SECTION 1

General Information	A1
Maintenance	A2
Engine	B1
Engine Mechanical	B2
Intake System	B3
Exhaust System	B4
Lubrication System	B5
Cooling System	B6
Fuel System	B7
Engine Control System	B8
Emission Control System	B9
Ignition System	B10
Starting System / Charging System	B11
Engine Mounting	B12
Front suspension	C1
Rear Suspension	C2
Wheel & Tire	C3
Drive Shaft / Propeller Shaft / Axle	D2
Brake	E1
Parking Brake	E2
Brake Control	E3
Clutch	F1
Manual Transmission / Manual Transaxle	F2
Steering	G1
Power Steering	G2
SRS Airbag System	H1
Body	I1
Exterior / Interior	I2
Windshield Windowglass / Mirror	I3

SECTION 2

Door Lock & Theft Deterrent	I4
Sunroof / T-Ber Roof / Convertible	I5
Lighting	J1
Wiper & Washer	J2
Meter	J3
Audio & Visual System	J4
Heater and Air Conditioner	K1
Wiring Diagrams - A, B, C & D	L1

TO INDEX

A1 GENERAL INFORMATION

IMPORTANT SAFETY NOTICE ---------- A1 - 1
GENERAL DESCRIPTION---------- A1 - 1
WARNINGS, CAUTIONS AND NOTES ---------- A1 - 1
GENERAL WARNINGS---------- A1 - 2
HOW TO USE THIS MANUAL ---------- A1 - 3
ARTICLES TO BE PREPARED---------- A1 - 3
REMOVAL AND INSTALLATION PROCEDURES ---------- A1 - 3
DESCRIPTION OF SERVICE STANDARD VALUE---------- A1 - 4
CONTENTS NOT DESCRIBED IN THIS MANUAL ---------- A1 - 5
DEFINITIONS OF TERMS---------- A1 - 5
ABBREVIATION CODES---------- A1 - 6
HOW TO GRASP SPECIFIED TIGHTENING TORQUE FOR GENERAL STANDARD BOLT AND NUT ---------- A1 - 7
DETERMINING PROCEDURE FOR TIGHTENING TORQUE FOR GENERAL STANDARD BOLTS AND NUTS ---------- A1 - 7
UNIT ---------- A1 - 9
NEW UNIT BECAUSE OF THE INTRODUCTION OF THE SI UNIT ----- A1 - 9
GENERAL SERVICE INSTRUCTION --- A1 - 10
SUPPORTING POINTS FOR JACKS AND SAFETY STANDS---------- A1 - 12
JACKING POINTS---------- A1 - 12
SUPPORTING POINTS OF SAFETY STANDS---------- A1 - 13
SUPPORTING POINTS OF LIFTS------- A1 - 14
SWING ARM TYPE ---------- A1 - 14
PLATE TYPE---------- A1 - 14
TOWING INSTRUCTIONS---------- A1 - 15
TOWING WITH ROPE(ONLY FOR EMERGENCY)---------- A1 - 15
USING FLAT BED TRUCK---------- A1 - 15
WHEEL LIFT TYPE ---------- A1 - 15
DIAGNOSTICS INSTRUCTIONS--------- A1 - 16
DIAGNOSIS---------- A1 - 16
DATA LINK CONNECTOR ---------- A1 - 18
DATA LINK CONNECTOR TERMINAL ARRANGEMENT ---------- A1 - 18
CONNECTION METHOD OF DATA LINK CONNECTOR---------- A1 - 18
CONNECTION METHOD OF EACH SYSTEM ---------- A1 - 18
INSTRUCTIONS FOR SYSTEM INSPECTION ---------- A1 - 19
HANDLING INSTRUCTION OF CONNECTOR ---------- A1 - 19
CONNECTOR REMOVAL/INSTALLATION PROCEDURE---------- A1 - 19
CHECK PROCEDURE OF WIRE HARNESS AND CONNECTOR-------- A1 - 21
CIRCUIT INSPECTION OF COMPUTER UNIT---------- A1 - 22
HANDLING INSTRUCTION OF SYSTEM ---------- A1 - 23
INSTRUCTIONS FOR RADIO INSTALLATION---------- A1 - 24
HANDLING INSTRUCTIONS ON CATALYTIC CONVERTER-EQUIPPED VEHICLES---------- A1 - 24
PRECAUTION FOR VEHICLES EQUIPPED WITH SRS AIRBAG AND SEAT BELT PRETENSIONER ---------- A1 - 25
INSTRUCTIONS FOR SERVICE OPERATION ---------- A1 - 25
VEHICLE IDENTIFICATION ---------- A1 - 27
BODY COLOR CODE ---------- A1 - 27
CHASSIS SERIAL NUMBER ---------- A1 - 27
ENGINE TYPE AND ENGINE NUMBER---------- A1 - 27
MANUFACTURER'S PLATE POSITION ---------- A1 - 28

1 IMPORTANT SAFETY NOTICE

1-1 GENERAL DESCRIPTION

1. The vehicle is a machine comprising a great number of parts. Basically speaking, the vehicle is potentially hazard. However, one can handle it safely if he has the required knowledge.
2. Correct service methods and repair procedures are very vital for assuring not only the safety and reliability of a vehicle, but also the safety of service personnel concerned.
3. The methods and procedures contained in this manual describe in a general way the techniques which the manufacturer has recommended. Thus, they will contribute to ensuring the reliability of the products. The contents of the servicing operations come in a wide variety of ways. Moreover, techniques, tools and parts necessary for each operation are different widely from each other.
4. This manual does not cover all details of techniques, procedures, parts, tools and handling instructions which are necessary for these operations, for such coverage is impossible. Hence, any one who obtains this manual is expected first to make his responsible selection as to techniques, tools and parts which are necessary for servicing the vehicle concerned properly. Furthermore, he must assume responsibility for his actions in connection with his own safety.
5. Therefore, one should not perform any service if he is not capable of making responsible selection and/or if he can not understand the contents herein described, for this manual has been prepared for experienced service personnel.

1-2 WARNINGS, CAUTIONS AND NOTES

1. All these symbols have their specific purposes, respectively.

WARNING

- This symbol means that there is the possibility of personal injury of the operator himself or the nearby workers if the operator fails to follow the operating procedure prescribed in this manual.

CAUTION

- This symbol means that there is the possibility of damage to the component being repaired if the operator fails to follow the operating procedure prescribed in this manual.

NOTE

- To accomplish the operation in an efficient manner, additional instructions concerning the operation are given in this section.

1-3 GENERAL WARNINGS

1-3-1 WARNING OVER THE WHOLE SERVICE OPERATIONS

1. Always wear safety glasses for eye protection.
2. Use safety stands whenever a procedure requires you to be under the vehicle.
3. Be sure that the ignition switch is always in the OFF position, unless otherwise required by the procedure.
4. Set the parking brake when working on the vehicle.
5. Operate the engine only in a well−ventilated area to avoid the danger of carbon monoxide.
6. Keep yourself and your clothing away from moving parts, when the engine is running, especially from the fan and belts.
7. To prevent serious burns, avoid contact with hot metal parts such as the radiator, exhaust manifold, tail pipe, catalytic converter and muffler.
8. Do not smoke while working on a vehicle.
9. To avoid injury, always remove rings, watches, loose hanging jewelry, and loose clothing before beginning to work on a vehicle.
10. Keep hands and other objects clear of the radiator fan blades! The electric cooling fan is mounted on the radiator and can start to operate anytime by a rise in coolant temperature or turning ON of the air conditioner switch in the case of vehicles equipped with an air conditioner. The electric cooling fan is also mounted on the condenser for air conditioner and starts to operate anytime when the air conditioner switch is turned ON. For this reason care should be taken to ensure that the electric cooling fan motor is completely disconnected when working under the hood.

2 HOW TO USE THIS MANUAL

2-1 ARTICLES TO BE PREPARED

When SST, tool, measuring instrument, a sort of fat and oil to be prepared before operation are necessary, those are described by compiling in the table as preparation tools at the beginning of each item.

However, the general tools, jacks, fixtures as considered being equipped always at the service shop are usually omitted.

2-2 REMOVAL AND INSTALLATION PROCEDURES

1. Block diagrams are posted so as to show the installed state of each part.
2. The application of a sort of fat and oil and sealer are instructed in the figure with arrow. And the indication of a tightening torque and non−reusable parts are also described. The explanation of each code is posted below the block diagram concerned.
3. The removal and installation (disassembling and assembling) procedure list is shown just beneath of components figure.
   The removal (disassembling) procedure, the installation (assembling) procedure and parts name are described in the sequence from left side of list. And the alphabet written before a part name links with alphabet in the figure.
4. In principle, reverse the removal (or disassembly) procedure to install (or assemble) the parts.

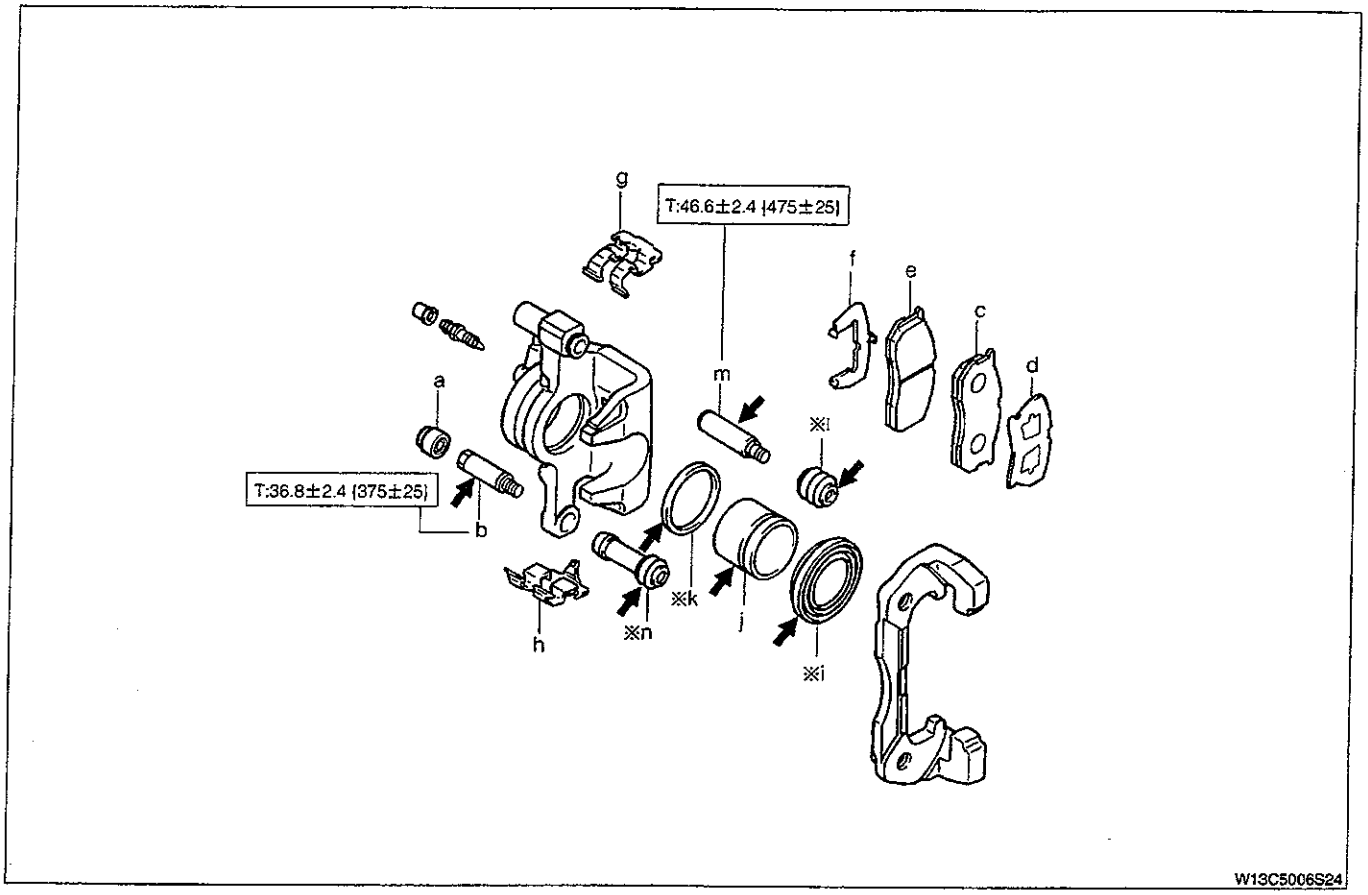
NOTE

- **Only in cases where the installation (or assembly) can not be carried out by reversing the removal (or disassembly) procedure, the installation (or assembly) procedure is provided.**

5. In cases where a special procedure is required for the operation, a marking "▼▲" is provided in front of the removal (or disassembly) procedure. Furthermore, explanation is given in the "Main points of Removal (Disassembly)" or the "Main points of Installation (Assembly)."
   The marking "▼"shows that there are the "Main points of Removal (Disassembly)," whereas "▲" shows that there are the "Main points of Installation (Assembly)."

2-2-1 ENTRY EXAMPLE

(1) COMPONENTS



➡ : Rubber grease
※: Non−reusable part
Unit:N·m{kgf·cm}

(2) DISASSEMBLY AND ASSEMBLY PROCEDURES

1 a Cap, cylinder slide pin
2 b Pin, cylinder slide, No.1
▲ 3 c Pad, disc brake, No.2
4 d Shim, anti squeal, No.1
▲ 5 e Pad, disc brake w/ indicator. No.1
6 f Shim, anti squeal, No.1
7 g Plate, disc brake pad guide
8 h Plate, disc brake pad guide
9 i Boot, cylinder
▼ 10 j Piston, disc brake
11 k Seal, piston
12 l Boot, pin
13 m Pin, cylinder slide, No.1
14 n Bush, cylinder slide

2-3 DESCRIPTION OF SERVICE STANDARD VALUE

The necessary service standard value for inspection and service operation are described with bold letter in the text as standard and allowable limit. The details of terms are described in the section for definition of terms.

2-4 CONTENTS NOT DESCRIBED IN THIS MANUAL

The description of the next elemental operation may omit in this service manual, but please perform in an actual operation.

1.Jacking operation and lifting operation
2.Cleaning and cleansing of removed parts to perform at need
3.Visual inspection

2-5 DEFINITIONS OF TERMS

SPECIFIED VALUE	This mark shows the standard value at the time of the check or adjustment.
ALLOWABLE LIMIT	This mark shows the maximum or minimum value at the time of the check or adjustment.
DEVIATION	This value refers to the difference between the maximum clearance and the minimum clearance.

3 ABBREVIATION CODES

The abbreviation codes that appear in this manual stand for the following, respectively.

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

4 HOW TO GRASP SPECIFIED TIGHTENING TORQUE FOR GENERAL STANDARD BOLT AND NUT

4-1 DETERMINING PROCEDURE FOR TIGHTENING TORQUE FOR GENERAL STANDARD BOLTS AND NUTS

4-1-1 DETERMINING PROCEDURE FOR TIGHTENING TORQUE FOR BOLTS

Determine the strength division of bolts, based on the table below.
Then, obtain the value, based on the tightening torque table.

4-1-2 DETERMINING PROCEDURE FOR TIGHTENING TORQUE FOR NUTS

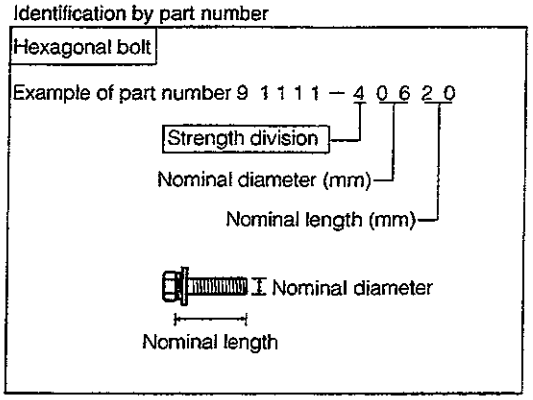
Determine with the aforesaid method, based on the mating bolt.

4-1-3 IDENTIFICATION

Identification of strength division by checking bolts themselves

Classification (Strength division)	Shape of head (how to know strength division)	
	Bolt without collar	Bolt with collar
4 T		
5 T		—
6 T	— —	
7 T		—

Identification by part number



L11S5003ES20

4-1-4 TIGHTENING TORQUE TABLE FOR GENERAL STANDARD BOLTS

Strength divisin	Nominal diameter (mm)	Pitch (mm)	Standard tightening torque (N·m{kgf·cm})	
			Bolt without collar	Bolt with collar
4 T	6	1.0	5.4 {55}	5.9 {60}
	8	1.25	13 {130}	14 {145}
	10	1.25	25 {260}	28 {290}
	12	1.25	47 {480}	53 {540}
	14	1.5	74 {760}	83 {850}
	16	1.5	113 {1150}	–
5 T	6	1.0	6.4 {65}	–
	8	1.25	16 {160}	–
	10	1.25	32 {330}	–
	12	1.25	59 {600}	–
	14	1.5	91 {930}	–
	16	1.5	137 {1400}	–
6 T	6	1.0	7.8 {80}	8.8 {90}
	8	1.25	19 {195}	20.5 {210}
	10	1.25	39 {400}	43 {440}
	12	1.25	72 {730}	79 {810}
	14	1.5	109 {1100}	123 {1250}
7 T	6	1.0	11 {110}	12 {120}
	8	1.25	25 {260}	28 {290}
	10	1.25	52 {530}	58 {590}
	12	1.25	95 {970}	103 {1050}
	14	1.5	147 {1500}	167 {1700}
	16	1.5	225 {2300}	–

5 UNIT

As for the units, the SI units (international unit system) have been posted. (The hitherto—employed units, too, are posted.)

Example: 33.25±13.25N·m{340±135kgf·cm}

5-1 NEW UNIT BECAUSE OF THE INTRODUCTION OF THE SI UNIT

1.SI unit is the international unit system established by aiming to proceed the communication in technology smoothly by unifying the former unit system which were different internationally each other into one value by one unit. The specification value is described in accordance with SI unit system in this service manual.

ITEM	SI unit	Conventional units	Conversion table
Force	N	kgf	1kgf = 9.80665 N
Torque	N·m	kgf·cm	1kgf·cm = 0.0980665 N·m
Pressure	kPa	kgf/cm^2	1kgf/ cm^2 = 98.0665 kPa
		mmHg	1mmHg = 0.133322 kPa
Spring constant	N/mm	kgf/mm	1kgf/mm = 9.80665 N/mm
Volume	ℓ	cc	1000cc = 1ℓ
Power	kW	PS	1PS = 0.735499 kW

6 GENERAL SERVICE INSTRUCTION

1. Use fender covers, seat covers, and floor sheets so that the vehicle may not get dirty or be scratched.
2. Jacking up
   (1) When only front section or rear section of a vehicle is jacked up, be sure to place chocks at the wheels so as to insure safe operations.
   (2) When the vehicle has been jacked up, be sure to support the vehicle at the specified section using the safety stands.
   (3) When the vehicle has been lifted up, be sure to set the cradle of the lift at the specified location, and lift it up. And after the jacking up, ensure to apply the protective safety device.
   And after the jacking up, ensure to apply the protective safety device.
   (4) The jack—up operation must be carried out only on a level, flat place.
   (5) Never jack up the vehicle at the front and rear sides at the same time.
3. Installation and removal of battery terminal
   (1) Before you start performing the electrical works, make certain to disconnect the battery ground cable terminal from the negative terminal of the battery.
   (2) Before disconnecting the battery ground cable terminal from the negative terminal of the battery, be sure to read out the diagnosis code of the EFI systems if it is equipped.
   (3) After reconnecting the battery ground cable terminal to the negative terminal of the battery, be sure to reset the watch or radio, if the vehicle is equipped with such equipment.
   (4) When it becomes necessary to disconnect the battery power supply for the purpose of carrying out checks or repairs, always disconnect the negative terminal of the battery ground cable from the negative terminal of the battery first.
   (5) To avoid damaging battery plates, after the terminal nut has been loosened, pull out the battery ground cable terminal straight upward, rather than turning or prying the terminal.
   (6) Be sure to employ a battery terminal puller (commercially available) to remove battery ground cable terminal from the negative terminal of the battery, if any difficulty is encountered.
   (7) Clean the battery terminal posts or battery ground cable terminals, using a cloth. Never use a file or other abrasive agents.
   (8) Install the battery cable terminals to the battery posts after loosing the nuts, and tighten the nuts after installation. Never tap the terminals on the battery posts using a hammer or the like.
   (9) As for the cover at the positive (+) terminal side, be sure to install it at the correct position.
4. Repairing of fuel system
   (1) Do not work near open flames.
   (2) Be certain to place a suitable container, a cloth, etc. under the connected section of the fuel line before disconnecting the fuel line.
   (3) Before the fuel line is disconnected, be sure to release the inner pressure of the fuel tank by detaching the fuel filler cap.
   (4) Be sure to prevent the fuel from splashing with a cloth or the like, when the union bolt or other connected section of the fuel line is loosened or slackened.
   (5) Tighten each connecting section to the specified torque.
   (6) Attach the specified clips to each connecting section.
5. For increased work efficiency and improved accuracy, be sure to utilize the SSTs (Special Service Tools) effectively.

6.Removal, Disassembly

(1) In case for the operation at the complicate place, the stamping and mating mark shall be put at the place where there is no influence to the function, so that the assembling operation becomes easy.

(2) At every time when each parts are removed, check the condition when it was assembled , deformation, breakage, roughness and existence of scratch .

(3) Arrange the removed parts in order, and divide them to the parts to replace and parts to reuse .

(4) Each parts to be reused shall be performed enough cleaning and cleansing operation.

7.Check and measurement of parts

(1) As regards those parts to be used again, perform thorough checks and measurements, as required.

8.Installation, Assembling

(1) Assemble the good parts with correct procedure following the specified standard (value for the adjusting , tightening torque).

(2) Use the genuine parts when replace the parts.

(3) Ensure to apply the seal packing and grease by a place.

(4) Ensure to use new packing, gasket or the like, cotter pin etc.

(5) When use the seal bolt, apply the specified liquid gasket and seal lock agent on.

(6) As for bolts and nuts, use the specified ones. Unless otherwise specified, the side for which the torque is indicated should be tightened to the specified torque, using a torque wrench. If there is no means to prevent the turning at the opposite side, be sure to prevent turning with box wrenches, spanners or the like.

9.Adjustment, Operation confirmation

(1) Adjust with the specified service standard value by using the gauge and the tester.

10.Handling of hose or the like

(1) Ensure to insert the fuel hose, water hose or the like without coming out or leakage.

(2) Be careful that fuel shall not splash on the parts near by when remove the fuel hose. (Deep care shall be paid for engine mount rubber or the like, as there may be possibility to get material deterioration for liquid of gasoline series.)

11.Touch up

(1) When removed the bolt or the like during body fitting operation and others, the scratch of the paint finishing surface on the body and bolt shall be repaired by the body color.

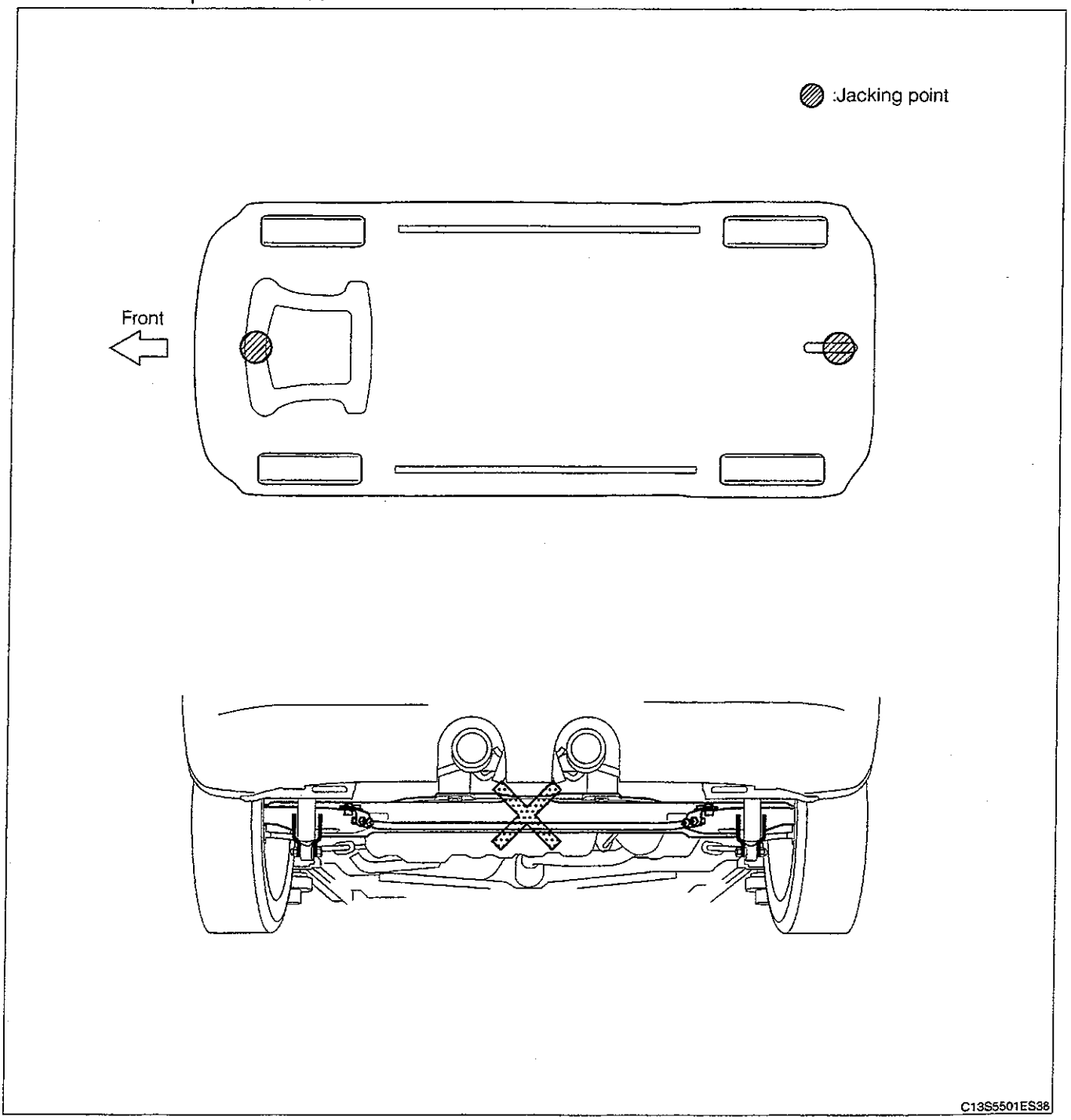
7 SUPPORTING POINTS FOR JACKS AND SAFETY STANDS

7-1 JACKING POINTS

CAUTION

- Be sure to set the jack in such a way that jack may not interfere with the bumper.
- Never apply a jack to the rear suspension intermediate beam section.
  Failure to observe this instruction may hamper the controllability due to beam deformation or breakage.

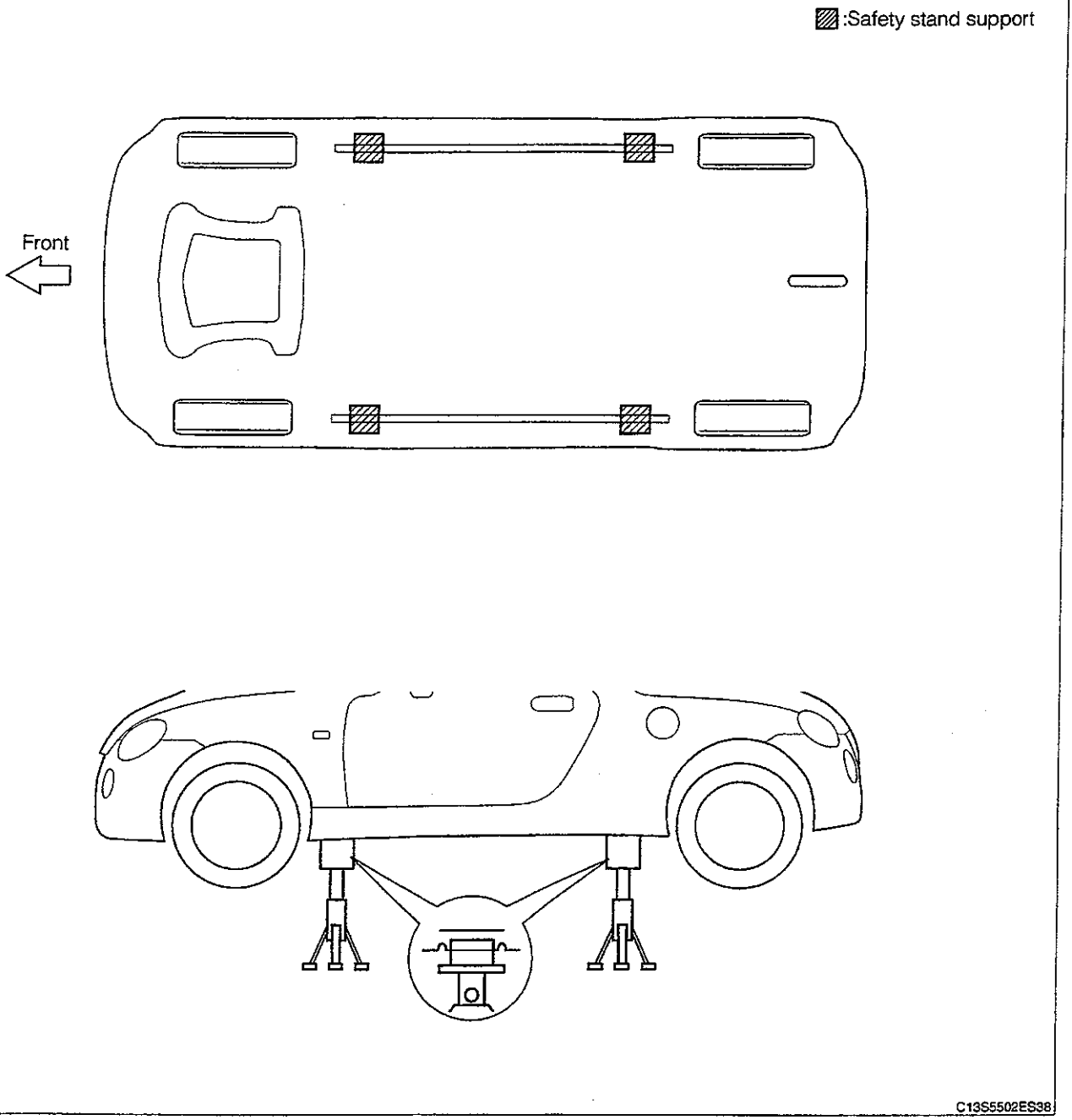
Jacking points
·Front side: Central projection at the front of the front frame
·Rear side: Transport hook section



7-2 SUPPORTING POINTS OF SAFETY STANDS

CAUTION

- Never support the vehicle at points other than the specified points.

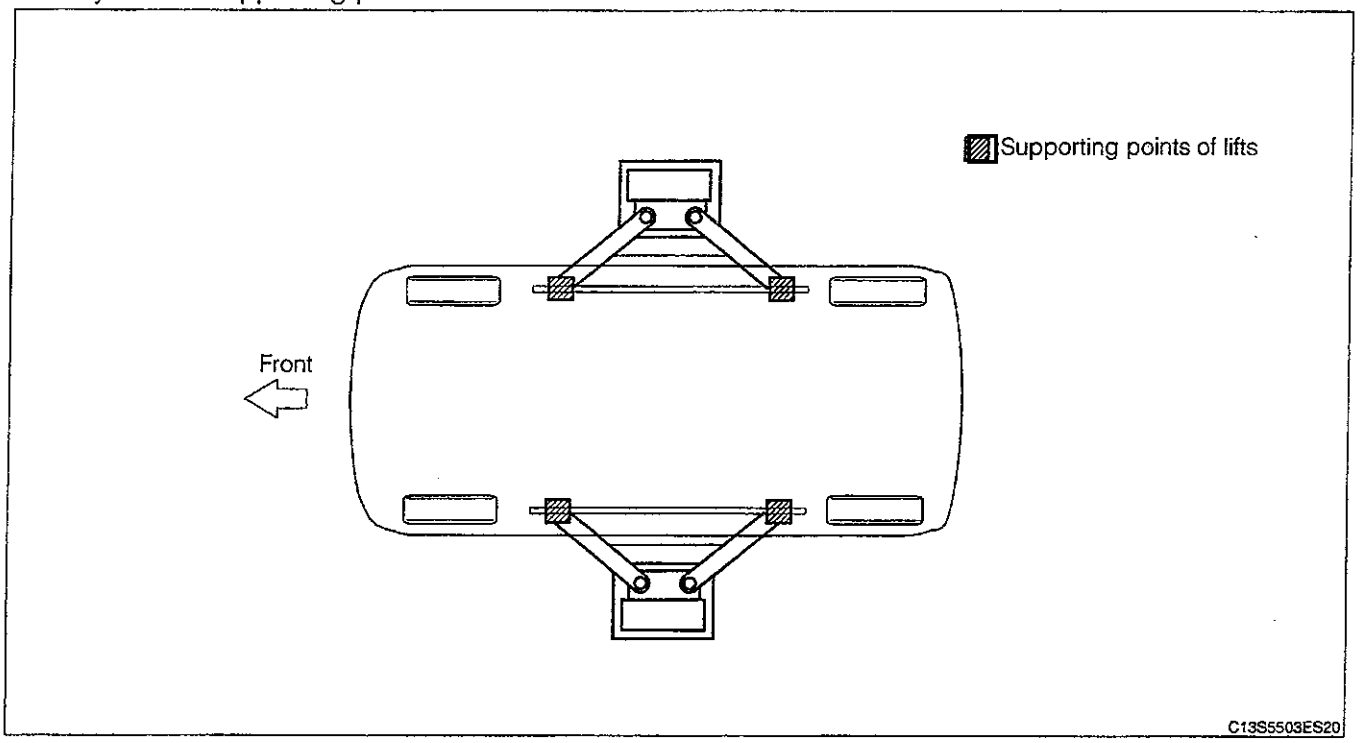


8 SUPPORTING POINTS OF LIFTS

8-1 SWING ARM TYPE

Supporting points of lifts:

·Safety stands supporting point

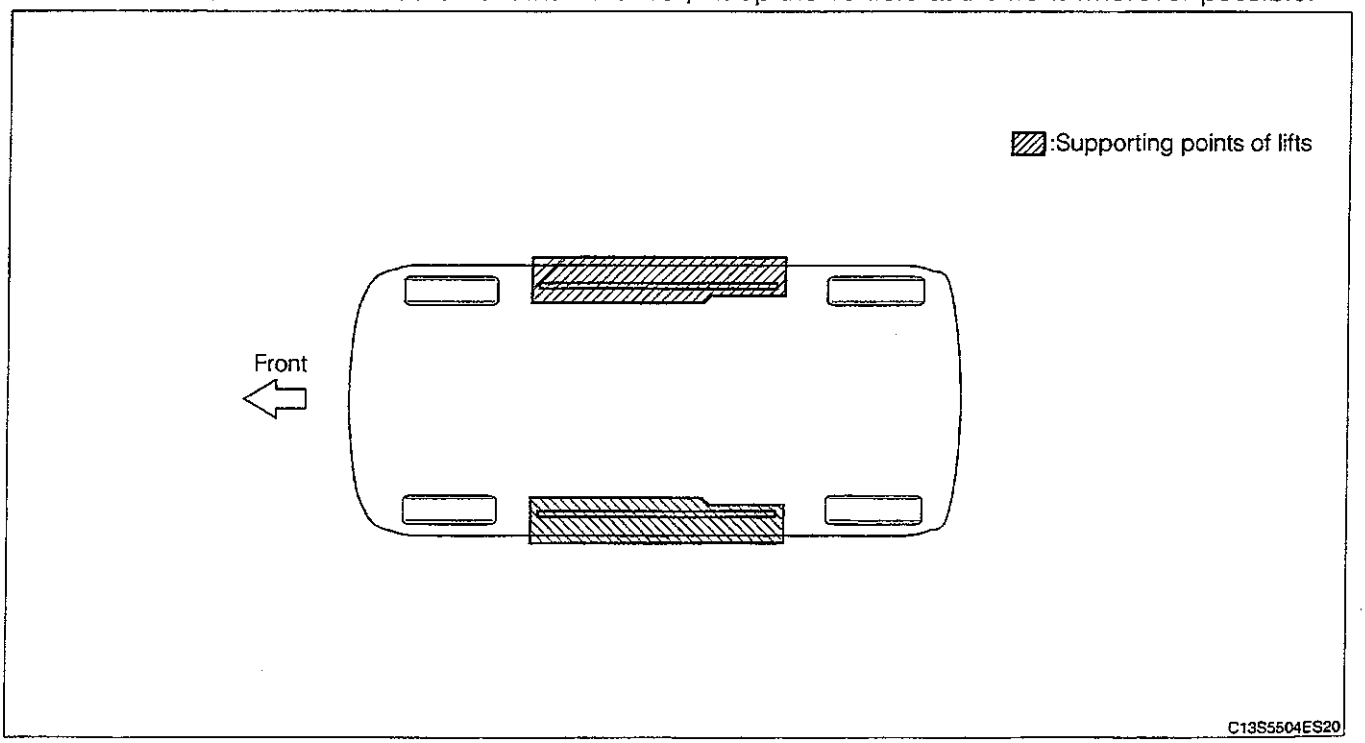


8-2 PLATE TYPE

Supporting points of lifts:

·Drive the vehicle onto the center of the supporting platforms both at the right and left.

·Since the vehicle is heavier at the front than the rear, lift up the vehicle at the front wherever possible.



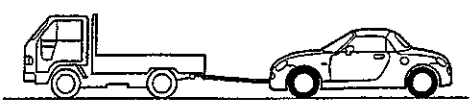
9 TOWING INSTRUCTIONS

1.Be certain to transfer the vehicle by using the flat deck truck when the running system and/or driving system seems to be abnormal.

9-1 TOWING WITH ROPE(ONLY FOR EMERGENCY)

Release parking brake, and turn IG switch to ACC position, and then put the sift lever into neutral range.

Towing with rope

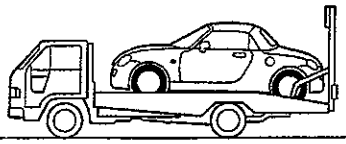


C13S5508ET10

9-2 USING FLAT BED TRUCK

1.Transfer the vehicle with applying parking brake and fixing the vehicle firmly.

Using flat bed type



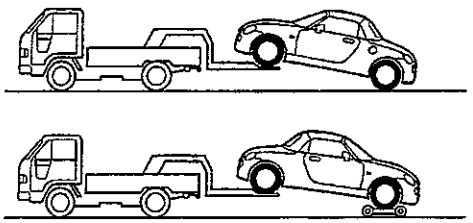
C13S5506ET10

9-3 WHEEL LIFT TYPE

CAUTION

- **Do not allow anyone to be in the vehicle being towed.**

Wheel lift type



C13S5507ET10

9-3-1 TO TOW WITH REAR WHEELS ON GROUND

1.Release the parking brake.

9-3-2 TO TOW WITH FRONT WHEELS ON GROUND

1.Use a towing dolly.

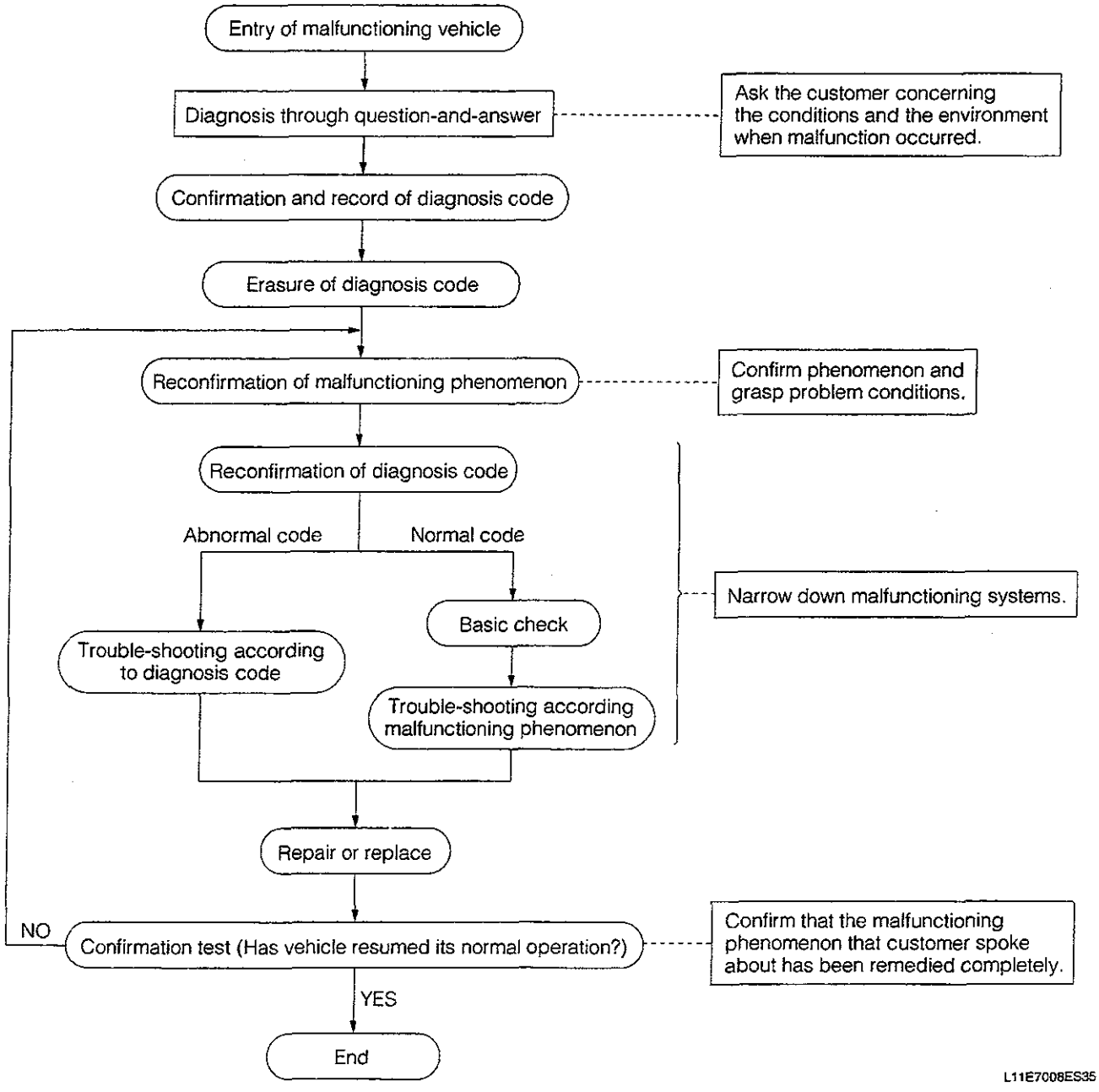
2.If a towing dolly is not available, and turn IG switch to ACC position, and then put the sift lever into neutral range (for manual transmission vehicle).

10 DIAGNOSTICS INSTRUCTIONS

10-1 DIAGNOSIS

10-1-1 HOW TO PROCEED DIAGNOSIS

1 Each electronic control system equipped on the vehicle is an important clue at performing trouble shooting. Also this system has self−diagnosis function to inspect the malfunction portion which occurred in corresponding system, and battery back up (the function that power source for diagnosis code memory is supplied even if IG switch is OFF) is equipped for self−diagnosis function of electronic control system with, and is designed so that diagnosis code is memorized to each system. As the function of diagnosis code memory is different by each system, perform the confirmation / elimination of code memory according to the right operation procedure after confirming equipped diagnosis code memory function.



10-1-2 SYMPTOM CONFIRMATION

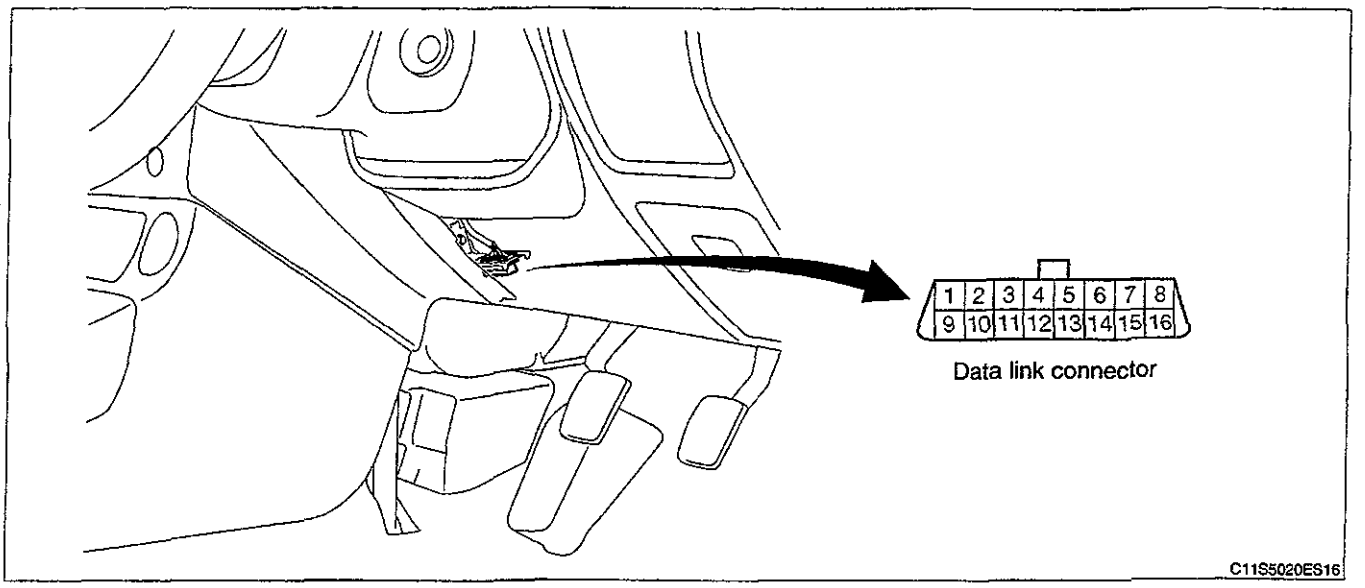
1. When conducting a trouble shooting, the operator cannot pinpoint the cause for the malfunction, unless he actually confirms the phenomenon. For this purpose, it is indispensable to reproduce the malfunctioning phenomenon by creating conditions and environments that are similar to those where the malfunction actually took place, based on the information obtained through the inquiry with the customer. As for phenomena which cannot be reproduced easily, it is necessary to produce running conditions that are close to those when the malfunction took place (road surface condition, weather condition, and driving condition), based on the information obtained through the inquiry with the customer. To this end, it is of great importance to try to reproduce the malfunction persistently by applying external factors, such as vibration (moving wire harnesses and relays by hand), heat (applying hot air), and water (applying moisture). Furthermore, while the malfunction phenomenon is being reproduced, it is essential to check diagnosis codes indicated before and after the confirmation of the malfunction phenomenon. Checking whether the code that was indicated before the confirmation is outputted or not is also an important step for confirming the malfunction phenomenon.

10-1-3 CUSTOMER PROBLEM ANALYSIS

1. For the vehicle which malfunctions occurred, confirm first the malfunction phenomenon, and study the cause and then eliminate the cause. There is possibility that the vehicle does not return to normal condition even if perform many operation without study of cause. An asking about problems is to gather the information from the customer before confirming the malfunction phenomenon, and become an important clue when attempt to reproduce the malfunction. When perform the asking about problem, it is necessary to focus to the items relating to said malfunctions so that information attained with an asking about problems becomes useful reference of trouble shooting.

11 DATA LINK CONNECTOR

11-1 DATA LINK CONNECTOR TERMINAL ARRANGEMENT



No	Terminal code	No	Terminal code
①	BAT(DS−21)	⑨	ITC-T
②	–	⑩	SIO(DS−21)
③	–	⑪	–
④	ECU-T	⑫	E(Signal earth)
⑤	EFI-T	⑬	E(Body earth)
⑥	W (immobilizer)	⑭	–
⑦	–	⑮	–
⑧	REV	⑯	VF

11-2 CONNECTION METHOD OF DATA LINK CONNECTOR

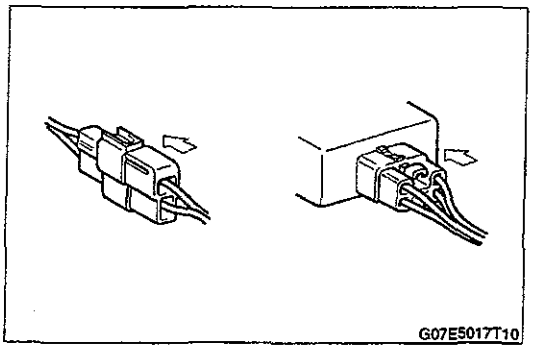
Perform it by connecting the engine control system inspection wire (SST) with the data link connector. Perform the system check of each system by using the terminal for Connect circuit (SST), the terminal for detecting engine speed and the terminal for VF output monitoring (SST).

11-3 CONNECTION METHOD OF EACH SYSTEM

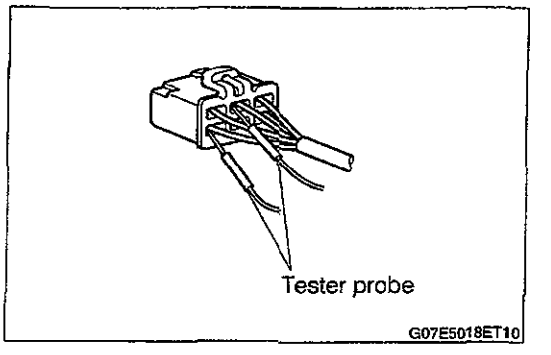
1.Diagnosis code output of engine control system
: Connect circuit between EFI-T − E
2.Functioning check of O_2 sensor for engine control system
: Measure between VF −E
3.Engine speed check of engine control system
: Measure between REV − Body earth
4.Diagnosis code output of ABS system
: Connect circuit between ECU-T − E
5.Diagnosis code output of SRS airbag system
: Connect circuit between ECU-T − E
6.Diagnosis code output of immobilizer system
: Connect circuit between ECU-T − E, SST between BAT(DS−21) −W(Immobilizer)
7.Operation check of body integrated controller and hazard lamp system
: Connect circuit between ITC-T − E
8.Diagnosis code output of electric opening/closing roof system
: Connect circuit between ECU-T − E

12 INSTRUCTIONS FOR SYSTEM INSPECTION

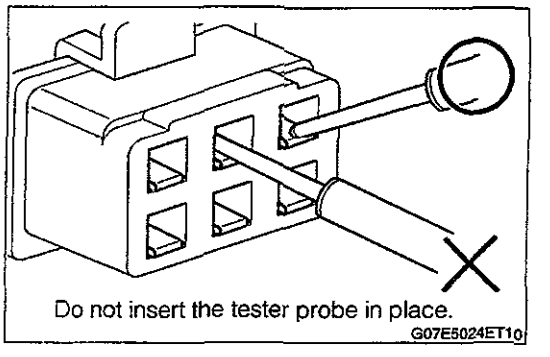
12-1 HANDLING INSTRUCTION OF CONNECTOR



1. Connection or disconnection of the connector and each terminal shall be performed basically after the removal of negative terminal of the battery.
   However, there may be the case that diagnosis code is erased when remove the negative terminal of battery, so confirm the diagnosis code first before the removal of battery negative terminal when need to confirm.
2. When disconnecting connectors, be sure to hold the connector itself with the connector unlocked.
   Never pull harnesses. When connecting connectors, be sure to positively insert the connectors, until you hear a clicking sound and the lock is engaged.
3. When inserting tester probes into a connector, insert them from the rear side of the connector.



4. For water–proof connectors which cannot be accessed from behind, take good care not to deform the connector terminals.
5. *Never touch the terminal of connector directly by hand.*
6. When a tester probe is applied to a terminal to which voltage is applied, care must be exercised so that two tester probes may not come in contact with each other so that short circuit may not take place.



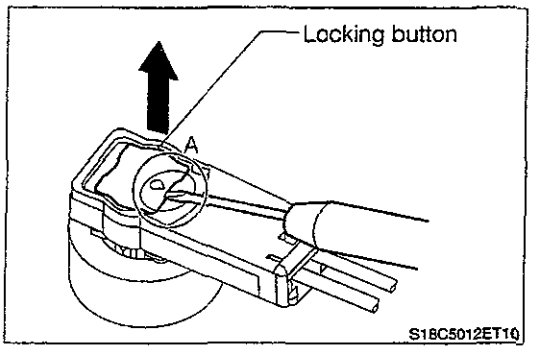
12-2 CONNECTOR REMOVAL/INSTALLATION PROCEDURE

12-2-1 CONNECTOR WITH LOCKING BUTTON

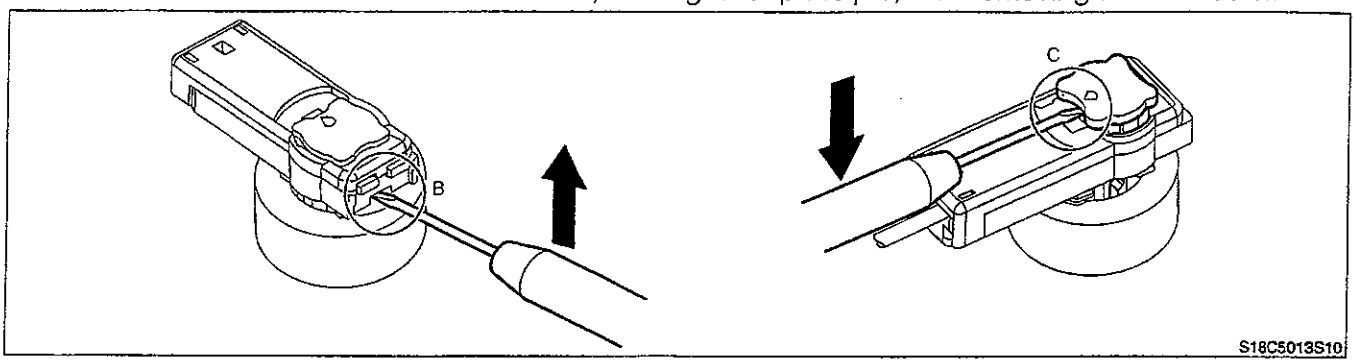
(1) Type 1

① POINTS OF REMOVAL

1. Insert a flat screwdriver with a thin forward end (approx. 2 mm wide) into the locking button at the point A. Raise the locking button, utilizing lever principle, until you hear a clicking sound, thus unlocking the connector.

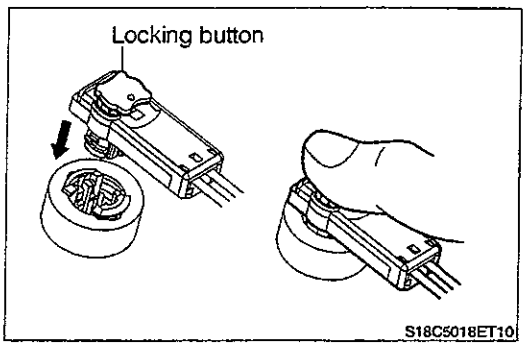


2.Insert a flat screwdriver with a thin forward end (approx. 2 mm wide) at the point B or C. Pry the point with the screwdriver in the arrow direction, utilizing lever principle, thus removing the connector.



② **POINTS OF INSTALLATION**

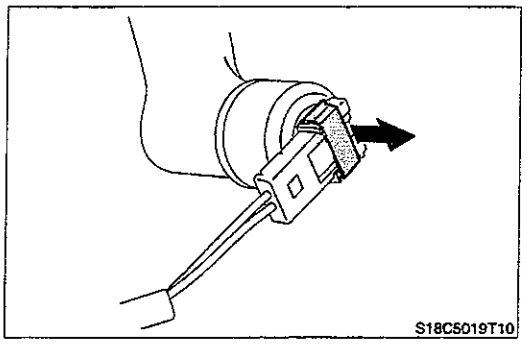
1.Insert the connector firmly as far as it goes. Push and lock the connector, until the locking button clicks.



(2) Type 2

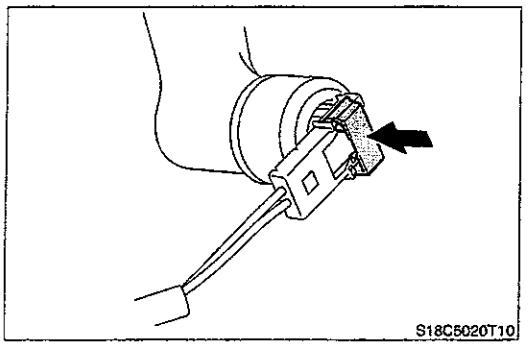
① **POINTS OF REMOVAL**

1.With a flat screwdriver with a thin forward end, pull out the locking button in the arrow direction, thus unlocking the lock. Then, remove the connector.



② **POINTS OF INSTALLATION**

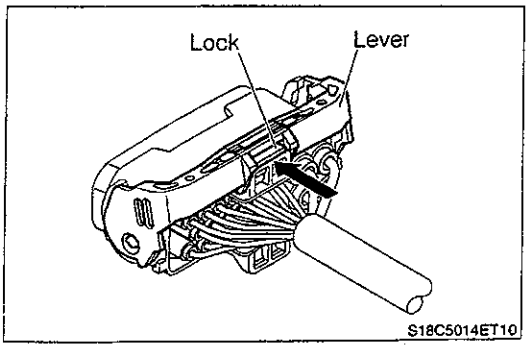
1.Insert the connector firmly as far as it goes. Push and lock the connector, until the locking button clicks.



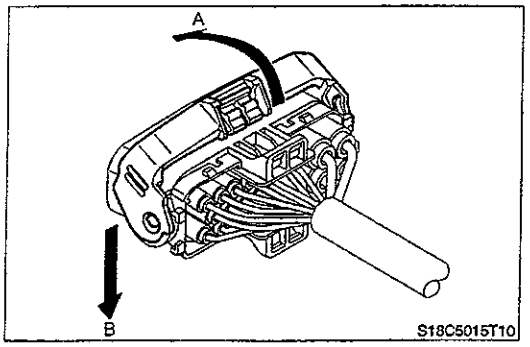
12-2-2 CONNECTOR WITH LEVER LOCK

(1) POINTS OF REMOVAL

1.Push the lock of the lever section in the arrow direction, thus unlocking the lock.

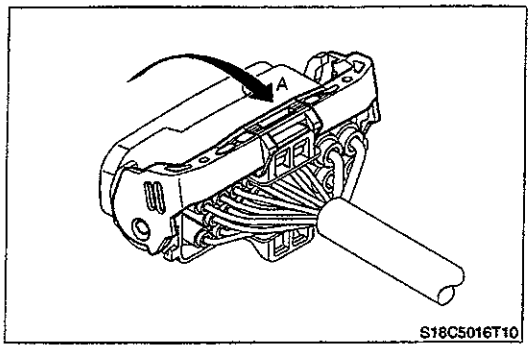


2.Turn the lever about 40°in the direction A. Then, apply force in the direction B to turn the lever.
3.Ensure that the lever has been turned fully. Then, remove the connector.



(2) POINTS OF INSTALLATION

1.Insert the connector to the mating side. Turn the lever in the direction A to lock the connector.



12-3 CHECK PROCEDURE OF WIRE HARNESS AND CONNECTOR

Perform the inspection of wire harness and connector portion in the distinctive system inspection in accordance with next points.

12-3-1 CONTINUITY INSPECTION

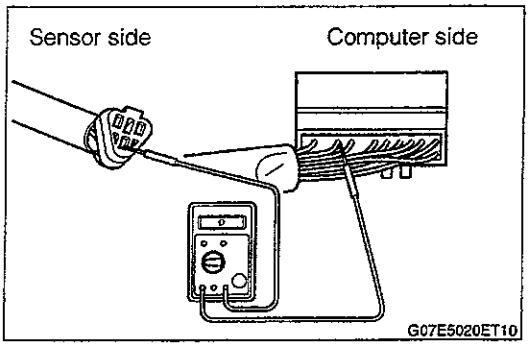
1.Remove the connector of corresponding harness on both ends.
2.Measure the electrical resistance between corresponding terminals of connector on both end.
SPECIFIED VALUE: Not more than 1Ω

CAUTION

- Measure the electrical resistance while shaking wire harness in top and down and right and left lightly.

NOTE

- In case of open circuit, as it is seldom that open circuit happen in central part of wiring harness, and most of part the open circuit happen are connector area. Particularly, check the connector of the sensor portion carefully.

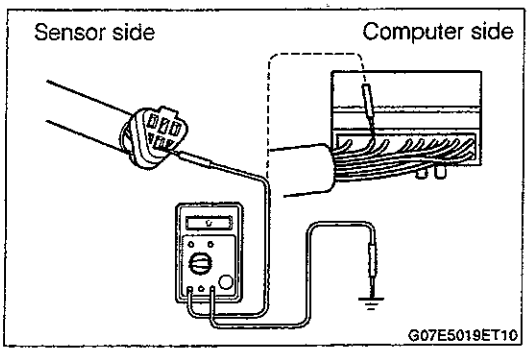


12-3-2 SHORT CIRCUIT INSPECTION

1.Remove the connector of corresponding harness on both end.
2.Measure the electrical resistance between corresponding terminal of connector and body earth connecting. In addition to above, perform the inspection with the connector of each side.
SPECIFIED VALUE: Not less than 1MΩ

CAUTION

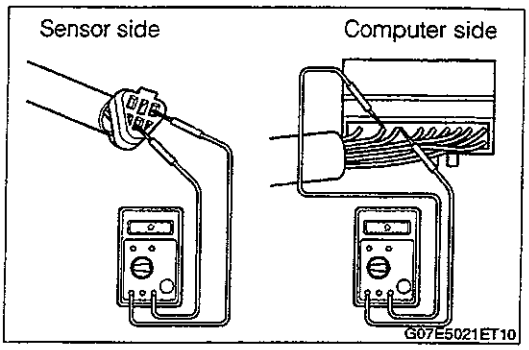
- Measure the electrical resistance while shaking wire harness in top and down, and right and left lightly.



3.Measure electrical resistance between terminals in same connector with the connector of corresponding terminal (except between each power supply lines or earth lines). In addition to above, perform the inspection at the connector of both sides.
SPECIFIED VALUE: Not less than 1MΩ

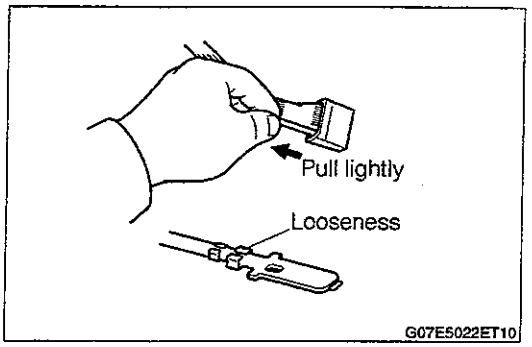
CAUTION

- **There may be short circuits due to wiring in the vehicle compartment which is pinched by the body or faulty clamps.**



12-3-3 VISUAL INSPECTION, CONTACT FORCE INSPECTION

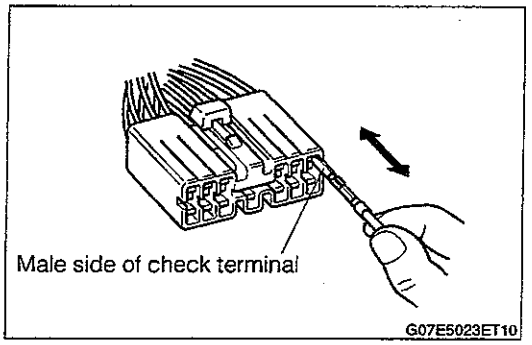
1.Remove the connector of corresponding harness on both end .
2.Check visually the rust generation or mixing of the foreign material at connector terminal portion.
3.Check whether there are looseness, damage at the staking portion and check coming out from the coupler by pulling the wire harness lightly .



4.Prepare the same male terminal as that of the connector terminal. Insert it into the female terminal and check the pulling force.
The terminal having a smaller pulling force, compared with other terminals, may cause poor contact.

CAUTION

- **If the terminal section has rust formation, admission of foreign matters or poor contact pressure between the male terminal and the female terminal, the contact condition may change by disconnecting and reconnecting the connector once, thus resulting in No malfunction.**
  Therefore, if the check of the wire harness and connector reveals that there is no malfunction, confirm the malfunction phenomenon. At this time, if no malfunction phenomenon is reproduced, most likely the poor contact between the male terminal and the female terminal was causing the malfunction.



12-4 CIRCUIT INSPECTION OF COMPUTER UNIT

Perform computer unit circuit inspection. If it is malfunction, repair the corresponding connector, circuit, and if normal, change the computer unit.

1.VISUAL CHECK OF CONNECTOR PORTION, CONTACT FORCE INSPECTION
Check the connector of computer unit according to visual check and the contact force check point described in former page.
2.COMPUTER UNIT EARTH CONNECTING INSPECTION
Remove the connector of computer unit, and then measure the applied voltage between each power source terminal, each earth connector and body earth connecting.
SPECIFIED VALUE: VOLTAGE OF EACH POWER SUPPLY TERMINAL

CAUTION

- **At the computer unit circuit check, there may be cases when the malfunction disappears by removing and installing the connectors, due to change of contact condition. Accordingly, when the result of computer unit circuit check is normal, judge that computer unit is malfunctioned after confirming the malfunction again by connecting the computer unit connector.**

12-5 HANDLING INSTRUCTION OF SYSTEM

1.The computer unit, sensors, etc. are precision parts. Be very careful not to give strong impacts to those parts during the installation and removal. Never use those parts which impacts have been given (for example, in case where the parts were dropped on the floor).
2.When the test is carried out on rainy day or the vehicle is washed, care must be exercised so that no water may be admitted and the computer unit, connectors, sensors, actuators, etc. may not get wet.
3.In cases where the computer unit was judged to be malfunctioning and the vehicle has been remedied by replacing it, install the removed computer unit (which has been judged to be malfunctioning) again to confirm that the original malfunction is reproduced. Then the computer unit can be finally judged to have been malfunctioning.

13 INSTRUCTIONS FOR RADIO INSTALLATION

CAUTION

- For those motor vehicles equipped with a mobile communication system, such as a bidirectional wireless telephone and cellular phone, be sure to observe the following precautionary measures.

1. Install the antenna as far away as possible from electronic control system.
2. As the electromagnetic wave is radiated from antenna feeder, set the antenna feeder within the distance at least not less than 300 mm apart from computer unit and ECU harness. Do not arrange both line in parallel for long distance.
3. Never bind the antenna feeder together with the engine harness with binding tape.
4. Regulate the antenna and the feeder to get rid of radio interference.
5. Never install a strong mobile communication system (exceeding 10 kW).

14 HANDLING INSTRUCTIONS ON CATALYTIC CONVERTER-EQUIPPED VEHICLES

1. Use only unleaded gasoline to catalytic converter—equipped vehicles.
2. Utmost care must be paid as to the following points, for the catalyst will be damaged if a large amount of unburned gasoline flows into the catalytic converter.
   (1) Do not operate the engine with the fuel in the fuel tank almost empty.
   (2) The spark jump test must be limited to cases where such test is absolutely necessary. Also, be sure to finish the test in the shortest possible time.
   (3) The spark check of the spark plug and engine compression pressure measurement must be performed with the fuel pump relay and injector connector disconnected and fuel injection stopped.
3. Do not dispose the waste catalyst along with parts contaminated with gasoline or oil.

15 PRECAUTION FOR VEHICLES EQUIPPED WITH SRS AIRBAG AND SEAT BELT PRETENSIONER

15-1 INSTRUCTIONS FOR SERVICE OPERATION

Be sure to perform the service operation for the vehicle equipped with the airbag and seat belt pretensioner according to the correct procedure and method, otherwise, the airbag or pretensioner may occur the malfunction and lead serious accidents during the service operation.Be sure to perform the service operation according to the correct procedure and method described in this manual.

15-1-1 PRECAUTION PRIOR TO SERVICE OPERATION

1.Before servicing the airbag components or the seat belt pretensioner device, perform the following procedures.
(1) Check the status of airbag warning lamp.
(2) Read the diagnosis codes and put it on record
(3) .Turn OFF the ignition switch and detach the negative terminal of the battery cable.
(4) Then, wait for at least 60 seconds to prevent the airbag from the deployment.

WARNING

- **If the operation is started within 60 seconds from disconnecting the negative terminal of the battery cable, the airbag may be deployed.**

NOTE

- **As airbag system provide the back up capacitor (for ignition purpose), about 60 seconds is necessary as discharging time even though the battery negative terminal cable is disconnected. (natural discharge)**

CAUTION

- **Be careful that memory of computer of other system (such as engine control) may be erased simultaneously when the battery negative terminal cable is disconnected.**

2.Ensure to use the digital circuit tester for the electric inspection of the vehicle equipped with the airbag, pretensioner, and use the circuit tester which satisfy the following standard.

WARNING

- **Ensure beforehand to measure the electric current value of circuit tester to be used for an operation, and confirm if it satisfy the following specified value. When the circuit tester exceeding specified value is used, there may be possibility that malfunction or deterioration of airbag occur. In addition to above, measure the electric current of the circuit tester with minimal resistance (Ω) range.**

SPECIFIED VALUE: Not more than 50 mA (0.05A)

15-1-2 PRECAUTION TO PREVENT MISS OPERATION

1.Be sure not to drop the airbag system component parts during removal and installation.
2.Be sure not to give impact or damage when removing the airbag system component parts.
3.Be sure to put the pad Ay and assistant driver's seat airbag unit with deployment surface upward during the operation though it is temporary operations. And never stack the pad Ay. (It may lead to serious accidents if metal surface is facing upward at an emergency)
4.Keep the airbag system component parts in the place where the effect of electricity noise, the high−temperature (not less than atmosphere temperature 85°C), and high humidity can be avoided.
5.Do not expose the airbag system component parts directly to high−temperature or flames.
6.Considering the case an airbag is actuated at an emergency, perform the service operation with posture as not to get your body close to deploying portion as much as possible.

15-1-3 GENERAL SERVICE INSTRUCTION

1.Follow the indication of the caution plate affixed on the airbag system related parts.
2.Be sure to mate the center when the steering roll connector is installed.
3.Be sure to perform the mating of the center for steering roll connector and marking to the separating portion when repair the related parts described below.If the relation of mutual position of parts are changed, the harness of roll connector may be snapped when the steering wheel is operated.

(1) STEERING CONCERNED

1.Steering wheel, steering column, steering gear or the like

(2) VEHICLE BODY CONCERNED

1.Instrument panel or the like
2.Body electrical malfunctioned
3.Multi－use lever switch or the like

(3) POWER TRAIN CONCERNED

1.The case when separate the connection of steering gear at the removal and installation of the engine and transmission and so on.

15-1-4 PRECAUTION PRIOR TO BODY AND PAINT OPERATION

1.As an inflator or the like are installed in the steering wheel central part, the upper part of instrument panel, the root of B pillar. Be sure not to give strong impact with hammer or the like, and high temperature during repairing.
2.Perform the operation after removing airbag system component parts when use of electric welding machine is needed.
3.Perform the operation after removing the airbag system component parts when use of impact and the high temperature is needed.
4.Do not expose the painting surface near the airbag related parts to high temperature (85°C or more) during drying it.
5.Be sure to change with new parts when an airbag related parts have the external scratch, deformation.

16 VEHICLE IDENTIFICATION

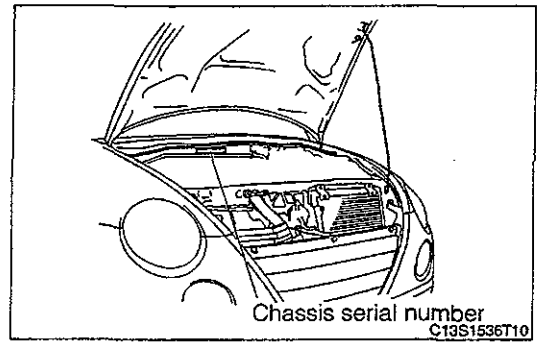
16-1 BODY COLOR CODE

Body color name	Color code
Silver metalic	S28
Red	R40
White	056
Dark blue mica metalic	B42
Sunflower yellow	Y07
Dark green mica	6Q7
Black mica	N05
Pearl white	W16

Body color name	Daihatsu	AKZO	DUPONT	GLASURIT	NEXA AUTO COLOR	SPIES HECKER	STANDOX
Silver metallic	S28	DAHS28	P6815	DAI−S28	2DFMB	88345	S28
Red	R40	DAHR40	P6814	DAI−R40	2DFLB	88346	R40
White	056	DAH056	F1858	DAI−056	BAB5/BAB5B	15217	056
Dark blue mica metalic	B42	DAHB42	F7984	DAI−B42	MXR2B	56568	B42
Sunflower yellow	Y07	DAHY07	P4572	DAI−Y07	1MNBB	84669	Y07
Dark green mica	6Q7	DAH6Q7	F3750	DAI−6Q7	KWC2B	65096	6Q7
Black mica	N05	DAHN05	M5554	DAI−N05	VRP1B	75683	N05
Pearl white	W16	DAHW16	F9387	DAI−W16	PMG8B	23039	W16

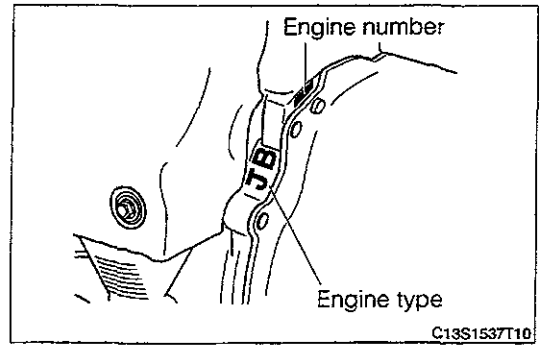
16-2 CHASSIS SERIAL NUMBER

1.The chassis serial number is stamped on the position as shown in the illustration.



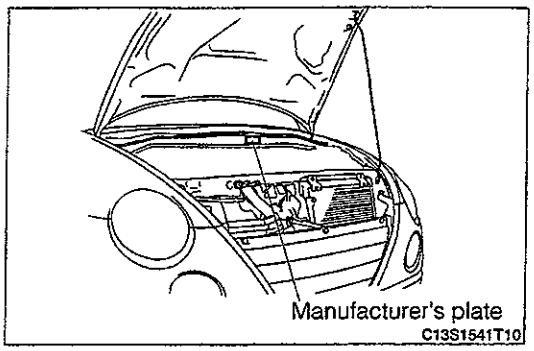
16-3 ENGINE TYPE AND ENGINE NUMBER

1.The engine type and engine number are given on the places as shown in the illustration.



16-4 MANUFACTURER'S PLATE POSITION

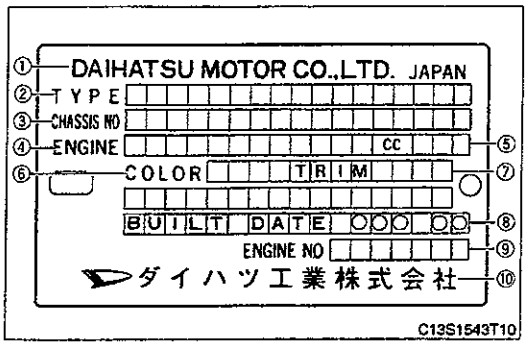
1.The manufacturer's plate is given on the place as shown in the illustration.



16-4-1 CONTENTS OF MANUFACTURER'S PLATE

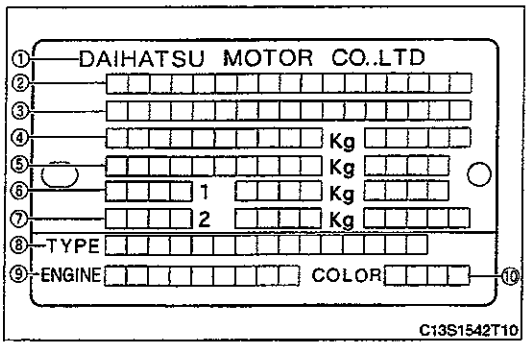
(1) Australia specifications

No.	Contents of indication
①	Manufacturer's name, Country
②	Vehicle model
③	Chassis No.
④	Engine type
⑤	Engine displacement
⑥	Body colors
⑦	Trim code
⑧	Production month—year
⑨	Engine number
⑩	Manufacturer's name in Japanese



(2) European specifications

No.	Contents of indication
①	Manufacturer's name
②	Authorized number of WVTA
③	Chassis No.
④	Gross vehicle weight
⑤	Gross combination weight
⑥	Maximum permissible front axle weight
⑦	Maximum permissible rear axle weight
⑧	Vehicle model
⑨	Engine type
⑩	Body colors



TO INDEX

A2 MAINTENANCE

MAINTENANCE REQUIREMENTS ------- A2 - 1
MAINTENANCE SCHEDULE ---------- A2 - 2
SEVERE DRIVING CONDITION ---------- A2 - 4

A2–1

1 MAINTENANCE REQUIREMENTS

1. The scheduled maintenance service is important to ensure trouble-free, safe and economical driving. Failure to perform the scheduled maintenance may cause an accident or serious damage.
2. If you conduct the periodical maintenance, Daihatsu car owners may reduce the chance of accidents or car problems. Furthermore, it becomes possible for you to find at an earlier stage malfunctions which may lead to serious damages. Consequently, potential vehicle damage can be prevented or the degree of the damage can be minimized.
3. Therefore, all of the persons who are concerned with servicing the Daihatsu vehicles should offer the periodical maintenance service to Daihatsu car owners in order that they may be protected from accidents or unexpected problems.
4. To prevent malfunctions in advance, however, conducting the periodical maintenance service only is insufficient. It is essential that owners themselves perform maintenance, such as the pre-starting check described in the owner's manual, so that the vehicle exhibits no abnormal change or phenomenon. Hence, please explain to owners about the necessity of maintenance performed by them.
5. However, malfunction may occur on those vehicles which are always checked by their owners. For instance, if a part instructed to be replaced periodically should be used beyond the replacement intervals and the life of the part has expired, there are cases where malfunction occurs suddenly despite the fact that no malfunction had taken place until yesterday. To prevent such malfunction in advance, be sure to replace parts recommended to be replaced periodically at the specified replacement intervals.
6. This section describes those items of the scheduled maintenance service recommended by the Daihatsu and their intervals. Be sure to observe the maintenance schedule.

2 MAINTENANCE SCHEDULE

1.For improved maintenance, the maintenance schedule has been simplified.

NOTE

- **Perform the periodical maintenance at the specified mileage or the time whichever comes first, unless otherwise specified.**

2.Continue to perform the periodical maintenance after 90,000 km (54,000 miles) at the same intervals as before 90,000 km.

3.If the vehicle should be operated under severe driving conditions, operated occasionally, operated in dusty areas, repeating short trip, operated under extremely cold climate and/or on salted roads, it is necessary to perform some maintenance items more frequently than the regular maintenance schedule.

4.This maintenance schedule has been prepared based on requirements mentioned in the owner's manual which are to be performed by the Daihatsu owner thoroughly.

○.....Check or inspect ●.....Change or replace

Section	Item	What to do	×1000 km	15	30	45	60	75	90
		Inspection interval	×1000 miles	9	18	27	36	45	54
			Years	1	2	3	4	5	6
Engine	Air cleaner element	Cleaning Check • Damage Change		○	○	●	○	○	●
	Engine oil & oil filter	Change (Use API: SG or higher)		Engine oil : Every 5,000 km (3,000 miles)/6 months Oil filter : Every 10,000 km (6,000 miles)					
	Fuel line & connections (Including fuel hoses)	Check • Crack • Tightness • Leakage • Damage			○		○		○
	Coolant (Long life coolant)	Change		Every 2 years					
	Drive belt (Alternator, water pump, power steering)	Check • Tension • Crack • Damage		○	○	○	○	○	○
	Spark Plug	Change		Every 60,000 km (36,000 miles)					
Exhaust emission control system	Charcoal canister	Check • Function • Damage				○			○
	Evaporative emission hoses	Change		Every 8 years					
	Exhaust pipe & muffler mounting	Check • Tightness • Damage			○		○		○

○.....Check or inspect ●.....Change or replace

Section	Item	What to do / Inspection interval	× 1000 km	15	30	45	60	75	90
			× 1000 miles	9	18	27	36	45	54
			Years	1	2	3	4	5	6
Power transmitting system	Clutch	Check • Free travel • Reserve travel • Damage		○	○	○	○	○	○
	Manual transmission	Check & Change • Oil			○		○		●
	Drive shaft boots	Check • Damage			○		○		○
Suspension system	Suspension arm (Front) Control arm (Rear) Dust boots Spring Stabilizer	Check • Tightness • Rattle • Damage			○		○		○
Steering system	Steering linkage Gear box Dust boots	Check • Free play (Steering wheel) • Tightness • Rattle • Damage			○		○		○
	Wheel alignment	Check • Toe-in				○			○
Brake system	Brake pedal & parking brake	Check • Free play (Brake pedal) • Reserve travel (Brake pedal) • Working travel (Parking brake) • Tightness • Rattle • Damage			○		○		○
	Disc & disc pad	Check • Wear • Damage		○	○	○	○	○	○
	Brake hose & tube	Check • Leakage (Fluid level, connection) • Loose clamp • Damage			○		○		○
	Brake fluid	Change		Every 2 years					
	Brake drum & lining	Check • Wear • Damage			○		○		○
	Master & wheel cylinder	Check • Leakage			○		○		○
Chassis & body	Wheel hub nuts, other bolts & nuts	Check • Tightness		○	○	○	○	○	○

3 SEVERE DRIVING CONDITION

Severe driving conditions

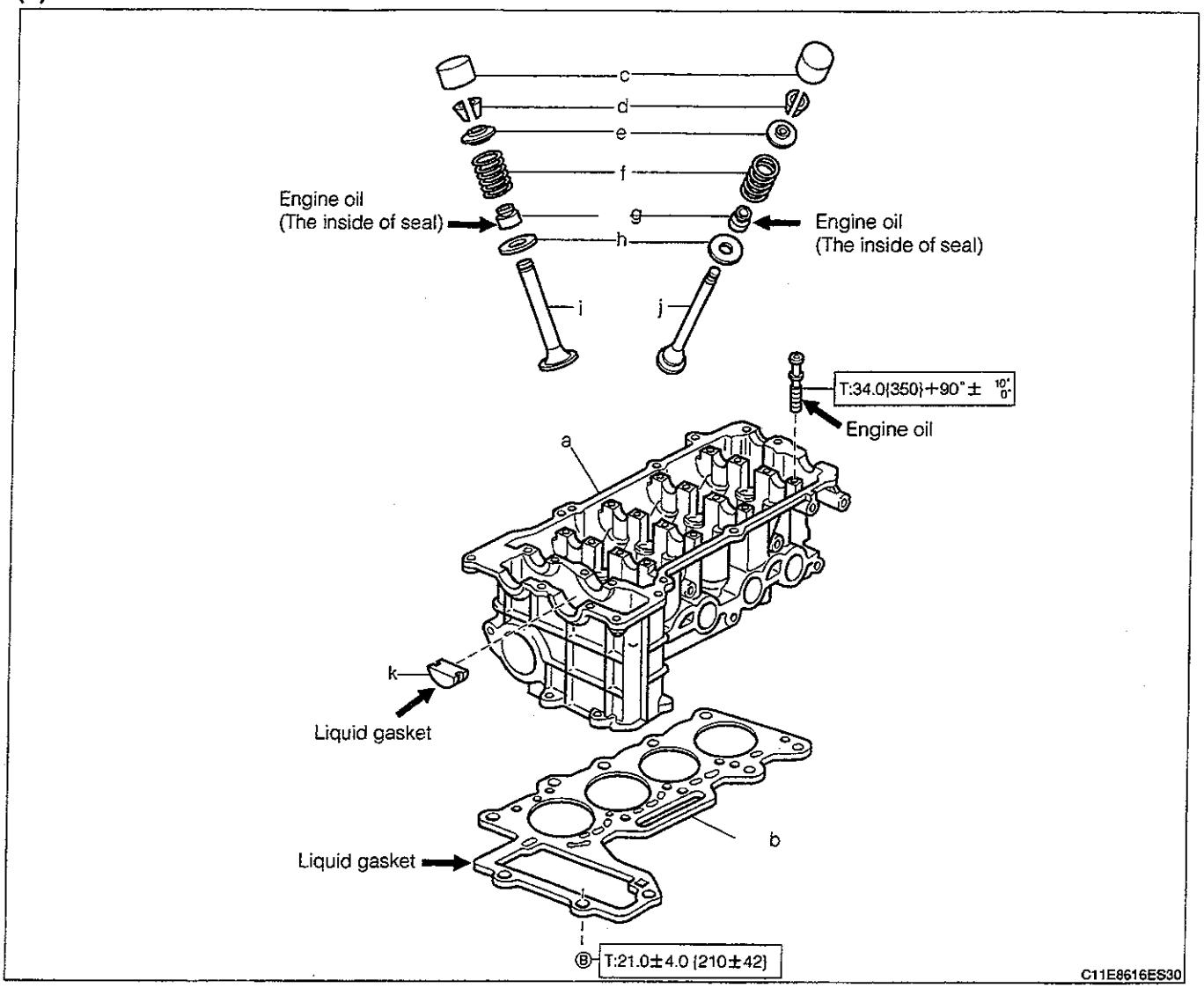
1: Repeated short trips
2: Driving on rough roads
3: Driving dusty roads
4: Driving in extremely cold climate and/or on salted roads

○.....Check or inspect ●.....Change or replace

Section	Item	What to do / Inspection interval		7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90
			×1000 km	4.5	9	13.5	18	22.5	27	31.5	36	40.5	45	49.5	54
			Years	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Engine	Air cleaner element	Cleaning Check • Damage Change		○:Every 5,000 km (3,000 miles) ●:Every 15,000km (9,000 miles) / 1 year											
	Engine oil & oil filter	Change (Use API : SG or higher)		Engine oil : Every 2,500 km (1,500 miles) Oil filter : Every 5,000 km (3,000 miles)											
Exhaust emission control system	Exhaust pipe & muffler mounting	Check • Tightness • Damage			○		○		○		○		○		○
Steering system	Steering linkage Gear box Dust boots	Check • Free play (Steering wheel) • Tightness • Rattle • Damage			○		○		○		○		○		○
Brake system	Disc & disc pad	Check • Wear • Damage		○	○	○	○	○	○	○	○	○	○	○	○
	Brake drum & lining	Check • Wear • Damage			○		○		○		○		○		○

TO INDEX TO NEXT SECTION

1-2-1 ENTRY EXAMPLE
(1) COMPONENTS



※: Non-reusable parts
Unit :N·m{kgf·cm}

1 a Cylinder head
2 b Cylinder head gasket
3 c Lifter, valve
4 d Lock, valve spring retainer
5 e Retainer, valve spring
6 f Spring, compression
7 g Seal, valve stem oil
8 h Valve seat
9 i Intake valve
10 j Exhaust valve
11 k Seal, valve stem oil

1-3 DESCRIPTION OF SERVICE STANDARD VALUE

The necessary service standard value for inspection and service operation are described with bold letter in the text as standard and allowable limit. The details of terms are described in the section for definition of terms.

1-4 CONTENTS NOT DESCRIBED IN THIS MANUAL

The description of the next elemental operation may omit in this service manual, but please perform in an actual operation.

1.Jacking operation and lifting operation
2.Cleaning and cleansing of removed parts to perform at need
3.Visual inspection

1-5 DEFINITIONS OF TERMS

SPECIFIED VALUE	This mark shows the standard value at the time of the check or adjustment.
ALLOWABLE LIMIT	This mark shows the maximum or minimum value at the time of the check or adjustment.
DEVIATION	This value refers to the difference between the maximum clearance and the minimum clearance.
WARNING	This symbol means that there is the possibility of personal injury of the operator himself or the nearby workers if the operator fails to follow the operating procedure prescribed in this manual.
CAUTION	This symbol means that there is the possibility of damage to the component being repaired if the operator fails to follow the operating procedure prescribed in this manual.
NOTE	Supplementary explanation which facilitates the operation is posted separately from the explanation. Because of difficulties in measurements to determine specified values, there may be cases where the specified values for simple measurement methods are indicated if malfunctions are unlikely to take place actually.

2 ABBREVIATION CODES

The abbreviation codes that appear in this manual stand for the following, respectively.

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

3 HOW TO GRASP SPECIFIED TIGHTENING TORQUE FOR GENERAL STANDARD BOLT AND NUT

3-1 Determining Procedure for Tightening Torque for General Standard Bolts and Nuts

3-1-1 Determining Procedure for Tightening Torque for Bolts

Determine the strength division of bolts, based on the table below.
Then, obtain the value, based on the tightening torque table.

3-1-2 Determining Procedure for Tightening Torque for Nuts

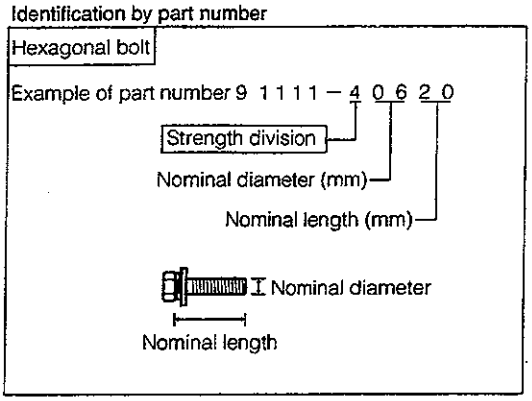
Determine with the aforesaid method, based on the mating bolt.

3-1-3 Identification

Identification of strength division by checking bolts themselves

Classification (Strength division)	Shape of head (how to know strength division)	
	Bolt without collar	Bolt with collar
4 T		
5 T		—
6 T	— —	
7 T		—

Identification by part number



L11S5003ES20

3-1-4 Tightening torque table for general standard bolts

Strength divisin	Nominal diameter (mm)	Pitch (mm)	Standard tightening torque (N·m{kgf·cm})	
			Bolt without collar	Bolt with collar
4 T	6	1.0	5.4 {55}	5.9 {60}
	8	1.25	13 {130}	14 {145}
	10	1.25	25 {260}	28 {290}
	12	1.25	47 {480}	53 {540}
	14	1.5	74 {760}	83 {850}
	16	1.5	113 {1150}	—
5 T	6	1.0	6.4 {65}	—
	8	1.25	16 {160}	—
	10	1.25	32 {330}	—
	12	1.25	59 {600}	—
	14	1.5	91 {930}	—
	16	1.5	137 {1400}	—
6 T	6	1.0	7.8 {80}	8.8 {90}
	8	1.25	19 {195}	20.5 {210}
	10	1.25	39 {400}	43 {440}
	12	1.25	72 {730}	79 {810}
	14	1.5	109 {1100}	123 {1250}
7 T	6	1.0	11 {110}	12 {120}
	8	1.25	25 {260}	28 {290}
	10	1.25	52 {530}	58 {590}
	12	1.25	95 {970}	103 {1050}
	14	1.5	147 {1500}	167 {1700}
	16	1.5	225 {2300}	—

4 UNIT

As for the units, the SI units (international unit system) have been posted. (The hitherto—employed units, too, are posted.)

Example: 33.25±13.25N·m{340±135kgf·cm}

4-1 NEW UNIT BECAUSE OF THE INTRODUCTION OF THE SI UNIT

1.SI unit is the international unit system established by aiming to proceed the communication in technology smoothly by unifying the former unit system which were different internationally each other into one value by one unit. The specification value is described in accordance with SI unit system in this service manual.

ITEM	SI unit	Conventional units	Conversion table
Force	N	kgf	1kgf = 9.80665 N
Torque	N·m	kgf·cm	1kgf·cm = 0.0980665 N·m
Pressure	kPa	kgf/cm^2	1kgf/ cm^2 = 98.0665 kPa
		mmHg	1mmHg = 0.133322 kPa
Spring constant	N/mm	kgf/mm	1kgf/mm = 9.80665 N/mm
Volume	ℓ	cc	1000cc = 1ℓ
Power	kW	PS	1PS = 0.735499 kW

5 GENERAL SERVICE INSTRUCTION

1.Removal, Disassembly

(1) In case for the operation at the complicate place, the stamping and mating mark shall be put at the place where there is no influence to the function, so that the assembling operation becomes easy.

(2) At every time when each parts are removed, check the condition when it was assembled , deformation, breakage, roughness and existence of scratch .

(3) Arrange the removed parts in order, and divide them to the parts to replace and parts to reuse .

(4) Each parts to be reused shall be performed enough cleaning and cleansing operation.

2.Check and measurement of parts

(1) As regards those parts to be used again, perform thorough checks and measurements, as required.

3.Installation, Assembling

(1) Assemble the good parts with correct procedure following the specified standard (value for the adjusting , tightening torque).

(2) Use the genuine parts when replace the parts.

(3) Ensure to apply the seal packing and grease by a place.

(4) Ensure to use new packing, gasket or the like, cotter pin etc.

(5) As for bolts and nuts, use the specified ones. Unless otherwise specified, the side for which the torque is indicated should be tightened to the specified torque, using a torque wrench. If there is no means to prevent the turning at the opposite side, be sure to prevent turning with box wrenches, spanners or the like.

4.Adjustment, Operation confirmation

(1) Adjust with the specified service standard value by using the gauge and the tester.

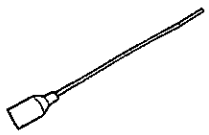
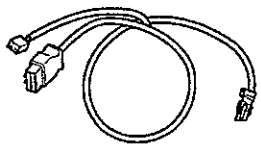
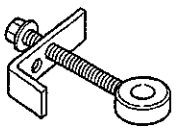
TO INDEX

B1 ENGINE

JB---------- B1 - 1
ENGINE---------- B1 - 1
ARTICLES TO BE PREPARED---------- B1 - 1
BASIC CHECK AND ADJUSTMENT--- B1 - 1

JB
1 ENGINE
1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09991-87402-000	Wire, tacho-pulse pick up
	09991-87403-000	Wire, diagnosis check
	09991-87404-000 (09991-87401-000)	Wire, engine control system inspection
	09286-87701-000 (09286-87201-000)	bar, alternator adjuster

Instrument

Belt tension gauge,Radiator cap tester,Radiator cap tester adapter,Tachometer,Timing light,Torque wrench,Thickness gauge,Compression gauge

1-2 BASIC CHECK AND ADJUSTMENT
1-2-1 CHECK OF COOLING WATER LEVEL AND WATER LEAKAGE

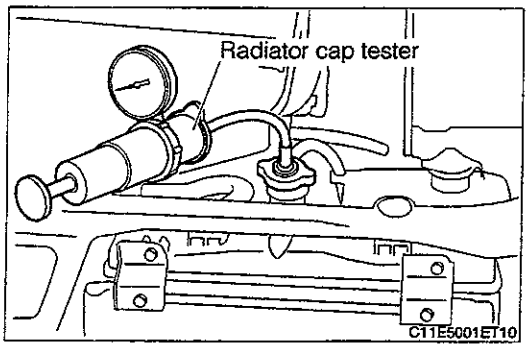
Check that the cooling water level is between the lower limit (LOW) and the upper limit (FULL) of the reservoir tank.

1-2-2 WATER LEAKAGE

With the engine idling, visually check that there is no water leakage from the radiator, radiator hose, heater hose, water pump, heater hose, etc.

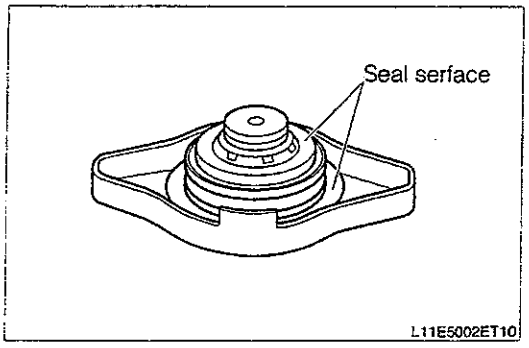
Moreover, apply pressure, using a radiator cap tester. Under this condition, check that no water leakage is present.

SPECIFIED VALUE: Specified value for check
122.7kPa{1.25kgf/cm2}



1-2-3 FUNCTION CHECK OF RADIATOR CAP

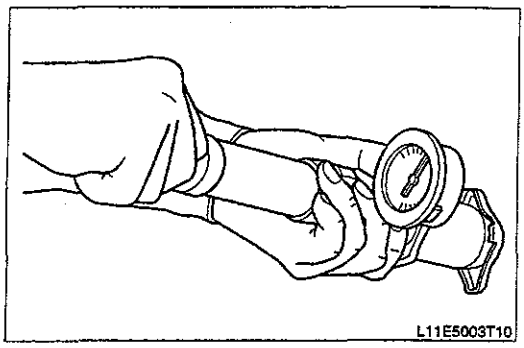
1.Remove the radiator cap. Then, visually check the valve seat surface for smear and damage. Also, move the negative pressure valve by your hand and check that it opens and closes.



2.Check the valve opening pressure of the cap, using a radiator cap tester.
SPECIFIED VALUE: 108.0±14.7kPa{1.1±0.15kgf/cm²}

CAUTION

- Liberally apply water to the cap seal surface before the installation to the tester.



1-2-4 CHECK OF ENJINE OIL LEVEL

1.Stop the engine. Perform the check on a level place.
2.Pull out the oil level gauge. Wipe out the oil adhered to the gauge and insert it again.
3.Check that the oil level is between the lower limit (L) and the upper limit (F).

1-2-5 CHECK OF SPARK PLUG

WARNING

- Be very careful not to get scalded, for the spark plug is very hot.

1.Ensure that the designated plugs are used. Also, check that the plug exhibits no smoldering and the plug is not burnt excessively. Check to see if the gap between the electric poles is normal.

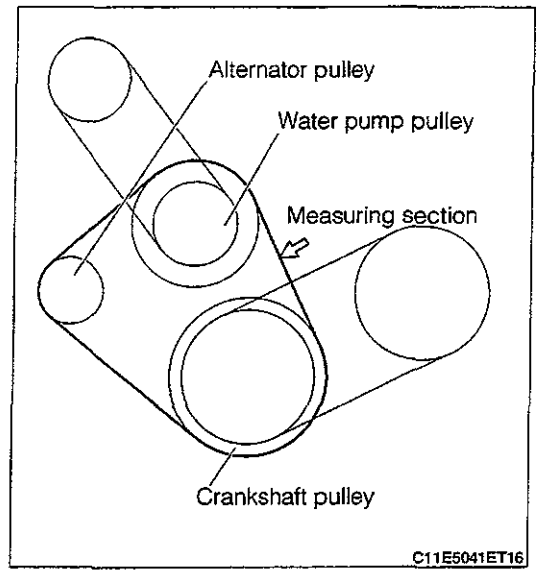
CAUTION

- In principle, do not clean iridium plugs so as to protect their electrodes.

Spark plug specifications

	JB-DET	
Type	SK20PR-A8	IFR6J
Kind	iridium plug	iridium plug
Electrode gap(mm)	0.7-0.8	0.7-0.8

1-2-6 CHECK AND ADJUSTMENT OF TENSION (DEFLECTION AMOUNT) OF V-BELT FOR ALTERNATOR



(1) CHECK

1. Check the V-ribbed belt for cracks, deterioration and significant wear.
2. Check the tension of the V-ribbed belt, using a belt tension gauge.

NOTE

- The check can be performed by measuring the deflection amount of the V-belt.

Specified value

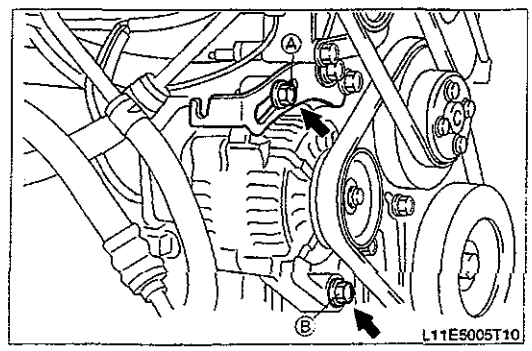
	When a new part is installed	During inspection
Tension value (N {kgf})	590±100 {60±10}	390±50 {40±5}
Deflection amount (mm) (Pushing force 98N{10kgf})	3.8-4.7	4.9-5.4

CAUTION

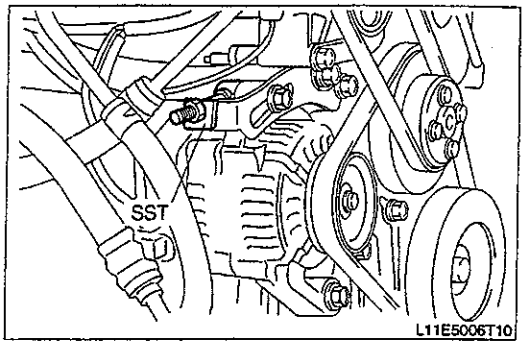
- For checking the deflection amount of the belt, apply a force of 98N(10kgf) to the belt at a point between the crankshaft pulley and the water pump pulley. Measure the belt deflection amount.
- In cases where the tension is measured after the V-ribbed belt has been assembled, the measurement should be performed after cranking two turns.
- When the belt is replaced with a new one, the belt tension should be adjusted to the mid-value of the specified value for "When a new part is installed."
- As regards the belt that has been used for more than five minutes, ensure that the belt tension conforms to the specified value for "During inspection."
- When the belt that has been used for more than five minutes is assembled, the belt tension should be adjusted to the mid-value of the specified value for "During inspection."

(2) ADJUSTMENT

1. Loosen the bolts A and B.



2.Install the SST and a washer. Turn the adjusting nut to adjust the tension.
SST: 09286-87701-000
3.Tighten the bolt
TIGHTENING TORQUE: Bolt A
29.0±5.8N·m{300±60kgf·cm}
Bolt B
39.0±7.8N·m{400±80kgf·cm}
4.Confirm the belt tension.



1-2-7 Check and adjustment of belt tension (deflection amount) for vane pump
Refer to Page G2-36.

1-2-8 Check and adjustment of belt tension (deflection amount) for air conditioner
Refer to Page K1-3.

1-2-9 CHECK AND ADJUSTMENT OF VALVE CLEARANCE

(1) Specified value

Specified value

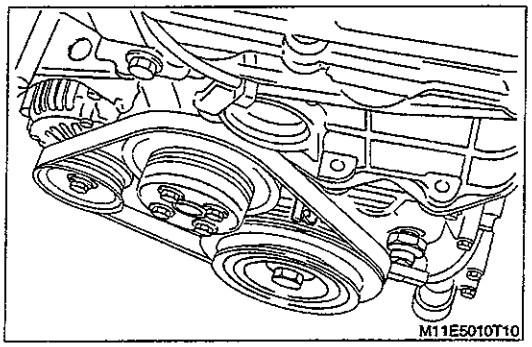
		Valve clearance (mm)	
JB-DET	IN	During cold period	$0.20^{+0.055}_{-0.035}$
	EX		$0.30^{+0.055}_{-0.035}$

(2) CHECK AND ADJUSTMENT

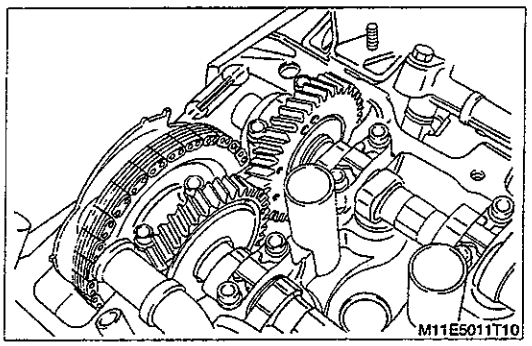
CAUTION

- For the removal and installation procedures of each part, refer to the section under "Removal and Installation of Camshaft."

Refer to Page B2-5.



1. Remove the cylinder head cover.
2. Align the timing mark of the crankshaft pulley with the ignition timing adjustment indicator of the oil pump body by turning the crankshaft clockwise.
3. Ensure that the mating marks of the drive gear and driven gear of the camshaft are aligned with each other. If not, turn the crankshaft one more turn so that the lower mating mark is aligned. (No.1 cylinder top dead center under compression)
4. In order to prevent the piston from being interfered with the valve, turn the crankshaft 90°(crank angle) from the top dead center so as to lower the piston.
5. Remove the chain sprocket from the camshaft.



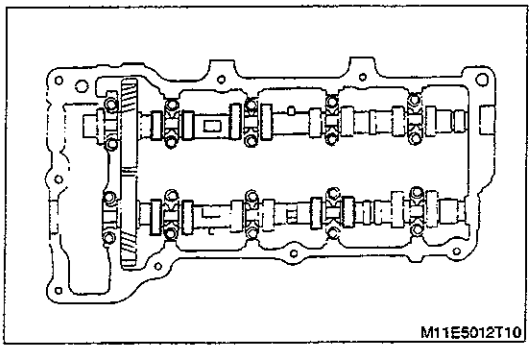
CAUTION

- Be very careful not to drop the chain into the cylinder head.

6. Align the mating marks of the timing gears, using the service hexagonal section of the camshaft. (Return to the state described in Step 3 above.)
7. Using a thickness gauge, check the valve clearances shown in the right figure.

Measurement points at time of camshaft No.1 cylinder top dead center under compression

Cylinder No.1		Cylinder No.2		Cylinder No.3		Cylinder No.4	
IN	EX	IN	EX	IN	EX	IN	EX
○	○	○	–	–	○	–	–

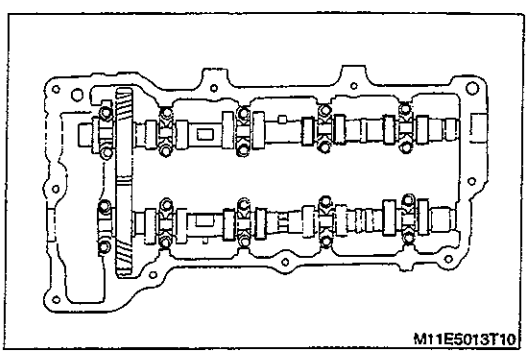


CAUTION

- The thickness gauge must be inserted from the spark plug side (center side).

8. Turn the camshaft 180°,using the service hexagonal section of the camshaft.

9.Using a thickness gauge, check the valve clearances shown in the right figure.



Measurement points at time of camshaft No.4 cylinder top dead center under compression

Cylinder No.1		Cylinder No.2		Cylinder No.3		Cylinder No.4	
IN	EX	IN	EX	IN	EX	IN	EX
–	–	–	○	○	–	○	○

CAUTION

- **The thickness gauge must be inserted from the spark plug side (center side).**

10.If the measured value is out of the specification, replace the valve lifter, following the procedure given below.

CAUTION

- **Record the position of the valve where the clearance deviates from the specification, as well as the their measurement results.**

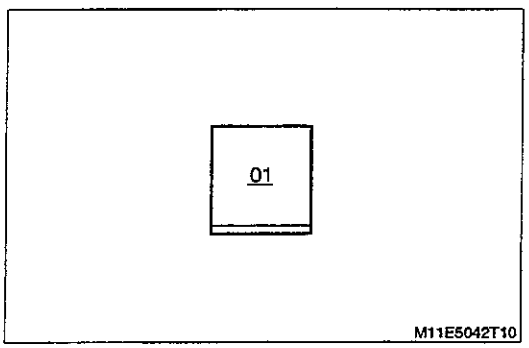
(1) Remove the camshaft No.1 and No.2.

(2) Using the following formula given below, select the valve lifter.

Selected lifter = Thickness of assembled lifter + (Measured clearance − Specified clearance)

CAUTION

- **The thickness of the selected lifter can be known by the stamp on the lifter side.**
- **The lifter thickness should be measured at the central section of the lifter.**



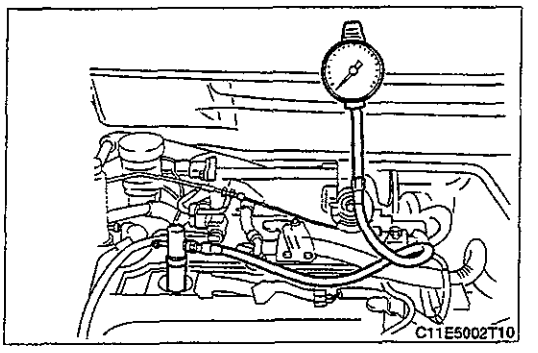
Valve lifter thickness table

stamp No.	Valve lifter thickness	stamp No.	Valve lifter thickness	stamp No.	Valve lifter thickness	stamp No.	Valve lifter thickness
01	2.500	09	2.660	17	2.820	25	2.980
02	2.520	10	2.680	18	2.840	26	3.000
03	2.540	11	2.700	19	2.860	27	3.020
04	2.560	12	2.720	20	2.880	28	3.040
05	2.580	13	2.740	21	2.900	29	3.060
06	2.600	14	2.760	22	2.920		
07	2.620	15	2.780	23	2.940		
08	2.640	16	2.800	24	2.960		

(3) Remove the lifters where the valve clearances are out of specifications.
(4) Apply engine oil to the outer periphery of the selected lifters. Insert each valve lifter into the cylinder head while turning it. Ensure that each lifter turns smoothly.
(5) Assemble the camshafts No. 1 and No. 2.
(6) Check the valve clearances.
(7) Install the cam sprocket.
(8) Install the cylinder head cover.

1-2-10 COMPRESSION CHECK

1.Warm up the engine thoroughly.
2.Turn OFF the ignition key switch.
3.Remove all of the IG coils and spark plugs.
4.Remove the fuel pump relay.
5.Remove all of the connector of injector.
6.Install the compression gauge.
7.Fully open the throttle valve and turn the starter. At this time, measure the compression pressure.
SPECIFIED VALUE: 1079kPa {11.0 kgf/cm²}
ALLOWABLE LIMIT: 785kPa {8.0 kgf/cm²}
(400 rpm, Difference between cylinders within 147 kPa}1.5kgf/cm²})

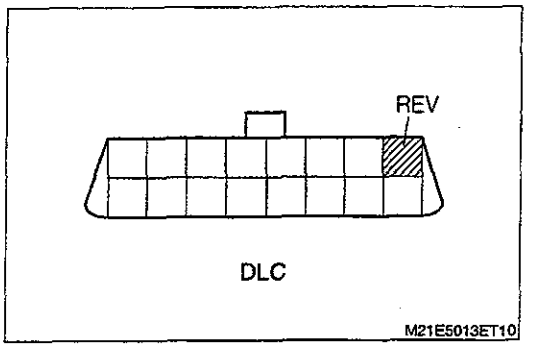


CAUTION

- Be sure to use a fully-charged battery. The measurement should be carried out in the shortest possible time.

1-2-11 CHECK OF IGNITION TIMING

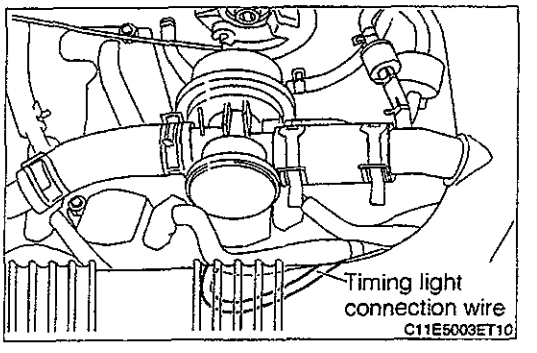
1.Connect an engine tachometer to the terminal REV(⑧), using the SST.
SST: 09991-87404-000
09991-87402-000
2.Warm up the engine (until the fan motor makes one turn).



3.Install a timing light.

CAUTION

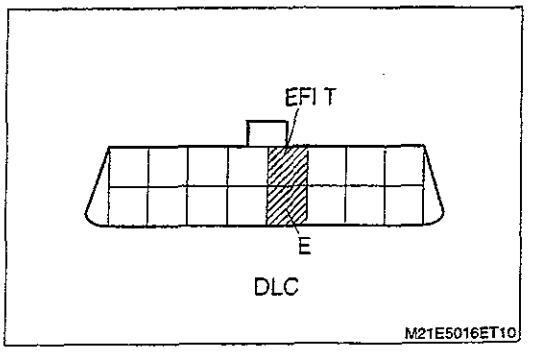
- Connect the timing light to the harness indicated in the right figure.



4.Short the terminals EFI T and E (⑤-⑬) of the check connector, using the SST.
SST: 09991-87404-000
09991-87403-000

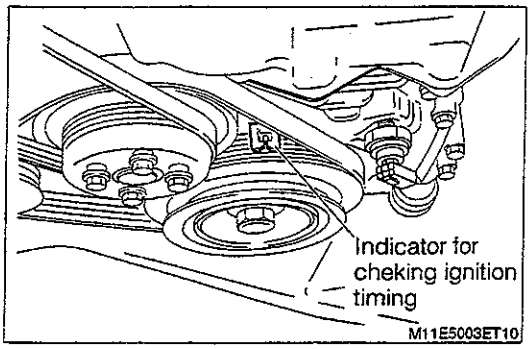
CAUTION

- Be sure to short the correct terminals. If wrong terminals are shorted, it will lead to malfunction.



5.Check the ignition timing, using the timing light.
SPECIFIED VALUE: 0° ±2(BTDC)
NOTE
- 750$^{+100}_{-50}$ rpm

CAUTION
- The specified value is given as a guide for the inspection. No adjustment is required.

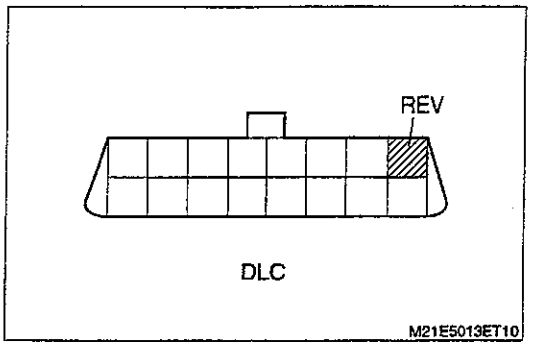


1-2-12 CHECK OF IDLE SPEED

CAUTION
- Be sure to mount an air cleaner.
- Warm up the engine.
- Do not apply electric load (headlamp, etc.).
- The inspection should be carried out under a condition where each vacuum pipe is not disconnected and exhibits no rupture, etc.

1.Connect an engine tachometer to the terminal REV(⑧), using the SST.
SST: 09991-87402-000
09991-87404-000
2.Check the idle speed.
SPECIFIED VALUE: 750$^{+100}_{-50}$ rpm

CAUTION
- The specified value is given as a guide for the inspection. No adjustment is required.

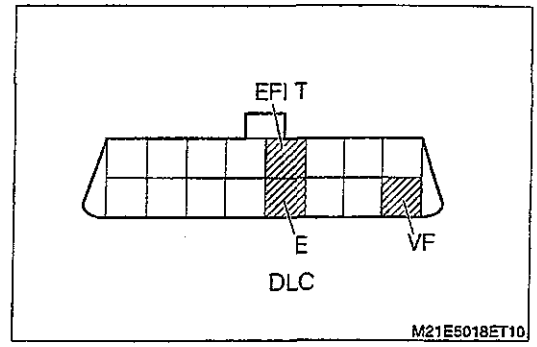


1-2-13 CHECK CO AND HC CONCENTRATIONS

1.Keep the engine speed at more than 2,500 rpm for two minutes, thus warming up the O_2 sensor.

2.Short the terminals EFI T and E (⑤-⑬) of the check connector, using the SST.
SST: 09991-87402-000
09991-87403-000
09991-87404-000

CAUTION
- **Be sure to short the correct terminals. If wrong terminals are shorted, it will lead to malfunction.**



3.Connect the positive (+) terminal of the tester to the terminal VF ⑯ of the check connector and the negative (-) terminal to the body earth.
4.Keep the engine revolution speed at 2,500 rpm. At this time, measure the indicated voltage (VF output) of the tester.
SPECIFIED VALUE: 0⇄5V (Repeating)
(Confirmation of O_2 feedback)
5.Release the short between the terminals EFI T and E (⑤-⑬).
6.With the engine idling, measure the VF voltage.
SPECIFIED VALUE: 2.5V (Confirmation of A/F learning value)
7.With the engine idling, measure the CO and HC concentrations.
SPECIFIED VALUE: 0.3% or less (CO concentration)
300 ppm or less (HC concentration)

CAUTION
- **The specified value is given as a guide for the inspection. No adjustment is required.**
- **Perform the operations of Step 6 and subsequent steps within a short length of time, because the O_2 sensor gets cool.**

1-2-14 CHECK OF AIR CONDITIONER IDLE-UP

1.Warm up the engine.
2.Turn ON the air conditioner switch while the engine is idling. Ensure that the engine revolution speed is within the specified rpm.
SPECIFIED VALUE: 900-1200 rpm

3.The specified value is given as a guide for the inspection. No adjustment is required.

TO INDEX

B ENGINE UNIT

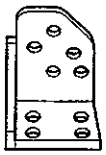
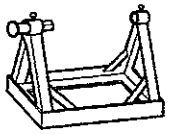
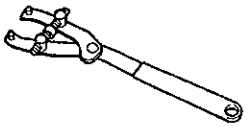
CAM SHAFT---------- B - 1
DISASSEMBLING AND
ASSEMBLING---------- B - 1
CYLINDER HEAD---------- B - 17
DISASSEMBLING AND
ASSEMBLING---------- B - 17
WATER PUMP---------- B - 30
REMOVAL AND INSTALLATION-------- B - 30
OIL PUMP---------- B - 32
DISASSEMBLING AND
ASSEMBLING---------- B - 32
TIMING CHAIN---------- B - 42
DISASSEMBLING AND
ASSEMBLING---------- B - 42
Cylinder block---------- B - 48
DISASSEMBLING AND
ASSEMBLING---------- B - 48

1 CAM SHAFT

1-1 DISASSEMBLING AND ASSEMBLING

1-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09219-87701-000	Attachment, engine overhaul
	09219-87202-000	stand, engine overhaul
	09504-87501-000 (09504-00011-000)	Wrench differential side bearing adjusting nut

Tools

Hexagon wrench (Width across flats : 5mm)

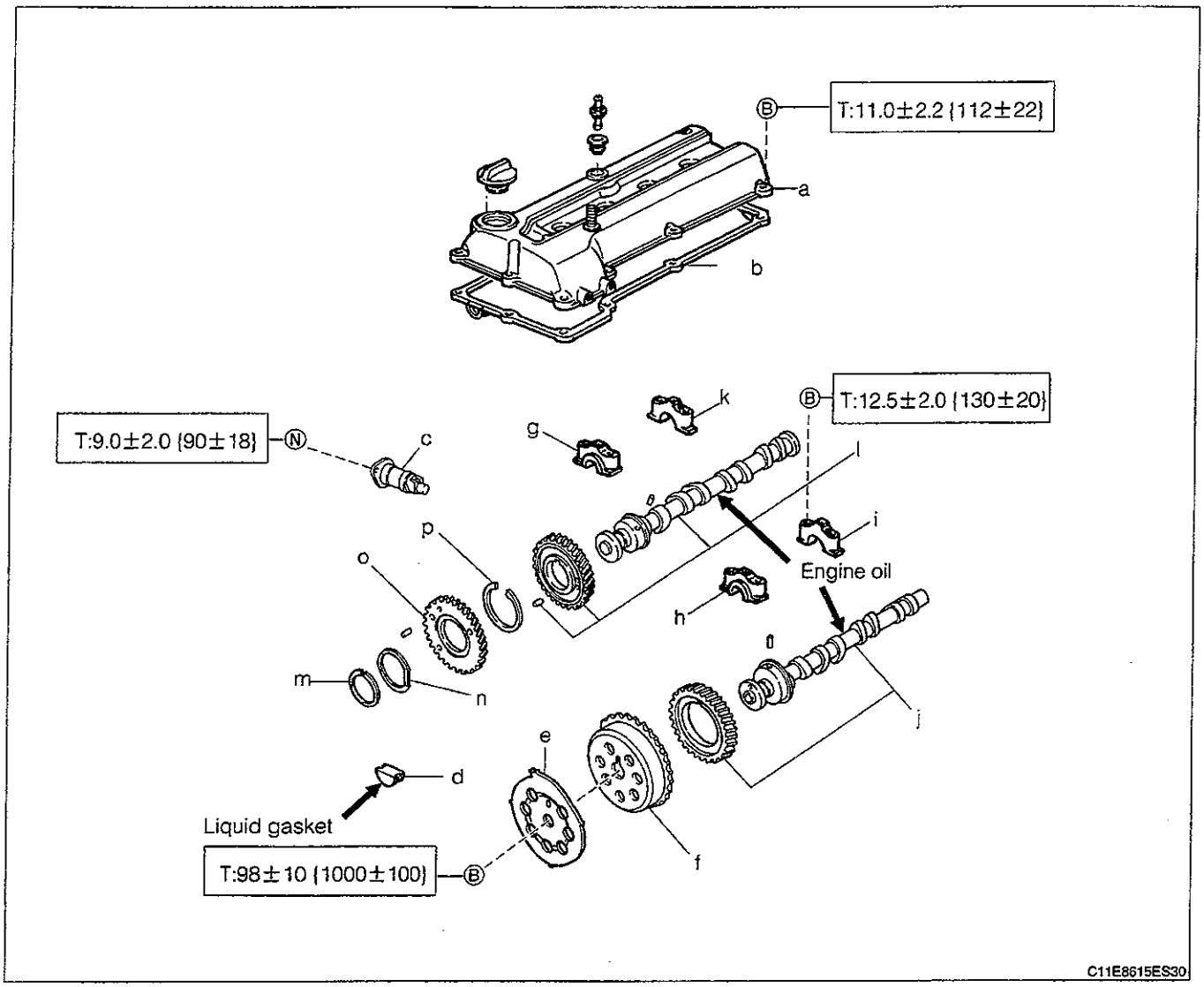
Instruments

Torque wrench,V-shaped blocks,Dial gauge,Micrometer,Press gauge

Lubricants, bonds and others

Bolt (Size: M5, Pitch: 0.8 mm),Engine oil

1-1-2 COMPONENTS



※: Non-reusable parts

Unit :N·m {kgf·cm}

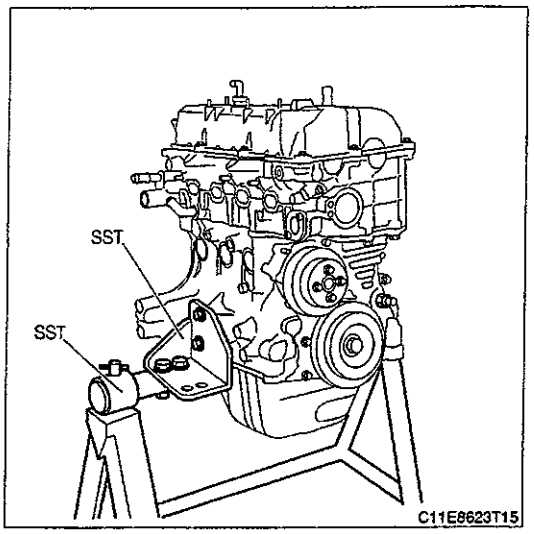
1 a Cover, cylinder head
2 b Gasket, cylinder head cover
3 c Plunger, chain tensioner
4 d Plug, semi-circular
5 e Rotor, signal
6 f Sprocket, camshaft timing
7 g Cap, camshaft bearing, No.1
8 h Cap, camshaft bearing, No.2
9 i Cap, camshaft bearing, No.3 (exhaust side)
10 j Camshaft, No.2
11 k Cap, camshaft bearing, No.3 (intake side)
12 l Camshaft, No.1
13 m Ring, shaft snap
14 n Washer, wave
15 o Gear S/A, camshaft sub
16 p Spring, camshaft gear

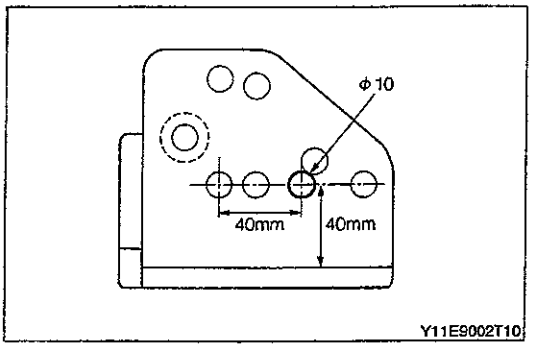
1-1-3 POINTS OF DISASSEMBLY

1.Install the partial engine to the SST.
SST: 09219-87101-000
09219-87202-000

NOTE

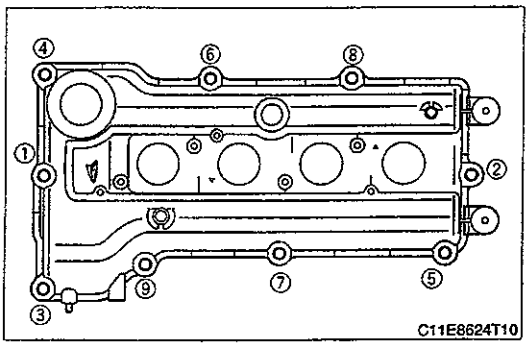
- The conventional attachment can be used for Type JB engine by drilling a 10mm dia. hole on the attachment at a point as indicated in the right figure.





(1) Removal of cylinder head cover

1.Remove the cylinder head cover.

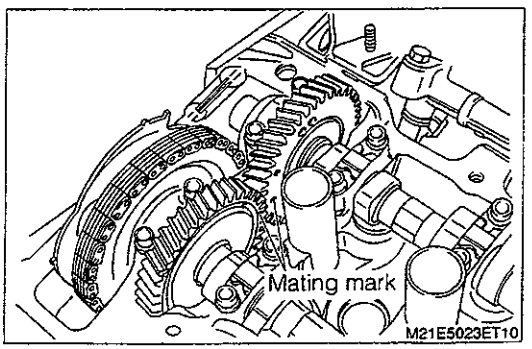


(2) Removal of chain tensioner plunger

1.Put the No.1 cylinder at the top dead center under compression by aligning the mating marks at the lower section of the timing gear, as indicated in the right figure.

CAUTION

- When turning the camshaft, be sure to turn it by turning the crankshaft in the normal direction with a tool applied to the crankshaft pulley.

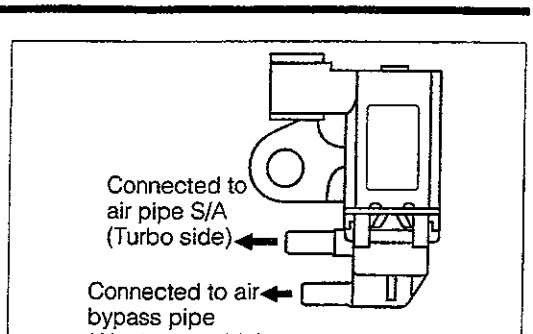


(12) Vacuum switching valve bracket (boost control VSV)

1.Install the VSV together with the vacuum switching valve bracket (boost control VSV).

CAUTION

- Install the hose as shown in the right figure.

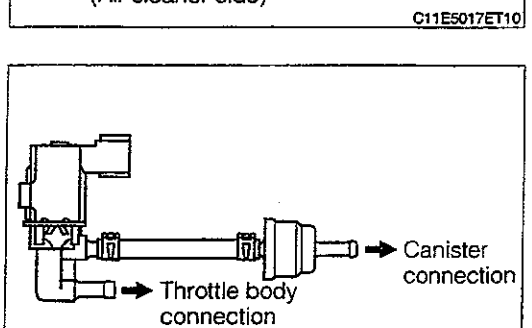


(13) Vacuum switching valve bracket (purge VSV)

1.Install the VSV together with the vacuum switching valve bracket (purge VSV).

CAUTION

- Install the hose as shown in the right figure.



2-1-6 OPERATION AFTER INSTALLATION

1.If the camshaft has been replaced, adjust valve clearance.
Refer to Page B5-1.

2.Install the ignition coil.
Refer to Page B10-1.

3 ENGINE ASSY

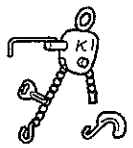
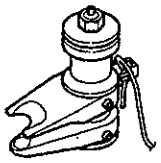
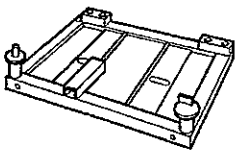
3-1 REMOVAL AND INSTALLATION

WARNING

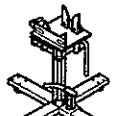
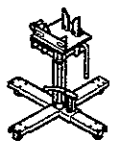
- Never bring fire close during servicing the fuel system.
- When removing the fuel hose, prevent the fuel from splashing.
- When the coolant is hot, do not remove the radiator cap, drain plug or water hose.
- When the oil is hot, do not remove the drain plug or oil cooler hose.

3-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09090-04020-000 (09090-04010-000)	Device, engine sling
	09628-00011-000 (09611-87701-000)	Puller, tie-rod end
	09994-87201-000	Holder, engine frame

Tool

Shape	Part No.	Part name	Use
	HMJ450-TW	High transmission jack	
	ML450	High transmission jack	

Instrument

Torque wrench

Lubricant,adhesive,others

Engine hanger No.1 (Replacement parts),Engine hanger No.2 (Replacement parts),Engine hanger attaching bolt (Replacement parts)

3-1-2 OPERATION BEFORE REMOVAL

1.Remove the fuel pressure.
Refer to Page B7-1.

2.Remove the battery.

CAUTION

- It must be noted that, when the negative ⊖ terminal of the battery is removed, memories for the diagnosis, radio setting, etc. will be erased at the same time.

3.Remove the front bumper.
Refer to Page I2-2.

4.Remove the air cleaner.
Refer to Page B3-2.

5.Remove the intercooler.
Refer to Page B3-12.

6.Drain the coolant.

7.As for the M/T vehicle, remove the clutch release control cable.
Refer to Page F1-5.

8.Remove the drain plug and the gasket and drain transmission oil (M/T vehicle) .

CAUTION

- The gasket is a non-reusable part.

9.Remove the front wheel.

10.Remove the front exhaust pipe assembly.
Refer to Page B4-2.

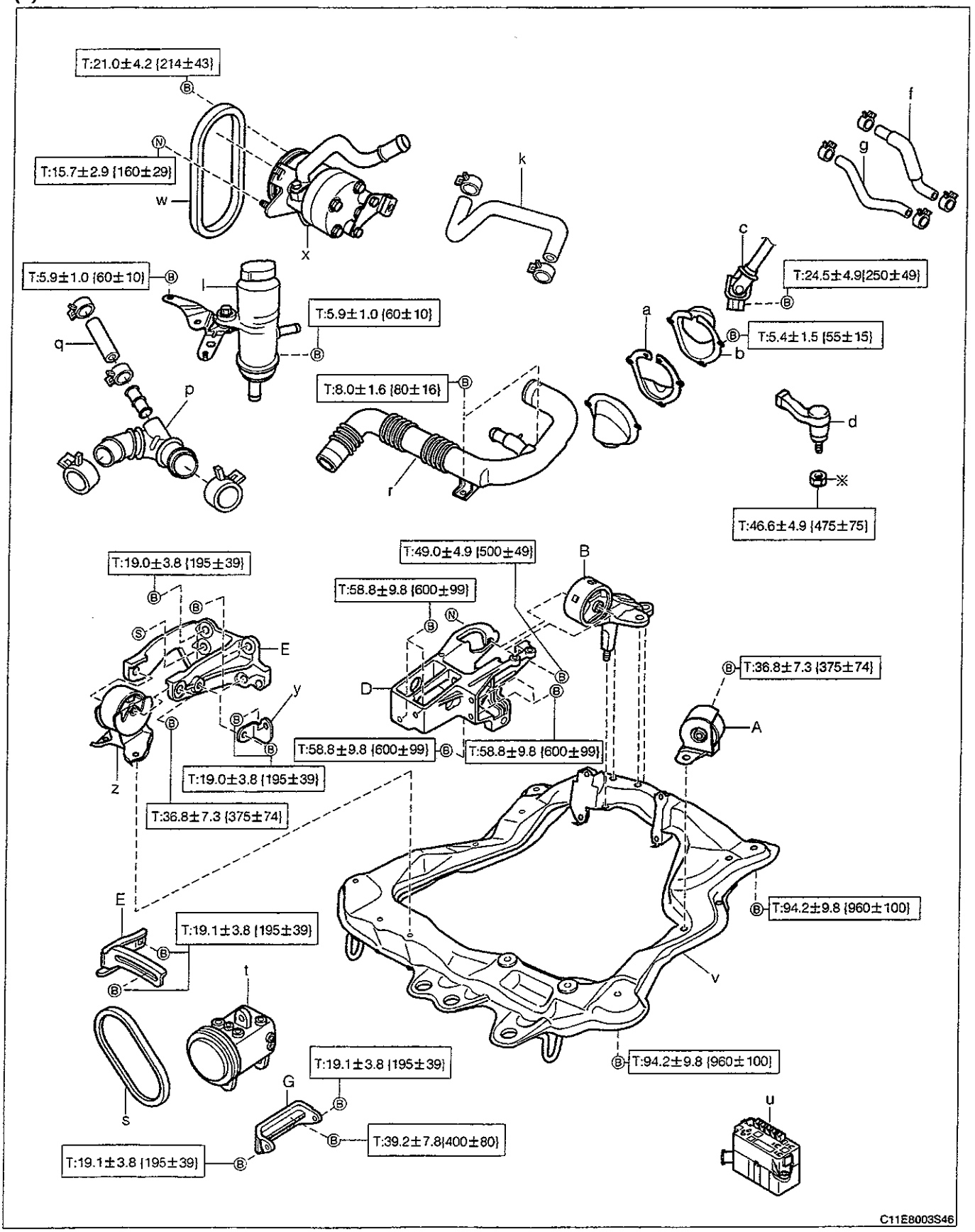
11.Remove the stabilizer bar and the lower arm (only the connection with the front frame).
Refer to Page C1-11.

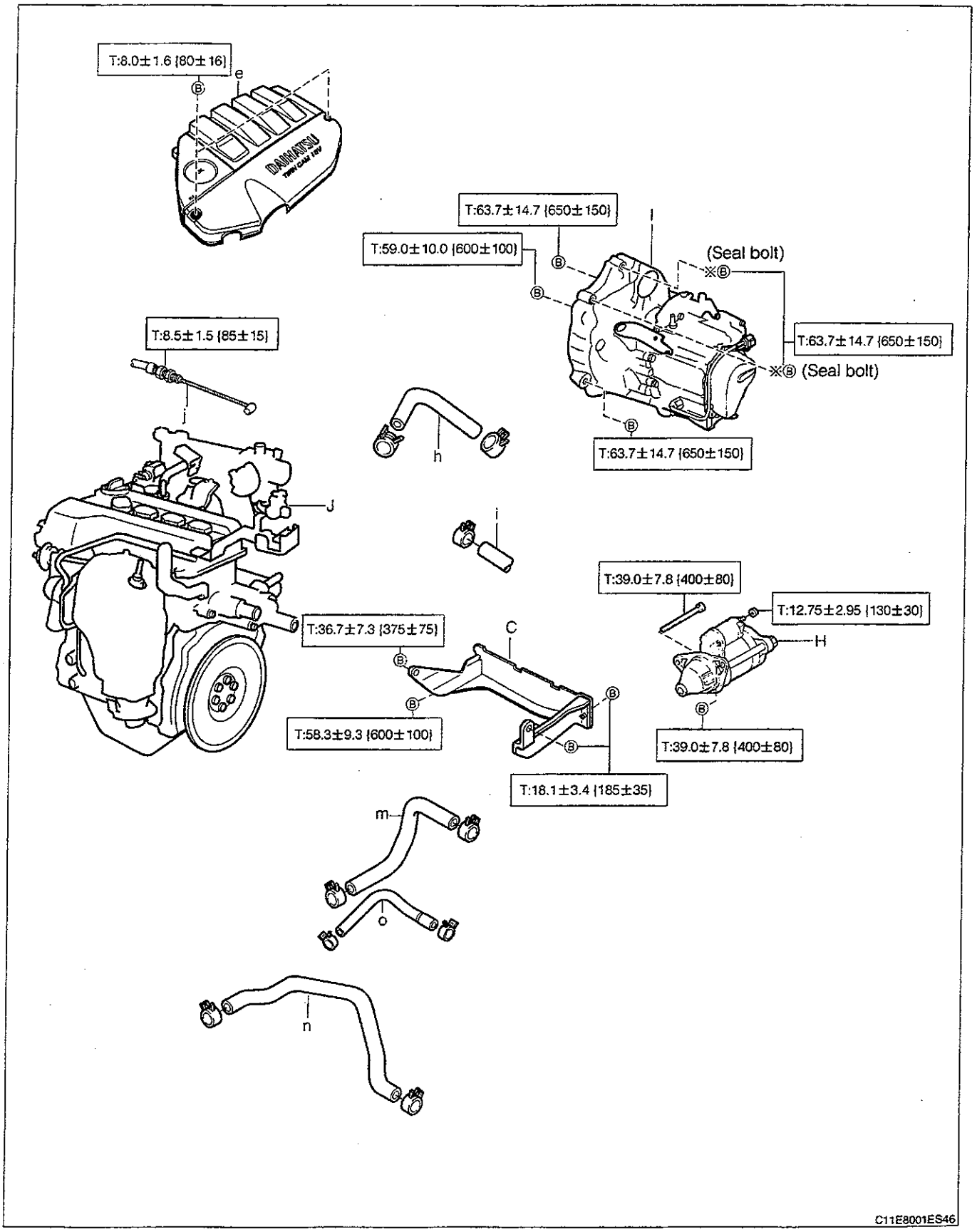
12.Remove transaxle side of the drive shaft.
Refer to Page D2-8.

13.As for the M/T vehicle, remove the shift & select shaft S/A and the extension rod S/A.
Refer to Page F2-8.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS





※Non-reusable parts
Unit:N·m{kgf·cm}

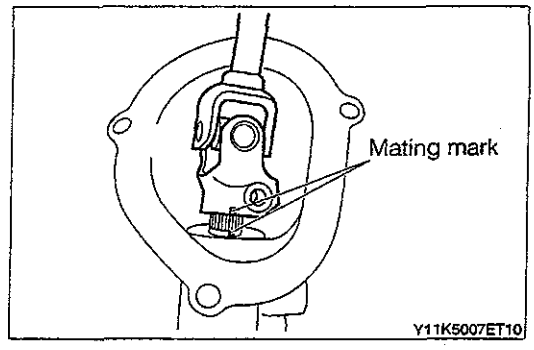
(2) REMOVAL AND INSTALLATION PROCEDURES

	1	a	Retainer, dust cover	▼	20	t	COMPRESSOR AY
	2	b	Cover, main shaft lower dust		21	u	Block Ay, relay
▼ ▲	3	c	Column Ay, steering	▼ ▲	22	v	Frame Ay
▼	4	d	Arm S/A, suspension lower arm	▲	23	w	Belt, V (vane pump)
	5	e	Cover S/A, engine upper	▼	24	x	Pump Ay, vane
	6	f	Hose, heater inlet water		25	y	Stay, exhaust manifold
	7	g	Hose, heater outlet water	▼	26	z	Insulator S/A, engine mounting, front
	8	h	Hose, fuel No.1 (main)	▼	27	A	Insulator, engine mounting, lower left
▲	9	i	Hose, vacuum (canister - purge VSV)	▼	28	B	Insulator S/A, engine mounting, rear
▼ ▲	10	j	Cable Ay, accelerator control	▼ ▲	29	v	Frame Ay
	11	k	Hose, booster vacuum		30	C	Stiffener, power train
▼	12	l	Reservoir Ay, oil	▲	31	D	Bracket, engine mounting, rear right
	13	m	Hose, radiator No.1	▲	32	E	Bracket, engine mounting, front right
	14	n	Hose, radiator No.2		33	F	Bar, adjusting
	15	o	Hose, turbo water		34	G	Bracket, compressor mounting
▼	16	p	Hose, air cleaner No.2		35	H	Starter Ay
	17	q	Hose, air bypass (air bypass pipe - air cleaner hose No.2)	▼ ▲	36	I	Manual transaxle AY
					37	J	ENGINE AY
	18	r	Pipe, intake No.1				
▲	19	s	Belt, V (air conditioner)				

3-1-4 POINTS OF REMOVAL

(1) Steering column Ay

1.Put a match mark with the steering gear Ay and remove the universal joint portion of the steering column Ay.



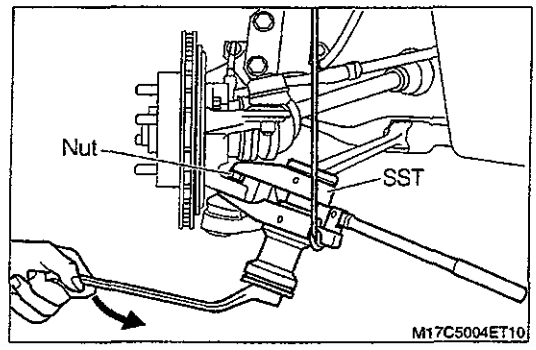
(2) Suspension, lower arm S/A

1.Use the SST to disconnect the steering knuckle and the ball joint area of the suspension lower arm S/A.

CAUTION

- When setting the SST, install a dummy nut to the threaded portion of the lower arm to prevent damage to the threaded portion.
- Hang the SST using a cord.
- Use care not to damage the ball joint dust cover.

SST: 09628-00011-000



(3) ACCELERATOR CONTROL CABLE AY

1.Loosen the bracket nut to remove the throttle body.

CAUTION

- Be careful not to have the cable get curly when removing it.

(4) Oil reservoir Ay

1.Remove only the bracket portion without disconnecting the oil reservoir Ay piping.

(5) Air cleaner hose No.2

1.Remove the Air cleaner hose No.2.

CAUTION

- Cover the hole of the turbocharger with adhesive to prevent dirt or dust from entering.

(6) COMPRESSOR AY

1.Remove the compressor Ay.

(1) Remove the two mounting bolts of the compressor mounting bracket at the lower compressor and then remove the bracket together with the compressor. Do not remove the pipe during this operation.

(2) Use a cord or the like to hang the compressor. Hang the condenser as well.

(7) Frame Ay

1.Remove the engine Ay, transaxle Ay, steering gear Ay together with the frame S/A from the vehicle.

(1) Install the engine hanger No.1 and engine hanger No.2.

NOTE

- The engine hangers No.1 and No.2 and bolts with washers are supplied parts.

TIGHTENING TORQUE: 20.0±6.0 N·m {200±60kgf·cm}

(2) Disconnect the engine wire from the engine control computer, and pull it into the engine compartment.

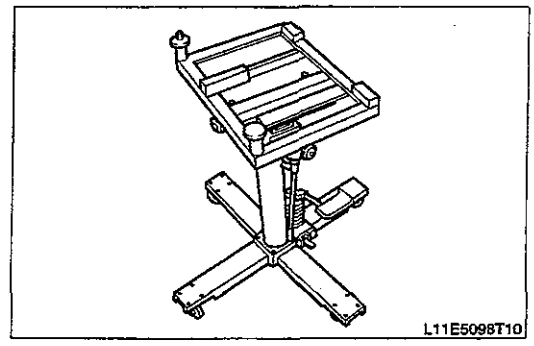
(3) Remove the connectors and clamps. Disconnect the engine wire from the vehicle.

(4) Disconnect each harness, and the earth wires of the engine section and transmission case cover section.

(5) Securely fix the SST on the high transmission jack.

SST: 09994-87201-000

TOOL: High transmission jack



NOTE

- If the high transmission jack is not used, securely fix the SST onto the low transmission jack or the rigid rack and perform the following operations by lifting and lowering the vehicle (two-post lift).

(6) Use the high transmission jack to set the SST on the frame S/A.

NOTE

- Match the stabilizer bar bracket (RH) mounting bolt hole (one of the two holes, which is located at the rear side of the vehicle) with the protrusion of the SST.

(7) Remove the mounting bolt of the frame S/A to the body.

(8) Use the high transmission jack to remove the front frame S/A from the vehicle with the engine Ay, transaxle Ay and steering gear Ay mounted.

CAUTION

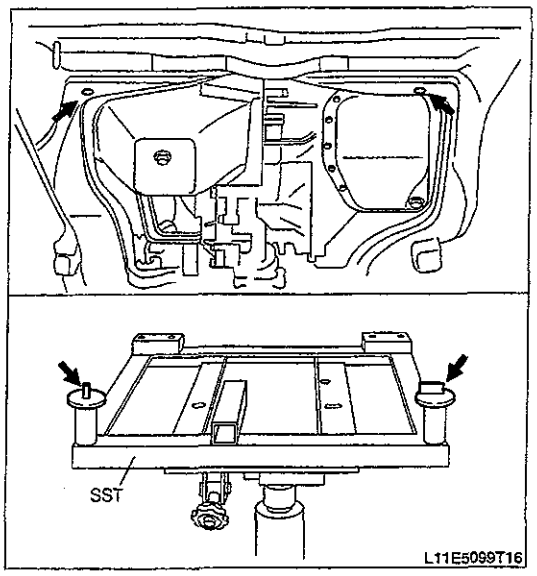
- Slowly remove the engine assembly, making sure that no connectors or hoses are left not removed or that they are not interfering with other parts.
- Remove the drive shaft and the lower arm by giving clearance to avoid interference.

(9) Use the SST (engine slinger devise) and the chain block to support the engine Ay.

SST: 09090-04020-000

CAUTION

- Securely hang the SST on the engine hanger.



(8) Vane pump Ay

1.Remove the vane pump Ay from the engine Ay.

CAUTION

- Remove the vane pump, oil reservoir, hose, etc. as an integrated part, without removing the piping.

(9) Engine mounting front insulator S/A

1.Remove the bolt connecting with the engine mounting front bracket.

CAUTION

- Make sure that the engine assembly is supported in a well balanced way during the removal.

NOTE

- There is no need to remove on the frame side.

(10) Engine mounting lower left insulator

1.Remove the bolt connecting the bracket on the transmission side.

CAUTION

- Make sure that the engine assembly is supported in a well balanced way during the removal.

NOTE

- There is no need to remove on the frame side.

(11) ENGINE MOUNTING REAR INSULATOR S/A

1.Remove the bolt connecting with the engine mounting rear bracket.

CAUTION

- Make sure that the engine assembly is supported in a well balanced way during the removal.

NOTE

- There is no need to remove on the frame side.

(12) Frame S/A

1.Remove the power steering gear Ay and the insulator (3 pcs) together with the frame S/A.

NOTE

- It is advised to remove the insulator and the frame if you have difficulty in disassembly. Reinstall the insulator to the frame after disassembly.

(13) Manual transaxle Ay

1.As for the M/T vehicle, remove the manual transaxle Ay.
Refer to Page F2-2.

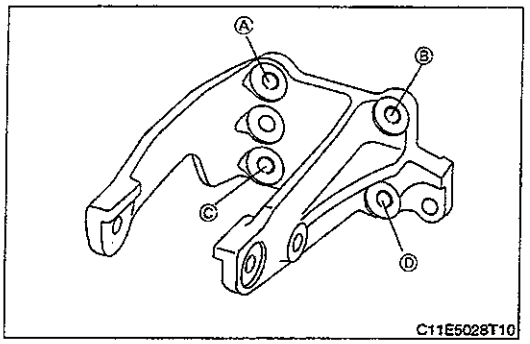
3-1-5 POINTS OF INSTALLATION

(1) Manual transaxle Ay

1.As for the M/T vehicle, install the manual transaxle Ay.
Refer to Page F2-2.

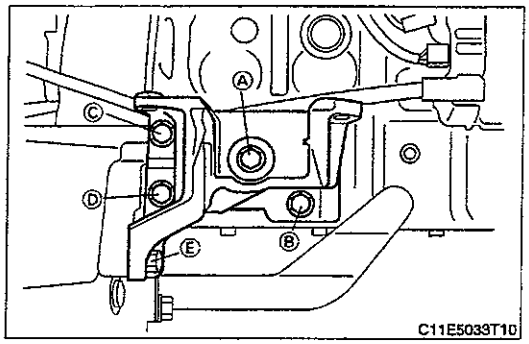
(2) Engine mounting front right bracket

1.Temporarily tighten the bolt Ⓐ on the engine mounting front right bracket, and tighten the bolts in the sequence of Ⓒ-Ⓑ-Ⓓ-Ⓐ to the specified torque.



(3) Engine mounting rear right bracket

1.Install the engine mounting rear right bracket.
(1) Temporarily tighten the bolt Ⓐ on the engine block.
(2) Tighten the bolts in the sequence of Ⓒ-Ⓑ-Ⓓ to the specified torque.
(3) Tighten the bolt Ⓐ to the specified torque.
(4) Tighten the bolt Ⓔ on the transaxle Ay to the specified torque.



(4) Frame Ay

1.Install the frame Ay to the engine Ay and the transaxle Ay together with the power steering gear Ay and the insulator (3 pcs).

NOTE

- Align each insulator with three mounting brackets and install.

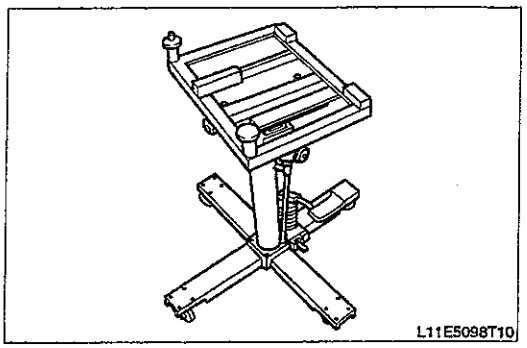
2.Install bolts connecting each insulator and the mounting brackets.

(5) Belt, V (vane pump))

1.Install the V belt and adjust the tension.
Refer to Page G2-36.

(6) Frame Ay

1.Secure the SST on the high transmission jack.
SST: 09994-87201-000
TOOL: High transmission jack



NOTE

- If the high transmission jack is not used, securely fix the SST onto the low transmission jack or on the rigid rack and perform the following operations by lifting and lowering the vehicle (the two-post lift).

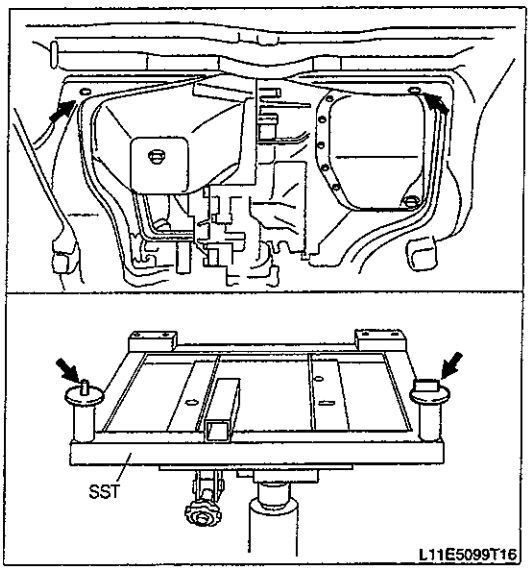
2.Use the high transmission jack to set the SST on the frame S/A.

CAUTION

- Apply vinyl tape or the like on the protrusion of the SST in order to prevent damage to the bolt hole.

NOTE

- Match the stabilizer bar bracket (RH) mounting bolt hole (one of the two holes, which is located at the rear side of the vehicle) with the protrusion of the SST.



3.Use the high transmission jack to raise the frame Ay, engine Ay, etc. as high as the mounting position to the vehicle.

CAUTION

- Be careful not to allow interference with parts in the engine compartment to occur.

4.Tighten the mounting bolt to the frame Ay to the specified torque.
5.Install each harness, connector and clamp.
6.Route the engine wire in the vehicle interior to connect it to the engine control computer.
7.Install the earth wires of the engine section and transaxle section.

(7) Belt, V (air conditioner)

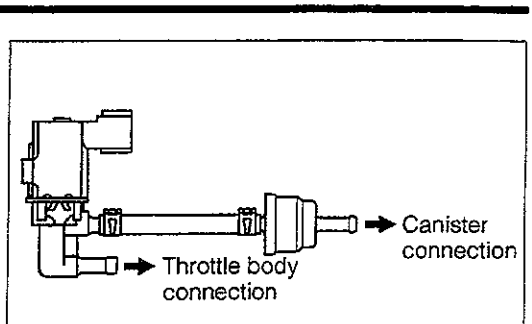
1.Install the compressor Ay and the V belt (for A/C) and adjust the tension.
Refer to Page K1-15.

(8) ACCELERATOR CONTROL CABLE AY

1.Install the accelerator control cable assembly to the throttle body. After adjusting the accelerator pedal free play, tighten the nut to the specified torque.
SPECIFIED VALUE: 1—5mm (accelerator pedal free play)

(9) Vacuum hose (canister - purge VSV)

1.Install the vacuum hose by setting the check valve with the larger diameter flange on the VSV side as shown in the right figure.

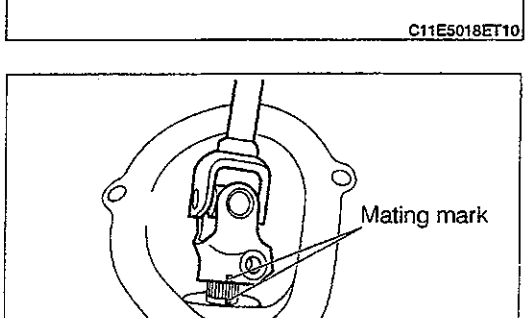


(10) Steering column Ay

1.Install the universal joint of the steering column Ay by matching the mark for the steering gear.

CAUTION

- **In case you failed to set a mating mark and align the wheel center on the steering wheel side, be sure to align the roll connector position.**



3-1-6 OPERATION AFTER INSTALLATION

1.Install the drive shaft Ay.
Refer to Page D2-8.

2.Install the front stabilizer bar and the lower arm (connection with the front frame).
Refer to Page C1-11.

3.Install the front exhaust pipe assembly.
Refer to Page B4-2.

4.As for the M/T vehicle, install the shift & select shaft S/A and the extension rod S/A.
Refer to Page F2-8.

5.As for the M/T vehicle, install the clutch release control cable.
Refer to Page F1-5.

6.Install the intercooler.
Refer to Page B3-12.

7.Install the air cleaner.
Refer to Page B3-2.

8.Install the front bumper.
Refer to Page I2-2.

9.Install the front wheel.

10.After installing the new gasket and tightening the drain plug to the specified torque, fill the transmission oil (M/T vehicle) .

11.Fill cooling water.

12.Remove the engine hanger if it has been installed.

13.Install the battery.

A. GENERAL INFORMATION A
B. ENGINE UNIT B
C. ENGINE ELECTRICAL C
D. SERVICE SPECIFICATIONS D



TO INDEX

A GENERAL INFORMATION

HOW TO USE THIS MANUAL---------- A - 1
ARTICLES TO BE PREPARED---------- A - 1
REMOVAL AND INSTALLATION PROCEDURES---------- A - 1
DESCRIPTION OF SERVICE STANDARD VALUE ---------- A - 2
CONTENTS NOT DESCRIBED IN THIS MANUAL---------- A - 3
DEFINITIONS OF TERMS---------- A - 3
ABBREVIATION CODES ---------- A - 4
HOW TO GRASP SPECIFIED TIGHTENING TORQUE FOR GENERAL STANDARD BOLT AND NUT---------- A - 4
Determining Procedure for Tightening Torque for General Standard Bolts and Nuts ---------- A - 4
UNIT ---------- A - 6
NEW UNIT BECAUSE OF THE INTRODUCTION OF THE SI UNIT------- A - 6
GENERAL SERVICE INSTRUCTION ------ A - 7

1 HOW TO USE THIS MANUAL

1-1 ARTICLES TO BE PREPARED

When SST, tool, measuring instrument, a sort of fat and oil to be prepared before operation are necessary, those are described by compiling in the table as preparation tools at the beginning of each item.

However, the general tools, jacks, fixtures as considered being equipped always at the service shop are usually omitted.

1-2 REMOVAL AND INSTALLATION PROCEDURES

1.Block diagrams are posted so as to show the installed state of each part.

2.The application of a sort of fat and oil and sealer are instructed in the figure with arrow. And the indication of a tightening torque and non−reusable parts are also described. The explanation of each code is posted below the block diagram concerned.

3.The removal and installation (disassembling and assembling) procedure list is shown just beneath of components figure.

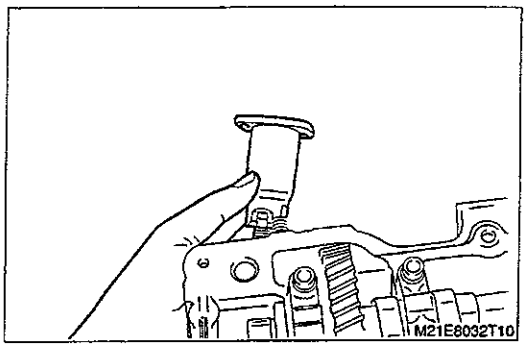
The removal (disassembling) procedure, the installation (assembling) procedure and parts name are described in the sequence from left side of list. And the alphabet written before a part name links with alphabet in the figure.

4.In principle, reverse the removal (or disassembly) procedure to install (or assemble) the parts.

NOTE

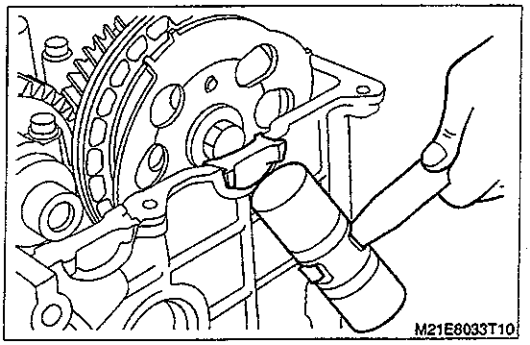
- **Only in cases where the installation (or assembly) can not be carried out by reversing the removal (or disassembly) procedure, the installation (or assembly) procedure is provided.**

2.Remove the chain tensioner plunger.



(3) Removal of semi-circular plug.

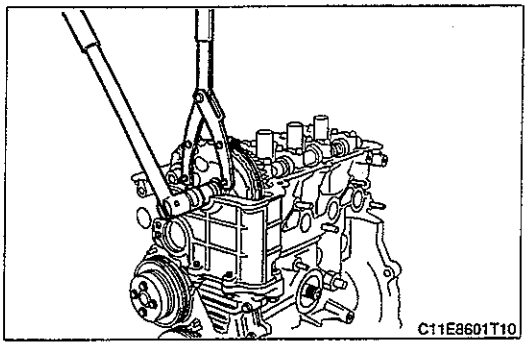
1.Remove the semi-circular plug, using a plastic hammer or the like.



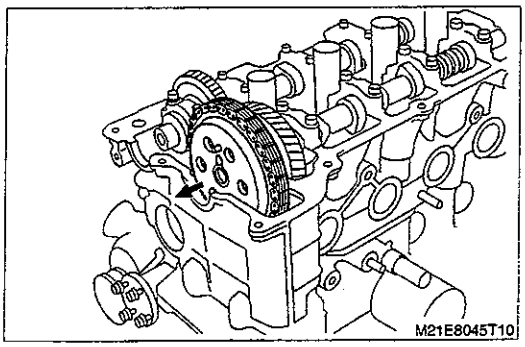
(4) Removal of camshaft timing sprocket

1.Set the SST to the hole of the signal rotor. Remove the bolt, while paying attention not to apply a force to the timing chain by taking a turn-preventive measure.
SST: 09504-87501-000

2.Remove the camshaft timing sprocket together with the signal rotor.



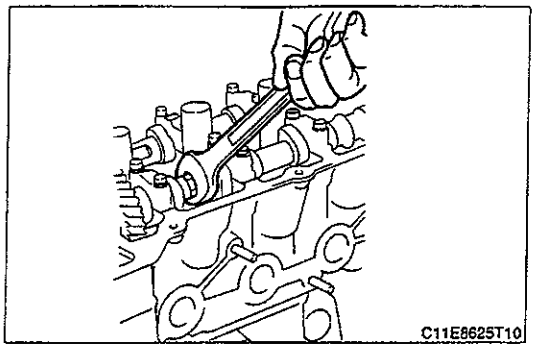
3.Remove the signal rotor. With the timing chain still applied on the sprocket, displace it toward the engine front side.

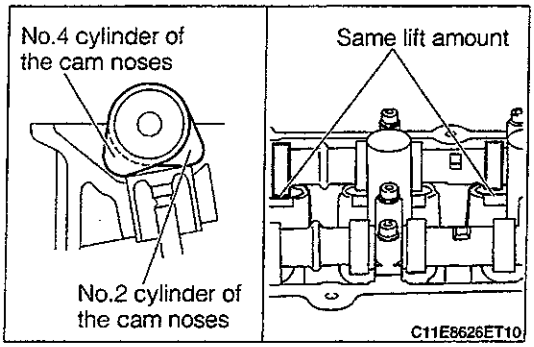


(5) Removal of camshaft bearing caps No.1 and No.2

1.After having turned the crankshaft about 90° in the engine rotating direction from the No.1 cylinder top dead center under compression, turn the camshaft counterclockwise in such a way that the cam noses of the No. 2 and No. 4 cylinders of the camshaft come at the bottom section and they push their lifters by the same lift amount. Here, the camshaft should be turned with a spanner applied to the hexagonal section of the exhaust camshaft.

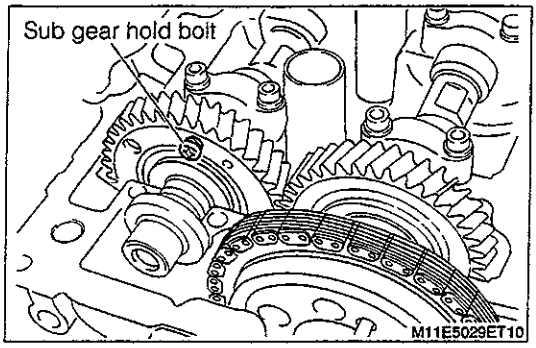
2.Remove the camshaft bearing caps No.1 and No.2.
TOOL: Hexagon wrench (Width across flats : 5mm)



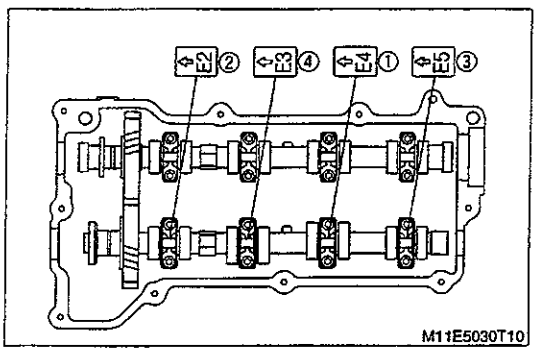


(6) Removal of camshaft bearing cap No.3 (exhaust side)

1.Attach the sub-gear at the camshaft No.1 side to the driven gear by means of a bolt.
Use a bolt whose outer diameter is 5 mm with a pitch of 0.8 mm).



2.Remove the camshaft bearing caps No.3 (4 pieces) at the exhaust side that are retaining the camshaft No.2 in accordance with the sequence indicated in the right figure.
TOOL: Hexagon wrench (Width across flats : 5mm)

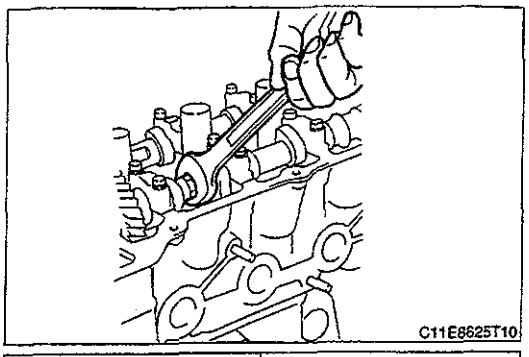


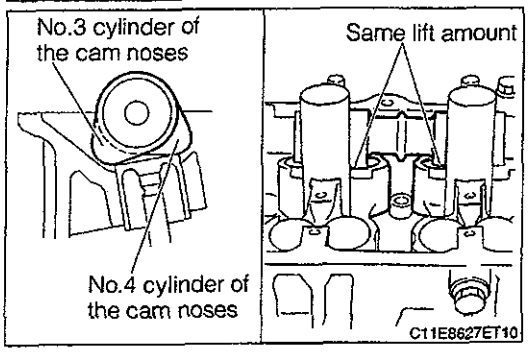
(7) Removal of camshaft No.2 (exhaust side)

1.Remove the camshaft No.2 by raising the gear side first.

(8) Removal of camshaft bearing cap No.3 (intake side)

1.Turn the camshaft No.1 counterclockwise in such a way that the cam noses of the No. 3 and No. 4 cylinders of the camshaft No.1 come at the bottom section and they push their lifters by the same lift amount. Here, the camshaft No.1 should be turned with a spanner applied to the hexagonal section of the camshaft. No.1.



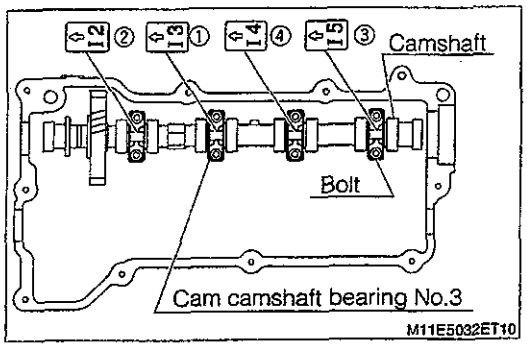


2.Remove the camshaft bearing caps No.3 (4 pieces) at the intake side that are retaining the camshaft No.1 in accordance with the sequence indicated in the right figure.

CAUTION

- Upon completion of the camshaft removal, leave the timing chain in an applied state on the camshaft timing sprocket.
- It should be noted that if the timing chain should drop into the oil pump, the cylinder head and oil pump must be removed.

TOOL: Hexagon wrench (Width across flats : 5mm)



(9) Removal of camshaft No.1 (intake side)

1.Remove the camshaft No.1 by raising the gear side first.

(10) Removal of camshaft sub-gear S/A

1.Clamp the hexagonal section of the No.1 camshaft in a vice with a protective sheet interposed.

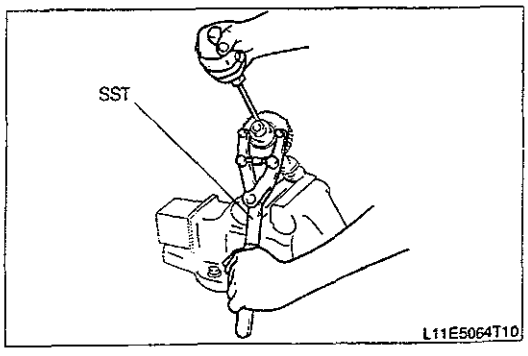
CAUTION

- Be very careful not to scratch the cam section.

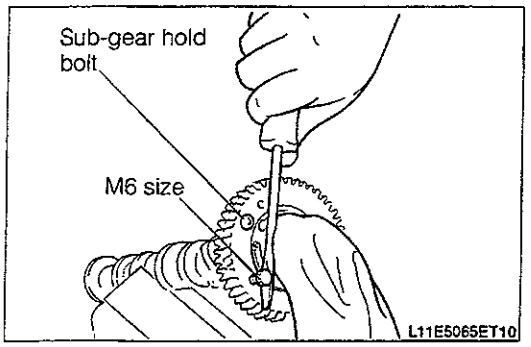
2.Remove the bolt for retaining the camshaft sub-gear.

(1) Set the SST to the two ϕ6 holes of the camshaft sub-gear S/A so as to retain the sub-gear.

SST: 09504-87501-000



(2) When the SST is not used, put a M6 bolt into the camshaft sub-gear Ay at a position as indicated in the right figure. Insert a screwdriver or the like into between the bolt and the camshaft journal so as to retain the sub-gear.



CAUTION

- **Be certain to apply a cloth or the like to the camshaft journal so as to prevent any scratch.**

(3) Remove the bolt for retaining the sub-gear, while maintaining a state in which the tooth tips of the sub-gear and driven gear are aligned with each other.

3. Detach the shaft snap ring, using snap ring pliers. Remove the wave washer, camshaft sub-gear S/A and camshaft gear spring.

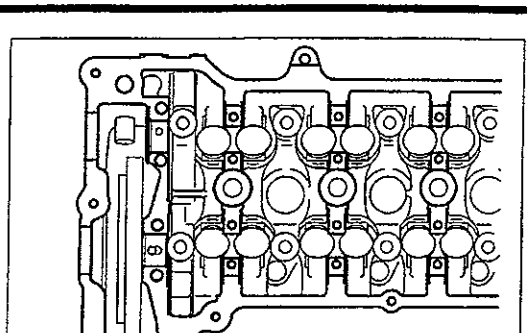
1-1-4 Clean

1.Clean the attachment surface of the camshaft bearing cap.

2.Clean the gasket from the attachment surfaces of the cylinder head cover of the cylinder head and the semi-circular plug.

CAUTION

- Care must be exercised not to drop the gasket into the cylinder head.



1-1-5 INSPECTION

(1) Camshaft check

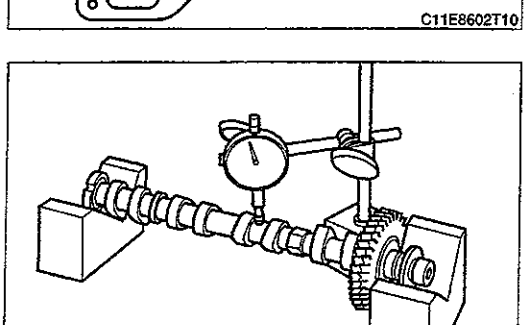
1.Check of camshaft for runout

(1) Measure the runout, using a Vee block and a dial gauge. If the runout exceeds the allowable limit, replace the camshaft.

ALLOWABLE LIMIT: 0.03 mm

CAUTION

- The half of the runout reading that is obtained when the camshaft makes a complete turn represents the runout of the camshaft.

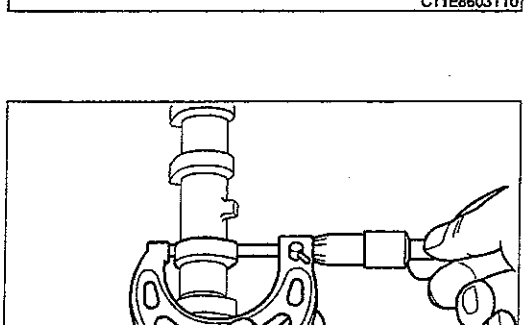


2.Check of cam lobe height

(1) Measure the cam lobe height, using a micrometer. If the cam lobe height is below the specified value, replace.

Cam lobe height

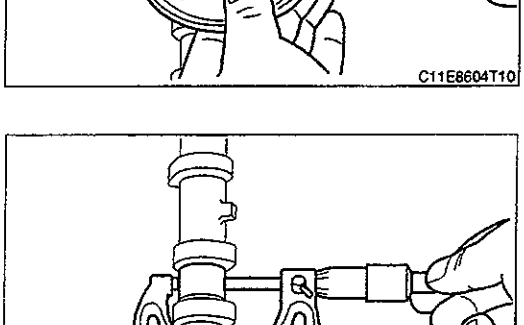
	Specified value (mm)	Allowable limit (mm)
Intake	33.86-33.94	33.81
Exhaust	33.21-33.29	33.16



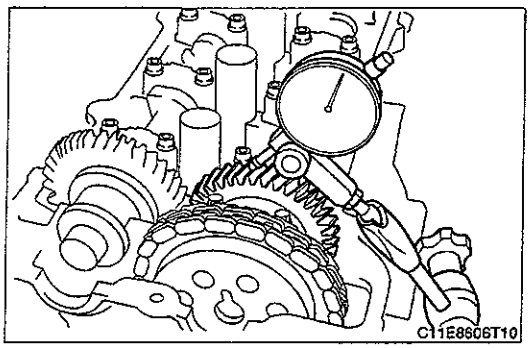
3.Check of camshaft journal outer diameter

(1) Measure the journal outer diameter, using a micrometer. If the measured value is out of the specified limit, replace the camshaft.

SPECIFIED VALUE: 22.979-22.995 mm



4.Measurement of camshaft backlash
(1) Install the camshaft in the cylinder head.
(2) Confirm the front mark and journal number of the bearing cap. Tighten the bolts.
TIGHTENING TORQUE: 12.5±2.0 N·m {130±20 kgf·cm}

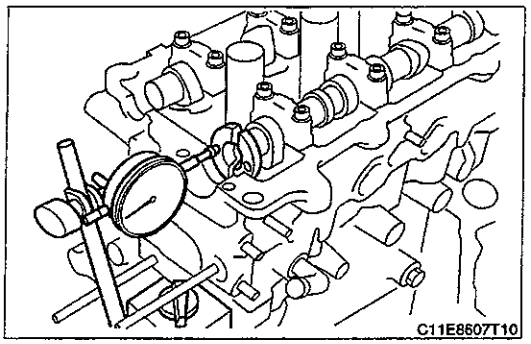


CAUTION
- Perform this operation with the sub-gear of the intake shaft removed.
- The installation should be made with the mating marks of the drive gear and the driven gear of the camshaft aligned with each other.

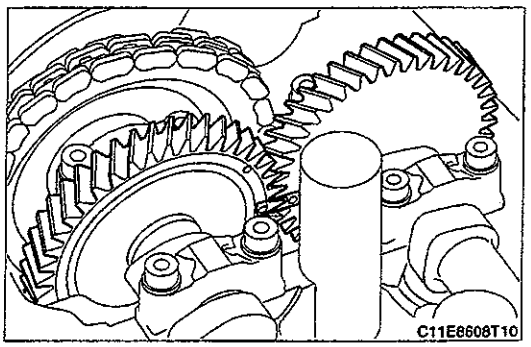
5.With the camshaft at the intake side fixed, measure the backlash, using a dial gauge.
SPECIFIED VALUE: 0.13-0.23 mm

CAUTION
- Conduct the measurement at four points or more.

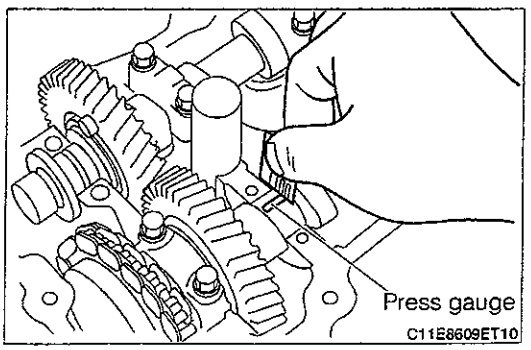
6.Check of camshaft thrust clearance
(1) Measure the thrust clearance, using a dial gauge. If the measured value is out of the specified limit, replace the cylinder head or camshaft.
SPECIFIED VALUE: 0.06 mm-0.16 mm
ALLOWABLE LIMIT: 0.18 mm



7.Check of camshaft oil clearance
(1) Set a press gauge to the journal section in the axial direction. Confirm the bearing cap and journal number. Tighten the bolts.
TIGHTENING TORQUE: 12.5±2.0 N·m {130±20 kgf·cm}



(2) Remove the bearing cap and measure the oil clearance. If the oil clearance exceeds the allowable limit, replace the cylinder head or the camshaft.
SPECIFIED VALUE: 0.037-0.073 mm
ALLOWABLE LIMIT: 0.10 mm



1-1-6 POINTS OF ASSEMBLY

1.Assemble the parts in the sequence as indicated in the COMPONENT.

(1) Assembling of camshaft sub-gear S/A

1.Clamp the hexagonal section of the No.1 camshaft in a vice with a protective sheet interposed.

CAUTION

- Be very careful not to scratch the cam section.

2.Set the camshaft gear spring, camshaft sub-gear S/A, and wave washer to the camshaft driven gear.

CAUTION

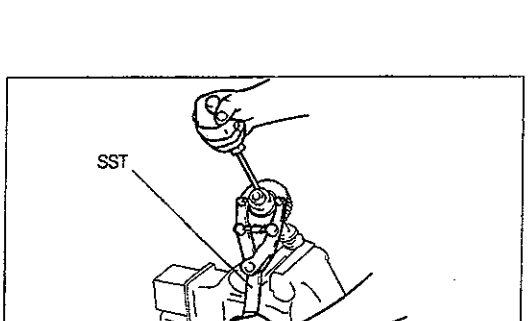
- As for the sub-gear, the side where the spring stopper pin is projected should face toward the driven gear side.

3.Install the shaft snap ring, using snap ring pliers.

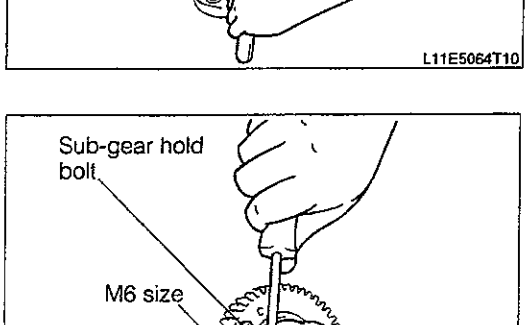
TOOL: Snap ring pliers

4.Install the bolt for retaining the camshaft sub-gear.

(1) Set the SST to the two ϕ6 holes of the camshaft sub-gear S/A. Turn the sub-gear clockwise so that the auxiliary hole for assembling the sub-gear may align with the auxiliary hole for assembling the camshaft driven gear and the tip-ends of the gear teeth may be aligned with each other.



(2) When the SST is not used, put a M6 bolt into the camshaft sub-gear S/A at a position as indicated in the right figure. Insert a screwdriver or the like into between the bolt and the camshaft journal. And turn the sub-gear clockwise so that the auxiliary hole for assembling the sub-gear may align with the auxiliary hole for assembling the camshaft driven gear and the tip-ends of the gear teeth may be aligned with each other.



CAUTION

- Be certain to apply a cloth or the like to the camshaft journal so as to prevent any scratch.

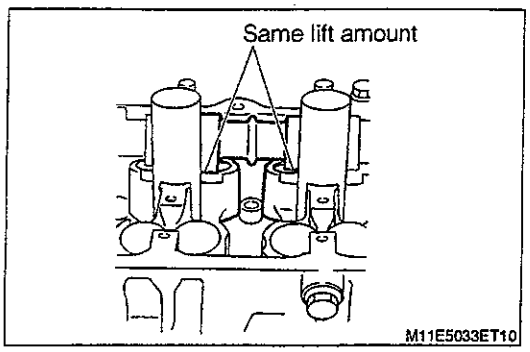
(3) Install the bolt for retaining the sub-gear (size: M5, pitch, 0.8 mm) to the auxiliary hole above. (When the SST is not used, remove the M6 bolt.)

(2) Assembling of camshaft No.1 (intake side)

1.Apply engine oil to the cam lobe and gear tooth surface of the camshaft and the journal sections of the cylinder head.

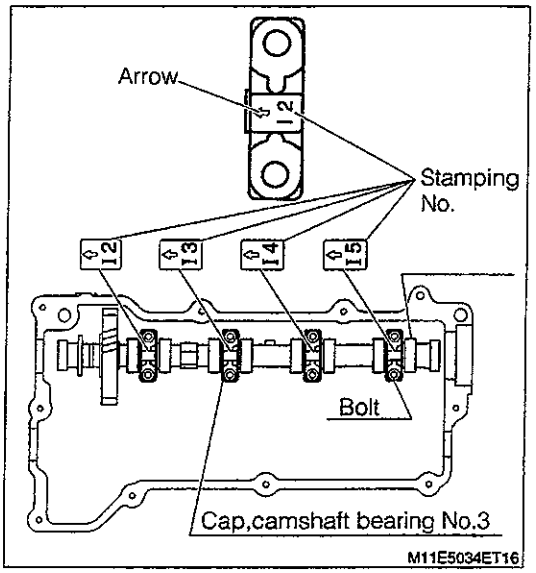
LUBRICANT: Engine oil

2.Set the camshaft No.1 to the cylinder head in such a way that the cam noses of the No. 3 and No. 4 cylinders of the camshaft No.1 come at the bottom section and they push their lifters by the same lift amount.

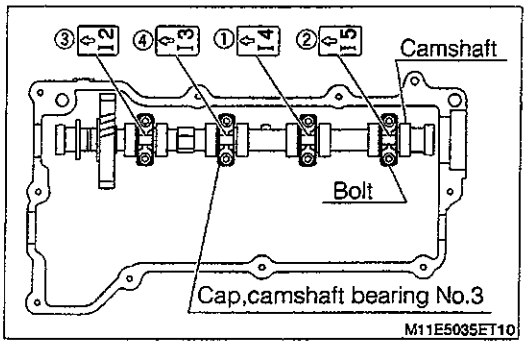


(3) Assembling of camshaft bearing cap No.3 (intake side)

1.Set the camshaft bearing caps No.3 (four pieces) to the camshaft No.1 (intake side).
Here, the setting should be made in such a way that the arrowheaded mark of the cap faces toward the front side of the engine and the punched number comes at the position as indicated in the right figure.



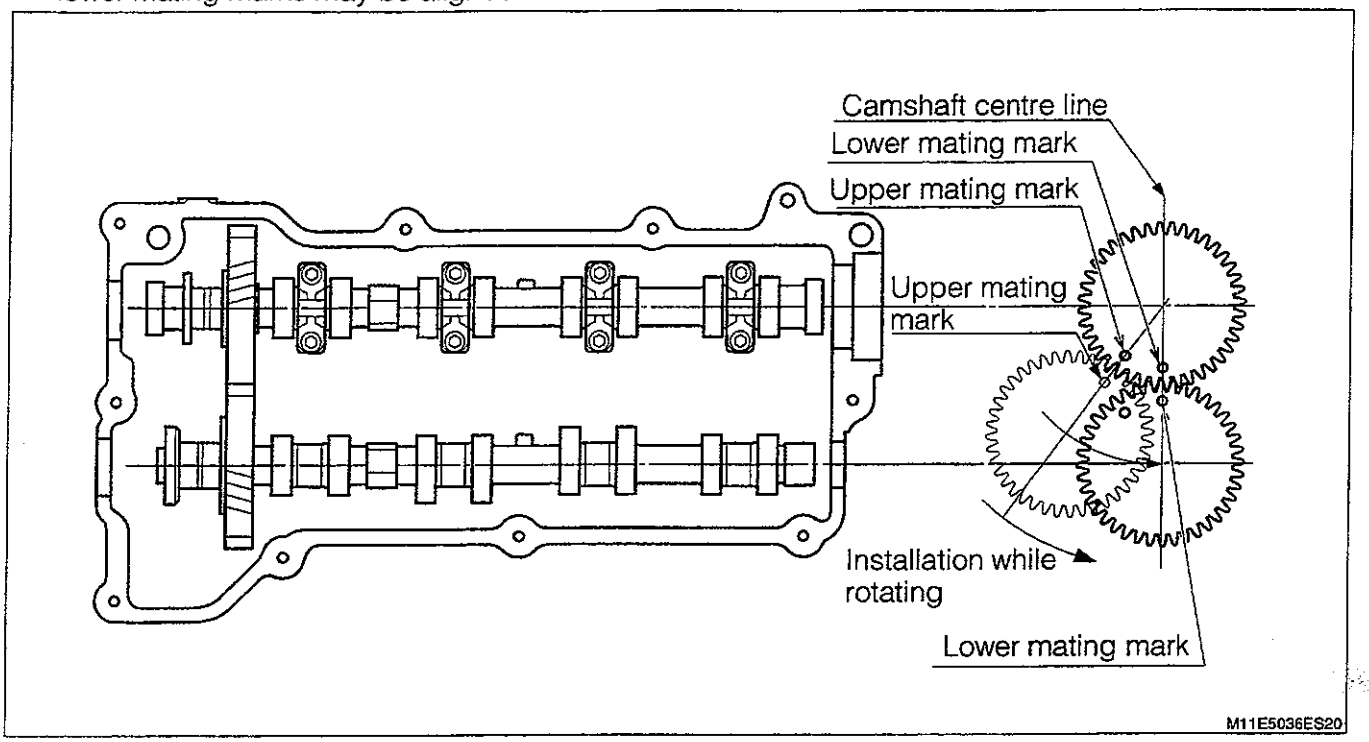
2.Tighten the camshaft bearing cap No.3 in the sequence indicated in the right figure.
TIGHTENING TORQUE: 12.5±2.0 N·m {130±20 kgf·cm}
TOOL: Hexagon wrench (Width across flats : 5mm)



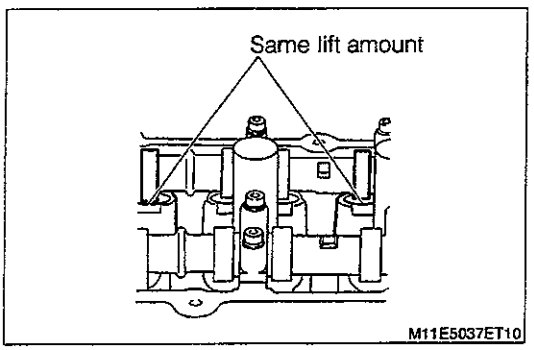
(4) Assembling of camshaft No.2 (exhaust side)

1.Apply engine oil to the cam lobe and gear tooth surface of the camshaft and the journal sections of the cylinder head.
LUBRICANT: Engine oil

2.Of the mating marks of the rear surface of the camshaft driven gear of the camshaft No.1 and the camshaft drive gear of the camshaft No.2, first make the upper mating marks aligned. While turning on the driven gear of the camshaft No.1, set the camshaft No.2 onto the cylinder head so that the lower mating marks may be aligned.

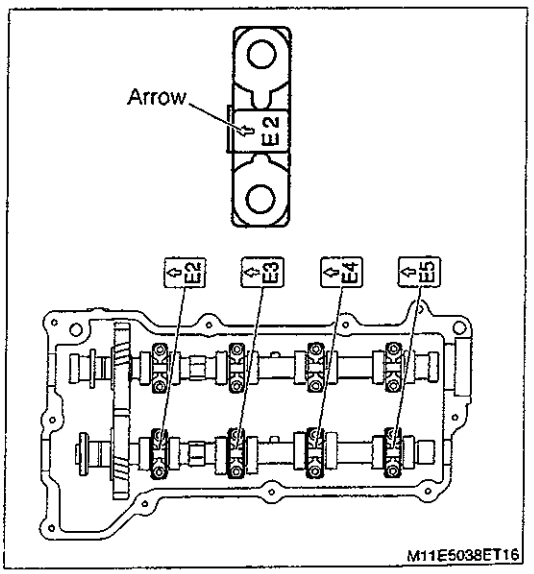


3.Set the camshaft No.2 onto the cylinder head in such a way that the cam noses of the No. 2 and No. 4 cylinders of the camshaft come at the bottom section and they push their lifters by the same lift amount, as indicated in the right figure.

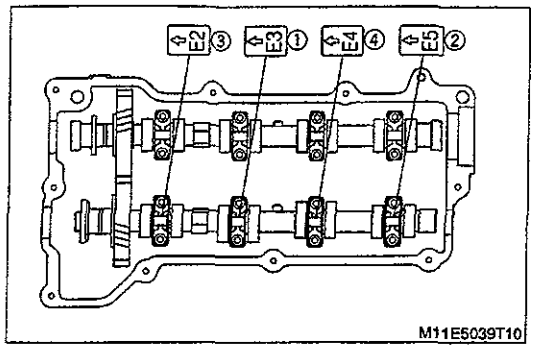


(5) Assembling of camshaft bearing cap No.3 (exhaust side)

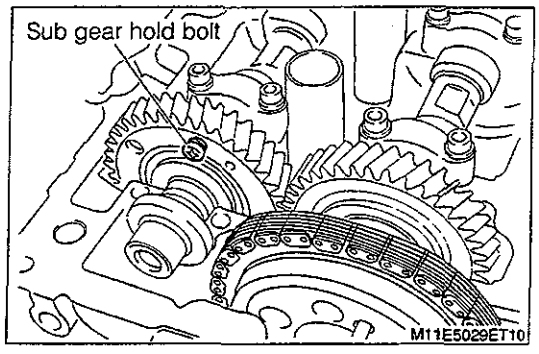
1.Set the camshaft bearing caps No.3 (four pieces) to the camshaft No.2 (exhaust side). Here, the setting should be made in such a way that the arrowheaded mark of the cap faces toward the front side of the engine and the punched number comes at the position as indicated in the right figure.



2.Tighten the camshaft bearing cap No.3 in the sequence indicated in the right figure.
TIGHTENING TORQUE: 12.5±2.0 N·m {130±20 kgf·cm}
TOOL: Hexagon wrench (Width across flats : 5mm)

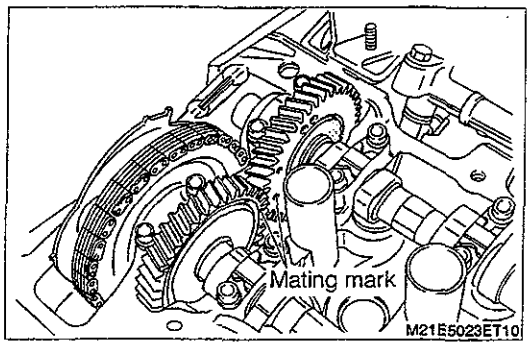


3.Remove the bolt for retaining the sub-gear.



(6) Check and adjustment of valve clearances

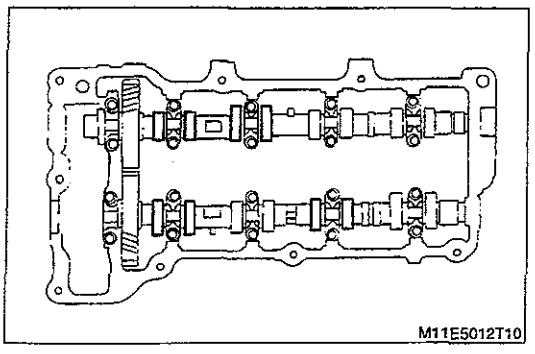
1.Temporarily install the camshaft timing sprocket to the camshaft No.2 together with the signal rotor.
2.Turn the crankshaft 90° (crank angle) from the top dead center.
3.Remove the camshaft timing sprocket from the camshaft.
4.Align the mating marks of the timing gears with each other, using the hexagonal section of the camshaft for servicing.



5.Using a thickness gauge, check the valve clearances at the positions indicated in the right figure.

Measuring points at top dead center under compression of camshaft No.1 cylinder

No.1 cylinder		No.2 cylinder		No.3 cylinder		No.4 cylinder	
IN	EX	IN	EX	IN	EX	IN	EX
○	○	○	–	–	○	–	–

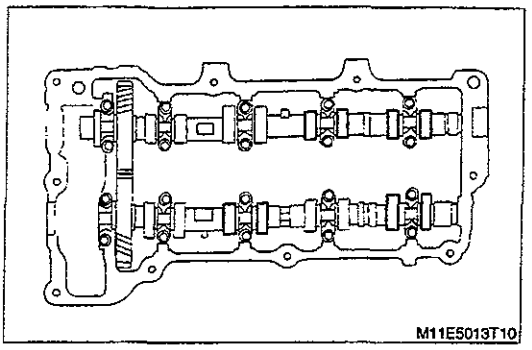


CAUTION

- Insert the thickness gauge from the spark plug side (central point).

6.Turn the camshaft 180°(cam angle), using the hexagonal section of the camshaft for servicing.

7.Using a thickness gauge, check the valve clearances at the positions indicated in the right figure.


M11E5013T10

Measuring points at top dead center under compression of camshaft No.4 cylinder

No.1 cylinder		No.2 cylinder		No.3 cylinder		No.4 cylinder	
IN	EX	IN	EX	IN	EX	IN	EX
–	–	–	○	○	○	○	○

CAUTION

- **Insert the thickness gauge from the spark plug side (central point).**

8.If the measured value is out of the specified value, replace the valve lifter, following the procedure given below.

CAUTION

- **The positions of those valves proved to be out of the specified value as well as their measured results should be recorded.**

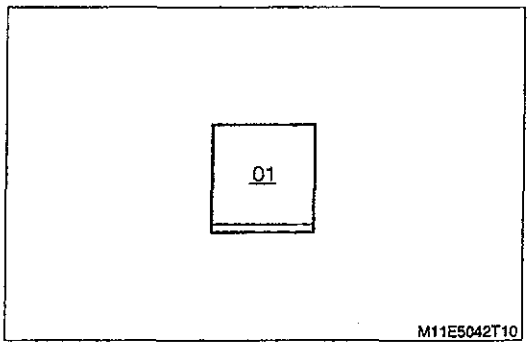
(1) Remove the camshafts No.1 and No.2.

(2) Select a suitable valve lifter, using the following formula given below.

Assembling lifter to be selected = Thickness of assembling lifter + (Measured clearance – Specified clearance)

CAUTION

- **The thickness of the lifter to be selected should be judged based on the punched mark at the side of the lifter.**
- **The measurement of the lifter thickness should be conducted at the central section of the lifter.**



M11E5042T10

Table showing valve lifter thicknesses

Punched mark	Valve lifter thickness (mm)	Punched mark	Valve lifter thickness (mm)	Punched mark	Valve lifter thickness (mm)	Punched mark	Valve lifter thickness (mm)
01	2.500	09	2.660	17	2.820	25	2.980
02	2.520	10	2.680	18	2.840	26	3.000
03	2.540	11	2.700	19	2.860	27	3.020
04	2.560	12	2.720	20	2.880	28	3.040
05	2.580	13	2.740	21	2.900	29	3.060
06	2.600	14	2.760	22	2.920		
07	2.620	15	2.780	23	2.940		
08	2.640	16	2.800	24	2.960		

(3) Remove those lifters at points where the valve clearances are out of the specified values.

(4) Apply engine oil to the outer periphery of the selected lifters. While turning the valve lifter, insert it into the cylinder head. Make sure that the lifter turns smoothly.

(5) Assemble the camshafts No.1 and No.2.

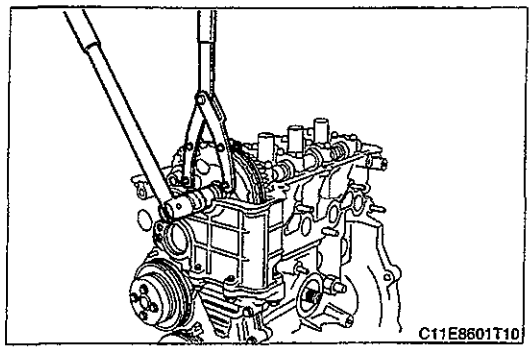
(6) Ensure that the valve clearances are correct.

(7) Assembling of camshaft timing sprocket

1.Install the camshaft timing sprocket to the camshaft No.2 together with the signal rotor.

2.Set the SST to the hole of the signal rotor hole. After taking a turn-preventive measure so that no force may be applied to the timing chain, install the bolt.

TIGHTENING TORQUE: 98±10 N·m {1000±100 kgf·cm}



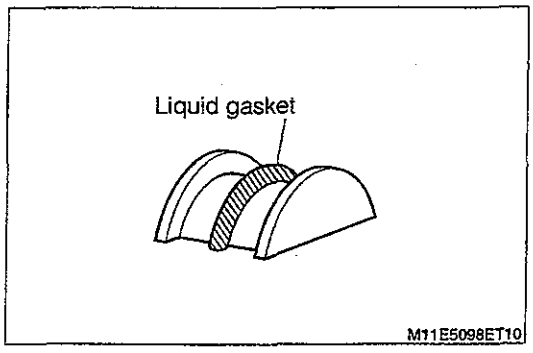
NOTE

- At this point, if the grooves of the straight pin and the sprocket at the forward end of the camshaft are not aligned with each other, make sure to align them, by turning the camshaft or the crankshaft.

(8) Assembling of semi-circular plug.

1.Apply liquid gasket to the central section of the semi-circular plug about ϕ 4-5mm. Within five minutes, install the semi-circular plug to the arched section at the top of the cylinder head.

ADHESIVE: Three Bond1207H



(9) Assembling of chain tensioner plunger

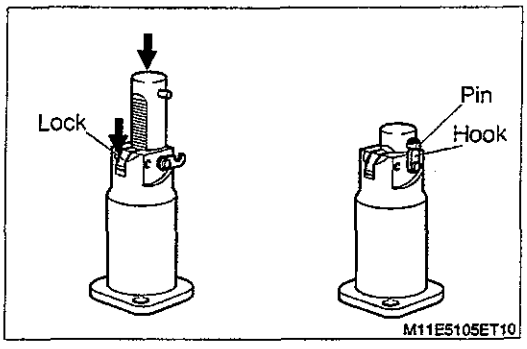
1.Depress the plunger by pushing the lock as indicated in the right figure. Attach the hook to the plunger pin.

2.Install the plunger to the cylinder head in such a way that the arrowheaded mark punched on the plunger faces upward with a new gasket interposed.

TIGHTENING TORQUE: 9.0±2.0 N·m {90±20 kgf·cm}

CAUTION

- Use a new gasket.

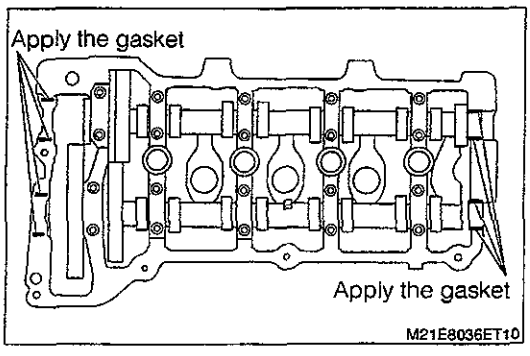


(10) Assembling of cylinder head cover

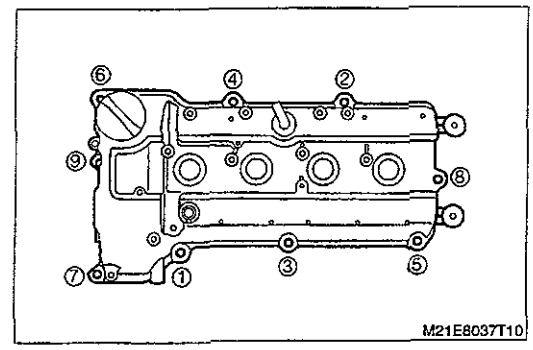
1.Install a new cylinder head cover gasket to the cylinder head cover.

2.Apply liquid gasket to the cylinder head at the positions indicated in the right figure.

ADHESIVE: Three Bond1207H



3.Within five minutes after the application of liquid gasket, tighten the cylinder head cover retaining bolts according to the sequence specified in the right figure. The tightening should be carried out over several stages.
TIGHTENING TORQUE: 11.0±2.2 N·m {112±22 kgf·cm}

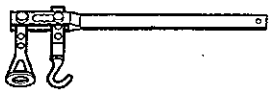
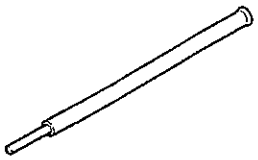
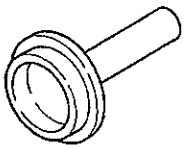


2 CYLINDER HEAD

2-1 DISASSEMBLING AND ASSEMBLING

2-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09202-87702-000 (09202-87701-000)	Replacer, valve spring replacer
	09201-87210-000	Remover & replacer, valve guide bush
	09388-87701-000	Replacer, transfer input gear rear oil seal

Tool

Hexagon wrench (Width across flats : 8mm),Scraper

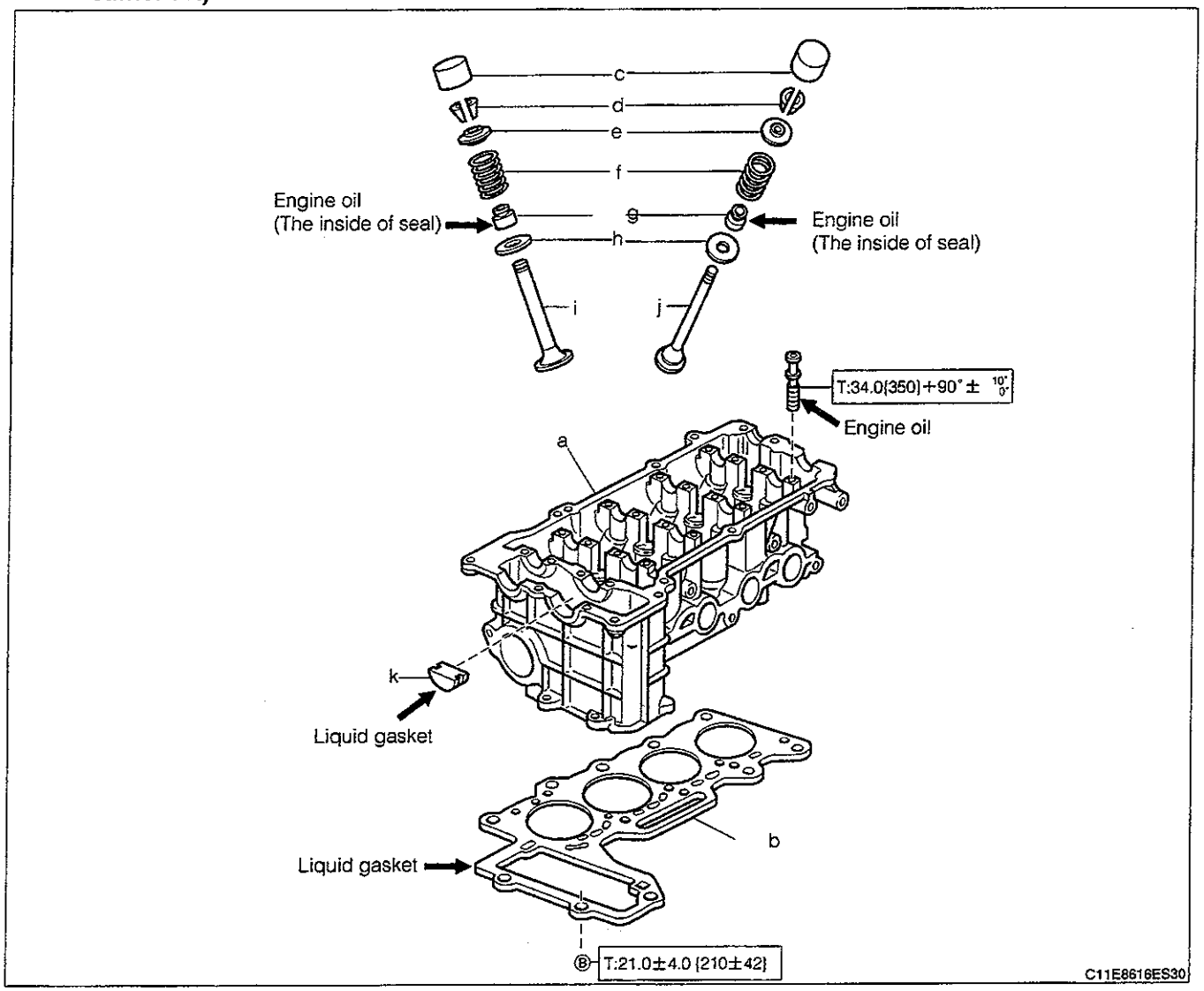
Instrument

Thickness gauge,Micrometer,Torque wrench,Vernier calipers,Steel square,Precision straightedge

Lubricant,adhesive,others

Engine oil,Three Bond1324,Three Bond1207H

2-1-2 COMPONENTS (Perform the following operations successively after the removal of the camshaft)



※:Non-reusable parts

Unit :N·m {kgf·cm}

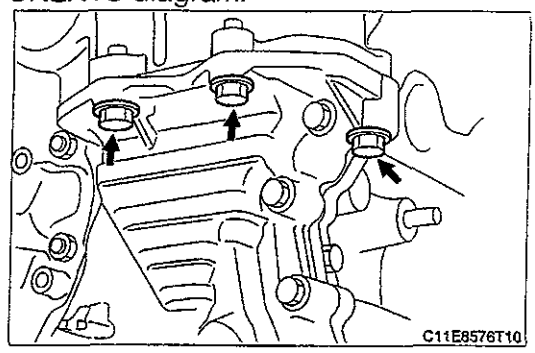
1 a Cylinder head
2 b Cylinder head gasket
3 c Lifter, valve
4 d Lock, valve spring retainer
5 e Retainer, valve spring
6 f Spring, compression
7 g Seal, valve stem oil
8 h Seat,valve spring
9 i Valve, intake
10 j Valve, exhaust
11 k Plug, semi-circular

2-1-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

1.Remove the parts in the sequence as indicated in the COMPONENTS diagram.

(1) Removal of cylinder head

1.Remove the three flanged bolts of the cylinder head.



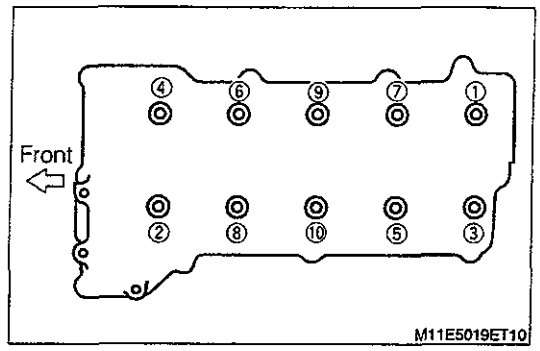
2.Slacken evenly and remove the ten cylinder head bolts over several stages according to the sequence indicated in the right figure.

TOOL: Hexagon wrench (Width across flats : 8mm)

3.Remove the cylinder head and cylinder head gasket.

CAUTION

- Be sure not to reuse the cylinder head gasket.

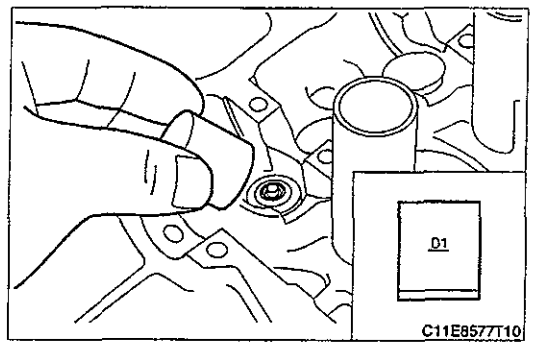


(2) Removal of valve lifters

1.Remove the valve lifters.

CAUTION

- When removing the valve lifters, record the punched mark of each valve lifter and keep them in order.



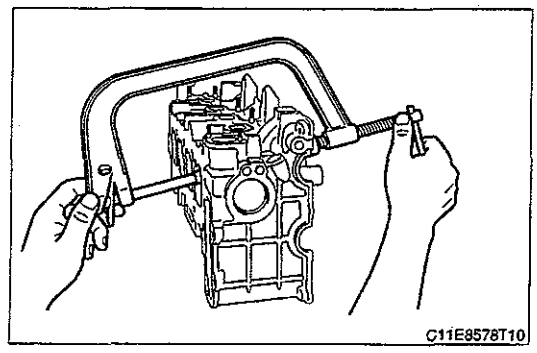
(3) Removal of valves

1.Remove the valve spring retainer locks, valve spring retainers, compression springs, intake valves and exhaust valves, using the SST.

SST: 09202-87002-100

CAUTION

- Sure to protect your eyes by wearing a pair of goggles, etc. during the operation.
- Care must be exercised to prevent the spring from jumping out.



2.Remove the valve stem oil seals and valve spring seats.

CAUTION

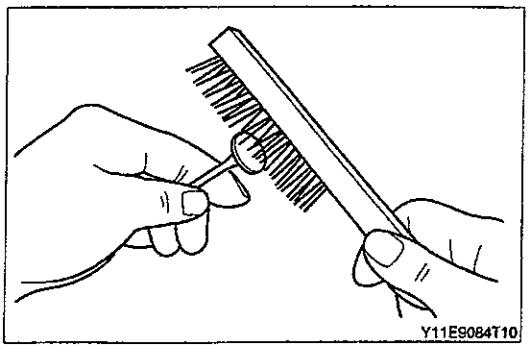
- Be sure not to reuse the valve stem oil seals.

3.Remove the semi-circular plug by tapping them by means of a plastic hammer.

2-1-4 Clean

(1) Cleaning of valves

1.Remove carbon deposited on the valve with a wire brush.

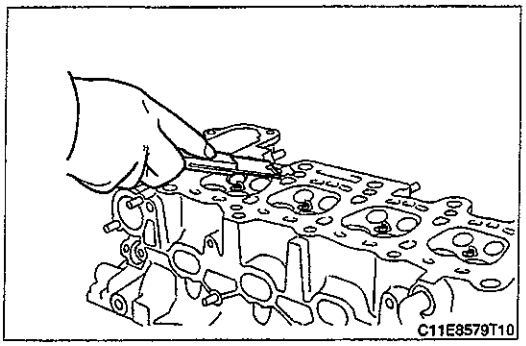


(2) Cleaning of cylinder head

1.Clean the cylinder block surface of the cylinder head and the manifold surface, using a scraper or the like.

CAUTION

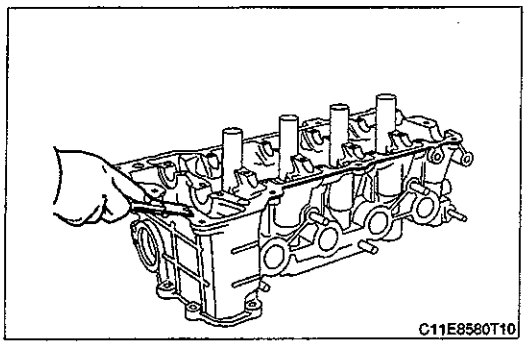
- Care must be exercised not to scratch the cylinder head surface during the cleaning. Furthermore, be very careful not to drop the gasket into the water jacket.



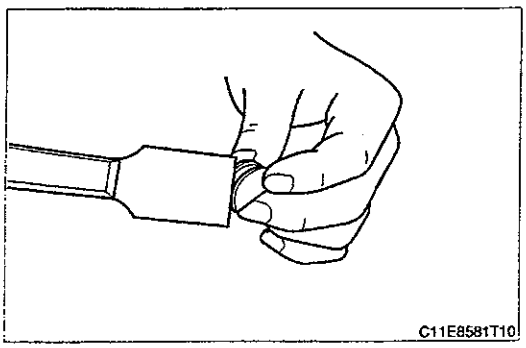
2.Remove the gasket from the cylinder head cover of the cylinder head and the semi-circular plug attaching surface, using a scraper, wire brush or the like.

CAUTION

- Care must be exercised not to scratch the cylinder head surface during the cleaning. Furthermore, be very careful not to drop the gasket into the water jacket.



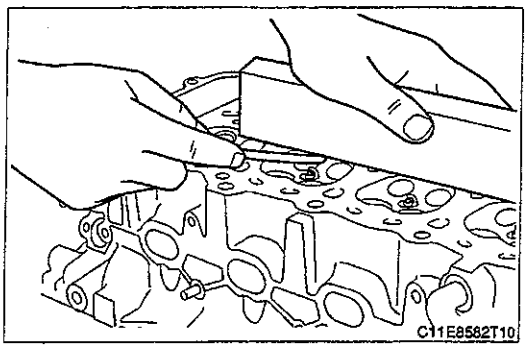
3.Remove the gasket from the semi-circular plug, using a scraper, wire brush or the like.

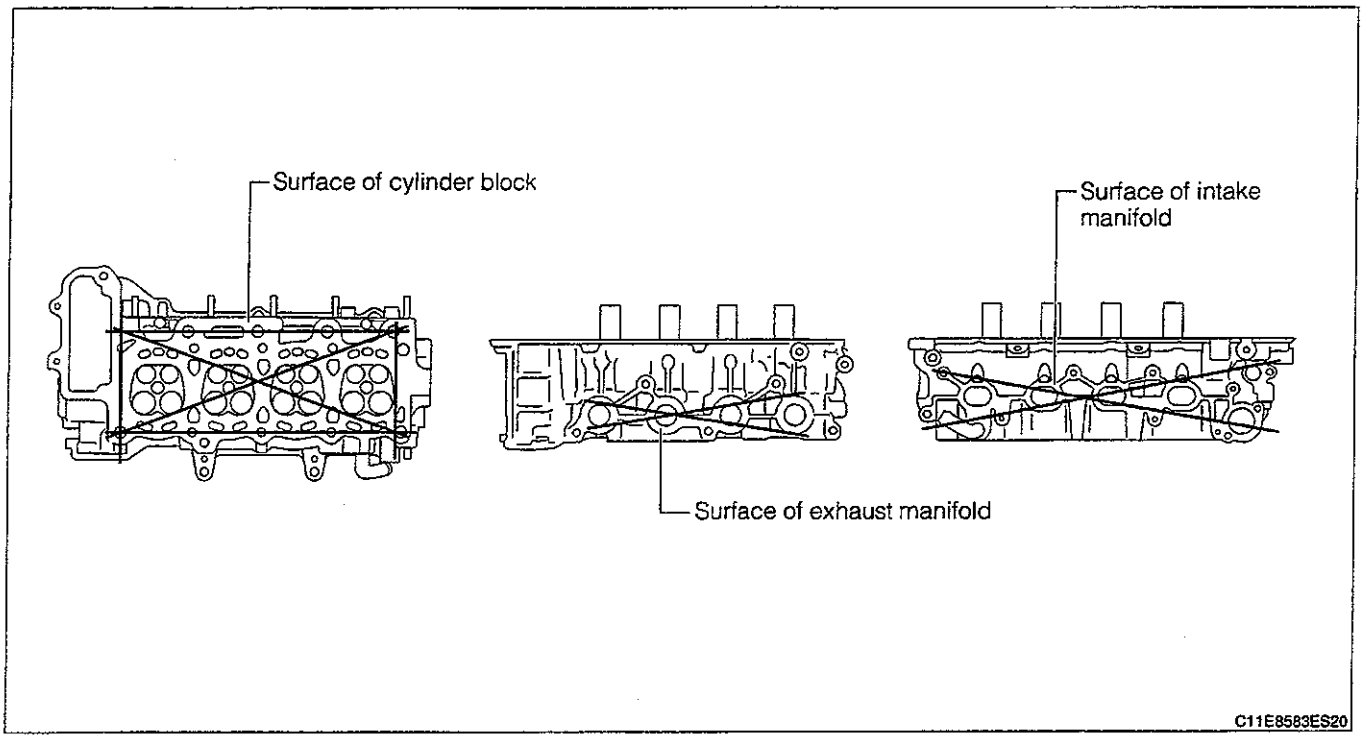


2-1-5 Inspection

(1) Check of cylinder head

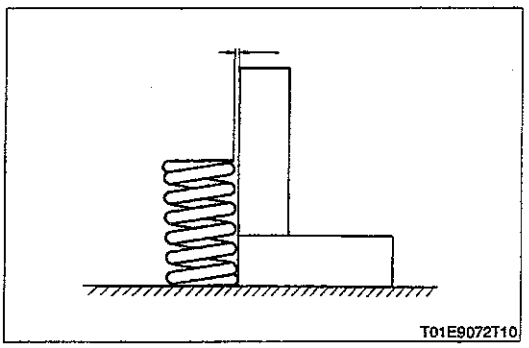
1.Measure the deformation at those points indicated in the figure below, using a straightedge and thickness gauge.
ALLOWABLE LIMIT: 0.10 mm



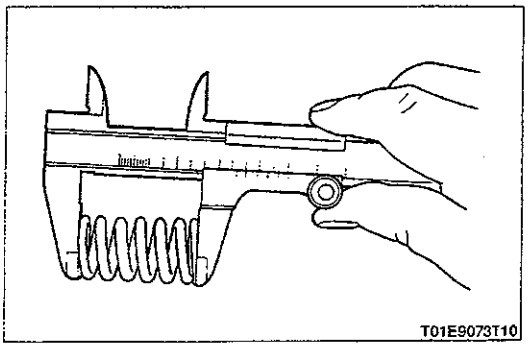


(2) Check of valve springs

1.Measure the squareness of the valve spring, using a straightedge. Replace the spring if the out-of-squareness exceeds the allowable limit.
SPECIFIED VALUE: 1.4 mm



2.Measure the free length of the spring, using vernier calipers.
SPECIFIED VALUE: Identification color : Light green
41.56 mm
Identification color : White 42.10 mm



(3) Valve check

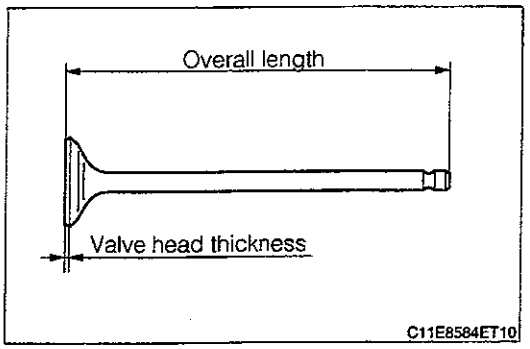
1.Valve check

(1) Check to see if the valve exhibits deformation or excessive wear.

(2) Inspect the valve head for its stock thickness.

SPECIFIED VALUE: 0.8-1.2 mm

(3) Measure the overall length of the valve.

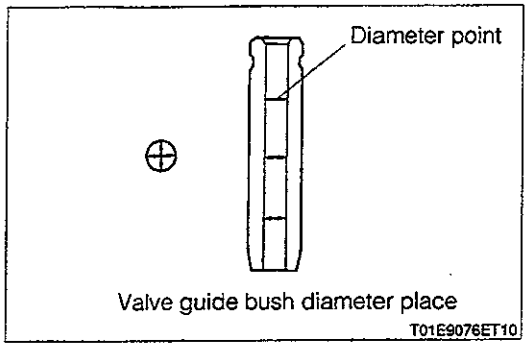


Valve specifications

	Specified Value (mm)
Intake valve	92.75-93.25
Exhaust valve	94.65-95.15

2.Check of clearance between valve guide bush and valve stem

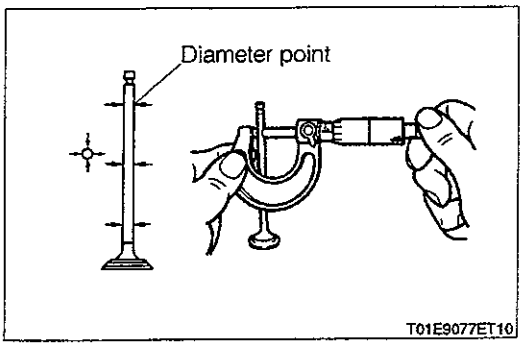
(1) Measure the bore diameter of the valve guide, using a caliper gauge. Also, measure the outer diameter of the valve stem, using a micrometer.



(2) Determine the clearance by calculating the difference between the respective measured values. If the clearance exceeds the allowable limit, replace the valve or the bush, as required.

CAUTION

- Conduct the measurements over several points, as indicated in the right figure so as to establish the clearance at the most worn section.



Clearance between valve guide bush and valve stem

Guide bush inner diameter (mm)	Specified Value	IN	4.500-4.512
		EX	4.500-4.512
Valve stem outer diameter (mm)	Specified Value	IN	4.465-4.480
		EX	4.455-4.470
Clearance (mm)	Specified Value	IN	0.02-0.047
		EX	0.03-0.057
	Allowable Limit	IN	0.06
		EX	0.08

(4) Replacement of valve guide bush

1.Heat the cylinder head up to a temperature of 80-100°C, using hot water or the like.

WARNING

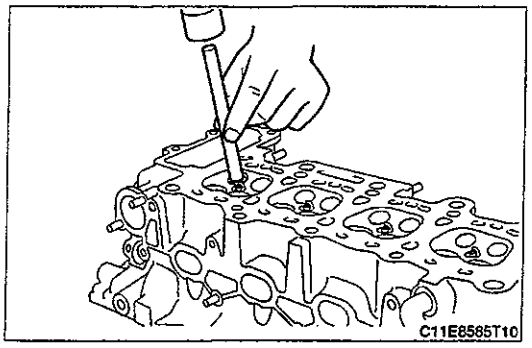
- The cylinder head may be very hot. Hence, care must be exercised to avoid a burn during the operation.

2.Drive out the valve guide bush from the combustion chamber, using the SST.

SST: 09201-87210-000

CAUTION

- Never reuse those bushes that have been driven out.
- When driving out the valve guide bush, make sure to remove it toward the combustion chamber.

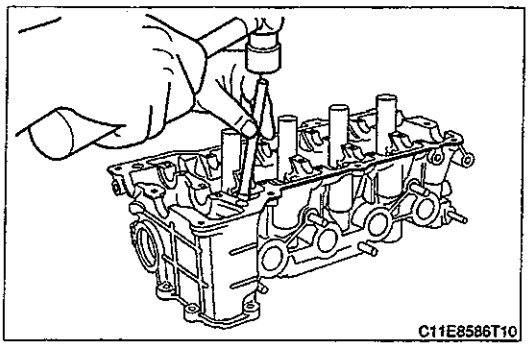


3.Using the SST, drive a new valve guide bush until the specified value in the satisfied.

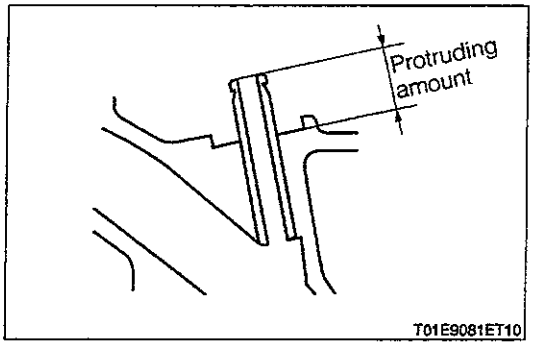
SPECIFIED VALUE: Protrusion above the head driving surface: 14.5 mm

CAUTION

- Make sure to use a valve guide bush for replacement use (O/S 0.03) , because the fitting will become loose in the cylinder head where the valve guide bush has been once driven out.
- Be certain to carry out the operation while confirming the dimensions so as to prevent the valve guide bush from being driven too far.

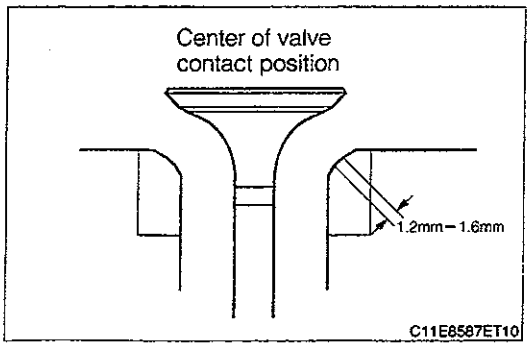


4.Using a hand reamer, grind the bore diameter of the valve guide bush so as to attain the specified oil clearance.



(5) Valve contact surface

1.Apply a thin film of red lead to the valve contact surface. In order to check the contact width, lightly push the valve to the valve seat while paying attention not to turn the valve during the check.

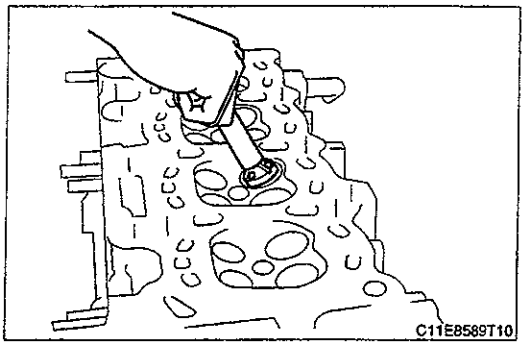


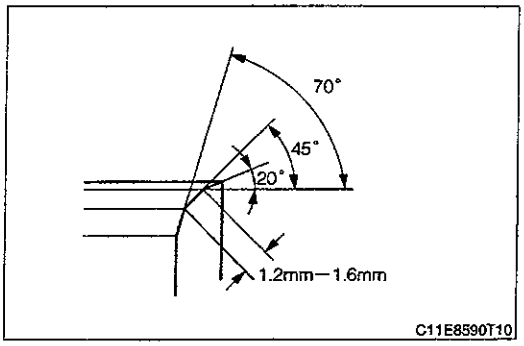
(6) Valve seat correction

1.Using a 45 degree cutter, cut the contact width to a width slightly greater than the specified value.

2.Carry out grinding in such a way that the valve contact position may come at the center of the valve face.

3.Using a 20 degree or 70 degree cutter, perform the grinding in order that a satisfactory center seating of the specified seat width may be obtained all around the circumference of the valve.



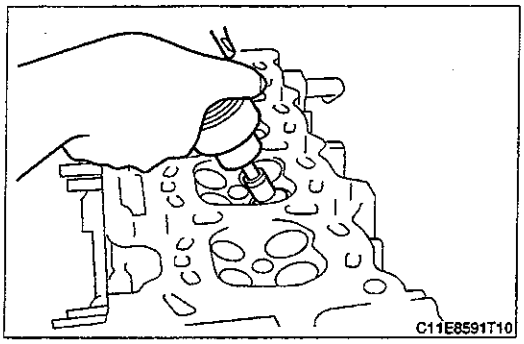


4.Carry out the valve-to-valve seat grinding.

(1) Apply a small amount of slightly coarse compound to the valve seat. Let the suction section of a grinding rod suck the valve head.

(2) Lightly tap the valve on the valve seat. Repeat the operation, while changing the tapping position slightly after each of several tappings so that both surfaces may be bedded with each other.

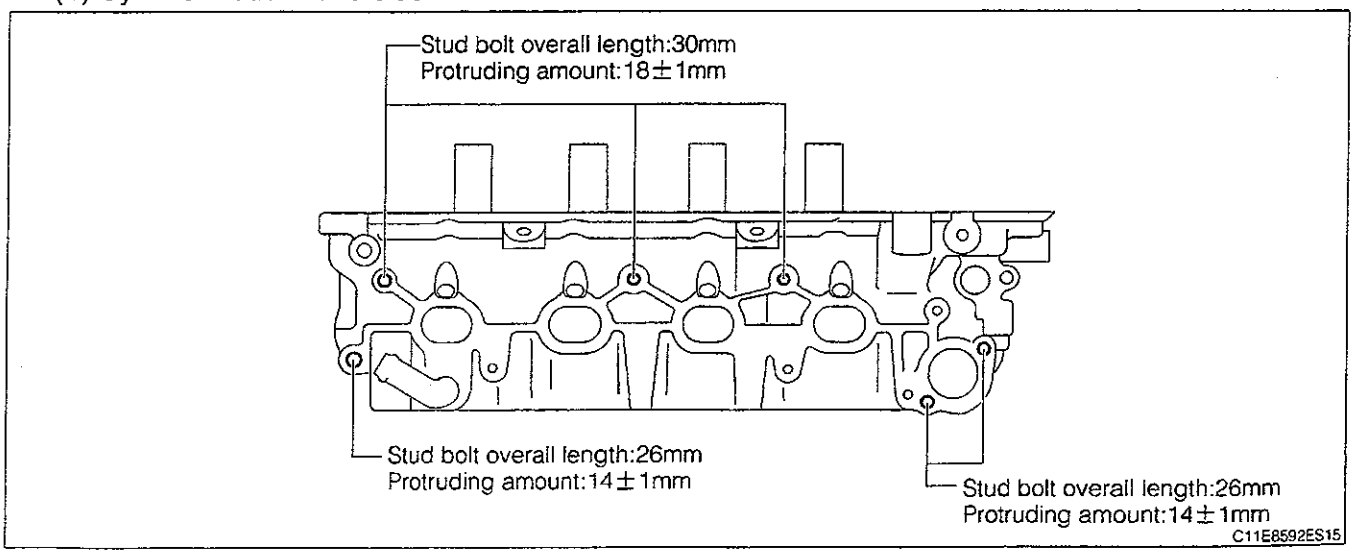
(3) When the bedded-in has been achieved, use fine compound for finish use. Repeat the operation described in Item (2).



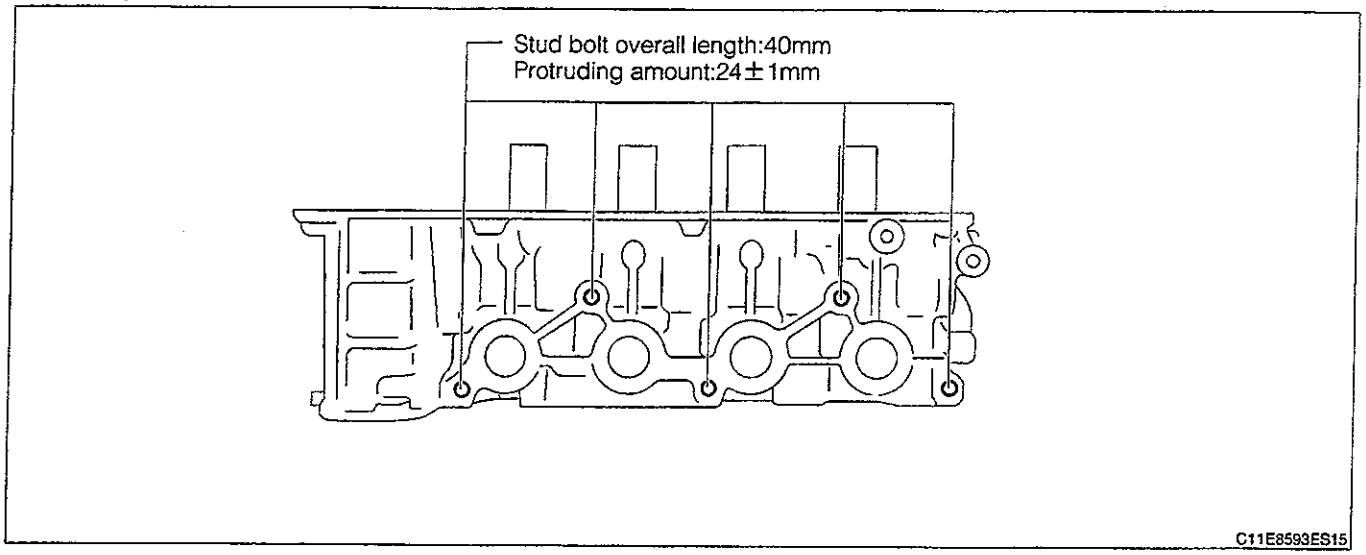
(7) Assembling of replacement parts

1.Assemble the stud bolts on the cylinder head, following the procedure given below.

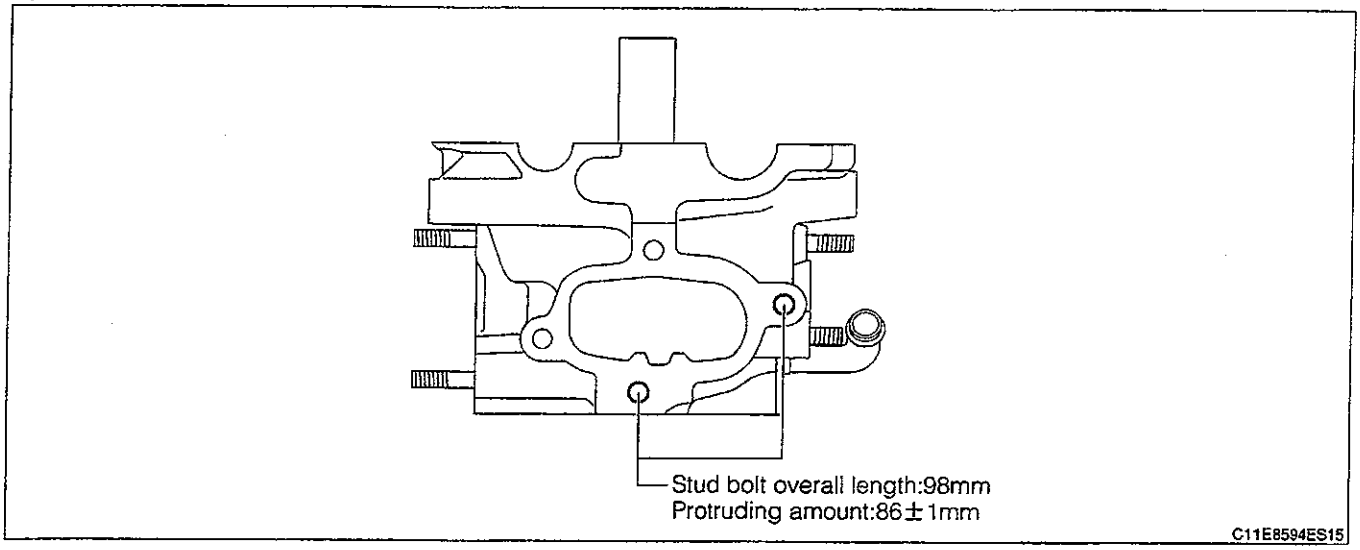
(1) Cylinder head intake side



(2) Cylinder head exhaust side



Cylinder head rear side

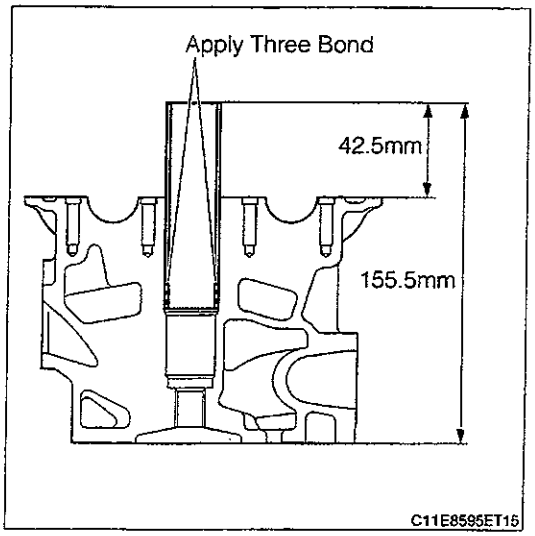


(8) Assembling of spark plug tube

1. Apply liquid gasket to the press-fitting section of the tube.
   ADHESIVE: Three Bond1324
2. Insert the tube into the grommet of the cylinder head cover. Without setting the gasket, install the cover. Tighten the bolts only to such an extent that no displacement may occur.
3. Using the SST, drive the tube into position, while confirming that the tube is aligned with the press-fitting hole of cylinder head.
   This driving of the tube should be made until the upper/center section of the tube becomes flush with the surface of the head cover.
   SST: 09388-87701-000

CAUTION

- Drive the tube, until the tube comes at the center of the tube hole of the cylinder head cover.



2-1-6 POINTS OF ASSEMBLY

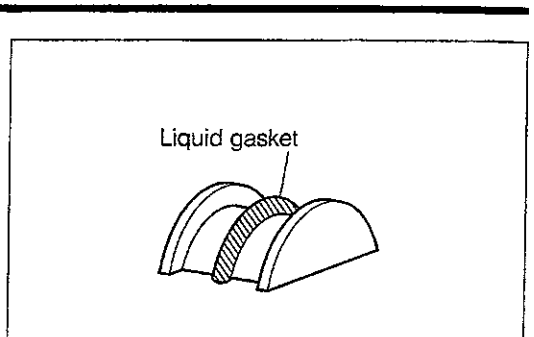
(1) Assembling of semi-circular plug

1.Apply liquid gasket to the installing section of the semi-circular plug No.1 and semi-circular plug No.2 about ϕ4-5mm and attach them to the top arch of the cylinder head.

ADHESIVE: Three Bond1207H

CAUTION

- Do not wipe off the liquid gasket that oozed out from the top surface of the cylinder head. Install the cylinder head cover within five minutes.
- Wipe off the liquid gasket if the cylinder head cover is not installed within five minutes.



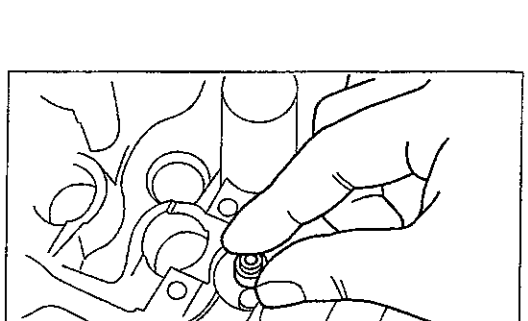
(2) Assembling of valve spring seat and valve stem oil seal

1.Install the valve spring seat and valve stem oil seal.

(1) Apply engine oil to the inside of the new valve stem oil seal. Press the oil seal in place by pushing the shoulder section of the oil seal.

CAUTION

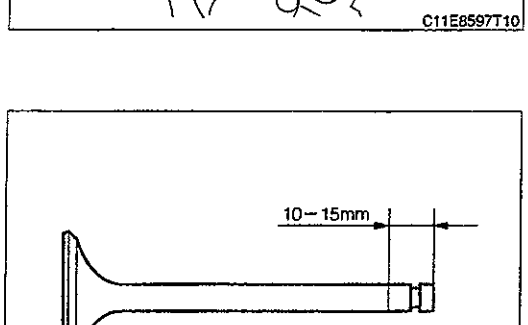
- Be sure to use a new valve stem oil seal.
- After completion of the assembling, lightly pull the oil seal by hand so as to confirm that the part has been installed securely.



(3) Assembling of intake valve and exhaust valve

1.Prior to the assembling, apply engine oil to the tip-ends of the intake valve and exhaust valve.

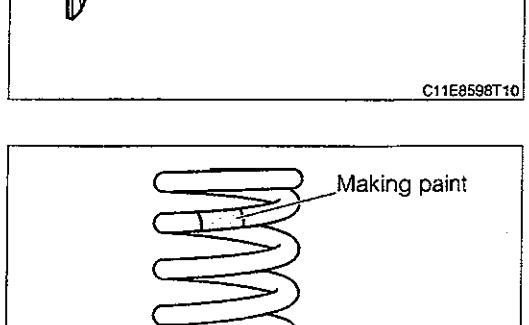
2.After the intake valve and exhaust valve have been installed, apply engine oil to the lip section of the valve stem oil seal.



(4) Assembling of compression spring

1.Install the compression spring.

2.The compression spring should be assembled in such a way that the side having a greater pitch comes at the top side.

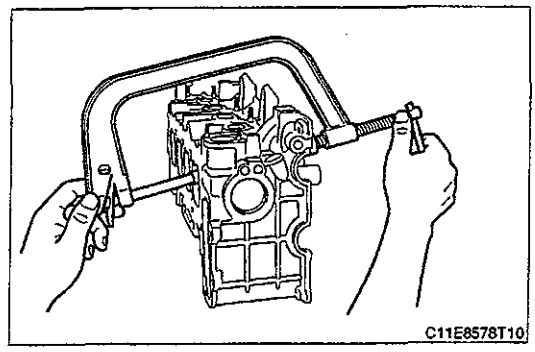


(5) Assembling of valve spring retainer and valve spring retainer locks

1.Install the valve spring retainer. Using the SST, install the retainer and valve spring retainer locks.
SST: 09202-87202-000

CAUTION

- Be sure to protect your eyes by wearing a pair of goggles, etc. during the operation.
- Care must be exercised to prevent the spring from jumping out.

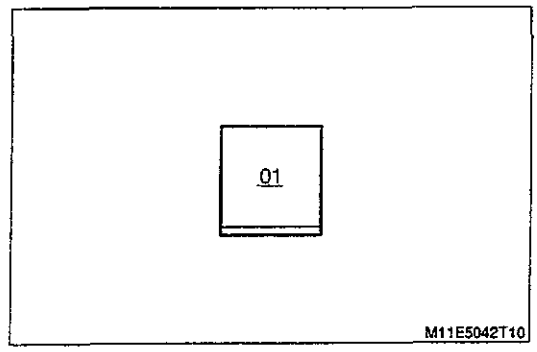


(6) Assembling of valve lifter

1.Apply engine oil to the valve lifter and assemble it.

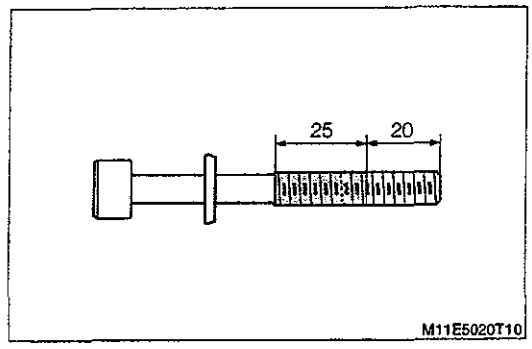
CAUTION

- The valve lifter bearing the same punched mark as before removal should be installed for each valve,
- After the valve lifter has been assembled, make sure that the valve lifter can turn lightly.



(7) Assembling of cylinder head gasket

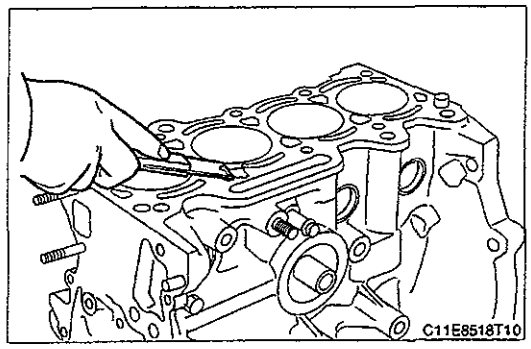
1.Using a micrometer, measure the diameters of threads of the cylinder head bolt at several points in the shaded range indicated in the right figure. If the measured diameter is below the allowable limit, replace the cylinder head bolt.
ALLOWABLE LIMIT: 8.63 mm



2.Using a scraper, clean the gasket installing surfaces of the cylinder block and cylinder head so as to completely remove foreign matter, oils, etc.

CAUTION

- Care must be exercised not to drop scraped gasket debris into the water jacket, oil holes and cylinder head bolt installing holes. If any scraped debris should drop, be sure to remove it.

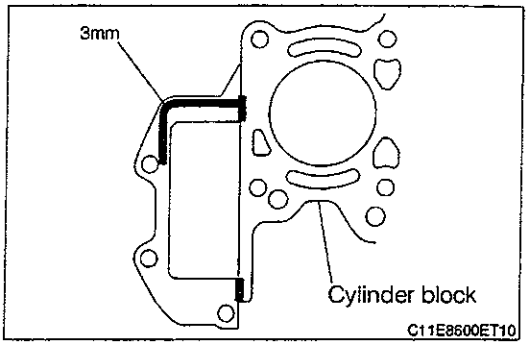


3.Apply liquid gasket (Three Bond 1207H) to the mating surfaces of the cylinder block and oil pump and the top surface of the oil pump that are indicated by the range in the right figure.

ADHESIVE: Three Bond1207H

CAUTION

- Be very careful not to apply the liquid gasket excessively. Excessive application may cause the admission of liquid gasket into the cooling system to occur.
- After the liquid gasket has been applied, be certain to assemble the cylinder head within 15 minutes.



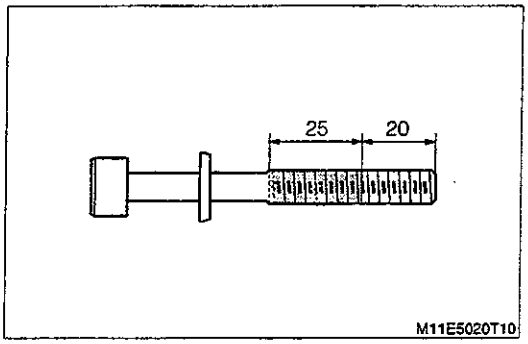
4.Install a new cylinder head gasket, aligning with the knocking pin of the cylinder block.

CAUTION

- Make sure to use a new cylinder head gasket.

(8) Assembling of cylinder head S/A

1.Apply engine oil to the threaded sections and seat surface of the cylinder head bolt. Then, install the bolt into the bolt hole.

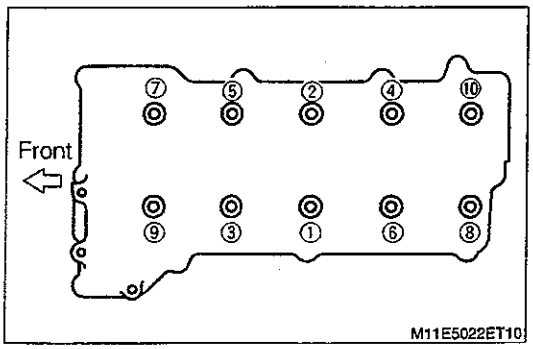


2.Tighten the ten cylinder head bolts over several stages according to the sequence indicated in the right figure. After tightening, torque them to the specified value.

TOOL: Hexagon wrench (Width across flats : 8mm)

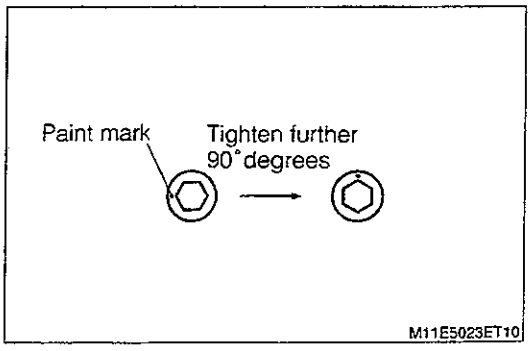
3.After the bolts have been tightened to the specified torque, further retighten them 90 degrees according to the same sequence.

TIGHTENING TORQUE: 34.0 N·m {350 kgf·cm}+90°$^{+10}_{0}$



NOTE

- Apply a paint mark to the head section of every head bolt in the same direction. After the head bolts have been tightened 90° according to the sequence above, ensure that the paint marks of all bolts come at a 90° turned position.

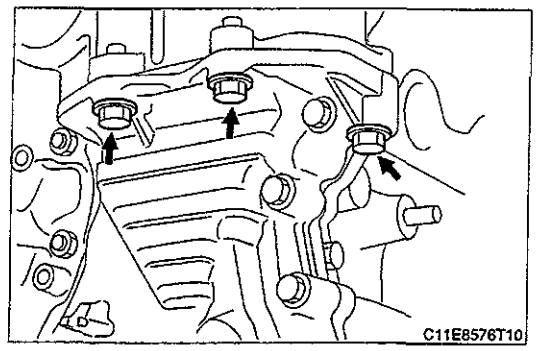


4.Tighten the three flanged bolts (cylinder head × oil pump) of the oil pump body section to the specified torque.

TIGHTENING TORQUE: 21.0±4.0 N·m {210±42 kgf·cm}

CAUTION

- This tightening should be made within five minutes after the cylinder head bolts have been tightened.



3 WATER PUMP

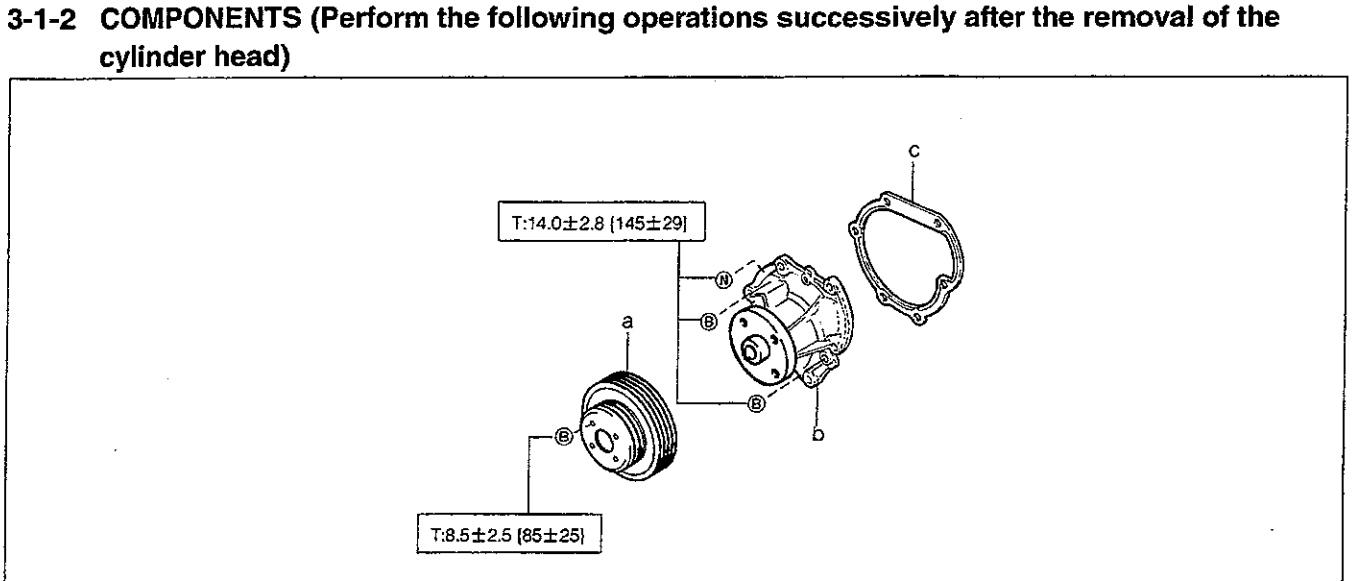
3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

3-1-2 COMPONENTS (Perform the following operations successively after the removal of the cylinder head)



※:Non-reusable parts
Unit:N·m {kgf·cm}

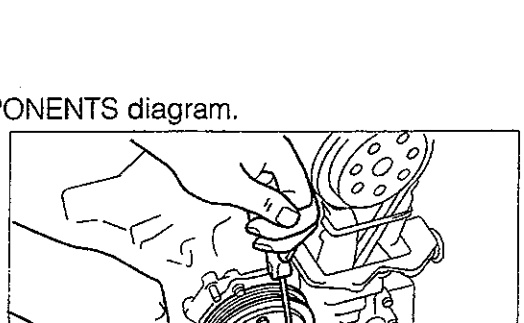
1 a Pulley, water pump
2 b Pump Ay, water
3 c Gasket, water pump

3-1-3 POINTS OF REMOVAL

1.Remove the parts in the sequence as indicated in the COMPONENTS diagram.

(1) Removal of water pump pulley

1.Remove the four bolts while preventing turning as shown in the illustration by using a flat screwdriver.



(2) Removal of water pump Ay

1.Remove the water pump Ay by removing the four bolts and two nuts.

CAUTION

- Do not reuse the water pump gasket once it has been removed.

3-1-4 INSPECTION

1.Clean the joint surface of the water pump and oil pump.

3-1-5 INSPECTION

1.Check for deformation and damage.
2.Check to see if the rotor turns smoothly by turning it by hand.

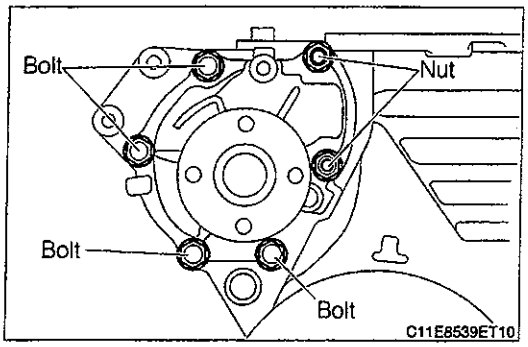
3-1-6 POINTS OF INSTALLATION

(1) Installation of water pump Ay

1.With a new water pump gasket interposed, install the water pump assembly. Tighten the four bolts and two nuts to the specified torque.
TIGHTENING TORQUE: 14.0±2.8 N·m {145±29 kgf·cm}

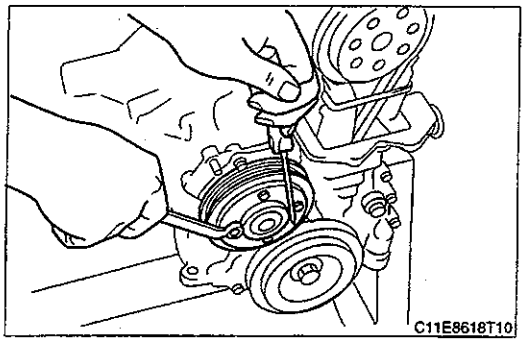
CAUTION

- Use a new water pump gasket.



(2) Installation of water pump pulley

1.Install the water pump pulley. Tighten the four bolts to the specified torque while preventing turning as shown in the illustration by using a flat screwdriver.
TIGHTENING TORQUE: 8.5±2.5 N·m {85±25 kgf·cm}

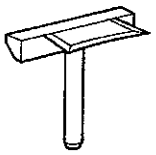
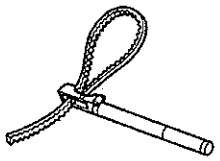
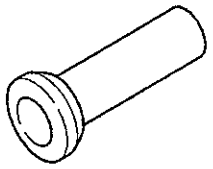


4 OIL PUMP

4-1 DISASSEMBLING AND ASSEMBLING

4-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09032-00100-000	Cutter, oil pan seal
	09213-87211-000	Holder, crankshaft pulley
	09309-87201-000	Replacer, transmission bearing

Tool

Scraper

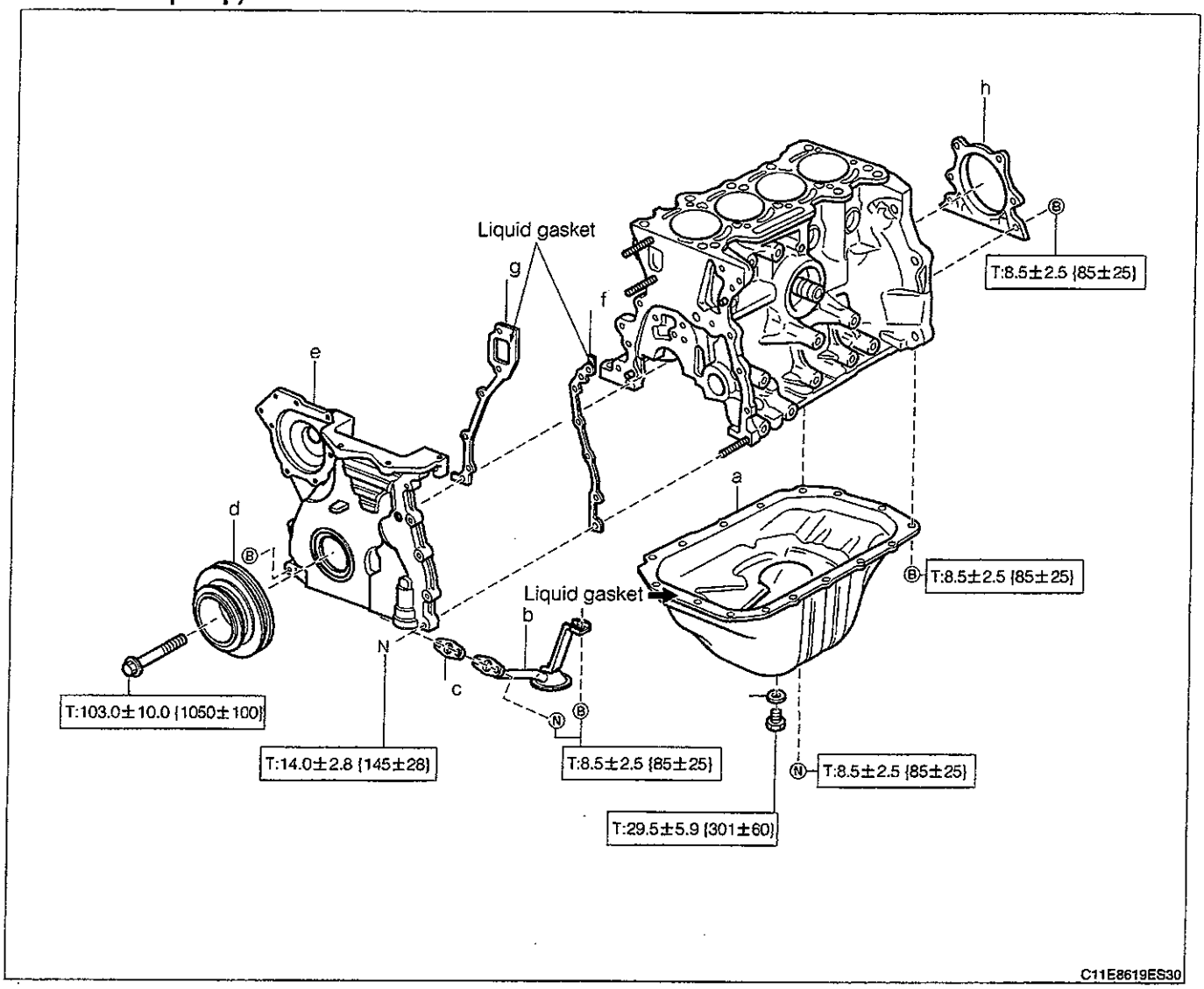
Instrument

Torque wrench,Thickness gauge,Precision straightedge

Lubricant,adhesive,others

Engine oil,Three Bond1207H

4-1-2 COMPONENTS (Perform the following operations successively after the removal of the water pump)



※:Non-reusable parts
Unit:N·m {kgf·cm}

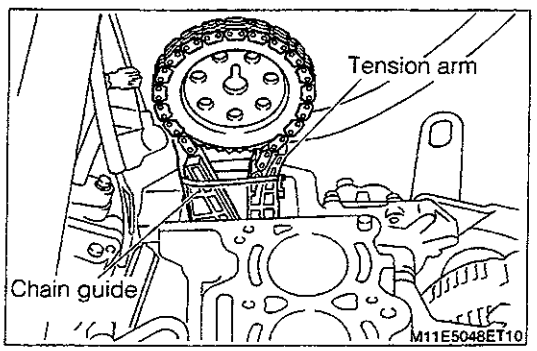
1 a Pan S/A, oil
2 b Strainer Ay, oil
3 c Gasket, oil strainer flange
4 d Pulley, crankshaft
5 e Pump Ay, oil
6 f Gasket, oil pump, No. 1
7 g Gasket, oil pump, No. 2
8 h Retainer, oil seal

4-1-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

1.Remove the parts in the sequence shown in the Components diagram.

(1) Removal of oil pan

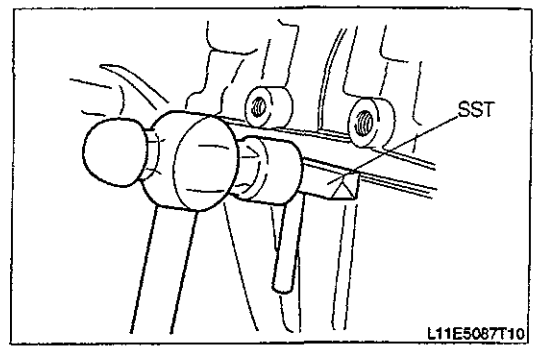
1.Secure the timing chain tension arm and timing chain guide with rubber bands or the like.



2.Remove the oil pan attaching bolts and nuts.
3.Remove the oil pan by inserting forcibly the SST into between the oil pan and the cylinder block.

CAUTION
- Perform the operation slowly so that the oil pan flange section may not be deformed.

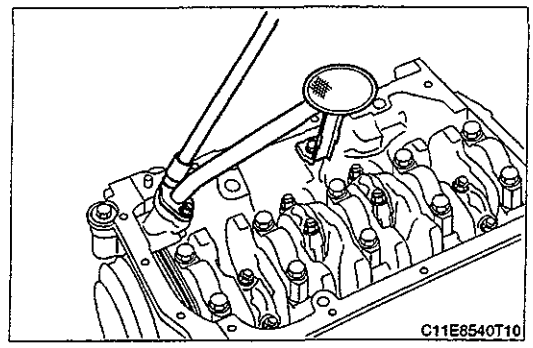
SST: 09032-00100-000



(2) Removal of oil pump strainer

1.Remove the oil pump strainer and oil strainer flange gasket.

CAUTION
- Do not reuse the oil strainer flange gasket once it has been removed.

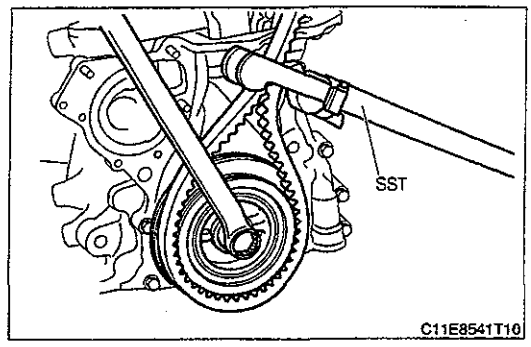


(3) Removal of crankshaft pulley

1.Install the crankshaft pulley with the SST.
(1) Apply the belt section of the SST to the second stage (air conditioner compressor driving side) of the crankshaft pulley, as indicated in the right figure.

SST: 09213-87211-000

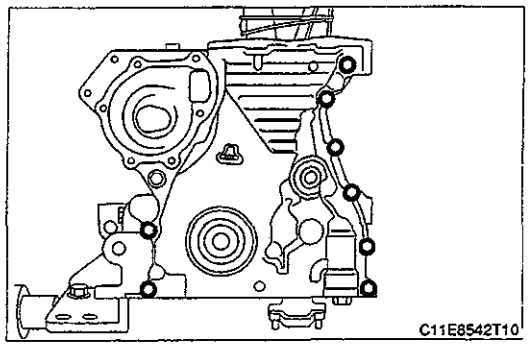
CAUTION
- Do not apply the belt section of the SST to the first stage (alternator driving side), because there is a potential of damaging the oil pressure switch.



(4) Removal of oil pump AY

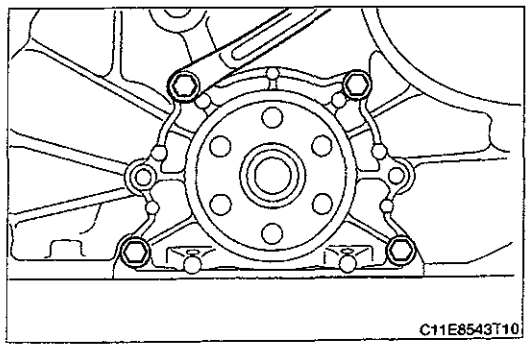
1.Remove the oil pump assembly by removing the seven bolts and one nut.

CAUTION
- The removal should be carried out carefully, while paying utmost attention not to scratch the oil pump installing surface.
- Do not reuse the O-ring and oil pump gasket once they have been removed.



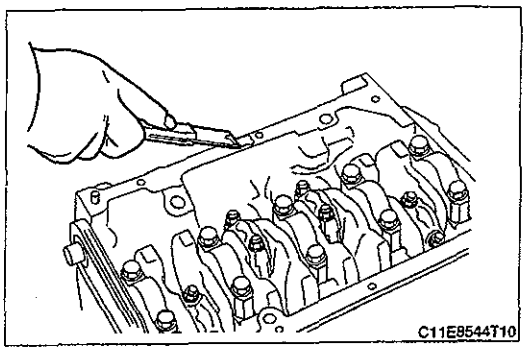
2.Remove the oil seal retainer.

CAUTION
- Do not reuse the oil seal retainer once it has been removed.



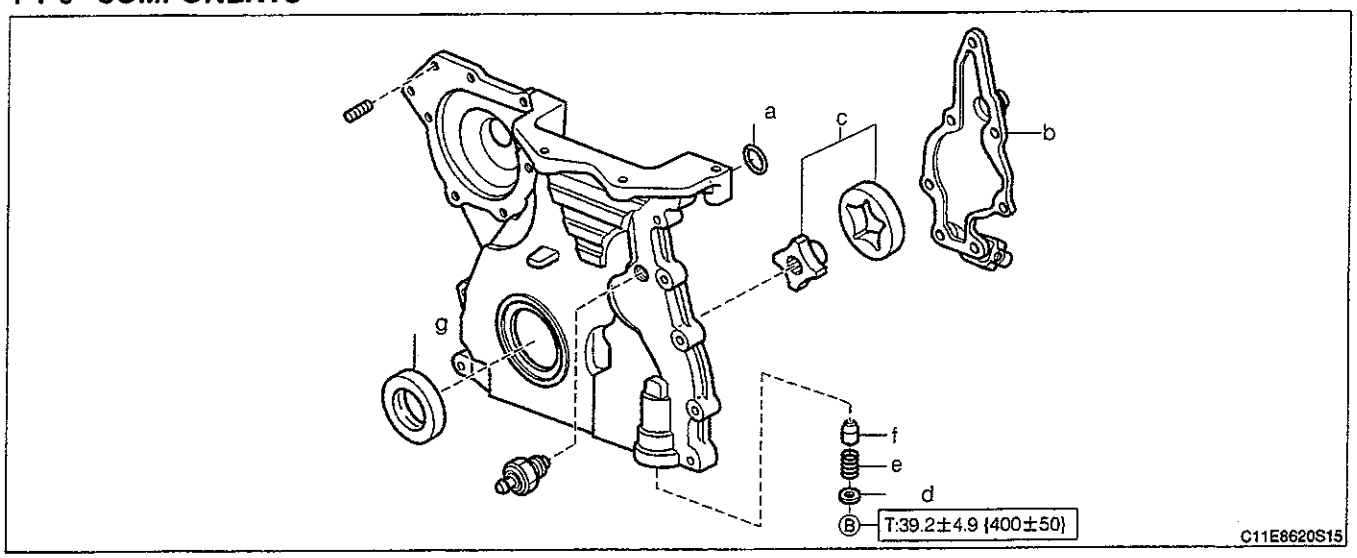
4-1-4 Cleaning

1. Clean the gasket that may remain on the oil pan installing surface or the oil pan flange section of the cylinder block, using a scraper, wire brush or the like.



4-1-5 Assembling/Disassembling of oil pump

4-1-6 COMPONENTS



※:Non-reusable parts

Unit: N·m {kgf·cm}

1 a O-ring
2 b Cover, oil pump
3 c Rotor set, oil pump
4 d Gasket
5 e Spring, compression
6 f Valve, oil pump relief
7 g Seal, type T oil

4-1-7 POINTS OF DISASSEMBLY

(1) Removal of O-ring

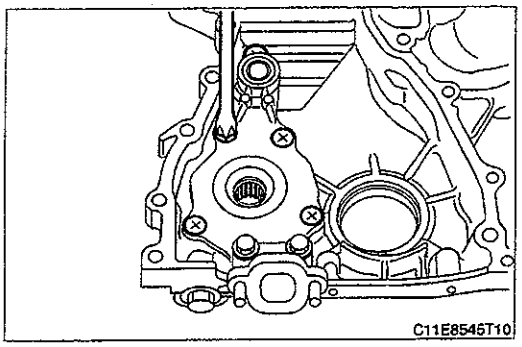
1.Remove the O-ring.

CAUTION

- Do not reuse the O-ring once it has been removed.

2.Remove the oil pump cover.

3.Remove the oil pump rotor set.

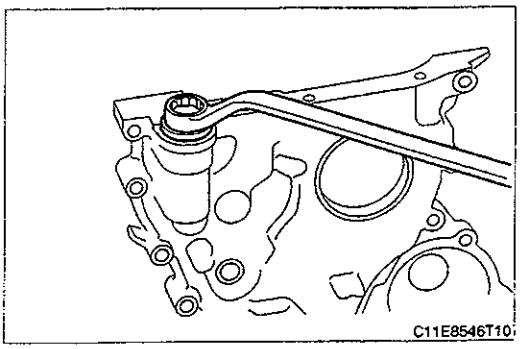


(2) Removal of oil relief control valve

1.Remove the bolt, gasket, compression spring, and oil relief control valve.

CAUTION

- Do not reuse the O-ring once it has been removed.

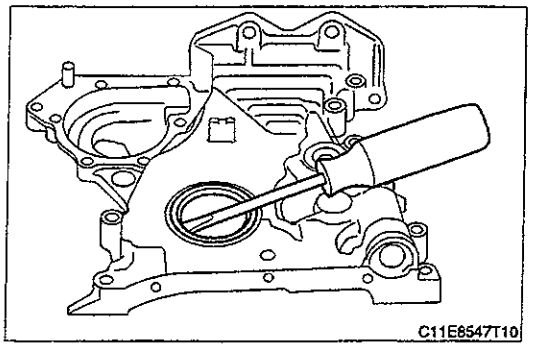


(3) Removal of Type T oil seal

1.Remove Type T oil seal.

CAUTION

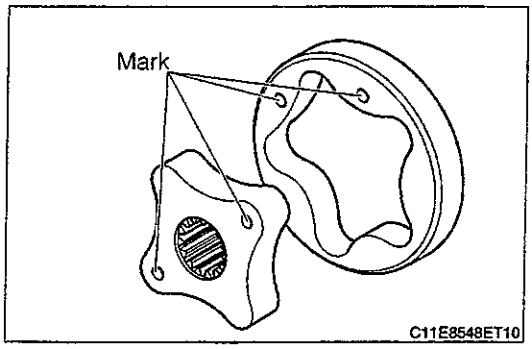
- Do not reuse the oil seal once it has been removed.



4-1-8 Inspection

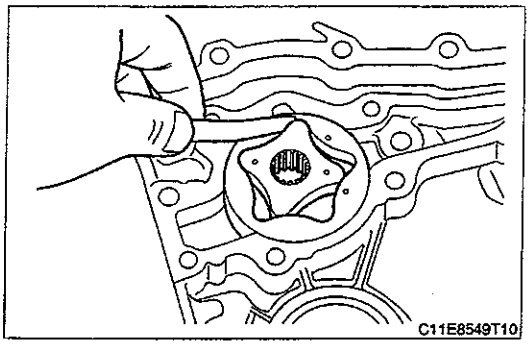
(1) Tip clearance measurement

1.Install it to the body in such a way that the marks of the oil pump drive rotor and the oil pump driven rotor face toward the cylinder block side.



2.Using a thickness gauge, measure the tip clearance between the oil pump drive rotor and the oil pump driven rotor.

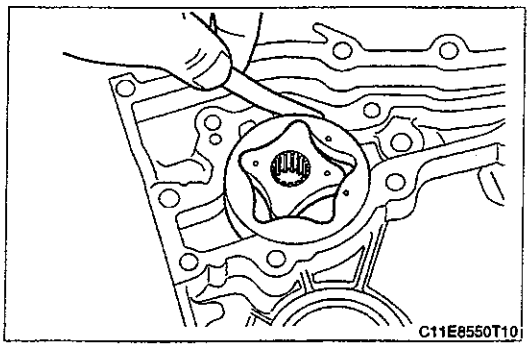
SPECIFIED VALUE: 0.02-0.14 mm



(2) Body clearance measurement

1.Using a thickness gauge, measure the clearance between the driven rotor and body.

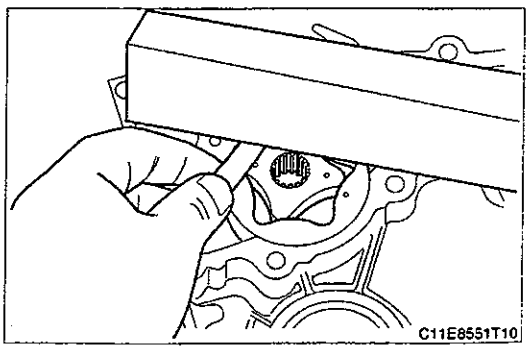
SPECIFIED VALUE: 0.09-0.25 mm



(3) Side clearance measurement

1.Measure the side clearance between the body and the rotor, using a straightedge and thickness gauge.

SPECIFIED VALUE: 0.035-0.085 mm

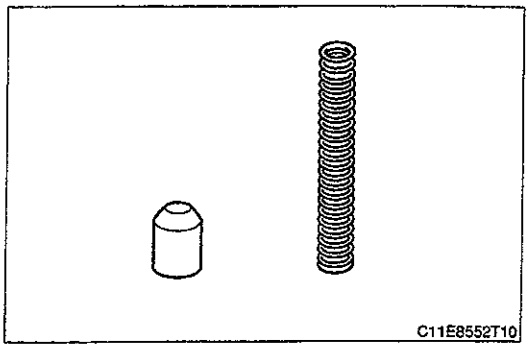


(4) Relief valve check

1.Check the relief valve for excessive wear or damage.

2.Measure the free length of the compression spring, using vernier calipers.

SPECIFIED VALUE: 57.0 mm



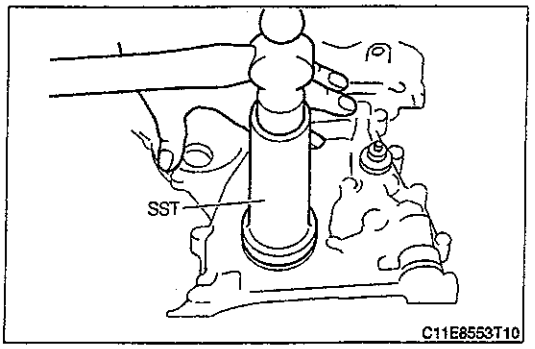
4-1-9 POINTS OF ASSEMBLY

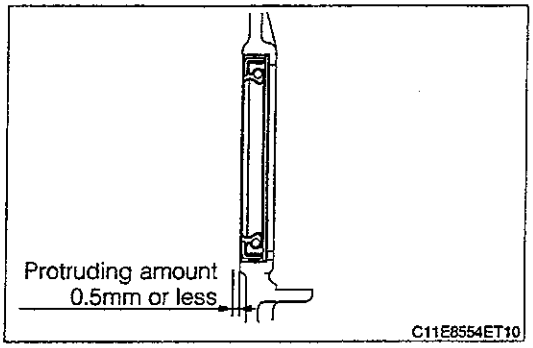
(1) Installation of Type T oil seal

1.Apply engine oil to the lip section of the Type T oil seal. Install the oil seal, using the SST.
SST: 09309-87201-000
LUBRICANT: Engine oil

CAUTION

- Do not reuse the oil seal once it has been removed.
- The oozing out amount after the press-fitting should be 0.5 mm or less.



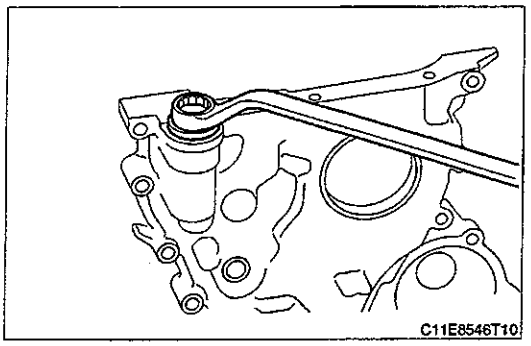


(2) Installation of oil relief control valve

1.Install the oil relief control valve and compression spring in this sequence. Tighten the bolts to the specified torque with the gasket interposed.
TIGHTENING TORQUE: 39.2±4.9 N·m {400±50 kgf·cm}

CAUTION

- Do not reuse the gasket once it has been removed.

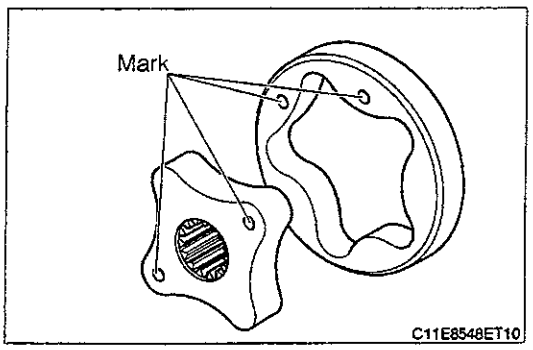


(3) Installation of oil pump set rotor

1.Install the oil pump set rotor to the body in such a way that the front mark, too, faces toward the engine block side.
2.Install the oil pump cover.
3.Install the O-ring.

CAUTION

- Do not reuse the O-ring once it has been removed.



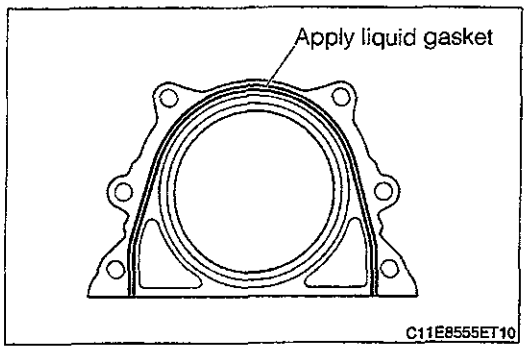
4-1-10 Installation

(1) Installation of oil seal retainer

1.Apply liquid gasket to the oil seal retainer.
ADHESIVE: Three Bond1207H

CAUTION

- Apply liquid gasket to the center of the seal surface with a width of ϕ3 to 4mm.
- The oil seal retainer should be installed to the cylinder block within five minutes after the liquid gasket has been applied.

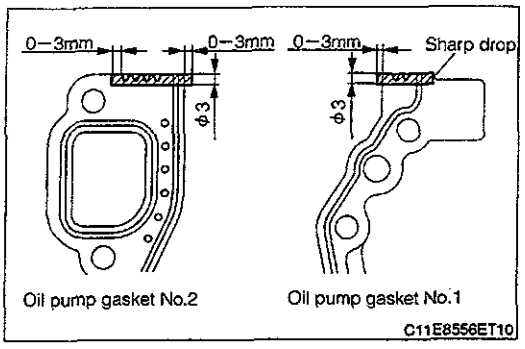


2.After engine oil has been applied to the lip section of the oil seal, install the oil seal retainer to the cylinder block.
TIGHTENING TORQUE: 8.5±2.5 N·m {85±25 kgf·cm}

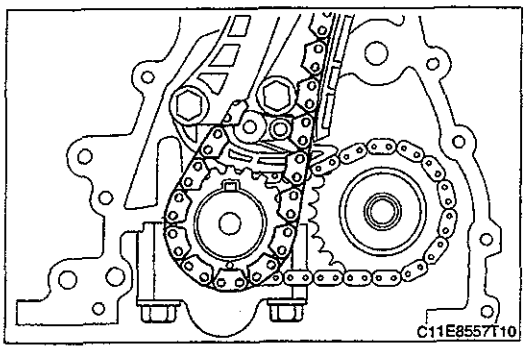
(2) Installation of oil pump AY

1.Clean the oil pump installing surface and its installing surface on the cylinder block so that foreign matter and oil, etc. may be removed completely.

2.Install the oil pump gasket No.1 and oil pump gasket No.2 to the cylinder block. Apply liquid gasket to the area indicated in the right figure.
ADHESIVE: Three Bond1207H



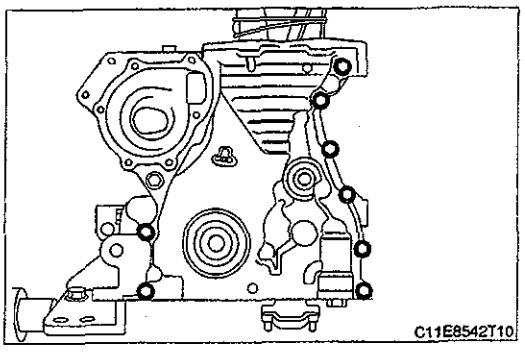
3.Ensure that the timing chain is not detached from the crankshaft timing sprocket.



4.Apply engine oil to the shaft section of the oil pump. Install the oil pump assembly to the cylinder block. Tighten the seven bolts and one nut to the specified torque.

CAUTION

- Care must be exercised not to scratch the oil pump installing surface.
- Wipe off any liquid gasket that has oozed out from the cylinder block and the top surface of the oil pump. After the installation of the cylinder head, apply liquid gasket again.

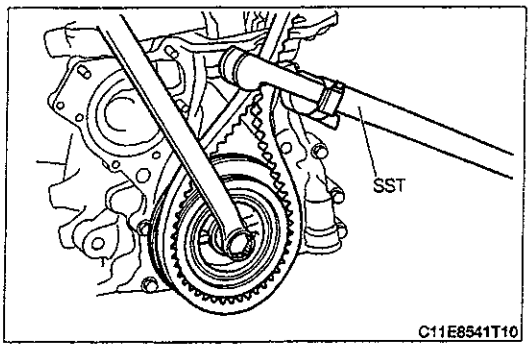


(3) Installation of crankshaft pulley

1.Install the crankshaft pulley with the SST.

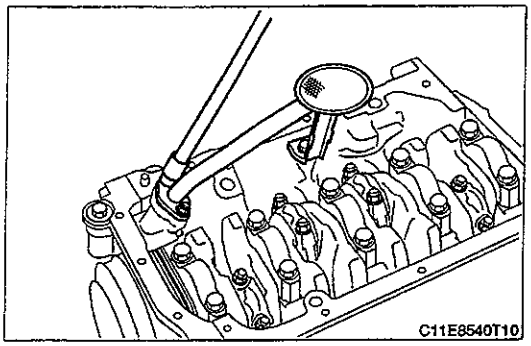
(1) Apply the belt section of the SST to the second stage (air conditioner compressor driving side) of the crankshaft pulley, as indicated in the right figure.

SST: 09213-87211-000



(4) Installation of oil pump strainer AY

1.Install a new oil pump strainer flange gasket. Install the oil pump strainer assembly.



(5) Installation of oil pan S/A

CAUTION

- If the oil pan is deformed, lightly tap the oil pan so as to flatten it.
- If the oil pan is deformed badly and its flattening seems to be difficult, replace it with a new part.

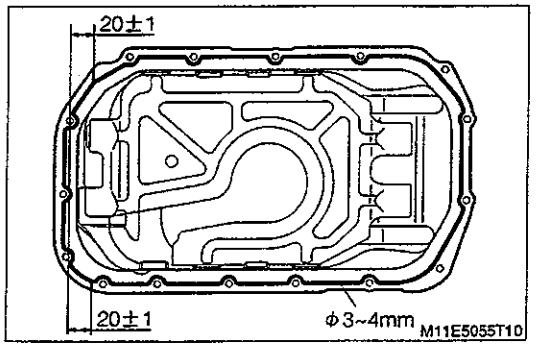
1.Clean the gasket that may remain on the oil pan installing surface and oil pan flange section of the cylinder block, using a scraper, wire brush or the like.

2.Apply liquid gasket to the oil pan S/A as indicated in the right figure.

ADHESIVE: Three Bond1207H

CAUTION

- The liquid gasket should be applied without any discontinuity with a width of ϕ 3 to 4 mm.
- Apply liquid gasket to those sections, too, that are corresponding to the mating surface of the cylinder block × oil pump.
- The assembling should be carried out within 15 minutes after the gasket has been applied.



CAUTION

- Care must be exercised not to allow the liquid gasket to stick to the cylinder block, etc.

3.Tighten the bolts and nuts to the specified torque.

TIGHTENING TORQUE: 8.5±2.5 N·m {85±25 kgf·cm}

5 TIMING CHAIN

5-1 DISASSEMBLING AND ASSEMBLING

5-1-1 ARTICLES TO BE PREPARED

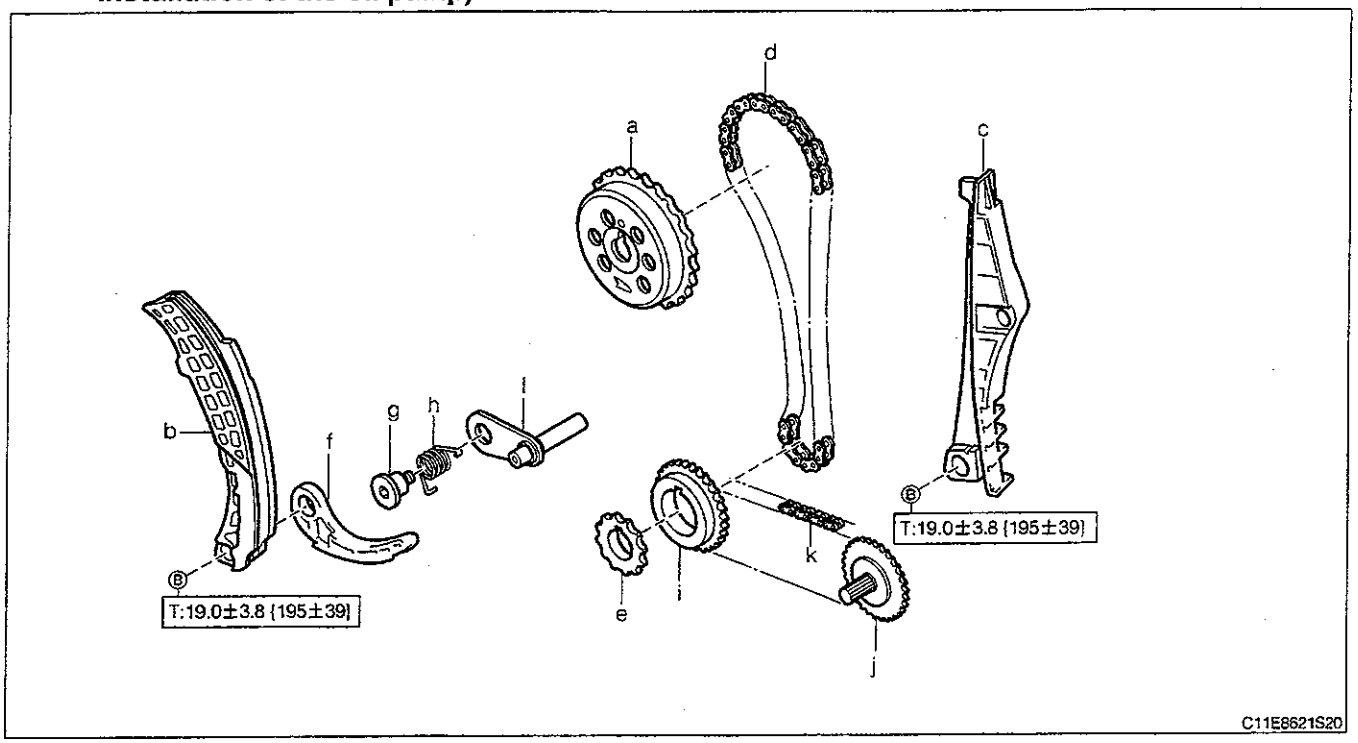
Instrument

Torque wrench

Lubricant,adhesive,others

Engine oil

5-1-2 COMPONENTS (Perform the following operations successively after the removal or installation of the oil pump)



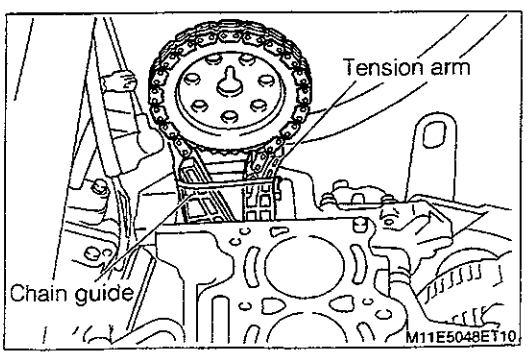
Unit:N·m {kgf·cm}

1 a Sprocket, camshaft timing
2 b Arm, timing chain tensioner
3 c Guide, timing chain
4 d Chain S/A, timing
5 e Sprocket, crankshaft timing
6 f Arm, oil pump chain tensioner
7 g Bolt, hexagon socket head cap
8 h Spring torsion
9 i Sprocket, oil pump drive
10 j Shaft S/A, oil pump drive
11 k Chain, oil pump
12 l Nozzle S/A, chain oil

5-1-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Removal of camshaft timing sprocket

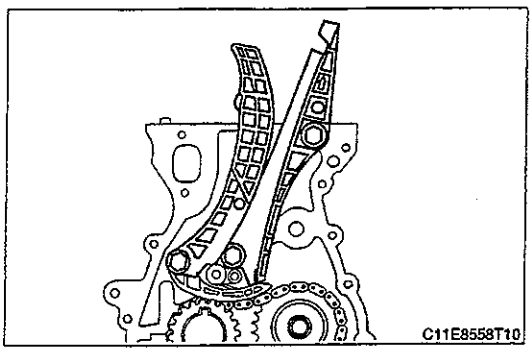
1.Remove the rubber bands etc. that retain the timing chain tensioner arm and timing chain guide.
2.Remove the camshaft timing sprocket.



(2) Removal of timing chain tensioner arm and timing chain guide

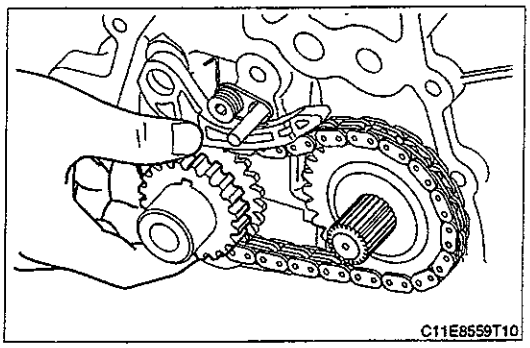
1.Remove the timing chain tensioner arm and timing chain guide.

2.Remove the timing chain S/A..



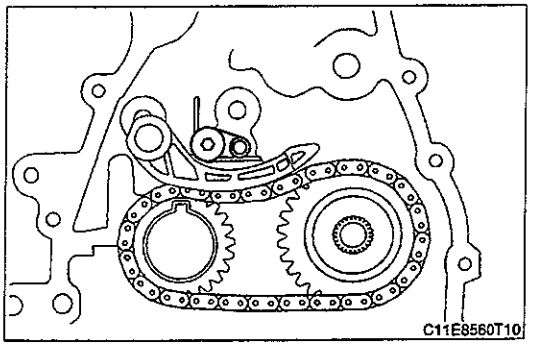
(3) Removal of crankshaft timing sprocket

1.Remove the crankshaft timing sprocket.



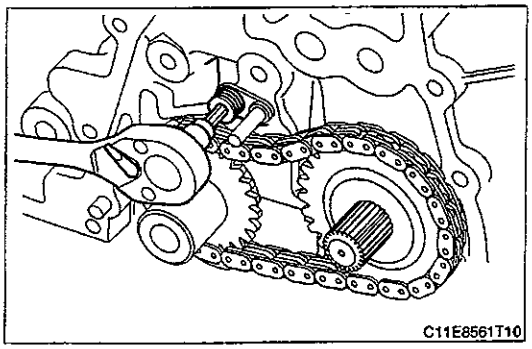
(4) Removal of oil pump chain tensioner arm

1.Remove the oil pump chain tensioner arm.



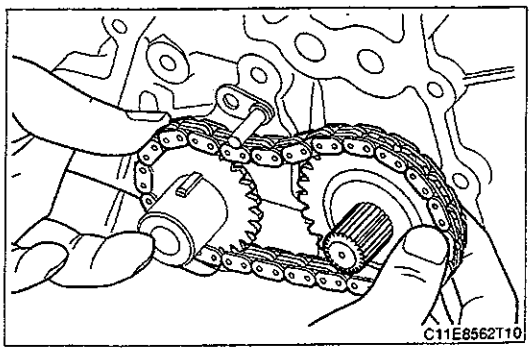
(5) Removal of torsion spring

1.Remove the socket head cap bolt and remove the torsion spring.



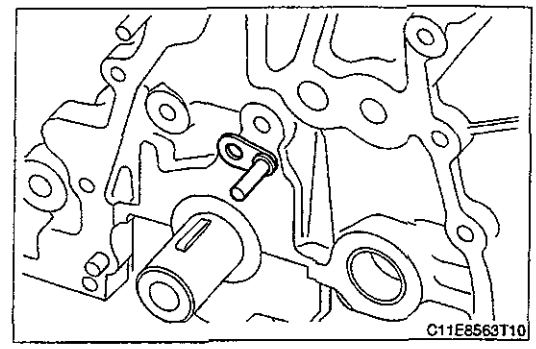
(6) Removal of oil pump chain S/A

1.Remove the oil pump drive sprocket, oil pump drive shaft, and oil pump chain S/A as a set.



(7) Removal of chain oil nozzle S/A

1.Remove the chain oil nozzle S/A.



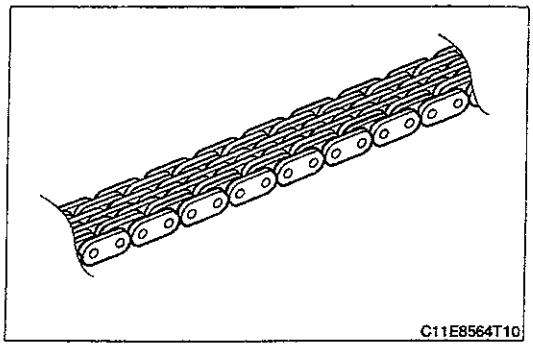
5-1-4 Inspection

(1) Timing chain S/A check

1.Check the timing chain for wear, cracks, etc. Replace any defective chain.

CAUTION

- If the timing chain exhibits any abnormality, carry out the check also at the sprocket side.

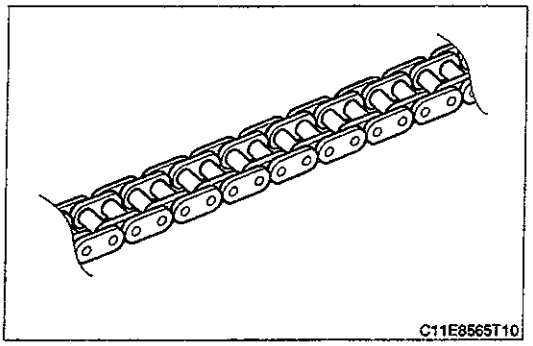


(2) Oil pump chain S/A check

1.Check the oil pump chain for wear, cracks, etc. Replace any defective chain.

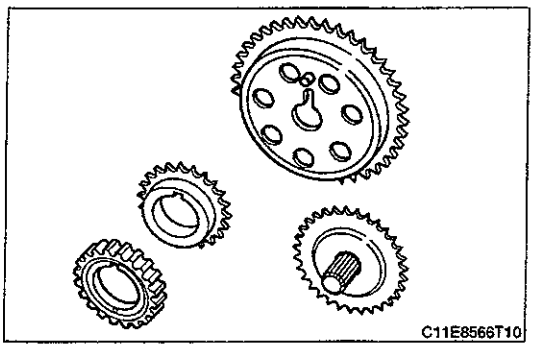
CAUTION

- If the timing chain exhibits any abnormality, carry out the check also at the sprocket side.



(3) Sprocket check

1.Check each sprocket for damage.



5-1-5 Installation

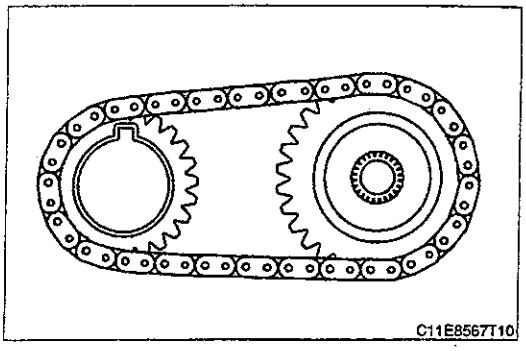
(1) Assembling of oil pump chain S/A

1.Perform the installation in such a state that the oil pump drive sprocket, oil pump drive shaft and oil pump chain S/A are assembled together.

LUBRICANT: Engine oil

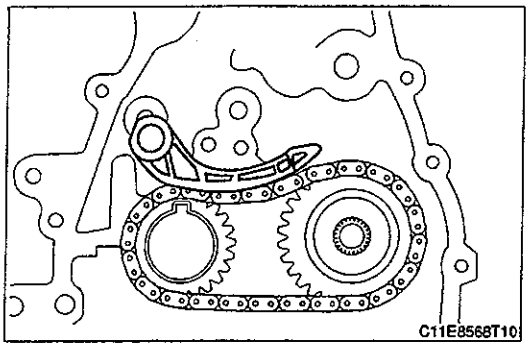
CAUTION

- Apply engine oil to the axial section and spline section of the oil pump drive shaft, both ends of the oil pump drive sprocket and bearing section of the cylinder block.



(2) Assembling of oil pump chain tensioner arm

1.Temporarily install the oil pump chain tensioner arm.



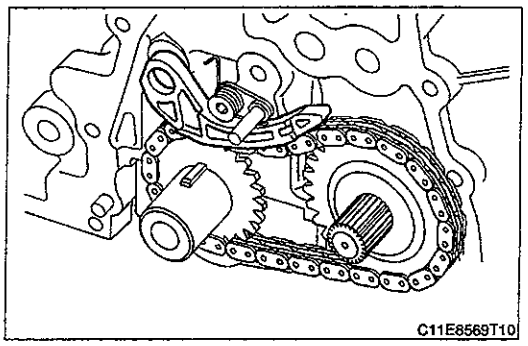
(3) Assembling of chain oil nozzle S/A

1.Insert the chain oil nozzle S/A into the installation hole of the cylinder block. Tighten the socket head cap bolt with the torsion spring interposed.

TIGHTENING TORQUE: 8.5±2.5 N·m {85±25 kgf·cm}

CAUTION

- Leave one end of the torsion spring in contact with the oil pump chain tensioner arm. Leave the other end free.



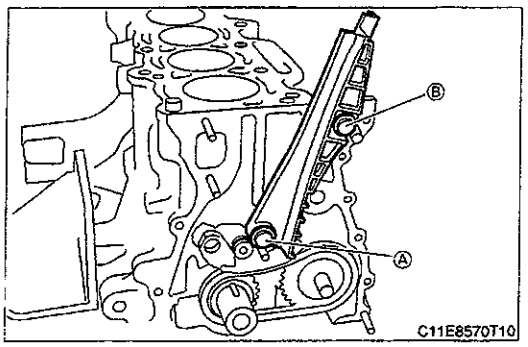
(4) Assembling of timing chain guide and timing chain arm

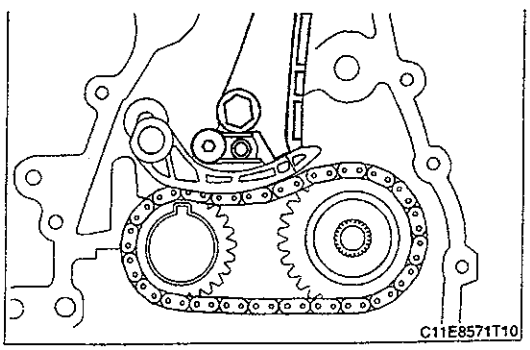
1.With the one end of the torsion spring in contact with the timing chain guide, temporarily tighten the bolt Ⓐ. Tighten the bolt Ⓑ first and then bolt Ⓐ to the specified torque.

TIGHTENING TORQUE: 19.0±3.8 N·m {195±39 kgf·cm}

CAUTION

- Ensure that the torsion spring is installed securely.

