Body Electrical System

GENERAL

SPECIFICATIONS ETTC0050

MULTIFUNCTION SWITCH

Items	Specifications
Rated Voltage	DC 12V
Operating temperature range	-30°C - +80°C (-22 - +176°F)
Rated load Dimmer & passing switch Lighting switch Turn signal & lane change switch Wiper switch Washer switch Rear wiper & washer switch Horn switch	 High : 121.4W (Lamp load) Low : 110W (Lamp load) Passing : 121.4W (Lamp load) Lighting : 121.4W (Lamp load) Tail : 40W (Lamp load) 57W (Lamp load) Low, High : 4A (Motor load) Int. : 0.22 ± 0.05A (Relay load) Lock : Max. 23A (Motor load) 4A (Motor load) 4A (Motor load) 7A (Horn load)

INSTRUMENTS AND WARNING SYSTEM

Warning lamps	Bulb wattage (W)	Color
High beam	3.0	Blue
Low fuel	3.0	Amber
Turn signal (LH, RH)	1.2	Green
Battery (charge)	1.2	Red
Oil pressure	1.2	Red
Air bag	1.2	Red
Parking brake	1.2	Red
Seat belt	1.2	Red
Check engine	1.2	Amber
ABS	1.2	Amber
Door ajar	1.2	Red
O/D OFF	1.2	Amber
Immobilizer	1.2	Amber

SERVICE SPECIFICATIONS ETTD0100

INDICATORS AND GAUGES

Items

Specifications

Speedometer

Type

Input spec.

Indication

- o Cross-coil type (A/T), Cable type or Eddy current type (M/T)
- o Hall IC type : 4 pulses/rev.
- o Km/h : 637rpm x 4 pulses/rev. indicates 60Km/h
- o MPH : 1025 rpm x 4 pulses/rev. indicates 60MPH

Standard values

Velocity (Km/h)	20	40	60	80	100
Tolerance (Km/h)	20-23	41-45	62-66	83-88	104-110
Tolerance (Km/h)	20-24.4	40-44.4	61-65	81-86	101-107
Velocity (Km/h)	120	140	160	180	Remark
Tolerance (Km/h)	127-132	147.5-153.5	168-175	188.5-196.5	M/T
Tolerance (Km/h)	123-128.3	143-149	163-170	183-191	A/T

Velocity (MPH)	10	20	40	60
Tolerance (MPH)	10-12.5	20-22.5	40-42.5	60-63.5
Velocity (MPH)	80	100	120	
Tolerance (MPH)	80-84.5	102-105.5	122-126.5	

- o Tap the speedometer to prevent hysterisis effects during inspection.

Fuel gauge

Type

Standard values

- o Cross - coil type

Level	Gauge	
	Resistance (Ω)	Indication tolerance (˚)
E (Empty)	95	-40 ± 2.4
1/2	32.5	0 ± 4.0
F (Full)	7	40 ± 2.4

- o Inspection order : E → F → E

Temperature gauge

Type

Indication standard

- o Cross - coil type

Temperature	Angle (˚)	Assembled tolerance (˚)
50˚C	-40	-
85˚C ~ 105˚C	-7	$^{+2}_{-3}$
Red zone (over 125˚C)	40	-

- o Inspection order : OFF → C → H

Resistance of temperature sender (NTC)

Temperature (˚C)	50	85	105	125
Resistance (Ω)	210	55	30	19.5

ETTC010A

LIGHTING SYSTEM

Items	Bulb wattage(W)
Head lamps - High/Low bulb - Turn signal bulb - Position bulb	 60W / 55W 21W 5W
Front fog lamp	27W
Rear combination lamps - Tail/stop bulb - Back up bulb - Turn signal bulb	 5W / 21W 16W 21W
Rear fog lamp	21W
Side repeater lamp	5W
Room lamp	10W
Luggage lamp	8W
High mounted stop lamp	LED type : 3W Bulb type : 16W
License plate lamp	5W

AUDIO

Items	Radio	Radio+Cassette tape	Radio+CD
Rated output	Max. 20W x 2	Max. 20W x 2	Max. 20W x 4
Load impedance	4Ω x 2	4Ω x 2	4Ω x 4
Band	AM/FM, LW/MW/FM	AM/FM, LW/MW/FM	AM/FM, LW/MW/FM
Tuning type	PLL Synthesized type	PLL Synthesized type	PLL Synthesized type
Dark current	Max. 3.5mA	Max. 3.5mA	Max. 2mA
Frequency range / Channel	AM : 531~1602KHZ/9KHZ	AM : 531~1602KHZ/9KHZ	AM : 531~1602KHZ/9KHZ
	FM : 87.5~108MHZ/100KHZ	FM : 87.5~108MHZ/100KHZ	FM : 87.5~108MHZ/100KHZ
	LW : 153~279KHZ/1KHZ	LW : 153~279KHZ/1KHZ	LW : 153~279KHZ/1KHZ
	MW : 531~1602KHZ/9KHZ	MW : 531~1602KHZ/9KHZ	MW : 531~1602KHZ/9KHZ
	FM : 87.5~108MHZ/50KHZ	FM : 87.5~108MHZ/50KHZ	FM : 87.5~108MHZ/50KHZ

WINDSHIELD WIPER AND WASHER

Items	Specifications
Wiper motor	
Rated voltage	DC 12V
Front wiper	
10 kgf·cm load test	Low : 48-56 rpm (Max. 3.5A) High : 64-78 rpm (Max. 4.5A)
40 kgf·cm load test	Low : 40-48 rpm (Max. 5.5A) High : 56-68 rpm (Max. 7A)
Rear wiper	
No load test	48 rpm (Max. 12A)
10 kgf·cm load test	34-46 rpm (Max. 2.5A)
Wiper arm and blade	
Arm spring type	Tension type
Wiping angle	
Driver side	80.5°
Passenger side	93.5°
Rear side	110°
Blade length	
Driver side	500mm
Passenger side	400mm
Rear side	500mm
Windshield washer	
Motor type	DC ferrite magnet
Pump type	Centrifugal
Discharge pressure	1.2kg/cm²
Flow rate	Min. 1,320 cc/min
Overload capacity	
Water	Max. 60 sec.
Racing	Max. 20 sec.

TROUBLESHOOTING ETCC0150

INSTRUMENTS AND WARNING SYSTEM

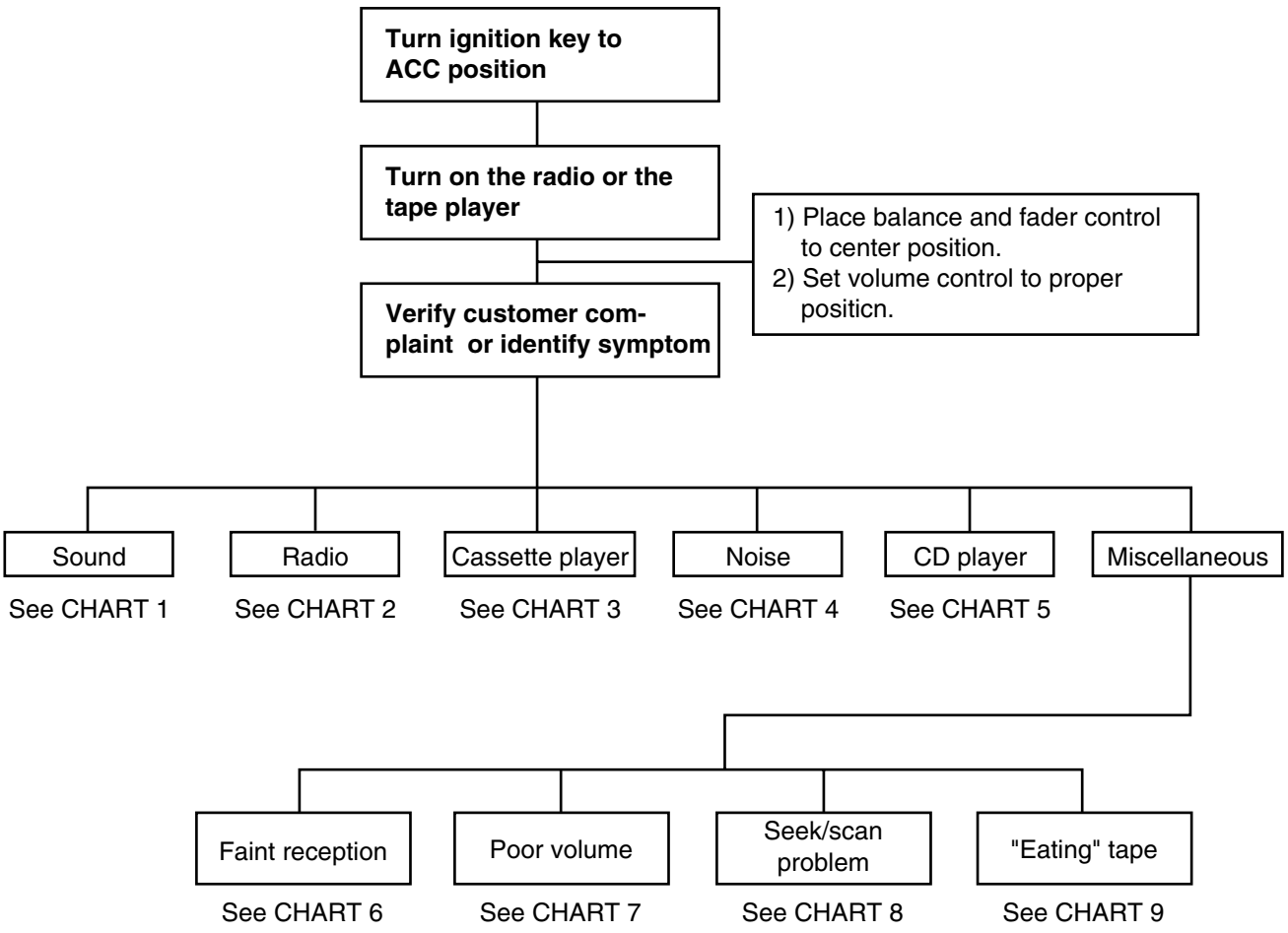
Symptom	Possible cause	Remedy
Fuel gauge does not operate	No.16 fuse (10A) blown Fuel gauge faulty Fuel sender faulty Wiring faulty	Check for short and replace fuse Check gauge Check fuel sender Repair if necessary
Low fuel warning lamp does not light	No.16 fuse (10A) blown Bulb burned out Fuel level sensor faulty Wiring or ground faulty	Check for short and replace fuse Replace bulb Check sensor Repair if necessary
Water temperature gauge does not operate	No.16 fuse (10A) blown Water temperature gauge faulty Water temperature sender faulty Wiring or ground faulty	Check for short and replace fuse Check gauge Check sender Repair if necessary
Oil pressure warning lamp does not light	No.16 fuse (10A) blown Bulb burned out Oil pressure switch faulty Wiring or ground faulty	Check for short and replace fuse Replace bulb Check switch Repair if necessary
Low brake fluid warning lamp does not light	No.16 fuse (10A) blown Bulb burned out Brake fluid level warning switch faulty Parking brake switch faulty Wiring or ground faulty	Check for short and replace fuse Replace bulb Check switch Check switch Repair if necessary
Open door warning lamp does not light	No.12 fuse (10A) blown Bulb burned out Door switch faulty Wiring or ground faulty	Check for short and replace fuse Replace bulb Check switch Repair if necessary
Seat belt warning lamp does not light	No.16 fuse (10A) blown Bulb burned out Buckle switch faulty Wiring or gound faulty	Check for short and replace fuse Replace bulb Check switch Repair if necessary

LIGHTING SYSTEM

Symptom	Possible cause	Remedy
One lamp does not light (all exterior)	Bulb burned out Socket, wiring or ground faulty	Replace bulb Repair if necessary
Head lamps do not light	Bulb burned out No.4, 5 fuse (10A) blown Head lamp relay faulty Lighting switch faulty Wiring or ground faulty	Replace bulb Replace fuse and check for short Check relay Check switch Repair if necessary
Tail lamps and license plate lamps do not light	Fusible link F (30A) blown Tail lamp fuse (10A) blown Tail lamp relay faulty Lighting switch faulty Wiring or ground faulty	Replace fusible link Replace fuse and check for short Check relay Check switch Repair if necessary
Stop lamps do not light	Fusible link E (50A) blown No. 10 fuse (10A) blown Stop lamp switch faulty Wiring or ground faulty	Replace fusible link Replace fuse and check for short Adjust or replace switch Repair if necessary
Stop lamps stay on	Stop lamp switch faulty	Adjust or replace switch
Turn signal lamp does not flash on one side	Bulb burned out Turn signal switch faulty Wiring or ground faulty	Replace bulb Check switch Repair if necessary
Turn signal lamps do not operate	No. 15 fuse (10A) blown Flasher faulty Turn signal switch faulty Wiring or ground faulty	Replace fuse and check for short Check flasher Check switch Repair if necessary
Hazard warning lamps do not operate	No. 9 fuse (10A) blown Flasher faulty Hazard switch faulty Wiring or ground faulty	Replace fuse and check for short Check flasher Check switch Repair if necessary
Flasher rate too slow or too fast	Lamps' wattages are smaller or larger than specified Defective flasher	Replace lamps Replace flasher
Back up lamps do not light up	No. 15 fuse (10A) blown Back up lamp switch faulty Wiring or ground faulty	Replace fuse and check for short Check switch Repair if necessary
Room lamp does not light up	No. 12 fuse (10A) blown Room lamp switch faulty Wiring or ground faulty	Replace fuse and check for short Check switch Repair if necessary
Luggage room lamp does not light up	No. 12 fuse (10A) blown Luggage room lamp switch faulty Wiring or ground faulty	Replace fuse and check for short Check switch Repair if necessary

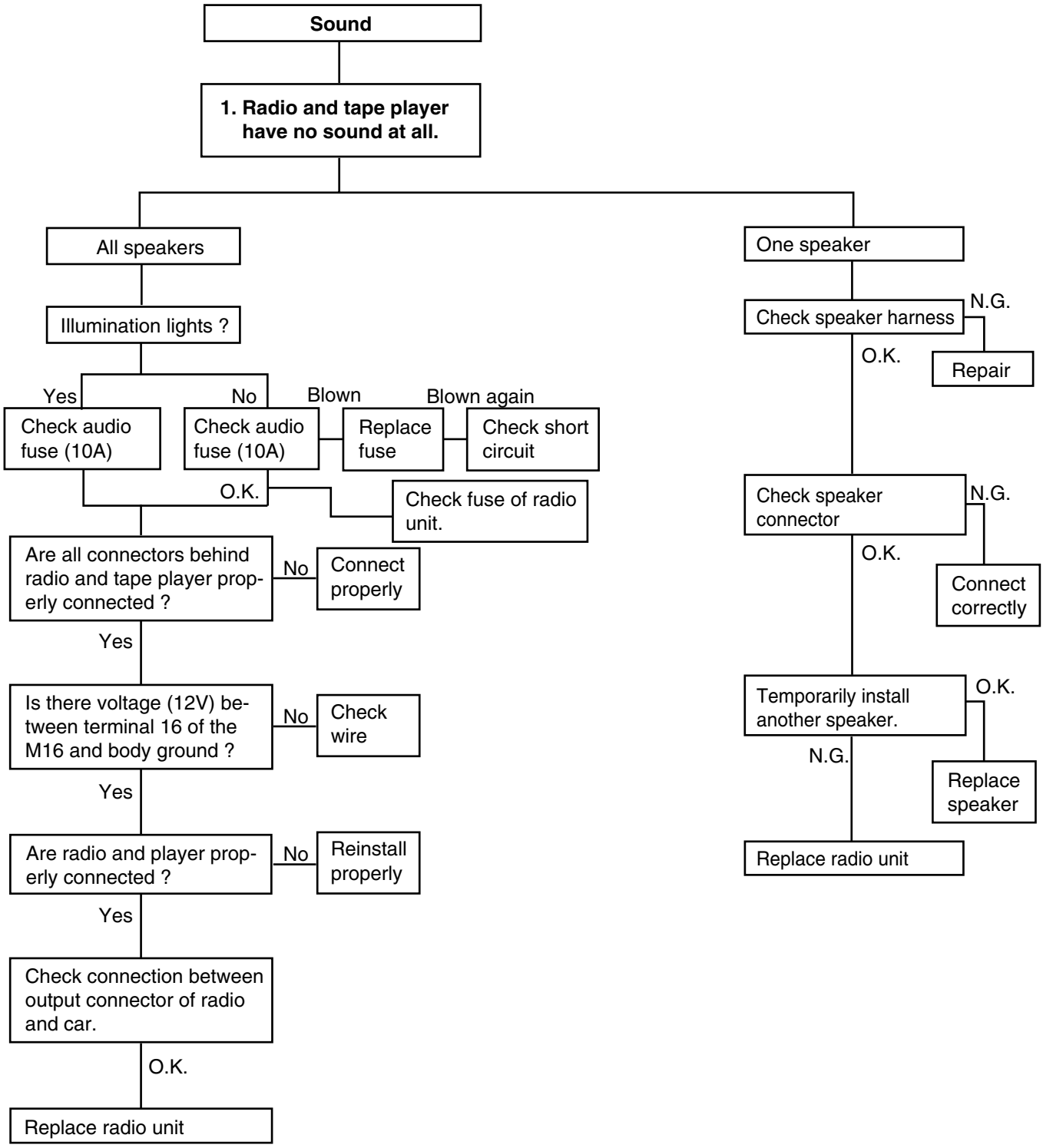
AUDIO

There are six areas where a problem can occur: wiring harness, the radio, the cassette tape deck, the CD player, the speaker, and antenna. Troubleshooting enables you to confine the problem to a particular area.

