

Fig. BF-12 Removing rear bumper and shock absorber

3. Install shock absorbers and bumper in the reverse order of removal, and adjust rear bumper height as shown in Figure BF-7.

Note: Securely insert side bumper boss into installation hole in fender.

RADIATOR, COWL TOP AND AIR OUTLET GRILLE

CONTENTS

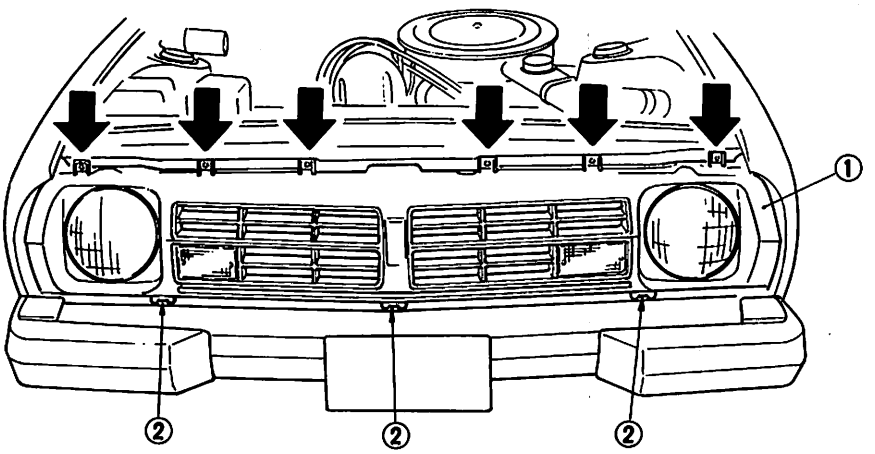
RADIATOR GRILLE ..... BF- 9
REMOVAL AND INSTALLATION ..... BF- 9
COWL TOP GRILLE ..... BF- 9
REMOVAL AND INSTALLATION ..... BF- 9
AIR OUTLET GRILLE BF-10
REMOVAL AND INSTALLATION BF-10

RADIATOR GRILLE

REMOVAL AND INSTALLATION

1. Open hood and support it in open position with a stay.
2. Remove screws attaching radiator grille shown by arrows and lift radiator grille out. See Figure BF-13.
3. Insert radiator grille into radiator grille mounting bases at front panel and tighten attaching screws. See Figure BF-13.

Note: The radiator grille is made of plastic so never use excessive force on it.



1 Radiator grille
2 Grille installation hole

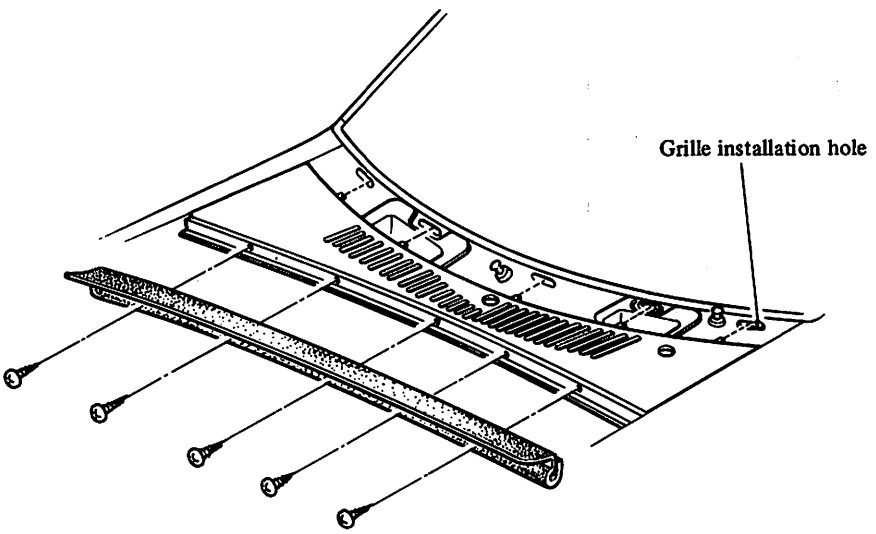
BF074B

Fig. BF-13 Removing radiator grille

COWL TOP GRILLE

REMOVAL AND INSTALLATION

1. Open hood and support it in open position with a stay, and protect front fenders with covers to prevent scratching the paint.
2. Remove windshield wiper arm with blades attached.
3. Remove cowl top grille securing screws, and draw top grille forward.
4. Install cowl top grille in the reverse order of removal. When installing cowl top grille, securely insert cowl top pawls into holes in panel.



BF075B

Fig. BF-14 Exploded view of cowl top grille

AIR OUTLET GRILLE

REMOVAL AND INSTALLATION

1. Remove air ventilation grille fixing screws.
2. Remove air outlet grille fixing nuts, and remove air outlet grille.

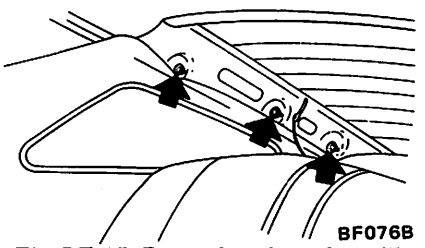
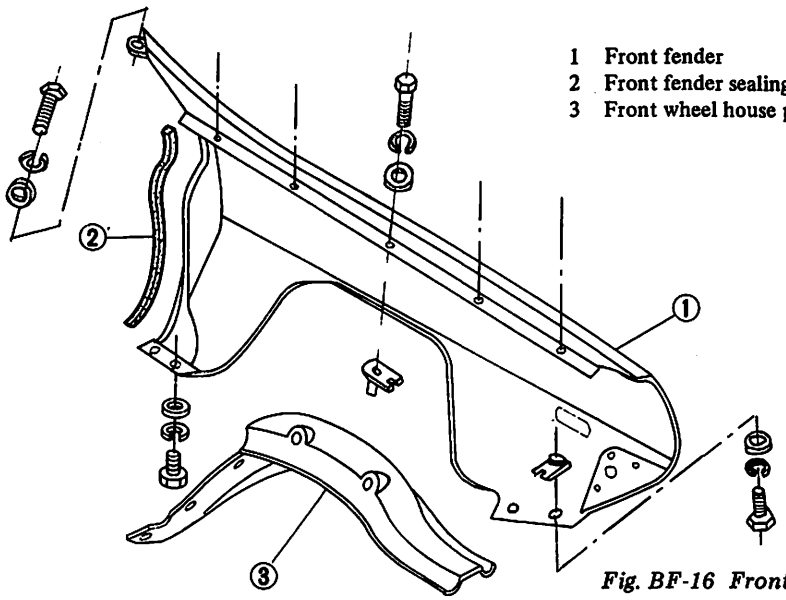


Fig. BF-15 Removing air outlet grille

3. Install air outlet grille in the reverse order of removal.

FRONT FENDER

REMOVAL AND INSTALLATION



1 Front fender
2 Front fender sealing rubber
3 Front wheel house protector

Fig. BF-16 Front fender

1. Remove hood and support it in open position with a stay.
2. Remove cowl top grille and body shell molding, and disconnect front side marker at connector.
3. Remove bolts attaching front apron to front fender.
4. Remove bolt at windshield pillar portion.
5. Remove bolts attaching hood ledge to front fender.
6. Remove fender by pulling upward.
7. Install front fender in the reverse order of removal.

Note: Replace front fender sealing rubber with a new one.

REAR BUMPER UPPER FINISHER

REMOVAL AND INSTALLATION

1. Remove rear finisher in luggage compartment.
2. Remove nuts attaching rear bumper upper finisher and remove rear bumper upper finisher.
3. Installation is in the reverse order of removal.

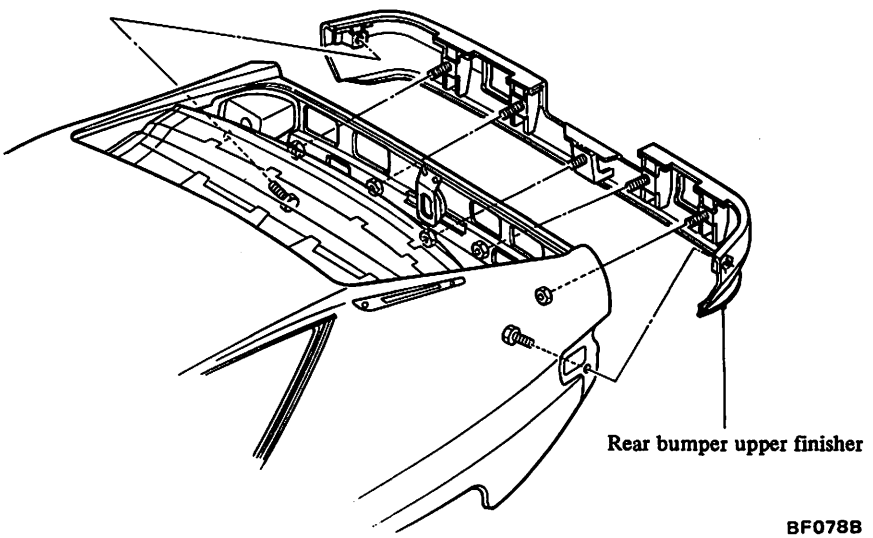
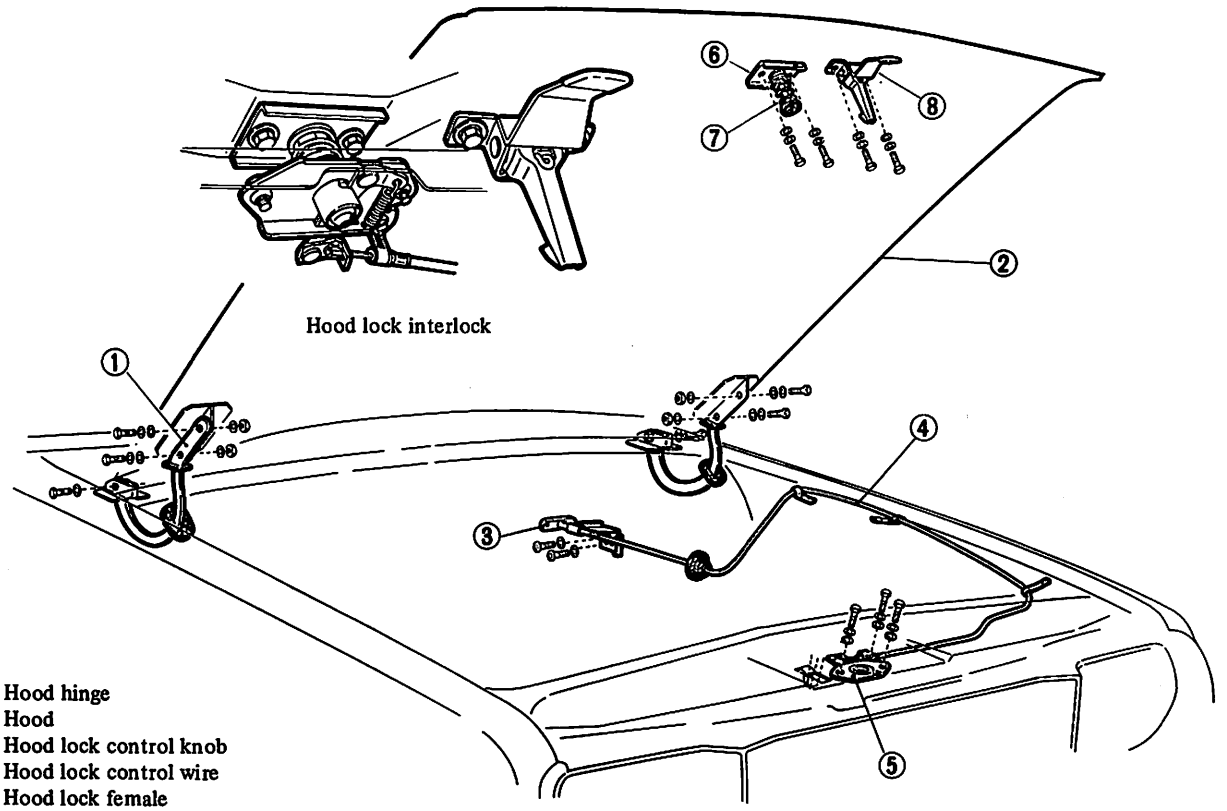


Fig. BF-17 Rear bumper upper finisher

HOOD AND HOOD LOCK CONTROL

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ADJUSTMENT BF-12
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HOOD HINGE BF-13
REMOVAL AND INSTALLATION BF-13



BF079B

Fig. BF-18 Hood and hood lock control

HOOD

REMOVAL AND INSTALLATION

1. Holding hood on both sides, unscrew bolts securing hinges to hood, and remove hood. This operation requires two men.
2. Install hood in the reverse order of removal.

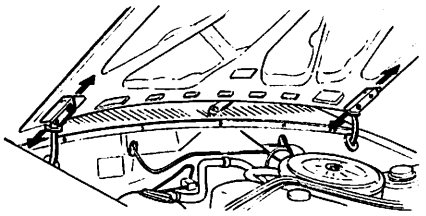
CAUTION:
Place rags between hood and body to avoid damaging painted surfaces.

ADJUSTMENT

Hood can be adjusted by bolts attaching hood to hood hinge, hood lock mechanism and hood bumpers. Adjust hood for an even fit between front fenders and for a flush fit with the front of fenders.

Adjust hood according to the following procedures:

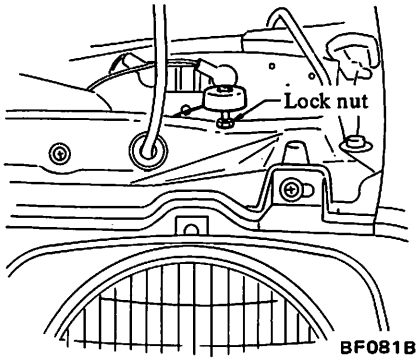
1. Adjust hood fore and aft by loosening bolts attaching hood to hinge, and repositioning hood.



BF080B

Fig. BF-19 Adjusting bolts attaching hood

2. Loosen hood bumper lock nuts and lower bumpers until bumpers do not come into contact with front hood when hood is closed.



BF081B

Fig. BF-20 Adjusting hood bumper height

3. Adjust hood lock mechanism after hood has been properly aligned. Refer to Adjustment of Hood Lock Control on page BF-12.

HOOD LOCK CONTROL

REMOVAL AND INSTALLATION

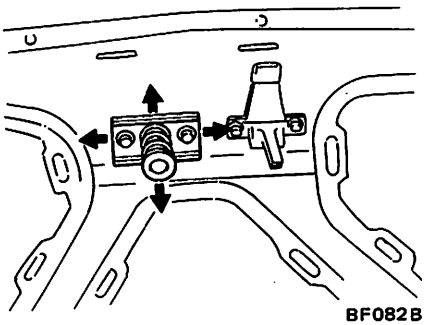
See Figure BF-18.

1. Remove cable clamp and cable clip, and disconnect cable from hood lock female.
2. Remove control knob bracket fixing bolts, and draw cable out through passenger compartment.
3. Remove hood lock female and male.
4. Installation is in the reverse order of removal.

ADJUSTMENT

Hood lock male can be moved fore and aft and from side to side to align it with hood lock female by loosening attaching bolts. Front end of hood can also be moved up and down by adjusting the height of dovetail bolt of hood lock male to obtain a flush fit with fenders.

1. Move hood lock male by loosening hood lock male attaching bolts until it is aligned with hood lock female. See Figure BF-21.



BF082B

Fig. BF-21 Adjusting hood lock male

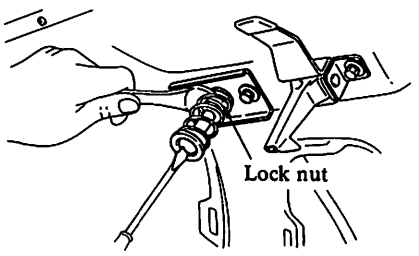
2. After the desired alignment is obtained, tighten hood lock male attaching bolts.

Tightening torque:
Male and female attaching bolts:
0.64 to 0.85 kg-m
(4.6 to 6.1 ft-lb)

3. Lower hood 1 to 3 mm (0.04 to 0.12 in) from top of front fender by adjusting dovetail bolt. See Figure BF-22.

After the desired alignment is obtained, tighten lock nut of dovetail bolt.

Tightening torque:
Lock nut of dovetail:
1.9 to 2.6 kg-m
(14 to 19 ft-lb)



BF083B

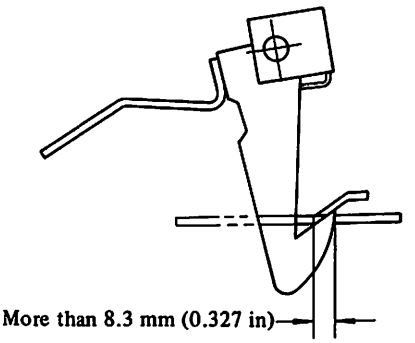
Fig. BF-22 Adjusting dovetail bolt

4. Raise two hood bumpers until hood is flush with fenders.
5. Open and close hood several times to check the operation.

Check hood lock male for complete engagement with hood lock female.

Note: Full engagement must be obtained for proper hood lock male adjustment. If complete engagement is not obtained, readjust hood lock male for full engagement of dovetail bolt and hood lock female.

6. Make sure that safety catch lever retains hood properly when hood lock is disengaged. See Figure BF-23.



BF084B

Fig. BF-23 Interlocking length of safety catch lever

Note:

When inspecting the hood lock, observe the following procedures:

a. **Operation of safety catch lever**
Check caulking portion of safety catch lever for wear.
Check spring for weakness and breakdown. If spring is broken, hood may be unlocked and spring open during driving.

b. **Operation of female lever**
Check female lever for smooth and correct operation.
Check spring for weakness and breakdown. If female lever does not move smoothly, engaging stroke will be reduced, and it may be disengaged from the hood lock.

LUBRICATION

When checking or adjusting the hood lock, lubricate the pivot, catcher and return spring of the safety catch lever thoroughly. Also, lubricate the lever of the hood lock female for smooth and correct operation.

HOOD HINGE

REMOVAL AND INSTALLATION

1. Remove hood.
2. Remove windshield wiper arm with blades and cowl top grille.
3. Remove hood hinge attaching bolts, and remove hood hinges.

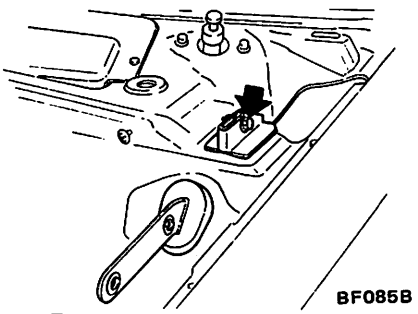


Fig. BF-24 Removing hood hinge

4. Installation is in the reverse order of removal.

TRUNK LID

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TRUNK LID HINGE BF-14
REMOVAL AND INSTALLATION BF-14
TRUNK LID LOCK AND STRIKER BF-14
REMOVAL AND INSTALLATION BF-14

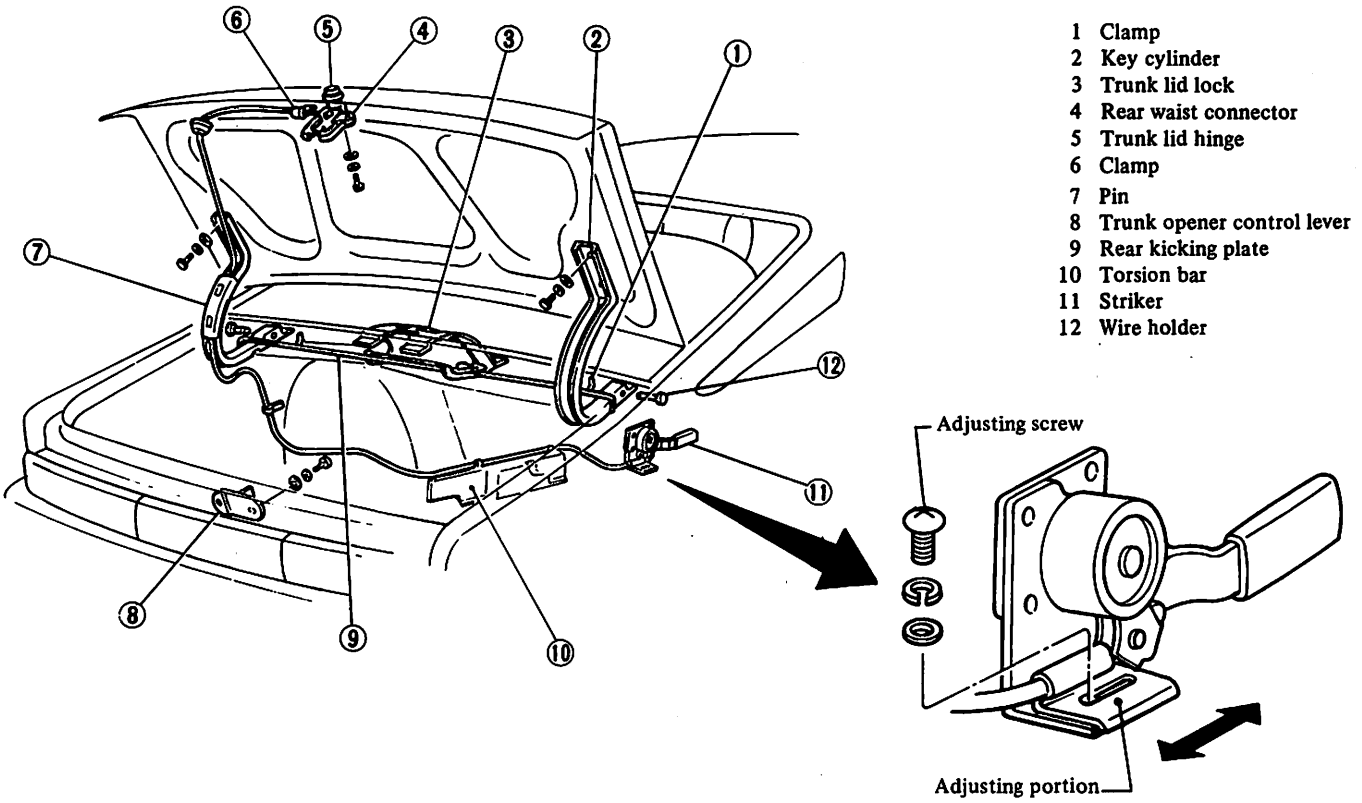


Fig. BF-25 Trunk lid

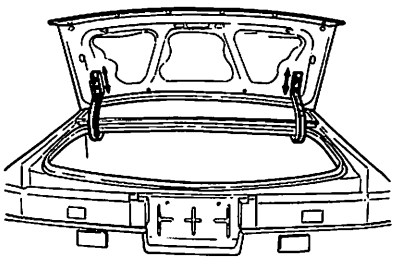
TRUNK LID

REMOVAL AND INSTALLATION

1. Open trunk lid and cover rear fenders.
2. Support trunk lid by hand and remove bolts attaching trunk lid to hinge. Then remove trunk lid.
3. Install trunk lid in the reverse order of removal.

ADJUSTMENT

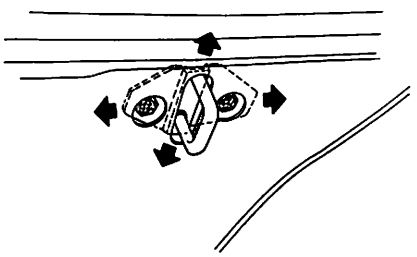
1. Move trunk lid fore and aft by loosening trunk lid hinge attaching bolts to obtain a flush fit between trunk lid and rear fender.



BF087B

Fig. BF-26 Adjusting trunk lid

2. Move striker up and down and from side to side by loosening trunk lid lock striker attaching bolts to obtain a snug fit between trunk lid and weatherstrip.



BF088B

Fig. BF-27 Adjusting trunk lid lock striker

3. After desired adjustment is obtained, tighten trunk lid lock striker attaching bolts securely.

Note:

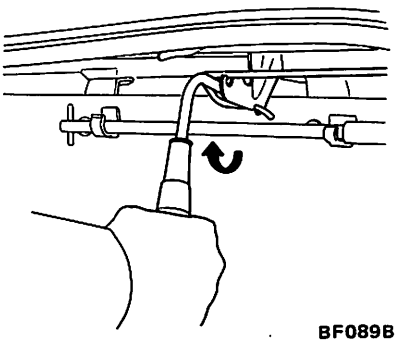
a. **Make sure that trunk lid lock engages striker securely.**
b. **Make sure that trunk lid can be opened with key.**

TORSION BAR

REMOVAL AND INSTALLATION

1. Open trunk lid.
2. Support trunk lid and remove each torsion bar, disengaging end of torsion bar from torsion bar bracket. Use a suitable screwdriver. See Figure BF-28.

Note: Be careful not to allow torsion bar to spring when removing and installing.



BF089B

Fig. BF-28 Removing torsion bar

3. Install torsion bars in the reverse order of removal.

TRUNK LID HINGE

REMOVAL AND INSTALLATION

1. Open trunk lid and protect body with covers.
2. Remove trunk lid and torsion bars.
3. Remove clevis pin and pin, and remove trunk lid hinge. See Figure BF-25.
4. Install trunk lid hinges in the reverse order of removal.

TRUNK LID LOCK AND STRIKER

REMOVAL AND INSTALLATION

Trunk lid lock

1. Open trunk lid.
2. Remove trunk lid lock attaching bolts and remove trunk lid lock from trunk lid. See Figure BF-25.
3. To remove lock cylinder, pry off retaining clip on lock cylinder from inside of trunk lid and remove lock cylinder from trunk lid outer panel.
4. Install trunk lid lock and lock cylinder in the reverse order of removal.

Trunk lid striker

1. Remove rear finisher.
2. Remove trunk lid striker attaching bolts, and remove striker. See Figure BF-25.
3. Install trunk lid striker in the reverse order of removal.

Trunk lid opener

1. For removal and installation, refer to Figure BF-25.
2. To adjust wire, loosen adjusting screw shown in Figure BF-25 and move adjusting plate to a position where trunk lid opener works smoothly. Then retighten adjusting screw.

DOOR

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INSTALLATION BF-19
ADJUSTMENT BF-19

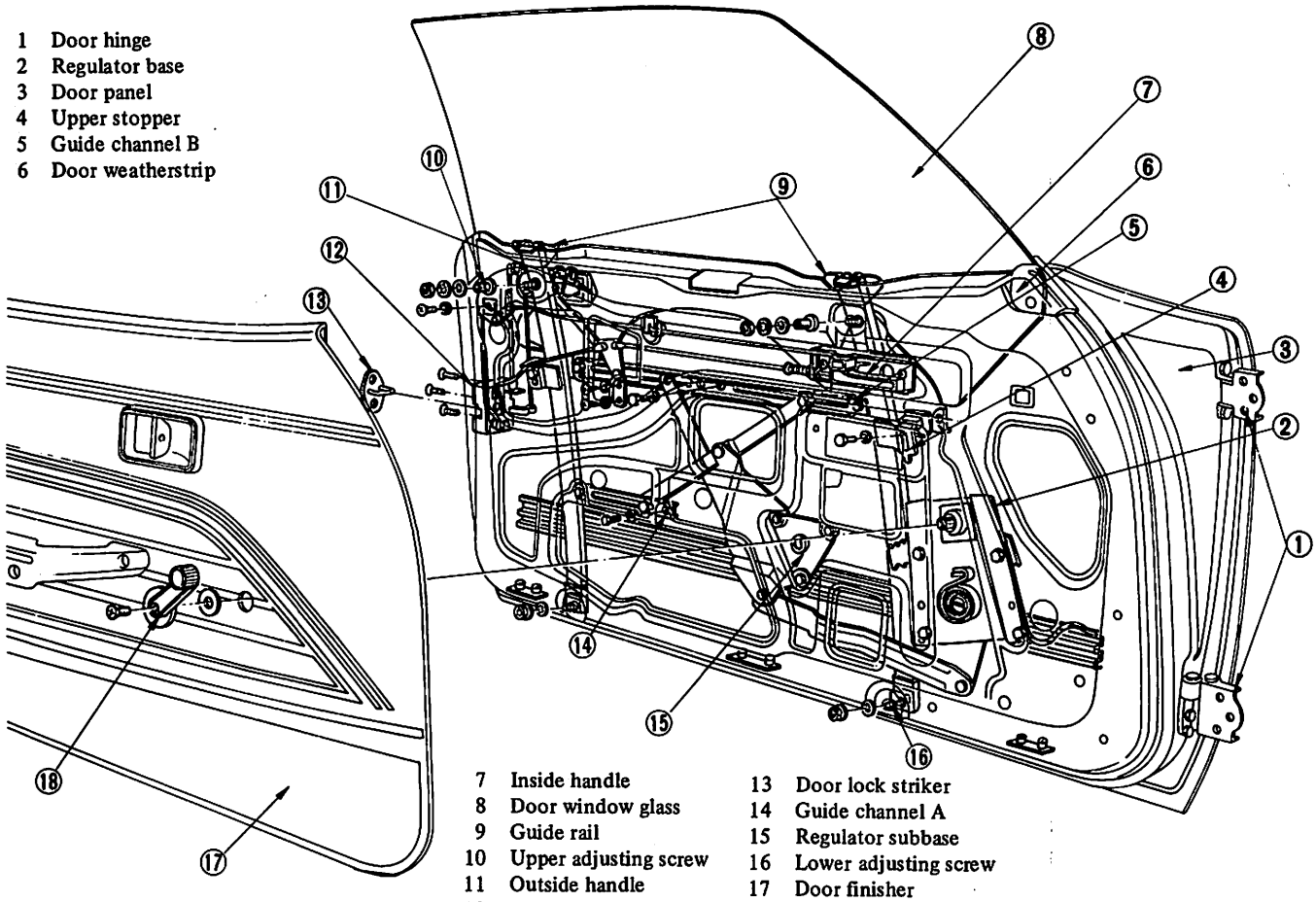


Fig. BF-29 Front door

DOOR

REMOVAL AND INSTALLATION

1. Open door fully and support it with a stand or jack.

Note: Place a rag between door and stand or jack to protect door panel from scarring.

2. Remove door side installation bolts from hinges, and remove door.
3. Install door in the reverse order of removal.

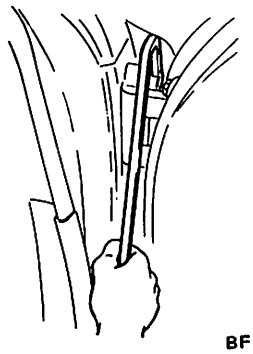
Tightening torque:
Hinge to door panel:
1.6 to 2.1 kg-m
(12 to 15 ft-lb)

Note: Before installing door, be sure to apply recommended multi-purpose grease to hinge link.

ADJUSTMENT

Proper door alignment can be obtained by adjusting door hinge and door lock striker.

1. Door hinges can be adjusted up and down or fore and aft by using Door Adjusting Wrench ST08730000.



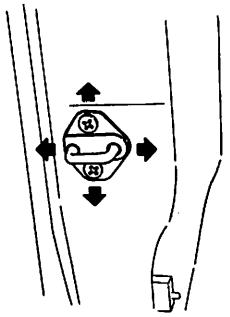
BF603A

Fig. BF-30 Adjusting door

Tightening torque:
Hinge to body attaching bolts:
1.6 to 2.1 kg-m
(12 to 15 ft-lb)

2. Door in and out adjustment as well as door lock adjustment are accomplished by changing location of door lock striker.

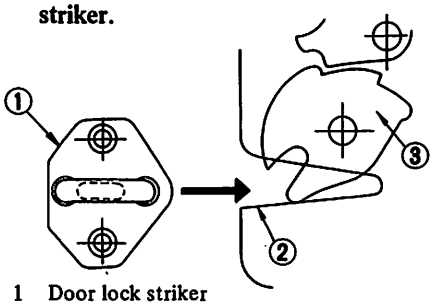
Tightening torque:
Door lock striker installation bolts:
1.6 to 2.1 kg-m
(12 to 15 ft-lb)



BF091B

Fig. BF-31 Adjusting door lock striker

Note: Perform up and down adjustment to the extent that door lock striker does not come into contact with door lock cover plate and resin portion until door lock engages striker.



1 Door lock striker
2 Cover plate
3 Latch

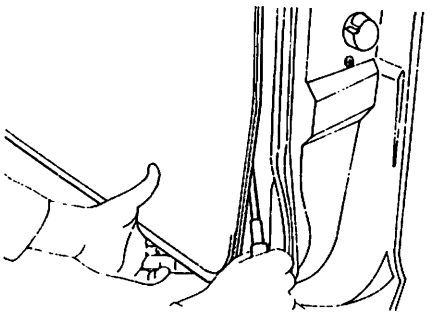
BF092B

Fig. BF-32 Adjusting door lock striker and latch

DOOR TRIM

REMOVAL AND INSTALLATION

1. Remove regulator handle, inside handle escutcheon and arm rest. See Figure BF-29.
2. Remove door finisher.

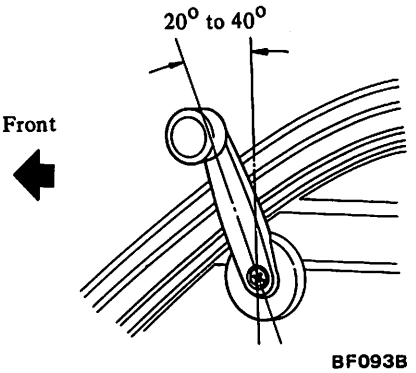


BF086

Fig. BF-33 Removing door finisher

3. Installation is in the reverse order of removal.

Note: With door glass up, set regulator handle at specified angle. See Figure BF-34.

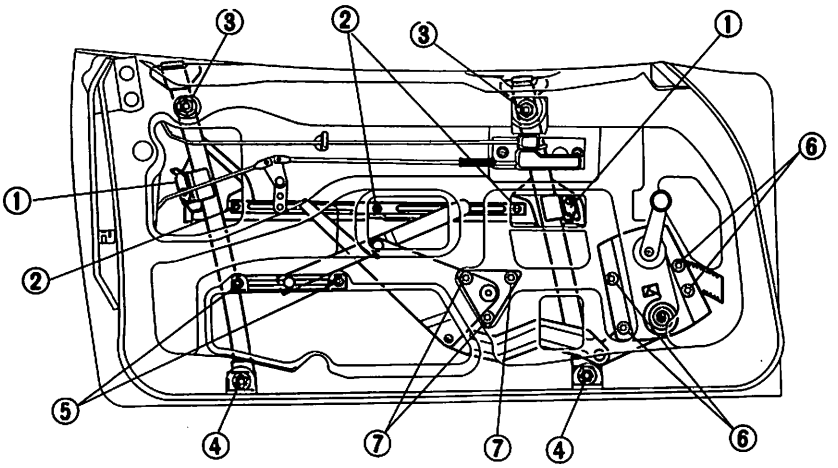


BF093B

Fig. BF-34 Setting angle of regulator handle

DOOR WINDOW GLASS AND REGULATOR

REMOVAL AND INSTALLATION



1 Upper stoppers
2 Guide channel B attaching bolts
3 Upper guide rail adjusting screw lock nuts
4 Lower guide rail adjusting screw lock nuts
5 Guide channel A attaching bolts
6 Regulator base attaching bolts
7 Regulator subbase attaching bolts

BF094B

Fig. BF-35 Removing door window glass and regulator

See Figure BF-35.

1. Remove door trim parts, seal screen and outside molding.
2. Remove upper stoppers ① fixed on guide rail.
3. Remove bolts ② retaining guide channel B to glass back plate.
4. Remove upper and lower guide

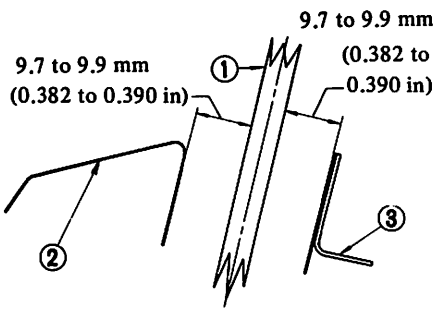
rail adjusting screw lock nuts ③ and ④, and fully tighten upper and lower adjusting screws.
5. Draw out glass with guide rail attached.
6. Remove bolts ⑤, ⑥ and ⑦ attaching guide channel A, regulator base and regulator subbase.
7. Draw regulator through the lower opening of door inside panel.
8. Installation is in the reverse order of removal.

Note: Apply recommended multi-purpose grease to sliding surface of guide rail and roller and link parts of regulator.

ADJUSTMENT

Door window glass adjustment

1. Raise door window glass and temporarily secure guide rail upper and lower adjusting screw midway.
2. Adjust guide rail upper adjusting screw so that clearances between door window glass and door inside and outside panels are as shown below.

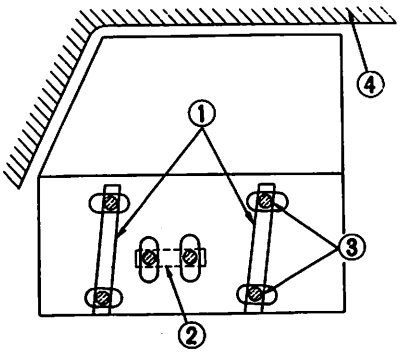


1 Door window glass
2 Door outside panel
3 Door inside panel

BF095B

Fig. BF-36 Adjusting clearances between door window glass and door inside and outside panels

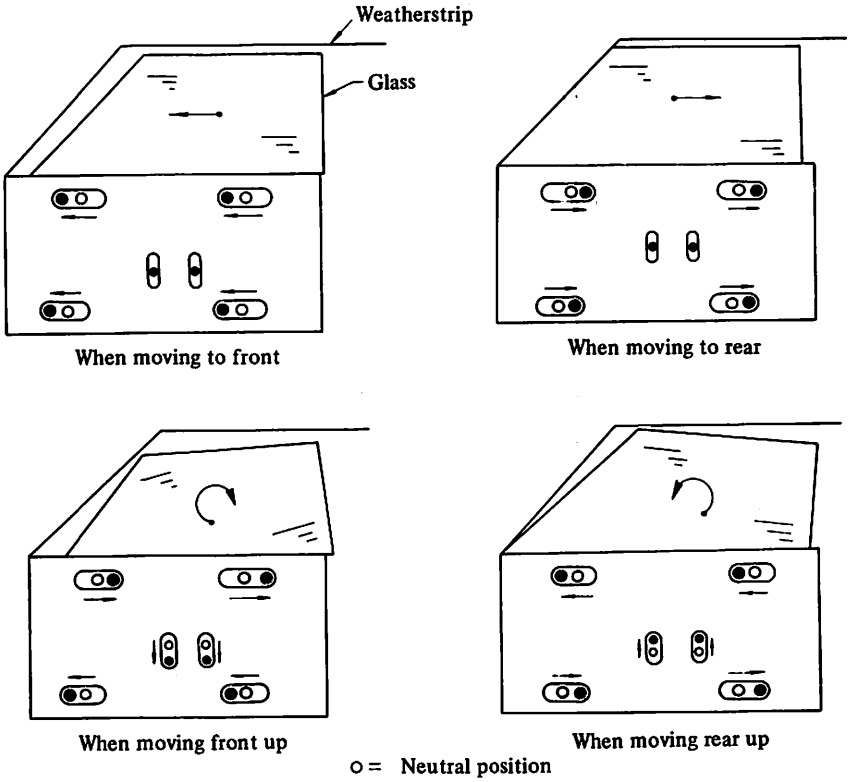
3. Install door outside molding and make sure that it makes proper contact with glass.
4. With glass up, adjust guide rail adjusting screw and guide channel A attaching bolts so that circumference of door glass fits body side weatherstrip. See Figures BF-37 and BF-38.



1 Guide rail
2 Guide channel A
3 Guide rail adjusting screw
4 Body side weatherstrip

BF096B

Fig. BF-37 Adjusting points for door window glass posture



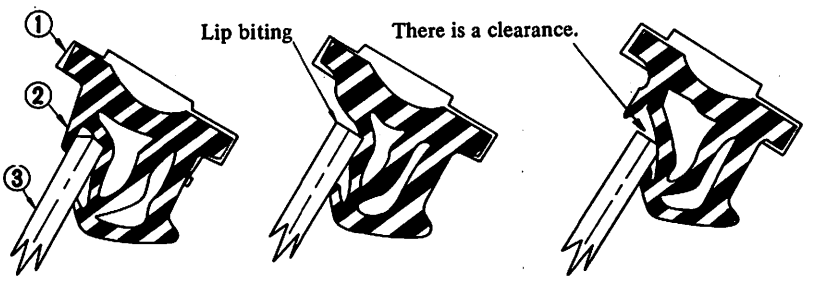
o = Neutral position
● = Adjusting position

BF097B

Fig. BF-38 Adjusting door window glass posture

Glass height adjustment

- Opening and closing door with door glass up, secure and adjust glass upper stopper at a position in which full circumference of glass makes proper contact with weatherstrip.



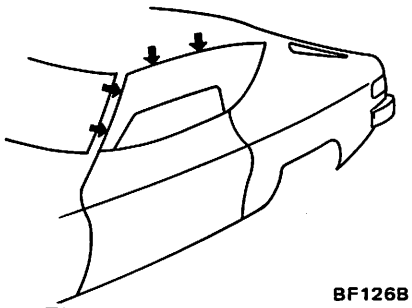
1 Retainer
2 Weatherstrip
3 Glass

BF098B

Fig. BF-39 Adjusting upper stopper

Glass to weatherstrip contact adjustment

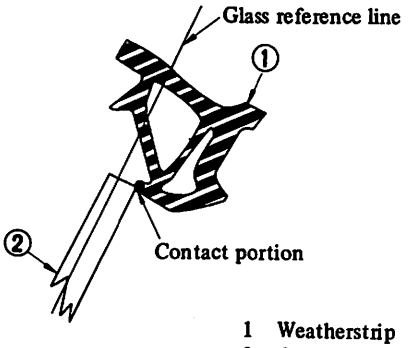
1. Check door window glass for proper contact with weatherstrip at positions shown by arrows.



BF126B

Fig. BF-40 Checking positions for contact

2. With door glass up, adjust lower adjusting screw on guide rail so that circumference of door window glass makes slight contact with weatherstrip as shown in illustration.



1 Weatherstrip
2 Glass

BF099B

Fig. BF-41 Adjusting door window glass to weatherstrip contact

Note: Adjust front and rear adjusting screws equally to prevent regulator handle from dragging.

Adjustment regulator

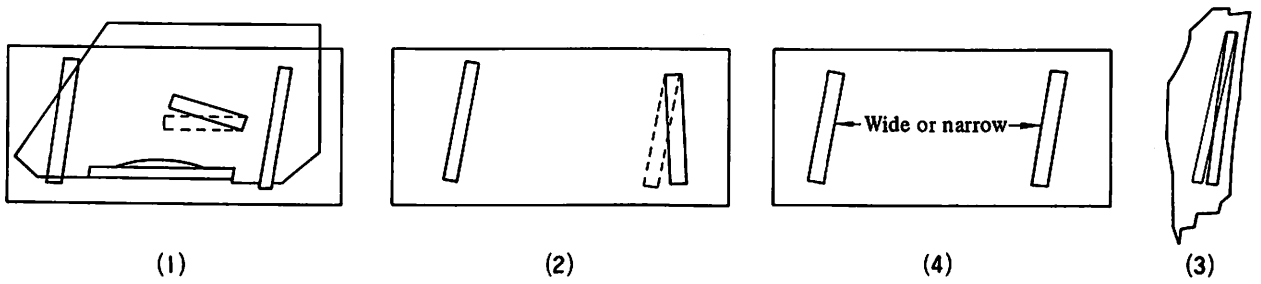
If regulator drags, adjust observing the following: (See Figure BF-42.)

(1) Two guide channels are not parallel.

(2) Two guide rails are not parallel. (when viewed from section)

(3) Two guide rails are not parallel. (when viewed from front)

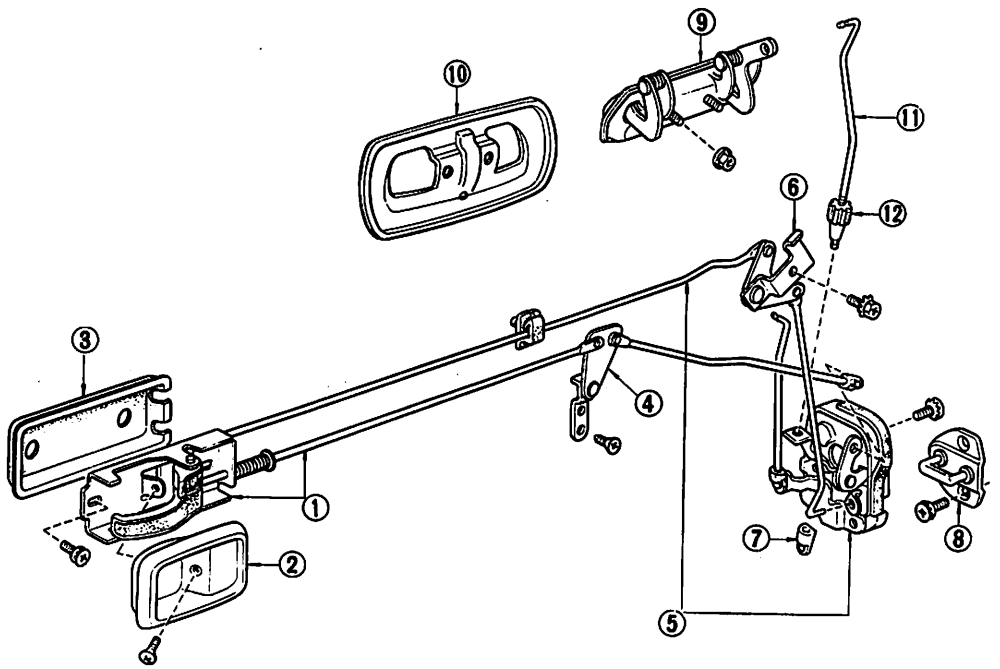
(4) Distance between guide rails is wide or narrow.



BF100B

Fig. BF-42 Adjusting regulator

DOOR LOCK AND REMOTE CONTROL



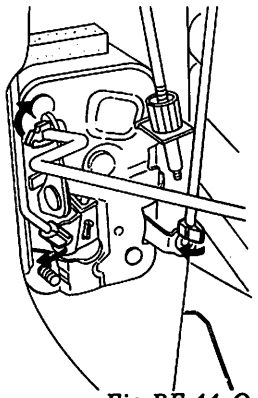
1 Inside handle assembly
2 Inside handle escutcheon
3 Dust cover
4 Bell crank A
5 Door lock assembly
6 Bell crank B
7 Clip
8 Door lock striker
9 Outside handle
10 Handle spacer
11 Outside handle rod
12 Adjusting nut

BF101B

Fig. BF-43 Door lock and door lock control

REMOVAL

1. Remove door trim parts and sealing screen.
2. Open clip connecting door lock to rod and remove rod from door lock.



BF102B

Fig. BF-44 Opening clip

3. Remove bolts attaching inside handle, bell cranks A and B, and remove door lock control.
4. Remove screws attaching door lock, and remove door lock.
5. Remove outside handle.
(1) Remove upper stoppers.
(2) With door window glass fully up, remove outside handle attaching nut.

INSTALLATION

Install the door lock and door lock control in the reverse order of removal, noting the following points.

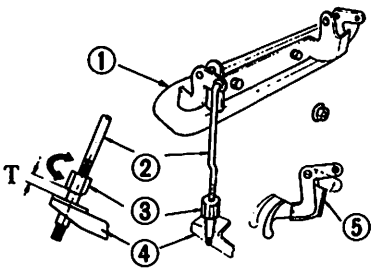
1. Make sure that there is no cracks, break or bends on door lock control.
2. Pass outside handle rod through door lock and install on door panel.
3. If clip securing rod to door lock is damaged, replace.

ADJUSTMENT

Outside door handle

Outside door handle adjustment can be accomplished by adjusting the clearance between outside door lock lever and adjusting nut (nylon) located on outside door handle rod.

To adjust outside door handle, turn adjusting nut clockwise or counter-clockwise to obtain a clearance of 0.1 to 3 mm (0.004 to 0.118 in) with outside door handle in normal condition. See Figure BF-45.



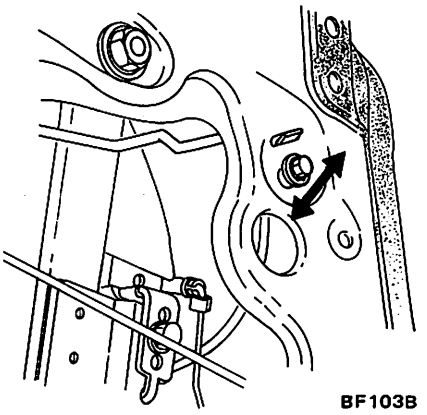
BF469

1 Outside door handle 4 Door lock lever
2 Remote control rod 5 Stopper
3 Adjusting nut

Fig. BF-45 Adjusting handle free play

Inside door handle

1. Install and tighten bell crank A.
2. With door in "Lock" position, install inside handle assembly so that there is no deflection of rod.
3. Install bell crank B so that there is no deflection of lock rod with door in "Lock" position.

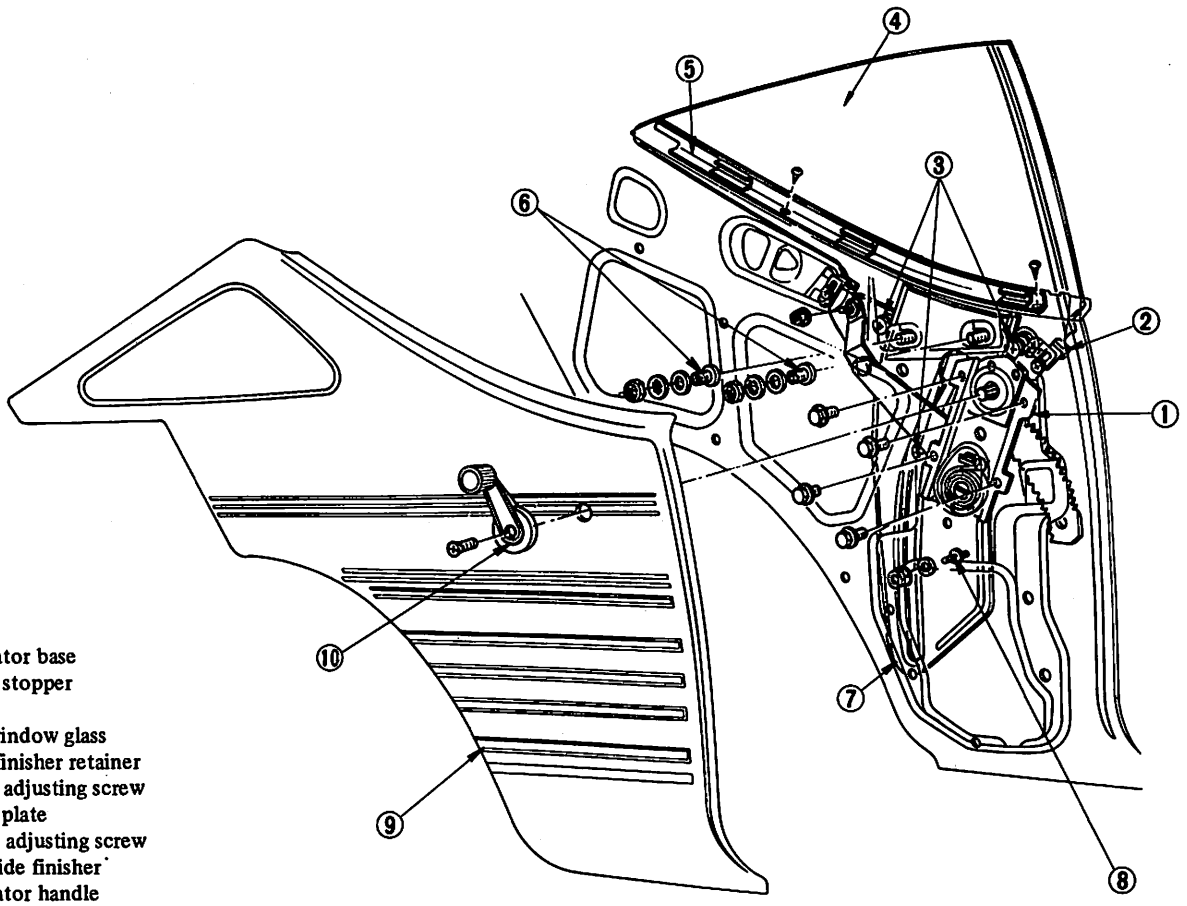


BF103B

Fig. BF-46 Adjusting bell crank B

Note: After adjustment, make sure that door lock and door lock control mechanism operates securely.

SIDE WINDOW



1 Regulator base
2 Upper stopper
3 Roller
4 Side window glass
5 Door finisher retainer
6 Upper adjusting screw
7 Guide plate
8 Lower adjusting screw
9 Rear side finisher
10 Regulator handle

BF104B

Fig. BF-47 Side window

REMOVAL AND INSTALLATION

See Figure BF-47.

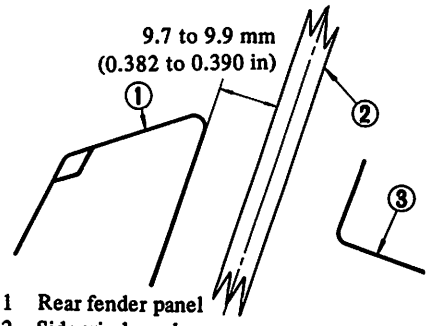
1. Remove the following parts:
(1) Rear ventilation grille
(2) Rear seat cushion and seat back
(3) Front outer seat belt
(4) Rear kicking plate
2. Remove regulator handle and rear side finisher.
3. Remove side window inside and outside moldings.
4. Remove sealing screen.
5. Remove upper stoppers.
6. Remove nut attaching side window glass to regulator.
7. Remove upper and lower adjusting nuts and screws.
8. Draw out side window glass with guide plate through upper opening.
9. Remove bolts attaching regulator.
10. Draw out regulator through lower opening.
11. Installation is in the reverse order of removal.

Note:

a. **Apply recommended multi-purpose grease to sliding surface of guide plate and roller and link parts of regulator.**
b. **Install regulator handle so that it comes atop when door window glass is fully opened.**

ADJUSTMENT

1. With door window glass up, position guide rail adjusting screw in neutral.
2. Adjust clearance between rear fender panel and inside panel with upper adjusting screw to value shown in illustration.



1 Rear fender panel
2 Side window glass
3 Inside panel

BF105B

Fig. BF-48 Adjusting clearance between rear fender panel and inside panel

3. Install outside molding and make sure that door window glass makes proper contact with outside molding.
4. With door window glass and side window glass fully closed, adjust so that side window glass posture fits door window glass and body side weatherstrip. See Figure BF-49.

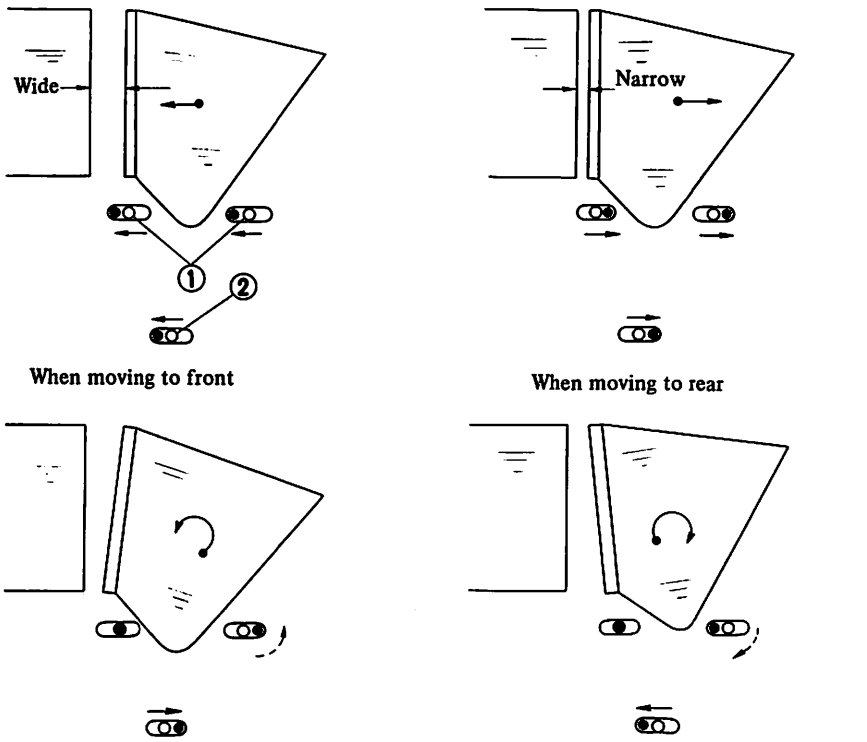


Fig. BF-49 Adjusting window glass posture

5. Raising or lowering side window glass with door window glass fully opened, adjust so that clearance between weatherstrip and door window glass is as shown in illustration when side window glass is fully opened.

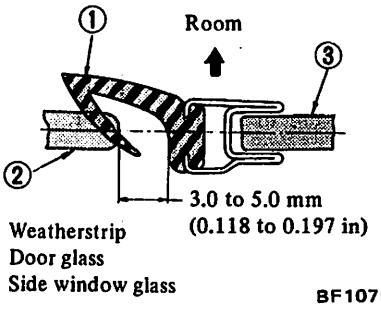


Fig. BF-50 Adjusting clearance between weatherstrip and door window glass

6. Adjust upper stopper. Refer to Section Door Window.
7. Adjust side window glass to outside molding contact with lower adjusting screws. Refer to Section Door Window.
8. Check window regulator for operation.

WINDSHIELD AND REAR WINDOW GLASS

CONTENTS

DESCRIPTION BF-21
REMOVAL AND INSTALLATION BF-22
REMOVAL BF-22
INSTALLATION BF-22
REPAIRING LEAKS BF-24

DESCRIPTION

A pre-mixed, one-part sealant to cement windshield glass to window opening is available.

After using this sealant, it is highly recommended that the car remain stationary for about 24 hours so that the sealant can cure well.

WARNING:
Keep heat or open flames away as primer is flammable.

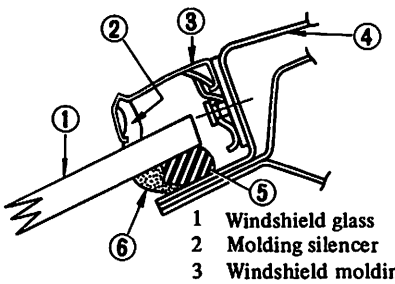


Fig. BF-51 Sectional view of front adhesive caulked windshield glass

CAUTION:
a. Do not use sealant if it is more than six months old.
b. Open cartridge only at the time of use.
c. Keep primer and sealant in a cool, dry place. Ideally, the sealant should be stored in a refrigerator.

REMOVAL AND INSTALLATION

REMOVAL

1. Protect hood, front fenders, instrument panel and front and rear seats with covers.
2. Windshield glass:

   Remove windshield wiper arms with blades, cowl top grille, radio antenna, windshield pillar garnish, instrument garnish and welt.

   Rear window glass:

   Remove rear ventilation grille, rear parcel shelf and welt.
3. Using a putty knife or similar tool, pry moldings out of position, starting at center and moving toward the ends. Refer to Moldings on page BF-32.

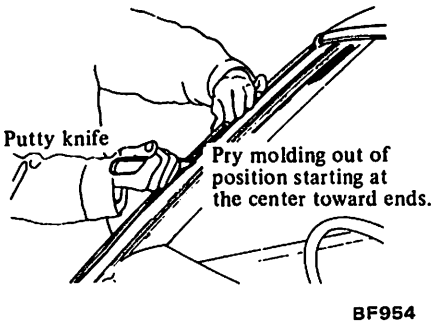


Fig. BF-52 Removing molding

4. Reaching from inside car, strip dam from around window glass.

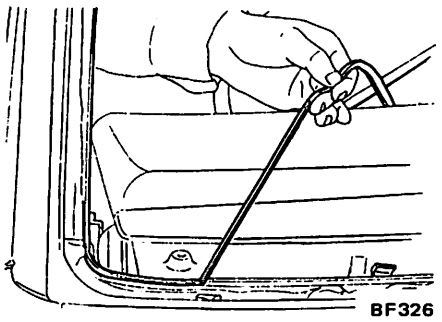


Fig. BF-53 Stripping dam

5. With aid of sharp cutting knife, cut off caulking material along edge of entire window opening.

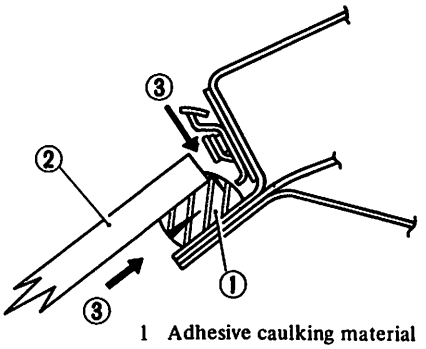


Fig. BF-54 Cutting off adhesive caulking

6. The following procedure may also be used in removing rear windshield.
(1) Using a knife, cut through part of caulking material.
(2) Secure one end of steel music wire [0.5 mm (0.020 in) diameter] to a piece of wood that can serve as a handle.

Using long nose pliers, insert other end of wire through caulking material at edge of glass; then, secure that end of wire to another wood handle.
(3) With the aid of an assistant, carefully cut (pull wire) through caulking material around entire perimeter of window using a sawing motion.

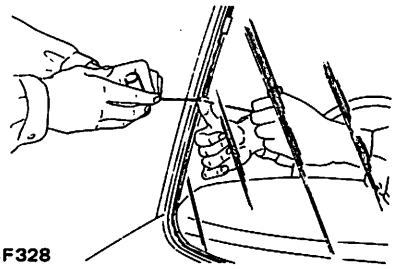


Fig. BF-55 Cutting sealant

7. From inside car, push glass up and out of window opening.
8. Using a razor blade or sharp scraper, remove caulking material along entire edge of window opening, leaving it about 1 to 2 mm (0.04 to 0.08 in) thick.

CAUTION:
When body painted surface is scratched, be sure to repair with paint.

INSTALLATION

1. Check for missing molding retainers.
2. Clean body side contacting face with suitable cleaning solvent.

CAUTION:
Do not allow oil, grease or water to get on clean surfaces from dirty hands or fouled tools.

3. Install five spacers on front window opening and five on rear. See Figures BF-56 and BF-57.

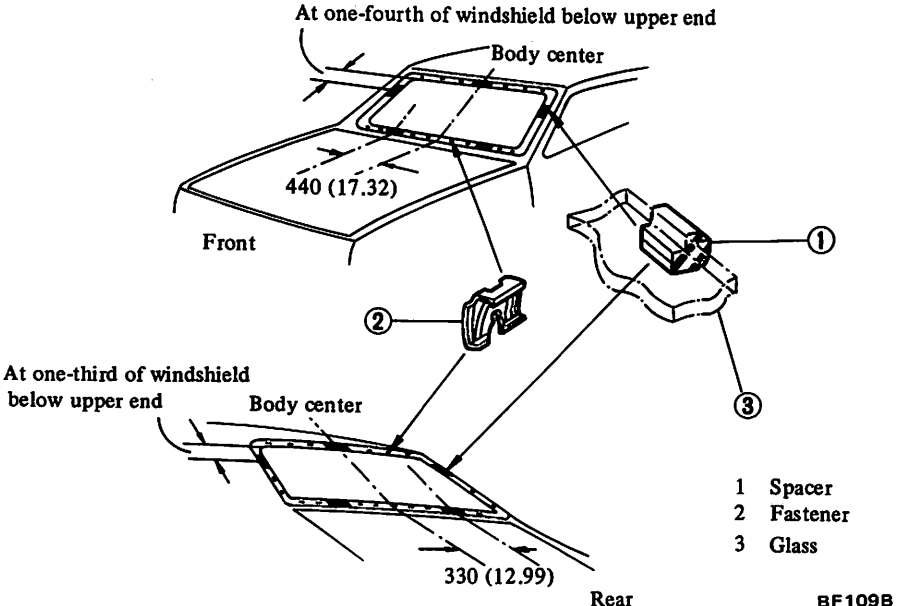


Fig. BF-56 Location of spacers and fasteners

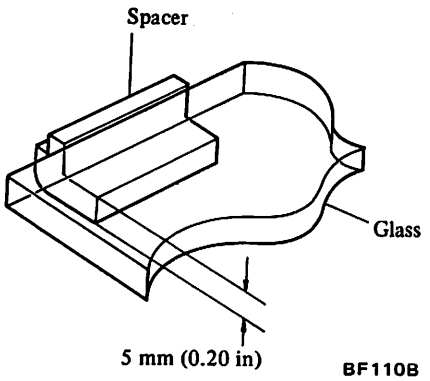


Fig. BF-57 Installing glass on spacer

4. To set glass in proper position in window opening, paste two pieces of masking tape at the center top and bottom of glass and panel for alignment.

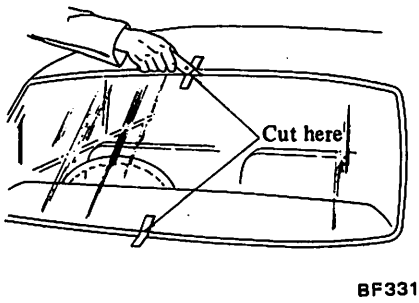


Fig. BF-58 Aligning glass in window opening

5. Clean glass surface where the sealant will be applied and dam with non-lead gasoline as shown in Figure BF-59.

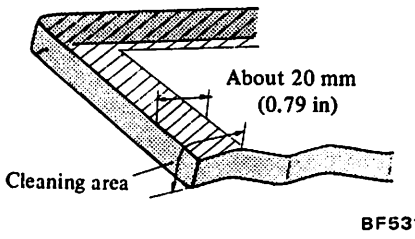


Fig. BF-59 Cleaning area of glass

6. Install dam to inside of windshield glass 8 mm (0.31 in) inboard from edge of glass and cut off excess amount at its ends. See Figure BF-60.

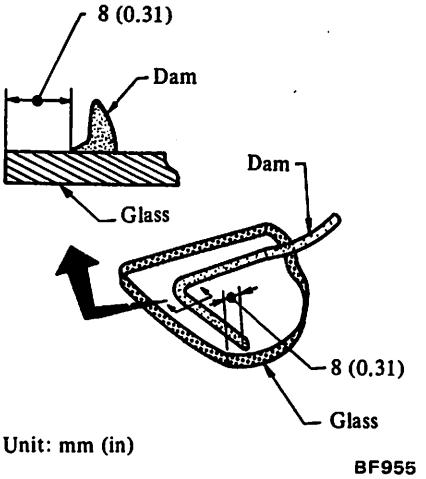


Fig. BF-60 Installing dam

7. With the sponge furnished with the primer, apply a light coat of primer to original caulking material left on window opening flanges.

CAUTION:

a. Do not apply primer to old sealant when replacing glass that was repaired with silicone sealant previously.
Identification of old adhesive material can be accomplished as follows:
1) Cut a small piece of excess sealant from glass or window opening flanges.
2) Stick small piece of sealant on the end of knife or the like, and hold it over flame from match or lighter until it ignites.
(1) Polysulfide burns with a clear flame with a very small amount of white smoke or no smoke and its odor is very objectionable (heavy sulfur dioxide).
(2) Silicone glows with little or no flame and emits white smoke and very little odor.
Burnt residue is white ash.

b. Allow primer to dry for 10 to 15 minutes before proceeding to the next step.

8. Insert cartridge in Caulking Hand Gun ST08810000 and place smooth, continuous bead on glass 10 mm (0.39 in) above glass surfaces. See Figure BF-61.

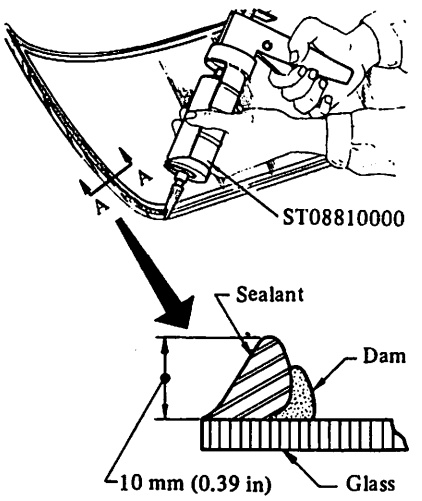


Fig. BF-61 Applying adhesive caulking

Note: Cut off nozzle end of cartridge as shown in Figure BF-62.

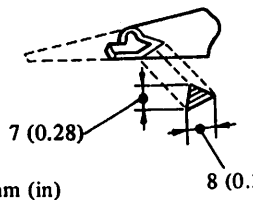


Fig. BF-62 Cutting nozzle of cartridge

Pierce sealing film with needle; install cartridge in hand gun.

CAUTION:

Sealant starts to harden 15 minutes after it is applied; therefore, window glass should be installed in glass opening in body within 15 minutes of applying sealant.

9. Support windshield glass with Sucker ST08800000.

10. Position windshield glass in opening and align the masking tape previously applied to make sure that glass is properly placed on spacers located at the glass opening flange.

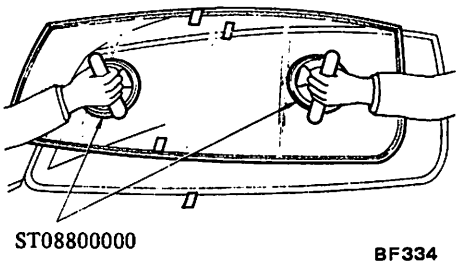


Fig. BF-63 Installing glass

11. Apply pressure on glass to aid in seating on plate.
12. Wipe excess caulking material off T studs, edges of glass, and body.
13. Remove protective covers.
14. Water test using a cold water spray after 1 or 2 hours.

Do not direct stream of water at fresh adhesive material. Allow water to spill over edges of glass. If leaks are encountered, use Caulking Hand Gun to work in additional caulking material at leak point.

16. Install all previously removed parts.

Note: After installing, attach caution label to glass surface.



BF679A

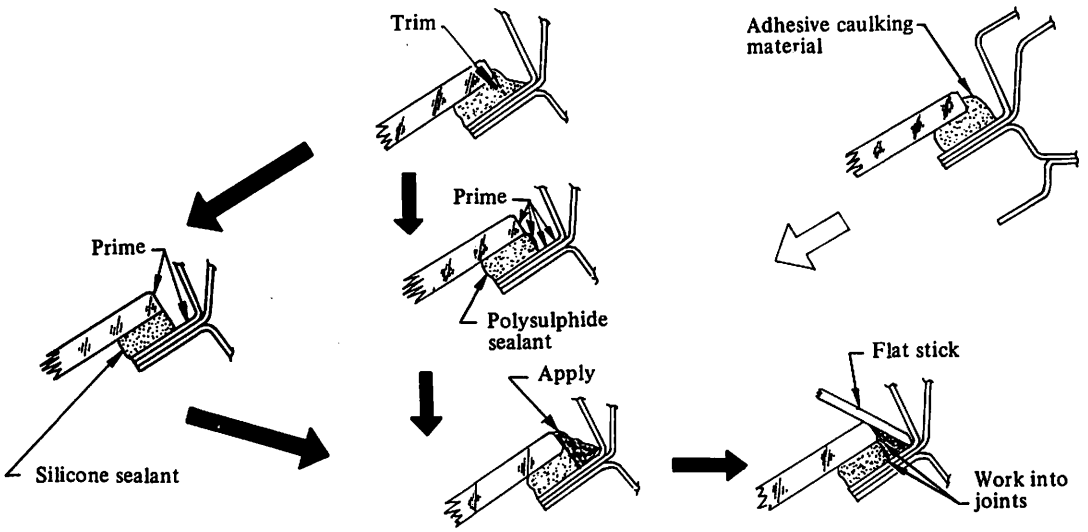
Fig. BF-64 Caution label

Be sure that it does not obstruct visibility. The label, noting the fact that sealing will be impaired if door is opened or closed with window closed before sealant has dried, will be furnished with the kit.

CAUTION:
Advise the user of the fact that car should not be driven on rough roads or surfaces until sealant has properly vulcanized.

REPAIRING LEAKS

Leaks can be repaired without removing and re-installing glass in the following manner:



BF958

Fig. BF-65 Adhesive caulked glass leak correction

CAUTION:
Do not apply primer to old silicone sealant.

1. To stop leaks, first remove moldings in area of leak. It may be necessary to remove garnish molding or finishing lace to isolate the cause of problem.
2. Mark location of leak.

Note: If water is leaking between caulking material and body or between glass and caulking material, determine the extent of leak by pushing the glass outwards.

Apply water to leak area while pushing on the glass.

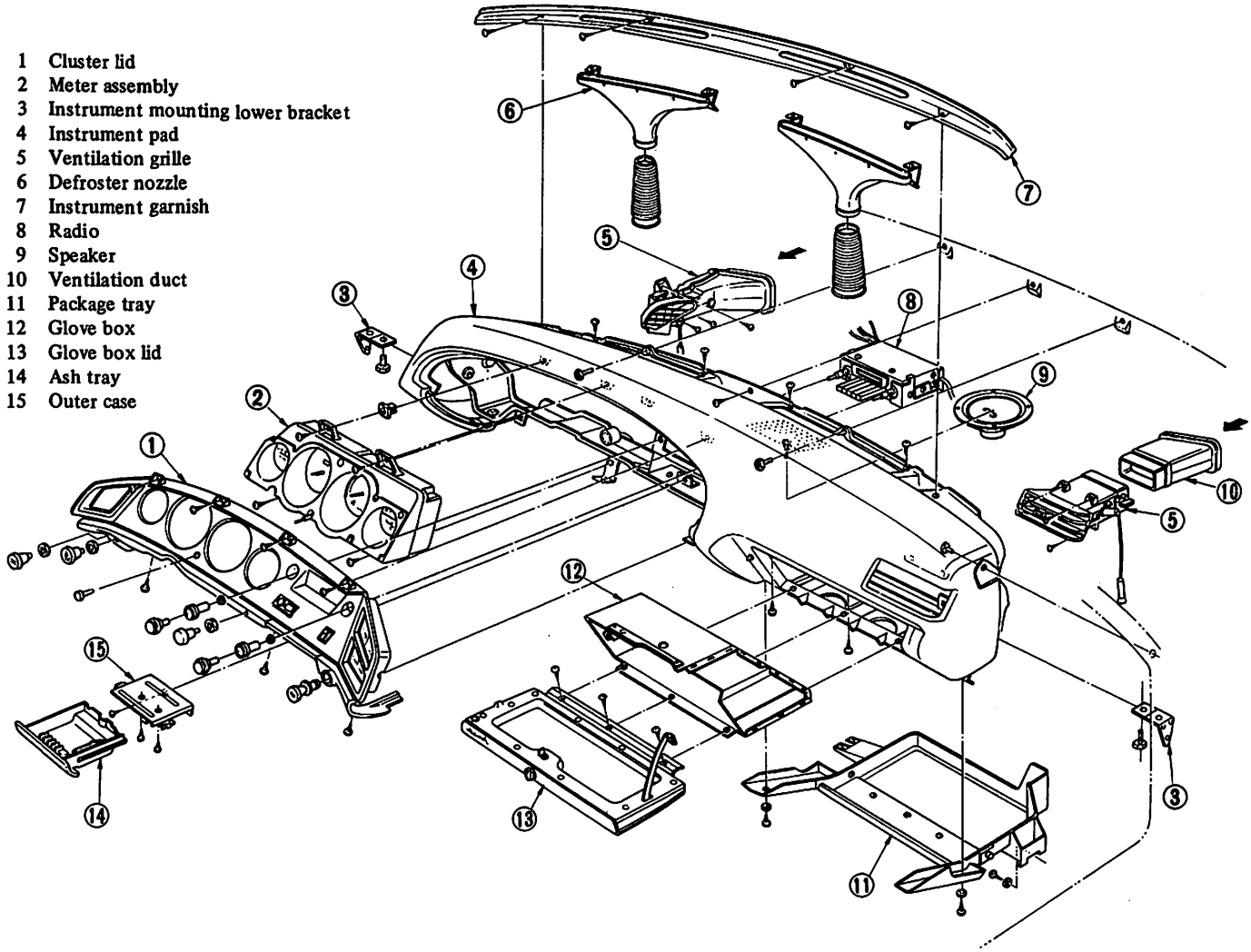
Mark the extent of leak point.

INSTRUMENT PANEL

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REMOVAL AND INSTALLATION BF-25
INSTRUMENT PANEL ASSEMBLY BF-25
CLUSTER LID BF-26
GLOVE BOX BF-26

1 Cluster lid
2 Meter assembly
3 Instrument mounting lower bracket
4 Instrument pad
5 Ventilation grille
6 Defroster nozzle
7 Instrument garnish
8 Radio
9 Speaker
10 Ventilation duct
11 Package tray
12 Glove box
13 Glove box lid
14 Ash tray
15 Outer case



BF111B

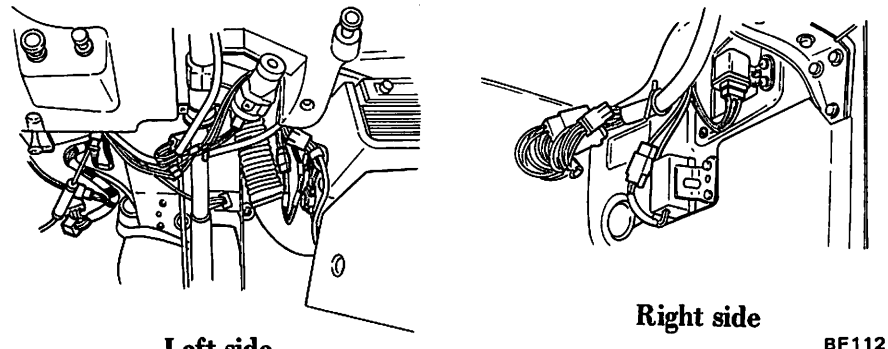
Fig. BF-66 Instrument panel

REMOVAL AND INSTALLATION

INSTRUMENT PANEL ASSEMBLY

See Figure BF-66.

1. Disconnect battery ground cable.
2. Remove steering wheel shell covers.
3. Disconnect speedometer cable and radio antenna cable.
4. Disconnect connectors between instrument harness and body, engine room, transistor ignition, console box, clock and room lamp harnesses.



Left side

Right side

BF112B

Fig. BF-67 Disconnecting connectors

5. Remove bolts securing steering column clamp.
6. Remove package tray.
7. Remove bolts attaching instrument panel to instrument mounting lower brackets at right and left dash sides.

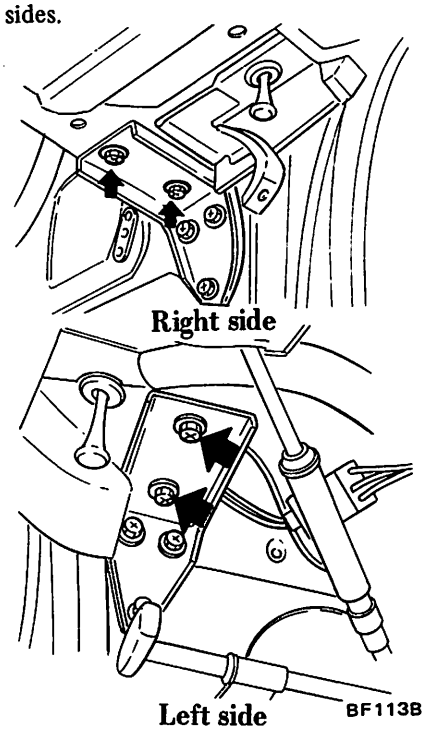


Fig. BF-68 Removing instrument panel attaching bolts

8. Remove right side windshield pillar garnish, and remove bolt attaching instrument panel to windshield pillar.
9. Remove instrument garnish.
10. Remove bolts and screw attaching instrument panel.
11. Extract instrument panel assembly rightward.
12. Install instrument panel assembly in the reverse order of removal.

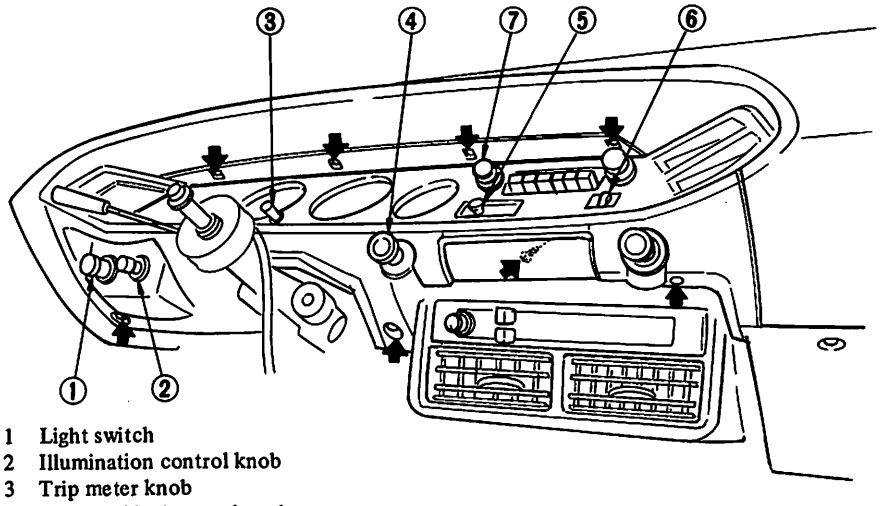
CAUTION:
After installation, check switches, etc. for operation.

CLUSTER LID

1. Remove steering wheel and shell cover.
2. Remove the following parts. (See Figure BF-69.)
- Remove each knob by pushing and turning counterclockwise head lamp switch, illumination control and windshield wiper and washer switch knob. Remove nuts.
- Radio knob, escutcheon and nut.
- Remove trip meter knob by turning counterclockwise.

3. Remove upper and lower screws attaching cluster lid to instrument panel. (See Figure BF-69.)
4. Extract cluster lid forward and proceed as follows:
- Disconnect cigarette lighter connector.
- Disconnect hazard switch.
- Remove rear defogger switch attaching screws from cluster lid.

5. Remove cluster lid.
6. Install cluster lid in the reverse order of removal.



1 Light switch
2 Illumination control knob
3 Trip meter knob
4 Windshield wiper and washer switch knob
5 Hazzard switch
6 Rear defogger switch
7 Radio knob

BF114B

Fig. BF-69 Removing cluster lid

GLOVE BOX

Removal and Installation

See Figure BF-66.

1. Remove screws attaching glove box lid and extract glove box lid stay from instrument pad. Glove box lid can then be taken out.
2. Remove upper screws attaching glove box, and remove glove box.
3. Install glove box and lid in the reverse order of removal.

SEAT

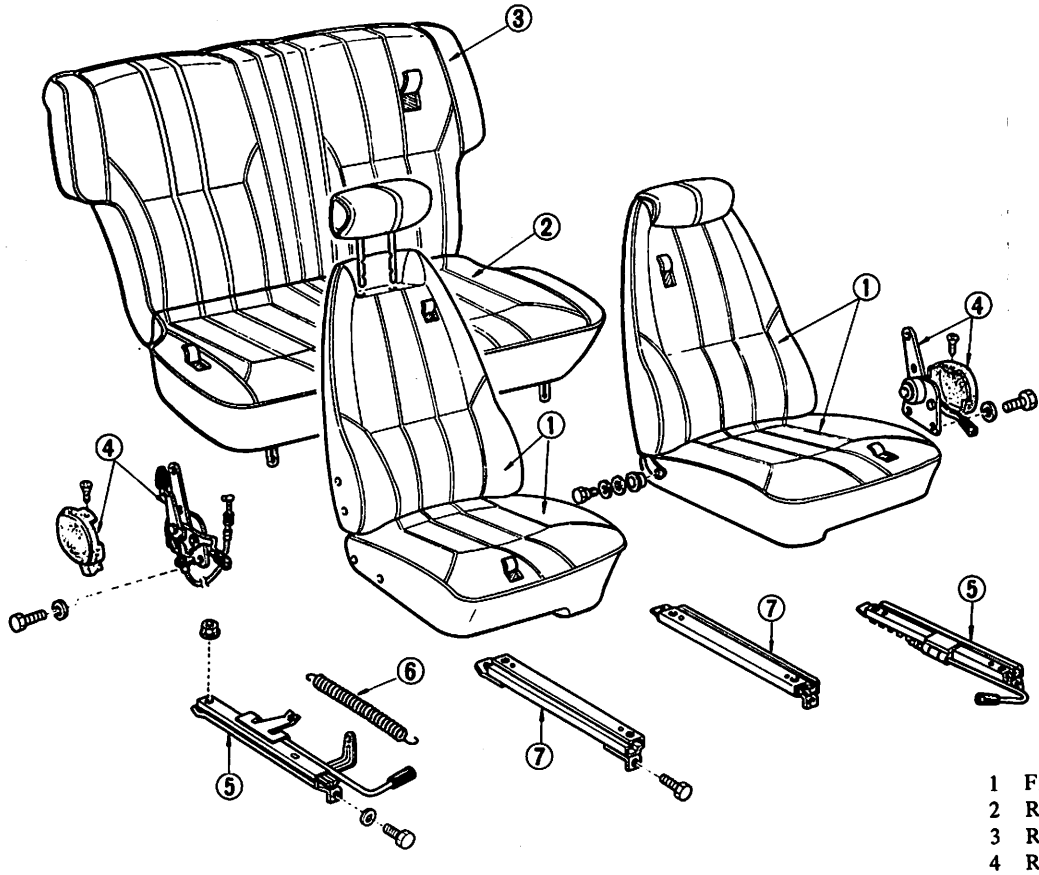
DESCRIPTION

The front seats are a separate, high back, manually-operated, reclining type. After getting in or out of the rear seat, push the seat backward, and the seat will stop in a neutral position.

They can be moved 60 mm (2.36 in) forward and 100 mm (3.94 in) backward, from the neutral position.

The rear seat-back is a semi-high-back type.

CAUTION: In conformity with M.V.S.S. No. 302, be sure to remove the thin polyethylene covers from seat cushions, seat backs and head restraints at:
a. Pre-delivery service
b. Parts replacements



1 Front seat assembly
2 Rear seat cushion
3 Rear seat back
4 Reclining device assembly
5 Outside seat slide
6 Return spring
7 Inside seat slide

BF115B

Fig. BF-70 Front and rear seats

FRONT SEAT

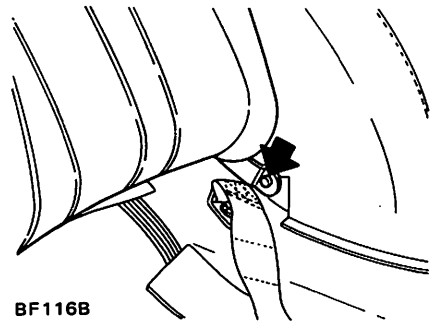
REMOVAL AND INSTALLATION

1. Remove slide cover.
2. Remove bolts (front) and nuts (rear) attaching front seat, and remove front seat.
3. Install front seat in the reverse order of removal.