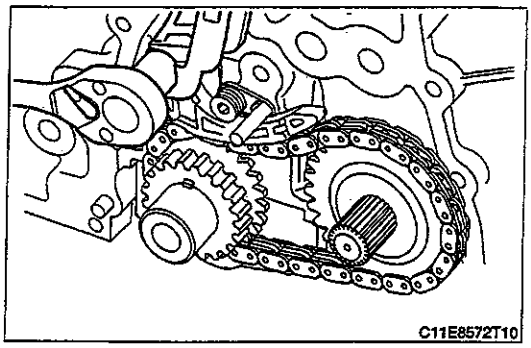




(5) Assembling of oil pump chain tensioner arm

1.Tighten the timing chain tensioner arm and oil pump chain tensioner arm with the bolt.

TIGHTENING TORQUE: 19.0±3.8 N·m {195±39 kgf·cm}

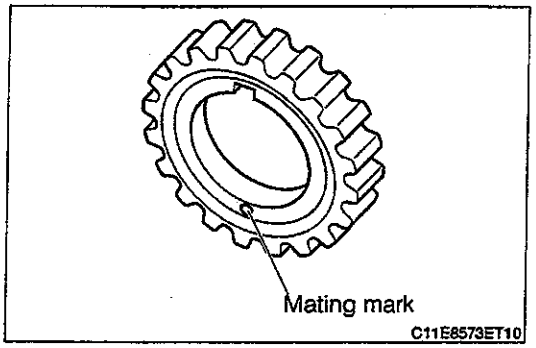


(6) Assembling of crankshaft timing sprocket

1.Install the crankshaft timing sprocket.

CAUTION

- **Perform the assembling with the timing mark facing the engine front side.**



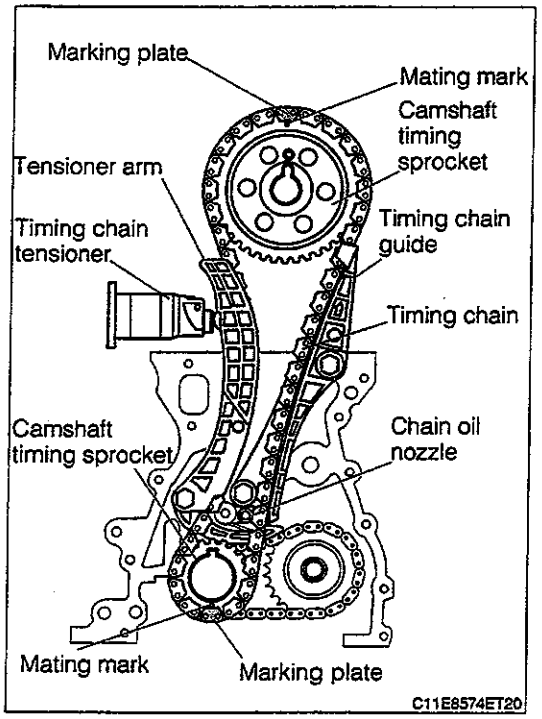
(7) Assembling of timing chain S/A

1.Install the timing chain S/A and camshaft timing sprocket.

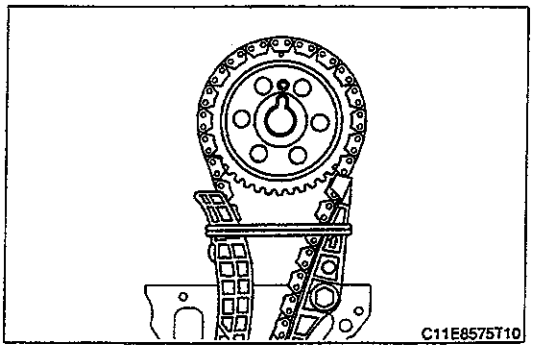
(1) Align the marking plates (at two points) of the timing chain with the timing marks of the crankshaft timing sprocket and camshaft timing sprocket when installing.

CAUTION

- **Face the front mark "F" of the camshaft timing sprocket toward the engine front side, when installing.**
- **Face the marking plate of the timing chain to the engine front, when installing.**



2.Secure the timing chain tensioner arm and timing chain guide with rubber bands or the like.

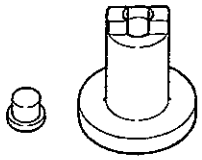


6 Cylinder block

6-1 DISASSEMBLING AND ASSEMBLING

6-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09221-87207-000	Remover & replacer piston pin body

Tool

Scraper

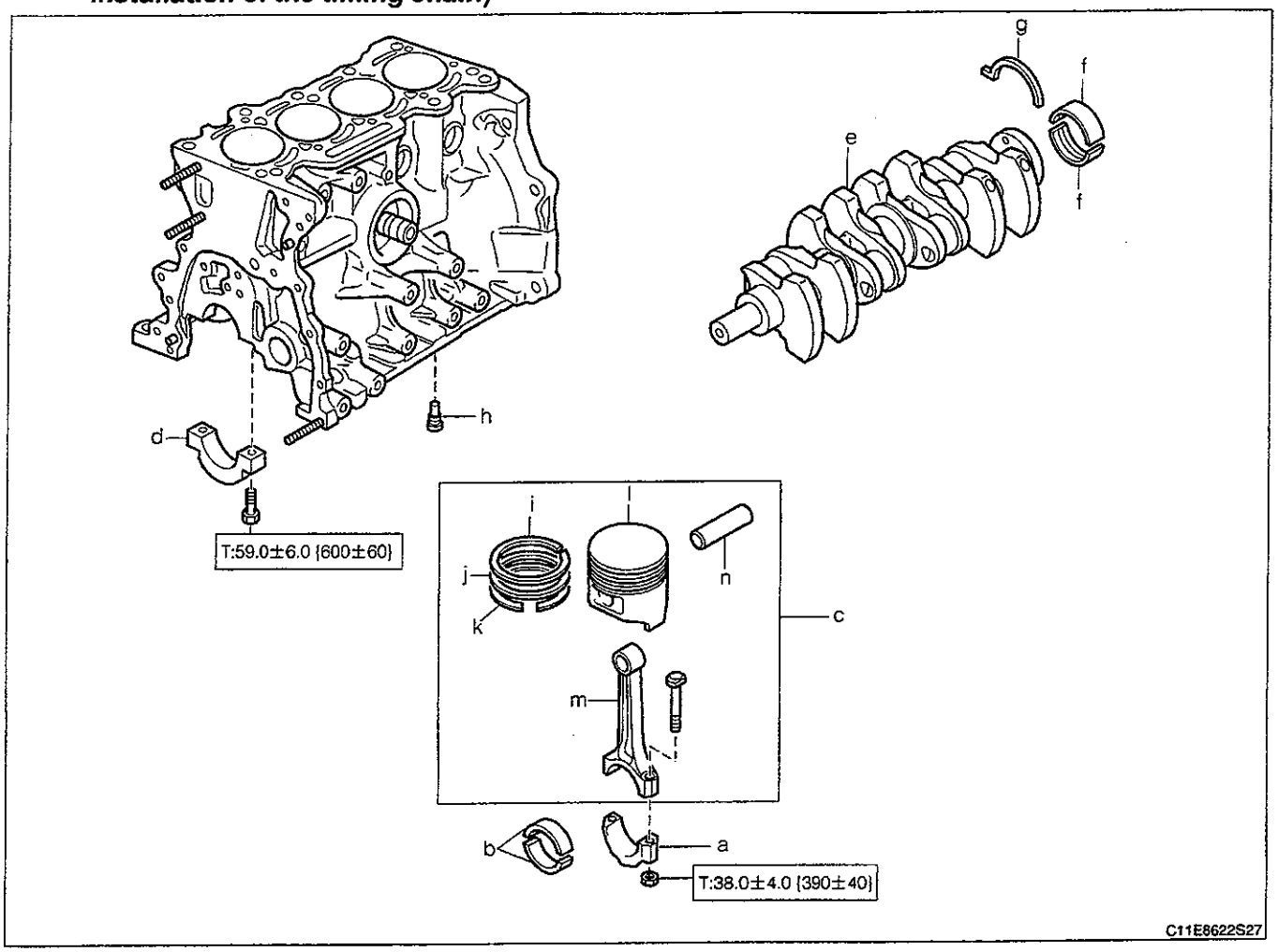
Instrument

Dial gauge,Press gauge,Micrometer,Precision straightedge,Thickness gauge,Cylinder gauge,Torque wrench

Lubricant,adhesive,others

Engine oil

6-1-2 COMPONENTS (Perform the following operations successively after the removal or installation of the timing chain)



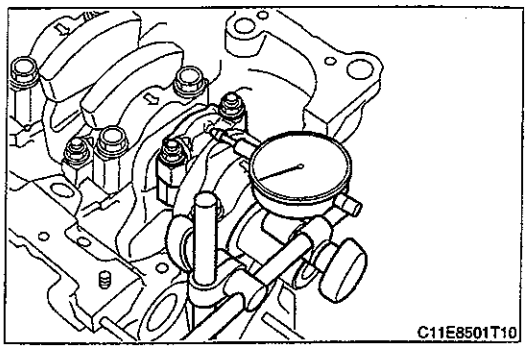
Unit:N·m {kgf·cm}

1 a Cap, connecting rod bearing
2 b Bearing, connecting rod
3 c Piston W/connecting rod
4 d Cap, crankshaft bearing
5 e Crankshaft
6 f Bearing, crankshaft
7 g Washer, crankshaft thrust
8 h Nozzle S/A, oil
9 i Ring, compression, NO.1
10 j Ring, compression, NO.2
11 k Ring, oil
12 l Piston
13 m Rod, connecting
14 n Pin, piston

6-1-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) Connecting rod thrust clearance check

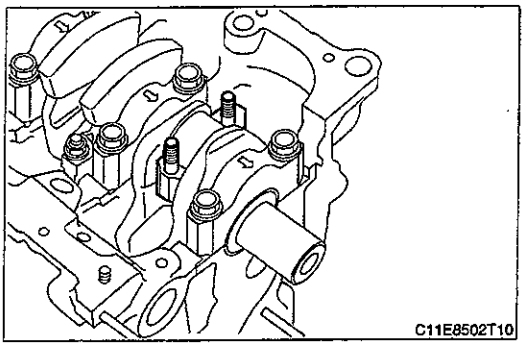
1.With a dial gauge or thickness gauge, measure the thrust clearance of each connecting rod.
2.Set the magnet base of the dial gauge to the crankshaft.
3.If the measured value exceeds the limit, replace the connecting rod.
SPECIFIED VALUE: 0.15-0.40 mm



(2) Connecting rod bearing oil clearance check

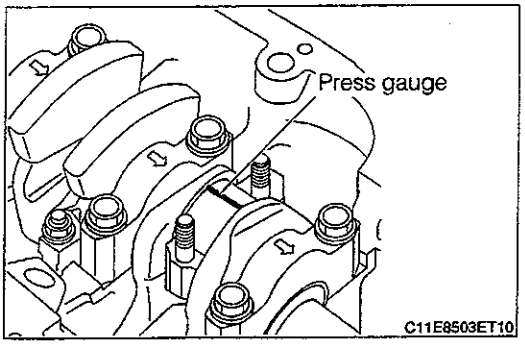
1.Remove the connecting rod bearing cap and connecting rod bearing.
CAUTION
- Keep the parts which belong to the same cylinder together.

2.Clean the bearing and crank pin.

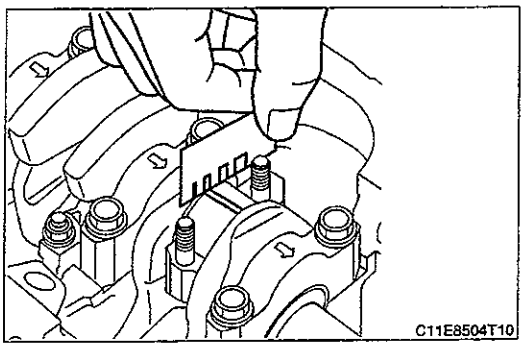


3.Set a press gauge in the axial direction of the crank pin. Tighten the bearing cap to the specified torque.
TIGHTENING TORQUE: 38.0±4.0 N·m {390±40 kgf·cm}

CAUTION
- Do not turn the crankshaft.



4.Remove the bearing cap. Measure the press gauge at its greatest width.
SPECIFIED VALUE: 0.020-0.044 mm
ALLOWABLE LIMIT: 0.07 mm
5.If the measured value exceeds the limit, replace the connecting rod bearing.

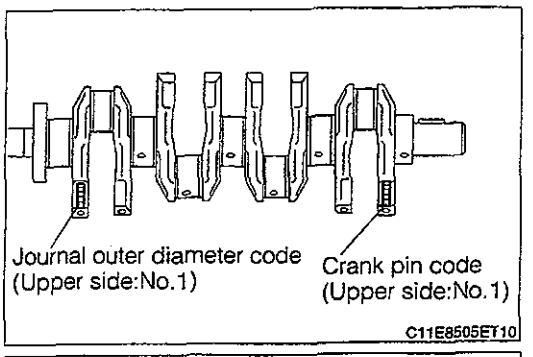


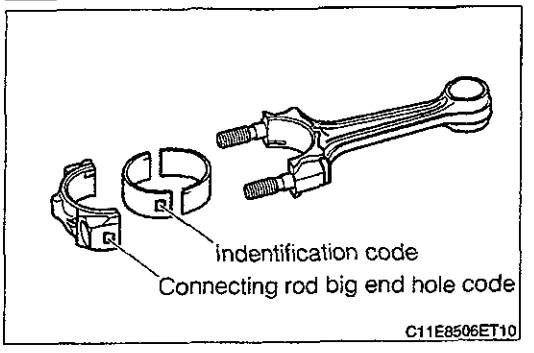
CAUTION

- When replacing the bearing, align the fitting codes both at the bearing cap side and connecting rod side.
- The crankshaft has undergone rolling. Therefore do not grind it.

Each specified value

Item	Identification code	Specified Value
Central stock thickness of connecting rod bearing (mm)	1	1.486-1.490
	2	1.490-1.494
	3	1.494-1.498
	4	1.498-1.502
	5	1.502-1.506
Crankshaft pin diameter (mm)	1	34.976-34.984
	2	34.984-34.992
	3	34.992-35.000
Connecting rod big end bore diameter (mm)	4	38.000-38.008
	5	38.008-38.016
	6	38.016-38.024





Connecting rod bearing selecting procedure

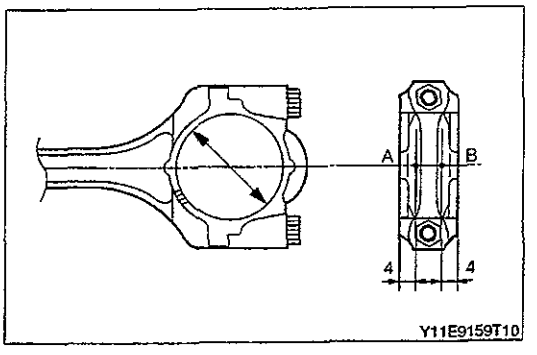
Connecting rod \ Crankshaft		Crank pin code		
		1	2	3
Big end bore code	4	3	2	1
	5	4	3	2
	6	5	4	3

CAUTION

- Assemble the upper and lower bearings having the same number.

NOTE

- (Bearing code) = (Big end bore code) − (Crank pin code)
- The right figure shows points where the connecting rod big end bore diameter is measured

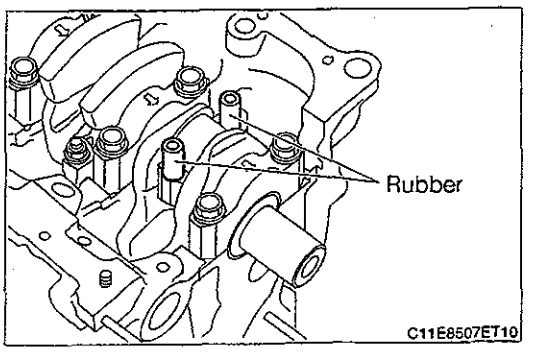


(3) Removal of piston W/connecting rod

1. Remove the connecting rod bearing cap and connecting rod bearing.
2. Wrap a rubber cap or the like around the bolt at the end of the connecting rod. Being very careful not to damage the cylinder and crankshaft, remove the piston W/connecting rod by tapping it with a grip of a hammer.

CAUTION

- Keep the parts which belong to the same cylinder together.



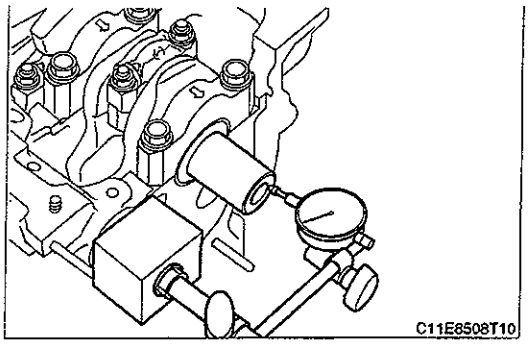
(4) Crankshaft thrust clearance check

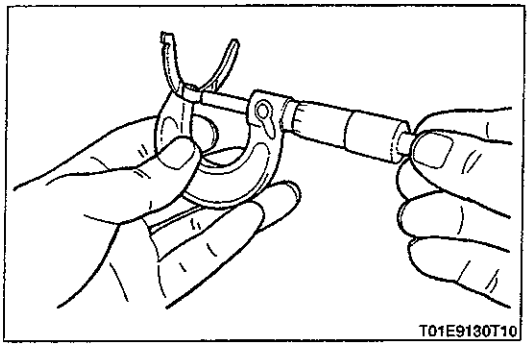
1.With a dial gauge, measure the thrust clearance (movement in a longitudinal direction) of the crankshaft. If the clearance exceeds the limit, replace the thrust washer or crankshaft.

SPECIFIED VALUE: 0.02-0.22 mm

NOTE

- When the crankshaft thrust clearance exceeds the limit, replace all the crankshaft thrust washers. (As for the O/S thrust washers, refer to the servicing specifications table.) If the clearance is out of specification even if the replacement has been carried out, replace the crankshaft.



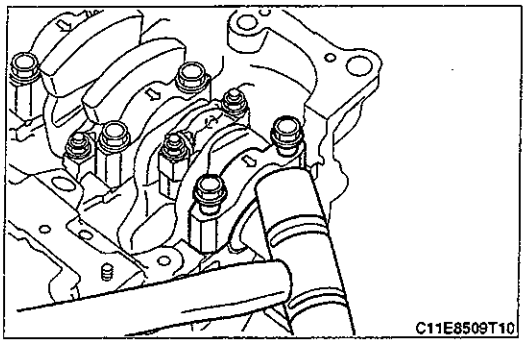


(5) Crankshaft oil clearance adjust

1.Remove the crankshaft bearing cap.

If it is difficult to remove the bearing cap, lightly tap it with a plastic hammer to remove.

(1) Clean the bearing inside, bearing cap inside, journal section of the cylinder block, and journal section of the crankshaft. Also, check for severe wear and damage.



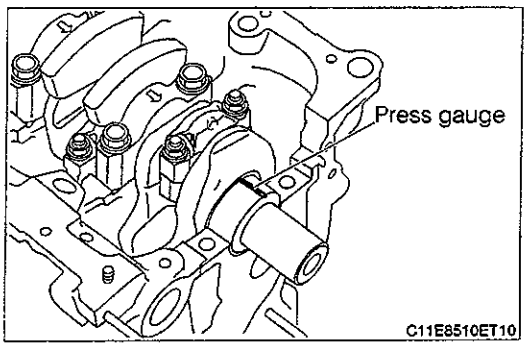
(2) Set a press gauge in the axial direction of the crankshaft journal section. Tighten the crankshaft bearing cap to the specified torque.

TIGHTENING TORQUE: 59.0±6.0 N·m {600±60 kgf·cm}

(3) Remove the bearing cap. Measure the press gauge at its greatest width.

SPECIFIED VALUE: 0.020-0.044 mm

(4) If the measured value exceeds the limit, replace the crankshaft bearing.

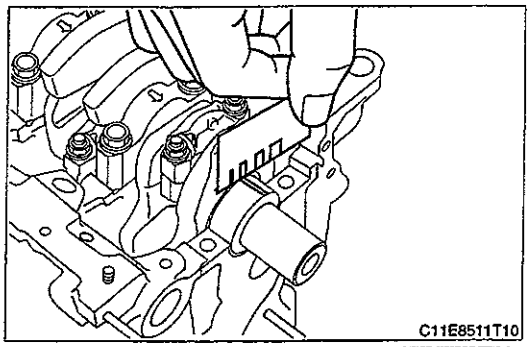


CAUTION

- The crankshaft has undergone rolling. Therefore do not grind it.

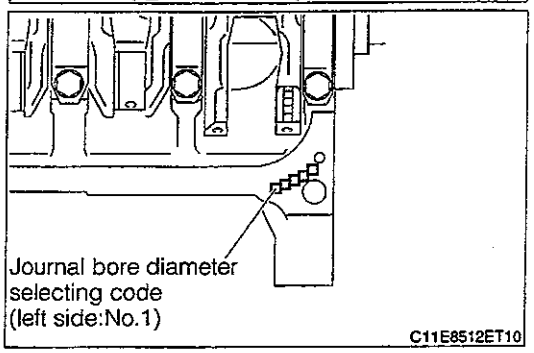
Cylinder block bearing bore diameter

Item	Selecting code	Specified Value
Cylinder block Bearing bore diameter (mm)	4	46.000-46.008
	5	46.008-46.016
	6	46.016-46.024


C11E8511T10

Crankshaft journal outer diameter

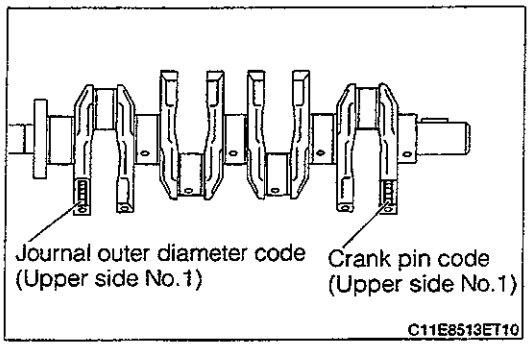
Item	Identification code	Specified Value
Crankshaft Journal outer diameter (mm)	1	41.976-41.984
	2	41.984-41.992
	3	41.992-42.000



C11E8512ET10

Crankshaft bearing thickness

Item	Identification color (code)	Specified Value
Central stock thickness of connecting rod bearing (mm)	Yellow (1)	1.986-1.990
	Green (2)	1.990-1.994
	Brown (3)	1.994-1.998
	Black (4)	1.998-2.002
	Blue (5)	2.002-2.006



C11E8513ET10

Crankshaft bearing selecting procedure

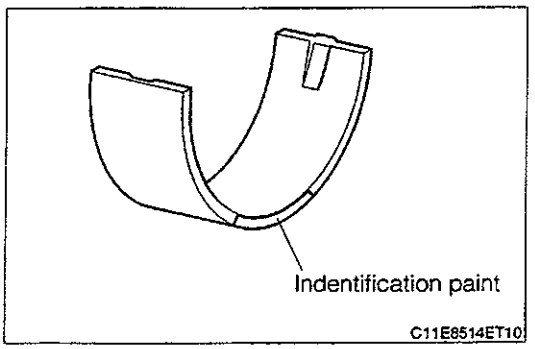
Cylinder block \ Crankshaft		Crank journal code		
		1	2	3
Bearing bore code	4	3	2	1
	5	4	3	2
	6	5	4	3

CAUTION

- Assemble the upper and lower bearings having the same color.

NOTE

- (Bearing code) = (Journal inner diameter code) − (Crankshaft journal outer diameter code)

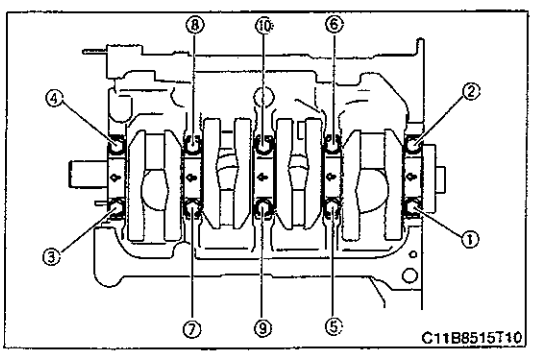


C11E8514ET10

2. Remove the crankshaft bearing cap. Then, remove the crankshaft, crankshaft bearing and crankshaft thrust washer.
3. Remove the oil nozzle S/A.

CAUTION

- Loosen the crankshaft bearing cap bolts in the sequence indicated in the right figure over two or three stages.



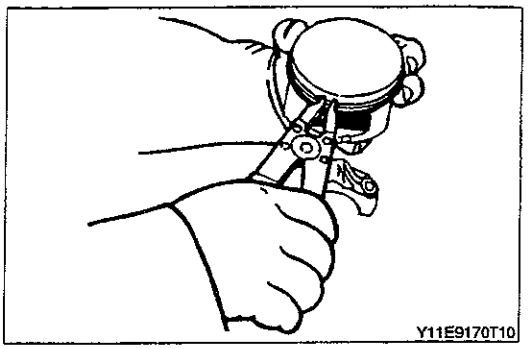
C11B8515T10

4.Assembling/disassembling of piston W/connecting rod

(1) Using the piston ring tool, remove the compression ring No. 1, compression ring No. 2, and the oil ring.

CAUTION

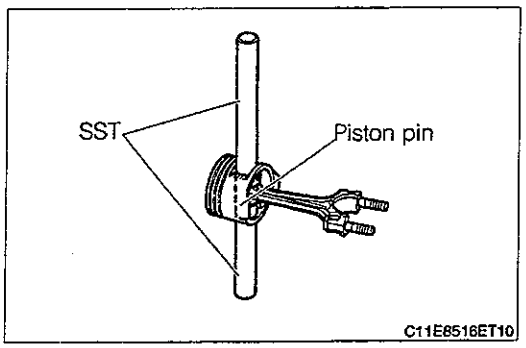
- Keep the piston and piston ring in the right combination.



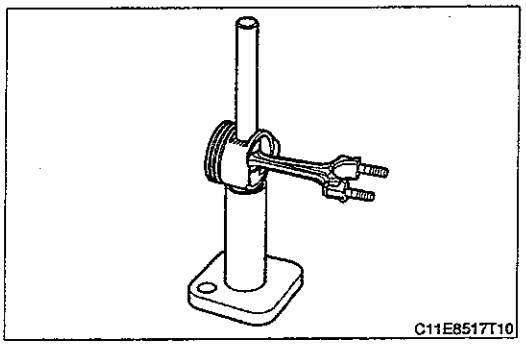
(2) Using the SST, remove the piston, connecting rod and piston pin.

SST: 09221-87207-000

(3) Set the SST on the piston pin as shown in the right figure.



(4) Set the SST to the piston under state mentioned above, as shown in the right figure. Pull the piston pin with a press and remove the piston and connecting rod.



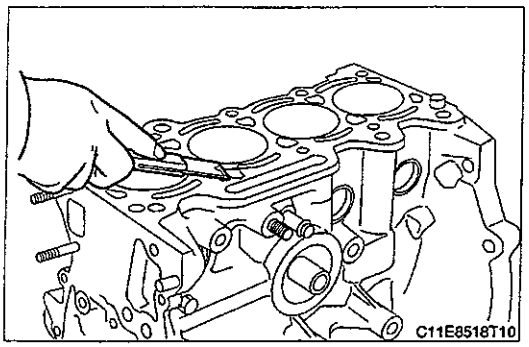
6-1-4 Cleaning

(1) Cylinder block cleaning

WARNING

- Wear safety goggles to protect your eyes during the cleaning.

1.Clean the cylinder head of the cylinder block, oil pan, oil pump and oil seal retainer installation section with a scraper or the like.



(2) Piston cleaning

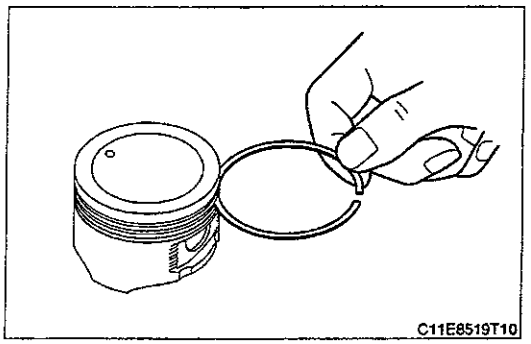
WARNING

- Wear safety goggles to protect your eyes during the cleaning.

1.Remove the carbon deposit in the right groove, using the oil piston ring or the like.
2.Remove carbon on each section, using washing fluid.

CAUTION

- Do not use a hard brush, such as a wire brush.



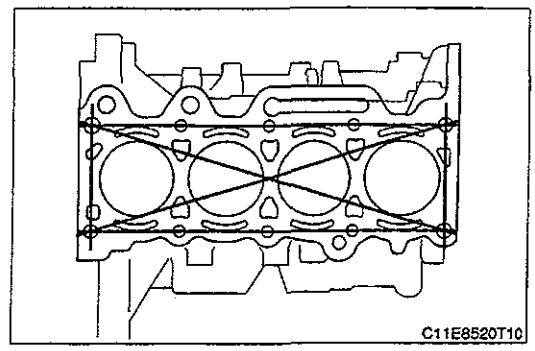
6-1-5 INSPECTION

(1) Cylinder block check

1.Cylinder block top surface distortion check

(1) With a straightedge and thickness gauge, measure the distortion at the six points indicated in the right figure.

ALLOWABLE LIMIT: 0.08 mm



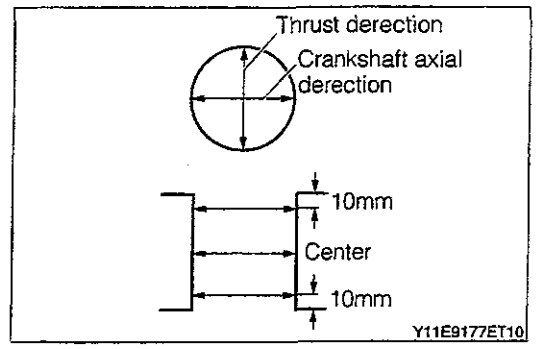
NOTE

- If the distortion exceeds the limit, machine and correct the top surface of the cylinder block.

2.Cylinder bore measurement

(1) With a cylinder gauge, measure the bore at the six points indicated in the right figure. Calculate the difference between the maximum value and minimum value.
If the limit is exceeded, replace the cylinder block or perform boring and use an O/S piston.

ALLOWABLE LIMIT: 0.2mm



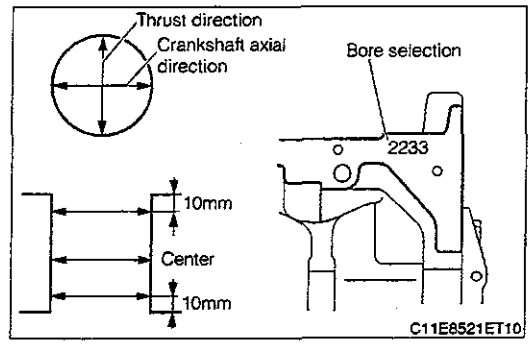
Specified cylinder bore diameter

Cylinder bore code	Cylinder bore diameter (mm)
1	61.000-61.010
2	61.010-61.020
3	61.020-61.030

3.Cylinder block boring

(1) Taking the cylinder with the maximum wear diameter and maximum damage depth as the reference, select the O/S piston.

(2) Calculate the boring dimension based on the selected O/S piston outer diameter. Then, perform boring.

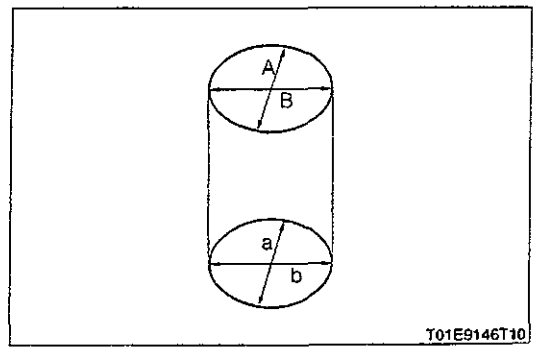


NOTE

- Boring dimension
  = (Actually-measured O/S piston outer diameter) + (Piston clearance specified value) − (Honing margin 0.02 mm)

(3) After boring, measure the ovality and taper of the cylinder inner diameter.

ALLOWABLE LIMIT: 0.03 mm



NOTE

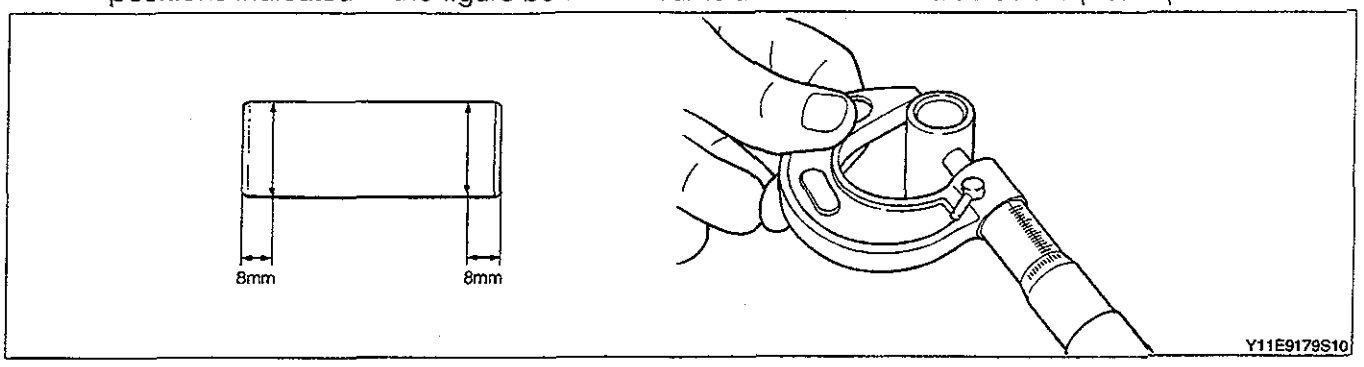
- Ovality
  A − B or a − b
- Taper
  A − a or B − b

(4) Check the piston clearance after boring.

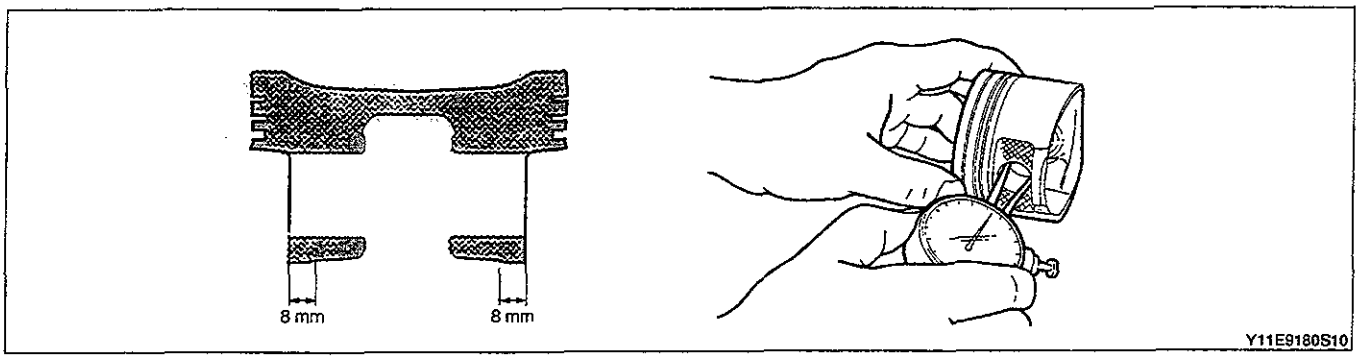
(2) Piston check

1.Piston pin oil clearance check

(1) With a micrometer, measure the diameter of the piston pin over the entire circumference at the positions indicated in the figure below. Assume the maximum value as the piston pin diameter.



(2) With a caliper gauge, measure the piston pin bore diameter over the entire circumference at the positions indicated in the figure below. Assume the minimum value as the piston pin bore diameter.



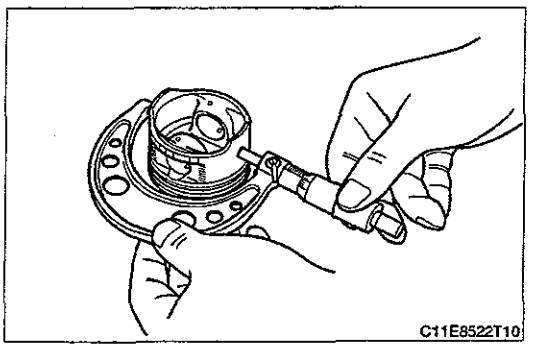
(3) Calculate the difference between the piston pin diameter and piston pin bore diameter. If the value is out of the specification, replace the piston and piston pin.

SPECIFIED VALUE: Clearance: 0.005-0.011 mm

2.Piston outer diameter measurement

(1) Perform the measurement at a position 11 mm from the lower end of the piston skirt section in a direction right angles to the piston bore.

SPECIFIED VALUE: 60.965-60.995 mm

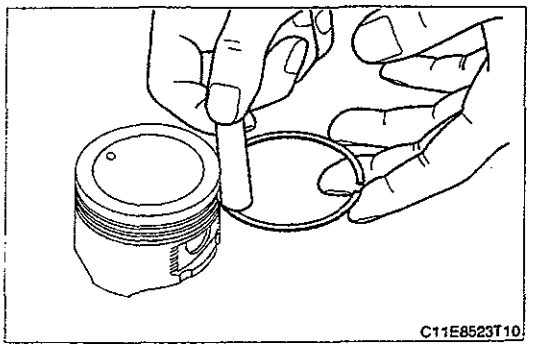


3.Check of clearance between piston ring and ring groove

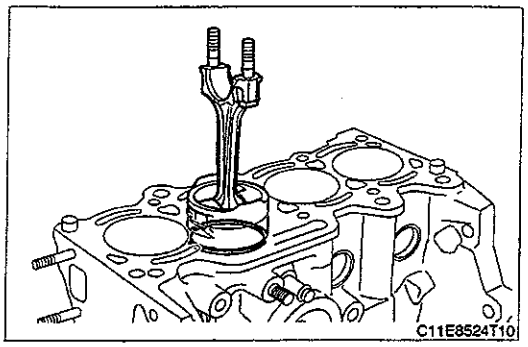
(1) With a thickness gauge, measure the clearance over the entire circumference of the piston.

Specified clearance between piston ring and ring groove

	Specified Value (mm)	Limit (mm)
Compression ring No.1	0.07-0.105	0.12
Compression ring No.2	0.02-0.06	0.11



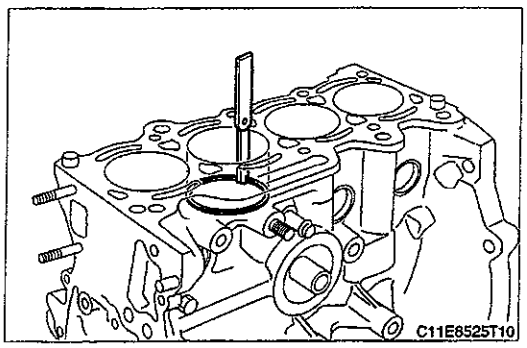
4.Mating end clearance check of piston ring



(1) Using the piston, push in the piston ring at a position about 45 mm from the block top surface. Measure the clearance with a thickness gauge.

CAUTION

- **The measurement should be performed with the ring placed in the cylinder to which the ring was assembled.**



Mating end clearance of piston ring

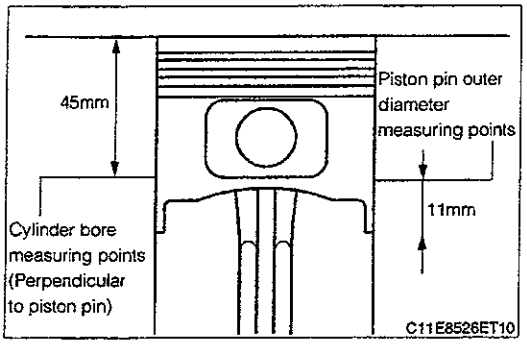
	Specified Value (mm)	Limit (mm)
Compression ring No.1	0.25-0.38	0.50
Compression ring No.2	0.38-0.53	0.65
Oil ring	0.15-0.45	0.60

5.Check of oil clearance between cylinder and piston

(1) Measure the piston outer diameter and cylinder inner diameter (right figure) to obtain the oil clearance. If the clearance exceeds the limit, replace the piston or cylinder block, or perform boring.

SPECIFIED VALUE: 0.025-0.045 mm

ALLOWABLE LIMIT: 0.10 mm



NOTE

- **The oil clearance of the piston and cylinder block can be obtained by subtracting the piston maximum outer diameter (basic diameter) from the thrust direction minimum inner diameter of the cylinder.**

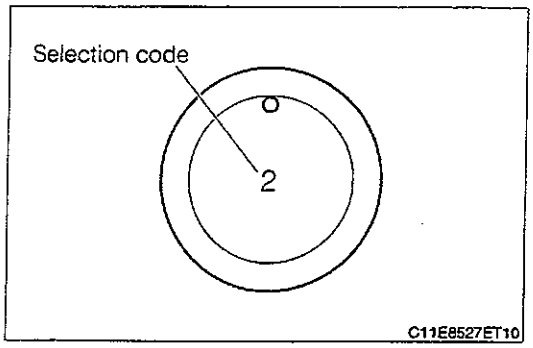
(2) If the piston or cylinder block has been replaced, check the oil clearance again.

Specified cylinder inner diameter and piston outer diameter

Selection code	Cylinder inner diameter (mm)	Piston outer diameter (mm)
1	61.000-61.010	60.965-60.975
2	61.010-61.020	60.975-60.985
3	61.020-61.030	60.985-60.995

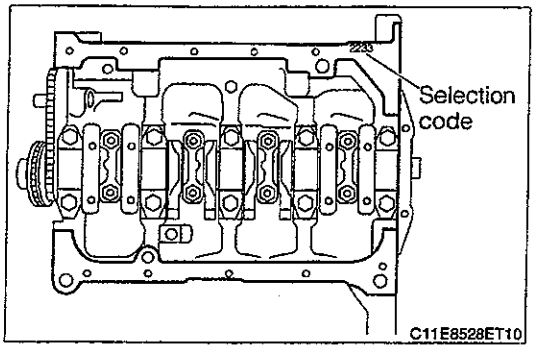
6.Selecting oversized (O/S) piston

(1) Measure the cylinder inner diameter and piston outer diameter. If the wear exceeds the limit, choose the standard (STD) or O/S piston.
Boring finish dimension = (actually measured O/S piston outer diameter) + (Oil clearance) − (Honing margin 0.02 mm)
As for the kind and outer diameter of O/S pistons, refer to the servicing specifications table.



CAUTION

- **When using the O/S piston, use also a piston ring which is for O/S.**



(3) Crankshaft check

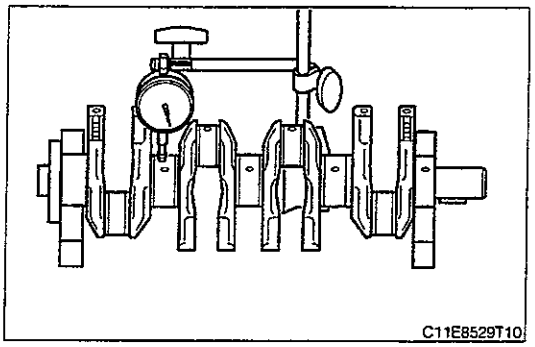
1.Crankshaft runout check

(1) With a dial gauge, measure the runout. If it exceeds the limit, replace the crankshaft.

ALLOWABLE LIMIT: 0.03 mm

CAUTION

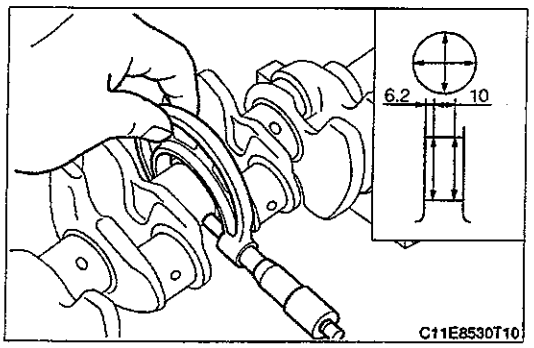
- **The runout is the half of the gauge reading (runout) when the crankshaft makes a turn.**



2.Crankshaft wear check

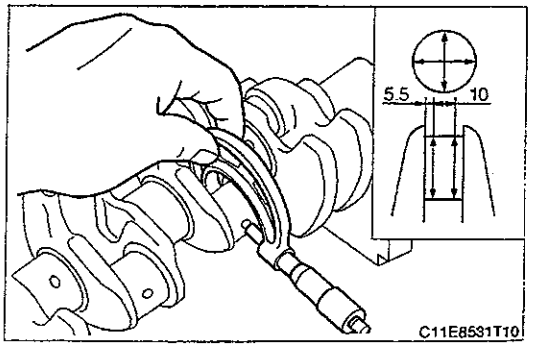
(1) With a micrometer, measure the journal section at positions indicated in the right figure. Calculate the ovality and taper.

ALLOWABLE LIMIT: 0.01 mm



(2) With a micrometer, measure the pin section at positions indicated in the right figure. Calculate the ovality and taper.

ALLOWABLE LIMIT: 0.01 mm



6-1-6 Assembling of cylinder block

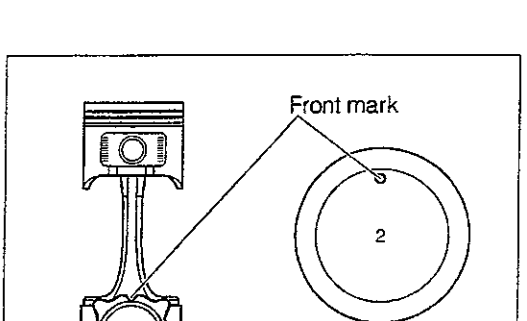
1.Perform assembling in the sequence shown in the Components diagram.

(1) Piston assembling

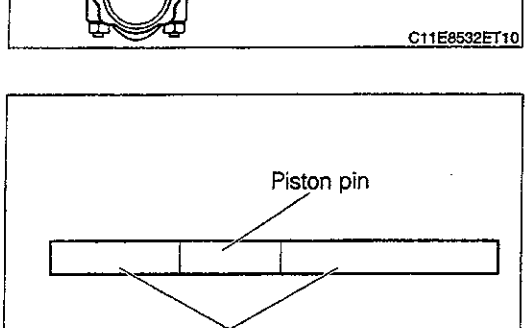
1.Using the SST, assemble the piston, connecting rod and piston pin, following the procedure given below.

SST: 09221-87207-000
09221-97401-000

(1) Apply engine oil to the pin hole of the connecting rod. Align the front mark of the piston with that of the connecting rod, and assemble temporarily.



(2) Assemble the piston pin to the SST, as shown in the right figure.

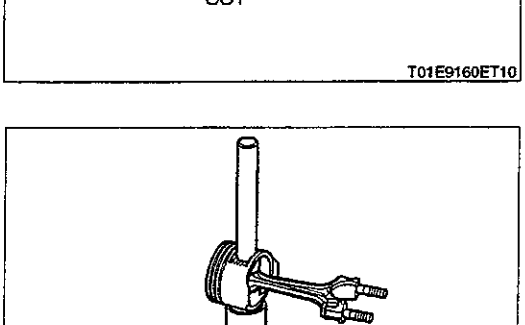


(3) Set the temporarily assembled piston pin and connecting rod to the SST as shown in the right figure.

(4) Apply engine oil to the piston pin. Assemble the piston pin and connecting rod with a press.

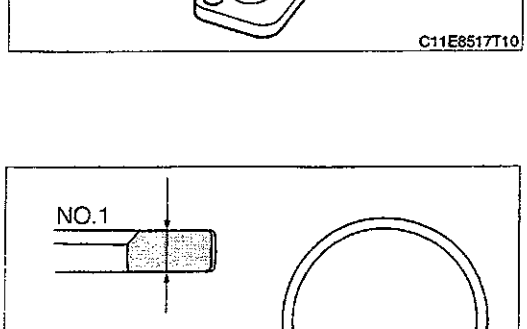
CAUTION

- **The piston pin press-fitting should be performed from the piston front mark direction.**
- **The piston pin press-fitting should be performed at the normal temperature.**
- **During press fitting, the pin should be pushed from right above. Do not apply force diagonally.**



(2) Assembling of compression ring and oil ring

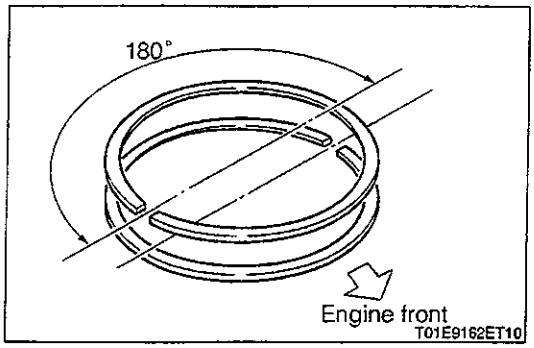
1.Assemble the compression ring No. 1, compression ring No. 2 and oil ring in the following procedure given below.



2.Assembling of compression ring

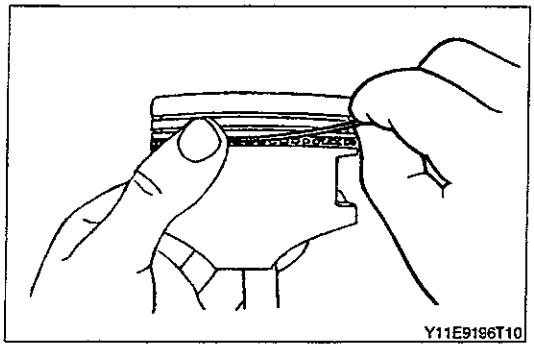
Using the piston ring tool, install the compression ring with the identification mark facing upward.

(1) Assemble each ring in such a way that the mating ends of the No.1 ring comes at the thrust direction (intake manifold side), whereas the mating ends of the next ring comes at the direction opposite to the thrust direction, 180 degrees away.



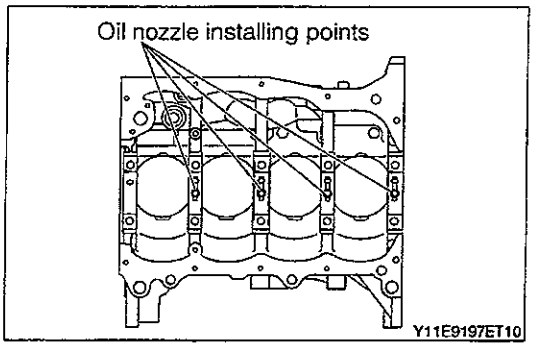
(2) Assembling of oil ring

Assemble the oil rings in such a way that the mating ends of the upper oil ring rail comes at the same direction as the No.1 ring, whereas the mating ends of the lower rail comes at the same direction as the No.2 ring. The end of the expander should be deviated 90 degrees from the mating ends of the rail.



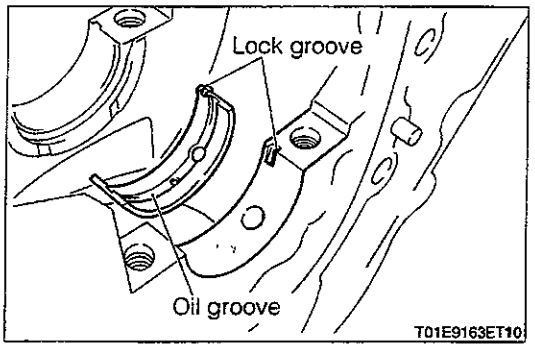
(3) Assembling of cylinder block

1.Assemble the oil nozzle S/A at a position indicated in the right figure.

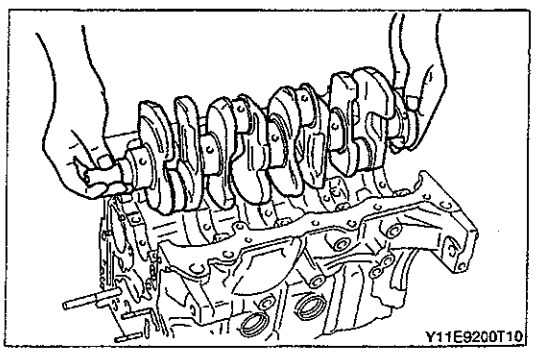


2.Assemble the crankshaft bearing cap, crankshaft, crankshaft bearing, crankshaft thrust washer in the following procedure given below.

(1) Assemble the bearing (upper), aligning with the lock width of the cylinder block.



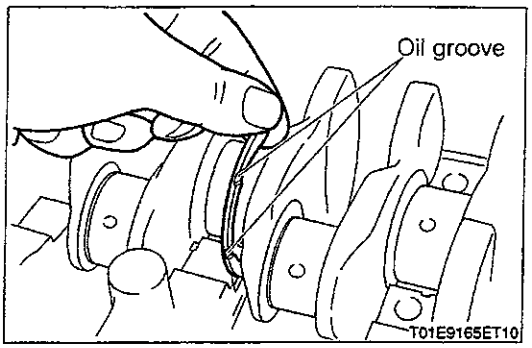
(2) Apply engine oil to the crankshaft sliding surface of the bearing (upper). Then, assemble the crankshaft.



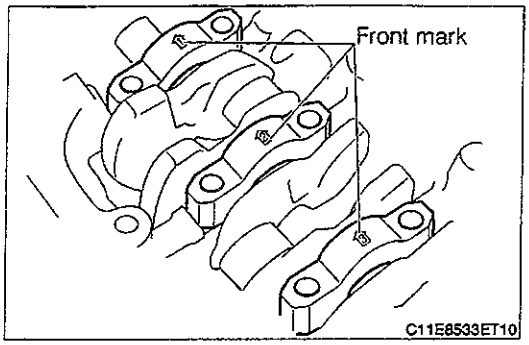
(3) Insert and install the thrust washer, starting with the side with no claw, so that the oil groove may face toward the outside (crank side).

CAUTION

- **Prior to assembling, apply engine oil to the oil groove.**



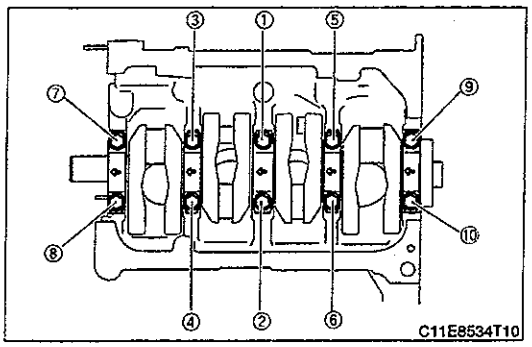
(4) Apply engine oil to the crankshaft sliding surface of the crankshaft bearing (lower). Then, assemble the crankshaft bearing cap with the front mark facing to the front.



(5) Apply engine oil to the bolts. Tighten them to the specified torque over two or three stages in the sequence indicated in the right figure.

TIGHTENING TORQUE: 59.0±6.0 N·m {601±61 kgf·cm}

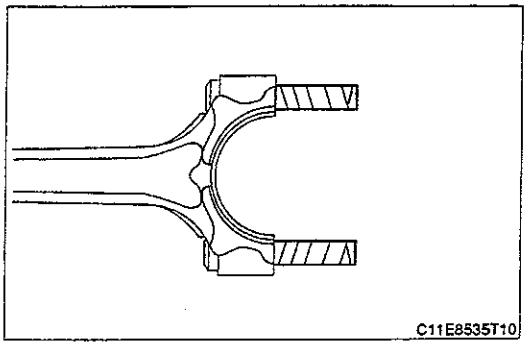
(6) After assembling, ensure that the crankshaft can turn smoothly.



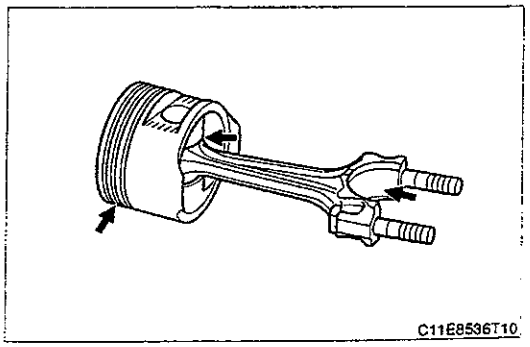
3.Assemble the piston W/ connecting rod, connecting rod bearing and connecting rod bearing cap, following the procedure given below.

(1) Confirm the direction of the mating ends of the compression ring and oil ring.

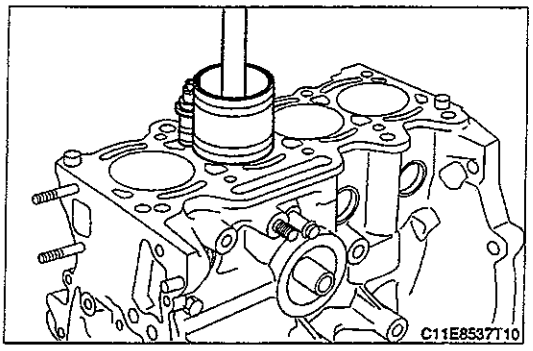
(2) Wrap a vinyl tape or the like around the bolt of the connecting rod. Be very careful not to damage the cylinder block bore section and crankshaft during the insertion into the cylinder block.



(3) Apply engine oil to the sliding surfaces of the piston and connecting rod.



(4) Using a piston ring tool, insert the piston into the cylinder block with the piston front mark facing to the front.

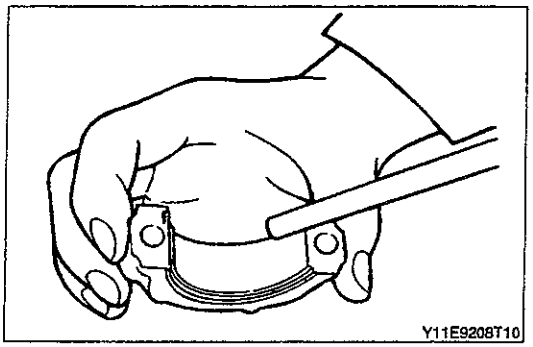


CAUTION

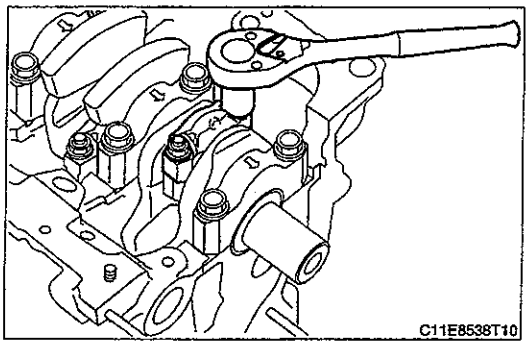
- Assemble the piston and each cylinder in the same combination as before the disassembling.

(5) Assemble the connecting rod bearing cap and connecting rod bearing, following the procedure given below.

(6) Apply engine oil to the connecting rod bearing.



(7) When assembling the connecting rod bearing cap and connecting rod, ensure that the knock pin is aligned with the knock hole when the assembling is carried out with the cap front mark coming at the front.



ALLOWABLE LIMIT: When tightening the connecting rod bolts, tighten the right and left bolts alternately and finally to the specified torque.

ALLOWABLE LIMIT: 38.0±4.0 N·m {390±40 kgf·cm}

CAUTION

- Assemble the connecting rod and connecting rod bearing cap in the same combination as before the disassembling.

TO INDEX

B2 ENGINE MECHANICAL

JB---------- B2 - 1
CYLINDER HEAD GASKET---------- B2 - 1
REMOVAL AND INSTALLATION-------- B2 - 1
CAM SHAFT---------- B2 - 5
REMOVAL AND INSTALLATION-------- B2 - 5
ENGINE ASSY ---------- B2 - 17
REMOVAL AND INSTALLATION ------ B2 - 17

JB
1 CYLINDER HEAD GASKET
1-1 REMOVAL AND INSTALLATION

WARNING

- No fire should be brought near when servicing the fuel system.
- There is a risk of burn injuries. Do not open the drain plug or remove the water hose while the engine is hot.

1-1-1 ARTICLES TO BE PREPARED

Tool

Hexagon wrench (Width across flats : 8mm)

Instrument

Torque wrench

Lubricant,adhesive,others

Engine oil,Three Bond1207H

1-1-2 OPERATION BEFORE REMOVAL

1.Release the fuel pressure.
Refer to Page B7-1.

2.Remove the battery ⊖ terminal.

CAUTION

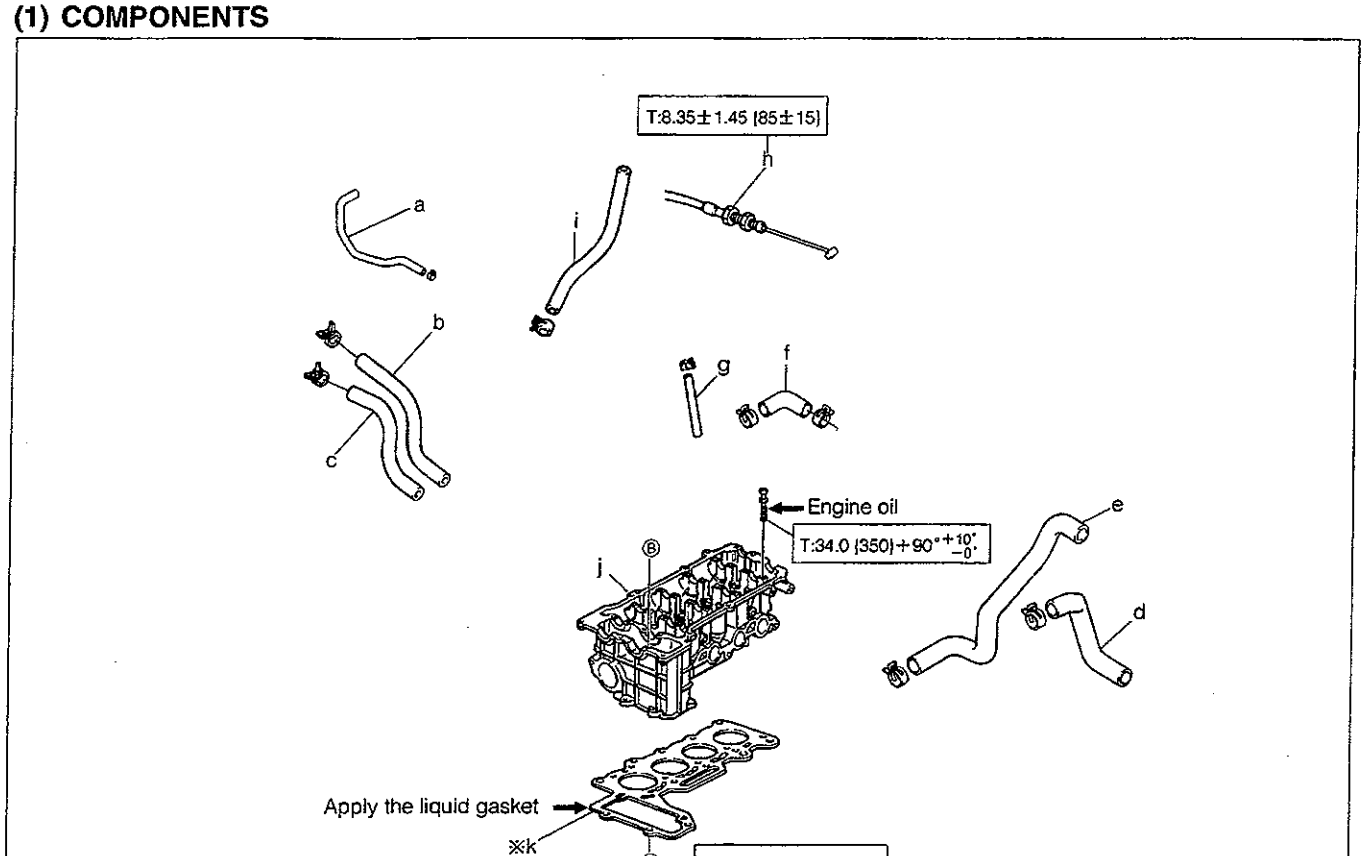
- When the battery negative ⊖ terminal is disconnected, it should be noted that diagnosis results and memories of the radio are erased simultaneously.

3.Remove the camshaft.
Refer to Page B2-5.

4.Remove the turbocharger.
Refer to Page B3-8.

1-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※Non-reusable parts
Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1	a	Hose, booster vacuum	7	g Hose, water (inlet pipe—throttle body)
2	b	Hose, heater inlet water	▼ ▲ 8	h Cable Ay, accelerator control
3	c	Hose, heater outlet water	9	i Hose, fuel No.1(main)
4	d	Hose, radiator No.1	▼ ▲ 10	j Head S/A, cylinder
5	e	Hose, radiator No.2	▲ 11	k Gasket, cylinder head
6	f	Hose, heater inlet water (inlet pipe—outlet pipe)		

1-1-4 POINTS OF REMOVAL

(1) ACCELERATOR CONTROL CABLE AY

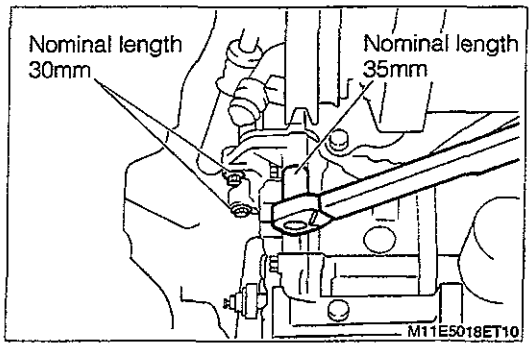
1.Loosen the bracket nut to remove the throttle body.

CAUTION

- Be careful not to have the cable get curly when during disassembly.

(2) CYLINDER HEAD S/A

1.Remove the three flange bolts (cylinder head × oil pump) on the oil pump body.

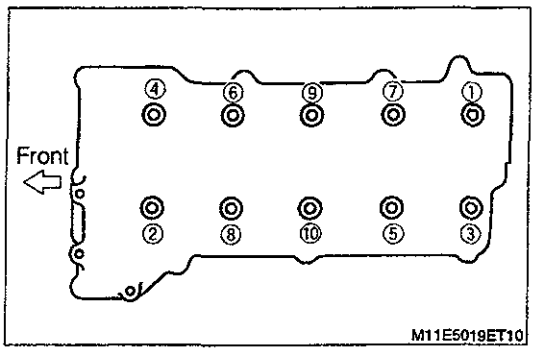


2.Remove the ten bolts of the cylinder head in the sequence shown at the right figure by loosening them evenly over several stages.
TOOL: Hexagon wrench (Width across flats : 8mm)

3.Remove the cylinder head S/A together with the intake manifold, the exhaust manifold and the injector.

CAUTION

- Do not reuse the cylinder head gasket.



1-1-5 POINTS OF INSTALLATION

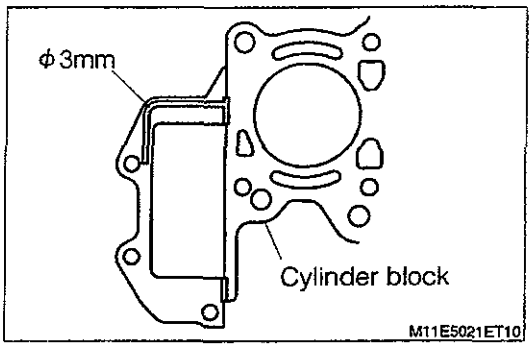
(1) CYLINDER HEAD GASKET

1.Clean the cylinder block, the oil pump top surface and the cylinder head lower surface and completely remove foreign matters, oil, etc.

2.Apply liquid gasket (Three Bond 1207H) on the mating face of the cylinder block and the oil pump, and on the top surface of the oil pump, in the area shown in the right figure.
ADHESIVE: Three Bond1207H

CAUTION

- Avoid excessive application, or the liquid will come to be mixed in the cooling system.
- Assemble the cylinder head within 15 minutes after liquid gasket application.



3.Install the new cylinder head gasket, while matching the cylinder block knock pin.

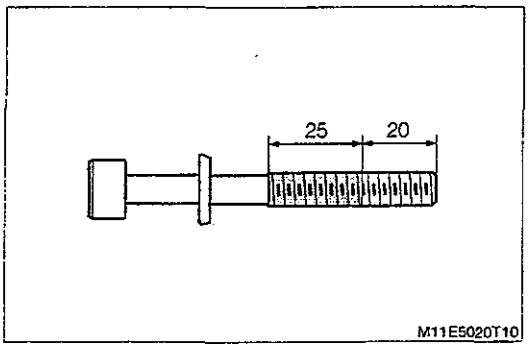
CAUTION

- Use a new cylinder head gasket.

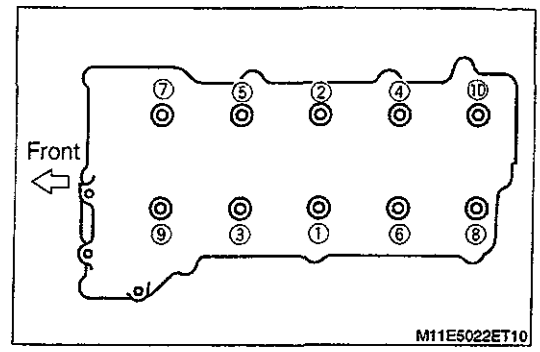
(2) CYLINDER HEAD S/A

1.Use a micrometer caliper to measure the thread diameter of the cylinder head bolts at a few locations, the marked areas shown in the right figure. If out of range, replace the cylinder head bolt.
ALLOWABLE LIMIT: 8.63mm

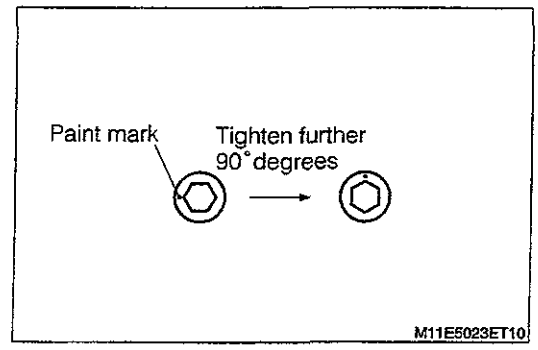
2.Apply engine oil on the cylinder head thread and the seating surface, and then insert into the bolt hole.
LUBRICANT: Engine oil



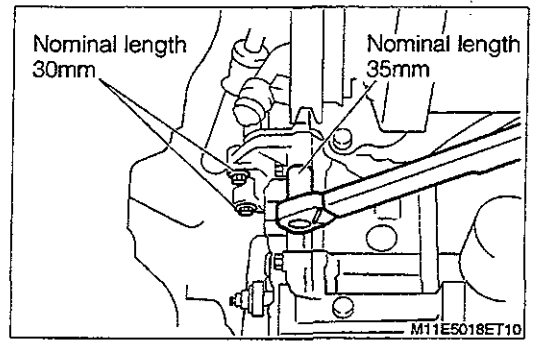
3.Tighten ten (10) cylinder head bolts over several stages in the sequence shown in the right figure, and then tighten them to the specified torque.
TOOL: Hexagon wrench (Width across flats : 8mm)
4.After tightening to the specified torque, use the same sequence to re-tighten 90° +10 0



NOTE
- Paint mark all the bolt heads in a same certain direction. After tightening 90° in the sequence given above, check if the bolt markings are located in the 90° rotated position.



5.Tighten the three (3) flange bolts (cylinder head × oil pump) of the oil pump body section to the specified torque.
CAUTION
- Tighten them within 5 minutes after tightening the cylinder head bolts.



(3) ACCELERATOR CONTROL CABLE AY
1.Install the accelerator control cable assembly to the throttle body. After adjusting the accelerator pedal free play, tighten the nut to the specified torque.
SPECIFIED VALUE: 1 – 5mm (accelerator pedal free play)

1-1-6 OPERATION AFTER INSTALLATION
1.Install the turbocharger.
Refer to Page B3-8.

2.Install the camshaft.
Refer to Page B2-5.

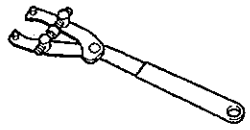
3.Install the battery ⊖ terminal.
4.Replenish the coolant
5.Adjust the engine.
Refer to Page B1-1.

2 CAM SHAFT

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09504-87501-000 (09504-00011-000)	Wrench differential side bearing adjusting nut

Tool

Snap ring pliers,Hexagon wrench (Width across flats : 5mm)

Instrument

Torque wrench

Lubricant,adhesive,others

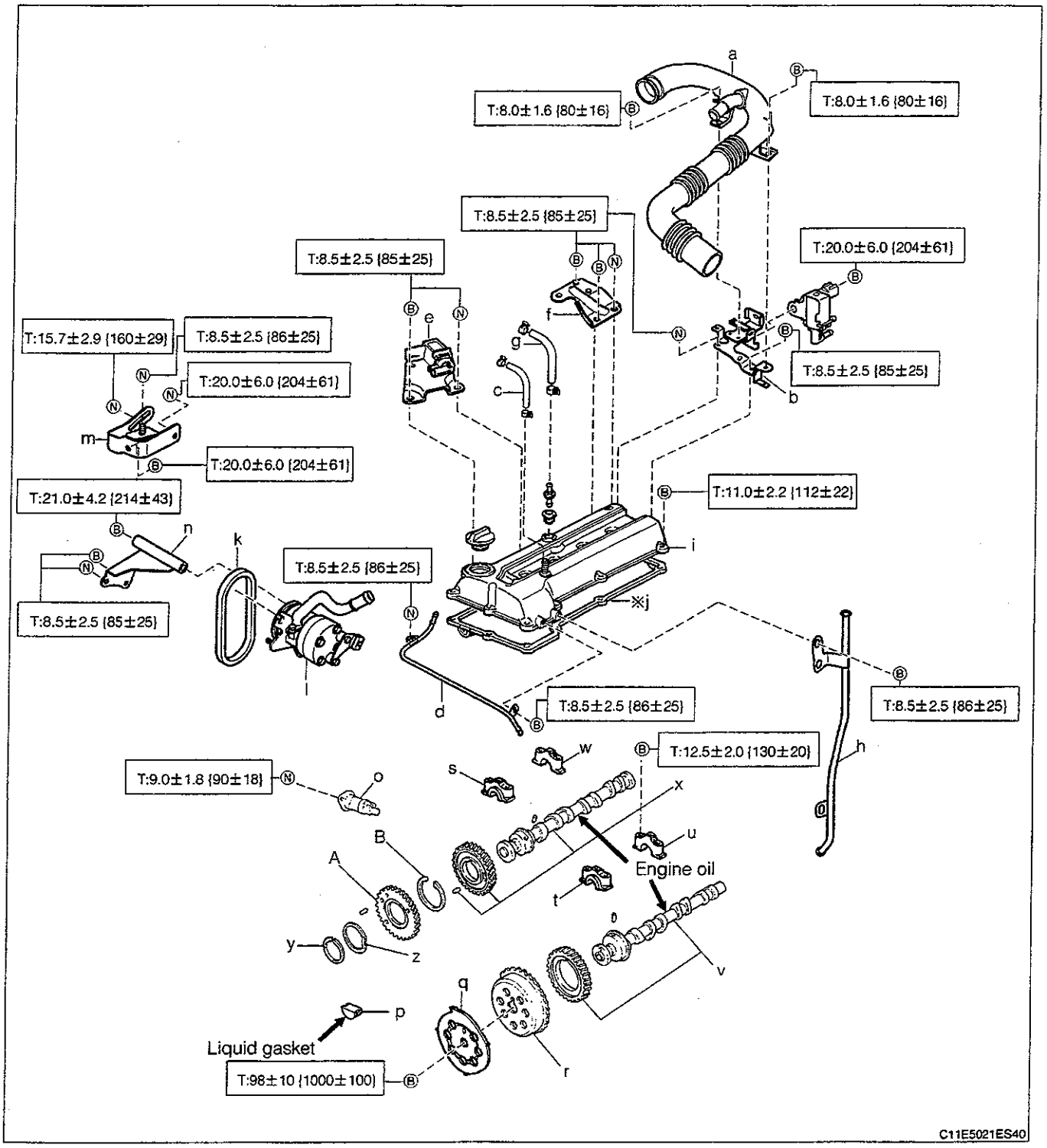
Bolt (Size: M5, Pitch: 0.8 mm),Engine oil

2-1-2 OPERATION BEFORE REMOVAL

1.Remove the ignition coil
Refer to Page B10-1.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※Non-reusable parts

Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

	1	a	Pipe, intake No.1
▼ ▲	2	b	Bracket, vacuum switching valve (purge VSV)
	3	c	Hose, ventilation (head front side)
	4	d	Pipe S/A air
▼ ▲	5	e	Bracket, vacuum switching valve (boost control VSV)
	6	f	Stay, surge tank No.1
	7	g	Hose, ventilation (head – intake manifold)
	8	h	Guide S/A, oil level gage
▲	9	i	Cover, cylinder head
	10	j	Gasket, cylinder head cover
▲	11	k	Belt, V ribbed (vane pump)
▼ ▲	12	l	Vane pump AY
	13	m	Stay, manifold No.2
	14	n	Bracket, pump lower
▼ ▲	15	o	Plunger, chain tensioner
▼ ▲	16	p	Plug, semi-circular
	17	q	Rotor, signal
▼ ▲	18	r	Sprocket, camshaft timing
▼	19	s	Cap, camshaft bearing, No.1
▼	20	t	Cap, camshaft bearing, No.2
▼ ▲	21	u	Cap, camshaft bearing, No.3 (exhaust side)
▼ ▲	22	v	Camshaft, No.2
▼ ▲	23	w	Cap, camshaft bearing, No.3 (intake side)
▼ ▲	24	x	Camshaft, No.1
	25	y	Ring, shaft snap
	26	z	Washer, wave
▼ ▲	27	A	Gear S/A, camshaft sub
	28	B	Spring, camshaft gear

2-1-4 POINTS OF REMOVAL

(1) Vacuum switching valve bracket (purge VSV)

1.Remove the purge VSV vacuum hose, and then remove the purge VSV together with the vacuum switching valve bracket.

(2) Vacuum switching valve bracket (boost control VSV)

1.Remove the boost control VSV hose, and then remove the boost control VSV together with the vacuum switching valve bracket.

(3) Vane pump Ay

1.Remove the vane pump Ay mounting bolts, and then remove the manifold stay No.2 mounting nuts and bolts.

2.Remove the vane pump Ay together with the manifold stay No.2. Give clearance to the vane pump Ay rearward of the vehicle.

CAUTION

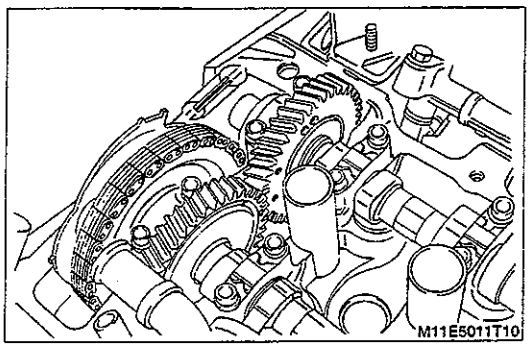
- **Do not remove the vane pump Ay oil piping.**

(4) Chain tensioner plunger

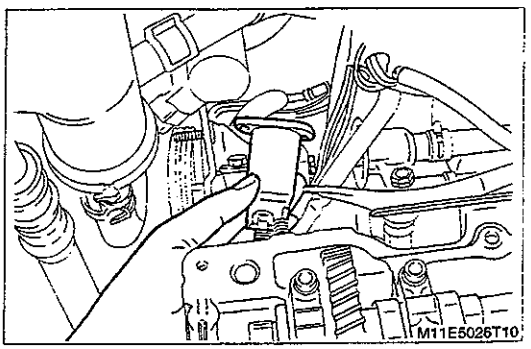
1.Align the mating marks on the lower side of the timing gear, as shown in the right figure, and position the cylinder No.1 to the compression top dead center (TDC).

CAUTION

- **When turning the camshaft, place the tool on the crankshaft pulley and turn the camshaft in the regular rotative direction.**

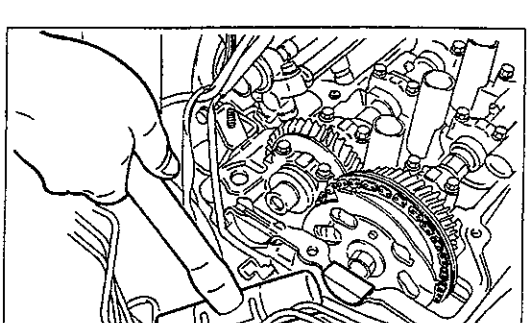


2.Give clearance to the vane pump rearward of the vehicle and remove the chain tensioner plunger.



(5) Semicircular plug

1.Use a plastic hammer to remove the semicircular plug.



(6) Camshaft timing sprocket

1.Insert the cross bar into the signal rotor hole so that no load may be applied to the timing chain and turning may be prevented. Then remove the bolts.

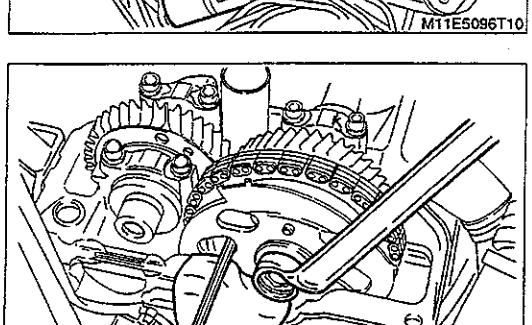
CAUTION

- Place a rag or the like between the cross bar and the cylinder head to avoid damage.

2.Remove the camshaft timing sprocket together with the signal rotor.

CAUTION

- Leave the timing chain on the sprocket and slide to the engine front side.

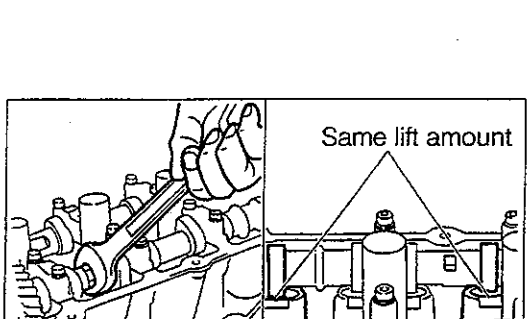


(7) Camshaft bearing cap No.1, No.2

1.After turning the crankshaft approx. 90° from the compression top dead center (TDC) of the cylinder No.1 toward the engine rotational direction, place a spanner on the hexagon portion of the exhaust camshaft. Turn the camshaft counterclockwise by ensuring that the cam noses of the cylinders No.2 and No.4 face downward and depress the lifter by the identical amount.

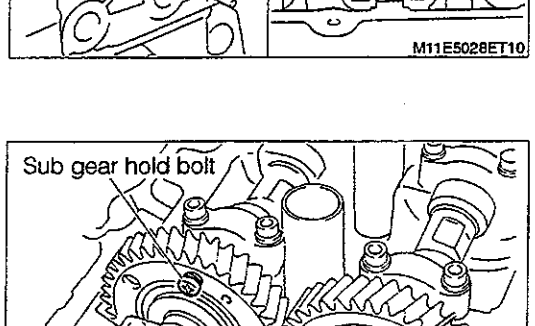
2.Remove the camshaft bearing cap No.1 and the camshaft bearing cap No.2.

TOOL: Hexagon wrench (Width across flats : 5mm)

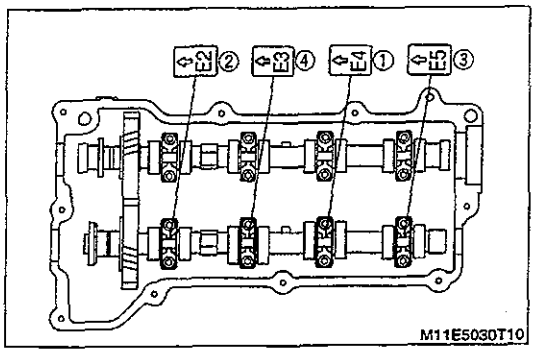


(8) Camshaft bearing cap No. 3 (exhaust side)

1.With a bolt, fix the sub-gear of the camshaft No.1 side on the driven gear.
(bolt size: outer diameter 5mm, pitch: 0.8mm)



2.Remove the camshaft bearing cap No.3 (4 pcs) on the exhaust side that secure the camshaft No.2 in the sequence shown in the right figure.
TOOL: Hexagon wrench (Width across flats : 5mm)

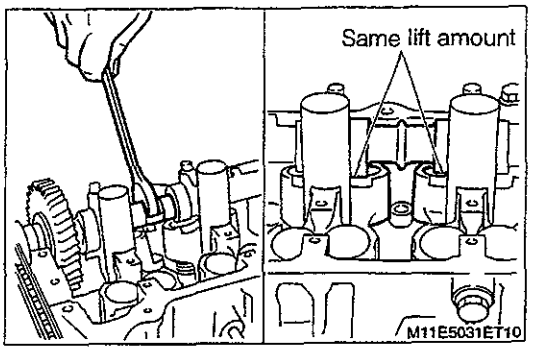


(9) Camshaft No.2 (exhaust side)

1.Remove the camshaft No.2 by lifting the gear side.

(10) Camshaft bearing cap No.3 (intake side)

1.Place a spanner on the hexagon portion of the camshaft No.1. Turn the camshaft No.1 counterclockwise by ensuring that the cam noses of the cylinders No.3 and No.4 of the camshaft No.1 face downward and depress the lifter by the identical amount.

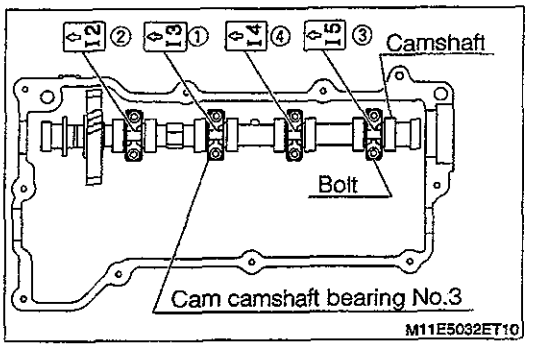


2.Remove the camshaft bearing cap No.3 (4 pcs) on the intake side that secure the camshaft No.1 in the sequence shown in the right figure.

CAUTION

- **After the camshaft is removed, leave the timing chain on the camshaft timing sprocket.**
- **If the timing chain drops into the oil pump, the cylinder head and the oil pump must be removed.**

TOOL: Hexagon wrench (Width across flats : 5mm)



(11) Camshaft No.1 (intake side)

1.Remove the camshaft No.1 by lifting the gear side first.

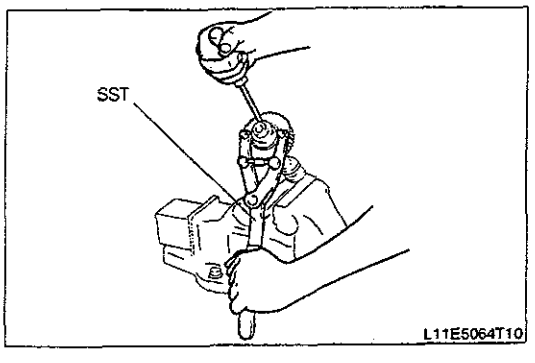
(12) Camshaft sub-gear S/A

1.Secure the hexagonal section of the No.1 camshaft to a vice with protective metal sheets interposed.

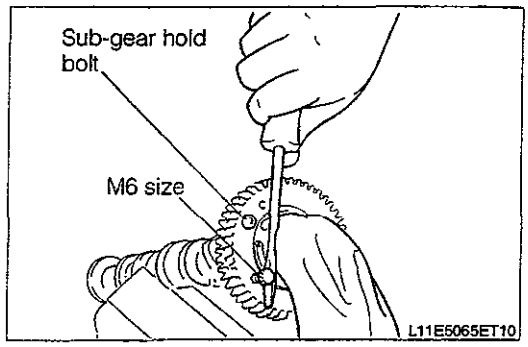
CAUTION

- **Be very careful not to damage the cam section.**

2.Remove the camshaft sub-gear fixing bolt.
(1) Set the SST on two holes of ϕ 6 of the camshaft sub-gear S/A to hold the sub-gear.
SST: 09504-87501-000



(2) When the SST is not used, put a bolt (M6) at the position shown at the right figure of the camshaft sub-gear assembly. Then, hold the sub-gear by inserting a screwdriver or the like between the bolt and the camshaft journal.



CAUTION

- **Be very careful not to scratch the cam journal by applying a cloth or the like.**

(3) Remove the bolt securing the sub-gear, while keeping the sub-gear teeth in mesh with the driven gear teeth.

3.Use snap ring pliers to remove the shaft snap ring, the wave washer, camshaft sub-gear S/A and the camshaft gear spring.

2-1-5 POINTS OF INSTALLATION

CAUTION

- Before assembling the camshaft, turn the crankshaft approx. 90° from the compression top dead center (TDC) of the cylinder No.1 toward the engine rotational direction in order to avoid the interference between the valve and the piston that have been lifted.

(1) Camshaft sub-sear S/A

1.Secure the hexagonal section of the No.1 camshaft to a vice with protective metal sheets interposed.

CAUTION

- Be very careful not to damage the cam section.

2.Set the camshaft gear spring, camshaft sub-gear S/A, and wave washer onto the camshaft driven gear.

CAUTION

- As for the sub-gear, face the side where the stopper pin of the spring protrudes to the driven gear side.

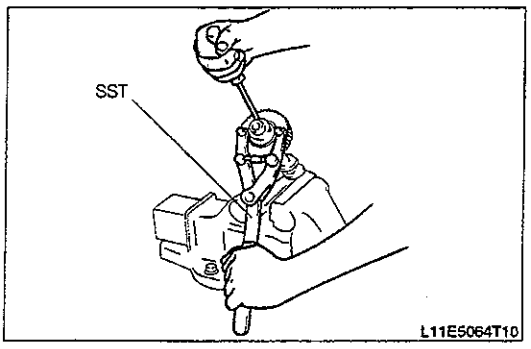
3.Using snap ring pliers, install the shaft snap ring.

TOOL: Snap ring pliers

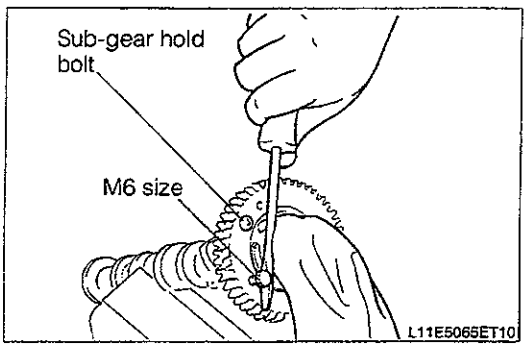
4.Install the camshaft sub-gear fixing bolt.

(1) Set the SST on the two ϕ6 holes of the camshaft sub-gear S/A. Turn the sub-gear clockwise until the auxiliary hole for mounting the sub-gear matches that of the camshaft driven gear to ensure the gear tooth top matches.

SST: 09504-87501-000



(2) If no SST is used, insert the M6 bolts into the camshaft sub-gear S/A at positions shown in the right figure. Insert a screwdriver in between the bolt and the camshaft journal and turn the sub-gear clockwise until the auxiliary hole for mounting the sub-gear matches that of the camshaft driven gear to ensure the gear tooth top matches.



CAUTION

- Be very careful not to scratch the cam journal by applying a cloth or the like.

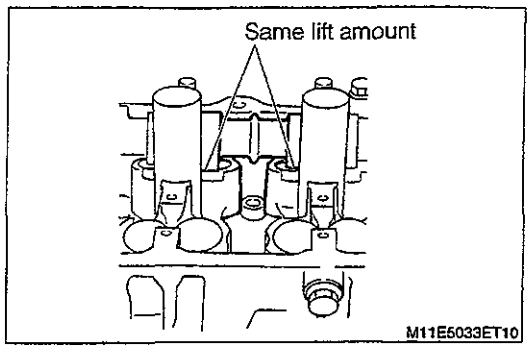
(3) Install the bolt (size: M5, pitch: 0.8 mm) for securing the sub-gear to the auxiliary hole above. (If no SST is used, remove the M6 bolt.)

(2) Camshaft No.1 (intake side)

1.Apply engine oil on the cam of the camshaft, gear tooth surface and the journal portion of the cylinder head.

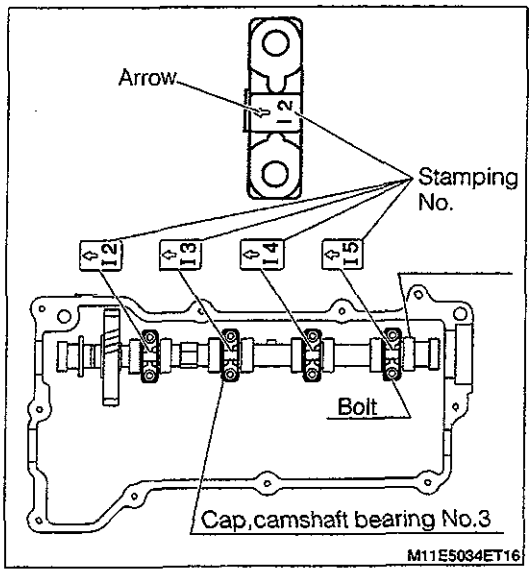
LUBRICANT: Engine oil

2.As shown in the right figure, set on the cylinder head by ensuring that the cam noses of the cylinder No.3 and No.4 of the camshaft No.1 face downward and depress the lifter by the identical amount.

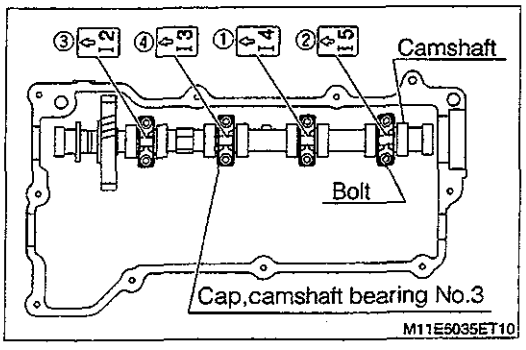


(3) Camshaft bearing cap No.3 (intake side)

1.Set the camshaft bearing cap No.3 (4 pcs) on the camshaft No.1 side (intake side).
Ensure that the stamping No. is at the position shown at the right figure so that the cap arrow faces the engine front.



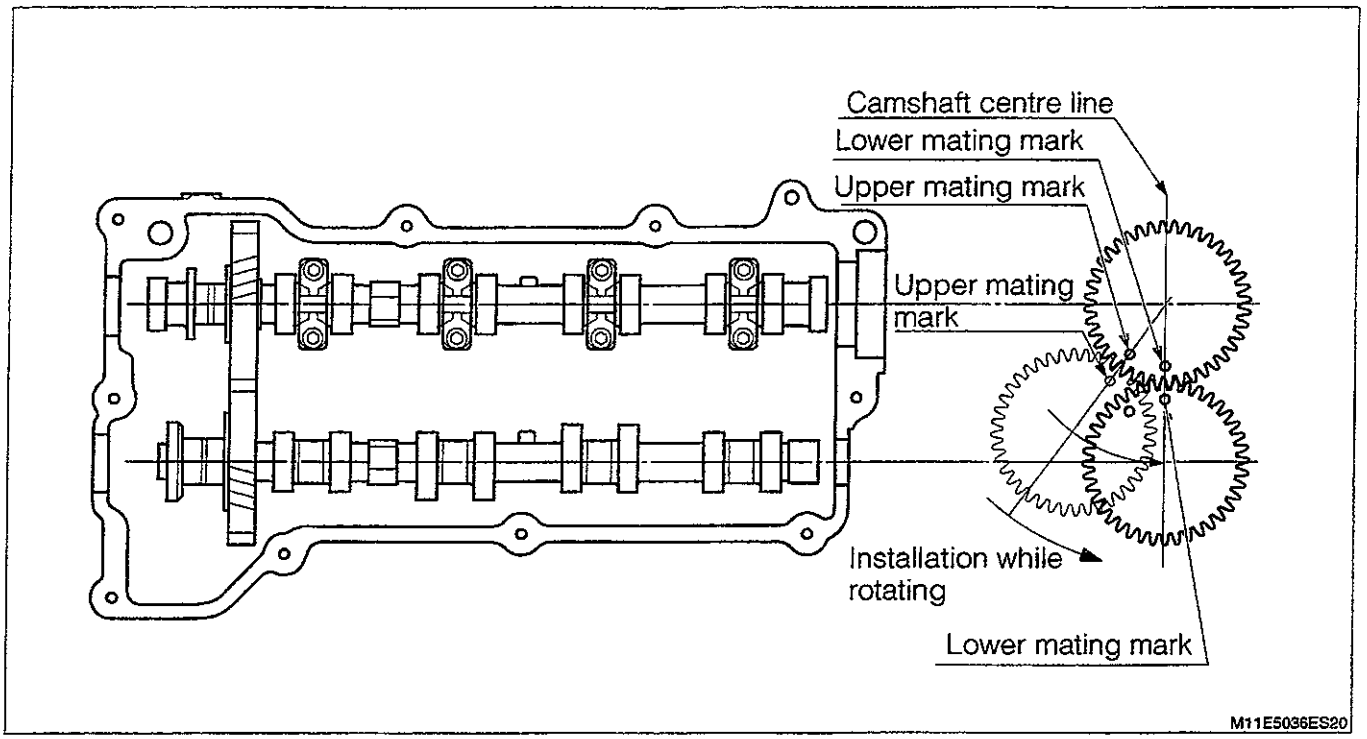
2.Tighten the camshaft bearing cap No.3 in the sequence shown in the right figure.
TOOL: Hexagon wrench (Width across flats : 5mm)



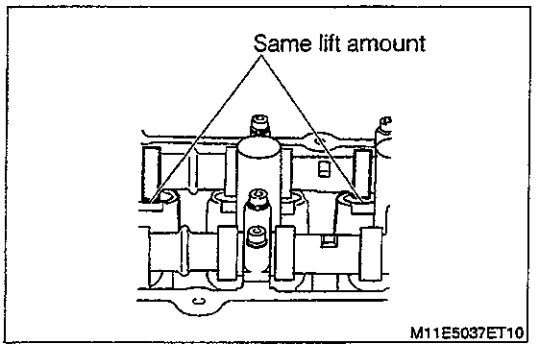
(4) Camshaft No.2 (exhaust side)

1.Apply engine oil on the cam of the camshaft, gear tooth surface and journal portion of the cylinder head.

LUBRICANT: Engine oil

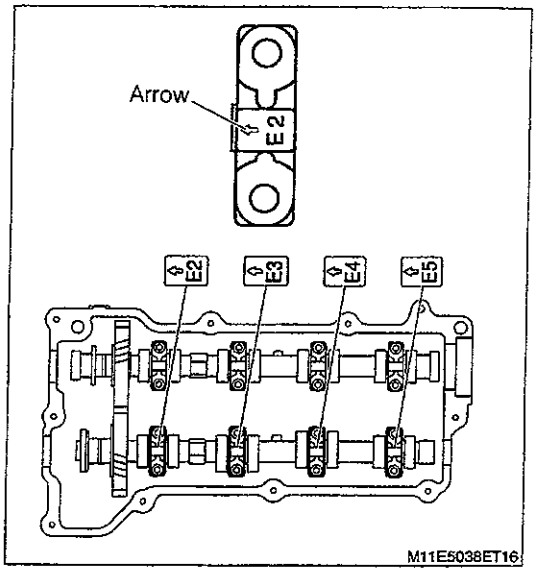


2.As shown in the right figure, set on the cylinder head by ensuring the cam noses of the cylinder No.3 and No.4 of the camshaft No.2 face downward and depress the lifter by the identical amount.



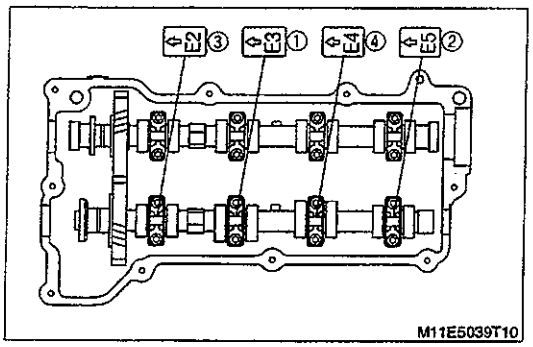
(5) Camshaft bearing cap No.3 (exhaust side)

1.Set the camshaft bearing cap No.3 (4 pcs) on the camshaft No.2 side (exhaust side). Ensure that the stamping No. is in the illustrated position so that the cap arrow faces the engine front.

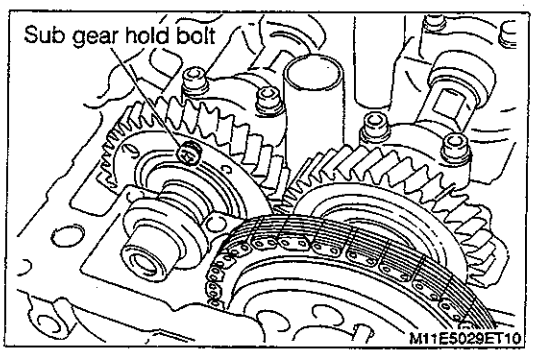


2.Tighten the camshaft bearing cap No.3 in the sequence shown in the right figure.

TOOL: Hexagon wrench (Width across flats : 5mm)



3.Remove the sub-gear fixing bolt.



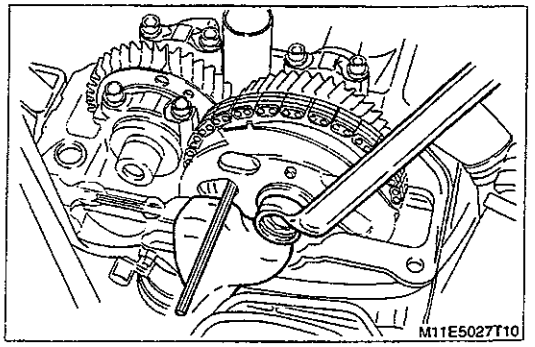
(6) Camshaft timing sprocket

1.Install the camshaft timing sprocket together with the signal rotor to the camshaft No.2.

2.Insert the cross bar into the signal rotor hole so that no load may be applied to the timing chain and turning may be prevented. Then remove the bolts.

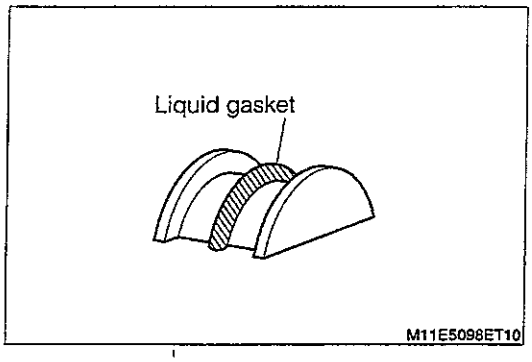
CAUTION

- Place a rag or the like between the cross bar and the cylinder head to avoid damage.



(7) Semicircular plug

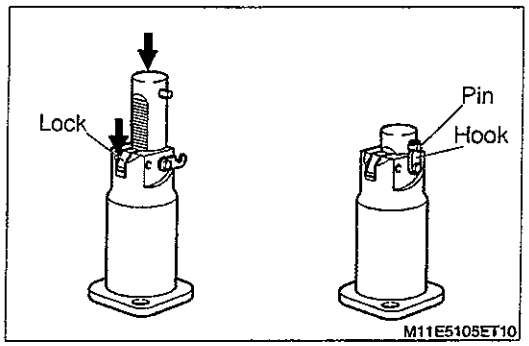
1.Apply liquid gasket approx. ϕ4-5mm in the central part of the semicircular plug and install to the arch area of the upper head.
ADHESIVE: Three Bond1207H



(8) Chain tensioner plunger

1.Depress the lock and lower the plunger as shown in the right figure, and engage a hook on the plunger pin.
2.Shift the vane pump rearward of the vehicle and install to the cylinder head through the new gasket with the arrow stamped on the plunger facing upside.

CAUTION
- Use a new gasket.



(9) Vane pump AY

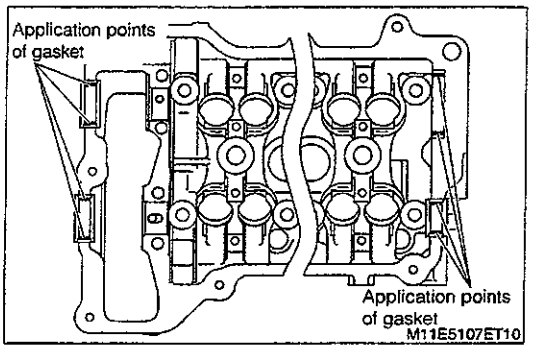
1.Install the vane pump together with the manifold stay No.2.

(10) V ribbed belt (vane pump)

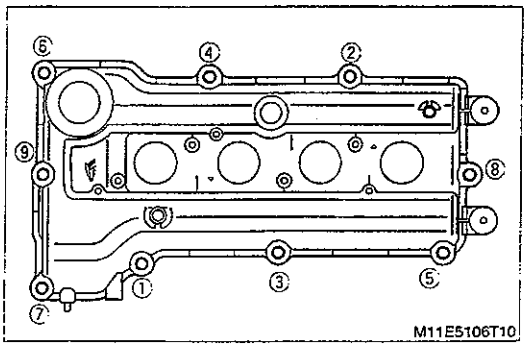
1.Install the V ribbed belt and adjust tension.
<RefCode=C114>

(11) CYLINDER HEAD COVER

1.Install the new cylinder head cover gasket to the cylinder head cover.
2.Apply liquid gasket on the cylinder head in the area shown in the right figure.
ADHESIVE: Three Bond1207H



3.Tighten the cylinder head cover mounting bolts in stages in the sequence shown in the right figure within 5 minutes after liquid gasket application.



TO INDEX

B3 INTAKE SYSTEM

JB ---------- B3 - 1
AIR CLEANER ELEMENT ---------- B3 - 1
REPLACEMENT ---------- B3 - 1
AIR CLEANER ---------- B3 - 2
REMOVAL AND INSTALLATION -------- B3 - 2
THROTTLE BODY ---------- B3 - 3
REMOVAL AND INSTALLATION -------- B3 - 3
INTAKE MANIFOLD GASKET ---------- B3 - 5
REMOVAL AND INSTALLATION -------- B3 - 5
TURBOCHARGER ---------- B3 - 8
REMOVAL AND INSTALLATION -------- B3 - 8
INTERCOOLER ---------- B3 - 12
REMOVAL AND INSTALLATION ------ B3 - 12
BOOST PRESSURE CONTROL SYSTEM ---------- B3 - 14
SYSTEM DRAWING ---------- B3 - 14
FUNCTION CHECK ---------- B3 - 15
UNIT CHECK ---------- B3 - 15
AIR BYPASS VALVE CONTROL SYSTEM ---------- B3 - 16
SYSTEM DRAWING ---------- B3 - 16
FUNCTION CHECK ---------- B3 - 16
UNIT CHECK ---------- B3 - 16

JB
1 AIR CLEANER ELEMENT
1-1 REPLACEMENT
1-1-1 REPLACEMENT PROCEDURE

1.Remove the air cleaner cap clips at two locations.
2.Remove the intake air temperature sensor coupler.
3.Remove the air cleaner cap and air cleaner hose No.2 clips.
4.Remove the air cleaner cap and replace the element.
5.Install the air cleaner cap.
6.Install the air cleaner hose No.2 and lock the clips.
7.Install the intake temperature sensor coupler.
8.Install the air cleaner cap clips at two locations.

2 AIR CLEANER

2-1 REMOVAL AND INSTALLATION

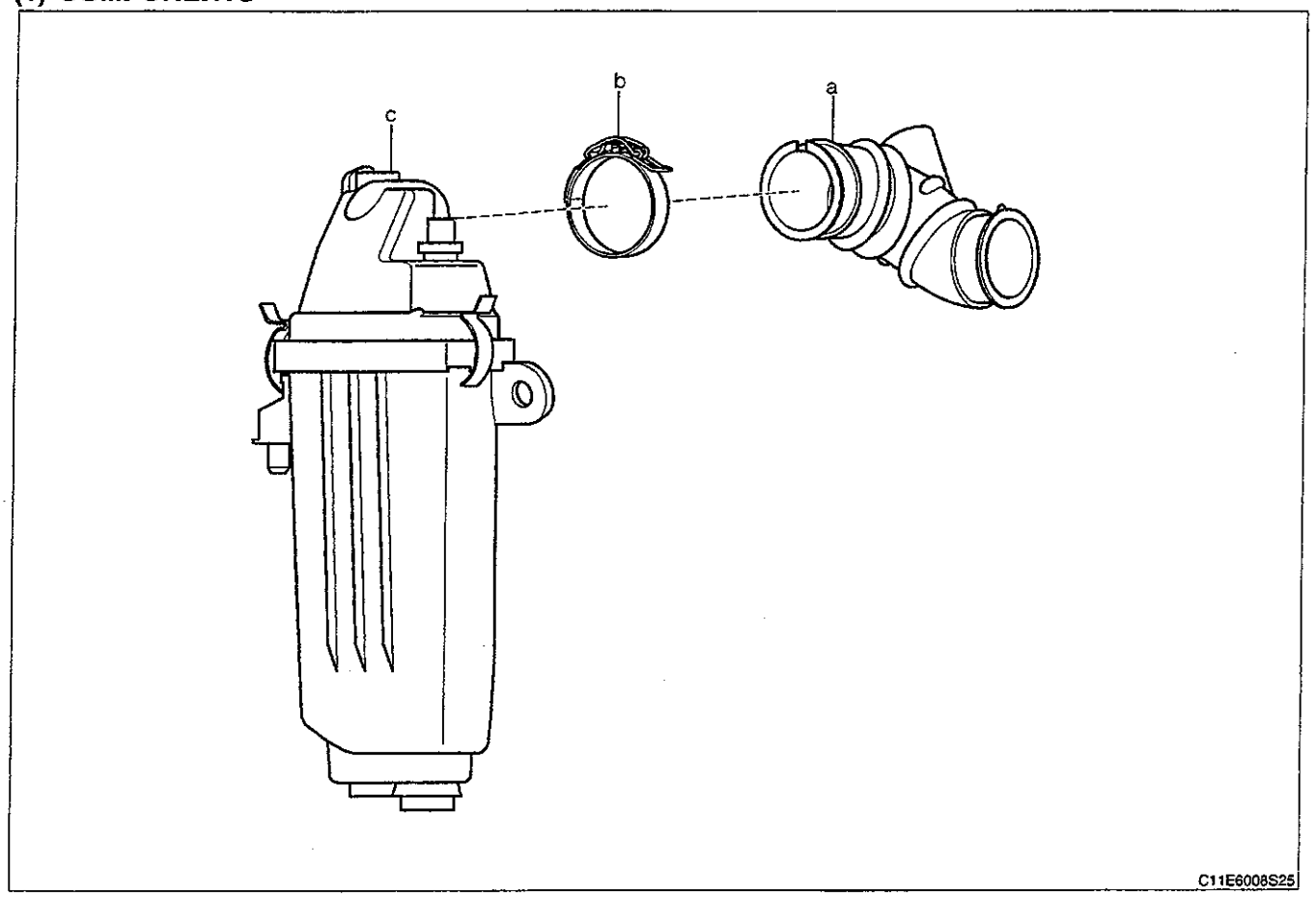
2-1-1 OPERATION BEFORE REMOVAL

1.Remove the front bumper.
Refer to Page I2-2.

2.Remove the front cross member.
Refer to Page I1-25.

2-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Air cleaner hose No.2
2 b Clip
3 c Air cleaner AY W/element

2-1-3 OPERATION AFTER INSTALLATION

1.Install the front cross member.
Refer to Page I1-25.

2.Install the front bumper.
Refer to Page I2-2.

3 THROTTLE BODY

3-1 REMOVAL AND INSTALLATION

WARNING

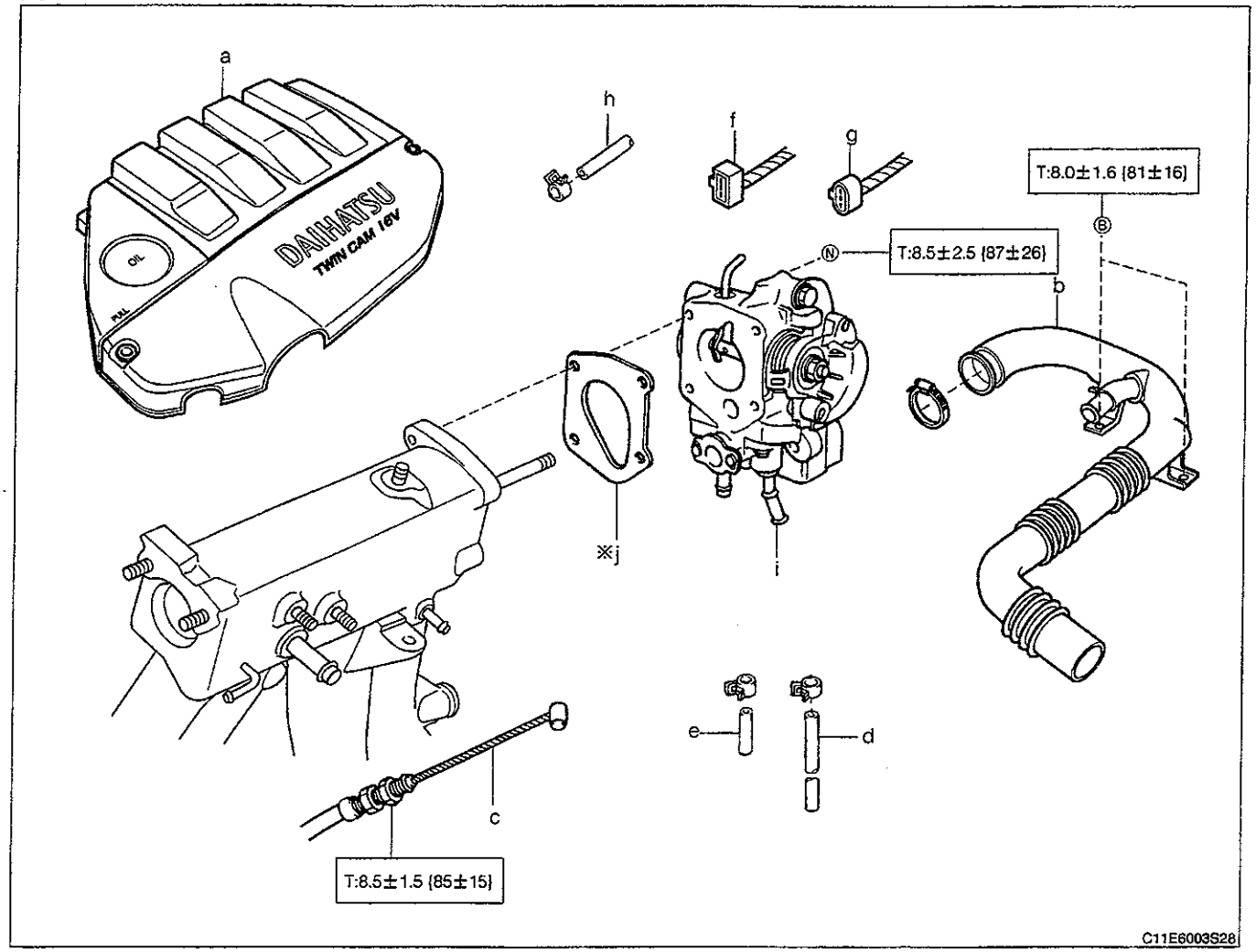
- Never disassemble the water hose while the coolant is hot, for there is a risk of burn.

3-1-1 ARTICLES TO BE PREPARED

Torque wrench

3-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non - reusable parts

Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Cover S/A, engine upper
2 b Pipe, intake No.1
▼ ▲ 3 c Cable Ay, accelerator control
4 d Hose, water
5 e Hose, water
6 f Connector (throttle sensor)
7 g Connector (ISC valve)
8 h Hose, purge
9 i Body Ay, throttle
10 j Gasket

3-1-3 POINTS OF REMOVAL

(1) ACCELERATOR CONTROL CABLE AY

1.Loosen the bracket nut to remove on the throttle body side.

CAUTION

- Be careful not to have the cable get curly when removing it.

3-1-4 INSPECTION

(1) THROTTLE BODY

1.No excessive play should exist in the throttle shaft.
2.No clogging should exist in each port.
3.Opening/closing motion of the throttle valve shall be smooth.
4.No clearance should exist between the stop screw and the lever at the throttle valve full close position.

3-1-5 POINTS OF INSTALLATION

(1) ACCELERATOR CONTROL CABLE AY

1.Install the accelerator control cable assembly to the throttle body. After adjusting the accelerator pedal free play, tighten the nut to the specified torque.
SPECIFIED VALUE: 1—5mm (accelerator pedal free play)

4 INTAKE MANIFOLD GASKET

4-1 REMOVAL AND INSTALLATION

WARNING

- Never disassemble any water hose while the engine is hot, for there is a risk of burn
- Never use fire during the work.
- Wear safety goggles during the cleaning so as to protect your eyes.

4-1-1 ARTICLES TO BE PREPARED

Torque wrench

4-1-2 OPERATION BEFORE REMOVAL

1.Remove the fuel pressure.
Refer to Page B7-1.

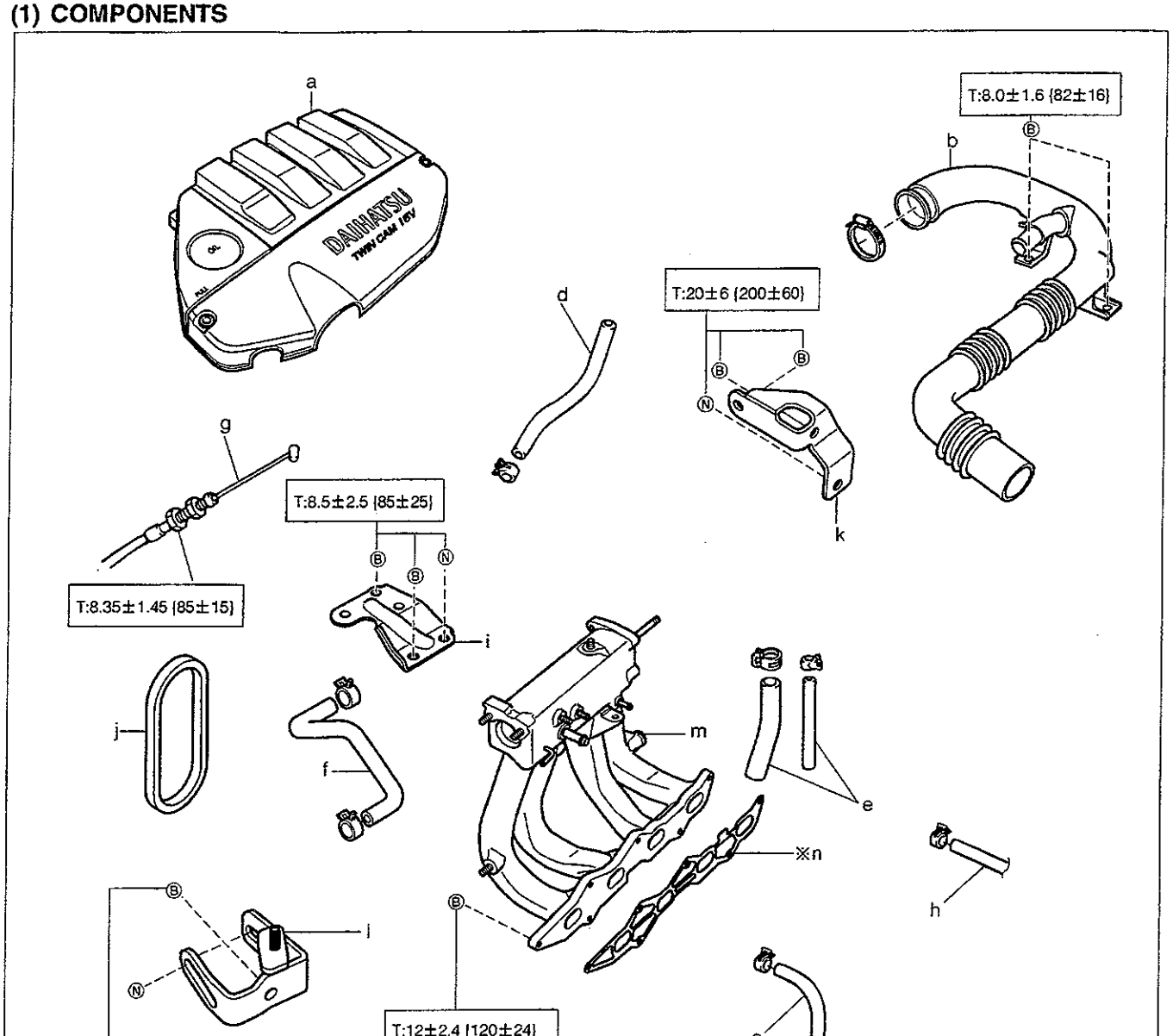
2.Remove the battery ⊖ terminal.

CAUTION

- When the battery negative ⊖ terminal is disconnected, it should be noted that diagnosis results and memories of the radio are erased simultaneously.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non - reusable parts

Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

	1	a	Cover S/A, engine upper
	2	b	Pipe, intake No.1
	3	c	Hose, ventilation
	4	d	Hose, fuel (main)
	5	e	Hose, water
	6	f	Hose, booster vacuum
▼ ▲	7	g	Cable Ay, accelerator control
▲	8	h	Hose, vacuum (to ABV)
	9	i	Stay, surge tank No.1
▲	10	j	Belt, V (vane pump)
	11	k	Stay, intake manifold No.1
	12	l	Stay, intake manifold No.2
▲	13	m	Manifold Ay, intake
	14	n	Gasket, intake manifold

4-1-4 POINTS OF REMOVAL

(1) Cable Ay, accelerator control

1.Loosen the bracket nut to remove the bracket on the throttle body side.

4-1-5 POINTS OF INSTALLATION

(1) Intake manifold

1.Install the intake manifold Ay. Tighten the three lower bolts to the specified torque, and then tighten the three upper bolts to the specified torque.

(2) Belt, V (vane pump)

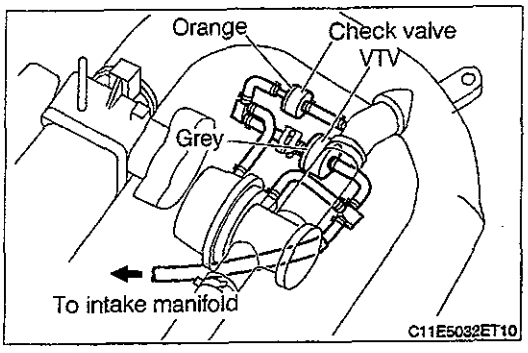
1.Install the V belt (vane pump) and adjust the tension.
Refer to Page G2-36.

(3) Vacuum house (to ABV)

1.Install the vacuum hose which leads to the ABV.

NOTE

•• Each hose shall be assembled as shown in the right figure.



(4) Cable Ay, accelerator control

1.Install the accelerator control cable to the throttle body. After adjusting the accelerator pedal free play, tighten the nut to the specified torque.
SPECIFIED VALUE: 1—5mm (accelerator pedal free play)

4-1-6 OPERATION AFTER INSTALLATION

1.Install the battery ⊖ terminal.
2.Refill the coolant.

5 TURBOCHARGER

5-1 REMOVAL AND INSTALLATION

WARNING

- Never open the water hose and drain plug while the engine is hot, for there is a risk of burn.
- Never perform the operation while the engine is hot, for there is a risk of burn.
- Wear safety goggles during the cleaning so as to protect your eyes.

5-1-1 ARTICLES TO BE PREPARED

Torque wrench

5-1-2 OPERATION BEFORE REMOVAL

1.Remove the battery ⊖ terminal.

CAUTION

- When the battery negative ⊖ terminal is disconnected, it should be noted that diagnosis results and memories of the radio are erased simultaneously.

2.Remove the air cleaner.
Refer to Page B3-2.

3.Remove the radiator.
Refer to Page B6-6.

4.Remove the intercooler.
Refer to Page B3-12.

5.Remove the head lamp.
Refer to Page J1-7.

6.Remove the front fender.
Refer to Page I1-23.

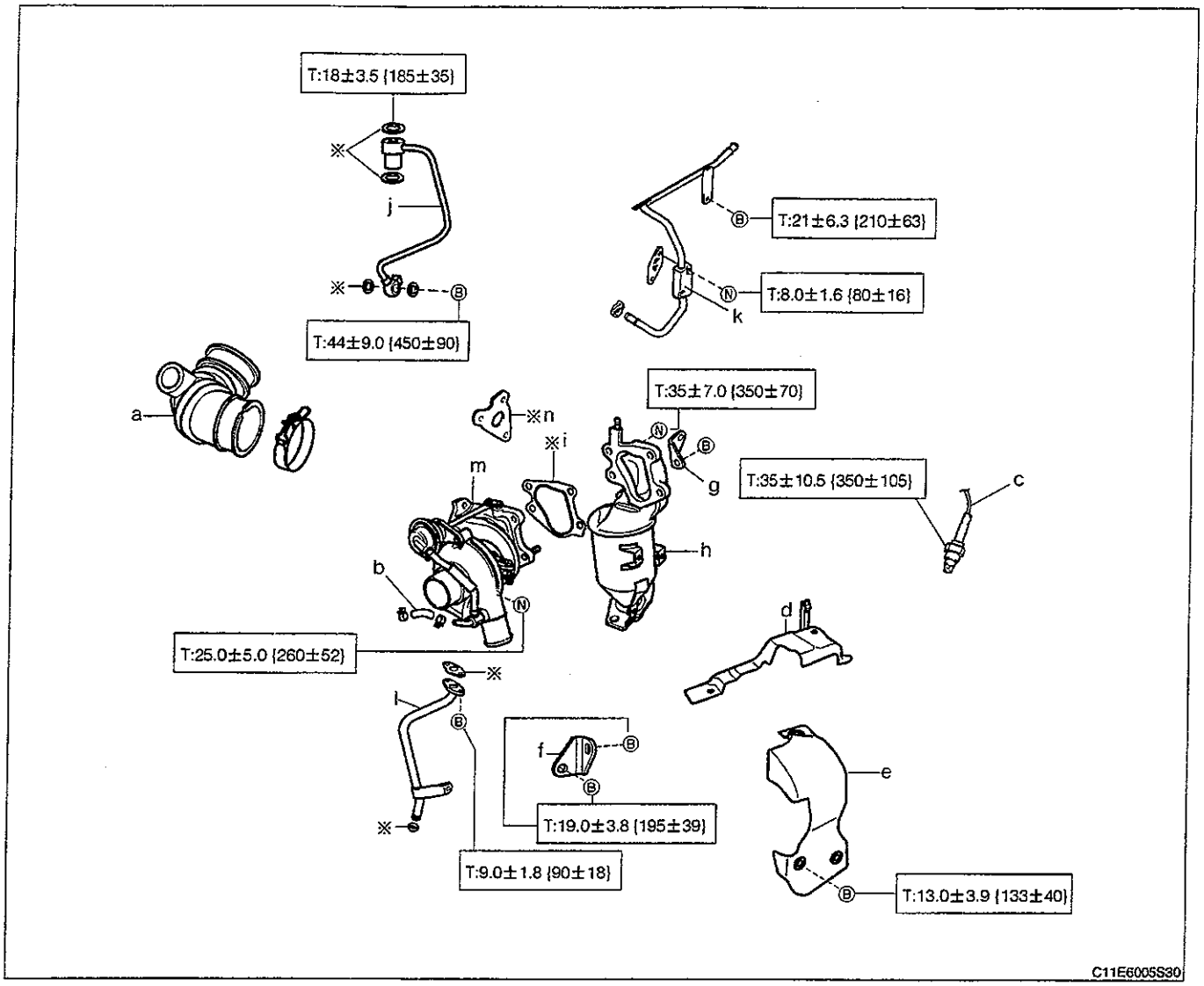
7.Remove the hood lock striker.
8.Remove the cowl wire clamp which goes to the headlamp, which is installed on the radiator support.
9.Remove the radiator support mounting bolt and shift forward.
Refer to Page I1-26.

NOTE

- Removal is not necessary, for shifting forward is enough to secure work space.

5-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non - reusable parts

Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

▼	1	a Hose, air cleaner No.2	8	h	Maniverter Ay
▼ ▲	2	b Hose, actuator	9	i	Gasket
	3	c O2 sensor	10	j	Pipe S/A, turbo oil inlet
	4	d Insulator, exhaust manifold No.1	11	k	Pipe S/A, turbo water
▼ ▲	5	e Insulator, exhaust manifold No.2	12	l	Pipe S/A, turbo oil outlet
	6	f Stay, exhaust manifold	▲ 13	m	Turbocharger
	7	g Stay, exhaust manifold	14	n	Gasket

5-1-4 POINTS OF REMOVAL

WARNING

- Never perform the operation while the engine is hot, for there is a risk of burn.

(1) Air cleaner hose No.2.

1.Remove the air cleaner hose No.2.

(1) Remove the hose between the air bypass valve and the air cleaner hose No.2 on the air cleaner hose No.2 side.

(2) Remove the air cleaner hose No.2.

CAUTION

- Cover the hole of the turbo with adhesive tape or the like to prevent dirt or dust from entering.

(2) Actuator hose

1.Remove the actuator hose between the boost control VSV (pipe S/A, air) and the turbocharger.

(3) Exhaust manifold insulator No.2

1.Remove the exhaust manifold insulator No.2.

(1) Shift the radiator support forward to make path between the engine and the radiator support to remove the insulator.

CAUTION

- Use care not to apply load to the air conditioner pipe when shifting the radiator support.

(2) Remove the exhaust manifold insulator No.2 through the clearance.

5-1-5 POINTS OF INSTALLATION

(1) Turbocharger

1.Install the turbocharger Ay.

(1) Install the pipe S/A, turbo oil outlet and the turbocharger with the gasket interposed.

(2) Install the turbocharger Ay to the exhaust manifold to the specified torque with the new gasket interposed.

CAUTION

- After replacing the turbocharger, pour a small amount of the engine oil through the turbo oil inlet to prevent seizure of the turbocharger.

(2) Exhaust manifold insulator No.2

1.Shift the radiator support forward to make path between the engine and the radiator support to install the insulator.

2.Install the exhaust manifold insulator No.2 through the clearance.

(3) Actuator hose

1.Install the actuator hose between the boost control VSV and the turbocharger.

5-1-6 OPERATION AFTER INSTALLATION

1.Install the radiator support.
Refer to Page I1-26.

2.Install the clamp of the cowl wire which goes to the headlamp, which is installed on the radiator support.
3.Install the hood lock striker.
4.Install the front fender.
Refer to Page I1-23.

5.Install the head lamp.
Refer to Page J1-7.

6.Install the intercooler.
Refer to Page B3-12.

7.Install the radiator.
Refer to Page B6-6.

8.Install the air cleaner.
Refer to Page B3-2.

6 INTERCOOLER

6-1 REMOVAL AND INSTALLATION

6-1-1 OPERATION BEFORE REMOVAL

1.Remove the negative terminal ⊖ of the battery.

CAUTION

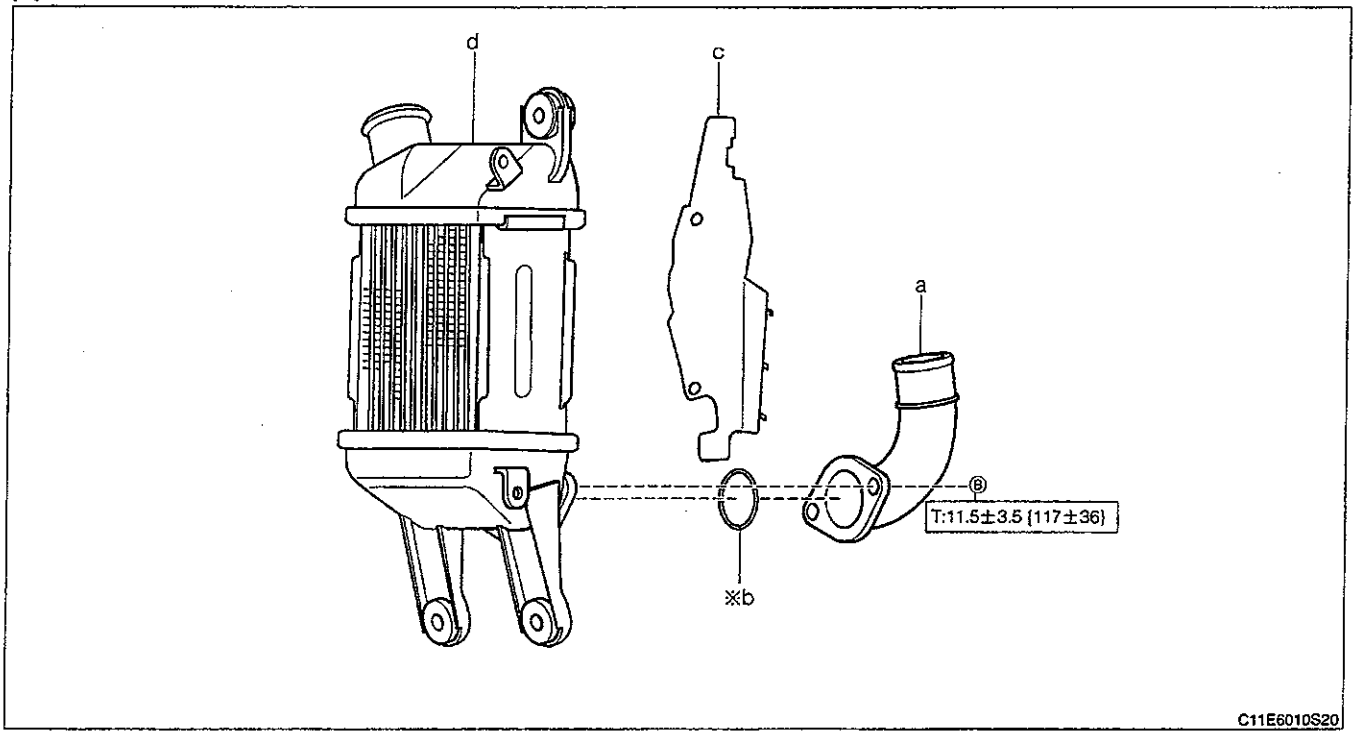
- It must be noted that, when the negative ⊖ terminal of the battery is removed, memories for the diagnosis, radio setting, etc. will be erased at the same time.

2.Remove the front bumper.
Refer to Page I2-2.

3.Remove the front cross member.
Refer to Page I1-25.

6-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non - reusable parts

Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Pipe, air intake No.3
2 b O ring
3 c Guide
▼ ▲ 4 d Intercooler AY

6-1-3 POINTS OF REMOVAL

(1) Intercooler AY

Remove the four condenser mounting bolts of the air conditioner. Lift the condenser, and shift the air conditioner hose forward and remove the intercooler while giving clearance.

6-1-4 POINTS OF INSTALLATION

(1) Intercooler AY

With the condenser lifted, install the intercooler while giving clearance. Reinstall the air conditioner hose to the original position and install the four condenser mounting bolts of the air conditioner.

6-1-5 OPERATION AFTER INSTALLATION

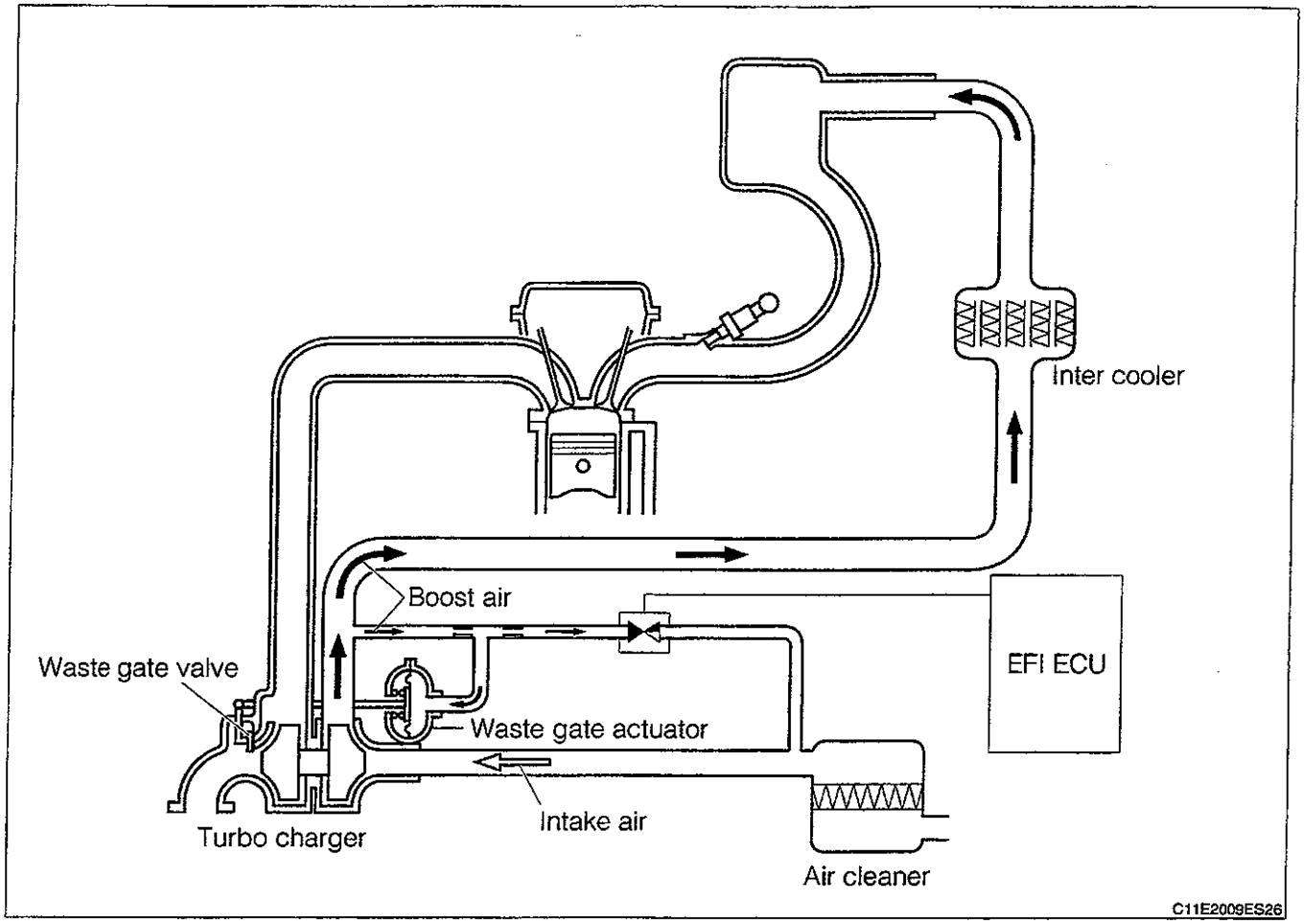
1. Install the cross member.
   Refer to Page I1-25.

2. Install the front bumper.
   Refer to Page I2-2.

3. Install the negative ⊖ terminal of the battery.

7 BOOST PRESSURE CONTROL SYSTEM

7-1 SYSTEM DRAWING



7-2 FUNCTION CHECK

CAUTION

•• With two people in the vehicle, perform a test drive at a place where you can safely accelerate at wide-open throttle in the second gear.

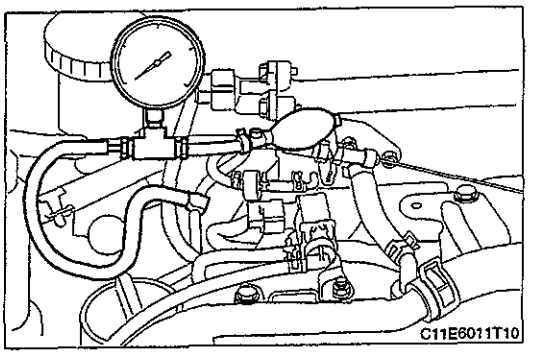
1.Remove the pressure sensor hose. Connect the three-way with the turbocharger pressure gauge, and install the gauge in the passenger compartment.

2.After warming up the engine, accelerate fully in the Ⓓ range until the revolution reaches 5,000 rpm.

3.Check the pressure at 4500rpm.

If out of range, replace the turbocharger Ay.

SPECIFIED VALUE: 89.2−99.0kPa{0.91−1.01kgf/cm²}



CAUTION

•• Do not adjust or disassemble the turbocharger.

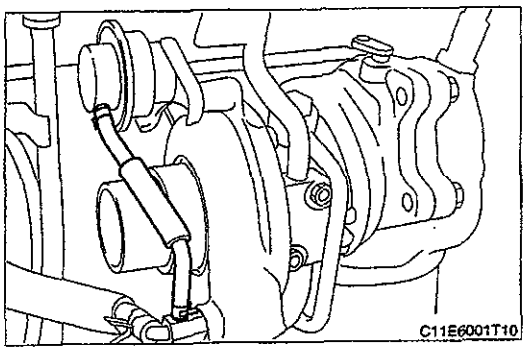
7-3 UNIT CHECK

7-3-1 WAST GATE VALVE OPERATION INSPECTION

1.Remove the waste gate actuator hose on the actuator side.

2.Connect the turbo charger pressure gauge and check if the rod and the link operate properly when a pressure of 101.9kPa is applied and return smoothly when the pressure is released.

3.Check if the hose is free from crack or damage.



CAUTION

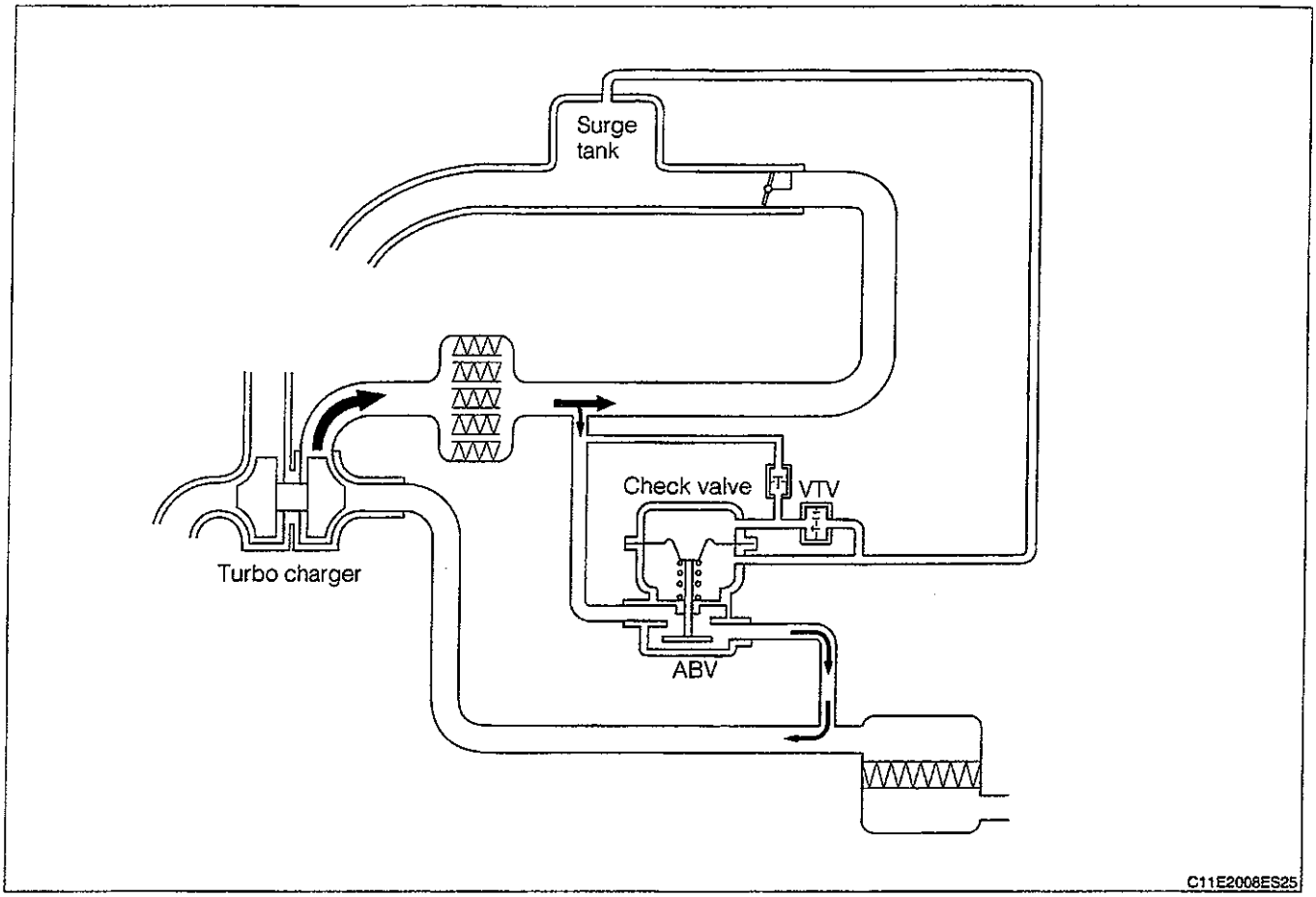
•• Do not apply pressure exceeding 105kPa to the waste gate actuator hose, otherwise damage to the diaphragm may result.

7-3-2 VSV INSPECTION

Refer to Page B8-141.

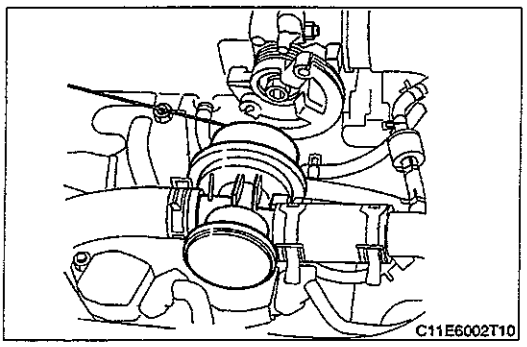
8 AIR BYPASS VALVE CONTROL SYSTEM

8-1 SYSTEM DRAWING



8-2 FUNCTION CHECK

1. Remove the air bypass hose between the ABV and the air cleaner hose on the ABV side.
2. Ensure that no intake air is discharged from the hose while the engine is idling after it has started.
3. Intake air shall be discharged when the vehicle is suddenly accelerated from idle speed, and then suddenly the accelerator pedal is released at the point when the tachometer reads 4000rpm.



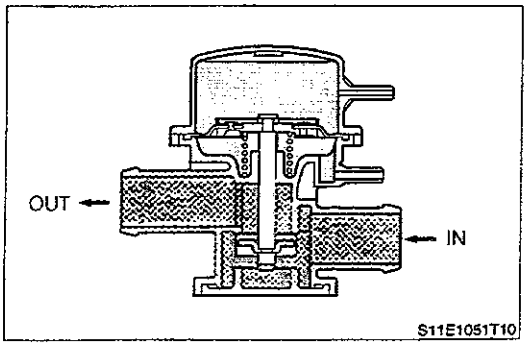
8-3 UNIT CHECK

8-3-1 ABV OPERATION INSPECTION

1. The ABV valve shall open when the negative pressure is applied to the diaphragm chamber (lower side).
   No extreme pressure drop should result when this negative pressure is held under this condition.

NOTE

- Checkout negative pressure 53.3kpa {400mmHg}



TO INDEX

B4 EXHAUST SYSTEM

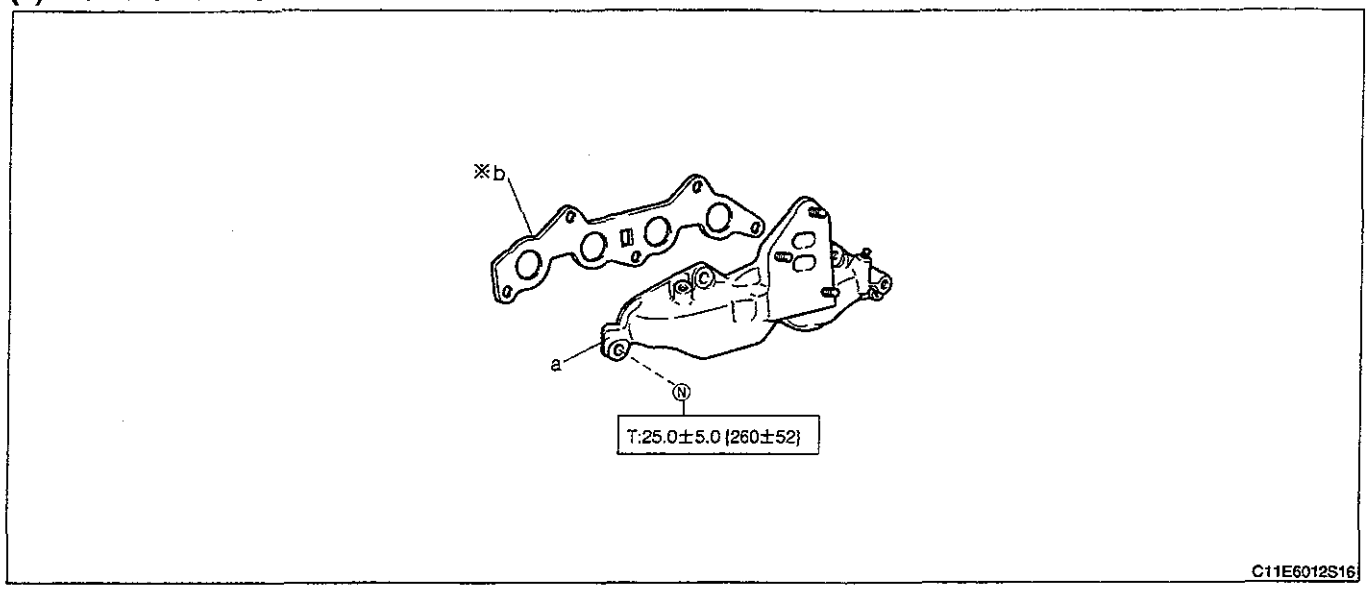
JB---------- B4 - 1
EXHAUST MANIFOLD GASKET---------- B4 - 1
REMOVAL AND INSTALLATION -------- B4 - 1
EXHAUST PIPE ---------- B4 - 2
REMOVAL AND INSTALLATION -------- B4 - 2

JB
1 EXHAUST MANIFOLD GASKET
1-1 REMOVAL AND INSTALLATION
1-1-1 ARTICLES TO BE PREPARED
Instrument

Torque wrench

1-1-2 OPERATION BEFORE REMOVAL
Remove the turbocharger.
Refer to Page B3-8.

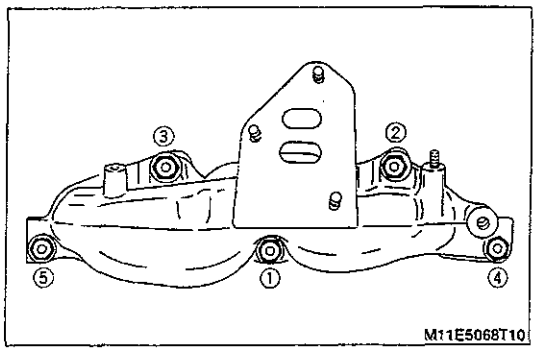
1-1-3 REMOVAL AND INSTALLATION PROCEDURES
(1) COMPONENTS



※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES
▲ 1 a Manifold Ay, exhaust
2 b Gasket, exhaust manifold

1-1-4 POINTS OF INSTALLATION
(1) Exhaust manifold
Attach the exhaust manifold. Temporarily tighten the five nuts in the sequence shown in the figure. Tighten them to the specified torque.



1-1-5 OPERATION AFTER INSTALLATION
Install the turbocharger.
Refer to Page B3-8.

2 EXHAUST PIPE

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

2-1-2 OPERATION BEFORE REMOVAL

Remove the floor brace.

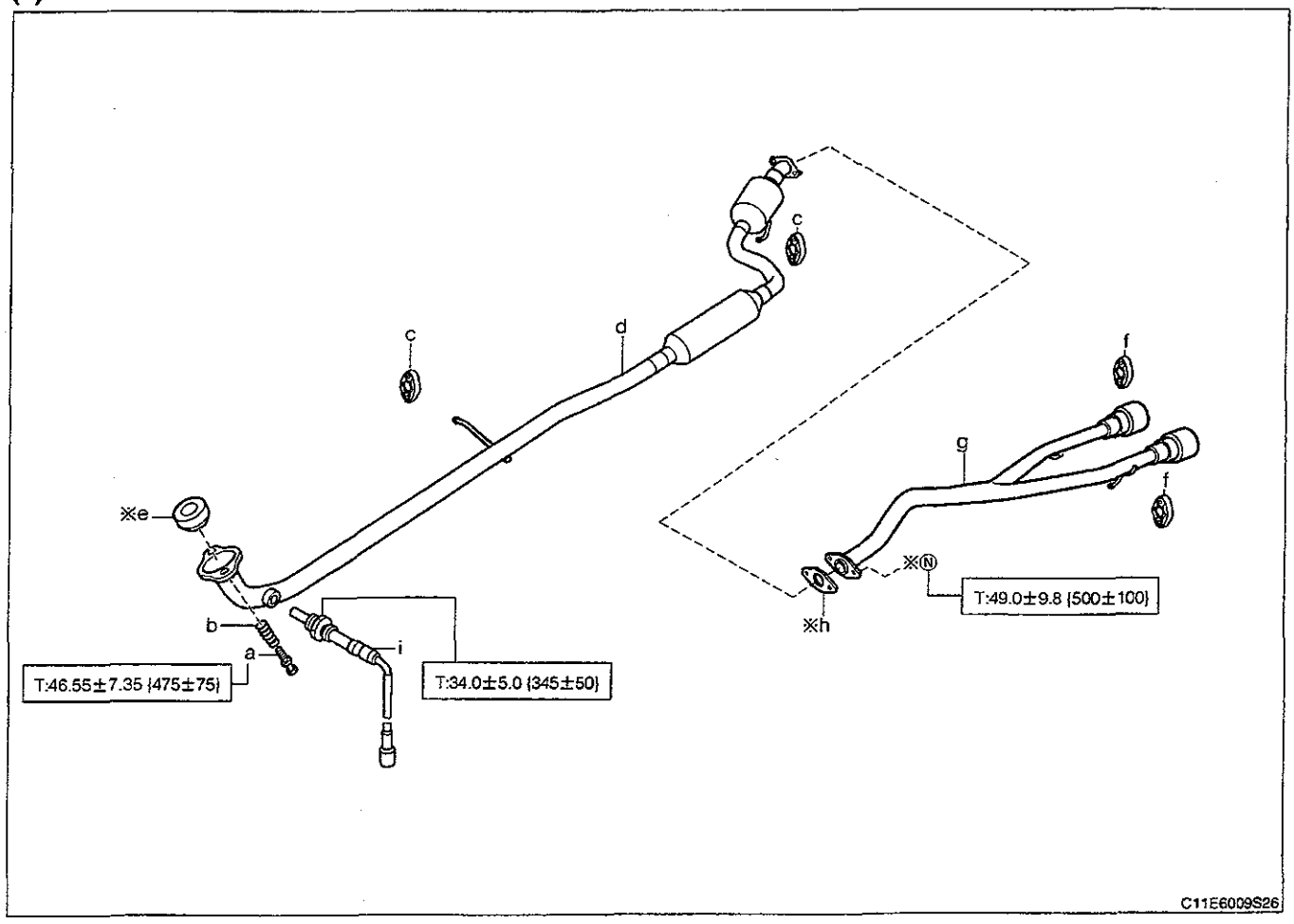
Refer to Page I1-32.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

WARNING

- Do not carry out operations while the exhaust manifold is still hot.

(1) COMPONENTS



※:Non-reusable parts

Unit: N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Bolt, exhaust pipe support
2 b Spring, exhaust manifold
3 c Support muffler No.2
4 d Pipe Ay, exhaust, front
5 e Gasket, exhaust pipe
6 f Support muffler No.2
7 g Pipe Ay, exhaust tail
8 h Gasket
9 i Rear O2 sensor

2-1-4 OPERATION AFTER INSTALLATION

Install the floor brace.

Refer to Page I1-32.

TO INDEX

B5 LUBRICATION SYSTEM

JB---------- B5 - 1
LUBRICATION SYSTEM ---------- B5 - 1
FUNCTION CHECK---------- B5 - 1
ENGINE OIL ---------- B5 - 3
REPLACEMENT---------- B5 - 3
OIL FILTER ---------- B5 - 4
REMOVAL AND INSTALLATION -------- B5 - 4
OIL PUMP---------- B5 - 6
REMOVAL AND INSTALLATION -------- B5 - 6
OIL PAN---------- B5 - 12
REMOVAL AND INSTALLATION ------ B5 - 12

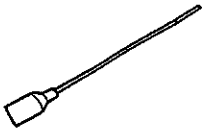
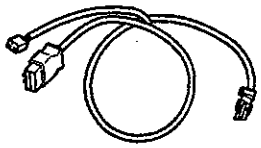
JB
1 LUBRICATION SYSTEM
1-1 FUNCTION CHECK

WARNING

- Never carry out the operation while the engine and engine oil are still hot, for there are hazard potentials for getting scald.

1-1-1 D37BSE2B05_0001" * MERGEFORMAT

SST

Shape	Part No.	Part name
	09991-87402-000	Wire, tacho-pulse pick up
	09991-87404-000 (09991-87401-000)	Wire, engine control system inspection

Instrument

Tachometer,Oil pressure gauge,Torque wrench

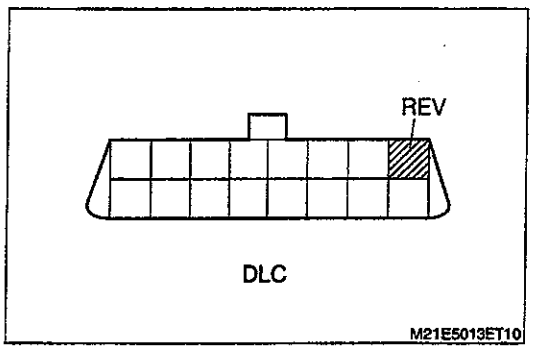
Lubricant,adhesive,others

Three Bond1104

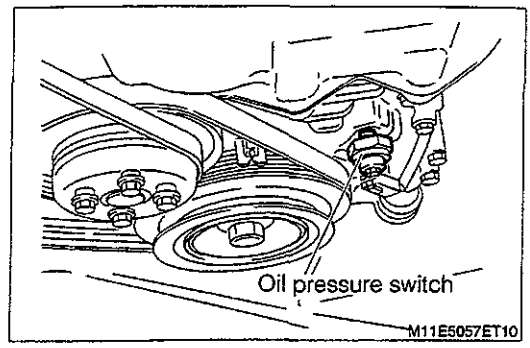
1-1-2 OIL PRESSURE

1.Attach an engine tachometer to the terminal REV⑧ , using the SST.

SST: 09991-87402-000
09991-87404-000



2.Remove the oil pressure switch and install an oil pressure gauge (thread diameter PT1/8).
3.Warm up the engine (until the radiator fan starts rotating).
4.Measure the pressure at each revolution speed.
SPECIFIED VALUE: At time of 1,300rpm
147kPa(1.5kgf/cm²)
At time of 5,200rpm
343kPa(3.5kgf/cm²)
5.Attach the oil pressure switch.
(1) Clean the threaded section of the oil pressure switch and the switch attaching section of the cylinder block.
(2) Apply bond (Three Bond 1104) to the threaded section of the oil pressure switch. After waiting for a little while, proceed to the installation.
(Inasmuch as a liquid gasket does not have quick drying feature, do not proceed to the installation immediately after application.)
ADHESIVE: Three Bond1104
TIGHTENING TORQUE: 13.5 N·m {140kgf·cm}



2 ENGINE OIL

2-1 REPLACEMENT

WARNING

- Never carry out the operation while the engine and engine oil are still hot, for there are hazard potentials for getting scald.

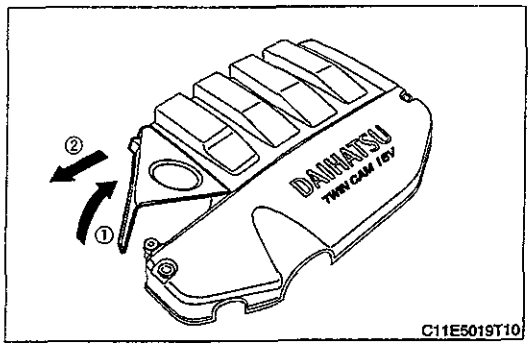
2-1-1 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

Engine oil 5W−30(API Grade SG or higher)

2-1-2 REPLACING PROCEDURE

1.Remove the engine cover at the top of the oil filler cap.
  (1) Open the left/upper section of the engine cover upward.
  (2) Remove the engine cover diagonally.



2.Remove the oil filler cap.
3.Remove the drain plug of the oil pan. Drain the engine oil.
4.Install the drain plug with a new gasket interposed.
  TIGHTENING TORQUE: 29.5±5.9N·m {295±59kgf·cm}

5.Fill engine oil.
  LUBRICANT: Engine oil 5W−30(API Grade SG or higher)

6.Check the oil level.
  Refer to Page B1-2.

CAUTION

- Prior to starting the check, wait for a little while so as to allow all engine oil to drip into the oil pan.

7.Install the oil filler cap.
8.Reverse the removal procedure to install the engine cover.

3 OIL FILTER

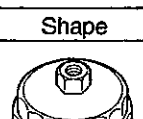
3-1 REMOVAL AND INSTALLATION

WARNING

- Never carry out the operation while the engine and engine oil are still hot, for there are hazard potentials for getting scald.

3-1-1 ARTICLES TO BE PREPARED

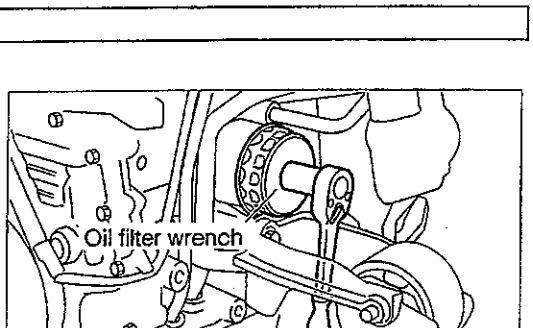
SST

Shape	Part No.	Part name
	09228-87201-000	Wrench oil filter

Lubricant,adhesive,others

Engine oil 5W−30(API Grade SG or higher)

3-1-2 REMOVAL AND INSTALLATION PROCEDURES

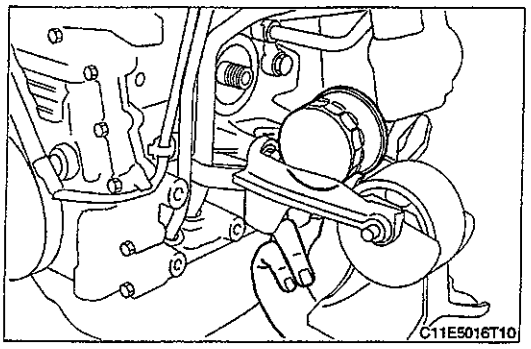


1.Lift up the vehicle.
2.Clean and remove any dirt from around the oil filter, front engine mount bracket, etc. so that no foreign matter may be admitted during the oil filter replacement.
3.Attach an oil filter wrench to the oil filter at the block side, inserting the wrench into between the arms of front engine mounting bracket, working from the underside.
4.Loosen the oil filter and let the remaining oil discharge from the inside of the filter.

CAUTION

- Pay attention as to the dripping oil.
- Upon completion of the oil filter removal, wipe off any dripped oil.

5.Remove the oil filter. Turn the direction of the filter 90 degrees relative to the installation surface, that is the lateral direction of the vehicle. Then, take out the oil filter downward from between the arms of front engine mounting bracket.



6.Wipe off the oil filter mounting surface at the block side, using a rag, etc. Check to see if oil or scratches are present at the mounting surface by applying a light beam through the grill clearances at the front side of the vehicle.

NOTE

- **At this time, it is advisable to check the union position at the mounting surface.**

7.Again ensure that no dirt is present at around the inner sides of the front engine mounting bracket arms.

8.Apply engine oil to the gasket surface of a new oil filter.

CAUTION

- **Be sure to install an oil filter designed exclusively for the Copen.**

LUBRICANT: Engine oil 5W−30(API Grade SG or higher)

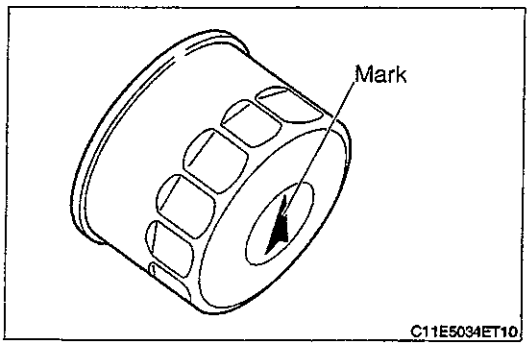
9.Reverse the removal procedure to install the oil filter.

CAUTION

- **Care must be exercised not to allow the oil filter gasket to interfere with the engine bracket, etc.**

10.Tighten the oil filter by hand until the filter contacts the seal surface.

11.Check the mark position at the top of the oil filter through the grill clearance at the front side of the vehicle.



12.Using an oil filter wrench, tighten the oil filter further a 1 turn.

(The turning angle can be checked based on the mark position at the top of the oil filter.)

13.Run the engine at least three minutes. Ensure that the engine exhibits no oil leakage.

14.Wipe off thoroughly any oil that may be stuck around.

4 OIL PUMP

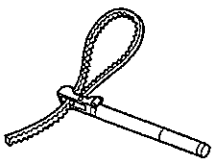
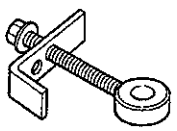
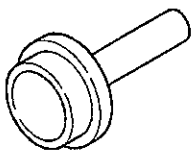
4-1 REMOVAL AND INSTALLATION

WARNING

- Never carry out the operation while the engine and engine oil are still hot, for there are hazard potentials for getting scald.

4-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09213-87211-000	Holder, crankshaft pulley
	09286-87701-000 (09286-87201-000)	bar, alternator adjuster
	09388-87702-000	Replacer, transfer input gear rear oil seal

Instrument

Torque wrench

Lubricant,adhesive,others

Three Bond1207C,Engine oil 5W−30(API Grade SG or higher),Soap water,Wooden block

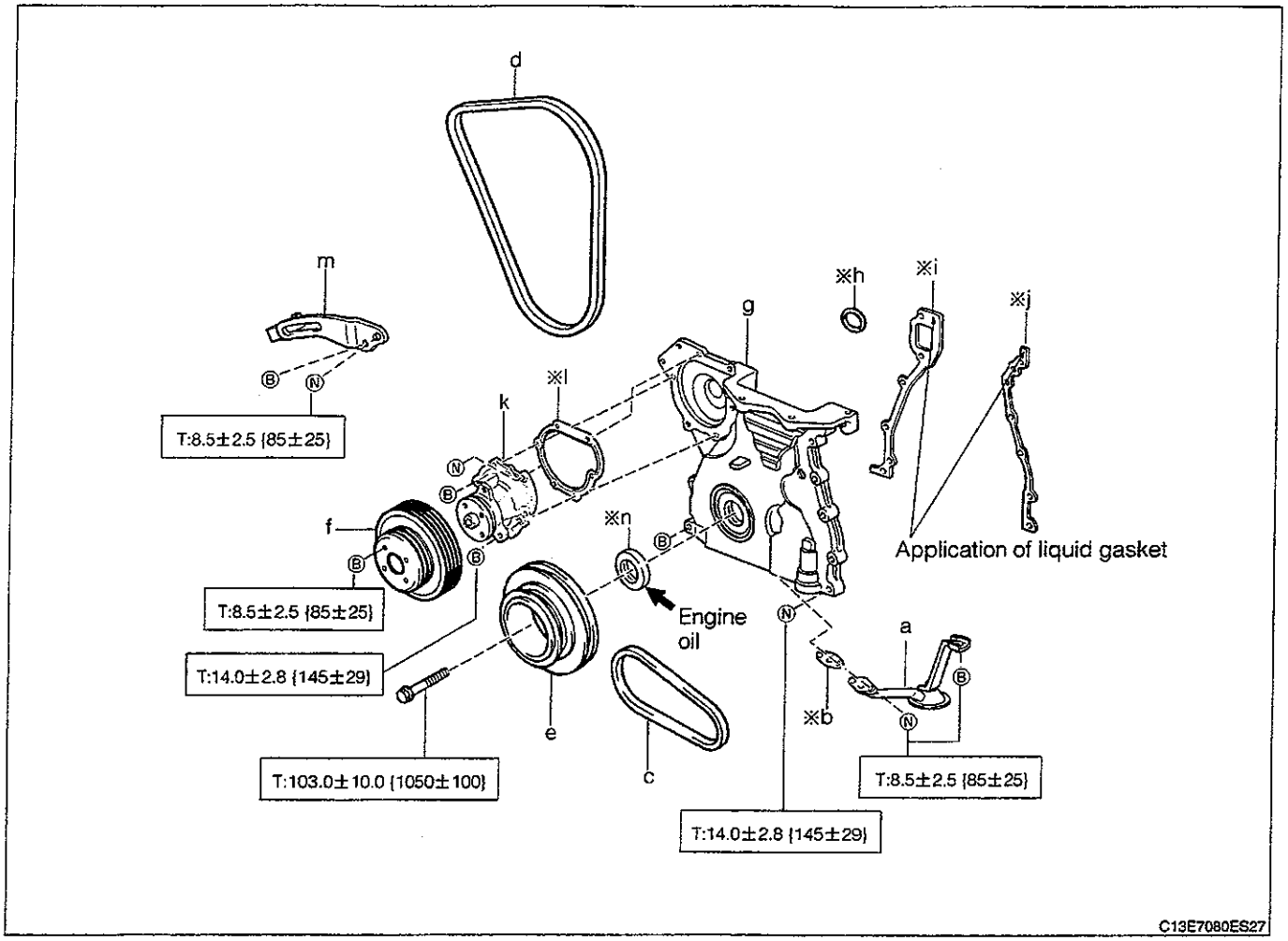
4-1-2 OPERATION BEFORE REMOVAL

1.Remove the cylinder head Ay.
Refer to Page B2-1.

2.Remove the oil pan.
Refer to Page B5-12.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※Non-reusable parts
Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Strainer Ay,oil
2 b Gasket,oil strainer flange
▲ 3 c Belt,V(For air conditioner use)
▲ 4 d Belt,V(For alternator use)
▼ ▲ 5 e Pulley,crankshaft
▼ ▲ 6 f Pulley,water pump
▼ ▲ 7 g Pump Ay,oil
▲ 8 h Ring ,O
▲ 9 i Gasket,oil pump,No2
▲ 10 j Gasket,oil pump,No1
11 k Pump Ay,water
12 l Gasket,water pump
13 m Bar,fan belt adjusting
▲ 14 n Seal,type T oil

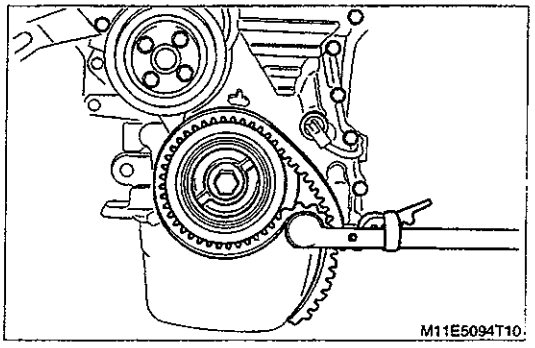
(3) CRANKSHAFT PULLEY

1.Remove the crankshaft pulley, using the SST.
(1) Apply the belt section of the SST to the second stage (air conditioner compressor driving side) of the crankshaft pulley, as indicated in the right figure.

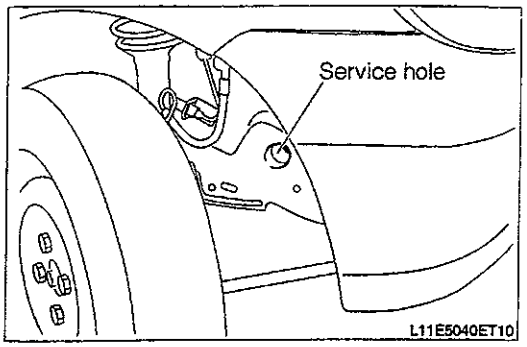
SST: 09213-87211-000

CAUTION

- Do not apply the SST to the first stage (alternator driving side), for there is a potential of an oil pressure switch damage.

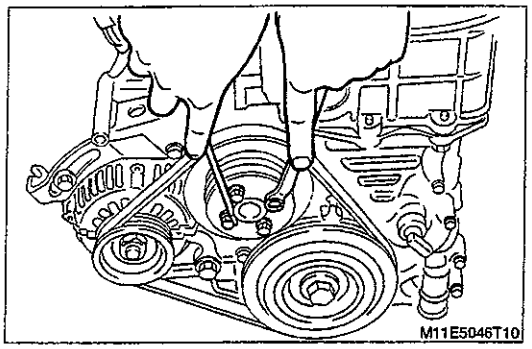


(2) Insert the tool through the service hole so as to remove the crankshaft pulley retaining bolt.



(4) WATER PUMP PULLEY

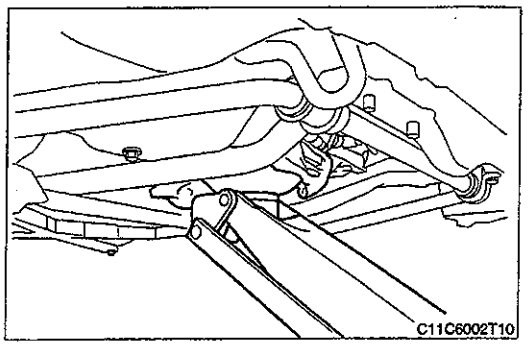
1.Remove the four bolts with a flat screwdriver used as a means to prevent the turning, as indicated in the figure.



2.Using a garage jack, raise the engine about 10 mm with a wooden block, etc. interposed at the transmission case of the joint section between the engine assembly and the transaxle assembly.

CAUTION

- Never apply a jack to the oil pan of the engine assembly or the transaxle assembly.
- When using a jack, be sure to use rags or the like so as to prevent any damage.
- Do not raise the engine beyond a required amount.



NOTE

- The gap between the body and the engine is very small, not allowing the pulley to be taken out. Therefore, raise the engine to provide a gap through which the pulley may be taken out.

3.Remove the water pump pulley.

4.Lower the engine by operating the garage jack.

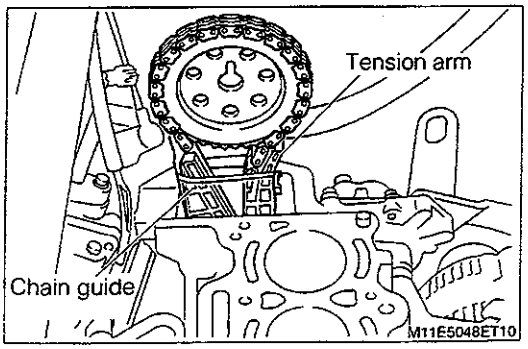
(5) OIL PUMP Ay

1.Secure the timing chain tension arm and timing chain guide with rubber bands or the like.

2.Remove the oil pump assembly by removing the eight bolts and three nuts.

CAUTION

- Carefully remove the oil pump so that no scratch be made to the oil pump attaching surface.
- Do not reuse the O-ring and oil pump gasket once they have been used.



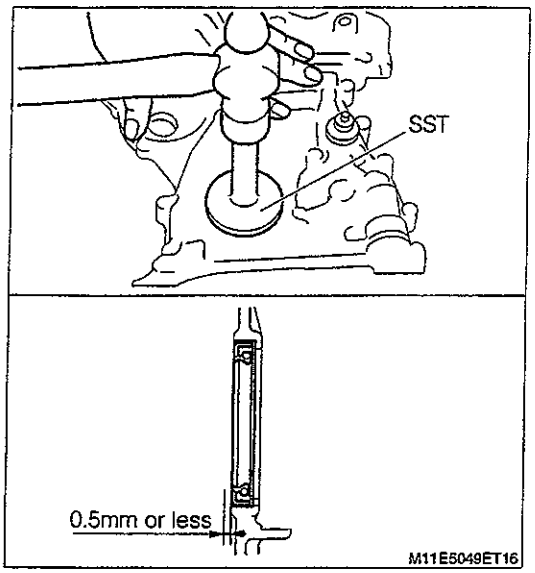
4-1-4 POINTS OF INSTALLATION

(1) TYPE T OIL SEAL

1.Apply engine oil to the lip-section of Type T oil seal. Assemble the oil seal, using the SST.
SST: 09388-87702-000
LUBRICANT: Engine oil 5W–30(API Grade SG or higher)

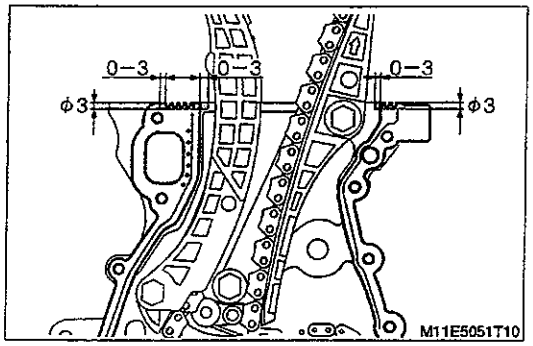
CAUTION

- Use a new oil seal.
- The oozing-out after the press-fitting should be 0.5mm or less.



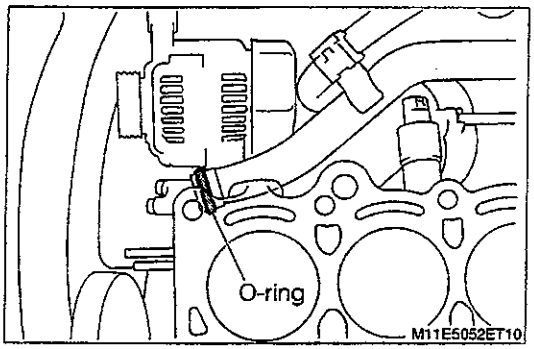
(2) OIL PUMP GASKET No.1,No.2

1.Install the oil pump gaskets No.1 and No.2 to the cylinder block. Apply liquid gasket to the area indicated in the right figure.
ADHESIVE: Three Bond1207C



(3) O-RING

1.Install a new O-ring to the water inlet pipe and apply soap water to it.
LUBRICANT: Soap water

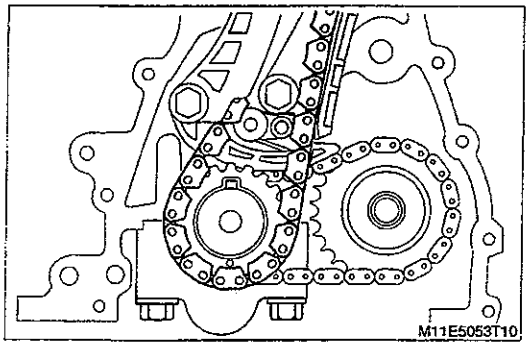


(4) OIL PUMP Ay

1.Ensure that the timing chain is not detached from the crankshaft timing sprocket. Then, install the oil pump assembly to the cylinder block. Tighten the eight bolts and three nuts to the specified torque.

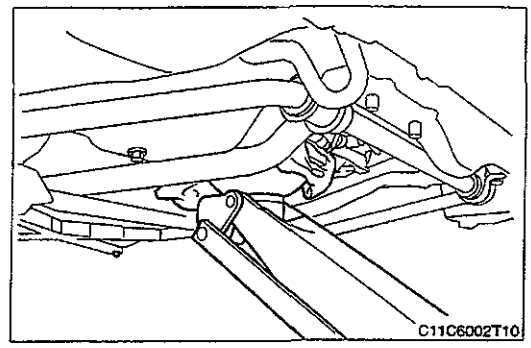
CAUTION

- Carefully install the oil pump so that no scratch be made to the oil pump attaching surface.
- Wipe off any oozed liquid gasket from the top surfaces of the cylinder block and oil pump. When installing the cylinder head, again apply liquid gasket.
- Perform assembling so that the O-ring (oil pump) may not be detached.
- Be sure to perform the fitting of the water inlet pipe.



(5) WATER PUMP PULLEY

1.Using a garage jack, raise the engine about 10 mm with a wooden block, etc. interposed at the transmission case of the joint section between the engine assembly and the transaxle assembly.



CAUTION

- Never apply a jack to the oil pan of the engine assembly or the transaxle assembly.
- When using a jack, be sure to use a rag or the like so as to prevent any scratch.
- Do not raise the engine beyond a required amount.

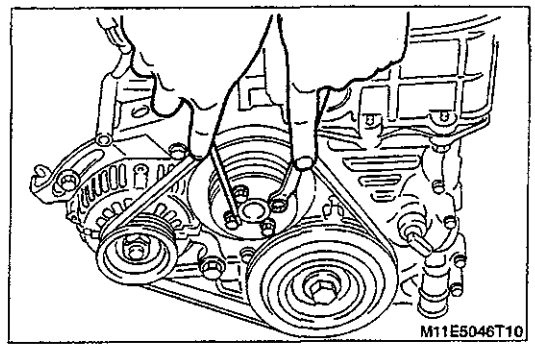
NOTE

- The gap between the body and the engine is very small, not allowing the pulley to be taken out. Therefore, raise the engine to provide a gap through which the pulley may be taken out.

2.Install the water pump pulley.

3.Lower the engine by operating the garage jack.

4.Install the four bolts with a flat ⊖ screwdriver used as a means to prevent the turning, as indicated in the figure.

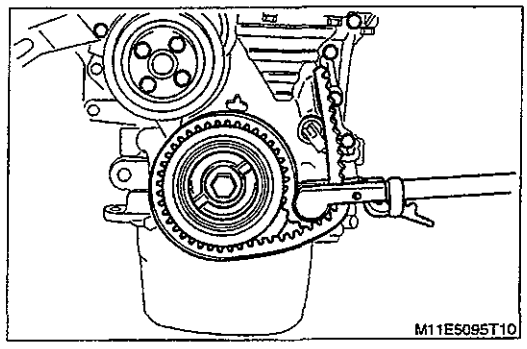


(6) CRANKSHAFT PULLEY

1.Install the crankshaft pulley, using the SST.

(1) Apply the belt section of the SST to the second stage (air conditioner compressor driving side) of the crankshaft pulley, as indicated in the right figure.

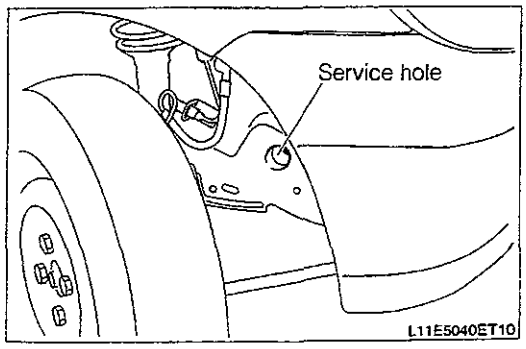
SST: 09213-87211-000



CAUTION

- Do not apply the SST to the first stage (alternator driving side), for there is a potential of an oil pressure switch damage.

(2) Pass the tool through the service hole. With the handle section of the SST held firmly, tighten the bolt to the specified torque, while paying attention not to allow the belt to be twisted.



(7) V-BELT (FOR ALTERNATOR USE)

1.Install the V-belt(For alternator use).Adjust the belt tention.
Refer To Page B1-3.

(8) V-BELT (FOR AIR CONDITIONER USE)

1.Install the V-belt(For air conditiner use).Adjust the belt tention.
Refer To Page K1-3.

3-1-5 OPERATION AFTER INSTALLATION

1.Install the oil pan.
Refer To Page B5-12.

2.Install the cylinder head Ay.
Refer To Page B2-1.

5 OIL PAN

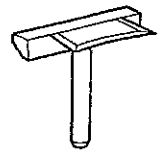
5-1 REMOVAL AND INSTALLATION

WARNING

- Never carry out the operation while the engine and engine oil are still hot, for there are hazard potentials for getting scald.

5-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09032-00100-000	Cutter, oil pan seal

Tool

Scraper

Instrument

Torque wrench

Lubricant,adhesive,others

Three Bond1207C,Engine oil 5W−30(API Grade SG or higher)

5-1-2 OPERATION BEFORE REMOVAL

1.Drain the engine oil, by removing the drain plug and gasket.

CAUTION

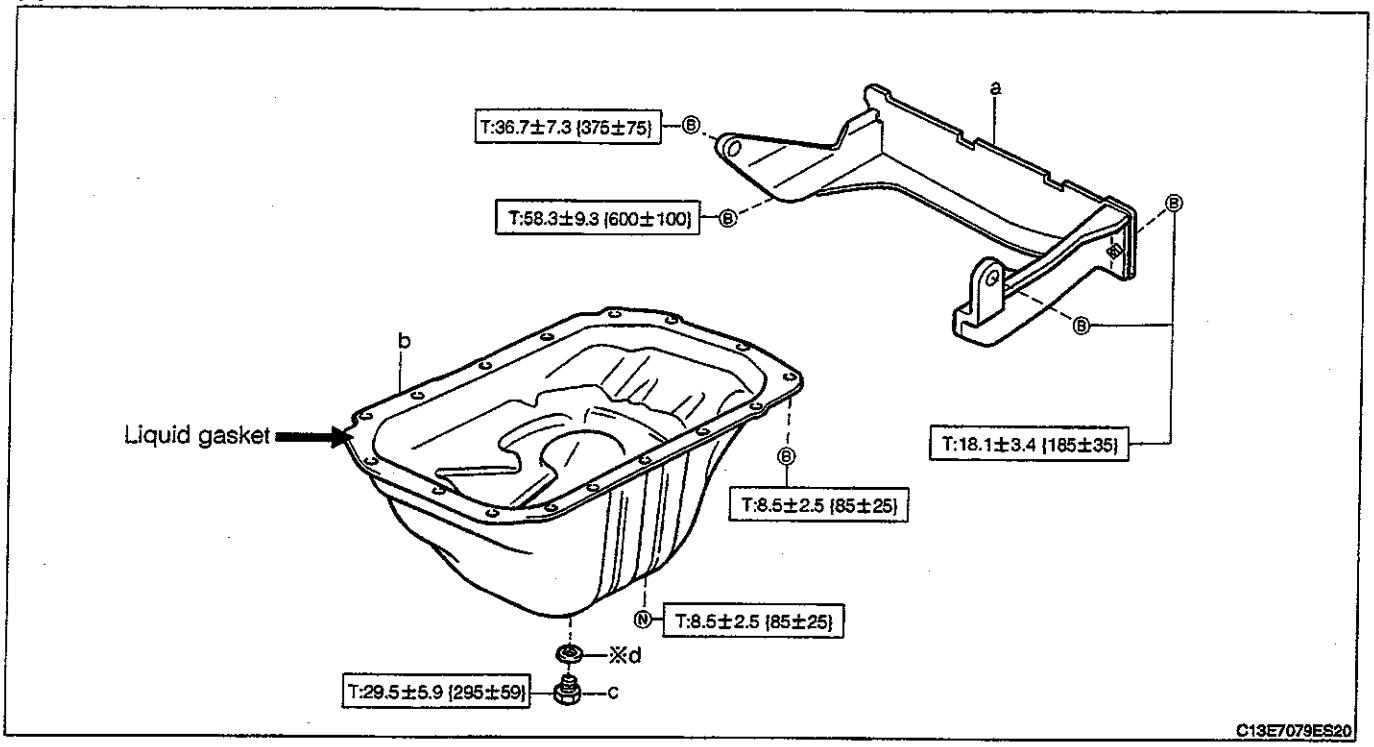
- Do not reuse the gasket once it has been used.

2.Remove the front exhaust pipe Ay.

Refer to Page B4-2.

5-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※Non-reusable parts
Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Stiffener,power train
▼ ▲ 2 b Pan S/A,oil

5-1-4 POINTS OF REMOVAL

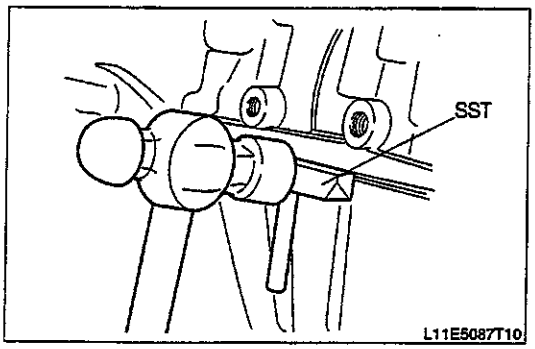
(1) OIL PAN S/A

1.Remove the oil pan retaining bolts and nuts.
2.Remove the oil pan by inserting the SST forcibly between the oil pan and the cylinder block.

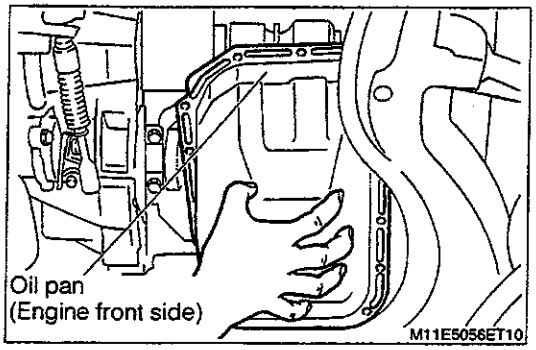
CAUTION

- **Perform the operation slowly so that the oil pan flanged section may not be deformed.**

SST: 09032-00100-000

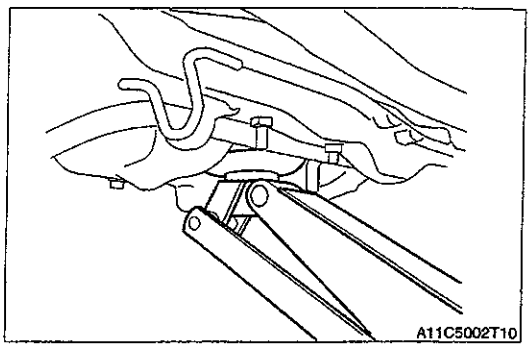


3.Remove the oil pan S/A while turning it about 90°.



NOTE

- If any difficulty is encountered in removing the oil pan, using a garage jack, raise the engine about 10 mm with a wooden block, etc. interposed at the transmission case of joint section between the engine assembly and the transaxle assembly.



CAUTION

- Never apply a jack to the oil pan of the engine assembly or the transaxle assembly.
- When using a jack, be sure to use a rag or the like so as to prevent any scratch.
- Do not raise the engine beyond a required amount.

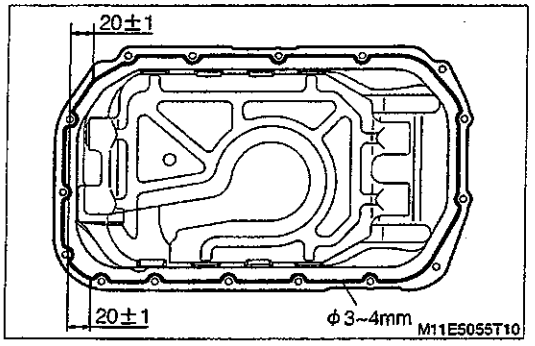
5-1-5 POINTS OF INSTALLATION

(1) OIL PAN S/A

CAUTION

- If the oil pan is deformed, lightly tap the oil pan with a hammer so as to flatten it.
- If it is difficult to flatten the oil pan due to being badly deformed, replace it with a new part.

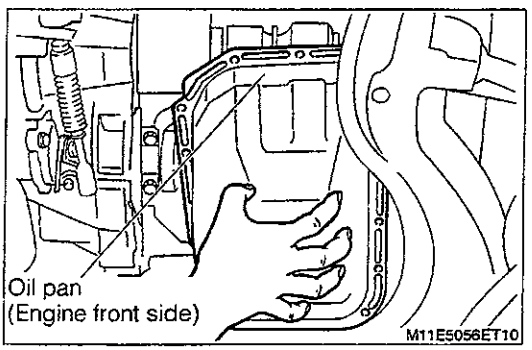
1. Using a scraper, wire brush, etc., clean any gasket that may remain on the oil pan installing surface or the oil pan flange section of the cylinder block.
2. Apply liquid gasket to the oil pan S/A, as indicated in the right figure.
   ADHESIVE: Three Bond1207C



CAUTION

- Apply a liquid gasket without any missing portion with a gauge of ϕ3-4.
- Apply liquid gasket to the section corresponding to the mating surface of the cylinder block × the oil pump, as indicated in the right figure.
- The assembling should be made within 15 minutes after the application of the gasket.

3. With the engine rear side of the oil pan S/A facing toward the rear side of the vehicle, put it in the oil strainer and install it to the block, while turning it.



CAUTION

- Care must be exercised not to allow the liquid gasket to get to the block, etc.

4. Tighten the bolts and nuts to the specified torque.

5-1-6 OPERATION AFTER INSTALLATION

1. Install the front exhaust pipe Ay.
   Refer to Page B4-2.

2. Install a new gasket in place and tighten the drain plug to the specified torque. Pour engine oil.

CAUTION

- Use a new gasket.

TO INDEX TO NEXT SECTION

TO INDEX

B6 COOLING SYSTEM

JB---------- B6 - 1
THERMOSTAT ---------- B6 - 1
REMOVAL AND INSTALLATION -------- B6 - 1
WATER PUMP ---------- B6 - 3
REMOVAL AND INSTALLATION -------- B6 - 3
RADIATOR ---------- B6 - 6
REMOVAL AND INSTALLATION -------- B6 - 6

JB
1 THERMOSTAT
1-1 REMOVAL AND INSTALLATION

WARNING

- Do not remove the radiator cap or drain plug when the coolant is hot.

1-1-1 ARTICLES TO BE PREPARED

Instrument

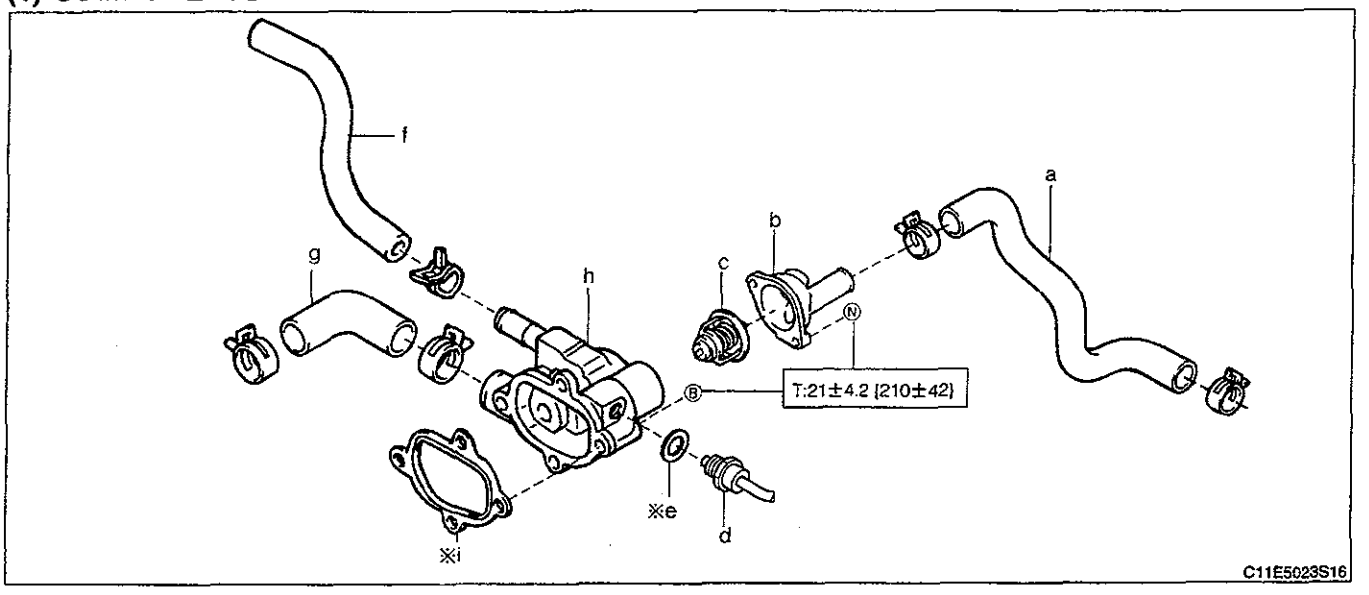
Torque wrench,Water temperature gauge

1-1-2 OPERATION BEFORE REMOVAL

1.Drain the coolant.

1-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※Non-reusable parts

Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Hose, radiator No.2
2 b Inlet, water
▲ 3 c Thermostat
4 d Sensor, water temperature
5 e Gasket
6 f Hose, heater outlet water
7 g Hose, water inlet
8 h Housing S/A, water outlet
9 i Gasket, water outlet housing

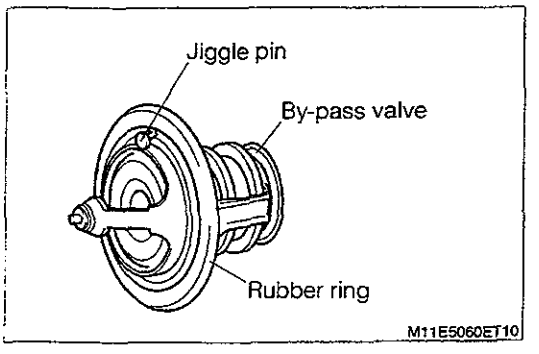
NOTE

- When the operation is limited only for the thermostat, perform the operations up to Step 3.

1-1-4 INSPECTION

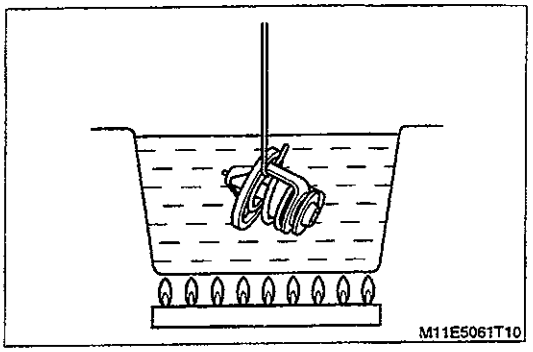
(1) Visual inspection

1.Ensure that the valve is completely closed at the room temperature of 20°C, and that the spring is free.
2.Check to see if the rubber ring is not damaged.
3.Ensure that the bypass valve and jiggle pin move smoothly.

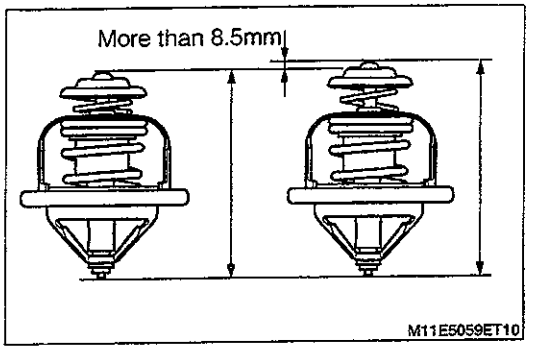


(2) Check of valve opening temperature

1.Immerse the thermostat in water. Raise the temperature gradually and measure the temperature when the bypass valve begins to open.
SPECIFIED VALUE: 82±1.5°C



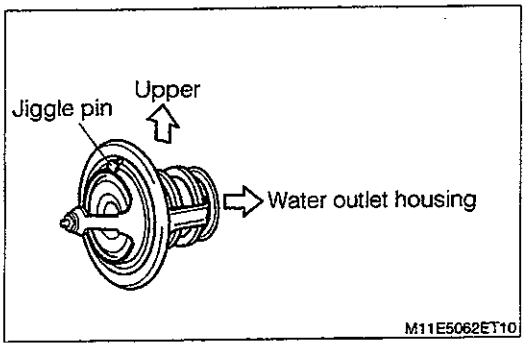
2.Further raise the temperature. Measure the lift amount when the temperature is 95°C.
SPECIFIED VALUE: 8.5 mm or more



1-1-5 POINTS OF INSTALLATION

(1) Thermostat

1.Assemble the thermostat to the water outlet housing in such a way that its jiggle pin comes at top of the engine.



1-1-6 OPERATION AFTER INSTALLATION

1.Fill the coolant.

2 WATER PUMP

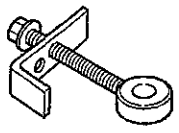
2-1 REMOVAL AND INSTALLATION

WARNING

- When the coolant is hot, do not remove the radiator cap and drain plug.

2-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09286-87701-000 (09286-87201-000)	bar, alternator adjuster

Instrument

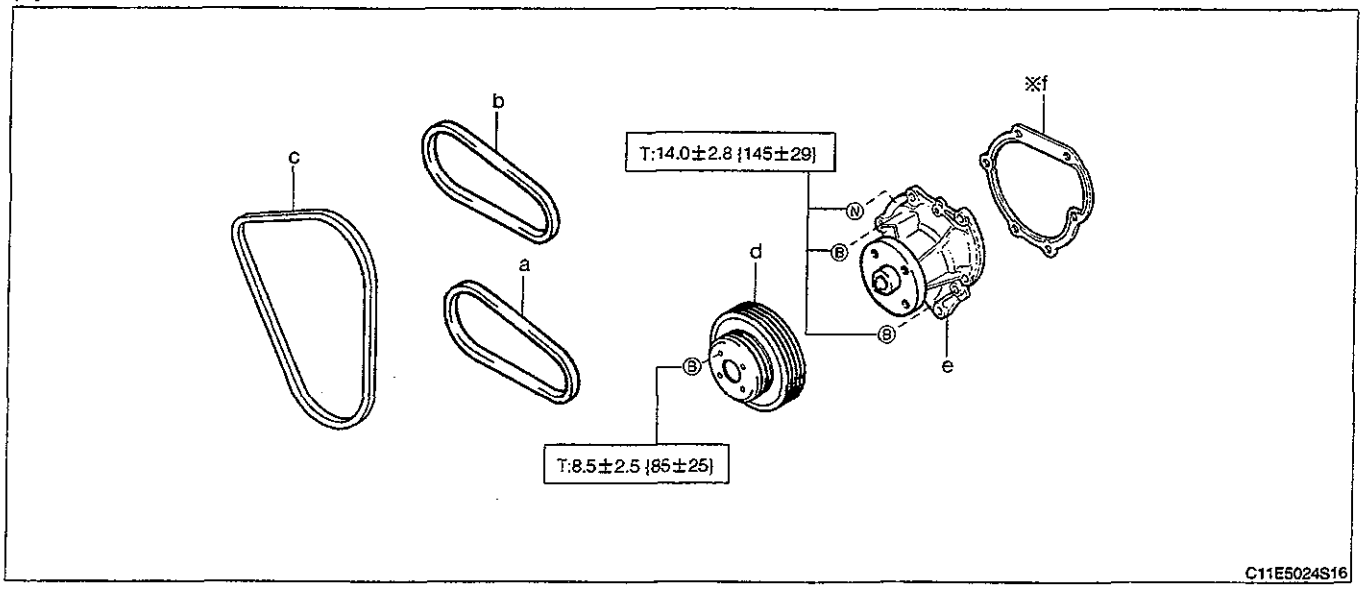
Torque wrench

2-1-2 OPERATION BEFORE REMOVAL

1.Drain the coolant.
2.Remove the air cleaner.
<RefCode=E532>

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※Non-reusable parts
Unit:N·m{kgf·cm}

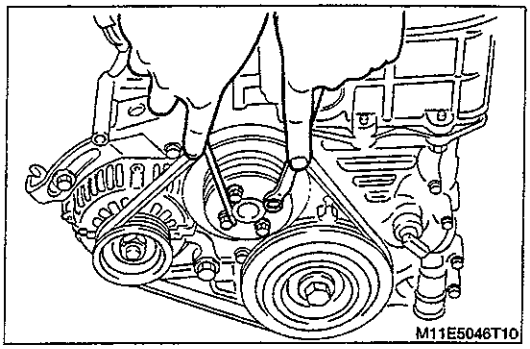
(2) REMOVAL AND INSTALLATION PROCEDURES

▲ 1 a Belt, V (for air conditioner)
▲ 2 b Belt, V (for vane pump)
▲ 3 c V-belt (for alternator)
▼ ▲ 4 d Pulley, water pump
▼ ▲ 5 e Pump Ay, water
6 f Gasket, water pump

2-1-4 POINTS OF REMOVAL

(1) WATER PUMP PULLEY

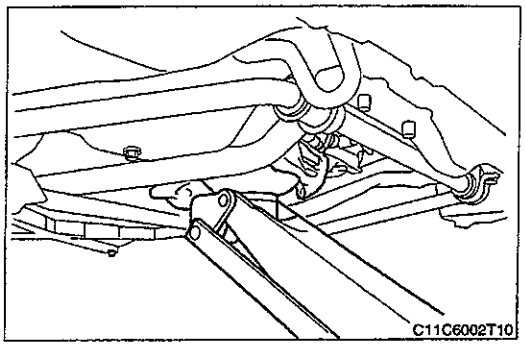
1.Remove the water pump pulley by removing the four bolts, while preventing turning as shown in the figure, using a flat screwdriver.



2.With a wooden piece or the like interposed, apply a garage jack to the transmission case where the engine assembly and transaxle assembly are connected. Then, raise the engine about 10 mm.

CAUTION

- Do not apply a jack to the oil pan of the engine assembly or transaxle assembly.
- When applying a jack, place a rag or the like so that no damage is made to the section concerned.
- Do not raise the engine more than necessary.



NOTE

- Because of lack of a gap between the body and the engine, the pulley cannot be removed. Therefore, it is necessary to raise the engine to provide a wider gap so as to remove the pulley.

3.Remove the water pump pulley.

4.Lower the engine by using the garage jack.

(2) Water pump Ay

1.Remove the water pump assembly by removing the four bolts and two nuts.

CAUTION

- Once the water pump gasket is removed, it cannot be used again.

2-1-5 INSPECTION

1.Check to if there is any deformation or damage.

2.Check to see if the rotor turns smoothly by turning it by hand.

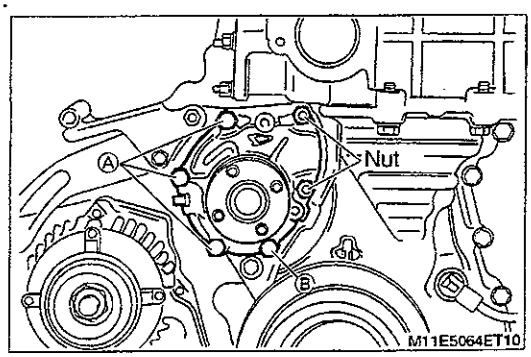
2-1-6 POINTS OF INSTALLATION

(1) Water pump Ay

1.Attach the water pump assembly with a new water pump gasket interposed. Tighten the four bolts and two nuts to the specified torque.

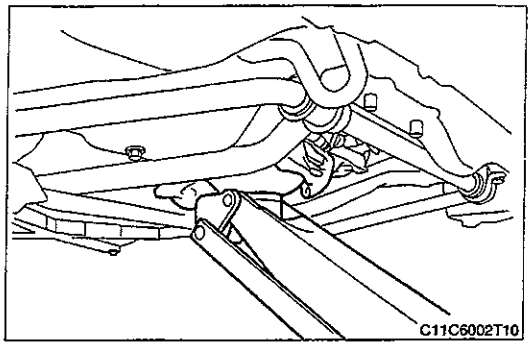
CAUTION

- Use the new water pump gasket.



(2) WATER PUMP PULLEY

1.With a wooden piece or the like interposed, apply a garage jack to the transmission case where the engine assembly and transaxle assembly are connected. Then, raise the engine about 10 mm.



CAUTION

- Do not apply a jack to the oil pan of the engine assembly or transaxle assembly.
- When applying a garage jack, place a rag or the like so that no damage is made to the section concerned.
- Do not raise the engine more than necessary.

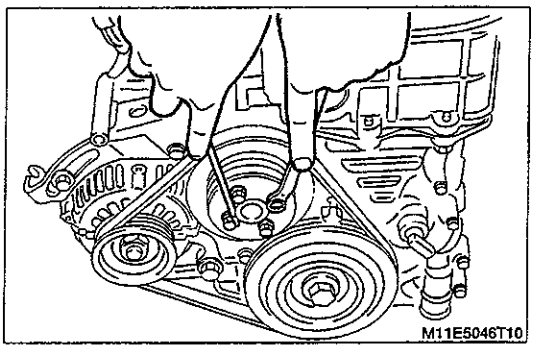
NOTE

- Because of lack of a gap between the body and the engine, the pulley cannot be installed. Therefore, it is necessary to raise the engine to provide a wider gap so as to install the pulley.

2.Install the water pump pulley.

3.Lower the engine by using the garage jack.

4.Install the four bolts, while preventing turning as shown in the figure, using a flat screwdriver.



(3) V-belt (for alternator)

1.Install the V-belt (for alternator). Adjust the belt tension.
Refer to Page B1-3.

(4) V-belt (for vane pump)

1.Install the V-belt (for vane pump). Adjust the belt tension.
Refer to Page G2-36.

(5) V-belt (for air conditioner)

1.Install the V-belt (for air conditioner). Adjust the belt tension.
Refer to Page K1-3.

2-1-7 OPERATION AFTER INSTALLATION

1.Install the air cleaner.
Refer to Page B3-2.

2.Replenish the coolant.

3 RADIATOR

3-1 REMOVAL AND INSTALLATION

WARNING

- When the coolant is hot, do not remove the radiator cap and drain plug.

3-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

3-1-2 OPERATION BEFORE REMOVAL

1.Drain the coolant.

2.Remove the battery ⊖ terminal.

CAUTION

- When the battery negative ⊖ terminal is disconnected, it should be noted that diagnosis results and memories of the radio are erased simultaneously.

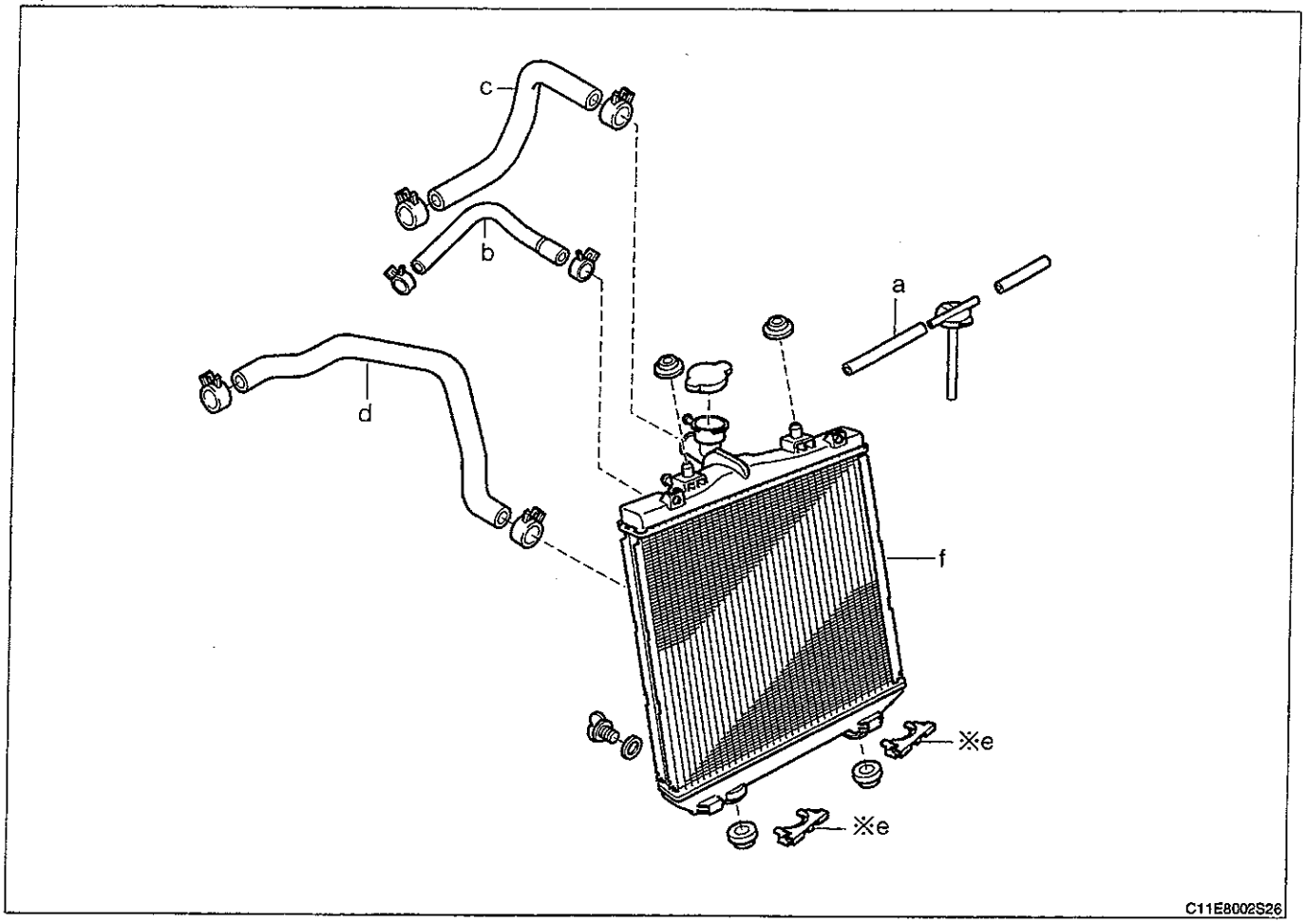
3.Remove the front bumper.
Refer to Page I2-2.

4.Remove the front cross member.
Refer to Page I1-25.

5.Remove the four bolts that attach the condenser of the air conditioner.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※Non-reusable parts

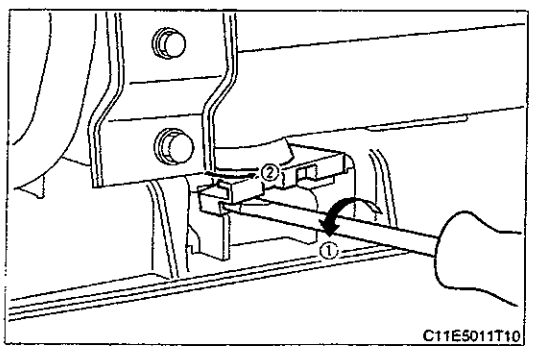
(2) REMOVAL AND INSTALLATION PROCEDURES

▲ 1 a Hose, radiator reservoir
2 b Hose, turbo water
3 c Hose, radiator No.1
4 d Hose, radiator No.2
▼ ▲ 5 e Bracket, radiator mounting, lower No.1
▼ ▲ 6 f RADIATOR AY

3-1-4 POINTS OF REMOVAL

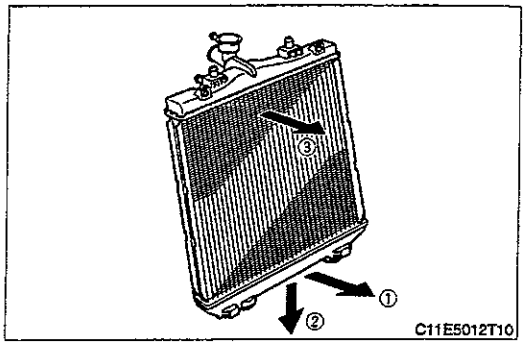
(1) Radiator mounting lower No.1 bracket

1. Insert a flat screwdriver into the hole at the lower/left of the bracket.
2. Unlock the bracket by turning the screwdriver to the left (① in the right figure) and pull the bracket toward you. (② in the right figure)
3. At the right hole, unlock the bracket by turning the screwdriver to the right. Then, remove the bracket.



(2) RADIATOR AY

1.Move the radiator lower section to the front. Remove the lower tank section from the radiator support. (① in the right figure)
2.Move the radiator downward. Remove the upper tank section from the radiator support. (② in the right figure)
3.Move the radiator upper section to the front. (③ in the right figure) Separate the radiator from the radiator support and lift and remove the radiator.



CAUTION

- Do not allow the vehicle harness to contact the core (including the tank caulking section). (Water leakage will occur due to galvanic corrosion.)
- Be careful not to damage or deform the fin when removing the radiator.

3-1-5 POINTS OF INSTALLATION

(1) RADIATOR AY

1.Reverse the radiator assembly removal procedure to install the radiator assembly.

CAUTION

- Do not allow the vehicle harness to contact the core (including the tank caulking section). (Water leakage will occur due to galvanic corrosion.)
- Be careful not to damage or deform the fin when installing the radiator.

(2) Radiator mounting lower No.1 bracket

1.Fit the new bracket to the radiator support and secure the radiator.

CAUTION

- Once the bracket is removed, it cannot be used again.

(3) Radiator reservoir hose

1.Install the radiator reservoir hose.

CAUTION

- Care must be exercised so that the hose may not be bent (restricted) midway.

3-1-6 OPERATION AFTER INSTALLATION

1.Install the four attaching bolts for the air conditioner condenser.
2.Install the front cross member.
Refer to Page I1-25.

3.Install the front bumper.
Refer to Page I2-2.

4.Install the battery ⊖ terminal.
5.Fill the coolant.
6.Check the coolant leakage.

TO INDEX

B7 FUEL SYSTEM

JB---------- B7 - 1
FUEL SYSTEM ---------- B7 - 1
INSTRUCTIONS FOR SERVICE OPERATION ---------- B7 - 1
FUEL SUCTION TUBE ---------- B7 - 1
REMOVAL AND INSTALLATION -------- B7 - 1
REPLACEMENT ---------- B7 - 2
FUEL TANK ---------- B7 - 2
REMOVAL AND INSTALLATION -------- B7 - 2
FUEL PUMP ---------- B7 - 7
REMOVAL AND INSTALLATION -------- B7 - 7
INJECTOR ---------- B7 - 8
REMOVAL AND INSTALLATION -------- B7 - 8

JB

1 FUEL SYSTEM

1-1 INSTRUCTIONS FOR SERVICE OPERATION

1-1-1 FUEL PRESSURE REMOVAL OPERATION

1.When you perform operations for the fuel system, remove the fuel pressure, following the procedure given below.
(1) Turn OFF the IG switch.
(2) Remove the fuel pump relay.
(3) Start the engine. Keep on running the engine, until the engine stops naturally.
(4) Turn OFF the IG switch. Install the fuel pump relay.

CAUTION

- Care must be exercised, for there is a residual pressure in the fuel line.

2 FUEL SUCTION TUBE

2-1 REMOVAL AND INSTALLATION

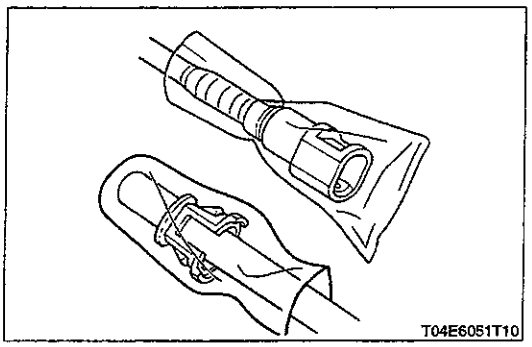
WARNING

- Never allow a fire to be brought near the jobsite during the operation.
- Be sure to take a precautionary measure to prevent fuel from being splashed.

2-1-1 POINTS OF REMOVAL

CAUTION

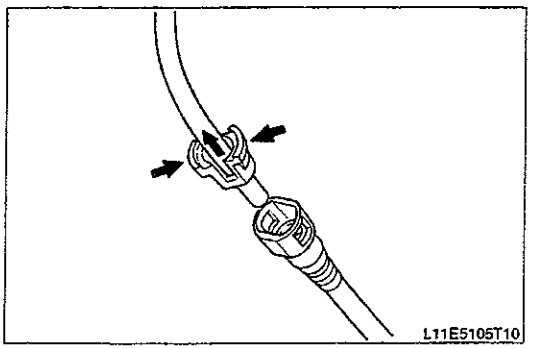
- When mud etc. gets to the tube, clean it prior to the removal.
- Make sure to perform the operation by hand without using any tools so that no scratch may be made to the tube etc.
- If there is a seizure between the connector and the tube, push and pull back with the retainer held by hand. Pull out the tube from the connector after they can move freely.
- Cover the disconnected tubes and connectors with a plastic bag etc. so that they may not be scratched or no foreign matter be admitted.



1.While holding the both ends of the retainer, pull out the connector under an unlocked state.

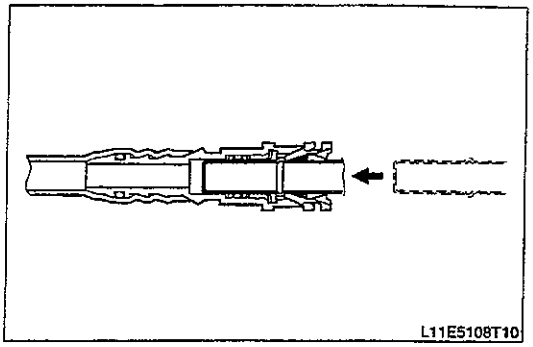
CAUTION

- When the retainer is removed from the tube, be sure to replace it by a new retainer, for the retainer is a non-reusable part.



2-1-2 POINTS OF INSTALLATION

1.With the axis of the pipe and connector aligned with each other, push in until you hear a clicking sound.
If the connection is stiff, apply a small amount of new engine oil to the tip end of the pipe.



CAUTION

- Ensure that no scratch or foreign matter is present at the pipe connecting section.

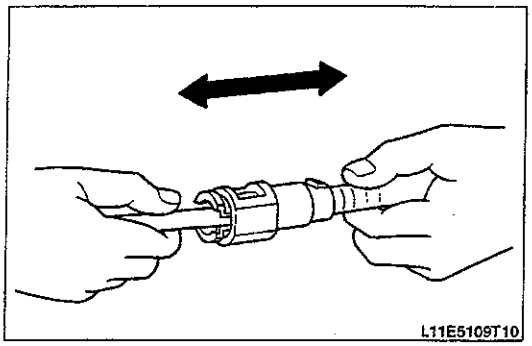
NOTE

- Retainer color
  Fuel pump side: Orange
  Body tube side: Blue green

2.After completion of the assembly, pull the tube and the connector so as to ensure that they are connected securely.

2-1-3 OPERATION AFTER INSTALLATION

1.With the fuel pressure applied, check the fuel system for leakage.



2-2 REPLACEMENT

2-2-1 REPLACEMENT PROCEDURES

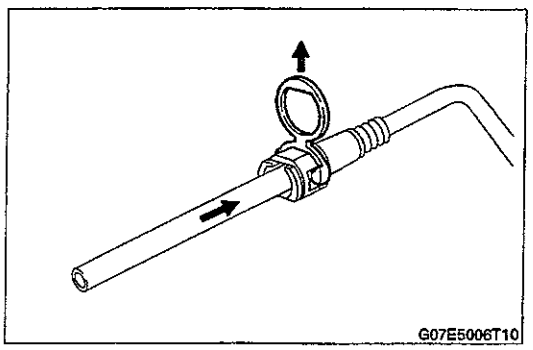
1.Remove the connector and pipe, following the aforesaid procedure. Remove the retainer from the pipe.

2.Align a replacement tube to the pipe and push in until you hear a clicking sound. Pull out the checker.

NOTE

- Checker color
  Fuel pump side: Orange
  Body tube side: Blue green

3.After completion of the assembly, pull the tube and the connector so as to ensure that they are connected securely.



2-2-2 OPERATION AFTER REPLACEMENT

1.With the fuel pressure applied, check the fuel system for leakage.

3 FUEL TANK

3-1 REMOVAL AND INSTALLATION

WARNING

- Never allow a fire to be brought near the jobsite during the operation.

3-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

3-1-2 OPERATION BEFORE REMOVAL

1.Remove the fuel pressure.
REFER TO PAGE B7-1.

2.Disconnect the battery negative terminal.

CAUTION

- When the battery negative terminal is disconnected, it should be noted that diagnosis results and memories of the radio are erased simultaneously.

3.Remove the pressure inside the fuel tank by removing the fuel filler cap.

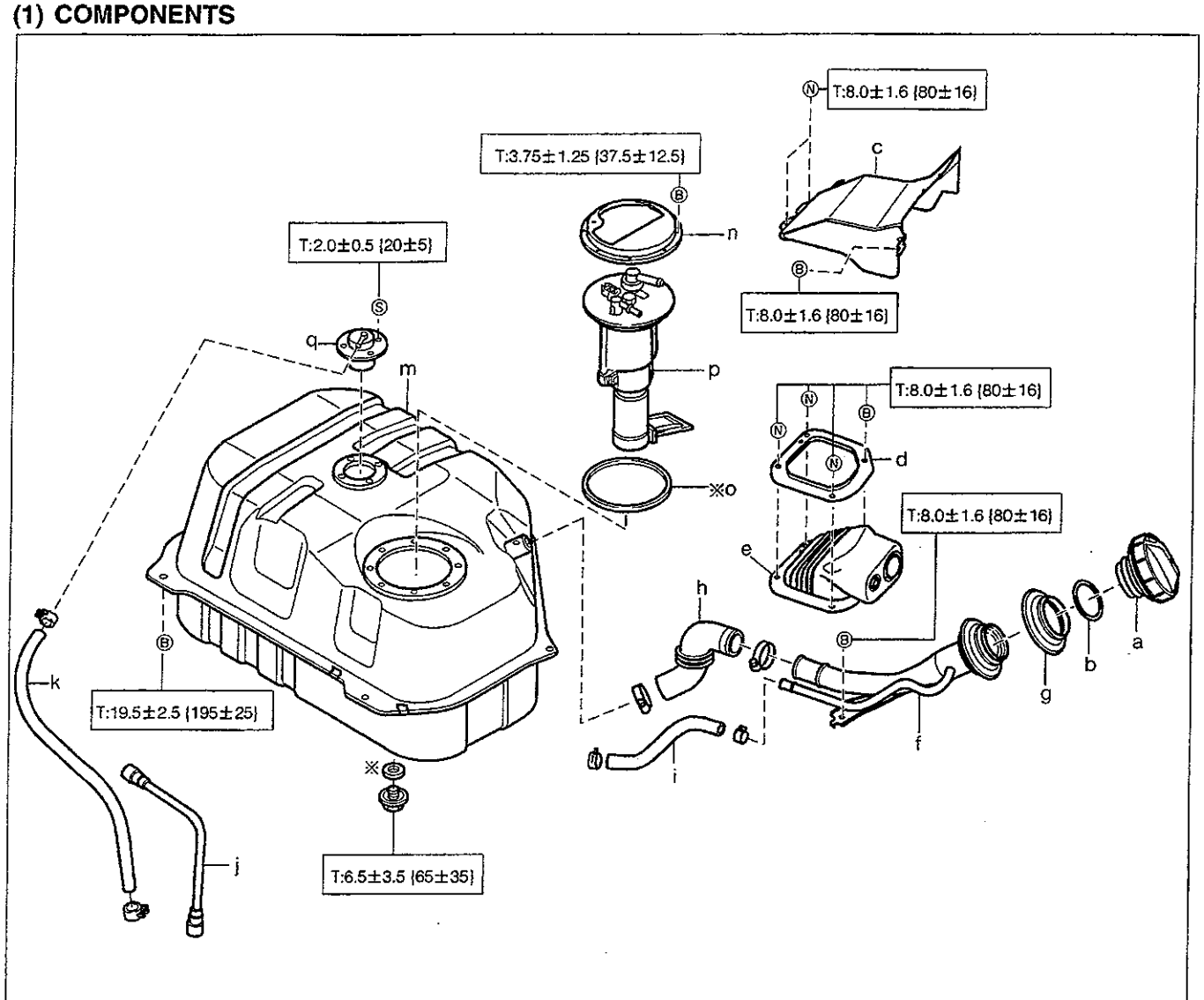
WARNING

- Be sure to take a precautionary measure to prevent fuel from being splashed.

4.Drain the fuel by removing the drain plug.
5.Turn over the carpet inside the boot at the left/front section of the vehicle.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※Non-reusable parts
Unit:N·m{kgf·cm}

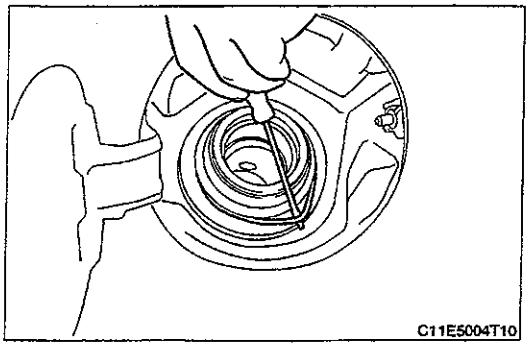
(2) REMOVAL AND INSTALLATION PROCEDURES

	1	a	Cap Ay,fuel tank
▼	2	b	Clamp,fuel filler pipe
	3	c	Cover S/A,fuel inlet pipe
	4	d	Plate,fuel inlet pipe hole
	5	e	Shield,fuel inlet pipe,lower
▲	6	f	Pipe S/A,fuel inlet,upper
	7	g	Shield,fuel tank inlet pipe
▲	8	h	Hose,fuel tank to filler pipe
▼ ▲	9	j	Tube S/A,fuel suction
▼ ▲	10	k	Hose,fuel emission
▼ ▲	11	m	Tank S/A,fuel
▼ ▲	12	j	Tube S/A,fuel suction
▲	13	i	Hose,fuel tank breather
	14	n	Bracket,fuel pump
	15	o	Gasket,fuel pump
▲	16	p	Pump Ay,fuel
▲	17	k	Hose,fuel emission
	18	q	Valve Ay,fuel cut off

3-1-4 POINTS OF REMOVAL

(1) FUEL FILLER PIPE CLAMP

1.Remove the clamps, using a flat screwdriver or the like.



(2) FUEL SUCTION TUBE

1.Remove the fuel suction tube S/A at the body tube side.
Refer to Page B7-1.

(3) FUEL EMISSION HOSE

1.Remove the fuel emission hose at the body tube side.

(4) FUEL TANK S/A

1.Remove the fuel tank S/A attaching bolts.
2.Make a gap between the fuel tank S/A and the body by lowering the fuel tank S/A slightly. Proceed to remove the fuel pump connector and harness clamp.
3.Remove the fuel tank S/A.

(5) FUEL SUCTION TUBE

1.Remove the fuel pump side of the fuel suction tube S/A.
Refer to Page B7-1.

(6) FUEL EMISSION HOSE

1.Remove the fuel emission hose at the fuel cut off valve side.

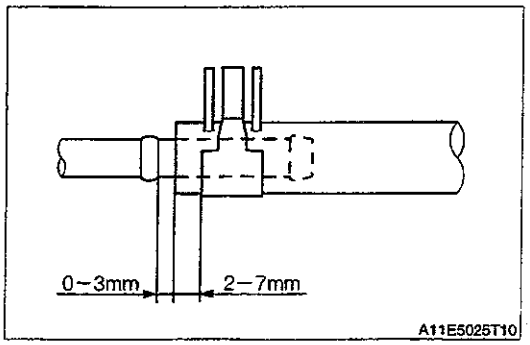
3-1-5 POINTS OF INSTALLATION

(1) FUEL EMISSION HOSE

1.Install the side where there is no white marking of the fuel emission hose to the fuel cut-off valve side.

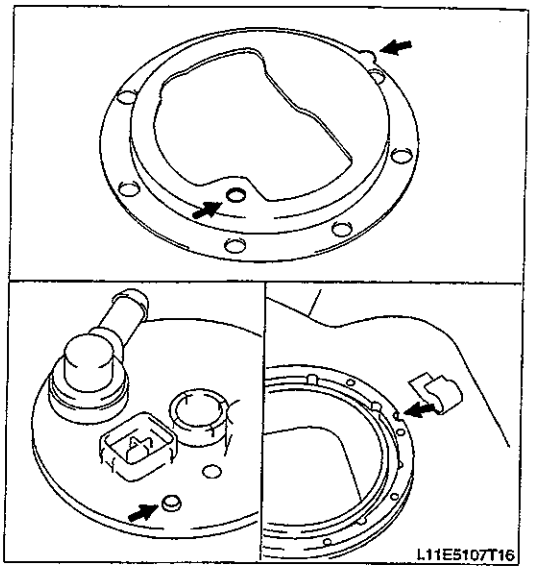
CAUTION

- **Install the hose as indicated in the right figure.**



(2) FUEL PUMP S/A

1.Install the fuel pump S/A.
  (1) Install the fuel pump to the fuel tank with a new fuel pump gasket interposed.
  (2) Align the fuel pump bracket hole with the projected section of the fuel pump. Also, align the mating marks of the fuel pump bracket and the fuel tank with each other.
  (3) Tighten the fuel pump bracket to the specified torque.

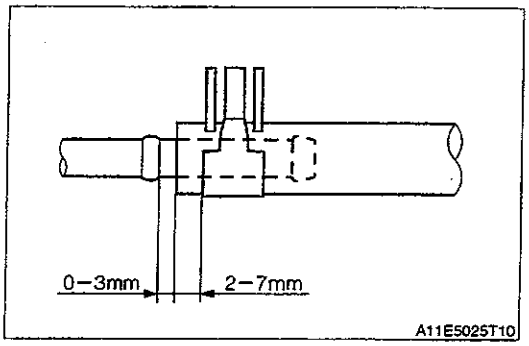


(3) FUEL TANK BREATHER HOSE

1.Perform the installation in such a way that the white marking side of the breather hose comes at the top direction of the vehicle at the fuel pump side.

CAUTION

- **Install the hose as indicated in the right figure.**



(4) FUEL SUCTION TUBE S/A

1.Install the fuel pump side of the fuel suction tube S/A.
Refer to Page B7-1.

(5) FUEL TANK S/A

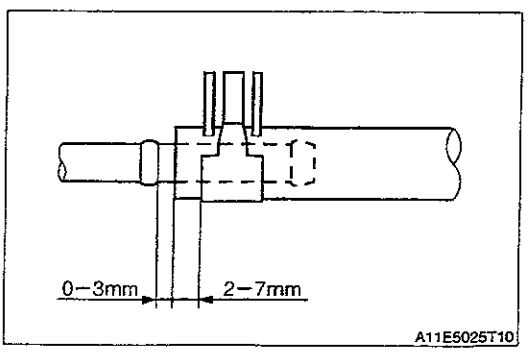
1.Install the fuel tank S/A.
  (1) With the fuel tank being brought toward the body side, install the fuel pump connector and harness clamps.
  (2) Install the fuel tank.

(6) FUEL EMISSION HOSE

1.Install the side where there is the white marking of the fuel emission hose to the body tube.

CAUTION

- **Install the hose as indicated in the right figure.**



(7) FUEL SUCTION TUBE

1.Install the fuel suction tube at the body tube side.
Refer to Page B7-1.

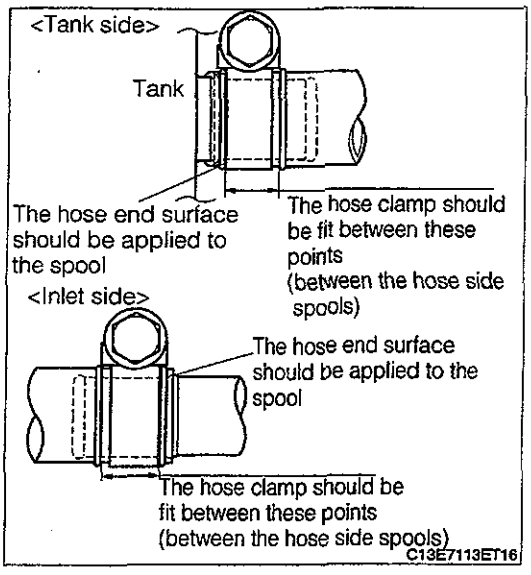
(8) FUEL TANK TO FILLER PIPE HOSE,FUEL INLET UPPER PIPE S/A

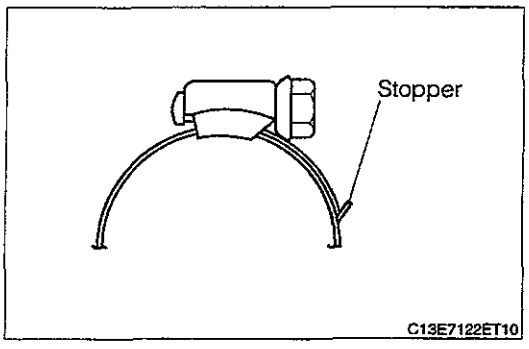
1.Pass the fuel inlet upper pipe S/A through the fuel inlet pipe lower shield and fuel inlet pipe hole plate.
2.Install the fuel tank inlet pipe shield to the body side and securely insert the fuel inlet upper pipe S/A.
3.Perform the assembling in such a way that the arrowheaded marking side of the fuel tank-to-filler pipe hose comes at the top direction of the vehicle at the fuel pump side. Tighten the hose clamps, as indicated in the right figure.

CAUTION

- Perform the tightening until the band edge contacts the stopper.
  (Relative to the stopper claw ±2 mm)

4.Install the fuel tank breather hose in the same way as with the aforesaid procedure.
5.Align the forward end of the lower shield with the white marking at the top of the inlet pipe.
6.Install the fuel filler pipe clamp.





3-1-6 OPERATION AFTER INSTALLATION

1.Install the carpet in the boots room.
2.Pour the fuel
3.Install the battery negative terminal.
4.Check the fuel system for leakage with the fuel pressure applied.

4 FUEL PUMP

4-1 REMOVAL AND INSTALLATION

WARNING

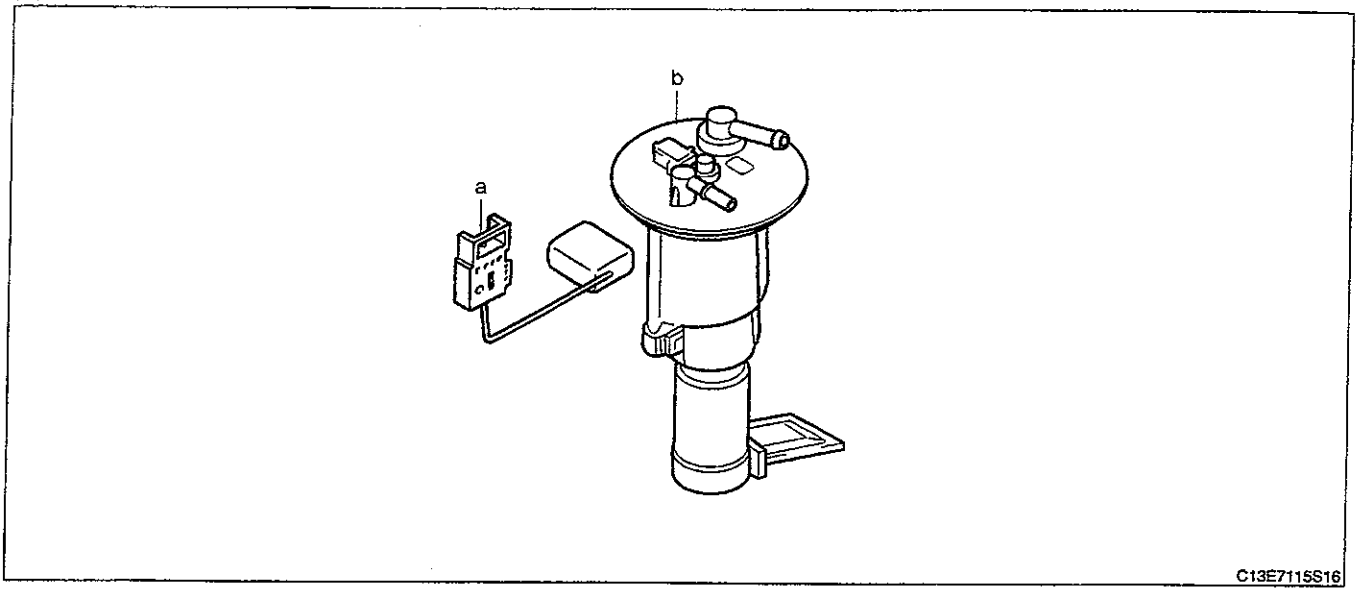
- Never allow a fire to be brought near the jobsite during the operation.
- Be sure to take a precautionary measure to prevent fuel from being splashed.

4-1-1 OPERATION BEFORE REMOVAL

1.Remove the fuel tank.
Refer to Page B7-2.

4-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



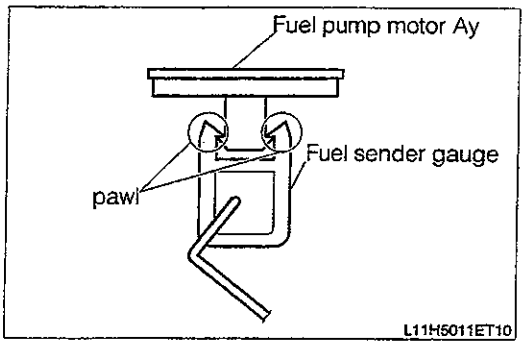
(2) REMOVAL AND INSTALLATION PROCEDURES

▼ 1 a Gauge Ay,sender
2 b Pump Ay,fuel

4-1-3 POINTS OF REMOVAL

(1) FUEL SENDER GAUGE AY

1.Remove the fuel sender gauge Ay, while opening the two claw sections of the gauge with your finger and pushing them downward.



4-1-4 OPERATION AFTER INSTALLATION

1.Install the fuel tank.
Refer to Page B7-2.

5 INJECTOR

5-1 REMOVAL AND INSTALLATION

WARNING

- Never allow a fire to be brought near the jobsite during the operation.
- Be sure to take a precautionary measure to prevent fuel from being splashed.

5-1-1 ARTICLES TO BE PREPARED

Instrument

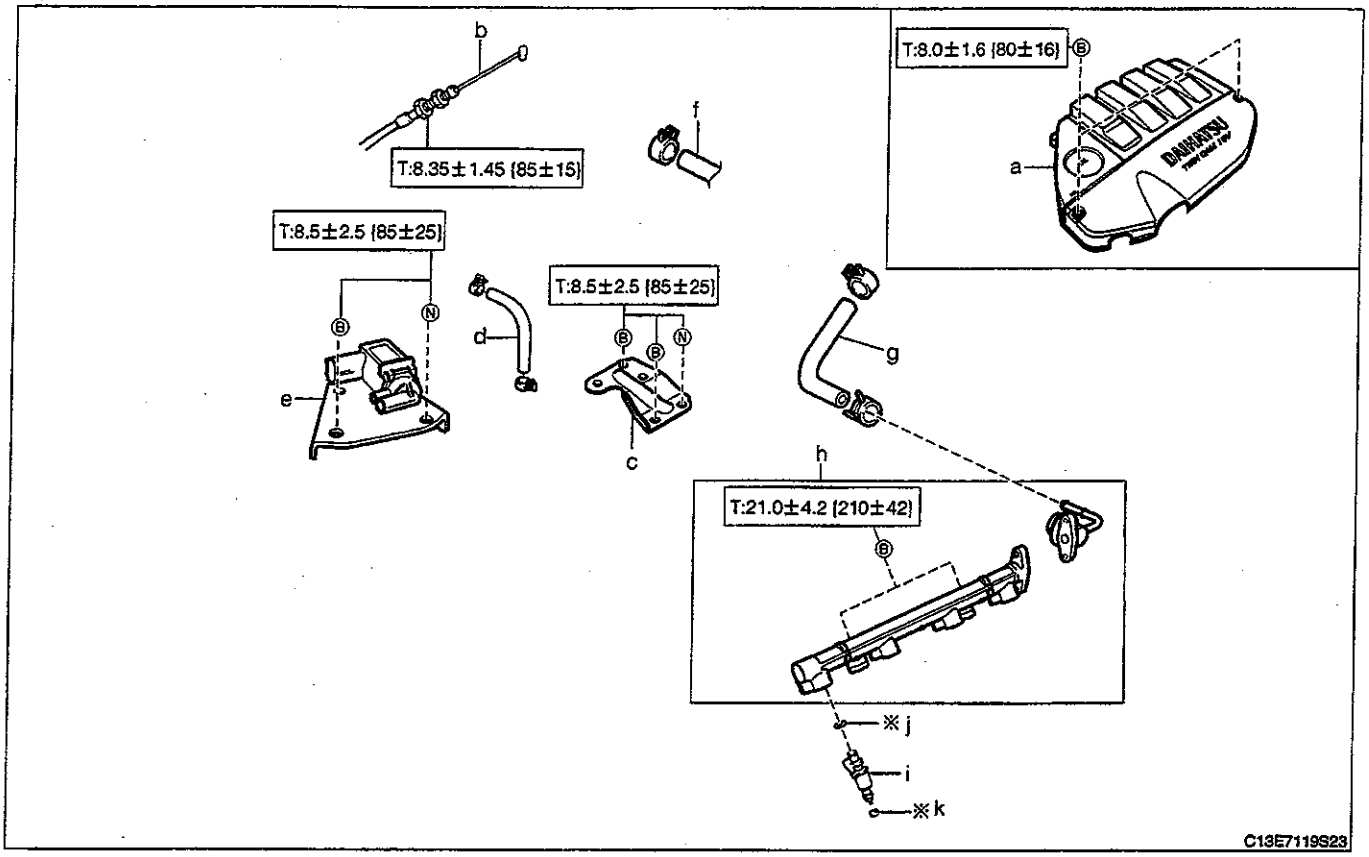
Torque wrench

5-1-2 OPERATION BEFORE REMOVAL

1.Remove the fuel pressure.
Refer to Page B7-1.

5-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※Non-reusable parts
Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

	1	a Cover S/A,engine upper	7	g Hose,fuel Not
▼ ▲	2	b Cable Ay,accelrator control	8	h Pipe S/A,fuel delivery
	3	c Stay,surge tank Not	9	i Injector Ay,fuel
	4	d Hose,ventilation	10	j Ring,O
▲	5	e Bracket,VSV	11	k Insulator,injector vibration
▲	6	f f hose, vacuum (For ABV control use)		

5-1-4 POINTS OF REMOVAL

(1) ACCELERATOR CONTROL CABLE AY

1.Remove the throttle body side by loosening the nut at the bracket section.

CAUTION

- Care must be exercised during the removal so that the part will not get curled.

5-1-5 INSPECTION

(1) INJECTOR

Refer to Page B8-146.

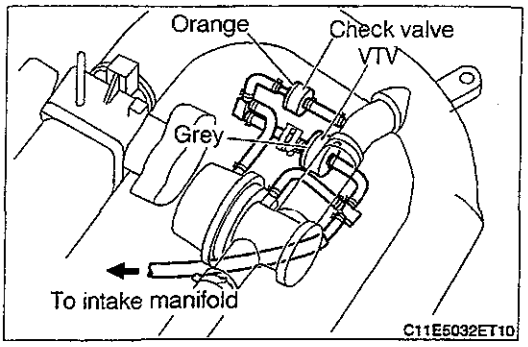
5-1-6 POINTS OF INSTALLATION

(1) VACUUM HOSE(FOR ABV USE)

1.Install the vacuum hose.

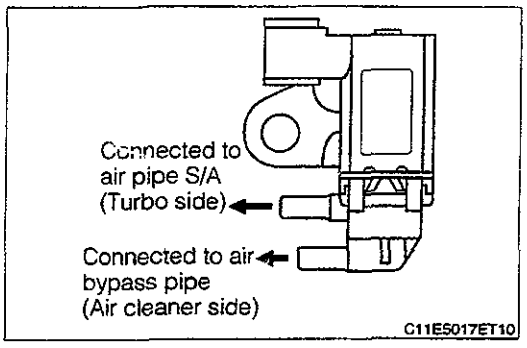
NOTE

- Ensure that each hose is assembled as indicated in the right figure.



(2) VSV BRACKET

1.Install the VSV bracket. Install the vacuum hose, as indicated in the right figure.



(3) ACCELERATOR CONTROL CABLE AY

1.Install the accelerator control cable assembly to the throttle body. After adjusting the accelerator pedal free play, tighten the nut to the specified torque.
SPECIFIED VALUE: 1-5mm (accelerator pedal free play)

5-1-7 OPERATION AFTER INSTALLATION

1.Check the fuel system for leakage with the fuel pressure applied.

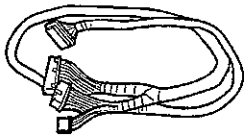
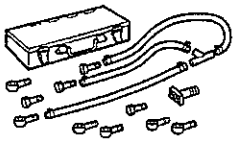
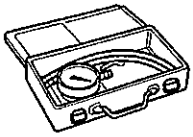
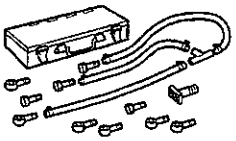
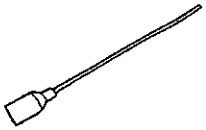
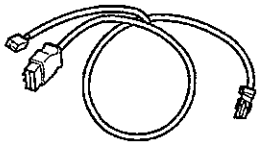
TO INDEX

B8 ENGINE CONTROL SYSTEM

JB---------- B8 - 1
ENGINE CONTROL SYSTEM ---------- B8 - 1
ARTICLES TO BE PREPARED---------- B8 - 1
HANDLING INSTRUCTIONS OF CONTROL SYSTEM---------- B8 - 2
SYSTEM WIRING DIAGRAM ---------- B8 - 4
ARRANGEMENT OF ECU TERMINAL ---------- B8 - 6
LOCATION OF COMPONENTS--------- B8 - 8
HOW TO PROCEED WITH TROUBLE SHOOTING ---------- B8 - 9
INQUIRY ---------- B8 - 15
SYMPTOM CONFIRMATION---------- B8 - 16
CONFIRMATION, RECORD AND ERASURE OF DIAGNOSIS CODE --- B8 - 18
BASIC CHECK ---------- B8 - 23
TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA--- B8 - 39
TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE---------- B8 - 44
UNIT CHECK---------- B8 - 143

JB
1 ENGINE CONTROL SYSTEM
1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09842-87502-000	Sub-harness, EFI computer check
	09268-41047-000 (09268-41045-000)	Tool set, injection measuring
	09268-87701-000	Gauge, EFI fuel pressure
	09268-87702-000	Tool set, measuring
	09991-87402-000	Wire, tacho-pulse pick up
	09991-87403-000	Wire, diagnosis check
	09991-87404-000 (09991-87401-000)	Wire, engine control system inspection
	09991-87301-000	Set,Diagnosis tester
	09965-97230-000 (09965-97207-000)	Trouble-Shooting program card

1-2 HANDLING INSTRUCTIONS OF CONTROL SYSTEM

1-2-1 INSTRUCTIONS ON USE OF THIS SERVICE MANUAL

1.This service manual has been compiled in such a way that the manual may be used both in regions where the type certification is implemented based on the EU exhaust emission approval, and AUS. Hence, with regard to the assignment, reading, erasing of diagnostic trouble codes and those steps of checks, repairs and confirmation, the service manual contains the procedures for both cases; One is a procedure that uses the DS-21 diagnosis tester or the OBD II generic scan tool, and the other is a procedure that does not use this tester or tool.

Therefore, the following instructions given below must be observed.

2.About Use of DS-21 Diagnosis Tester or OBD II Generic Scan Tool

(1) Regions where type certification is implemented based on EC exhaust emission approval; Make sure to use the DS-21 diagnosis tester or the OBD II generic scan tool.

(2) AUS; You may use or not use the DS-21 diagnosis tester or the OBD II generic scan tool. You may perform the operation, employing whichever method that will be easier to you.

3.Instructions to be followed concerning Diagnosis Trouble Codes

Diagnosis trouble codes, such as P0105/31 (four-digit code/two-digit code) are posted additionally.

(1) Regions where type certification is implemented based on EC exhaust emission approval

Make sure to use only four-digit trouble codes (e.g. P0105) whose have been assigned according to the ISO regulations.

(2) AUS;

You may perform the operation using the four-digit code, employing the DS-21 diagnosis tester or the OBD II generic scan tool. Or you may perform the operation using the two-digit codes (e.g. 31), without the use of the tester or tool. You may perform the operation, employing whichever method that will be easier to you.

Or you may perform the operation using the two-digit codes (e.g. 31), without the use of the tester or tool.

You may perform the operation, employing whichever method that will be easier to you.

NOTE

- The OBD II generic scan tool means a scan tool complying with the ISO 14230 (KWP2000) format.
- In cases where the OBD II generic scan tool is employed, not all diagnostic trouble codes (four-digit codes) can be read out. It should be noted that only those diagnostic trouble codes in which "zero" follows after "P", for example, P0XXX, can be read out.
- The accuracy of the two-digit codes in diagnosing malfunctioning components is slightly inferior to that of the four-digit codes.
- Hereinafter, those regions where the type certification is implemented based on the EU exhaust emission approval, is referred to as the "EU specifications".

1-2-2 PRECAUTIONARY MEASURES DURING TROUBLE-SHOOTING

1.Before the diagnosis information memorized in the EFI ECU memory is confirmed, never disconnect the connector from the EFI ECU, the battery negative terminal, the EFI ECU earth wire from the engine, or the main fuse.

2.The diagnosis information memorized in the EFI ECU memory can be erased by using the DS-21 diagnosis tester or the OBD-II generic scan tool in the same way as the check. Therefore, before using the tester, read its instruction manual so as to understand the functions furnished and how to use it.

3.Priority in trouble-shooting

(1) If the priority in trouble-shooting for a number of diagnostic trouble codes is given in the concerned DTC flow chart, make sure to follow the priority.

(2) If not given, follow the priority given below and perform the trouble-shooting for each diagnostic trouble code (DTC).

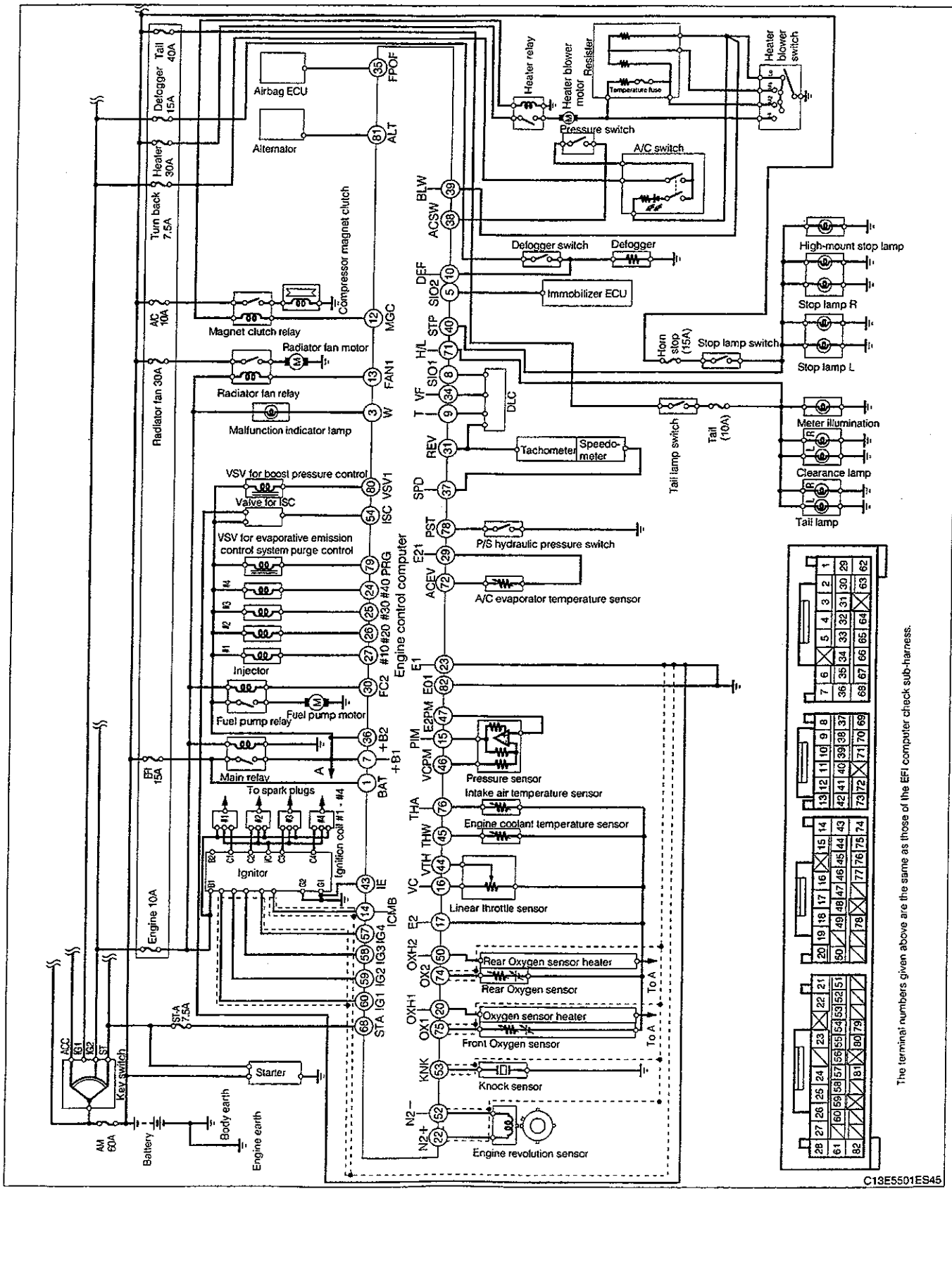
(1) DTC other than DTC P0171/25, DTC P0172/26 (too lean/too rich in fuel system), and DTC 0300/17, DTC P0301-P0304/17, DTC P0314/-(misfire found)

(2) DTC P0171/25, DTC P0172/26 (too lean/too rich in fuel system)

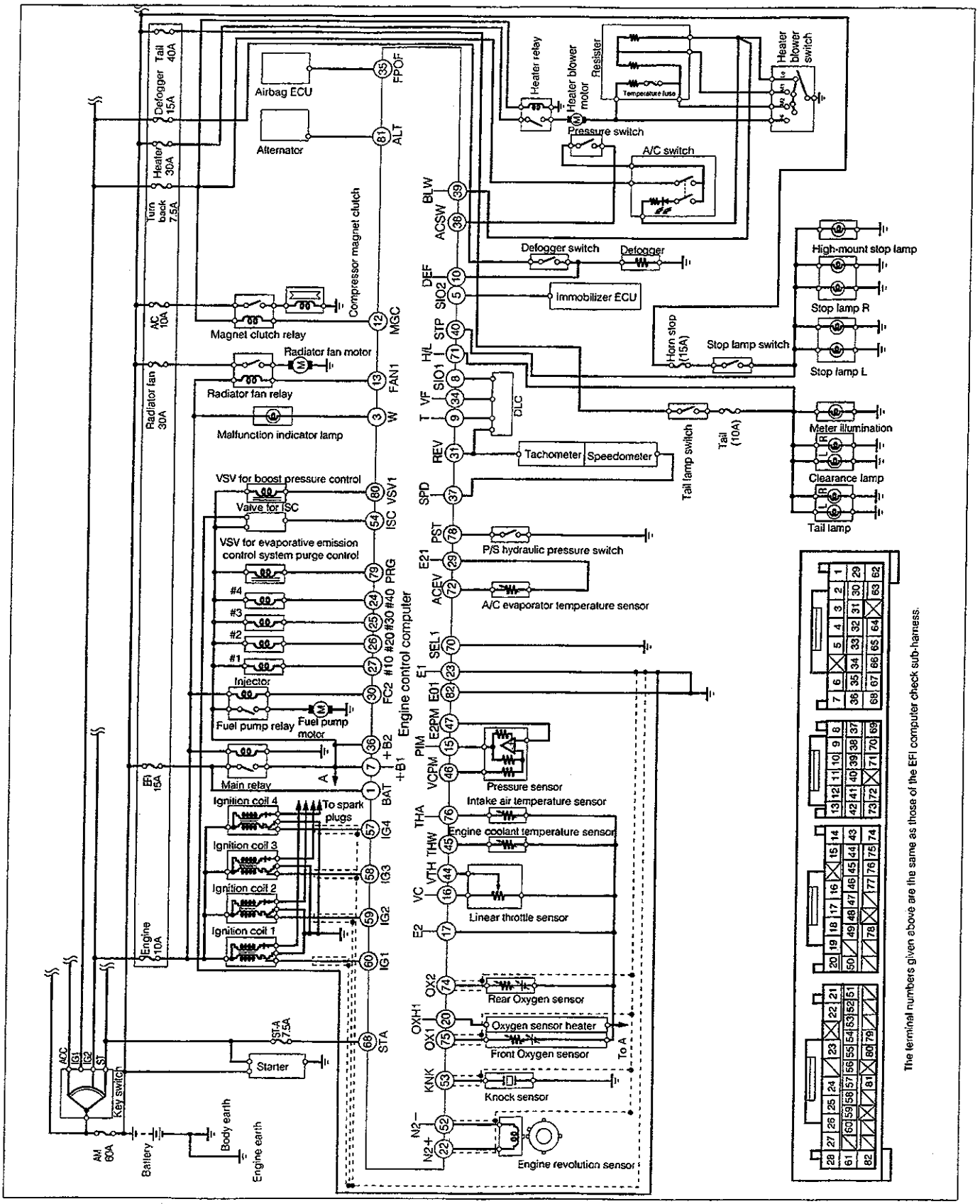
(3) DTC 0300/17, DTC P0301-P0304/17, DTC P0314/-(misfire found)

1-3 SYSTEM WIRING DIAGRAM

1-3-1 FOR EU SPECIFICATIONS



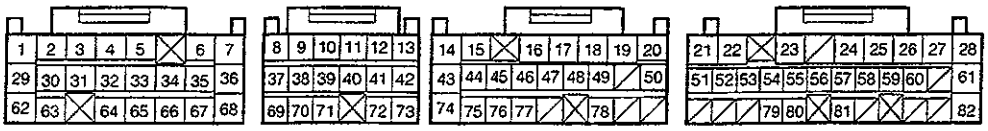
1-3-2 FOR AUS SPECIFICATIONS



1-4 ARRANGEMENT OF ECU TERMINAL

1-4-1 FOR EU SPECIFICATIONS

EFI ECU wire harness side

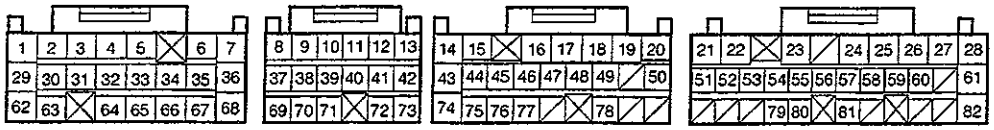


C13E5545S10

No.	Terminal code	Contents of connection	No.	Terminal code	Contents of connection
1	BAT	Back-up power supply	42	–	–
2	–	–	43	IE	Ion current sensor ground
3	W	Malfunction indicator lamp	44	VTH	Linear throttle sensor
4	–	–	45	THW	Engine coolant temperature sensor
5	SIO2	Serial port for IMB	46	VCPM	Manifold absolute pressure sensor power supply
6	–	–	47		Manifold absolute pressure sensor ground
7	+B1	Power supply	48	–	–
8	SIO1	Diagnosis tester	49	–	–
9	T	Test terminal	50	OXH2	Rear oxygen sensor heater
10	DEF	Defogger switch	51	–	–
11	–	–	52	N2–	Engine revolution sensor (–)
12	MGC	A/C Magnet switch	53	KNK	Knock sensor
13	FAN1	Radiator fan relay	54	ISC	Valve for ISC
14	ICMB	–	55	–	–
15	PIM	Manifold absolute pressure sensor	56	–	–
16	VC	Linear throttle sensor power supply	57	IG4	Ignition signal (Cylinder 4)
17	E2	Sensor ground	58	IG3	Ignition signal (Cylinder 3)
18	–	–	59	IG2	Ignition signal (Cylinder 2)
19	–	–	60	IG1	Ignition signal (Cylinder 1)
20	OXH1	Front oxygen sensor heater	61	–	–
21	–	–	62	–	–
22	N2+	Engine revolution sensor (+)	63	–	–
23	E1	Sensor system ground	64	–	–
24	#40	Injector (Cylinder 4)	65	–	–
25	#30	Injector (Cylinder 3)	66	–	–
26	#20	Injector (Cylinder 2)	67	–	–
27	#10	Injector (Cylinder 1)	68	STA	Starter signal
28	–	–	69	–	–
29	E21	A/C Evaporator temp. sensor ground	70	–	–
30	FC2	Fuel pump relay	71	H/L	Tail lamp switch
31	REV	Engine speed signal	72	ACEV	A/C Evaporator temp. sensor
32	–	–	73	–	–
33	–	–	74	OX2	Rear oxygen sensor
34	VF	VF monitor terminal	75	OX1	Front oxygen sensor
35	FPOF	Fuel pump relay	76	THA	Intake air temperature sensor
36	+B2	Power supply	77	–	–
37	SPD	Vehicle speed sensor	78	PST	P/S oil pressure switch
38	ACEV	A/C Evaporator temp. sensor	79	PRG	Evaporative emission control VSV
39	BLW	Heater blower switch	80	VSV1	VSV for boost pressure control
40	STP	Stop lamp switch	81	ALT	Alternator
41	–	–	82	E01	Power suppiy system ground

1-4-2 FOR AUS SPECIFICATIONS

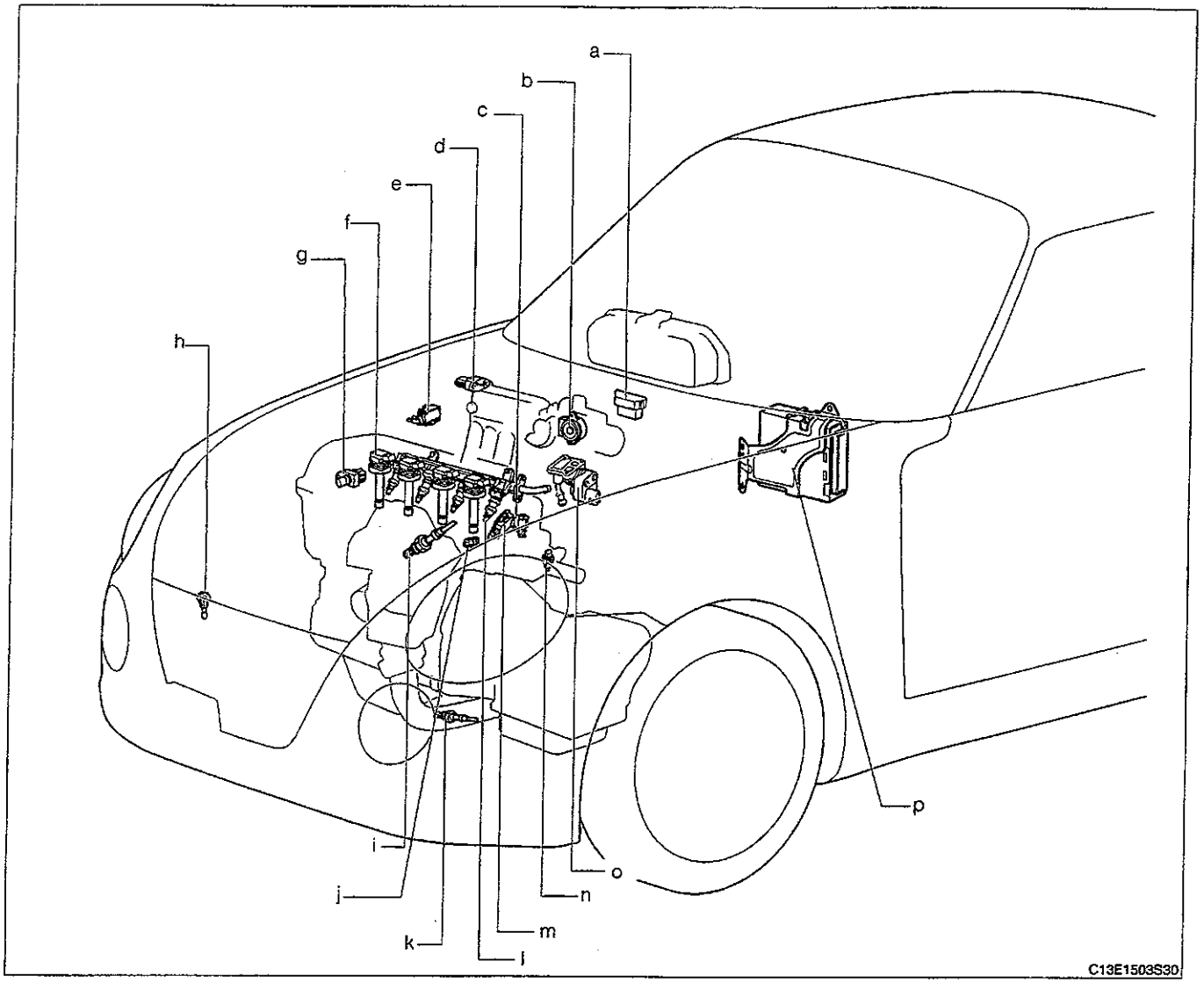
EFI ECU wire harness side



C13E5545S10

No.	Terminal code	Contents of connection	No.	Terminal code	Contents of connection
1	BAT	Back-up power supply	42	–	–
2	–	–	43	–	–
3	W	Malfunction indicator lamp	44	VTH	Linear throttle sensor
4	–	–	45	THW	Engine coolant temperature sensor
5	SIO2	Serial port for IMB	46	VCPM	Manifold absolute pressure sensor power supply
6	–	–	47		Manifold absolute pressure sensor ground
7	+B1	Power supply	48	–	–
8	SIO1	Diagnosis tester	49	–	–
9	T	Test terminal	50	–	–
10	DEF	Defogger switch	51	–	–
11	–	–	52	N2–	Engine revolution sensor (–)
12	MGC	A/C Magnet switch	53	KNK	Knock sensor
13	FAN1	Radiator fan relay	54	ISC	ISC valve
14	–	–	55	–	–
15	PIM	Manifold absolute pressure sensor	56	–	–
16	VC	Linear throttle sensor power supply	57	IG4	Ignition signal (Cylinder 4)
17	E2	Sensor ground	58	IG3	Ignition signal (Cylinder 3)
18	–	–	59	IG2	Ignition signal (Cylinder 2)
19	–	–	60	IG1	Ignition signal (Cylinder 1)
20	OXH1	Front oxygen sensor heater	61	–	–
21	–	–	62	–	–
22	N2+	Engine revolution sensor (+)	63	–	–
23	E1	Sensor system ground	64	–	–
24	#40	Injector (Cylinder 4)	65	–	–
25	#30	Injector (Cylinder 3)	66	–	–
26	#20	Injector (Cylinder 2)	67	–	–
27	#10	Injector (Cylinder 1)	68	STA	Starter signal
28	–	–	69	–	–
29	E21	A/C Evaporator temp. sensor ground	70	SEL1	Signal 1
30	FC2	Fuel pump relay	71	H/L	Tail lamp switch
31	REV	Engine speed signal	72	ACEV	A/C Evaporator temp. sensor
32	–	–	73	–	–
33	–	–	74	OX2	Rear oxygen sensor
34	VF	VF monitor terminal	75	OX1	Front oxygen sensor
35	FPOF	Fuel pump relay	76	THA	Intake air temperature sensor
36	+B2	Power supply	77	–	–
37	SPD	Vehicle speed sensor	78	PST	P/S oil pressure switch
38	ACEV	A/C Evaporator temp. sensor	79	PRG	Evaporative emission control VSV
39	BLW	Heater blower switch	80	VSV1	VSV for boost pressure control
40	STP	Stop lamp switch	81	ALT	Alternator
41	–	–	82	E01	Power supply system ground

1-5 LOCATION OF COMPONENTS



	Part name
a	Data link connector (DLC)
b	Throttle position sensor
c	VSV for evaporative emission control system purge control (VSV for EVAP)
d	Manifold absolute pressure sensor (MAP sensor)
e	VSV for boost pressure control
f	Ignition coil
g	Engine revolution sensor
h	Intake air temperature sensor (IAT sensor)
I	Oxygen sensor
j	Knock sensor
k	Rear Oxygen sensor
l	Injector
m	Ignitor
n	Engine coolant temperature sensor (ECT sensor)
o	Valve for ISC
p	Engine control computer (EFI ECU)

1-6 HOW TO PROCEED WITH TROUBLE SHOOTING

1-6-1 GENERAL INFORMATION

1.The engine and engine control system of this vehicle are controlled by the EFI ECU. Furthermore, the vehicle is provided with the on-board diagnosis system.

Therefore, when any abnormality takes place in the input/output systems (sensors, actuators, harnesses, connectors, etc.) of the engine control system, the EFI ECU memorizes the system concerned and informs the driver by making the malfunction indicator lamp (MIL) illuminate or flash.

Also the malfunction is informed to the operator by means of the malfunction indicator lamp (MIL). When trouble-shooting the engine, it is imperative for you to get the general idea of the onboard diagnostic system, and fully understand the precautionary measures in trouble-shooting, the items diagnostic system, and fully understand the precautionary measures in trouble-shooting, the items to be observed and how to use testers.

Then, conduct the trouble-shooting following the flow chart that indicates the correct procedure for the engine troubleshooting.

(1) ON-BOARD DIAGNOSTIC SYSTEM OF VEHICLES FOR EUROPE

1.The vehicles for Europe have the following functions that comply with the 1999/102/EC (generally called Euro-OBD) standards.

2.When the ignition switch is turned ON, the malfunction indicator lamp (MIL) goes on. When no malfunction has been detected, the lamp will go out after the engine has started. (Check for a blown bulb)

3.While the engine is running, if the EFI ECU detects any malfunction in the emission control system/components that will affect the emissions from the vehicle, or in the power train control components, or if any malfunction is detected in the EFI ECU itself, the EFI ECU illuminates or flashes the MIL (only when misfire is detected which will damage the catalyst). Then, the EFI ECU memorizes the malfunction area (DTC by ISO15031-6/SAEJ2012).

If that malfunction will not occur in three successive running, the MIL is automatically turned off. However, the DTC will be recorded in the EFI ECU memory.

DTC No.	De		Malfunction evaluation method	MIL
P0105/31	Manifold pressure pressure		1 trip	!
P0110/43	Intake air malfunction		1 trip	!
P0115/42	Engine co malfunction		1 trip	!
P0116/42	Engine coo circuit mance		2 trip	!
P0120/41	Throttle/P switch "A"		1 trip	!

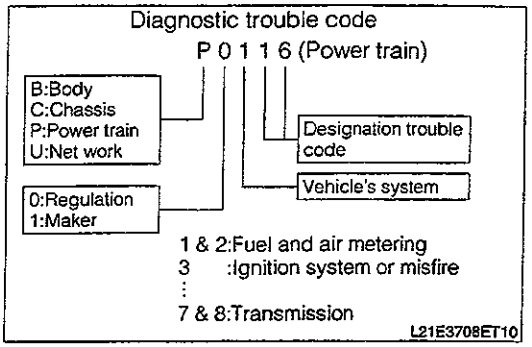
L21E3706ET10

NOTE

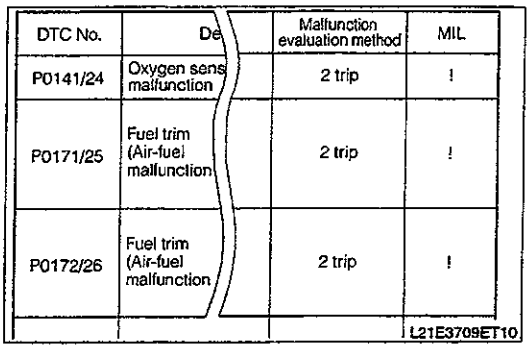
- **The MIL is illuminated only by the malfunction that affects the emissions from the vehicle. (Only items bearing a circle ("O" mark) in the MIL column.)**

4.It is possible to read out various data from the engine ECU by connecting the OBD II generic scan tool which complies with the ISO 14230 format or DS-21 diagnosis tester to the DLC of the vehicle. You can perform trouble-shooting efficiently by checking these data (DTC, freeze-frame data, current data, oxygen sensor monitor data, etc.).

5. The DTC is composed of the ISO standard code (specified by ISO 15031-6) and the manufacturer's designation code. The ISO standard code should be set pursuant to the ISO. On the other hand, the manufacturer's designation code can be freely set forth by the manufacturer within a specified limit.



6. Many DTC have a two trip detection logic which assures avoidance of wrong detection and functions only when a malfunction is surely occurring. However, another diagnosis mode is provided, in which only a one-time final confirmation test is necessary for a service mechanic to confirm that the malfunction has been completely remedied after the repair. The mode can be switched on with the OBD II generic scan tool or the DS-21 diagnosis tester. (In the case of the DS-21 diagnosis tester, the "Continuous monitoring results" of "Vehicle communication in CARB mode" must be selected.)

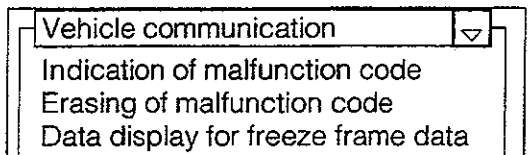


7. When a malfunction is detected, the engine and running conditions at that moment are memorized as a freeze-frame data in the EFI ECU memory.

8. Two trip detection logic

When a malfunction is detected for the first time, that malfunction is temporarily memorized in the engine ECU memory. (First running). If the same malfunction is detected again during the second running, the MIL is illuminated and the DTC is determined. (Second running).

(However, the ignition switch should be turned off between the first running and the second running.)

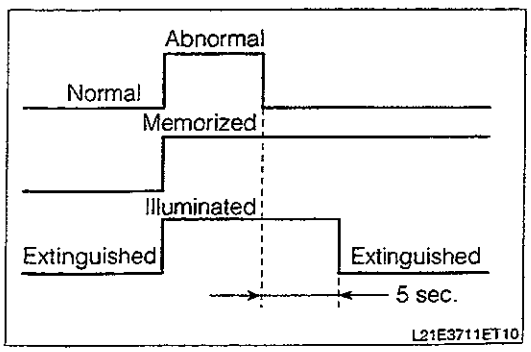


(2) ON-BOARD DIAGNOSTIC SYSTEM OF VEHICLES OTHER THAN THOSE FOR EUROPE

1. When the ignition switch is turned ON, the MIL goes on. When no malfunction has been detected, the lamp will go out after the engine has started. (Check for a blown bulb)

While the engine is running, if the ECU detects any malfunction in the engine control system/components, or if any malfunction is detected in the EFI ECU itself, the EFI ECU illuminates the MIL.

2. In addition to the illumination of the MIL, the corresponding diagnostic trouble code (DTC) is memorized in the engine ECU memory. When the malfunction has been remedied or the system returns to its normal state, the MIL automatically goes out. However, the DTC remains memorized in the engine ECU memory.



3. It is possible to read out various data from the engine ECU by connecting the DS-21diagnosis tester to the DLC of the vehicle. You can perform trouble-shooting accurately and efficiently by checking these data (DTC, freeze-frame data, current data, oxygen sensor monitor data, etc.). (Only when DS-21 diagnosis tester is used)

4.The DTC (diagnostic trouble code) is set to a four-digit code in accordance with ISO standard. Furthermore, the conventional two-digit code is also provided. The four-digit code can be read out by the DS-21 diagnosis tester. The two-digit code has been set forth by the DMC itself. This code can be read by observing the flashing pattern of the MIL.

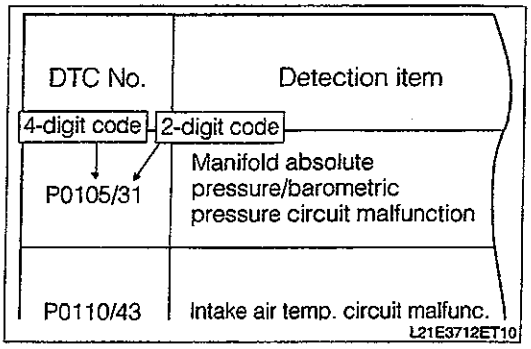
5.Some DTC have a two trip detection logic which assures avoidance of wrong detection and functions only when a malfunction is surely taking place.

6.When a malfunction is detected, the engine and running conditions at that moment are memorized as a freeze-frame data in the EFI ECU memory.

7.Two trip detection logic

When a malfunction is initially detected, that malfunction is temporarily memorized in the engine ECU memory. (First running) If the same malfunction is detected again during the second running, the MIL is illuminated and the DTC is determined. (Second running)

(However, the ignition switch should be turned off between the first running and the second running.)

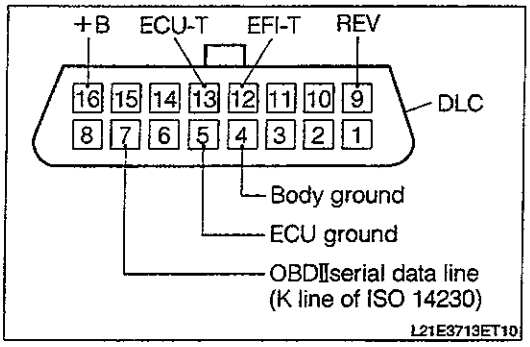


DTC No.	De	Malfunction evaluation method	MIL
P0141/24	Oxygen sens malfunction	2 trip	!
P0171/25	Fuel trim (Air-fuel malfunction	2 trip	!
P0172/26	Fuel trim (Air-fuel malfunction	2 trip	!

L21E3709ET10

1-6-2 DATA LINK CONNECTOR (DLC, COMMON DESTINATIONS)

1.The vehicle engine ECU uses the ISO14230 (Euro-OBD) protocol. As regards the position, connector shape and pin arrangement, the DLC is in accordance with the ISO 15031-3 (SAEJ1962) and has complied with the ISO14230 format. The OBD II serial data line (K line of ISO14230) is used for the OBD II generic scan tool or the DS-21 diagnosis tester in order to communicate with the ECU.

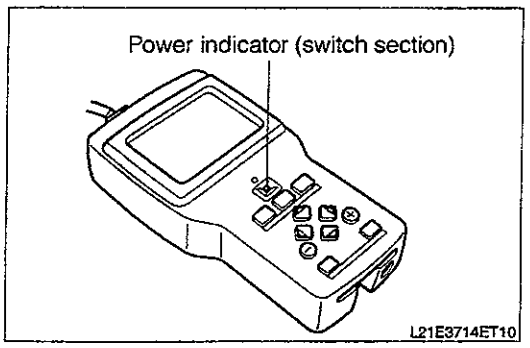


CAUTION

- **With the cable of the DS-21 diagnosis tester connected to the DLC through the SST, turn ON the ignition switch. If the power indicator of the tester will not go on, conduct the following checks and repair any malfunctioning parts.**

SST: 09991-87404-000

2.Connect the DS-21 diagnosis tester to another vehicle. Turn ON the ignition switch.



1-6-3 CONNECTING PROCEDURE FOR SST (EFI COMPUTER CHECK SUB-HARNESS)

1.When the EFI ECU terminal voltage is measured with the EFI ECU connector connected to the engine ECU, connect the SST, following the procedure given below.

NOTE

- The terminal number of the SST connector is the same as the EFI ECU connector.

2.Turn OFF the ignition switch. Disconnect the battery negative terminal with the ignition switch turned OFF.

CAUTION

- Be sure to memorize the diagnostic trouble code before disconnecting the battery negative terminal. Otherwise, the diagnostic trouble code(s) will be erased by disconnecting the battery negative terminal.

3.Remove the glove compartment sub assembly.

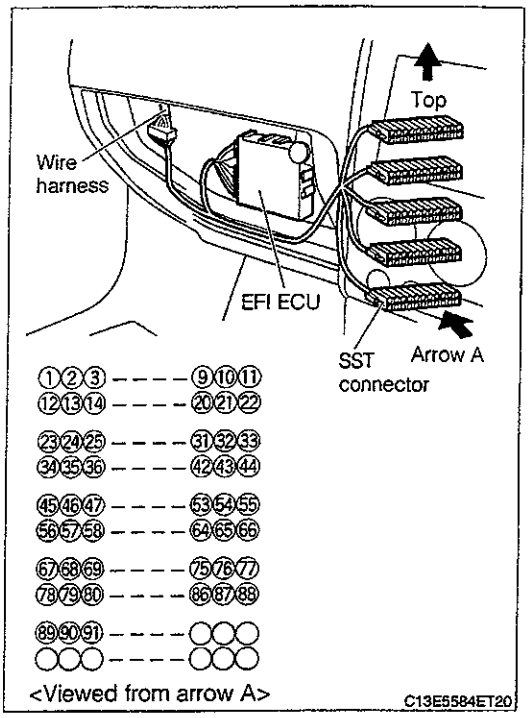
4.Disconnect the wire harness connectors from the EFI ECU connectors at the cowl side of the passenger seat.

5.Connect the following SST between the wire harness connectors and the EFI ECU connectors.
SST: 09842-97203-000

6.Reconnect the battery negative terminal.

CAUTION

- When disconnecting or reconnecting the EFI ECU connectors, be sure to disconnect the battery negative terminal with the ignition switch and all accessory switches in the off state.
- When installing a new battery, care must be exercised not to mistake the battery polarity. Failure to observe this caution could cause EFI ECU malfunction.
- Before using the SST, be sure to check to see if short circuit or open wire exists between the terminals of the SST.



1-6-4 TROUBLE-SHOOTING PROCEDURE

(1) Discription

1.The engine control system is equipped with diagnosis functions whose are capable of diagnosing malfunctioning sections. These functions give important clues in trouble-shooting. The flow chart on the next page shows how to proceed with trouble-shooting by using these diagnosis functions.

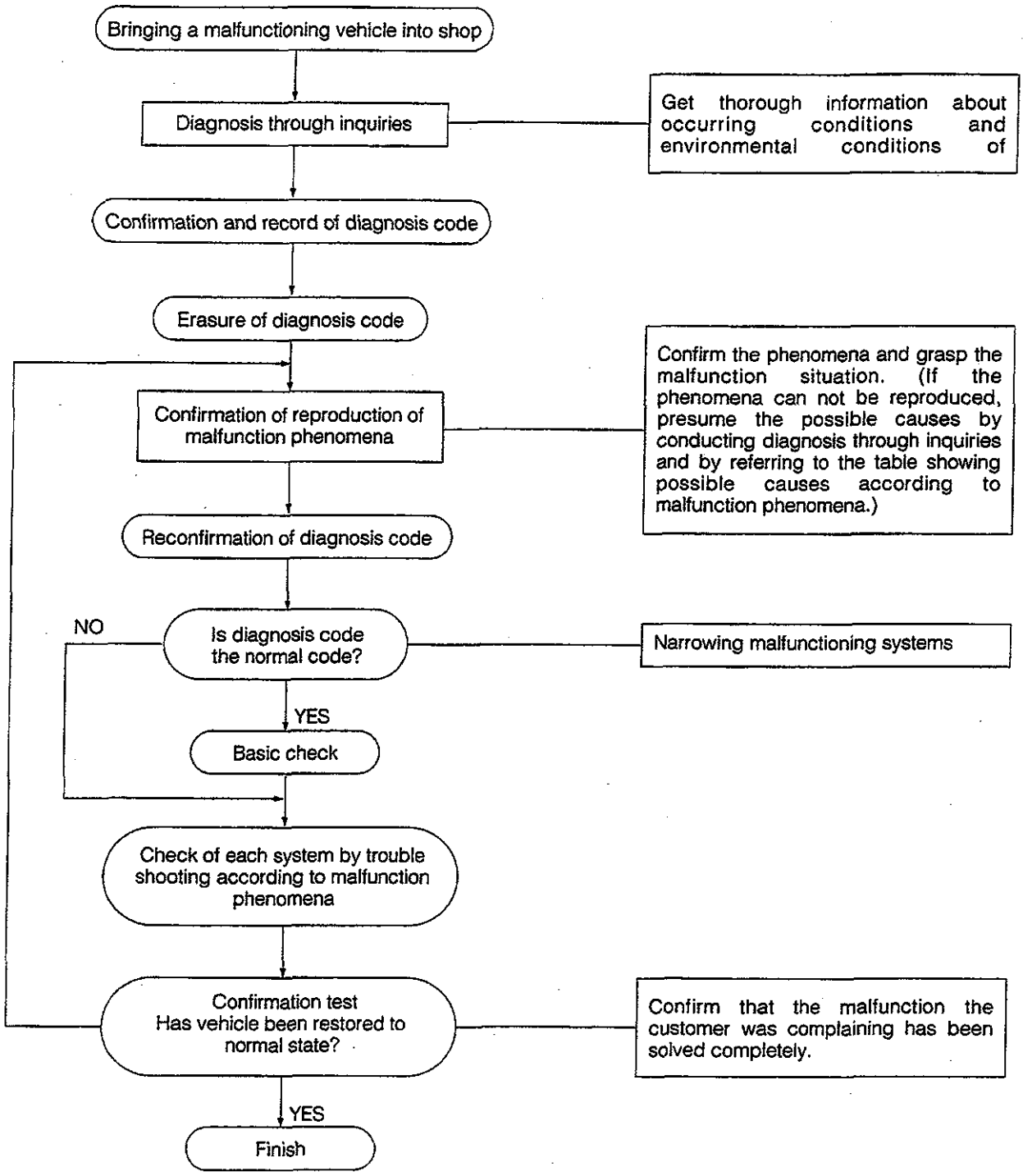
The flow chart shows how the diagnostic trouble code check can be used effectively. Moreover, when its results are fully reviewed, you can determine whether you are going to do the trouble-shooting according to diagnostic trouble codes or the trouble-shooting according to malfunctioning phenomena.

The diagnosis of this system is equipped with a battery back-up function (a function which supplies power for diagnosis memory even if the ignition switch is turned OFF.)

NOTE

- When no DS-21 diagnosis tester or OBD-II generic scan tool is used, the DTC or freeze-frame data in the flow chart can not be read out.

ENGINE DIAGNOSIS FLOW CHART



L21E3716ES48

(2) INQUIRY

① Discription

1.In your attempt to remove the causes for a malfunction of the vehicle, you will not able to remove the causes unless you actually confirm the malfunctioning phenomenon. No matter how long you continue operations, the vehicle may not resume the normal state unless you confirm the malfunctioning phenomenon. The inquiry with the customer is a vital information collecting activity which is to be conducted previous to the confirmation of malfunctioning phenomenon.

2.This inquiry will provide you with an important clue in an effort to reproduce the malfunctioning phenomenon. Furthermore, the information obtained by the inquiry can be referred to during the trouble-shooting. Hence, instead of making general questions, it is necessary to focus your questions on the items related to the malfunction.

3.The following five main points of the inquiry given below are the most important points in analyzing the malfunction. In some cases, the information about malfunctions whose took place in the past and about the history of previous repairs, which seem to have nothing to do with the current malfunction, may prove to be helpful in solving the malfunction.

Hence, it is important to obtain as much information as possible and keep them accurately in mind as reference information when trouble-shooting the malfunctioning phenomenon.

1-7 INQUIRY

1.If you make an inquiry sheet in advance, as shown in the example below, you can completely make all necessary inquiries. The following shows a standard form. This should be altered according to the characteristic of conditions of each market.

[INQUIRY SHEET]

Inquiry sheet				
Name of customer		Vehicle model	Engine - N/A, T/C, S/C, carburetor, EFI, LPG	Transmission - 4M/T, 5M/T, 2WD, 4WD 2A/T, 3A/T, 4A/T
Details of vehicle	Frame No.	Registration date · ·	Date of malfunction · ·	Running distance km
	Equipment:			
	[Sex] of customer (driver) Male Female	[Age] Approx.	[Occupation]	[Places where vehicle is mainly used] Urban district/suburb/seacoast/mountain/others / [Parking place] Outdoor/indoor
Symptom	Poor starting	• No initial explosion takes place. • Explosion is incomplete although initial explosion takes place • Hard starting (cold engine, hot engine, always) • No cranking takes place. • Other ( )		
	Faulty idling	• Fast idling ineffective • Idling speed too low • Idling speed too high • Idling unstable (cold engine, hot engine, always) • Other ( )		
	Poor drive-ability	• Hesitation (during start, during acceleration, during deceleration, during a certain period) • Knocking • Backfire • Lack of power • Poor acceleration • Poor blow • Other ( )		
	Engine stall	• During idling (during warming up, after warming up) • At time of starting • During running ( ) • Immediately after vehicle stops (Re-start possible, Re-start impossible) • Under loaded state (Air conditioner, electric load, power steering) • Other ( )		
From when malfunction has started?		• Since vehicle was purchased as a new car • Recently (since what year/ month)		
Frequency of occurrence		• At all times • Under a certain condition ( ) • Sometimes		
Meteorological conditions	Weather	• At all times • Fine • Cloudy • Rain • Snow • Other ( )		
	Temperature	• Temperature (about °C) (Spring, summer, autumn, winter)		
Engine condition		• When cold • After warming-up • During warming-up (Water temperature about °C)		
Road		• Urban district • Suburb • Highway • Mountainous road (Uphill, downhill)		
Driving conditions		• No relation • During racing under no load • During running (Vehicle speed: km/h, Engine speed: rpm, MT Which gear?) • During turn (right curve, left curve)		
Other situations				

State of malfunction indicator lamp (MIL)	• Illuminated or flashing at all times • Illuminated or flashing sometimes • Will not go on.	
Indication of DTC • Reading out by using OBDII generic scan tool or DS-21 diagnosis tester • Reading-out of MIL flashing pattern by shorting terminal T	During checking	• Normal • Malfunction code ( )
	2nd time	• Normal • Malfunction code ( )

1-8 SYMPTOM CONFIRMATION

1-8-1 CONFIRMATION OF REPRODUCTION OF MALFUNCTIONING PHENOMENA

1. In the course of trouble-shooting, the operator can not pinpoint the cause for the malfunction unless he confirms the phenomenon. For this purpose, it is indispensable to reproduce the malfunctioning phenomenon by creating conditions and environments that are similar to those customer.
2. As for phenomena whose can not be reproduced easily, it is necessary to produce running conditions that are similar to those when the malfunction occurred (road surface condition, weather condition, driving condition). For this end, it is of great importance to try to reproduce the conditions that are similar to those when the malfunction occurred (road surface condition, weather relays by hand), heat (applying hot air) and water (applying moisture).
3. Vibration, heat or moisture can constitute causes for malfunction that are difficult to reproduce.
4. Therefore, with the vehicle in a stationary state, you can perform the following malfunction reproduction simulation tests given below.

   Moreover, if you presume a section (part) which can cause a malfunction and connect a tester, etc. to that section so as to confirm the malfunctioning phenomenon, you can also achieve a function to that section so as to confirm the malfunctioning phenomenon, you can also achieve a function evaluation of that section (part).

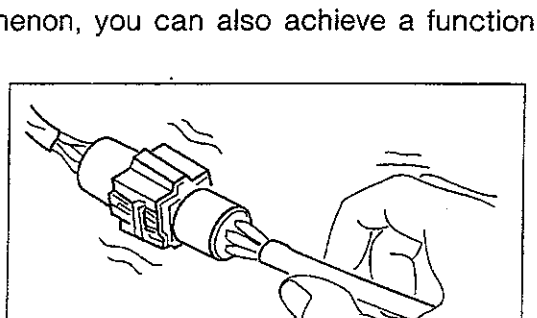
(1) MALFUNCTION REPRODUCTION SIMULATION TEST METHODS

① Vibration method:

1. When vibration is thought to be the main cause

(1) Connector

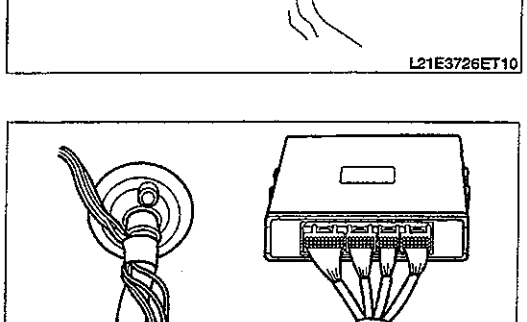
Lightly shake the connector vertically and laterally.



(2) Wire harness

Lightly shake the wire harness vertically and laterally.

The points to be checked are connector joints, the vibrating point and the section where the wire harness is passing through the body.

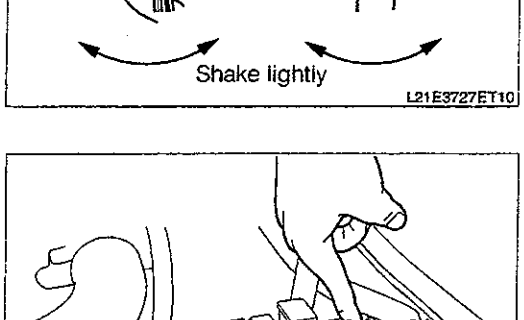


(3) Parts, sensors

With your finger, apply light vibrations to a part of the sensor which is presumed to be the cause for the malfunction. Check to see if the malfunction is reproduced.

NOTE

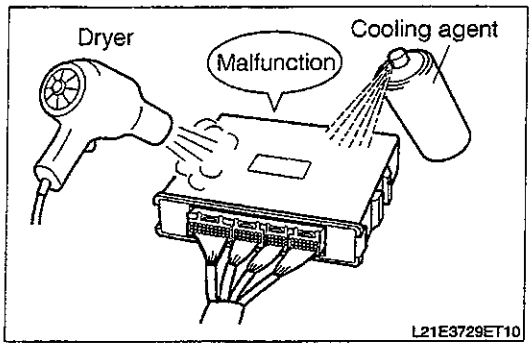
- Be careful not to apply too strong vibration to a relay, for it can cause an open wire in the relay.