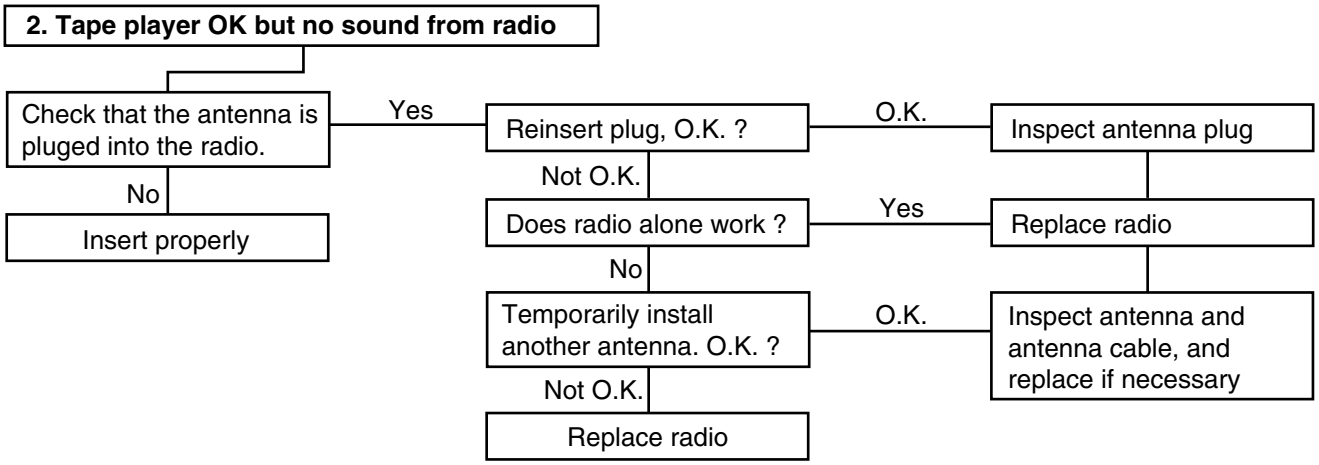


ETTC015A

CHART 1

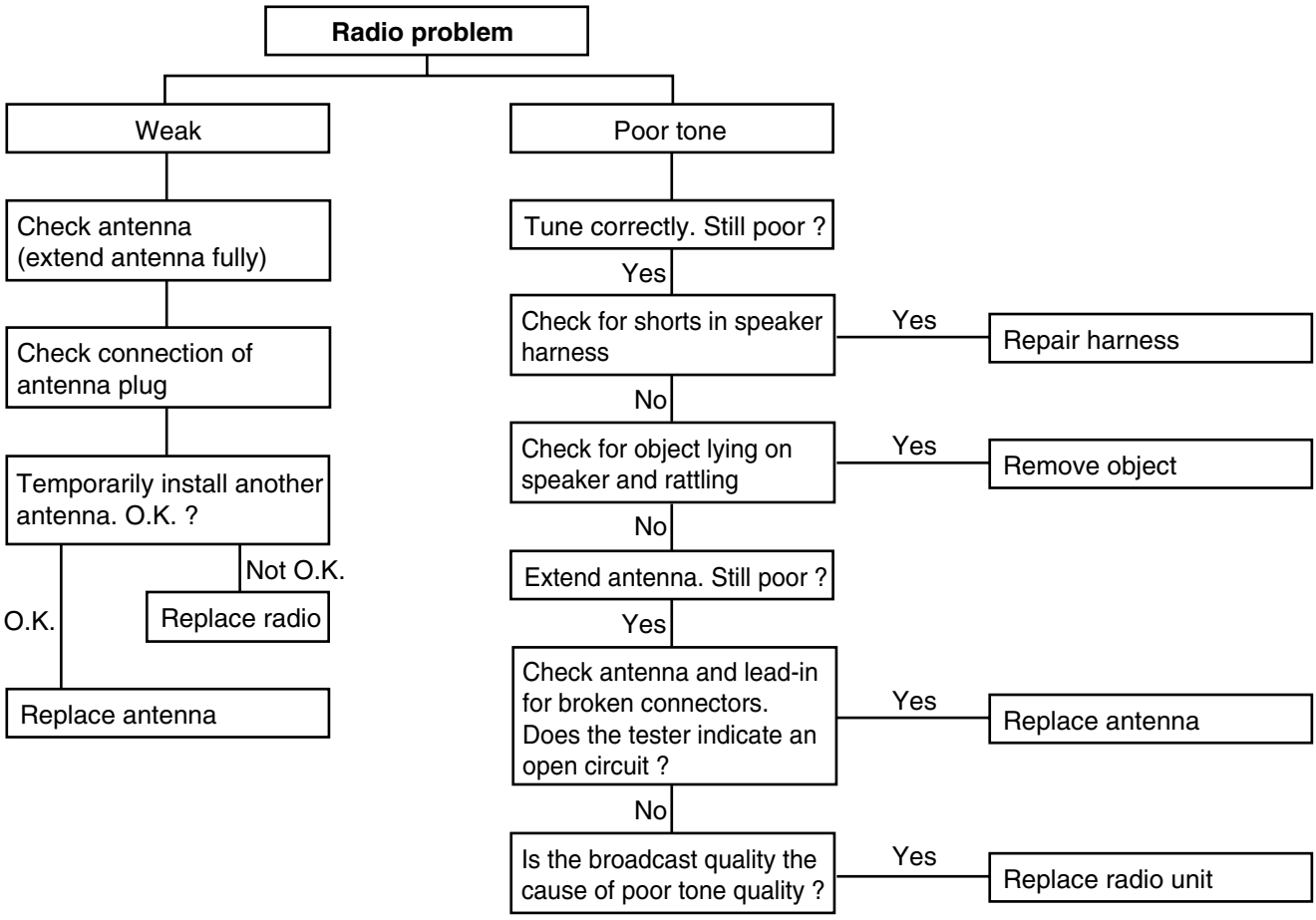


ETNC015A



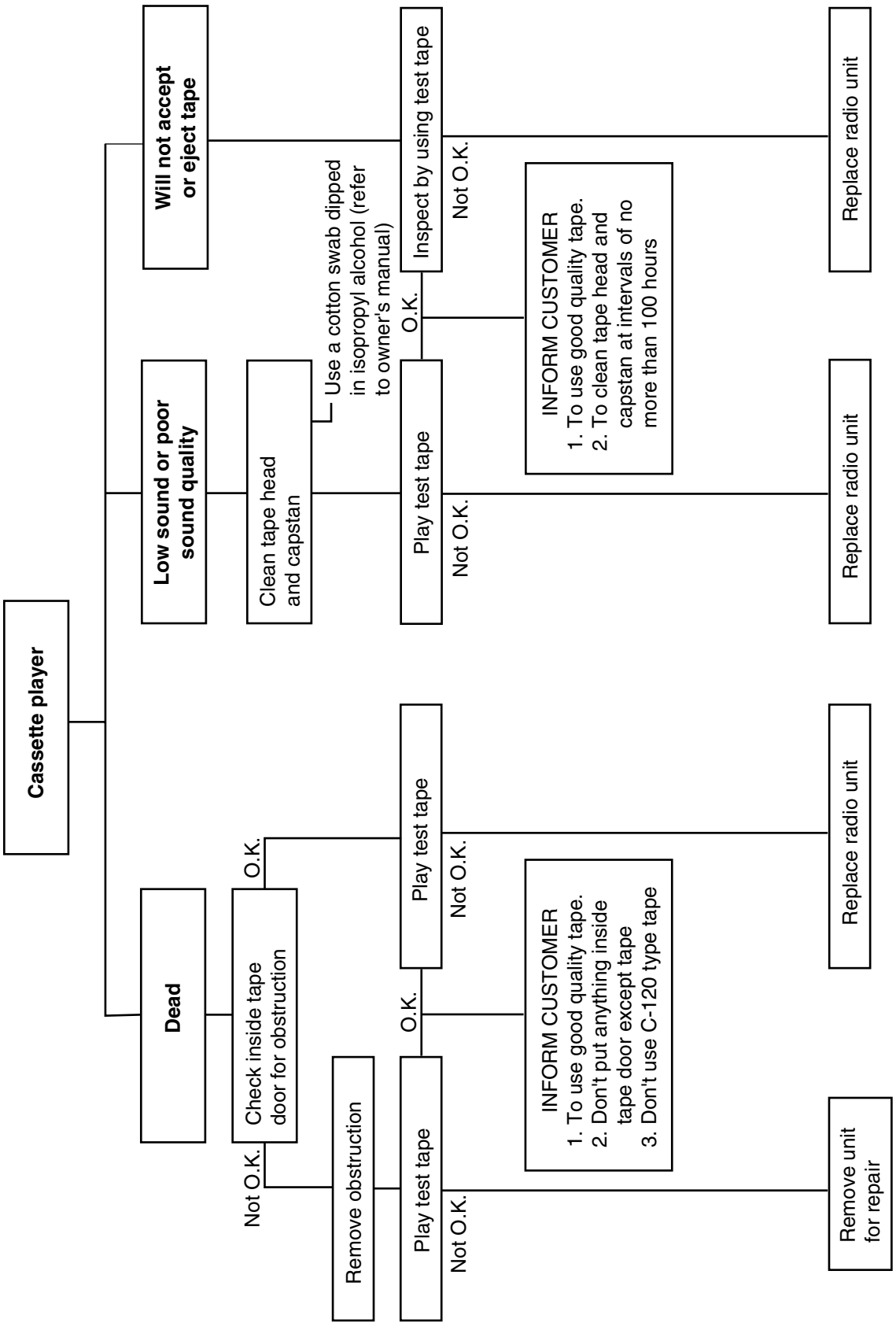
ETA9010C

CHART 2



ETA9010D

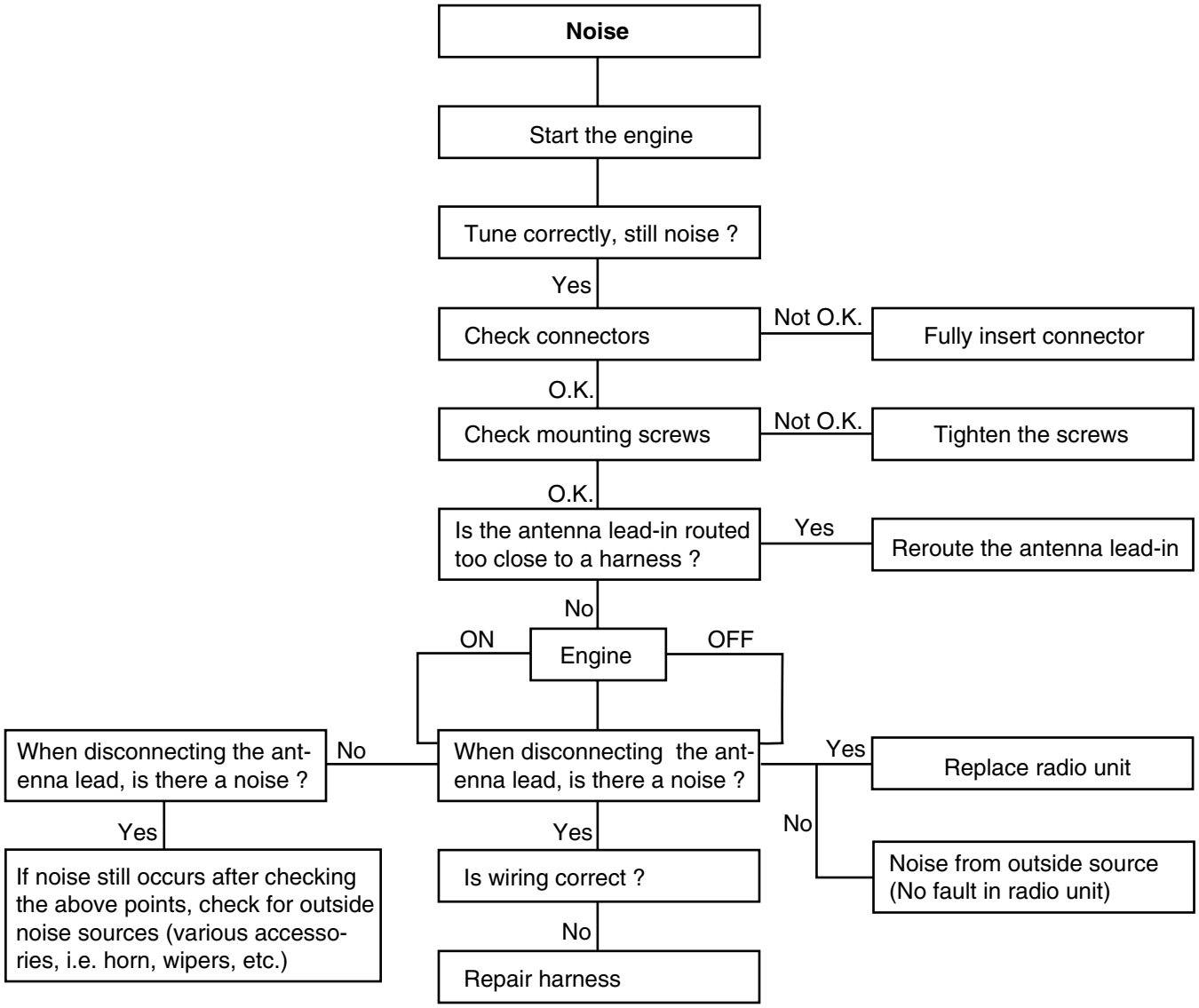
CHART 3



ETA9010E

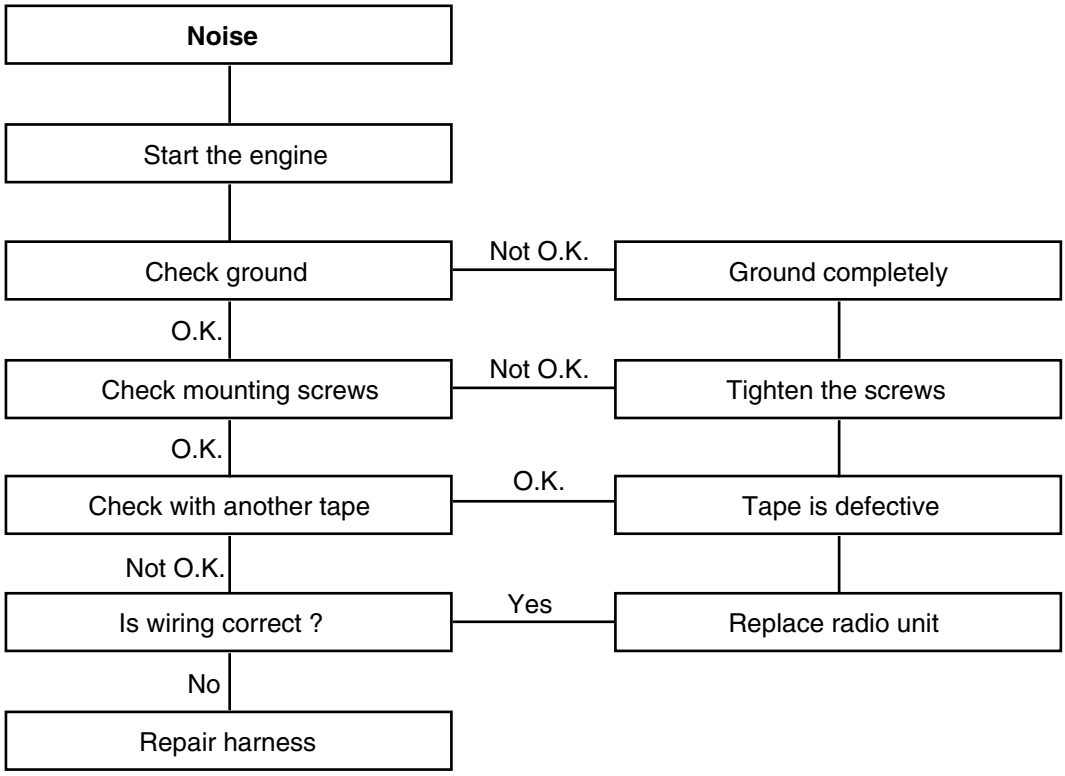
CHART 4

1. RADIO



ETA9010F

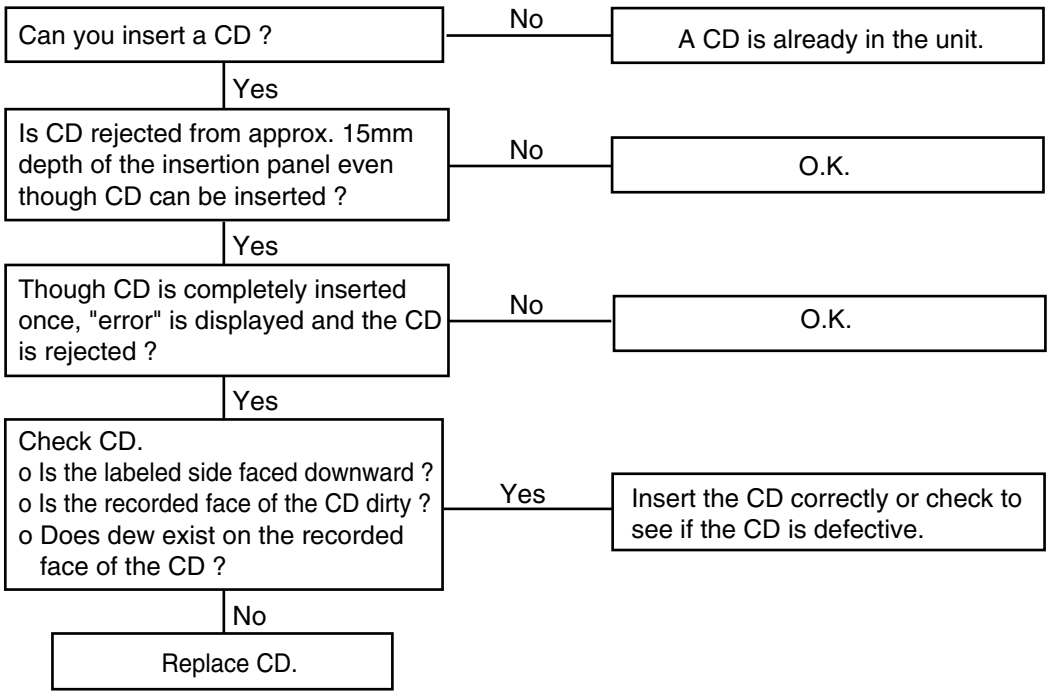
2. TAPE



ETA9010G

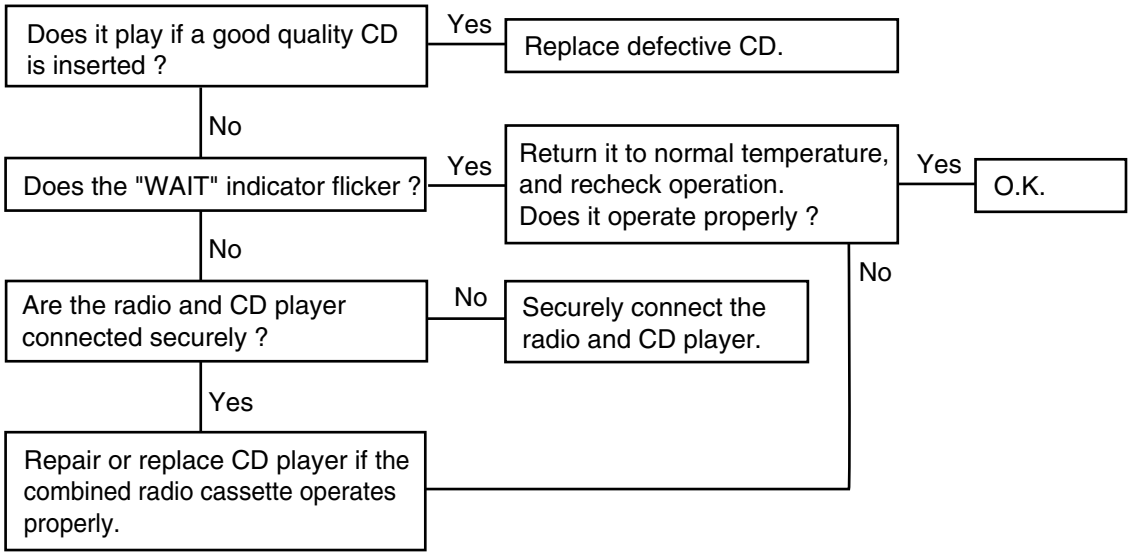
CHART 5

1. CD WILL NOT BE ACCEPTED



ETA9010H

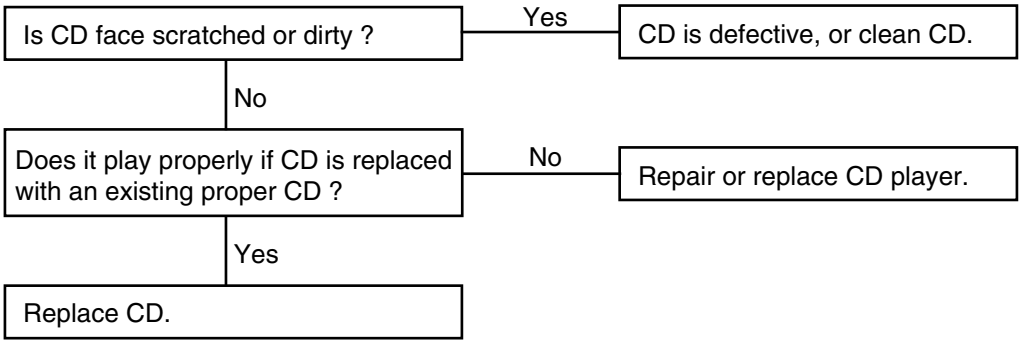
2. NO SOUND



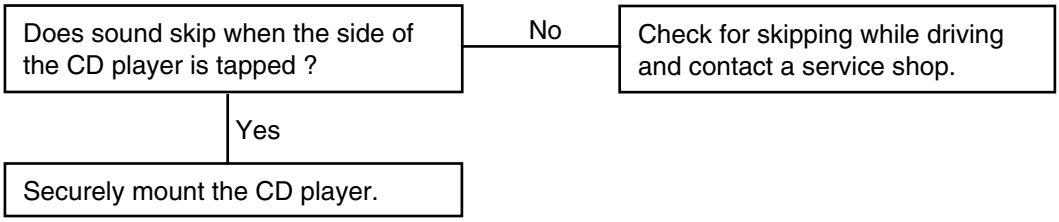
ETA9010O

3. CD SOUND SKIPS

1. Sound sometimes skips when parking.

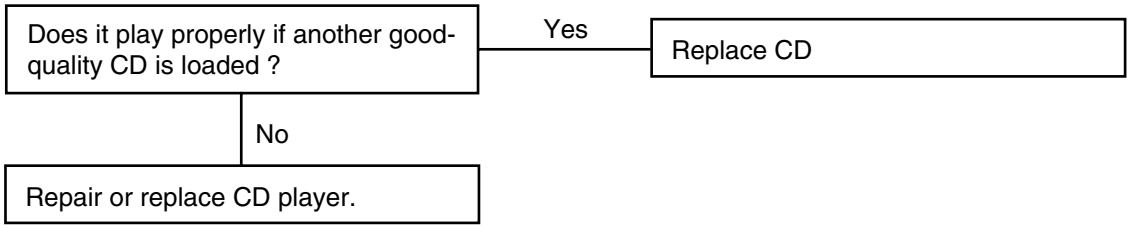


2. Sound sometimes skips when driving.
(Stop vehicle, and check it.)
(Check by using a CD which is free of scratches, dirt or other damage.)

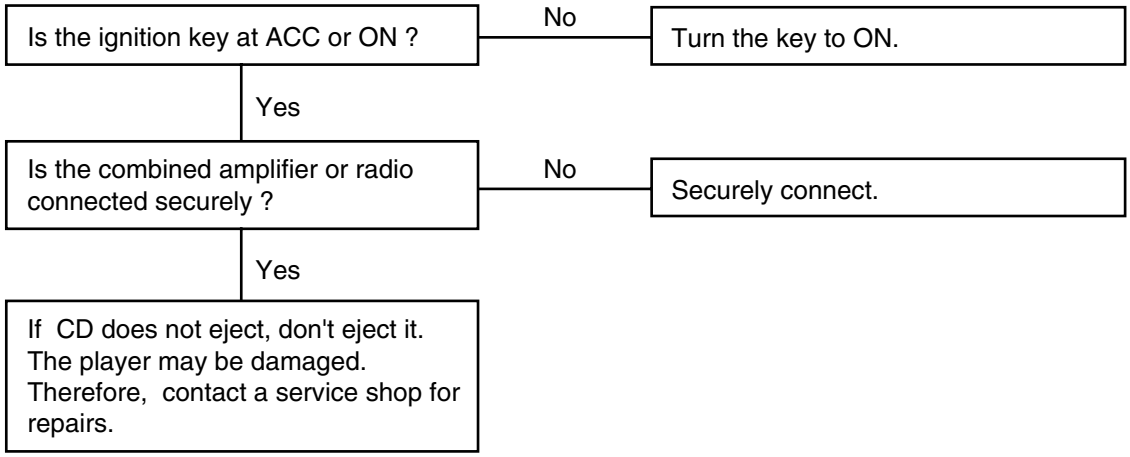


ETA9010I

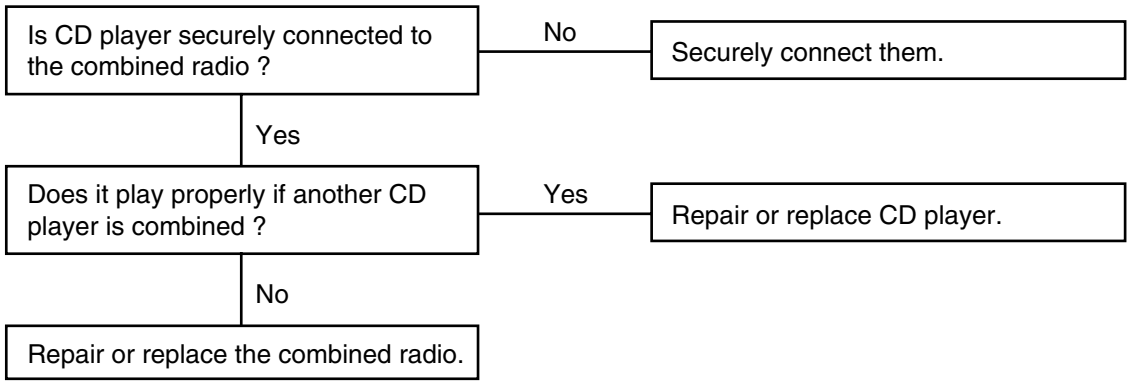
4. SOUND QUALITY IS POOR



5. CD WILL NOT EJECT

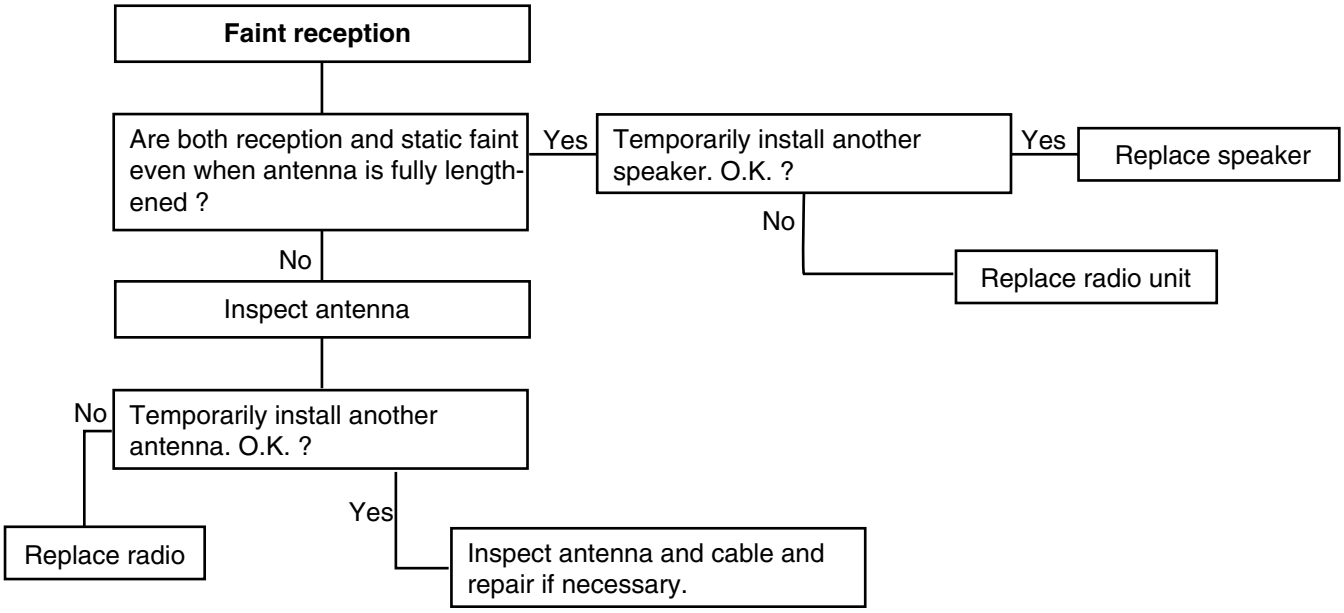


6. NO SOUND FROM ONE SPEAKER



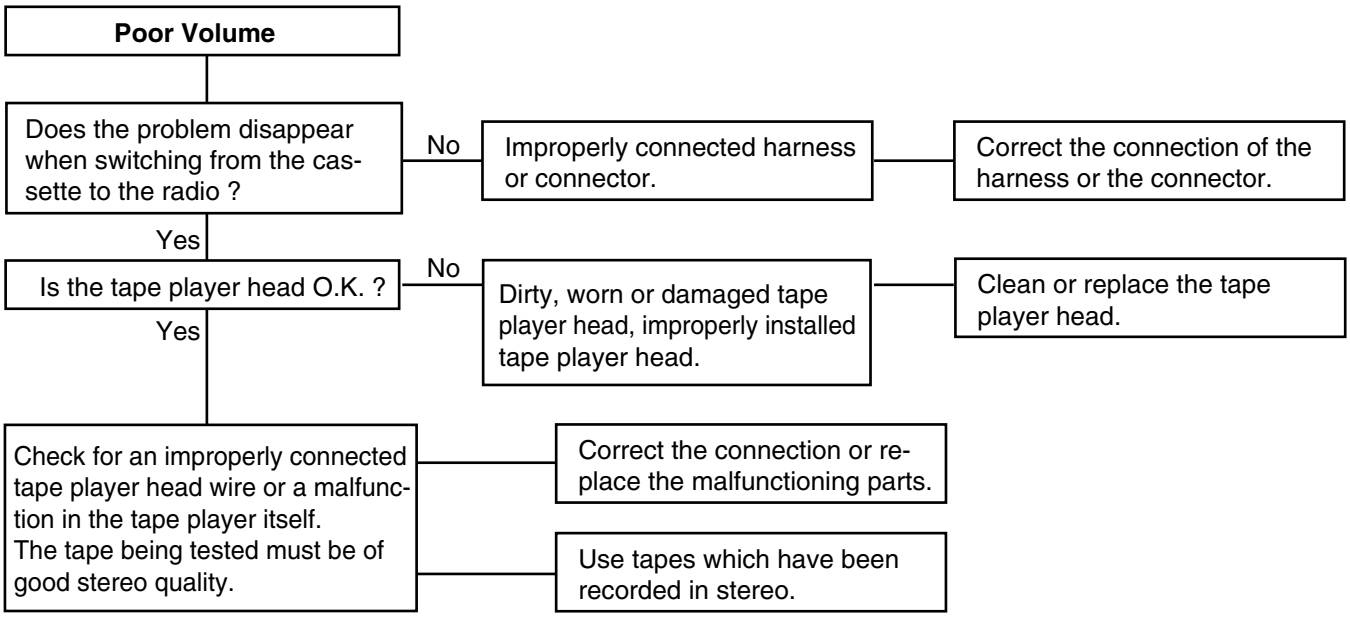
ETA9010J

CHART 6



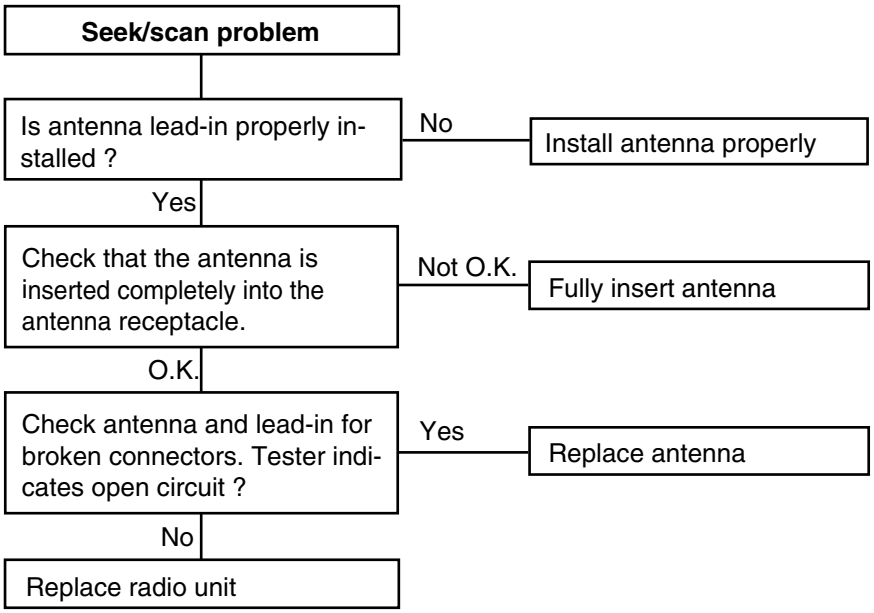
ETA9010K

CHART 7



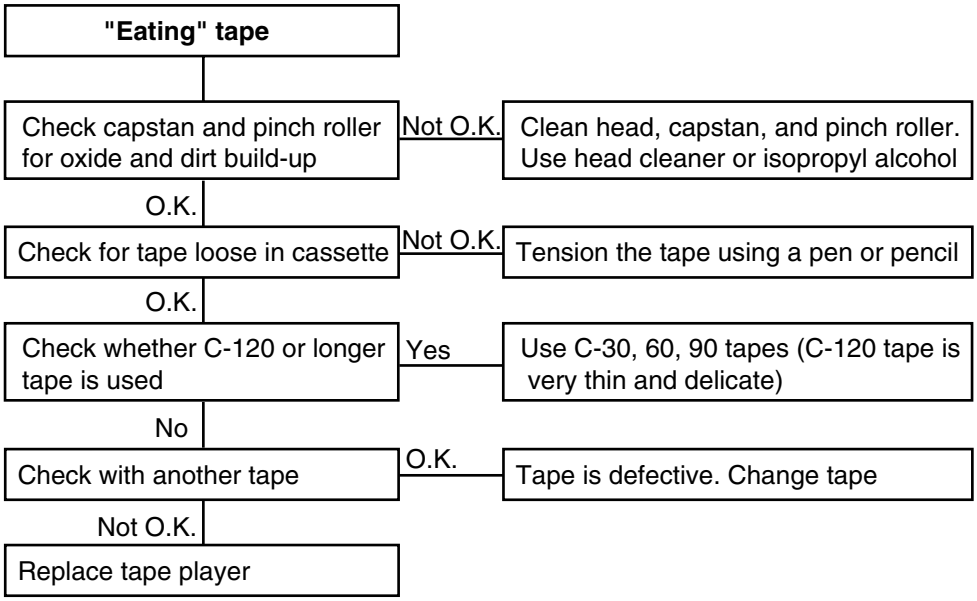
ETA9010L

CHART 8



ETA9010M

CHART 9



ETA9010N

WINDSHIELD WIPER

Symptom	Possible cause	Remedy
Wipers do not operate or return to off position.	No.7 fuse (20A) blown Wiper motor faulty Wiper switch faulty Wiring or ground faulty	Check for short and replace fuse Check motor Check switch Repair if necessary
Wipers do not operate in INT position	Intermittent wiper relay faulty Wiper switch faulty Wiper motor faulty Wiring or ground fautly	Check intermittent wiper relay Check switch Check motor Repair if necessary

POWER WINDOW

Symptom	Possible cause	Remedy
No windows operate from the main switch on the driver's door	No.2 fuse (30A) blown Poor ground Defective power window main switch Open circuit in wires or loose or disconnected connector	Check for short and replace the fuse Clean and retighten the ground terminal mounting bolt Check the switch Replace if necessary Repair or replace
Driver's side window does not operate	Defective power window main switch Defective motor or circuit breaker Open circuit in wires or loose or disconnected connector	Check for driver's window switch Replace the motor Check the harness and the connector
Passenger's side window does not operate	Defective power window subswitch Defective motor or circuit breaker Wiring faulty or disconnected connector	Replace the switch Replace the motor Repair if necessary

KEYLESS ENTRY SYSTEM

Symptom	Possible cause	Check	Remedy
Operation range is unstable	Discharged transmitter battery	Check the transmitter, red lamp blinking upon pressing the transmitter switch	Replace the battery
	Transmitter or receiver faulty		Replace the transmitter or the receiver
Central locking device operates but keyless entry does not work	Discharged receiver battery	Check the transmitter, red lamp blinking upon pressing the transmitter switch	Replace the battery
	Faulty signal code registration		Ensure normal door opening/closing by using the door key and register the code again
	Faulty keyless entry circuit	Check the receiver connector, and the harness between the receiver and the door lock relay	Repair the connector or the harness
	Faulty receiver	Check the receiver output using the oscilloscope	Replace the receiver
	Faulty control unit and door module		Replace the faulty control unit and module

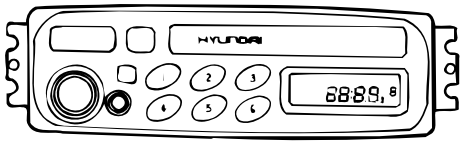
NOTE

If central lock and keyless entry do not operate simultaneously, systems other than the keyless entry may be considered faulty.
Then check related systems.

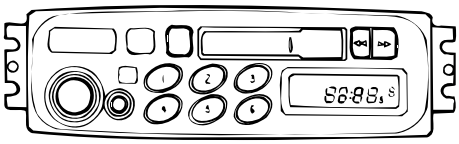
AUDIO SYSTEM

AUDIO UNIT

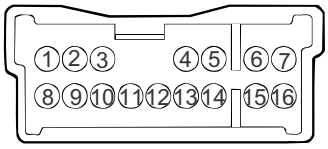
COMPONENTS ETTC0200



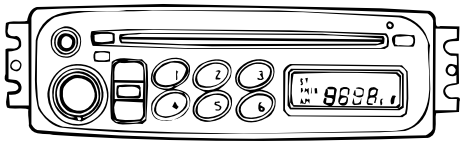
[Radio]



[Radio+Cassette]



ETJA001C



[Radio+CD]

[Radio]

Terminal	Description
1	N.C
2	N.C
3	Front left speaker (-)
4	Front right speaker (-)
5	N.C
6	Illumination (-)
7	ACC (+)
8	Ground
9	N.C
10	Front left speaker (+)
11	N.C
12	N.C
13	Front right speaker (+)
14	N.C
15	Illumination (+)
16	Back up (+)

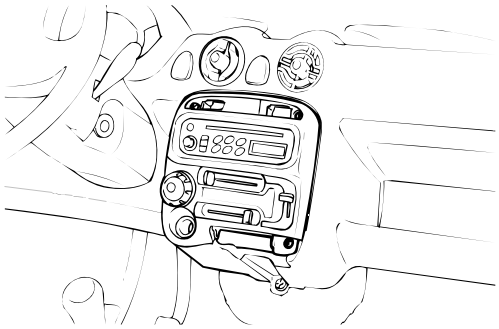
[Radio + Cassette, Radio + CD]

Terminal	Description
1	N.C
2	Rear left speaker (-)
3	Front left speaker (-)
4	Front right speaker (-)
5	Rear right speaker (-)
6	Illumination (-)
7	ACC (+)
8	Ground
9	Rear left speaker (+)
10	Front left speaker (+)
11	N.C
12	N.C
13	Front right speaker (+)
14	Rear right speaker (+)
15	Illumination (+)
16	Back up (+)

ETTC020A

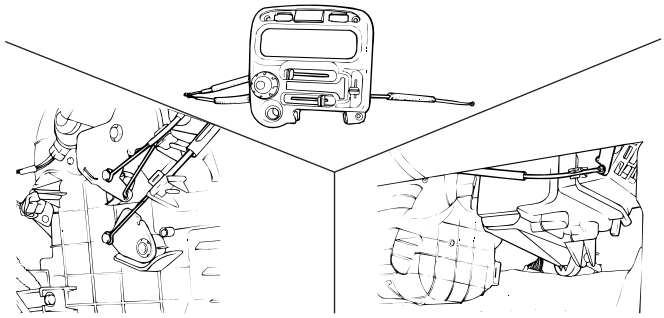
REMOVAL AND INSTALLATION ETTC0250

1. Disconnect the negative(-) battery terminal.
2. Remove the center facia blanking switch and ash tray.



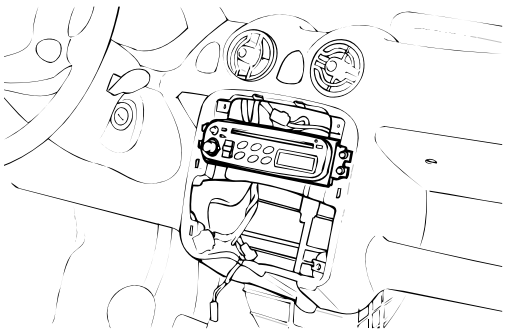
ETTC025A

3. Disconnect the heater control lever and loosen the screws (3EA).



ETTC025B

4. Disconnect the wire connectors.
5. Loosen the audio mounting screws and disconnect the power connector and antenna cable.