REAR SEAT

REMOVAL AND INSTALLATION

1. Remove seat cushion by lifting it out.
2. Remove bolts attaching seat back to body, and detach seat back by lifting it out.
3. Install rear seat in the reverse order of removal.



BF116B

Fig. BF-71 Removing seat back

SEAT BELT

CONTENTS

DESCRIPTION BF-28
REMOVAL AND INSTALLATION BF-29
FRONT SEAT BELT BF-29
REAR SEAT BELT BF-29
INSPECTION OF SEAT BELT SWITCH BF-29

DESCRIPTION

The front seat belt assembly is a three-point type and consists of an inner lap and an outer lap-shoulder belt.

The outer lap belt incorporates a webbing, sensitive, emergency locking retractor in it. This retractor serves to restraint the belt securely in case of emergency, as in a collision or sudden stop of the car, thus protecting the seat occupant against serious injury. Under normal condition, the belt can be freely pulled out.

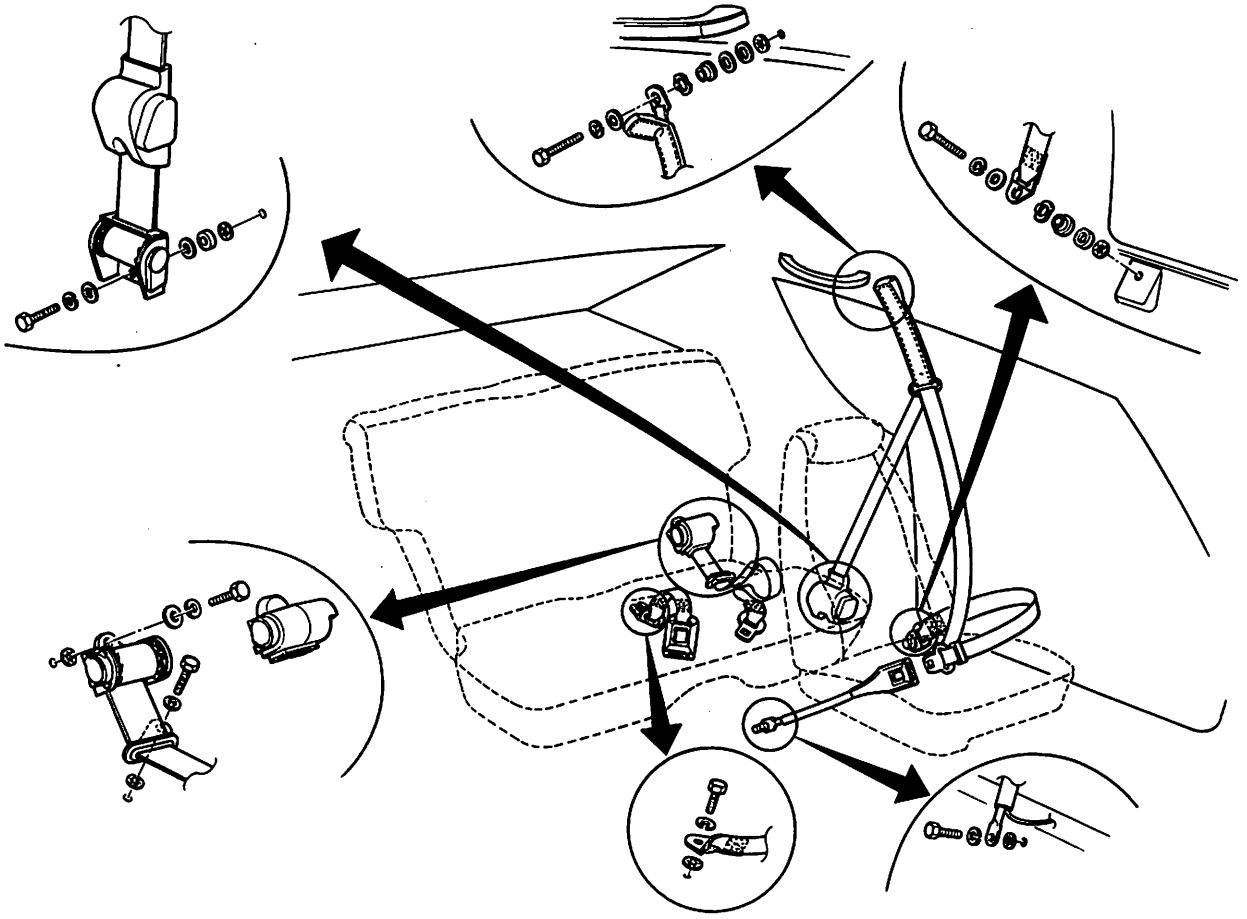
The inner lap belt is a flexible wire combined with a buckle. The buckle of driver seat belt includes a switch which is used as a seat belt warning device.

The rear seat belt is a two-point type and includes an automatic belt locking-retracting device.

Cautions

1. In conformity with MVSS No. 302, be sure to remove the thin polyethylene covers from seat belts at:
   (1) Pre-delivery service
   (2) Parts replacements
2. If the car is collided or overturned, replace the entire belt assembly, regardless of nature of accident.
3. If the condition of any component of a seat belt is questionable, do not have seat belt repaired, but replaced as a belt assembly.
4. If webbing is cut, frayed, or damaged, replace belt assembly.
5. Do not spill drinks, oil, etc. on inner lap belt buckle. Never oil tongue and buckle.
6. Use only a Nissan genuine seat belt assembly.
7. To clean the seat belt, brush it with neutral detergent, wipe it off with cloth, and then dry it in the shade.

   Do not use other chemicals or try bleaching or redyeing.



BF117B

Fig. BF-72 Seat belt

REMOVAL AND INSTALLATION

FRONT SEAT BELT

See Figure BF-72.

1. Disconnect battery ground cable.
2. Remove rear seat cushion.
3. Remove outer lap-shoulder belt assembly.
4. Remove rear kicking plate.
5. Remove screws securing rear carpet. With carpet turned up, remove buckle switch harness from connector under felt. Then remove inner lap belt.
6. Installation is in the reverse order of removal.

REAR SEAT BELT

1. Remove rear seat cushion and back.
2. Remove retractor cover.
3. Remove through anchor attaching bolt.
4. Remove inner and outer lap belts.
5. Installation is in the reverse order of removal.

INSPECTION OF SEAT BELT SWITCH

The contacts of seat belt switch is normally closed. When tongue latches buckle, the tip end of tongue pushes rod to open the switch contacts.

1. Disconnect battery ground cable.
2. Disconnect seat belt switch wire harness.
3. Check seat belt switch for proper operation, using a test light. The light should go out when tongue of outer lap belt latches buckle, and go on when it unlatches buckle. Replace belt assembly if necessary.

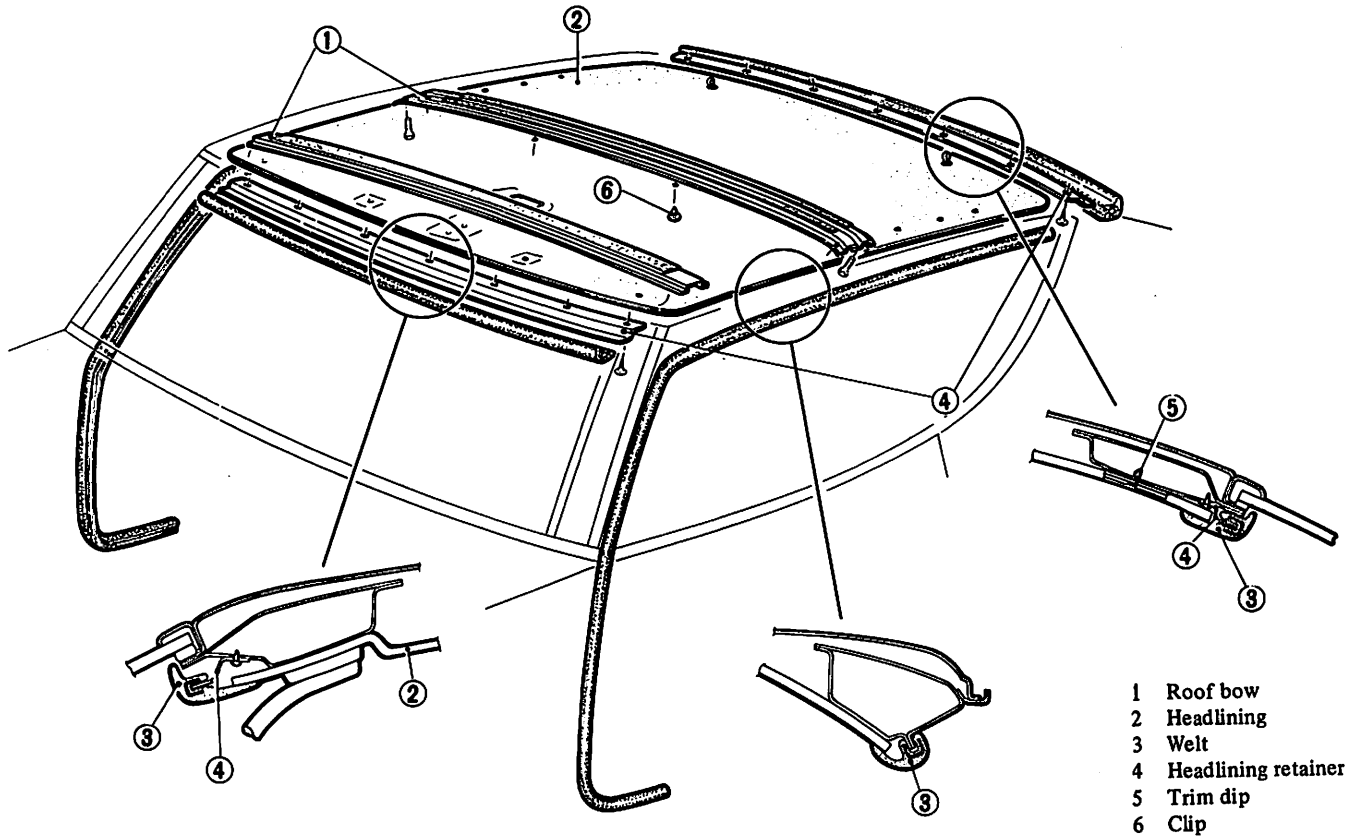
Note: When checking seat belt switch operation, make sure that power is held below 16 volts and 13 mA.

INTERIOR TRIM

CONTENTS

HEADLINING BF-29
REMOVAL AND INSTALLATION BF-30
CONSOLE BOX BF-30
REMOVAL AND INSTALLATION BF-30
OTHER TRIMS BF-30

HEADLINING



1 Roof bow
2 Headlining
3 Welt
4 Headlining retainer
5 Trim dip
6 Clip

BF118B

Fig. BF-73 Headlining

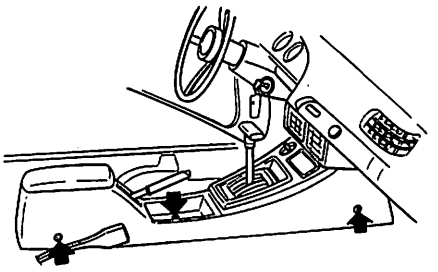
REMOVAL AND INSTALLATION

1. Remove rearview mirror, sun visors, room lamp, windshield pillar garnish, rear ventilation grille, assist grip, front seat belt outer lap belt and welt.
2. Remove headlining. (See Figure BF-73.)
3. Installation is in the reverse order of removal.

CONSOLE BOX

REMOVAL AND INSTALLATION

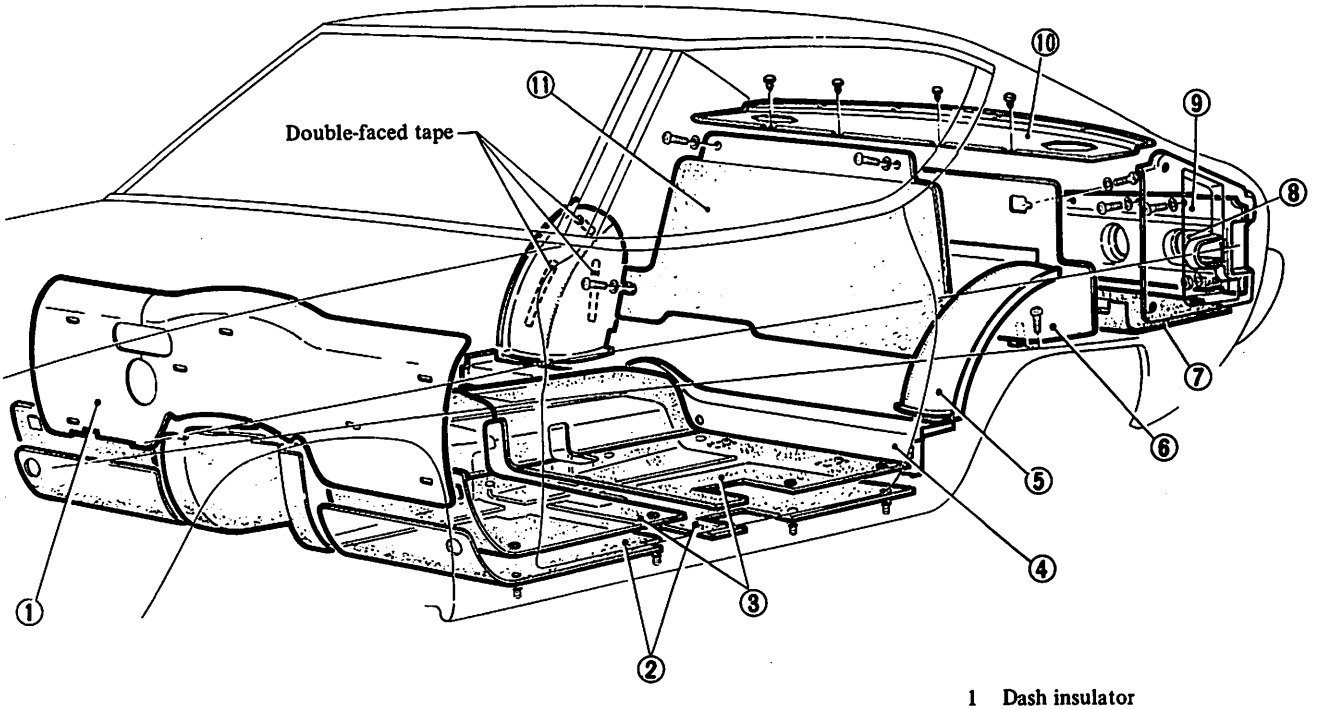
1. Remove six screws, and disconnect connector of clock harness.
2. Remove console box.
3. Install console box in the reverse order of removal.



BF119B

Fig. BF-74 Removing console box

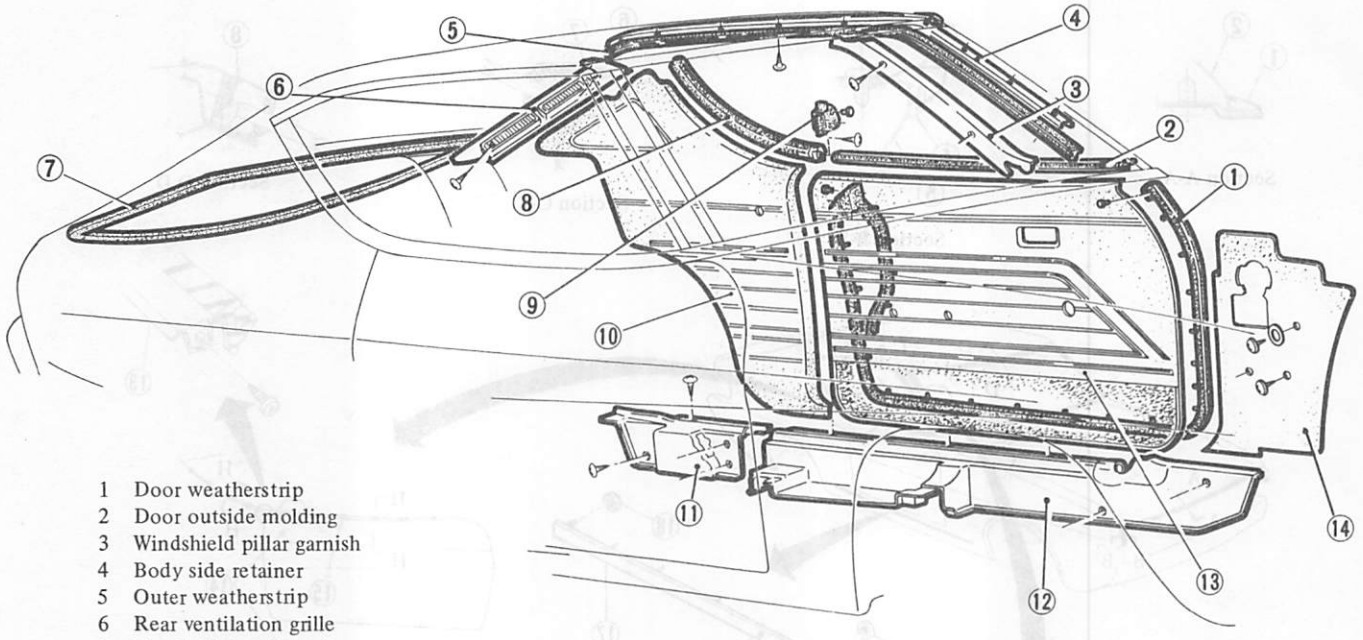
OTHER TRIMS



1 Dash insulator
2 Felt
3 Carpet
4 Rear seat lower cover
5 Rear wheel house finisher
6 Trunk board
7 Trunk floor mat
8 Trunk side finisher
9 Rear trunk finisher
10 Rear parcel shelf
11 Seat back sealing board

BF120B

Fig. BF-75 Dash and floor trim

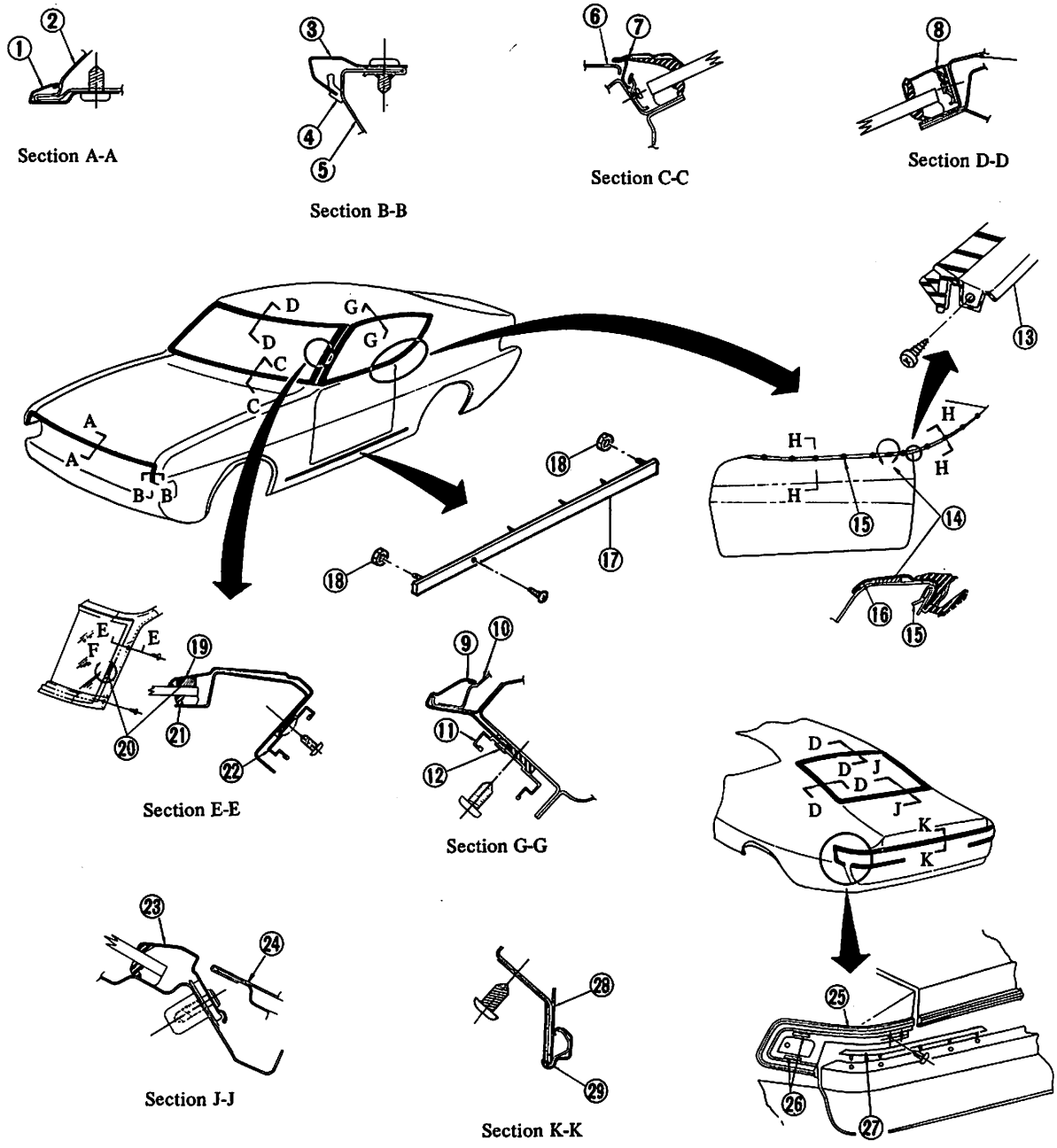


1 Door weatherstrip
2 Door outside molding
3 Windshield pillar garnish
4 Body side retainer
5 Outer weatherstrip
6 Rear ventilation grille
7 Trunk lid weatherstrip
8 Side window molding
9 Lock pillar cover
10 Rear side finisher
11 Rear kicking plate
12 Front kicking plate
13 Door finisher
14 Dash side finisher

BF121B

Fig. BF-76 Body side trim

MOLDINGS



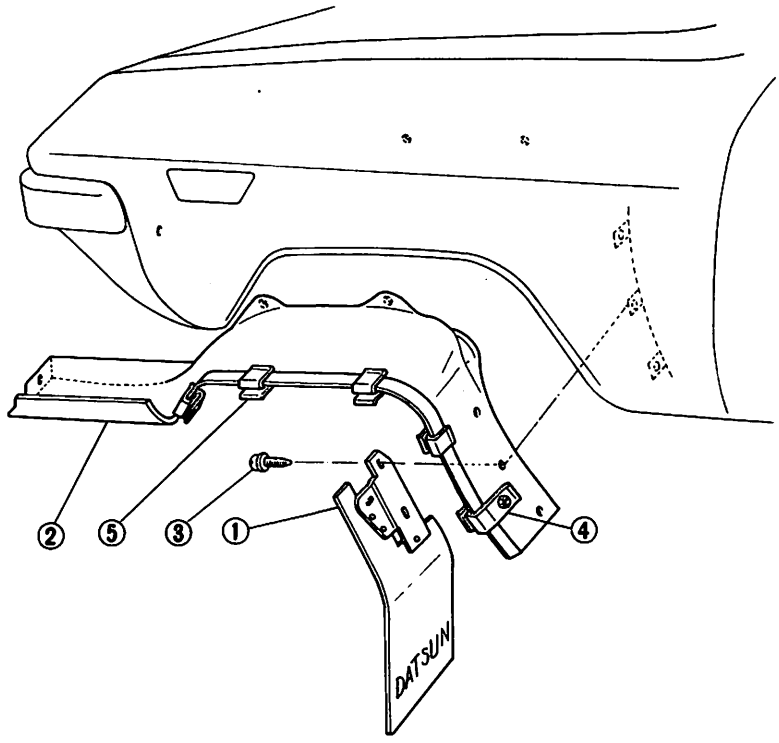
1 Hood molding
2 Hood
3 Front fender molding
4 End cover
5 Front fender
6 Cowl top grille
7 Windshield molding (Lower)
8 Windshield molding (Upper) and rear window molding (Upper and side)
9 Roof drip molding
10 Roof panel
11 Body side retainer
12 Rivet
13 Side window molding
14 Butyl tape (I portion only)
15 Clip
16 Door outside molding
17 Body sill molding
18 Nut
19 Windshield pillar molding
20 Butyl tape adhesion (F portion only)
21 Side rail
22 Body side retainer
23 Rear window molding (Lower)
24 Trunk lid panel
25 Rear fender molding
26 Both-sided adhesive tape
27 Rear upper finisher molding
28 Trunk lid panel
29 Trunk lid molding

BF122B

Fig. BF-77 Molding

SPLASH GUARD

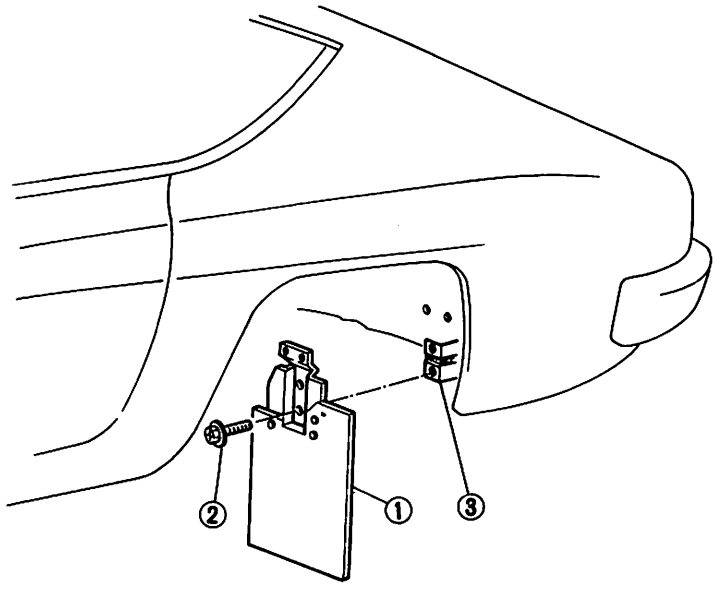
Front



1 Front splash guard assembly
2 Front wheel house protector
3 Tapping screw
4 Clip nut
5 Clip

BE785B

Rear

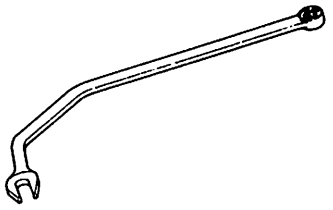
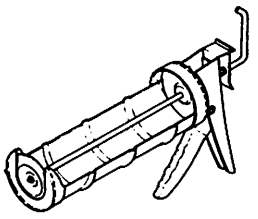
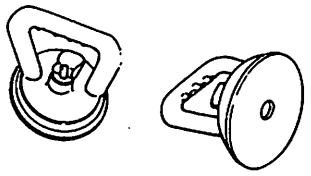


1 Rear splash guard assembly
2 Screw
3 Rear splash guard bracket

BE786B

Fig. BE-78 Splash guard

SPECIAL SERVICE TOOLS

Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.
ST08730000 Door hinge wrench 	—— / Fig. BF-30	ST08810000 Caulking hand gun 	—— / Fig. BF-61
ST08800000 Sucker 	—— / Fig. BF-63		

SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION BE

BODY ELECTRICAL SYSTEM

BODY ELECTRICAL WIRING ..... BE- 2
LIGHTING AND SIGNAL LAMP SYSTEM BE-14
METERS AND GAUGES BE-37
WARNING SYSTEM BE-48
ELECTRIC ACCESSORY BE-57

BODY ELECTRICAL WIRING

CONTENTS

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WIRING HARNESS ..... BE- 3
COLORS OF CABLES ..... BE- 3
INSPECTION ..... BE- 5
MAINTENANCE ..... BE- 5
FUSE BLOCK AND FUSIBLE LINK ..... BE- 5
DESCRIPTION ..... BE- 5
MAINTENANCE INSTRUCTIONS ..... BE- 6
RELAY BRACKET ..... BE- 6
ELECTRICAL SYSTEM BLOCK DIAGRAM..... BE-13
FUSE BLOCK CIRCUIT SUPPLY ROUTING.... BE-13

DESCRIPTION

Cables used for body electrical wiring are low tension cables. They are covered with color-coded vinyl for easy identification. Each system (e.g. ignition, lighting, or signal system) has its own distinctive color. This facilitates trouble-shooting. In the wiring diagram, the colors are indicated by one or two alphabetical letters. Basic colors include standard and supplementary colors.

The entire wiring system consists of several harnesses connected one to another by means of connectors.

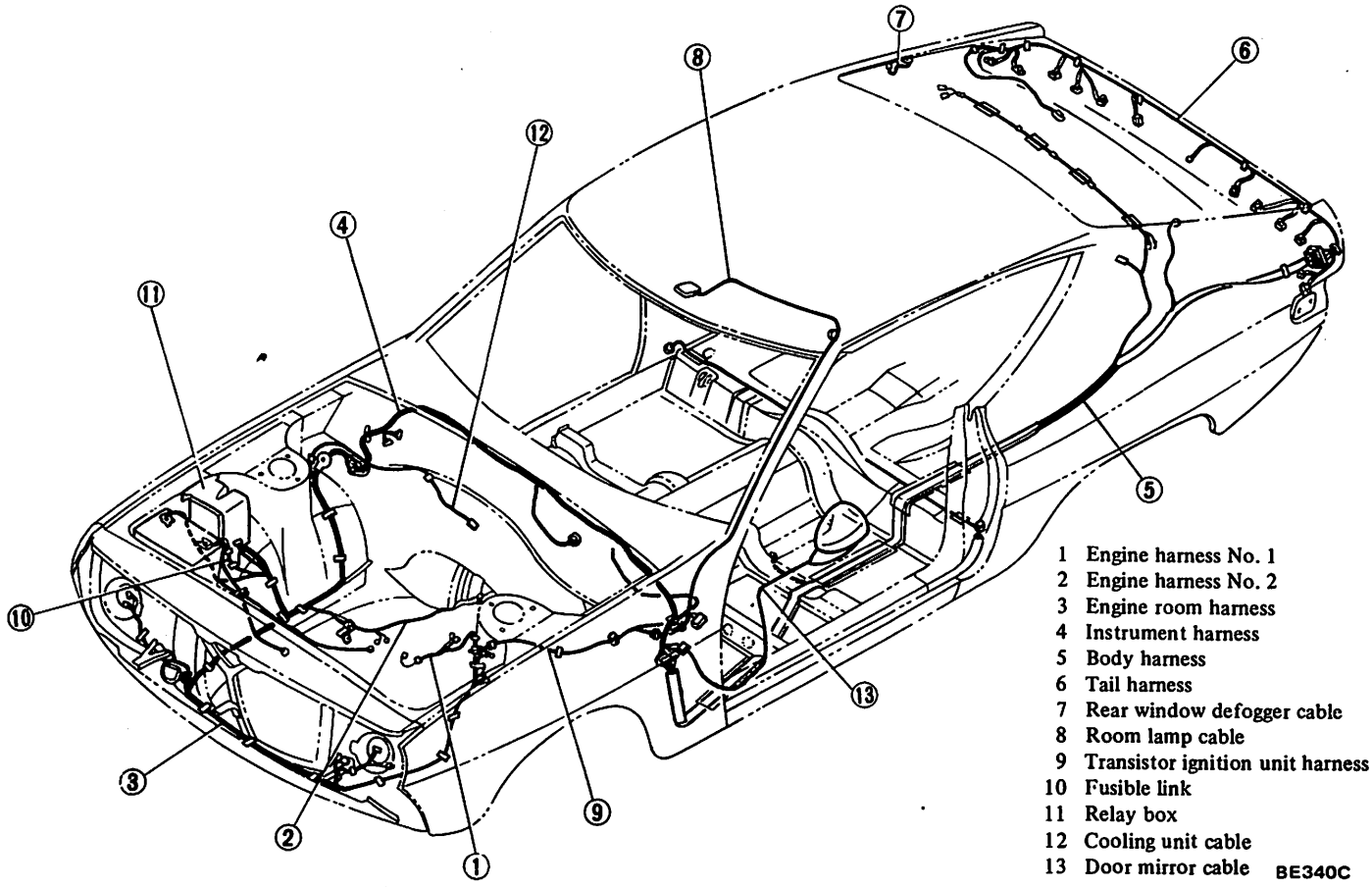
They are engine room harness, engine harnesses No. 1 and No. 2, instrument harness, body harness, tail harness, room lamp cable, battery cable, hand brake switch cable, clock cable, console box cable, rear defogger, heat glass cable, cooler cable, door mirror cable and transistor ignition unit harness.

It is recommended that the battery is disconnected before performing any electrical service other than bulb or fuse replacement. To protect the electrical devices, fuses are installed in the middle of circuit.

In addition to fuses, a fusible link is installed to protect wiring. Fusible link functions almost the same as fuse, though its characteristics are slightly different from normal fuses.

On all models, the ignition system circuit has been separated from other electrical circuits to prevent misfiring under heavy loads that may cause an abnormally high temperature in the exhaust system.

For transistor ignition unit harness, refer to Section EE in detail.



1 Engine harness No. 1
2 Engine harness No. 2
3 Engine room harness
4 Instrument harness
5 Body harness
6 Tail harness
7 Rear window defogger cable
8 Room lamp cable
9 Transistor ignition unit harness
10 Fusible link
11 Relay box
12 Cooling unit cable
13 Door mirror cable BE340C

Fig. BE-1 Wiring harness

WIRING HARNESS

COLORS OF CABLES

Cable colors are generally used as shown in the following table.

Circuit system	Standard color
Starting and ignition system	B (Black)
Charging system	W (White)
Lighting system	R (Red)
Signal system	G (Green)
Instrument system	Y (Yellow)
Others	L (Blue)
Grounding system	B (Black)

The main cable of each system is generally coded with a single color. These colors are represented by such letters as G, W, and Br. Minor items of each circuit's terminal are coded with a two-tone color as follows:

BW: Black with white stripe.
LgR: Light green with red stripe.

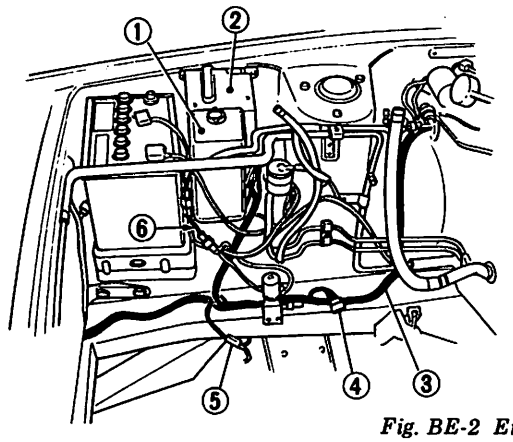
Engine room harness

The engine room harness is connected to the instrument harness with two connectors located under the right side of the instrument panel, and runs along the right side of the engine compartment, it is connected to engine harness No. 2 at the right side of the engine compartment, traverses the engine compartment along its front end and is connected to engine harness No. 1 at the left side of the engine compartment. See Figures BE-2 and BE-3 for details.

This harness services the cooling unit in the passenger compartment and condensers, wiper motor, cooler cable, washer motor, engine harness No. 2, fusible link, earth point, auto-choke relay, inhibitor relay, windshield wiper amplifier and alternator at the right side of the engine compartment.

It services the side marker lamps, head lamps, combination lamps and horns on the front end of the engine compartment.

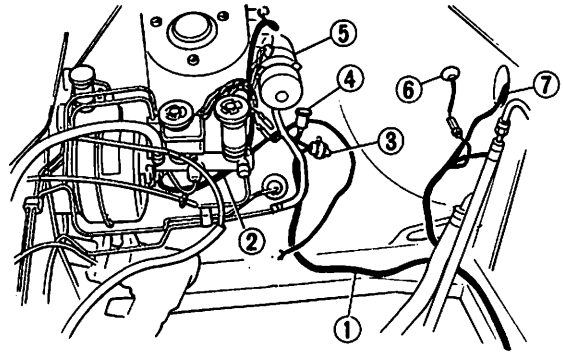
It also services the air conditioning compressor, function test connector, engine harness No. 1, distributor, ignition coil, condenser, brake fluid level warning switch at the left side of engine compartment.



1 Washer tank
2 Relay box
3 Engine room harness
4 To engine harness No. 2
5 To alternator
6 Fusible link

BE709B

Fig. BE-2 Engine room harness (R.H. side)



1 Engine room harness
2 Transistor ignition unit harness
3 Function test connector
4 To engine harness No. 1
5 Ignition coil
6 To side marker lamp
7 To headlamp

BE710B

Fig. BE-3 Engine room harness (L.H. side)

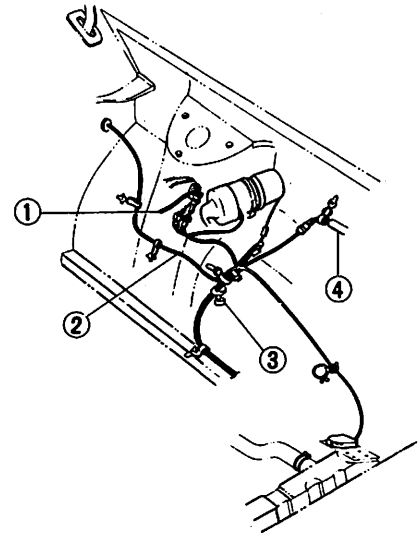
Engine harness No. 1

This harness is connected to the engine room harness at the left side of the engine compartment, and services the P.T.C. heater, run-on solenoid, B.C.D.D. solenoid (Non-California models), thermal transmitter and vacuum cut solenoid (M/T models).

Engine harness No. 2

This harness is connected to the engine room harness at the right side of the engine compartment.

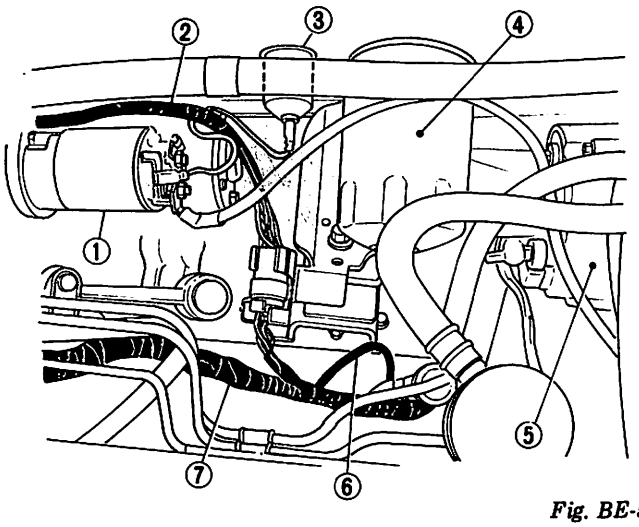
On automatic transmission models, it services the oil pressure switch, starter motor, kickdown solenoid and inhibitor switch. On manual transmission models, it services the oil pressure switch, starter motor, back-up lamp switch, top gear switch.



1 Engine harness No. 1
2 Transistor ignition unit harness
3 Function test connector
4 Engine room harness

BE341C

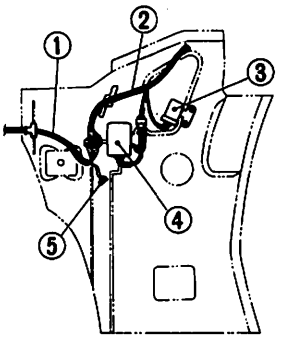
Fig. BE-4 Engine harness No. 1



1 Starter motor
2 Engine harness No. 2
3 Oil pressure switch
4 Oil filter
5 Alternator
6 To alternator
7 Engine room harness

BE511C

Fig. BE-5 Engine harness No. 2



1 Engine room harness
2 Instrument harness
3 Ignition relay
4 Seat belt warning timer unit
5 To cooling unit

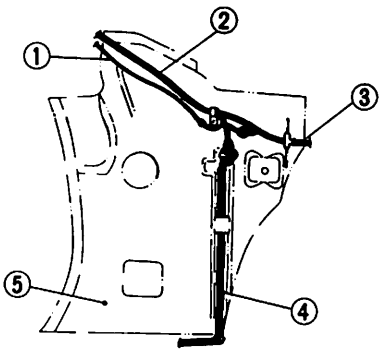
BE714B

Fig. BE-7 Instrument harness (R.H. side)

Instrument harness

The instrument harness is connected to the engine room harness with two connectors located under the right side of the instrument panel.

The room lamp cable is connected to the instrument harness under the left side of the instrument panel. The instrument harness crosses to the left side of the passenger compartment behind the cluster lid and services the seat belt warning timer, ignition relay, front speaker, horn relay, hazard unit, glove box illumination lamp, warning lamps (floor temp., seat belt, door and brake), fuse block, buzzer, lights "ON" warning relay, cigarette lighter, flasher unit, radio, stereo, rear electric defogger switch, hazard switch, clock cable, console box cable, hand brake cable, heater control, turn signal pilot lamps, wiper and washer switch, floor-temp sensor relay, tachometer, volt-temp gauge, oil-fuel gauge, kickdown switch (A/T models), ignition warning switch, turn signal and dimmer switch, illumination control switch, stop lamp switch, lighting switch, illumination lamp and door mirror cable and switch, and is connected to the body harness with two connectors, and to the transistor ignition harness and room lamp cable with a connector each under the left-hand side of the instrument panel. See Figures BE-6 and BE-7.



1 Room lamp cable
2 Instrument harness
3 To ignition coil
4 Body harness
5 Dash side panel (L.H.)

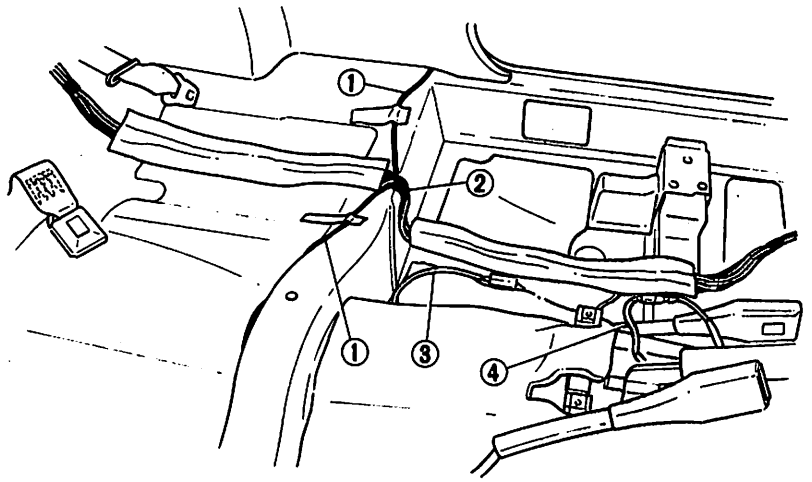
BE245D

Fig. BE-6 Instrument harness (L.H. side)

Body harness

Body harness is between instrument harness and tail harness. It is connected to instrument harness under the left side of instrument panel and to tail harness at trunk compartment.

This harness has six branches for driver's belt switch, door switches, fuel tank unit gauge, stereo speakers, rear electric defogger and luggage compartment lamp and switch, and is connected to tail harness with a connector. This harness runs along left side on floor, and is fixed with adhesive tape.

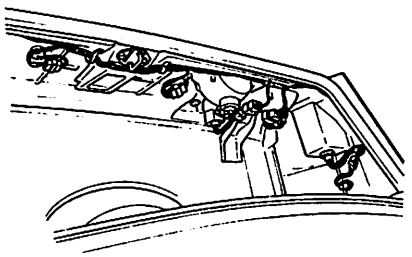


1 To door switch
2 Body harness
3 To driver's seat belt switch
4 To hand brake switch

BE715B
Fig. BE-8 Body harness

Tail harness

Tail harness is connected to body harness and runs along rear end of trunk compartment. It services rear side marker lamps, turn signal lamps, rear combination lamps, earth point and license plate lamps.



BE716B
Fig. BE-9 Tail harness

INSPECTION

Inspect all electrical circuits, referring to wiring or circuit diagrams. Circuits should be tested for continuous or short circuit with a conventional test lamp or low reading voltmeter. Before inspection of circuit, insure that:

1. Each electrical component part or cable is securely fastened to its connector or terminal.
2. Each connection is firmly in place and free from rust and dirt.
3. Each cable covering shows no evidence of cracks, deterioration or other damage.
4. Each terminal is kept away from any adjacent metal parts.
5. Each cable is fastened to its proper connector or terminal.
6. Each grounding bolt is planted firmly.
7. Wiring is kept away from any adjacent parts with sharp edges or parts (such as exhaust pipe) having high temperature.
8. Wiring is kept away from any rotating or working parts such as fan pulley, fan belt, etc.
9. Cables between fixed portions and moving equipment are long enough to withstand shocks and vibratory forces.

MAINTENANCE

Wire harness must be replaced if insulation becomes burned, cracked, or deteriorated. Whenever it is necessary to splice or repair a wire, be sure to use resin flux solder or electrical connections. Use insulating tape to cover all splices or bare wire. In replacing wire, correct size wire must be used. Never replace a wire with smaller one. Each harness and wire must be held securely in place with clips or other holding devices to avoid chafing or wearing away of insulation due to vibration.

Note:

a. **Before starting to inspect and repair any part of electrical system or other parts which may lead to a short circuit, disconnect cables at battery terminals as follows:**
Disconnect cable at negative (–) terminal, and then disconnect cable at positive (+) terminal.
Before connecting cables to battery terminals, be sure to clean terminals with a rag. Fasten cable at positive (+) terminal, and then ground cable at negative (–) terminal. Apply grease to the top of these terminals to prevent rust from developing on them.
b. **Never use a screwdriver or service tool to conduct a continuity test. Use test leads to conduct this check.**
c. **Never ground an open circuit or circuits under no load. Use a test lamp (12V-3W) or circuit tester as a load.**

FUSE BLOCK AND FUSIBLE LINK

DESCRIPTION

The fuse and fusible link are protective devices used in an electrical circuit. When current increases beyond rated amperage, fusible metal melts and the circuit is broken, thus protecting cable and electrical equipment from burning. Whenever fuse is melted for one reason or another, use systematic procedure to check and eliminate cause of malfunction before installing new fuse.

MAINTENANCE INSTRUCTIONS

Fuse

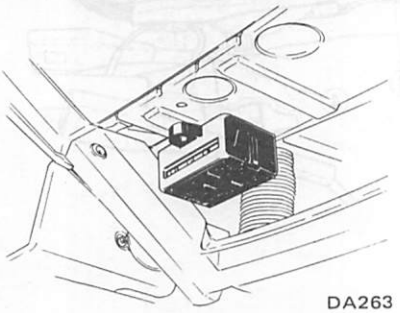
In nearly all cases, visual inspection can reveal faulty fuse. If condition of fuse is questionable, conduct a continuity test with a circuit tester or test lamp.

Note:

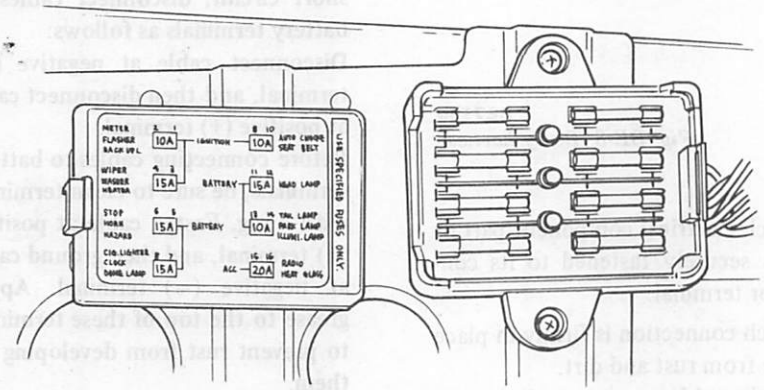
a. If fuse is blown, be sure to eliminate the cause before installing new fuse in position.

b. Use fuse of specified rating. Do not use fuse of more than specified rating. See Figure BE-10.

c. Check fuse holders for conditions. If much rust or dirt is found thereon, clean metal parts with fine-grained sandpaper until proper metal-to-metal contact is made.
Poor contact of any fuse holder will often lead to voltage drop or heating in the circuit and could result in improper operation of circuit.



DA263



BE717B

Fig. BE-10 Fuse block

Fusible link

Color	Size mm^2 (sq in)
Green	0.5 (0.0008)

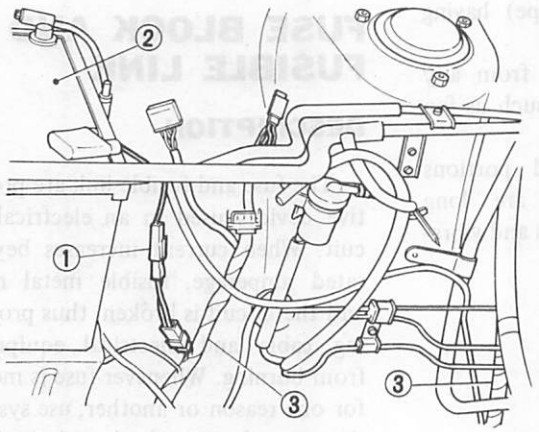
A melted fusible link can be detected either by visual inspection or by feeling with finger tip. If its condition is questionable, use circuit tester or test lamp, as required, to conduct continuity test. This continuity test can be performed in the same manner as for any conventional fuse.

CAUTION:

a. Under no circumstances should any larger fusible link than that specified be used.

b. Should melting of fusible link occur, it is possible that critical circuit (power supply or large current carrying circuit) is shorted. In such a case, carefully check and eliminate the cause of trouble.

c. Never wrap periphery of fusible link with vinyl tape. Extreme care should be taken with this link so that it does not come into contact with any other wiring harness or vinyl or rubber-parts.



1 Fusible link
2 Battery
3 Engine room harness

BE718B

Fig. BE-11 Fusible link

RELAY BRACKET

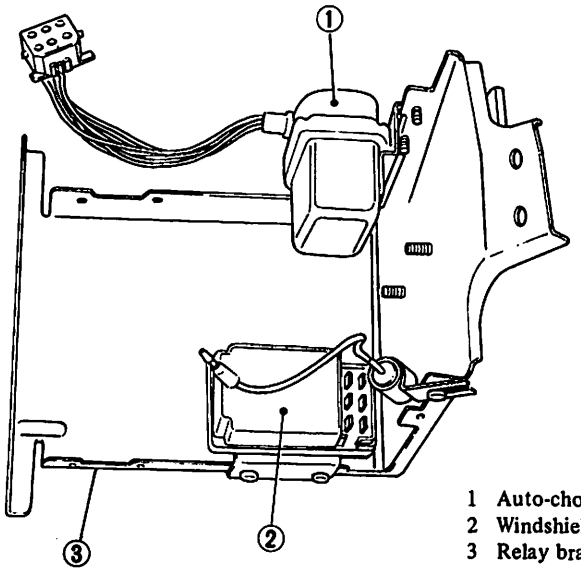
The relay bracket is so installed that a number of relays can be located in the same place for easy maintenance.

There are two relay brackets. One is installed on the hoodledge on the right side of the engine compartment, and the other behind the cluster lid in the instrument panel.

The following parts are attached to the relay bracket:

Engine compartment

1. Auto-choke relay
2. Condenser
3. Inhibitor relay (A/T models only)
4. Intermittent wiper amplifier

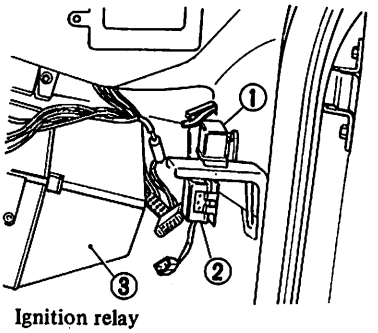


1 Auto-choke relay
2 Windshield wiper amplifier
3 Relay bracket

BE342C

Fig. BE-12 Relay bracket (M/T models)

The ignition relay and seat belt timer are located on the right side under the instrument panel.



1 Ignition relay
2 Seat belt warning timer unit
3 Cooling unit

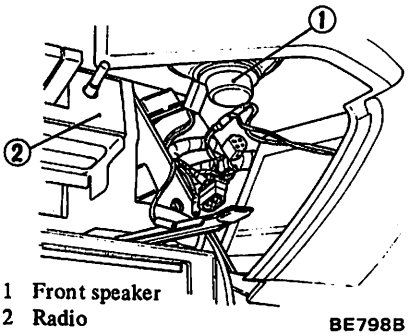
BE343C

Fig. BE-15 Ignition relay and seat belt timer

The turn signal flasher unit (relay) is located just beside the hazard flasher unit (relay) on the relay bracket shown below. For details, refer to Lighting and signal lamp system.

Inside instrument panel

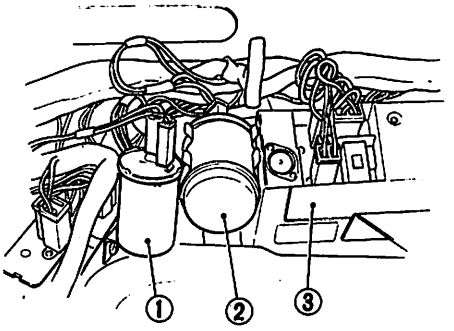
1. Warning buzzer "A" (intermittent) (for theft protection, seat belt and back-up warning) + timer (for U.S.A. only)
2. Horn relay
3. Lights "ON" warning relay
4. Hazard flasher unit
5. Warning buzzer "B" (continuous) (for lights "ON" warning)



1 Front speaker
2 Radio

BE798B

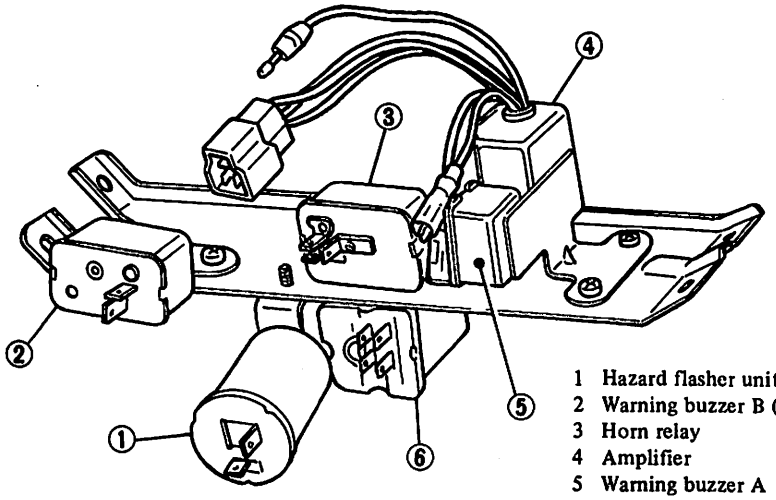
Fig. BE-13 Relay bracket



1 Flasher unit (hazard)
2 Flasher unit (turn signal)
3 Radio

BE802B

Fig. BE-16 Flasher units for hazard and turn signal (Rear view of instrument panel)

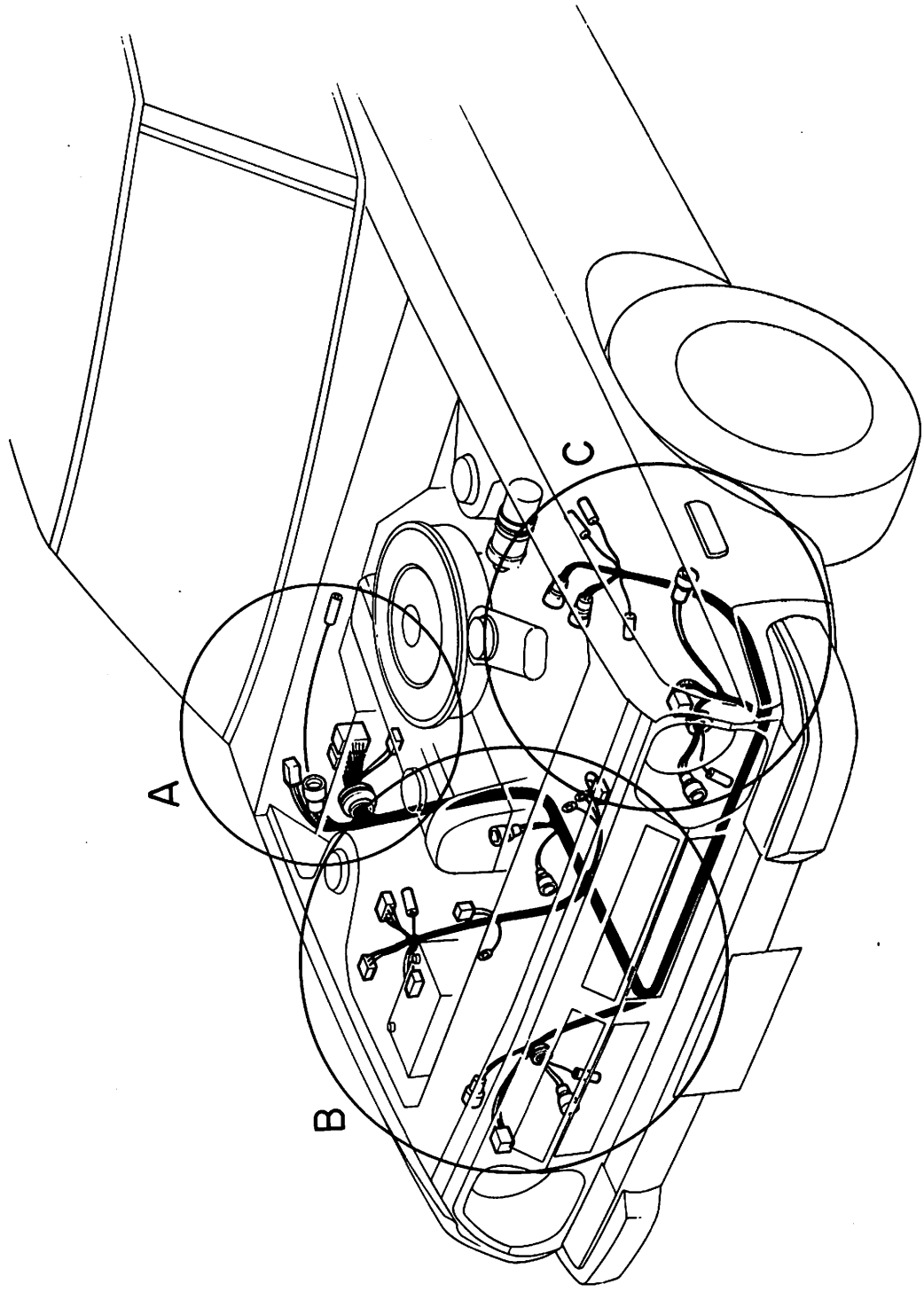


1 Hazard flasher unit
2 Warning buzzer B (continuous)
3 Horn relay
4 Amplifier
5 Warning buzzer A (intermittent)
6 Relay for warning buzzer B

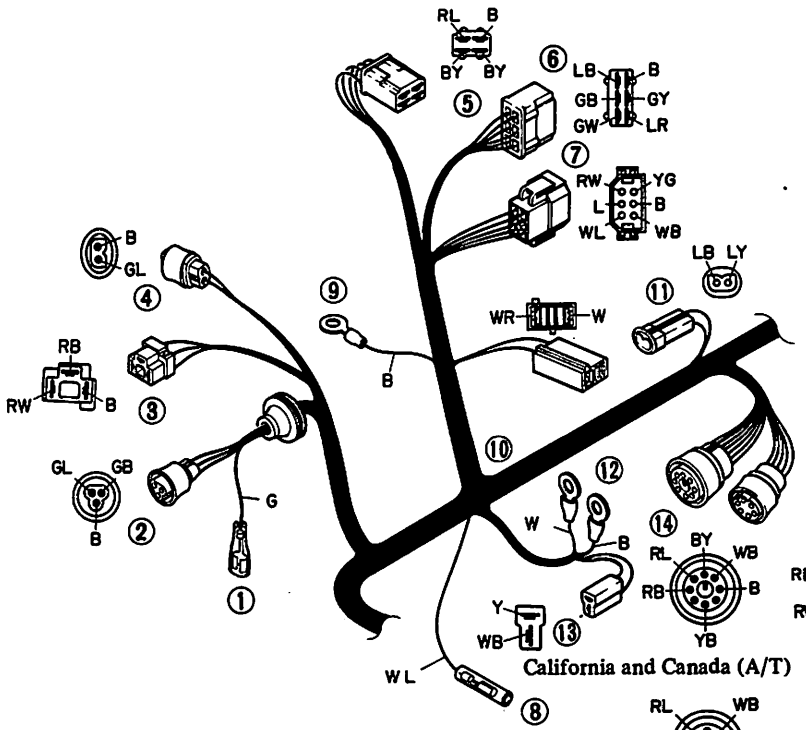
BE799B

Fig. BE-14 Relay bracket

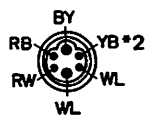
Engine compartment harnes



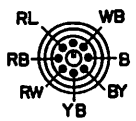
BE344C



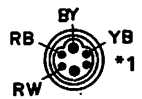
California and Canada (A/T)



U.S.A. (M/T)



Non-California and U.S.A. (A/T)

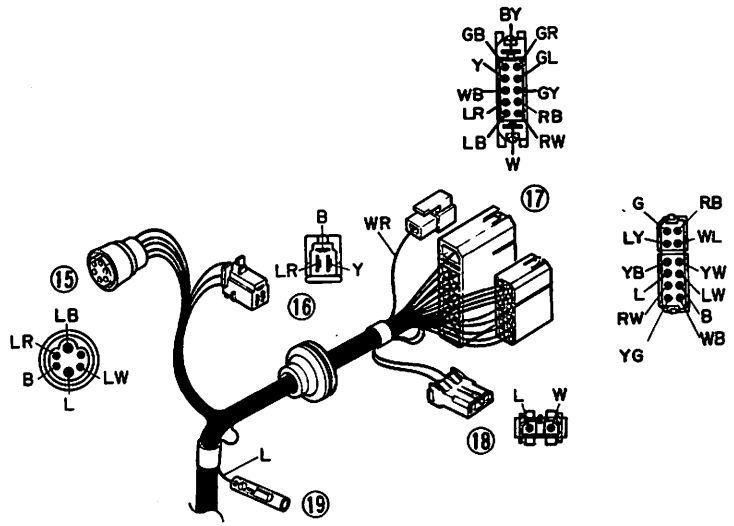


Canada (M/T)

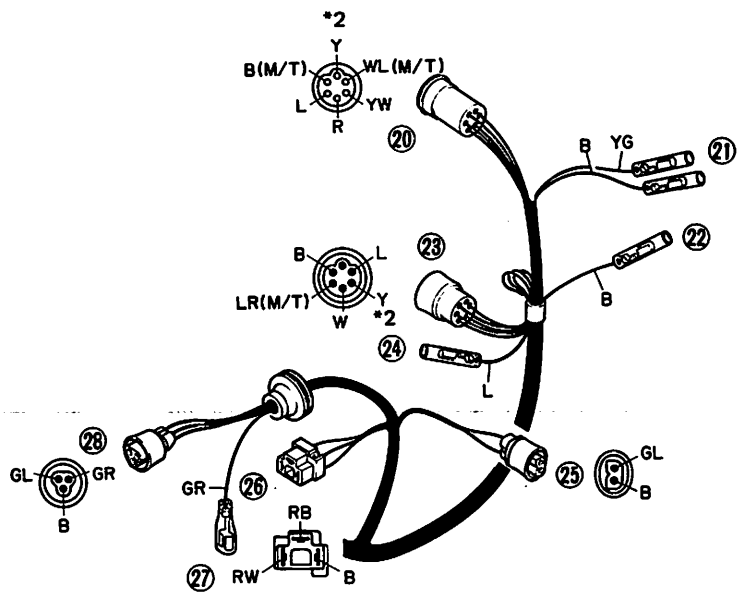
DETAIL "B"

1 To horn (R.H.)
2 To front combination lamp (R.H.)
3 To headlamp (R.H.)
4 To front side marker lamp (R.H.)
5 To inhibitor relay
6 To intermittent wiper amplifier
7 To auto-choke heater relay
8 To condenser "C"
9 To earth point
10 To fusible link (California models)
11 To washer motor
12 To alternator
13 To alternator
14 To engine harness No. 2
15 To wiper motor
16 To condenser "B"
17 To instrument harness
18 To cooling unit
19 To cooling unit cable
20 To engine harness No. 1
21 To brake level warning switch
22 To condenser "A"
23 To check connector
24 To compressor
25 To front side marker lamp (L.H.)
26 To headlamp (L.H.)
27 To horn (L.H.)
28 To front combination lamp (L.H.)

*1: Canada models
*2: U.S.A. models



DETAIL "A"

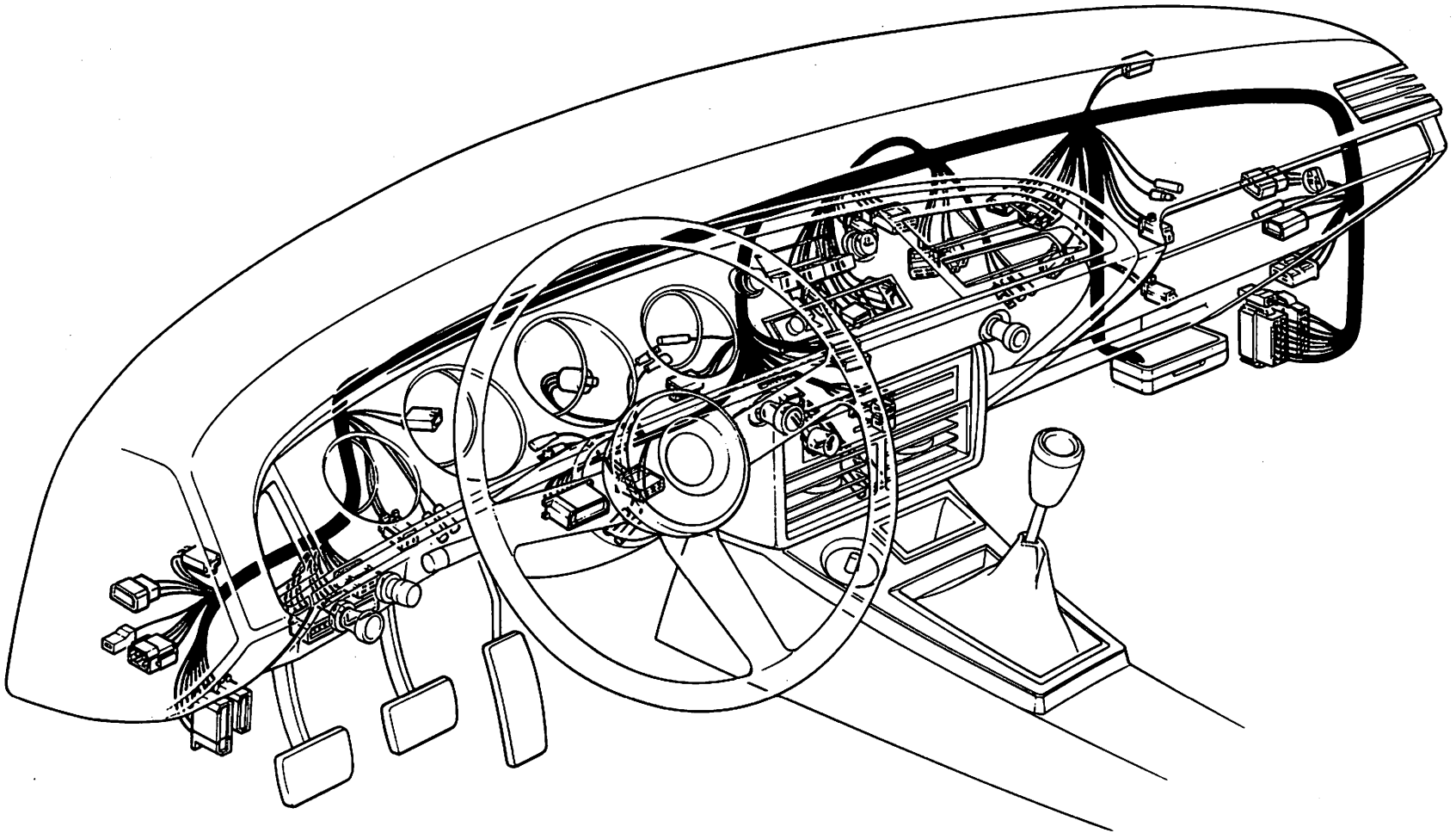


DETAIL "C"

BE345C

Fig. BE-17 Engine compartment harness

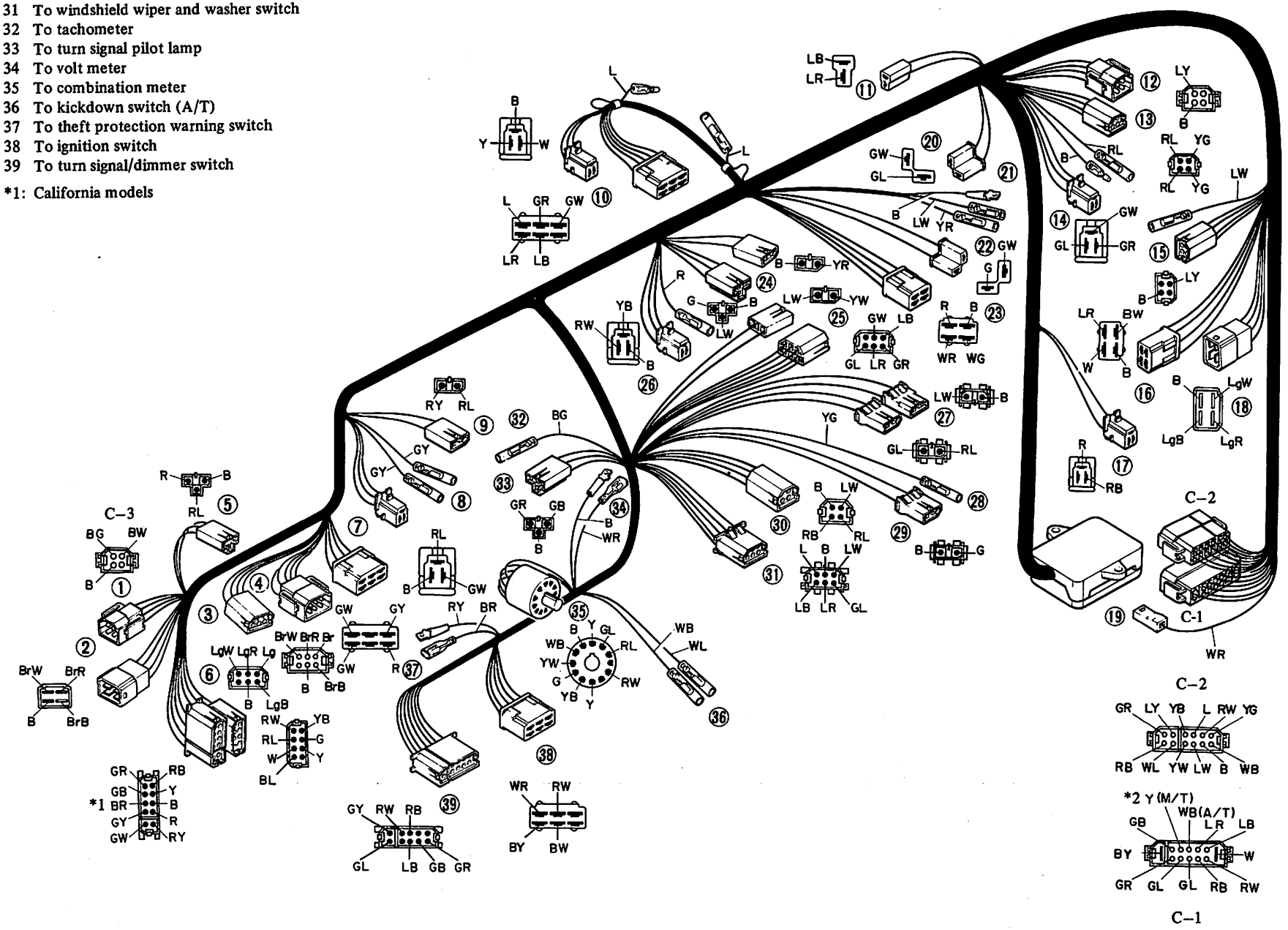
Instrument harness



1 To transistor ignition unit harness
2 To left door mirror cable
3 To right door mirror switch (Option)
4 To left door mirror switch
5 To room lamp cable
6 To body harness
7 To lighting switch
8 To stop lamp switch
9 To illumination lamp
10 To radio
11 To front speaker
12 To warning lamp
13 To glove box lamp
14 To horn relay
15 To belt warning timer
16 To ignition relay
17 To warning buzzer "B"
18 To right door mirror cable (Option)
19 To fuse block
20 To hazard unit
21 To cigarette lighter
22 To flasher unit
23 To lights "ON" warning relay
24 To rear window defogger switch
25 To hazard switch
26 To warning buzzer "A"
27 To heater unit
28 To hand brake switch
29 To console box cable (A/T)
30 To clock

31 To windshield wiper and washer switch
32 To tachometer
33 To turn signal pilot lamp
34 To volt meter
35 To combination meter
36 To kickdown switch (A/T)
37 To theft protection warning switch
38 To ignition switch
39 To turn signal/dimmer switch

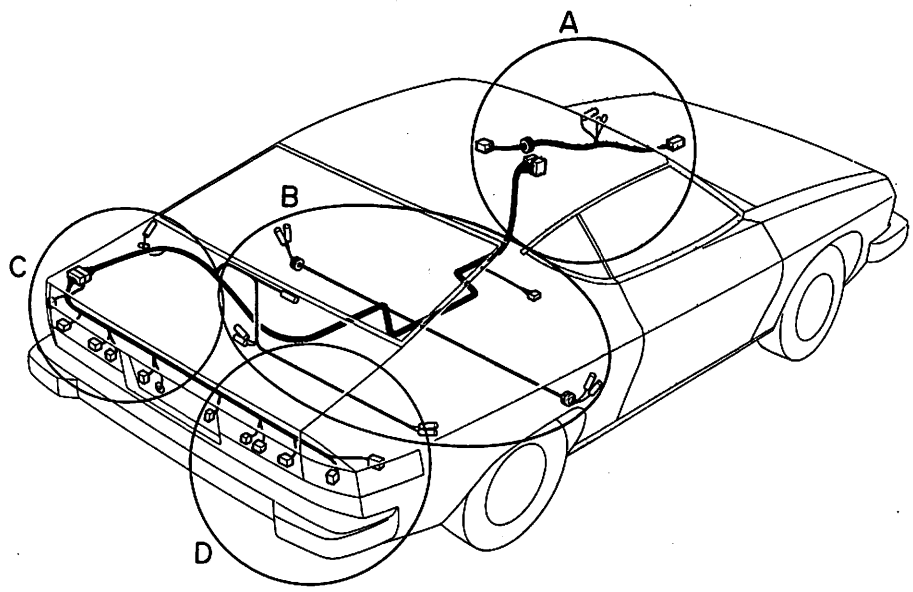
*1: California models



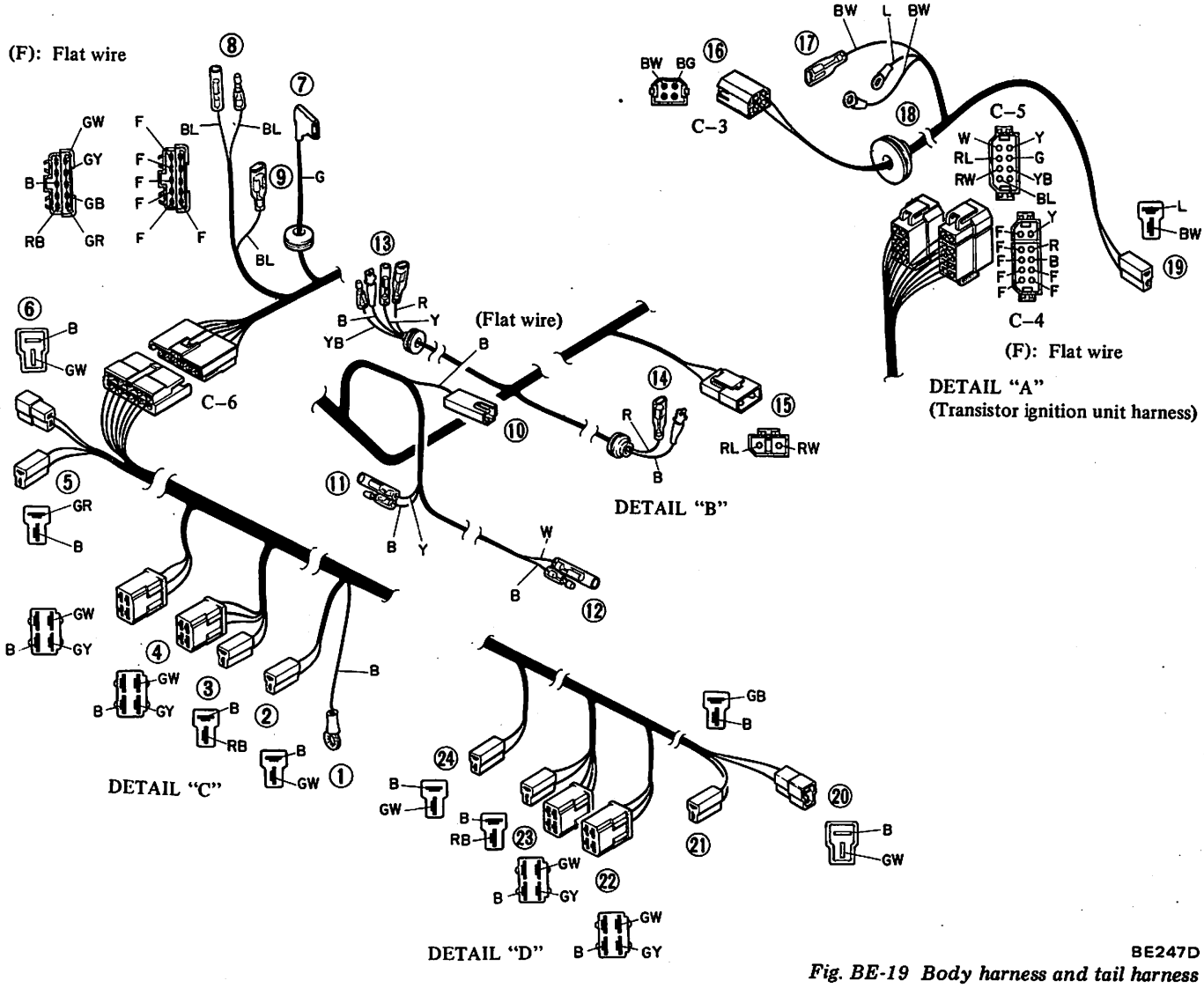
BE246D

Fig. BE-18 Instrument harness

Body harness and tail harness



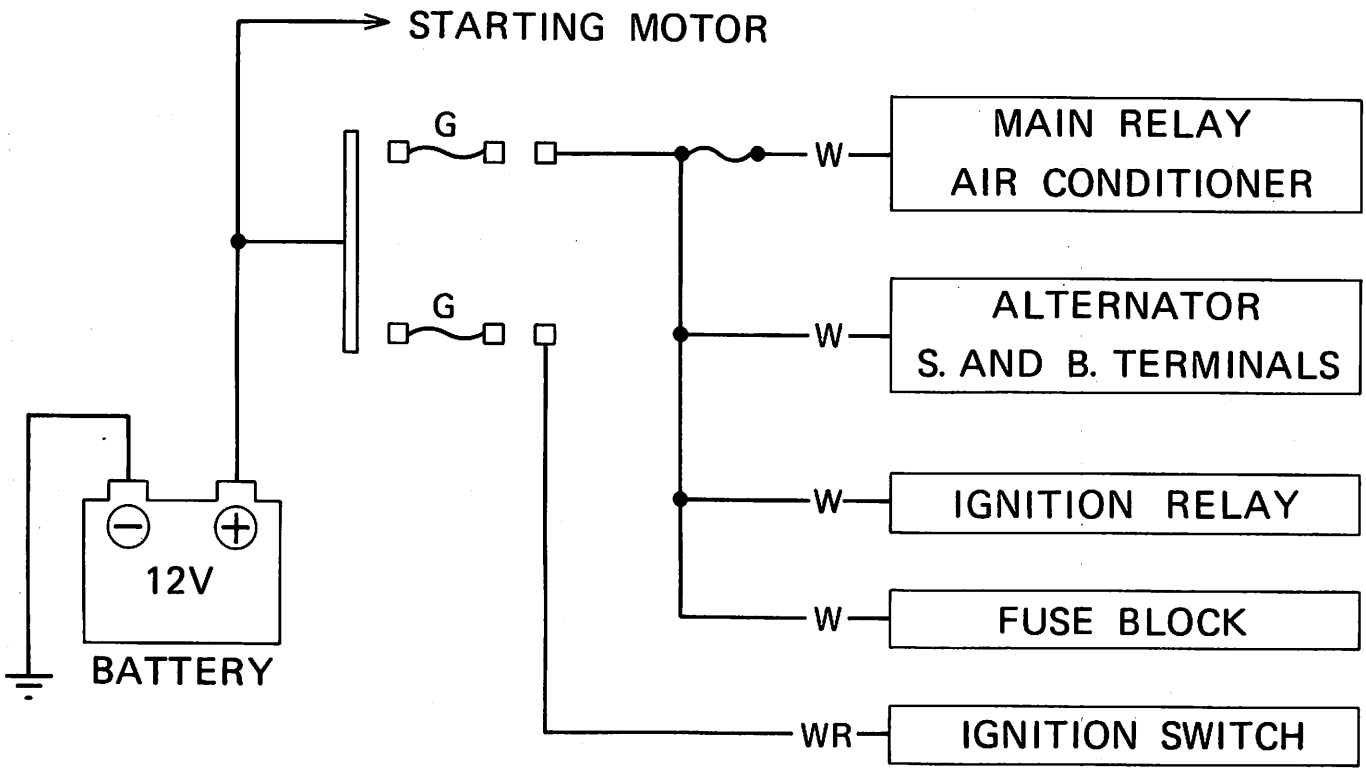
1 To earth point
2 To license plate lamp
3 To back-up lamp
4 To tail and stop lamp
5 To turn signal lamp (L.H.)
6 To rear side marker lamp
7 To rear window defogger
8 Luggage compartment lamp
9 Luggage compartment lamp switch
10 To fuel tank
11 To rear speaker (L.H.)
12 To rear speaker (R.H.)
13 To door switch (driver side)
14 To door switch (passenger side)
15 To seat belt switch
16 To instrument harness
17 To condenser
18 To ignition coil
19 To distributor
20 To rear side marker lamp (R.H.)
21 To turn signal lamp (R.H.)
22 To tail and stop lamp
23 To back-up lamp
24 To license plate lamp



BE247D

Fig. BE-19 Body harness and tail harness

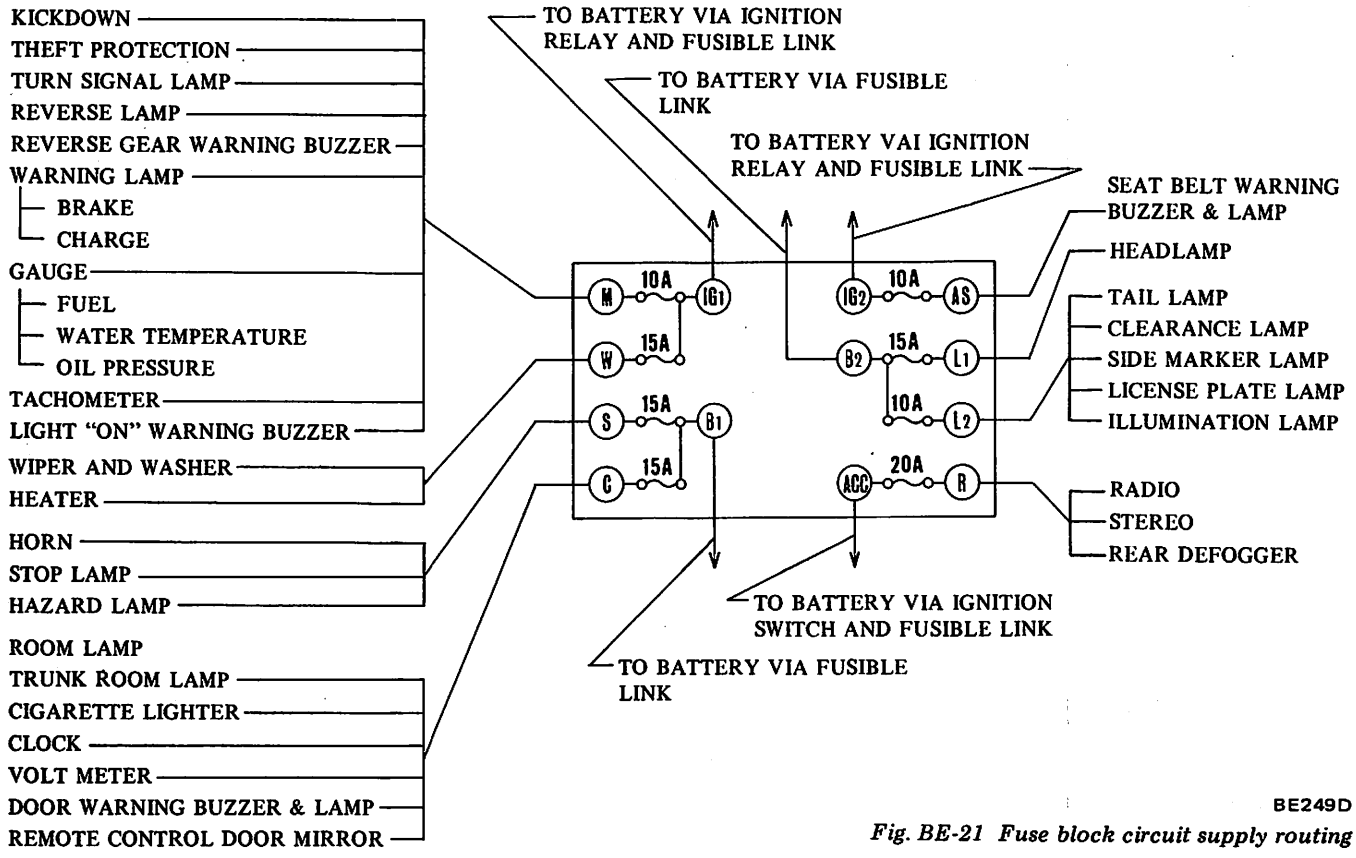
ELECTRICAL SYSTEM BLOCK DIAGRAM



BE248D

Fig. BE-20 Electrical system block diagram

FUSE BLOCK CIRCUIT SUPPLY ROUTING



BE249D

Fig. BE-21 Fuse block circuit supply routing

LIGHTING AND SIGNAL LAMP SYSTEM

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DESCRIPTION

Lighting and signal lamp system includes headlamps, front combination lamps, side marker lamps, room lamp, rear combination lamps, luggage compartment lamp, license plate lamp, back-up lamp, turn signal lamps and dimmer switch, lighting switch, meter illumination lamp and control switch, hazard switch and flasher units. Every lighting system is not independent. Some lead wires are co-used by several systems. Refer to following circuit diagrams for each system.