② **Cool/hot method:**

1.When a suspected section is likely causing the malfunction when it is cold or hot.

(1) Heat a component which is presumed to be causing the malfunction by using a dryer or the like. Check to see if the malfunction occurs.



CAUTION

- Do not heat the section beyond 60°C. (Temperature limit to assure that no damage be made to the component.)
- Do not directly heat the parts inside the ECU.

③ **Water applying method:**

1.When the malfunction is believed to occur on rainy days or under humid conditions. Apply water to the vehicle. Check to see if the malfunction occurs.

NOTE

- Never apply water directly to the engine compartment. By applying water to the front of the radiator, you can indirectly change the temperature and humidity.
- Never apply water directly to the electronic parts.
- If rain leaks into the vehicle compartment, rain may get into the inside of the ECU through the wire harnesses. If the vehicle has experienced any rain leakage before, utmost attention must be paid in respect to this point.

1-8-2 RECHECK AND MAKING RECORD OF DTC/FREEZE-FRAME DATA

1.By checking the DTC/freeze-frame data after confirming the reproduction of the malfunctioning phenomenon, it is possible to judge whether the system related to the DTC that was indicated before confirmation of the reproduction is now functioning properly or not. Then, you are to proceed to one of the following three steps.

2.When a DTC was indicated at the time of checking the DTC and the same DTC is indicated after the confirmation of reproduction of the malfunction, it indicates that the malfunction is still persisting in the diagnosis circuit. Proceed to the trouble-shooting according codes.

3.When no abnormal code is indicated, although the occurrence of malfunction was observed during the confirmation of reproduction of malfunction, a malfunction other than those related to the diagnosis system is likely taking place. Proceed to the trouble-shooting according to malfunctioning phenomena.

4.When no malfunction is observed during the confirmation of reproduction of malfunction, and the normal code is indicated at the check of the DTC, it is presumed that an abnormality, such as poor contacts at the harnesses and connectors, occurred in the past, but now they are functioning properly. Check the harnesses and connectors of those systems related to the DTC that was indicated before the confirmation of reproduction of the malfunctioning phenomenon.

1-9 CONFIRMATION, RECORD AND ERASURE OF DIAGNOSIS CODE

1-9-1 CHECKING METHOD OF DIAGNOSIS

1.Prior to the check, check the malfunction indicator lamp (MIL), following the procedure given below.

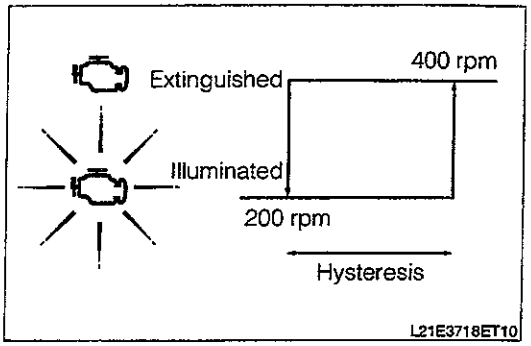
2. CHECK OF MALFUNCTION INDICATOR LAMP

(1) Ensure that the malfunction indicator lamp goes on when the ignition switch is turned ON, but with the engine not running.

NOTE

- **If the malfunction indicator lamp (MIL) fails to go on, perform the trouble-shooting for the combination meter.**

(2) Ensure that the malfunction indicator lamp goes out when the engine starts. If the lamp remains illuminated or is flashing, the diagnosis system is detecting a malfunction. Therefore, a DTC is memorized in the EFI ECU. If no DTC is memorized in the EFI ECU, perform the trouble-shooting for the malfunction indicator lamp circuit.



(1) CHECK OF DTC, USING DS-21 DIAGNOSIS TESTER OR OBD II GENERIC SCAN TOOL

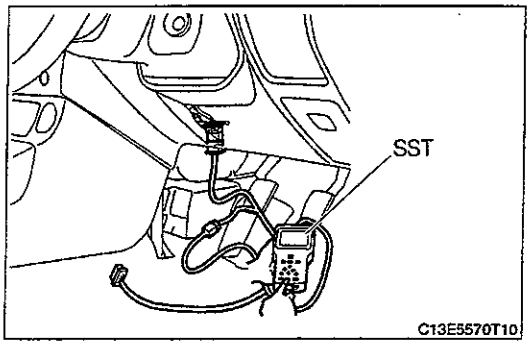
1.Prepare the DS-21 diagnosis tester or OBD II generic scan tool.

2.Connect the DS-21 diagnosis tester or the OBD II generic tester to the data link connector (DLC) located at the lower section of the instrument panel on the driver's seat side. At this time, the DS-21 tester should be connected to the DLC with the following SST interposed, and the OBD II generic tester should be connected directly

SST: 09991-87404-000

NOTE

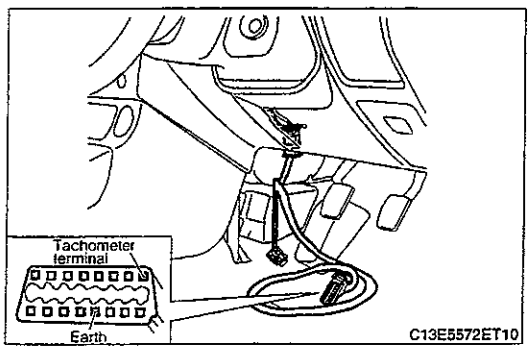
- **When DS-21 diagnosis tester or OBD-II generic scan tool is used, refer the instruction manual for each tester.**



(2) CHECK OF DTC WITHOUT USING DS-21 DIAGNOSIS TESTER OR OBD II GENERIC SCAN TOOL

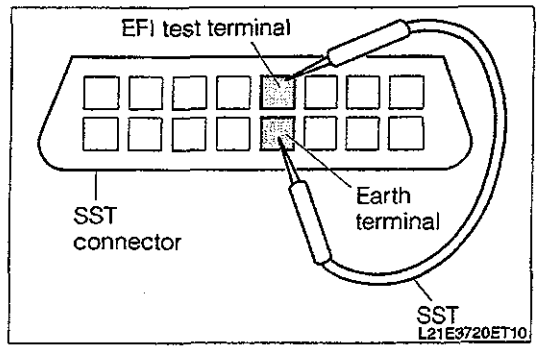
1.With the ignition switch turned OFF, connect the following SST to the data link connector (DLC) located at the lower section of the instrument panel on the driver's seat side.

SST: 09991-87404-000

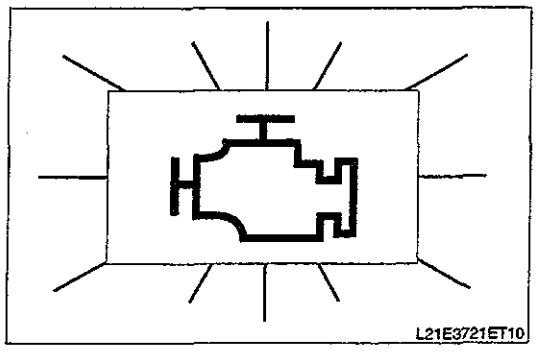


2.Connect the terminal between the EFI-T terminal and the earth terminal of the SST connector with a jump wire as indicated in the illustration.
SST: 09991-87403-000

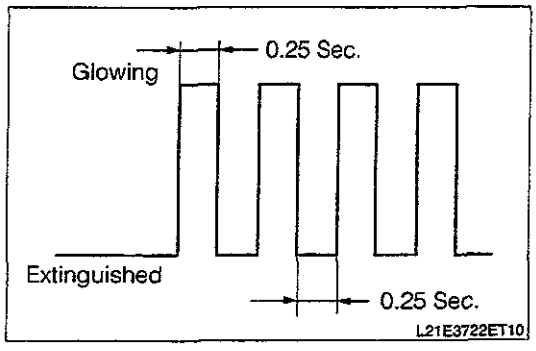
3.Turn the ignition switch to the "ON" position. At this time, be careful not to start the engine.



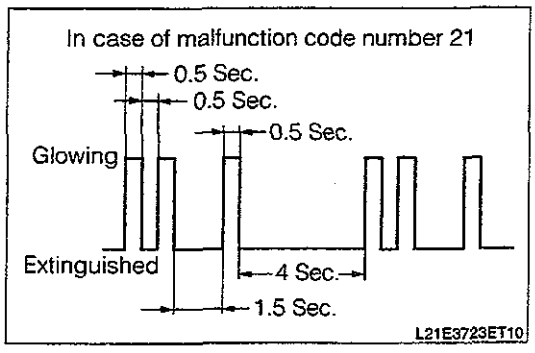
4.Read out the diagnostic trouble code (DTC) by observing the flashing number of the malfunction indicator lamp.



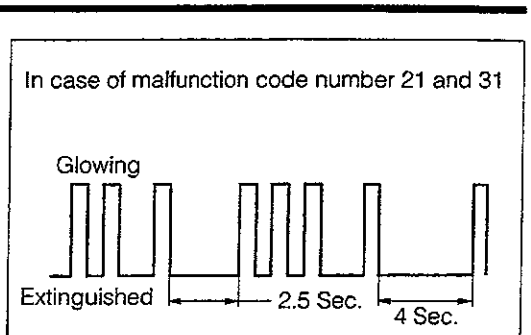
5.The illustration shows an example of the flashing pattern of the normal code. The malfunction indicator lamp glows for 0.25 second, right after the ignition switch has been turned ON. After a lapse of 0.25 second, the malfunction indicator lamp again glows for 0.25 second. Then, this pattern will be repeated.



6.The illustration shows an example of the flashing pattern of the code No. 21. The diagnostic trouble code is composed of two digits. These two numbers are indicated by blinking of the malfunction indicator lamp. Four seconds after the ignition switch has been turned ON, the malfunction indicator lamp indicates first the number of the tens digit of the diagnostic trouble code by glowing the same times as the number. The lamp glows for 0.5 second each time and then it is extinguished for 0.5 second. After a pause of 1.5 seconds, the lamp indicates the number of the units digit of the diagnostic trouble code by glowing the same times as the number. The lamp glows for 0.5 second each time and then it is extinguished for 0.5 second. Then, this pattern will be repeated after a pause of 4 seconds.



7.The illustration shows an example of the flashing pattern of the codes No. 21 and 31. In cases where plural malfunction codes have been detected, the two-digit diagnostic trouble codes are indicated in the sequence of the code number, starting from a smaller number. Each diagnostic trouble code is indicated in the above described pattern. A pause of 2.5 seconds occurs between the outputs of respective diagnostic trouble codes, thus separating one from the others. After all of the plural diagnostic trouble codes that have been detected are indicated, the malfunction indicator lamp is extinguished for four seconds. Then, the detected plural diagnostic trouble codes will be indicated again.



8.For the details of malfunctions, refer to the DTC chart.
Refer to Page B8-32.

9.After completion of the check, disconnect the jump wire and turn OFF the ignition switch. Then, disconnect the SST from the DLC.

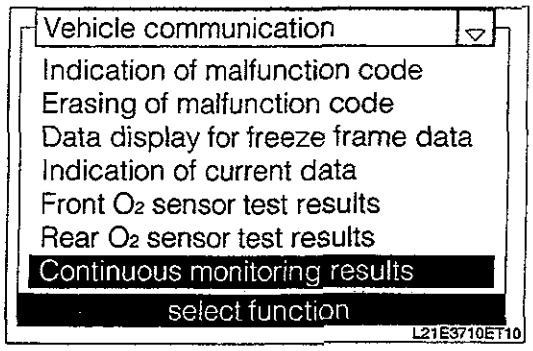
NOTE

- **In cases where plural malfunction codes have been detected, the indication will be made progressively, starting from the smaller number to the larger number.**
- **In cases where the DS-21 diagnosis tester or the OBD II generic scan tool is not used, it is impossible to take a reading of unidentified two-trip DTC from the SST connector.**
- **When malfunctioning phenomena are to be reproduced without using the DS-21 diagnosis tester or OBD II generic scan tool, follow the procedure given below to detect the DTC.**

(1) It is assumed that two trip detection logic is used for the DTC detection.
(2) Therefore, after a malfunctioning phenomenon is first reproduced, turn OFF the ignition switch.
(3) Then, repeat the same reproduction procedure once again.
(4) When the malfunction is reproduced again, the malfunction indicator lamp goes on and the DTC is memorized in the engine ECU. For reading out of the DTC.

NOTE

- When malfunctioning phenomena are to be reproduced with the DS-21 diagnosis tester or OBD II generic scan tool connected to the DLC, the "Continuous monitoring results" function can be used. (In the case of the DS-21 diagnosis tester, select the "Continuous monitoring results" of the "Vehicle communication" in CARB mode.) This function makes it possible to indicate the DTC when the malfunctioning phenomenon is first reproduced. (Request of onboard monitoring test results of ISO 15031-5 Continuous monitoring system.)



1-9-2 CANCELING METHOD OF DIAGNOSIS

1.The DTC and freeze-frame data can be erased through the following methods.

(1) The DS-21 diagnosis tester or OBD II generic scan tool is used to erase the DTC. (For the operating procedure, refer to the instruction manual.)

(2) The power supply to the EFI ECU is shut off to erase the DTC without using the DS-21 diagnosis tester or OBD II generic scan tool. (Disconnect the battery negative terminal or detach the EFI fuse.)

(1) WHEN DS-21 DIAGNOSIS TESTER OR OBD II GENERIC SCAN TOOL IS USED:

1.In the same way as the check of DTC, connect the DS-21 diagnosis tester to the data link connector (DLC) with the following SST interposed. Or, connect the OBD II generic scan tool directly.

SST: 09991-87404-000

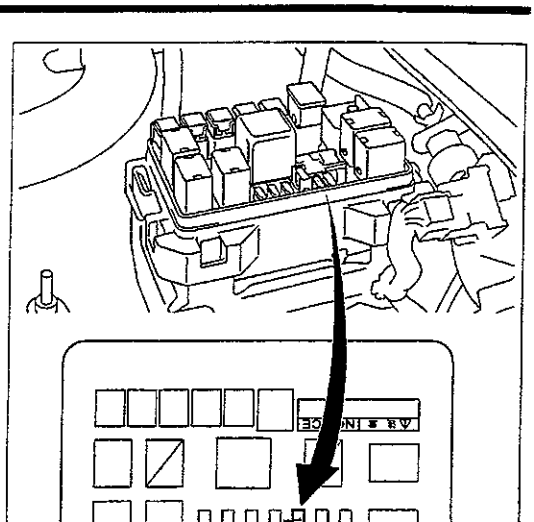
NOTE

- When DS-21 diagnosis tester or OBD-II generic scan tool is used, refer the instruction manual for each tester.

① WHEN DS-21 DIAGNOSIS TESTER OR OBD II GENERIC SCAN TOOL IS NOT USED:

1.Erasure by disconnecting EFI fuse

To erase the diagnostic trouble codes (DTC) memorized in the ECU after malfunctions have been repaired, disconnect the EFI fuse from the relay block for at least 30 seconds with the ignition switch turned OFF. [When ambient temperature is about 20°C.



NOTE

- It is possible to complete this erasing for approximately 30 seconds. In some cases, however, it may take longer. Furthermore, the erasing can be made by disconnecting the circuit, such as the battery power supply and fusible link. In cases where the battery terminal is to be disconnected, record the radio channels in advance. After completion of the operation, set the radio channels the same as before.
- In cases where the same malfunction (DTC) cannot be detected again during the 40 cycles of the engine warming-up, the DTC and freeze-frame data will be automatically erased from the ECU memory. (Only in the case of vehicles with EU specifications)
- Warming-up cycle
- The warming-up cycle refers to a driving cycle that sufficiently allows the water temperature to rise by at least 22°C above the temperature at the time of engine starting and to reach at least 70°C.
- Driving cycle
- The driving cycle consists of the engine starting and engine stopping.

1-10 BASIC CHECK

1-10-1 BASIC ENGINE CHECK FLOW CHART

1.When the ECU is detecting no DTC during the reproduction test of malfunctioning phenomena and when no abnormality is found by the visual inspection, it is necessary to progressively perform the trouble-shooting for circuits which are most likely causing the malfunctions.

2.In many cases, sections causing malfunctions can be narrowed down quickly and effectively by performing the basic engine check indicated in the following flow chart. Therefore, it is very important to perform this check for the engine trouble-shooting.

(1) BASIC ENGINE CHECK

➤1. Check the battery voltage.

1.Is the battery voltage 11 V or more with the engine in a stopped state?

YES: Go to ➤2.

NO: Charge the battery or replace it.

➤2. Check the engine cranking.

1.Does the engine crank?

YES: Go to ➤3.

NO: Go to "Matrix Table for Trouble-Shooting According to Malfunctioning Phenomena".

Refer to Page B8-39.

➤3. Check the engine starting.

1.Does the engine start?

YES: Go to ➤4.

NO: Go to ➤6.

➤4. Check the engine idle speed.

1.Warm up the engine, until the engine water temperature reaches 90°C or more.

2.Turn OFF all electric load switches (including A/C switch).

3.Set the transmission to neutral.

4.Connect the DS-21 tester to the DLC with the SST interposed, or connect the general-purpose tester to the DLC directly. Then, check the idle speed.

SST: 09991-87404-000

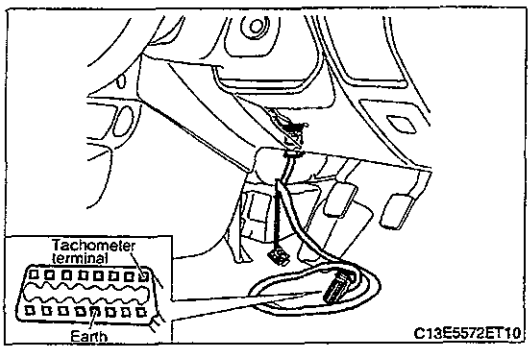
5.When the DS-21 or general-purpose tester is not used, connect a tachometer to the Tachometer terminal.

SPECIFIED VALUE: 750^{+100}_{-50} rpm

YES: Go to ➤5.

NO: Go to "Matrix Table for Trouble-Shooting According to Malfunctioning Phenomena".

Refer to Page B8-39.

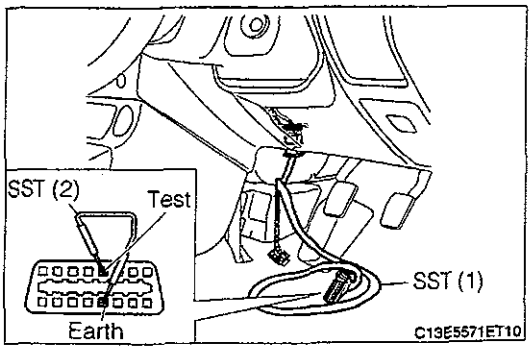


➤5. Check the ignition timing.

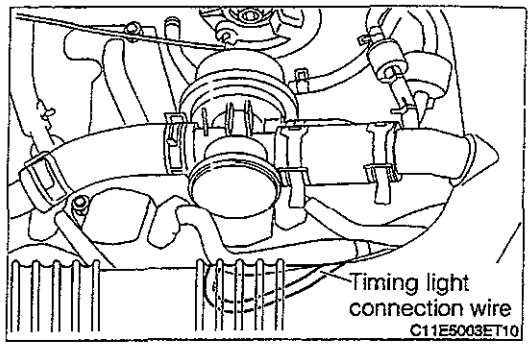
1.When the DS-21 diagnosis tester is not used, connect the terminal T of the SST connector to the earth terminal, using a jump wire.

SST: 09991-87403-000

2.When the DS-21 diagnosis tester is used, select the "Engine adjustment" on the course menu so as to connect the EFI- T terminal.

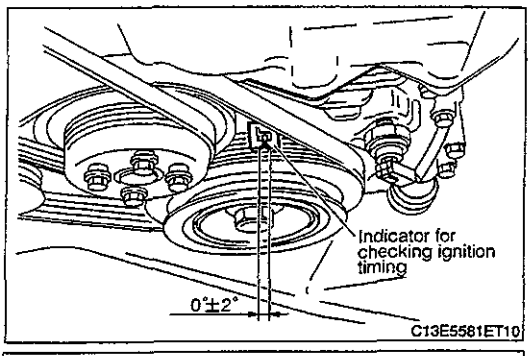


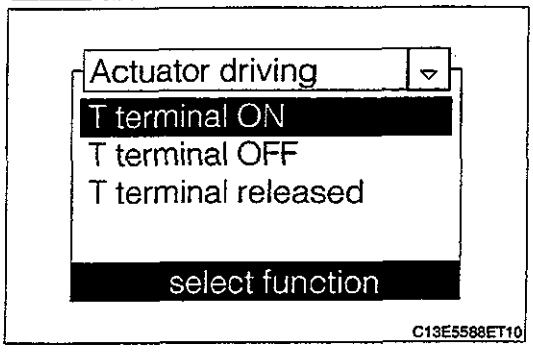
3.Attach the clip of the timing light to the wire harness for timing light connection wire.



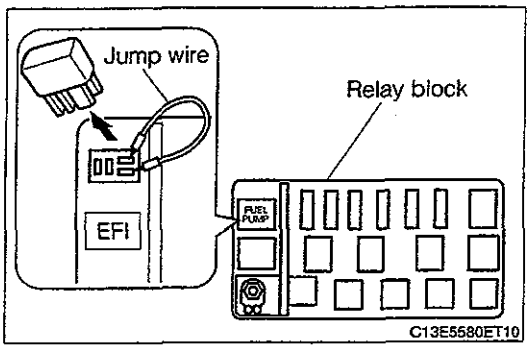
4.Is the timing mark of the crankshaft within a range of the indicator for ignition timing check provided on the timing chain cover?
SPECIFIED VALUE: 0° ± 2°(BTDC)
5.Are the check results OK?
YES: Go to "Matrix Table for Trouble-Shooting According to Malfunctioning Phenomena".
Refer to Page B8-39.

NO: Check the timing chain for wrong assembling. Also, check the plunger protruding amount of the tensioner.

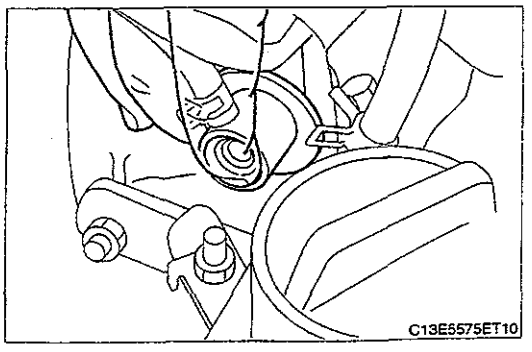




➤6. Fuel pressure check (simple check).
① **When DS-21 diagnosis tester is not used:**
1.Ensure that the fuel tank is filled with sufficient fuel.



2.Remove the fuel pump relay and connect a jump wire, as indicated in the illustration.
SST: 09991-87403-000
3.Check that the pulsation damper screw rises when the ignition switch is turned ON.

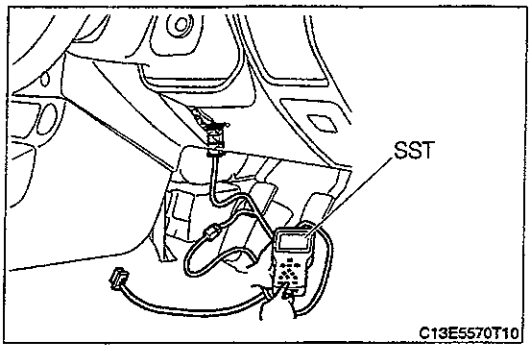


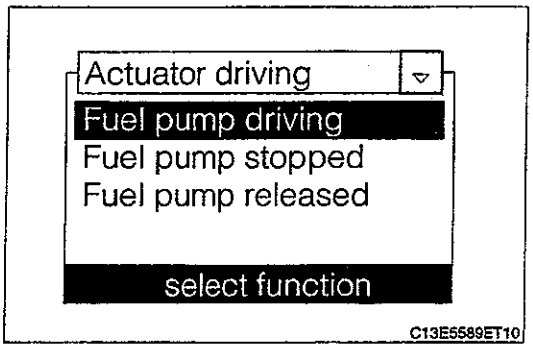
② When DS-21 diagnosis tester is used:

1.Connect the DS-21 diagnosis tester to the DLC with the SST interposed.
SST: 09991-87404-000

2.Turn ON the ignition switch. Then, select the "Fuel pump driving" of the actuator driving among the individual functions so as to drive the fuel pump.

3.Does the pulsation damper screw rise?
YES: Go to ➤1.
NO: Go to "Check of Fuel Pump and F/P Regulator".
Refer to Page B8-138.





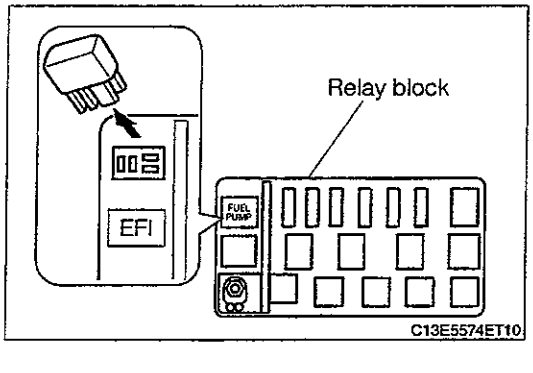
➤1. Spark check.

1.Remove the fuel pump relay from the relay block.
2.Remove the IG coils and spark plugs (all cylinders #1, 2, 3 and 4).
3.Disconnect the fuel pump relay
4.Disconnect the connector of the injector.

CAUTION

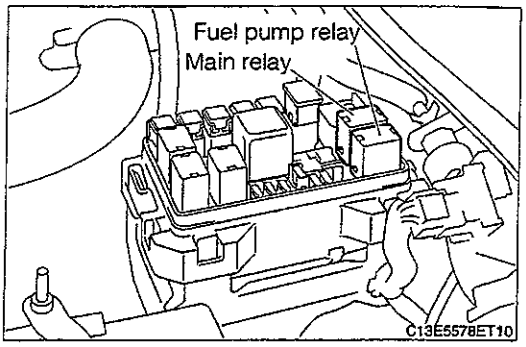
- **Stop the fuel injection by the operations at Steps 3 and 4 above so as to prevent the catalyst from being damaged by unburnt gas, etc.**
- **When there is no fuel, the injector injection must be avoided wherever possible, as this may damage the injector.**

5.Install the spark plug to the IG coil. Connect the IG coil connector to the IG coil.
6.Ground the spark plug.
7.Crank the engine. At this time, check to see if each spark plug sparks.
8.Is it in a good condition?
YES: Go to ➤2.
NO: Go to Check of IG System.



➤2. Confirmation of operation of fuel injector.

1.Install the spark plugs, IG coils and fuel pump relay. Connect the connector of the IG coil.
2.Using a sound scope, check each injector for operation sound while the engine is being cranked or idling.
3.Can you hear operator sound of all injectors?
YES: Go to ➤3.
NO: Go to "Check of Fuel Injector Circuit".
Refer to Page B8-78.



➤3. Inspection of compression pressure.
1.Warm up the engine.
2.With the IG switch turned OFF, remove all of the IG coils and spark plugs.
3.Temporarily remove the main relay and fuel pump relay.
4.Insert a compression gauge into the spark plug hole.
5.Depress the accelerator pedal fully.
6.While cranking the engine, measure the compression pressure.
7.Repeat the steps 4, 5 and 6 to perform the measurement for all cylinders.

NOTE
- Be sure to use a fully-charged battery. Also the measurement should be performed in the shortest possible length of time.

8.Are the check results OK?
YES: Go to ➤4.
NO: Perform the checks, referring to the section ENGINE MECHANICAL.

➤4. Inspection of idle CO and HC concentrations.
1.Warm up the engine completely.

NOTE
- Warm up the engine, until the fan motor starts to operate.

2.Measure CO and HC concentrations at idle speed.

CO concentration	Not to exceed 0.3 %
HC concentration	Not to exceed 300 ppm

3.Are the check results OK?
YES: Go to "Matrix Table for Trouble-Shooting According to Malfunctioning Phenomena". Refer to Page B8-39.

NO: Perform the checks, referring to the section ENGINE MECHANICAL.

(2) CHECK OF WIRE HARNESSES AND CONNECTORS

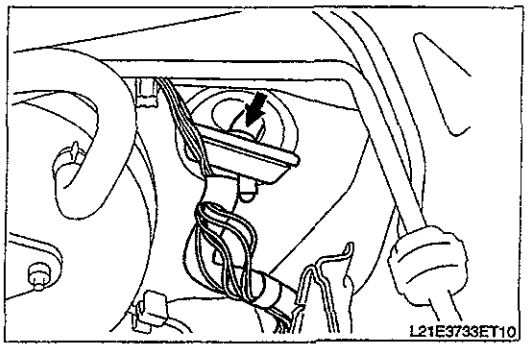
1.Check of open wire

This is caused by detached wire harness, poor contact inside the connector, detached connector terminal, and so forth.

NOTE
- The wires are rarely cut at the center. In most cases, an open wire occurs at the connectors. Particularly, the connectors of the sensor and actuator should be checked very carefully.
- Poor contact is caused by rust formation at the connector terminal, foreign substances adhered to the terminal, or drop in the contact pressure between the male and female terminals of the connector.
- Simply disconnect the connector once, and then, reconnect it. It may change the contacting condition, thus returning to the normal operation. Hence, if no abnormality was found when the wire harness and connector were checked during the trouble-shooting, and if the malfunction ceases to exist after completion of the checks, then the wire harness or connector was most likely causing the malfunction.

2.Check of short circuit

This is caused by a short circuit between the wire harness and the body ground or by an internal short circuit of the switches, etc.

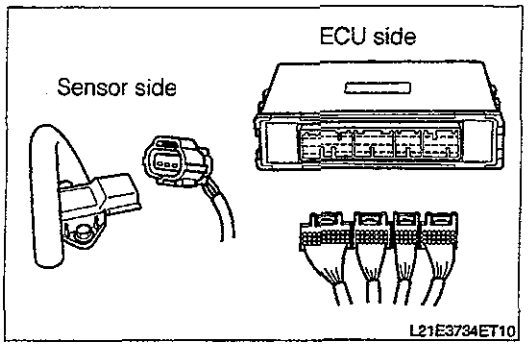


NOTE

- If a short circuit is present between the wire harness and the body ground, thoroughly check to see if the wire harness is caught in the body, if the wire is rubbed and the insulator section is ruptured, thus contacting other parts, and if the wire is clamped properly.

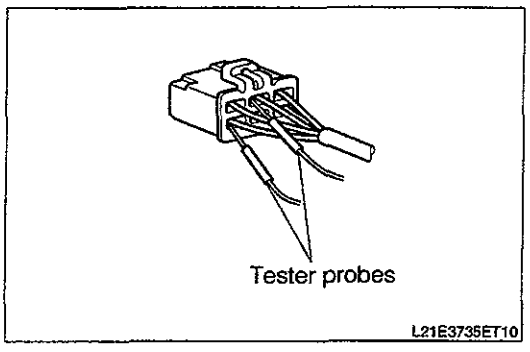
3.Continuity check (check for open wire)

(1) Disconnect the connector on both sides of the EFI ECU and sensor.



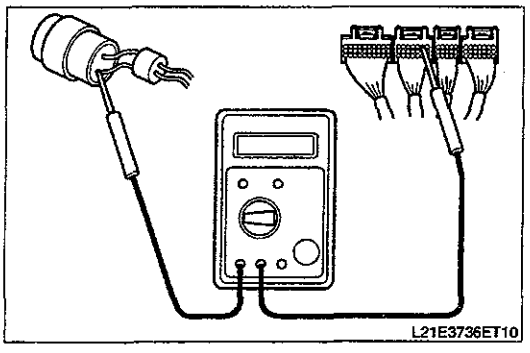
(2) Measure the resistance between the relevant terminals of the connector.

SPECIFIED VALUE: Resistance: 1 Ω or less



NOTE

- Lightly shake the wire harness in a longitudinal direction as well as in a horizontal direction when the resistance is measured.
- In the case of non-waterproof connectors, the test probe should be inserted into the connector from each wire harness side.
- In cases where the waterproof connector is checked without removing the waterproof rubber, be very careful not to deform the connector terminal when applying the test probes.

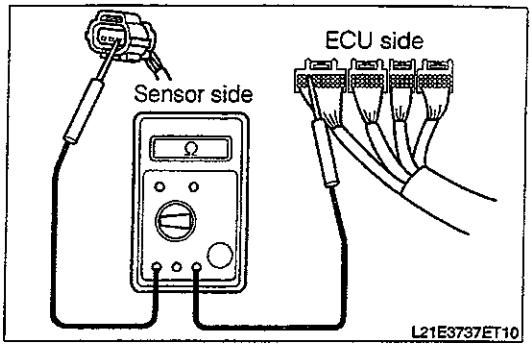


4.Continuity check (check for short circuit)

(1) Disconnect the connector on both sides.

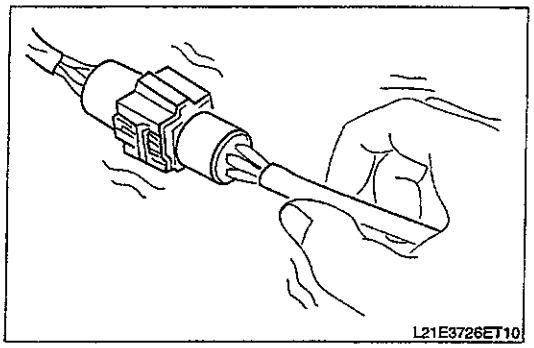
(2) Measure the resistance between the relevant terminal of the connector and the body ground. Moreover, be sure to check for the connectors on both sides.

SPECIFIED VALUE: Resistance: 1 M Ω or more



NOTE

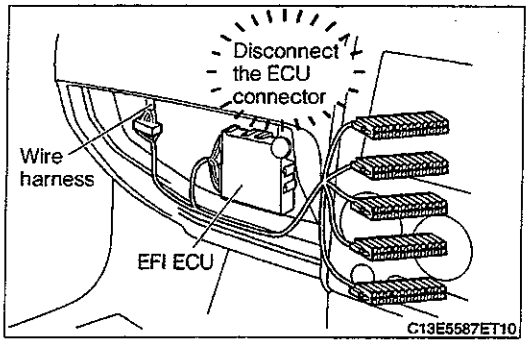
- Lightly shake the wire harness in a longitudinal direction as well as in a horizontal direction when the resistance is measured.



5.CHECK OF EFI ECU AND ITS CIRCUIT

The EFI ECU and its circuit can be checked by measuring the voltage and resistance at the EFI ECU connector. In order to narrow down the cause further after the cause has been decided to a certain system, it is imperative to measure the voltage and resistance of the external route of the EFI ECU.

The measurement of the voltage and resistance is conducted during the system check, following the procedure given below.



CAUTION

- The EFI ECU cannot be checked by itself. Never connect a voltmeter or an ohmmeter to the EFI ECU with the connector disconnected from the EFI ECU.
- When conducting the continuity test or measuring the resistance, turn OFF the ignition switch once. Then, disconnect the connector at the EFI ECU.

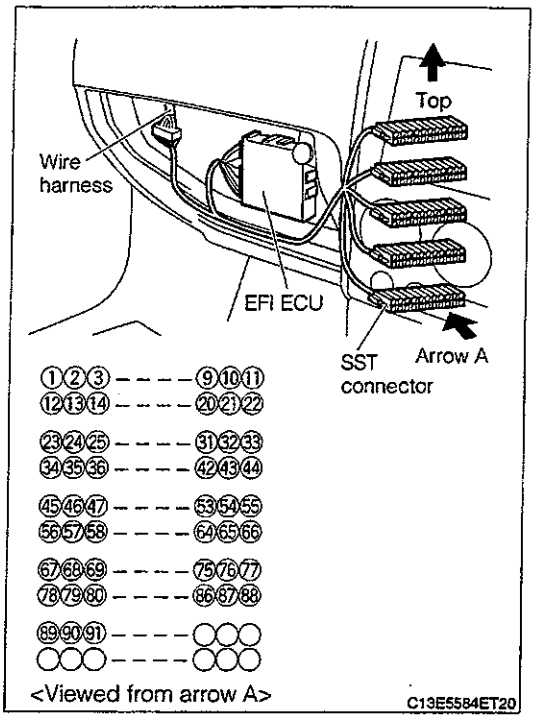
6.VOLTAGE CHECK

(1) Installation of SST

First, install the SST between the engine ECU and the vehicle harness.

For the installation procedure, refer to the section under.

Refer to Page B8-11.



(2) Measure the voltages between the respective terminals of the SST connectors.
(3) Check to see if the measured values conform to the specification in accordance with the following table "Characteristics of ECU Output".

NOTE

- Make sure that the battery voltage is 11 V or more with the ignition switch turned ON, for each terminal voltage is affected by the battery voltage.

Characteristics of ECU Output

System to be checked		Terminals	Measurement conditions	Reference values
Power supply system		7 (+B1) – 23 (E1)	When IG switch is "ON"	Battery voltage
		36 (+B2) – 23 (E1)	When IG switch is "ON"	
		1 (BAT) – 23 (E1)	At all time	
Pressure sensor system		46 (VCPM) – 47 (E2PM)	When IG switch is "ON"	4.5 – 5.5V
		15 (PIM) – 47 (E2PM)	Sensor released atmosphere	3.2 – 4.1V
			After engine starting	Value changes, according to accelerator opening angle
Throttle sensor system		16 (VC) – 17 (E2)	When IG switch is "ON"	4.5 – 5.5V
		44 (VTH) – 17 (E2)	Throttle valve fully closed	0.4 – 0.8V
			Throttle valve fully opened	3.2 – 5.0V
Engine coolant temperature sensor system		45 (THW) – 17 (E2)	When warming up engine (Water temperature 60 – 120°C)	0.2 – 1.0V
Intake air temperature		76 (THA) – 17 (E2)	When warming up engine	0.1 – 4.8V
Vehicle speed sensor		37 (SPD) – 23 (E1)	When wheels are turned slowly	0 ⇄ 5V
Knock sensor system		53 (KNK) – 23 (E1)	When idling, racing	Generation of wave form
Engine revolution sensor		22 (N+) – 52 (N–)	When idling	Generation of pulse
Oxygen sensor system	Front	75 (OX1) – 17 (E2)	After engine speed is held at 3000 rpm for four minutes	0.2 – 1.0V
	Rear	74 (OX2) – 17 (E2)	After engine speed is held at 3000 rpm for four minutes	0.2 – 1.0V
Injector system		27 (#10) – 23 (E1)	When IG switch is "ON" When engine is cranking	Battery voltage Generation of pulse
		26 (#20) – 23 (E1)		
		25 (#30) – 23 (E1)		
		24 (#40) – 23 (E1)		
Ignition system		60 (IG1) – 23 (E1)	When IG switch is "ON" When engine is cranking	0 – 0.11V Generation of pulse
		59 (IG2) – 23 (E1)		
		58 (IG3) – 23 (E1)		
		57 (IG4) – 23 (E1)		
ISC driving signal system		54 (ISC) – 23 (E1)	During idling	Generation of pulse
		78 (PST) – 23 (E1)	Oil pressure switch "ON"	0 – 0.5V
			Oil pressure switch "OFF"	Battery voltage
Fuel pump system		30 (FC2) – 23 (E1)	With fuel pump in stopped state	Battery voltage
			During idling (or when cranking)	2 V or less
VF monitor system		34 (VF) – (E1)	After engine speed is held at 3000 rpm	0⇄5V (Pulse)
A/C Evaporator temp.		72 (ACEV) – 29 (E21)	When air conditioner is operating	0.15 – 4.8V
Air conditioner input signal system		38 (ACSW) – 23 (E1)	When air conditioner is operating	Battery voltage
			When air conditioner is not operating	0 – 0.5V
Headlamp system		71 (H/L) – 23 (E1)	Tail lamp illuminated	Battery voltage
			Tail lamp extinguished	0 – 0.5V
Defogger system		10 (DEF) – 23 (E1)	When defogger switch is "ON"	Battery voltage
			When defogger switch is "OFF"	0 – 0.5V
Blower system		39 (BLW) – 23 (E1)	When heater blower switch is "ON"	0 – 0.5V
			When heater blower switch is "OFF"	Battery voltage
Radiator fan control system		13 (FAN1) – 23 (E1)	When water temperature switch is "ON"	Approx. 0 V
			When water temperature switch is "OFF"	Battery voltage

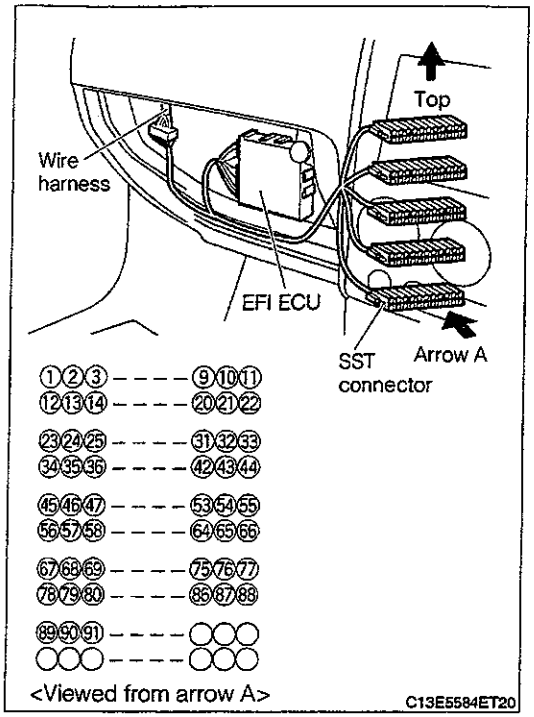
7.RESISTANCE CHECK

(1) Installation of SST

First, install the SST between the engine ECU and the vehicle harness. However, the SST connector at the ECU side should not be connected.

For the installation procedure, refer to the section under "Connecting Procedure for SST".

Refer to Page B8-11.



(2) Measure the resistances between the respective terminals.

(3) Check to see if the measured resistances conform to the specification in accordance with the following table "Standard Resistances".

NOTE

- **Make sure that the ignition switch is turned OFF during the measurement.**
- **The following table shows the resistance at the time when the temperature of parts is 20°C.**

STANDARD RESISTANCES

System to be checked	Terminals	Circuit	Standard resistance
Front oxygen sensor system	20 (OXH1) – 7 (+B1)	Front oxygen sensor and main relay	11 – 14.5Ω
Rear oxygen sensor system	50 (OXH2) – 7 (+B1)	Rear oxygen sensor and main relay	11.7 – 14.5Ω
Engine revolution sensor system	22 (N2+) – 52 (N2–)	Engine revolution sensor system	1850 – 2450Ω
Injector system	27 (#10) – 7 (+B1)	No.1 - 4 fuel injector	13.4 – 14.2Ω
	26 (#20) – 7 (+B1)		
	25 (#30) – 7 (+B1)		
	24 (#40) – 7 (+B1)		
VSV for evaporative emission control system purge control system	79 (PRG) – 7 (+B1)	Evaporative emission purge control valve	30 – 34Ω
VSV for boost pressure control system	80 (VSV1) – 7 (+B)	Boost pressure control valve	30 – 34Ω
Ground system	23 (E1) – Body ground	Ground	10Ω or less
	17 (E2) – Body ground		
	47 (E2PM) – Body ground		
	29 (E21) – Body ground		

1-10-2 CHECK AND REPAIR BY CHART ACCORDING TO DTC

(1) SCAN TOOL DATA (ECU DATA)

1. The following data values given below are representative values obtained under the ""normal condition".

   However, there are cases where the system is functioning normally even if the measured value is different from the values listed here. Therefore, no judgment as to whether any malfunction is occurring or not should be made only on the basis of these data under the "normal condition".

NOTE

- The data monitor value may vary significantly, depending on slight difference in the measurement, difference in the measurement environment, deterioration due to passage of time in the vehicle, and so forth. Therefore, it is difficult to indicate the definite reference values. Hence, there are cases where malfunctions are occurring even when the measured value is within the reference value.
- With regard to minor phenomenon, such as hesitation and rough idling, it is necessary to make total evaluation, based on all the data monitor items, by sampling the data of the vehicle of the same type under the same conditions and comparing them.
- In the case of the OBD II generic scan tool, it is possible to take a reading of the values with an asterisk mark in the following table.
- When checking the data under a condition where the engine is "idling" or "racing", the shift lever should be placed in the "neutral", the A/C switch should be turned OFF, and all accessory switches should be turned OFF.

Items specified by CARB

	DS-21 diagnosis tester display	Signal name	Vehicle condition	Reference values under normal condition
* 1	FUEL SYSTEM	FSYS	At idle speed after warming up	O2
* 2	CALC LOAD	LOAD	At idle speed after warming up	1.7 – 2.2 %
			At 2500 rpm with no load after warming up	5.0 – 6.3 %
* 3	COOLANT TEMP	ECT	Cold start - Warming up running	Value should be rising gradually
			When engine has warmed up completely	80 – 100°C
			During fall-safe function (At time of starting)	20°C
			During fall-safe function (After starting)	80°C
* 4	SHORT FT	SHRT	At idle speed after warming up	−20 – 20 %
* 5	LONG FT	LONG	At idle speed after warming up	−16 – +16 %
* 6	ENGINE SPEED	RPM	When engine is running at constant speed	There should be no remarkable variation
			At idle speed after warming up	650 – 750 rpm
* 7	VEHICLE SPEED	VS	During running (Compared with speedometer)	There should be no remarkable variation
* 8	IGN ADVANCE	ITA	At idle speed after warming up	−3 – −7°
			When idle switch is OFF	Changes should be made according to running conditions
* 9	INTAKE AIR TEMP	IAT	When engine is running	Changes should be made according to running conditions
* 10	MAIN ABS PRESS	MAP	When ignition switch is ON	Around 100kPa
			At idle speed after warming up	63 - 72 kPa
			During fall-safe function	34 - 72 kPa
* 11	THROTTLE POS	TP	When acceleration pedal is operate	Changes should be made according to pedal operation
* 12	OXYGEN SENSOR S1	O_2FP	At idle speed after warming up	−5 – +5 %
		O_2FV		0.05 – 0.95 V
* 13	OXYGEN SENSOR S2	O_2RP	When engine is running at 2000 rpm, for 3 minutes or longer after warming up.	20 – 77 %
		O_2RV		0.05 – 0.95 V
* 14	MIL ON RUN DIST	DWM	When there is no DTC	0 km

Items specified by DMC

	DS-21 diagnosis tester display	Signal name	Vehicle condition	Reference values under normal condition
1	BATTERY VOLTAGE	BAT	When engine is running at 5000 rpm (25°C)	Approx. 14 V
2	ELECTRIC LOAD	DSW	When light, heater blower, defogger or radiator fan is ON	OFF→ON
3	AIR CONDITIONING	AC	When air conditioner switch is set to ON	OFF→ON
4	CTP SWITCH	IDL	When throttle valve is switched from fully closed state to opened state	ON→OFF
5	INJ PULSE WIDTH	TAU	Cold start - Warming up running	Value should be decreasing gradually
			At idle speed after warming up	1 – 3 ms
6	ISC DUTY RATIO	ISC	When ignition switch is ON	0%
			Cold start - Warming up running	Value should be decreasing gradually
			At idle speed after warming up	5 – 15 %
			When air conditioner switch is set to ON	18 – 45 %
			When light, heater blower or defogger is ON	7 – 19 %
			At idle speed after warming up	0 – 2°CA
7	ACTUAL DIS ANGLE OF IN CAM	VT	During vehicle running	The value changes, depending on driving conditions.
			At idle speed after warming up	0°CA
8	TARGET DISP ANGLE OF IN CAM	VTT	During vehicle running	The value changes, depending on driving conditions.

NOTE

- The items with an asterisk (*) mark is provided only for the EU specifications. Therefore, in the case of the non-EU specification vehicles, no indication will be made.

(2) DTC CHART SPECIFICATIONS

1. The parameters indicated in the table may vary, depending upon the system types and specifications. This applies to vehicles for all destinations.
   For details of the checking of each code, refer to the DTC chart for each code.

Codes specified by ISO/SAE

DTC No.	Diagnosis Items	Diagnosis contents	Malfunction evaluation method	Warning indication
P0105/31	Manifold absolute pressure/barometric pressure circuit malfunction	When abnormality takes place in the signal from manifold absolute pressure/barometric pressure circuit: Malfunction of the sensor, or open wire or short circuit in the manifold absolute pressure/barometric pressure circuit.	1 trip	○
P0110/43	Intake air temperature sensor circuit malfunction	When malfunction takes place in the signal from the intake air temperature sensor: Malfunction of the sensor, or open wire or short circuit in intake air temperature sensor circuit.	1 trip	○
P0115/42	Engine coolant temperature sensor circuit malfunction	When abnormality takes place in the signal from the engine coolant temperature sensor: Malfunction of the sensor, or open wire or short circuit in engine coolant temperature sensor circuit.	1 trip	○
P0116/42*1	Engine coolant temperature sensor circuit range/performance problem	When abnormality takes place in the signal from the engine coolant temperature sensor: Malfunction of engine cooling system	2 trip	○
P0120/41	Throttle/pedal position sensor/switch	When abnormality takes place in the signal from throttle/pedal position sensor: Malfunction of the sensor, or open wire or short circuit in throttle/pedal position sensor/switch circuit.	1 trip	○
P0130/21	Oxygen sensor circuit malfunction (Bank 1 sensor 1)	When abnormalities take place two times consecutively in the signal from the oxygen sensor: Malfunction of the sensor, or open wire or short circuit in oxygen sensor circuit.	2 trip	○
P0133/21*1	Oxygen sensor circuit slow response (Bank1 sensor1)	When abnormalities take place two times consecutively in the signal from the oxygen sensor: Malfunction of the sensor, or open wire or short circuit in oxygen sensor circuit.	2 trip	○
P0135/23*1	Oxygen sensor heater circuit malfunction (Bank1 sensor1).	When abnormalities take place in the signal from the oxygen sensor heater: Open wire or short circuit in oxygen sensor heater circuit.	2 trip	○
P0136/22	Rear oxygen sensor circuit malfunction (Bank 1 sensor 2)	When abnormalities take place two times consecutively in the signal from the rear oxygen sensor: Malfunction of the sensor, or open wire or short in the rear oxygen sensor circuit.	2 trip	○
P0141/24*1	Oxygen sensor heater circuit malfunction (Bank 1 sensor 2)	When abnormalities take place in the signal from the oxygen sensor heater: Open wire or short circuit in oxygen sensor heater circuit.	2 trip	○
P0171/25	Fuel trim system too lean (Air-fuel ratio lean malfunction, bank 1)	When the air-to-fuel ratio deviates two times consecutively to the lean side due to abnormality of the fuel trim system: · Abnormal combustion pressure, malfunctioning injector or oxygen sensor	2 trip	○

P0172/26	Fuel trim system too rich (Air-fuel ratio rich malfunction, bank 1)	When the air-to-fuel ratio deviates two times consecutively to the rich side due to abnormality of the fuel trim system: Abnormal combustion pressure, malfunctioning injector or oxygen sensor	2 trip	○
P0350/16	Ignition system circuit malfunction	When the ignition signal is not inputted continually.	1trip	○
P0300/17*1	Random/multiple cylinder misfire detected	When malfunction takes place in the signal from the ion system	2 trip	MIL flashing during misfire detection. ○
P0301/17*1 P0302/17*1 P0303/17*1 P0304/17*1	Misfire detected Cylinder 1 Cylinder 2 Cylinder 3 Cylinder 4			
P0314/-*1	Single cylinder misfire (Cylinder not specified)			
P0325/18	Knock sensor 1 circuit malfunction	When malfunction takes place in the signal from the knock sensor: · Malfunction of the sensor, or open wire or short circuit in the signal system	1 trip	–
P0335/13	Engine revolution sensor circuit malfunction	When malfunction takes place in the signal from the engine revolution sensor: Malfunction of the sensor, or open wire or short circuit in engine revolution sensor circuit.	1 trip	○
P0420/27*1	Catalyst system efficiency below threshold	When abnormalities take place in the signal from the oxygen sensor heater	2 trip	○
P0443/76	Evaporative emission control system purge control valve circuit malfunction	When malfunction takes place in the detection signal of the evaporative emission control system purge control valve: Open wire or short circuit in evaporative emission control system purge control circuit.	2 trip	○
P0500/52	Vehicle speed sensor circuit malfunction	When malfunction takes place in the signal from the vehicle speed sensor: Sensor malfunction, open wire or short circuit of the signal system	2 trip	○
P0505/71	Idle control system malfunction	When malfunction takes in the signal from the valve for ISC. Open wire or short in valve for ISC circuit	1 trip	○

NOTE

- 2 trip: 2 trip detection logic
- MIL; Malfunction indicator lamp
- When the "O" mark is shown in the MIL column, the lamp will go on for that DTC number, but when the "—" mark is shown, the lamp will not go on for that DTC number. However, the data other than the switch signal system (P1520/51) are memorized in the backup memory. Therefore, it is possible to read out the DTC number by using the diagnosis tester DS-21. As for the DTC number bearing the mark, the MIL will go on except the EU specifications.
- DTC number with *1 mark ..... Only for EU specifications
- But, only in the case of DTC No. P0314, it is possible to read out this DTC No. by means of the "Continuous monitoring results" in CARB mode

Codes specified by DMC

DTC No.	Diagnosis Items	Diagnosis contents	Malfunction evaluation method	Warning indication
P1300/36*1	Ion system malfunction	When malfunction takes place in the signal from Ion system	2 trip	○
P1510/54	Starter relay output system	When malfunction takes place in the starter relay driving output Malfunction of the starter relay output circuit or output monitor circuit	2 trip	○
P1520/51	Switch signal circuit malfunction	With the terminal EFI-T connected 1. When AC switch is turned ON: 2. When clutch start switch is turned ON. 3. When the accelerator pedal is depressed:	1 trip	—
P1530/44	A/C evaporator temperature sensor circuit malfunction	When malfunction takes place in the signal from the A/C evaporator temperature sensor: Malfunction of the sensor, or open wire or short circuit in A/C evaporator temperature sensor circuit.	1 trip	—
P1560/61	ECU back up power source circuit malfunction	Open wire in back up power source circuit Malfunction of the EFI ECU	1 trip	○
P1600/83	Immobilizer signal circuit malfunction	When abnormality occur in the wring and reading-out of the rolling codes into/from the immobilizer ECU during immobilizer communication	1 trip	—
P1601/81	Immobilizer signal malfunction	When the rolling codes can not be exchanged between the EFI ECU and the immobilizer ECU or the rolling codes are not matched.	1 trip	—

NOTE

- 1 trip: 1 trip detection logic
- 2 trip: 2 trip detection logic
- MIL; Malfunction indicator lamp
- When the "O" mark is shown in the MIL column, the lamp will go on for that DTC number, but when the "—" mark is shown, the lamp will not go on for that DTC No. However, the data other than the switch signal system (P1520/51) are memorized in the backup memory. Therefore, it is possible to read out the DTC No. by using the diagnosis tester DS-21. As for the DTC No. bearing the mark, the MIL will go on except the EU specifications.
- DTC No. with *1 mark ..... Only for EU specifications
- But, only in the case of DTC No. P0314, it is possible to read out this DTC No. by means of the "Continuous monitoring results" in CARB mode

(3) FAIL-SAFE FUNCTION

1.When any of the following DTC has been detected, the ECU enters the fail-safe mode in order to make it possible for the vehicle to drive for evacuation and to ensure safety. When the malfunction is remedied to a normal condition, the fail-safe control will be released.

However, the diagnosis results will remain memorized. Hence, it is necessary to determine whether the malfunction still persists or not.

FAIL-SAFE SPECIFICATIONS

DTC No.	Fail-safe operation	Fail-specifications
P0105/31	When abnormality takes place in the signal from the manifold absolute pressure/barometric pressure circuit	The signal from the intake manifold pressure sensor is set to the value determined from the throttle opening angle, engine speed and ISC opening angle. If both the throttle opening angle and engine speed exceed their set values, the fuel is cut.
P0110/43	When malfunction takes place in the signal from the intake air temperature sensor:	The signal from the intake air temperature sensor is set to a constant value.
P0115/42	When malfunction takes place in the signal from the coolant temperature sensor:	The signal from the engine coolant temperature sensor is set to a constant value.
P0120/41	The signal from the throttle position sensor is set to a constant value.	The signal from the throttle position sensor is set to a constant value
P0136/22	When abnormality takes place in the signal from the rear oxygen sensor:	The feedback of the rear oxygen sensor is stopped.
P0325/18	When malfunction takes place in the signal from the knock sensor:	The ignition timing is retarded.
P1530/44	When malfunction takes place in the signal from the A/C evaporator temperature sensor.	The air conditioner will be cut.
P1600/83	When abnormality occur in the wring and reading-out of the rolling codes into/from the immobilizer ECU during immobilizer communication.	Prohibition of fuel injection and ignition.
P1601/81	When the rolling codes can not be exchanged between the EFI ECU and immobilizer ECU or rolling codes are not mached.	Prohibition of fuel injection and ignition.

1-11 TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA

1-11-1 CHECK AND REPAIR BY MATRIX TABLE FOR TROUBLESHOOTING ACCORDING TO MALFUNCTIONING PHENOMENA

(1) Discription

1.This table can be used when trouble-shooting a malfunction which persists although the normal code is indicated at time of the DTC recheck. However, before performing trouble-shooting, carry out the basic check to narrow down possible causes for the malfunction. For example, if the spark check of the basic check proves that there is no problem, it can be presumed that the ignition system is normal. Also, you can narrow down further possible causes based on the information obtained through inquiry to the customer.

NOTE

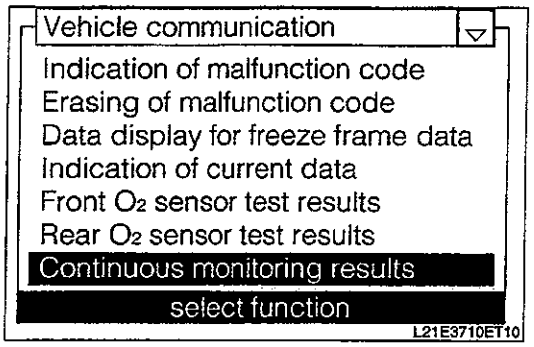
- If any malfunction can not be detected by the diagnosis system although the malfunctioning phenomenon exists, that malfunction is not covered by the detection range of the diagnosis system or the malfunction exists in a system other than the diagnosis-related systems.

(2) CHECK OF MALFUNCTIONS WHICH OCCUR INTERMITTENTLY

1.Check parts where malfunctions occur intermittently, such as wire harnesses and connectors, by following the section "Check of malfunctions which occur intermittently and poor contacts". At that time, focus checks on the circuits related to the systems of the DTC that were indicated at the time of initial DTC check.

(3) FINAL CONFIRMATION TEST

1.Confirm that the malfunctioning phenomenon pinpointed by the customer has been completely eliminated. If the remedied parts are related to the DTC, erase the DTC once and carry out the DTC confirmation test. Ensure that no DTC is indicated. At this time, for improved efficiency of operations, use the "continuous monitoring results" function. (In the case of the DS-21 diagnosis tester, select the "Continuous monitoring results" of the vehicle communication in CARB mode.)



1-11-2 MATRIX TABLE FOR TROUBLE-SHOOTING ACCORDING TO MALFUNCTIONING PHENOMENA

1. In cases where no malfunction code was detected during the DTC check and no malfunction can be still confirmed during the basic check, perform the trouble-shooting, referring to the following table. In the trouble shooting according to malfunction phenomena, first arrange in order the contents of diagnosis through inquiries, basic checks and ECU circuit checks. Next, narrow down possible causes, referring to the table showing possible causes according to malfunction phenomena.
2. In the trouble shooting according to malfunction phenomena, first arrange in order the contents of diagnosis through inquiries, basic checks and ECU circuit checks. Next, narrow down possible causes, referring to the table showing possible causes according to malfunction phenomena.

(1) Poor starting

Malfunction phenomena		Cause of malfunction		
		Suspect area	Components	Mode of malfunction
No initial combustion take place		Power source system	ECU power source circuit	Open wire/short circuit
			IG switch	Switch is not turned ON
			Main relay	
			Starter relay	
		Fuel supply system	Fuel pump relay	Switch is not turned ON
			Fuel line/fuel filter	Clogged
			Injector	Not inject, inject at all times
			Fuel pump	Not operate
		Ignition system circuit	IG coil	Spark is not existed
			Spark plug	
			Ignition timing	Deference of timing
		Control system circuit	Engine revolution sensor system	NE signal is not existed
Although initial combustion take place, combustion is not complete		Fuel supply system	Fuel pump relay	Switch is not turned ON
			Fuel line/fuel filter	Clogged
			Injector	Leakage, not inject, inject at all times
			Fuel pump	Not operate
		Ignition system circuit	Spark plug	Misfire
		Air inlet system circuit	Air hose etc.	Leakage
		Control system circuit	Manifold absolute pressure sensor	Deference of characteristic, open wire, short circuit
			Engine coolant temperature sensor	
			Engine revolution sensor	Output signal is no good
Poor starting	Cold condition	Air inlet system circuit	Throttle body	Valve is not opened completely, not opened
		Control system circuit	Engine coolant temperature sensor	Deference of characteristic, open wire, short circuit
	Warm up condition	Fuel supply system	Injector	Leakage
		Air inlet system circuit	Valve for ISC	Valve is not opened completely, not opened
	At all time	Fuel supply system	Fuel pump relay	Switch is not turned ON
			Fuel line/fuel filter	Clogged
			Injector	Leakage
		Ignition system circuit	Spark plug	
		Air inlet system circuit	Valve for ISC	Valve is not opened completely

(2) Poor idling

Malfunction phenomena	Cause of malfunction		
	Suspect area	Components	Mode of malfunction
First idle is not effective	Air inlet system circuit	Valve for ISC	Valve is not opened completely, not opened
	Control system circuit	Engine coolant temperature sensor	Open wire/short circuit
Idle speed is too high	Air inlet system circuit	Air hose etc.	Leakage
		Throttle body	Valve is not closed completely
		Valve for ISC	Valve is opened at all time
	Control system circuit	Manifold absolute pressure sensor	Deference of characteristic, open wire, short circuit
		Engine coolant temperature sensor	
		Linear throttle sensor	Deference of characteristic
		Defogger switch	Switch is turned ON at all time
		Tail lamp switch	
		Heater blower switch	
		Oil pressure switch	
Idle speed is too low	Air inlet system circuit	Air hose etc.	Clogged
		Throttle body	
	Control system circuit	Manifold absolute pressure sensor	Deference of characteristic
		Engine coolant temperature sensor	
		Defogger switch	Switch is not turned ON
		Tail lamp switch	
		Heater blower switch	
		Oil pressure switch	
Hunting during idling	Air inlet system circuit	Air hose etc.	Leakage
		Throttle body	
		Valve for ISC	Valve is opened at all time
	Control system circuit	Manifold absolute pressure sensor	Deference of characteristic
		Engine revolution sensor	Defect of output signal
Poor idling	Fuel supply system	Injector	Leakage,
		Fuel pump	Poor operation
	Air inlet system circuit	Throttle body	Leakage
	Ignition system circuit	IG coil	Poor contact
		Spark plug	Misfire
	Control system circuit	Manifold absolute pressure sensor	Poor operation, poor contact
		Oxygen sensor	Poor operation, poor contact

(3) Engine stalling

Malfunction phenomena	Cause of malfunction		
	Suspect area	Components	Mode of malfunction
Engine stalls during idling	Fuel supply system	Fuel pump relay	Switch is not turned ON
		Fuel line/fuel filter	Clogged
		Fuel pump	Not operate
	Control system circuit	Engine coolant temperature sensor	Deference of characteristic
		Engine revolution sensor	Defect of output signal
Engine stalls when accelerator pedal is depressed	Control system circuit	Manifold absolute pressure sensor	Deference of characteristic
		Engine coolant temperature sensor	
		Engine revolution sensor	Defect of output signal
Engine stalls when accelerator pedal is released	Air inlet system circuit	Throttle body	Poor operation
	Control system circuit	Manifold absolute pressure sensor	Deference of characteristic
Engine stalls when A/C switch is turned on	Air inlet system circuit	Valve for ISC	Valve is closed at all time
Possible to restart after engine stalling	Power source system	ECU power source circuit	Poor contact
		IG switch	
		Main relay	
	Air inlet system circuit	Valve for ISC	Valve is closed at all time
	Ignition system circuit	IG coil	Poor contact
	Control system circuit	Manifold absolute pressure sensor	Poor contact
		Engine revolution sensor	
		Vehicle speed sensor	Open wire, short circuit

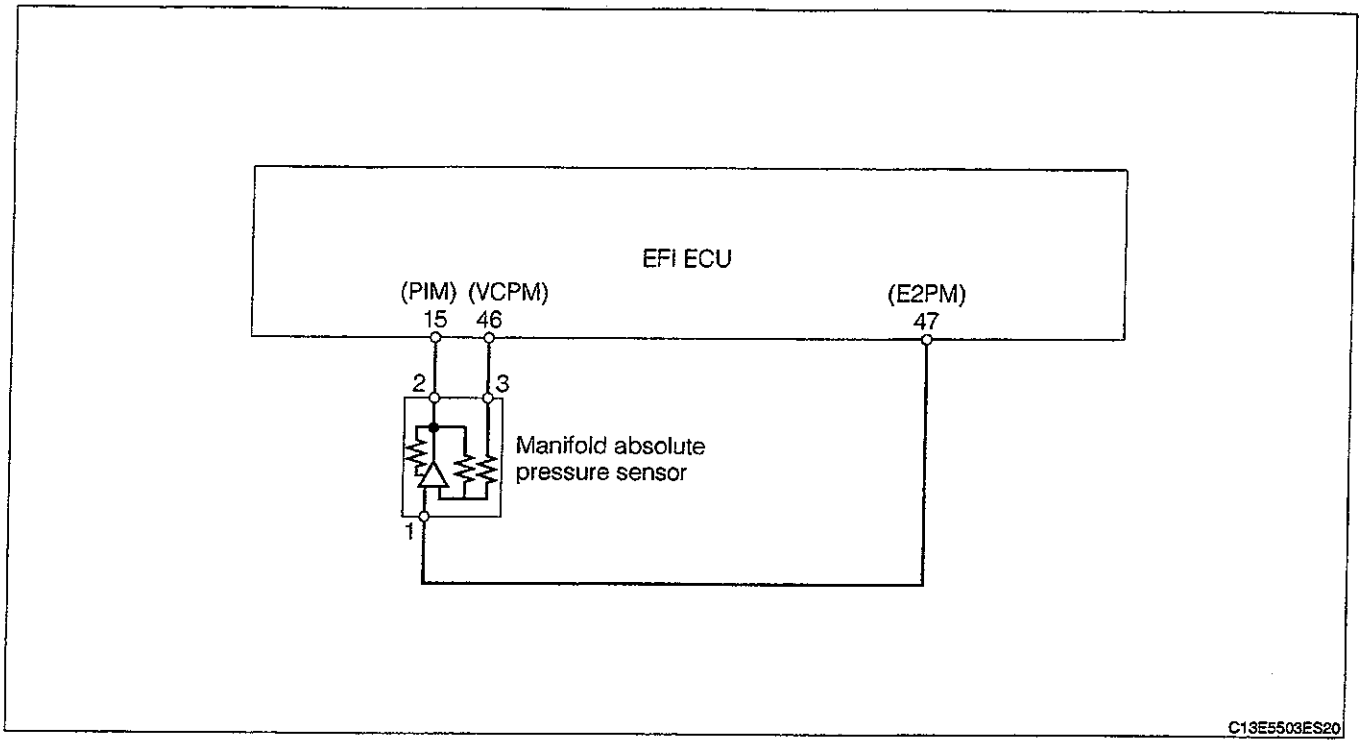
(4) Poor running

Malfunction phenomena	Cause of malfunction		
	Suspect area	Components	Mode of malfunction
Hesitation during acceleration period	Fuel supply system	Fuel line/fuel filter	Clogged
		Injector	Deterioration of flow rate
		Fuel pump	
	Ignition system circuit	IG coil	Skipping ignition
		Spark plug	Misfire
		Ignition timing	Deference of timing
	Control system circuit	Manifold absolute pressure sensor	Deference of characteristic, open wire, short circuit
		Engine coolant temperature sensor	
		Leaner throttle sensor	
		Knock sensor	Open wire, short circuit
Back fire After fire	Fuel supply system	Injector	Deterioration of flow rate
	Ignition system circuit	IG coil	Poor contact
		Spark plug	Misfire
		Ignition timing	Deference of timing
	Control system circuit	Manifold absolute pressure sensor	Poor operation
		Engine coolant temperature sensor	Deference of characteristic
		Engine revolution sensor	Defect of output signal
Poor output	Fuel supply system	Fuel line/fuel filter	Fuel pressure is not improved
		Injector	Deterioration of flow rate
		Fuel pump	Fuel pressure is not improved
	Ignition system circuit	Spark plug	Misfire
	Control system circuit	Manifold absolute pressure sensor	Deference of characteristic, open wire, short circuit
		Engine coolant temperature sensor	
		Leaner throttle sensor	Deference of characteristic
		Engine revolution sensor	Defect of output signal
Emitting black smoke	Fuel system circuit	Injector	Inject at all time
	Control system circuit	Manifold absolute pressure sensor	Deference of characteristic
		Engine coolant temperature sensor	Deference of characteristic
		Leaner throttle sensor	
Hunting during running	Fuel system circuit	Fuel line/fuel filter	Clogged
		Injector	Poor operation
	Ignition system circuit	IG coil	Poor contact
	Control system circuit	Leaner throttle sensor	Deference of characteristic
		Vehicle speed sensor	Fault operation
		Engine revolution sensor	Defect of output signal
Abnormally knocking	Control system circuit	Manifold absolute pressure sensor	Deference of characteristic, open wire, short circuit
		Leaner throttle sensor	Deference of characteristic
		Knock sensor	Deference of characteristic, open wire, short circuit

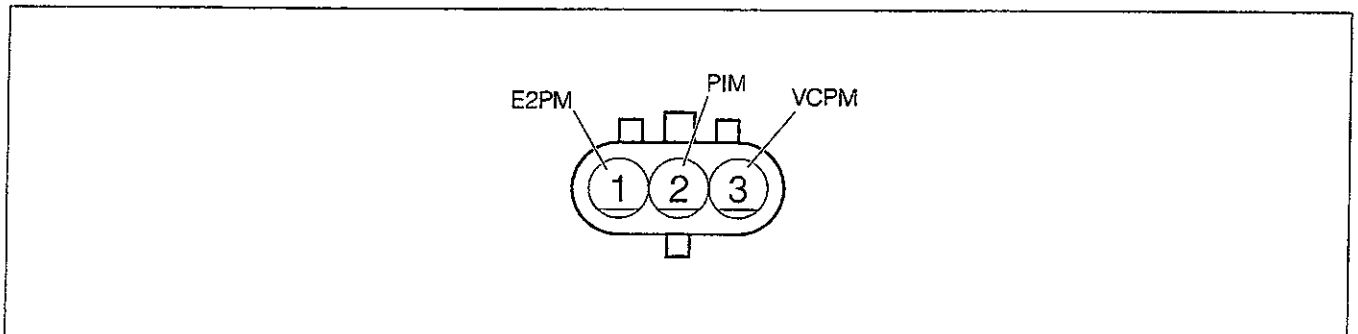
1-12 TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE

1-12-1 DTC No.P0105/31 Manifold absolute pressure/barometric pressure circuit malfunction

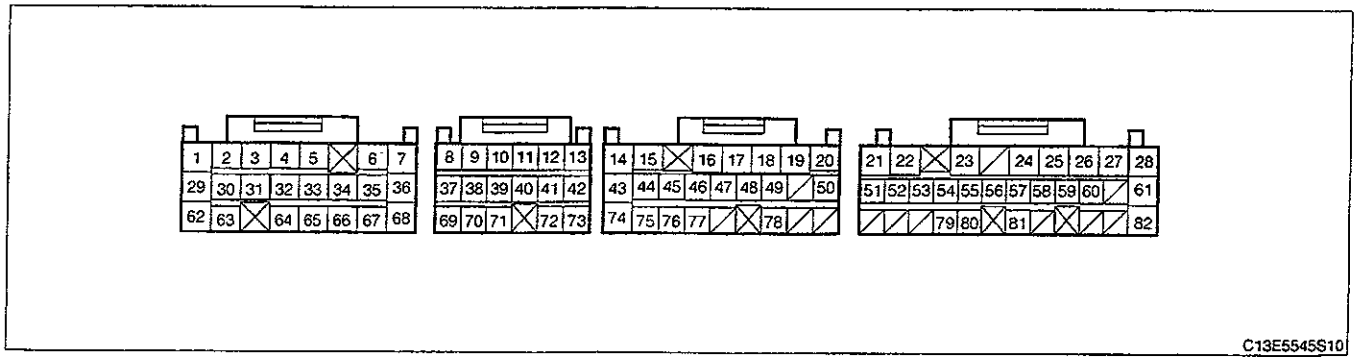
(1) WIRING DIAGRAM



MAP sensor wire harness side



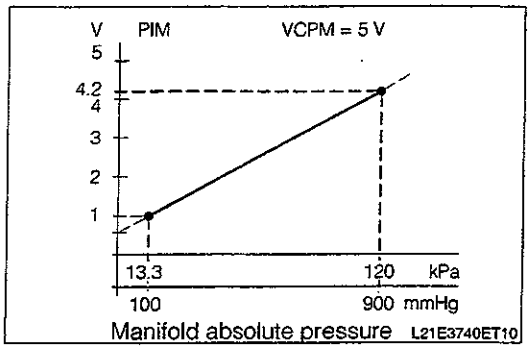
EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1.The manifold absolute pressure sensor detects the intake manifold pressure as a voltage.

2.Since the manifold absolute pressure sensor does not use the atmospheric pressure as a criterion, but senses the absolute pressure inside the intake manifold (the pressure in proportion to the present absolute vacuum 0), it is not influenced by fluctuations in the atmospheric pressure due to high altitude and other factors. This permits it to control the air-fuel ratio at the proper level under all conditions.



(3) DTC DETECTING CONDITION

1.When the engine starts, the manifold absolute pressure sensor value is more than 4.7 V or less than 0.16 V for more than a certain length of time.

NOTE

- **After confirming DTC P0105/31, use the OBD II generic scan tool or DS-21 diagnosis tester to confirm the manifold absolute pressure from "CURRENT DATA".**
- **If the ECU detects DTC P0105/31, it operates the fail-safe function, keeping the ignition timing and injection volume constant and making it possible to drive the vehicle.**

(4) TROUBLE AREA

1.Open wire or short circuit in manifold absolute pressure sensor circuit
2.Manifold absolute pressure (MAP) sensor
3.EFI ECU

(5) POINTS OF INSPECTION

1.Is the signal from the MAP sensor inputted to the ECU?
2.Is the harness between the MAP sensor and the ECU proper?
3.Is the MAP sensor output proper?

(6) INSPECTION PROCEDURE

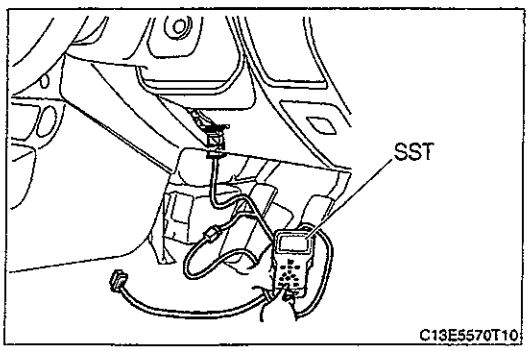
① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of output value of Manifold absolution pressure (MAP) sensor.

1.With the IG switch turned OFF, connect the DS-21 diagnosis tester to DLC through the SST or connect the OBD II generic scan tool directly to DLC.
SST: 09991-87404-000

2.After turning ON the IG switch, turn ON the main switch of the tester. Read the intake manifold absolute pressure value of the DS-21 diagnosis tester or OBD II generic scan tool.

3.Is the measured value the same as the atmospheric pressure (approx. 100 kPa)?
YES: Check malfunction that occurs intermittently or poor contact.
NO: Go to ➤2.



➤2. Check of power supply voltage of MAP sensor.

1.After turning OFF the main switch of the tester, turn OFF the IG switch.

2.Connect the SST between the EFI ECU connectors and the wire harness connectors.
SST: 09842-97203-000

3.Ensure that the voltage between the SST terminals 46 (VCPM) and 47 (E2PM) is within the specified valve when the ignition switch is turned to the ON position.
SPECIFIED VALUE: 4.5 — 5.5 V

4.Is the voltage within the specified value?

NOTE

- If no voltage appears, check the EFI ECU power supply circuit.

YES: Go to ➤3.
NO: Check or replace the EFI ECU.

➤3. Check of MAP sensor.

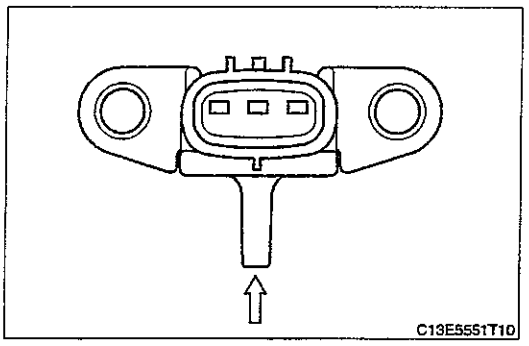
1.With the IG switch turned OFF, remove the MAP sensor from the throttle body with the harness connected.

2.After turning ON the IG switch, turn ON the main switch of the tester.

3.Apply a negative pressure to the MAP sensor, using a MityVac.

4.Check the manifold absolute pressure value under following conditions.

Applying Vacuum	Displayed Value on Scan Tool
0	Approx. 100 kPa (Approx. 760 mmHg)
27 kPa (200 mmHg)	Approx. 73 kPa (Approx. 560 mmHg)
67 kPa (500 mmHg)	Approx. 33 kPa (Approx. 260 mmHg)



5.Is the measured value the same as that shown above?
YES: Check for intermittent trouble caused by freeze in the vacuum passage, wire harness or connector.
NO: Go to ➤4.

➤4. Check of harness between MAP sensor and ECU.

1.After turning OFF the main switch of the tester, turn OFF the IG switch.

2.Disconnect the harness from the MAP sensor. Install the MAP sensor to the throttle body.

3.Disconnect the SST connectors at the EFI ECU side.

4.Check the harness and connector for open wire or short.
Connector 2 (E2PM) at sensor side — Connector 47 (E2PM) at ECU side.
Connector 1 (PIM) at sensor side — Connector 15 (PIM) at ECU side.
Connector 3 (VCPM) at sensor side — Connector 46 (VCPM) at ECU side.

5.Are the check results for open wire and short OK?

NOTE

- Apply gasoline to the O-ring of the MAP sensor. Then, carefully insert it.

YES: Replace the MAP sensor.
NO: Repair or replace the harness or connector.

② When not using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of ECU input signal PIM.

1.Set the SST (sub-harness).
SST: 09842-97203-000

2.With the IG switch turned ON, measure the voltage between the SST terminals 15 (PIM) and 47 (E2PM).
SPECIFIED VALUE: 3.3 – 4.0 V

3.Is the measured value within the specified value?
YES: Check malfunction that occurs intermittently or poor contact.
NO: Go to ➤2.

➤2. Check of power supply voltage of MAP sensor.

1.Next, ensure that the voltage between the SST terminals 46 (VCPM) and 47 (E2PM) is within the specified value.
SPECIFIED VALUE: 4.5 – 5.5 V

2.Is the measured value within the specified value?

NOTE

- If no voltage appears, check the EFI ECU power supply circuit.

YES: Go to ➤3.
NO: Check or replace the EFI ECU.

➤3. Check of MAP sensor.

1.Remove the MAP sensor from the throttle body with the harness connected.
2.Apply a negative pressure to the MAP sensor, using a MityVac.
3.Ensure that the voltage between the SST terminals 15 (PIM) and 47 (E2PM) is within the following specified voltage under the following conditions.

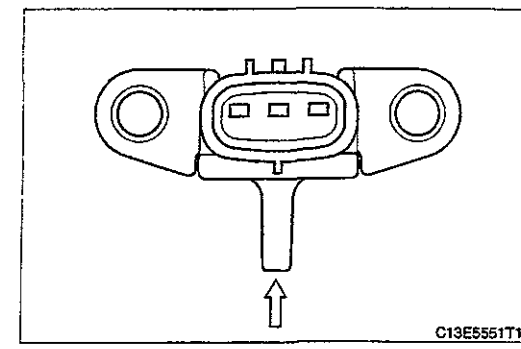
Applying Vacuum	Displayed Value on voltage meter
0	3.3 – 4.0 V
27 kPa (200 mmHg)	2.6 – 3.1 V
67 kPa (500 mmHg)	1.1 – 1.4 V

4.Is the measured value within the values in the table above?
YES: Check for intermittent trouble caused by freeze in vacuum passage, wire harness or connector.
NO: Go to ➤4.

➤4. Check of harness between MAP sensor and ECU.

1.Turn OFF the IG switch.

2.Disconnect the harness from the MAP sensor. Install the MAP sensor to the throttle body.
3.Disconnect the SST connectors at the ECU side.
Connector 2 (E2PM) at sensor side – Connector 47 (E2PM)at ECU side.
Connector 1 (PIM) at sensor side – Connector 15 (PIM) at ECU side.
Connector 3 (VCPM) at sensor side – Connector 46 (VCPM) at ECU side.
4.Are the check results for open wire and short OK?



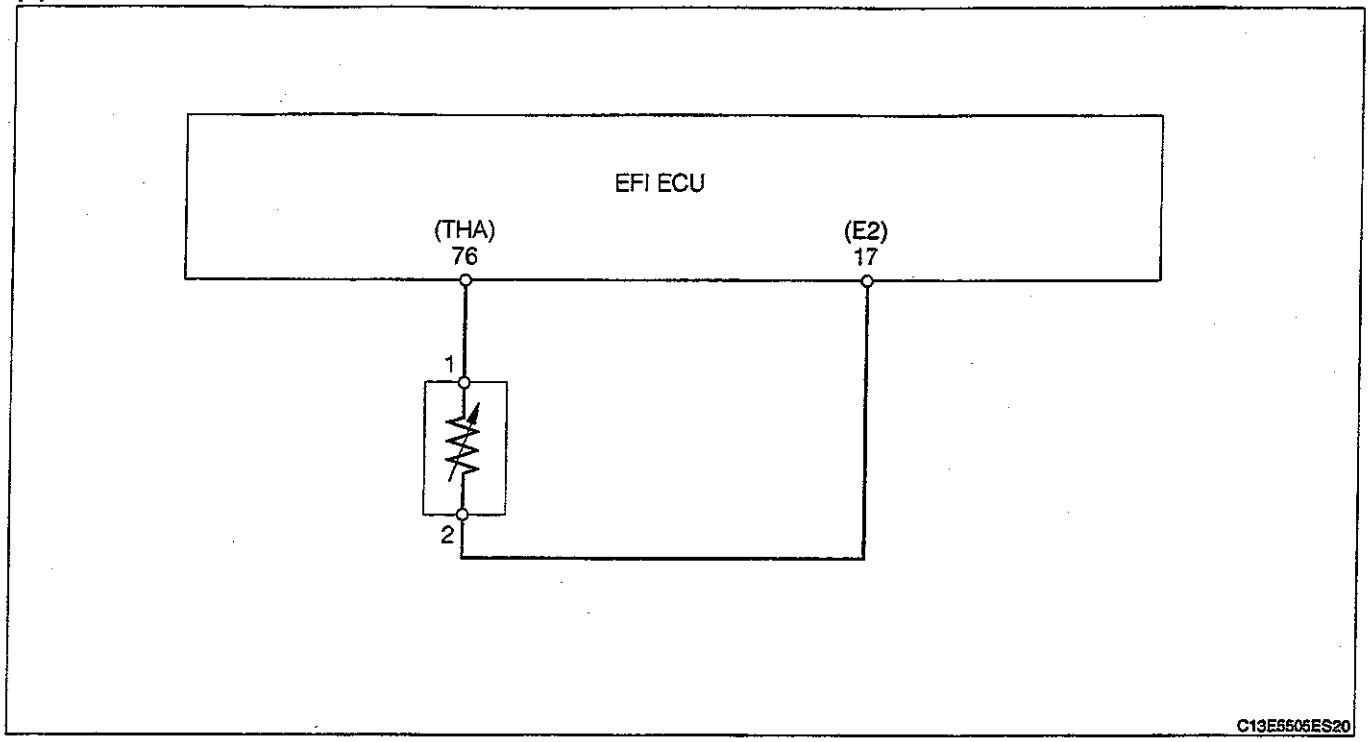
NOTE

- **Apply gasoline to the O-ring of the MAP sensor. Then, carefully insert it.**

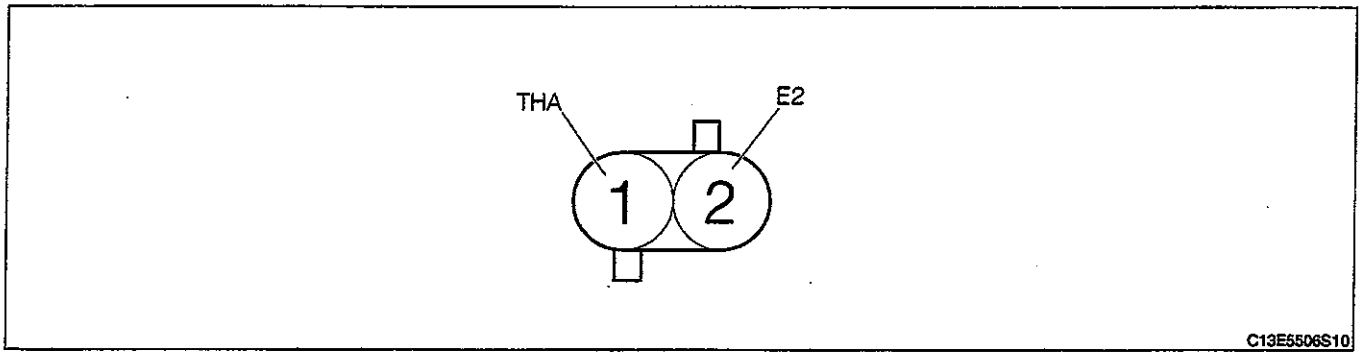
YES: MAP sensor replace.
NO: Repair or replace of harness or connector.

1-12-2 DTC No. P0110/43 Intake air temperature (IAT) sensor circuit malfunction

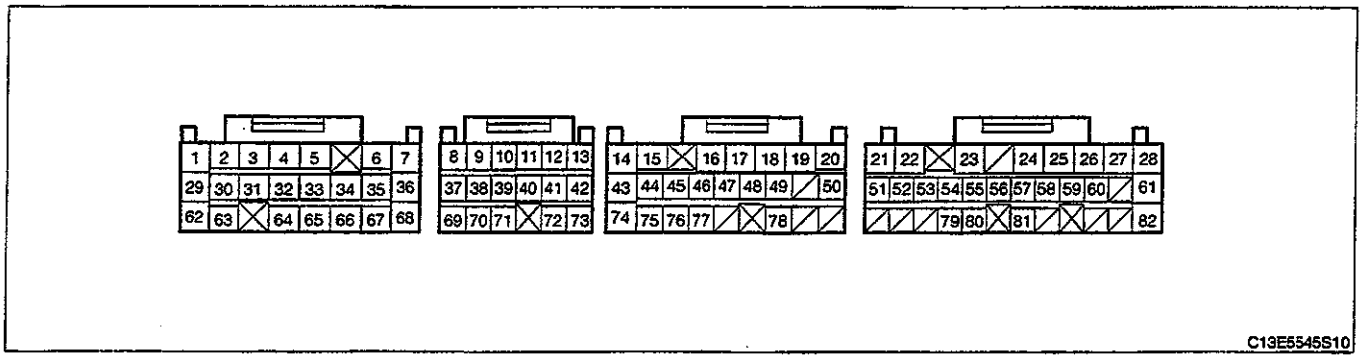
(1) WIRING DIAGRAM



IAT sensor wire harness side

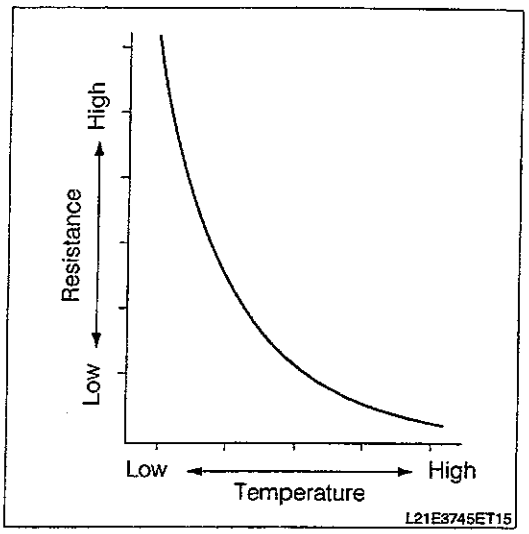


EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1.The IAT sensor, which detects the intake air temperature, is located at the air cleaner. A thermistor built in the sensor changes the resistance value according to the intake air temperature. The lower the intake air temperature, the greater the thermistor resistance value, and the higher the intake air temperature, the lower the thermistor resistance value. When the resistance value of the intake air temp. sensor changes in accordance with changes in the intake air temperature, the potential at terminal THA also changes. Based on this signal, the EFI ECU increases the fuel injection volume to improve driveability during cold engine operation.



(3) DTC DETECTING CONDITION

1.Open wire or short circuit in the IAT sensor circuit

(4) TROUBLE AREA

1.Open wire or short circuit in the IAT sensor circuit
2.Intake air temperature (IAT) sensor
3.EFI ECU

(5) POINTS OF INSPECTION

1.Is the signal from the IAT sensor inputted to the EFI ECU proper ?
2.Is the harness between the IAT sensor and EFI ECU proper ?
3.Is the output of IAT sensor proper ?

(6) INSPECTION PROCEDURE

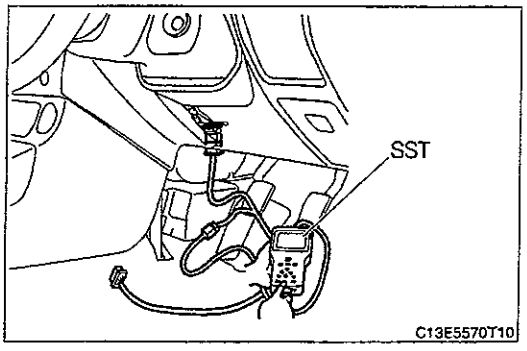
① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of IAT sensor output value.

1.With the IG switch turned OFF, connect the DS-21 diagnosis tester to DLC through the SST or connect the OBD II generic scan tool directly to DLC.
SST: 09991-87404-000

2.After turning ON the IG switch, turn ON the main switch of the tester. Read the intake air temperature value of the DS-21 diagnosis tester or OBD II generic scan tool.

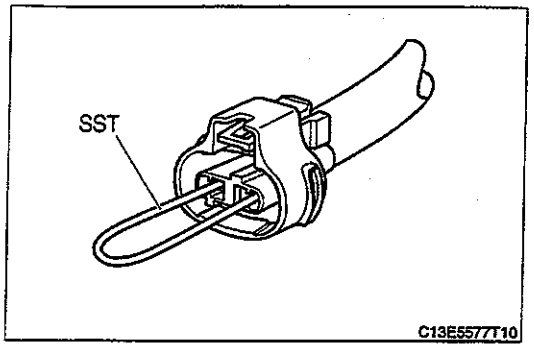
3.Is the measured value the same as the actual intake air temperature?
YES: Check malfunction that occurs intermittently or poor contact.
NO: Go to ➤2.



➤2. Confirmation of IAT sensor output value.
When −40 °C: Go to ➤3.
When 140 °C or above: Go to ➤5.

➤3. Check of open wire in harness or inside EFI ECU (1).

1.After turning OFF the main switch of the tester, turn OFF the IG switch.
2.Disconnect the connector of the IAT sensor.
3.Connect a jump wire between the harness terminals 1 (THA) and 2 (E2) of the IAT sensor.
SST: 09991-87403-000
4.After turning ON the IG switch, turn ON the main switch of the tester. Read the intake air temperature value of the DS-21 diagnosis tester or OBD II generic scan tool.
5.Is the measured value 140°C or above?
YES: Check the IAT sensor connector or terminal for connecting condition. If they are satisfactory, replace the IAT sensor.
NO: Go to ➤4.



➤4. Check of open wire in harness or inside EFI ECU (2).

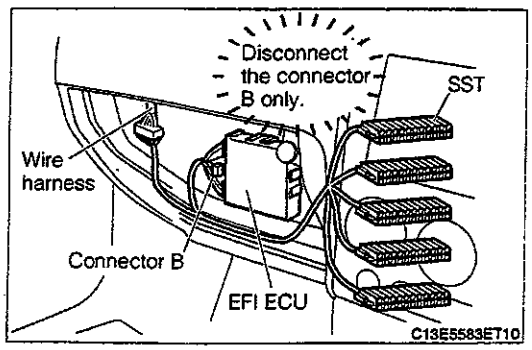
1.After turning OFF the main switch of the tester, turn OFF the IG switch.
2.Set the SST (sub-harness).
SST: 09842-97203-000
3.Disconnect the jump wire from the IAT sensor connector.
4.Next, connect the jump wire between the SST connector terminals 76 (THA) and 17 (E2).
5.After turning ON the IG switch, turn ON the main switch of the tester. Read the intake air temperature value of the DS-21 diagnosis tester or OBD II generic scan tool.
6.Is the measured value 140°C or above?
YES: The harness between the IAT sensor and the EFI ECU is open. Repair or replace the harness.
NO: Check the ECU connector or terminal for connecting condition. If they are satisfactory, replace the EFI ECU.

➤5. Check of short in harness or inside EFI ECU (1).

1.After turning OFF the main switch of the tester, turn OFF the IG switch.
2.Disconnect the connector of the IAT sensor.
3.After turning ON the IG switch, turn ON the main switch of the tester. Read the intake air temperature value of the DS-21 diagnosis tester or OBD II generic scan tool.
4.Is the measured value −40°C ?
YES: Replace the IAT sensor.
NO: Go to ➤6.

➤6. Check of short in harness or inside EFI ECU (2).

1.After turning OFF the main switch of the tester, turn OFF the IG switch.
2.Disconnect the connector B of the SST from the EFI ECU connector.
3.After turning ON the IG switch, turn ON the main switch of the tester. Read the intake air temperature value of the DS-21 diagnosis tester or OBD II generic scan tool.
4.Is the measured value −40°C ?
YES: Repair or replace the harness or connector.
NO: Check or replace the EFI ECU.



② When not using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of ECU input signal THA.

1.Set the SST (sub-harness).

2.With the IG switch turned ON, measure the voltage between the SST connectors 76 (THA) and 17 (E2) under the following condition given below.

Intake air temp [°C]	Specified value [V]
20	1.8 – 2.9
60	0.6 – 1.2

3.Is the measured value within the specified value?

YES: Check malfunction that occurs intermittently or poor contact.

Refer to Page B8-26.

NO: Go to ➤2.

➤2. Check of harness between IAT sensor and ECU.

1.Turn OFF the IG switch.

2.Disconnect the harness from the IAT sensor.

3.Disconnect the SST connectors at the EFI ECU side.

4.Check the harness and connector for open wire or short.

Connector 1 (THA) at sensor side – Connector 76 (THA) at ECU side.

Connector 2 (E2) at sensor side – Connector 17 (E2) at ECU side.

5.Are the check results for open wire and short OK?

YES: Go to ➤3.

NO: Repair or replace the harness or connector.

➤3. Check of IAT sensor.

6.Carry out unit check of IAT sensor.

Refer to Page B8-143.

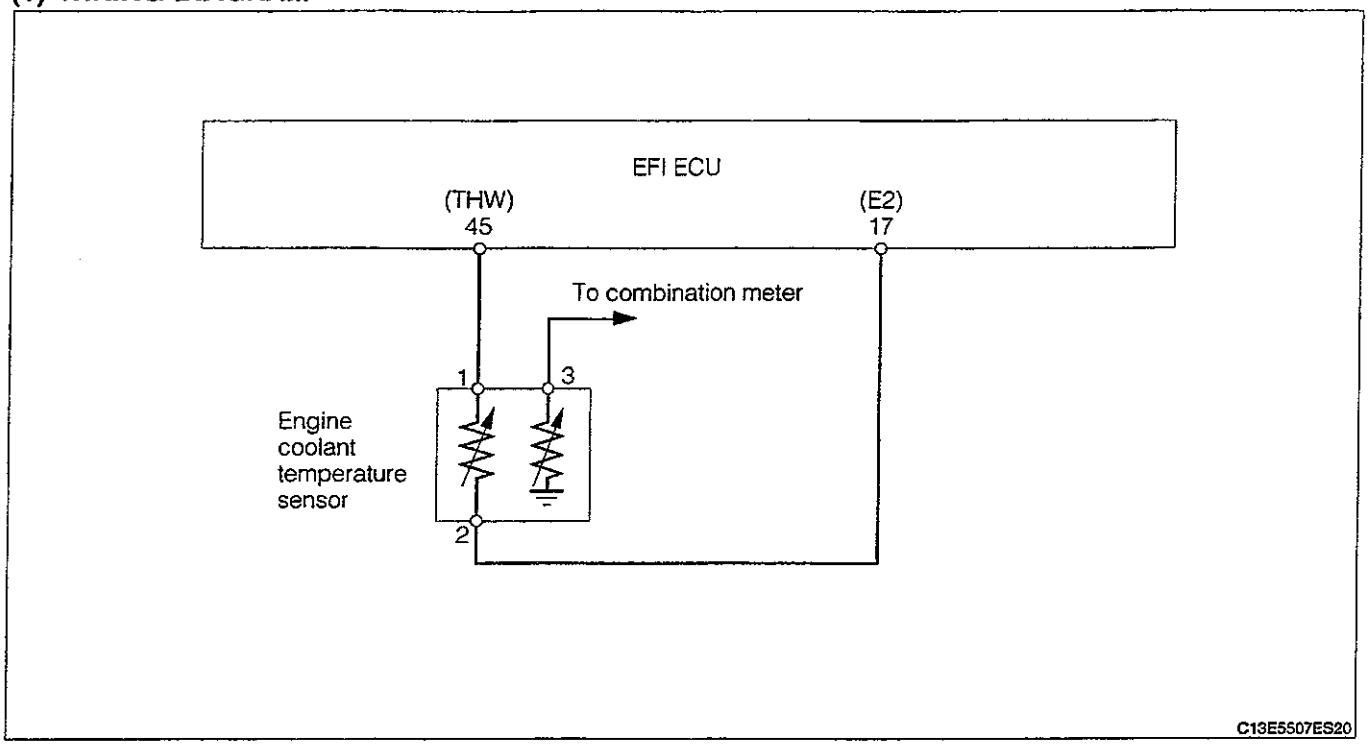
7.Are the unit check results OK?

YES: Check or replace the EFI ECU.

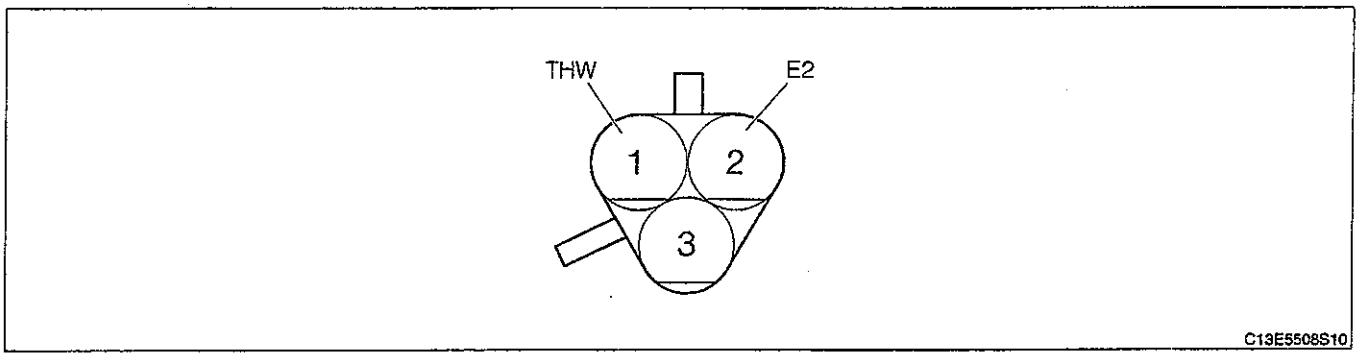
NO: Replace the IAT sensor.

1-12-3 DTC No.P0115/42 Engine coolant temperature sensor (ECT) circuit malfunction

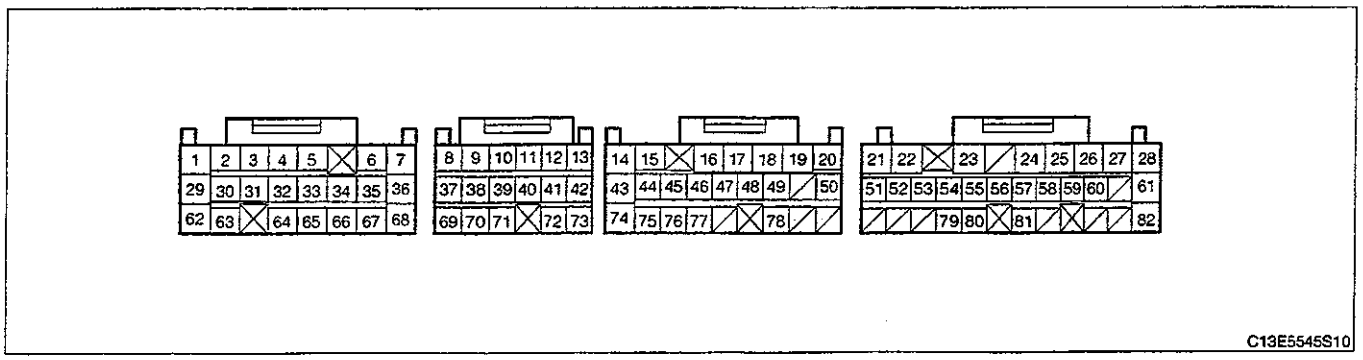
(1) WIRING DIAGRAM



ECT sensor wire harness side



EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1.A thermistor built into the ECT sensor changes the resistance valve according to the engine coolant temperature. The structure of the sensor and connection to the EFI ECU is the same as in the DTC P0110/43 (IAT Sensor Circuit Malfunction).

(3) DTC DETECTING CONDITION

1.Open wire or short circuit in the ECT sensor circuit

(4) TROUBLE AREA

1.Open wire or short circuit in the ECT sensor circuit
2.Engine coolant temperature (ECT) sensor
3.EFI ECU

(5) POINTS OF INSPECTION

1.Is the signal from the ECT sensor inputted to the EFI ECU proper ?
2.Is the harness between the ECT sensor and EFI ECU proper ?
3.Is the output of the ECT sensor proper ?

(6) INSPECTION PROCEDURE

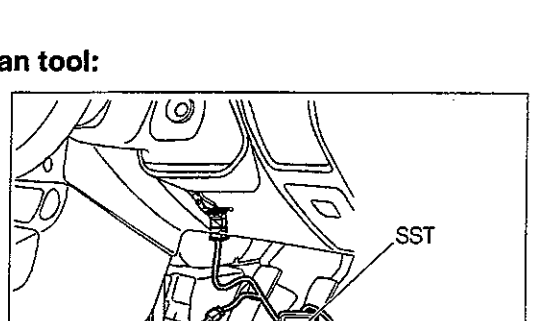
NOTE

- If DTC P0110/43 (IAT Sensor Circuit Malfunction), P0115/42 (ECT Sensor Circuit Malfunction), are P0120/41 (Throttle/Pedal Position Sensor/Switch A Malfunction) are outputted simultaneously, E2 (Sensor Ground) may be open.
- Read the freeze frame data, using the DS-21 diagnosis tester or OBD II generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of output value of ECT sensor.

1.With the IG switch turned OFF, connect the DS-21 diagnosis tester to DLC through the SST or connect the OBD II generic scan tool directly to DLC.
SST: 09991-87404-000
2.After turning ON the IG switch, turn ON the main switch of the tester. Read the engine coolant temperature of the DS-21 diagnosis tester or OBD II generic scan tool.
3.Is the measured value the same as the actual engine coolant temperature?
YES: Check malfunction that occurs intermittently or poor contact.
NO: Go to ➤2.



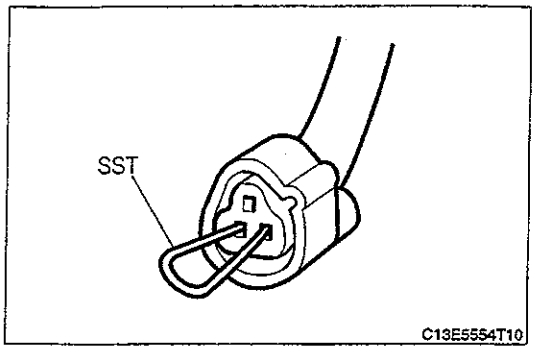
➤2. Confirmation of cooling water temperature sensor output value.

When −40°C: Go to ➤3.
When 140°C or above: Go to ➤5.

➤3. Check of open wire in harness or inside EFI ECU (1).

1.After turning OFF the main switch of the tester, turn OFF the IG switch.
2.Disconnect the connector of the ECT sensor.

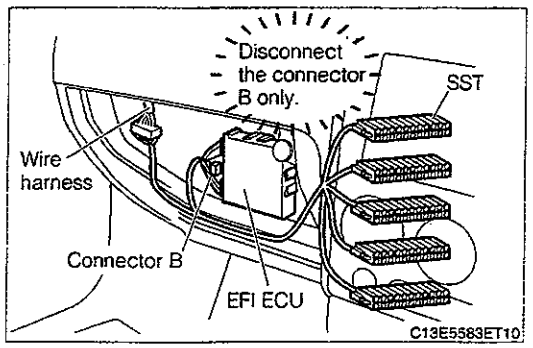
3.Connect a jump wire between the harness terminals 1 (THW) and 2 (E2) of the ECT sensor.
SST: 09991-87403-000
4.After turning ON the IG switch, turn ON the main switch of the tester. Read the engine coolant temperature value of the DS-21 diagnosis tester or OBD II generic scan tool.
5.Is the measured value 140°C or above?
YES: Check the ECT sensor connector or terminal for connecting condition. If they are satisfactory, replace the ECT sensor.
NO: Go to ➤4.



➤4. Check of open wire in harness or inside EFI ECU (2).
1.After turning OFF the main switch of the tester, turn OFF the IG switch.
2.Set the SST (sub-harness).
SST: 09842-97203-000
3.Disconnect the jump wire from the ECT sensor connector.
4.Next, connect the jump wire between the SST connector terminals 45 (THW) and 17(E2).
5.After turning ON the IG switch, turn ON the main switch of the tester. Read the engine coolant temperature value of the DS-21 diagnosis tester or OBD II generic scan tool.
6.Is the measured value 140°C or above?
YES: The harness between the ECT sensor and the ECU is open. Repair or replace the harness.
NO: Check the EFI ECU connector and terminal for connecting condition. If they are satisfactory, replace the EFI ECU.

➤5. Check of short in harness or inside EFI ECU (1).
1.After turning OFF the main switch of the tester, turn OFF the IG switch.
2.Disconnect the connector of the ECT sensor.
3.After turning ON the IG switch, turn ON the main switch of the tester. Read the coolant temperature value of the DS-21 diagnosis tester or OBD II generic scan tool.
4.Is the measured value −40°C?
YES: Replace the ECT sensor.
NO: Go to ➤6.

➤6. Check of short in harness or inside EFI ECU (2).
1.After turning OFF the main switch of the tester, turn OFF the IG switch.
2.Disconnect the connector B of the SST from the EFI ECU connector.
3.After turning ON the IG switch, turn ON the main switch of the tester. Read the engine coolant temperature value of the DS-21 diagnosis tester or OBD II generic scan tool.
4.Is the measured value −40°C?
YES: Repair or replace the harness or connector.
NO: Check or replace the EFI ECU.



② When not using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of ECU input signal THW.

1.Set the SST (sub-harness).

2.With the IG switch turned ON, measure the voltage between the SST terminals 45 (THW) and 17 (E2) under the following condition given below.

Engine coolant temp. [°C]	Specified value [V]
20	1.8 – 2.9
60	0.5 – 1.2

3.Is the measured value within the specified value?

YES: Check malfunction that occurs intermittently or poor contact.

NO: Go to ➤2.

➤2. Check of harness between ECT sensor and ECU.

1.Turn OFF the IG switch.

2.Disconnect the harness from the ECT sensor.

3.Disconnect the SST connectors at the EFI ECU side.

4.Check the harness and connector for open wire or short.

Connector 1 (THW) at sensor side – Connector 45 (THW) at ECU side.

Connector 2(E2) at sensor side – Connector 17 (E2) at ECU side.

5.Are the check results for open wire and short OK?

YES: Go to ➤3.

NO: Repair or replace the harness or connector.

➤3. Unit check of ECT sensor.

1.Carry out unit check of ECT sensor.

Refer to Page B8-143.

2.Are the unit check results OK?

YES: Check or replace the EFI ECU.

NO: Replace the ECT sensor.

1-12-4 DTC No.P0116/42 Engine coolant temperature (ECT) sensor circuit range/performance problem

(1) WIRING DIAGRAM

1.Refer to section DTC0115/42.
Refer to Page B8-53.

(2) CIRCUIT DESCRIPTION

1.Refer to Engine Coolant Temperature Circuit Malfunction.
Refer to Page B8-53.

(3) DTC DETECTING CONDITION

1.When the engine starts, the engine coolant temperature sensor value is more than 4.85 V or less than 0.15 V for more than a certain length of time.

(4) TROUBLE AREA

1.ECT sensor
2.Cooling system

(5) POINTS OF INSPECTION

1.Is the signal from the ECT sensor inputted to the ECU proper ?
2.Is the harness between the ECT sensor and the EFI ECU proper ?
3.Is the output of ECT sensor proper ?

(6) INSPECTION PROCEDURE

NOTE

- If DTC P0115/42 (ECT Sensor Circuit Malfunction) and P0116/42 (ECT Sensor Circuit Range/Performance Problem) are output simultaneously, ECT sensor circuit may be open. Perform troubleshooting of DTC P0115/42 first.
- Read the freeze frame data, using the DS-21 diagnosis tester or OBD II generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.
- In the troubleshooting for the water temperature sensor system, only the use of DS-21 diagnosis tester or OBD II generic scan tool will be able to determine whether open wire, short (P0115) or functional malfunction (P0116).

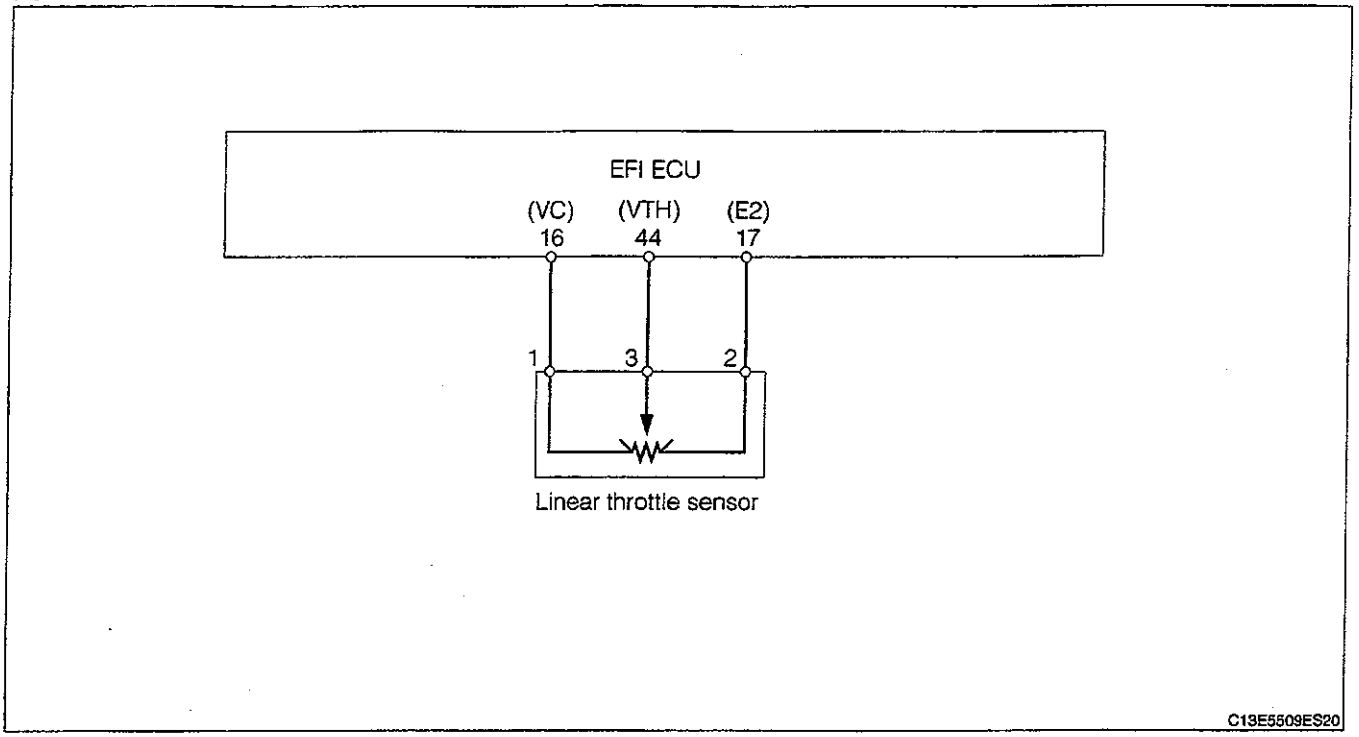
① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of DTC.
1.Are codes other than DTC P0116/42 outputted?
YES: Go to applicable DTC flow chart.
NO: Go to ➤2.

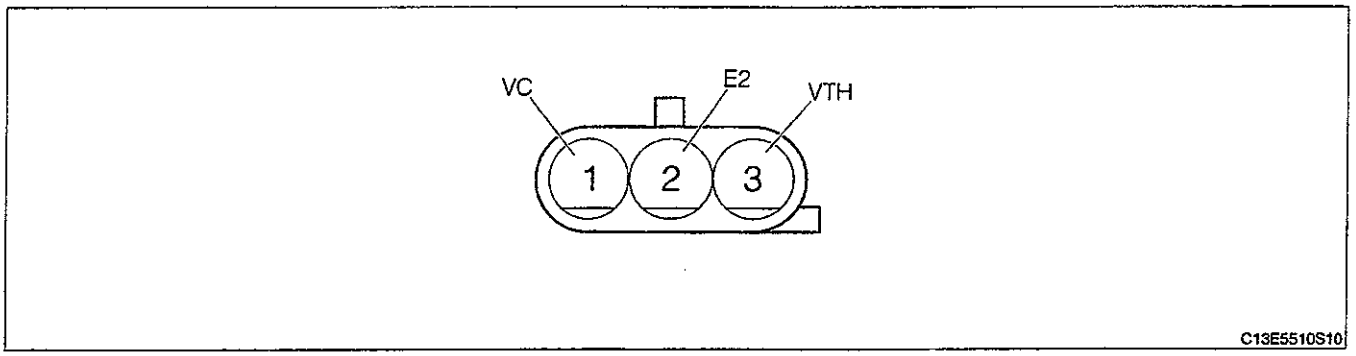
➤2. Check of thermostat.
1.(Conduct the check of thermostat in Section COOLING SYSTEM.)
2.Are the check results OK?
YES: Replace the ECT sensor.
NO: Replace the thermostat.

1-12-5 DTC No.P0120/41 Throttle/pedal position sensor/switch

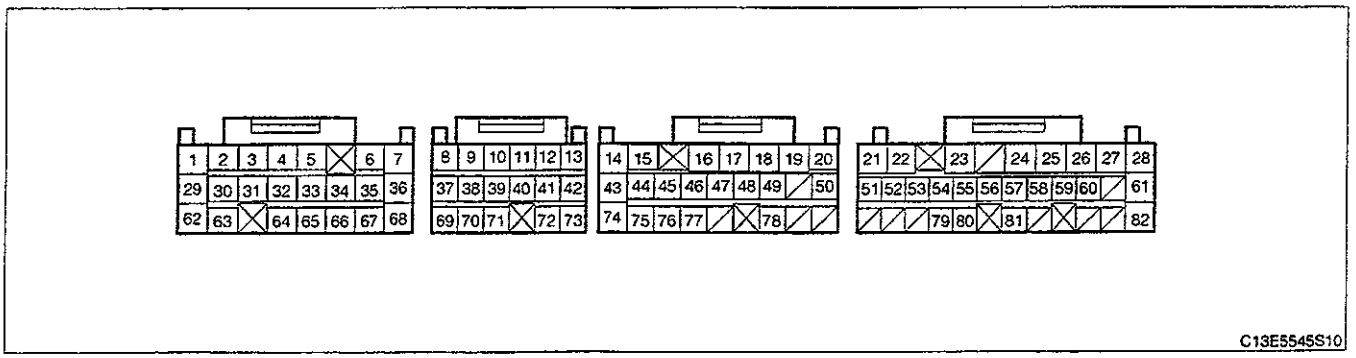
(1) WIRING DIAGRAM



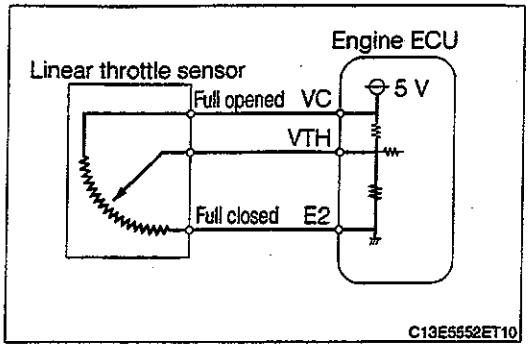
Linear throttle sensor wire harness side



EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION



1.The linear throttle sensor is mounted in the throttle body and detects the throttle valve opening angle. When the throttle valve is fully closed, a voltage of approximately 0.4 - 0.8 V is applied to terminal VTH of the EFI ECU. The voltage applied to the terminals VTH of the EFI ECU increases in proportion to the opening angle of the throttle valve and becomes approximately 3.5 - 5.0 V when the throttle valve is fully opened. The EFI ECU judges the vehicle driving conditions from these signals input from terminal VTH, uses them as one of the conditions for deciding the air-fuel ratio correction, power increase correction and fuel-cut control etc.

(3) DTC DETECTING CONDITION

1.Open wire or short circuit in the throttle/pedal position sensor/switch circuit

(4) TROUBLE AREA

1.Open wire or short circuit in the throttle/pedal position sensor/switch circuit
2.Linear throttle position sensor
3.EFI ECU

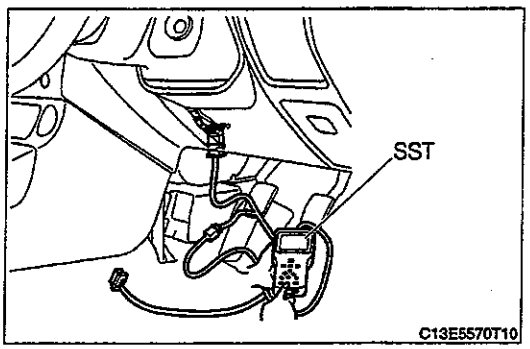
(5) POINTS OF INSPECTION

1.Is the signal from the linear throttle sensor inputted to the ECU proper ?
2.Is the harness between the linear throttle sensor and the EFI ECU proper ?
3.Is the supply voltage of the linear throttle sensor proper ?
4.Is the output of linear throttle sensor proper ?

(6) INSPECTION PROCEDURE

① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of output value of liner throttle sensor.



1.With the IG switch turned ON, connect the DS-21 diagnosis tester to DLC through the SST or connect the OBD II generic scan tool directly to DLC.
SST: 09991-87404-000
2.After turning ON the IG switch, turn ON the main switch of the tester. Read the throttle valve opening value of the DS-21 diagnosis tester or OBD II generic scan tool.

Throttle valve	Throttle valve opening [%]
Fully closed	0.0
Fully open	100.0

3.Are the check results OK?
YES: Check malfunction that occurs intermittently or poor contact.
NO: Go to ➤2.

➤2. Check of power supply voltage at linear throttle sensor harness side.

1.After turning OFF the main switch of the tester, turn OFF the IG switch.

2.Disconnect the connector of the linear throttle sensor.

3.Measure the voltage between the terminals 1 (VC) of wire harness connector and body ground when the ignition switch is turned to the ON position.

SPECIFIED VALUE: 4.5 – 5.5V

4.Is the voltage within the specified value?

YES: Go to ➤3.

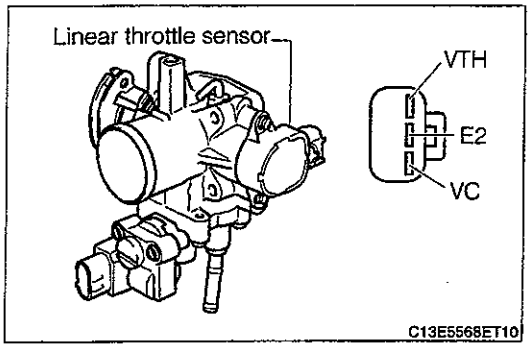
NO: Go to ➤5.

➤3. Check of linear throttle sensor.

1.Turn OFF the IG switch.

2.Measure the resistance between the respective terminals.

Terminal	Condition	Standard value [kΩ]
1 (VC) – 2 (E2)	–	2.5 – 6.0
2 (E2) – 3 (VTH)	Throttle valve fully closed	0.1 – 1.3
	Throttle valve fully opened	1.7 – 4.2



3.Are the check results OK?

YES: Go to ➤4.

NO: Replace the linear throttle sensor.

➤4. Check of ECU input signal VTH.

1.Set the SST (sub-harness).

SST: 09842-97203-000

2.With the IG switch turned ON, measure the voltage between the SST connector 44 (VTH) and 17 (E2) under the following condition given below.

Throttle valve	Specified value [V]
Fully closed	0.4 – 0.8
Fully open	3.5 – 5.0

3.Is the measured value within the specified value?

YES Check or replace the EFI ECU.

NO: Check the harness and connector between the EFI ECU and the linear throttle sensor (VTH line) for open wire or short.

➤5. Check of power supply voltage at linear throttle sensor ECU side.

1.Turn OFF the IG switch.

2.Set the SST (sub-harness).

SST: 09842-97203-000

3.With the IG switch turned ON, measure the voltage between the SST connectors 16 (VC) and 17 (E2).

SPECIFIED VALUE: 4.5 – 5.5V

4.Is the measured value within the specified value?

NOTE

- If no voltage appears, check the EFI ECU power supply circuit.

YES: Check the harness and connector between the EFI ECU and the linear throttle sensor (VC line) for open wire or short.

NO: Check or replace the EFI ECU.

② When not using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of ECU input signal VTH.

1.Set the SST (sub-harness).

2.With the IG switch turned ON, measure the voltage between the SST connectors 44 (VTH) and 17 (E2) under the following condition given below.

Throttle valve	Specified value [V]
Fully closed	0.4 – 0.8
Fully open	3.5 – 5.0

3.Is the measured value within the specified value?

YES: Check malfunction that occurs intermittently or poor contact.

NO: Go to ➤2.

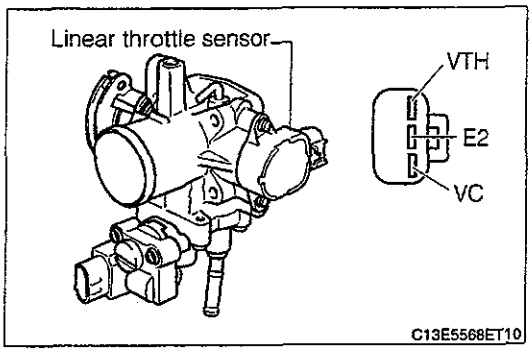
➤2. Check of linear throttle sensor.

1.Turn OFF the IG switch.

2.Disconnect the linear throttle sensor.

3.Measure the resistance between the respective terminals.

Terminal	Condition	Standard value [kΩ]
1 (VC) – 2 (E2)	–	2.5 – 6.0
2 (E2) – 3 (VTH)	Throttle valve fully closed	0.1 – 1.3
	Throttle valve fully opened	1.7 – 4.2



4.Are the check results OK?

YES: Go to ➤3.

NO: Replace the linear throttle sensor.

➤3. Check of harness between ECU and linear throttle sensor.

1.Check the harness and connector between the EFI ECU and the linear throttle sensor (VC, VTH, E2 line) for open wire or short.

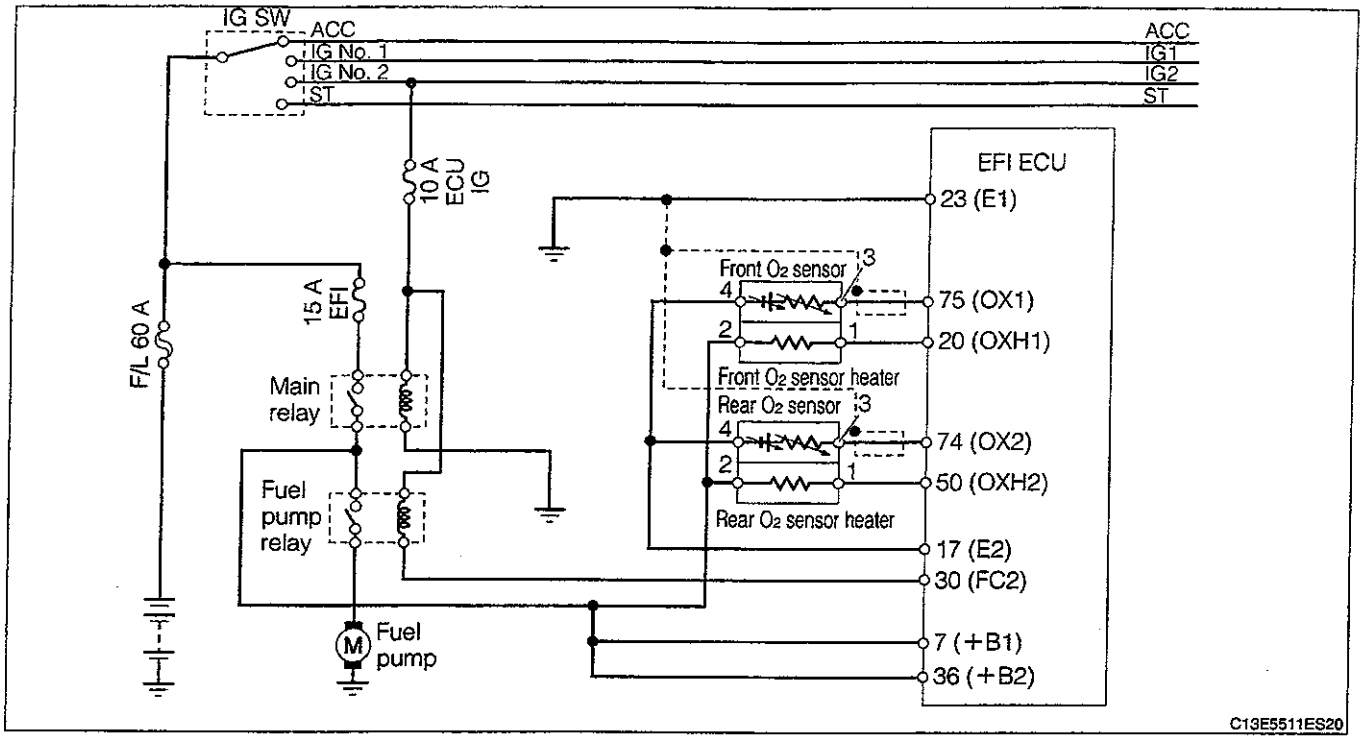
YES: Check or replace the EFI ECU.

NO: Repair or replace the harness or connector.

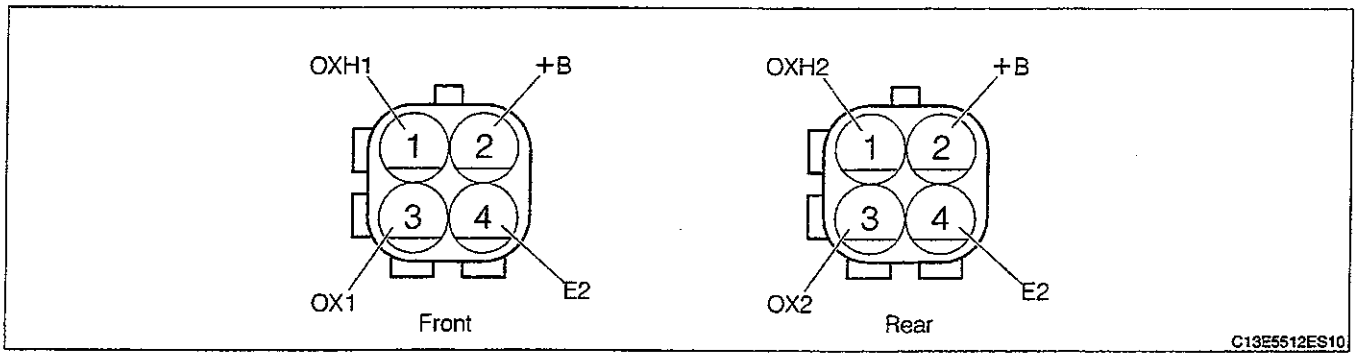
1-12-6 DTC No.P0130/21 Oxygen sensor circuit malfunction (Bank 1 sensor 1)

(1) WIRING DIAGRAM

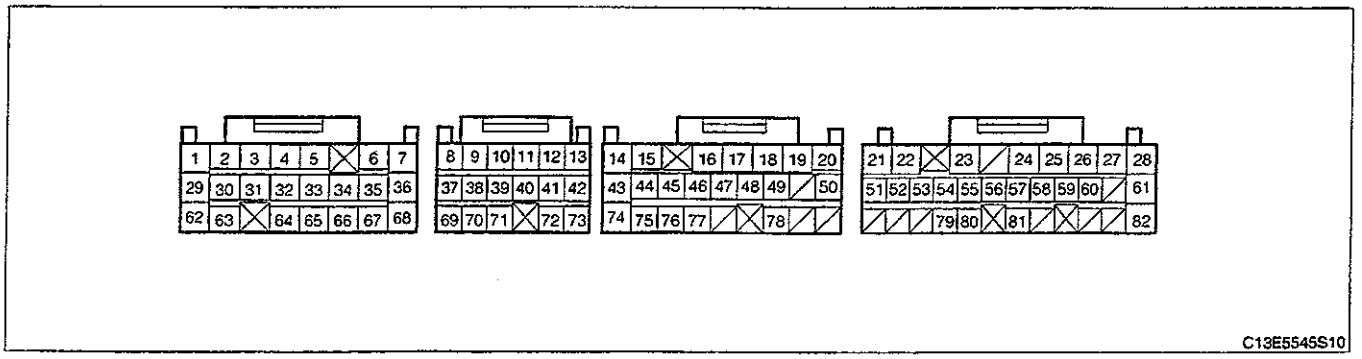
① FOR EU SPECIFICATION



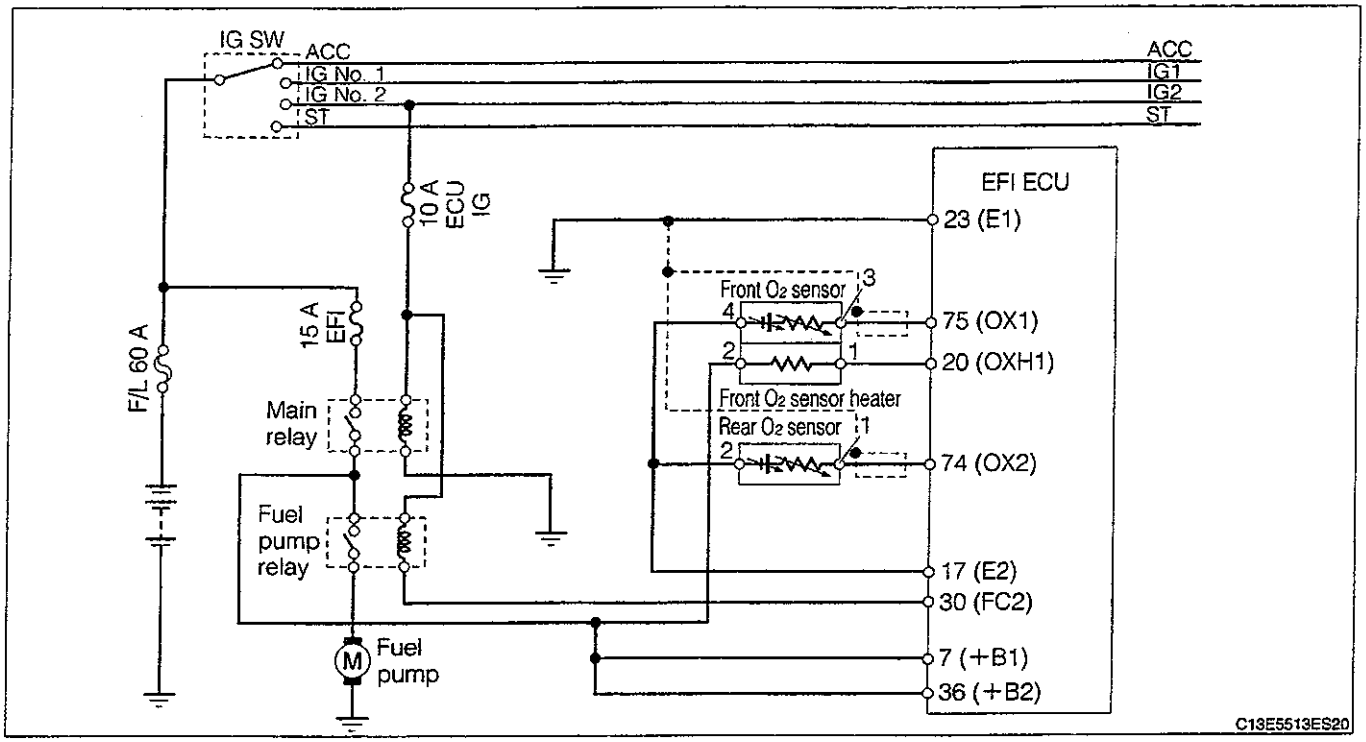
Sensor wire harness side



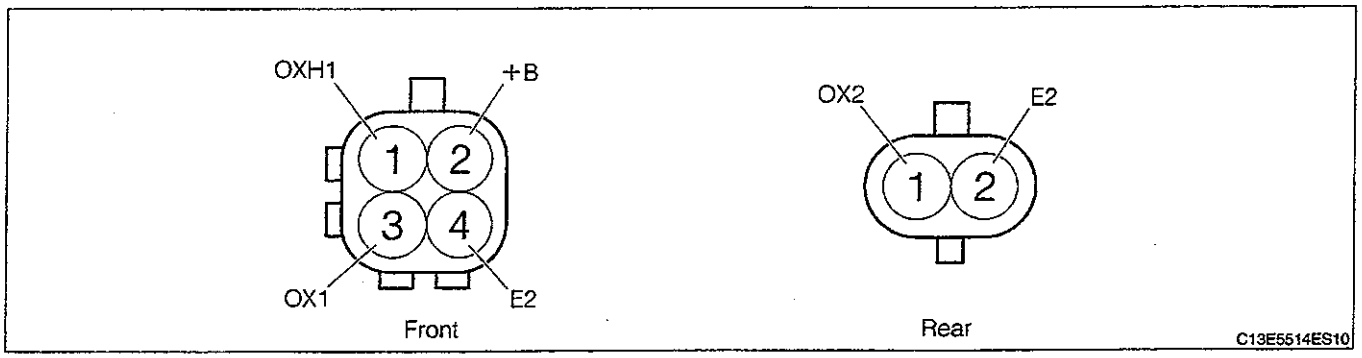
EFI ECU wire harness side



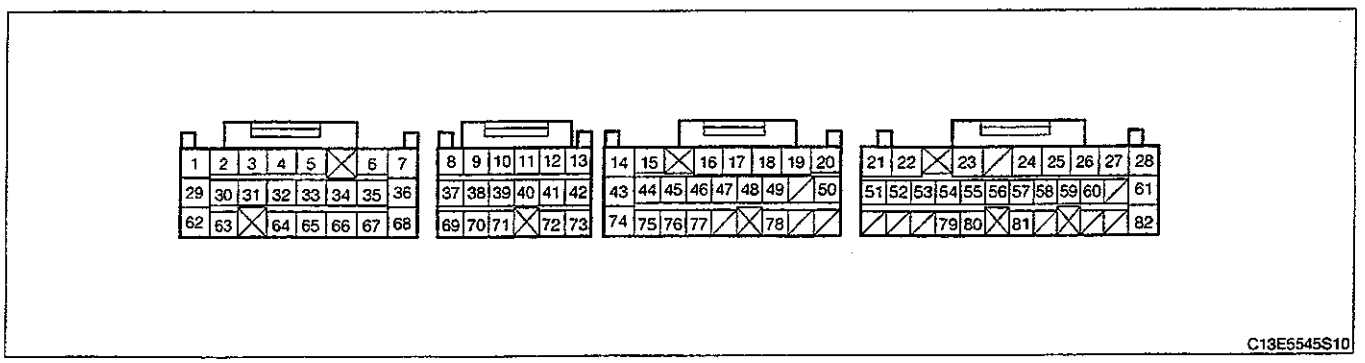
② FOR AUS SPECIFICATION



Sensor wire harness side



EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1.The front oxygen sensor (bank 1, sensor 1) detects the concentration of oxygen contained in the exhaust gas according to the magnitude of the electromotive force that is being generated in itself. When the air-to-fuel ratio becomes richer than the stoichiometric ratio, a greater electromotive force (approx. 1 volt) is applied to the ECU. Conversely, when the ratio becomes leaner than the stoichiometric ratio, a smaller electromotive force (approx. 0 volt) is applied to the ECU. In this way, the ECU determines whether the air-to-fuel ratio is rich or lean. Based on this evaluation, the injection time is controlled.

(3) DTC DETECTING CONDITION

1.When the flowing conditions (a) and (b) continue for more than certain length of time.

(a) After engine warming up, the signal from the oxygen sensor continuously remains in the non-rich state, not becoming rich even once.

(b) Voltage output of oxygen sensor remains at 0.3 V or more, or 0.6 V or less, during idling after engine is warmed up.

(4) TROUBLE AREA

1.Air induction system
2.Fuel pressure
3.Injector
4.Open wire or short circuit in the oxygen sensor circuit
5.Oxygen sensor
6.EFI ECU

(5) POINTS OF INSPECTION

CAUTION

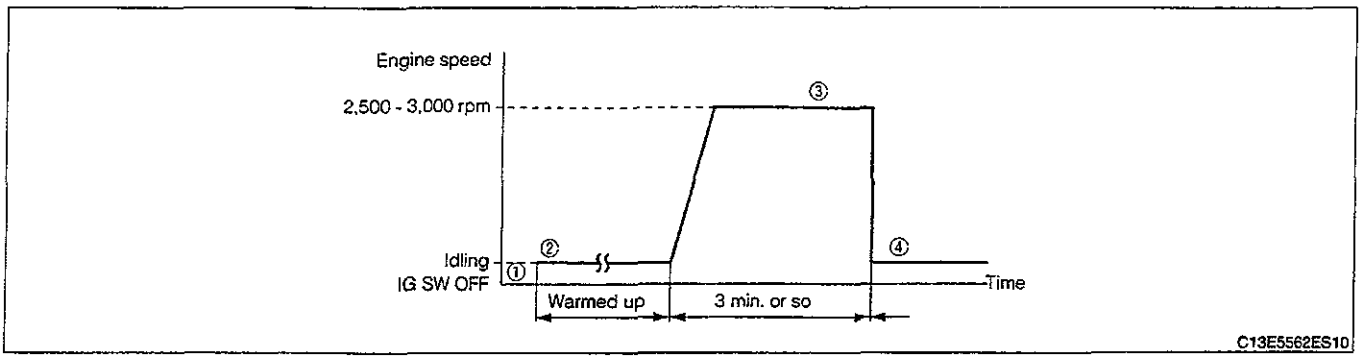
- **If it is the case that any DTC besides misfire is memorized simultaneously, first perform the troubleshooting for them.**

1.Is the signal from the oxygen sensor inputted to the EFI ECU proper ?
2.Is the harness between the oxygen sensor and the EFI ECU proper ?
3.Is the output of oxygen sensor proper ?
4.Are there the open wire or short circuit for the oxygen sensor heater circuit.

NOTE

- **Sensor 1 means a sensor which is located near the engine block.**
- **Using the DS-21 diagnosis tester or OBD II generic scan tool, confirm the output voltage of the oxygen sensor (bank 1, sensor 1) from the current data. If the output voltage of the oxygen sensor (bank 1, sensor 1) is 0.1 V or less, most likely the circuit of the oxygen sensor (bank 1, sensor 1) is open or shorted.**

CONFIRMATION ENGINE RACING PATTERN



①With the IG switch turned OFF, connect the DS-21 diagnosis tester to DLC through the SST. Turn ON the IG switch and the main switch of the tester. Set the tester to the "Continuous monitoring results" of the CARB mode.
②Start the engine. Keep on warming the engine for more than five minutes until the engine cooling water temperature reaches 90°C or above.
③Race the engine for about three minutes at 2500 to 3000 rpm.
④After one minute of idling, press the F1 key of the tester. Check to see if the DTC P0130 is outputted.

CAUTION

- If the condition in this test is not strictly followed, detection of the malfunction will not be possible.
- If you do not have the DS-21 diagnosis tester, turn the ignition switch OFF after performing steps ② to ④, then perform steps ② to ④ again.

(6) INSPECTION PROCEDURE

NOTE

- Read the freeze frame data, using the DS-21 diagnosis tester or OBD II generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of DTC.

1.Are other codes (those other than DTC P0130/21) outputted?

YES: Go to the relative DTC chart.

NO: Go to ➤2.

➤2. Check of harness between oxygen sensor and ECU.

1.With the IG switch turned OFF, set the SST (sub-harness). However, the SST connectors at the EFI ECU side should remain disconnected.

SST: 09842-97203-000

2.Disconnect the oxygen sensor connector.
3.Check the harness and connector for open wire or short.
4.Are the check results for open wire and short between the connector 1 (OX1) of the oxygen sensor at the harness side and the SST terminal 75 (OX1) OK?

YES: Go to ➤3.

NO: Repair or replace the harness or connector.

➤3. Check of output voltage of oxygen sensor during idling.

1.Connect the oxygen sensor and SST connectors, respectively.

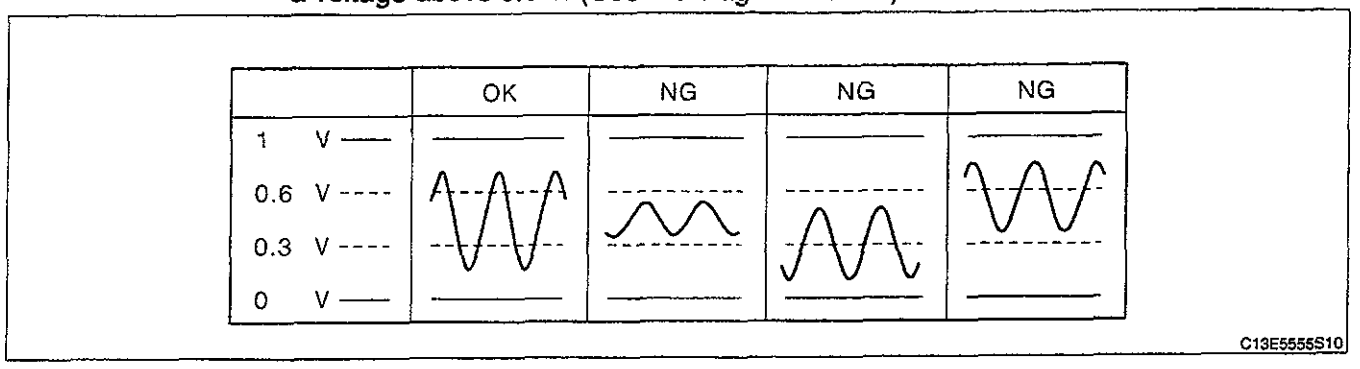
2.Connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000

3.Warm up the engine at 2500 rpm for about 90 seconds.

4.Turn ON the main switch of the tester to read the output voltage of oxygen sensor during idling.

SPECIFIED VALUE: The voltage varies repeatedly between a range from a voltage below 0.3 V and to a voltage above 0.6 V. (See the diagram below.)



5.Are the check results OK?

YES: Go to ➤10.

NO: Go to ➤4.

➤4. Check of misfire.

1.Check to see if any misfire is occurring by monitoring the DTC and data list.

2.Are the check results OK?

YES: Go to ➤5.

NO: Perform troubleshooting for misfire. (Go to troubleshooting of DTC P0300/17, P0301−0304/17.)

➤5. Check of air induction system.

1.Check the following items given below:

(1) Check of the engine oil level gauge, oil filler cap and PCV hose for disconnection.

(2) Check of parts of the air induction system between the cylinder head and the throttle body for disconnection, looseness, or cracks.

2.Are the check results OK?

YES: Go to ➤6.

NO: Repair or replace the induction system.

➤6. Check of fuel pressure.

1.Are the check results OK?

YES: Go to ➤7.

NO: Check and repair fuel pump, fuel pipe line and filter.

➤7. Check of injector injection.

1.Are the check results OK?

YES: Go to ➤8.

NO: Replace the injector.

➤8. Check of gas leakage of exhaust system.

1.Are the check results OK?

YES: Go to ➤9.

NO: Repair or replace.

➤9. Check of output voltage of oxygen sensor unit.

1.Warm up engine completely.

2.Disconnect the connector of the oxygen sensor with IG switch turned OFF.

3.Connect a voltmeter to the connector terminal of oxygen sensor.

4.Hold the engine racing speed for 3 minutes at 2000 rpm. At this time, ensure that the reading of the volt meter is within the specified value.

SPECIFIED VALUE: The voltmeter exhibits an output voltage of 0.2 V or more at least one time.

5.Are the check results OK?

YES: Check or replace the EFI ECU.

NO: Replace the oxygen sensor. (Bank 1, sensor 1)

➤10. Perform confirmation engine racing pattern.

1.Is there DTC P0130/21 being output again?

YES: Check or replace the EFI ECU.

NO: Go to ➤11.

➤11. The past situation of vehicles operation is investigated.

1.Did the vehicle run out of fuel in the past?

YES: DTC P0130/21 is caused by running out of fuel.

NO: Check malfunction that occurs intermittently or poor contact.

1-12-7 DTC No.P0133/21 Oxygen sensor circuit slow response (Bank1 sensor1)

(1) WIRING DIAGRAM

1.Refer to DTC P0130/21 (Oxygen sensor circuit malfunction)
Refer to Page B8-62.

(2) CIRCUIT DESCRIPTION

1.Refer to DTC P0130/21 (Oxygen sensor circuit malfunction).
Refer to Page B8-63.

(3) DTC DETECTING CONDITION

1.Response time for heated oxygen sensor voltage output to change from rich to lean, or from lean to rich, is more than certain length of time during idling after engine is warmed up.

(4) TROUBLE AREA

1.Air induction system
2.Fuel pressure
3.Injector
4.Open wire or short circuit in the oxygen sensor circuit

(5) POINTS OF INSPECTION

1.Is the signal from the oxygen sensor inputted to the EFI ECU proper ?
2.Is the harness between the oxygen sensor and the EFI ECU proper ?
3.Is the output of oxygen sensor proper ?
4.Are there the open wire or short circuit for the oxygen sensor heater circuit.

(6) INSPECTION PROCEDURE

NOTE

- **Read the freeze frame data, using the DS-21 diagnosis tester or OBD II generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.**

① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of DTC.

1.Are other codes (those other than DTC P0130/21) outputted?
YES: Go to the relative DTC chart.
NO: Go to ➤2.

➤2. Check of harness between oxygen sensor and ECU.

1.With the IG switch turned OFF, set the SST (sub-harness). However, the SST connectors at the EFI ECU side disconnected.
SST: 09842-97203-000

2.Disconnect the oxygen sensor connector.
3.Check the harness and connector for open wire or short.
4.Are the check results for open wire and short between the connector 3 (OX1) of the oxygen sensor at the harness side and the SST terminal 75 (OX1) OK?
YES: Go to ➤3.
NO: Repair or replace the harness or connector.

➤3. Check of output voltage of oxygen sensor during idling.

1.Connect the oxygen sensor and SST connectors, respectively.

2.Connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000

3.Turn OFF all accessory switches. Warm up the engine at 2500 rpm, until the radiator fan starts operating one time.

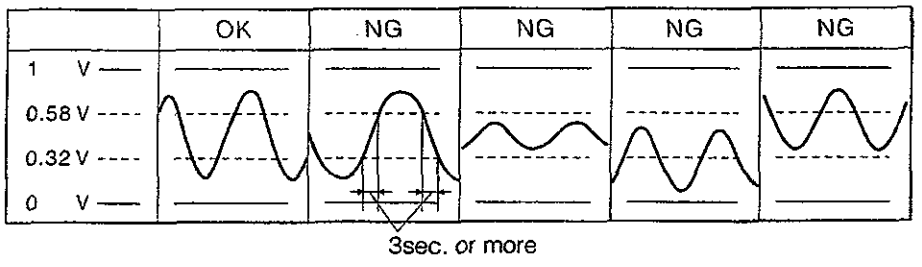
4.Turn ON the main switch of the tester. Read the output voltage of the oxygen sensor when the engine is idling and the radiator fan is not operating.

SPECIFIED VALUE: The voltage varies repeatedly between a range from a voltage below 0.32 V and to a voltage above 0.58 V. (See the diagram below.)

5.Are the check results OK?

YES: Go to ➤8.

NO: Go to ➤4.



➤4. Check of air induction system.

1.Check the following items given below.

(1) Check of the engine oil level gauge, oil filler cap and PCV hose for disconnection.

(2) Check of parts of the air induction system between the cylinder head and the throttle body for disconnection, looseness, or cracks.

2.Are the check results OK?

YES: Go to ➤5.

NO: Repair or replace induction system.

➤5. Check of fuel pressure.

1.Are the check results OK?

YES: Go to ➤6.

NO: Check and repair fuel pump, fuel pipe line and filter.

➤6. Check of injector injection.

1.Are the check results OK?

Refer to Page B8-146.

YES: Go to ➤7.

NO: Replace the injector.

➤7. Check of output voltage of oxygen sensor unit.

1.Warm up engine completely.

2.Disconnect the connector of the oxygen sensor with IG switch turned OFF.

3.Connect a voltmeter to the connector terminal of oxygen sensor.

4.Hold the engine racing speed for 3 minutes at 2000 rpm. At this time, ensure that the reading of the volt meter is within the specified value.

SPECIFIED VALUE: Does the voltmeter exhibit an output voltage of 0.2 V or more at least one time?

5.Are the check results OK?

YES: Check or replace the EFI ECU.

NO: Replace the oxygen sensor. (Bank 1, Sensor 1)

➤8. Perform confirmation engine racing pattern (Refer to DTC P0130/21 chart).

1.Is there DTC P0133/21 being output again?

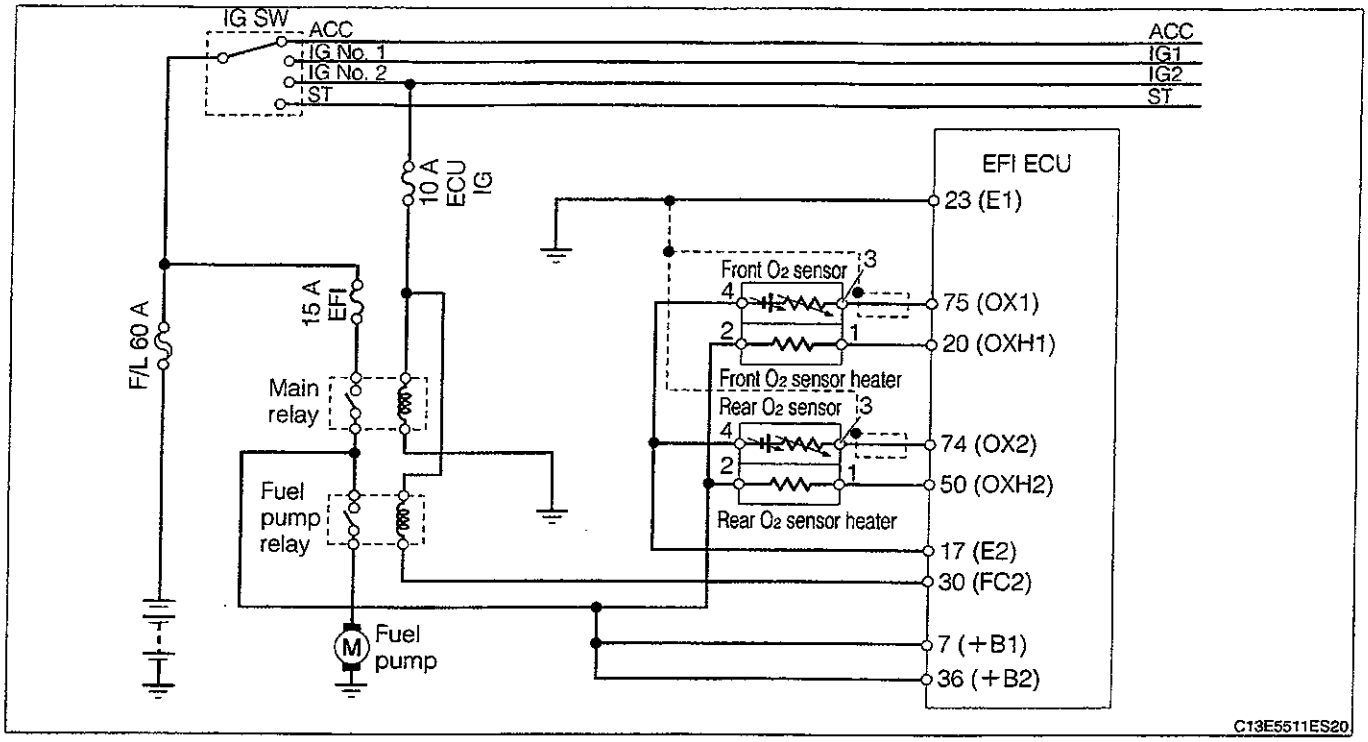
YES: Check or replace the EFI ECU.

NO: Check malfunction that occurs intermittently or poor contact.

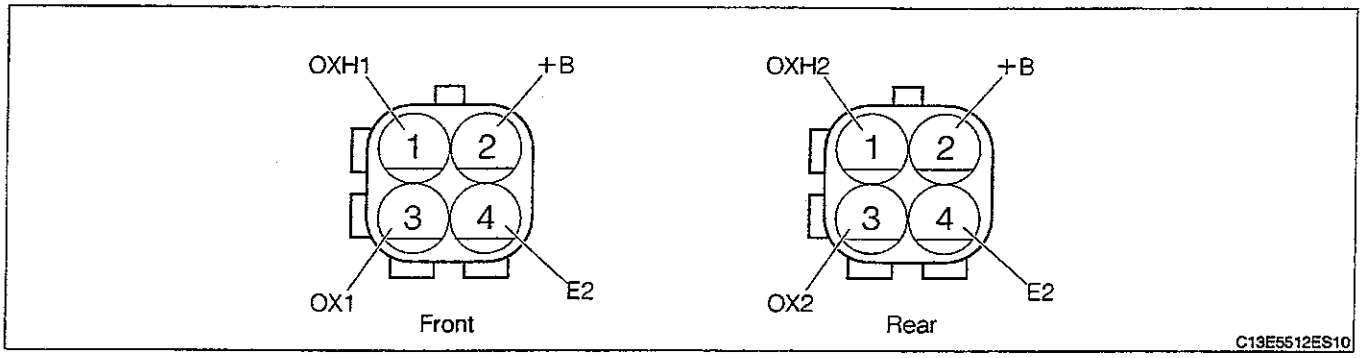
1-12-8 DTC No.P0135/23 Oxygen sensor heater circuit malfunction DTC No.P0141/24 ÉäÉÑO₂ ÉZÉìÉTÅ[ÉqÅ[É^Å[êMçÜånìù

(1) WIRING DIAGRAM

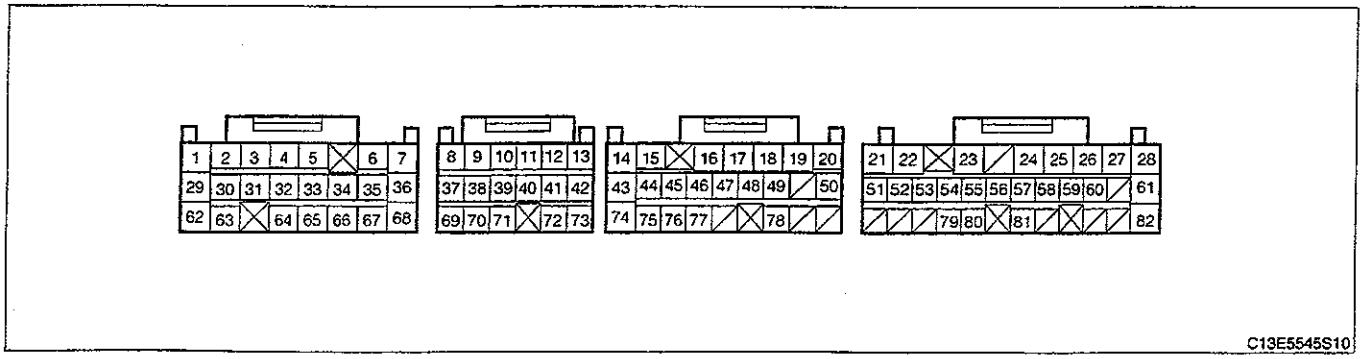
① FOR EU SPECIFICATION



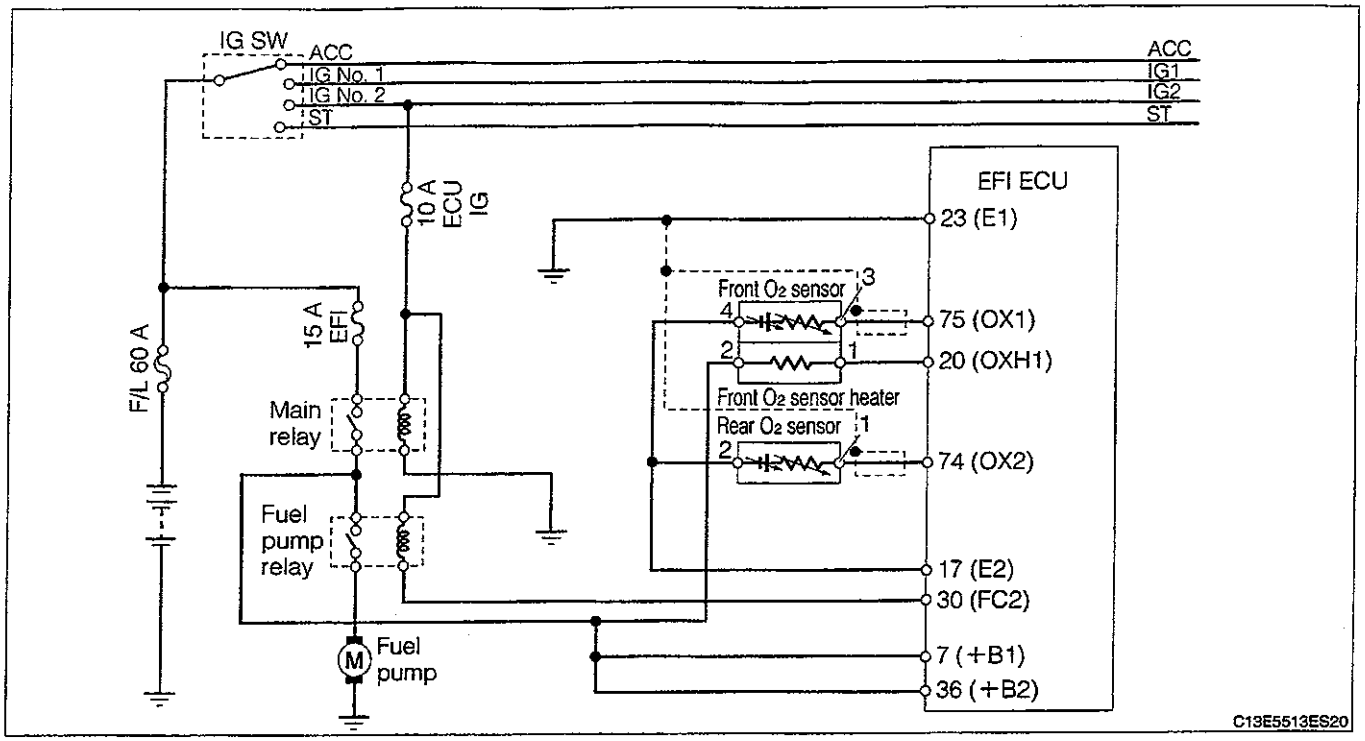
Sensor wire harness side



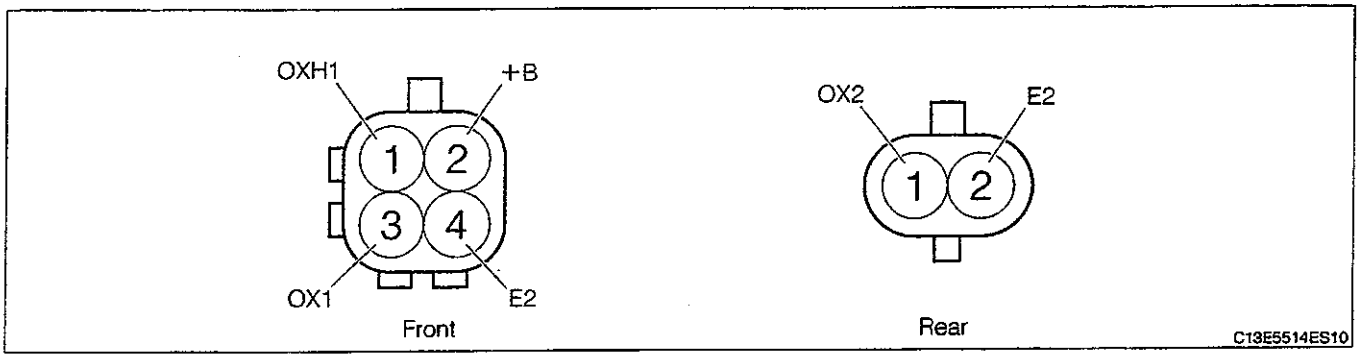
EFI ECU wire harness side



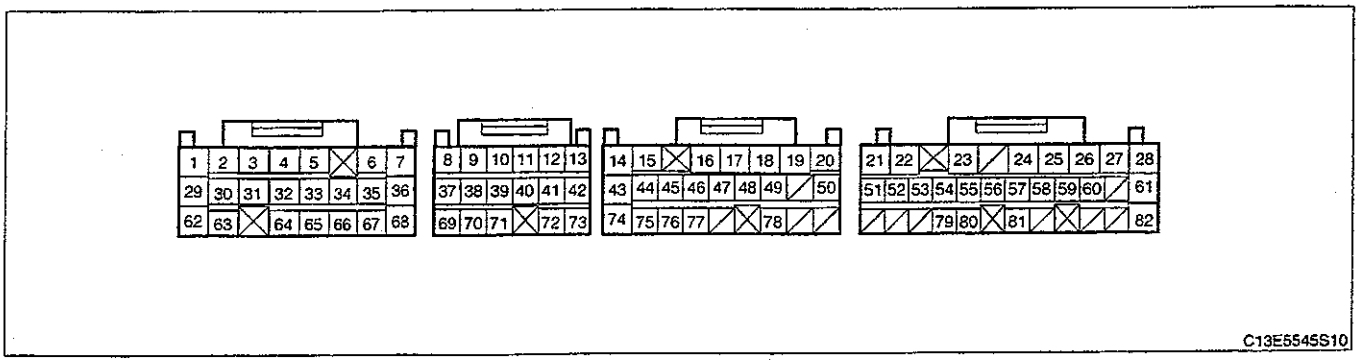
② FOR AUS SPECIFICATION



Sensor wire harness side



EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1. Refer to DTC P0130/21 (Oxygen sensor circuit malfunction (Bank 1 sensor 1)).
   Refer to Page B8-63.

(3) DTC DETECTING CONDITION

1. When the battery voltage is above 7.5 V and the heater terminal voltage of the EFI ECU is above 1.0 V when the heater is operating or below 7.5 V when the heater is not operating.

(4) TROUBLE AREA

1.Open wire or short circuit for the oxygen sensor heater circuit
2.Oxygen sensor heater
3.EFI ECU

(5) POINTS OF INSPECTION

CAUTION

- **If it is the case that any DTC besides misfire is memorized simultaneously, first perform the troubleshooting for them.**

1.Is the signal from the oxygen sensor inputted to the ECU proper ?
2.Is the harness between the oxygen sensor and the EFI ECU proper ?
3.Is the output of oxygen sensor proper ?
4.Are there the open wire or short circuit for the oxygen sensor heater circuit?

(6) INSPECTION PROCEDURE

NOTE

- **Read the freeze frame data, using the DS-21 diagnosis tester or OBD II generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.**

① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of output voltage of ECU.

1.Set the SST (sub-harness).
SST: 09842-97203-000

2.Measure the voltage between the SST connectors 20 (OXH1), 50 (OXH2) and the body ground under the following conditions given below.

	Measurement conditions	
	IG switch ON	After engine started
Front Oxygen sensor heater	Battery voltage	Below 1.0 V/Immediately after
Rear Oxygen sensor heater (Only for EU Specification)	Battery voltage	Below 1.0 V/After more than 3 minutes

3.Are the check results OK?
YES: Check or replace the EFI ECU.
NO: Go to ➤2.

➤2. Unit check of oxygen sensor.

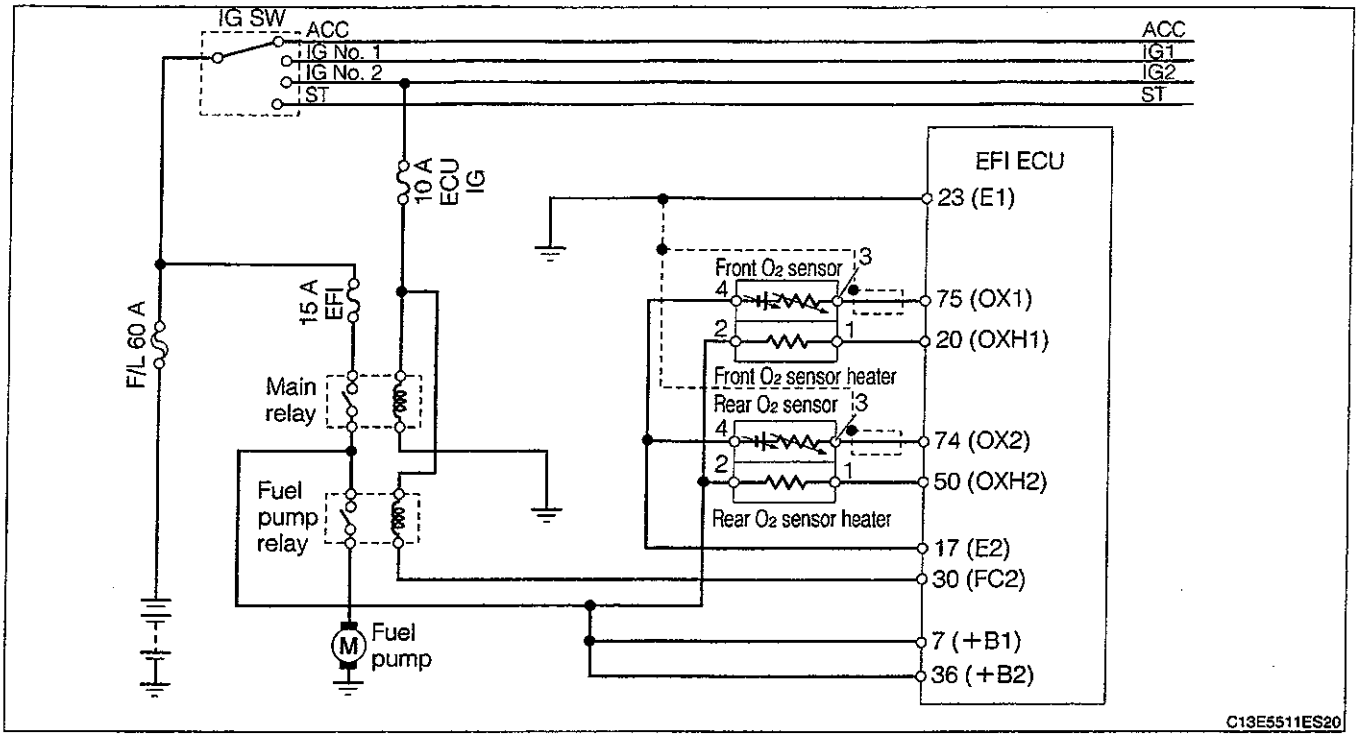
1.Check the resistance of the front and rear oxygen sensor heaters.
Refer to Page B8-144.

2. Are the unit check results OK?
YES: Check and repair the harness or connector between the main relay and oxygen sensor and the EFI ECU.
NO: Replace the oxygen sensor.

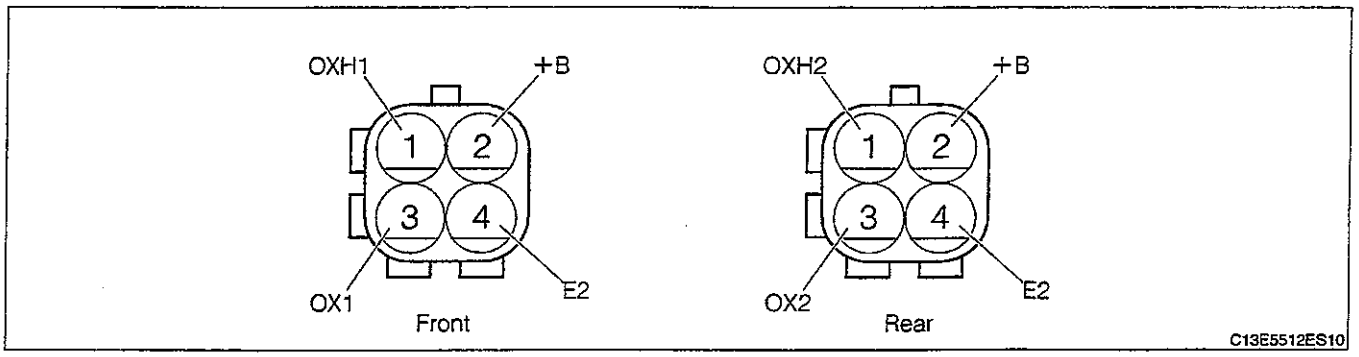
1-12-9 DTC No.P0136/22 Rear oxygen sensor circuit malfunction (Bank 1 sensor 2)

(1) WIRING DIAGRAM

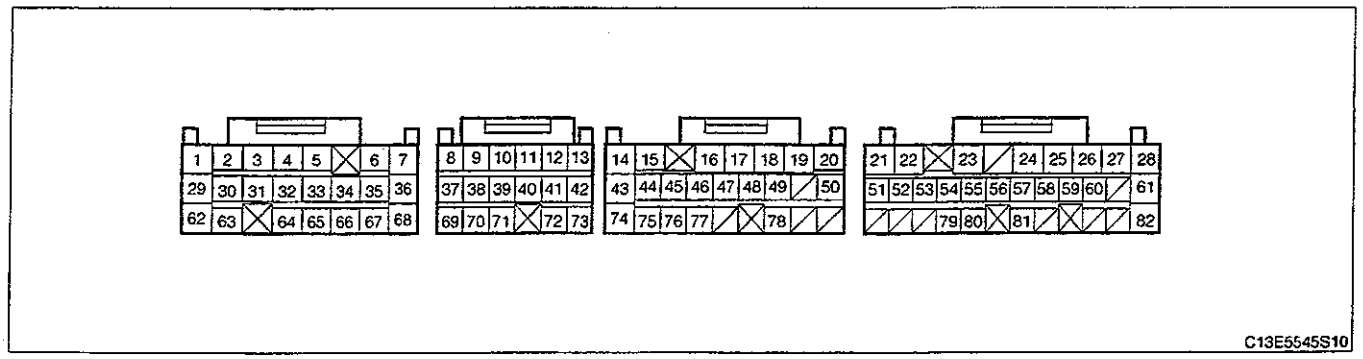
① FOR EU SPECIFICATION



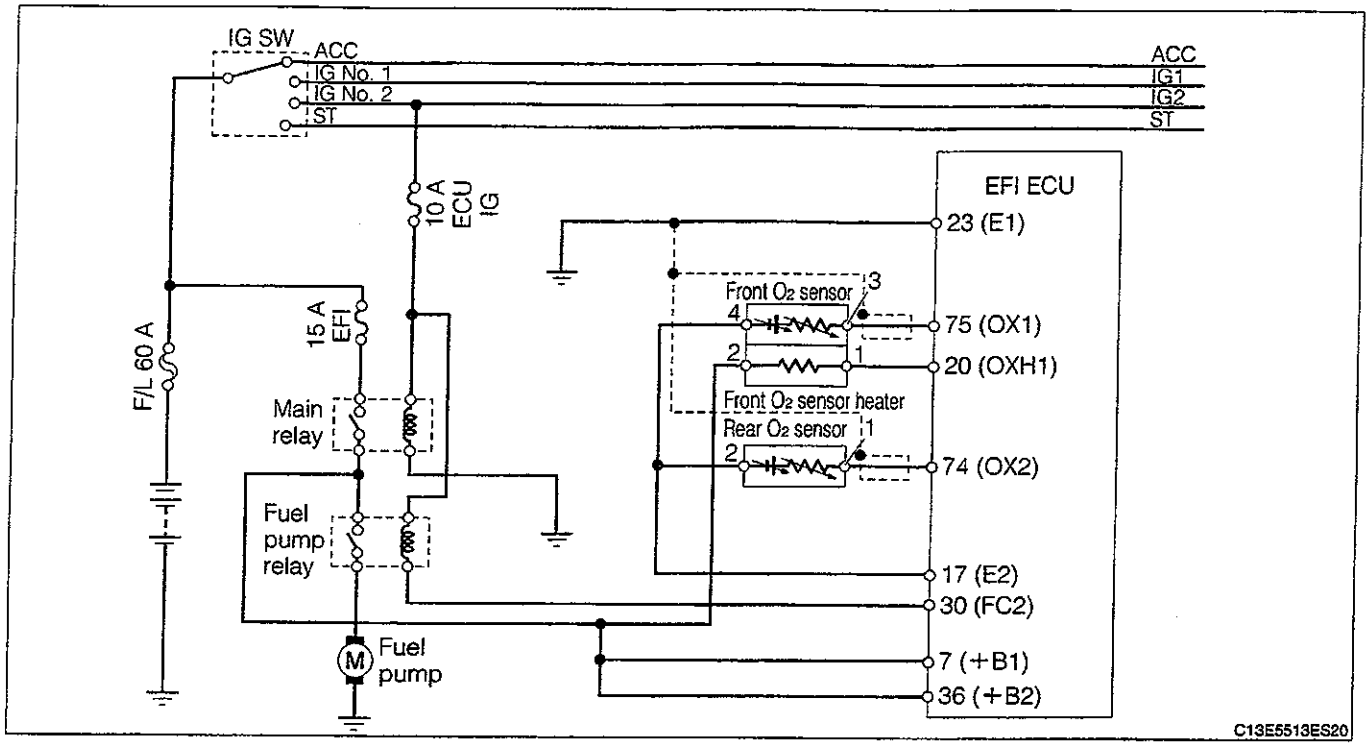
Sensor wire harness side



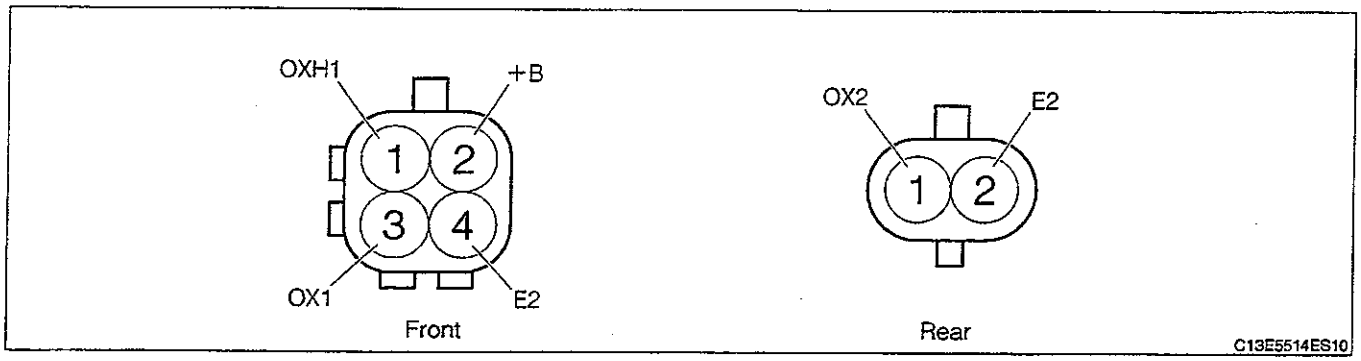
EFI ECU wire harness side



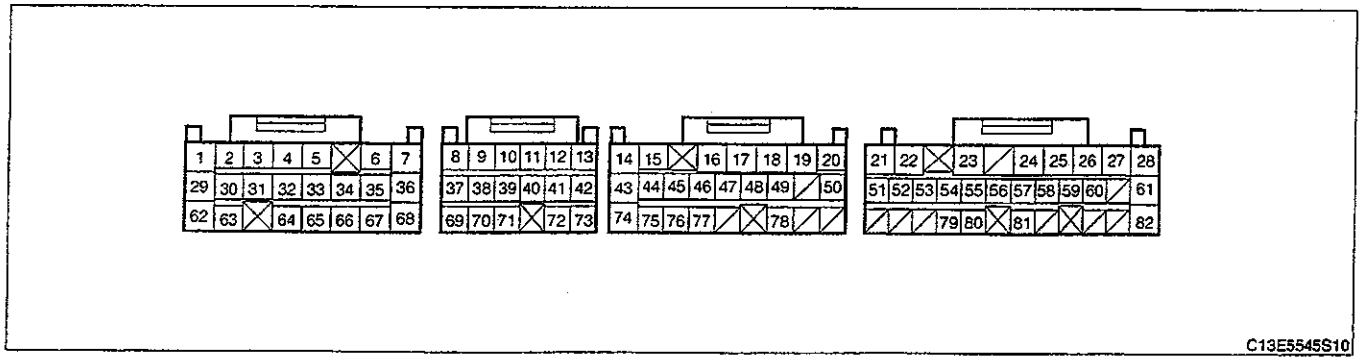
② FOR AUS SPECIFICATION



Sensor wire harness side



EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1.Refer to DTC P0130/21 (Oxygen sensor circuit malfunction (Bank 1 sensor 1)).
Refer to Page B8-63.

(3) DTC DETECTING CONDITION

1.Voltage output of heated oxygen sensor remains at 0.4 V or more or 0.5 V or less when vehicle is driven at 100 km/h or more after engine is warmed up.

(4) TROUBLE AREA

1.Open wire or short circuit in the oxygen sensor circuit
2.Oxygen sensor
3.EFI ECU

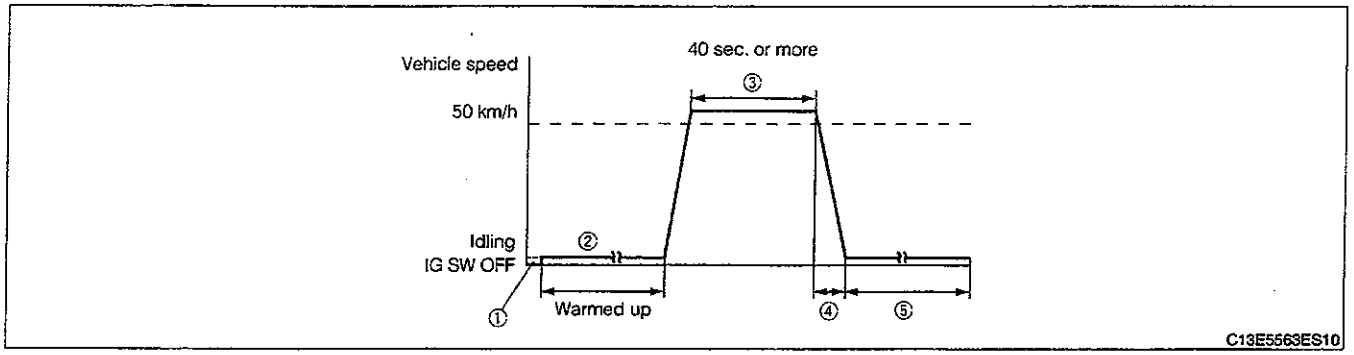
(5) POINTS OF INSPECTION

CAUTION

- **If it is the case that any DTC besides misfire is memorized simultaneously, first perform the troubleshooting for them.**

1.Is the signal from the oxygen sensor inputted to the ECU proper ?
2.Is the harness between the oxygen sensor and the ECU proper ?
3.Is the output of oxygen sensor proper ?

CONFIRMATION DRIVING PATTERN



①With the IG switch turned OFF, connect the DS-21 diagnosis tester to DLC through the SST. Turn ON the IG switch and the main switch of the tester. Set the tester to the "Continuous monitoring results" of the CARB mode.
②Start the engine. With all switch turned OFF, keep on warming the engine for more than five minutes until the engine coolant temperature reaches 90°C or above.
③Accelerate the vehicle until the vehicle speed reaches 50 km/h or more in the 1st → 2nd gear . Keep on running the vehicle at that speed for at least 40 seconds.
④Under this condition, release the foot off from the accelerator pedal so as to decelerate the vehicle. Maintain the idling state.
⑤After one minute of idling, press the F1 key of the tester. Check to see if the DTC P0130 is outputted.

CAUTION

- **If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.**
- **If you do not have DS-21 diagnosis tester, turn the ignition switch OFF after performing steps ② to ④, then perform steps ② to ④ again.**

(6) INSPECTION PROCEDURE

NOTE

- **Read the freeze frame data, using the DS-21 diagnosis tester or OBD II generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.**

① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of DTC.

1.Are other codes (those other than DTC P0136/22) outputted?

YES: Go to the relative DTC chart.

NO: Go to ➤2.

➤2. Check of harness between oxygen sensor and ECU.

1.With the IG switch turned OFF, set the SST (sub-harness). However, the SST connectors at the ECU side should remain disconnected.

SST: 09842-97203-000

2.Disconnect the oxygen sensor connector.

3.Check the harness and connector for open wire or short.

4.Are the check results for open wire and short between the connector 3 (OX2) of the oxygen sensor at the harness side and the SST terminal 74 (OX2) OK?

YES: Go to ➤3.

NO: Repair or replace the harness or connector.

➤3. Check of output voltage of oxygen sensor during idling.

1.Connect the oxygen sensor and SST connectors, respectively.

2.Connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000

3.Warm up the engine.

4.Turn ON the main switch of the tester. Race the engine at 4000 rpm for three minutes by depressing the accelerator pedal.

5.Under the condition of step 4, release the foot off from the accelerator pedal so as to allow the engine to idle.

6.Read the output voltage of the oxygen sensor between Steps 4 to 5.

SPECIFIED VALUE: The voltage should become 0.4 V or below and 0.55 V or more, respectively, at least one time.

7.Are the check results OK?

YES: Check malfunction that occurs intermittently or poor contact.

NO: Go to ➤4.

➤4. Check of output voltage of oxygen sensor unit.

1.Warm up engine completely.

2.Disconnect the connector of the oxygen sensor with IG switch turned OFF.

3.Connect a voltmeter to the connector terminal of oxygen sensor.

4.Hold the engine racing speed for 3 minutes at 2000 rpm. At this time, ensure that the reading of the volt meter is within the specified value.

SPECIFIED VALUE: The voltmeter exhibits an output voltage of 0.2 V or more at least one time?

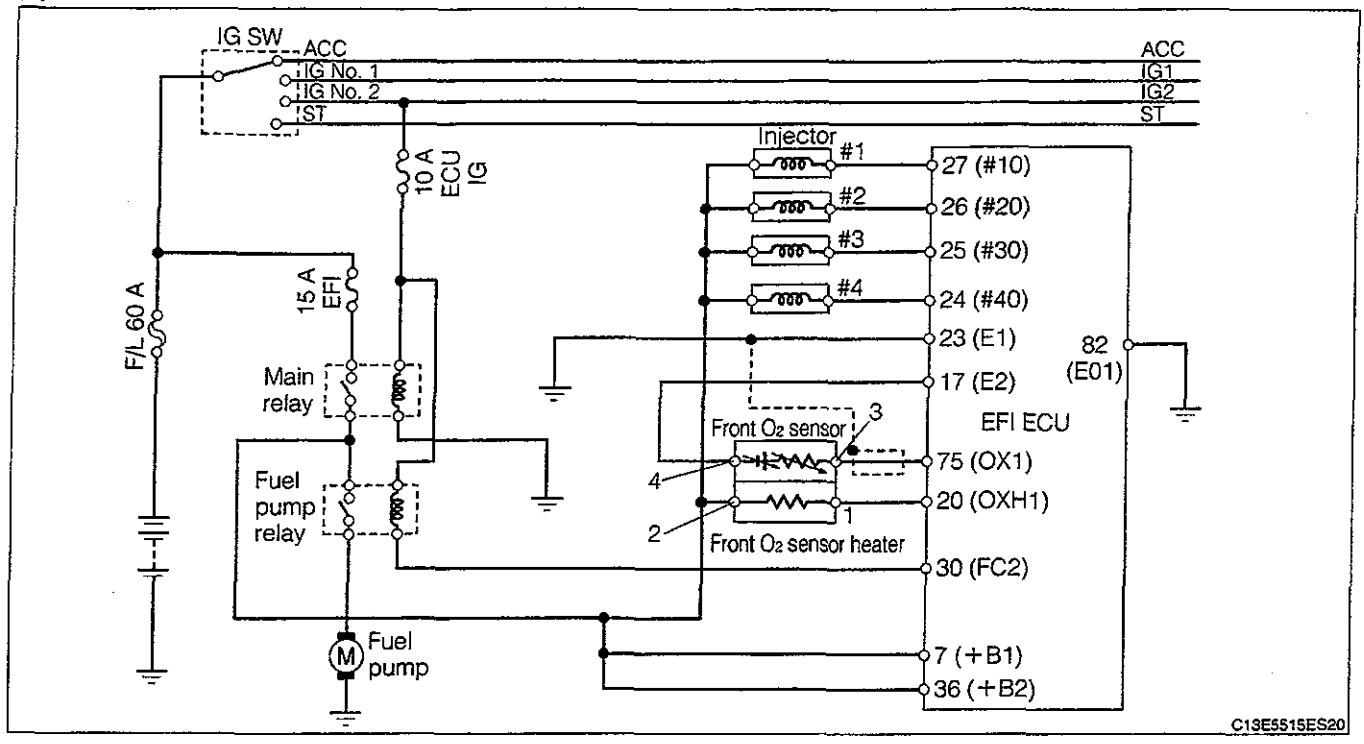
5.Are the check results OK?

YES: Check or replace the EFI ECU.

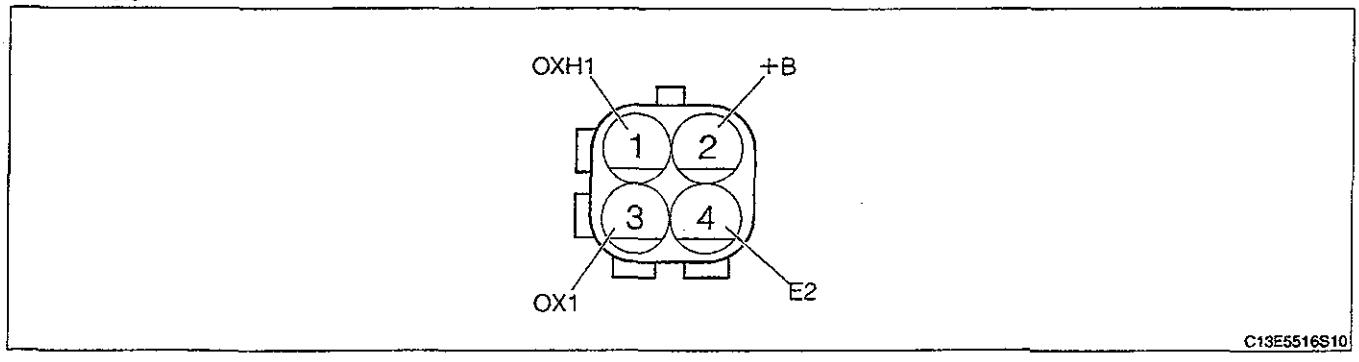
NO: Replace the oxygen sensor. (Bank 1, sensor 2)

1-12-10 DTC No.P0171/25 Fuel trim system too lean (Air-fuel ratio lean malfunction, bank 1) DTC No.P0172/26 îRóøånìù(ÉäÉbÉ`àŸèÌ)

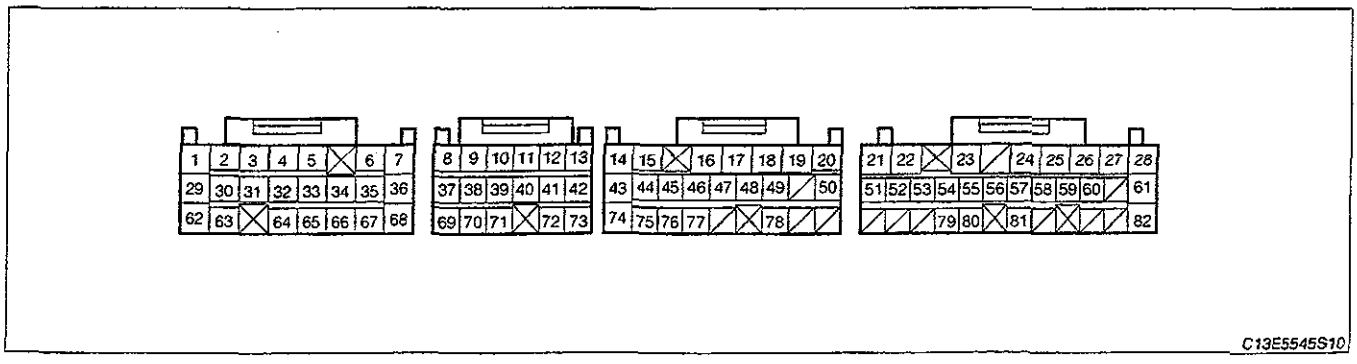
(1) WIRING DIAGRAM



Front oxygen sensor wire harness side



EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1.The fuel trim means the feedback compensation value that will compensate the basic injection time. The fuel trim comes in two kinds: the short-term fuel trim and the long-term fuel trim.

2.The short-term fuel trim is a short-term fuel compensation to be carried out to maintain the air-to-fuel ratio at the stoichiometric air-to-fuel ratio. The signal from the oxygen sensor indicates whether the current air-to-fuel ratio is rich or lean than the stoichiometric air-to-fuel ratio. Hence, if the air-to-fuel ratio is rich, the fuel injection amount will be reduced. Conversely, if the air-to-fuel ratio is lean, the fuel injection amount will be increased.

3.The long-term fuel trim is overall fuel compensation over a long period of time in order to compensate a continues deviation of the short-term fuel trim from the central value, which will be caused by the engine's inherent characteristics, the wear due to operation over a long period of time and the change in operational environment.

(3) DTC DETECTING CONDITION

1.When the following conditions given below occur while the air-to-fuel feedback after the engine warming-up is being executed.

2.The air-to-fuel is too lean:(The total fuel trim (the sum of the short-term fuel trim and long-term fuel trim) exceeds the set value.)

3.The air-to-fuel is too rich:(The total fuel trim is less than the set value.)

(4) TROUBLE AREA

1.Open wire or short circuit in the oxygen sensor circuit

2.Oxygen sensor

3.ECT sensor

4.Evaporative emission purge VSV

5.EFI ECU

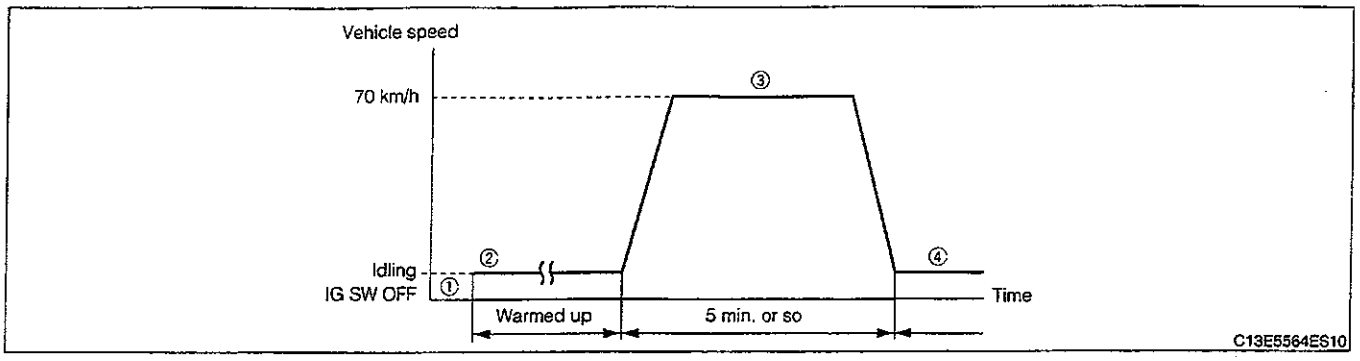
(5) POINTS OF INSPECTION

1.Is the signal from the oxygen sensor inputted to the ECU proper ?

2.Is the harness between the oxygen sensor and the ECU proper ?

3.Is the output of oxygen sensor proper ?

CONFIRMATION DRIVING PATTERN



①With the IG switch turned OFF, connect the DS-21 diagnosis tester to DLC through the SST. Turn ON the IG switch and the main switch of the tester. Set the tester to the "Continuous monitoring results" of the CARB mode.
②Start the engine. Keep on warming the engine for more than five minutes until the engine cooling water temperature reaches 90°C or above.
③Run the vehicle for more than five minutes at a speed of 70 km/h with the gear selected to the 5th gear.
④After one minute of idling, press the F1 key of the tester. Check to see if the DTC P0171/0172 is detected.

CAUTION

- If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.
- If you do not have DS-21 diagnosis tester, turn the ignition switch OFF after performing steps ② to ④, then perform steps ② to ④ again.

(6) INSPECTION PROCEDURE

NOTE

- Read the freeze frame data, using the DS-21 diagnosis tester or OBD II generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of DTC.

1.Are other codes (those other than DTC P0171/25 or P0172/26) outputted?

YES: Go to the relative DTC chart.

NO: Go to ➤2.

➤2. Check of air induction system.

1.Check the following items given below.

(1) Check of the engine oil level gauge, oil filler cap and PCV hose for disconnection.

(2) Check of parts of the air induction system between the cylinder head and the throttle body for disconnection, looseness, or cracks.

YES: Go to ➤3.

NO: Repair or replace the induction system.

➤3. Check of injector injection.
1.Are the check results OK?
YES: Go to ➤4.
NO: Replace the injector.

➤4. Check of purge VSV for EVAP.
1.Go to trouble-shooting of DTC P0443/76.
Refer to Page B8-103.

2.Are the check results OK?
Go to ➤5.
Replace the purge VSV for EVAP.

➤5. Performance check of ECT sensor.
1.Go to trouble-shooting of DTC P0116/42.
Refer to Page B8-53.

2.Are the check results OK?
YES: Go to ➤6.
NO: Replace the ECT sensor.

➤6. Check of MAP sensor.
1.Go to trouble-shooting of DTC P0105/31.
Refer to Page B8-44.

2.Are the check results OK?
YES: Go to ➤7.
NO: Replace the MAP sensor.

➤7. Check of fuel pressure.
1.Are the check results OK?
YES: Go to ➤8.
NO: Check and repair fuel pump, fuel pipe line and filter.

➤8. Check of gas leakage of exhaust system.
1.Are the check results OK?
YES: Go to ➤9.
NO: Repair or replace.

➤9. Check of harness between oxygen sensor and ECU.
1.With the IG switch turned OFF, set the SST (sub-harness). However, the SST connectors at the ECU side should remain disconnected.
SST: 09842-97203-000

2.Disconnect the oxygen sensor connector.
3.Check the harness and connector for open wire or short.
4.Are the check results for open wire and short between the connector 3 (OX1) of the oxygen sensor at the harness side and the SST terminal 75 (OX1) OK?
YES: Go to ➤10.
NO: Repair or replace the harness or connector.

➤10. Check of output voltage of oxygen sensor during idling.

1.Connect the oxygen sensor and SST connectors, respectively.

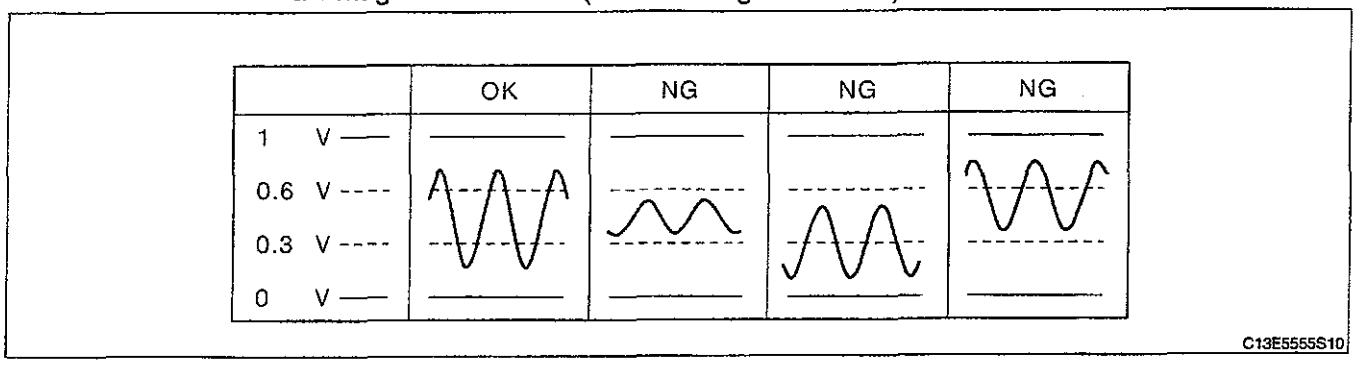
2.Connect the DS-21 diagnosis tester to DLC through the SST.

SST: 09991-87404-000

3.Warm up the engine at 2500 rpm for about 90 seconds.

4.Turn ON the main switch of the tester to read the output voltage of oxygen sensor during idling.

SPECIFIED VALUE: The voltage varies repeatedly between a range from a voltage below 0.3 V and to a voltage above 0.6 V. (See the diagram below.)



YES: Go to ➤12.

NO: Go to ➤11.

➤11. Check of output voltage of oxygen sensor unit.

1.Warm up engine completely.

2.Disconnect the connector of the oxygen sensor with IG switch turned OFF.

3.Connect a voltmeter to the connector terminal of oxygen sensor.

4.Hold the engine racing speed for 3 minutes at 2000 rpm. At this time, ensure that the reading of the volt meter is within the specified value.

SPECIFIED VALUE: The voltmeter exhibits an output voltage of 0.2 V or more at least one time?

5.Are the check results OK?

YES: Check or replace the EFI ECU.

NO: Replace the oxygen sensor. (Bank 1, sensor 1)

➤12. Perform confirmation driving pattern.

1.Is there DTC P0171/25 or P0172/26 being output again?

YES: Check or replace the EFI ECU.

NO: Go to ➤13.

➤13. The past situation of vehicles operation is investigated.

1.Did the vehicle run out of fuel in the past?

YES: DTC P0171/25 is caused by running out of fuel.

NO: Check malfunction that occurs intermittently or poor contact.

② **When not using DS-21 diagnosis tester or OBD II generic scan tool:**

➤1. Check of DTC.

1.Are other codes (those other than DTC P0171/25 or P0172/26) outputted?

YES: Go to the relative DTC chart.

NO: Go to ➤2.

➤2. Check of air induction system.
1.Check the following items given below.
(1) Check of the engine oil level gauge, oil filler cap and PCV hose for disconnection.
(2) Check of parts of the air induction system between the cylinder head and the throttle body for disconnection, looseness or cracks.
YES: Go to ➤3.
NO: Repair or replace.

➤3. Check of fuel pressure.
1.Are the check results OK?
YES: Go to ➤4.
NO: Check and repair the fuel pump, fuel pipe line and filter.

➤4. Check of injector injection.
1.Are the check results OK?
Refer to Page B8-146.

YES: Go to ➤5.
NO: Replace the injector.

➤5. Performance check of ECT sensor.
1.(Go to trouble-shooting of DTC P0116/42.)
Refer to Page B8-53.

2.Are the check results OK?
YES: Go to ➤6.
NO: Replace the ECT sensor.

➤6. Check of MAP sensor.
1.(Go to trouble-shooting of DTC P0105/31.)
Refer to Page B8-44.

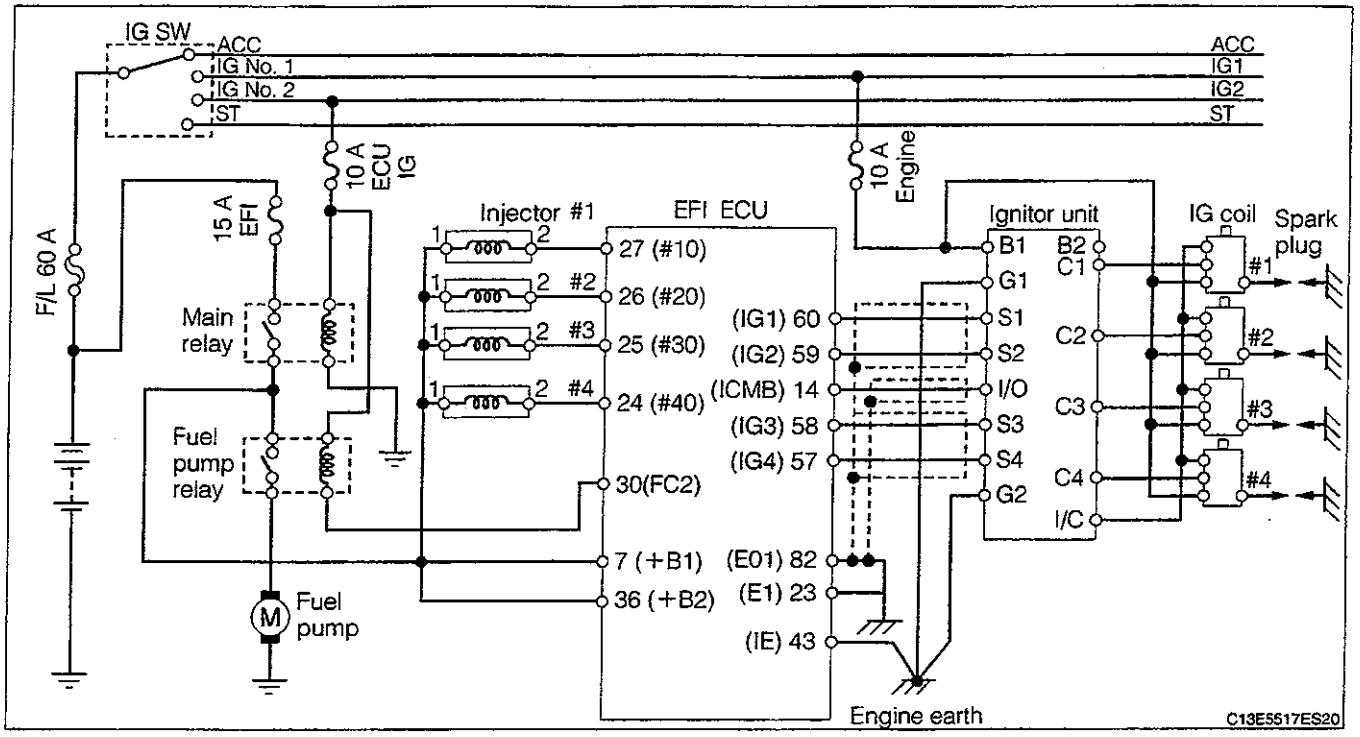
2.Are the check results OK?
YES: Go to ➤7.
NO: Replace the MAP sensor.

➤7. Perform the confirmation driving pattern.
1.After installing a satisfactory oxygen sensor (bank 1, sensor 1), perform the confirmation driving pattern.
2.Is the code (DTC P0171/25 or P0172/26) outputted?
YES: Check or replace the EFI ECU.
NO: Replace the oxygen sensor (bank 1, sensor 1) that was mounted originally on the vehicle.

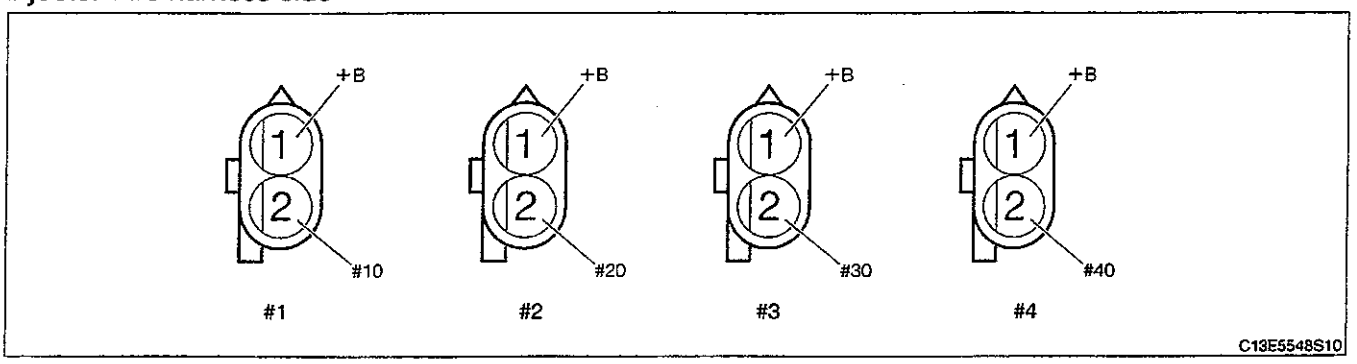
1-12-11 DTC No.P0300/17 Random/multiple cylinder misfire detected
DTC No.P0301/17 Misfire detected (Cylinder 1)
DTC No.P0302/17 Misfire detected (Cylinder 2)
DTC No.P0303/17 Misfire detected (Cylinder 3
DTC No.P0304/17 Misfire detected (Cylinder 4)

(1) WIRING DIAGRAM

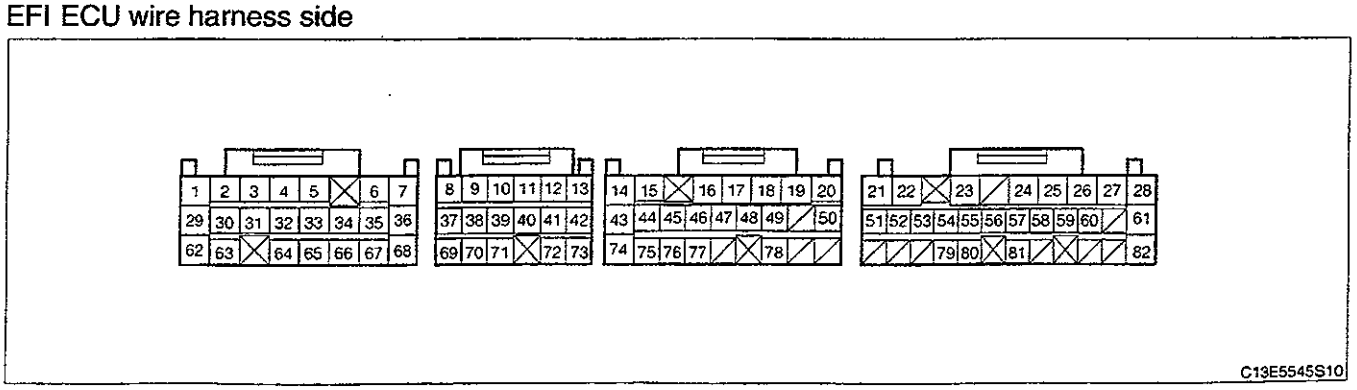
① FOR EU SPECIFICATION



Injector wire harness side



EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

① MISFIRE:

1.The igniter unit detects the ion current that flows in proportion to the combustion pressure. This ion current is converted into a voltage, which will be inputted to the ECU. If the voltage value is below a certain value, the EFI ECU evaluate it as a misfire and counts its occurrence numbers.

2.When the misfire rate becomes or exceeds a number that indicates deteriorated engine conditions, this state will cause the malfunction indicator lamp (MIL) to be illuminated. If such a misfire is occurring whose misfire rate is high enough that the driving condition will most likely cause the catalyst to be overheated, the malfunction indicator lamp (MIL) will flash.

(3) DTC DETECTING CONDITION

① P0314/-,P0300/17:

1.Misfiring of random/multiple cylinders is detected during any particular 400 or 2000 ignitions.

② P0301/17,P0302/17,P0303/17:

1.For any particular 400 ignitions for engine, misfire is detected which can cause catalyst overheating. (This causes MIL to blink.)

2.For any particular 2000 ignitions for engine, misfire is detected which can cause deterioration in emissions.

NOTE

- **When the 2 or more codes for a misfiring cylinder are recorded repeatedly but no random/multiply cylinder misfire code is recorded, it indicates that the misfire were detected and recorded at different times.**
- **When any one or any two or more of P0301 through P0303/17 codes are outputted, the code P0314 is memorized without fail. However, only when the function Continuous monitoring results of the CARB mode is used, it is possible to read this code P0314.**

(4) TROUBLE AREA

1.Open wire/short circuit for the ignition system circuit
2.Open wire/short circuit for the ion system circuit
3.Injector
4.Fuel pressure
5.Combustion pressure
6.MAP sensor
7.ECT sensor
8.EFI ECU

(5) POINTS OF INSPECTION

1.Is the signal from the igniter inputted to the ECU proper ?
2.Does the igniter operate proper ?
3.Is the harness between the injector and the ECU proper ?
4.Does the injector operate proper ?
5.Is the harness between the ECT sensor and the ECU proper ?
6.Does the ECT sensor operate proper ?

(6) INSPECTION PROCEDURE

NOTE

- In order to memorize DTC of misfire, it is necessary to drive around MISFIRE RPM, MISFIRE LOAD in the data list for the following period of time.

CONFIRMATION DRIVING PATTERN

Engine speed	Time
Idling	3 minutes 30 seconds or more
1000 rpm	3 minutes or more
2000 rpm	1 minutes 30 seconds or more
3000 rpm	1 minutes or more

NOTE

- If it is the case that any DTC besides misfire is memorized simultaneously, first perform the troubleshooting for them.
- Read the freeze frame data, using the DS-21 diagnosis tester or OBD II generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.
- When the vehicle is brought to the workshop and the misfire is not occurred, misfire can be confirmed by reproducing the condition of freeze frame data. Also, after finishing the repair, confirm that there is no misfire. (See the confirmation driving pattern)

① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Visual check of inside of engine compartment.

1.Check the connecting conditions of the wire harnesses and connectors.

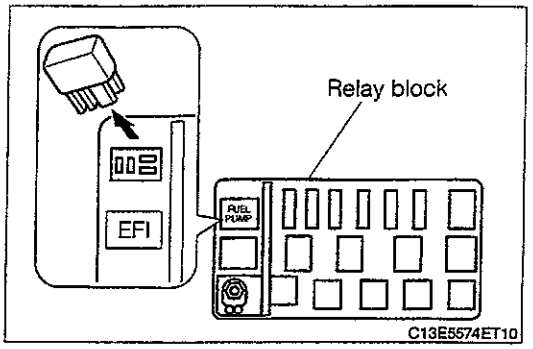
2.Check the vacuum hoses, purge hoses, fuel hoses and pipes for disconnection and breakage.

3.Are the check results OK?

YES: Go to ➤2.

NO: Repair or replace, then confirm that there is no misfire. (See confirmation driving pattern)

➤2. Check of spark plug and spark of misfiring cylinder.



1.Remove the fuel pump relay from the relay block.
2.Disconnect the connector of the injector.

CAUTION

- Stop the fuel injection by the operations at Steps 3 and 4 above so as to prevent the catalyst from being damaged by unburnt gas, etc.
- When there is no fuel, the injector injection must be avoided wherever possible, as this may damage the injector.

3.Remove the IG coils and spark plugs (misfire cylinders).
4.Install the spark plug to the IG coil.
5.Ground the spark plug.
6.Crank the engine at this time, check to see if the spark plug sparks.
7.If no spark occurs, conduct the check according to the check procedure for spark plug.

YES: Go to ➤3.
NO: Replace the spark plug or check the ignition system and ion system.

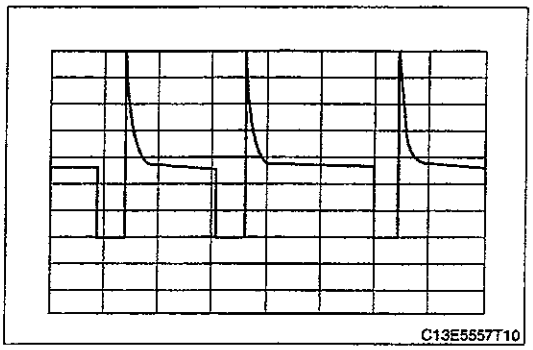
CAUTION

- Do not use any spark plugs other than those designated.

➤3. Check of ECU output signal of injector of misfiring cylinder.

1.With the IG switch turned OFF, perform restoration.
2.Set the SST (sub-harness).With the IG switch turned ON, measure the voltage between the SST connector terminal of an injector in which misfire is taking place among the SST connectors 27 (#10) through 24 (#40) and the body ground.
SST: 09842-97203-000
SPECIFIED VALUE: Battery voltage

3.Observation of injector waveform with oscilloscope (reference).
4.Check voltage waveform between the SST connectors 27 (#10) through 24 (#40) and 82 (E01) while engine is idling.



5.Are the check results OK?

YES: Go to ➤6.
NO: Go to ➤4.

NOTE

- When an oscilloscope is used, the injector control signal produces such waveforms, as shown in the diagram below. (The frequency or injection time can not be specified.)

➤4. Unit check of injector of misfiring cylinder.
1.Turn OFF the IG switch.
2.Disconnect the injector connector of the misfiring cylinder.
3.Measure the resistance between the injector terminals.
SPECIFIED VALUE: 12 Ω at 20°C

4.Are the unit check results OK?
YES: Go to ➤5.
NO: Replace the injector.

➤5. Check of harness between injector and ECU.
1.Disconnect the SST connectors from the EFI ECU (with the IG switch turned OFF).
2.Check the harness and connector for open wire or short.
Connector 2 (#10) of #1 injector at harness side – SST connector 27 (#10)
Connector 2 (#20) of #2 injector at harness side – SST connector 26 (#20)
Connector 2 (#20) of #3 injector at harness side – SST connector 25 (#30)
Connector 2 (#40) of #4 injector at harness side – SST connector 24 (#40)
3.Are the check results for open wire and short OK?
YES: Check malfunction that occurs intermittently or poor contact.
NO: Repair or replace the harness or connector.

➤6.Check of ion system.
1.(Go to trouble-shooting of DTC P1300/36.)
Refer to Page B8-115.

2.Are the check results OK?
YES: Go to ➤7.
NO: Repair or replace.

➤7.Check of fuel pressure.
1.YES: Are the check results OK?
NO: Go to ➤8.
Check and repair the fuel pump, pressure regulator, fuel pipe line and filter.

➤8. Check of injector injection.
1.Are the check results OK?
Refer to Page B8-146.

YES: Go to ➤9.
NO: Replace the injector.

➤9. Check of MAP sensor.
1.(Go to trouble-shooting of DTC P0105/31.)
Refer to Page B8-44.

2.Are the check results OK?
YES: Go to ➤10.
NO: Replace the MAP sensor.

➤10. Performance check of ECT sensor.

1.(Go to trouble-shooting of DTC P0116/42.)
Refer to Page B8-57.

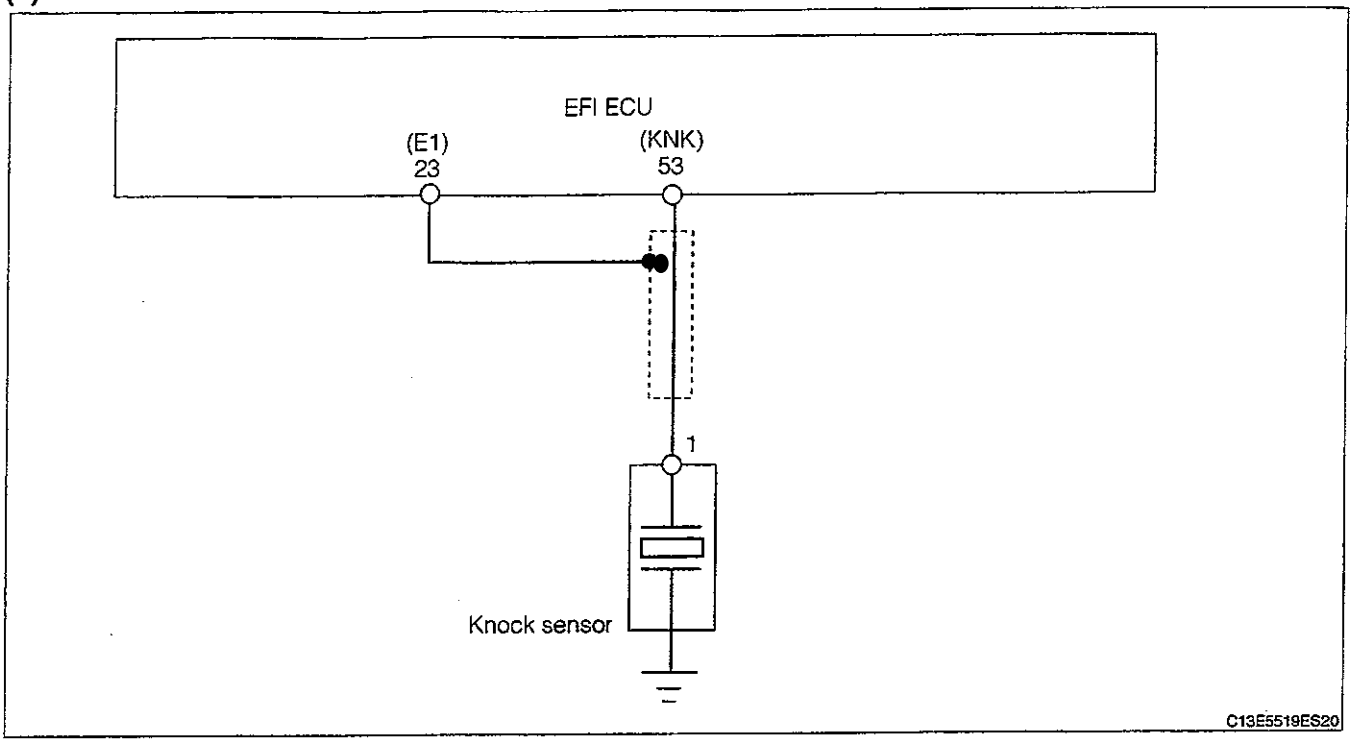
2.Are the check results OK?

YES: Check compression pressure, valve clearance and valve timing.

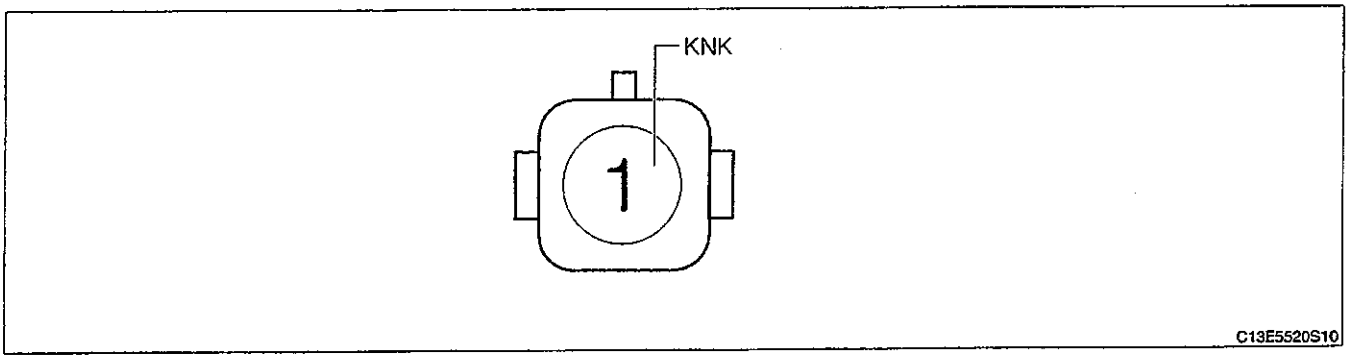
NO: Replace the ECT sensor.

1-12-12 DTC No. P0325/18 Knock sensor 1 circuit malfunction

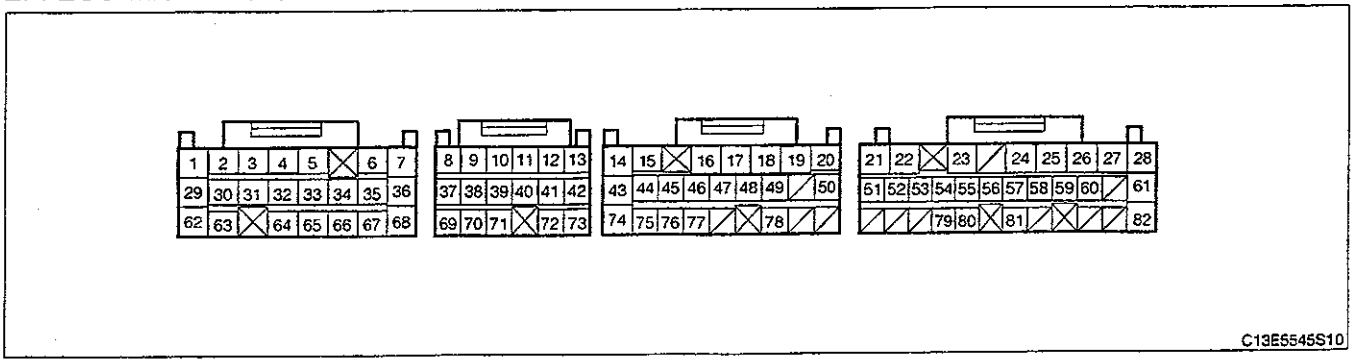
(1) WIRING DIAGRAM



Knock sensor wire harness side



EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1. Knock sensor are fitted to the cylinder block to detect engine knocking. This sensor contains a piezoelectric element which generates a voltage when it becomes deformed, which occurs when the cylinder block vibrates due to knocking. If engine knocking occurs, ignition timing is retard to suppress it.

(3) DTC DETECTING CONDITION

1. When the signal from the knock sensor exceeds the voltage preset according to the engine revolution speed continuous by for more than a certain engine revolution speed of 2000 rpm or more.

(4) TROUBLE AREA

1.Open wire or short circuit for knock sensor system circuit
2.Knock sensor
3.EFI ECU

(5) POINTS OF INSPECTION

1.Is the signal from the knock sensor inputted to the ECU proper ?
2.Is the harness between the knock sensor and the ECU proper ?
3.Is the output of knock sensor proper ?

(6) INSPECTION PROCEDURE

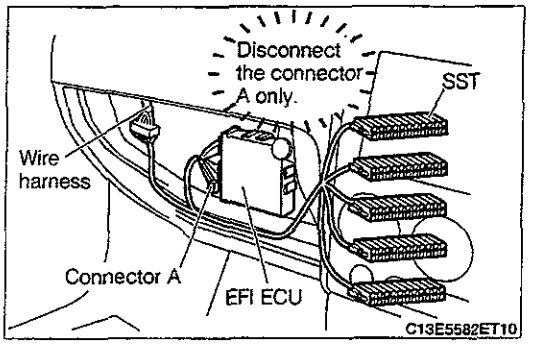
NOTE

- **Read the freeze frame data, using the DS-21 diagnosis tester or OBD II generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.**

① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of continuity of knock sensor circuit.

1.Set the SST (sub-harness). However, the SST connector "A" should remain disconnected from the ECU connector.
SST: 09842-97203-000
2.With the IG switch turned OFF, measure the resistance between the SST connector 53 (KNK) and the body ground.
SPECIFIED VALUE: 1 MΩ or higher
3.Are the unit check results OK?
YES: Go to ➤2.
NO: Go to ➤3.



➤2. Check of knock sensor.

1.Disconnect the connector of the knock sensor with ignition switch OFF.
2.Remove the knock sensor from the cylinder block.
3.Using an ohmmeter, check the resistance between the terminal and body.
SPECIFIED VALUE: 1 MΩ or higher

4.Are the check results OK?
YES: Go to ➤3.
NO: Replace the knock sensor.

➤3. Check of harness between ECU and knock sensor .

1.Check the harness and connector between the EFI ECU and the knock sensor for open wire or short.
2.Are the check results for open wire and short OK?
YES: Go to ➤4.
NO: Repair or replace the harness or connector.

➤4. Check the knock sensor.

1.Check the knock sensor for installing condition (e.g. looseness).

2.Are the check results OK?

YES: Check or replace the EFI ECU.

NO: Tighten the knock sensor.

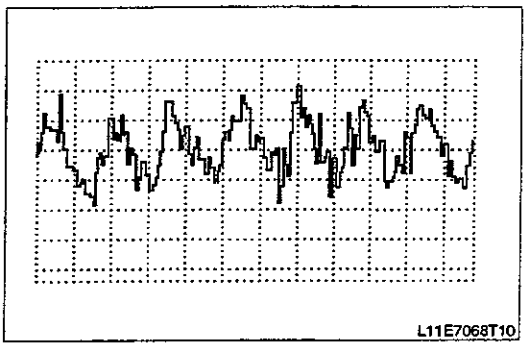
② **Check by oscilloscope.**

1.Connect the SST connector "A" to the ECU.

2.Start the engine and keep it idling.

3.Connect the positive (+) and negative (−) probes of an oscilloscope to the SST connector terminals 53 (KNK) and 23 (E1), respectively.

4.When the waveforms as shown in the right figure are observed, the knock sensor circuit is functioning properly. (The measurement can be conducted using the oscilloscope function of the DS-21 diagnosis tester.)

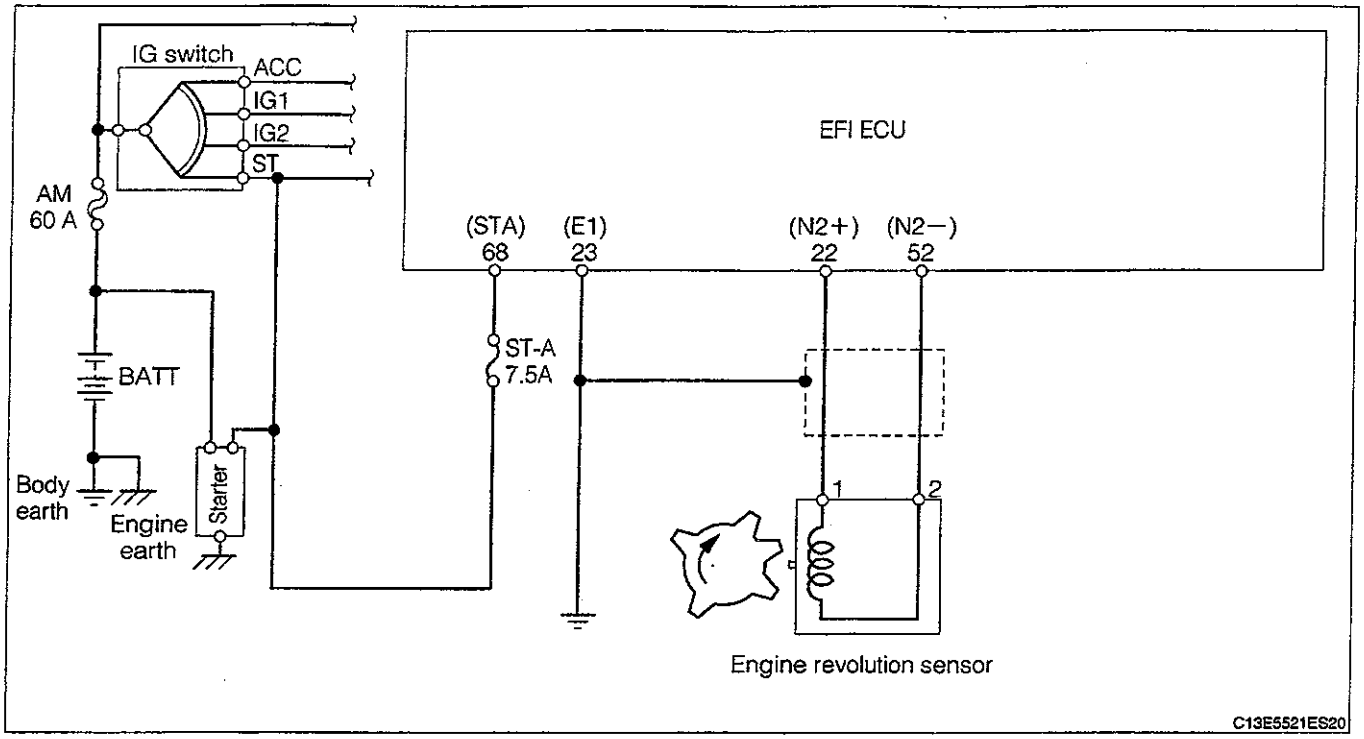


NOTE

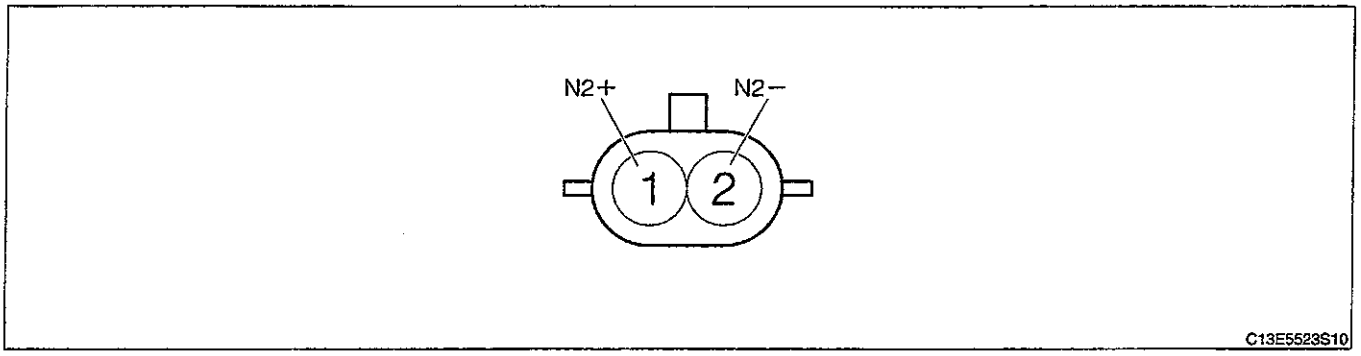
- The waveform at the time of racing becomes greater than that at the time of idling.

1-12-13 DTC No.P0335/13 Engine revolution sensor circuit Malfunction

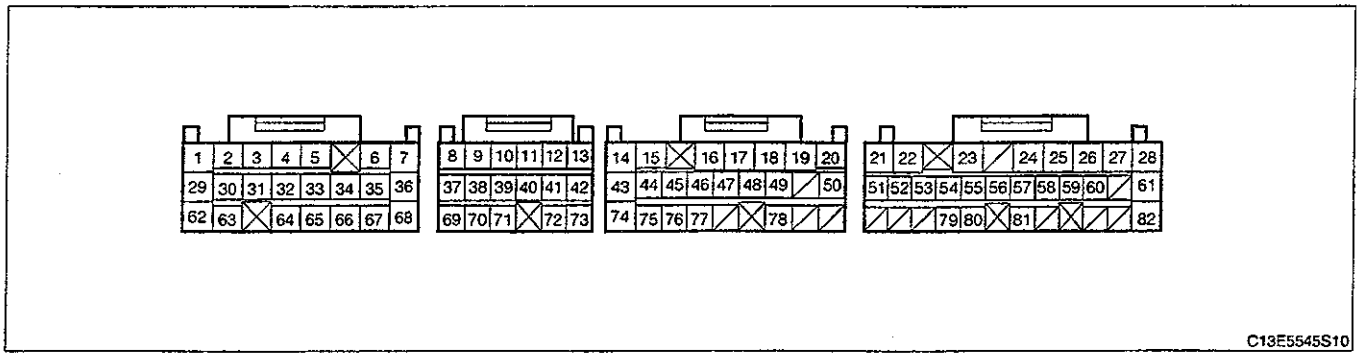
(1) WIRING DIAGRAM



Engine revolution sensor wire harness side



EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1.The engine revolution sensor (NE signal) consists of a signal rotor and a pickup coil. The NE signal rotor has 4+1 teeth and is mounted on the camshaft. The NE sensor generates four signals (one of them being a signal for distinguishing cylinders) per two engine revolutions. The EFI ECU detects the actual crankshaft angle and the engine speed by the NE signals, based on the N2+ signal.

(3) DTC DETECTING CONDITION

1.No engine revolution signal to EFI ECU during cranking.

(4) TROUBLE AREA

1.Open wire or short circuit for engine revolution sensor system circuit
2.Engine revolution sensor
3.EFI ECU

(5) POINTS OF INSPECTION

1.Is the signal from the engine revolution sensor inputted to the ECU proper ?
2.Is the harness between the engine revolution sensor and the ECU proper ?
3.Is the output of engine revolution sensor proper ?

(6) INSPECTION PROCEDURE

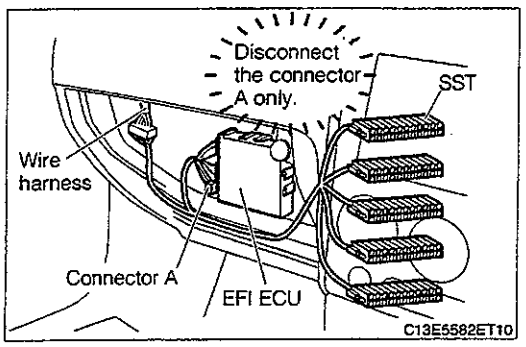
NOTE

- Read the freeze frame data, using the DS-21 diagnosis tester or OBD II generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of resistance of engine revolution sensor circuit.

1.Set the SST (sub-harness). However, the SST connector "A" should remain disconnected from the ECU connector.
SST: 09842-97203-000
2.With the IG switch turned OFF, measure resistance between the SST terminals 22 (N2+) and 52 (N2−).
SPECIFIED VALUE: 950 to 1200Ω at 20°C
3.Are the check results OK?
YES: Go to ➤2.
NO: Go to ➤4.



➤2. Unit check of engine revolution sensor.

1.Disconnect the coupler of the engine revolution sensors.
SPECIFIED VALUE: 950 to 1250Ω at 20°C

2.Are the check results OK?
YES: Go to ➤3.
NO: Replace the engine revolution sensor.

➤3. Check of harness between ECU and engine revolution sensor.

1.Check the harness and connector between the EFI ECU and the engine revolution sensor for open wire or short.
2.Are the check results OK?
YES: Check malfunction that occurs intermittently or poor contact.
NO: Repair or replace the harness or connector.

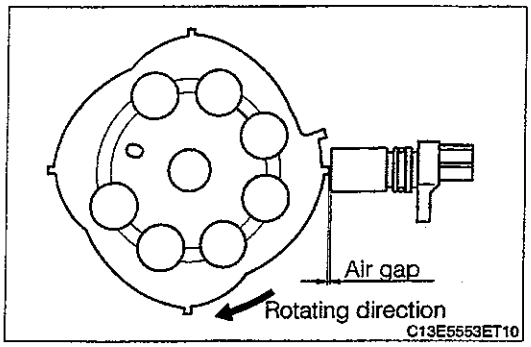
➤4. Check the installation state of the sensor.

1.Check the sensor for installing condition and the signal rotor for tooth condition. (Check for the air gap, sensor for looseness, tooth distortion, adhesion of rust, foreign matter, etc. Refer to Section IGNITION SYSTEM.)

2.Are the check results OK?

YES: Tighten the sensor. Replace the signal rotor.

NO: Go to ➤5.



➤5. Check of starter signal.

1.Connect the SST connector "A" to the EFI ECU.

2.Measure the voltage between the SST connector terminals 68 (STA) and 23 (E1) while the engine is being cranked.

SPECIFIED VALUE: Battery voltage

3.Are the check results OK?

YES: Check or replace the EFI ECU.

NO: Repair or replace the harness or connector (Between EFI ECU — IG switch).

② **Check by oscilloscope.**

1.Connect the SST connector "A" to the ECU.

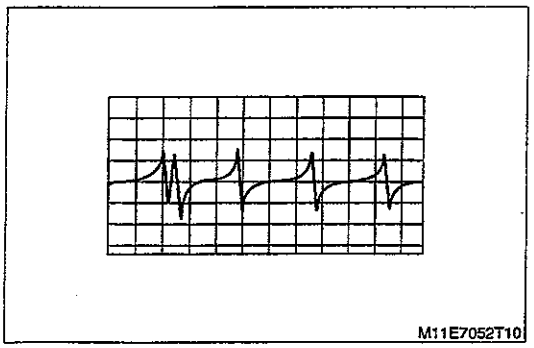
2.Start the engine and keep it idling.

3.Connect the positive (+) and negative (−) probes of an oscilloscope to the SST connector terminals between 22 (N2+) and 23 (N2−) respectively.

4.When the waveforms as shown in the right figure are observed, the engine revolution sensor circuits are functioning properly.

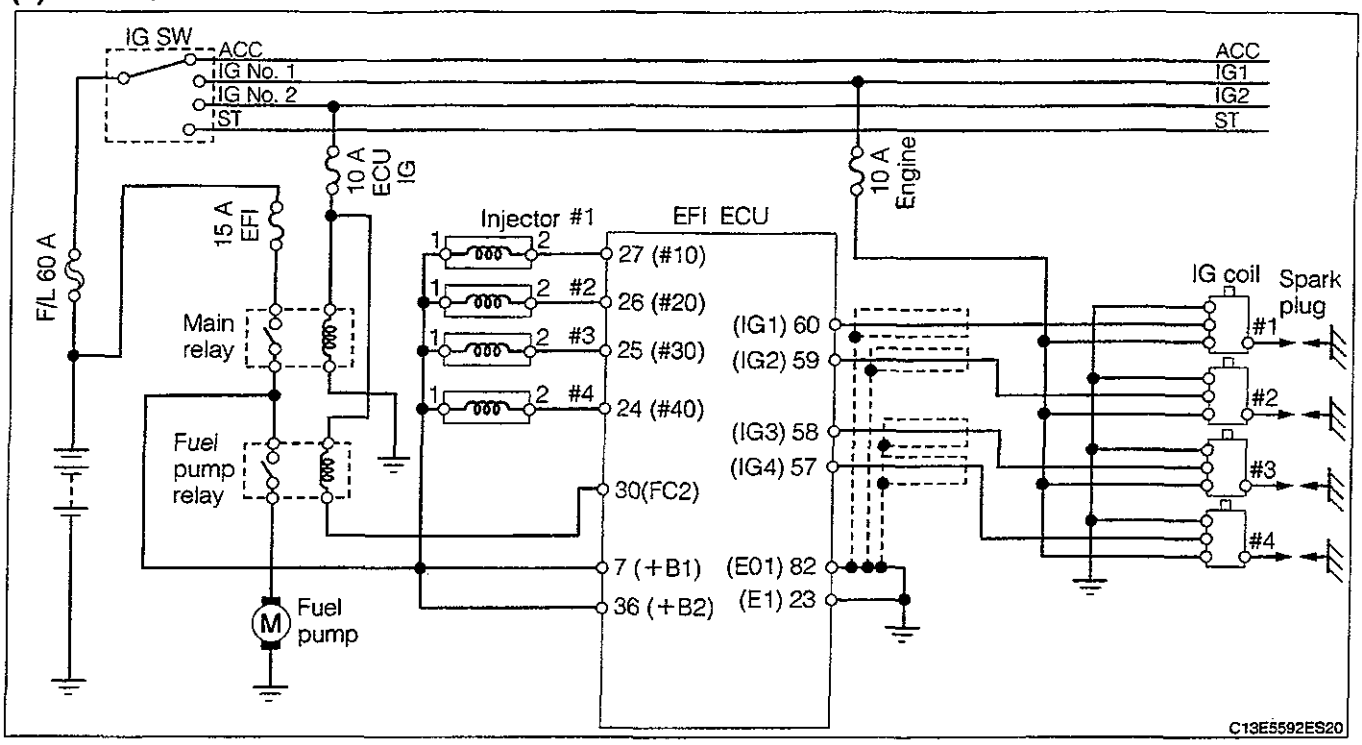
NOTE

- The waveform at the time of racing becomes greater than that at the time of idling.

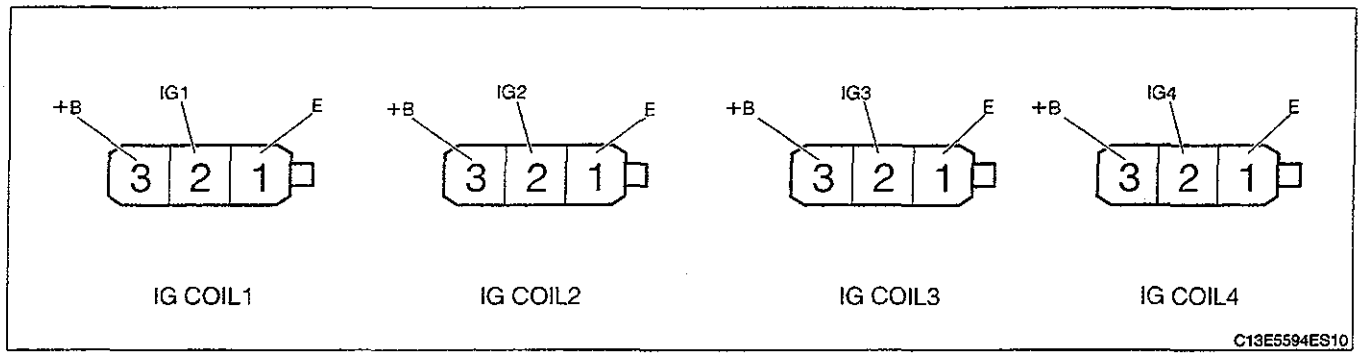


1-12-14 Ignition system circuit Malfunction

(1) WIRING DIAGRAM



IG coil wire harness side



(2) CIRCUIT DESCRIPTION

1.A DLI (Distributorless Ignition) system has been employed.

2.The DLI system has no distributor. Furthermore, the ignition coil is located just above the spark plug. Consequently, there is no ignition energy loss due to the electricity distribution, thus making it possible to directly furnish the electric energy induced at the coil. Therefore, an optimum ignition condition can be obtained at all times.

(3) DTC DETECTING CONDITION

1.When the ignition signal is not inputted continually.

(4) TROUBLE AREA

1.Open wire/short circuit for the ignition system circuit

2.IG coil

3.Battery

4.EFI ECU

(5) POINTS OF INSPECTION

1.Is the power supply voltage of IG coil proper?

2.Is the harness between the IG coil and the ECU proper ?

3.Is spark in a good condition?

(6) INSPECTION PROCEDURE

① When not using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Spark check.

1.Remove the IG coils and spark plugs (all cylinders #1, 2, 3 and 4).

2.Remove the fuel pump relay.

3.Disconnect the connector of the injector.

CAUTION

- Stop the fuel injection by the operations at Steps 3 and 4 above so as to prevent the catalyst from being damaged by unburnt gas, etc.
- When there is no fuel, the injector injection must be avoided wherever possible, as this may damage the injector.

4.Crank the engine. At this time, check to see if each spark plug sparks.

YES: Ignition system circuit is normal.

NO: Go to ➤2.

➤2. Check of ECU output signal.

1.An oscilloscope is used.

2.While engine is being cranked, check the ignition signal between the following terminals.

ECU side connector 60 (IG1) — ECU side connector 23 (E1)

ECU side connector 59 (IG2) — ECU side connector 23 (E1)

ECU side connector 58 (IG3) — ECU side connector 23 (E1)

ECU side connector 57 (IG4) — ECU side connector 23 (E1)

SPECIFIED VALUE: Normal waveforms are outputted.

NOTE

- Correct evaluation cannot be performed for the ignition signal, unless an oscilloscope is used.

YES: Go to ➤3.

NO: Check of EFI ECU circuit.

➤3. Check of power supply voltage of IG coil.

1.With the IG switch turned ON, measure the voltage between the each connector 1 (+B) at IG coil harness side and the body ground.

SPECIFIED VALUE: Battery voltage

YES: Go to ➤4

NO: Repair or replace the harness between the IG coil and the battery.

➤4. Check of wire herness.

1.Check of continuity between the following terminals.

IG coil side connector 2 (IG1) — ECU side connector 60 (IG1)

IG coil side connector 2 (IG2) — ECU side connector 59 (IG2)

IG coil side connector 2 (IG3) — ECU side connector 58 (IG3)

IG coil side connector 2 (IG4) — ECU side connector 57 (IG4)

YES: Go to ➤5.

NO: Repair or replace the harness.

➤5. Check of wire herness.

1.Check continuity of the between the terminals given below.

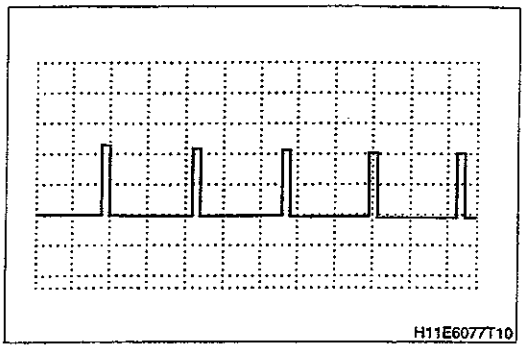
Between harness side terminals "3" (E) of each IG coil and ECU side connector 23 (E1).

YES: Replace the IG coil.

NO: Repair or replace the harness.

NOTE

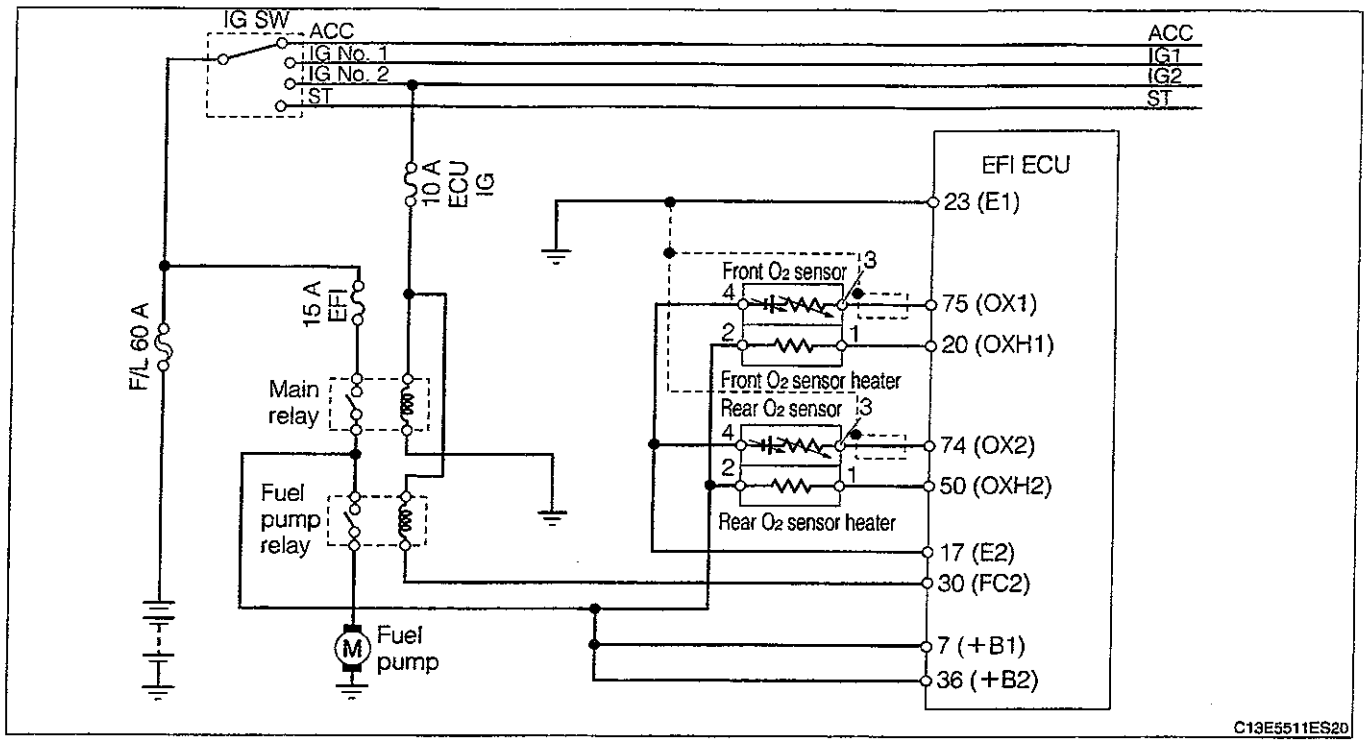
- When an oscilloscope is used, the ignition signal becomes the waveform as indicated in the figure above.



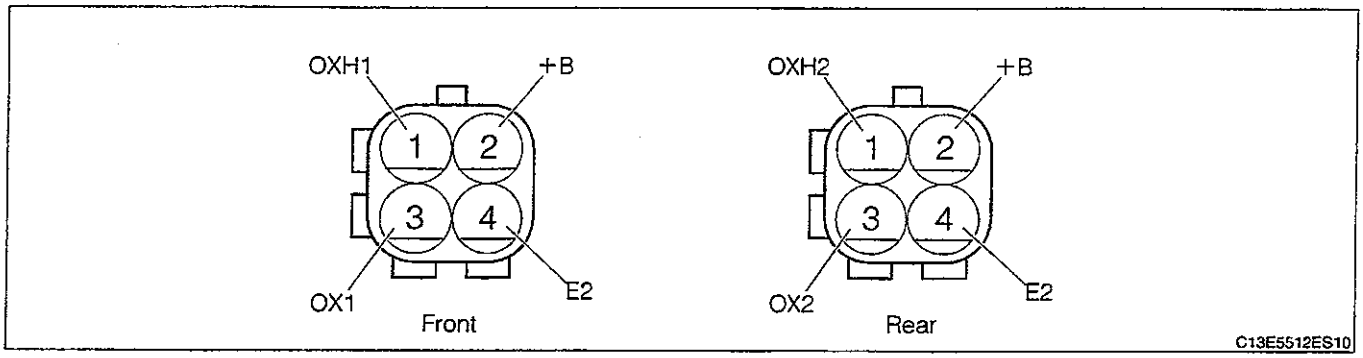
1-12-15 DTC No.P0420/27 Catalyst system efficiency below threshold

(1) WIRING DIAGRAM

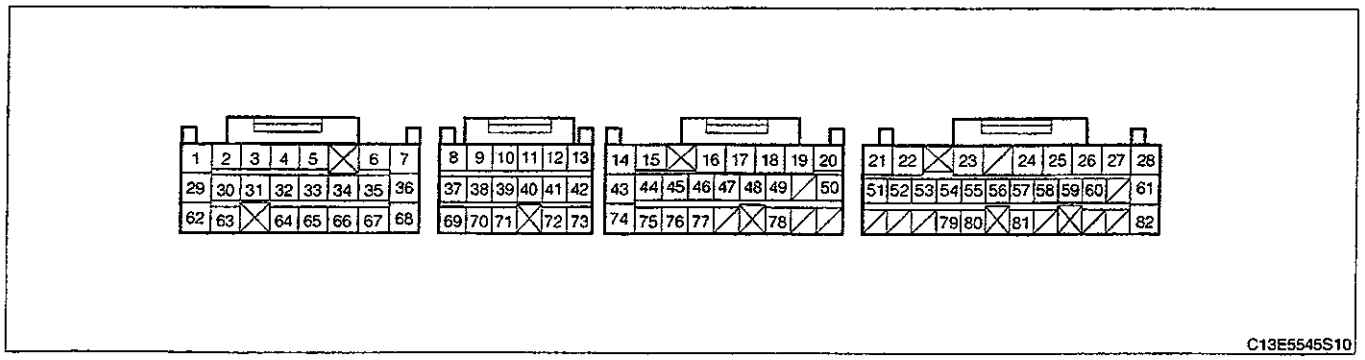
① FOR EU SPECIFICATION



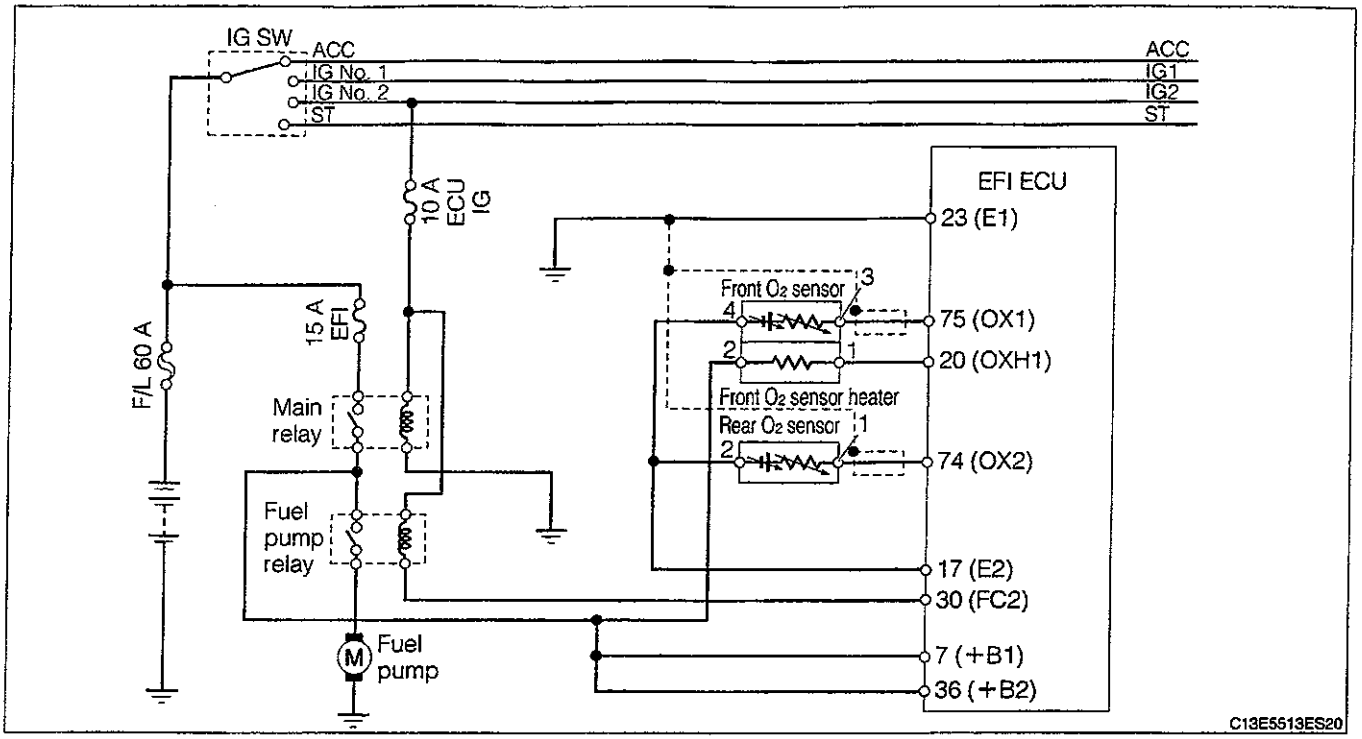
Sensor wire harness side



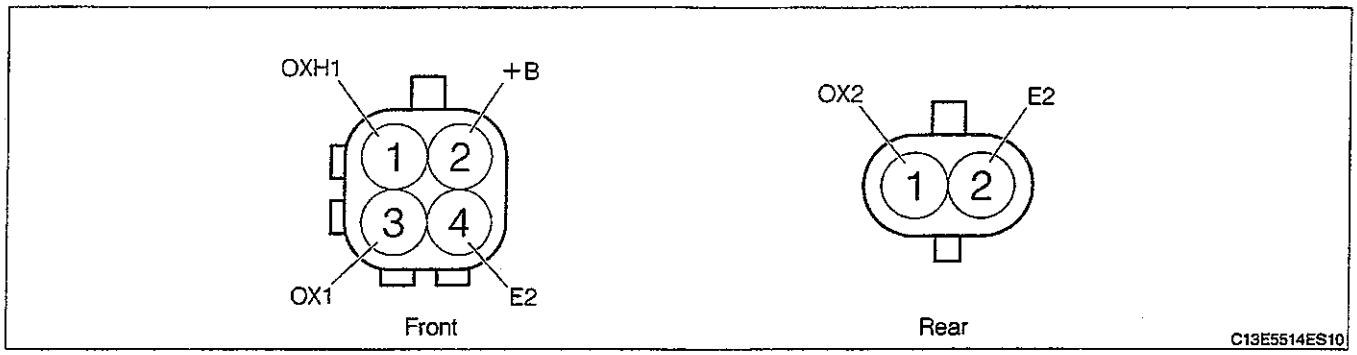
EFI ECU wire harness side



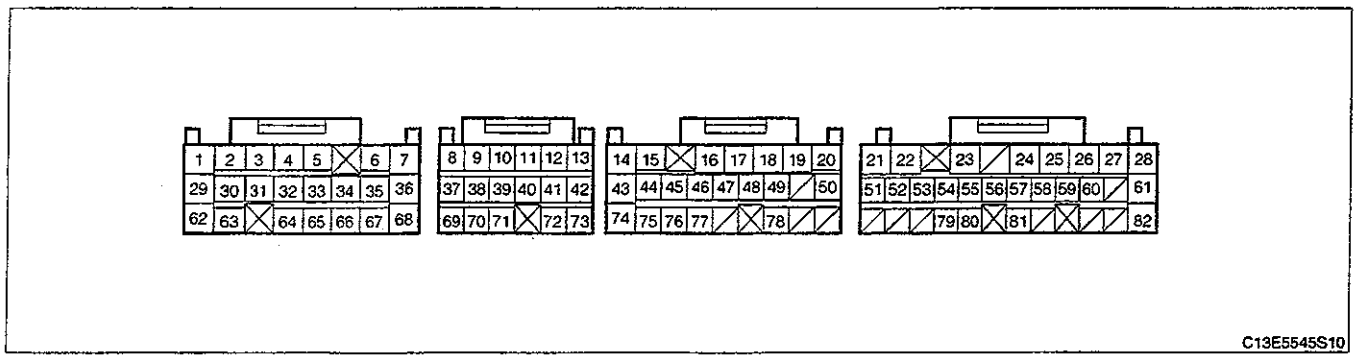
② FOR AUS SPECIFICATION



Sensor wire harness side



EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1. The ECU monitors the concentration of oxygen in the exhaust gas that is flowing through the three-way catalytic converter, using the rear oxygen sensor. When the catalyst is functioning properly, the varying cycle of the output voltage of the rear oxygen sensor is slower than that of the output voltage of the front oxygen sensor. However, if both the output waveforms of the front and rear sensors are varying at the same rate, it indicates that the catalyst performance has deteriorated.

(3) DTC DETECTING CONDITION

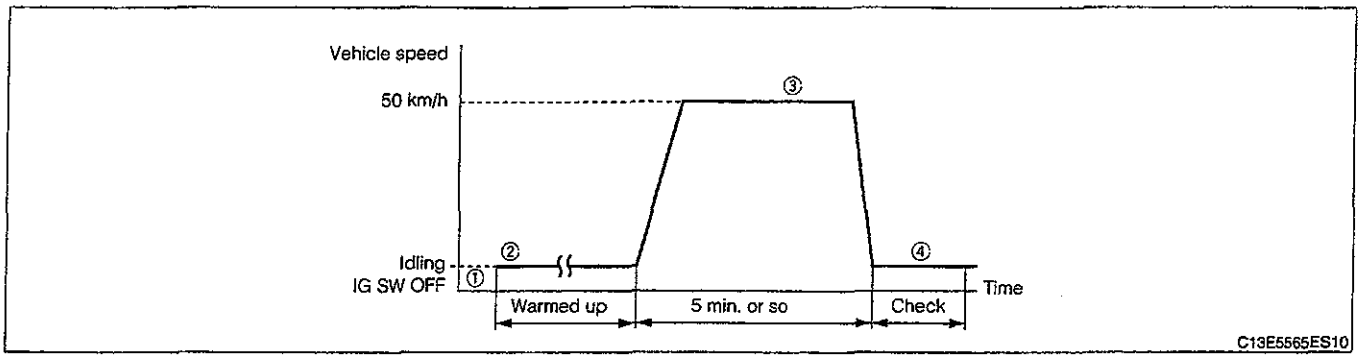
1. When both the output waveforms of the front and rear oxygen sensors are varying at the same rate when the vehicle is running at predetermined speed.

(4) TROUBLE AREA

1.Three-way catalyst
2.Open wire or short circuit for the oxygen sensor system circuit
3.Oxygen sensor

(5) INSPECTION PROCEDURE

CONFIRMATION DRIVING PATTERN



①With the IG switch turned OFF, connect the DS-21 diagnosis tester to DLC through the SST. Turn on the IG switch and the main switch of the tester. Set the tester to the "Continuous monitoring results" of the CARB mode.
②Start the engine. With all switch turned OFF, keep on warming the engine for more than five minutes until the engine coolant temperature reaches 90°C or above.
③Run at a constant speed of 50 km/h for about five minutes (in the 4th gear).
④After one minute of idling, press the F1 key of the tester. Check to see if the DTC P0420 in out putted.

CAUTION

- If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.
- If you do not have DS-21 diagnosis tester, turn the ignition switch OFF after performing steps ② to ④ then perform steps ② to ④ again.

NOTE

- Read the freeze frame data, using the DS-21 diagnosis tester or OBD II generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of DTC.

1.Are other codes (those other than DTC P0420/27) outputted?
YES: Go to the relative DTC chart.
NO: Go to ➤2.

➤2. Check of rear oxygen sensor (bank 1, sensor 1).

1.(Go to trouble-shooting of DTC P0130/21.)
Refer to Page B8-62.

2. Are the unit check results OK?
YES: Go to ➤3.
NO: Repair or replace.

➤3. Check of rear oxygen sensor (bank 1, sensor 2).

1.(Go to trouble-shooting of DTC P0136/22.)
Refer to Page B8-74.

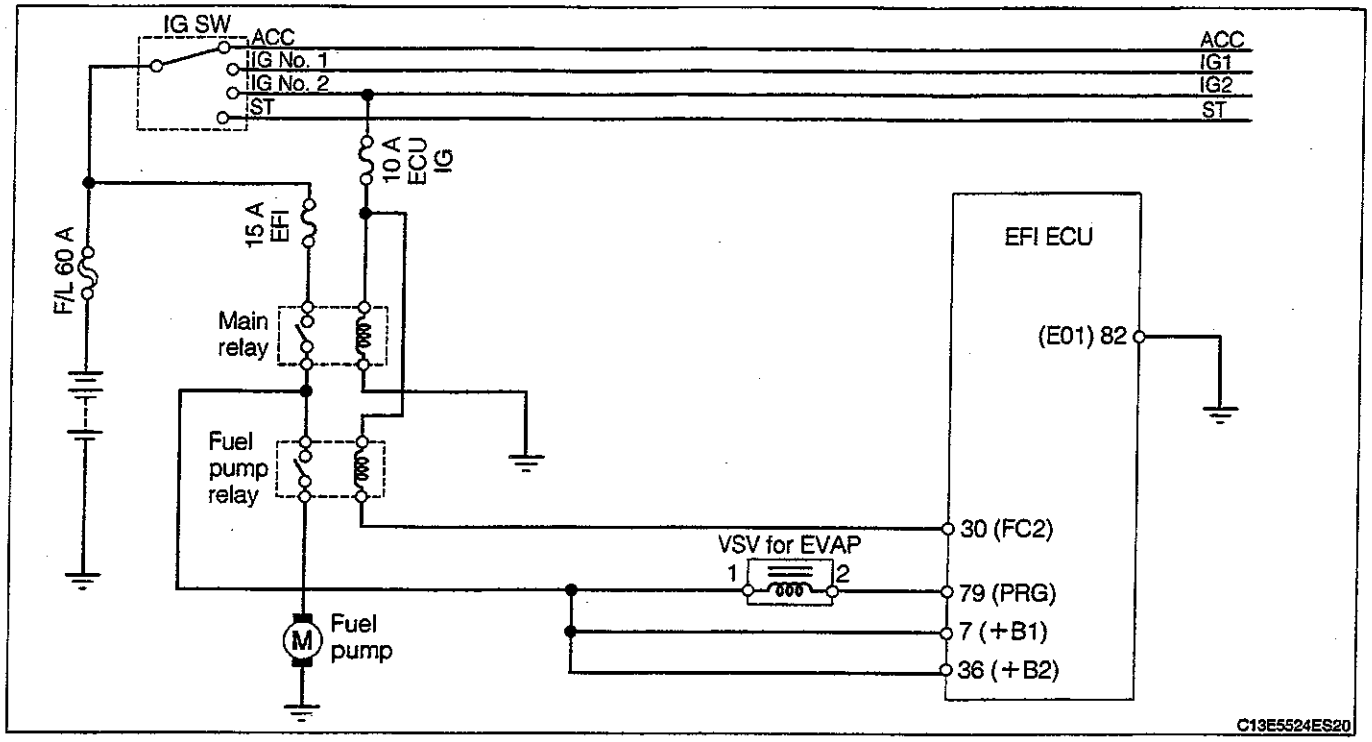
2.Are the unit check results OK?
YES: Go to ➤4.
NO: Repair or replace.

➤4. Perform the confirmation driving pattern.

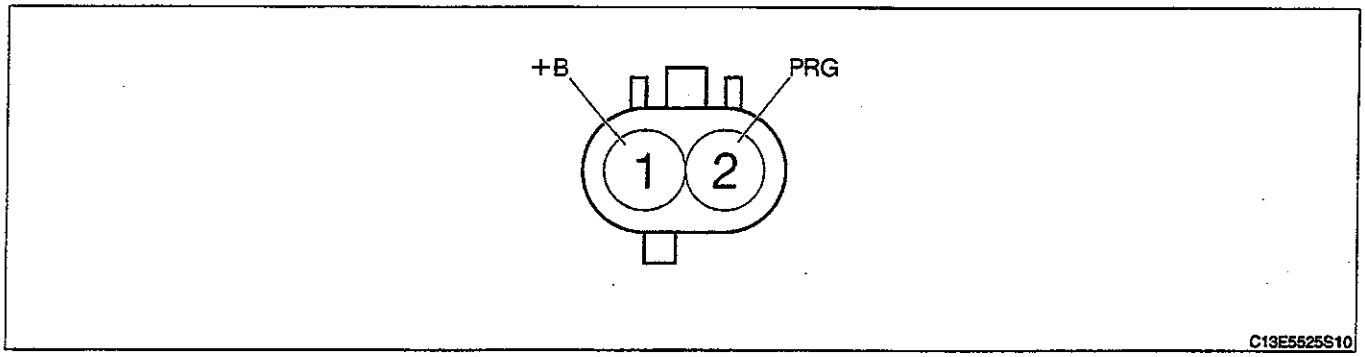
1.Perform the confirmation driving pattern.
2.Is DTC P0420/27 being outputted again?
YES: Replace the three-way catalytic converter.
NO: Check malfunction that occurs intermittently or poor contact.
Refer to Page B8-64.

1-12-16 DTC No.P0443/76 VSV for evaporative emission control system purge control

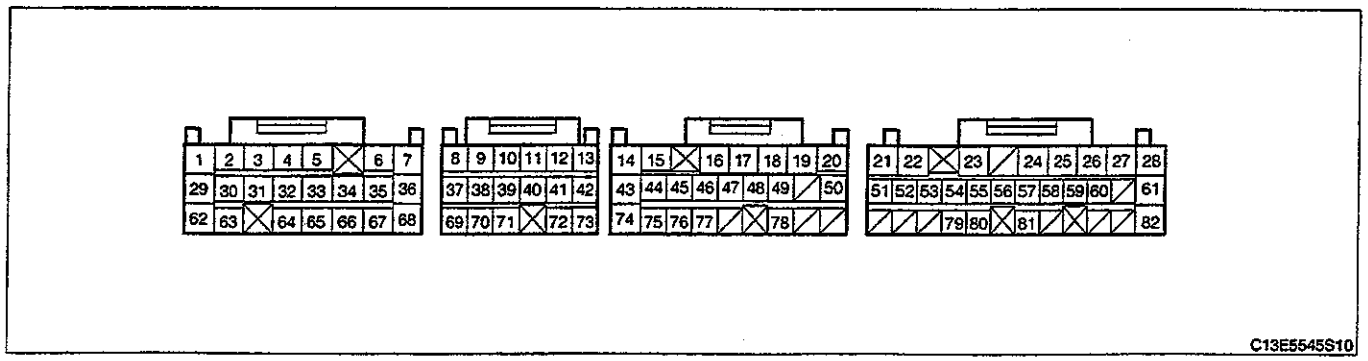
(1) WIRING DIAGRAM



VSV for EVAP wire harness side

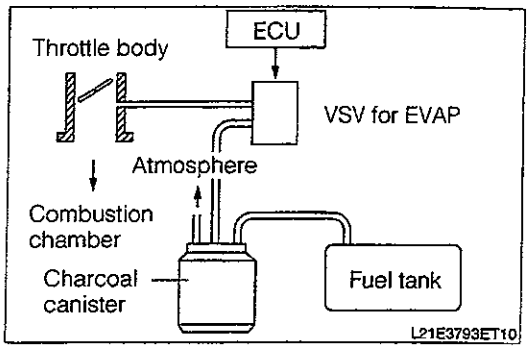


EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1.When the execution conditions for the evaporative emission purging are met, the EFI ECU performs the duty control for the VSV for evaporative emission purging and purges the evaporative emissions into the combustion chamber.



(3) DTC DETECTING CONDITION

1.After the engine starting, not operate the evaporative emission purge VSV by the control signal.

(4) TROUBLE AREA

1.VSV for evaporative emission control system purge control (Purge VSV for EVAP)
2.Open wire or short circuit for the evaporative emission purge VSV control system circuit
3.EFI ECU

(5) POINTS OF INSPECTION

1.Is the harness between the purge VSV for EVAP and the ECU proper ?
2.Is the control signal from the ECU outputted to the purge VSV for EVAP proper ?
3.Is the purge VSV for EVAP operated proper ?

(6) INSPECTION PROCEDURE

NOTE

- **Read the freeze frame data, using the DS-21 diagnosis tester or OBD II generic scan tool. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. t the time of the malfunction.**

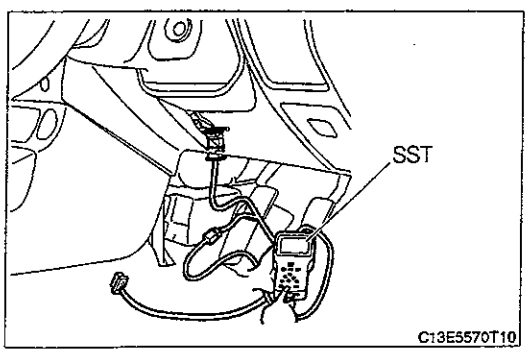
① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Operation check of Purge VSV for EVAP.

1.With the IG switch turned OFF, connect the DS-21 diagnosis tester to the DLC through the SST.
SST: 09991-87404-000

2.Disconnect the hose going to the purge VSV for EVAP from the charcoal canister.
3.Turn ON the IG switch, and turn ON the main switch of the tester. Erase the DTC. Select the "Purge VSV" of the "Actuator driving".
4.When executing "ON" and "OFF" check the operation of the VSV for purging.

VSV "OFF"	No air continuity should exist when air is blown into the hose.
VSV "ON"	Air continuity should exist when air is blown into the hose.

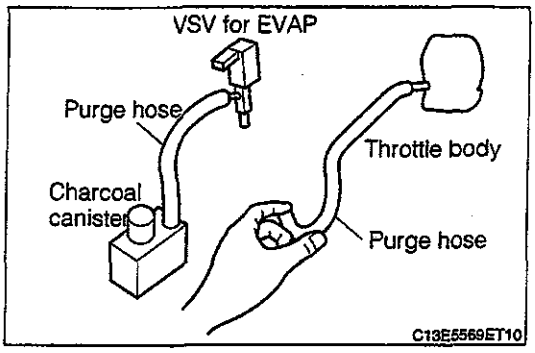


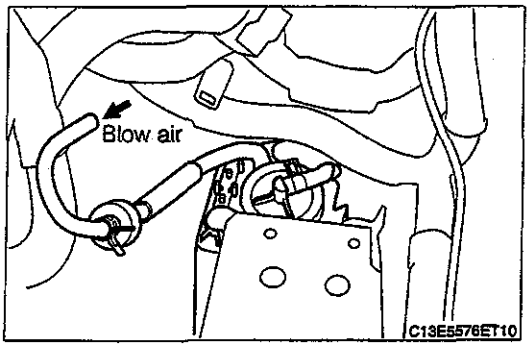
5.Are the check results OK?
YES: Check malfunction that occurs intermittently and poor contact.
NO: Go to ➤2.

➤2. Check of purge hose and passage.

1.Execute the VSV "Release" so as to return the purge VSV for EVAP to the original operating state.
2.Start the engine and keep the engine racing.
3.Disconnect the hose going from the purge VSV for EVAP to the intake manifold.

4.Apply your finger to the disconnected hose. Ensure that a negative pressure is applied.
SPECIFIED VALUE: Negative pressure should be applied.
5.Check the hose for connecting state, leakage, restriction, bending and deterioration.
6.Are the check results OK?
YES: Go to ➤3.
NO: Clean, repair or replace.





➤3. Check of power supply voltage of Purge VSV for EVAP.
1.Turn OFF the main switch of the tester. Turn OFF the IG switch.
2.Disconnect the purge VSV for EVAP connector.
3.With the IG switch turned ON, measure the voltage between the harness side connector 1 (+B) of purge VSV for EVAP and the body earth.
SPECIFIED VALUE: Battery voltage

4.Are the check results OK?
YES: Go to ➤4.
NO: Check the harness and connector between the VSV for purging and the battery, and the main relay for open wire or short. Repair or replace, as required.

➤4. Check of harness between ECU and purge VSV for EVAP.
1.With the IG switch turned OFF, connect the SST (sub-harness).
Refer to Page B8-11.

CAUTION
- Do not connect the SST connector to the ECU.

2.Check the harness and connector for open wire or short.
Connector 2 (PRG) at purge VSV for EVAP harness side — connector 79 (PRG) at ECU side.
3.Are the check results for open wire and short OK?
YES: Go to ➤5.
NO: Repair or replace the harness or connector.

➤5. Unit check of purge VSV for EVAP.

1.Are the unit check results OK?
Refer to Page B8-145.

YES: Go to ➤6.
NO: Replace the purge VSV for EVAP.

➤6. Check of ECU output signal.

1.Connect the connector to VSV for purging. Connect the SST connector to the EFI ECU. Connect the hoses that have been disconnected to the original places.

2.When the engine is cold, with the engine idling, measure the voltage between the SST connector 79 (PRG) and 82 (E01).
SPECIFIED VALUE: Battery voltage

3.After warming up the engine (after the radiator fan has operated at least one time), measure the voltage between the SST connectors 79 (PRG) and 82 (E01) for more than two minutes with the accelerator pedal depressed.
SPECIFIED VALUE: The voltage should become 0 to 1 V within the two minutes.

4.Are the check results OK?
YES: Check malfunction that occurs intermittently and poor contact.
NO: Check or replace the ECU.

② **When not using DS-21 diagnosis tester or OBD II generic scan tool:**

➤1. Check of ECU output signal.

1.Set the SST (sub-harness).
SST: 09842-97203-000

2.When the engine is cold, with the engine idling, measure the voltage between the SST connectors 79 (PRG) and 82 (E01).
SPECIFIED VALUE: Battery voltage

3.After warming up the engine (after the radiator fan has operated at least one time), measure the voltage between the SST connectors 79 (PRG) and 82 (E01) for more than two minutes with the accelerator pedal depressed.
SPECIFIED VALUE: The voltage should become 0 to 1 V within the two minutes.

4.Are the check results OK?
YES: Go to ➤2.
NO: Check or replace the EFI ECU.

➤2. Check of power supply voltage of purge VSV for EVAP.

1.Turn OFF the IG switch.

2.Disconnect the purge VSV for EVAP connector.

3.With the IG switch turned ON, measure the voltage between the harness side connector 1 (+B) of VSV and the body earth.

SPECIFIED VALUE: Battery voltage

4.Are the check results OK?

YES: Go to ➤3.

NO: Check the harness and connector between the purge VSV for EVAP and the battery, and the main relay for open wire and short. Repair or replace, as required.

<RefCode=SB08_0213>

➤3. Check of harness between ECU and purge VSV for EVAP.

1.With the IG switch turned OFF, connect the SST (sub-harness).

SST: 09842-97203-000

CAUTION

- Do not connect the SST connector to the ECU.

2.Check the harness and connector for open wire or short.

Connector 2 (PRG) at VSV harness side — connector 79 (PRG) at ECU side.

3.Are the check results for open wire and short OK?

YES: Go to ➤4.

NO: Repair or replace the harness or connector.

➤4. Unit check of purge VSV for EVAP.

1.Are the unit check results OK?

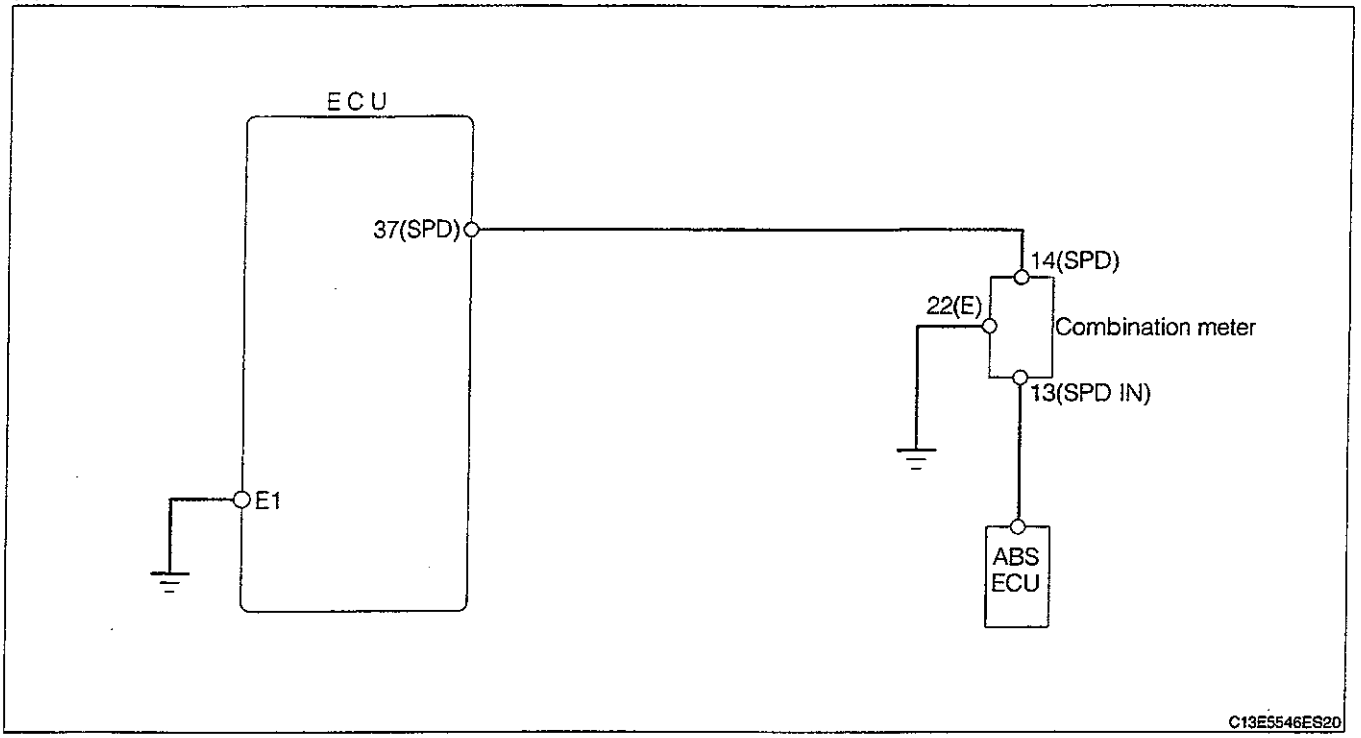
Refer to Page B8-145.

YES: Check malfunction that occurs intermittently and poor contact.

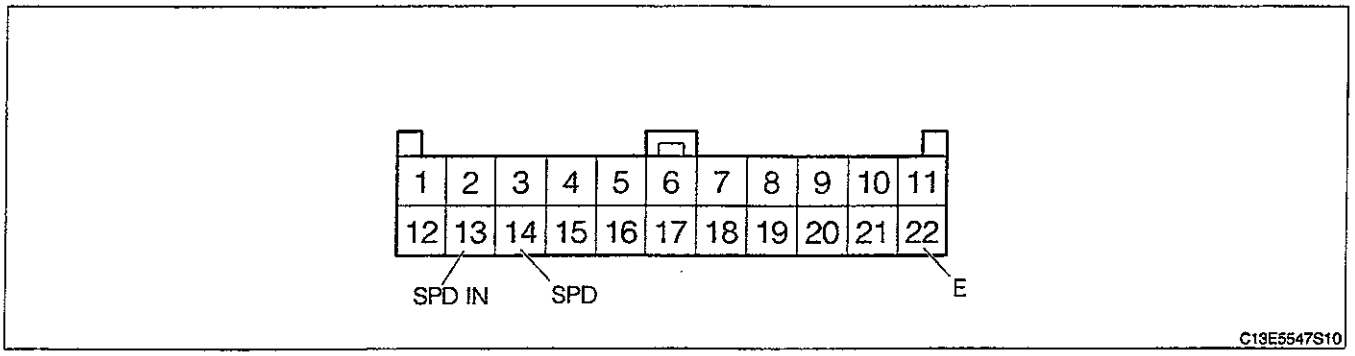
NO: Replace the purge VSV for EVAP.

1-12-17 DTC No.P0500/52 Vehicle speed sensor circuit malfunction

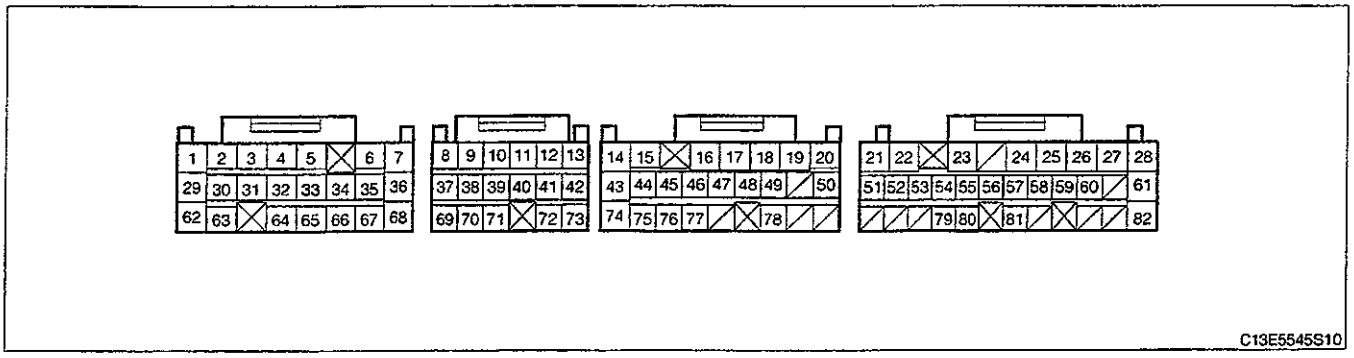
(1) WIRING DIAGRAM



Combination meter wire harness side



EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1.The vehicle speed signals (pulses) are inputted from the ABS computer via the combination meter. The EFI ECU calculates the vehicle speed based on the frequency of these pulse signals.

(3) DTC DETECTING CONDITION

1.No vehicle speed sensor signal to EFI ECU during the fuel cut control is functioning.

(4) TROUBLE AREA

1.Combination meter
2.Open wire or short in the vehicle speed signal system circuit
3.EFI ECU
4.ABS ECU

(5) POINTS OF INSPECTION

1.Is the signal from the Combination meter inputted to the ECU proper ?
2.Is the harness between the Combination meter and the EFI ECU proper ?
3.Check to see if the vehicle signal output of the ABS ECU is correct.

(6) INSPECTION PROCEDURE

① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Operation check of speedometer.

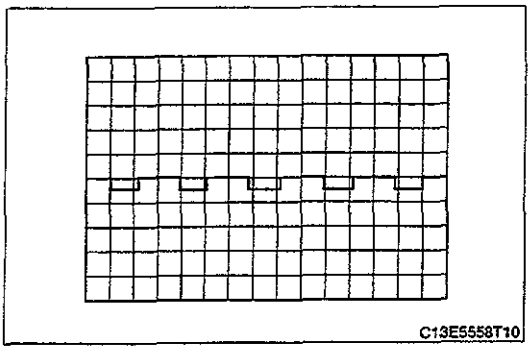
1.Run the vehicle .Does the speedometer indicate the vehicle speed correctly?
SPECIFIED VALUE: If the speedometer indication is normal, the speedometer system is functioning normally.

YES: Go to ➤2.
NO: Check of ABS ECU and combination meter. (Refer to sections BODY ELECTRICAL SYSTEM and BRAKE CONTROL.)

➤2. Check of input signal to ECU.

1.Set the SST (sub-harness).
SST: 09842-97203-000

2.Check that the voltage between the SST terminals 37 (SPD) and 17 (E2) is within the following specified value when the vehicle is moving with the ignition switch turned ON.
SPECIFIED VALUE: Specified Value: 0 ⇄ 4.5 to 5.5 V for pulse signal.
3.Are the check results OK?
YES: Check or replace the EFI ECU.
NO: Go to ➤3.

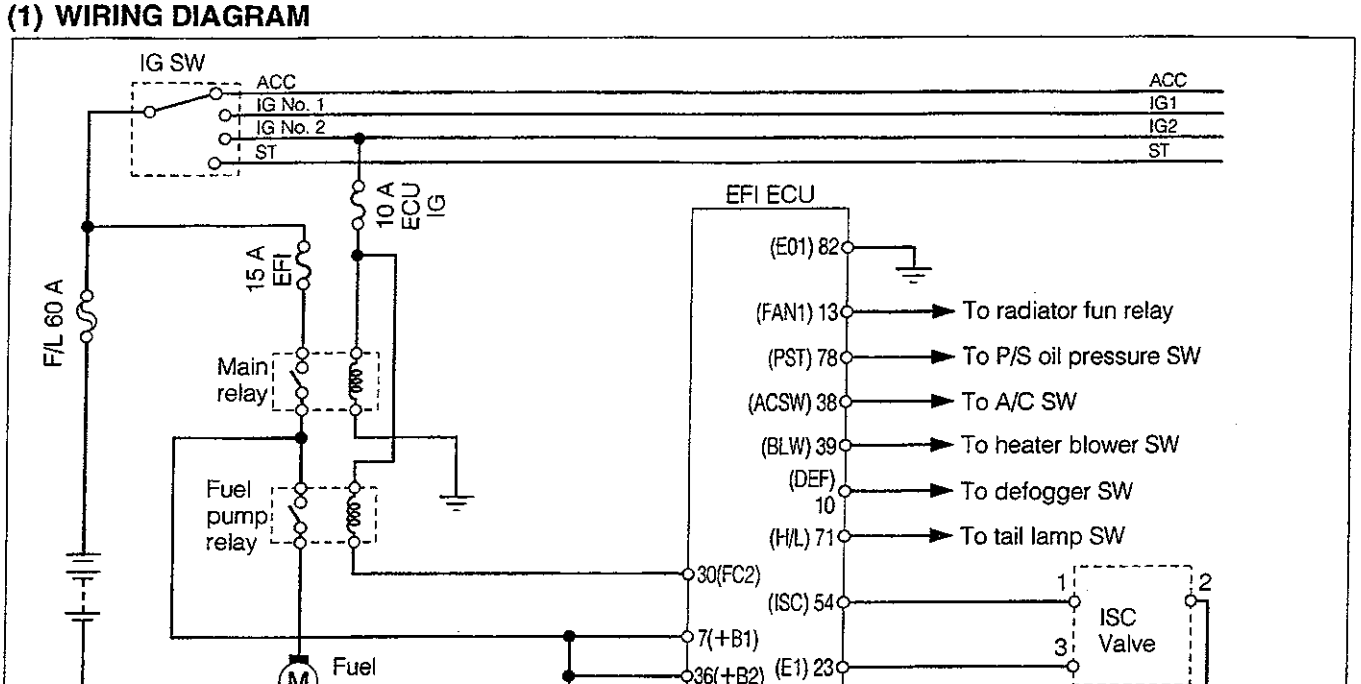


➤3. Check of harness between EFI ECU and combination meter.

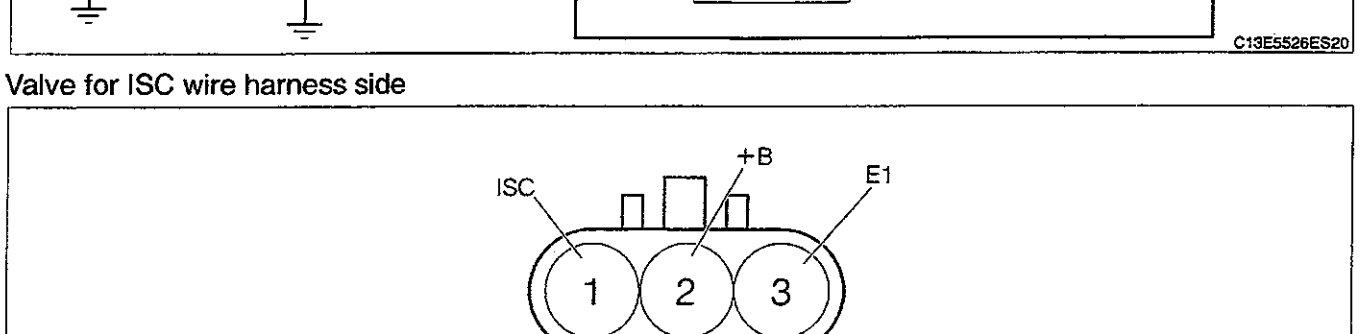
1.Turn OFF the IG switch.
2.Remove the combination meter.
3.Disconnect the harness from the combination meter.
4.Check the harness and connector for open wire or short.
SST connector 37 (SPD) — Harness side connector 14 (SPD) of combination meter.
Harness side connector 22 (E) — Body ground.
5.Are the check results for open wire and short OK?
YES: Replace the combination meter
NO: Repair or replace the harness or connector.

1-12-18 DTC No.P0505/71 Idle Control System Malfunction

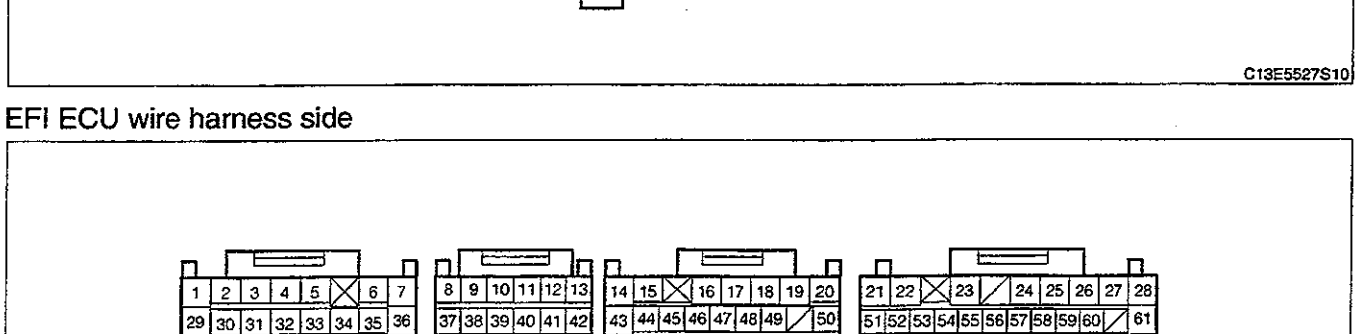
(1) WIRING DIAGRAM



Valve for ISC wire harness side

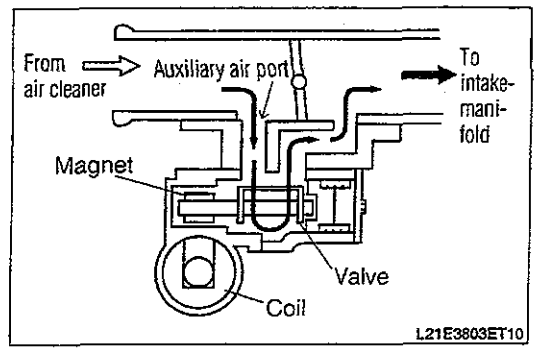


EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1.The rotary solenoid type valve for ISC is located in front of the intake manifold and the intake air bypassing the throttle valve is directed to the valve for ISC through a passage. In this way the intake air volume bypassing the throttle valve is regulated, controlling the engine speed. The EFI ECU operates only the valve for ISC to perform idle-up and provide feedback for the target idling speed.



(3) DTC DETECTING CONDITION

1.When the value is for more than a certain length of time.

(4) TROUBLE AREA

1.Open wire or short circuit for ISC system circuit
2.Valve for ISC
3.EFI ECU

(5) POINTS OF INSPECTION

1.Is the valve for ISC operated proper ?
2.Is the harness between the valve for ISC and the ECU proper ?

(6) INSPECTION PROCEDURE

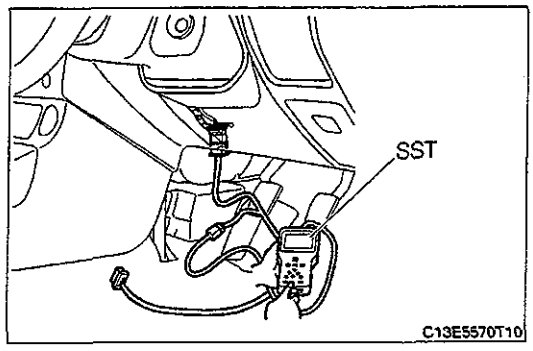
NOTE

- Read the freeze frame data, using the DS-21 diagnosis tester. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Operation check of valve for ISC.

1.With the IG switch turned OFF, connect the DS-21 diagnosis tester to the DLC through the SST.
SST: 09991-87404-000
2.Warm up the engine fully.
3.Turn ON the main switch of the DS-21 diagnosis tester.
4.With the engine idling, select the "ISC" in the "Actuator driving". Execute the "5% open" and "50 % open" respectively.
5.Does the engine speed increase or decrease in accordance with the change in the ISC duty ratio (5 %, 50 %)?
YES: Check malfunction that occurs intermittently and poor contact.
NO: Go to ➤2.



➤2. Check of power supply voltage of valve for ISC.

1.Turn OFF the main switch of the tester. Turn OFF the IG switch

2.Disconnect the connector of the valve for ISC.

3.Measure the voltage between the terminals 2 (+B) of the wire harness connector and the body ground when the ignition switch is turned to the ON position.

SPECIFIED VALUE: Battery voltage

4.Is the measured value the specified value?

YES: Go to ➤3.

NO: Check the harness and connector between the valve for ISC and the battery, and main relay for open wire and short.

➤3. Check of input signal of valve for ISC.

1.After warming up the engine fully, turn ON the main switch of the DS-21 diagnosis tester.

2.With the engine idling, select the "ISC" in the "Actuator driving." Execute the "5% open" and "50 % open" respectively. Measure the voltage between 1 (ISC) and 3 (E1).

3.Does the voltage increase or decrease in accordance with the change in the ISC duty ratio (5 %, 50 %)?

YES: Replace the valve for ISC.

NO: Go to ➤4.

➤4. Check of output signal of valve for ISC of ECU.

1.Turn OFF the main switch of the tester. Turn OFF the IG switch.

2.Connect the SST between the EFI ECU connectors and the wire harness connectors.

SST: 09842-97203-000

3.Warm up the engine. With the engine idling, select the "ISC" in the "Actuator driving". Execute the "5% open" and "50 % open" respectively. Measure the voltage between the SST terminals 54 (ISC) and 23 (E1).