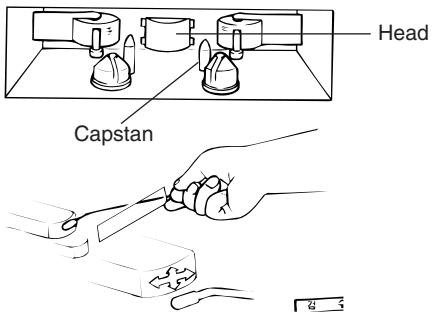
ETTC025C

6. Installation is the reverse of removal.

SERVICE INSTRUCTIONS ETHA0750

TAPE HEAD AND CAPSTAN CLEANING

1. To obtain optimum performance, clean the head, and capstan as often as necessary, depending on frequency of use and tape cleanness.
2. To clean the tape head and capstan, use a cotton swab dipped in ordinary rubbing alcohol. Wipe the head and capstan.



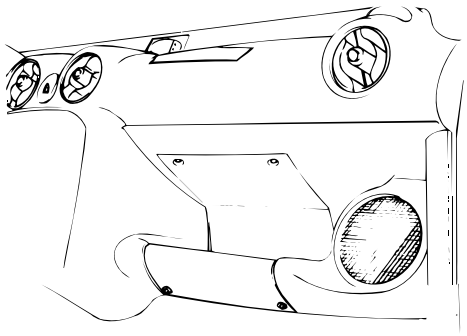
ETA9035A

SPEAKERS

REMOVAL AND INSTALLATION ETTC0300

FRONT SPEAKER

1. Remove the crash pad assembly (Refer to BD group).

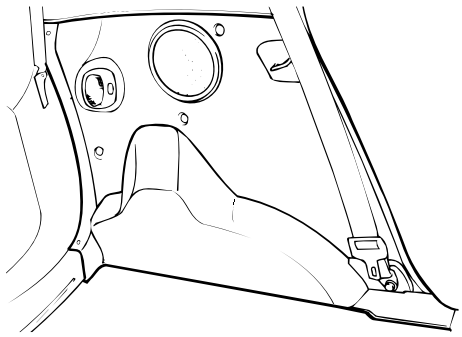


ETTC030A

2. Remove the front speaker.

QUARTER SPEAKER

1. Remove the quarter trim.



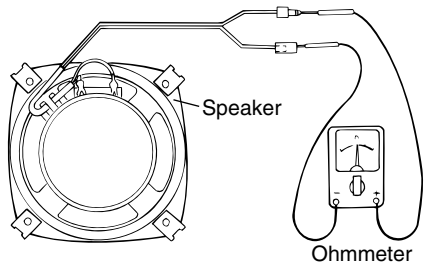
ETTC030B

2. Remove the quarter speaker.

SPEAKER CHECKING ETA90400

1. Check the speaker with an ohmmeter. If an ohmmeter indicates the correct impedance of the speaker when checking between the speaker (+) and speaker (-) of the same channel, the speaker is ok.

2. If a clicking sound is emitted from the speaker when the ohmmeter is connected to the speaker terminals, the speaker is ok.



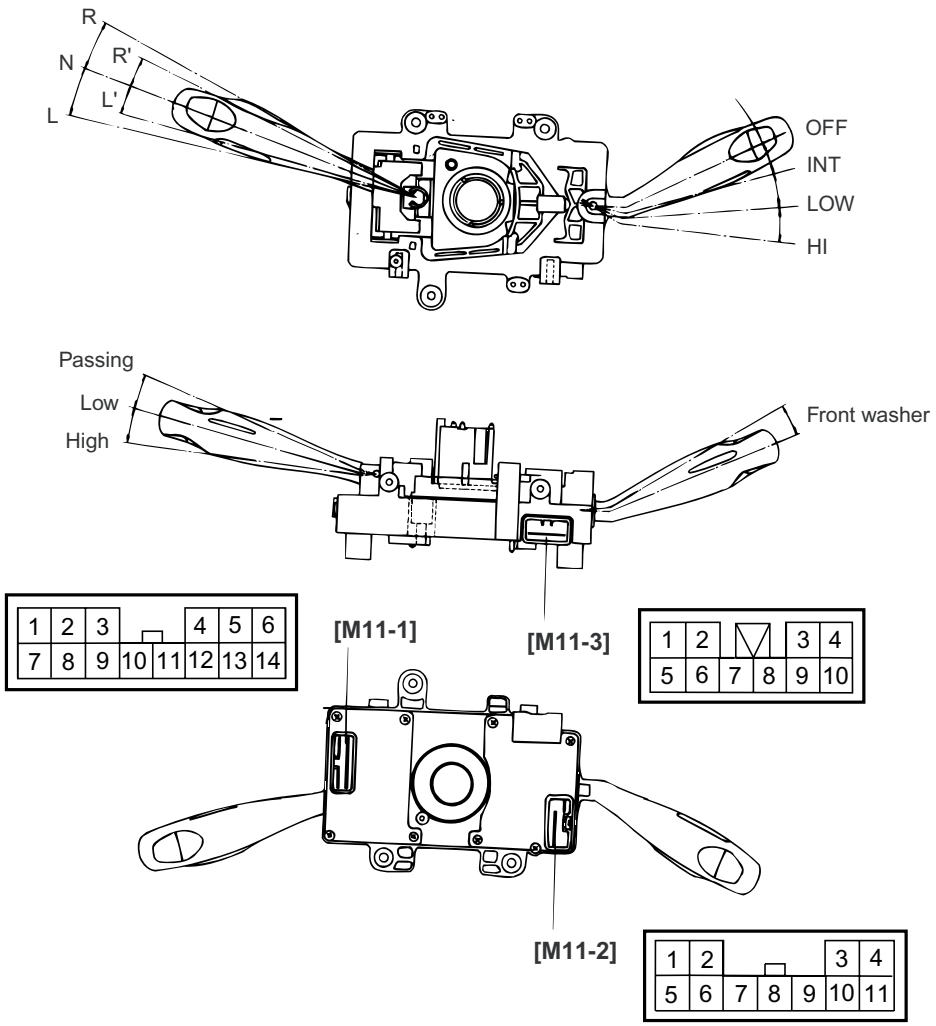
ETA9040A

MULTI FUNCTION SWITCH

MULTI FUNCTION SWITCH

COMPONENTS ETTC0450

[WITHOUT AIR BAG]

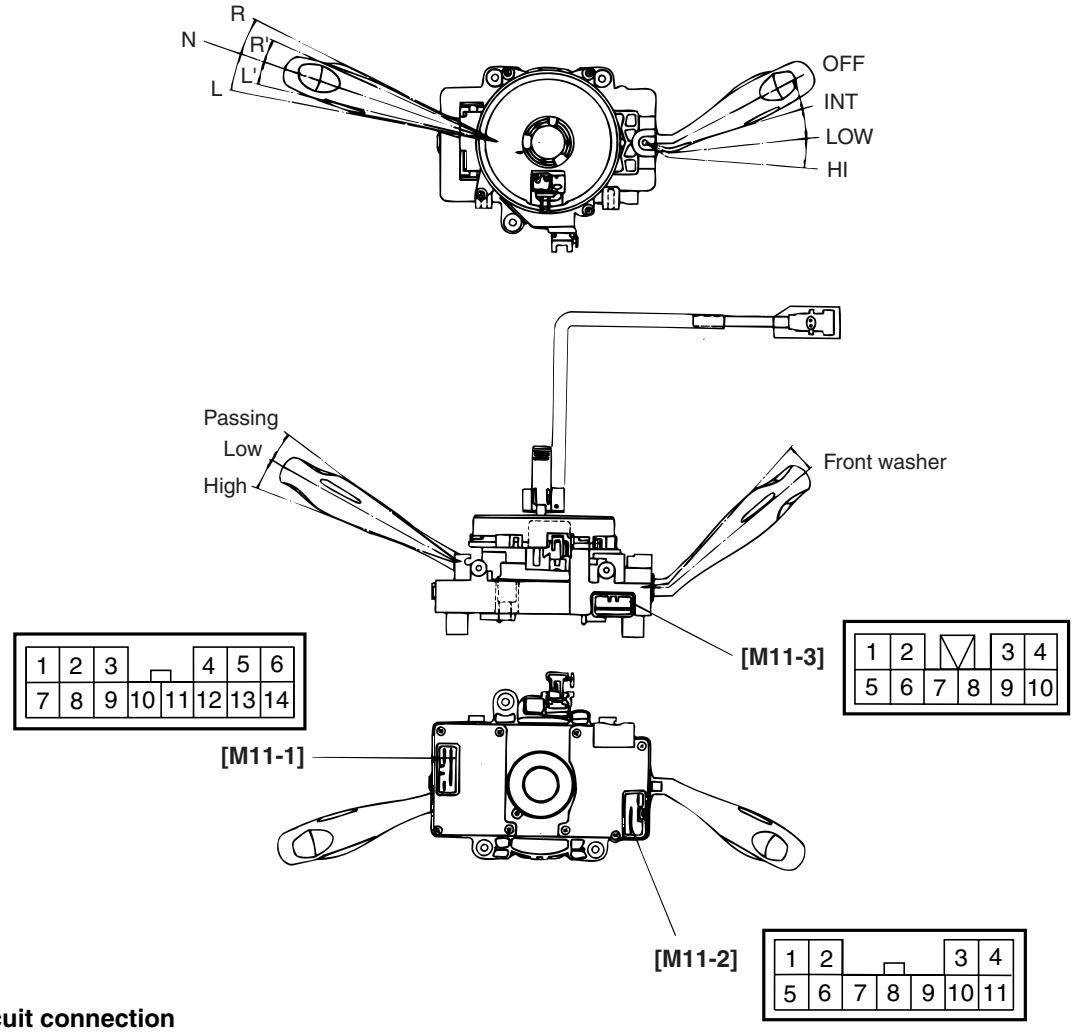


Circuit connection

Connector No.	Terminal No.	Description	Connector No.	Terminal No.	Description
M11-1	1	Right tail lamp switch I	M11-2	1	Rear wiper swtich
	2	Right tail lamp switch II		2	Rear washer switch
	3	Left head lamp low beam		7	Rear wiper and washer ground
	4	Left head lamp switch II		8	Rear wiper parking
	5	Left head lamp high beam		9	Right turn signal lamp
	6	Left head lamp switch I		10	Left turn signal lamp
	8	Horn		11	Flasher unit power
	9	Right head lamp switch I	M11-3	5	Wiper high speed
	10	Right head lamp high beam		6	Wiper low speed
	11	Right head lamp low beam		7	Front wiper parking
	12	Right head lamp switch II		8	Intermittent wiper
	13	Left tail lamp switch I		9	Wiper and washer ground
	14	Left tail lamp switch II		10	Washer switch

ETTC045A

[WITH AIR BAG]



Circuit connection

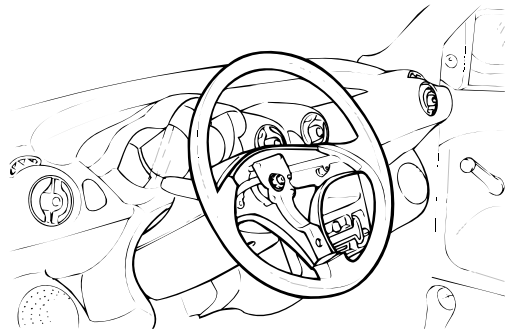
Connector No.	Terminal No.	Description	Connector No.	Terminal No.	Description
M11-1	1	Right tail lamp switch I	M11-2	1	Rear wiper swtich
	2	Right tail lamp switch II		2	Rear washer switch
	3	Left head lamp low beam		7	Rear wiper and washer ground
	4	Left head lamp switch II		8	Rear wiper parking
	5	Left head lamp high beam		9	Right turn signal lamp
	6	Left head lamp switch I		10	Left turn signal lamp
	8	Horn		11	Flasher unit power
	9	Right head lamp switch I	M11-3	5	Wiper high speed
	10	Right head lamp high beam		6	Wiper low speed
	11	Right head lamp low beam		7	Front wiper parking
	12	Right head lamp switch II		8	Intermittent wiper
	13	Left tail lamp switch I		9	Wiper and washer ground
	14	Left tail lamp switch II		10	Washer switch

ETTC045B

REMOVAL AND INSTALLATION ETCC0500

WITHOUT AIR BAG

1. Remove the horn pad mounting screws and remove the horn pad and steering wheel.

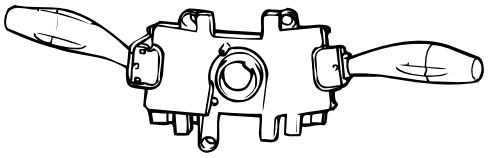


ETTC050A

2. Remove the steering column shrouds.

ETTC050B

3. Disconnect the multifunction switch connectors and loosen the multifunction switch mounting screws.



ETTC050C

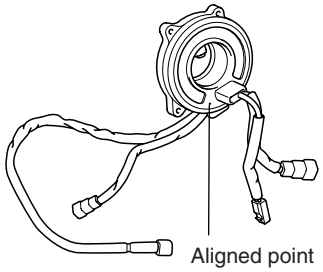
4. Installation is the reverse of removal.

WITH AIR BAG

Prior to removing of the multi function switch assembly in vehicles equipped with air bags, be careful to follow the following:

CAUTION

- ***Never attempt to disassemble or repair the air bag module or clock spring. If faulty, replace it.***
- ***Do not drop the air bag module or clock spring or allow contact with water, grease or oil. Replace if a dent, crack, deformation or rust is detected.***
- ***The air bag module should be stored on a flat surface and placed so that the pad surface is facing upward. Do not place anything on top of it.***
- ***Do not expose the air bag module to temperatures over 93°C(200°F).***
- ***After deployment of an air bag, replace the clock spring with a new one.***
- ***Wear gloves and safety glasses when handing an air bag that has been deployed.***
- ***An undeployed air bag module should only be disposed of in accordance with the procedures mentioned in the restraints section.***
- ***When you disconnect the air bag module-clock spring connector, take care not to apply excessive force.***
- ***The removed air bag module should be stored in a clean, dry place.***
- ***Prior to installing the clock spring, align the mating mark and "NEUTRAL" position indicator of the clock spring, and after turning the front wheels to the straight-ahead position, install the clock spring to the column switch. If the mating mark of the clock spring is not properly aligned, the steering wheel may not completely rotate during a turn, or the flat cable within the clock spring may be broken obstructing normal operation of the SRS and possibly leading to serious injury to the vehicle's driver. To inspect the clock spring, refer to the restraints section.***



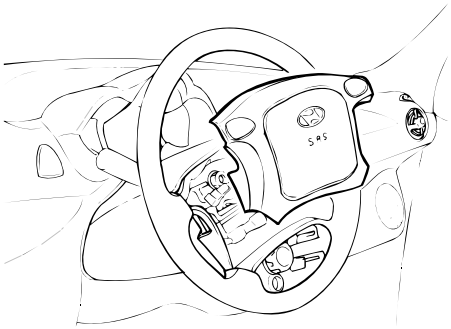
ETTC050D

1. Disconnect the negative (-) battery terminal.

NOTE

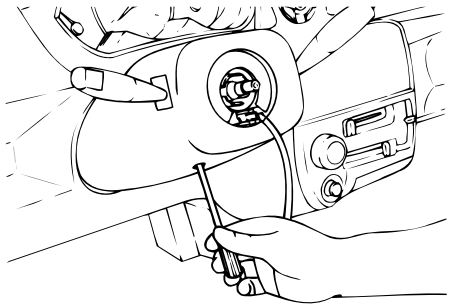
Prior to doing any further work after disconnection of the battery cable, wait at least 30 seconds.

2. Remove the air bag module mounting bolts and disconnect the air bag module connectors.



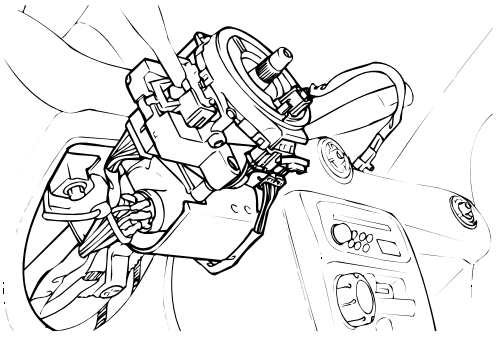
ETTC050E

3. Remove the steering wheel and steering column shrouds



ETTC050F

4. Disconnect the clock spring connectors and multifunction switch connectors and remove the multifunction switch.



ETTC050G

5. Installation is the reverse of removal.

INSPECTION ETTC0550

With the multifunction switch in each position, make sure that continuity exists between terminals below. If continuity is not as specified, replace the multifunction switch.

DIMMER AND PASSING SWITCH [M11-1]

Position \ Terminal	6	5	9	10	3	4	11	12
PASSING	○	○	○	○				
LOW					○	○	○	○
HIGH		○		○		○		○

ETTC055A

LIGHTING SWITCH [M11-1]

Position \ Terminal	6	4	9	12	1	2	13	14
OFF								
I					○	○	○	○
II	○	○	○	○	○	○	○	○

ETTC055B

TURN SIGNAL SWITCH [M11-2]

Hazard switch \ Turn signal switch \ Terminal	11	10	9
OFF — LEFT	○	○	
OFF — NEUTRAL			
OFF — RIGHT	○		○

ETTC055C

REAR WIPER AND WASHER SWITCH [M11-2]

Position \ Terminal	1	2	7	8
Rear washer		○	○	
Rear wiper	○		○	
OFF	○			○

ETTC055D

FRONT WIPER SWITCH [M11-3]

Terminal / Position	6	5	7	8	9
OFF	○		○		
INT	○		○	○	○
LOW	○				○
HI		○			○

ETTC055E

FRONT WASHER SWITCH [M11-3]

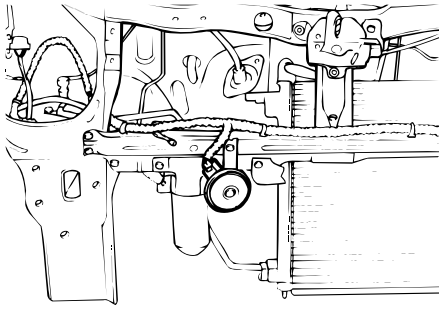
Terminal / Position	9	10
OFF		
ON	○	○

ETTC055F

HORNS

REMOVAL AND INSTALLATION ETCC0600

1. Remove the bolt holding the horn and remove the horn assembly.



ETTC060A

2. Installation is the reverse of removal.

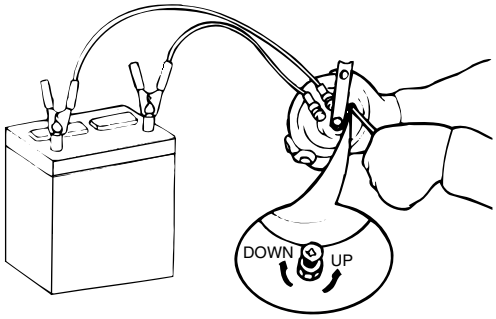
INSPECTION ETHA1200

1. Test the horn by connecting battery voltage to the 1 terminal and ground the 2 terminal.
2. The horn should make a sound. If the horn fails to make a sound, replace it.

ADJUSTMENT

Operate the horn, and adjust the tone to a suitable level by turning the adjusting screw.

> ***NOTE***
>
> *After adjustment, apply a small amount of paint around the screw head to keep it from loosening.*



ETDA050A

KEYLESS ENTRY SYSTEM

The keyless entry system is able to lock and unlock all the doors at a distance, transmitting a weak radio wave from a transmitter.

DESCRIPTION ETTC0650

The keyless entry system consists of transmitter, receiver and some other parts.

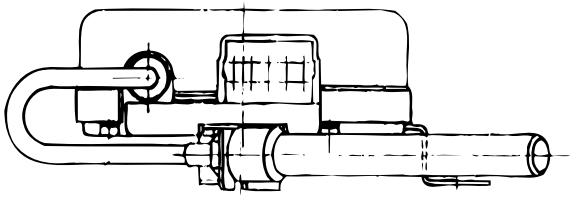
1. RECEIVER

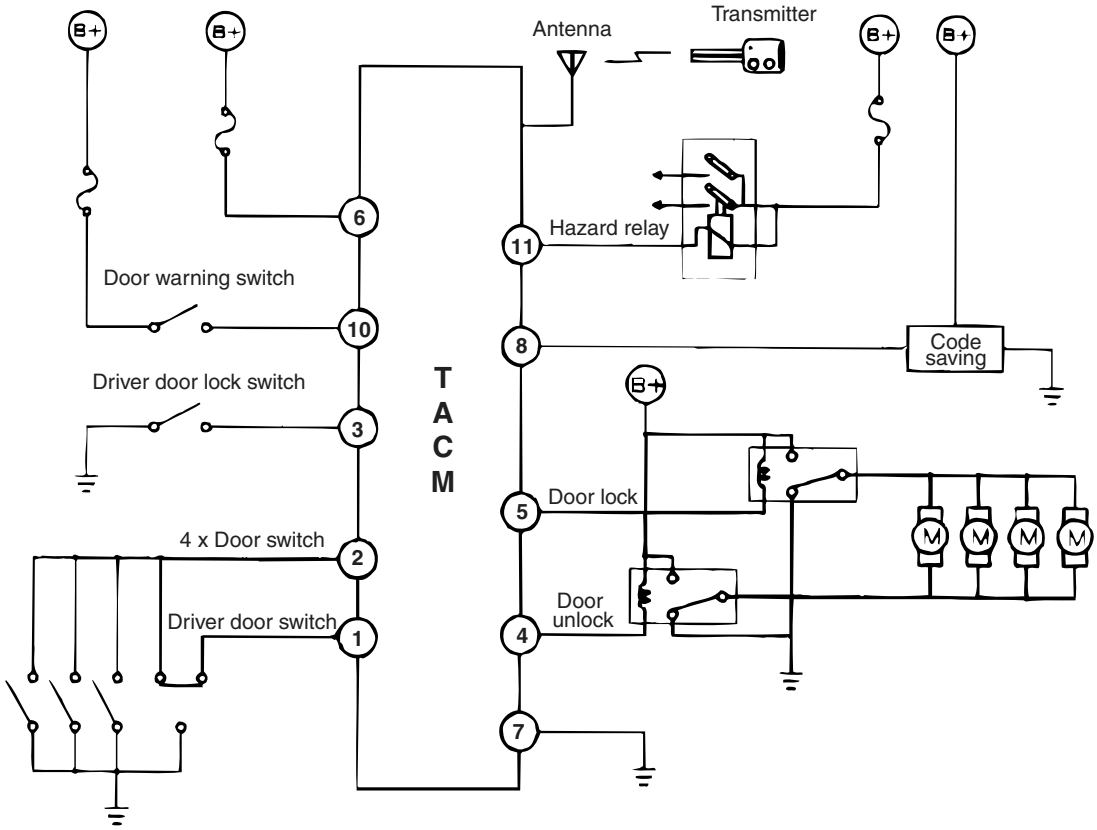
Items	Terminal	Specifications
Transmitter communication	Antenna jack	Modulation : AM Frequency : 314.85 ~ 315.15 MHz Sensitivity : Min. -100dBm Operating range : 5m from body
General input	Door warning switch Driver door lock switch	High level : DC 7V or more Low level : DC 0.5V or less
	Driver door switch Assist door switch	Close : DC 4.5V or more Open : DC 0.5V or less
General output	Hazard relay Door lock relay Door unlock relay	DC 12V, Max.200mA inductive load Voltage drop Before test : Max. 1.2V After test : Max. 2.0V
Code saver communication	Code saver	High level : DC 3.0V or more Low level : DC 2.0V or less

2. TRANSMITTER

Items	Specifications
Modulation	AM
Frequency	315MHz
Code	Rolling code (hopping algorithm)
Spurious radiation	-36dBm
Power source	Lithium DC. 3V battery 1EA (CR1616)
Life of battery	3 years (at 10 times per day)

CIRCUIT DIAGRAM ETTC0700





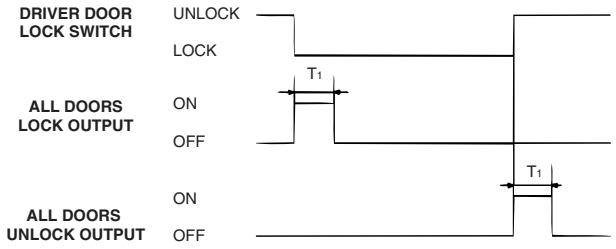
[M53]

1	2	3			4	5	6
7	8	9	10	11	12	13	14

ETTC070A

GENERAL FUNCTION ETTC0750

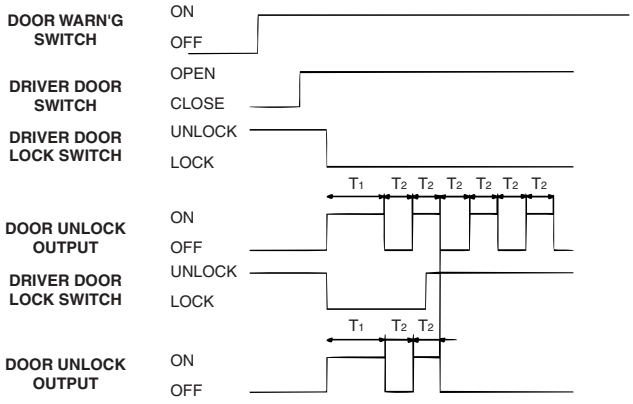
1. **Central door lock/unlock**



ETTC075A

Time specification
T1 : 0.5 ± 0.1 sec.

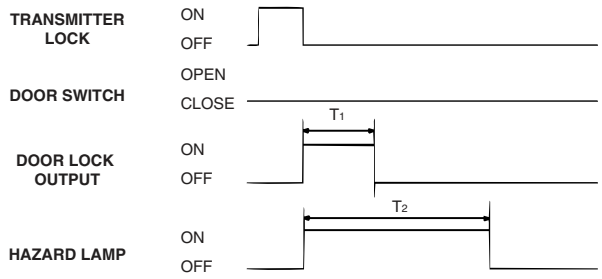
2. **Ignition key reminder**



ETTC075B

Time specification
T1 : 1 ± 0.1 sec.
T2 : 500 ± 50 msec.

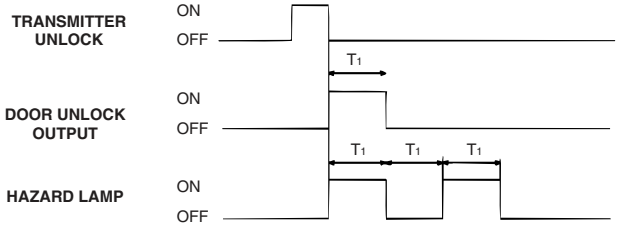
3. **Keyless entry function**
   a. Door lock



ETTC075C

Time specification
T1 : 0.5 ± 0.1 sec.
T2 : 1 ± 0.2 sec.

   b. Door unlock



ETTC075D

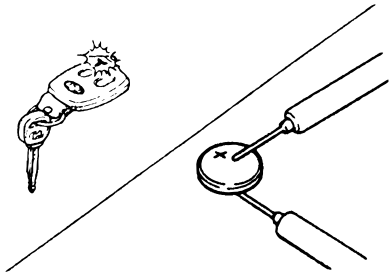
Time specification
T1 : 0.5 ± 0.1 sec.

TRANSMITTER

INSPECTION ETTC0800

1. Check that the red light flickers when the door lock button or unlock button is pressed on the transmitter.
2. Remove the battery and check voltage if the red light doesn't flicker.