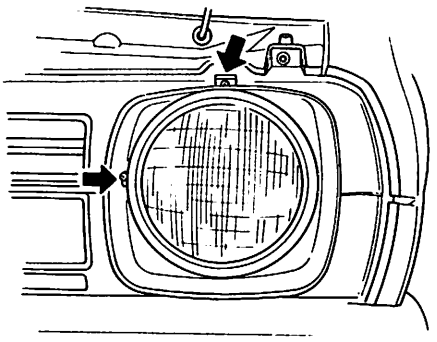
BULB SPECIFICATIONS

Item	Wattage	SAE trade number	Remarks
Headlamp Main/Dimmer	60W/50W	6014	Double filament
Front combination lamp Turn/Clearance	27W/8W	1157	Double filament
Side marker lamp Front Rear	8W 8W	67	
License plate lamp	8W x 2	67	
Rear combination lamp Turn Tail/Stop Tail/Stop	27W 8W/27W 8W/27W	1156 1157 1157	
Back-up lamp	27W	1156	
Room lamp	10W	–	
Luggage compartment lamp	3.4W	158	
Knob illumination lamp	3.4W	158	Wedge base type
Automatic transmission indicator lamp	3.4W	158	Wedge base type
Clock illumination lamp	3.4W	57X	
Radio illumination lamp	3.4W	158	
Hazard switch pilot lamp	1.4W	74	
Cigarette lighter illumination lamp	1.7W	53	
Ash tray illumination lamp	3.4W	158	
Rear defogger switch pilot lamp	1.4W	–	
Meter illumination lamp	3.4W	158	
Main beam indicator lamp	3.4W	158	
Turn signal pilot and warning lamp	3.4W	57X	
Charge warning lamp	3.4W	57X	
Seat belt warning lamp	3.4W	57X	
Heater control illumination lamp	3.4W	57X	
Brake warning lamp	3.4W	57X	

HEADLAMP

AIMING ADJUSTMENT

To adjust vertical aim, use adjusting screw on upper side of headlamp; and to adjust horizontal aim, use adjusting screw on side of headlamp.



BE806B

Fig. BE-22-1 Aiming Adjusting Screws

Note: Before making headlamp aiming adjustment, observe the following instructions.

a. Keep all tires inflated to correct pressures.

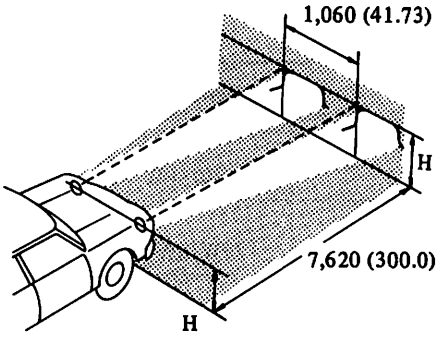
b. Place car and tester on one and same flat surface.

c. See that there is no load in car (coolant, engine oil filled up to correct level and full fuel tank) other than the driver (or equivalent weight placed in driver's position).

d. For details, refer to SAE J599d.

When performing headlamp aiming adjustment, use an aiming machine, aiming wall screen or headlamp tester. For operating instructions of any aimer, it should be in good repair, calibrated and used according to respective operation manuals supplied with the unit.

If any aimer is not available, aiming adjustment can be done as follows: Turn headlamp low beam on.



Unit: mm (in)

"H": Horizontal center line of headlamps

BE297D

Fig. BE-22-2 Aiming Adjustment

Note:

a. Adjust headlamps so that upper edge of hot spot is equal in height to headlamp height and left edge of hot spot is equal in height to each center line of headlamps.

b. Dotted lines in illustration show center of headlamp.

HEADLAMP BEAM REPLACEMENT

1. Remove screws retaining radiator grille to body and remove radiator grille.

2. Remove headlamp retaining ring by loosening three screws. Retaining ring can be taken out by rotating it counterclockwise.

Note: Be careful not to disturb aiming adjust screws.

3. After removing headlamp beam from mounting ring, disconnect lead wires at connector.

Note: Rubber cover is installed at back of headlamp beam. The connector is located in the cover.

4. Change headlamp beam and connect wiring connector to new beam. Remember to install rubber cover on installed connector.

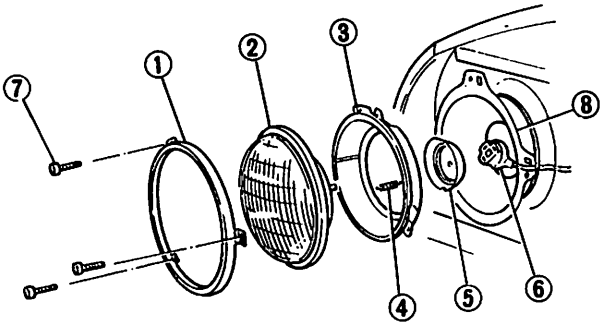
5. Place headlamp beam in position so that three location tabs behind beam fit in with three hollows on mounting ring. Make sure that the word "Top" on beam lens is on the upper side.

6. Install headlamp retaining ring by rotating clockwise and tighten retaining screws.

7. Place radiator grille in position and tighten retaining screws.

Bulb wattage:

Headlamp (Main/Dimmer) 60W/50W



1 Retaining ring
2 Sealed beam
3 Mounting ring
4 Expansion spring
5 Rubber protector
6 Socket
7 Adjusting screw
8 Headlamp housing

BE808B

Fig. BE-23 Headlamp

FRONT COMBINATION LAMP

BULB REPLACEMENT

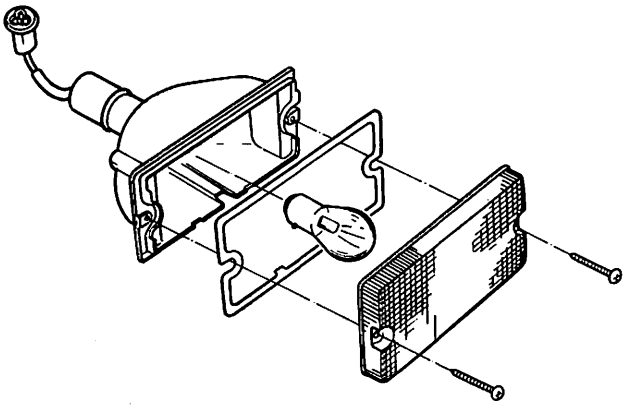
1. Remove two screws retaining lens to lamp body. Lens can then be taken out.
2. Push in on bulb, turn it counter-clockwise and remove it from socket.
3. Insert new bulb into socket, press it inward and rotate it clockwise. Make sure that bulb is locked in socket.
4. Replace lens and fix lens with two retaining screws.

Bulb wattage:
Turn signal/Clearance 27W/8W

LAMP ASSEMBLY REPLACEMENT

1. Remove two screws retaining lamp body to radiator grille.
2. Disconnect lead wires for front combination lamp at connector.
3. Replace lamp body assembly.

Installation is in the reverse sequence of removal.



BE809B

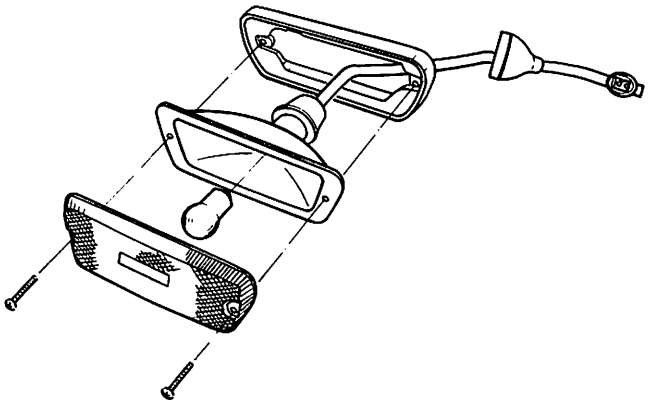
Fig. BE-24 Front combination lamp

FRONT SIDE MARKER LAMP

BULB REPLACEMENT

1. Remove two lens retaining screws.
2. Remove lens from lamp body.
3. Push in on bulb, twist it counter-clockwise and remove from socket.
4. Insert new bulb into socket, press it inward and rotate it clockwise. Make sure that bulb is locked in socket.
5. Install lens in the reverse order of removal.

Bulb wattage:
Front side marker lamp 8W



BE810B

Fig. BE-25 Front side marker lamp

CAUTION:
Be careful not to smear front side marker lamp lens with organic solvent such as gasoline or thinner, otherwise lens can be cracked.

LAMP BODY REPLACEMENT

1. Disconnect lead wire at a connector in engine compartment.
2. Remove two lens retaining screws.
3. Take out lamp body assembly with a grommet.
4. Install new lamp body assembly in the reverse sequence of removal.

ROOM LAMP

BULB REPLACEMENT

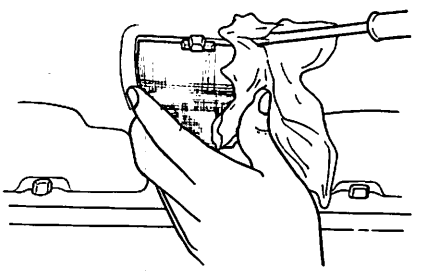
Lens can be removed by prying off lamp body with a screwdriver.

1. Disconnect battery ground cable.
2. Prying off with a screwdriver, remove lamp body from ceiling.

CAUTION:
Be careful not to damage lens or ceiling vinyl by scratching with a screwdriver. Rag is useful to protect it.

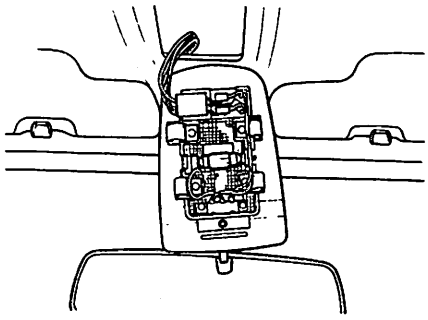
3. Replace bulb and install lamp body in the reverse order of removal.

Bulb wattage:
Room lamp 10W



BE811B

Fig. BE-26 Prying off lamp body



BE812B

Fig. BE-27 Replacing bulb

LAMP BODY REPLACEMENT

1. Disconnect battery ground cable.
2. Remove lamp body by following above directions. (Bulb Replacement)
3. Disconnect room lamp wire at connector.
4. Install lamp body in the reverse sequence of removal.

LUGGAGE COMPARTMENT LAMP

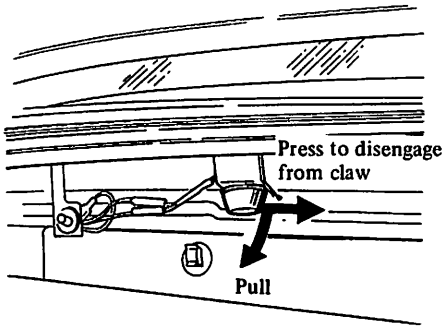
BULB REPLACEMENT

Lens can be removed by pressing it by hand in side direction shown in Figure BE-28 and pulling it downward.

1. Disconnect battery ground cable.
2. Pry bulb off by hand.
3. Replace bulb and install lens in the reverse order of removal.

Bulb wattage:

Luggage compartment lamp 3.4W

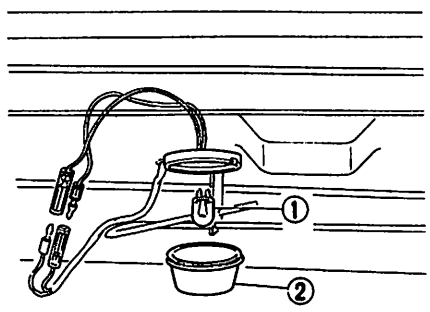


BB030

Fig. BE-28 Bulb replacement

LAMP BODY REPLACEMENT

1. Disconnect battery ground cable.
2. Remove lens.
3. Disconnect luggage compartment lamp wire at connector.
4. Lamp body can be removed by pulling on lamp body and disengaging pawl from bracket.
5. Install lamp body in the reverse order of removal.



1 Bulb
2 Lens

BE481C

Fig. BE-29 Lamp body replacement

REAR COMBINATION LAMP

BULB REPLACEMENT

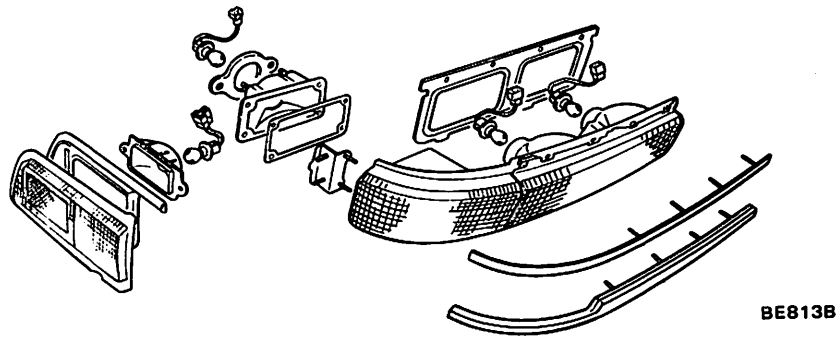
1. From inside trunk, turn bulb socket counterclockwise and remove from lamp body.
2. Push in on bulb, turn it counterclockwise and remove from socket.
3. Insert new bulb into socket, making sure that lock pins at base of bulb are in position. Press bulb inward, rotate it clockwise and lock it in socket.

Bulb wattage:

Turn signal lamp 27W
Tail/Stop lamp 8W/27W
Tail/Stop lamp 8W/27W

LAMP BODY REPLACEMENT

1. From inside trunk, loosen screws retaining finishers to the body (front, rear and side finishers) and remove them.
2. Disconnect wiring harness at connectors.
3. Remove flange nuts retaining lamp body assembly.
4. Take out lamp body assembly.
5. Install new lamp body assembly in the reverse sequence of removal.



BE813B

Fig. BE-30 Rear combination lamp

LICENCE PLATE LAMP

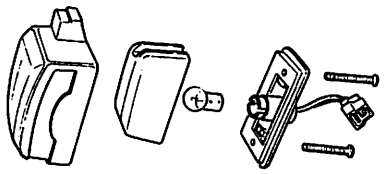
BULB REPLACEMENT

1. From inside trunk compartment, push in on bulb and turn it counterclockwise. Bulb socket assembly can be taken out from lamp body.
2. Insert new bulb into socket, press it inward and rotate it clockwise, making sure that bulb is locked in socket.
3. Install socket to lamp body.

LAMP BODY REPLACEMENT

1. Disconnect lead wire for license plate lamp at connector.
2. Remove two nuts retaining license plate lamp to body.

3. Take out license plate lamp assembly.
4. Installation is in the reverse sequence of removal.



BE814B

Fig. BE-31 License plate lamp

BACK-UP LAMP

BULB REPLACEMENT

1. From inside trunk compartment, turn bulb socket counterclockwise and remove from socket.
2. Insert new bulb into socket, making sure that lock pin at base of bulb is in position. Press bulb inward, rotate it clockwise and lock it in socket.

LAMP BODY REPLACEMENT

1. Remove rear finisher from inside trunk compartment.
2. Remove two screws retaining back-up lamp to body and remove back-up lamp.
3. Install new lamp body in the reverse order of removal.

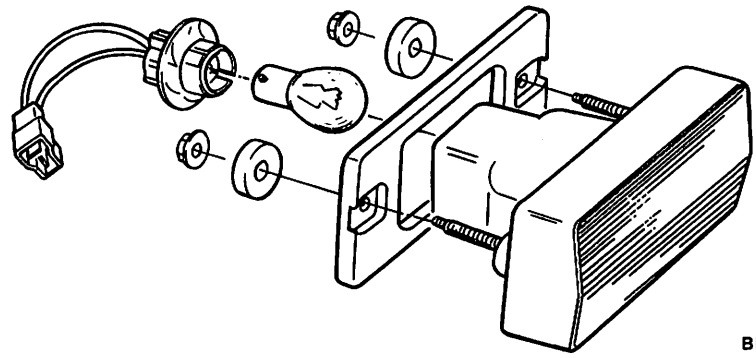
REAR SIDE MARKER LAMP

BULB REPLACEMENT

1. From inside trunk compartment, turn bulb socket counterclockwise and remove from socket.
2. Insert new bulb into socket, making sure that lock pin at base of bulb is in position. Press bulb inward, rotate it clockwise and lock it in socket.

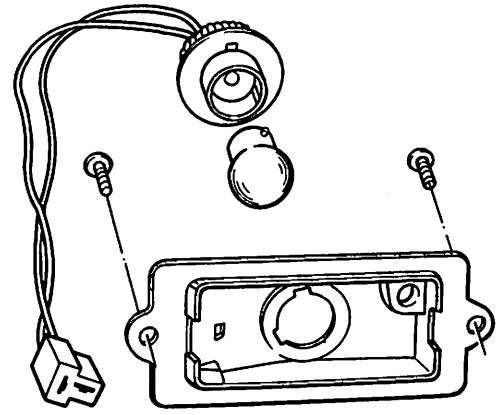
LAMP BODY REPLACEMENT

1. Disconnect lead wire at connector.
2. Remove side finisher by loosening four screws.



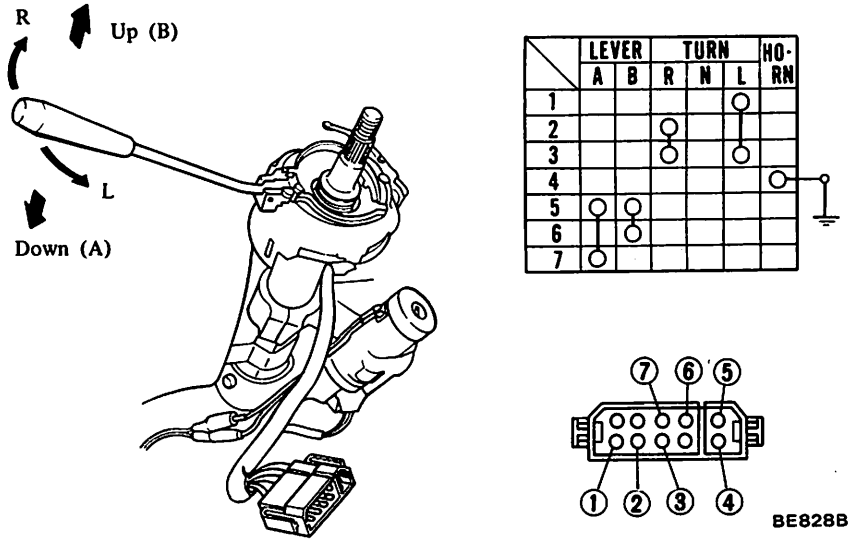
BE826B

Fig. BE-32 Back-up lamp



BE827B

Fig. BE-33 Rear side marker lamp



BE828B

Fig. BE-34 Turn signal and dimmer switch

3. Remove two screws and remove lamp body.
4. Install new lamp body in the reverse order of removal.

TURN SIGNAL AND DIMMER SWITCH

Turn signal switch operates as a lane change device. Position turn signal switch lever at the first stop position in the left or right direction when changing lanes. The turn signal lamps operate until the lever is released. Move the lever up and down to switch headlamp between main and dim.

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.

2. Remove steering wheel referring to Section ST for detailed instructions.
3. Remove four screws securing upper and lower shell covers to each other and take out shell covers.
4. Disconnect lead wires of turn signal switch at connector.
5. Loosen two screws holding switch assembly to steering column jacket and remove it.
6. Installation is in the reverse sequence of removal. Make sure that location tab of switch fits in the hole of steering column jacket.

INSPECTION

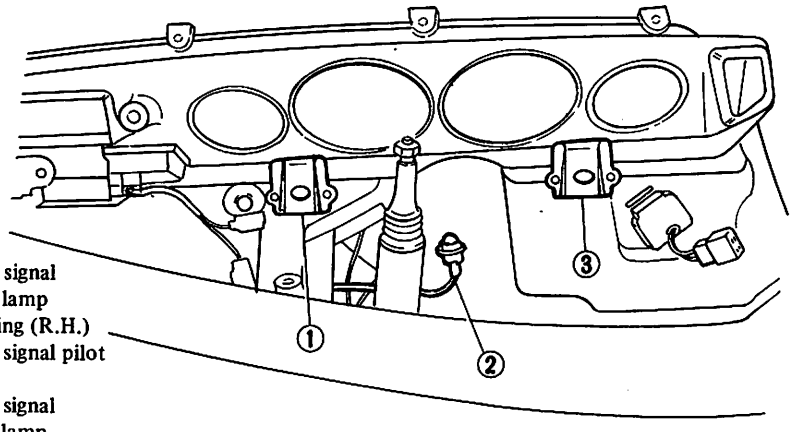
Test continuity through turn signal switch at each step by using test lamp or ohmmeter. The continuity diagram is shown in Figure BE-34.

TURN SIGNAL PILOT LAMP

BULB REPLACEMENT

1. Disconnect battery ground cable.
2. Reaching up from under instrument panel, pull out bulb with socket.
3. Push in bulb, turn it counterclockwise and replace with a new one.

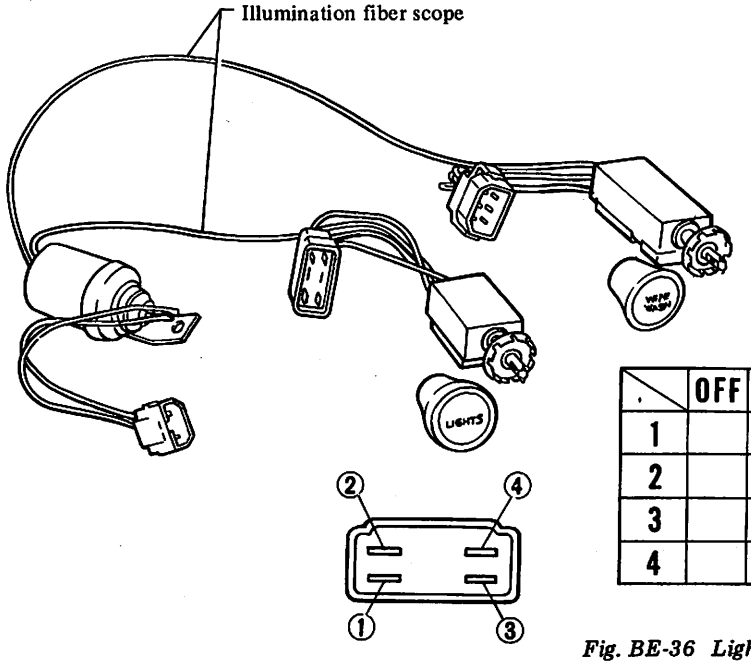
Bulb wattage:
Turn signal pilot lamp 3.4W



1 Turn signal pilot lamp housing (R.H.)
2 Turn signal pilot lamp
3 Turn signal pilot lamp housing (L.H.)

BE829B

Fig. BE-35 Turn signal pilot lamp



	OFF	1ST	2ND
1			○
2			○
3		○	○
4		○	○

BE830B

Fig. BE-36 Lighting switch

LIGHTING SWITCH

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Press switch knob in and turn it counterclockwise. Knob can be taken out.
3. Unscrew ring nut retaining switch assembly to instrument panel.
4. Reaching up from underneath instrument panel, disconnect lead wires of lighting switch at connector and remove switch body.
5. Installation is in the reverse sequence of removal.

INSPECTION

Test continuity through lighting switch by using test lamp or ohmmeter. Refer to the continuity diagram indicated in the following Figure BE-36.

FLASHER UNIT

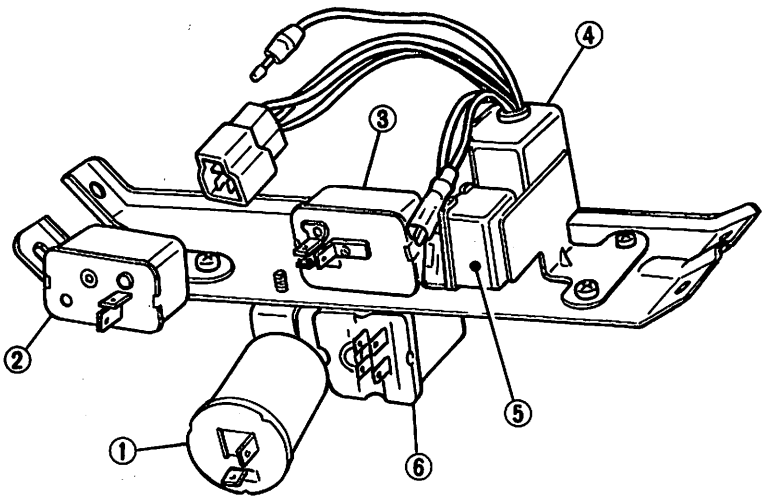
There are two flasher units. One is for turn signal and the other for hazard. They can be distinguished from each other by their shapes.

The larger one is for the turn signal; the smaller for hazard.

REMOVAL AND INSTALLATION

Flasher unit for hazard (Smaller)

1. Disconnect battery ground cable.
2. Remove glove box inner case from under instrument panel.
3. Loosen four screws retaining relay bracket to instrument panel.
4. Disconnect lead wires at connectors and take out relay bracket.
5. Remove flasher unit retaining screws and replace with a new one.
6. Installation is in the reverse order of removal.



1 Hazard flasher unit
2 Warning buzzer B (continuous)
3 Horn relay
4 Amplifier
5 Warning buzzer A (intermittent)
6 Relay for warning buzzer B

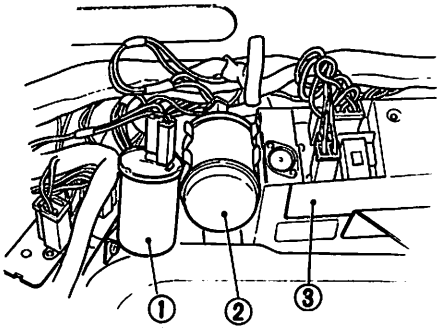
BE799B

Fig. BE-37 Flasher unit for hazard

Flasher unit for turn signal (Larger)

This unit is located on the instrument frame behind the radio receiver.

1. Disconnect battery ground cable.
2. Pull out ash tray.
3. Remove ash tray cover retaining screws and take out ash tray cover.
4. Remove flasher unit from spring bracket.
5. Disconnect lead wires at connector fitted at the bottom of unit.
6. Installation is in the reverse sequence of removal.



1 Flasher unit (hazard)
2 Flasher unit (turn signal)
3 Radio

BE802B

Fig. BE-38 Flasher unit for turn signal

DOOR SWITCH AND LUGGAGE LAMP SWITCH

REMOVAL AND INSTALLATION

Door switches are installed on each side of the bottom of the center pillar. They differ from each other. The left-hand switch has four lead wires and the right-hand switch has two lead wires.

The luggage lamp switch is installed on the bracket that is near the luggage compartment lamp as shown in Figure BE-28.

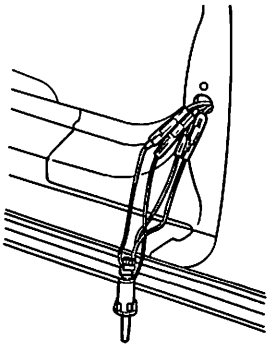
1. Disconnect battery ground cable.
2. Remove rubber grommet on switch at lower pillar. (Only door switch)
3. Withdraw switch and wire assembly and disconnect lead wires at connectors.
4. Installation is in the reverse sequence of removal.

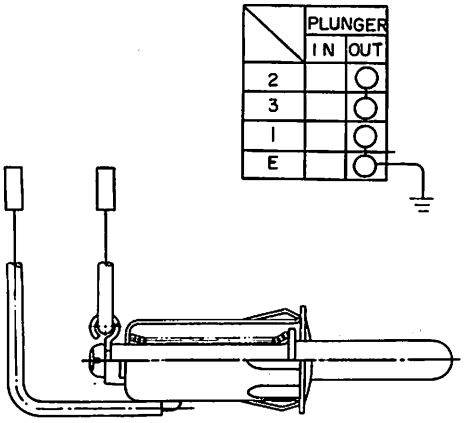
Note: In case switch is hard to pull out, pry off flange of switch with a screwdriver.

INSPECTION

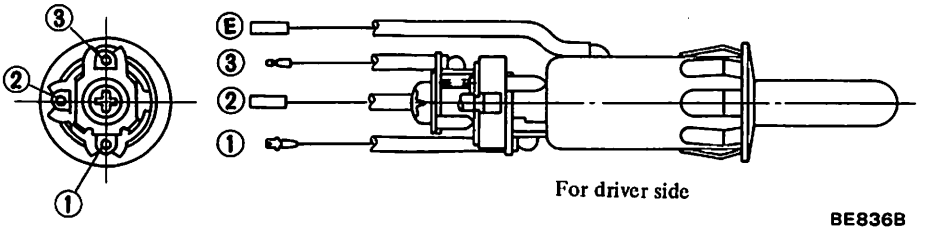
Inspect the continuity through door switch by using test lamp or ohmmeter.

When plunger is pressed into switch assembly, door switch contacts are open. Contacts are closed with plunger projected.





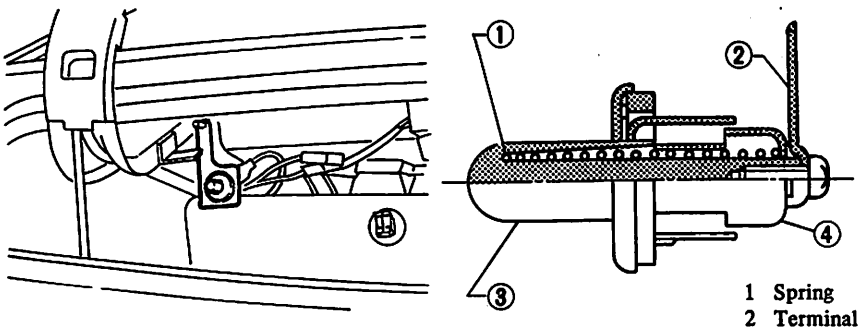
For passenger side



For driver side

BE836B

Fig. BE-39 Door switch



1 Spring
2 Terminal
3 Shaft
4 Case

BE351C

Fig. BE-40 Luggage lamp switch

STOP LAMP SWITCH

REMOVAL AND INSTALLATION

Stop lamp switch is integral part of brake pedal bracket.

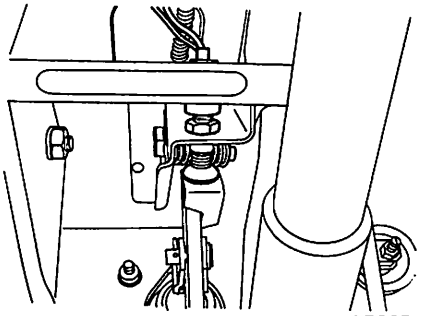
Whenever stop lamp switch is removed, some adjustment is required.

1. Disconnect lead wires at connectors.
2. Loosen lock nut. Switch assembly can be taken out by rotating switch.
3. Install in reverse sequence of removal.

INSPECTION

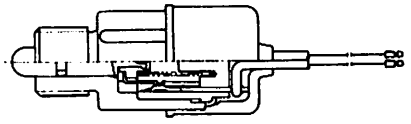
When plunger is pressed into switch assembly, stop lamp switch contacts are open, contacts are closed when plunger is projected.

Test continuity as previously described by using test lamp or ohmmeter.



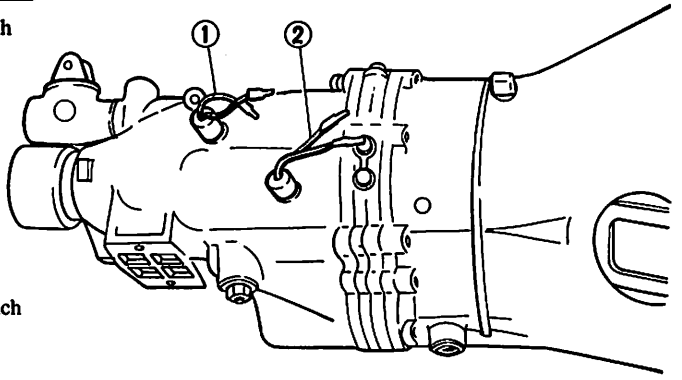
BE837B

Fig. BE-41 Stop lamp switch



Back-up lamp switch

BE813



1 Back-up lamp switch
2 Top switch

BE838B

Fig. BE-42 Back-up lamp switch

BACK-UP LAMP SWITCH

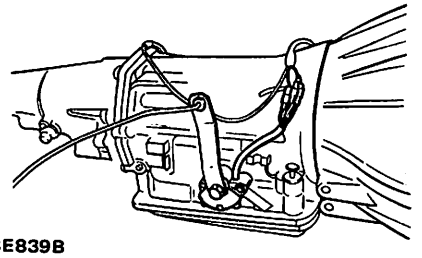
Back-up lamp switch is installed on transmission. On manual transmission, this switch is installed on rear extension.

On automatic transmission, the switch is an integral part of inhibitor switch. The harnesses of back-up lamp switch are RB (Red with black stripe).

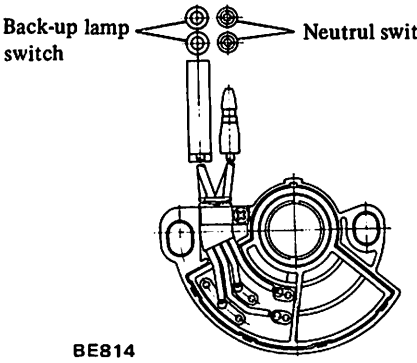
Removal and installation is described in Sections MT and AT.

INSPECTION

When the transmission lever or indicator is in R (Reverse) position, there must be continuity between these harnesses as shown below.



BE839B



BE814

Fig. BE-43 Inhibitor switch

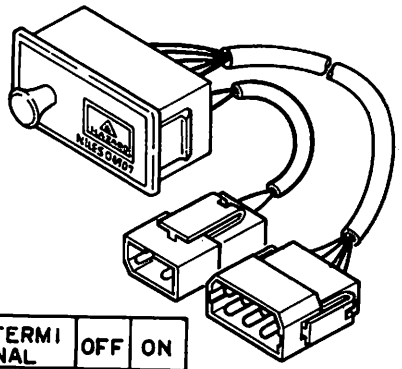
HAZARD SWITCH

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Pull out ash tray.
3. Remove ash tray cover retaining screws and take out ash tray cover.
4. From underneath the instrument panel, take off the hooks on the switch and push switch assembly out to the passenger compartment.

Note: The hazard switch body is held by spring pressure against the instrument panel.
In case of difficulty in removing, take it out with a standard screwdriver.

5. Disconnect lead wires at connector.
6. Install new switch in the reverse sequence of removal.



TERMINAL	OFF	ON
1		○
2		○
3		○
4	○	
5	○	

BE840B

Fig. BE-44 Hazard switch

INSPECTION

Test continuity through hazard switch by using test lamp or ohmmeter. See Figure BE-44.

IGNITION AND STARTING SWITCH

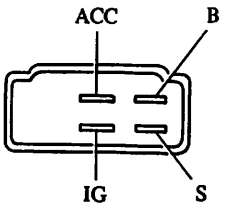
The ignition switch is installed on the bottom of the steering lock. For information on engine electrical system, refer to Section EE.

REMOVAL AND INSTALLATION

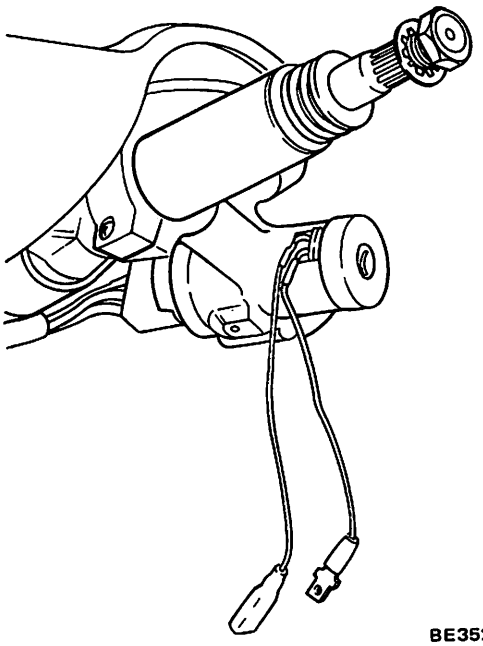
For removal and installation of ignition and steering switch, refer to Section ST.

INSPECTION

Test continuity through ignition switch at each step by using ohmmeter or test lamp. Refer to following continuity diagram.



	LOCK	OFF	ACC	ON	START
B			○	○	○
IG				○	○
S					○
ACC			○	○	



BE352C

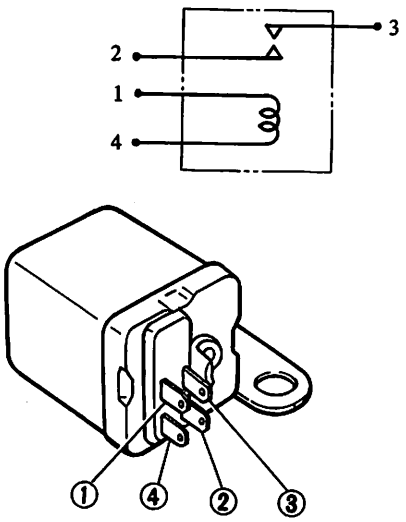
Fig. BE-45 Ignition switch

IGNITION RELAY

REMOVAL AND INSTALLATION

Ignition relay is attached to the right side of lower panel in passenger compartment.

1. Disconnect lead wire at connector.
2. Remove bolts securing relay to panel and remove relay.
3. Installation is in the reverse sequence of removal.



BE842B

Fig. BE-46 Ignition relay

INSPECTION

Test continuity through relay with an ohmmeter.

Under normal conditions continuity between (1)-(4) must exist. When 12V direct current is applied to (1)-(4) continuity between (2)-(3) must exist.

RHEOSTAT (Illumination control switch)

The illumination control switch is a rheostat (variable resistor) and controls the brightness of the illumination lamps of the speedometer, combination meter, tachometer, radio, hazard switch illumination, heater control illumination, clock, lighting switch knob and wiper switch knob.

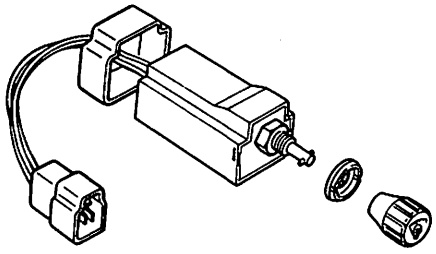
REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Push in switch knob, turn it counterclockwise and pull it out.
3. Unscrew retaining nut.
4. Reaching up from underneath instrument panel, disconnect lighting switch wiring connector at the back of switch.

5. Take out switch assembly from instrument panel.
6. Install new switch in the reverse order of removal.

INSPECTION

Test continuity between two lead wires by using test lamp or ohmmeter. When switch is in off position. Continuity must not exist.



BE843B

Fig. BE-47 Rheostat

WIPER SWITCH AND LIGHTING SWITCH KNOB ILLUMINATION LAMP

This lamp illuminates wiper switch knob and lighting switch knob by fiber scope. It is located under instrument panel.

The fiber scopes between knobs and cap of illumination lamp carry the light through their tubes with inner reflective wall.

BULB REPLACEMENT

1. Reach up from under instrument panel, twist bulb socket counterclockwise and remove with socket.
2. Install new bulb.
3. Installation is in the reverse sequence of removal.

Bulb wattage:

Knob illumination lamp 3.4W
(Wedge base type)

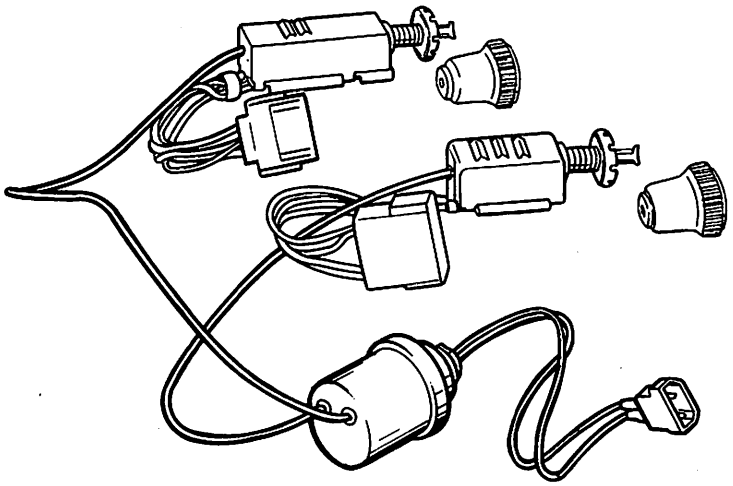
LAMP BODY REPLACEMENT

1. Disconnect lead wires for illumination lamp at connector from under instrument panel.
2. Remove screw retaining lamp body to instrument panel.
3. Installation is in the reverse sequence of removal.

METER ILLUMINATION LAMP REPLACEMENT

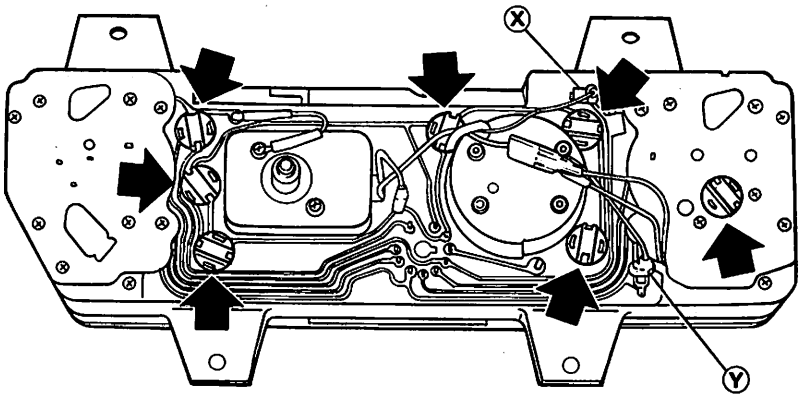
To replace bulbs, remove cluster lid and take out combination meter housing. (Refer to Meter and Gauge Replacement.) Turn bulb socket counterclockwise to dismount from combination meter and remove bulb from socket.

All lamps used in combination meter are 3.4W, wedge base type. Refer to the following Section Meter and Gauge.



BE844B

Fig. BE-48 Wiper switch and lighting switch knob illumination lamp



BE845B

Fig. BE-49 Meter illumination lamps

AUTOMATIC TRANSMISSION INDICATOR

The automatic transmission indicator lamp is located in the indicator finisher and illuminates the select lever indicator.

BULB REPLACEMENT

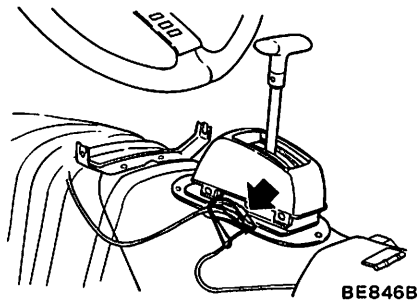
1. Remove console box. (Refer to Section BF.)
2. Remove automatic transmission indicator finisher. (Refer to Section AT.)
3. Remove socket with bulb from under indicator finisher.

4. Remove bulb from socket.
5. Install new bulb in the reverse sequence of removal.

Bulb wattage:
Automatic transmission indicator lamp 3.4W

INSPECTION

Test continuity through the system by using ohmmeter or test lamp.


BE846B

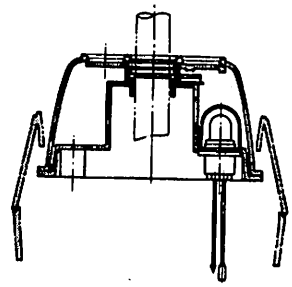

BE513

Fig. BE-50 Automatic transmission indicator lamp

GLOVE BOX LAMP

BULB REPLACEMENT

Bulb is installed at the bottom of lamp body. Pushing bulb into switch body, twist it counterclockwise. Installation is in the reverse order of removal.

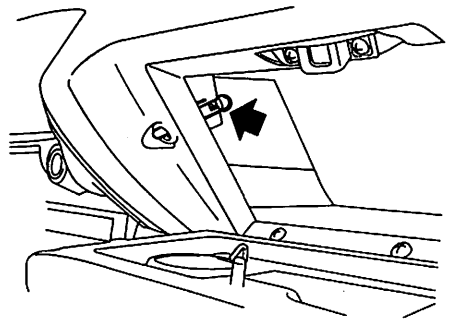
Bulb wattage:
Glove box lamp 3.4W

LAMP BODY REPLACEMENT

1. Disconnect battery ground cable.
2. Pull bulb from socket.
3. Installation is in the reverse order of removal.

INSPECTION

Test continuity between two lead wires. When plunger is pressed into lamp body, continuity must not exist.


BE847B

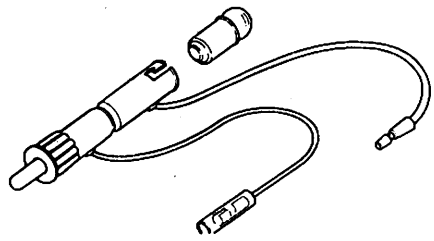

BE992

Fig. BE-51 Glove box lamp

CIGARETTE LIGHTER ILLUMINATION LAMP

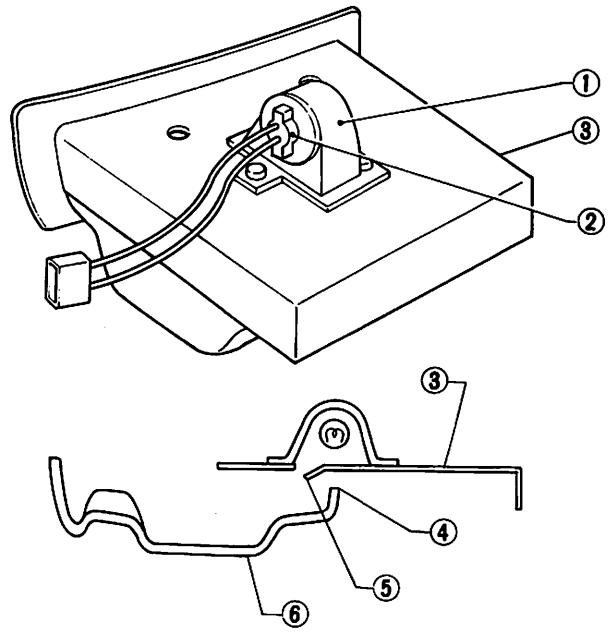
Refer to Electrical Accessory Section for bulb replacement.

ASH TRAY LAMP

BULB REPLACEMENT

1. Disconnect battery ground cable.
2. Remove ash tray outer case.
3. Disconnect ash tray lamp connector from instrument harness.
4. Remove socket with bulb from bulb case on back of outer case.
5. Remove bulb from socket.
6. Install new bulb in the reverse order of removal.

Bulb wattage:
Ash tray lamp 3.4W



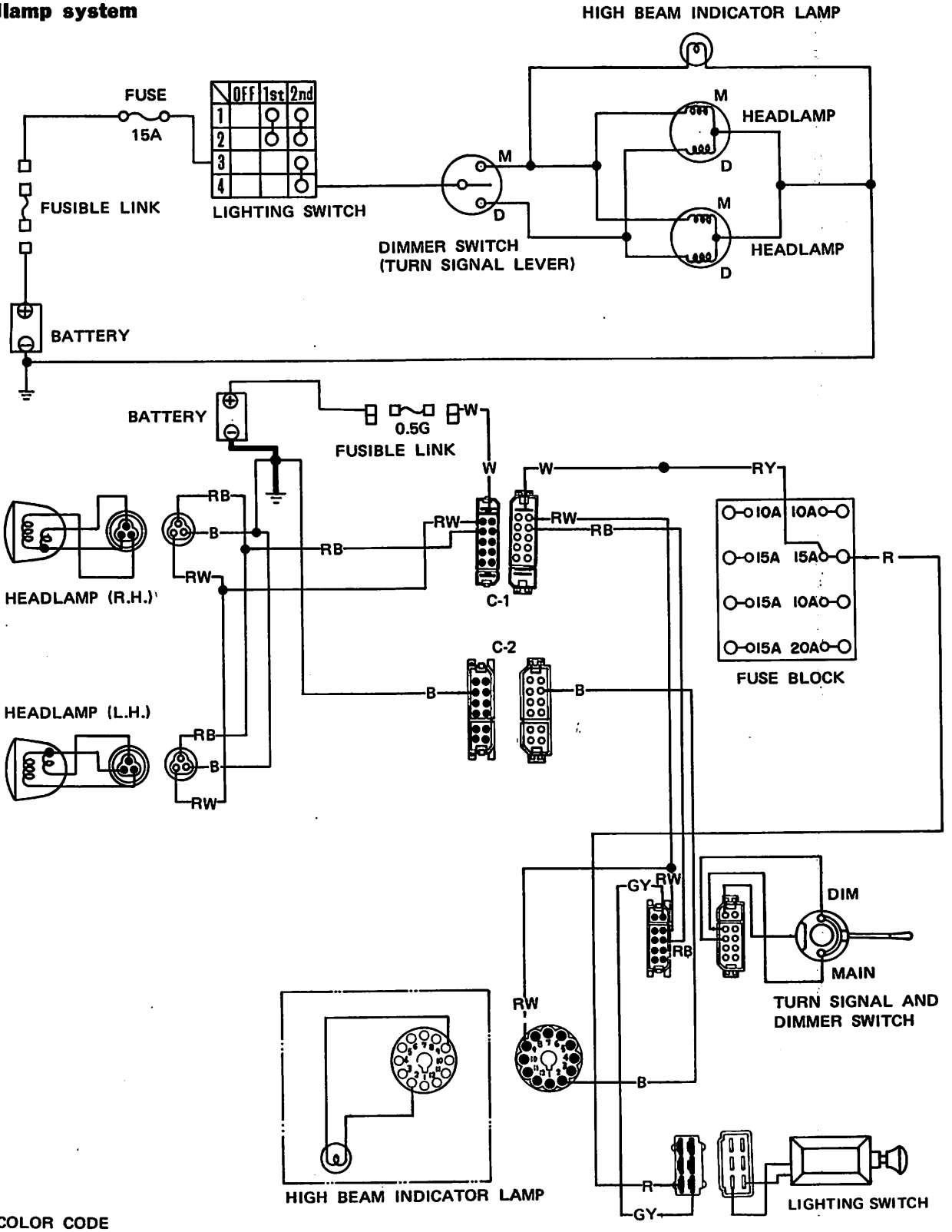
1 Bulb case
2 Bulb and socket assembly
3 Outer case
4 Pawl (Added)
5 Lighting hole (Added)
6 Inner case

BE353C

Fig. BE-52 Ash tray lamp

CIRCUIT DIAGRAM OF LIGHTING SYSTEM

Headlamp system



COLOR CODE

B	:	Black
W	:	White
R	:	Red
RB	:	Red with black stripe
RW	:	Red with white stripe
GY	:	Green with yellow stripe

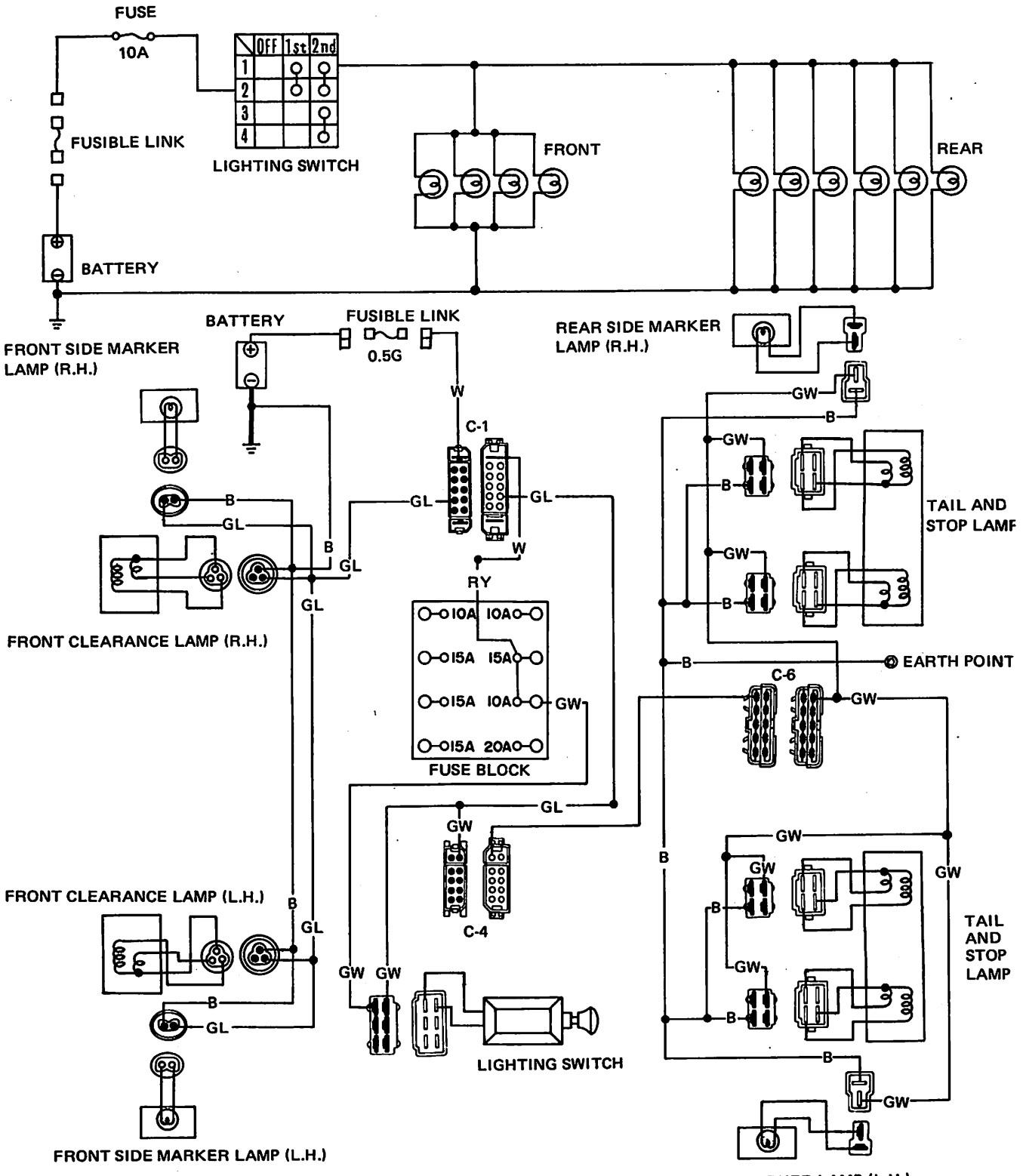
CONNECTOR

C-1 : White
C-2 : White

BE354C

Fig. BE-53 Headlamp system

Clearance and tail lamp system



COLOR CODE

B	:	Black
W	:	White
GW	:	Green with white stripe
GL	:	Green with blue stripe

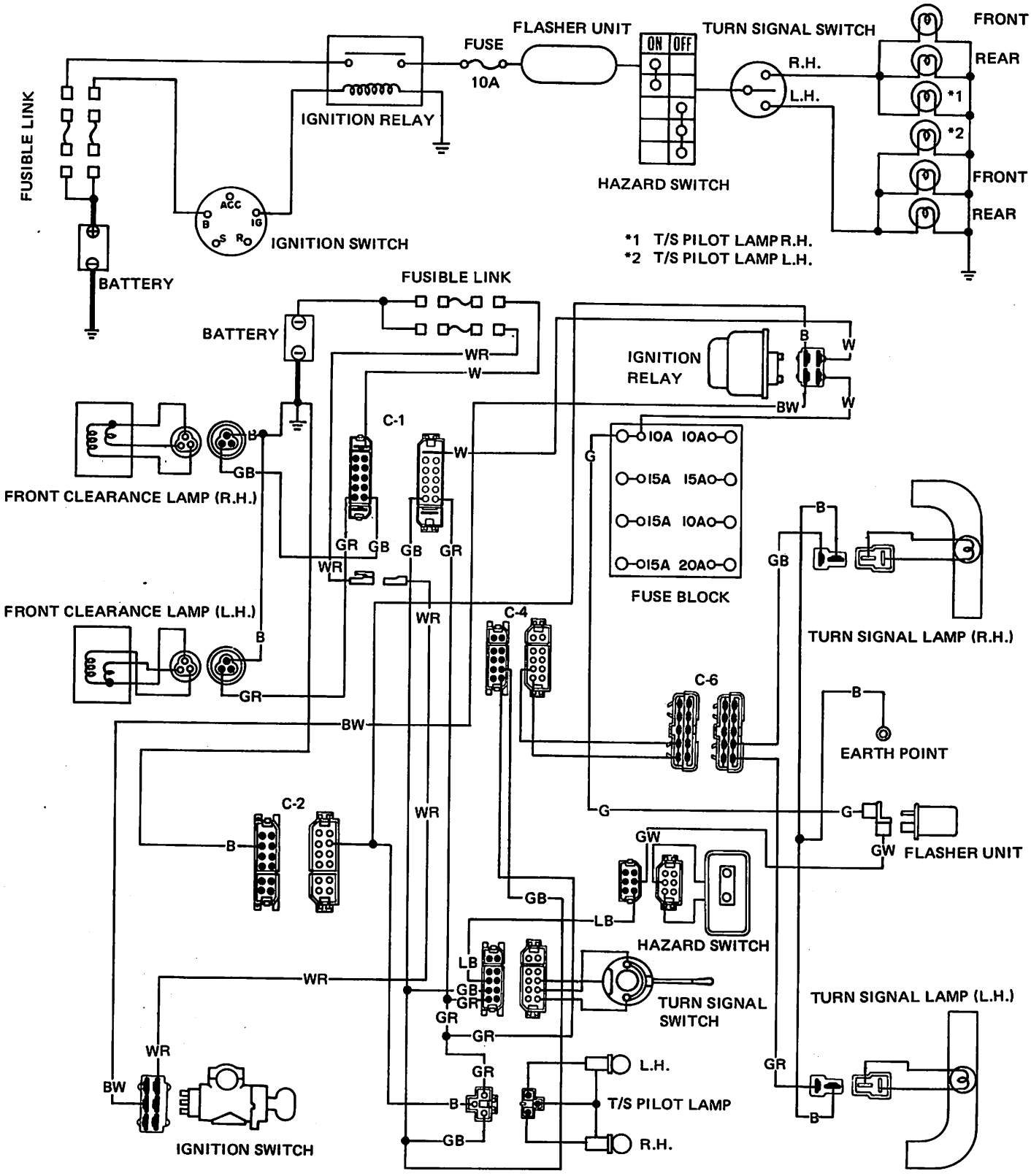
CONNECTOR

C-1: White
C-4: White
C-6: White

BE355C

Fig. BE-54 Clearance and tail lamp system

Turn signal lamp system



COLOR CODE

B	:	Black	GB	:	Green with black stripe
BW	:	Black with white stripe	GW	:	Green with white stripe
W	:	White	GR	:	Green with red stripe
WR	:	White with red stripe	LB	:	Blue with black stripe
G	:	Green	LR	:	Blue with red stripe

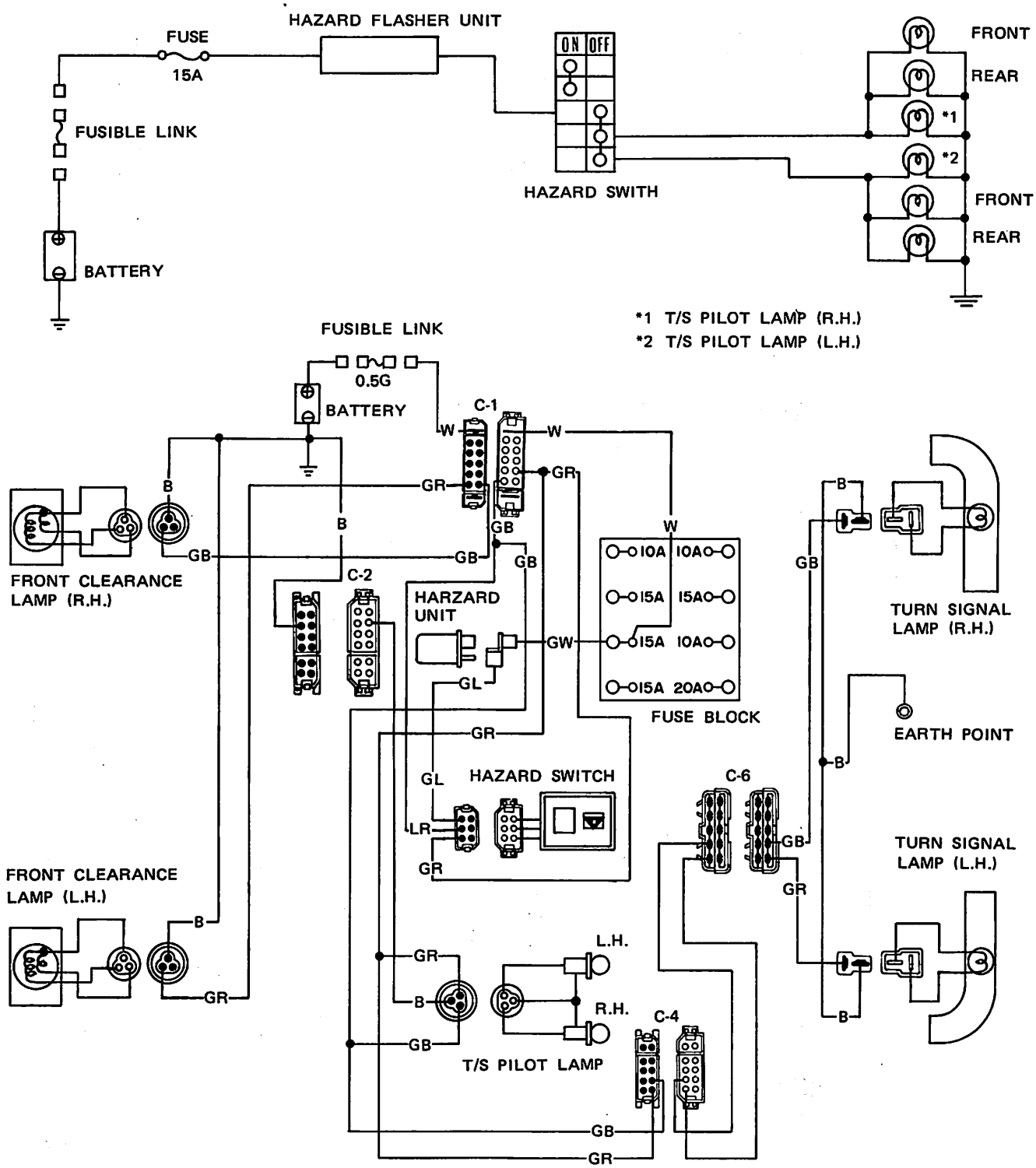
CONNECTOR

C-1: White
C-2: White
C-4: White
C-6: White

BE356C

Fig. BE-55 Turn signal lamp system

Harzard warning system



COLOR CODE

B	:	Black
W	:	White
GB	:	Green with black stripe
GW	:	Green with white stripe
GR	:	Green with red stripe
GL	:	Green with blue stripe
LR	:	Blue with red stripe
C	:	California model

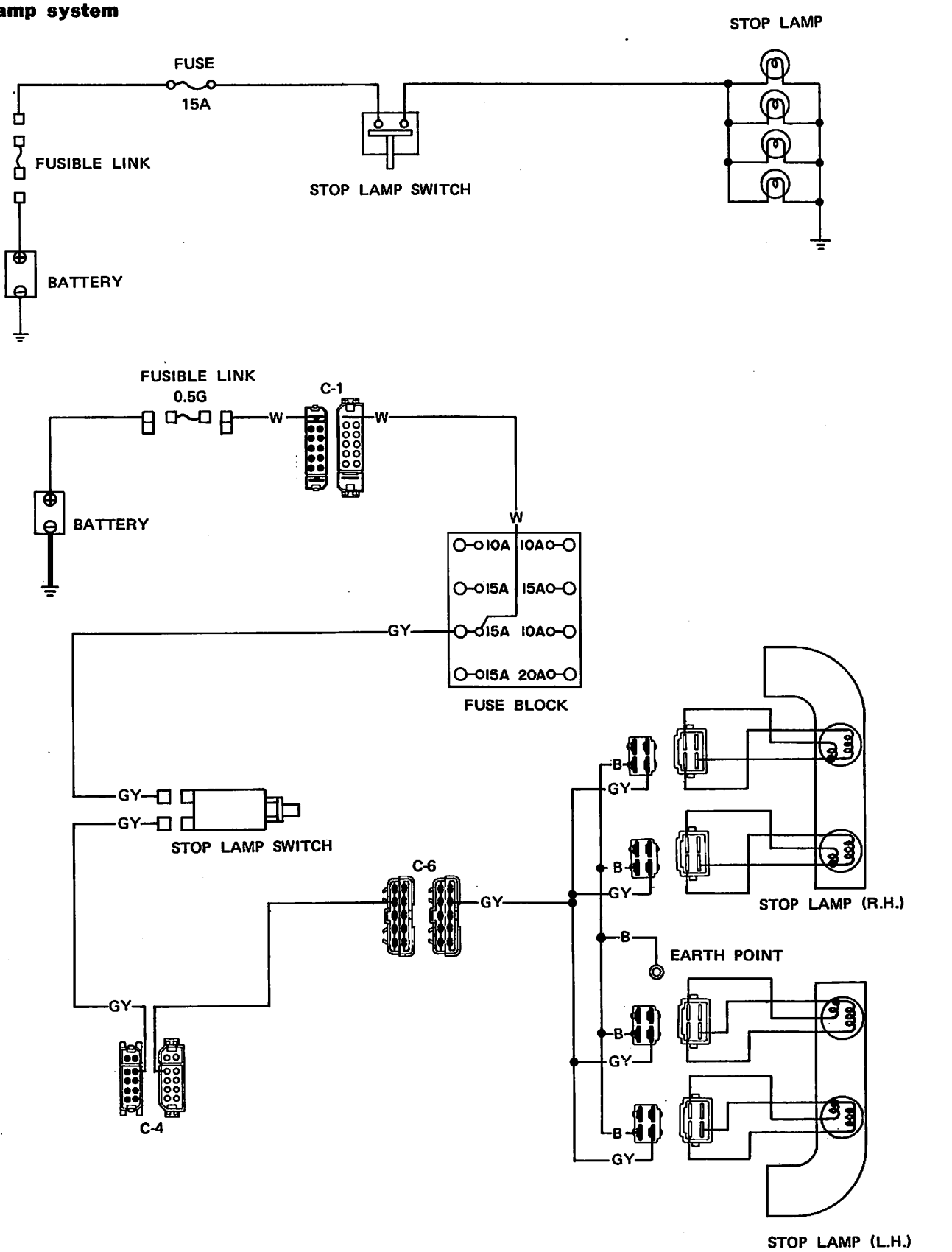
CONNECTOR

C-1 : White
C-2 : White
C-4 : White
C-6 : White

BE357C

Fig. BE-56 Hazard warning system

Stop lamp system



COLOR CODE

B	:	Black
W	:	White
GY	:	Green with yellow stripe

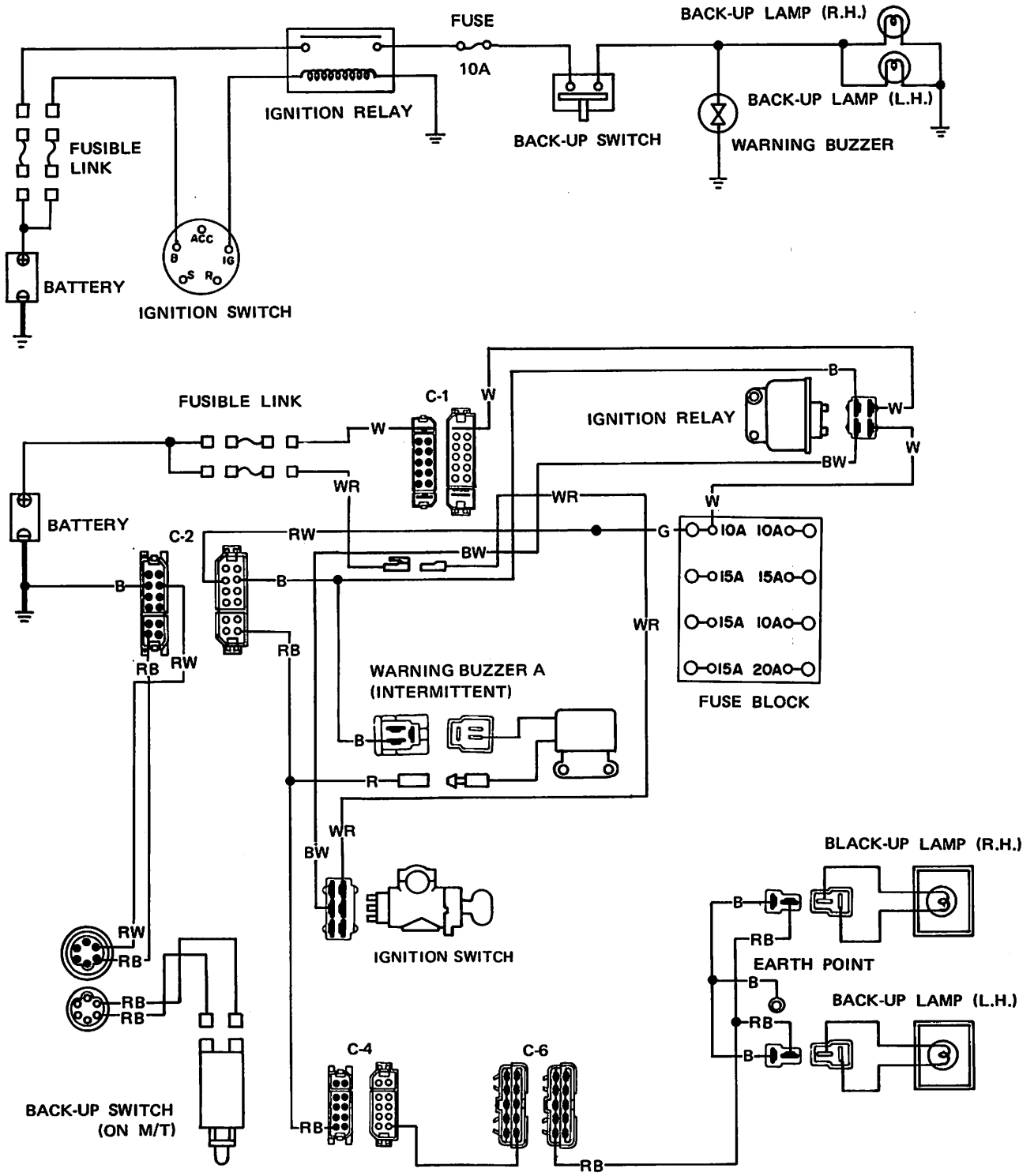
CONNECTOR

C-1	:	White
C-4	:	White
C-6	:	White

BE358C

Fig. BE-57 Stop lamp system

Back-up lamp system (M/T)



COLOR CODE

B	:	Black
BW	:	Black with white stripe
W	:	White
WR	:	White with red stripe
R	:	Red
RB	:	Red with black stripe
G	:	Green
LR	:	Blue with red stripe

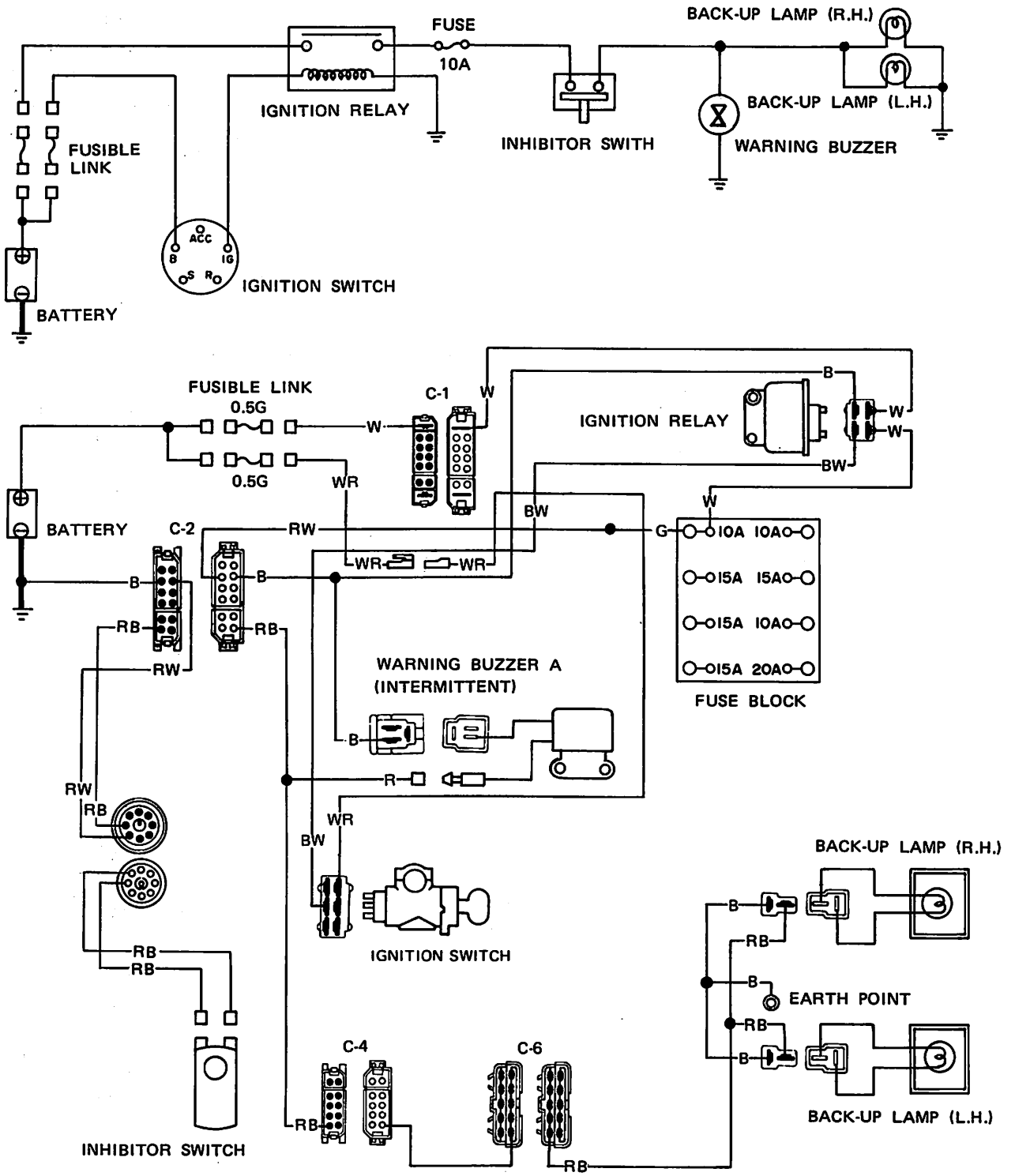
CONNECTOR

C-1 : White
C-2 : White
C-3 : White
C-4 : White
C-6 : White

BE359C

Fig. BE-58 Back-up lamp system (M/T)

Back-up lamp system (A/T)



COLOR CODE

B	:	Black
BW	:	Black with white stripe
W	:	White
WR	:	White with red stripe
R	:	Red
RB	:	Red with black stripe
G	:	Green
LR	:	Blue with red stripe

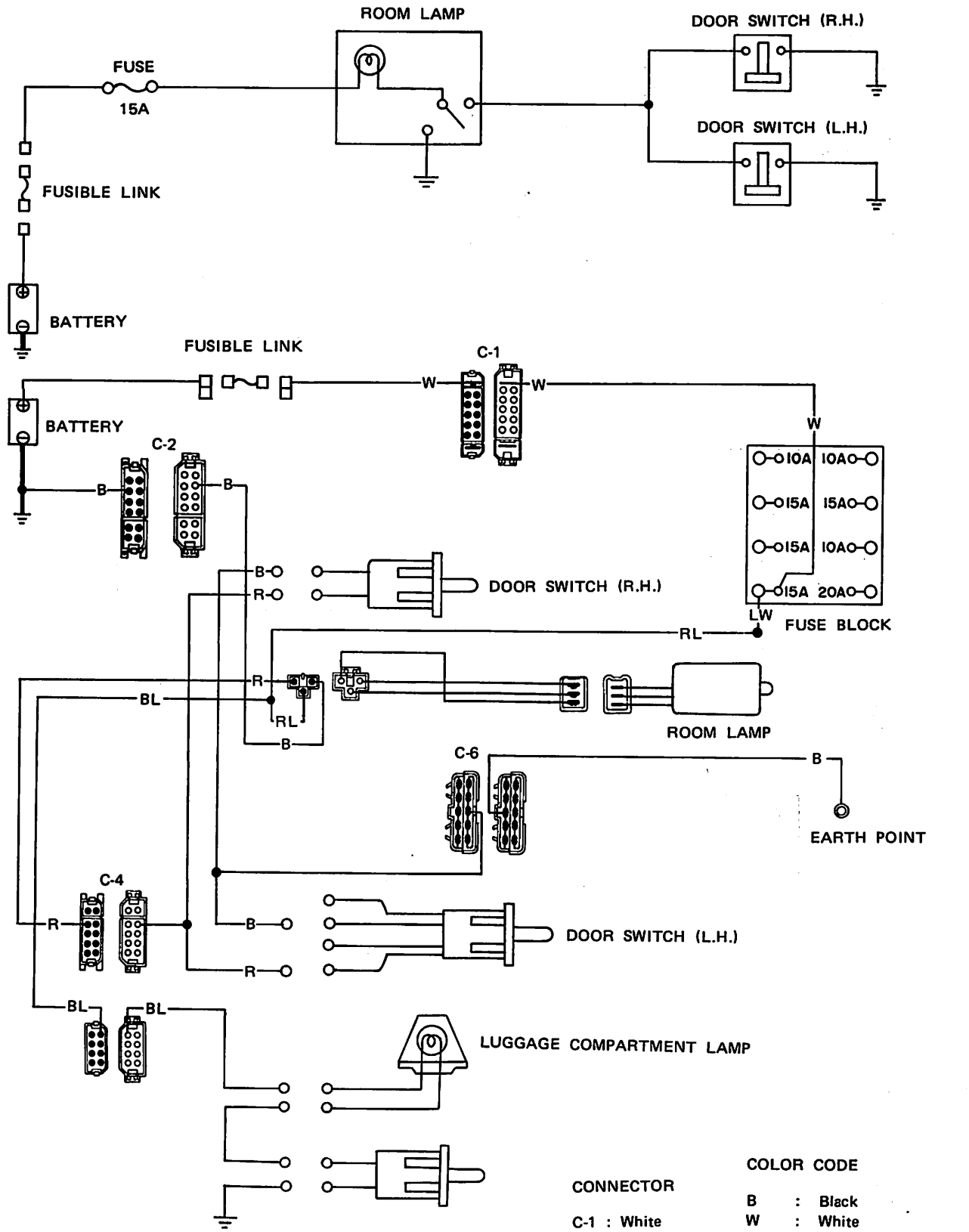
CONNECTOR

C-1 : White
C-2 : White
C-4 : White
C-6 : White

BE360C

Fig. BE-59 Back-up lamp system (A/T)

Room lamp and luggage compartment lamp system



CONNECTOR

C-1 : White
C-2 : White
C-4 : White
C-6 : White

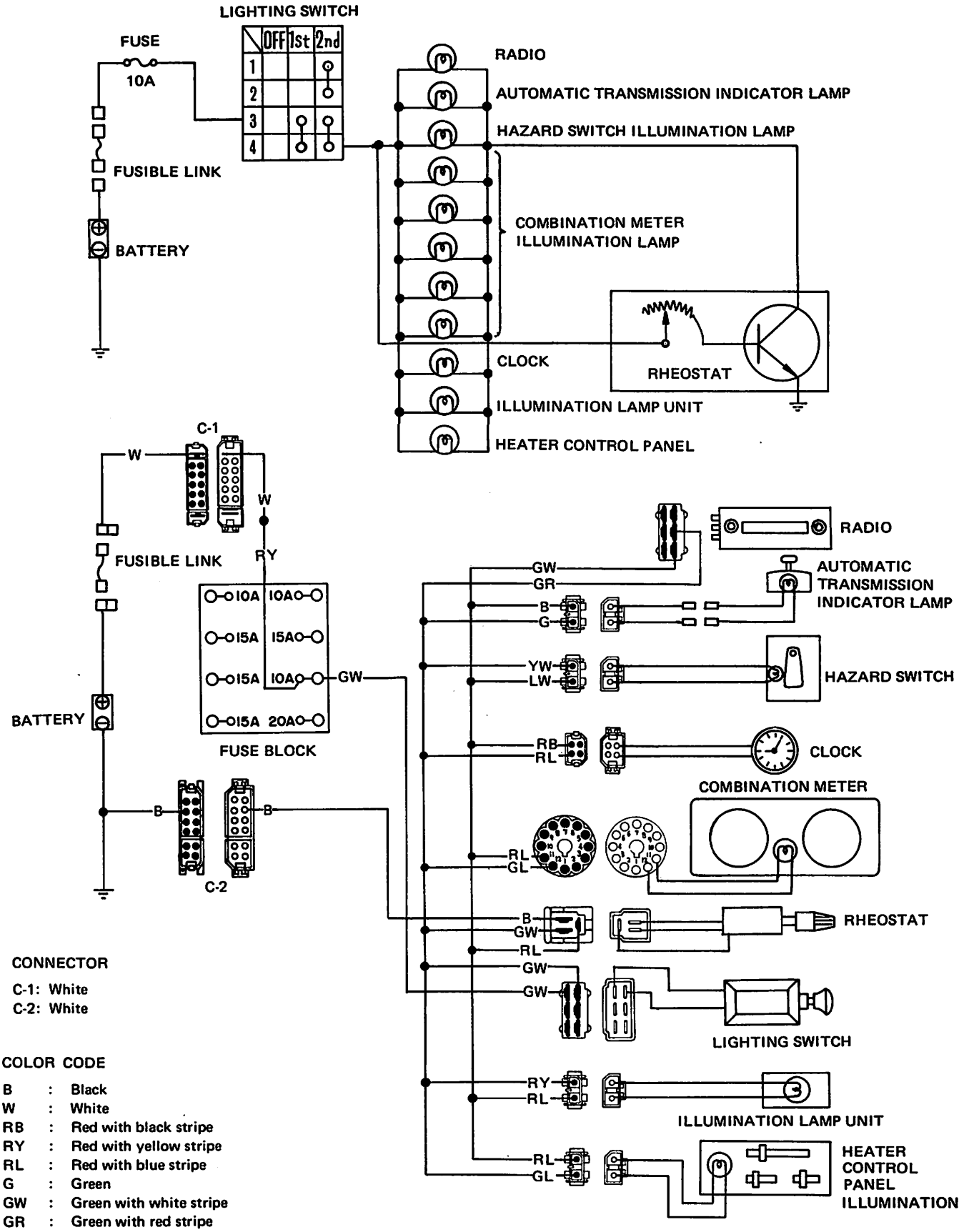
COLOR CODE

B : Black
W : White
R : Red
RL : Red with blue stripe
LW : Blue with white stripe

BE361C

Fig. BE-60 Room lamp and luggage compartment lamp system

Meter illumination control system



CONNECTOR

C-1: White
C-2: White

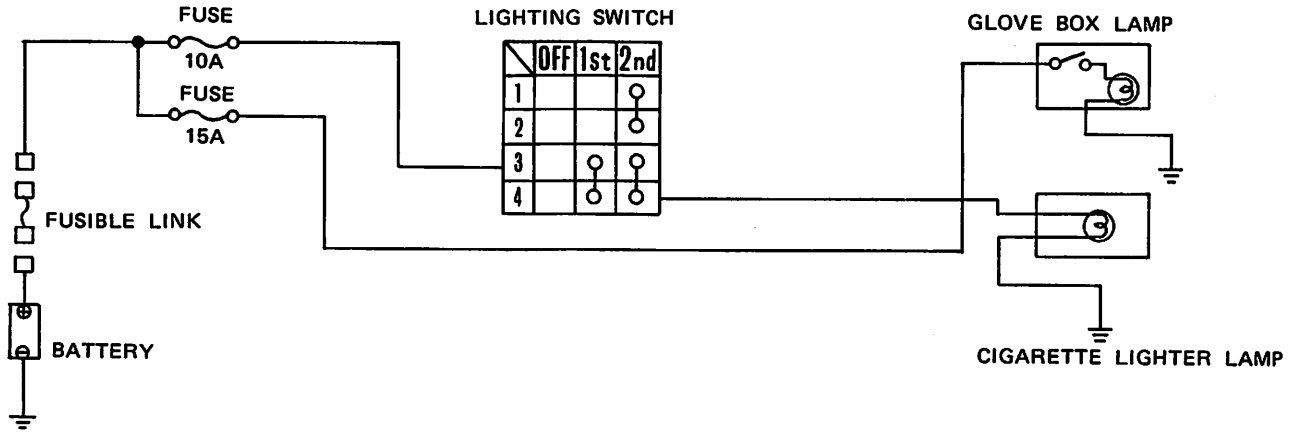
COLOR CODE

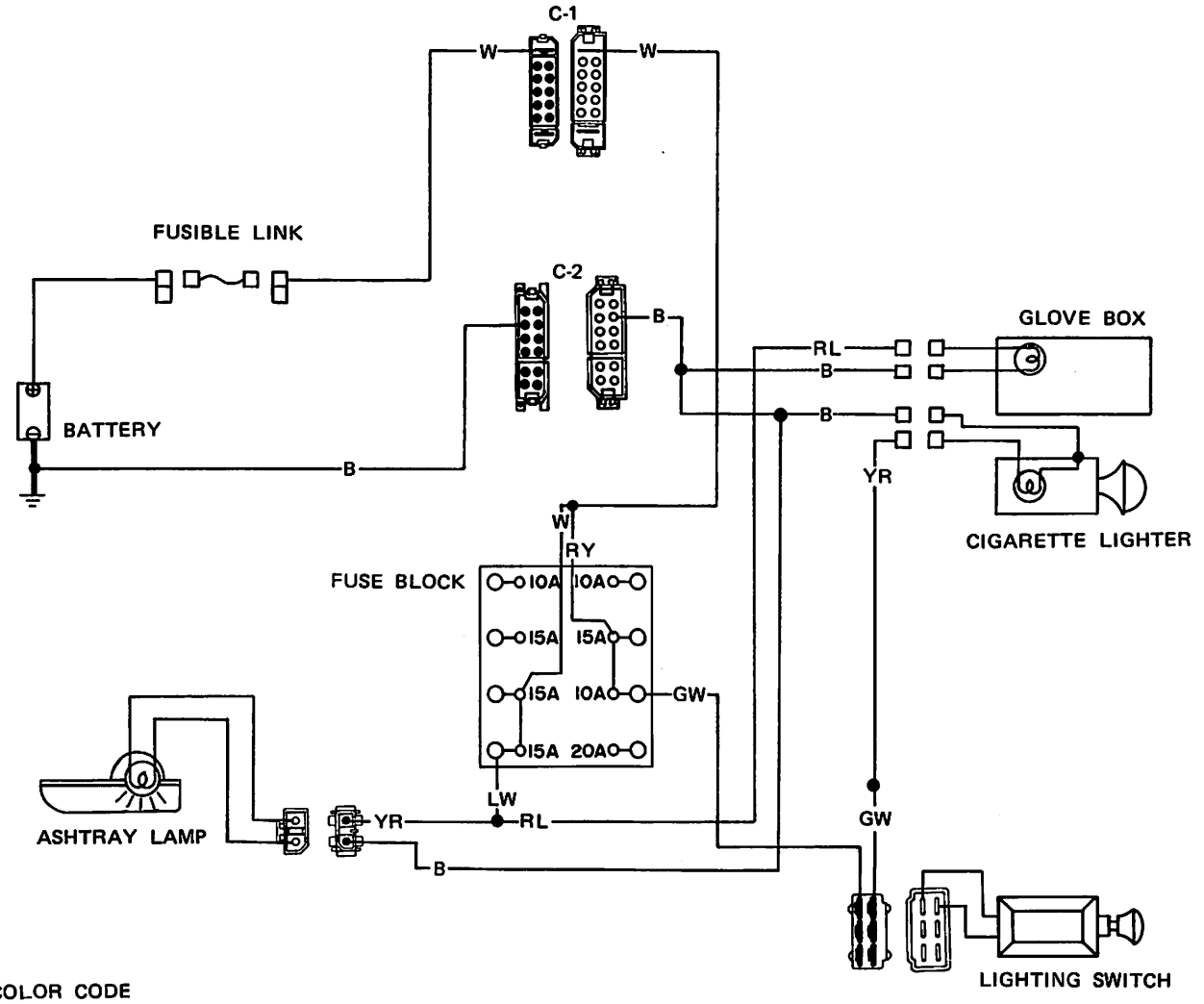
B	:	Black
W	:	White
RB	:	Red with black stripe
RY	:	Red with yellow stripe
RL	:	Red with blue stripe
G	:	Green
GW	:	Green with white stripe
GR	:	Green with red stripe
GL	:	Green with blue stripe
YW	:	Yellow with white stripe
LW	:	Blue with white stripe

BE362C

Fig. BE-61 Meter illumination control system

Illumination lamp system (Cigarette lighter lamp, glove box lamp and ash tray lamp)





COLOR CODE

B	:	Black
W	:	White
RY	:	Red with yellow stripe
RL	:	Red with blue stripe
GW	:	Green with white stripe
YR	:	Yellow with red stripe

CONNECTOR

C-1 : White
C-2 : White

BE363C

Fig. BE-62 Illumination lamp system

TROUBLE DIAGNOSES AND CORRECTIONS

HEADLAMP

Condition	Probable cause	Corrective action
Head lamps do not light for either high or low beam.	Burnt fusible link. Loose connection or open circuit. Faulty combination switch. No ground.	Correct cause and replace. Check wiring and/or repair connection. Conduct continuity test and replace if necessary. Clean and tighten ground terminal.
High beam cannot be switched to low beam or vice versa.	Faulty combination switch.	Conduct continuity test and replace if necessary.
Head lamps dim.	Partly discharged or faulty battery. Faulty charging system. Poor ground or loose connection. Burnt fusible link.	Measure specific gravity of electrolyte and recharge or replace battery if necessary. Measure voltage at headlamp terminals. If it is less than 12.8V, check charging system for proper operation. Clean and/or tighten. Replace.
Head lamp lights on only one side.	Loose head lamp connection. Faulty headlamp beam.	Repair. Replace.