4.Does the voltage increase or decrease in accordance with the change in the ISC duty ratio (5 %, 50 %)?

YES: Go to ➤5.

NO: Check or replace the EFI ECU.

➤5. Check of harness between valve for ISC and ECU.

1.Turn OFF the main switch of the tester. Turn OFF the IG switch.

2.Disconnect the SST connector at the EFI ECU side.

3.Check the harness and connector for open wire or short.

Valve for ISC connector 1 (ISC) – SST terminal 54 (ISC)

Valve for ISC connector 3 (E1) – SST terminal 23 (E1)

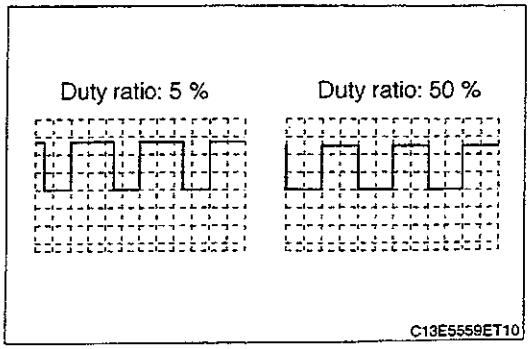
4.Are the check results for open wire and short OK?

YES: Check malfunction that occurs intermittently and poor contact.

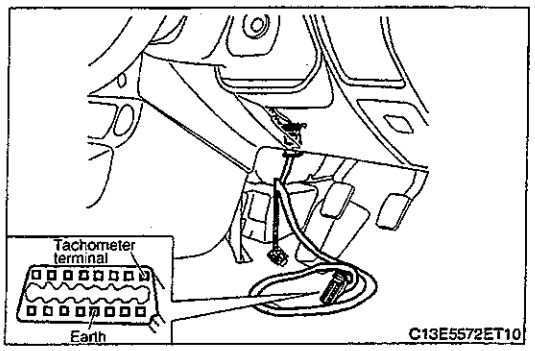
NO: Repair or replace the harness or connector.

② **Check by oscilloscope.**

1.When an oscilloscope is used, the ISC control signal becomes the waveform as indicated in the figure above.



③ When not using DS-21 diagnosis tester or OBD II generic scan tool:



➤1. Operation check of valve for ISC.

1.Ensure that the engine revolution speed is high during the cold period. Also, ensure that the engine revolution speed drops as the engine warms up and that the idle speed is maintained.

2.Are the check results OK?

YES: Check malfunction that occurs intermittently and poor contact.

NO: Go to ➤2.

➤2. Check of power supply voltage of Valve for ISC.

1.Turn OFF the IG switch.

2.Disconnect the connector of the valve for ISC.

3.Measure the voltage between the terminals 2 (+B) of the wire harness connector and the body ground when the ignition switch is turned to the ON position.

SPECIFIED VALUE: Battery voltage

4.Is the measured value the specified value?

YES: Go to ➤3.

NO: Check the harness and connector between the valve for ISC and the battery, and main relay for open wire and short.

➤3. Check of input signal of valve for ISC.

1.Warming up the engine fully.

2.With the engine idling (with the valve for ISC connector disconnected), measure the voltage between 1 (ISC) and 3 (+B) at the harness connector side.

SPECIFIED VALUE: The voltage should be stable at a constant value. (The value of the voltage can not be specified.)

3.Are the check results OK?

YES: Replace the valve for ISC.

NO: Go to ➤4.

➤4. Check of output signal of valve for ISC of ECU.

1.Turn OFF the IG switch.

2.Connect the SST between the ECU connectors and the wire harness connectors.

SST: 09842-97203-000

3.Warm up the engine. With the engine idling (with the valve for ISC connector disconnected), measure the voltage between the SST terminals 54 (ISC) and 23 (E1).

SPECIFIED VALUE: The voltage should be stable at a constant value. (The value of the voltage can not be specified.)

4.Are the check results OK?

YES: Go to ➤5.

NO: Check or replace the EFI ECU.

➤5. Check of harness between valve for ISC and ECU.

1.Turn OFF the IG switch.

2.Disconnect the SST connector at the EFI ECU side.

3.Check the harness and connector for open wire or short.

Valve for ISC connector 1 (ISC) — SST terminal 54 (ISC)

Valve for ISC connector 3 (E1) — SST terminal 23 (E1)

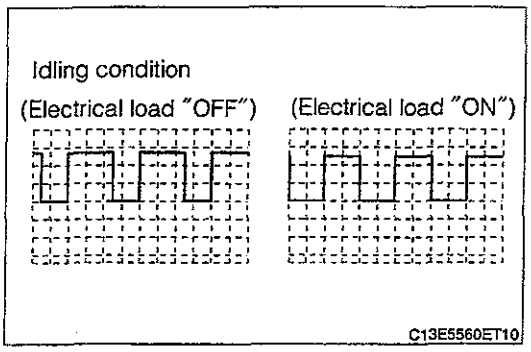
4.Are the check results for open wire and short OK?

YES: Check malfunction that occurs intermittently and poor contact.

NO: Repair or replace the harness or connector.

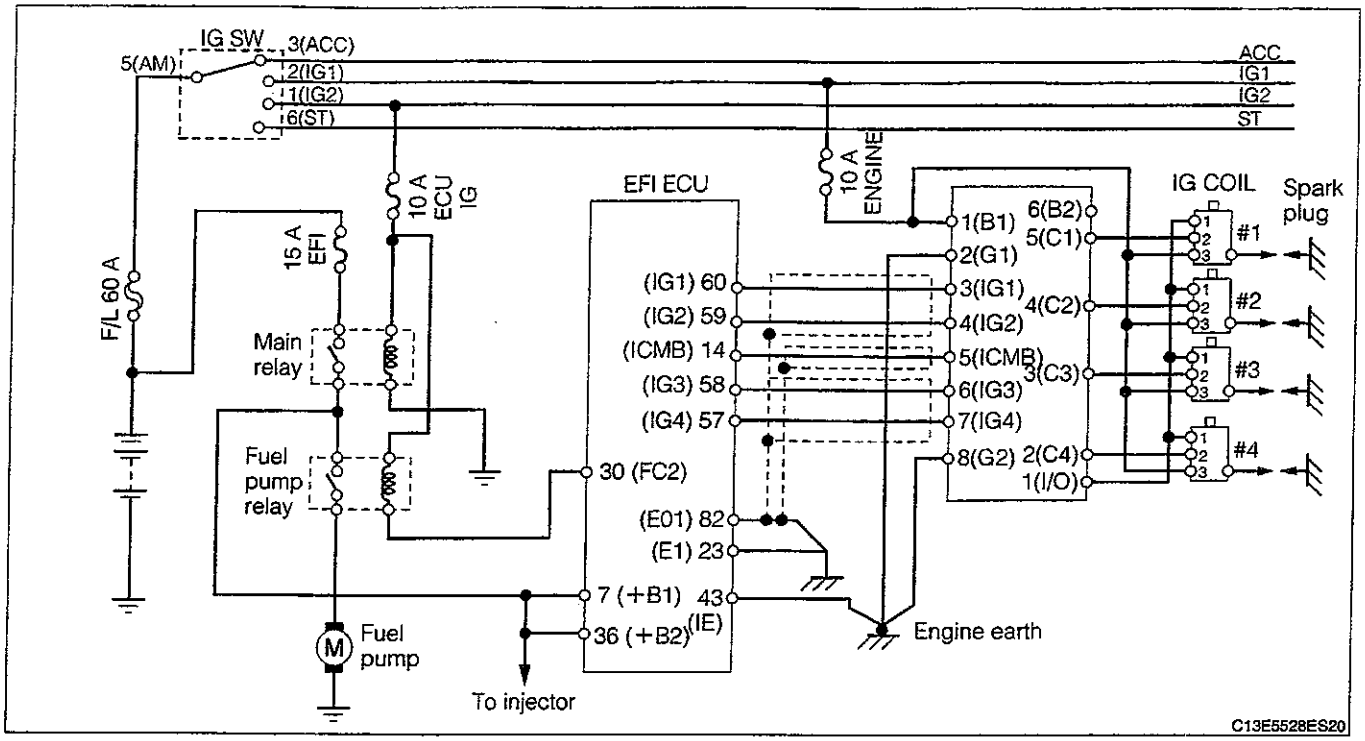
④ **Check by oscilloscope.**

1.When an oscilloscope is used, the ISC control signal becomes the waveform as indicated in the figure above. (The duty ratio cannot be specified.)

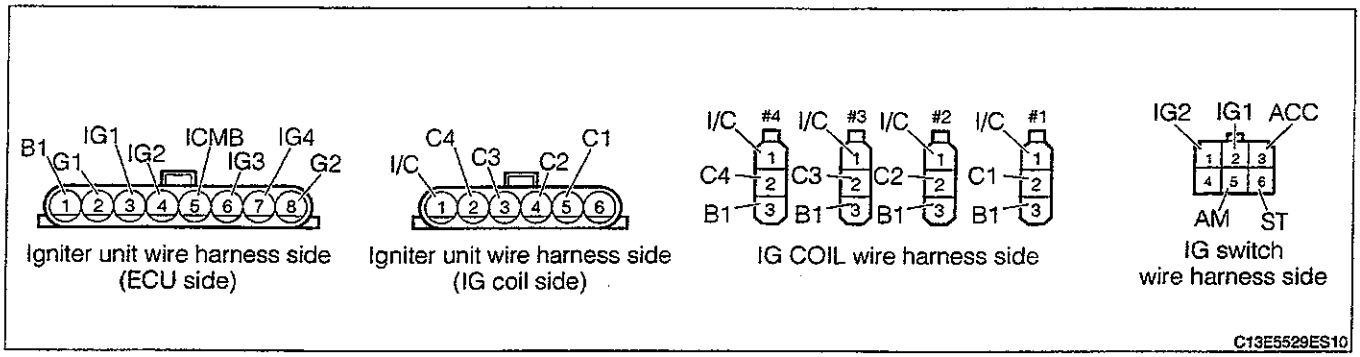


1-12-19 DTC No. P1300/36 Ion system malfunction

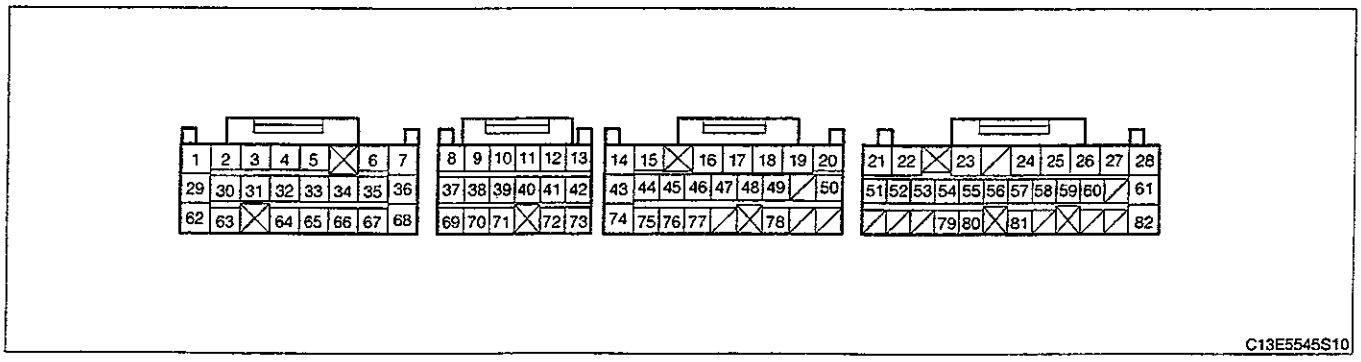
(1) WIRING DIAGRAM



Unit and switch wire harness side



EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1. This system detects any misfire of the engine by using an ion current which has the same waveforms as those of the combustion pressure. When any misfire takes place, no ion current is produced. Therefore, if the input voltage at the ECU side is below a certain value, it is judged that a misfire took place. Since the detected ion current is very weak, it is amplified in the igniter unit. In addition, a vibration waveform appears in the ion current waveform when knocking takes place. Hence, knocking control is also performed by detecting vibration waveforms. This applies only to vehicles with EU specifications.

(3) DTC DETECTING CONDITION

1.No ion current signal to EFI ECU during cranking or engine is running.

(4) TROUBLE AREA

1.Open wire or short circuit for ion system circuit
2.Igniter unit
3.IG coil
4.Spark plug
5.EFI ECU

(5) POINTS OF INSPECTION

1.Is the signal from the igniter unit inputted to the ECU proper ?
2.Is the harness between the igniter unit and the ECU proper ?
3.Is the igniter unit operated proper ?

(6) INSPECTION PROCEDURE

NOTE

- Read the freeze frame data, using the DS-21 diagnosis tester. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.
- When P1300/36 (ion system malfunction) is outputted, both P0300/17 (random/multiple cylinder misfire detected) and P0301/17 - P0303/17 (cylinders 1 to 3 misfire detected) may be outputted simultaneously.

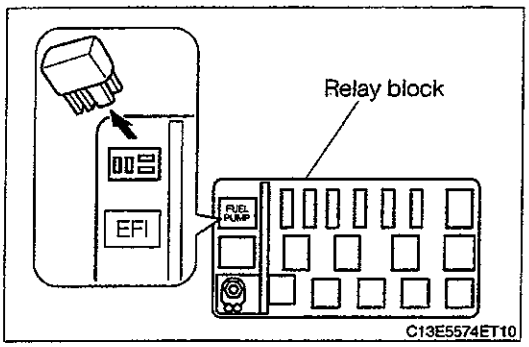
① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Spark check.

1.Remove the fuel pump relay from the relay block.
2.Disconnect the connector of the injector.

CAUTION

- Stop the fuel injection by the operations at Steps 3 and 4 above so as to prevent the catalyst from being damaged by unburnt gas, etc.
- When there is no fuel, the injector injection must be avoided wherever possible, as this may damage the injector.



3.Remove the IG coils and spark plugs (all cylinders #1, 2 ,3 and 4).
4.Install the spark plug to the IG coil.
5.Connect the IG coil connector to the IG coil.
6.Ground the spark plug.
7.Crank the engine. at this time, check to see if each spark plug sparks.

No spark takes place in all cylinders.	a
No spark takes place in some cylinders.	b
Spark takes place in all cylinders.	c

a: Go to ➤2.
b: Go to ➤3.
c: Go to ➤7.

WARNING

- Sparks will take place. Care must be exercised to the surrounding combustible objects.

➤2. Unit check of spark plug.
1.Are the unit check results OK?

➤3. unit check of the spark plug where no spark takes place
1.Perform the unit check of the spark plug for the cylinders where no spark takes place.
2.Are the unit check results OK?
YES: Go to Step ➤5
NO: Go to ➤4

➤4. Spark check again.
1.Replace the spark plug. Perform the spark check again.

No spark takes place.	a
Sparks take place.	b

a: Go to ➤5.
b: Go to ➤7.

WARNING
- Never use spark plugs other than those designated.

➤5. Check of power supply voltage of IG coil.
1.With the IG switch turned OFF, disconnect the connector of the IG coil of each cylinder.
2.With the IG switch turned ON, measure the voltage between the body earth and each of the harness-side connectors terminal 3 (B2) of each IG coil.
SPECIFIED VALUE: Battery voltage

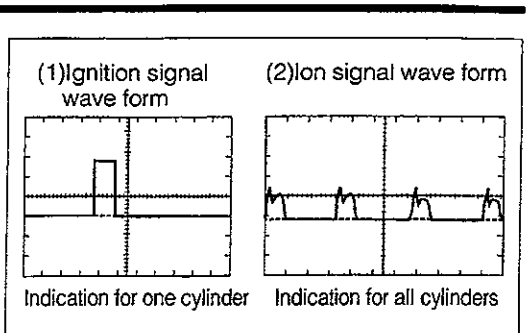
3.Are the check results OK?
YES: Go to ➤7.
NO: Go to ➤6.

➤6. Check of power supply voltage of IG coil.
1.Check the harness, connector and fuse for open wire and short.
2.Turn OFF the IG switch.
3.Disconnect the connectors at the ECU side of the IG switch and ignitor unit
4.Check the harness and connector for open wire or short.
Between connector 2 (IG2) at IG switch side — ignitor unit terminal 1 (B1).
Between connector 2 (IG1) at IG switch side — each of terminal 3 (B2) each IG coil.
5.Are the check results for open wire and short OK?
YES: Replace the IG switch.
NO: Repair or replace the harness or connector. Or replace the fuse.

➤7. Check of ignition signal and ion signal.
1.Check that the ignition signal and ion signal are outputted from the EFI ECU and inputted by using an oscilloscope.
2.With the IG switch turned OFF, perform the restoration.
3.Set the SST (sub-harness).
SST: 09842-97203-000

4.Warm up the engine. (only when the engine can start).
5.With the engine idling or cranking, connect the negative (−) probe of the oscilloscope to the SST terminal 82 (E01) , the positive (+) probe to each of the SST terminals 60 (IG1), 59 (IG2), 58 (IG3) and 57 (IG4), respectively. Check the ignition signal for all cylinders.

6.Pulse waveforms should be confirmed.



7.As has been done in Step 5 connect the positive (+) and negative (−) probes of the oscilloscope to the SST terminals 14 (ICMB) and 43 (IE), respectively, and check the ion signal.
SPECIFIED VALUE: **Waveforms as shown in the right figure should be observed without any waveform missing.**

8.Are the ignition signal and ion signal observed?

When sparks take place and the ignition signal waveform is observed, is the ion signal waveform observed?	YES	a
	NO	b
When no spark takes place and the ignition signal waveform is observed, and no ion signal waveform is observed.		c
When no spark takes place and no ignition signal waveform is observed, and no ion signal waveform is observed.		d

a: Check malfunction that occurs intermittently and poor contact.
b: Go to ➤8.
c: Go to ➤12.
d: Check or replace the ECU.

➤8. Check of harness between ECU and ignitor unit.
1.Turn OFF IG switch.
2.Disconnect the SST connector of the EFI ECU.
3.Disconnect the ECU side connector of the ignitor unit.
4.Check the harness and connector for open wire or short.
SST terminal 14 (ICMB) — Harness side 5 (I/O) terminal of ignitor unit.
5.Are the check results for open wire and short OK?

➤9. Check of harness between ignitor unit and IG coil.
1.Check the harness and connector for open wire or short.
2.Disconnect the IG coil side connector of the ignitor unit.
3.Disconnect the connector of each IG coil.
(1) Between harness side terminal 1 (I/C) of ignitor unit — Harness side terminals "1" of each IG coil.
4.Are the check results for open wire and short OK?
YES: Go to ➤10.
NO: Repair or replace the harness or connector.

➤10. Unit check of ignitor unit.
1.Are the check results OK?
Refer to Page B8-146.

YES: Go to ➤11.
NO: Replace the ignitor unit.

➤11. Check of earth circuit of ignitor unit.
1.Measure the continuity between the engine earth and each of harness side terminals 2 (G1) and 8 (G2) of the ignitor unit.
SPECIFIED VALUE: Continuity exists.

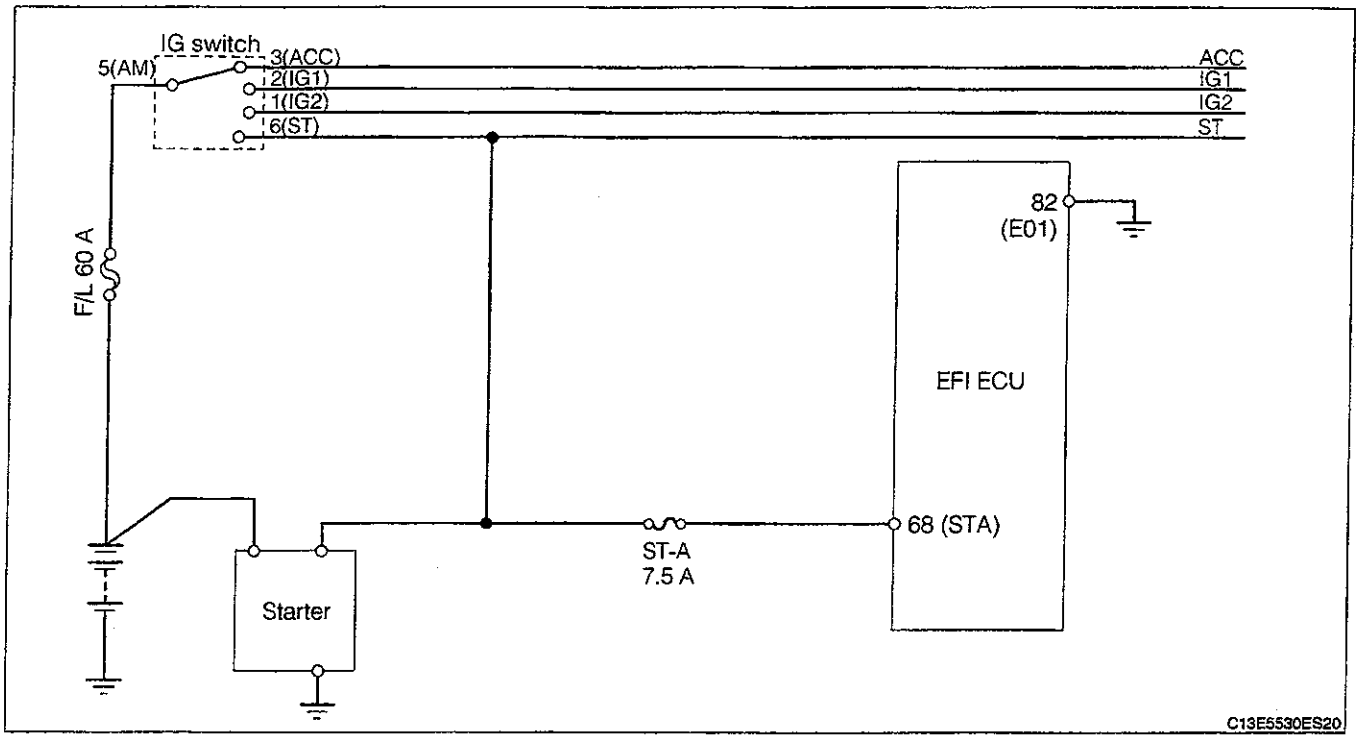
2.Are the check results OK?
YES: Replace the IG coil. (All cylinders)
NO: Repair or replace the harness or connector.

➤12. Check of harness between ignitor unit and IG coil.
1.Check the harness and connector for open wire or short.
2.Turn OFF the IG switch.
3.Disconnect each IG coil and the IG coil side connector of the ignitor unit.
(1) Between harness side terminals "2" of each IG coil and harness side terminals 5 (C1), 4 (C2), 3 (C3) and 2 (C4) of ignitor unit.
4.Are the check results for open wire and short OK?
YES: Go to ➤13.
NO: Repair or replace the harness or connector.

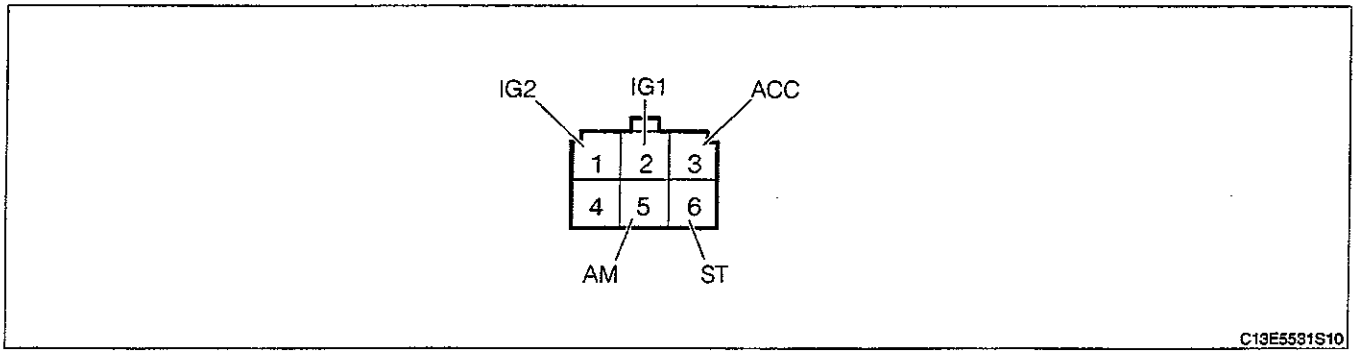
➤13. Check of harness between EFI ECU and ignitor unit
1.Check the harness and connector for open wire or short.
2.Disconnect the SST connector from the EFI ECU.
3.Disconnect the EFI ECU side connector of the ignitor unit.
4.Harness side terminals 7 (S1), 6 (S2), 4 (S3), 3 (S4) and 5 (I/O) of ignitor unit — SST connector terminals 60 (IG1), 59 (IG2), 58(IG3), 57 (IG4) and 14 (ICMB).
5.Are the check results for open wire and short OK?
YES: Go to ➤0.
NO: Repair or replace the harness or connector.

1-12-20 DTC No.P1510/54 Starter relay output system

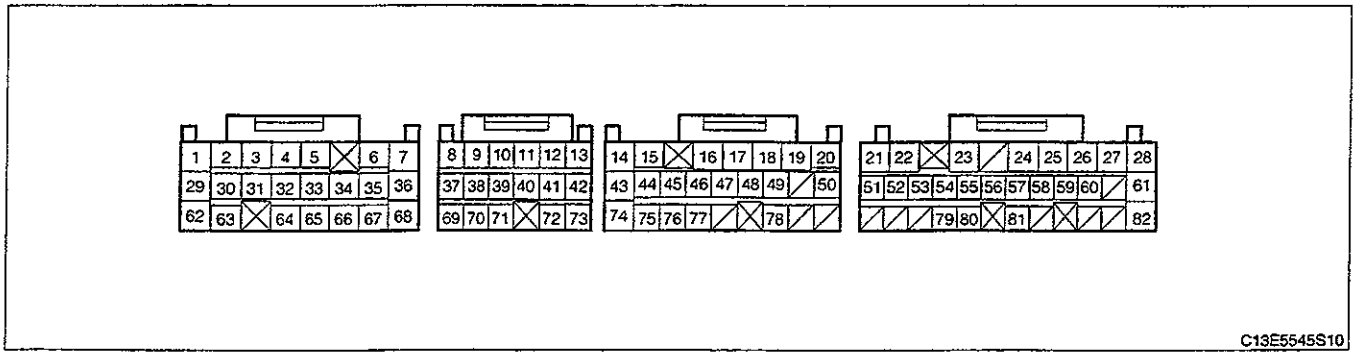
(1) WIRING DIAGRAM



Switch wire harness side



EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1.The starter signal is manly used to increase the fuel injection volume for the starting injection control and after-start injection control. While engine is being cranked, the battery positive voltage is applied to the terminal STA of the EFI ECU.

(3) DTC DETECTING CONDITION

1.No signal of starter while rising the engine revolution speed to the specified value at the vehicle stopped state.

(4) TROUBLE AREA

1.Open wire or short circuit for the starter system circuit.
2.EFI ECU

(5) POINTS OF INSPECTION

1.Is the harness between the starter and EFI ECU proper ?

(6) INSPECTION PROCEDURE

① When not using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of ECU input signal STA.

1.Set the SST (sub-harness).
SST: 09842-97203-000

2.Measure the voltage between the SST connectors 68 (STA) and 82 (E01) under the following conditions.

Condition	Specified value
Engine being cranked	6 — 10 V
After engine has started	0 V

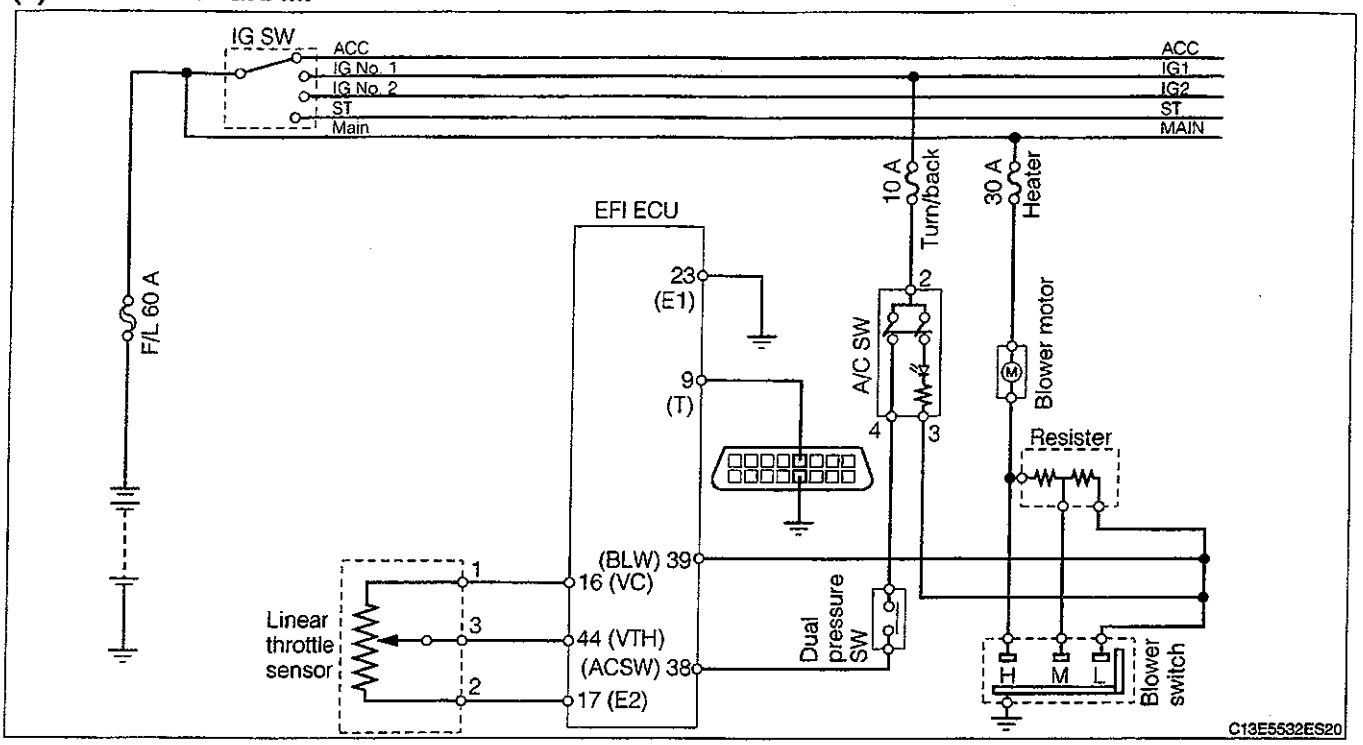
3.Is the measured value the specified value?
YES: Check malfunction that occurs intermittently and poor contact.
NO: Go to ➤2.

➤2. Check of harnesses between IG switch and ECU.

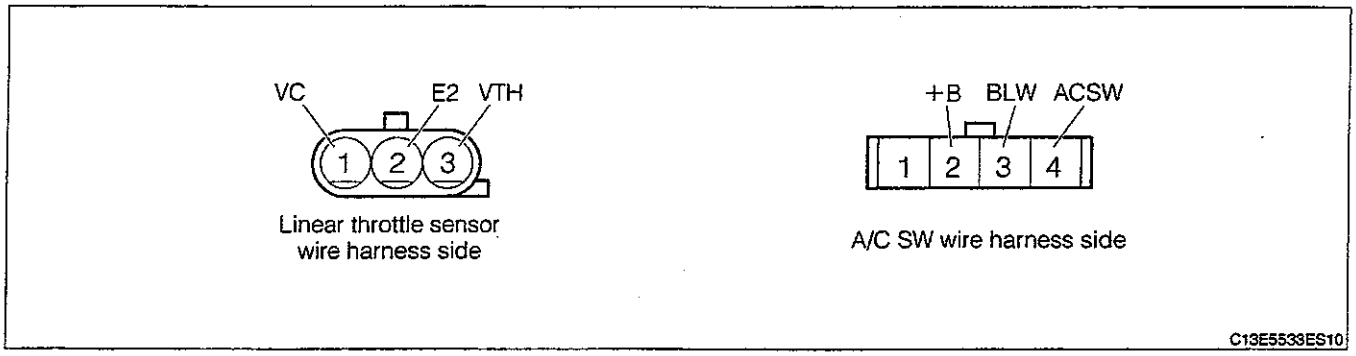
1.Turn OFF the IG switch.
2.Disconnect the connector of the IG switch.
3.Disconnect the SST connector at ECU side
4.Check the harness and connector for open wire or short.
Connector 6 (STA) at IG switch side — Connector 68 (STA) at ECU side.
5.Are the check results for open wire and short OK?
YES: Check or replace the EFI ECU.
NO: Repair or replace the harness or connector.

1-12-21 DTC No.P1520/51 Switch signal circuit malfunction

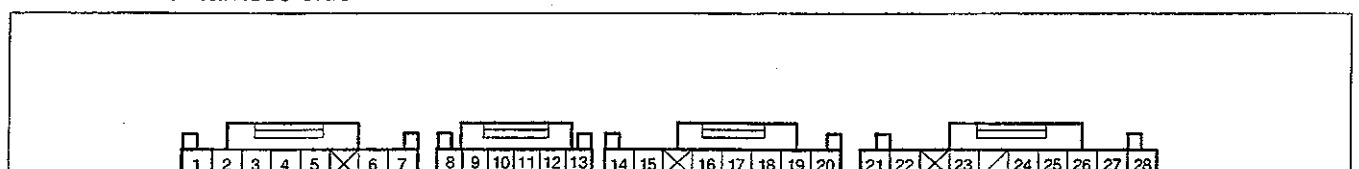
(1) WIRING DIAGRAM



Sensor and switch wire harness side



EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1. This is used as the normal state judging code for the switch system. While the terminal T is ON, if the idle switch becomes OFF or the air conditioner becomes ON, the DTC is outputted. However, the DTC is diagnosed only when the terminal T is ON. No memorization is made.

(3) TROUBLE AREA

1.Open wire or short circuit for the air conditioner system circuit
2.A/C switch
3.Open wire or short circuit for the linear throttle sensor system circuit
4.Linear throttle sensor
5.EFI ECU

(4) POINTS OF INSPECTION

1.Is the signal from the air conditioner switch inputted to the EFI ECU proper ?
2.Is the harness between the air conditioner switch and EFI ECU proper ?
3.Is each switch for the air conditioner operated proper ?

(5) INSPECTION PROCEDURE

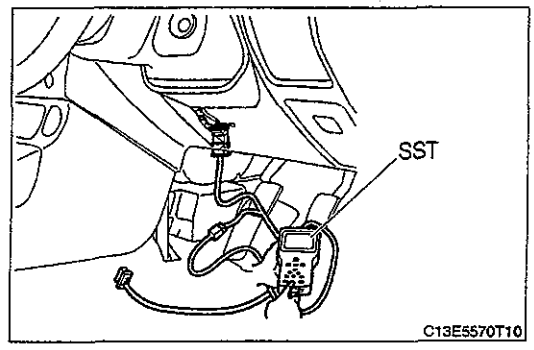
NOTE

- If DTC P0110/43 P0115/42, P0120/41 are output simultaneously, E2 (Sensor Ground) may be open.

① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of input signal by A/C switch and idle switch to ECU.

1.Turn OFF the IG switch. Connect the DS-21 diagnosis tester to the DLC through the SST.
SST: 09991-87404-000
2.Turn ON the IG switch. Turn ON the main switch of the tester. Check the signals of the A/C switch and idle switch. (As for the operation, refer to the instruction manual of the DS-21 diagnosis tester.)



A/C switch

	A/C signal indication
OFF	OFF
ON	ON

Throttle valve

	IDL signal indication
Fully closed	ON
Fully opened	OFF

3.Are the check results OK?
YES: Check malfunction that occurs intermittently and poor contact.
NO: Go to ➤2.

➤2. Check of harnesses between A/C switch and ECU and between linear throttle sensor and ECU.

1.Turn OFF the main switch of the tester. Turn OFF the IG switch.

2.Set the SST (sub-harness).

SST: 09842-97203-000

CAUTION

- Do not connect the SST connector to the ECU.

3.Check the harness and connector for open wire or short.

(1) A/C switch

Switch side connector 4 (ACSW) – ECU side connector 38 (ACSW)

(2) Linear throttle sensor

Sensor side connector 2 (E2) – ECU side connector 17 (E2)

Sensor side connector 3 (VTH) – ECU side connector 44 (VTH)

Sensor side connector 1 (VC) – ECU side connector 16 (VC)

4.Are the check results for open wire and short OK?

YES: Go to ➤3.

NO: Repair or replace the harness or connector.

➤3. Unit check of A/C switch and liner throttle sensor.

1.Are the unit check results OK?

YES: Check or replace the EFI ECU.

NO: Replace the A/C switch or liner throttle sensor.

② When not using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of ECU input signal.

1.Set the SST (sub-harness).

SST: 09842-97203-000

2.With the IG switch turned ON, measure the voltage between SST 16 (VC) and 17 (E2), between 44 (VTH) and 17 (E2), between 38 (ACSW) and 23 (E1).

16 (VC) – 17 (E2)	4.5–5.5 V	
44 (VTH) – 17 (E2)	When throttle lever is changed from full close state to full open state, voltage should increase proportionally from 0 to 4.8 V.	
38 (ACSW) – 23 (E1)	When A/C switch is ON.	Battery voltage
	When A/C switch is OFF.	0–0.5 V

3.Is the measured value the specified value?

YES: Check malfunction that occurs intermittently and poor contact.

NO: Go to ➤2.

➤2. Check of harness between linear throttle sensor , A/C switch and ECU.

1.Turn OFF the IG switch. Disconnect the SST connector from the ECU.

2.Check the harness and connector for open wire or short.

(1) Linear throttle sensor

Sensor side connector 2 (E2) – ECU side connector 17 (E2)

Sensor side connector 3 (VTH) – ECU side connector 44 (VTH)

Sensor side connector 1 (VC) – ECU side connector 16 (VC)

(2) A/C switch

Switch side connector 4 (ACSW) – ECU side connector 38 (ACSW)

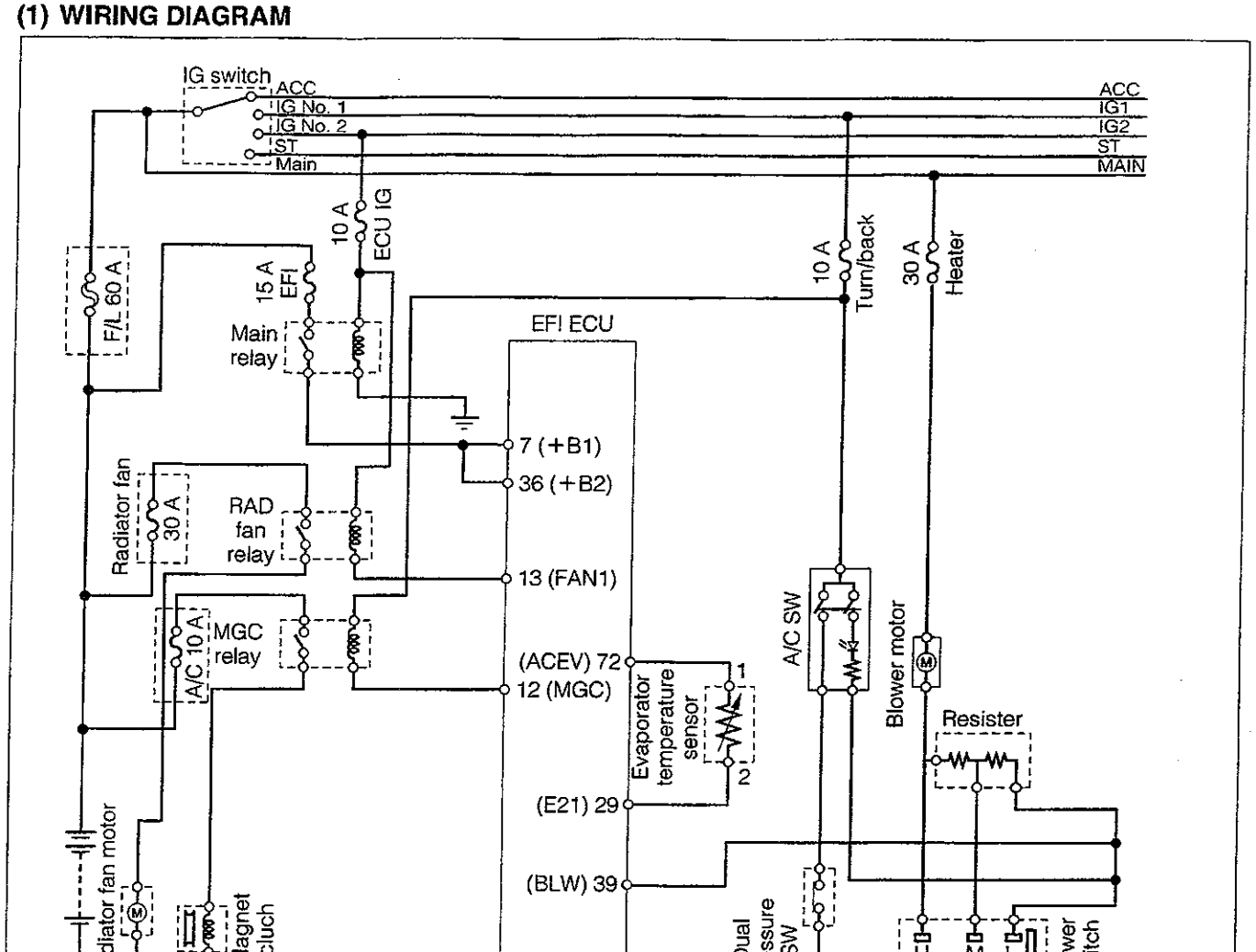
3.Are the check results for open wire and short OK?

YES: Check or replace the EFI ECU.

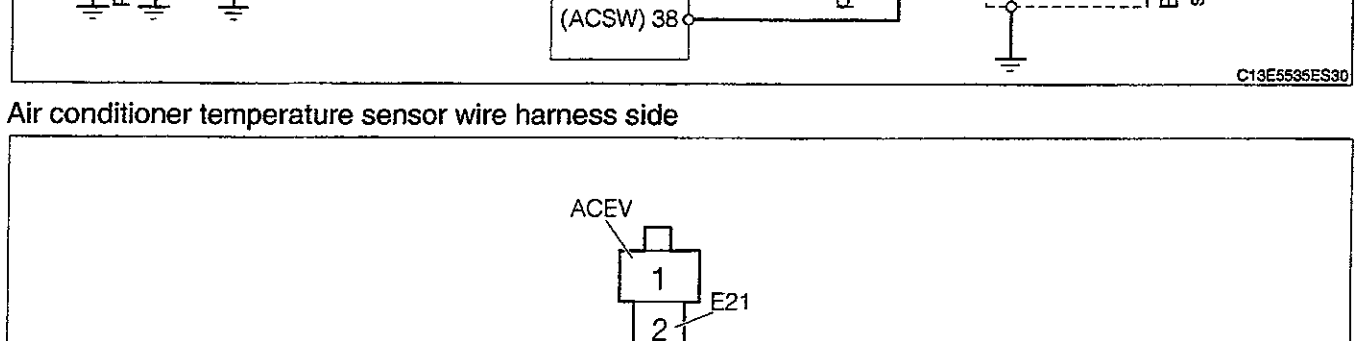
NO: Repair or replace the harness or connector.

1-12-22 DTC No.P1530/44 Air conditioner evaporator temperature sensor circuit malfunction

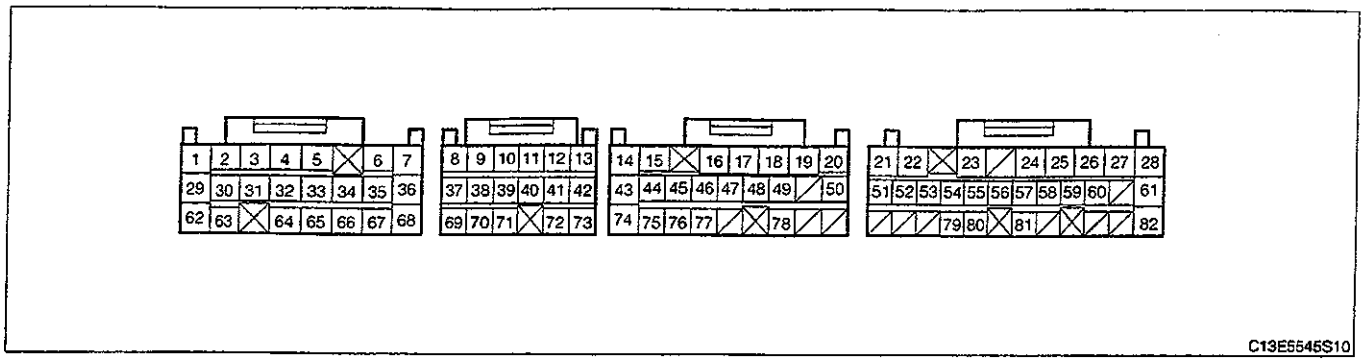
(1) WIRING DIAGRAM



Air conditioner temperature sensor wire harness side

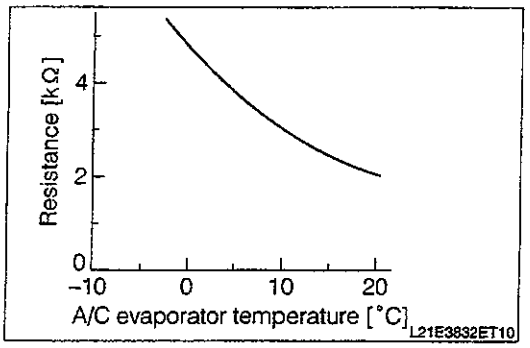


EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1.This circuit, located at the rear of the evaporator of the air conditioner unit, detects the temperature of the air passing through the evaporator. A thermistor is incorporated in the sensor. This thermistor has characteristics that its resistance decreases as the temperature rise, while the resistance increases as the temperature drops. When the temperature becomes 0°C, the thermistor disengages the magnet clutch through the MGC relay, thus preventing frosting.



(3) DTC DETECTING CONDITION

1.When the engine starts, the air conditioner evaporator temperature sensor value is more than 4.85 V or less than 0.1 V for more than a certain length of time.

(4) TROUBLE AREA

1.Air conditioner (A/C) evaporator temperature sensor
2.Open wire or short circuit for the air conditioner evaporator temperature sensor
3.EFI ECU

(5) POINTS OF INSPECTION

1.Is the signal from the A/C temperature sensor inputted to the EFI ECU proper ?
2.Is the harness between the A/C evaporator temperature sensor and EFI ECU proper ?
3.Is the output of the A/C evaporator temperature sensor proper ?

(6) INSPECTION PROCEDURE

NOTE

- Read the freeze frame data, using the DS-21 diagnosis tester. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of ECU output voltage.

1.Set the SST (sub-harness).
SST: 09842-97203-00097203-000

2.With the IG switch turned "ON" measure the voltage between the SST connector 72 (ACEV) and 29 (E21).
SPECIFIED VALUE: 0.1 – 4.8 V (Varies, depending upon the temperature.) (Reference: 1.8 – 2.9 V at 20°C)

3.Are the check results OK?
YES: Check malfunction that occurs intermittently and poor contact.
NO: Go to ➤2

➤2. Check of harness between A/C evaporator temperature sensor and ECU.

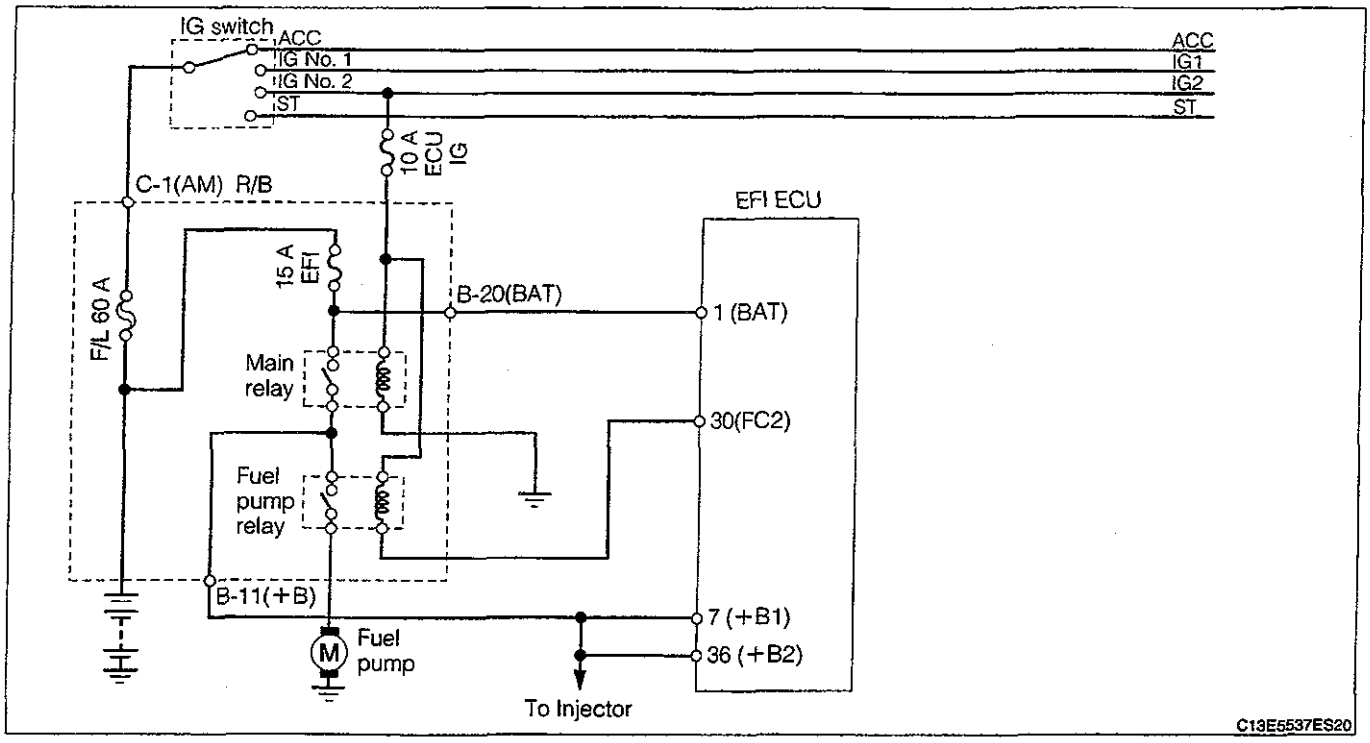
1.With the IG switch turned OFF, disconnect the SST connector from the ECU.
2.Check the harness and connector for open wire or short.
Harness side connector 1 (ACEV) of sensor – ECU 72 (ACEV)
Harness side connector 2 (E21) of sensor – ECU 29 (E21)
3.Are the check results for open wire and short OK?
YES: Go to ➤3.
NO: Repair or replace the harness or connector.
Refer to Page B8-26.

➤3. Unit check of A/C evaporator temperature sensor.

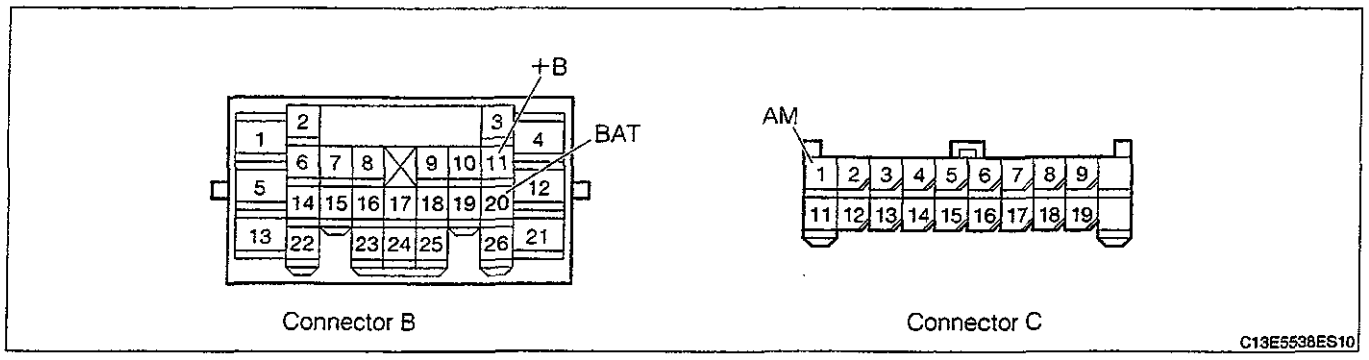
1.Are the unit check results OK?
YES: Check or replace the EFI ECU.
NO: Replace the A/C evaporator temperature sensor

1-12-23 DTC No.P1560/61 ECU back up power source circuit malfunction

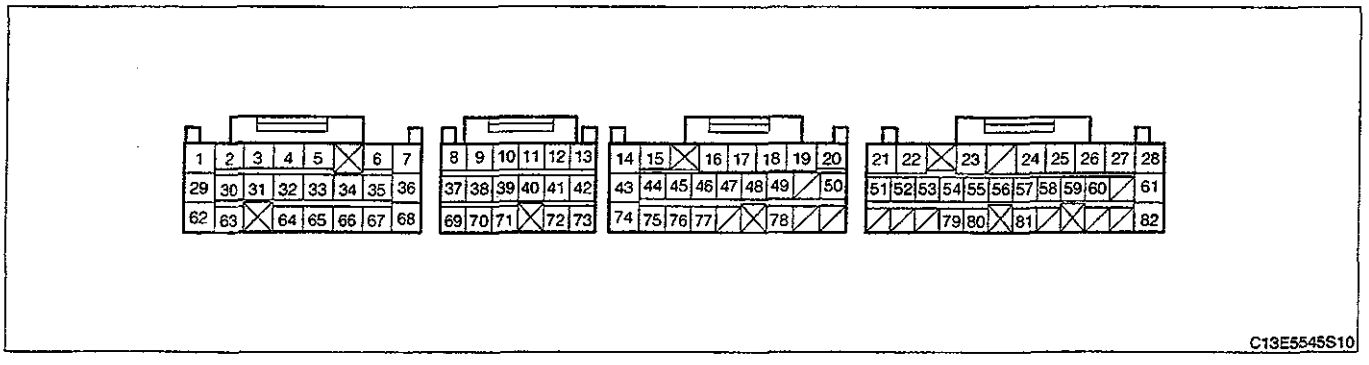
(1) WIRING DIAGRAM



Wire harness side



EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1.The battery positive voltage is supplied to the terminal BAT of the EFI ECU even when the ignition switch is OFF for use by the DTC memory and air-to-fuel ratio adaptive control valve memory, etc.

(3) TROUBLE AREA

1.Open wire or short circuit for the back-up power supply system circuit.
2.EFI ECU

(4) POINTS OF INSPECTION

1.If the MIL is not illuminated when the ignition switch is turned ON, it is not to supply the power sauce to the EFI ECU.

(5) INSPECTION PROCEDURE

NOTE

- Read the freeze frame data, using the DS-21 diagnosis tester. Because the freeze frame data records the engine conditions when the malfunction was detected, when troubleshooting the freeze frame data is useful to determine whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

① When not using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of ECU backup power supply voltage.

1.Set the SST (sub-harness).
SST: 09842-97203-000

2.With the IG switch turned OFF, measure the voltage between the SST connector 1 (BAT) and the body ground.
SPECIFIED VALUE: Battery voltage

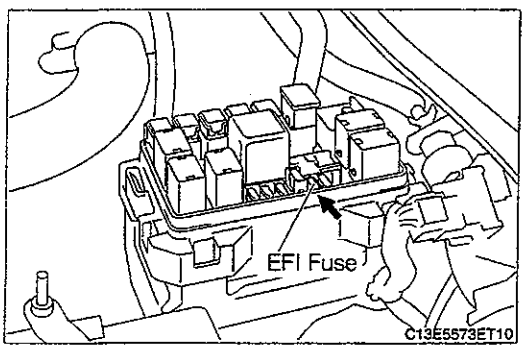
3.Are the check results OK?
YES: Check malfunction that occurs intermittently and poor contact.
NO: Go to ➤2.

➤2. Check of harness between relay block and ECU.

1.With the IG switch turned OFF, disconnect the SST connector from the EFI ECU.
2.Remove the harness from the battery positive terminal.
3.Check the harness and connector for open wire or short.
Harness side connector B-20 (BAT) of the relay block — ECU 1 (BAT)
Stud bolt of the relay block and the battery positive terminal.
4.Are the check results for open wire and short OK?
YES: Go to ➤3.
NO: Repair or replace the harness or connector.

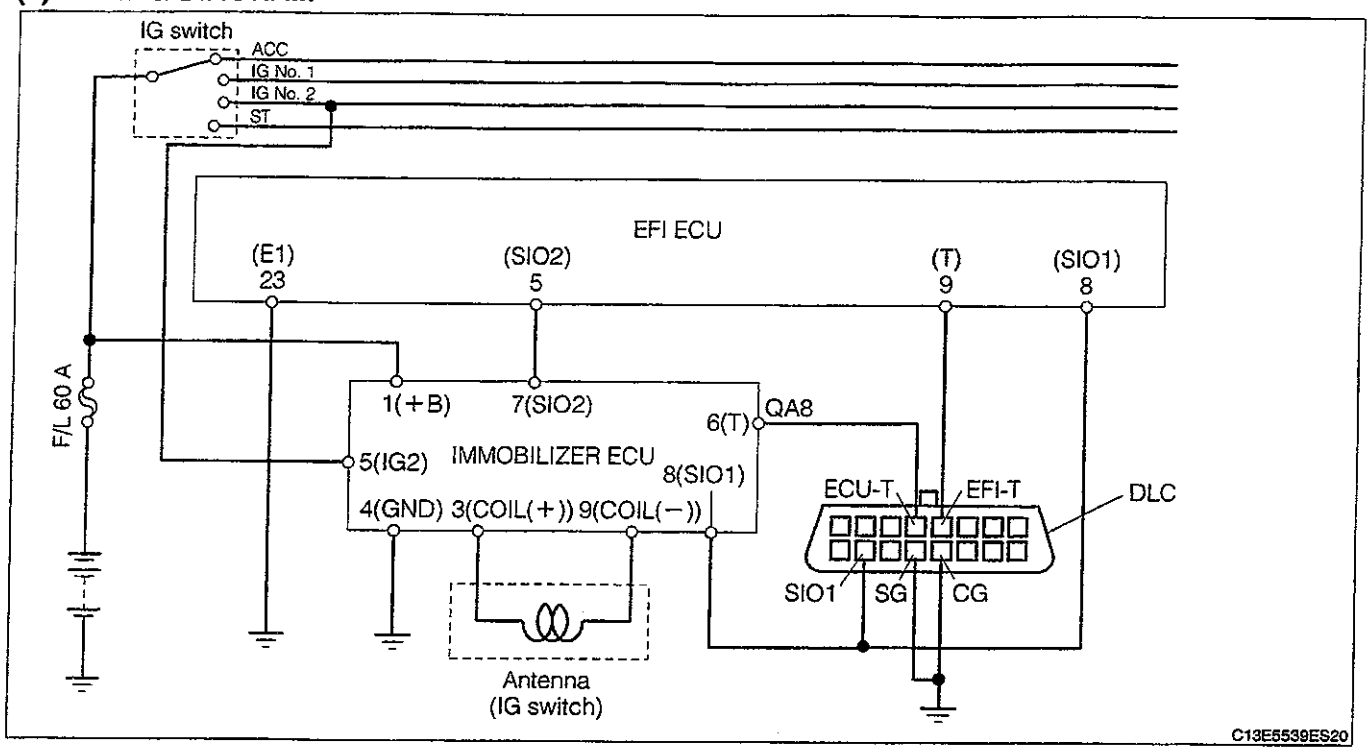
➤3. Unit check of EFI fuse.

1.Remove the EFI fuse from the relay block.
2.Check continuity of the EFI fuse.
SPECIFIED VALUE: Continuity should exist.
3.Are the check results OK?
YES: Check or replace the EFI ECU.
NO: Replace the EFI fuse.

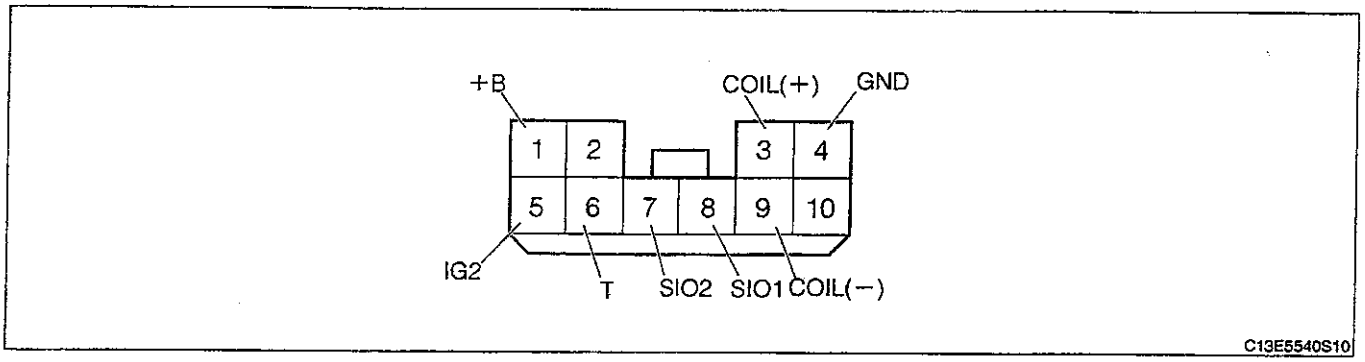


1-12-24 DTC No.P1600/83 Immobilizer signal circuit malfunction

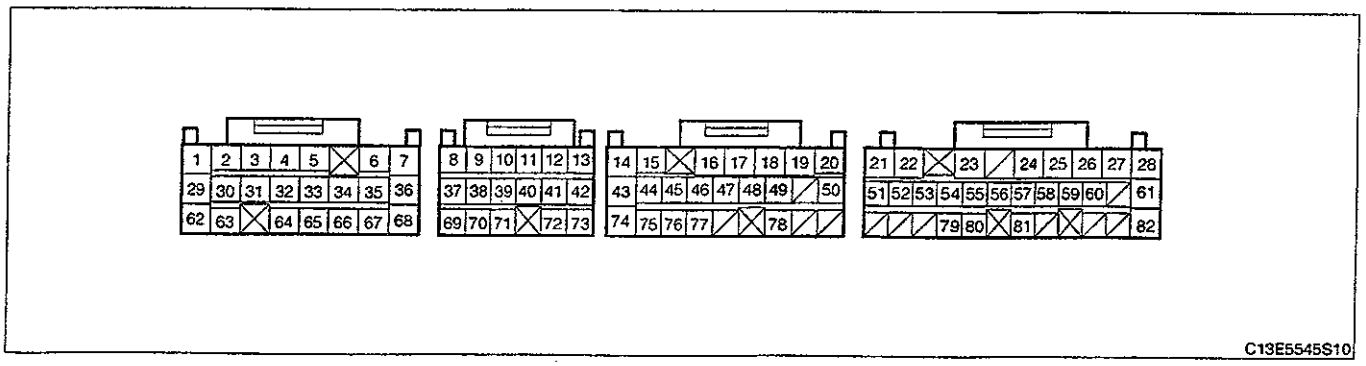
(1) WIRING DIAGRAM



Immobilizer ECU wire harness side



EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1.This circuit performs collation and updating of the rolling code in the communication between the immobilizer ECU and the EFI ECU. The engine can start only when the collation and updating of the rolling code can be done. The rolling code is collated and updated by reading out or writing to non volatile memory (E2PROM) of both ECUs.

(3) DTC DETECTING CONDITION

1.When the engine starts, the rolling code can not reading out or writing to the EFI ECU.

(4) TROUBLE AREA

1.EFI ECU

(5) INSPECTION PROCEDURE

① When using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Re-confirmation of DTC.

1.With the IG switch turned OFF, connect the DS-21 diagnosis tester to the DLC through the SST.
SST: 09991-87404-000

2.Turn ON the IG switch, and turn ON the main switch of the tester. Erase the DTC. (As for the operation, follow the instruction manual of the DS-21 diagnosis tester.)

3.Turn OFF the main switch of the tester. Turn OFF the IG switch.

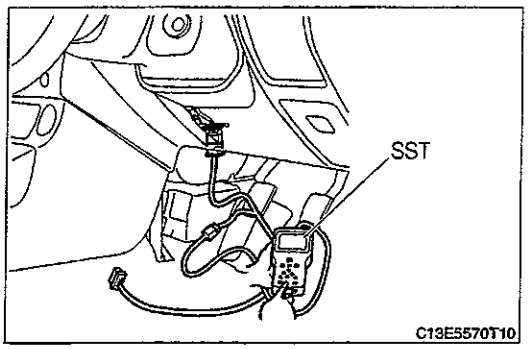
4.Turn ON the IG switch. Turn ON the main switch of the tester.

5.Check the DTC.

6.Is P1600 indicated?

YES: Replace the EFI ECU.

NO: Check or replace the EFI ECU.



② When not using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Re-confirmation of DTC.

1.With the IG switch turned OFF, connect the DS-21 diagnosis tester to the DLC through the SST.
SST: 09991-87404-000

2.Connect the EFI-T terminal and the earth terminal of the SST connector with a jump wire.
SST: 09991-87403-000

3.Remove the EFI fuse. Erase the DTC. (As for the erasing method.)
Refer to Page B8-21.

4.Set the EFI fuse to the original position.

5.Turn ON the IG switch.

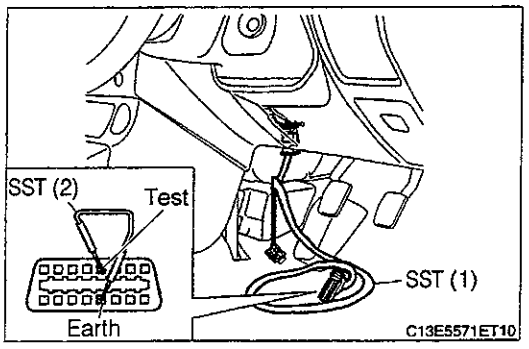
6.Check the DTC. (Read out the flashing pattern of the MIL.)

7.Is "83" indicated?

YES: Replace the EFI ECU.

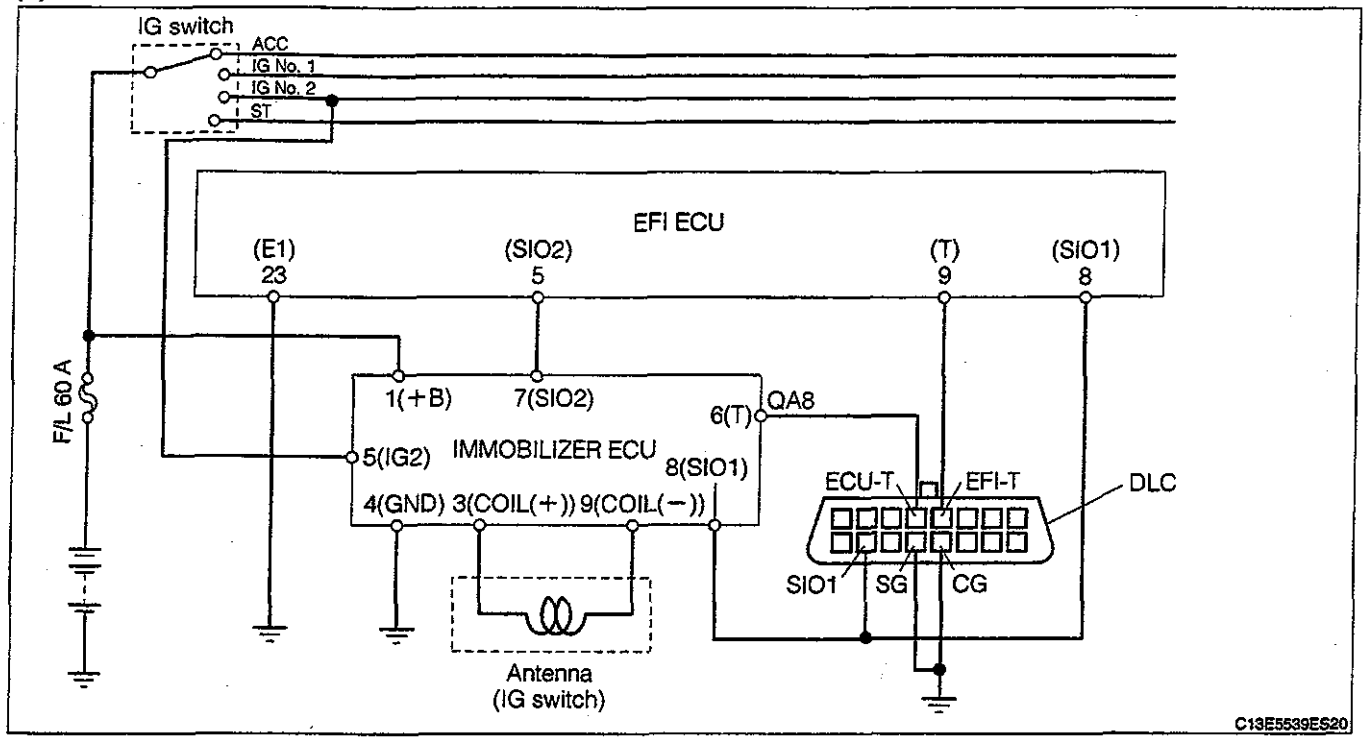
NO: Check or replace the EFI ECU.

Refer to Page B8-26.

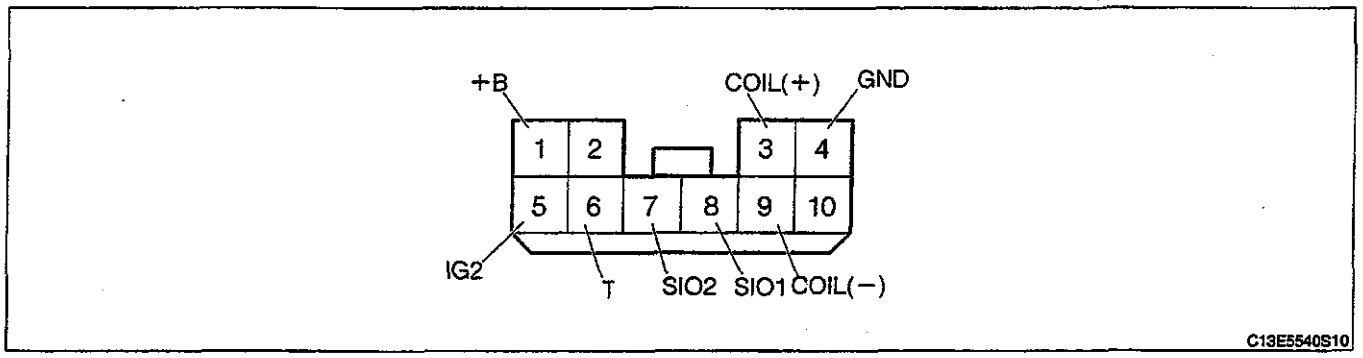


1-12-25 DTC No.P1601/81 Immobilizer signal malfunction

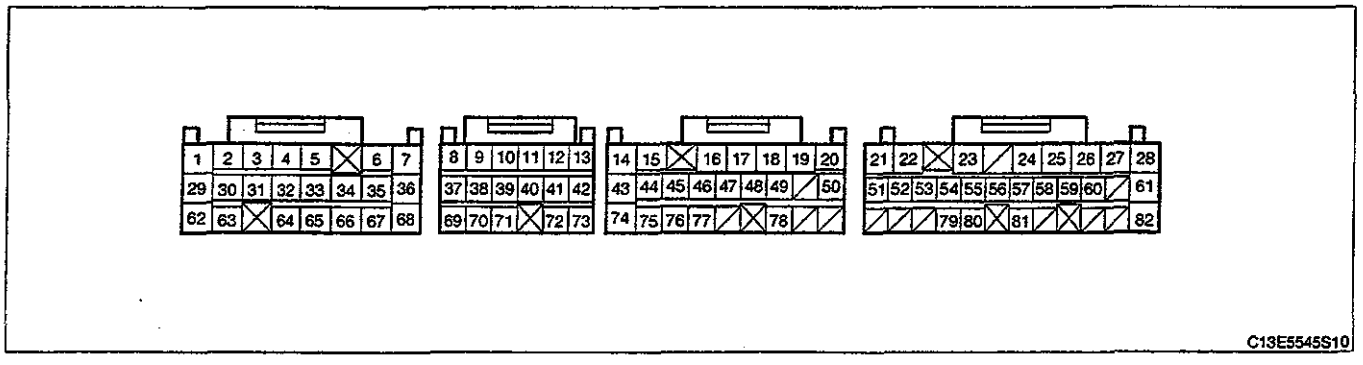
(1) WIRING DIAGRAM



Immobilizer ECU wire harness side



EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1.When the ignition switch is turned ON, communication starts between the immobilizer ECU and EFI ECU. The engine can start only when the communication between the two ECU is possible and the rolling codes are matched. In order cases, fuel injection and ignition are prohibited, thus making engine starting impossible.

(3) DTC DETECTING CONDITION

1.When the engine starts, the rolling codes are not matched.

(4) TROUBLE AREA

1.Open wire or short circuit for the immobilizer system circuit
2.Immobilizer ECU
3.EFI ECU

(5) INSPECTION PROCEDURE

① When not using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of harness between immobilizer ECU and EFI ECU.

1.Set the SST (sub-harness).
SST: 09842-97203-000

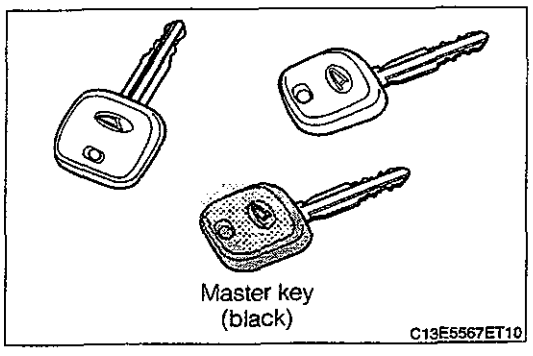
CAUTION

- Do not connect the SST connector to the EFI ECU.

2.Disconnect the immobilizer ECU connector.
3.Check the harness and connector for open wire or short, with the IG switch turned OFF.
Connector 8 (SIO1) at immobilizer ECU harness side – SST terminal 8 (SIO1)
Connector 7 (SIO2) at immobilizer ECU harness side – SST terminal 5 (SIO2)
4.Are the check results for open wire and short OK?
YES: Go to ➤2.
NO: Repair or replace the harness or connector.

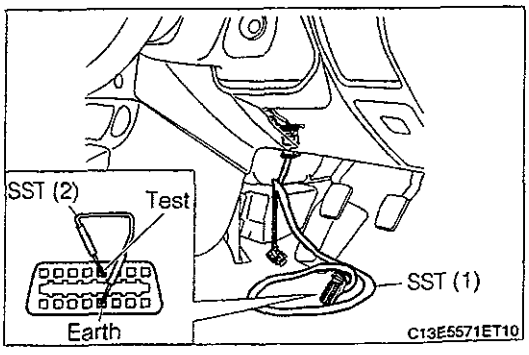
➤2. Check of immobilizer system (1).

1.Connect the connector of the immobilizer ECU.
2.Replace the EFI ECU with a new one. Connect the SST connector to the EFI ECU.
3.Start the engine with the master key.
4.Does the engine start?
YES: Check or replace the EFI ECU.
NO: Go to ➤3.



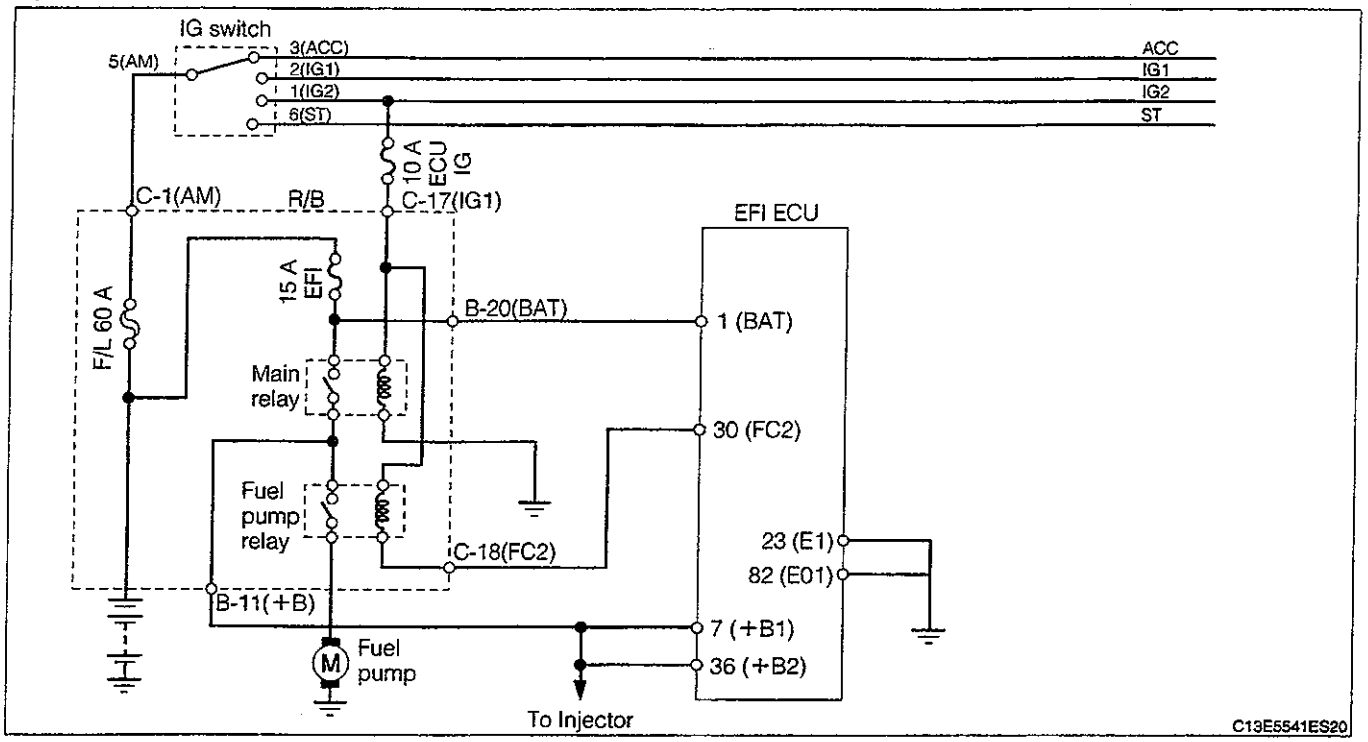
➤3. Check of immobilizer system (2).

1.Replace the immobilizer ECU with a new one, with the IG switch turned OFF.
2.Connect the SST to the DLC.
SST: 09991-87404-000
3.Connect the ECU-T and the earth terminal of the SST connector with a jump wire.
SST: 09991-87403-000
4.Start the engine with the master key.
5.Does the engine start?
YES: Check the IG key, antenna coil, etc. (Refer to section BODY ELECTRICAL SYSTEM.)
NO: Check or replace the immobilizer ECU. (Refer to section BODY ELECTRICAL SYSTEM.)

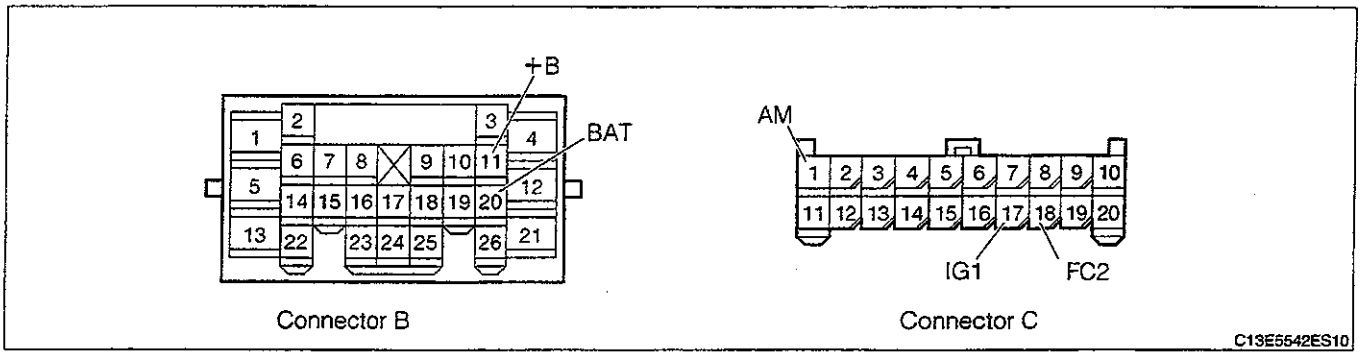


1-12-26 ECU Power Source Circuit

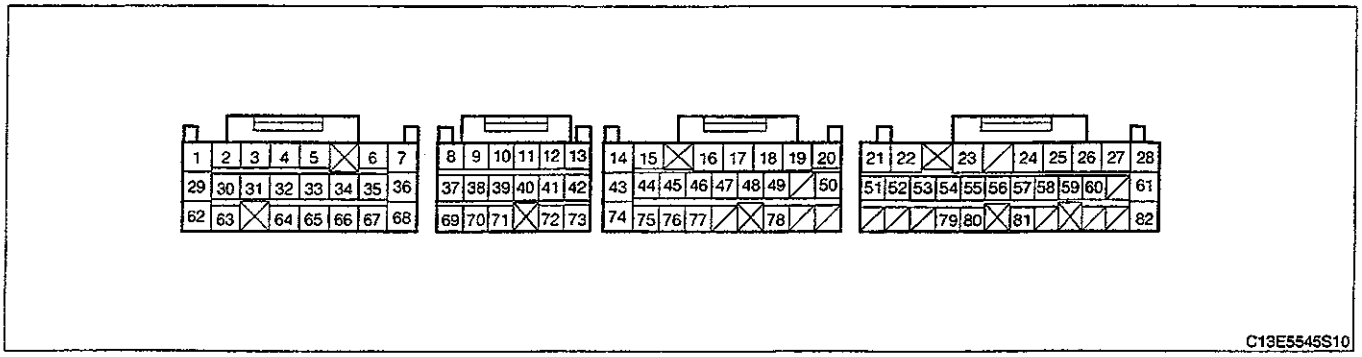
(1) WIRING DIAGRAM



Switch wire harness side



EFI ECU wire harness side



(2) INSPECTION PROCEDURE

① When not using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of power supply voltage of ECU.

1.Set the SST (sub-harness).
SST: 09842-97203-000

2.With the IG switch turned ON, measure the voltage between the SST connectors 7 (+B1), 36 (+B2) through 82 (E01).
SPECIFIED VALUE: Battery voltage

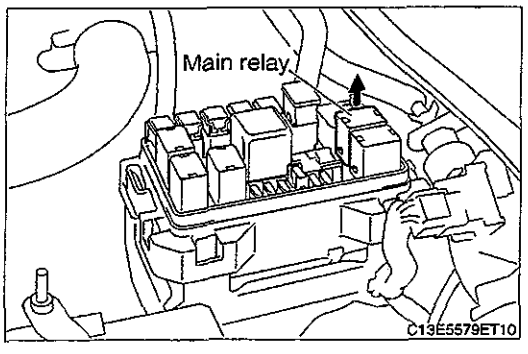
3.Are the check results OK?
YES: Check malfunction that occurs intermittently or poor contact.
NO: Go to ➤2.

➤2. Check of harness between relay block and ECU.

1.With the IG switch turned OFF, disconnect the SST connector from the EFI ECU.
2.Disconnect the harness from the battery positive terminal.
3.Check the harness and connector for open wire or short.
Connector C-18 (FC2) of the relay block at the harness side and the SST terminal 7 (+B1) and 36 (+B2)
Stud bolt of the relay block and the battery positive terminal.
4.Are the check results for open wire and short OK?
YES: Go to ➤3.
NO: Repair or replace the harness or connector.

➤3. Unit check of EFI main relay.

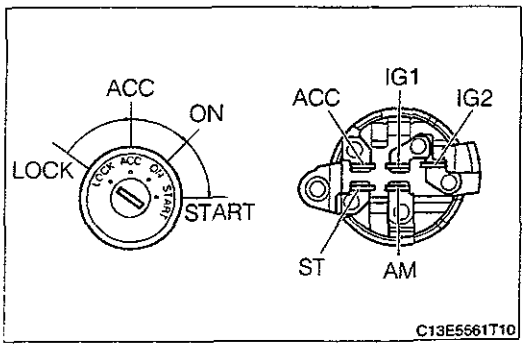
1.Disconnect the EFI main relay from the relay block.
2.Perform the check.
3.Are the check results OK?
YES: Go to ➤4.
NO: Replace the EFI main replay.



➤4. Unit check of IG switch.

1.Disconnect the connector from the IG switch.
2.With the IG switch disconnected, check continuity between the terminals given below.

Switch position	Terminal No. to continuity
LOCK	–
ACC	3–4
ON	1 – 2 – 3 – 4
START	1 – 2 – 4 – 5



3.Are the check results OK?
YES: Go to ➤5.
NO: Replace the ignition switch.

➤5. Check of harness between IG switch, relay block and body ground.

1.Check the harness and connector between the IG switch, relay block and the body ground for open wire or short.

2.Are the check results for open wire and short OK?

YES: Go to ➤6.

NO: Repair or replace the harness or connector.

➤6. Unit check of EFI fuse.

1.Disconnect the EFI fuse from the relay block.

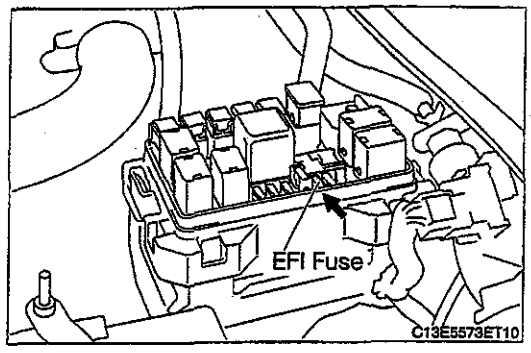
2.Check the EFI fuse for continuity.

SPECIFIED VALUE: Continuity exists.

3.Are the unit check results OK?

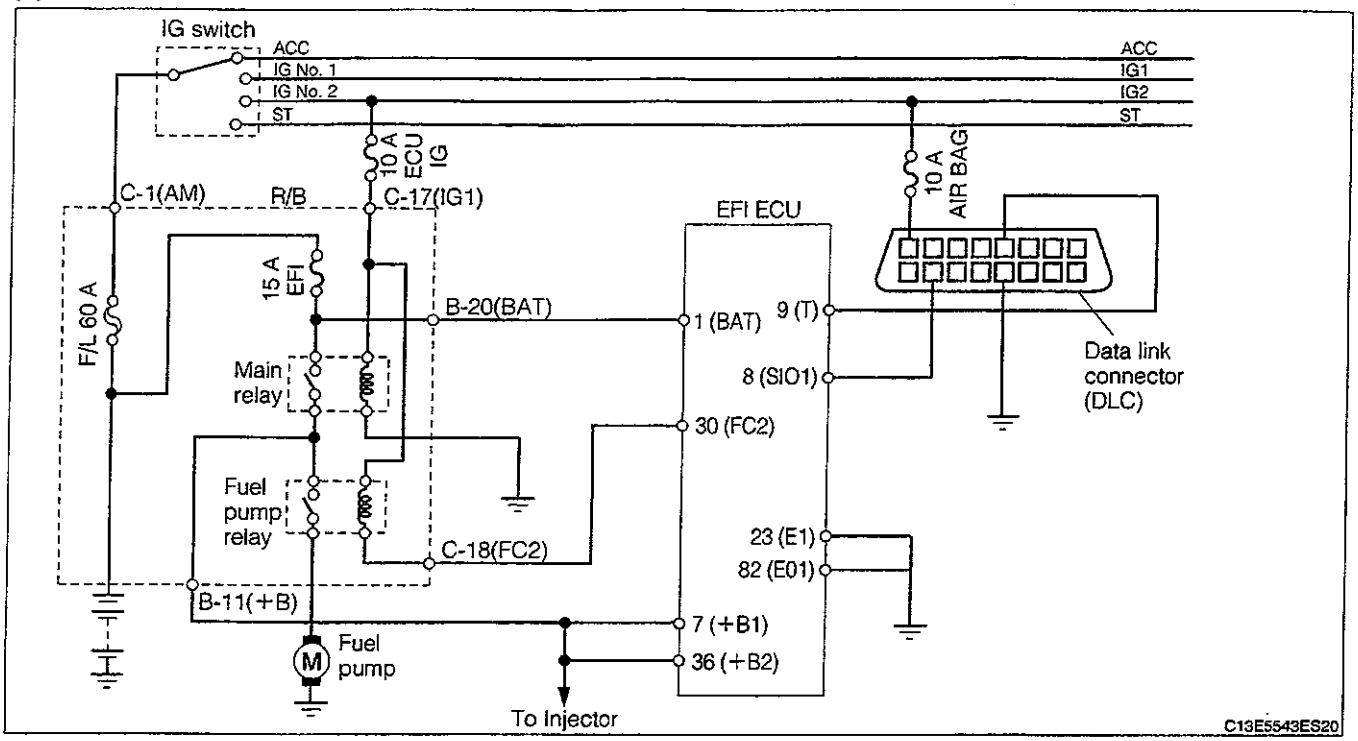
YES: Check or replace the EFI ECU.

NO: Replace the EFI fuse.

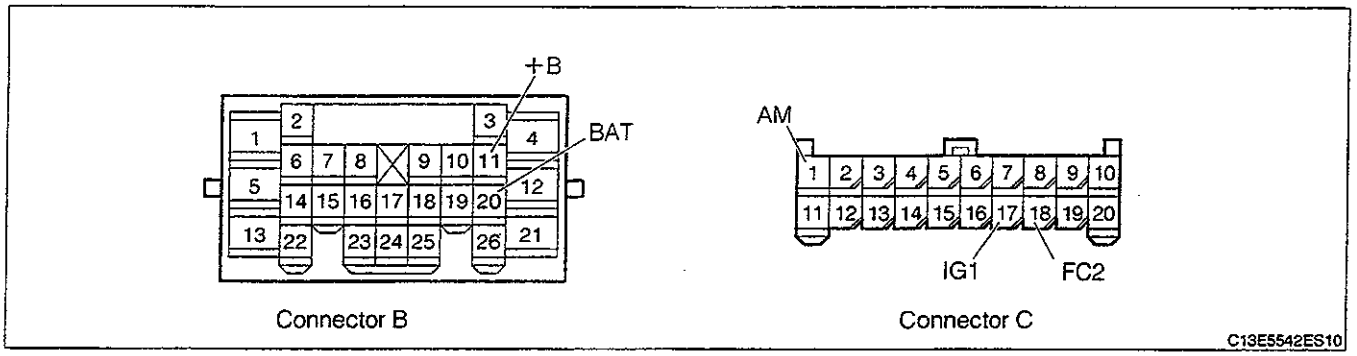


1-12-27 Fuel Pump Control Circuit

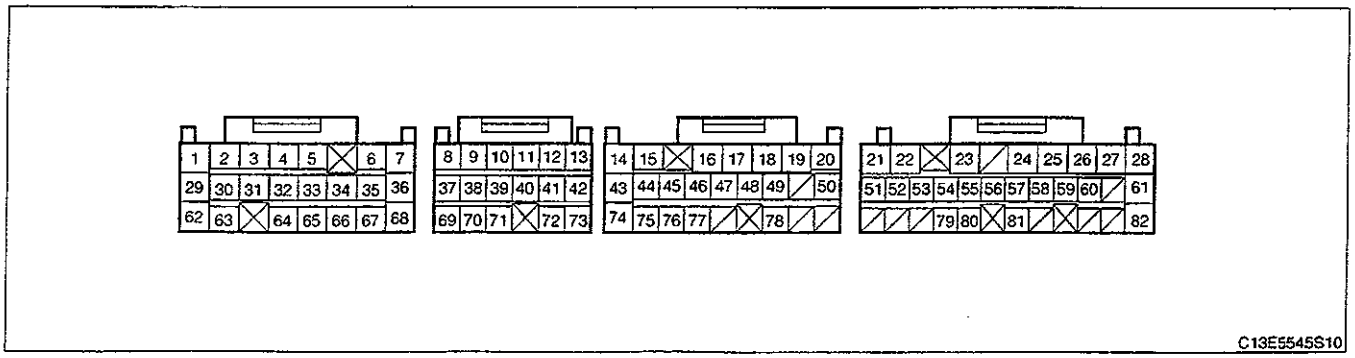
(1) WIRING DIAGRAM



Wire harness side



EFI ECU wire harness side



(2) INSPECTION PROCEDURE

① When not using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Operation check of fuel pump.

1.With the IG switch turned OFF, connect the DS-21 diagnosis tester to DLC through the SST.

2.After turning ON the IG switch, turn ON the main switch of the tester. Select the actuator driving.

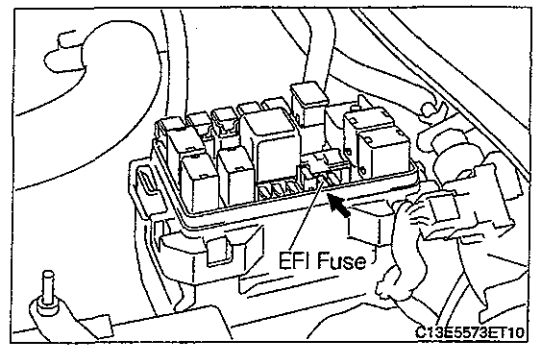
3.Select the fuel pump ON so as to actuate the fuel pump. (If the DS-21 diagnosis tester is not available, connect a jump wire between the EFI-terminal of the DLC and the earth terminal.)

4.Ensure that the screw of the pulsation damper rises in Step 3.

5.Are the check results OK?

YES: Go to ➤2.

NO: Check malfunction that occurs intermittently or poor contact.



➤2. Check of power supply circuit of EFI ECU.

1.Perform the check according to the trouble-shooting of the ECU power source circuit.

2.Are the check results OK?

YES: Go to ➤0.

NO: Repair or replace.

➤3. Unit check of fuel pump relay.

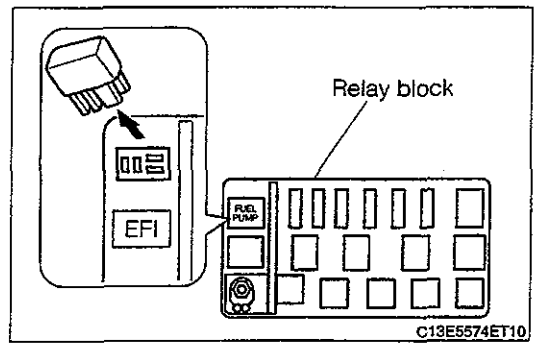
1.With the IG switch turned OFF, disconnect the fuel pump relay from the relay block.

2.Perform the check.

3.Are the check results OK?

YES: Go to ➤0.

NO: Replace the fuel pump relay.



➤4. Check of voltage at the terminal FC2 of EFI ECU.

1.Set the SST (sub-harness).

SST: 09842-97203-000

2.Turn ON the IG switch.

3.Measure the voltage between the SST connector 30 (FC2) and the body ground.

SPECIFIED VALUE: Battery voltage

4.Are the check results OK?

YES: Go to ➤5.

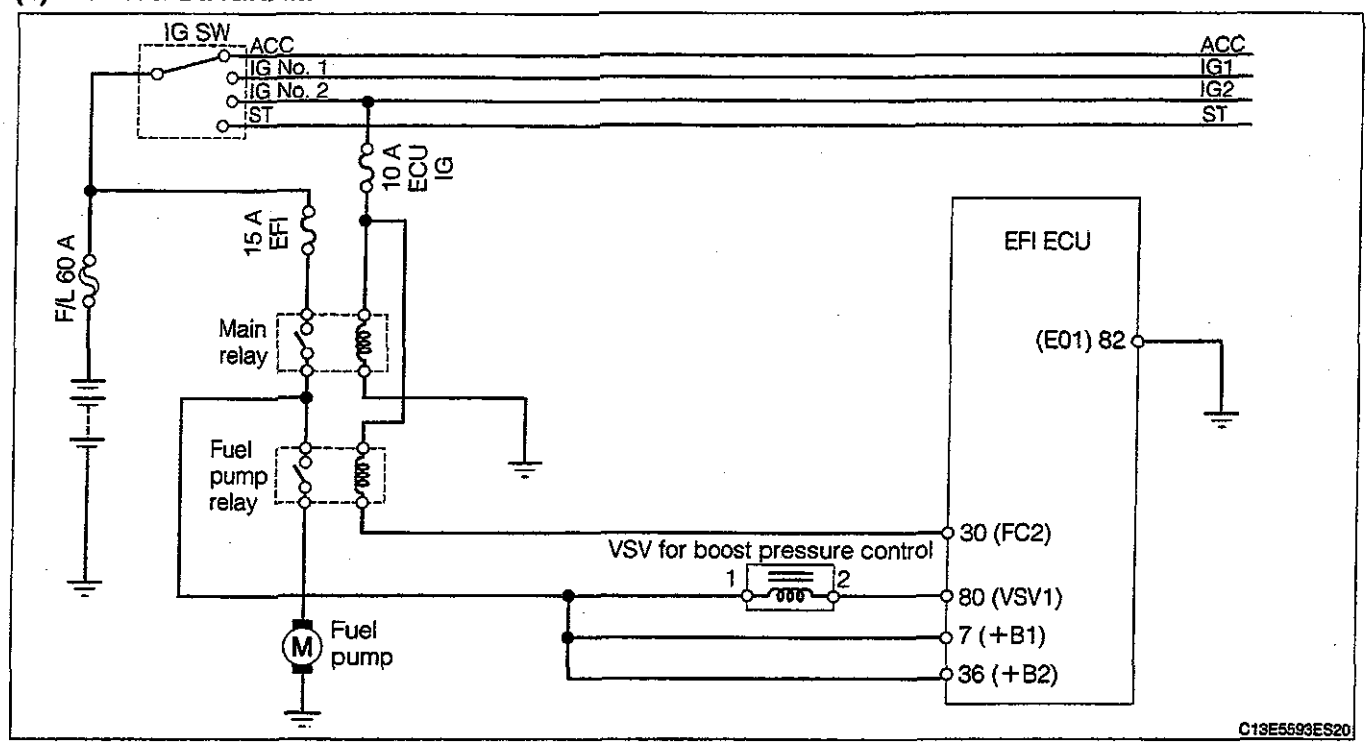
NO: Check the harness and connector between the relay block and the EFI ECU for open wire or short.

➤5. Unit check of fuel pump.
1.Are the check results OK?
YES: Go to ➤6.
NO: Repair or replace the fuel pump.

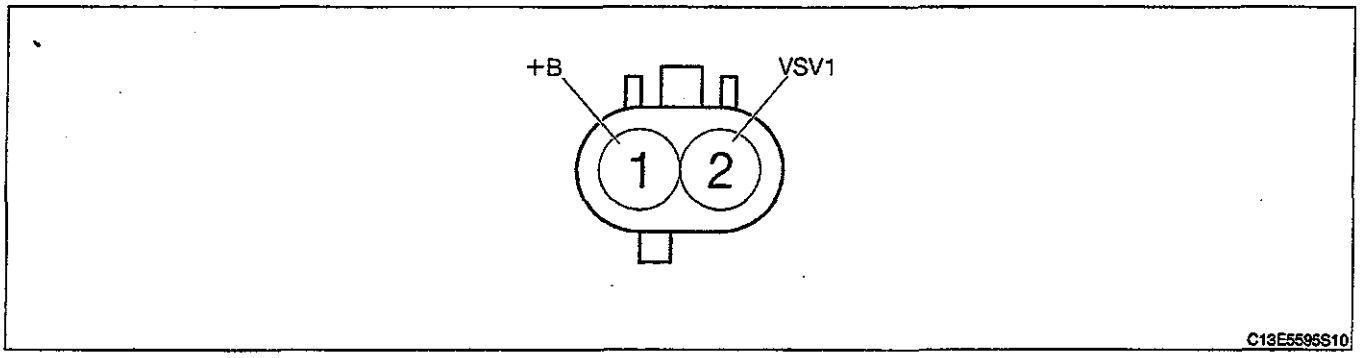
➤6. Check of harness between relay block and fuel pump.
1.Check the harness and connector for open wire or short.
Relay block — Fuel pump
Fuel pump — Body earth
2.Are the check results for open wire and short OK?
YES: Check or replace the EFI ECU.
NO: Repair or replace the harness or connector.

1-12-28

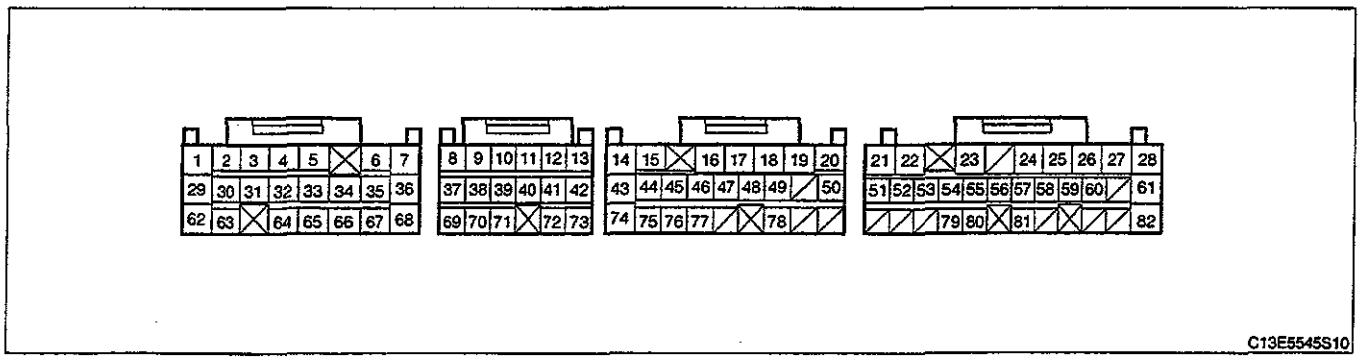
(1) WIRING DIAGRAM



VSV for boost pressure control wire harness side



EFI ECU wire harness side



(2) CIRCUIT DESCRIPTION

1. The computer controls the supercharging pressure according to the input from the pressure sensors, the vehicle speed signals and the engine revolution speed.
2. This control is carried out by changing the pressure of the actuator chamber of the waste gate valve through the duty control over turning ON and OFF of VSV. The control is classified into two methods: All closed control and the feedback control.

(3) TROUBLE AREA

1.VSV for boost pressure control
2.Open wire or short circuit for the VSV for boost pressure control system circuit

(4) POINTS OF INSPECTION

1.Are the hoses of the boost pressure control system normal?
2.Is the valve for waste gate operated proper ?
3.Is the power supply voltage of VSV for boost pressure control proper?
4.Is the harness between the purge VSV for boost pressure control and the ECU proper ?
5.Is the VSV for boost pressure control operated proper ?

(5) INSPECTION PROCEDURE

① When not using DS-21 diagnosis tester or OBD II generic scan tool:

➤1. Check of the hose for boost pressure control system.

1.Check the hoses of the boost pressure control system for disconnection and damage.
YES: Go to ➤2.
NO: Repair or replace.

➤2. Operation check of valve for waste gate.

YES: Go to ➤3.
NO: Replace the turbocharger S/A.

➤3. Check of power supply voltage of VSV for boost pressure control.

1.Disconnect the VSV for boost pressure control system connector.
2.With the IG switch turned ON, measure the voltage between the connector 2 (+B) at VSV for boost pressure control harness side and the body ground.
SPECIFIED VALUE: Battery voltage

YES: Go to ➤4.
Check or repair the harness between battery and VSV for boost pressure control.

➤4. Check of harness between ECU and VSV for boost pressure control.

1.Check continuity of the between the terminals given below.
Connector 80 (VSV1) at VSV for boost pressure control harness side – connector 2 (+B) at ECU side.
YES: Go to ➤5.
NO: Repair the harness or connector.

➤5. Check of VSV for boost pressure control.

1.Carry out unit check of VSV for boost pressure control.
Refer to Page B8-145.

YES: Go to ➤6.
NO: Replace the VSV for boost pressure control.

➤6. Check of connecting condition of each connector

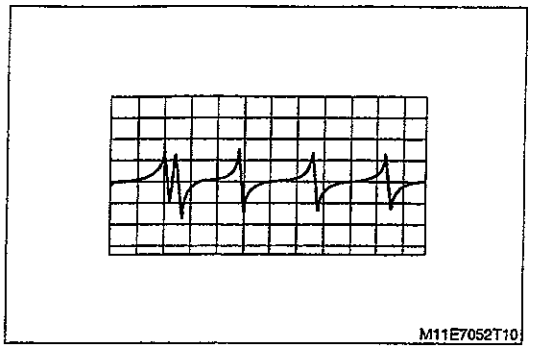
Check of circuit of EFI ECU.
NO: Repair the connector.

1-13 UNIT CHECK

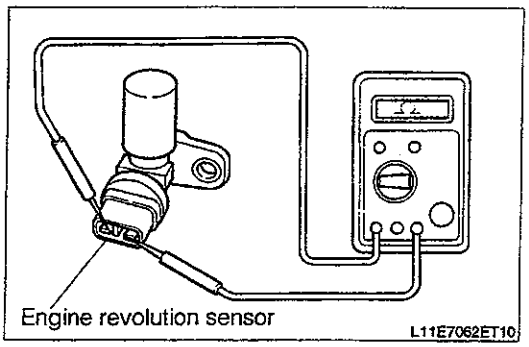
1-13-1 ENGINE REVOLUTION SENSOR

1.Connect the SST.
SST: 09842-97203-000

2.Measure the output voltage between the terminals for the engine revolution sensor during cranking, using the oscilloscope.



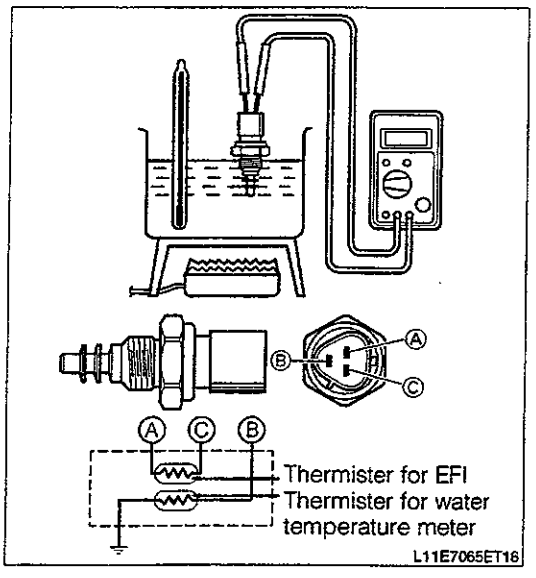
3.Measure the resistance between the terminals or engine revolution sensor proper.
SPECIFIED VALUE: 1100 ± 150Ω (at 20°C)



1-13-2 ENGINE COOLANT TEMPERATURE SENSOR

1.Measure the resistance between the terminals for sensor.
Engine coolant temperature sensor

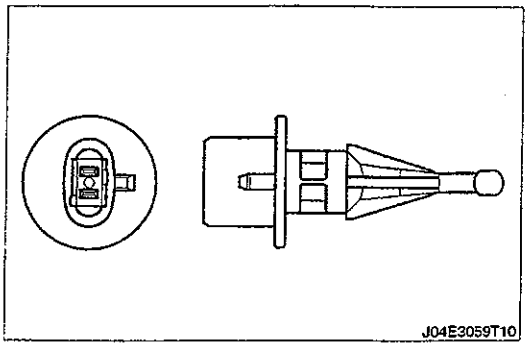
Temperature (°C)	−20	20	80	110
Resistance (kΩ)	15.06	2.44	0.31	0.14



1-13-3 INTAKE AIR TEMPERATURE SENSOR

1.Measure the resistance between the terminals for sensor.
Intake air temperature sensor

Temperature (°C)	−30	−20	20	80	120
Resistance (kΩ)	(28.6)	16.2	2.45	0.33	(0.18)



1-13-4 OXYGEN SENSOR

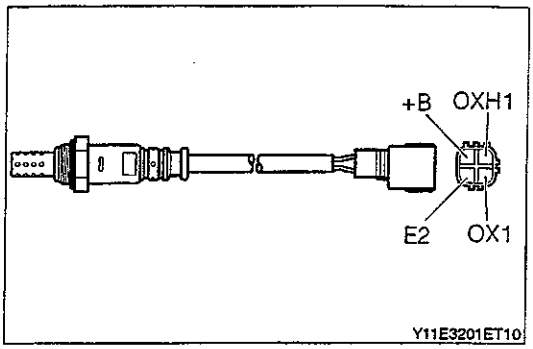
1.Measure the resistance between the terminal of OXH1 and +B

SPECIFIED VALUE: $5.6^{+0.8}_{-0.6}\Omega$ (20±1°C)

2.Confirm the continuity exists between the following terminals.

Oxygen sensor body — Terminal of the OX1
Oxygen sensor body — Terminal of the E2
Oxygen sensor body — Terminal of the OHX1
Oxygen sensor body — Terminal of the +B
OX1 — OXH1
OX1 — +B
E2 — OXH1
E2 — +B

SPECIFIED VALUE: No continuity exists



CAUTION

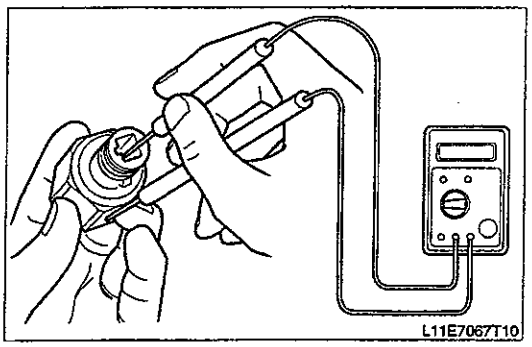
- **Confirm the output voltage for the oxygen sensor on the vehicle.**

1-13-5 KNOCK SENSOR

1.Confirm that the no continuity exists between the knock sensor body and each terminals.

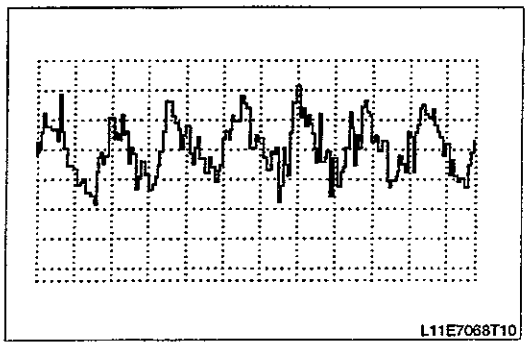
2.Connect the SST.

SST: 09842-97203-000



3.Measure the output voltage between the terminal of KNK and E1at the SST, using the oscilloscope.

4.Start the engine, confirm that the waveform exists at idling and racing by using the oscilloscope.

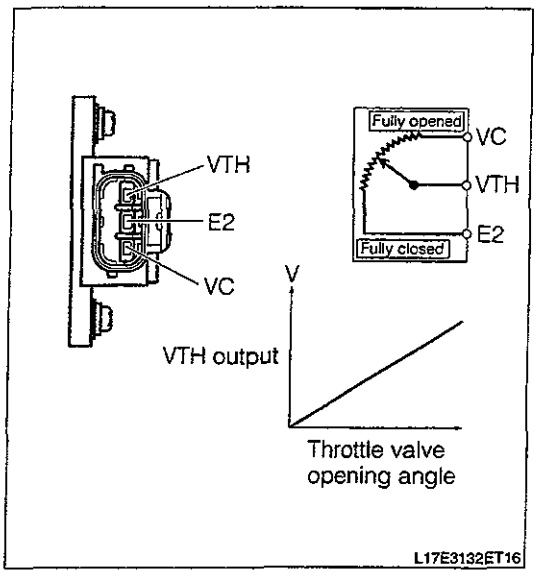


1-13-6 LEANER THROTTLE POSITION SENSOR

1.Measure the resistance between the terminal of VC and E2.
SPECIFIED VALUE: 2.5 – 6.0kΩ
2.Measure the change in resistance between the terminal of VC and E2.
SPECIFIED VALUE: The resistance value should increase in proportion to be the opening degree of the throttle lever.

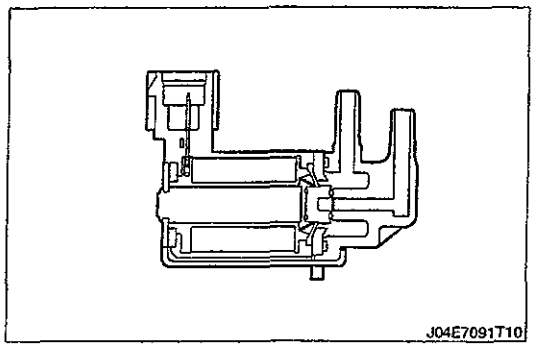
NOTE

- When the throttle lever is fully closed, the resistance value should be about 0.4 kΩ.
- When the throttle lever is fully opened, the resistance value should be about 3.4 kΩ.



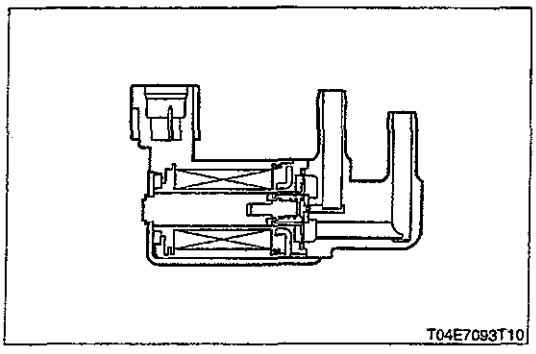
1-13-7 VSV for boost pressure control connector

1.Perform continuity check between ports.
SPECIFIED VALUE: No continuity should exist.
2.With a voltage applied to the VSV for boost pressure control connector terminals, perform continuity check between ports.
SPECIFIED VALUE: Continuity should exist.
3.Measure the resistance value between the terminals.
SPECIFIED VALUE: Approx. 32Ω at 20°C

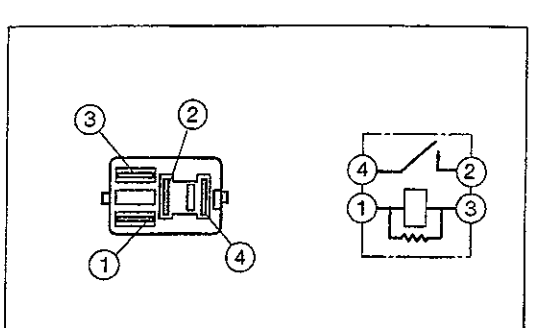


1-13-8 VSV for evaporative emission control system purge system

1.Perform continuity check between ports.
SPECIFIED VALUE: No continuity should exist.
2.With a voltage applied to the VSV for evaporative emission control system purge system connector terminals, perform continuity check between ports.
SPECIFIED VALUE: Continuity should exist.
3.Measure the resistance value between the terminals.
SPECIFIED VALUE: Approx. 32Ω at 20°C



1-13-9 MAIN RELAY & FUEL POMP RELAY



1.Turn ON the IG switch. Check to see if the relay is functioning through sound and vibration.

CAUTION

- The relay may be very hot through its operation. Do not touch it with your hand.

2.Measure the resistance between the terminals 1 and 3.

SPECIFIED VALUE: 131 – 230Ω at 20°C

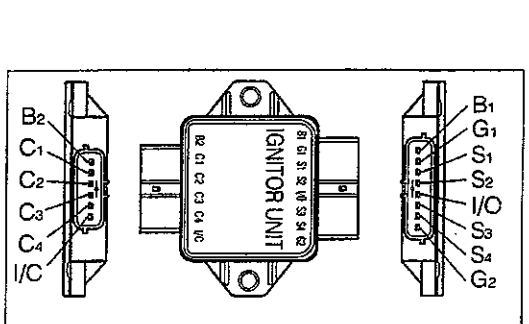
CAUTION

- The measurement should be conducted after the relay unit has been soaked at least one hour in an ambient temperature of 0°C to40°C.

3.Ensure that no continuity exists except between terminals 1and 3.

4.Apply the battery voltage between 1 and 3. Ensure that continuity exists between terminals 1and 3.

1-13-10 IGNITOR UNIT



1.Measure the resistance between terminals given below.

Terminal		Resistance (kΩ)	Terminal		Resistance (kΩ)
B1	G1	∞	B1	G2	∞
C1	G1	∞	C1	G2	∞
C2	G1	∞	C2	G2	∞
C3	G1	∞	C3	G2	∞
C4	G1	∞	C4	G2	∞
I/C	G1	∞	I/C	G2	∞
S1	G1	∞	S1	G2	3.7 - 4.1
S2	G1	∞	S2	G2	3.7 - 4.1
I/O	G1	1.9 - 2.1	I/O	G2	∞
S3	G1	∞	S3	G2	3.7 - 4.1
S4	G1	∞	S4	G2	3.7 - 4.1
G2	G1	∞	G2	G2	∞

1-13-11 INJECTOR

WARNING

- Utmost care must be exercised so that no fire is brought close to the working area during the operation.
  Be sure to place a cloth or the like so that no fuel may splash.

1.Remove the injector to be checked.

CAUTION

- After the removal, install another injector.

2.Disconnect the fuel hose from between the fuel inlet pipe and the fuel pipe.

3.Set the injector to be checked on the fuel hose that has been removed, using the SST (sub-harness, measuring tool, EFI inspection wire).
SST: 09842-87502-000
09268-41047-000
09991-87404-000

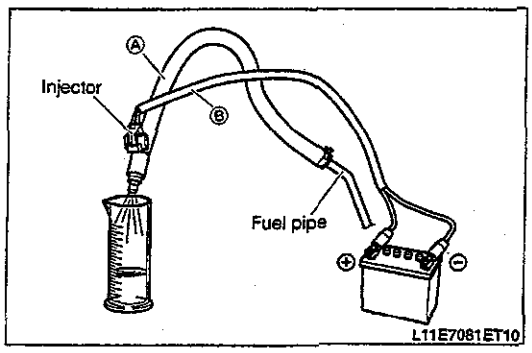
4.Short the terminals SST30 (FC2) and 23 (E1). With the IG switch turned "ON", drive the fuel pump.

5.Apply the battery voltage to the injector for 15 seconds. At this time, measure the injection amount.
SPECIFIED VALUE: 44 – 56cc

CAUTION
- **Be sure to perform the "ON" and "OFF" operations at the battery side.**

6.Remove the battery under the injection amount checking condition. Measure the leakage amount from the injector for one minute.
SPECIFIED VALUE: One drop or less

7.Measure the resistance across the injector terminals.
SPECIFIED VALUE: 12Ω at 20°C



TO INDEX

B9 EMISSION CONTROL SYSTEM

JB---------- B9 - 1
EXHAUST EMISSION PURIFICATION SYSTEM ---------- B9 - 1
PURPOSE OF SYSTEM---------- B9 - 1
SCHEMATIC DIAGRAM ---------- B9 - 3
LOCATION OF COMPONENTS--------- B9 - 5
ARTICLES TO BE PREPARED---------- B9 - 6
AIR-TO-FUEL RATIO CONTROL DEVICE ---------- B9 - 6
IGNITION TIMING CONTROL DEVICE ---------- B9 - 6
CONTROL DEVICE DURING DECELERATION ---------- B9 - 6
FUEL EVAPORATIVE EMISSION CONTROL SYSTEM---------- B9 - 7

JB
1 EXHAUST EMISSION PURIFICATION SYSTEM
1-1 PURPOSE OF SYSTEM

For EU Specifications

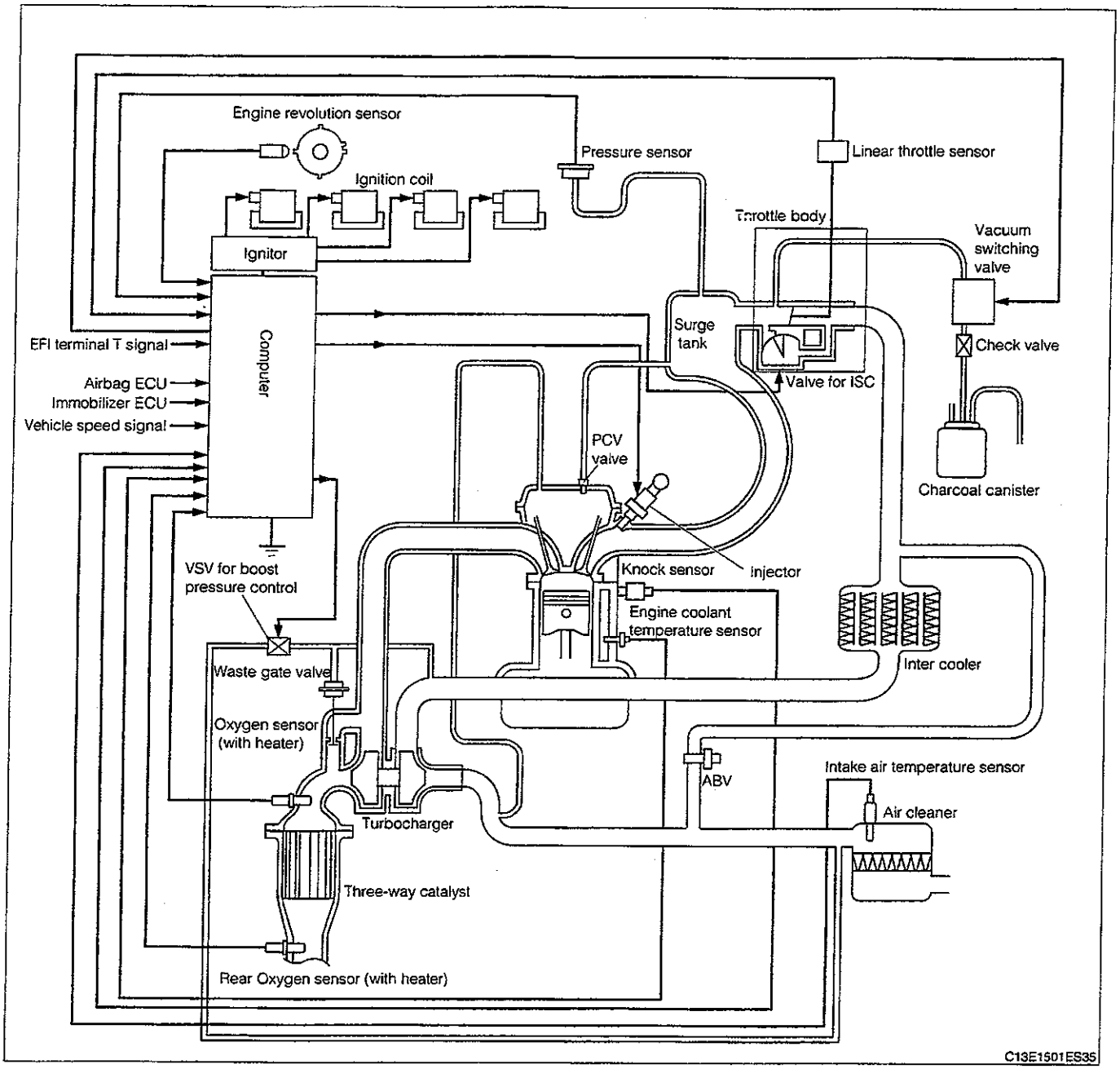
Device name	Device method	Component	Purpose and function
Catalyst device	Three-way catalyst	Monolith catalyst 0.55 litter	Reduction of CO, HC and Nox.
Air-to-fuel ratio control device	Electronically-controlled fuel injection method	Injector Oxygen sensor (with a heater) Rear oxygen sensor (with a heater) Computer for control Operation control devices: Linear throttle sensor, pressure sensor, coolant temperature sensor, intake air temperature sensor, engine revolution sensor	Reduction of CO, HC and NOx. The air-to-fuel ratio of the mixture sucked into the combustion chamber is controlled approximately to the stoichiometric air-to-fuel ratio so that the three-way catalyst can exert the best emission control performance. Purpose and function.
Ignition timing control device	Electronic control method	Computer for control Operation control devices: Pressure sensor, coolant temperature sensor, linear hrottle sensor, engine revolution sensor, ignitor unit or knock sensor	Reduction of NOx. An ignition timing control best suited to the running conditions is performed.
Control device during deceleration		Injector Computer for control Operation control devices: Engine revolution sensor, linear throttle sensor	Reduction of CO and HC during deceleration. Improvement of fuel consumption. Prevention of overheating of catalyst. Fuel cut during deceleration is performed by the control devices.
Fuel evaporative emission control device	Canister method	Charcoal canister 0.6 liter VSV for evaporative emission purging Check valve	Fuel evaporative emission control device.
Blow-by gas recirculation device	Closed type	Ventilation hose PCV valve	Reduction of CO and HC. The blow-by gas is burnt again to reduce CO and HC emissions.

For Aus Specifications

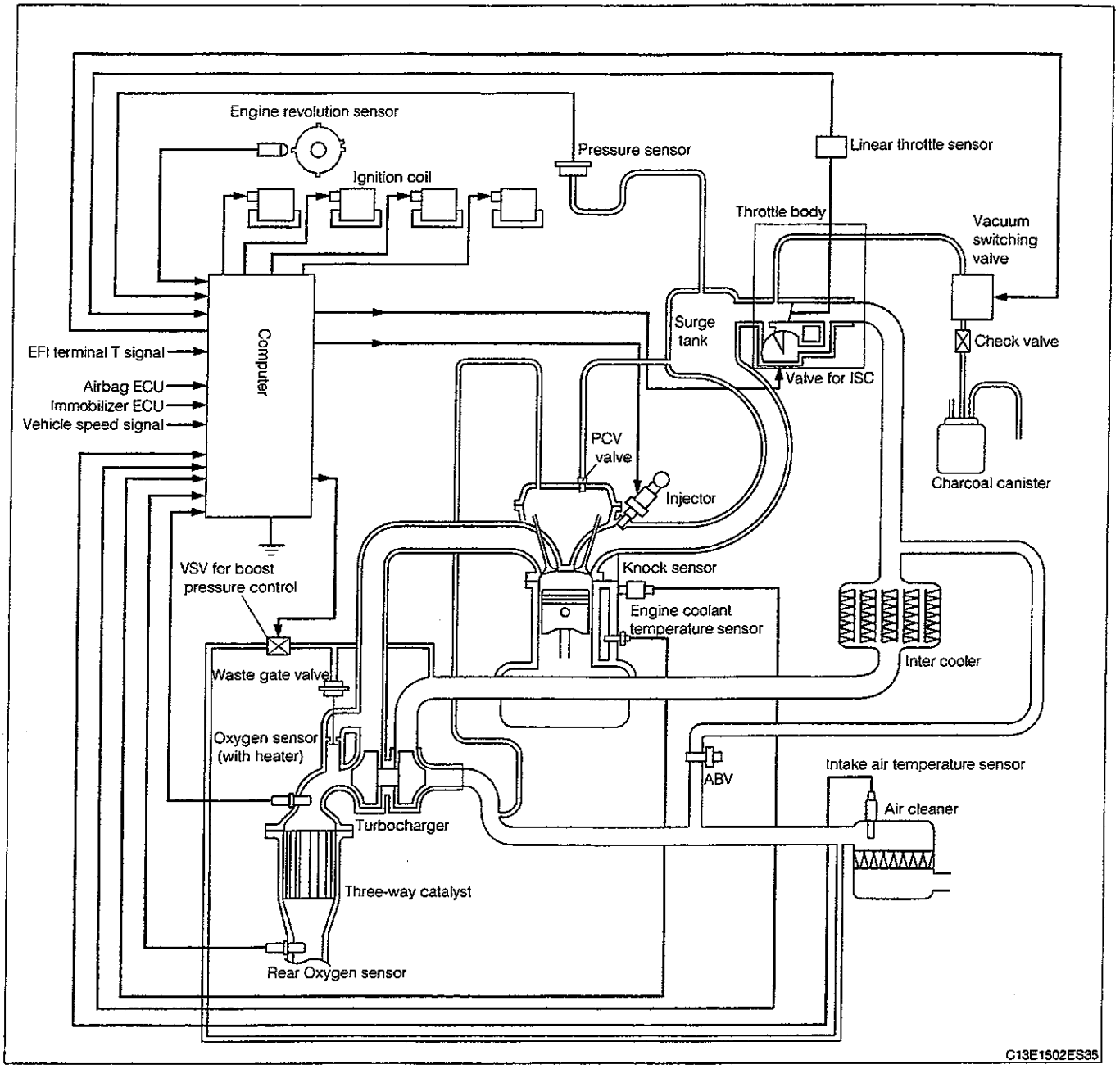
Device name	Device method	Component	Purpose and function
Catalyst device	Three-way catalyst	Monolith catalyst 0.55 litter	Reduction of CO, HC and Nox.
Air-to-fuel ratio control device	Electronically-controlled fuel injection method	Injector Oxygen sensor (with a heater) Rear oxygen sensor Computer for control Operation control devices: Linear throttle sensor, pressure sensor, coolant temperature sensor, intake air temperature sensor, engine revolution sensor	Reduction of CO, HC and NOx. The air-to-fuel ratio of the mixture sucked into the combustion chamber is controlled approximately to the stoichiometric air-to-fuel ratio so that the three-way catalyst can exert the best emission control performance. Purpose and function.
Ignition timing control device	Electronic control method	Computer for control Operation control devices: Pressure sensor, coolant temperature sensor, linear hrottle sensor, engine revolution sensor, knock sensor	Reduction of NOx. An ignition timing control best suited to the running conditions is performed.
Control device during deceleration		Injector Computer for control Operation control devices: Engine revolution sensor, linear throttle sensor	Reduction of CO and HC during deceleration. Improvement of fuel consumption. Prevention of overheating of catalyst. Fuel cut during deceleration is performed by the control devices.
Fuel evaporative emission control device	Canister method	Charcoal canister 0.6 liter VSV for evaporative emission purging Check valve	Fuel evaporative emission control device.
Blow-by gas recirculation device	Closed type	Ventilation hose PCV valve	Reduction of CO and HC. The blow-by gas is burnt again to reduce CO and HC emissions.

1-2 SCHEMATIC DIAGRAM

For EU Specifications

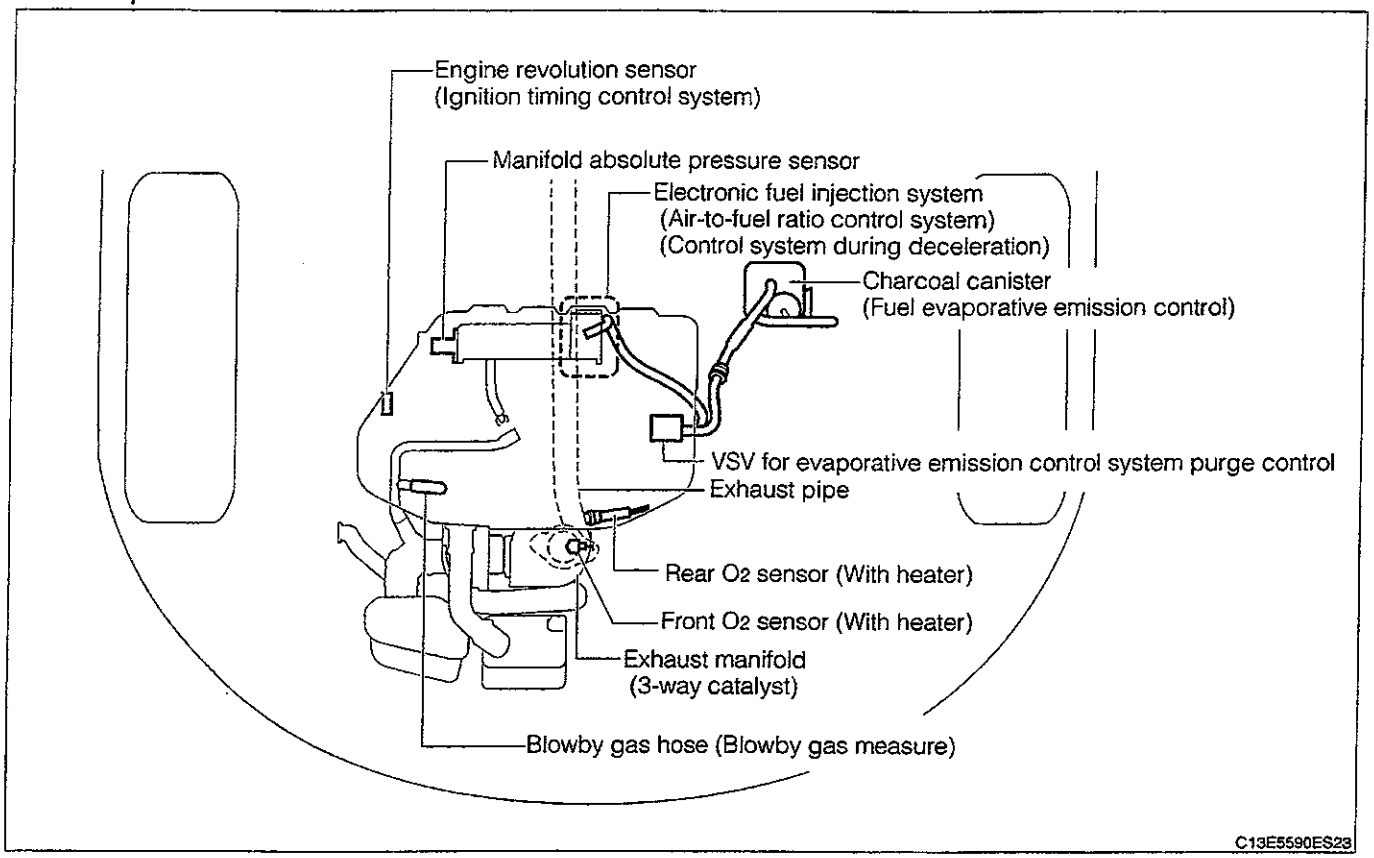


For Aus Specifications

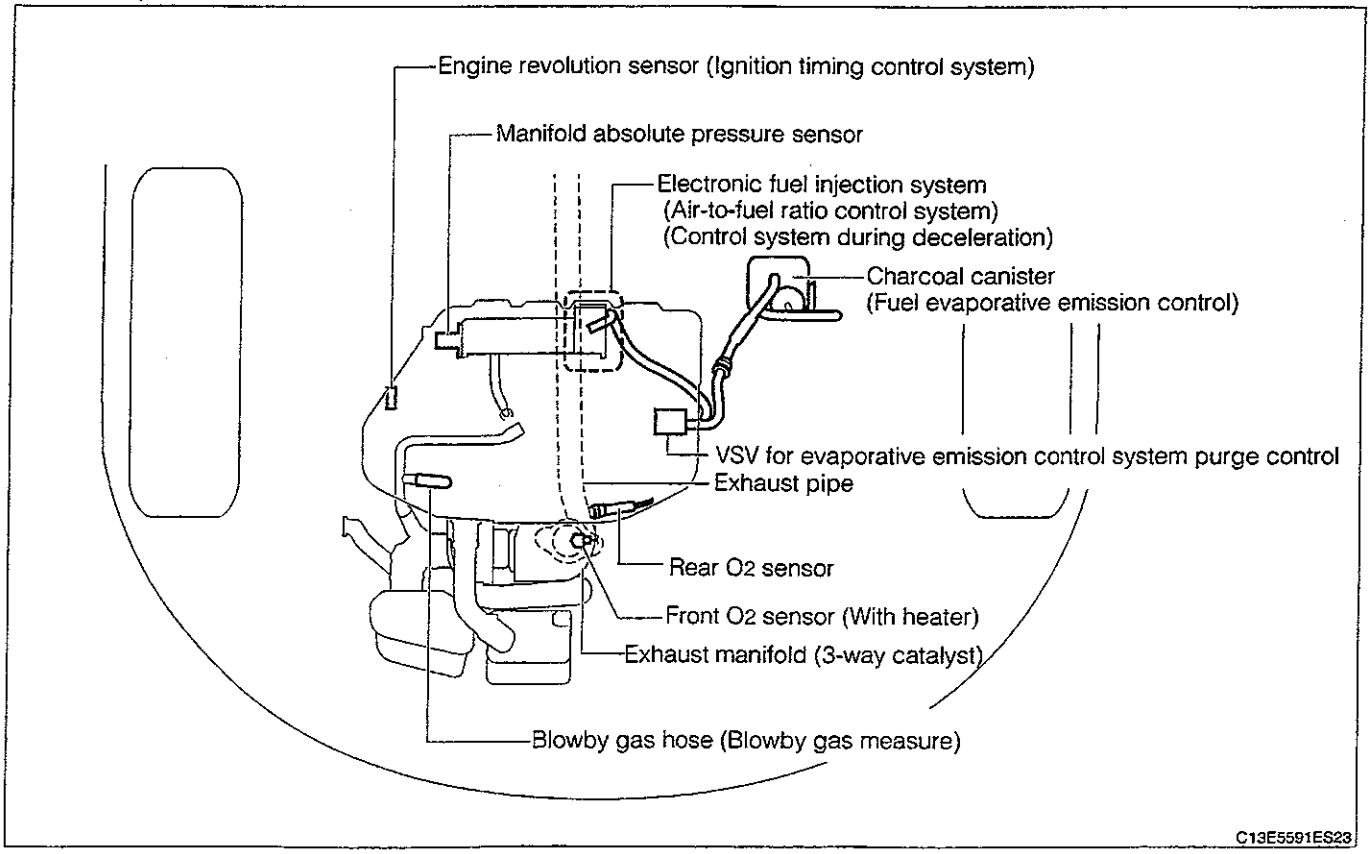


1-3 LOCATION OF COMPONENTS

For EU Specifications

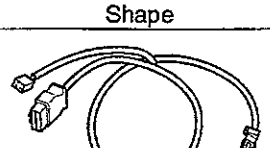
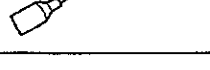


For Aus Specifications



1-4 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09991-87404-000 (09991-87401-000)	Wire, engine control system inspection
	09991-87402-000	Wire, tacho-pulse pick up
	09991-87403-000	Wire, diagnosis check

Instrument

Tachometer,Electrical Tester,Timing light,

1-5 AIR-TO-FUEL RATIO CONTROL DEVICE

Refer to Page B8-44.

Refer to Page B8-143.

1-6 IGNITION TIMING CONTROL DEVICE

<The electronically-controlled method>

1-6-1 FUNCTION CHECK

Refer to Page B8-44.

Refer to Page B8-143.

1-7 CONTROL DEVICE DURING DECELERATION

<Fuel cut device>

1-7-1 FUNCTION CHECK

1.Connect the tachometer to the 8 (REV) terminal of DLC by using the SST.

SST: 09991-87404-000
09991-87402-000

CAUTION

- **If not using the SST, remove the DLC from the vehicle. After finish the operation, fix the DLC to the bracket properly.**

2.Warm up the engine.

3.Using a sound scope, check each injector for operation sound.

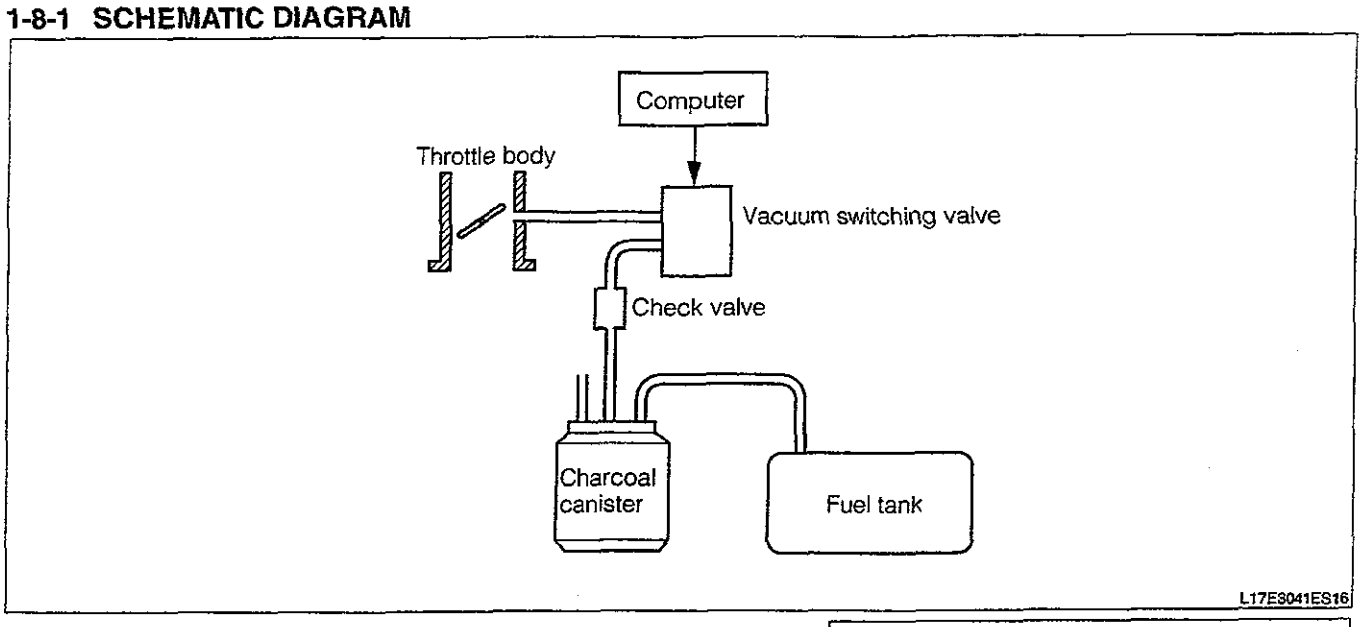
4.Rise the engine speed to 3000 rpm.

5.When the throttle lever is released, confirm that the operation sound of the injector is stopped at a moment and reach the operation sound again.

1-8 FUEL EVAPORATIVE EMISSION CONTROL SYSTEM

Canister method

1-8-1 SCHEMATIC DIAGRAM



1-8-2 UNIT INSPECTION

(1) Charcoal canister

1. Visually inspect the charcoal canister case for cracks or damage.
2. Check of charcoal canister for air leakage
   (1) Continuity check between the port at fuel tank side and at atmospheric side. Apply the positive pressure 4.41 kPa (0.045 kgf/cm²) to the port at fuel tank side while the purge port is plugged by your finger.

   SPECIFIED VALUE: **Continuity exists between the port at fuel tank side and at atmospheric side.**

   (2) Continuity check between the port at fuel tank side and at the atmospheric port side. Apply the negative pressure 1.96 kPa (0.020 kgf/cm²) to the port at fuel tank side while the purge port is plugged by your finger.

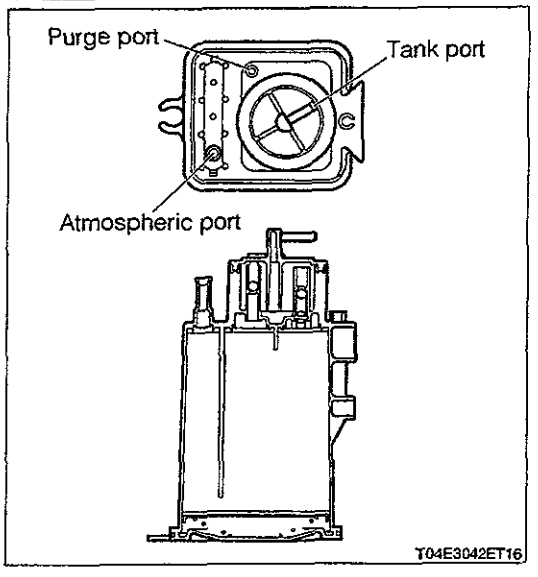
   SPECIFIED VALUE: **Continuity exists between the port at fuel tank side and the atmospheric port side.**

   (3) Continuity check between the purge port and at atmospheric port. Apply the negative pressure 1.96 kPa (0.020 kgf/cm²) to the purge port side while the port at fuel tank side is plugged by your finger.

   SPECIFIED VALUE: **Continuity exists between the purge port side and the atmospheric port side.**

   (4) Continuity check the port at fuel tank side. Apply the negative pressure 19.6kPa (0.199 kgf/cm²) to the port at fuel tank side while the purge port side and the atmospheric port side are plluged by your finger.

   SPECIFIED VALUE: **There is no leakage.**



(2) Inspection of VSV for EVAP

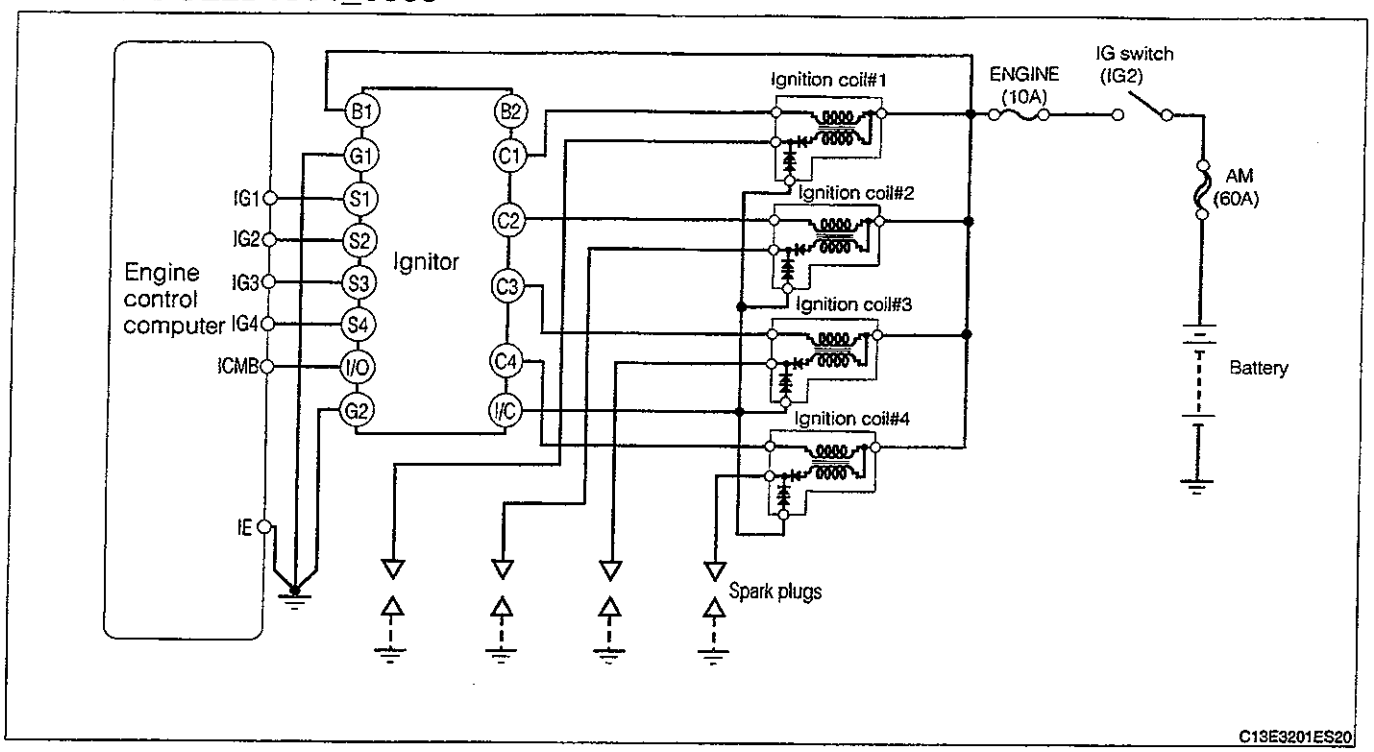
Refer to Page B8-103.

TO INDEX

B10 IGNITION SYSTEM

JB ---------- B10 - 1
IGNITION SYSTEM ---------- B10 - 1
SYSTEM DIAGRAM ---------- B10 - 1
SPARK PLUG ---------- B10 - 1
REMOVAL AND INSTALLATION ------ B10 - 1

JB
1 IGNITION SYSTEM
1-1 D37BSE2B1001_0000



2 SPARK PLUG
2-1 REMOVAL AND INSTALLATION
2-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

2-1-2 OPERATION BEFORE REMOVAL

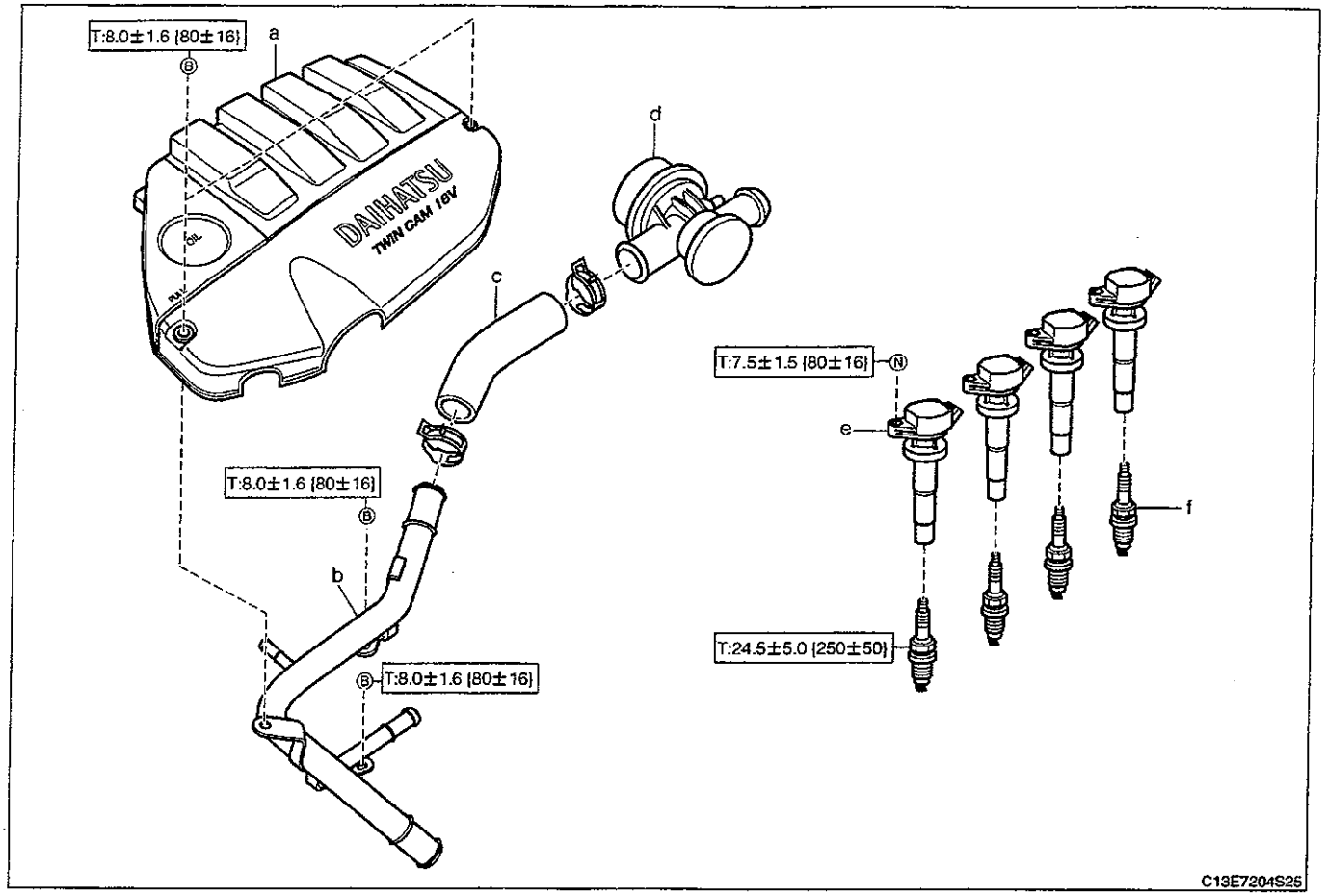
1.Disconnect the battery negative terminal.

CAUTION

- When the battery negative terminal is disconnected, it should be noted that diagnosis results and memories of the radio are erased simultaneously.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※Non-reusable parts
Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Cover S/A,engine upper
2 b Pipe,air bypass
3 c Hose,air bypass
▲ 4 d Valve Ay,air bypass
5 e Coil Ay(Coil Ay,W/Ignitor)
6 f Plug,spark

2-1-4 INSPECTION

(1) IGNTION COIL

Check to see if the ignition coil is satisfactory or not by conducting the check of the ignition system.
Refer to Page B8-113.

Refer to Page B8-96.

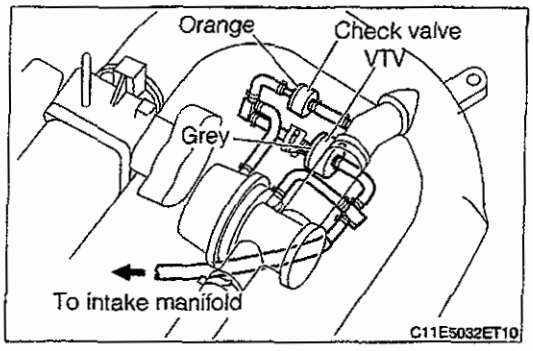
(2) SPARK PLUG

Refer to Page B1-2.

2-1-5 POINTS OF INSTALLATION

(1) AIR BYPASS VALVE AY

1.Install the air bypass valve assembly. Install the hose, as indicated in the right figure.



2-1-6 OPERATION AFTER INSTALLATION

1.Install the battery negative terminal.

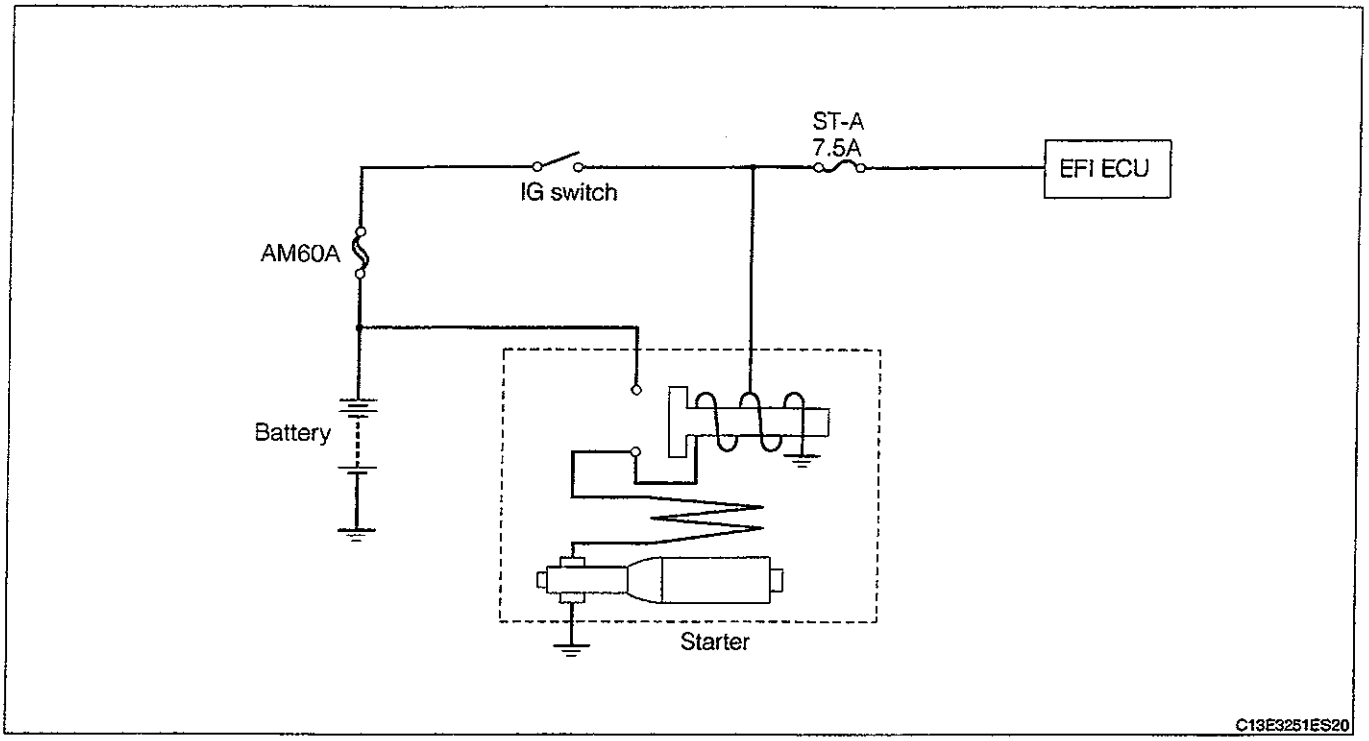
2.Check of charcoal canister for air leakage

TO INDEX

B11 STARTING SYSTEM/CHARGING SYSTEM

JB ---------- B11 - 1
STARTING SYSTEM ---------- B11 - 1
SYSTEM DIAGRAM ---------- B11 - 1
STARTER ---------- B11 - 2
REMOVAL AND INSTALLATION ------ B11 - 2
CHARGING SYSTEM ---------- B11 - 4
SYSTEM DIAGRAM ---------- B11 - 4
IN-VEHICLE CHECK ---------- B11 - 4
ALTERNATOR ---------- B11 - 6
REMOVAL AND INSTALLATION ------ B11 - 6

JB
1 STARTING SYSTEM
1-1 SYSTEM DIAGRAM



2 STARTER

2-1 REMOVAL AND INSTALLATION

2-1-1 OPERATION BEFORE REMOVAL

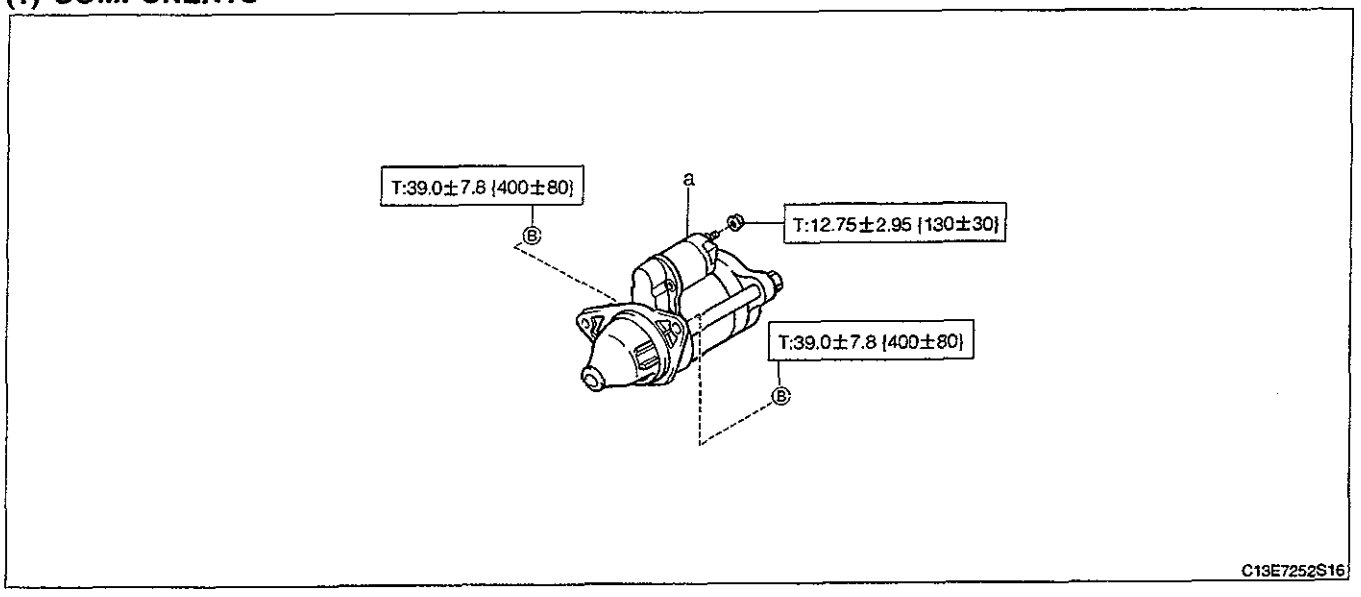
1.Remove the battery negative terminal.

CAUTION

- When the battery negative terminal is disconnected, it should be noted that diagnosis results and memories of the radio are erased simultaneously.

2-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※Non-reusable parts

Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

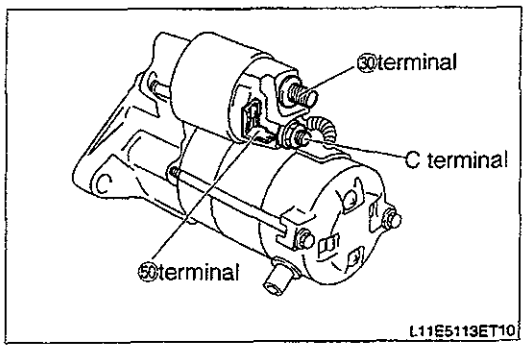
1 Starter Ay

2-1-3 INSPECTION

(1) POINT TO BE OBSERVED AND TERMINAL POSITIONS

CAUTION

- Make sure to perform each check in a short length of time (three to five seconds).



(2) OPERATION CHECK

CAUTION

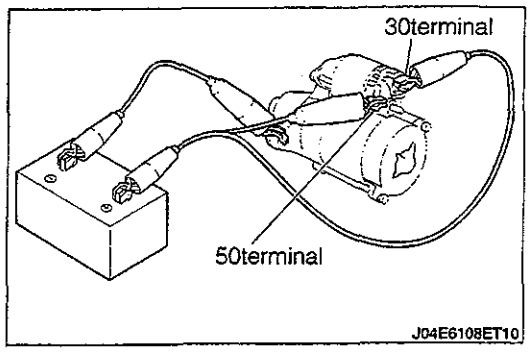
- **A large current will flow during the test. Hence, be certain to employ a heavy lead wire.**

1.Secure the starter with a vice etc.

2.Perform wiring to the cable and tester, as indicated in the figure. (At this time, do not connect the wire for the terminal ⑤⓪ .)

3.Connect the terminal ⑤⓪ . Ensure that the pinion gear jumps out and turns.

4.Disconnect the terminal ⑤⓪ . Ensure that the pinion gear stops its turning and returns to the original position.



(3) NO-LOAD TEST

CAUTION

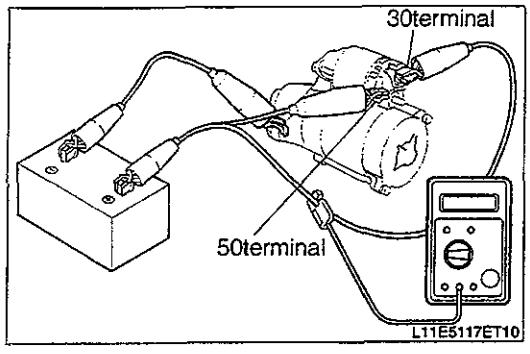
- **A large current will flow during the test. Hence, be certain to employ a heavy lead wire.**

1.Secure the starter with a vice etc.

2.Perform wiring to the cable and tester, as indicated in the figure. (At this time, do not connect the wire for the terminal ⑤⓪ .)

3.Connect the terminal ⑤⓪ . When the ammeter reading has stabilized, take the reading of the ammeter.

SPECIFIED VALUE: 50A or less (Standard specification vehicle)
90A or less (Cold region specification vehicle)

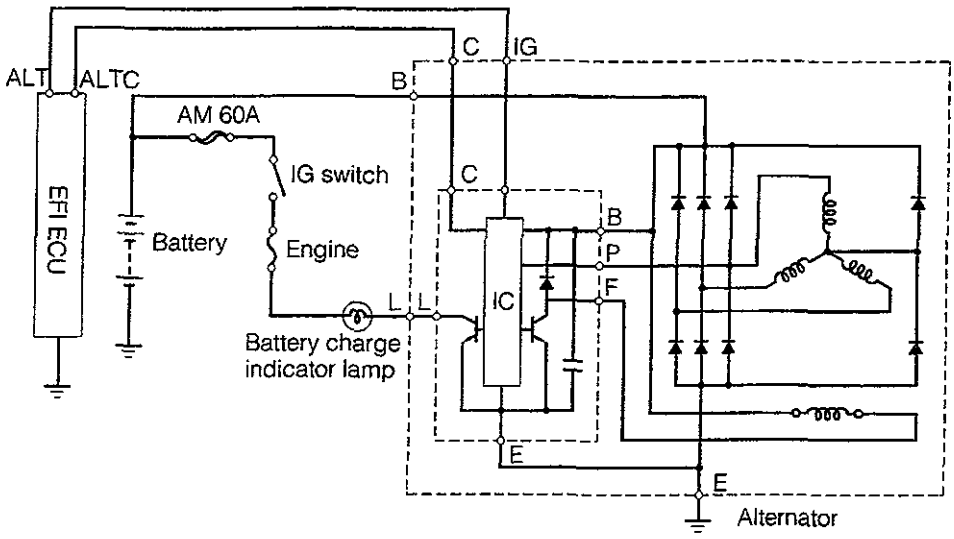


2-1-4 OPERATION AFTER INSTALLATION

1.Install the battery negative terminal.

3 CHARGING SYSTEM

3-1 SYSTEM DIAGRAM



3-2 IN-VEHICLE CHECK

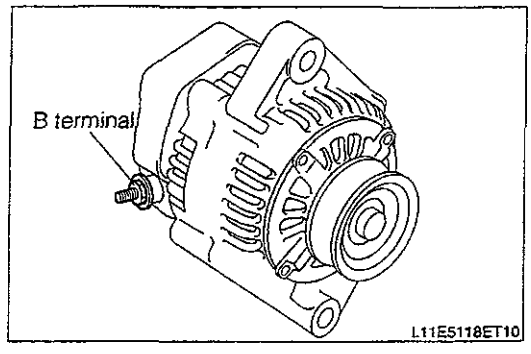
3-2-1 *PRE-CHECK*

1.After conducting the checks given below, carry out the in-vehicle check.
(1) Check the battery terminals for connecting state.
(2) Check the deflection amount of the V-belt.
Refer to Page B1-3.

(3) Check the fuse.
(4) Check the wiring.
(5) Check that the alternator emits abnormal noise while the engine is running.

3-2-2 NO-LOAD TEST

1.Connect a tester to the harness connected to the terminal B in the right figure.
2.Gradually raise the engine speed up to 2500 rpm. Measure the current.
SPECIFIED VALUE: 10A or less (25˚C)
3.Measure the battery voltage at this time.
SPECIFIED VALUE: 14.2-14.8V(25˚C)



3-2-3 LOAD TEST

1. Under the conditions of the no-load test , turn ON the high beams of the headlamps and set the heater blower switch to the high position.
2. Gradually raise the engine speed up to 2500 rpm. Measure the current.
   SPECIFIED VALUE: 30A or more

NOTE

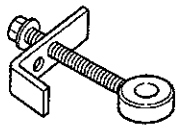
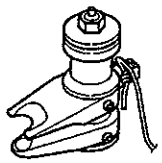
- It should be noted that the charging current may become smaller when the battery is in a fully charged state. Therefore, replace the present battery with a battery that has been discharged to some extent or increase the electrical load (hazard lamps or defogger etc.) Carry out the measurement again.

4 ALTERNATOR

4-1 REMOVAL AND INSTALLATION

4-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09286-87701-000 (09286-87201-000)	bar, alternator adjuster
	09628-00011-000 (09611-87701-000)	Puller, tie-rod end

Instrument

Torque wrench

4-1-2 OPERATION BEFORE REMOVAL

1.Remove the battery negative terminal.

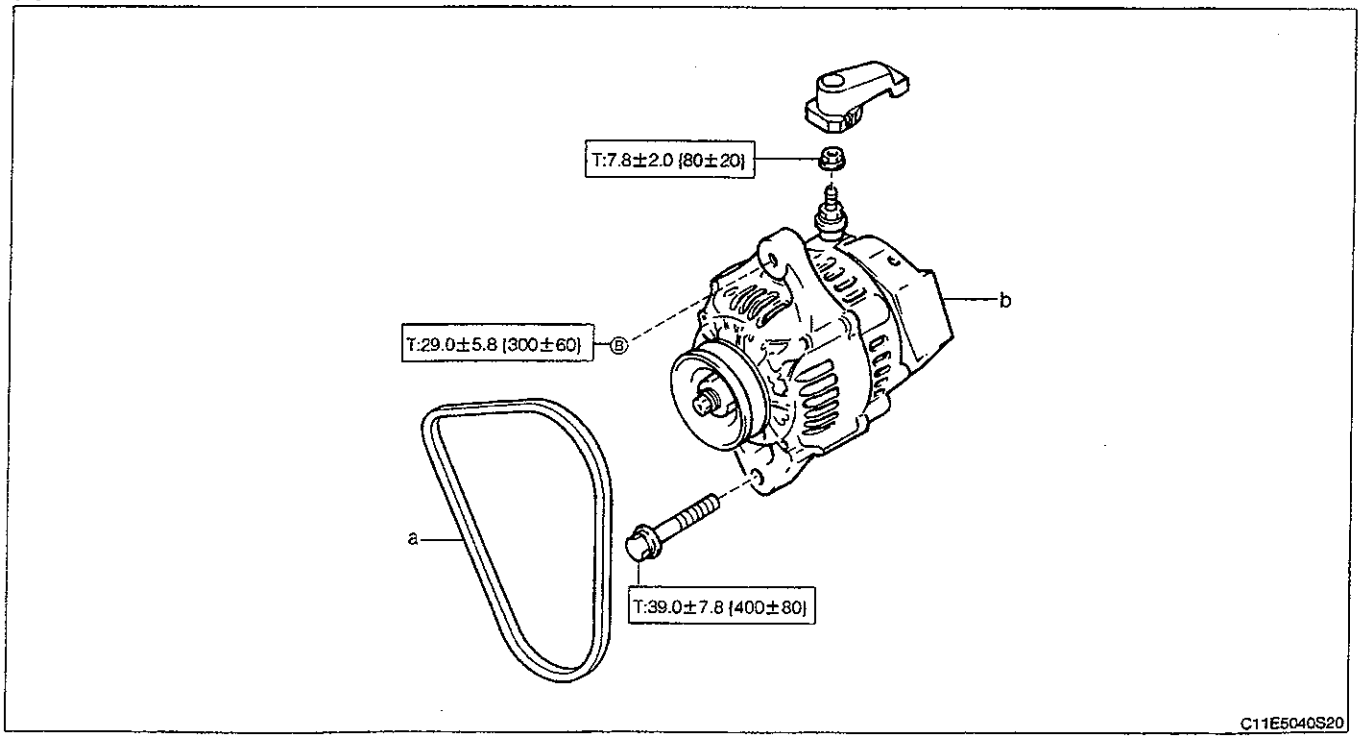
CAUTION

- When the battery negative terminal is disconnected, it should be noted that diagnosis results and memories of the radio are erased simultaneously.

2.Remove the right front tire.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※Non-reusable parts

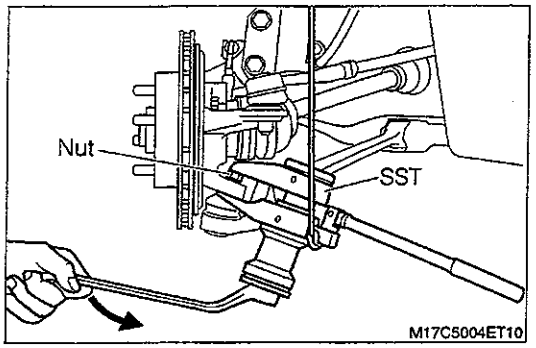
Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

▲ 1 a Belt V(For alternater use)
▼ ▲ 2 b Alternater Ay

4-1-4 POINTS OF REMOVAL

(1) ALTERNATOR AY



1.Disconnect the ball joint section of the suspension lower arm S/A from the steering knuckle, using the SST.

CAUTION

- When setting the SST, install a dummy nut to the threaded section of the lower arm so as to prevent the threaded section from being damaged.
- Hang the SST with a cord.
- Be very careful not to damage the ball joint dust cover.

SST: 09628-00011-000

2.Disconnect the alternator assembly.
3.Remove the attaching bolts of the alternator assembly.
4.Take out the alternator assembly by passing it through the gap between the right fender apron and the front frame.

NOTE

- Turning the right front wheel to the left will facilitate this removal operation.

4-1-5 POINTS OF INSTALLATION

(1) ALTERNATOR AY

1.Install the alternator assembly by passing it through the gap between the right fender apron and the front frame. Then, tighten the bolts temporarily.

NOTE

- Turning the right front wheel to the left will facilitate this removal operation.

2.Install the connector of the alternator assembly.
3.Install the tie rod end to the steering knuckle. Tighten the nut to the specified torque.

(2) V-BELT (FOR ALTERNATOR USE)

1.Install the V-belt. Adjust the tension of the belt.
Refer to Page B1-3.

4-1-6 OPERATION AFTER INSTALLATION

1.Install the right front tire.
2.Install the battery negative terminal.

TO INDEX

B12 ENGINE MOUNTING

ENGINE MOUNTING FRONT
INSULATOR---------- B12 - 1
REMOVAL AND INSTALLATION ------ B12 - 1
ENGINE MOUNTING LEFT
INSULATOR---------- B12 - 3
REMOVAL AND INSTALLATION ------ B12 - 3
ENGINE MOUNTING REAR
INSULATOR---------- B12 - 5
REMOVAL AND INSTALLATION ------ B12 - 5

1 ENGINE MOUNTING FRONT INSULATOR

1-1 REMOVAL AND INSTALLATION

1-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

Wooden block

1-1-2 OPERATION BEFORE REMOVAL

1.Remove the front bumper.
Refer to Page I2-2.

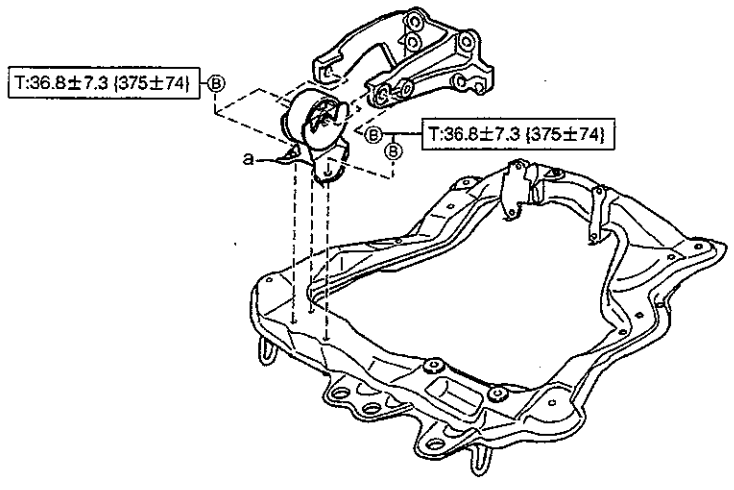
2.Lift up the vehicle.
3.Remove the front floor center brace S/A.
Refer to Page I1-32.

4.Remove the bolts connecting the exhaust pipe with the exhaust manifold. Move the exhaust pipe.
5.Remove the air cleaner.
Refer to Page B3-2.

6.Remove the intercooler.
Refer to Page B3-12.

1-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf·cm}

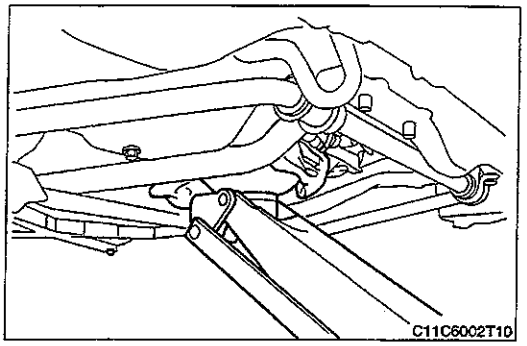
(2) REMOVAL AND INSTALLATION PROCEDURES

▼ ▲ 1 a Insulator S/A, engine mounting, front

1-1-4 POINTS OF REMOVAL

(1) ENGINE MOUNTING FRONT INSULATOR S/A

1.Place a garage jack at a connecting point between the engine assembly and the transaxle assembly so as to sustain it.



CAUTION

- Never apply a jack to the oil pan of the engine assembly or the transaxle assembly.
- When applying a garage jack, interpose a wooden block or cloth so as not to cause any scratch.

2.Remove the bolts connecting the engine mounting front insulator S/A with the engine mounting front right bracket.

3.Lift up the engine assembly and transaxle assembly, using the garage jack.

4.Remove the engine mounting front insulator S/A.

1-1-5 INSPECTION

(1) ENGINE MOUNTING FRONT INSULATOR S/A

Replace any insulator that exhibits cracks, fluid leakage or a flattened condition.

1-1-6 POINTS OF INSTALLATION

(1) ENGINE MOUNTING FRONT INSULATOR S/A

1.Install the engine mounting front insulator S/A to the frame assembly.

2.Fit the engine mounting front right bracket into the engine mounting front insulator S/A, while adjusting the position of the engine assembly, using a garage jack. Temporarily tighten the bolts.

3.After the garage jack has been lowered fully, securely tighten the bolts connecting the engine mounting front insulator S/A with the engine mounting front right bracket, with the engine mounting front insulator S/A in a loaded state.

1-1-7 OPERATION AFTER INSTALLATION

1.Install the intercooler.
Refer to Page B3-12.

2.Install the air cleaner.
Refer to Page B3-2.

3.Install the exhaust pipe.
Refer to Page B4-2.

4.Install the front floor center brace S/A.
Refer to Page I1-32.

5.Lift down the vehicle.

6.Install the front bumper.
Refer to Page I2-2.

2 ENGINE MOUNTING LEFT INSULATOR

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

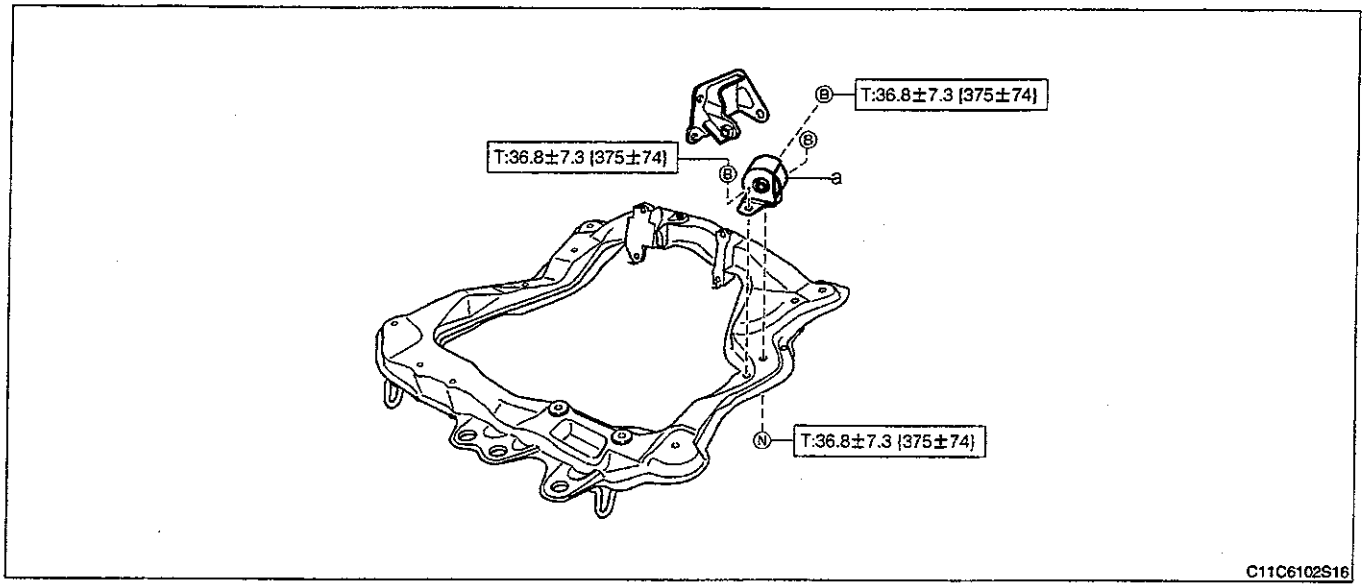
Wooden block

2-1-2 OPERATION BEFORE REMOVAL

1.Remove the battery.
2.Remove the battery carrier subassembly No.2 as well as the battery carrier support located underneath the subassembly.
3.Lift up the vehicle.
4.Install the front disc wheels LH.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

▼ ▲ 1 a Insulator,engine mounting,lower left

2-1-4 POINTS OF REMOVAL

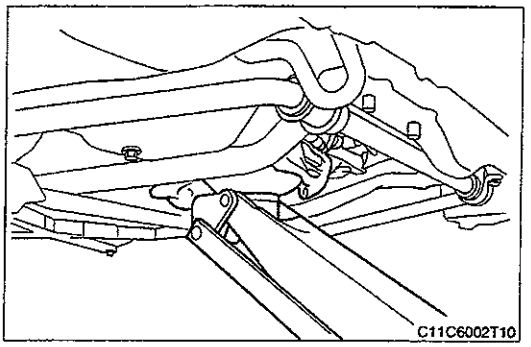
(1) ENGINE MOUNTING LOWER LEFT INSULATOR

1.Place a garage jack at a connecting point between the engine assembly and the transaxle assembly so as to sustain it.

CAUTION

- Never apply a jack to the oil pan of the engine assembly or the transaxle assembly.
- When applying a garage jack, interpose a wooden block or cloth so as not to cause any scratch.

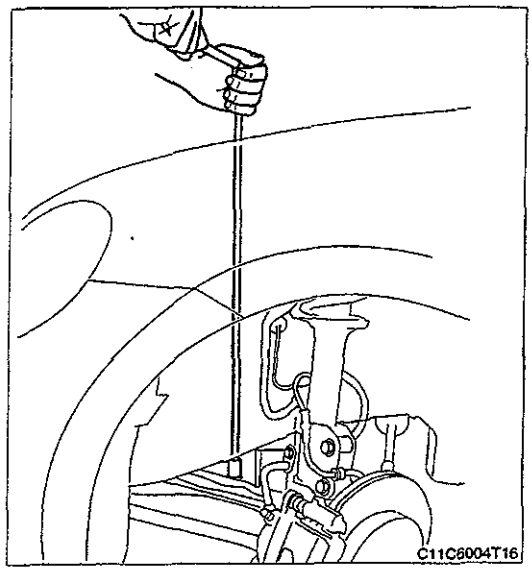
2.Turn the steering wheel to the left as far as it will go.
3.Remove the bolts connecting the frame assembly with the engine mounting lower left insulator.



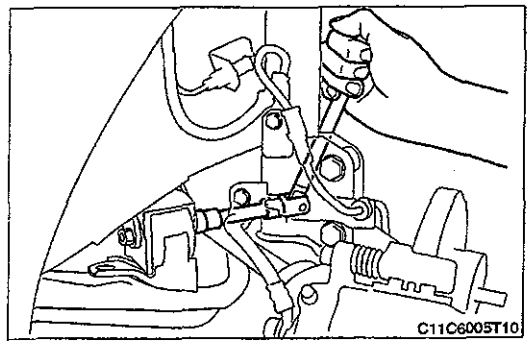
NOTE

- As for the bolts at the front side of the vehicle, it is advisable to carry out the work from around the battery carrier that was removed in the work prior to removal, using a long extension bar.

4.Lift up the engine assembly and transaxle assembly, using the garage jack.



5.Remove the engine mounting lower left insulator from the engine mounting left bracket.



2-1-5 INSPECTION

(1) ENGINE MOUNTING LOWER LEFT INSULATOR

Replace any insulator that exhibits cracks, fluid leakage or a flattened condition.

2-1-6 POINTS OF INSTALLATION

(1) ENGINE MOUNTING LOWER LEFT INSULATOR

1.Install the engine mounting lower left insulator to the frame assembly.

2.Fit the engine mounting left bracket into the engine mounting lower left insulator, while adjusting the position of the transaxle assembly, using a garage jack. Temporarily tighten the bolts.

3.After the garage jack has been lowered fully, securely tighten the bolts connecting the engine mounting lower left insulator with the engine mounting left bracket, with the engine mounting lower left insulator in a loaded state.

2-1-7 OPERATION AFTER INSTALLATION

1.Install the front disc wheels LH.

TIGHTENING TORQUE: 103.0±14.7N·m{1050±150kgf·cm}

2.Lift down the vehicle.

3.Install the battery carrier support and battery carrier subassembly No.2.

4.Install the battery.

3 ENGINE MOUNTING REAR INSULATOR

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

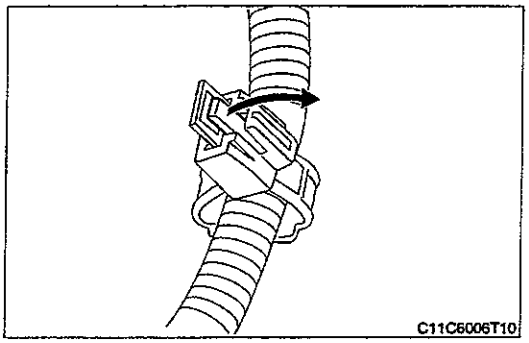
Wooden block

3-1-2 OPERATION BEFORE REMOVAL

1.Remove the foot rest.
2.Turn over the carpet near the steering column hole.
3.Remove the dust cover retainer.
4.Remove the steering shaft dust cover.
5.Separate the universal joint at the steering gear side of the steering column assembly.
6.Push out the steering column hole shield to the vehicle outside under a condition where it is attached to the steering gear assembly.
7.Remove the pressure feed hose (pressure side) from the engine mounting rear right bracket.
8.Disconnect the alternator harness that is attached to the engine mounting rear right bracket.

NOTE

- **Raise the claw of the clamp so as to unlock the lock, as indicated in the right figure.**

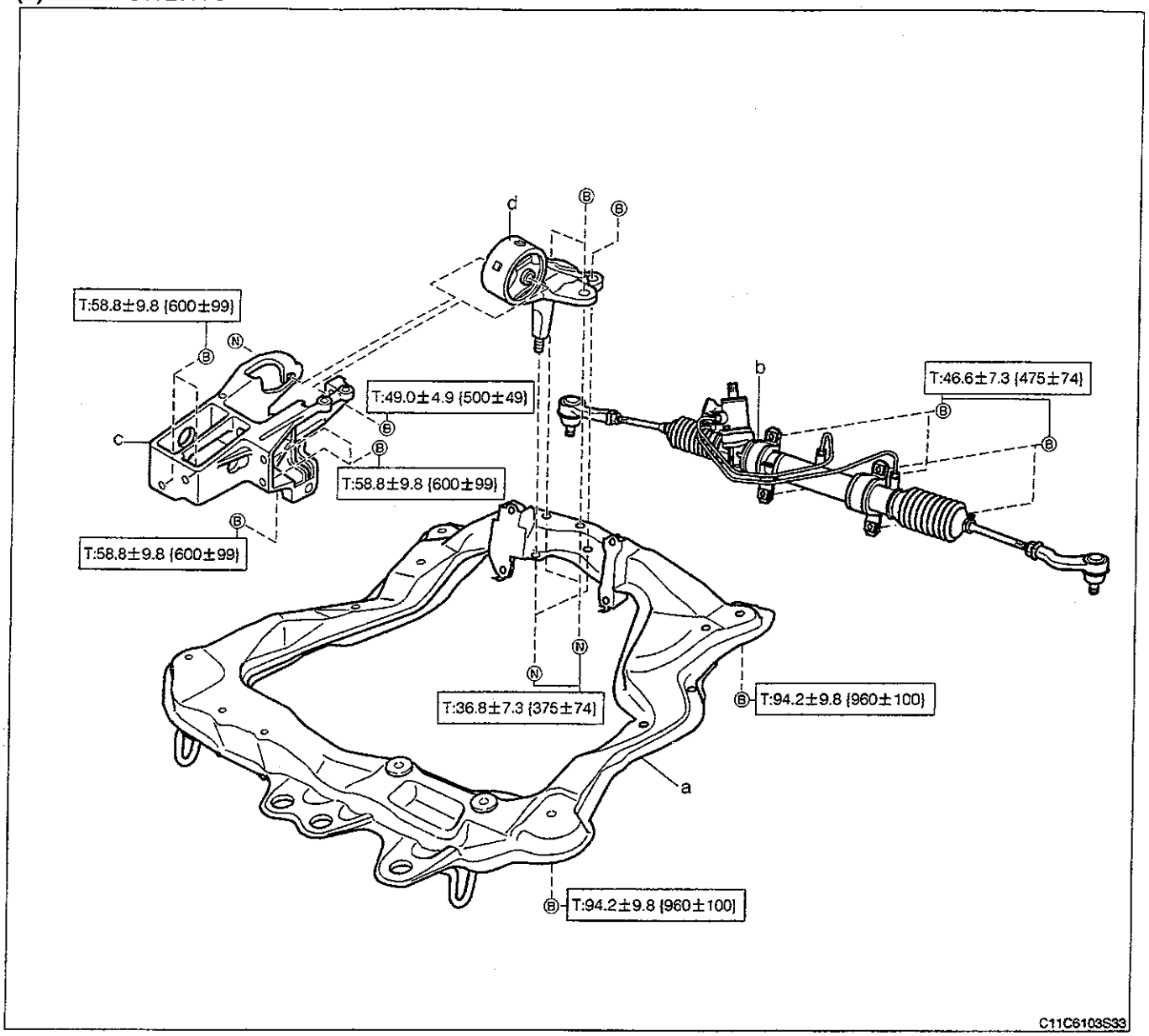


9.Lift up the vehicle.
10.Remove the front disc wheels.
11.Remove the front floor center brace S/A.
12.Disconnect the connector of the rear O_2 sensor.
13.Remove the two bolts connecting the exhaust pipe with the manifold converter assembly.
14.Separate the shift & select shaft and extension rod from the transmission.

Refer to Page F2-8.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

▼ ▲ 1 c Bracket,engine mounting,rear right
▼ 2 a Frame Ay
▼ 3 b Gear assembly, power steering
▼ ▲ 4 c Bracket,engine mounting,rear right
▼ ▲ 5 d Insulator S/A, engine mounting, rear

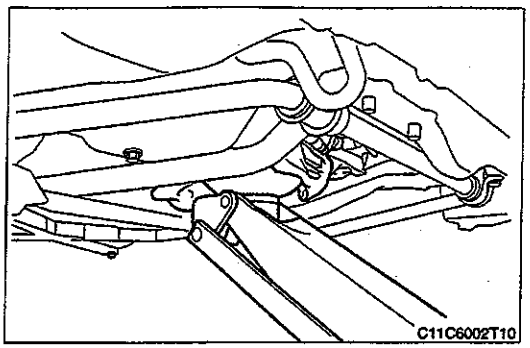
3-1-4 POINTS OF REMOVAL

(1) ENGINE MOUNTING REAR RIGHT BRACKET

1.Place a garage jack at a connecting point between the engine assembly and the transaxle assembly so as to sustain it.

CAUTION

- Never apply a jack to the oil pan of the engine assembly or the transaxle assembly.
- When applying a garage jack, interpose a wooden block or cloth so as not to cause any scratch.
- Care must be exercised not to allow the engine to lower while the engine is sustained with the jack.



2.Disconnect the engine mounting rear insulator S/A from the engine mounting rear right bracket.

NOTE

- It is advisable to carry out the work from the tire house at the left side of the vehicle, using a long extension bar.

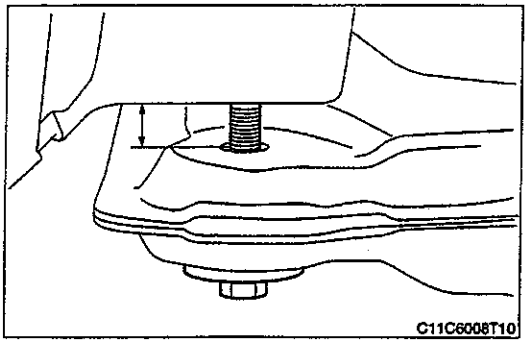
3.Remove the engine mounting rear right bracket from the engine block. Temporarily secure it.

(2) Frame Ay

Slacken the retaining bolts of the frame assembly a little at a time so as to lower the front side about 15 mm; the rear side about 25mm.

CAUTION

- Since there are possibilities that the frame assembly may drop, do not lower it more than 25 mm.



(3) POWER STEERING GEAR AY

Remove the retaining bolts that attach the power steering gear assembly to the frame assembly.

(4) ENGINE MOUNTING REAR RIGHT BRACKET

Pull out the engine mounting rear right bracket from the right side of the vehicle.

(5) ENGINE MOUNTING REAR INSULATOR S/A

Remove the engine mounting rear insulator S/A. Pull it out from the right side of the vehicle.

3-1-5 INSPECTION

(1) ENGINE MOUNTING REAR INSULATOR S/A

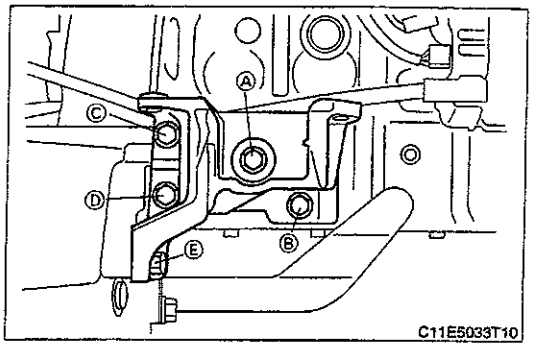
Replace any insulator that exhibits cracks, or a flattened condition.

3-1-6 POINTS OF INSTALLATION

(1) ENGINE MOUNTING REAR INSULATOR S/A

Install the engine mounting rear insulator S/A to the frame assembly.

(2) ENGINE MOUNTING REAR RIGHT BRACKET



1.Install the engine mounting rear right bracket.
  (1) Temporarily secure the engine mounting rear right bracket to the engine block by means of the bolt A.
  (2) Tighten the bolt C to the specified torque.
  (3) Securely tighten the bolts B and D to the specified torque.
  (4) Securely tighten the bolt A to the specified torque.
  (5) Tighten the bolt E to the transaxle assembly to the specified torque.

(3) POWER STEERING GEAR AY

Install the power steering gear assembly to the frame assembly.

(4) Frame Ay

Install the frame assembly to the body. At this time, push the steering column hole cover into the column hole.

(5) ENGINE MOUNTING REAR RIGHT BRACKET

1.Temporarily connect the engine mounting rear insulator S/A to the engine mounting rear right bracket, while adjusting the position of the transaxle assembly, using a garage jack.
2.After lowering the garage jack, securely tighten the engine mounting rear insulator S/A to the engine mounting rear right bracket.

3-1-7 OPERATION AFTER INSTALLATION

1.Install the shift & select shaft and extension rod to the transmission.
Refer to Page F2-8.

2.Install the exhaust pipe.
Refer to Page B4-2.

3.Connect the connector of the rear O_2 sensor.
4.Install the front floor center brace S/A.
TIGHTENING TORQUE: Front side:33.9±7.3N·m{345±74kgf·cm}
Rear side:23.5±5.9N·m{240±59kgf·cm}

5.Install the front disc wheels.
CAUTION
- **The rotating direction of the tire has been specified. Hence, confirm the indication of the rotating direction (arrowheaded mark) provided at the tire side. Mount the tire according to the forward moving direction.**

TIGHTENING TORQUE: 103.0±14.7N·m{1050±150kgf·cm}

6.Lift down the vehicle.
7.Attach the pressure feed hose (pressure side) to the engine mounting rear right bracket.
TIGHTENING TORQUE: 15.7±2.9N·m{160±29kgf·cm}

8.Secure the alternator harness to the engine mounting rear right bracket.
9.Install the universal joint at the steering gear side of the steering column assembly.
Refer to Page G1-4.

10.Install the steering shaft dust cover.
11.Install the dust cover retainer.
TIGHTENING TORQUE: 5.4±1.5N·m{55±15kgf·cm}

12.Place the carpet near the steering column hole.
13.Install the foot rest.
14.Check the front alignment.
Refer to Page C1-1.

TO INDEX

C1 FRONT SUSPENSION

FRONT SUSPENSION ---------- C1 - 1
BASIC CHECK AND ADJUSTMENT--- C1 - 1
FRONT SHOCK ABSORBER AND
FRONT COIL SPRING---------- C1 - 6
REMOVAL AND INSTALLATION-------- C1 - 6
FRONT STABILIZER BAR AND FRONT
SUSPENSION ---------- C1 - 11
REMOVAL AND INSTALLATION ------ C1 - 11

1 FRONT SUSPENSION

1-1 BASIC CHECK AND ADJUSTMENT

1-1-1 FRONT WHEEL ALIGNMENT

(1) ARTICLES TO BE PREPARED

Tool

CCK gauge compensator,Brake pedal pusher

Instrument

Turning radius gauge,Tire pressure gauge,Camber, caster gauge,Dial gauge

CAUTION

- The wheel alignment should be measured under the unloaded condition (However, the fuel tank must be filled fully and the spare tire, jack and tools must be removed.).

(2) CHECKS PRIOR TO MEASUREMENT

① CHECK OF TIRE SIZE AND WEAR CONDIRION

Check that there is no difference in size. Also, check that there is no significant difference in wear between the right and left sides nor uneven wear.

② CHECK OF TIRE AIR INFLATION PRESSURE

SPECIFIED VALUE:

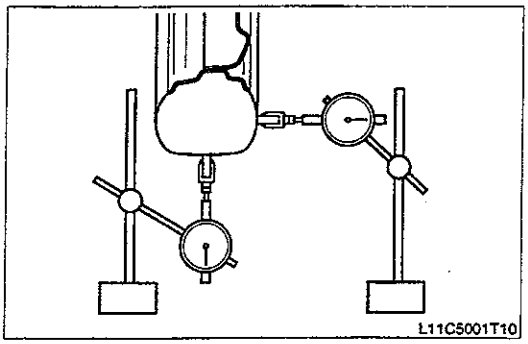
Tire size	Air inflation pressure [kPa{kgf/cm^2}]	
	Front wheel	Rear wheel
165/50R15	240{2.4}	

③ CHECK OF TIRES FOR RUNOUT

Check the tire for runout, using a dial gauge.

ALLOWABLE LIMIT: MAX 1.4 mm (Vertical runout)

ALLOWABLE LIMIT: MAX 2.0 mm (Lateral runout)



④ CHECK OF BOLTS FOR TIGHTENING CONDITION AT RESPECTIVE SECTIONS

Check each installation section related to the axles and suspensions for looseness and deformation.

⑤ CHECK OF RESPECTIVE SECTIONS FOR EXCESSIVE PLAY.

1.Ball joint for excessive play

2.Steering linkage for excessive play

3.Suspension-related parts for excessive play

4.Front wheel bearing for excessive play

(3) TOE-IN

① CHECK

1.Rock the vehicle so that it may be stabilized.

CAUTION

- If the suspension parts have been changed, rock the vehicle greatly so that the suspension can be settled. Then, proceed with the measurement.

2.Move the vehicle about 5 m straight forward by pushing it by hands.

CAUTION

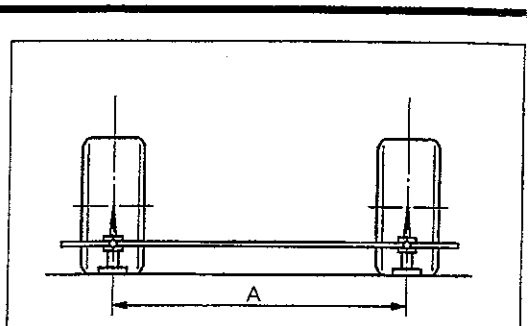
- When the vehicle has been moved backward, be sure to move it forward by the distance that the vehicle traveled backward.

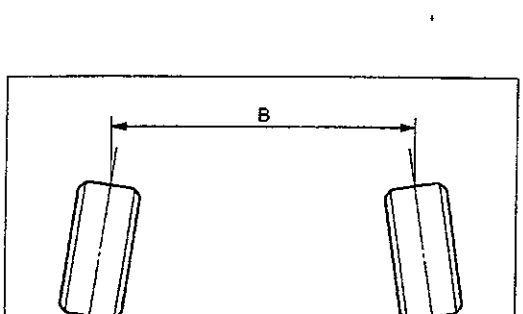
3.Align the height of the pointer of the toe-in gauge with the center height of the front disc wheel axle, and place the gauge behind the tires.
4.Mark the tread center at the rear section of the front tyres. Measure the distance (A) between marks.
5.Slowly move the vehicle forward by pushing it, until the front wheels make 180° turn.

CAUTION

- **Be very careful not to turn the wheel more than 180°. If the wheel is turned more than 180°, repeat the operations from Step 3.**

6.Measure the distance (B) between the marks at the front section of the front tyres.
7.Calculate the toe-in (A − B).
SPECIFIED VALUE: 0.0±2.0mm





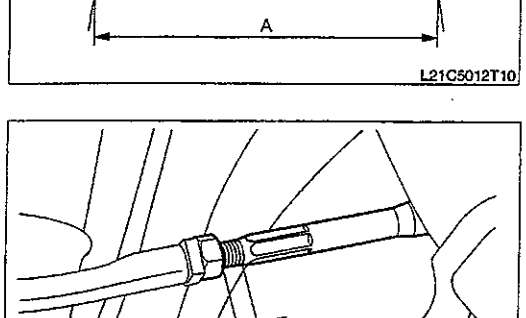
② ADJUSTMENT

1.Loosen the lock nut of the tie-rod end.
2.Turn the rack ends at the right and left sides by the same amount in the opposite direction, respectively, so as to adjust the toe-in to the range of the specified value.
SPECIFIED VALUE: 0.0±1.0mm
3.Tighten the lock nut of the tie-rod end.
TIGHTENING TORQUE: 36.8±7.3N·m{375±74kgf·cm}

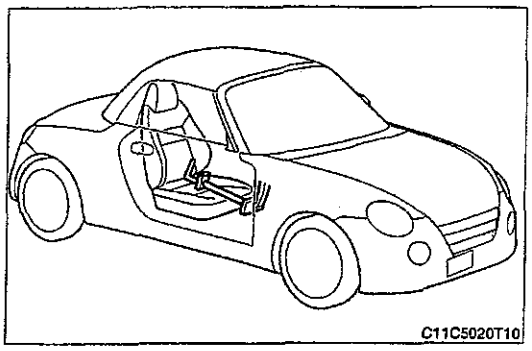
CAUTION

- **Make sure that the moving amount of the tie rods at the right and left sides is the same.**
- **Make sure that the length indicated in the right figure is the same. (Failure to observe this caution may cause differences in the wheel turning angle.)**
- **Be very careful not to twist the boots during the adjustment.**

4.Check the toe-in again.
SPECIFIED VALUE: 0.0±1.0mm



(4) CAMBER, CASTER AND KINGPIN INCLINATION ANGLE


C11C5020T10

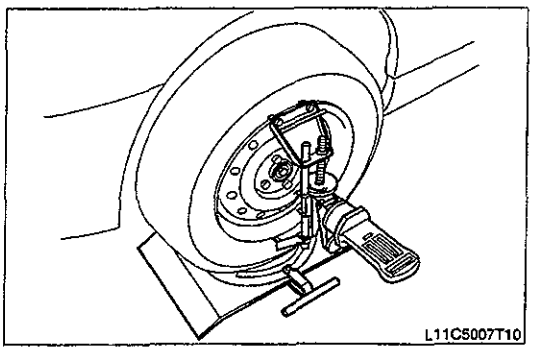
① CHECK

1. Setting of turning radius gauge
2. Set the turning radius gauge to the 0° point and lock it.
3. Drive the vehicle so that the center of the ground-contacting surface of the tire may be aligned with the center of the turning radius gauge.

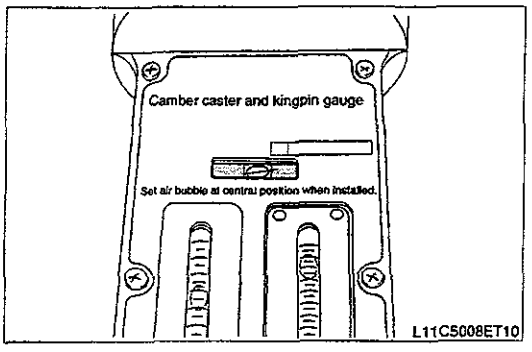
CAUTION

- The checks should be conducted under the unloaded state and with the service brake applied, using a brake pedal pressure, so that the front wheels may not turn.
- In cases where a portable type turning radius gauge is used, make certain to keep the vehicle horizontal by placing a stand of the same height as the gauge at the rear wheel.
- During the inspection, remove the stop lamp fuse so that the stop lamp switch may not be turned on.

4. Install a compensator to the wheel. Then, install a camber/caster/kingpin gauge.
5. Set the pointer of the turning radius gauge to 0°.
6. Install the gauge, while aligning the tip end of the center rod of the camber-caster-kingpin gauge with the designated position of the compensator.


L11C5007T10

7. Check the camber.



L11C5008ET10

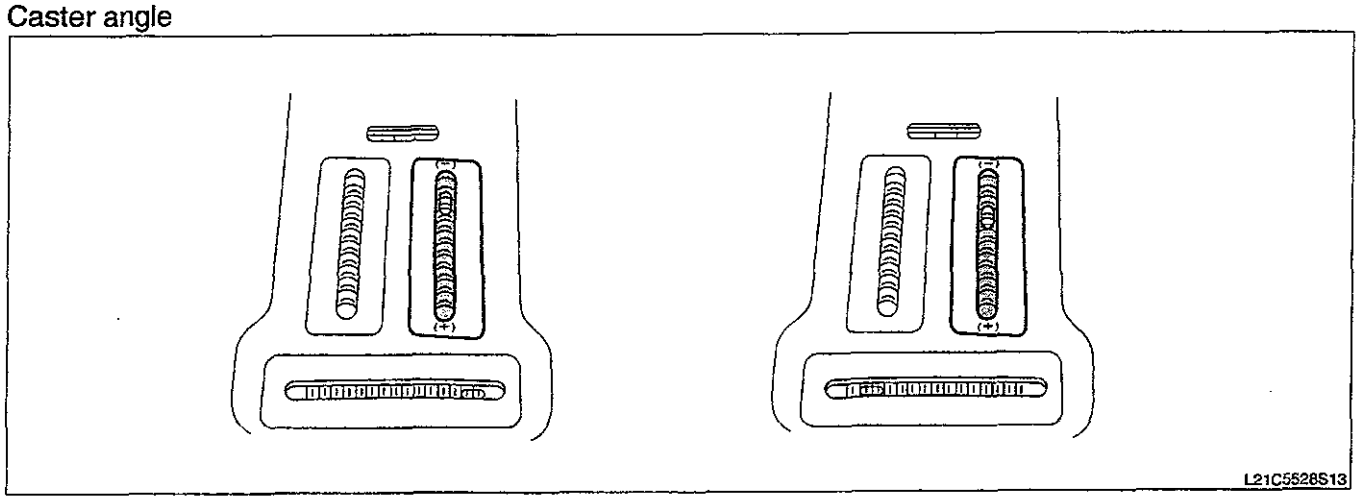
8.Confirm the straight-ahead position.
9.Set the gauge horizontally so that a level bubble of the gauge comes at the center.
10.Read out the graduation at the center position of the bubble of the gauge for the camber measurement.

SPECIFIED VALUE:

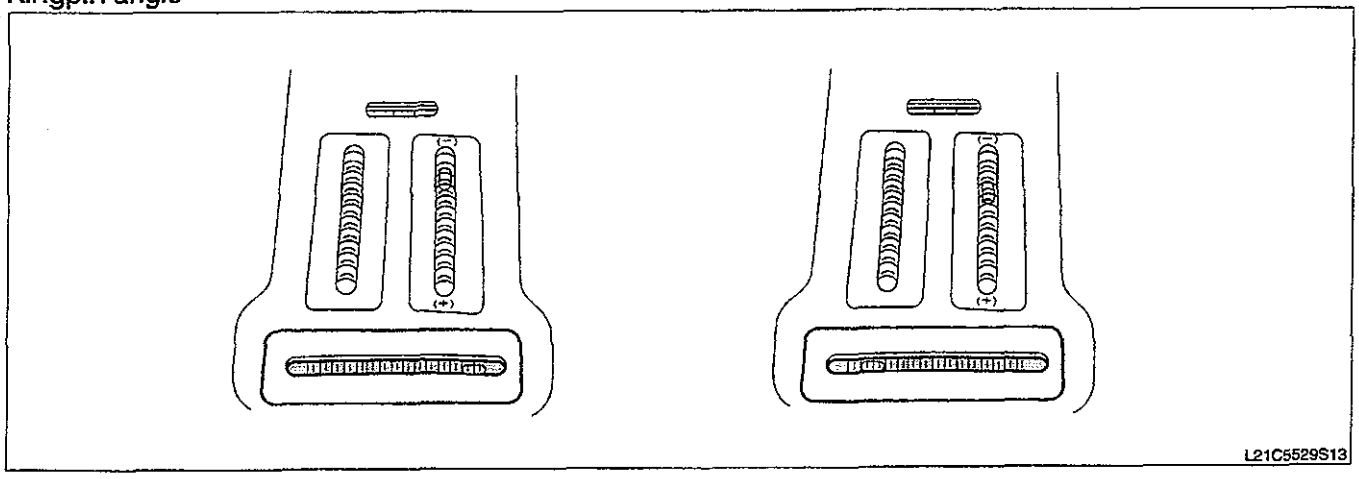
Vehicle model	L880RK	
	KMVZW	KMVZQ
Camber angle	0°±45′	0°13′±45′

11.Check the caster angle and kingpin angle (right wheel).

Caster angle



Kingpin angle



12.Turn the steering wheel clockwise until the turning radius gauge points 20 °.
13.Turn the adjusting screws for caster angle and kingpin angle of the gauge so that each bubble come at 0° .
14.Turn the steering wheel counterclockwise until the turning radius gauge points 20 °.
15.Read the graduation of the bubble center position at the caster angle measuring gauge and kingpin angle measuring gauge.
SPECIFIED VALUE:

Vehicle model	L880RK	
	KMVZW	KMVZQ
Caster angle	3°40′±1°	3°32′±1°
Kingpin angle	12°16′±1°	11°55′±1°

16.Check the caster angle and kingpin inclination angle (left wheel).
NOTE
- **This is a non-adjustable type, in which the camber, caster and kingpin inclination angle have already been adjusted to the specified values.**

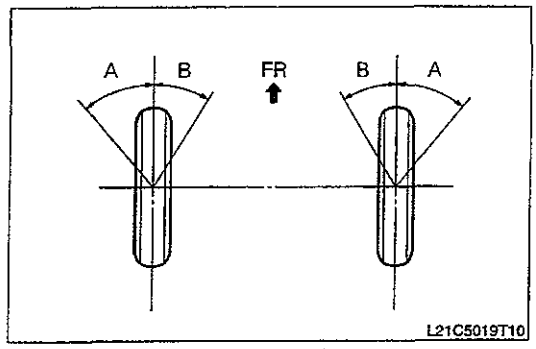
17.Remove the gauge and SST.

(5) WHEEL TURNING ANGLE

① CHECK

Turn the steering wheel fully to the right and to the left. At this time, check the wheel turning angle.
SPECIFIED VALUE:

Vehicle model	L880RK	
	KMVZW	KMVZQ
In(A)	36°25' ±2°	37°00' ±2°
Out(B)	31°30' ±2°	31°48' ±2°



② ADJUSTMENT

If there is a difference in turning angle between the right and left sides, or the turning angle deviates from the standard value, check and adjust the toe-in.

(6) FRONT SIDE SLIP

① CHECK

NOTE
- **Even when the side slip value is within the range of the specified value, if there is any abnormality, be sure to check and adjust the above items.**

Check the side slip with a side slip tester.
SPECIFIED VALUE: In 5 mm - out 5 mm

2 FRONT SHOCK ABSORBER AND FRONT COIL SPRING

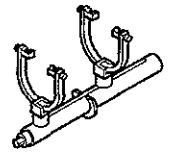
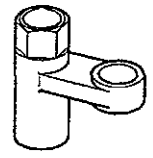
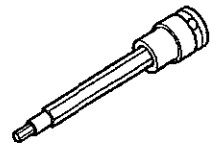
2-1 REMOVAL AND INSTALLATION

WARNING

- If the lock nut is removed without using the SST, the coil spring jumps out, posing extreme danger. Therefore, be sure to use the SST for this removal.

2-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09727-30021-000 (09727-30020-000)	Compressor, front coil spring
	09729-97202-000	Socket, lock nut17
	09729-97203-000	Socket, hexagon wrench6(TONE 3KH-6L)

Instrument

Torque wrench

2-1-2 OPERATION BEFORE REMOVAL

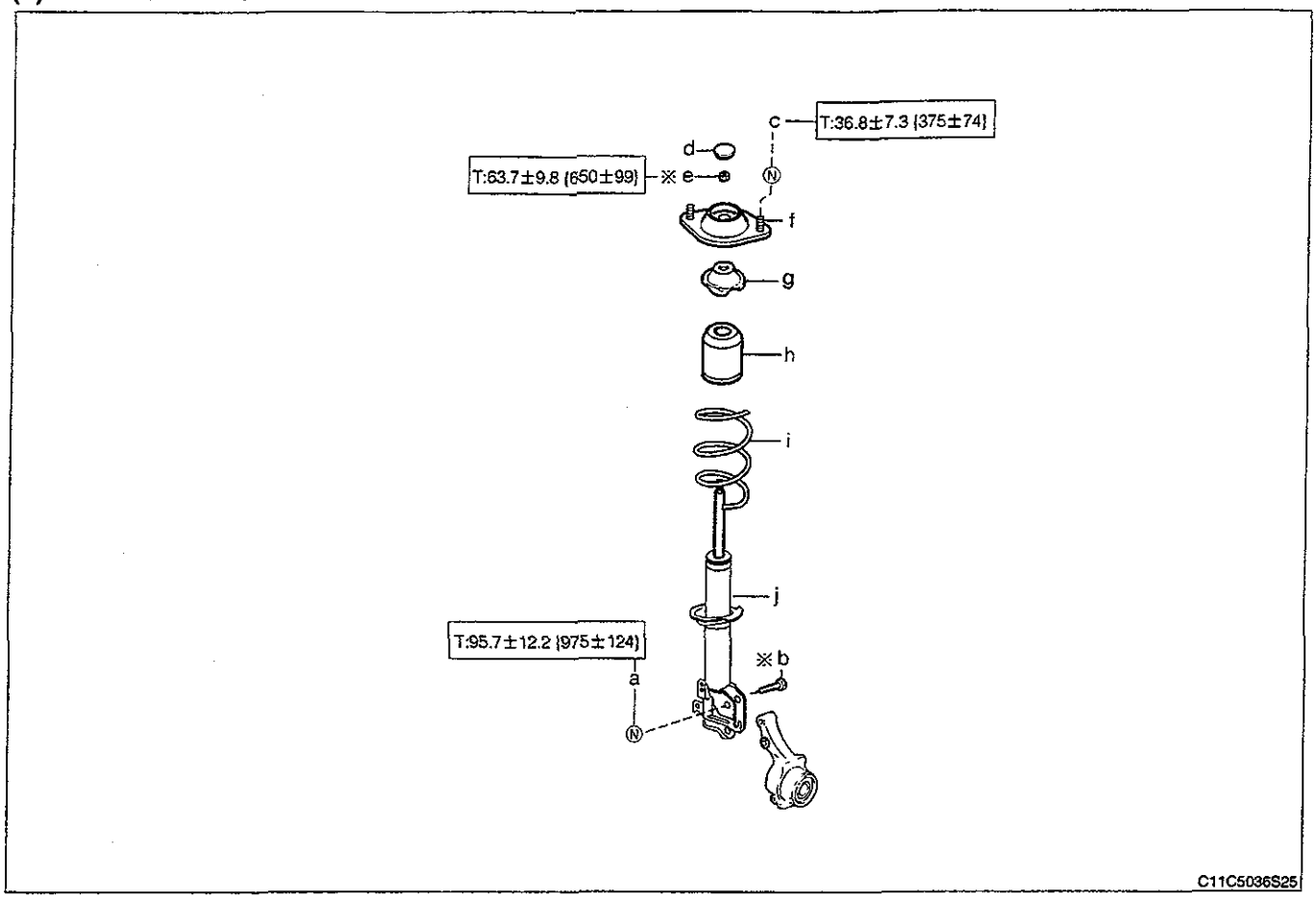
1.Jack up the vehicle.
2.Remove the front disc wheel.
3.Remove the front bumper.
Refer to Page I2-2.

4.Remove the front fender liner and front fender.
Refer to Page I2-23.

5.Remove the clamp of the flexible brake hose.
6.Remove the clamp of the speed sensor harness.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Nut, hexagon
2 b Bolt, hexagon
3 c Nut, hexagon
4 d Cover, bearing dust
5 e Nut, lock
▼ ▲ 6 f Support Ay, front suspension
7 g Seat, front spring damper
8 h Bumper, front spring
▲ 9 i Spring, coil, front
10 j Absorber Ay, front shock

2-1-4 POINTS OF REMOVAL

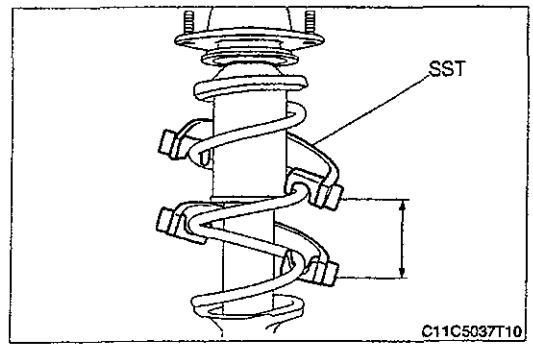
(1) FRONT SUSPENSION SUPPORT AY

1.Install the SST to the coil spring.

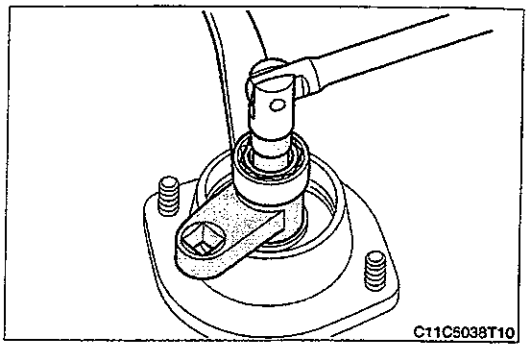
WARNING

- At this time, make sure that the SST is installed in such a way that the distance between the hooks becomes the greatest.
- When compressing the spring, do not use an impact wrench.

SST: 09727-30021-000



2.Remove the lock nut, using the SST.
SST: 09729-97202-000
09729-97203-000

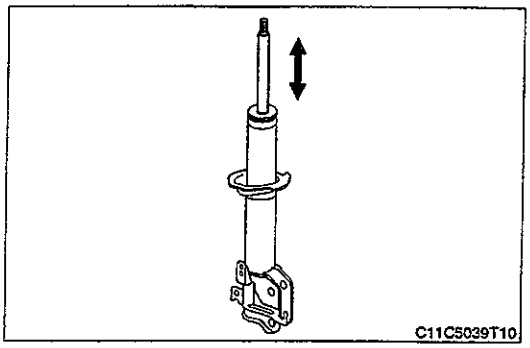


CAUTION
- Do not use an impact wrench to remove the lock nut.
- Only when you are encountered with a difficulty in removing the lock nut because of a broken hexagonal section of the front shock absorber assembly or the SST due to a seizure, etc. of the lock nut, you can use an impact wrench to remove the lock nut.However, in this case, do not reuse the front shock absorber assembly.

2-1-5 INSPECTION

(1) OPERATION CHECK OF SHOCK ABSORBER

Extend and compress the shock absorber.
SPECIFIED VALUE: Ensure that the shock absorber is extended and compressed with a certain resistance and it exhibits no abnormal noise.



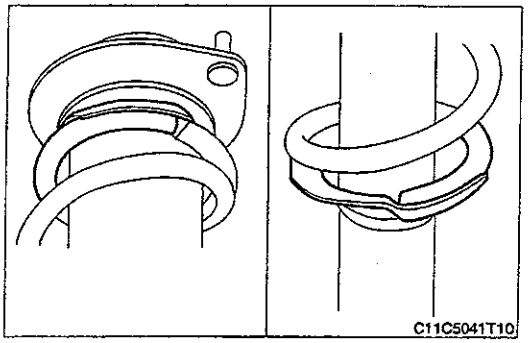
2-1-6 POINTS OF INSTALLATION

(1) COIL SPRING

Install the coil spring to the shock absorber assembly, using the SST.

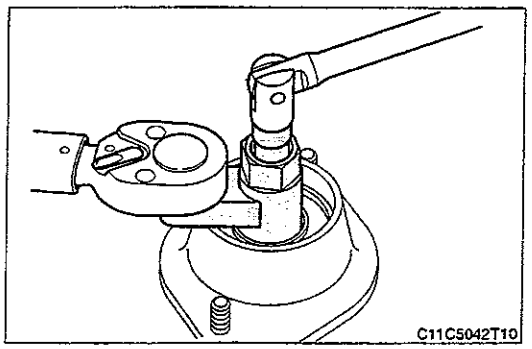
WARNING
- At this time, make sure that the SST is installed in such a way that the distance between the hooks becomes the greatest.
- When compressing the spring, do not use an impact wrench.
- Make sure to align the groove of the spring seats at the upper and lower sides with the edge of the spring.

SST: 09727-30021-000



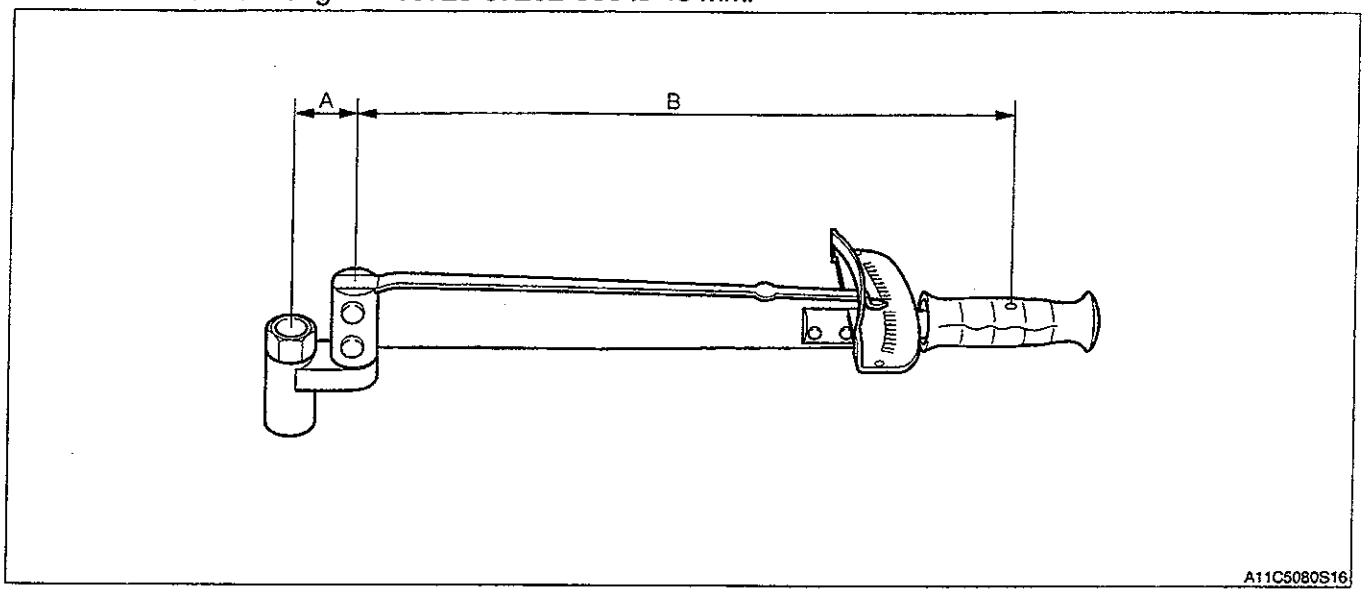
(2) FRONT SUSPENSION SUPPORT AY

1.Install the lock nut, using the SST.
SST: 09729-97202-000
09729-97203-000



CAUTION

- As for the tightening torque to be used when the SST is employed, it is calculated as follows.
- The extended length of 09729-97202-000 is 40 mm.



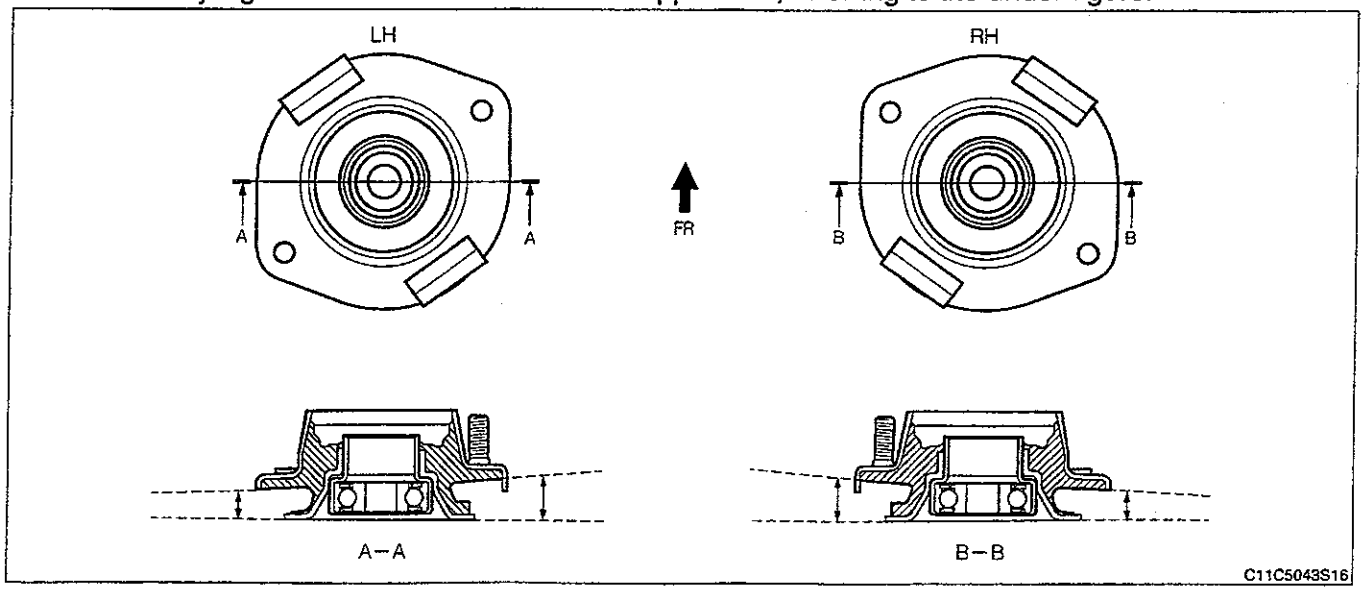
NOTE

- Reading value of torque wrench[N·m]=Effective length of torque wrenchB[m]×Specified torque[N·m]/(Effective length of torque wrench B[m]+Length of extension A[m])
  When the effective diameter of the torque wrench is 380mm:
  Reading value of torque wrench[N·m]=0.38[m]×63.7[N·m]/(0.38[m]+0.04[m])=57.6[N·m]
  Reading value of torque wrench[N·m]=38[cm]×650[kgf·cm]/(38[cm]+4[cm])=588[kgf·cm]

2.Install the front suspension support S/A to the body. At this time, the installation should be carried out in such a way that the side bearing a paint mark comes to the right side of the vehicle.

CAUTION

- If the identification paint mark at the tip-end of the bolt is not clear, the correct installing direction must be judged from the inclination of the support S/A, referring to the under figure.



2-1-7 OPERATION AFTER INSTALLATION

1.Install the clamp of the speed sensor harness.
2.Install the clamp of the flexible brake hose.
3.Install the front disc wheel.
TIGHTENING TORQUE: 103.0±14.7N·m{1050±150kgf·cm}

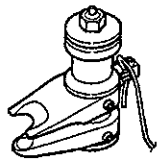
4.Jack down the vehicle.
5.Check the front alignment.

3 FRONT STABILIZER BAR AND FRONT SUSPENSION

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09628-00011-000 (09611-87701-000)	Puller, tie-rod end

Instrument

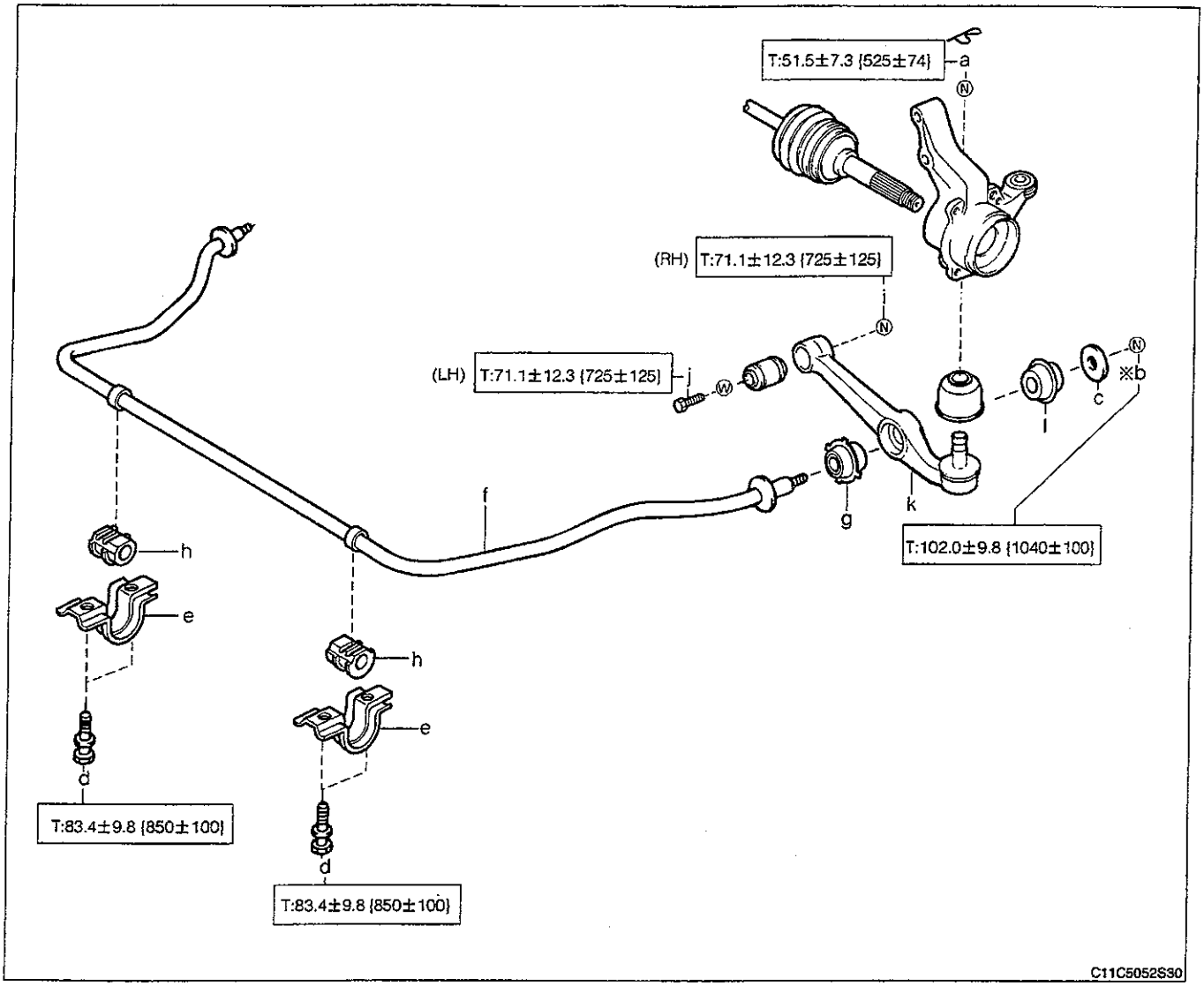
Torque wrench

3-1-2 OPERATION BEFORE REMOVAL

1.Jack up the vehicle.
2.Install the front disc wheel.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

▼ 1 a Nut, hexagon
2 b Nut, lock
3 c Cushion, retainer
4 d Bolt, hexagon
▲ 5 e Bracket, stabilizer
▲ 6 f Bar, stabilizer
7 g Cushion, strut bar
8 h Bush, stabilizer
9 i Nut, hexagon(RH only)
10 j Bolt, hexagon
▲ 11 k Arm S/A, suspension lower arm w/bush
12 l Cushion, strut bar

3-1-4 POINTS OF REMOVAL

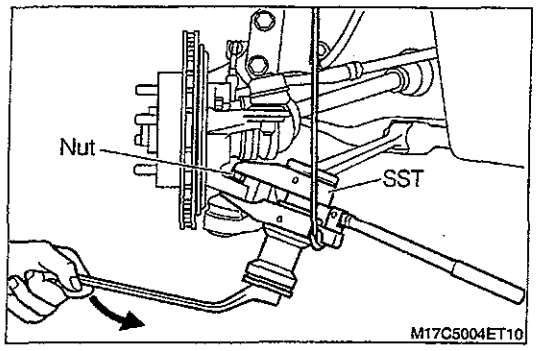
(1) SUSPENSION LOWER ARM S/A

Separate the steering knuckle from the ball joint section of the suspension lower arm subassembly, using the SST.

CAUTION

- When setting the SST, attach a dummy nut to the threaded portion of the suspension lower arm subassembly so that the threaded portion may not be damaged.
- Hang the SST using a cord.

SST: 09628-00011-000

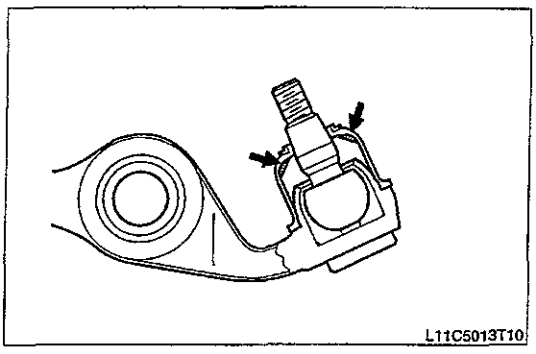


3-1-5 POINTS OF INSTALLATION

(1) SUSPENSION LOWER ARM S/A

1.Fill grease to the arrowheaded point in the lower ball joint dust cover.

LUBRICANT: MP grease

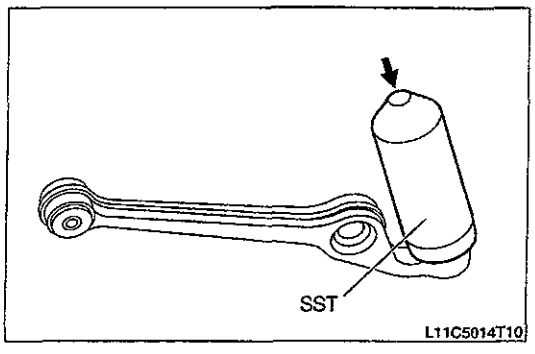


2.Press the dust cover to the lower ball joint of the lower arm, using the SST in combination with a press.

CAUTION

- The press operation is under an unstable state. Hence, full attention must be paid while you are sustaining it by hand.

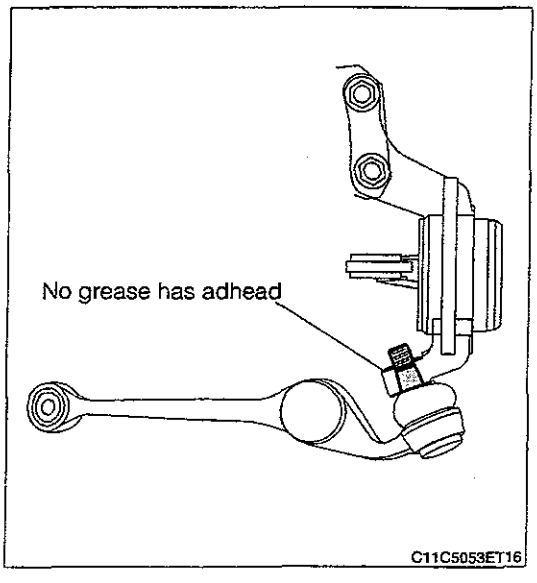
SST: 09618-87301-000



3.Install the lower arm to the knuckle.

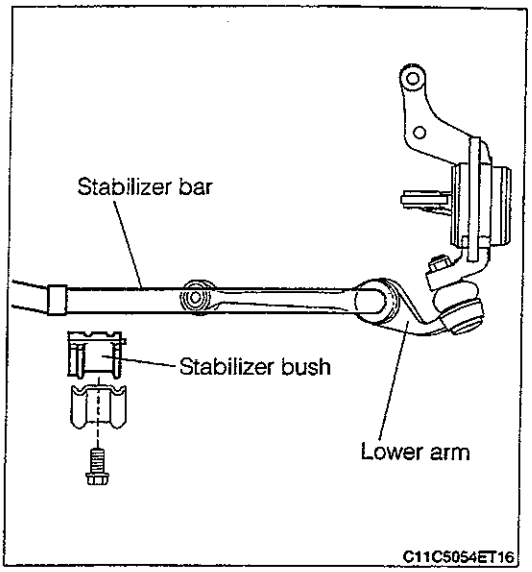
CAUTION

- When assembling, make sure to check to see if any lubricant, such as grease, gets to the threaded portion of the ball stud, taper section and knuckle installing section of of the lower arm. If any lubricant gets to the parts, be sure to degrease it.



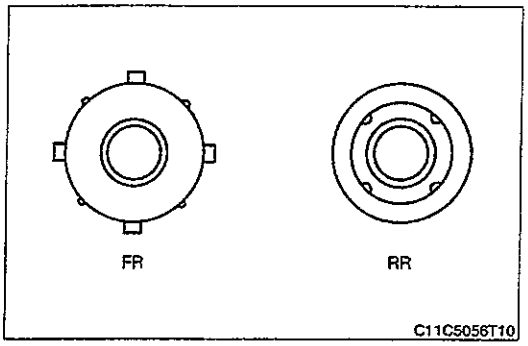
(2) STABILIZER BAR

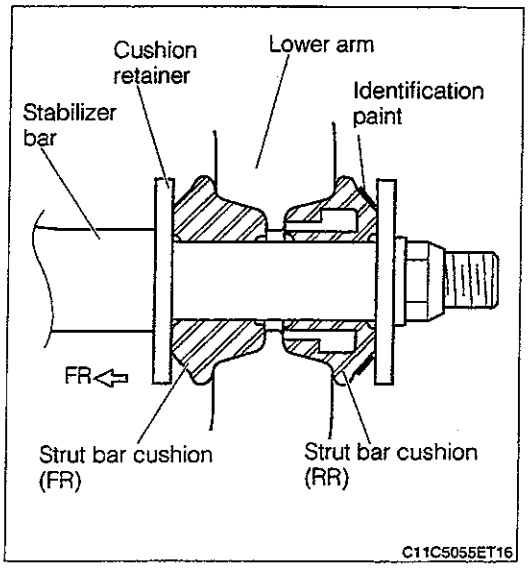
1. Install the stabilizer bush to the stabilizer bar, referring to the right figure.
2. Install the lower arm to the stabilizer bar. However, do not tighten it securely yet.



CAUTION

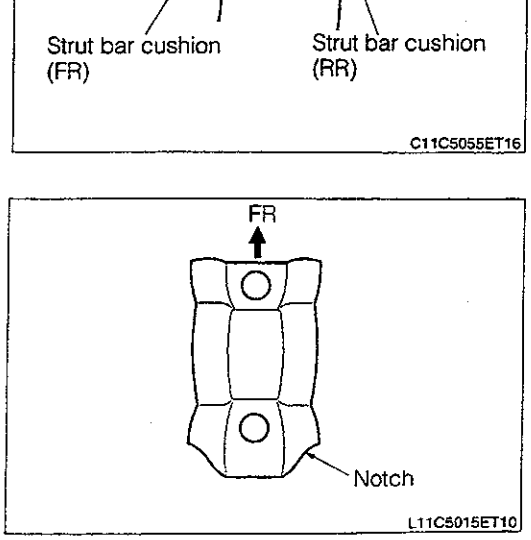
- Different strut bar cushions are used in the front and rear side. Hence, care must be exercised so that they are not installed in a wrong position.
- The strut bar cushion at the rear side of the vehicle has a correct installing direction. Be sure to install this cushion in such a way that the side bearing a paint mark faces the rear side of the vehicle.
- Care must be exercised so that the strut bar cushion may not be caught by the stabilizer bar and cushion retainer.





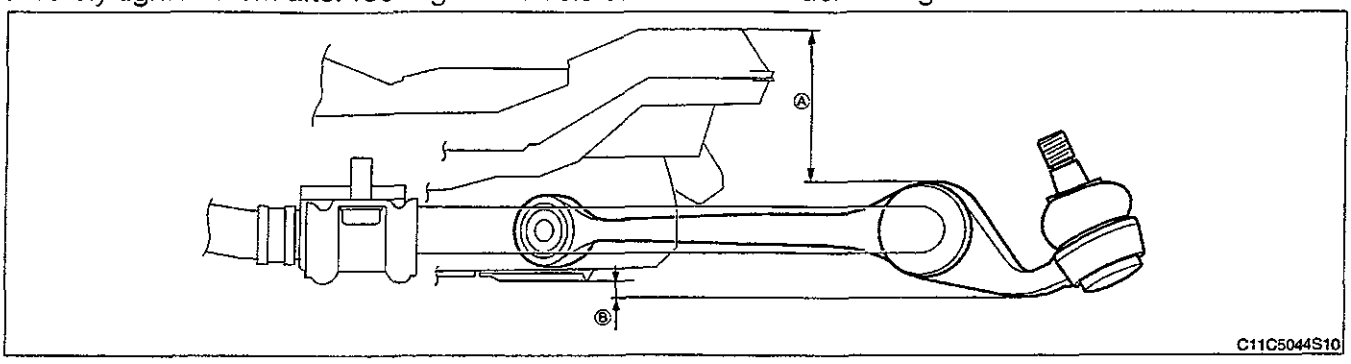
(3) STABILIZER BRACKET

Install the stabilizer bar in such a way that the side having a cut comes at the rear side of the vehicle. Tighten the retaining bolt, while paying attention not to allow the bracket to tilt. Tightening should be made alternately between the front and rear sides a little at a time. Do not tighten the bolt securely yet.



(4) SUSPENSION LOWER ARM S/A·STABILIZER BAR

Tighten the suspension lower arm and stabilizer bar according to the dimensions specified in the drawing. Or temporarily tighten the suspension lower arm and stabilizer bar at this time. Then, later securely tighten them after rocking the vehicle several time under a weighted condition.



SPECIFIED VALUE:

Sections			Dimensions[mm]	
			L880RK−KMVZW	L880RK−KMVZQ
A	Body installation surface at the frame side − upper edge of the lower arm	FR	76.8±5	87.8±5
		RR	25.4±5	36.4±5
B	Lowest edge of the bracket at the frame side	FR	2.8±5	15.8±5
		RR	4.4±5	17.4±5

CAUTION

- The retaining bolt of the right suspension lower arm may be installed either from the front side or from the rear side. However, make sure to install the washer at the nut side and tighten the nut.

3-1-6 OPERATION AFTER INSTALLATION

1.Install the front disc wheel.
TIGHTENING TORQUE: 103.0±14.7N·m{1050±150kgf·cm}

2.Jack down the vehicle.
3.Check the front alignment.

TO INDEX

C2 REAR SUSPENSION

REAR SHOCK ABSORBER AND
REAR COIL SPRING (2WD) ---------- C2 - 1
REMOVAL AND INSTALLATION-------- C2 - 1
DISPOSAL ---------- C2 - 4
REAR SUSPENSION ARM (2WD)------- C2 - 5
REMOVAL AND INSTALLATION-------- C2 - 5
REAR STABILIZER BAR ---------- C2 - 8
REMOVAL AND INSTALLATION-------- C2 - 8

1 REAR SHOCK ABSORBER AND REAR COIL SPRING (2WD)

1-1 REMOVAL AND INSTALLATION

1-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

1-1-2 OPERATION BEFORE REMOVAL

WARNING

- Make sure to observe the jacking points. Failure to observe this caution can cause the vehicle to incline, resulting in hazard potential.

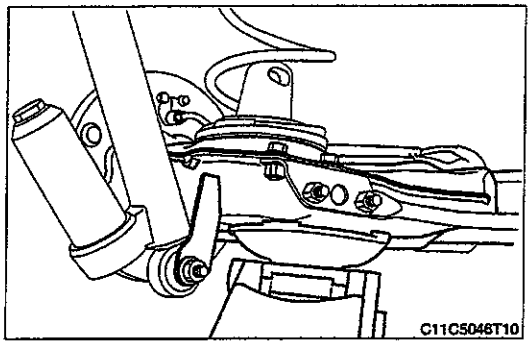
CAUTION

- When jacking up the vehicle, be very careful not to allow any interference with the bumper.

1.Jack up the vehicle.
2.Remove the rear disc wheel.
3.Support the rear suspension arm with the garage jack.

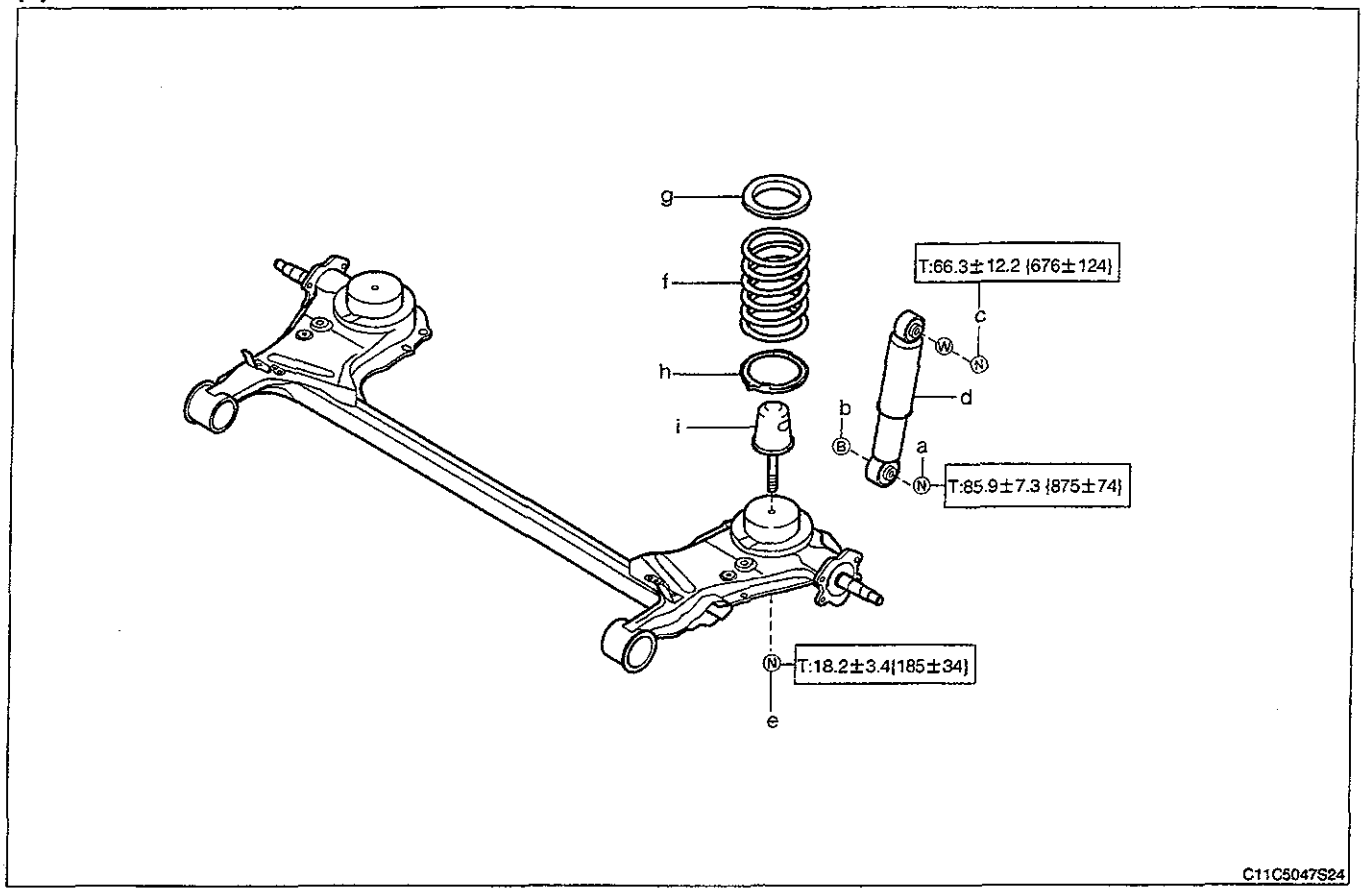
CAUTION

- Be certain to apply the garage jack to the trailing arm section. Never apply the garage jack to the bracket section at the lower side of the shock absorber or to the torsion beam section .
- When applying a garage jack to the suspension arm, be sure to interpose cloth or the like so as not to scratch the parts.



1-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Nut, hexagon
2 b Bolt, hexagon
3 c Nut
▲ 4 d Absorber Ay,shock rear
5 e Nut, hexagon
▼ ▲ 6 f Spring,coil,rear
7 g Seat,rear spring,upper
8 h Seat,rear spring,under
9 i Bumper,rear,spring

1-1-4 POINTS OF REMOVAL

(1) REAR COIL SPRING

When you remove the rear coil spring, be sure to gradually lower the jack supporting the suspension arm, after the rear spring bumper has been disconnected from the suspension arm.

NOTE

- If the rear spring bumper has been disconnected from the suspension arm, this will facilitate the spring removal.

1-1-5 INSPECTION

1.Extend and compress the shock absorber. If any abnormality is present, replace the shock absorber.
SPECIFIED VALUE: When the shock absorber is compressed by hand, ensure that it can be compressed with a certain resistance, but without binding. When you release your hand after compressing the shock absorber, ensure that it is extended at a constant speed by itself.

2.Check the spring for cracks, wear and damage. If any damage is present, replace the spring.

1-1-6 POINTS OF INSTALLATION

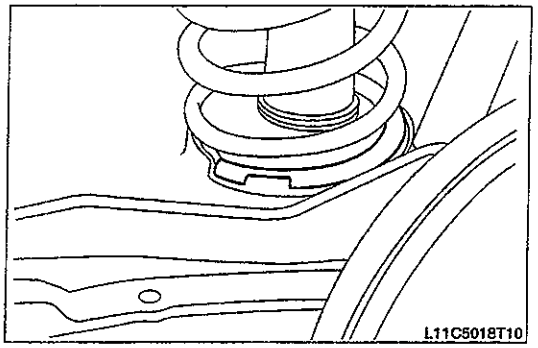
(1) REAR SHOCK ABSORBER AY

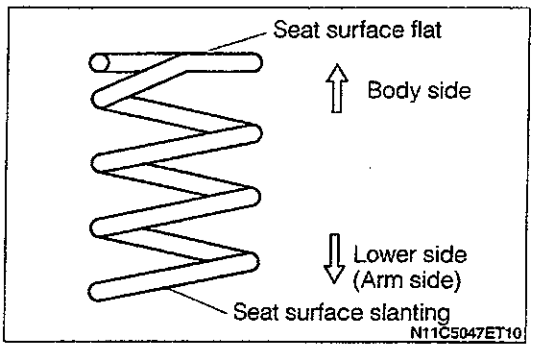
Place the rear coil spring at the specified position. Then, slowly raise the jack that is supporting the suspension arm to compress the spring. Lift up the suspension arm to a position where the shock absorber can be installed and, then, install the shock absorber.

(2) REAR COIL SPRING

CAUTION

- Install the lower edge of the spring by aligning it with the groove of the suspension arm.
- Set the upper and lower sections of the spring, as indicated in the figure on the right.





1-1-7 OPERATION AFTER INSTALLATION

1.Remove the garage jack.

2.Install the rear disc wheel.

TIGHTENING TORQUE: 103.0±14.7N·m{1050±150kgf·cm}

3.Jack down the vehicle. Rock the vehicle up and down several times so that the suspensions may be settled.

4.Under a condition where the vehicle weight is applied, tighten the attaching bolts and nuts of the rear shock absorber to the specified torque.

1-2 DISPOSAL

1-2-1 Disposal Procedure

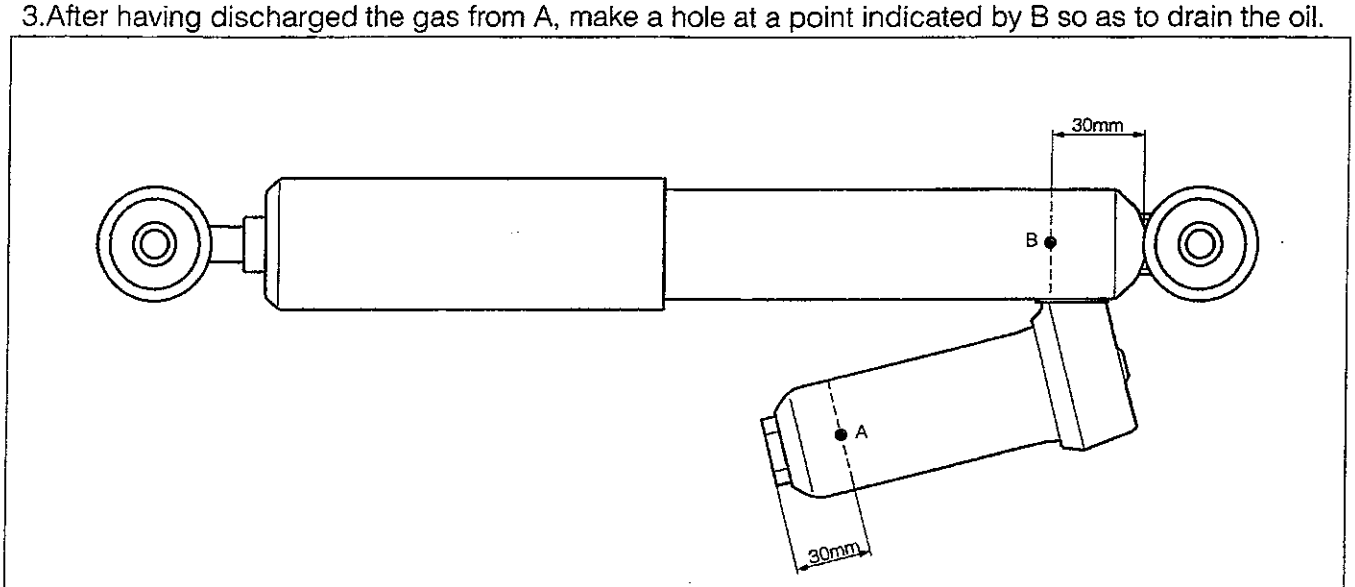
Disposal Procedure

(1) Mono-tube type shock absorber with a separate tank

WARNING

- The gas is colorless, odorless and not harmful. However, the pressure of gas being released may fly off chips, etc. Hence, take a measure to prevent scattering of chips, such as putting a cloth on the metal saw. Furthermore, care must be exercised for safety precautions for the drilling operation, such as wearing safety goggles.
- As for the mono-tube type shock absorber with a separate tank, be sure to observe the correct drilling procedure.

1.Put it horizontally with the rod in an extended state.
2.In order to discharge the gas, make a hole at a point indicated by A in the figure, using a metal saw.
3.After having discharged the gas from A, make a hole at a point indicated by B so as to drain the oil.



2 REAR SUSPENSION ARM (2WD)

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

2-1-2 OPERATION BEFORE REMOVAL

WARNING

- Make sure to observe the jacking points. Failure to observe this caution can cause the vehicle to incline, resulting in hazard potential.

CAUTION

- When jacking up the vehicle, be very careful not to allow any interference with the bumper.

1.Jack up the vehicle.
2.Remove the rear disc wheel.
3.Remove the rear shock absorber and spring.
Refer to Page C2-1.

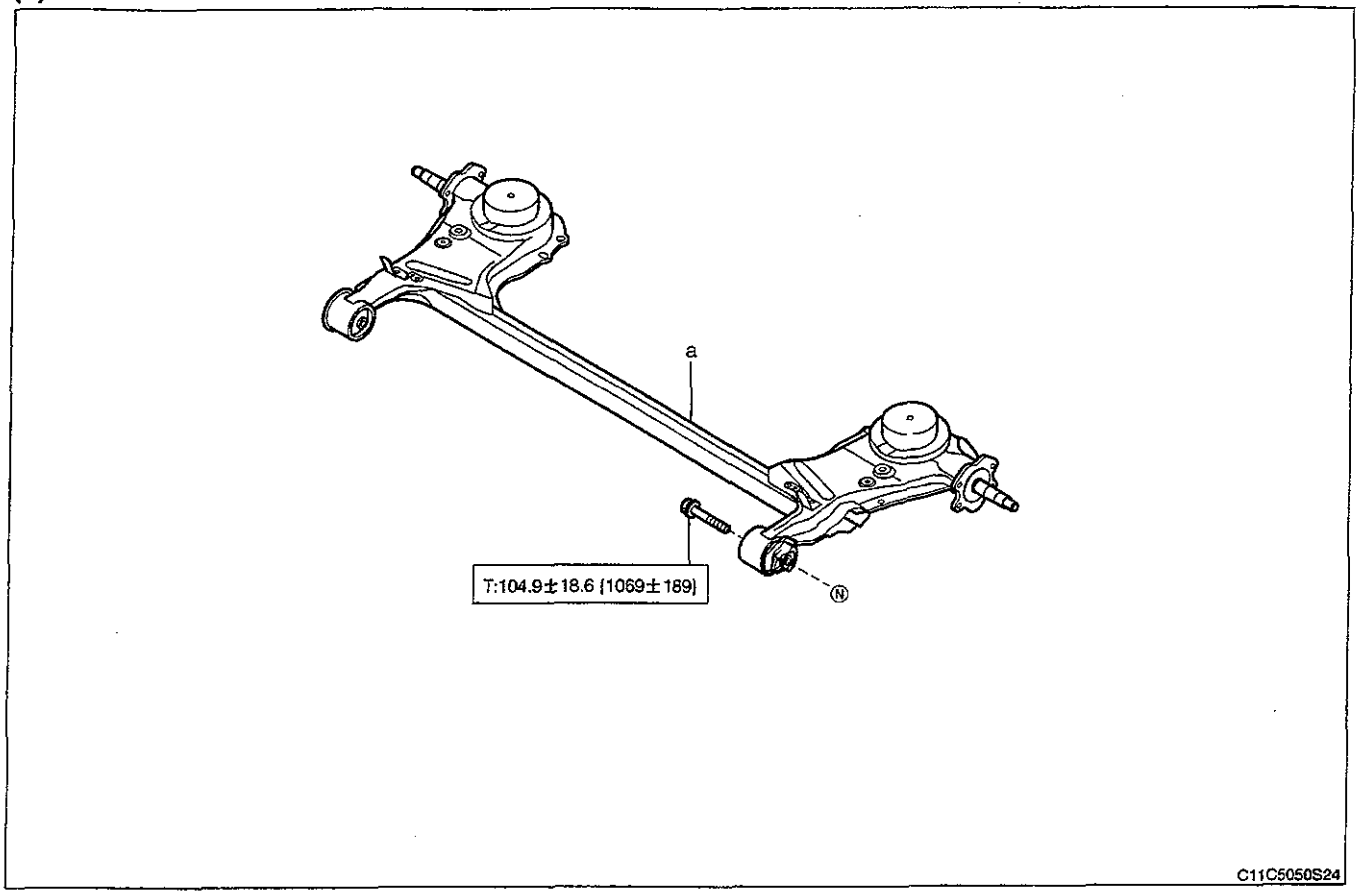
4.Remove the rear brake.
Refer to Page E1-26.

5.Remove the rear wheel speed sensor from the rear suspension arm.
Refer to Page E3-6.

6.Remove the parking brake cable assembly from the rear suspension arm.
Refer to Page E2-2.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

▲ 1 a Arm Ay,rear suspension

2-1-4 POINTS OF INSTALLATION

When installing the suspension arm to the vehicle, temporarily tighten the bolts and nuts in advance.

2-1-5 OPERATION AFTER INSTALLATION

1. Install the parking brake cable assembly to the rear suspension arm.
   Refer to Page E2-2.

2. Install the rear wheel speed sensor to the rear suspension arm.
   Refer to Page E3-6.

3. Install the rear brake.
   Refer to Page E1-26.

4. Install the rear shock absorber and rear spring.
   Refer to Page C2-1.

CAUTION

- **Temporarily tighten the rear shock absorber in advance.**

5. Install the rear disc wheel.
   TIGHTENING TORQUE: 103.0±14.7N·m{1050±150kgf·cm}

6. Jack down the vehicle. Rock the vehicle up and down several times so that the suspensions may be settled.
7. Under a condition where the vehicle weight is applied, tighten the attaching bolts and nuts of the rear suspension arm and rear shock absorber to the specified torque.

3 REAR STABILIZER BAR

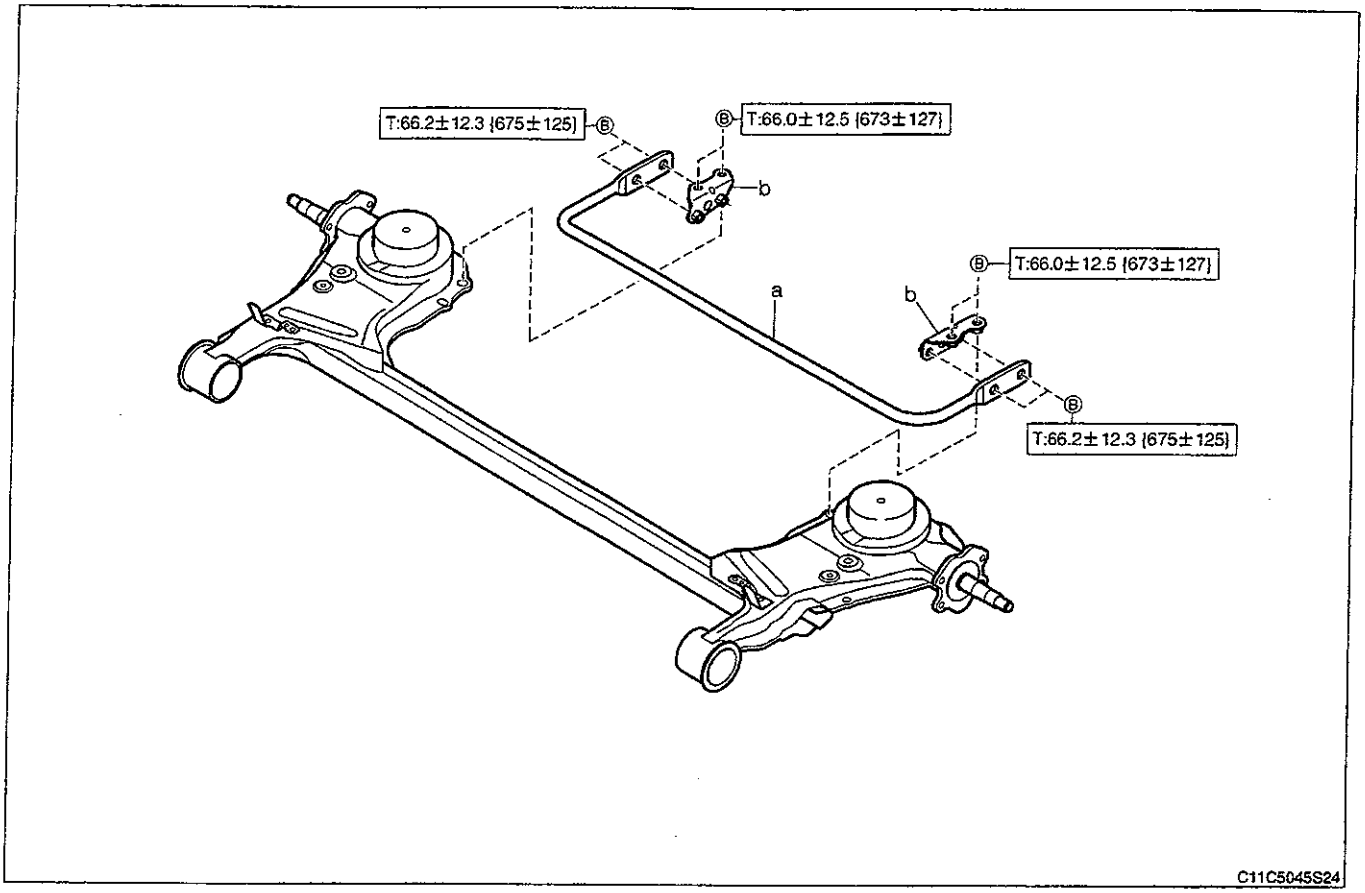
3-1 REMOVAL AND INSTALLATION

Instrument

Torque wrench

3-1-1 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Bar,rear stabilizer
2 b Bracket

TO INDEX

C3 WHEEL & TIRE

TIRE PUNCTURE REPAIR AGENT------- C3 - 1
DRAINING---------- C3 - 1

1 TIRE PUNCTURE REPAIR AGENT

1-1 DRAINING

1-1-1 BRIEF DESCRIPTION

When you repair or replace a tire for which the repair tire kit (tire puncture emergency repair set) has been used, it is necessary to drain any repair agent remaining inside the tire.

1-1-2 ARTICLE TO BE PREPARED

Lubricant,adhesive,others

Empty repair agent bottle(with cap),Vinyl hose

1-1-3 ITEMS TO BE OBSERVED

CAUTION

- Care must be exercised not to allow the repair agent to flow from the tire during the operation.

1-1-4 DRAINING PROCEDURE

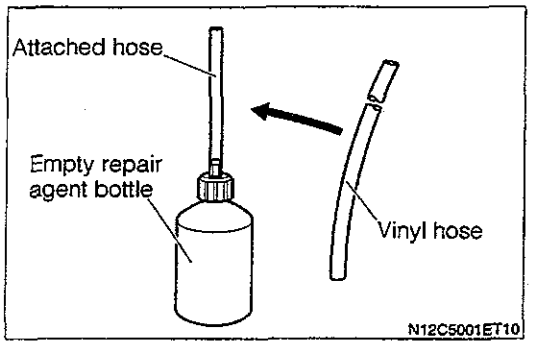
1.Take out the tire from the vehicle that has undergone the puncture emergency repair.

2.Drop the bead to the inside of the rim.

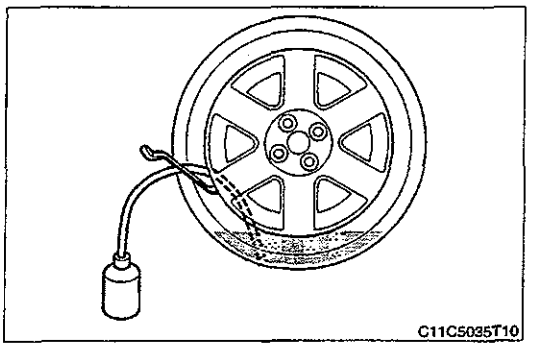
NOTE

- If any difficulty is encountered in dropping the bead from the rim, pour detergent solvent diluted with water into between the bead and the rim.

3.Detach the attached hose from the empty repair agent bottle. Install a prepared vinyl hose with an inner diameter ϕ 7 to 8 mm and a length of about 600 mm.



4.With the tire erected, insert a tool, etc. into between the bead and the rim to make a gap. Insert a vinyl hose into the gap so that the tip-end of the vinyl hose may be submerged into the repair agent liquid.

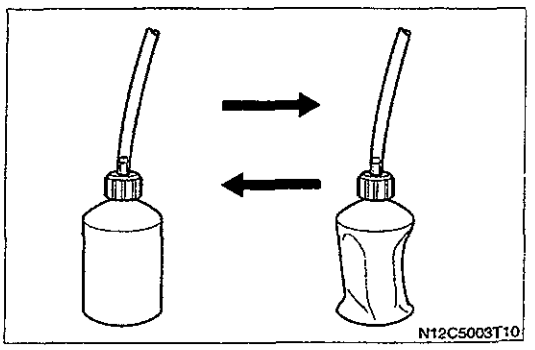


5.Squeeze the empty repair agent bottle so as to push out the inner air so as to suck the repair agent.

NOTE

- Put the tire on a bench, etc. so that the tire may be set at a higher level than the repair agent bottle. This will make the work more easily.

6.Repeat the operation in Step 5 until it is no longer possible to suck the repair agent, by changing the position of the vinyl hose.



1-1-5 OPERATION AFTER DRAINING

Remove the tire from the disc wheel. Wipe off any remaining repair agent.
When you are able to locate the puncture hole, carry out an ordinary puncture repair.
If you can not locate the puncture hole, replace the tire.

1-1-6 DISPOSAL

Be sure to dispose the drained repair agent as waste oil.

TO INDEX

D SERVICE SPECIFICATIONS

Maintenans specified value---------- D - 1
Tightening Torque---------- D - 3

D-1

1 Maintenans specified value

Camshaft

		Specified value	Allowable limit	Applicable
Deformation (mm)		–	0.03	
Cam lobe height (mm)	IN	33.86-33.94	33.81	
	EX	33.21-33.29	33.16	
Backlash (mm)		0.13-0.23	0.30	
Thrust clearance (mm)		0.06-0.16	0.18	
Journal outer diameter (mm)	Camshaft	22.979-22.995	–	
	Cylinder head	23.032-23.052	–	
Oil clearance (mm)		0.037-0.073	0.10	

Cylinder head

			Specified value	Allowable limit	Applicable
Flatness	Block surface		–	0.10	
	Manifold surface		–	0.10	
Valve seat	Contact width (mm)	IN	1.2-1.6	–	
		EX	1.2-1.6	–	
	Contact width (°)	IN	–	20-45-70	
		EX	–	20-45-70	

Valve spring

	Specified value	Allowable limit	Applicable
Squareness	1.4	1.6	
Free length (mm)	42.1	–	White paint
	41.56	–	Light green paint

Valve

		Specified value	Allowable limit	Applicable
Contact width (mm)	IN	1.2-1.6	–	
	EX	12.-1.6	–	
Valve head stock thickness (mm)		0.8-1.2	0.75	
Overall length (mm)	IN	92.75-93.25	92.6	
	EX	94.65-95.15	94.5	
Stem outer diameter (mm)	IN	4.465-4.480	–	
	EX	4.455-4.470	–	

Valve guid bush

		Specified value	Allowable limit	Applicable
Bush diameter (mm)	IN	4.500-4.512	–	
	EX	4.500-4.512	–	
Stem×Bush of clearance (mm)	IN	0.020-0.047	0.06	
	EX	0.03-0.057	0.08	
Valve guid bush O/S (mm)		–	–	0.03

Cylinder block

	Specified value	Allowable limit	Applicable
Head for deformation (mm)	0.05	0.08	
Cylinder bore diameter wear amount (mm)	–	0.2	
Sylinder of true roundness(°)	–	0.03	

Piston , Piston ring

		Specified value	Allowable limit	Applicable
Oil clearance(Sylinder×Piston)(mm)		0.025-0.045	0.10	
Oil clearance(Piston×Pin)(mm)		0.005-0.011	–	
Piston ring groove-to-ring clearance (mm)	Compression ring No.1	0.07-0.105	0.12	
	Compression ring No.2	0.02-0.06	0.11	
Ring end gap (mm)	Compression ring No.1	0.25-0.38	0.50	
	Compression ring No.2	0.38-0.53	0.65	
	Oil	0.15-0.45	0.60	
Piston W/Pin O/S(mm)		–	–	0.25 0.50
Piston ring O/S(mm)		–	–	0.25 0.50

Connecting rod

	Specified value	Allowable limit	Applicable
Thrust clearance (mm)	0.15-0.40	0.45	
Oil clearance (mm)	0.02-0.044	0.07	

Crankshaft

		Specified value	Allowable limit	Applicable
Thrust clearance (mm)		0.02-0.22	0.3	
Oil clearance (mm)		0.020-0.044	0.07	
Check of bend (mm)		–	0.03	
Check of journal wear (mm)	True round-ness	–	0.01	
	Taper	–	0.01	
Check of pin journal wear (mm)	True round-ness	–	0.01	
	Taper	–	0.01	

Oil pump

	Specified value	Allowable limit	Applicable
Tip clearance(mm)	0.02-0.14	0.2	
Body clearance (mm)	0.09-0.25	0.2	
Side clearance (mm)	0.035-0.085	0.1	
Relief valve spring (mm)	57	–	

2 Tightening Torque

Components	Tightening Torque (N·m{kg·cm})
Cylinder head × Cylinder block	34.0{350}90° $^{+10°}_{-0°}$, Wet (angle)
Cylinder head × Cylinder head cover	11.0±2.2{112±22}
Cylinder block × Crankshaft bearing cap	59.0±6.0{600±60} Wet
Oil seal retainer × Cylinder block	8.5±2.5{85±25}
Cylinder block drain plug	39.0±7.8{400±80}
Connecting rod × Connecting rod cap	38.0±4.0{390±40} Wet
Crankshaft × Crank pulley	103.0±10.0{1,050±100}
Camshaft × Camshaft timing sprocket	98.0±10.0{1,000±100}
Cylinder head × Camshaft bearing cap	12.5±2.0{130±20}
Timing chain guid × Cylinder block	19.0±3.8{195±39}
Timing chain tensioner arm × Cylinder block	19.0±3.8{195±39}
Chain tensioner plunger × Cylinder block	9.0±2.0{90±18}
Oil pump × Cylinder block	14.0±2.8{145±29}
Oil pump × Cylinder head	21.0±4.0{210±42}}
Oil strainer × Oil pump , Cylinder block	8.5±2.5{85±25}
Oil chain nozzle × Cylinder block	8.5±2.5{85±25}
Oil pan	8.5±2.5{85±25}
Water pump × Oil pump , Cylinder block	14.0±3.0{145±29}
Water pump pully × Water pump	8.5±2.5{85±25}

TO INDEX

D2 DRIVE SHAFT/PROPELLER SHAFT/AXLE

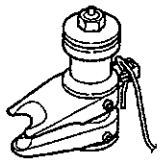
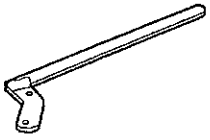
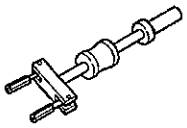
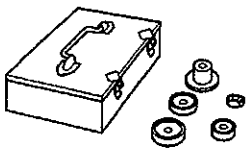
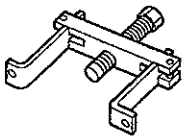
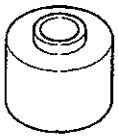
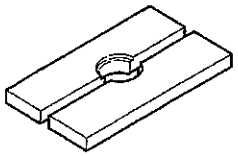
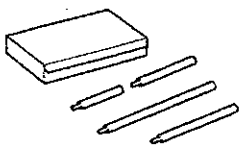
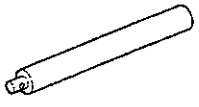
FRONT AXLE ---------- D2 - 1
REMOVAL AND INSTALLATION-------- D2 - 1
FRONT DRIVE SHAFT ---------- D2 - 8
REMOVAL AND INSTALLATION-------- D2 - 8
DISASSEMBLING AND
ASSEMBLING ---------- D2 - 12
REAR AXLE BEARING (2WD) ---------- D2 - 17
REMOVAL AND INSTALLATION ------ D2 - 17

1 FRONT AXLE

1-1 REMOVAL AND INSTALLATION

1-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09628-00011-000 (09611-87701-000)	Puller, tie-rod end
	09511-87202-000	Wrench rear axle bearing lock nut
	09520-00031-000 (09520-00030-000)	Puller, rear axle shaft
	09550-10013-000 (09550-10012-000)	set, replacer B
	09950-97201-000 (09950-20017-000)	Puller, universal
	09510-87301-000	Puller, axle shaft
	09506-87302-000	Replacer, differential drive pinion bearing corn, rear
	09527-87301-000	Remover, rear axle shaft bearing
	09950-70010-000	Set, handle
	09951-07200-000 (09631-00020-000)	Handle

Tool

Snap ring expander

Instrument

Dial gauge,Torque wrench

Lubricant,adhesive,others

MP grease

1-1-2 OPERATION BEFORE REMOVAL

1.Lift up the vehicle.
2.Remove the front wheel.
3.Remove the stabilizer bar.
Refer to Page C1-11.

4.Remove the front speed sensor.
5.Remove the front disc brake caliper assembly and hang it, using a wire or the like.
Refer to Page E1-20.

CAUTION

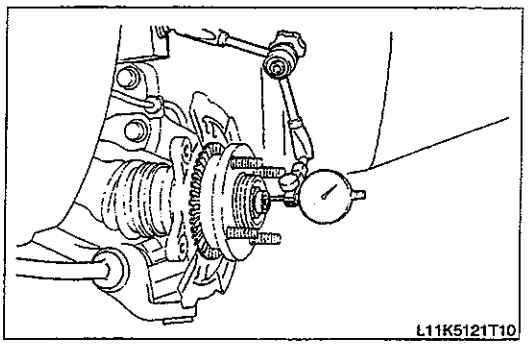
- **Be very careful not to damage the flexible hose.**

6.Remove the brake disc.

1-1-3 INSPECTION

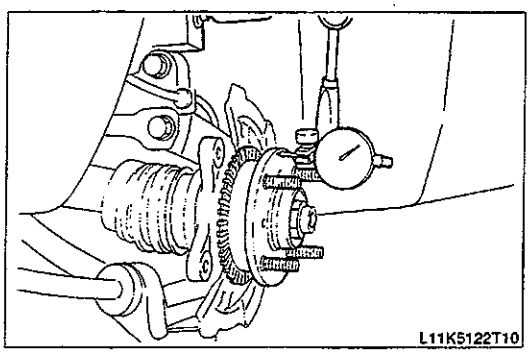
(1) Check of bearing for axial play

1.Set a dial gauge to a point on the periphery at the tip-end of the drive shaft. Check the bearing for axial play.
If the play exceeds the limit, replace the axle hub and radial ball bearing.
ALLOWABLE LIMIT: 0.05mm



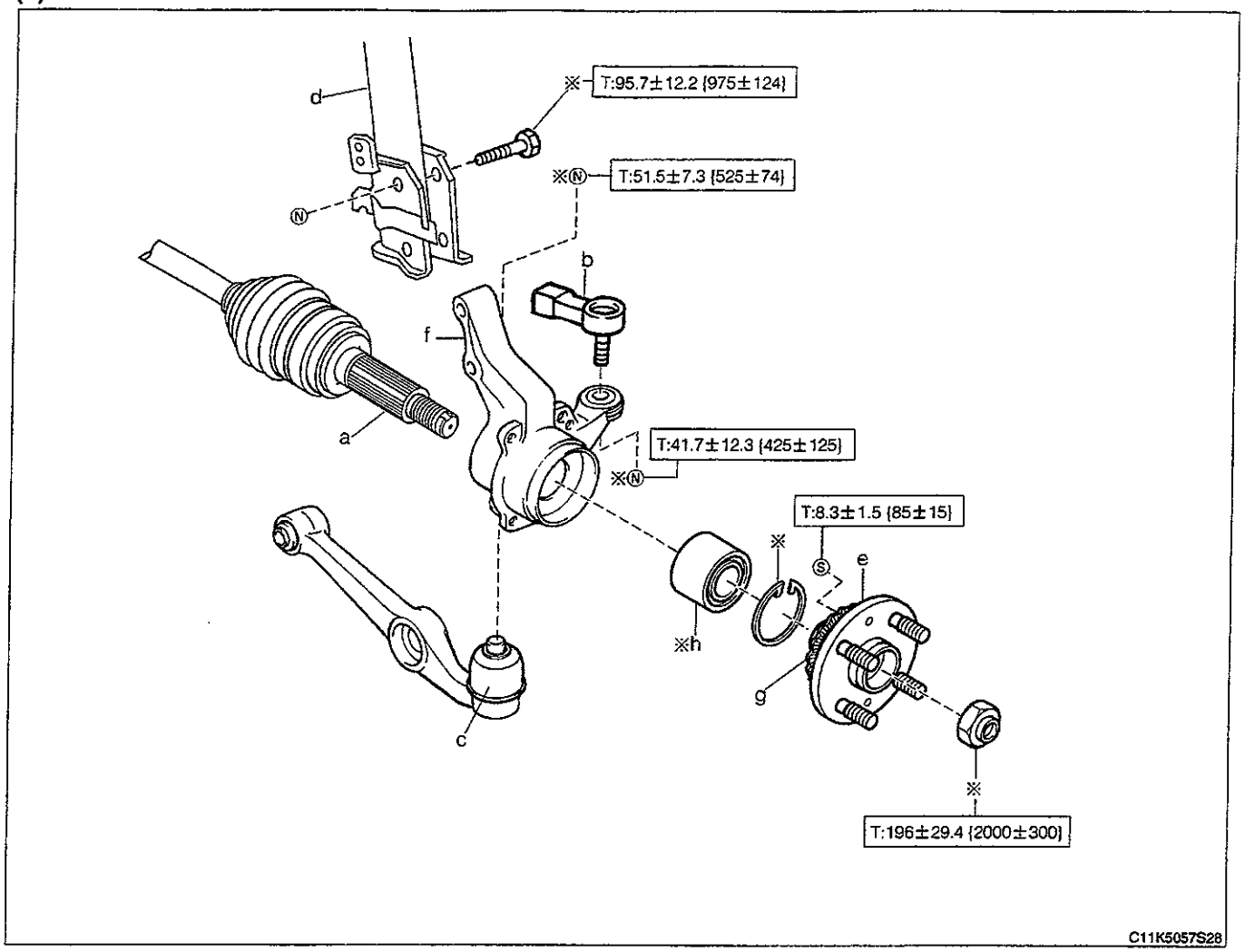
(2) Check of front axle runout

1.Set a dial gauge to the outer periphery of the axle hub. Turn the axle hub to check the runout.
If the runout exceeds the limit, replace the axle hub and radial ball bearing.
ALLOWABLE LIMIT: 0.05mm



1-1-4 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non - reusable parts

Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

▼ ▲ 1 a Shaft Ay, front drive
▼ 2 b End S/A, tie rod
▼ ▲ 3 c Arm S/A, suspension lower w/bush
▼ 4 a Shaft Ay, front drive
5 d Absorber Ay, front shock
▼ ▲ 6 e Hub S/A, front axle
7 f Knuckle, steering
8 g Rotor, skid control sensor
▼ ▲ 9 h Bearing, radial ball

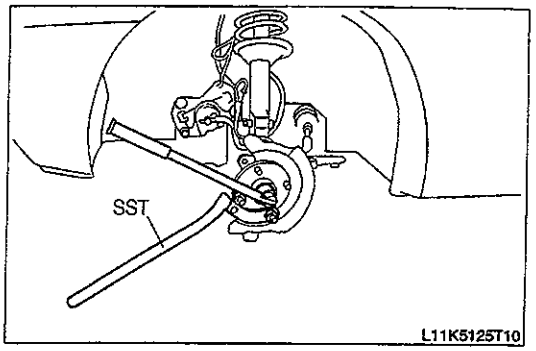
1-1-5 POINTS OF REMOVAL

(1) FRONT DRIVE SHAFT

1.Remove the nut.

(1) Release the staked portion, using a chisel or the like.

(2) Remove the nut, using the SST.
SST: 09511-87202-000

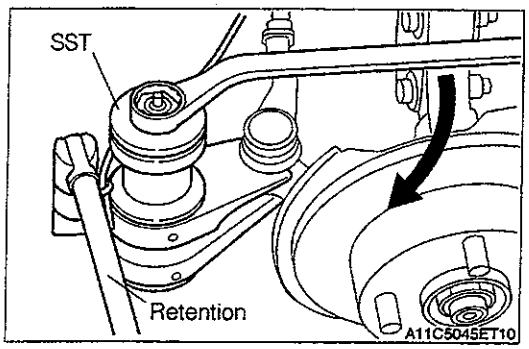


(2) TIE ROD END S/A

1.Disconnect the tie rod end S/A from the steering knuckle, using the SST.
SST: 09628-00011-000

CAUTION

- When the SST is to be installed, install a dummy nut to the threaded section of the tie rod end so that the threaded section may not be damaged.
  Hang the SST, using a cord.

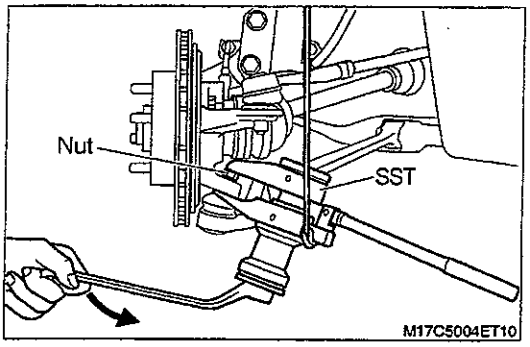


(3) SUSPENSION LOWER ARM S/A

1.Remove the lower arm ball joint, using the SST.
SST: 09628-00011-000

CAUTION

- When the SST is to be installed, install a dummy nut to the threaded section of the lower arm so that the threaded section may not be damaged.
- .Hang the SST, using a cord.

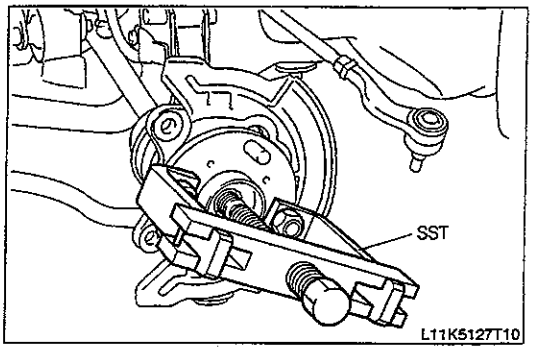


(4) FRONT DRIVE SHAFT

1.Disconnect the front axle hub S/A with steering knuckle from the drive shaft, using the SST.
SST: 09510-87301-000

CAUTION

- Hang the drive shaft by means of wire or the like.



(5) FRONT AXLE HUB

1.Remove the front axle hub S/A with steering knuckle from the shock absorber.

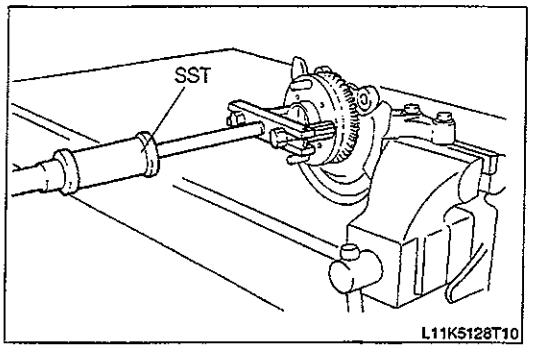
CAUTION

- The bolt is a nonreusable part.

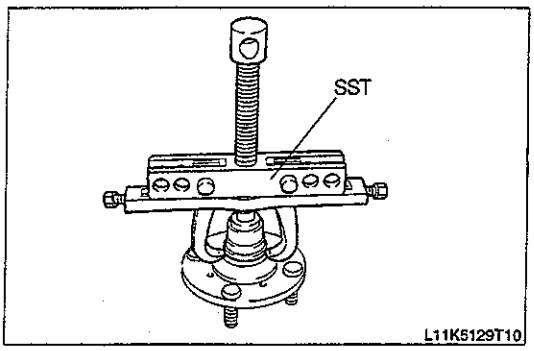
2.Remove the front axle hub S/A.

(1) Secure the front axle hub S/A with steering knuckle in a vice by means of the bolt that was used to attach the steering knuckle to the shock absorber.

(2) Remove the front axle hub S/A from the front axle hub S/A with steering knuckle, using the SST.
SST: 09520-00031-000
(3) Remove the skid control sensor rotor.

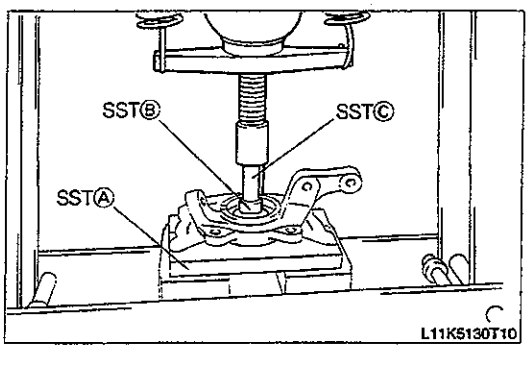


(4) Remove the radial ball bearing inner race, using the SST.
SST: 09950-97201-000



(6) RADIAL BALL BEARING

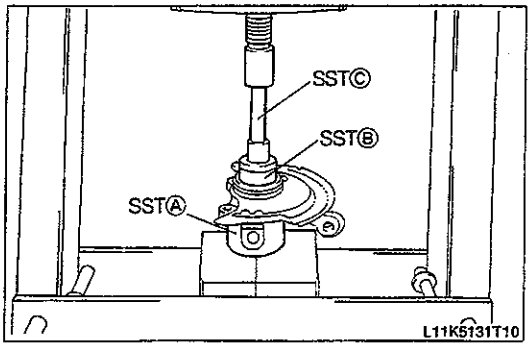
1.Detach the hole snap ring, using a snap ring expander.
2.Remove the radial ball bearing, using the SST in combination with a press.
SST: 09527-87301-000
09550-10013-000[09556-10011-000]
09950-70010-000[09951-07200-000]



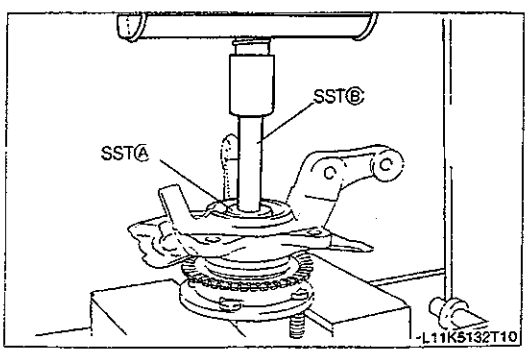
1-1-6 POINTS OF INSTALLATION

(1) RADIAL BALL BEARING

1.Press the radial ball bearing to the steering knuckle S/A, using the SST in combination with a press. Install the hole snap ring.
SST: 09506-87301-000
09550-10013-000[09554-10011-000]
09950-70010-000[09951-07200-000]
2.Install the skid control sensor rotor.



3.Press the front axle hub S/A into the steering knuckle, using the SST in combination with a press.
SST: 09550-10013-000[09556-10011-000]
09950-70010-000[09951-07200-000]

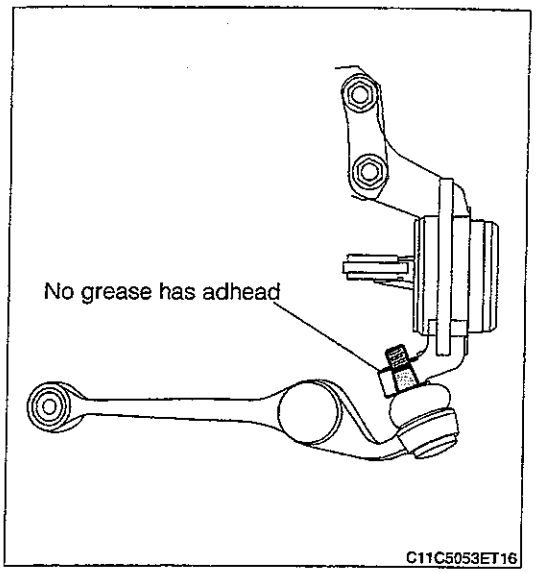


(2) SUSPENSION LOWER ARM S/A

1.Install the lower arm to the knuckle.

CAUTION

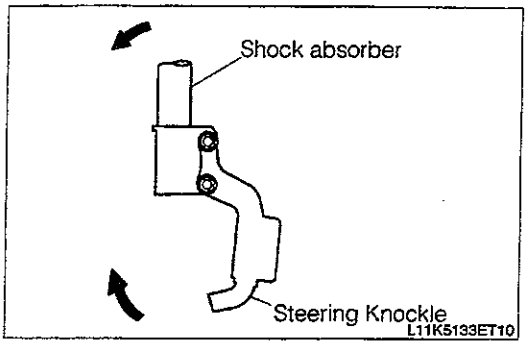
- When assembling, make sure to check to see if any lubricant, such as grease, gets to the threaded portion of the ball stud, taper section and knuckle installing section of the lower arm. If any lubricant gets to the parts, be sure to degrease it.



2.Install the front axle hub Ay with knuckle to the shock absorber, while inserting the drive shaft.

CAUTION

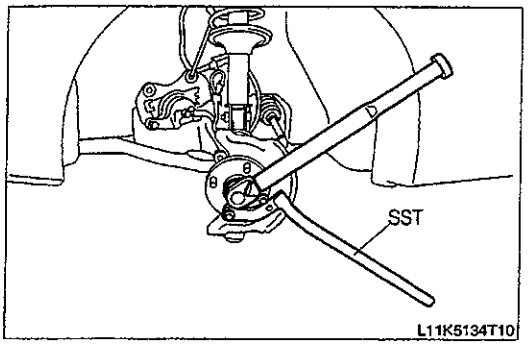
- The tightening should be made while any looseness of the bolt hole is brought to the arrow-headed direction in the figure.
- Use new bolts and nuts.
- Do not pull out the drive shaft beyond the required extent.



(3) FRONT DRIVE SHAFT

1.Install the nut.

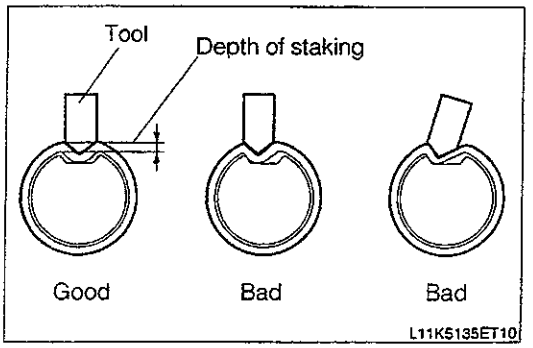
(1) Tighten the nut to the specified torque, using the SST.
SST: 09511-87202-000



(2) Using a chisel, firmly stake the tip-end of the front drive shaft and nut, as indicated in the right figure.

CAUTION

- The staked section of the nut and the threaded section of the drive shaft should not exhibit cracks. (Peeling-off of the nut plating is permissible.)
  As for the staking direction, the staking depth of the drive shaft is $3.5^{+1.5}_{-0.5}$mm in the center direction.



1-1-7 OPERATION AFTER INSTALLATION

1.Install the brake disc.
2.Install the front disc brake caliper assembly.
Refer to Page E1-20.

3.Install the front speed sensor.
4.Install the front stabilizer bar.
Refer to Page C1-11.

5.Install the front wheel.
TIGHTENING TORQUE: 103.0±14.7N·m {1050±150kgf·cm}

6.Check the front alignment.
Refer to Page C1-1.

7.Lift down the vehicle.

2 FRONT DRIVE SHAFT

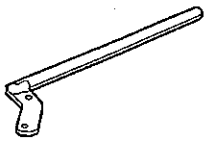
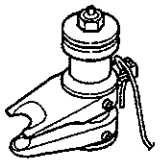
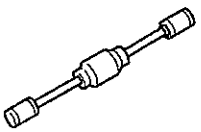
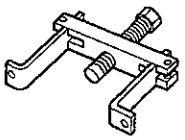
2-1 REMOVAL AND INSTALLATION

WARNING

- Do not carry out the operation while the exhaust pipe is still hot, for there is a possibility of getting scalded.