Standard voltage : DC. 3V

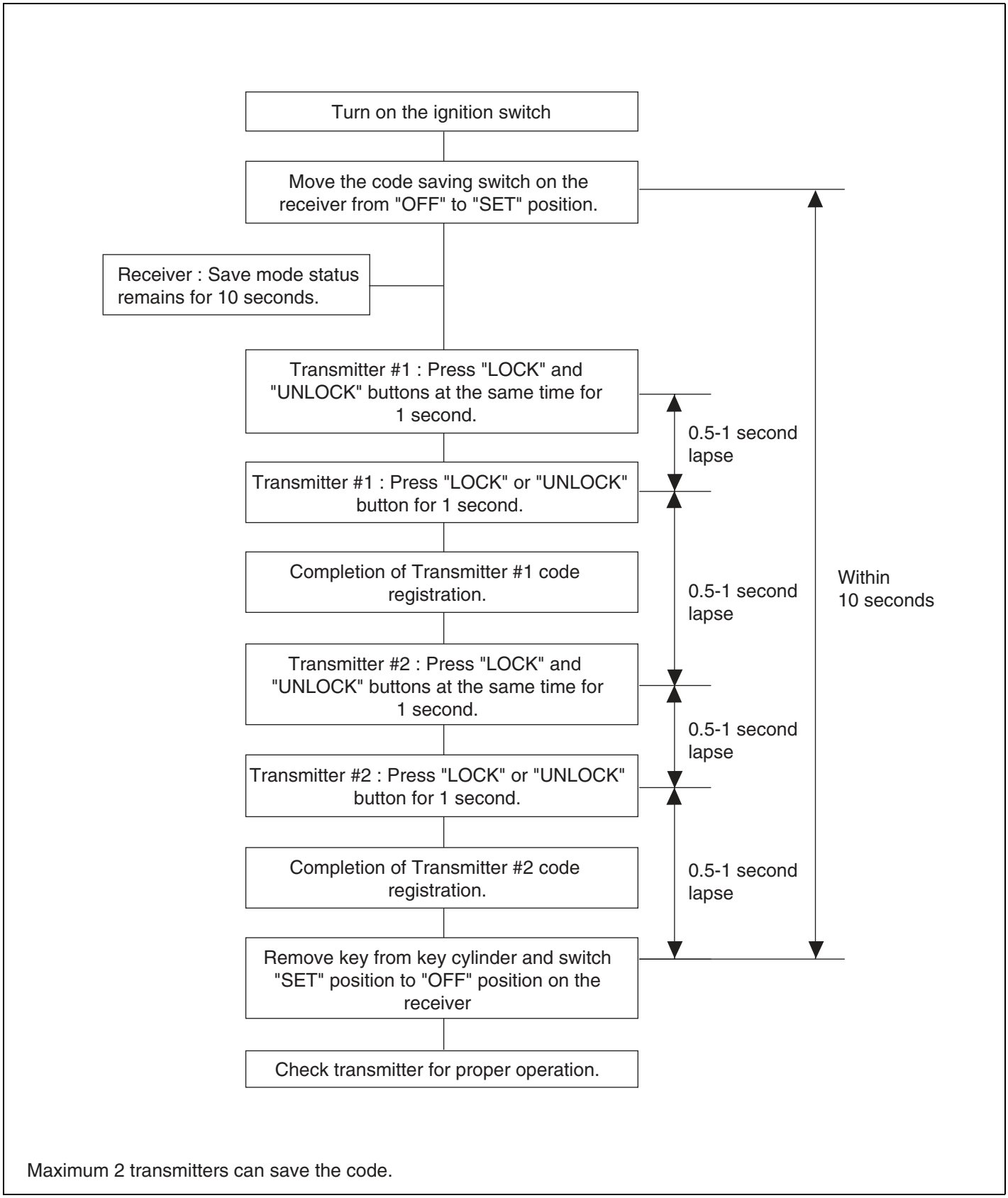


KTAB195A

3. Replace the battery if voltage is below 3V and replace the remote control switch if it is inoperable after replacing the battery.

Battery : Lithium CR1616

KEYLESS ENTRY TRANSMITTER CODE SAVING METHOD



Maximum 2 transmitters can save the code.

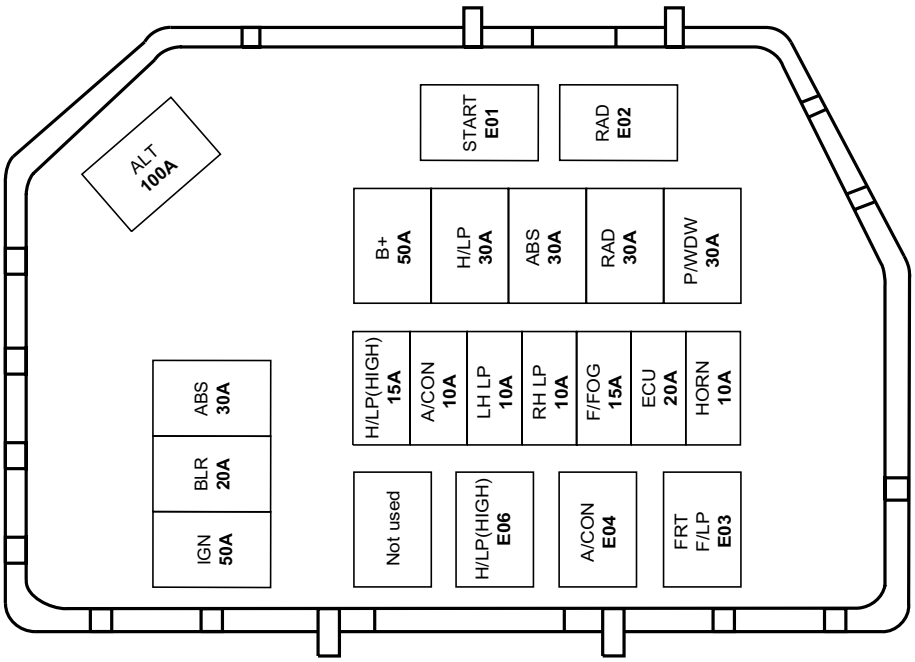
ETTC080A

FUSES AND RELAYS

RELAY BOX (ENGINE COMPARTMENT)

COMPONENTS ETTD0850

[INDIA AREA]

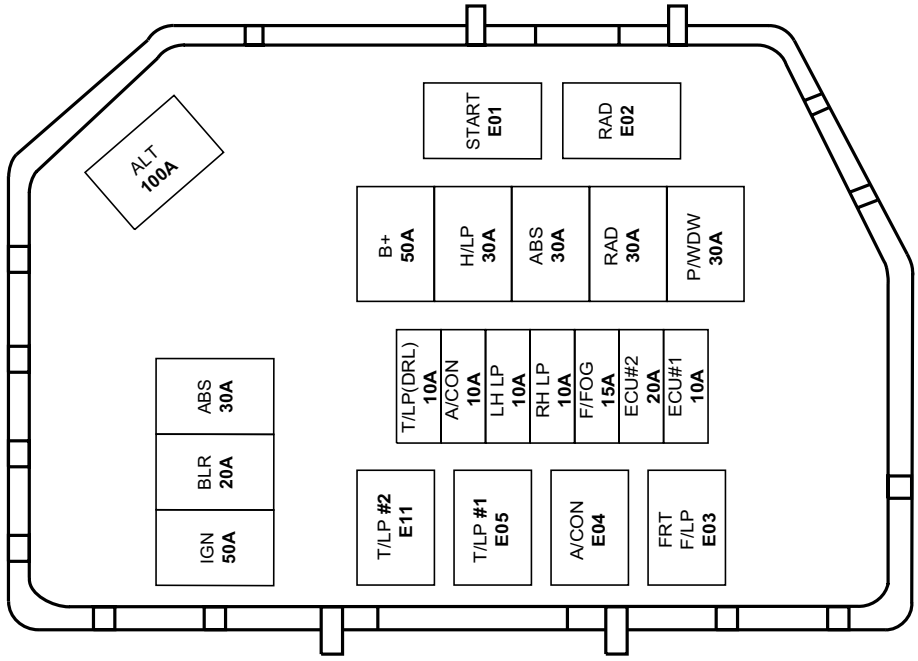


CIRCUIT

Description	Amperages	Circuit propected	Remark
Fusible link			
ALT	100A	Generator	
ABS	30A	ABS control	
BLR	20A	Blower control	
IGN	50A	Ignition power source	
B+	50A	Battery power source	
H/LP	30A	Lamps	
ABS	30A	ABS control	
RAD	30A	Radiator fan control	
P/WDW	30A	power window control	
Fuse			
H/LP(HIGH)	15A	Head lamps	
A/CON	10A	A/CON controls	
LH LP	10A	Left tail lamps	
RH LP	10A	Right tail lamps	
F/FOG	15A	Front fog lamps	
ECM	20A	Engine control relay	
HORN	10A	Horns	

ETTD085A

[GENERAL EXPORT]



CIRCUIT

Description	Amperages	Circuit propected	Remark
Fusible link			
ALT	100A	Generator	
ABS	30A	ABS control	
BLR	20A	Blower control	
IGN	50A	Ignition power source	
B+	50A	Battery power source	
H/LP	30A	Lamps	
ABS	30A	ABS control	
RAD	30A	Radiator fan control	
P/WDW	30A	Power window control	
Fuse			
T/LP(DRL)	10A	Tail lamp (DRL)	
A/CON	10A	A/CON controls	
LH LP	10A	Left tail lamps	
RH LP	10A	Right tail lamps	
F/FOG	15A	Front fog lamps	
ECM #2	20A	Engine control relay	
ECU #1	10A	ECM	

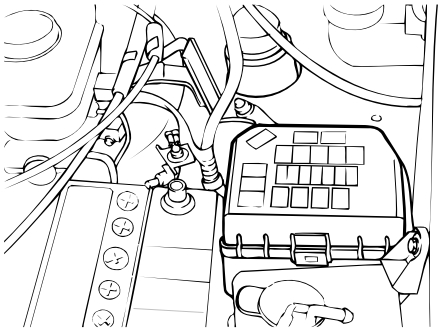
ETTD085B

INSPECTION ETTC0860

1. Check for a burnt fusible link with an ohmmeter.
2. If a fusible link burns out, there is a short or some other problem in the circuit. Carefully determine the cause and correct it before replacing the fusible link.

CAUTION

The fusible link will burn out within 15 seconds if a higher than specified current flows through the circuit.

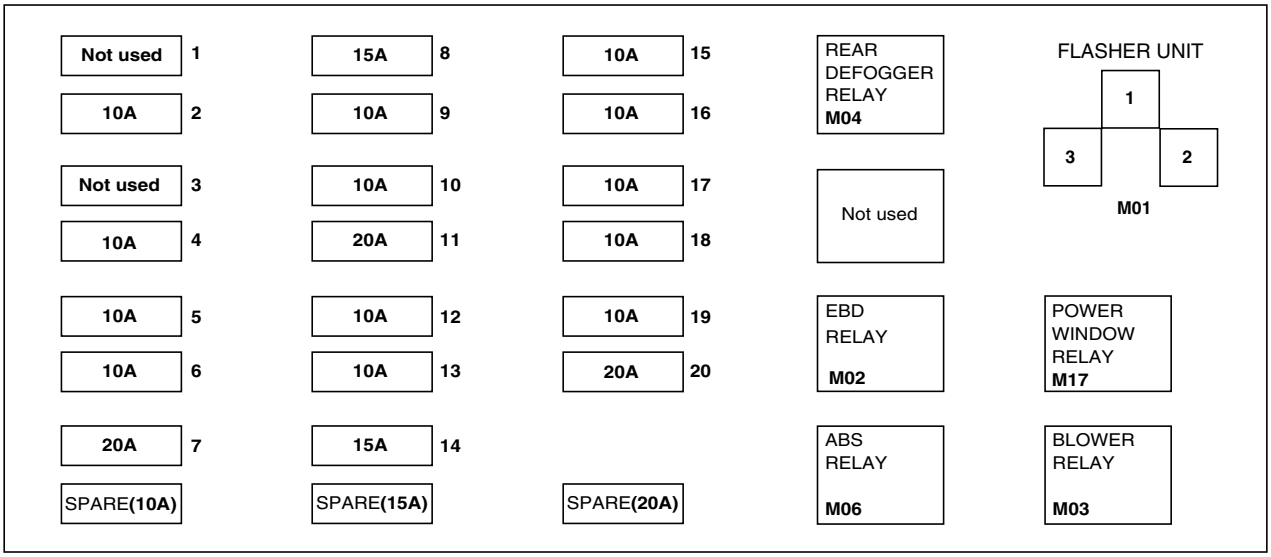


ETTC086A

RELAY BOX (PASSENGER COMPARTMENT)

COMPONENTS ETTD0900

[INDIA AREA]

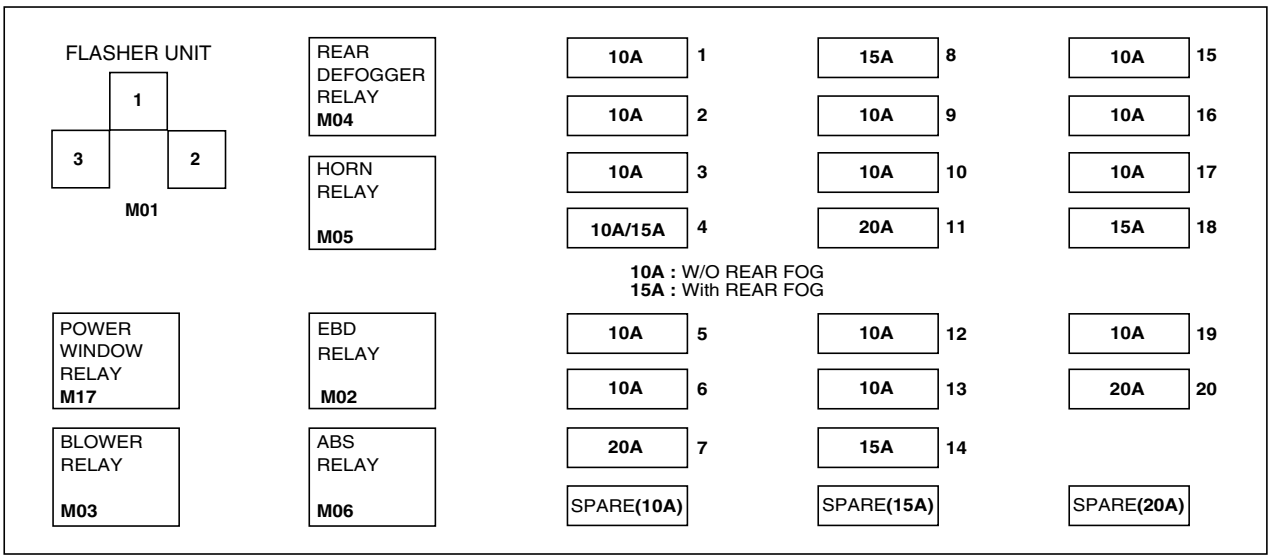


CIRCUIT

Fuse	Amperages	Circuit
1	-	Not used
2	10A	Power window
3	-	Not used
4	10A	Left head lamp
5	10A	Right head lamp
6	10A	Blower, rear window defogger
7	20A	Wiper, washer
8	15A	Power door lock
9	10A	Hazard lamp, data link connector
10	10A	Stop lamp
11	20A	Rear window defogger
12	10A	Audio, room lamp
13	10A	Audio
14	15A	Cigarette lighter
15	10A	Back-up lamp, generator, TCM, turn signal lamp, vehicle speed sensor, Multipurpose check connector
16	10A	Instrument cluster, ABS relay, EBD relay
17	-	Not used
18	10A	ECM
19	10A	A/C & blower control
20	20A	Ignition coil, ECM

ETTD090A

[GENERAL EXPORT]

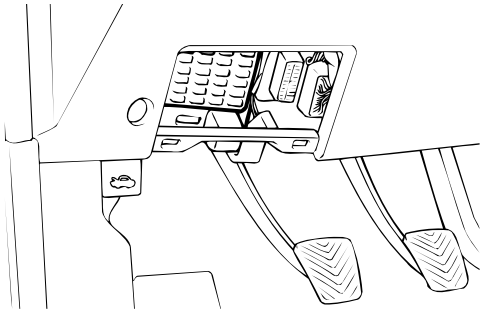


CIRCUIT

Fuse	Amperages	Circuit
1	10A	Horn
2	10A	Power window
3	10A	ABS
4	10A/15A	Left head lamp, rear fog lamp, DRL control
5	10A	Right head lamp, DRL control
6	10A	Blower, rear window defogger
7	20A	Wiper, washer
8	15A	Power door lock, door warning control
9	10A	Hazard lamp, data link connector
10	10A	Stop lamp, shift & key lock control
11	20A	Rear window defogger
12	10A	Digital clock, audio, room lamp, instrument cluster, rear fog lamp, luggage room lamp
13	10A	Digital clock, audio, A/T interlock control
14	15A	Seat warmer, cigarette lighter
15	10A	Back-up lamp, generator, TCM, vehicle speed sensor, Turn signal lamp, ATM shift lever, Multipurpose check connector
16	10A	ABS, instrument cluster, seat belt timer, EBD, A/T interlock control
17	10A	Instrument cluster (Air bag IND.)
18	15A	Air bag
19	10A	A/C & blower control
20	20A	ECM, Ignition coil

INSPECTION ETNC1150

1. Check for a burnt relay with an ohmmeter.
2. If a relay burns out, there is a short or some other problem in the circuit. Carefully determine the cause and correct it before replacing the relay.



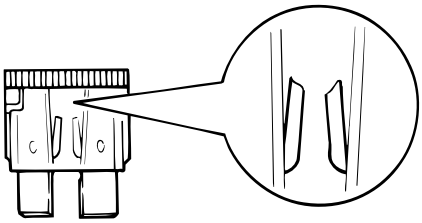
ETJA075E

INSPECTION OF FUSES

When a fuse is blown, there are two probable causes. The two causes can easily be determined by a visual check after removing the fuses.

1. **Fuse blown due to over-current.**
   Prior to replacing the fuse with a new one, check the circuit for a short and the related parts for abnormal conditions. Only after the correction of a short or replacement of abnormal parts, should a fuse with the same ampere rating be installed.

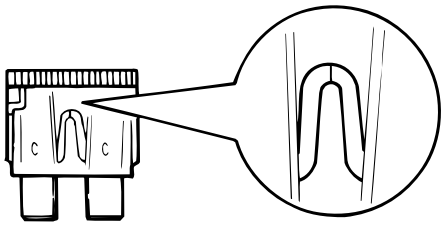
Blown fuse due to overcurrent



ETDA086A

2. **Fuse blown due to repeated on-off current.**
   Normally, this type of problem occurs after a fairly long period of use, and is less frequent than #1 above. In this case, you may simply replace with a new fuse of the same capacity.

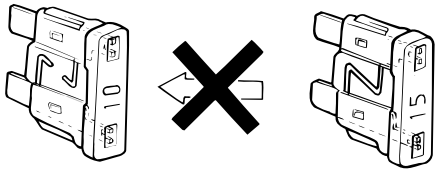
Blown fuse due to thermal fatigue



ETDA086B

CAUTION

A blade type fuse is identified by the numbered value in amperes. If the fuse is blown, be sure to replace a fuse with the same ampere rating. If a fuse of higher capacity than specified is used, parts may be damaged and a danger of fire exists. To remove or insert a fuse, use the fuse puller in the fuse box.



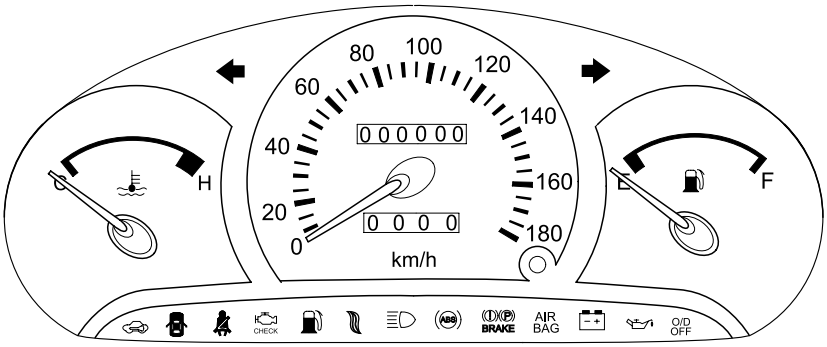
10A 15 A

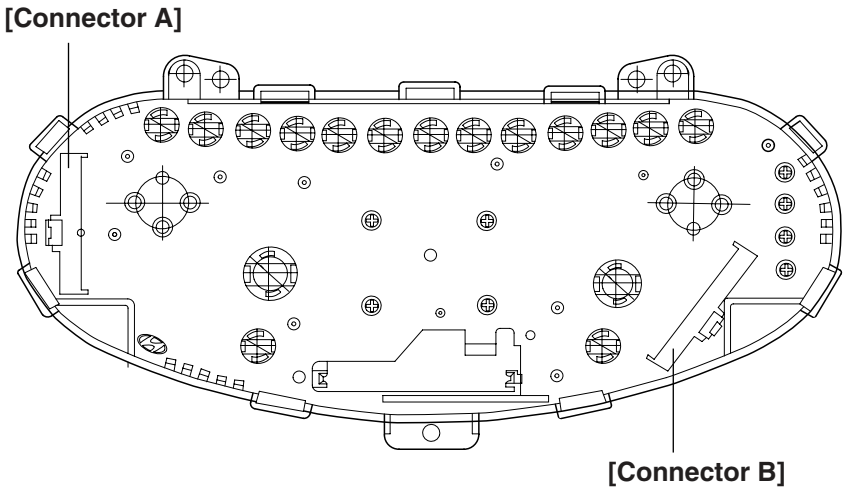
ETDA086C

INDICATORS AND GAUGES

INSTRUMENT CLUSTER

COMPONENTS ETTC0950





[Connector A]

1	2	3	4	5	6	7	8	9	10	11	12	13	14

[Connector B]

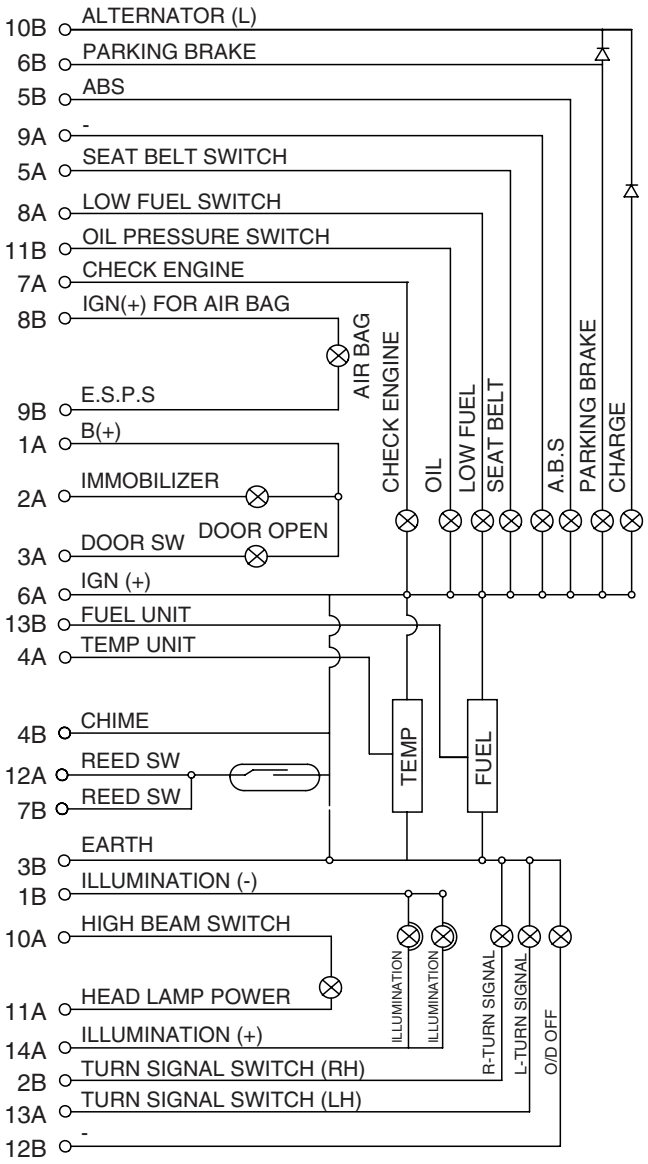
1	2	3	4	5	6	7	8	9	10	11	12	13	14

ETTC095A

CIRCUIT DIAGRAM ETTC1000

[WITH M/T]

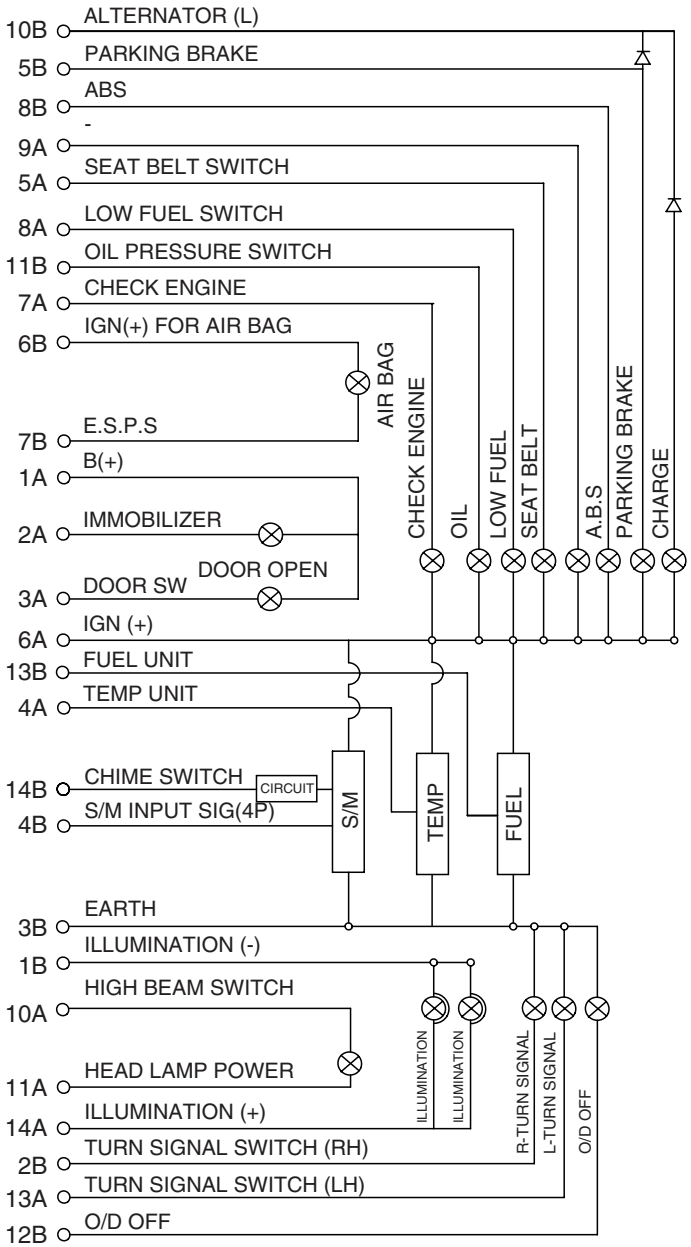
Connector No.	Terminal No.	Description
Connector A	1	Battery (B+)
	2	Immobilizer
	3	Door switch
	4	Temperature sender
	5	Seat belt switch
	6	IGN (+)
	7	Check engine
	8	Low fuel switch
	9	-
	10	High beam switch
	11	Head lamp power
	12	Reed switch
	13	Turn signal switch (LH)
	14	Illumination (+)
Connector B	1	Illumination (-)
	2	Turn signal switch (RH)
	3	Ground
	4	Chime bell
	5	ABS
	6	Parking brake
	7	Reed switch
	8	Air bag (+)
	9	Air bag unit (ESPS)
	10	Alternator (L)
	11	Oil pressure switch
	12	-
	13	Fuel sender
	14	-



ETTC100A

[WITH A/T]

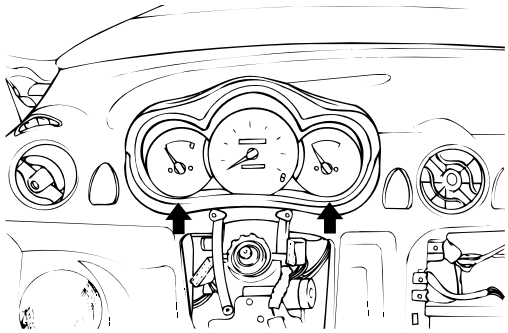
Connector No.	Terminal No.	Description
Connector A	1	Battery (B+)
	2	Immobilizer
	3	Door switch
	4	Temperature sender
	5	Seat belt switch
	6	IGN (+)
	7	Check engine
	8	Low fuel switch
	9	-
	10	High beam switch
	11	Head lamp power
	12	-
	13	Turn signal switch (LH)
	14	Illumination (+)
Connector B	1	Illumination (-)
	2	Turn signal switch (RH)
	3	Ground
	4	Speed input signal
	5	Parking brake
	6	Air bag (+)
	7	Air bag unit (ESPS)
	8	Air bag (+)
	9	-
	10	Alternator (L)
	11	Oil pressure switch
	12	O/D OFF
	13	Fuel sender
	14	Chime bell



ETTC100B

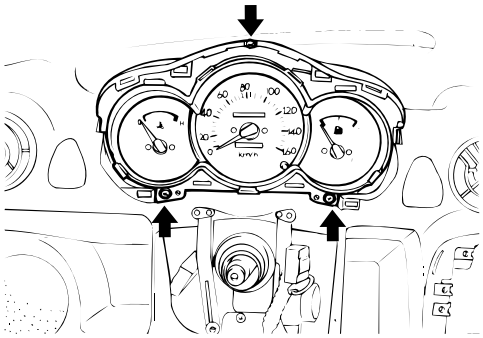
REMOVAL AND INSTALLATION ETTC1050

1. Disconnect the negative (-) battery terminal.
2. Remove the cluster facia panel with a flat-tip screwdriver.



ETTC105A

3. Remove the instrument cluster mounting screws.



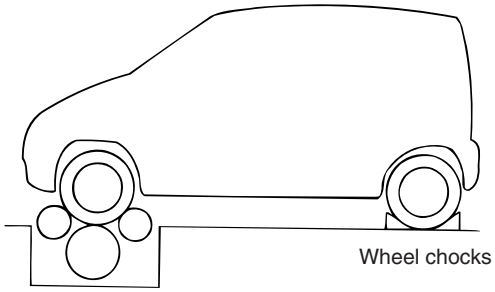
ETTC105B

4. Installation is the reverse of removal.

INSPECTION OF COMPONENTS ETTC1100

SPEEDOMETER

1. Adjust the pressure of the tires to the specified level.
2. Drive the vehicle onto a speedometer tester. Use wheel chocks as appropriate.