TURN SIGNAL LAMP

Condition	Probable cause	Corrective action.
Turn signals do not operate.	Burnt fuse. Loose connection or open circuit. Faulty flasher unit. Faulty turn signal switch.	Correct cause and replace. Check wiring and/or repair connection. Replace. Conduct continuity test and replace if necessary.
Flashing cycle is too slow, (Pilot lamp does not go out.) or too fast.	Bulbs of other than specified wattage are being used. Burnt bulbs. Loose connection. Faulty flasher unit.	Replace with one specified. Replace. Repair. Replace.
Flashing cycle is irregular.	Burnt bulb. Loose connection. Bulb of other than specified wattage is being used.	Replace. Repair. Replace with one specified.

TAIL LAMP, STOP LAMP AND BACK-UP LAMP

Condition	Probable cause	Corrective action
Neither left nor right lamp lights.	Burnt fuse.	Correct cause and replace.
	Faulty stop lamp switch.	Conduct continuity test and replace if necessary.
	Faulty ignition relay (Back-up lamp only).	Check for operation of circuits (i.e., meters, gauges and turn signal lamp) electrically connected to ignition relay. If they do not function, replace ignition relay.
	Faulty back-up lamp switch. Faulty inhibitor switch.	Conduct continuity test and replace if necessary.
	Loose connection or open circuit.	Check wiring and/or repair connection.
Lamp on only one side lights.	Burnt bulb.	Replace.
	Loose bulb.	Repair lamp socket.

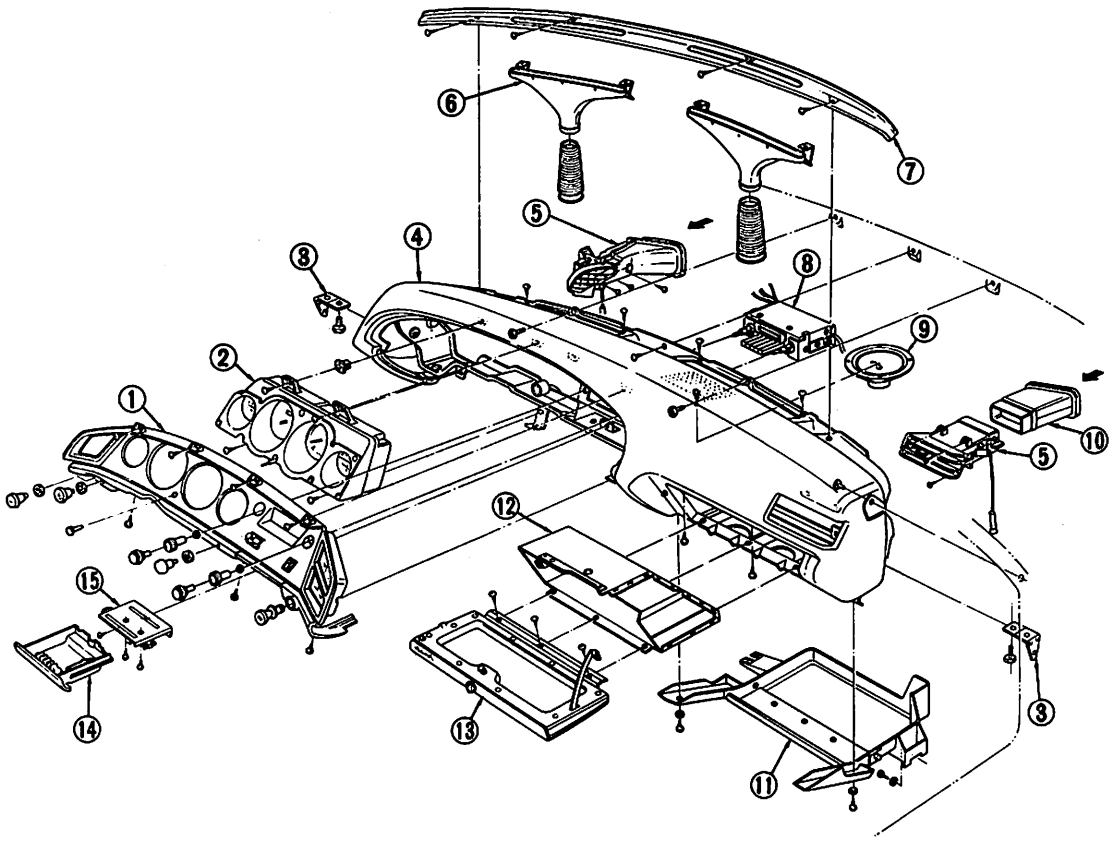
METERS AND GAUGES

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DESCRIPTION

This section includes information on all meters and gauges. Bulbs for indicator or for illumination can be replaced by twisting bulb socket. They are wedge base 3.4W bulbs.



1 Cluster lid
2 Meter assembly
3 Instrument mounting lower bracket
4 Instrument pad
5 Ventilation grille
6 Defogger nozzle
7 Instrument garnish
8 Radio
9 Speaker
10 Ventilation duct
11 Package tray
12 Glove box
13 Glove box lid
14 Ash tray
15 Ash tray cover

BF111B

Fig. BE-63 Cluster lid and instrument panel

BULB SPECIFICATIONS

Item	Wattage	Q'ty	SAE trade number	Remarks
Speedometer Illumination lamp	3.4W	1	57X	Wedge base
Tachometer Illumination lamp	3.4W	1	57X	Wedge base
Oil gauge illumination lamp	3.4W	1	57X	Wedge base
FUEL gauge illumination lamp	3.4W	1	57X	Wedge base
VOLT gauge illumination lamp	3.4W	1	57X	Wedge base
TEMP gauge illumination lamp	3.4W	1	57X	Wedge base
Charge warning lamp	3.4W	1	57X	Wedge base
Main beam indicator lamp	3.4W	1	57X	Wedge base
Seat belt warning lamp	3.4W	1	57X	Wedge base
Door warning lamp	3.4W	1	57X	Wedge base
Brake warning lamp	3.4W	1	57X	Wedge base
Turn signal pilot lamp	3.4W	1	57X	Wedge base

CIRCUIT DIAGRAM

Tachometer operating system

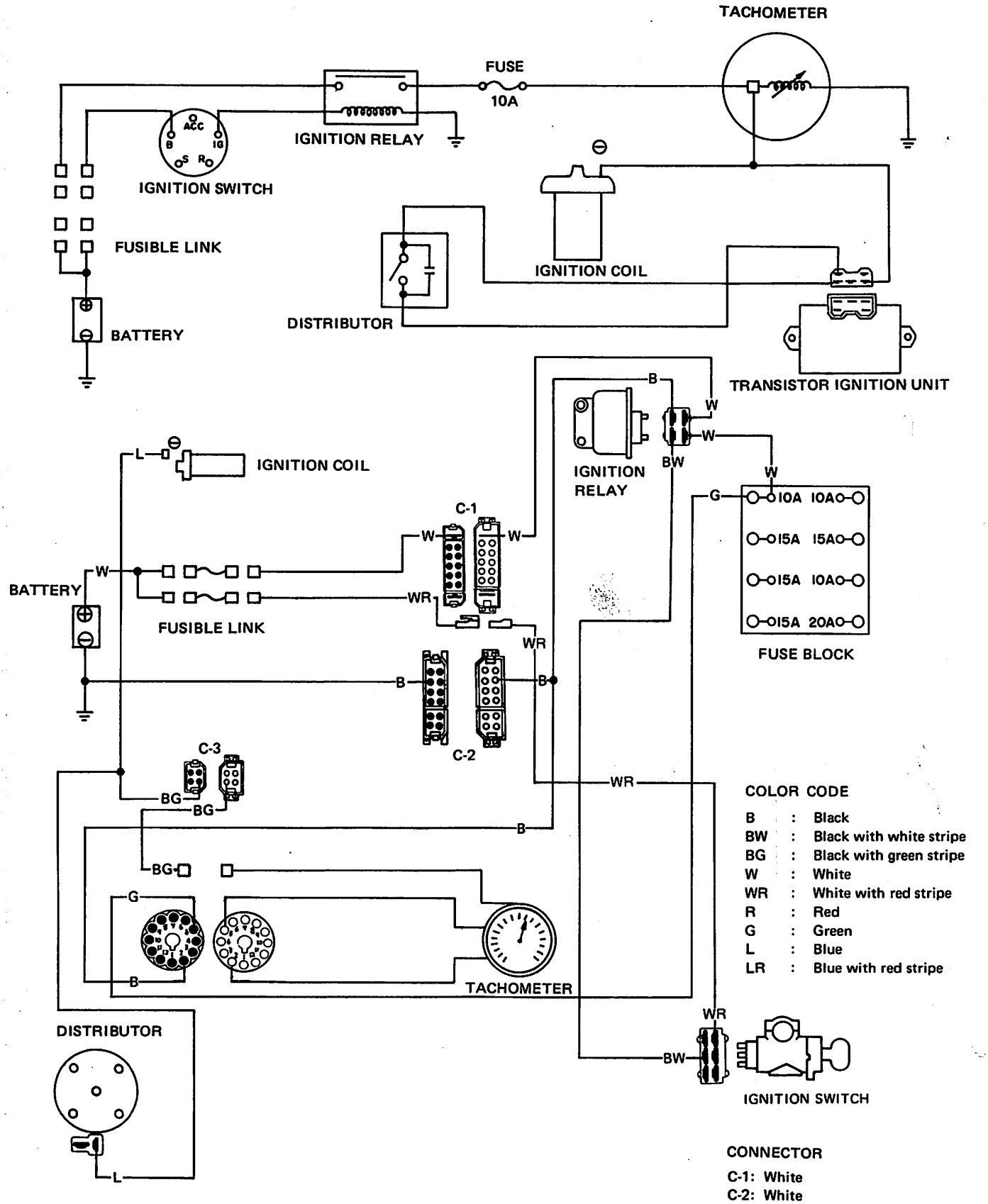
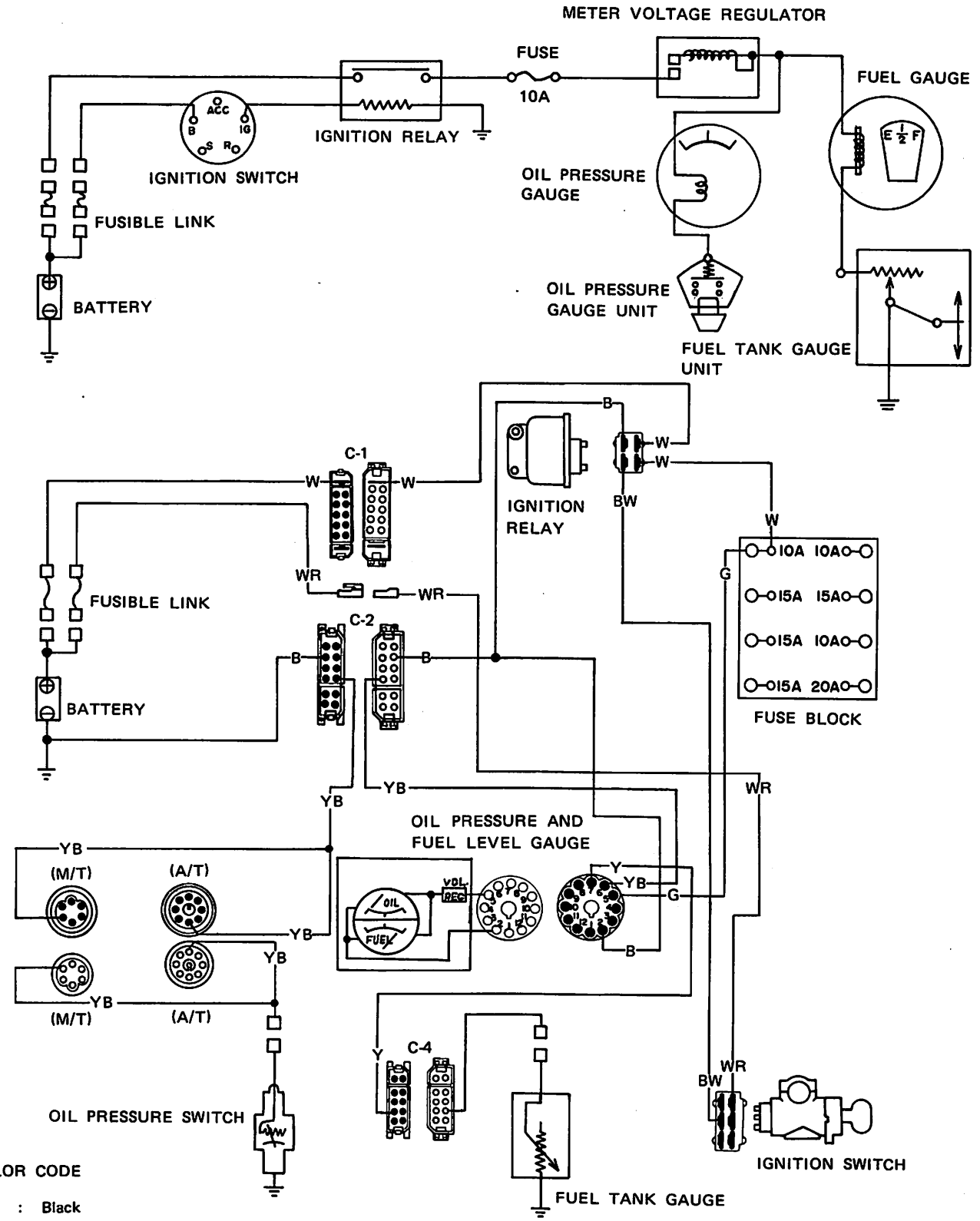


Fig. BE-64 Tachometer operating system

Oil pressure and fuel level indicating system



COLOR CODE

B	:	Black
BW	:	Black with white stripe
W	:	White
WR	:	White with red stripe
G	:	Green
Y	:	Yellow
YB	:	Yellow with black stripe
LR	:	Blue with red stripe

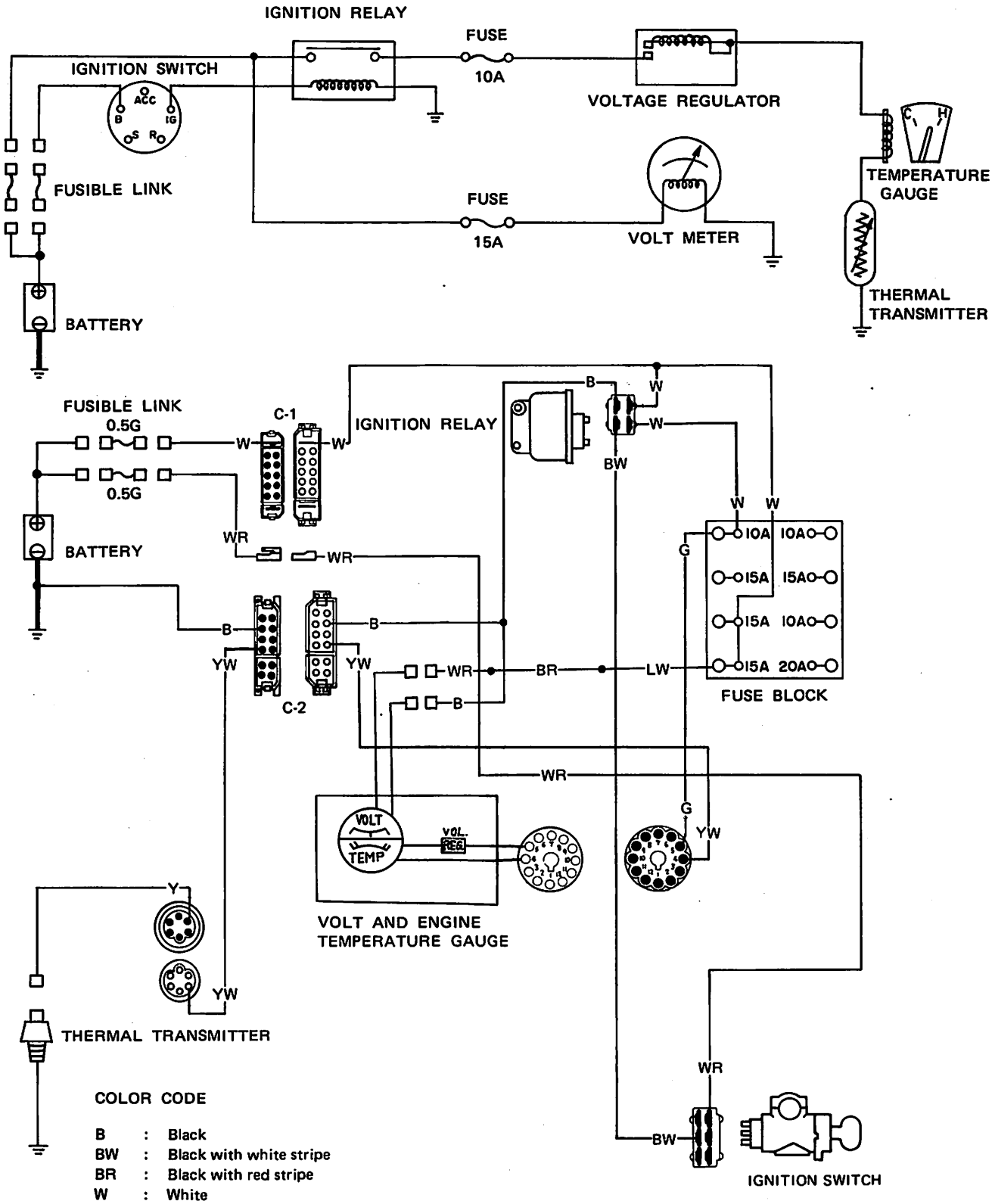
CONNECTOR

C-1 : White
C-2 : White
C-4 : White

BE365C

Fig. BE-65 Oil pressure and fuel level indicating system

Voltage and water temperature indicating system



COLOR CODE

B	:	Black
BW	:	Black with white stripe
BR	:	Black with red stripe
W	:	White
WR	:	White with red stripe
G	:	Green
Y	:	Yellow
YW	:	Yellow with white stripe
LR	:	Blue with red stripe
LW	:	Blue with white stripe

CONNECTOR

C-1 : White
C-2 : White

BE366C

Fig. BE-66 Voltage and water temperature indicating system

CLUSTER LID AND COMBINATION METER

REMOVAL AND INSTALLATION

Cluster lid

Information on removal and installation of the cluster lid is described in Section BF. Refer to Section BF.

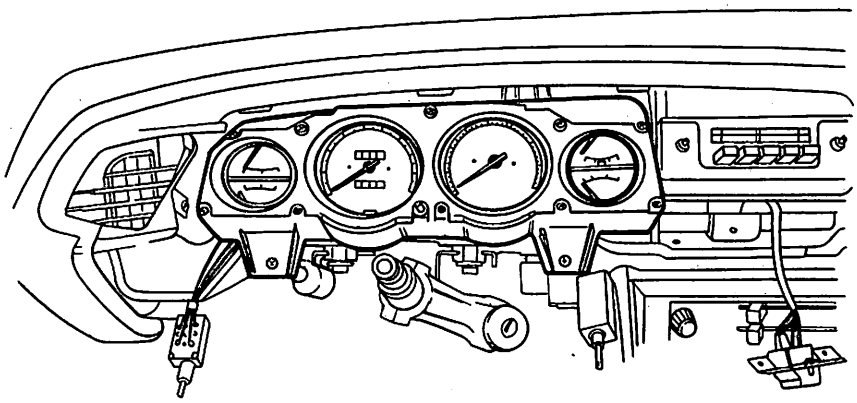
Combination meter

1. Remove cluster lid as described in previous section.
2. Remove four combination meter retaining screws.
3. Pulling combination meter out a little, disconnect speedometer cable, multi-pole connector and a few lead wires at the back of combination meter.
4. Remove combination meter from instrument panel.
5. Installation is in the reverse sequence of removal.

BULB REPLACEMENT

To replace illumination bulbs, turn bulb socket counterclockwise.

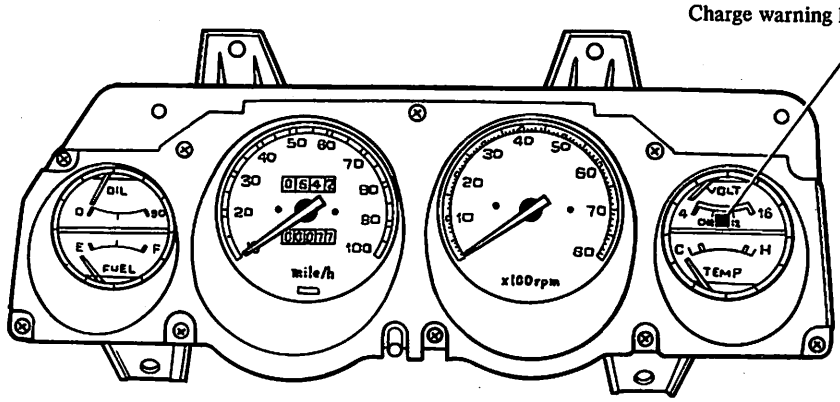
Bulb wattage:
Refer to Bulb specifications.
(Page BE-40)



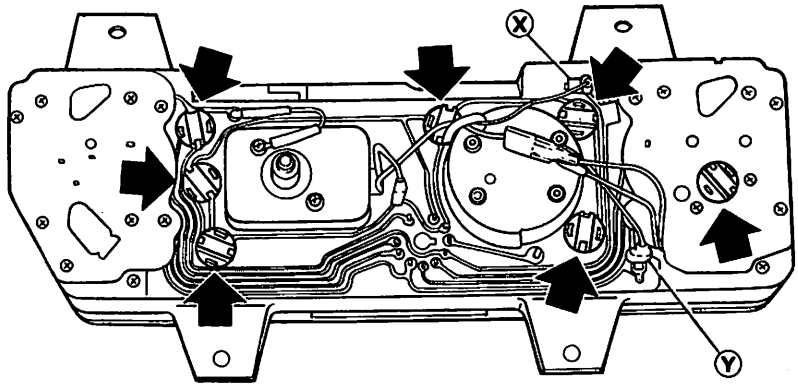
BE858B

Fig. BE-67 Removing combination meter

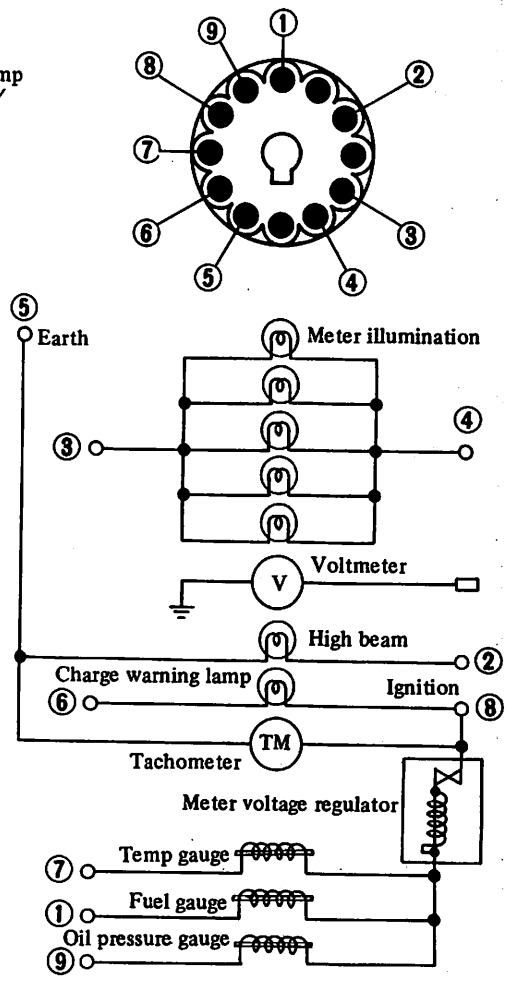
METER AND GAUGE REPLACEMENT



BE859B



BE845B



BE860B

Fig. BE-68 Combination meter

SPEEDOMETER

The main beam indicator lamp is installed on the speedometer.

1. Take out combination meter, following procedures described previously.
2. Remove screws retaining acrylic cover on combination meter.
3. Remove the cover and loosen two screws fixing speedometer on housing panel.
4. Take out speedometer.
5. Installation is in the reverse order of removal.

Bulb replacement

1. Turn socket counterclockwise and remove bulb with socket.
2. Pull out bulb and replace with a new one.
3. Installation is in the reverse order of removal.

TACHOMETER

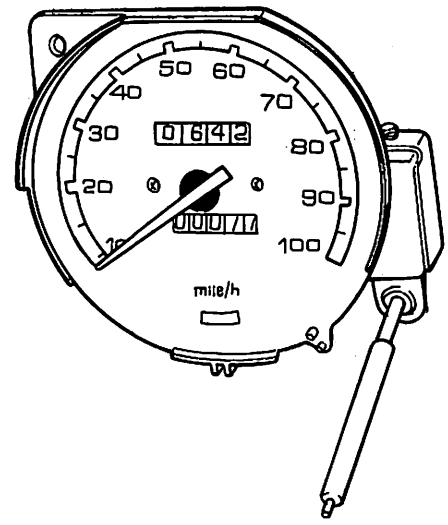
1. Remove combination meter. (Refer to Combination Meter.)
2. Remove screws retaining acrylic cover on combination meter.
3. Remove the cover and loosen four nuts securing tachometer to housing panel.
4. Take out tachometer and install a new one.
5. Installation is in the reverse order of removal.

Note: Tachometer has three lead wires. Two of them must be connected to X and Y terminals. (Refer to Figure BE-68.) The other must go to tachometer harness from ignition coil.

OIL AND FUEL GAUGES

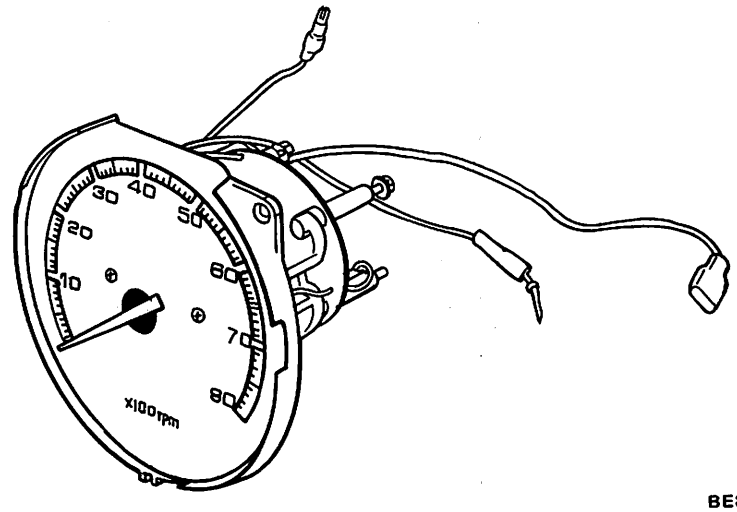
Each gauge is attached with two retaining screws.

1. Remove combination meter. (Refer to Combination Meter.)
2. Remove screws retaining acrylic cover on combination meter.
3. Remove the cover and loosen two screws securing each gauge to housing panel.
4. Take out each gauge and install a new one.
5. Installation is in the reverse order of removal.



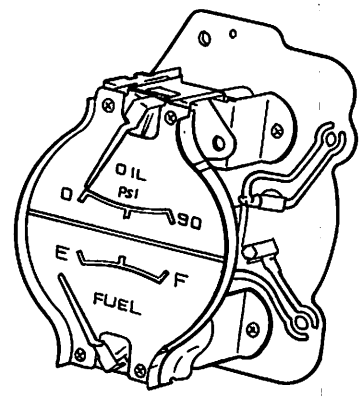
BE861B

Fig. BE-69 Speedometer



BE862B

Fig. BE-70 Tachometer



BE863B

Fig. BE-71 Oil pressure and fuel gauges

VOLT AND TEMP GAUGES

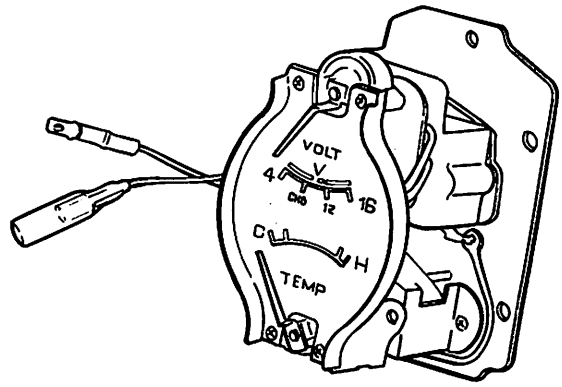
Each gauge is attached with two retaining screws.

Replacement is the same as described before in Oil Pressure Gauge and Fuel Gauge.

The charge warning lamp is an integral part of the Volt gauge.

Bulb replacement

Refer to Charge Warning System.



BE864B

Fig. BE-72 Volt and Temp gauges

OIL PRESSURE AND WATER TEMPERATURE INDICATING SYSTEM

DESCRIPTION

The oil pressure gauge consists of a bimetal meter unit, a variable resistance sensing unit (incorporating a diaphragm) and a voltage regulator.

As oil pressure varies, the diaphragm moves accordingly, causing the sliding contact to move along the resistance. This changes the amount of current that can flow in the circuit and actuates the bimetal.

The water temperature gauge consists of a meter and a thermal transmitter located in the engine block. The thermal transmitter is equipped with a thermistor element which converts cooling water temperature variation to a resistance, thereby controlling current flowing to the gauge.

The oil pressure gauge and water temperature gauge are equipped with a bimetal arm and heater coil.

When the ignition switch is set to ON, current flows to the heater coil, and the heater coil is heated. With this heat, the bimetal arm is bent, thus causing the pointer connected to the bimetal arm to move. The characteristics of both gauges are the same.

If both the oil pressure and water temperature gauges become faulty at the same time, the fault may lie in the voltage regulator.

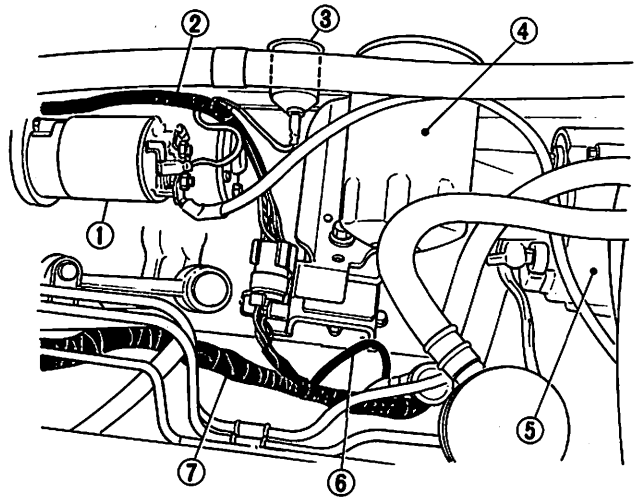
REPLACEMENT

Oil and Temp gauges

Refer to previous section Meter and Gauge Replacement.

Oil pressure gauge unit

The oil pressure gauge unit is located on the cylinder block beside the oil element. The switch can be removed by unscrewing it. Be sure to apply a conductive sealer to the threads prior to installing a new unit.



1 Starter motor
2 Engine harness No. 2
3 Oil pressure switch
4 Oil filter
5 Alternator
6 To alternator
7 Engine room harness

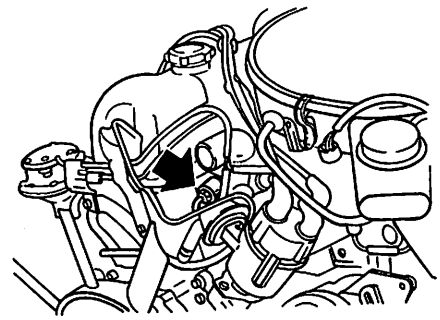
BE511C

Fig. BE-73 Oil pressure gauge unit

Thermal transmitter

To replace thermal transmitter, disconnect lead wire from its terminal and unscrew thermal transmitter from its housing.

Be sure to apply conductive sealer to threads prior to installing new thermal transmitter.



BE865B

Fig. BE-74 Thermal transmitter

INSPECTION

Check each unit for proper operation.

Test continuity of oil pressure and water temperature indicating system with a test lamp or ohmmeter. See Figures BE-65 through BE-66.

VOLTMETER AND FUEL LEVEL INDICATING SYSTEM

DESCRIPTION

The voltmeter monitors the condition of electrical system and battery. It is in good order if it registers more than 11 volts before and during engine starting, and 6 to 8 volts during engine cranking. If it registers more than 15.5 volts during engine running, voltage regulator is out of order.

The fuel level indicating system consists of a tank unit and a fuel level gauge. The tank unit consists of a float which moves up and down in the fuel tank with changes in fuel level, and a sliding contact that slides back and forth on a resistance when the float moves. This changes the amount of electric resistance offered by the tank unit and controls the current flowing to the fuel level gauge. The gauge moves with the changes in current flow.

The fuel gauge is equipped with a bimetal arm and heat coil. When the ignition switch is turned on, current flows to the heater coil, and the heater coil is heated. With this heat, the bimetal arm is bent, thus causing the pointer connected to the bimetal arm to move.

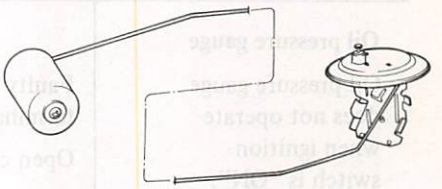
REPLACEMENT

Volt and Fuel gauges

Refer to previous section Meter and Gauge Replacement.

Fuel tank gauge unit

Refer to Section FE (Fuel and Exhaust system) for Replacement.



BE952B

Fig. BE-75 Fuel tank gauge

TROUBLE DIAGNOSES AND CORRECTIONS

SPEEDOMETER

Condition	Probable cause	Corrective action
Speedometer pointer and odometer do not operate.	Loose speedometer cable union nut.	Retighten.
	Broken speedometer cable.	Replace.
	Damaged speedometer drive pinion gear (Transmission side).	Replace.
	Faulty speedometer.	Replace.
Unstable speedometer pointer.	Improperly tightened or loose speedometer cable union nut.	Retighten.
	Faulty speedometer cable.	Replace.
	Faulty speedometer.	Replace.
Unusual sound occurs in when driving speed is increased.	Excessively bent or twisted speedometer cable inner wire or lack of lubrication.	Replace or lubricate.
	Faulty speedometer.	Replace.
Inaccurate speedometer indication.	Faulty speedometer.	Replace.
Inaccurate odometer operation.	Improperly meshed second and third gear or worn gears.	Replace speedometer.
	Faulty feeding due to deformed odometer and pinion carrier.	Replace speedometer.

OIL PRESSURE AND FUEL GAUGES

Condition	Probable cause	Corrective action
Neither oil pressure gauge nor fuel gauge operates.	Burnt fuse. Faulty meter voltage regulator.	Correct cause and replace fuse. Replace oil pressure and fuel gauges.
Both oil pressure and fuel gauges indicate inaccurately.	Faulty meter voltage regulator. (Gauge pointer fluctuates excessively.) Loose or poor connection. (Gauge pointer fluctuates slightly.)	Replace oil pressure and fuel gauges. Correct connector contact.
Oil pressure gauge Oil pressure gauge does not operate when ignition switch is "ON".	Faulty oil pressure gauge unit or loose terminal connection. Open circuit.	Replace gauge unit or correct terminal connection. Repair or replace.
Gauge indicates only maximum pressure.	Faulty oil pressure gauge unit. (Gauge pointer returns to original position when ignition switch is turned off.) Faulty oil pressure gauge. (Gauge pointer indicates maximum pressure even after ignition switch is turned off.)	Replace. Replace.
Fuel gauge Fuel gauge does not operate.	Burnt fuse. Faulty ignition relay. Faulty tank unit or loose unit terminal connection. (Pointer deflects when tank unit wire is grounded.) Faulty fuel gauge. Open circuit.	Correct cause and replace fuse. Check for operation of circuits (i.e., water temperature, oil pressure gauge and turn signal lamp) electrically connected to ignition relay. If they do not function, replace ignition relay. Replace tank unit or correct terminal connection. Replace fuel gauge.
Pointer indicates only "F" position.	Faulty tank unit. (Pointer drops below "E" mark when ignition switch is turned off.) Faulty fuel gauge. (Pointer still indicates "F" position when ignition switch is turned off.)	Replace tank unit. Replace fuel gauge.
Fuel gauge does not operate accurately.	Faulty tank unit. (Pointer indicates a half level when a 32Ω resistor is connected between tank unit wire and ground.) Faulty fuel gauge. Poor or loose connection.	Replace tank unit. Replace fuel gauge. Correct connector terminal contact.

WATER TEMPERATURE AND CHARGE WARNING LAMPS

Condition	Probable cause	Corrective action
Neither water temperature warning lamp nor charge warning lamp operates.	Burnt fuse.	Correct cause and replace fuse.
Water temperature gauge		
Water temperature gauge does not operate.	Faulty thermal transmitter or loose terminal connection. (When thermal transmitter yellow wire is grounded, gauge pointer fluctuates).	Replace thermal transmitter or correct terminal connection.
	Faulty water temperature gauge.	Replace water temperature gauge.
	Open circuit.	
Meter indicates only maximum temperature.	Faulty thermal transmitter. (Meter pointer returns to original position when ignition switch is turned off).	Replace thermal transmitter.
	Faulty water temperature gauge. (Meter pointer indicates maximum temperature even after ignition switch is turned off).	Replace water temperature gauge.
Water temperature gauge does not operate accurately.	Faulty water temperature gauge.	[Connect a 116Ω resistance between thermal transmitter yellow wire and ground. When meter indicates approximately 50°C (122°F), gauge is serviceable].
	Loose or poor connection.	Correct connector terminal contact.
Charge warning lamp		
Lamp does not light when ignition switch is set to "ON".	Burnt bulb or loose bulb.	Replace bulb or connect bulb socket.
	Faulty ignition relay or burnt fuse.	Replace.
	Faulty IC regulator in alternator.	Replace.
Lamp does not go out when engine is started.	Faulty charging system.	Inspect charging system.

VOLTMETER

Condition	Probable cause	Corrective action
Voltmeter operates inaccurately.	Faulty voltmeter.	Replace.
	Faulty alternator, or faulty voltage regulator, or faulty battery.	Check for operation of alternator, voltage regulator and battery. If they do not function correctly, correct or replace.
Voltmeter does not operate.	Faulty voltmeter or loose connection.	Replace voltmeter or correct terminal connection.

WARNING SYSTEM

CONTENTS

CHARGE WARNING SYSTEM BE-48
REPLACEMENT BE-48
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THEFT PROTECTION SYSTEM BE-48
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WARNING LAMP BE-50
TIMER UNIT BE-50
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DESCRIPTION BE-50
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CHARGE WARNING SYSTEM

Except for lamp refer to Section EE.

REPLACEMENT

Charge warning lamp bulb

The charge warning lamp is built in the Volt meter.

1. Remove cluster lid and take out combination meter. (Refer to Cluster Lid and Combination Meter)
2. Turn bulb socket counter-clockwise and pull it out from the back of Volt meter. (See Figure BE-68.)
3. Extract bulb from socket.
4. Replace with new one.
5. Installation is in the reverse order of removal.

Bulb wattage:
Charge warning lamp 3.4W

INSPECTION

Refer to Section EE for details.

THEFT PROTECTION SYSTEM

DESCRIPTION

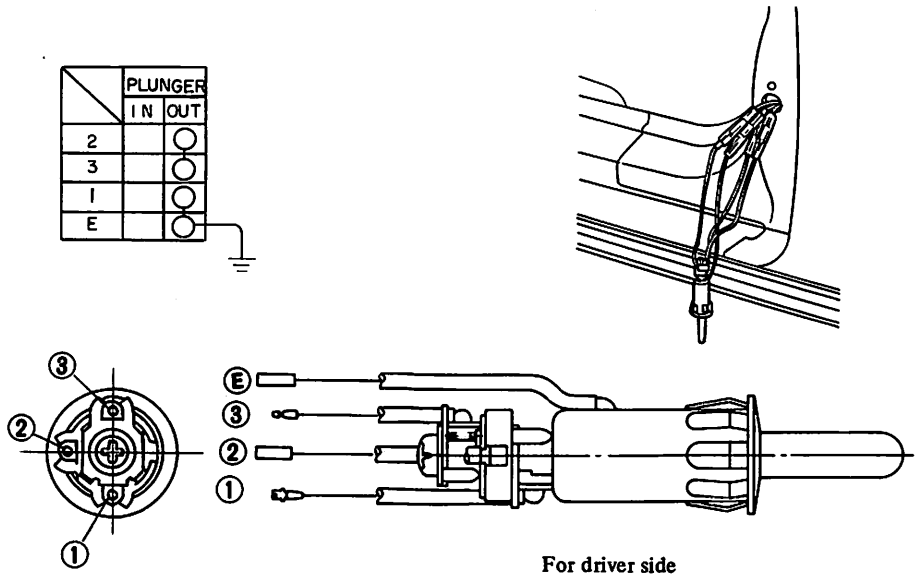
This system consists of an ignition switch, a door switch and a buzzer and is designed to prevent a driver from leaving the car without taking off the key. When the L.H. door is opened with the ignition key still in the ignition switch, the buzzer sounds.

REMOVAL AND INSTALLATION

Door switch

The door switch is located at the bottom of the L.H. center pillar.

For removal and replacement, refer to Lighting and Signal Lamp System.



For driver side

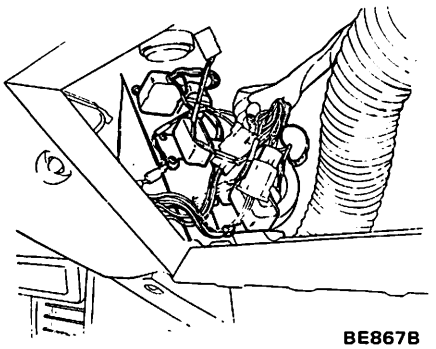
BE866B

Fig. BE-76 Door switch

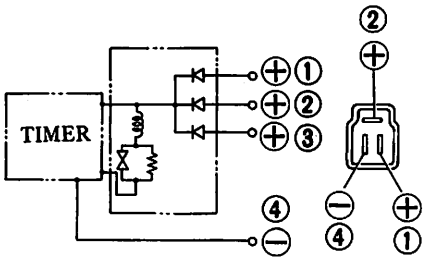
Warning buzzer A (Intermittent)

The warning buzzer A is located on the relay bracket behind the cluster lid.

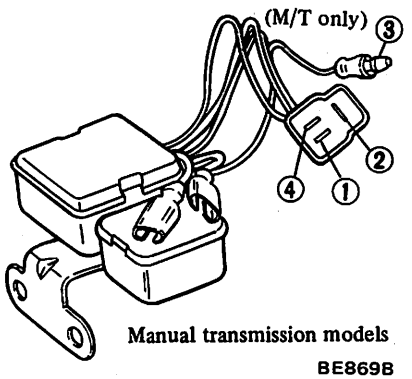
1. Disconnect battery ground cable.
2. Remove glove box inner case from under instrument panel.
3. Loosen four screws retaining relay bracket to instrument panel.
4. Disconnect lead wires at connectors and take out relay bracket.
5. Remove warning buzzer retaining screws and replace with a new one.
6. Installation is in the reverse order of removal.



BE867B



BE868B



Manual transmission models

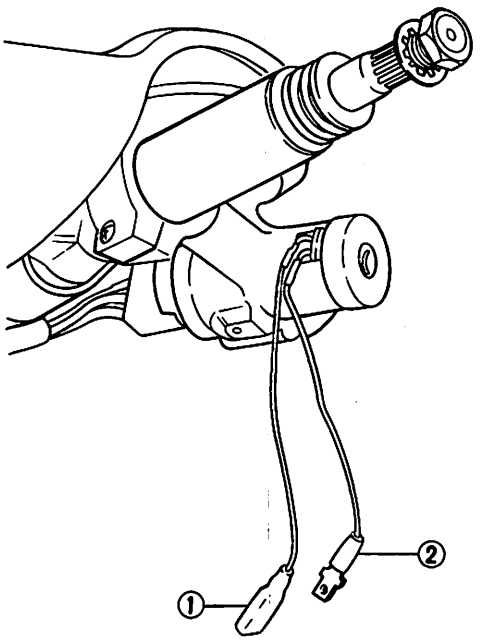
BE869B

Fig. BE-77 Warning buzzer A (M/T models)

Ignition switch

For the purpose of making the switch tamper-proof, self-shear type screws are used, and their heads are sheared off when installed so that the steering lock system cannot be easily removed.

For the removal and installation, refer to Section ST.



	IN SERT	PULL OUT
1	○	
2	○	

BE870B

Fig. BE-78 Ignition switch

INSPECTION

Door switch

Refer to Lighting and Signal Lamp System.

Warning buzzer

Apply 12V direct current between (1)-(4), (2)-(4) or (3)-(4) and check whether buzzer sound or not. The buzzer must sound when (1)-(4), (2)-(4) and (3)-(4) are connected to power circuit. See Figure BE-77 for warning buzzer.

Note: Make sure that (–) negative terminal of power circuit is always connected to (4) terminal.

Ignition switch

Test continuity between two harnesses (1)-(2) indicated in Figure BE-78. When the key is inserted into the switch, continuity must exist. On the contrary, continuity must not exist when the key is removed from the ignition switch.

Circuit

Test continuity through the circuit by using an ohmmeter or test lamp. The whole circuit is described later in detail.

SEAT BELT WARNING SYSTEM

DESCRIPTION

To meet the requirements of M.V.S.S. No. 208, the S10 model is equipped with the Seat Belt Warning Device.

When the ignition switch is turned to the START position, the warning lamp comes on and remains on for 4 to 8 seconds. The warning buzzer sounds for 4 to 8 seconds intermittently if the driver's seat belt is not fastened properly.

Components of system

The seat belt warning system consists of a belt switch, a warning buzzer, a warning lamp, a timer unit, and an ignition switch.

BELT SWITCH

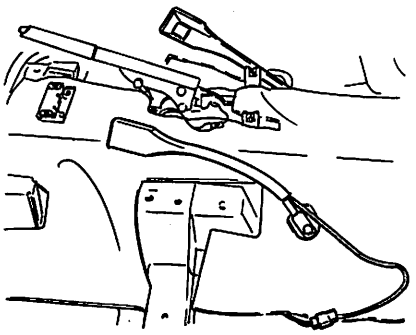
Replacement

Belt switch is an integral part of seat belt fastener so switch and seat belt fastener must be replaced as an assembly.

1. Remove console box.
2. Remove carpet from floor tunnel.
3. Disconnect lead wire for belt switch at connector.
4. Remove bolt securing seat belt.
5. Installation is in the reverse sequence of removal.

Inspection

Test continuity between two lead wires from seat belt switch by using ohmmeter or test lamp when the seat belt is fastened, continuity between lead wires must not exist. Conversely continuity must exist when released.



BE871B

Fig. BE-79 Seat belt switch

WARNING BUZZER

Refer to previous instructions under heading Theft Protection System in Section BE.

WARNING LAMP

Bulb replacement

The lamp with a bulb is located behind the cluster lid.

1. Disconnect battery ground cable.
2. Remove glove box inner case.
3. Through glove box opening, turn bulb socket counterclockwise and pull out socket from behind warning lamp body.
4. Remove bulb from socket.
5. Install new bulb in the reverse sequence of removal.

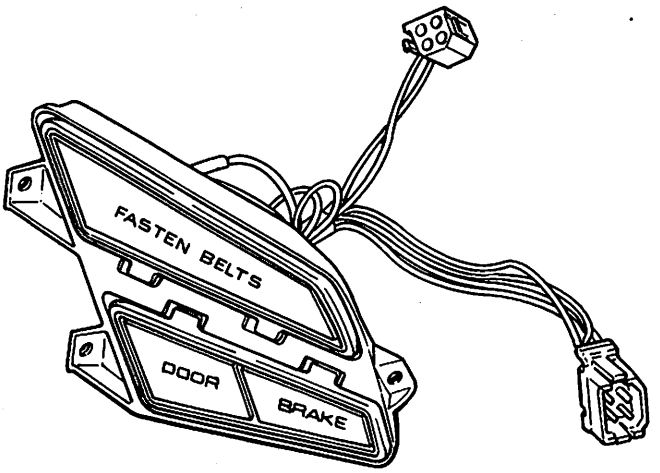
Bulb wattage:

Seat belt warning lamp 3.4W

(Wedge base type)

Lamp body replacement

1. Remove cluster lid as described in Cluster Lid and Combination Meter.
2. Loosen three screws and remove warning lamp body from cluster lid.
3. Install a new lamp body in the reverse sequence of removal.

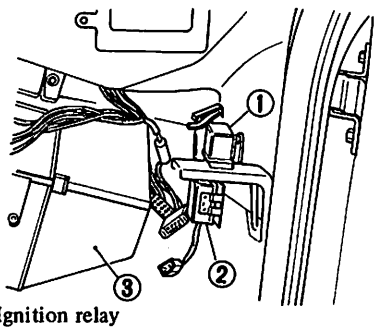


BE251D

Fig. BE-80 Warning lamp

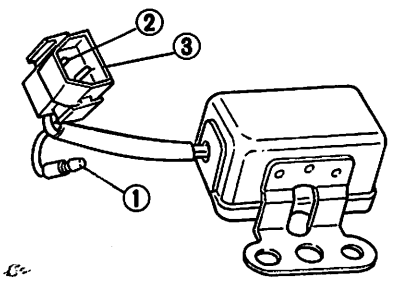
TIMER UNIT

The seat belt timer unit is located on the right side of the dash side panel.



1 Ignition relay
2 Seat belt warning timer unit
3 Cooling unit

BE800B



BE873B

Fig. BE-81 Seat belt timer unit

Replacement

1. Disconnect lead wires at connector.
2. Loosen two screws and replace with a new timer unit.
3. Installation is in the reverse order of removal.

Inspection

Turn ignition key to the START position (no need to start the engine).

The voltage across terminal ② and ground must be 12V for 4 to 8 seconds and then go out. (See Figure BE-87.)

IGNITION SWITCH

The ignition switch is described in Ignition and Starting Switch in Section BE.

DOOR WARNING SYSTEM

DESCRIPTION

Door warning system consists of a door switch, a warning lamp, and a warning buzzer B (continuous) and a relay.

REMOVAL AND INSTALLATION

Door switch

Refer to Lighting and Signal Lamp System.

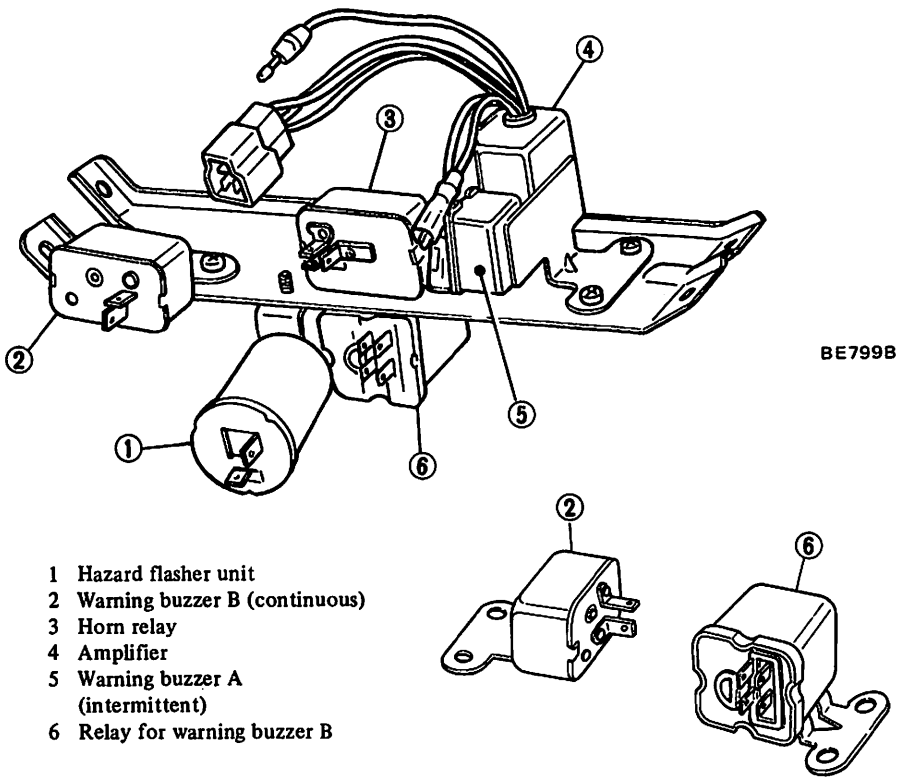
Warning lamp

The door warning lamp bulb can be easily replaced by twisting the socket behind the warning lamp body. Refer to Seat Belt Warning for bulb replacement.

Warning buzzer B (Continuous) and relay

The warning buzzer and relay are located behind the cluster lid in the instrument panel.

1. Disconnect battery ground cable.
2. Remove glove box inner case from under instrument panel.
3. Loosen four screws retaining relay bracket to instrument panel.
4. Disconnect lead wires at connectors and take out relay bracket.
5. Remove warning buzzer and relay retaining screws and replace with new units.
6. Installation is in the reverse order of removal.



1 Hazard flasher unit
2 Warning buzzer B (continuous)
3 Horn relay
4 Amplifier
5 Warning buzzer A (intermittent)
6 Relay for warning buzzer B

Fig. BE-82 Warning buzzer B (continuous) and relay

BRAKE WARNING SYSTEM

DESCRIPTION

The brake warning system consists of a warning lamp, a parking brake switch and a fluid level warning switch in the brake reservoir tanks. Refer to the system circuit diagram.

The brake warning lamp comes on when the parking brake is applied.

The warning switch causes warning lamp to come on when problem occurs in brake lines. For information on brake fluid level warning switch, refer to Section BR.

The warning lamp also comes on when the ignition switch is turned ON with the engine shut down, permitting inspection of the lamp condition.

The brake warning lamp checking system consists of a warning lamp, check relay (auto-choke heater relay) and an alternator. The whole circuit is shown in Figure BE-88.

When the ignition switch is turned ON, current flows to the warning lamp. When the engine is shut down, the brake warning lamp check relay (auto-choke heater relay) contacts are closed and warning lamp comes on.

When the engine is started, current from terminal N of the alternator flows through the winding of the check relay, causing relay contacts to open. The lamp will go out when the parking brake is released and the brake warning switch is OFF.

REPLACEMENT

Brake warning lamp

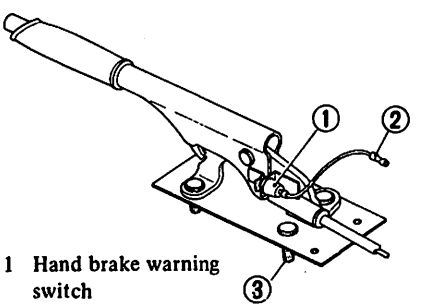
The brake warning lamp bulb can be easily replaced by twisting the socket behind the warning lamp body. Refer to Seat Belt Warning System for bulb replacement.

Hand brake switch

The hand brake switch is mounted on the lever support bracket.

To replace hand brake switch, disconnect lead wire at connector plug and pull switch assembly out of bracket.

When plunger is pressed into switch assembly, hand brake switch contacts are open. Contacts are closed when plunger is projected.



1 Hand brake warning switch
2 Terminal
3 Bolt

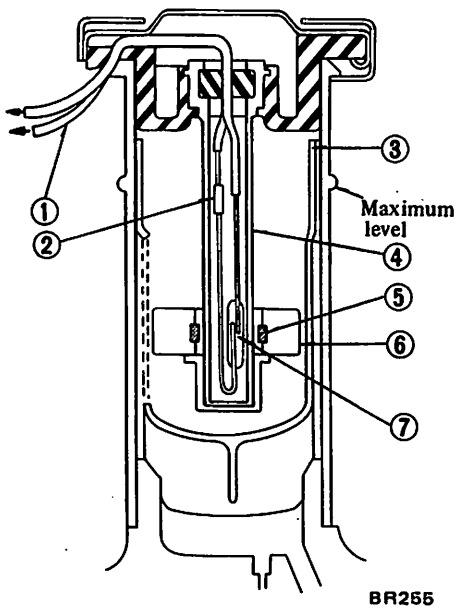
Fig. BE-83 Hand brake switch

Fluid level warning switch

Fluid level warning switch is located in the reservoir tanks.

Replacement

1. Disconnect lead wires at connectors.
2. Remove reservoir tank cap.
3. Replace faulty cap as a pair.

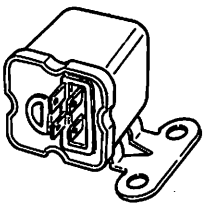


1 Lead wire
2 Resistor
3 Filter
4 Case
5 Magnet
6 Float
7 Lead switch

Fig. BE-84 Fluid level warning switch

INSPECTION

Check each switch for proper operation and test continuity of wiring system with an ohmmeter or test lamp, referring to circuit diagram. Take care that each connection is correctly secured.



BE875B

Fig. BE-85 Warning buzzer B

LIGHTS "ON" WARNING SYSTEM

DESCRIPTION

The lights "ON" warning system consists of a warning buzzer (continuous), a relay, and a door switch.

When the ignition switch is ON, the buzzer relay gets excited and the buzzer switch comes off. When the ignition switch is OFF, the relay point is always ON.

In case a driver leaves the car with the engine shut down (ignition key OFF) but leaving lights ON, the continuous buzzer sounds when the door is open (Door switch is ON) and reminds a driver of lights.

REPLACEMENT

Buzzer and relay

Refer to Door Warning System.

Door switch

Refer to Lighting and Signal Lamp System.

INSPECTION

Test system continuity by using a test lamp or ohmmeter, referring to Figure BE-89.

REVERSE GEAR WARNING BUZZER

DESCRIPTION

On manual transmission models, to protect from misshift, a warning buzzer sounds intermittently when the control lever is in the reverse position.

REPLACEMENT

Warning buzzer (Intermittent)

Refer to Seat Belt Warning System.

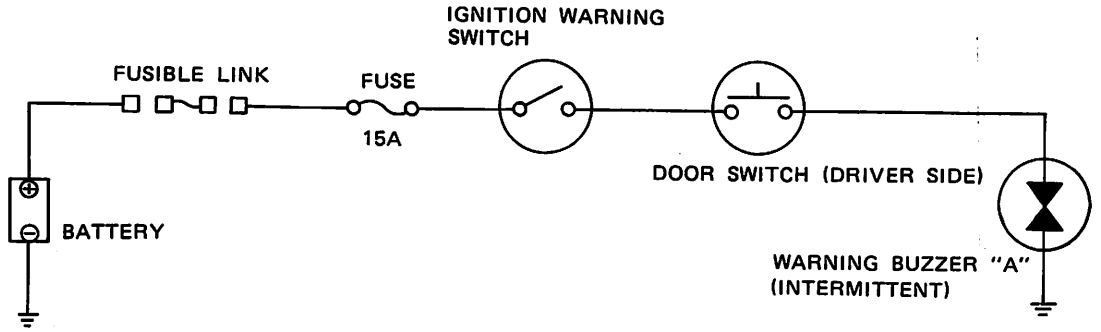
Reverse gear switch

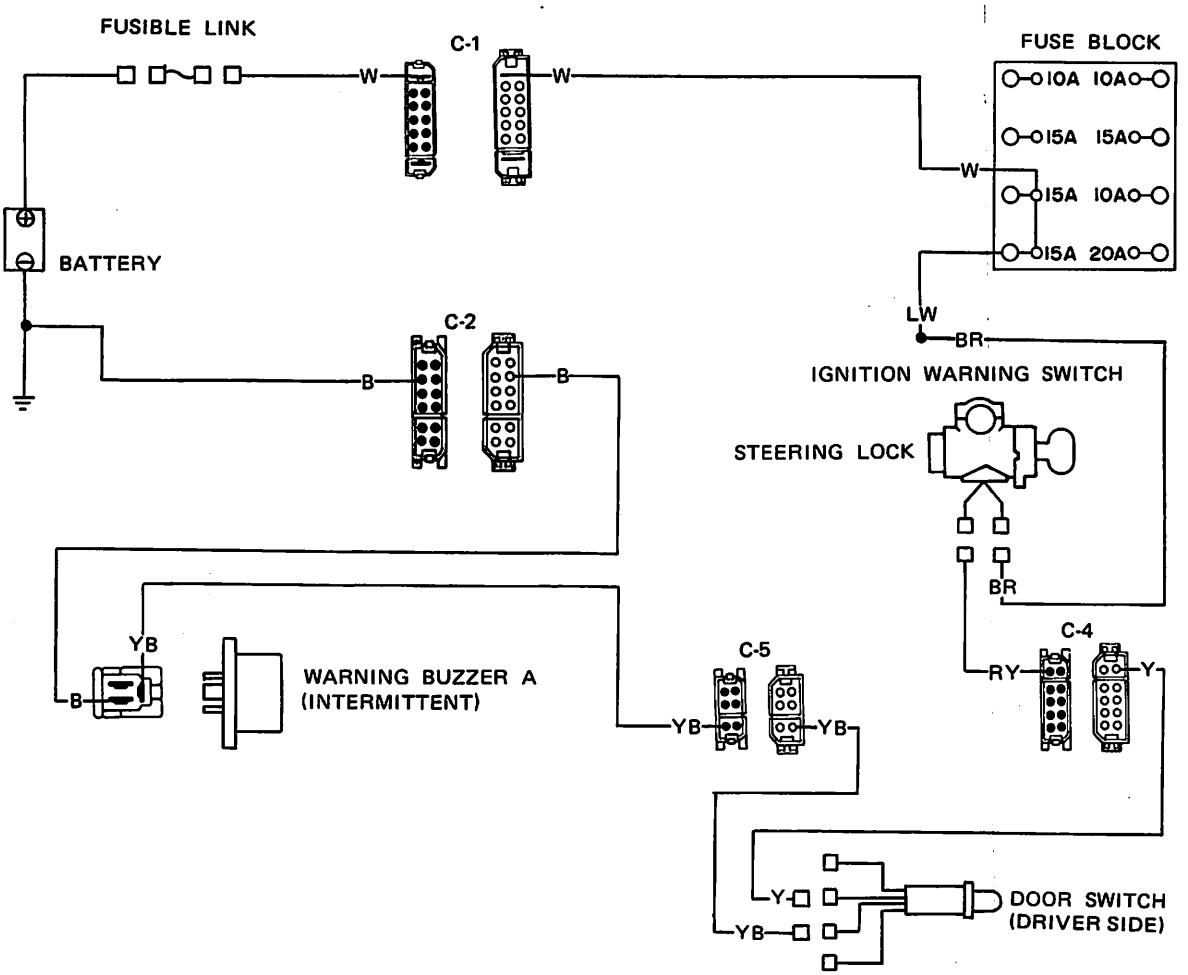
Refer to Section MT.

INSPECTION

Test continuity of warning buzzer system by using a test lamp or ohmmeter, referring to Figures BE-58 and BE-58.

Theft protection warning system





COLOR CODE

B	:	Black
W	:	White
Y	:	Yellow
BR	:	Black with red stripe
RY	:	Red with yellow stripe
YB	:	Yellow with black stripe
LW	:	Blue with white stripe

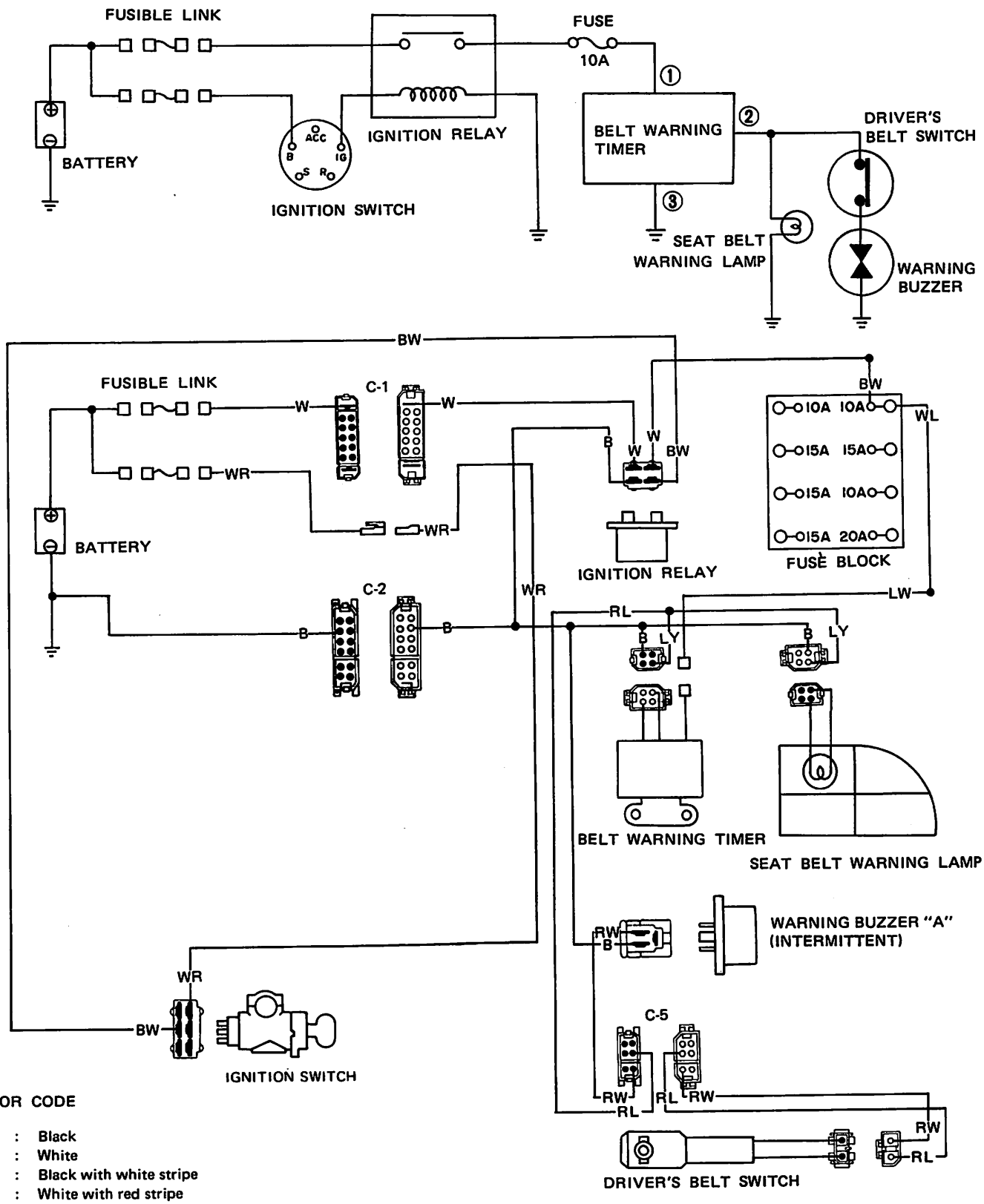
CONNECTOR

C-1 : White
C-2 : White
C-4 : White
C-5 : Black

BE367C

Fig. BE-86 Theft protection warning system

Seat belt warning system



COLOR CODE

B	:	Black
W	:	White
BW	:	Black with white stripe
WR	:	White with red stripe
WL	:	White with blue stripe
RW	:	Red with white stripe
RL	:	Red with blue stripe
LW	:	Blue with white stripe
LR	:	Blue with red stripe
LY	:	Blue with yellow stripe

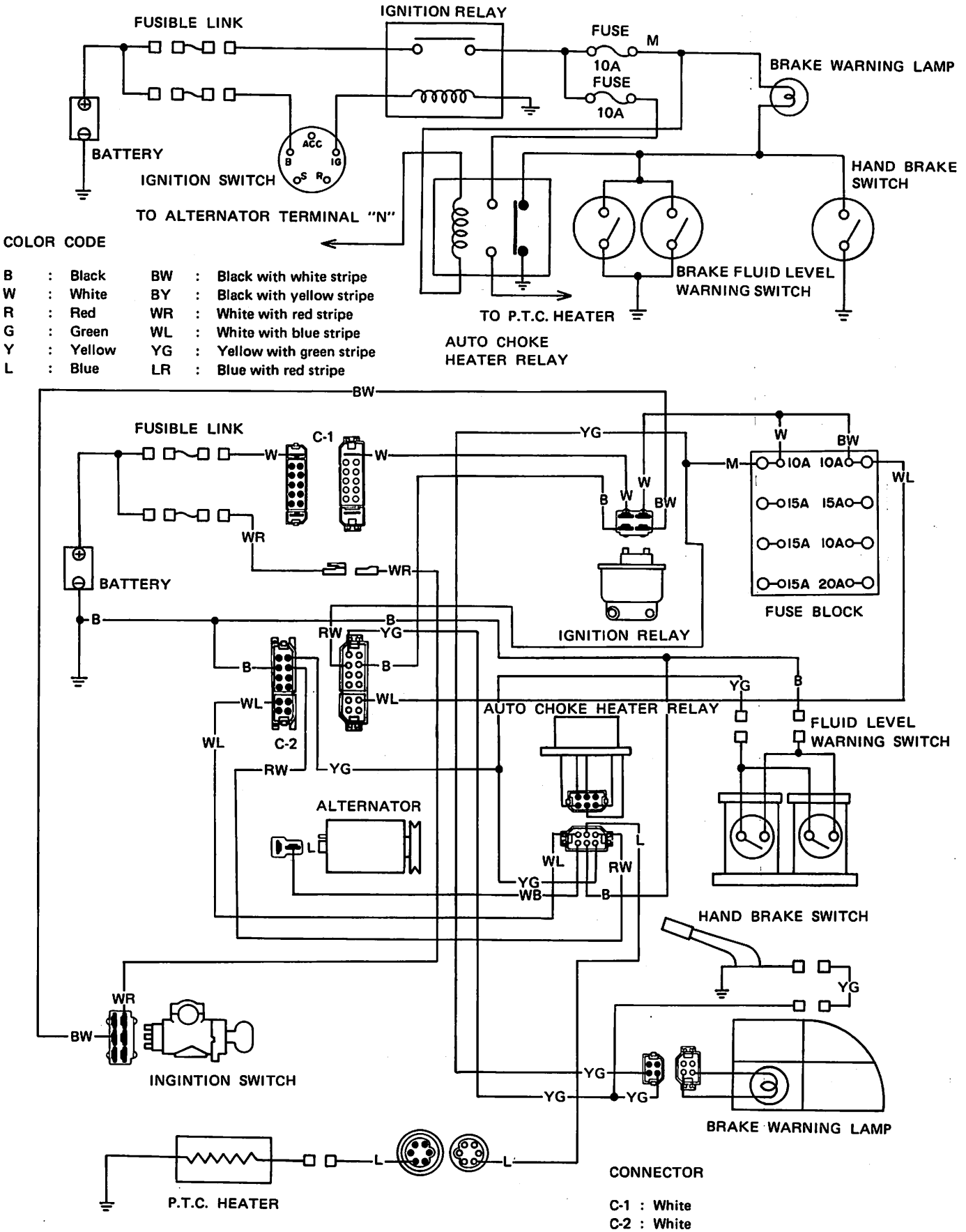
CONNECTOR

C-1 : White
C-2 : White
C-5 : Black

BE369C

Fig. BE-87 Seat belt warning system

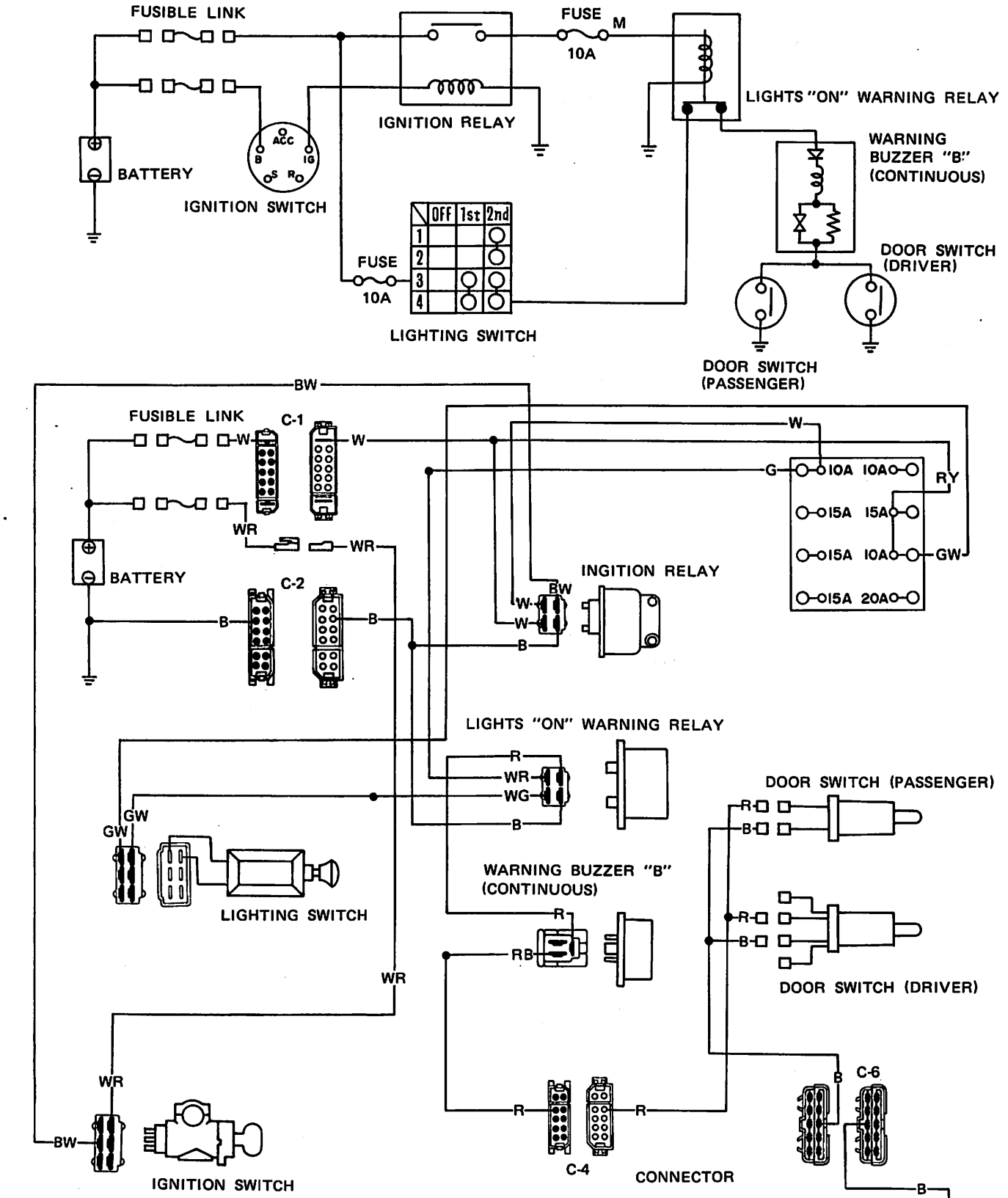
Brake warning system



BE370C

Fig. BE-88 Brake warning system

Light "ON" warning system



COLOR CODE

B	:	Black
W	:	White
R	:	Red
G	:	Green
BW	:	Black with white stripe
WR	:	White with red stripe
WG	:	White with green stripe
RY	:	Red with yellow stripe
RL	:	Red with blue stripe
GW	:	Green with white stripe
LR	:	Blue with red stripe

CONNECTOR

C-1 : White
C-2 : White
C-4 : White
C-6 : White

BE371C

Fig. BE-89 Lights "ON" warning system

ELECTRIC ACCESSORY

CONTENTS

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HEATER

DESCRIPTION

This heater unit is a air-mix type so that the good responsibility and controlability of air temperature control will be obtained. The heater unit is equipped with the BI-LEVEL and fan ventilation mechanism in order to obtain better comfort in the passenger compartment.

Outside air taken in through the cowl top grille of the body passes through the air intake box and is sent to the heater unit by the motor fan.

The heater unit has the following components: air mix door for temperature control, vent door for distribution (ventilation side, heater side, or both sides) of air flow and room door.

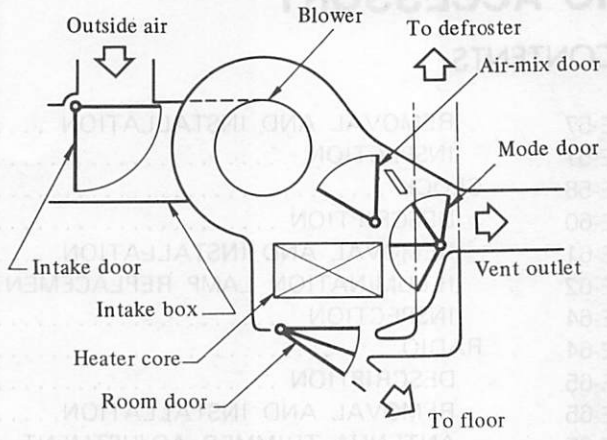
The intake door is installed on the intake box to shut out the outside air when the Air control lever is off.

The Air lever controls air discharge by three doors (air intake, mode and room doors).

- The air intake door is used to let either outside- or inside-air flow into the heater unit. Outside air is drawn from the cowl top grille and delivered to the air intake box.
- The mode door serves to supply air flow to the outlet in the instrument panel. This door has three detent positions – open, close, middle.
- The defroster room door controls air flow discharged from heater unit. When door is open, air is discharged to the floor area with a small amount going to defroster nozzle. When closed, all air is discharged through defroster nozzle.

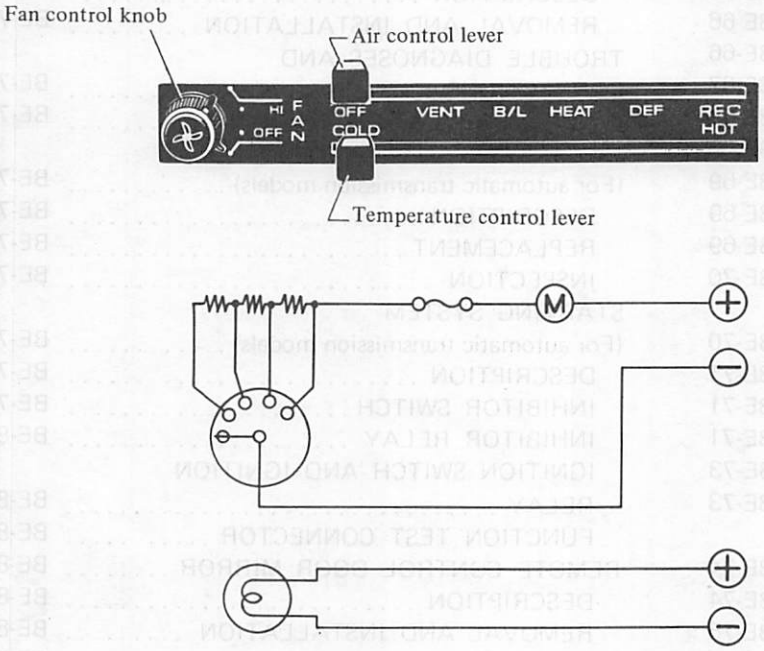
The Temp lever controls the air mix door and mixes heated air with air bypassing the heater core to obtain the desired air temperature. In this manner, the temperature of air is effectively controlled.

The Fan lever controls switch that is located on the control lever assembly, providing three blower speeds.



BE894B

Fig. BE-90 Heater mechanism



BE372C

Fig. BE-91 Heater control

The heater unit is located on the floor tunnel under the instrument panel and is controlled by two levers and Fan switch.

- Air lever (for the selection of outlet)
- Temp lever (for the temperature control of outlet air)
- Fan switch (for the control of air flow amount)

AIR FLOW

Air ventilating

Air ventilating position is used for

- Induction of outside fresh air
- High speed driving with window closed

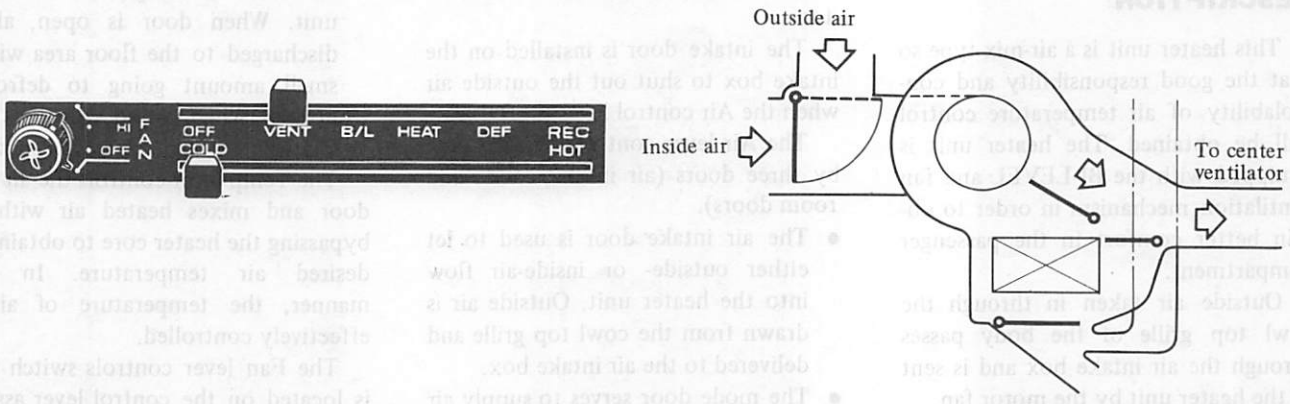
Note: Air ventilation is useful to take fresh air into passenger compartment when traffic is heavy or car is stopped.

- Locate Air lever at OFF, Temp lever at COLD and Fan switch OFF when heater is not used for long time.

At the REC position air flow is restricted inside the passenger compartment.

Note: REC position is useful in the tunnel, or to prevent entrance of other car's exhaust gases when traffic is heavy.