2-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09511-87202-000	Wrench rear axle bearing lock nut
	09628-00011-000 (09611-87701-000)	Puller, tie-rod end
	09912-87301-000	Puller, slide hammer
	09510-87301-000	Pulier, axle shaft

Instrument

Torque wrench

Lubricant,adhesive,others

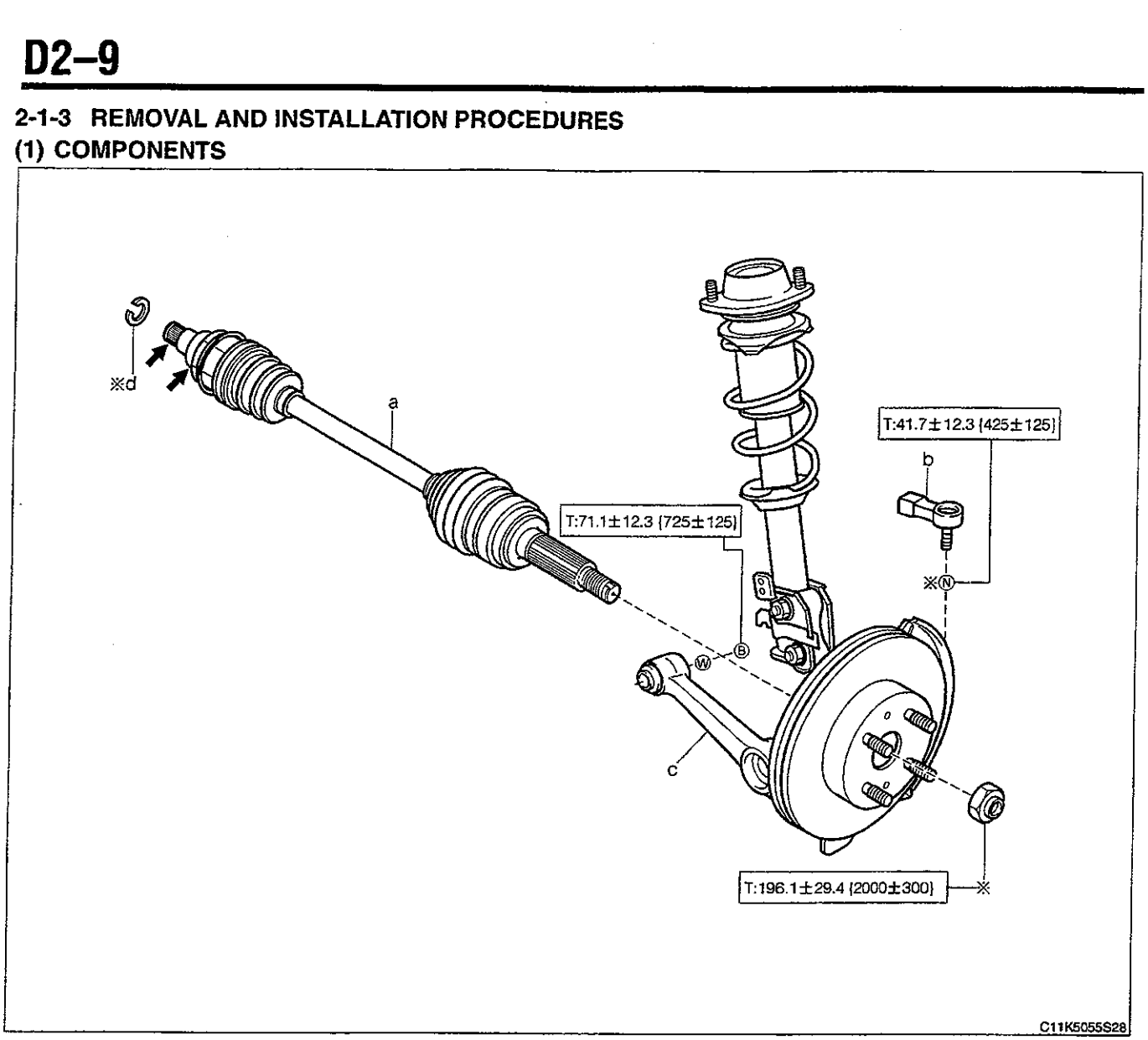
Transmission gear oil SAE75W−90 or SAE75W−85 or SAE75W−80 (API Classification GL3 or GL4),MP grease

2-1-2 OPERATION BEFORE REMOVAL

1.Lift up the vehicle.
2.Remove the front wheel.
3.Drain the transaxle oil.
4.Remove the front stabilizer bar.
Refer to Page C1-11.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



➡: MP grease
※: Non-reusable parts
Unit: N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

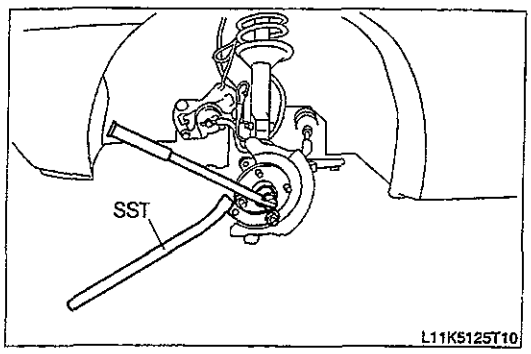
1 a Shaft Ay, front drive
2 b End S/A, tie rod
3 c Arm S/A, suspension lower arm w/bush
4 a Shaft Ay, front drive
5 d Ring, snap

2-1-4 POINTS OF REMOVAL

(1) FRONT DRIVE SHAFT AY

1.Remove the lock nut.
(1) Release the staked portion, using a chisel or the like.

(2) Remove the nut by using the SST to prevent turning.
SST: 09511-87202-000

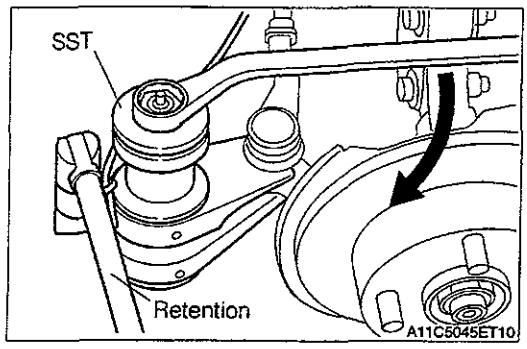


(2) TIE ROD END S/A

1.Remove the tie rod end assembly from the steering knuckle, uisng the SST.
SST: 09628-00011-000

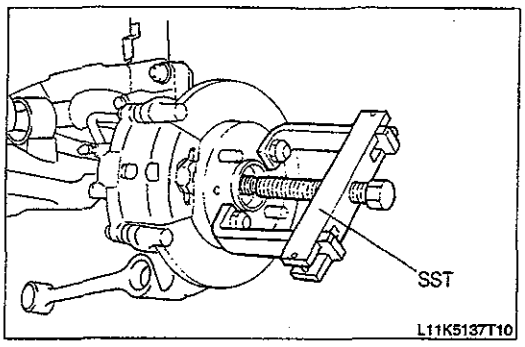
CAUTION

- When the SST is to be installed, install a dummy nut to the threaded section of the tie rod end so that the threaded section may not be damaged.
  Hang the SST, using a cord.



(3) FRONT DRIVE SHAFT AY

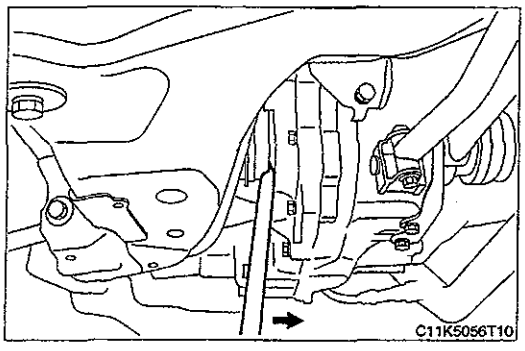
1.Disconnect the front drive shaft assembly from the steering knuckle, using the SST.
SST: 09510-87301-000



2.Remove the front drive shaft assembly, using a hub nut wrench or the like.

CAUTION

- Turn over the dust cover and apply the sharp end of the hub nut wrench to the edge surface of the drive shaft.
  Be very careful not to scratch the dust cover.



2-1-5 INSPECTION

Check the boot for brekage or damage. Replace any faulty part.

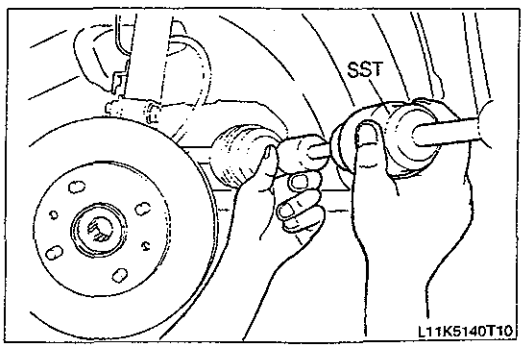
2-1-6 POINTS OF INSTALLATION

(1) FRONT DRIVE SHAFT AY

1.Insert the front drive shaft assembly to the differential carrier assembly, using the SST.
SST: 09912-87301-000

CAUTION

- This insertion should be carried out in such a way that the lip section of the oil seal may not be damaged.
  Apply MP grease to the oil seal contact surface and serration of the drive shaft.



(2) SUSPENSION LOWER ARM

1.Install the suspension lower arm to the body.

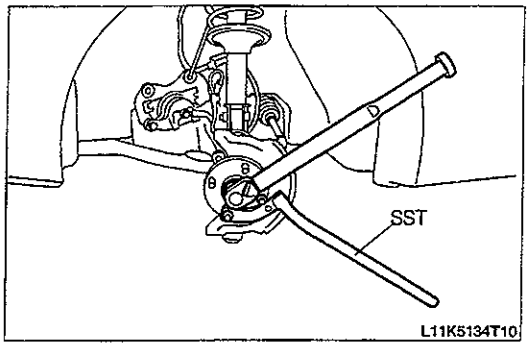
CAUTION

- As for the retaining bolt of the suspension lower arm, right, you can insert it either from the front or rear. However, be sure to install the washer at the nut side and tighten the nut.

(3) FRONT DRIVE SHAFT AY

1.Install the nut.

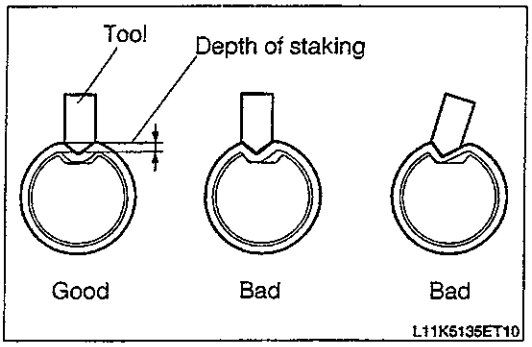
(1) Tighten the nut to the specified torque, using the SST.
SST: 09511-87202-000



(2) Using a chisel, firmly stake the tip-end of the front drive shaft and nut, as indicated in the right figure.

CAUTION

- The staked section of the nut and the threaded section of the drive shaft should not exhibit cracks. (Peeling-off of the nut plating is permissible.)
  As for the staking direction, the staking depth of the drive shaft is $3.5^{+1.5}_{-0.5}$mm in the center direction.



2-1-7 OPERATION AFTER INSTALLATION

1.Install the front stabilizer bar.
Refer to Page C1-11.

2.Fill oil to the transaxle assembly.
(1) M/T vehicle
Refer to Page F2-1.

3.Install the front wheel.
TIGHTENING TORQUE: 103.0±14.7N·m {1050±150kgf·cm}

4.Lift down the vehicle.

2-2 DISASSEMBLING AND ASSEMBLING

NOTE

- The boot at the outboard side of the right drive shaft can not be replaced.

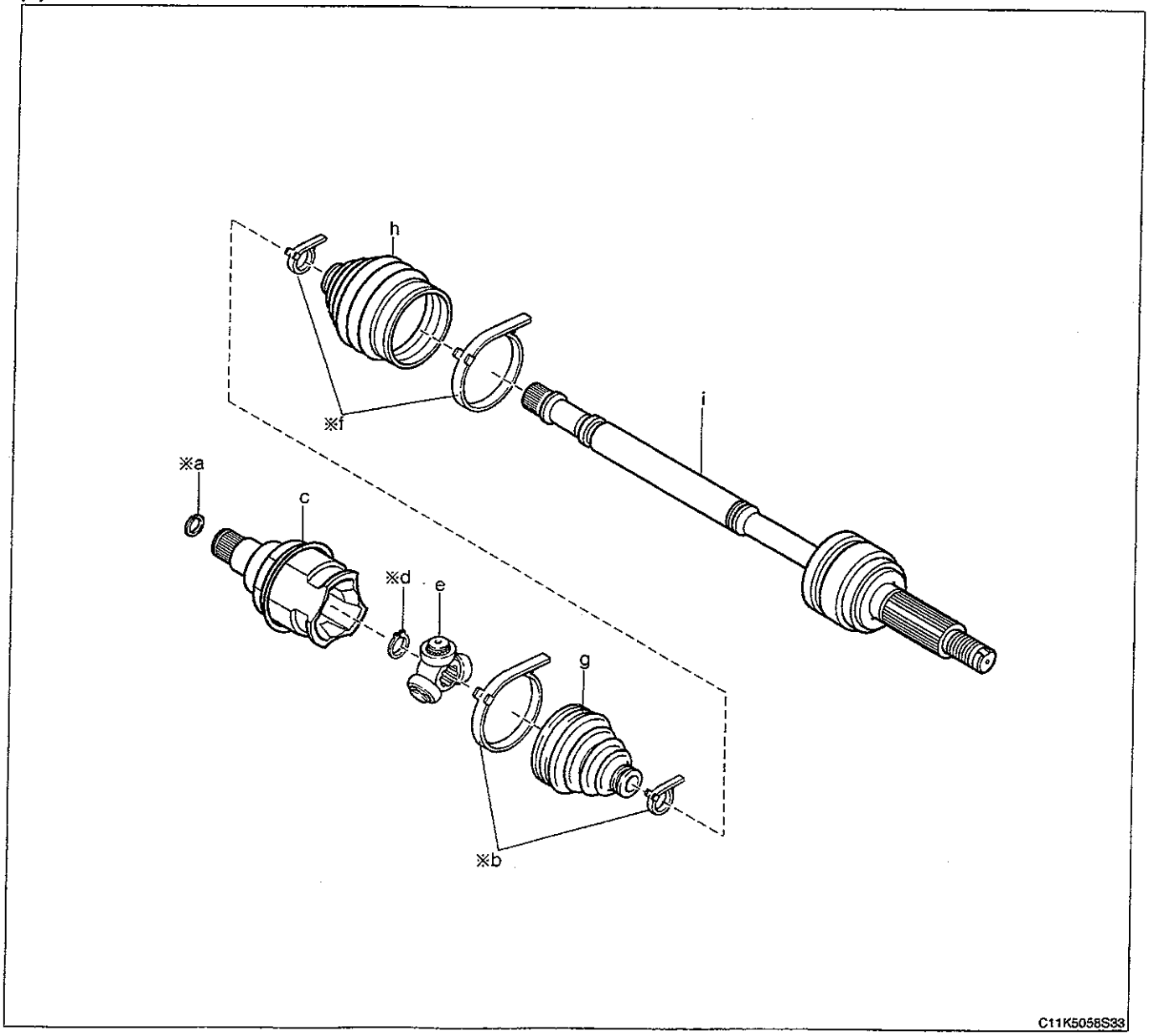
2-2-1 ARTICLES TO BE PREPARED

Tool

Snap ring pliers

2-2-2 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) COMPONENTS



※:Non - reusable parts

(2) DISASSEMBLING AND ASSEMBLING PROCEDURE

	1	a Ring, snap	▼ ▲	6	f Band, boot
▼ ▲	2	b Band, boot	▼	7	g Boot, front axle inboard joint
▼ ▲	3	c Joint S/A, front axle inboard	▼	8	h Boot, front axle outboard joint
▼ ▲	4	d Ring, shaft snap		9	i Shaft, front axle
▼ ▲	5	e Tripod Ay, inboard joint			

2-2-3 POINTS OF DISASSEMBLY

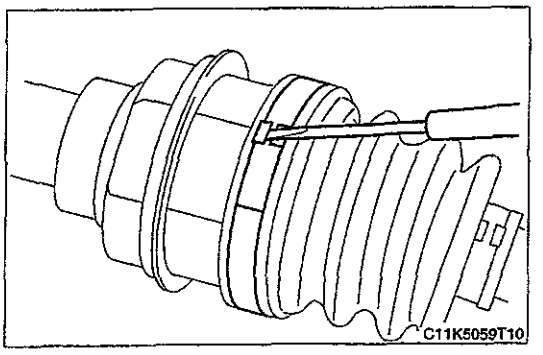
(1) FRONT AXLE INBOARD JOINT S/A

1.Remove the boot band (at the inboard side).

Using a flat screwdriver, release the locking at the bent section of the boot band (at the inboard side).

CAUTION

- **When removing the boot band, be very careful not to scratch the boot.**

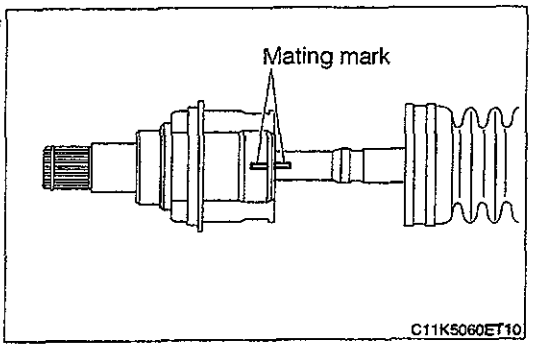


2.Displace the front axle inboard joint boot and wipe off the grease. Then, put mate marks on the front axle inboard joint S/A and the drive shaft.

CAUTION

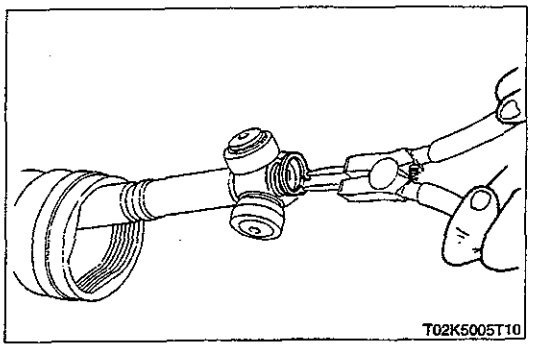
- **As for the mate marks, use paint. (Do not use punching.)**

3.Remove the front axle inboard joint S/A.



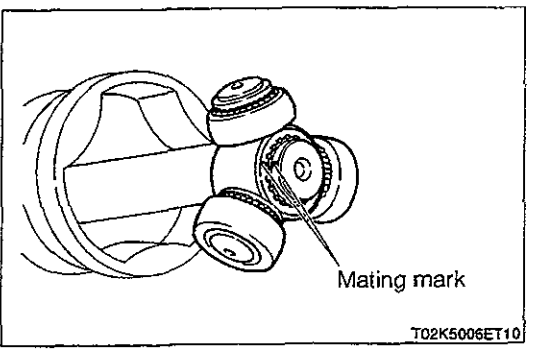
(2) INBOARD JOINT TRIPOD S/A

1.Detach the hole snap ring, using a snap ring expander.



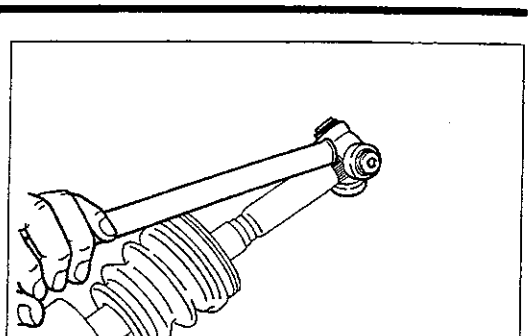
2.Put mate marks on the inboard joint triport Ay and the drive shaft.

3.Remove the inboard joint tripod Ay, using a brass bar.



CAUTION

- Be sure to apply a brass bar to the boss section of the tripod, not at the roller section.

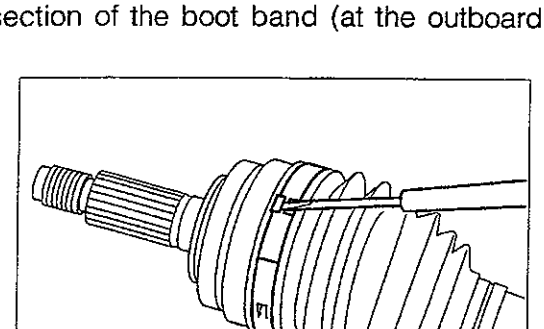


(3) REMOVAL OF BOOT

1.Using a flat screwdriver, release the locking at the bent section of the boot band (at the outboard side).

CAUTION

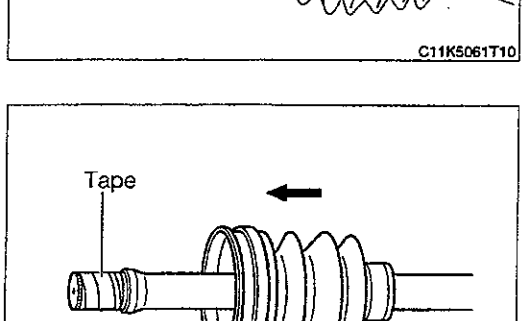
- When removing the boot band, be very careful not to scratch the boot.



2.Remove the boots (at the inboard and outboard sides).

CAUTION

- When pulling out the boot, wind a tape around the spline section so as to prevent boot damage.



2-2-4 POINTS OF ASSEMBLY

(1) BOOT (OUTBOARD SIDE)

1.Fill the outboard joint section and the inside of the boot with the grease furnished in the boot set. Assemble the boot (at the outboard side).

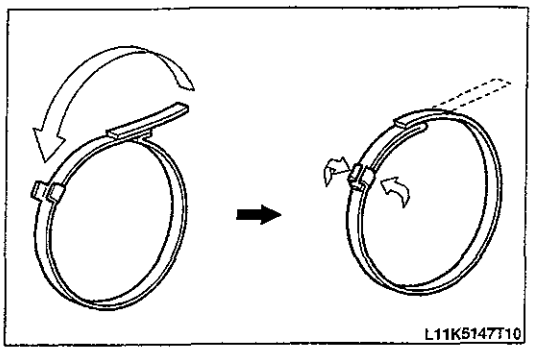
NOTE

- Filling amount 65±10g

CAUTION

- Wind a tape around the spline section at the inboard side. Then, proceed to assemble the boot.

2.Bend and assemble the boot band in the sequence indicated in the figure.



(2) INBOARD JOINT TRIPOD S/A

1.Assemble the boot (inboard side) and boot band to the front axle shaft.

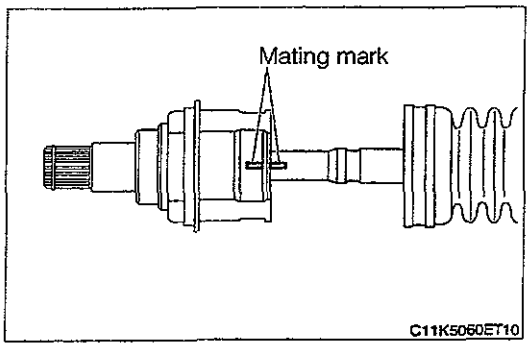
CAUTION

- **Do not fail to install the boot band in place.**

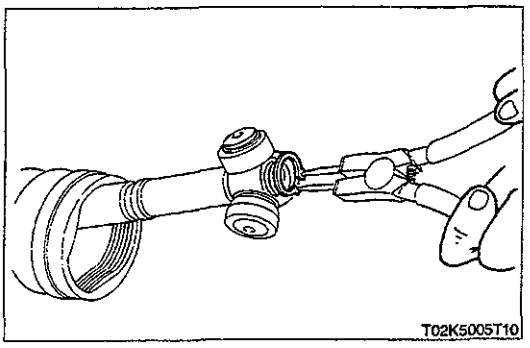
2.Assemble the inboard joint tripod Ay, aligning the mate marks with the drive shaft.

CAUTION

- **Assemble the inboard joint tripod Ay, starting from the chamfered section at the spline.**
- **When the brass bar is used for driving, be sure to apply the brass bar to the boss section of the tripod, not to the roller section.**



3.Install the shaft snap ring, using a snap ring expander.

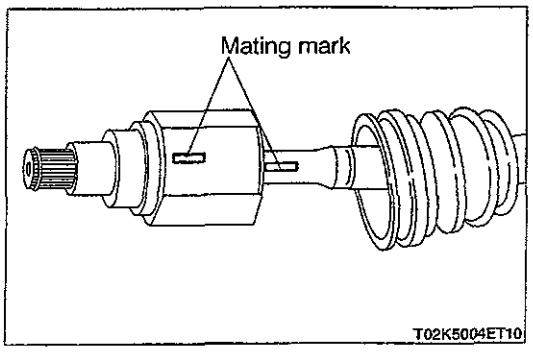


(3) FRONT AXLE INBOARD JOINT S/A

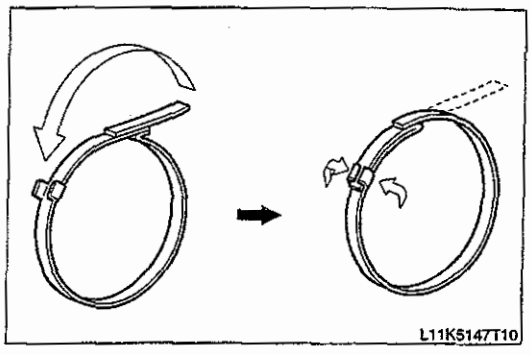
1.Fill the front axle inboard joint S/A with the grease furnished in the boot set. Assemble the front axle inboard joint S/A, aligning with the mate mark with the drive shaft.

NOTE

- **Filling amount 90±10g**



2.Bend and assemble the boot band, as indicated in the *right figure*.



3 REAR AXLE BEARING (2WD)

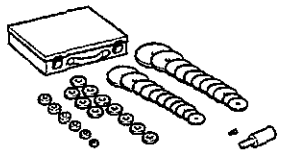
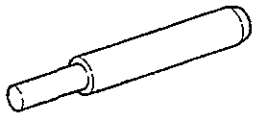
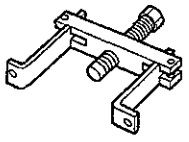
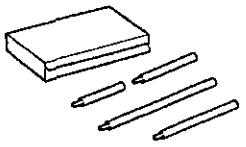
3-1 REMOVAL AND INSTALLATION

WARNING

- Since it is unstable during the press operation, utmost care must be exercised when you hold it by hand.

3-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09950-60010-000 (09608-12010-000)	Replacer set
	09301-87702-000	Tool, clutch guide
	09510-87301-000	Puller, axle shaft
	09950-70010-000	Set, handle
	09951-07200-000 (09631-00020-000)	Handle

Instrument

Torque wrench

Lubricant,adhesive,others

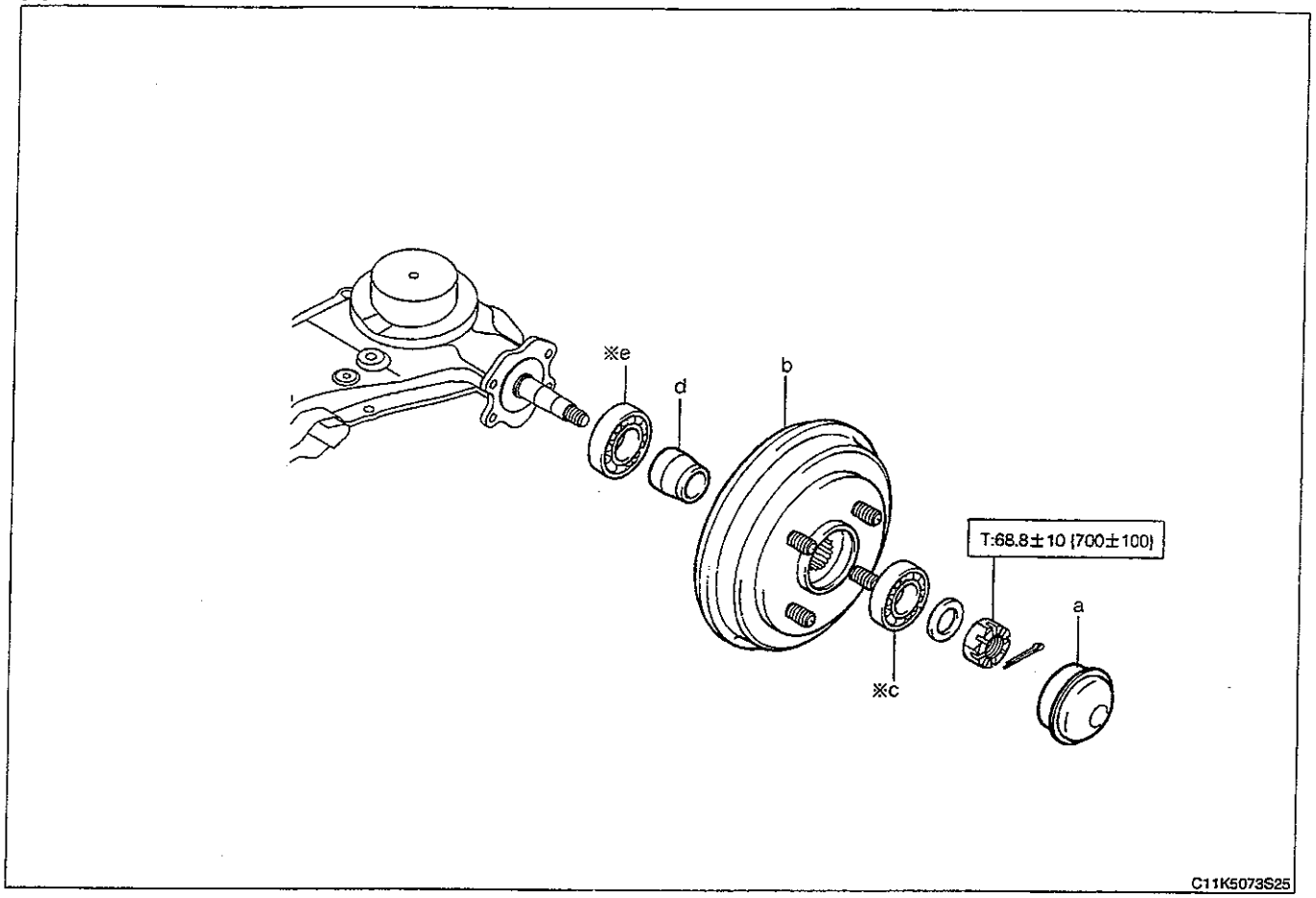
MP grease

3-1-2 OPERATION BEFORE REMOVAL

1.Jack up the vehicle.
2.Remove the rear disc wheels.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

▲ 1 a Cap, rear hub grease
▼ 2 b Drum, brake rear
▼ ▲ 3 c Bearing, radial ball (outer side)
▲ 4 d Retainer, rear axle bearing
▼ ▲ 5 e Bearing, radial ball (inner side)

3-1-4 POINTS OF REMOVAL

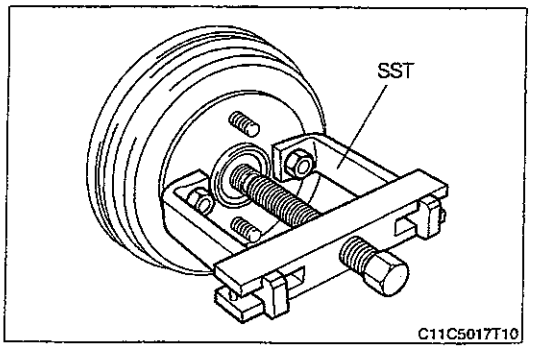
(1) BRAKE DRUM

1.Remove the brake drum.

NOTE

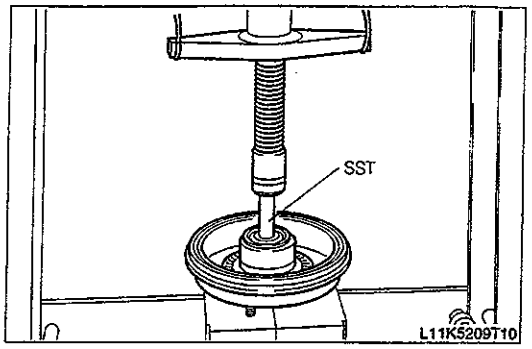
- If difficulty is encountered in removing the brake drum, remove it by using the SST.

SST: 09510-87301-000

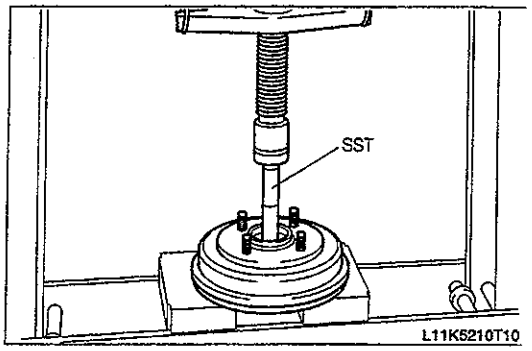


(2) RADIAL BALL BEARING

1.Remove the radial ball bearing (outer side), using the SST in combination with a press.
SST: 09301-87702-000

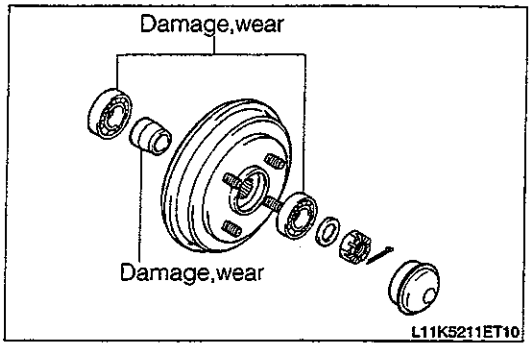


2.Remove the radial ball bearing (inner side), using the SST in combination with a press.
SST: 09950-60010-000
09950-70010-000[09951-07200-000]



3-1-5 INSPECTION

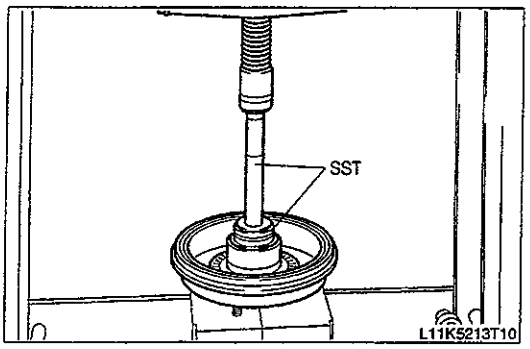
Check each of the following parts. Replace any faulty part.



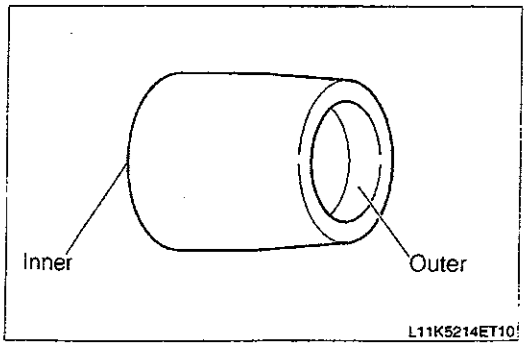
3-1-6 POINTS OF INSTALLATION

(1) RADIAL BALL BEARING

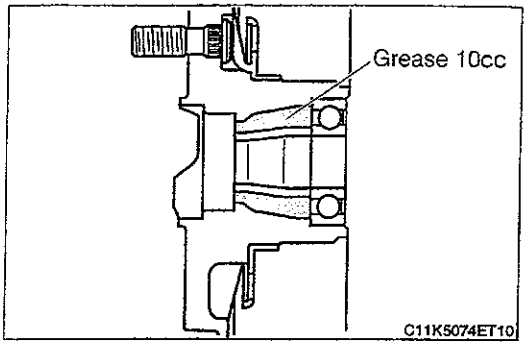
1.Using the SST in combination with a press, install the new radial ball bearing (inner side) in such a way that the bearing seal surface faces the inside of the vehicle.
SST: 09950-60010-000
09950-70010-000[09951-07200-000]



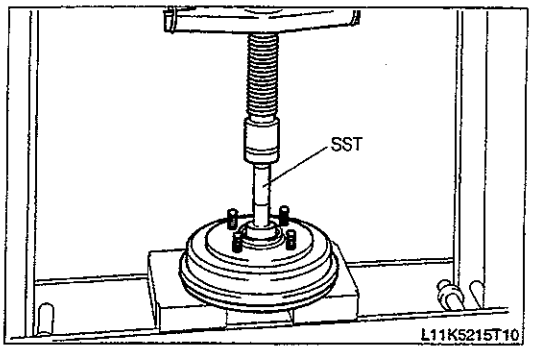
2.Install the rear axle bearing retainer in the direction shown at the right figure.



3.Pack MP grease to the points shown at the right figure.



4.Pack the new radial ball bearing (outer side) with 3 cc of MP grease. Install the radial ball bearing to the brake drum, using the SST in combination with a press.
SST: 09950-60010-000
09950-70010-000[09951-07200-000]



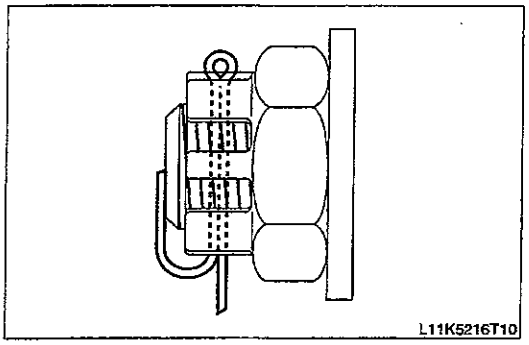
(2) BRAKE DRUM

1.Tighten the castle nut to the specified torque. Line up the hole positions by turning the nut in the tightening direction. Install the new cotter pin.

CAUTION

- **Split the cotter pin vertically and bend the cotter pin, until it comes in contact with the shaft.**

2.Pack the inside of the rear hub grease cap with 15 cc of MP grease. Install the rear hub grease cap.



3-1-7 OPERATION AFTER INSTALLATION

1.Install the rear wheel.
TIGHTENING TORQUE: 103.0±14.7N·m {1,050±150kgf·cm}

TO INDEX

E1 BRAKE

BRAKE ---------- E1 - 1
BASIC CHECK AND ADJUSTMENT --- E1 - 1
BRAKE PEDAL ---------- E1 - 5
REMOVAL AND INSTALLATION -------- E1 - 5
BRAKE MASTER CYLINDER ---------- E1 - 6
REMOVAL AND INSTALLATION -------- E1 - 6
DISASSEMBLING AND ASSEMBLING ---------- E1 - 10
BRAKE BOOSTER ---------- E1 - 13
REMOVAL AND INSTALLATION ------ E1 - 13
FRONT DISC BRAKE PAD ---------- E1 - 17
REMOVAL AND INSTALLATION ------ E1 - 17
FRONT DISC CALIPER ---------- E1 - 20
REMOVAL AND INSTALLATION ------ E1 - 20
DISASSEMBLING AND ASSEMBLING ---------- E1 - 22
FRONT BRAKE DISC ---------- E1 - 24
REMOVAL AND INSTALLATION ------ E1 - 24
REAR BRAKE DRUM ---------- E1 - 26
REMOVAL AND INSTALLATION ------ E1 - 26

1 BRAKE

1-1 BASIC CHECK AND ADJUSTMENT

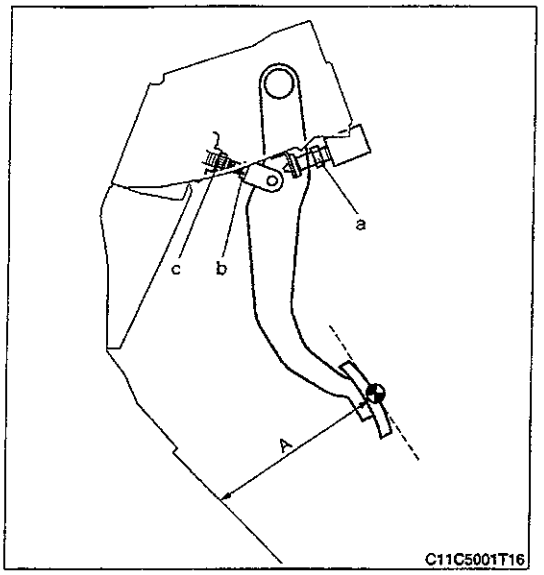
1-1-1 BRAKE PEDAL

(1) HEIGHT CHECK

1.Turn over the carpet near the brake pedal.

2.Measure the height from the left center section of the brake pedal depressing surface to the upper surface of the dash panel.

SPECIFIED VALUE: A:145.5－150.5mm



(2) HEIGHT ADJUSTMENT

1.Disconnect the connector of the stop lamp SW, loosen the nut (a), turn the switch and make the free travel of the brake pedal S/A.

2.Adjust the pedal height by loosening the nut (b) and turning the push rod (c).

TIGHTENING TORQUE: 25.5±2.9N·m{260±30kgf·cm}

3.Turn the switch main body until the gap between the stop lamp SW threaded section edge and the brake pedal cushion becomes 1±1mm. Lock the nut.

TIGHTENING TORQUE: 19.6±7.8N·m{200±80kgf·cm}

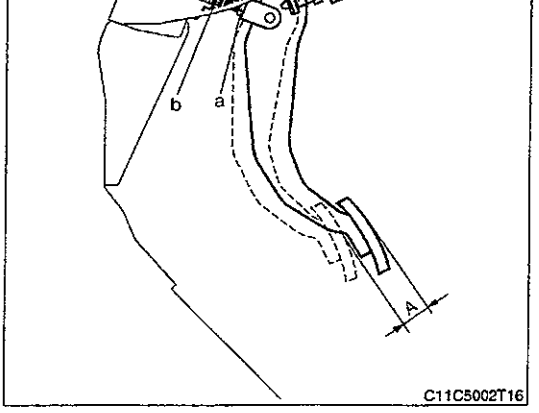
4.After adjusting the pedal height, check the pedal free travel and lighting of the stop lamp.

(3) FREE PLAY CHECK

1.After stopping the engine, depress the brake pedal several times so that no vacuum could remain in the brake booster Ay.

2.Check the pedal free travel by pushing the brake pedal lightly by hand.

SPECIFIED VALUE: A:0.5 - 3.0 mm



(4) FREE PLAY ADJUSTMENT

1.Adjust the pedal free travel by loosening the nut (a) and turning the push rod(b) .

TIGHTENING TORQUE: 14.7±2.9N·m{150±29kgf·cm}

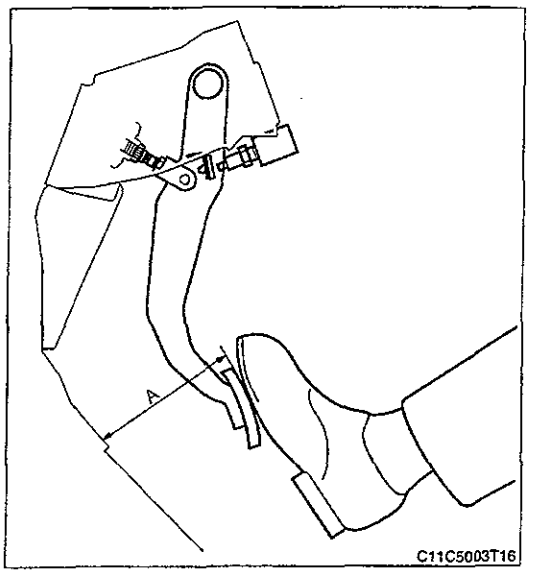
2.After adjusting, check the pedal height and lighting of the stop lamp.

(5) RESERVE TRAVEL CHECK

1.Turn over the carpet near the brake pedal.

2.With the parking brake released while idling, depress the brake pedal with the specified force. At this time, measure the height from the left center section of the brake pedal depressing surface to the upper surface of the dash panel.

SPECIFIED VALUE: A:95 mm or more
(Pedal applying force 294N {30kgf})



1-1-2 BLAKE BOOSTER

(1) ARTICLES TO BE PREPARED

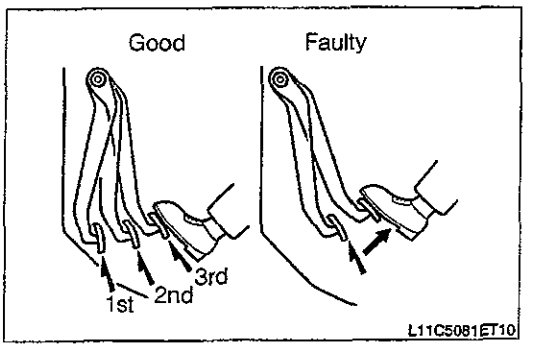
Lubricant,adhesive,others

Brake fluid(DOT3)

(2) AIR-TIGHT PERFORMANCE CHECK

Start the engine, then stop it one or two minutes later and check the height of the brake pedal when depressing the pedal with usual pedal applying force.

SPECIFIED VALUE: The pedal position of 2nd application should be higher than that of the 1st application, meanwhile that of the 3rd application should be higher than that of the 2nd application. (Each intervals of depressing the pedal should be at least five seconds.)

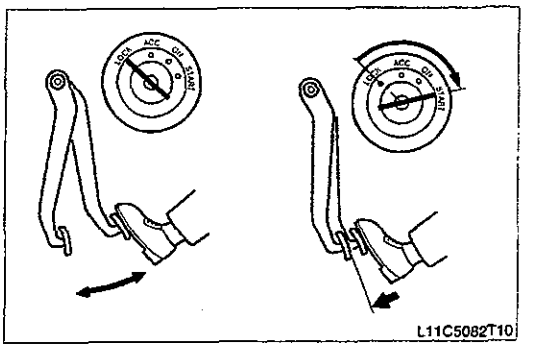


(3) OPERATION CHECK

1.While engine stopped, depress the brake pedal several times with same level of pedal applying force. Check to see that the pedal height does not vary each time.

2.Start the engine with the brake pedal depressed and check the change of the pedal height.

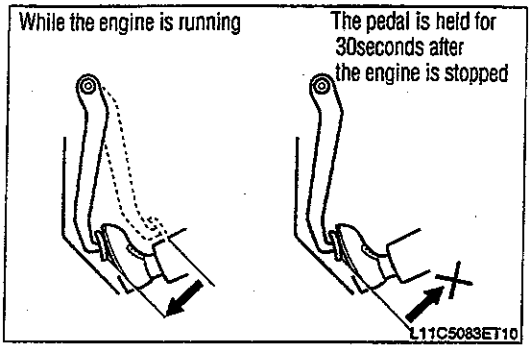
SPECIFIED VALUE: The pedal should move slightly toward the floor when starting the engine with the brake pedal depressed condition.



(4) AIR-TIGHT PERFORMANCE CHECK UNDER LOADED CONDITION

With the engine running, depress the brake pedal. With this condition stop the engine and hold the pedal position for 30 seconds. Check the change of the pedal height.

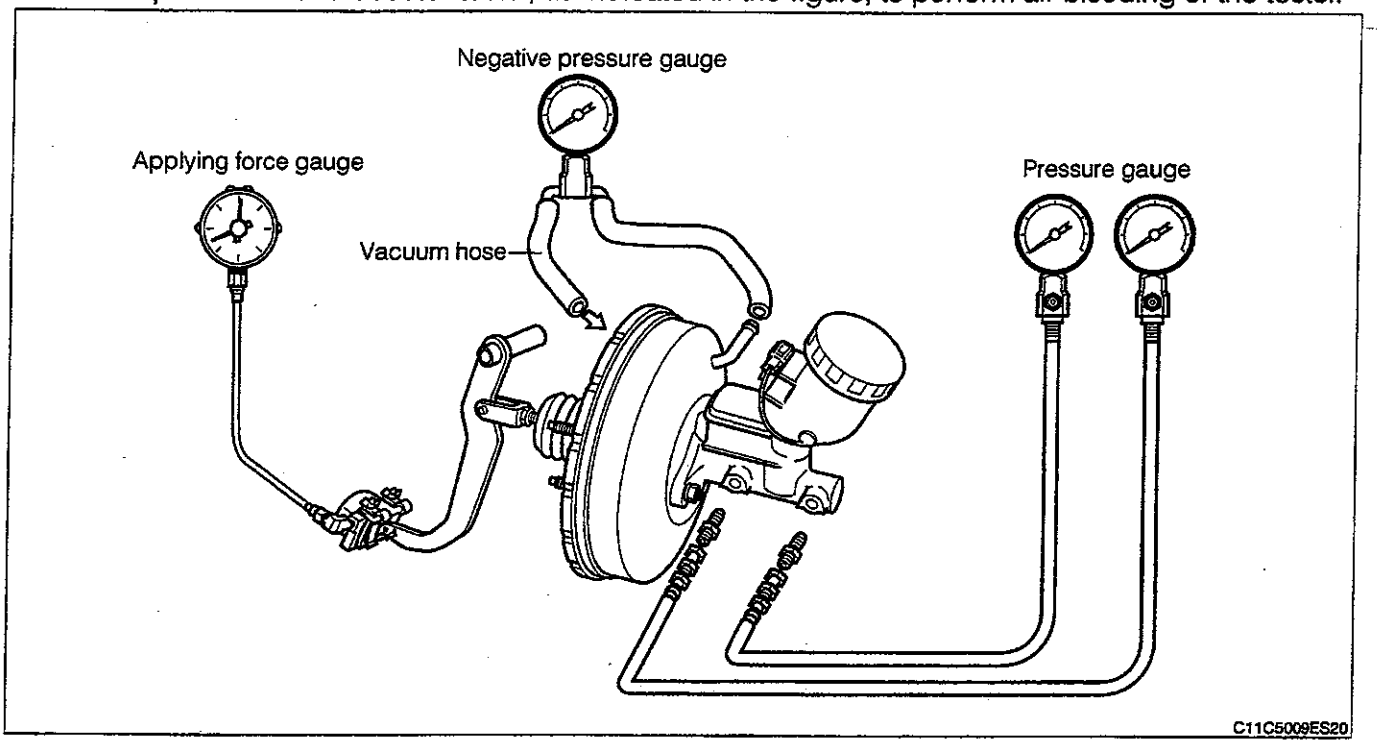
SPECIFIED VALUE: **There should be no change in the pedal height.**



(5) CHECK BY MEANS OF PORTABLE BRAKE BOOSTER TESTER

① OPERATIONS PRIOR TO CHECK

Connect a portable brake booster tester, as indicated in the figure, to perform air bleeding of the tester.



② AIR-TIGHT PERFORMANCE CHECK

1. Start the engine. When a pressure gauge (negative pressure gauge) indicates a negative pressure of 66.7 kPa {500 mmHg}, stop the engine and measure the pressure (negative pressure).

SPECIFIED VALUE: **After the engine has been stopped, there should be no change in pressure (drop of negative pressure) for 15 seconds.**

2. Start the engine and depress the brake pedal with a pedal applying force of 196 N {20 kgf}. When the pressure gauge (negative pressure gauge) indicates 66.7 kPa {500 mmHg}, stop the engine and measure the pressure (negative pressure).

SPECIFIED VALUE: **After the engine has been stopped, the change in pressure (drop of negative pressure) should be within 2.7 kPa {20 mmHg} for 20 seconds.**

③ NO-BOOSTER OPERATION CHECK

1. With the engine in a stopped state, set the value of the pressure gauge (negative pressure gauge) to zero. At this time, check the relationship between the pedal applying force and the hydraulic pressure.

SPECIFIED VALUE:

Pedal applying force [N {kgf}]	98{10}	294{30}
Fluid pressure [MPa {kgf/cm²}]	0.21{2.1}	2.35{24.0}

2. Start the engine. Set the reading of the pressure gauge (negative pressure gauge) to 60.0kPa(450mmHg). After stopping the engine, check the hydraulic pressure of the master cylinder for each pedal applying force.

SPECIFIED VALUE:

Pedal applying force [N {kgf}]	49{5}	98{10}	147{15}	196{20}
Fluid pressure [MPa {kgf/cm²}]	1.91{19.5}	4.16{42.4}	6.47{66.0}	6.98{71.2}

2 BRAKE PEDAL

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

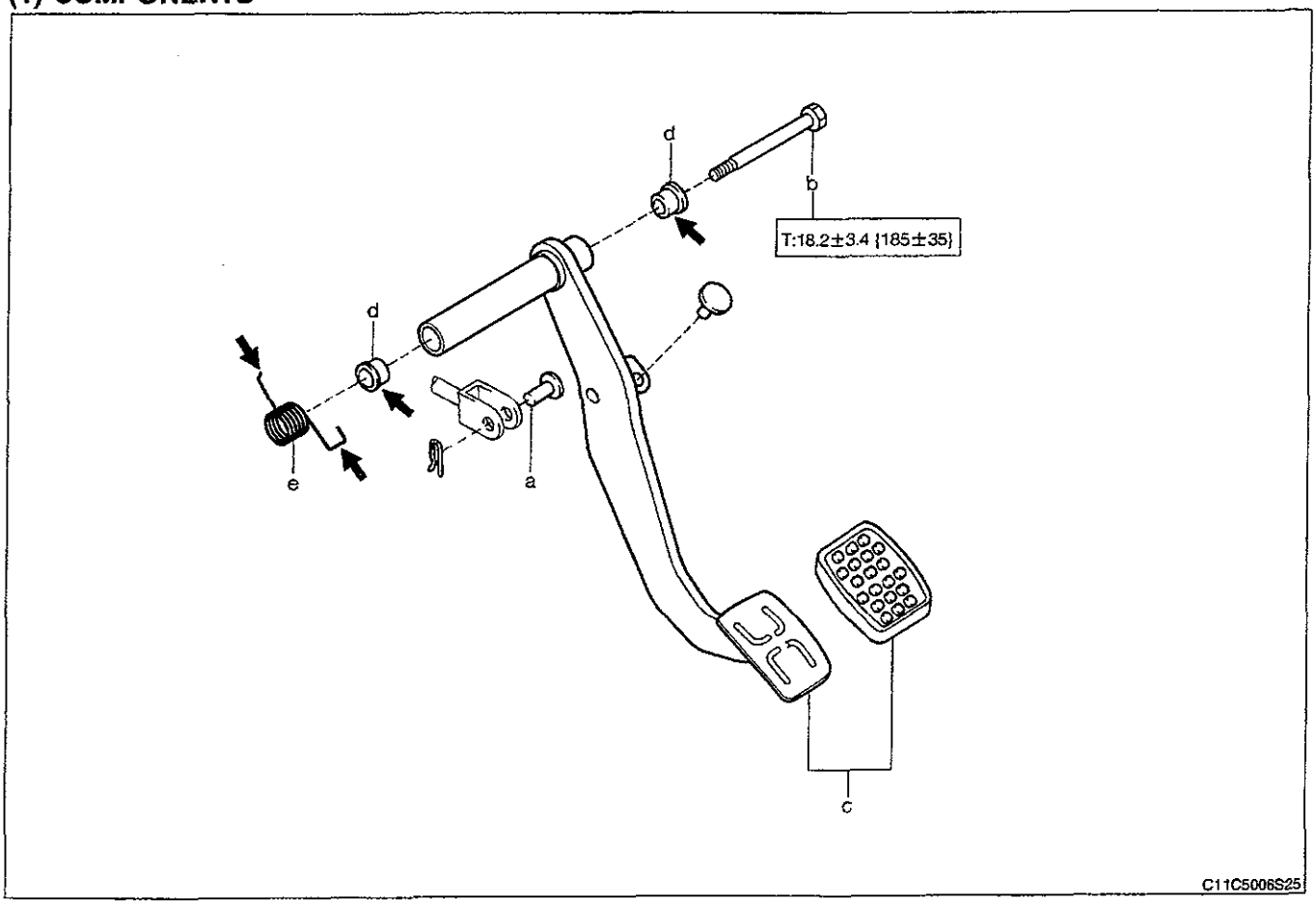
MP grease

2-1-2 OPERATION BEFORE REMOVAL

Remove the instrument panel finish lower panel.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



➡:MP grease

Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Pin W/hole
2 b Shaft, pedal
3 c Pedal Ay, brake
4 d Bush
5 e Spring, torsion

2-1-4 OPERATION AFTER INSTALLATION

1.Check and adjust the brake pedal.
Refer to Page E1-1.

2.Install the instrument panel finish lower panel.

3 BRAKE MASTER CYLINDER

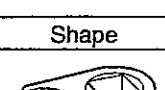
3-1 REMOVAL AND INSTALLATION

CAUTION

- Care must be exercised so that no brake fluid may adhere to the paint surface. If brake fluid is adhered to the paint surface, immediately wipe it out and wash it with water.
- Never reuse the wiped-out brake fluid.
- Never turn ON the IG, until air bleeding is finished. Failure to observe this caution may allow air to admit into the actuator, thus making it difficult to perform air bleeding.

3-1-1 ARTICLES TO BE PREPARED

SST

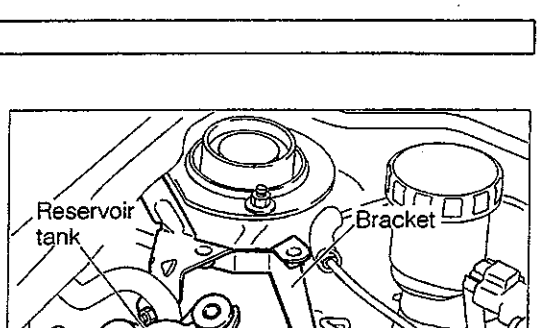
Shape	Part No.	Part name
	09023-00100-000	Wrench, union nut
	09730-87401-000	Gauge set, brake booster gauge

Lubricant,adhesive,others

Brake fluid(DOT3)

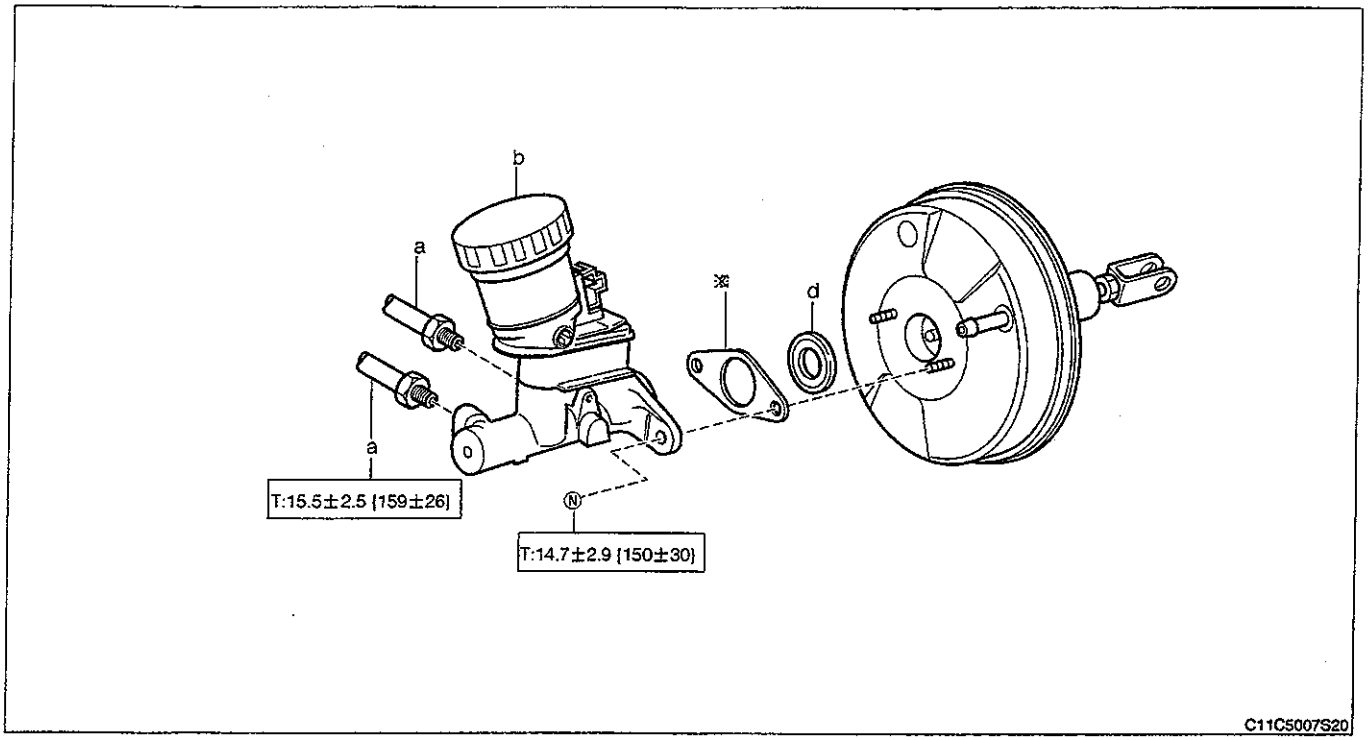
3-1-2 OPERATION BEFORE REMOVAL

1.Remove the power steering reserve tank from the bracket without cutting the hydraulic pressure pipe.
2.Detach the clamp retaining the hose pressure feed (return side) and the vacuum hose Ay.
3.Detach the clamp retaining the hose reservoir-to-pump and the brake tube.
4.Drain the brake fluid from the master cylinder reservoir.



3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

▼ 1 a Tube, brake
▲ 2 b Cylinder S/A, brake master
3 c Gasket, master cylinder
4 d Seal, master cylinder piston

3-1-4 POINTS OF REMOVAL

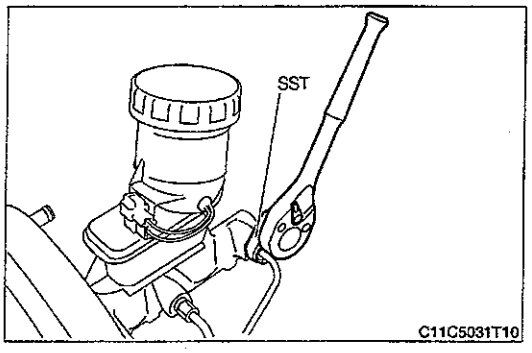
(1) BRAKE TUBE

Disconnect the brake tube from the brake master cylinder Ay.

SST: 09023-00100-000

CAUTION

- Plug the disconnected brake tube, using a bleeder plug cap, etc.



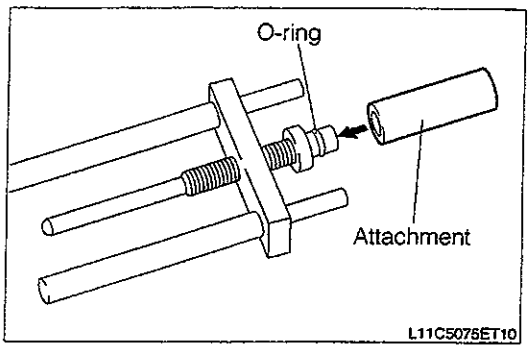
3-1-5 POINTS OF INSTALLATION

(1) BRAKE MASTER CYLINDER S/A

1.Check the clearance of the brake booster push rod.

2.Fit an O-ring into the groove at the rod section of the gauge(SST). Then, install an attachment to the same place. Moreover, apply silicone grease to the surface of the attachment in advance.

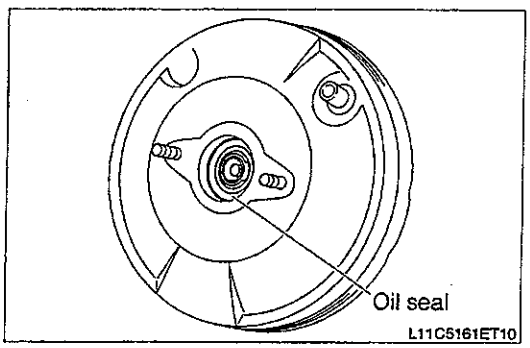
SST: 09730-87401-000
09730-87401-000[09737-87003-000]
09730-87401-000[09733-87401-000]
09730-87401-000[09731-87401-000]



3.On the other hand, install the oil seal, that is mounted between the master cylinder and the booster, to the booster side. Furthermore, install the booster hose to the booster.

CAUTION

- Apply grease to the lip section of the oil seal.



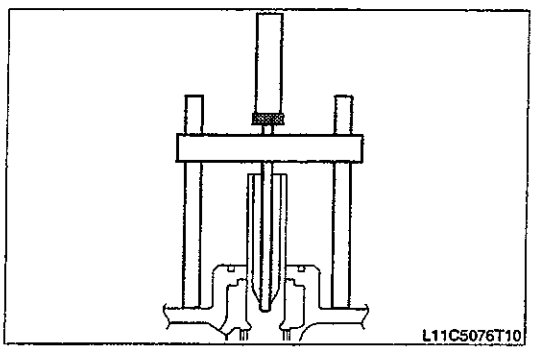
4.Set the gauge (SST) to a position where the rod of the gauge (SST) may come in contact lightly with the piston of the master cylinder.

CAUTION

- Install the gasket to the master cylinder.

5.Install the SST at the booster side in an inverted state.

6.Start the engine and apply a negative pressure of about 66.7 kPa {500 mmHg} to the booster.



7.Then, check the clearance between the rod of the SST and the push rod of the booster.

SPECIFIED VALUE: Clearance: 0 mm

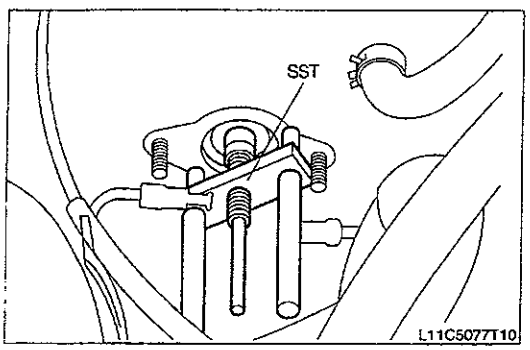
8.If it is out of specifications, loosen the double nuts of the push rod at the brake booster pedal. Perform the adjustment by turning the nut at the booster side.

9.Connect the brake tube to the brake master cylinder Ay, using the SST.

CAUTION

- Tighten the union nut of the front brake tube temporarily by hand till flare portion of the tube contacts securely to the seat, and then tighten it with the specified tightening torque.
- Never turn ON the IG, until air bleeding is finished.

TIGHTENING TORQUE: 15.5±2.5N·m
{159±26kgf·cm}



3-1-6 OPERATION AFTER INSTALLATION

1.Install the bracket to the power steering reserve tank.
2.Perform air bleeding of the brake system.

CAUTION

- After completion of the air bleeding of the brake system, check that no air has been admitted once again.

3.Replenish the reservoir tank with brake fluid up to the MAX line.
4.Confirm that there is no brake dragging.

3-2 DISASSEMBLING AND ASSEMBLING

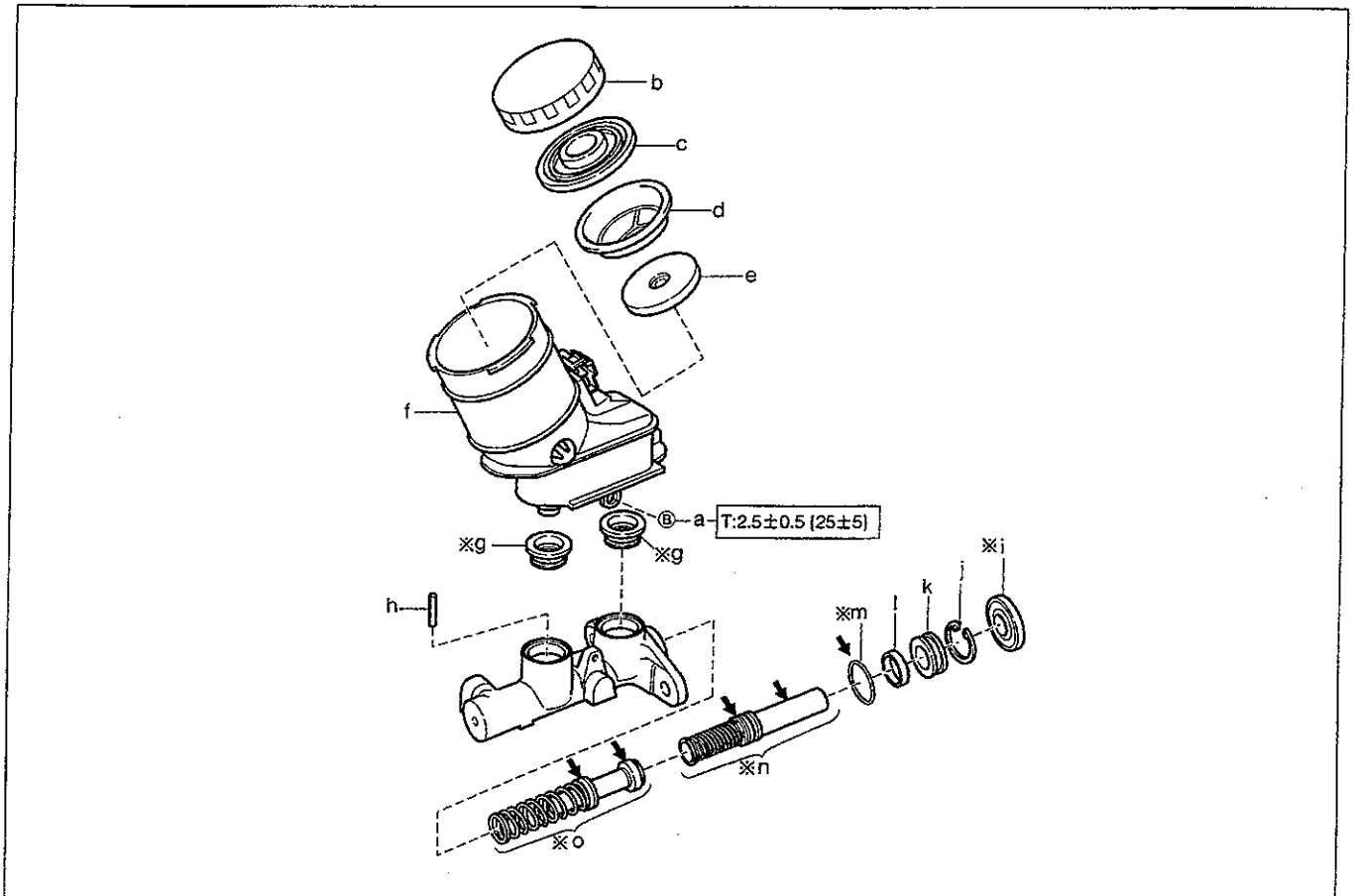
3-2-1 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

Brake fluid(DOT3),Rubber grease

3-2-2 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) COMPONENTS



➡:Rubber grease
※: Non-reusable parts
N·m{kgf·cm}

(2) DISASSEMBLING AND ASSEMBLING PROCEDURE

1	a	Bolt. set	9	i Seal, master cylinder piston
2	b	Cap , reservoir filler	▼ ▲ 10	j Ring, hole snap
3	c	Diaphragm, reservoir	11	k Guide, master cylinder piston
4	d	Strainer, master cylinder reservoir	12	l Cup, cylinder
5	e	Flort, switch operating	13	m Ring, O
6	f	Reservoir S/A, master cylinder	▼ 14	n Piston S/A, master cylinder No.1
7	g	Grommet, reservoir	▼ 15	o Piston S/A, master cylinder No.2
8	h	Pin		

3-2-3 POINTS OF DISASSEMBLY

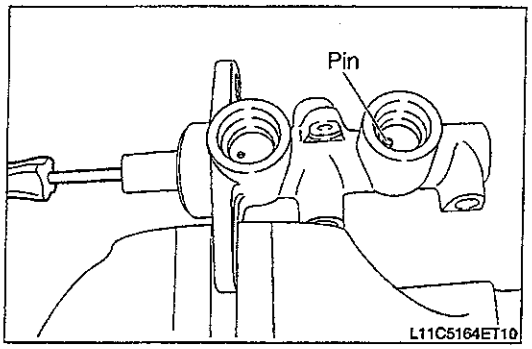
(1) HOLE SNAP RING

1.Clamp the master cylinder in a vice with aluminum sheets, etc. interposed.

CAUTION

- Do not clamp the cylinder section, because there is a potential for deformation.

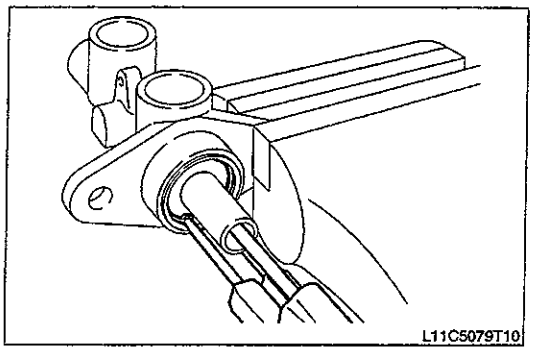
2.Remove the pin by means of a screwdriver with the piston in a pushed-in state.



3.Remove the hale snap ring with the piston pushed into, by using a snap ring expander.

CAUTION

- Be careful so that the oil may not scatter when pushing the piston.



(2) MASTER CYLINDER PISTON S/A No.1

Take out the brake master cylinder No. 1 piston S/A straight.

CAUTION

- Be very careful not to scratch the cylinder inner surface during the removal operation.

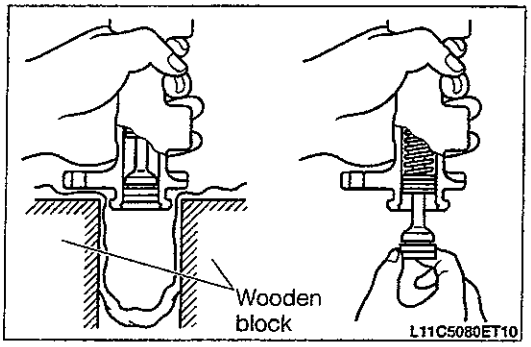
(3) MASTER CYLINDER PISTON S/A No.2

1.Tap flange portion lightly against a chip of wood until the end of the brake master cylinder No. 2 piston S/A comes out.

2.When the end of the brake master cylinder No. 2 piston S/A comes out, then pull out the piston straight.

CAUTION

- Be very careful not to scratch the cylinder inner surface during the removal operation.



3-2-4 INSPECTION

(1) BRAKE MASTER CYLINDER

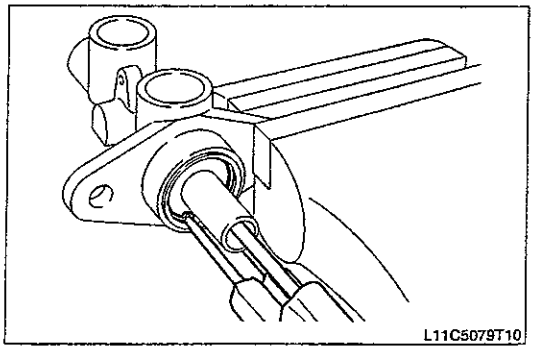
1.Check to see if the cylinder bore exhibits scratches.

2.Check to see if the cylinder exhibits deformation and scratches.

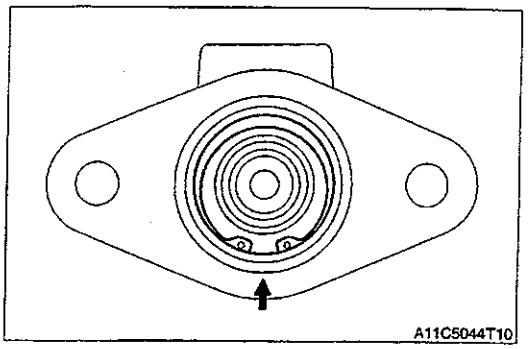
3-2-5 POINTS OF ASSEMBLY

(1) HOLE SNAP RING

1.With the piston in a pushed state, assemble the hole snap ring, using a snap ring expander.



2.Care must be exercised so that the hole at the arrow-headed section may not be plugged during the installation of the hole snap ring.



4 BRAKE BOOSTER

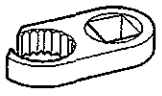
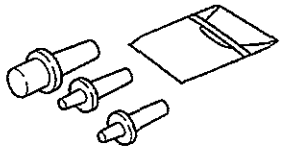
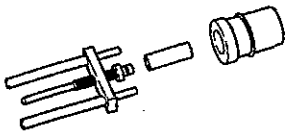
4-1 REMOVAL AND INSTALLATION

CAUTION

- Never turn ON the IG, until air bleeding is finished. Failure to observe this caution may allow air to admit into the actuator, thus making it difficult to perform air bleeding.

4-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09023-00100-000	Wrench, union nut
	09258-00030-000	Plug set, hose
	09730-87401-000	Gauge set, brake booster gauge

Lubricant,adhesive,others

Brake fluid(DOT3)

4-1-2 OPERATION BEFORE REMOVAL

1.Remove the instrument panel finish lower panel.
Refer to Page I2-22.

2.Remove the fender.
Refer to Page I1-23.

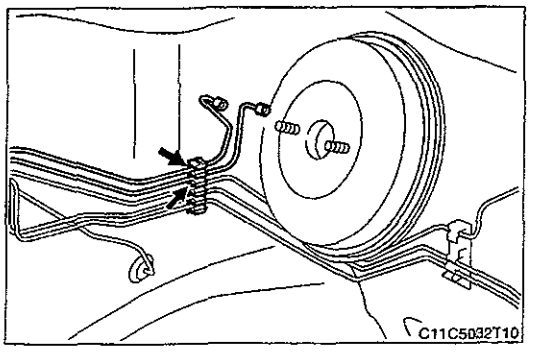
3.Remove the brake master cylinder.
Refer to Page E1-6.

4.Disconnect the suction hose of the air conditioner from the bracket.

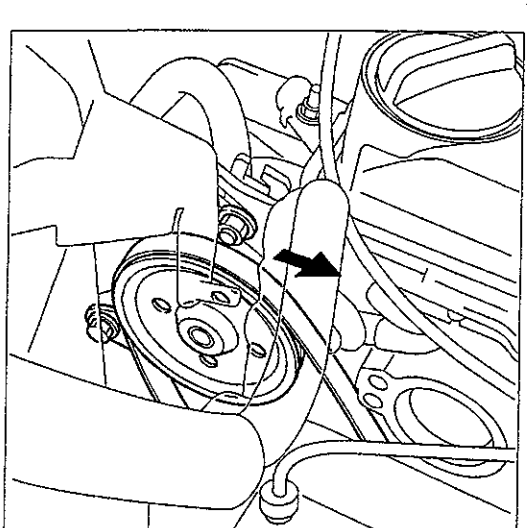
5.Disconnect the two brake tubes attached to the ABS actuator, using the SST. Remove the disconnected brake tubes.
SST: 09023-00100-000

CAUTION

- Clog the disconnected brake tube, using a bleeder plug cap or the like.

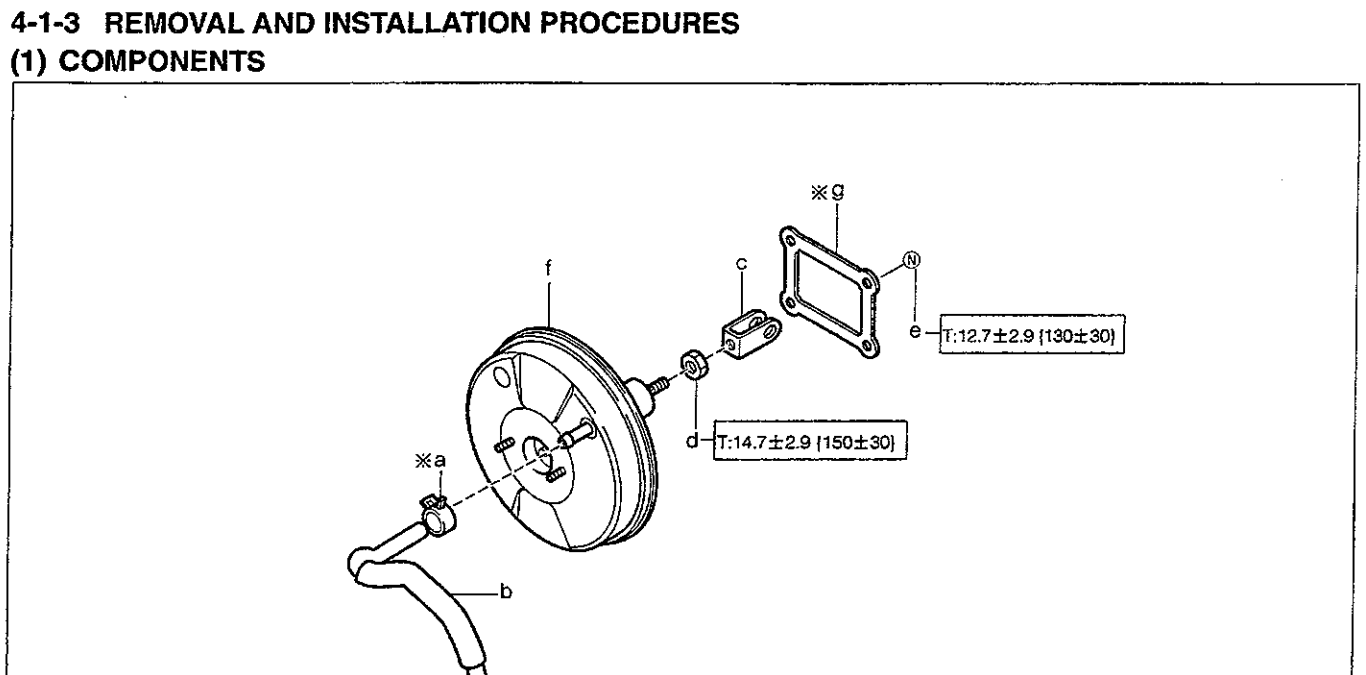


6.Slacken the bolts and nuts that are attached to the bracket. Move the vane pump toward the front side of the vehicle.



4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

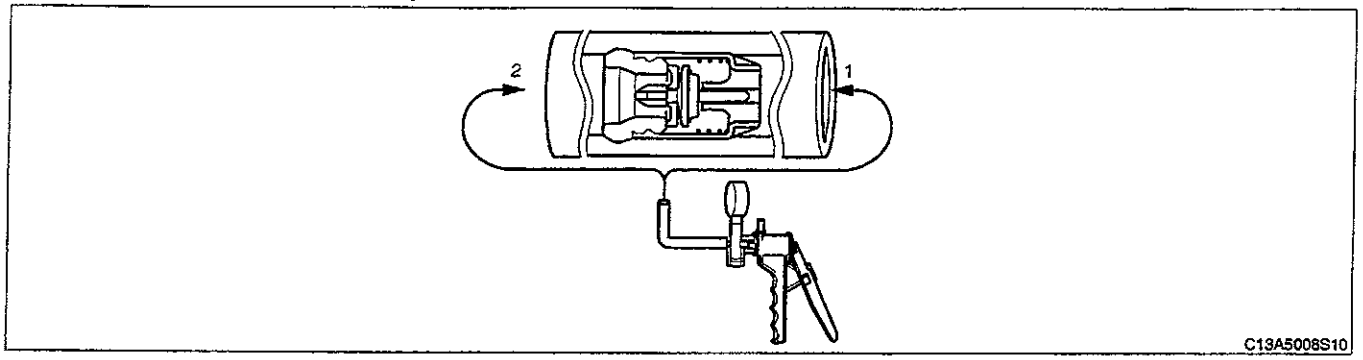
1 a Clip
▲ 2 b Hose Ay, vacuum
3 c Clevis, master cylinder push rod
4 d Nut
5 e Nut
6 f Booster Ay, brake
7 g Gasket,brake booster bracket

4-1-4 INSPECTION

(1) CHECK VALVE (VACUUM HOSE)

1.Ensure that there is air continuity from the booster side to the engine. Furthermore, ensure that there is no air continuity from the engine to the booster side.

2.Replace the vacuum hose Ay in case that the above condition is not satisfied.



1: Engine side
2: Booster side

(2) BRAKE BOOSTER PUSH ROD

Check and adjust the brake booster push rod clearance.
Refer to Page E1-6.

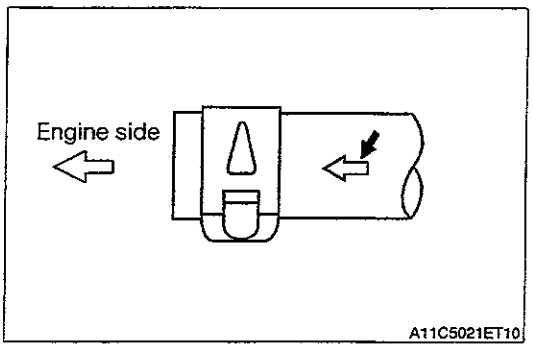
4-1-5 POINTS OF INSTALLATION

(1) VACUUM HOSE

Install the vacuum hose.

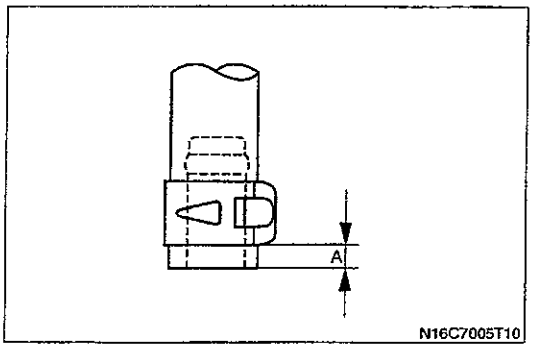
CAUTION

- Make sure that the vacuum hose is connected in the correct direction. Ensure that the paint of "ENGINE ←" comes at the intake manifold side of the engine. If the print mark has been erased, check air continuity and carry out the installation in such a way that air continuity exists from the booster side to the intake manifold side.



CAUTION

- Be sure to insert the vacuum hose up to the stopper surface of the union. Moreover, install the clip so that the dimension A indicated in the figure may become 2 to 5.5 mm.



4-1-6 OPERATION AFTER INSTALLATION

1.Install the vane pump.
Refer to Page G2-36.

2.Install the two brake tubes to the ABS actuator at the motor side.
3.Install the brake master cylinder.
Refer to Page E1-6.

CAUTION

- **Tighten the union nut of the front brake tube temporarily by hand till flare portion of the tube contacts securely to the seat, and then tighten it with the specified tightening torque.**

4.Install the power steering reservoir tank and suction hose to the bracket.
5.Adjust the brake pedal height.
6.Perform air bleeding of the brake system.

CAUTION

- **After completion of the air bleeding of the brake system, check that no air has been admitted once again.**

7.Replenish the reservoir tank with brake fluid up to the MAX line.
8.Confirm that there is no brake dragging.
9.Install the fender.
Refer to Page I1-23.

10.Install the instrument panel finish lower panel.
Refer to Page I2-22.

5 FRONT DISC BRAKE PAD

5-1 REMOVAL AND INSTALLATION

WARNING

- Keep the position of the jack-up point to avoid causing serious accident due to inclining of the vehicle.

CAUTION

- Any kind of lubricants applied to the disc brake pad or the brake disc could reduce the efficiency of the brake.

5-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

Brake fluid(DOT3)

5-1-2 OPERATION BEFORE REMOVAL

1.Jack up the vehicle.

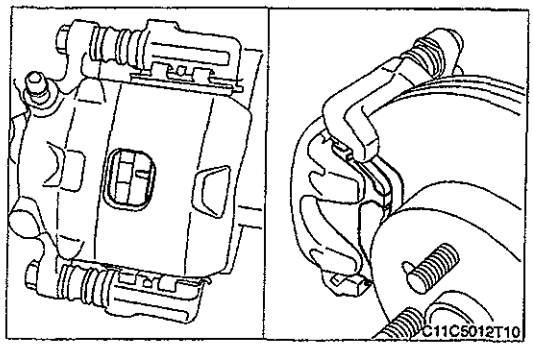
2.Remove the front disc wheel.

3.Check the pad for thickness as follows: In the case of the pad at the inner side, perform the check through inspection hole of the cylinder. In the case of the pad at the outside, perform the check from the rear of the caliper.

ALLOWABLE LIMIT: 1.5mm

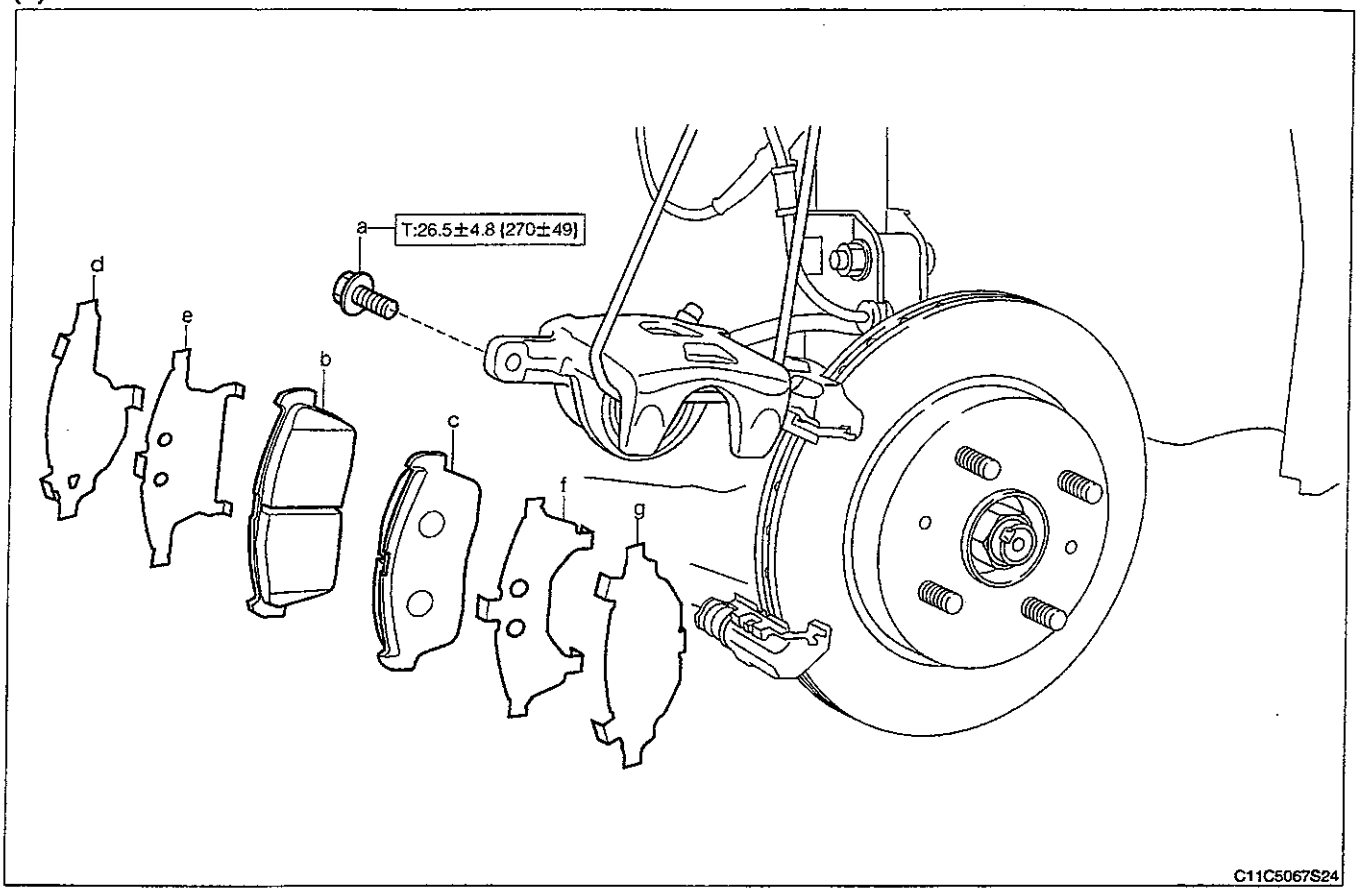
NOTE

- New part: 9.5mm



5-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf·cm}

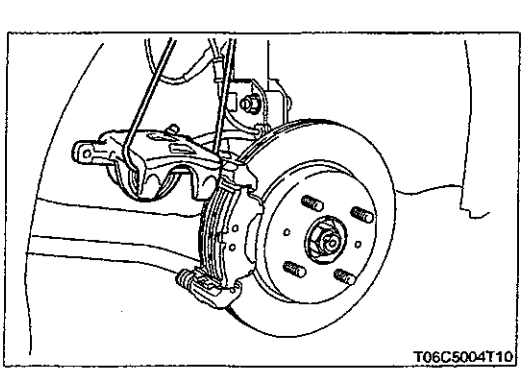
(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Bolt, disc brake cylinder
▲ 2 b Pad, disc brake W/wear indicator
3 c Pad, disc brake, No.2
4 d Shim, anti squeal, No.3
5 e Shim, anti squeal, No.1
6 f Shim, anti squeal, No.2
7 g Shim, anti squeal, No.4

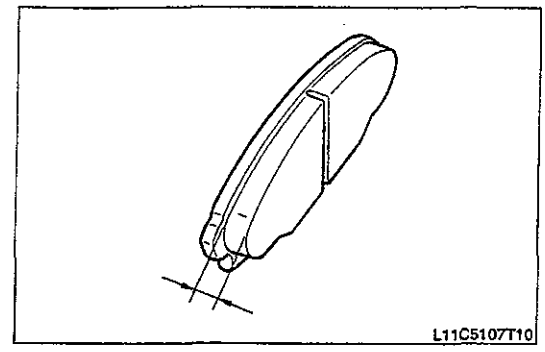
5-1-4 INSPECTION

(1) BRAKE PAD THICKNESS

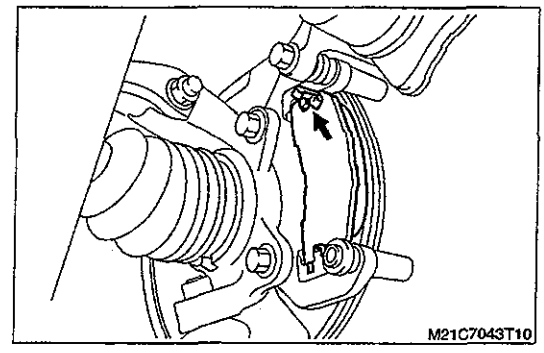
1.Suspend the disc brake cylinder, using a wire or the like.



2.Check the thickness of the disc brake pad, and replace it if the thickness is less than the allowable limit.
ALLOWABLE LIMIT: 1.5mm
NOTE
- New part: 9.5mm



5-1-5 POINTS OF INSTALLATION
(1) DISC BRAKE PAD W/ WEAR INDICATOR
Install the disc brake pad with a wear indicator at the inner side of the vehicle. At this time, make sure that the wear indicator comes at the vehicle upper side during the installation.



5-1-6 OPERATION AFTER INSTALLATION
1.Replenish the reservoir tank with brake fluid up to the MAX line.
2.Install the front disc wheel.
TIGHTENING TORQUE: 103.0±14.7N·m{1050±150kgf·cm}

3.Confirm that there is no brake dragging.

6 FRONT DISC CALIPER

6-1 REMOVAL AND INSTALLATION

WARNING

- Keep the position of the jack-up point to avoid causing serious accident due to inclining of the vehicle.

CAUTION

- Care must be exercised so that no brake fluid may adhere to the paint surface. If brake fluid is adhered to the paint surface, immediately wipe it out and wash it with water.
- Never reuse the wiped-out brake fluid.
- Care must be exercised so that no oil, grease, etc. may adhere to the sliding surface between the brake pad and the brake disc.

6-1-1 ARTICLES TO BE PREPARED

Tool

Brake pedal pusher

Instrument

Torque wrench

Lubricant,adhesive,others

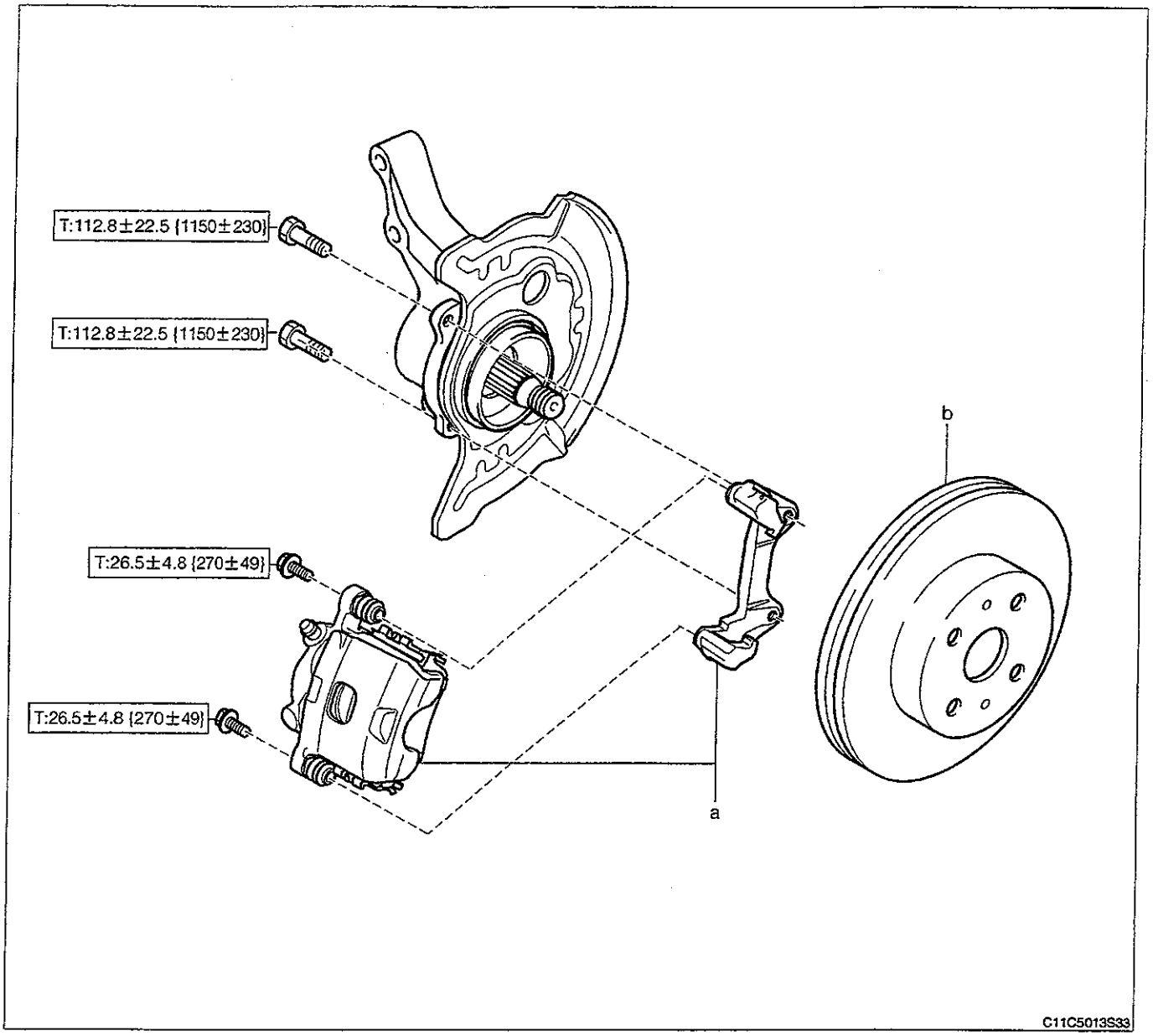
Brake fluid(DOT3)

6-1-2 OPERATION BEFORE REMOVAL

1.Check the front wheel bearing for excessive looseness.
2.Measure the runout of the disc edge surface, using a dial gauge.
3.Drain brake fluid from the reservoir tank.

6-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Caliper Ay, disc brake front
2 b Disc, brake

6-1-4 OPERATION AFTER INSTALLATION

1.Replenish the reservoir tank with brake fluid up to the MAX line.
2.Perform air bleeding of the brake system.

CAUTION

- After completion of the air bleeding of the brake system, check that no air has been admitted once again.

3.Install the front disc wheel.
TIGHTENING TORQUE: 103.0±14.7N·m{1050±150kgf·cm}

Confirm that there is no brake dragging.

6-2 DISASSEMBLING AND ASSEMBLING

CAUTION

- While using compressed air, put on safety glasses.
- When blowing on compressed air, be careful not to pinch fingers and so on by the piston came out intensely.
- Any kind of lubricants applied to the disc brake pad or the brake disc could reduce the efficiency of the brake.

6-2-1 ARTICLES TO BE PREPARED

Instrument

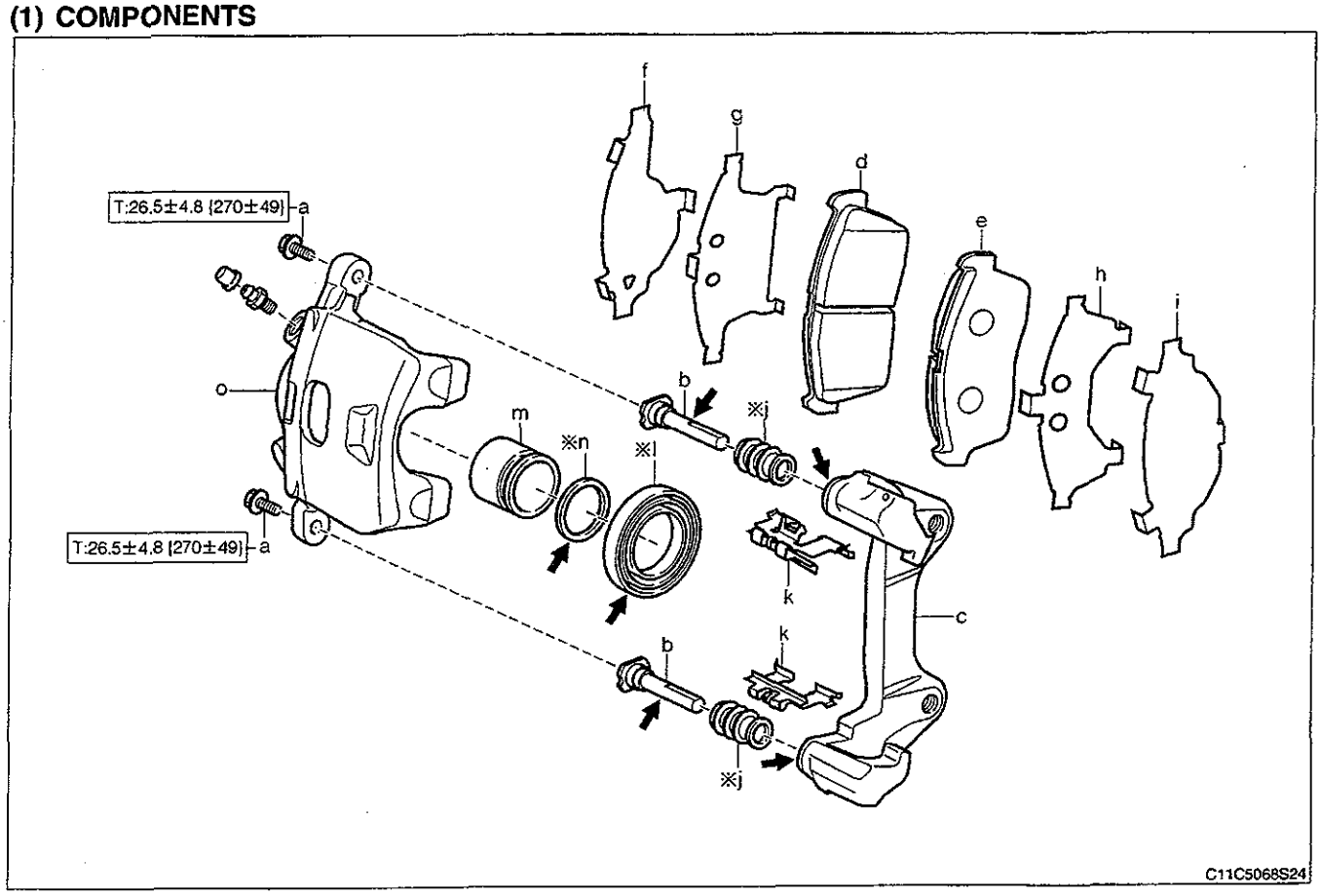
Torque wrench

Lubricant,adhesive,others

Brake grease,Rubber grease,Brake fluid(DOT3)

6-2-2 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) COMPONENTS



➡:Rubber grease
※: Non-reusable parts
Unit:N·m{kgf·cm}

(2) DISASSEMBLY AND ASSEMBLY PROCEDURES

1 a Bolt,disc brake cylinder
2 b Pin,cylinder slide
3 c Mounting, disc brake cylinder
4 d Pad,disc brake W/indicator No.1
5 e Pad,disc brake No.2
6 f Shim,anti squeal,No3
7 g Shim,anti squeal,No1
8 h Shim,anti squeal,No2
9 i Shim,anti squeal,No4
10 j Boot, pin
11 k Plate, disc brake pad guide
▲ 12 l Boot, cylinder
▼ ▲ 13 m Piston, disc brake
▲ 14 n Seal, piston
15 o Cylinder,disc brake

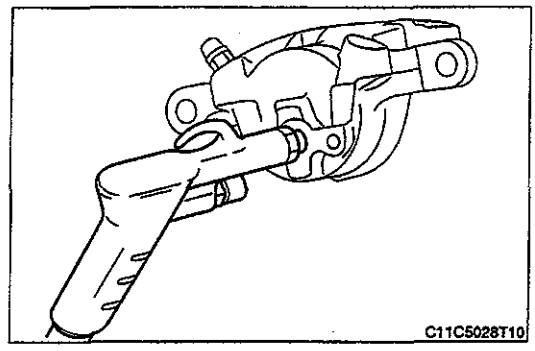
6-2-3 POINTS OF DISASSEMBLY

(1) DISC BRAKE PISTON

Remove the piston seal by pulling out the disc brake piston, using compressed air. When compressed air is blown to the brake piston, reduce the pressure with a cloth, etc. interposed so as to avoid scores on the components.

CAUTION

- **Be very careful not to scratch the cylinder inner surface.**



6-2-4 POINTS OF ASSEMBLY

Prior to the assembling, wash each part with brake fluid that is the same as the one to be used.

LUBRICANT: Brake fluid(DOT3)

(1) DISC BRAKE PISTON

Before the disc brake piston is assembled to the disc brake cylinder, apply brake fluid to the disc brake piston.

LUBRICANT: Brake fluid(DOT3)

(2) PISTON SEAL

As for the piston seal, be sure to use a new part. Prior to the installation to the disc brake cylinder, apply brake fluid to the new piston seal.

Securely assemble it in the disc brake cylinder groove, while paying attention not to allow any twisting.

LUBRICANT: Brake fluid(DOT3)

(3) CYLINDER BOOT

Before the disc brake piston is assembled to the disc brake cylinder, install the cylinder boot to the disc brake piston edge.

Install the cylinder boot to the boot groove provided at the inside of the disc brake cylinder. Ensure that the cylinder boot is fitted securely into the boot groove.

(4) DISC BRAKE PISTON

Make sure to manually insert the disc brake piston to the disc brake cylinder.

7 FRONT BRAKE DISC

7-1 REMOVAL AND INSTALLATION

WARNING

- Keep the position of the jack-up point to avoid causing serious accident due to inclining of the vehicle.

7-1-1 ARTICLES TO BE PREPARED

Instrument

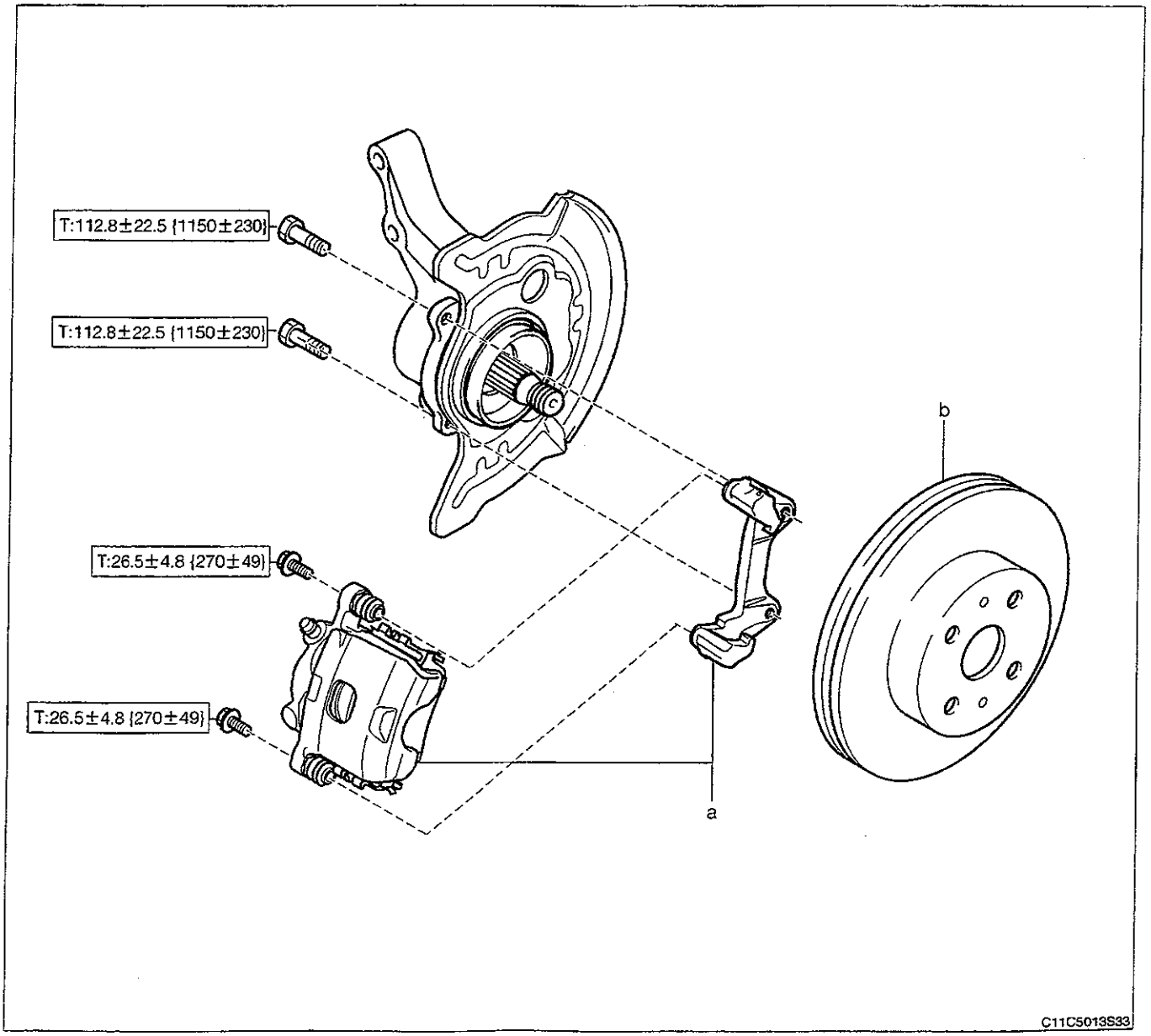
Torque wrench

7-1-2 OPERATION BEFORE REMOVAL

1.Jack up the vehicle.
2.Remove the front disc wheel.

7-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf·cm}

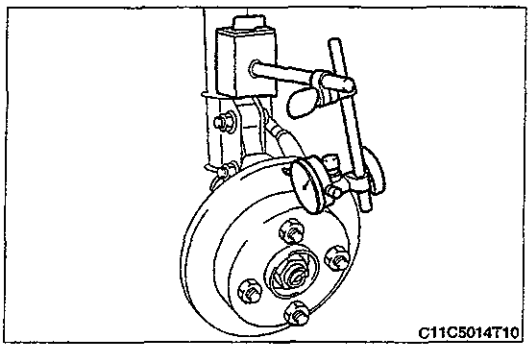
(2) REMOVAL AND INSTALLATION PRPCEDURES

1 a Caliper Ay, disc brake front
2 b Disc, brake

7-1-4 INSPECTION

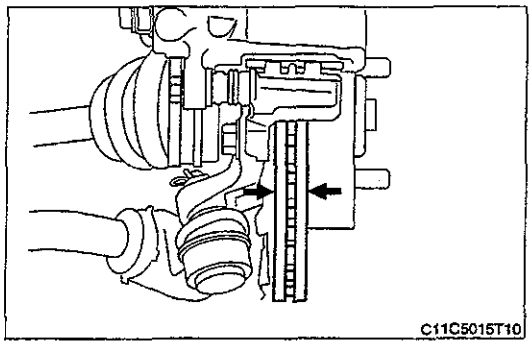
(1) RUNOUT

1.Confirm that there is no excessive play in the front wheel bearing.
2.Measure the runout of the disc end face, using a dial gauge.
SPECIFIED VALUE: 0.10mm
(Measure it at a point 10mm from outer periphery edge of the disc)
3.In case that the disc runout exceeds the limit, check the axle hub runout. And replace the disc if no abnormality is found on the axle hub.


C11C5014T10

(2) DISC THICKNESS

1.Measure the thickness of the brake rotor disc, and replace it if the thickness is less than the limit.
ALLOWABLE LIMIT: 16mm
NOTE
- New part: 17mm


C11C5015T10

7-1-5 OPERATION AFTER INSTALLATION

1.Install the front disc wheel.
TIGHTENING TORQUE: 103.0±14.7N·m{1050±150kgf·cm}

2.Confirm that there is no brake dragging.

8 REAR BRAKE DRUM

8-1 REMOVAL AND INSTALLATION

WARNING

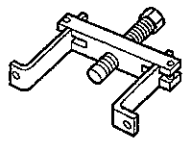
- Keep the position of the jack-up point to avoid causing serious accident due to inclining of the vehicle.

CAUTION

- Care must be exercised so that no brake fluid may adhere to the paint surface. If brake fluid is adhered to the paint surface, immediately wipe it out and wash it with water.
- Care must be exercised so that no oil, grease, etc. may adhere to the sliding surface between the brake lining and the brake drum.

8-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09510-87301-000	Puller, axle shaft

Instrument

Torque wrench

Lubricant,adhesive,others

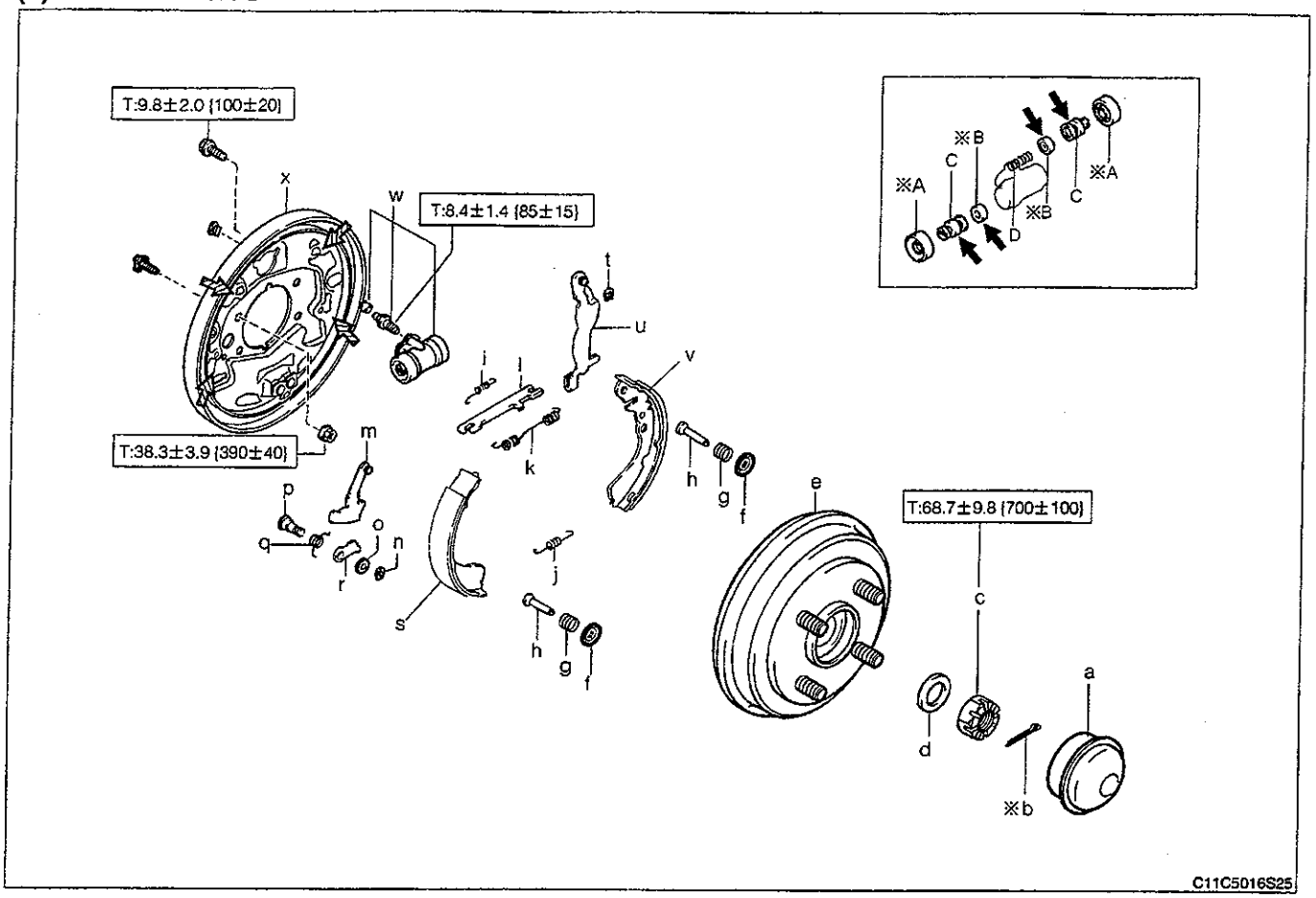
Brake fluid(DOT3),Brake grease,Three Bond1212,MP grease,Three Bond1104

8-1-2 OPERATION BEFORE REMOVAL

1.Jack up the vehicle.
2.Remove the rear wheel.
3.Disconnect the brake tube from the brake wheel cylinder assembly.

8-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



➡:Rubber grease
➡: Brake grease
※: Non-reusable parts
Unit:N·m{kgf·cm}

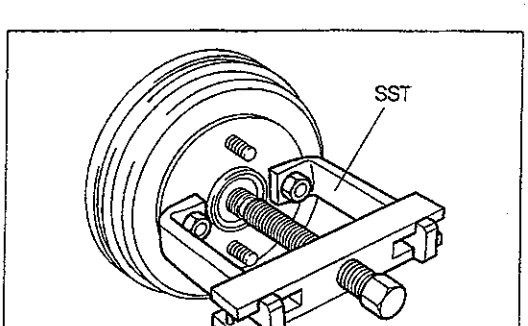
(2) REMOVAL AND INSTALLATION PROCEDURES

	1	a	Cap, rear wheel grease retainer	15	o	Washer, web
	2	b	Pin, cotter	16	p	pin,automatic adjust
▲	3	c	Nut, castle	17	q	Spring, torsion
	4	d	Washer	18	r	Latch,automatic adjust
▼	5	e	Drum S/A, brake rear	19	s	Shoe Ay, brake
	6	f	Cup, shoe hold down spring	20	t	Washer, type C
	7	g	Spring, compression	21	u	Lever S/A, parking brake shoe
	8	h	Pin, shoe hold down spring	22	v	Shoe Ay, brake
	9	i	Spring, tension	23	w	Cylinder, wheel brake, rear
	10	j	Spring, tension	24	x	Plate S/A, brake backing, rear
	11	k	Spring, tension	25	A	Boot, wheel cylinder
	12	l	Strut, parking brake shoe	26	B	Cup, cylinder
	13	m	Lever S/A, parking brake shoe	27	C	Piston, wheel brake cylinder
	14	n	Washer, type C	28	D	Spring,compression

8-1-4 POINTS OF REMOVAL

Remove the brake drum, using the SST.

SST: 09510-87301-000



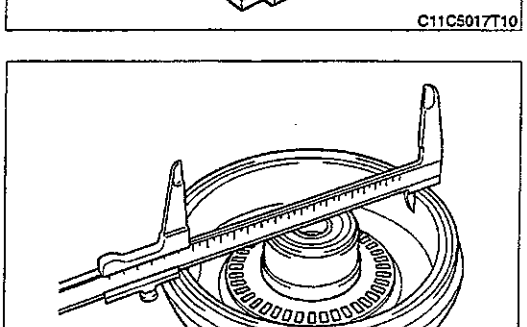
8-1-5 INSPECTION

(1) Brake drum inner diameter

If the brake drum exhibits excessive uneven wear, grind or replace the brake drum.

SPECIFIED VALUE: 180mm

ALLOWABLE LIMIT: 181mm



(2) BRAKE SHOE THICKNESS

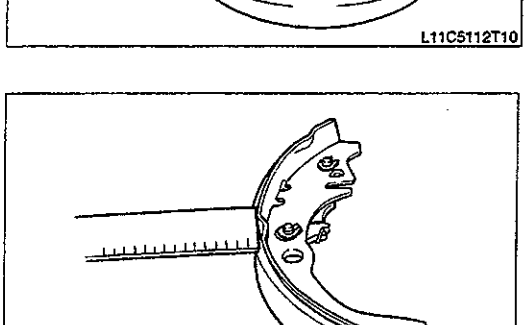
If the thickness of the shoe lining is below the limit or it exhibits excessive uneven wear, replace the brake shoe.

SPECIFIED VALUE: 4.0mm

ALLOWABLE LIMIT: 1.0mm

CAUTION

- When replacing the rear brake shoe Ay, replace both shoes in right and left wheels as a set in order to prevent the pulling of brake.



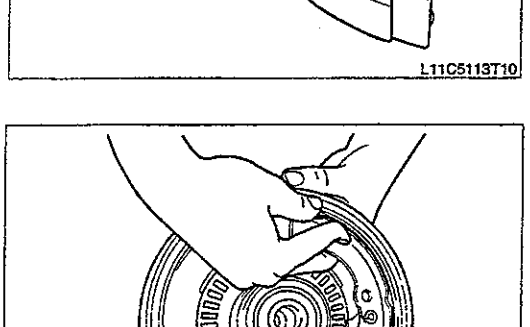
(3) Contact between shoe lining and brake drum

Apply chalk to the inner surface of the brake drum. Slide the brake shoe assembly, while it is being pressed against the inner surface of the drum. If poor contact is present, be sure to grind the brake shoe lining.

SPECIFIED VALUE: No significant poor contact is present.

CAUTION

- After completion of the check, be sure to wipe off the chalk.



(4) WHEEL BRAKE REAR CYLINDER AY

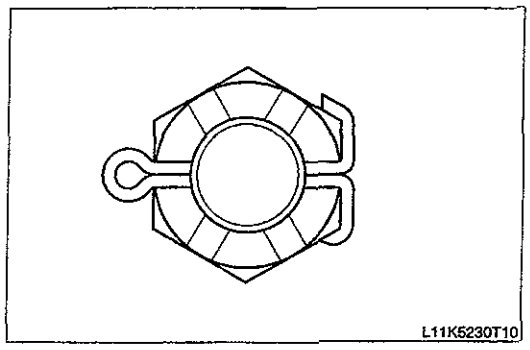
Check the wheel brake rear cylinder assembly for corrosion and damage.

(5) BRAKE BACKING REAR PLATE S/A

Check the brake backing rear plate subassembly for wear and damage.

8-1-6 POINTS OF INSTALLATION

Install a new cotter pin after aligning the hole positions in the tightening direction of the castle nut.



8-1-7 OPERATION AFTER INSTALLATION

1.Connect the brake tube to the wheel brake rear cylinder assembly, using the SST.
SST: 09023-00100-000

CAUTION

- Tighten the union nut of the front brake tube temporarily by hand till flare portion of the tube contacts securely to the seat, and then tighten it with the specified tightening torque.

TIGHTENING TORQUE: 15.2±2.5N·m{155±25kgf·cm}

2.Replenish the reservoir tank with brake fluid up to the MAX line.
3.Perform air bleeding of the brake system.

CAUTION

- After completion of the air bleeding of the brake system, check that no air has been admitted once again.

4.Check for brake fluid leakage.
5.Install the rear wheel.
TIGHTENING TORQUE: 103.0±14.7N·m{1050±150kgf·cm}

6.Depress the brake pedal several times, thus activating the adjuster mechanism of the shoe clearance, so that the shoe clearance may be adjusted to an optimum condition.
7.Check and adjust the pulling amount of the parking brake.
Refer to Page E1-1.

8.Confirm that there is no brake dragging.
9.Jack down the vehicle.

TO INDEX

E2 PARKING BRAKE

PARKING BRAKE ---------- E2 - 1
BASIC CHECK AND ADJUSTMENT --- E2 - 1
PARKING BRAKE ---------- E2 - 2
REMOVAL AND INSTALLATION -------- E2 - 2

1 PARKING BRAKE

1-1 BASIC CHECK AND ADJUSTMENT

1-1-1 PARKING BRAKE LEVER

(1) Check of pulling amount

1.Depress the brake pedal several times.

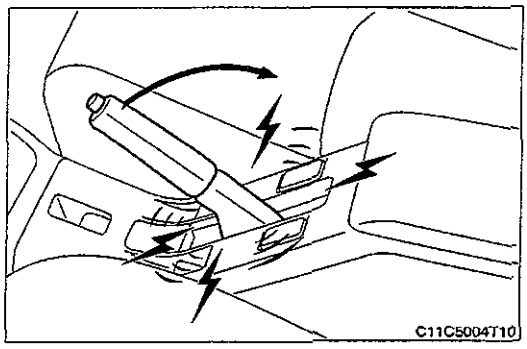
2.Operate the parking brake lever. At this time, ensure that the brake warning lamp goes on.

SPECIFIED VALUE: Ensure that the brake warning lamp goes on before the parking brake lever is engaged one notch after the lever starts to be pulled out.

3.Operate the parking brake lever several times. Then, return the lever fully.

4.Slowly pull the parking brake lever with the specified force. At this time, count the number of clicking sounds.

SPECIFIED VALUE: 4 to 7 notches
(Operating force: 196N {20kgf})



(2) Adjustment of pulling amount

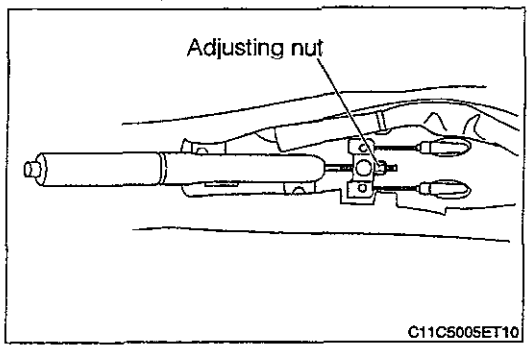
1.Depress the brake pedal several times.

2.Remove the rear console box.

3.Perform the adjustment to the specified value by turning the adjusting nut.

SPECIFIED VALUE: 4 to 7 notches
(Operating force: 196N {20kgf})

4.Check that the parking brake exhibits no dragging.



2 PARKING BRAKE

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

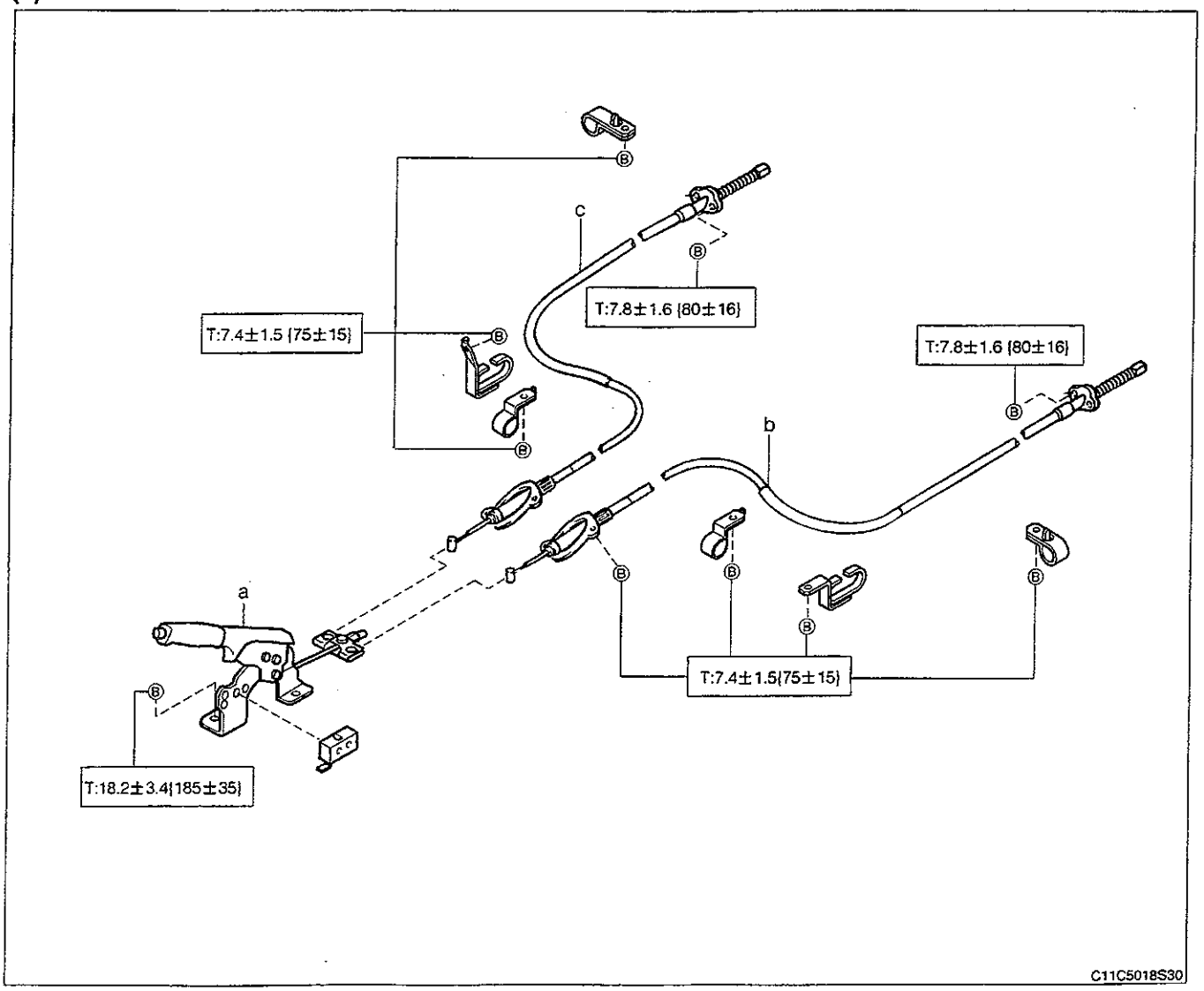
2-1-2 OPERATION BEFORE REMOVAL

1.Remove the rear console box.
Refer to Page I2-38.

2.Jack up the vehicle.
3.Remove the rear disc wheel.
4.Remove the brake drum.
Refer to Page E1-26.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Lever Ay, parking brake
2 b Cable Ay, parking brake(Rear left)
3 c Cable Ay, parking brake(Rear right)

2-1-4 OPERATION AFTER INSTALLATION

1.Install the brake drum.
Refer to Page E1-26.

2.Install the rear disc wheel.
TIGHTENING TORQUE: 103.0±14.7N·m{1050±150kgf·cm}

3.Jack down the vehicle.
4.Check and adjust the pulling amount of the parking brake lever.
Refer to Page E1-1.

5.Install the rear console box.

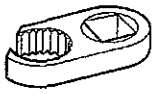
TO INDEX

E3 BRAKE CONTROL

ABS ---------- E3 - 1
ABS ACTUATOR UNIT ---------- E3 - 1
REMOVAL AND INSTALLATION -------- E3 - 1
FRONT WHEEL SPEED SENSOR -------- E3 - 4
REMOVAL AND INSTALLATION -------- E3 - 4
REAR WHEEL SPEED SENSOR ---------- E3 - 6
REMOVAL AND INSTALLATION -------- E3 - 6
CONTROL SYSTEM ---------- E3 - 7
ARTICLES TO BE PREPARED ---------- E3 - 7
HANDLING INSTRUCTIONS OF CONTROL SYSTEM ---------- E3 - 7
SYSTEM WIRING DIAGRAM ---------- E3 - 8
ARRANGEMENT OF ECU TERMINAL ---------- E3 - 8
ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS ---------- E3 - 9
LOCATION OF COMPONENTS ------- E3 - 10
HOW TO PROCEED WITH TROUBLE SHOOTING ---------- E3 - 11
INQUIRY ---------- E3 - 12
DIAGNOSIS ---------- E3 - 12
FAIL-SAFE FUNCTION ---------- E3 - 16
SENSOR CHECK FUNCTION (TEST MODE) ---------- E3 - 16
BASIC CHECK ---------- E3 - 17
TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE ---------- E3 - 19
TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA --- E3 - 25
UNIT CHECK ---------- E3 - 31

ABS
1 ABS ACTUATOR UNIT
1-1 REMOVAL AND INSTALLATION
1-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09023-00100-000	Wrench, union nut

Instrument

Torque wrench

Lubricant,adhesive,others

Brake fluid(DOT3)

1-1-2 OPERATION BEFORE REMOVAL

1.Remove the negative terminal of the battery.

CAUTION

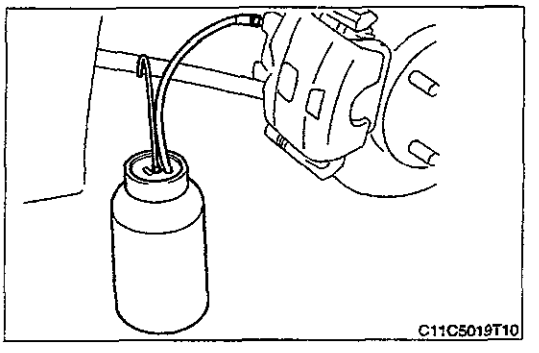
- **When the negative (−) terminal of the battery is removed, the memories of some systems will be erased. Therefore, record the contents of the memory of each system, as required, and input them after the operation.**

2.Prevent the brake fluid from flowing out by the following procedure.

3.Lift up the vehicle.

(1) Remove the disc wheel (four wheels).

(2) Connect a bottle for air bleeding to the bleeder plug of the front wheel calipers at both right and left sides. Then, open the bleeder plug.

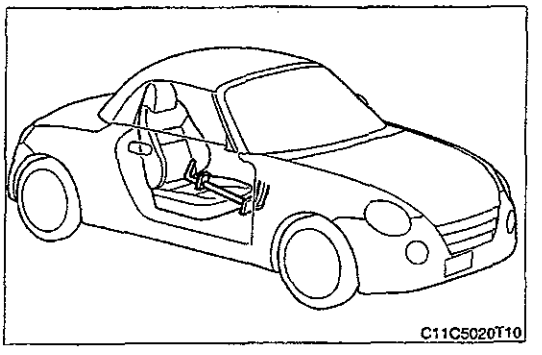


(3) Depress the brake pedal more than 60 mm. At this point, secure the brake pedal.

NOTE

- **This closes the master cylinder port, thus preventing the brake fluid from flowing out from the brake hydraulic circuit.**

(4) Close the bleeder plug of the front wheels at the right and left sides.

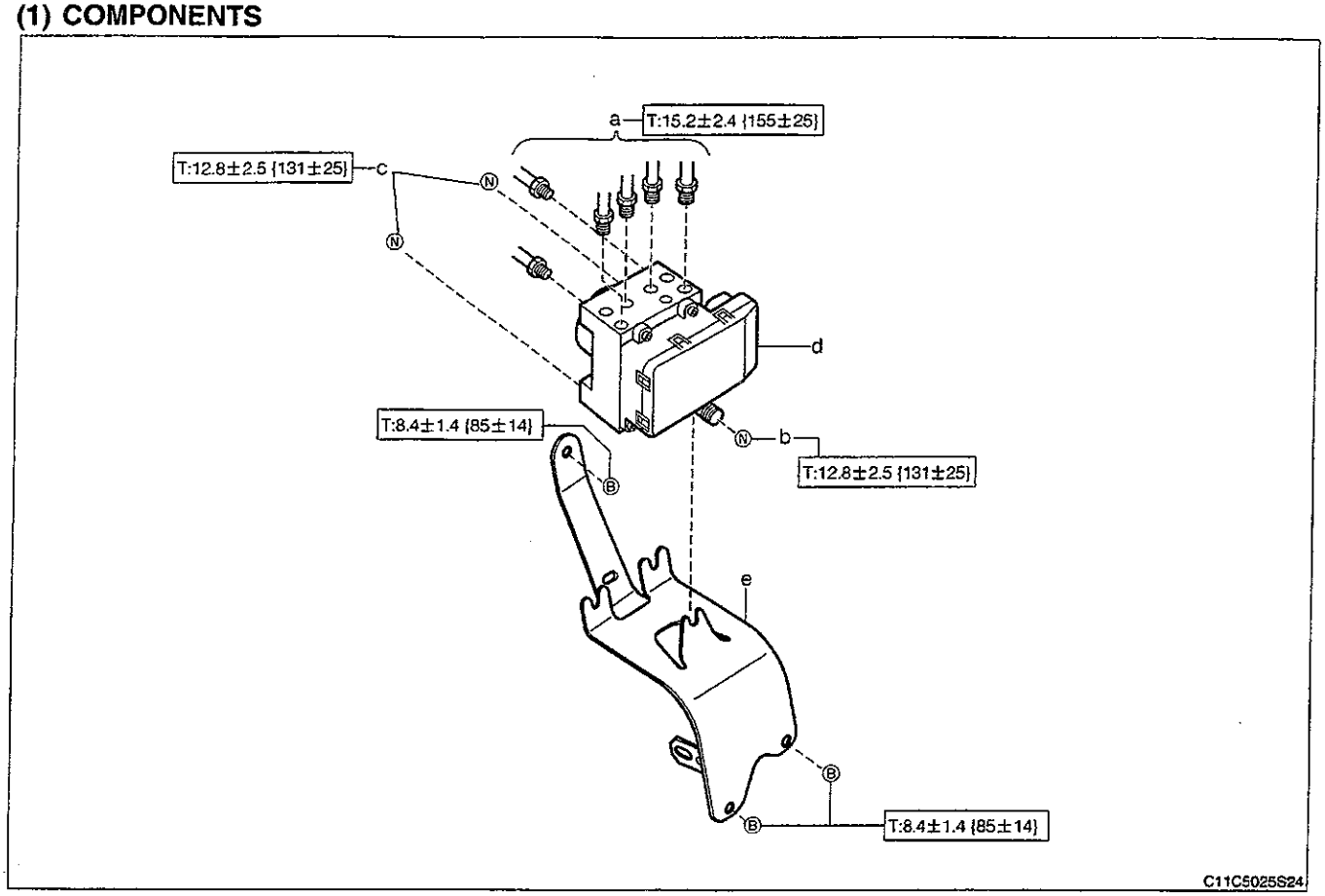


4.Remove the fender.

Refer to Page I2-23.

1-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



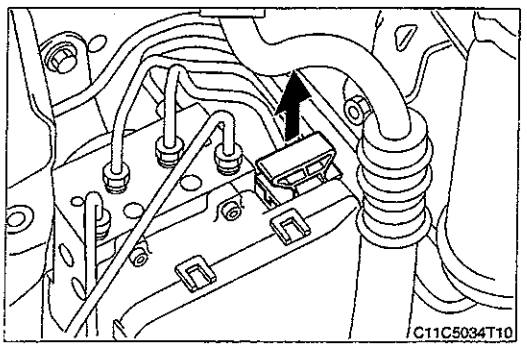
Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

▼ 1 a BRAKE TUBE
2 b Nut
3 c Nut
▼ 4 d Actuator Ay, Brake (ABS)
5 e Bracket, brake actuator

1-1-4 POINTS OF REMOVAL

(1) ABS ACTUATOR



1.Remove the connector by pulling up the lock lever fully.
2.Remove the brake tube, using the SST.
(1) Remove the four tubes at the upper surface of the ABS actuator.
(2) Remove the two tubes at the right side.
SST: 09023-00100-000
3.Clog the disconnected brake tube, using a bleeder plug cap or the like.
4.Remove the ABS actuator together with the bracket.

1-1-5 POINTS OF INSTALLATION

(1) ABS actuator

1.Install the ABS actuator to the ABS actuator bracket with the flange bolt turning prevention section facing upward.

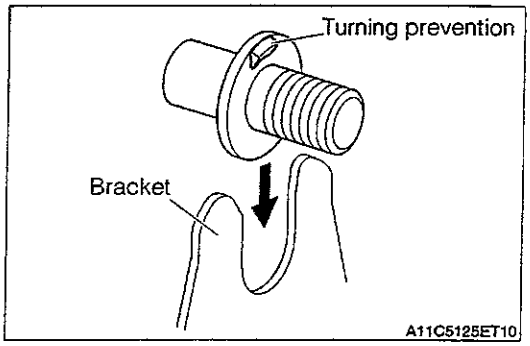
2.Using the SST, install the brake tube to the brake actuator assembly.

CAUTION

- **Temporarily tighten the union nut until the flare section of the tube closely contacts with the seat. After that, tighten the nut to the specified torque.**

TIGHTENING TORQUE: 15.2±2.4N·m
{155±25kgf·cm}

SST: 09023-00100-000



1-1-6 OPERATION AFTER INSTALLATION

1.Perform air bleeding of the brake system.

CAUTION

- **After completion of the air bleeding of the brake system, check that no air has been admitted once again.**

2.Check for brake fluid leakage.

3.Replenish the reservoir tank with brake fluid up to the MAX line.

4.Remove the fender.
Refer to Page I1-23.

5.Install the disc wheels.
TIGHTENING TORQUE: 103.0±14.7N·m {1050±150kgf·cm}

6.Lift down the vehicle.

7.Install the negative terminal of the battery.

2 FRONT WHEEL SPEED SENSOR

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

2-1-2 OPERATION BEFORE REMOVAL

1.Remove the negative terminal of the battery.

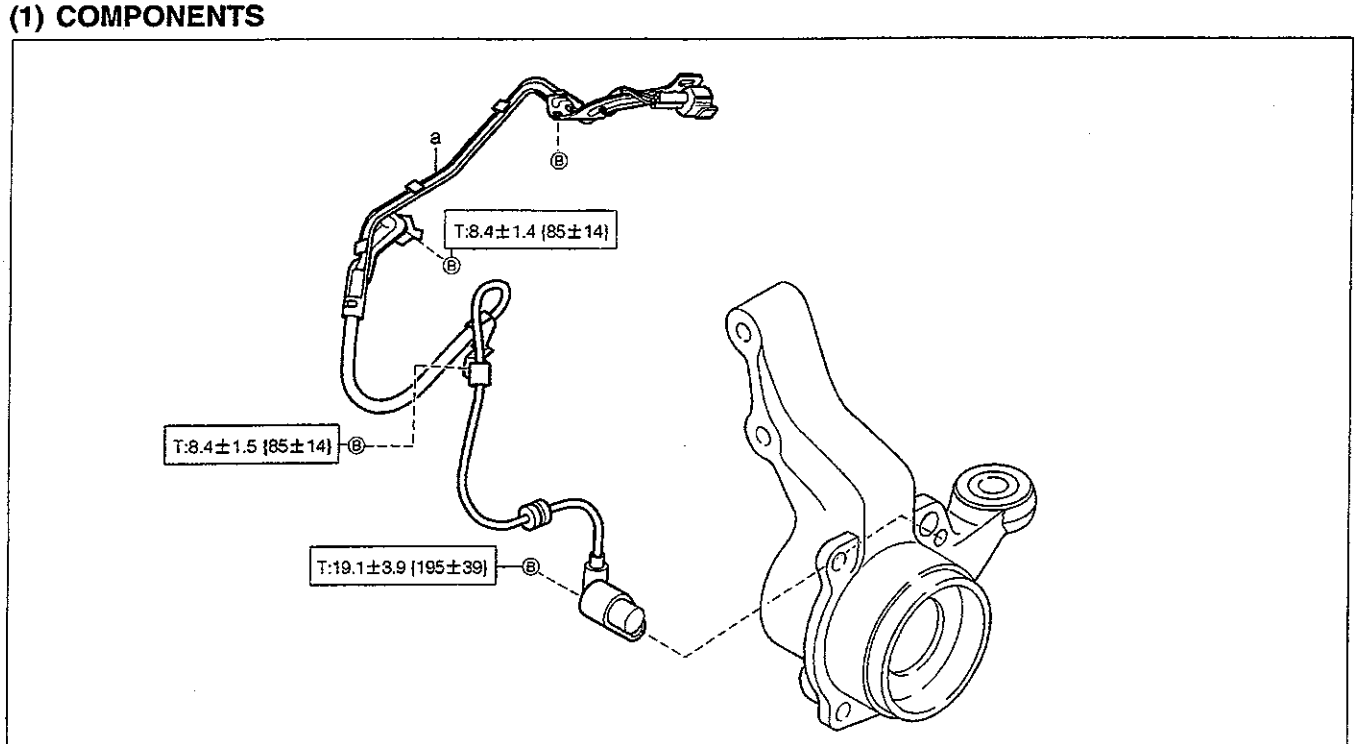
CAUTION

- When the negative (−) terminal of the battery is removed, the memories of some systems will be erased. Therefore, record the contents of the memory of each system, as required, and input them after the operation.

2.Lift up the vehicle.
3.Remove the front wheel.
4.Remove the front fender liner.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Sensor, skid control front

2-1-4 INSPECTION

Carry out the unit check of the front wheel speed sensor.

Refer to Page E3-31.

2-1-5 OPERATION AFTER INSTALLATION

1.Install the front fender liner.
2.Install the front wheel.
TIGHTENING TORQUE: 103.0±14.7N·m {1050±150kgf·cm}

3.Install the negative terminal of the battery.
4.Lift down the vehicle.

3 REAR WHEEL SPEED SENSOR

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

3-1-2 OPERATION BEFORE REMOVAL

1.Disconnect the negative terminal of the battery.

CAUTION

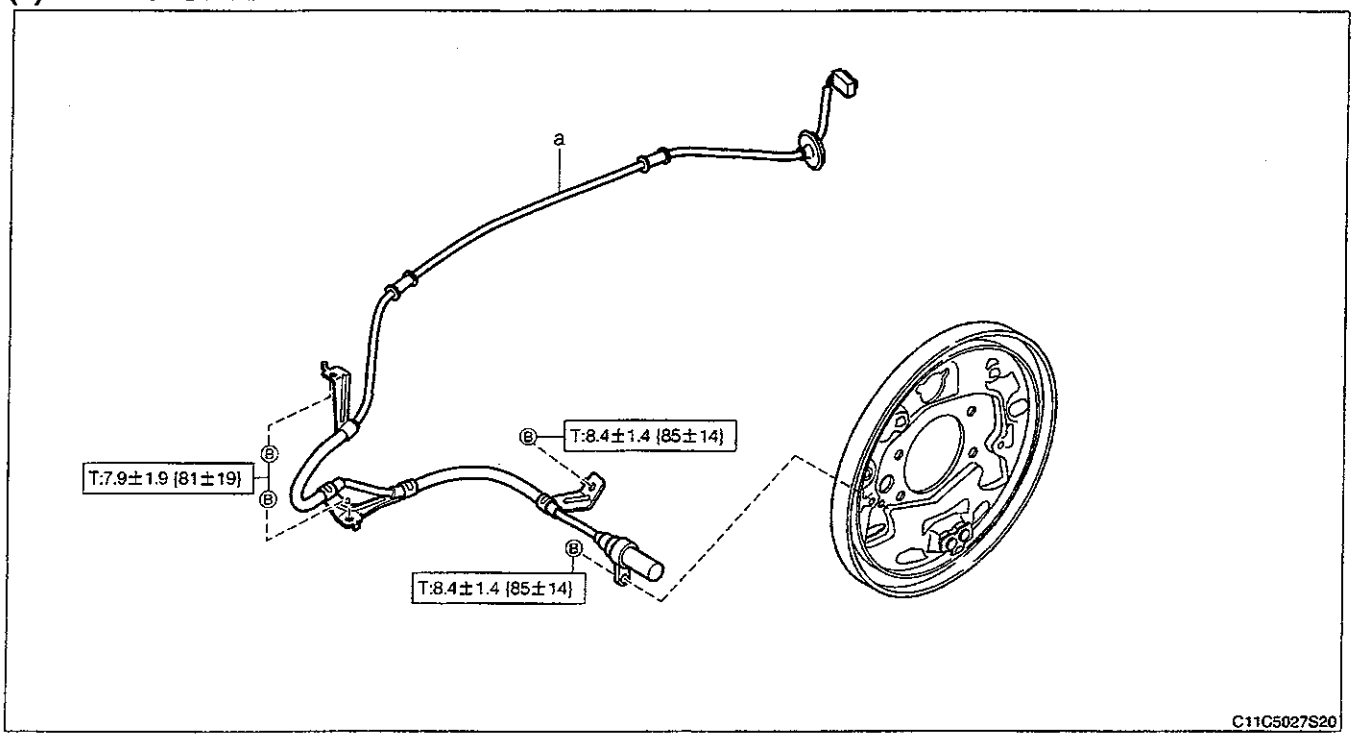
- When the negative terminal of the battery is disconnected, the memories of all system ECUs and the radio settings will be erased, so after the power is restored these need to be reset.

2.Lift up the vehicle.

3.Remove the rear wheels.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Sensor, skid control rear/right
2 b Sensor, skid control rear/left

3-1-4 INSPECTION

1.Conduct an individual inspection of the skid control rear sensor.
Refer to Page E3-32.

3-1-5 OPERATION AFTER INSTALLATION

1.Install the rear wheels.
TIGHTENING TORQUE: 103.0±14.7N·m {1050±150kgf·cm}

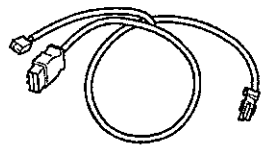
2.Connect the negative terminal of the battery.

3.Lift down the vehicle.

4 CONTROL SYSTEM

4-1 ARTICLES TO BE PREPARED

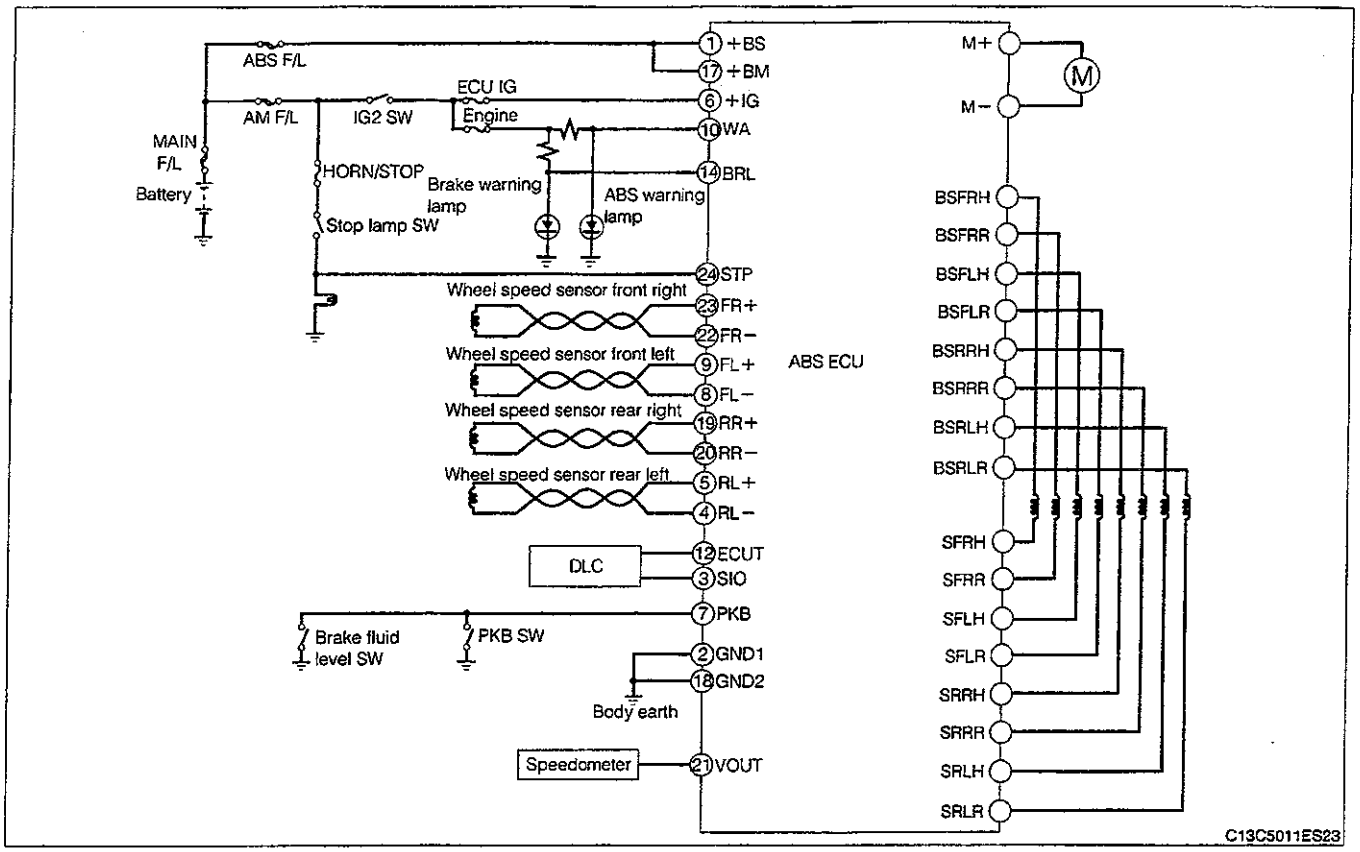
SST

Shape	Part No.	Part name
	09991-87404-000 (09991-87401-000)	Wire, engine control system inspection
	09991-87403-000	Wire, diagnosis check

4-2 HANDLING INSTRUCTIONS OF CONTROL SYSTEM

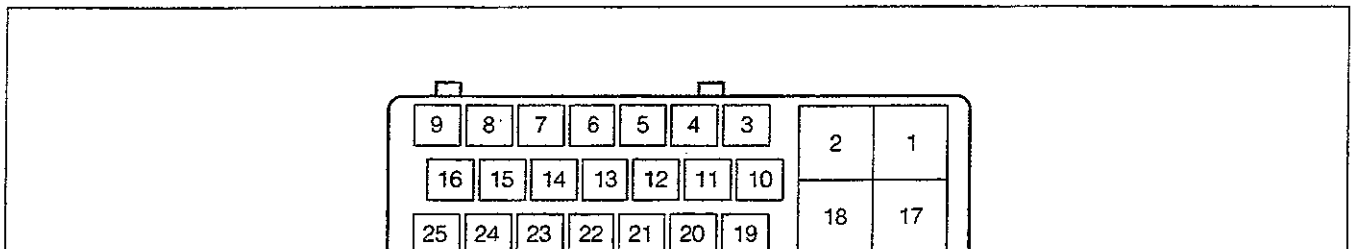
1. The ABS actuator and sensors are precision components. Do not subject them to a large shock during removal and installation. Do not use components that have been subjected to a large shock (such as being dropped on the floor).
2. Make sure water does not get in the system when conducting an inspection during rainy weather or when the vehicle is washed, and do not get water on the ABS actuators or sensors.
3. If an error is detected in the ABS ECU and the vehicle returned to normal when the ABS actuator was replaced, reinstall the replaced ABS actuator (the one that was deemed to be faulty) and confirm that the initial error occurred again before finally determining that the ABS ECU is defective.
4. Do not disassemble the ABS actuator.
5. Make sure that all of the wheel brake related parts are installed properly.
6. When a wireless device is installed, take the following precautions.
   (1) Move the antenna as far away as possible from the computer unit.
   (2) Place the antenna feeder as far away as possible from the ABS computer and wire harness (minimum distance of 30 cm). Keep the antenna feeder level and avoid pulling it around.
   (3) The antenna is matched well.
   (4) Do not install wireless devices with a high output.

4-3 SYSTEM WIRING DIAGRAM



4-4 ARRANGEMENT OF ECU TERMINAL

ABS ECU

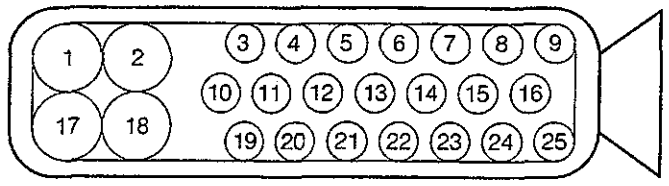


Terminal name

1	+BS	Solenoid valve power supply
2	GND1	Earth
3	SIO	Communication terminal of the diagnosis tester
4	RL−	Input of the rear left wheel speed sensor (−)
5	RL+	Input of the rear left wheel speed sensor (+)
6	+IG	IG2 power supply
7	PKB	Input of the parking brake SW
8	FL−	Input of the front left wheel speed sensor (−)
9	FL+	Input of the front left wheel speed sensor (+)
10	WA	Output of the ABS warning lamp
11	−	−
12	ECUT	Input of the diagnosis start
13	−	−
14	BRL	Output of the brake warning lamp
15	−	−
16	−	−
17	+BM	Motor power supply
18	GND2	Earth
19	RR+	Input of the rear right wheel speed sensor (+)
20	RR−	Input of the rear right wheel speed sensor (−)
21	VOUT	Output of the speed meter
22	FR−	Input of the front right wheel speed sensor (−)
23	FR+	Input of the front right wheel speed sensor (+)
24	STP	Input of the stop lamp SW
25	−	−

4-5 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS

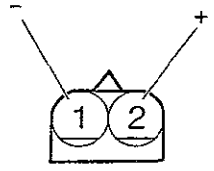
ABS ECU



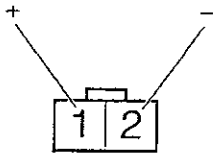
C13C5002S10

As for the name of the terminal of the ABS ECU vehicle harness side connector, see the computer connector terminal arrangement diagram.

WHEEL SPEED SENSOR



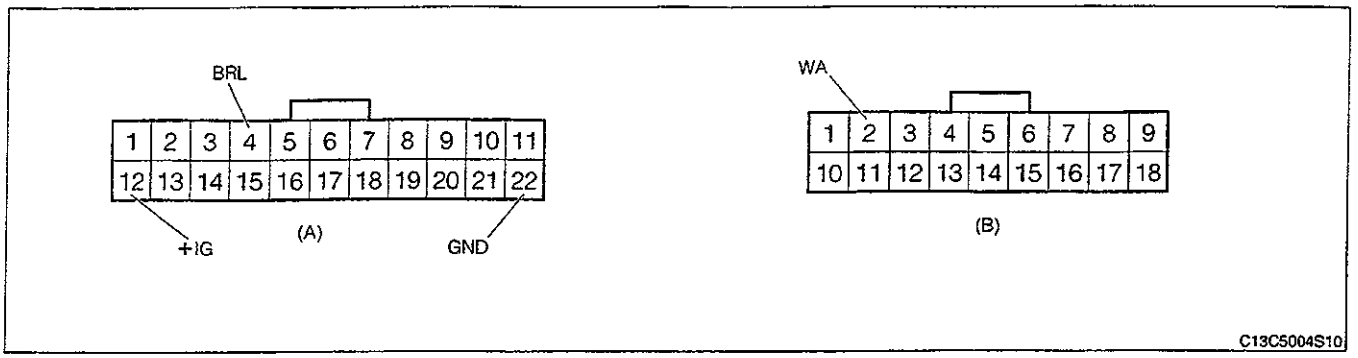
FR



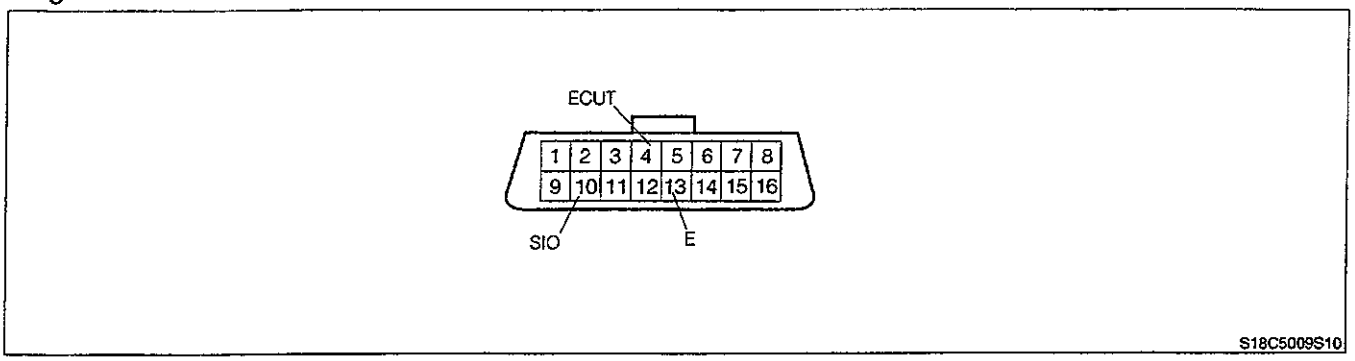
RR

C13C5003S10

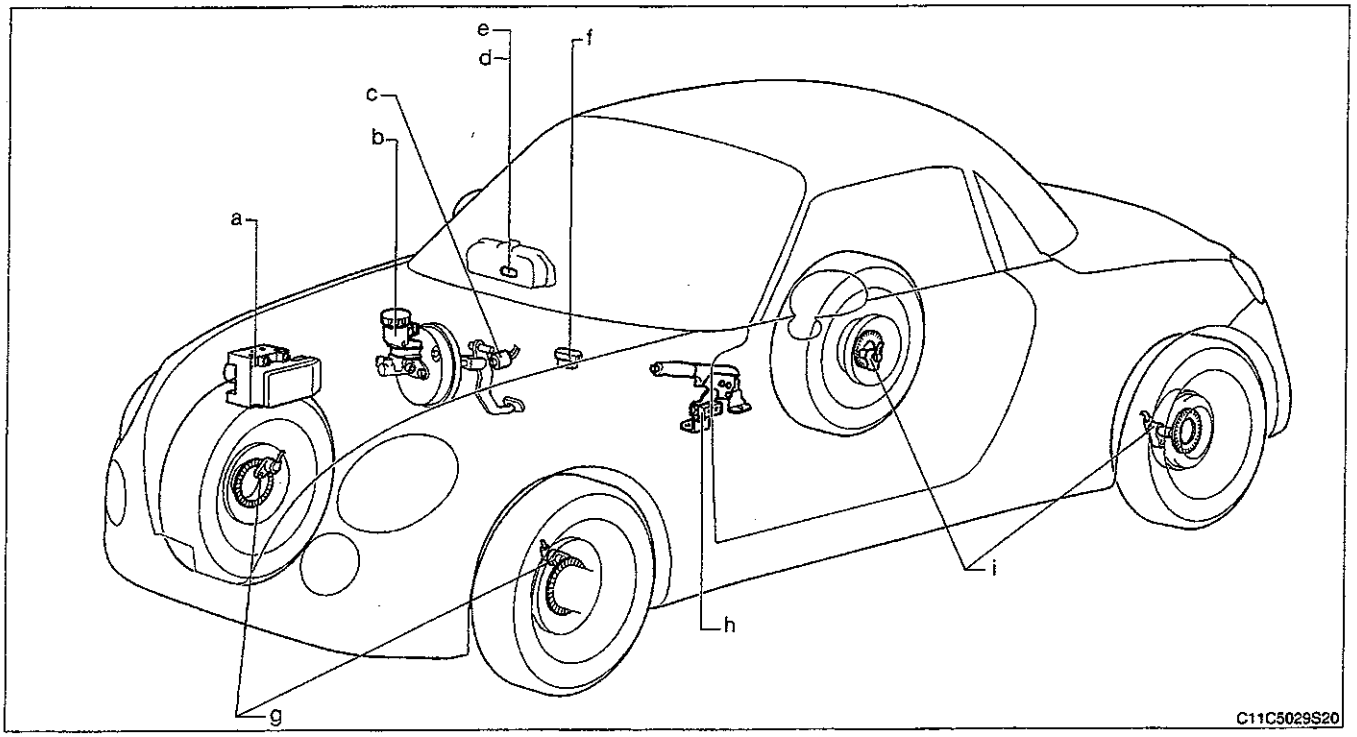
Combination meter



Diagnosis check connector



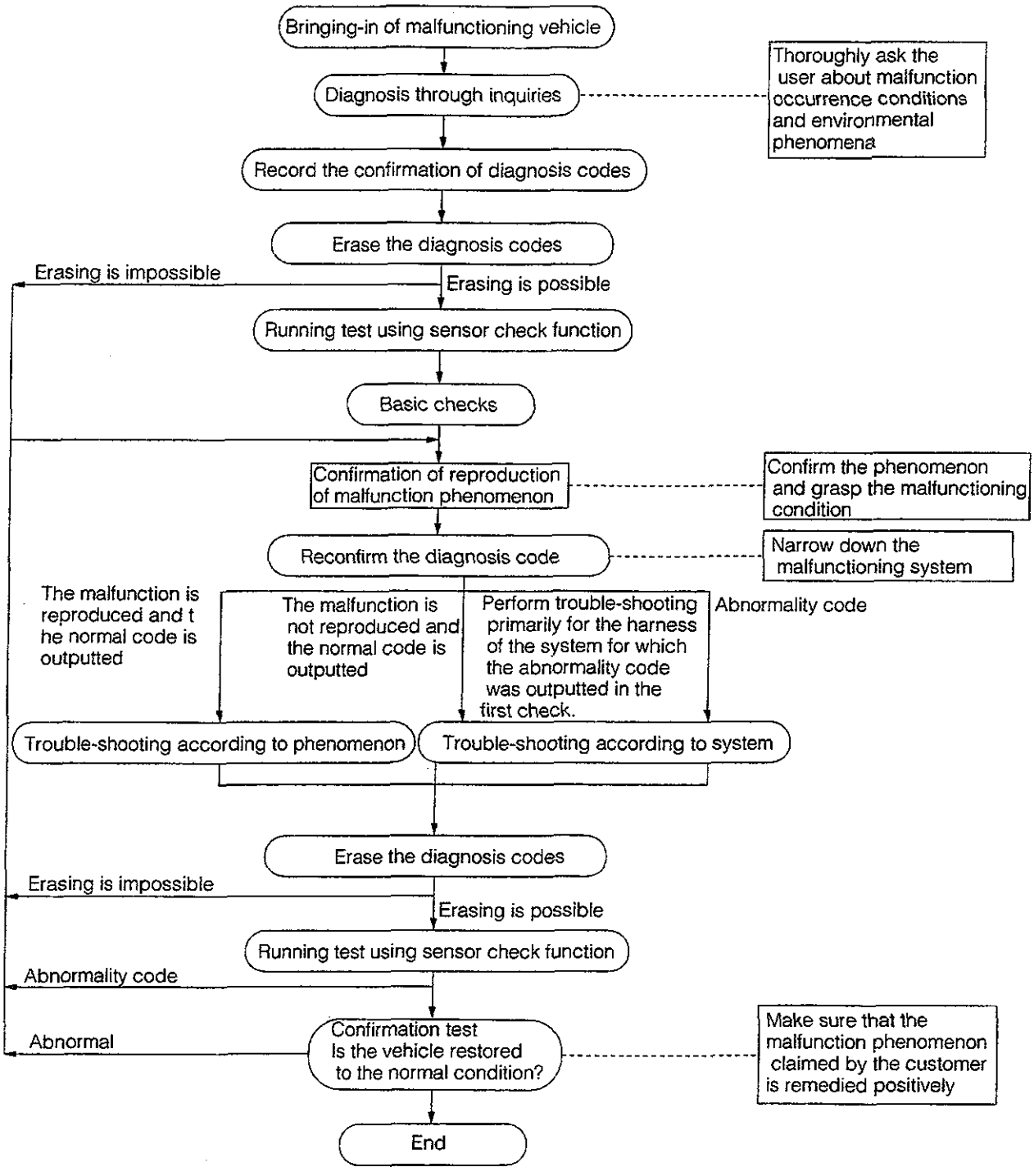
4-6 LOCATION OF COMPONENTS



a	ABS actuator
b	Brake fluid level SW
c	Stop lamp SW
d	ABS warning lamp
e	Brake warning lamp
f	DLC
g	Wheel speed sensor&rotor front
h	Parking brake SW
i	Wheel speed sensor&rotor rear

4-7 HOW TO PROCEED WITH TROUBLE SHOOTING

This system is equipped with a diagnosis function capable of performing the self−diagnosis of malfunctioning sections. This will be an important help at the time of trouble−shooting.
The diagnosis of this system has a backup that uses an EEPROM (non−volatile ROM). Hence, the diagnosis code is stored in memory even if the power is cut off.



L11C5125ES40

4-8 INQUIRY

When the vehicle is encountered with a malfunction, even if an attempt is made to remove its cause, it is impossible to find out the cause, unless the malfunction phenomenon can be actually confirmed. Hence, the vehicle may not be remedied to the normal condition regardless of the repairing operations. The diagnosis through inquiries to the customer is to be performed in order to collect information from the customer before confirming the malfunction phenomenon. This step will be a very important help in reproducing the malfunction phenomenon.

Moreover, the information obtained by the diagnosis through inquiries to the customer can be used as reference at the time of trouble—shooting. Therefore, it is essential to ask the customer mainly about the items related to the malfunction.

In addition, during the diagnosis through inquiries, utmost attention must be paid to complaints of the customer, for it may include phenomena peculiar to the ABS—equipped vehicles.

4-9 DIAGNOSIS

4-9-1 OUTLINE

When any abnormality code of the diagnosis is indicated, it is necessary to confirm the relationship with the reproduced malfunction phenomenon by ascertaining whether the system malfunction has occurred in the past or it still persists up to the present. To this end, the diagnosis code should be indicated twice before and after the confirmation of the phenomenon.

4-9-2 CHECKING METHOD OF DIAGNOSIS

1. While the vehicle is stopped, use the SST to short circuit the ECUT terminal in DLC with the E terminal.

   SST: 09991-87404-000
   09991-87403-000

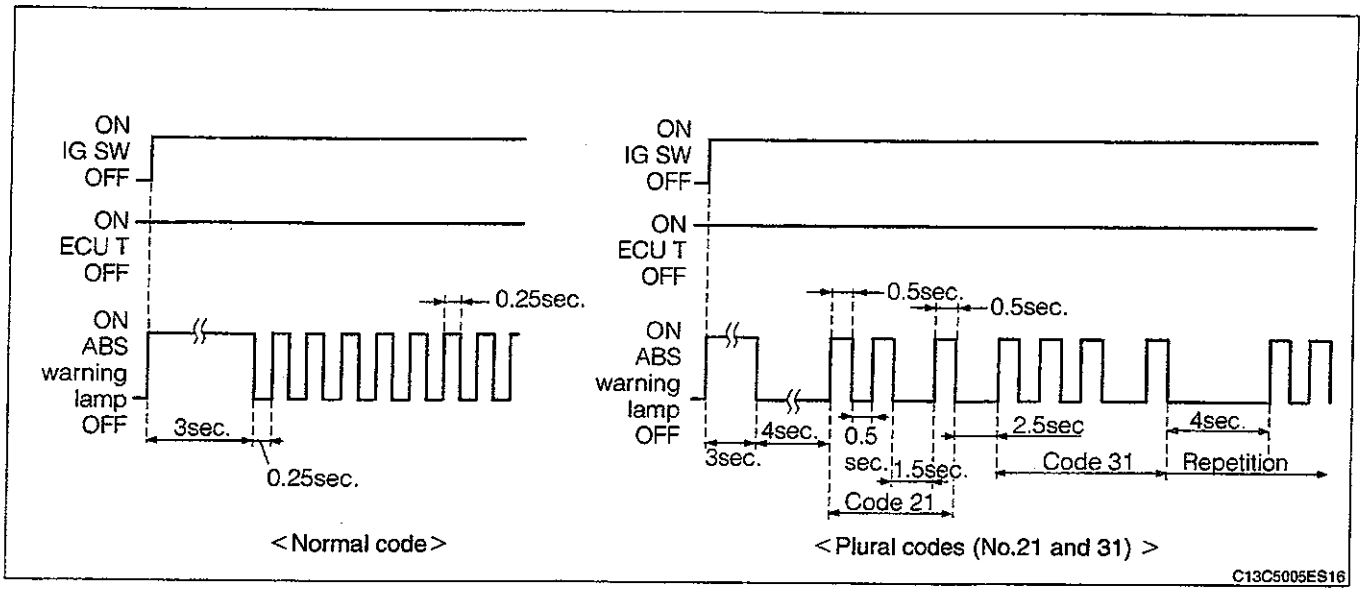
2.After the IG SW has been set to "ON" position, read the number of times the ABS warning lamp flashes.

CAUTION

- Connecting the connector in the wrong location could cause a malfunction, so make sure the connection is correct.

NOTE

- When the system is functioning normally, the flashing interval is 0.25 second.
- If there is one malfunction code, the lamp will flash at an interval of 4 seconds and the same code will be outputted. If multiple codes are outputted, the respective codes will be outputted in order at an interval of 2.5 seconds, and after all the codes have been outputted, there will be another 4 second pause before the output of the codes starts over again.
- When multiple codes are outputted, the codes will be outputted in order, starting from a smaller code.



4-9-3 CANCELING METHOD OF DIAGNOSIS

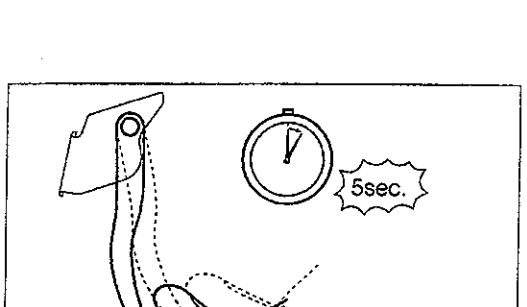
The diagnosis of this system has a backup that uses an EEPROM (non−volatile ROM). Hence, the diagnosis code is stored in memory even if the power is cut off. Therefore, the following method is the only way the diagnosis code can be deleted.

1.Stop the vehicle.

2.Short the terminal T of the ECU of DLC with the terminal E, using the SST. Then, turn ON the ignition SW.

SST: 09991-87404-000
09991-87403-000

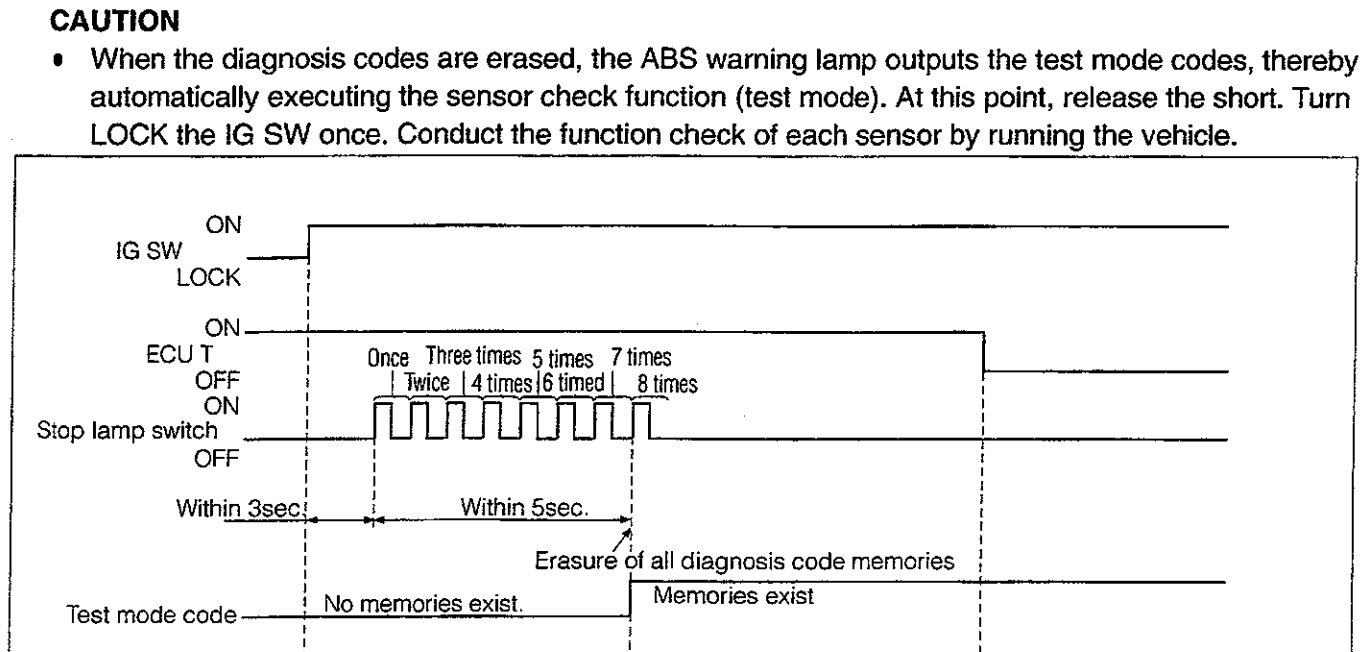
3.Repeat turning ON and OFF the stop lamp SW at least eight times for five seconds by depressing the brake pedal. (If the codes have not been erased, repeat this operation again.)



4.Release the terminal T of the ECU of DLC and terminal E.

CAUTION

- **When the diagnosis codes are erased, the ABS warning lamp outputs the test mode codes, thereby automatically executing the sensor check function (test mode). At this point, release the short. Turn LOCK the IG SW once. Conduct the function check of each sensor by running the vehicle.**



4-9-4 CONTENTS OF DIAGNOSIS

List of diagnosis codes

Code No.		Warning indication		Diagnosis system	Diagnosis item
Lamp	ISO※1	ABS Warning lamp	Brake Warning lamp		
11	C0278	○	○	Solenoid relay	Open wire in solenoid relay system
12	C0279	○	○	Solenoid relay	Short in solenoid relay system
13	C0273	○	○	Motor relay	Open wire in motor relay system
14	C0274	○	○	Motor relay	Short in motor relay system
15	C1241	○	○	Power supply system	Low voltage of power supply
16	C1241	○	○	Power supply system	High voltage of power supply
21	C0200	○	×※2	Wheel speed sensor	Open wire or short in the front right wheel speed sensor system circuit
22	C0205	○	×※2	Wheel speed sensor	Open wire or short in the front left wheel speed sensor system circuit
23	C0210	○	×※2	Wheel speed sensor	Open wire or short in the rear right wheel speed sensor system circuit
24	C0215	○	×※2	Wheel speed sensor	Open wire or short in the rear left wheel speed sensor system circuit
25	C1235	○	×※2	Wheel speed sensor	Abnormal interval in the front right wheel speed sensor system
26	1236	○	×※2	Wheel speed sensor	Abnormal interval in the front left wheel speed sensor system
27	C1238	○	×※2	Wheel speed sensor	Abnormal interval in the rear right wheel speed sensor system
28	C1239	○	×※2	Wheel speed sensor	Abnormal interval in the rear left wheel speed sensor system
51	C1251	○	×	Motor relay	Abnormality of pump motor non-rotation
52	C0226	○	○	Solenoid	Open wire or short in the front right retention solenoid system circuit
53	C0226	○	○	Solenoid	Open wire or short in the front right pressure reduction solenoid system circuit
54	C0236	○	○	Solenoid	Open wire or short in the front left retention solenoid system circuit
55	C0236	○	○	Solenoid	Open wire or short in the front left pressure reduction solenoid system circuit
56	C0246	○	○	Solenoid	Open wire or short in the rear right retention solenoid system circuit
57	C0246	○	○	Solenoid	Open wire or short in the rear right pressure reduction solenoid system circuit
58	C0256	○	○	Solenoid	Open wire or short in the rear left retention solenoid system circuit
59	C0256	○	○	Solenoid	Open wire or short in the rear left pressure reduction solenoid system circuit
77	C1300	○	○	ECU	ABS ECU malfunctioning

○: Illuminated
×: Extinguished
※1:This shows the output code when the diagnostic tester is used. ※2:Illuminated in cases where two wheels or more are malfunctioning.

4-10 FAIL-SAFE FUNCTION

1. If the signal system of the ABS computer encounters with any abnormality, the ABS warning lamp goes on, thereby indicating an abnormality. Simultaneously, the solenoid relay incorporated inside the ABS actuator is turned OFF. Consequently, the control signal to the solenoid is prohibited, thus allowing the system to return to the normal braking function.
2. If the ABS computer encounters with any abnormality, the ABS warning lamp goes on, thereby indicating an abnormality. Furthermore, the solenoid relay is turned OFF.
3. If an abnormality, in which the EBD can not function, should occur, the brake warning lamp goes on simultaneously and the EBD control is prohibited.

4-11 SENSOR CHECK FUNCTION (TEST MODE)

The test mode is executed either immediately after the trouble codes have been erased through the brake pedal operation or when the ignition SW is turned ON for the first time after a new ABS actuator has been installed. When the switching is made from the regular mode to the test mode, first the ABS computer memorizes all the test mode codes. Then, the checks are conducted for each sensor while the vehicle is being run. The test mode codes that have been judged to be normal by the ABS computer will be erased from the memory. Therefore, if no driving is performed or if driving is performed but the test mode inspection conditions have not been satisfied, the test mode codes in memory will not be deleted but will be displayed as abnormal test mode codes.

4-11-1 OUTPUT OF TEST MODE CODE

1. Release the short circuit of DLC and set the ignition SW to the ON position. At this time, ensure that the ABS warning lamp is illuminated for three seconds and, then, flashes at an interval of 0.13 second.

CAUTION

- At this time, if the ABS warning lamp remains lit, then there is probably a problem with the system. Check the diagnosis code and make repairs.

2. Start the engine.
3. Perform a running at a speed of about 45 km/h.
4. Stop the vehicle.
5. Use the SST to short circuit DLC ECUT terminal with the E terminal, and then read how many times the ABS warning lamp flashes.

NOTE

- When the system is functioning normally, the flashing interval is 0.25 second.
- If there is one malfunction code, the lamp will flash at an interval of 4 seconds and the same code will be outputted. If multiple codes are outputted, the respective codes will be outputted in order at an interval of 2.5 seconds, and after all the codes have been outputted, there will be another 4 second pause before the output of the codes starts over again.
- When multiple codes are outputted, the codes will be outputted in order, starting from a smaller code.

SST: 09991-87404-000
09991-87403-000

4-11-2 CONTENTS OF DIAGNOSIS

List of test mode codes

Code No.		Diagnosis item	Releasing conditions
Lamp	ISO※		
81	C1271	Abnormal output voltage of the right/front wheel speed sensor	Perform a straight running at a speed of 7 km/h.
82	C1272	Abnormal output voltage of the left/front wheel speed sensor	
83	C1273	Abnormal output voltage of the right/rear wheel speed sensor	
84	C1274	Abnormal output voltage of the left/rear wheel speed sensor	
85	C1275	Abnormal change in output interval of the right/front wheel speed sensor	Drive the vehicle straight for five seconds or more at a speed of 10 km/h to 40 km/h. (Or drive the vehicle straight until the vehicle speed reach over 40 km/h.)
86	C1276	Abnormal change in output interval of the left/front wheel speed sensor	
87	C1277	Abnormal change in output interval of the right/rear wheel speed sensor	
88	C1278	Abnormal change in output interval of the left/rear wheel speed sensor	

※:This shows the output code when the diagnostic tester is used.

4-12 BASIC CHECK

4-12-1 ABS ECU

(1) CIRCUIT INSPECTION

Perform the ABS computer circuit check during the system check operation, following the procedure given below. If any circuit or connector proves to be faulty, repair the circuit or connector concerned. If the circuits and connectors are satisfactory, replace the ABS actuator.

CAUTION

- When you apply a tester probe to the ABS computer connector or you make a short to the body earth, use the diagnosis check wire (SST). This will prevent any damage to the terminal.

SST: 09991-87403-000

(2) VISUAL INSPECTION AND CONTACT FORCE INSPECTION

1.Disconnect the negative terminal of the battery.

CAUTION

- When the negative terminal (−) of the battery is removed, all setting memories of the computers in each system and the radio will be erased. Hence, it is necessary to redo the settings when the battery terminal is restored.

2.Check the connector of the ABS actuator.

(3) EARTH CIRCUIT CHECK

1.Remove the negative terminal (−) of the battery.

CAUTION

- When the negative terminal (−) of the battery is removed, all setting memories of the computers in each system and the radio will be erased. Hence, it is necessary to redo the settings when the battery terminal is restored.

2.Disconnect the connector of the ABS actuator. Check that there is continuity between the following harness side connector terminal and the body earth.

(1) Harness side connector 2- Body earth

(2) Harness side connector 18- Body earth

SPECIFIED VALUE: Continuity exists

(4) POWER SUPPLY CIRCUIT CHECK

1.With the ABS actuator connector disconnected, measure the voltage between each power supply terminal and the body earth.
SPECIFIED VALUE: Battery voltage

CAUTION

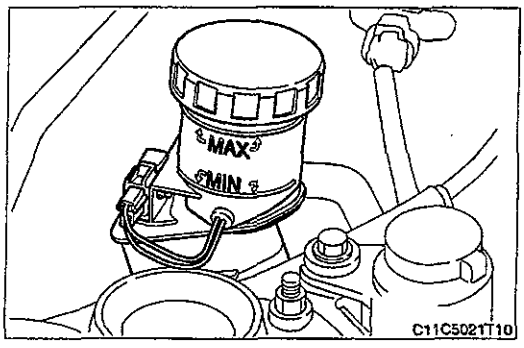
- While checking the ABS computer, there are instances where you may conclude that there are "No trouble" in the system because the terminal contact conditions have been altered due to the detachment of the connectors. Hence, when you get the check results of the ABS computer circuit that suspect a faulty ABS computer, it is advisable to reconnect the connectors concerned to see if there will occur any deficiency in order that you may correctly evaluate whether or not the ABS computer is satisfactory.

4-12-2 BATTERY VOLTAGE MEASUREMENT

Measure the battery voltage while the engine is off.
SPECIFIED VALUE: 10 -14 V (while engine is off)

4-12-3 BRAKE FLUID INSPECTION

Check if the specified amount of brake fluid is in the master cylinder reservoir and make sure there are no brake system fluid leaks.



4-12-4 BRAKING FORCE CHECK

Check to see if the braking forces are more than the specified values, using a brake tester.

	Braking force
Sum of braking forces of rear wheels	10% of axle weight or more
Difference in braking force between right and left wheels	8% of axle weight or less
Total sum	50% of the vehicle weight at time of inspection or more

4-12-5 WARNING LAMP CHECK

Check when the ignition SW is turned to "ON" if the ABS warning lamp lights up for approximately 3 seconds and then turns off.

NOTE

- Conduct the brake warning lamp check with the parking brake in a released state.

4-13 TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE

As for the troubleshooting according to system, perform the related troubleshooting, based on the following table given below.

Code No.		Diagnosis item	Diagnosis item
Lamp	ISO※		
11	C0278	Open wire in solenoid relay system	Troubleshooting according to diagnosis code No.11
12	C0279	Short in solenoid relay system	Replace the ABS actuator.
13	C0273	Open wire in motor relay system	Troubleshooting according to diagnosis code No.13
14	C0274	Short in motor relay system	Replace the ABS actuator.
15	C1241	Low voltage of power supply	Troubleshooting according to diagnosis code No.15 and No.16
16	C1241	High voltage of power supply	
21	C0200	Open wire or short in the front right wheel speed sensor system circuit	Troubleshooting according to diagnosis code No.21 to No.28
22	C0205	Open wire or short in the front left wheel speed sensor system circuit	
23	C0210	Open wire or short in the rear right wheel speed sensor system circuit	
24	C0215	Open wire or short in the rear left wheel speed sensor system circuit	
25	C1235	Abnormal interval in the front right wheel speed sensor system	
26	1236	Abnormal interval in the front left wheel speed sensor system	
27	C1238	Abnormal interval in the rear right wheel speed sensor system	
28	C1239	Abnormal interval in the rear left wheel speed sensor system	
51	C1251	Abnormality of pump motor non-rotation	Replace the ABS actuator.
52	C0226	Open wire or short in the front right retention solenoid system circuit	Replace the ABS actuator.
53	C0226	Open wire or short in the front right pressure reduction solenoid system circuit	
54	C0236	Open wire or short in the front left retention solenoid system circuit	
55	C0236	Open wire or short in the front left pressure reduction solenoid system circuit	
56	C0246	Open wire or short in the rear right retention solenoid system circuit	
57	C0246	Open wire or short in the rear right pressure reduction solenoid system circuit	
58	C0256	Open wire or short in the rear left retention solenoid system circuit	
59	C0256	Open wire or short in the rear left pressure reduction solenoid system circuit	
77	C1300	ABS ECU malfunctioning	Replace the ABS actuator.

※:This shows the output code when the diagnostic tester is used

4-13-1 DIAGNOSIS CODE No.11,12(SOLENOID RELAY SYSTEM DIAGRAM)

(1) DIAGNOSIS CODE OUTPUT CONDITIONS

1.The ABS ECU monitors the solenoid relay circuit at all times. When the [OFF] state of the solenoid relay continues even if the ABS ECU turns ON the solenoid relay, the system judges it as a solenoid relay system open wire. As a result, an abnormal code is outputted. (No.11)

2.When the [ON] state of the solenoid relay continues even if the ABS ECU turns OFF the solenoid relay, the system judges it as a solenoid relay system short. As a result, an abnormal code is outputted. (No.12)

(2) CHECKING POINTS

1.Is the ABS fusible link normal?

2.Is the harness between the ABS fusible link and the ABS actuator normal?

3.Are all connected connectors normal?

(3) CHECKING METHOD

➤1. Check the ABS fusible link

SPECIFIED VALUE: The fusible link should not burn out.

If it is OK, go to ➤2.
If it is NG, go to ➤3.

➤2. Continuity check between ABS fusible link and ABS actuator

1.After the IG SW has been set to [LOCK] position, disconnect the negative terminal of the battery.

2.Disconnect the ABS fusible link and the connector from the ABS actuator. Check the harness.

(1) ABS fusible link connector downstream side −ABS actuator harness side connector 1(+BS)

SPECIFIED VALUE: 10Ω or less (Continuity exists)

If it is OK, replace the ABS actuator.
If NG, repair the harness between the ABS actuator and the ABS fusible link and the connector.

➤3. Continuity check between the ABS fusible link and the ABS actuator

1.After the IG SW has been set to [LOCK] position, disconnect the negative terminal of the battery.

2.Disconnect the ABS fusible link and the connector from the ABS actuator. Check the harness.

(1) ABS fusible link connector downstream side −Body earth

SPECIFIED VALUE: 1M Ω or more (No continuity)

If it is OK, go to ➤4 .
If NG, repair the harness between the ABS actuator and the ABS fusible link and the connector.

➤4. Check of ABS fusible link for operating state

1.After the ABS fusible link has been replaced, install the connector and the battery negative terminal. Turn ON the IG SW.

SPECIFIED VALUE: The fusible link is not fused.

If OK, observe the condition for a while.
If it is NG, replace the ABS actuator.

4-13-2 DIAGNOSIS CODE No.13,14(MOTER RELAY SYSTEM DIAGRAM)

(1) DIAGNOSIS CODE OUTPUT CONDITIONS

1.The ABS ECU monitors the motor relay circuit at all times. When the [OFF] state of the motor relay continues even if the ABS ECU turns ON the motor relay, the system judges it as a motor relay system open wire. As a result, an abnormal code is outputted. (No.13)

2.When the [ON] state of the motor relay continues even if the ABS ECU turns OFF the motor relay, the system judges it as a motor relay system short. As a result, an abnormal code is outputted. (No.14)

(2) CHECKING POINTS

1.Is the harness between the ABS fusible link and the ABS actuator normal?

2.Are all connected connectors normal?

3.When the ABS fusible link is abnormal, the diagnosis code No.11 is detected. The motor relay will not turn ON.

(3) CHECKING METHOD

➤1. Check continuity between the ABS fusible link and the ABS actuator

1.After the IG SW has been set to [LOCK] position, disconnect the negative terminal of the battery.

2.Disconnect the ABS fusible link and the connector from the ABS actuator. Check the harness.

(1) ABS fusible link connector downstream side – ABS actuator harness side connector 17(+BM)

SPECIFIED VALUE: 10Ω or less (Continuity exists)

If it is OK, replace the ABS actuator.

If NG, repair the harness between the ABS actuator and the ABS fusible link and the connector.

4-13-3 DIAGNOSIS CODE No.15,No.16(ABS ECU POWER SUPPLY SYSTEM)

(1) DIAGNOSIS CODE OUTPUT CONDITIONS

1.The ABS ECU monitors the power voltage.

2.If the power supply voltage of the ABS ECU drops below 9±0.5V during the running (with a vehicle speed of 5 km/h or more) and this condition continues for more than 224 ms, this is regarded as a power supply voltage abnormality. Consequently, an abnormality code is outputted.(No.15)

3.If the power supply voltage of the ABS ECU exceeds 18±2.0V and this condition continues for more than 224 ms, this is regarded as a power supply voltage abnormality. Consequently, an abnormality code is outputted.(No.16)

(2) CHECKING POINTS

1.Is the alternator normal?

2.Is the battery normal?

3.Are the harness and connector between the battery and ABS actuator normal?

(3) CHECKING METHOD

➤1. Check of A/B fuse

SPECIFIED VALUE: The fusible link should not burn out.

If it is OK, go to ➤2.
If it is NG, go to ➤4.

➤2. Voltage check between A/B fuse and ABS actuator

1. After the IG SW has been set to the [LOCK] position, disconnect the connector from the ABS actuator.
2. After the IG SW has been set to "ON" position, measure the voltage between the ABS actuator vehicle side connector 6(+IG) and the terminal 2(GND1).
   SPECIFIED VALUE: 9.5V－16V

If it is OK, replace the ABS actuator.
If it is NG, go to ➤3.

➤3. Continuity check between the A/B fuse and the ABS actuator

After the IG SW has been set to the [LOCK] position, measure the resistance between the ABS actuator vehicle side connector 6 (+IG) and the A/B fuse downstream side terminal.
SPECIFIED VALUE: 10Ω or less (Continuity exists)

If OK, check and repair the battery or alternator.
If NG
· Harness check between A/B fuse and ABS actuator
· Repair or replace the harness and connector.

➤4. Continuity check between the A/B fuse and the ABS actuator

1. After the IG SW has been set to the [LOCK] position, disconnect the connector from the ABS actuator.
2. Measure the resistance between the ABS actuator vehicle side connector 6(+IG) and the terminal 2(GND1).
   SPECIFIED VALUE: 1M Ω or more (No continuity)

If OK, replace the A/B fuse. Observe the condition.
If NG, repair the harness between the ABS actuator and the A/B fuse and the connector. Then, replace the ABS fuse.

4-13-4 DIAGNOSIS CODE No.21 to 28(WHEEL SPEED SENSOR SYSTEM DIAGRAM)

(1) DIAGNOSIS CODE OUTPUT CONDITIONS

This abnormal code is outputted when open wire or short is detected in the wheel speed sensor system. Furthermore, when no wheel speed sensor signal is inputted during the running, the said signal is missing, or a noise is mixed into the said signal, the abnormal code is outputted. When this code is outputted, it is necessary to check not only the circuit itself or but also the installing state of the sensor.

(2) CHECKING POINTS

1.Is the wheel speed sensor installation condition normal? (Is there any factor to make the wheel speed sensor output unstable?)
2.Check to see if the wheel speed sensor and the wheel speed sensor rotor are normal.
3.Are the harness and connector between the wheel speed sensor and ABS actuator normal?

(3) CHECKING METHOD

➤1. Unit check of wheel speed sensor

1.Perform the unit check of the wheel speed sensor.
Refer to Page E3-31.

DIAGNOSIS CODE	Items to be checked
No.21, No25	Wheel speed sensor front right
No.22, No26	Wheel speed sensor front left
No.23, No27	Wheel speed sensor rear right
No.24, No28	Wheel speed sensor rear left

If it is OK, go to ➤2.
If it is NG, go to ➤5.

➤2. Continuity check between wheel speed sensor and ABS actuator

1.Disconnect the connector of the related wheel speed sensor and the ABS actuator. Check the harness.

CONTENTS OF CHECKS ACCORDING TO DIAGNOSIS CODES

No.21, No25	Wheel speed sensor front harness side connector 1(−) −ABS actuator harness side connector 22(FR−)
	Wheel speed sensor front harness side connector 2(+)−ABS actuator harness side connector 23(FR+)
No.22, No26	Wheel speed sensor front harness side connector 1(−) −ABS actuator harness side connector 8(FL−)
	Wheel speed sensor front harness side connector 2(+)−ABS actuator harness side connector 9(FL+)
No.23, No27	Wheel speed sensor rear harness side connector 2(−) −ABS actuator harness side connector 20(RR−)
	Wheel speed sensor rear harness side connector 1(+) −ABS actuator harness side connector 19(RR+)
No.24, No28	Wheel speed sensor rear harness side connector 2(−) −ABS actuator harness side connector 4(RL−)
	Wheel speed sensor rear harness side connector 1(+) −ABS actuator harness side connector 5(RL+)

SPECIFIED VALUE: Continuity exists

If it is OK, go to ➤3.
If NG, repair the harness between the wheel speed sensor and the ABS actuator and the connector.

➤3. Harness check between the wheel speed sensor and the ABS actuator

1.Visually check the related wheel speed sensor and the harness between the related wheel speed sensor and the ABS actuator. In this inspection, check to see if damage is present at each harness or poor connection is present at the connectors.
If it is OK, go to ➤4.
If NG, repair the harness between the wheel speed sensor and the ABS actuator and the connector.

➤4. Check of wheel speed sensor

1.Check to see if the installing state of the wheel speed sensor and the wheel speed sensor rotor are not abnormal.

If it is OK, replace the ABS actuator.

If NG, repair the installing state of the wheel speed sensor and replace the wheel speed sensor rotor.

➤5. Check of wheel speed sensor

1.Perform checks given below.

(1) Check of the installing state of the wheel speed sensor

(2) Adjust, repair or replace the wheel speed sensor rotor.

(3) Check the axle bearing for looseness.

4-14 TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA

4-14-1 WITH THE IG SWITCH TURNED ON , THE WARNING LAMP ILLUMINATES AT ALL TIMES.

(1) CHECKING POINTS

If the ABS warning lamp remain illuminated, most likely the causes are that malfunctioning components are detected by means of diagnosis functions, open wire in the ABS warning lamp lighting circuit or malfunctioning ABS actuator.

(2) CHECKING METHOD

➤1. Confirm the diagnosis code

1.The indication of diagnosis code output is performed by means of the ABS warning lamp.
Refer to Page E3-12.

2.After the IG SW has been turned ON, confirm the lighting state of the ABS warning lamp.
SPECIFIED VALUE: Abnormality code is outputted.

If OK, perform a trouble-shooting corresponding to the diagnosis code table.
Refer to Page E3-15.

If it is NG, go to ➤2.

➤2. Confirmation of connector fitting state

1.After the IG SW has been set to the [LOCK] position, disconnect the connector of the ABS actuator. Again connect the connector.
2.After the IG SW has been turned ON, confirm the lighting state of the ABS warning lamp.
SPECIFIED VALUE: Abnormality code is outputted.

If OK, perform a trouble-shooting corresponding to the diagnosis code table.
Refer to Page E3-15.

If it is NG, go to ➤3.

➤3. Confirm the diagnosis code
SPECIFIED VALUE: Indicates normal code or goes out.

If OK
· Low voltage abnormal (Normal code indicated).
· ABS actuator malfunctioning (extinguished)
If it is NG, go to ➤4.

➤4. Check of engine fuse
SPECIFIED VALUE: Normal

If it is OK, go to ➤5 .
If NG, replace the engine fuse system and check the engine fuse system.

➤5. Confirmation of ABS warning lamp for lighting state

1.After the IG SW has been set to the [LOCK] position, disconnect the battery negative terminal so as to eliminate the short of the check connector.

2.Disconnect the connector from the ABS actuator. Connect the ABS actuator vehicle side connector terminal 10 (WA) to the body earth. Install the negative terminal of the battery.

3.After the IG SW has been turned ON, confirm the lighting state of the ABS warning lamp.

SPECIFIED VALUE: Extinguishes.

If OK, ABS actuator malfunctioning

If it is NG,

· Faulty harness between the combination meter 2(WA) and ABS actuator 10(WA)

· Combination meter malfunctioning

4-14-2 WITH THE IG SWITCH TURNED ON,THE BRAKE WARNING LAMP ILLUMINATES AT ALL TIMES.

(1) CHECKING POINTS

1.When the brake warning lamp is illuminated at all times, most likely the parking brake is applied, or the brake fluid level is low. In addition, there are possibilities that the brake fluid level SW and parking brake SW are malfunctioning, the brake warning lamp lighting circuit is encountered with abnormality, or the ABS actuator is malfunctioning.

2.The check should be carried out with the parking brake released.

(2) CHECKING METHOD

➤1. Check of brake fluid level

1.Check that the brake fluid is filled up to the specified level in the master cylinder reservoir.

SPECIFIED VALUE: There exists up to the specified level .

If it is OK, go to ➤2.

If NG, fill the brake fluid up to the specified level.

➤2. Check of engine fuse

1.Check to see if the engine fuse is damaged.

SPECIFIED VALUE: No abnormality exists.

If it is OK, go to ➤3.

If NG, check the engine fuse system and replace the engine fuse.

➤3. Confirmation of the brake warning lamp for lighting state

1.Disconnect the connector from the ABS actuator. Connect the ABS actuator vehicle side connector 14 (BRL) to the body earth.

2.After the IG SW has been turned ON, confirm the lighting state of the brake warning lamp.

SPECIFIED VALUE: Extinguishes.

If it is OK, go to ➤4 .

If NG

· Faulty harness between the combination meter4 (BRL) and ABS actuator 14(BRL)

· Combination meter malfunctioning

➤4. Continuity check between the ABS actuator and the body earth

1.Harness check between the ABS actuator and the body earth

(1) ABS actuator vehicle side connector 7(PKB)— Body earth

SPECIFIED VALUE: 10Ω or less (Continuity exists)

If OK

· Brake fluid level SW malfunctioning

· Faulty harness between the ABS actuator and the brake fluid level SW

· Parking brake SW malfunctioning

· Faulty harness between the ABS actuator and the parking brake SW

If NG, the ABS actuator is malfunctioning.

4-14-3 THE ABS WARNING LAMP FAILS TO ILLUMINATE FOR THREE SECONDS AFTER THE IG SWITCH IS TURNED ON.

(1) CHECKING POINTS

When the ignition SW is turned ON, the ABS ECU makes the ABS warning lamp illuminated for about three seconds to check the ABS warning system.

(2) CHECKING METHOD

➤1. Check of warning lamp for lighting state

1.After the IG SW has been turned ON, check to see if other warning lamps go on.
SPECIFIED VALUE: Illuminates.

If it is OK, go to ➤2.
If it is NG,

- Combination meter power supply system malfunctioning
- Combination meter malfunctioning

➤2. Confirmation of ABS warning lamp

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery.
2.Disconnect the connector from the ABS actuator. Install the negative terminal of the battery and turn ON the IG SW.
3.Check the ABS warning lamp for lighting state.
SPECIFIED VALUE: Remains extinguished.

If it is OK, go to ➤0 .
If NG, the ABS actuator is malfunctioning

➤3. Short check between the combination meter and the ABS actuator

1.After the IG SW has been set to the [LOCK] position, check to see if short exists in the harness between the combination meter 2(WA) and the ABS actuator 10 (WA).
SPECIFIED VALUE: No continuity exists

If OK

- Combination meter malfunctioning
- ABS warning lamp faulty

If NG, faulty harness between the combination meter (WA) and the ABS actuator 10 (WA)

4-14-4 THE BRAKE WARNING LAMP FAILS TO ILLUMINATE FOR THREE SECONDS AFTER THE IG SWITCH IS TURNED ON.

(1) CHECKING POINTS

When the ignition SW is turned ON, the ABS ECU makes the brake warning lamp illuminated for about three seconds to check the brake warning system.

(2) CHECKING METHOD

➤1. Check of warning lamp for lighting state

1.After the IG SW has been turned ON, check to see if other warning lamps go on.
SPECIFIED VALUE: Illuminates.

If it is OK, go to ➤2.
If it is NG,

- Combination meter power supply system malfunctioning
- Combination meter malfunctioning

➤2. Confirmation of brake warning lamp

1.After the IG SW has been set to [ON] position, remove the negative terminal of the battery.
2.Disconnect the connector from the ABS actuator. Install the negative terminal of the battery and turn ON the IG SW.
3.Confirm the lighting state of the brake warning lamp.
SPECIFIED VALUE: Remains extinguished

If it is OK, go to ➤3.
If NG, the ABS actuator is malfunctioning

➤3. Short check between the combination meter and the ABS actuator

1.After the IG SW has been set to the [LOCK] position, check to see if short exists in the harness between the combination meter4 (BRL) and the ABS actuator 14 (BRL).
SPECIFIED VALUE: No continuity exists

If OK

- Combination meter malfunctioning
- Brake warning lamp faulty

If NG, faulty harness between the combination meter4 (BRL) and the ABS actuator 14 (BRL)

4-14-5 MALFUNCTIONS OF THE BRAKE OPERATIONS (UNEVEN BRAKING, LACK OF BRAKING FORCE, THE ACTUATION OF ABS DURING NORMAL BRAKING AND PEDAL VIBRATION DURING THE ABS OPERATION) AND THE ABS WARNING LAMP GOES ON DURING RUNNING.

(1) CHECKING POINTS

Different driving conditions and road conditions make it difficult to determine the problem. When the diagnostic code shows a normal code, conduct an inspection following the flow chart.

(2) CHECKING METHOD

➤1. Confirmation of ABS warning lamp

1.The diagnosis code output is indicated.
Refer to Page E3-12.

2.After the IG SW has been turned ON, confirm the lighting state of the ABS warning lamp.
SPECIFIED VALUE: The normal code is flashing.

If it is OK, go to ➤2.
If NG, perform the trouble-shooting according to the diagnosis code table.
Refer to Page E3-15.

➤2. Check each wheel speed sensor for installing state.

1.Confirm the installing state of each wheel speed sensor.
SPECIFIED VALUE: Normally installed. The retaining bolt exhibits no looseness.

If it is OK, go to ➤3.
If NG, faulty installation of the wheel speed sensor

➤3. Continuity check between terminals of each wheel speed sensor

1.Disconnect the connector from the ABS actuator. Check continuity between the terminals of each sensor at the harness side.
If it is OK, go to ➤4 .
If NG, faulty wire harness

➤4. Check of harness for connecting state

1.While moving the harnesses and connectors, check the continuity state.
SPECIFIED VALUE: Abnormality exists.

If OK, the joint of the wire harness is poor.
If it is NG, go to ➤5.

➤5. Check of wheel speed sensor system

1.Perform the check of the wheel speed sensor system.
Refer to Page E3-31.

If it is OK, replace the ABS actuator.
If NG
- Wheel speed sensor system malfunctioning
- Wheel speed sensor rotor malfunctioning
- Wheel speed sensor malfunctioning

4-15 UNIT CHECK

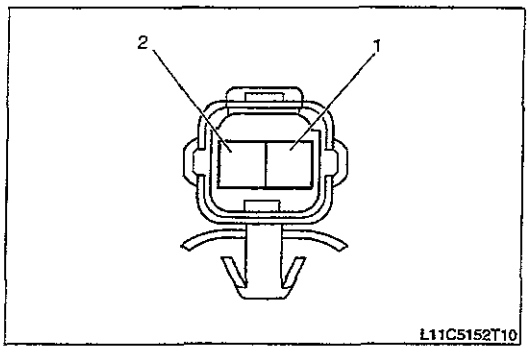
4-15-1 STOP LAMP SWITCH

1.Check continuity between the stop lamp SW connector terminals.
SPECIFIED VALUE: When the brake pedal is depressed: Continuity exists.

4-15-2 FRONT WHEEL SPEED SENSOR

(1) MEASUREMENT AND VISUAL INSPECTION

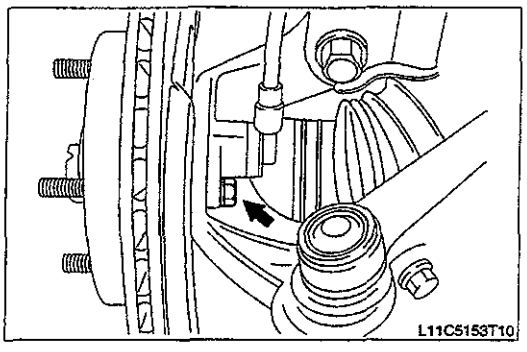
1.Measure the resistance between the connector terminals 1— 2.
SPECIFIED VALUE: 1.4±0.15kΩ



2.Check the sensor for installation condition.
SPECIFIED VALUE: The sensor should not float above the sensor installation surface.

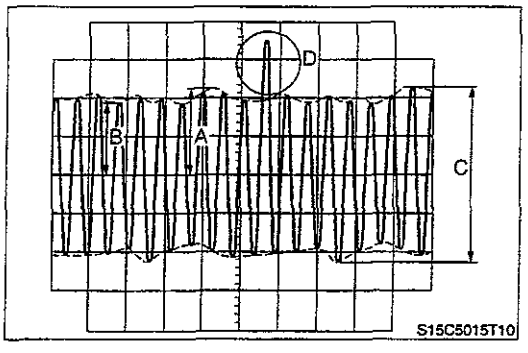
3.Check the sensor installation bolt tightness.
TIGHTENING TORQUE: 19.1±3.9N·m{195± 40kgf·cm}

4.Check that no foreign substance is adhered to the tip end of the sensor.
SPECIFIED VALUE: No foreign substance should be adhered.



(2) INSPECTION USING AN OSCILLOSCOPE

1.Connect the SST. The figure indicates the output waveform of the skid control sensor when running at a speed of 20 km/h or more.
SPECIFIED VALUE: C is 0.5 V or more.
B is 70% or more of A.
D should not occur.



NOTE

- If C is outside the standard, replace the wheel speed sensor sensor.
- If B is outside the standard, replace the wheel speed sensor rotor (front axle hub).
- If D occurs, inspect the end of the sensor.

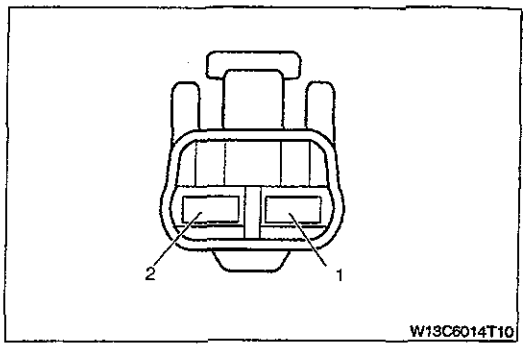
4-15-3 FRONT WHEEL SPEED SENSOR ROTOR

1.Inspect the axle hub wheel speed sensor rotor.
SPECIFIED VALUE: The rotor should exhibit no abnormality, such as scratches, chip and deformation.

4-15-4 REAR WHEEL SPEED SENSOR

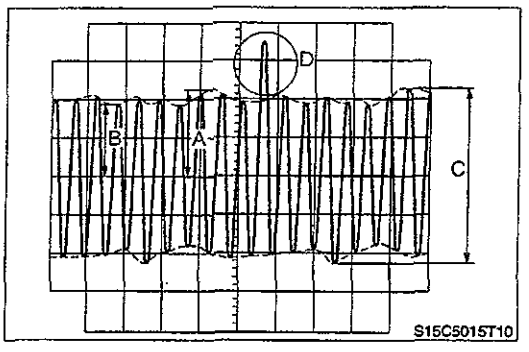
(1) MEASUREMENT AND VISUAL INSPECTION

1. Measure the resistance between the connector terminals 1–2.
   SPECIFIED VALUE: 1.4±0.4kΩ
2. Check the sensor installation bolt tightness.
   TIGHTENING TORQUE: 8.4±1.4N·m{85±14kgf·cm}
3. Check that no foreign substance is adhered to the tip end of the sensor.
   SPECIFIED VALUE: No foreign substance should be adhered.



(2) INSPECTION USING AN OSCILLOSCOPE

1. Connect the SST. The figure indicates the output waveform of the wheel speed sensor when running at a speed of 20 km/h or more.
   SPECIFIED VALUE: C is 0.5 V or more.
   B is 70% or more of A.
   D should not occur.



NOTE

- If C is outside the standard, replace the wheel speed sensor.
- If B is outside the standard, replace the wheel speed sensor rotor (rear brake drum).
- If D occurs, inspect the end of the sensor.

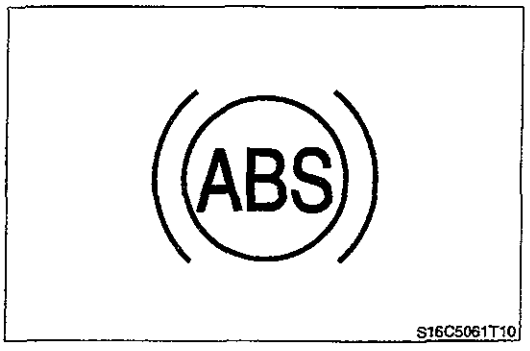
4-15-5 REAR WHEEL SPEED SENSOR ROTOR

1. Remove the rear brake drum. Check the wheel speed sensor rotor.
   SPECIFIED VALUE: The rotor should exhibit no abnormality, such as scratches and deformation.

4-15-6 WARNING LAMP

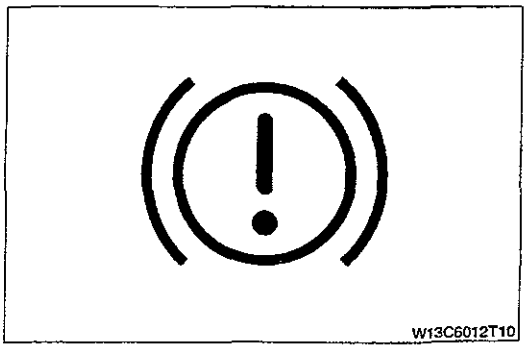
(1) ABS WARNING LAMP

1. Turn the ignition SW to "LOCK," and disconnect the ABS actuator connector.
2. In this state, check if the brake warning lamp goes on when the ignition SW is turned to "ON."
3. Next, check if the ABS warning lamp goes out when the disconnected ABS actuator's vehicle side connector 18 terminal is connected to the ground.



(2) BRAKE WARNING LAMP

1. Turn the ignition SW to "LOCK," and disconnect the ABS actuator connector.
2. In this state, check if the brake warning lamp goes on when the ignition SW is turned to "ON."
3. Next, check if the ABS warning lamp goes out when the disconnected ABS actuator's vehicle side connector 12 terminal is connected to the ground



4-15-7 ABS ECU (ABS ACTUATOR)

1.Conduct the following inspection with the engine turned off.

(1) Check the battery voltage.

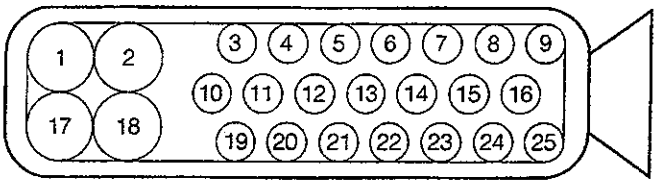
SPECIFIED VALUE: 10−14 V (when the ignition SW is "ON")

(2) Check continuity between the ground terminal and the body ground.

SPECIFIED VALUE: Continuity exists. (when the ignition SW is "LOCK").

(3) After the IG SW has been turned ON, disconnect the actuator connector. At this time, check the voltage, resistance, and continuity between the respective terminals of the vehicle side connector as well as between the terminal and the body earth.

Vehicle harness side connector



C13C5002S10

ABS ECU Check

Connection				Measuring condition	Specification value	Malfunctioning points not satisfying the requirements
9	FL+	8	FL−	The IG SW is turned LOCK.	1.4±0.4kΩ	Front wheel speed sensor, LH.
23	FR+	22	FR−	The IG SW is turned LOCK.	1.4±0.4kΩ	Front wheel speed sensor, RH.
5	RL+	4	RL−	The IG SW is turned LOCK.	1.4±0.4kΩ	Rear wheel speed sensor, LH.
19	RR+	20	RR−	The IG SW is turned LOCK.	1.4±0.4kΩ	Rear wheel speed sensor, RH.
1	+BS	−	Body earth	The IG SW is turned LOCK.	10 - 14 V	ABS fusible link
6	+IG	−	Body earth	The IG SW is turned LOCK.	10 - 14 V	Airbag fuse, ECU IG fuse
24	STP	−	Body earth	When the brake pedal is depressed:	10 - 14 V	Stop lamp SW
				When the brake pedal is released:	0V	
2	GND1	−	Body earth	The IG SW is turned LOCK.	Continuity exists	Body earth

TO INDEX

F1 CLUTCH

CLUTCH SYSTEM ---------- F1 - 1
BASIC CHECK AND ADJUSTMENT --- F1 - 1
CLUTCH PEDAL---------- F1 - 3
REMOVAL AND INSTALLATION -------- F1 - 3
CLUTCH CABLE---------- F1 - 5
REMOVAL AND INSTALLATION -------- F1 - 5
CLUTCH ---------- F1 - 9
REMOVAL AND INSTALLATION -------- F1 - 9

1 CLUTCH SYSTEM

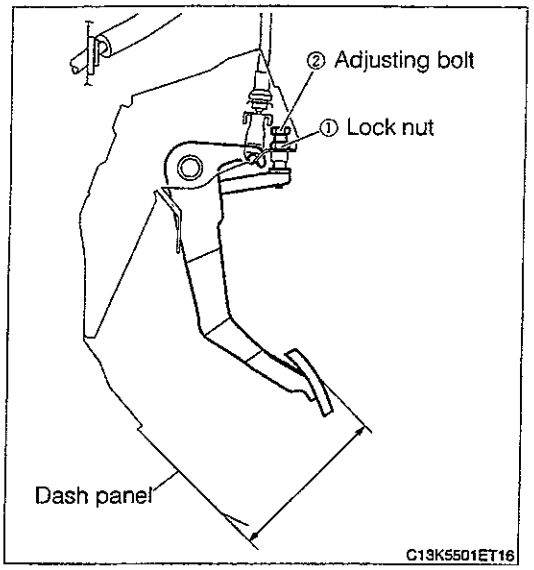
1-1 BASIC CHECK AND ADJUSTMENT

1.Loosen the lock nut ① and adjust the pedal height by turning the adjusting bolt ②.

CAUTION

- The measurement should be carried out at the center of the pedal at the right side.

SPECIFIED VALUE: Height of clutch pedal
156.8−161.8mm



1-1-1 Adjustment of clutch pedal free travel

1.Move the clutch release lever by your left hand and stop it at a position where it comes in contact lightly with the diaphragm spring of the clutch cover.
(The arrow mark in the figure shows the direction in which the release lever is moved.)

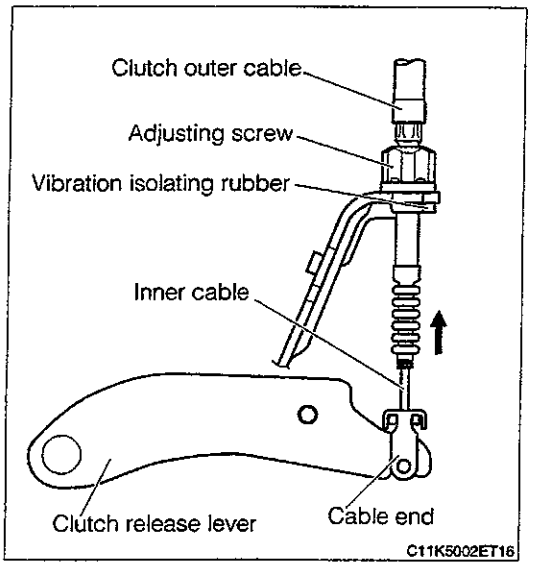
2.Pull up the clutch outer cable by your right hand and hold it at a position where there is no slack of the inner cable. Then, release your left hand.

3.Screw in the adjusting screw by your left hand, until it comes in contact with the rotation stopper protrusion of the vibration preventive rubber.
At this time, if the rotation stopper protrusion is not aligned with the groove position of the adjusting screw, perform the alignment by backing off the adjusting screw.

4.Release your hand under a condition where the groove position of the adjusting screw is aligned with the rotation stopper protrusion.

5.Ensure that the free travel of the clutch pedal conforms to the specified value.
(When carrying out the operations above, the operations to be performed by your right hand can be performed by your left hand and vice versa.)

SPECIFIED VALUE: Free travel of clutch pedal
10 to 30 mm
(Upper surface of pedal pad)



1-1-2 Check of distance to the floor panel when the clutch is disengaged

1.Check and adjust the clutch pedal height.

2.With the engine idling, pull the parking brake lever fully. Then, move the shift lever to the 1st gear position and slowly release the pedal. Check the distance between the pedal at a moment immediately before the clutch is engaged and the position when the clutch pedal is depressed fully to the floor.

SPECIFIED VALUE: 20 mm or more (Reserve travel)

2 CLUTCH PEDAL

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

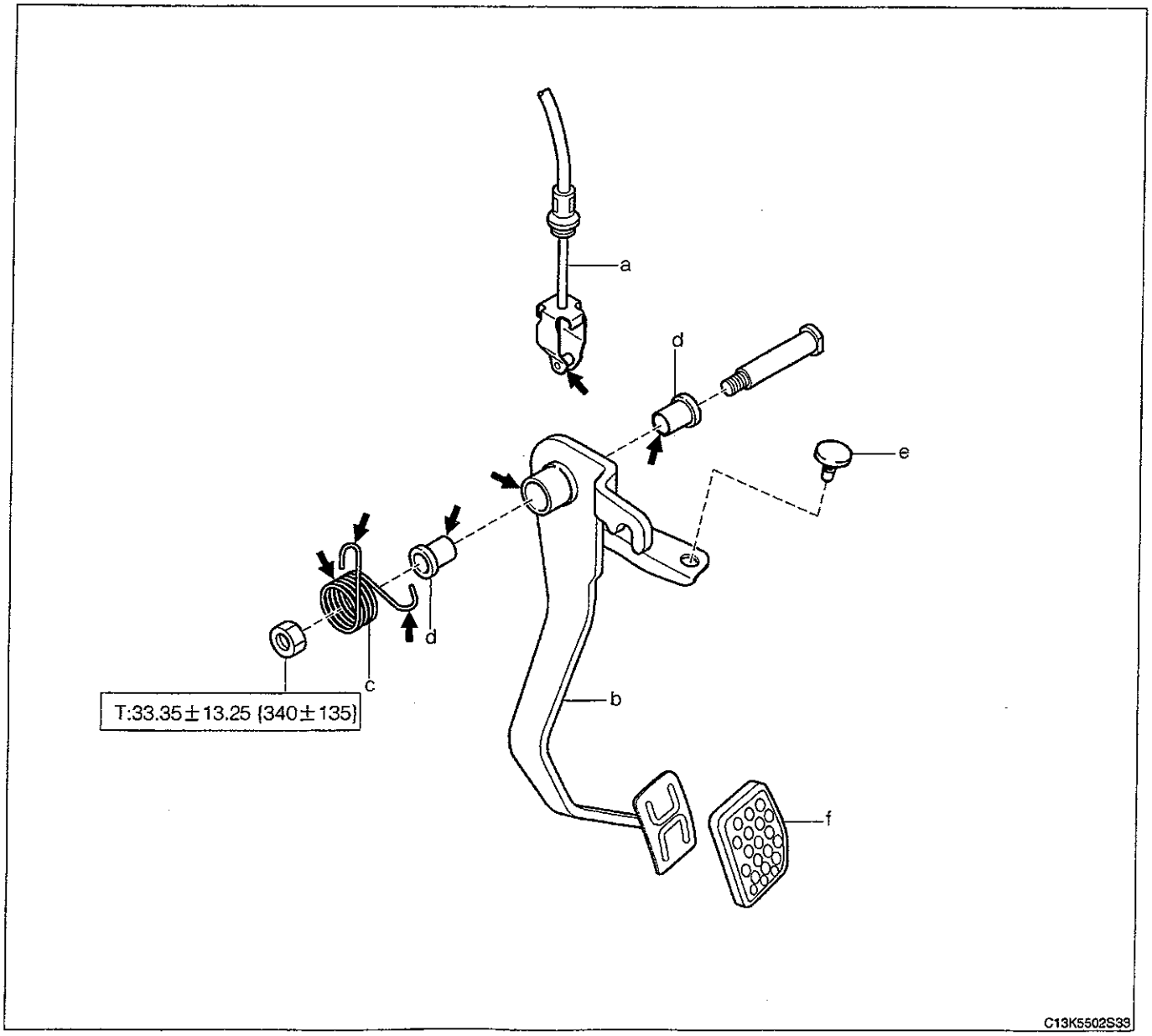
MP grease

2-1-2 OPERATION BEFORE REMOVAL

1.Remove the instrument panel finish lower panel.
Refer to Page I2-22.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



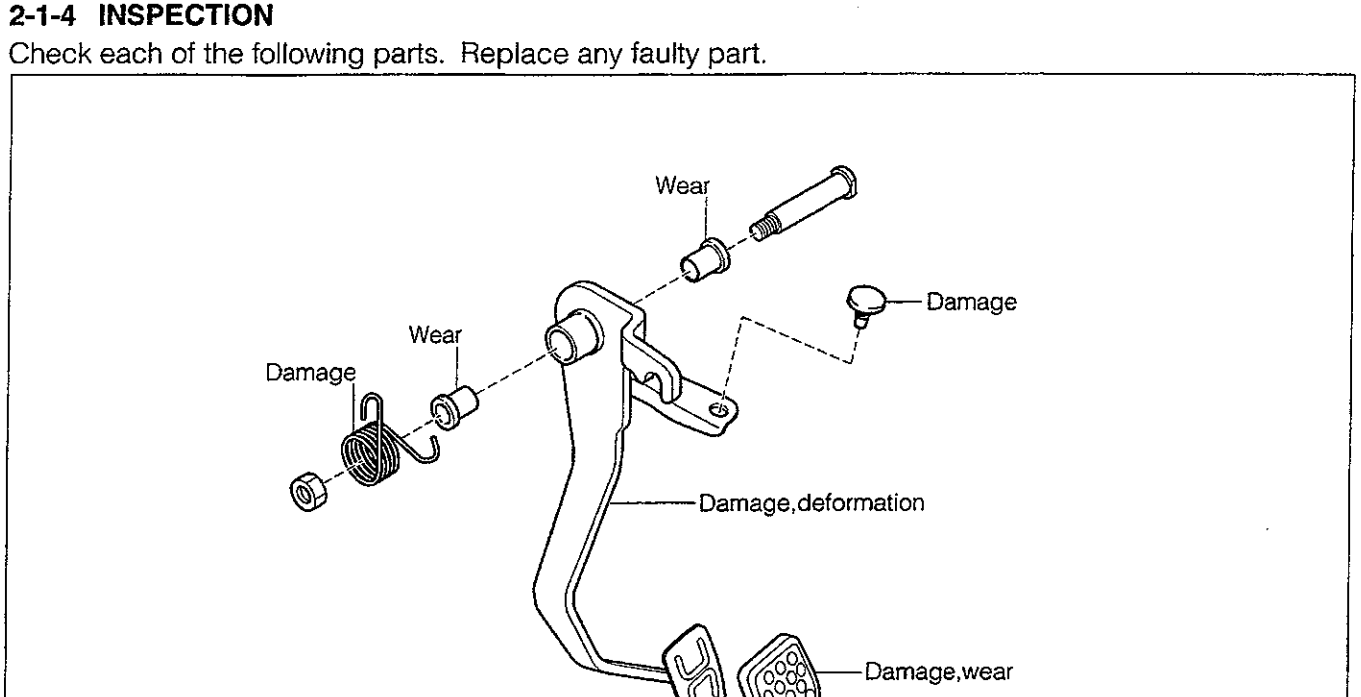
➡: MP grease
Unit: N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Cable Ay, clutch release
2 b Pedal S/A, clutch
3 c Spring, torsion
4 d Bush
▲ 5 e Cushion (for clutch pedal)
6 f PAD, CLUTCH PEDAL

2-1-4 INSPECTION

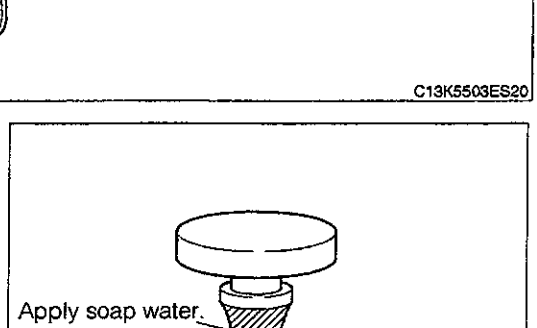
Check each of the following parts. Replace any faulty part.



2-1-5 POINTS OF INSTALLATION

(1) CUSHION (FOR CLUTCH PEDAL)

1.Apply soap water to the tip end of the cushion. Then, install it to the clutch pedal subassembly.



2-1-6 OPERATION AFTER INSTALLATION

1.Adjust the clutch pedal height and free travel.
Refer to Page F1-1.

2.Install the instrument panel finish lower panel.
Refer to Page I2-22.

3 CLUTCH CABLE

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

Lubricant,adhesive,others

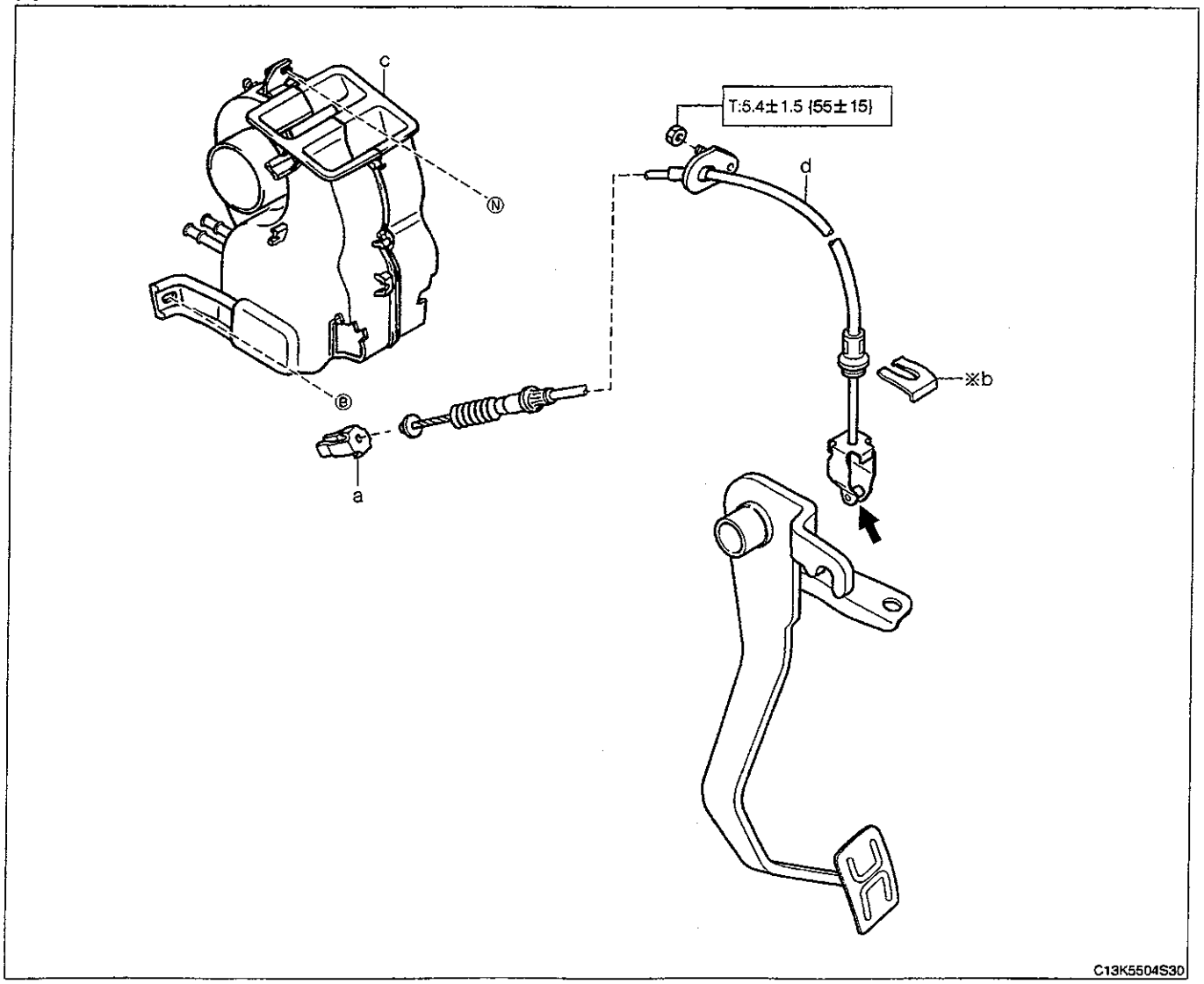
MP grease

3-1-2 OPERATION BEFORE REMOVAL

1.Remove the instrument panel Ay.
Refer to Page I2-22.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



➡: MP grease
※:Non - reusable parts
Unit: N·m{kgf·cm}

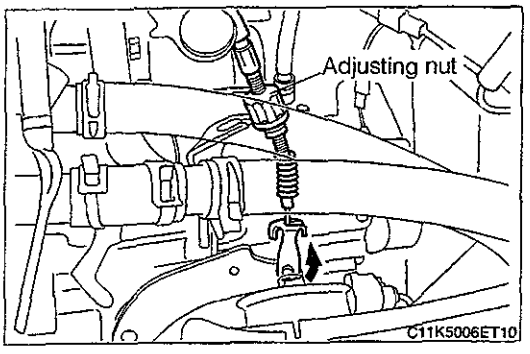
(2) REMOVAL AND INSTALLATION PROCEDURES

▼ ▲ 1 a Bracket, clutch release cable No.1
2 b Clip
▼ 3 c Heater Ay
▼ ▲ 4 d Cable Ay, clutch release

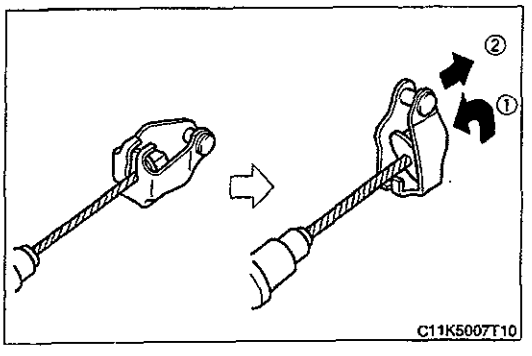
3-1-4 POINTS OF REMOVAL

(1) CLUTCH RELEASE CABLE No.1

1.Loosen the adjusting nut of the clutch release cable assembly.
2.While pulling up the clutch release lever subassembly by your hand, take out the clutch release cable bracket No.1 from the clutch release lever subassembly.



3.Route the cable at the cutout section of the clutch release cable bracket No.1. Then, remove the clutch release cable bracket No.1 by raising it 90°.



(2) HEATER AY

1.After removing the bolt and nut (front heater Ay × dash panel), pull the lower side of the heater assembly and place a wooden block or the like between the heater assembly and the dash panel, thus keeping the heater assembly in a pulled state.

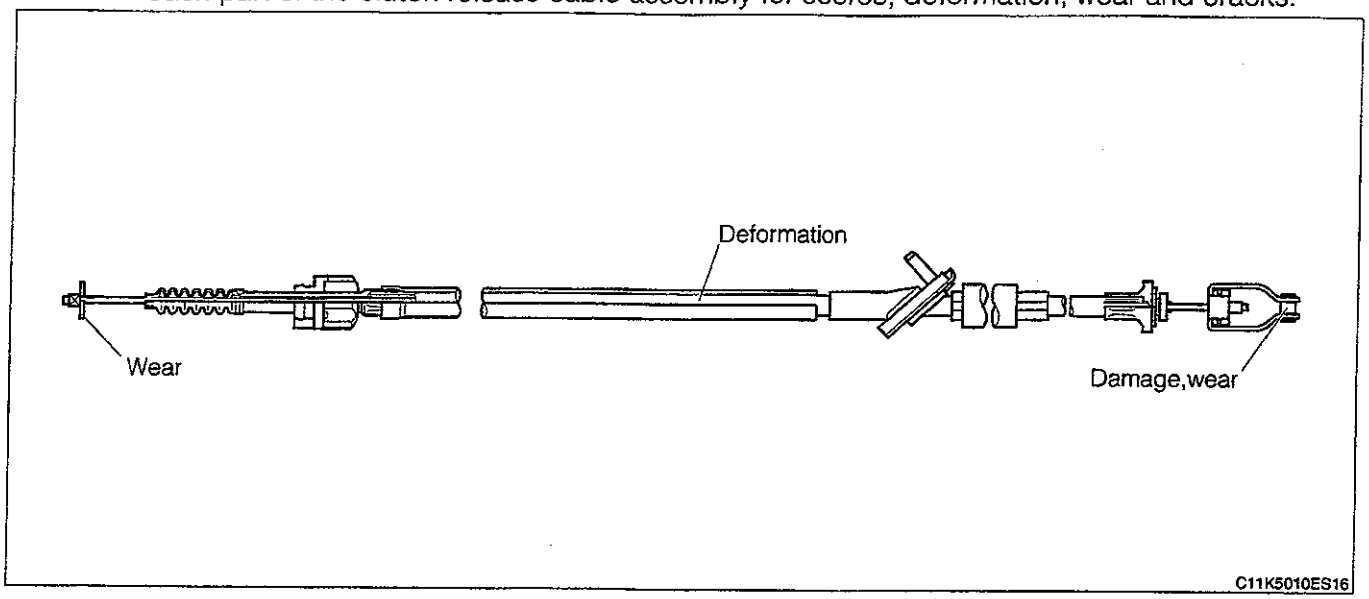
(3) CLUTCH RELEASE CABLE No.1

1.Pull the clutch release cable assembly toward the vehicle inside and remove it.

3-1-5 INSPECTION

Check the following items. Replace any faulty part.

1.Push and pull the inner cable of the clutch release cable assembly. At this time, ensure that there is no abnormal resistance and binding.
2.Check each part of the clutch release cable assembly for scores, deformation, wear and cracks.



3.Clutch release cable bracket No.1 for damage and wear



3-1-6 POINTS OF INSTALLATION

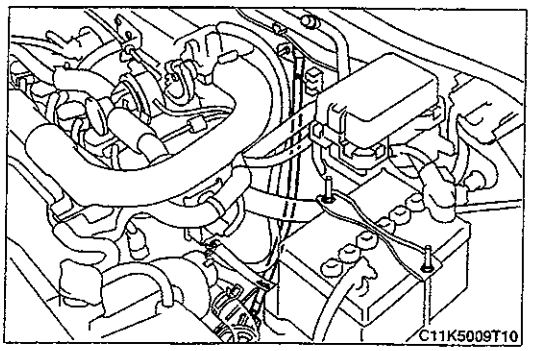
(1) CLUTCH RELEASE CABLE No.1

1.Install the clutch release cable assembly.

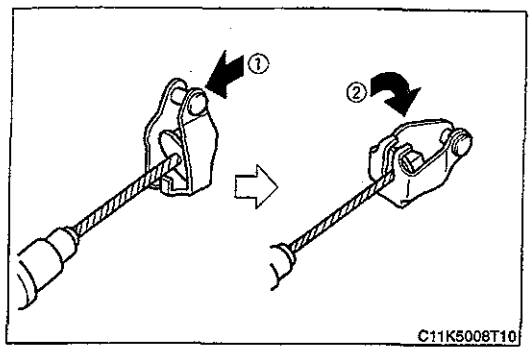
CAUTION

- Utmost care must be exercised so that the inner cable may not be bent.

2.Carry out routing the clutch cable in the engine compartment as shown in the right figure.



(2) CLUTCH RELEASE CABLE BRACKET No.1



1.Install the clutch release cable No.1.

(1) Connect the cable by routing it at the cutout section of the clutch release cable bracket No.1. Then, tilt the cable 90°.

(2) Lightly pull the clutch release lever subassembly by your hand. When the clutch release lever subassembly comes in contact with the clutch cover, apply the clutch cable bracket No.1 to the clutch release lever subassembly. Then, tighten the adjusting nut to adjust the play.

Refer to Page F1-1.

CAUTION

- Be very careful not to damage the grommet section.

3-1-7 OPERATION AFTER INSTALLATION

1.Install the instrument panel assembly.

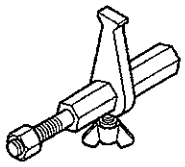
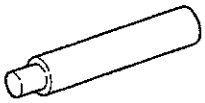
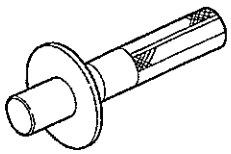
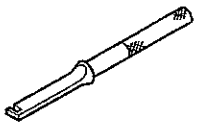
Refer to Page I2-22.

4 CLUTCH

4-1 REMOVAL AND INSTALLATION

4-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09210-87701-000	Holder, fly wheel
	09301-87501-000	Tool, clutch guide
	09302-87701-000	Gauge, clutch diaphragm spring height No.4
	09333-00013-000 (09301-00012-000)	aligner, clutch diaphragm spring

Instrument

Torque wrench,Dial gauge,Thickness gauge,Vernier calipers

Lubricant,adhesive,others

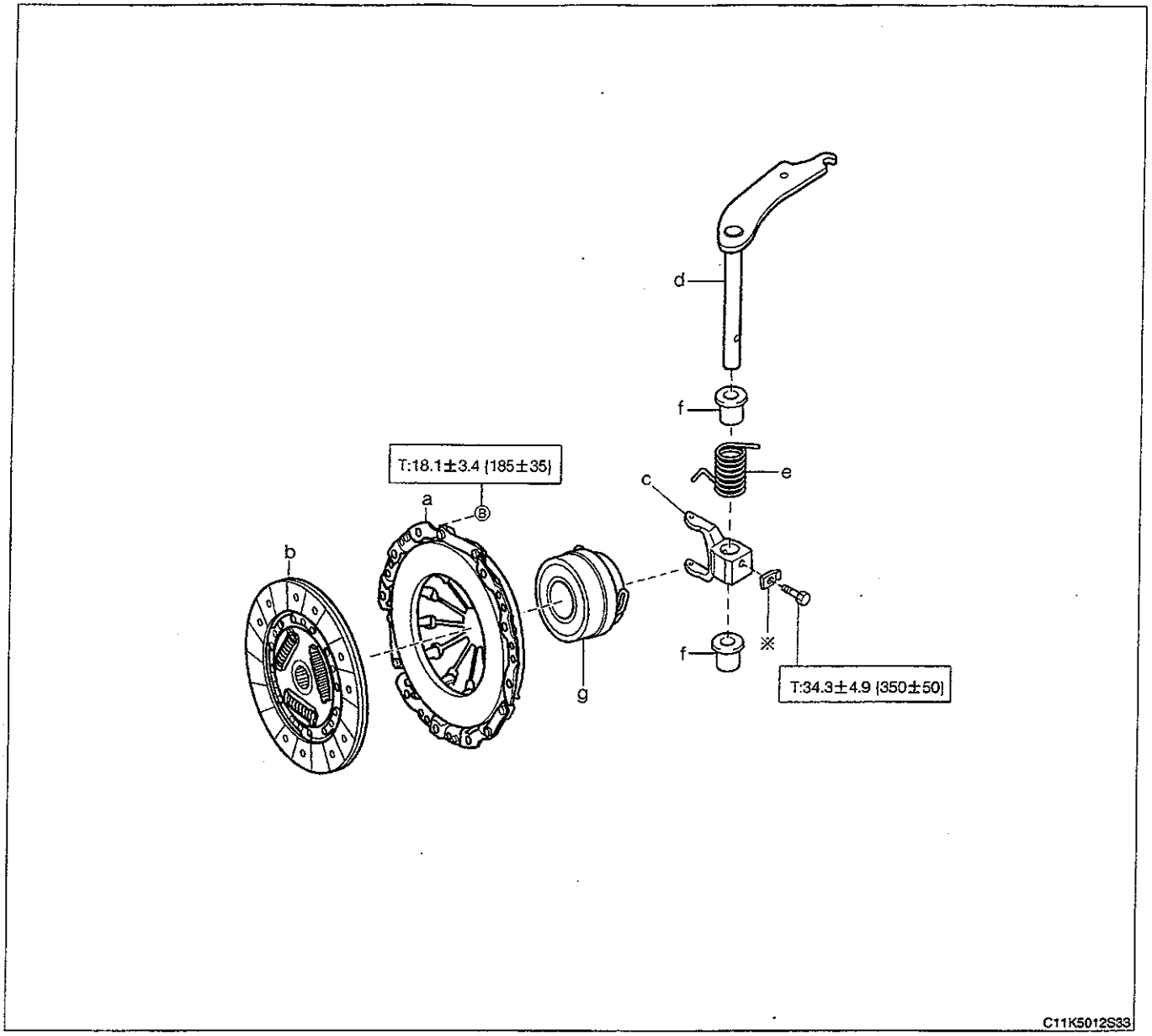
MP grease,EP grease,Clutch grease

4-1-2 OPERATION BEFORE REMOVAL

1.Remove the transaxle assembly from the vehicle.
Refer to Page IF2-2.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non - reusable parts

Unit: N·m{kgf·cm}

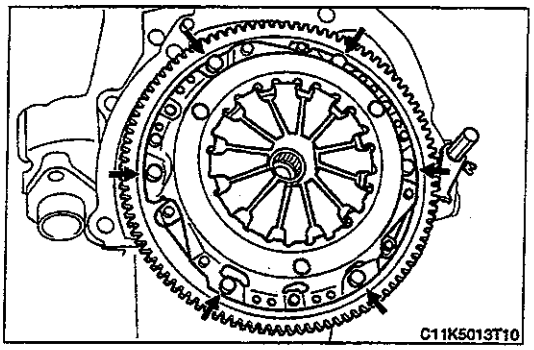
(2) REMOVAL AND INSTALLATION PROCEDURES

▼ ▲ 1 a Cover Ay, clutch
▲ 2 b Disc Ay, clutch
3 c Yoke, clutch release lever
4 d Lever S/A, clutch release fork
5 e Spring, torsion
▲ 6 f Bush
▲ 7 c Yoke, clutch release lever
▲ 8 g Hub S/A, clutch release bearing

4-1-4 POINTS OF REMOVAL

(1) CLUTCH COVER AY

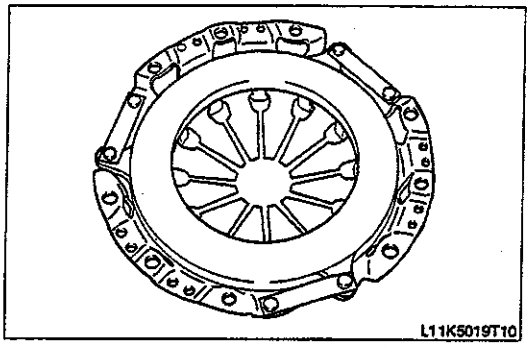
1.Prevent the ring gear from turning, using the SST. Under this condition, remove the clutch cover assembly and clutch disc assembly.
SST: 09210-87701-000



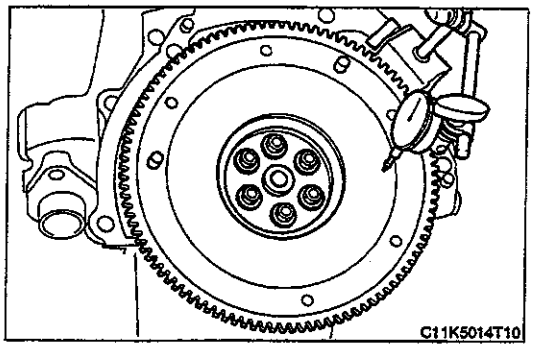
4-1-5 INSPECTION

Check the following items. Replace any faulty part.

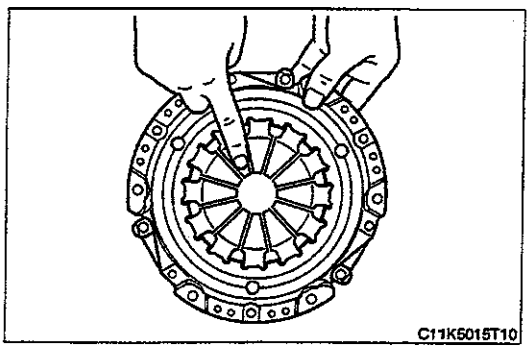
1.Flywheel and pressure plate surface of clutch cover assembly for streak, cracks and discoloration.



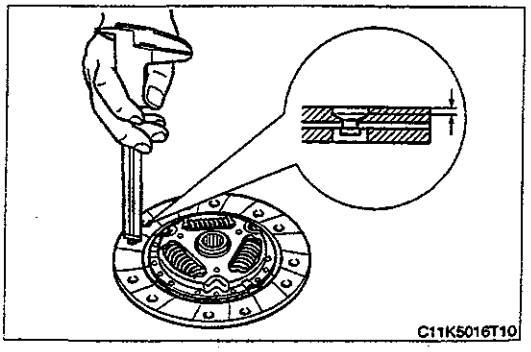
2.Clean the flywheel surface. Then, check the runout.
ALLOWABLE LIMIT: 0.10mm



3.Pressure plate (diaphragm spring finger section) of clutch cover assembly for wear, rust formation and breakage

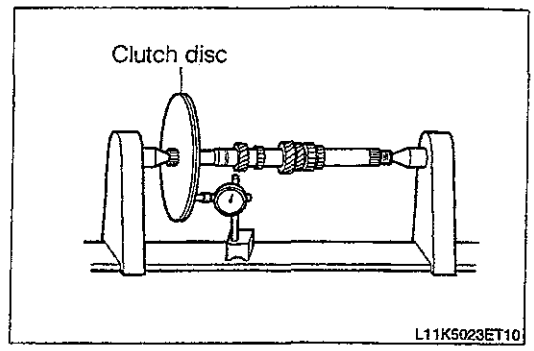


4.Clutch disc assembly for wear and runout
ALLOWABLE LIMIT: Wear limit
0.3mm(Sagging of rivet
Lateral runout limit
1.0mm

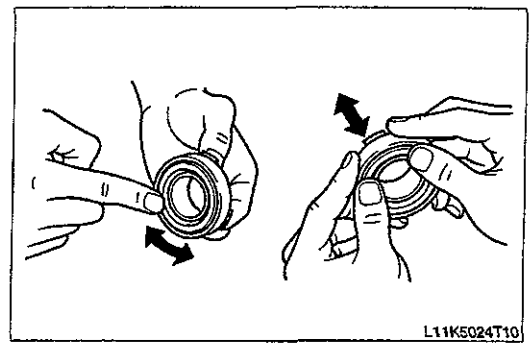


CAUTION

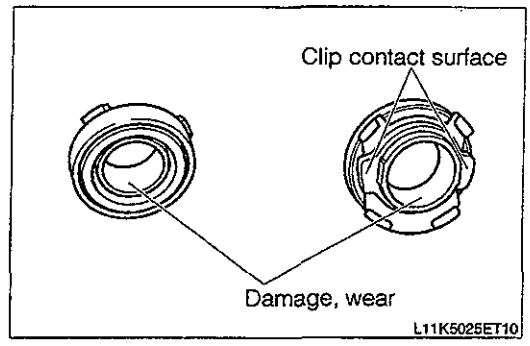
- The measurement of the lateral runout should be carried out under a condition where the clutch disc assembly is assembled with a new input shaft.



5.When the sliding section (the contact surface with the clutch cover) of the clutch release bearing hub subassembly is turned, and when pressure is applied to push the sliding section in the turning direction, ensure that there is no abnormal resistance nor binding.



6.Check the clutch release bearing hub subassembly for damage and wear. Also, check the clip contact surface and sliding section of the housing for damage and wear.



4-1-6 POINTS OF INSTALLATION

(1) CLUTCH RELEASE BEARING HUB S/A,

1.Apply EP grease over all the periphery of the bore.
LUBRICANT: EP grease

(2) CLUTCH RELEASE LEVER YOKE

1.Apply EP grease to the sliding section with the clutch release bearing hub S/A.
LUBRICANT: EP grease

(3) Bush

1.Apply MP grease over all the inside and outside periphery.
LUBRICANT: MP grease

(4) CLUTCH DISC AY

1.Install the clutch disc Ay.

(1) Thinly apply Clutch grease to the hub inside (the spline section) of the clutch disc assembly.

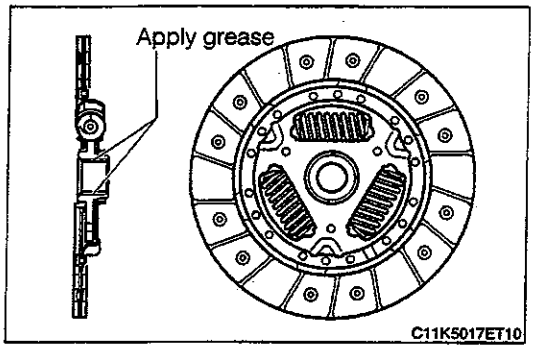
CAUTION

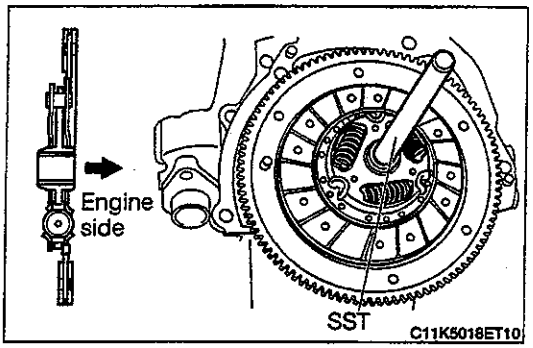
- **As regards the grease applying direction, grease should be applied from the clutch cover side. Be sure to apply grease as thinly as possible so that the excessive grease may not ooze out to the flywheel side.**

LUBRICANT: Clutch grease

(2) Install the clutch disc assembly to the flywheel by centering it, using the SST.

SST: 09301-87501-000





(5) CLUTCH COVER AY

1.Install the clutch cover assembly while aligning it with the knock pin of the flywheel. While preventing the flywheel from turning, using the SST, tighten the bolts to the specified torque.

SST: 09210-87701-000

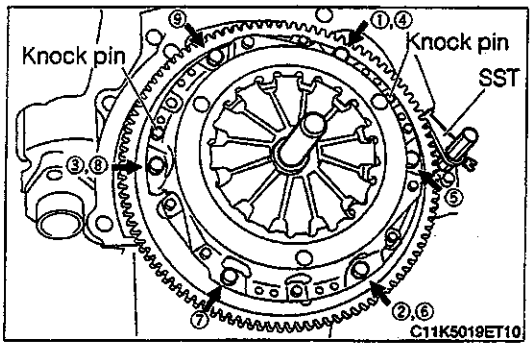
CAUTION

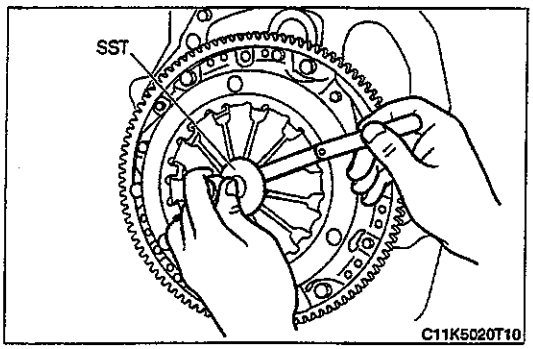
- **The bolts should be tightened in the following sequence: ① Temporary tightening, ② to ⑨ Tightening securely.**

2.Check the diaphragm spring section for unevenness in height, using the SST.

SST: 09302-87701-000

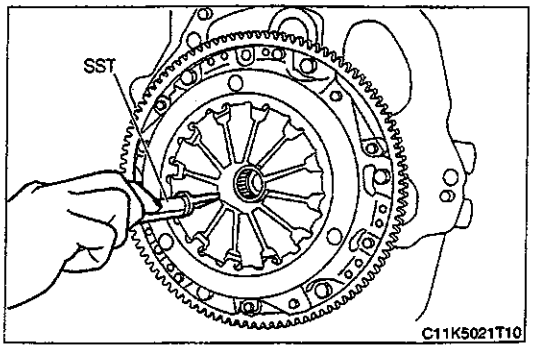
ALLOWABLE LIMIT: 0.7mm





3.If the above check has revealed that the unevenness exceeds the limit, correct the unevenness in height, using the SST.

SST: 09333-00013-000



4-1-7 OPERATION AFTER INSTALLATION

1. Install the transaxle assembly.
   Refer to Page F2-2.

TO INDEX

F2 MANUAL TRANSMISSION/MANUAL TRANSAXLE

MANUAL TRANSAXLE ---------- F2 - 1
BASIC CHECK AND ADJUSTMENT --- F2 - 1
TRANSMISSION GEAR OIL---------- F2 - 1
REPLACEMENT ---------- F2 - 1
MANUAL TRANSAXLE AY---------- F2 - 2
REMOVAL AND INSTALLATION -------- F2 - 2
DIFFERENTIAL SIDE OIL SEAL ---------- F2 - 4
REMOVAL AND INSTALLATION -------- F2 - 4
BACK UP LAMP SWITCH---------- F2 - 6
REMOVAL AND INSTALLATION -------- F2 - 6
SHIFT LEVER ---------- F2 - 8
REMOVAL AND INSTALLATION -------- F2 - 8
DISASSEMBLING AND
ASSEMBLING---------- F2 - 11

1 MANUAL TRANSAXLE

1-1 BASIC CHECK AND ADJUSTMENT

1-1-1 Check of transmission oil level

1.Remove the filler plug. With the vehicle placed in a horizontal state, ensure that the oil level is at the specified level.

SPECIFIED VALUE: 5 mm or less below lower edge of filler plug hole

TIGHTENING TORQUE: 39.2±9.8N·m {400±100kgf·cm}

CAUTION

- If the oil level is low, check for oil leakage.
  Never reuse the gasket.

2 TRANSMISSION GEAR OIL

2-1 REPLACEMENT

LUBRICANT: Transmission gear oil SAE75W{{-}}90 or SAE75W{{-}}85 or SAE75W{{-}}80 (API Classification GL3 or GL4)−90 or SAE75W−85 or SAE75W−80 (API Classification GL3 or GL4)

SPECIFIED VALUE: Total capacity approx. 2.1 - 2.25ℓ
5 mm or less below lower edge of filler plug hole

TIGHTENING TORQUE: 39.2±9.8N·m {400±100kgf·cm}

CAUTION

- Never reuse the removed gasket.

3 MANUAL TRANSAXLE AY

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

Instrument

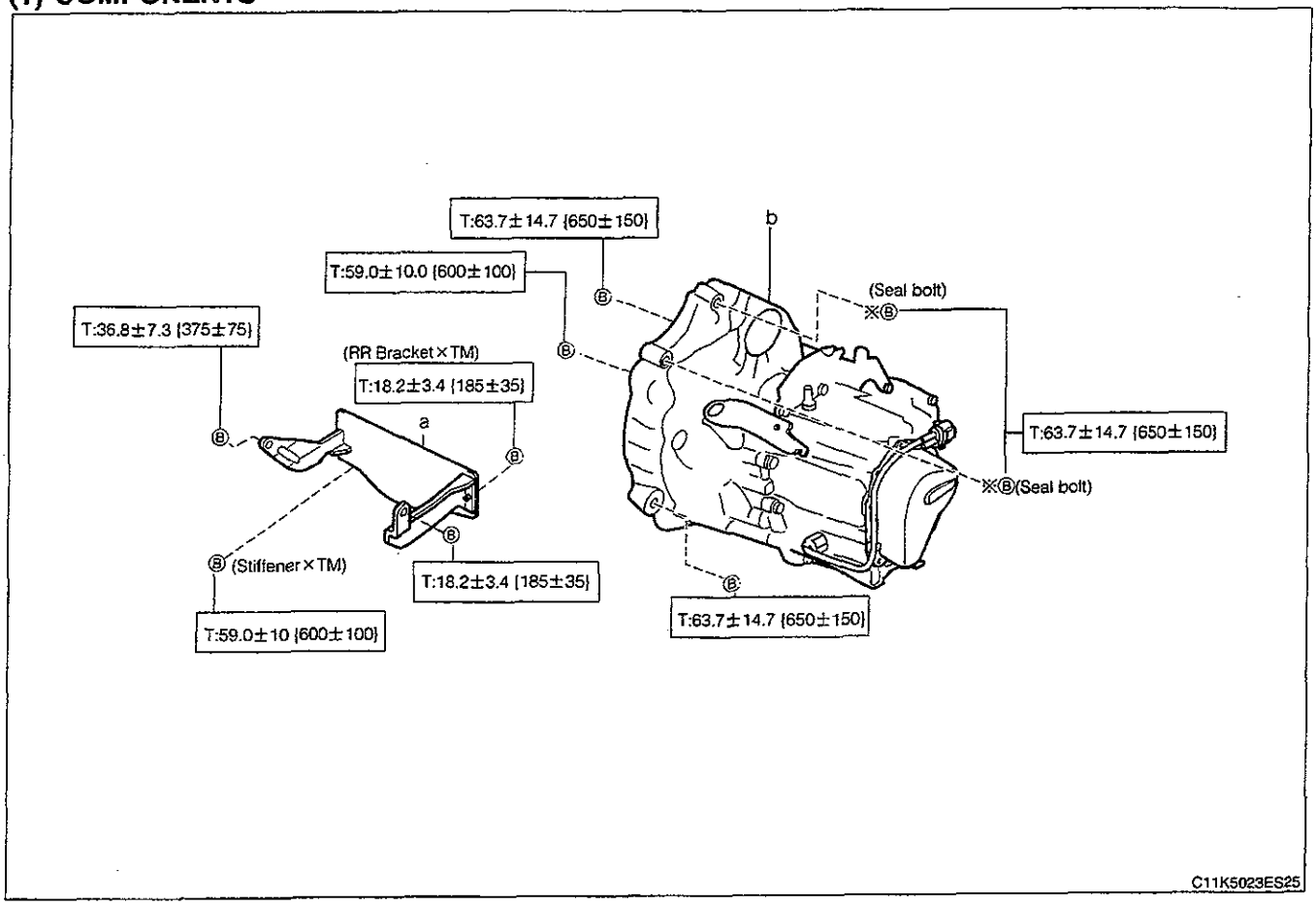
Torque wrench

3-1-2 OPERATION BEFORE REMOVAL

1.Remove the transaxle together with the engine.
Refer to Page B2-17.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Stiffener, power train
▲ 2 b Transaxle Ay

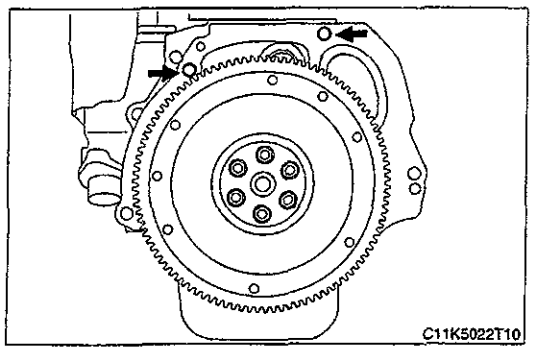
3-1-4 POINTS OF INSTALLATION

(1) TRANSAXLE AY

1.After cleaning the seal bolt holes of the engine block, install the transaxle assembly.

CAUTION

- Never reuse the removed seal bolts.



3-1-5 OPERATION AFTER INSTALLATION

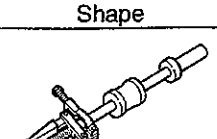
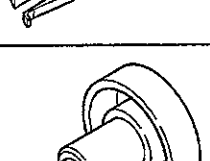
1.Install the transaxle together with the engine.
Refer to Page B2-17.

4 DIFFERENTIAL SIDE OIL SEAL

4-1 REMOVAL AND INSTALLATION

4-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09308-00010-000	Puller, oil seal
	09518-87709-000	Replacer, oil seal No.8

Lubricant,adhesive,others

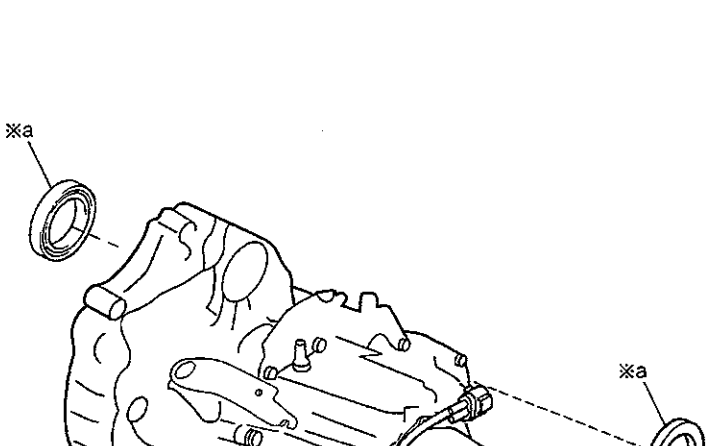
Transmission gear oil SAE75W−90 or SAE75W−85 or SAE75W−80 (API Classification GL3 or GL4)

4-1-2 OPERATION BEFORE REMOVAL

1.Remove the drive shaft.
Refer to Page D2-8

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



C11K5024S25

※:Non - reusable parts

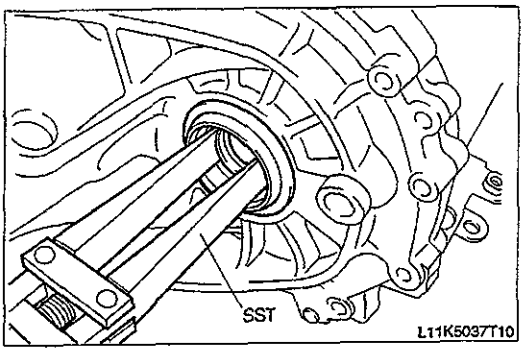
(2) REMOVAL AND INSTALLATION PROCEDURES

▼ ▲ 1 a Seal, type T oil

4-1-4 POINTS OF REMOVAL

(1) TYPE T OIL SEAL

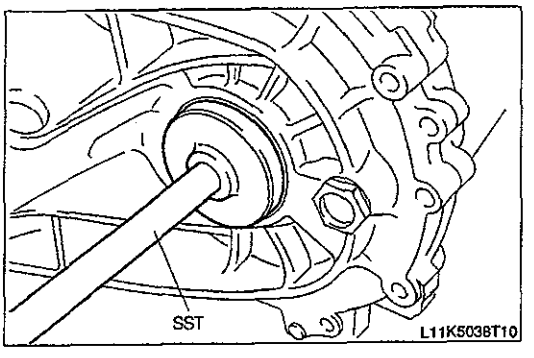
1.Remove the type T oil seal, using the SST.
SST: 09308-00010-000



4-1-5 POINTS OF INSTALLATION

(1) TYPE T OIL SEAL

1.Drive the type T oil seal in place, using the SST.
SST: 09518-87709-000



4-1-6 OPERATION AFTER INSTALLATION

1.Install the drive shaft.
Refer to Page D2-8.

5 BACK UP LAMP SWITCH

5-1 REMOVAL AND INSTALLATION

5-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench,Electrical Tester

Lubricant,adhesive,others

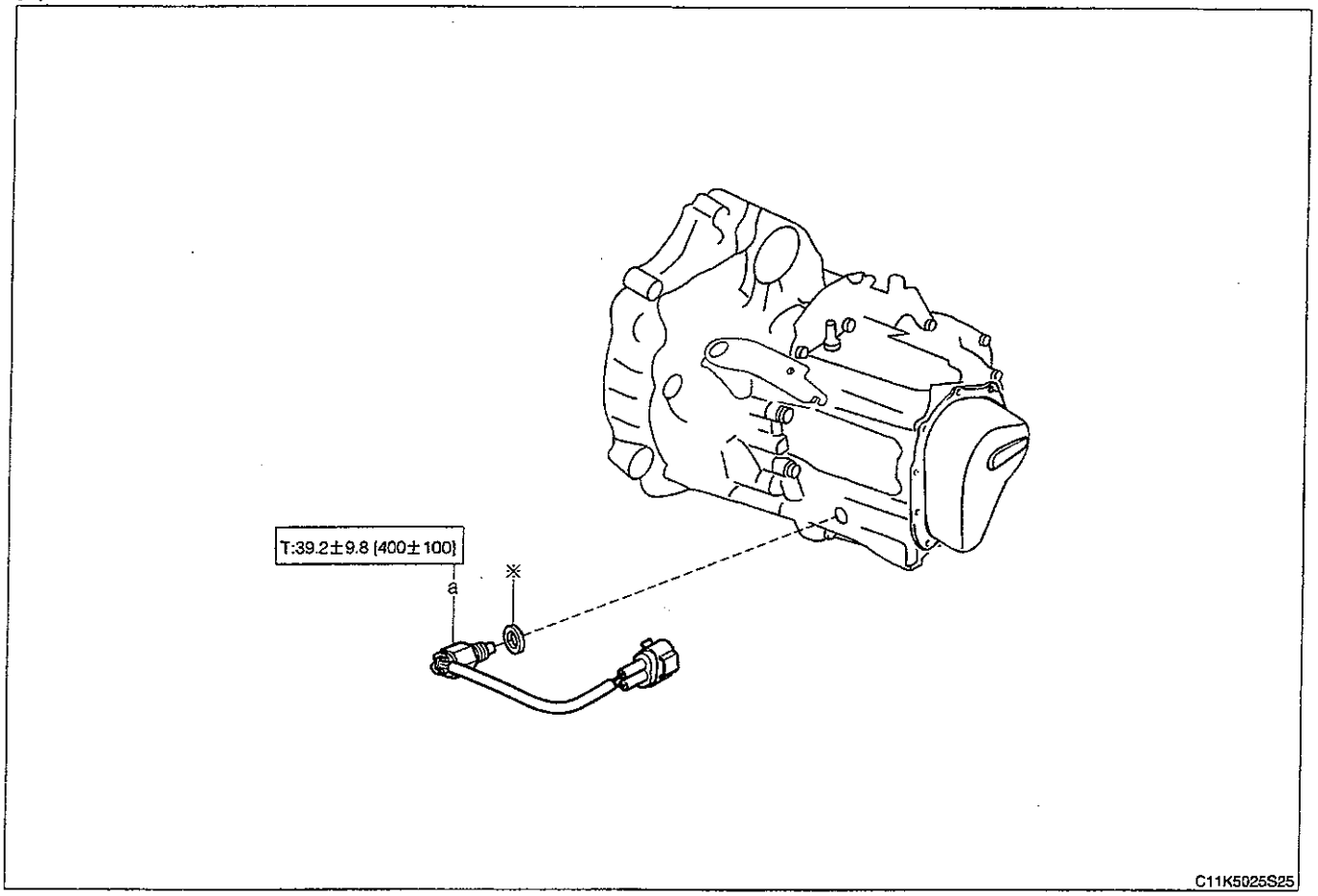
Transmission gear oil SAE75W−90 or SAE75W−85 or SAE75W−80 (API Classification GL3 or GL4)

5-1-2 OPERATION BEFORE REMOVAL

1.Drain the transaxle oil.

5-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non - reusable parts

Unit:N·m{kgf·cm}

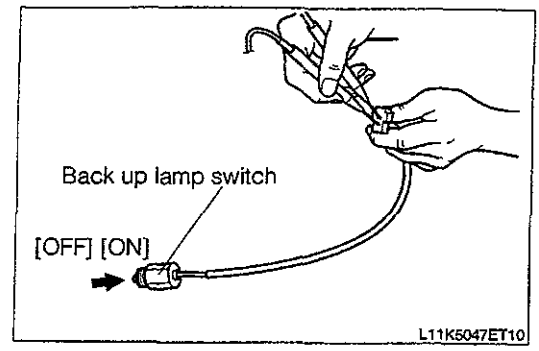
(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Switch Ay, back up lamp

5-1-4 INSPECTION

Check the following items. Replace any faulty part.

1. Ensure that continuity exists when the switch of the backup lamp switch assembly is pushed (ON). Conversely, ensure that no continuity exists when the switch is not pushed (OFF).



5-1-5 OPERATION AFTER INSTALLATION

1. Fill transaxle oil.
   Refer to Page F2-1.

6 SHIFT LEVER

6-1 REMOVAL AND INSTALLATION

WARNING

- Do not carry out the operation while the exhaust pipe is still hot, for there is a possibility of getting scalded.

6-1-1 ARTICLES TO BE PREPARED

Tool

Snap ring pliers

Instrument

Torque wrench

Lubricant,adhesive,others

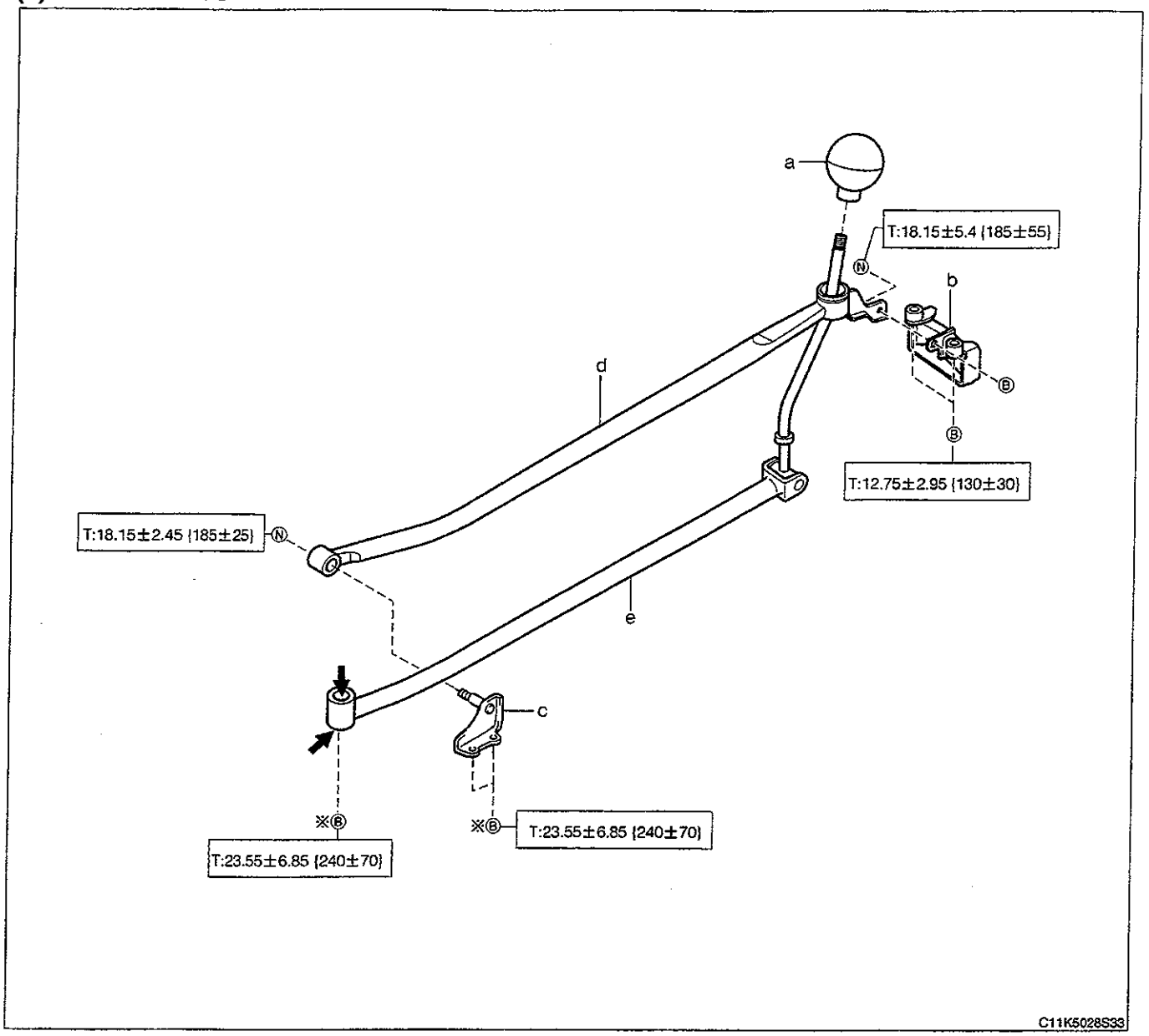
MP grease

6-1-2 OPERATION BEFORE REMOVAL

1.When the support No.2 is riveted with the extension rod S/A, remove the exhaust pipe.
Refer to Page B4-2.

6-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non - reusable parts
➡: MP grease
Unit: N·m{kgf·cm}

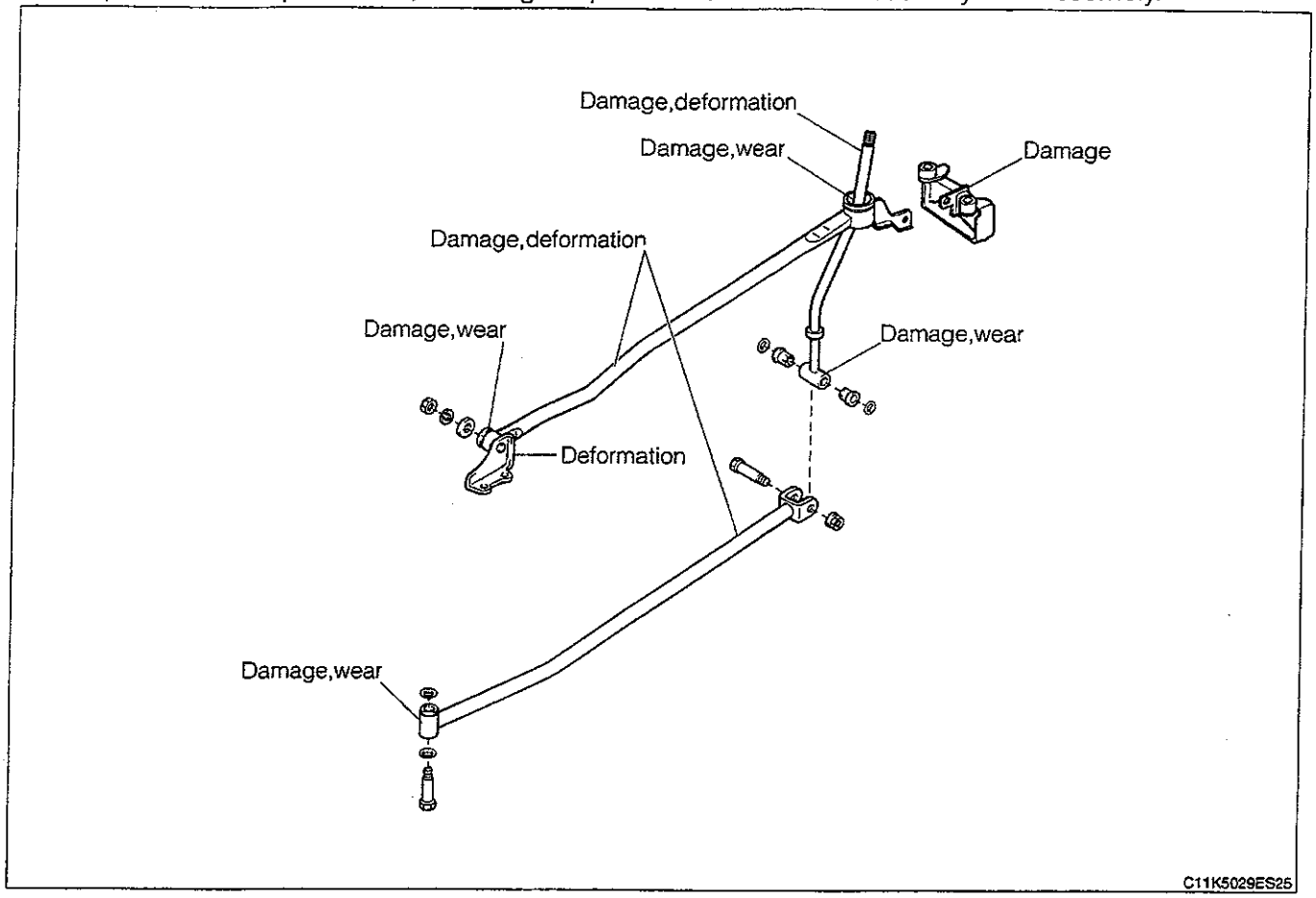
(2) REMOVAL AND INSTALLATION PROCEDURES

▲ 1 a Knob, shift lever
2 b Support, floor shift, No.2
3 c Support, floor shift, No.1
4 d Rod S/A, extension
▲ 5 e Shaft S/A, shift & select

6-1-4 INSPECTION

Check the following items. Replace any faulty part.

Check that each joint section of the assembly turns smoothly without any binding. If any malfunction is found, perform the replacement, following the procedure under "Disassembly and Assembly."



6-1-5 POINTS OF INSTALLATION

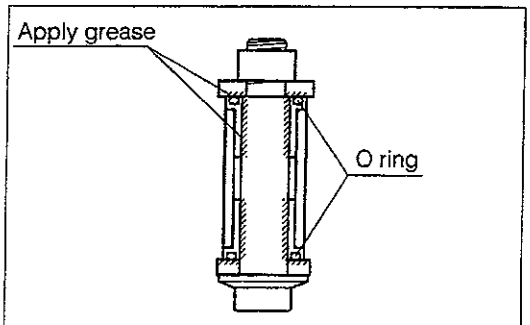
(1) SHIFT & SELECT SHAFT S/A

1.Install the shift & select shaft S/A.

(1) Ensure that the O-ring has been installed securely to the bush.

(2) Apply MP grease t the shaft at the transmission side (the entire periphery indicated by the slanting line in the figure on the right).

LUBRICANT: MP grease

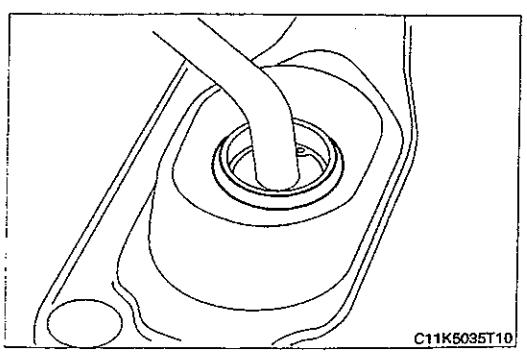


CAUTION

- Never reuse the attaching bolts.

(2) EXTENSION ROD S/A

1.Securely fit the dust boots into the groove of the extension rod S/A.



(3) SUPPORT NO.2

1.When the support No.2 is bolted to the extension rod S/A, tighten the support No.2 and extension rod S/A to the specified torque after the support No.1 and support No.2 have been installed to the vehicle..

CAUTION

- Do not reuse the support No.1 attaching bolts once they are used.

(4) SHIFT LEVER KNOB

1.Install the shift lever hole cover.

2.Install the shift lever knob.

Screw it in the shift & select lever assembly until it can be attached temporarily. Then, tighten it further by 1.5 turns.

6-1-6 OPERATION AFTER INSTALLATION

1.Install the exhaust pipe.

Refer to Page B4-2.

6-2 DISASSEMBLING AND ASSEMBLING

6-2-1 ARTICLES TO BE PREPARED

Tool

Hand grinder,Snap ring pliers

Instrument

Torque wrench

Lubricant,adhesive,others

MP grease

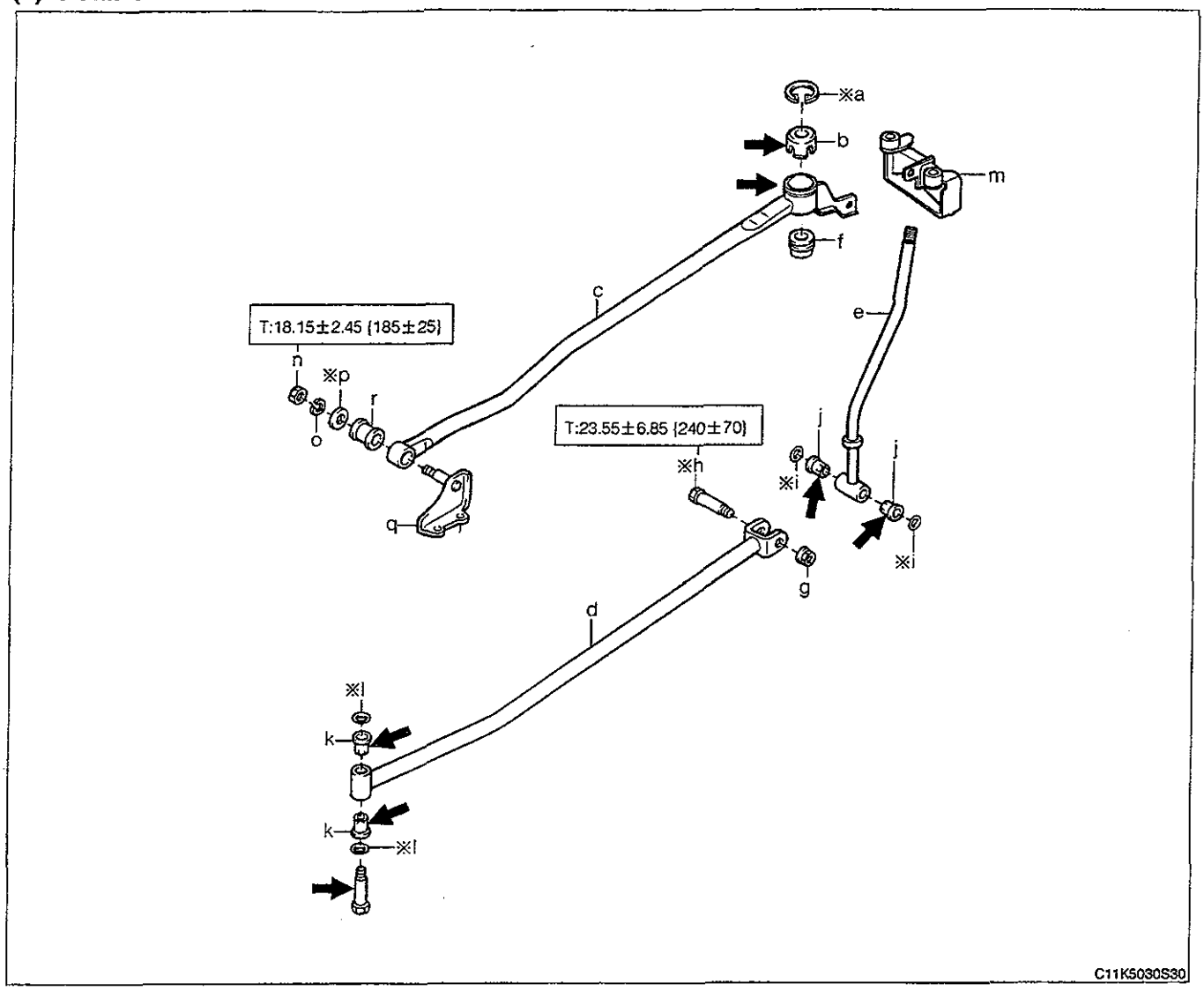
6-2-2 OPERATION BEFORE DISASSEMBLY

1.Remove the floor shift assembly from the vehicle.

Refer to Page F2-8.

6-2-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) COMPONENTS



※:Non - reusable parts
➡: MP grease
Unit: N·m{kgf·cm}

(2) DISASSEMBLING AND ASSEMBLING PROCEDURE

1 a Ring, snap
2 b Sheet, shift lever
3 c Rod S/A, extension
▼ ▲ 4 d Shaft S/A, shift & select
5 e Lever S/A, shift & select
6 f Boot, shift lever retainer dust
8 g Nut (Replacement parts)
9 h Bolt (Replacement parts)
10 i Ring, O
11 j Bush
12 k Bush
13 l Ring, O
▼ ▲ 14 c Rod S/A, extension
14 m Support, floor shift, No.2
16 n Nut (Replacement parts)
17 o Washer (Replacement parts)
18 p Collar (Replacement parts)
18 q Support, floor shift, No.1 (Replacement parts)
20 r Bush

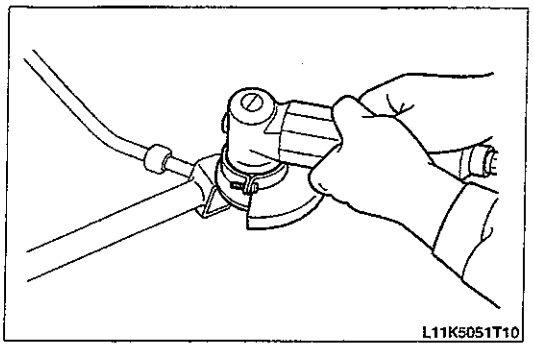
6-2-4 POINTS OF DISASSEMBLY

(1) SHIFT & SELECT SHAFT S/A

1.Separate the shift & select shaft S/A and shift & select lever S/A by removing caulking with a grinder.

CAUTION

- Never reuse the pin whose staked section has been cut off.



(2) EXTENSION ROD S/A

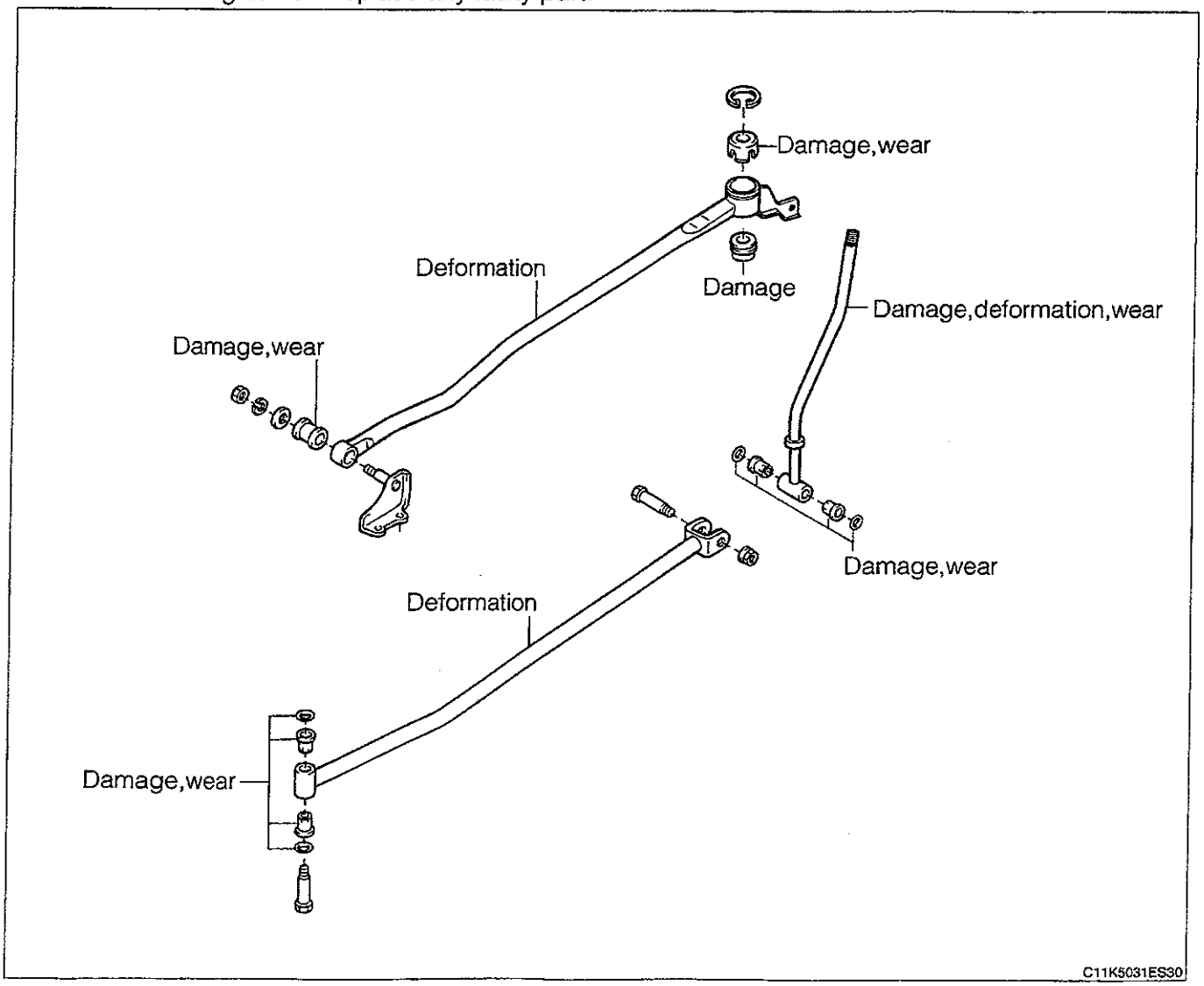
1.Separate the extension rod S/A and support No.2, and the extension rod S/A and support No.1, respectively, by removing caulking with a grinder.

CAUTION

- Do not reuse the pin where caulking was broken and support No.1 once they are used.

6-2-5 INSPECTION

Check the following items. Replace any faulty part.



6-2-6 POINTS OF ASSEMBLY

(1) EXTENSION ROD S/A

1.Assemble the extension rod S/A and support No.1.

CAUTION

- In the case of replacement parts, the connecting method is of a nut securing type. Utmost care must be exercised so that no wrong installation method is employed.

2.Temporarily assemble the extension rod S/A and support No.2. Securely tighten when they are mounted on the vehicle.

CAUTION

- In the case of replacement parts, the connecting method is of a nut securing type. Utmost care must be exercised so that no wrong installation method is employed.

(2) SHIFT & SELECT SHAFT S/A

1.Assemble the shift & select lever S/A and shift & select shaft S/A.

CAUTION

- In the case of replacement parts, the connecting method is of a bolt securing type. Utmost care must be exercised so that no wrong installation method is employed.

6-2-7 OPERATION AFTER ASSEMBLY

1.Install the floor shift assembly to the vehicle.

Refer to Page F2-8.

TO INDEX

G1 STEERING

STEERING WHEEL ---------- G1 - 1
REMOVAL AND INSTALLATION-------- G1 - 1
STEERING COLUMN---------- G1 - 4
REMOVAL AND INSTALLATION-------- G1 - 4

1 STEERING WHEEL

WARNING

- The following operations will affect the SRS airbag. Hence, prior to the operation, be sure to confirm the instructions for the SRS airbag in order to perform reliable operations.

Refer to Page H1-1.

1-1 REMOVAL AND INSTALLATION

1-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

1-1-2 OPERATION BEFORE REMOVAL

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

CAUTION

- It should be noted that the memory of the computers of other systems (engine control, etc.) and the radio will be erased at the same time when the cable is disconnected from the negative negative terminal of the battery.
- The SRS airbag system is provided with a backup condenser (for the squib). Therefore, about 60 seconds are necessary for the backup condenser to discharge after the negative negative terminal of the battery is removed. (Natural discharge)
- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

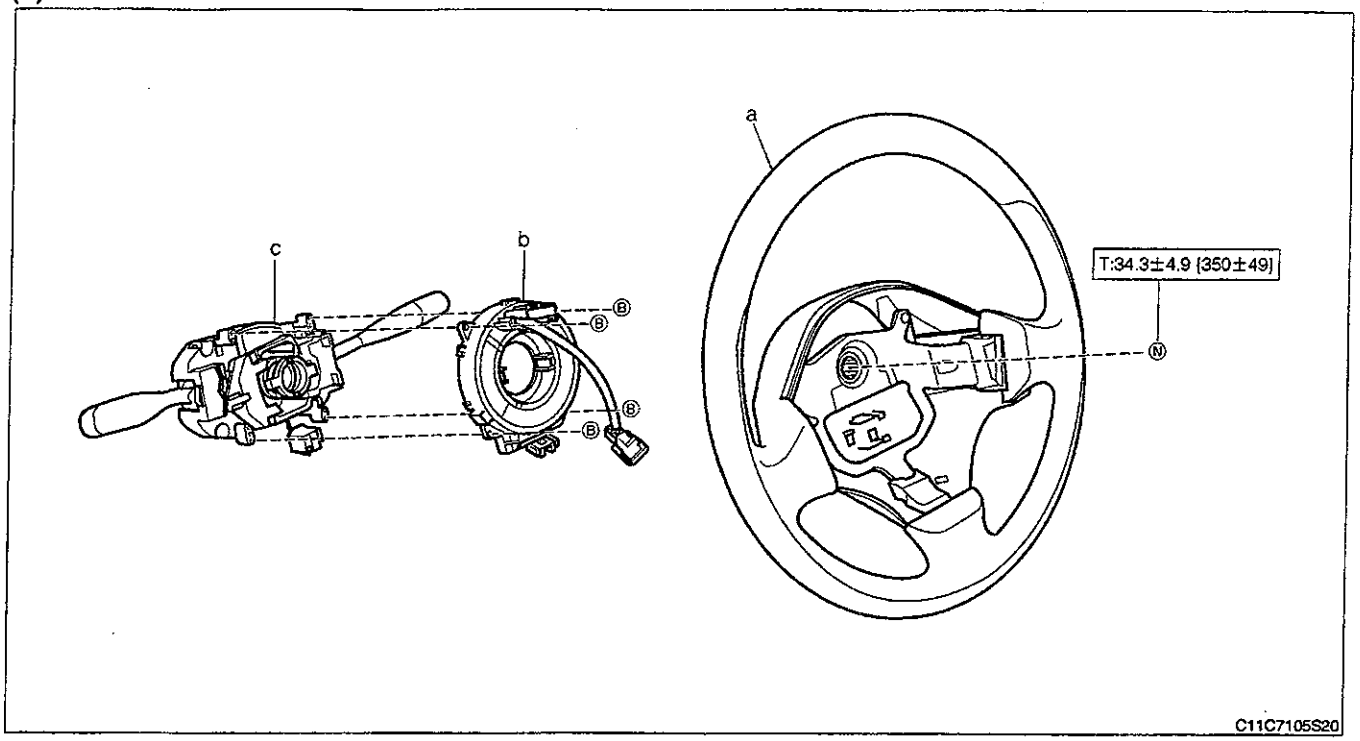
2.Ensure that the steering wheel is in the straight ahead condition.

3.Remove the horn pad subassembly.

Refer to Page H1-7.

1-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf·cm}

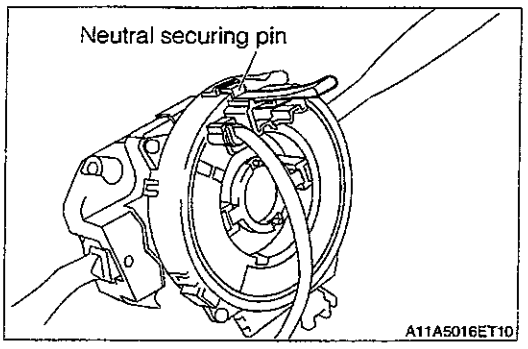
(2) REMOVAL AND INSTALLATION PROCEDURES

▲ 1 a Wheel S/A, steering
▲ 2 b Cable S/A, spiral
3 c Switch S/A, turn signal

1-1-4 POINTS OF INSTALLATION

(1) SPIRAL CABLE S/A

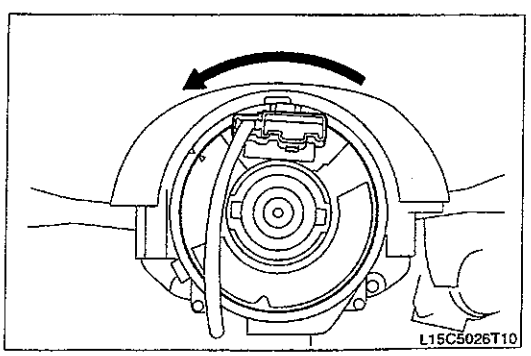
1.Ensure that the tires are in a straight-ahead state.
2.Adjust the center position of the spiral cable subassembly.