ETTC110A

3. Check if the speedometer indicator range is within the standard values.

CAUTION

Do not operate the clutch suddenly or increase/ decrease speed rapidly while testing.

NOTE

Tire wear and tire over or under inflation will increase the indication error.

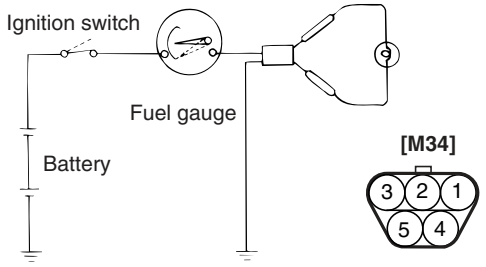
Velocity (Km/h)	20	40	60	80	100
Tolerance (Km/h)	20-23	41-45	62-66	83-88	104-110
Tolerance (Km/h)	20-24.4	40-44.4	61-65	81-86	101-107
Velocity (Km/h)	120	140	160	180	Remark
Tolerance (Km/h)	127-132	147.5-153.5	168-175	188.5-196.5	M/T
Tolerance (Km/h)	123-128.3	143-149	163-170	183-191	A/T

Velocity (MPH)	10	20	40	60
Tolerance (MPH)	10-12.5	20-22.5	40-42.5	60-63.5
Velocity (MPH)	80	100	120	
Tolerance (MPH)	80-84.5	102-105.5	122-126.5	

FUEL GAUGE

OPERATION CHECK

1. Disconnect the fuel sender connector from the fuel sender.
2. Connect a 3.4 watt, 12V test bulb to terminals 1 and 3 on the wire harness side connector.
3. Turn the ignition switch to the ON, and then check that the bulb lights up and the fuel gauge needle moves to full.

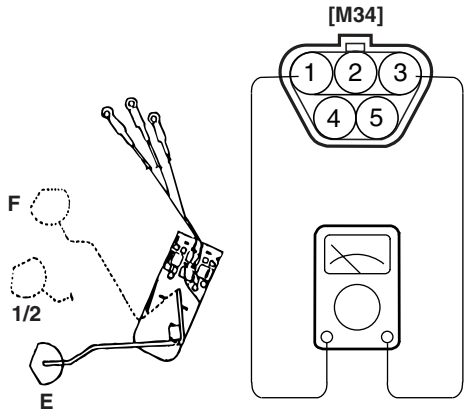


ETTC110B

FUEL SENDER

1. Using an ohmmeter, measure the resistance between terminals 1 and 3 at each float level.

Float position	F	1/2	E
Resistance (Ω)	4.0	32.5	110



1. Fuel gauge
2. Thermister
3. Ground

ETTC110C

2. Also check that the resistance changes smoothly when the float is moved from “E” to “F”.

LOW FUEL LEVEL SENSOR

1. Connect a test lamp (12V, 3.4W) and the battery to the sender. Immerse the sender in water.

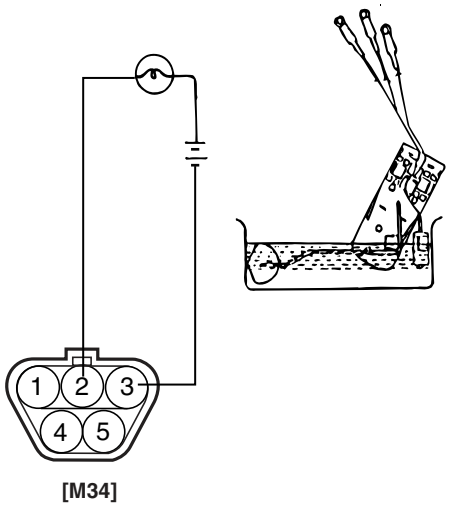
2. The lamp should be off while the thermister is submerged in the water, and should illuminate when the sender is taken out of the water.

NOTE

If there is a malfunction, replace the fuel sender as an assembly.

CAUTION

After completing this test, wipe the sender dry and reinstall it in the fuel tank.



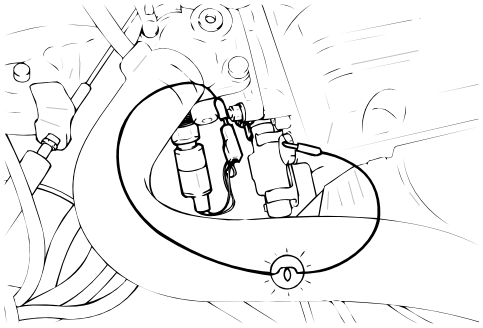
ETTC110D

ENGINE COOLANT TEMPERATURE GAUGE

1. Disconnect the wiring connector from the engine coolant temperature sender in the engine compartment.

2. Turn the ignition switch ON. Check that the gauge needle indicates cool. Turn the ignition switch OFF.

3. Connect a 12V, 3.4 watt test bulb to terminals 1 and 2 on the wire harness side connector.



ETLA605D

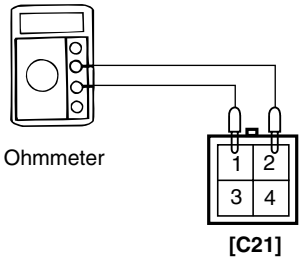
4. Turn the ignition switch ON.

5. Verify that the test bulb flashes and that the indicator moves to HOT.

If operation is not as specified, replace the sender. Then recheck the system.

ENGINE COOLANT TEMPERATURE SENDER

1. Using an ohmmeter, measure the resistance between the terminal 1 and 2.



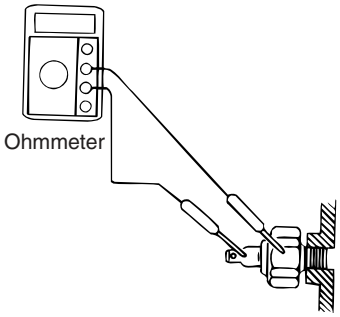
ETTC110E

2. If the resistance value is not as shown in the table, replace the temperature sender.

Temperature (°C)	60	85	110	125
Resistance (Ω)	122	47.4	24.3	15.9

OIL PRESSURE SWITCH

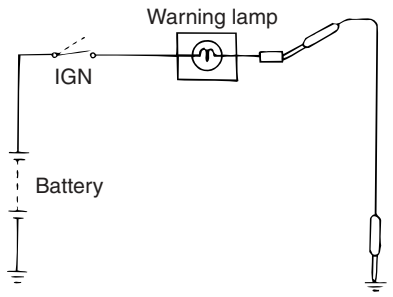
1. Check that there is continuity between the switch's terminal and ground with the engine stopped.
2. Check that there is no continuity between the terminal and ground with the engine running.
3. If operation is not as specified, replace the switch.



ETMB140C

OIL PRESSURE WARNING LAMP

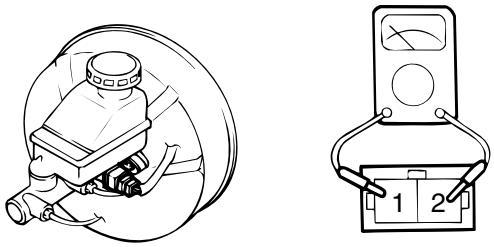
1. Disconnect the connector from the warning switch and ground the terminal on the wire harness side connector.
2. Turn the ignition switch ON. Check that the warning lamp lights up. If the warning lamp doesn't light, test the bulb or inspect wire harness.



ETMB140D

BRAKE FLUID LEVEL WARNING SWITCH

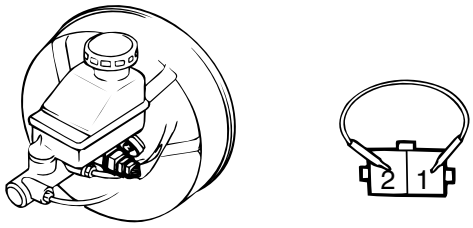
1. Remove the connector from the switch located at the brake fluid reservoir.
2. Verify that continuity exists between switch terminals 1 and 2 while pressing down the switch (float) with a rod.



V5BE060M

BRAKE FLUID LEVEL WARNING LAMP

1. Start the engine.
2. Release the parking brake.
3. Remove the connector from the brake fluid level warning switch.
4. Ground the connector at the harness side.
5. Verify that the warning lamp lights.



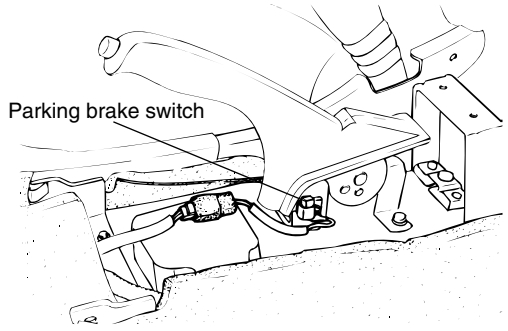
V5BE060N

PARKING BRAKE SWITCH

The parking brake switch is a push type located under the parking brake lever. To adjust, move the switch mount up and down with the parking brake lever released all the way.

1. Check that there is continuity between the terminal and switch body with the switch ON (Lever is pulled).
2. Check that there is no continuity between the terminal and switch body with the switch OFF (Lever is released).

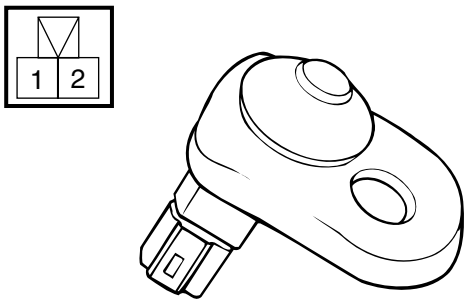
If continuity is not as specified, replace the switch or inspect its ground connection.



V5BE060O

DOOR SWITCH

Remove the door switch and check for continuity between the terminals.



V5BE060P

FRONT DOOR SWITCH

Terminal / Position	Ground (Body)	1	2
Free (Door open)	○	○	○
Push(Door close)			

ETTC110F

REAR DOOR SWITCH

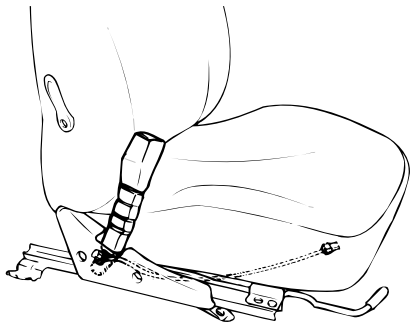
Terminal / Position	Ground (Body)	1
Free (Door open)	○	○
Push (Door close)		

ETTC110G

SEAT BELT SWITCH

1. Remove the connector from the switch.
2. Check for continuity between terminals.

Seat belt condition	Continuity
Fastened	Non-conductive ($\infty\Omega$)
Not fastened	Conductive(0Ω)



V5BE060Q

SEAT BELT WARNING LAMP

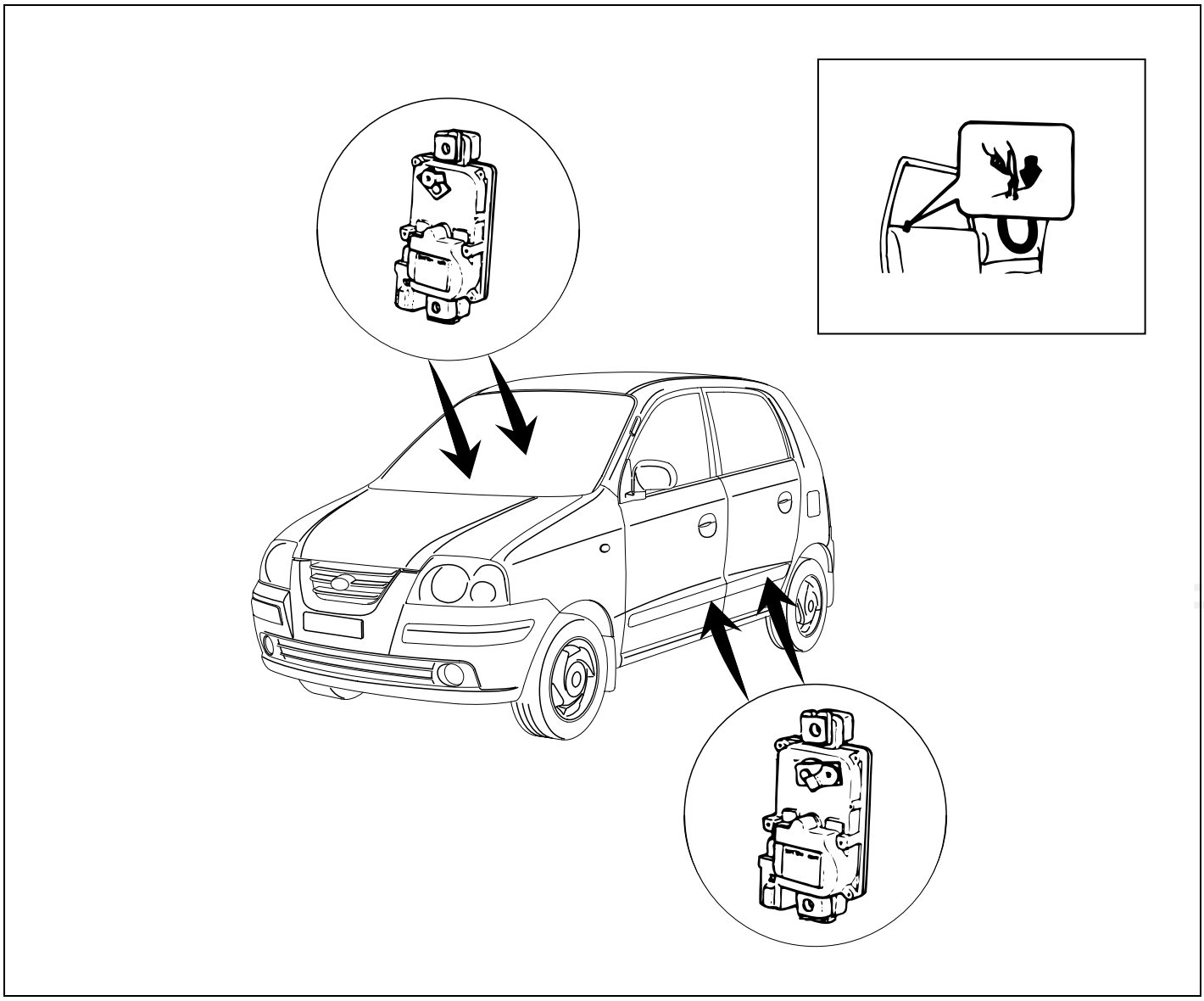
With the ignition switch turned ON, verify that the lamp glows.

Seat belt condition	Warning lamp
Fastened	OFF
Not fastened	ON

POWER DOOR LOCKS

POWER DOOR LOCK ACTUATORS

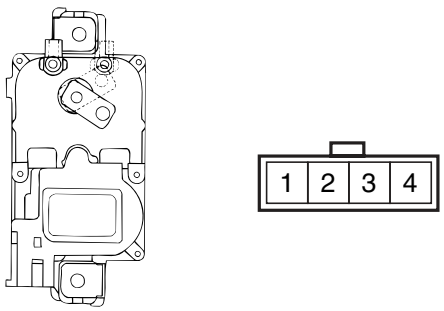
COMPONENTS ETTC1150



ETTC115A

INSPECTION ETTC1200

1. Disconnect the actuator connector from the wiring harness.



ETTC120A

2. Apply battery voltage (DC12V) to each terminal as shown in the table below and confirm that the actuator makes corresponding operation.

[D06, D07, D08, D10]

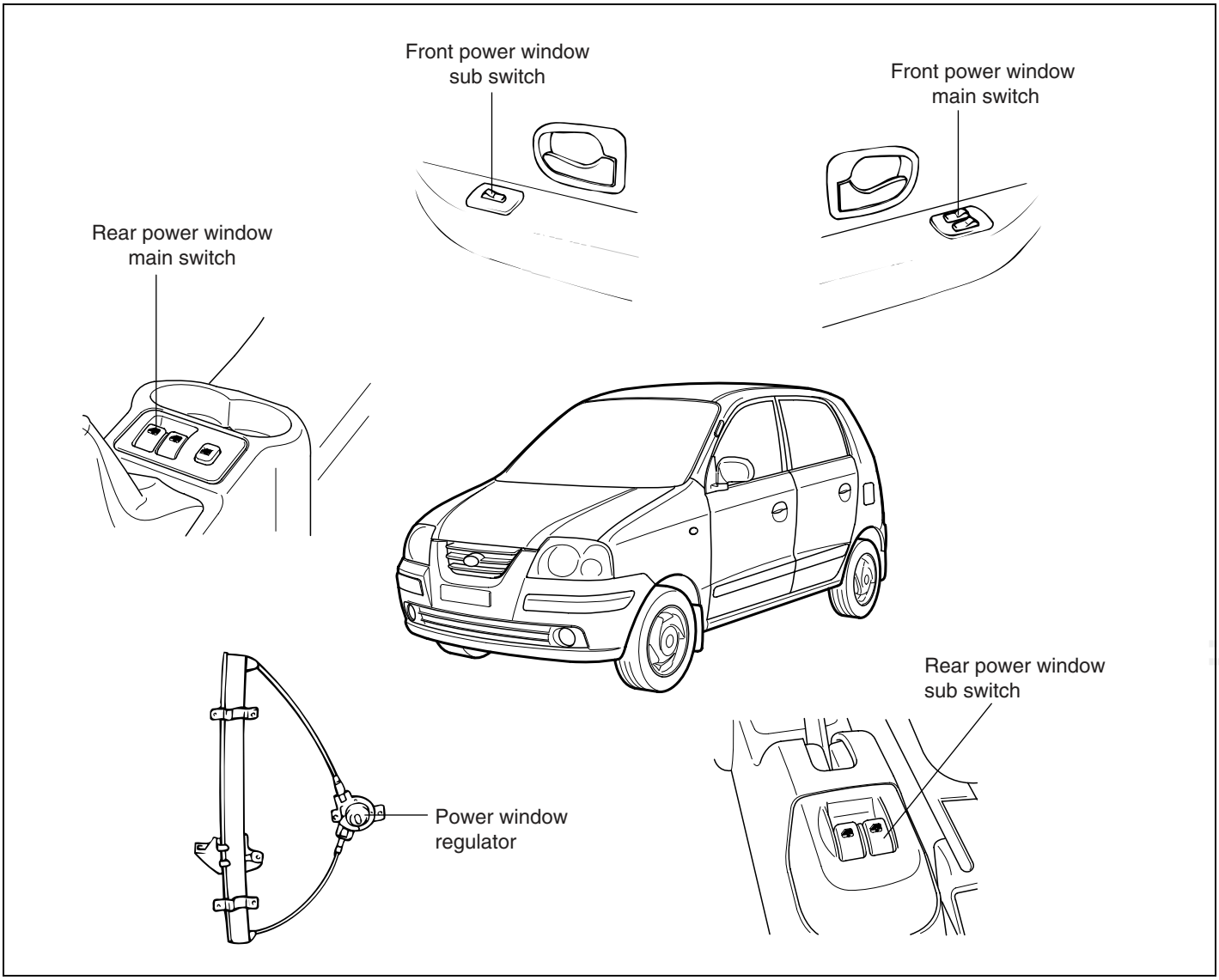
Terminal / Position	2	3
Unlock → Lock	⊕	⊖
Lock → Unlock	⊖	⊕

ETTC120B

POWER WINDOWS

POWER WINDOW MOTOR

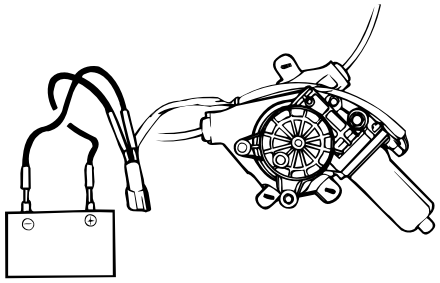
COMPONENTS ETTC1250



ETTE125A

INSPECTION ETJA1200

Connect the motor terminals directly to battery voltage (12V) and check that the motor operates smoothly. Next, reverse the polarity and check that the motor operates smoothly in the reverse direction. If the operation is abnormal, replace the motor.

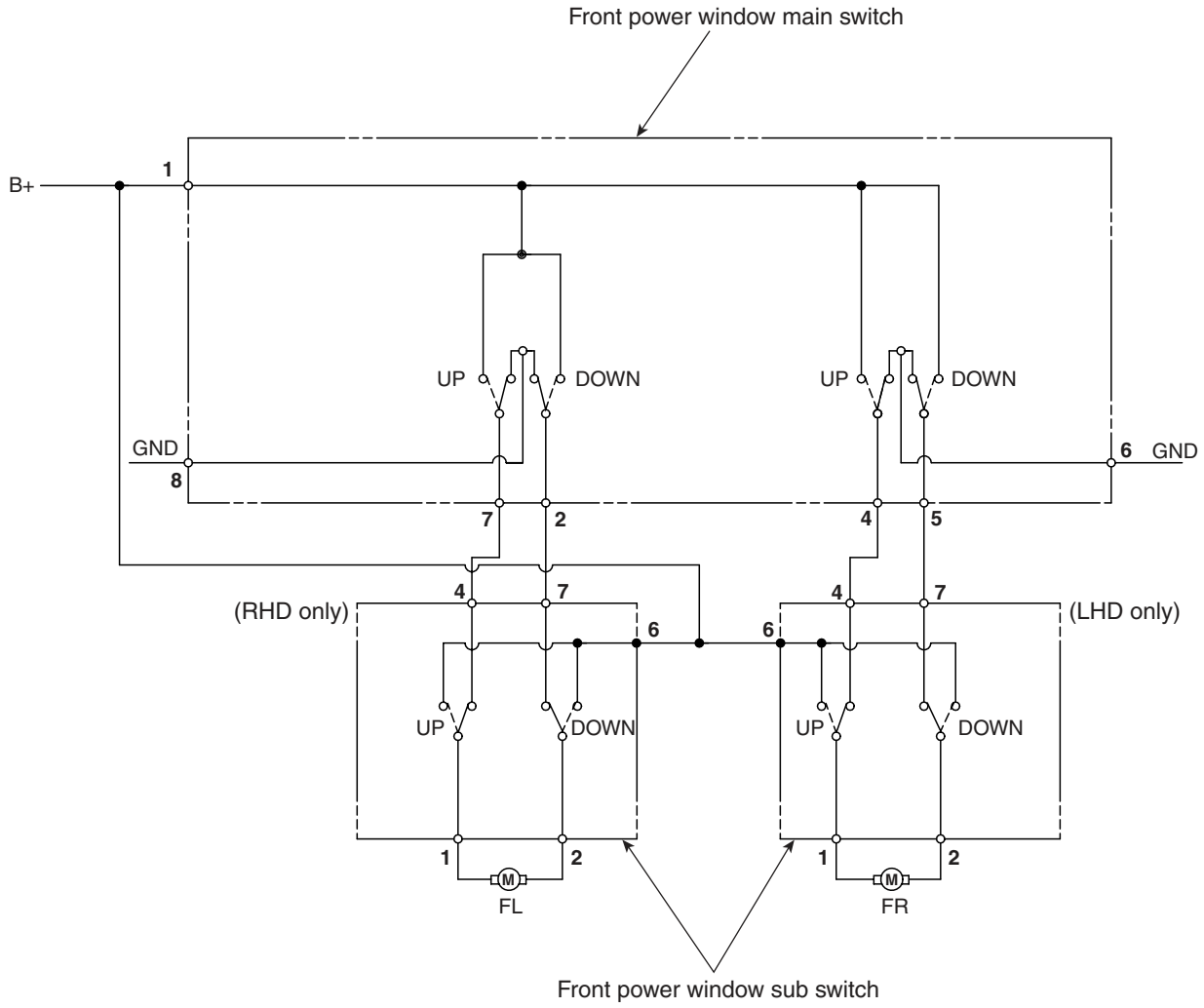


ETDA135A

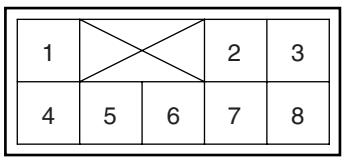
POWER WINDOW SWITCH

CIRCUIT DIAGRAM ETTC1300

[FRONT POWER WINDOW SWITCH]

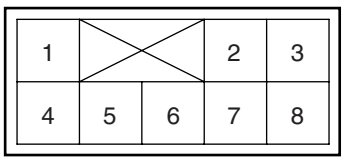


[D01]



(Front power window main switch connector)

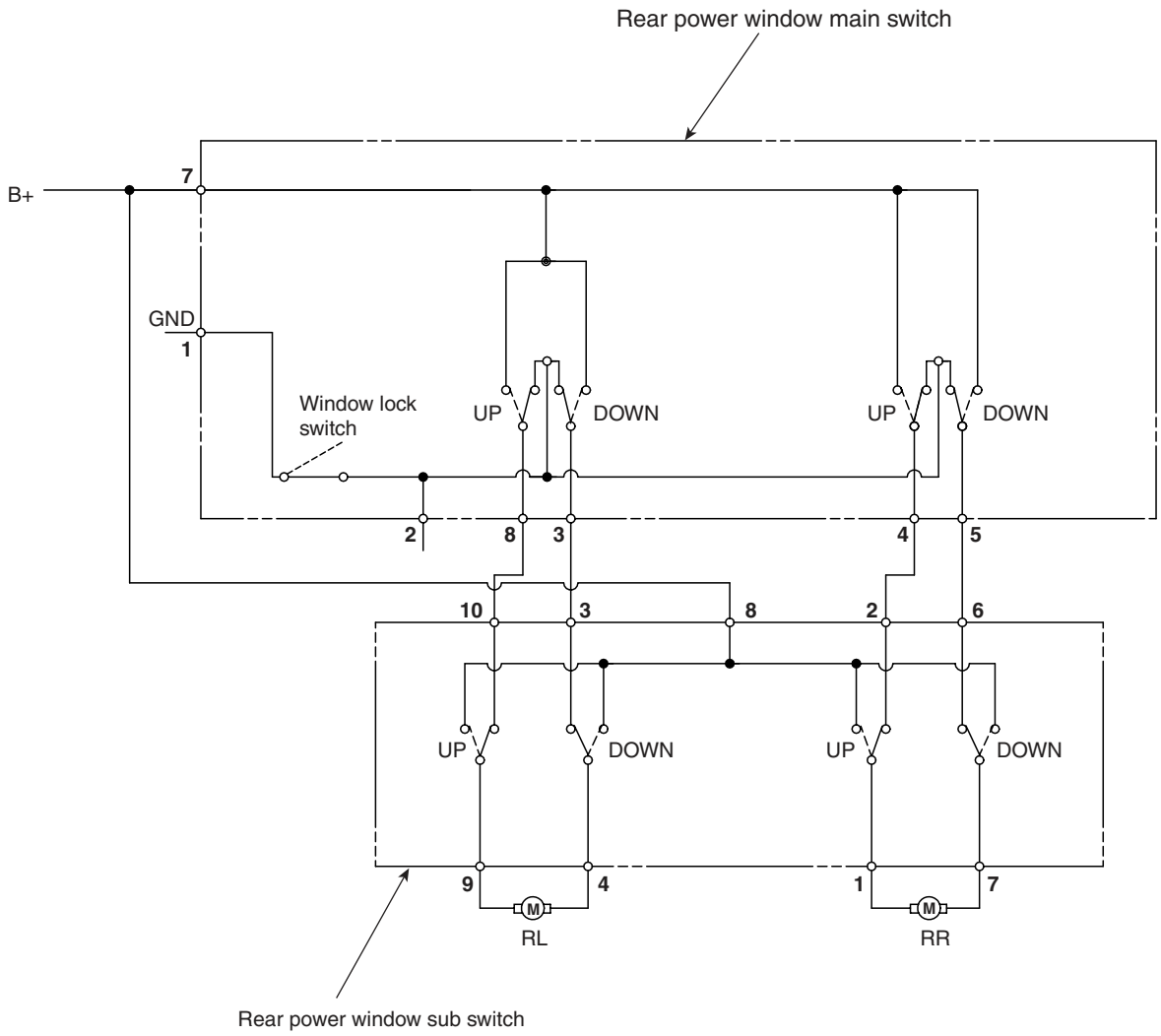
[D02]



(Front power window sub switch connector)

ETTE125D

[REAR POWER WINDOW SWITCH]



[M55]

1			2	3
4	5	6	7	8

(Rear power window main switch connector)

[M56]

1	2			3	4
5	6	7	8	9	10

(Rear power window sub switch connector)

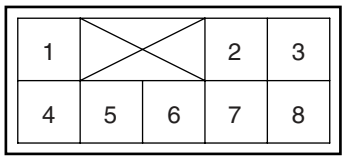
ETTE125E

INSPECTION ETTC1350

FRONT POWER WINDOW MAIN SWITCH

1. Remove the switch from the front door trim panel.
2. Check for continuity between the terminals. If continuity is not as specified in the table, replace the front power window switch.