- Also this position will introduce the inside fogging of windshield. Combine OFF and Vent position adequately.



BE373C

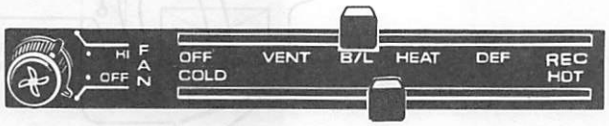
Fig. BE-92 Air ventilating

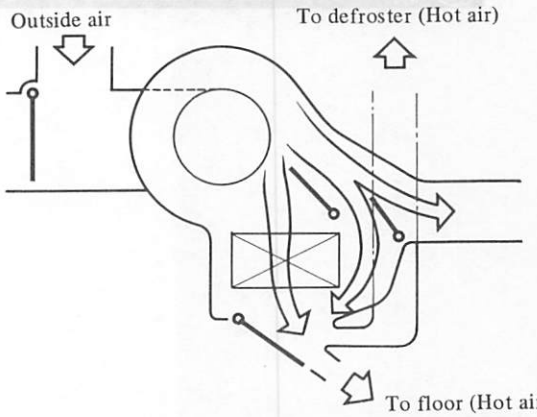
Bi-level
(Heating and air ventilating)

Bi-level position is used for

- Getting cool at the face and warm at the foot.
- Getting un-humid air for defrosting and warm air for heating in the rainy season.

Note: Fresh air will be obtained from all ventilation nozzles when Temp lever is at the COLD position.





BE374C

Fig. BE-93 Bi-level

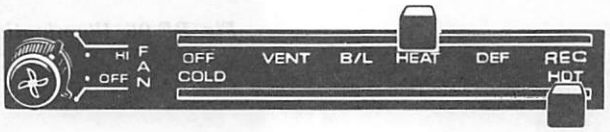
Heating

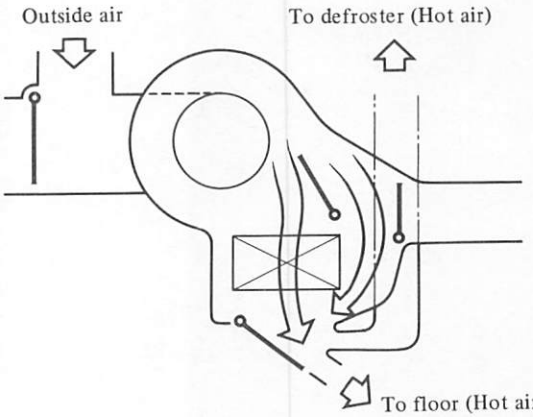
Heat position is used for

- Getting warm in cold weather

At the heat position, 1/5 of air flow will be distributed to the defroster nozzle to clear up the windshield.

Note: An air mix type heater unit controls outlet air flow temperature quickly. It is easier to set the room temperature as desired as compared with a recirculating type.





BE375C

Fig. BE-94 Heating

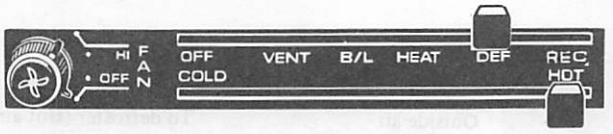
Defrosting

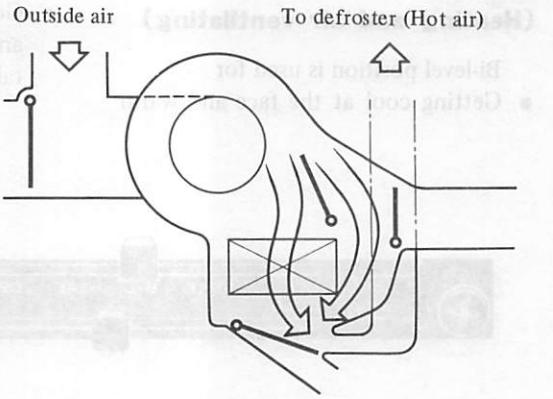
The defrosting position is used for

- Defogging front windshield in cold weather
- Defrosting front windshield in cold weather
- Defogging front windshield in rainy weather

Note: This defrosting system is designed to clear the F.M.V.S.S. No. 103 regulation.

- Be sure not to disconnect or damage the connection of heater hose and unit.





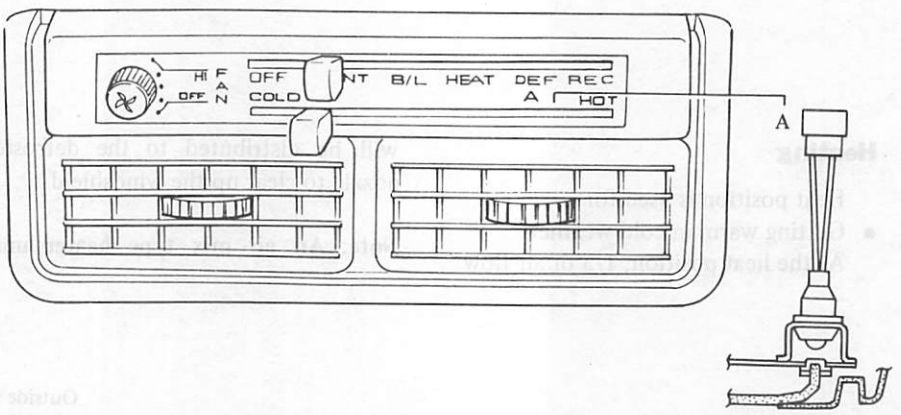
BE376C

Fig. BE-95 Defrosting

ILLUMINATION LAMP REPLACEMENT

The illumination lamp is located in the center ventilator.

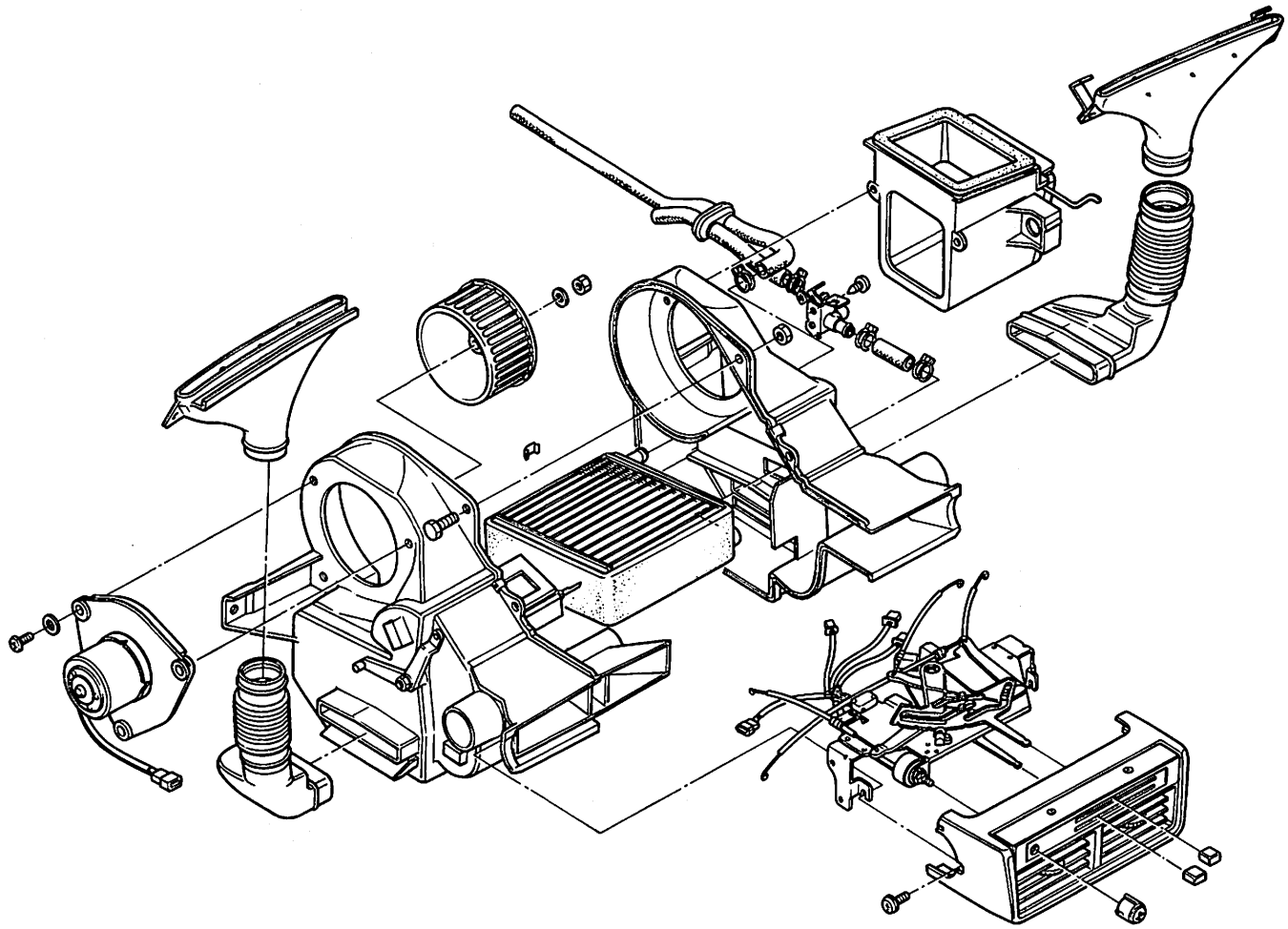
1. Remove center ventilator. Refer to page BE-96 for Center Ventilator.
2. Remove bulb with socket from behind center ventilator.
3. Take out bulb.
4. Install new bulb in the reverse sequence of removal.



BE377C

Fig. BE-96 Illumination lamp

REMOVAL AND INSTALLATION

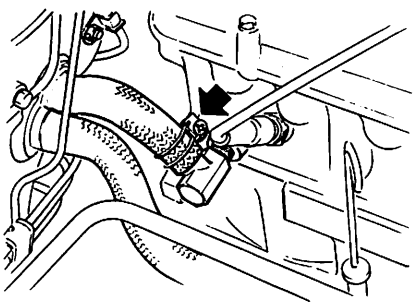


BE252D

Fig. BE-97 Heater unit

Engine compartment side

1. Disconnect battery ground cable.
2. Drain engine coolant and disconnect heater hose clamp.



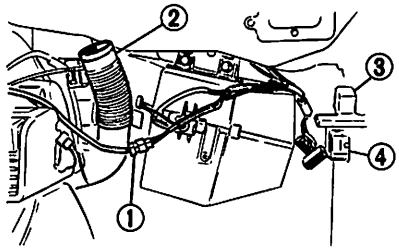
BE902B

Fig. BE-98 Removing clamp

Passenger compartment side

1. Disconnect lead wires from heater unit to instrument harness.
2. Remove instrument panel. For details, refer to Section BF.

3. Remove defogger hoses on both sides of heater unit.
4. Disconnect lead wires from heater unit to cooling unit on air conditioner equipped models.



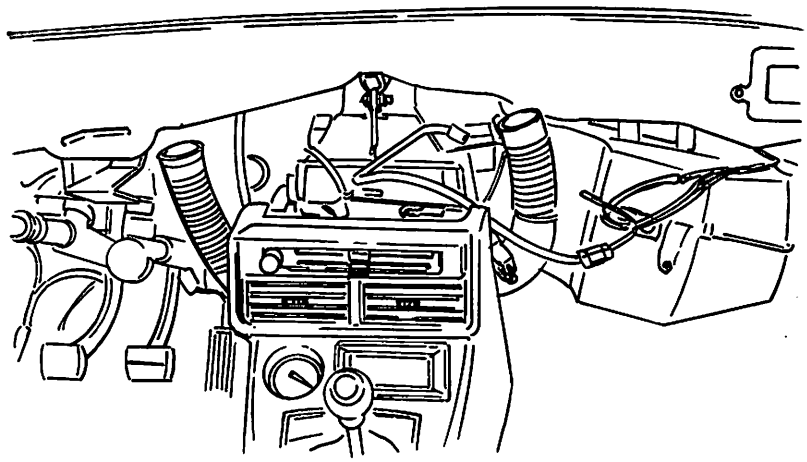
1 Connector between heater unit and cooling unit
2 Defogger hose
3 Ignition relay
4 Seat belt timer BE904B

Fig. BE-100 Disconnecting connector

5. Remove three heater retaining bolts and take out heater unit.

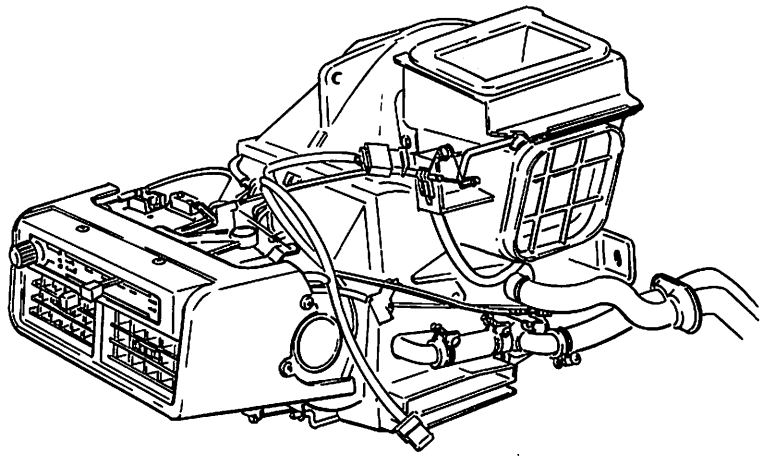
Note: Be careful not to drip water remaining in heater core.

6. Installation is in the reverse sequence of removal.



BE903B

Fig. BE-99 Removing instrument panel



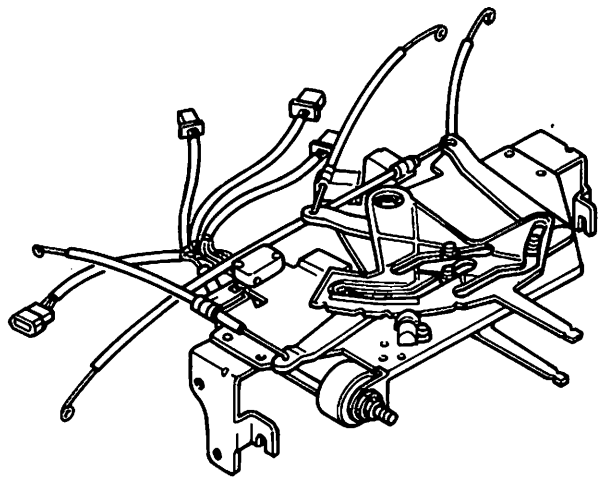
BE905B

Fig. BE-101 Taking out heater unit

DISASSEMBLY AND ASSEMBLY

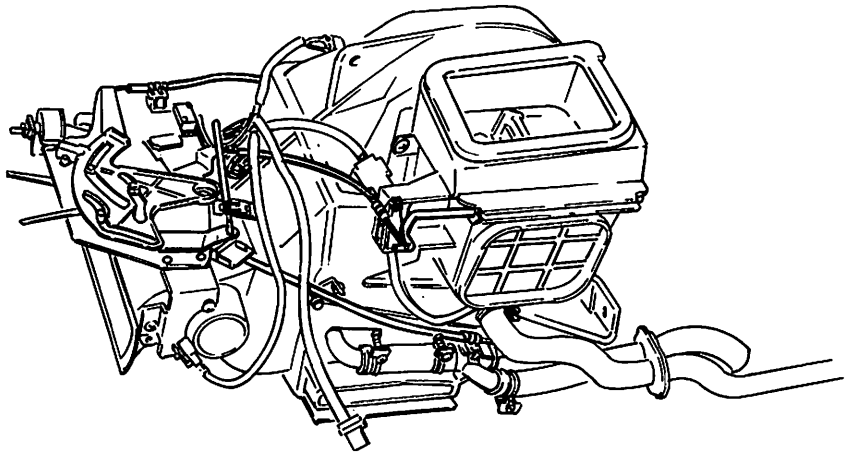
Heater control and center ventilator

1. Pull out heater control knobs and Fan switch knob.
2. Disconnect heater control illumination lamp connector.
3. Remove four screws securing center ventilator to heater unit and remove center ventilator.
4. Disconnect lead wires from microswitch to fan motor and Fan switch to resistor.



BE906B

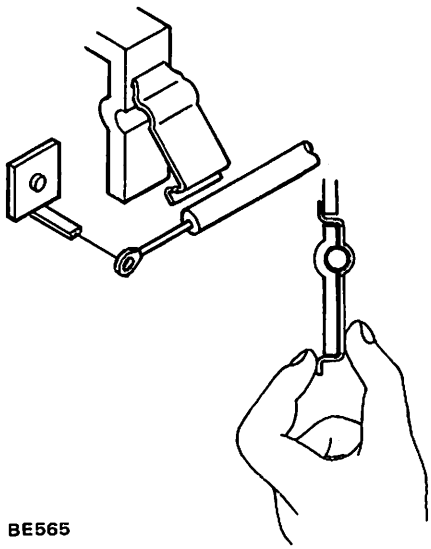
Fig. BE-102 Heater control



BE907B

Fig. BE-103 Disconnecting control cables

5. Remove clips and disconnect control cables and rod at heater cock, air intake valve, heat valve and ventilation valve.



BE565

Fig. BE-104 Removing clips

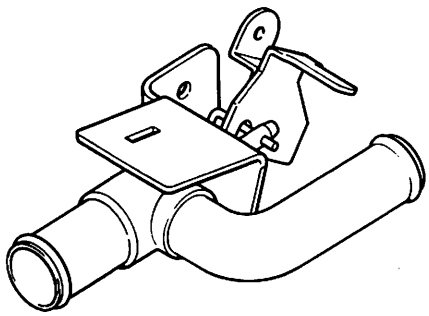
6. Loosen screws securing heater control to heater unit and remove heater control.
7. Installation is in the reverse sequence of removal.

Air intake box

1. Disconnect control cable for intake door.
2. Remove screws retaining air intake box to heater unit.
3. Remove air intake box.
4. Installation is in the reverse order of removal.

Heater cock

1. Remove clamps from heater cock. There are two heater hoses for inlet and outlet. Disconnect heater hose from heater cock.



BE908B

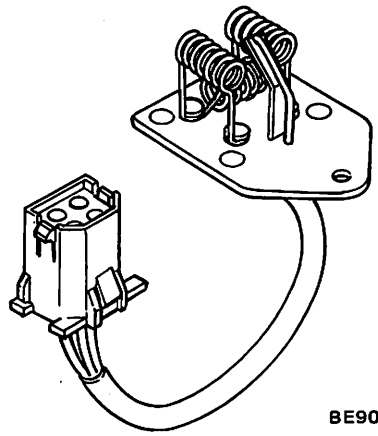
Fig. BE-105 Heater cock

2. Disconnect control rod at air mix door.
3. Remove two retaining screws. Heater cock can be taken out.
4. Installation is in the reverse sequence of removal.

Resistor

Resistor is located at the bottom of air intake box.

1. Disconnect lead wires at connector.
2. Remove two screws retaining resistor and take it out.
3. Installation is in the reverse sequence of removal.



BE909B

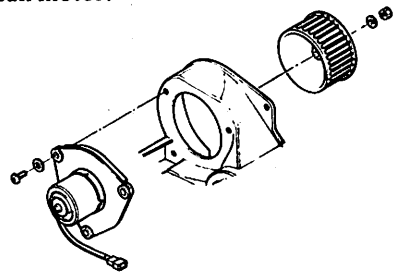
Fig. BE-106 Resistor

Fan motor

1. Remove heater control and center ventilator. Refer to Heater Control and Center Ventilator for removal.
2. Disconnect inlet and outlet hoses from heater core.
3. Remove connecting rod of air mix door. (Loosen screw and remove rod with bracket.)
4. Remove clips retaining both left and right side heater box in body.

Note: There are five clips and they can be removed easily with a screwdriver.

5. Separate heater box into two pieces.
6. Disconnect lead wire at connector.
7. Remove fan from fan motor shaft.
8. Remove three screws retaining fan motor.



BE253D

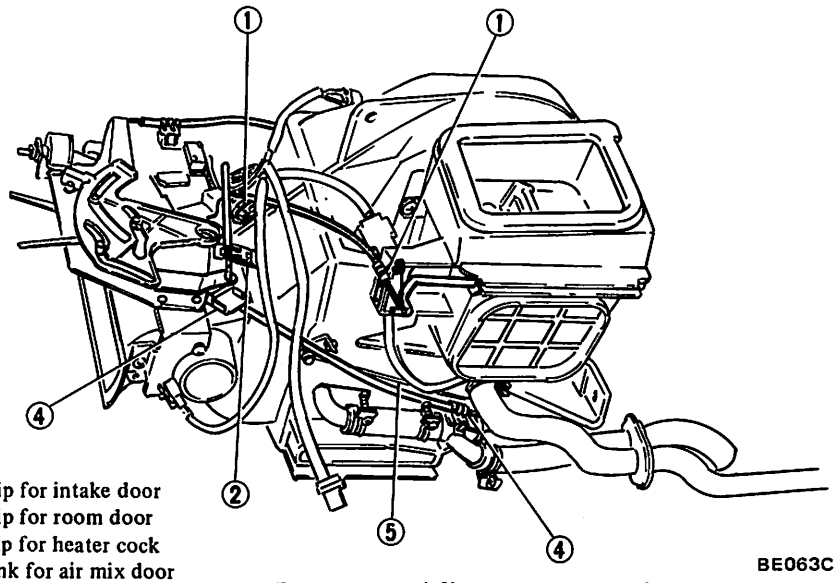
Fig. BE-107 Removing fan motor

Heater box and heater core

1. Remove heater control from body as previously described.
2. Disconnect heater hose from heater cock by removing clip.
3. Remove the connecting rod of air mix door. (Loosen small screw and remove rod with bracket.)
4. Remove clips retaining both left side and right side heater box in body.

Note: There are five clips and they can be removed easily with a screwdriver.

5. Separate heater box into two pieces.
6. Heater core, air mix door, vent door and room door can be taken out.
7. Installation is in the reverse sequence of removal.



1 Clip for intake door
2 Clip for room door
4 Clip for heater cock
5 Link for air mix door

BE063C

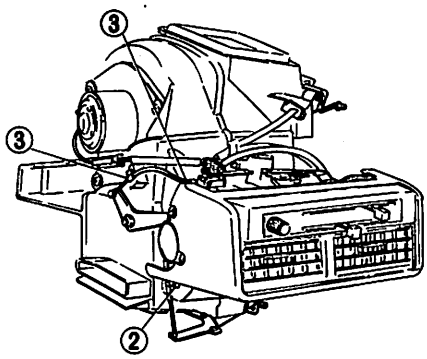
Fig. BE-108 Adjusting air intake door control cable

ADJUSTMENT

Control assembly

Whenever a new or reconditioned heater unit is to be installed, adjust control assembly as follows:

1. Move Air lever to A/C position.
- Pull the outer case of heater control cable fully and fix the cable with cable retaining clamp at air intake door.
- Push the outer case of heater control cable fully downward and fix cable with retaining clamp at room door.



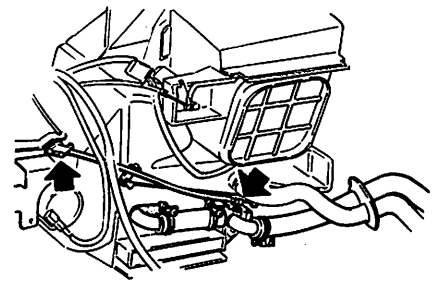
2 Clip for room door
3 Clip for mode door

BE912B

Fig. BE-109 Adjusting room door control cable

2. Move Air lever to HEAT position.
- Pull the outer case of heater control cable fully and fix cable with cable retaining clamp at vent door. See Figures BE-108 and BE-109.

3. Move Temp lever to COLD position.
- Pull the outer case of heater control cable fully and fix cable with cable retaining clamp at heater cock.
- Confirm that air mix door is shut down to COLD side. If not, adjust connecting rod.



BE913B

Fig. BE-110 Adjusting heater cock control cable

Note: Make sure that each control lever moves smoothly over its entire stroke.

INSPECTION

Check the following items if fan motor fails to rotate.

1. Fuse and fusible link
2. To check for burned fuse, use the same procedure as that for ordinary fuses by using a circuit tester or test lamp.
3. Loose wire connection

Fan motor power supply

1. Disconnect lead wires at connector.
2. Move ignition switch to ON position.
3. Connect test lamp lead wire to blue/white wire terminal in connector plug of instrument harness and other to the ground.
4. Make sure that test lamp goes on.

Fan motor

1. Disconnect lead wires at connector.
2. Move ignition switch to ON position.
3. Connect test lead to positive side of fuse block power supply (15A, Heater) and the other to blue/white wire terminal in connector plug on fan motor side.
4. Make sure that fan motor operates at each fan lever position.

SERVICE DATA AND SPECIFICATIONS

SPECIFICATIONS

Rated voltage	V	12
Heating capacity	kcal/h	3,500
Fan blow rate	m^3/h (cu. ft/h)	315 (11,123)

COMPONENT PARTS

Fan		
Type		Sirocco
Outer diameter	mm (in)	135 (5.31)
Width	mm (in)	70 (2.76)
Motor		
Type		Magnet motor
Power consumption	W	150
Outer diameter	mm (in)	75 (2.95)
Heater core		
Type		Corrugated fin
Dimension	mm (in)	160 x 155 x 66 (6.30 x 6.10 x 2.60)
Water cock		
Type		Manual ON-OFF

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Insufficient heating performance.		
No heated air discharged.	Cooling water temperature too low.	Check thermostat. Replace as necessary.
	Heater core plugged.	Clean.
	Insufficient cooling water level.	Refill.
	Water cock not operating properly.	Adjust control cable.
	Air mix door not operating properly.	Adjust control cable.
Insufficient air flow to floor.	Fan motor speed too low.	Check for motor terminal voltage. Repair poor connection and discontinuity. Replace motor if necessary.
	Floor door and mode door not operating properly.	Adjust control cable.

Condition	Probable cause	Corrective action
Insufficient defrosting performance.		
Cold air discharged.	Refer to "No heated air discharged".	
Insufficient air flow to defroster.	Floor door and mode door not operating properly (or seal defective).	Adjust control cable.
	Defroster nozzle plugged.	Clean.
	Leak at defroster duct-to-nozzle connection.	Correct.
Heated air discharged with lever in VENT.	Water cock not operating properly.	Adjust control cable.
No heated air discharged with lever in B/L	Air intake door not operating properly.	Adjust control cable.
Failure of fan to run.	Fuse melted.	Replace.
	Motor wire connector disconnected.	Correct.
	Switch defective.	Replace.
	Motor defective.	Check and correct.
Control lever drags.	Inner wire rubbing against outer case end.	Adjust control cable.
	Control cable bent excessively.	Correct.
	Doors, door levers, etc. not operating properly.	Check and correct.
Outside air comes in with fan in OFF.	Air intake door not operating properly.	Repair or replace.
	Control cable out of adjustment.	Adjust control cable.
Noise from fan motor.	Unusual noise from fan motor.	Check and tighten loose bolts.

ELECTRIC REAR WINDOW DEFOGGER

DESCRIPTION

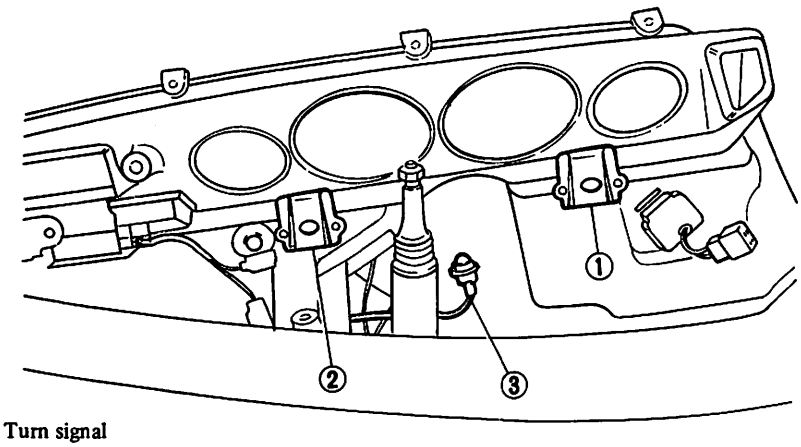
The electrical rear window defogger system consists of a defogger switch and filaments in the rear window. Heat from the filament keeps the rear window free of fog and frost. The filament is printed inside of the rear window. It can not be replaced, but can be repaired as described in this section.

REMOVAL AND INSTALLATION

Defogger switch

The defogger switch is installed by screws against the cluster lid. The switch has an indicator lamp in the body.

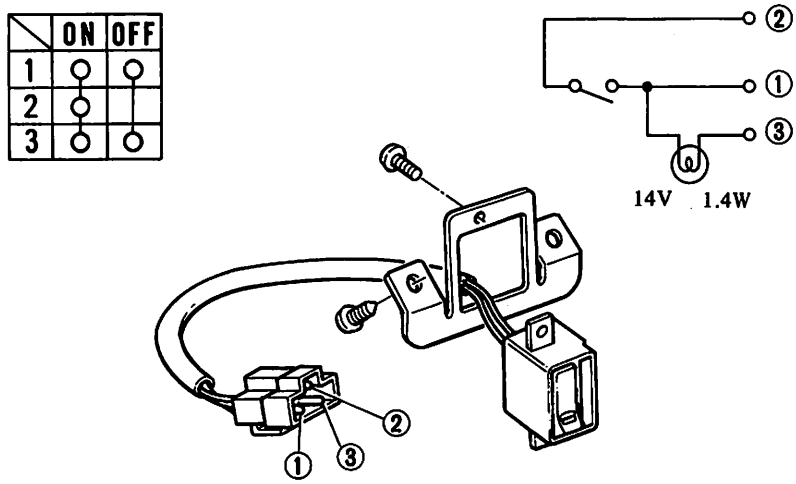
1. Draw out cluster lid. (Refer to Meters and Gauges.)
2. Loosen two screws retaining defogger switch bracket to cluster lid and remove switch with bracket.
3. Disconnect lead wires at connector.



1 Turn signal pilot lamp housing (L.H.)
2 Turn signal pilot lamp housing (R.H.)
3 Turn signal pilot lamp

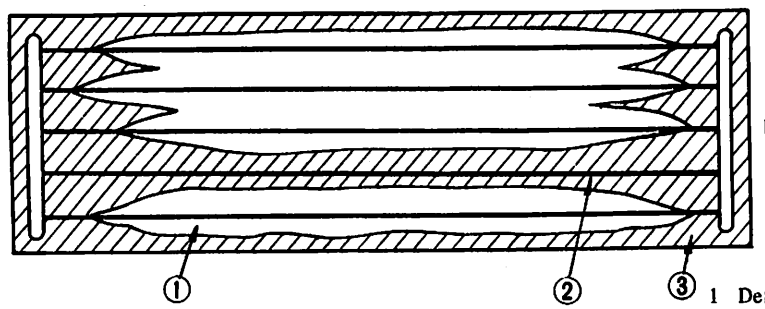
BE829B

Fig. BE-111 Removing cluster lid



BE914B

Fig. BE-112 Defogger switch



BE537

1 Defogged area
2 Broken heat wire
3 Fogged area

Fig. BE-113 Broken filament

Note: Connector is behind radio receiver.

4. Take out defogger switch.
5. Installation is in the reverse order of removal.

Defogger switch indicator lamp replacement

1. Remove defogger switch assembly from cluster lid as described previously.
2. Push socket located behind the switch, and turn it counterclockwise. Socket with bulb can then be taken out.
3. Pick up bulb from socket.
4. Install new bulb in the reverse sequence of removal.

Bulb wattage:
Defogger switch lamp 1.4W

Rear window filaments

The filaments are printed inside the rear window glass. Therefore, the element cannot be removed. Refer to Section BF for Removal of Rear Window Glass.

INSPECTION

Test continuity of system by using test lamp or ohmmeter. Refer to Figure BE-152.

Defogger switch

Test continuity of switch by using test lamp or ohmmeter. The test must be carried out with switch both ON and OFF. See Figure BE-112.

Rear window filament

Rear window defogger filament can be inspected for circuit breaks by one of three methods.

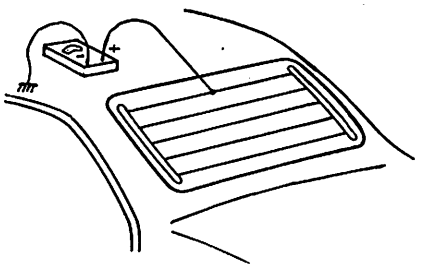
Method 1:

Start the engine and turn on the window defroster system. If the area around a specific filament is not defogged, that line is broken.

Method 2:

Start the engine and turn on the window defroster system. With a direct-current voltmeter setup shown in Figure BE-114, check each heat wire for discontinuity. If the meter indicates 12 volts or 0 on a specific wire, that line is broken. (Normal indication: 6 volts)

A break in that line can then be detected by moving the positive lead of meter along the line until an abrupt variation in the meter indication is encountered.



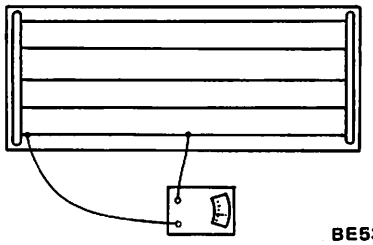
BE538

Fig. BE-114 Checking for broken filament with D-C voltmeter

Method 3:

With an ohmmeter setup shown in Figure BE-115, place one lead on end of a heat wire and the other in the middle section of that wire. If the meter resisters, on a specific grid line, a value twice as much on any other line, that line is broken.

A break in that line can then be located by an abrupt variation in the meter indication as the test lead moves along the broken heat wire.



BE539

Fig. BE-115 Checking for broken filament with ohmmeter

FILAMENT MAINTENANCE

Repair equipment

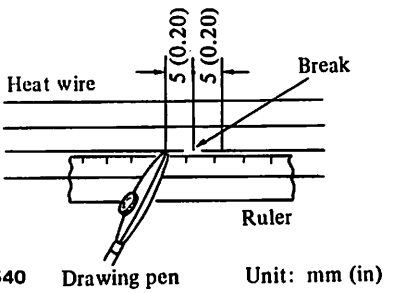
1. Conductive silver composition (Dupont No. 4817)
2. Ruler, 30 cm (11.8 in) long
3. Drawing pen
4. Heat gun
5. Alcohol
6. Cloth

Repair procedure

1. Wipe clean broken heat wire and its surrounding area with a cloth dampened in alcohol.
2. Apply a small amount of conductive silver composition to the tip of drawing pen.

Note: Shake silver composition container before use.

3. Place ruler on glass along broken line to be repaired as shown in Figure BE-125. Deposit conductive silver composition on break line with drawing pen. Slightly overlap existing heat wire both sides [5 mm (0.20 in) preferable] of the break.

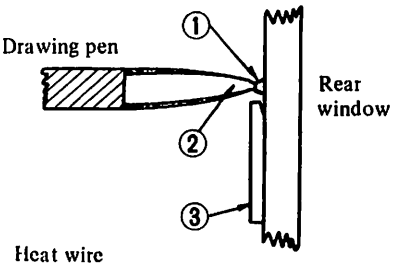


BE540

Fig. BE-116 Locating ruler in position

4. Wipe clean silver composition from tip of drawing pen.
5. After repair has been completed, check repaired wire for continuity. This check should be conducted 10 minutes after silver composition is deposited.

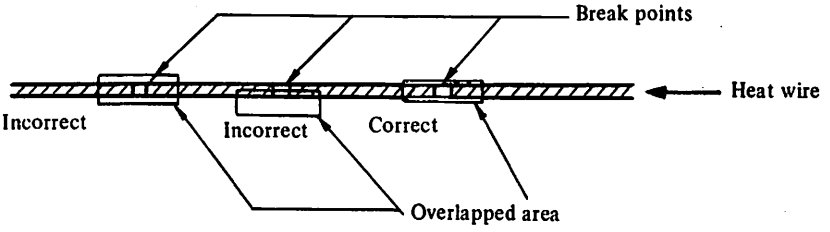
Note: Do not touch repaired area while test is being conducted.



1 Heat wire
2 Silver composition
3 Ruler

BE541

Fig. BE-117 Depositing silver composition in place



BE542

Fig. BE-118 Incorrect and correct deposition of silver composition

6. Apply a constant stream of hot air directly to the repaired area for approximately 20 minutes with a heat gun. A minimum distance of 3 cm (1.18 in) should be kept between the repaired area and hot air outlet. If a heat gun is not available, leave the repaired area unattended for 24 hours.

Instructions after repair

Wipe clean the repaired area with a soft, clean cloth.

Note: Do not use a cleaning solvent containing much soapy water.

HORN

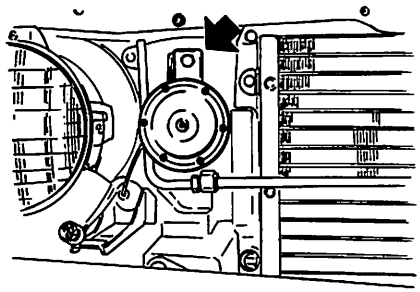
DESCRIPTION

The horn electrical system consists of a horn switch, a horn relay, two horns and lead wires connecting these parts to each other. The horn is a dual type. One is low tone and other is high tone. They can be distinguished by the letter L or R printed on their bodies. The horn relay is installed on the relay bracket in the instrument panel.

REMOVAL AND INSTALLATION

Horn

1. Remove radiator grille by loosening retaining screws.
2. Disconnect lead wire to terminal on horn body.
3. Remove bolt retaining horn body to radiator core support, horn can then be taken out.
4. Installation is in the reverse sequence of removal.



BE915B

Fig. BE-119 Removing horn

Horn switch

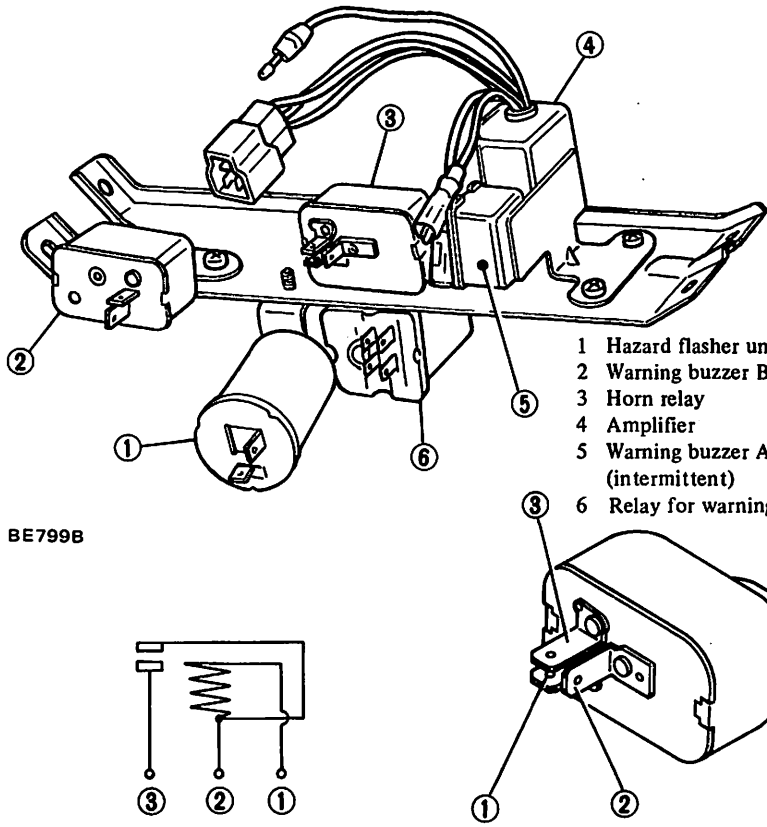
The horn switch is integral with the steering wheel assembly. Remove switch assembly as described in page BE-18 for Turn Signal Switch.

The horn switch is located at the back of the horn pad and has a lead wire. The lead wire is connected to a terminal on the steering wheel. The steering wheel has a terminal which has continuity to the turn signal switch. Consequently, refer to page BE-20 for Turn Signal Switch and Section ST for Steering Wheel.

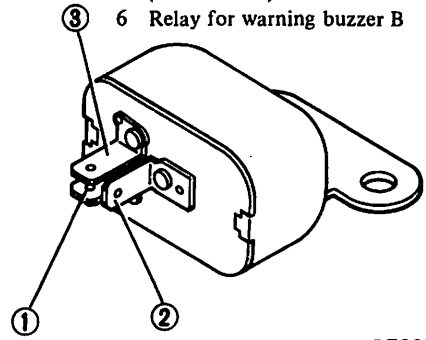
Horn relay

The horn relay is located behind the cluster lid in the instrument panel.

1. Disconnect battery ground cable.
2. Remove glove box inner case from under instrument panel. (Refer to Section BF.)
3. Loosen four screws retaining relay bracket to instrument panel.
4. Disconnect lead wires at connectors and take out relay bracket.
5. Remove horn relay retaining screws and replace with new one.
6. Installation is in the reverse order of removal.



BE799B

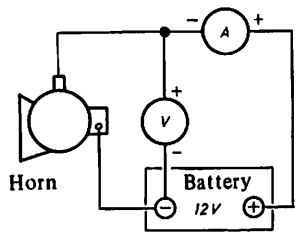


BE835

Fig. BE-120 Horn relay

ADJUSTMENT

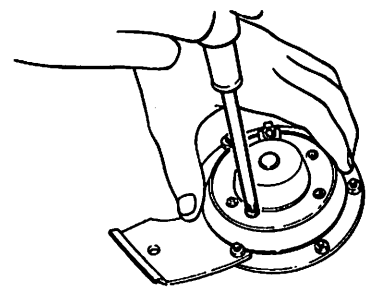
1. Secure horn in a vise. Using a voltmeter, battery and ammeter, connect horn as shown in Figure BE-121.



BE169

Fig. BE-121 Circuit of horn adjustment

2. Set switch to "ON", and make sure that voltmeter indicates between 12 and 12.5 volts.
3. Listen to horn for sound level, volume and tone. Adjust ammeter reading to consumed current at or below specifications. Make sure that horn sounds clear. See Figure BE-122.



BE366

Fig. BE-122 Adjusting horn sound

Note:
a. Adjustment is made by turning adjusting screw, after loosening lock nut.
b. When adjusting screw is turned;
   Clockwise:
      Current increases
   Counterclockwise:
      Current decreases

Sound	Consumed current at 12 volts (Amperes)
Low pitch (330Hz)	1.5 to 3.5
High pitch (390Hz)	1.5 to 3.5

4. After tone adjustment has been made as outlined above, check sound again at alternator voltage (14 to 15 volts). If sound is clear through this check, then tighten lock nut securely.

INSPECTION

Test continuity of system by using test lamp or ohmmeter. See Figure BE-121.

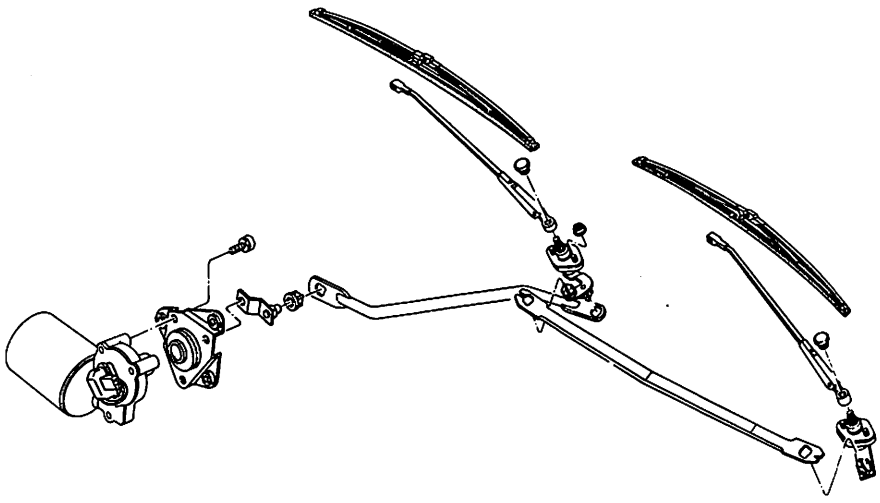
In testing horn relay, there must be continuity between terminals ① and ③ when there is 12V between terminals ① and ②. See Figure BE-120.

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Horn does not operate.	Discharged battery. (Measure specific gravity of electrolyte.)	Recharge or replace battery.
	Burnt fuse.	Correct cause and replace fuse.
	Faulty horn button contact. [Horn sounds when horn relay terminal(1) is grounded.]	Repair horn button.
	Faulty horn relay. [Horn sound when (2) and (3) horn relay terminals are connected with a test lead.]	Replace horn relay.
	Faulty horn or loose horn terminal connection.	Correct horn terminal connection or replace horn.
Horn sounds continuously.	Short-circuited horn button and/or horn button lead wire. [When black lead wire is disconnected from horn relay terminal(1), horn stops sounding.]	Repair horn button or its wiring.
		Replace horn relay.
Reduced volume and/ or tone quality.	Loose or poor connector contact. (Fuse, relay, horn and/or horn button.)	Repair.
	Faulty horn.	Replace.

WINDSHIELD WIPER AND WASHER

The windshield wiper and washer system consists of a wiper motor, links, arms, washer nozzles, blades, a washer tank, a washer motor, an intermittent amplifier, and wiper switch.



BE916B

Fig. BE-123 Wiper system

DESCRIPTION

The windshield wiper consists of a wiper motor, links, wiper arms and blades. The motor unit consists of a motor and auto-stop mechanism. The wiper motor is a 2-speed type. The washer motor operates when the knob is twisted.

The electrically operated windshield washer consists of a washing fluid tank, a washer motor, washer nozzles, and vinyl tubes used to connect those components.

REMOVAL AND INSTALLATION

Wiper arm and wiper blade

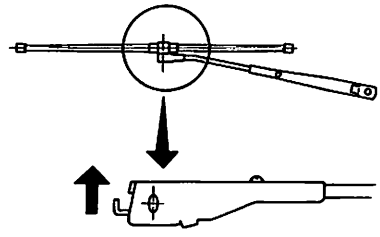
Remove arm and blade assembly from pivot in this sequence.

1. Raise wiper blade from windshield glass.
2. Unscrew arm setting nut. Arm can then be pulled off pivot.
3. Installation is in the reverse sequence of removal.

Note: Be sure to install arm and blade assembly in correct peak position. Position of blade can be adjusted in pushing it onto pivot.

Tightening torque:
Arm set nut:
0.9 to 1.2 kg-m
(6.5 to 8.7 ft-lb)

To remove blade, pick up tab to unlatch blade lock and pull blade off top end of arm.

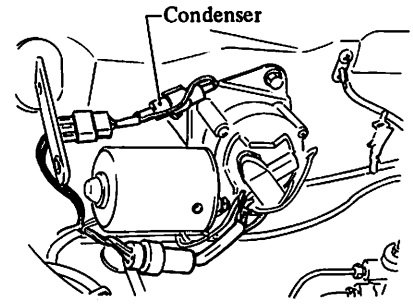


BE642B

Fig. BE-124 Removing wiper blade

Wiper motor and linkage

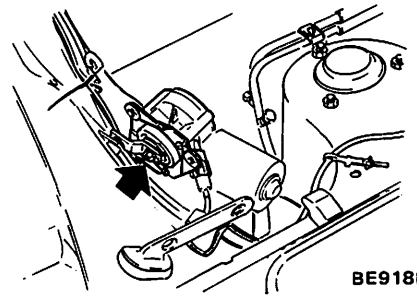
1. Remove wiper arm, referring to previous section.
2. Open engine compartment hood, and disconnect connector on wiper motor.



BE917B

Fig. BE-125 Wiper motor

3. Remove cowl top grille by removing cowl top retaining screws.
4. Remove three wiper motor retaining bolts.
5. Pulling wiper motor assembly outward a little, disconnect wiper motor from wiper linkage at junction.



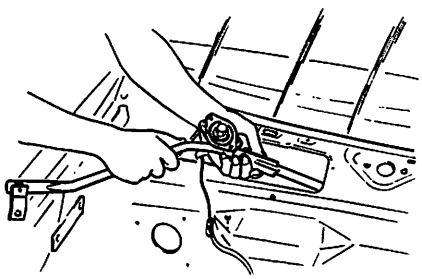
BE918B

Fig. BE-126 Removing motor shaft connecting nut

6. Remove two flange nuts attaching pivot to cowl top panel and take out link assembly.

CAUTION:
Be careful not to bend linkage during removal.

7. Install wiper linkage and wiper motor in the reverse sequence of removal.

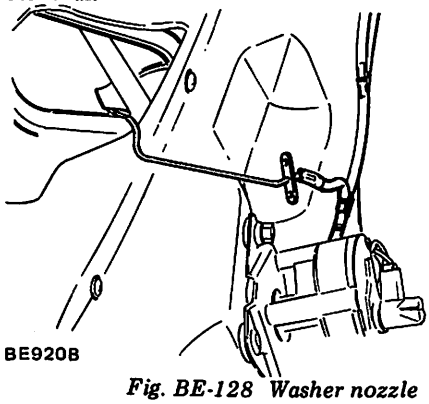


BE919B

Fig. BE-127 Removing link assembly

Washer nozzle

1. Remove washer nozzle fixing screws from cowl top panel.
2. Take out washer nozzle with tube.
3. Install in the reverse sequence of removal.



BE920B

Fig. BE-128 Washer nozzle

Washer tank and pump

The washer tank is hang up on the relay bracket in the engine compartment. The washer pump is located on the right body side member under the washer tank.

1. Remove washer tank from tank bracket.
2. Loosen two screws and remove washer pump.
3. Remove vinyl hoses from tank and pump and drain washer fluid.
4. Replace washer tank or pump with a new one, if found faulty.

Caution for windshield washer operation

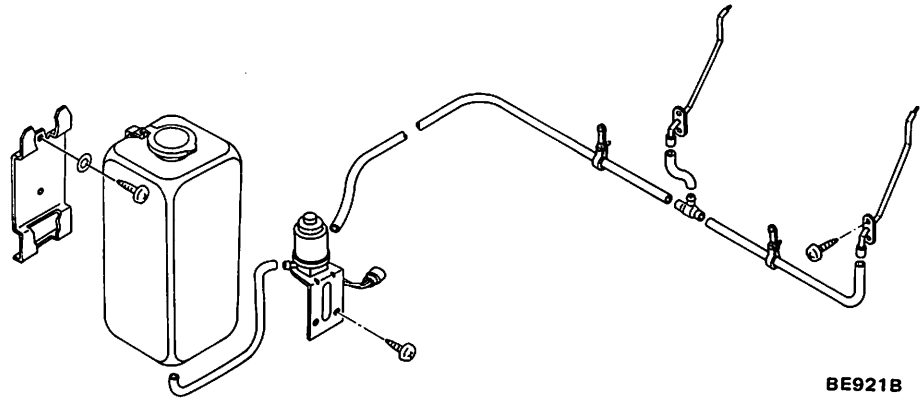
1. Be sure to use only washing solution.

Never mix soap powder or detergent with solution.

2. Do not operate windshield washer continuously more than 30 seconds or without washer fluid. This often causes improper windshield washer operation. Normally, windshield washer should be operated 10 seconds or less at one time.

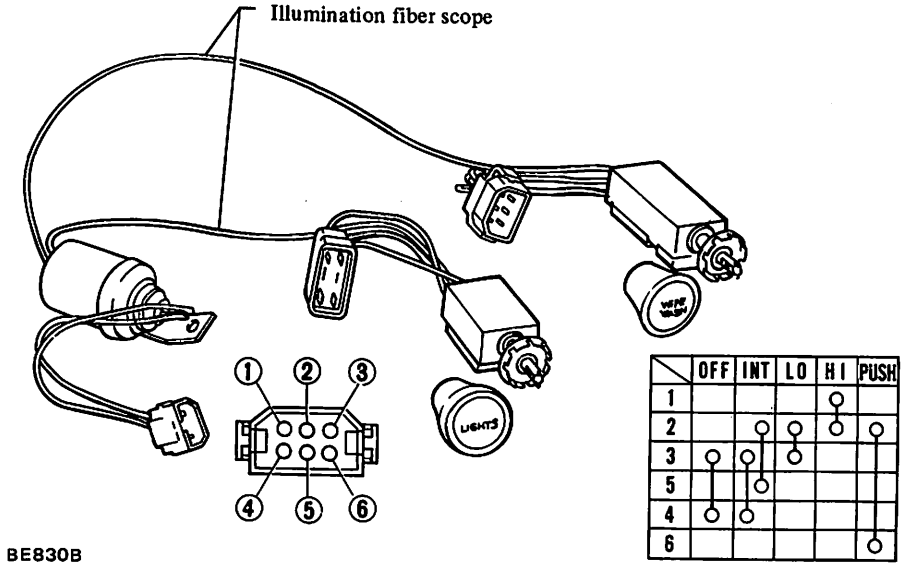
Wiper and washer switch

1. Disconnect battery ground cable.
2. Reach up underneath instrument panel and disconnect connector.
3. Disconnect illumination fiber scope at illumination lamp.
4. Remove knob by pressing and twisting.
5. Remove retaining nut on cluster lid.
6. Reach up underneath instrument panel, take out wiper switch.
7. Installation is in the reverse sequence of removal.



BE921B

Fig. BE-129 Washer tank and pump



BE830B

Fig. BE-130 Wiper and washer switch

Intermittent wiper amplifier

The intermittent wiper amplifier is installed on the relay bracket in the engine compartment.

1. Loosen screws and take out relay bracket.
2. Disconnect terminal connector on wiper amplifier.
3. Loosen screws and remove wiper amplifier.
4. Replace with a new one.
5. Installation is in the reverse order of removal.

CAUTION:

Be careful not to rub a service tool against cowl top panel when loosening pivot securing nut. Use a box of less than 30 mm (1.18 in) in diameter.

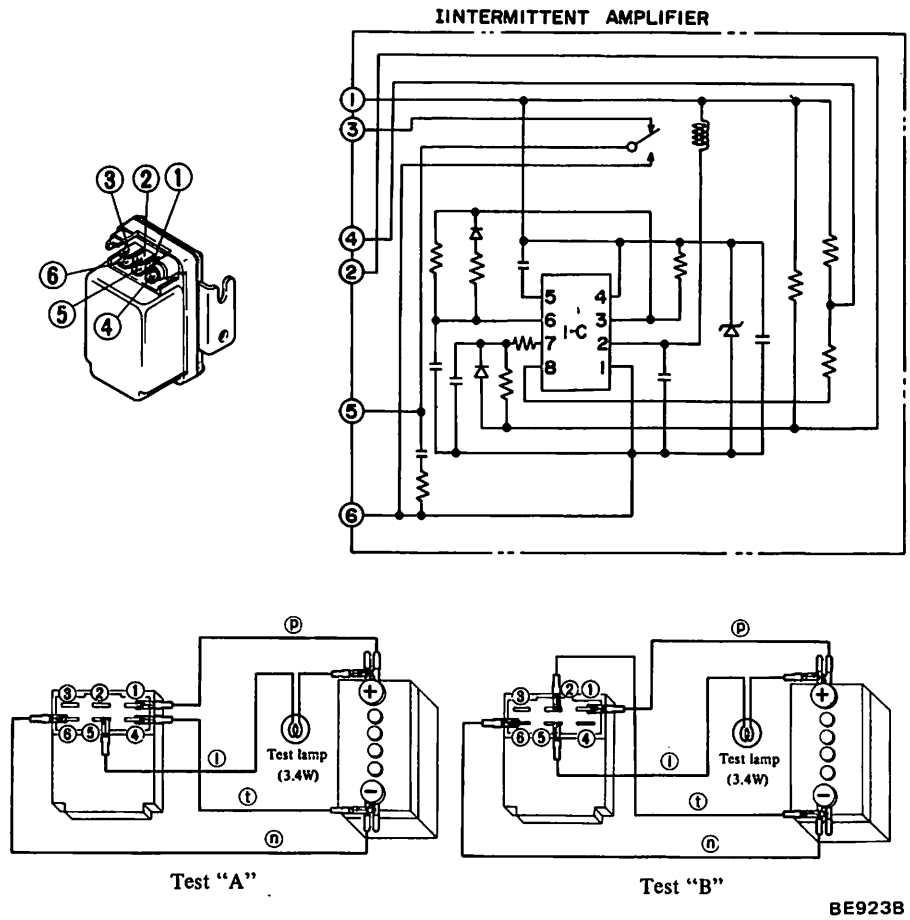


Fig. BE-131 Intermittent wiper amplifier

ADJUSTMENT

Wiping area

To adjust wiping area, loosen arm set nut and adjust blade to correct installation angle to obtain correct sweeping zone as sketched in Figure BE-132.

Then, secure nut at specified tightening torque.

Tightening torque:
0.9 to 1.2 kg-m
(6.5 to 8.7 ft-lb)

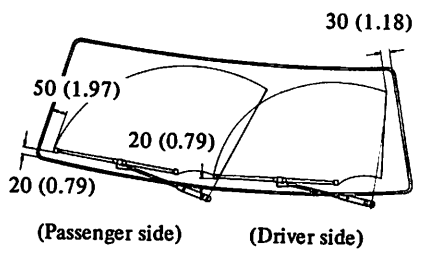


Fig. BE-132 Wiping area

Nozzle direction

Adjust nozzle direction so that fluid is sprayed in proper range by bending nozzle with screwdriver. This adjustment can be carried out through cowl top grille.

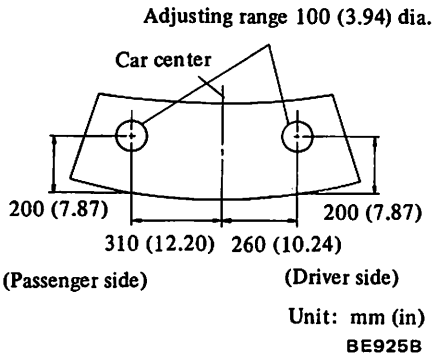


Fig. BE-133 Nozzle direction

CAUTION:

a. Be sure to use only windshield washing solution.
Never mix soap powder or detergent with solution.

b. To avoid improper windshield washer operation, do not operate windshield washer continuously for more than 30 seconds or without washer fluid. Normally, windshield washer should be operated for 10 seconds or less at one time.

INSPECTION

Check operation of each part of wiper system and test continuity of system with an ohmmeter or test lamp.

See Figures BE-123, BE-130 and BE-132.

Intermittent wiper amplifier

1. Disconnect connector from intermittent wiper amplifier.
2. Test "A":
(1) With test lamp and connecting wires, set up the test circuit for test "A". (See Figure BE-131.)
(2) With this testing circuit, if test lamp repeatedly comes on for one second and goes out for six seconds, amplifier will work properly.
3. Test "B":
(1) Set up the test circuit for test "B".
(2) If test lamp comes on for 0.7 second after this, amplifier will work properly.
4. Connect test wire (t) to terminal ② for two seconds or more, and disconnect it. If lamp comes on for 2.7 seconds, after disconnection, amplifier will work properly.
5. Tests A and B may be reversed.

CAUTION:

Be careful not to connect lead wires to incorrect terminals as this will damage transistors.

If both test results are satisfactory, intermittent wiper amplifier is functioning properly.

TROUBLE DIAGNOSES AND CORRECTIONS

WINDSHIELD WIPER

Condition		Probable cause		Corrective action
Windshield wiper does not operate.		Motor	No current flows to motor due to:	
			Broken armature.	Replace motor.
			Worn motor brush.	Replace motor.
			Motor is overheated due to seized motor shaft.	Replace motor.
			Windshield wiper fuse (20A) is easily fused due to short-circuit, rate short-circuit, or inside motor component burnt.	Replace motor or repair short-circuited part.
		Power supply and cable	Blown fuse due to problem in other part of windshield wiper circuit.	Check other part for operation and correct problem.
			Loose, open or broken wiring.	Check wiring near motor and connector for proper connection. Correct if necessary.
			Erroneous wiring.	Check each wire for color code, and correct if necessary.
			Improper grounding.	Correct.
		Switch	Improper switch contact.	Correct.
		Link	Foreign materials interrupt movement of windshield wiper circuit.	Correct.
			Disconnected link rod.	Correct.
			Seized or rusted arm shaft.	Lubricate or replace arm shaft.
		Windshield wiper blade	Windshield wiper blade sticks on windshield glass.	Raise arm and operate windshield wiper without applying load. Clean windshield glass and/or replace wiper blade.
Windshield wiper speed cannot be adjusted correctly.		Motor	Low or high speed motor brush is worn.	Replace motor.
Windshield wiper does not stop correctly.	Stops anywhere.	Motor	Contaminated auto-stop relay contacts or improper contact due to foreign matter.	Remove auto-stop device cover, and clean contacts carefully so as not to deform relay plate.
		Cable and switch	Improper connection between 1st and 2nd switch steps.	Remove switch, and make sure that 1st and 2nd steps are not connected at "OFF" position. If connected, replace switch.
	Does not stop.	Motor	Incomplete auto-stop operation (Contact is not interrupted.).	Remove auto-stop device cover, and correct relay plate bending.

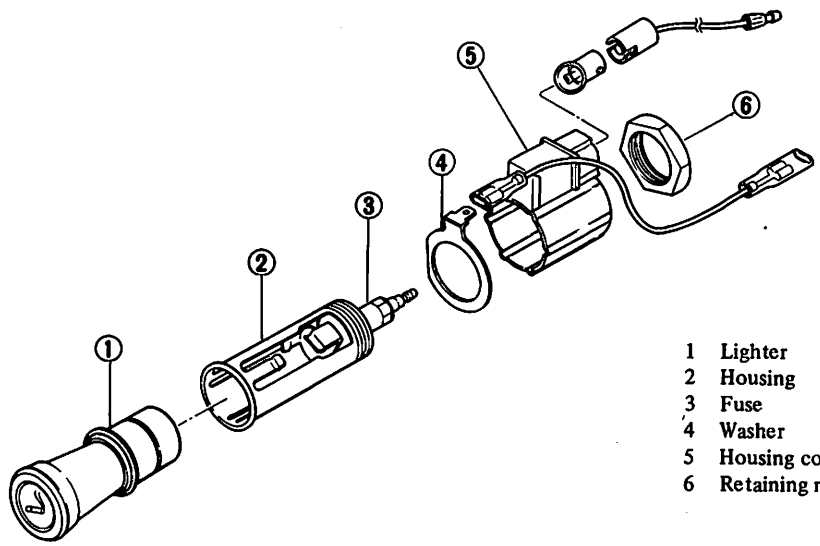
Condition	Probable cause		Corrective action
Windshield wiper operating speed is too slow.	Motor	With arm raised, excessive current still flows due to layer short-circuit of motor armature.	Replace motor.
		Windshield wiper stops when lightly held with hand due to worn motor brush.	Replace motor.
		With arm raised, excessive current still flows (3 to 5A) due to seized motor shaft.	Replace motor or lubricate bearing with engine oil.
	Power supply and cable	Low source voltage.	Measure voltage, check other electrical parts for operation, and take corrective action for power supply if necessary.
	Link	Humming occurs on motor in arm operating cycle due to seized arm shaft.	Lubricate or replace.
	Switch	Improper switch contact.	Conduct continuity test, and replace if necessary.

CIGARETTE LIGHTER

DESCRIPTION

The cigarette lighter consists of a lighter, a housing and a housing cover. The housing is secured on the cluster lid by the housing cover and nut. A fuse is added at the bottom of the housing. In pushing the lighter into the housing, the lighter is retained by nails in the housing and gets continuity through the heater coil at the end of the lighter.

When the heater is warmed enough, the bi-metal nail frees the lighter. The lighter then pops out by spring back, and breaks its continuity.



1 Lighter
2 Housing
3 Fuse
4 Washer
5 Housing cover
6 Retaining nut

BE926B

Fig. BE-134 Cigarette lighter

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Remove lighter from its housing.
3. Pull out ash tray.
4. Remove ash tray cover retaining screws and take out ash tray cover.
5. Remove three lead wires at connector.
6. Unscrew retaining nut on end of housing and remove it from housing. Housing and housing cover can be taken out from cluster lid.
7. Installation is in the reverse order of removal.

INSPECTION

Test continuity of whole system by using a test lamp or ohmmeter.

Refer to cigarette lighter circuit diagram.

CLOCK

DESCRIPTION

The clock is installed on the console box so removal requires removal of the console box.

The clock has four lead wires. They are for ground, illumination and for clock operation. The illumination bulb can be taken out by twisting the socket on the back of the clock body.

REMOVAL AND INSTALLATION

1. Remove console box. (Refer to Section BF.)
2. Disconnect connector.
3. Remove two screws retaining clock to instrument panel.
4. Installation is in the reverse sequence of removal.

ILLUMINATION LAMP REPLACEMENT

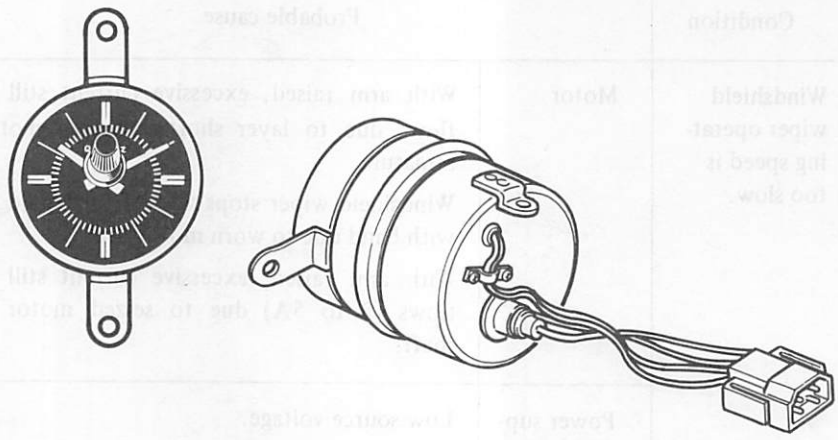
1. Remove clock assembly as previously described.
2. Remove socket of illumination lamp located at back of clock. Socket with a bulb can be taken out.
3. Pick up bulb from socket.
4. Install new bulb in the reverse sequence of removal.

Bulb wattage:

Clock illumination lamp 3.4W

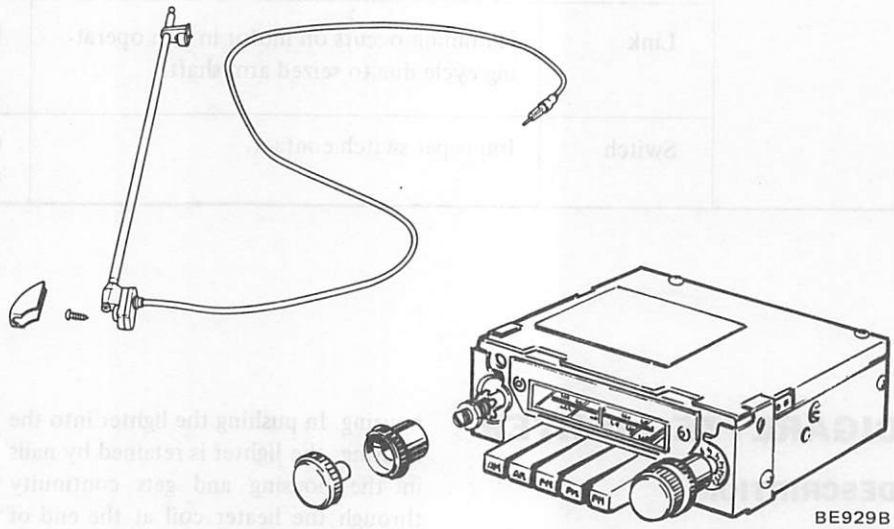
INSPECTION

Test continuity by using an ohmmeter or test lamp. Circuit is shown in Figure BE-154.

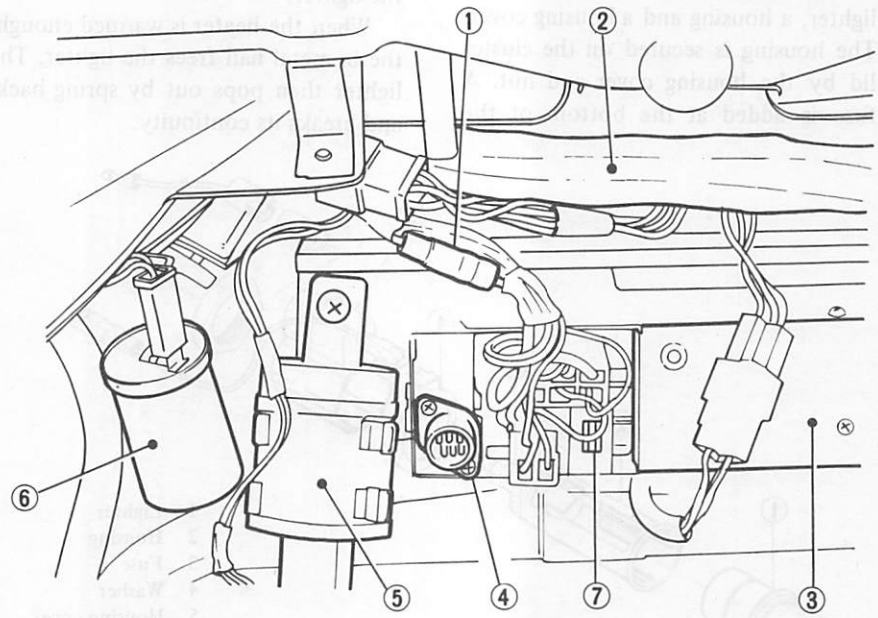


BE378C

Fig. BE-135 Clock



BE929B



1 Connector "A"
2 Instrument harness
3 Radio receiver
4 Power supply connector
5 Flasher unit (Turn signal)
6 Flasher unit (Hazard)
7 Fuse

BE930B

Fig. BE-136 Radio system

RADIO

DESCRIPTION

The radio system consists of an antenna, a speaker, and a radio receiver. The antenna is connected to the radio receiver with a feeder cable. The speaker is connected to the radio receiver with a pair of speaker harnesses. The speaker is installed under the dash panel.

To remove speaker, it is necessary to remove instrument pad. Antenna trimmer adjustment is also required for best condition of radio performance.

A fuse is added on the back of receiver. (See Figure BE-136.)

REMOVAL AND INSTALLATION

Radio receiver

1. Pull out all radio switch knobs.
2. Remove cluster lid, referring to Section BF for Removal of Cluster Lid.
3. Loosen screws and detach receiver from its bracket.
4. Disconnect two connectors on the back of receiver and feeder cable.
5. Take out receiver.

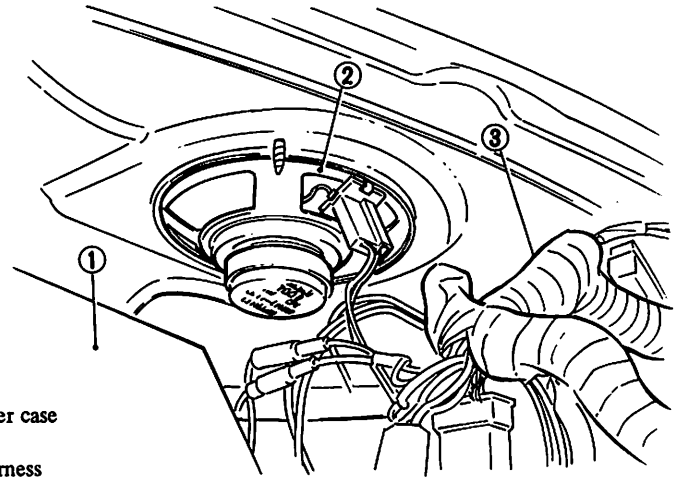
Note: One is for inlet power and the other is for speaker.

- The receiver has a power supply connector for stereo tape player. (See Figures BE-136 and BE-141.)

6. Installation is in the reverse sequence of removal.

Speaker

1. Remove instrument pad. (Refer to Section BF.)
2. Remove two screws retaining speaker under instrument pad.
3. Take out speaker and disconnect lead wire at connector.
4. Installation is in the reverse sequence of removal.



1 Glove box inner case
2 Speaker
3 Instrument harness

BE931B

Fig. BE-137 Removing speaker

Antenna and feeder cable

1. Pull out escutcheon on the lower antenna retainer.
2. Remove screws retaining upper and lower antenna retainers on front pillar.
3. Remove cluster lid. (Refer to Cluster Lid in Section BF.)
4. Take out radio receiver. (Refer to Radio Receiver.)
5. Disconnect feeder cable at connector located at the back of radio receiver.
6. Pull out antenna with feeder cable through hole on front pillar.
7. Installation is in the reverse order of removal.

ANTENNA TRIMMER ADJUSTMENT

When a new radio receiver, antenna or antenna feeder cable is installed, antenna trimmer should be adjusted.

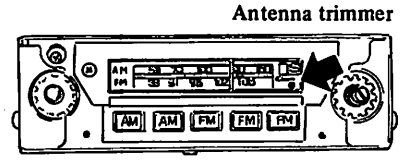
1. Extend antenna completely.

Note: On FM, the longest position of the antenna is not always the best for the reception.

2. Tune in weakest station between 12 and 16 (1,200 to 1,600 Hz) on dial.

Note: Noise may be generated but disregard it.

3. Turn antenna trimmer to left and right slowly with a screwdriver and set it where receiving sensitivity is best.



BE933B

Fig. BE-138 Trimmer adjusting screw

INSPECTION

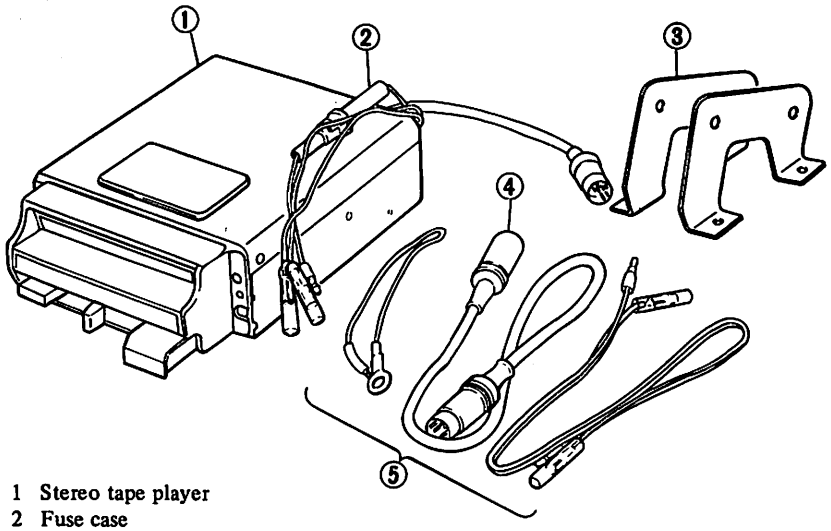
If radio does not work, inspect wiring circuit referring to circuit diagram for radio.

If noise is generated, refer to Noise Prevention Chart.

STEREO TAPE PLAYER

DESCRIPTION

The stereo tape player kit is located on the console box and consists of a player deck, support brackets, cables and wires. This stereo kit shares an amplifier and rear speakers with the radio system.



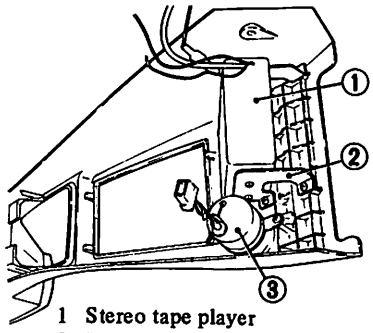
1 Stereo tape player
2 Fuse case
3 Bracket
4 Tape player cable
5 Wires

BE951B

Fig. BE-139 Stereo tape player kit

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Disconnect cables and lead wires from tape player and clock at the connectors under dash panel.
3. Remove floor console, referring to Section BF.
4. Loosen four screws retaining tape player brackets to console.
5. Installation is in the reverse order of removal.



1 Stereo tape player
2 Bracket
3 Clock

BE949B

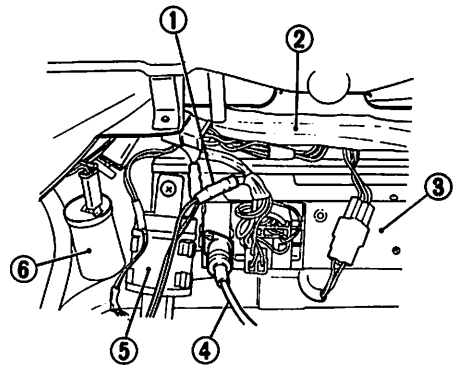
Fig. BE-140 Removing stereo tape player

Note: For installation for the first time as an option,

a. Remove radio receiver from instrument panel. (Refer to Removal and Installation of Radio in Section BE.)

b. Disconnect connector "A" and plug lead wires from tape player in connector "A".

3. Install tape player cables to radio receiver.



1 Connector "A"
2 Instrument harness
3 Radio receiver
4 Power supply cable (Radio receiver to tape player)
5 Flasher unit (Turn signal)
6 Flasher unit (Hazard)

BE950B

Fig. BE-141 Installing cables and wires to radio receiver

TROUBLE DIAGNOSES AND CORRECTIONS

NOISE PREVENTION CHART

Position car in an open area away from steel buildings, run engine, extend antenna to its maximum length, set volume control to maximum and set dial at a medium point without receiving broadcasting wave.

Condition	Probable cause	Corrective action
Ignition system		
Noise occurs when engine is operated.	High tension cable	Install new high tension cable.
	Ignition coil.	Install a 0.5μF capacitor to primary side + terminal of ignition coil. **Note: Be careful not to install capacitor to secondary or primary breaker side, This will result in improper engine operation.**

Condition	Probable cause	Corrective action
Charging system. Sound of alternating current present.	Alternator and faulty condenser (shown in Figure EE-34)	Replace condenser (shown in Figure EE-34) with new one. **Note: Do not use a larger capacitor.**

Note:
a. **Be sure to locate capacitor as close to noise source as possible and connect in parallel.**
b. **Cut lead wire as short as possible.**
c. **Ground wire should be attached to the body completely.**
d. **Make installation and connections securely.**
e. **Carefully identify "+", "–", "IN" or "OUT" marks.**

KICKDOWN SYSTEM (For automatic transmission models)

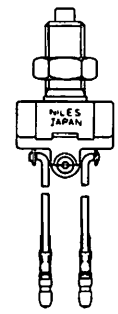
DESCRIPTION

The kickdown system consists of a kickdown switch and a kickdown solenoid. The kickdown switch is located on the accelerator pedal. The kickdown solenoid is located on right side of the automatic transmission. They are connected to each other. For details on the automatic transmission, refer to Section AT.

REPLACEMENT

Kickdown switch

1. Disconnect a pair of lead wires.
2. Loosen lock nut on switch body.
3. Remove kickdown switch by rotating switch body.
4. Installation is in the reverse sequence of removal.

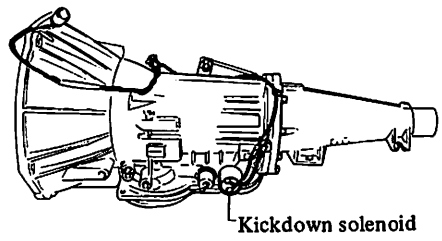


BE776

Fig. BE-142 Kickdown switch

Kickdown solenoid

Refer to Section AT for Removal of Kickdown Solenoid.



BE936B

Fig. BE-143 Kickdown solenoid

INSPECTION

Kickdown switch

The switch plunger is controlled by the accelerator pedal. When the plunger is pressed into the switch assembly, the contacts are closed.

Therefore there must be continuity only when the plunger is pressed into the switch body.

Kickdown solenoid

Refer to Section AT for Inspection of Kickdown solenoid.

Wiring

Referring to following circuit diagram, test continuity by using an ohmmeter or test lamp.

STARTING SYSTEM (For automatic transmission models)

DESCRIPTION

The starting system consists of an inhibitor switch, an inhibitor relay, an ignition switch and an ignition relay. (Calif. models only)

The engine can be started when the automatic transmission slector lever is shifted to "N" or "P" position.

The inhibitor switch is located on the right side of the automatic transmission.

INHIBITOR SWITCH

Replacement

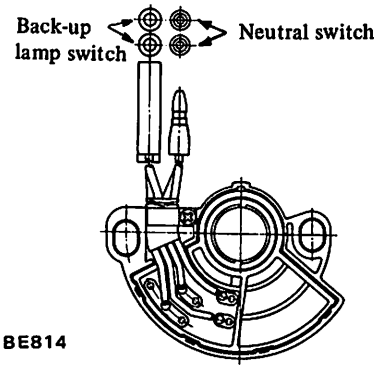
Refer to Section AT for Removal and installation of inhibitor switch.

Inspection

The neutral switch is an integral part of the inhibitor switch.

The harness for neutral switch is a pair of BY (Calif. models), Y and YW (Non-Calif. models).

When the transmission lever is set in the N position, continuity in the harnesses must exist.



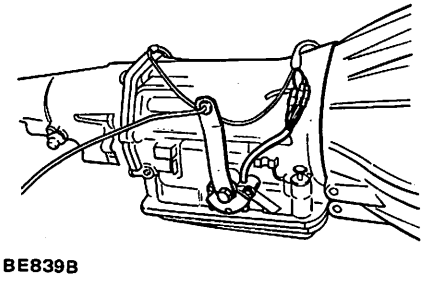


Fig. BE-144 Inhibitor switch

INHIBITOR RELAY

The inhibitor relay is located on the relay bracket in the engine compartment. See Figure BE-145.

Replacement

1. Loosen screws and take out relay bracket.
2. Disconnect terminal connector on inhibitor relay.
3. Loosen screws and remove inhibitor relay.
4. Replace with a new one.
5. Installation is in the reverse sequence of removal.

Inspection

Test continuity through relay with an ohmmeter.

In the normal condition continuity between (1)-(4) must exist. When 12V direct current is applied to (1)-(4) continuity between (2)-(3) must exist.

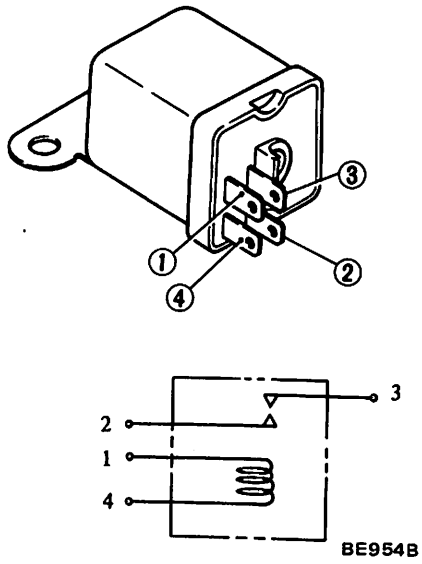


Fig. BE-145 Inhibitor relay

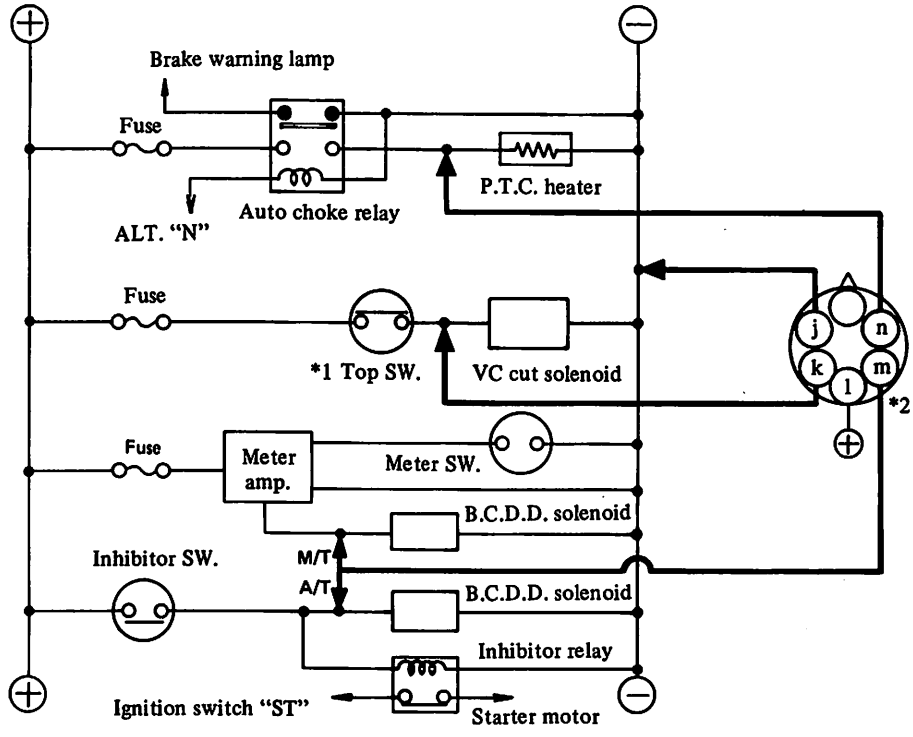
IGNITION SWITCH AND IGNITION RELAY

Refer to page BE-22.

FUNCTION TEST CONNECTOR

A function test connector is installed on the left side in the engine compartment. (See Figure BE-155.) This is helpful to check the function of the P.T.C. heater, V.C. cut solenoid, B.C.D.D. solenoid. For details, refer to Sections EF and EC.

Note: Be sure to install protector cap after use.



*1: Except for Canada.
*2: B.C.D.D. check is available for non-California models only.

Fig. BE-146 Function test connector

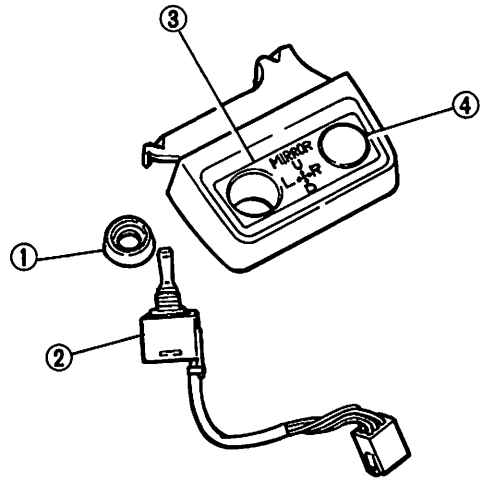
REMOTE CONTROL DOOR MIRROR

DESCRIPTION

The remote control door mirror consists of a mirror unit with a self-contained motor, control switch, connector and wire. The wiring arrangement is shown in Figure BE-18.