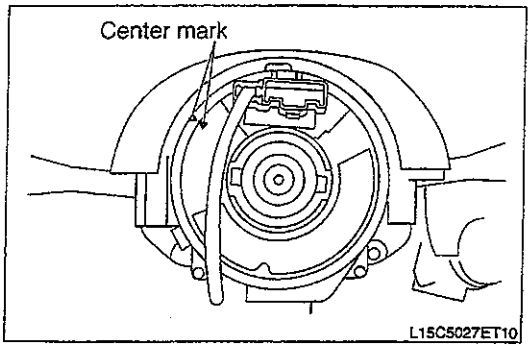
(1) Turn the spiral cable S/A in the arrowheaded direction until it is locked.

NOTE

- It should be noted that the number of lock-to-lock turns of the spiral cable subassembly is about six.



(2) Make about three turns in the clockwise direction from the position where the spiral cable S/A is locked and align the center mark from this position.

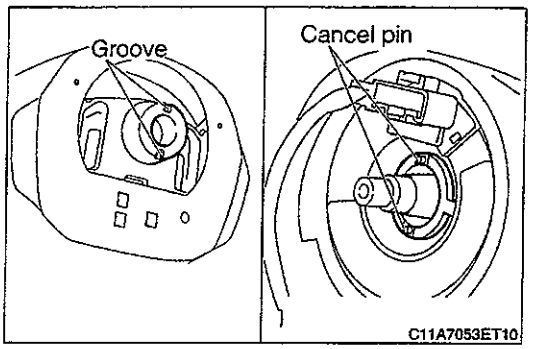


(2) STEERING WHEEL S/A

1.Install the steering wheel S/A to the steering shaft.

CAUTION

- As for the installation of the steering wheel S/A, install the steering wheel S/A deeply and positively. Turn it two or three times clockwise and counterclockwise so that the canceling pin of the turn signal switch S/A (at the spiral cable S/A side) is accurately aligned with the assembling groove of the steering wheel S/A.



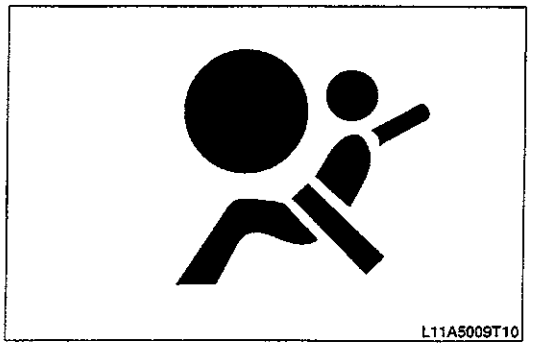
1-1-5 OPERATION AFTER INSTALLATION

1.Install the horn pad subassembly.
Refer to Page H1-7.

2.Confirm the steering wheel center position.

3.Install the negative negative terminal of the battery.

4.Turn ON the ignition switch. Ensure that the airbag warning lamp is illuminated for about six seconds and, then, it goes out.



2 STEERING COLUMN

WARNING

- The following operations will affect the SRS airbag. Hence, prior to the operation, be sure to confirm the instructions for the SRS airbag in order to perform reliable operations.

Refer to Page H1-1.

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Tool

Center ponch,Drill,Tap

Instrument

Torque wrench

2-1-2 OPERATION BEFORE REMOVAL

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

CAUTION

- It should be noted that the memory of the computers of other systems (engine control, etc.) and the radio will be erased at the same time when the cable is disconnected from the negative negative terminal of the battery.
- The SRS airbag system is provided with a backup condenser (for the squib). Therefore, about 60 seconds are necessary for the backup condenser to discharge after the negative negative terminal of the battery is removed. (Natural discharge)
- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

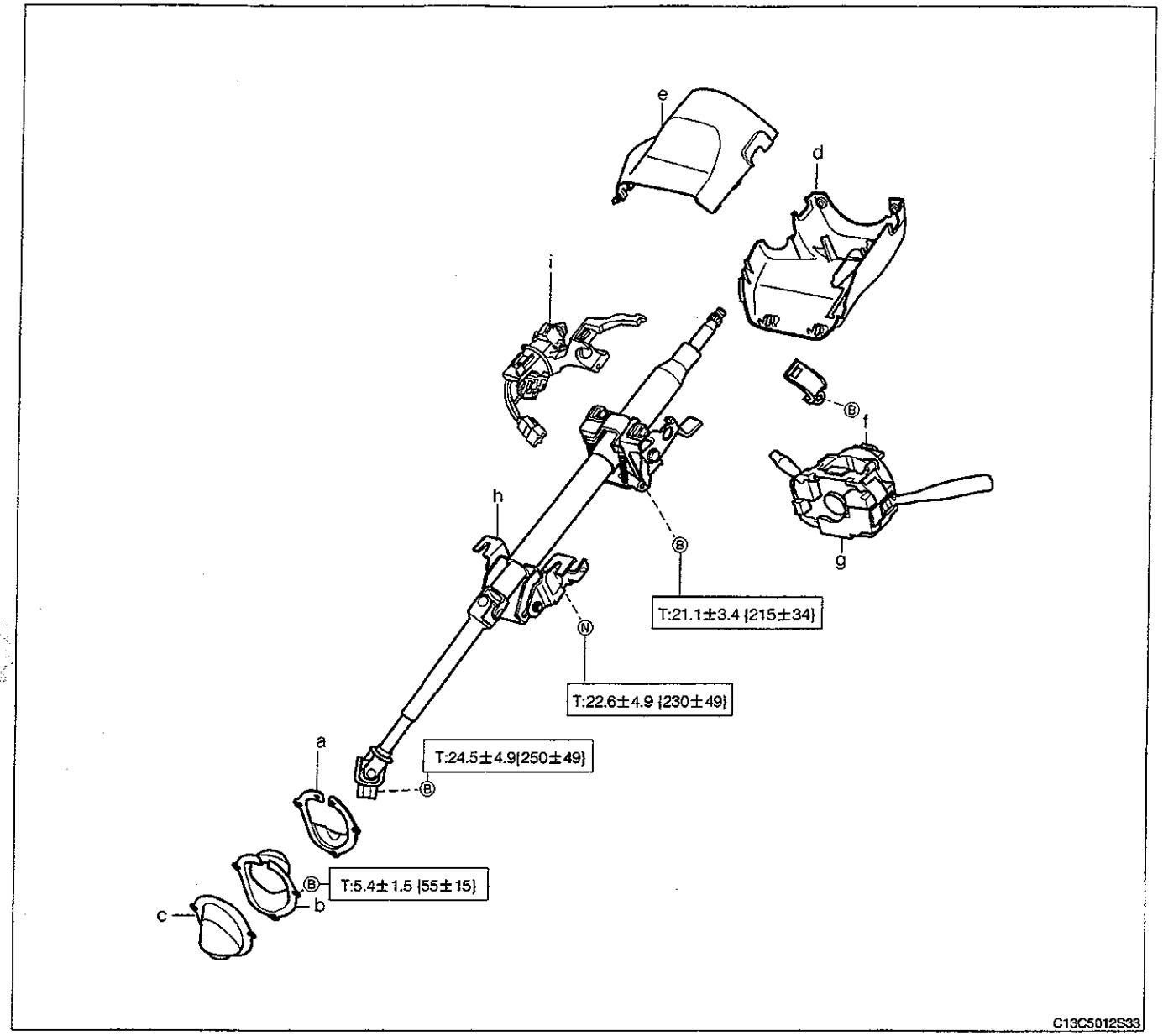
2.Remove the horn pad subassembly.
Refer to Page H1-7.

3.Remove the steering wheel S/A.
Refer to Page G1-1.

4.Remove the instrument panel finish lower panel.
5.Remove the foot rest.
6.Turn over the carpet.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

	1	a	Retainer,dust cover	
	2	b	Cover, steering shaft dust	
	3	c	Shield, steering column hole	
	4	d	Cover, steering column, lower	
▼	5	e	Cover, steering column, upper	
▲	6	f	Cable S/A, spiral	
	7	g	Switch S/A, turn signal	
▼ ▲	8	h	Columu Ay, steering	
▼ ▲	9	i	Lock Ay, steering	

2-1-4 POINTS OF REMOVAL

(1) STEERING COLUMN UPPER COVER

Remove the steering column upper cover with the operation lever of the telescopic and tilt mechanism set to the unlock position and the steering column assembly lowered fully to the lowest position.

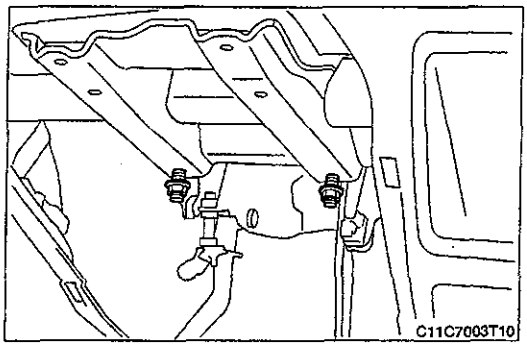
(2) STEERING COLUMN AY

1. Immediately before removing the steering column assembly, set the operation lever of the telescopic and tilt mechanism to the unlock position. Also, raise the steering column assembly fully to the uppermost position and push it toward the front side of the vehicle. Then, lock the operation lever.

NOTE

- Do not release the operation lever of the telescopic & tilt mechanism until the steering column assembly is installed. If the lever was released, correction should be made to get the specified position as indicated in the "Main Points of Installation." After the operation lever has been locked, install the steering column assembly.

2. Do not remove the nuts attaching the steering column assembly, but loosen the nuts up to the edge of the bolts.
3. Remove the steering column Ay.



CAUTION

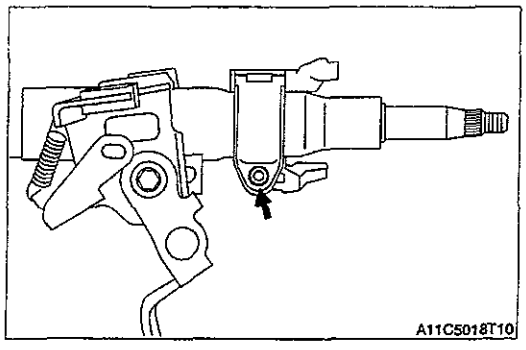
- During the removal, be very careful not to give impacts to the assembly or drop it.
- If the serration of the intermediate shaft is pulled out from the tube, put it back, aligning the paint positions. Be very careful not to allow any foreign matter to get to the components.

(3) STEERING LOCK AY

1. Remove the steering lock assembly. Install it to a new steering column assembly.
   (1) Make a hole, using a drill, to such an extent that the reverse tapping of the steering lock set bolt is possible.

   TOOL: Center ponch
   Drill

   (2) Remove the steering lock set bolt, using the reverse tapping. Then, remove the steering lock assembly.



CAUTION

- Never reuse the removed bolts.

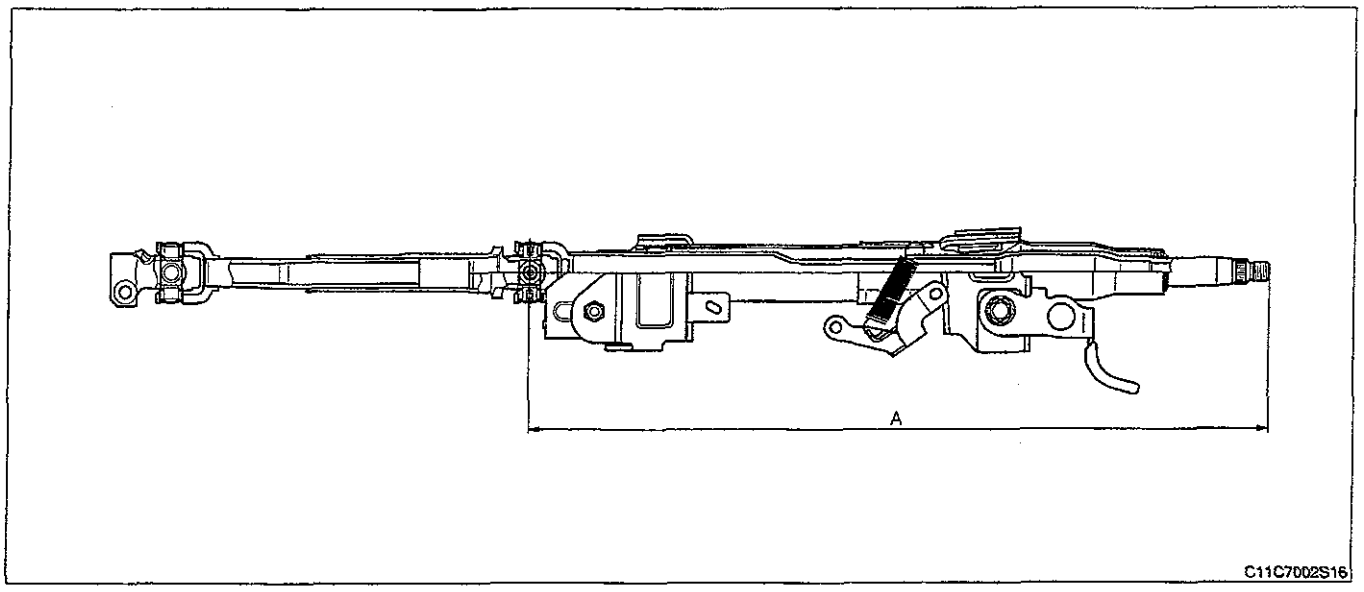
TOOL: Tap

2-1-5 INSPECTION

(1) STEERING COLUMN AY

1.The steering column assembly is of an impact-absorbing construction. Therefore, measure the dimensions indicated in the figure below after the removal. If the measured value is considerably short, replace the assembly.

SPECIFIED VALUE: 503.5mm



2-1-6 POINTS OF INSTALLATION

(1) STEERING LOCK AY

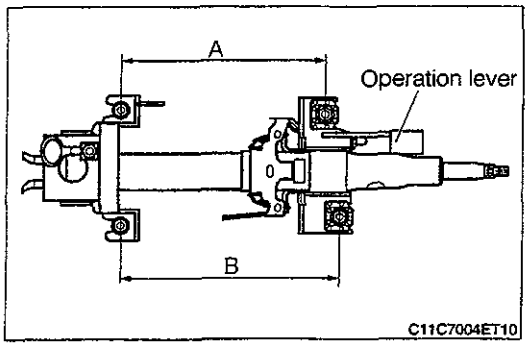
1.Install a new steering lock set bolt. Tighten it, until the head of the bolt is cut off.

(2) STEERING COLUMN AY

1.Do not release the operation lever of the telescopic & tilt mechanism until the steering column assembly is installed.

If the lever was released, set the distance between the brackets to the reference dimension given below. After the operation lever has been locked, install the steering column assembly.

SPECIFIED VALUE:

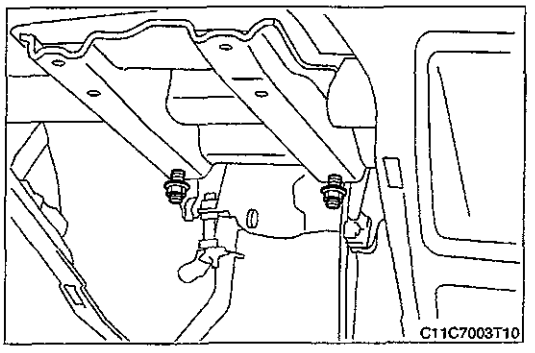


A[mm]	216.1±1.5
B[mm]	229.8±1.5

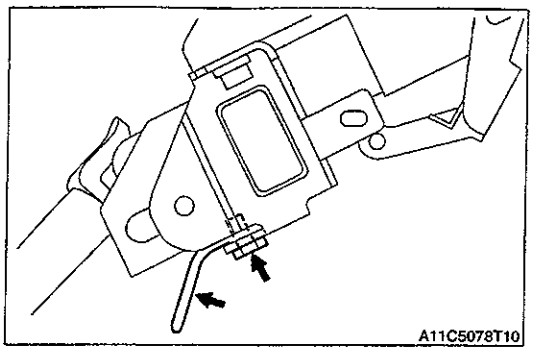
2.Temporarily tighten the nuts, that are attaching the steering column assembly, to the stud bolts of the pillar-to-pillar member.

3.Temporarily secure the steering column tube assembly by attaching the lower side bracket of the steering column assembly to the temporarily-tightened nuts.

4.Tighten the upper side bracket of the steering column assembly to the specified torque. Then, securely tighten the nuts of the lower side bracket.



5.Remove the retaining bolt (reversing screw) of the telescopic & tilt mechanism and spacer. (In cases where a new steering column assembly is installed)



CAUTION

- **If this removal fails to be carried out, the tilt and telescopic will not function.**

6.Positively insert the universal joint (lower side) of the steering column assembly to the steering gear pinion, until the joint bottoms. Tighten the bolt to the specified torque.

CAUTION

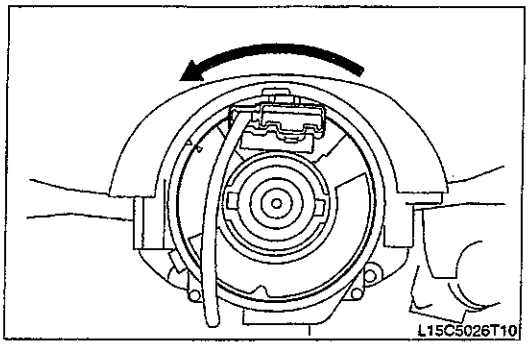
- **Be sure to start the installation of bolts from the direction where the spot facing of the universal joint is present..**

(3) SPIRAL CABLE S/A

1.Ensure that the tires are in a straight-ahead state.

2.Adjust the center position of the spiral cable subassembly.

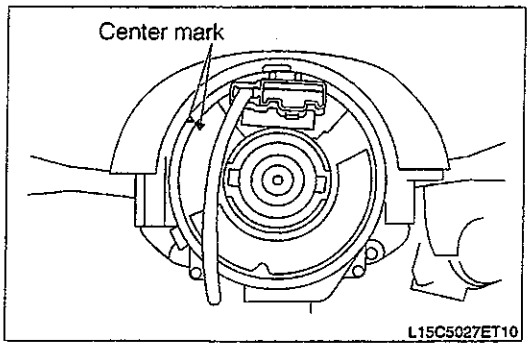
(1) Turn the spiral cable S/A in the arrowheaded direction until it is locked.



NOTE

- **It should be noted that the number of lock-to-lock turns of the spiral cable subassembly is about six.**

(2) Make about three turns in the clockwise direction from the position where the spiral cable S/A is locked and align the center mark from this position.



2-1-7 OPERATION AFTER INSTALLATION

1.Connect the connector to each harness, etc.

2.Install the steering wheel subassembly.
Refer to Page G1-1.

3.Install the horn pad subassembly.
Refer to Page H1-7.

4.Confirm the steering wheel center position.

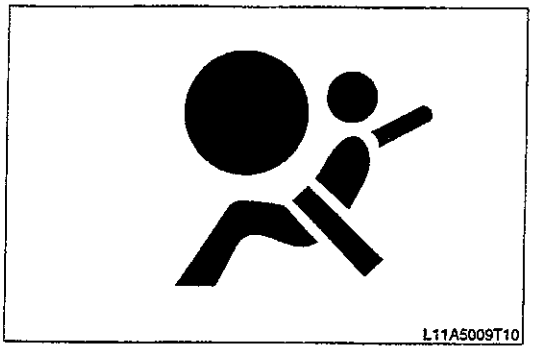
5.Place the carpet.

6.Install the foot rest.

7.Install the instrument panel finish lower panel.

8.Install the negative negative terminal of the battery.

9. Turn ON the IG SW. Ensure that the airbag warning lamp is illuminated for about six seconds and, then, it goes out.



TO INDEX

G2 POWER STEERING

HYDRAULIC POWER STEERING ---------- G2 - 1
POWER STEERING SYSTEM ---------- G2 - 1
INSTRUCTIONS FOR SERVICE OPERATION---------- G2 - 1
ARTICLES TO BE PREPARED---------- G2 - 1
BASIC CHECK AND ADJUSTMENT--- G2 - 1
FUNCTION CHECK ---------- G2 - 3
POWER STEERING FLUID---------- G2 - 6
REPLACEMENT---------- G2 - 6
STEERING GEAR ---------- G2 - 9
REMOVAL AND INSTALLATION-------- G2 - 9
DISASSEMBLING AND ASSEMBLING---------- G2 - 16
VANE PUMP---------- G2 - 36
REMOVAL AND INSTALLATION ------ G2 - 36

HYDRAULIC POWER STEERING

1 POWER STEERING SYSTEM

1-1 INSTRUCTIONS FOR SERVICE OPERATION

WARNING

- The following operations will affect the SRS airbag. Hence, prior to the operation, be sure to confirm the instructions for the SRS airbag in order to perform reliable operations.

Refer to Page H1-1.

1-2 ARTICLES TO BE PREPARED

Instrument

Power steering pressure gauge set,Belt tension gauge,Remote Cable,Temperature gauge,Tachometer,Torque wrench

1-3 BASIC CHECK AND ADJUSTMENT

1-3-1 STEERING WHEEL

(1) FREE PLAY CHECK

1.Set the tires to a straight-ahead state.
2.Start the engine and keep the engine idling.
3.Lightly turn the steering wheel by hand to the right and left. At this time, measure the free play (amount of movement before the tires start moving) on the outer periphery of the steering wheel.
SPECIFIED VALUE: 0 - 10 mm

(2) CHECK OF EXCESSIVE PLAY

1.Move the steering wheel in up-and-down, right-and-left and fore-and-aft directions by holding it by hand. At this time, check that no excessive play is present.

1-3-2 V BELT

(1) CHECK BY THE USE OF A TENSIOMETER

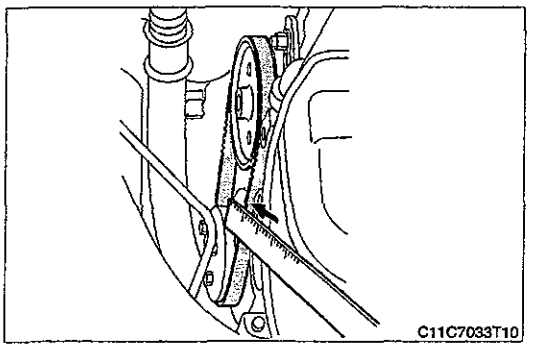
Use a tensiometer to inspect if the belt tension meets the specification.
SPECIFIED VALUE:

When installing new part [N{kgf}]	392.0±98.0 {40±9}
During a check (when used for 2min or longer) [N{kgf}]	269.5±122.5 {27±12}

(2) INSPECT BY DEFLECTION

Check if the deflection is acceptable when the central part of the belt between pulleys is presses by force of approx. 98N{10kgf}.
SPECIFIED VALUE:

When installing new part [mm]	5.5- 7.5
During a check (when used for 2min or longer) [mm]	6.4- 9.5



(3) ADJUSTMENT

1.Loosen the vane pump Ay attaching nut and bolt.
2.Temporarily tighten the nut and bolt with the vane pump bracket pressed and the V-belt tightened.
3.Check the V-belt for tension or deflection. If acceptable, fully tighten the nut and bolt for the vane pump Ay.
TIGHTENING TORQUE: Upper nut: 15.7±2.9N·m{160±29kgf·cm}
Lower bolt: 21.0±4.2N·m{214±42kgf·cm}

1-3-3 POWER STEERING FLUID

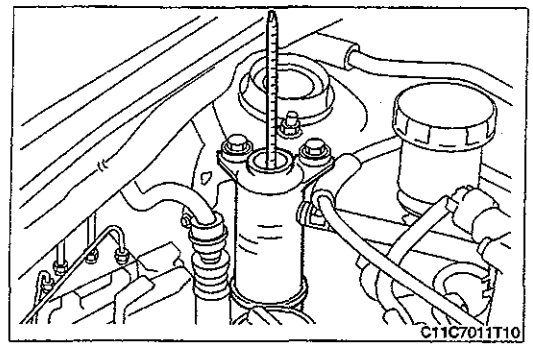
(1) LEVEL CHECK

1.Keep the vehicle in a horizontal position and start the engine.

2.Raise the fluid temperature.

(1) Give the steering wheel a few turns lock to lock with the engine running at 1000 rpm or lower and raise fluid temperature.

SPECIFIED VALUE: 40−80°C(reserve tank area)



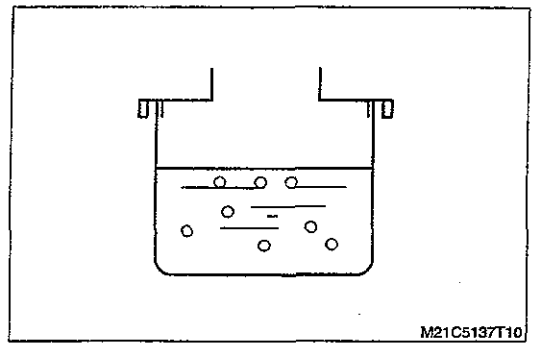
3.Ensure that there is no white turbidity or foaming.

CAUTION

- If the fluid temperature is low during the fluid level check, residual foam will be created, misleading the outcome. It is important to turn the steering wheel with the tires in stationary state so that the check is conducted at 40−80°C.

NOTE

- White turbidity or foaming indicates that air is mixed in the power steering system or fluid level is low.



4.Check the fluid level on the reserve tank.

(1) Measure the fluid level difference between engine start and engine stop.

CAUTION

- If the fluid temperature is low during the fluid level check, residual foam will be created, misleading the outcome. It is important to turn the steering wheel with the tires in stationary state so that the check is conducted at 40−80°C.

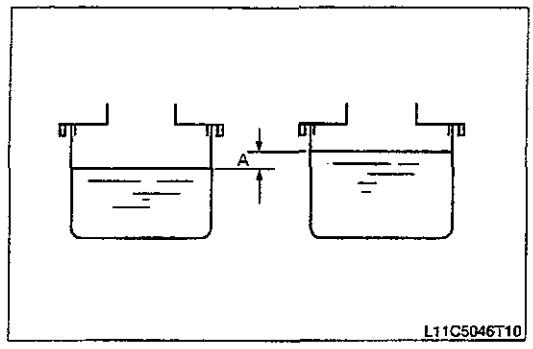
SPECIFIED VALUE: A:5mm or less

(2) Measure the fluid level change caused by steering operation.

CAUTION

- If the fluid temperature is low during the fluid level check, residual foam will be created, misleading the outcome. It is important to turn the steering wheel with the tires in stationary state so that the check is conducted at 40−80°C.

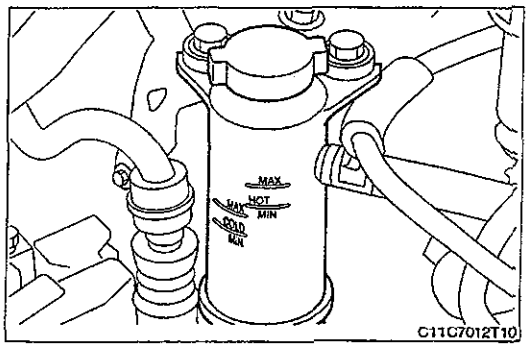
SPECIFIED VALUE: A:5mm or less



(3) Ensure that fluid level is within the limits (max.−min.) at engine stop condition.

NOTE

- When fluid temperature is high (80°C), check within range of the HOT level. When fluid temperature is low (20°C), check within the range of the COLD level.



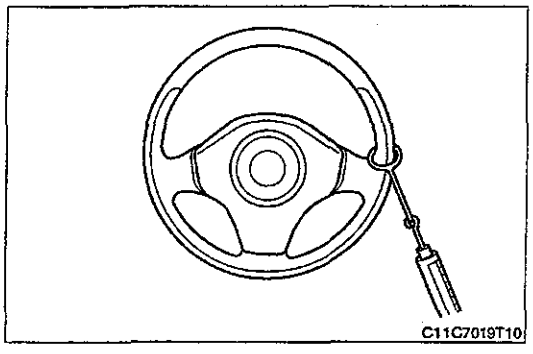
(2) LEAKAGE CHECK

1.Inspect the following positions for fluid leak.
(1) Vane pump
(2) Reserve tank main unit
(3) Piping of the oil hose, oil tube, etc.
(4) Each pipe connection
2.Replace if fluid leaks.

1-4 FUNCTION CHECK

1-4-1 Check of the turning force required to turn the steering wheel with the tires in stationary state

1.Park the vehicle on a flat concrete road and set the tires to the straight ahead condition.
2.Start the engine and keep the engine idling.
3.Install a spring scale to the steering wheel.
4.Give the steering wheel one right turn from the straight ahead position. At this position, place the spring scale in the tangent to the periphery and measure the turning force as the tires begin to move.
5.Likewise, give the steering wheel one left turn from the straight ahead position and perform the same measurements.
SPECIFIED VALUE: 30N{3.1kgf} or less



1-4-2 Hydraulic pressure check

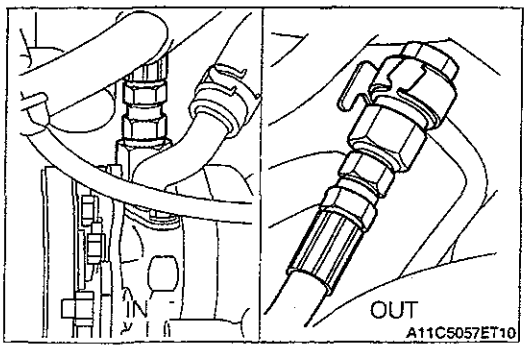
(1) PRESSURE GAUGE INSTALLATION

1.Remove the pressure feed hose (pressure side) from the vane pump.
2.Install the pressure gauge IN side to the vane pump union.

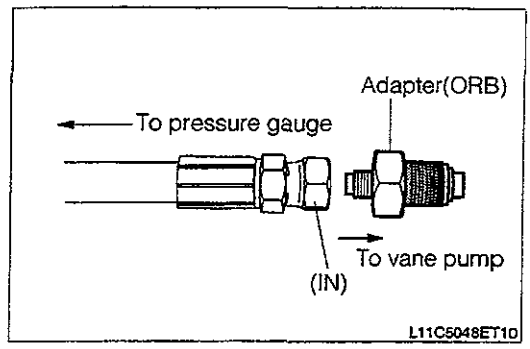
CAUTION

- Install the pressure gauge valve in the full open state.

3.Install the pressure gauge OUT side hose to the pressure feed hose (pressure side).



CAUTION
- Install the pressure gauge valve in the full open state.
- Install the adapter (ORB) to connect the pressure gauge IN side (hose) and the vane pump (union) with the seal tape applied to the screw area.

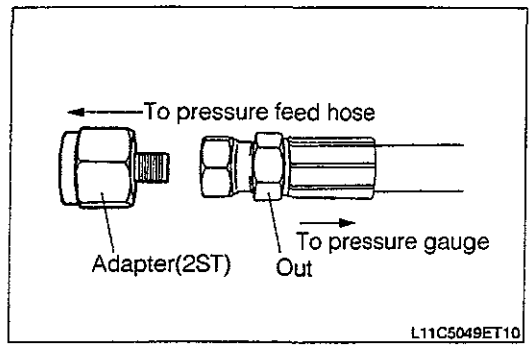


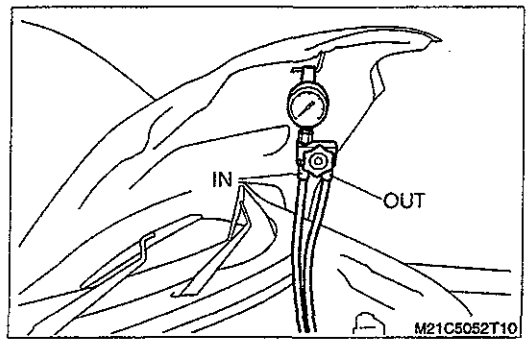
CAUTION
- Install the adapter (2ST) to connect the pressure gauge OUT side (hose) and the pressure feed hose (IN side).

4.Perform air bleeding.
Refer to Page G2-6.

5.Check the fluid level.
Refer to Page G2-2.

6.Start the engine.





(2) CHECK OF HYDRAULIC PRESSURE GENERATED IN THE VANE PUMP

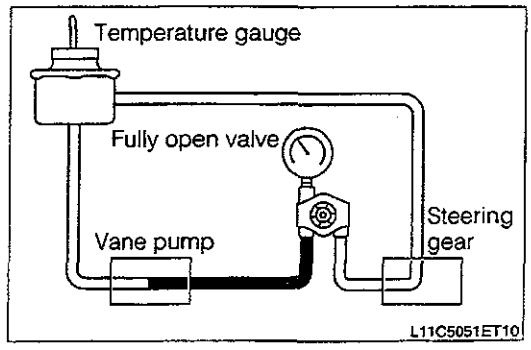
1.Insert the oil temperature gauge into the reserve tank to measure the oil temperature.
SPECIFIED VALUE: 55°C

2.Close the pressure gauge valve at idle speed and measure the hydraulic pressure generated in the vane pump.

CAUTION
- If the valve is closed at length during measurements, oil temperature will excessively go up, affecting the vane pump. Therefore do not close the valve exceeding 10 sec.

SPECIFIED VALUE: 5.4−5.9MPa{55−60 kgf/cm^2}

3.If the hydraulic pressure is low, the vane pump shall be replaced.



(3) CHECK OF PRESSURE DIFFERENCE UNDER NO LOAD

1.Fully open the pressure gauge valve.

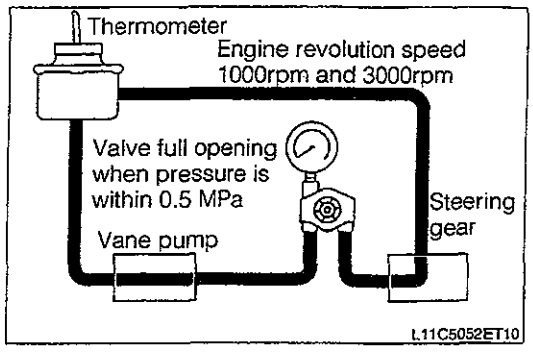
2.Measure hydraulic pressure at the engine speeds of 1000 rpm and 3000 rpm to see the difference.

CAUTION

- Do not operate the steering wheel.

SPECIFIED VALUE: Max. 0.5 MPa{5kgf/cm^2}

3.Replace the vane pump if the specified value is not satisfied.



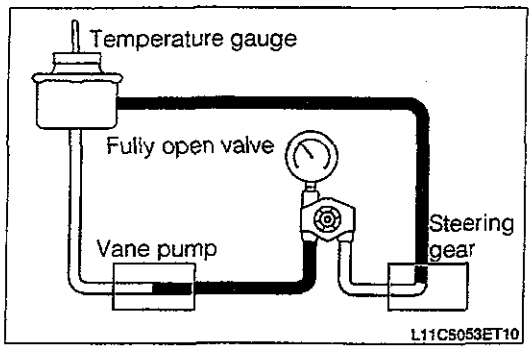
(4) CHECK THE HYDRAULIC PRESSURE GENERATED IN THE STEERING GEAR AY

1.Wide open the pressure gauge valve at idle speed.

2.Measure the hydraulic pressure generated when the steering wheel is turned all the way to either right or left.

SPECIFIED VALUE: 5.4−5.9MPa{55−60 kgf/cm^2}

3.Low hydraulic pressure indicates fluid leak within the steering gear, in this case overhaul is required.



1-4-3 CHECK THE IDLE SPEED CONTROL UNIT

(1) CHECK ENGINE REVOLUTIONS

Ensure that no notable drop in idle speed nor rough revolutions are found, when the steering wheel is turned all the way from the straight ahead position with the vehicle stopped.

SPECIFIED VALUE: 700−850 rpm (at idle)

(2) PRESSURE SWITCH CHECK

1.Disconnect the vane pump pressure switch from the harness connector of the vehicle.

CAUTION

- Do not remove the pressure switch from the vane pump.

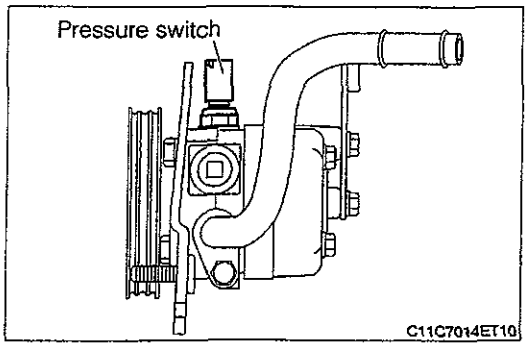
2.Check continuity between the pressure switch terminal and the body earth while the engine running.

(1) When the steering wheel is at the straight ahead position

SPECIFIED VALUE: At idle speed, no continuity shall exist between the pressure switch terminal to the body earth

(2) When the steering wheel is turned all the way to the right or left.

SPECIFIED VALUE: At idle speed, continuity should exist between the pressure switch terminal to the body earth.



2 POWER STEERING FLUID

2-1 REPLACEMENT

2-1-1 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

Power steering fluid

2-1-2 REPLACING PROCEDURE

(1) REMOVAL

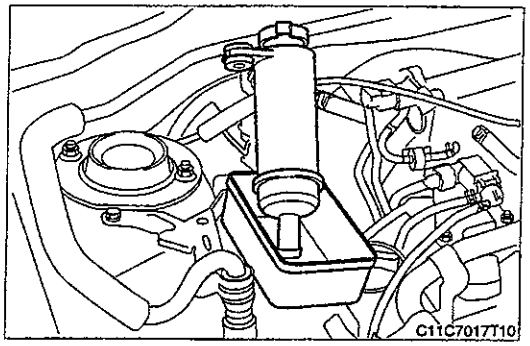
1.Remove the reserve tank from the reservoir bracket and drain the fluid from the reserve tank.

2.Remove the oil reservoir to pump hose (the suction hose between the reserve tank and the vane pump) from the reserve tank side and receive the fluid in a container such as a tray.

CAUTION

- **Do not crank longer than is required.**
- **Do not spatter fluid on the engine compartment.**

3.Start the engine.

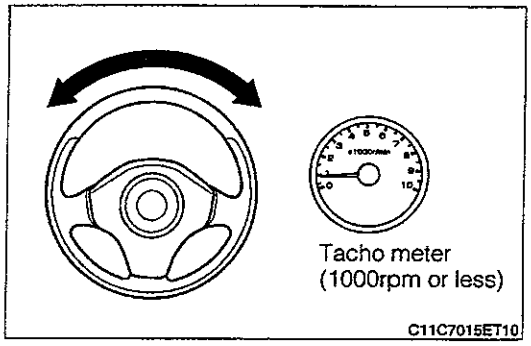


4.Slowly turn the steering wheel lock to lock with the engine running at 1000 rpm or lower and drain the fluid.

CAUTION

- **Do not raise the engine revolution speed.**

5.stop the engine.

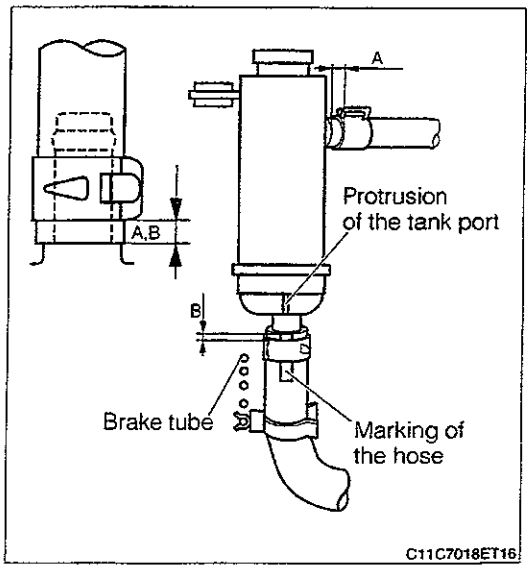


6.Install the oil reservoir to pump hose (the suction hose between the reservoir tank and the vane pump) as shown in the figure on the right and receive the fluid in a container such as a tray.

(1) Match the marking of the oil reservoir to pump hose (suction hose) with a protrusion of the tank port of the lower reserve tank and securely insert the hose up to the stopper surface.

(2) The clip shall be installed upward of the vehicle and the distance B shall be 4±1mm.

(3) Install the oil reservoir to pump hose (suction hose) clamp to the brake tube.

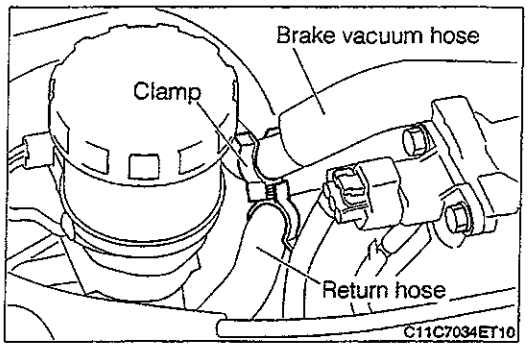


7.Check if the clip of the return hose (between the steering gear and the reserve tank) is installed, facing upward of the vehicle and the distance A is 2±1mm.

8.Install the reserve tank to the reservoir bracket.

TIGHTENING TORQUE: 12.3±2.4N·m{125±24kgf·cm}

9.Install the clamp of the return hose to the brake vacuum hose.



(2) FILLING

1.Fill the power steering fluid to the reserve tank.

CAUTION

- During operation, fill the tank with fluid so that it will not be emptied.
- Use care not to generate foam when filling.

2.Crank for 1 to 2 sec. to feed fluid to the vane pump, and repeat this procedure a few times.

CAUTION

- Do not start the engine until fluid filling is complete.

3.Fill the fluid up to the max. level.

(3) AIR BLEEDING

1.Start the engine.

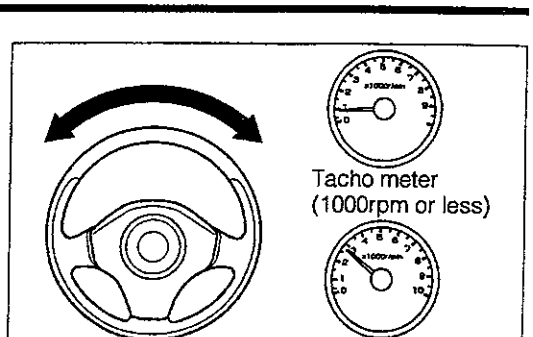
2.Give the steering wheel a turn from the lock to the lock (repeat this procedure a few times) with the engine running below idle speed and bleed.

CAUTION

- When turning the steering wheel lock to lock, keep the steering wheel at each lock for 2 to 3 sec and quickly turn the steering wheel.
- Do not raise the engine revolution speed.

NOTE

- If the fluid level changes by 5mm or more and the level will not drop to a lower value, the piping should be checked.
  If the piping is found normal, repeat the step 2 mentioned above.



3.When there is no change in the fluid level in the tank, hold for 5 to 6sec while turning the steering wheel to either right or left, with the tires in stationary state.

4.With the engine speed kept at between the idle speed and 3000 rpm and the vehicle stopped, turn the steering wheel. Ensure that there is no abnormal noise, white turbidity or foaming.

5.Perform the fluid level check.
Refer to Page G2-2.

6.Fill the fluid up to the max. level.

NOTE

- When one of the following cases is encountered after bleeding, check each piping component for leak and repeat the step 2.

Refer to Page G2-3.

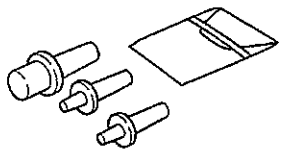
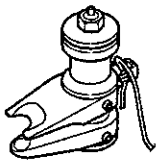
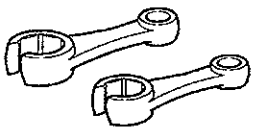
(1) Fluid becomes clouded when engine revolutions surge.
(2) Steering operation is not smooth and produces abnormal noise.
(3) There is 5mm or more fluid level difference between engine start and engine stop.
(4) Fluid level changes 5mm or more by steering operation .
(5) Abnormal noise is created while running.

3 STEERING GEAR

3-1 REMOVAL AND INSTALLATION

3-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09258-00030-000	Plug set, hose
	09628-00011-000 (09611-87701-000)	Puller, tie-rod end
	09631-22020-000	wrench set, power steering hose nut

Instrument

Torque wrench

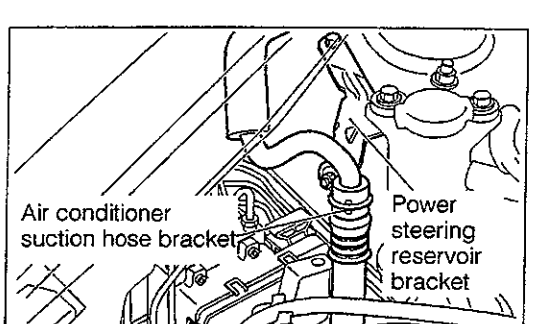
Lubricant,adhesive,others

Power steering fluid

3-1-2 OPERATION BEFORE REMOVAL

1.Remove the engine upper cover.

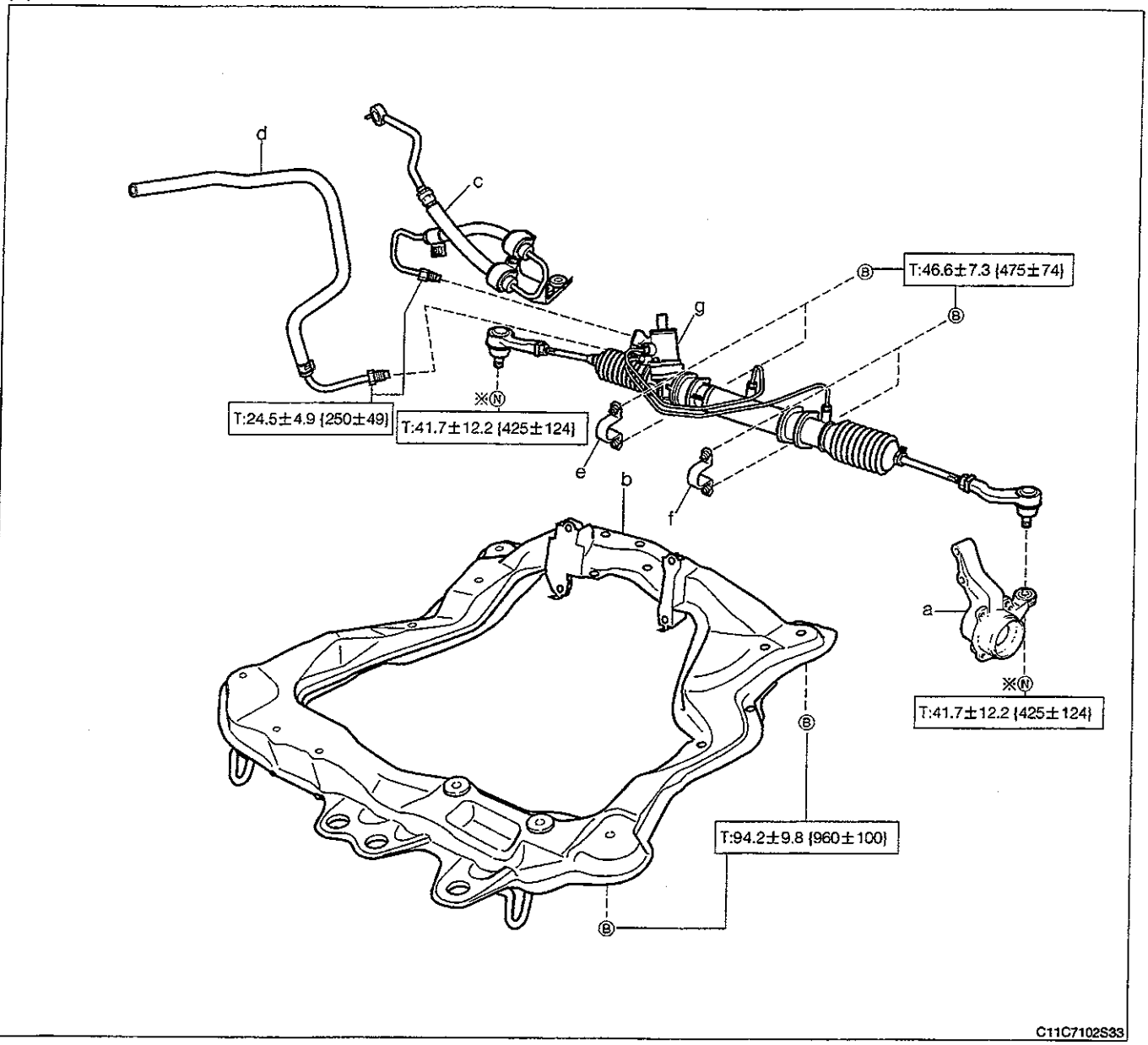
2.Remove the A/C suction hose from the power steering reservoir bracket.
3.Remove the power steering reserve tank from the reservoir bracket.
4.Drain the power steering fluid.
Refer to Page G2-6.



5.Plug the oil reservoir to pump hose, which has been removed using the SST.
SST: 09258-00030-000
6.Remove the foot rest.
7.Turn over the carpet near the steering column hole.
8.Remove the dust cover retainer.
9.Remove the steering shaft dust cover.
10.Separate the universal joint at the steering gear side of the steering column assembly.
11.Push out the steering column hole shield to the vehicle outside under a condition where it is attached to the steering gear assembly.
12.Lift up the vehicle.
13.Remove the front wheels. (RH, LH)
14.Remove the front floor center brace S/A.
15.Disconnect the connector of the rear O_2 sensor.
16.Remove the two bolts that secure the exhaust pipe and the maniverter.
17.Separate the shift & select shaft and extension rod from the transmission.
Refer to Page F2-8.

3-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※: Non - reusable parts
Unit:N·m{kgf·cm}

(2) REMOVAL PROCEDURES

▼ 1 a Knuckle, steering, RH/LH
▼ 2 b Frame Ay
▼ 3 c Hose, pressure feed
▼ 4 d Hose, Return
▼ 5 e Bracket, steering rack housing, RH
▼ 6 f Bracket, steering rack housing, LH
▼ 7 g Gear assembly, power steering

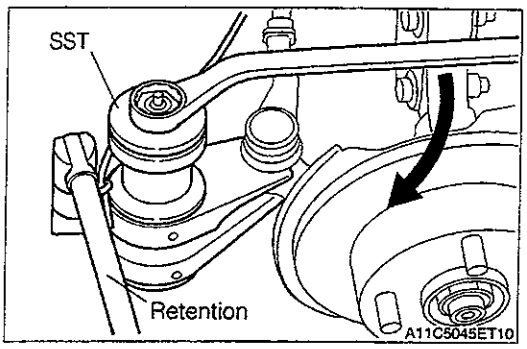
(3) INSTALLATION PROCEDURES

▲ 1 g Gear assembly, power steering
▲ 2 f Bracket, steering rack housing, LH
▲ 3 e Bracket, steering rack housing, RH
▲ 4 g Gear assembly, power steering
▲ 5 d Hose, Return
▲ 6 c Hose, pressure feed
▲ 7 b Frame Ay
▲ 8 a Knuckle, steering, RH/LH

3-1-4 POINTS OF REMOVAL

(1) KNUCKLE, STEERING, RH/LH

Separate the steering knuckles RH and LH from the ball joint section of the tie-rod end, using the SST.



CAUTION

- When setting the SST, attach a dummy nut to the threaded portion of the tie-rod end so that the threaded portion may not be damaged.
- Hang the SST using a cord.

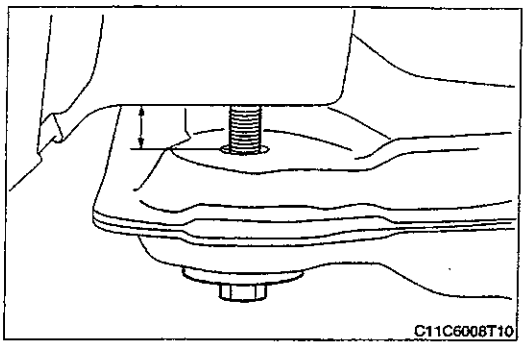
SST: 09628-00011-000

(2) FRAME AY

Loosen the frame Ay mounting bolt little by little to lower the front by approx. 15mm and to lower the rear by approx. 25 mm.

CAUTION

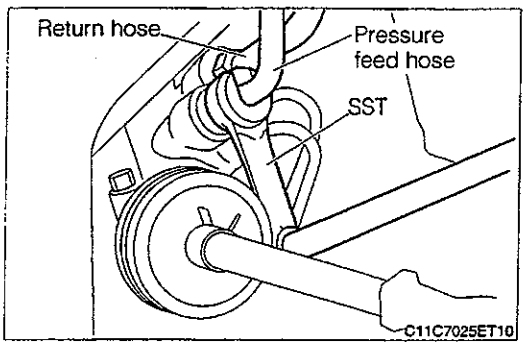
- Do not lower the frame Ay more than 25mm to avoid a fall.



(3) PRESSURE FEED HOSE

Use the SST to remove the pressure feed hose from the power steering gear Ay.

SST: 09631-22020-000



(4) RETURN HOSE

Use the SST to remove the return hose from the power steering gear Ay.

SST: 09631-22020-000

(5) STEERING RACK HOUSING BRACKET RH/LH

Remove the steering rack housing bracket RH and LH.

(6) POWER STEERING GEAR AY

Turn the power steering gear Ay approx. 45° to rearward of the vehicle and take it out into the right side of the vehicle.

CAUTION

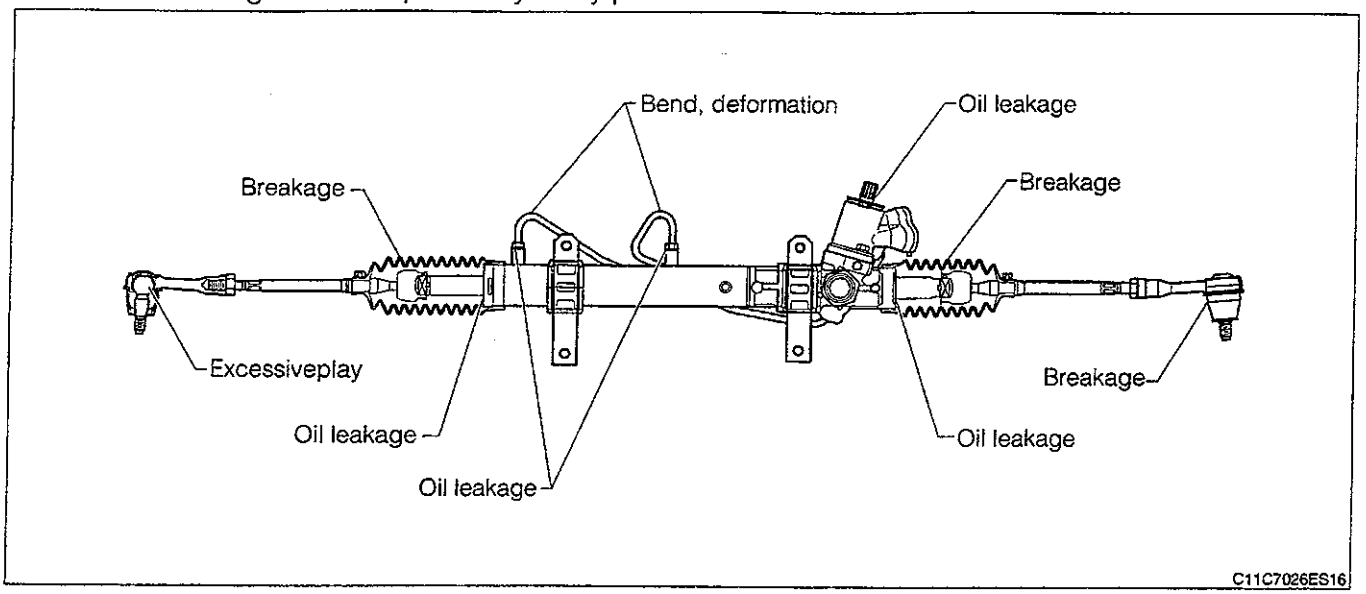
- Use care not to damage the pressure tube.

NOTE

- When pulling out the power steering gear Ay, turn it back and forth in order to fend off the turn pressure tube.

3-1-5 INSPECTION

Check the following items. Replace any faulty part.



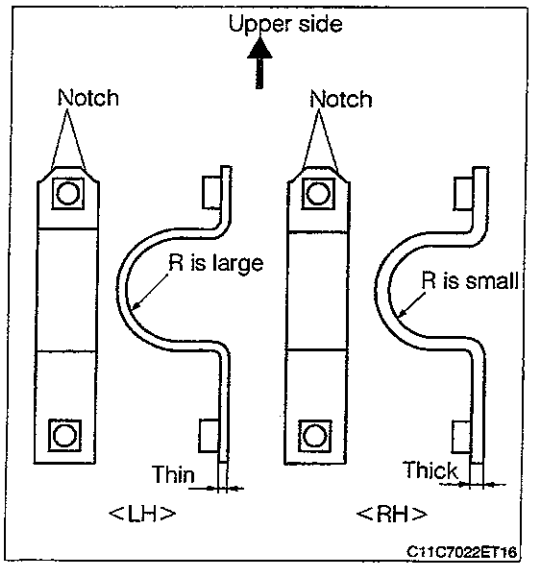
3-1-6 POINTS OF INSTALLATION

(1) POWER STEERING GEAR AY

Install the power steering gear Ay from the right side of the vehicle to the center of the vehicle.

(2) STEERING RACK HOUSING BRACKET RH/LH

Install the steering rack housing bracket RH and LH to the power steering gear Ay.

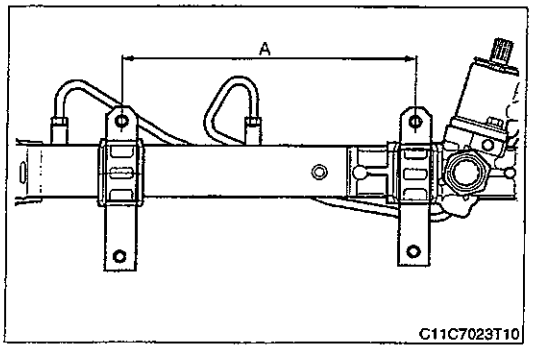


CAUTION

- Ensure that up-and-down and RH/LH orientation of the bracket is correct. The bracket RH has larger thickness and smaller bend radius, while LH has smaller thickness and larger bend radius. Install each bracket with the notch faced upward of the vehicle.

NOTE

- If you are not sure where to install the LH bracket, use the mounting hole on the RH bracket as reference and install the LH bracket in such a way that the distance A in the figure on the right becomes 250±1mm.



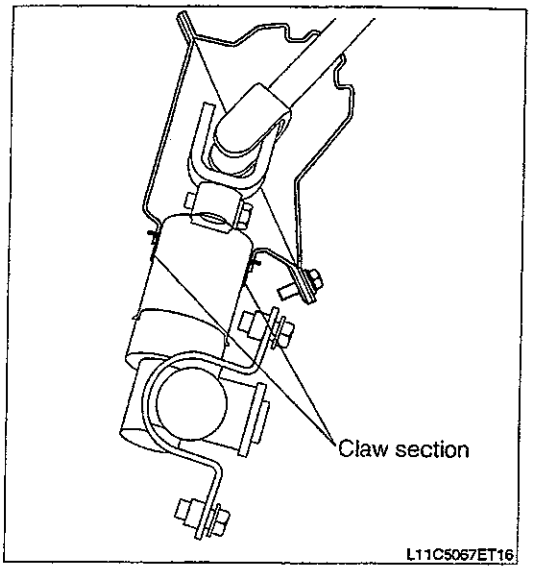
(3) POWER STEERING GEAR AY

1.Install the power steering gear Ay to the frame Ay.

2.Install the steering column hole shield to the power steering gear assembly.

CAUTION

- Make sure that the cutout section of the steering column hole shield is securely installed to the pawl section of the power steering gear assembly.



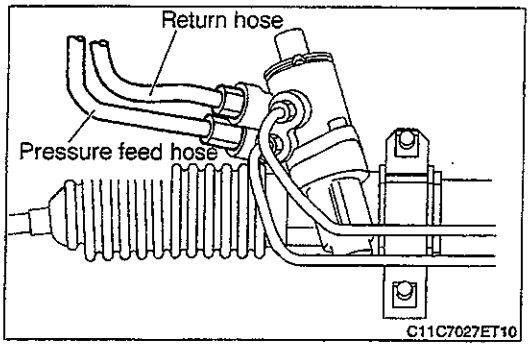
(4) RETURN HOSE

Use the SST to install the return hose to the power steering gear Ay.

CAUTION

- Ensure that the hose is installed in place.
- Installation shall be performed in proper orientation free from interference with hoses.

SST: 09633-00020-000



(5) PRESSURE FEED HOSE

Use the SST to install the pressure feed hose to the power steering gear Ay.

CAUTION

- Ensure that the hose is installed in place.
- Shall be installed in proper orientation free from interference with hoses.

SST: 09633-00020-000

(6) FRAME AY

Install the frame Ay to the body. During this installation, push the steering column shield into the column hole.

(7) KNUCKLE, STEERING, RH/LH

Install the ball joint of the tie rod end to the steering knuckle RH and LH.

3-1-7 OPERATION AFTER INSTALLATION

1.Install the shift & select shaft and extension rod to the transmission.
Refer to Page F2-8.

2.Install the exhaust pipe.
Refer to Page B4-2.

3.Connect the connector of the rear O_2 sensor.
4.Install the front floor center brace S/A.
Refer to Page I1-32.

5.Install the front wheels. (RH, LH)
TIGHTENING TORQUE: 103.0±14.7N·m{1050±150kgf·cm}

6.Lift down the vehicle.
7.Install the universal joint at the steering gear side of the steering column assembly.
Refer to Page G1-4.

8.Install the steering shaft dust cover.
9.Install the dust cover retainer.
TIGHTENING TORQUE: 5.4±1.5N·m{55±15kgf·cm}

10.Place the carpet near the steering column hole.
11.Install the foot rest.
12.Install the power steering reserve tank to the power steering reservoir bracket.
13.Install the A/C suction hose to the power steering reservoir bracket.
14.Bleed after filling the power steering fluid.
Refer to Page G2-6.

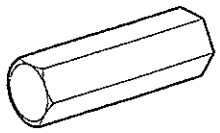
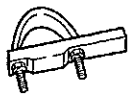
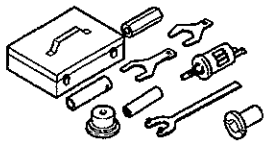
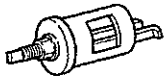
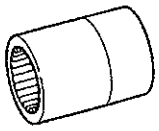
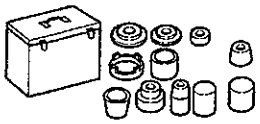
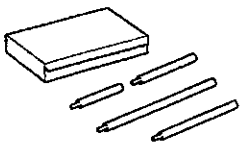
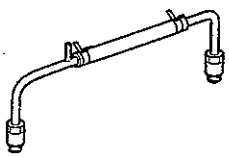
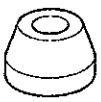
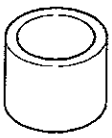
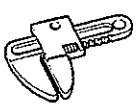
15.Check the proper operation of the power steering gear Ay.
16.Install the engine upper cover S/A.
TIGHTENING TORQUE: 8.0±1.6N·m{80±16kgf·cm}

17.Check and adjust the front wheel alignment.
Refer to Page C1-1.

3-2 DISASSEMBLING AND ASSEMBLING

3-2-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09043-30190-000	Wrench, hexagon
	09612-00012-000 (09612-00011-000)	stand, rack & pinion steering rack housing
	09612-87180-000	Tool set, steering gear housing overhaul
	09613-87701-000	Puller, steering rack shaft bush
	09616-87702-000	Socket, steering pinion bearing adjusting
	09630-24014-000 (09630-24013-000)	Tool set, steering rack oil seal
	09950-70010-000	Set, handle
	09951-07200-000 (09631-00020-000)	Handle
	09631-12071-000 (09631-12070-000)	Tool, steering rack oil seal test
	09631-20070-000	guide, seal ring
	09631-20081-000 (09631-20080-000)	Tool, seal ring
	09922-10010-000	Wrench, steering rack end

Tool

Cutter knife,Wire brush

Instrument

MityVac,V-shaped blocks,Dial gauge,Torque wrench,Micrometer

Lubricant,adhesive,others

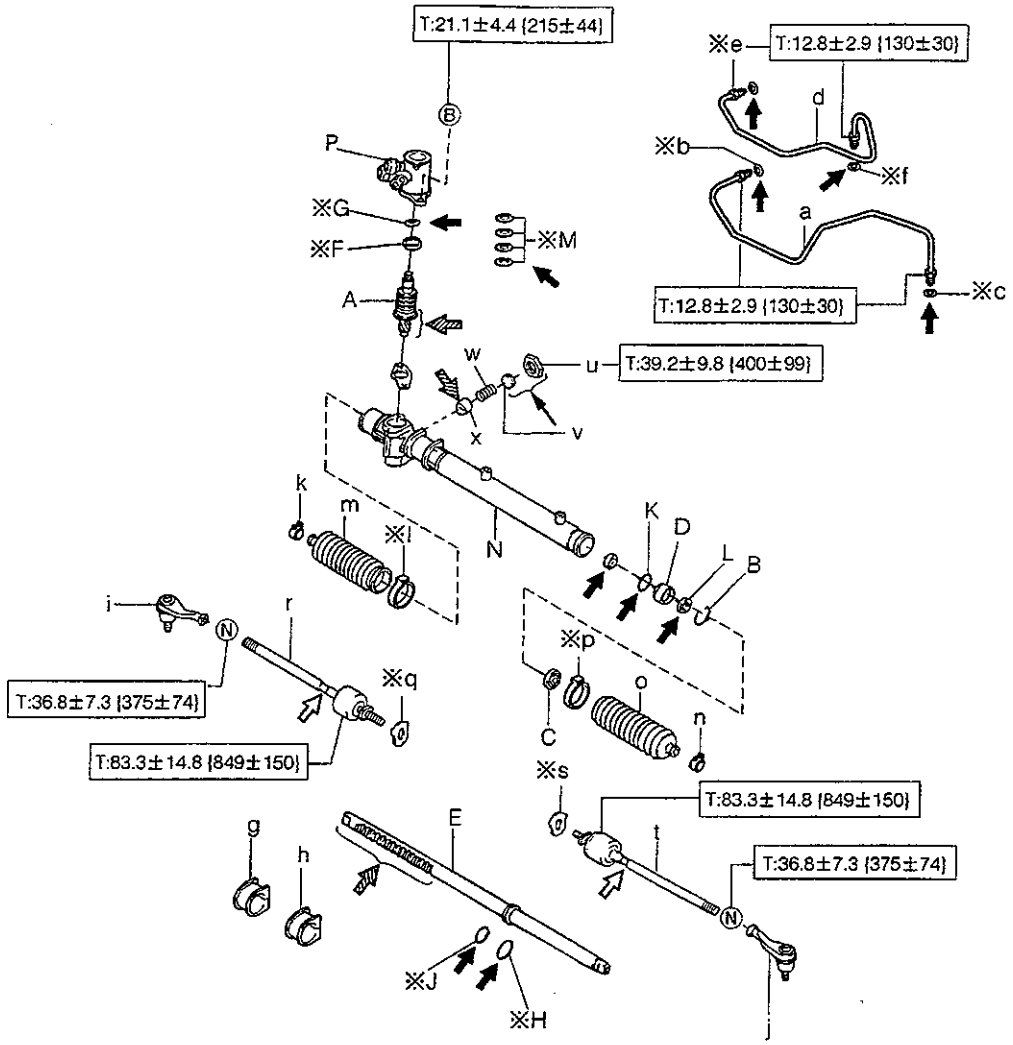
Power steering fluid,Molybdenum disulphide lithium base grease,Silicon grease,Three Bond1104,Dryer,,Wire,Protective tape

3-2-2 OPERATION BEFORE DISASSEMBLY

Remove the power steering gear Ay.

Refer to Page G2-9.

3-2-3 DISASSEMBLY AND ASSEMBLY PROCEDURES
(1) COMPONENTS



※:Non-reusable parts
Unit:N·m{kgf·cm}
➡:Power steering fluid
➡:Molybdenum disulphide lithium base grease
⇨:Silicone grease
→:Three Bond1104

(2) Disassembly procedures

1 a Tube, LH turn pressure
2 b Ring, O
3 c Ring, O
4 d Tube, RH turn pressure
5 e Ring, O
6 f Ring, O
▼ 7 i End S/A, steering tie-rod end, RH
▼ 8 j End S/A, steering tie-rod end, LH
9 g Grommet, steering rack housing, RH
▼ 10 h Grommet, steering rack housing, LH
▼ 11 i End S/A, steering tie-rod end, RH
▼ 12 j End S/A, steering tie-rod end, LH
13 k Band, steering rack boot No.2
14 l Band, steering rack boot
▼ 15 m Boot, steering rack
16 n Band, steering rack boot No.2
17 p Band, steering rack boot
▼ 18 o Boot, steering rack
19 q Washer, claw
▼ 20 r Steering rack end S/A
21 s Washer, claw
▼ 22 t Steering rack end S/A
▼ 23 u Nut, lock
▼ 24 v Rack guide cap
25 w Spring, compression
26 x Rack guide
▼ 27 P Housing S/A, control valve
28 F Bearing, cylindrical roller
29 G Seal, type T oil
▼ 30 A Valve S/A, power steering control
31 M Ring, seal, No.1
32 B Ring, shaft snap
33 C Stopper, cylinder end
▼ 34 D Bush S/A, power steering rack
▼ 35 E Rack S/A, power steering
36 H Ring, seal, No.2
37 J Ring, O
38 K Ring, O
39 L Seal, type S oil
40 N Housing Ay, power steering rack

(3) Assembly procedures

1 N Housing Ay, power steering rack
▲ 2 L Seal, type S oil
▲ 3 K Ring, O
▲ 4 D Bush S/A, power steering rack
▲ 5 J Ring, O
▲ 6 H Ring, seal, No.2
▲ 7 E Rack S/A, power steering
▲ 8 C Stopper, cylinder end
▲ 9 B Ring, shaft snap
▲ 10 M Ring, seal, No.1
▲ 11 A Valve S/A, power steering control
▲ 12 G Seal, type T oil
▲ 13 F Bearing, cylindrical roller
▲ 14 P Housing S/A, control valve
▲ 15 x Rack guide
16 w Spring, compression
▲ 17 v Rack guide cap
▲ 18 u Nut, lock
▲ 19 s Washer, claw
▲ 20 t Steering rack end S/A
▲ 21 s Washer, claw
▲ 22 q Washer, claw
▲ 23 r End S/A, steering rack
▲ 24 q Washer, claw
25 p Band, steering rack boot
▲ 26 o Boot, steering rack
27 p Band, steering rack boot
28 n Band, steering rack boot No.2
29 l Band, steering rack boot
▲ 30 m Steering rack boots
31 l Band, steering rack boot
32 k Steering rack boot band No.2
▲ 33 j End S/A, steering tie-rod end, LH
▲ 34 i End S/A, steering tie-rod end, RH
▲ 35 h Grommet, steering rack housing, LH
36 g Grommet, steering rack housing, RH
37 f Ring, O
38 e Ring, O
39 d Tube, RH turn pressure
40 c Ring, O
41 b Ring, O
42 a Tube, LH turn pressure

3-2-4 POINTS OF DISASSEMBLY

CAUTION

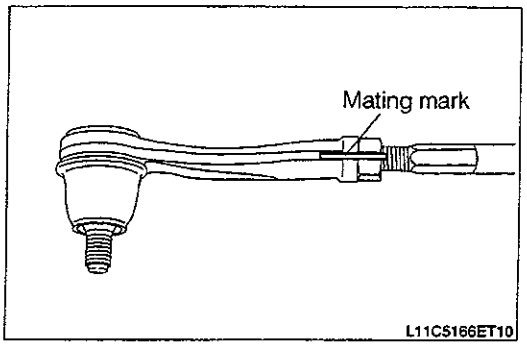
- The hydraulic power steering gear is a precision hydraulic instrument. Use care not to contaminate the environment by dirt, dust, iron powder or debris and work with your bare hands wherever possible.
- Keep all the components free from contamination. Wash your hands clean before starting work activities.
- All the disassembled seals shall be replaced with new ones. Do not clean plastic and rubber parts with thinner.
- Do not reassemble the defective parts, which were used before replacement.

(1) STEERING TIE-ROD END S/A RH/LH

Put mating marks on the steering tie-rod end subassemblies RH and LH as well as on the steering rack end subassembly.

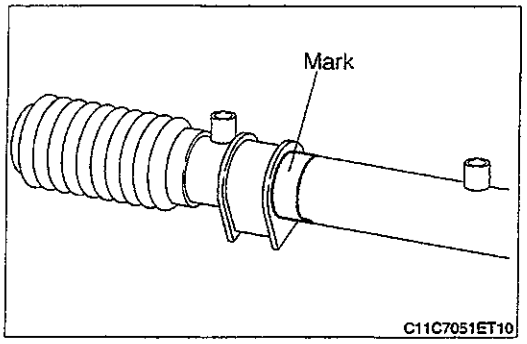
CAUTION

- When putting mating marks, ensure that the right and left sides can be discerned.



(2) STEERING RACK HOUSING GROMMET LH

Put a mating mark on the power steering rack housing assembly so that the installation position of the steering rack housing grommet LH can be discerned. Then, remove the steering rack housing grommet LH.



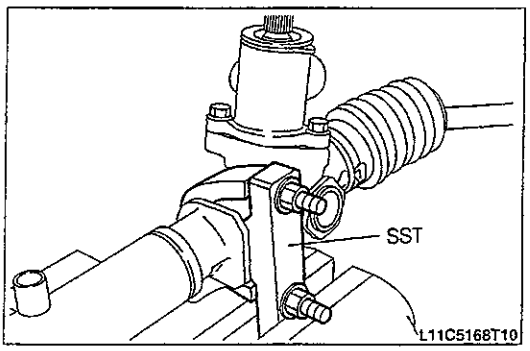
(3) STEERING TIE-ROD END S/A RH/LH

Secure the power steering gear in a vice by applying the SST to the steering rack housing section. Then, remove the steering tie-rod end subassemblies RH and LH.

CAUTION

- Do not secure the rack housing section of the power steering gear assembly directly in a vice.

SST: 09612-00012-000



(4) STEERING RACK BOOT

Remove the steering rack boot band No.2 and steering rack boot band. Then, remove the steering rack boots. (Both right and left sides)

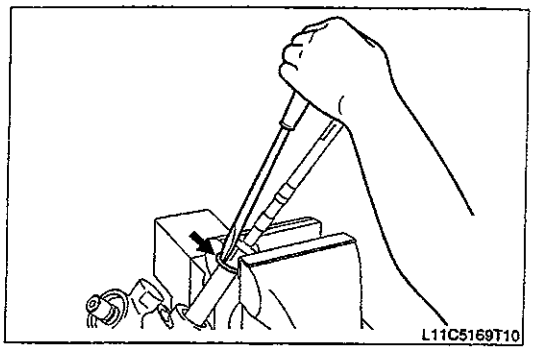
(5) STEERING RACK END S/A

① Claw Washer

Loosely fix the ball joint area of the steering rack end S/A on a vise and release caulking of the claw washers (both RH/LH) with a flat screwdriver.

CAUTION

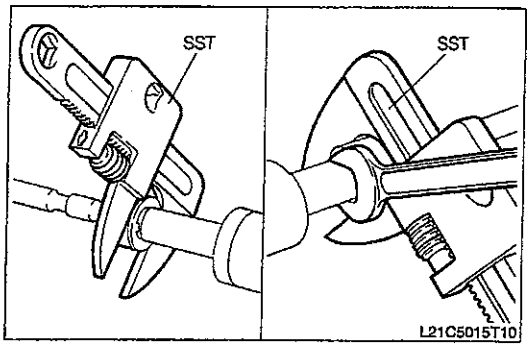
- Be very careful not to apply impacts to the power steering rack housing assembly.



② STEERING RACK END S/A

Remove the steering rack end subassembly, using the SST in combination with a spanner. (Both right and left sides)

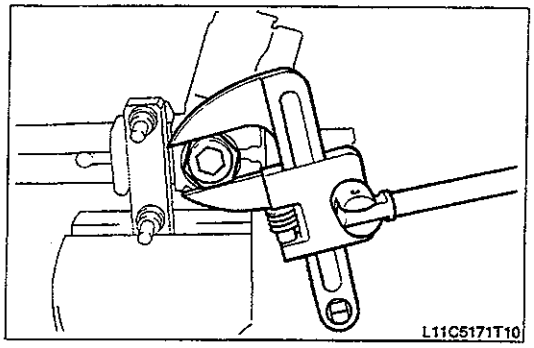
SST: 09922-10010-000



(6) LOCK NUT

Remove the lock nut, using the SST.

SST: 09922-10010-000



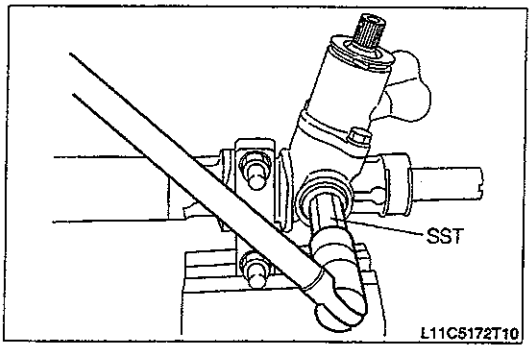
(7) RACK GUIDE SPRING CAP

Use the SST to remove the rack guide spring cap.

CAUTION

- After completion of the removal, completely wipe off any bond adhered to the threaded portion.

SST: 09043-30190-000

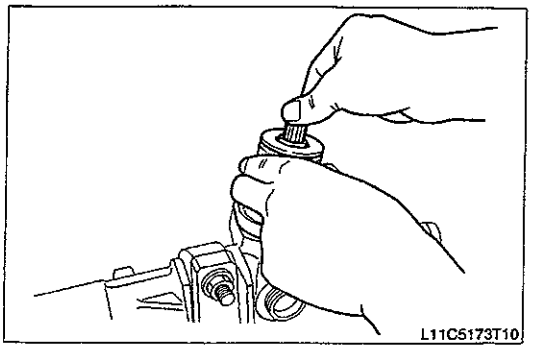


(8) POWER STEERING CONTROL VALVE AY

Remove the bolts (at two locations) which secure the control valve housing S/A and remove the control valve housing S/A, while holding the power steering control valve housing S/A.

CAUTION

- Pulling out only the control valve housing S/A might cause damage to the seal in the housing.

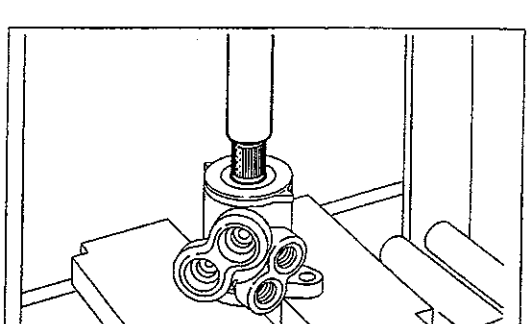


(9) CONTROL VALVE HOUSING

1.Place the mating surfaces of the control valve housing S/A on the hand press and lightly depress the tip of the power steering control valve S/A to push out the valve area.

CAUTION

- Depress the power steering control valve S/A straight down. Failure to do so might cause damage to the seal in the valve housing by the valve S/A spline area.

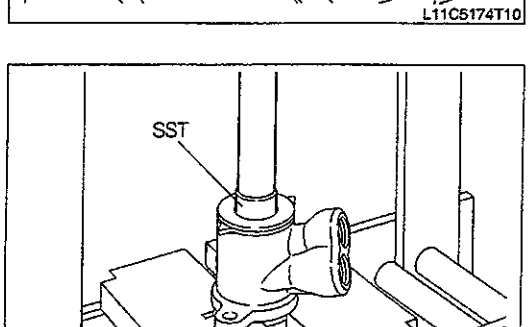


2.Use the SST to remove the cylindrical roller bearing together with the type T oil seal with a press.

CAUTION

- Do not reuse the disassembled bearing and the oil seal.

SST: 09630-24014-000[09620-24011-000]



(10) POWER STEERING CONTROL VALVE S/A

Use a cutter knife or the like to cut off the seal ring No.1 (4 pcs) one by one from the power steering control valve S/A.

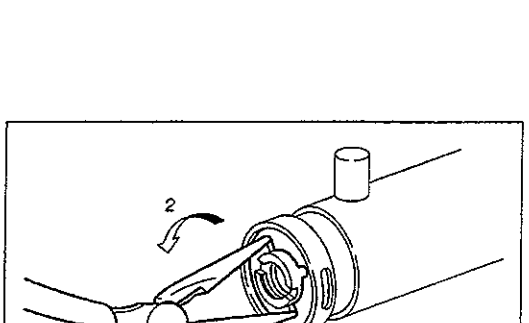
CAUTION

- When cutting the seal ring No.1, do not damage the ring groove and the side face.
- The disassembled seal ring shall not be reused.

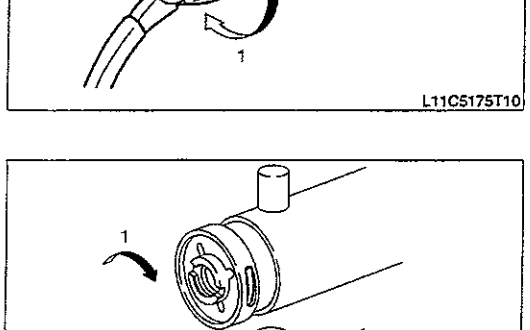
TOOL: Cutter knife

(11) PAWER STEERING RACK S/A

1.Turn the cylinder end stopper clockwise with a long-nose pliers to take out the end of the shaft snap ring from the power steering rack housing.



2.Turn the cylinder end stopper counterclockwise to remove the shaft snap ring from the cylinder end stopper.

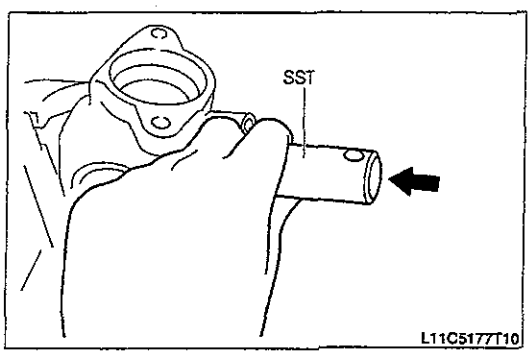


3.Using the SST, gently hammer the power steering rack S/A with a plastic hammer to remove the cylinder end stopper, power steering rack bush S/A and power steering rack S/A at a time.

CAUTION

- Use care not to damage each component when removed.
- Use wash oil to clean the disassembled power steering rack S/A and remove the residual grease in the tooth gullet.
- Care should be taken, as fluid in the cylinder might spatter.

SST: 09612-87180-000[09612-10061-000]



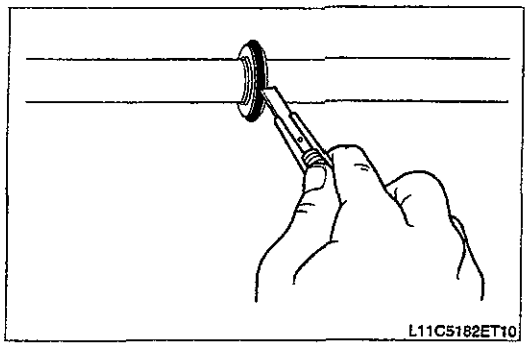
4.Use a cutter knife or the like to cut off the seal ring No.2 from the power steering rack S/A.

CAUTION

- When cutting the seal ring No.2, do not damage the ring groove and the side face.
- The disassembled seal ring shall not be reused.

TOOL: Cutter knife

5.Remove the O-ring with a baby screwdriver or the like.



(12) POWER STEERING RACK BUSH S/A

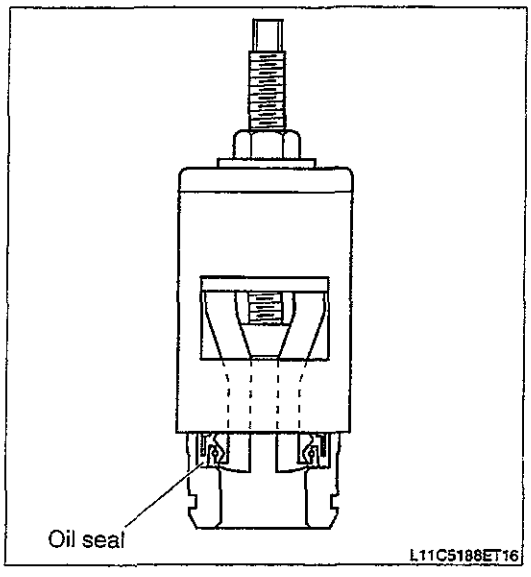
1.Remove the Oring.

2.Use the SST to remove the type-S oil seal inside the rack bush.

CAUTION

- Use care not to damage inside/outside of the rack bush when setting the SST or removing type S oil seal.

SST: 09613-87701-000



3-2-5 INSPECTION

(1) TURN PRESSURE TUBE RH/LH

Check the following parts. Replace any part exhibiting abnormality.

(1) Damage and spoilage to the turn pressure tube RH/LH.

(2) STEERING RACK HOUSING GROMMET RH/LH

Check the following parts. Replace any part exhibiting abnormality.

(1) Crack and damage to the steering rack housing grommet RH and LH.

(3) STEERING TIE-ROD END S/A RH/LH

Check the following parts. Replace any part exhibiting abnormality.

(1) Dust boot of steering tie-rod end subassemblies RH and LH for rupture, and ball joint section for non-smooth operation

(4) STEERING RACK BOOT

Check the following parts. Replace any part exhibiting abnormality.

(1) Steering rack boot for cracks, damage and aging

(5) STEERING RACK END S/A

Check the following parts. Replace any part exhibiting abnormality.

(1) Rack end ball for excessive play and non-smooth operation
(2) Rack end for foreign matter and grease for discoloration
(3) Tie-rod section of rack end for bending and cracks

(6) RACK GUIDE

Check the following parts. Replace any part exhibiting abnormality.

(1) Sliding surface seat of rack guide for abnormal wear

(7) CONTROL VALVE HOUSING S/A

Check the following parts. Replace any part exhibiting abnormality.

(1) Crack and deformation of the control valve housing.
(2) Damage and foreign material deposit on the seat surface of each control valve housing port.
(3) Operation of the bearing not smooth
(4) Damage or wear-out on oil seal lip area.

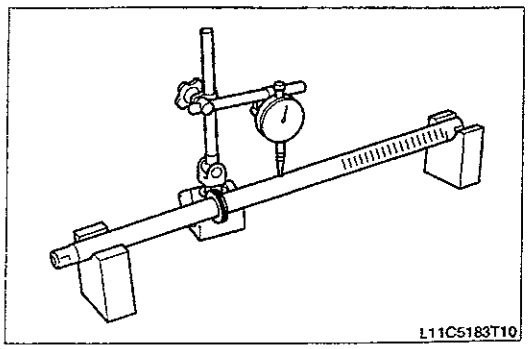
(8) POWER STEERING CONTROL VALVE S/A

Check the following parts. Replace any part exhibiting abnormality.

(1) Unusually worn, damaged or broken seal.
(2) Damage to the sleeve periphery.
(3) Damage, wear-out or foreign material deposit on the pinion oil seal.
(4) Excessive play and malfunction
(5) Deformation of the bearing caulking ring
(6) Crack and abnormal wear on the pinion teeth.
(7) Damage to the shaft area and serration area of the control valve shaft.

(9) POWER STEERING RACK S/A

1.Check wear and damage of the teeth.
2.Use a V-block and a dial gauge to check the rack for bent.
SPECIFIED VALUE: Deflection 0.15mm (midsection of the rack)
3.Check the piston for excessive play and damage to its periphery.
4.Check the seal for unusual ware.



(10) POWER STEERING RACK BUSH S/A

Check the following parts. Replace any part exhibiting abnormality.

(1) Damage and dent of the oil seal groove inside of the power steering rack bush.
(2) Damage and dent of the O-ring groove of the power steering rack bush periphery.
(3) Unusual wear of the inner diameter of the power steering rack bush.
(4) Damage or wear-out on oil seal lip area.
(5) Wear-out or foreign material deposit on O-ring.

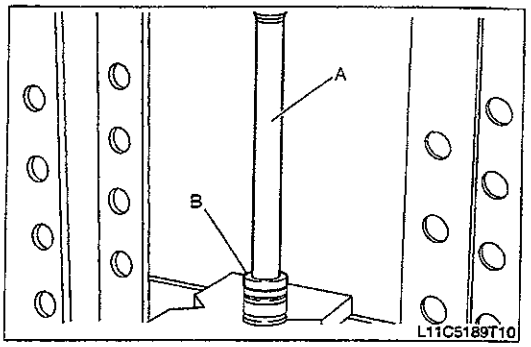
(11) POWER STEERING RACK HOUSING AY

Check the following parts. Replace any part exhibiting abnormality.

(1) Crack and damage to the power steering rack housing.
(2) Harmful scores in groove where large-diameter boot is assembled
(3) Damage to the screw in the mounting area of the control valve housing S/A.
(4) Damage to the bore of the cylinder and damage/deformation to the external of the cylinder.
(5) Damage and foreign material deposit on the seat surface of each port.
(6) Operation is not smooth for needle roller bearing inside of the power steering rack housing S/A (the power steering control valve S/A seat).

3-2-6 POINTS OF ASSEMBLY

(1) POWER STEERING RACK BUSH S/A



1.Apply power steering fluid all over the new type S oil seal. Use the SST to press fit into the power steering rack bush.

CAUTION

- Ensure that press fit orientation for the oil seal is correct.
- Use care not to damage the oil seal due to the excessive overload during press fitting.

SST: 09950-70010-000
09630-24014-000

LUBRICANT: Power steering fluid

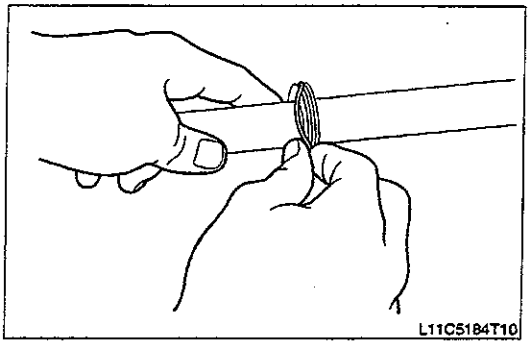
2.Apply power steering fluid all over the new O-ring and install it to the ring groove of the power steering rack bush.

CAUTION

- Use care not to twist or damage an O-ring.

LUBRICANT: Power steering fluid

(2) POWER STEERING RACK S/A

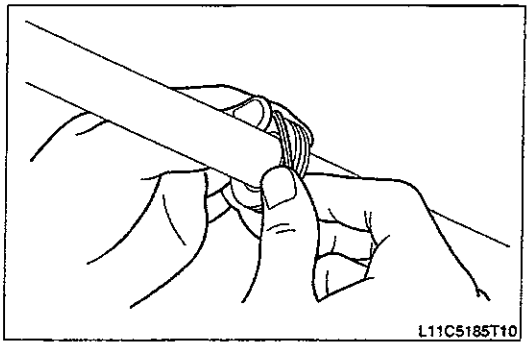


1.Apply power steering fluid all over the new O-ring. Finger the ring to enlarge and install it to the ring groove of the power steering rack bush.

CAUTION

- Use care not to twist or damage an O-ring.

LUBRICANT: Power steering fluid

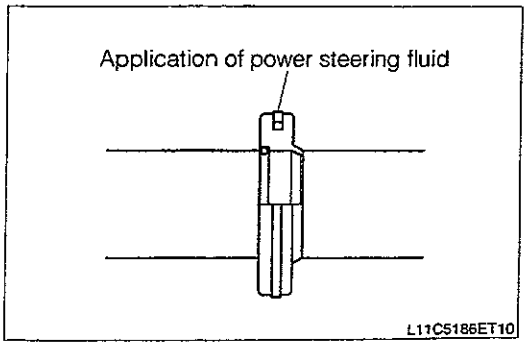


2.Apply power steering fluid all over the new seal ring No.2. Finger the ring to enlarge and install it to the ring groove of the power steering rack.

CAUTION

- Do not twist or damage the seal ring No.2.

LUBRICANT: Power steering fluid



3.After installation, reapply the power steering fluid to the ring groove.

LUBRICANT: Power steering fluid

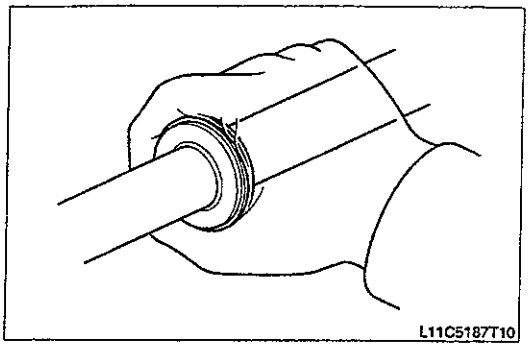
4.Manually contract the expanded seal ring No.2, while pressing and settling.

5.Apply long life grease to the gullet of the teeth of the power steering rack S/A and apply power steering fluid to the piston seal area.

CAUTION

- **Do not allow grease to clog the vent hole of the power steering rack.**

LUBRICANT: Power steering fluid
Molybdenum disulphide lithium base grease

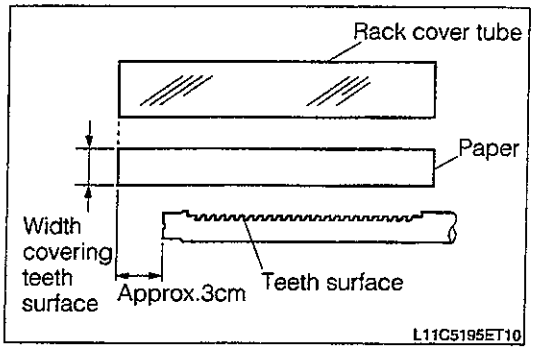


6.Cut the rack cover tube in such a way the tube covers the teeth and the port and is longer than the rack end by approx. 3cm.

7.Prepare some paper close to the thickness of newspaper, and cut it as wide as it covers the tooth surface and as long as the tube.

CAUTION

- **The rack cover tube is used to protect the oil seal inside of the power steering rack housing, so damage to the tube surface might cause oil leak. Therefore check the tube surface prior to contraction for burr, crack or damage before use.**

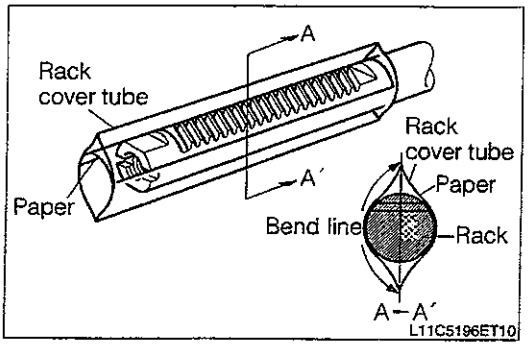


NOTE

- **Contracting action will create tooth form of the rack on the tube. Use paper to prevent the tooth form.**

8.Place paper so that it covers all over the teeth of the power steering rack S/A.

9.Insert the rack cover tube in the bending orientation shown in the figure as deep as it covers the port.



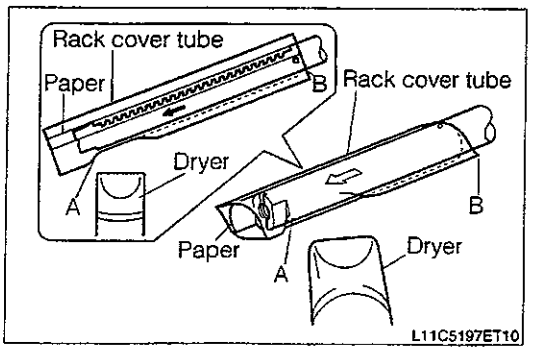
10.Use the backside of the teeth to crossly place the power steering rack S/A at a drier nozzle as shown in the figure. Move the power steering rack S/A so as to push out the air inside of the rack cover tube to side B, contracting the rack cover tube from point A to point B.

CAUTION

- **Always use the backside of the teeth, as the use of the tooth surface will create tooth form on the rack cover tube and makes it difficult to remove the tube.**

NOTE

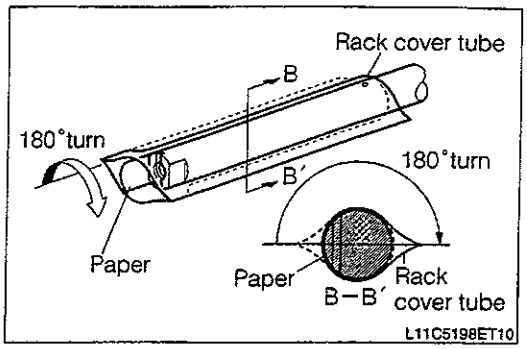
- **It is recommended to use a drier with a narrow nozzle, as the tube bend is to be contracted one side at a time.**



11.Turn the rack cover tube only by 180°.
12.Along with the operation above, use the backside of the teeth to contract the rack cover tube.
13.Pull out the paper.

CAUTION

- **If the paper is broken, pull out the rack cover tube and remove the paper. When installing the rack cover tube, securely insert the tube as deep as it covers the port.**

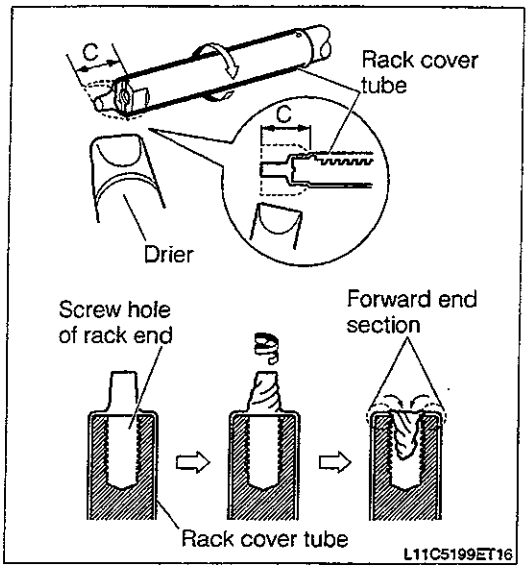


14.Heat only the end section of the power steering rack S/A, while turning it. Quickly twist the rack cover tube and push into the screw hole of the rack end.

CAUTION

- **Heat only the end of the teeth, as heating the tooth surface will create tooth form, thus making it difficult to remove the tube.**

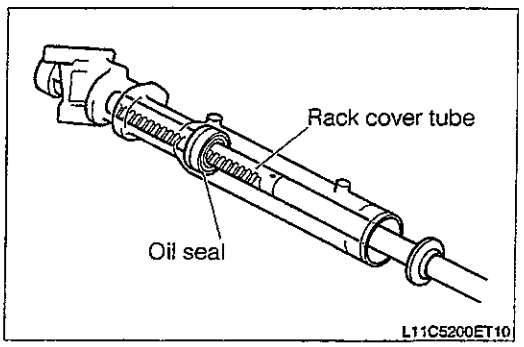
15.Ensure that the end has no protrusion or edge.
16.If the end has a protrusion or an edge, loosen the end again and press into the screw hole with a ball point pen or the like.
17.Ensure that the rack cover tube surface has no sharp groove.



18.Apply Ammix power steering fluid to the rack cover tube periphery, the O-ring and the seal ring No.2.
LUBRICANT: Power steering fluid
19.Install the power steering rack S/A with the rack cover tube to the power steering rack housing Ay.
20.Remove the rack cover tube.

CAUTION

- **Do not reuse the rack cover tube.**
- **When the rack cover tube is removed, it is important not to move the rack more than is necessary until the power steering control valve Ay is installed, as the rack over stroke and the port might damage the teeth and the oil seal, respectively.**



21.Apply power steering fluid all over the O-ring of the power steering bush S/A and then insert the power steering bush S/A to the power steering rack S/A in order to assemble it to the inside of the power steering rack S/A.

CAUTION

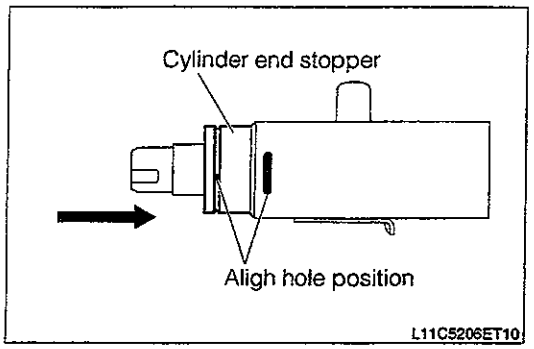
- **Ensure that the assembly orientation of the power steering bush S/A is correct.**

LUBRICANT: Power steering fluid

22.Insert the cylinder end stopper to the power steering rack S/A and assemble to the power steering rack housing Ay.

CAUTION

- **Ensure that the insert orientation of the cylinder end stopper is correct.**
- **Match the shaft snap ring mounting hole of the cylinder end stopper with the long hole of the rack housing side.**



23.Install the new shaft snap ring to the cylinder end stopper.

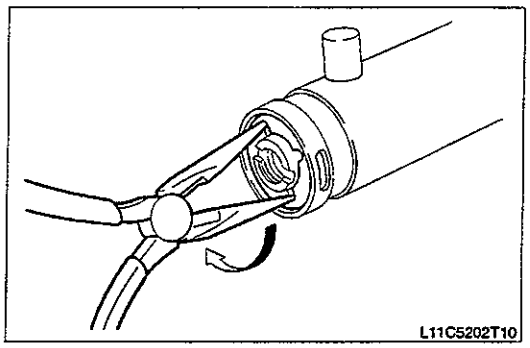
(1) Insert the claws of the shaft snap ring to the wire hole of the cylinder end stopper.

(2) Turn the cylinder end stopper clockwise with a long-nose pliers to slowly feed the wire inside the housing.

(3) Ensure that the wire rear end does not interfere with the long hole of the housing.

CAUTION

- **The rotational range of the cylinder end stopper shall be within approx. 400°−500°.**



24.Perform air tightness test.

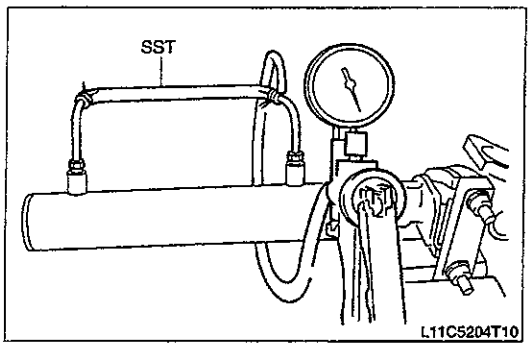
(1) Install the SST to the power steering rack housing Ay union area.

CAUTION

- **Install the O-ring to the SST before use.**

SST: 09631-12071-000

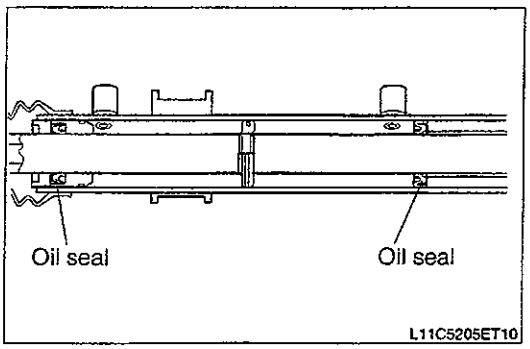
(2) Install a MityVac on the SST.



(3) Apply pressure (negative pressure) of approx. 53.3 kPa{400mmHg} and hold for approx. 30sec to see that the indicator indicates no change.

CAUTION

- **If there is a leak, check the oil seal within the power steering rack housing and replace as required.**



(3) POWER STEERING CONTROL VALVE S/A

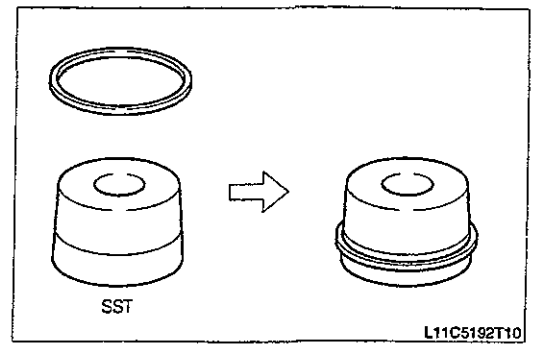
1.Apply power steering fluid all over the new seal ring No.1, insert it from the minor diameter of the SST into the major diameter and expand. Then install rings (4 pcs) one by one to the ring groove of the power steering control valve.

CAUTION

- Ensure that the seal ring No.1 and the SST are free from damage or contamination.
- Do not make the seal ring No.1 larger than is necessary.
- Use care not to damage the seal ring No.1.

SST: 09631-20070-000

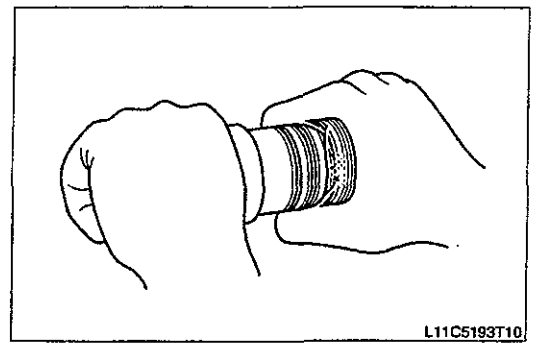
LUBRICANT: Power steering fluid



2.Manually hold the seal ring No.1 (4 pcs) installed to the power steering control valve and contract it while pressing and settling.

CAUTION

- Use care not to damage the seal end and periphery with nails.



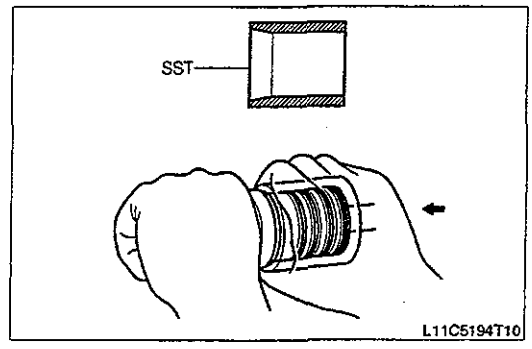
3.Reapply power steering fluid to the seal ring No.1 (4pcs) and use the SST to additionally contract the seal while settling.

CAUTION

- Provide good cleaning to the SST and ensure that the SST is free from damage or contamination.
- Apply power steering fluid to the inside of the SST.

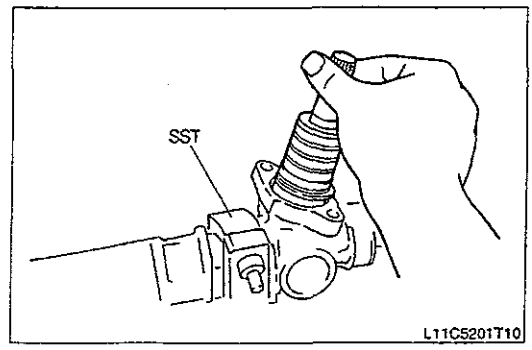
SST: 09631-20081-000

LUBRICANT: Power steering fluid



4.Apply long life grease to the pinion teeth area of the power steering control valve S/A, the bearing area and the contact surface with the needle roller bearing inside of the power steering rack housing Ay. Then assemble to the power steering rack housing Ay.

LUBRICANT: Molybdenum disulphide lithium base grease



(4) CONTROL VALVE HOUSING S/A

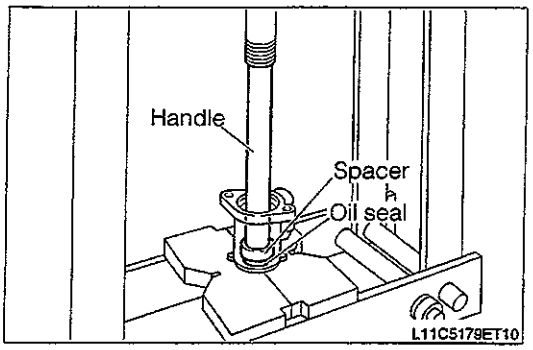
1.Apply power steering fluid all over the new type T oil seal. Use the SST to press fit the seal into the control valve housing.

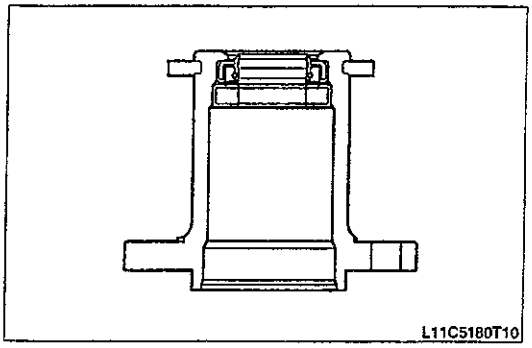
CAUTION

- Do not overload during press fitting.
- Ensure that seal is properly oriented.

SST: 09950-70010-000
09630-24014-000

LUBRICANT: Power steering fluid



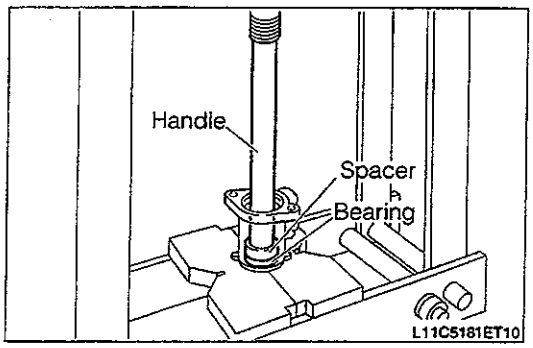


2.Use the SST to press fit the new cylindrical roller bearing to the control valve housing.

CAUTION

- Do not overload during press fitting.
- Press fit the bearing with the stamped side on your side.

SST: 09950-70010-000
09630-24014-000



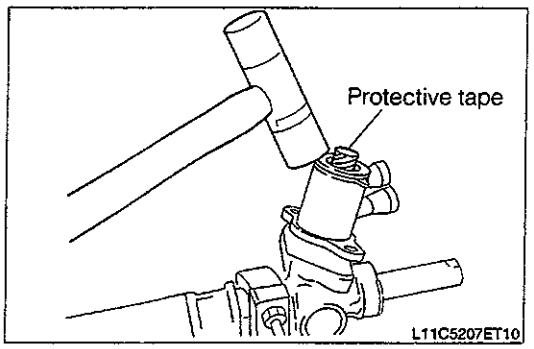
3.Check for the smooth rotational movement after the cylindrical roller bearing is press fit.

4.Apply protective tape to the serration portion of the power steering control valve S/A and apply power steering fluid to the seal ring No.1 area of the power steering control valve S/A and to the type T oil seal lip area of the control valve housing S/A. Then assemble the control valve housing S/A to the power steering rack housing Ay.

CAUTION

- Use a plastic hammer to evenly hammer the upper area of the control valve housing to settle.

LUBRICANT: Power steering fluid



(5) RACK GUIDE

1.Apply long life grease to the inside of the rack guide (contact surface with the rack shaft). Then assemble to the power steering rack housing Ay.

LUBRICANT:

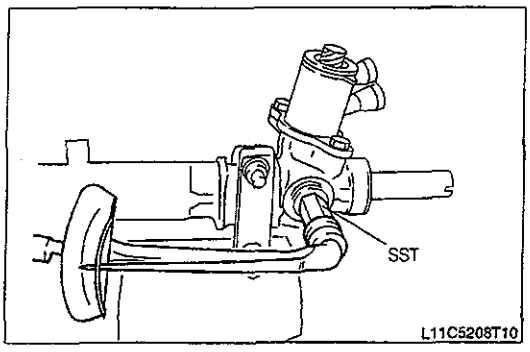
(6) RACK GUIDE SPRING CAP

1.Apply liquid packing to the threaded portion of the rack guide spring cap.
ADHESIVE: Three Bond1104

2.Install the compression spring to the rack guide. Then, install the rack guide spring cap and temporarily tighten it.

3.Adjust the preload.

(1) Use the SST to tighten the rack guide spring cap to the specified torque.
SST: 09043-30190-000
TIGHTENING TORQUE: 12.3±2.4N·m{125±24kgf·cm}



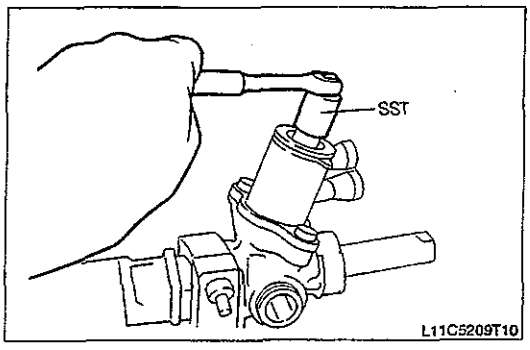
(2) From this point, return the rack guide spring cap approx. 10°.

(3) Use the SST to turn control valve S/A and operate steering rack one or two times at full stroke to help smooth operation.

CAUTION

- **Ensure that the end section of the power steering rack S/A does not go deeper than that of the cylinder end stopper and the power steering rack housing Ay.**

SST: 09616-87702-000

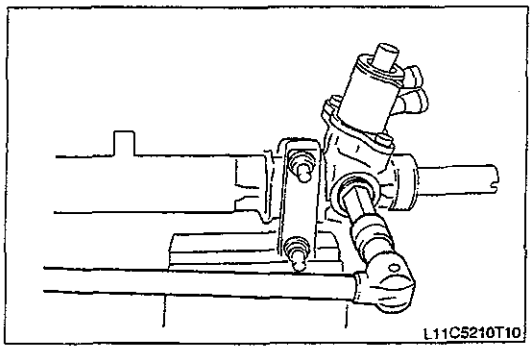


(4) Use the SST to loosen the rack guide spring cap until the rack guide compression spring is inoperative.

CAUTION

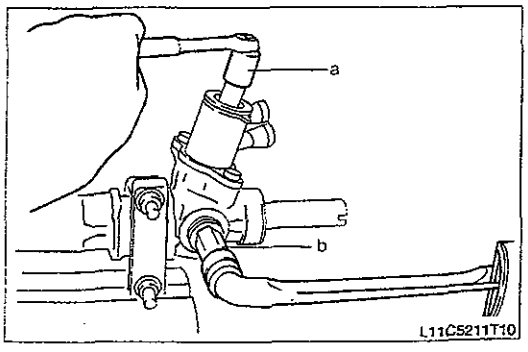
- **Heat the end section of the power steering rack S/A only until it is movable by hand.**

SST: 09043-30190-000



(5) When turning the power steering control valve S/A using the SST, tighten the rack guide spring cap so as to set the turning preload as standard.

SST: 09616-87702-000
09043-30190-000
SPECIFIED VALUE: 1.03±0.25N·m{10.5±2.5kgf·cm}
(during turning)

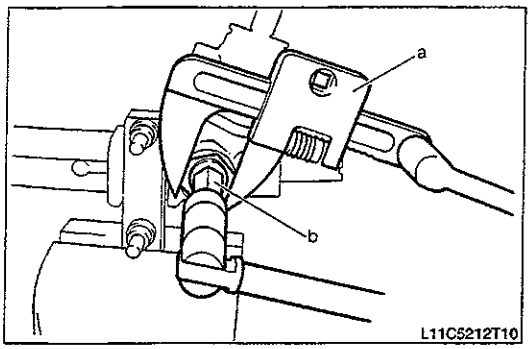


(6) Next, apply liquid packing to the screw area of the lock nut (for the rack guide spring cap) and the end of the rack housing. Use the SST to tighten to the specified torque.

CAUTION

- Completely remove residual bond when disassembling.

SST: 09922-10010-000
09043-30190-000
ADHESIVE: Three Bond1104
TIGHTENING TORQUE: 39.2±9.8N·m{400±99kgf·cm}



(7) Turn the power steering control valve subassembly again, using the SST. At this time, ensure that the preload during turning conforms to the specified value.

SST: 09616-87702-000
SPECIFIED VALUE: 1.03±0.25N·m{10.5±2.5kgf·cm}
(during turning)

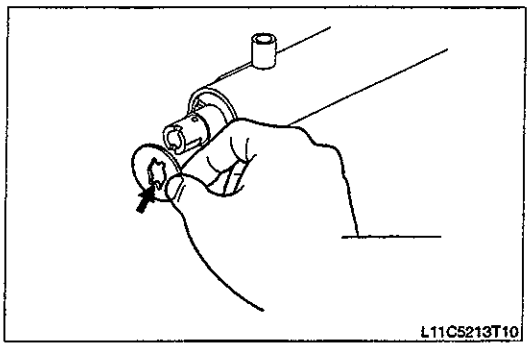
(7) STEERING RACK END S/A

① CLAW WASHER

Install the new claw washer to the rack shaft in the direction shown in the figure on the right. (RH/LH)

CAUTION

- Securely fix claws of claw washers on the rack shaft notch.



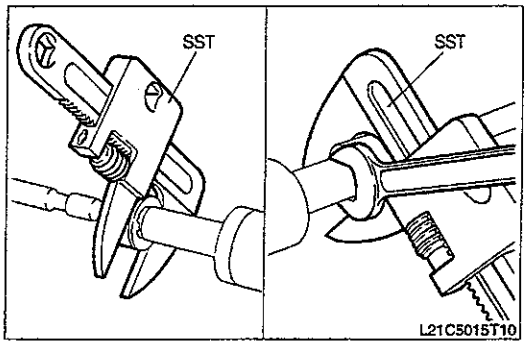
② STEERING RACK END S/A

Install the steering rack end subassembly and tighten it to the specified torque, using the SST in combination with a spanner. (Both right and left sides)

CAUTION

- While tightening, be very careful not to twist the power steering rack subassembly.

SST: 09612-87180-000
09628-10020-000

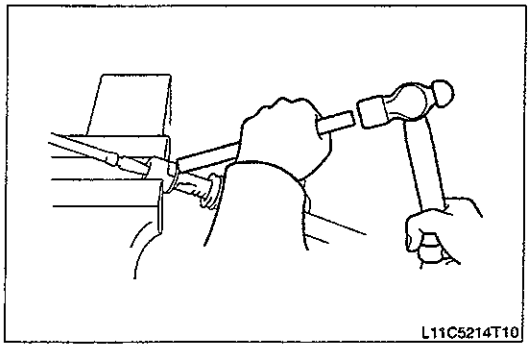


③ CLAW WASHER

Loosely fix the ball joint area of the steering rack end S/A on the vise and caulk the claw washers which have been installed before.

CAUTION

- Caulk the claw washer in two positions.
- Use care not to make an impact during caulking.
- Caulking area shall be free from damage or burr.

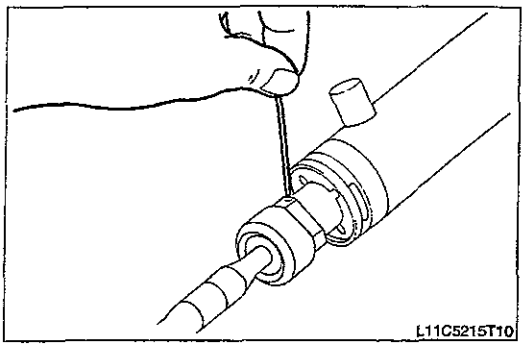


④ **STEERING RACK END S/A**

1.Insert a wire (outer diameter: approx. 2 mm, length: approx. 50 mm) into the vent hole of the steering rack end. At this time, ensure that the vent hole is not clogged with grease.

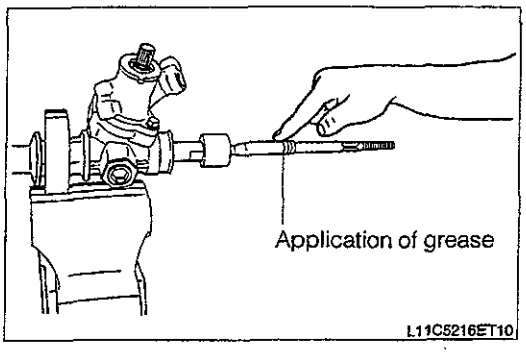
NOTE

- The vent hole of the steering rack end equalizes pressure difference in both sides of the rack boot right and left. For this reason, if the vent hole is blocked, the pressure in the boot when the steering is turned may vary so that the boot may be deflected or broken.



2.Apply silicone grease to the rack boot installation groove of the steering rack end subassembly. (Both right and left sides)

LUBRICANT: Silicon grease



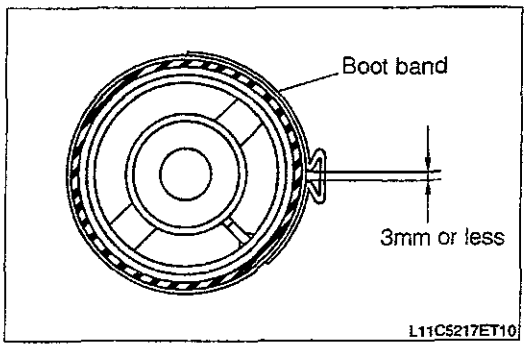
(8) STEERING RACK BOOT

1. Apply the steering rack boot band through the power steering rack housing Ay. Then install the steering rack boot (both RH/LH).

2.Caulk the steering rack boot band, which have been installed before. (Both RH/LH)

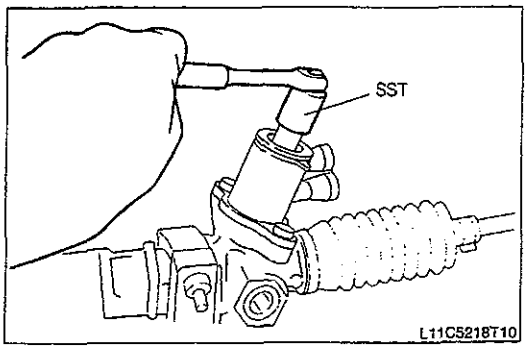
CAUTION

- Securely tighten the boot band.



3.Use the SST to turn the power steering control valve S/A and check the rack boot for smooth expanding and contracting motion.

SST: 09616-87702-000



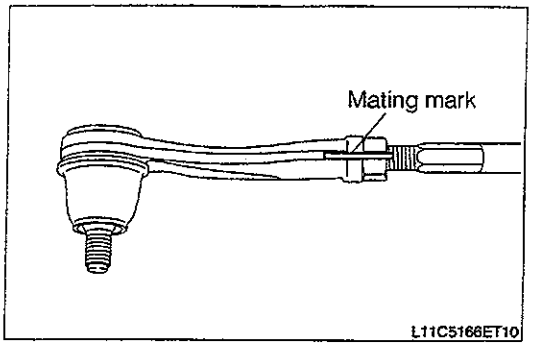
(9) STEERING TIE-ROD END S/A RH/LH

1.Temporarily install the steering tie-rod ends RH and LH, while referring to the mating marks that have been put during the removal.

CAUTION

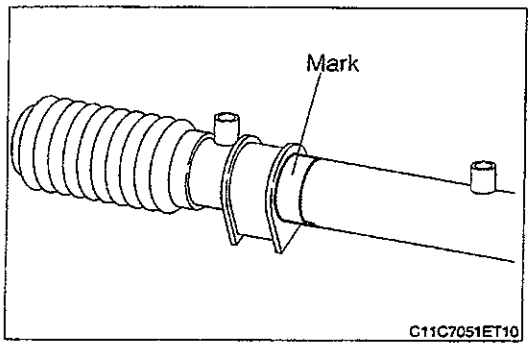
- Make sure that the right and left steering tie-rod ends are installed at the correct positions.
- While tightening, be very careful not to twist the steering rack.
- After the power steering gear assembly is mounted on the vehicle, securely tighten the lock nuts of the steering tie-rod end subassembly at the time of the front wheel alignment adjustment.

2.Remove the SST for securing the steering rack housing.
SST: 09612-00012-000



(10) STEERING RACK HOUSING GROMMET LH

1.Install the steering rack housing grommet LH, while referring to the mating mark that has been put during the disassembling.



3-2-7 OPERATION AFTER ASSEMBLY

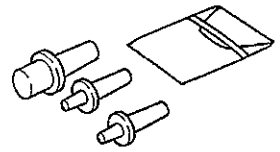
1.Install the power steering gear Ay.
Refer to Page G2-9.

4 VANE PUMP

4-1 REMOVAL AND INSTALLATION

4-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09258-00030-000	Plug set, hose

Instrument

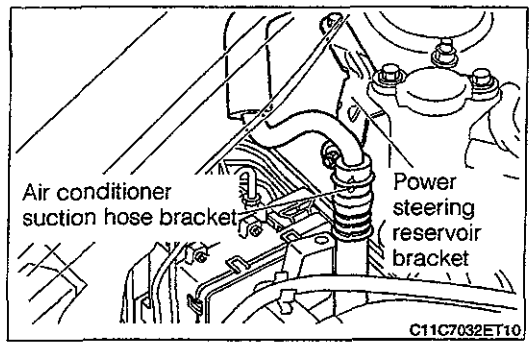
Belt tension gauge,Remote Cable,Torque wrench

Lubricant,adhesive,others

Power steering fluid

4-1-2 OPERATION BEFORE REMOVAL

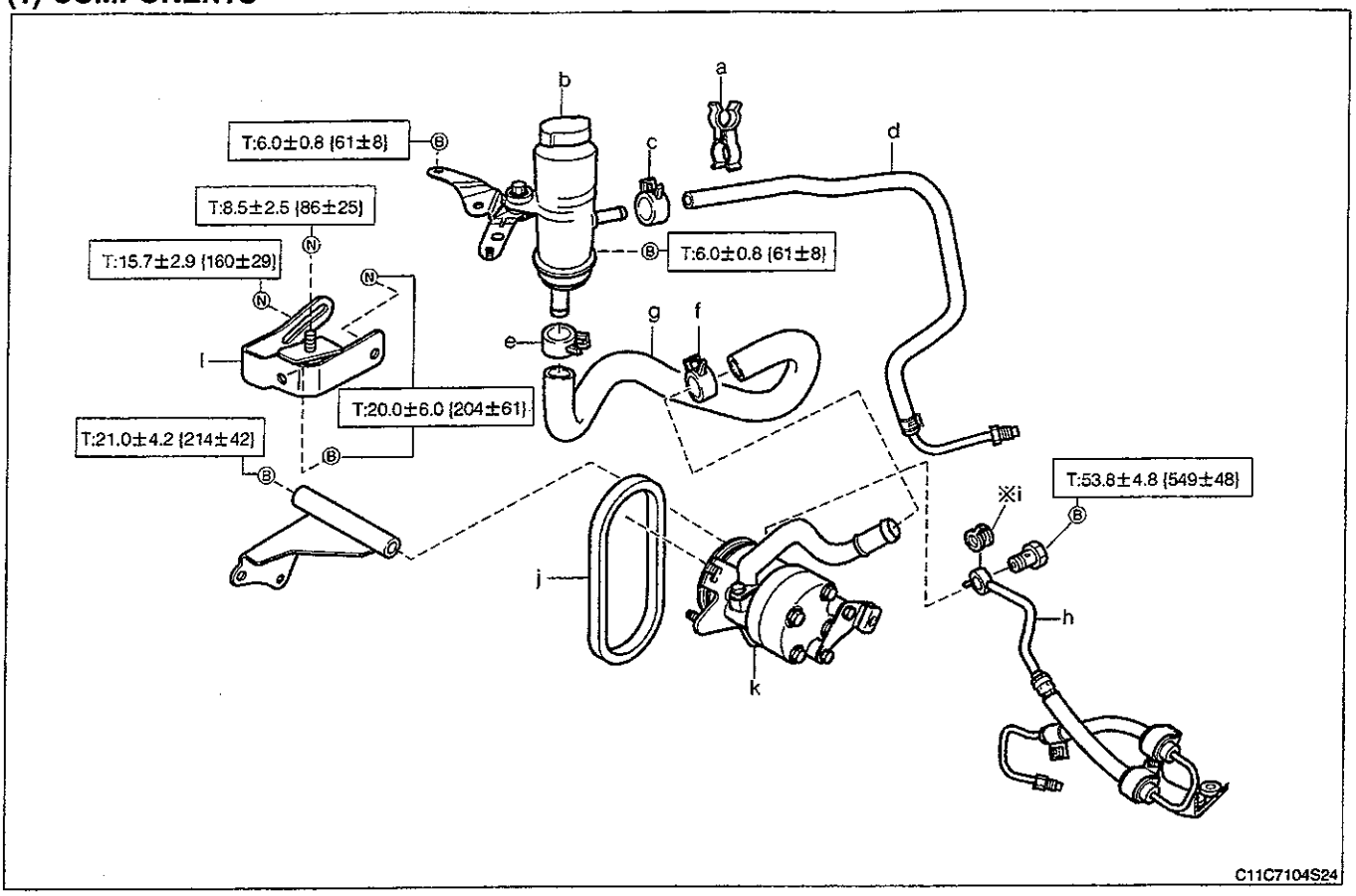
1.Remove the engine upper cover S/A.
2.Remove the A/C suction hose from the power steering reservoir bracket.
3.Remove the power steering reserve tank from the power steering reservoir bracket.
4.Drain the power steering fluid.
Refer to Page G2-6.



5.Plug the oil reservoir to pump hose, which has been removed using the SST.
SST: 09258-00030-000
6.Remove the brake master cylinder.
Refer to Page E1-6.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non - reusable parts
Unit:N;m{kgf·cm}

(2) REMOVAL PROCEDURES

1 a Clamp
2 b Reservoir Ay, oil
3 c Clip
4 d Hose, return
5 e Clip
6 f Clip
7 g Hose, oil reservoir to pump
8 h Hose,pressure feed
9 i Gasket
10 j Belt, V
▼ 11 k Pump Ay,vane
▼ 12 l Stay,intake manifold, No.2

(3) INSTALLATION PROCEDURES

▲ 1 l Stay,intake manifold, No.2
▲ 2 k Pump Ay,Vane
3 h Hose,pressure feed
4 i Gasket
▲ 5 g Hose, oil reservoir to pump
6 f Clip
7 e Clip
▲ 8 d Hose, return
9 c Clip
10 b Reservoir Ay, oil
▲ 11 a Clamp
▲ 12 j Belt, V

4-1-4 POINTS OF REMOVAL

(1) VANE PUMP AY

Remove the vane pump Ay and the intake manifold No.2 stay at a time.

NOTE

- When the bolt on the downside of the vane pump cannot be pulled out easily, press the engine to the left to help the operation.

4-1-5 INSPECTION

(1) VANE PUMP AY

Inspect oil leak or exudation, and replace in the event of problems.

4-1-6 POINTS OF INSTALLATION

(1) VANE PUMP AY

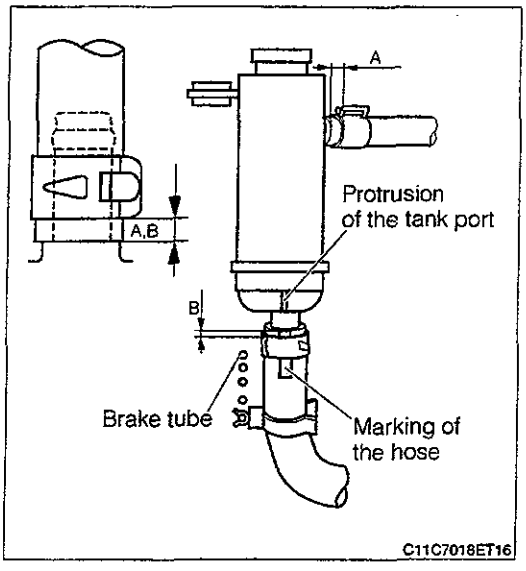
Install the vane pump Ay and the intake manifold No.2 stay at a time.

(2) OIL RESERVOIR TO PUMP HOSE

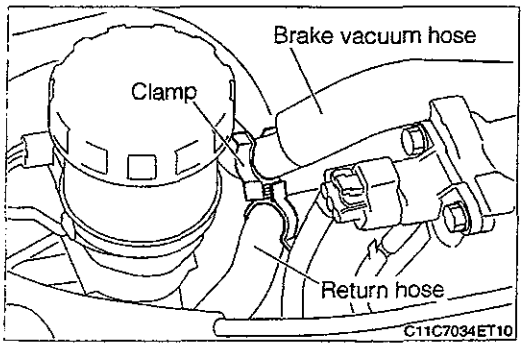
1. Install the oil reservoir to pump hose (the suction hose between the reservoir tank and the vane pump) as shown in the lower right figure.
   (1) Match the marking of the oil reservoir to pump hose (suction hose) with a protrusion of the tank port of the lower reserve tank and securely insert the hose up to the stopper surface.
   (2) The clip shall be installed upward of the vehicle and the distance B shall be 4±1mm.
   (3) Install the oil reservoir to pump hose (suction hose) clamp to the brake tube.

(3) RETURN HOSE

1. Install the return hose (between the steering gear and the reserve tank) to the reserve tank.
   (1) Ensure that the hose is inserted to the stopper surface.
   (2) The clip shall be installed so that it faces to the front of the vehicle and the distance A shall be 2±1mm.



   (3) Install the clamp of the return hose to the brake vacuum hose.



(4) V BELT

1. Adjust the V-belt tension.
   Refer to Page G2-1.

4-1-7 OPERATION AFTER INSTALLATION

1.Install the brake master cylinder.
Refer to Page E1-6.

2.Install the power steering reserve tank to the power steering reservoir bracket.
3.Install the A/C suction hose to the power steering reservoir bracket.
4.Fill the power steering fluid and bleed.
Refer to Page G2-6.

5.Install the engine upper cover.
TIGHTENING TORQUE: 8.0±1.6N·m{80±16kgf·cm}

TO INDEX

H1 SRS AIRBAG SYSTEM

SRS AIRBAG SYSTEM---------- H1 - 1
INSTRUCTIONS FOR SERVICE OPERATION---------- H1 - 1
SRS AIRBAG (DRIVER'S SEAT SIDE)--- H1 - 7
REMOVAL AND INSTALLATION-------- H1 - 7
DISPOSAL ---------- H1 - 9
STEERING ROLL CONNECTOR -------- H1 - 14
REMOVAL AND INSTALLATION ------ H1 - 14
SRS AIRBAG (FRONT PASSENGER SEAT SIDE)---------- H1 - 19
REMOVAL AND INSTALLATION ------ H1 - 19
DISPOSAL---------- H1 - 21
SEAT BELT WITH PRETENSIONER MECHANISM ---------- H1 - 26
REMOVAL AND INSTALLATION ------ H1 - 26
DISPOSAL---------- H1 - 26
SENSOR UNIT---------- H1 - 31
REMOVAL AND INSTALLATION ------ H1 - 31
CONTROL SYSTEM---------- H1 - 34
ARTICLES TO BE PREPARED-------- H1 - 34
SYSTEM WIRING DIAGRAM ---------- H1 - 34
ARRANGEMENT OF ECU TERMINAL ---------- H1 - 35
ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS ---------- H1 - 36
LOCATION OF COMPONENTS ------- H1 - 38
HOW TO PROCEED WITH TROUBLE SHOOTING---------- H1 - 39
DIAGNOSIS---------- H1 - 40
BASIC CHECK ---------- H1 - 45
TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE ---------- H1 - 46
TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA--- H1 - 81

1 SRS AIRBAG SYSTEM

1-1 INSTRUCTIONS FOR SERVICE OPERATION

1-1-1 OUTLINE

If the correct procedures and methods specified are not observed during the operation of the SRS airbag and seat belts with the pretensioner mechanism, these devices may operate in incorrect ways, leading to serious accidents. Moreover, if wrong repairs are performed, these devices may not operate when they should operate. Therefore, before starting services (removal/installation of parts, inspection, replacement, etc.) of the SRS airbag and seat belt with the pretensioner mechanism, be sure to read the following information and perform the correct procedures and methods prescribed in this book.

NOTE

- SRS refers to Supplemental Restraint System for passengers.

1-1-2 CAUTION TIPS BEFORE SERVICING

1.Before starting the removal of the driver's seat SRS airbag, front passenger's seat SRS airbag and pretensioner-equipped seat belt, ensure that the illuminating state of the warning lamp. After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Wait 60 seconds. Then, proceed to the removal operation.

CAUTION

- The SRS airbag system is provided with a backup condenser (for the squib). Therefore, about 60 seconds are necessary for the backup condenser to discharge after the negative terminal of the battery is removed. (Natural discharge)
- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.
- It should be noted that the memory of the computers of other systems (engine control, etc.) and the radio will be erased at the same time when the cable is disconnected from the negative terminal of the battery.

2.To check the SRS airbag system electrically, be sure to use a digital circuit tester which complies with the following requirements given below.

CAUTION

- In advance, be sure to measure the current of the tester to be used. Make sure that it satisfies the following specified value given below. If the tester which exceeds the specified value is used, the airbag may be actuated mistakenly or damaged. When performing the current measurement for the tester, use the minimum range of the resistance (Ω).

SPECIFIED VALUE: About 50 mA (0.05A) or less

1-1-3 REPLACEMENT PARTS AFTER DEPLOYMENT

(1) SRS AIRBAG & PRETENSIONER MECHANISM-EQUIPPED SEAT BELT

1.When the SRS airbag & pretensioner mechanism-equipped seat belt have been actuated and deployed for example in an accident, the following parts should be replaced with new parts.

(1) Airbag computer
(2) Driver's seat SRS airbag (Pad S/A, horn)
(3) Front passenger's seat SRS airbag (Airbag Ay, instrument panel passenger)
(4) Driver's seat pretensioner mechanism + force limiter mechanism-equipped seat belt (Belt Ay, front seat, outer RH)
(5) Front passenger's seat pretensioner mechanism + force limiter mechanism-equipped seat belt (Belt Ay, front seat, outer LH)

2.When the SRS airbag & pretensioner mechanism-equipped seat belt have been actuated and deployed for example in an accident, be sure to check the following parts. If there are problems, repair or replace the parts.
(1) Steering wheel S/A
(2) Steering column Ay
(3) Steering roll connector(cable S/A, spiral)
(4) Body-related

3.Check to see if harnesses are caught, connectors damaged, or terminals deformed.

1-1-4 Caution tips to maintain performance

(1) SRS AIRBAG&SEAT BEKT WITH THE PRETENSTIONER MECHANISM

1.Never use the driver's seat SRS airbag, front passenger's seat SRS airbag, pretensioner mechanism-equipped seat belt and airbag computerthat are designed for other vehicles. Be sure to use the new specified parts when replacing the parts.

2.Do not drop the driver's seat SRS airbag, front passenger's seat SRS airbag, pretensioner mechanism-equipped seat belt, steering roll connector and airbag computer. If they exhibit cracks, dents or chips, replace them with new parts.

3.Never disassemble the driver's seat SRS airbag, front passenger's seat SRS airbag, pretensioner mechanism-equipped seat belt and airbag computer.

4.Follow the instructions and caution tips written on a label affixed to each of the driver's seat SRS airbag, front passenger's seat SRS airbag, pretensioner mechanism-equipped seat belt, steering roll connector and airbag computer. If the label is dirty or torn, replace the label with a new one.

5.Do not apply grease to the driver's seat SRS airbag, front passenger's seat SRS airbag, pretensioner mechanism-equipped seat belt and airbag computer. Do not allow cleaning detergent, oil or water to get to these parts.

1-1-5 Caution tips to prevent wrong operation

(1) SRS AIRBAG&SEAT BELT WITH THE PRETENSIONER MECHANISM

1.Be very careful not to drop the driver's seat SRS airbag, front passenger's seat SRS airbag, pretensioner mechanism-equipped seat belt and airbag computer when installing/removing these parts.

2.Be very careful not to give shocks or damages to the driver's seat SRS airbag, front passenger's seat SRS airbag, pretensioner mechanism-equipped seat belt and airbag computer when removing these parts.

3.When placing the driver's seat SRS airbag or front passenger's seat SRS airbag even temporarily, face its deploying surface upward. Do not place the driver's seat SRS airbags stacked. (If the airbag is deployed, it may lead to a serious accident when the metal surface faces upward.)

4.Store the driver's seat SRS airbag, front passenger's seat SRS airbag, pretensioner mechanism-equipped seat belt and airbag computer in a place which is not hot (ambient temperature of 85 °C or more) or humid and hardly exposed to electric noises.

5.Do not directly expose the driver's seat SRS airbag, front passenger's seat SRS airbag and pretensioner mechanism-equipped seat belt to high temperature or fire.

1-1-6 Caution tips for body repair and paint

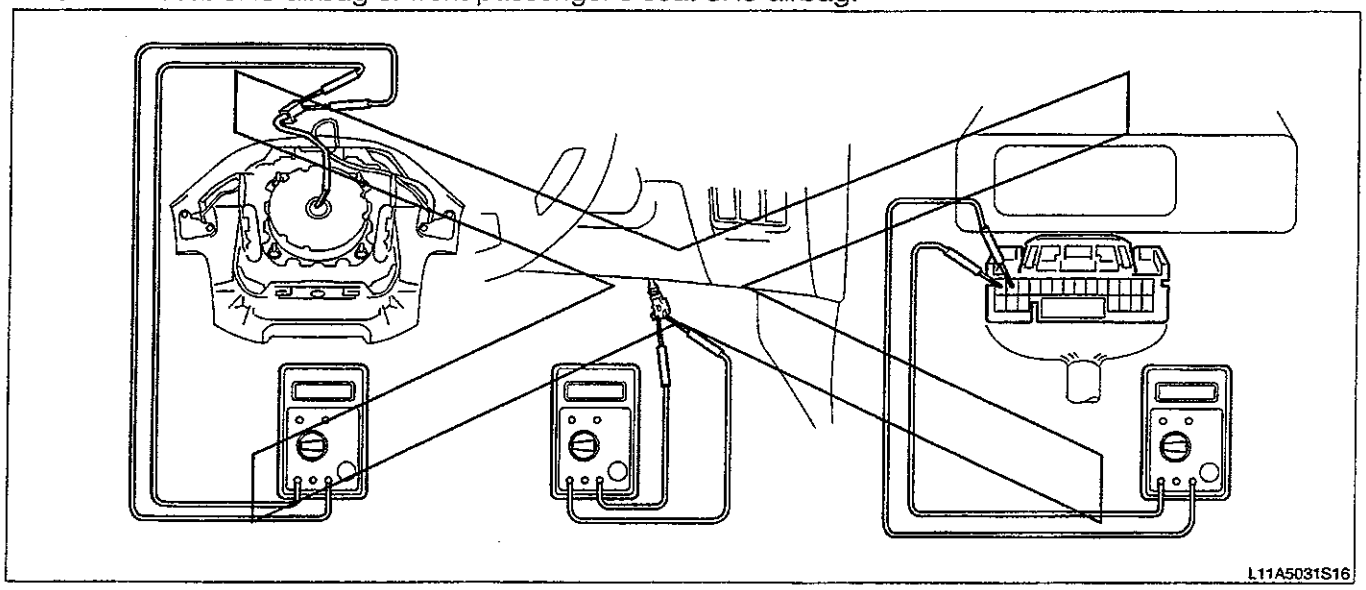
(1) SRS AIRBAG&SEAT BELT WITH THE PRETENSIONER MECHANISM

1.When repairing the driver's seat SRS airbag, front passenger's seat SRS airbag, pretensioner mechanism-equipped seat belt and airbag computer, do not give strong impacts to these parts by a hammer or the like, or do not expose these parts to high temperature.
2.When using an electric welding machine, remove the driver's seat SRS airbag, front passenger's seat SRS airbag, pretensioner mechanism-equipped seat belt and airbag computer before welding.
3.When there is the possibility that the SRS airbag system is exposed to impacts or high temperature, remove the SRS airbag system components before the operation.
4.When drying the paint around the airbag related parts, do not allow the temperature to exceed 85°C in those areas.
5.If the airbag-related parts exhibit external damages or deformation, be sure to replace them with new ones.

1-1-7 CAUTION TIPS OF SRS AIRBAG SYSTEM COMPONENTS

(1) DRIVER'S SEAT SRS AIRBAG, FRONT PASSENGER'S SEAT SRS AIRBAG

1.Never measure the resistance of the driver's seat SRS airbag or front passenger's seat SRS airbag. (There is the possibility that the tester current triggers the airbag deployment.) For the checks of the system, be sure to use the specified digital circuit tester.
2.If the vehicle was involved in a minor collision in which the airbag was not deployed, check the driver's seat SRS airbag and front passenger's seat SRS airbag.
3.When the airbag-mounted vehicle or the airbag unit is to be scrapped, deploy the airbag before scrapping.
4.During the operation, follow the instructions given at the caution plate provided at the back of the driver's seat SRS airbag or front passenger's seat SRS airbag.



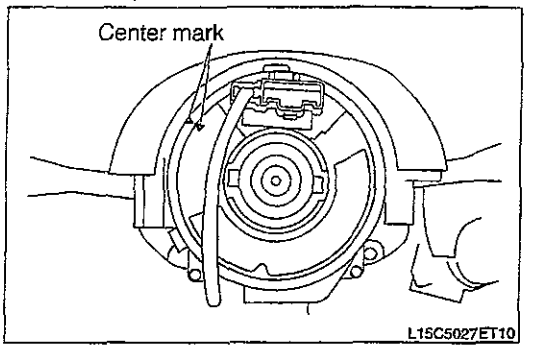
(2) PRETENSIONER MECHANISM-EQUIPPED SEAT BELT

1.Never measure the resistance of the pretensioner mechanism. (There is the possibility that the tester current triggers the pretensioner mechanism.) For the checks of the system, be sure to use the specified digital circuit tester.
2.If the vehicle was involved in a minor collision in which the airbag was not deployed, check the pretensioner mechanism.
3.When the vehicle with the pretensioner mechanism-equipped seat belt or the seat belt itself is to be scrapped, deploy the pretensioner before scrapping.
4.During the operation, follow the instructions given at the caution plate provided at the side of the retractor.

(3) STEERING ROLL CONNECTOR (INCLUDING THE TURN SIGNAL SWITCH)

1.When installing the steering roll connector, be sure to perform centering.

2.If the positional relationship between parts changes after the following operation, there is the possibility that the steering roll connector may have open wires when the steering wheel is operated. Therefore, centering of the steering roll connector and marking of the disconnecting sections should be performed.



NOTE

- Steering wheel-related
  Steering wheel, steering wheel column, steering gear, etc.
- Body-related
  Instrument panel, etc.
- Body electrical-related
  Multi-use lever SW etc.

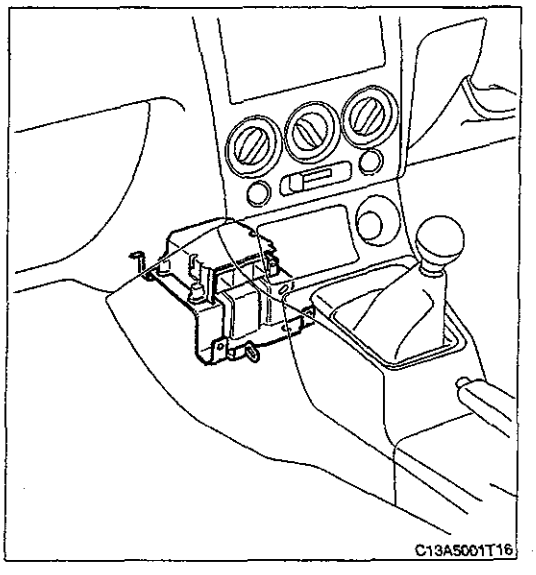
(4) AIRBAG COMPUTER

1.Perform connection/disconnection of the connector with the airbag computer installed to the vehicle.

CAUTION

- If the connector is connected with the airbag computer disconnected from the vehicle, the airbag may be actuated mistakenly.

2.When removing/installing the airbag computer, be sure to remove the negative terminal of the battery. Wait 60 seconds before starting the operation. When installing the airbag computer, be sure to use the specified bolts and tighten them to the specified torque.



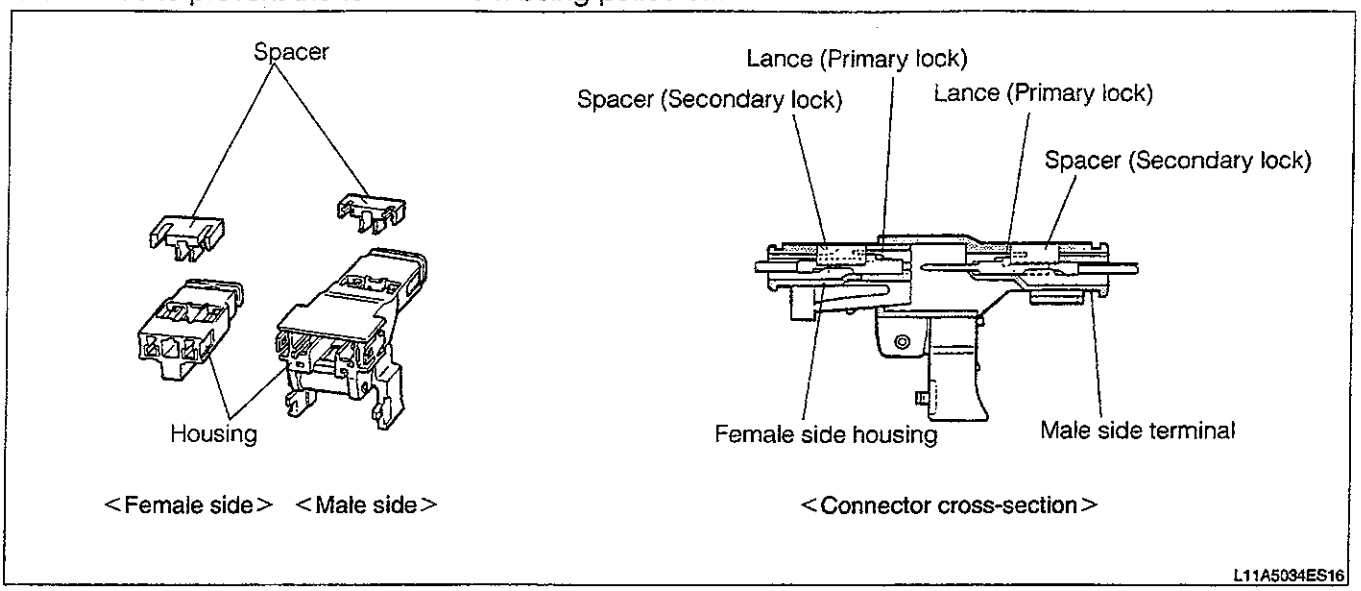
(5) WIRE HARNESS, CONNECTOR

1.The SRS airbag system connectors and the branch wire harness exclusively used for the system are yellow colored, except exposed portions in the engine compartment, thus distinguishing themselves from other systems. Therefore, please pay utmost care so that these connectors and harnesses are not damaged.

2.Since special connectors are used for the SRS airbag system, be very careful not to damage the connector when handling it.

① TERMINAL DOUBLE LOCK MECHANISM

The connector is of a two-piece construction consisting of the housing and spacer. The terminal is retained doubly by a lance (first lock) and spacer (second lock). This enhances the terminal retaining force so as to prevent the terminal from being pulled off.

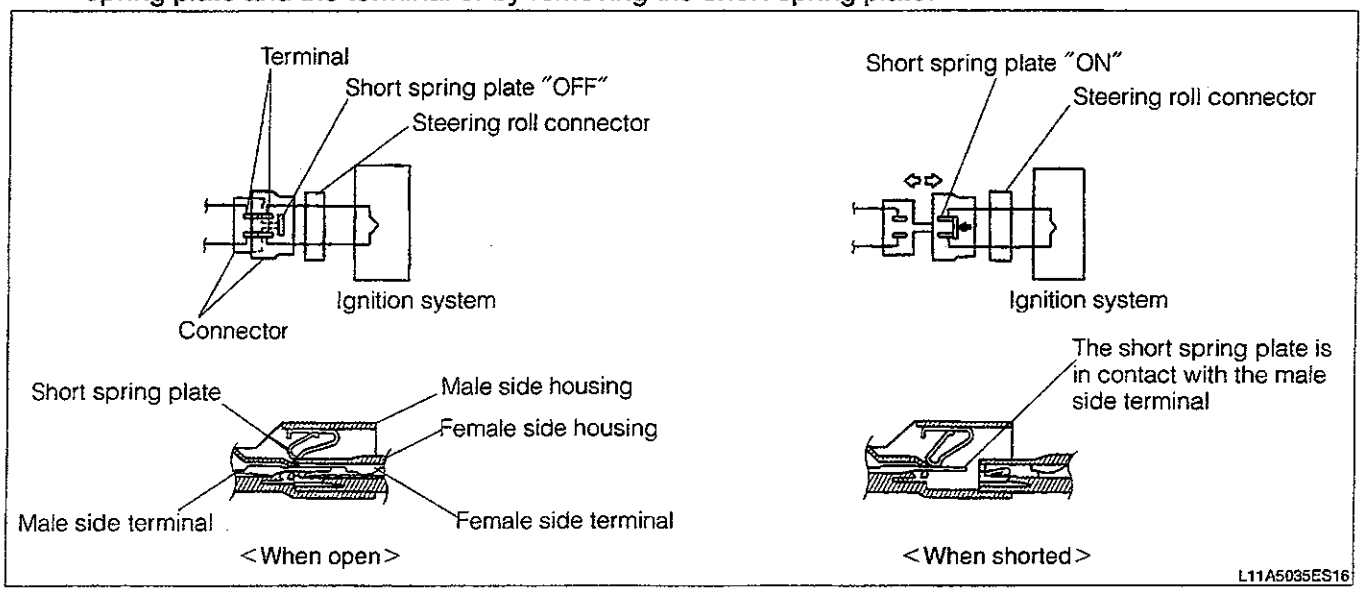


② TERMINAL SHORT MECHANISM

This mechanism is provided to prevent explosion during servicing. A short spring plate is provided inside the male connector. When the connector is disconnected, the power supply side terminal and earth side terminal are automatically shorted, forming a closed circuit. (No potential is generated between both terminals.)

CAUTION

- **When checking the harness, there is the possibility that wrong judgment, for example, that a short exists between the harnesses may be made because of this terminal short mechanism. Therefore, when checking the harness, insert the SST for airbag deployment (part number:09082-87710-000) into the connector to be checked and check the connector together with the SST. If the harness is found to be faulty by this check, perform the check by inserting an insulation into between the short spring plate and the terminal or by removing the short spring plate.**

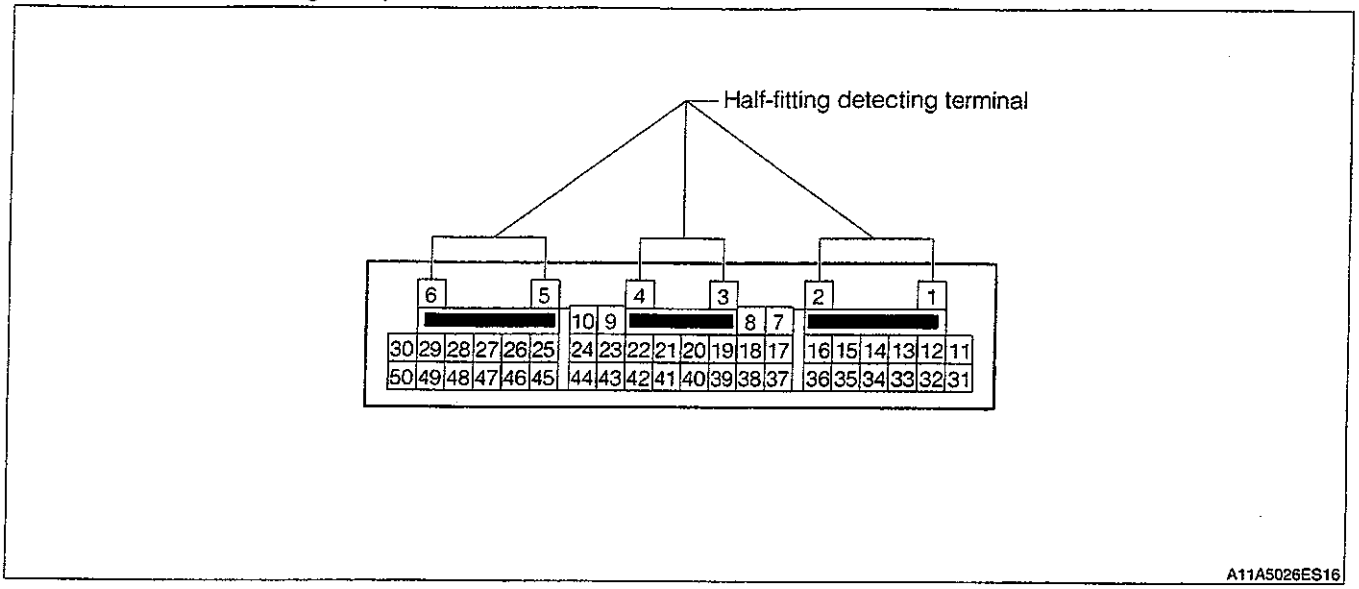


③ HALF FIT DETECTING MECHANISM

This is a mechanism which detects whether the airbag computer is firmly connected with the vehicle side harness connector or not.

If the IG SW is set to ON position with the connector being half fit, the airbag warning lamp keeps illuminated. When the airbag system is normal and the connector is firmly connected, the airbag warning lamp is extinguished.

Connector on the airbag computer side



2 SRS AIRBAG (DRIVER'S SEAT SIDE)

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Tool

TORX® wrench T30

Instrument

Torque wrench

2-1-2 OPERATION BEFORE REMOVAL

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery.

CAUTION

- It should be noted that the memory of the computers of other systems (engine control, etc.) and the radio will be erased at the same time when the cable is disconnected from the negative terminal of the battery.

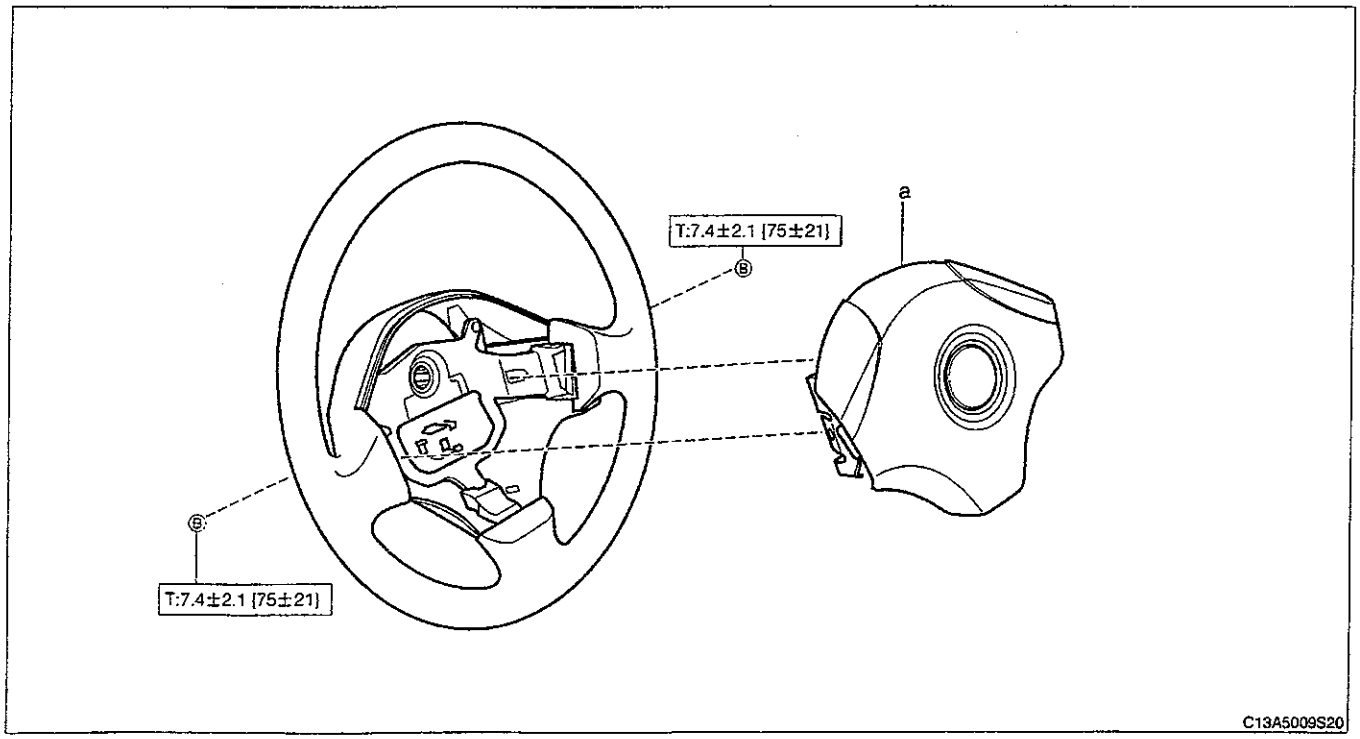
2.Wait at least 60 seconds.

CAUTION

- The SRS airbag system is provided with a backup condenser (for the squib). Therefore, about 60 seconds are necessary for the backup condenser to discharge after the negative terminal of the battery is removed. (Natural discharge)
- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

▼ ▲ 1 a Pad S/A, horn

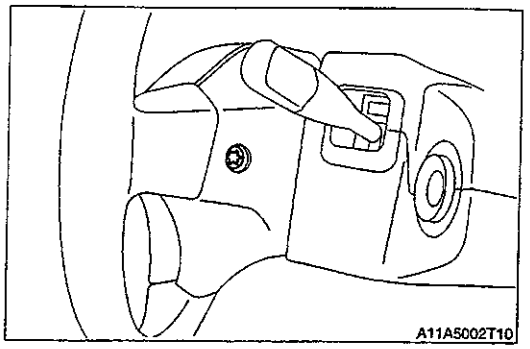
2-1-4 POINTS OF REMOVAL

(1) HORN PAD S/A

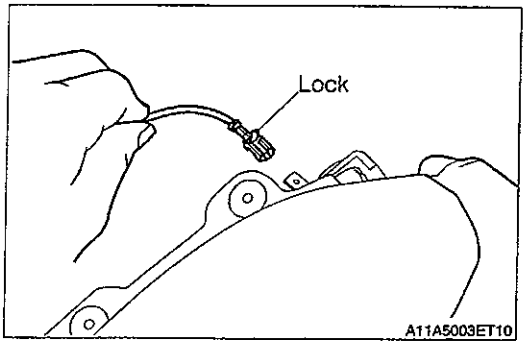
1.Loosen the right and left torx bolts provided at the side of the horn pad S/A as much as possible.

CAUTION

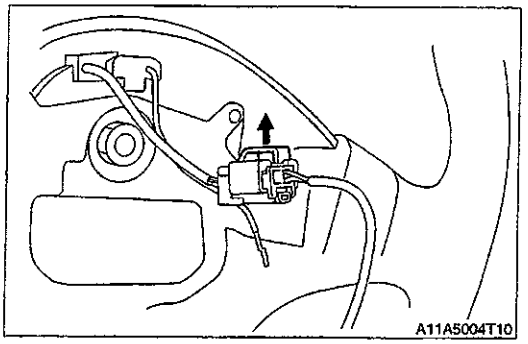
- Remove the horn pad S/A slowly, for the airbag harness and horn harness are wired.



2.Remove the horn connector (except for the MOMO steering).

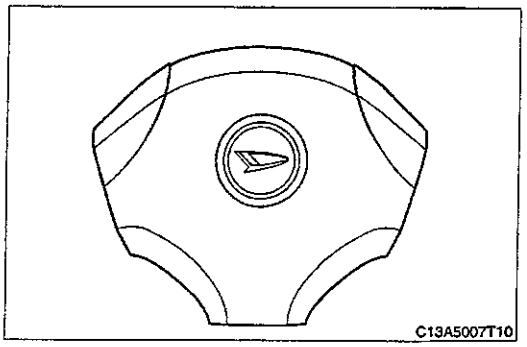


3.Before removing the air bag connector, pull the white double lock portion upward.



CAUTION

- When placing the horn pad S/A, be sure to face the deploying surface upward.
- Store the horn pad S/A in a place where it will not drop.



2-1-5 INSPECTION

(1) CHECK OF HORN PAD S/A

1.When the following cases have occurred, perform visual checks or system checks. If there are any faulty parts, replace them.

(1) Case where the vehicle is damaged, including minor collisions where the airbag has not been deployed.

(2) Case where problems have been found out by the diagnosis check

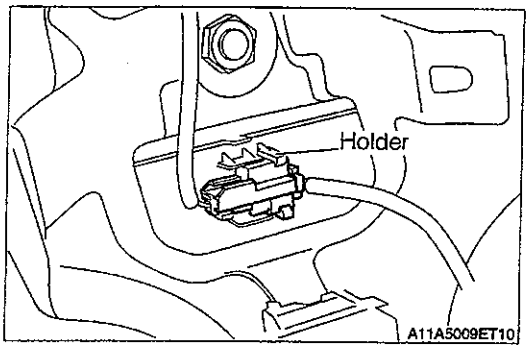
(2) EXTERNAL CHECK OF HORN PAD S/A

1.When the following cases have occurred, replace the horn pad S/A.
(1) Case where the airbag has been deployed.
(2) Case where the airbag deploying surface of the horn pad S/A has scratches or cracks.
(3) Case where the connector or harness has dents or chips.
(4) Case where grease, water, detergent or oil has got to the horn pad S/A in a large quantity.
(5) Case where the horn pad S/A dropped and got damaged.

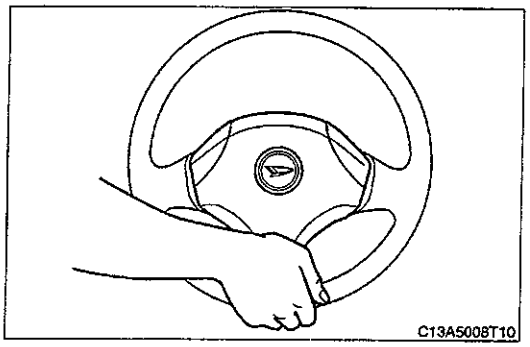
2-1-6 POINTS OF INSTALLATION

(1) HORN PAD S/A

1.Connect the connector until it locks and securely fixe it on the holder of the steering wheel S/A side. Securely fix the harness on the clamp of the steering wheel.

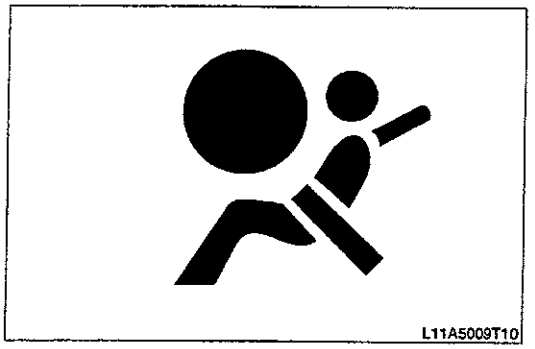


2.When installing the horn pad S/A, hold the lower side of the horn pad S/A.



2-1-7 OPERATION AFTER INSTALLATION

1.Install the negative terminal of the battery.
2.After the IG SW has been set to [LOCK] position. At this time, ensure that the airbag warning lamp goes on about six seconds and then goes out.



2-2 DISPOSAL

2-2-1 OUTLINE

When scrapping a vehicle equipped with the SRS airbag system, deploy the driver seat SRS airbag system and the front passenger seat SRS airbag system so that the airbag system can be scrapped as a single part. In the event of scrapping the airbag system that has not been deployed, it is absolutely important to deploy the system prior to scrapping. Follow the instructions below on how to scrap the airbag system.

CAUTION

- Do not scrap the driver's seat SRS airbag system or the front passenger seat SRS airbag system until airbags have been deployed.
- When scrapping the the driver's seat SRS airbag or front passenger's seat SRS airbag that has been deployed by a customer, follow the "Airbag scrapping procedure."

2-2-2 DEPLOYMENT OF HORN PAD S/A

(1) ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09082-87710-000 (09082-87701-000)	Wire, air bag deployment

Tool

TORX® wrench T30

Lubricant,adhesive,others

Wire harness (1.25mm^2),Two bolts (Nominal length of 35 mm or more, pitch of 1.0 mm, nominal diameter of 6.0 mm),12V battery for car use,2 tires with disc wheel,3 tires,Vinyl bag

(2) INSTRUCTIONS ON THE HORN PAD S/A DEPLOYMENT

1. The deployment of the SRS airbag should be performed at an outdoor flat place where safety can be ensured. Deploying the airbag in a residential area should be avoided whenever possible.
2. Use SST to keep at least 5 m away from the horn pad S/A.
3. Allow at least 30min after activation, because the deployed horn pad S/A is extremely hot.
4. Do not pour water or other liquid over the deployed horn pad S/A.
5. Wear protective glasses and gloves in handling the deployed horn pad S/A.
6. Put the deployed horn pad S/A in a plastic bag, seal and scrap it.
7. Wash your hands with water after operation is complete.

(3) IN-VEHICLE DEPLOYMENT OF HORN PAD S/A

WARNING

- Before connecting the SST terminal to the battery, once again make sure there are no one around.
- Keep at least 5 m away from the site, as the operation produces a large sound.

1. After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery.

CAUTION

- It should be noted that the memory of the computers of other systems (engine control, etc.) and the radio will be erased at the same time when the cable is disconnected from the negative terminal of the battery.

2. Wait at least 60 seconds.

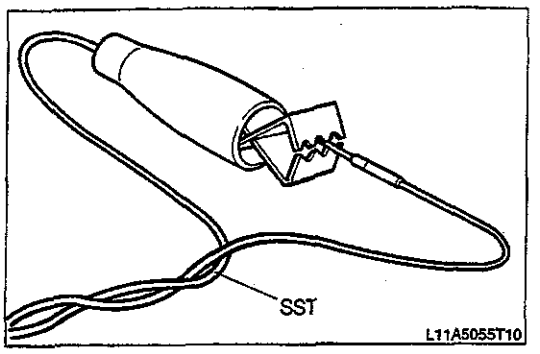
CAUTION

- The SRS airbag system is provided with a backup condenser (for the squib). Therefore, about 60 seconds are necessary for the backup condenser to discharge after the negative terminal of the battery is removed. (Natural discharge)
- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

3.Short the terminal with the alligator clip of the SST (Airbag deployment wire).
SST: 09082-87710-000

CAUTION
- Before starting work, ensure that there is no excessive play in the steering wheel area.

4.Remove the instrument panel finish lower panel.
5.Remove the column cover lower.

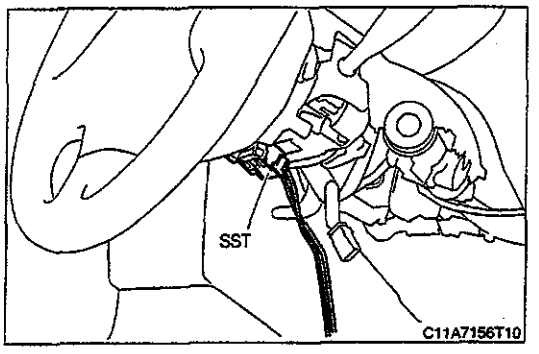


6.Connect the SST connector to the connector for the airbag (yellow 2P).

NOTE
- Disconnect the spiral cable S/A from the connector on the vehicle side, and connect the SST there.

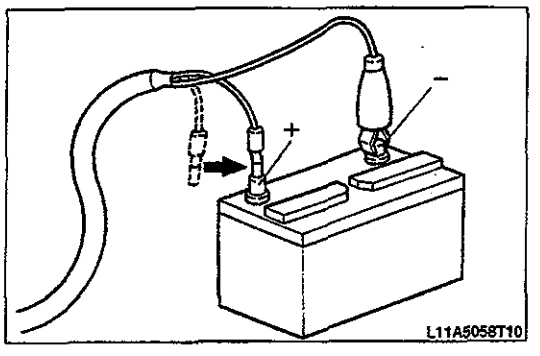
7.Place the battery at a position where the SST has been extended as long as possible.

CAUTION
- At this time, close all the doors and windows.
- Make sure that there is no one inside and around the vehicle.
- Since a big sound will be emitted at the time of deployment, keep at least 5 m away.



8.Once again make sure of the safety inside and around the vehicle, and then connect the SST to the battery [with the alligator clip on battery side, and the terminal on side] and deploy the airbag.

CAUTION
- Give warning loudly to those nearby before deploying the airbag.



(4) DEPLOYMENT OF HORN PAD S/A

WARNING
- Before connecting the SST terminal to the battery, once again make sure there are no one around.
- Since a big sound will be emitted at the time of deployment, keep at least 5 m away.

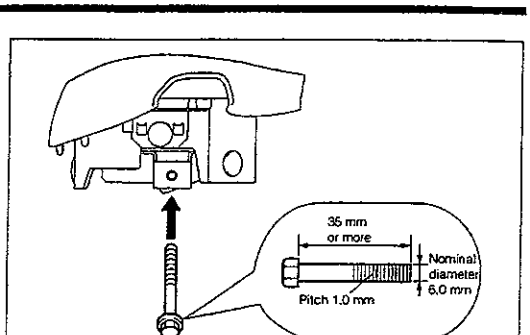
1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery.

CAUTION
- It should be noted that the memory of the computers of other systems (engine control, etc.) and the radio will be erased at the same time when the cable is disconnected from the negative terminal of the battery.

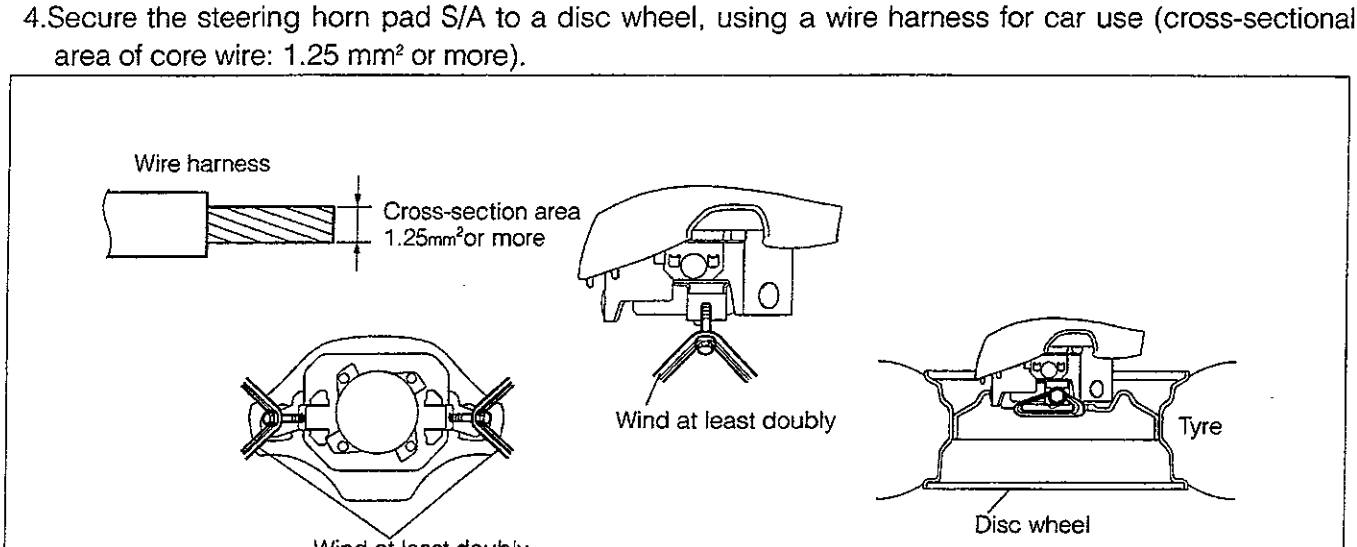
2.Wait at least 60 seconds.

CAUTION
- The SRS airbag system is provided with a backup condenser (for the squib). Therefore, about 60 seconds are necessary for the backup condenser to discharge after the negative terminal of the battery is removed. (Natural discharge)
- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

3.Attach plate washers to two bolts. By your hands, fully tighten the bolts to the two attaching holes of the horn pad S/A.



4.Secure the steering horn pad S/A to a disc wheel, using a wire harness for car use (cross-sectional area of core wire: 1.25 mm² or more).



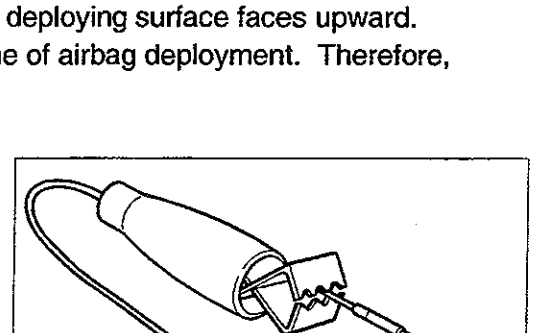
CAUTION

- **Perform the installation in such a direction that the airbag deploying surface faces upward.**
- **A great force will be applied to the wire harness at the time of airbag deployment. Therefore, secure the wire harness securely by winding it triple.**

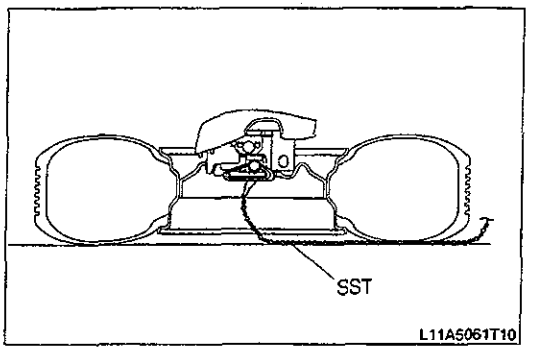
5.Short the terminal with the alligator clip of the SST (Airbag deployment wire).
SST: 09082-87710-000

CAUTION

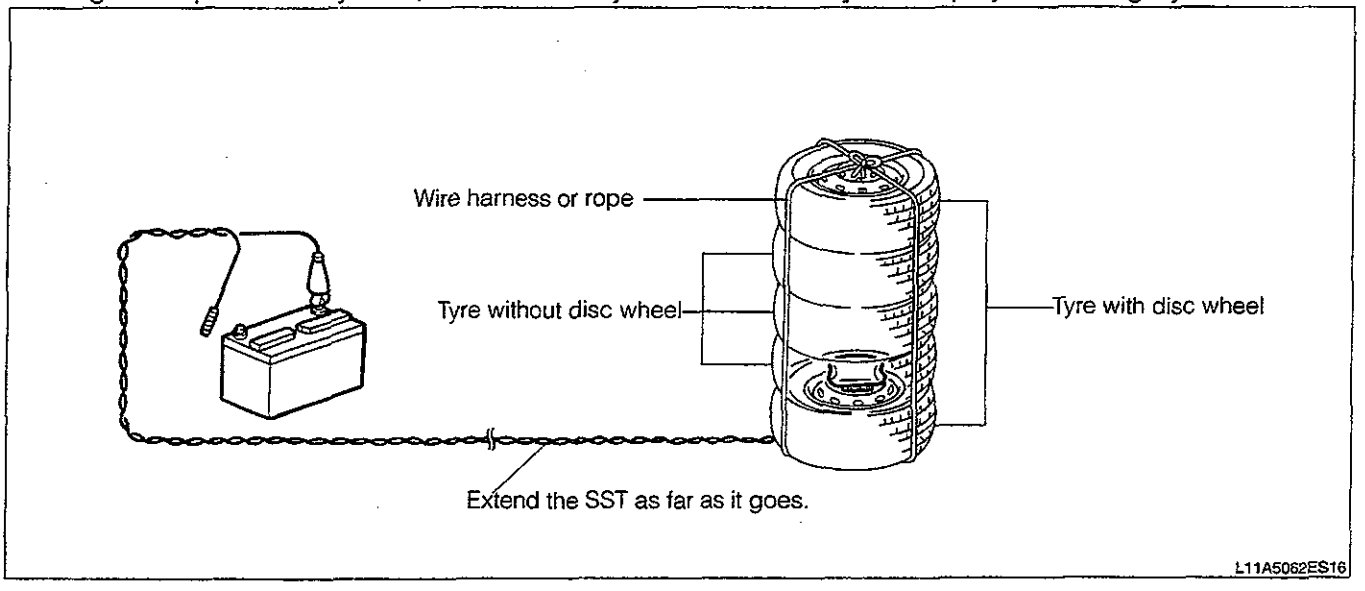
- **Deployment activity for the horn pad S/A shall be done outdoors.**



6.Connect the SST connector and the airbag connector (yellow 2P) on the lower disk wheel.



7.Next, pile up at least three tires on the disc wheel to which the horn pad S/A has been secured. Then, place a tire with a disc wheel on the top.
8.Connect the tires with wire harnesses or ropes so that the tires will not be scattered when the airbag is deployed.
9.Make doubly sure of the safety around the vehicle, and then connect the SST to the battery [with the alligator clip on battery side, and the battery terminal on side] and deploy the airbag Ay.



CAUTION

- Give warning loudly to those nearby before deploying the airbag.
- Never mount and reuse the tires and wheels used for the deployment on vehicles.

(5) SCRAPPING OF HORN PAD S/A

Seal the deployed horn pad S/A in a plastic bag before it is scrapped.



CAUTION

- Scrap only after deployment is complete.
- Allow at least 30min after activation, because the deployed horn pad S/A is extremely hot.
- Do not apply water, etc. to the deployed steering wheel pad assembly.
- Wear protective glasses and gloves in handling the deployed horn pad S/A.
- After completion of the operation, be sure to wash your hands with water.

3 STEERING ROLL CONNECTOR

3-1 REMOVAL AND INSTALLATION

3-1-1 OPERATION BEFORE REMOVAL

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery.

CAUTION

- It should be noted that the memory of the computers of other systems (engine control, etc.) and the radio will be erased at the same time when the cable is disconnected from the negative terminal of the battery.

2.Wait at least 60 seconds.

CAUTION

- The SRS airbag system is provided with a backup condenser (for the squib). Therefore, about 60 seconds are necessary for the backup condenser to discharge after the negative terminal of the battery is removed. (Natural discharge)
- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

3.Ensure that the steering wheel is in the straight ahead condition.
4.Remove the horn pad subassembly.
Refer to page H1-7.

5.Remove the steering wheel S/A.
Refer to page G1-1.

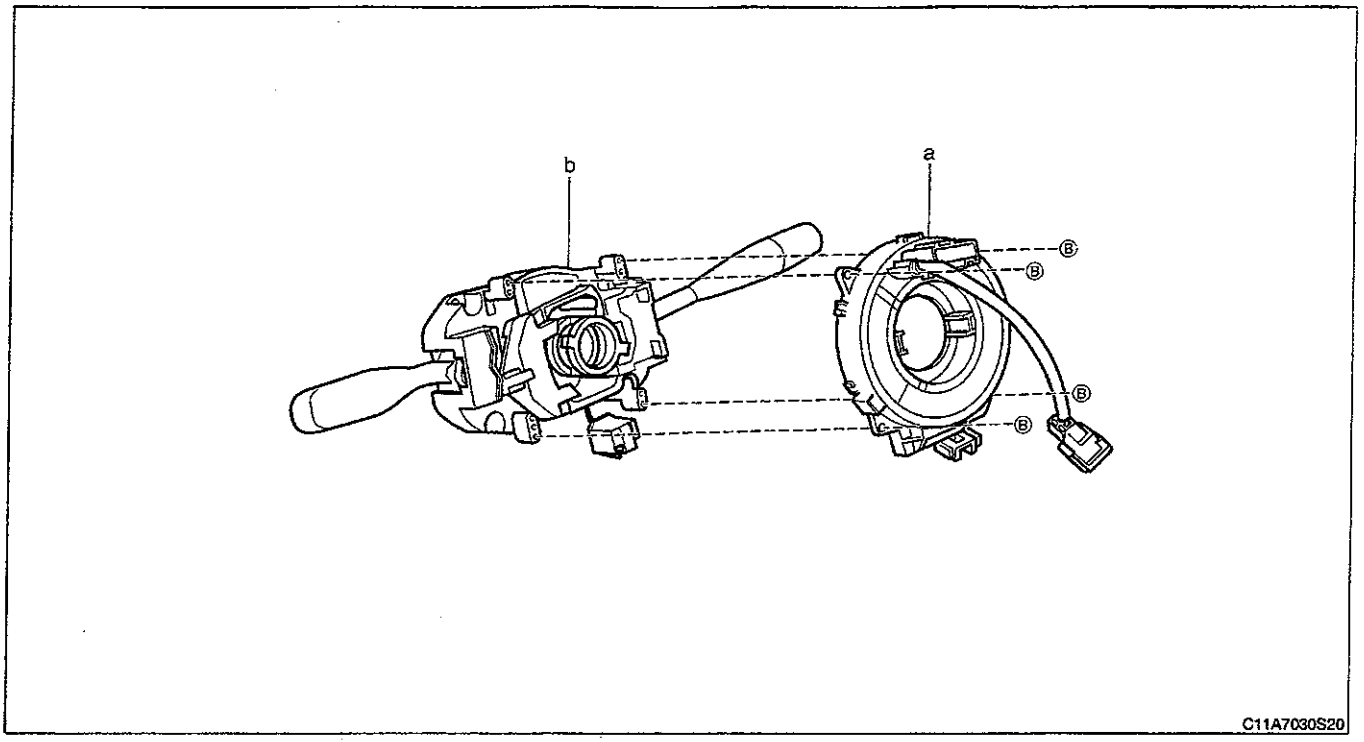
6.Remove the instrument panel finish lower panel.
7.Lower the steering column as far as it goes.
8.Remove the column cover lower.
9.Remove the column cover upper.

CAUTION

- Be very careful not to scratch the column cover during the removal.

3-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



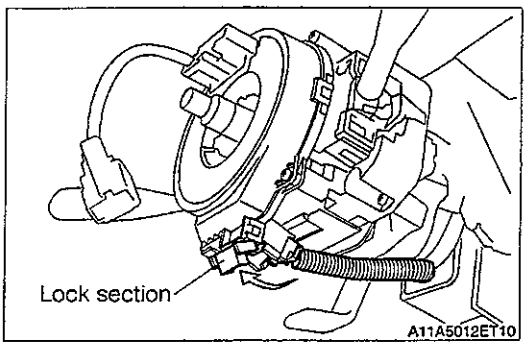
(2) REMOVAL AND INSTALLATION PROCEDURES

▼ ▲ 1 a Cable S/A, spiral
2 b Switch S/A, turn signal

3-1-3 POINTS OF REMOVAL

(1) SPIRAL CABLE S/A

Before removing the air bag harness, unlock the double locks of the connector.



3-1-4 INSPECTION

(1) CHECK STANDARD FOR SPIRAL CABLE S/A

Check the spiral cable S/A in the following cases. Replace it if problems are found.

(1) Case where the vehicle is involved in a collision.

CAUTION

- Perform the check whether the airbag has been deployed or not.
- As for the checking procedure, follow the trouble shooting instructions.

(2) Check of external appearance of spiral cable S/A

Replace the spiral cable S/A in the following cases.

(1) When the spiral cable S/A dropped.
(2) Connector section having worn out portions, cracks or breakage
(3) Spiral cable S/A having deformation, cracks or breakage
(4) Harness section being damaged

CAUTION

- Never disassemble the spiral cable S/A.

3-1-5 POINTS OF INSTALLATION

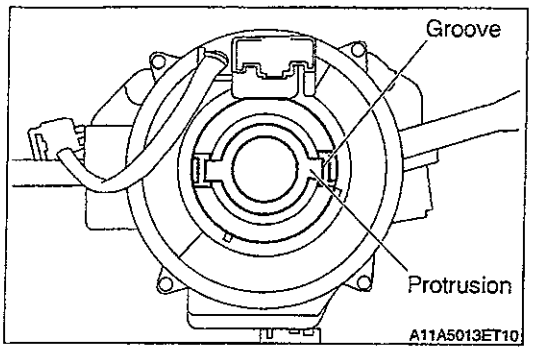
(1) SPIRAL CABLE S/A

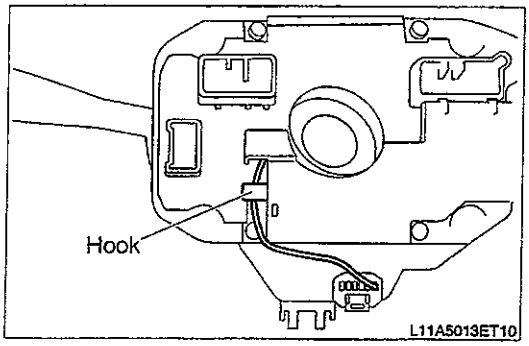
1.Ensure that the steering wheel is in the straight ahead state.

2.Install the spiral cable S/A to the turn signal SW S/A.

CAUTION

- Assemble by inserting the convex portion of the turn signal SW cancel cam into the groove of the spiral cable S/A.
- Before connecting a white connector, ensure that a lead wire is seated on the hook located at the cover on the back of the turn signal SW.

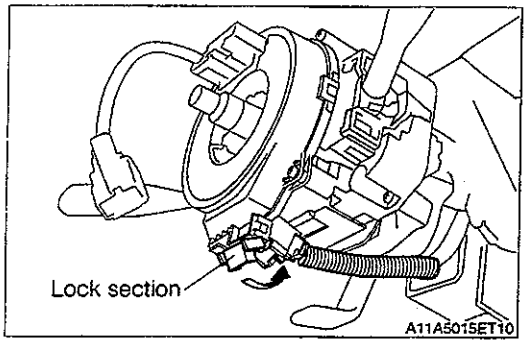




3.Connect the connector.

CAUTION

- When installing the yellow connector, make sure to turn the double lock portion to fix the connector.



3-1-6 OPERATION AFTER INSTALLATION

1.Install the column upper cover upper.

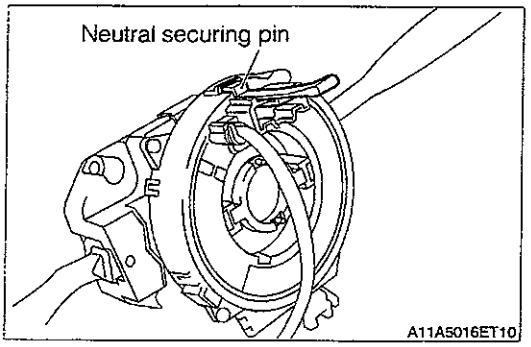
2.Install the column upper cover lower.

3.Install the instrument panel finish lower panel.

4.Adjust the center position of the spiral cable subassembly.

CAUTION

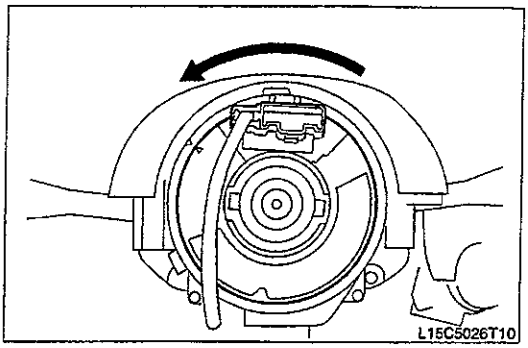
- If the new spiral cable S/A is to be installed, ensure that the neutral holddown pin stays. Following operations are required, only if the pin is out.



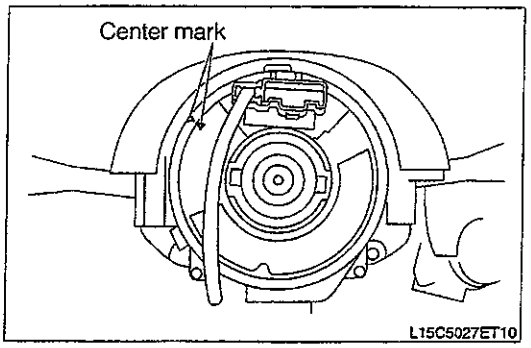
(1) Give the spiral cable S/A counterclockwise turns until it locks.

NOTE

- It should be noted that the number of lock-to-lock turns of the spiral cable subassembly is about six.



(2) Give the spiral cable S/A approx. 3 clockwise counter-rocking turns from the lock position, followed by the additional turn to whichever direction close to the center mark in order to match with the mark.



5.Install the steering wheel S/A to the steering shaft.
Refer to page G1-1.

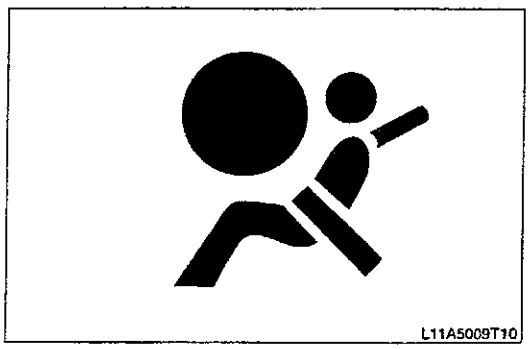
6.If the new spiral cable S/A is installed, pull out the neutral holddown pin at this point.

7.Install the horn pad subassembly.
Refer to page H1-7.

8.Confirm the steering wheel center position.

9.Install the negative terminal of the battery.

10.Turn ON the IG SW. Ensure that the airbag warning lamp is illuminated for about six seconds and, then, it goes out.



4 SRS AIRBAG (FRONT PASSENGER SEAT SIDE)

4-1 REMOVAL AND INSTALLATION

4-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

4-1-2 OPERATION BEFORE REMOVAL

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery.

CAUTION

- It should be noted that the memory of the computers of other systems (engine control, etc.) and the radio will be erased at the same time when the cable is disconnected from the negative terminal of the battery.

2.Wait at least 60 seconds.

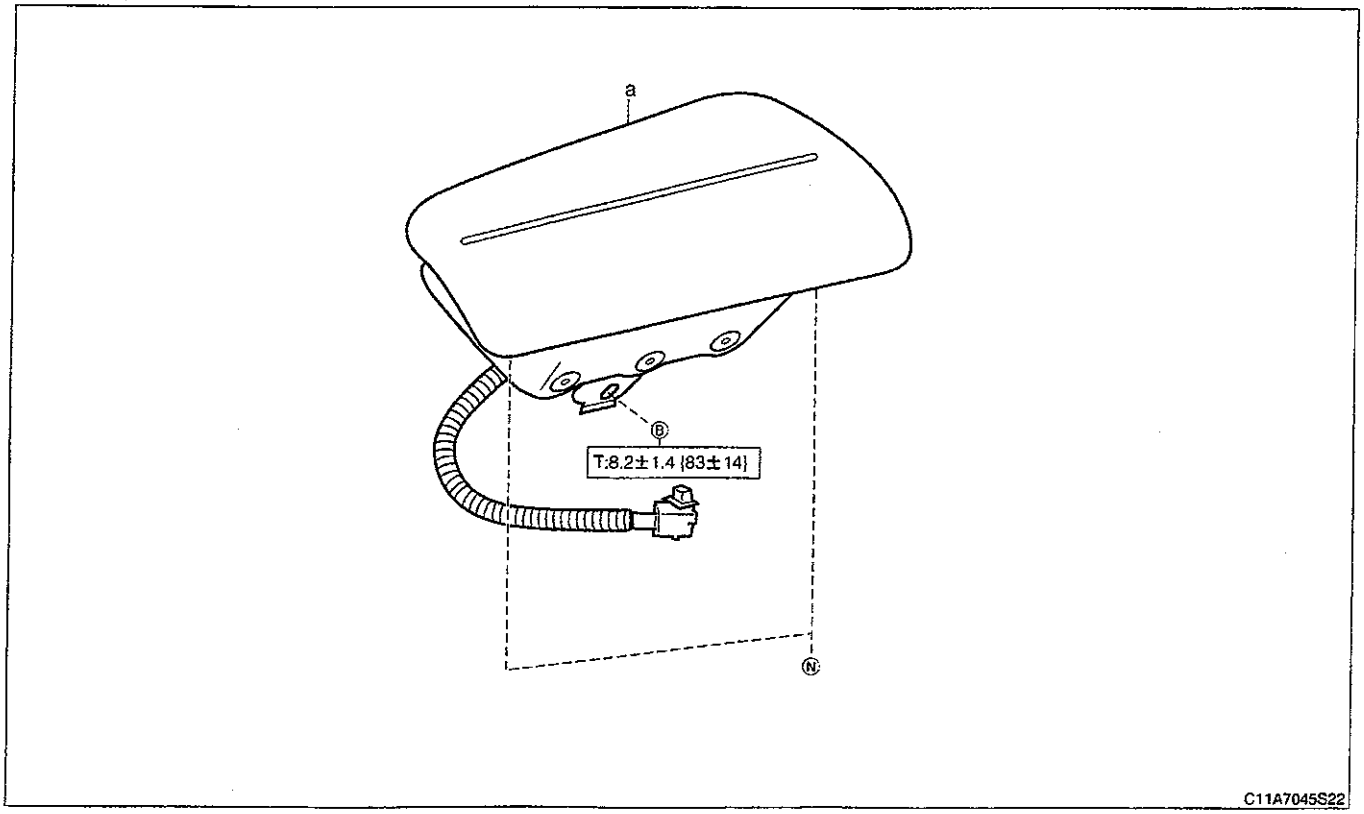
CAUTION

- The SRS airbag system is provided with a backup condenser (for the squib). Therefore, about 60 seconds are necessary for the backup condenser to discharge after the negative terminal of the battery is removed. (Natural discharge)
- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

3.Remove the instrument panel box assembly.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf·cm}

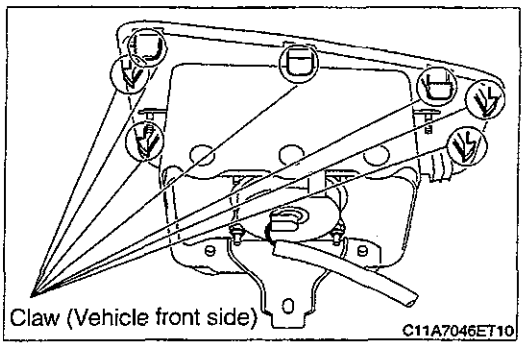
(2) REMOVAL AND INSTALLATION PROCEDURES

▼ ▲ 1 a Airbag Ay, instrument panel passenger

4-1-4 POINTS OF REMOVAL

(1) INSTRUMENT PANEL PASSENGER AIRBAG AY

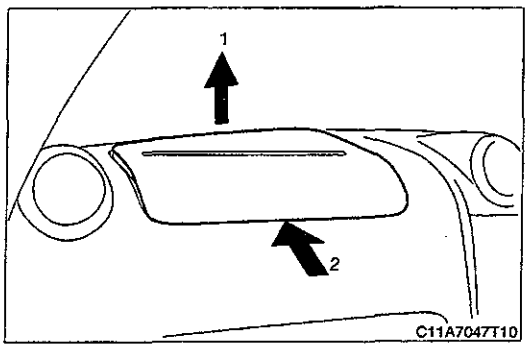
1. Remove the two bolts and the one nut which secure the instrument panel passenger airbag assembly with the pillar-to-pillar member .
2. Remove the claw of the instrument panel passenger airbag Ay on the vehicle front side.

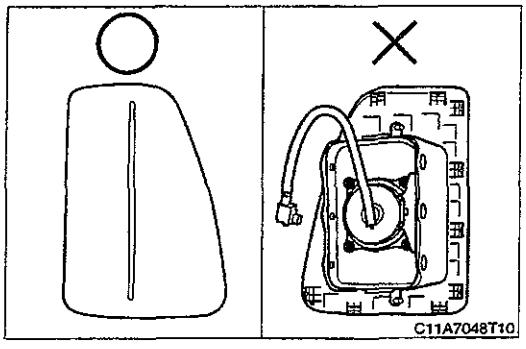


3. Slide the instrument panel passenger airbag Ay frontward of the vehicle and remove.

CAUTION

- When placing the instrument panel passenger airbag assembly, be sure to face the deploying surface upward.
- Use care not to drop the instrument panel passenger airbag Ay.





4-1-5 INSPECTION

(1) CHECK OF INSTRUMENT PANEL PASSENGER AIRBAG AY

Perform checks in the following cases. Replace any faulty parts.

(1) Case where the vehicle is damaged, including minor collisions where the airbag has not been deployed.

(2) Case where problems have been found out by the diagnosis check

(2) EXTERNAL CHECK OF INSTRUMENT PANEL PASSENGER AIRBAG Ay

When the following cases have occurred, replace the instrument panel passenger airbag Ay

(1) Case where the airbag has been deployed.

(2) Case where the airbag deploying surface of the instrument panel passenger airbag Ay has scratches or cracks.

(3) Case where the connector or harness has dents or chips.

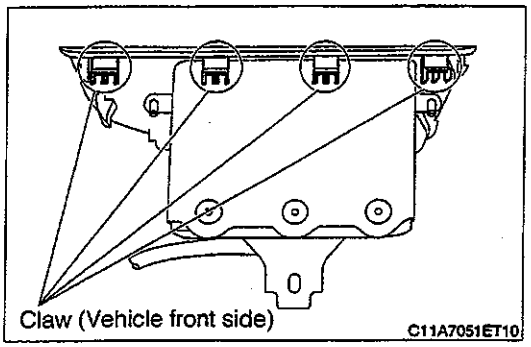
(4) Case where grease, water, detergent or oil has got to the instrument panel passenger airbag assembly in a large quantity.

(5) Case where the instrument panel passenger airbag assembly dropped and got damaged.

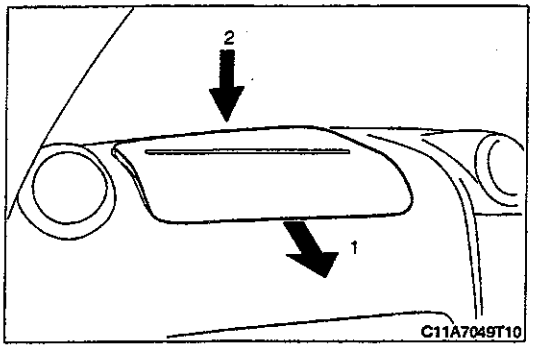
4-1-6 POINTS OF INSTALLATION

(1) INSTRUMENT PANEL PASSENGER AIRBAG AY

1.Insert the claw of the instrument panel passenger airbag Ay, starting with the claw on the vehicle rear side.

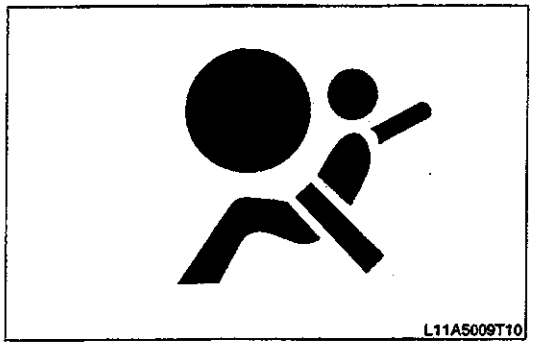


2.Hold it down to fit into the instrument panel.



4-1-7 OPERATION AFTER INSTALLATION

1.Install the instrument panel box assembly.
2.Install the negative terminal of the battery.
3.Turn ON the IG SW. Ensure that the airbag warning lamp is illuminated for about six seconds and, then, it goes out.



4-2 DISPOSAL

4-2-1 OUTLINE

When scrapping a vehicle equipped with the SRS airbag system, deploy the driver seat SRS airbag system and the front passenger seat SRS airbag system so that the airbag system can be scrapped as a single part. In the event of scrapping the airbag system that has not been deployed, it is absolutely important to deploy the system prior to scrapping. Follow the instructions below on how to scrap the airbag system.

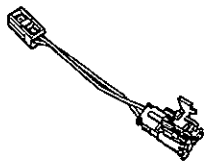
CAUTION

- Never scrap the driver's seat SRS airbag or front passenger's seat SRS airbag that has not been deployed.
- When scrapping the driver's seat SRS airbag or front passenger's seat SRS airbag that has been deployed by a customer, follow the "Airbag scrapping procedure."

4-2-2 Deployment of instrument panel passenger airbag assembly

(1) ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09082-87710-000 (09082-87701-000)	Wire, air bag deployment
	09082-00760-000	Sub-harness 4, air bag deployment wire

Lubricant,adhesive,others

Wire harness (1.25mm^2),12V battery for car use,1 tire with disc wheel,4 tires,Vinyl bag

(2) INSTRUCTIONS ON DEPLOYING THE INSTRUMENT PANEL PASSENGER AIRBAG Ay.

1.This operation shall be done outdoors where safety is assured.
2.Use SST to keep at least 5 m away from the instrument panel passenger airbag Ay.
3.Allow at least 30min after activation, because the deployed instrument panel passenger airbag Ay is extremely hot.
4.Do not apply water, etc. to the deployed instrument panel passenger airbag assembly.
5.Wear protective glasses and gloves in handling the deployed instrument panel passenger airbag Ay.
6.Put the deployed instrument panel passenger airbag Ay in a plastic bag, seal and scrap it.
7.After completion of the operation, be sure to wash your hands with water.

(3) ON-VEHICLE DEPLOYMENT OF INSTRUMENT PANEL PASSENGER AIRBAG Ay

WARNING

- Before connecting the SST terminal to the battery, once again make sure there are no one around.
- Keep at least 5 m away from the site, as the operation produces a large sound.

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery.

CAUTION

- It should be noted that the memory of the computers of other systems (engine control, etc.) and the radio will be erased at the same time when the cable is disconnected from the negative terminal of the battery.

2.Wait at least 60 seconds.

CAUTION

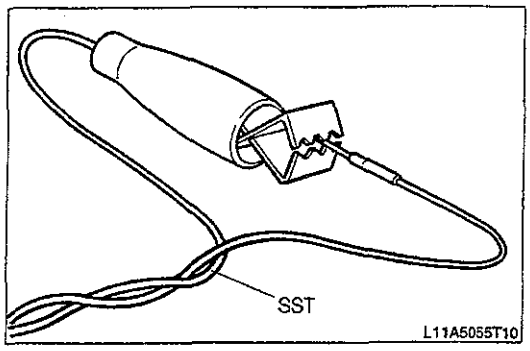
- The SRS airbag system is provided with a backup condenser (for the squib). Therefore, about 60 seconds are necessary for the backup condenser to discharge after the negative terminal of the battery is removed. (Natural discharge)
- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

3.Connect the following two SSTs.
SST: 09082-87710-000
09082-00760-000

4.Short the terminal with the alligator clip of the SST (Airbag deployment wire).
SST: 09082-87710-000

CAUTION

- Before starting work, ensure that the instrument panel passenger airbag Ay is securely fixed on the instrument panel and the instrument panel passenger airbag Ay is securely fixed on the pillar to pillar member.



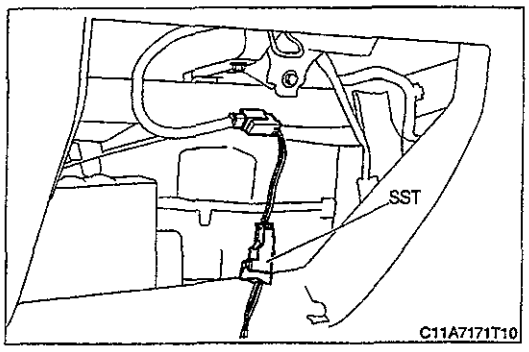
5.Remove the instrument panel box Ay.

6.Connect the SST connector to the airbag connector (yellow 2P) located on the right side of the instrument panel box Ay opening.

7.Place the battery at a position where the SST has been extended as long as possible.

CAUTION

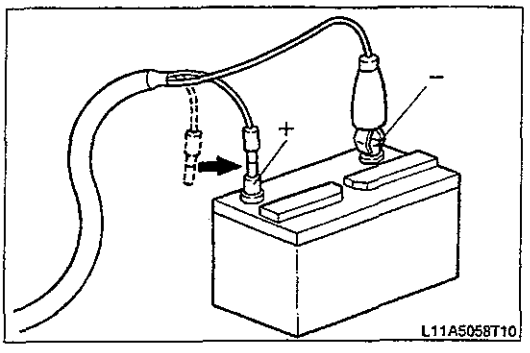
- Keep all the doors and windows closed during this operation.
- Make sure that there is no one inside and around the vehicle.
- Since a big sound will be emitted at the time of deployment, keep at least 5 m away.



8.Once again make sure of the safety inside and around the vehicle, and then connect the SST to the battery [with the alligator clip on battery side, and the terminal on side] and deploy the unit.

CAUTION

- Give warning loudly to those nearby before deploying the airbag.



(4) DEPLOYMENT OF INSTRUMENT PANEL PASSENGER AIRBAG AY AS UNIT

WARNING

- Before connecting the SST terminal to the battery, once again make sure there are no one around.
- Keep at least 5 m away from the site, as the operation produces a large sound.

1.rAfter the IG SW has been set to [LOCK] position, remove the negative terminal of the battery.

CAUTION

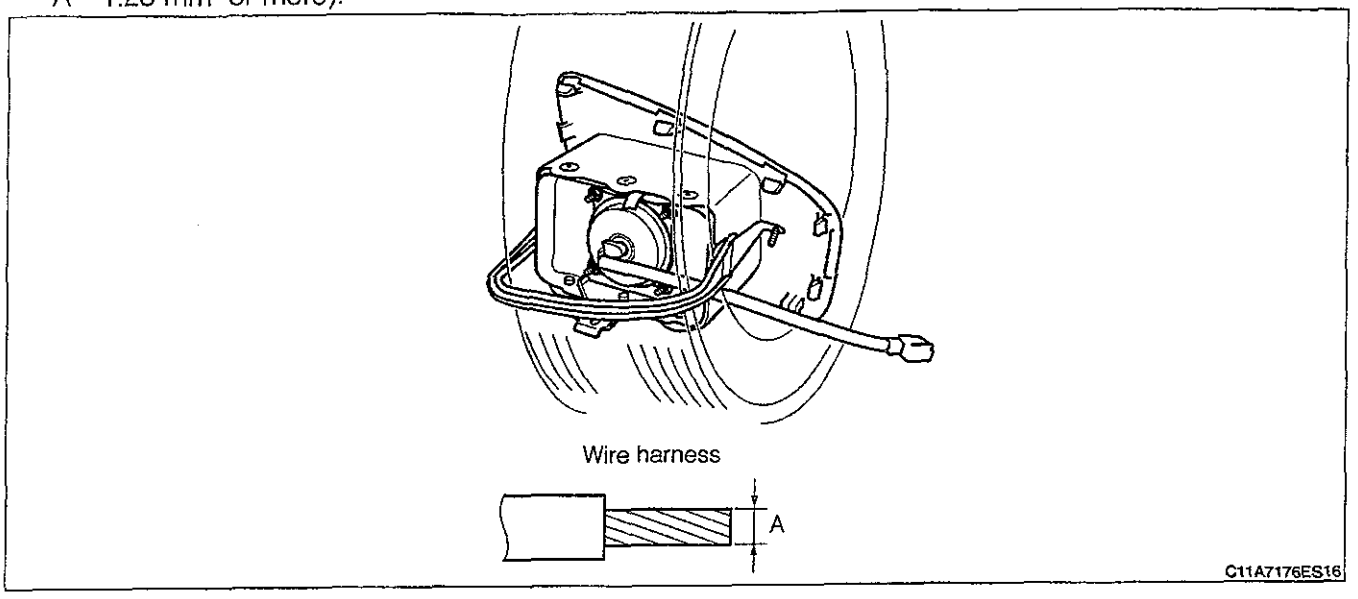
- It should be noted that the memory of the computers of other systems (engine control, etc.) and the radio will be erased at the same time when the cable is disconnected from the negative terminal of the battery.

2.Wait at least 60 seconds.

CAUTION

- The SRS airbag system is provided with a backup condenser (for the squib). Therefore, about 60 seconds are necessary for the backup condenser to discharge after the negative terminal of the battery is removed. (Natural discharge)
- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

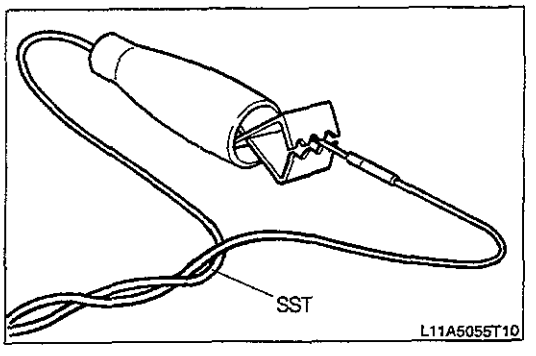
3.Remove the instrument panel passenger airbag assembly.
4.Secure the unit to a disc wheel, using a wire harness for car use (cross-sectional area of core wire: A = 1.25 mm² or more).



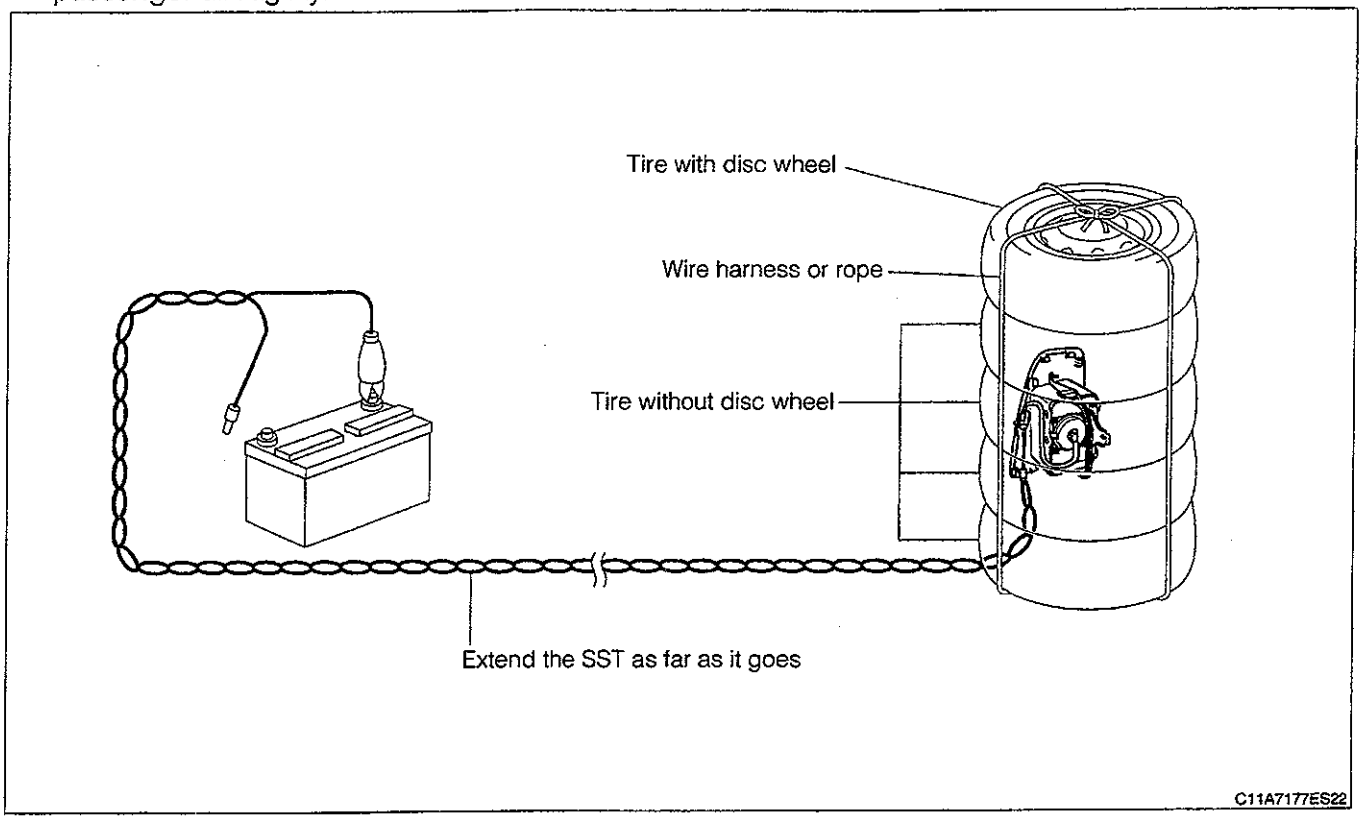
CAUTION
- Triple the wire harness and securely fix it.

5.Short the terminal with the alligator clip of the SST (Airbag deployment wire).
SST: 09082-87710-000

CAUTION
- Deployment activity of the instrument panel passenger airbag Ay shall be done outdoors.



6.Connect the SST connector to the connector for the airbag (yellow 2P).
7.Place two or more tires on each upper and lower side of the tire with instrument panel passenger airbag Ay fixed. And place the tire equipped with the disk wheel on top of those tires.
8.Connect the tires with wire harnesses or ropes so that the tires will not be scattered when the airbag is deployed.
9.Once again make sure of the safety around the vehicle, and then connect the SST to the battery [with the alligator clip on battery side, and the terminal on side] and deploy the instrument panel passenger airbag Ay.

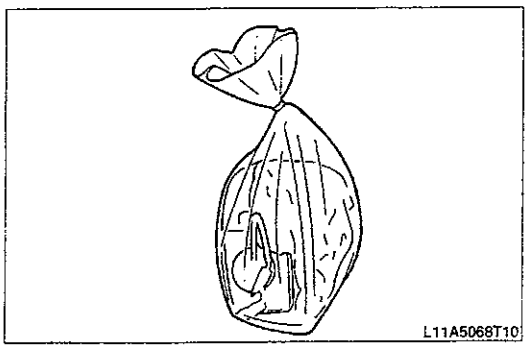


CAUTION
- Give warning loudly to those nearby before deploying the airbag.
- Never mount and reuse the tires and wheels used for the deployment on vehicles.

(5) SCRAPPING OF THE INSTRUMENT PANEL PASSENGER AIRBAG AY

1.Seal the deployed instrument panel passenger airbag assembly in a plastic bag before it is scrapped.

CAUTION
- Scrap only after deployment is complete.
- Allow at least 30min after activation, because the deployed instrument panel passenger airbag Ay is extremely hot.
- Do not apply water, etc. to the deployed instrument panel passenger airbag assembly.
- Wear protective glasses and gloves in handling the deployed instrument panel passenger airbag Ay.
- After completion of the operation, be sure to wash your hands with water.



5 SEAT BELT WITH PRETENSIONER MECHANISM

5-1 REMOVAL AND INSTALLATION

Refer to Page I2-32.

5-2 DISPOSAL

5-2-1 OUTLINE

1.The driver's seat and the front passenger seat are equipped with seatbelts with the pretensioner mechanism (hereinafter referred to as "pretensioner").

2.When scrapping a vehicle equipped with the pretensioner, it is necessary to remove the pretensioner and scrap it as a single part. An undeployed pretensioner needs to be deployed before scrapping.

CAUTION

- **Do not scrap a vehicle equipped with an undeployed pretensioner until the pretensioner has been deployed.**
- **Do not scrap the undeployed pretensioner.**
- **Do not disassemble the pretensioner.**

5-2-2 CONFIRMATION OF ACTUATED PRETENSIONER

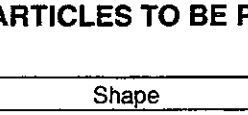
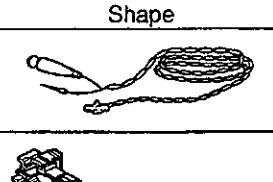
The pretensioner deploys simultaneously with the airbag. This means that when the airbag is deployed in a crash or for some other reason, the pretensioner is also deployed.

CAUTION

- **The pretensioner can be actuated with or without seatbelt fastened.**

5-2-3 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09082-87710-000 (09082-87701-000)	Wire, air bag deployment
	09082-00770-000	Sub-harness 5, air bag deployment wire

Lubricant,adhesive,others

12V battery for car use,2 tires with disc wheel,A steel sheet(a thickness t = 1 to 2mm),Vinyl bag

5-2-4 Instructions on the pretensioner deployment

1.Scrap only after deployment is complete.

2.Deployment activity shall be done outdoors where safety is assured.

3.Use SST to keep at least 5 m away from the pretensioner.

4.Allow at least 30min after activation, because the deployed pretensioner is extremely hot.

5.Do not pour water or other liquid over the deployed pretensioner.

6.Wear protective glasses and gloves in handling the deployed pretensioner.

7.Put the deployed pretensioner in a plastic bag, seal and scrap it.

8.Wash your hands after operation.

5-2-5 Onboard pretensioner deployment

1.Wait for at least 60 sec to start work after turning the IG SW LOCK and disconnecting the negative battery terminal.

CAUTION

- It should be noted that the memory of the computers of other systems (engine control, etc.) and the radio will be erased at the same time when the cable is disconnected from the negative terminal of the battery.

2.Remove the quarter trim panel assembly.

3.With a flat screwdriver or the like, pull out the locking button of the pretensioner connector toward you to unlock and disconnect the pretensioner connector.

WARNING

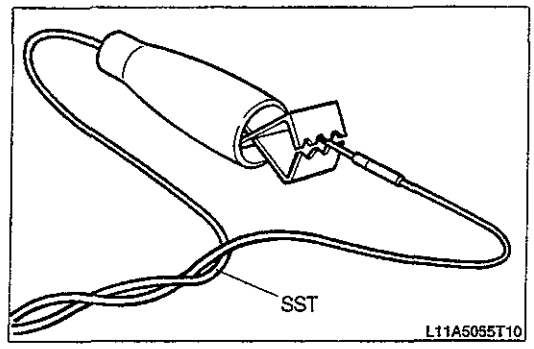
- Check that there is no excessive play at the pretensioner installing section.

4.Connect the following two SSTs.

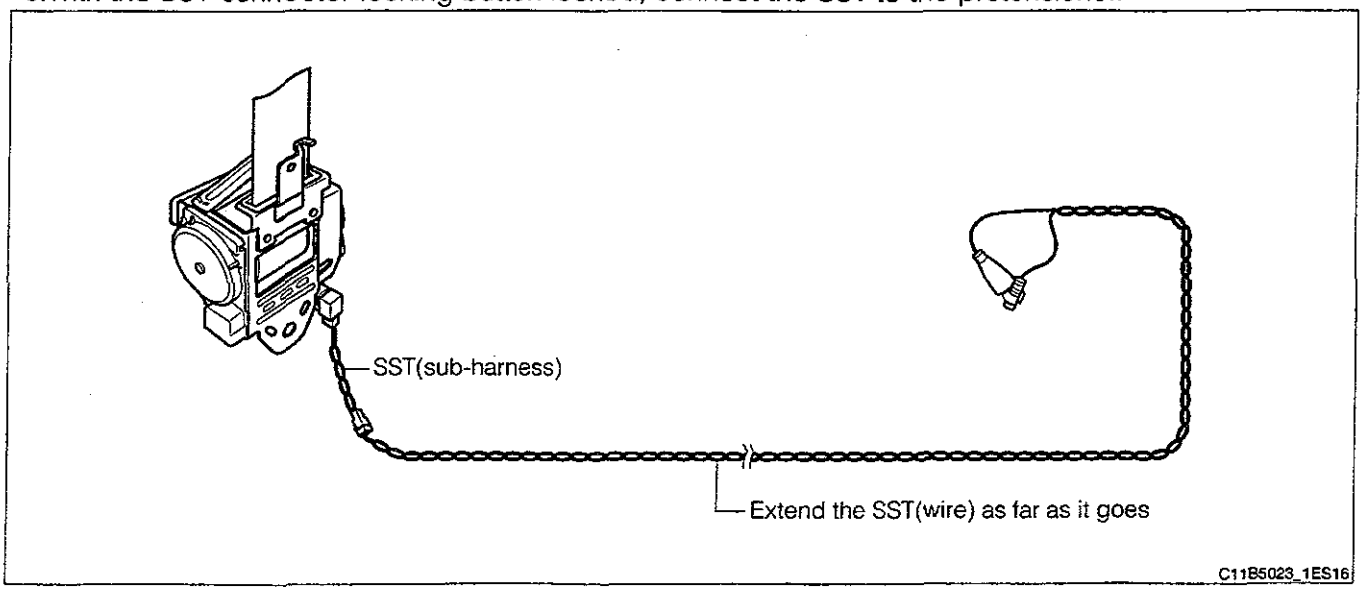
SST: 09082-87710-000
09082-00770-000

5.Short the terminal with the alligator clip of the SST (Airbag deployment wire).

SST: 09082-87710-000



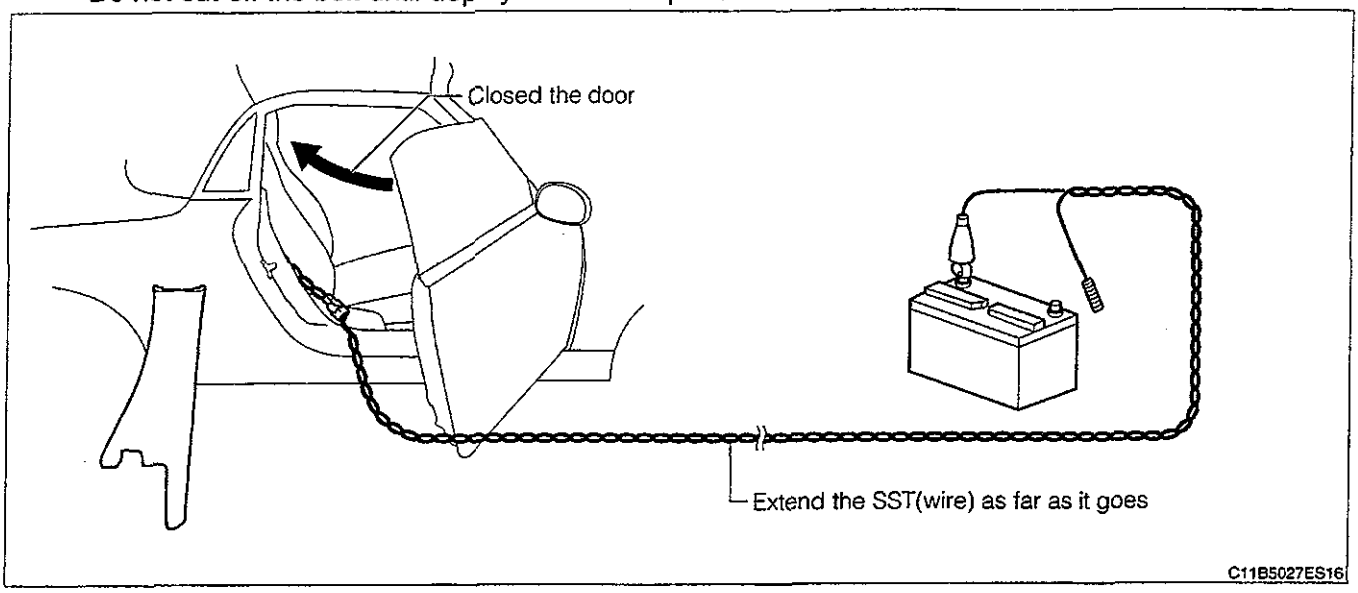
6.With the SST connector locking button locked, connect the SST to the pretensioner.



7.Fully extend the SST from the vehicle, and place the battery a distance of 5 m or more.

WARNING

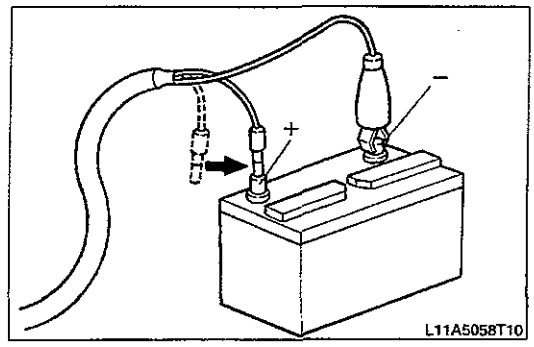
- At this time, close all the doors and windows.
- Do not cut off the belt until deployment is complete.



8.Connect the SST (airbag deployment wire) to the battery [with the alligator clip on battery side, and the terminal on side] and deploy the pretensioner.

WARNING

- Before deployment operation, it is absolutely necessary to ensure nobody is in and around the vehicle.
- Before deployment operation, it is absolutely necessary to alert people around in a loud voice.



5-2-6 Pretensioner deployment as a single part

WARNING

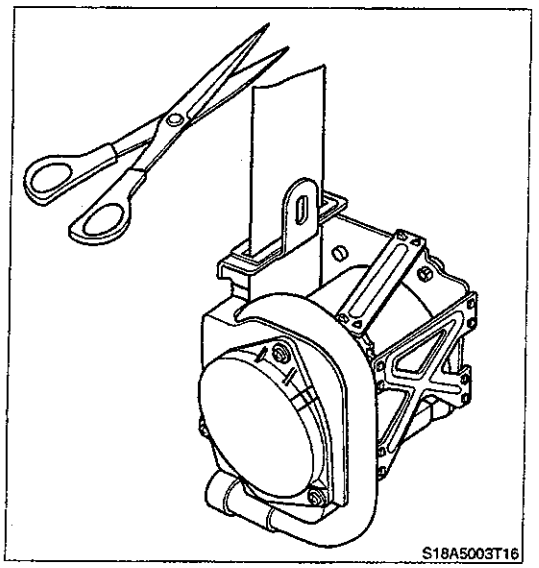
- Deployment operation shall be done outdoors on a flat ground where safety is assured. Wherever possible, avoid residential districts.
- People around must be well informed of the deployment activity, as the operation produces a large sound.

1.Wait for at least 60 sec to start work after turning the IG SW LOCK and disconnecting the battery terminal.

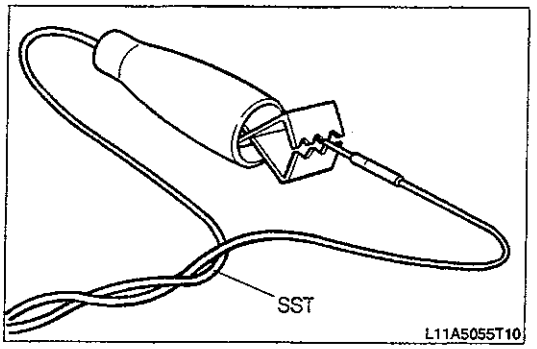
CAUTION

- It should be noted that the memory of the computers of other systems (engine control, etc.) and the radio will be erased at the same time when the cable is disconnected from the negative terminal of the battery.

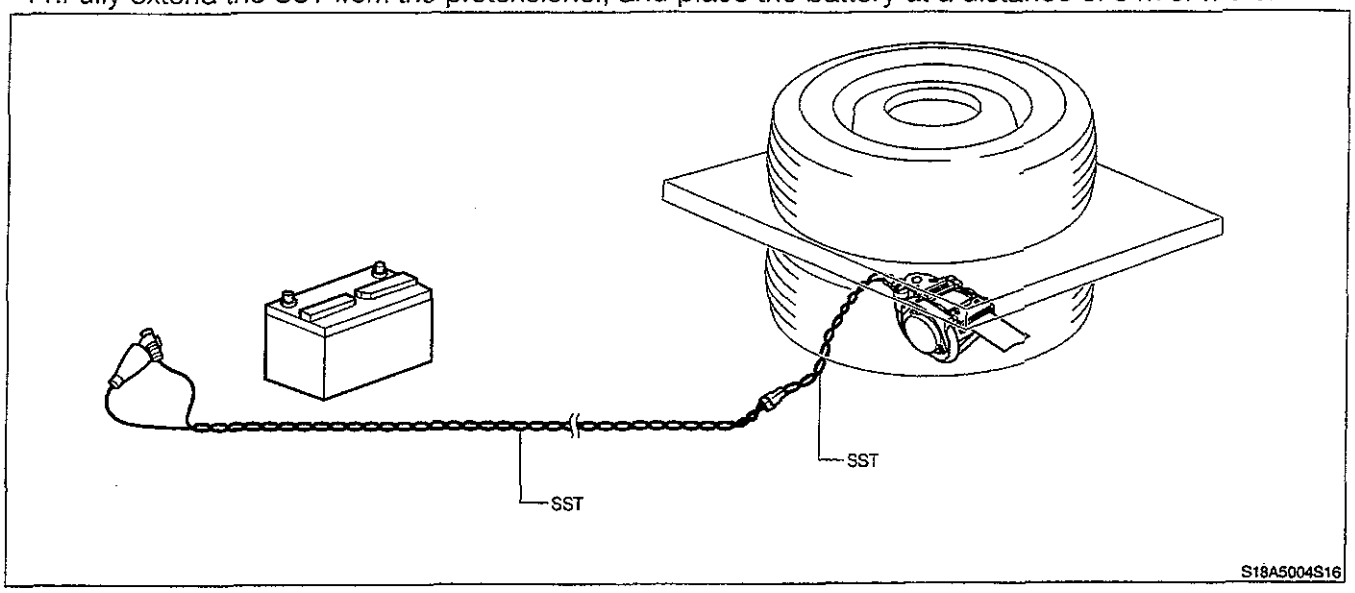
2.Remove the rear door scuff plate.
3.Remove the quarter trim panel assembly.
4.With a flat screwdriver or the like, pull out the locking button of the pretensioner connector toward you to unlock and disconnect the pretensioner connector.
5.Cut the belt of the front seat outer belt assembly at the retractor section.
6.Connect the following two SSTs.
SST: 09082-87710-000
09082-00770-000



7.Short the terminal with the alligator clip of the SST (Airbag deployment wire).
SST: 09082-87710-000



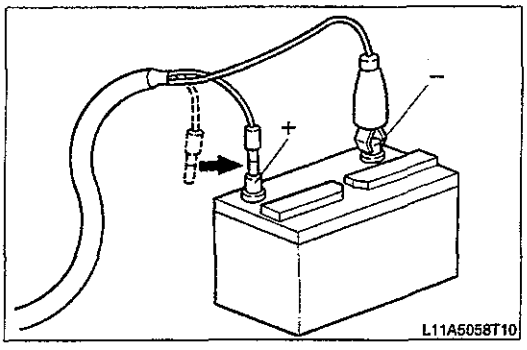
8.With the SST connector locking button locked, connect the SST to the pretensioner.
9.Place the pretensioner on the ground with its connector side facing upward. Place a tyre with a disc wheel on it.
10.Place a steel plate (with the thickness of t=1−2mm) on top of the tire equipped with the disk wheel. Again place another tire equipped with the disk wheel on top of the plate.
11.Fully extend the SST from the pretensioner, and place the battery at a distance of 5 m or more.



12.When safety around the vehicle is assured, connect the SST (airbag deployment wire) to the battery [with the alligator clip on battery side, and the terminal on side] and deploy the pretensioner.

WARNING

- Before deployment operation, it is absolutely necessary to ensure nobody is in and around the vehicle.
- Before deployment operation, it is absolutely necessary to alert people around in a loud voice.

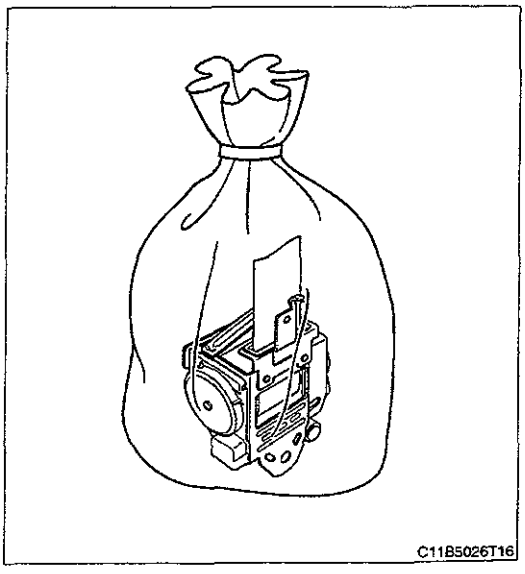


5-2-7 Scrapping of pretensioner

Put the activated pretensioner in a strong and clear plastic bag, seal and scrap it.

WARNING

- The temperature of the pretensioner that has been actuated is a few hundred °C at some sections. Therefore, leave it at least 30 minutes after it is actuated.
- Do not splash water on the actuated pretensioner.
- When handling the actuated pretensioner, wear dust protective goggles and gloves.
- After completion of the operation, be sure to wash your hands with water.
- Never scrap the undeployed pretensioner.



6 SENSOR UNIT

6-1 REMOVAL AND INSTALLATION

6-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

6-1-2 OPERATION BEFORE REMOVAL

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery.

CAUTION

- It should be noted that the memory of the computers of other systems (engine control, etc.) and the radio will be erased at the same time when the cable is disconnected from the negative terminal of the battery.

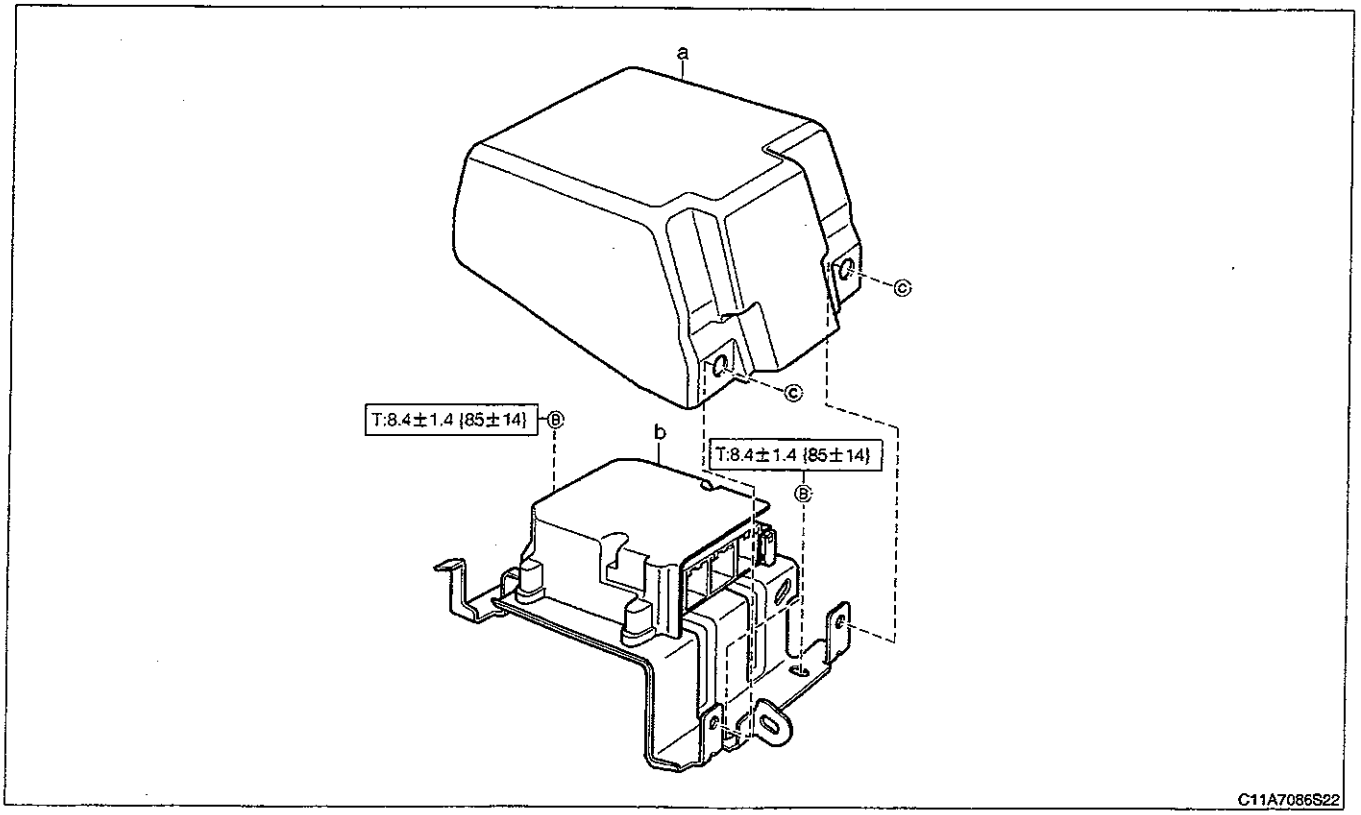
2.Wait at least 60 seconds.

CAUTION

- The SRS airbag system is provided with a backup condenser (for the squib). Therefore, about 60 seconds are necessary for the backup condenser to discharge after the negative terminal of the battery is removed. (Natural discharge)
- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

6-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

▼ ▲ 1 a Cover, airbag sensor

▼ ▲ 2 b Computer Ay, airbag

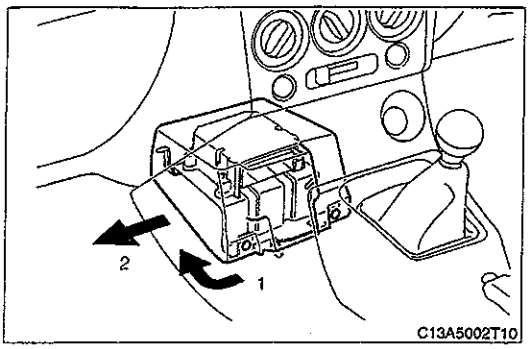
6-1-4 POINTS OF REMOVAL

(1) AIRBAG COMPUTER COVER

Follow instructions below to remove the airbag sensor cover.

(1) Remove the two clips that secure the airbag sensor cover.

(2) Horizontally turn the airbag sensor cover approx. 90° clockwise and pull it out to the left side of the vehicle.



(2) AIRBAG COMPUTER AY

1.Disconnect the connector of the airbag computer assembly.

CAUTION

- Connection or disconnection of the connector must be performed with the airbag computer assembly installed on the vehicle.
- If the connector is connected while the airbag computer Ay is removed from the vehicle, the airbag might deploy.

2.Remove the airbag computer Ay.

6-1-5 INSPECTION

(1) CHECK STANDARD FOR AIRBAG COMPUTER Ay

Check the airbag computer assembly in the following cases. Replace it if it is faulty.

(1) Case where the vehicle is involved in a collision.

CAUTION

- Perform the check whether the airbag has been deployed or not.
- As for the checking procedure, follow the trouble shooting instructions.

(2) EXTERNAL APPEARANCE CHECK OF AIRBAG COMPUTER Ay

Replace the airbag computer Ay in the following cases.

SPECIFIED VALUE: · The airbag computer assembly dropped.
·The connector section has damage or cracks.
·The airbag computer assembly has deformation or cracks.

CAUTION

- Never perform the circuit check of the airbag computer assembly, for there is the possibility that the airbag can be deployed unexpectedly.
- It is prohibited to use the airbag computer assembly that has been disassembled and assembled.

6-1-6 POINTS OF INSTALLATION

(1) AIRBAG COMPUTER AY

1.Install the airbag computer Ay.

CAUTION

- Never use the airbag computer assembly that are designed for other vehicles. Be sure to use the new specified assembly when replacing.

2.Connect the connector of the airbag computer assembly.

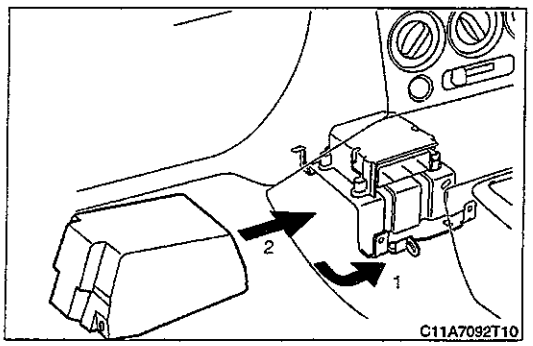
CAUTION

- Connect or disconnect the connector for the airbag computer Ay with the sensor unit mounted on the vehicle.
- If the connector is connected while the airbag computer Ay is removed from the vehicle, the airbag might deploy.
- Care must be exercised so that the harness or connector may not interfere with other parts or may not be caught by other parts.

(2) AIRBAG COMPUTER COVER

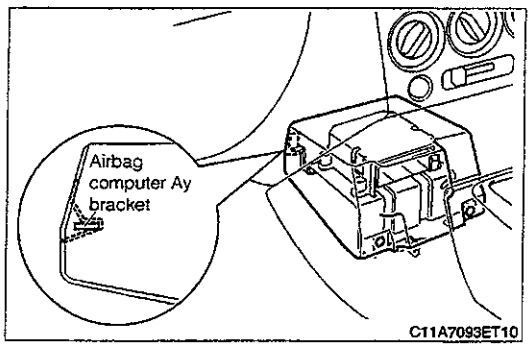
Follow instructions below to install the airbag sensor cover.

(1) Install the airbag sensor cover, while horizontally turning it approx. 90° counterclockwise from the left side of the vehicle.



(2) Secure the airbag sensor cover on the airbag computer Ay bracket.

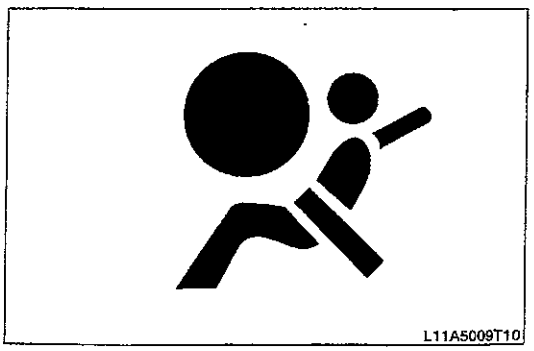
(3) Install the two clips that secure the airbag sensor cover.



6-1-7 OPERATION AFTER INSTALLATION

1.Install the negative terminal of the battery.

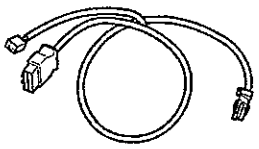
2.After the IG SW has been set to [LOCK] position. At this time, ensure that the airbag warning lamp goes on about six seconds and then goes out.



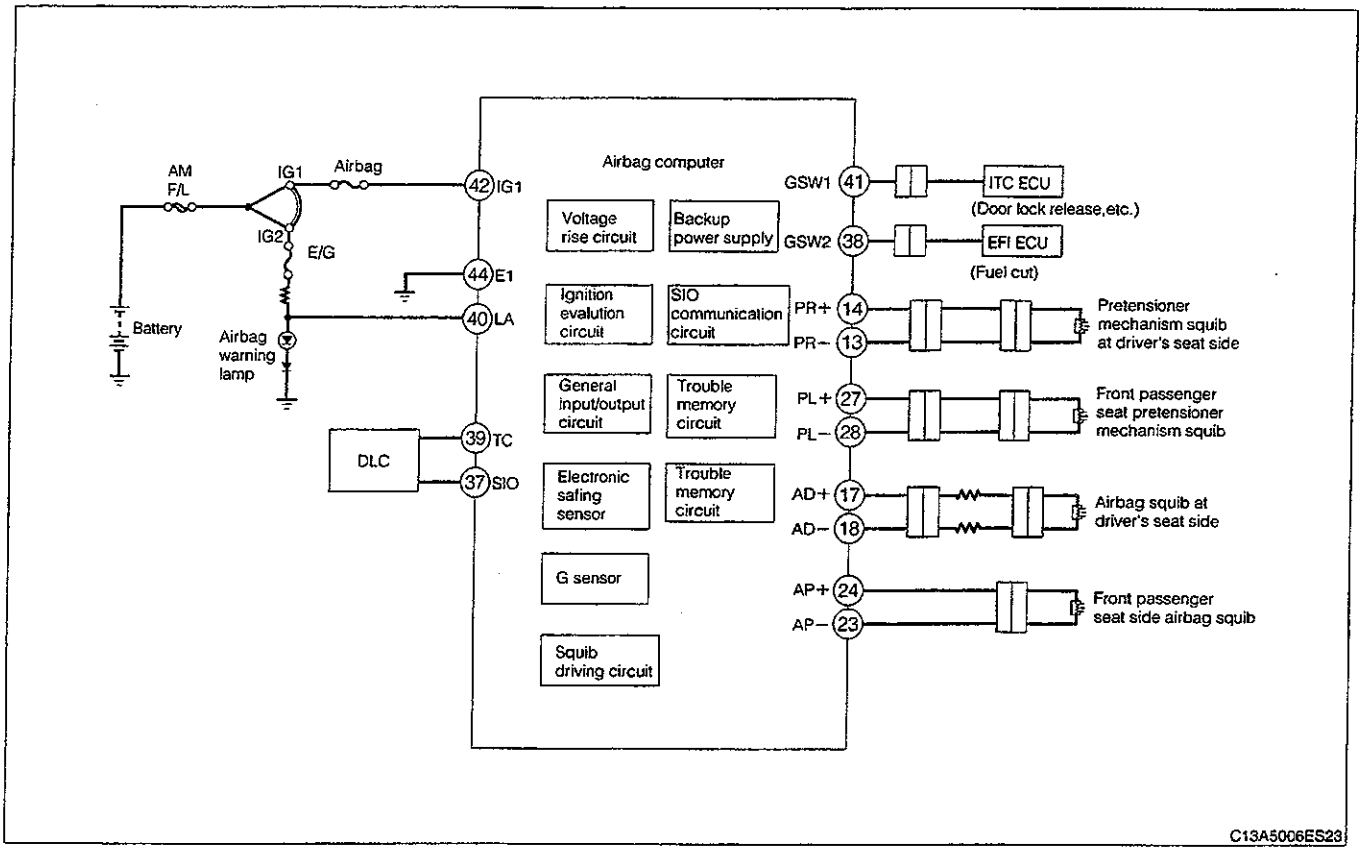
7 CONTROL SYSTEM

7-1 ARTICLES TO BE PREPARED

SST

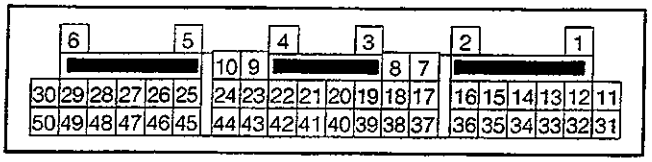
Shape	Part No.	Part name
	09991-87404-000 (09991-87401-000)	Wire, engine control system inspection
	09991-87403-000	Wire, diagnosis check

7-2 SYSTEM WIRING DIAGRAM



7-3 ARRANGEMENT OF ECU TERMINAL

Airbag computer

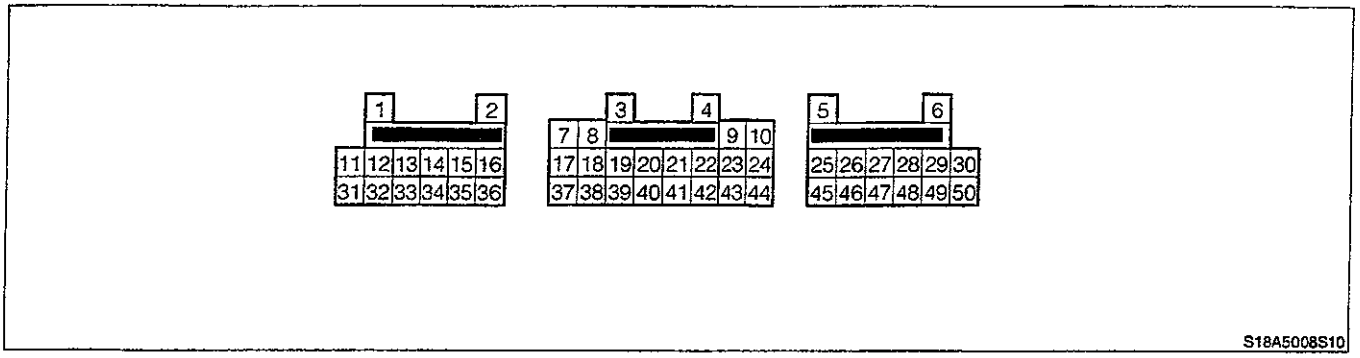


S18A5007S10

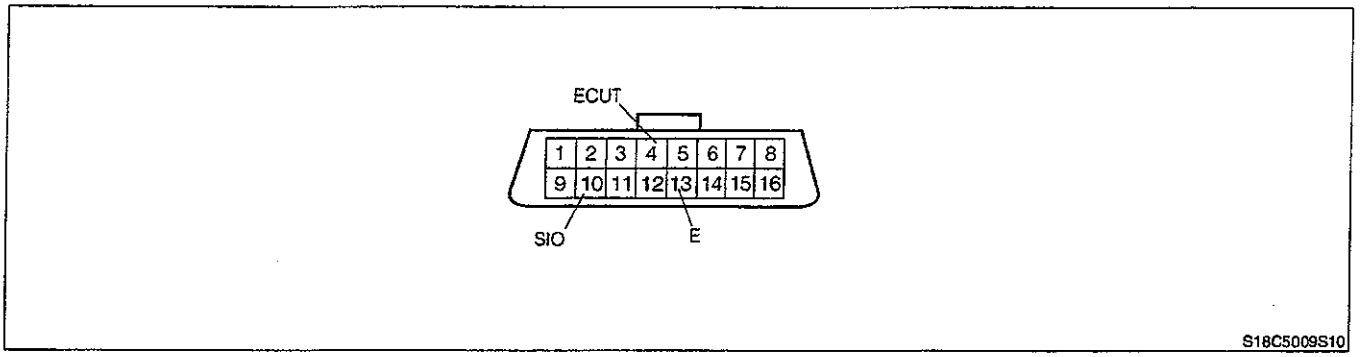
1	C-LOCKLA	Vehicle right side connector half - fitting detection(A)	26	–	–
2	C-LOCKLB	Vehicle right side connector half - fitting detection(B)	27	PL+	Front passenger's seat pretensioner mechanism squib (+)
3	C-LOCKCB	Vehicle center connector half - fitting detection(A)	28	PL-	Front passenger's seat pretensioner mechanism squib (-)
4	C-LOCKCA	Vehicle center connector half - fitting detection(B)	29	–	–
5	C-LOCKRB	Vehicle left side connector half - fitting detection(A)	30	–	–
6	C-LOCKRA	Vehicle left side connector half - fitting detection(B)	31	–	–
7	–	–	32	–	–
8	–	–	33	–	–
9	–	–	34	–	–
10	–	–	35	–	–
11	–	–	36	–	–
12	–	–	37	SIO	Diagnostic tester communication
13	PR-	Driver's seat pretensioner mechanism squib (-)	38	GSW2	EFI ECU communication
14	PR+	Driver's seat pretensioner mechanism squib (+)	39	TC	Start of diagnosis
15	–	–	40	LA	Airbag warning lamp
16	–	–	41	GSW1	
17	AD+	Driver's seat airbag squib (+)	42	IG1	IG1 power supply
18	AD-	Driver's seat airbag squib (-)	43	–	–
19	–	–	44	E1	Earth
20	–	–	45	–	–
21	–	–	46	–	–
22	–	–	47	–	–
23	AP-	Front passenger's seat airbag squib (-)	48	–	–
24	AP+	Front passenger's seat airbag squib (+)	49	–	–
25	–	–	50	–	–

7-4 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS

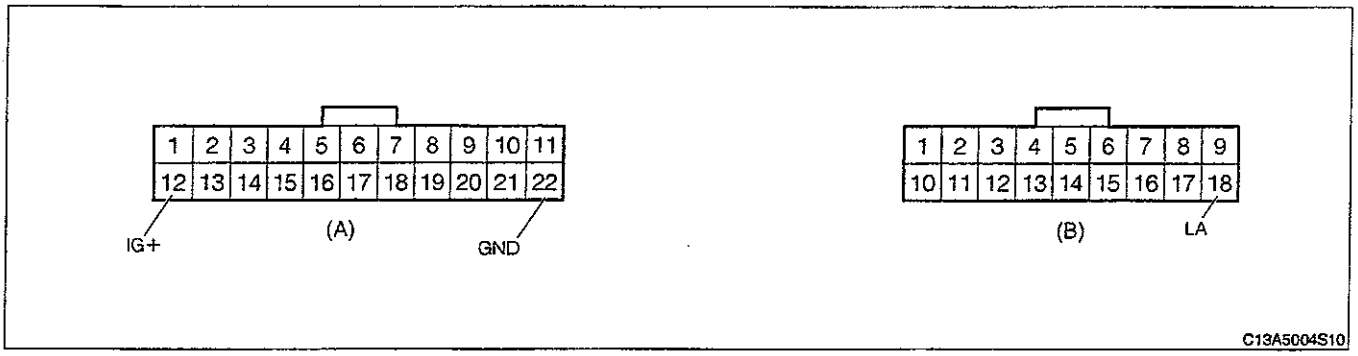
Airbag computer



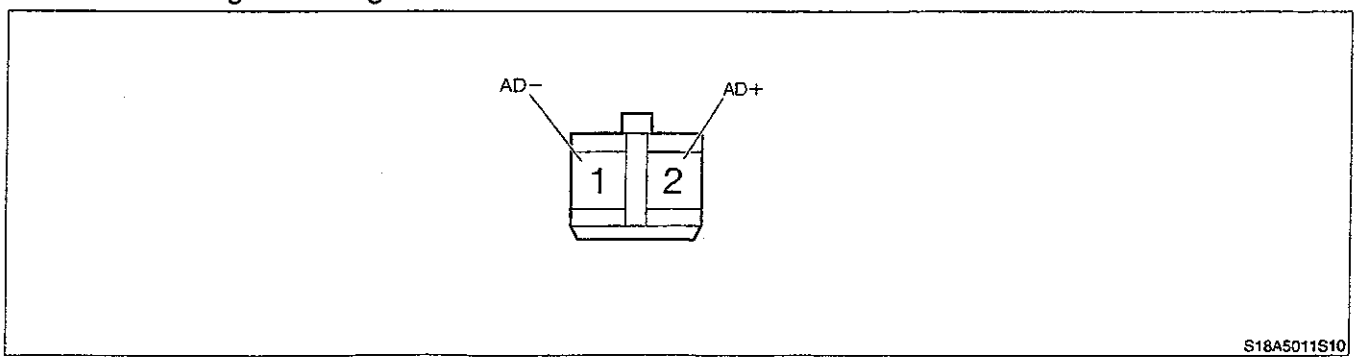
Check connector



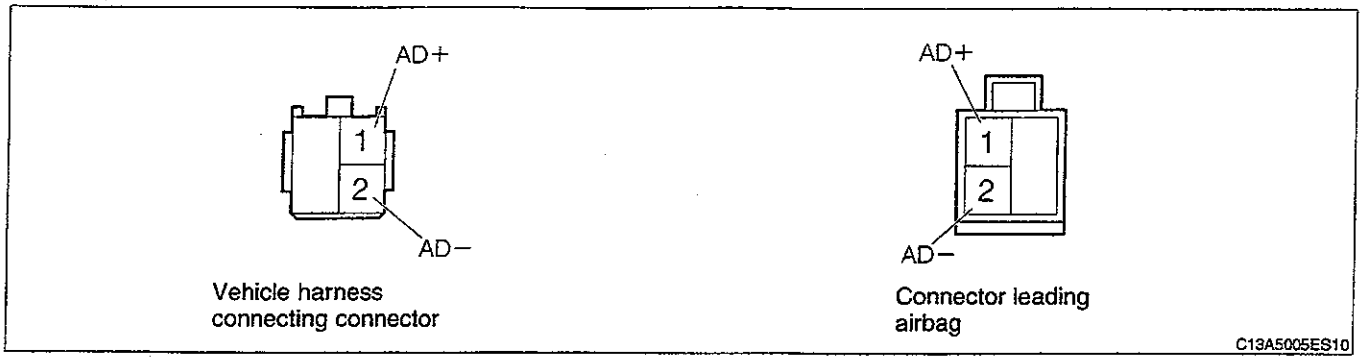
Combination meter



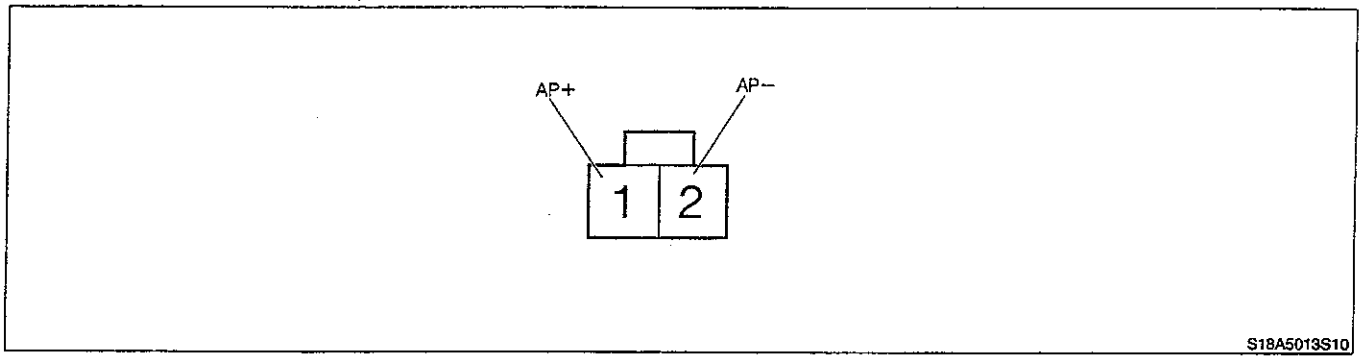
Connector leading to steering roll connector



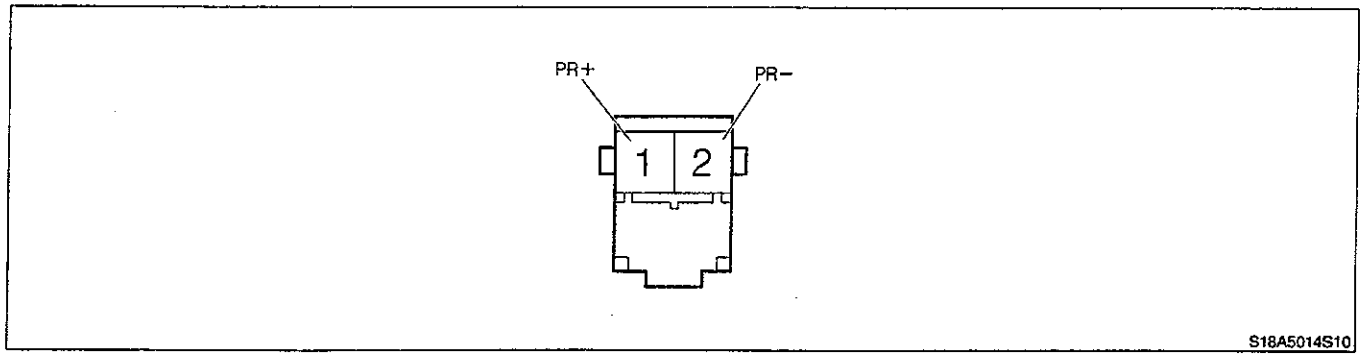
Steering roll connector



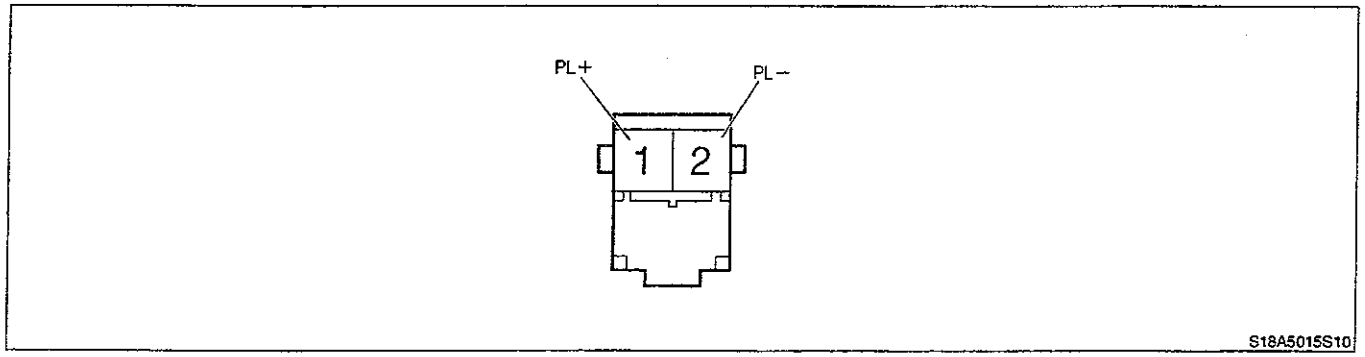
Front passenger seat airbag unit



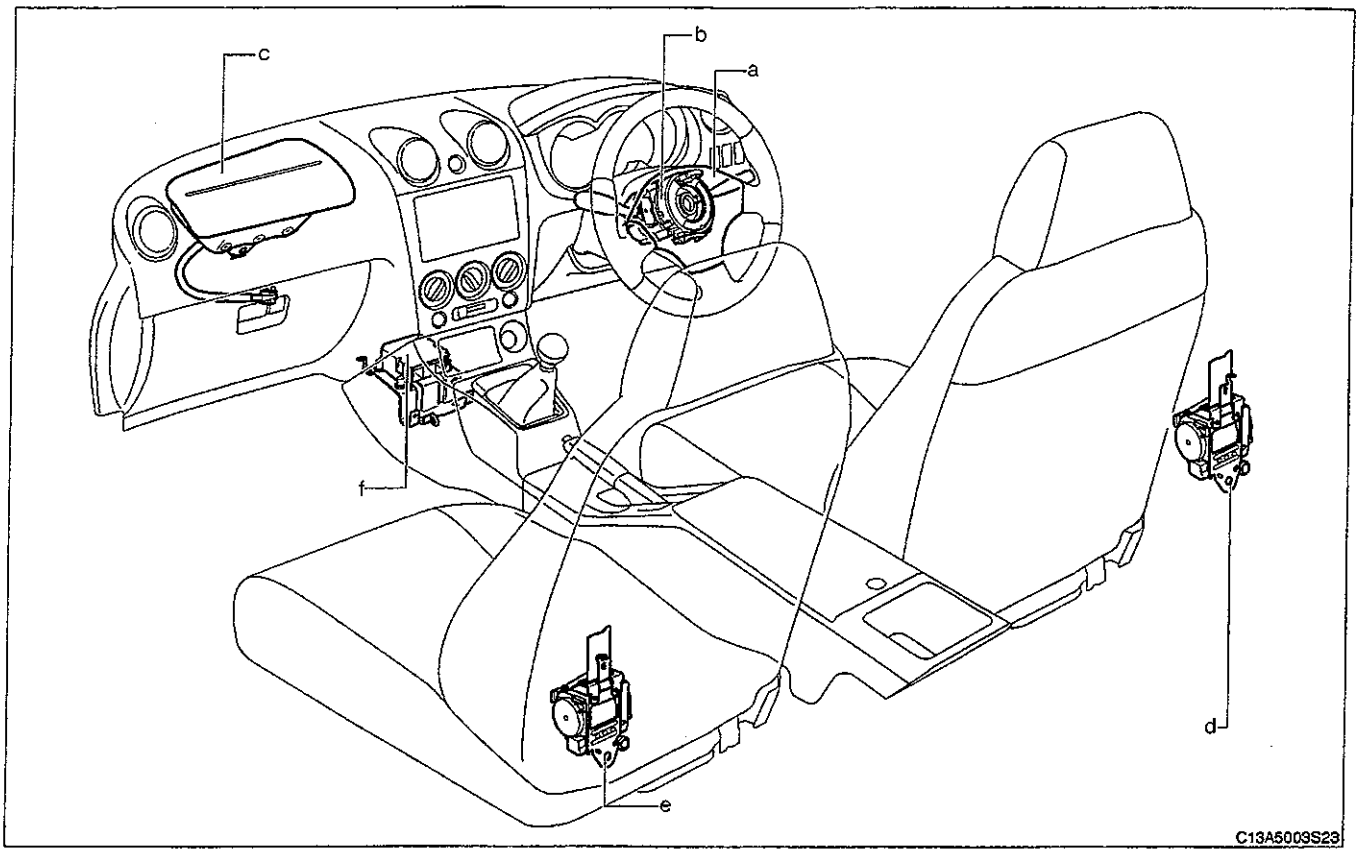
Driver's seat pretensioner mechanism



Front passenger seat pretensioner mechanism



7-5 LOCATION OF COMPONENTS



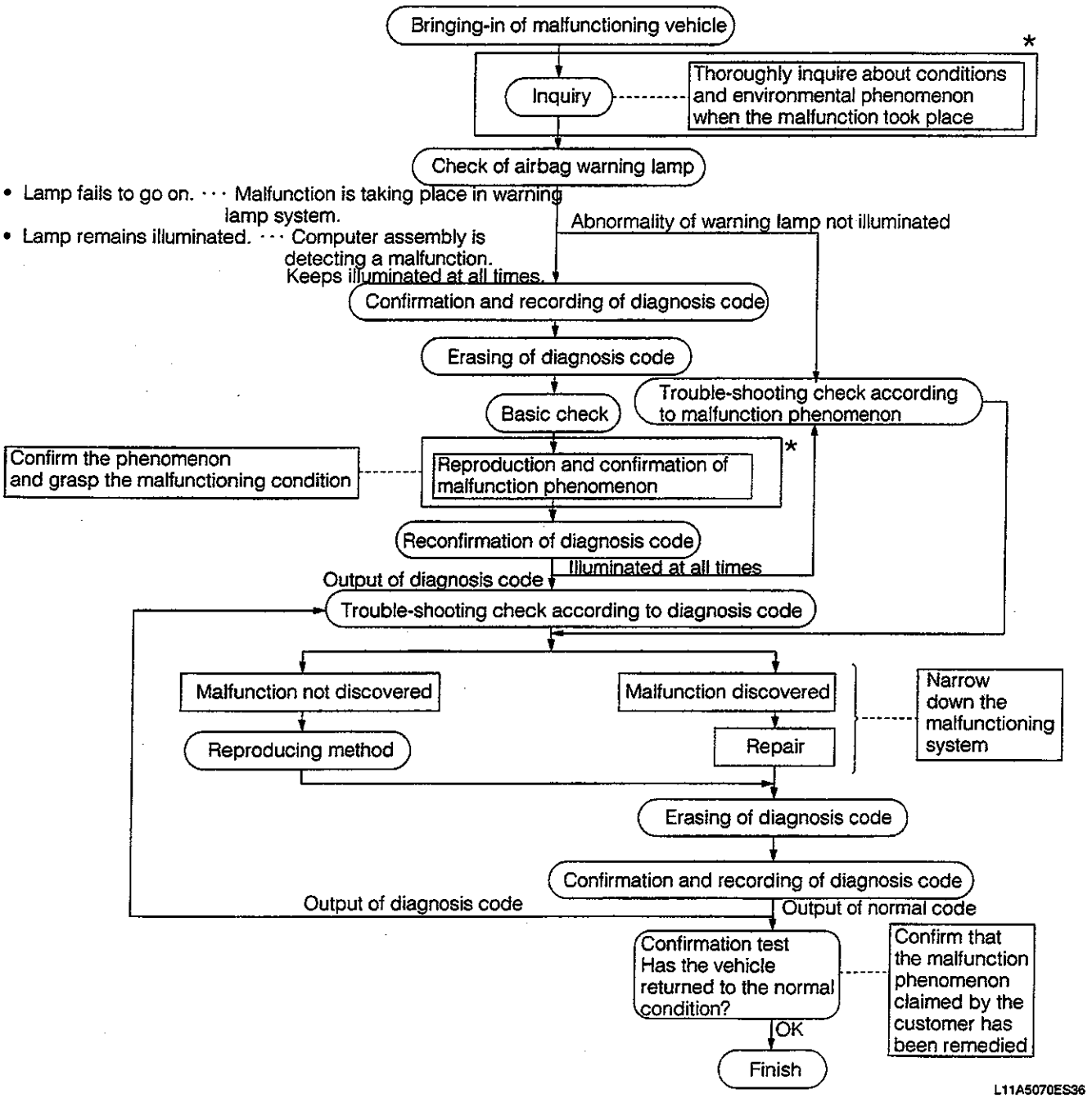
a	SRS airbag at driver's seat side
b	Steering roll connector
c	SRS airbag at front passenger seat side
d	Seat belt at driver's seat with pretensioner mechanism and force limiter mechanism
e	Seat belt at front passenger seat with pretensioner mechanism and force limiter mechanism
f	Airbag computer

7-6 HOW TO PROCEED WITH TROUBLE SHOOTING

7-6-1 HOW TO PROCEED DIAGNOSIS

The SRS airbag is provided with a diagnosis function which diagnoses malfunctioning sections. This function gives important clues in carrying out the trouble shooting. This system is provided with a backup function (EEPROM) which memorizes the diagnosis code. Therefore, even if the power supply is cut off, the diagnosis contents are retained.

The diagnosis code is indicated by illumination of the airbag warning lamp inside the combination meter.



CAUTION

- In the trouble shooting of the SRS airbag, it might be difficult to confirm the items bearing ※ marks given above due to the characteristics of the system (safety device).
- If wrong operations are performed during checks or repairs, the system may have malfunction or wrong operation. Therefore, care must be exercised to observe the notes given and perform the operations according to the instructions of this manual.

7-6-2 DIAGNOSIS THROUGH INQUIRIES

In an effort to remove causes for malfunction from the vehicle concerned, it is impossible to determine the cause without confirming the malfunction phenomenon. If the phenomenon is not confirmed, the vehicle may not be able to return to the normal conditions even if you continue your work. The diagnosis through inquiries is to collect information from the customer before confirming the malfunction phenomena. The diagnosis through inquiries provides very important clues in reproducing malfunction phenomena.

Since the information obtained by the diagnosis through inquiries is referred to during the trouble shooting, it is imperative to make an inquiry of the customer, centering on the items related to the malfunction, instead of simply asking general questions.

7-6-3 Confirmation of phenomenon

When the diagnosis code is indicated, confirm whether the malfunction took place sometimes in the system or is still persisting. Also it is necessary to check any relation between the code and the reproduced malfunction (malfunction mode). For this purpose, the diagnosis code should be indicated twice, namely before and after the confirmation of the phenomena.

7-7 DIAGNOSIS

7-7-1 CHECKING METHOD OF DIAGNOSIS

(1) INDICATION BY AIRBAG WARNING LAMP

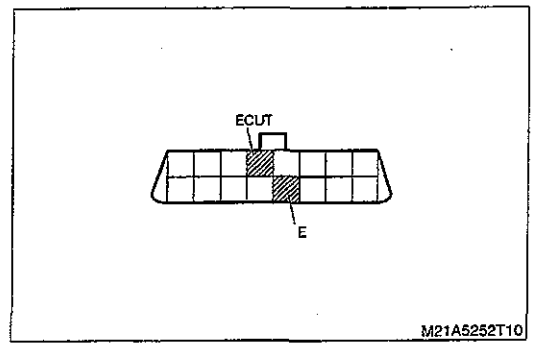
1.Stop the vehicle.

2.With the IG SW set to ON position, connect (short) ECUT terminal and E terminal inside the DLC located under the instrument panel.

CAUTION

- To short the check terminals, be sure to use the specified SST.
- If the short is made for wrong check terminals, it may cause malfunction. Be very careful not to select wrong terminals

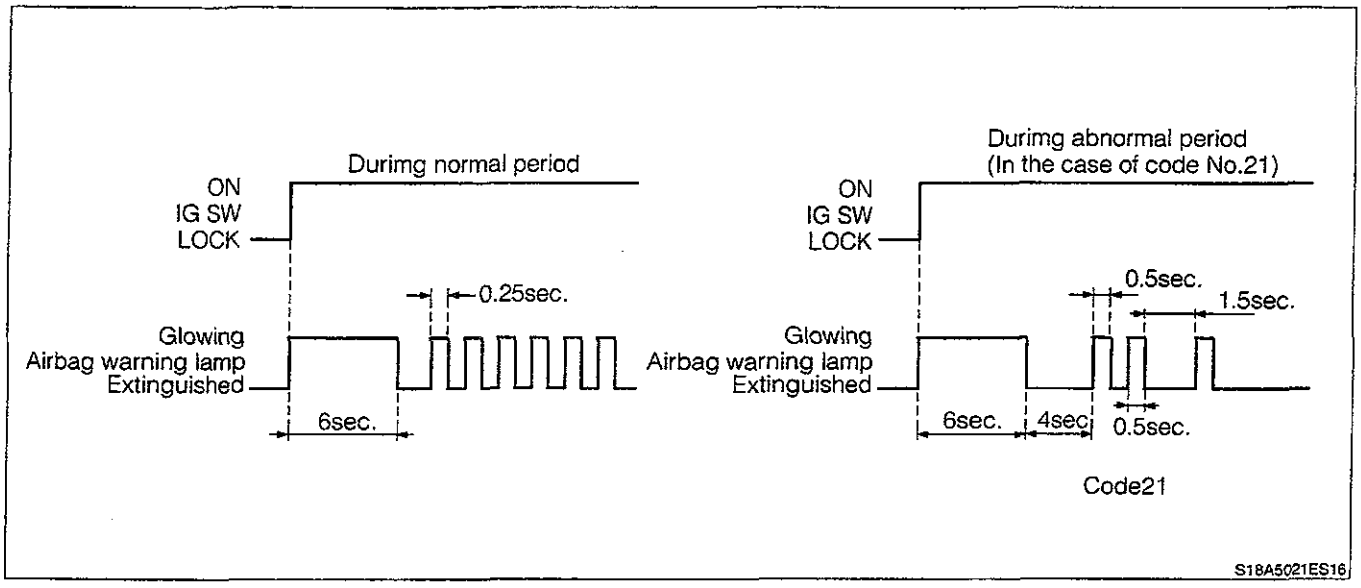
SST: 09991-87404-000
09991-87403-000



3.The airbag warning lamp inside the combination meter flashes, thus indicating the malfunction code.

NOTE

- When the check terminals are shorted, warning lamps other than the airbag warning lamp will flash. But this does not indicate system malfunction.
- All the malfunction codes memorized are shown repeatedly in the sequence of malfunction number, starting from the smallest number.
- When there is one malfunction code, the malfunction code is indicated again after a pause of four second. When there are more than one code, the codes are shown starting from the smaller number with a pause of 2.5 seconds made between each code indication. When all codes have been shown, after a pause of 4 seconds, the codes are again indicated one by one from the smaller one.



7-7-2 CANCELING METHOD OF DIAGNOSIS

(1) ERASURE BY DLC

When the section which is responsible for the malfunction code has been checked and repaired, erase the memory, following the procedure given below.

1. Make the diagnosis code be outputted to the airbag warning lamp by using the diagnosis code output indicating method.
2. While looking at a clock (having a second hand), connect (short) the ECUT terminal and E terminal of the DLC 1 ±0.4 second, and release these terminals 1 ±0.4 second. Repeat connecting/releasing four times. Then, when the ECUT terminal and E terminal are connected (shorted) fifth time, these terminals should be kept connected.
3. If the diagnosis code has been erased by now, the airbag warning lamp will flash quickly.

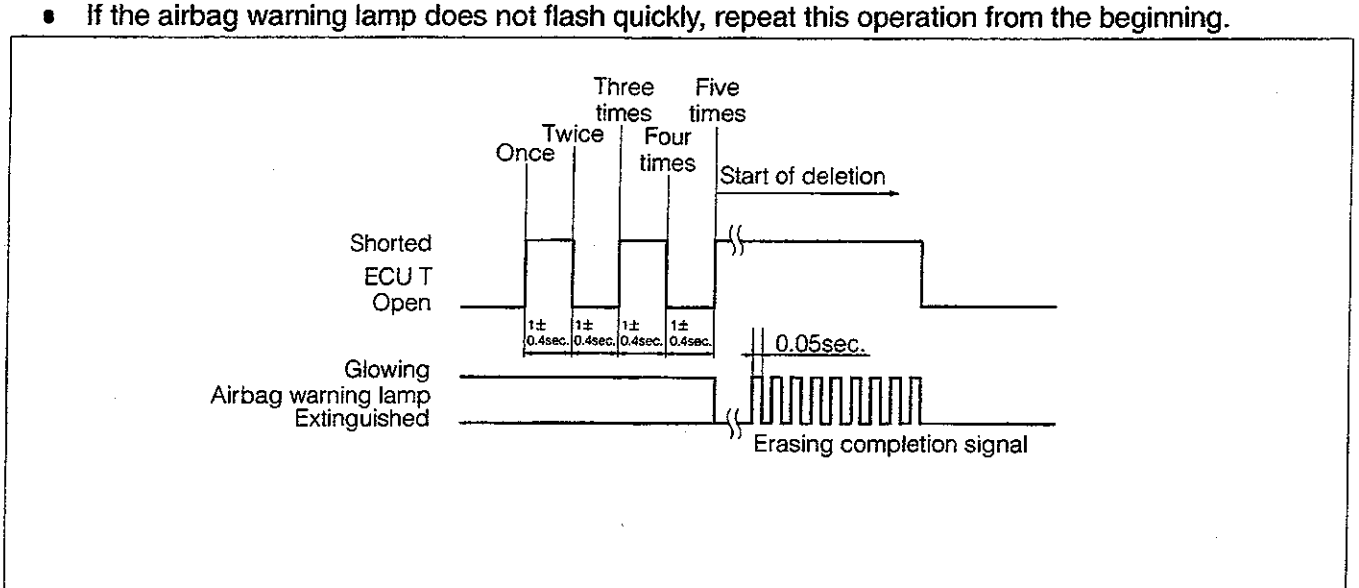
CAUTION

- In order to short the check terminal, be sure to use the specified SST.

SST: 09991-87404-000
09991-87403-000

NOTE

- If the airbag warning lamp does not flash quickly, repeat this operation from the beginning.



4. After the memory has been erased, ensure that the airbag warning lamp is extinguished. Let the diagnosis code be outputted again. Ensure that the normal code is outputted.

7-7-3 CONTENTS OF DIAGNOSIS

Contents of diagnosis

Code No.		Diagnosis item	Diagnosis contents
Lamp	ISO※		
11	B0102	Earth short of airbag squib system at driver's seat side	· Earth short of the harness between the airbag computer and the airbag squib system
12	B0103	Power supply short of airbag squib system at driver's seat side	· Power supply short of the harness between the airbag computer and the airbag squib system
13	B0100	Short between wires of airbag squib system at driver's seat side	· Short between wires of the harness between the airbag computer and the airbag squib system
14	B0101	Open wire of airbag squib system at driver's seat side	· Open wire of the harness between the airbag computer and the airbag squib system
31	B1100	Abnormality of airbag computer	Malfunction of airbag computer main body
51	B0107	Earth short of airbag squib system at front passenger seat side	· Earth short of the harness between the airbag computer and the airbag squib system
52	B0108	Power supply short of airbag squib system at front passenger seat side	· Power supply short of the harness between the airbag computer and the airbag squib system
53	B0105	Short between wires of airbag squib system at front passenger seat side	· Short between wires of the harness between the airbag computer and the airbag squib system
54	B0106	Open wire of airbag squib system at front passenger seat side	· Open wire of the harness between the airbag computer and the airbag squib system
61	B0132	Earth short of pretensioner squib system at driver's seat side	· Earth short of the harness between the airbag computer and the pretensioner squib system
62	B0133	Power supply short of pretensioner squib system at driver's seat side	· Power supply short of the harness between the airbag computer and the pretensioner squib system
63	B0130	Short between wires of pretensioner squib system at driver's seat side	· Short between wires of the harness between the airbag computer and the pretensioner squib system
64	B0131	Open wire of pretensioner squib system at driver's seat side	· Open wire of the harness between the airbag computer and the pretensioner squib system
71	B0137	Earth short of pretensioner squib system at front passenger seat side	· Earth short of the harness between the airbag computer and the pretensioner squib system
72	B0138	Power supply short of pretensioner squib system at front passenger seat side	· Power supply short of the harness between the airbag computer and the pretensioner squib system
73	B0135	Short between wires of pretensioner squib system at front passenger seat side	· Short between wires of the harness between the airbag computer and the pretensioner squib system
74	B0136	Open wire of pretensioner squib system at front passenger seat side	· Open wire of the harness between the airbag computer and the pretensioner squib system

※:This shows the output code when the diagnostic tester is used.

NOTE

- After the SRS front airbag and seat belt with pretensioner mechanism have operated and deployed, the airbag warning lamp flashes at an interval of 0.5 second.
- The code No.31 may be emitted, not only when the airbag computer inside is malfunctioning, but also when the squib system circuit has an abnormality.

(1) CONFIRMATION OF PHENOMENON

In carrying out the trouble shooting, the operator cannot find out the cause unless he confirms the malfunctioning phenomenon. For this end, it is imperative to reproduce the malfunction phenomenon by creating conditions and environments similar to the situation where the malfunction took place, based on the information obtained by the diagnosis through inquiries.

As for the phenomenon that is hard to be reproduced, it is necessary to create the conditions similar to the running conditions under which the malfunction took place (road condition, meteorological condition and running condition), based on the information obtained by the diagnosis through inquiries.

For this purpose it is most important to try to reproduce the phenomenon patiently by applying external factors, such as vibration (moving wire harnesses or relays by hand), heat (applying hot wind) and water (giving humidity).

(2) RECHECK OF DIAGNOSIS CODE

After confirming the malfunction phenomenon, check the illuminating condition of the warning lamp (malfunction mode). Note whether any change has occurred before and after the confirmation. In this way, judge whether the system is currently normal or not.

7-8 BASIC CHECK

The basic check enables you to narrow down the malfunctioning system.

7-8-1 MEASUREMENT OF BATTERY VOLTAGE

With the engine stopped, measure the battery voltage.

SPECIFIED VALUE: 10 - 14 V

7-8-2 CHECK OF SRS AIRBAG SYSTEM POWER SUPPLY AND EARTH CIRCUIT

(1) CHECK OF POWER SUPPLY CIRCUIT

1.Perform the measurement, using the connector on the vehicle side, connected to the airbag computer.

CAUTION

- The airbag computer shall be dismounted from the vehicle.

2.Check each voltage after IG SW set to "ON".

(1) Harness side connector 42(IG1) - 44(E1)

SPECIFIED VALUE: 10 - 14V(Battery voltage)

(2) CHECK OF EARTH CIRCUIT

Disconnect the connector on the vehicle side from the airbag computer, and check each connector for continuity.

(1) Airbag computer - Body earth

SPECIFIED VALUE: Continuity exists

(2) Vehicle side connector 44(E1) - Body earth

SPECIFIED VALUE: Continuity exists

7-9 TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE

7-9-1 WARNING LAMP CIRCUIT SYSTEM

(1) CHECKING POINTS

1.Is the fuse normal?
2.Is the combination meter normal?
3.Is there any abnormality in the harness of the warning lamp system?

(2) CHECKING METHOD

➤1.Confirm the lighting state of the warning lamp

1.After the IG SW has been set to [ON] position, check the lighting state of the airbag warning lamp.
Proceed to ➤2when the lamp remains illuminated even after an elapse of 6 seconds.
If distinguished, proceed to ➤4.

➤2.Confirm the lighting state of the warning lamp

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Disconnect the connector from the airbag computer. Short the airbag computer harness side connector 40(LA) with earth, using the SST.
SST: 09991-87403-000

3.Install the negative terminal of the battery. With the IG SW set to [ON] position, check the lighting state of the airbag warning lamp.
SPECIFIED VALUE: Distinguishes.

If distinguished, replace the airbag computer.
If it remains illuminated, proceed to ➤3.

➤3.Check continuity between the combination meter and the airbag computer

1.After the IG SW has been set to [LOCK] position, disconnect the combination meter connector.
2.Check the harness between the combination meter and the airbag computer.
(1) Between the connector 18(LA) at the combination meter harness side and the airbag computer 40(LA)
SPECIFIED VALUE: Continuity exists

If it is OK, repair or replace the combination meter.
If it is NG, replace the harness and connector.

➤4.Confirm the lighting state of the warning lamp

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Disconnect the connector from the airbag computer.

3.Install the negative terminal of the battery. With the IG SW set to [ON] position, check the lighting state of the warning lamp.

SPECIFIED VALUE: Illuminates.

If lighted, replace the airbag computer.
If distinguished, proceed to ➤5.

➤5.Check the fuse

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Check the fuse.

SPECIFIED VALUE: Not fused.

If it is OK, go to step ➤6.
If it is NG, go to step ➤8.

➤6.Check continuity between the combination meter and the fuse and continuity between the combination meter and the earth

1.Check to see if open wire exists between the combination meter and the fuse as well as between the combination meter and the earth.

(1) Between combination meter harness side connector 12(IG+) and gauge fuse (downstream side)

(2) Between combination meter harness side connector 22(GND) and body earth

SPECIFIED VALUE: Continuity exists

If it is OK, go to step ➤7.
If it is NG, replace the harness and connector.

➤7.Check short between the combination meter and the airbag computer

1.Check to see if there is a short at the harness between the combination meter and the airbag computer.

(1) Between the connector 40(LA) at the airbag computer harness side and the body earth

SPECIFIED VALUE: 1MΩ or more (No continuity)

If it is OK, repair or replace the combination meter.
If it is NG, replace the harness and connector.

➤8.Check continuity between the combination meter and the fuse

1.Check the harness between the combination meter and the fuse.

(1) Between combination meter harness side connector 12(IG+) and IG SW (+B side)

SPECIFIED VALUE: Continuity exists

If it is OK, replace the fuse. Then, wait for a little while.

If it is NG, replace the fuse. Also, replace the harness and connector.

7-9-2 DIAGNOSIS CODE No.11(DRIVER'S SEAT AIRBAG SQUIB CIRCUIT SYSTEM)

(1) DIAGNOSTIC CODE OUTPUT CONDITIONS

When the harness between the driver's seat airbag and the airbag computer is shorted with the earth:

(2) CHECKING POINTS

Is there abnormality in the harness and connector between the driver's seat airbag and the airbag computer?

CAUTION

- The steering roll connector is provided with a connector with a terminal short mechanism. Hence, there is a possibility for wrong diagnosis of short in harness. Therefore, for this check it is advisable to use the SST (Part No :09082-87710-000) for deploying airbag. First, ensure that there is no damage, such as open wire and short in this SST. Then, install the SST on the steering roll connector and carry out check for the harness together with the SST.

(3) CHECKING METHOD

➤1.Check short between the steering wheel pad Ay and the airbag computer

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Remove the airbag computer and steering wheel pad Ay. Check to see if short exists in harness between the pad Ay and the airbag computer.
(1) Connector 1 (AD+) leading to the steering roll connector side airbag and the body earth
(2) Connector 2 (AD−) leading to the steering roll connector side airbag and the body earth
SPECIFIED VALUE: 1MΩ or more (No continuity)

If it is OK, go to step ➤2.
If it is NG, go to step ➤4.

➤2.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, install the airbag computer to the vehicle. Connect the connector.
2.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.
SPECIFIED VALUE: Diagnosis code No.11 is not outputted. (Other codes may be outputted.)

If not outputted, proceed to ➤3.
If outputted, replace the airbag computer.

➤3.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- The memories of some systems are erased when the negative terminal of the battery is disconnected. Therefore, it is necessary to record the contents of the memories, as required. After completion of the operation, be sure to reset the memories.

2.Install the steering wheel pad assembly.

3.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.11 is not outputted. (Other codes may be outputted.)

If not outputted, a normal state has been restored. Erase the diagnosis code. Then, wait for a little while.

If outputted, replace the steering wheel pad Ay.

➤4.Check short between the steering roll connector and the airbag computer

1.Disconnect the vehicle harness side connector of the steering roll connector.

2.Check to see if there is a short at the harness between the steering roll connector and the airbag computer.

(1) Vehicle harness roll connector side connector 1(AD−) - body earth

SPECIFIED VALUE: 1MΩ or more (No continuity)

If it is OK, go to step ➤5.

If it is NG, replace the vehicle harness and connector.

➤5.Check short in the steering roll connector

1.Check to see if there is a short at the steering roll connector.

(1) Connector 1 (AD+) leading to the steering roll connector side airbag and the body earth

SPECIFIED VALUE: 1MΩ or more (No continuity)

If it is OK, a normal state has been restored. Erase the diagnosis code. Then, wait for a little while.

If it is NG, replace the steering roll connector.

7-9-3 DIAGNOSIS CODE No.12(DRIVER'S SEAT AIRBAG SQUIB CIRCUIT SYSTEM)

(1) DIAGNOSTIC CODE OUTPUT CONDITIONS

When the harness between the driver's seat airbag and the airbag computer is shorted with the power supply;

(2) CHECKING POINTS

Is there abnormality in the harness and connector between the driver's seat airbag and the airbag computer?

CAUTION

- The steering roll connector is provided with a connector with a terminal short mechanism. Hence, there is a possibility for wrong diagnosis of short in harness. Therefore, for this check it is advisable to use the SST (Part No :09082-87710-000) for deploying airbag. First, ensure that there is no damage, such as open wire and short in this SST. Then, install the SST on the steering roll connector and carry out check for the harness together with the SST.

(3) CHECKING METHOD

➤1.Check short between the steering wheel pad Ay and the airbag computer

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Remove the airbag computer and steering wheel pad Ay.

3.Install the negative terminal of the battery. With the IG SW set to [ON] position, check to see if short exists in the harness between the pad Ay and the airbag computer.

(1) Connector 1 (AD+) leading to the steering roll connector side airbag and the body earth

(2) Connector 2 (AD−) leading to the steering roll connector side airbag and the body earth

SPECIFIED VALUE: 0 V (No continuity with +B)

If it is OK, go to step ➤2.
If it is NG, go to step ➤4.

➤2.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, install the airbag computer to the vehicle. Connect the connector.

2.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.12 is not outputted. (Other codes may be outputted.)

If not outputted, proceed to ➤3.
If outputted, replace the airbag computer.

➤3.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Install the steering wheel pad assembly.

3.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.12 is not outputted. (Other codes may be outputted.)

If not outputted, a normal state has been restored. Erase the diagnosis code. Then, wait for a little while.

If outputted, replace the steering wheel pad Ay.

➤4.Check short between the steering roll connector and the airbag computer

1.After the IG SW has been set to [LOCK] position, disconnect the vehicle harness side connector of the steering roll connector.

2.After the IG SW has been set to [ON] position, check to see if short exists in the harness between the steering roll connector and the airbag computer.

(1) Vehicle harness roll connector side connector 1(AD−) - body earth

SPECIFIED VALUE: 0 V (No continuity with +B)

If it is OK, go to step ➤5.

If it is NG, replace the vehicle harness and connector.

➤5.Check short in the steering roll connector

1.Set the IG SW to [LOCK] position.

2.With the IG SW set to [ON] position, check to see if short exists in the steering roll connector.

(1) Between steering roll connector pad side connector 1(AD+) and body earth

SPECIFIED VALUE: 0 V (No continuity with +B)

If it is OK, a normal state has been restored. Erase the diagnosis code. Then, wait for a little while.

If it is NG, replace the steering roll connector.

7-9-4 DIAGNOSIS CODE No.13(DRIVER'S SEAT AIRBAG SQUIB CIRCUIT SYSTEM)

(1) DIAGNOSTIC CODE OUTPUT CONDITIONS

When a short between wires takes place in the harness between the driver's seat airbag and the airbag computer:

(2) CHECKING POINTS

Is there abnormality in the harness and connector between the driver's seat airbag and the airbag computer?

CAUTION

- The steering roll connector is provided with a connector with a terminal short mechanism. Hence, there is a possibility for wrong diagnosis of short in harness. Therefore, for this check it is advisable to use the SST (Part No :09082-87710-000) for deploying airbag. First, ensure that there is no damage, such as open wire and short in this SST. Then, install the SST on the steering roll connector and carry out check for the harness together with the SST.

(3) CHECKING METHOD

➤1.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Remove the steering wheel pad Ay. Short both terminals of the steering roll connector pad side connector.

3.Install the negative terminal of the battery. Erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.13 is outputted.

If outputted, proceed to ➤2.
If not outputted, replace the airbag computer.

➤2.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, release short between the terminals of the connector leading to the steering roll connector side airbag.

2.After the IG SW has been set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.13 is outputted. (Other codes may be outputted.)

If not outputted, proceed to ➤3.
If outputted, proceed to ➤4.

➤3.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Install the steering wheel pas Ay.

2.After the IG SW has been set to [ON] position, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.13 is not outputted. (Other codes may be outputted.)

If not outputted, a normal state has been restored. Erase the diagnosis code. Then, wait for a little while.

If outputted, replace the steering wheel pad Ay.

➤4.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, disconnect the connector of the steering roll connector at the vehicle harness side.

2.After the IG SW has been set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.13 is not outputted. (Other codes may be outputted.)

If not outputted, proceed to ➤5.

If outputted, proceed to ➤6.

➤5.Check short in the steering roll connector

1.After the IG SW has been set to [LOCK] position, remove the steering roll connector from the vehicle.

2.Connect the SST to the steering roll connector vehicle side connector.

SST: 09082-87710-000

3.Ensure that the SST terminals for connecting battery are not interfering each other. Also, check for short in the steering roll connector.

(1) Connector 1 (AD+) leading to the steering roll connector side airbag
- connector 2(AD−) leading to the steering roll connector side airbag

SPECIFIED VALUE: 1MΩ or more (No continuity)

If it is OK, a normal state has been restored. Erase the diagnosis code. Then, wait for a little while.

If it is NG, replace the steering roll connector.

➤6.Check short between the steering roll connector and the airbag computer

1.After the IG SW has been set to [LOCK] position, remove the connector of the airbag computer. Remove the short terminal of the airbag computer vehicle side connector.

2.Check to see if there is a short at the harness between the steering roll connector and the airbag computer.