[D01]



ETTE125C

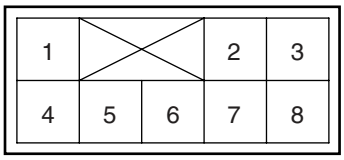
[D01]

Position		Terminal 1	2	4	5	6	7	8
Front Left	UP	○	○				○	○
	OFF		○				○	○
	DOWN	○	○				○	○
Front Right	UP	○		○	○	○		
	OFF			○	○	○		
	DOWN	○		○	○	○		

ETTE125G

FRONT POWER WINDOW SUB SWITCH

[D02]



ETTE125H

[D02]

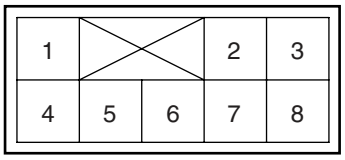
Position	Terminal 1	2	4	6	7
UP	○	○		○	○
OFF		○			○
DOWN	○	○		○	

ETTE125I

REAR POWER WINDOW MAIN SWITCH

1. Remove the switch from the floor console.
2. Check for continuity between the terminals. If continuity is not as specified in the table, replace the rear power window switch.

[M55]



ETTE125J

[M55]

Position		Terminal 1	3	4	5	7	8
Rear Left	UP	○	○			○	○
	OFF	○	○				○
	DOWN	○		○		○	○
Rear Right	UP	○		○	○		
	OFF	○		○	○		
	DOWN	○		○	○	○	

ETTE125K

WINDOW LOCK SWITCH

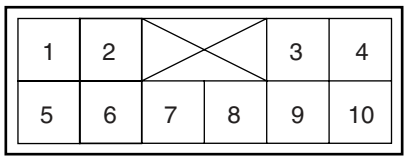
[M55]

Position	Terminal 1	2
NORMAL	○	○
LOCK		

ETTE125L

REAR POWER WINDOW SUB SWITCH

[M56]



ETTE125F

[M56]

Position		Terminal 1	2	3	4	6	7	8	9	10
Rear Left	UP			○	○			○	○	
	OFF			○	○				○	○
	DOWN				○			○	○	○
Rear Right	UP	○				○	○			
	OFF	○	○			○	○			
	DOWN	○	○				○	○		

ETTE125M

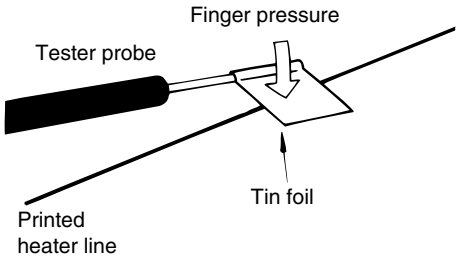
REAR WINDOW DEFOGGER

REAR WINDOW DEFOGGER PRINTED HEATER

INSPECTION ETA91650

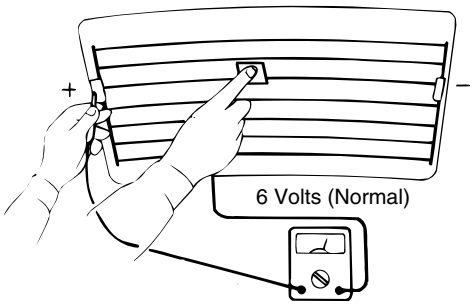
CAUTION

Wrap tin foil around the end of the voltmeter test lead to prevent damaging the heater line. Apply finger pressure on the tin foil, moving the tin foil along the grid line to check for open circuits.



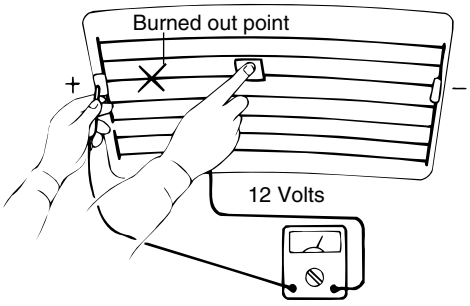
ETA9165A

1. Turn on the defogger switch and use a voltmeter to measure the voltage of each heater line at the glass center point. If a voltage of approximately 6V is indicated by the voltmeter, the heater line of the rear window is considered satisfactory.



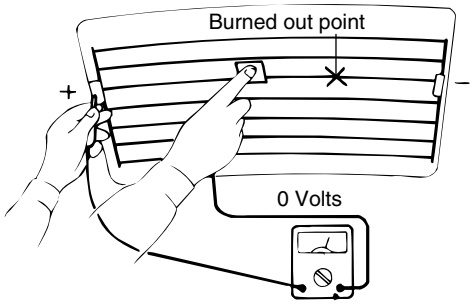
ETA9165B

2. If a heater line is burned out between the center point and (+) terminal, the voltmeter will indicate 12V.



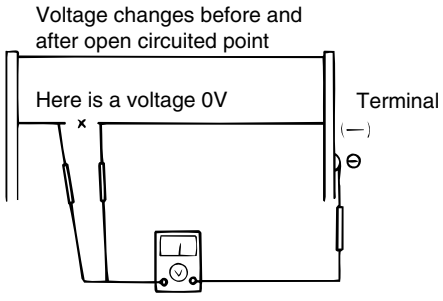
ETA9165C

3. If a heater line is burned out between the center point and (-) terminal, the voltmeter will indicate 0V.



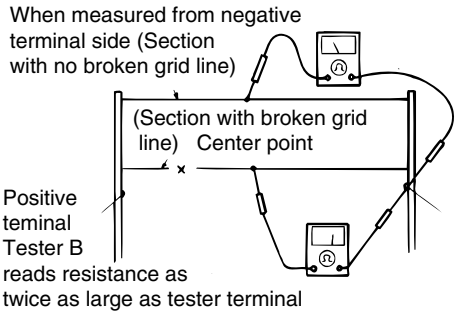
ETA9165D

4. To check for open circuits, slowly move the test lead in the direction that the open circuit seems to exist. Try to find a point where a voltage is generated or changes to 0V. The point where the voltage has changed is the open-circuit point.



ETA9165E

5. Use an ohmmeter to measure the resistance of each heater line between a terminal and the center of a grid line, and between the same terminal and the center of one adjacent heater line. The section with a broken heater line will have a resistance twice as that in other sections. In the affected section, move the test lead to a position where the resistance sharply changes.



ETA9165F

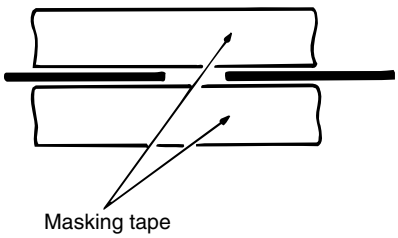
REPAIR OF BROKEN HEATER LINE

Prepare the following items:

1. Conductive paint.
2. Paint thinner.
3. Masking tape.
4. Silicone remover.
5. Thin brush.
   Wipe the glass adjacent to the broken heater line, clean with silicone remover and attach the masking tape as shown. Shake the conductive paint container well, and apply three coats with a brush at intervals of about 15 minutes apart. Remove the tape and allow sufficient time for drying before applying power. For a better finish, scrape away excess deposits with a knife after the paint has completely dried. (Allow 24 hours).

CAUTION

After repairing, clean the glass with a soft dry cloth or wipe along the grid line with a slightly moistened cloth.



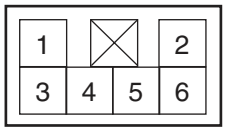
ETA9165G

REAR WINDOW DEFOGGER SWITCH

INSPECTION ETTC1400

1. Disconnect the negative(-) battery terminal.
2. Remove the rear window defogger switch from the crash pad.

[I06]



ETTC140A

3. Check the switch for continuity between the terminals. If continuity is not as specified in the table, replace the switch.

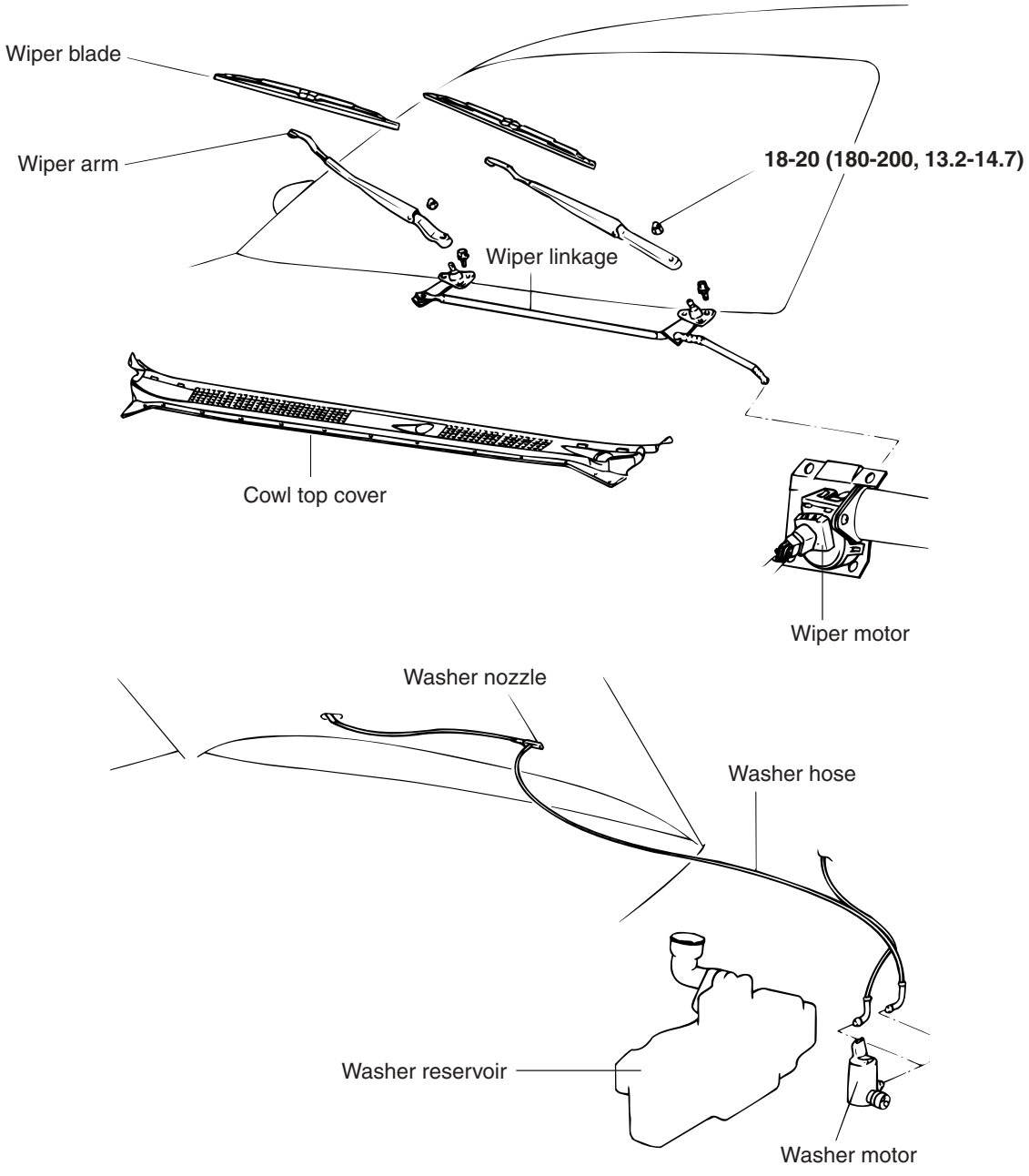
[I06]

Terminal / Position	2	5	3	1	4
ON					
OFF					

ETTC140B

WINDSHIELD WIPER/WASHER

COMPONENTS ETTC1450

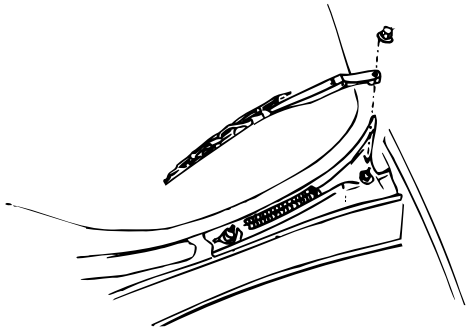


TORQUE : Nm (kg·cm, lb·ft)

ETTC145A

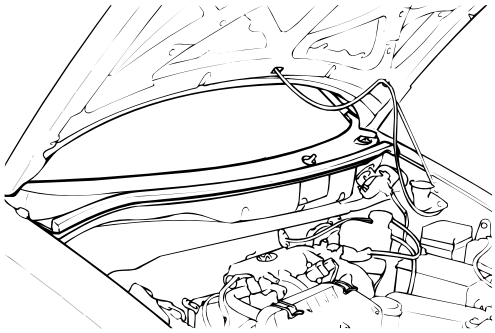
REMOVAL ETTC1500

1. Remove the wiper arms.



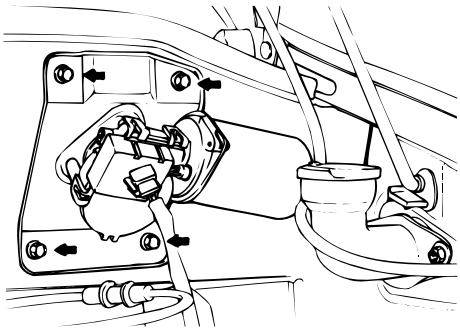
ETTC150A

2. Remove the cowl top cover.



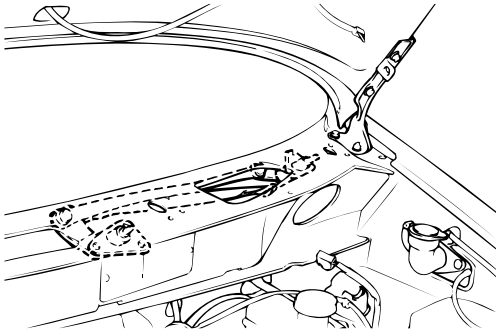
ETTC150B

3. Loosen the wiper motor mounting bolts.
   Disconnect the wiper arm pivot and linkage.



ETTC150C

4. Remove the wiper linkage.

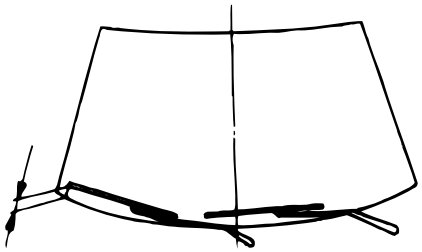


ETTC150D

INSTALLATION ETTC1550

Installation is the reverse of removal.
Install the wiper arm to the specific position.

Distance between the wiper blade and front deck panel : 30 ± 5mm



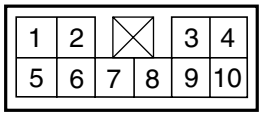
ETTC155A

WINDSHIELD WIPER/WASHER SWITCH

INSPECTION ETTC1600

Remove the multifunction switch and disconnect the wire connectors.
Check the switch for continuity between the terminals.
If continuity is not as specified, replace the wiper and washer switch.

[M11-3]



ETTC160A

WIPER AND INTERMITTENT VOLUME SWITCH [M11-3]

Terminal / Position	6	5	7	8	9
OFF	○		○		
INT	○		○	○	○
LOW	○				○
HI		○			○

ETTC055E

WASHER SWITCH [M11-3]

Terminal / Position	9	10
OFF		
ON	○	○

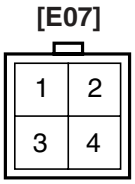
ETTC055F

FRONT WIPER MOTOR

INSPECTION ETTC1650

SPEED OPERATION CHECK

1. Remove the connector from the wiper motor.
2. Attach the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 4.
3. Check that the motor operates at low speed.
4. Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 3.
5. Check that the motor operates at high speed.



1. Parking
2. Power
3. High
4. Low

ETTC165A

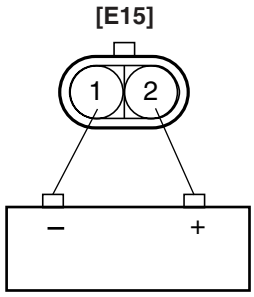
AUTOMATIC STOP OPERATION CHECK

1. Operate the motor at low speed.
2. Stop the motor operation anywhere except at the off position by disconnecting terminal 4.
3. Connect terminals 1 and 4.
4. Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to the motor ground.
5. Check that the motor stops running at the off position.

FRONT WASHER MOTOR

INSPECTION ETTC1700

1. With the washer motor connected to the reservoir tank, fill the reservoir tank with water.
2. Connect positive (+) and negative (-) battery cables to terminals 2 and 1 respectively to see that the washer motor runs and water sprays from the front nozzles.
3. Check that the motor operates normally.

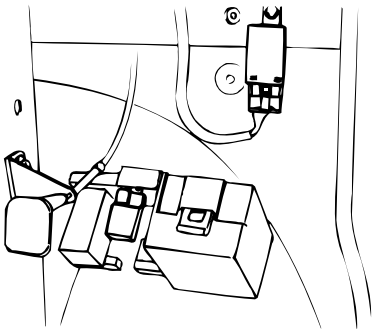


ETTC170A

INTERMITTENT WIPER RELAY

REMOVAL ETTC1750

After removing the shroud under cover, remove the intermittent wiper relay from the cowl cross member (Left bottom side of the driver's seat)

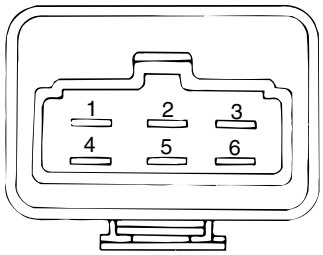


ETTC175A

INSPECTION ETTC1800

The intermittent relay operating time is controlled by variable resistance.
If the problem has been traced to the intermittent relay, replace it with a new one.
Check for proper operation. If the system operates properly, the original intermittent relay was faulty.

[M18]



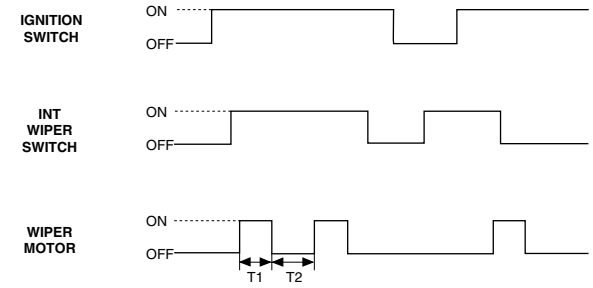
ETTC180A

1. **Wiper**

   1) Time specification
      T1 : Time required for the wiper to rotate 1 cycle.
      T2 : 4 ± 1 sec.

   2) Variable resister (VR) : 50 ± 10kΩ

   3) Relay operation noise : Below 50dB/20cm

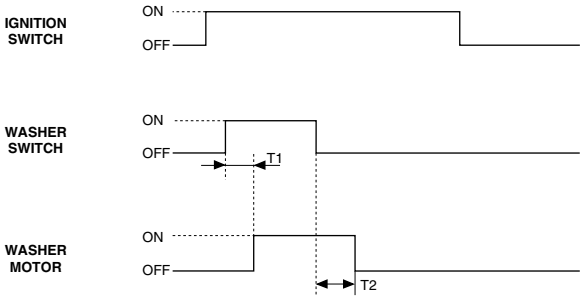


ETTC180B

2. **Washer**

   1) Time specification
      T1 : 0.4 - 1.2 sec.
      T2 : 2.0 - 4.7 sec.

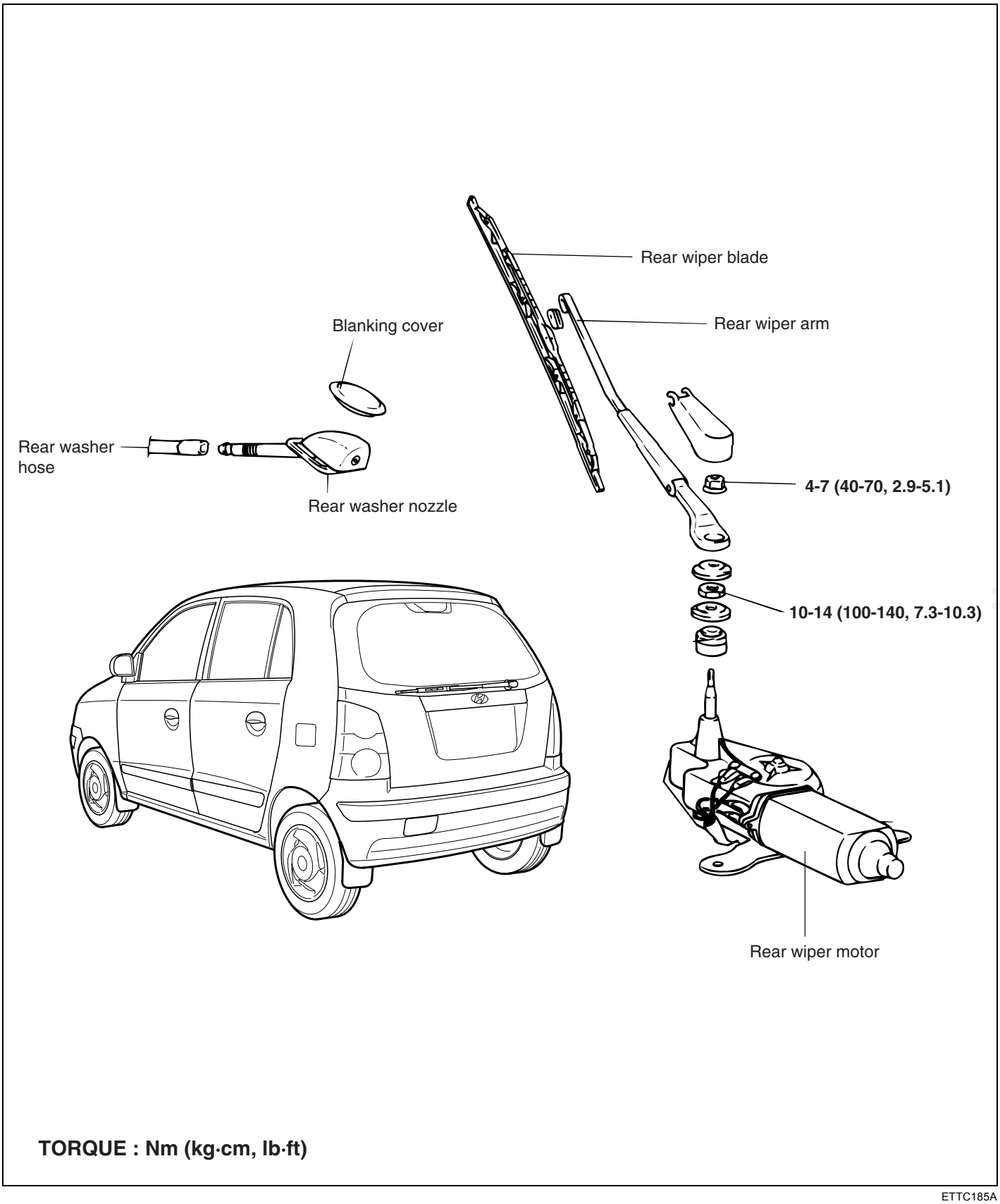
   2) This function should be operated preferentially even though the intermittent wiper is operating.



ETTC180C

REAR WIPER/WASHER

COMPONENTS ETTC1850



TORQUE : Nm (kg·cm, lb·ft)

ETTC185A

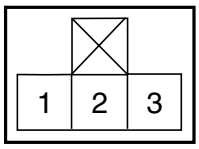
INSPECTION ETTC1900

REAR WIPER MOTOR

Operation check

1. Remove the connector from the rear wiper motor.
2. Attach the positive (+) lead from the battery to terminal 2 and negative (-) lead from the battery to terminal 1.
3. Check that the motor operates normally.
   Replace the motor if it operates abnormally.

[R06]



1. Rear wiper switch (-)
2. IGN (+)
3. Parking

ETTC190A

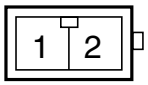
Automatic stop operation check

1. Operate the motor at normal speed.
2. Connect the terminal 1 and 3.
3. Attach the positive (+) lead from the battery to terminal 2 and negative (-) lead from the battery to motor ground.
4. Check that the motor stops at the off position.

REAR WASHER MOTOR

1. With the washer connected to the washer tank, fill the washer tank with water.
2. Connect battery positive (+) and negative (-) cables to terminals 2 and 1 respectively to see that the washer motor operates and water ejected.