REMOVAL AND INSTALLATION

Control switch



1 Retainer
2 Door mirror switch
3 Switch bracket and panel
4 Hole cover for right door switch

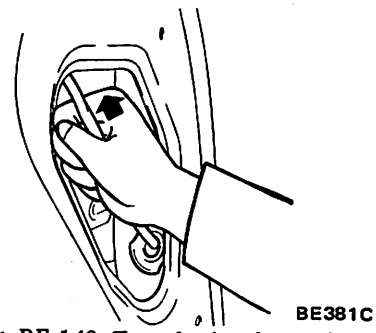
BE380C

Fig. BE-147 Control switch

1. Disconnect battery ground cable.
2. Remove retainer by turning it counterclockwise.
3. Disconnect control switch connector from instrument panel.
4. To install, reverse the order of removal.

Door mirror

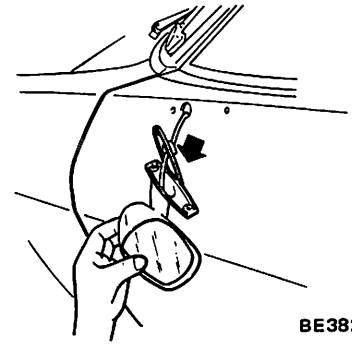
1. Disconnect battery ground cable.
2. Disconnect connector from instrument harness.
3. Remove cover from dash side finisher through which door mirror wire runs.
4. Pull door mirror wire out from passenger compartment. Pulling portion of wire is that which runs from body to door.
5. Remove door finisher; transfer exposed door mirror wire together with rubber plug to inside of door.



BE381C

Fig. BE-148 Transferring door mirror wire to inside of door

6. Remove door mirror and its wire from door.



BE382C

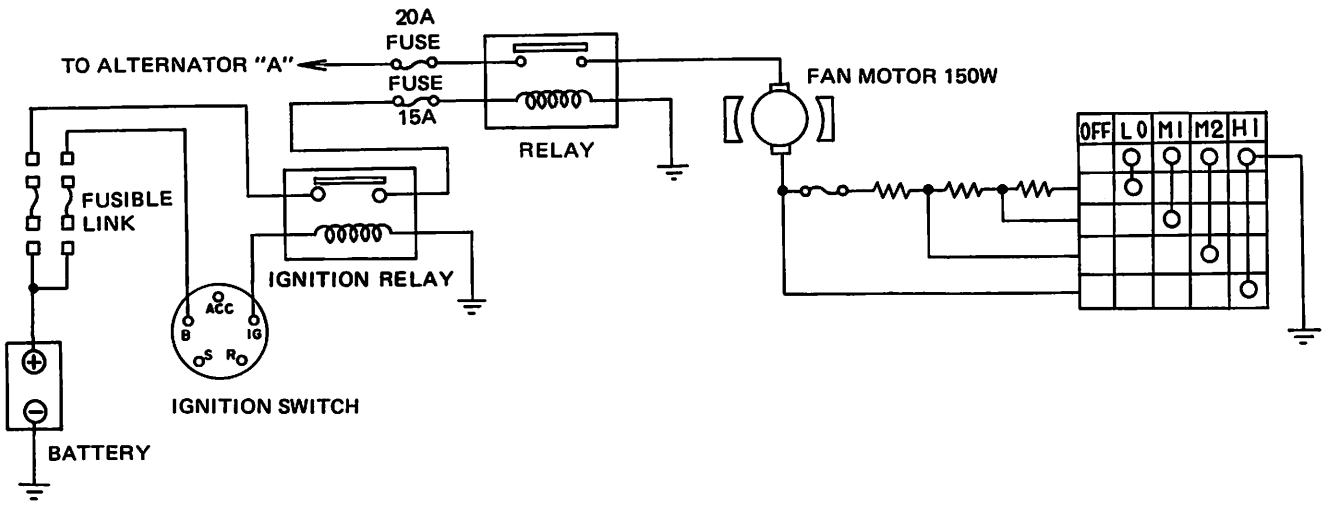
Fig. BE-149 Removing door mirror and its wire

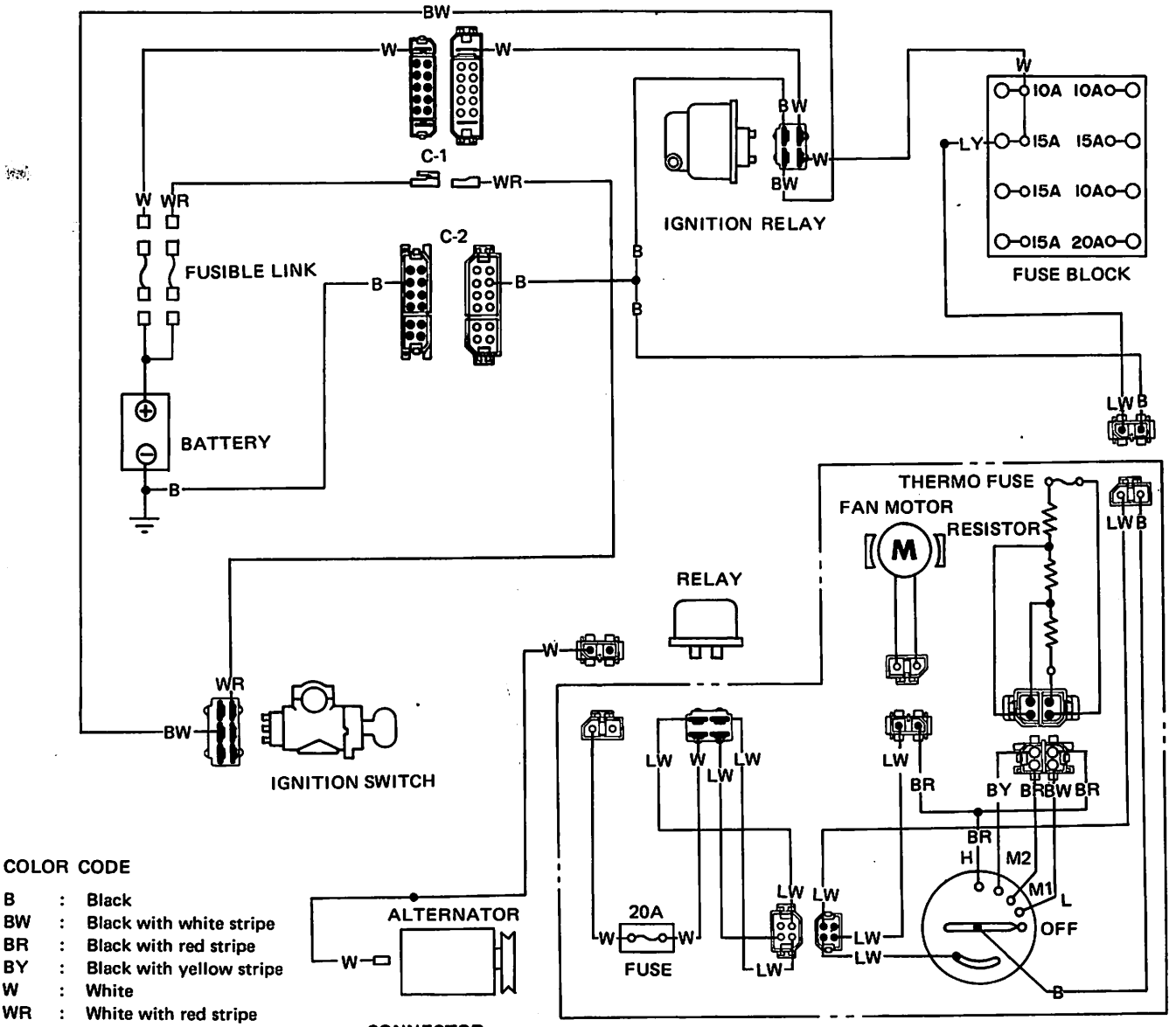
INSPECTION

Check voltage across points, continuity and insulation, as indicated in Figure BE-155. When battery is fully charged, voltage applied to door mirror motor should be more than 12 volts, DC. Before measuring motor voltage, be sure to connect battery cable.

- If there is any malfunction in electrical or mechanical parts after checking, replace mirror as an assembly.
- If there is any abnormality in wiring, reconnect it correctly.

Heater system





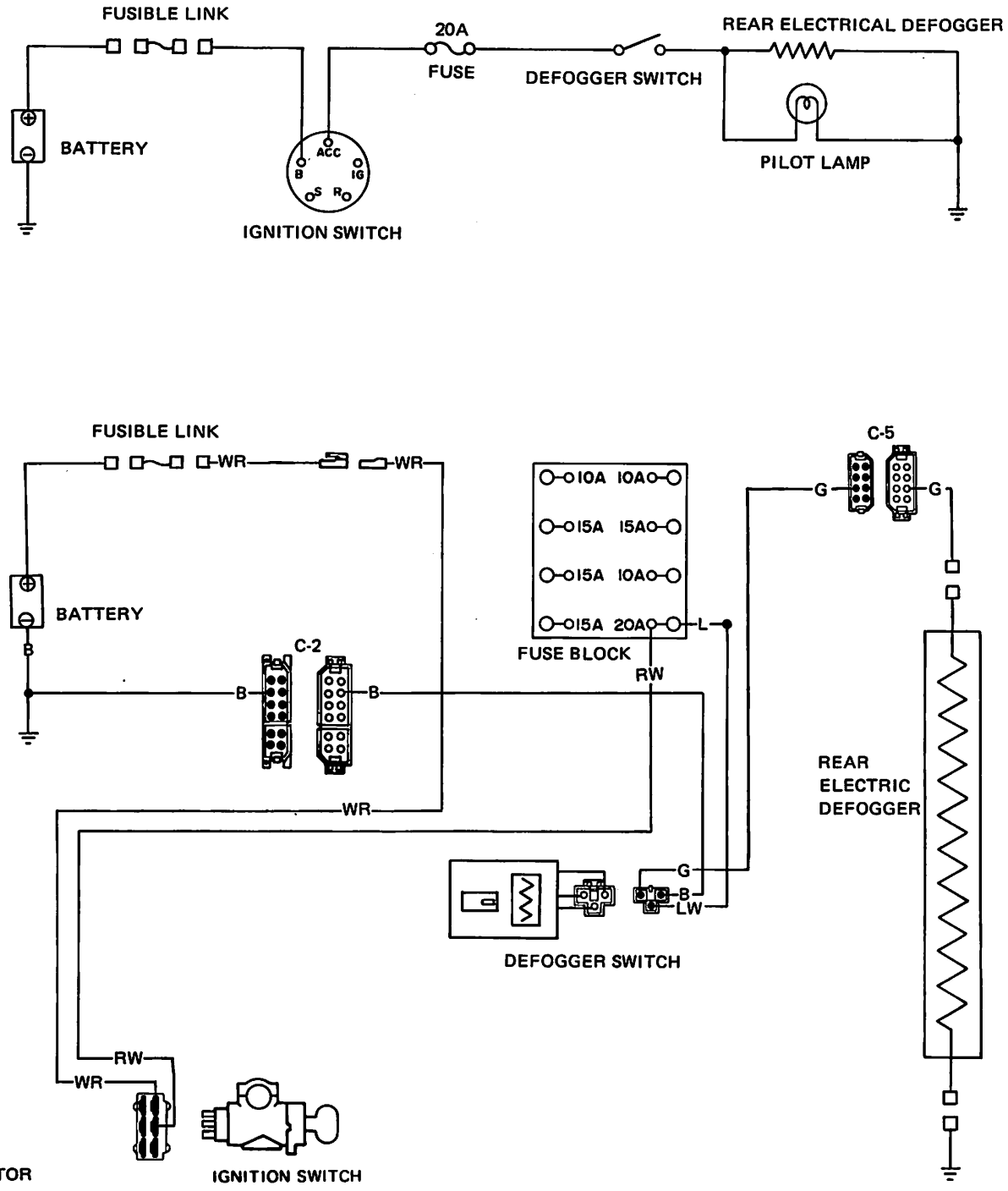
COLOR CODE

B	:	Black
BW	:	Black with white stripe
BR	:	Black with red stripe
BY	:	Black with yellow stripe
W	:	White
WR	:	White with red stripe
LW	:	Blue with white stripe
LR	:	Blue with red stripe
LY	:	Blue with yellow stripe

BE383C

Fig. BE-150 Heater system

Rear window defogger system



CONNECTOR

C-1: White
C-2: White
C-5: Black

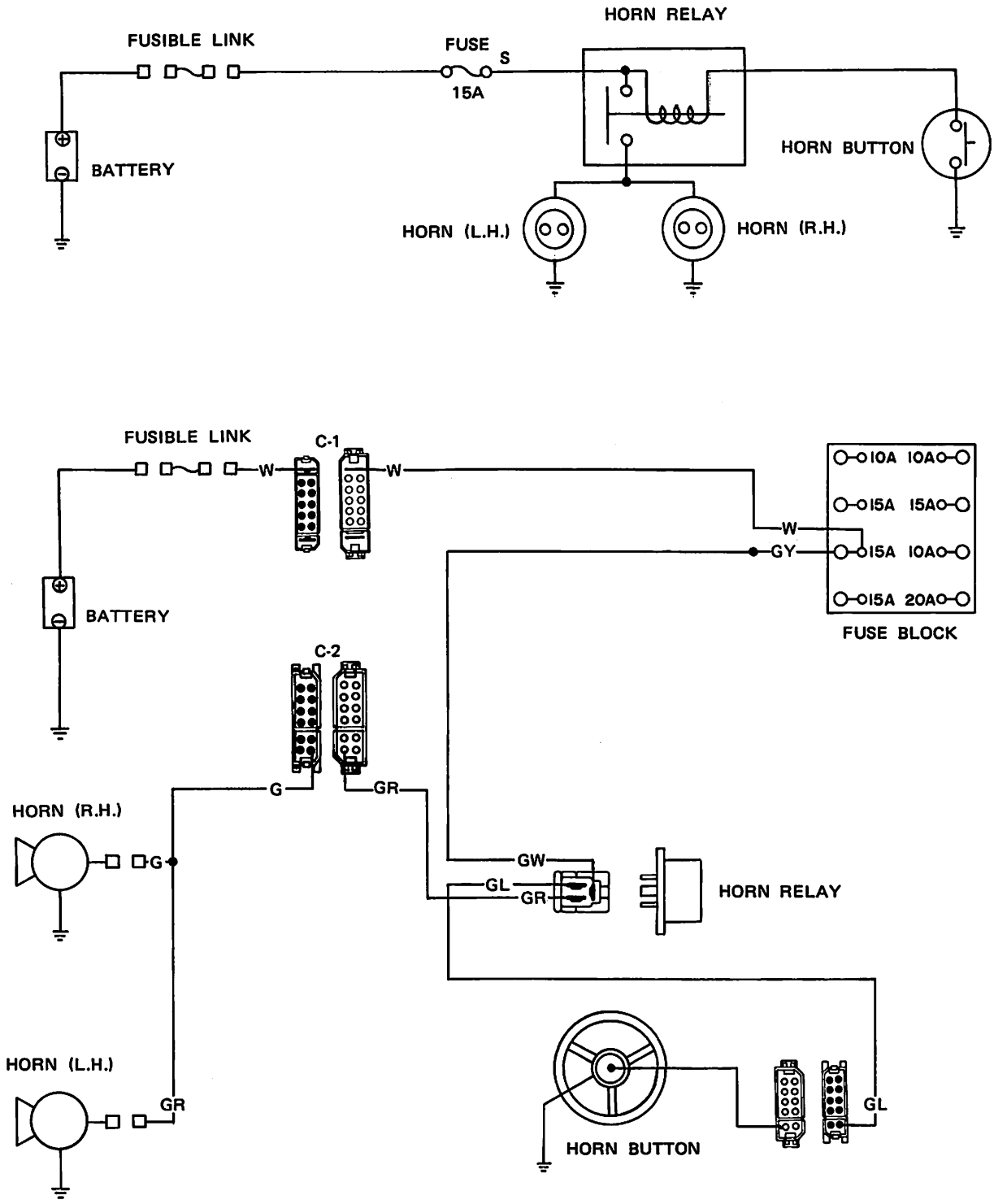
COLOR CODE

B	:	Black
BW	:	Black with white stripe
WR	:	White with red stripe
G	:	Green
RW	:	Red with white stripe
L	:	Blue
LW	:	Blue with white stripe

BE384C

Fig. BE-151 Rear window deforgger system

Horn



COLOR CODE

W	:	White
G	:	Green
GW	:	Green with white stripe
GR	:	Green with red stripe
GY	:	Green with yellow stripe
GL	:	Green with blue stripe

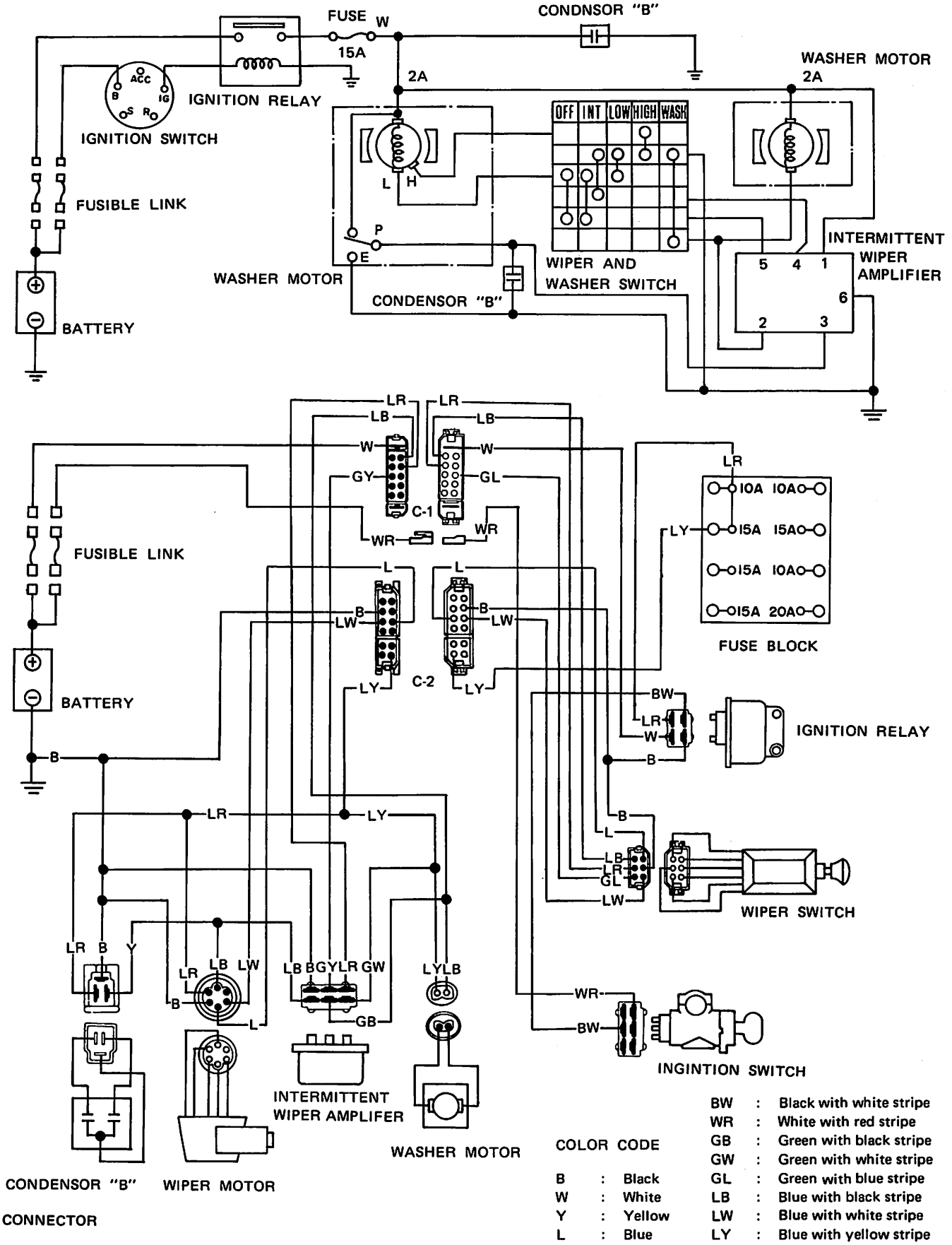
CONNECTOR

C-1 : White
C-2 : White

BE385C

Fig. BE-152 Horn

Wiper and washer system



CONNECTOR

C-1 : White
C-2 : White

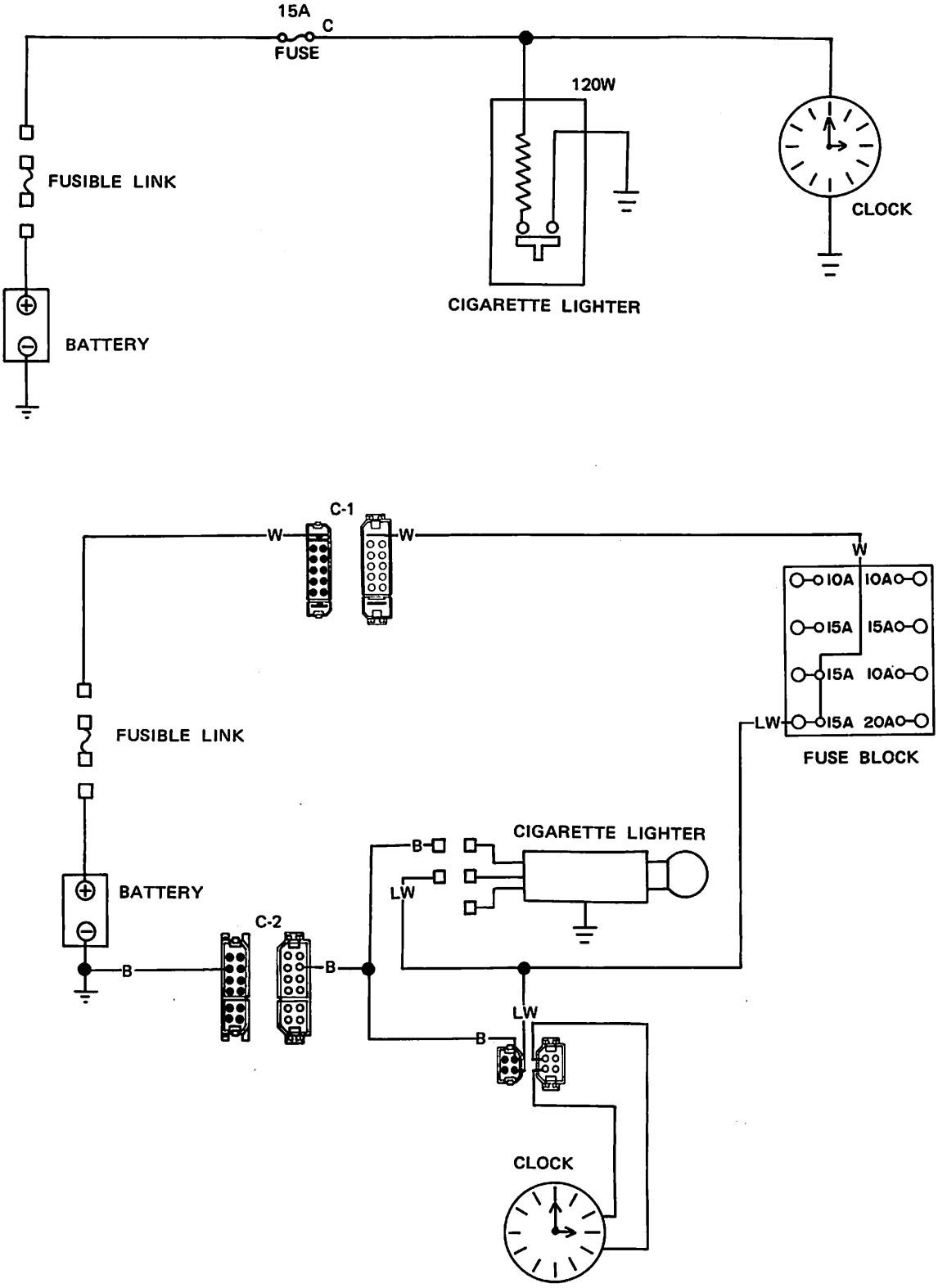
COLOR CODE

B	:	Black	BW	:	Black with white stripe
W	:	White	WR	:	White with red stripe
Y	:	Yellow	GB	:	Green with black stripe
L	:	Blue	GW	:	Green with white stripe
			GL	:	Green with blue stripe
			LB	:	Blue with black stripe
			LW	:	Blue with white stripe
			LY	:	Blue with yellow stripe

BE386C

Fig. BE-153 Wiper and washer system

Cigarette lighter and clock



COLOR CODE

B	:	Black
W	:	White
LW	:	Blue with white stripe

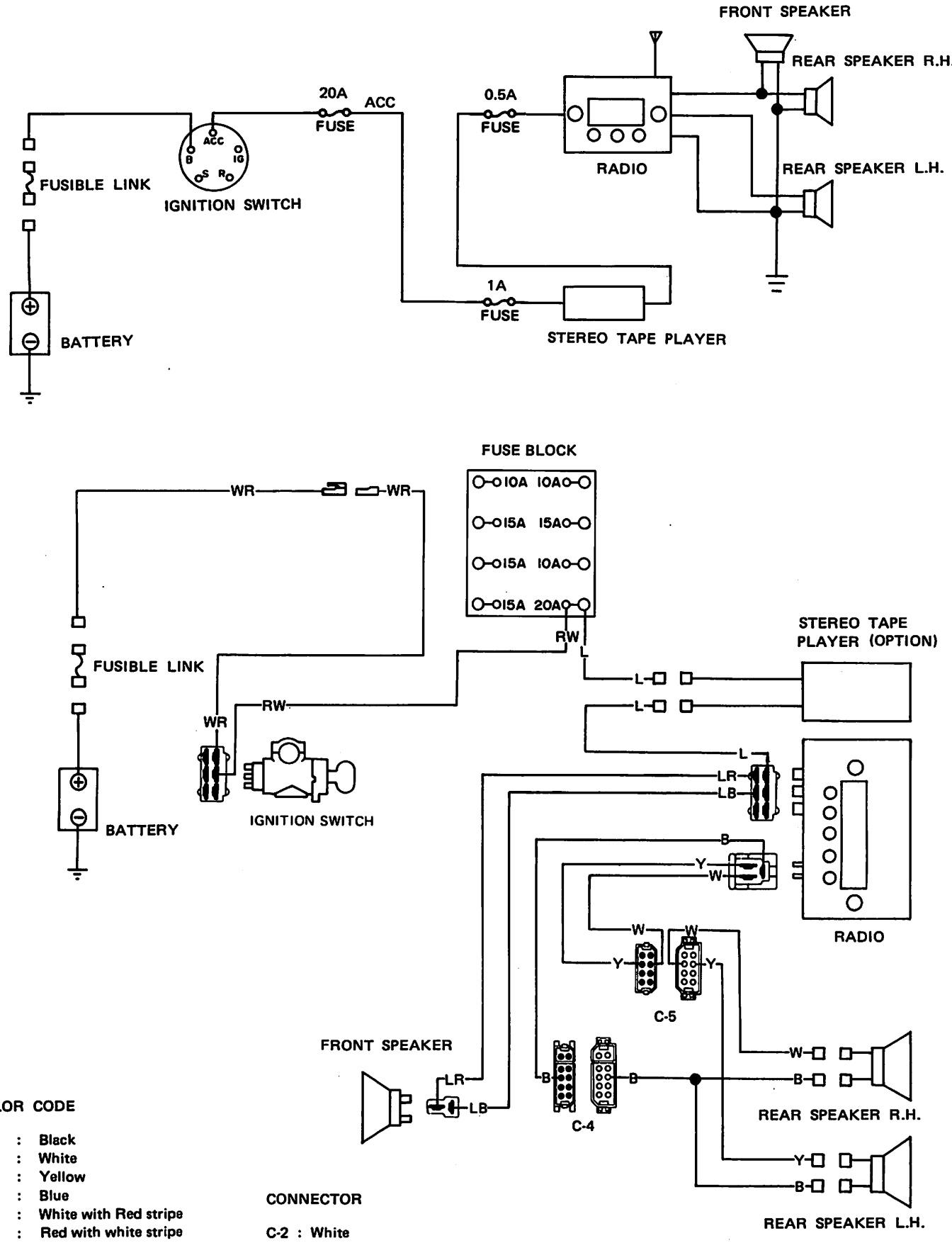
CONNECTOR

C-1 : White
C-2 : White

BE387C

Fig. BE-154 Cigarette lighter and clock

Radio and Stereo tape player



COLOR CODE

B	:	Black
W	:	White
Y	:	Yellow
L	:	Blue
WR	:	White with Red stripe
RW	:	Red with white stripe
LB	:	Blue with black stripe
LR	:	Blue with red stripe

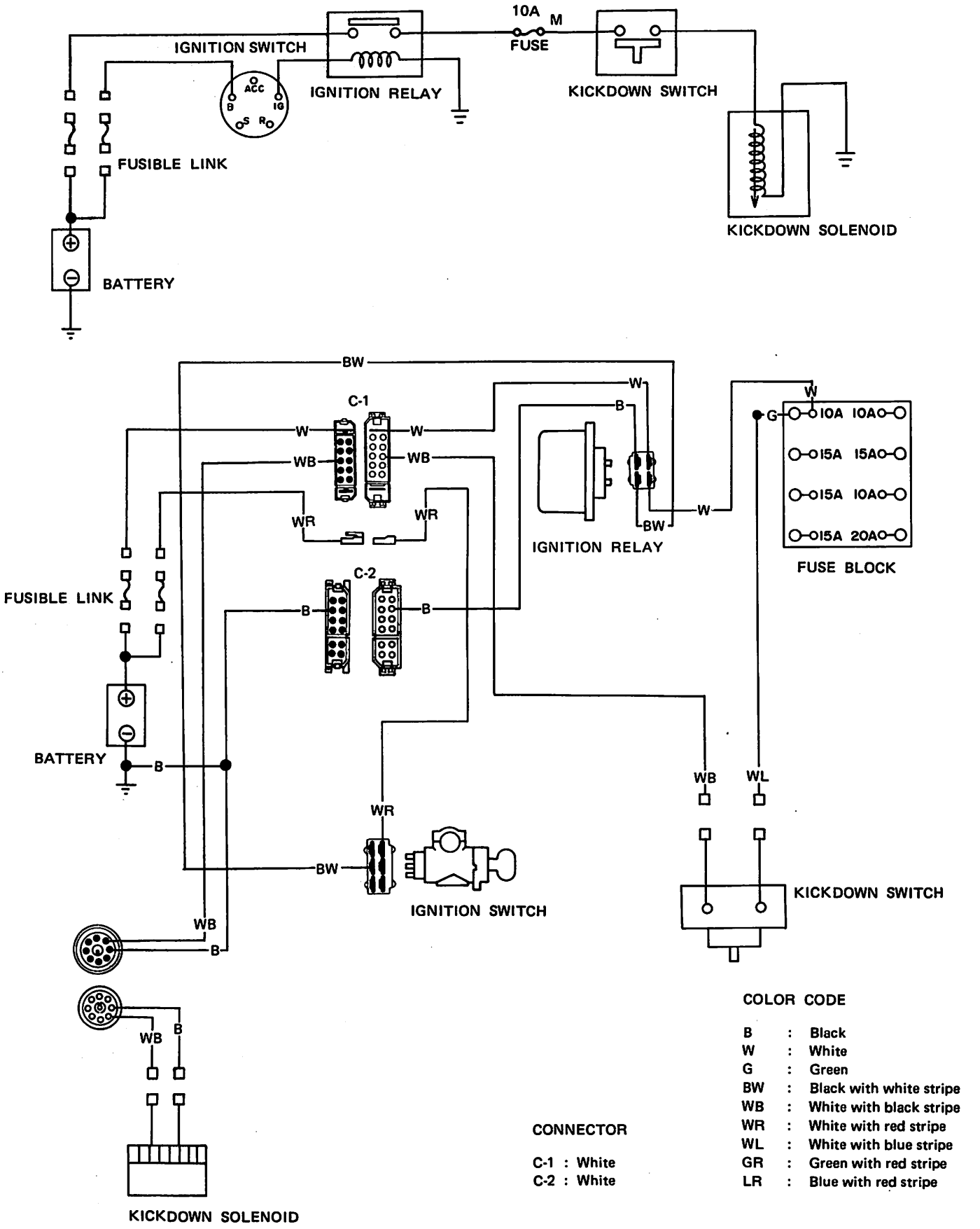
CONNECTOR

C-2 : White
C-4 : White
C-5 : Black

BE388C

Fig. BE-155 Radio and Stereo tape player

Kickdown system



COLOR CODE

B	:	Black
W	:	White
G	:	Green
BW	:	Black with white stripe
WB	:	White with black stripe
WR	:	White with red stripe
WL	:	White with blue stripe
GR	:	Green with red stripe
LR	:	Blue with red stripe

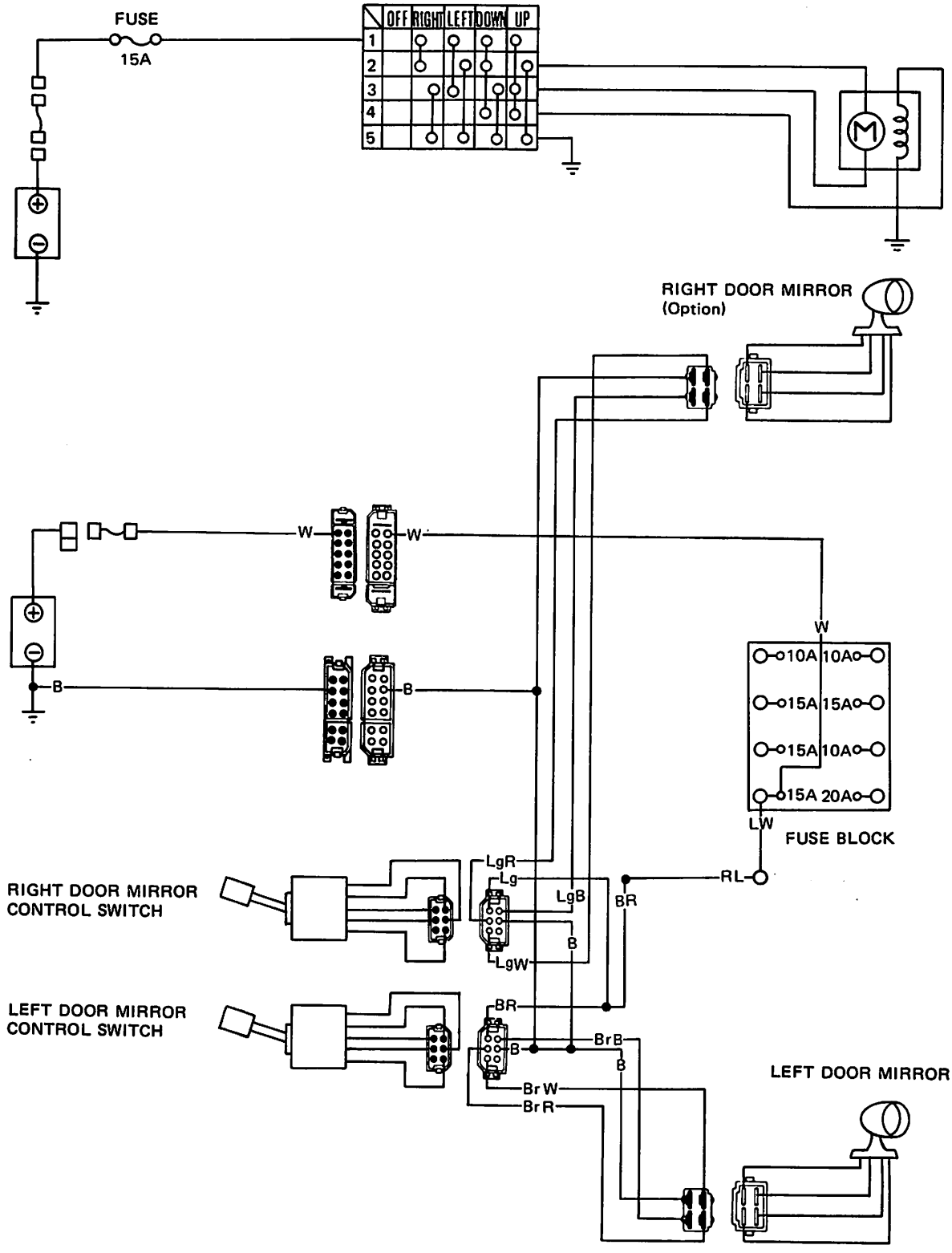
CONNECTOR

C-1 : White
C-2 : White

BE389C

Fig. BE-156 Kickdown system

Remote control door mirror system



BE390C

Fig. BE-157 Remote control door mirror system

SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

SECTION AC

AIR CONDITIONING

DESCRIPTION ..... AC- 2
GENERAL SERVICE ..... AC- 8
REMOVAL AND INSTALLATION AC-19
COMPRESSOR (SWP123) AC-29
COMPRESSOR (SC206) AC-38
SERVICE DATA AND SPECIFICATIONS AC-45
TROUBLE DIAGNOSES AND CORRECTIONS AC-47

DESCRIPTION

CONTENTS

OUTLINE OF AIR CONDITIONER AC-2
REFRIGERATION SYSTEM AC-3
COMPRESSOR AC-3
CONDENSER AC-3
RECEIVER DRIER AC-3
COOLING UNIT AC-4
VACUUM SYSTEM AC-5
MAGNET VALVE AC-5
FAST IDLE CONTROL DEVICE (F.I.C.D.)-FAST IDLE DASH POT AC-5
ELECTRICAL CIRCUIT AC-6
DESCRIPTION AC-6
HEATER MOTOR RELAY AC-6
MICROSWITCH AC-6
FAN SWITCH AC-6
THERMO SWITCH AC-6

OUTLINE OF AIR CONDITIONER

This air conditioner consists of a heating unit and a cooling unit, controlled jointly by a single control mechanism. With the bi-level and ventilation functions provided, this air conditioner permits defrosting and dehumidifying, thus maintaining comfortable air conditioning in the passenger compartment for all seasons.

The cooling unit is connected to the inside air suction port of the heating unit and is secured at two places, on the dash upper panel and on the lower side of the dash panel.

The compressor, used to compress the refrigerant, is mounted on the engine block by a bracket.

The condenser is a device that cools the gaseous refrigerant sent from the compressor. It is mounted in front of the radiator in the engine compartment.

The receiver drier stores fluid refrigerant sent from the condenser and is mounted on the condenser and the radiator core support.

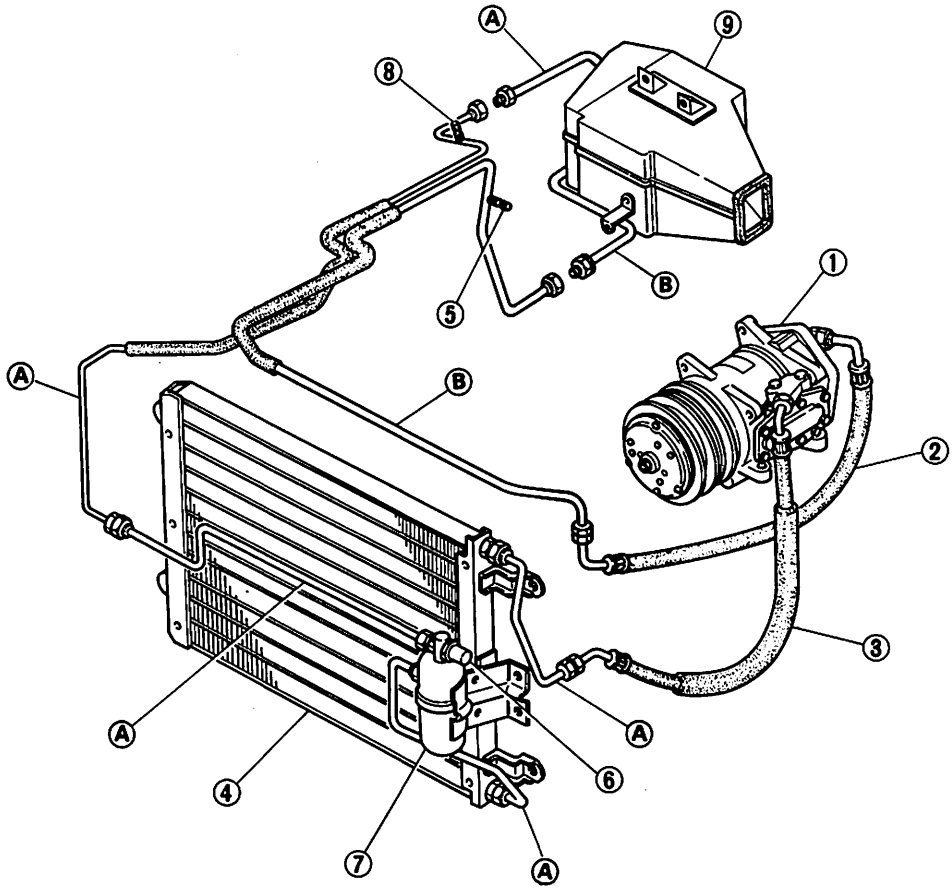
The air conditioner piping is made of two flexible hoses and five copper tubes.

Note: Compressor

Air conditioners used on the S10 models can be classified in two types according to the type of compressor.

The air conditioner installed on the production line at the Nissan plant uses a swash plate type (SWP123) compressor.

The air conditioner installed as a dealer option uses a crank type (SC206) compressor.



1 Compressor
2 Low flexible hose
3 High flexible hose
4 Condenser
5 Service valve (Low pressure)
6 Pressure switch
7 Receiver drier
8 Service valve (High pressure)
9 Cooling unit

Ⓐ : Copper tube (High pressure)
Ⓑ : Copper tube (Low pressure)

AC820

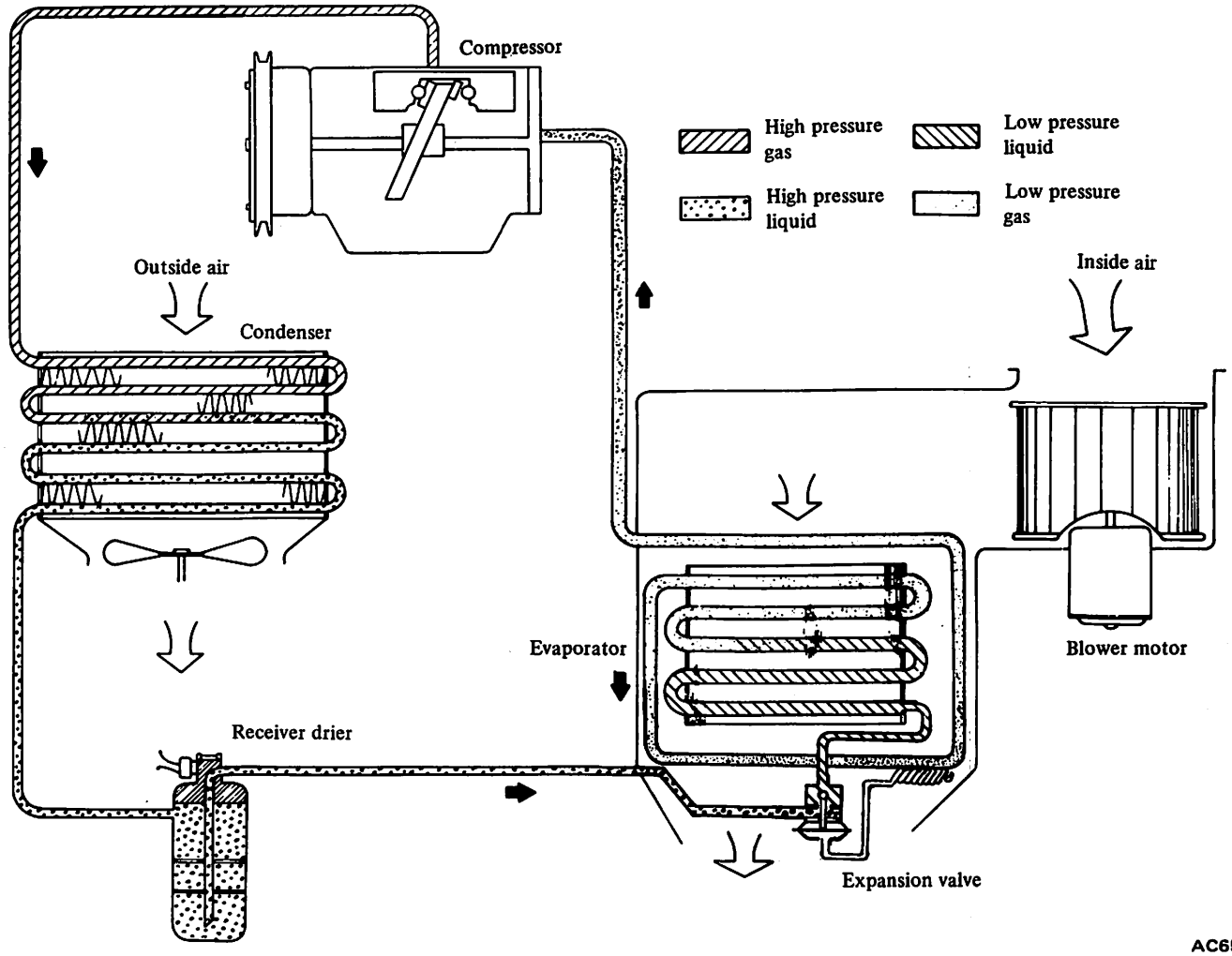
Fig. AC-1 Cooling system

REFRIGERATION SYSTEM

If you were to paint your finger with alcohol, your finger would feel cold. This is because the liquid alcohol takes heat away from your finger while it evaporates. If a quickly evaporating liquid such as alcohol is placed in a container inside a box, the temperature inside the box will drop. This is because the alcohol is evaporated absorbing the heat from the air inside the box. If the gaseous alcohol is collected and cooled with cold water, it will be changed back into a liquid by absorption of its heat by the cold water.

The cooler operates on this principle. The liquid used is the refrigerant R-12. The heat inside the passenger compartment is absorbed by changing the refrigerant from a liquid to a gas and then dissipated to the outside by changing the refrigerant from a gas back to a liquid.

The refrigeration system is shown in Figure AC-2.



AC650

Fig. AC-2 Refrigeration cycle

COMPRESSOR

The compressor is installed to the side of the engine and is driven by crank pulley through a belt. The refrigerant gas leaving the evaporator is forced out to the condenser by compressor and the low pressure refrigerant gas is compressed to a high pressure and high temperature.

The driving force is transmitted by an electrical clutch.

CONDENSER

The condenser is installed to the front of the radiator. The heated and compressed refrigerant gas from the compressor condenses to a liquid by being cooled by air passing between the fins of the condenser.

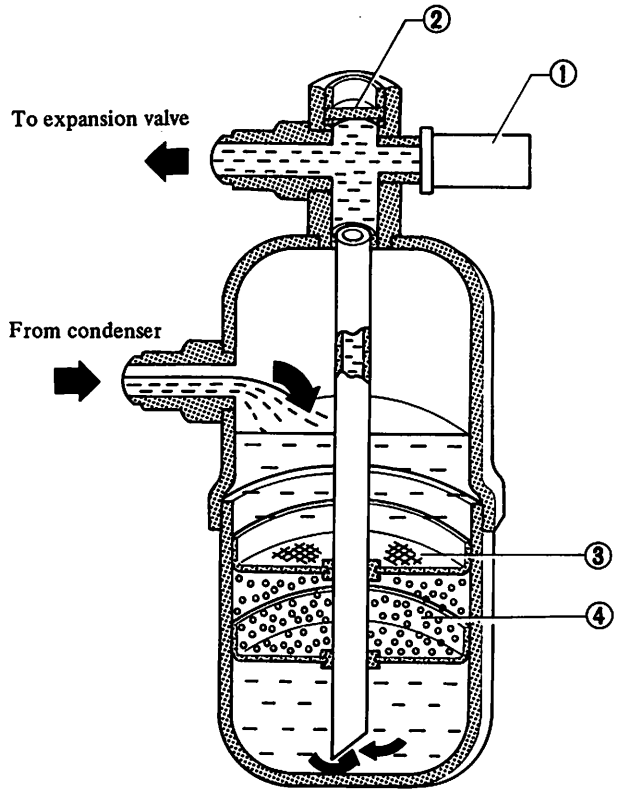
RECEIVER DRIER

The receiver drier serves the purpose of storing the liquid refrigerant. The amount of the liquid refrigerant flowing through the system varies with the operating condition of the air conditioner. To be accurate, the receiver drier stores excess amount of refrigerant when the heat load is lowered. It also releases stored refrigerant when additional cooling is needed, thus maintaining the optimum flow of refrigerant within the system.

The receiver drier includes a strainer and desiccating agent. They have

the job of removing moisture and foreign particles as the refrigerant circulates within the system.

The pressure safety valve is installed near the sight glass of the receiver drier. This valve releases pressure to the atmosphere if unusually high pressure builds up in the refrigeration system.



1 Security valve
2 Sight glass
3 Strainer
4 Desiccating agent

AC821

Fig. AC-3 Receiver drier

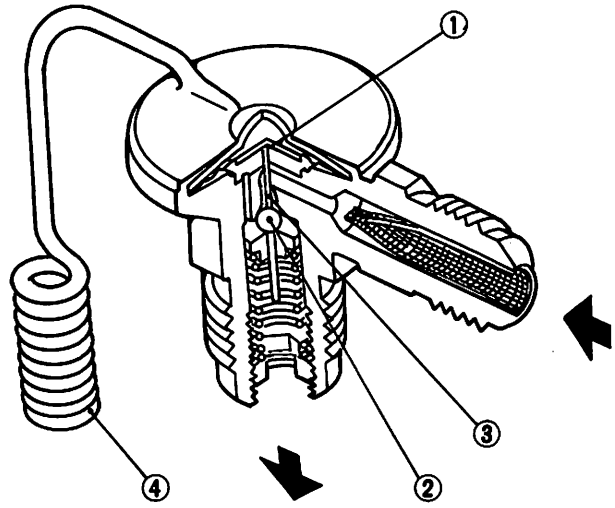
COOLING UNIT

The cooling unit includes an evaporator and an expansion valve. From the electrical point of view, the cooling unit consists of a thermo switch and a main relay.

The liquid refrigerant evaporates in the evaporator with the aid of the expansion valve. Consequently the air drawn by the blower motor is cooled in passing through the evaporator.

The expansion valve restricts the liquid refrigerant as it passes through it and delivers sprayed refrigerant to the evaporator for facilitating refrigerant evaporation.

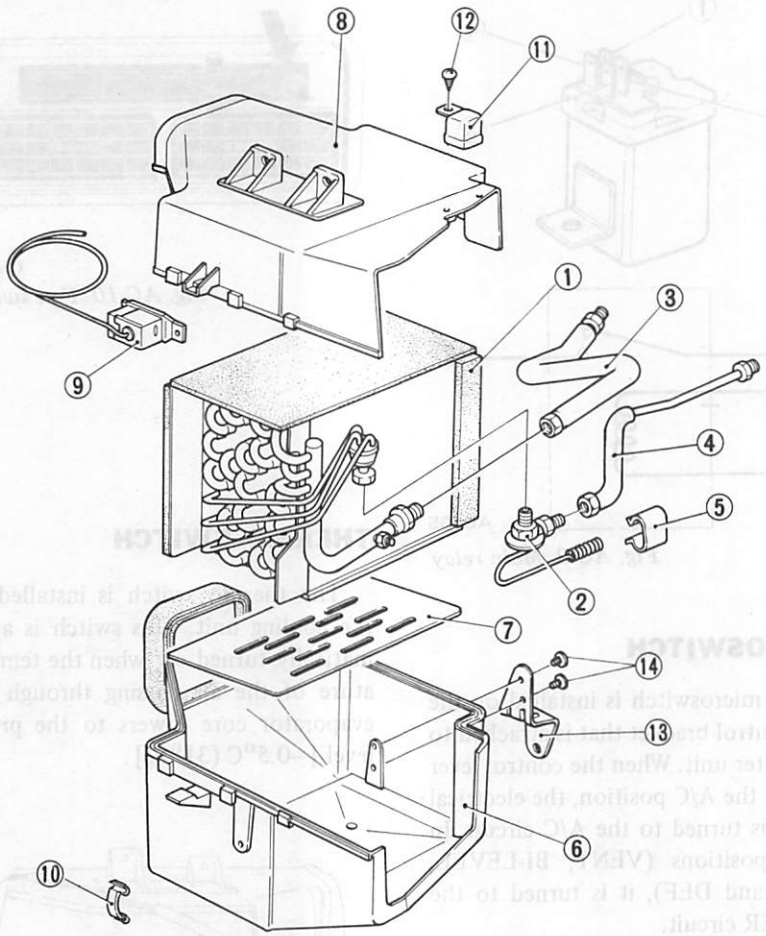
The refrigerant within the thermo bulb changes in pressure through the super heat condition of vaporized refrigerant gas which comes out of the evaporator, causing the deflection of the diaphragm. The lift of the ball valve attached to the diaphragm is changed by the deflection of the diaphragm, thus controlling the amount of refrigerant passing the orifice.



1 Diaphragm
2 Orifice
3 Valve ball
4 Sensing bulb

AC822

Fig. AC-4 Expansion valve



1 Evaporator
2 Expansion valve
3 Low pressure pipe
4 High pressure pipe
5 Clip
6 Lower case
7 Drainboard
8 Upper case
9 Thermo switch
10 Clip
11 Heater motor relay
12 Screw
13 Bracket
14 Screw

AC823

Fig. AC-5 Cooling unit

VACUUM SYSTEM

MAGNET VALVE

The magnet valve is located between the fast idle dash pot and the intake manifold vacuum connector.

Valve closed

When current to the coil is interrupted, passage on the intake manifold side closes, leaving the fast idle dash pot side line open to the atmosphere.

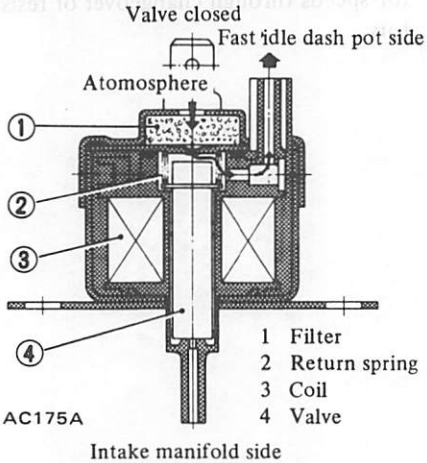


Fig. AC-6 Magnet valve — Closed

Valve open

While the magnet valve coil is energized by an electric current, it holds the valve needle in the raised position and vacuum is imposed on the fast idle dash pot from the intake manifold.

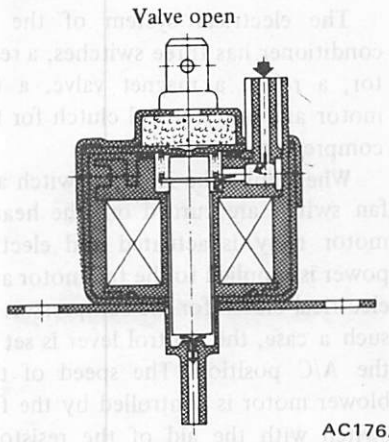


Fig. AC-7 Magnet valve — Open

FAST IDLE CONTROL DEVICE (F.I.C.D.)-FAST IDLE DASH POT

The fast idle control device increases engine idle speed so that the air conditioner continues to cool the passenger compartment even when the car is at a standstill.

The device is a vacuum actuator and is equipped with a diaphragm. The diaphragm deflects when vacuum pressure is applied, and as a result, the push rod attached to it is moved. The push rod is attached to the carburetor throttle lever. When the vacuum pressure acting on the diaphragm is lost, the diaphragm is returned to its original position.

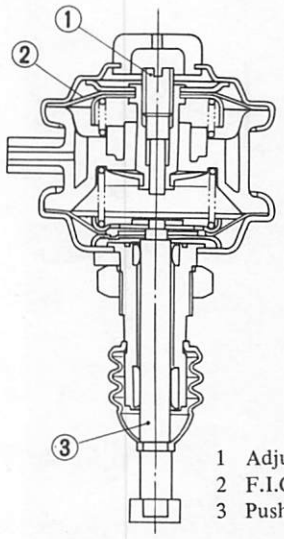


Fig. AC-8 Fast idle dash pot

ELECTRICAL CIRCUIT

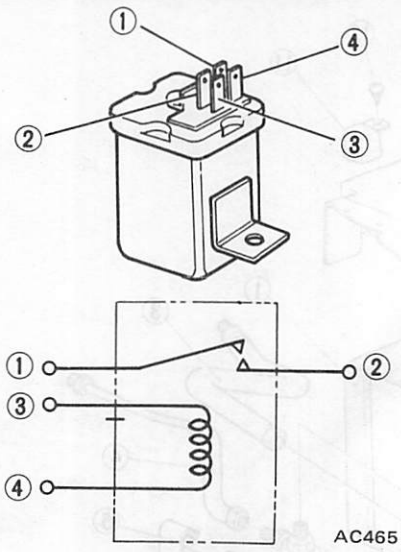
DESCRIPTION

The electrical system of the air conditioner has three switches, a resistor, a relay, a magnet valve, a fan motor and an electrical clutch for the compressor.

When both the ignition switch and fan switch are turned on, the heater motor relay is actuated and electric power is supplied to the fan motor and electrical clutch for the compressor. In such a case, the control lever is set in the A/C position. The speed of the blower motor is controlled by the fan switch with the aid of the resistors. The electrical clutch is actuated by the thermo switch and fan switch. At the same time, the magnet valve also operates to supply vacuum from the engine to the actuator of the F.I.C.D., thereby increasing the engine rpm at idling.

HEATER MOTER RELAY

The heater motor relay is mounted on the cooling unit. When the ignition switch is ON, the control lever in the A/C position (microswitch: ON), and the fan switch also ON, then the relay contact is closed. Then, power from the battery is supplied to the fan motor and to the electrical clutch for the compressor.



AC465

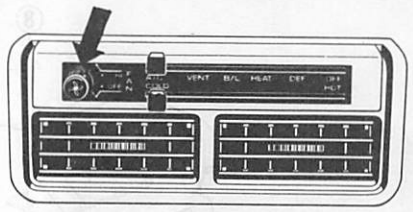
Fig. AC-9 Main relay

MICROSWITCH

The microswitch is installed on the A/C control bracket that is attached to the heater unit. When the control lever is set in the A/C position, the electrical circuit is turned to the A/C circuit. In other positions (VENT, BI-LEVEL, HEAT and DEF), it is turned to the HEATER circuit.

FAN SWITCH

The fan switch is installed on the air conditioner control panel. This switch controls the four blower motor speeds through changeover of resistors.

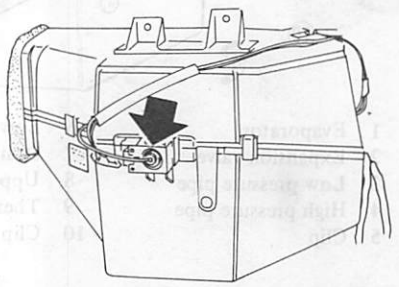


CM669

Fig. AC-10 Fan switch

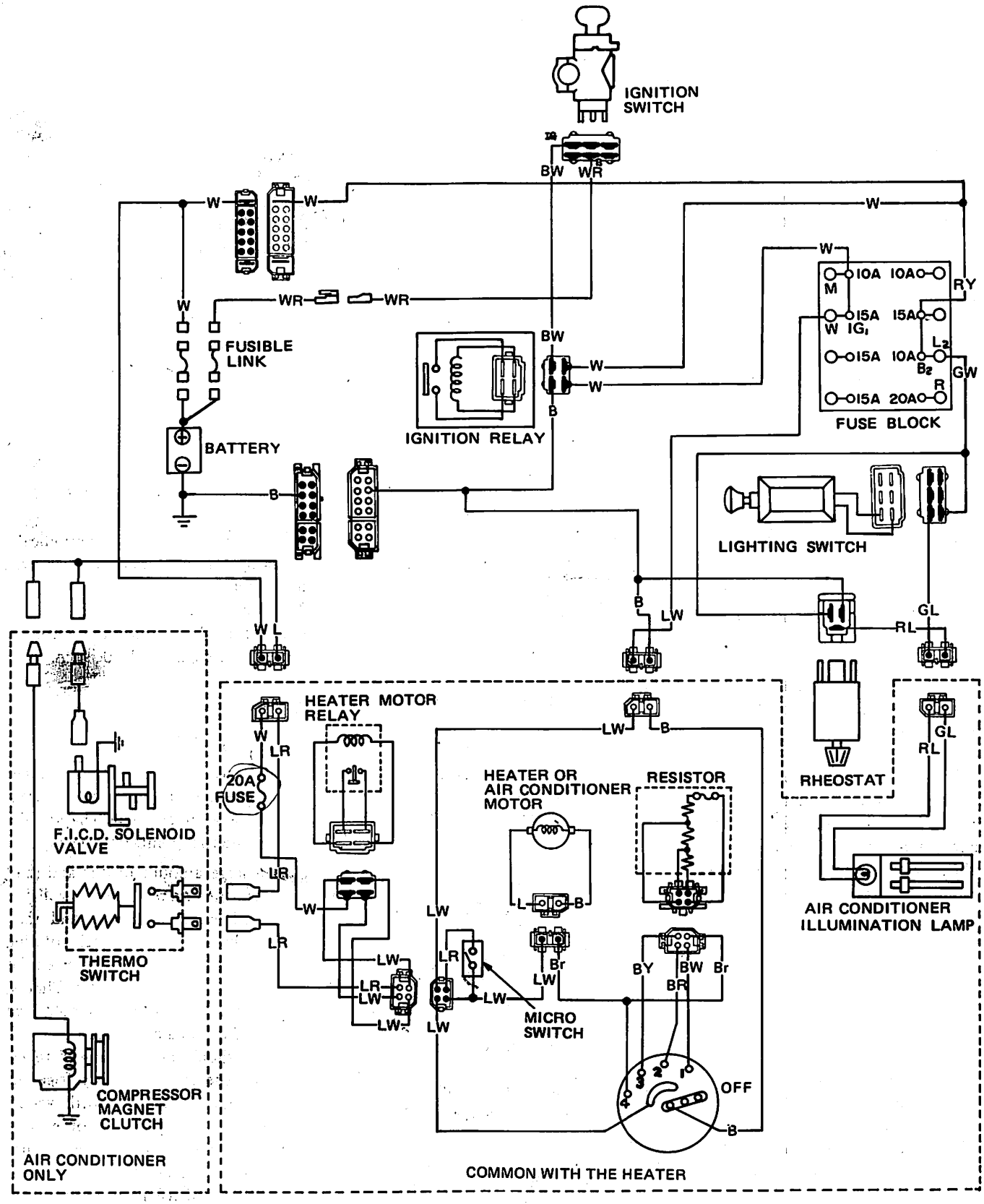
THERMO SWITCH

The thermo switch is installed on the cooling unit. This switch is automatically turned off when the temperature of the air passing through the evaporator core lowers to the preset level [–0.5°C (31°F)].



AC825

Fig. AC-11 Thermo switch



COLOR CODE

B	:	Black	WR	:	White with red stripe	L	:	Blue
BW	:	Black with white stripe	RY	:	Red with yellow stripe	LW	:	Blue with white stripe
BY	:	Black with yellow stripe	RL	:	Red with blue stripe	LR	:	Blue with red stripe
BR	:	Black with red stripe	GW	:	Green with white stripe	Br	:	Brown
W	:	White	GL	:	Green with blue stripe			

AC227A

Fig. AC-12 Circuit diagram of air conditioner system

GENERAL SERVICE

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COMPRESSOR OIL ..... AC- 8
MAINTENANCE ..... AC- 8
PERIODIC MAINTENANCE AND SEASON-IN INSPECTION ..... AC- 8
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HANDLING MANIFOLD GAUGE ..... AC- 9
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REFRIGERANT R-12

The refrigerant used in the air conditioner is generally called "Refrigerant-12 (R-12)". No other refrigerant than the above refrigerant should be used.

This refrigerant is usually available in a small can or a cylinder. In either case, it is liquefied under high pressure in the container.

Refrigerant evaporates easily (has a low evaporation point) and, moreover, since the latent heat of the refrigerant is large, it can absorb a large amount of heat when evaporating. Extreme care must be exercised when handling the refrigerant.

COMPRESSOR OIL

The "SUNISO 5GS" refrigeration lubricant should be used to assure the successful compressor operation. Use of oils other than recommended or mixing of the oil with other oils would cause chemical reaction or lead to lowered viscosity or deficient lubrication.

The oil absorbs moisture as it contacts the air. This points out the need for care not to expose it to atmosphere for an extended period of time.

MAINTENANCE

PERIODIC MAINTENANCE AND SEASON-IN INSPECTION

Both periodic maintenance and season-in inspection are most essential to enable the air conditioner to give full performance.

Perform the following checks.

1. Start engine and check refrigerant level through sight glass on receiver drier. For details, refer to relative topics under "Refrigerant Level Check".
2. Check the entire system for sign of refrigerant leaks. Refer to relative topics under "Checking for Leaks" and "Refrigerant Leaks".

If any trace of oil is noted at and around connection fittings, it is a sure indication that refrigerant is leaking. This condition can be corrected easily by retightening the joints. If any joint on line is suspected of small amount of leakage, use a leak detector to locate leaking points.

3. Check compressor drive belts for proper deflection.

Season-off

Observe the following maintenance tips to allow the air conditioner to operate normally in the next season.

1. Keep the entire system free from refrigerant leakage by periodically checking for refrigerant gas leak even out of season.
2. Turn the compressor for 10 minutes at least once a month by running the engine at 1,500 rpm.

GENERAL SERVICE INSTRUCTIONS

The servicing of the air conditioner should be carried out only by well-trained servicemen. This chapter describes essential points of servicing.

- If a large amount of dirt and sand enter the system, they will be carried with refrigerant and may clog the system or scratch rotating parts. This points out the need for care in servicing the system. That is, disconnecting joints should be carried out in a clean place.
- Water should not be allowed to get inside the system. The refrigerant does not readily mix with water. However, the presence of even a minute amount of water will cause a chemical reaction at high temperature which will in turn produce hydrochloric acid (HCl). Since hydrochloric acid is highly corrosive to metals, the aluminum and copper piping, etc. will become corroded and the refrigeration system will become clogged.

- Water in the system will ice the orifice when the high pressure refrigerant is changed to low pressure refrigerant by expansion valve, etc., and will obstruct the refrigerant flow.

The following items are general instructions to be closely observed in servicing the system.

1. When a system line is disconnected, plug the opening immediately. This is expecially necessary to prevent moisture condensation from forming in the line and to keep out dirt and dust. It is also necessary to keep the line at and above surrounding air temperatures at all times. When connecting system lines, do not attempt to remove the plug from the opening until ready for immediate use.
2. Always keep the working place clean and dry and free from dirt and dust. Using clean cloth, wipe off any water that comes into contact with the pipe joint before disconnecting.
3. Have all necessary tools in preparation beforehand and have tools clean and dry.
4. The compressor oil will easily absorb moisture when exposed to air. Immediately close the opening of the container after use. It is also necessary to observe the following notes:

CAUTION:

a. The oil should not be transfused from a container into another, as the failure will possibly cause moisture to mix with the oil.
b. The used oil should not be returned into a container.
c. The oil should not be used if its state of preservation is not clear enough.

5. When connecting or disconnecting pipes from the refrigeration system, use two wrenches. One wrench is used for holding the fixing nut in place while the other for turning the mating flare nut. Failure to do so may result in a twisted tube or may damage connection.
6. Also use care not to give scratches to the seating surface at connections. A small scratch on the seating surface may be the cause of gas leakage. Before connecting pipes, be sure to give coating of compressor oil to the seating surfaces.

SAFETY PRECAUTIONS

WARNING:

a. Since direct contact of the liquid refrigerant with your skin will cause frostbite, always be careful when handling the refrigerant. Wear gloves or wrap a piece of cloth around service valve to protect your fingers against frostbite by refrigerant. If any of the refrigerant should get into your eyes when charging the refrigerant, splash your eyes with cool water to raise the temperature gradually. Apply a protective film to the eye to avoid infection. Do not rub your eyes. Consult an eye specialist. Always wear goggles or glasses to protect your eyes when working around the system. Should refrigerant strikes your body, splash on cool water and apply a protective film.
b. The refrigerant service container has a safe strength. However, if handled incorrectly, it will explode. Therefore, always follow the instructions on the label. In particular, never store it in a hot location [above 52°C (126°F)] or drop it from a high height.
c. The refrigerant gas is odorless and colorless and breathing may become difficult due to the lack of oxygen. Since the refrigerant gas is heavier than air and will lay close to the floor, be especially careful when handling it in small, confined spaces.
d. The refrigerant itself is non-flammable. However, a toxic gas (phosgene gas) is produced when it contacts fire and special care is therefore required when checking for leaks in the system with a halide torch.
e. Do not steam clean on the system, especially condenser since excessively high pressure will build up in the system, resulting in explosion of the system.

The above precautions are essential in handling of Refrigerant-12, and their strict observation requires sufficient training. Therefore, it is of first importance that any other personnel than a well-trained serviceman should not be allowed to handle the refrigerant.

EVACUATING AND CHARGING SYSTEM

During servicing, use caution to keep air from getting into refrigerant. When air enters the system, all refrigerant must be evacuated from system prior to charging new refrigerant. Air in refrigerant has the following deleterious effects:

1. Since the condensation temperature of the air extremely low, the air will not be condensed when refrigerant gas is condensed in the condenser, and the air will thus remain in gaseous form. Consequently, the effective thermal transmission area of condenser for refrigerant gas will be reduced and refrigerant gas to be condensed will be reduced. The pressure rise will become proportional to the volume of the air in system.
2. When air and refrigerant are mixed in system, a chemical reaction will be produced and hydrochloric acid which will adversely affect the aluminum, copper, iron, and other materials in system may be generated.

HANDLING MANIFOLD GAUGE

The pressure at the high- and low-sides of system should be measured when evacuating and charging refrigerant and when diagnosing trouble in the system. The manifold gauge is used for these purposes. A manifold gauge has two pressure gauges; a low pressure gauge and a high pressure gauge. These gauges are connected to the high- and low-side service valves of system through flexible charging hoses. The

construction of manifold gauge is shown in Figure AC-13.

When valve stem is fully screwed, the valve is front-seated and valve path and the center path are blocked. When valve stem is backed off, the paths are opened.

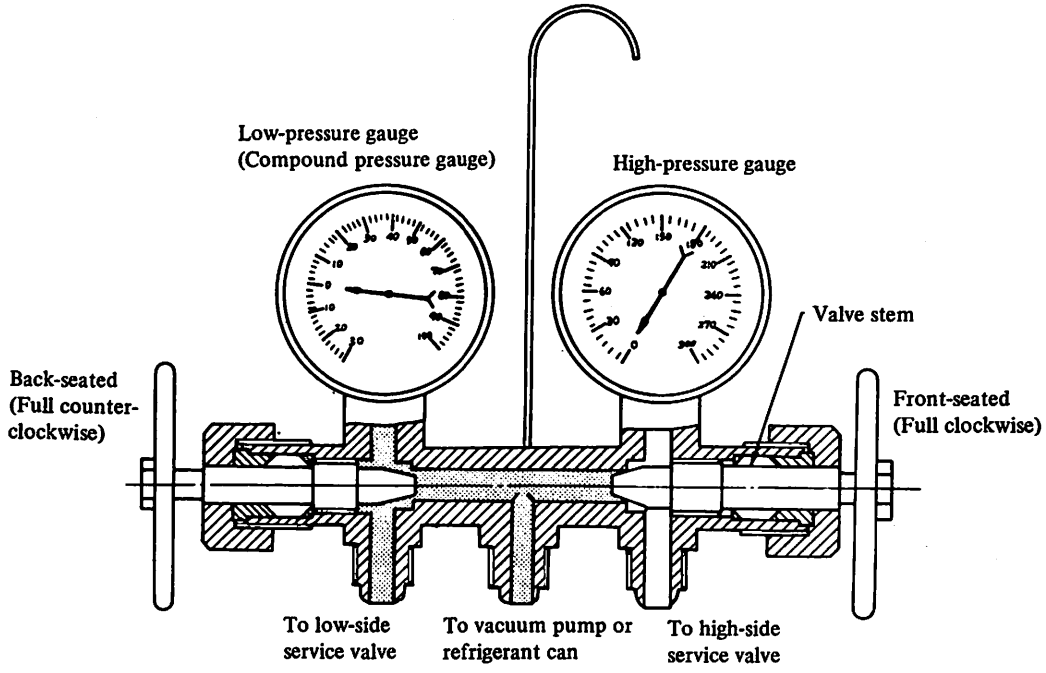


Fig. AC-13 Manifold gauge

Connection to service valve

1. Fully close both valves of manifold gauge. Connect high- and low-pressure charging hoses to manifold gauge.
2. Remove caps from service valves. Connect high- and low-pressure charging hoses to service valves in system. The refrigerant gas will be discharged since check valve is open when pressing charging hose onto service valve.
3. Next, loosen the connection fitting of charging hose at manifold gauge side for 2 to 3 seconds to purge any air inside charging hose by the pressurized gas in system.

Disconnection from service valve

1. Fully close both valves of manifold gauge.
2. Disconnect two charging hoses from service valves. At this time, the gas will be discharged until check valve is closed. Therefore, disconnect hose quickly.

WARNING:
Work with fingers protected with cloth against frostbite by refrigearnt.

HANDLING SERVICE VALVE

An automatic check valve is built into service valve. When this valve presses against the connection fitting, that is, when charging hose is connected to service valve, the valve is open. When charging hose is disconnected, the valve is closed automatically. Always observe the following usage precautions:

1. Always install valve cap after using service valve.

When high speed operation is performed without valve cap, a negative pressure will gradually build up at the low pressure side of system and air may be sucked in. In addition, dirt and dust will easily enter the valve resulting in foreign matter entering the system.

CAUTION:
Do not overtighten valve cap.

2. Check valve will be half opened during connection and disconnection of charging hoses and refrigerant will be forcefully discharged. Therefore, connect and disconnect charging hoses quickly while pressing flare nut of charging hose against service valve.

WARNING:
Work with fingers protected with cloth against frostbite by refrigerant.

3. Since close contact between the thread of valve cap and the thread of service valve will prevent gas leakage, keep these sections clean and free of scratches and damage.
4. Since packing of charging hose will be lost during long use, always check packing prior to installing charging hose.

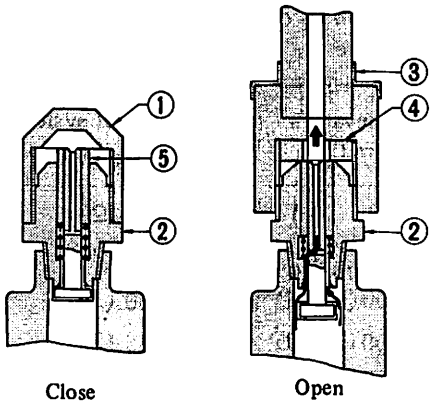


Fig. AC-14 Service valve

The two service valves are provided on the piping. See Figure AC-15.

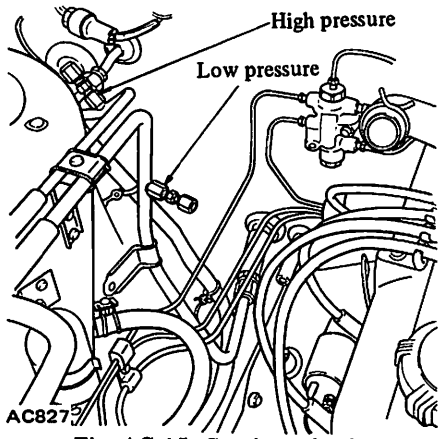


Fig. AC-15 Service valve location

HANDLING CAN TAP

A wide variety of can taps are available. The following procedures apply to conventional can taps.

For the correct usage, refer to the manufacturer's instructions.

CAUTION:
Use can tap of good quality.

1. Connect charging hose to the center fitting of manifold gauge. At this time, confirm that both stems are fully turned in (front-seated).
2. Turn can tap handle fully counterclockwise so that the needle is pulled up.
3. Attach can tap to refrigerant can firmly.
4. Turn can tap handle fully clockwise to make a hole in refrigerant can.
5. Turn the handle fully counterclockwise to raise the needle. Refrigerant gas will flow up to the center fitting of manifold gauge.
6. Loosen the connection at the center fitting of manifold gauge for a few seconds to purge air inside charging hose. See Figure AC-16.

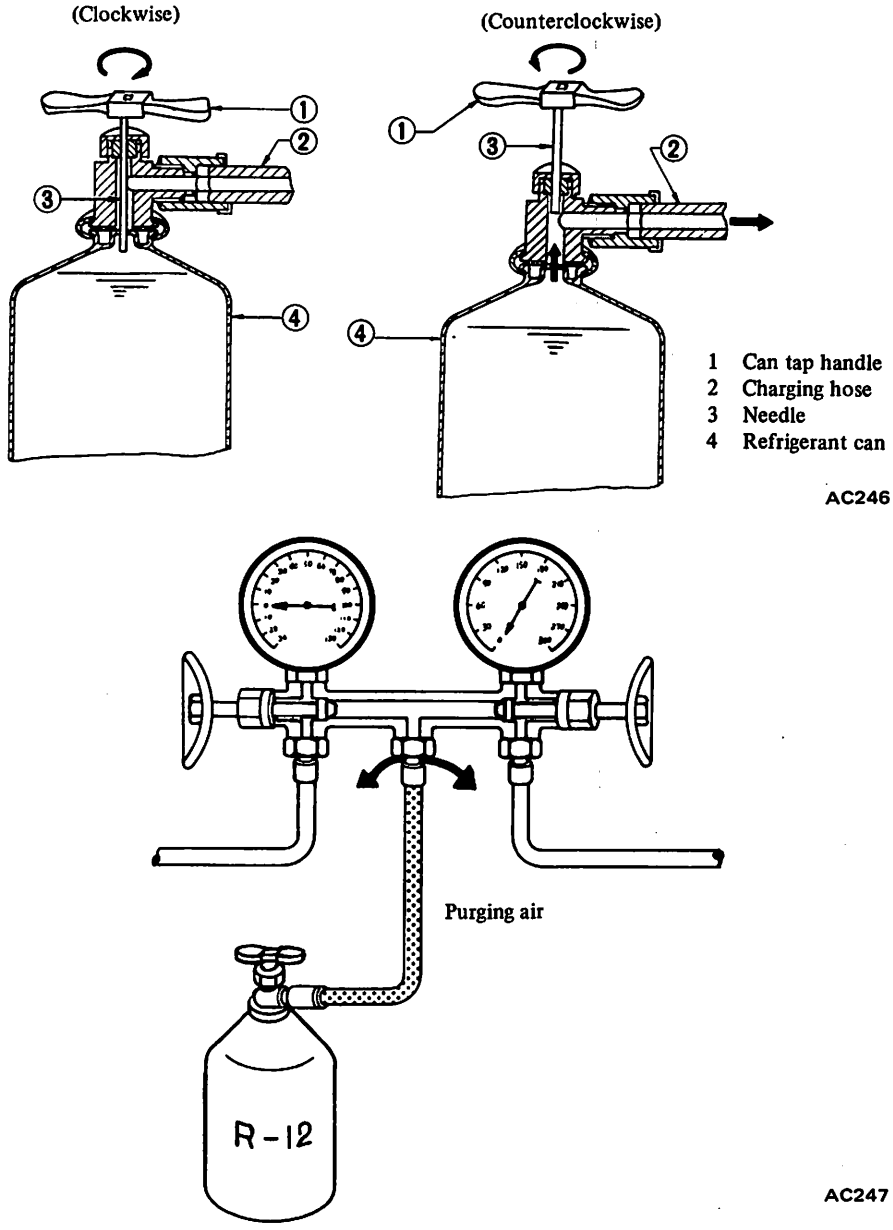


Fig. AC-16 Can tap and purging air

DISCHARGING SYSTEM

The pressurized refrigerant gas inside system must be discharged to a pressure approaching atmospheric pressure prior to evacuating refrigerant inside system. This operation should be made to permit safe removal when replacing system components.

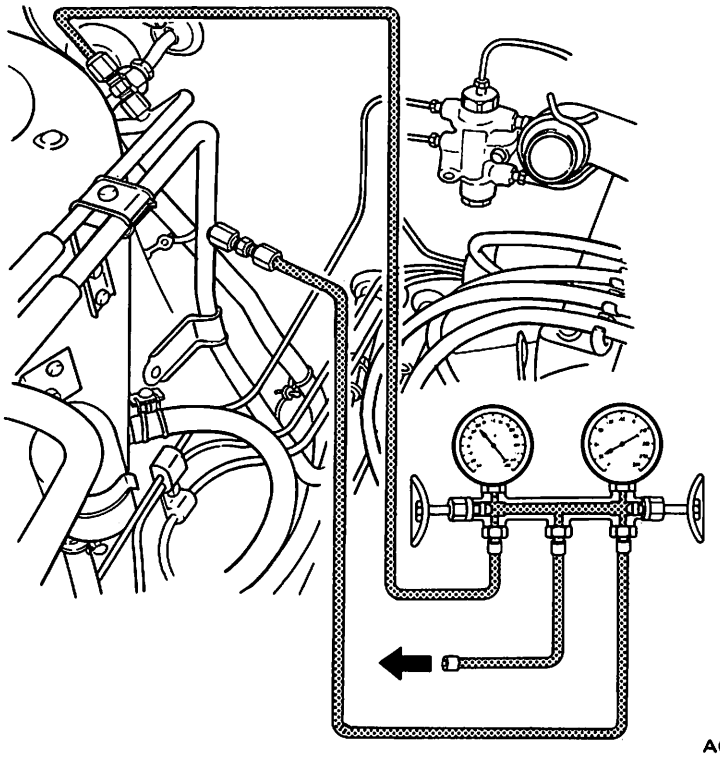
1. Close high- and low-pressure valves of manifold gauge fully.
2. Connect two charging hoses of manifold gauge to their respective service valves.

WARNING:
Securely connect high pressure (discharge) service valve to that of manifold gauge with a hose; also connect low pressure (suction) service valve to that of manifold gauge. For locations of high and low pressure (discharge and suction) service valves, see Figure AC-15.

3. Open both manifold gauge valves slightly and slowly discharge refrigerant from system. See Figure AC-17.

WARNING:
Protect fingers with cloth against frostbite by refrigerant when connecting the charging hose to the service valve or disconnecting it therefrom.

CAUTION:
Do not allow refrigerant to rush out. Otherwise, compressor oil will be discharged along with refrigerant.



AC828

Fig. AC-17 Discharging system

EVACUATING SYSTEM

1. Connect high- and low-pressure charging hoses of manifold gauge to their respective service valves of system and discharge refrigerant from system. Refer to "Discharge System".
2. When refrigerant has been discharged to a pressure approaching atmospheric pressure, connect center charging hose to a vacuum pump.
3. Close both valves of manifold gauge fully. Then start vacuum pump.
4. Open low-pressure valve and suck old refrigerant from system. See Figure AC-18.
5. When low-pressure gauge reading has reached to approximately 500 mm Hg (20 in Hg), slowly open high-pressure valve. See Figure AC-19.
6. When pressure inside system has dropped to 710 mm Hg (28 in Hg), fully close both of valves of manifold gauge and stop vacuum pump. Let it stand for 5 to 10 minutes in this state and confirm that the reading does not rise.

Note:

a. **The low-pressure gauge reads lower by 25 mm Hg (1 in Hg) per a 300 m (1,000 ft) elevation. Perform evacuation according to the following table.**

Elevation m (ft)	Vacuum of system mm Hg (in Hg)
0 (0)	710 (28)
300 (1,000)	685 (27)
600 (2,000)	660 (26)
900 (3,000)	635 (25)

Note: Values show readings of the low-pressure gauge.

b. **The rate of ascension of the low-pressure gauge should be less than 25 mm Hg (1 in Hg) in five minutes.**

If the pressure rises or the specified negative pressure can not be obtained, there is a leak in the system. In this case, immediately charge system with refrigerant and repair the leak described in the followings.

(1) Confirm that both valves of manifold gauge are fully closed and then disconnect center charging hose from vacuum pump.

(2) Connect center hose to can tap in place of vacuum pump. Attach refrigerant can to can tap and pass refrigerant to manifold gauge.

(3) Loosen the connection of center fitting of manifold gauge to purge air from center hose.

(4) Open low-pressure valve of manifold gauge and charge refrigerant into system. After one can [about 0.4 kg (0.9 lb)] of refrigerant has been charged into system, close low-pressure valve.

(5) Check for refrigerant leakage with a leak detector. Repair any leakages found. Refer to "Checking for Leaks" and "Refrigerant Leaks".

(6) Confirm that both valves of manifold gauge are fully closed and then change center charging hose from can tap to vacuum pump.

(7) Open high- and low-pressure valves and operate vacuum pump to suck refrigerant from system. When the pressure in system has dropped to 710 mm Hg (28 in Hg), fully close both valves of manifold gauge.

7. The above operation completes evacuation of system. Next, charge refrigerant. Refer to "Charging Refrigerant".

WARNING:
Securely connect high pressure (discharge) service valve to that of manifold gauge with a hose; also connect low pressure (suction) service valve to that of manifold gauge. For locations of high and low pressure (discharge and suction) service valves, see Figure AC-15.