(1) Connector1(AD−) leading to the vehicle harness roll connector
- connector 2(AD+) leading to the vehicle harness roll connector

SPECIFIED VALUE: 1MΩ or more (No continuity)

If it is OK, a normal state has been restored. Erase the diagnosis code. Then, wait for a little while.

If it is NG, replace the vehicle side harness.

7-9-5 DIAGNOSIS CODE No.14(DRIVER'S SEAT AIRBAG SQUIB CIRCUIT SYSTEM)

(1) DIAGNOSTIC CODE OUTPUT CONDITIONS

When open wire takes place in the harness between the driver's seat airbag and the airbag computer.:

(2) CHECKING POINTS

Is there abnormality in the harness and connector between the driver's seat airbag and the airbag computer?

CAUTION

- The steering roll connector is provided with a connector with a terminal short mechanism. Hence, there is a possibility for wrong diagnosis of short in harness. Therefore, for this check it is advisable to use the SST (Part No :09082-87710-000) for deploying airbag. First, ensure that there is no damage, such as open wire and short in this SST. Then, install the SST on the steering roll connector and carry out check for the harness together with the SST.

(3) CHECKING METHOD

➤1.Check continuity between the steering wheel pad Ay and the airbag computer

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Remove the airbag computer and steering wheel pad Ay.

3.Check to see if open wire exists in the harness between the pad Ay and the airbag computer.

(1) Connector 1 (AD+) leading to the steering roll connector side airbag
- airbag computer vehicle side connector 17 (AD+)

(2) Connector 2 (AD−) leading to the steering roll connector side airbag
- airbag computer vehicle side connector 18(AD−)

SPECIFIED VALUE: Continuity exists

If it is OK, go to step ➤2.
If it is NG, go to step ➤4.

➤2.Confirm the diagnosis code

1.Short between the connectors 1(AD+) and 2 (AD−) leading to the steering roll connector pad Ay side airbag.

2.Install the airbag computer on the vehicle. Connect the connector.

3.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.14 is not outputted. (Other codes may be outputted.)

If not outputted, proceed to ➤3.
If outputted, replace the airbag computer.

➤3.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

2.Release short between the terminals of the steering roll connector. Install the steering wheel pad Ay.

3.After the IG SW has been set to [ON] position, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.14 is not outputted. (Other codes may be outputted.)

If not outputted, a normal state has been restored. Erase the diagnosis code. Then, wait for a little while.

If outputted, replace the steering wheel pad Ay.

➤4.Check continuity between the steering roll connector and the airbag computer

1.Disconnect the vehicle harness side connector of the steering roll connector.

2.Check to see if open wire exists in the harness between the steering roll connector and the airbag computer.

(1) Connector1(AD−) leading to the vehicle harness roll connector
- connector 2(AD+) leading to the vehicle harness roll connector

SPECIFIED VALUE: Continuity exists

If it is OK, go to step ➤5.

If it is NG, replace the vehicle harness and connector.

➤5.Check continuity in the steering roll connector

1.Check to see if there is an open wire in the steering roll connector.

(1) Connector 1(AD+) leading to the steering roll connector side airbag
- connector 2(AD−) leading to the steering roll connector side airbag

SPECIFIED VALUE: Continuity exists

If it is OK, a normal state has been restored. Erase the diagnosis code. Then, wait for a little while.

If it is NG, replace the steering roll connector.

7-9-6 DIAGNOSIS CODE No.51(FRONT PASSENGER SEAT AIRBAG SQUIB CIRCUIT SYSTEM)

(1) DIAGNOSTIC CODE OUTPUT CONDITIONS

When the harness between the front passenger's seat airbag and the airbag computer is shorted with the earth.

(2) CHECKING POINTS

Is there abnormality in the harness and connector between the front passenger's seat airbag and the airbag computer?

(3) CHECKING METHOD

➤1.Check short between the front passenger seat airbag unit and the airbag computer

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- **If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.**

CAUTION

- **When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.**

2.Disconnect the connectors from the airbag computer and the front passenger seat airbag unit.

3.Check the harness for short between the front passenger seat airbag unit and the airbag computer.

(1) Between front passenger's seat airbag unit vehicle side connector 1(AP+) and body earth

(2) Between front passenger's seat airbag unit vehicle side connector 2(AP−) and body earth

SPECIFIED VALUE: 1MΩ (No continuity)

If it is OK, go to step ➤2.

If it is NG, replace the vehicle side harness.

➤2.Confirm the diagnosis code

1.Connect the connector to the airbag computer.

2.The IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.51 is not outputted. (Other codes may be outputted.)

If not outputted, proceed to ➤3.

If outputted, replace the airbag computer.

➤3.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Connect the connector to the front passenger seat airbag unit.

3.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.51 is not outputted. (Other codes may be outputted.)

If not outputted, a normal state has been restored. Erase the diagnosis code and see how the system works for a while.

If outputted, replace the front passenger seat SRS airbag unit.

7-9-7 DIAGNOSIS CODE No.52(FRONT PASSENGER SEAT AIRBAG SQUIB CIRCUIT SYSTEM)

(1) DIAGNOSTIC CODE OUTPUT CONDITIONS

When the harness between the front passenger's seat airbag and the airbag computer is shorted with the power supply.

(2) CHECKING POINTS

Is there abnormality in the harness and connector between the front passenger's seat airbag and the airbag computer?

(3) CHECKING METHOD

➤1.Check short between the front passenger seat airbag unit and the airbag computer

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Disconnect the connectors from the airbag computer and the front passenger seat airbag unit. Install the negative terminal of the battery.

3.With the IG SW set to [ON] position, check to see if short exists between the front passenger seat airbag unit and the airbag computer.

(1) Between front passenger's seat airbag unit vehicle side connector 1(AP+) and body earth

(2) Between front passenger's seat airbag unit vehicle side connector 2(AP−) and body earth

SPECIFIED VALUE: 0 V (No continuity with +B)

If it is OK, go to step ➤2.

If it is NG, replace the vehicle side harness.

➤2.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, connect the connector to the airbag computer.

2.After the IG SW has been set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.52 is not outputted. (Other codes may be outputted.)

If not outputted, proceed to ➤3.

If outputted, replace the airbag computer.

➤3.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Connect the connector to the front passenger seat airbag unit.

3.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.52 is not outputted. (Other codes may be outputted.)

If not outputted, a normal state has been restored. Erase the diagnosis code and see how the system works for a while.

If outputted, replace the front passenger seat SRS airbag unit.

7-9-8 DIAGNOSIS CODE No.53(FRONT PASSENGER SEAT AIRBAG SQUIB CIRCUIT SYSTEM)

(1) DIAGNOSTIC CODE OUTPUT CONDITIONS

When shorts take place in the wires of the harness between the front passenger's seat airbag and the airbag computer.

(2) CHECKING POINTS

Is there abnormality in the harness and connector between the front passenger's seat airbag and the airbag computer?

(3) CHECKING METHOD

➤1.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- **If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.**

CAUTION

- **When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.**

2.Disconnect the connector from the front passenger seat airbag unit. Short between both terminals of the front passenger seat airbag unit vehicle side connector.

3.Install the negative terminal of the battery. Erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No. 53 is outputted.

If outputted, proceed to ➤2.
If not outputted, replace the airbag computer.

➤2.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, release short between the terminals of the front passenger seat airbag unit side connector.

2.After the IG SW has been set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.53 is not outputted. (Other codes may be outputted.)

If not outputted, proceed to ➤3.
If outputted, proceed to ➤4.

➤3.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, install the negative terminal of the battery. Connect the connector to the front passenger seat airbag unit.

2.After the IG SW has been set to [ON] position, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.53 is not outputted. (Other codes may be outputted.)

If not outputted, a normal state has been restored. Erase the diagnosis code. Then, wait for a little while.
If outputted, replace the front passenger seat airbag unit.

➤4.Check short between the front passenger seat airbag unit and the airbag computer

1.After the IG SW has been set to [LOCK] position, disconnect the connector from the airbag computer. Remove the short terminal of the airbag computer vehicle side connector.

2.Check the harness for short between the front passenger seat airbag unit and the airbag computer.

(1) Between front passenger's seat airbag unit vehicle side connector 1(AP+) and front passenger's seat airbag unit vehicle side connector 2(AP−)

SPECIFIED VALUE: 1MΩ or more (No continuity)

If it is OK, a normal state has been restored. Erase the diagnosis code. Then, wait for a little while.
If it is NG, replace the vehicle harness.

7-9-9 DIAGNOSIS CODE No.54(FRONT PASSENGER SEAT AIRBAG SQUIB CIRCUIT SYSTEM)

(1) DIAGNOSTIC CODE OUTPUT CONDITIONS

When open wires take place in the harness between the front passenger's seat airbag and the airbag computer.

(2) CHECKING POINTS

Is there abnormality in the harness and connector between the front passenger's seat airbag and the airbag computer?

(3) CHECKING METHOD

➤1.Check continuity between the front passenger seat airbag unit and the airbag computer

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Disconnect the connectors from the airbag computer and the front passenger seat airbag unit. Check to see if open wire exists in the harness between the front passenger seat airbag unit and the airbag computer.

(1) Between front passenger's seat airbag unit vehicle side connector 1(AP+) and airbag computer vehicle side connector 24(AP+)

(2) Between front passenger's seat airbag unit vehicle side connector 2(AP−) and airbag computer vehicle side connector 23(AP−)

SPECIFIED VALUE: Continuity exists

If it is OK, go to step ➤2.
If it is NG, replace the vehicle harness and connector.

➤2.Confirm the diagnosis code

1.Short between the front passenger seat airbag vehicle side connectors 1(AP+) and 2(AP−). Connect the connector to the airbag computer.

2.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.54 is not outputted. (Other codes may be outputted.)

If not outputted, proceed to ➤3.
If outputted, replace the airbag computer.

➤3.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Release short between the terminals at the front passenger seat airbag unit vehicle side. Connect the connector to the front passenger seat airbag unit.

3.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.54 is not outputted. (Other codes may be outputted.)

If not outputted, a normal state has been restored. Erase the diagnosis code and see how the system works for a while.

If outputted, replace the front passenger seat airbag unit.

7-9-10 DIAGNOSIS CODE No.61(FRONT DRIVER'S PRETENSIONER SQUIB CIRCUIT SYSTEM)

(1) DIAGNOSTIC CODE OUTPUT CONDITIONS

When the harness between the driver's seat seat belt and the airbag computer is shorted with the earth;

(2) CHECKING POINTS

Is there abnormality in the harness and connector between the driver's seat pretensioner and the airbag computer?

(3) CHECKING METHOD

➤1.Check short between the driver's seat seat belt and the airbag computer

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Disconnect the connectors from the airbag computer and the seat belt in the driver's seat.

3.Check to see if short exists in the harness between the driver's seat seat belt and the airbag computer.

(1) Between driver's seat belt vehicle side connector 1(PR+) and body earth

(2) Between driver's seat belt vehicle side connector 2(PR−) and body earth

SPECIFIED VALUE: 1MΩ or more (No continuity)

If it is OK, go to step ➤2.
If it is NG, replace the vehicle side harness.

➤2.Confirm the diagnosis code

1.Connect the connector to the airbag computer.

2.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.61 is not outputted. (Other codes may be outputted.)

If not outputted, proceed to ➤3.
If outputted, replace the airbag computer.

➤3.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Connect the connector to the driver's seat seat belt.

3.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.61 is not outputted. (Other codes may be outputted.)

If not outputted, a normal state has been restored. Erase the diagnosis code and see how the system works for a while.

If outputted, replace the driver's seat seat belt.

7-9-11 DIAGNOSIS CODE No.62(FRONT DRIVER'S PRETENSIONER SQUIB CIRCUIT SYSTEM)

(1) DIAGNOSTIC CODE OUTPUT CONDITIONS

When the harness between the driver's seat seat belt and the airbag computer is shorted with the power supply;

(2) CHECKING POINTS

Is there abnormality in the harness and connector between the driver's seat pretensioner and the airbag computer?

(3) CHECKING METHOD

➤1.Check short between the driver's seat seat belt and the airbag computer

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- **If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.**

CAUTION

- **When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.**

2.Disconnect the connectors from the airbag computer and the seat belt in the driver's seat.

3.Install the negative terminal of the battery. With the IG SW set to [ON] position, check to see if short exists in the harness between the driver's seat seat belt and the airbag computer.

(1) Between the connector 1(PR+) at the seat belt in the driver's seat and the body earth,

(2) Between the connector 2(PR−) at the seat belt in the driver's seat and the body earth,

SPECIFIED VALUE: 0 V (No continuity with +B)

If it is OK, go to step ➤2.

If it is NG, replace the vehicle side harness.

➤2.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, connect the connector to the airbag computer.

2.After the IG SW has been set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.62 is not outputted. (Other codes may be outputted.)

If not outputted, proceed to ➤3.

If outputted, replace the airbag computer.

➤3.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Connect the connector to the driver's seat seat belt.

3.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.62 is not outputted. (Other codes may be outputted.)

If not outputted, a normal state has been restored. Erase the diagnosis code and see how the system works for a while.

If outputted, replace the driver's seat seat belt.

7-9-12 DIAGNOSIS CODE No.63(FRONT DRIVER'S PRETENSIONER SQUIB CIRCUIT SYSTEM)

(1) DIAGNOSTIC CODE OUTPUT CONDITIONS

When a short between wires takes place in the harness between the driver's seat seat belt and the airbag computer.

(2) CHECKING POINTS

Is there abnormality in the harness and connector between the driver's seat pretensioner and the airbag computer?

(3) CHECKING METHOD

➤1.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- **If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.**

CAUTION

- **When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.**

2.Disconnect the connector from the driver's seat seat belt.

3.Short between both terminals of the driver's seat seat belt vehicle side connector.

4.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.63 is outputted.

If outputted, proceed to ➤2.
If not outputted, replace the airbag computer.

➤2.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, release short between the terminals of the driver's seat seat belt vehicle side connector.

2.After the IG SW has been set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.63 is not outputted. (Other codes may be outputted.)

If not outputted, proceed to ➤3.
If outputted, proceed to ➤4.

➤3.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, install the negative terminal of the battery. Connect the connector to the driver's seat seat belt.

2.After the IG SW has been set to [ON] position, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.63 is not outputted. (Other codes may be outputted.)

If not outputted, a normal state has been restored. Erase the diagnosis code and see how the system works for a while.
If outputted, replace the driver's seat seat belt.

➤4.Check short between the driver's seat seat belt and the airbag computer

1.After the IG SW has been set to [LOCK] position, disconnect the connector from the airbag computer.

2.Check to see if short exists in the harness between the driver's seat seat belt and the airbag computer.

(1) Between driver's seat belt vehicle side connector 1(PR+) and driver's seat belt vehicle side connector 2(PR−)

SPECIFIED VALUE: 1MΩ or more (No continuity)

If it is OK, a normal state has been restored. Erase the diagnosis code. Then, wait for a little while.
If it is NG, replace the vehicle side harness.

7-9-13 DIAGNOSIS CODE No.64(FRONT DRIVER'S PRETENSIONER SQUIB CIRCUIT SYSTEM)

(1) DIAGNOSTIC CODE OUTPUT CONDITIONS

When open wire takes place in the harness between the driver's seat seat belt and the airbag computer.

(2) CHECKING POINTS

Is there abnormality in the harness and connector between the driver's seat pretensioner and the airbag computer?

(3) CHECKING METHOD

➤1.Check continuity between the driver's seat seat belt and the airbag computer

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Disconnect the connectors from the airbag computer and the seat belt in the driver's seat.

3.Check to see if open wire exists in the harness between the driver's seat seat belt and the airbag computer.

(1) Between the driver's seat seat belt vehicle side connector 1 (PR+) and the airbag computer vehicle side connector 14 (PR+)

(2) Between driver's seat belt vehicle side connector 2(PR−) and the airbag computer vehicle side connector 13(PR−)

SPECIFIED VALUE: Continuity exists

If it is OK, go to step ➤2.
If it is NG, replace the vehicle harness and connector.

➤2.Confirm the diagnosis code

1.Short between the driver's seat belt vehicle side connector 1(PR+) and the driver's seat belt vehicle side connector 2(PR−).

2.Connect the connector to the airbag computer.

3.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.64 is not outputted. (Other codes may be outputted.)

If not outputted, proceed to ➤3.
If outputted, replace the airbag computer.

➤3.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Release between both terminals of the driver's seat seat belt vehicle side connector.

3.Connect the connector to the driver's seat seat belt.

4.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.64 is not outputted. (Other codes may be outputted.)

If not outputted, a normal state has been restored. Erase the diagnosis code and see how the system works for a while.

If outputted, replace the driver's seat seat belt.

7-9-14 DIAGNOSIS CODE No.71(FRONT PASSENGER'S PRETENSIONER SQUIB CIRCUIT SYSTEM)

(1) DIAGNOSTIC CODE OUTPUT CONDITIONS

When the harness between the front passenger's seat seat belt and the airbag computer is shorted with the earth.

(2) CHECKING POINTS

Is there abnormality in the harness and connector between the front passenger's seat pretensioner and the airbag computer?

(3) CHECKING METHOD

➤1.Check short between the front passenger seat belt and the airbag computer

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Disconnect the connectors from the airbag computer and the seat belt in the front passenger seat.

3.Check to see if short exists in the harness between the front passenger seat seat belt and the airbag computer.

(1) Between the front passenger seat seat belt vehicle side connector 1(PL+) and the body earth

(2) Between the front passenger seat seat belt vehicle side connector 2(PL−) and the body earth

SPECIFIED VALUE: 1MΩ or more (No continuity)

If it is OK, go to step ➤2.

If it is NG, replace the vehicle side harness.

➤2.Confirm the diagnosis code

1.Connect the connector to the airbag computer.

2.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.71 is not outputted. (Other codes may be outputted.)

If not outputted, proceed to ➤3.

If outputted, replace the airbag computer.

➤3.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Connect the connector to the front passenger seat belt.

3.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.71 is not outputted. (Other codes may be outputted.)

If not outputted, a normal state has been restored. Erase the diagnosis code and see how the system works for a while.

If outputted, replace the front passenger seat seat belt.

7-9-15 DIAGNOSIS CODE No.72(FRONT PASSENGER'S PRETENSIONER SQUIB CIRCUIT SYSTEM)

(1) DIAGNOSTIC CODE OUTPUT CONDITIONS

When the harness between the front passenger's seat seat belt and the airbag computer is shorted with the power supply.

(2) CHECKING POINTS

Is there abnormality in the harness and connector between the front passenger's seat pretensioner and the airbag computer?

(3) CHECKING METHOD

➤1.Check short between the front passenger seat belt and the airbag computer

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Disconnect the connectors from the airbag computer and the seat belt in the front passenger seat.

3.Install the negative terminal of the battery. With the IG SW set to [ON] position, check to see if short exists in the harness between the passenger's seat seat belt and the airbag computer.

(1) Between the front passenger seat seat belt vehicle side connector 1(PL+) and the body earth

(2) Between the front passenger seat seat belt vehicle side connector 2(PL−) and the body earth

SPECIFIED VALUE: 0 V (No continuity with +B)

If it is OK, go to step ➤2.
If it is NG, replace the vehicle side harness.

➤2.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Connect the connector to the airbag computer.

3.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.72 is not outputted. (Other codes may be outputted.)

If not outputted, proceed to ➤3.
If outputted, replace the airbag computer.

➤3.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Connect the connector to the front passenger seat belt.

3.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.72 is not outputted. (Other codes may be outputted.)

If not outputted, a normal state has been restored. Erase the diagnosis code and see how the system works for a while.

If outputted, replace the front passenger seat seat belt.

7-9-16 DIAGNOSIS CODE No.73(FRONT PASSENGER'S PRETENSIONER SQUIB CIRCUIT SYSTEM)

(1) DIAGNOSTIC CODE OUTPUT CONDITIONS

When shorts take place in the wires of the harness between the front passenger's seat seat belt and the airbag computer.

(2) CHECKING POINTS

Is there abnormality in the harness and connector between the front passenger's seat pretensioner and the airbag computer?

(3) CHECKING METHOD

➤1.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Disconnect the connector from the front passenger seat seat belt.

3.Short between terminals of the front passenger seat seat belt vehicle side connector.

4.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.73 is outputted.

If outputted, proceed to ➤2.
If not outputted, replace the airbag computer.

➤2.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, release short between the terminals of the front passenger seat seat belt vehicle connector.

2.After the IG SW has been set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.73 is not outputted. (Other codes may be outputted.)

If not outputted, proceed to ➤3.
If outputted, proceed to ➤4.

➤3.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, install the negative terminal of the battery. Connect the connector to the front passenger seat seat belt.

2.After the IG SW has been set to [ON] position, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.73 is not outputted. (Other codes may be outputted.)

If not outputted, a normal state has been restored. Erase the diagnosis code and see how the system works for a while.
If outputted, replace the front passenger seat seat belt.

➤4.Check short between the front passenger seat seat belt and the airbag computer

1.After the IG SW has been set to [LOCK] position, disconnect the connector from the airbag computer.

2.Check to see if short exists in the harness between the front passenger seat seat belt and the airbag computer.

(1) Between the front passenger seat seat belt vehicle side connector 1(PL+) and the front passenger seat seat belt vehicle side connector 2(PL−)

SPECIFIED VALUE: 1MΩ or more (No continuity)

If it is OK, a normal state has been restored. Erase the diagnosis code. Then, wait for a little while.
If it is NG, replace the vehicle side harness.

7-9-17 DIAGNOSIS CODE No.74(FRONT PASSENGER'S PRETENSIONER SQUIB CIRCUIT SYSTEM)

(1) DIAGNOSTIC CODE OUTPUT CONDITIONS

When open wires take place in the harness between the front passenger's seat seat belt and the airbag computer.

(2) CHECKING POINTS

Is there abnormality in the harness and connector between the front passenger's seat pretensioner and the airbag computer?

(3) CHECKING METHOD

➤1.Check continuity between the front passenger seat belt and the airbag computer

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Disconnect the connectors from the airbag computer and the seat belt in the front passenger seat.

3.Check to see if open circuit exists in the harness between the front passenger seat seat belt and the airbag computer.

(1) Between the front passenger seat seat belt vehicle side connector 1(PL+) and the airbag computer vehicle side connector 27(PL+)

(2) Between the front passenger seat seat belt vehicle side connector 2(PL−) and the airbag computer vehicle side connector 28 (PL−)

SPECIFIED VALUE: Continuity exists

If it is OK, go to step ➤2.
If it is NG, replace the vehicle harness and connector.

➤2.Confirm the diagnosis code

1.Short between the front passenger seat seat belt vehicle side connectors 1(PL+) and 2(PL−).

2.Connect the connector to the airbag computer.

3.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.74 is not outputted. (Other codes may be outputted.)

If not outputted, proceed to ➤3.
If outputted, replace the airbag computer.

➤3.Confirm the diagnosis code

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Release short between terminals at the front passenger seat seat belt vehicle side.

3.Connect the connector to the front passenger seat belt.

4.Install the negative terminal of the battery. With the IG SW set to [ON] position, erase the diagnosis codes. Then, check the diagnosis code.

SPECIFIED VALUE: Diagnosis code No.74 is not outputted. (Other codes may be outputted.)

If not outputted, a normal state has been restored. Erase the diagnosis code and see how the system works for a while.

If outputted, replace the front passenger seat seat belt.

7-10 TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA

7-10-1 NO DIAGNOSIS CODE IS INDICATED

(1) CHECKING POINTS

1.Open wires in the harness and connector between the airbag computer and the DLC
2.Abnormality of airbag computer

(2) CHECKING METHOD

➤1.Check continuity between the airbag computer and the DLC

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Disconnect the connector from the airbag computer.
3.Check that open wire exists in harness between the airbag computer and the DLC.
(1) airbag computer harness side connector 39(TC) - DLC 4(ECUT)
(2) airbag computer harness side connector 37(SIO) - DLC 10(SIO)
SPECIFIED VALUE: Continuity exists

If it is OK, go to step ➤2.
If it is NG, replace the harness and connector.

➤2.Check continuity between the DLC and the earth

1.Check to see if open wire exists in the harness between the DLC and the earth.
(1) Between the DLC 13 (earth) and the body earth
SPECIFIED VALUE: Continuity exists

If it is OK, connect the connector to the airbag computer. Then, wait for a little while.
If it is NG, replace the harness and connector.

7-10-2 THE DIAGNOSIS CODE IS ALWAYS INDICATED

(1) CHECKING POINTS

1.Short in the harness between the airbag computer and the diagnosis check connector

➤1.Check short between the airbag computer and the DLC

1.After the IG SW has been set to [LOCK] position, remove the negative terminal of the battery. Leave the engine under this state for 60 seconds or more.

WARNING

- If you begin the operation before 60 seconds pass, there is a danger that the airbag is mistakenly deployed.

CAUTION

- When the negative terminal of the battery is disconnected, the memory of some systems will be erased. Record the memory contents of each system, as required, and set the memory again after completion of the operation.

2.Disconnect the connector from the airbag computer.

3.Check to see if short exists in the harness between the airbag computer and the DLC.

(1) airbag computer harness side connector 39(TC) - DLC 4(ECUT)

If it is OK, replace the airbag computer.

If it is NG, replace the harness and connector.

7-10-3 How to reproduce

It is absolutely necessary for the accurate trouble shooting to simulate conditions and an environment where a particular malfunction has occurred.
The following shows how to reproduce the malfunction phenomenon hard to reproduce with the vehicle stopped by applying external factors (vibration, heat, water, etc.).

(1) VIBRATION APPLYING METHOD

Case that malfunction may be caused by vibration.

① HARNESS

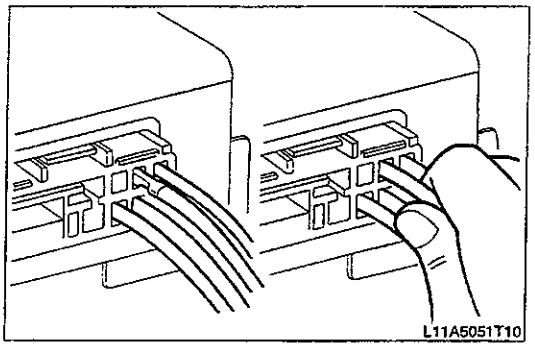
Check to see if malfunction takes place by lightly swinging the wire harness vertically and laterally.

CAUTION

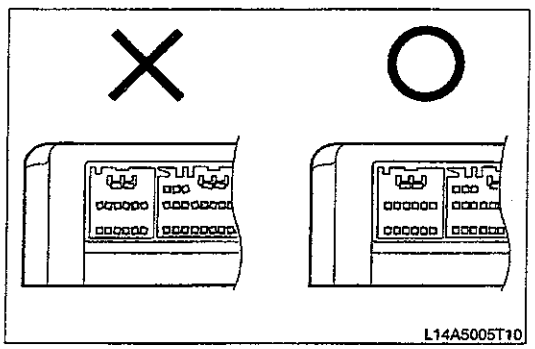
- **In the case of harnesses, focus on checking the neck of the connector, a fulcrum of vibration, body pass-through section.**

② CONNECTORS

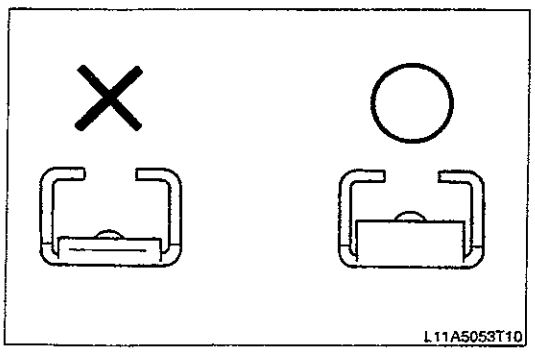
1. Visually check if the terminal is not pulled out, with the connector connected.
2. Lightly pull harnesses on the connector one by one to check if all the harnesses are seated fully.



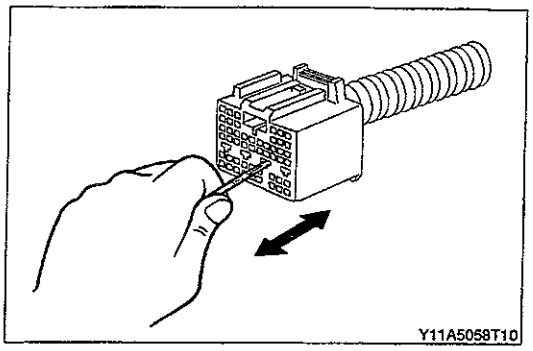
3. Disconnect the connector and check the male terminal for bent or alignment.



4. Disconnect the connector and check the female terminal for deformation such as spread open condition in its connected portion.
5. Ensure that the pressure is not extremely low when the male terminal is inserted to the female terminal.
6. Check each connecting portion of the connector for disturbance or disorder at the connector joint section.



7.When the connector is connected to the part, ensure that the harness does not apply undesired force to the connector and that the harness has proper amount of slack.



(2) COLD/HEAT METHOD

1.Case where malfunction seems to take place during cold period or hot period

2.With a hair dryer or refrigerant, heat or cool the parts of the system thought to be responsible for the malfunction. See if the malfunction is reproduced.

CAUTION

- When heating, do not heat the part beyond +60°C (temperature at which the part can be touched by hand).

3.When heating or cooling, do not open the lid of the unit, such as a sensor, to heat or cool directly electronic parts.

(3) WATER APPLYING METHOD

1.Case where the malfunction seems to take place on a rainy day or humid day

2.Apply water to the vehicle and see if the malfunction takes place.

CAUTION

- Do not apply water directly to electronic parts.

NOTE

- If rain leak takes place inside the vehicle, the rainwater may go along the harness, entering the inside of the parts. This should be kept in mind especially when the vehicle has had rain leak before.

TO INDEX

I1 BODY

BODY ---------- I1 - 1
BASIC CHECK AND ADJUSTMENT ---- I1 - 1
FRONT DOOR---------- I1 - 15
DISASSEMBLING AND ASSEMBLING(TRIM-RELATED) ------- I1 - 15
DISASSEMBLING AND ASSEMBLING(GLASS-RELATED)----- I1 - 19
DISASSEMBLING AND ASSEMBLING(LOCK-RELATED)------- I1 - 21
FENDER ---------- I1 - 23
REMOVAL AND INSTALLATION-------- I1 - 23
FRONT CROSSMEMBER---------- I1 - 25
REMOVAL AND INSTALLATION-------- I1 - 25
RADIATOR SUPPORT ---------- I1 - 26
REMOVAL AND INSTALLATION-------- I1 - 26
CENTER CROSS MEMBER---------- I1 - 29
REMOVAL AND INSTALLATION-------- I1 - 29
FLOOR BRACE ---------- I1 - 32
REMOVAL AND INSTALLATION-------- I1 - 32
LOWER ARM BRACKET BRACE --------- I1 - 33
REMOVAL AND INSTALLATION-------- I1 - 33
FLOOR CORNER BRACE ---------- I1 - 34
REMOVAL AND INSTALLATION-------- I1 - 34
HOOD LOCK CONTROL CABLE---------- I1 - 35
REMOVAL AND INSTALLATION-------- I1 - 35
FUEL LID OPENER ---------- I1 - 37
REMOVAL AND INSTALLATION-------- I1 - 37
FUEL FILLER OPENING LID---------- I1 - 39
REMOVAL AND INSTALLATION-------- I1 - 39
LUGGAGE DOOR LOCK OPENER------- I1 - 42
REMOVAL AND INSTALLATION-------- I1 - 42

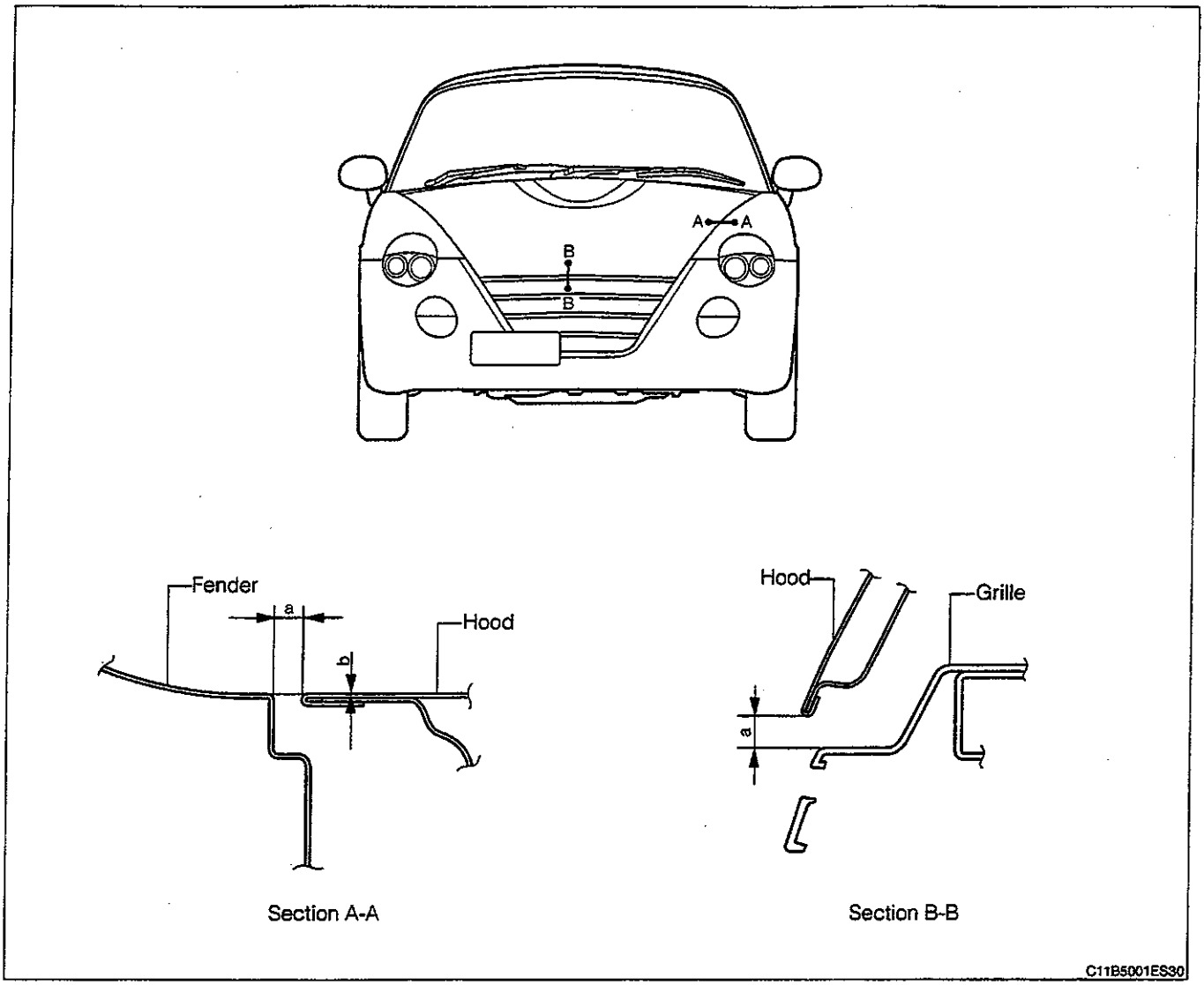
1 BODY

1-1 BASIC CHECK AND ADJUSTMENT

1-1-1 FITTING ADJUSTMENT

(1) HOOD

① FITTING DIMENSIONS



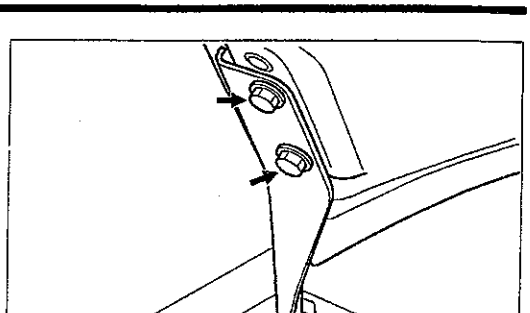
FITTING DIMENSIONS OF HOOD

Measuring point		Specified gap (a)	Stagger (b)	Difference between right and left	Deviation value
A−A	Hood X Front fender	3.4±1.5	0±1.5	Not to exceed 2.0	Not to exceed 1.5
B−B	Hood X Radiator grille	$10.5^{+2.0}_{-3.0}$	−	−	Not to exceed 2.0

Unit : mm

② **FITTING ADJUSTMENT**

1.To adjust the hood panel in a fore-and-aft direction and in a right-and-left direction at the rear end, loosen the hood hinge bolts.



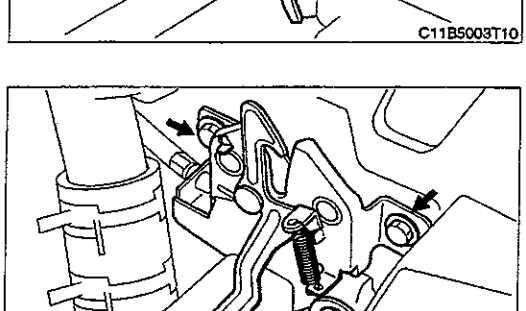
2.To adjust the hood in up-and-down and right-and-left directions at the front end, loosen the hood lock bolts.

CAUTION

- In cases where the centering bolt has been used, replace it with a bolt supplied for adjustment use in advance.

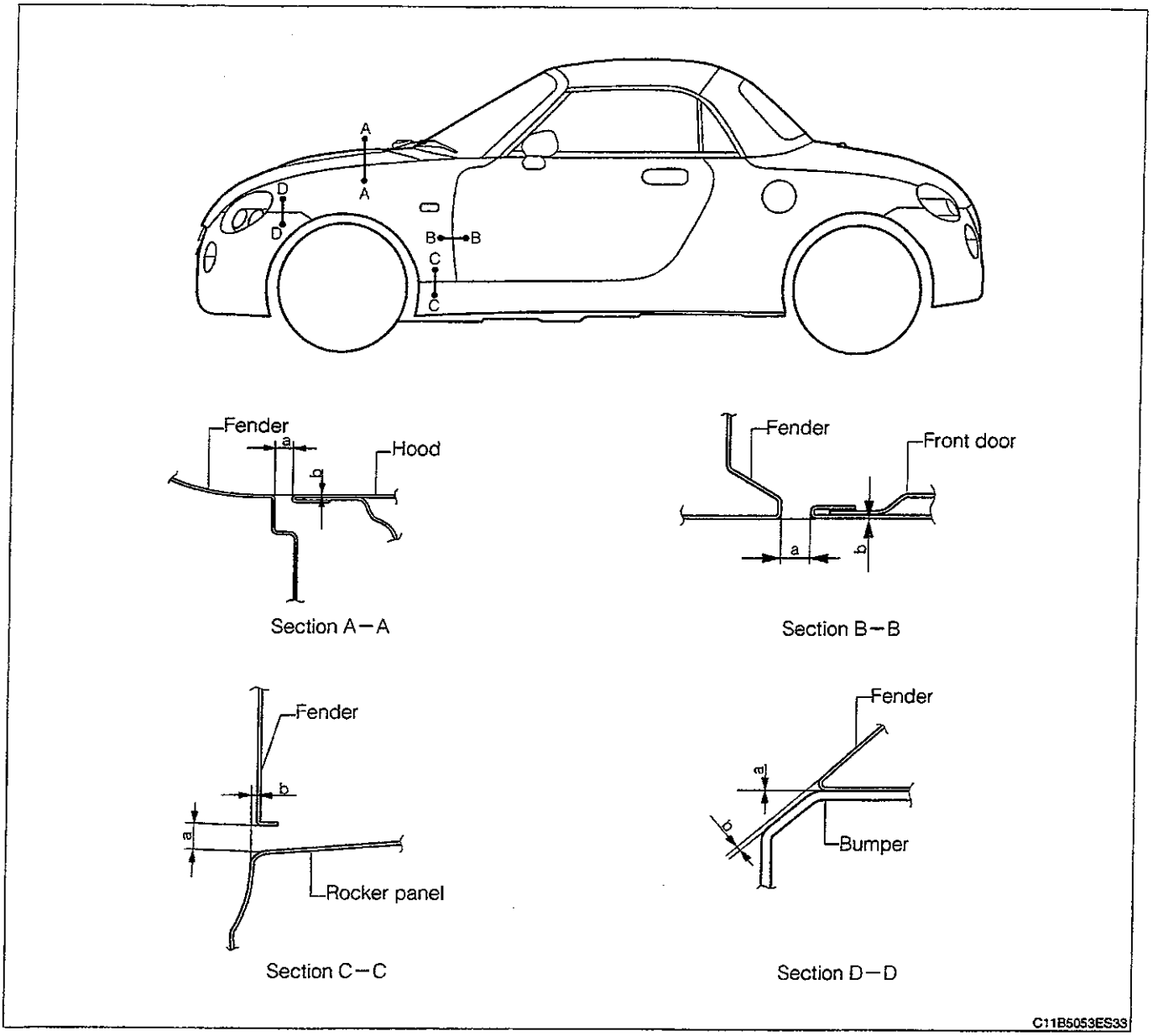
NOTE

- Part number of bolt:91511−G0612−000



(2) FRONT FENDER

① FITTING DIMENSIONS



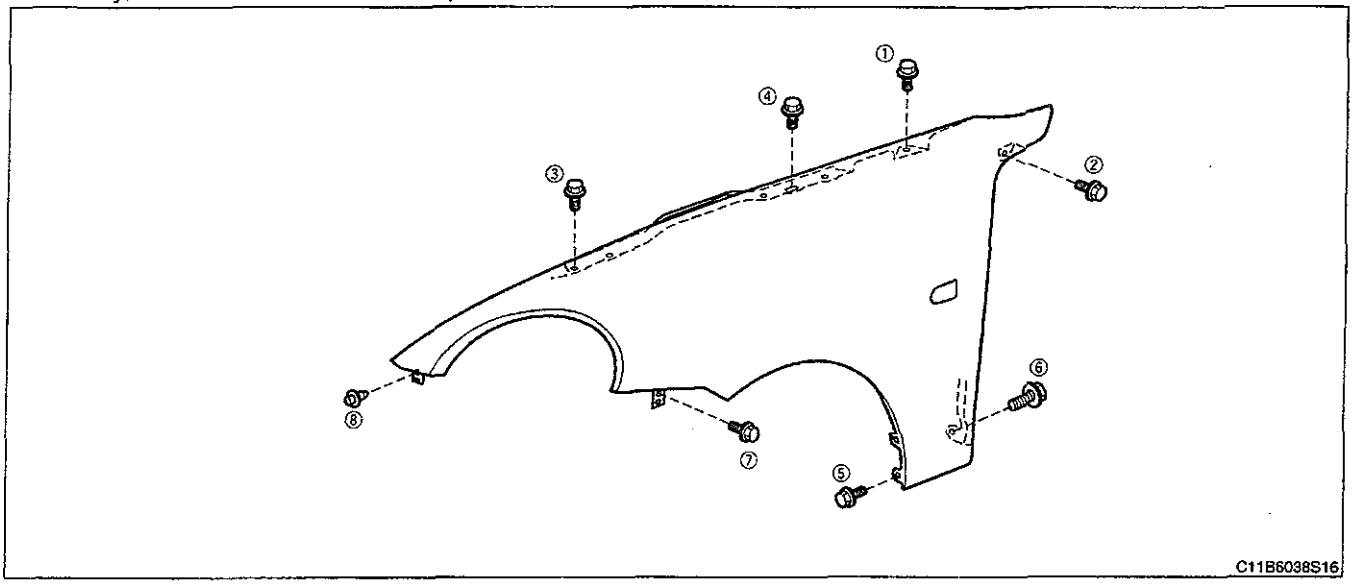
FITTING DIMENSIONS OF FRONT FENDER

Measuring point		Specified gap (a)	Stagger (b)	Difference between right and left	Deviation value
A−A	Front fender × Hood	3.4±1.5	0±1.5	Not to exceed 2.0	Not to exceed 1.5
B−B	Front fender × Front door	4.3±1.5	0±1.5	−	Not to exceed 1.5
C−C	Front fender × Rocker	4.5±1.5	−0.6±2.0 (With the rocker panel used as reference)	−	−
D−D	Front fender × Front bumper	0	−0.7±1.0 (With the fender panel used as reference)	Not to exceed 1.5	Not to exceed 1.0

Unit : mm

② FITTING ADJUSTMENT

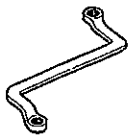
1. Adjust the clearance between the front pillar and the rocker by the bolt tightening adjustment ① and ②.
2. Adjust the clearance with the hood by the bolt tightening adjustment ③ and ④.
3. Adjust the difference in height with the rocker and the clearance with the door by the bolt tightening adjustment ⑤ and ⑥.
4. Finally, install the bolt ⑦ and clip ⑧.



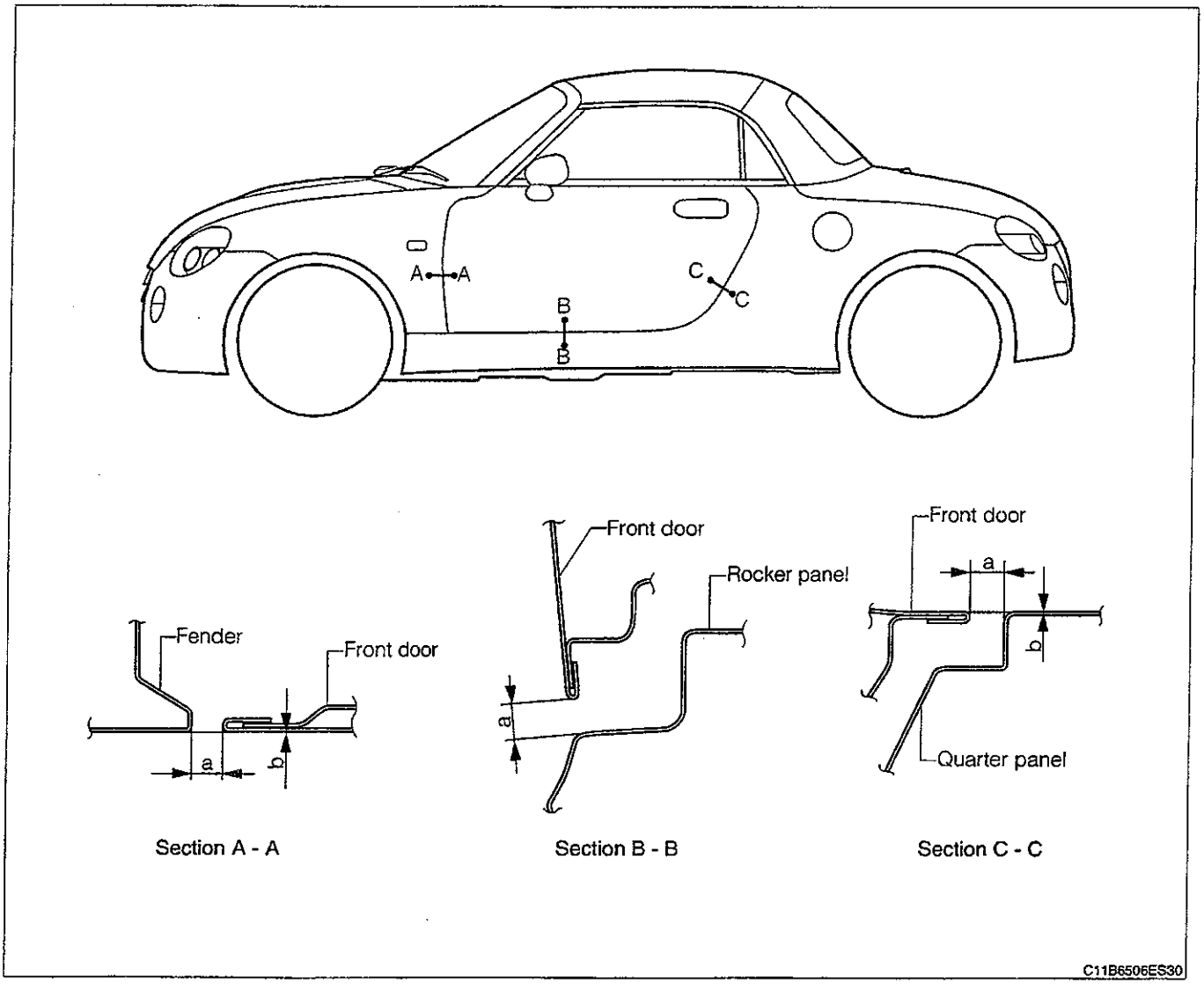
(3) FRONT DOOR

① ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09812-00010-000 (09812-22010-000)	Wrench door hinge set bolt

② FITTING DIMENSIONS



FITTING DIMENSIONS OF FRONT DOOR

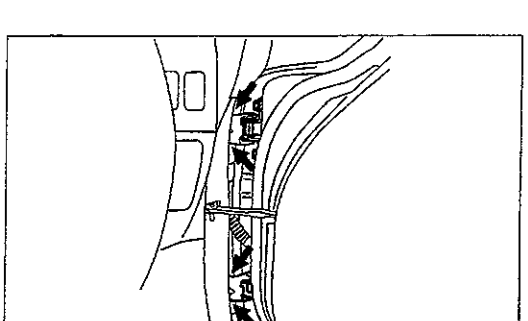
Measuring point		Specified gap	Stagger	Difference between right and left	Deviation value
A–A	Front door × Front fender	4.3±1.5	0±1.5	–	Not to exceed 1.5
B–B	Front door × Rocker	5.5±1.5	–	–	Not to exceed 2.0
C–C	Front door × Quarter panel	4.3±1.5	0±1.5	–	Not to exceed 1.5

Unit : mm

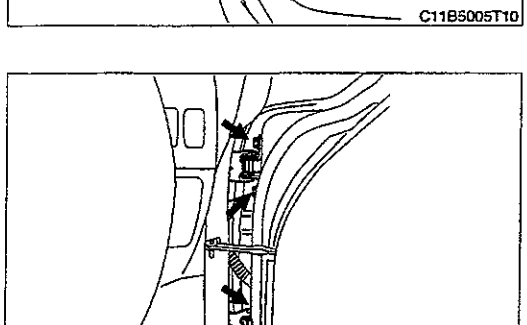
③ FITTING ADJUSTMENT

SST: 09812-00010-000

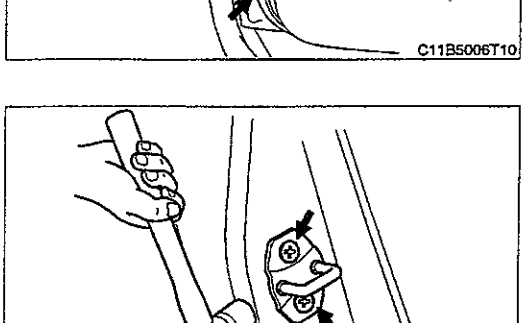
1. To adjust the rear end of the door and to perform adjustment in up-and-down and right-and-left directions, loosen the bolts at the pillar side.



2. To adjust the door in an up-and-down direction and the front end of the door in a right-and-left direction, loosen the bolts at the door side.



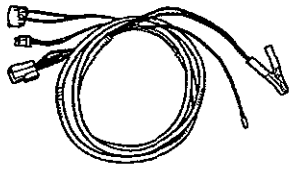
3. To adjust the door in fore-and-aft and right-and-left directions and to adjust the front door lock striker, loosen the striker attaching screws to such an extent that the striker can be moved. Then, perform the adjustment by lightly tapping the striker.
4. After adjustment of the striker, fully tighten.



(4) DOOR & QUARTER GLASS

① ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09842-97208-000	Sub-harness set,removal roof drive

② FITTING DIMENSIONS

FITTING DIMENSIONS OF FRONT DOOR

Measuring point		Specified gap (a)	Stagger (b)	Difference between right and left	Deviation value
A−A	Door glass×Roof mold	7.5±3.0	–	–	–
B−B	Door glass×FR roof mold	7.4±3.0	–	–	–
C−C	Door glass×Quarter window	5.7±2.0	3±2.5 "With the glass used as reference"	–	–
D−D	Quarter window×RR roof mold	7.4±3	–	–	–

Unit : mm

③ FITTING ADJUSTMENT (DOOR GLASS)

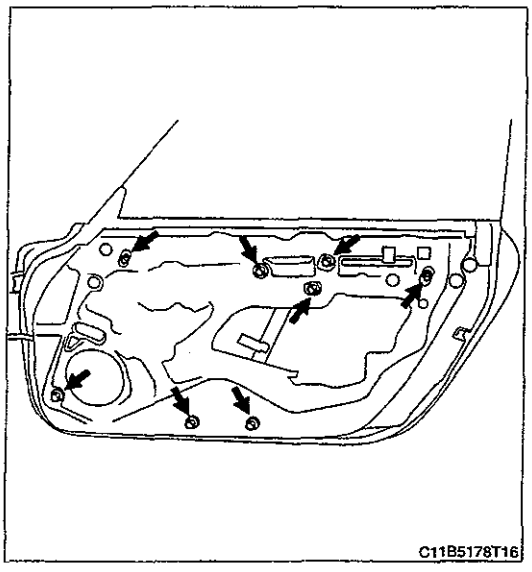
1.Fully close the roof.

2.Loosen the bolts and nuts shown at the right figure and keep them in a temporarily tightened state.
- (1) Front door mirror bracket installing nut. (Adjust bolt securing nut)
- (2) Front door glass installing nut.
- (3) Front door power window regulator installing nut .(Adjust bolt securing nut)
- (4) Door window upper stop installing bolt.

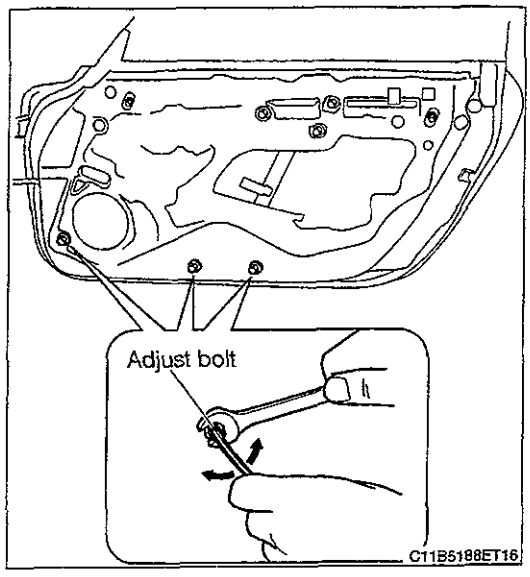
NOTE

- **Temporarily tighten the door window upper stop at the highest end position.**

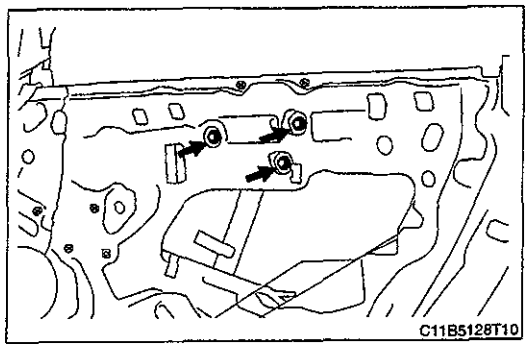
3.Raise the door glass and stop it 3 mm before the full close position.



4.Perform the vehicle lateral direction adjustment by turning the adjusting bolts of the door mirror bracket and regulator. Then, fully tighten the door mirror bracket and regulator.



5.Adjust each section for the vertical direction, longitudinal direction and inclination. Then, fully tighten the door glass–installing nut.

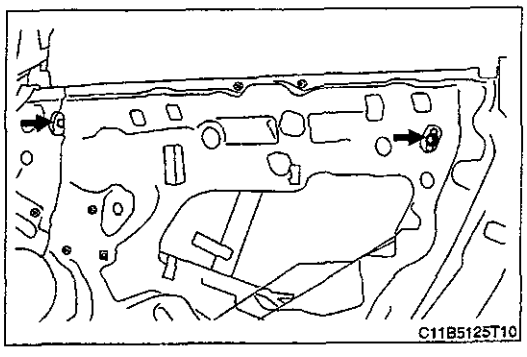


6.With the door window upper stop kept lightly applied to the stopper of the door glass, fully tighten the installing bolt.

7.After fully opening the door glass, close it fully. Check the following items.

(1) Check the alignment at all the points.

(2) While the glass is rising, the roof side weatherstrip and glass should be kept parallel to each other. Also the door window stoppers at the front and rear and the glass stoppers should make contact at the same time.



8.With the door glass fully closed, open and close the door. At this time, ensure that the roof drip side finish front molding and removable roof front molding do not interfere with the door glass.

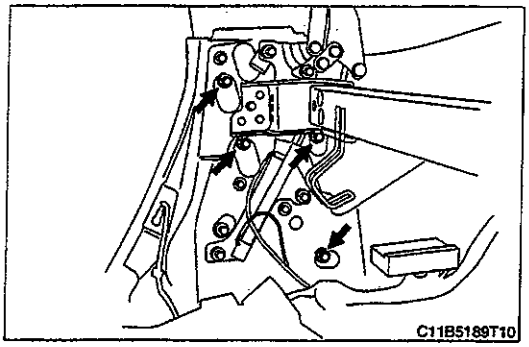
④ **FITTING ADJUSTMENT (QUARTER GLASS)**

SST: 09842-97208-000

1.Remove the center floor side member RH/LH.

2.Fully close the roof.

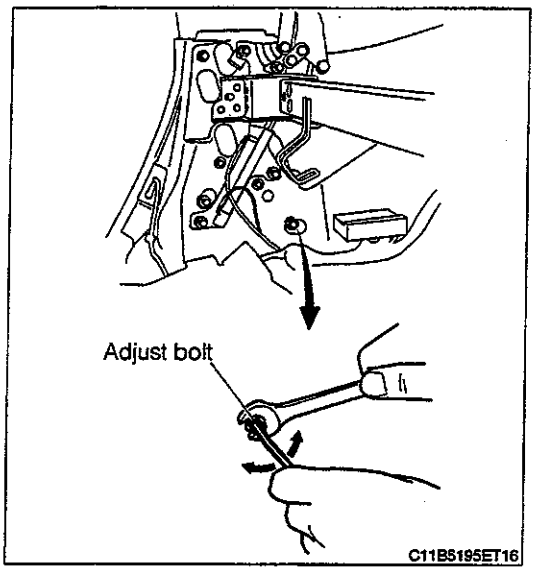
3.Loosen the bolts and nuts shown at the right figure and keep them in a temporarily tightened state.
(1) Quarter window installing nut (3 points)
(2) Quarter window regulator installing nut (1 point)



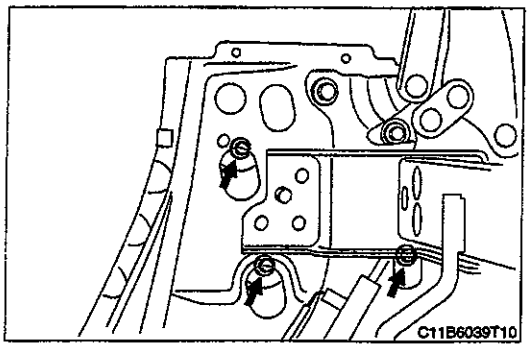
4.Remove the coupler of the quarter window regulator motor. Set the SST. (For battery voltage supply.)
SST: 09842-97208-000

5.Apply the battery voltage to the quarter window regulator motor and make the quarter window fully closed.

6.Perform the vehicle lateral direction adjustment by turning the adjusting bolt of the quarter window regulator shown at the right figure. Fully close the nut.



7.Adjust each section for the vertical direction, longitudinal direction and inclination. Then, fully tighten the quarter glass.

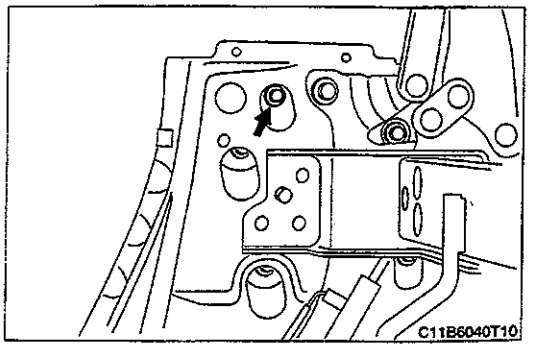


NOTE

- **If there is no margin for the vertical adjustment, loosen the bolt shown at the right figure. Raise the position of the quarter window up stopper.**

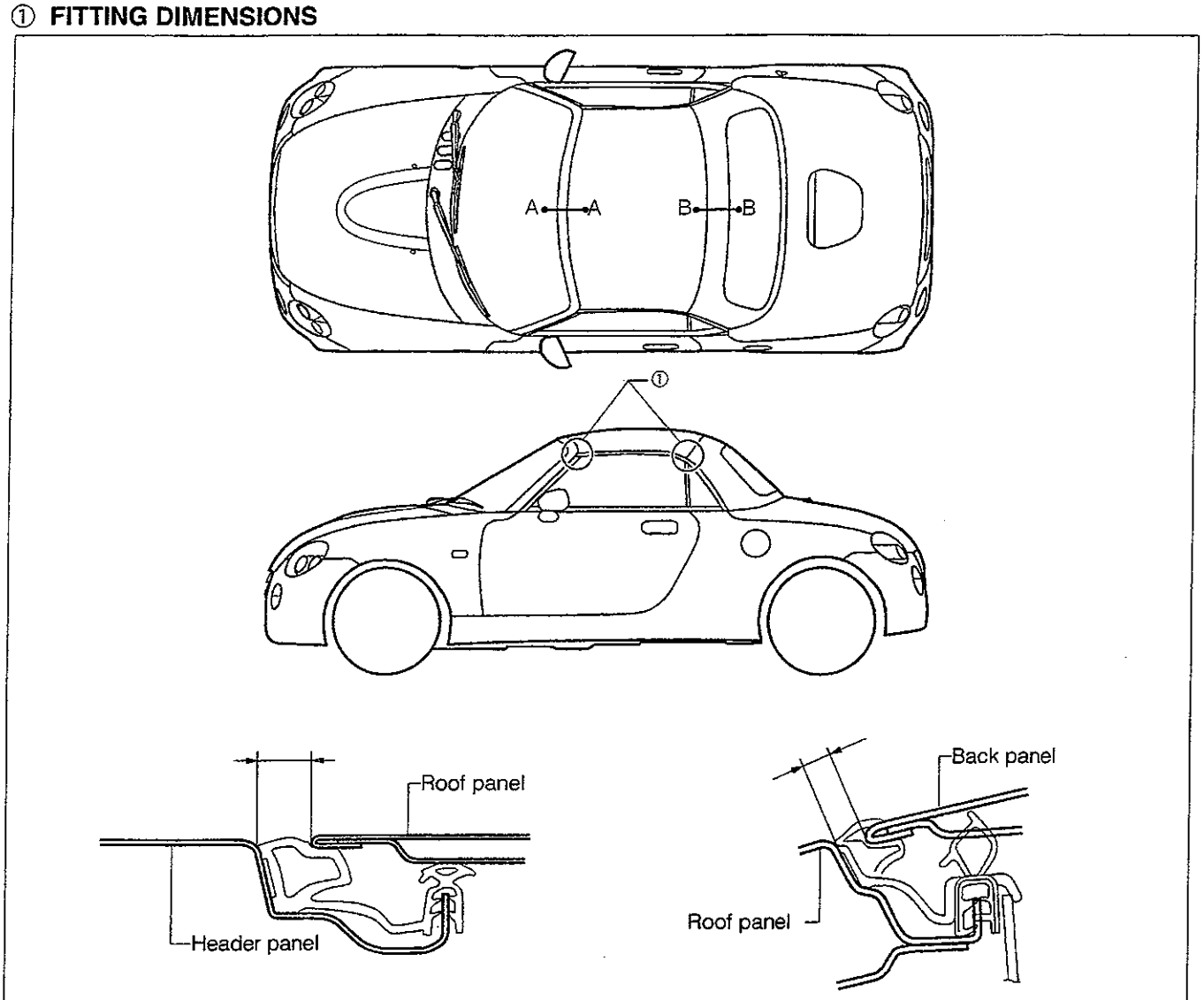
8.Confirm the alignment state of the quarter window at all the points with the window fully closed.

9.Install the center floor side member RH/LH.



(5) ROOF

① FITTING DIMENSIONS



FITTING DIMENSIONS OF ROOF PANEL

Measuring point		Specified gap	Stagger	Difference between right and left	Deviation value
A–A	Roof×Header panel	7.0±1.5	0±1.0	–	–
B–B	Roof×Back panel	7.0±1.5	0±1.0	–	–
①	Roof×Header panel stagger Roof×Back panel stagger	–	0±1.0	–	–

Unit : mm

② ALIGNMENT ADJUSTMENT(WHEN ROOF PANEL HAS BEEN REPLACED OR REMOVED)

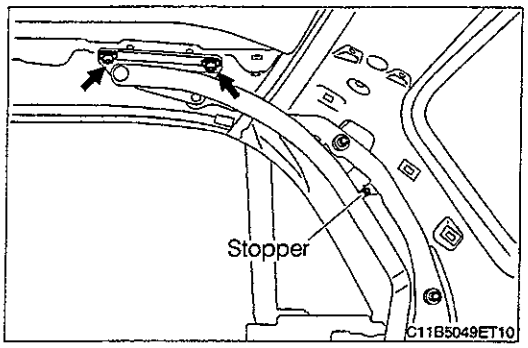
1.Loosen the bolts at the positions shown in the right figure (Both right and left). Perform the vehicle longitudinal and lateral direction adjustment.

CAUTION

- **At this time, do not adjust the adjusting bolts of the roof link or back panel by loosening the bolt.**

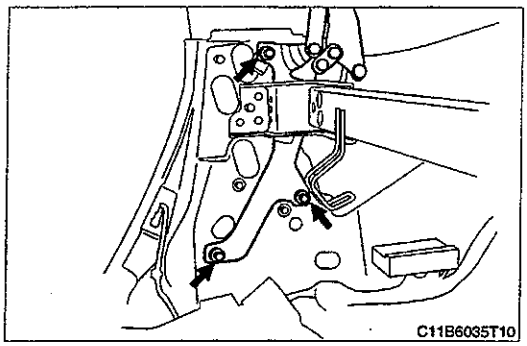
2.Ensure that the roof link stopper is in light contact with the link (Zero contact).

3.After completion of the adjustment, ensure that the roof can be opened/closed smoothly.



③ ALIGNMENT ADJUSTMENT (WHEN REMOVABLE ROOF UNIT ASSEMBLY HAS BEEN REPLACED OR REMOVED)

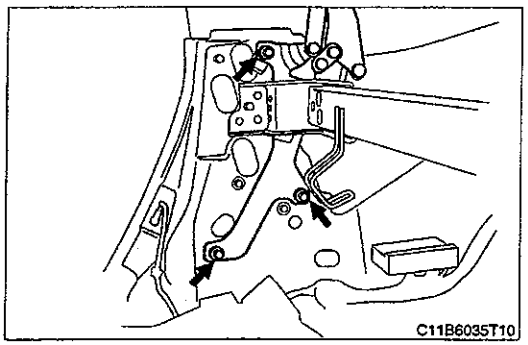
1.Remove the bolt shown at the right figure. Insert shims between the link and the body so as to perform the vehicle lateral direction adjustment.



2.Remove the bolt shown at the right figure. Insert shims between the link and the body so as to perform the vehicle lateral direction adjustment.

NOTE

- Shim number:52331-97201-000(0.5mm)
  52331-97202-000(1.0mm)
  52331-97202-000(2.0mm)



3.Loosen the bolts shown in the right figure (Both right and left). Perform the vehicle longitudinal and vertical adjustment.

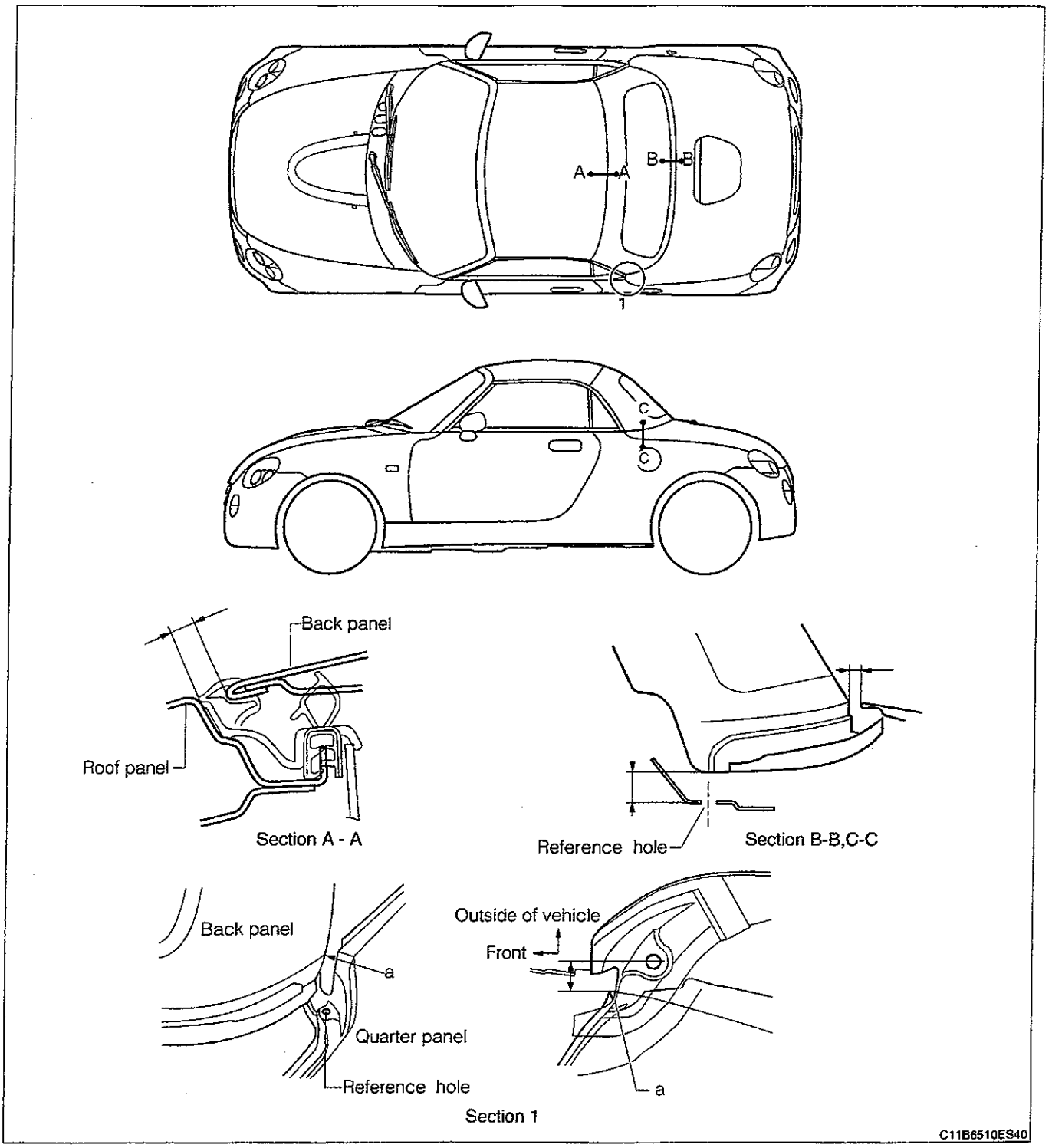
CAUTION

- **At this time, do not adjust the adjusting bolts of the roof panel or back panel by loosening the bolt.**

4.After completion of the adjustment, ensure that the roof can be opened/closed smoothly.

(6) BACK PANEL

① FITTING DIMENSIONS

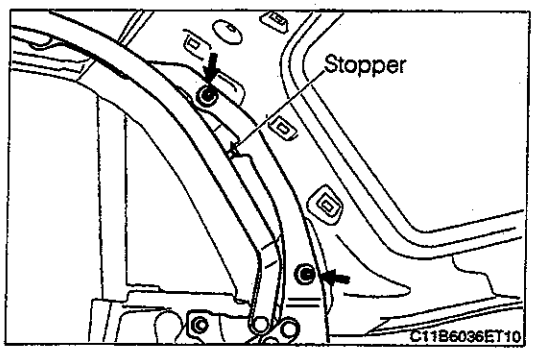


FITTING DIMENSIONS OF BACK PANEL

Measuring point		Specified gap	Stagger	Difference between right and left	Dimensions
A−A	Roof×Back panel	7.0±1.5	–	–	–
B−B	Back panel×Trunk lid	7.0±1.5	–	–	–
C−C	Back panel×Quarter panel	21.7±1.0	–	–	–
①	Back panel point a−quarter panel standart hole	–	–	–	16.0±1.0

Unit : mm

② FITTING ADJUSTMENT



1.Loosen the bolts shown in the right figure (Both right and left). Perform the vehicle longitudinal and vertical direction adjustment.

CAUTION

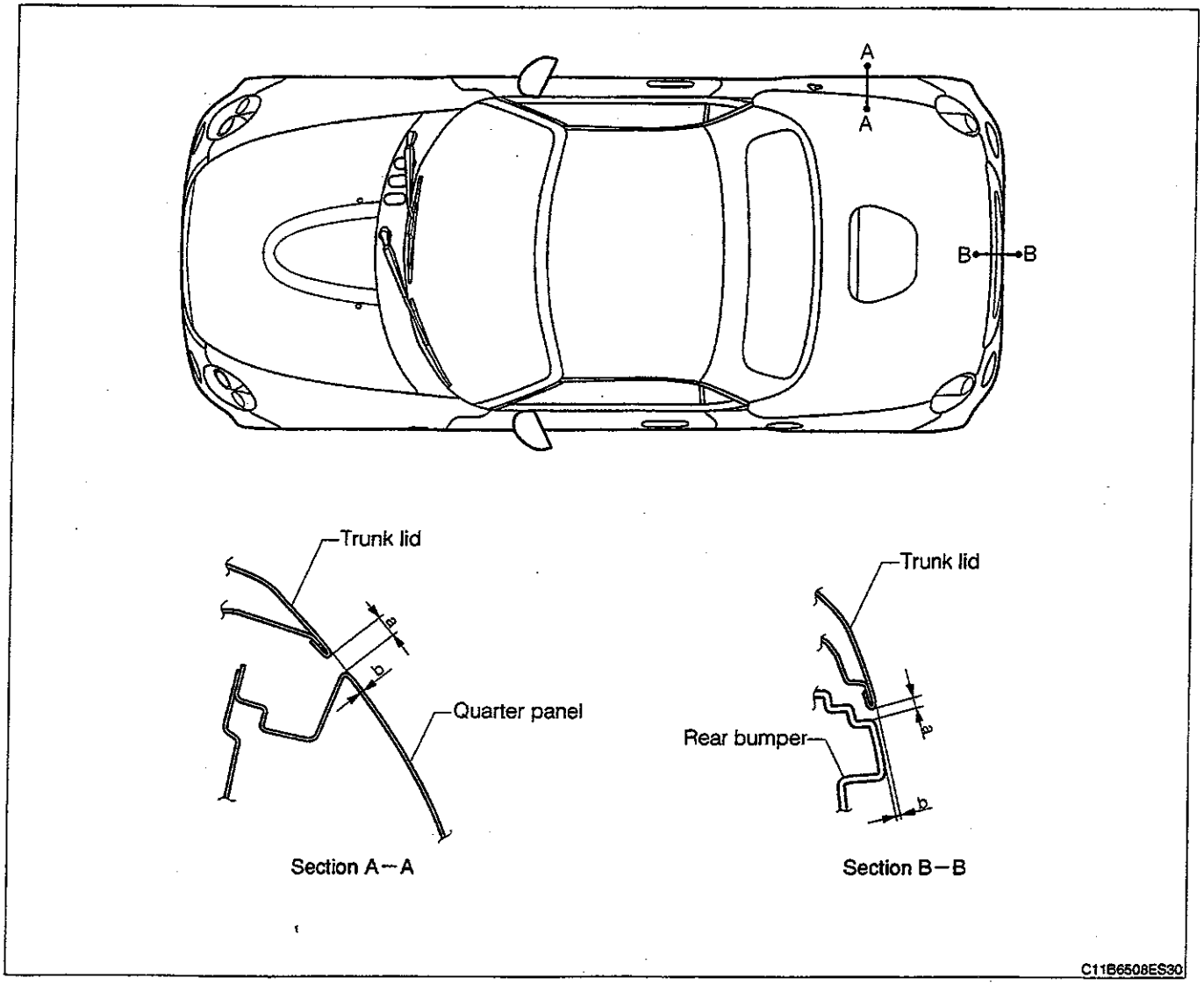
- **At this time, do not adjust the adjusting bolts of the roof panel or roof link by loosening the bolt.**

2.Ensure that the roof link stopper is in light contact with the link (Zero contact).

3.After completion of the adjustment, ensure that the roof can be opened/closed smoothly.

(7) TRUNK LID

① FITTING DIMENSIONS



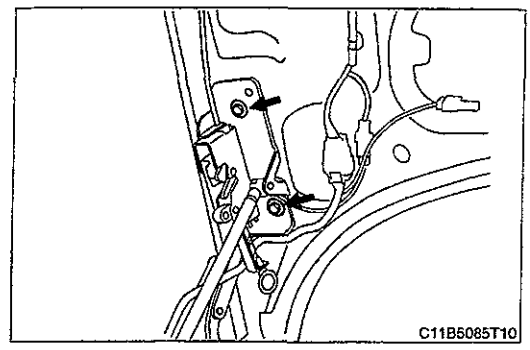
FITTING DIMENSIONS OF TRUNK LID

Measuring point		Specified gap (a)	Stagger (b)	Difference between right and left	Deviation value
A - A	Trunk lid × Quarter panel	6.8±1.5	0±1.5	Not to exceed 2.0	Not to exceed 2.0
B—B	Trunk lid × Rear bumper	5.4±2.0	−0.7±2.0	—	Not to exceed 2.0

Unit : mm

② FITTING ADJUSTMENT

1.Loosen the trunk lid installing bolts. Perform the vehicle longitudinal and lateral direction adjustment.

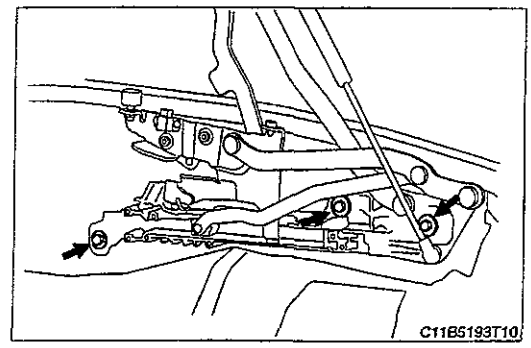


2.Loosen the installing bolts (At three points) of the luggage link. Perform the vehicle longitudinal and vertical direction adjustment.

NOTE

- As for the alignment dimension of the back panel × trunk lid, see the section under "Back panel alignment adjustment."

Refer to Pge I1-12.



CAUTION

- Only when the luggage link has been replaced or removed, adjustment should be made by moving the luggage link.
- Do not adjust the trunk lid by moving the luggage compartment door striker.

3.After completion of the adjustment, ensure that the trunk lid can be opened/closed (Both to the forward and rearward) smoothly.

4.After completion of the adjustment, ensure that the easy closer function of the trunk lid can function properly.

2 FRONT DOOR

2-1 DISASSEMBLING AND ASSEMBLING(TRIM-RELATED)

2-1-1 ARTICLES TO BE PREPARED

Tool

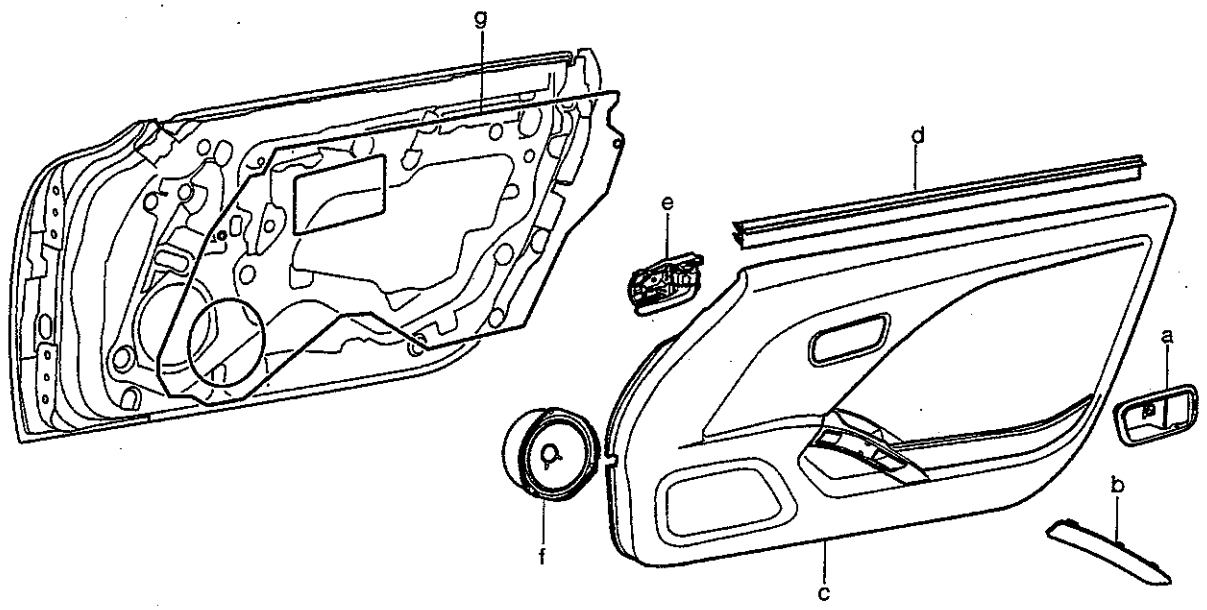
Clip remover

Lubricant, adhesive, others

Butyl tape,Protective tape

2-1-2 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) COMPONENTS



C11B5014S33

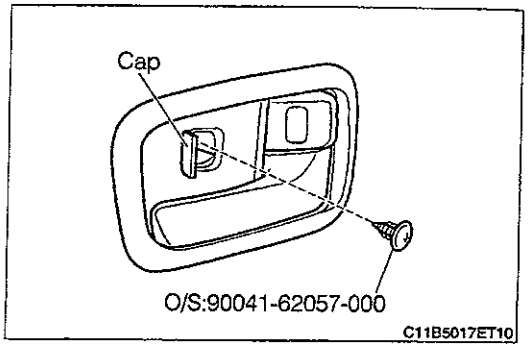
(2) DISASSEMBLING AND ASSEMBLING PROCEDURE

▼ ▲ 1 a Bezel, FR door inside handle
▼ 2 b Cover, door assist grip
▼ 3 c Panel Ay, FR door trim
▼ 4 d Weatherstrip, front door glass, inner
▲ 5 e Handle S/A, FR door, inside
6 f Speaker Ay
▲ 7 g Cover, front door service hole

2-1-3 POINTS OF DISASSEMBLY

(1) FR DOOR INSIDE HANDLE BEZEL

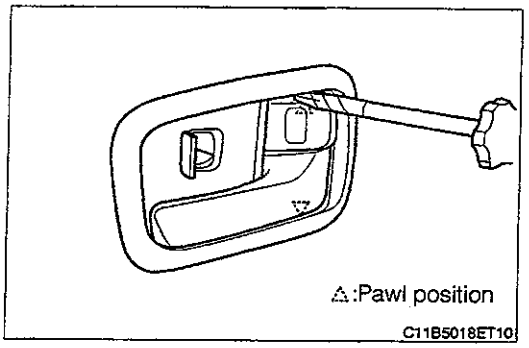
1.Remove the cap then, remove the screw.



2.Insert a flat screwdriver whose tip end is wound with a protective tape into between the door lock knob and the inside handle bezel so as to disengage the pawl. In the same way, disengage the pawl between the inside handle and inside handle bezel. Remove the inside handle bezel.

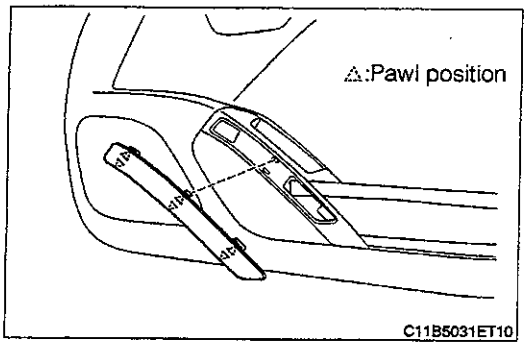
CAUTION

- **When the temperature is low, there is the possibility that the pawl fitting section may be broken. Hence, warm up the fitting section with a dryer before removal.**



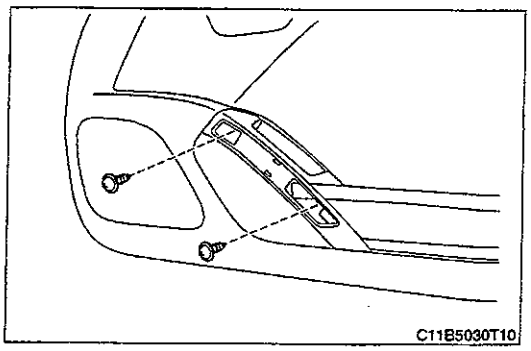
(2) DOOR ASSIST GRIP COVER

1.Remove the door assist grip cover by disengaging the pawl shown in the right figure.

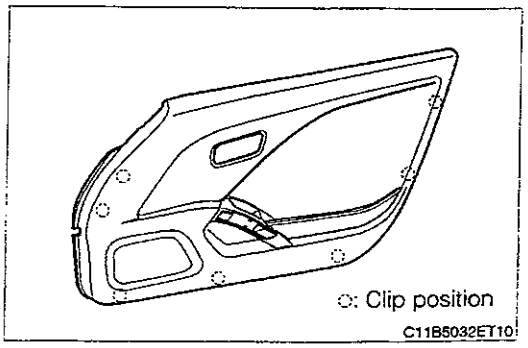


(3) FRONT DOOR TRIM PANEL AY

1.Remove the screw (Two section) by detaching its fitting.

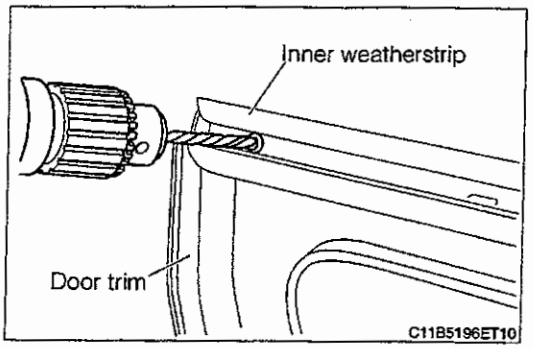


2.Remove the front door trim panel by disengaging the clip shown in the right figure.



(4) FRONT DOOR GLASS INNER WEATHERSTRIP

1.By lightly applying a drill vertically to the mandrel of the rivet, grind the mandrel to remove it. (At two points)



2-1-4 POINTS OF ASSEMBLY

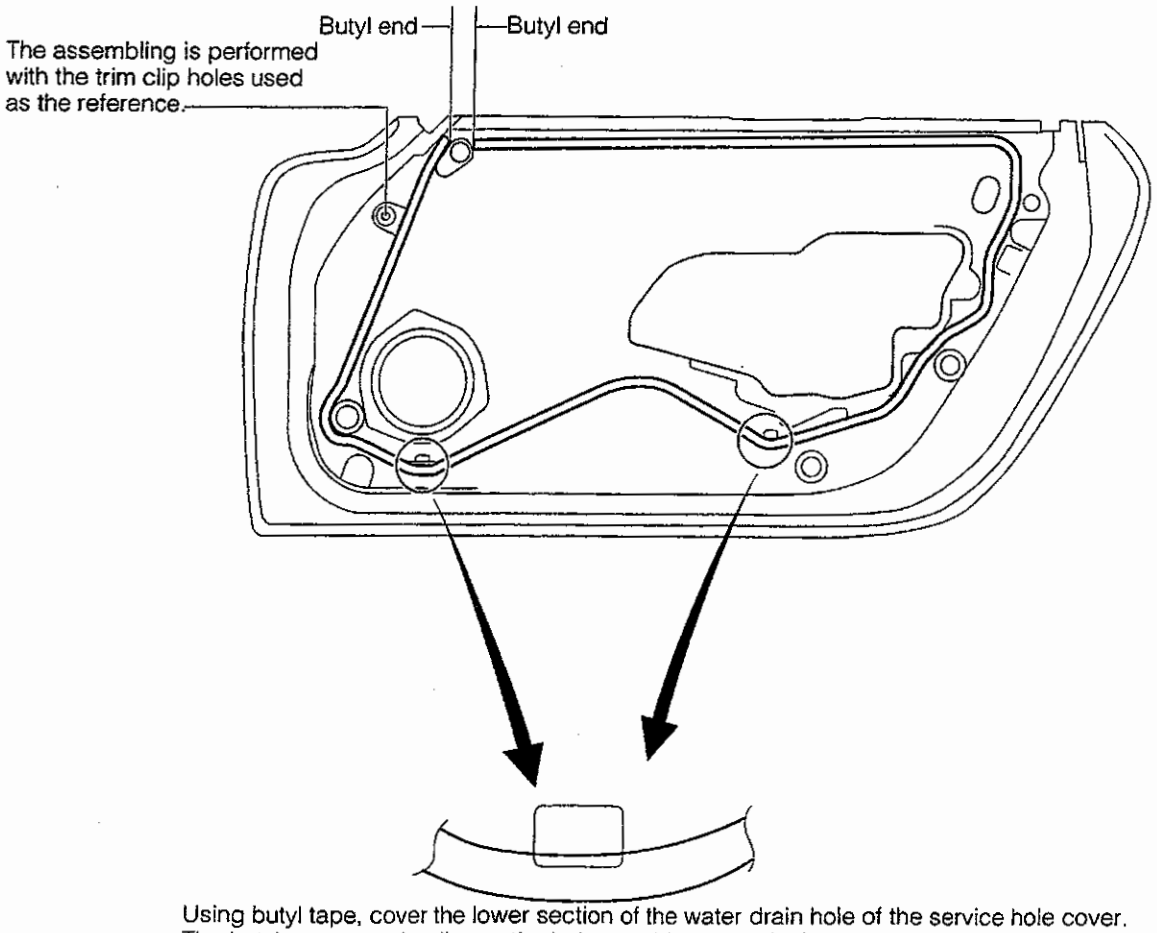
(1) FRONT DOOR SERVICE HOLE COVER

1.Install the front door service hole cover, following the main points given below.

(1) Affix butyl tape along the panel groove as shown in the figure below. At this time, do not stretch the tape.

(2) When affixing the service hole cover, securely press the butyl tape affixing section.

(3) If the service hole cover has rupture, this will cause water leakage. Be sure to replace the service hole cover.



Using butyl tape, cover the lower section of the water drain hole of the service hole cover.
The butyl tape route leading to the hole should have an inclination.
The affixing should be carried out so that the hole center section may become the lowest point.

C11B5037ES30

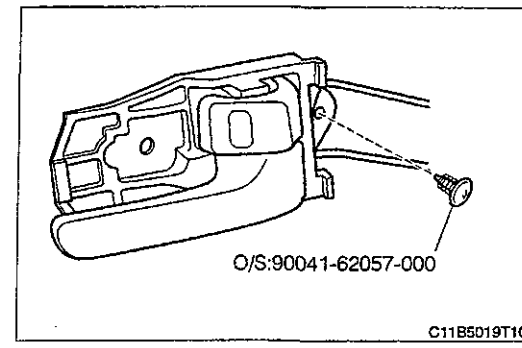
(2) FRONT DOOR INSIDE HANDLE S/A

CAUTION

- Be very careful not to break the threaded hole by tightening the screw with an excessive torque, for an ET screw has been employed. Do not use an impact driver when tightening the screw.
- If the threaded section should be broken, be sure to use an over sized ET screw.

NOTE

- ET screw: This is a screw by which a female screw is threaded as it is tightened, utilizing the shape at the tip end which has a self-drilling effect.



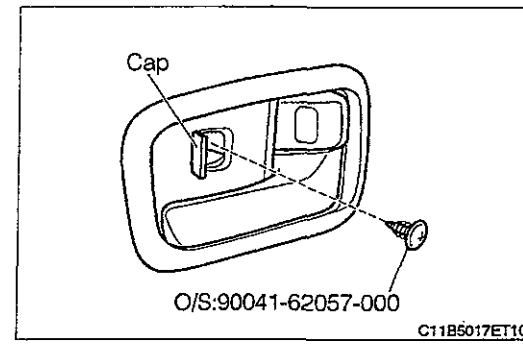
(3) FRONT DOOR INSIDE HANDLE BEZEL

CAUTION

- Be very careful not to break the threaded hole by tightening the screw with an excessive torque, for an ET screw has been employed. Do not use an impact driver when tightening the screw.
- If the threaded section should be broken, be sure to use an over sized ET screw.

NOTE

- ET screw: This is a screw by which a female screw is threaded as it is tightened, utilizing the shape at the tip end which has a self-drilling effect.



2-2 DISASSEMBLING AND ASSEMBLING(GLASS-RELATED)

2-2-1 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

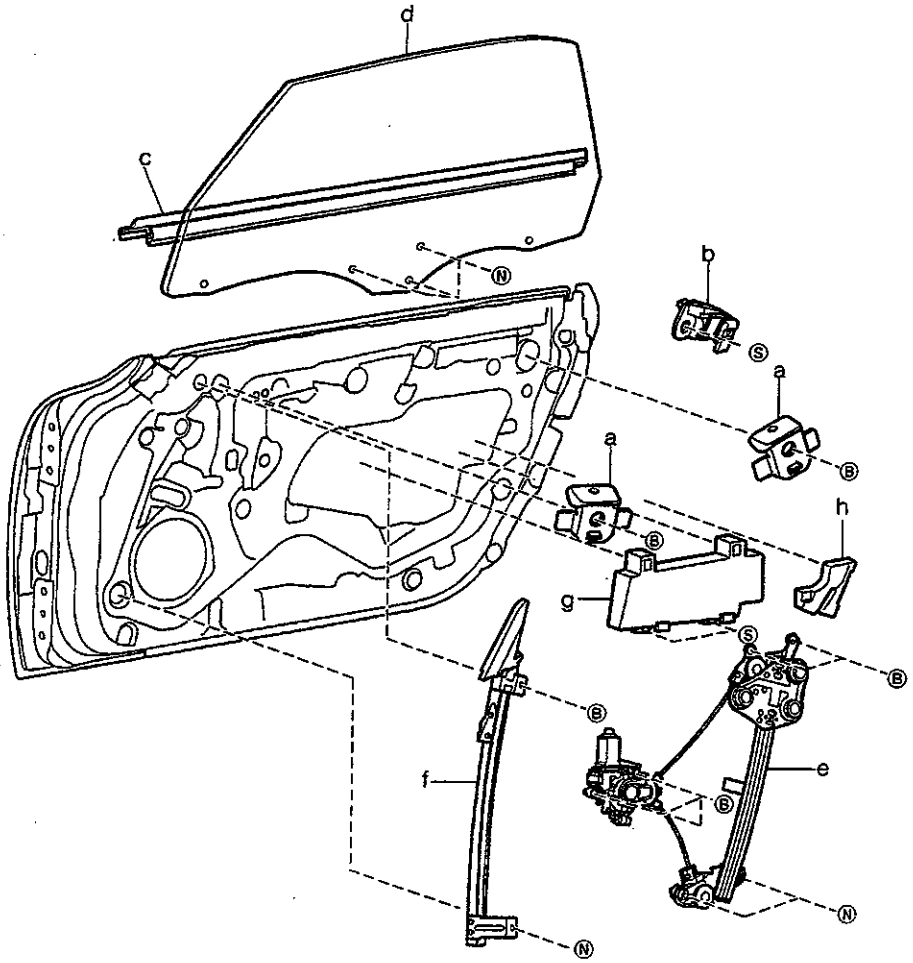
MP grease,Butyl tape,Protective tape

2-2-2 OPERATION BEFORE DISASSEMBLY

1.Remove the front door service hole cover.
Refer to Page I1-5.

2-2-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) COMPONENTS



C11B5015S33

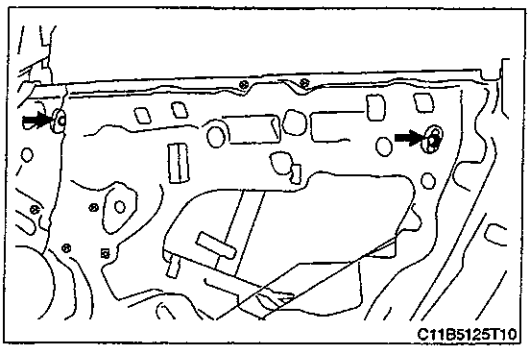
(2) DISASSEMBLING AND ASSEMBLING PROCEDURE

- ▼ 1 a Stopper, FR door window, upper
- 2 b Door, glass frame stabilizer
- 3 c Weatherstrip Ay door glass outer
- ▼ 4 d Glass S/A, front door
- ▼ 5 e Regulator Ay, FR door power window
- 6 f Bracket S/A, FR door mirror
- 7 g Pad, FR door outside molding
- 8 h Pad, FR door lower flame garnish

2-2-4 POINTS OF DISASSEMBLY

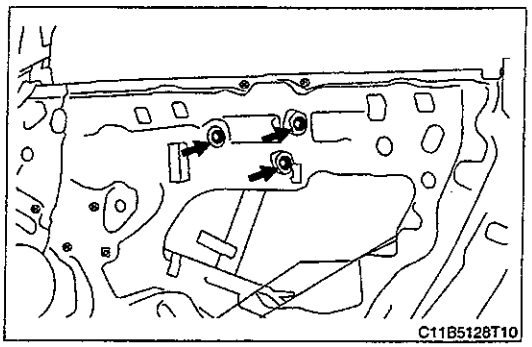
(1) FRONT DOOR WINDOW UPPER STOPPER

1.Remove the cap and remove the screw by detaching its fitting. (Two point)



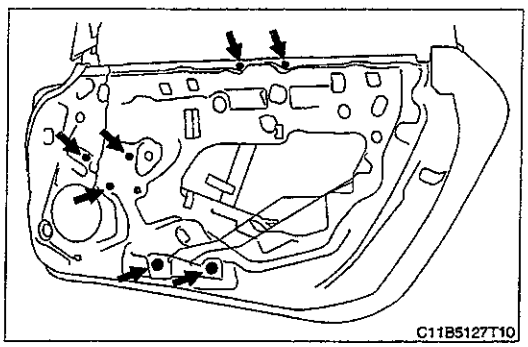
(2) FRONT DOOR GLASS S/A

1.Raise the door glass to the position shown in the right figure. Remove the three nuts and remove the front door glass assembly.



(3) FRONT DOOR POWER WINDOW REGULATOR Ay

1.Shown in the right figure remove the five bolt and two nut, remove the front door power window regulator Ay.



2-2-5 POINTS OF ASSEMBLY

1.Perform the door glass alignment adjustment.
Refer to Page I1-7.

2-2-6 OPERATION AFTER ASSEMBLY

1.Install the front door service hole cover.
Refer to Page I1-15.

2-3 DISASSEMBLING AND ASSEMBLING(LOCK-RELATED)

2-3-1 ARTICLES TO BE PREPARED

Lubricant, adhesive, others

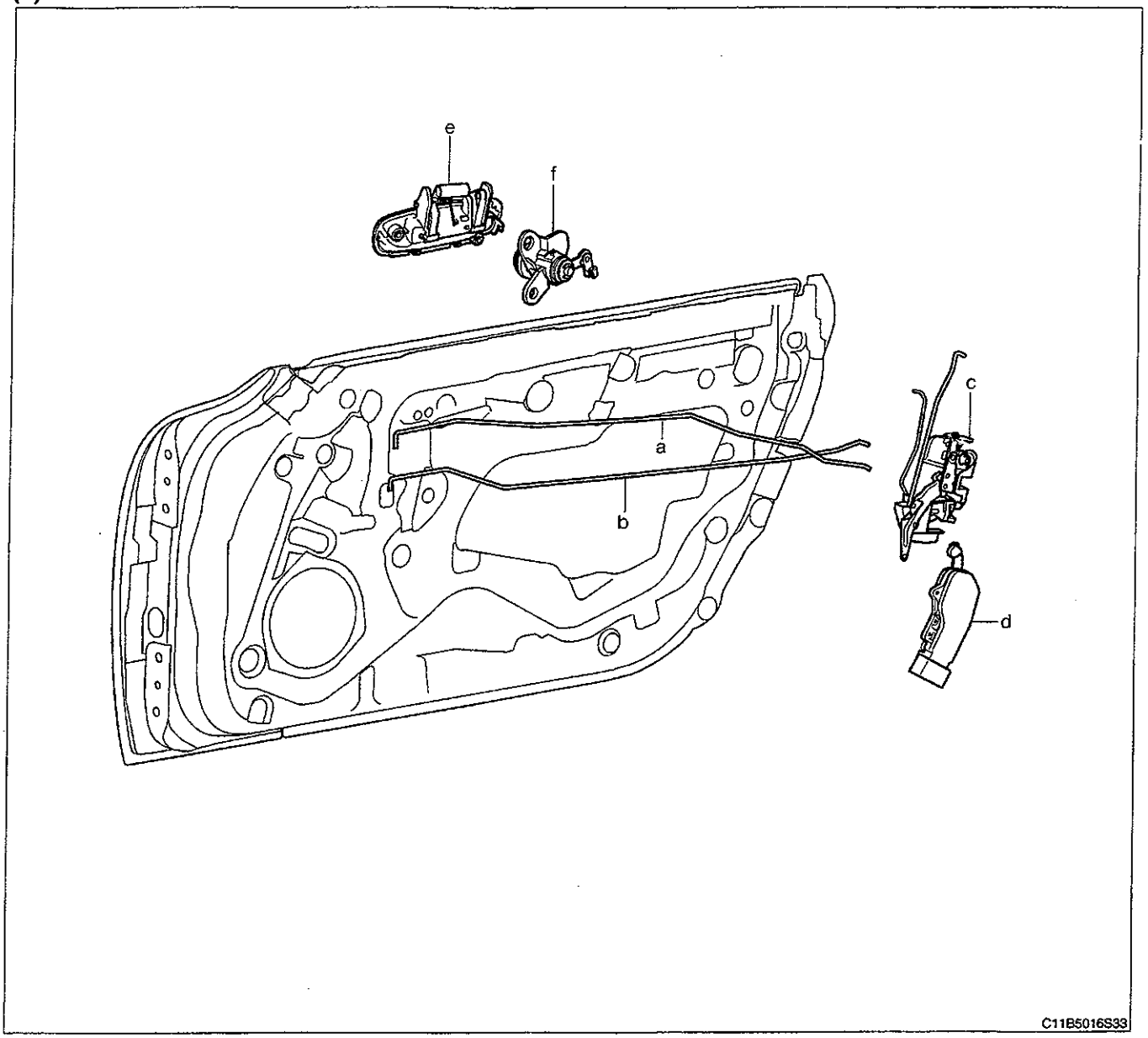
MP grease,Butyl tape,Protective tape

2-3-2 OPERATION BEFORE DISASSEMBLY

1.Remove the front door service hole cover.
Refer to Page I1-15.

2-3-3 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) COMPONENTS



(2) DISASSEMBLING AND ASSEMBLING PROCEDURE

1 a Link, FR door lock remote control (For locking knob)
2 b Link, FR door lock remote control (For inside handle)
3 c Lock Ay, FR door
4 d Actuator Ay, FR door lock
5 e Handle Ay, FR door lock
6 f Cylinder Ay, front door lock

2-3-4 OPERATION AFTER ASSEMBLY

1.Install the front door service hole cover.
Refer to Page I1-15.

3 FENDER

3-1 REMOVAL AND INSTALLATION

3-1-1 OPERATION BEFORE REMOVAL

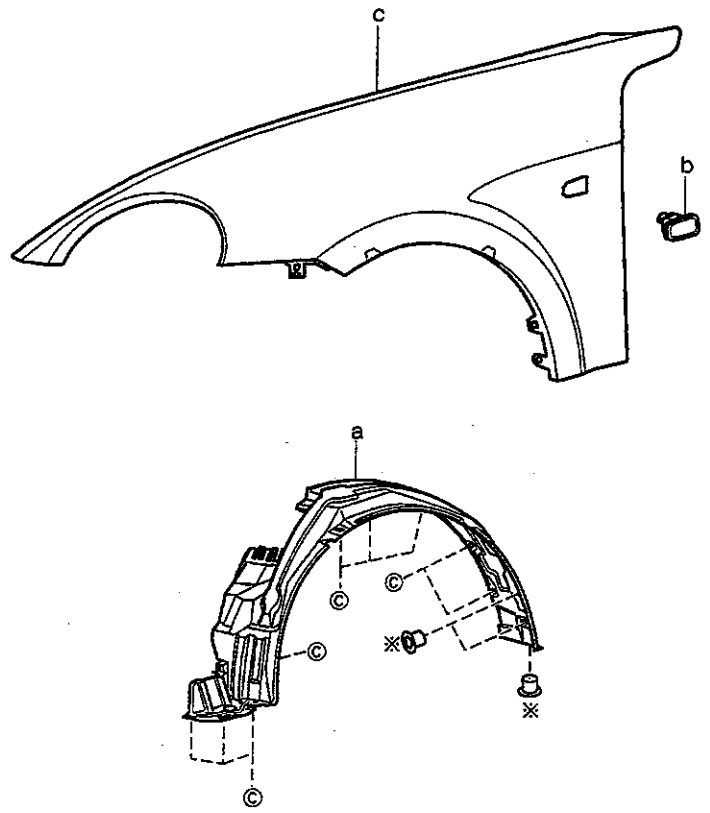
1.Remove the radiator grille.
Refer to Page I2-1.

2.Remove the front bumper cover.
Refer to Page I2-2.

3.Remove the cowl top ventilator louver.
Refer to Page I2-5.

3-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



C11B5044S33

※:Non – reusable parts

(2) REMOVAL AND INSTALLATION PROCEDURES

▲ 1 a Liner, front fender
2 b Lamp Ay, side turn signal
▲ 3 c Fender, FR

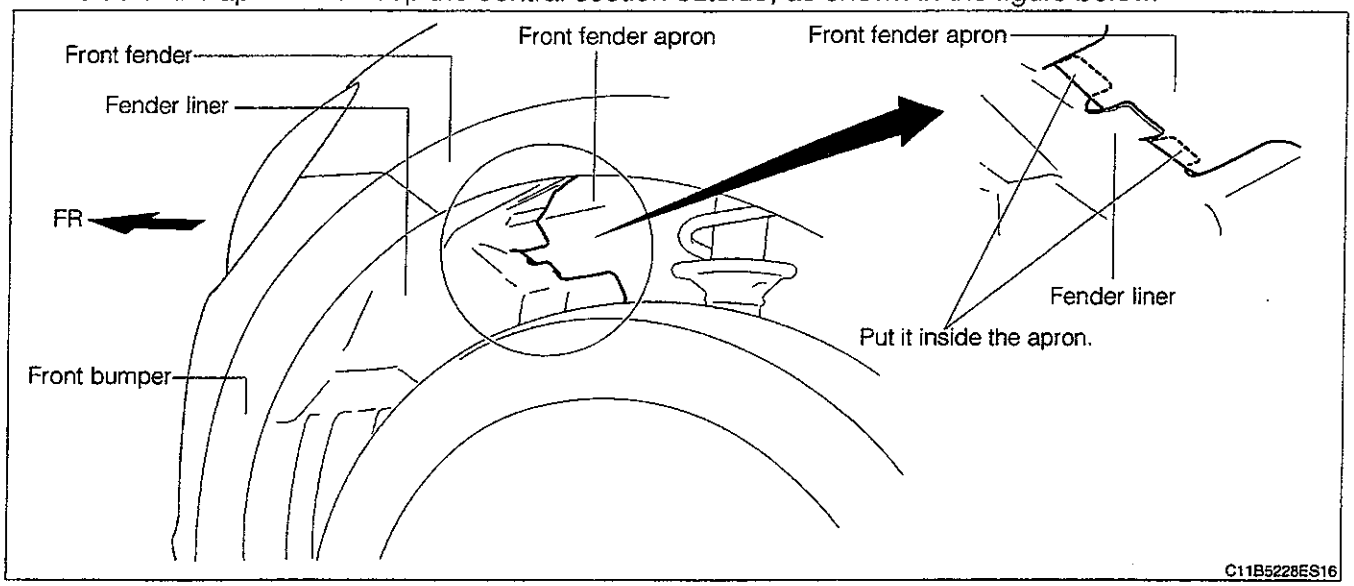
3-1-3 POINTS OF INSTALLATION

(1) FRONT FENDER

1.Perform the front fender alignment adjustment.
Refer to Page I1-3.

(2) FRONT FENDER LINER

1.When installing the front fender liner, insert both ends of the slit section of the fender liner into the inside of the apron and keep the central section outside, as shown in the figure below.



3-1-4 OPERATION AFTER INSTALLATION

1.Install the cowl top ventilator louver S/A.
Refer to Page I2-5.

2.Install the front bumper cover.
Refer to Page I2-2.

3.Install the radiator grille.

4 FRONT CROSSMEMBER

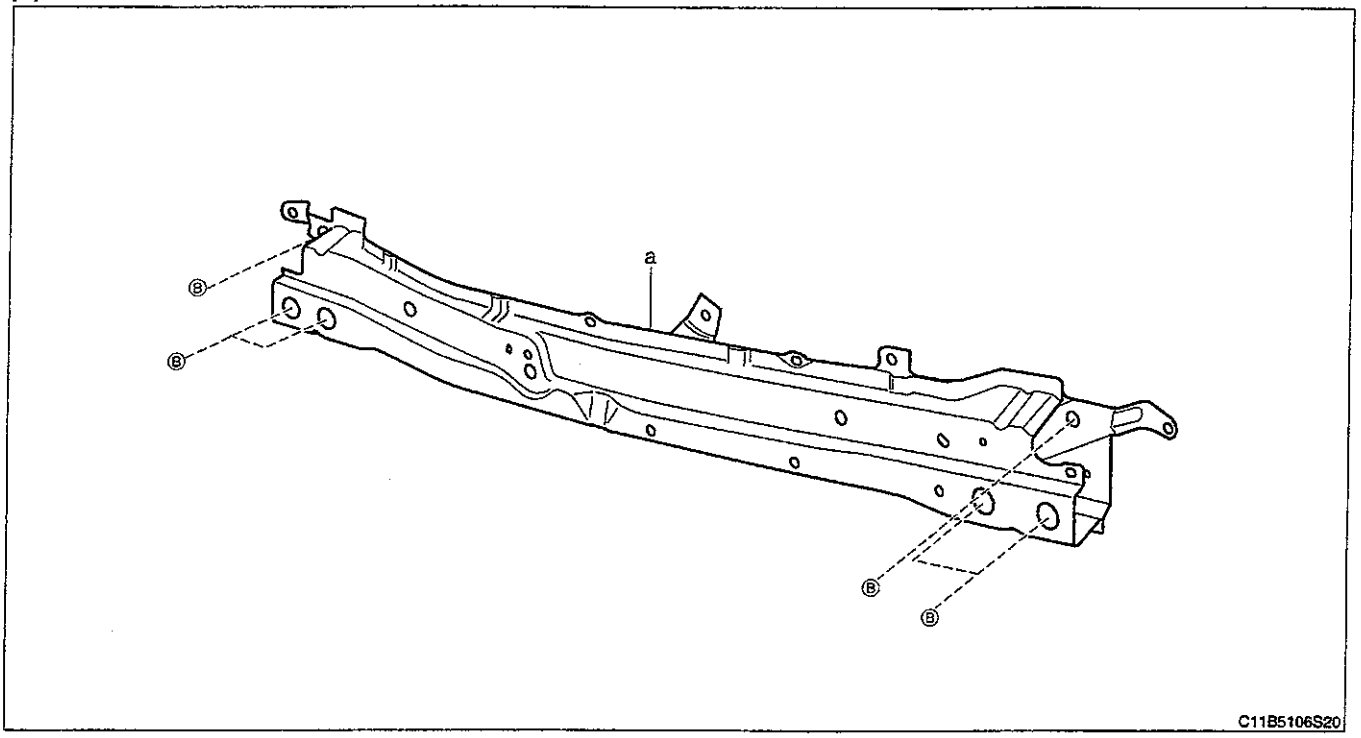
4-1 REMOVAL AND INSTALLATION

4-1-1 OPERATION BEFORE REMOVAL

1.Remove the front bumper.
Refer to Page I2-2.

4-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Member S/A, FR cross

4-1-3 OPERATION AFTER INSTALLATION

1.Install the front bumper.
Refer to Page I2-2.

5 RADIATOR SUPPORT

5-1 REMOVAL AND INSTALLATION

5-1-1 OPERATION BEFORE REMOVAL

1.Remove the radiator grille.
Refer to Page I2-1.

2.Remove the front bumper cover.
Refer to Page I2-2.

3.Remove the front fender.
Refer to Page I1-23.

4.Remove the head lamp.
Refer to Page J1-7.

5.Remove the front cross member S/A.
Refer to Page I1-25.

6.Remove the air cleaner.
Refer to Page B3-2.

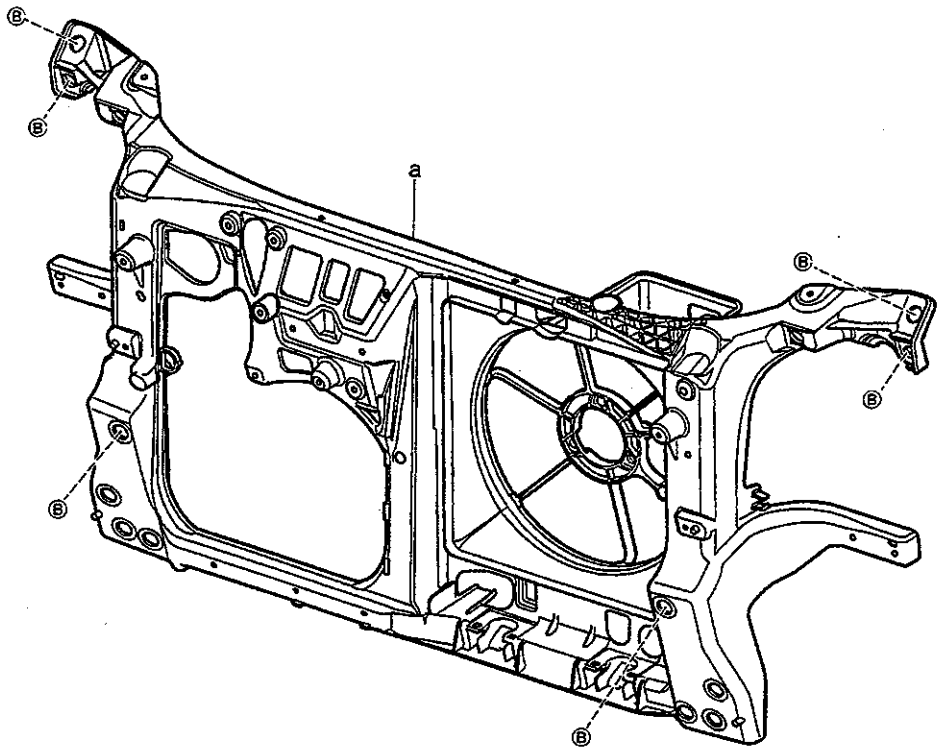
7.Remove the inter cooler Ay.
Refer to Page B3-12.

8.Remove the condenser Ay.
Refer to Page K1-20.

9.Remove the radiator Ay.
Refer to Page B6-6.

5-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



C11B5055S25

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Support S/A, radiator

5-1-3 OPERATION AFTER INSTALLATION

1.Install the radiator Ay.
Refer to Page B6-6.

2.Install the condenser Ay.
Refer to Page K1-20.

3.Install the inter cooler Ay.
Refer to Page B3-12.

4.Install the air cleaner.
Refer to Page B3-2.

5.Install the front cross member S/A.
Refer to Page I1-25.

6.Install the head lamp.
Refer to Page J1-7.

7.Install the front fender.
Refer to Page I1-23.

8.Install the front bumper cover.
Refer to Page I2-2.

9.Install the radiator grille.
Refer to Page I2-1.

6 CENTER CROSS MEMBER

6-1 REMOVAL AND INSTALLATION

6-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

6-1-2 OPERATION BEFORE REMOVAL

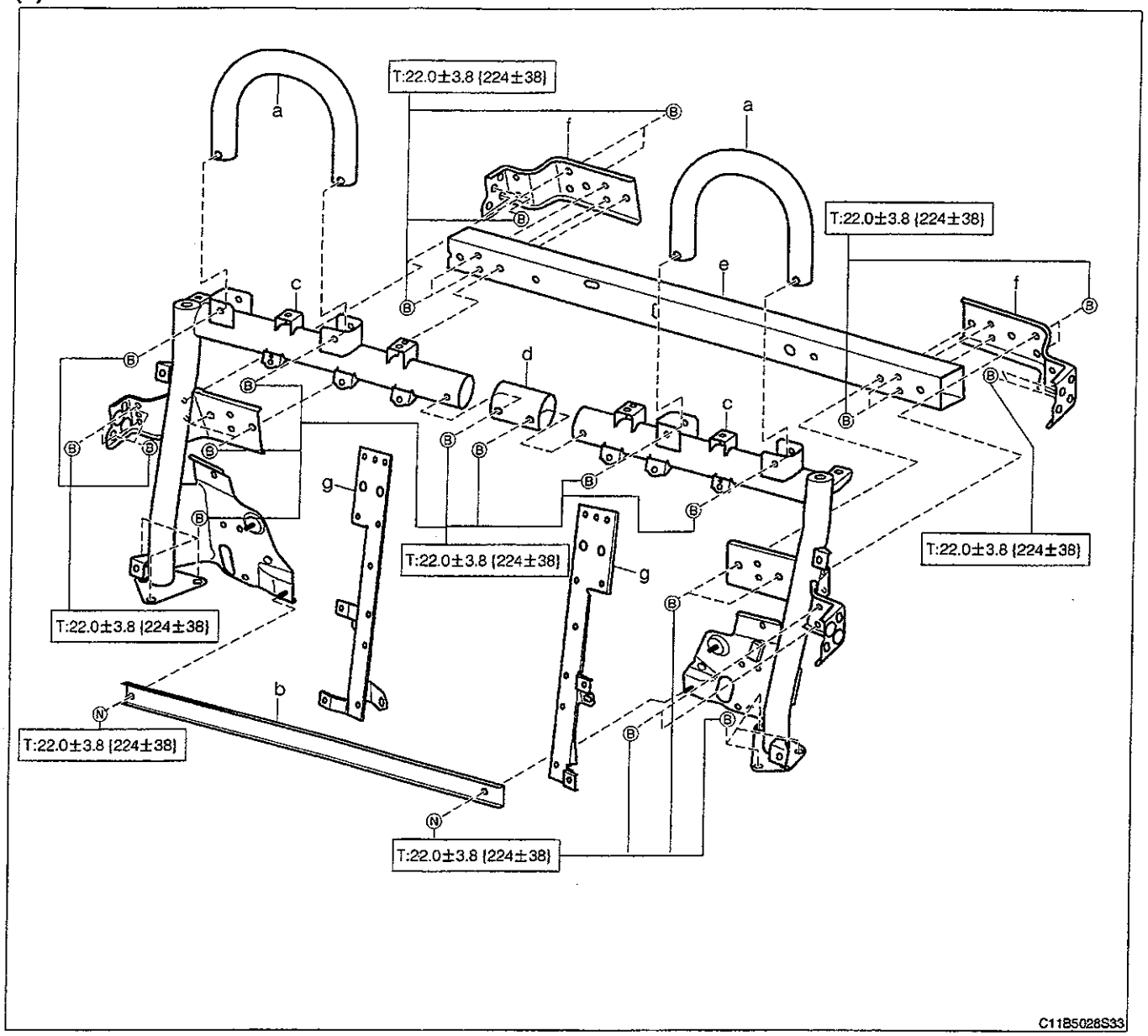
1.Remove the window deflector board Ay.
Refer to Page I2-27.

2.Remove the back panel trim.
Refer to Page I2-28.

3.Remove the roof stay.
Refer to Page I5-7.

6-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf/cm}

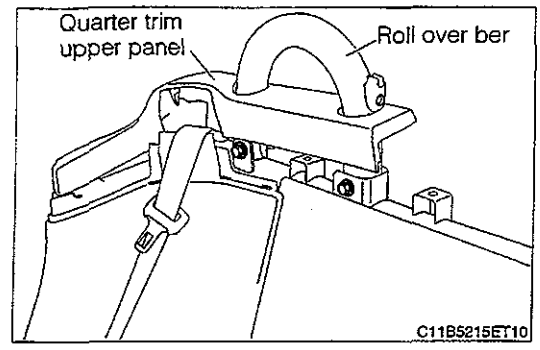
(2) REMOVAL AND INSTALLATION PROCEDURES

▼ 1 a Bar S/A, roll over
2 b Reinforcement, cross member floor No.3
3 c Member S/A, center floor side, RH/LH
4 d Member, center floor
5 e Member S/A, center floor cross
6 f Bracket S/A, body mounting No.1, RH/LH
7 g Base S/A, quarter trim, RH/LH

6-1-4 POINTS OF REMOVAL

(1) ROLL OVER BAR S/A

1.Disengage the clip of the quarter trim upper panel. With the quarter trim upper panel floating, remove the two bolts and remove the roll over bar S/A.



6-1-5 OPERATION AFTER INSTALLATION

1.Install the roof stay.
Refer to Page I5-7.

2.Install the back panel trim.
Refer to Page I2-28.

3.Install window deflector board Ay.
Refer to Page I2-27.

7 FLOOR BRACE

7-1 REMOVAL AND INSTALLATION

7-1-1 ARTICLES TO BE PREPARED

Instrument

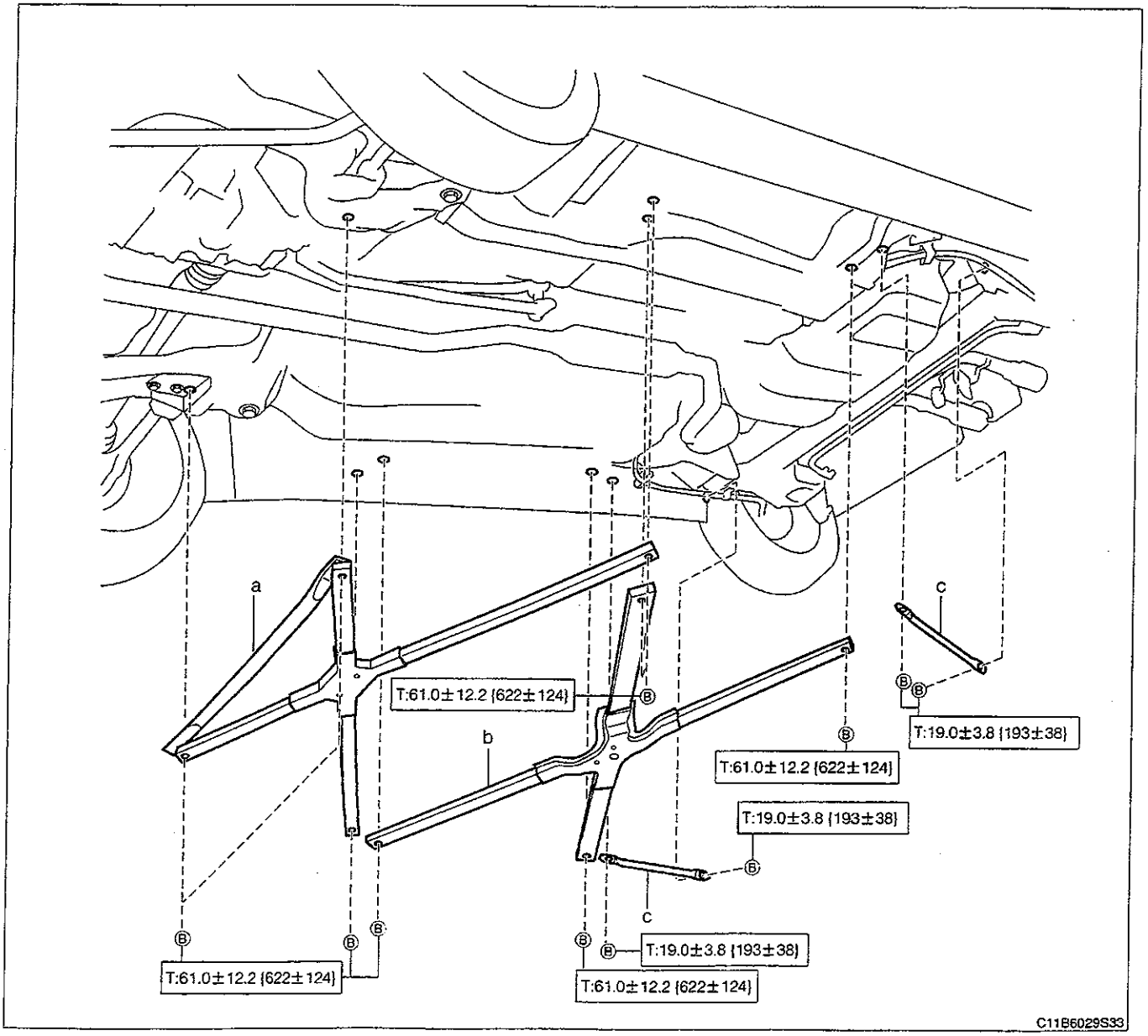
Torque wrench

7-1-2 OPERATION BEFORE REMOVAL

1.Lift up the vehicle.

7-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf/cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Brace, FR floor center
2 b Brace, FR floor side member
3 c Brace, floor corner, RH/LH

7-1-4 OPERATION AFTER INSTALLATION

1.Lift down the vehicle.

8 LOWER ARM BRACKET BRACE

8-1 REMOVAL AND INSTALLATION

8-1-1 ARTICLES TO BE PREPARED

Instrument

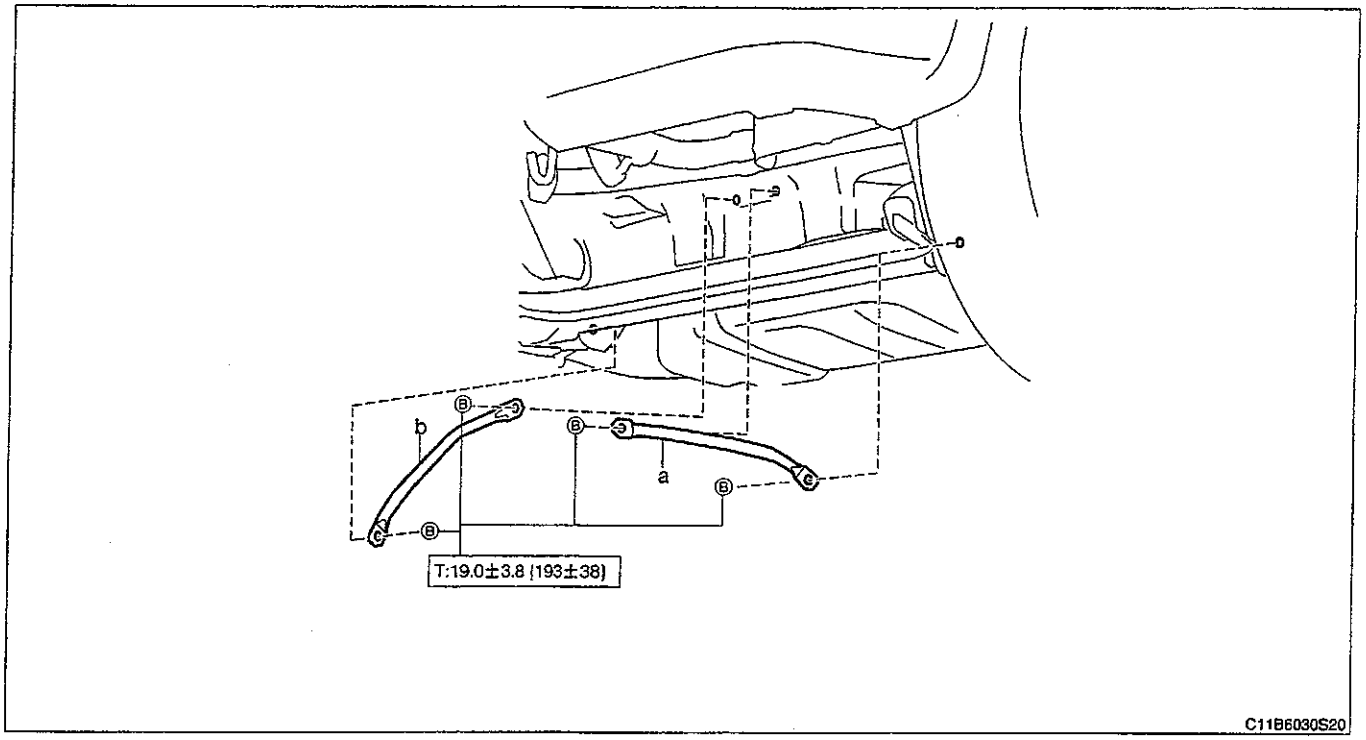
Torque wrench

8-1-2 OPERATION BEFORE REMOVAL

1.Lift up the vehicle.

8-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf/cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Brace, lower arm bracket, RH/LH

8-1-4 OPERATION AFTER INSTALLATION

1.Lift down the vehicle.

9 FLOOR CORNER BRACE

9-1 REMOVAL AND INSTALLATION

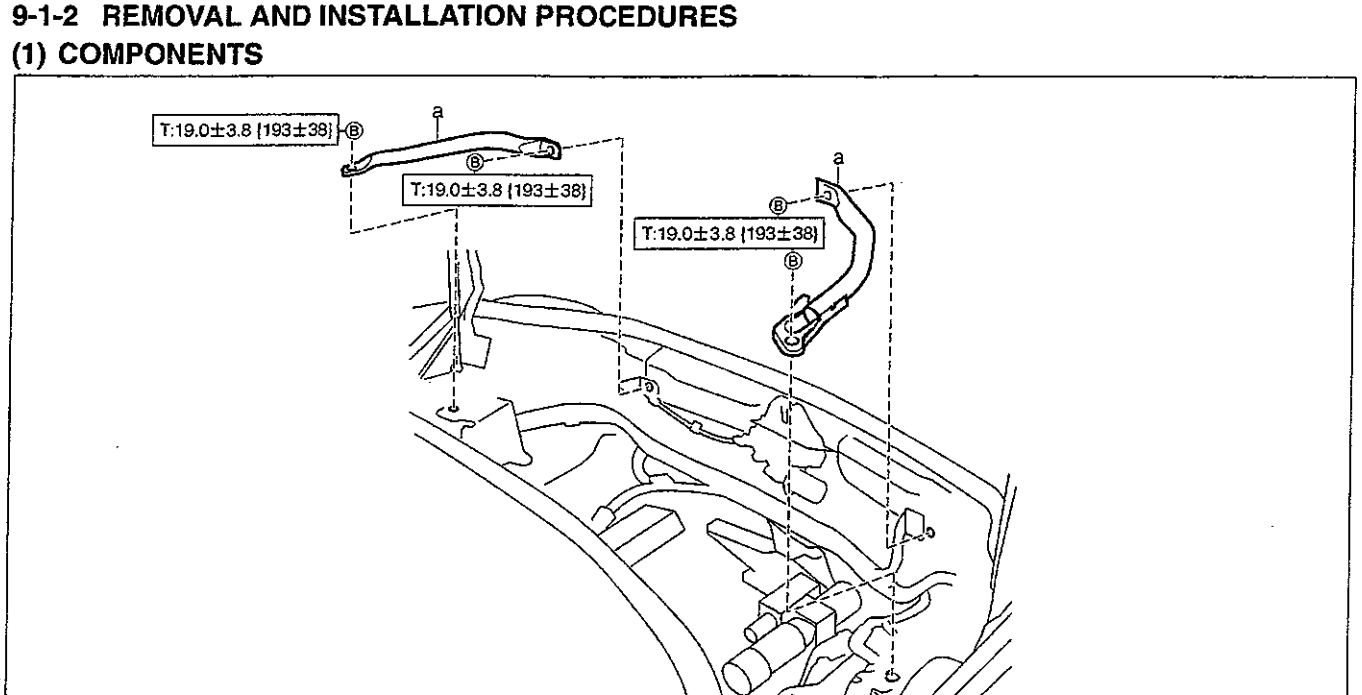
9-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

9-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



Unit:N·m{kgf/cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Brace, floor RR corner, RH/LH

10 HOOD LOCK CONTROL CABLE

10-1 REMOVAL AND INSTALLATION

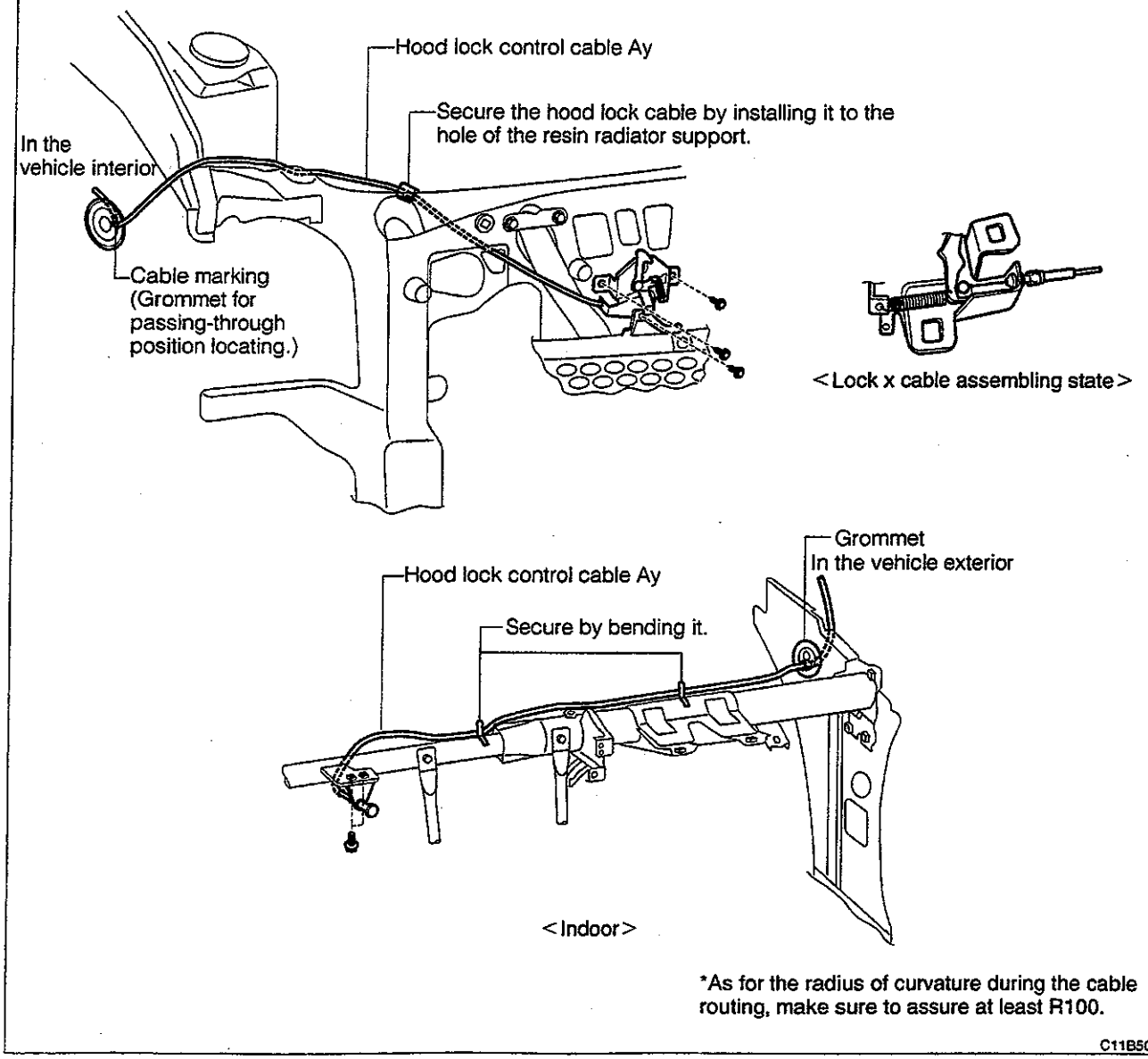
10-1-1 OPERATION BEFORE REMOVAL

1.Remove the radiator grille.
Refer to Page I2-1.

2.Remove the front bumper cover.
Refer to Page I2-2.

3.Remove the instrument panel.
Refer to Page I2-22.

10-1-2 REMOVAL AND INSTALLATION PROCEDURES



*As for the radius of curvature during the cable routing, make sure to assure at least R100.

C11B5045ES33

1.Install the instrument panel.
Refer to Page I2-22.

2.Install the front bumper cover.
Refer to Page I2-2.

3.Install the radiator grille.
Refer to Page I2-1.

11 FUEL LID OPENER

11-1 REMOVAL AND INSTALLATION

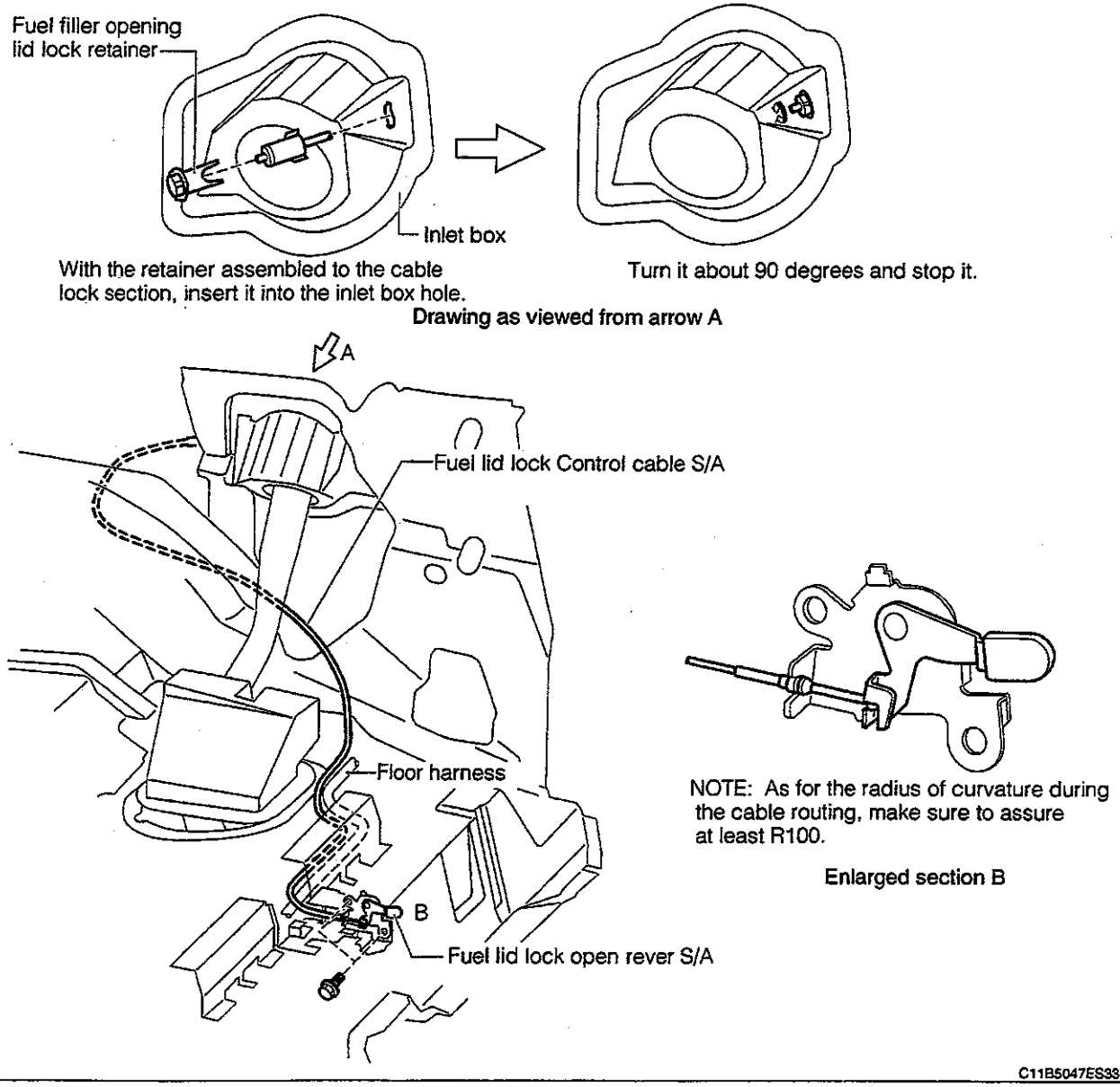
11-1-1 OPERATION BEFORE REMOVAL

1.Remove the rear console box.
Refer to Page I2-38.

2.Remove the back panel trim.
Refer to Page I2-28.

3.Remove the luggage component trim cover, LH.

11-1-2 REMOVAL AND INSTALLATION PROCEDURES



11-1-3 OPERATION AFTER INSTALLATION

1. Install the luggage component trim cover, LH.
2. Install the back panel trim.
   Refer to Page I2-28.

3. Install the rear console box.
   Refer to Page I2-38.

12 FUEL FILLER OPENING LID

12-1 REMOVAL AND INSTALLATION

12-1-1 ARTICLES TO BE PREPARED

Tool

Hand riveter,Drill

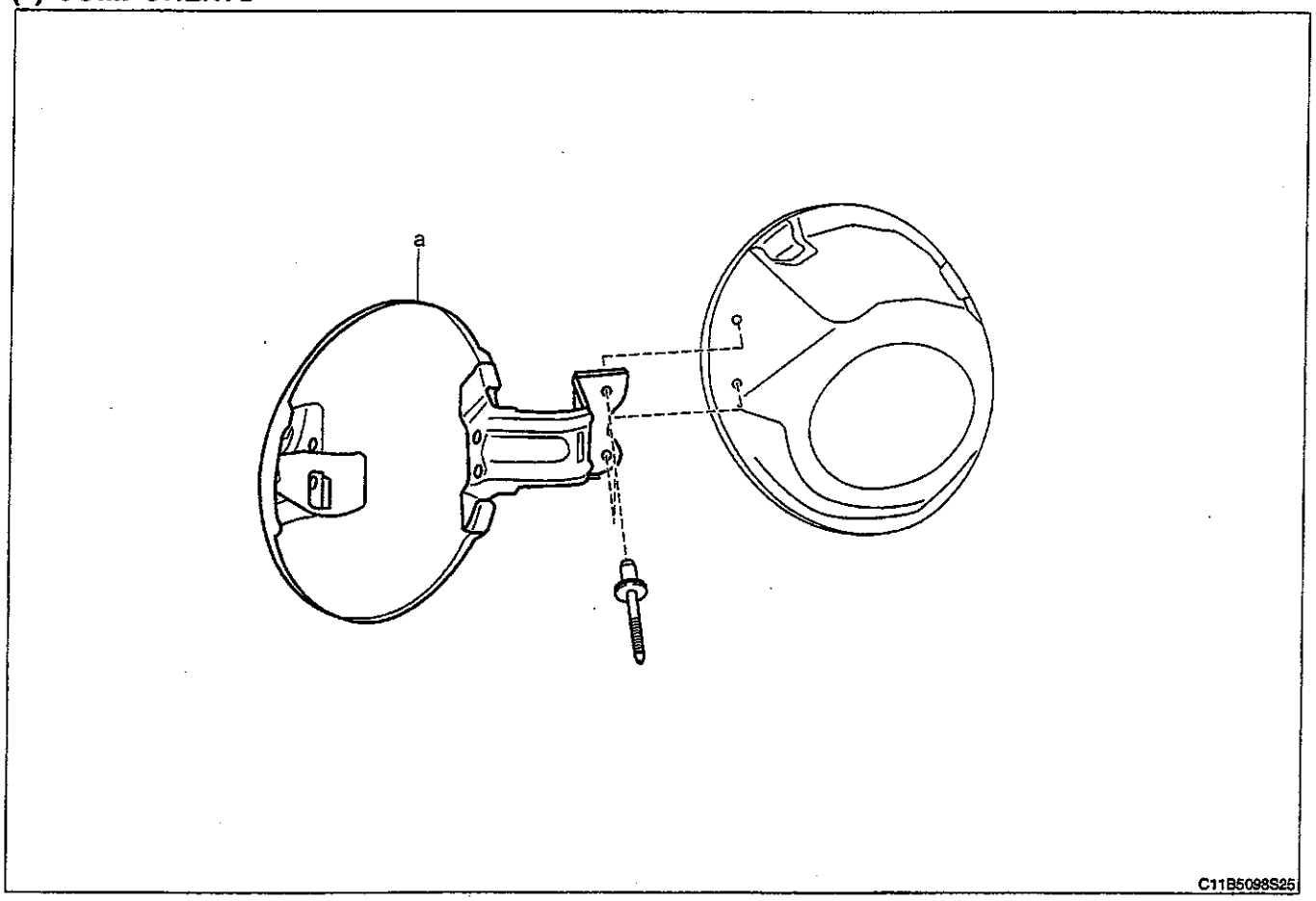
12-1-2 OPERATION BEFORE REMOVAL

1.Remove the tonneau cover holder LH.
Refer to Page I2-37.

2.Remove the luggage comportment trim cover LH.

12-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) DISASSEMBLING AND ASSEMBLING PROCEDURES

▼ ▲ 1 a Lid Ay, fuel filler opening.

12-1-4 POINTS OF REMOVAL

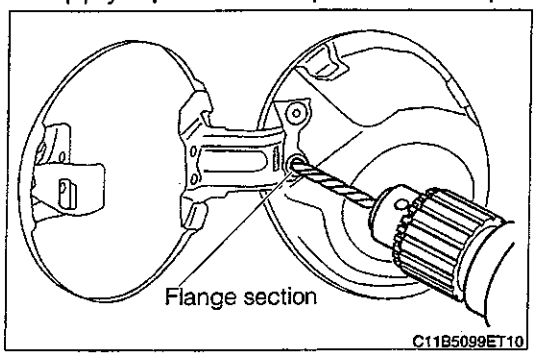
(1) FUEL FILLER OPENING LID AY

1.Mask the gap by filling rags or the like there from the vehicle inside so that the removed rivet may not fall into the locker section.

CAUTION

- When the head section of the rivet is removed, be sure to secure it so that the rivet may not fall down to the locker section.

2.Apply a protective tape or cloth to prevent the fuel filler opening lid Ay from being damaged.



3.Lightly apply a drill to the rivet vertically. Then, grind the mandrel section of the rivet, using the drill.

CAUTION

- Be very careful not to damage the section around the fuel filler opening lid.

4.After the flange section of the rivet has been removed, stop the drilling operation. Then, remove the remaining fragments of the rivet, using pliers or the like.

CAUTION

- Care must be exercised, for the removed rivet has been very hot.

12-1-5 POINTS OF INSTALLATION

(1) FUEL FILLER OPENING LID AY

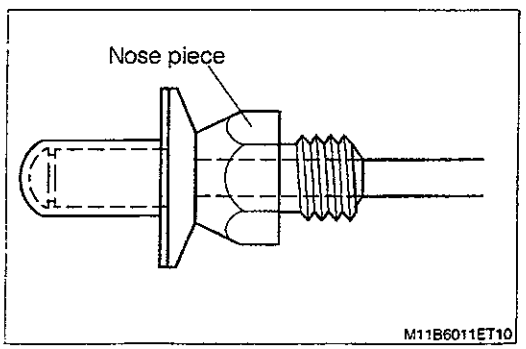
CAUTION

- Utmost care must be exercised so that your finger may not be caught by the roof or luggage link during the operation.

1.Select a nose piece with the minimum diameter for which the mandrel of the rivet can be inserted.

CAUTION

- Any wrong selection of the nose piece will cause improper rivet tightening and malfunctions of riveter.

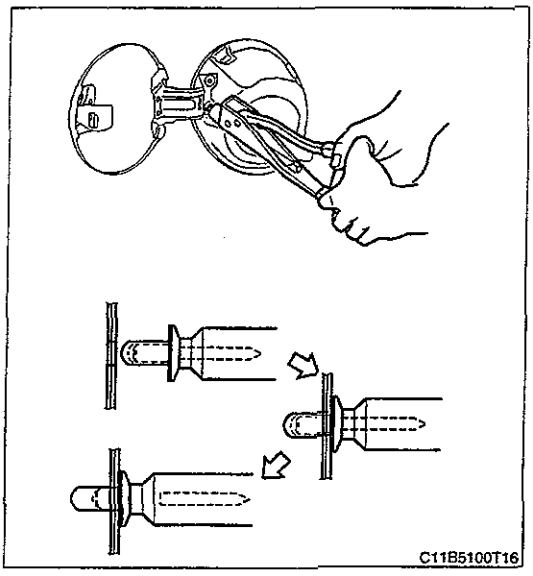


2.Mount the nose piece to the hand riveter and insert the mandrel section of the rivet into the nose piece.

NOTE

- Part number of rivet:90042−69027−000

3.With the rivet applied strongly and vertically to the installation hole, operate the hand riveter to install the rivet.

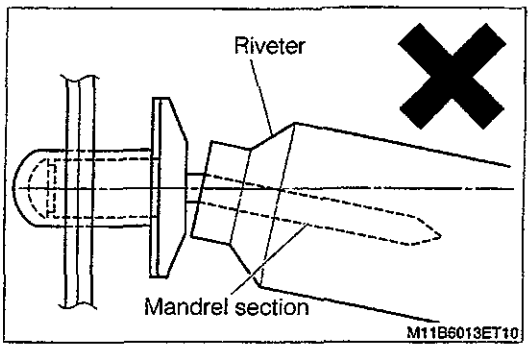


CAUTION

- Be very careful not to damage the section around the fuel filler opening lid.
- In cases where the rivet has not been tightened by one riveter operation (the mandrel has not been cut), repeat the operation again.

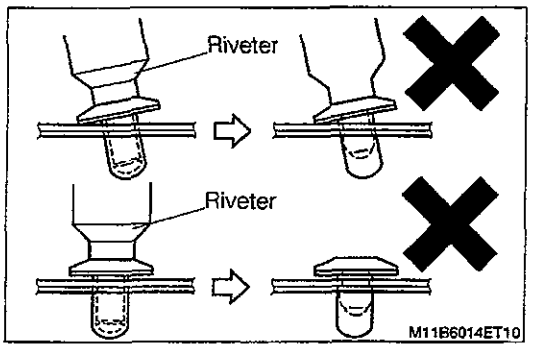
CAUTION

- If the operation is performed by prying during the hand riveter operation, the mandrel section of the rivet will be bent, leading to improper rivet tightening and malfunctions of the hand riveter.



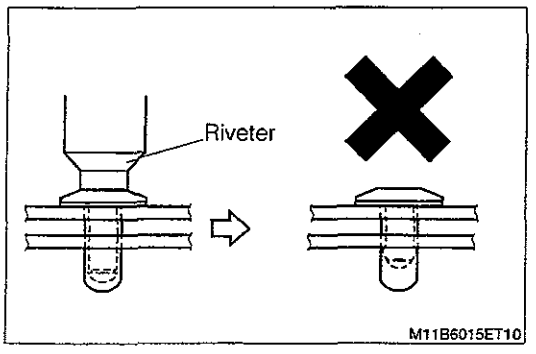
CAUTION

- If the hand riveter is operated with the rivet tilted or floating, it will lead to improper rivet tightening.



CAUTION

- If the rivet is installed without press-fitting the installation parts, it will lead to improper rivet tightening.



12-1-6 OPERATION AFTER INSTALLATION

1.Install the luggage component trim cover, LH.

2.Install the tonneau cover holder LH.

Refer to Page I2-37.

13 LUGGAGE DOOR LOCK OPENER

13-1 REMOVAL AND INSTALLATION

13-1-1 OPERATION BEFORE REMOVAL

1.Remove the rear console box.
Refer to Page I2-38.

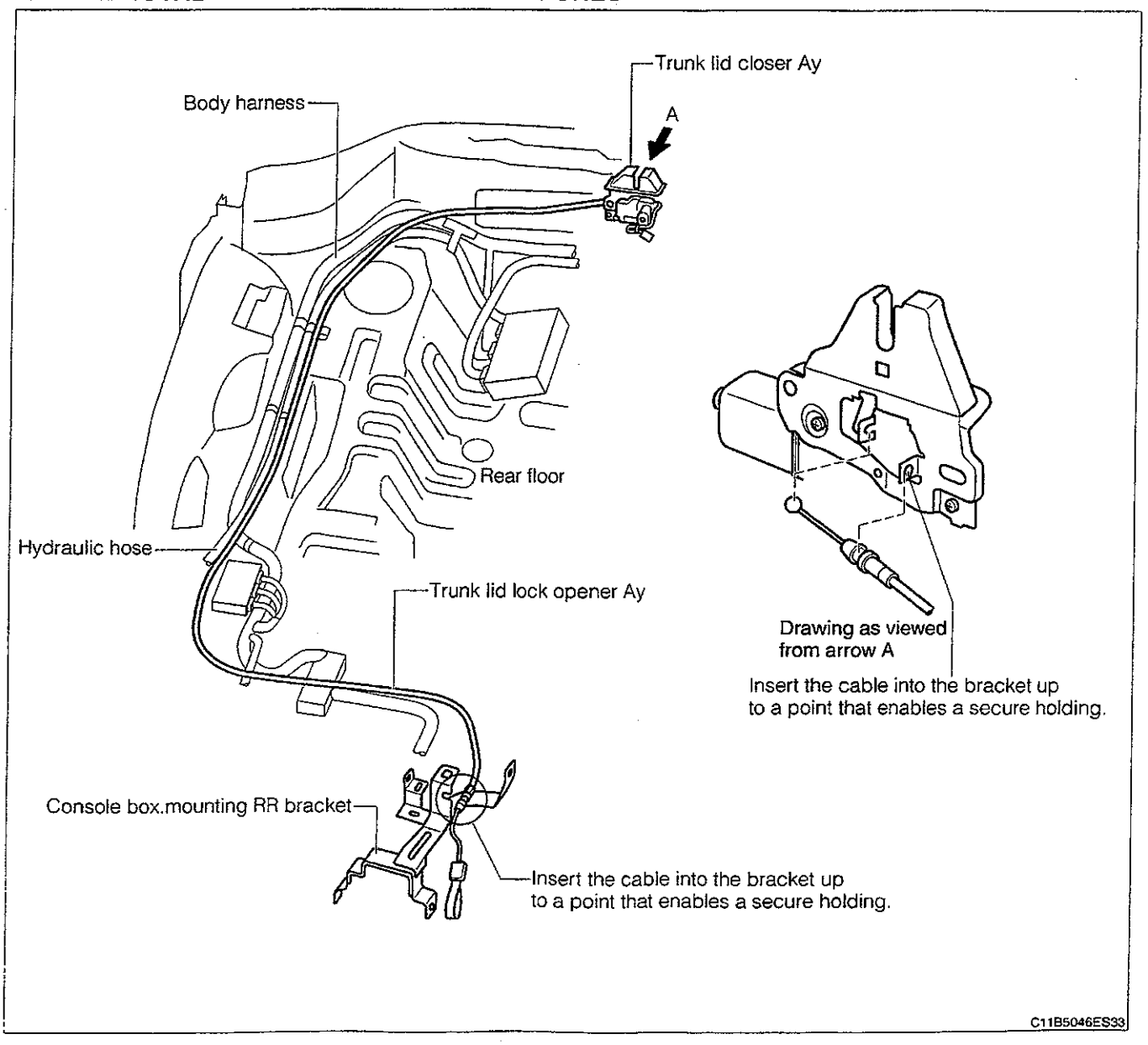
2.Remove the back panel trim.
Refer to Page I2-28.

3.Remove the center floor side member RH/LH .
Refer to Page I2-29.

4.Remove the tonneau cover holder RH.
Refer to Page I2-37.

5.Remove the luggage component trim cover, RH.
6.Remove the lower back trim.

13-1-2 REMOVAL AND INSTALLATION PROCEDURES



13-1-3 OPERATION AFTER INSTALLATION

1.Install the lower back trim.
2.Install the luggage component trim cover, RH.
3.Install the tonneau cover holder RH.
Refer to Page I2-37.

4.Install the center floor side member RH/LH.
Refer to Page I2-29.

5.Install the back panel trim.
Refer to Page I2-28.

6.Install the rear console box.

TO INDEX

I2 EXTERIOR/INTERIOR

RADIATOR GRILLE---------- I2 - 1
REMOVAL AND INSTALLATION --------- I2 - 1
BUMPER---------- I2 - 2
REMOVAL AND INSTALLATION --------- I2 - 2
REAR BUMPER ---------- I2 - 4
REMOVAL AND INSTALLATION --------- I2 - 4
COWL TOP VENTILATOR LOUVER------- I2 - 5
REMOVAL AND INSTALLATION --------- I2 - 5
WEATHER STRIP(FRONT HEADER SECTION) ---------- I2 - 6
REMOVAL AND INSTALLATION --------- I2 - 6
WEATHER STRIP(FRONT DOOR SECTION) ---------- I2 - 9
REMOVAL AND INSTALLATION --------- I2 - 9
WEATHER STRIP(TRUNK SECTION) --- I2 - 11
REMOVAL AND INSTALLATION-------- I2 - 11
WEATHER STRIP(ROOF SECTION) ---- I2 - 17
REMOVAL AND INSTALLATION-------- I2 - 17
INSTRUMENT PANEL---------- I2 - 22
REMOVAL AND INSTALLATION-------- I2 - 22
WINDOW DEFLECTOR BOARD ---------- I2 - 27
REMOVAL AND INSTALLATION-------- I2 - 27
TRIM PANEL ---------- I2 - 28
REMOVAL AND INSTALLATION-------- I2 - 28
FRONT SEAT ---------- I2 - 31
REMOVAL AND INSTALLATION-------- I2 - 31
FRONT SEAT OUTER BELT---------- I2 - 32
REMOVAL AND INSTALLATION-------- I2 - 32
ROOF HEADLINING ---------- I2 - 35
REMOVAL AND INSTALLATION-------- I2 - 35
BACK PANEL GARNISH---------- I2 - 36
REMOVAL AND INSTALLATION-------- I2 - 36
TONNEAU COVER---------- I2 - 37
REMOVAL AND INSTALLATION-------- I2 - 37
REAR CONSOLE BOX---------- I2 - 38
REMOVAL AND INSTALLATION-------- I2 - 38

1 RADIATOR GRILLE

1-1 REMOVAL AND INSTALLATION

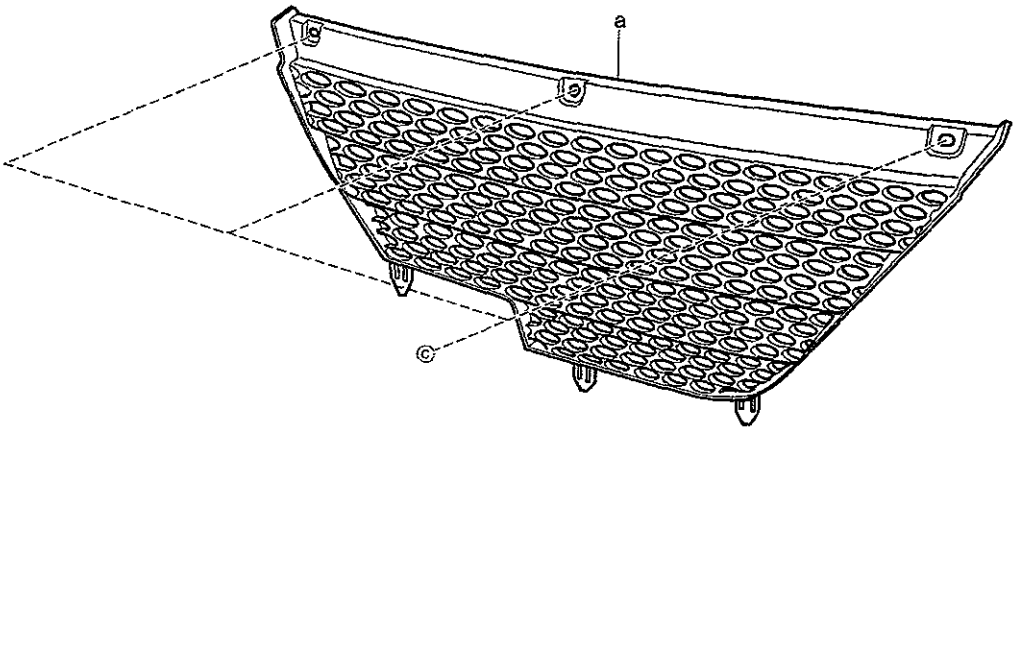
1-1-1 ARTICLES TO BE PREPARED

Tool

Clip remover

1-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Grille, radiator

2 BUMPER

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Tool

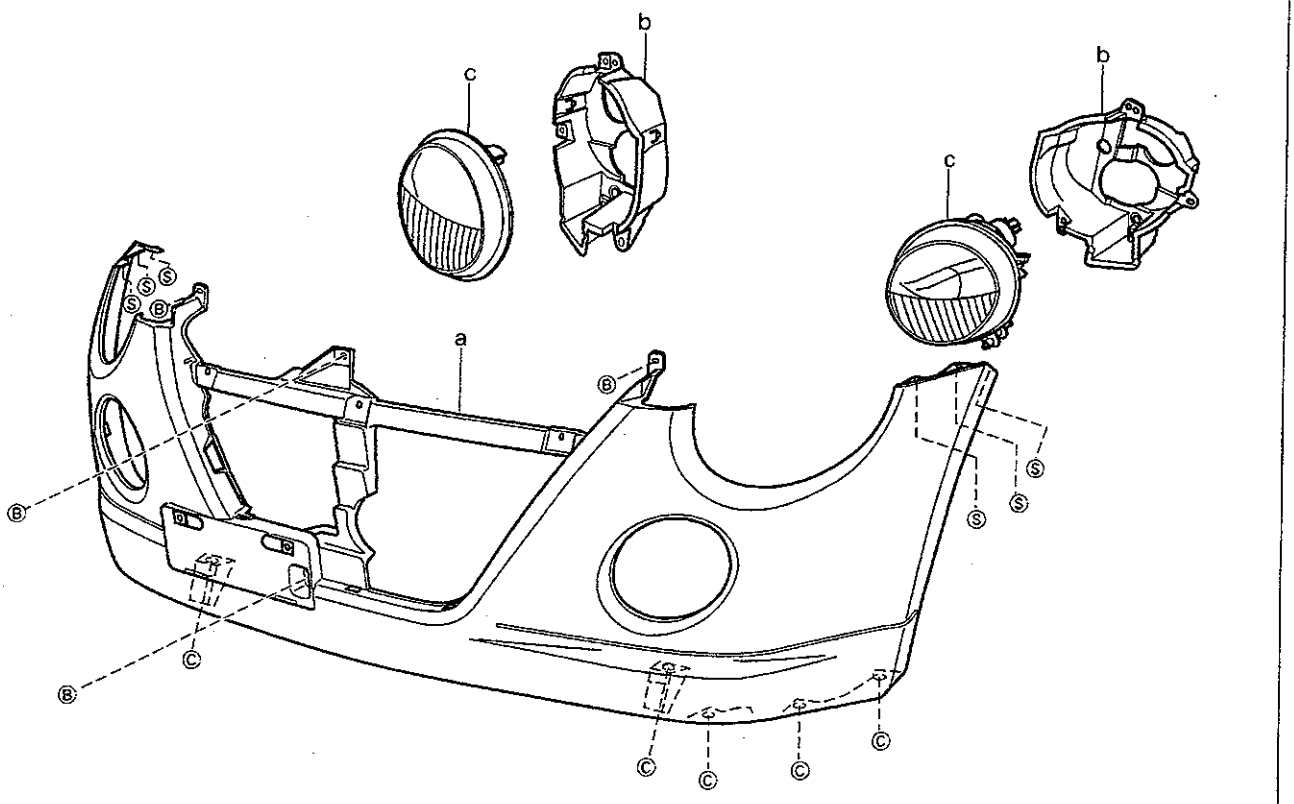
Clip remover

2-1-2 OPERATION BEFORE REMOVAL

1.Remove the radiator grille.
Refer to Page I2-1.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



C11B5012S33

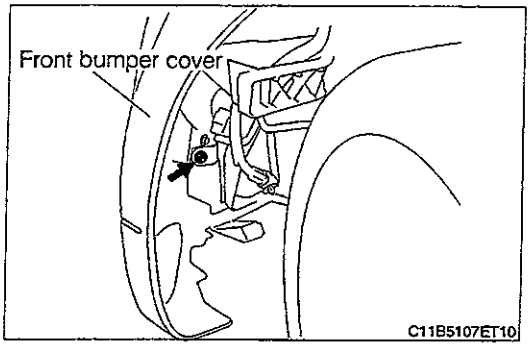
(2) REMOVAL AND INSTALLATION PROCEDURES

▼ 1 a Cover, front bumper
2 b Bracket, FR fog lamp, RH/LH
3 c Lamp Ay, FR fog & turn, RH/LH

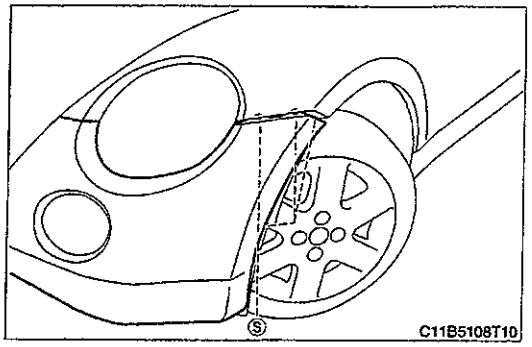
2-1-4 POINTS OF REMOVAL

(1) FRONT BUMPER COVER

1.Remove the bolt(four pieces)and clip.(eight pieces)
2.Remove the nuts (RH and LH) located on the back side of the front fog lamp bracket.



3.Loosen the screws (Three on each side) and remove the front bumper.



2-1-5 OPERATION AFTER INSTALLATION

1.Install the radiator grille.
Refer to Page I2-1.

3 REAR BUMPER

3-1 REMOVAL AND INSTALLATION

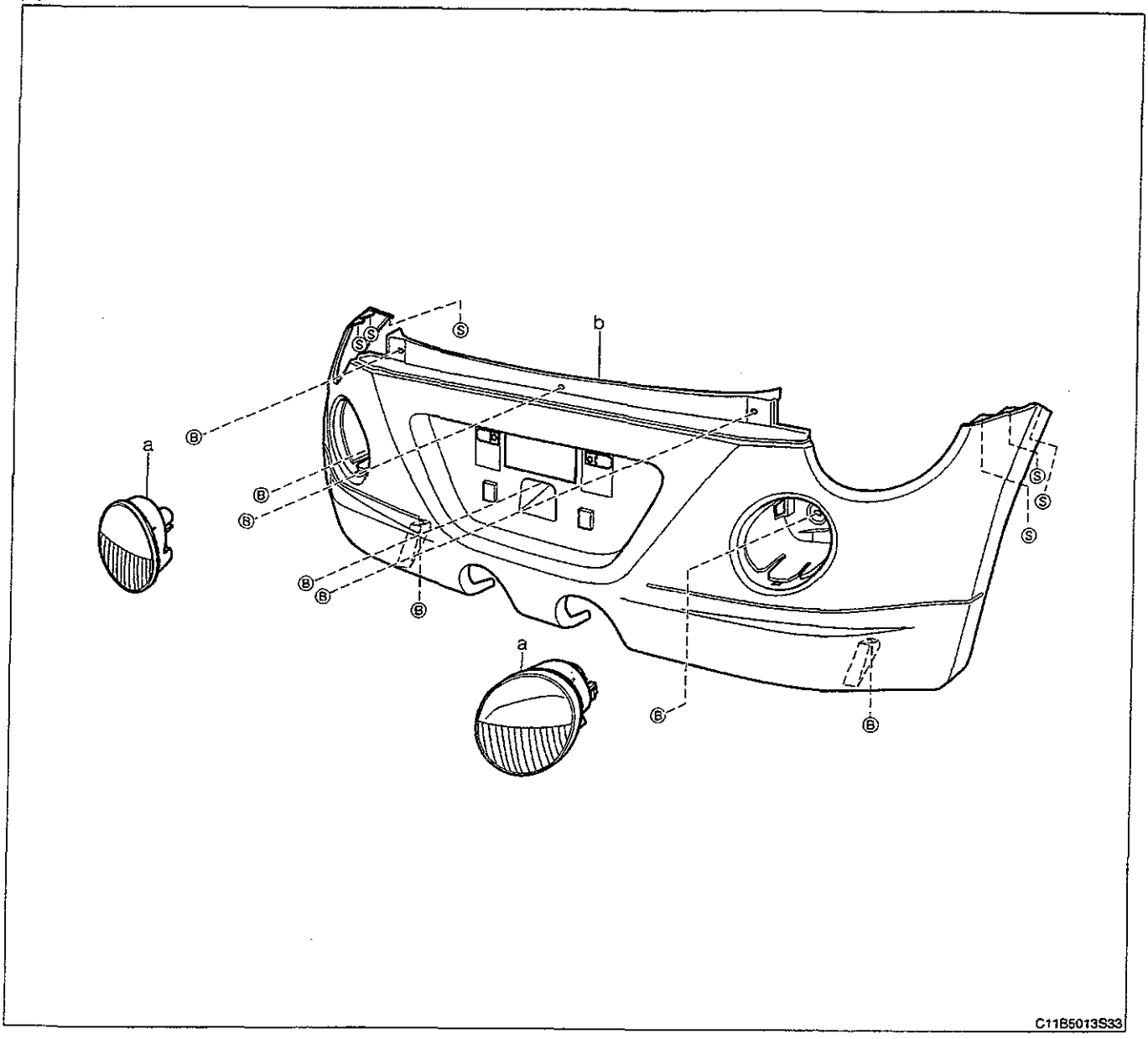
3-1-1 ARTICLES TO BE PREPARED

Tool

Clip remover

3-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

▼ 1 a Lamp Ay, back up
2 b Cover, rear bumper

3-1-3 POINTS OF REMOVAL

1.Remove the back up lamp Ay.
Refer to Page J1-15.

4 COWL TOP VENTILATOR LOUVER

4-1 REMOVAL AND INSTALLATION

4-1-1 ARTICLES TO BE PREPARED

Tool

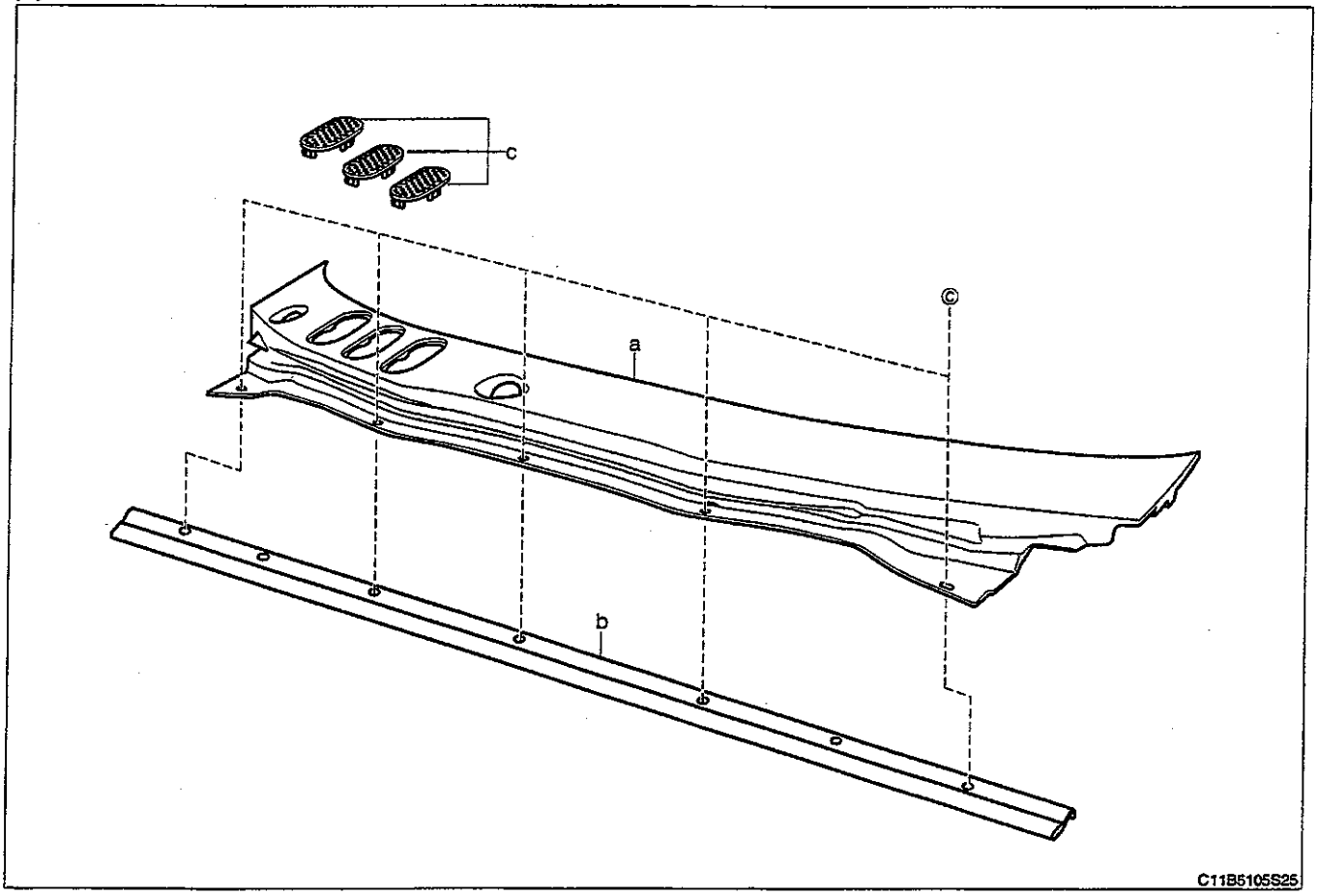
Clip remover

4-1-2 OPERATION BEFORE REMOVAL

1.Remove the wiper arm Ay.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

▼ 1 a Louver S/A, cowl top
2 b Seal, hood to cowl top
3 c Cover, cowl vent

4-1-4 POINTS OF REMOVAL

(1) COWL TOP LOUVER S/A

1.Keep the hood ajar to remove the cowl top louver.

4-1-5 OPERATION AFTER INSTALLATION

1.Install the wiper arm Ay.

5 WEATHER STRIP(FRONT HEADER SECTION)

5-1 REMOVAL AND INSTALLATION

5-1-1 ARTICLES TO BE PREPARED

Lubricant, adhesive, others

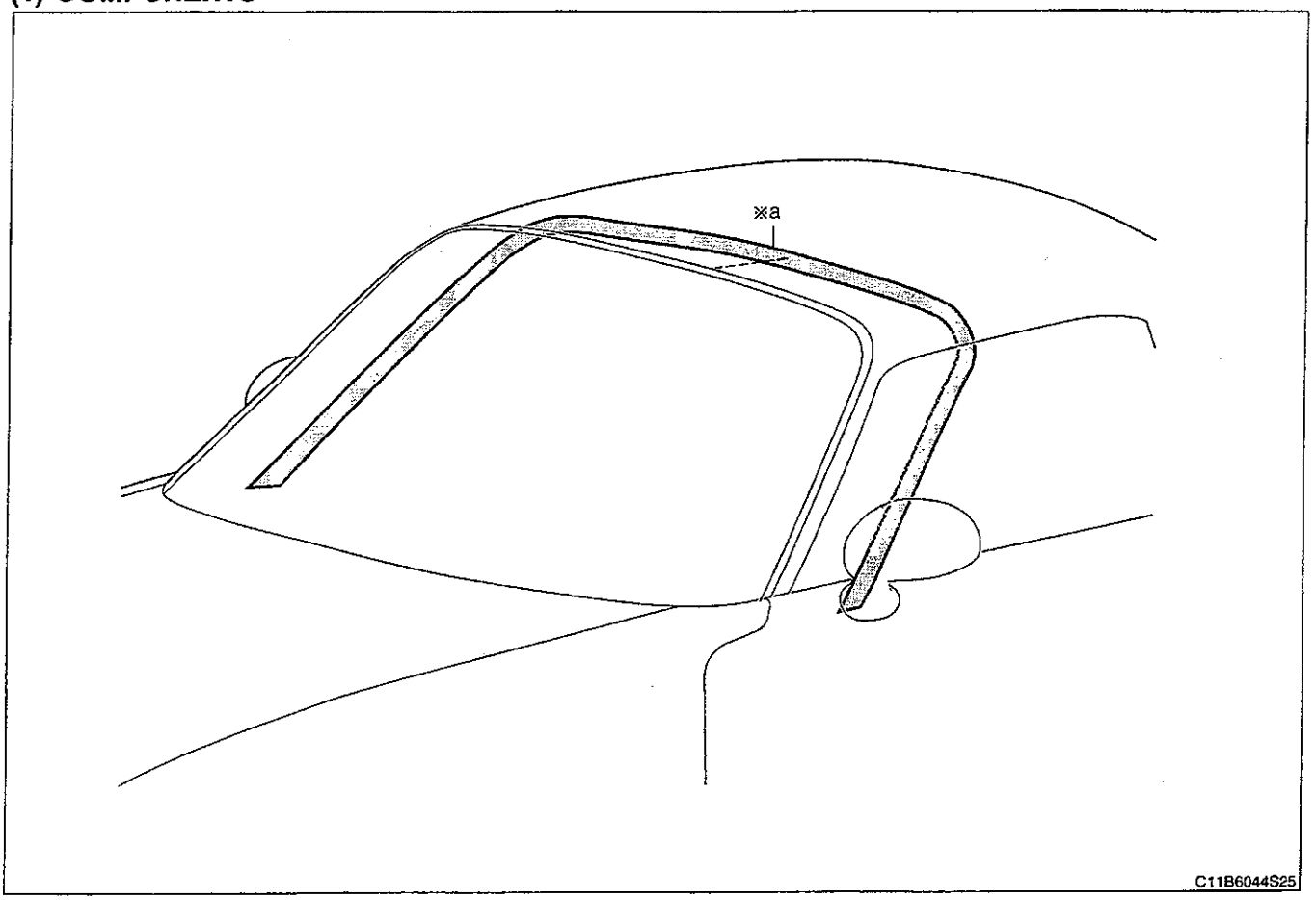
Alcohol or white gasoline

Tool

Clip remover

5-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non - reusable parts

(2) REMOVAL AND INSTALLATION PROCEDURES

▲ 1 a Weatherstrip, removable roof front

5-1-3 POINTS OF INSTALLATION

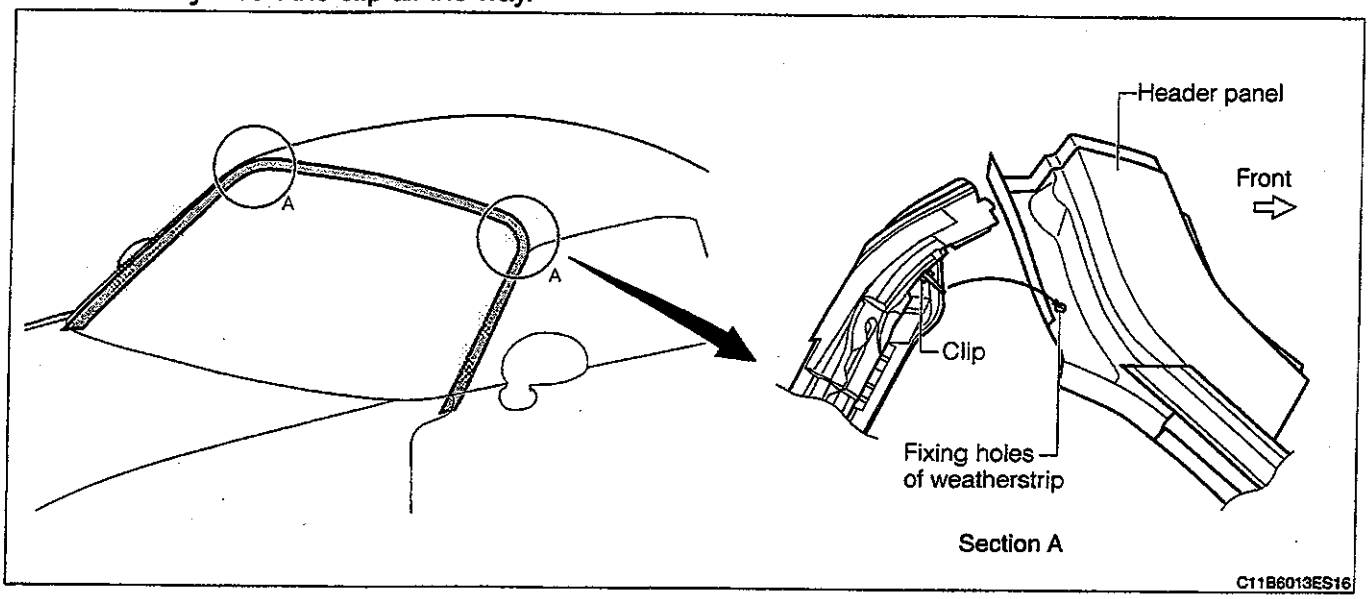
(1) REMOVABLE ROOF FRONT WEATHERSTRIP

1.Using alcohol, degrease the panel surface where double-faced adhesive is to be applied.

2.Insert the clip of the weatherstrip into the fixing hole. (One on each side.)

CAUTION

- When degreasing the panel surface, do not wipe out the seal surface of the weatherstrip.
- Securely insert the clip all the way.

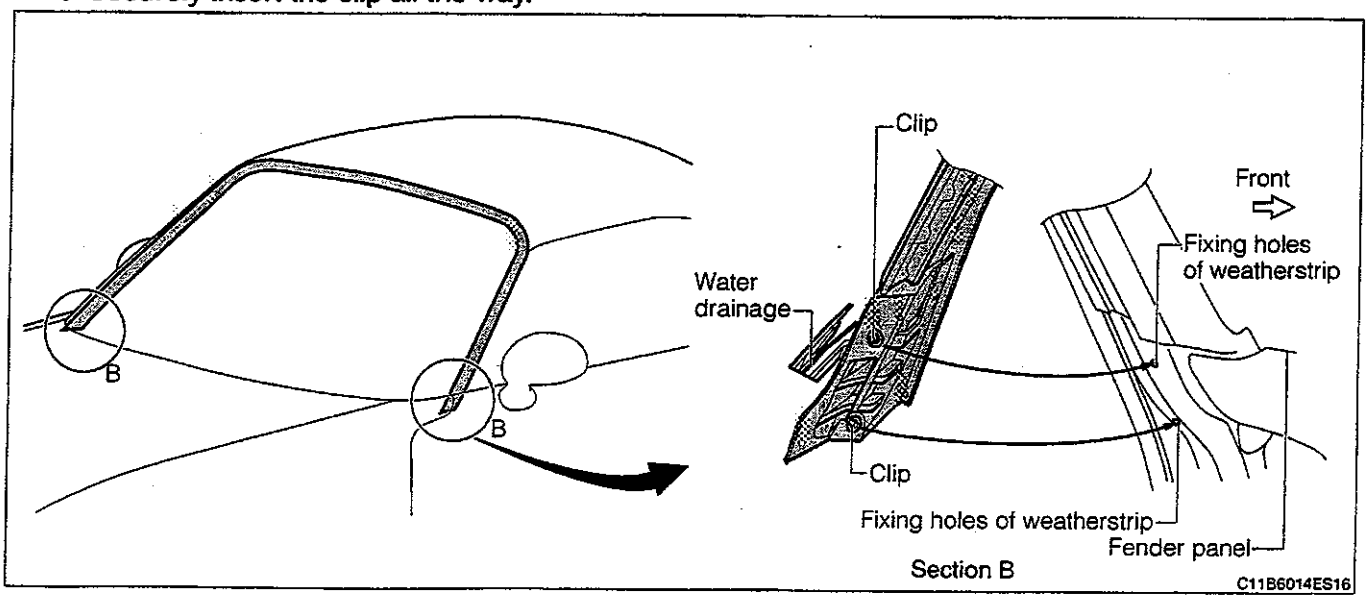


3.Insert the clip into the fixing hole. (Two clips on each side.)

4.Install rest of the weatherstrip to the molding.

CAUTION

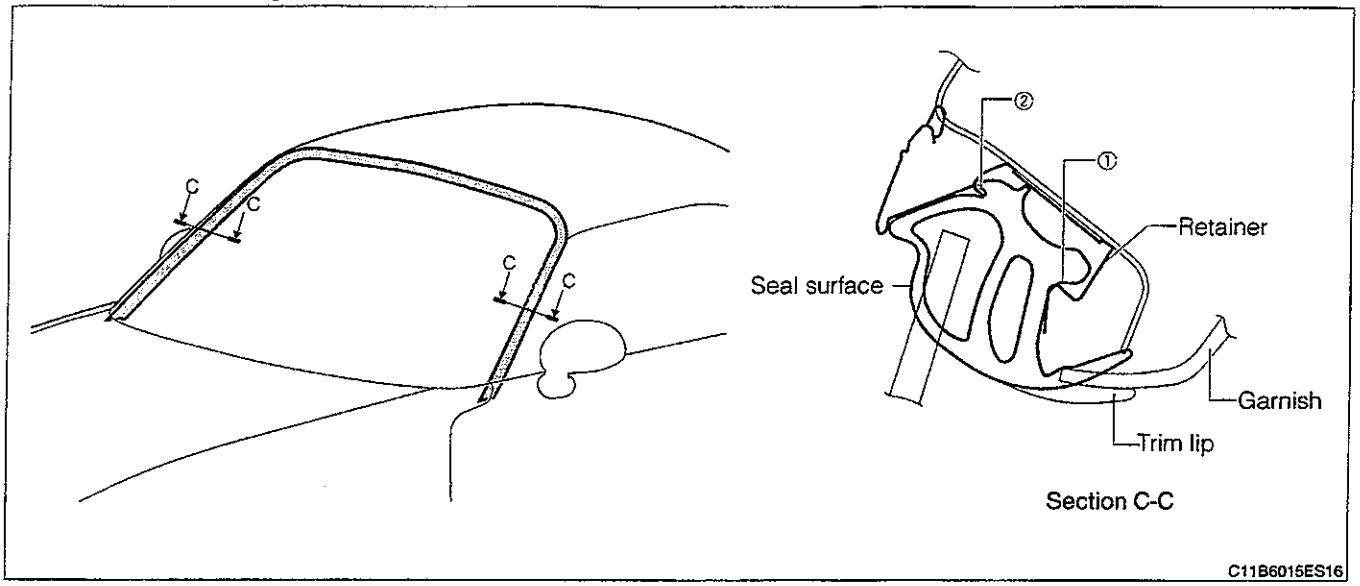
- Place the upper surface of the marked area on the weatherstrip drain groove in order to avoid appearance problem.
- Securely insert the clip all the way.



5.Insert the hook ① into the retainer.
6.Press the seal surface to assemble the hook ② to the retainer.

CAUTION

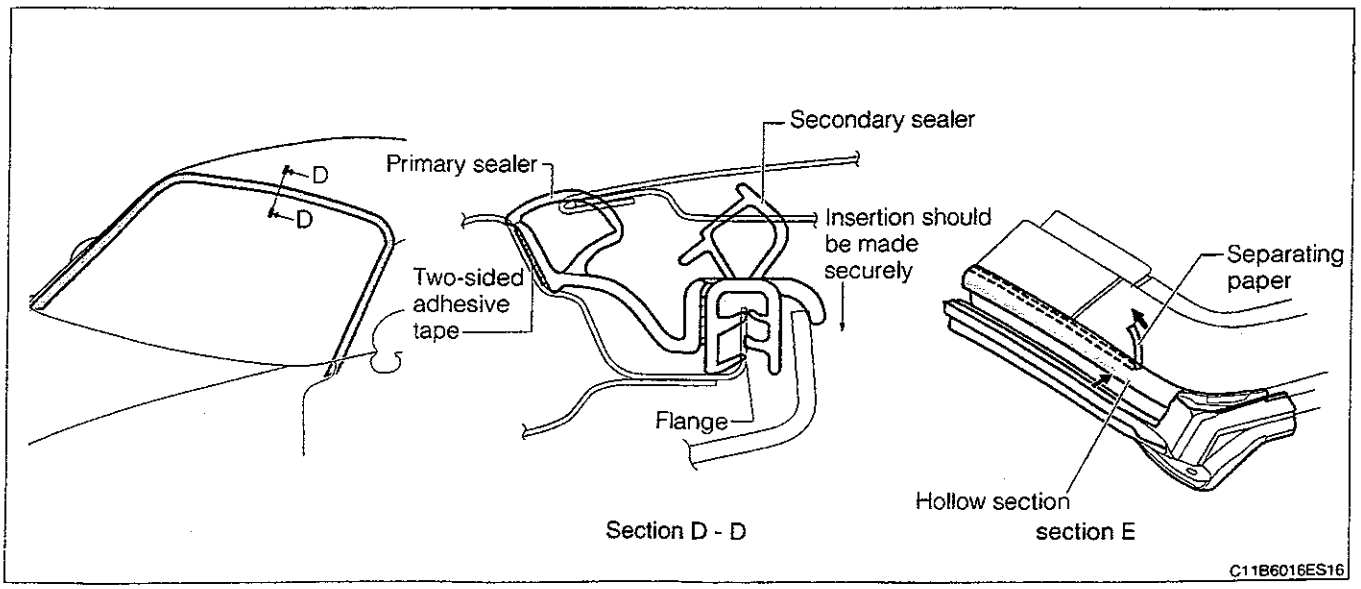
- Use care not to catch the trim lip inside the garnish, as the weatherstrip trim lip is designed to be placed on the garnish.



7.Install the secondary seal to the panel flange.
8.When applying the primary seal, press the outer surface of the primary seal and remove the backing sheet of the double-faced adhesive.(Refer to section E.)

CAUTION

- When assembling the weatherstrip to the panel flange, securely insert all the way into the panel.
- When applying the primary seal, stripping the backing sheet in advance might cause appearance problem such as misalignment. Therefore carefully peel off the paper, while pressing the outer surface of the weatherstrip.
- When applying the primary seal, press the outer surface of the primary seal and remove the backing sheet of the double-faced adhesive.
- After the primary seal is applied, press the outer surface to press-fit.
  Press-fit force:19.6kPa{2kgf/cm²}
- If the double-faced adhesive needs correction due to misalignment, the part shall be replaced, as the double-faced adhesive will lose adhesion and cannot be reused.



6 WEATHER STRIP(FRONT DOOR SECTION)

6-1 REMOVAL AND INSTALLATION

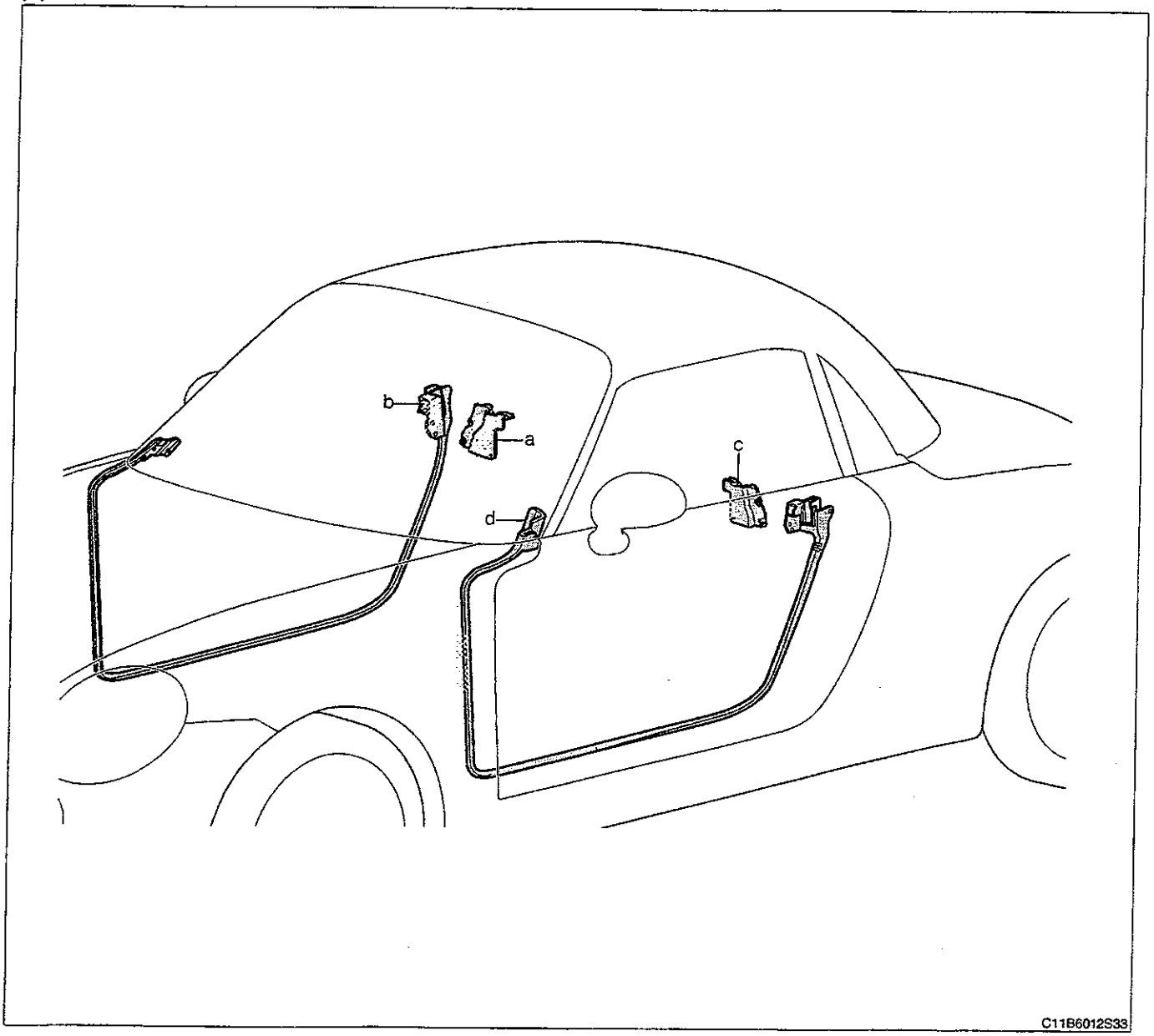
6-1-1 OPERATION BEFORE REMOVAL

Remove the front door mirror bracket.

Refer to Page I1-19.

6-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

▲ 1 a Weatherstrip, front door No.2 RH
▲ 2 b Weatherstrip, front door RH
▲ 3 c Weatherstrip, front door No.2 LH
▲ 4 d Weatherstrip, front door LH

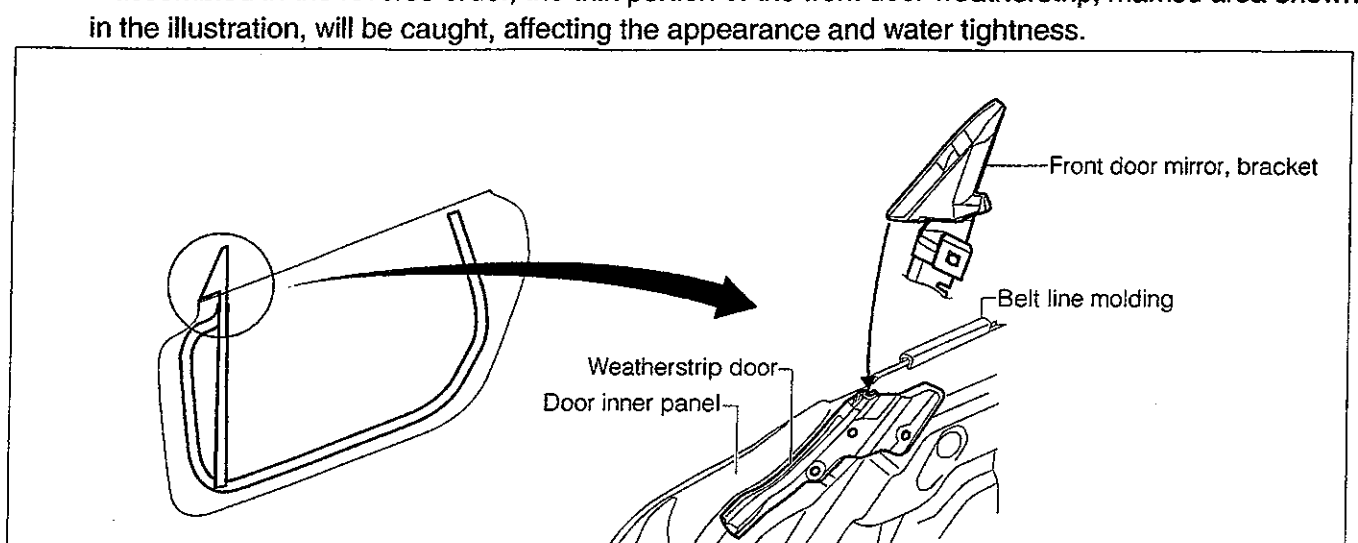
6-1-3 POINTS OF INSTALLATION

(1) FRONT DOOR WEATHERSTRIP RH/LH

1.First assemble the front door weatherstrip, and then assemble front door mirror bracket.

CAUTION

- If assembled in the reverse order, the thin portion of the front door weatherstrip, marked area shown in the illustration, will be caught, affecting the appearance and water tightness.



(2) FRONT DOOR NO.2 WEATHERSTRIP RH/LH

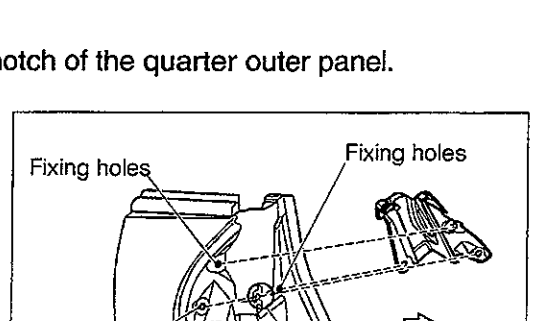
1.Fix the weatherstrip with three clips on the panel.

CAUTION

- Securely fix the hook shape portion of the panel into the notch of the quarter outer panel.

6-1-4 OPERATION AFTER INSTALLATION

1.Install the front door mirror bracket.
<RefCode=B110>



7 WEATHER STRIP(TRUNK SECTION)

7-1 REMOVAL AND INSTALLATION

7-1-1 ARTICLES TO BE PREPARED

Lubricant, adhesive, others

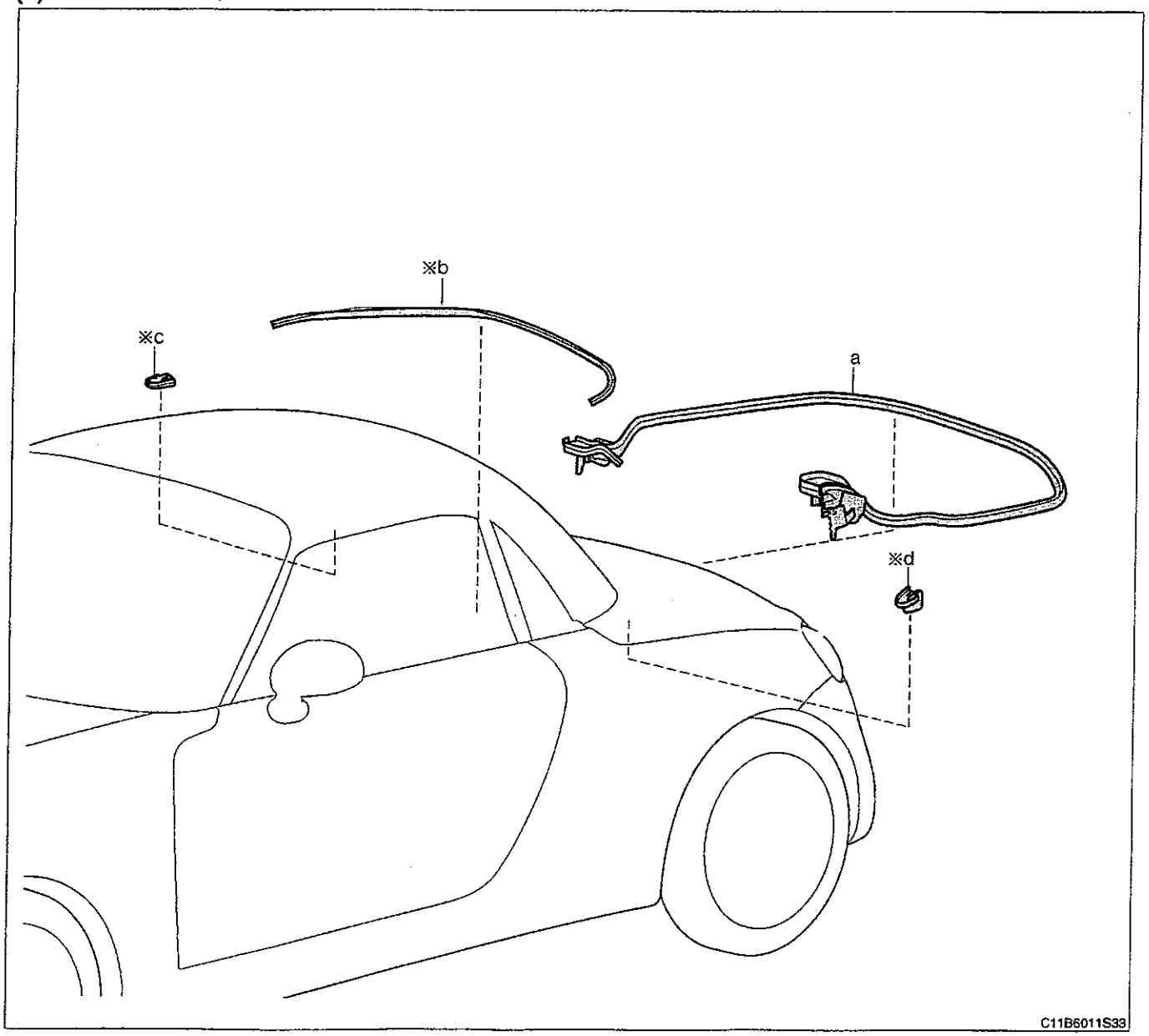
Alcohol or white gasoline

Tool

Clip remover

7-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non −reusable parts

(2) REMOVAL AND INSTALLATION PROCEDURES

▲ 1 a Weatherstrip, luggage compartment door
▲ 2 b Weatherstrip, luggage compartment door No.2
▲ 3 c Weatherstrip, back door, upper RH
▲ 4 d Weatherstrip, back door, upper LH

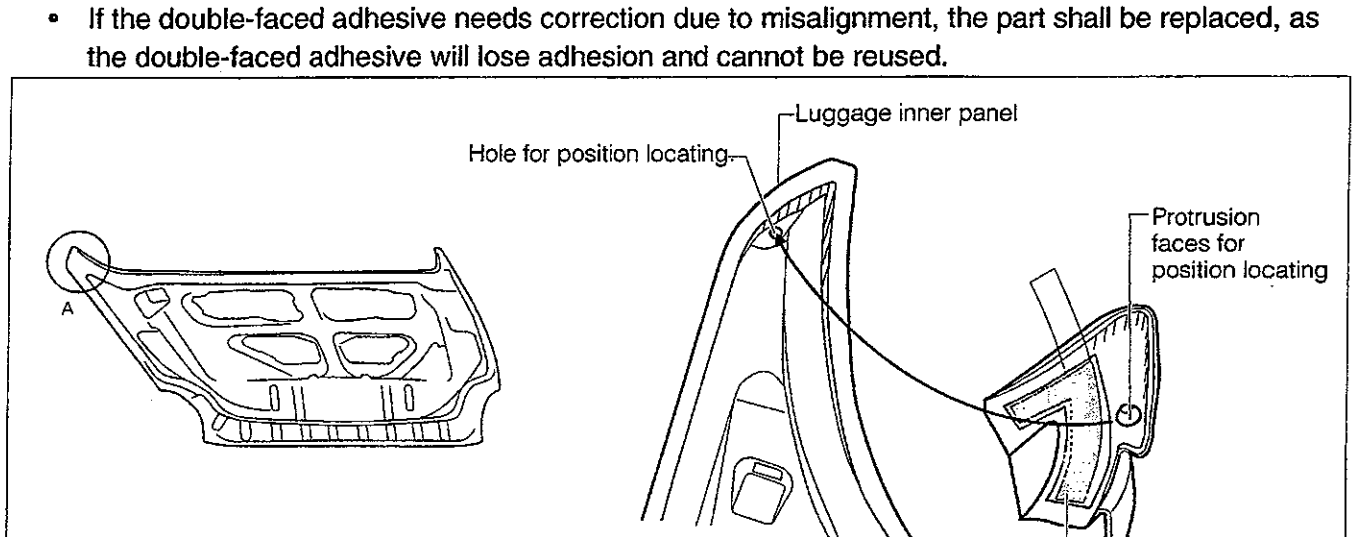
7-1-3 POINTS OF INSTALLATION

(1) BACK DOOR, UPPER WEATHERSTRIP RH/LH

1. Using alcohol, degrease the panel surface where double-faced adhesive is to be applied.
2. Install the locating tab into the hole.
3. Match the marked area A with the panel to control the rotation direction.
4. When applying weatherstrip, peel-off the backing sheet of the double-faced adhesive, while pressing the outer surface of the primary seal.

CAUTION

- When degreasing the panel surface, do not wipe out the seal surface of the weatherstrip.
- Stripping the backing sheet in advance might cause appearance problem such as misalignment. Therefore carefully peel off the paper, while pressing the outer surface of the weatherstrip.
- After the primary seal is applied, press the outer surface to press-fit.
  Press-fit force:19.6kPa{2kgf/cm²}
- If the double-faced adhesive needs correction due to misalignment, the part shall be replaced, as the double-faced adhesive will lose adhesion and cannot be reused.



(2) LUGGAGE COMPARTMENT DOOR WEATHERSTRIP NO.2

1.Using alcohol, degrease the panel surface where double-faced adhesive is to be applied.

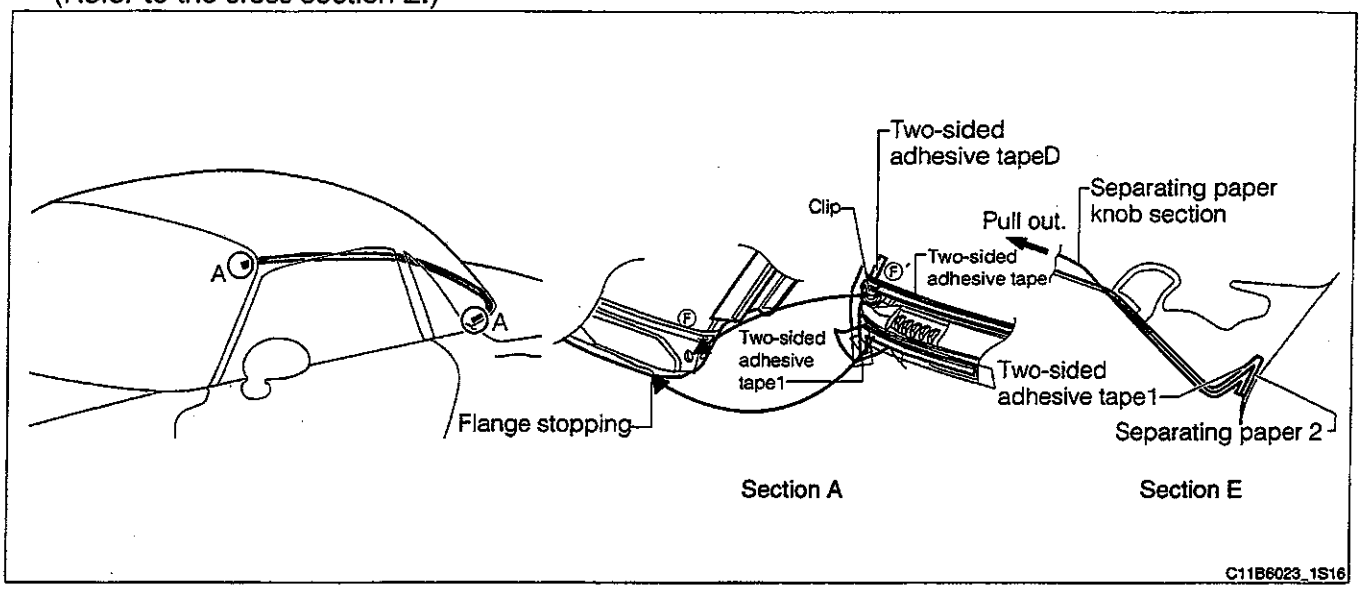
CAUTION

- When degreasing the panel surface, do not wipe out the seal surface of the weatherstrip.

2.Insert the clip of the weatherstrip into the hole F section of the back panel.

3.Carefully strip the backing sheet on the edge and apply the adhesive.

4.When applying the double-faced adhesive ①, fold back the end portion of the backing sheet ② of the double-faced adhesive. Keep the tab upside and pull it out in the direction indicated by an arrow. (Refer to the cross section E.)

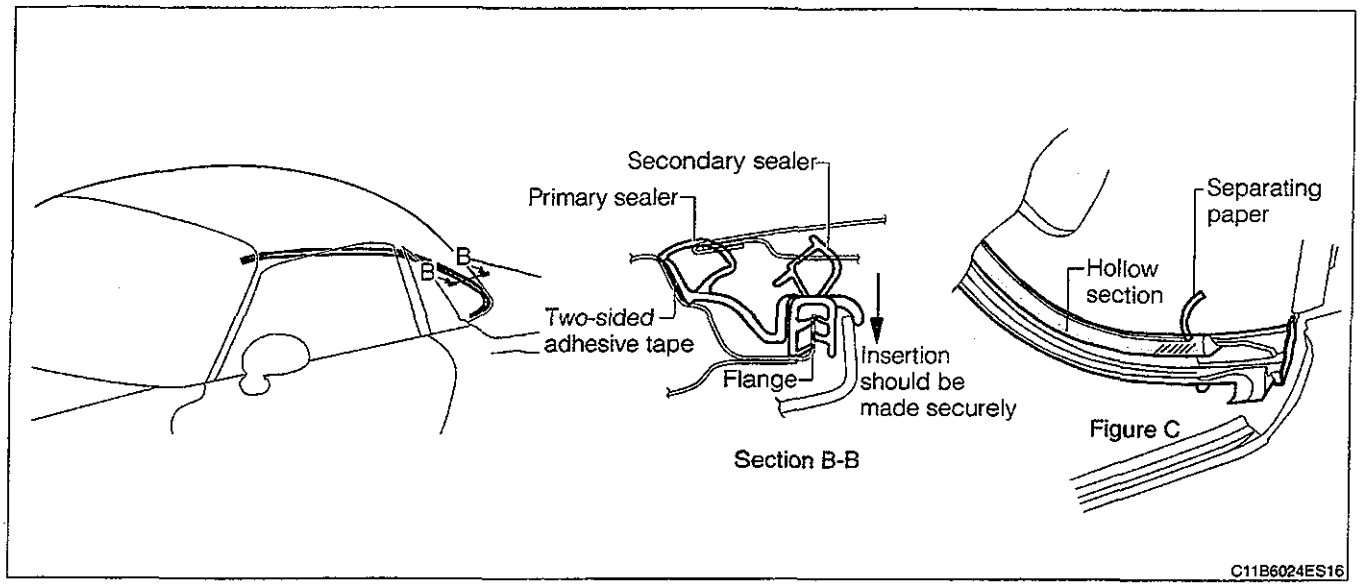


5.Install the secondary seal to the panel flange.

6.When applying weatherstrip, peel-off the backing sheet of the double-faced adhesive, while pressing the outer surface of the primary seal.(Refer to figure C.)

CAUTION

- When assembling the weatherstrip to the panel flange, securely insert all the way into the panel.
- When applying the primary seal, press the outer surface of the primary seal and remove the backing sheet of the double-faced adhesive.
- After the primary seal is applied, press the outer surface to press-fit.
  Press-fit force:19.6kPa{2kgf/cm²}
- If the double-faced adhesive needs correction due to misalignment, the part shall be replaced, as the double-faced adhesive will lose adhesion and cannot be reused.

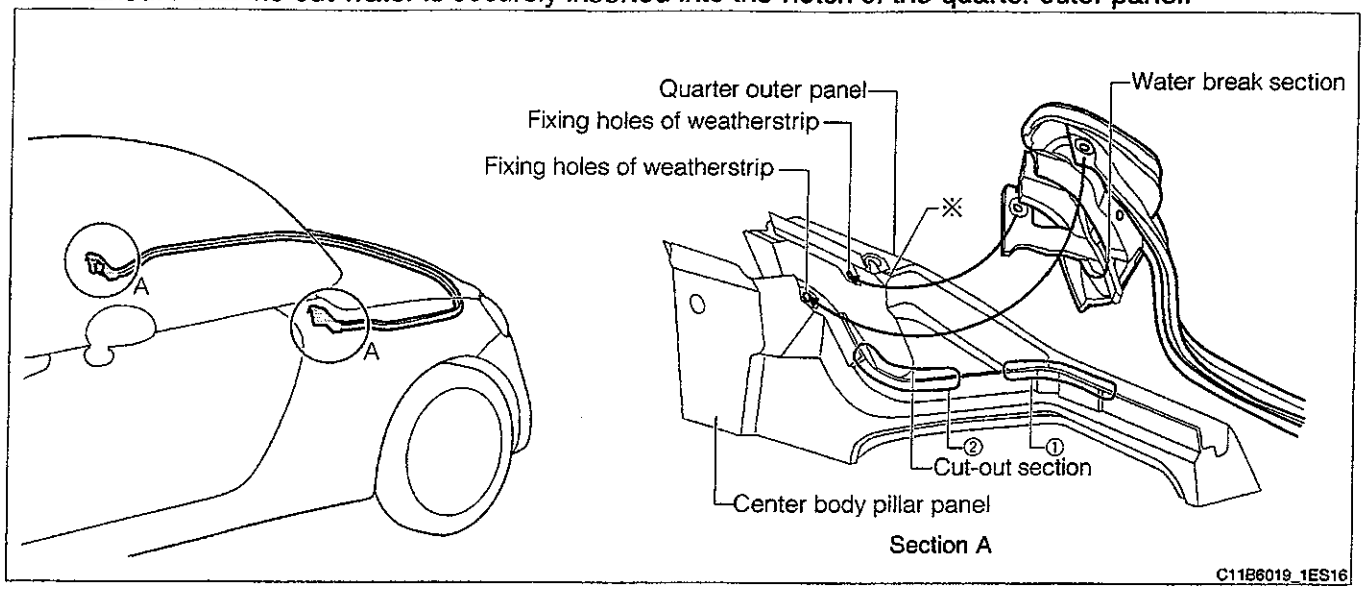


(3) LUGGAGE COMPARTMENT DOOR WEATHERSTRIP

1.Insert the luggage compartment door weatherstrip into the flange ①.
2.Insert the clip of the weatherstrip into the fixing hole.
3.Insert the rest into the flange. [Area around ②]

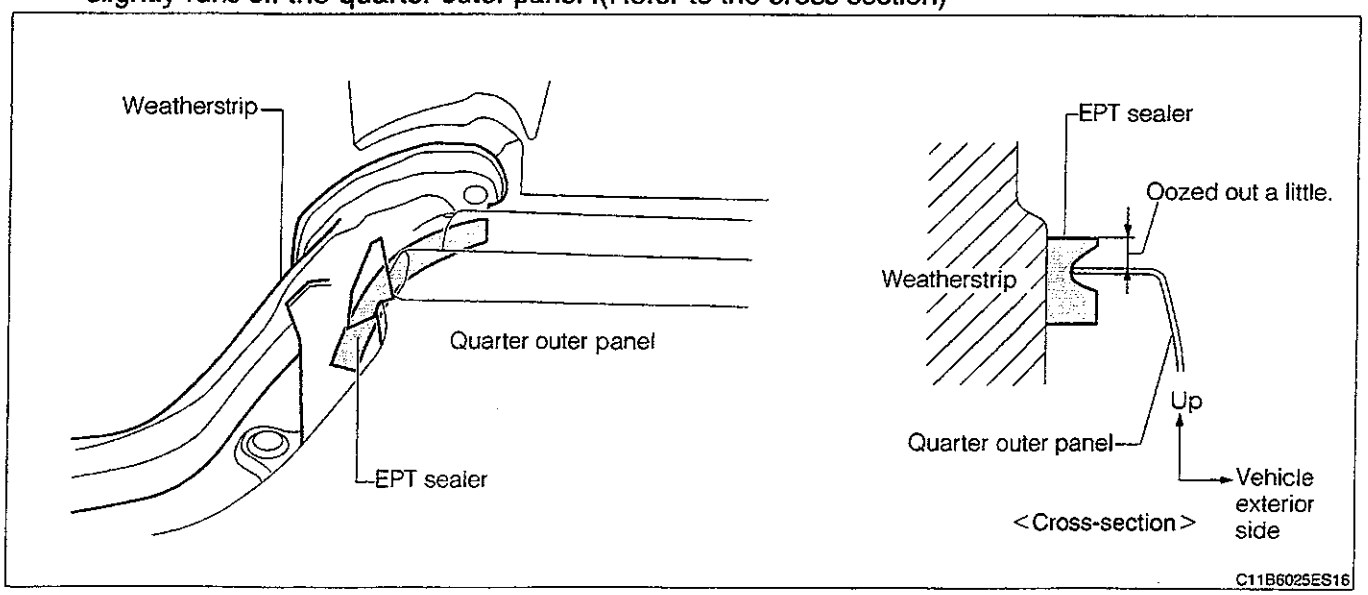
CAUTION

- Securely insert the clip all the way.
- Ensure that the cut water is securely inserted into the notch of the quarter outer panel.

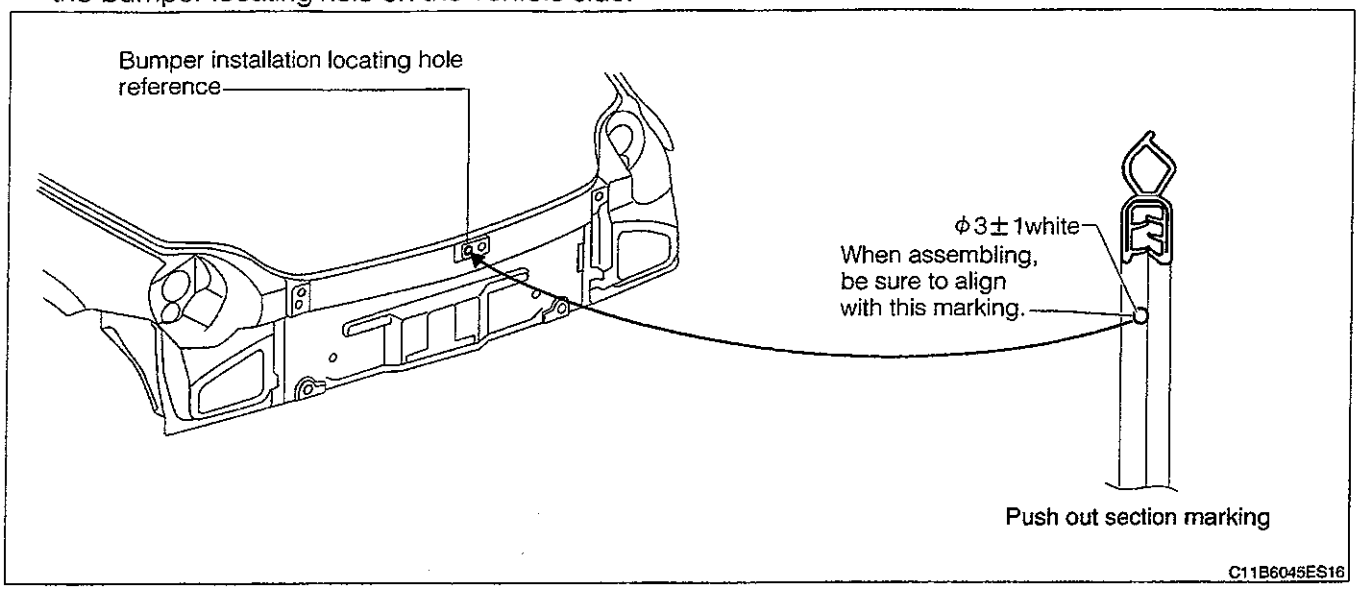


CAUTION

- Install the quarter outer panel so that its corner area (※Marked area in the above illustration) can be sealed with EPT-sealer.
- Imperfect sealing can cause water intrusion, therefore EPT-sealer shall be applied as much as it slightly runs off the quarter outer panel .(Refer to the cross section)



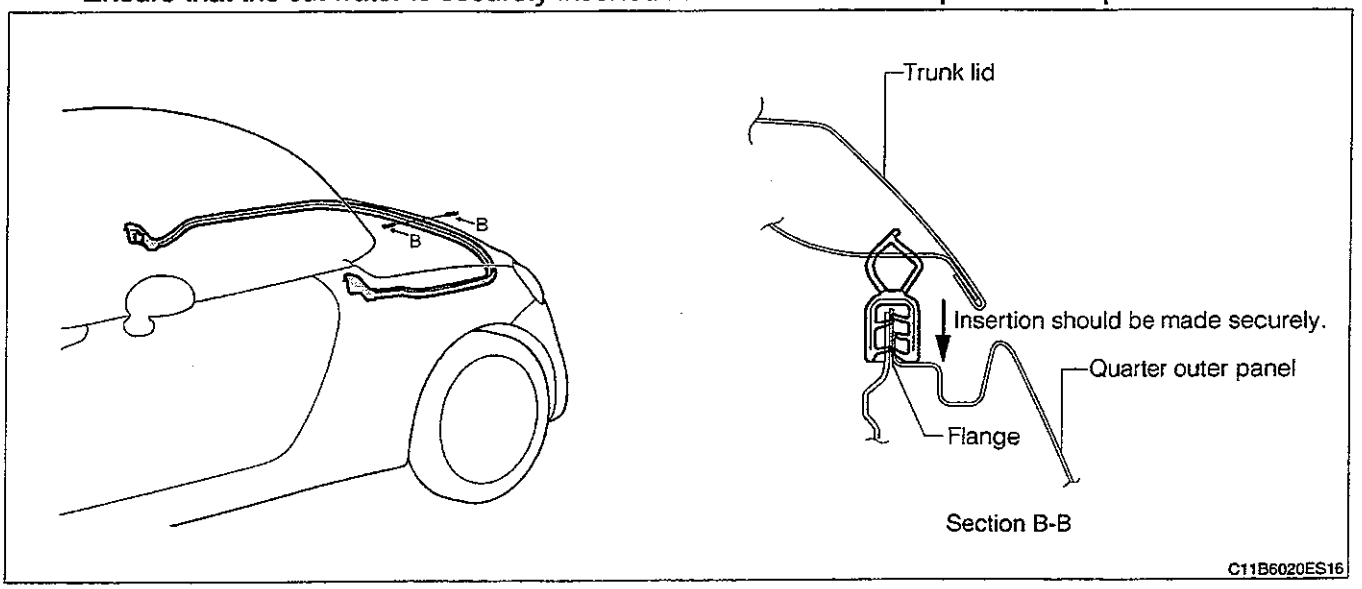
4.Match the marking located on the bottom of the extrusion section shown in the illustration below with the bumper locating hole on the vehicle side.



5.Install the weatherstrip to the panel flange.

CAUTION

- When assembling the weatherstrip to the panel flange, securely insert all the way into the panel.
- Ensure that the cut water is securely inserted into the notch of the quarter outer panel.



8 WEATHER STRIP(ROOF SECTION)

8-1 REMOVAL AND INSTALLATION

8-1-1 ARTICLES TO BE PREPARED

Lubricant, adhesive, others

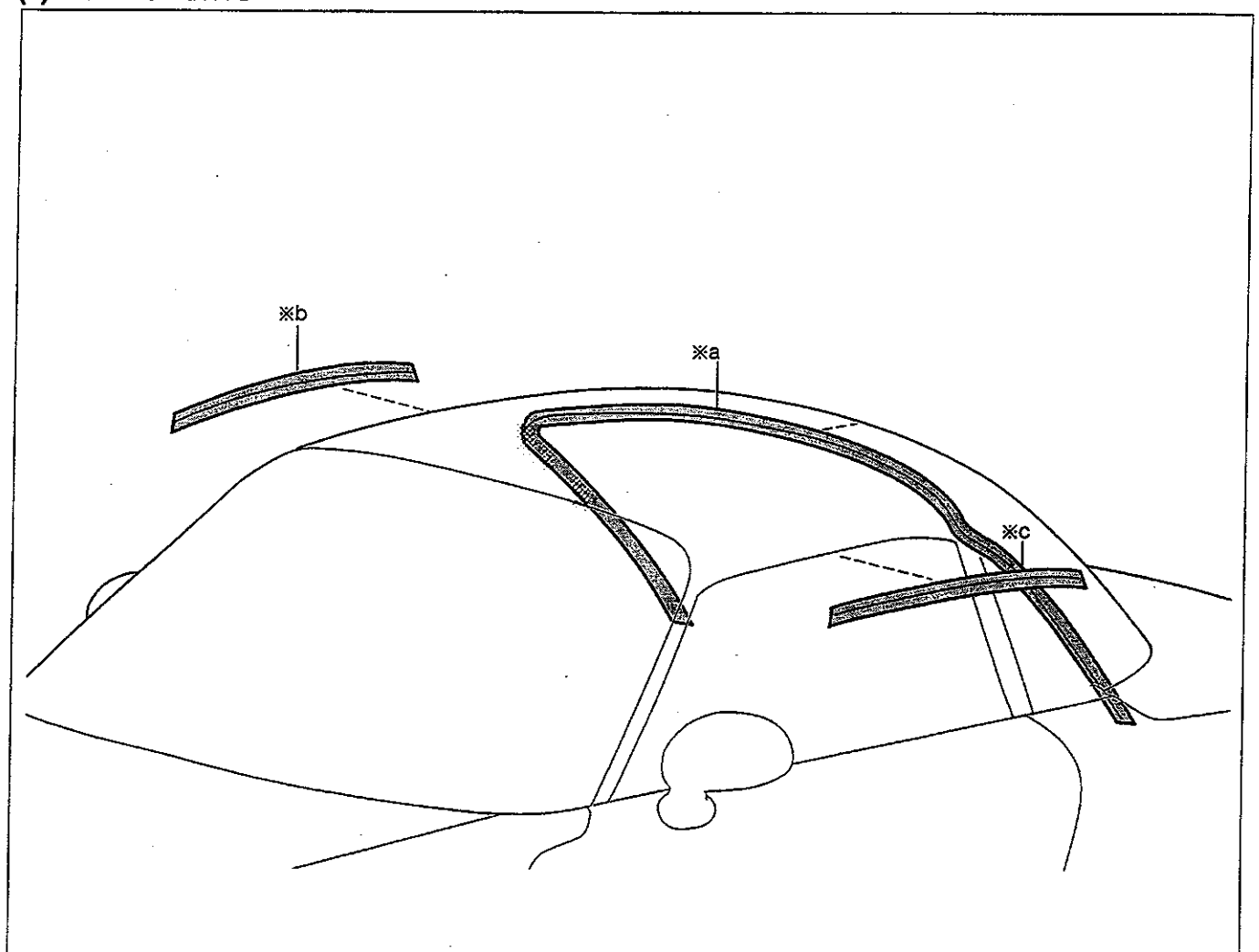
Alcohol or white gasoline

Tool

Clip remover

8-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non -reusable parts

(2) REMOVAL AND INSTALLATION PROCEDURES

▲ 1 a Weatherstrip, removable roof RR
▲ 2 b Weatherstrip, roof side rail RH
▲ 3 c Weatherstrip, roof side rail LH

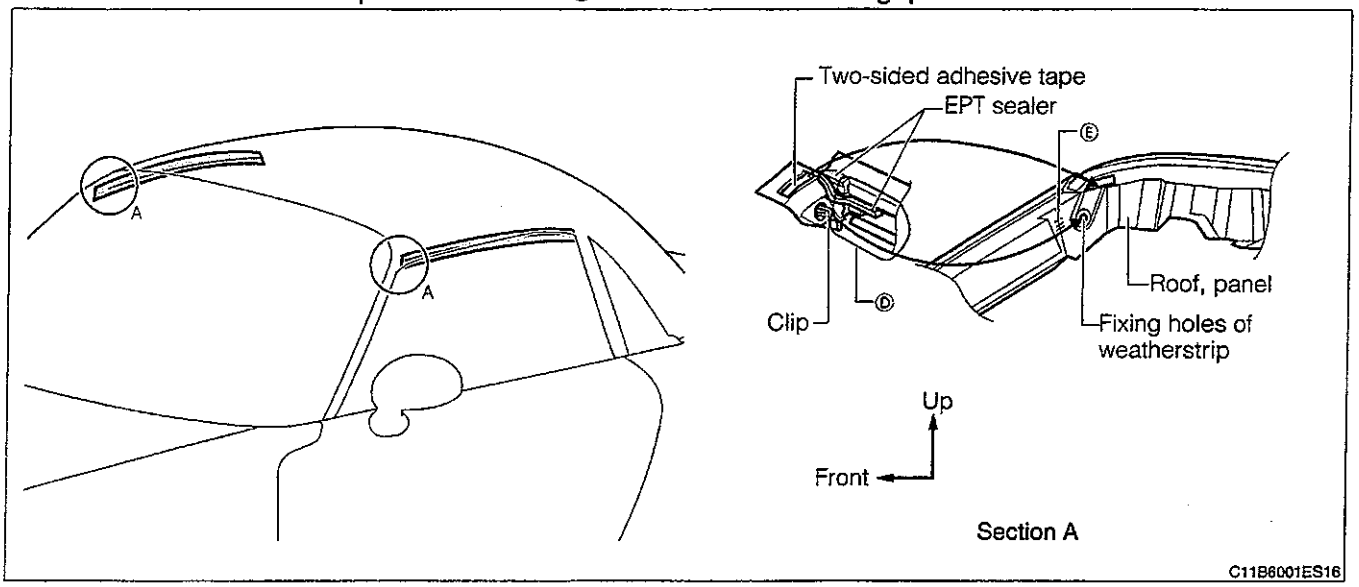
8-1-3 POINTS OF INSTALLATION

(1) ROOF SIDE RAIL RR WEATHERSTRIP RH/LH

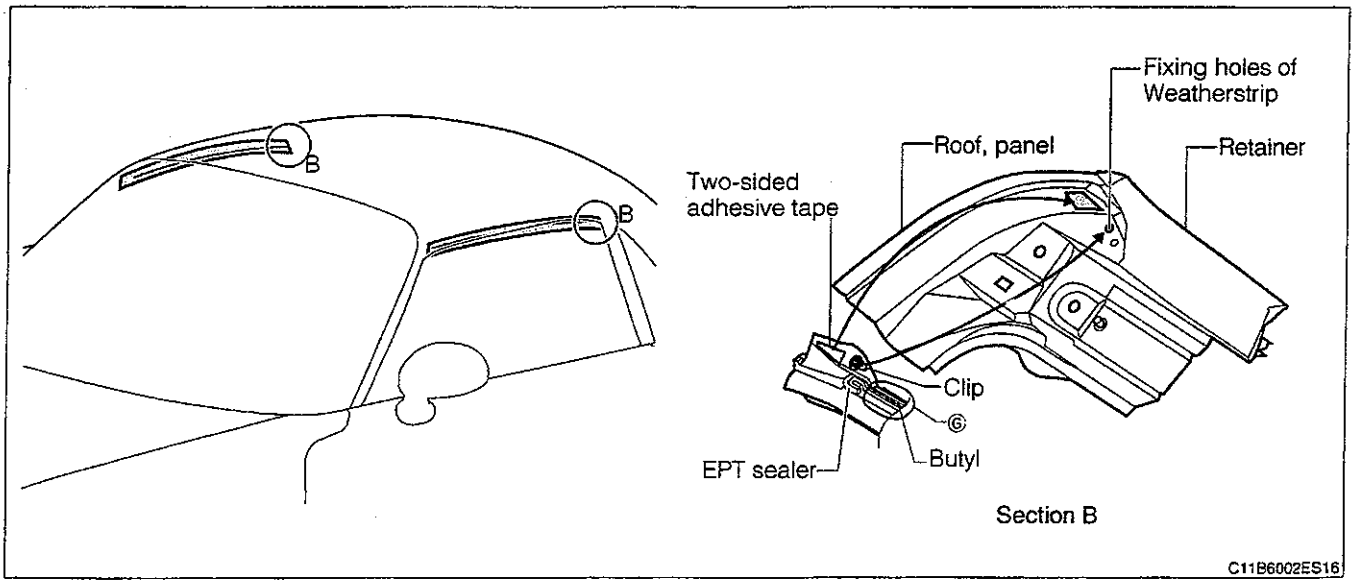
1.Using alcohol, degrease the panel surface where double-faced adhesive is to be applied.
2.Insert the section A clip of the weatherstrip into the fixing hole.
3.Install of the retainer on side Ⓓ.

CAUTION

- Install the weatherstrip to the retainer ② so as not to create a gap on side E.



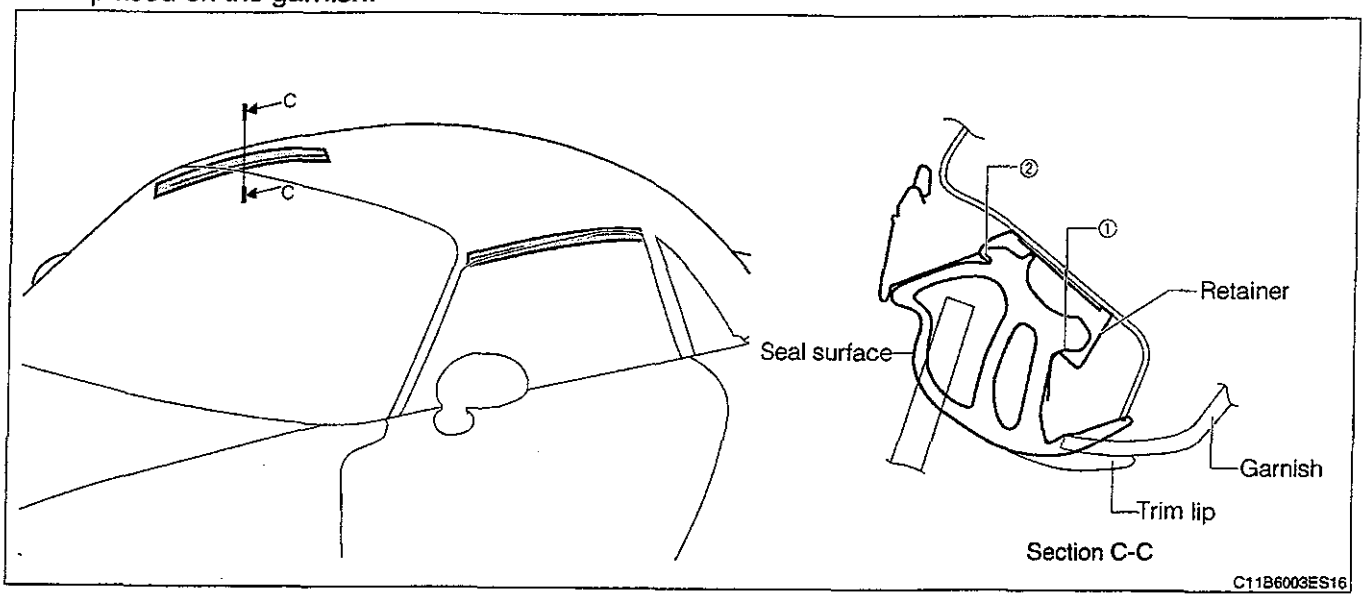
4.Insert the clip into the fixing hole at the rear of the vehicle (Position B) in the same way as in front.
5.Install of the retainer on side Ⓖ.



6.Insert the section hook ① into the retainer.
7.Press the seal surface to assemble the hook ② to the retainer.

CAUTION

- Use care not to catch the trim lip inside the garnish, as the weatherstrip trim lip is designed to be placed on the garnish.



8.When applying weatherstrip, peel-off the backing sheet of the double-faced adhesive, while pressing the outer surface of the primary seal.

CAUTION

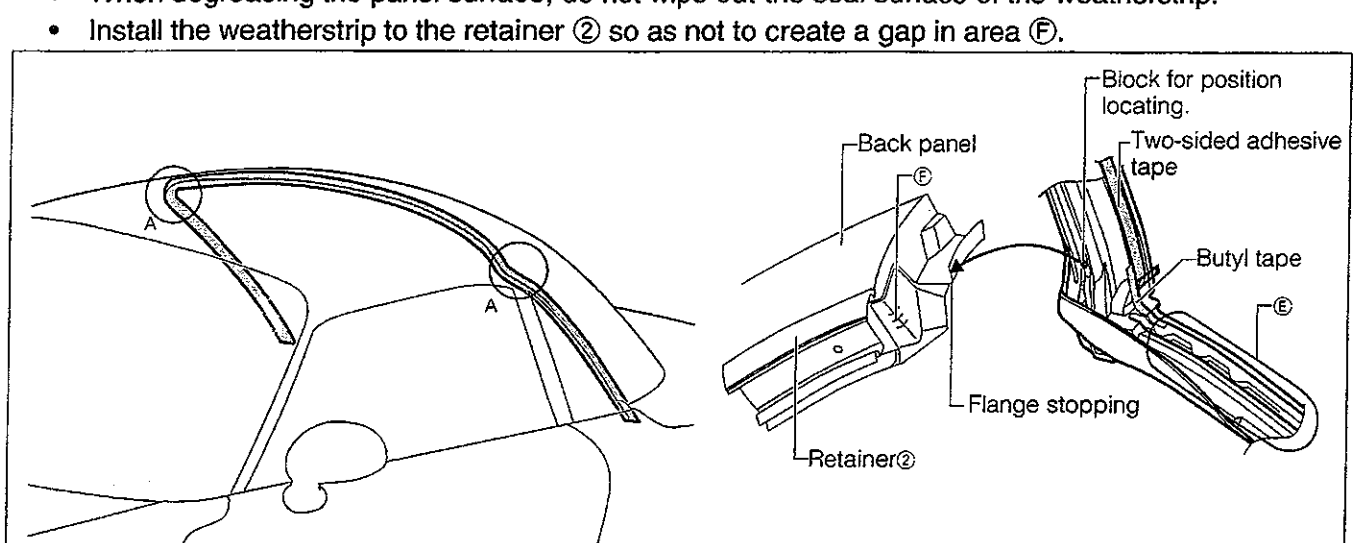
- First assemble the weatherstrip to the retainer, and then position the double-faced adhesive. Peel-off the backing sheet and apply.
- Stripping the backing sheet in advance might cause appearance problem such as misalignment. Therefore carefully peel off the paper, while pressing the outer surface of the weatherstrip.
- After the primary seal is applied, press the outer surface to press-fit.
  Press-fit force:19.6kPa{2kgf/cm²}
- If the double-faced adhesive needs correction due to misalignment, the part shall be replaced, as the double-faced adhesive will lose adhesion and cannot be reused.

(2) REMOVABLE ROOF RR WEATHERSTRIP

1.Using alcohol, degrease the panel surface where double-faced adhesive is to be applied.
2.Match the locating block A with the flange on the panel side and install to the panel.
3.Install the weatherstrip to the fitting portion of the retainer on side E.

CAUTION

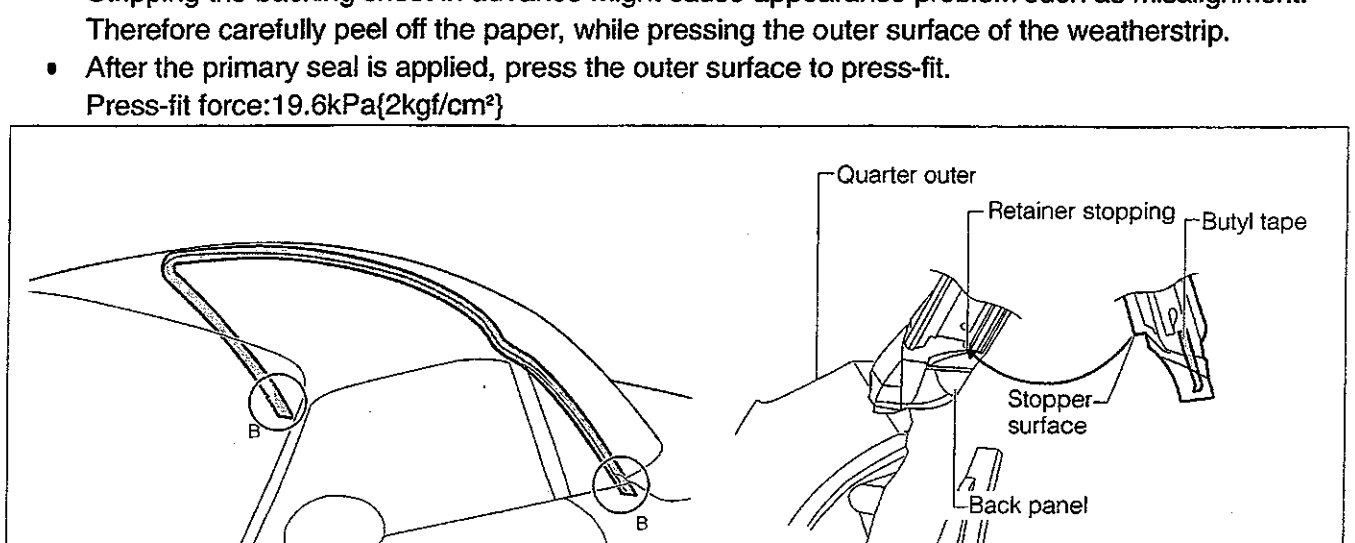
- When degreasing the panel surface, do not wipe out the seal surface of the weatherstrip.
- Install the weatherstrip to the retainer ② so as not to create a gap in area Ⓕ.



4.Match the stopper surface B of the weatherstrip with the retainer edge and install it to the retainer.
5.When applying weatherstrip, peel-off the backing sheet of the double-aced adhesive, while pressing the outer surface of the primary seal.

CAUTION

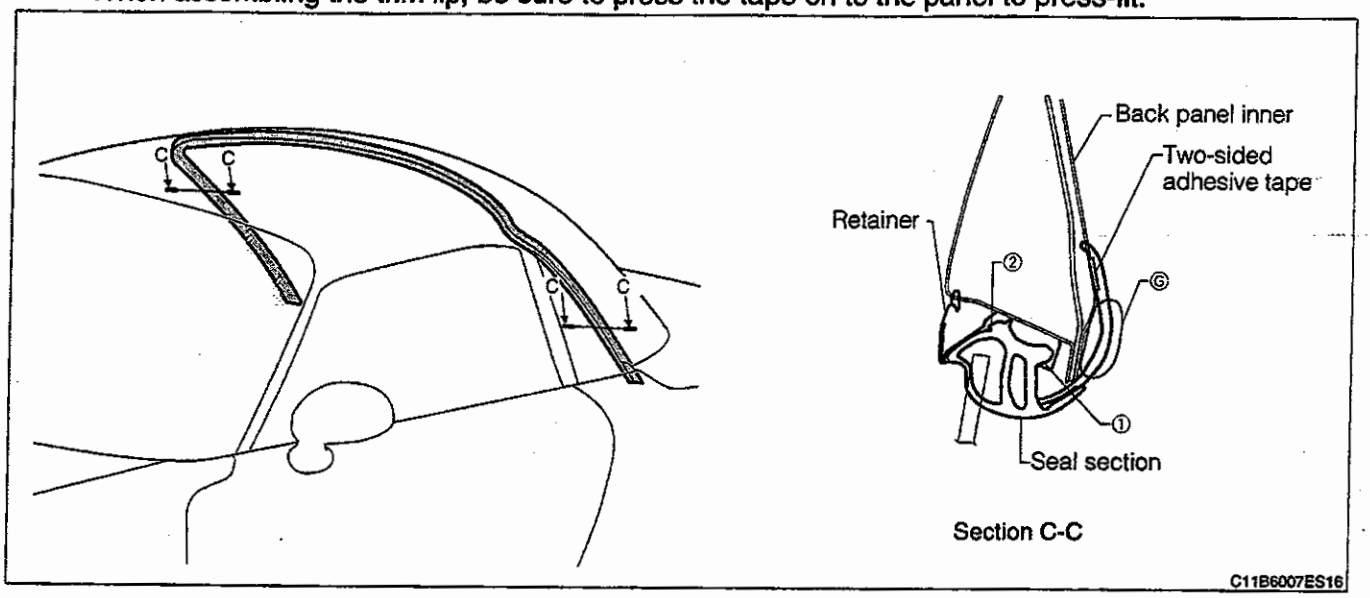
- Stripping the backing sheet in advance might cause appearance problem such as misalignment. Therefore carefully peel off the paper, while pressing the outer surface of the weatherstrip.
- After the primary seal is applied, press the outer surface to press-fit.
  Press-fit force:19.6kPa{2kgf/cm²}



6.Insert the section hook ① into the retainer.
7.Press the seal surface to assemble the hook ② to the retainer.
8.Peel-off the backing sheet of the double-faced adhesive, while pressing the trim lip onto the back panel inner.

CAUTION

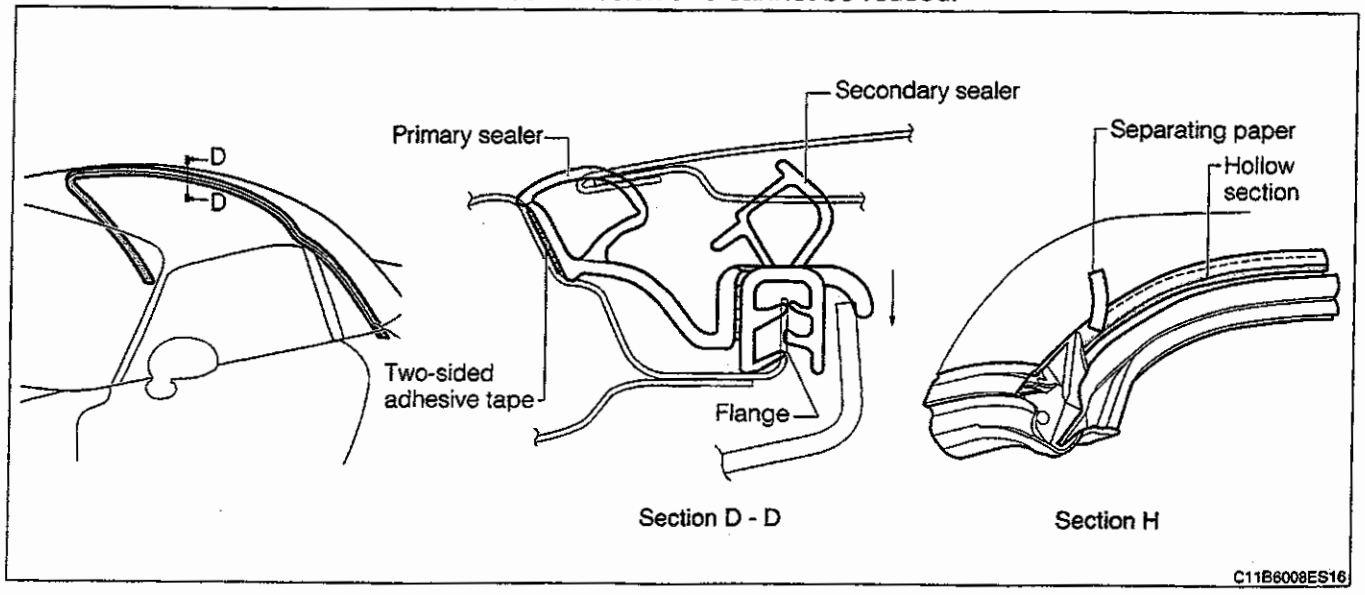
- **Assemble the trim lip, being careful not to create excessive sagging in the lip G of the trim lip.**
- **When assembling the trim lip, be sure to press the tape on to the panel to press-fit.**



9.Install the secondary seal to the panel flange.
10.When applying the primary seal, peel-off the backing sheet of the double-faced adhesive, while pressing the outer surface of the primary seal.

CAUTION

- **When assembling the weatherstrip to the panel flange, securely insert all the way into the panel.**
- **When applying the primary seal, press the outer surface of the primary seal and remove the backing sheet of the double-faced adhesive.**
- **After the primary seal is applied, press the outer surface to press-fit.**
- **If the double-faced adhesive needs correction due to misalignment, the part shall be replaced, as the double-faced adhesive will lose adhesion and cannot be reused.**



9 INSTRUMENT PANEL

9-1 REMOVAL AND INSTALLATION

WARNING

- Since the following operation will affect the SRS airbag, be sure to confirm the notes for the SRS airbag system before the operation and perform safe operation.

Refer to Page H1-1.

9-1-1 ARTICLES TO BE PREPARED

Tool

Clip remover

Lubricant, adhesive, others

Protective tape

9-1-2 OPERATION BEFORE REMOVAL

1.Disconnect the battery negative terminal.

CAUTION

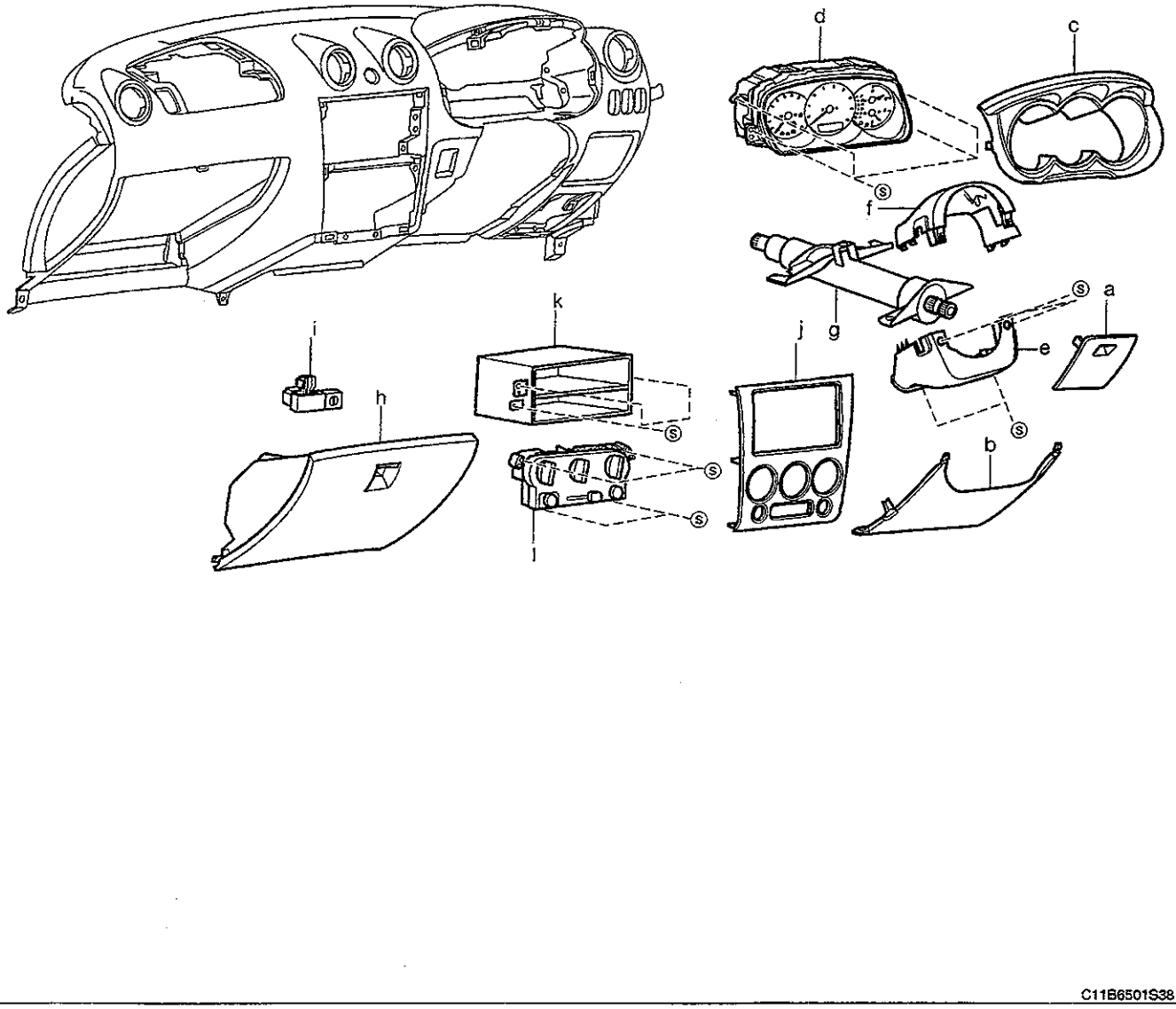
- It should be noted that the memories of the computers (Engine control etc.) of other systems or radio settings are erased at the same time when the battery negative terminal of the battery is disconnected.

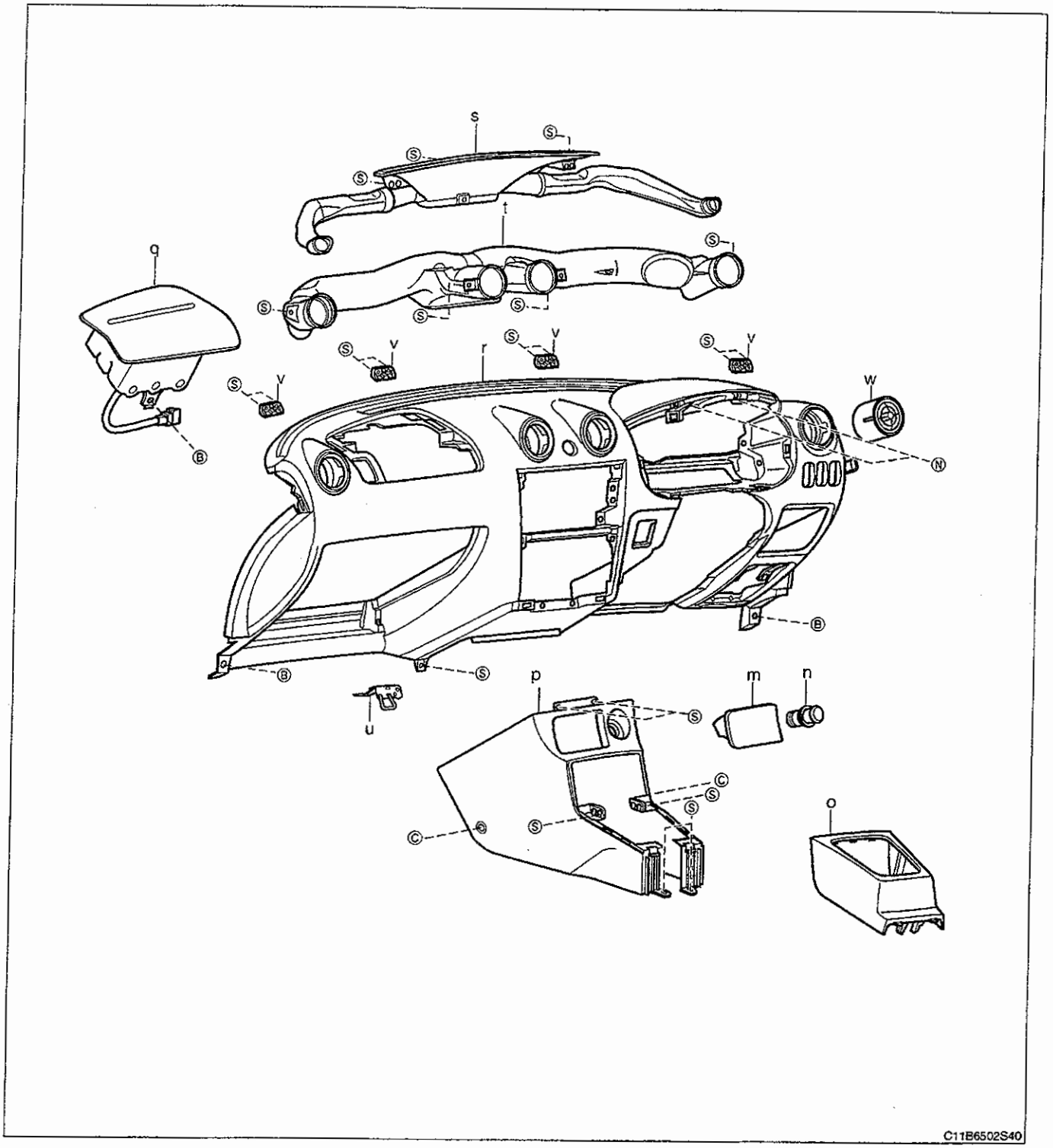
2.Remove the rear console box.

Refer to Page I2-28.

9-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS




s
t
q
r
v
w
p
m
n
o
u
C11B6502S40

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Cover, fuse box opening
2 b Panel, instrument panel finish, lower
3 c Panel Ay, instrument cluster finish
4 d Meter Ay, combination
5 e Cover, steering column lower
6 f Cover, steering column upper
7 g Tube S/A, steering column
8 h Box Ay, instrument panel
9 i Lock Ay, glove compartment door
▼ 10 j Panel S/A, instrument cluster finish, center
11 k Box Ay, instrument panel center
12 l Control Ay, heater
13 m Box S/A, ash receptacle
14 n Cigar, lighter
15 o Bezel, shifting hole
16 p Box Ay, console FR
17 q Airbag Ay, instrument passenger
18 r Panel, instrument
19 s Nozzle Ay, defroster
20 t Duct S/A, heater to register, center
21 u Striker, glove compartment door lock
22 v Pin, instrument panel,No.1
23 w Register Ay, instrument panel

9-1-4 POINTS OF REMOVAL

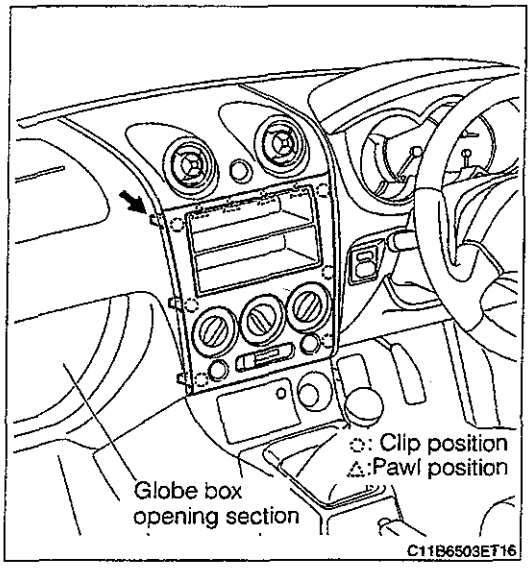
(1) INSTRUMENT CLUSTER FINISH CENTER PANEL S/A

1.Access through the glove box opening and unhook the clip indicated by an arrow.

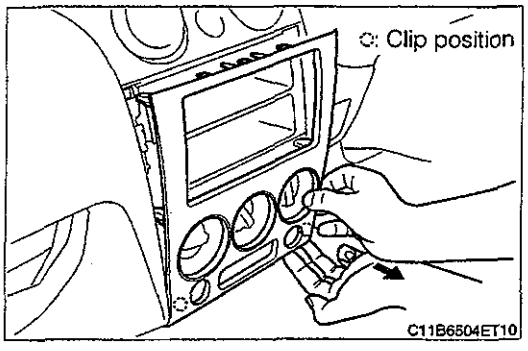
2.Disengage the clip. Insert a bamboo spatula into where the clip is floated and detach other clips.

CAUTION

- **When detaching the clip, apply force to a point close to the clip and pull it horizontally.**

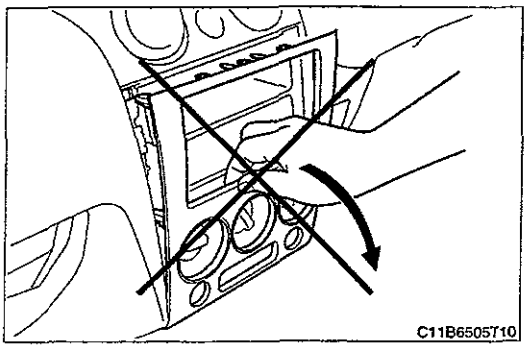


3.Hold the cluster and pull the clip, shown in the right illustration, in horizontal direction to unhook. Then remove the instrument cluster finish panel.



CAUTION

- **Do not remove the clip while rotating the cluster as shown in the right illustration, for this might damage the clip.**



9-1-5 OPERATION AFTER INSTALLATION

1.Install the rear console box.
Refer to Page I2-38.

2.Connect the battery negative terminal.

10 WINDOW DEFLECTOR BOARD

10-1 REMOVAL AND INSTALLATION

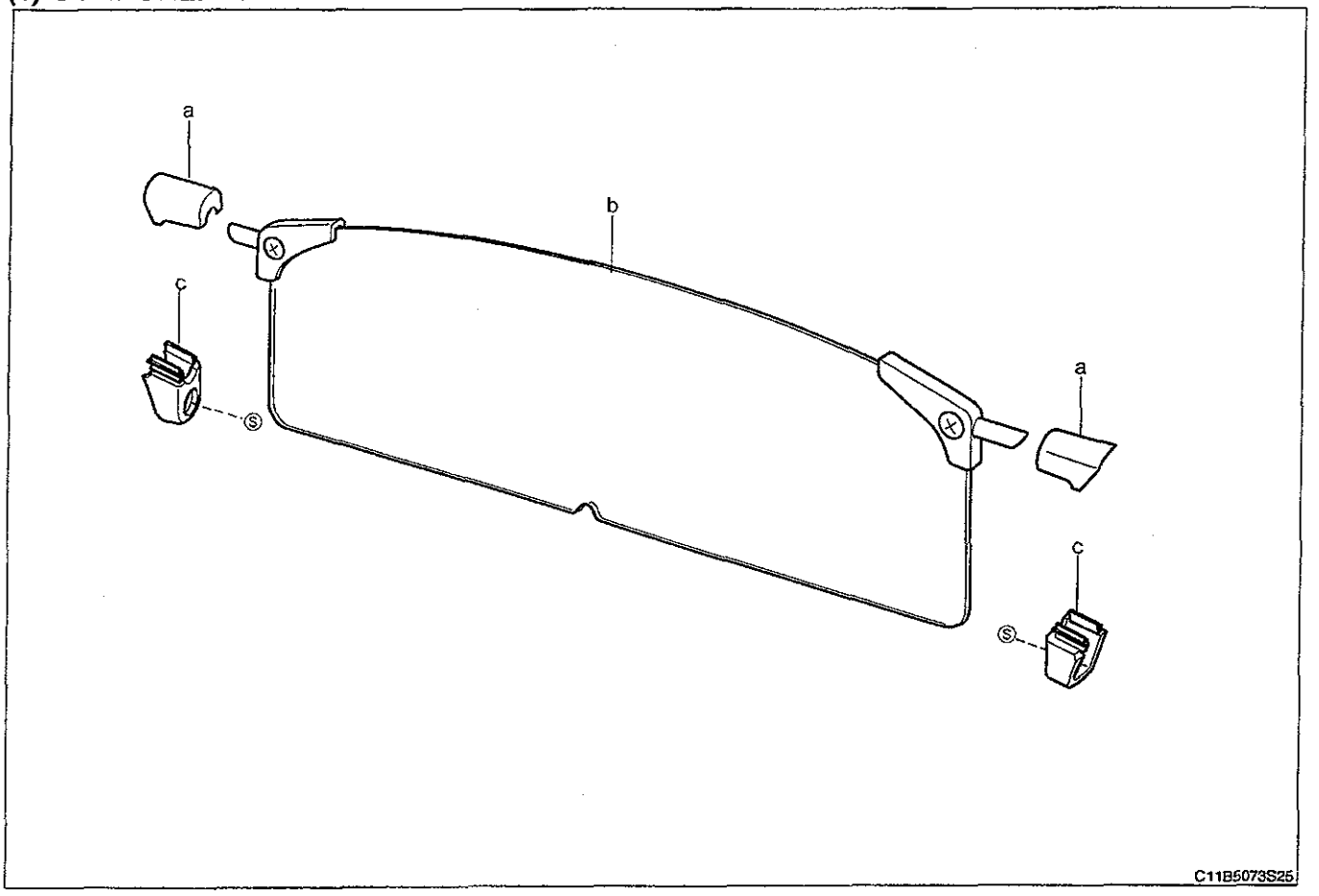
10-1-1 ARTICLES TO BE PREPARED

Lubricant, adhesive, others

Protective tape

10-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



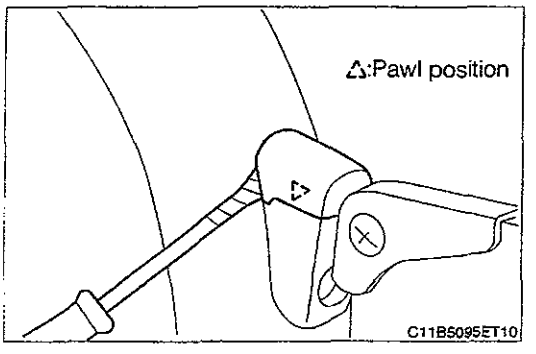
(2) REMOVAL AND INSTALLATION PROCEDURES

▼ 1 a Retainer, windshield support bracket
2 b Board Ay, window deflector
3 c Bracket, windshield support

10-1-3 POINTS OF REMOVAL

(1) WINDSHIELD SUPPORT BRACKET RETAINER

1.Apply the protective tape to a flat screwdriver and insert the screwdriver between the retainer and the roll over bar. Then pry the windshield support bracket retainer to disengage the pawl.



11 TRIM PANEL

11-1 REMOVAL AND INSTALLATION

11-1-1 ARTICLES TO BE PREPARED

Tool

Clip remover

Lubricant, adhesive, others

Protective tape

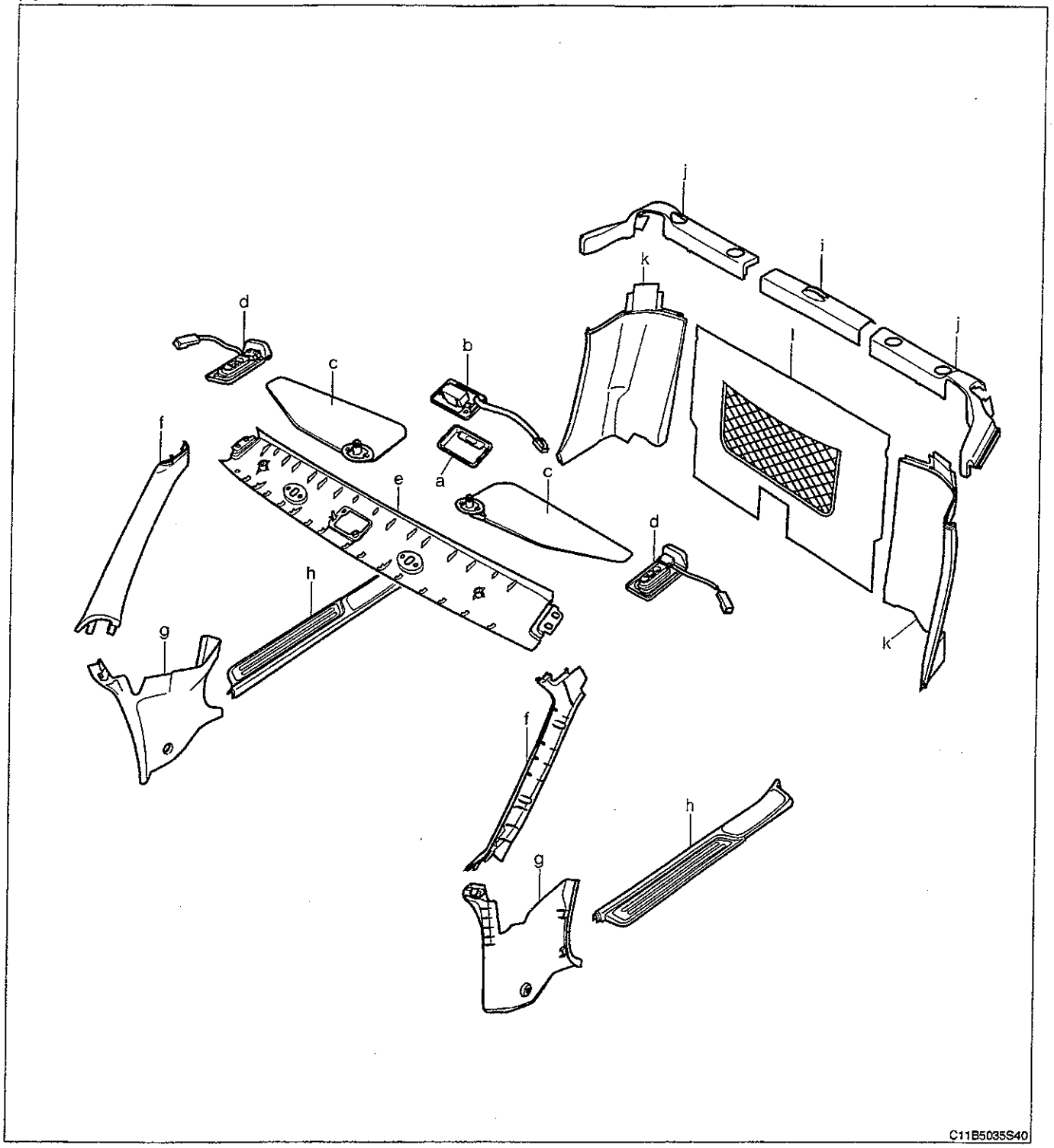
11-1-2 OPERATION BEFORE REMOVAL

Remove the window deflector board Ay.

Refer to Page I2-27.

11-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

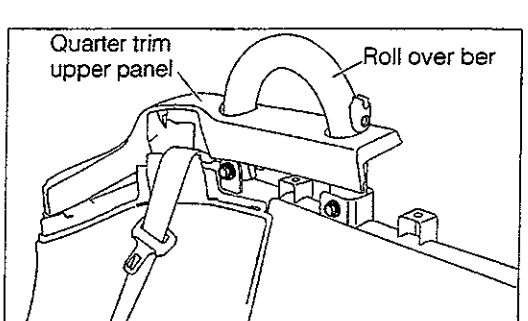
1 a Lens, map lamp
2 b Unit Ay, map lamp
3 c Visor Ay, RH/LH
4 d Catch, center lock, RH/LH
5 e Cover, roof header garnish
6 f Garnish, FR pillar RH/LH
7 g Board, cowl side trim RH/LH
8 h Plate, front door scuff, RH/LH
9 i Trim Ay, back panel
▼ 10 j Panel, quarter trim upper, RH/LH
11 k Panel, quarter trim RH/LH
12 l Trim, back panel

11-1-4 POINTS OF REMOVAL

(1) QUARTER TRIM UPPER PANEL RH/LH

1.Detach the clip of the quarter trim upper.

2.Lift up the quarter trim upper panel to remove the roll over bar mounting bolts (Two peaces). Then remove the roll over bar and remove the quarter trim upper panel.



11-1-5 OPERATION AFTER INSTALLATION

1.Install the window deflector board.

Refer to Page I2-27.

12 FRONT SEAT

12-1 REMOVAL AND INSTALLATION

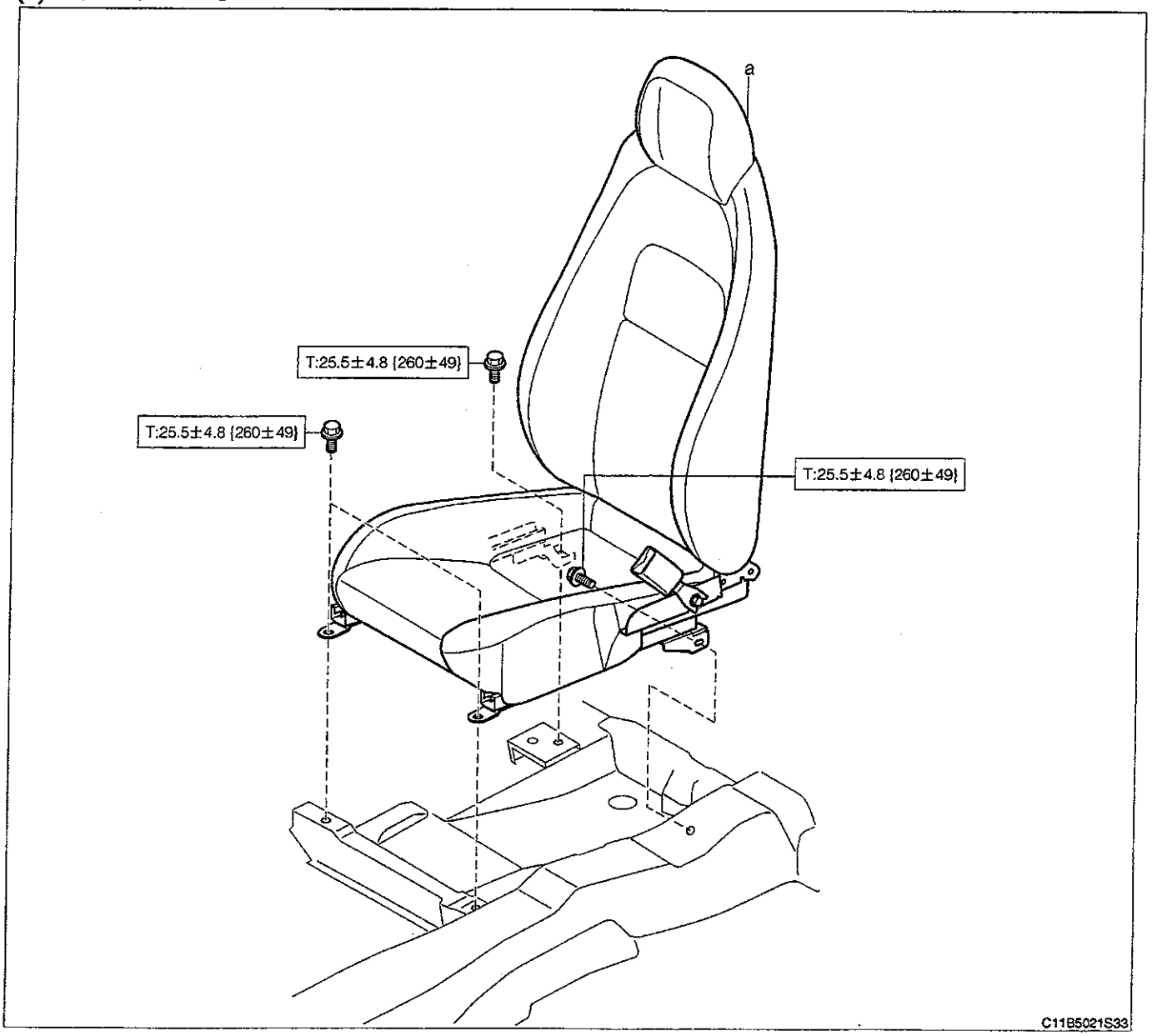
12-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

12-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Seat Ay, FR

13 FRONT SEAT OUTER BELT

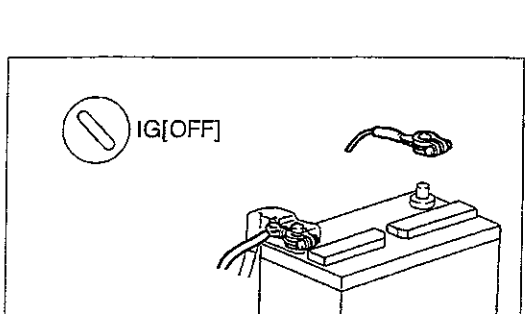
13-1 REMOVAL AND INSTALLATION

13-1-1 ARTICLES TO BE PREPARED

Instrument

Torque wrench

13-1-2 OPERATION BEFORE REMOVAL



1.Disconnect the battery negative terminal.

CAUTION

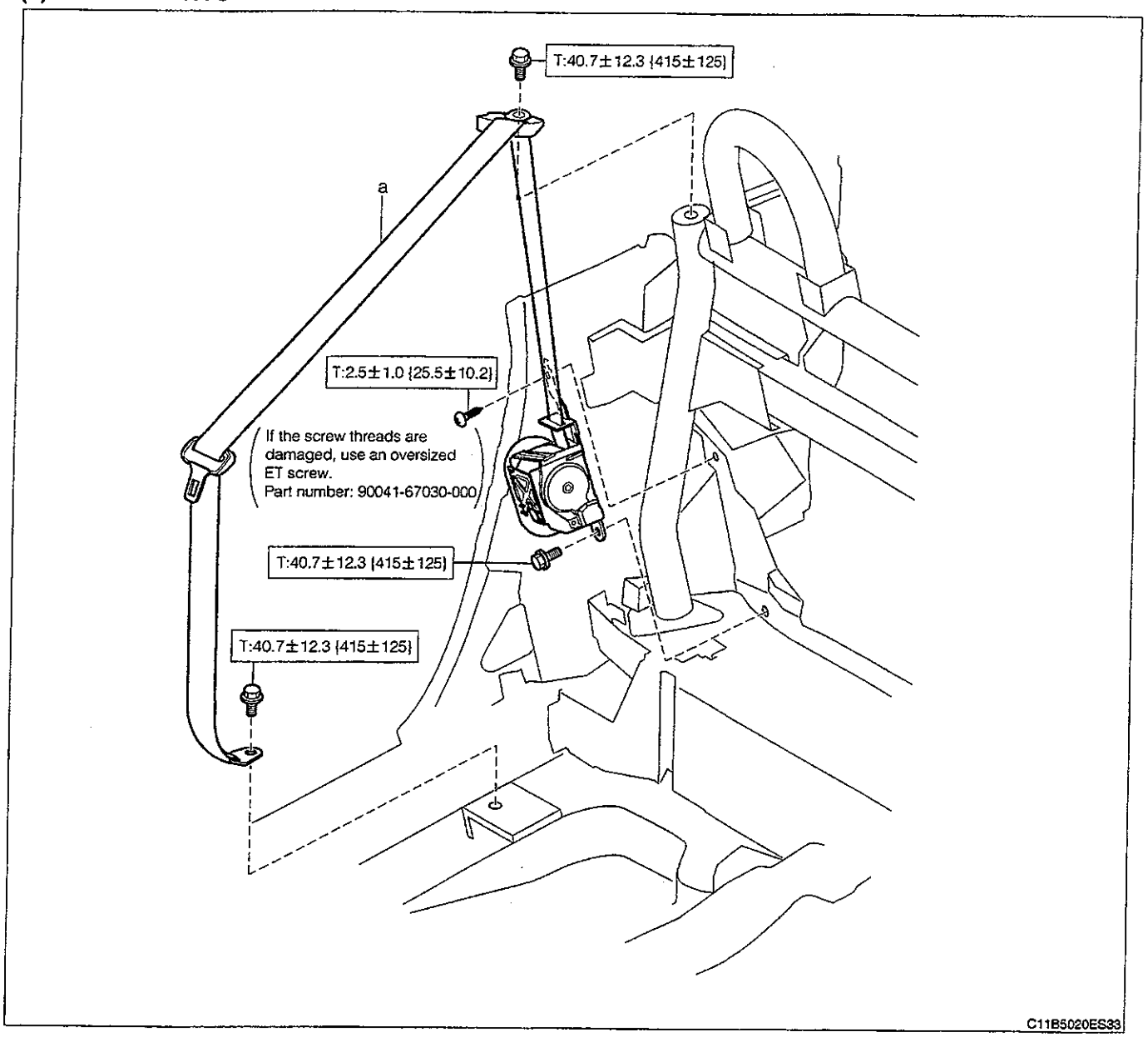
- It should be noted that the memories of the computers (Engine control etc.) of other systems or radio settings are erased at the same time when the battery negative terminal is disconnected.
- Before starting the operation, set the ignition switch to OFF position (LOCK) and disconnect the battery negative terminal. Wait at least 60 seconds.

2.Remove quarter trim upper panel.

Refer to Page I2-28.

13-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

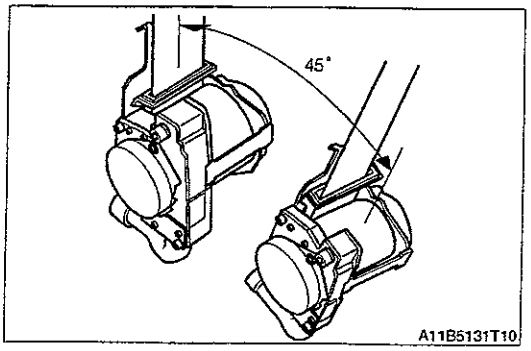
1 a Belt Ay, front seat outer

13-1-4 INSPECTION

(1) CHECK OF PRETENSIONER MECHANISM-EQUIPPED SEAT BELT

1.Check of inclination angle at time of ELR lock.

2.Gently move the retractor from the installation state. Ensure that the belt locking does not take place within 15°in all directions. Also ensure that the lock is retained beyond 45°.



CAUTION

- Never disassemble the retractor.

(2) ELR LOCK POINT

1.Suddenly pull out the seat belt that is assembled to the vehicle. Ensure that locking takes place.

2.Check the following items. Replace any faulty parts.

(1) Case where problems have been found out by the diagnosis check.

(3) EXTERNAL APPEARANCE CHECK OF PRETENSIONER MECHANISM-EQUIPPED SEAT BELT

1.Replace the seat belt in the following cases.

(1) Case where the pretensioner mechanism has been actuated.

(2) Case where the vehicle is damaged in a collision, including a minor one in which pretensioner mechanism has not been actuated.

(3) Case where the seat belt (Hereinafter referred to as the pretensioner) is damaged or cracked.

(4) Case where the connector or harness has dents or chips.

(5) Case where grease, water, detergent or oil get to the pretensioner in a large quantity.

(6) Case where the pretensioner dropped and got damaged.

13-1-5 OPERATION AFTER INSTALLATION

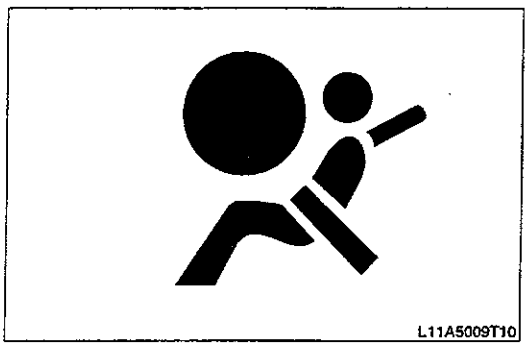
1.Install the quarter trim panel.

Refer to Page I2-28.

Connect battery negative terminal.

CAUTION

- **After connecting the battery negative terminal, set the IG switch to ON position. Ensure that the airbag warning lamp illuminate for about six seconds, and then goes out.**



14 ROOF HEADLINING

14-1 REMOVAL AND INSTALLATION

14-1-1 ARTICLES TO BE PREPARED

Tool

Clip remover

Lubricant, adhesive, others

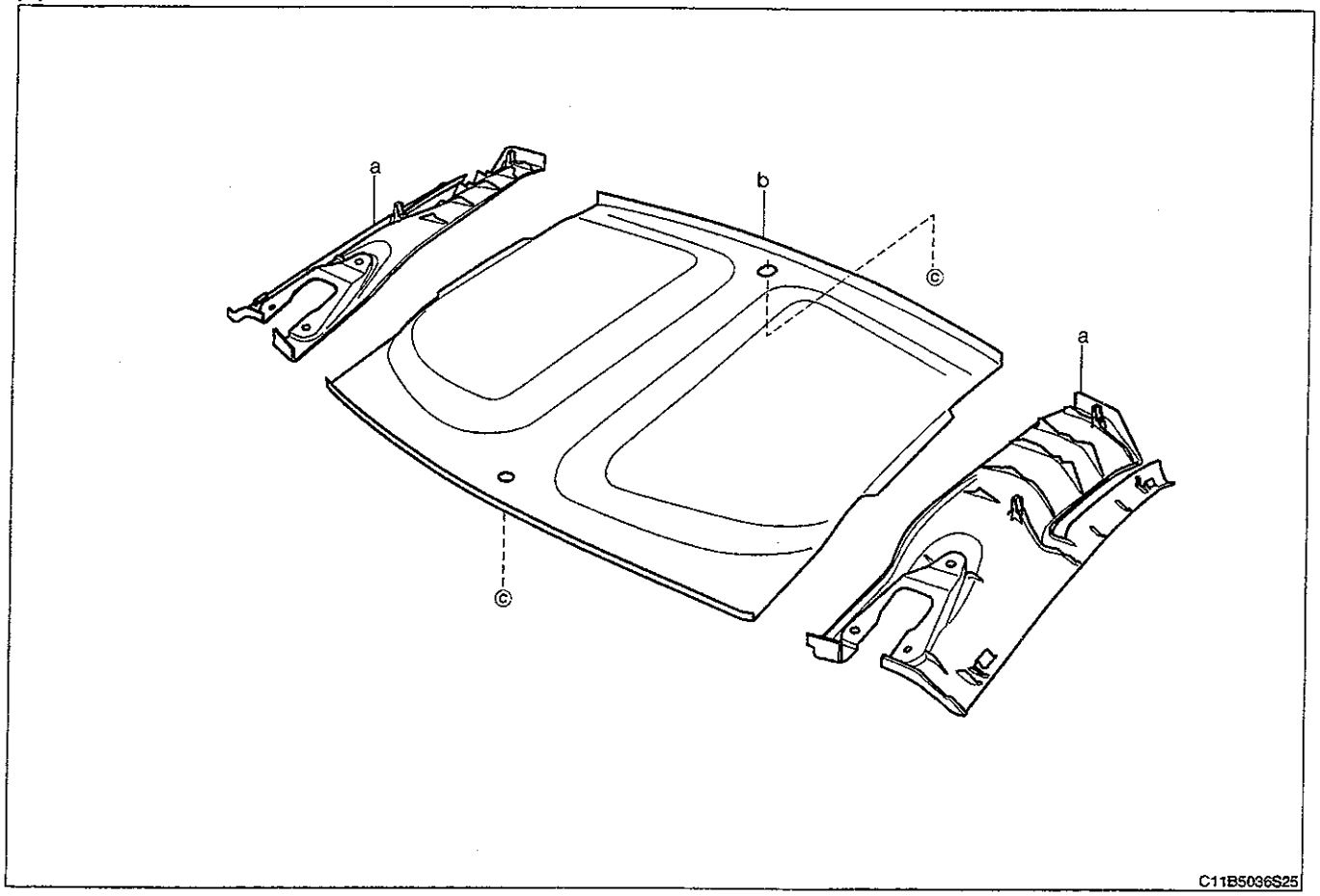
Protective tape

14-1-2 OPERATION BEFORE REMOVAL

Remove the removable roof auxiliary hook RH/LH.
Refer to Page I5-16.

14-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Garnish, roof side rail, RH/LH
2 b Headlining Ay, roof

14-1-4 OPERATION AFTER INSTALLATION

1.Install the removable roof auxiliary hook RH/LH.
Refer to Page I5-16.

15 BACK PANEL GARNISH

15-1 REMOVAL AND INSTALLATION

15-1-1 ARTICLES TO BE PREPARED

Tool

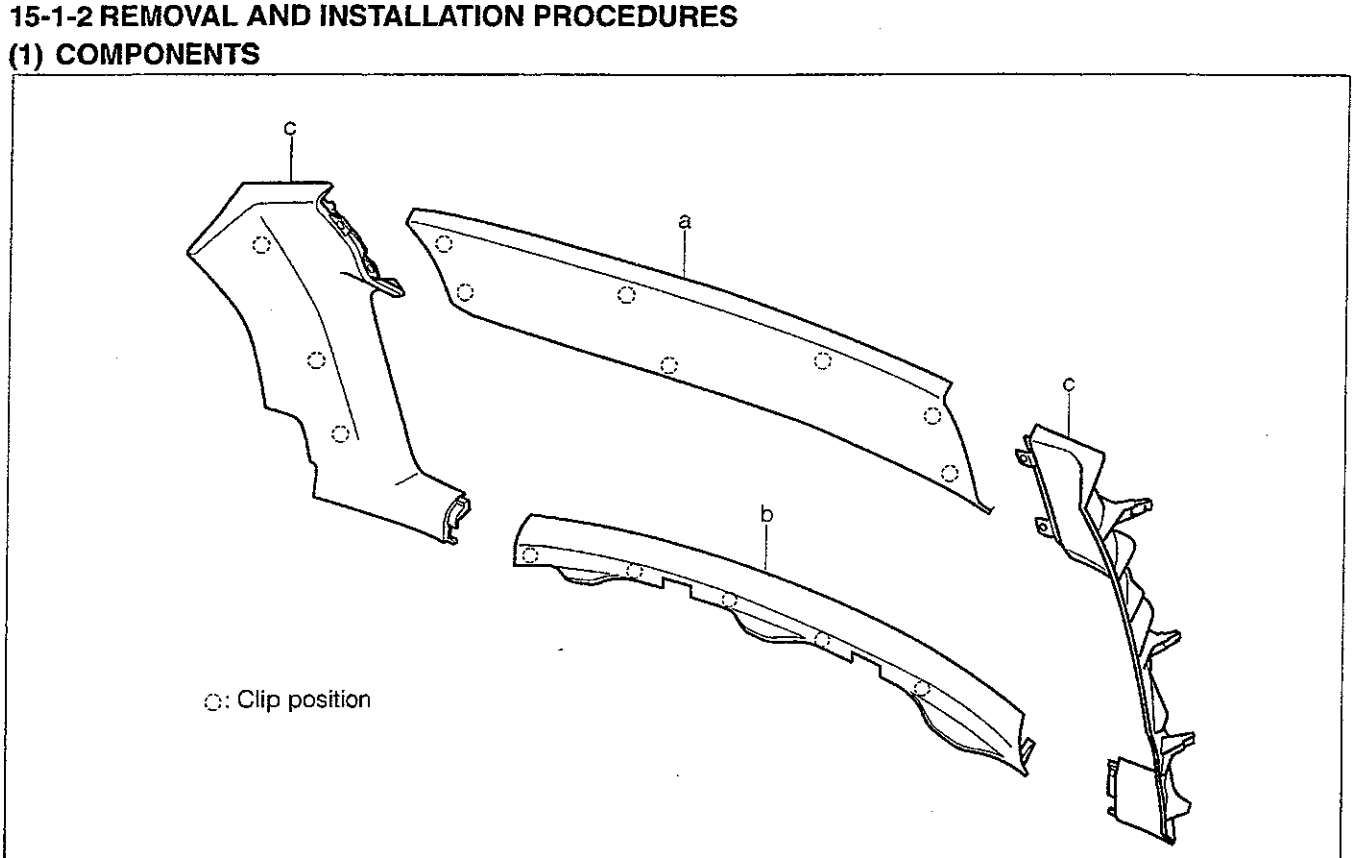
Clip remover

Lubricant, adhesive, others

Protective tape

15-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

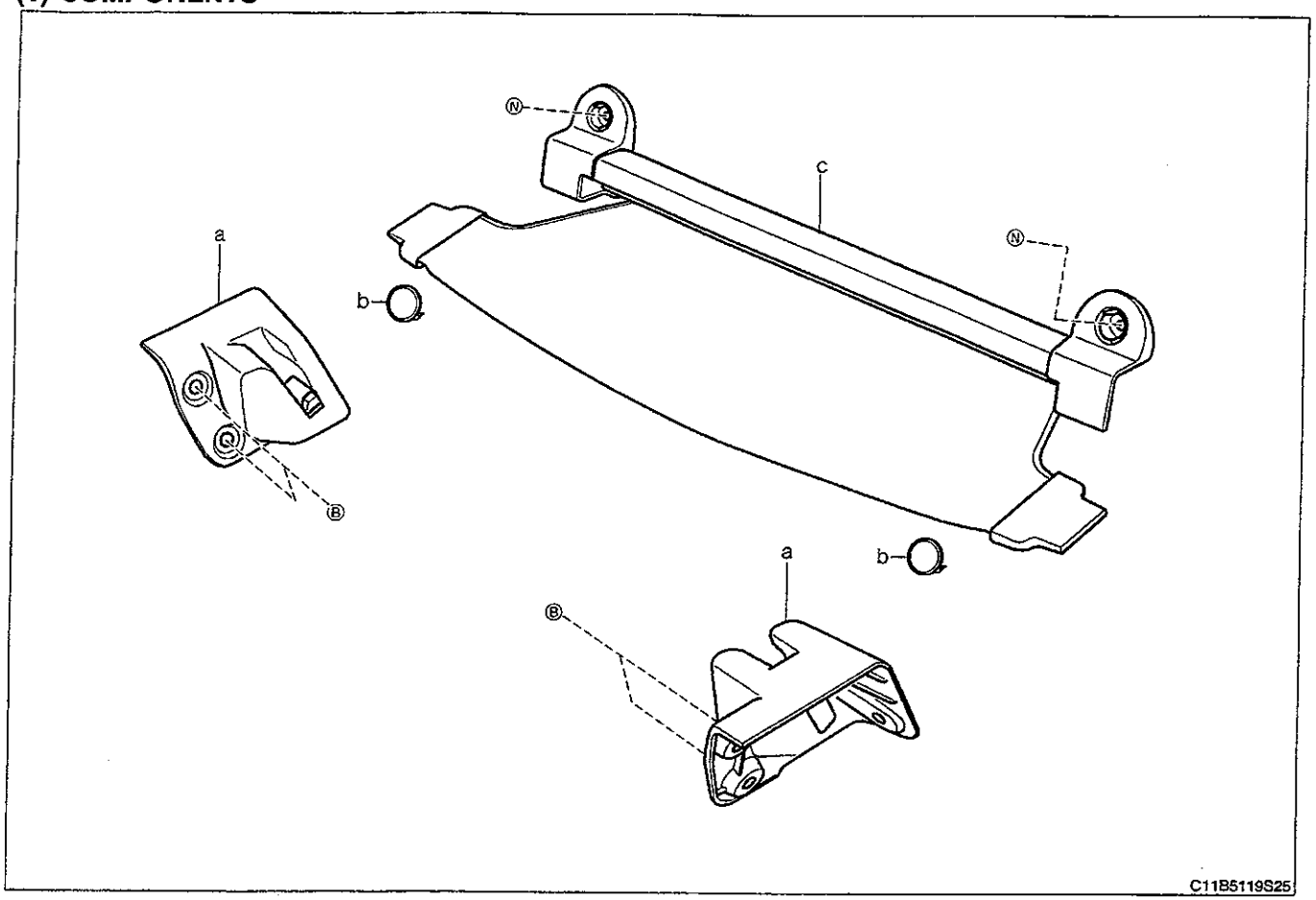
1 a Cover, roof headlining molding end
2 b Garnish, back panel lower
3 c Garnish, roof side inner RH/LH

16 TONNEAU COVER

16-1 REMOVAL AND INSTALLATION

16-1-1 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

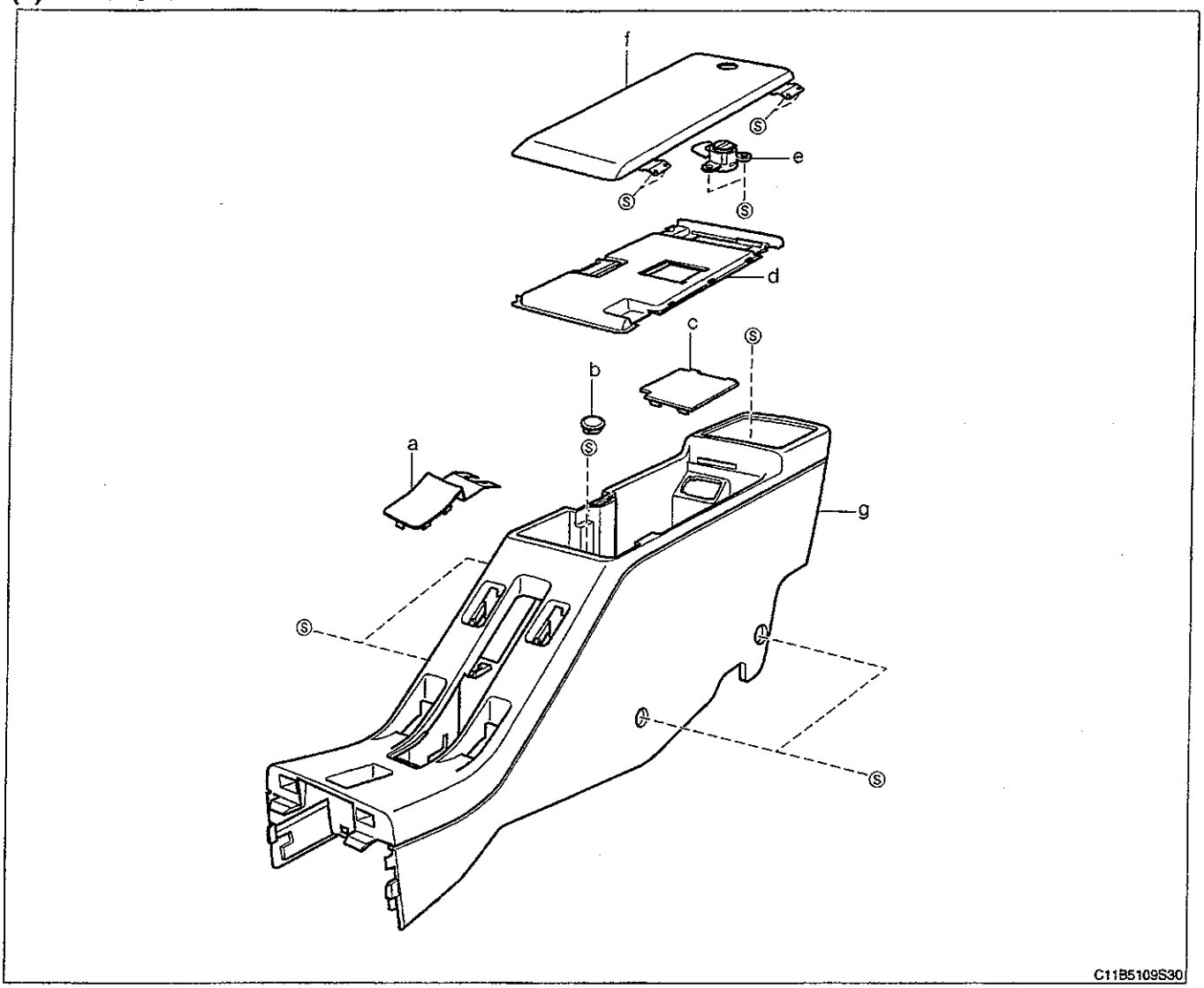
1 a Holder, tonneau cover
2 b Cover, cigarette lighter hole
3 c Cover Ay, tonneau

17 REAR CONSOLE BOX

17-1 REMOVAL AND INSTALLATION

17-1-1 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Cover, console box, FR
2 b Cover, cigarette lighter hole
3 c Cover, console box, RR
4 d Cover, console, upper
5 e Cover, console, lower
6 f Cylinder Ay, console compartment door lock
7 g Box Ay, console RR

TO INDEX TO NEXT SECTION

TO INDEX

I3 WINDSHIELD WINDOWGLASS/MIRROR

WINDSHIELD GLASS---------- I3 - 1
REMOVAL AND INSTALLATION --------- I3 - 1
BACK WINDOW GRASS---------- I3 - 6
REMOVAL AND INSTALLATION --------- I3 - 6
POWER WINDOW SYSTEM ---------- I3 - 9
ARTICLES TO BE PREPARED---------- I3 - 9
HANDLING INSTRUCTIONS OF CONTROL SYSTEM---------- I3 - 9
SYSTEM WIRING DIAGRAM ---------- I3 - 9
ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS---------- I3 - 10
LOCATION OF COMPONENTS--------- I3 - 11
BASIC CHECK---------- I3 - 11
TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA ---- I3 - 12
UNIT CHECK---------- I3 - 16
REAR QUARTER WINDOW---------- I3 - 18
REMOVAL AND INSTALLATION-------- I3 - 18
QUARTER WINDOW REGULATOR------ I3 - 20
SYSTEM WIRING DIAGRAM---------- I3 - 20
ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS---------- I3 - 20
LOCATION OF COMPONENTS -------- I3 - 20
TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA ---- I3 - 20
UNIT CHECK---------- I3 - 20
OUTER REAR VIEW MIRROR---------- I3 - 21
REMOVAL AND INSTALLATION-------- I3 - 21
MIRROR SURFACE MOTOR-DRIVEN MOVABLE TYPE OUTER REAR-VIEW MIRROR---------- I3 - 23
ARTICLES TO BE PREPARED --------- I3 - 23
SYSTEM WIRING DIAGRAM---------- I3 - 23
ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS---------- I3 - 23
LOCATION OF COMPONENTS -------- I3 - 24
UNIT CHECK---------- I3 - 25
INNER REAR VIEW MIRROR---------- I3 - 26
REMOVAL AND INSTALLATION-------- I3 - 26

1 WINDSHIELD GLASS

1-1 REMOVAL AND INSTALLATION

1-1-1 ARTICLES TO BE PREPARED

Tool

Sealant gun,Drill or eyeleteer (heavy needle to make a hole),Cutter knife,Rubber suction cups

Lubricant, adhesive, others

Seal set (Part number : 999-09600-U9-001),Wooden block,Protective tape,Cloth,Alcohol or white gasoline

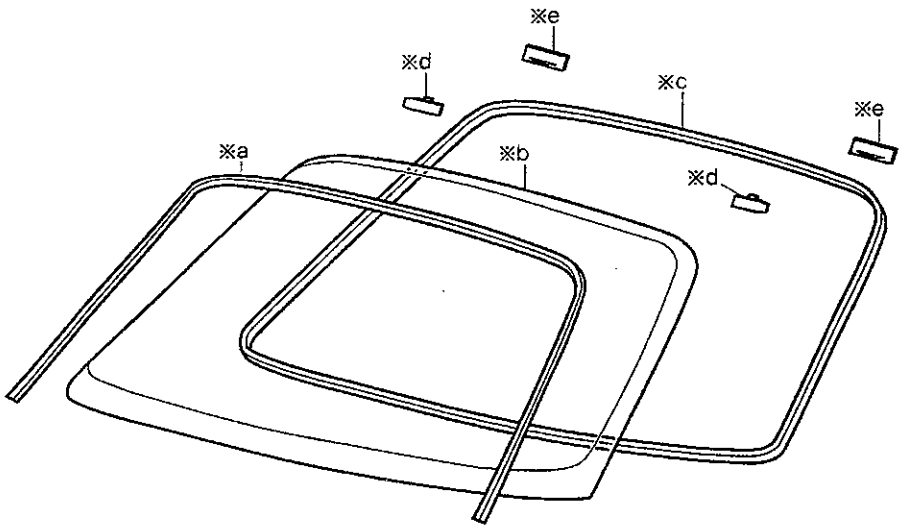
1-1-2 OPERATION BEFORE REMOVAL

1.Remove the cowl top ventilator louver.
Refer to Page I2-5.