[E14]

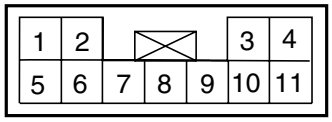


ETTC190B

REAR WIPER/WASHER SWITCH

1. Disconnect the connector from the rear wiper and washer switch.
2. Check for continuity between the terminals.

[M11-2]



ETTC190C

Terminal / Position	1	2	7	8
Rear washer		○	○	
Rear wiper	○		○	
OFF	○			○

ETTC055D

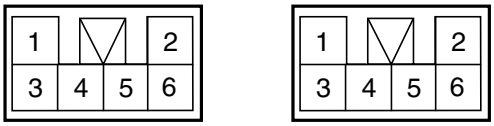
SEAT WARMER

SEAT WARMER SWITCH

INSPECTION ETTC1950

1. Disconnect the negative(-) battery terminal.
2. Remove the seat warmer switch from the floor console upper cover.

[LH:M24] **[RH:M23]**



ETTC195A

3. Check for continuity between the terminals.

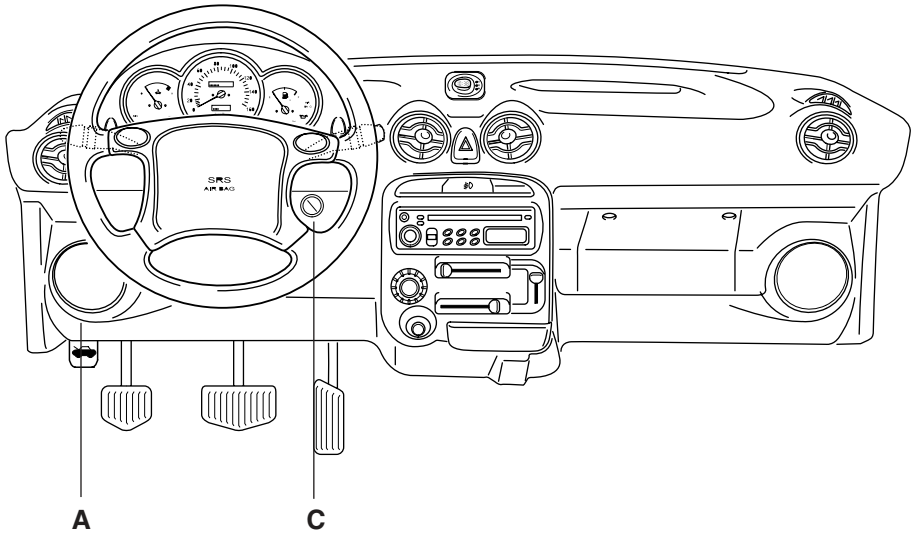
[M23/M24]

Terminal / Position	1	3	5
ON	○	○	○
OFF	○	○	

ETTC195B

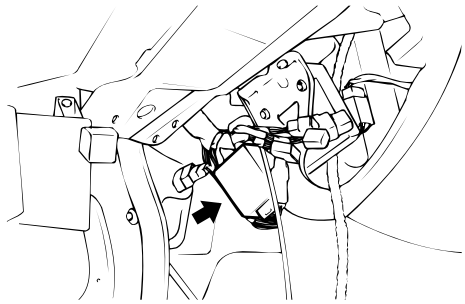
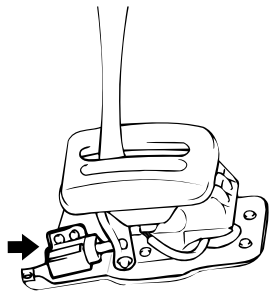
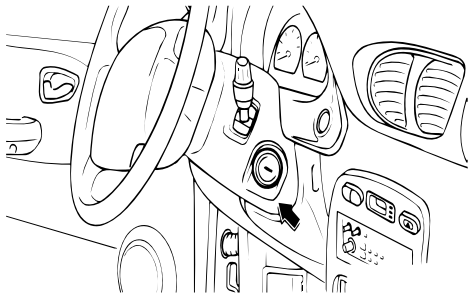
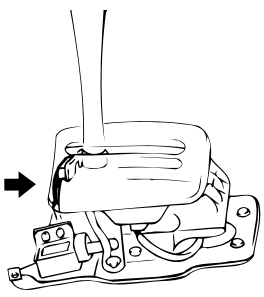
SHIFT AND KEY LOCK CONTROL SYSTEM

COMPONENTS ETTC2000

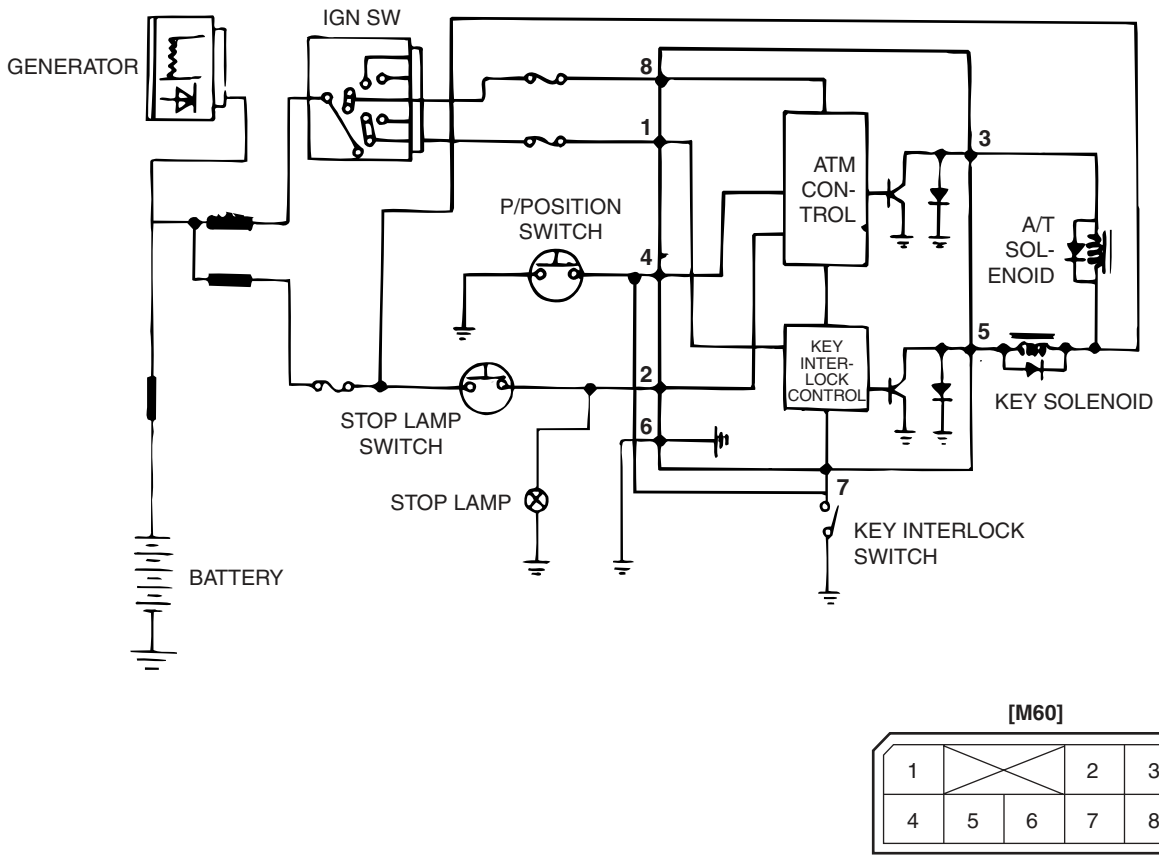


A. A/T interlock control module
B. A/T shift lock solenoid
C. Key interlock solenoid
D. "P" position switch

ETTC200A

A. A/T INTERLOCK CONTROL MODULE	B. A/T SHIFT LOCK SOLENOID
 ETLA065A	 ETTC200B
C. KEY INTERLOCK SOLENOID	**D. "P" POSITION SWITCH**
 ETTC200C	 ETTC200D

CIRCUIT DIAGRAM ETTC2050

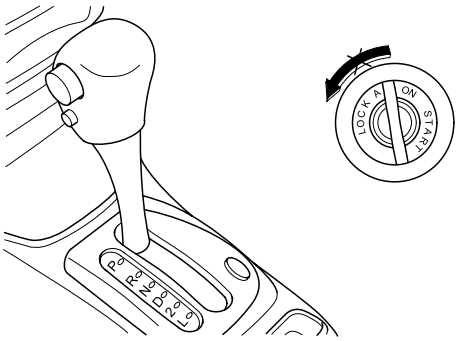


ETTC205A

SYSTEM CHECK ETTC2100

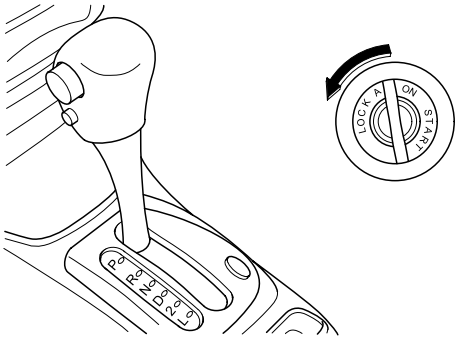
KEY INTERLOCK

1. Check that the ignition key cannot be turned to “LOCK” (OFF) position, when the position of the shift lever is not in “P” position.



ETTC210A

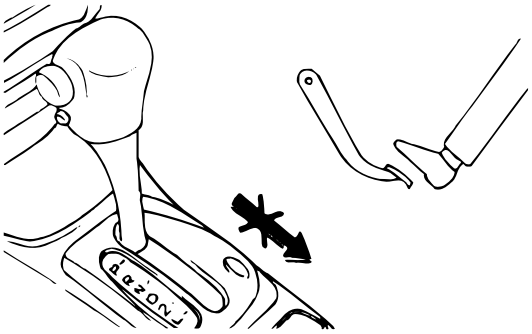
2. Check that the ignition key turns to the “LOCK” (OFF) position, when the shift lever is set to the “P” position.



ETTC210B

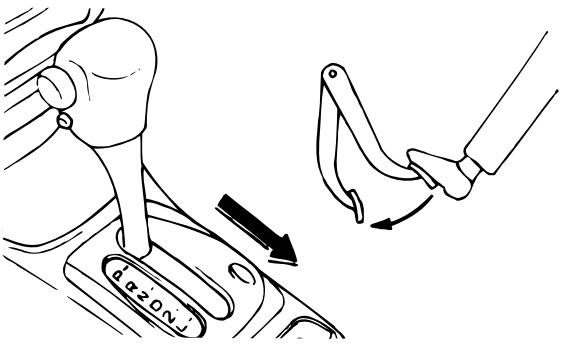
A/T SHIFT LOCK

1. Check that under the following conditions, the shift lever cannot be moved from the “P” position to any other position.
   IGNITION KEY POSITION “ON”
   BRAKE PEDAL : NOT DEPRESSED
   BUTTON : PRESSED



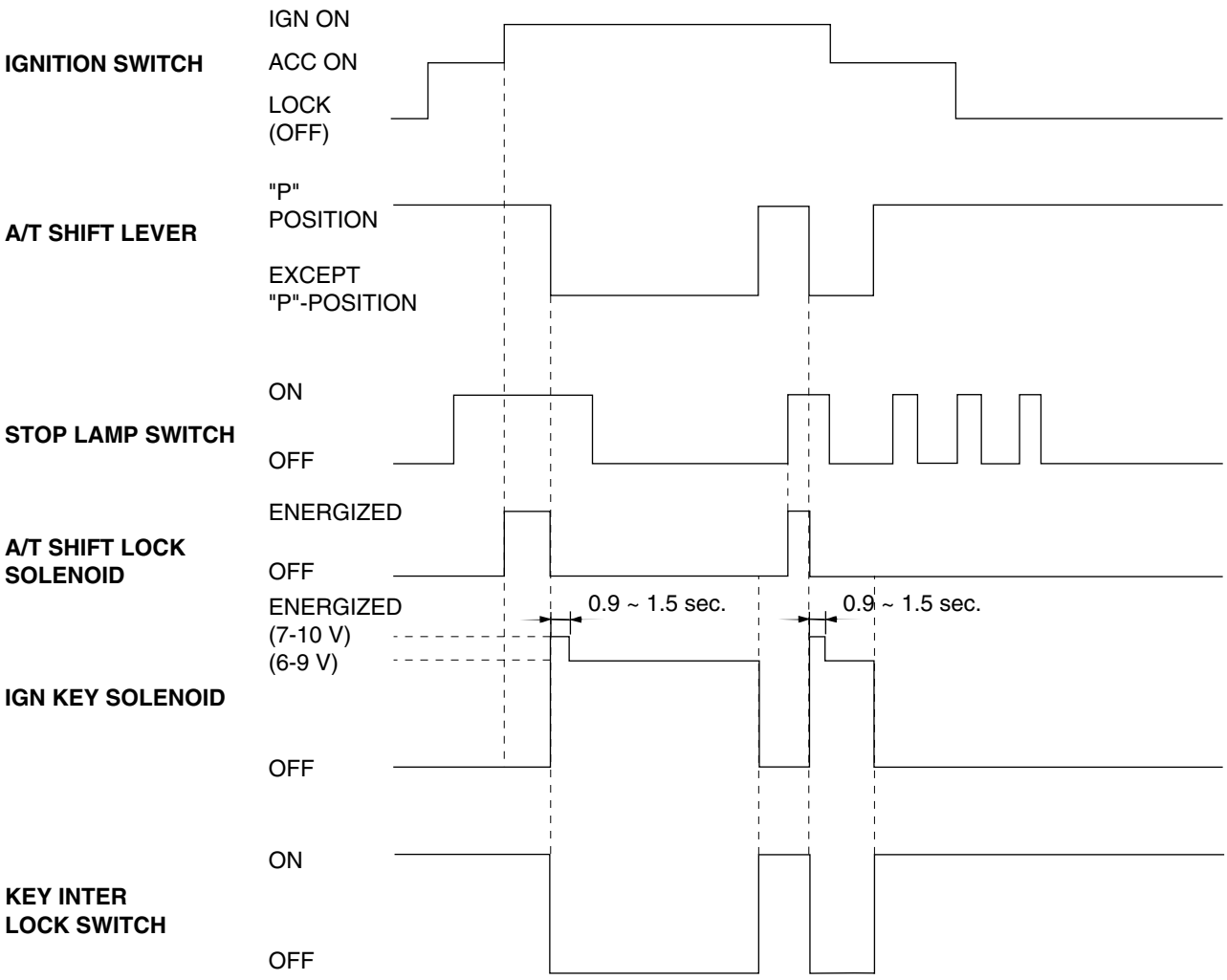
ETTC210C

2. Check that under the following conditions, the shift lever can be moved from the “P” position to other position.
   IGNITION KEY POSITION “ON”
   BRAKE PEDAL : DEPRESSED
   BUTTON : PRESSED



ETTC210D

TIMMING CHART ETTC2150



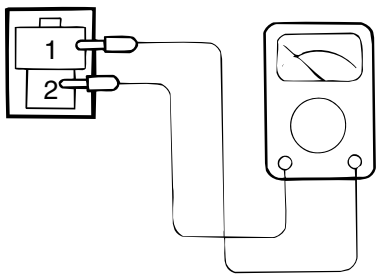
ETTC215A

INSPECTION ETTC2200

A/T SHIFT LOCK

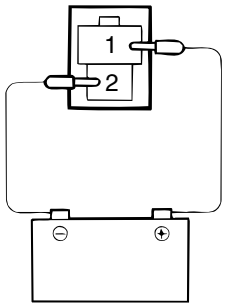
1. Remove the solenoid connector.
2. Using an ohmmeter, measure the resistance between terminals.

Standard resistance : 12-16Ω



ETTC220A

3. Attach the position (+) lead from the battery to terminal 1, and the negative (-) lead to terminal 2.



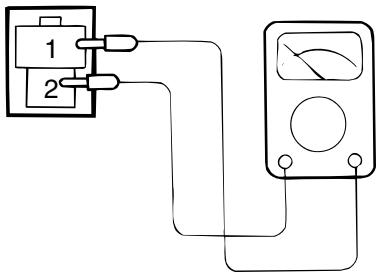
ETTC220B

4. Check that an operation noise can be heard from the solenoid.

KEY INTERLOCK SOLENOID

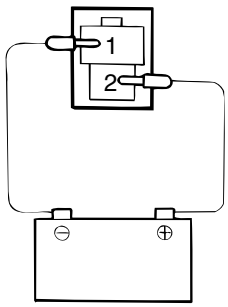
1. Remove the solenoid connector.
2. Using an ohmmeter, measure the resistance between terminals.

Resistance between terminals : 12.5-16.5Ω



ETTC220A

3. Attach the positive (+) lead from the battery to terminal 2, and the negative (-) lead to terminal 1.



ETTC220D

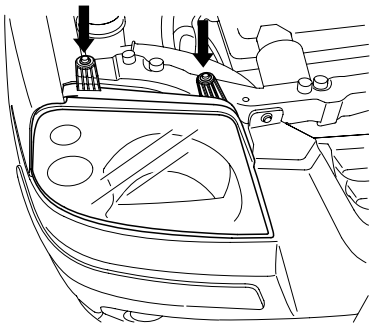
4. Check that an operation noise can be heard from the solenoid.

LIGHTING SYSTEM

REMOVAL AND INSTALLATION ETTC2250

HEAD LAMP / TURN SIGNAL LAMP

1. Disconnect the battery negative terminal and loosen the head lamp mounting bolts.



ESTE027A

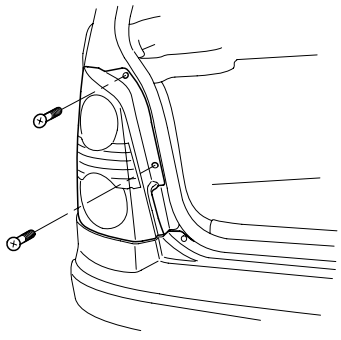
2. Disconnect the head lamp connector.
3. Installation is the reverse of removal.

CAUTION

Do not touch the surface of the bulb with hands or dirty gloves.
If the surface does become dirty, clean it with alchol or thinner, and let it dry thoroughly before installing.

REAR COMBINATION LAMP

1. Disconnect the battery negative terminal and loosen the rear combination lamp mounting screws.



ETTC226A

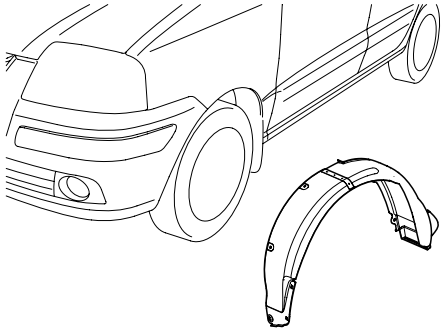
2. Disconnect the combination lamp connector.
3. Installation is the reverse of removal.

ROOM LAMP

1. Disconnect the battery negative terminal and detach the room lamp lens.
2. Loosen the room lamp mounting screws and disconnect the connector.
3. Installation is the reverse of removal.

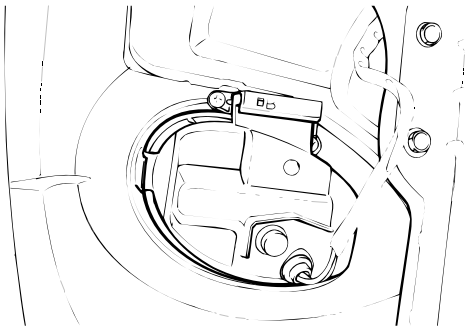
FOG LAMP

1. Remove the wheel cover.



ESTE015B

2. Remove the fog lamp mounting screws.



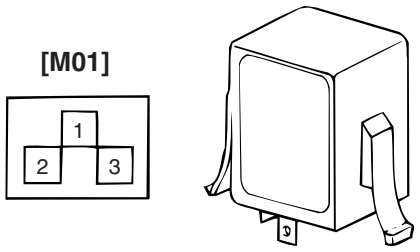
ETTC225D

3. Installation is the reverse of removal.

INSPECTION OF COMPONENTS ETTC2300

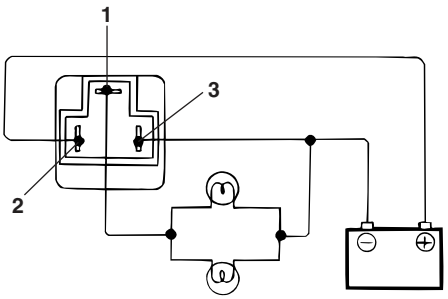
FLASHER UNIT

1. Remove the flasher unit from the relay box in passenger compartment.
2. Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 3.



ETTC230A

3. Connect the two turn signal lamps parallel to each other to terminal 1 and 3, check that the bulbs turn on and off.



Turn signal lamp bulbs

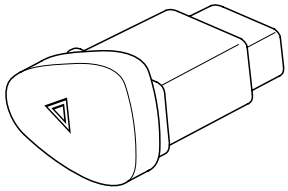
ETTC230B

NOTE

The turn signal lamps should flash 60 to 120 times per minute.
If one of the front or rear turn signal lamps has an open circuit, the number of flashes will be more than 120 per minute.
If operation is not as specified, replace the flasher unit.

HAZARD SWITCH

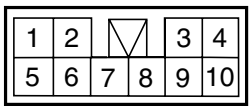
1. Disconnect the battery negative terminal.
2. Remove the hazard switch from the crash pad panel.
3. Disconnect the connector from the crash pad harness.



ETTC230C

4. Operate the switch and check for continuity between terminals by using an ohmmeter.

[I11]



ETTC230D

[I11]

Position \ Terminal	5	7	8	1	10	9	6	3	2
OFF	○	—	○						
ON		○	○		○	○	○	○	○

NOTE

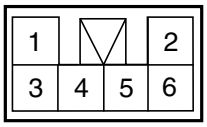
○—○—○ **: Indicates that the symbol illumination lights up when tail lamp switch is turned on.**

ETTC230E

FRONT FOG LAMP SWITCH

1. Disconnect the negative (-) battery terminal.
2. Disconnect the switch connector from the center facia panel.

[I14]



ETTC230F

3. Operate the switch and check for continuity between the terminals with an ohmmeter.

[I14]

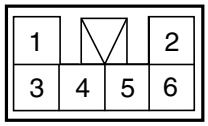
Terminal / Position	1	4	6
ON	●	●	●
OFF			

ETTC230G

REAR FOG LAMP SWITCH

1. Disconnect the negative (-) battery terminal.
2. Disconnect the switch connector from the center facia panel.

[I15]



ETTC230H

3. Operate the switch and check for continuity between the terminals with an ohmmeter.

[I15]

Terminal / Position	1	3	6	4	5
ON	●	●	●	●	●
OFF					

ETTC230I

HEAD LAMPS

HEAD LAMP AIMING INSTRUCTIONS ETTC2350

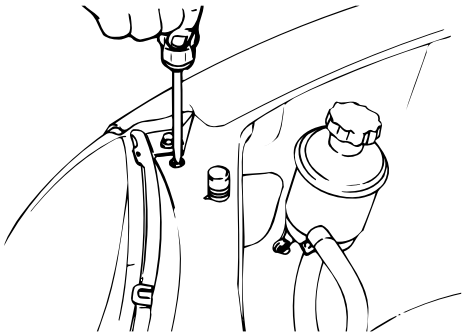
The headlamps should be aimed with the proper beam-setting equipment, and in accordance with the equipment manufacturer's instructions.

NOTE

If there are any regulations pertinent to the aiming of headlamps in the area where the vehicle is to be used, adjust so as to meet those requirements.

Alternately turn the adjusting gear to adjust the headlamp aiming. If beam-setting equipment is not available, proceed as follows:

1. Inflate the tires to the specified pressure and remove any loads from the vehicle except the driver, spare tire, and tools.
2. The vehicle should be placed on a flat floor.
3. Draw vertical lines (Vertical lines passing through respective headlamp centers) and a horizontal line (Horizontal line passing through center of headlamps) on the screen.
4. With the headlamp and battery in normal condition, aim the headlamps so the brightest portion falls on the horizontal and vertical lines.
   Make vertical and horizontal adjustments to the lower beam using the adjusting wheel.

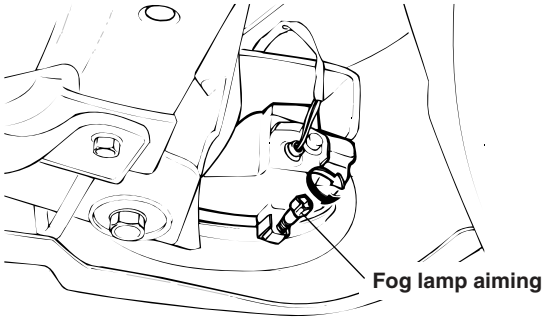


ETTC235A

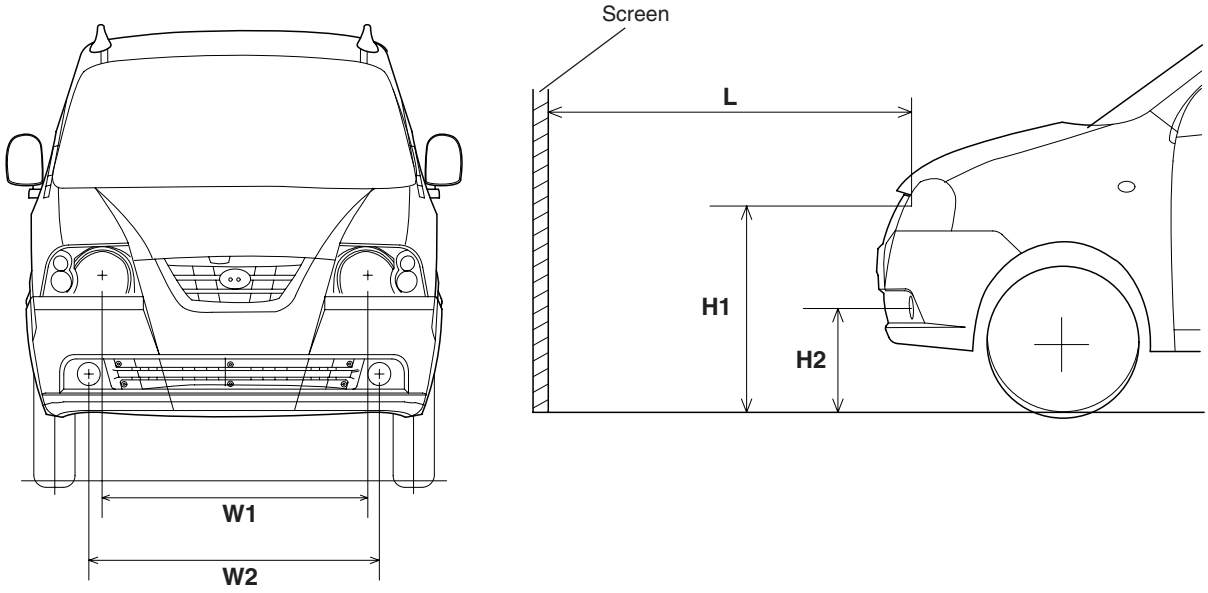
FRONT FOG LAMP

The front fog lamps should be aimed as the same manner of the head lamps aiming.

With the front fog lamps and battery normal condition, aim the front fog lamps by turning the adjusting gear.



ETTC235B



W1 : Distance between the head lamp bulb center
W2 : Distance between the fog lamp bulb center

H1 : Height between the head lamp bulb center and ground
H2 : Height between the fog lamp bulb center and ground
L : Distance between the head lamp bulb center and screen.

ETTD235C

HEAD LAMP AND FOG LAMP AIMING POINT

Unit : mm

Loading Condition	Area	H1	H2	W1	W2	L
Unload Vehicle	General, M/East	722	370	966	1,068	3,000
	Europe	715	363			
With Driver	General, M/East	714	362			
	Europe	706	354			

ETTD235D

CAUTION

Be sure to adjust the aiming adjustment screw in the tightening direction.

NOTE

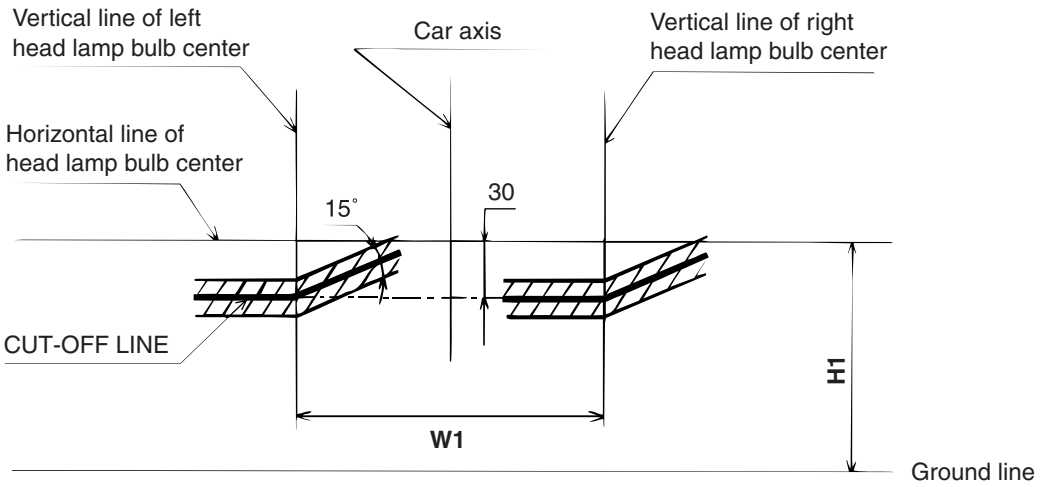
The reflectors for low beam and high beam have been combined into a single part, so if the low beam adjustment is made, high beam adjustment is not necessary.

1. Turn the low beam on without driver aboard.
   The cut-off line should be projected in the allowable range (shaded region).

NOTE
If leveling device installed, set the leveling device switch to the "0" position.

Unit : mm

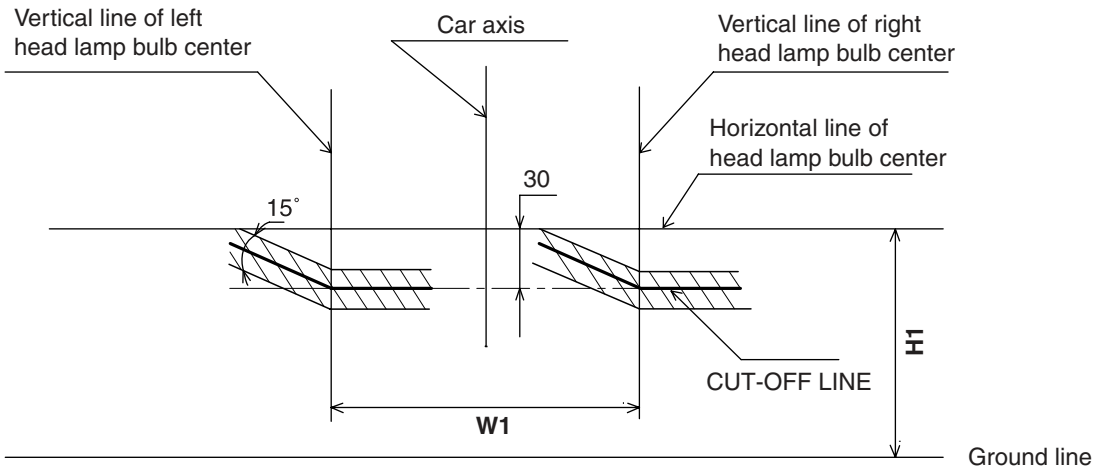
[LHD Type]



ETTD235F

Unit : mm

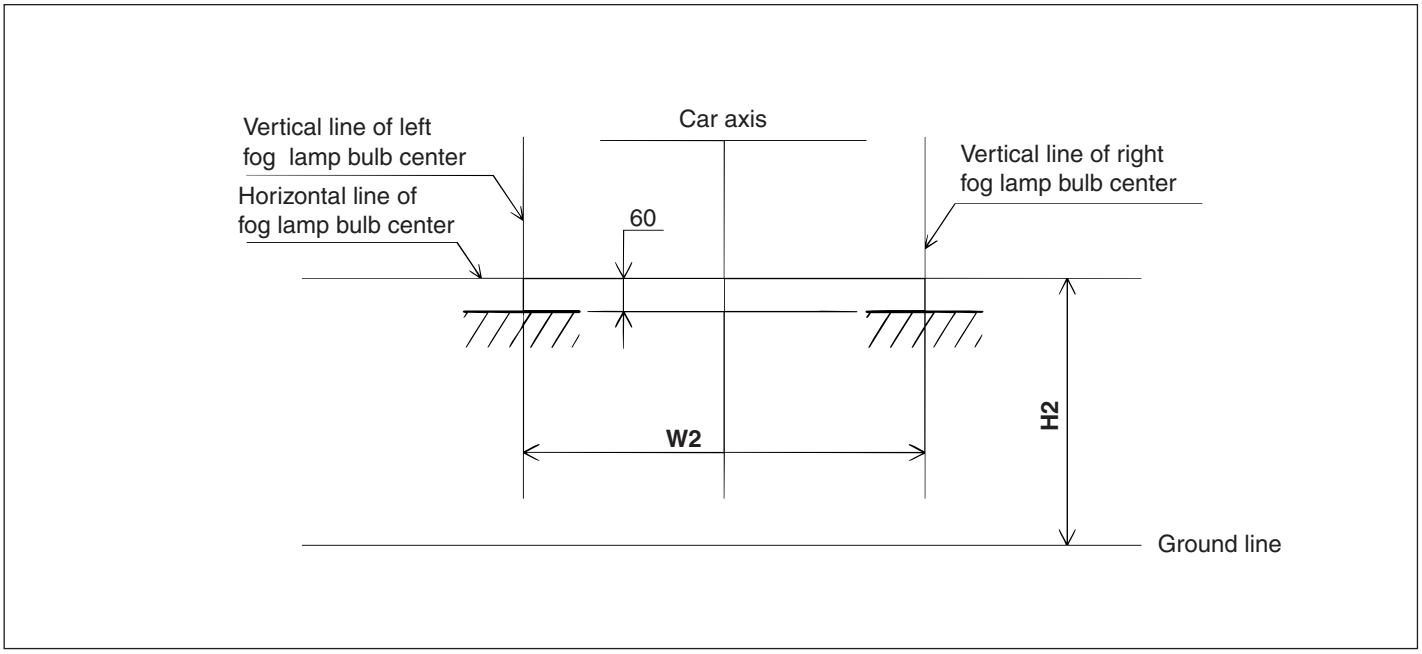
[RHD Type]



ETTD001C

2. Turn the front fog lamp on without the driver aboard.
   The cut-off line should be projected in the allowable range (shaded region).