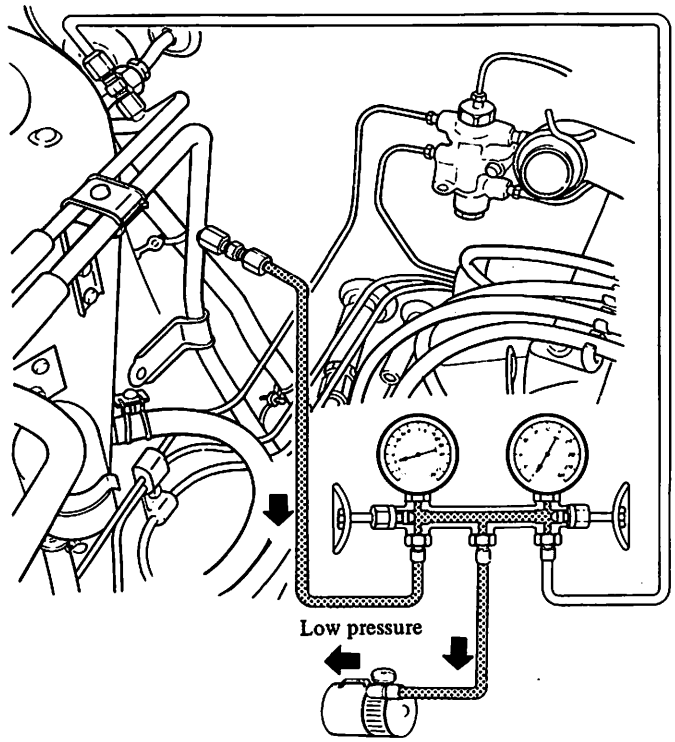


Fig. AC-18 Evacuating system - First step

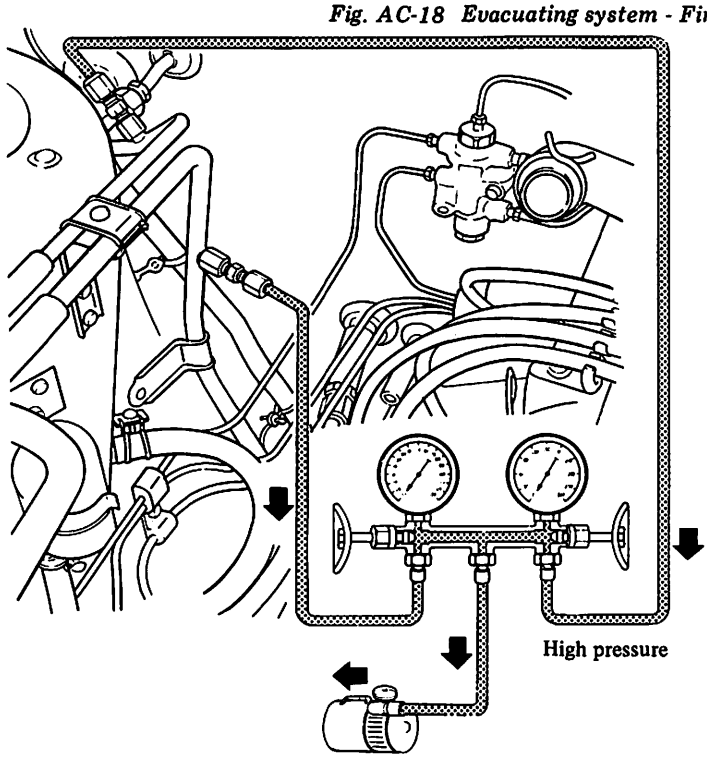


Fig. AC-19 Evacuating system - Second step

CHARGING REFRIGERANT

1. Install manifold gauge to system. Refer to "Handling Manifold Gauge".

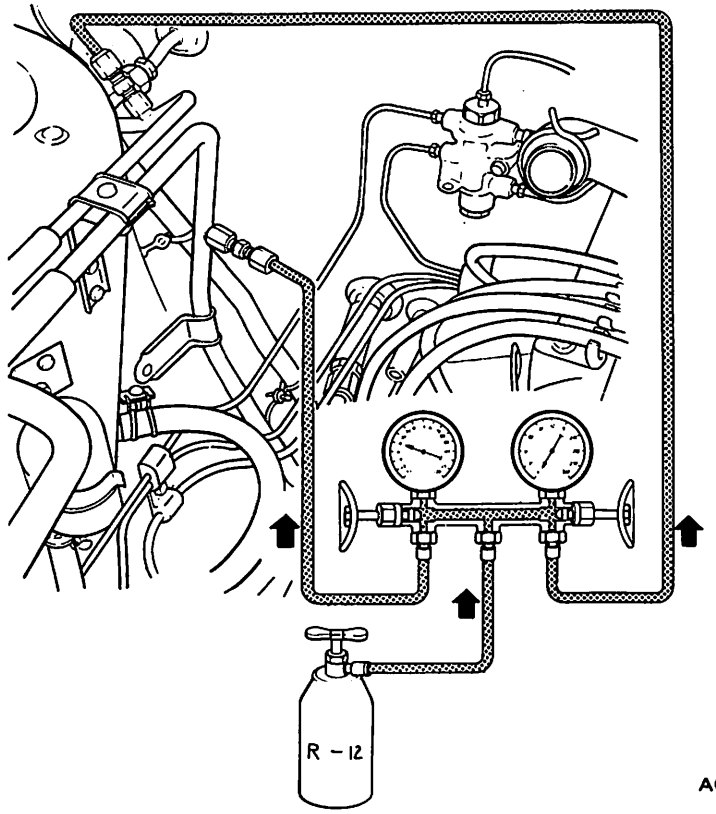
WARNING:
Securely connect high pressure (discharge) service valve to that of manifold gauge with a hose; also connect low pressure (suction) service valve to that of manifold gauge. For locations of high and low pressure (discharge and suction) service valves, see Figure AC-15.

CAUTION:
a. Be sure to purge air from the high- and low-pressure charging hoses.
b. If air is mixed with refrigerant gas in system, evacuation of system should be performed. Refer to Evacuating System.

2. Attach center charging hose of manifold gauge to refrigerant can through can tap. Break seal of refrigerant can to allow refrigerant to enter manifold gauge. Loosen charging hose at the center fitting of manifold gauge and purge air from inside charging hose. Refer to "Handling Can Tap".
3. Open high- and low-pressure valves of manifold gauge and charge refrigerant into system. See Figure AC-20.

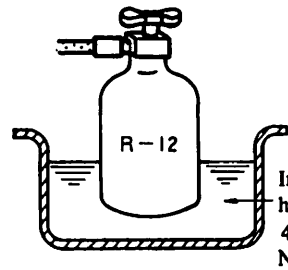
Note: When refrigerant charging speed is slow, immerse refrigerant can in water heated to a temperature of about 40°C (104°F). However, note that this is dangerous when water is hot. See Figure AC-21.

WARNING:
a. Under any circumstances the refrigearnt can must not be warmed in water heated to a temperature of over 52°C (126°F).
b. A blow torch or stove must never be used to warm up the can.



AC831

Fig. AC-20 Charging refrigeran

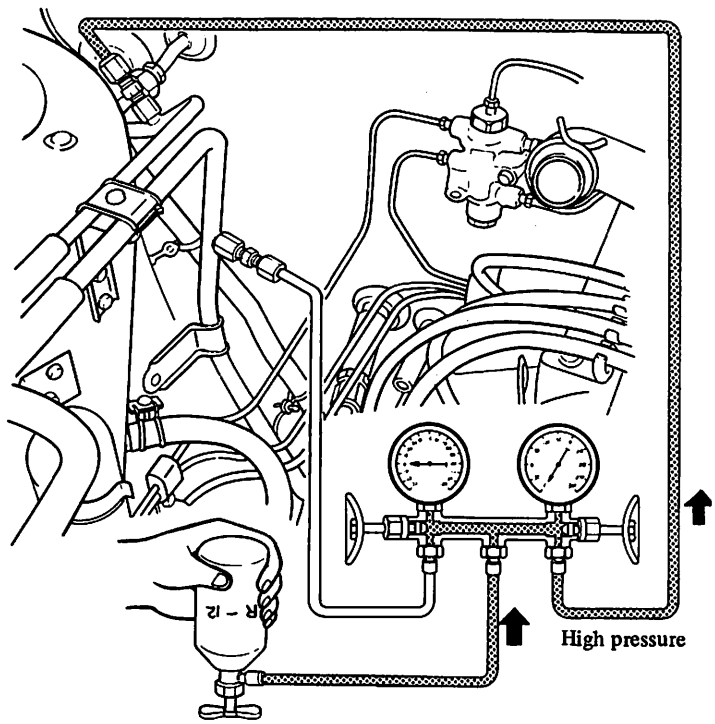


Immerse in water heated to about 40°C (104°F). Note that hot water is dangerous.

AC252

Fig. AC-21 Charging refrigerant

CAUTION:
When charging liquefied refrigerant into the system with the can turned upside down to reduce charging time, charge it only through high pressure valve, but not through low-pressure valve.
After completion of charging, the compressor should always be turned several times manually. See Figure AC-22.

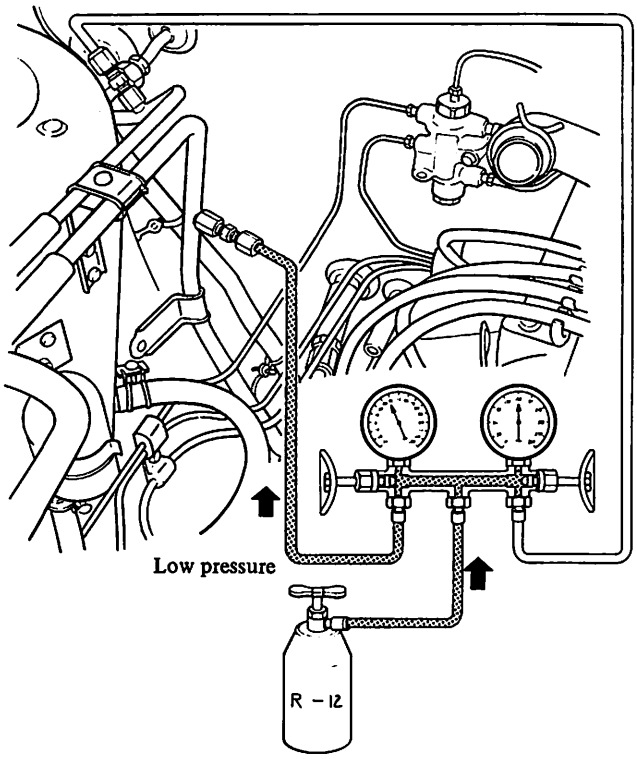


AC832

Fig. AC-22 Charging refrigerant

4. If refrigerant charging speed slows down, charge it while running the compressor for ease of charging. After having taken the steps up to 3 above, proceed with charging in the following order.

(1) Shut off high pressure valve of manifold gauge.



AC833

Fig. AC-23 Charging refrigerant

WARNING:
Never charge refrigerant through high pressure side of system since this will force refrigerant back into refrigerant can and can may explode.

(2) Run the engine at idling speeds below 1,500 rpm.

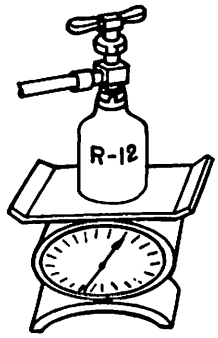
(3) Set the control lever to A/C and FAN switch at maximum speed.

(4) Charge refrigerant while controlling low-pressure gauge reading at 2.8 kg/cm² (40 psi) or less by turning in or out low-pressure valve of manifold gauge. See Figure AC-23.

5. When refrigerant can is empty, fully close both valves of manifold gauge and replace refrigerant can with a new one.

Before opening manifold gauge valve to charge refrigerant from new can, be sure to purge air from inside charging hose.

6. Charge the specified amount of refrigerant into system by weighing charged refrigerant with scale. Overcharging will cause discharge pressure to rise. See Figure AC-24.



Measure the amount of charged refrigerant with a scale.
Make a note of the amount charged from can. AC255

Fig. AC-24 Charging refrigerant

Refrigerant capacity

Unit: kg (lb)

Refrigerant	Minimum	Maximum
R-12	0.7 (1.5)	0.9 (2.0)

Note: The presence of bubbles in sight glass of receiver drier is an unsuitable method of checking the amount of refrigerant charged in system. The state of the bubbles in sight glass should only be used for checking whether the amount of charged refrigerant is small or not. The amount of charged refrigerant can be correctly judged by means of discharge pressure. Refer to "Refrigerant Level Check".

7. After the specified amount of refrigerant has been charged into system, close manifold gauge valves. Then detach charging hoses from service valves of system. Be sure to install valve cap to service valve.

8. Confirm that there are no leaks in system by checking with a leak detector.

Refer to "Checking for Leaks".

Note: Conducting a performance test prior to removing manifold gauge is a good service operation. Refer to "Performance Test".

CHECKING FOR LEAKS

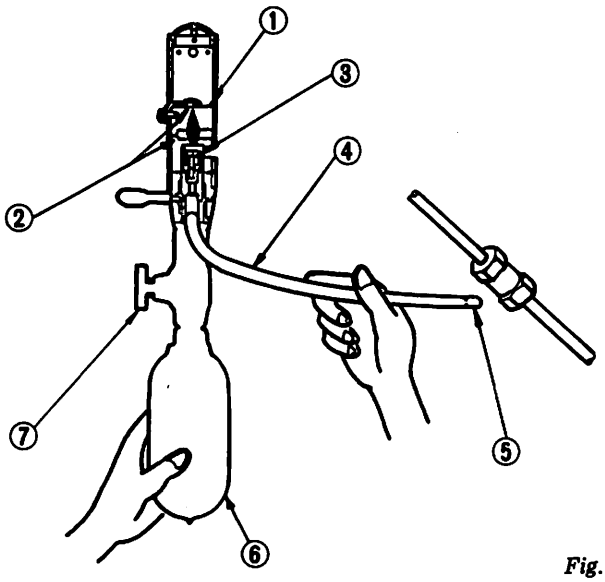
Conduct a leak test whenever leakage of refrigerant is suspected and when conducting service operations which are accompanied by disassembly or loosening of connection fittings.

Refrigerant is a colorless, odorless gas and leakage from system is difficult to detect. Accordingly, the use of a leak detector facilitates check for leaks. Two methods of checking are available; one employs a halide leak detector which burns propane gas or butane gas and the other is an electric type leak detector.

HALIDE LEAK DETECTOR

Since the propane leak detector and butane leak detector are the same in respect to their operation, this section describes the operation of the propane leak detector.

The copper screen is heated by the burning of propane. Refrigerant gas decomposes to color the flame when it contacts the heated screen. The gas to be checked is drawn into the sampling tube and sent out to the burner. A refrigerant leak can clearly be detected by variations in the color of the flame.



1 Copper reaction plate
2 Flame adjusting lines
3 Burner
4 Sampling tube
5 Strainer
6 Gas bomb
7 Flame adjuster

AC010

Fig. AC-25 Checking for leaks

	Propane type	Butane type
NO LEAK	Greenish blue	Pale blue
SMALL LEAK	Yellow	Bright blue
LARGE LEAK	Purple	Vivid green

1. Discharge refrigerant in one or two seconds to ascertain that system has a sufficient pressure needed for leak detection. Charge with 0.4 kg (0.9 lb) of refrigerant, if necessary.
2. Light leak detector. Adjust the height of the flame between flame adjusting lines at the top and bottom of combustion tube. A reaction plate will immediately become red hot.
3. Place the end of sampling tube near the point of the suspected leak in system.

WARNING:
a. Never inhale the fumes produced by combustion of refrigerant gas since they are toxic.
b. Never use halide torch in a place where combustible or explosive gas is present.

Note:
a. Since refrigerant gas is heavier than air, small leaks can be easily detected by placing sampling tube directly below the check point.
b. Suitable ventilation is required. If refrigerant gas is mixed with the surrounding air, leak detector will always indicate a response and detection of the actual leak will be difficult.
c. Never hold leak detector at an angle.

4. The flame will be almost colorless when there is no refrigerant gas being burned. When there is a small refrigerant gas leak, the flame will be green or yellowgreen. When refrigerant gas leakage is large, the flame will be brilliant blue or purple. Since the color of the flame will be yellow when dust is being burned or there is aging scale on copper reaction plate, always keep the strainer of sampling tube and reaction plate clean.
5. Major check points
(1) Compressor
- Compressor shaft seal (rotate the compressor by hand)
- Oil filler plug
- Flexible hose connections
- Rear cover and side cover gaskets.
- Service valve

(2) Condenser
- Condenser pipe fitting
- Condenser inlet and outlet pipe connections

(3) Piping
- Flared section of high pressure and low pressure flexible hose.
- Pipe connections
- Service valve

(4) Evaporator housing
- Inlet and outlet pipe connections
- Expansion valve

ELECTRIC LEAK DETECTOR

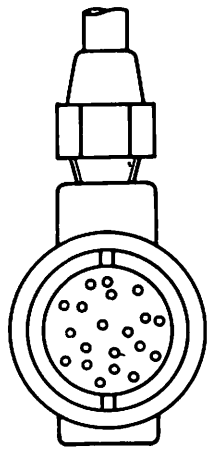
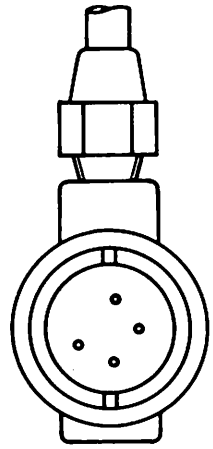
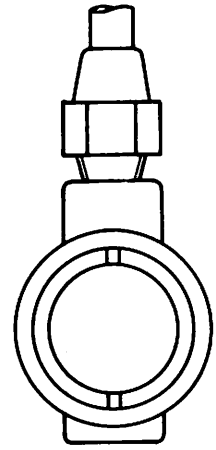
For the operational procedures, refer to the instructions furnished with each electric leak detector.

REFRIGERANT LEVEL CHECK

SIGHT GLASS

Sight glass is provided at the top of receiver drier. One guide for whether there is enough refrigerant in system is given by observing refrigerant flow through sight glass. However, this method is unsuitable for judging the amount of refrigerant. The correct refrigerant level can be judged by measuring the system pressures in accordance with the procedures as described "Performance Test".
1. Start the engine and hold engine speed at 1,500 rpm.
2. Set blower to maximum speed.
3. Check sight glass after the lapse of about five minutes. Judge according to the following table.

Note:
a. The bubbles seen through the sight glass are influenced by the ambient temperature. Since the bubbles are hard to show up in comparatively low temperatures below 20°C (68° F), it is possible that a slightly larger amount of refrigerant would be filled, if supplied according to the sight glass. Be sure to recheck the amount when it exceeds 20°C (68°F). In higher temperature the bubbles are easy to show up.
b. When the screen in the receiver drier is clogged, the bubbles will appear even if the amount of refrigerant is normal. In this case, the outlet side pipe of the receiver drier becomes considerably cold.

Amount of refrigerant / Check item	Almost no refrigerant	Insufficient	Suitable	Too much refrigerant
Temperature of high pressure and low pressure pipes.	Almost no difference between high pressure and low pressure side temperature.	High pressure side is warm and low pressure side is fairly cold.	High pressure side is hot and low pressure side is cold.	High pressure side is abnormally hot.
State in sight glass.	Bubbles flow continuously. Bubbles will disappear and something like mist will flow when refrigerant is nearly gone.  AC256	The bubbles are seen at intervals of 1 - 2 seconds.  AC257	Almost transparent. Bubbles may appear when engine speed is raised and lowered. No clear difference exists between these two conditions.  AC258	No bubbles can be seen.
Pressure of system.	High pressure side is abnormally low.	Both pressures on high and low pressure sides are slightly low.	Both pressures on high and low pressure sides are normal.	Both pressures on high and low pressure sides are abnormally high.
Repair.	Stop compressor and conduct an overall check.	Check for gas leakage, repair as required, replenish and charge system.		Discharge refrigerant from service valve of low pressure side.

PERFORMANCE TEST

Check for the amount of refrigerant in the system can be made by measuring pressure on discharge side.

The correct amount of refrigerant is in the system, if pressure on the discharge side is within the specified range. For details, refer to "Performance Test" described later.

Overcharging will show up in higher pressure on discharge side.

COMPRESSOR OIL LEVEL CHECK

The oil used to lubricate compressor circulates into system from the oil sump while compressor is operating. Therefore, to correctly measure compressor oil, the amount of oil flowing to system must be considered. If a considerable amount of leakage of refrigerant gas happens, the leakage of compressor oil is also considered. There will be no compressor oil leakage from a completely sealed system. When system operates under satisfying condition, the compressor oil level check is unnecessary.

When checking the level of compressor oil or when replacing any component part of the system, use the following service procedure. This facilitates to return oil to compressor.

1. Operate compressor at engine idling speed (1,000 rpm or below) with controls set for maximum cooling and high blower speed for 10 to 15 minutes in order to return compressor oil to compressor.
2. Stop the engine and discharge refrigerant of system and then remove compressor from the car.
3. Remove compressor drain plug.

Drain compressor oil from compressor oil sump and measure the amount.

4. Compressor oil is satisfactory if the following amount of oil remains in the compressor.

Residual oil
SWP123, SC206
140 to 220 cc
(4.7 to 7.4 US fl oz,
4.9 to 7.7 Imp fl oz)

5. Check the cleanliness of the oil. If the oil contains chips or other foreign material, clean oil sump with new oil.
6. Discard the used oil and fill with the same amount of new oil. Add oil if found less than above amount.

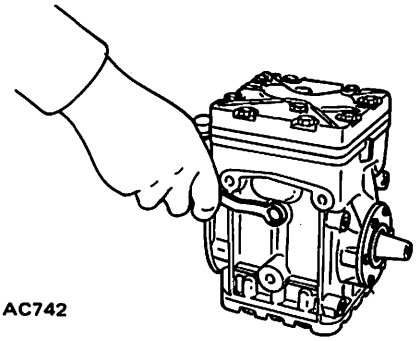


Fig. AC-26 Filler plug of SC206 compressor

If compressor is inoperative due to defective compressor or heavy loss of refrigerant, remove compressor and repair as necessary. Then pour oil up to correct level and install on engine. After above steps have been completed, recheck oil level; drain oil to correct level if level is excessively high.

PERFORMANCE TEST

The cooling performance of the air conditioner changes considerably with changes in surrounding conditions. Testing must be performed using the correct method. This test is used to judge whether system is operating correctly and can also be used as a guide in checking for problems.

1. Park the car indoors or in the shade.
2. Open all the windows of the car fully. However, close the doors.
3. Open the hood.
4. Connect manifold gauge to high- and low-side service valves of the system. Refer to "Handling Manifold Gauge".
5. Set control lever to A/C.
6. Set blower to its highest speed.
7. Start the engine and hold engine speed at 1,500 rpm.
8. After the air conditioner has been operated for about 10 minutes, measure system pressures at high-pressure (discharge) side and low-pressure (suction) side.
9. Measure the temperature of discharge air at outlet grille.
10. Measure the temperature and humidity of the ambient air at a point 1 m (3 ft) front of condenser. However, a dry bulb and wet bulb must not be placed in direct sunlight.

Note:

a. **The pressure will change in the following manner with changes in conditions:**
- **When blower speed is low, discharge pressure will drop.**
- **When the relative humidity of intake air is low, discharge pressure will drop.**

b. **The temperature will change in the following manner with changes in conditions:**
When the ambient air temperature is low, the outlet air temperature will become low.

If the test reveals that there is any abnormality in system pressure, isolate the cause and repair by reference to the "Trouble Diagnoses and Corrections".

REFRIGERANT LEAKS

If leaks are noticeable, leaky parts should be repaired. Then system should be filled with refrigerant. Do not operate compressor with refrigerant level excessively low.

If this caution is neglected, a burnt compressor will result since heavy loss of refrigerant usually indicates heavy loss of compressor oil.

If system has been exposed to atmosphere for an extended period of time, receiver drier must be replaced. If leaks are slight and no air is present in system, add refrigerant as necessary.

To detect leaks, refer to relative topics under "Checking for Leaks". Here is how leaks are stopped.

1. Check torque on the connection fitting and, if too loose, tighten to the proper torque. Check for gas leakage with a leak detector.
2. If leakage continues even after the fitting has been retightened, discharge refrigerant from system, disconnect the fittings, and check its seating face for damage. Always replace even if damage is slight.
3. Check compressor oil and add oil if required.
4. Charge refrigerant and recheck for gas leaks. If no leaks are found, evacuate and charge system.

REMOVAL AND INSTALLATION

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COMPRESSOR

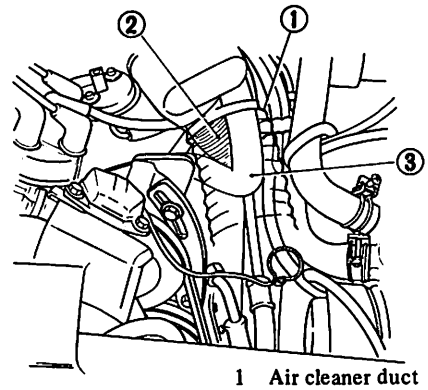
Air conditioners of the S10 model can be classified into two types, depending on the type of compressor. Air conditioners installed on the production line at the Nissan plant use the swash plate type (SWP123) compressor, while air conditioners installed as a dealer option use the crank type (SC206) compressor.

When servicing the compressor, be sure to confirm the compressor type, and refer to "Removal and Installation" instructions provided for that particular compressor.

SWP123 COMPRESSOR

REMOVAL

1. Disconnect battery ground cable.
2. Discharge refrigerant from air conditioning system. Refer to "Discharging System" Section of "General Service".
3. Disconnect air cleaner duct, hot air duct and air pump inlet air hose.



1 Air cleaner duct
2 Hot air duct
3 Air pump inlet hose

Fig. AC-27 Removing air cleaner duct, hot air duct and air pump inlet hose

4. Loosen idler pulley lock nut and tension adjusting bolt to slacken belt, and remove compressor drive belt.
5. Loosen air pump adjusting bolt and air pump mounting bolts and remove air pump drive belt.

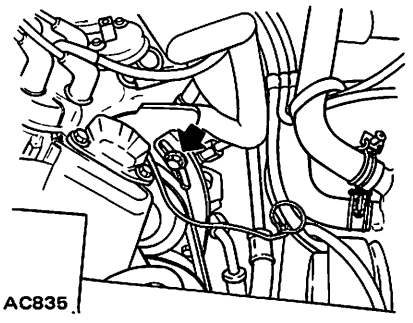


Fig. AC-28 Air pump adjusting bar

6. Remove bolts securing air pump adjusting bar to compressor.
7. Disconnect lead wire from compressor at connector.
8. Disconnect high and low pressure hoses from compressor.

CAUTION:
Be sure to immediately put plugs in pressure hose opening and in compressor opening.

Note: Use wrench to fix joint nut on compressor side, and then loosen flare nut of flexible hose with another wrench.

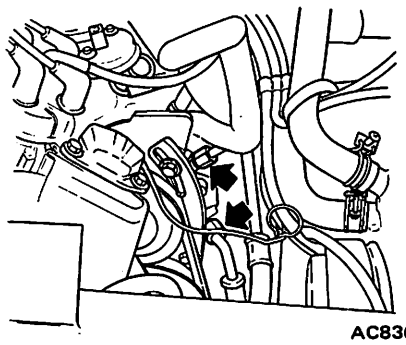
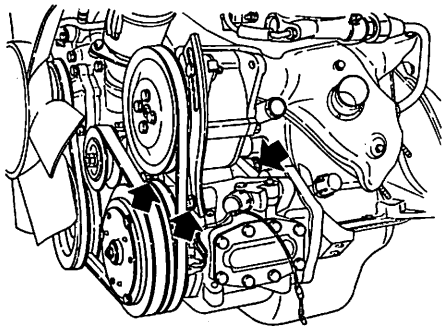


Fig. AC-29 Removing pressure hoses

9. Remove three bolts securing upper side of compressor.



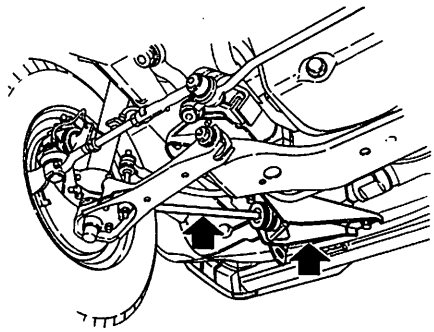
AC837

Fig. AC-30 Removing compressor upper side bolts

10. Jack up front side of car, and place stand under it.
11. Remove engine underside cover.
12. Remove tension rod and tension rod bracket. Refer to Section FA.

CAUTION:
Do not attempt to operate the compressor on its side or upside down for more than 10 minutes, as the compressor oil will enter the low pressure chambers. If, under that condition, compressor should be operated suddenly, internal damages would result. To expel oil from chambers, hand-crank compressor several times in its installed condition.

Note: When storing a compressor, be sure to fill it with refrigerant through low pressure service valve and purge air from high pressure side service valve.



AC838

Fig. AC-31 Removing tension rod and tension rod bracket

13. Remove two bolts securing lower side of compressor, and take compressor out of car, downward.

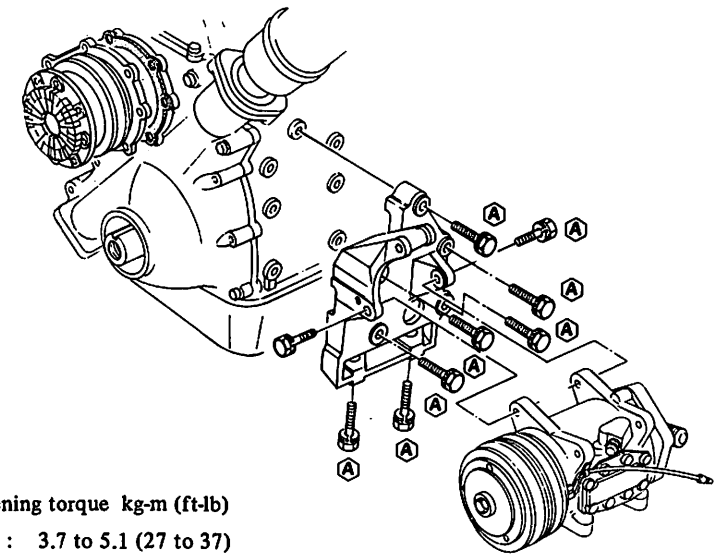
INSTALLATION

Before installing compressor, be sure to check amount and quality of compressor oil by referring to "Compressor Oil Level Check" Section in "General Service." Installation of compressor is to be done in reverse sequence of removal, with attention paid to the following points:

(1) Oil in compressor to be installed should be equal in amount to what remained in compressor just removed.
(2) Coat sealing surface of joint with new compressor oil.
(3) Check tightening torque of bolts holding compressor bracket, tension rod and tension rod bracket.

Tightening torque:
- Compressor bracket to cylinder block:
  3.7 to 5.1 kg-m
  (27 to 37 ft-lb)
- Compressor to compressor bracket:
  3.7 to 5.1 kg-m
  (27 to 37 ft-lb)
- Tension rod end nut:
  4.5 to 5.5 kg-m
  (33 to 40 ft-lb)
- Tension rod bracket bolt:
  3.2 to 4.3 kg-m
  (23 to 31 ft-lb)
- Tension rod to transverse link:
  4.9 to 6.3 kg-m
  (35 to 46 ft-lb)

(4) Before installing compressor, turn compressor drive shaft manually a few turns.
(5) Before installing compressor, make sure that there is no refrigerant leak from compressor.
(6) Upon installation of compressor, conduct refrigerant leak test and make sure that there is no leak from any connection between compressor and flexible hose.
(7) Evacuate and recharge system. Refer to "General Service" for "Evacuating and Charging System".



Tightening torque kg-m (ft-lb)
Ⓐ : 3.7 to 5.1 (27 to 37)

AC839

Fig. AC-32 Installing compressor

SC206 COMPRESSOR

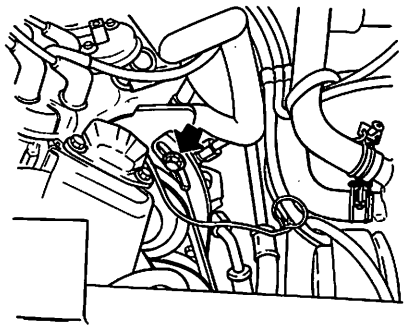
REMOVAL

1. Disconnect battery ground cable.
2. Discharge refrigerant from air conditioner system. Refer to "Discharging System" Section of "General Service".
3. Drain coolant from radiator.
4. Disconnect harness connector from radiator. Harness connector is located on left side of radiator upper tank.
5. Remove four screws securing radiator shroud, and place shroud on cooling fan.
6. Remove radiator grille.

7. Remove radiator and also remove shround. Radiator and condenser are jointly tightened to radiator core support with four bolts on radiator grille side.

Note: After removal of four radiator mounting bolts, radiator is supported only by pipes and receiver drier bracket. Do not apply any large force to condenser or pipes.

8. Loosen alternator drive belt tension adjusting bolt and two alternator mounting bolts, and remove cooling fan drive belt.
9. Loosen idler pulley lock nut and compressor drive belt tension adjusting bolt, and remove compressor drive belt.
10. Disconnect air cleaner air duct.
11. Disconnect air cleaner hot air duct.
12. Disconnect air pump inlet and outlet hoses from air pump.
13. Loosen air pump drive belt tension adjusting bolt and air pump mounting bolts, and remove air pump drive belt.
14. Remove air pump adjusting bar.



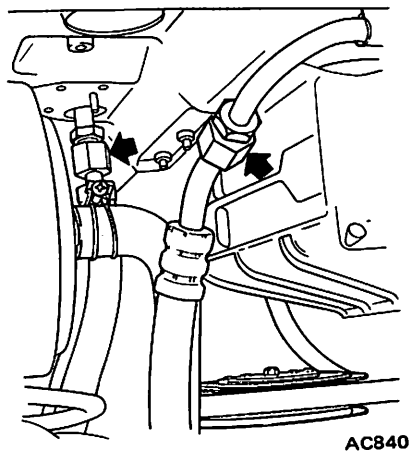
AC835

Fig. AC-33 Air pump adjusting bar

15. Remove air pump from compressor bracket.
16. Disconnect lead wire from compressor.
17. Disconnect flexible hose (Ps) and flexible hose (Pd) at pipe joint.

Notes:

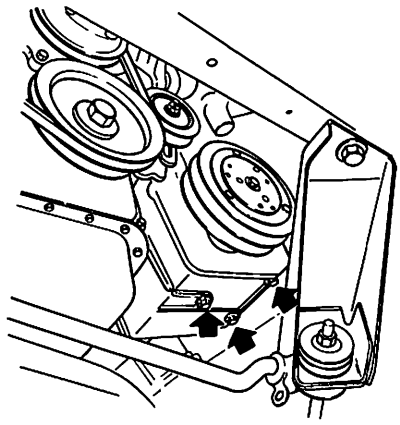
a. **When loosening flexible hose joint nut, be sure to use two wrenches.**
b. **Be sure to immediately put plugs in flexible hose opening and pipe opening.**



AC840

Fig. AC-34 Flexible hose joint

18. Raise car, and remove under cover.
19. Remove three bolts securing lower side of compressor.



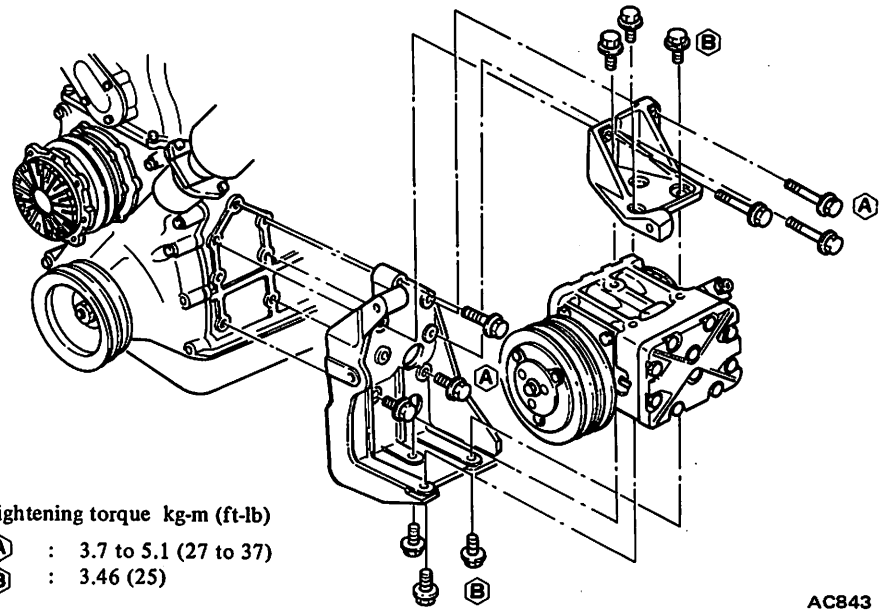
AC841

Fig. AC-35 Removing compressor bolts from underside of engine

20. Lower car, and remove three bolts securing compressor attachment to compressor bracket.
21. Take out compressor unit fitted with flexible hose and attachment, with compressor clutch facing up.

INSTALLATION

Before installing compressor, be sure to check quality and amount of compressor oil by referring to "Compressor Oil Level Check" Section in "General Service". Installation of compressor is to be done in reverse sequence of removal. Use the same care as for the SWP123 compressor. Refer to "Removal and Installation" of the SWP123 compressor.



Tightening torque kg-m (ft-lb)
Ⓐ : 3.7 to 5.1 (27 to 37)
Ⓑ : 3.46 (25)

AC843

Fig. AC-36 Installing compressor

IDLER PULLEY

ADJUSTMENT OF BELT TENSION

Normal compressor drive belt deflection is 8 to 12 mm (0.31 to 0.47 in) when 10 kg (22 lb) of thumb pressure is applied midway between crankshaft pulley and compressor pulley. Move idler pulley up or down by turning adjusting bolt to correct belt deflection.

1. Loosen idler pulley lock nut and turn adjusting bolt to obtain correct belt deflection.
2. After completing adjustment, securely tighten idler pulley lock nut.

REMOVAL AND INSTALLATION

1. Loosen idler pulley lock nut.
2. Loosen belt tension adjusting bolt and loosen belt tension.
3. Remove two bolts securing idler pulley assembly to cylinder block and one bolt securing it to compressor bracket, and remove idler pulley assembly.
4. Install idler pulley assembly in the reverse sequence of removal.

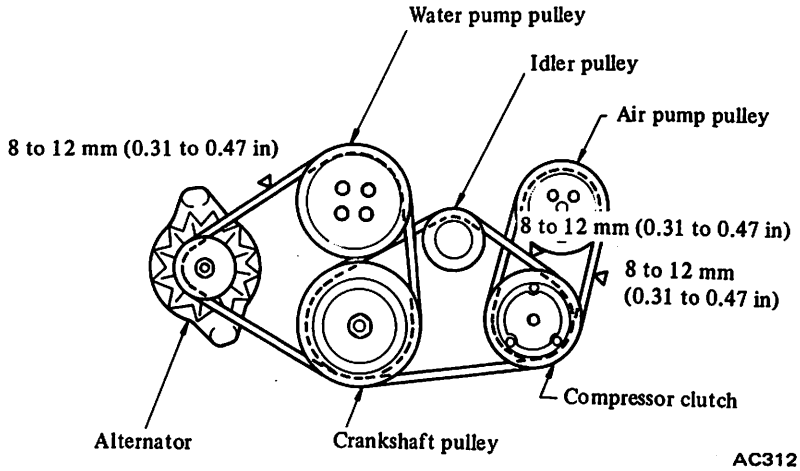
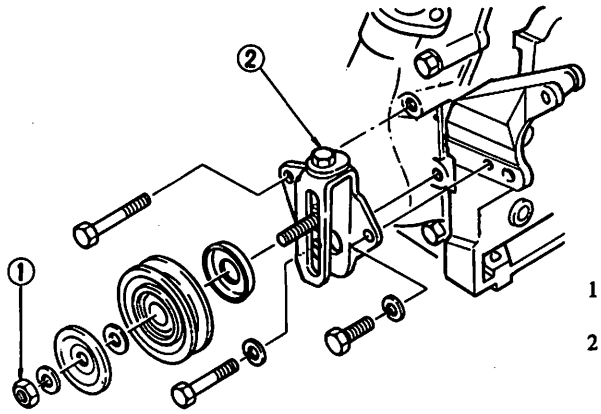


Fig. AC-37 Adjusting belt tension



1 Idler pulley attaching nut
2 Belt tension adjusting bolt

Fig. AC-38 Removing idler pulley

COOLING UNIT

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Discharge refrigerant from air conditioning system. Refer to "Discharging System" Section in "General Service".
3. Disconnect high-pressure pipe and low-pressure pipe joints located at dash panel on engine compartment side.

CAUTION:
Immediately attach blind plug to pipe opening.

Note: When disconnecting pipe joint, be sure to use two wrenches.

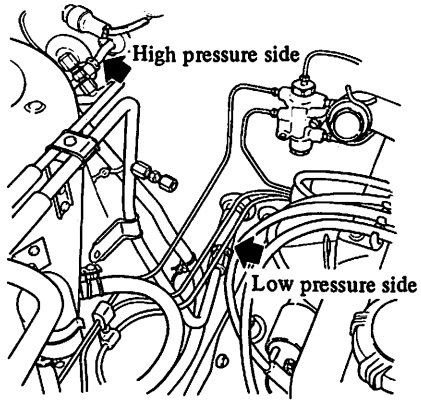
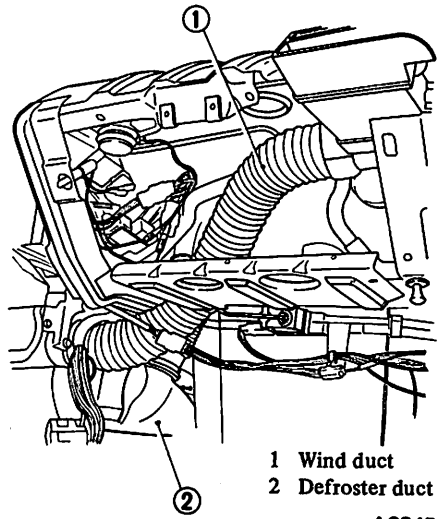


Fig. AC-39 Disconnecting refrigeration pipes

4. Remove grommet fixing high-pressure pipe and low-pressure pipe to dash panel.
5. Remove package tray finisher by removing two screws on each side securing finisher to instrument panel and one screw securing it to cooling unit.
6. Remove glove box lid.
7. Remove glove box.
8. Remove right-hand side wind duct and defroster duct.

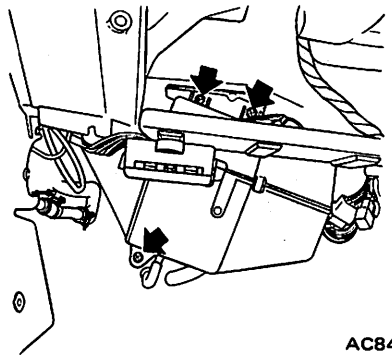


1 Wind duct
2 Defroster duct

Fig. AC-40 Wind duct

9. Disconnect drain hose from cooling unit.
10. Remove screw securing cooling unit lower bracket to dash panel and two screws securing cooling unit to bracket on dash upper panel, lower cooling unit to floor.

CAUTION:
When removing two screws securing cooling unit to dash upper panel, be sure to hold cooling unit to prevent it from falling.



AC846

Fig. AC-41 Removing cooling unit

11. Disconnect cooling unit harness at connector.

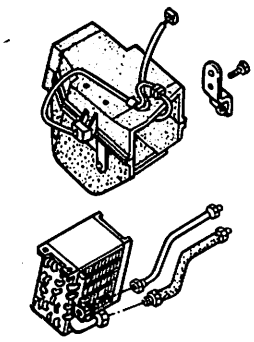
One connector is colored green and is located at upper right corner of dash panel; the other is connected to harness from heating unit.

12. Install cooling unit in the reverse sequence of removal.

Note:
a. **Before connecting pipes, be sure to apply new compressor oil to each sealing surface.**
b. **When connecting pipe, be sure to use two wrenches.**

Tightening torque:
Joint nut for copper tube
High pressure side (3/8 in)
2.5 to 3.5 kg-m
(18 to 25 ft-lb)
Low pressure side (1/2 in)
2.5 to 4.0 kg-m
(18 to 29 ft-lb)

DISASSEMBLY AND ASSEMBLY



AC847

Fig. AC-42 Disassembling cooling unit

1. Disconnect cooling unit harness from respective connector of thermo switch and main relay.
2. Remove high pressure pipe fastening clip from upper cooling unit case.
3. Remove main relay from upper cooling unit case.
4. Remove four fixed springs that join upper and lower coooling unit cases, and then separate upper and lower cases.
5. Take out thermo switch and evaporator.
6. Remove insulating material that encases expansion valve, and remove clip securing temperature sensor in expansion valve. Remove expansion valve from evaporator.
7. Assemble cooling unit in the reverse sequence of disassembly.

Tightening torque:
Expansion valve
5.0 kg-m (36 ft-lb)

CAUTION:
a. **When installing expansion valve to evaporator, use sufficient care so that temperature sensor can be mounted correctly to low pressure pipe.**
b. **Use sufficient care so that temperature sensor of capillary tube of thermo switch can be installed correctly to evaporator.**

INSPECTION

Evaporator

Check evaporator for leakage or damage. If damaged, replace.

Expansion valve

Check expansion valve for leakage or clogging. If clogged, clean filter in expansion valve. If damaged, replace.

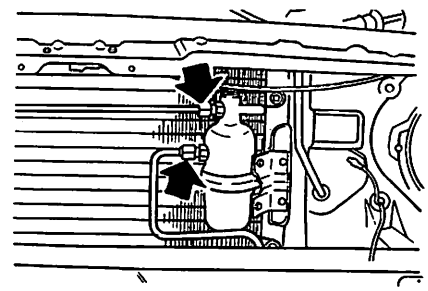
RECEIVER DRIER

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Discharge refrigerant from air conditioning system. Refer to "Discharging System" Section in "General Service".
3. Remove radiator grille.
4. Disconnect pipes from receiver drier.

CAUTION:
Attach blind plug immediately to pipe opening and to receiver drier opening.

Note: **When disconnecting pipe from receiver drier, use two wrenches.**



AC848

Fig. AC-43 Receiver drier

5. Remove two nuts securing receiver drier bracket to radiator core support on engine compartment side.
6. Remove two screws securing receiver drier bracket to condenser, and take out receiver drier.
7. Install in the reverse sequence of removal.

Tightening torque:
Joint nut for copper pipe to receiver drier:
2.5 to 3.5 kg-m
(18 to 25 ft-lb)

INSPECTION

Check receiver drier for leakage or damage. If necessary, replace receiver drier and safety valve as an assembly.

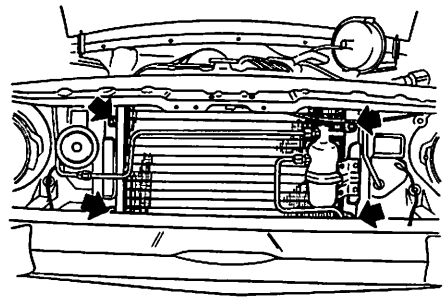
CONDENSER

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Discharge refrigerant from air conditioning system. Refer to "Discharging System" Section in "General Service".
3. Remove radiator grille and hood lock stay.
4. Remove receiver driver. Refer to "Removal" of "Receiver Drier".
5. Disconnect pipes from condenser.

CAUTION:
a. Use wrench to fix union on condenser, and then loosen flare nut of refrigerant line with another wrench.
b. Plug up all openings in condenser and system.

6. Remove four screws securing condenser and radiator to radiator core support, and remove condenser.



AC849

Fig. AC-44 Removing condenser

7. Install in the reverse sequence of removal.

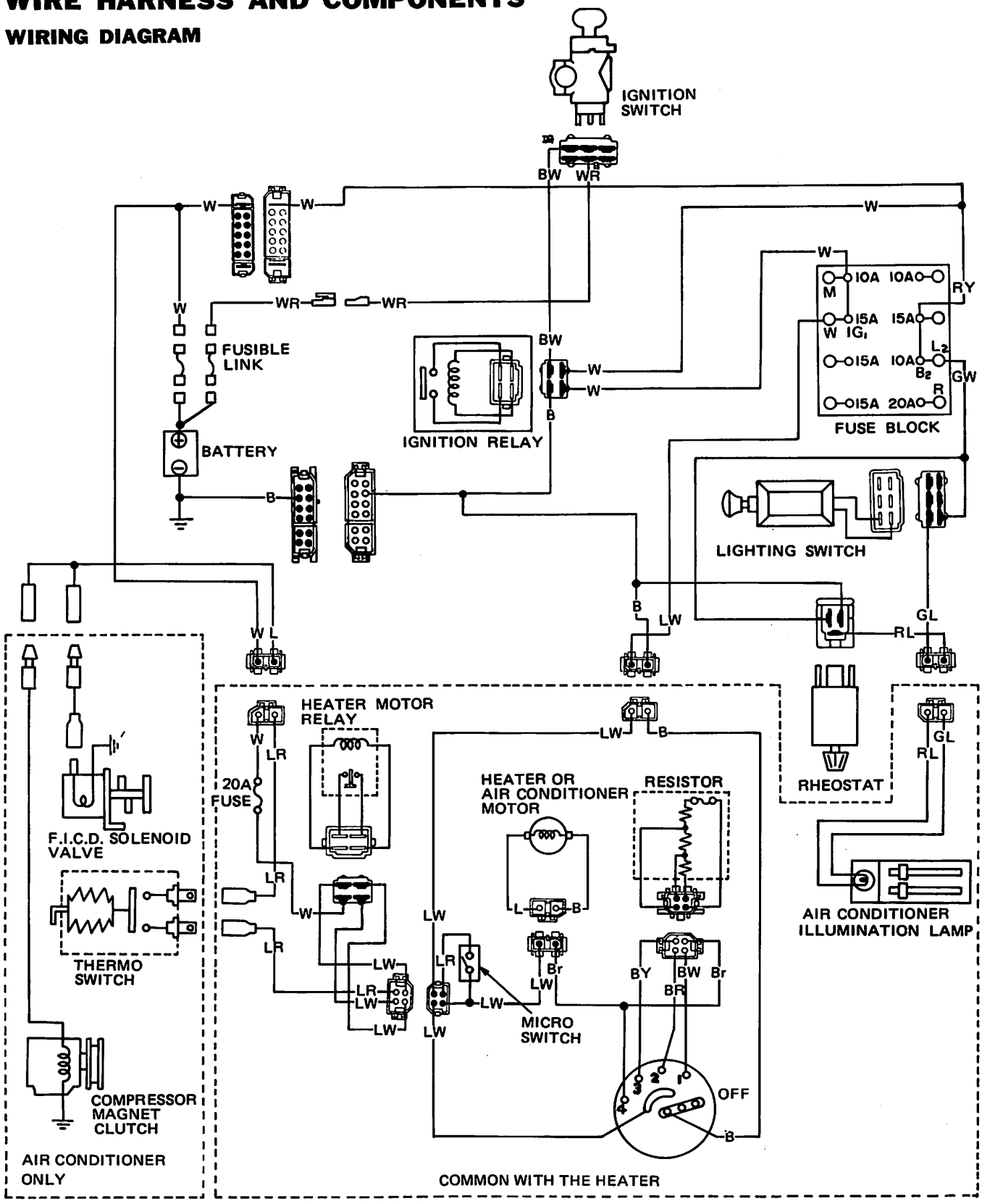
INSPECTION

Check condenser for scratches or cracks. Upon finding any problem which may cause gas to leak, repair or replace condenser. Condenser fins or air passages clogged with dirt, insects or leaves will reduce cooling efficiency of condenser. In such a case, clean fins or air passages with compressed air.

CAUTION:
Do not clean condenser with steam. Be sure to use cold water or compressed air.

WIRE HARNESS AND COMPONENTS

WIRING DIAGRAM



COLOR CODE

B	:	Black	WR	:	White with red stripe	L	:	Blue
BW	:	Black with white stripe	RY	:	Red with yellow stripe	LW	:	Blue with white stripe
BY	:	Black with yellow stripe	RL	:	Red with blue stripe	LR	:	Blue with red stripe
BR	:	Black with red stripe	GW	:	Green with white stripe	Br	:	Brown
W	:	White	GL	:	Green with blue stripe			

AC227A

Fig. AC-45 Wiring diagram

MAINTENANCE

If cracks or deterioration is found on wire harness insulation, replace wire harness. When replacing or connecting wire, be sure to use resin flux solder or electrical connector. Cover jointed portion and exposed portion with insulating tape. Always use specified diameter of wire when replacing wire. Never use smaller diameter wire. Each harness and wire should be held securely by clip or other means so that the wires will not rub or be cut by vibration.

Note:

a. **Before inspection or replacement of electrical circuit and its components, disconnect battery terminals in the following sequence: Disconnect ground cable from negative (–) terminal and then disconnect positive cable from positive (+) terminal.**
   Before connecting cable to battery terminal, be sure to clean terminal with rag. Connect positive cable to positive (+) terminal and then connect ground cable to negative (–) terminal. Apply grease to these terminals to prevent rust formation.
b. **Do not use screwdrivers or any other service tool for continuity test. Always use test leads for this test.**
c. **Never ground an open circuit or circuit with no load. Use a test lamp (12V-3W) or circuit tester as a load.**

HEATER MOTOR RELAY

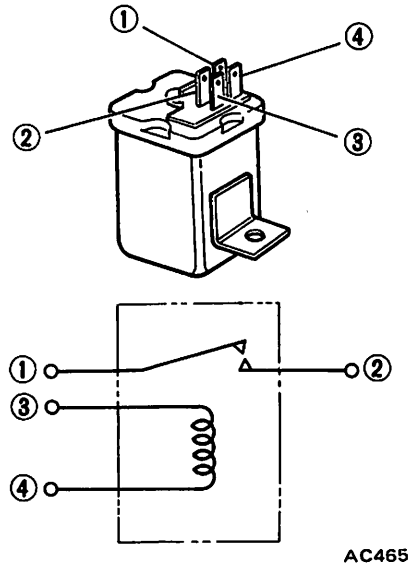
Removal and Installation

Heater motor relay is installed to cooling unit. Remove heater motor relay after removing cooling unit.

1. Disconnect battery ground cable.
2. Remove cooling unit. Refer to "Removal and Installation" of "Cooling Unit".
3. Disconnect cooling unit harness from heater motor relay terminal.
4. Remove screws mounting heater motor relay to cooling unit, and remove heater motor relay.
5. Install heater motor relay in the reverse sequence of removal.

Inspection

Check heater motor relay for continuity by using circuit tester or test lamp. Continuity must be observed between terminals ③ and ④. When DC 12V is applied between terminals ③ and ④, continuity must be observed between terminals ① and ②.

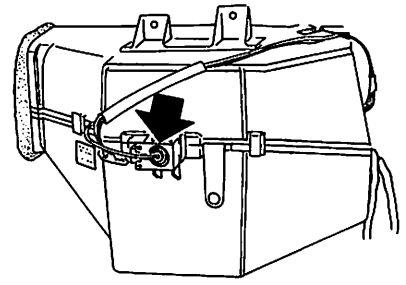


AC465

Fig. AC-46 Heater motor relay

THERMO SWITCH

Thermo switch is located on side face of cooling unit. Thermo switch is assembled between lower and upper cases of cooling unit. Remove cooling unit before removing thermo switch.



AC852

Fig. AC-47 Thermo switch

Removal and Installation

1. Disconnect battery ground cable.
2. Remove cooling unit. Refer to "Removal and Installation" of "Cooling Unit".
3. Disconnect cooling unit harness from thermo switch terminal.
4. Remove four fixing springs that join upper and lower cases, and then separate the cases.
5. Remove thermo switch from groove of upper and lower cases.
6. Install thermo switch in the reverse sequence of removal.

CAUTION:
Capillary tube of thermo switch is fitted in groove of cooling unit case. Use care not to bend or crush this tube.

Note: **When installing, take heed so that temperature sensor of thermo switch capillary tube can be mounted correctly to evaporator.**

Inspection

1. Using circuit tester or test lamp, check thermo switch for continuity between its two terminals. Continuity must be observed.
2. Place temperature sensing end of thermo switch capillary tube in atmosphere of –1°C (30°F), and check continuity between two terminals. Continuity must be observed.
3. Replace thermo switch if damaged.

BLOWER MOTOR

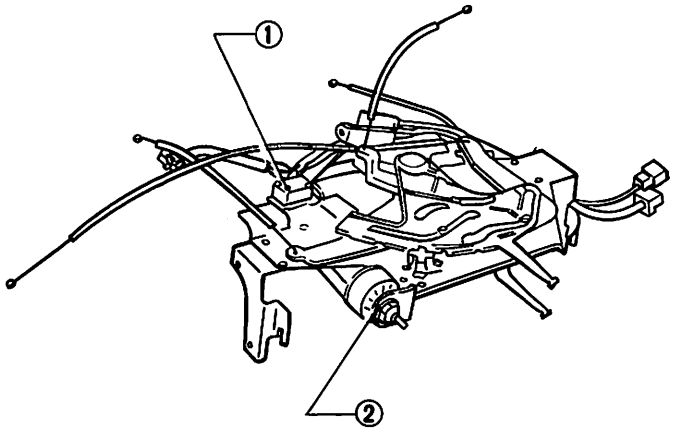
1. Disconnect battery ground cable.
2. Disconnect cooler duct and defroster duct on driver's seat from heating unit.
3. Disconnect blower motor lead wires at connector.
4. Remove screws securing blower motor to heating unit.
5. Remove blower motor and fan, as an assembly, from heating unit.
6. Install blower motor in the reverse sequence of removal.

FAN SWITCH AND MICROSWITCH

Removal and Installation

1. Disconnect battery ground cable.
2. Remove vent cover from heating unit.

3. Disconnect control cable from each door and water cock. Remove cable clips attached to each cable.
4. Disconnect four lead wires from control at respective connector.
5. Remove three screws securing control assembly to heating unit, and pull out control assembly toward front.
6. Remove screws securing microswitch.
7. Remove nut securing fan switch.
8. Remove fan switch and microswitch as an assembly.
9. Install fan switch and microswitch in the reverse sequence of removal.



1 Microswitch
2 Fan switch

AC852

Fig. AC-48 Removing fan switch and microswitch

Inspection

Using circuit tester or test lamp, check fan switch and microswitch for continuity.

RESISTOR FOR FAN SWITCH

Removal and installation

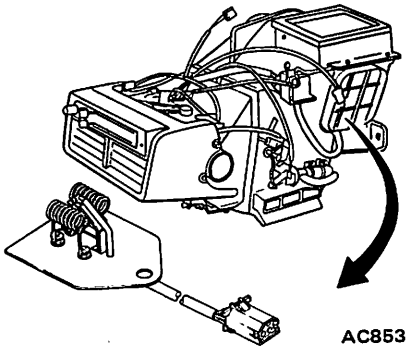
1. Disconnect battery ground cable.
2. Drain coolant from radiator.

Note: Set temperature control lever to HEAT position to open water cock before draining coolant.

3. Remove console box. Refer to Section BF of Service Manual.
4. Remove instrument panel. Refer to Section BF of Service Manual.
5. Remove cooling unit. Refer to "Removal and Installation" of "Cooling Unit".
6. Disconnect lead wire from resistor at connector.
7. Remove resistor from heating unit. Resistor is mounted to heater case by spring pressure.
8. Install resistor in the reverse sequence of removal.

Inspection

Check fuse for continuity and measure resistance of each coil. Refer to Continuity Diagram shown below.



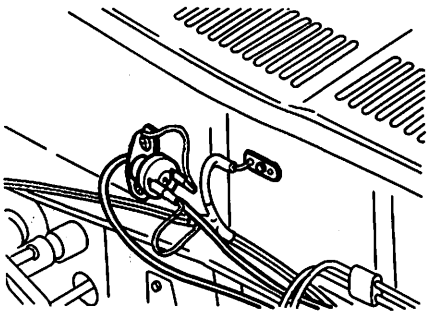
AC853

Fig. AC-49 Resistor

MAGNET VALVE

Removal and installation

1. Disconnect battery ground cable.
2. Disconnect magnet valve lead wires and vacuum hoses.
3. Remove magnet valve securing screws and then remove magnet valve.



AC232A

Fig. AC-50 Removing magnet valve

4. Installation is in the reverse order of removal.

Inspection

1. Using circuit tester or test lamp, check magnet valve for continuity between two terminals.
2. Start engine, set control lever in A/C position, and set fan switch to ON. Make sure that first idle actuator operates when engine is idling.

FAST IDLE DASH POT

ADJUSTMENT OF IDLE SPEED

Transmission	When A/C is OFF.	When F.I.C.D. is actuated.
Manual	600 rpm	800 rpm
Automatic	600 rpm at "D" range	800 rpm at "N" range

The fast idle control device is used on cars equipped with an air conditioner to raise the idle speed automatically.

Use the following procedures when adjusting.

1. Run engine until it reaches operating temperature.
2. With air conditioner in OFF (when compressor is not operated), make sure that engine is at correct idle speed.
3. With air conditioner in ON (when F.I.C.D. is actuated), set engine speed to 800 rpm using following procedures as a guide.

(1) Put off cap and turn adjusting screw until engine speed is 800 rpm.

Clockwise:
Engine speed increases.

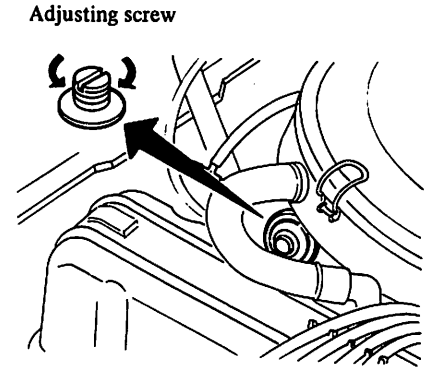
Counterclockwise:
Engine speed decreases.

On cars equipped with automatic transmission, make this adjustment with shift control lever in "N" position.

(2) Depress and release accelerator pedal several times, and make sure that engine speed reduces to 800 rpm as pedal is released.

If correct adjustment is not made after making sure that engine speed is normal when throttle valve lever touches dash pot, repeat steps (1) and (2) above until engine speed is 800 rpm at idling. (Refer to Section EF for adjustment of engine speed when throttle valve lever touches dash pot.)

(3) Install cap.



AC220A

Fig. AC-51 Fast idle dash pot

REMOVAL AND INSTALLATION

1. Remove vacuum hose from fast idle dash pot.
2. Remove air cleaner assembly.
3. Remove attaching nuts, then fast idle dash pot.
4. Install fast idle dash pot in the reverse order of removal.
5. After installing, adjust fast idle dash pot. Refer to Adjustment of Idle Speed.

COMPRESSOR (SWP123)

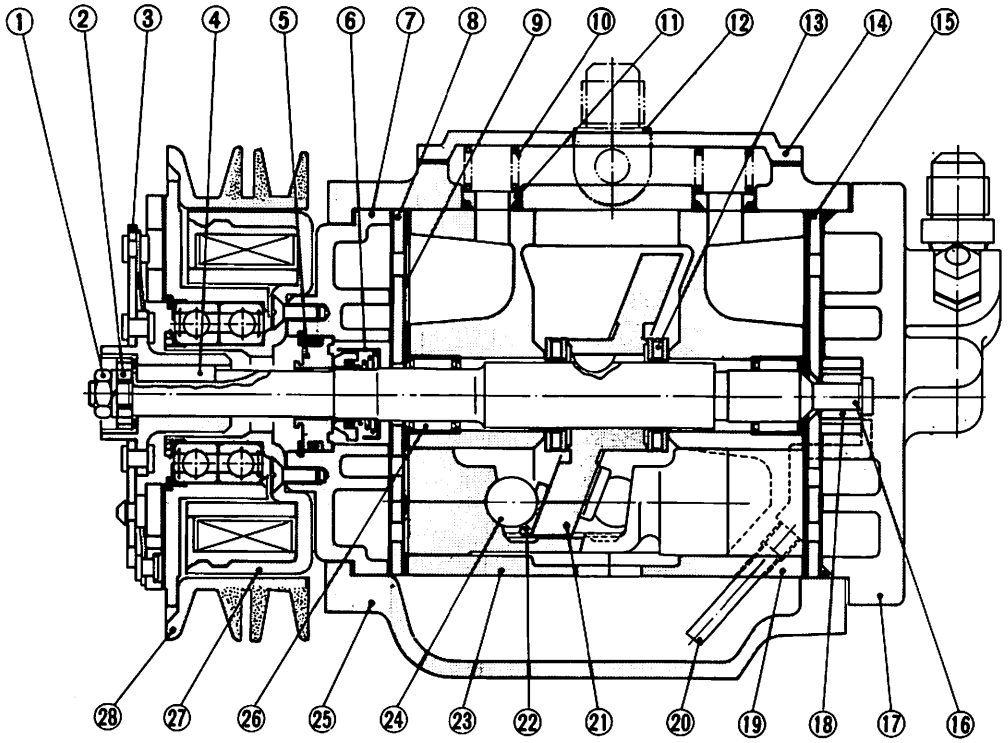
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DESCRIPTION

Model SWP123 is a swash plate type compressor. As with conventional crank type compressors, reciprocating pistons compress incoming gas. The principal difference between these two types of compressors lies in the way in which the piston is driven, by crankshaft rotation on the one hand and by swash plate rotation on the other. When the swash plate compressor is used in air conditioning system, the following advantages are obtained. tained.

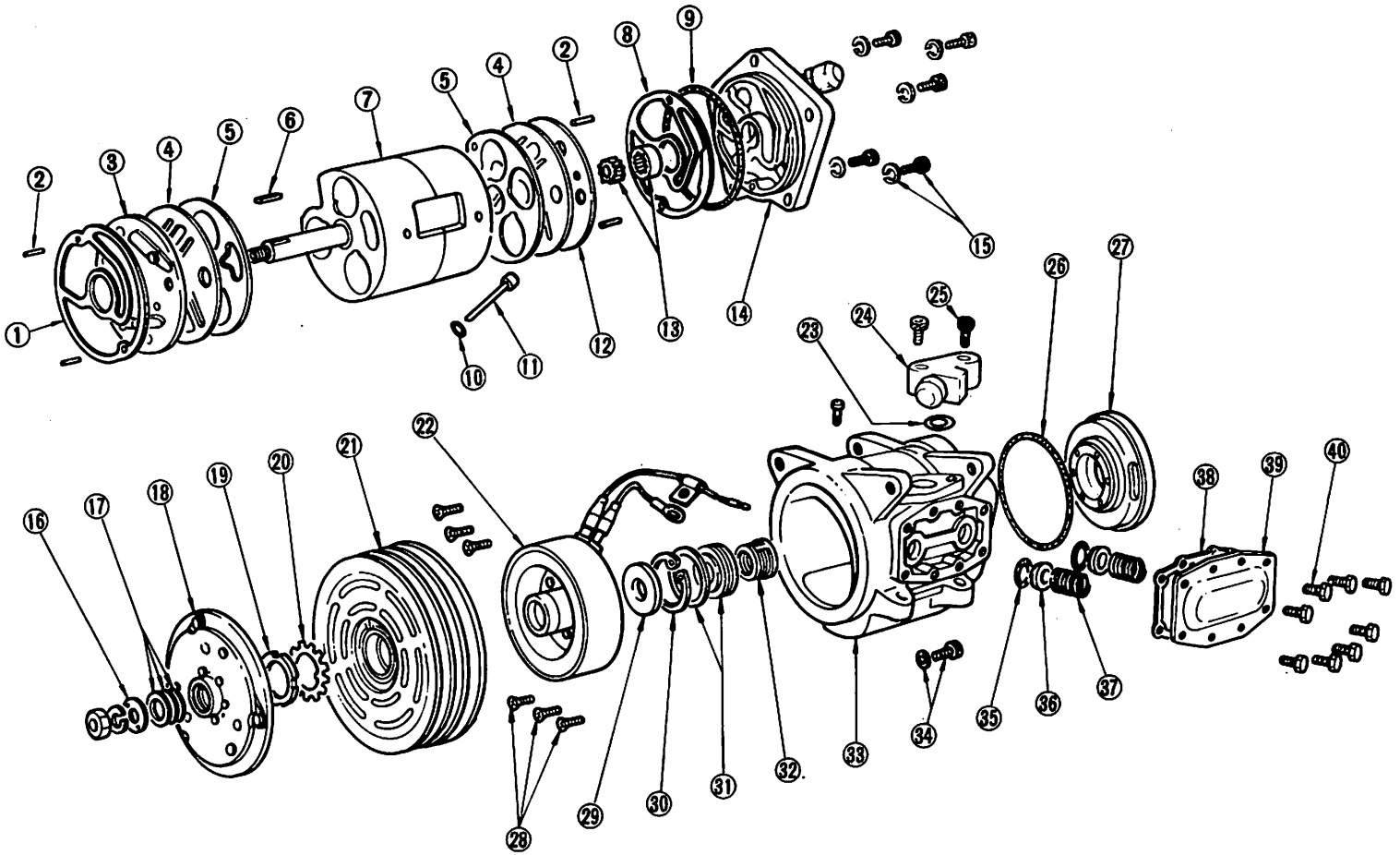
1. The shape is cylindrical, facilitating installation.
2. Torque changes are minimal since a number of cylinders are used.
3. Complete mechanical balance is possible, limiting vibration and noise and allowing high-speed operation.
4. Discharge per unit of compressor volume is quite high, resulting in high cooling capacity and superb cooling characteristics.



AC022A

1 Shaft nut
2 Clutch hub nut
3 Clutch hub
4 Key
5 Shaft seal seat
6 Shaft seal
7 Front end cover
8 Front cylinder head
9 Suction valve plate
10 Silencer spring
11 Silencer piece
12 Discharge valve
13 Thrust bearing
14 Side cover
15 Rear cylinder head
16 Compressor shaft
17 Rear end cover
18 Oil pump
19 Rear cylinder
20 Oil pipe
21 Swash plate
22 Shoe disc
23 Front cylinder
24 Drive ball
25 Shell
26 Needle bearing
27 Clutch coil
28 Pulley and bearing assembly

Fig. AC-52 Sectional view



1 Gasket
2 Knock pin
3 Front cylinder head
4 Suction valve plate
5 Gasket
6 Key
7 Compressor cylinder assembly
8 Gasket
9 Rear end cover O-ring
10 Oil pipe O-ring
11 Oil pipe
12 Rear cylinder head
13 Gear pump assembly
14 Rear end cover
15 Rear end cover fixing bolt and washer
16 Hub nut
17 Spacer
18 Clutch hub
19 Lock nut
20 Lock washer
21 Pulley and bearing assembly
22 Coil assembly
23 Discharge valve O-ring
24 Discharge valve assembly
25 Discharge valve fixing bolt
26 Gasket
27 Front end cover
28 Coil mounting screw
29 Felt
30 Retainer ring
31 Shaft seal seat and O-ring
32 Shaft seal
33 Compressor shell
34 Drain plug and gasket
35 Silencer piece O-ring
36 Silencer piece
37 Silencer spring
38 Gasket
39 Side cover
40 Side cover fixing bolt

AC023A

Fig. AC-53 Exploded view

COMPRESSOR CLUTCH

The most likely source of problem is clutch slippage. Factors are listed here. Exercise ample care.

1. Clearance between clutch hub and pulley should be 0.5 to 0.8 mm (0.020 to 0.031 in) at all peripheral points.
2. Make sure that there is no oil or dirt on friction surfaces of clutch disc (clutch hub) and pulley. Remove any oil or dirt with a dry rag.
3. Make sure that terminal voltage at magnetic coil is above 10.5V.

REMOVAL

CAUTION:
Do not leave compressor on its side or upside down for more than 10 seconds, as compressor oil will enter low pressure chamber.

1. Using Clutch Hub Wrench KV99412302, hold clutch hub. With suitable socket wrench, remove shaft nut from shaft.
2. Then, using Hub Nut Socket KV99412305, remove clutch hub nut. Remove spacers.

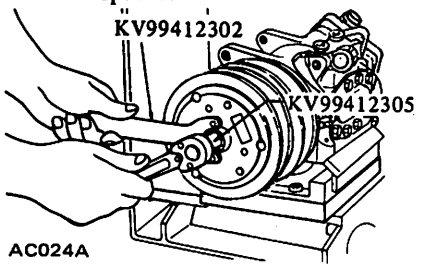


Fig. AC-54 Removing clutch hub nut

3. Using Clutch Hub Puller KV99412306, remove clutch hub. Thread tool into the bore of clutch hub, hold tool with wrench, and then thread in center bolt.

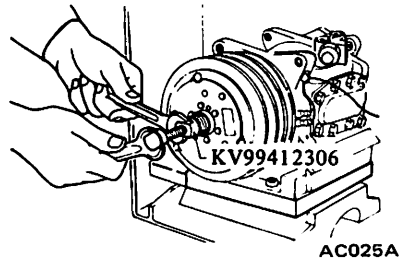


Fig. AC-55 Removing clutch hub

4. With an ordinary screwdriver, flatten lock washer tab.

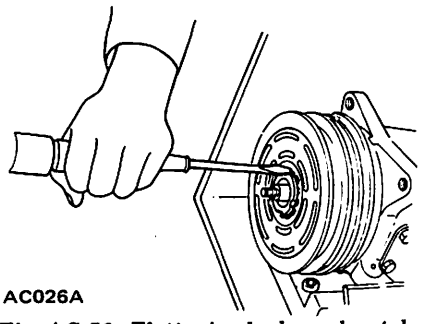


Fig. AC-56 Flattening lock washer tab

5. Using Lock Nut Socket KV99412310, loosen lock nut. Remove lock nut and lock washer.

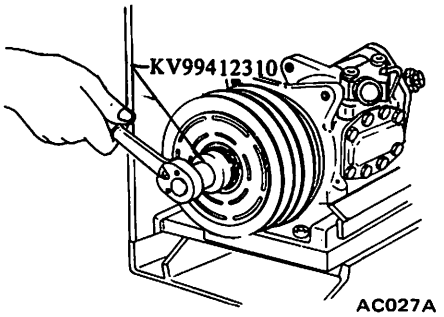


Fig. AC-57 Removing lock nut

6. Remove pulley and bearing assembly. When the assembly can not be removed by hand, use a puller, Puller Adapter KV99412313 and Puller Pilot KV99412312.

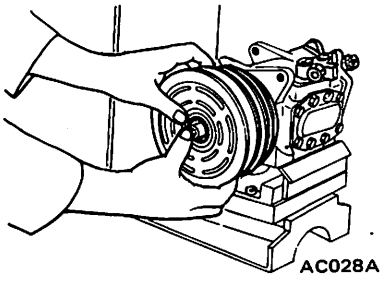


Fig. AC-58 Removing pulley

7. Using an impact tool, loosen six coil mounting screws. Use of the impact tool is advisable as screws have been calked.

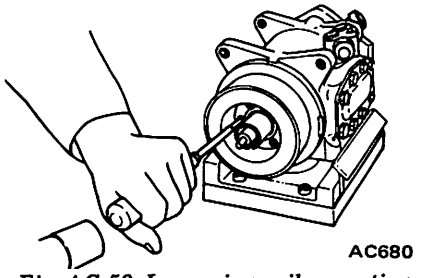


Fig. AC-59 Loosening coil mounting screw

8. Remove coil mounting screws and separate coil assembly.

INSPECTION

1. Check the friction surfaces of the clutch for damage due to excessive heat, or excessive grooving due to slippage. If necessary, replace coil, pulley and bearing assembly, and clutch hub as a set.
2. Oil or dirt on the friction surfaces should be cleaned with a suitable solvent and a dry rag.
3. Check coil for shorted or opened binding leads.
4. When replacing compressor clutch assembly, do not forget break-in operation, accomplished by engaging and disengaging the clutch some thirty times. Break-in operation raises the level of transmitted torque.

INSTALLATION

1. Using a Phillips screwdriver, tighten coil assembly mounting screws in an alternating pattern. After screws have been firmly tightened, punch-lock each at one location to prevent loosening. Correct tightening torque is 0.28 to 0.35 kg-m (2.0 to 2.5 ft-lb).

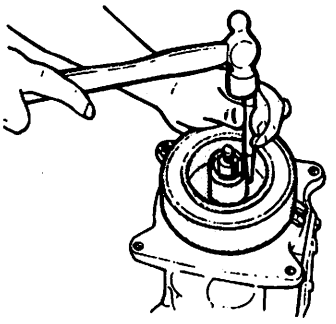


Fig. AC-60 Punch-locking

2. Using a plastic mallet, drive pulley and bearing assembly onto the neck of the installed coil assembly. Turn the pulley, making sure that there is no noise and that rotation is free. Also make sure that there is no pulley play.
3. Position lock washer and lock nut in place. Using Lock Nut Socket KV99412310, tighten lock nut firmly. With lock washer tab and lock nut cutouts matched, bend the tab with the screwdriver. Proceed carefully to avoid bearing cage damage. Correct

tightening torque is 2.5 to 2.8 kg-m (18 to 20 ft-lb).

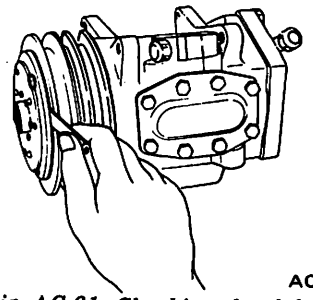
4. Fit key and clutch hub to the shaft. Select adjusting spacer which gives the correct clearance between the pulley and clutch hub.

Tighten hub nut to 1.8 to 2.1 kg-m (13 to 15 ft-lb)

5. Tighten shaft nut with locking agent in place.

Tightening torque:
1.6 to 1.7 kg-m
(11.6 to 12.3 ft-lb)

6. Using a thickness gauge, measure the clutch hub-to-pulley gap. If the gap is 0.5 to 0.8 mm (0.020 to 0.031 in), adjustment is correct.



AC029A

Fig. AC-61 Checking clutch hub-to-pulley clearance

Note: If the specified gap is not obtained, replace adjusting spacer and readjust.

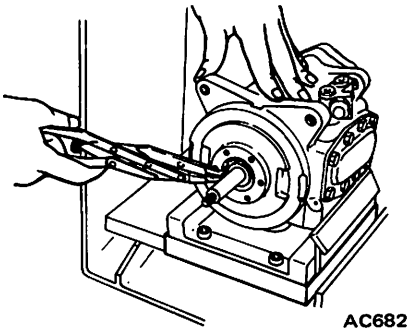
SHAFT SEAL

To prevent refrigerant leakage at the cylinder shaft exit point, tightness must be maintained at friction surfaces between shaft seal and shaft seal seat and at contact surfaces between shaft seal seat and front end cover. Use extreme care in removing or assembling seals not to damage the sealing surfaces. Discard the old seals. Do not re-use them.

REMOVAL

The system must be discharged beforehand. When compressor is removed, do not turn it on its side or upside down without first draining the oil. Remove dirt from the exterior. Clean the workbench to be used, tools and your hands.

1. Remove drain plug, thereby draining the oil.
2. Remove clutch hub, pulley and bearing assembly, and coil assembly. Proceed according to information under "Compressor Clutch".
3. Using snap ring pliers, compress and remove retainer ring.



AC682

Fig. AC-62 Removing retainer ring

4. To remove shaft seal seat, proceed as follows:

(1) Plug high (discharge) and low (suction) pressure openings of compressor with blind caps.

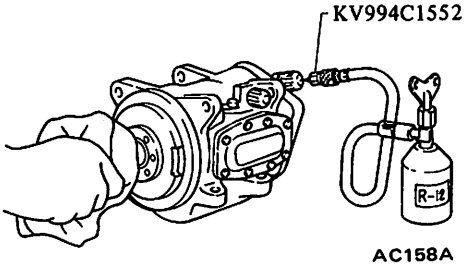
(2) Connect charging hose to refrigerant can. Install Charge Nozzle KV994C1552 to other end of charging hose and insert it into hole in middle of blind cap at low pressure side.

5. Wrap shaft end with rag. Apply refrigerant pressure of 2 to 5 kg/cm^2 (28 to 71 psi) through low pressure line of compressor until shaft seal seat is received at rag.

CAUTION:

a. Do not use air to prevent entry of moisture, dust, etc.

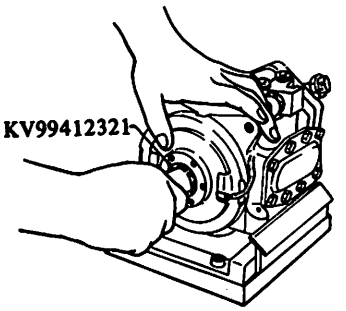
b. If shaft seal seat is not plucked out, install it again and apply refrigerant pressure.



AC158A

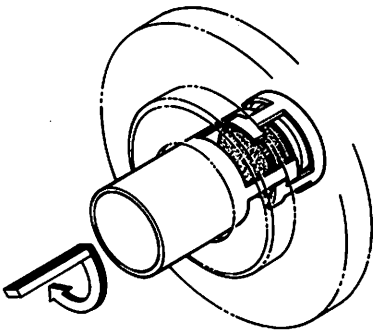
Fig. AC-63 Removing shaft seal seat

6. Insert Shaft Seal Remover & Installer KV99412321 through the open end of front end cover. Depress the carbon seal and hook the tool at the case projection of shaft seal. Slowly pull out the tool, thereby removing shaft seal.



AC684

Fig. AC-64 Inserting special tool

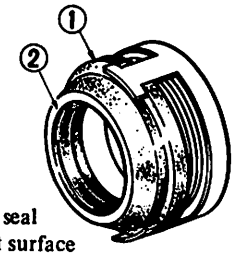


AC685

Fig. AC-65 Removing shaft seal

INSPECTION

1. Check the carbon seal surface of shaft seal for damage.

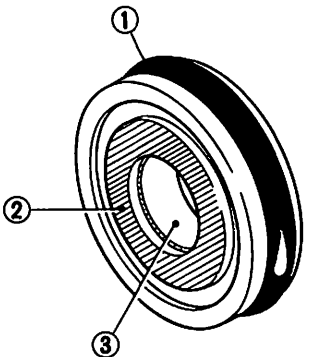


1 Carbon seal
2 Contact surface

AC035

Fig. AC-66 Checking shaft seal

2. Check O-ring and the carbon seal contact surface of shaft seal seat for damage. Make sure that O-ring contact surface at front end cover is not damaged.



1 O-ring
2 Contact surface
3 Oil seal

AC805

Fig. AC-67 Checking shaft seal seat

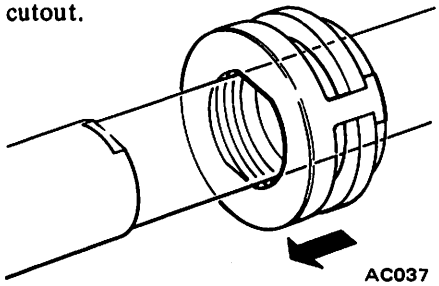
CAUTION:
In placing a new seal on the workbench, make sure that the contact surface faces upward. Take necessary steps to avoid damage.

Note: Do not re-use shaft seal seat and shaft seal.

INSTALLATION

1. Make sure that the shaft seal contact surface is free of dirt and amply lubricated with compressor oil.
2. Cap Shaft Seal Pilot KV99412322 to the top end of compressor shaft.
3. Using Shaft Seal Remover & Installer KV99412321, insert shaft seal with shaft seal case and shaft cutout aligned.

Apply force to turn the seal somewhat to the left and right. Insure that shaft seal seats properly in the shaft cutout.



AC037

Fig. AC-68 Inserting shaft seal

4. Fit O-ring to the outside groove of shaft seal seat, making sure that it seats properly.
5. Apply an ample coat of oil to contact surface and shaft seal seat so that seat easily slides on inner side of front end cover.

Also apply a thin coat of grease or oil to shaft. Push shaft seal seat into front end cover until it bottoms up to land.

6. Using snap ring pliers, compress retainer ring and fit it into front end cover. Seat retainer ring firmly in the groove.
7. Install Shaft Handle Socket KV99412329 to compressor shaft and turn shaft 5 to 6 turns clockwise. Then, check for gas leakage as follows:

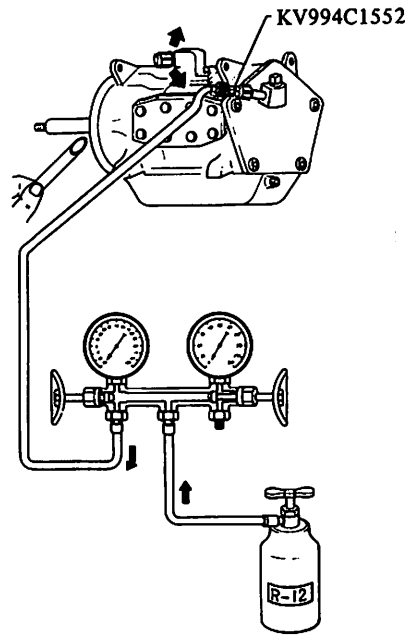
(1) Plug high- and low-pressure joints on compressor with blind caps.

(2) Connect charging hose to low pressure gauge of manifold gauge. Install Charge Nozzle KV994C1552 to other end of charging hose and insert it into hole in middle of blind cap at low pressure side.

Connect center hose of manifold gauge to referigerant can.

(3) Open valve of can top, charge refrigerant from low pressure side and purge air from high pressure side by loosening blind cap.

(4) Conduct a leak test. If there is a leak, remove and then install again.



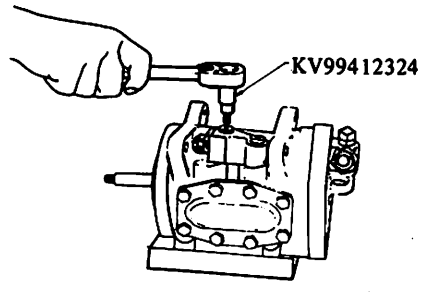
AC159A

Fig. AC-69 Checking for gas leaks

DISCHARGE VALVE

REMOVAL

1. Using Allen Socket KV99412324, remove two hex. socket head bolts.



AC686

Fig. AC-70 Removing bolts

2. Remove discharge valve.
3. Discard the old O-ring.

CAUTION:
Do not tap on compressor shaft.

INSPECTION

1. Check for scratched seating surface of discharge valve and of shell. Do not re-use the old O-ring.
2. Replace discharge valve which is scratched.
3. If a scratch is found on the groove of shell O-ring, replace shell.

INSTALLATION

1. Apply a coating of compressor oil to the groove of discharge valve and O-ring, and install these parts in their proper positions on shell.
2. Using Allen Socket KV99412324, secure discharge valve to shell with two hex. socket head bolts.

Tightening torque:
1.8 to 2.0 kg-m
(13 to 14 ft-lb)

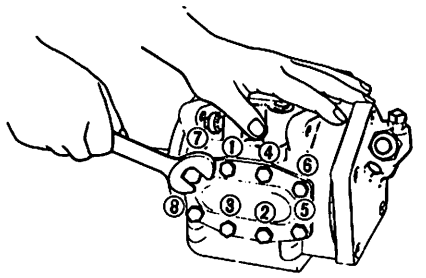
3. Conduct a gas leak test by referring to the topic "Installation" of "Shaft Seal".

SIDE COVER

REMOVAL

Discharge the system before beginning work. Work may be carried out with compressor mounted. If compressor is to be removed, first drain oil. Unless oil has been drained, do not turn compressor on its side or upside down.

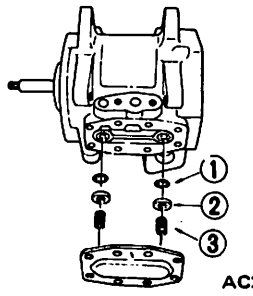
1. Drain oil.
2. Loosen and remove eight side cover mounting bolts in an alternate pattern as shown in Figure AC-71. Note that two silencer springs inside the cover will force up side cover.