Unit : mm

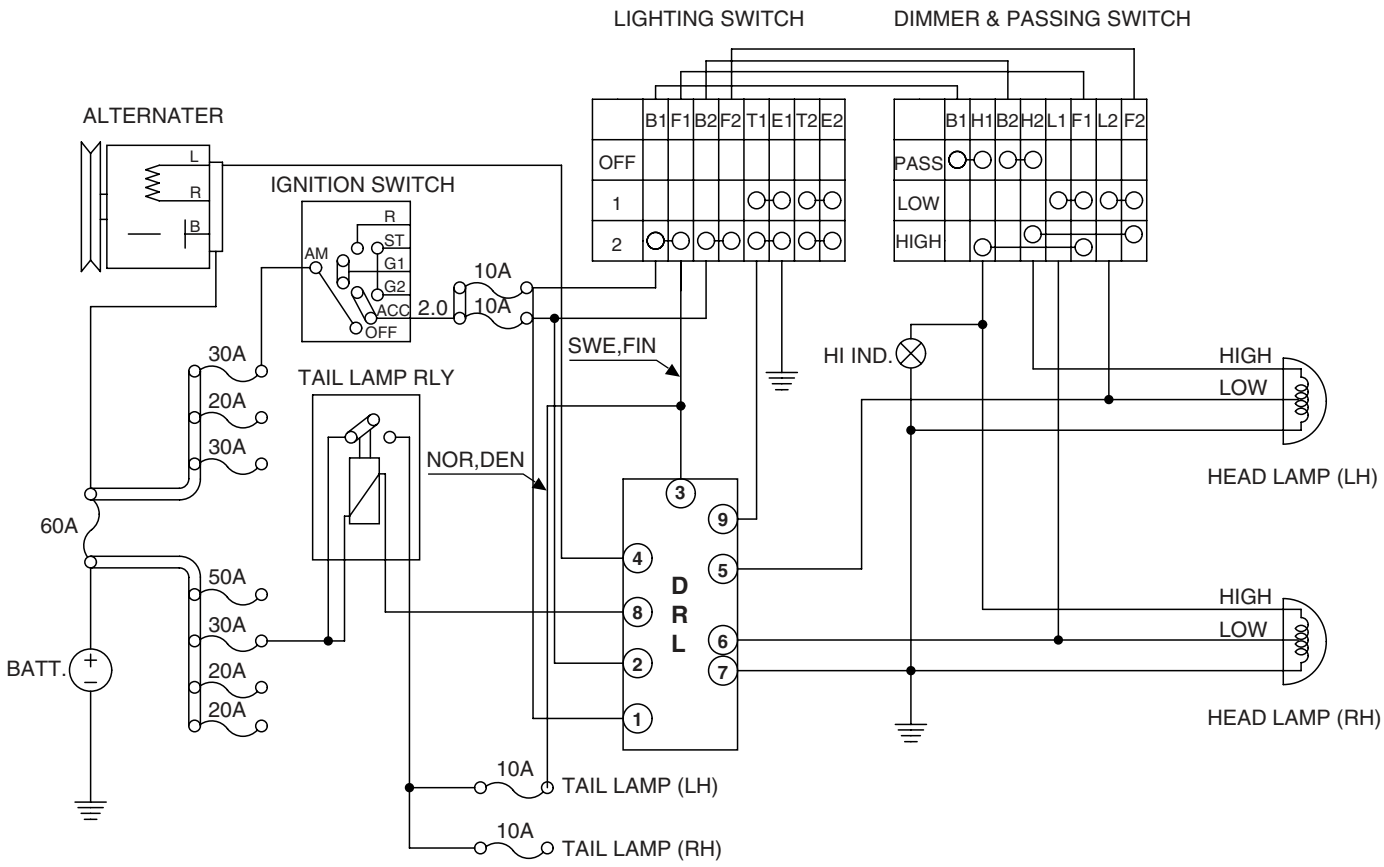


ETNC265F

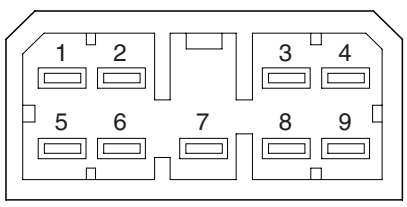
DAYTIME RUNNING LIGHTS

DRL CONTROL MODULE

CIRCUIT DIAGRAM ETTC2400



[E34]

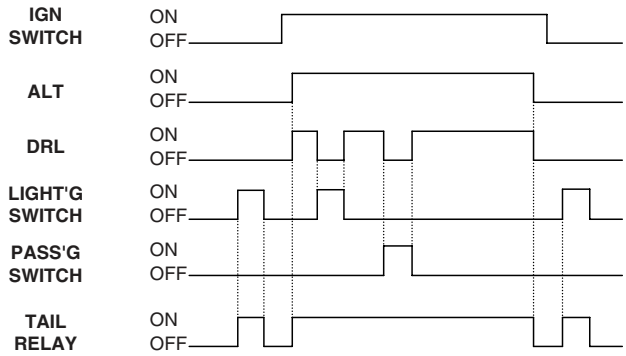


ETTC240A

INSPECTION ETTC2450

OPERATION CHECK

Check that the lights operate according to the following timing chart.

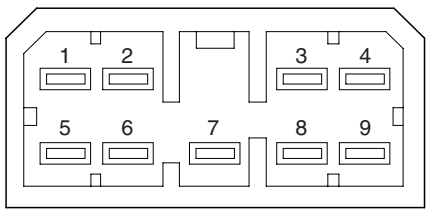


ETTC002C

INSPECT CIRCUITS FOR DAYTIME RUNNING LIGHT SYSTEM

1. Disconnect the wire connector to DRL module from engine compartment.
2. Inspect the connector on wire harness side as shown.

[E34]



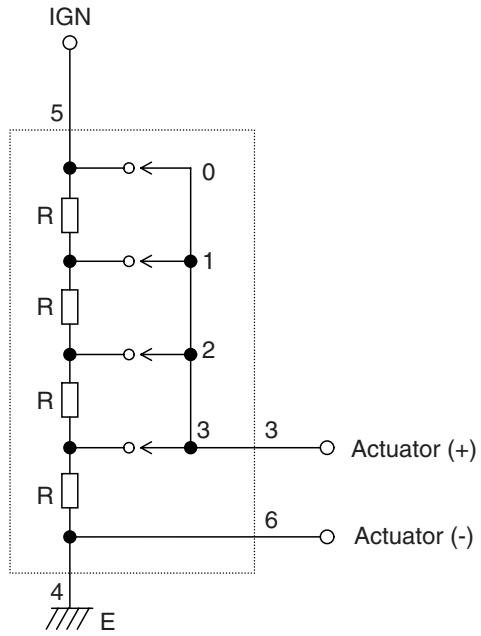
ETTC002B

3. If circuit is not as specified, refer to schematic diagram and inspect short or circuits.

HEAD LAMP LEVELLING DEVICE

HEAD LAMP LEVELLING SWITCH

CIRCUIT DIAGRAM ETTC2500

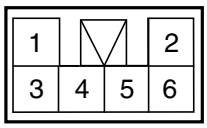


ETTC001D

PIN CONNECTION

Pin No.	Description
1	-
2	-
3	Actuator (+)
4	Ground
5	IGN
6	Actuator (-)

[I03]

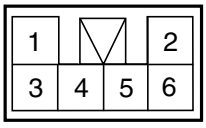


ETTC250A

INSPECTION ETTC2550

1. Disconnect the switch connector from the crash pad panel.
2. Connect the battery voltage between terminals 4 and 5(Reference voltage =V_B).
3. Measure the voltage between terminals 3 and 4(V).

[I03]



ETTC255A

4. Check the percent ratio(V/V_B x 100%) between voltages V_B and V at each position.

Position No.	Rotation	Ratio(±5%)
0	0°	100%
1	33°	81.8%
2	81°	62.6%

5. If the voltage is not as specified, replace the head lamp levelling switch.

IMMOBILIZER CONTROL SYSTEM

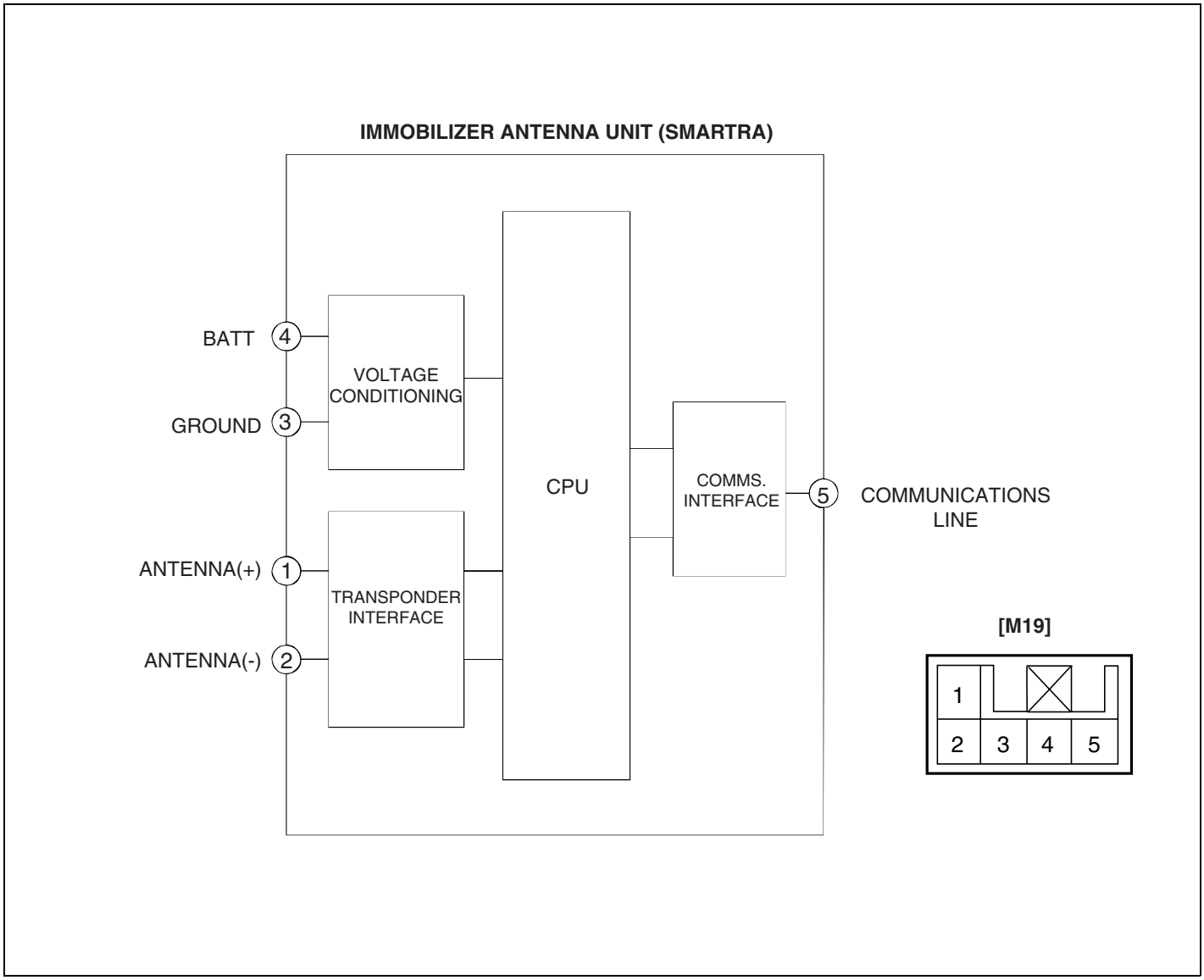
DESCRIPTION ETTD2600

The vehicle is equipped with an immobilizer system that will disable the vehicle unless the proper ignition key is used. This system consists of a transponder located in the ignition key, an immobilizer antenna unit (SMARTRA), an indicator light and the ECM/PCM.

The SMARTRA unit contains an integrated inductive antenna and electronics around the lock assembly. The SMARTRA communicates to the ECM (Engine Control Module) via a dedicated communications line.

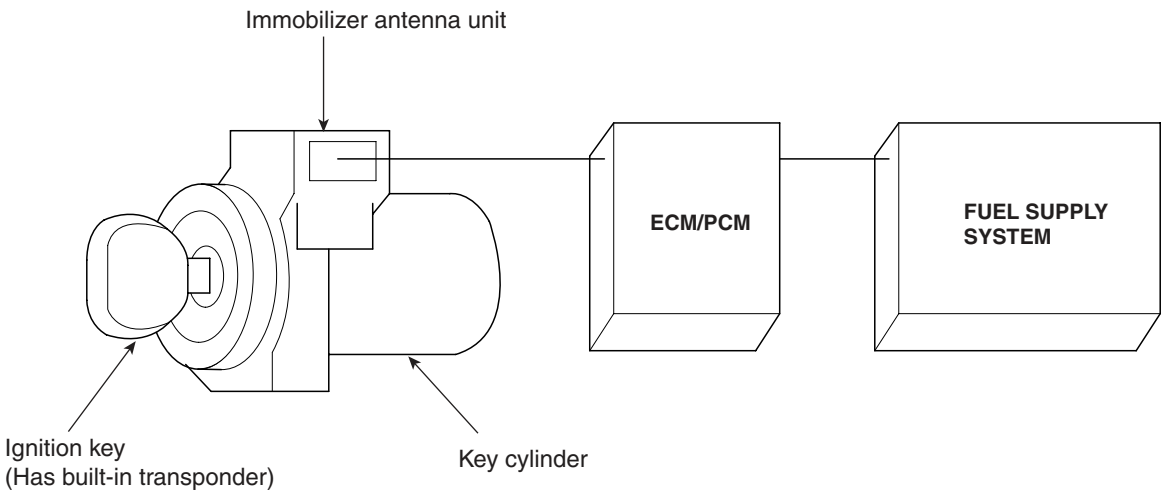
Since the vehicle engine management system is able to control engine mobilization, it is the most suitable unit to control the SMARTRA.

SYSTEM BLOCK DIAGRAM



ETTC260A

When the key is inserted in the ignition and turned to the ON position, the immobilizer antenna unit sends power to the transponder in the ignition key. The transponder then sends a coded signal back through the immobilizer antenna unit to the ECM/PCM.



ETKD920B

- The immobilizer system can store up to four key codes.
- If it is necessary to rewrite the ECM/PCM to learn a new key, the dealer needs the customer's vehicle, all its master keys and the Hi-scan(pro) equipped with an immobilizer program card. Any key that is not learned during rewriting will no longer start the engine.
- If the customer has lost his key, and cannot start the engine, contact Hyundai-motor service station.
- If the proper key has been used, the ECM/PCM will energize the fuel supply system. The immobilizer indicator light in the gauge assembly will simultaneously come on for about two seconds, then go off, indicating that the immobilizer antenna unit has recognized the code sent by the transponder.
- If the wrong key has been used and the code was not received or recognized by the ECM/PCM the indicator light will come on for about two seconds, then it will continue blinking until the ignition switch is turned OFF.

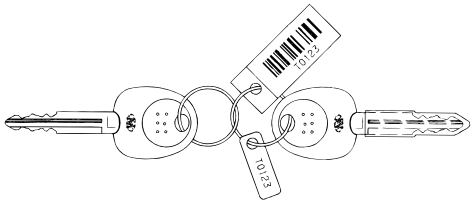
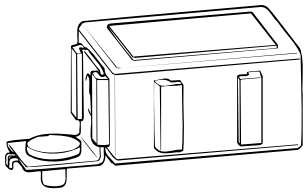
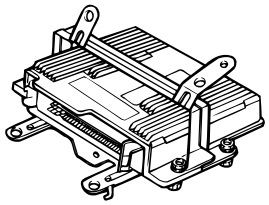
PROBLEMS AND REPLACEMENT PARTS :

Problem	Part set	Hi-scan (pro) required?
Master key has been lost or additional master key is required	Blank key	YES
All master keys have been lost	Blank key(4)	YES
Immobilizer antenna unit does not work	Immobilizer antenna unit	NO
ECM/PCM does not work	ECM/PCM	YES
Ignition switch does not work	Ignition switch with immobilizer antenna unit. Master key	YES
Unidentified vehicle specific data occurs	Ignition switch with immobilizer antenna unit. Master key ECM/PCM	YES

COMPONENTS OPERATIONS

The vehicle immobilizer system consists of the ECM/PCM, the Immobilizer antenna unit (SMARTRA) and transponder built into the ignition key.

COMPONENT

A. TRANSPONDER KEY	B. IMMOBILIZER ANTENNA UNIT (SMARTRA)
 ETKA470C	 ETNB291C
C. ENGINE CONTROL MODULE	
 B6BE710E	

COMPONENTS	FUNCTION
ECM	The ECM carries out a check of the ignition key using a special encryption algorithm, which is programmed into the transponder as well as the ECM simultaneously. Only if the results are equal can the engine be started. The data of all transponders, which are valid for the vehicle, are stored in the ECM.
SMARTRA	The SMARTRA carries out communication with the built-in transponder in the ignition key. This wireless communication runs on RF(Radio frequency of 125 kHz). The SMARTRA is mounted at the ignition lock close to the antenna coil for RF transmission and receiving. The RF signal from the transponder, received by the antenna coil, is converted into messages for serial communication by the SMARTRA device. And, the received messages from the ECM are converted into an RF signal, which is transmitted to the transponder by the antenna. The SMARTRA does not carry out the validity check of the transponder or the calculation of encryption algorithm. This device is only an advanced interface, which converts the RF data flow of the transponder into serial communication to the ECM and vice versa.
TRANSPONDER (built-in keys)	The transponder has an advanced encryption algorithm. During the key teaching procedure, the transponder will be programmed with vehicle specific data. The vehicle specific data are written into the transponder memory. The write procedure is once only; therefore, the contents of the transponder can never be modified or changed.

TEACHING PROCEDURES

1. Key Teaching Procedure

Key teaching must be done after replacing a defective ECM or when providing additional keys to the vehicle owner.

The procedure starts with an ECM request for vehicle specific data from the tester. The “virgin” ECM stores the vehicle specific data and the key teaching can be started. The “learnt” ECM compares the vehicle specific data from the tester with the stored data. If the data are correct, the teaching can procede.

If incorrect vehicle specific data have been sent to the ECM three times, the ECM will reject the request of key teaching for one hour. This time cannot be reduced by disconnecting the battery or any other manipulation. After reconnecting the battery, the timer starts again for one hour.

The key teaching is done by ignition on with the key and additional tester commands. The ECM stores the relevant data in the EEPROM and in the transponder. Then the ECM runs the authentication required for confirmation of the teaching process. The successful programming is then confirmed by a message to the tester.

If the key is already known to the ECM from a previous teaching, the authentication will be accepted and the EEPROM data are updated. There is no changed transponder content (this is impossible for a learnt transponder).

The attempt to repeatedly teach a key, which has been taught already during the same teaching cycle, is recognized by the ECM. This rejects the key and a message is sent to the tester.

The ECM rejects invalid keys, which are presented for teaching. A message is sent to the tester. The key can be invalid due to faults in the transponder or other reasons, which result from unsuccessful programming of data. If the ECM detects different authenticators of a transponder and an ECM, the key is considered to be invalid.

The maximum number of taught keys is 4.

If an error occurs during the Immobilizer Service Menu, the ECM status remains unchanged and a specific fault code is stored.

If the ECM status and the key status do not match for teaching of keys, the tester procedure will be stopped and a specific fault code will be stored at ECM.

2. User Password Teaching Procedure

The user password for limp home is taught at the service station. The owner of the vehicle can select a number with four digits.

User password teaching is only accepted by a “learnt” ECM. Before first teaching of user password to an ECM, the status of the password is “virgin”. No limp home function is possible.

The teaching is started by ignition on, with a valid key and sending the user password by tester. After successful teaching, the status of the user password changes from “virgin” to “learnt”.

The learnt user password can also be changed. This can be done if the user password status is “learnt” and the tester sends authorization of access, either the old user password or the vehicle specific data. After correct authorization, the ECM requests the new user password. The status remains “learnt” and the new user password will be valid for the next limp home mode.

If incorrect user passwords or wrong vehicle specific data have been sent to the ECM three times, the ECM will reject the request to change the password for one hour. This time cannot be reduced by disconnecting the battery or any other actions. After reconnecting the battery, the timer starts again for one hour.

THE USER PASSWORD CAN BE IN THE STATUS

00. Not yet checked

The status is stored in the EEPROM. In case of incorrect or no plausible data from this circuit, the ECM cannot check the status and the ECM sends 00.

01. Learnt

The password has been taught successfully to the ECM.

02. Virgin

This is the status at the end of the ECM production line before delivery to the final customer.

04. Locked by timer

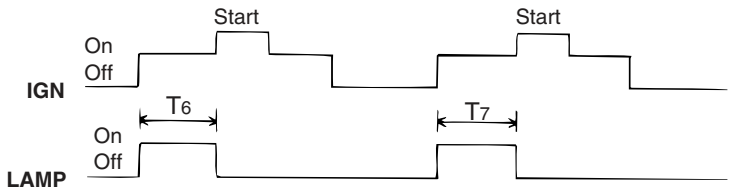
After a certain number of incorrect inputs, the ECM is locked for one hour and no inputs are accepted during this time.

05. Teaching not accepted

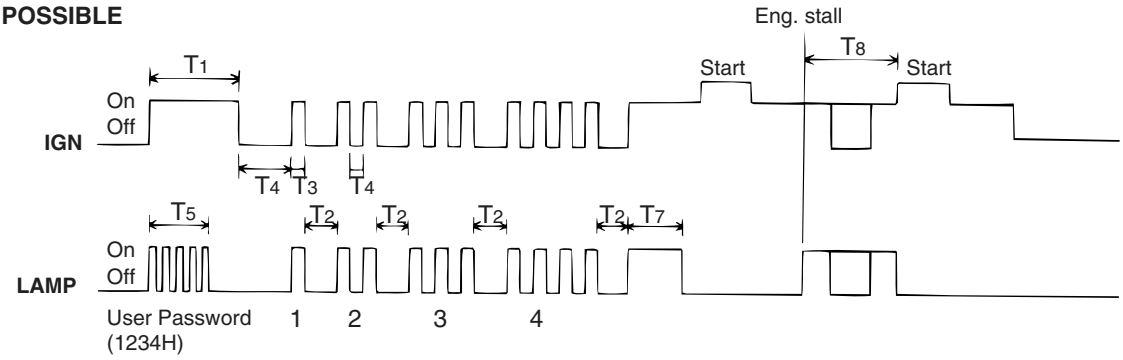
This status is set if, for example, the ECM is in neutral status.

LIMP HOME FUNCTION

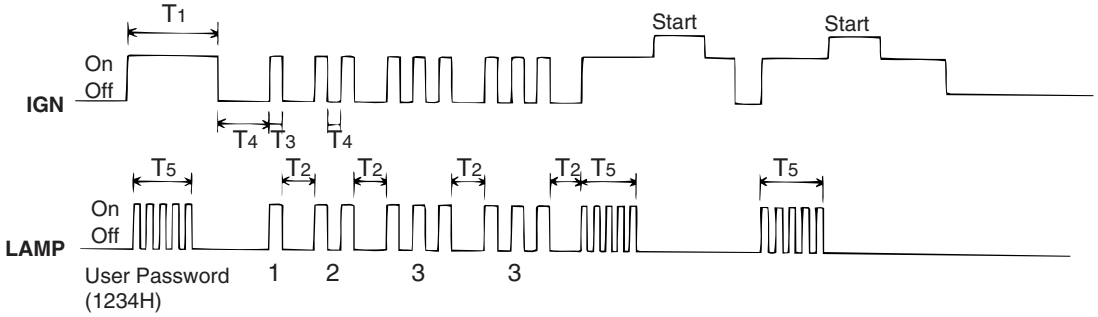
o **NORMAL CONDITION**



o **START POSSIBLE**



o **START IMPOSSIBLE**



NOTE

T1 > 5 sec

3 sec <T2 < 10 sec

0.2 sec <T3 < 5 sec

0.2 sec <T4 < 3 sec

T5 = 5 sec

T6 < 5 sec

T7 < 30 sec

T8 < 8 sec

ETPD700E

1. **LIMP HOME BY TESTER**
   If the ECM detects the fault of the SMARTRA or transponder, the ECM will allow limp home function of the immobilizer. Limp home is only possible if the user password (4 digits) has been given to the ECM before. This password can be selected by the vehicle owner and is programmed at the service station.
   The user password can be sent to the ECM via the special tester menu.
   Only if the ECM is in status "learnt" and the user password status is "learnt" and the user password is correct, the ECM will be unlocked for a period of time (30 sec.). The engine can only be started during this time. After the time has elapsed, engine start is not possible.
   If the wrong user password is sent, the ECM will reject the request of limp home for one hour. Disconnecting the battery or any other action cannot reduce this time. After econnecting the battery to the ECM, the timer starts again for one hour.

2. **LIMP HOME BY IGNITION KEY**
   The limp home can be activated also by the ignition key. The user password can be input to the ECM by a special sequence of ignition on/off.
   Only if the ECM is in status "learnt" and the user password status is "learnt" and the user password is correct, the ECM will be unlocked for a period of time (30 sec.). The engine can be started during this time. After the time has elapsed, engine start is not possible. After a new password has been input, the timer (30 sec.) will start again.
   After ignition off, the ECM is locked if the timer has elapsed 8 seconds. For the next start, the input of the user password is requested again.

DIAGNOSIS OF IMMOBILIZER FAULTS

THE DIAGNOSIS MONITORS :

- Communication between the ECM and the SMARTRA.
- Function of the SMARTRA and the transponder.
- Data (stored in the ECM) related to the immobilizer function.

There are four different faults that are assigned to the immobilizersystem. Every fault is broken down into four different types (circuit malfunction,circuit range / performance problem, low input, high input). The followingtable shows the assignment of immobilizer related faults to each type :

Immobilizer Related Faults	Fault types	Diagnostic codes
Transponder Fault	Invalid transponder data	P1801
	Transponder not in password mode or transport data has been changed	
	Programming error	
SMARTRA Fault	Antenna error	P1800
	Invalid request from ECM or corrupted data	P1803
	No answer from SMARTRA	P1610
	Invalid message from SMARTRA to ECM	
EEPROM	Inconsistent data of EEPROM	P1805
	Invalid write operation to EEPROM	
Immobilizer indicator or ECM Faults	Not plausible immobilizer indicator stored at ECM	P1805
	No valid data from SMARTRA after 3 attempts by ECM	
	Invalid tester message or unexpected requests by tester	

REPLACEMENT OF ECM AND SMARTRA

In case of a defective ECM, the unit has to be replaced with a"virgin" or "neutral" ECM. All keys have to be taught to the new ECM. Keys,which are not taught to the ECM, are invalid for the new ECM (Refer to keyteaching procedure). The vehicle specific data have to be left unchangeddue to the unique programming of transponder.

In case of a defective SMARTRA, there is no special procedurerequired. A new SMARTRA device simply replaces the old one. There are no transponder-related data stored in this device.

NEUTRALISING OF ECM

The ECM can be set to the "neutral" status by a tester.

A valid ignition key is inserted and after ignition on is recorded,the ECM requests the vehicle specific data from the tester. The communicationmessages are described at "Neutral Mode". After successfully receiving thedata, the ECM is neutralized.

The ECM remains locked. Neither the limp home mode nor the "twiceignition on" function, is accepted by the ECM.

The teaching of keys follows the procedure described for the virginECM. The vehicle specific data have to be unchanged due to the unique programmingof the transponder. If data should be changed, new keys with a virgin transponderare requested.