AC687

Fig. AC-71 Loosening cover mounting bolt

3. Remove side cover and side cover gasket. Discard the gasket.
4. Remove silencer springs, pieces, and O-rings. Do not damage O-ring surface of silencer piece during this process. Discard used O-rings.



1 O-ring
2 Piece
3 Silencer spring

AC207

Fig. AC-72 Exploded view of silencer spring, pieces and O-ring

INSPECTION

1. Make sure that side cover gasket surface and shell gasket surface are not damaged.
2. Make sure that silencer pieces and shell contact surfaces in contact with O-ring are not damaged.
3. Do not reuse old gasket and O-rings.

INSTALLATION

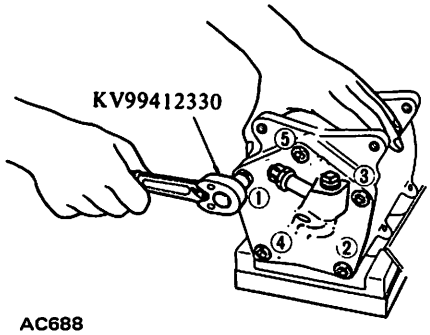
1. Place the mounting surface of side cover upward.
2. Make sure that holes of cylinder and shell are aligned and install O-rings.
3. Coat O-ring and the area around shell hole with an ample amount of compressor oil. Using O-ring Installer KV99412328, install O-ring into the shell hole. Then install silencer piece with Silencer Piece Installer KV99412327.
4. Coat the gasket surface of shell with compressor oil and position gasket and side cover.
5. Hold side cover in place by hand and thread in eight mounting bolts. Tighten these bolts evenly in an alternating pattern as shown in Figure AC-65. Tightening torque is 1.8 to 2.0 kg-m (13 to 14 ft-lb).
6. Fill with compressor oil.
7. Upon completion of the above operations, conduct a gas leak test by referring to the item "Installation" under the topic "Shaft Seal".

REAR END COVER AND REAR CYLINDER HEAD

Before beginning work, remove dirt from the exterior of the detached compressor. Clean the workbench to be used, tools, and your hands.

DISASSEMBLY

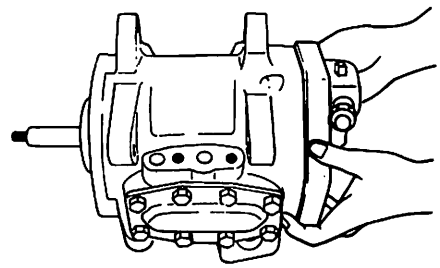
1. Drain oil.
2. Using Allen Socket KV99412330, remove five rear end cover mounting bolts. Starting at the top, loosen all bolts one turn in an alternating pattern. Then remove bolts in turn.



AC688

Fig. AC-73 Loosening bolts

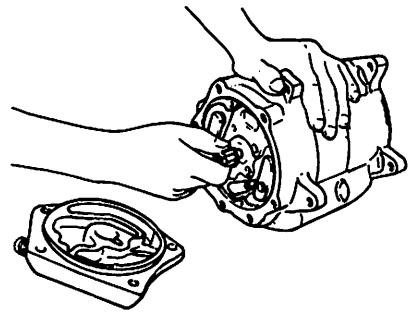
3. Grasp rear end cover and carefully separate it from compressor. Tap the flange lightly and alternately as required with a plastic mallet. Do not tap on the compressor shaft.



AC689

Fig. AC-74 Removing rear end cover

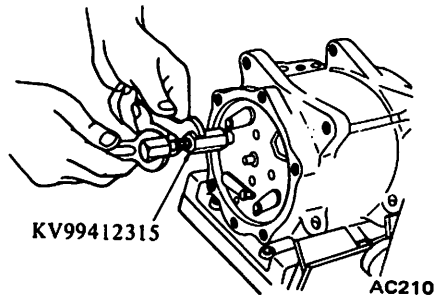
4. Remove pump gear. Do not allow pump gear to damage the surface.



AC042

Fig. AC-75 Removing pump gear

5. Remove O-ring, gasket and two pins. Discard the O-ring and gasket.
6. Remove rear cylinder head, suction valve plate and gasket. Discard the gasket. Carefully remove suction valve plate, avoiding deformation.
7. When removal proves difficult, use Cylinder Head Remover KV99412315. Insert this tool into hole in cylinder head as shown in Figure AC-76. With the nut in firm contact with the back side of cylinder head, tighten the bolt slowly to break loose the head.



AC210

Fig. AC-76 Removing rear cylinder head

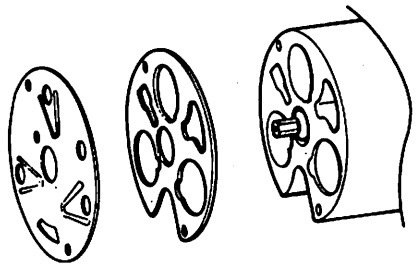
INSPECTION

1. Do not reuse old gasket and O-ring.
2. Make sure that the gasket contact surface is free of damage.
3. If replacement of rear end cover connector and check valve is necessary, replace rear end cover with a new one.
4. Check suction valve plate and cylinder head for broken valves.
5. Check pump gear for wear and damage.

ASSEMBLY

Using clean compressor oil, remove dirt and other matter from end cover, cylinder head and suction valve plate. Clean the workbench.

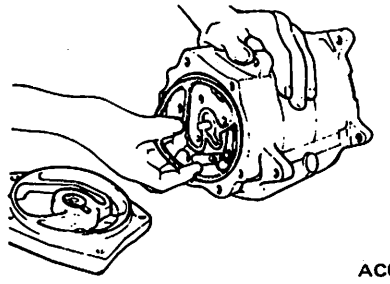
1. Using suitable blocks, position compressor with the front face downward and the rear upward.
2. Insert two pins in the rear of cylinder.
3. Coat both surfaces of cylinder head gasket with compressor oil and align gasket with cylinder.
4. Install suction valve plate, making sure that the three valves properly align with cylinders and gasket cutouts.



AC224

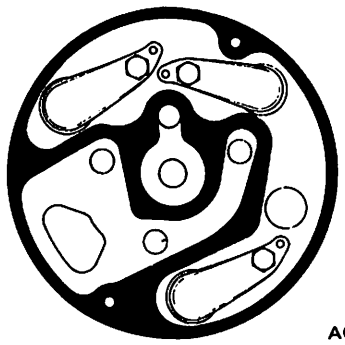
Fig. AC-77 Cutouts of cylinder and gasket

5. Install cylinder head, gasket, and O-ring in the order listed. Coat gasket and O-ring beforehand with an ample amount of compressor oil.



AC045

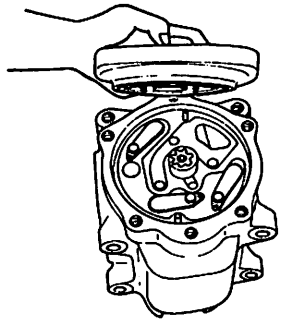
Fig. AC-78 Installing gasket



AC046

Fig. AC-79 Cylinder head and gasket

6. Fit pump gear to rear end cover.
7. Carefully fit rear end cover to the rear of compressor.



AC211

Fig. AC-80 Installing rear end cover

8. Using Allen Socket KV99412330, tighten up five bolts in an alternating pattern, starting at the top. Do not forget lock washers. Then, using torque wrench, tighten these bolts to 3.0 to 3.5 kg-m (22 to 25 ft-lb) in the same sequence.
9. Fill with compressor oil.
10. Upon completion of the above operation, conduct a leak test by referring to the topic under "Shaft Seal".

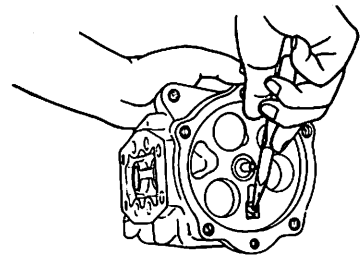
REPLACEMENT OF CYLINDER

Before proceeding, remove all dirt and other matter from the detached compressor. Clean the workbench, tools, and your hands. Lay out parts in the order in which they were removed, in space set aside for this purpose. This procedure facilitates reassembly.

REMOVAL

1. Drain oil.
2. Remove compressor clutch assembly. Refer to "Compressor Clutch".
3. Using snap ring pliers, remove shaft seal retainer ring. Then remove shaft seal seat. Refer to "Shaft Seal". Removal of shaft seal is not absolutely necessary. It may be removed when cylinder assembly is removed from front end cover. In fact, this approach facilitates work.
4. Remove side cover. Refer to "Side Cover".
5. Remove rear end cover. Refer to "Rear End Cover and Rear Cylinder Head". Remove O-ring, gasket, two pins, cylinder head, suction valve plate, and gasket in the order listed. This exposes the rear part of cylinder.
6. Using long nose pliers or other suitable tool, pull out oil pipe. Proceed carefully as oil pipe is easily bent.

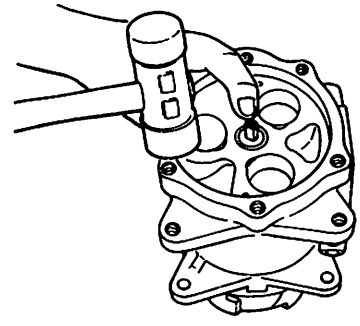
CAUTION:
Unless oil pipe has been removed, do not attempt the following steps.



AC212

Fig. AC-81 Pulling out oil pipe

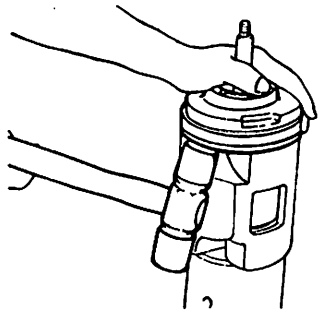
7. With the front facing downward support compressor shell. Using a plastic mallet, tap at the rear end of the shell flange, driving shell straight downward. Discard front end cover gasket.



AC213

Fig. AC-82 Removing shell

8. Detach front end cover from cylinder assembly. Using a plastic mallet, drive end cover upward. Refrain from excessive force to avoid cover damage.



AC050

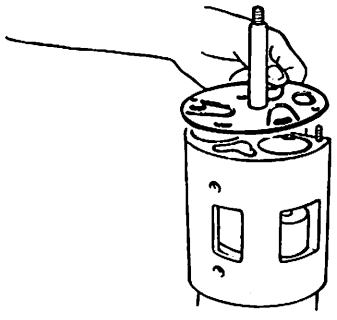
Fig. AC-83 Removing front end cover

9. Remove shaft seal from the shaft.
10. Remove two pins, gasket, cylinder head, suction valve plate, and gasket. In removing two pins, proceed carefully to avoid cylinder head damage. Do not deform suction valve plate in removing suction valve plate. Discard old gasket.

CAUTION:
Do not deform suction valve plate when removing it.

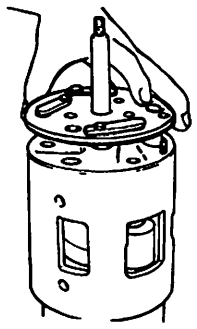
INSTALLATION

1. Using suitable blocks, face cylinder assembly upward. Insert two pins. Position gasket and suction valve plate in the order listed while making sure that three valves of suction valve plate are aligned with the cylinder and gasket cutouts. Coat gasket with compressor oil prior to assembly. Gaskets and suction valve plates are the same for front and rear. The cylinder head with the smaller numbers of holes goes to the front. Do not mix front and rear parts.



AC051

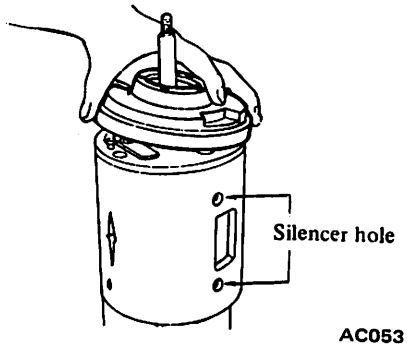
Fig. AC-84 Installing suction valve plate



AC052

Fig. AC-85 Installing cylinder head

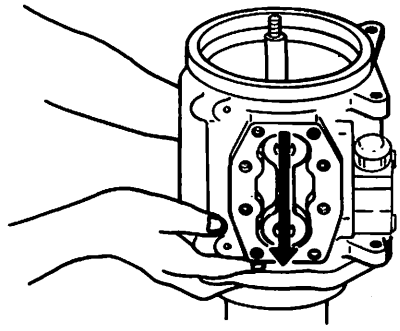
2. Align shaft seal with the shaft cutaway. Firmly seat shaft seal at the shaft land. Attempt to turn shaft seal to the left and right, confirming that it is seated properly.
3. Place gasket on cylinder head and install front end cover. Coat gasket with compressor oil beforehand. Gasket differs for the front and rear. Make sure that the correct gasket is used. After completing this work, gasket protruding from front end cover and cylinder head should be adjusted by hand.



AC053

Fig. AC-86 Installing front end cover

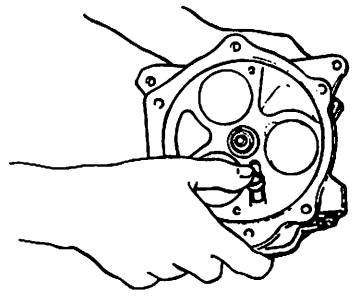
4. Fit gasket to front end cover. Then bring the shell into place over the cylinder assembly. At this time, make sure that the two holes of side cover and the cylinder holes are matched. Note that later adjustment will no longer be possible, as inside and outside diameters of these are not perfectly round. Note that moving the shell up and down may cause the gasket to slip out of place.



AC690

Fig. AC-87 Installing shell

5. Turn over the assembled shell and cylinder assembly, that is, face the front downward.
6. Coat oil pipe and O-ring with an ample amount of oil. Insert oil pipe at the rear of the cylinder. After making sure that the hole lines are matched as specified in step (4), continue with step (6) work.



AC226

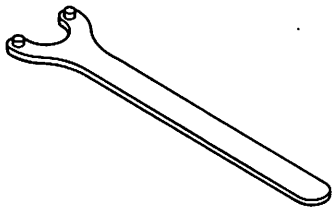
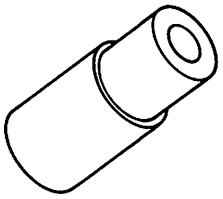
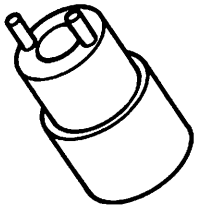
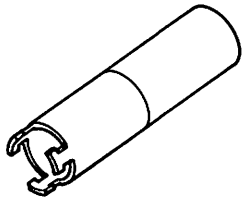
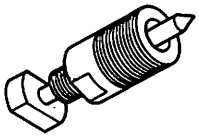
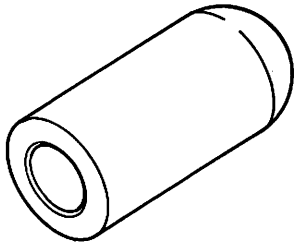
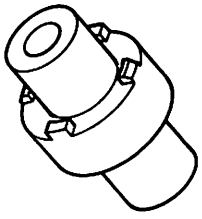
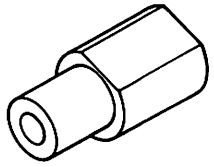
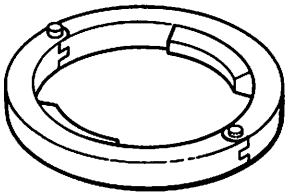
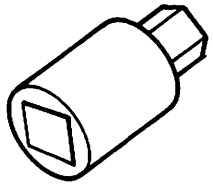
Fig. AC-88 Installing oil pipe

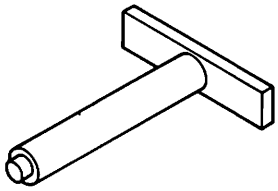
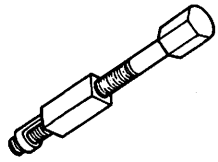
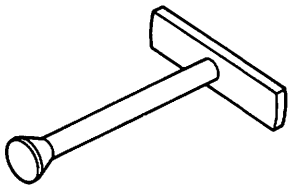
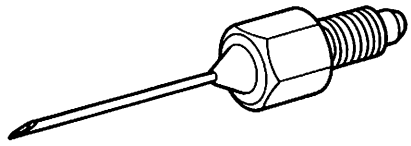
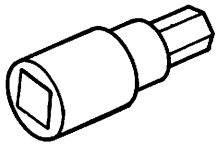
7. Continue with work up to installation of rear end cover, according to "Installation" under "Rear End Cover and Rear Cylinder Head".
8. Continue with work up to installation of side cover, according to "Installation" under "Side Cover".
9. Install shaft seal seat according to instructions in "Installation" under "Shaft Seal".
10. Install and adjust compressor clutch according to instructions in "Installation" under "Compressor Clutch".
11. Fill with compressor oil, and tighten oil plug with copper gasket in place.

Tightening torque:
1.8 to 2.0 kg-m
(13 to 14 ft-lb)

12. Conduct a leak test by referring to the topic under "Shaft Seal".

SPECIAL SERVICE TOOLS (For SW123)

Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.
KV99412302 Clutch hub wrench 	J 94878-1 Fig. AC-54	KV99412312 Puller pilot 	J 25472 Page AC-31 Fig. AC-58
KV99412305 Hub nut socket 	J 24878-2 Fig. AC-54	KV99412321 Shaft seal remover and installer 	J 26067 Fig. AC-64
KV99412306 Clutch hub puller 	J 24878-3 Fig. AC-55	KV99412322 Shaft seal pilot 	J 25473 Page AC-33
KV99412310 Lock nut socket 	J 24878-4 Fig. AC-57	KV99412329 Shaft handle socket 	J 26072 Page AC-33
KV99412313 Puller adapter 	J 26066 Page AC-31 Fig. AC-58	KV99412324 Allen socket 	—— Fig. AC-70

Tool number & tool name	Kent-Moore No. Reference page or Fig. No.	Tool number & tool name	Kent-Moore No. Reference page or Fig. No.
KV99412327 Silencer piece installer 	——— Page AC-34	KV99412315 Cylinder head remover 	——— Fig. AC-76
KV99412328 O-ring installer 	——— Page AC-34	KV994C1552 Charge nozzle 	——— Fig. AC-69
KV99412330 Allen socket 	——— Fig. AC-73		

COMPRESSOR (SC206)

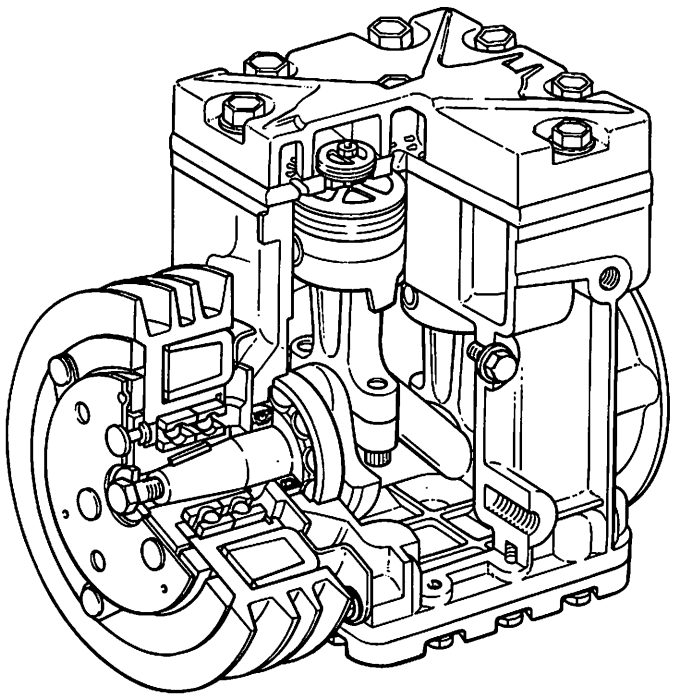
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DESCRIPTION

Model SC206 is a crank type compressor specially designed, with minimum size and light weight, for use on compact vehicles.

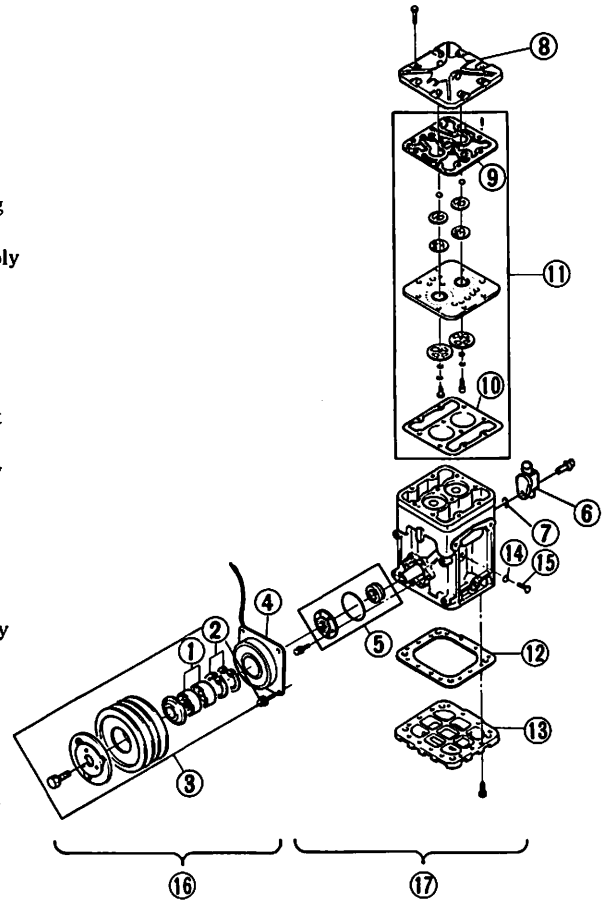
The compressor crankshaft is driven by a belt from the crankshaft pulley through the electromagnetic clutch. Two pistons, positioned in line, are actuated by connecting rods connected to the crankshaft.



AC855

Fig. AC-89 Sectional view of compressor

1 Clutch wheel bearing
2 Snap ring
3 Clutch wheel assembly
4 Magnet coil
5 Shaft seal assembly
6 Service valve
7 Flange valve O-ring
8 Cylinder head
9 Cylinder head gasket
10 Cylinder gasket
11 Valve plate assembly
12 Base plate gasket
13 Base plate
14 O-ring
15 Oil filler plug
16 Clutch assembly
17 Compressor assembly



AC856

Fig. AC-90 Exploded view of compressor

Discharge and suction valves are mounted in the valve liner between the crankcase and cylinder head.

As a lubricant, SUNISO 5GS is used. Simplified positive pressure lubrication utilizes existing pressure differential between suction intake and crankcase to provide a film of lubricating oil to bearings. All internal components have been designed to provide more than adequate lubrication to cylinder walls, connecting rod bearings and seal assembly. The result is improved lubrication, lower seal temperatures, reduced oil pumping and a reduction in the number of moving parts.

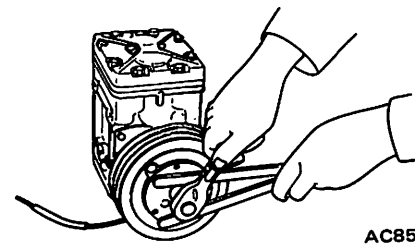
COMPRESSOR CLUTCH

The most likely source of problem is clutch slippage. Factors are listed here. Exercise ample care.

1. Clearance between clutch hub and pulley should be 0.4 to 0.6 mm (0.016 to 0.024 in) at all peripheral points.
2. Make sure that there is no oil or dirt on friction surfaces of clutch disc (clutch hub) and pulley. Remove oil or dirt with clean lint-free cloth.
3. Make sure that terminal voltage at magnetic coil is above 10.5V.

REMOVAL

1. Using Clutch Spanner Wrench, hold clutch hub. With suitable socket wrench, remove bolt retaining clutch hub to crankshaft.

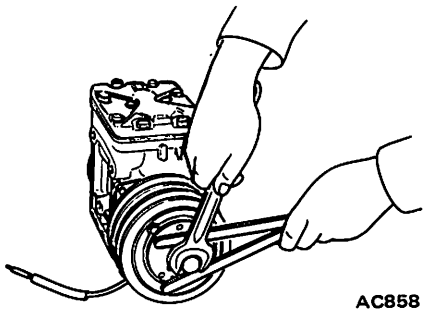


AC857

Fig. AC-91 Removing bolt

2. Then, using Clutch Removing Bolt, remove clutch assembly from crankshaft.

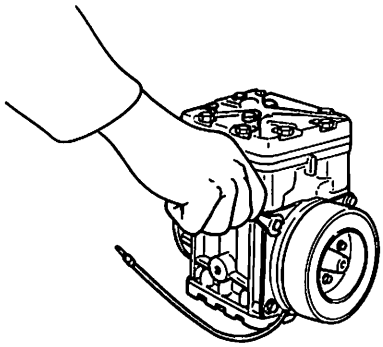
CAUTION:
Be careful not to damage key on compressor crankshaft.



AC858

Fig. AC-92 Removing clutch assembly

3. Loosen four electromagnetic coil mounting screws. Coil assembly can then be taken out easily.



AC859

Fig. AC-93 Removing magnetic clutch

INSTALLATION

1. Locate the electromagnetic coil at the correct position on compressor housing. Then, secure four electromagnetic coil mounting screws.

Tightening torque:
Electromagnetic coil mounting screws:
0.7 kg-m (5.1 ft-lb)

2. Install the clutch assembly on the crankshaft.

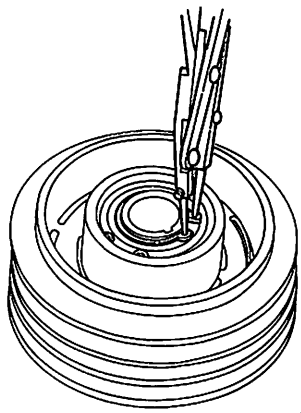
Note: Key should be set on crankshaft before installing clutch assembly.

3. Using Clutch Spanner Wrench, hold clutch hub. With socket wrench, secure clutch hub securing bolt.

Tightening torque:
Clutch hub securing bolt:
1.5 kg-m (11 ft-lb)

DISASSEMBLY

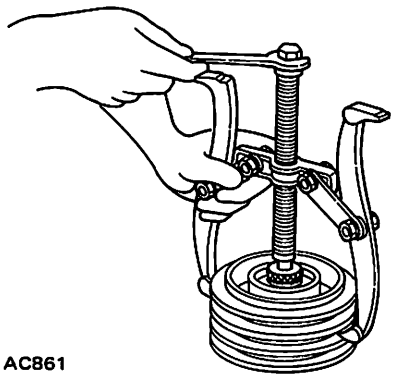
1. Remove two snap rings retaining bearing. They are located inside of clutch wheel.



AC860

Fig. AC-94 Removing snap rings

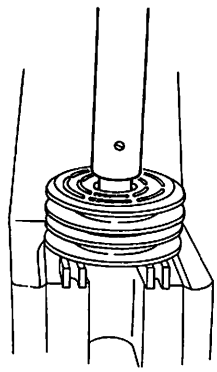
2. Using Clutch Wheel Remover KV99100700 and conventional puller, remove V-pulley with bearings from clutch wheel.



AC861

Fig. AC-95 Removing V-pulley from clutch assembly

3. Using Bearing Remover ST33061000, press clutch wheel bearings out from clutch wheel.

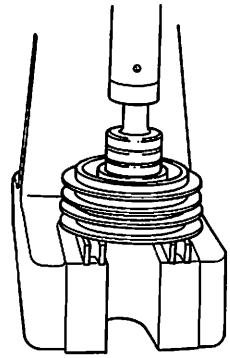


AC862

Fig. AC-96 Removing clutch wheel bearing

ASSEMBLY

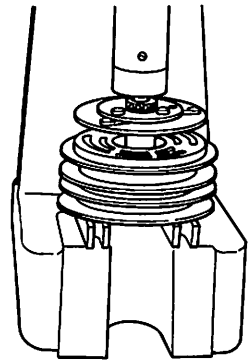
1. Press bearings into V-pulley with Bearing Installer ST02371000.

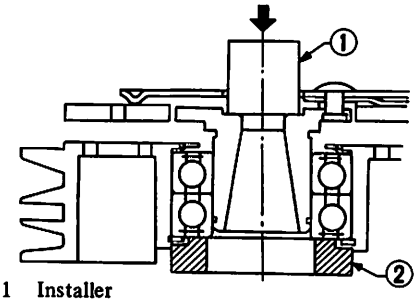


AC863

Fig. AC-97 Installing bearings

2. Install outer snap ring in groove of V-pulley.
3. Using Installer KV99100610 and Stopper ST33061000, press clutch wheel into V-pulley.
4. Install inner snap ring in groove of clutch wheel.





1 Installer (KV99100610)
2 Stopper (ST33061000)

AC864

Fig. AC-98 Installing clutch wheel

INSPECTION

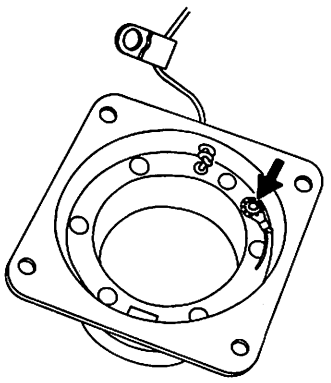
1. Check friction surface of clutch for damage due to excessive heat, or excessive grooving due to slippage. If necessary, replace clutch wheel and V-pulley as a set.

2. The clearance between V-pulley and clutch wheel should be 0.4 to 0.6 mm (0.016 to 0.024 in).

If not, replace clutch wheel assembly.

3. Oil or dirt on friction surfaces of clutch wheel and V-pulley should be cleaned with a clean lint-free cloth or suitable solvent.

4. Check coil for shorted or opened lead wire. Pay particular attention to grounding part of coil. If there is no continuity, replace electromagnetic coil.



AC506

Fig. AC-99 Grounding point of coil

5. If clutch assembly must be replaced, remember that break-in operation is necessary. The break-in operation consists of engaging and disengaging the clutch some tirty times.

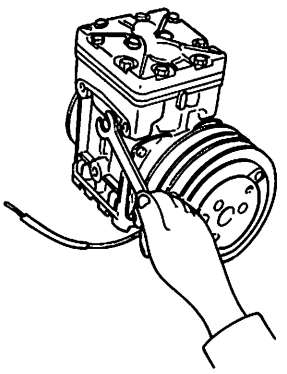
SHAFT SEAL ASSEMBLY

The shaft seal assembly of this compressor is of a simplified design, yet tight sealing and long lasting.

REMOVAL

It is recommended that the compressor be removed from the car for shaft seal replacement.

1. Remove oil filler plug with O-ring and drain the compressor oil.

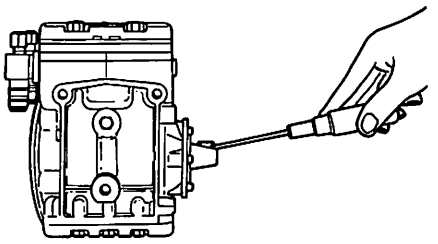


AC865

Fig. AC-100 Removing filler plug

2. Remove clutch. Refer to Compressor Clutch Removal.

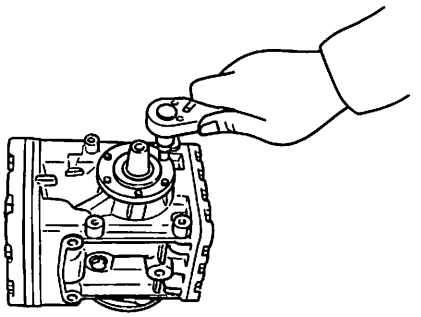
3. Remove shaft key from crankshaft.



AC807

Fig. AC-101 Removing shaft key

4. Remove seal plate.



AC866

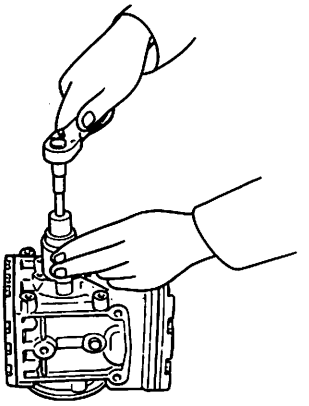
Fig. AC-102 Removing seal plate

5. With Compressor Seal Puller, pull out seal gland and discard.

CAUTION:

a. Discard all parts of the seal including the O-ring.

b. Do not use a screwdriver to pry shaft seal from shaft as damage to shaft may result.



AC867

Fig. AC-103 Removing shaft seal

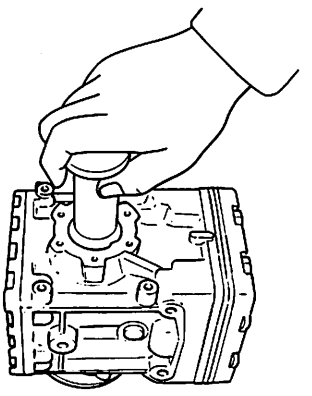
INSTALLATION

1. Clean shaft and seal cavity with clean lint-free cloth.

2. Dip seal gland in clean refrigerant oil.

3. Push seal assembly, except carbon ring, over end of shaft with carbon ring retainer facing out.

4. Move seal assembly into position on shaft.



AC868

Fig. AC-104 Inserting shaft seal assembly

5. Place carbon ring in ring retainer so lapped surface is facing outward.

Note: The indentions in outside edge of carbon ring must engage driving lugs and be firmly seated in retainer.

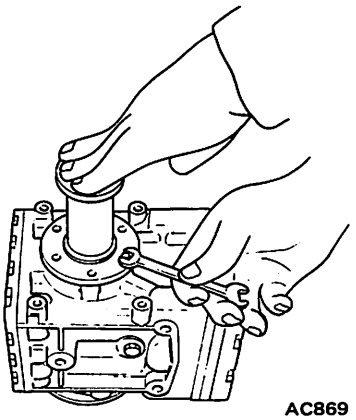
6. Install new O-ring in groove of seal plate.

Note: Use refrigeration oil to make it adhere to surface.

7. Space seal plate with equal clearance around shaft and insert cap screws.

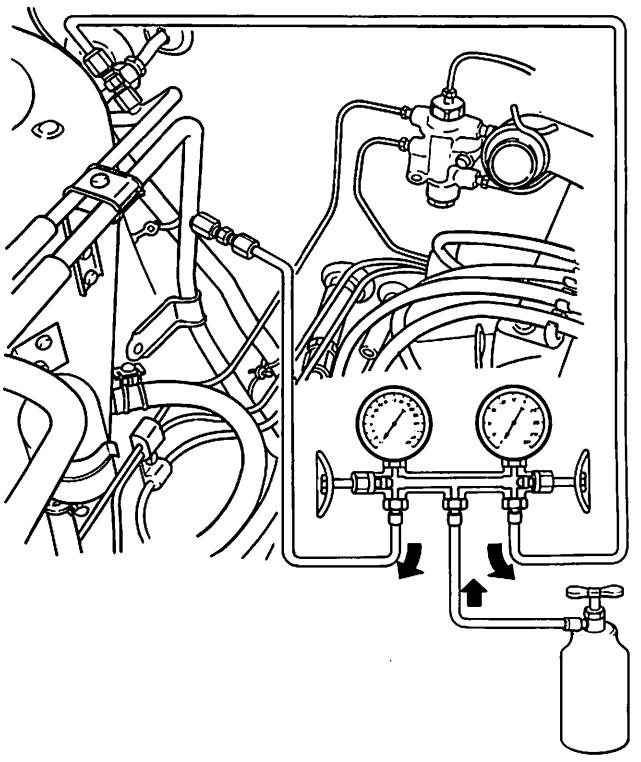
Tighten these screws evenly.

Tightening torque:
Seal plate securing cap screws:
0.7 to 1.0 kg-m
(5.1 to 7.2 ft-lb)



AC869

Fig. AC-105 Spacing seal plate and tightening cap screws



AC854

Fig. AC-106 Checking for gas leakage

8. Install clutch. Refer to Compressor Clutch Installation.
9. Charge lubricant.
10. Install oil filler plug together with O-ring.

CAUTION:
Use new O-ring when installing oil filler plug.

INSPECTION

Check for gas leakage as follows:
1. Plug high- and low-pressure joints on compressor with blind caps.
2. Connect charging hoses in lines between manifold gauge and high- and low-pressure service valves.

Connect refrigerant can to middle hose of manifold gauge.

3. Open valve of can tap, and charge refrigerant. Loosen oil filler plug at side of compressor to purge air out of compressor.
4. Turn shaft 5 or 6 turns. Then confirm that pressure does not decrease on low pressure gauge. If gauge indicates a pressure decrease, there is a leak. Conduct a leak test. Under such a condition, remove and then install parts again.

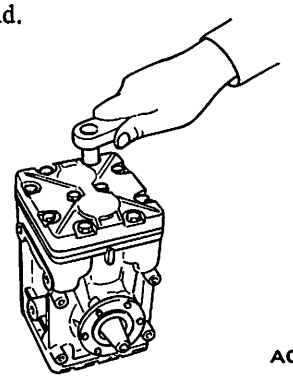
CYLINDER HEAD AND VALVE PLATE

Insufficient refrigerant compression is likely to be caused by damaged head gasket or damaged valves.

Prior to servicing the head and valve plate, both service valves should be opened to free any gas pressure which may be in the compressor.

REMOVAL

1. Remove the remaining bolts in the head.



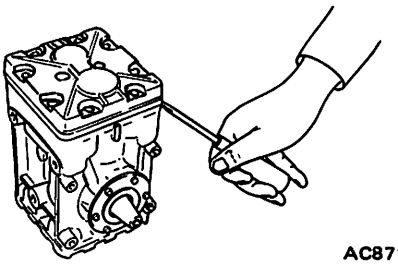
AC870

Fig. AC-107 Removing cylinder head bolts

2. Remove valve plate and head from cylinder by prying or tapping under the ears which extend from valve plate.

If head and valve plate adhere, hold head and tap valve plate ears away from head with a soft hammer.

CAUTION:
Do not hit or tap head to separate head and valve plate because damage to head may result.

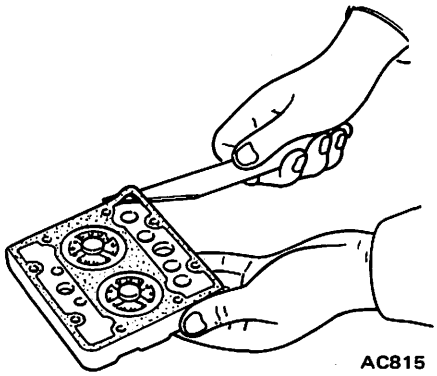


AC871

Fig. AC-108 Removing valve plate and head

3. When removing the gaskets, use a sharp-edged knife.

CAUTION:
a. In removing head gasket, be very careful not to damage machined sealing surface.
b. Do not reuse gaskets.

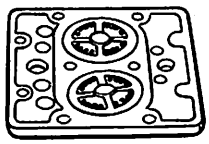


AC815

Fig. AC-109 Removing gasket

INSTALLATION

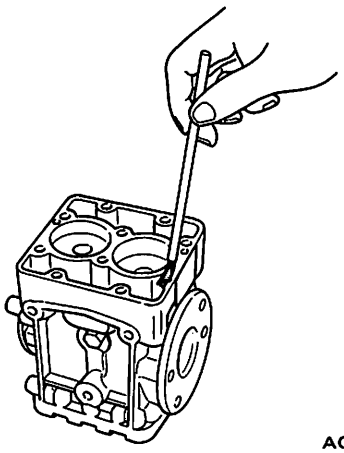
Valves and valve plates are furnished only as a complete assembly.



AC872

Fig. AC-110 Valve plate assembly

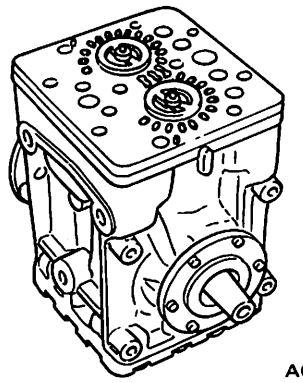
1. Apply a thin film of clean refrigeration oil on area of crankcase to be covered by cylinder gasket.



AC816

Fig. AC-111 Applying clean refrigeration oil

2. Place cylinder gasket in position on cylinder so dowel pins in crankcase go through dowel pin holes in cylinder gasket.
3. Apply a thin film of clean refrigeration oil to top and bottom valve plate areas to be covered by gaskets.
4. Place valve plate in position on cylinder gasket so discharge valve assemblies (i.e. smaller diameter assemblies with restrainer over valve reed) are facing up and locating dowel pins go through dowel pin holes in valve plate.



AC817

Fig. AC-112 Placing valve plate

5. Place head gasket in position on valve plate so dowel pins go through dowel pin holes in gasket.
6. Apply a thin film of clean refrigeration oil on the machined surface of cylinder head which matches head gasket.
7. Place head on cylinder head gasket so dowel pins go into dowel pin holes in head.
8. Tighten screws according to Sequence Chart.

Tightening torque:
Cylinder head screws:
2.1 to 3.2 kg-m
(15 to 23 ft-lb)

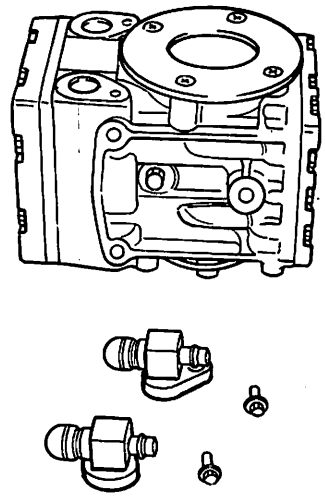
DISCHARGE AND SUCTION VALVES

Discharge and suction valves are located on rear side of compressor.

REMOVAL

1. Remove each screw securing discharge and suction valves, using Torx Driver Bit.
2. Pull out each discharge and suction valve.

Note: Memorize mounted direction of discharge and suction valves to ensure correct reassembling.



AC873

Fig. AC-113 Removing discharge and suction valves

INSTALLATION

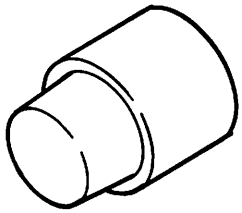
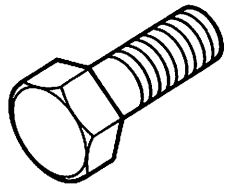
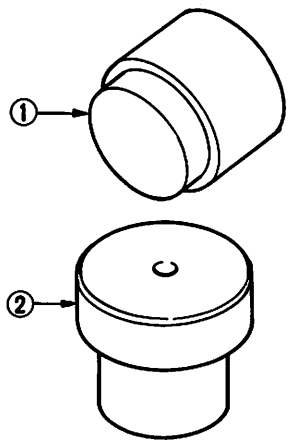
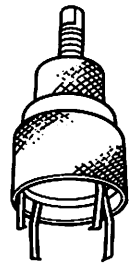
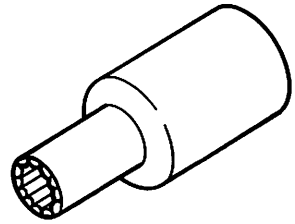
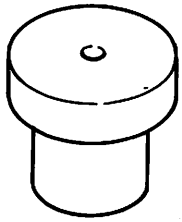
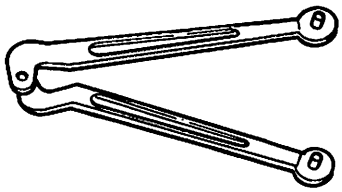
1. Attach new O-ring to each cylindrical portion of discharge and suction valves.

Note: Apply clean lubricant to O-ring so that it can be fitted tightely to cylindrical portion and crankcase hole.

2. Insert each discharge and suction valves into correct valve port in crankcase by matching it with mark on cylinder head.
3. Set each valve in the same position as it was before removal, and tighten screws with specified torque.

Tightening torque:
Discharge and suction valves:
2.1 to 3.2 kg-m
(15 to 23 ft-lb)

SPECIAL SERVICE TOOLS (For SC206)

Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.
KV99100700 Clutch wheel remover 	——— / Page AC-40	Clutch removing bolt 	J 26344 / Fig. AC-92
KV991006S0 Clutch wheel installer set ① KV99100610 Installer ② ST33061000 Stopper 	② J25797-2 / Fig. AC-98	Compressor seal puller 	J 10549 / Fig. AC-103
		Torx driver bit 	J 24392 / Page AC-43
ST02371000 Bearing installer 	——— / Fig. AC-97	Oil dip stick 	J 10545
Clutch spanner wrench 	J 24878-1 / Fig. AC-91		

SERVICE DATA AND SPECIFICATIONS

Compressor

Model		SWP123	SC206
Displacement	cc (cu in)	123 (7.51)	100 (6.10)
Cylinder (Bore x stroke)	mm (in)	32 x 25.4 (1.26 x 1.000)	47.6 x 28.1 (1.874 x 1.106)
Direction of rotation (Viewed from drive end)		Clockwise	Clockwise
Lubricating oil			
Type		SUNISO 5GS	SUNISO 5GS
Capacity	cc (US fl oz, Imp fl oz)	270 (9.1, 9.5)	237 (8.0, 8.3)
Clutch hub to pulley clearance	mm (in)	0.5 to 0.8 (0.020 to 0.031)	0.4 to 0.6 (0.016 to 0.024)

F.I.C.D. adjustment

Transmission	When A/C is OFF.	When F.I.C.D. is actuated.
Manual	600 rpm	800 rpm
Automatic	600 rpm at "D" range	800 rpm at "N" range

Refrigerant

Type		R12	R12
Capacity	kg (lb)	0.7 to 0.9 (1.5 to 2.0)	0.7 to 0.9 (1.5 to 2.0)

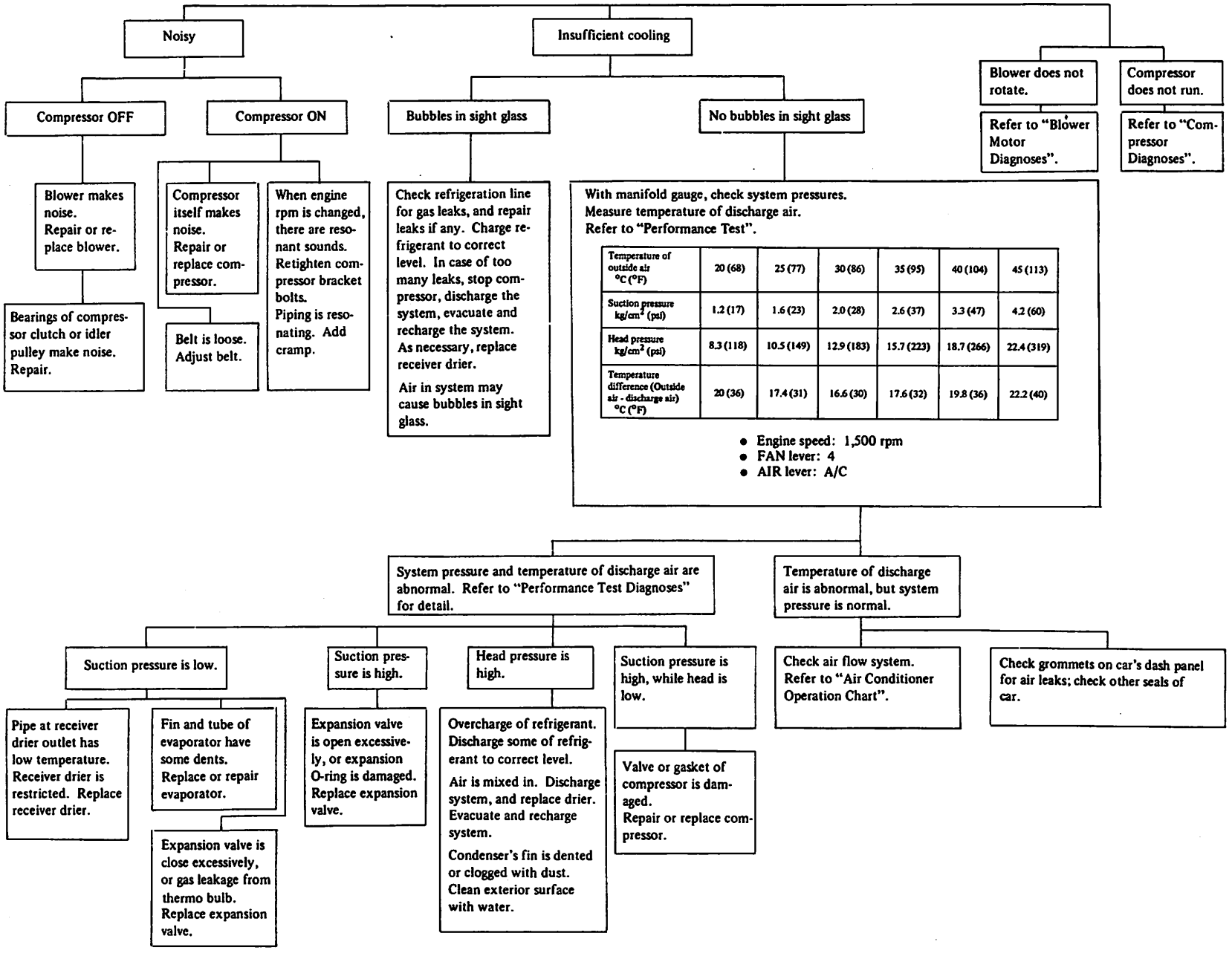
Tightening torque

Compressor			
Rear end cover bolt	kg-m (ft-lb)	3.0 to 3.5 (22 to 25)	–
Side cover bolt	kg-m (ft-lb)	1.8 to 2.0 (13 to 14)	–
Coil screw	kg-m (ft-lb)	0.28 to 0.35 (2.0 to 2.5)	–
Clutch hub nut (Bolt)	kg-m (ft-lb)	1.8 to 2.1 (13 to 15)	1.5 (11)
Shaft nut	kg-m (ft-lb)	1.6 to 1.7 (11.6 to 12.3)	–
Oil plug	kg-m (ft-lb)	1.8 to 2.0 (13 to 14)	–
Discharge valve assembly bolt	kg-m (ft-lb)	1.8 to 2.0 (13 to 14)	–
Seal plate cap screw	kg-m (ft-lb)	–	0.7 to 1.0 (5.1 to 7.2)
Head and service valve	kg-m (ft-lb)	–	2.1 to 3.2 (15 to 23)
Compressor bracket to cylinder block	kg-m (ft-lb)	3.7 to 5.1 (27 to 37)	3.7 to 5.1 (27 to 37)
Mounting screw	kg-m (ft-lb)	3.46 (25)	–

Compressor to compressor bracket	kg-m (ft-lb)	3.7 to 5.1 (27 to 37)	3.5 (25)
Joint nut copper tube and flexible hose			
High pressure (3/8 in)	kg-m (ft-lb)	3.0 to 3.5 (22 to 25)	3.0 to 3.5 (22 to 25)
Low pressure (1/2 in)	kg-m (ft-lb)	4.5 to 5.0 (33 to 36)	4.5 to 5.0 (33 to 36)

TROUBLE DIAGNOSES AND CORRECTIONS

AIR CONDITIONER DIAGNOSES



Temperature of outside air °C (°F)	20 (68)	25 (77)	30 (86)	35 (95)	40 (104)	45 (113)
Suction pressure kg/cm² (psi)	1.2 (17)	1.6 (23)	2.0 (28)	2.6 (37)	3.3 (47)	4.2 (60)
Head pressure kg/cm² (psi)	8.3 (118)	10.5 (149)	12.9 (183)	15.7 (223)	18.7 (266)	22.4 (319)
Temperature difference (Outside air - discharge air) °C (°F)	20 (36)	17.4 (31)	16.6 (30)	17.6 (32)	19.8 (36)	22.2 (40)

AIR CONDITIONER OPERATION CHART

Control lever position			Operation	
AIR lever	FAN lever	TEMP lever	Item	Correct action
A/C Engine at idle	1 to 4	COLD HOT At any position	Discharge air Air intake door Mode door Floor door Air temperature Cock Air mix door FICD Magnet valve Compressor Compressor clutch	Instrument – 100% Position of isolating outside air A/C position Shut COLD HOT OFF OPEN At any position Vacuum ON * Current ON * ON * Current ON * * may be on or off by switching thermostat on or off
	OFF	COLD	Blower motor FICD Magnet valve Compressor Magnet clutch	OFF Vacuum OFF Current OFF OFF Current OFF
VENT	1 to 4	COLD	Discharge air Air intake door Mode door Floor door Air temperature Cock Air mix door	Instrument – 100% Position of admitting outside air A/C (VENT) position DEF position Same as outside air OFF At any position
BI-LEVEL Engine at idle	1 to 4	HOT COLD	Discharge air Air intake door Mode door Floor doorq Air temperature Cock Air mix door	Floor & instrument Position of admitting outside air BILEVEL position Heat position Floor: WARM COOL Instrument: Same as outside air OFF OPEN At any position

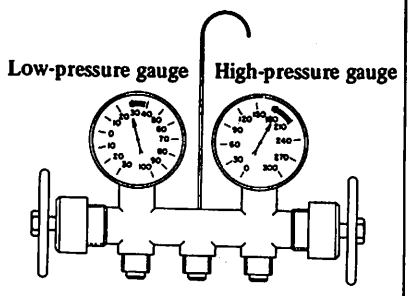
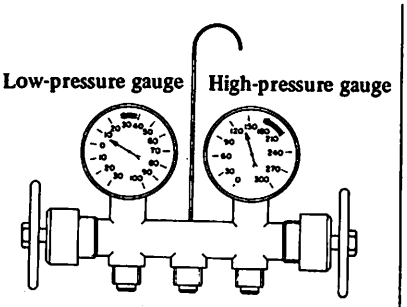
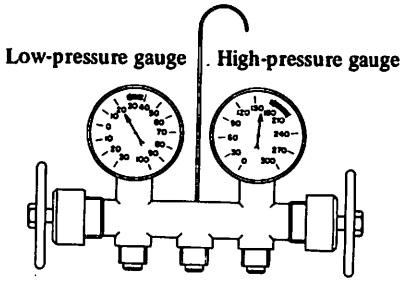
Control lever position			Operation	
AIR lever	FAN lever	TEMP lever	Item	Correct action
HEAT Engine at idle	1 to 4	HOT COLD	Discharge air Air intake door Mode door Floor door Air temperature Cock Air mix door	Floor – 80% Defroster nozzle – 20% Position of admitting outside air Shut position Heat position WARM COOL OPEN OFF At any position
DEF Engine at idle	1 to 4	HOT COLD	Discharge air Air intake door Mode door Floor door Air temperature Cock Air mix door	Defroster nozzle – 90% Position of admitting outside air Shut position Defroster position WARM COOL OPEN OFF At any position
OFF	OFF (1 to 4)	At any position	Blower motor Air intake door Mode door Floor door Discharge air Air temperature Cock Air mix door	OFF Position of isolating outside air Shut position Heat position Floor – 80% WARM COOL OEPN OFF At any position

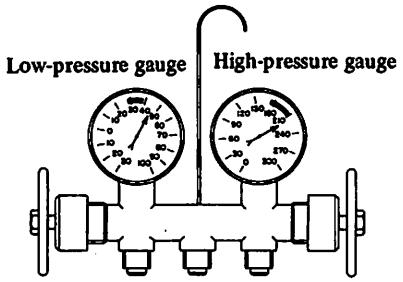
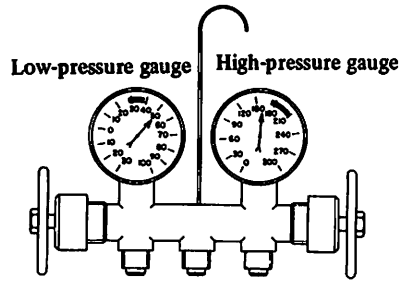
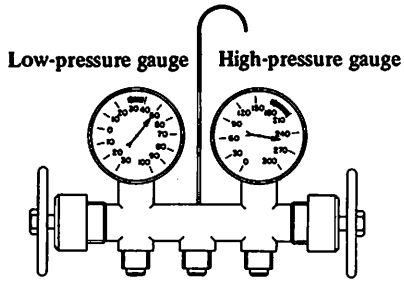
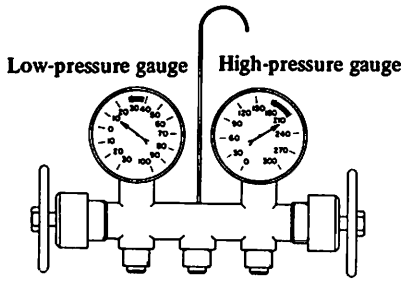
PERFORMANCE TEST DIAGNOSES

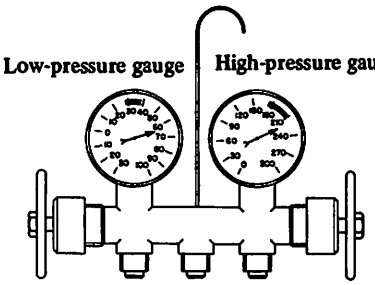
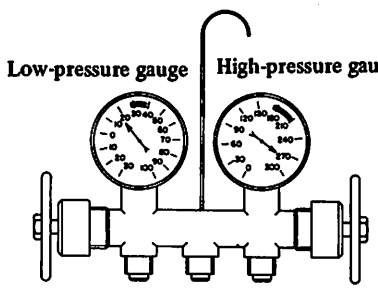
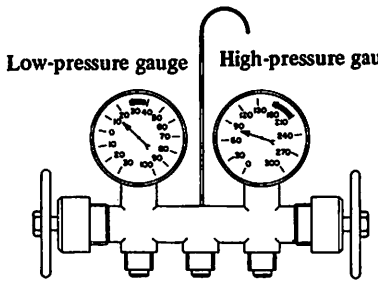
Of various conditions caused to the air conditioning system, the characteristics revealed on manifold gauge reading are shown in the following.

As to the method of a performance test, refer to the item of "Performance Test".

Each shaded area on the following tables indicates a reading of the normal system when the temperature of outside air is 32.5°C (91°F).

Condition	Probable cause	Corrective action
INSUFFICIENT REFRIGERANT CHARGE  AC287 Insufficient cooling. Bubbles appear in sight glass.	Refrigerant is small, or leaking a little.	1. Leak test. 2. Repair leak. 3. Charge system. **Note: Evacuate, as necessary, and recharge system.**
ALMOST NO REFRIGERANT  AC288 No cooling action. In sight glass appear a lot of bubbles or something like mist.	Serious refrigerant leak.	**Stop compressor immediately.** 1. Leak test. 2. Discharge system. 3. Repair leak(s). 4. Replace receiver drier if necessary. 5. Check oil level. 6. Evacuate and recharge system.
FAULTY EXPANSION VALVE  AC289 Slight cooling. Sweating or frosted expansion valve inlet.	Expansion valve restricts refrigerant flow. • Expansion valve is clogged. • Expansion valve is inoperative. Valve stuck closed. Thermal bulb has lost charge.	If valve inlet reveals sweat or frost: 1. Discharge system. 2. Remove valve and clean it. Replace it if necessary. 3. Evacuate system. 4. Charge system. If valve does not operate: 1. Discharge system. 2. Replace valve. 3. Evacuate and charge system.

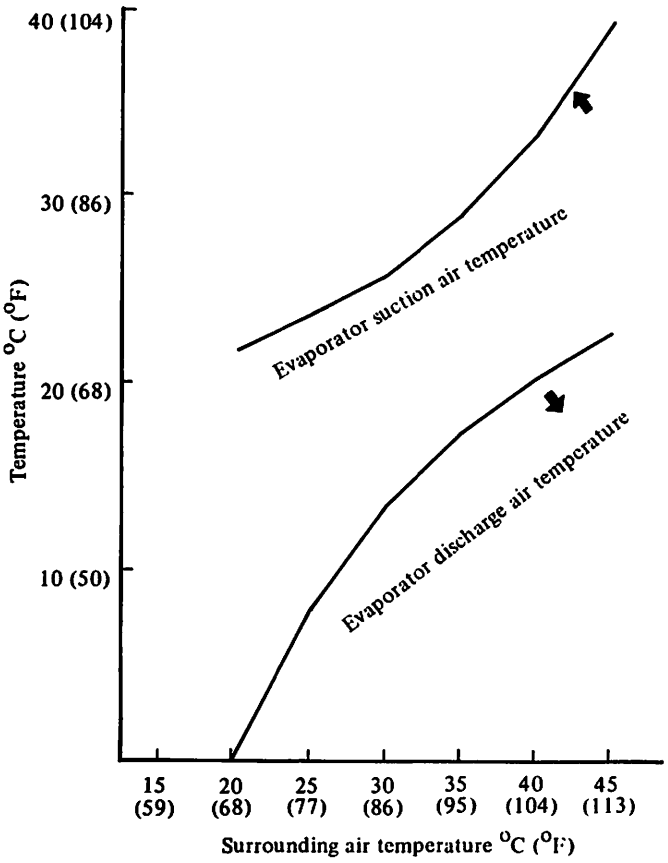
Condition		Probable cause	Corrective action
 AC290	Insufficient cooling. Sweated suction line.	Expansion valve allows too much refrigerant through evaporator.	Check valve for operation. If suction side does not show a pressure decrease, replace valve.
 AC291	No cooling. Sweating or frosted suction line.	Faulty seal of O-ring in expansion valve.	1. Discharge system. 2. Remove expansion valve and replace O-ring. 3. Evacuate and replace system.
AIR IN SYSTEM  AC292	Insufficient cooling. Sight glass shows occasional bubbles.	Air mixed with refrigerant in system.	1. Discharge system. 2. Replace receiver drier. 3. Evacuate and charge system.
MOISTURE IN SYSTEM  AC293	After operation for a while, pressure on suction side may show vacuum pressure reading. During this condition, discharge air will be warm. As warning of this, reading shows 0.4 kg/cm^2 (6 psi) vibration.	Drier is saturated with moisture. Moisture has frozen at expansion valve. Refrigerant flow is restricted.	1. Discharge system. 2. Replace receiver drier (twice if necessary). 3. Evacuate system completely. (Repeat 30-minute evacuating three times.) 4. Recharge system.

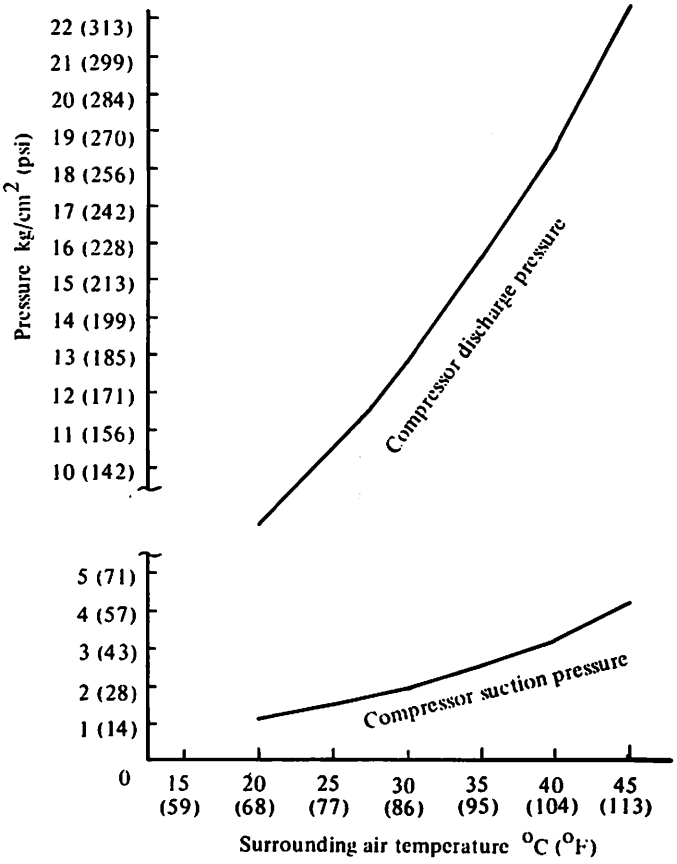
Condition	Probable cause	Corrective action
FAULTY CONDENSER  AC294 No cooling action: engine may overheat. Bubbles appear in sight glass of drier. Suction line is very hot.	Condenser is often found not functioning well.	• Check fan belt and fluid coupling. • Check condenser for dirt accumulation. • Check engine cooling system for overheat. • Check for refrigerant overcharge. **Note: If pressure remains high in spite of all above actions taken, remove and inspect the condenser for possible oil clogging.**
HIGH PRESSURE LINE BLOCKED  AC295 Insufficient cooling. Frosted high pressure liquid line.	Drier clogged, or restriction in high pressure line.	1. Discharge system. 2. Remove receiver drier or strainer and replace it. 3. Evacuate and charge system.
FAULTY COMPRESSOR  AC296 Insufficient cooling.	Internal problem in compressor, or damaged gasket and valve.	1. Discharge system. 2. Remove and check compressor. 3. Repair or replace compressor. 4. Check oil level. 5. Replace receiver drier. 6. Evacuate and charge system.

PERFORMANCE TEST

STANDARD PEFORMANCE

The air conditioner on the model S10 has the following performance characteristics when all systems are in good condition.

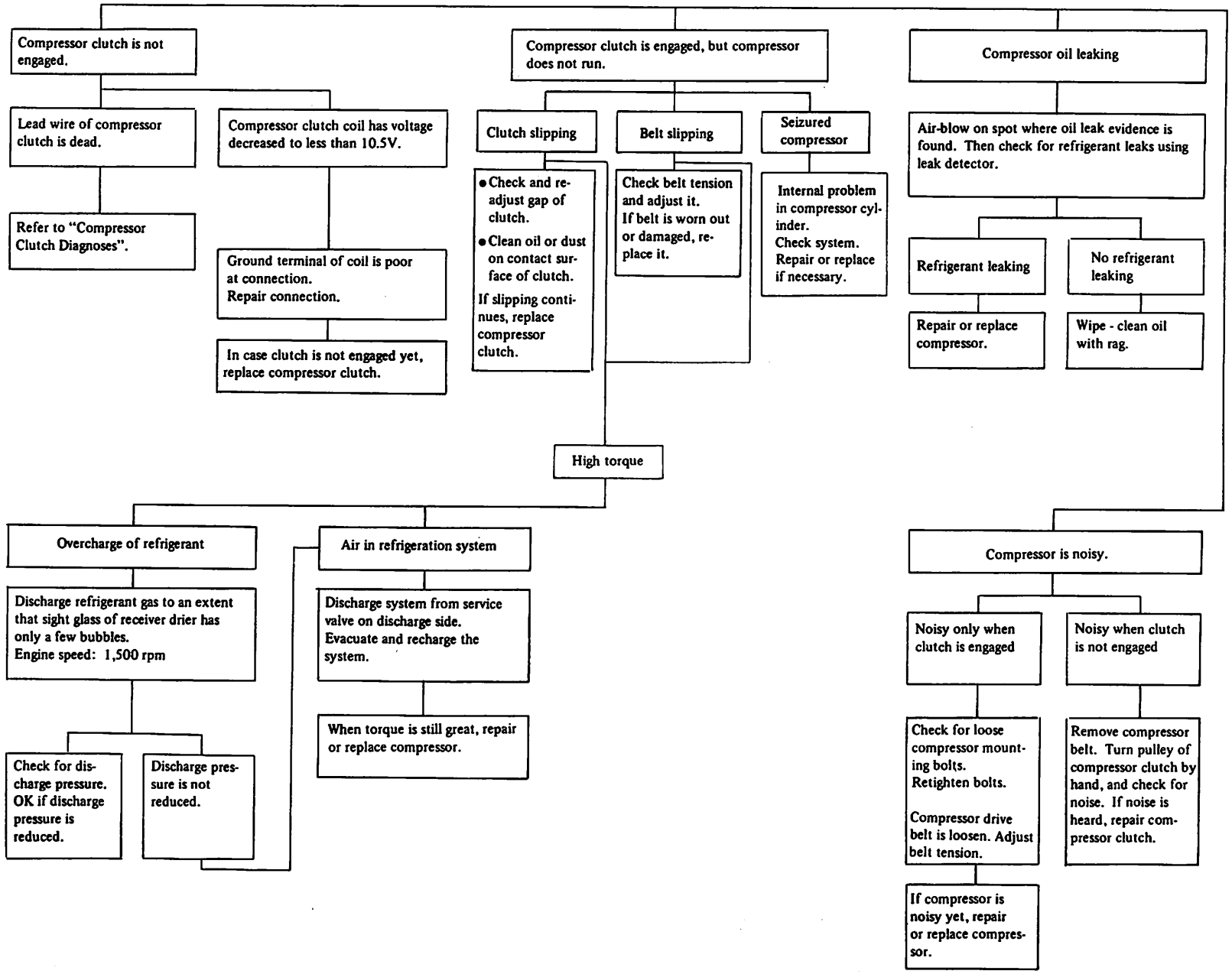




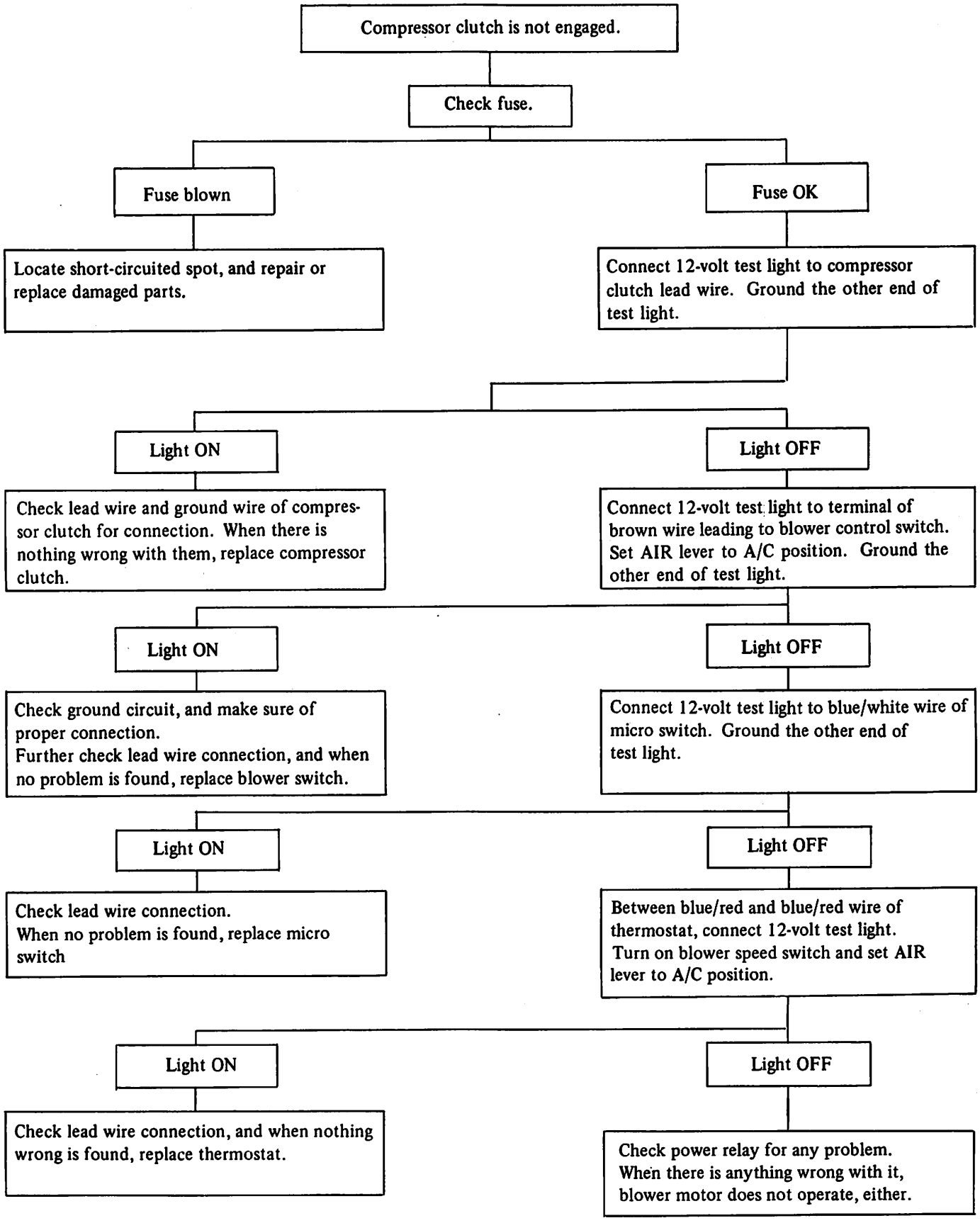
Outside air temperature °C (°F)	Discharge air temperature °C (°F)	Discharge pressure (High pressure) kg/cm² (psi)	Suction pressure (Low pressure) kg/cm² (psi)
20 (68)	0 (32)	8.3 (118)	1.2 (17)
25 (77)	7.6 (46)	10.5 (149)	1.6 (23)
30 (86)	13.4 (56)	12.9 (183)	2.0 (28)
35 (95)	17.4 (63)	15.7 (223)	2.6 (37)
40 (104)	20.2 (68)	18.7 (266)	3.3 (47)
45 (113)	22.8 (73)	22.4 (319)	4.2 (60)

Note: These data are based on results when air conditioner has been in operation approximately for 10 minutes.

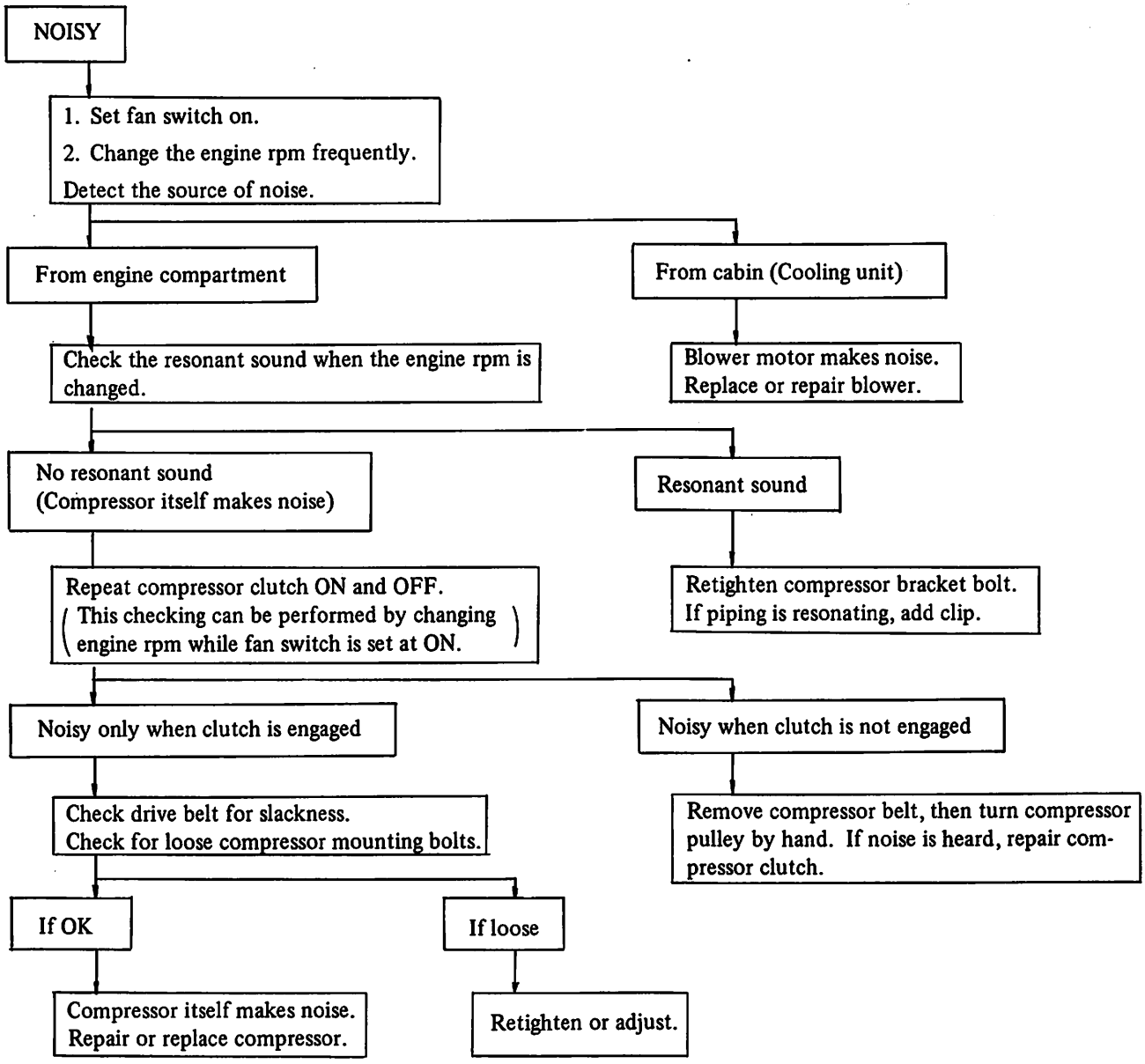
Conditions :
- Test location : Room or shadow
- Hood : Open
- All windows : Fully open
- Humidity : 60 %
- Engine speed : 1,500 rpm
- Fan knob : Hi
- Temp knob : Max. cool


Compressor clutch is not engaged.
Lead wire of compressor clutch is dead.
Refer to "Compressor Clutch Diagnoses".
Compressor clutch coil has voltage decreased to less than 10.5V.
Ground terminal of coil is poor at connection.
Repair connection.
In case clutch is not engaged yet, replace compressor clutch.
Compressor clutch is engaged, but compressor does not run.
Clutch slipping
• Check and re-adjust gap of clutch.
• Clean oil or dust on contact surface of clutch.
If slipping continues, replace compressor clutch.
Belt slipping
Check belt tension and adjust it.
If belt is worn out or damaged, replace it.
Seizured compressor
Internal problem in compressor cylinder.
Check system.
Repair or replace if necessary.
High torque
Overcharge of refrigerant
Discharge refrigerant gas to an extent that sight glass of receiver drier has only a few bubbles.
Engine speed: 1,500 rpm
Check for discharge pressure.
OK if discharge pressure is reduced.
Discharge pressure is not reduced.
Air in refrigeration system
Discharge system from service valve on discharge side.
Evacuate and recharge the system.
When torque is still great, repair or replace compressor.
Compressor oil leaking
Air-blow on spot where oil leak evidence is found. Then check for refrigerant leaks using leak detector.
Refrigerant leaking
Repair or replace compressor.
No refrigerant leaking
Wipe - clean oil with rag.
Compressor is noisy.
Noisy only when clutch is engaged
Check for loose compressor mounting bolts.
Retighten bolts.
Compressor drive belt is loosen. Adjust belt tension.
If compressor is noisy yet, repair or replace compressor.
Noisy when clutch is not engaged
Remove compressor belt. Turn pulley of compressor clutch by hand, and check for noise. If noise is heard, repair compressor clutch.

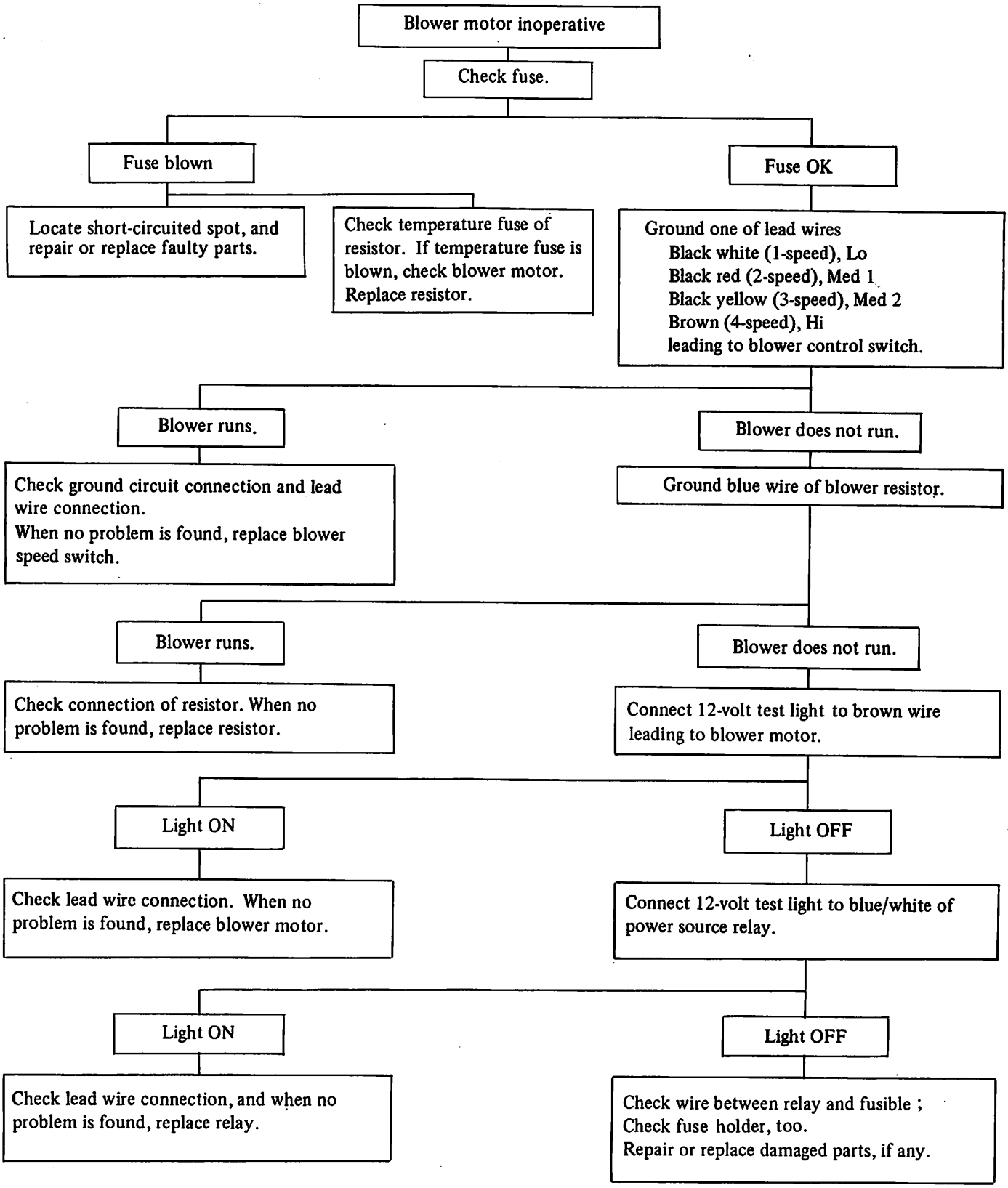
COMPRESSOR CLUTCH DIAGNOSES



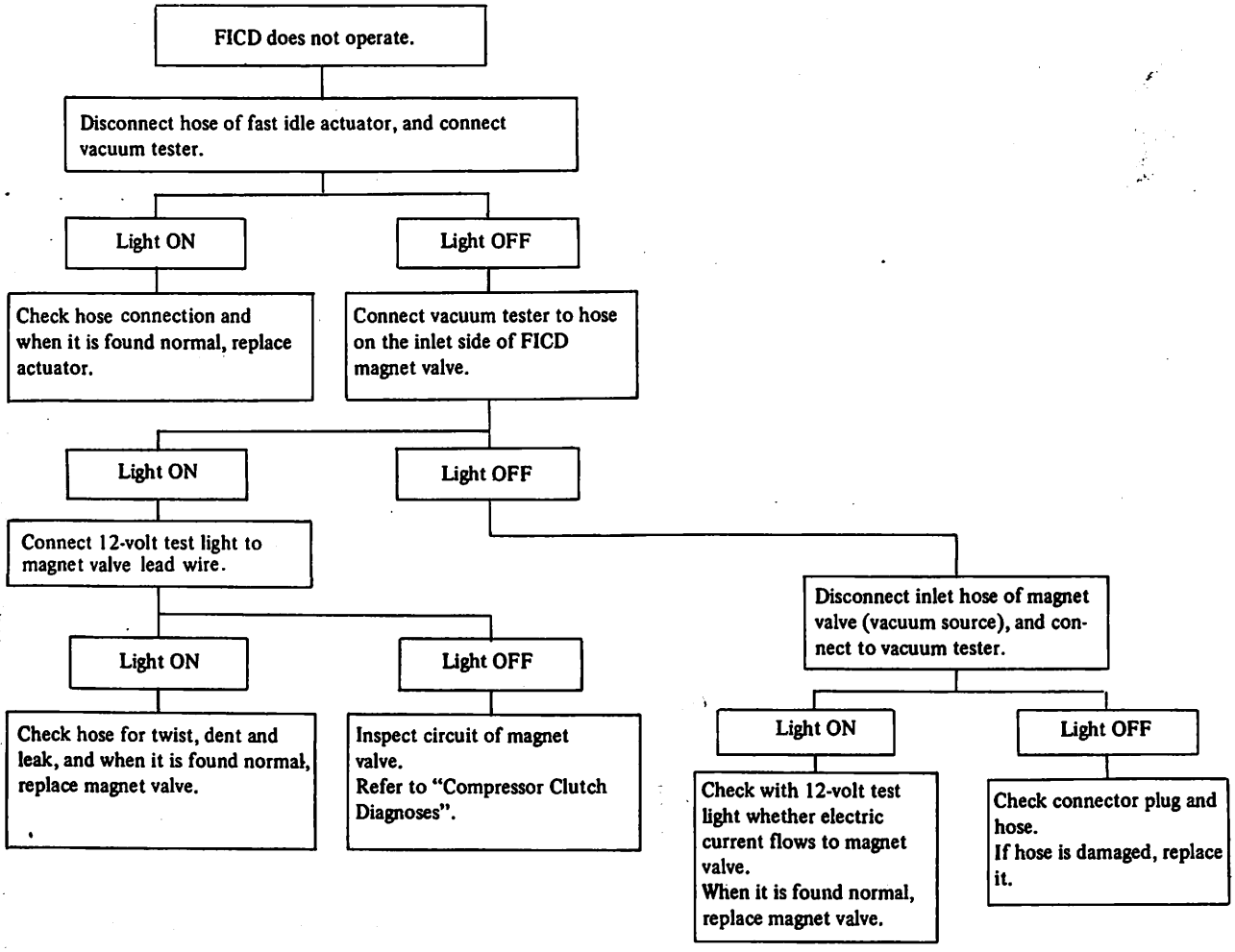
NOISE DIAGNOSES



BLOWER MOTOR DIAGNOSES



FAST IDLE CONTROL DEVICE DIAGNOSES (FICD)



Vacuum tester: Tester light keeps OFF unless normal vacuum level exists in each check point.

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