2.Remove the instrument panel.
Refer to Page I2-22.

1-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



C11B5039S25

※:Non - reusable parts

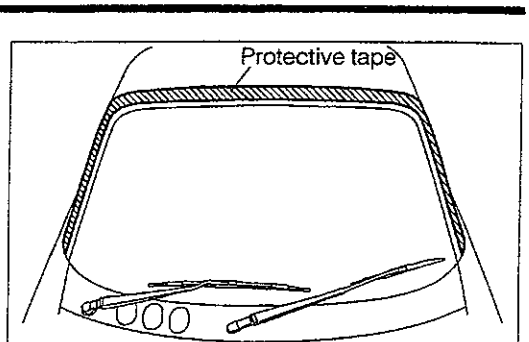
(2) REMOVAL AND INSTALLATION PROCEDURES

▲ 1 a Molding, windshield outside
▼ ▲ 2 b Glass, windshield
▲ 3 c Dam, windshield glass adhesive
▲ 4 d Stopper, windshield glass, No.1
▲ 5 e Stopper, windshield glass, No.2

1-1-4 POINTS OF REMOVAL

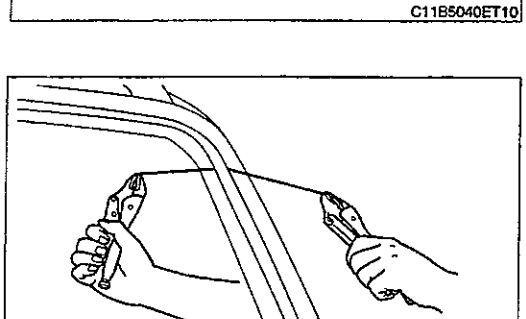
(1) WINDSHIELD GLASS

1.Apply a protective seal to the body around the edge of the glass.



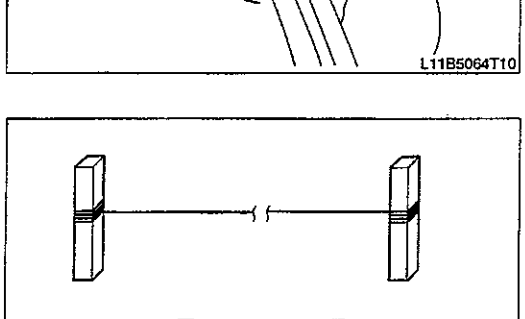
2.Make a hole in the adhesive layer and pass a piano wire through it.

3.Using the piano wire, saw the adhesive layer.



CAUTION

- When cutting the glass adhesive layer, attach a wooden block to each end of the piano wire or fit vice pliers to it.



1-1-5 POINTS OF INSTALLATION

(1) WINDSHIELD GLASS STOPPER No.2

1.Use a cutter knife to smooth the cut adhesive layers on the body side and glass side.

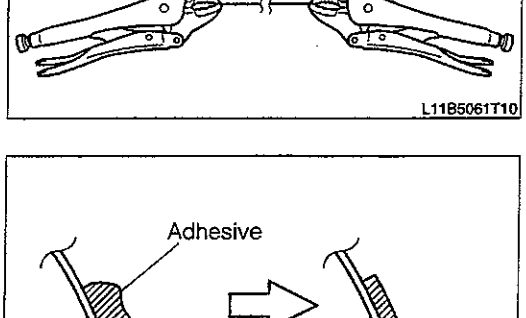
CAUTION

- Degrease the cutter knife.
- Leave a thin film of the adhesive layer.

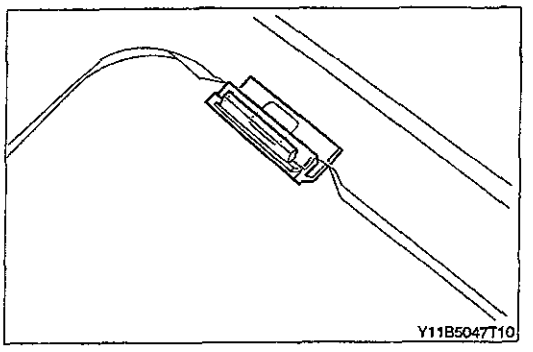
2.Apply body primer to exposed body surfaces of the body side adhesion area.

CAUTION

- Do not coat thickly.
- Do not coat the adhesive.
- Go to the next step after the primer has dried. (After about 3 min.)

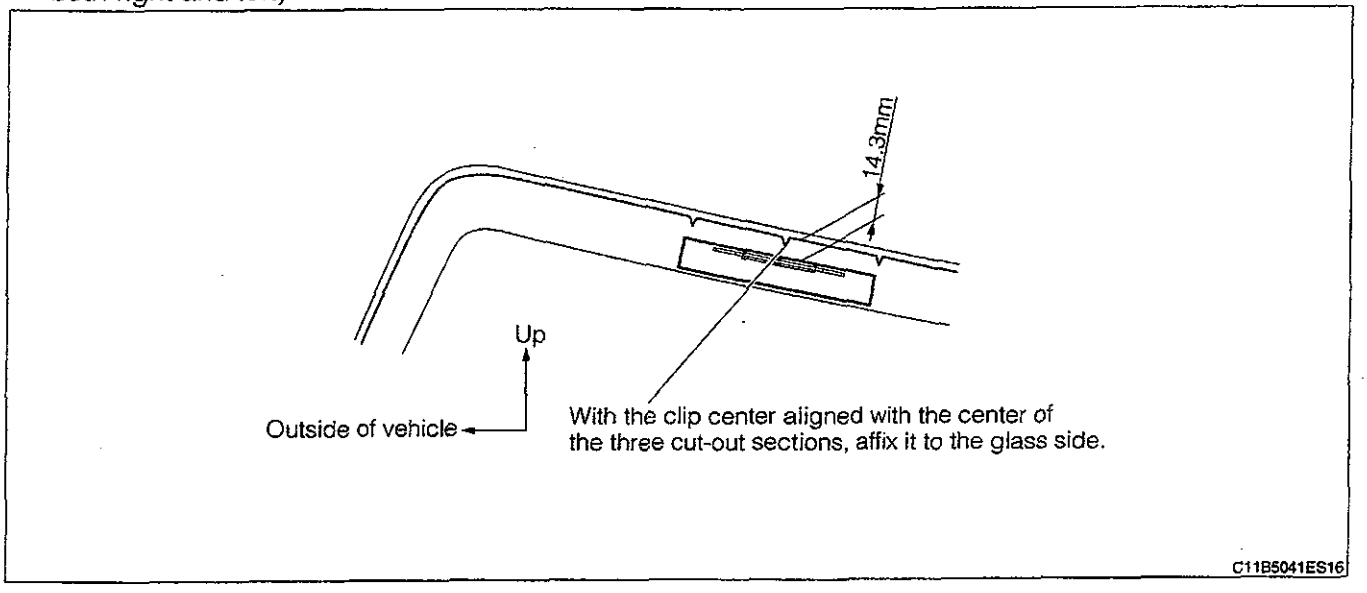


3.Attach the windshield glass stopper No.2 to the body hook section. (Two sections at both right and left.)



(2) WINDSHIELD GLASS STOPPER No.1

1.Affix the windshield glass stopper No.1 to the position shown at the figure below. (Two sections at both right and left)

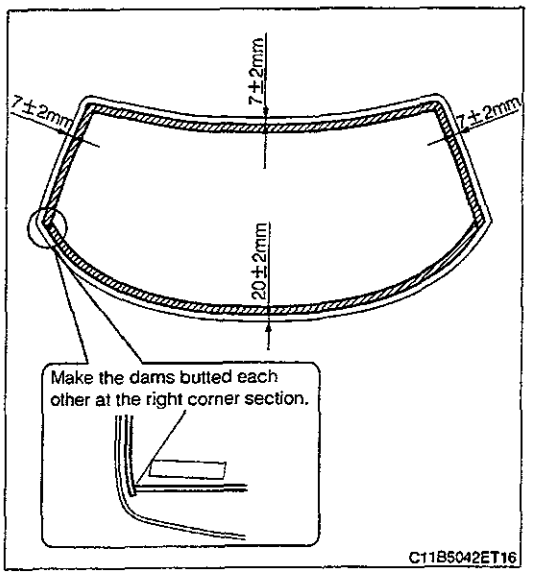


(3) WINDSHIELD GLASS ADHESIVE DAM

1.Affix the window glass adhesive dam to a position as indicated in the right figure.

CAUTION

- **Attach the lower edge linearly, using the white-punched mark of the windshield glass as a guide.**

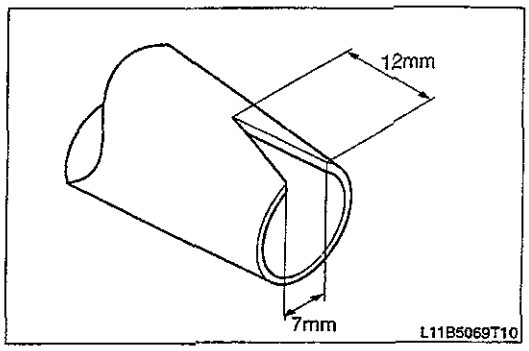


2.Cut the cartridge nozzle tip as shown in the illustration at right.

3.Load the cartridge into the gun and apply adhesive all the way around the dam.

CAUTION

- Go to the next step after the primer has dried. (After about 3 min.)
- Apply the adhesive amply to the corners.



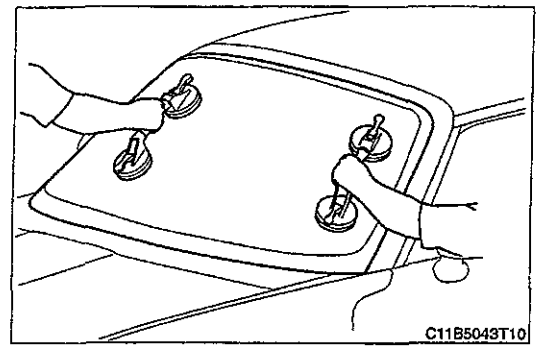
(4) WINDSHIELD GLASS

1.Using a suction rubber pad, attach the windshield glass stopper No.1 to the windshield glass stopper No.2 attached to the hook section of the body.

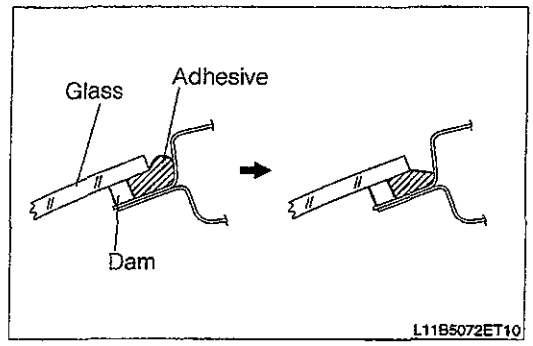
2.Attach the windshield and lightly push the glass front surface to fit it firmly.

CAUTION

- **After applying the adhesive, immediately install the glass.**



3.Using a spatula or the like, correct any adhesive oozing out from the glass top section and side sections.



(5) WINDSHIELD OUTSIDE MOLDING

1.Before the adhesive hardens, install the windshield outside molding.

2.After the adhesive hardens, check water leaks. If there is water leak, remove the water and install the glass again from the first step.

CAUTION

- **If you move the vehicle after the glass installation, move the vehicle gently.**

NOTE

- **Refer to the seal set instruction manual for information regarding the adhesive's minimum drying time.**

1-1-6 OPERATION AFTER INSTALLATION

1.Install the instrument panel.
Refer to Page I2-22.

2.Install the cowl top ventilator louver, RH/LH.
Refer to Page I2-5.

2 BACK WINDOW GRASS

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Tool

Sealant gun,Drill or eyeleteer (heavy needle to make a hole),Cutter knife,Rubber suction cups

Lubricant, adhesive, others

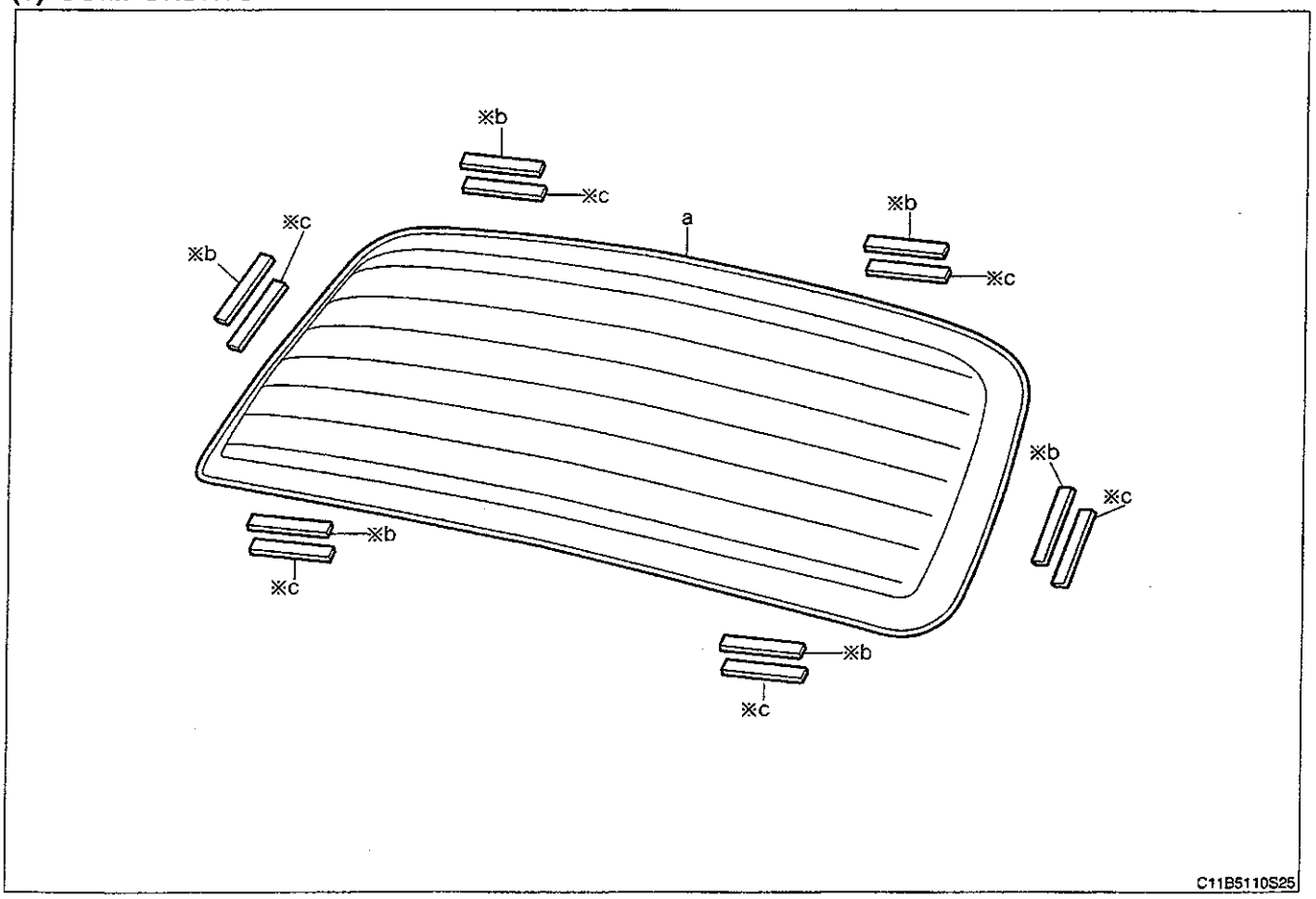
Seal set (Part number : 999-09600-U9-001),Wooden block,Protective tape,Cloth,Alcohol or white gasoline

2-1-2 OPERATION BEFORE REMOVAL

1.Remove the roof side inner garnish RH/LH.
Refer to Page I2-36.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non - reusable parts

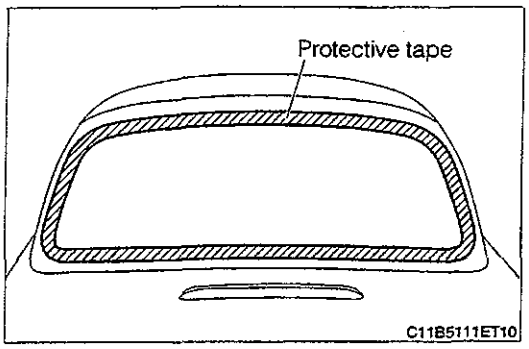
(2) REMOVAL AND INSTALLATION PROCEDURES

▼ ▲ 1 a Glass, back window
▲ 2 b Clip, back window glass, RH
▲ 3 c Clip, back window glass, LH

2-1-4 POINTS OF REMOVAL

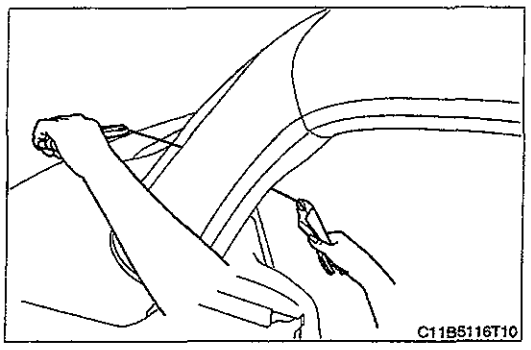
(1) BACK WINDOW GLASS

1.Apply a protective tape to the body around the edge of the glass.



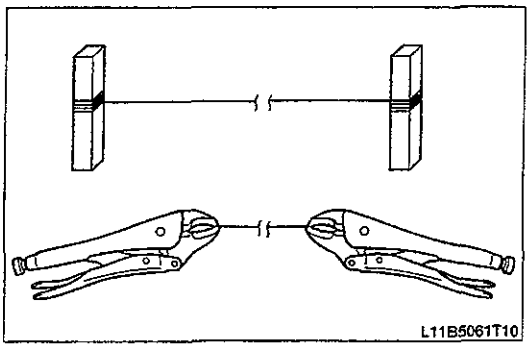
2.Make a hole in the adhesive layer and pass a piano wire through it.

3.Using the piano wire, saw the adhesive layer.



CAUTION

- When cutting the glass adhesive layer, attach a wooden block to each end of the piano wire or fit vice pliers to it.



2-1-5 POINTS OF INSTALLATION

(1) BACK WINDOW GLASS CLIP RH/LH

1.Use a cutter knife to smooth the cut adhesive layers on the body side and glass side.

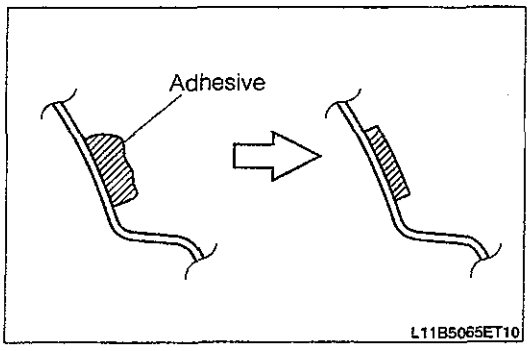
CAUTION

- Degrease the cutter knife.
- Leave a thin film of the adhesive layer.

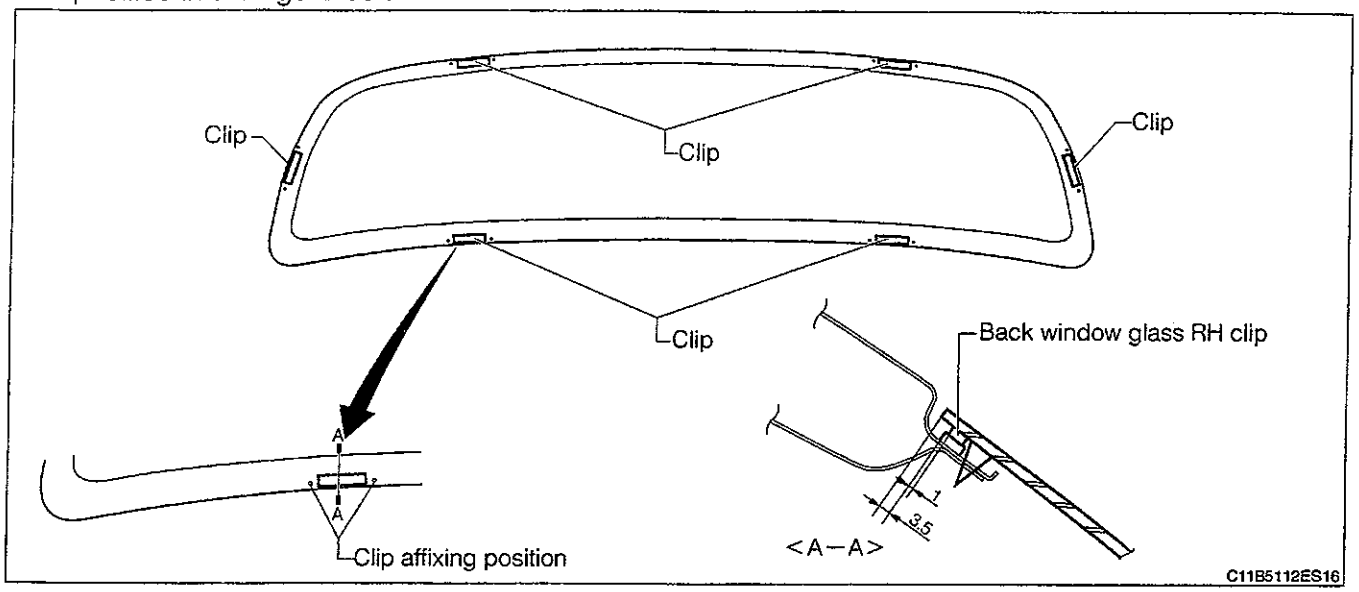
2.Apply body primer to exposed body surfaces of the body side adhesion area.

CAUTION

- Do not coat thickly.
- Do not coat the adhesive.
- Go to the next step after the primer has dried. (After about 3 min.)



3.Overlap the back window glass RH clip on the back window glass LH clip. Then, affix it to a position specified in the figure below.

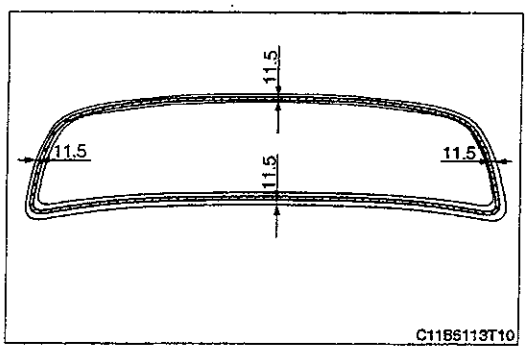


(2) BACK WINDOW GLASS

1.Install the cartridge to a gun and apply the adhesive agent to a position specified in the right figure.

CAUTION

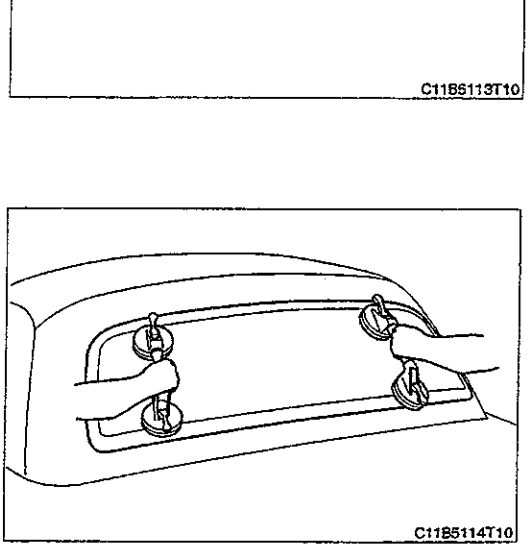
- **Go to the next step after the primer has dried. (After about 3 min.)**
- **Apply the adhesive amply to the corners.**



2.Using a suction rubber, install the glass. Install it firmly by lightly pushing the glass front surface.

CAUTION

- **After applying the adhesive, immediately install the glass.**



3.Using a spatula or the like, correct any adhesive oozing out from the glass top section and side sections.

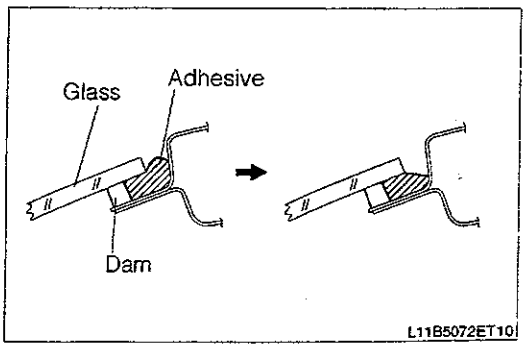
4.After the adhesive hardens, check water leaks. If there is water leak, remove the water and install the glass again from the first step.

CAUTION

- **If you move the vehicle after the glass installation, move the vehicle gently.**

NOTE

- **Refer to the seal set instruction manual for information regarding the adhesive's minimum drying time.**



2-1-6 OPERATION AFTER INSTALLATION

1.Install the roof side inner garnish RH/LH.
Refer to Page I2-36.

3 POWER WINDOW SYSTEM

3-1 ARTICLES TO BE PREPARED

Instrument

Voltage tester

3-2 HANDLING INSTRUCTIONS OF CONTROL SYSTEM

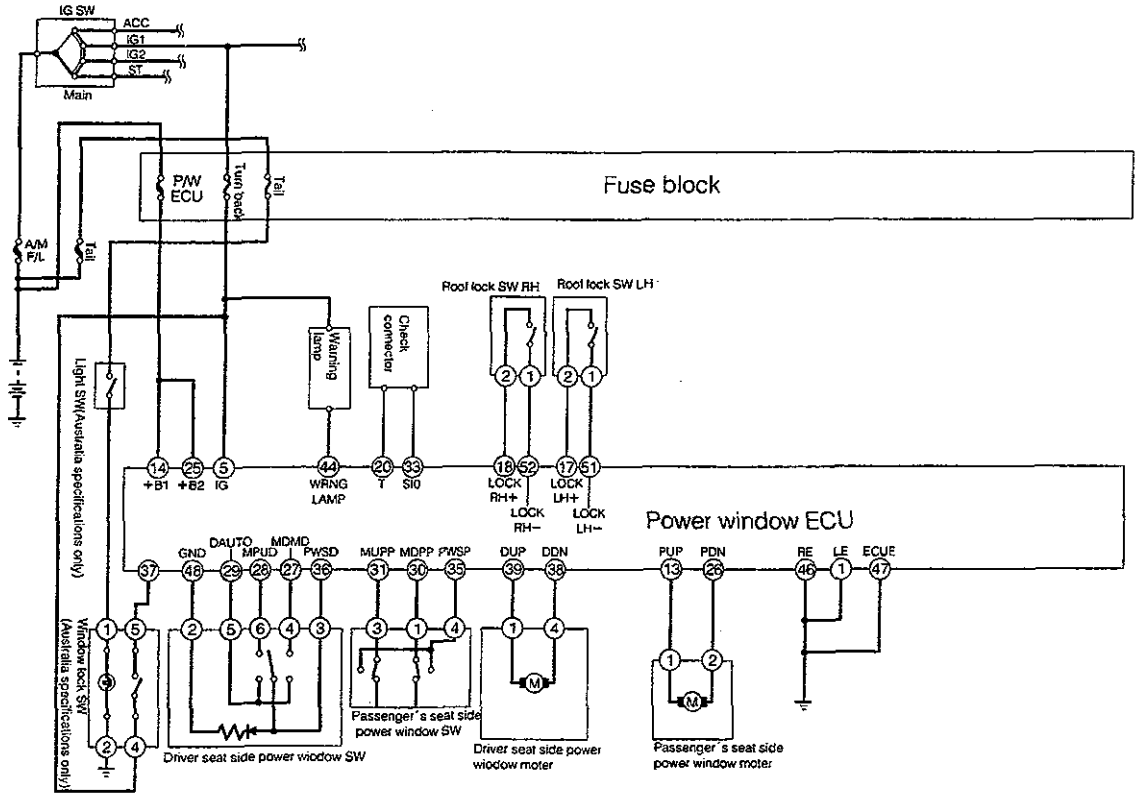
3-2-1 OPERATIONS WHICH REQUIRE INITIAL SETTING OF POWER WINDOW

1.It becomes necessary to carry out the initial setting of the power window when the battery terminal has been removed or the connector of the power window ECU has been disconnected.

(1) HOW TO CARRY OUT INITIAL SETTING OF POWER WINDOW

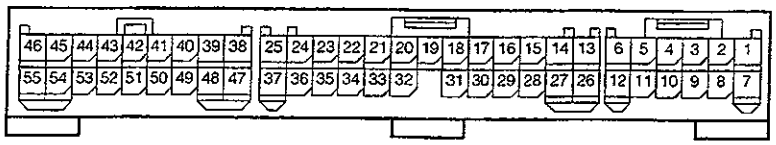
1.After connecting the battery terminal or connector of the power window ECU, manually perform the "UP" operation of the driver's seat side power window. After the window has closed fully, keep on the "UP" switch operation for three seconds or more.

3-3 SYSTEM WIRING DIAGRAM

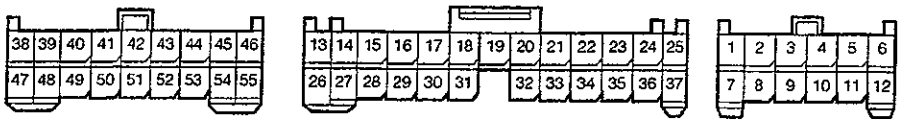


C11B2519ES25

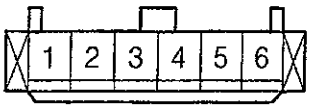
3-4 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS



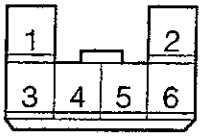
Power window ECU(ECU side)



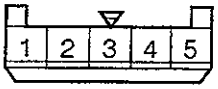
Power window ECU(Vehicle harness side)



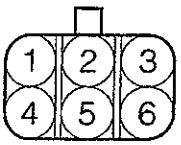
Window lock SW



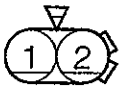
Driver's seat SW



Front passenger seat switch



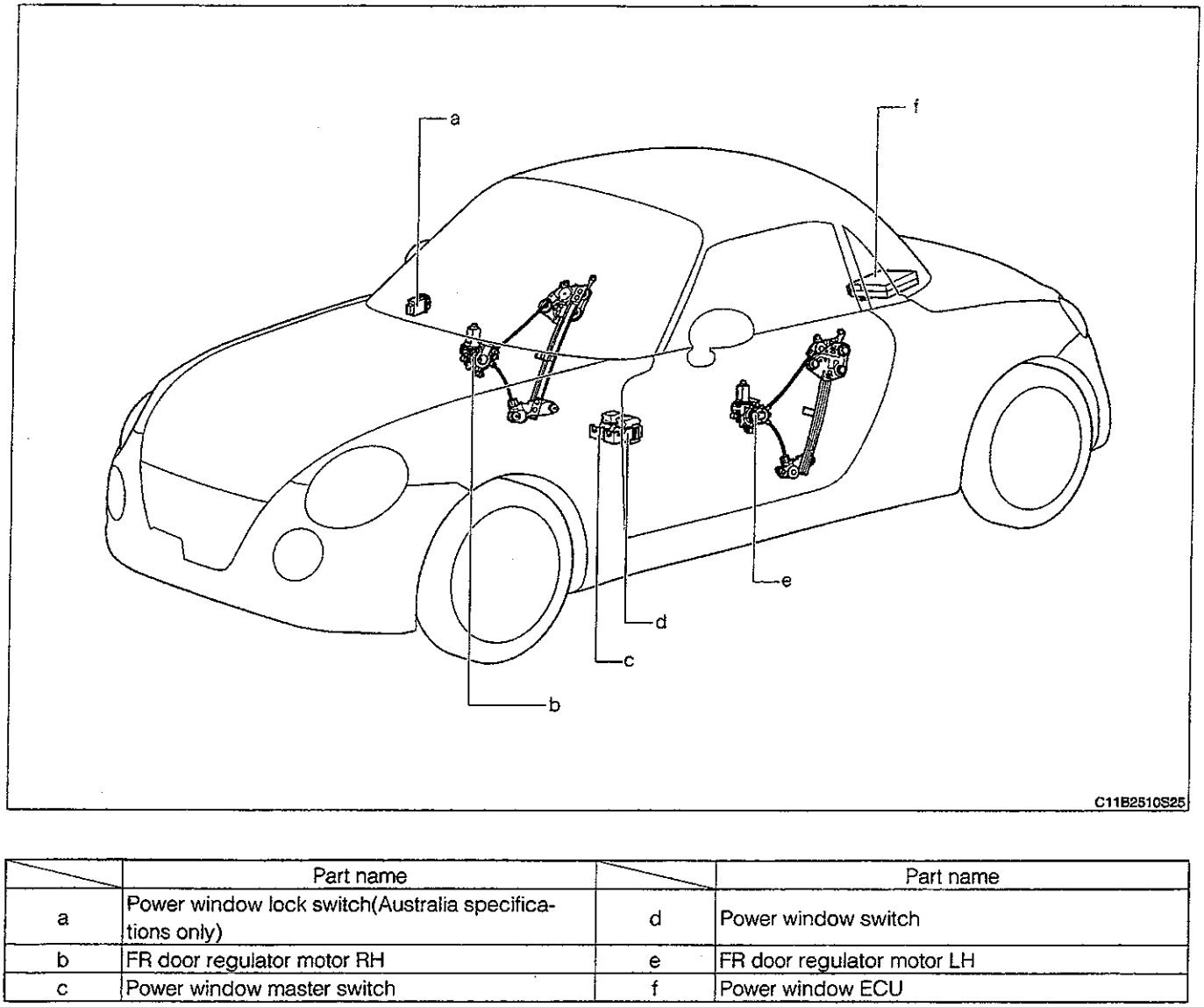
Driver's seat motor



Passenger seat motor

C11B5072ES30

3-5 LOCATION OF COMPONENTS



	Part name		Part name
a	Power window lock switch(Australia specifications only)	d	Power window switch
b	FR door regulator motor RH	e	FR door regulator motor LH
c	Power window master switch	f	Power window ECU

3-6 BASIC CHECK

3-6-1 POWER WINDOW OPERATING CONDITIONS

1.When the following conditions given below are satisfied, the opening/closing of the window can be made through the power window switch operation.
(1) Condition for the roof opening
When the roof system is opened fully.
(2) Condition for the roof closing
When one of the roof lock switches RH/LH is "ON". (Condition in which one of them is locked.)

3-6-2 MANUAL OPERATION

1.With the ignition switch set to ON position, perform the following checks.
2.The up and down operation of each door glass can be carried out by means of the driver's seat master switch and the front passenger seat power window switch.
3.When the window lock switch is set to the [LOCK] position, it becomes impossible to operate the power window switches at the driver's seat and front passenger seat. (Only the Australia specifications)

3-6-3 AUTOMATIC OPERATION FUNCTION

1.With the ignition switch set to ON position, perform the following checks.

(1) Perform a two-stage operation for the door glass at the driver's seat to the down side of the driver's seat master switch. After the down auto has been made, the door glass stops under the fully opened state.

(2) If the power window switch is operated to the UP side during the auto down operation, the auto down operation will be stopped.

3-7 TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA

3-7-1 POWER WINDOW AT THE DRIVER'S SEAT WILL NOT OPERATE.

➤1. CONFIRMATION OF DIAGNOSIS CODE OF ROOF SYSTEM

1.After setting the IG switch to "ON" position, confirm the diagnosis code of the roof system.

SPECIFIED VALUE: No abnormality code should be outputted.

If NG, proceed to the trouble-shooting of the motor-driven opening/closing roof.
If it is OK (Australia specifications), go to ➤2.
If it is OK (EC specifications), go to ➤4.

➤2.CONTINUITY CHECK OF POWER WINDOW LOCK SWITCH

1.Disconnect the connectors from the window lock switch and power window ECU.

2.Check the harness between the window lock switch and the power window ECU.

(1) Vehicle harness side connector 5 of window lock switch—Vehicle harness side connector 37.

(2) Vehicle harness side connector 4 of window lock switch— Ignition switch (IG1).

SPECIFIED VALUE: Continuity exists.

If it OK, go to ➤3.

➤3.POWER WINDOW LOCK SWITCH UNIT CHECK

1.Check for the window lock switch unit check.

<RefCode=B238>

If it OK, go to ➤4.
If it is NG, replace the power window lock switch.

➤4.CONTINUITY CHECK THE POWER SUPPLY CIRCUIT OF POWER WINDOW ECU

1.Disconnect the connectors from the power window ECU.

2.Check the power supply circuit of the power window ECU and ground circuit.

(1) Vehicle harness side connector 14(+B1), 25 (+B2) of power window ECU —Battery (+) terminal.

(2) Vehicle harness side connector 5(IG) of power window ECU — Ignition switch (IG1) .

(3) Vehicle harness side connector 48(RE), 47(ECU E) of power window ECU — Body ground.

SPECIFIED VALUE: Continuity exists.

If it OK, go to ➤5.
If it is NG, repair the power supply circuit and ground circuit.

➤5. CONTINUITY CHECK BETWEEN POWER WINDOW ECU – DRIVER'S SEAT POWER WINDOW SWITCH

1.Disconnect the connectors from the power window ECU and driver's seat power window switch.
2.Check the harness between the power window ECU and the driver's seat power window switch.
(1) Vehicle harness side connector 27 of power window ECU – Vehicle harness side connector 4 of driver's seat power window switch .
(2) Vehicle harness side connector 28 of power window ECU – Vehicle harness side connector 6 of driver's seat power window switch.
(3) Vehicle harness side connector 36 of power window ECU – Vehicle harness side connector 3 of driver's seat power window switch.
SPECIFIED VALUE: Continuity exists.

If it OK, go to ➤6.
If it is NG, replace the harness. Also, replace the connector.

➤6.DRIVER SEAT SW UNIT CHECK

1.Perform the unit check of the driver's seat switch.
Refer to Page I3-16.

If it OK, go to ➤7.
If NG, replace the driver's seat switch.

➤7. CONTINUITY CHECK BETWEEN POWER WINDOW ECU – DRIVER'S SEAT POWER WINDOW SWITCH

1.Disconnect the connectors from the power window ECU and driver's seat power window motor.
2.Check the harness between the power window ECU and the driver's seat power window motor.
(1) Vehicle harness side connector 38 of power window– Vehicle harness side connector 4 of driver's seat power window motor.
(2) Vehicle harness side connector 39 of power window– Vehicle harness side connector 1 of driver's seat power window motor.
SPECIFIED VALUE: Continuity exists.

If it OK, go to ➤8.
If it is NG, replace the harness. Also, replace the connector.

➤8. POWER WINDOW MOTOR OPERATION CHECK

1.Check the operating condition when a voltage of 12V is applied directly to the power window motor.
SPECIFIED VALUE: The motor should turn smoothly.

If OK, replace the power window ECU.
If NG, replace the driver's seat power window regulator assembly.

3-7-2 POWER WINDOW AT THE FRONT PASSENGER SEAT WILL NOT OPERATE.

➤1. CONFIRMATION OF DIAGNOSIS CODE OF ROOF SYSTEM

1.After setting the ig switch to "ON" position, confirm the diagnosis code of the roof system.
SPECIFIED VALUE: No abnormality code should be outputted.

If it is OK (Australia specifications), go to ➤2.
If it is OK (EC specifications), go to ➤4.
If NG, proceed to the trouble-shooting of the motor-driven opening/closing roof.

➤2.CONTINUITY CHECK OF POWER WINDOW LOCK SWITCH

1.Disconnect the connectors from the window lock switch and power window ECU.

2.Check the harness between the window lock switch and the power window ECU.

(1) Vehicle harness side connector 5 of window lock switch—Vehicle harness side connector 37.

(2) Vehicle harness side connector 4 of window lock switch— Ignition switch (IG1).

SPECIFIED VALUE: Continuity exists.

If it OK, go to ➤3.

If it is NG, replace the harness. Also, replace the connector.

➤3.POWER WINDOW LOCK SWITCH UNIT CHECK

1.Perform the unit check of the window lock switch.

Refer to Page I3-16.

If it OK, go to ➤4.

If it is NG, replace the power window lock switch.

➤4.CONTINUITY CHECK THE POWER SUPPLY CIRCUIT OF POWER WINDOW ECU

1.Disconnect the connectors from the power window ECU.

2.Check the power supply circuit of the power window ECU and ground circuit.

(1) Vehicle harness side connector 14(+B1), 25 (+B2) of power window ECU —Battery (+) terminal

(2) Vehicle harness side connector 5(IG) of power window ECU — Ignition switch (IG1).

(3) Vehicle harness side connector 48(RE), 47(ECU E) of power window ECU — Body ground.

SPECIFIED VALUE: Continuity exists.

If it OK, go to ➤5.

If it is NG, repair the power supply circuit and ground circuit.

➤5. CONTINUITY CHECK BETWEEN POWER WINDOW ECU — DRIVER'S SEAT POWER WINDOW SWITCH

1.Disconnect the connectors from the power window ECU and passenger's seat power window switch.

2.Check the harness between the power window ECU and the passenger's seat power window switch.

(1) Vehicle harness side connector 30 of power window ECU — Vehicle harness side connector 1 of passenger's seat power window switch.

(2) Vehicle harness side connector 31 of power window ECU — Vehicle harness side connector 3 of passenger's seat power window switch.

(3) Vehicle harness side connector 35 of power window ECU — Vehicle harness side connector 4 of passenger's seat power window switch.

SPECIFIED VALUE: Continuity exists.

If it OK, go to ➤6.

If it is NG, replace the harness. Also, replace the connector.

➤6.DRIVER SEAT SW UNIT CHECK

1.Check of the passenger's seat unit check.

Refer to Page I3-16.

If it OK, go to ➤7.

If NG, replace the front passenger seat switch.

➤7. CONTINUITY CHECK BETWEEN POWER WINDOW ECU – DRIVER'S SEAT POWER WINDOW SWITCH

1.Disconnect the connectors from the power window ECU and passenger's seat power window motor.
2.Check the harness between the power window ECU and the passenger's seat power window motor.
(1) Vehicle harness side connector 13 of power window– Vehicle harness side connector 1 of front passenger's seat power window motor.
(2) Vehicle harness side connector 26 of power window– Vehicle harness side connector 2 of front passenger's seat power window motor.
SPECIFIED VALUE: Continuity exists.

If it OK, go to ➤8.
If it is NG, replace the harness. Also, replace the connector.

➤8. POWER WINDOW MOTOR OPERATION CHECK

1.Check the operating condition when a voltage of 12V is applied directly to the power window motor.
SPECIFIED VALUE: The motor should turn smoothly.

If OK, replace the power window ECU.
If NG, replace the passenger's seat power window regulator assembly.

3-8 UNIT CHECK

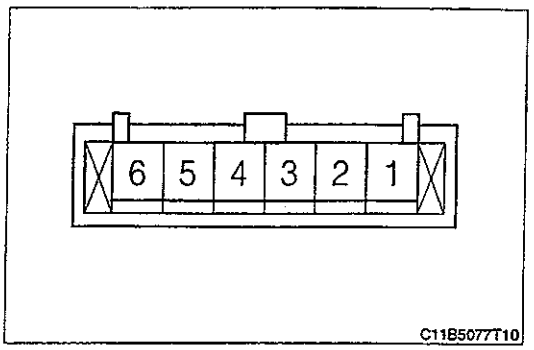
3-8-1 POWER WINDOW LOCK SW

1.Check continuity between terminals of the switch.

○—○: Continuity should exist

Position \ Terminal No.	④	⑤	⑥	③	①⊕	②⊖
Free	○	○				
↕		×		×		
Lock	○			○		

C11B5080EL08



C11B5077T10

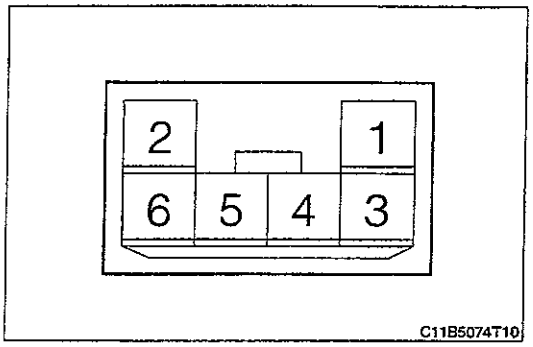
3-8-2 DRIVER'S SEAT POWER WINDOW SW

1.Check continuity between terminals of the master SW.

○—○ : Continuity should exist

Position \ Terminal No.	③	⑥	④	⑤
UP MANUAL	○	○		
↕	○	○		
OFF	×	×	×	×
↕	×	×	×	×
DOWN MANUAL	○		○	
↕	○		○	
DOWN AUTO	○		○	
	○			○

C11B5078EL16



C11B5074T10

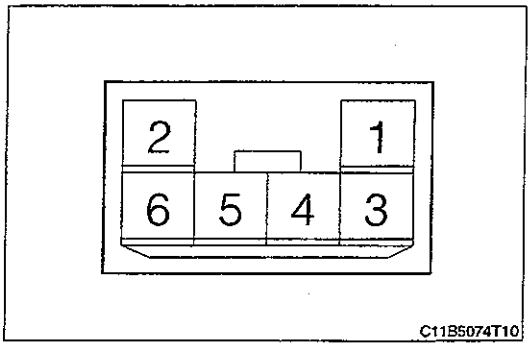
3-8-3 PASSENGER SEAT POWER WINDOW SW

1.Check continuity between terminals of the switch.

○—○: Continuity should exist

Position \ Terminal No.	③	④	①
U P	○	○	
OFF			
DOWN	○	○	○

C11B5079EL08



C11B5074T10

3-8-4 REGULATOR MOTOR

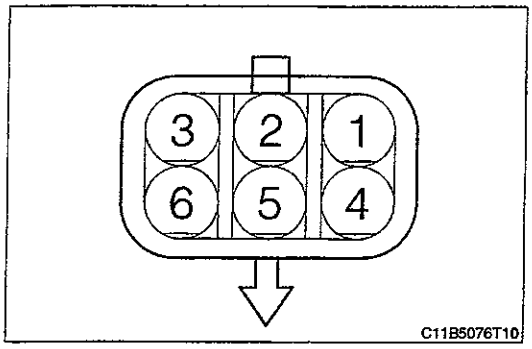
(1) DRIVER'S SEAT REGULATOR MOTOR

1.Connect the battery terminals to the terminals ① and ④ as shown in the table below. Confirm the rotating direction.

2.Ensure that no abnormal noise nor shaft looseness or warp are observed during the motor rotation.

CAUTION

- **Utmost care should be paid so that the terminals ⊕ and ⊖ of the battery are not shorted.**



Measuring condition	Motor rotating direction (As viewed from the pinion gear side)
Battery⊕→ Terminal④ Battery⊖→ Terminal①	Right turn
Battery⊕→ Terminal① Battery⊖→ Terminal④	Left turn

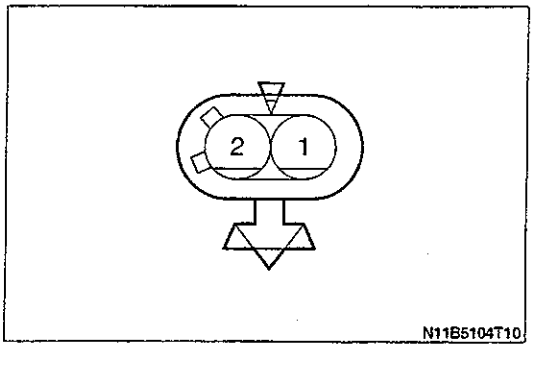
(2) FRONT PASSENGER SEAT REGULATOR MOTOR

1.Connect the battery terminals to the terminals ① and ② as shown in the table below. Confirm the rotating direction.

2.Ensure that no abnormal noise nor shaft looseness or warp are observed during the motor rotation.

CAUTION

- **Utmost care should be paid so that the terminals ⊕ and ⊖ of the battery are not shorted.**



Measuring condition	Motor rotating direction (As viewed from the pinion gear side)
Battery⊕→ Terminal① Battery⊖→ Terminal②	Right turn
Battery⊕→ Terminal② Battery⊖→ Terminal①	Left turn

4 REAR QUARTER WINDOW

4-1 REMOVAL AND INSTALLATION

4-1-1 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

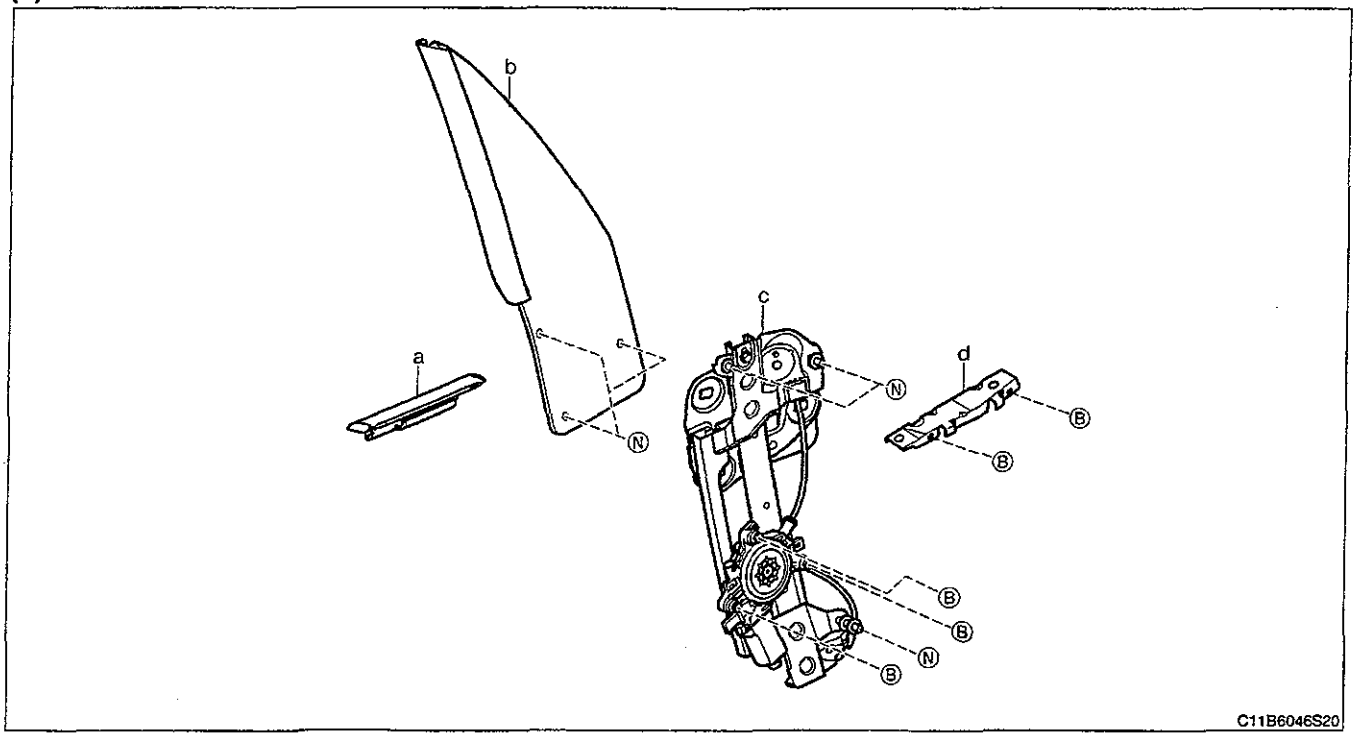
MP grease,Butyl tape

4-1-2 OPERATION BEFORE REMOVAL

1.Remove the Center floor side member RH/LH.
Refer to Page I1-29.

4-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



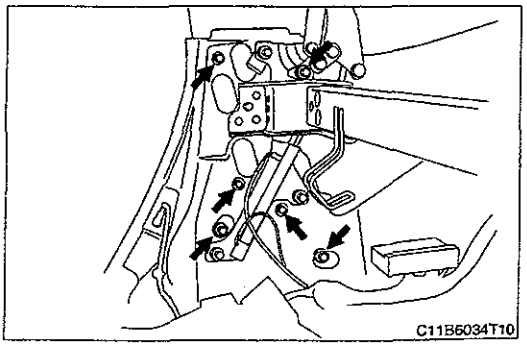
(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Weatherstrip, front door glass, outer
2 b Retainer, quarter trim, upper
▼ 3 c Regulator Ay, quarter window
▲ 4 d Glass S/A, rear door

4-1-4 POINTS OF REMOVAL

(1) QUARTER WINDOW REGULATOR AY

1.Remove the bolt and nut at the position shown in the right figure. Remove the quarter window regulator assembly together with the rear door glass S/A.



4-1-5 POINTS OF INSTALLATION

(1) REAR DOOR GLASS S/A(QUARTER WINDOW GLASS)

1.Temporarily tighten the rear door glass S/A to the quarter window regulator. Install the quarter window regulator assembly to the vehicle.

2.Perform the alignment adjustment of the rear door glass S/A.
Refer to Page I1-7.

4-1-6 OPERATION AFTER INSTALLATION

1.Install the center floor side member RH/LH.
Refer to Page I1-29.

5 QUARTER WINDOW REGULATOR

5-1 SYSTEM WIRING DIAGRAM

Refer to Page I5-36.

5-2 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS

Refer to Page I5-39.

5-3 LOCATION OF COMPONENTS

Refer to Page I5-41.

5-4 TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA

Refer to Page I5-97.

5-5 UNIT CHECK

Refer to Page I5-103.

6 OUTER REAR VIEW MIRROR

6-1 REMOVAL AND INSTALLATION

6-1-1 OPERATION BEFORE REMOVAL

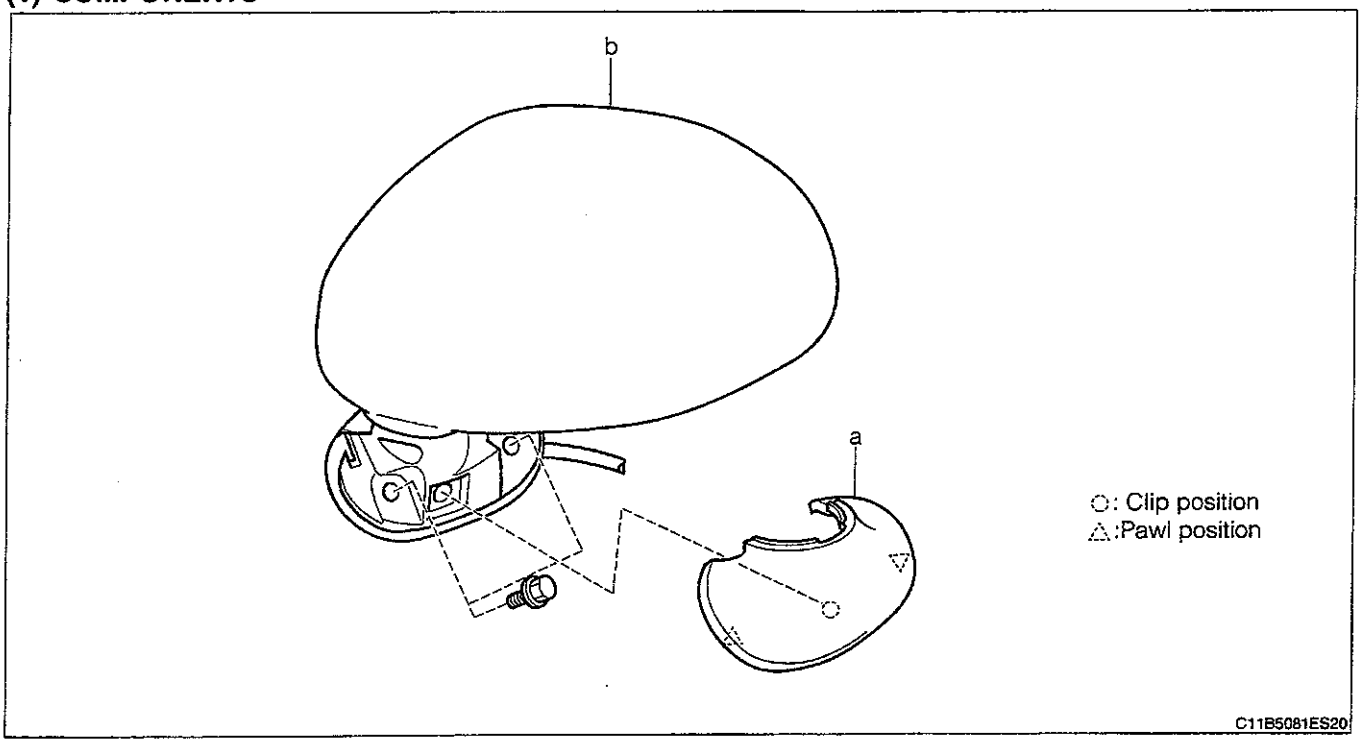
1.Remove the front door trim.
Refer to Page I1-15.

2.Remove the speaker Ay.
Refer to Page I1-15.

3.Turn over the front door service hole cover of the speaker installing hole.

6-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



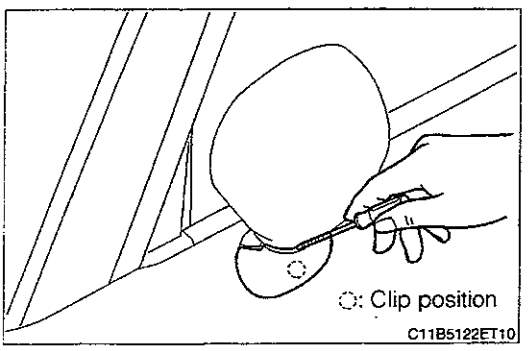
(2) REMOVAL AND INSTALLATION PROCEDURES

▼ 1 a Cover, outer mirror
2 b Mirror S/A, outer rear view

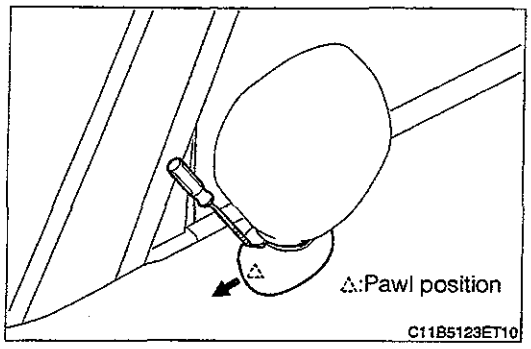
6-1-3 POINTS OF REMOVAL

(1) OUTER MIRROR COVER

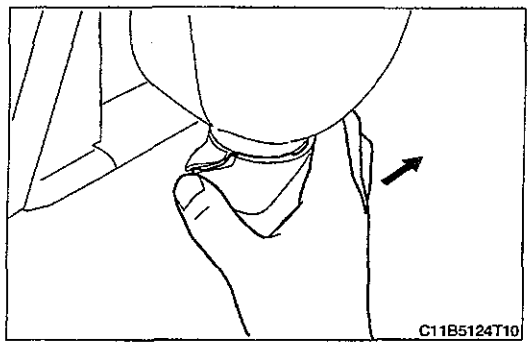
1.Tilt the outer mirror halfway toward the vehicle rear side. (Do not tilt it completely.)
2.Wrap a flat screwdriver with protective tape and insert it into the cover cutout section to make the cover float slightly.



3.Insert a flat screwdriver into a gap created at the floated cover, as shown in the right figure. Push the cover toward the front/outside of the vehicle to disengage the pawl.
4.Insert a flat screwdriver into the cutout section of the cover again and push the cover outward to disengage the clip.



5.With the pawl of the vehicle front side cover disengaged from the clip, slide the cover toward the vehicle rear side to take it out.



6-1-4 OPERATION AFTER INSTALLATION

1.Affix the front door service hole cover.

CAUTION

- When the service hole cover is torn, replace it.

2.Install the speaker Ay.
Refer to Page I1-15.

3.Install the front door trim.
Refer to Page I1-15.

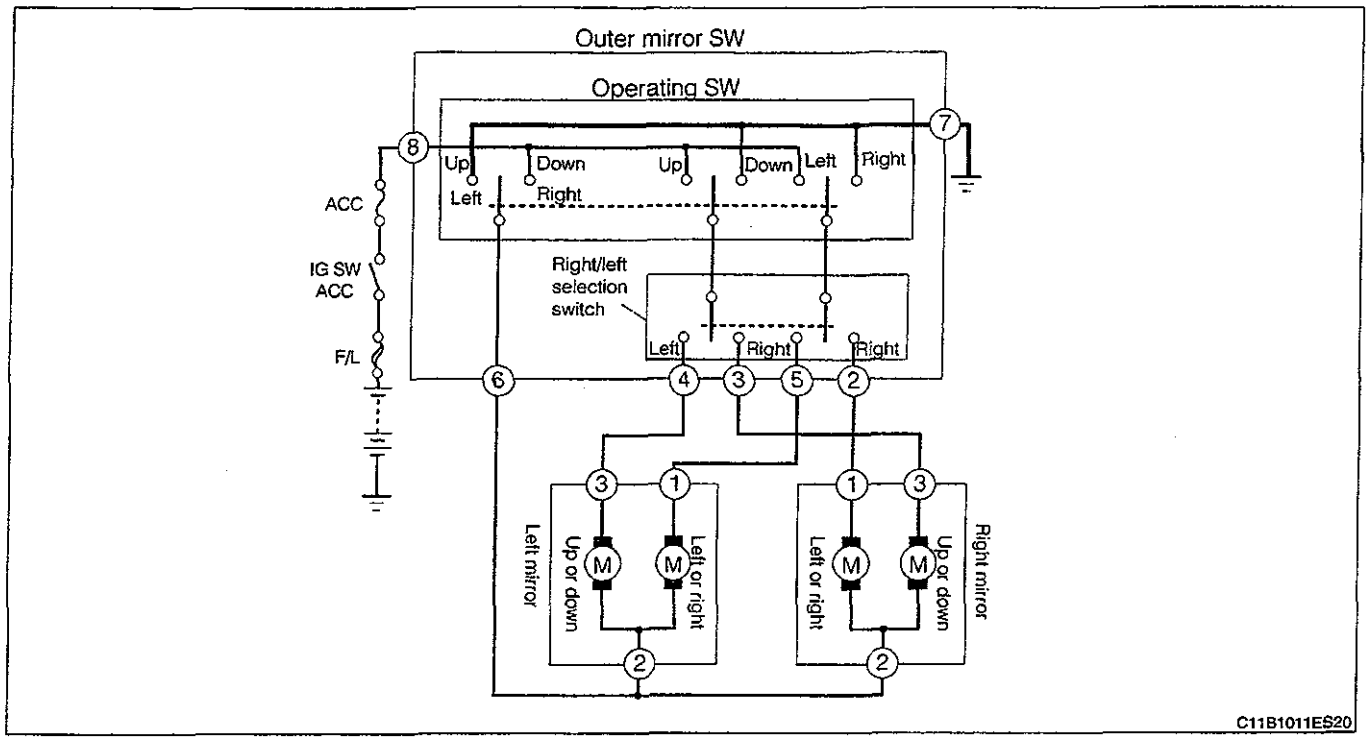
7 MIRROR SURFACE MOTOR-DRIVEN MOVABLE TYPE OUTER REAR-VIEW MIRROR

7-1 ARTICLES TO BE PREPARED

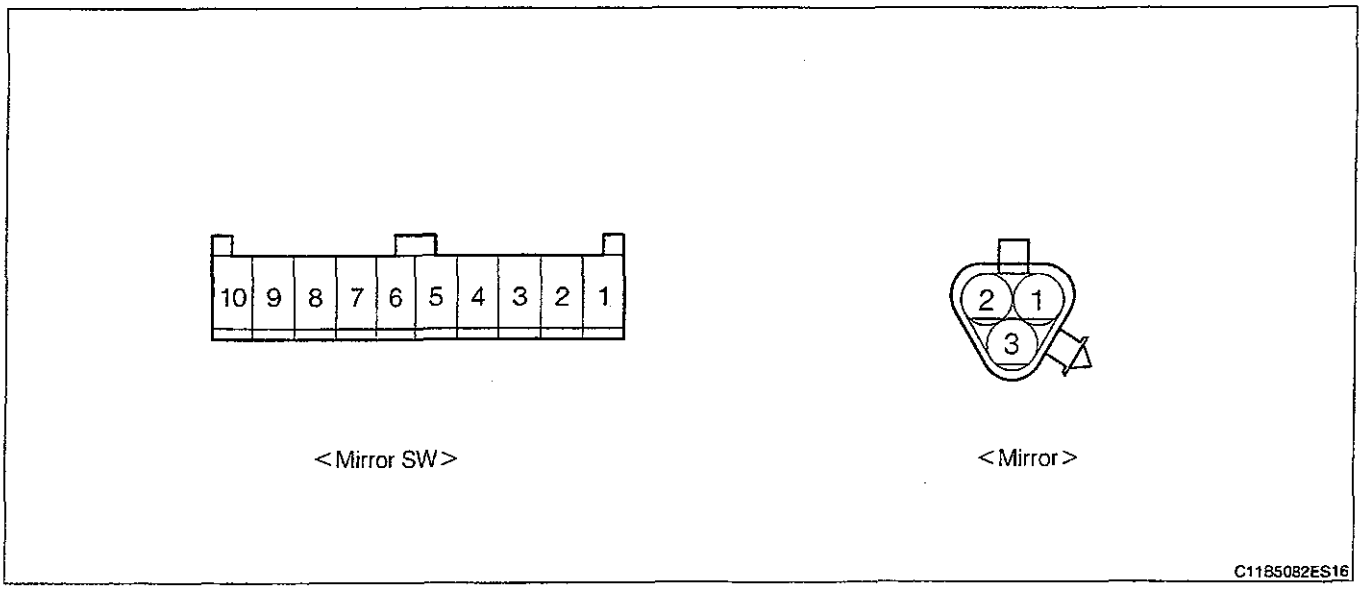
Instrument

Voltage tester

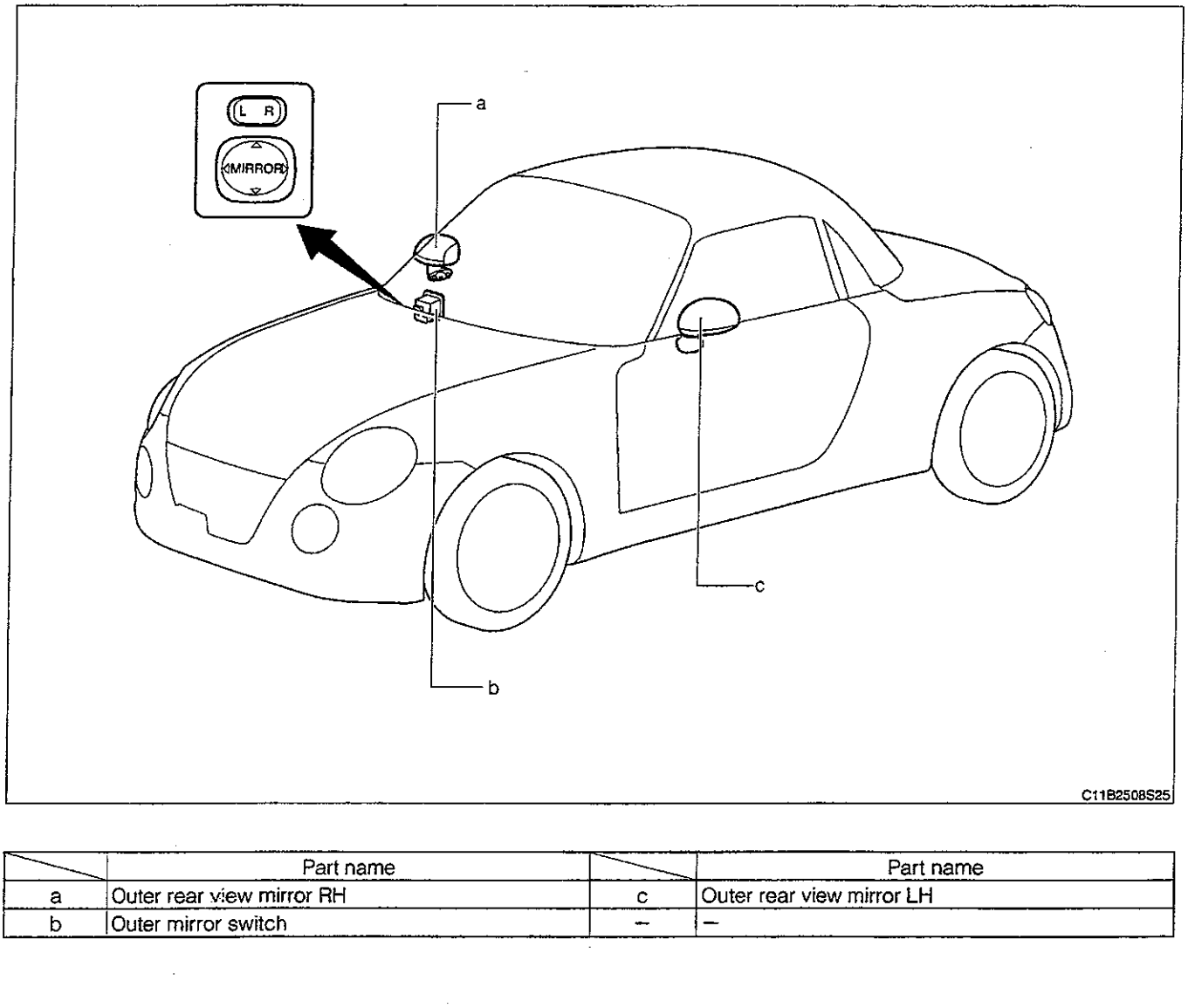
7-2 SYSTEM WIRING DIAGRAM



7-3 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS



7-4 LOCATION OF COMPONENTS

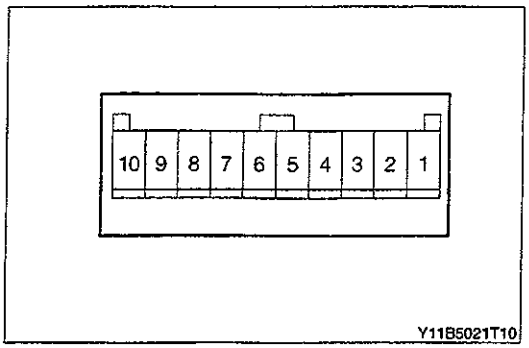


	Part name		Part name
a	Outer rear view mirror RH	c	Outer rear view mirror LH
b	Outer mirror switch	–	–

7-5 UNIT CHECK

7-5-1 MIRROR SW

1.While operating the switch, check continuity between terminals.



Right/Left Switching SW Mirror operation

SW section

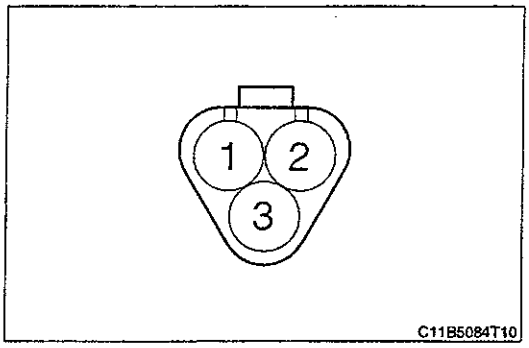
○—○: Continuity should exist

Switching		Terminal No. ⑧	⑥	⑦	③	②	④	⑤
LH	Up	○					○	
			○	○				
	Down	○	○	○			○	
	OFF							
	Left	○						○
			○	○				
	Right	○	○	○				○
OFF	Up			○				○
	Down	○						○
	OFF							
	Left			○			○	
	Right	○					○	
RH	Up	○			○			
			○	○				
	Down	○	○	○	○			
	OFF							
	Left	○				○		
			○	○				
	Right	○	○	○		○		

Y11B5019EL27

7-5-2 CHECK OF OPERATION OF ACTUATOR SECTION

1.Apply the battery voltage to each terminal. Check the operation.



○—○:Connection

Operating direction	Connection	Battery ⊕	Battery ⊖	③	②	①
Up		○		○		
			○			○
Down		○				○
			○	○		
Left		○			○	
			○			○
Right		○				○
			○		○	

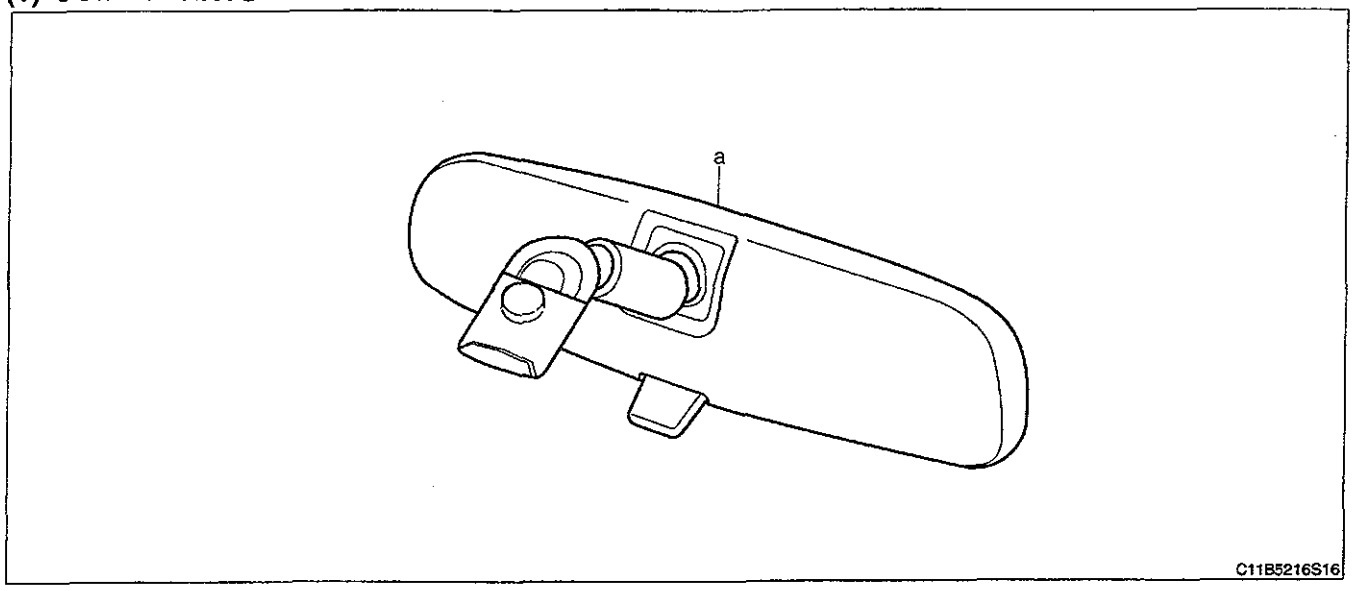
C11B5088EL12

8 INNER REAR VIEW MIRROR

8-1 REMOVAL AND INSTALLATION

8-1-1 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



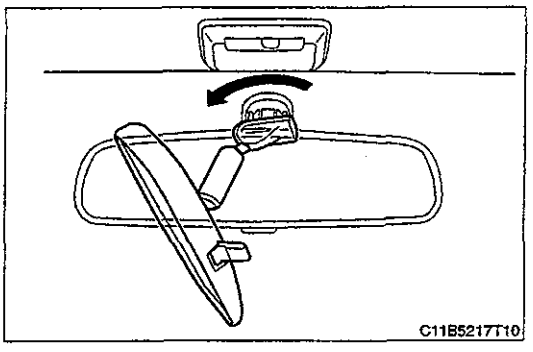
(2) REMOVAL AND INSTALLATION PROCEDURES

▼ 1 a Mirror Ay, inner rear view

8-1-2 POINTS OF REMOVAL

(1) INNER REAR VIEW MIRROR Ay

1.Remove the inner rear-view mirror by turning the bottom section 90 degrees.



TO INDEX

I4 DOOR LOCK & THEFT DETERRENT

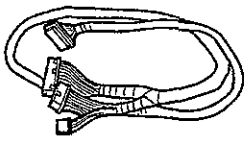
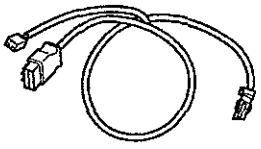
IMPACT SENSING SAFETY SYSTEM -------- I4 - 1
IMPACT SENSING SAFETY SYSTEM ---- I4 - 1
ARTICLES TO BE PREPARED ---------- I4 - 1
SYSTEM WIRING DIAGRAM ---------- I4 - 1
ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS ---------- I4 - 2
LOCATION OF COMPONENTS ---------- I4 - 3
BASIC CHECK ---------- I4 - 4
TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA------ I4 - 4
UNIT CHECK ---------- I4 - 7
ITC COMPUTER ---------- I4 - 10
REMOVAL AND INSTALLATION-------- I4 - 10
KEY-LESS ENTRY SYSTEM ---------- I4 - 12
KEY-LESS ENTRY SYSTEM ---------- I4 - 12
ARTICLES TO BE PREPARED --------- I4 - 12
SYSTEM WIRING DIAGRAM---------- I4 - 12
ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS---------- I4 - 13
LOCATION OF COMPONENTS -------- I4 - 14
REGISTRATION OF IDENTIFICATION CODE---------- I4 - 15
TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA ---- I4 - 15
UNIT CHECK---------- I4 - 23
ITC COMPUTER ---------- I4 - 26
REMOVAL AND INSTALLATION-------- I4 - 26
DOOR CONTROL RECEIVER ---------- I4 - 27
REMOVAL AND INSTALLATION-------- I4 - 27
IMMOBILIZER SYSTEM ---------- I4 - 29
IMMOBILIZER SYSTEM ---------- I4 - 29
ARTICLES TO BE PREPARED --------- I4 - 29
SYSTEM WIRING DIAGRAM---------- I4 - 29
ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS---------- I4 - 30
LOCATION OF COMPONENTS -------- I4 - 30
HOW TO PROCEED WITH TROUBLE SHOOTING---------- I4 - 31
INQUIRY ---------- I4 - 32
DIAGNOSIS ---------- I4 - 32
TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE---------- I4 - 35
UNIT CHECK---------- I4 - 38
STEERING COLUMN W/SWITCH BRACKET---------- I4 - 40
REMOVAL AND INSTALLATION-------- I4 - 40
TRANSPONDER KEY COIL(IMMOBILIZER COIL) ---------- I4 - 41
REMOVAL AND INSTALLATION-------- I4 - 41
TRANSPONDER KEY COMPUTER(IMMOBILIZER ECU) ---------- I4 - 42
REMOVAL AND INSTALLATION-------- I4 - 42

IMPACT SENSING SAFETY SYSTEM

1 IMPACT SENSING SAFETY SYSTEM

1-1 ARTICLES TO BE PREPARED

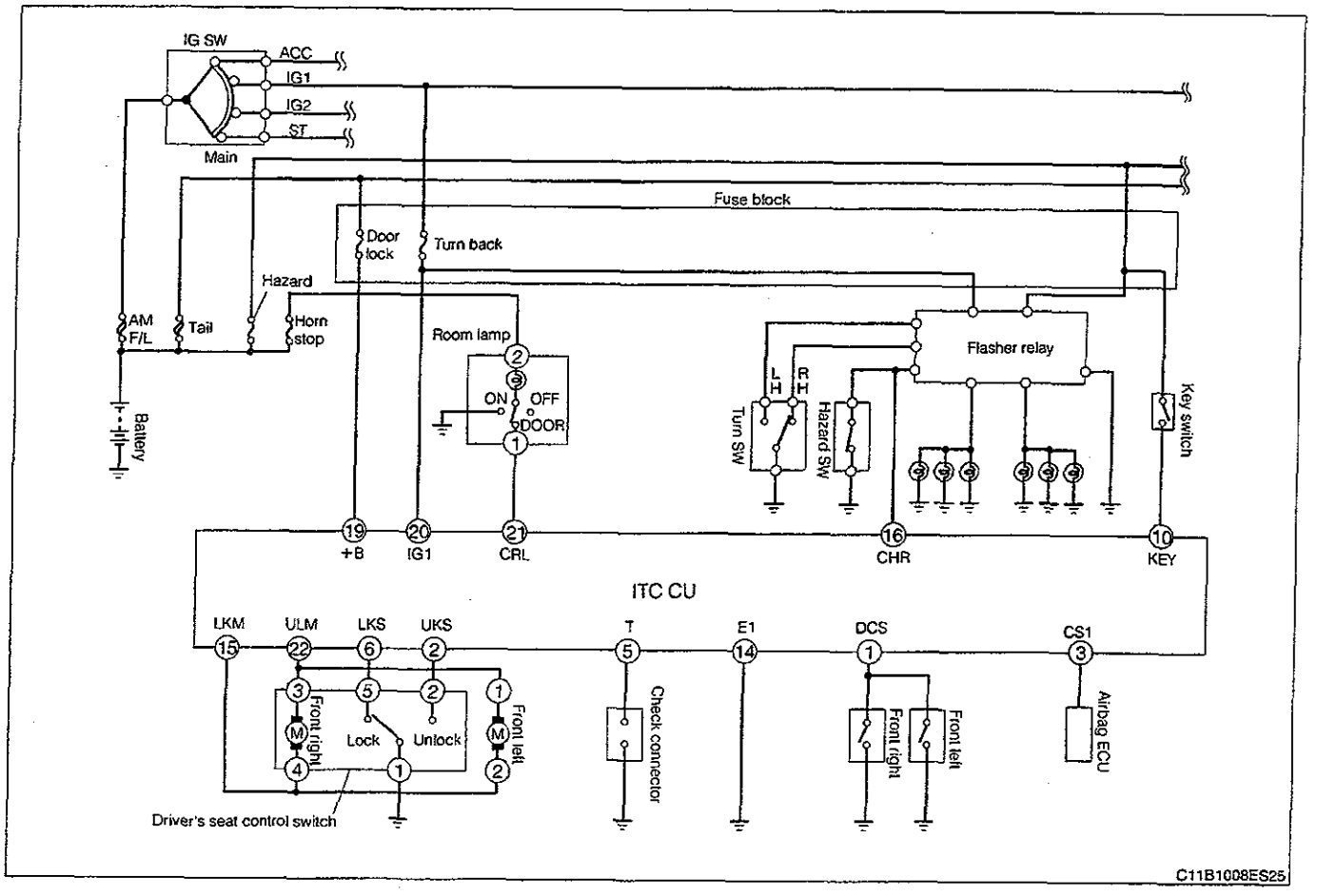
SST

Shape	Part No.	Part name
	09842-97401-000	Sub-harness, ITC computer check
	09991-87403-000	Wire, diagnosis check
	09991-87404-000 (09991-87401-000)	Wire, engine control system inspection

Instrument

Voltage tester

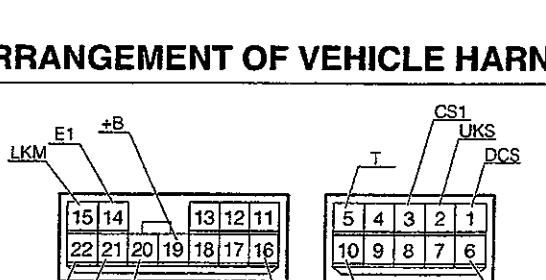
1-2 SYSTEM WIRING DIAGRAM



TERMINAL NAME OF ITC COMPUTER CONNECTOR

Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
1	DCS	Door courtesy switch	12	–	–
2	UKS	Door control unlock side switch	13	–	–
3	CS1	Airbag ECU (Pulse signal input)	14	E1	Ground
4	–	–	15	LKM	Door lock motor lock side output
5	T	Check terminal	16	CHR	Hazard lamp driving output
6	LKS	Door control lock side switch	17	–	–
7	–	–	18	–	–
8	–	–	19	+B	ECU power supply
9	–	–	20	IG1	Ignition switch
10	KEY	Key switch	21	CRL	Room lamp driving output
11	–	–	22	ULM	Door lock motor unlock side output

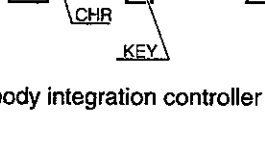
1-3 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS



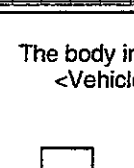
The body integration controller



The body integration controller
<Vehicle harness side>



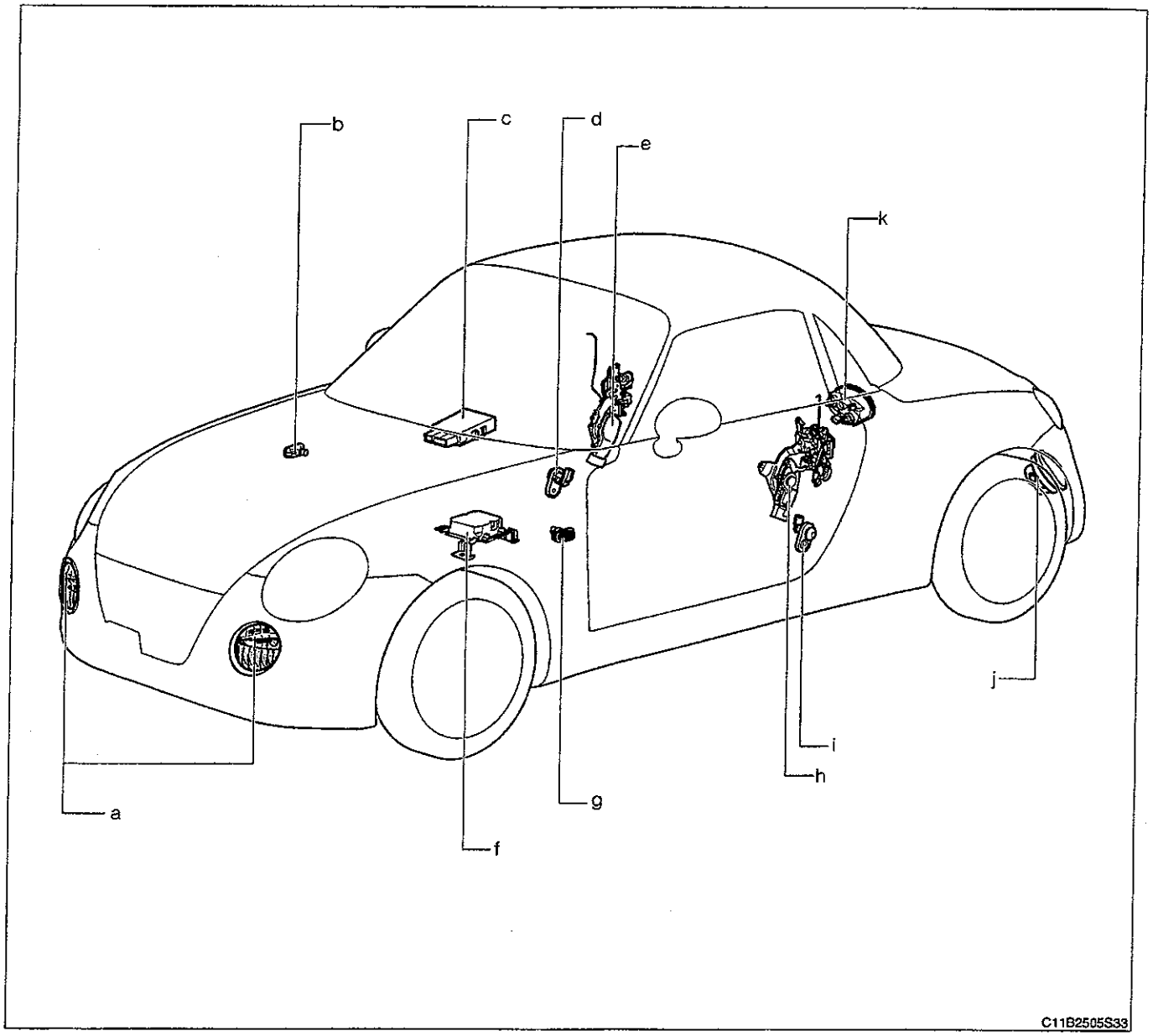
Driver´s seat control SW
Driver´s seat door lock motor



Passenger´s seat door lock motor

C11B5057ES16

1-4 LOCATION OF COMPONENTS



code	Sales name	code	Sales name
a	Front turn lamp	g	Side turn lamp LH
b	Side turn lamp RH	h	Front door lock motor LH
c	ITC ECU	i	Courtesy switch LH
d	Courtesy switch RH	j	RR turn lamp LH
e	Front door lock motor LH	k	RR turn lamp RH
f	Airbag unit	–	–

1-5 BASIC CHECK

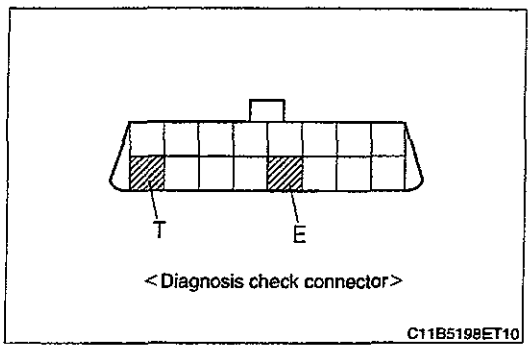
1-5-1 OUTLINE

By shorting the ECU T terminal of the diagnosis check connector, it is possible to check whether the impact sensing signal outputted from the airbag ECU is normally outputted or not, and whether the door lock system is abnormal or not.

SST: 09991-87403-000
09991-87404-000

1-5-2 PROCEDURE

1. With the IG switch set to ON position, short the ECU T terminal and E terminal of the diagnosis check connector.
2. If the impact sensing signal outputted from the airbag ECU is normal, the hazard lamp flashes three times.
3. Release short circuit of the terminal T and finish the check.



<Diagnosis check connector>
C11B5198ET10

1-6 TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA

1-6-1 MALFUNCTION OF POWER DOOR LOCK

(1) ALL DOORS ARE NOT LOCKED INTERLOCKING WITH LOCK OPERATION AT DRIVER'S SEAT

➤1. VOLTAGE CHECK BETWEEN BODY INTEGRATION CONTROLLER (HEREINAFTER REFERRED TO AS "ITC") AND BODY GROUND

1. Check the voltage between the vehicle harness side connector 19 (+B) of ITC ECU and the body ground.
   SPECIFIED VALUE: 12−14V (Battery voltage)

If it is OK, go to ➤3.
If it is NG, go to ➤2.

➤2. CONFIRMATION OF POWER SUPPLY CIRCUIT OF ITC ECU

1. Check that the following sections exhibit no abnormality.
   (1) Check the external appearance of the fuse (door lock) and fusible link for abnormality.
   (2) Confirmation of battery voltage.
   (3) Check the harness of the power supply system for abnormality, such as open wire.

➤3. CONTINUITY CHECK OF ITC ECU GROUND SYSTEM

1. Disconnect the ITC ECU connector.
2. Check the harness between the ITC ECU and the body ground.
   (1) Vehicle harness side connector 14 (E1) of ITC ECU − Body ground.
   SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤4.
If it is NG, repair the ground circuit.

➤4. CHECK OF THE DRIVER'S SEAT DOOR CONTROL SWITCH UNIT CHECK

1.Conduct the unit check of the driver's seat door control switch.
Refer to Page I4-7.

If it is OK, go to ➤5.
If it is NG, replace the door control switch.

➤5. CONTINUITY CHECK BETWEEN ITC ECU AND DOOR CONTROL SWITCH

1.Disconnect the connectors of the ITC ECU and door control switch.
2.Check the harness between the ITC ECU and the door control switch.
(1) Vehicle harness side connector 2(UKS) of ITC ECU — Vehicle harness side connector 2 of door control switch.
(2) Vehicle harness side connector 6(LKS) of ITC ECU — Vehicle harness side connector 5 of door control switch.
(3) Body ground — Vehicle harness side connector 1 of door control switch.
SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤6.
If it is NG, replace the harness and connector.

➤6. VOLTAGE CHECK BETWEEN ITC ECU TERMINALS

1.Check the voltage between the ITC ECU terminals when the door control switch is operated.
(1) Vehicle harness side connector 15 (LKM), 22 (ULM) of ITC ECU — All door lock motors.
SPECIFIED VALUE: Voltage of 12 to 14v. (Around 0.5 second.)

If it is OK, go to ➤7.
If it is NG, replace ITC ECU.

➤7.CHECK OF DOOR LOCK MOTOR UNIT CHECK

1.Check of all door lock motor unit check.
Refer to Page I4-7.

If it is OK, go to ➤8.
If it is NG, replace door lock motor.

➤8. REPAIR OR REPLACE THE HARNESS BETWEEN THE ITC ECU AND THE DOOR LOCK MOTOR

1.Repair or replace the harness and connector between the ITC ECU and each door lock motor.
(1) Vehicle harness side connector 15 (LKM), 22 (ULM) of ITC ECU — All door lock motors.

(2) SOME DOORS ARE NOT LOCKED INTERLOCKING WITH LOCK OPERATION AT DRIVER'S SEAT

➤1.DOOR LOCK MOTOR UNIT CHECK

1.Conduct the unit check of the door lock motor that is not functioning.
Refer to Page I4-7.

If it is OK, repair or replace the harness and connector between the door lock motor and the ITC ECU <15(LKM) and 22(ULM)>
If it is NG, replace the door lock motor.

(3) MALFUNCTION OF POWER SENSING SYSTEM

① MALFUNCTION WHEN OPERATION IS CONFIRMED BY SHORTING T TERMINAL

➤1. OPERATION CHECK AFTER POWER DOOR LOCK

1.Check the operation of the power door lock with the IG set to the "OFF" position.
SPECIFIED VALUE: The system should operate properly.

If it is OK, go to ➤2.
If it is NG, proceed to the trouble-shooting of malfunction of the power door lock.
Refer to Page I14-4.

➤2. CHECK OF ROOM LAMP AND HAZARD LAMP FOR OPERATION

1.With the IG set to the "OFF" position, operate the room lamp and hazard lamp. Check their lighting state.
SPECIFIED VALUE: The room lamp: Illuminated
The hazard lamp: Flashing

If it is OK, go to ➤4.
If it is NG, go to ➤3.

➤3. OPERATION CHECK AFTER LAMP REPLACEMENT

1.After the lamp bulb that failed to illuminate or flash has been replaced, check its operation.
SPECIFIED VALUE: The room lamp: Illuminated
The hazard lamp: Flashing

If it is OK, replace the lamp.
If it is NG, check or repair the fuses, harnesses and switches.

➤4. OPERATION CONFIRMATION CHECK BY CONNECT TERMINAL T

1.Check to see if the procedure of "operation check by connect terminal T" was correct.
If it is OK, replace the ITC.
Refer to Page I4-4.

If it is NG, conduct "operation check by connect terminal T" once more from the beginning.

② CERTAIN LAMPS FAIL TO OPERATE.

➤1. OPERATION CHECK OF ROOM LAMP AND HAZARD LAMP

1.With the IG switch set to the "OFF" position, turn "ON" the switch of the lamp that fails to operate. Check to see if the lamp illuminates properly.

SPECIFIED VALUE: The room lamp: Illuminated
The hazard lamp: Flashing

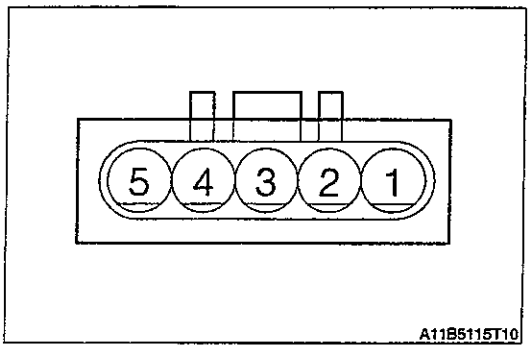
If it is OK, replace the ITC.
If it is NG, go to ➤2.

➤2. OPERATION CHECK AFTER LAMP REPLACEMENT

1.After the lamp bulb that failed to illuminate or flash has been replaced, check its operation.

SPECIFIED VALUE: The room lamp: Illuminated
The hazard lamp: Flashing

If it is OK, replace the lamp bulb.
If it is NG, check or repair the fuses, harnesses and switches.



A11B5115T10

1-7 UNIT CHECK

1-7-1 DRIVER'S SEAT DOOR CONTROL SWITCH, DRIVER'S SEAT DOOR LOCK MOTOR

1.Check the door locking operation when the battery voltage is applied to between the terminals of the lock motor of all the doors.

2.Check continuity between the terminals of the driver's seat door control switch.

- Driver's seat door lock motor
- Driver's seat door control switch ○—○: Continuity should exist

Terminal No.		①	②	⑤	③	④
Operating direction	Lock	○—○			Battery⊕	Battery⊖
	Unlock	○		○	Battery⊖	Battery⊕

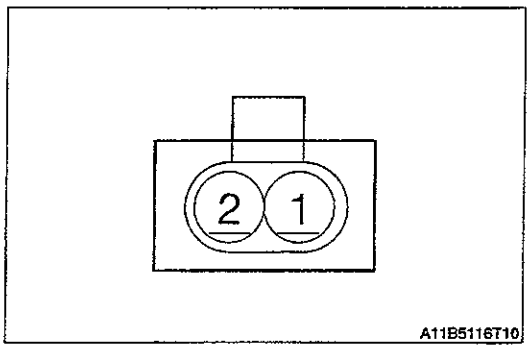
A11B5117EL06

1-7-2 FRONT PASSENGER SEAT DOOR LOCK MOTOR

1.Check the door locking operation when the battery voltage is applied to between the terminals of the door lock motor.

FRONT PASSENGER SEAT DOOR LOCK MOTOR

Section		Terminal ①	Terminal ②
Door lock motor	Lock	Battery ⊕	Battery ⊖
	Unlock	Battery ⊖	Battery ⊕



A11B5116T10

1-7-3 ITC INPUT/OUTPUT SIGNAL CHECK

(1) CHECKING METHOD

1.With the SST, check the voltage, pulses and continuity between the terminals.
SST: 09842-97401-000

SPECIFIED VALUES FOR INPUT/OUTPUT SIGNALS

Check system	Terminal	Condition	Specified value	Reference value (Example of measured value)
Power supply	⑲+B−⑭ E1	At all times	Battery voltage	12.8V
Ignition switch	⑳IG1−⑭ E1	IG SW "OFF"	About 0V	0V
		IG SW "ON"	Battery voltage	12.5V
Room lamp	㉑CRL−⑭ E1	All door "OPEN"	About 0V	0V
		All door "CLOSE"	Battery voltage	12.6V
Hazard lamp	⑯CHR−⑭ E1	Hazard SW "OFF"	About 0V	0V
		Hazard SW "ON"	Pulse generation	※
Key switch	⑩KEY−⑭ E1	Key SW "OFF"	About 0V	0V
		Key SW "ON"	Battery voltage	12.7V
Door lock motor	⑮LKM−㉒ULM	When door control SW "LOCK" is operated	Battery voltage	12 - 14V
	㉒ULM−⑮LKM	When door control SW "UNLOCK" is operated	Battery voltage	12 - 14V
Door control switch	⑥LKS−⑭E1−Body ground	Door control SW "LOCK"	Continuity exists	Continuity exists
	②UKS−Body ground	Door control SW "UNLOCK"	Continuity exists	Continuity exists
Courtesy switch	①DCS−⑭ E1	All door "OPEN" at all times	Continuity exists	Continuity exists
		All doors "OPEN" at all time	No continuity exists	No continuity exists
Airbag ECU communication	③CS1−⑭ E1	IG SW "ON"	Pulse generation	※
Self diagnosis switch	⑤T −⑭E1	When terminal T is released	Voltage	4.5V
		When terminal T is shorted	About 0V	0V
Ground	⑭E1−Body ground	At all times	Continuity exists	Continuity exists

※: See the oscilloscope waveforms of the next paragraph.

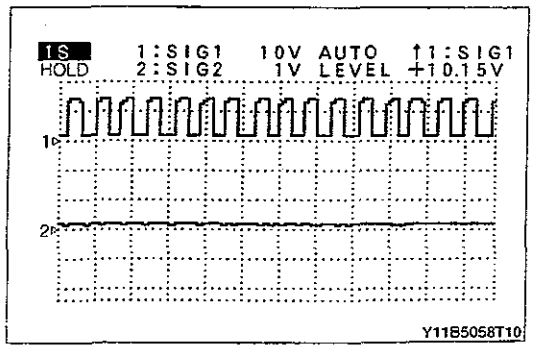
(2) OSCILLOSCOPE WAVEFORMS

① OUTLINE

Waveforms measured by the oscilloscope function of diagnosis tester (DS-21) are shown below as reference.

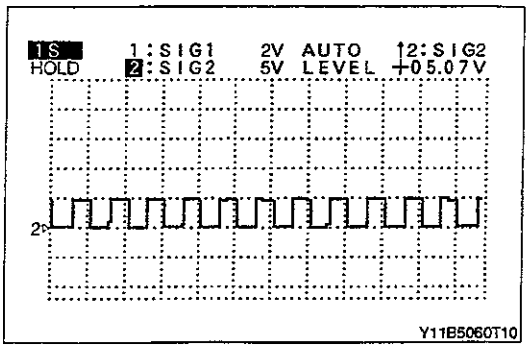
Hazard lamp system waveform

1.Measuring terminals : ⑯CHR−⑭ E1
2.Measuring conditions : Hazard switch "ON"
3.Measuring range : 10V (Voltage axis), 1S (Time axis)



② AIRBAG ECU COMMUNICATION WAVE FORM

1.Measuring terminals : ③CS1 – ⑭ E1
2.Measuring conditions : Ignition switch "ON"
3.Measuring range : 5V (Voltage axis), 1S (Time axis)



2 ITC COMPUTER

2-1 REMOVAL AND INSTALLATION

CAUTION

- Be careful not to drop the computer or give great impacts to it.
- If the computer dropped or was subjected to great impacts, replace it with a new one even if there is no abnormality in its external appearance.

2-1-1 OPERATION BEFORE REMOVAL

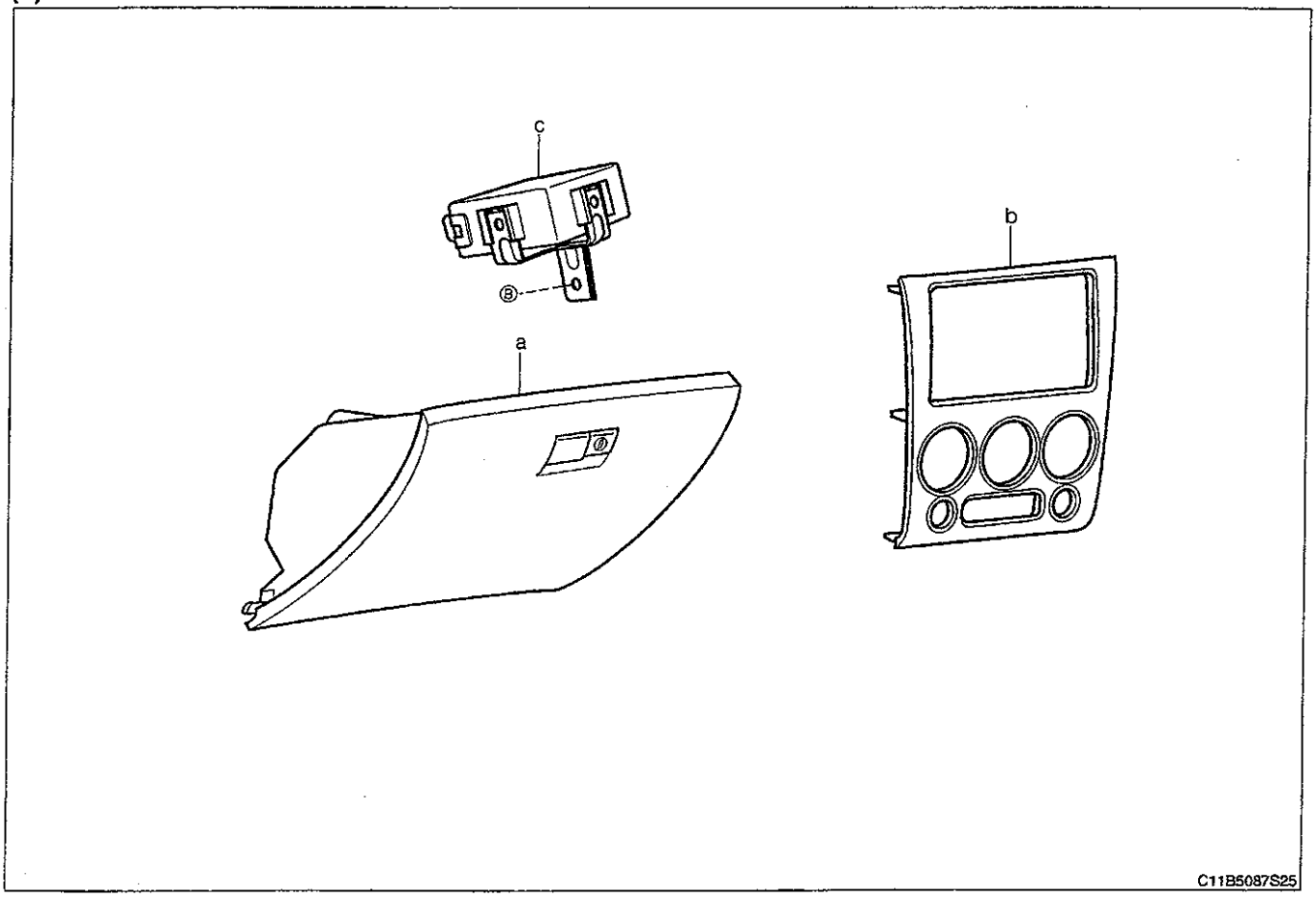
1.Disconnect battery negative terminal.

CAUTION

- It should be noted that the memories of the computers (Engine control computer etc.) of other systems or radio settings are erased at the same time when the battery negative terminal is disconnected.

2-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Box Ay, instrument panel
▼ 2 b Panel S/A, instrument cluster finish, center
3 c Relay Ay, door control

2-1-3 POINTS OF REMOVAL

(1) INSTRUMENT CLUSTER FINISH CENTER PANEL S/A

Refer to Page I2-22.

2-1-4 INSPECTION

(1) COMPUTER EXTERNAL APPEARANCE CHECK

1.Replace the computer with a new one in the following cases.

(1) Case where the computer has deformation, abrasion, cracks or breakage.

CAUTION

- Never disassemble the computer.

2-1-5 OPERATION AFTER INSTALLATION

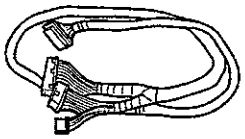
1.Connect the battery negative terminal.

KEY-LESS ENTRY SYSTEM

1 KEY-LESS ENTRY SYSTEM

1-1 ARTICLES TO BE PREPARED

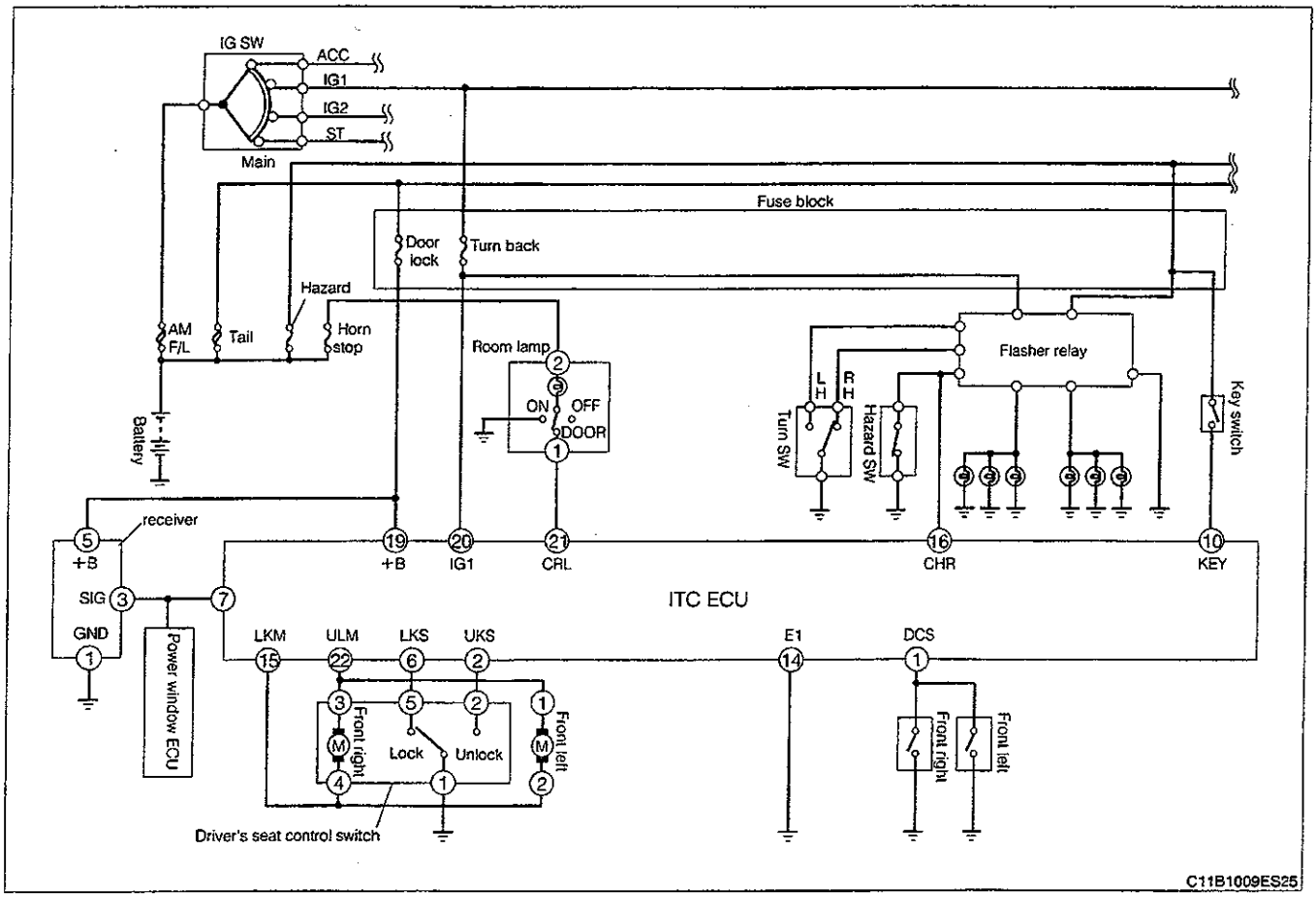
SST

Shape	Part No.	Part name
	09842-97401-000	Sub-harness, ITC computer check

Instrument

Voltage tester

1-2 SYSTEM WIRING DIAGRAM



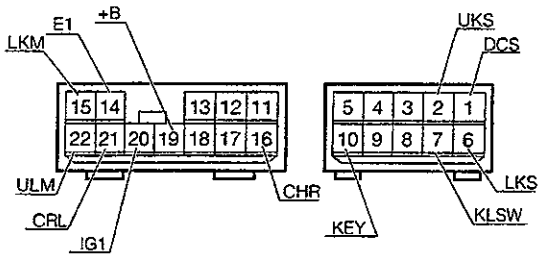
CONNECTOR TERMINAL NAME

Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
1	DCS	Door courtesy switch	12	–	–
2	UKS	Door control unlock side switch	13	–	–
3	–	–	14	E1	Ground
4	–	–	15	LKM	Door lock motor lock side output
5	–	–	16	CHR	Hazard lamp driving output
6	LKS	Door control lock side switch	17	–	–
7	KLSW	Key less signal	18	–	–
8	–	–	19	+B	ECU power supply
9	–	–	20	IG1	Ignition switch
10	KEY	Key switch	21	CRL	Room lamp driving output
11	–	–	22	ULM	Door lock motor unlock side output

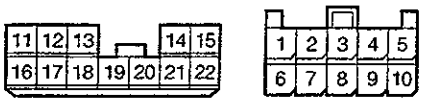
RECEIVER CONNECTOR TERMINAL NAME

Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
1	GND	Ground	4	–	–
2	–	–	5	+B	Receiver power supply
3	SIG	Key less signal	–	–	–

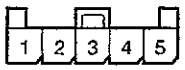
1-3 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS



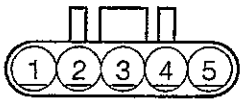
The body integration controller



The body integration controller
<Vehicle harness side>



Receiver



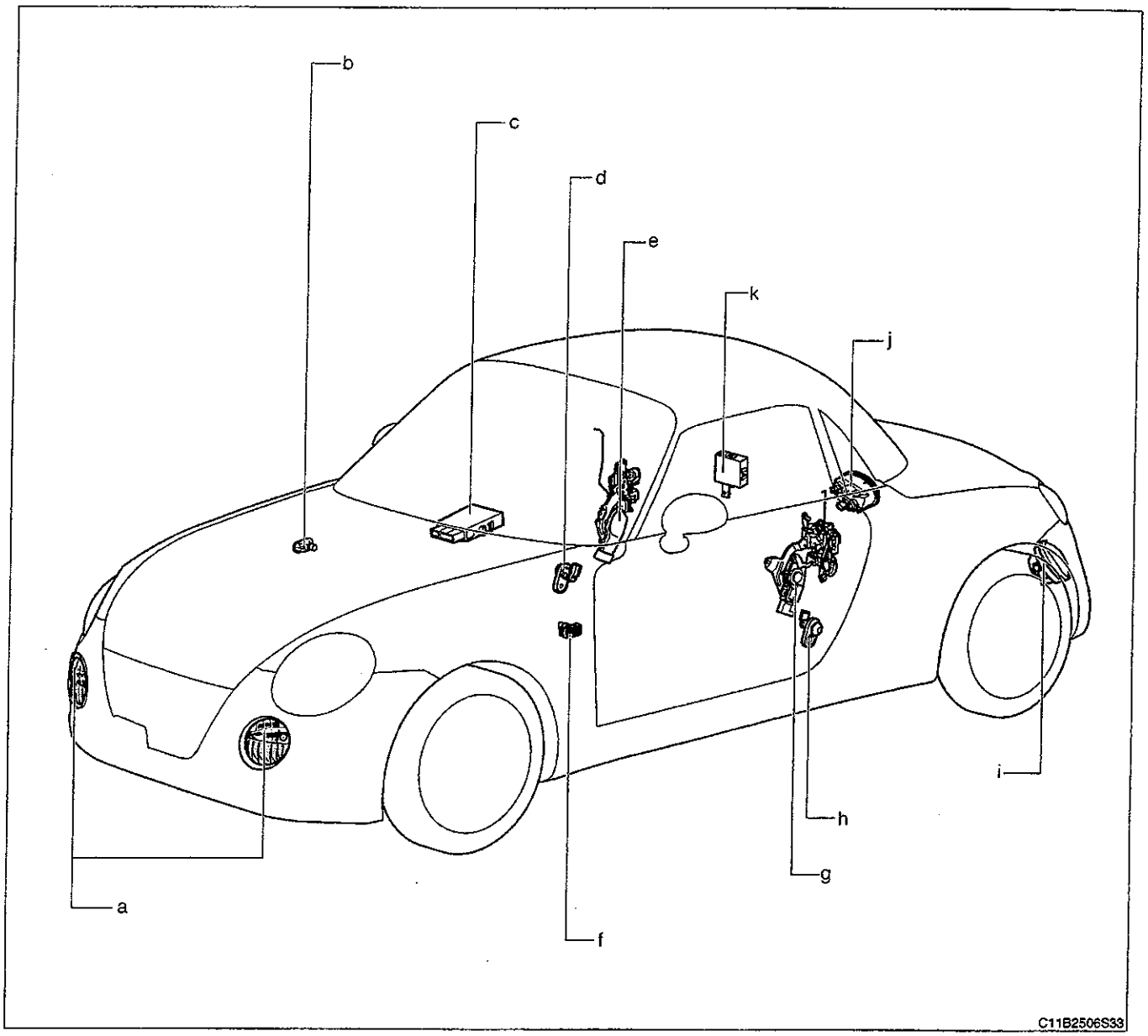
Driver´s seat control SW
Driver´s seat door lock motor



Passenger´s seat door lock motor

C11B5059ES25

1-4 LOCATION OF COMPONENTS



code	Sales name	code	Sales name
a	Front turn lamp	g	Front door lock motor LH
b	Side turn lamp RH	h	Courtesy switch LH
c	ITC ECU	i	RR turn lamp LH
d	Courtesy switch RH	j	RR turn lamp RH
e	Front door lock motor RH	k	Receiver
f	Side turn lamp LH	–	–

1-5 REGISTRATION OF IDENTIFICATION CODE

1-5-1 OUTLINE

1.If the transmitter is lost or added, the registration of the identification code is required.
2.Up to two identification codes can be registered for the receiver, thus making it possible to use two transmitters. When registering two transmitters, register them successively following the procedures given below.
3.If a new transmitter is registered, all the former identification codes registered in the receiver will be erased.
4.The memory of the identification code will not be lost even if the battery is disconnected.

1-5-2 HOW TO REGISTER IDENTIFICATION CODE

CAUTION

- It should be noted that the memories of the computers (Engine control computer etc.) of other systems or radio settings are erased at the same time when the battery negative terminal is disconnected.

(1) VEHCLE IN AN INITIAL REGISTRATION CONDITION

1.The initial condition refers to the condition that satisfies the following given below.
(1) No key is inserted into the key cylinder.
(2) The battery negative terminal or receiver connector is disconnected.

(2) INITIAL REGISTRATION METHOD OF TRANSMITTER

The following is the initial registration procedure for the transmitter.
1.Put the vehicle in an initial registration condition.
Refer to Page I4-15.

2.Connect the battery negative terminal or receiver connector. (Supply power to the receiver.)
3.Close all the doors.
4.Within 15 seconds after completion of the connection, keep pressing the UNLOCK switch and LOCK switch of the transmitter simultaneously at least for five seconds.
5.As a response operation, an operation of LOCK and UNLOCK takes place automatically.
6.After receiving the response operation, within five seconds, keep pushing the UNLOCK switch or LOCK switch of the transmitter to be registered at least one second.
7.As a response operation of the registration completion, an operation of LOCK and UNLOCK takes place automatically.

CAUTION

- When you want to register the second transmitter in succession, repeat the operations described in Step 4 onward.

1-6 TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA

1-6-1 KEYLESS FUNCTION (REMOTE CONTROL) WILL NOT OPERATE (CASE WHERE THERE IS NO NEW OR NORMAL TRANSMITTER OF THE SAME TYPE OF VEHICLE)

CAUTION

- It should be noted that the memories of the computers (Engine control computer etc.) of other systems or radio settings are erased at the same time when the battery negative terminal is disconnected.

➤1. VEHICLE CONDITIONS

1.Put the vehicle in an initial registration condition.
Refer to Page I4-15.

Go to ➤2.

➤2. KEYLESS BASIC CHECK

1.Conduct the LOCK operation and UNLOCK operation consecutively at least three times as the standard operation. Check the operation.

SPECIFIED VALUE: The operation takes place from the third time onward.

CAUTION

- The standard operation refers to the procedure given below.

(1) Stand about one meter away in the right direction from the outside handle of the driver's seat.

(2) Direct the transmitter toward the vehicle. Keep pressing each switch for about one second.

If it is OK, go to ➤3.

If it is NG, go to ➤6.

➤3. CHECK OF ANSWER BACK OPERATION

1.Set the room lamp switch to the door interlocking position.

2.Check the room lamp and hazard lamp for lighting state during the standard operation check.

<RefCode=SI04_0044>

SPECIFIED VALUE: OPERATION REQUIREMENTS OF ROOM LAMP AND HAZARD LAMP

Operating condition	Measuring point	Answer back
At time of LOCK	Room lamp	–
	Hazard lamp	Flashes once
AT TIME OF UNLOCK	Room lamp	Illuminates for 15 seconds
	Hazard lamp	Flashing two times

If it is OK, this section is normal.

NOTE

- The operating distance varies, depending upon the person who operates, the way one holds and place.
- Since the electric wave used is very weak, the operating distance can be shortened in the presence of strong electric waves or noises in the frequency used.

If it is NG, go to ➤4.

➤4. CHECK OF LAMP FOR OPERATION

1.Check the room lamp and hazard lamp for lighting state when they are operated.

SPECIFIED VALUE: The room lamp: Illuminated

The hazard lamp: Flashing

If it is OK, go to ➤5.

If it is NG, check the bulbs of the room lamp and hazard lamp, fuse and harness.

➤5. CONTINUITY CHECK BETWEEN LAMPS, ETC. AND ITC

1.Disconnect the connectors of the room lamp, hazard lamp and ITC.

2.Check the harness between the room lamp and the ITC ECU and the harness between the hazard lamp and the ITC ECU.

SPECIFIED VALUE: Continuity exists

If it is OK, replace the ITC.

If it is NG, replace the harness and connector.

➤6. OPERATION CHECK OF TRANSMITTER

1.Check to see if the transmitter is functioning as follows when the keyless basic check of the transmitter is carried out.

Refer to Page I4-15.

(1) The transmitter operates only first or second times. However, it fails to operate at the third time onward.

(2) Afterward, when the transmitter is left for a little while, there are cases where the transmitter starts to operate again.

SPECIFIED VALUE: The transmitter shall not function as described above.

If it is OK, go to ➤7.

If it is NG, go to ➤8.

➤7. REPLACEMENT OF TRANSMITTER BATTERY

1.After the transmitter battery has been replaced, conduct the keyless basic function check. Confirm that the transmitter functions properly.

Refer to Page I4-15.

SPECIFIED VALUE: The operation takes place from the third time onward.

If it is OK, replace the battery.

If it is NG, go to ➤8.

➤8. PUT THE VEHICLE IN AN INITIAL REGISTRATION CONDITION

1.Put the vehicle in an initial registration condition.

Refer to Page I4-15.

Go to ➤9.

➤9. OPERATION CHECK OF TRANSMITTER REGISTRATION FUNCTION

1.Change the receiver to the registration mode by conducting the following operations given below.

(1) Disconnect the battery negative terminal or the receiver connector.

(2) Connect the disconnected battery negative terminal or receiver connector.

(3) Close all the doors.

(4) Within 15 seconds after completion of the connection, keep pressing the UNLOCK switch and LOCK switch of the transmitter simultaneously at least for five seconds.

Go to ➤10.

➤10. OPERATION CONFIRMATION AFTER CHANGE TO THE REGISTRATION MODE HAS BEEN MADE

1.After the receiver has been changed to the registration mode, check to see if the door lock motor exhibits a response operation.

SPECIFIED VALUE: The change from LOCK to UNLOCK takes place.

If it is OK, go to ➤12.
If it is NG, go to ➤11.

➤11. CONFIRMATION OF REGISTRATION MODE PROCEDURE

1.Confirm the procedure by which the receiver is changed to the registration mode.

SPECIFIED VALUE: Change the receiver to the registration mode according to the correct procedure.

If it is OK, proceed to ➤14.
If it is NG, go to ➤0.

➤12. CONFIRMATION OF OPERATION OF REGISTRATION COMPLETION

1.After a response operation for the registration mode change, within five seconds, keep pressing the UNLOCK switch or the LOCK switch at least one second. Check to see if there is a response operation of the door lock motor.

SPECIFIED VALUE: The change from LOCK to UNLOCK takes place.

If it is OK, go to ➤13.
If it is NG, replace the receiver.

➤13. KEYLESS OPERATION CHECK

1.Conduct the keyless operation check. Check that the operation takes place.
Refer to Page I4-15.

SPECIFIED VALUE: The operation takes place from the third time onward.

If it is OK, this section is normal.
If it is NG, replace the receiver.

➤14. CHECK OF RECEVER CONDITION

1.Conduct the continuity check and voltage check between each terminal of the receiver vehicle harness side connector and the body ground.

RECEIVER TERMINAL NAME AND CHECK REQUIREMENTS

Terminal No.	Check items	Check conditions	Standard
1	Continuity	Body ground and short	Continuity exists
2	Not used terminal	Visual confirmation	Is a blank terminal.
3	Signal	(1) Waveform at the time when the "LOCK" switch of the transmitter is pressed	Refer to the keyless signal system waveform
		(2) Waveform at the time when the "UNLOCK" switch of the transmitter is pressed	Refer to the keyless signal system waveform
4	Not used terminal	Visual confirmation	Is a blank terminal.
5	Voltage	Battery voltage check	At all times 10−16V

NOTE

- For the connector shape of the receiver, refer to the vehicle harness side connector terminal arrangement diagram.
- For the keyless signal system waveform, refer to the unit check.

Refer to Page I4-13.

Refer to Page I4-25.

If it is OK, replace the receiver or the transmitter.

If it is NG, replace the vehicle side harness or connector, or replace the ITC ECU.

1-6-2 KEYLESS FUNCTION (REMOTE CONTROL) WILL NOT OPERATE (CASE WHERE THERE IS NEW OR NORMAL TRANSMITTER)

CAUTION

- It should be noted that the memories of the computers (Engine control computer etc.) of other systems or radio settings are erased at the same time when the battery negative terminal is disconnected.

➤1. VEHICLE CONDITIONS

1.Put the vehicle in an initial registration condition.

Refer to Page I4-15.

Go to ➤2.

➤2. KEYLESS BASIC CHECK

1.Conduct the LOCK operation and UNLOCK operation consecutively at least three times as the standard operation. Check the operation.

SPECIFIED VALUE: The operation takes place from the third time onward.

CAUTION

- The standard operation refers to the procedure given below.

(1) Stand about one meter away in the right direction from the outside handle of the driver's seat.

(2) Direct the transmitter toward the vehicle. Keep pressing each switch for about one second.

If it is OK, go to ➤3.

If it is NG, go to ➤6.

➤3.CHECK OF ANSWER BACK OPERATION

1.Set the room lamp switch to the door interlocking position.

2.Check the room lamp and hazard lamp for lighting state during the standard operation check. Refer to Page I4-19.

SPECIFIED VALUE: OPERATION REQUIREMENTS OF ROOM LAMP AND HAZARD LAMP

Operating condition	Measuring point	Answer back
At time of LOCK	Room lamp	—
	Hazard lamp	Flashes once
AT TIME OF UNLOCK	Room lamp	Illuminates for 15 seconds
	Hazard lamp	Flashing two times

If it is OK, this section is normal.

NOTE

- The operating distance varies, depending upon the person who operates, the way one holds and place.
- Since the electric wave used is very weak, the operating distance can be shortened in the presence of strong electric waves or noises in the frequency used.

If it is NG, go to ➤4.

➤4. CHECK OF LAMP FOR OPERATION

1.Check the room lamp and hazard lamp for lighting state when they are operated.

SPECIFIED VALUE: The room lamp: Illuminated

The hazard lamp: Flashing

If it is OK, go to ➤5.

If it is NG, check the bulbs of the room lamp and hazard lamp, fuse and harness.

➤5. CONTINUITY CHECK BETWEEN LAMPS, ETC. AND ITC

1.Disconnect the connectors of the room lamp, hazard lamp and ITC ECU.

2.Check of between room lamp and ITC ECU, hazard lamp and ITC ECU.

SPECIFIED VALUE: Continuity exists

If it is OK, replace the ITC.

If it is NG, replace the harness and connector.

➤6. OPERATION CHECK OF TRANSMITTER

1.Check to see if the transmitter is functioning as follows when the keyless basic check of the transmitter is carried out.
Refer to Page I4-19.

(1) The transmitter operates only first or second times. However, it fails to operate at the third time onward.
(2) Afterward, when the transmitter is left for a little while, there are cases where the transmitter starts to operate again.

SPECIFIED VALUE: The transmitter shall not function as described above.

If it is OK, go to ➤7.
If it is NG, go to ➤8.

➤7. REPLACEMENT OF TRANSMITTER BATTERY

1.After the transmitter battery has been replaced, conduct the keyless basic function check. Confirm that the transmitter functions properly.
Refer to Page I4-19.

SPECIFIED VALUE: The operation takes place from the third time onward.

If it is OK, replace the battery.
If it is NG, go to ➤8.

➤8. PUT THE VEHICLE IN AN INITIAL REGISTRATION CONDITION.

1.Put the vehicle in an initial registration condition.
Refer to Page I4-15.

Go to ➤9.

➤9. OPERATION CHECK OF TRANSMITTER REGISTRATION FUNCTION

1.Change the receiver to the registration mode by conducting the following operations given below.

CAUTION

- **As for the transmitter, use another one that can function normally.**

(1) Disconnect the battery negative terminal or the receiver connector.
(2) Connect the disconnected battery negative terminal or receiver connector.
(3) Close all the doors.
(4) Within 15 seconds after completion of the connection, keep pressing the UNLOCK switch and LOCK switch of the transmitter simultaneously at least for five seconds.

Go to ➤0.

➤10. OPERATION CONFIRMATION AFTER CHANGE TO THE REGISTRATION MODE HAS BEEN MADE

1.After the receiver has been changed to the registration mode, check to see if the door lock motor exhibits a response operation.

SPECIFIED VALUE: The change from LOCK to UNLOCK takes place.

If it is OK, go to ➤12.
If it is NG, go to ➤11.

➤11. CONFIRMATION OF REGISTRATION MODE PROCEDURE

1.Confirm that the procedure whereby the receiver is changed to the registration mode was correct.
SPECIFIED VALUE: The procedure where by the receiver is changed to the registration mode was correct.

If it is OK, go to ➤18.
If it is NG, go to ➤0.

➤12. CANCELING REGISTRATION MODE

1.Cancel the registration mode.
CAUTION
- Canceling method: Do not press the button of the transmitter for five seconds or more.

Go to ➤0.

➤13. TRANSMITTER CHECK BY REGISTRATION MODE

CAUTION
- As for the transmitter, use the one that did not function.
- The changing method to the registration mode is the same as step 9.

Refer to Page I4-19.

Go to ➤14.

➤14. OPERATION CONFIRMATION AFTER CHANGE HAS BEEN MADE TO REGISTRATION MODE

1.After the receiver has been changed to the registration mode, check to see if the door lock motor exhibits a response operation.
SPECIFIED VALUE: The change from LOCK to UNLOCK takes place.

If it is OK, go to ➤16.
If it is NG, go to ➤15.

➤15. CONFIRMATION OF REGISTRATION MODE PROCEDURE

1.Confirm that the procedure whereby the receiver is changed to the registration mode was correct.
SPECIFIED VALUE: The procedure where by the receiver is changed to the registration mode was correct.

If it is OK, replace the transmitter.
If it is NG, go to ➤0.

➤16. CONFIRMATION OF OPERATION AFTER REGISTRATION COMPLETION

1.After a response operation for the registration mode change, within five seconds, keep pressing the UNLOCK switch or the LOCK switch at least one second. Check to see if there is a response operation of the door lock motor.
SPECIFIED VALUE: The change from LOCK to UNLOCK takes place.

If it is OK, go to ➤17.
If it is NG, replace the receiver.

➤17. KEYLESS OPERATION CHECK

1.Conduct the keyless operation check. Check that the operation takes place.
Refer to Page I4-19.

SPECIFIED VALUE: The operation takes place from the third time onward.

If it is OK, this section is normal.
If it is NG, replace the receiver.

➤18. CHECK OF RECEVER CONDITION

1.Conduct the continuity check and voltage check between each terminal of the receiver vehicle harness side connector and the body ground.

RECEIVER TERMINAL NAME AND CHECK REQUIREMENTS

Terminal No.	Check items	Check conditions	Standard
1	Continuity	Body ground and short	Continuity exists
2	Not used terminal	Visual confirmation	Is a blank terminal.
3	Signal	(1) Waveform at the time when the "LOCK" switch of the transmitter is pressed	Refer to the keyless signal system waveform
		(2) Waveform at the time when the "UNLOCK" switch of the transmitter is pressed	Refer to the keyless signal system waveform
4	Not used terminal	Visual confirmation	Is a blank terminal.
5	Voltage	Battery voltage check	At all times 10−16V

NOTE

- For the connector shape of the receiver, refer to the vehicle harness side connector terminal arrangement diagram.
- For the keyless signal system waveform, refer to the unit check.

Refer to Page I4-13.

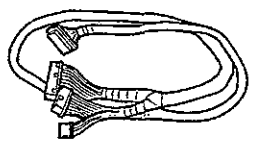
Refer to Page I4-25.

If it is OK, replace the receiver.
If it is NG, replace the vehicle side harness or connector, or replace the ITC ECU.

1-7 UNIT CHECK

1-7-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09842-97401-000	Sub-harness, ITC computer check

1-7-2 ITC AND KEY LESS RECEVER INPUT/OUTPUT SIGNAL CHECK

(1) CHECKING METHOD

1.Check the voltage, pulses and continuity between the terminals, using the SST.
SST: 09842-97401-000

(2) INPUT/OUTPUT SIGNAL CHECK

ITC SPECIFIED FOR INPUT/OUTPUT SIGNALS

Check system	Terminal	Condition	Specified value	Reference value (Example of measured value)
Power supply	⑲+B−⑭ E1	At all times	Battery voltage	12.8V
Ignition switch	⑳IG1−⑭ E1	IG SW "OFF"	About 0V	0V
		IG SW "ON"	Battery voltage	12.5V
Room lamp	㉑CRL−⑭ E1	All door "OPEN"	About 0V	0V
		All door "CLOSE"	Battery voltage	12.6V
Hazard lamp	⑯CHR−⑭ E1	Hazard SW "OFF"	About 0V	0V
		Hazard SW "ON"	Pulse generation	※
Key switch	⑩KEY−⑭ E1	Key SW "OFF"	About 0V	0V
		Key SW "ON"	Battery voltage	12.7V
Door lock motor	⑮LKM−㉒ULM	When door control SW "LOCK" is operated:	Battery voltage	12 −14V
	㉒ULM−⑮LKM	When door control SW "UNLOCK" is operated:	Battery voltage	12 − 14V
Door control switch	⑥LKS−⑭E1−Body ground	Door control SW "LOCK"	Continuity exists	Continuity exists
	②UKS−body ground	Door control SW "UNLOCK"	Continuity exists	Continuity exists
Courtesy switch	①DCS−⑭ E1	All doors "OPEN" at all time	Continuity exists	Continuity exists
		All doors "OPEN" at all time	No continuity exists	No continuity exists
Key less signal	⑦KLSW−⑭E1	When keyless is not operated	Approx. 5V	5V
		Key less operated.	Pulse generation	※
Ground	⑭E1−Body ground	At all times	Continuity exists	Continuity exists

※: See the oscilloscope waveforms of the next paragraph.

RECEIVER INPUT/OUTPUT SIGNAL SPECIFICATION

Check system	Terminal	Condition	Specified value	Reference value (Example of measured value)
Power supply	⑤(+B)−①(GND)	At all times	Battery voltage	12.8V
Key less signal	③(SIG)−①(GND)	When keyless operation is not being done	About 5V	5V
		When "LOCK" is operated	Pulse generation	※
		"UNLOCK" is operated	Pulse generation	※
Ground	①(GND)−body ground	At all times	Continuity exists	Continuity exists

※: See the oscilloscope waveforms of the next paragraph.

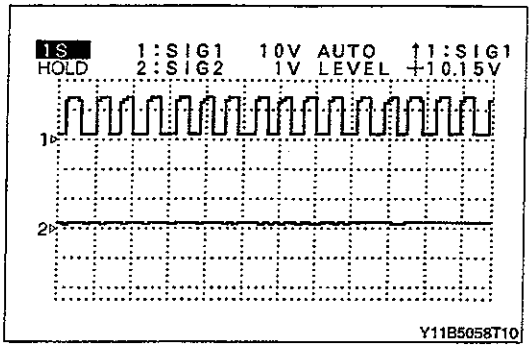
(3) OSCILLOSCOPE WAVEFORMS

① OUTLINE

Waveforms measured by the oscilloscope function of diagnosis tester (DS-21) are shown below as reference.

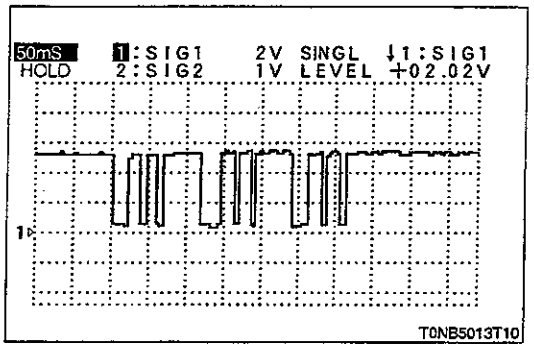
② HAZARD LAMP SYSTEM WAVEFORM

1.Measuring terminals : ⑯CHR—⑭ E1
2.Measuring conditions : Hazard switch "ON"
3.Measuring range : 10V (Voltage axis), 1S (Time axis)

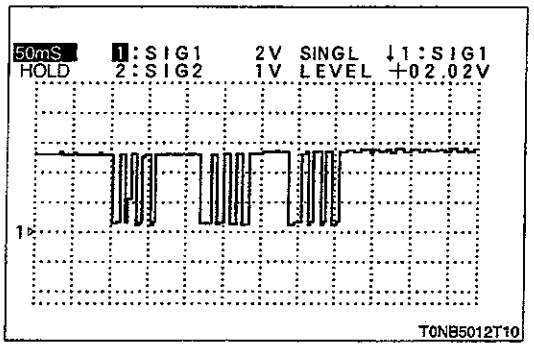


③ KEYLESS SIGNAL SYSTEM WAVEFORM

1.Measuring terminals : ⑦SIG—⑭ E1
2.Measuring condition: When "LOCK" is operated
3.Measuring range : 2V (Voltage axis), 50ms (Time axis)



4.Measuring terminals : ⑦SIG—⑭ E1
5.Measurement condition: "UNLOCK" has been operated
Measuring range : 2V (Voltage axis), 50ms (Time axis)



2 ITC COMPUTER

2-1 REMOVAL AND INSTALLATION

Refer to Page I4-10.

3 DOOR CONTROL RECEIVER

3-1 REMOVAL AND INSTALLATION

3-1-1 OPERATION BEFORE REMOVAL

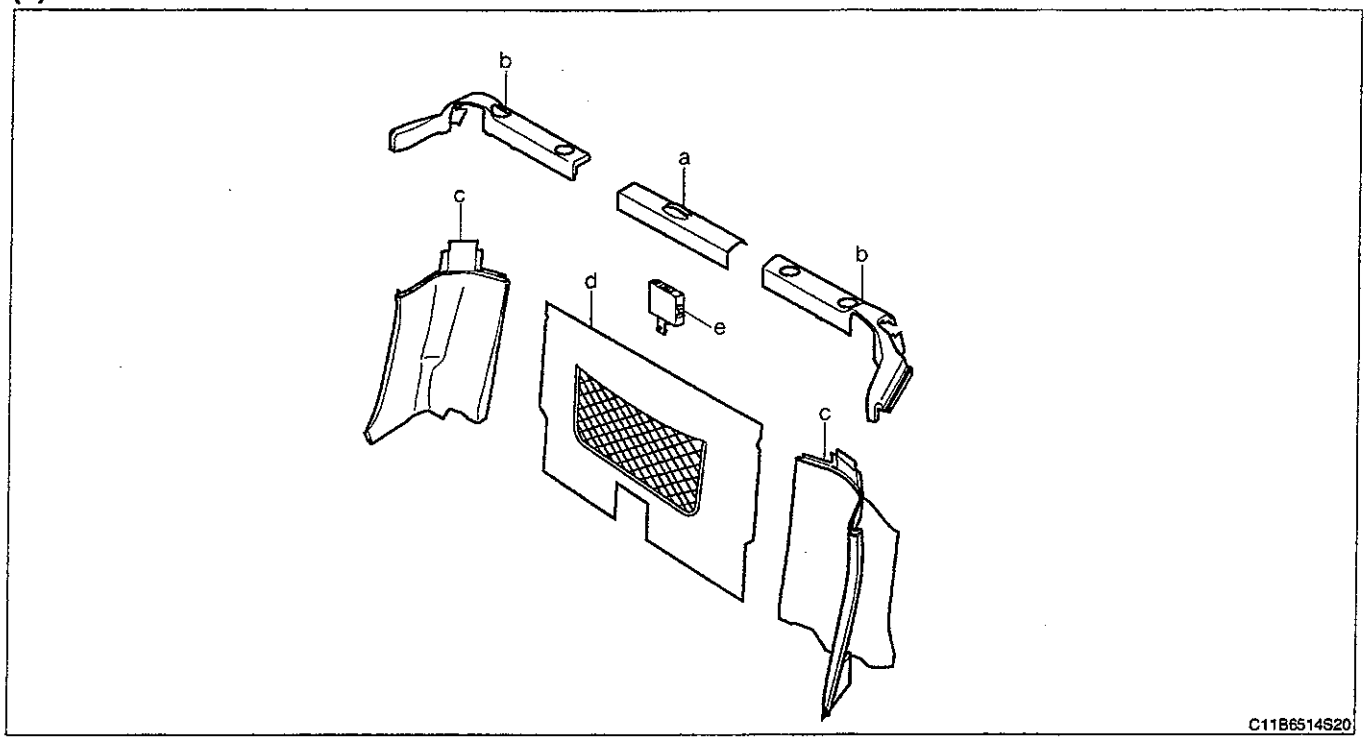
1.Disconnect the battery negative terminal.
2.Remove the rear console box.
Refer to Page I2-28.

3.Remove the wind deflector board.
Refer to Page I2-27.

4.Remove roll over bar.
Refer to Page I1-29.

3-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Trim Ay, back panel
2 b Panel, quarter trim upper, RH/LH
3 c Panel, quarter trim, RH/LH
4 d Trim, back panel
5 e Receiver, door control

3-1-3 OPERATION AFTER INSTALLATION

1.Install the roll over bar.
Refer to Page I1-29.

2.Install the wind deflector board.
Refer to Page I2-27.

3.Install the rear console box.
Refer to Page I2-38.

4.Connect the battery negative terminal.
5.Register the identification code. (Only when receiver is replaced.)
Refer to Page I4-15.

IMMOBILIZER SYSTEM

1 IMMOBILIZER SYSTEM

1-1 ARTICLES TO BE PREPARED

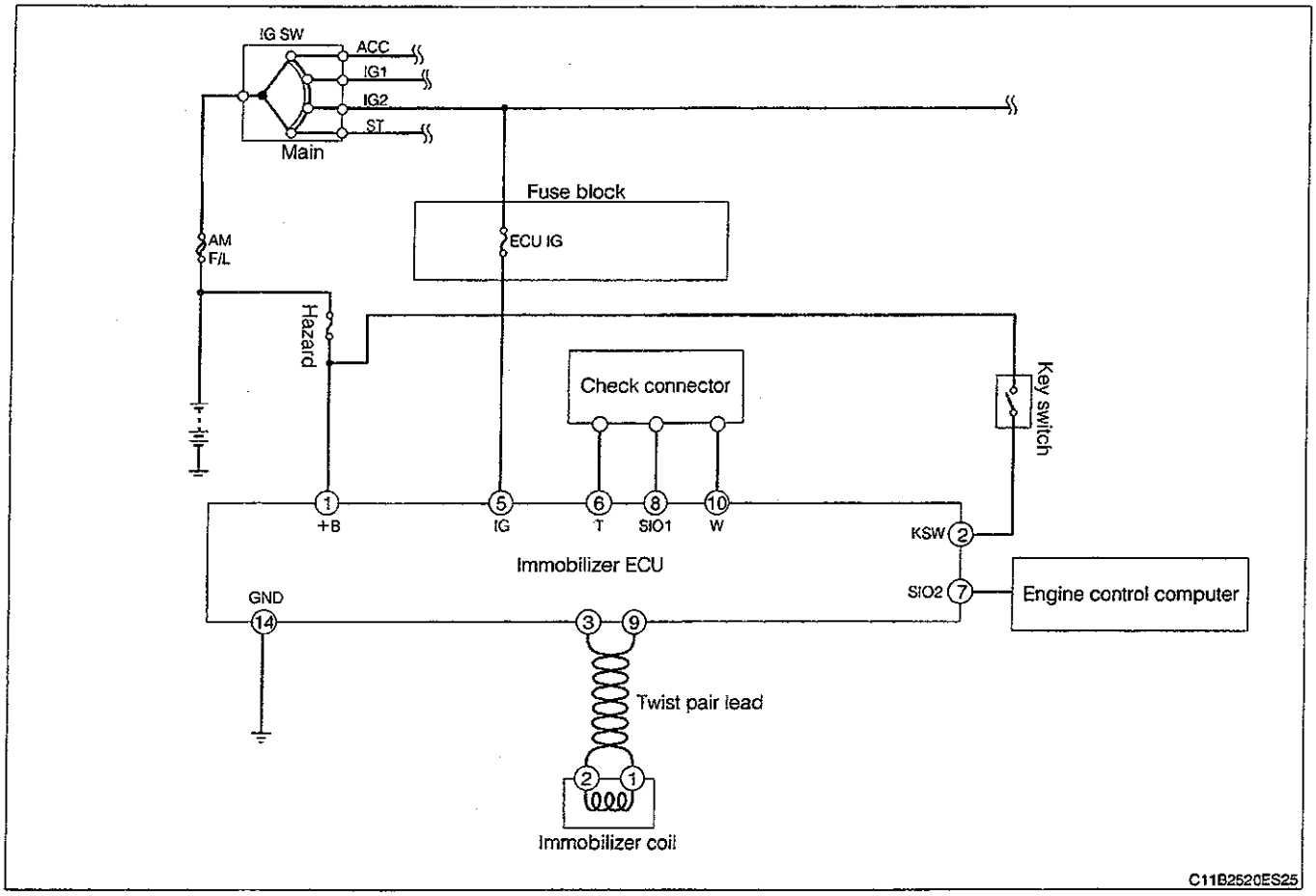
SST

Shape	Part No.	Part name
	09991-87403-000	Wire, diagnosis check
	09991-97201-000 (09991-87211-000)	Lamp, diagnosis check

Instrument

Voltage tester

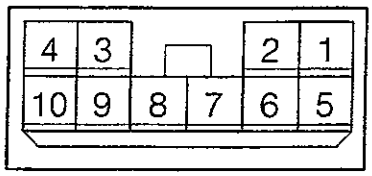
1-2 SYSTEM WIRING DIAGRAM



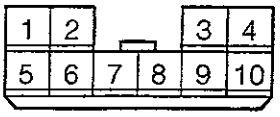
TERMINAL NAME OF IMMOBILIZER COMPUTER CONNECTOR

Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
1	+B	ECU power supply	6	T	Diagnostic tester communication
2	KSW	Key switch	7	SIO2	Immobilizer communication
3	COIL+	Transponder communication	8	SIO1	Diagnostic tester communication
4	GND	Ground	9	COIL−	Transponder communication
5	IG	Ignition switch power supply	10	W	Diagnostic tester communication

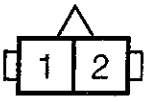
1-3 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS



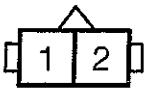
Immobilizer ECU



Immobilizer ECU
<Vehicle harness side>



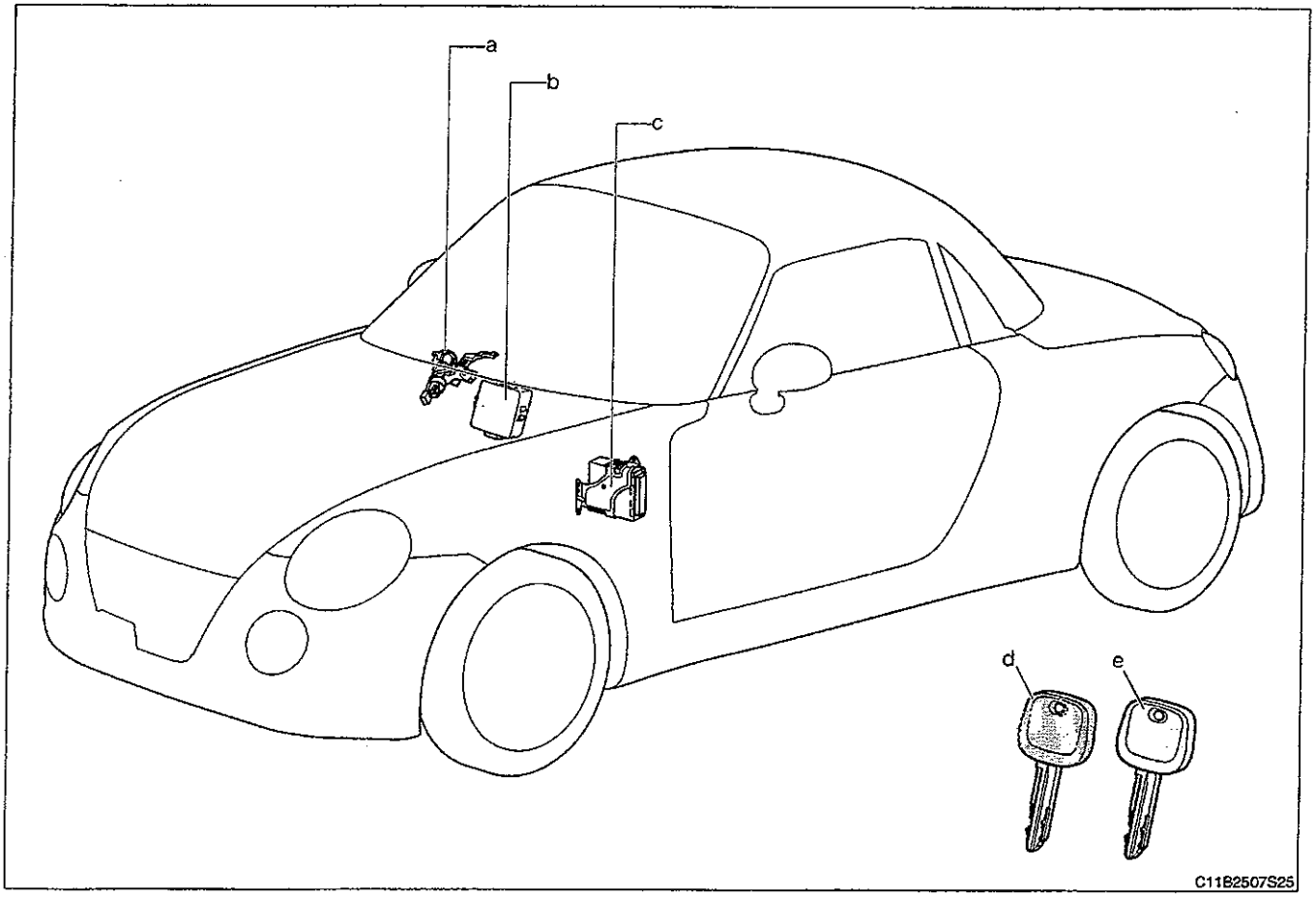
<Key SW(Connector color:black)>



<Immobilizer coil(Connector color:white)>

C11B6511ES16

1-4 LOCATION OF COMPONENTS



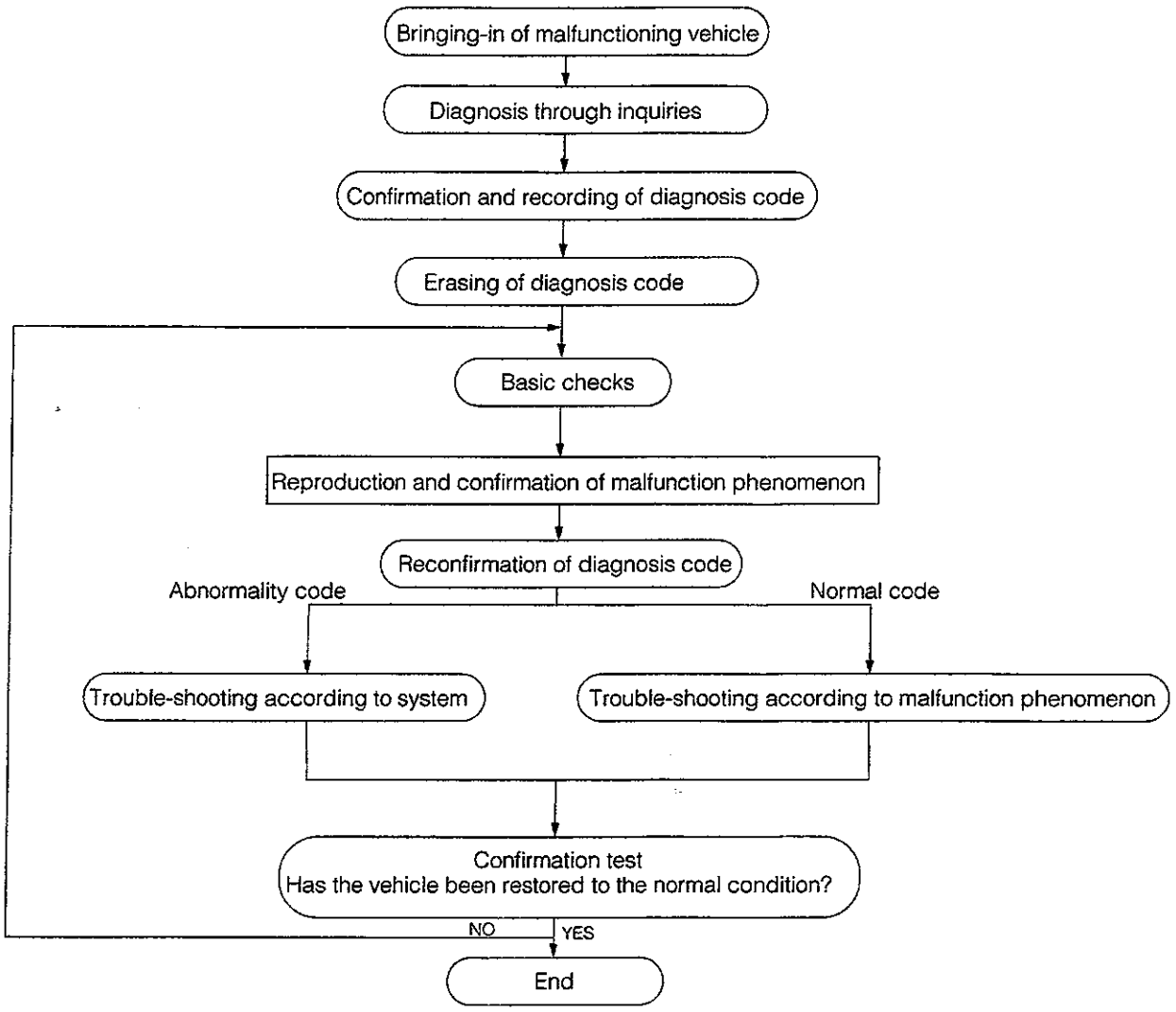
C11B2507S25

code	Part name	code	Part name
a	Steering column upper W/switch bracket	d	Master key (Grip section "black")
b	Immobilizer ECU	e	Sub key (Grip section "gray")
c	EFI ECU	–	–

1-5 HOW TO PROCEED WITH TROUBLE SHOOTING

1.The immobilizer system is equipped with a diagnosis function which diagnoses malfunctioning sections and gives important clues in the trouble shooting.

2.The diagnosis function of the immobilizer system is equipped with the battery backup. (Which keeps supplying power for diagnosis memory even when the ignition switch is set to LOCK position.)



L11K5313ES40

1-6 INQUIRY

1.In an effort to remove causes for malfunction from the vehicle concerned, it is impossible to determine the cause without confirming the malfunction phenomenon. If the phenomenon is not confirmed, the vehicle may not be able to return to the normal conditions even if you continue your work. The diagnosis through inquiries is to collect information from the customer before confirming the malfunction phenomena. The diagnosis through inquiries provides very important clues in reproducing malfunction phenomena.

2.Since the information obtained by the diagnosis through inquiries is referred to during the trouble shooting, it is imperative to make an inquiry of the customer, centering on the items related to the malfunction, instead of simply asking general questions.

1-7 DIAGNOSIS

1-7-1 OUTLINE

1.When the diagnosis code is indicated, confirm whether the malfunction took place sometimes in the system or is still persisting. Also it is necessary to check any relation between the code and the reproduced malfunction. For this purpose, the diagnosis code should be indicated twice, namely before and after the confirmation of the phenomena.

1-7-2 CHECKING METHOD OF DIAGNOSIS

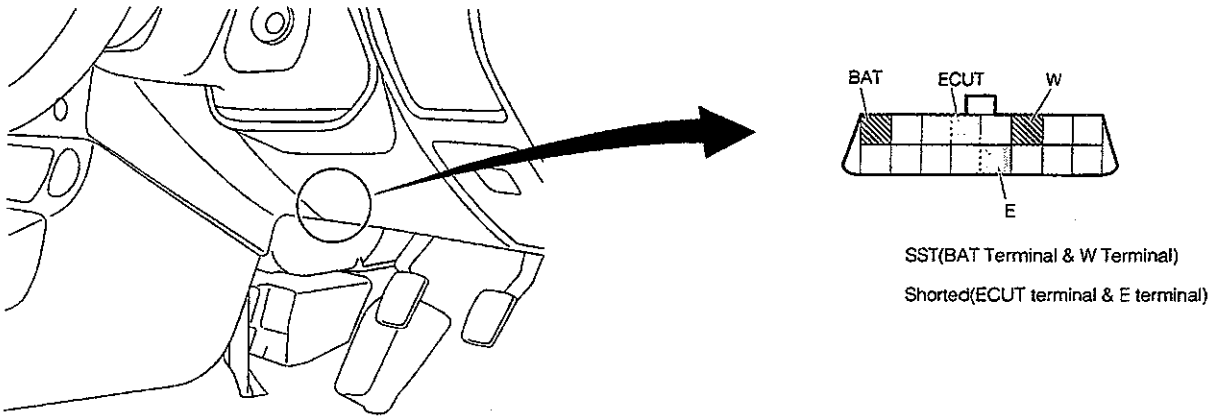
1.Connect the SST to between the terminal BAT+ and terminal W of the diagnosis check connector located under the instrument panel. Connect the terminal ECUT and terminal E and start the diagnosis check mode. The SST lamp will flash, thus indicating the diagnosis code.

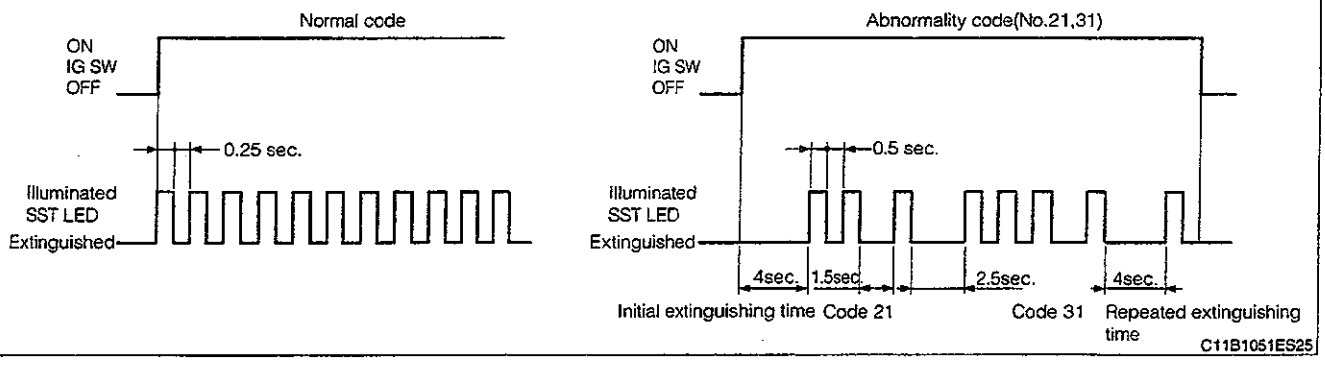
SST: 09991-87403-000
09991-97201-000

2.All the diagnosis codes memorized are shown repeatedly in the sequence of diagnosis number, starting from the smallest number.

CAUTION

- The SST lamp section uses a light emitting diode. Therefore, connect the "red" wire of the SST to the terminal "BAT" of the diagnosis check connector; the "black" wire of the SST to the terminal "W" of the connector.





1-7-3 CANCELING METHOD OF DIAGNOSIS

1.When the section which is responsible for the malfunction code has been checked and repaired, erase the memory, following the procedure given below. After the erasure, let the diagnosis code be outputted again and confirm that the normal code is outputted.

CAUTION

- The code No.12 will be erased even when the normal main key (Registered main key) is used.
- The diagnosis codes No. 23 and No. 31 are not memorized.

(1) ERASURE BY DISCONNECTING EFI FUSE

1. The memorized diagnosis code can be erased by setting the ignition knob to the "LOCK" position and disconnecting the "hazard fuse" for at least 30 seconds.

NOTE

- The "hazard fuse" is located inside the engine compartment (Relay box).
- The codes can be erased usually in about 30 seconds, but in some cases it may take more than 30 seconds.

CAUTION

- It should be noted that the memories of the computers (Engine control computer etc.) of other systems or radio settings are erased at the same time when the battery negative terminal of the battery is disconnected.

1-7-4 CONTENTS OF DIAGNOSIS

CONTENTS OF DIAGNOSIS

Code No.		Diagnosis items	Diagnosis contents
2 digits	4 digits		
12	B2796	Key or immobilizer coil faulty	Cases where there is no reply from the key after the immobilizer coil has been energized.
21	B2795	ID code of key unmatched.	Cases where an unregistered key is used to operate the system.
23	B2787	ID code of key unregistered	Cases where no key has been registered in the immobilizer ECU.
31	B2790	Abnormality of registration mode	Cases where the terminal T is "OFF" or the sub-key is inputted.
41	B2788	Faulty communication with EFI ECU ①	When the code collation has revealed that the code is unmatched during the communication with the EFI ECU.
42	B2789	Faulty communication with EFI ECU ②	Cases where there is no reply during the communication with the EFI ECU.

1-8 TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE

1-8-1 DIAGNOSIS CODE No.12

(1) CHECKING POINTS

1.Is immobilizer coil normal?
2.Are the harness and connector between the immobilizer coil and the immobilizer ECU normal?

(2) CHECKING METHOD

➤1. HARNESS CONTINUITY CHECK BETWEEN IMMOBILIZER COIL–IMMOBILIZER ECU

1.Disconnect the connectors of the immobilizer coil and immobilizer ECU.
2.Check the harness between the immobilizer coil and the immobilizer ECU.
(1) Vehicle harness side connector 1 of immobilizer coil – Vehicle harness side connector 3 (COIL+) of immobilizer ECU.
(2) Vehicle harness side connector 2 of immobilizer coil – Vehicle harness side connector 9(COIL–) of immobilizer ECU.
SPECIFIED VALUE: Continuity exists

If it is OK, go to ➤2.
If it is NG, replace the harness and connector.

2.IMMOBILIZER COIL UNIT CHECK
Refer to Page I4-38.

If it is OK, go to ➤3.
If it is NG, replace the transponder key coil.

➤3. OPERATION CHECK BY OTHER KEY

1.Check the operation by the master key or another sub key.
SPECIFIED VALUE: The system should operate properly.

If it is OK, perform the key replacement and re-registration.
If it is NG, replace the transponder key coil.

1-8-2 DIAGNOSIS CODE No.21

(1) CHECKING POINTS

1.Is the registered key use?

(2) CHECKING METHOD

➤1. OPERATION CHECK BY THE MASTER KEY

1.Check to see if the engine can start by the master key.

SPECIFIED VALUE: The engine can start.

If it is OK, perform the key re-registration.

NOTE

- The ID code of the key used has not been registered yet.

If it is NG, go to ➤2.

➤2. CHECK OF KEY USE CONDITIONS

1.Check to see if the key is used in a wrong way.

SPECIFIED VALUE: Do not use the keys in an overlapped state. Use the key correctly.

If it is OK, replace the immobilizer ECU. Then, proceed to ➤3.
If it is NG, use the key correctly.

➤3.CHECK OF IMMOBILIZER ECU OPERATION

1.After the key ID code has been registered on the immobilizer ECU, check that the system functions normally.

SPECIFIED VALUE: The engine can start.

If it is OK, this completes the check.
If it is NG, replace the transponder key coil.

1-8-3 DIAGNOSIS CODE No.23

(1) CHECKING POINTS

1.Is the registered key use?
2.Are the harness and connector between the immobilizer coil and the immobilizer ECU normal?

(2) CHECKING METHOD

➤1. OPERATION CHECK BY RE-REGISTRATION OF KEY ID CODE

1.Check the operation after the ID code of the master key and sub key has been re-registered.
SPECIFIED VALUE: The engine can start.

If it is OK, this completes the check.
If it is NG, go to ➤2.

➤2.CONTINUITY CHECK BETWEEN IMMOBILIZER COIL AND IMMOBILIZER ECU

1.Disconnect the connectors of the immobilizer coil and immobilizer ECU.
2.Check the harness between the immobilizer coil and the immobilizer ECU.
(1) Vehicle harness side connector 1 of immobilizer coil – Vehicle harness side connector 3 (COIL+) of immobilizer ECU.
(2) Vehicle harness side connector 2 of immobilizer coil – Vehicle harness side connector 3 (COIL−) of immobilizer ECU.
SPECIFIED VALUE: Continuity exists

If it is OK, proceed to ➤3.
If it is NG, replace the harness and connector.

➤3. OPERATION CHECK BY NORMAL KEY

1.Check the operating state when another normal key is used.
SPECIFIED VALUE: The system should operate properly.

If it is OK, perform the key replacement and re-registration of the key ID code.
If it is NG, replace the immobilizer ECU. Then, proceed to➤4.

➤4. CHECK OF IMMOBILIZER ECU OPERATION

1.After the key ID code has been registered on the immobilizer ECU, check that the system functions normally.
SPECIFIED VALUE: The engine can start.

If it is OK, this completes the check.
If it is NG, replace the transponder key coil.

1-8-4 DIAGNOSIS CODE No.31

1.There is a problem in the key registration. Redo the registration from the beginning.

1-8-5 DIAGNOSIS CODE No.41,42

(1) CHECKING POINTS

1.Are the harness and connector between the EFI ECU and the immobilizer ECU normal?

(2) CHECKING METHOD

➤1. CONTINUITY CHECK BETWEEN EFI ECU AND IMMOBILIZER ECU

1.Disconnect the connectors of the EFI ECU and immobilizer ECU.

2.Check the harness between the EFI ECU and the immobilizer ECU.

(1) Vehicle harness side connector 7 (SI02) of EFI ECU – Vehicle harness side connector 7 of immobilizer ECU.

SPECIFIED VALUE: Continuity exists

If it is OK, replace the immobilizer ECU. Then, proceed to ➤2.
If it is NG, replace the harness and connector.

➤2. CHECK OF IMMOBILIZER ECU OPERATION

1.After the key ID code has been registered on the immobilizer ECU, check that the system functions normally.

SPECIFIED VALUE: The engine can start.

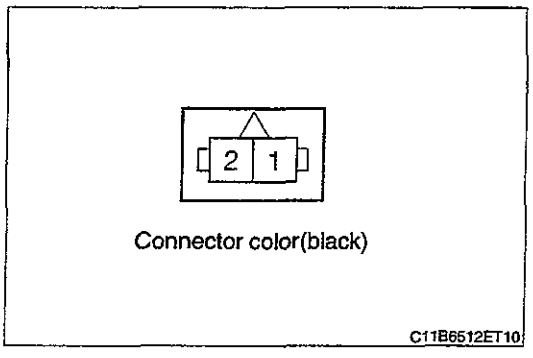
If it is OK, this completes the check.
If it is NG, replace EFI ECU.

1-9 UNIT CHECK

1-9-1 STEERING COLUMN UPPER W/SWITCH BRACKET Ay

(1) KEY INSERTION SWITCH

1.At the LOCK position of the ignition switch, insert and pull out the key to check continuity between the terminals.



KEY SW CONTINUITY TABLE

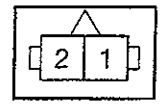
Switching \ Terminal No.		① – ②
Lock cylinder	Key not inserted	No continuity exists
	Key inserted	Continuity exists

(2) IMMOBILIZER COIL

1.Check continuity between the terminals ① and ②.
(Connector color: white)

CAUTION

- Even if continuity exists, no judgment can be made about whether the coil is normal or not.



Connector color (white)

C11B6513ET10

2 STEERING COLUMN W/SWITCH BRACKET

2-1 REMOVAL AND INSTALLATION

Refer to Page G1-4.

3 TRANSPONDER KEY COIL(IMMOBILIZER COIL)

3-1 REMOVAL AND INSTALLATION

3-1-1 OPERATION BEFORE REMOVAL

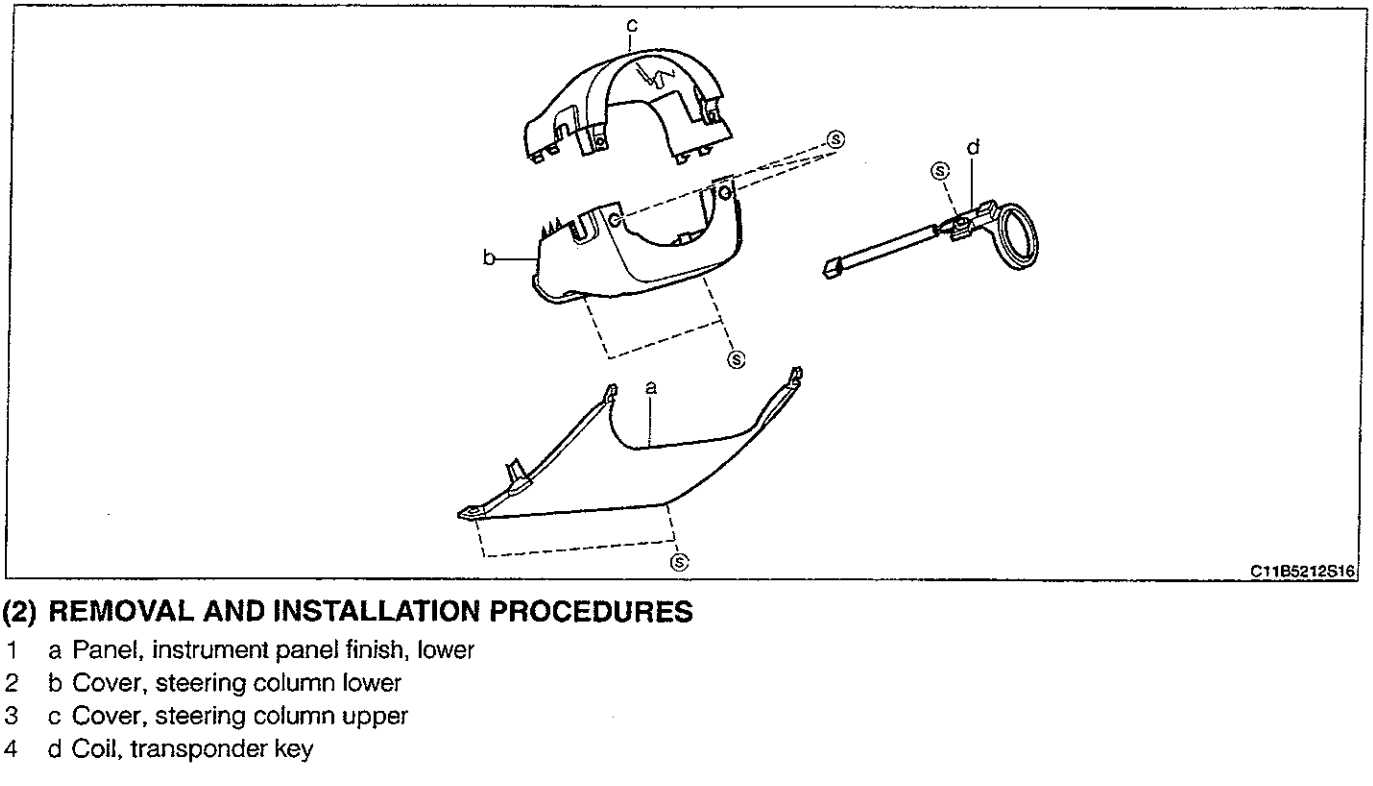
1.Disconnect the battery negative terminal.

CAUTION

- It should be noted that the memories of the computers (Engine control computer etc.) of other systems or radio settings are erased at the same time when the battery negative terminal is disconnected.

3-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Panel, instrument panel finish, lower
2 b Cover, steering column lower
3 c Cover, steering column upper
4 d Coil, transponder key

3-1-3 OPERATION AFTER INSTALLATION

1.Connect the battery negative terminal.

4 TRANSPONDER KEY COMPUTER(IMMOBILIZER ECU)

4-1 REMOVAL AND INSTALLATION

4-1-1 OPERATION BEFORE REMOVAL

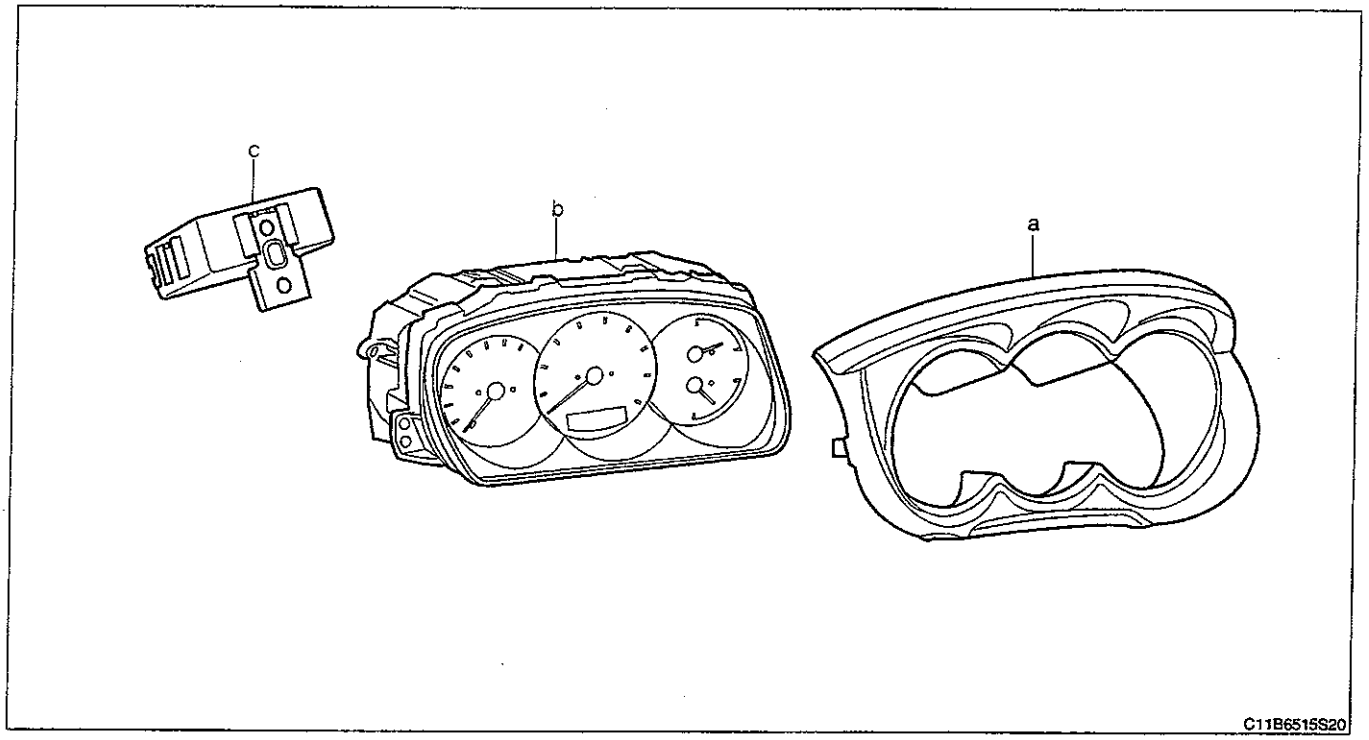
1.Disconnect the battery negative terminal.

CAUTION

- It should be noted that the memories of the computers (Engine control computer etc.) of other systems or radio settings are erased at the same time when the battery negative terminal is disconnected.

4-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Panel Ay, instrument cluster finish
2 b Meter Ay, combination
3 c Computer Ay, transponder key

CAUTION

- Be careful not to drop the computer or give great impacts to it.
- If the computer dropped or was subjected to great impacts, replace it with a new one even if there is no abnormality in its external appearance.

4-1-3 INSPECTION

(1) COMPUTER EXTERNAL APPEARANCE CHECK

1.Replace the computer with a new one in the following cases.

(1) Case where the computer has deformation, abrasion, cracks or breakage.

CAUTION

- Never disassemble the computer.

4-1-4 OPERATION AFTER INSTALLATION

1.Connect the battery negative terminal.
2.When the computer has been replaced with a new one, perform the ID code registration for the master key and sub key.

TO INDEX

I5 SUNROOF/T-BER ROOF/CONVERTIBLE

ACTIVE TOP (MOTOR DRIVEN OPENING ROOF) ---------- I5 - 1
ROOF PANEL ---------- I5 - 1
REMOVAL AND INSTALLATION --------- I5 - 1
BACK PANEL ---------- I5 - 3
REMOVAL AND INSTALLATION --------- I5 - 3
REMOVABLE ROOF HINGE (ROOF LINK) ---------- I5 - 5
REMOVAL AND INSTALLATION --------- I5 - 5
LUGGAGE COMPARTMENT DOOR HINGE(LUGGAGE LINK) ---------- I5 - 7
DISASSEMBLING AND ASSEMBLING ---------- I5 - 7
BACK DOOR LOCK ACTUATOR (SIDE LATCH) ---------- I5 - 14
REMOVAL AND INSTALLATION-------- I5 - 14
ROOF LOCK ---------- I5 - 16
REMOVAL AND INSTALLATION-------- I5 - 16
LIMIT SWITCH AY(OPENING COVER SW AY) ---------- I5 - 17
REMOVAL AND INSTALLATION-------- I5 - 17
LIMIT SWITCH AY(LUGGAGE PARTITION SW AY) ---------- I5 - 18
REMOVAL AND INSTALLATION-------- I5 - 18
METAL TOP ROOF CONTROL COMPUTER AY(POWER WINDOW ECU) ---------- I5 - 19
REMOVAL AND INSTALLATION-------- I5 - 19
METAL TOP ROOF CONTROL COMPUTER AY(ROOF ECU) ---------- I5 - 20
REMOVAL AND INSTALLATION-------- I5 - 20
CONTROL SYSTEM ---------- I5 - 21
ARTICLES TO BE PREPARED --------- I5 - 21
HANDLING INSTRUCTIONS OF CONTROL SYSTEM ---------- I5 - 21
SYSTEM WIRING DIAGRAM ---------- I5 - 35
ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS ---------- I5 - 38
LOCATION OF COMPONENTS -------- I5 - 40
HOW TO PROCEED WITH TROUBLE SHOOTING ---------- I5 - 43
DIAGNOSIS ---------- I5 - 45
FAIL-SAFE FUNCTION ---------- I5 - 48
TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE ---------- I5 - 49
TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA ---- I5 - 70
UNIT CHECK ---------- I5 - 96

ACTIVE TOP (MOTOR DRIVEN OPENING ROOF)

1 ROOF PANEL

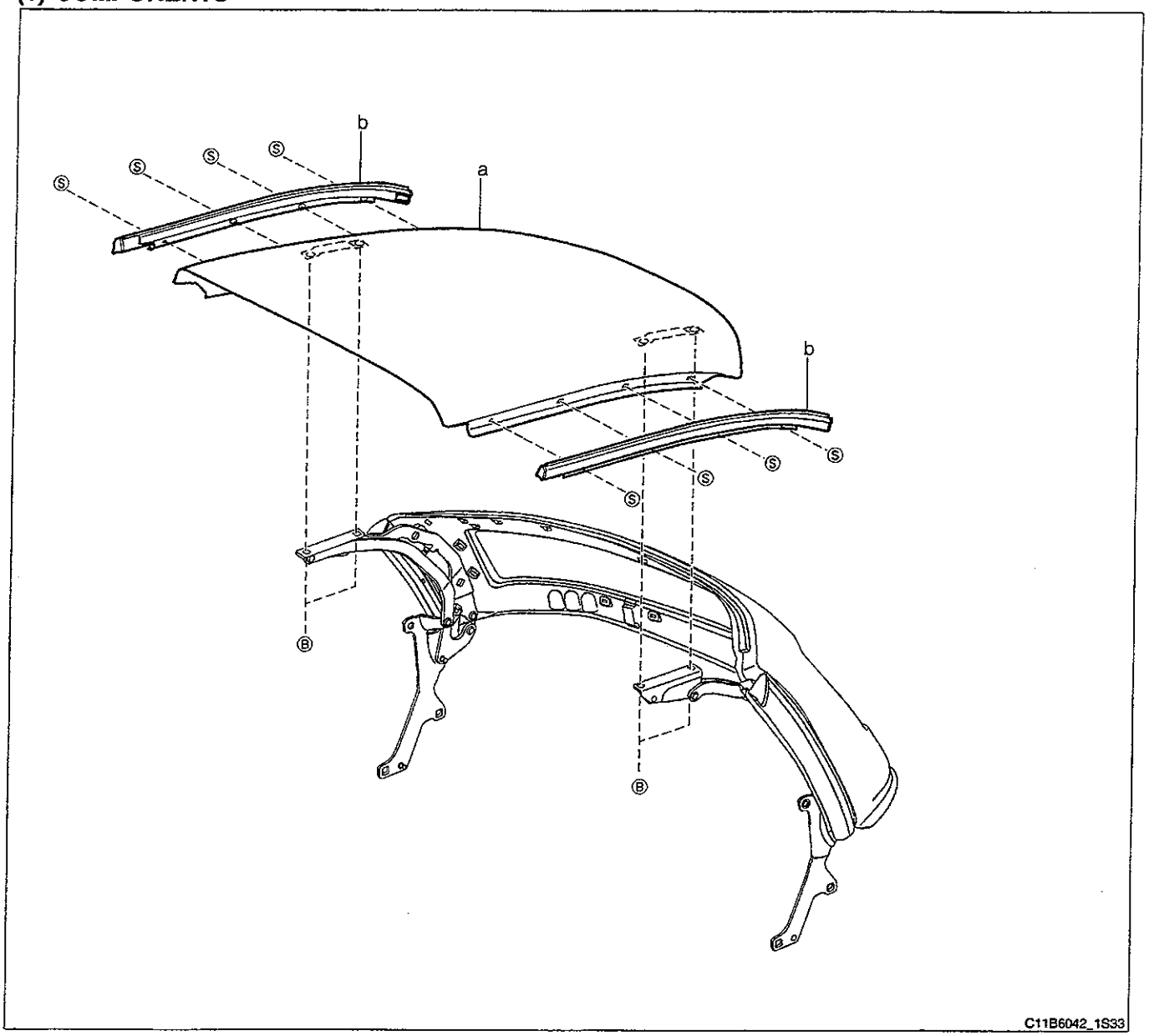
1-1 REMOVAL AND INSTALLATION

1-1-1 OPERATION BEFORE REMOVAL

1.Remove the roof headlining.
Refer to Page I2-35.

1-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS

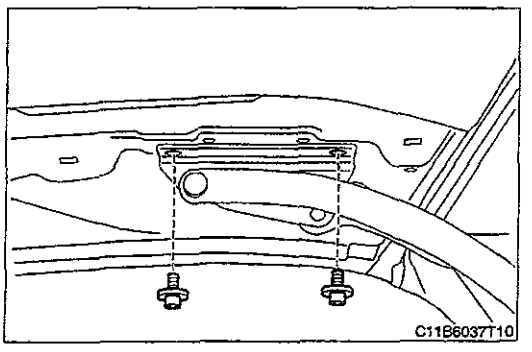


(2) REMOVAL AND INSTALLATION PROCEDURES

▼ ▲ 1 a Panel S/A, removable roof
2 b Molding S/A, removable roof, FR RH/LH

1-1-3 POINTS OF REMOVAL

(1) REMOVABLE ROOF PANEL RH/LH



1. Remove the bolts shown in the right-hand illustration to remove the roof panel. (both RH and LH)

WARNING

- Be careful not to allow your finger to be caught by the link.

CAUTION

- Do not remove the back panel and the roof link at a time.

1-1-4 POINTS OF INSTALLATION

(1) REMOVABLE ROOF PANEL S/A

After installing the roof panel, perform the alignment adjustment of the roof panel.
Refer to Page I1-10.

1-1-5 OPERATION AFTER INSTALLATION

1. Install the roof headlining.
Refer to Page I2-35.

2 BACK PANEL

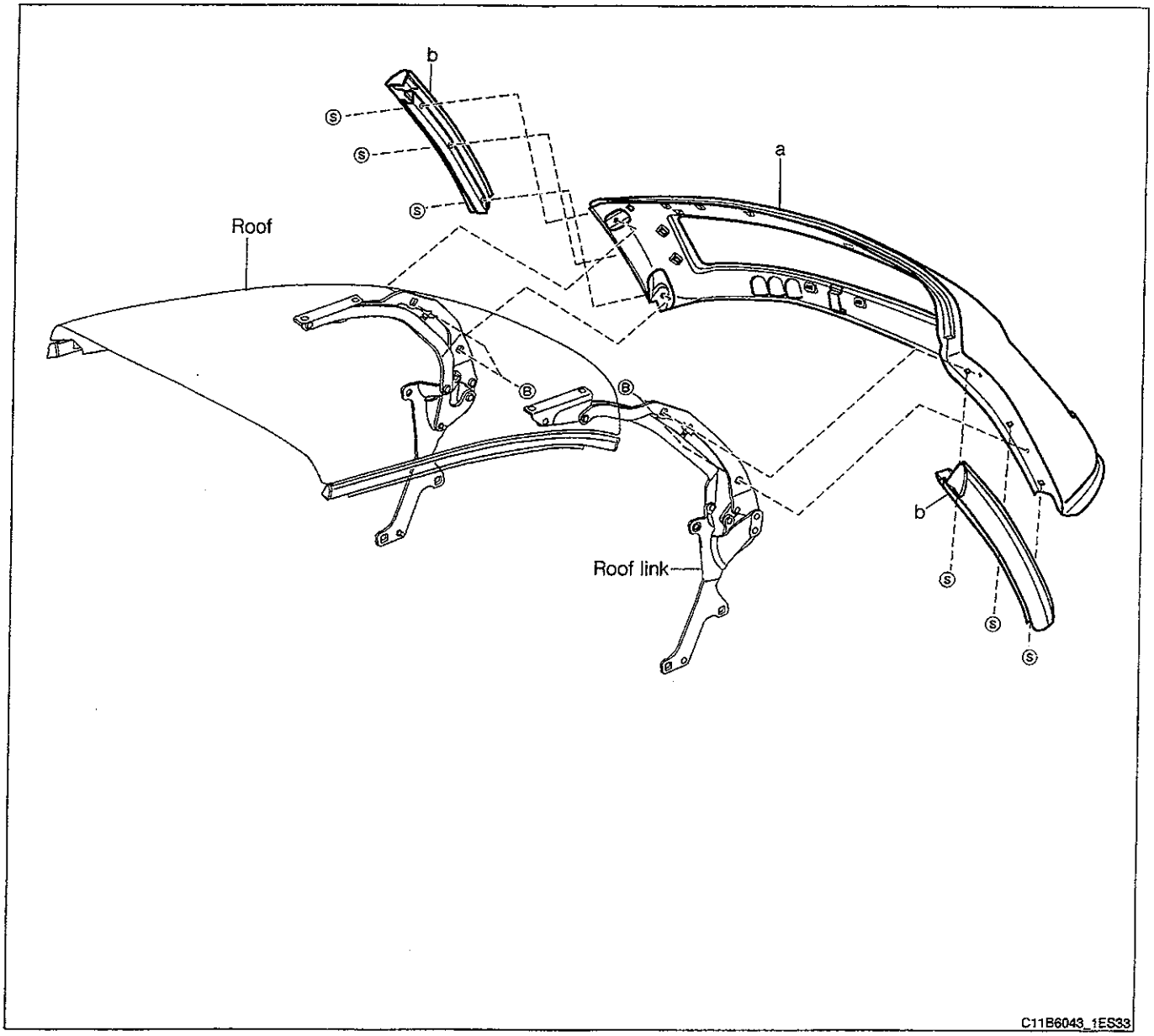
2-1 REMOVAL AND INSTALLATION

2-1-1 OPERATION BEFORE REMOVAL

1.Remove the roof side inner garnish RH/LH.
Refer to Page I2-36.

2-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

▼ ▲ 1 a Panel S/A, back
2 b Molding S/A, roof drip side finish, RR RH/LH

2-1-3 POINTS OF REMOVAL

(1) BACK PANEL S/A

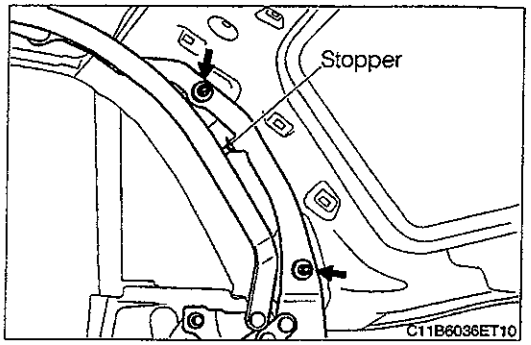
1.Remove the bolts shown in the right-hand illustration to remove the back panel. (both RH and LH)

WARNING

- Be careful not to allow your finger to be caught by the link.

CAUTION

- Do not remove the roof panel and roof link at the same time.



2-1-4 POINTS OF INSTALLATION

(1) BACK PANEL S/A

After the back panel is installed, adjust the alignment of the back panel.

Refer to Page I1-12.

2-1-5 OPERATION AFTER INSTALLATION

Install the roof side inner garnish RH/LH.

Refer to Page I2-36.

3 REMOVABLE ROOF HINGE (ROOF LINK)

3-1 REMOVAL AND INSTALLATION

3-1-1 OPERATION BEFORE REMOVAL

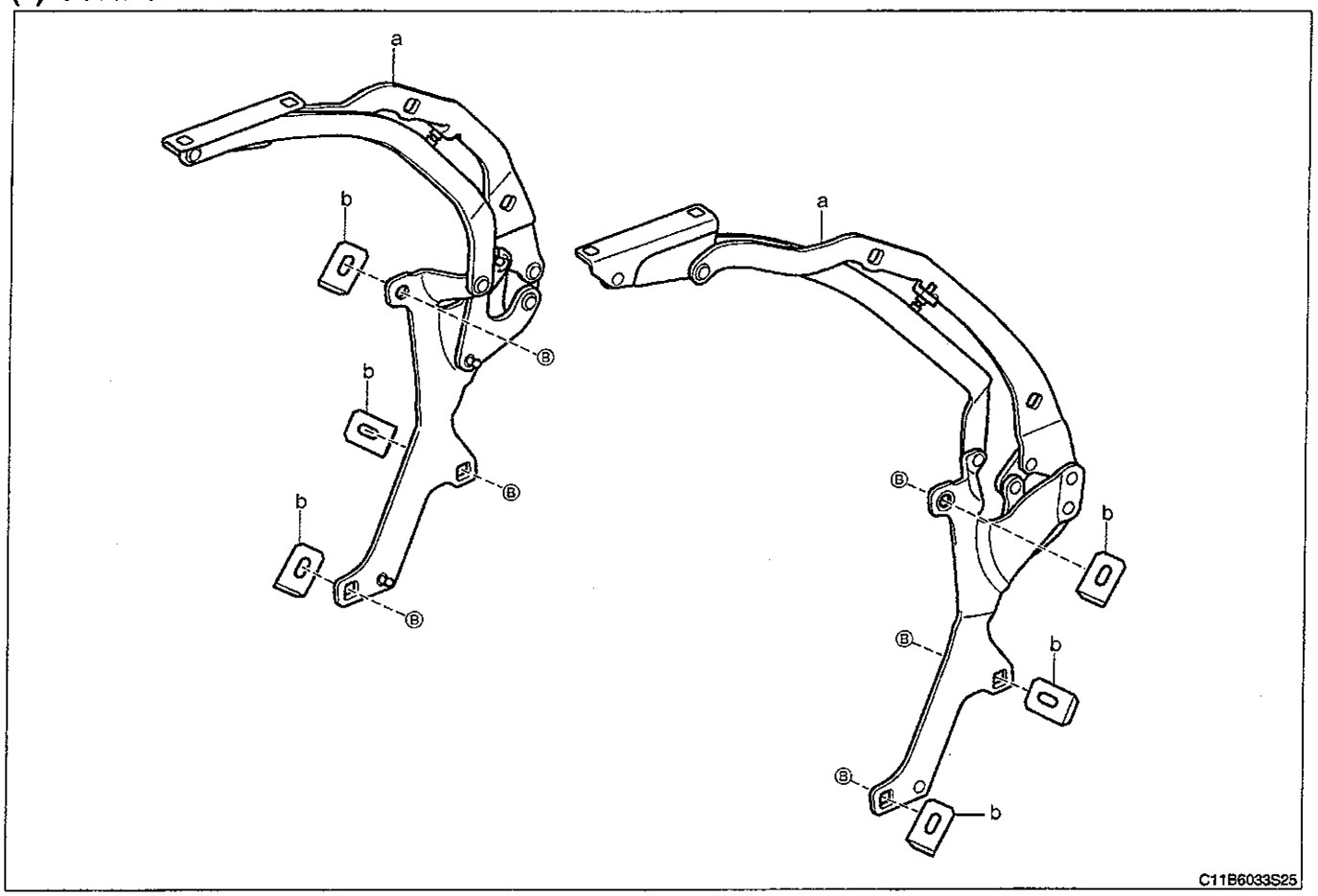
1.Remove the quarter trim panel RH/LH.
Refer to Page I2-28.

2.Remove the center floor side member RH/LH.
Refer to Page I1-29.

3.Remove the hydraulic cylinder.
Refer to Page I5-7.

3-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



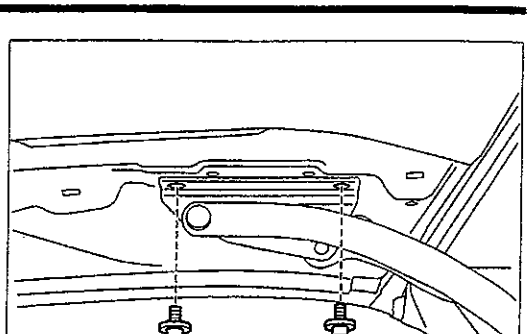
(2) REMOVAL AND INSTALLATION PROCEDURES

▼ ▲ 1 a Hinge, removable roof RH/LH
2 b Shim body mounting

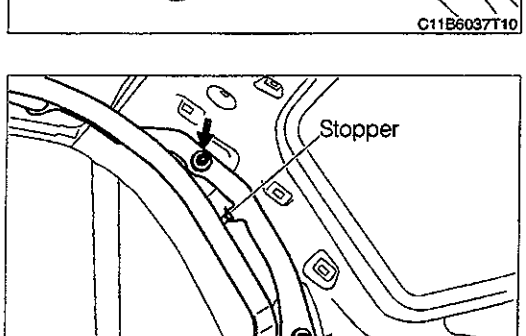
3-1-3 POINTS OF REMOVAL

(1) REMOVABLE ROOF HINGE RH/LH (ROOF LINK)

1.Remove the bolts that tighten the roof panel to the removable roof hinge.



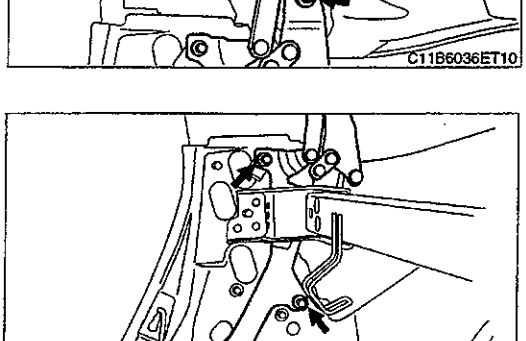
2.Remove the bolts that tighten the back panel to the removable roof hinge.



3.Remove the coupler of the defogger harness and remove the bolts shown in the right-hand illustration to remove the removable roof hinge.

CAUTION

- **Do not remove the removable roof hinges RH and LH at a time. When removing both hinges RH and LH, install either side of the hinge to adjust alignment and remove the other side of the removable roof hinge.**



3-1-4 POINTS OF INSTALLATION

(1) REMOVABLE ROOF HINGE RH/LH (ROOF LINK)

1.Adjust the removable roof hinge so that the attaching bolt may come at the center of the removable roof hinge installation hole (at the three positions), and temporarily tighten them.

2.After installing the removable roof hinge, adjust the alignment of the roof panel and back panel.
Refer to Page I1-10.

Refer to Page I1-12.

3-1-5 OPERATION AFTER INSTALLATION

1.Install the hydraulic cylinder.
Refer to Page I5-7.

2.Install the center floor side member RH/LH.
Refer to Page I1-29.

3.Install the quarter trim panel RH/LH.
Refer to Page I2-28.

4 LUGGAGE COMPARTMENT DOOR HINGE(LUGGAGE LINK)

4-1 DISASSEMBLING AND ASSEMBLING

4-1-1 OPERATION BEFORE DISASSEMBLY

1.Disconnect the battery negative terminal.

CAUTION

- It should be noted that the memories of the computers (engine control computer etc.) of other systems or radio settings are erased at the same time when the battery negative terminal is disconnected.

2.Remove the tonneau cover holder RH/LH.(luggage partition holder RH/LH)
Refer to Page I2-37.

3.Remove the tonneau cover Ay.(luggage partition)
Refer to Page I2-37.

4.Remove the luggage compartment cover RH/LH.
5.Remove the back door lock actuator.(side latch)
Refer to Page I5-14.

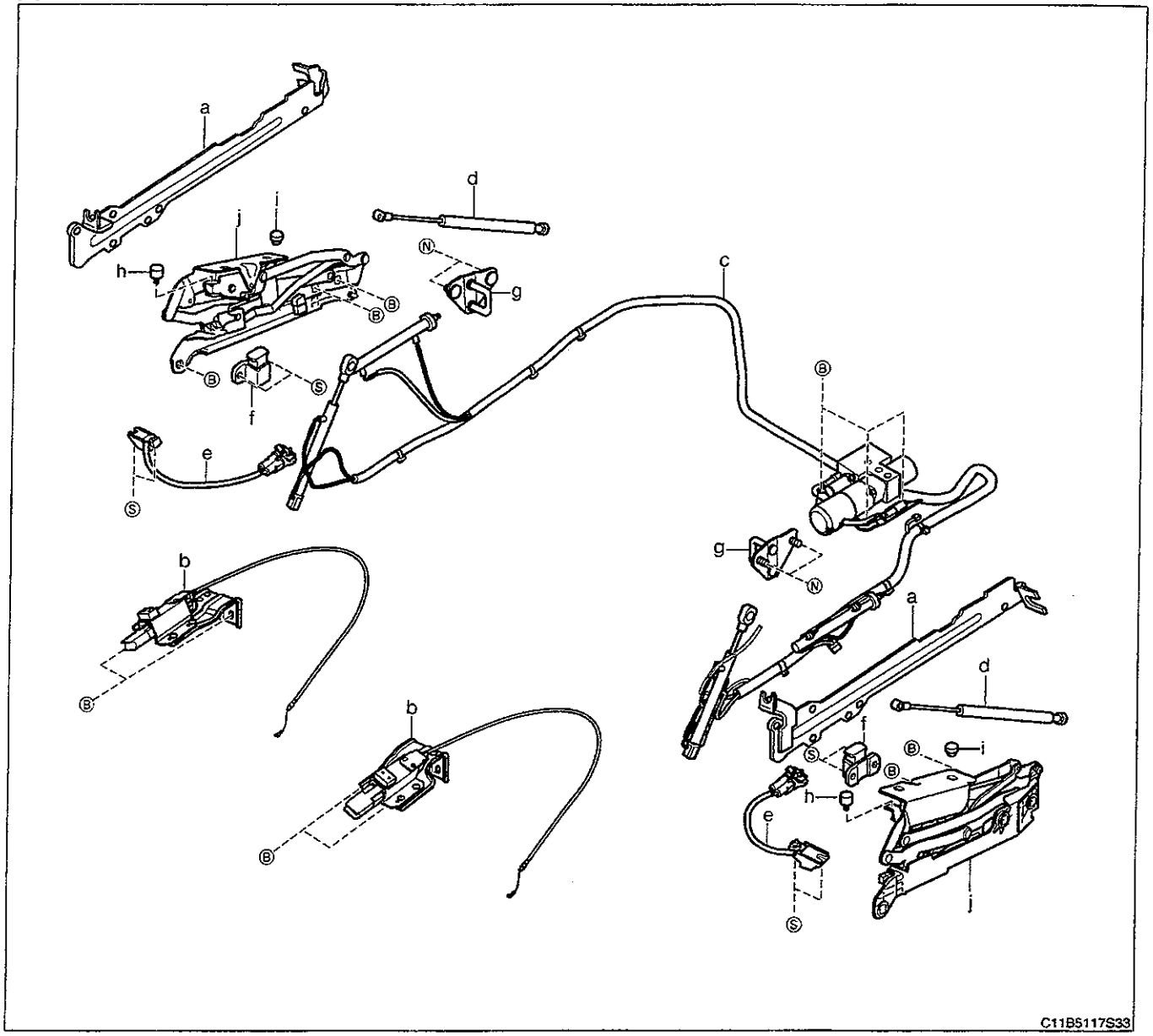
6.Remove the luggage compartment door panel.

WARNING

- Be careful not to allow your finger to be caught by the link.

4-1-2 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) COMPONENTS



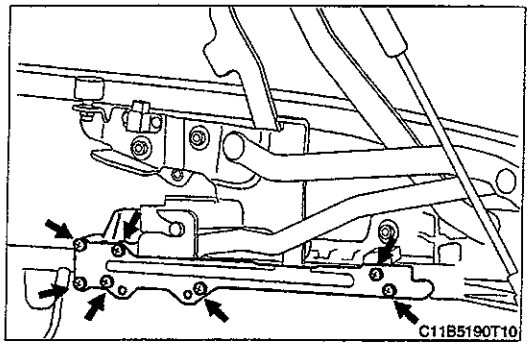
(2) DISASSEMBLING AND ASSEMBLING PROCEDURE

- ▼ 1 a Cover luggage compartment door hinge, RH/LH
- ▼ 2 b Stay Ay, removable roof, RH/LH
- ▼ ▲ 3 c Power supply Ay
- ▼ 4 d Stay Ay, luggage door
- 5 e Switch, luggage door closer
- 6 f Switch, luggage lock closer
- ▼ ▲ 7 g Striker Ay, luggage compartment door
- ▼ ▲ 8 h Cushion, luggage compartment door
- 9 i Cushion, luggage compartment door,No.2
- ▼ ▲ 10 j Hinge Ay, luggage compartment door
- ▼ ▲ 11 j Hinge Ay, luggage compartment door

4-1-3 POINTS OF DISASSEMBLY

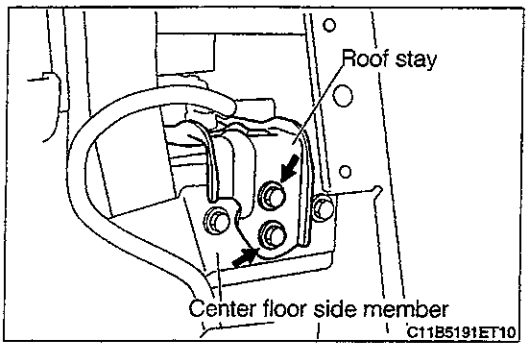
(1) LUGGAGE COMPARTMENT DOOR HINGE COVER

1.Remove the screws [seven locations] shown in the right-hand illustration to remove the luggage door hinge cover.

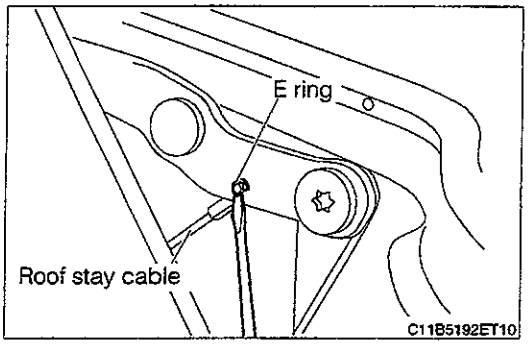


(2) REMOVABLE ROOF STAY AY

1.Remove the mounting bolts [two locations] to the center floor side member.

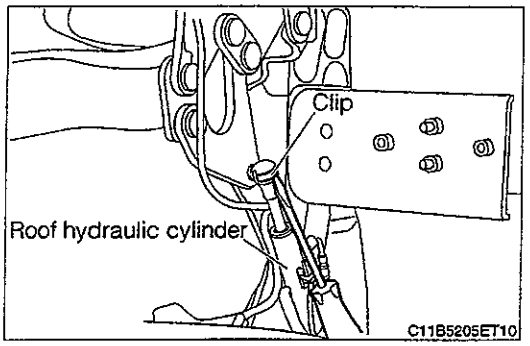


2.Remove the E-ring shown in the right-hand illustration to remove the removable roof stay cable and then remove the removable roof stay Ay.



(3) POWER SUPPLY AY

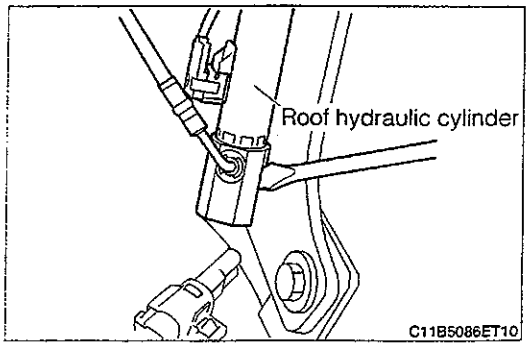
1.Use a flat screwdriver to slide up the back door stay plate, located at upper end of the roof hydraulic cylinder.



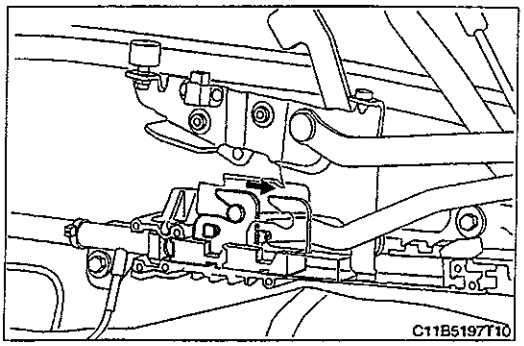
2.Use a flat screwdriver to pry the lower end of the roof hydraulic cylinder to disengage from the roof link and remove the roof hydraulic cylinder.

CAUTION

- Care should be taken not to bend the hydraulic hose.



3.Pull the sliding hook shown in the right-hand illustration to the rearward of the vehicle to disengage from the pin and remove the sliding hook.



CAUTION

- When the sliding hook is removed while the side latch is uninstalled, the luggage link can be opened both in front and to the rear. If the luggage link is moved in this condition, the link might be disassembled or damaged. Therefore, care should be take.

4.Cut off the harness band to remove the luggage hydraulic cylinder from the luggage door hinge.

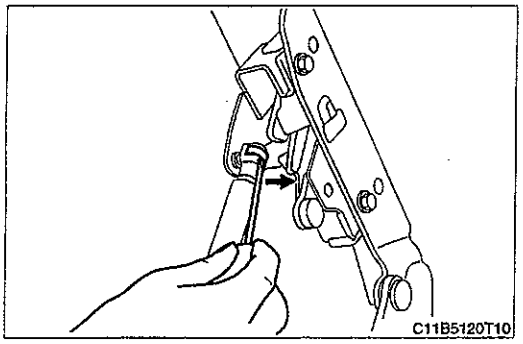
5.Remove the harness coupler to remove the hydraulic pump mounting bolts [three locations] and remove the power supply Ay.

CAUTION

- Care should be taken not to bend the hydraulic hose.

(4) LUGGAGE DOOR STAY AY

1.Use a flat screwdriver to pry the luggage door stay plate, located at both ends of the luggage door stay and remove the luggage door stay Ay.



(5) LUGGAGE COMPARTMENT DOOR STRIKER

CAUTION

- Do not remove the luggage compartment door striker or loosen the mounting nut unless the striker unit is to be replaced.

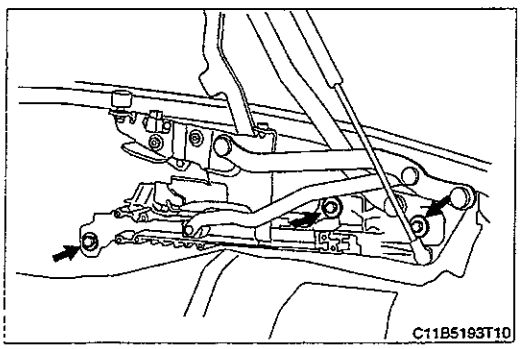
(6) LUGGAGE COMPARTMENT DOOR CUSHION

CAUTION

- Do not remove the luggage compartment door cushion or loosen the mounting nut unless the cushion unit is to be replaced.

(7) LUGGAGE COMPARTMENT DOOR HINGE AY (LUGGAGE LINK)

1.Remove the bolts [three locations] shown in the right-hand illustration to remove the luggage compartment door hinge Ay.



WARNING

- Be careful not to allow your finger to be caught by the link.

CAUTION

- Now the luggage link can be opened both in front and to the rear. If the luggage link is moved in this condition, the link might be disassembled or damaged. Therefore, care should be taken not to move the link.

4-1-4 POINTS OF ASSEMBLY

(1) LUGGAGE COMPARTMENT DOOR HINGE AY (LUGGAGE LINK)

1.Adjust the mounting bolts so that the bolts sit at the center of the mounting holes [three locations] of the luggage compartment door hinge and temporarily tighten them.

CAUTION

- As the side latch is not installed, the luggage link can be opened both in front and to the rear when the sliding hook is removed. If the luggage link is moved in this condition, the link might be disassembled or damaged. Therefore, care should be taken.

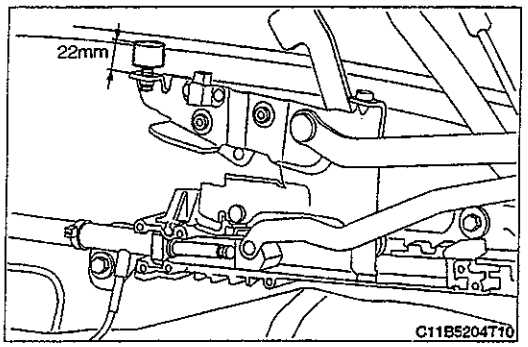
(2) LUGGAGE COMPARTMENT DOOR CUSHION

1.When installing the luggage compartment door cushion, adjust the distance between the link and the cushion lower to maintain 22mm prior to installation.

SPECIFIED VALUE: 22mm

CAUTION

- Do not remove the luggage compartment door cushion or loosen the mounting nut unless the cushion unit is to be replaced.



(3) LUGGAGE COMPARTMENT DOOR STRIKER AY

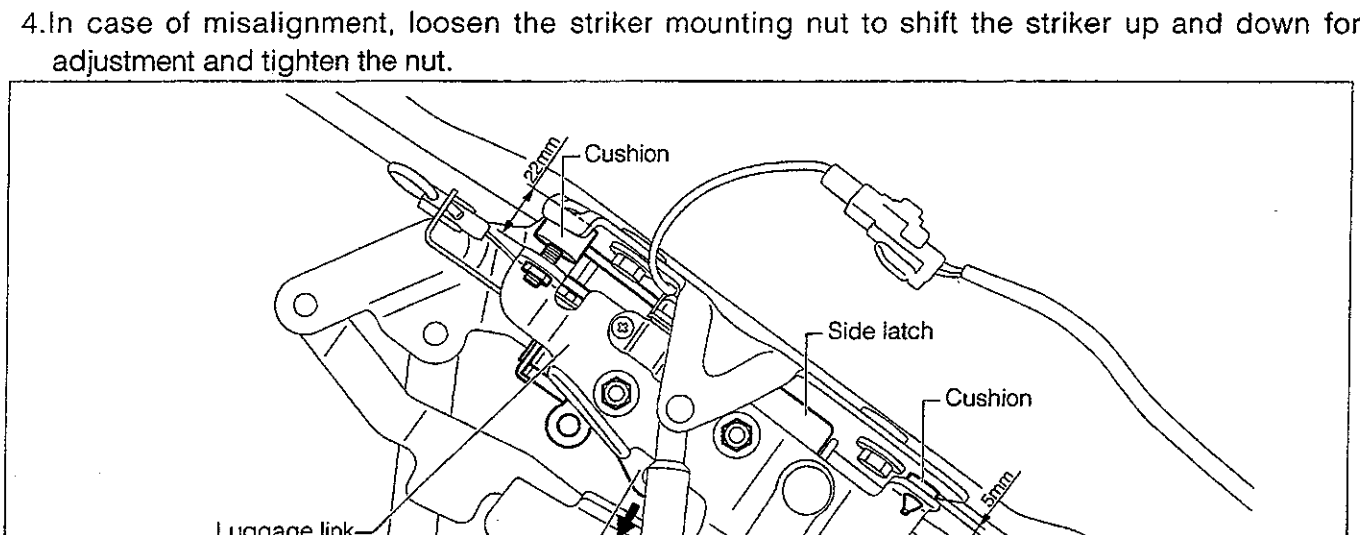
1. Install the striker and temporarily tighten it.
2. Full-lock the back door lock actuator Ay (side latch) unit, which had been removed, onto the striker and then give temporary tightening.

CAUTION

- Care should be taken not to bend the tube that holds the back door lock actuator (side latch) cable.
- Latch is locked(full lock) securely.
- Do not move the link carelessly until the latch is locked onto the striker and the side latch mounting bolt is installed to ensure that the trunk lid opens at the rear.

3. Ensure that the cushion portion in front and the rear of the luggage link is in contact (zero touch) with the link as shown in the illustration below.
   SPECIFIED VALUE: Luggage compartment door cushion:22mm.
   SPECIFIED VALUE: Luggage compartment door cushion No2:5mm.

4. In case of misalignment, loosen the striker mounting nut to shift the striker up and down for adjustment and tighten the nut.



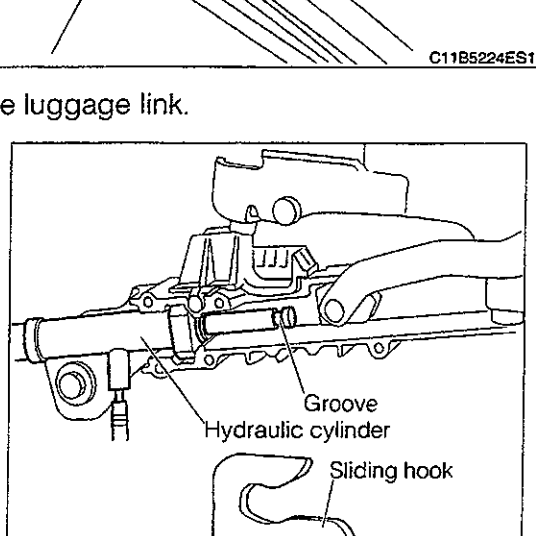
5. Remove the back door lock actuator Ay (side latch) from the luggage link.

(4) POWER SUPPLY AY

1. Install the luggage hydraulic cylinder to the luggage compartment door hinge.
2. Install the sliding hook to the luggage compartment door hinge.

CAUTION

- Install the sliding hook so that the notch of the hook fits into the luggage hydraulic cylinder slot.
- After the sliding hook is installed, press the sliding hook fully toward the vehicle front to prevent unevenness created in right and left.
- As the side latch is not installed, the luggage link can be opened both in front and to the rear when the sliding hook is disengaged from the pin. If the luggage link is moved in this condition, the link might be disassembled or damaged. Therefore, care should be taken not to move the link.



4-1-5 OPERATION AFTER ASSEMBLY

1.Install the luggage compartment door panel.
2.Install the back door lock actuator.(side latch)
Refer to Page I5-14.

3.Adjust the trunk lid alignment.
Refer to Page I1-13.

4.Install the rear floor carpet.
5.Install the tonneau cover holder RH/LH.(luggage partition holder RH/LH)
Refer to Page I2-37.

6.Install the tonneau cover Ay.(luggage partition)
Refer to Page I2-37.

7.Connect the battery negative terminal.
8.Open the trunk lid in the roof mode (front opening) and in the trunk mode (rear opening) to ensure the smooth operation.

5 BACK DOOR LOCK ACTUATOR (SIDE LATCH)

5-1 REMOVAL AND INSTALLATION

5-1-1 OPERATION BEFORE REMOVAL

1.Disconnect the battery negative terminal.

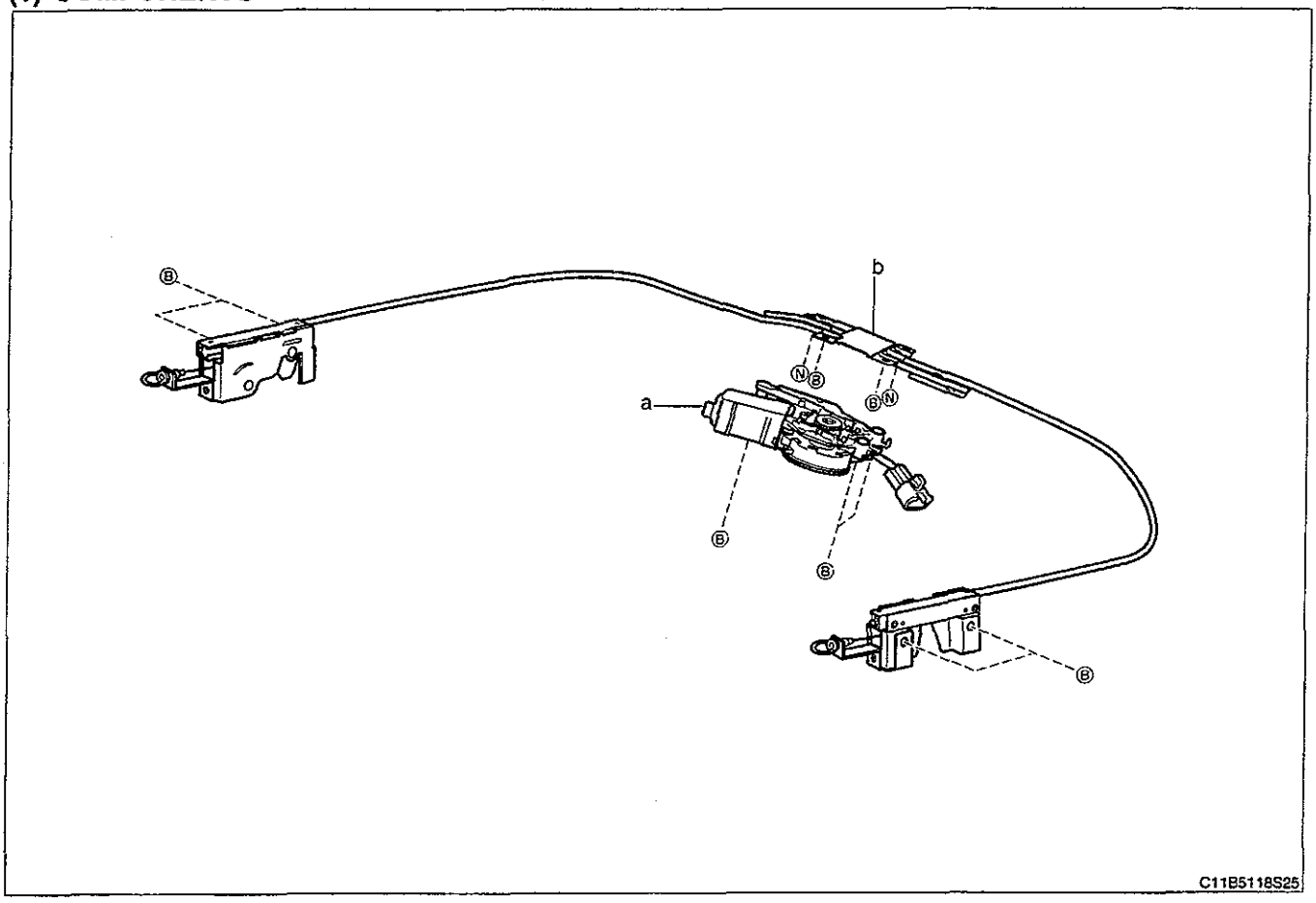
CAUTION

- It should be noted that the memories of the computers (engine control computer etc.) of other systems or radio settings are erased at the same time when the battery negative terminal is disconnected.

2.Remove the luggage compartment door cover.

5-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

▲ 1 a Motor Ay, door control, RR
2 b Latch S/A, side gate support

5-1-3 POINTS OF INSTALLATION

(1) DOOR CONTROL REAR MOTOR AY

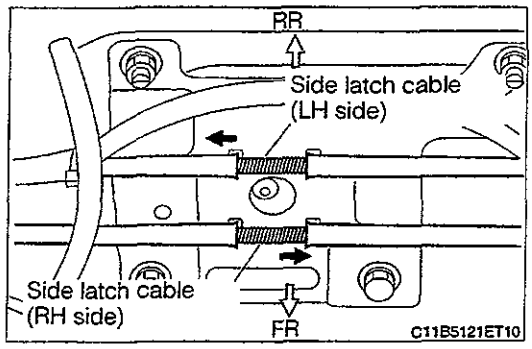
1.Bring the stone at the forward end of the cable into light contact with the stopper by moving each of the cables leading to RH and LH to the forward direction of the vehicle.

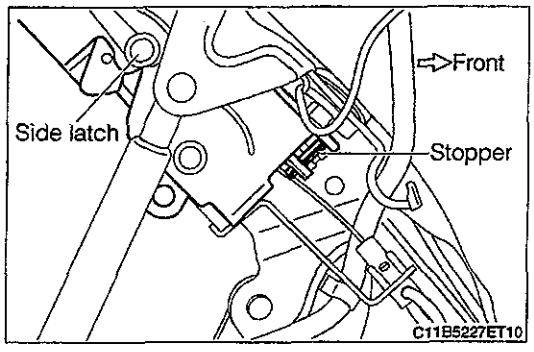
CAUTION

- **Ensure that the stones touch both RH and LH latch stoppers in order to prevent RH and LH latches from being out of synchronizing.**

2.Install the door control motor while the stones touch the stopper. Then initialize the side latch before closing the trunk lid.

Refer to Page I5-29.





5-1-4 OPERATION AFTER INSTALLATION

1.Install the luggage compartment door cover.
2.Connect the battery negative terminal.

6 ROOF LOCK

6-1 REMOVAL AND INSTALLATION

6-1-1 OPERATION BEFORE REMOVAL

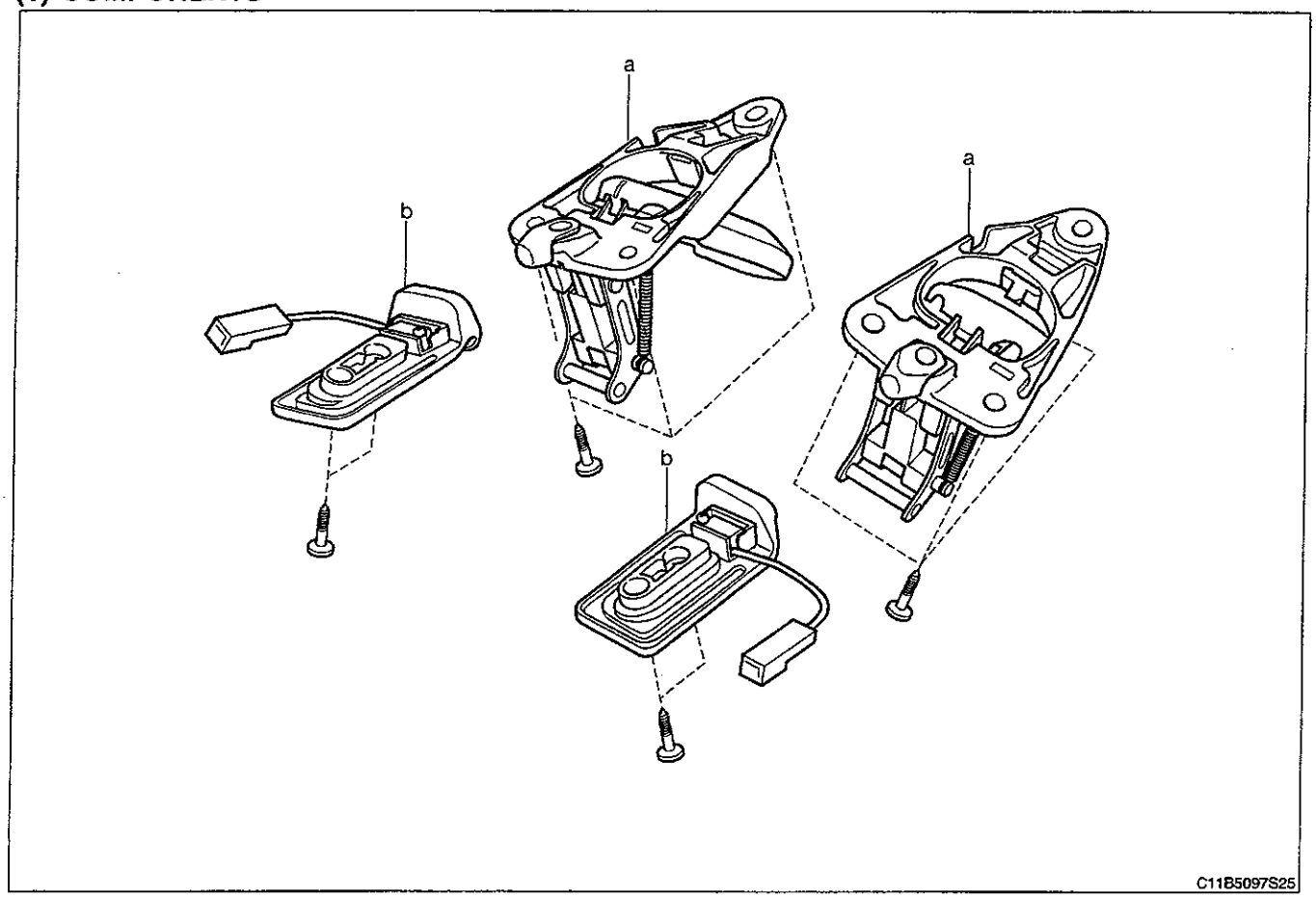
1.Disconnect the battery negative terminal.

CAUTION

- It should be noted that the memories of the computers (engine control computer etc.) of other systems or radio settings are erased at the same time when the battery negative terminal is disconnected.

6-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Hook, removable roof auxiliary, RH/LH
2 b Catch, center lock, RH/LH

6-1-3 OPERATION AFTER INSTALLATION

1.Connect the battery negative terminal.

7 LIMIT SWITCH AY(OPENING COVER SW AY)

7-1 REMOVAL AND INSTALLATION

7-1-1 OPERATION BEFORE REMOVAL

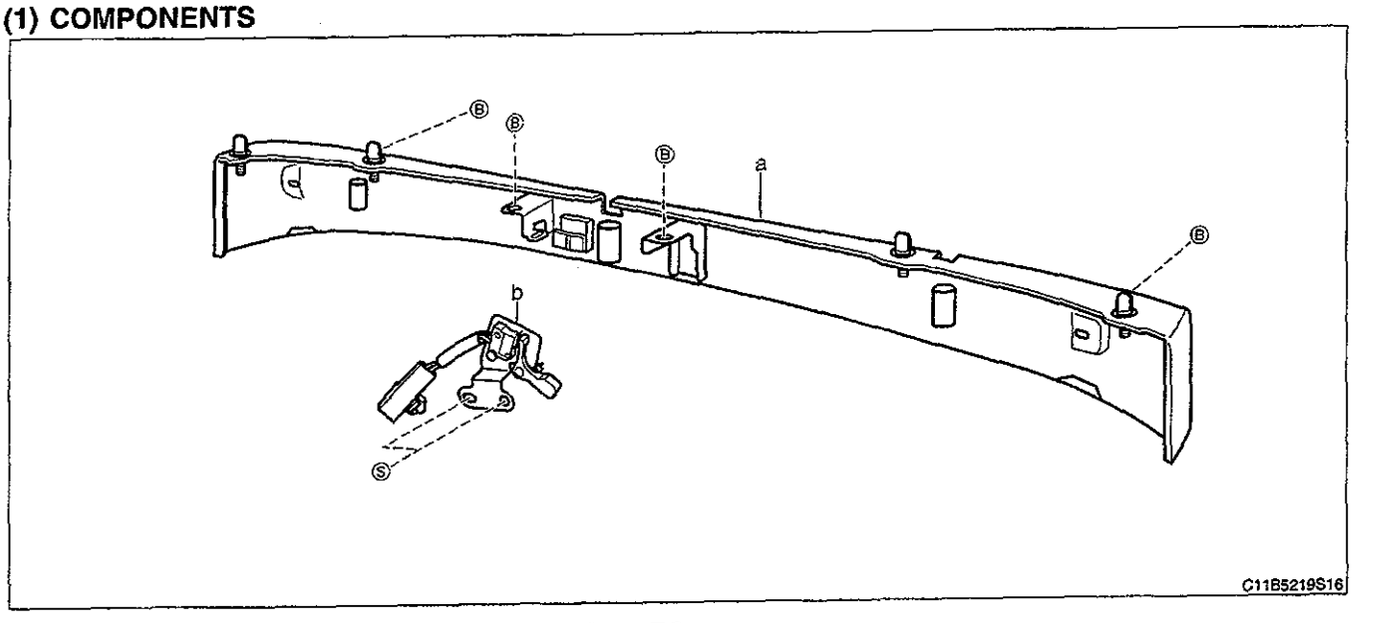
1.Disconnect battery negative terminal.

CAUTION

•• It should be noted that the memories of the computers (engine control computer etc.) of other systems or radio settings are erased at the same time when the battery negative terminal is disconnected.

7-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Cover, package tray trim
2 b Switch Ay, limit switch

7-1-3 OPERATION AFTER INSTALLATION

1.Connect the battery negative terminal.

8 LIMIT SWITCH AY(LUGGAGE PARTITION SW AY)

8-1 REMOVAL AND INSTALLATION

8-1-1 OPERATION BEFORE REMOVAL

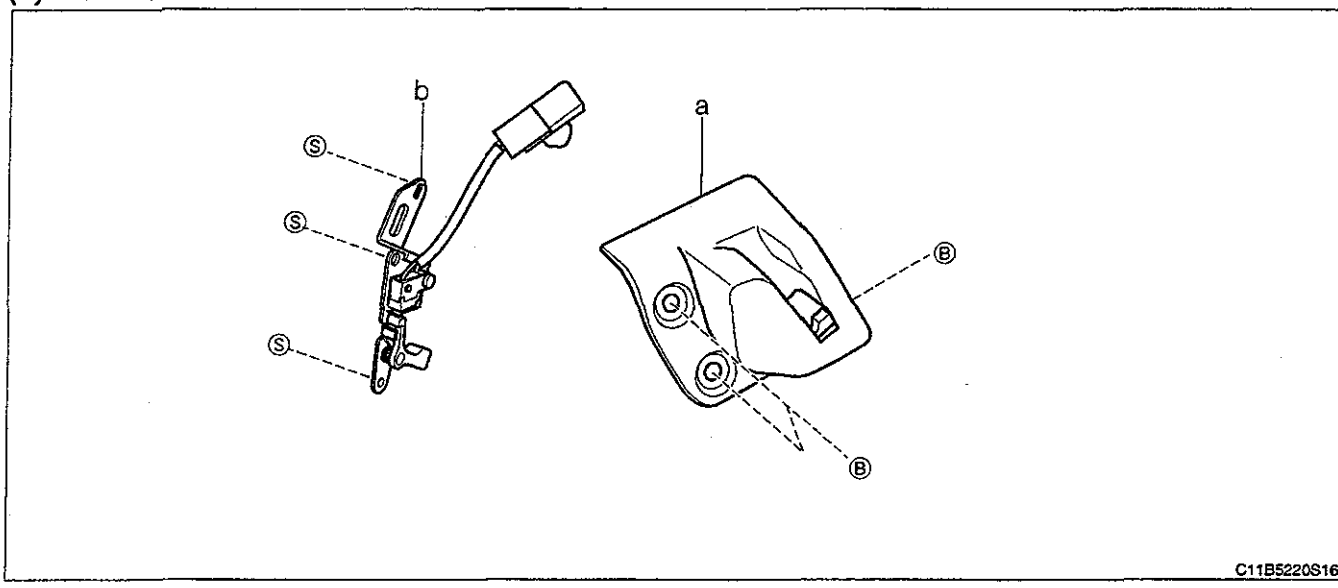
1.Disconnect the battery negative terminal.

CAUTION

- It should be noted that the memories of the computers (engine control computer etc.) of other systems or radio settings are erased at the same time when the battery negative terminal is disconnected.

8-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Holder tonneau cover, LH
2 b Switch Ay, limit

8-1-3 OPERATION AFTER INSTALLATION

1.Connect the battery negative terminal.

9 METAL TOP ROOF CONTROL COMPUTER AY(POWER WINDOW ECU)

9-1 REMOVAL AND INSTALLATION

CAUTION

- Be careful not to drop the computer or give great impacts to it.
- If the computer dropped or was subjected to great impacts, replace it with a new one even if there is no abnormality in its external appearance.

9-1-1 ARTICLES TO BE PREPARED

TOOL: Clip remover

9-1-2 OPERATION BEFORE REMOVAL

1.Disconnect the battery negative terminal.

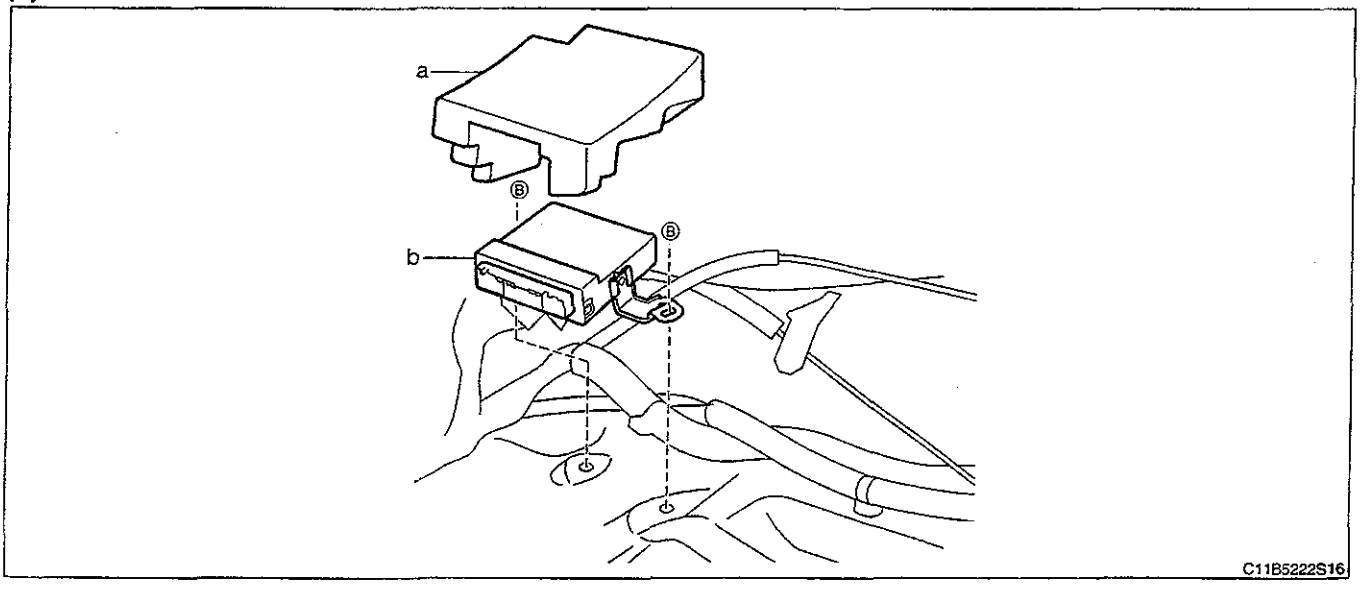
CAUTION

- It should be noted that the memories of the computers (engine control computer etc.) of other systems or radio settings are erased at the same time when the battery negative terminal is disconnected.

2.Remove the luggage compartment cover RH.

9-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Cover, computer
2 b Computer Ay, metal top roof control

9-1-4 INSPECTION

(1) COMPUTER EXTERNAL APPEARANCE CHECK

1.Replace the computer with a new one in the following cases.
(1) Case where the computer has deformation, abrasion, cracks or breakage.

9-1-5 OPERATION AFTER INSTALLATION

1.Install the luggage compartment door cover RH.
2.Connect the battery negative terminal.

10 METAL TOP ROOF CONTROL COMPUTER AY(ROOF ECU)

10-1 REMOVAL AND INSTALLATION

CAUTION

- Be careful not to drop the computer or give great impacts to it.
- If the computer dropped or was subjected to great impacts, replace it with a new one even if there is no abnormality in its external appearance.

10-1-1 OPERATION BEFORE REMOVAL

1.Disconnect the battery negative terminal.

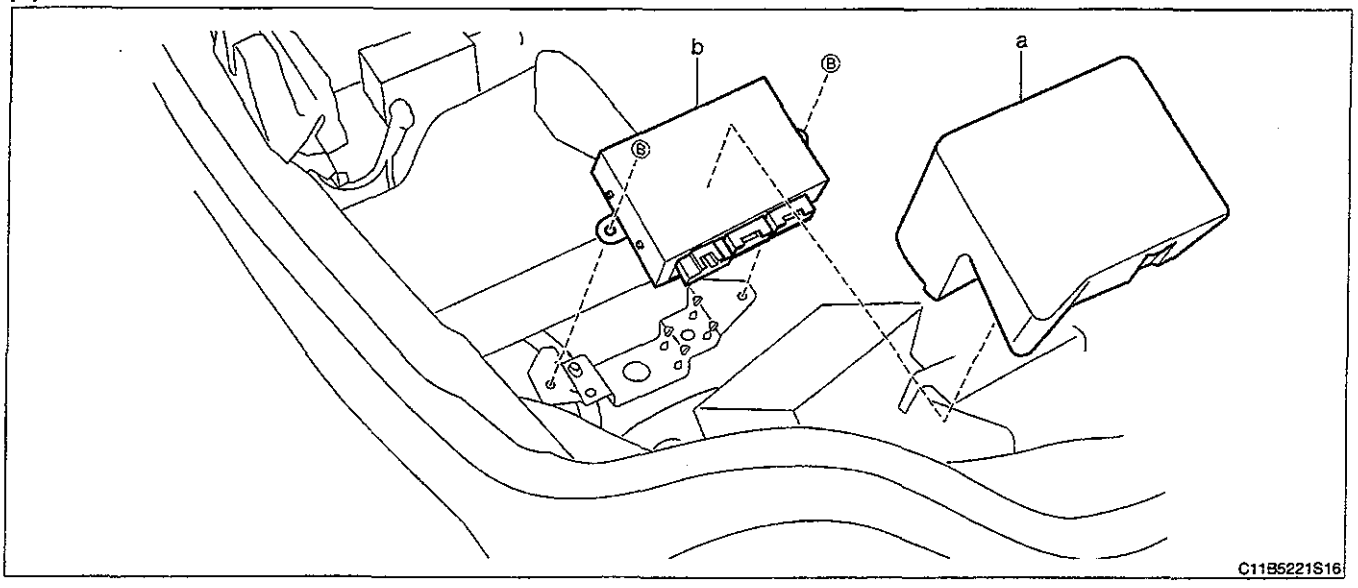
CAUTION

- It should be noted that the memories of the computers (engine control computer etc.) of other systems or radio settings are erased at the same time when the battery negative terminal is disconnected.

2.Open the cover of the rear floor carpet rear end.

10-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Cover, computer
2 b Computer Ay, metal top roof control

10-1-3 INSPECTION

(1) COMPUTER EXTERNAL APPEARANCE CHECK

1.Replace the computer with a new one in the following cases.

(1) Case where the computer has deformation, abrasion, cracks or breakage.

10-1-4 OPERATION AFTER INSTALLATION

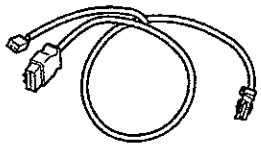
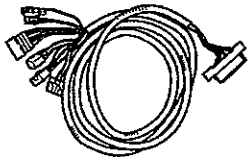
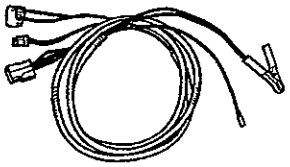
1.Connect the battery negative terminal.

2.Close the cover of the rear floor carpet rear end.

11 CONTROL SYSTEM

11-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09991-87403-000	Wire, diagnosis check
	09991-87404-000 (09991-87401-000)	Wire, engine control system inspection
	09842-97207-000	Sub-harness set, roof computer check
	09842-97208-000	Sub-harness set,removal roof drive

Instrument

Voltage tester

11-2 HANDLING INSTRUCTIONS OF CONTROL SYSTEM

WARNING

- Use caution in opening/closing the roof or the trunk lid manually or forcibly by the hydraulic pump to prevent your finger(s) from being caught in the link mechanism.

CAUTION

- Before the hydraulic pump drives forced full open of the roof or forced open/close of the trunk lid, ensure that no luggage sits in the trunk room.

11-2-1 HOW TO CLOSE THE ACTIVE TOP (POWER OPEN/CLOSE ROOF) MANUALLY

(1) ARTICLES TO BE PREPARED

Lubricant, adhesive, others

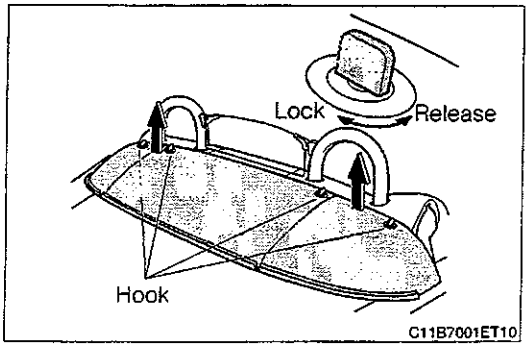
Rope

(2) OPERATING PROCEDURE

1.For the vehicle equipped with the opening cover, unlock the opening cover hooks at four locations to lift up and remove the opening cover.

NOTE

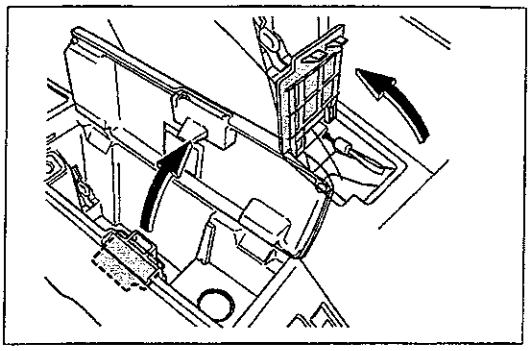
- If the trunk lid can be opened by means of the trunk lid open switch or remote control of the transmitter, open the trunk lid and remove the opening cover. Proceed to Step 5 and open the trunk lid.



2.Remove the bottom cover located inside the console box.

NOTE

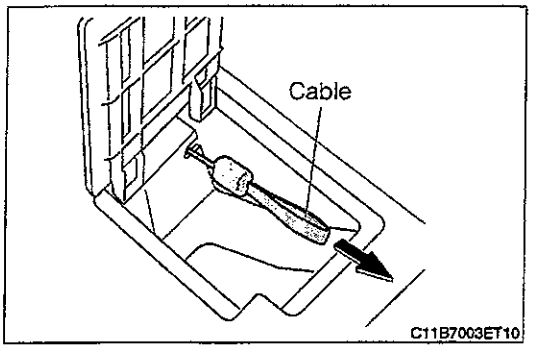
- Use a flat screwdriver to remove the cover, as the cover is not easily opened by hand.



3. Pull the emergency trunk lid opener to unlock the trunk. (Unlock the center latch.)

CAUTION

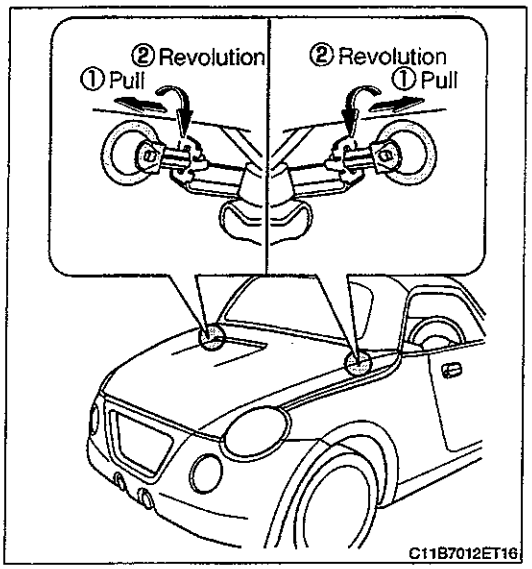
- Ensure that the cable that had been pulled is back into position.



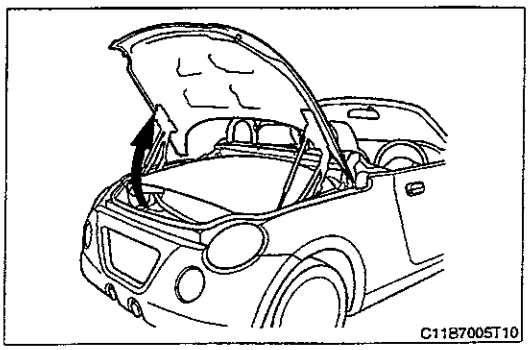
4.Pull the side latch emergency cable (blue hook) located on both sides of the trunk lid and rotate 90°to prevent the cable from turning.

CAUTION

- Pull both hooks fully.
- Ensure that the cable is pulled and held.



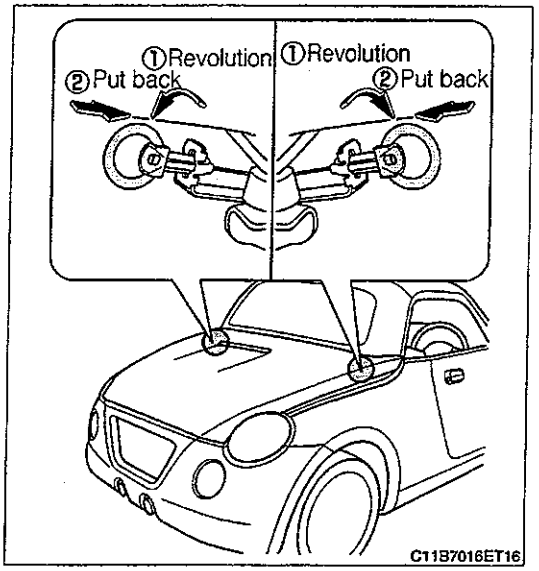
5.Fully depress the trunk lid.



6.Rotate the side latch emergency cable (blue hook) fixed on both sides in the direction indicated by an arrow in the right-hand illustration and return the cable.

CAUTION

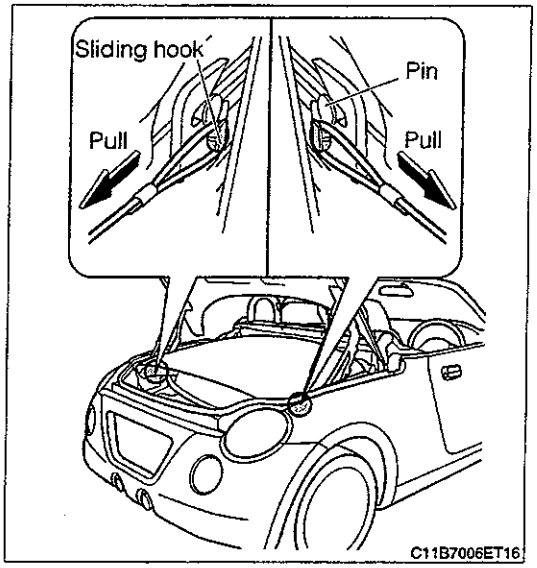
- Ensure that the side latch emergency cable is back into position.



7.Hang the string over the sliding hook on the RH and LH luggage links and carefully pull it until disengaged form the pin.

CAUTION

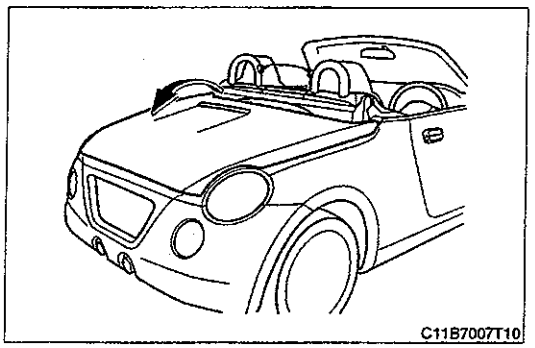
- Wear gloves during the operation.



8.Close the trunk lid until it is slightly raised.

CAUTION

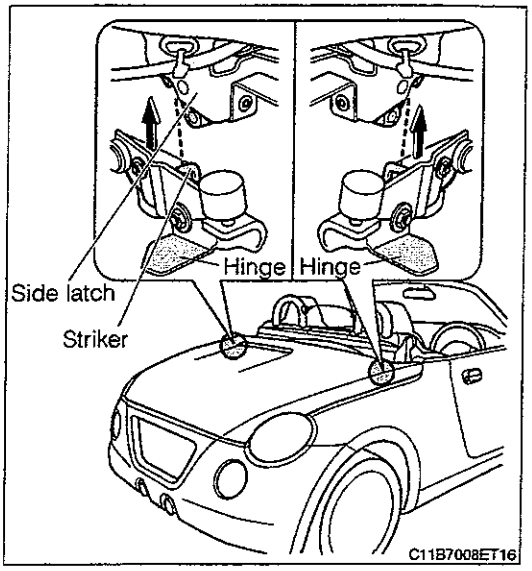
- Close the center latch just before the latch is locked.
- If the latch is locked, pull the trunk lid opener to release the lock. (Ensure that the cable is back into position after the lock is released.)



9.Open the trunk lid in the roof mode (front opening) to allow access. Then, carefully lift up the bottom of the hinges of the RH and LH luggage links to open in the roof mode. And push the hinges up while holding the trunk lid from both sides until click. (Lock the side latch and the striker of the luggage link.)

WARNING

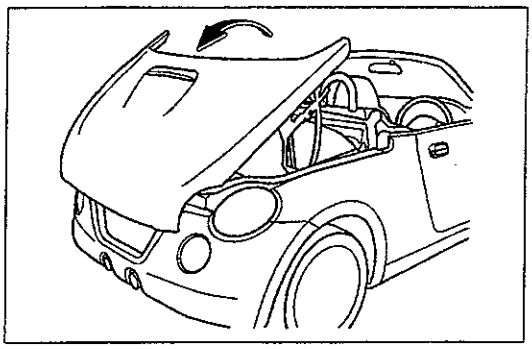
- **Be careful not to allow your finger to be caught by the link.**



10.Slowly open the trunk lid to its full open position in the roof mode. (front opening)

CAUTION

- **Keep opening the trunk lid until it opens fully at the roof mode. (front opening)**
- **Do not apply excessive force to the trunk lid.**



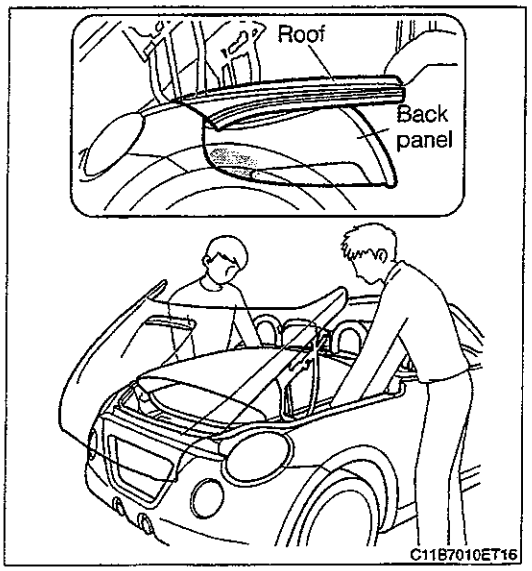
11.Hold the back panel and the roof on both sides of the vehicle and slowly lift them up in a parallel motion to close the roof.

WARNING

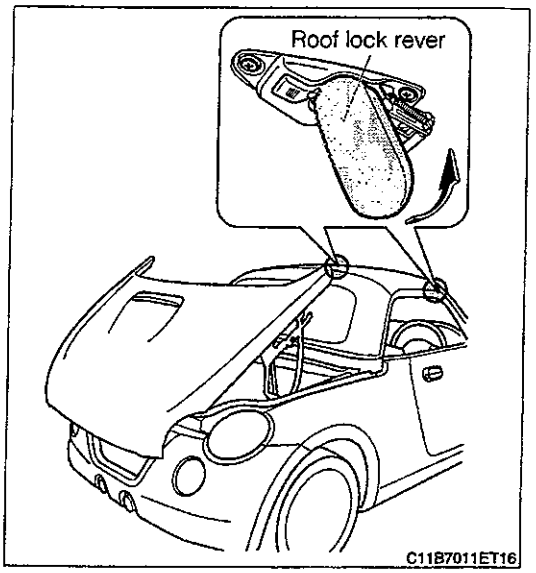
- **Be careful not to allow your fingers or the like to be caught at the gap between the roof and the back panel.**

CAUTION

- **This operation requires two people. Each person shall stand on each side at the rear of the vehicle and perform the operation in harmony.**
- **Do not lift up only the roof or the back panel, but hold both the roof and the back panel to lift.**
- **Before lifting, ensure that the roof lock and the roof stay are not engaged. If they are engaged, use a screwdriver or some other tool to pry and disengage from the roof stay.**



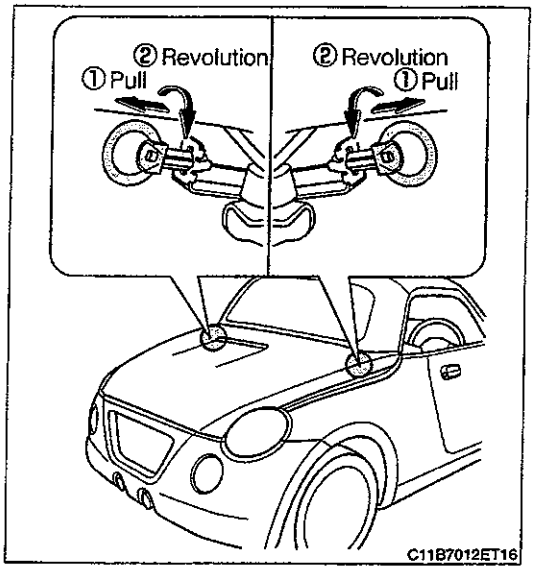
12.Close the roof and then push up the roof lock lever at the roof front to lock it.



13.To open the trunk lid in the trunk mode (rear opening), close the trunk lid until just before the lock engages. While pulling the side latch emergency cable (blue hook), rotate and lock the cable to prevent returning. Then switch from the roof mode (front opening) to the trunk mode.

CAUTION

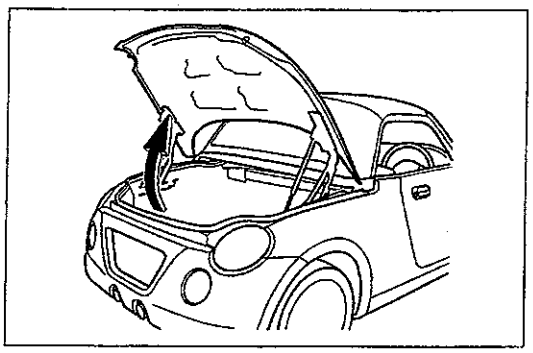
- **Close the center latch just before the latch is locked.**
- **If the center latch is locked, pull the trunk lid opener (for emergency) to release the lock. (Ensure that the cable is back into position.)**



14.Open the trunk lid in the trunk mode (rear opening) while holding the RH and LH front ends of the trunk lid.

CAUTION

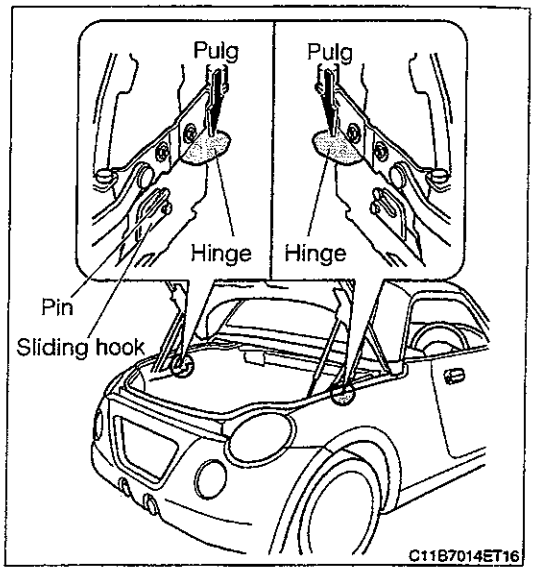
- **Now the luggage link can be moved in the roof mode (front opening) direction, too. Therefore, hold RH and LH front ends of the trunk lid to prevent moving in the roof mode direction.**



15.Press the hinge of the luggage link from the top until the sliding hook reaches in alignment with the pin.

NOTE

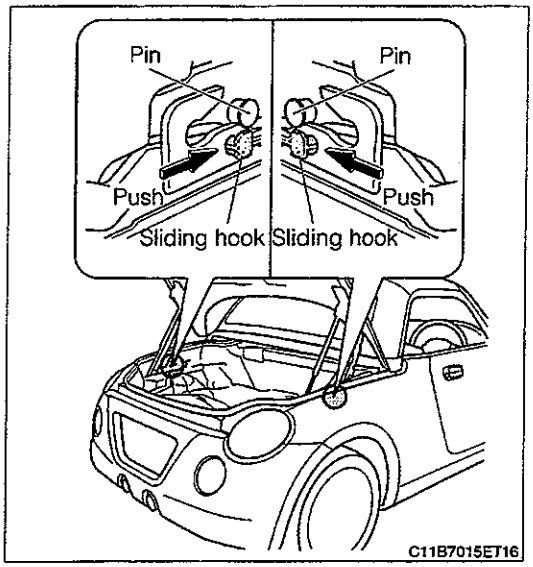
- As the sliding hook of the luggage link and the pin are not engaged, the luggage link can also be operated in roof mode. (front opening)



16.Use a hammer handle or the like to slide down the sliding hooks of RH and LH luggage links so that the trunk lid will not open in the roof mode. (front opening)

CAUTION

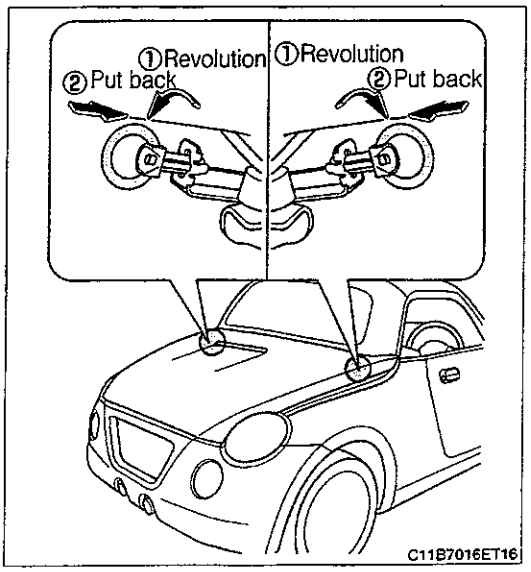
- In Step 15, securely press the hinge and ensure that the sliding hook and the pin are at the position shown in the right-hand illustration.
- Press the sliding hook fully to prevent unevenness created in right and left.



17.Rotate the side latch emergency cable (blue hook) fixed on both sides in the direction indicated by an arrow in the right-hand illustration and return the cable.

CAUTION

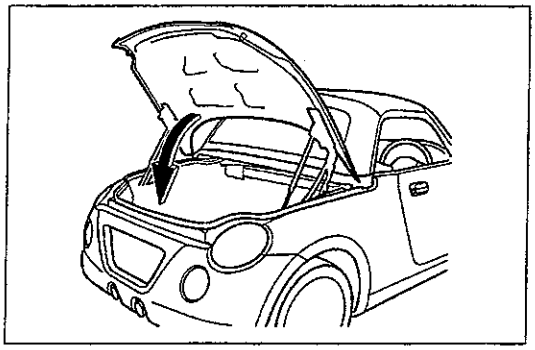
- Ensure that the side latch emergency cable is back into position.



18.Close the trunk lid.

NOTE

- Do not close the trunk lid when performing malfunction diagnosis.
- When opening the trunk lid manually, easy-closure function is inoperative. Press both sides and the rear center of the trunk lid to lock the center latch and the side latch manually. After manual lock is complete, press the trunk lid.

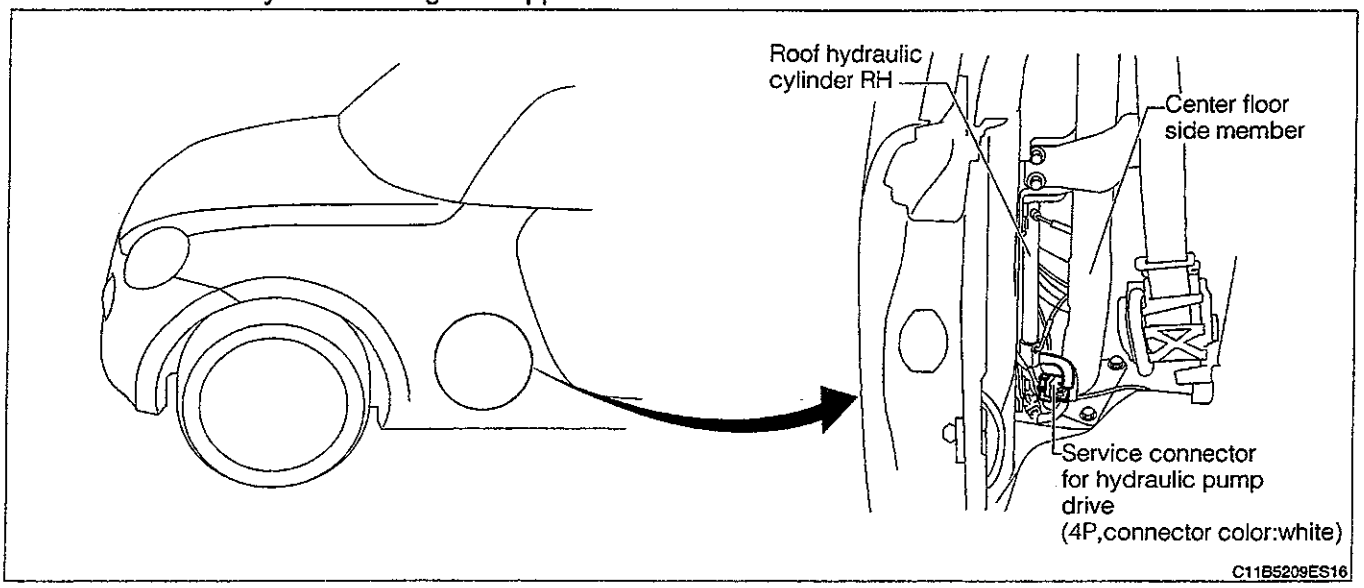


11-2-2 FORCED DRIVING OF HYDRAULIC PUMP

1.Connect the SST (for battery supply voltage) to the service connector (4P female) located under the quarter window RH lower. Supply battery voltage to the hydraulic pump in order to force open/close the trunk lid.
SST: 09842-97208-000

CAUTION

- Supply voltage while RH and LH roof locks are "locked", as both the roof and the trunk lid move simultaneously when voltage is supplied.



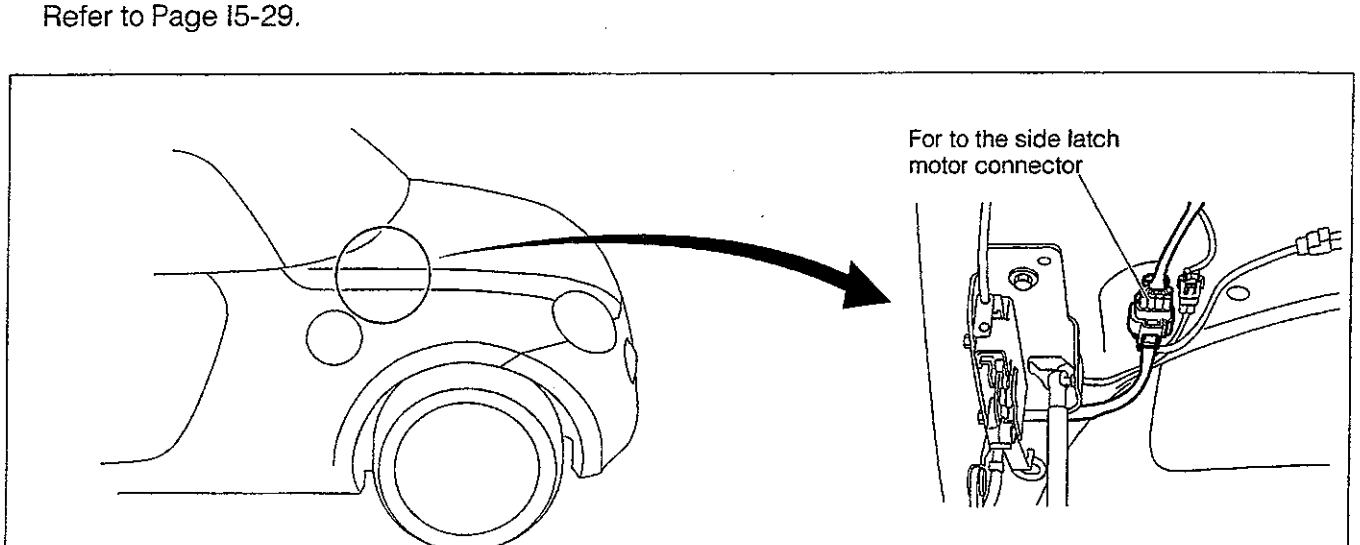
11-2-3 FORCED DRIVING OF SIDE LATCH MOTOR

1.Connect the SST (for battery supply voltage) to the side latch motor connector (8P female) located left front of the trunk lid in order to force the side latch motor to activate.
SST: 09842-97208-000

CAUTION

- Do not force the side latch motor to activate while the trunk lid is front opening.
- Rotate the side latch slowly while checking its condition.
- Initialize the side latch after the SST is used to force the motor to activate.

Refer to Page I5-29.



11-2-4 INITIALIZING THE SIDE LATCH (INITIALIZATION)

Initialize the side latch (initialization) when any of the following operations is performed or condition is encountered.

(1) When the SST is used to force the side latch motor to activate.
(2) When the side latch motor is removed.
(3) When the active top (power open/close roof) system is given emergency maintenance.
(4) When the trunk lid will not open.

CAUTION

- In cases (1) to (3), initialization shall be performed while the trunk lid is open.

NOTE

- When the trunk lid will not open, initializing the side latch might correct the condition back to normal.

(1) HOW TO INITIALIZE

1.Press and hold the trunk lid open switch for 10 seconds or more.
2.Take your hand off the switch and press the switch again within 2 seconds.

11-2-5 SYSTEM MAINTENANCE WORK PROCEDURE (IN CASE THE SIDE LATCH EMERGENCY CABLE CANNOT BE PULLED.)

When the power open/close roof system is given emergency maintenance, some system shutdown status might create a condition where the side latch emergency cable cannot be pulled, causing manual opening operation of the trunk lid inoperative. In this case, follow the procedures given below to perform emergency maintenance. If the trunk lid can be opened manually, go to the relevant troubleshooting and initialize the side latch prior to operation checks.

Refer to Page I5-29.

(1) WORK PROCEDURE FROM HALF WAY STOPPAGE OF THE ROOF

1.The roof stops.

2.Be sure to disconnect the battery negative terminal.

CAUTION

- The vehicle harnesses are used to connect the SST (for battery supply voltage). If the operation is carried out without removing the battery negative terminal, connect will occur.

3.Make the trunk lid fully open at the front by hand.

4.Remove the connector (8P) leading to the side latch motor located at the left/front of the trunk lid. Connect the SST. (sub wire)

Refer to Page I5-28.

5.Fully close the trunk lid by hand.

6.Connect the SST terminal to the battery and unlock the side latch.

NOTE

- Battery connection terminal: 4 (SLDM+ /⊕terminal) , 1 (SLDM− /battery negative terminal)

7.While holding the forward end of the trunk lid, lift the rear end so that the trunk lid opens at the rear.

CAUTION

- The luggage link can be opened both in front and to the rear when the sliding hook is disengaged from the pin. If the luggage link is moved in this condition, the link might be disassembled or damaged. When opening the trunk lid to the rear, hold the front end of the door and carefully do so by preventing the door from opening in front.

8.Push the sliding hooks at both right and left of the luggage link as far as they will go.

9.Perform the troubleshooting.

10.With the trunk lid opening at the rear, pull the sliding hooks at both right and left of the luggage link to disengage them from the pin.

CAUTION

- The luggage link can be opened both in front and to the rear when the sliding hook is disengaged from the pin. If the link is moved in front while opening to the rear, the link might be disassembled or damaged. Therefore, care should be taken not to move the link in front.

11.Close the trunk lid. (Confirm that the SST is connected to the connector (8P) leading to the side latch motor)

Refer to Page I5-28.

12.With the trunk lid held at both right and left, connect the SST terminal to the battery and lock the side latch.

NOTE

- Battery connection terminal: 4 (SLDM+ / ⊕terminal) , 1 (SLDM− / battery negative terminal)

13.With the trunk lid opening at the front, remove the SST. Reinstall the connector leading to the side latch motor and connect the battery.

14.Set the ignition key to the "ON" position. Operate the roof open/close switch in the close direction to fully close the roof.

15.Press the trunk lid open switch and make the trunk lid open at the rear. Press the open switch again for at least ten seconds. Then, within two seconds, press the open switch again to initialize the side latch.

(2) WORK PROCEDURE FROM THE TRUNK LID FULL CLOSE AND THE ROOF FULL OPEN (IN CASE OF A VEHICLE EQUIPPED WITH THE OPENING COVER)

1.The roof stops. (Side latch emergency cable inoperative.)
2.Be sure to disconnect the battery negative terminal.

CAUTION

- The vehicle harnesses are used to connect the SST (for battery supply voltage). If the operation is carried out without removing the battery negative terminal, short-circuit will occur.

3.Unlock the center latch by pulling the trunk lid opener (for emergency use) inside the rear console box.
4.Connect the SST (for battery supply voltage) to the service connector (4P female) located under the quarter window RH lower. (sub wire)
5.Connect the battery to the SST and make the trunk lid fully open at the front.
6.Remove the opening cover.
7.Remove the SST and reinstall the connector.
8.Fully close the roof by hand.
9.Remove the connector (8P) leading to the side latch motor located at the left/front of the trunk lid. Connect the SST (sub wire).
Refer to Page I5-28.

10.Fully close the trunk lid by hand.
11.Connect the SST terminal to the battery and unlock the side latch.

NOTE

- Battery connection terminal: 4 (SLDM+ / terminal⊕) , 1 (SLDM− / battery negative terminal).

12.While holding the forward end of the trunk lid, lift the rear end so that the trunk lid opens at the rear.

CAUTION

- The luggage link can be opened both in front and to the rear when the sliding hook is disengaged from the pin. If the luggage link is moved in this condition, the link might be disassembled or damaged. When opening the trunk lid to the rear, hold the front end of the lid and carefully do so by preventing the lid from opening in front.

13.Push the sliding hooks at both right and left of the luggage link as far as they will go. (The trunk lid becomes open at the rear.)

CAUTION

- The luggage link can be opened both in front and to the rear when the sliding hook is disengaged from the pin. If the luggage link is moved in this condition, the link might be disassembled or damaged. When opening the trunk lid to the rear, hold the front end of the lid and carefully do so by preventing the lid from opening in front.

14.Perform the troubleshooting.
15.With the trunk lid opening at the rear, pull the sliding hooks at both right and left of the luggage link to disengage them from the pin.

CAUTION

- The luggage link can be opened both in front and to the rear when the sliding hook is disengaged from the pin. If the luggage link is moved in this condition, the link might be disassembled or damaged. When opening the trunk lid to the rear, hold the front end of the lid and carefully do so by preventing the lid from opening in front.

16.Close the trunk lid. (Confirm that the SST is connected to the connector (8P) leading to the side latch motor.)
Refer to Page I5-28.

17.With the trunk lid held at both right and left, connect the SST terminal to the battery and lock the side latch.

NOTE

- **Battery connection terminal: 4 (SLDM +/ ⊕terminal) , 1 (SLDM− / battery negative terminal).**

18.With the trunk lid opening at the front, remove the SST. Reinstall the connector leading to the side latch motor and connect the battery.

19.Set the ignition key to the "ON" position. Operate the roof open/close switch in the close direction to fully close the roof.

20.Press the trunk lid open switch and make the trunk lid open at the rear. Press the open switch again for at least ten seconds. Then, within two seconds, press the open switch again to initialize the side latch.

21.Complete the procedure by confirming the operation.

(3) WORK PROCEDURE FROM THE TRUNK LID FULL CLOSE AND THE ROOF FULL CLOSE

1.The roof stops. (Side latch emergency cable inoperative.)
2.Disconnect the battery negative terminal.
3.Unlock the center latch by pulling the trunk lid opener (for emergency use) inside the rear console box.
4.Connect the SST (for battery supply voltage) to the service connector (4P female) located under the quarter window RH lower.
Refer to Page I5-27.

5.With the roof locks at both right and left applied, connect the battery to the SST. Make the trunk lid fully open at the front.

CAUTION

- **Supply voltage while RH and LH roof locks are "locked", as both the roof and the trunk lid move simultaneously when voltage is supplied.**

6.Remove the SST and reinstall the connector.
7.Remove the connector (8P) leading to the side latch motor located at the left/front of the trunk lid. Connect the SST (sub wire).
Refer to Page I5-28.

8.Fully close the trunk lid by hand.
9.Connect the SST terminal to the battery and unlock the side latch.

NOTE

- **Battery connection terminal: 4 (SLDM+ / terminal⊕) , 1 (SLDM− / battery negative terminal)**

Refer to Page I5-28.

10.While holding the forward end of the trunk lid, lift the rear end so that the trunk lid opens at the rear.

CAUTION

- **The luggage link can be opened both in front and to the rear when the sliding hook is disengaged from the pin. If the luggage link is moved in this condition, the link might be disassembled or damaged. When opening the trunk lid to the rear, hold the front end of the lid and carefully do so by preventing the lid from opening in front.**

11.Push the sliding hooks at both right and left of the luggage link as far as they will go. (The trunk lid becomes open at the rear.)

CAUTION

- **The luggage link can be opened both in front and to the rear when the sliding hook is disengaged from the pin. If the trunk lid is moved to the rear while opening the trunk lid in front, the link might be disassembled or damaged. When opening the trunk lid to the rear, hold the front end of the lid and carefully open the lid by preventing the lid from opening in front.**

12.Perform the troubleshooting.
13.With the trunk lid opening at the rear, pull the sliding hooks at both right and left of the luggage link to disengage them from the pin.

CAUTION

- **The luggage link can be opened both in front and to the rear when the sliding hook is disengaged from the pin. If the trunk lid is moved to the rear while opening the trunk lid in front, the link might be disassembled or damaged. When opening the trunk lid to the rear, hold the front end of the lid and carefully open the lid by preventing the lid from opening in front.**

14.Close the trunk lid. (Confirm that the SST is connected to the connector (8P) leading to the side latch motor.)
Refer to Page I5-28.

15.With the trunk lid held at both right and left, connect the SST terminal to the battery and lock the side latch.

NOTE

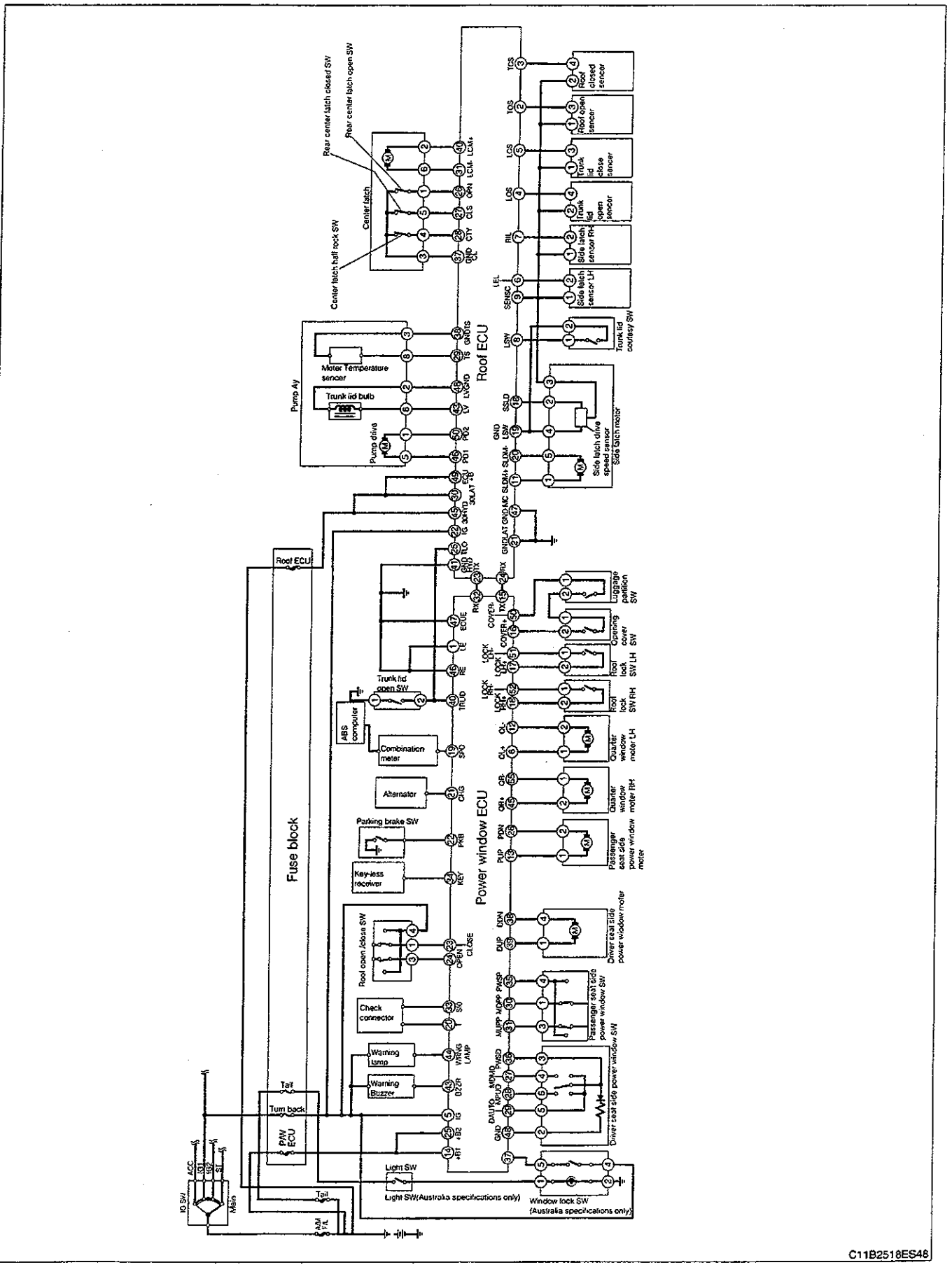
- Battery connection terminal: 4 (SLDM +/⊕terminal) , 1 (SLDM− / battery negative terminal).

16.With the trunk lid opening at the front, remove the SST. Reinstall the connector leading to the side latch motor and connect the battery.

17.Release the roof lock. Set the ignition key to the "ON" position. Fully close the roof by operating the roof open/close switch in the closing direction.

18.Press the trunk lid open switch and make the trunk lid open at the rear. Press the open switch again for at least ten seconds. Then, within two seconds, press the open switch again to initialize the side latch.

11-3 SYSTEM WIRING DIAGRAM



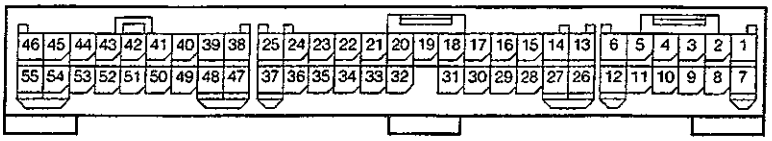
TERMINAL NAMES OF POWER WINDOW ECU CONNECTOR

Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
1	LE	LH driving system ground	29	DAUTO	Driver's seat power window switch "AUTO DOWN" input
2	–	–	30	MDPP	Front passenger's seat power window switch "DOWN" input
3	–	–	31	MUPP	Front passenger's seat power window switch "UP" input
4	–	–	32	RX	Roof ECU signal receiving line
5	IG	Ignition SW power supply	33	SIO	Communication of diagnosis device
6	QL+	Quarter window LH motor "UP" output	34	KEY	Trunk open signal input
7	–	–	35	PWSP	Front passenger's seat power window SW power supply
8	–	–	36	PWSD	Driver's seat power window SW power supply
9	–	–	37	WL	Window lock (Australian specification only)
10	–	–	38	DDN	Door window RH motor "DOWN" output
11	–	–	39	DUP	Door window RH motor "UP" output
12	QL–	Quarter window LH motor "DOWN" output	40	TRLID	Trunk open signal output
13	PUP	Door window LH motor UP output	41	–	–
14	+B1	Battery power supply	42	–	–
15	TX	Roof ECU signal sending line	43	BZZR	Warning buzzer
16	COVER+	Opening cover SW input	44	WRNG LAMP	Warning lamp
17	LOCK LH+	Roof lock SW LH input	45	QR+	Quarter window RH motor "UP" output
18	LOCK RH+	Roof lock SW RH input	46	RE	RH driving system ground
19	SPD	Vehicle speed signal	47	ECUE	ECU system ground
20	T	Diagnostic tester communication	48	GND	Driver's seat power window SW ground
21	CHG	Battery charge	49	–	–
22	PKB	Parking brake SW input	50	COVER–	Luggage partition SW ground
23	CLOSE	Roof open/close SW "CLOSE" input	51	LOCK LH–	Roof lock SW LH ground
24	OPEN	Roof open/close SW "OPEN" input	52	LOCK RH–	Roof lock SW RH ground
25	+B2	Battery power supply	53	–	–
26	PDN	Door window LH motor "DOWN" output	54	–	–
27	MDMD	Driver's seat power window SW "DOWN" input	55	QR–	Quarter window RH motor "DOWN" output
28	MPUD	Driver's seat power window SW "UP" input	–	–	–

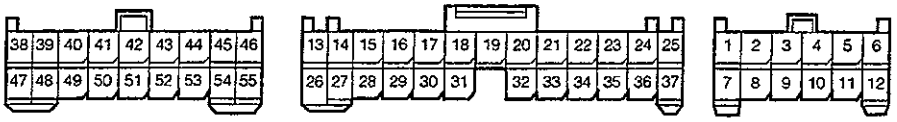
TERMINAL NAME OF ROOF ECU CONNECTOR

Terminal No.	Terminal code	Terminal name	Terminal No.	Terminal code	Terminal name
1	–	–	26	OPN	Rear center latch open SW
2	TOS	Roof open sensor	27	CLS	Rear center latch closed SW
3	TCS	Roof closed sensor	28	CTY	Center latch half lock SW
4	LOS	Trunk lid open sensor	29	TS	Hydraulic system temperature sensor
5	LCS	Trunk lid closed sensor	30	LAT	Latch drive power supply
6	LEL	Side latch sensor LH	31	LCM–	Rear center latch drive (+)
7	RIL	Side latch sensor RH	32	–	–
8	LSW	Trunk lid courtesy SW	33	–	–
9	SENSC	Hall sensor power supply	34	–	–
10	–	–	35	–	–
11	SLDM+	Side latch drive (+)	36	–	–
12	–	–	37	GND CL	Rear center latch ground
13	–	–	38	GND TS	Hydraulic system temperature sensor ground
14	–	–	39	–	–
15	–	–	40	LCM+	Rear center latch drive (+)
16	–	–	41	GND HYD	Hydraulic system ground
17	–	–	42	–	–
18	SSLD	Side latch drive speed sensor	43	LV	Trunk lid bulb power supply
19	GND LSW	Trunk lid courtesy SW ground	44	–	–
20	SLDM–	Side latch drive (–)	45	30HYD	Hydraulic system power supply
21	GND LAT	Latch system ground	46	PD1	Hydraulic pump drive
22	IG	Ignition SW power supply	47	GND MC	Ground of ECU system
23	TX	Power window ECU signal sending line	48	GND LV	Trunk lid bulb ground
24	RX	Power window ECU signal receiving line	49	ECU +B	Power supply for ECU
25	TLO	Trunk open signal input	50	PD2	Hydraulic pump drive

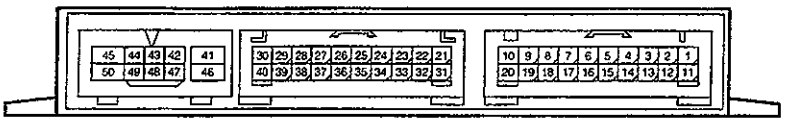
11-4 ARRANGEMENT OF VEHICLE HARNESS SIDE CONNECTOR TERMINALS



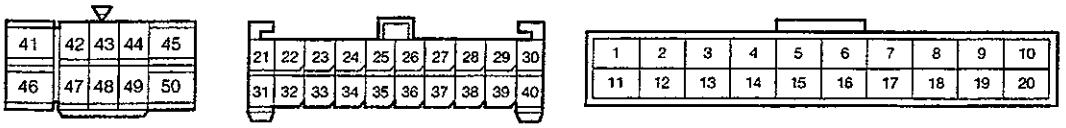
Power window ECU(ECU SIDE)



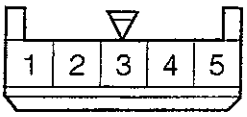
Power window ECU(Vehicle harness side)



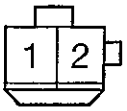
Roof ECU(ECU side)



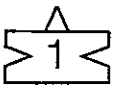
Roof ECU(Vehicle harness side)



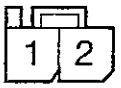
Roof open/close Switch



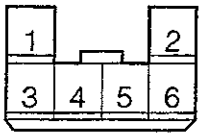
Trunk lid open switch



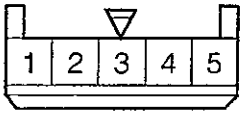
Parking brake switch



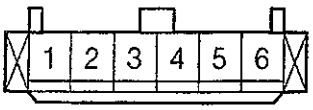
- Opening cover switch
- Luggage patition switch
- Roof lock switch RH/LH



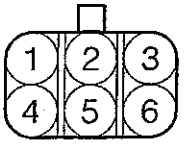
Driver´s seat power window switch



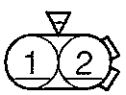
Passenger seat power window switch



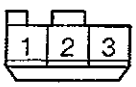
Window lock switch



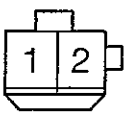
Driver´s seat power window motor



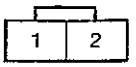
- Passenger seat power window motor
- Quautor window motor RH/LH



Warning lamp

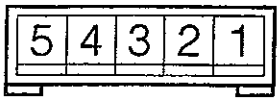


Warning buzzer

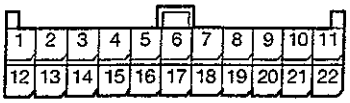


Trunk lid Courtesy switch

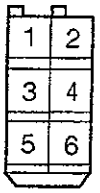
C11B5169ES44



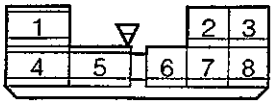
Key-less receiver



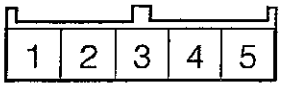
Combination meter
(connector color:white,pale nomber 22P)



Center latch



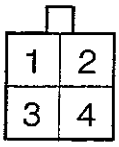
Hydraulic pump



Trunk lid latch drive(Side latch motor)



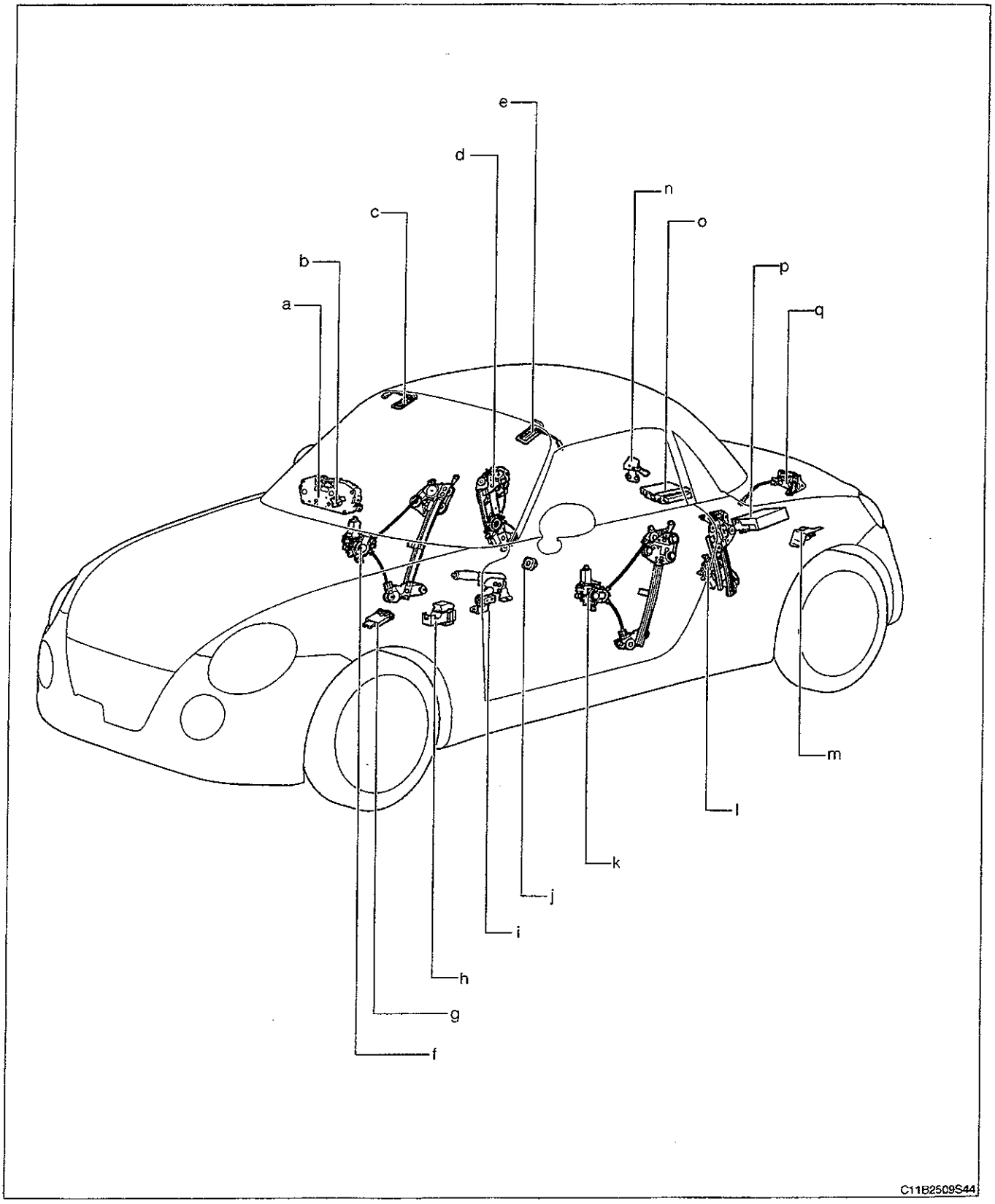
Side latch sensor



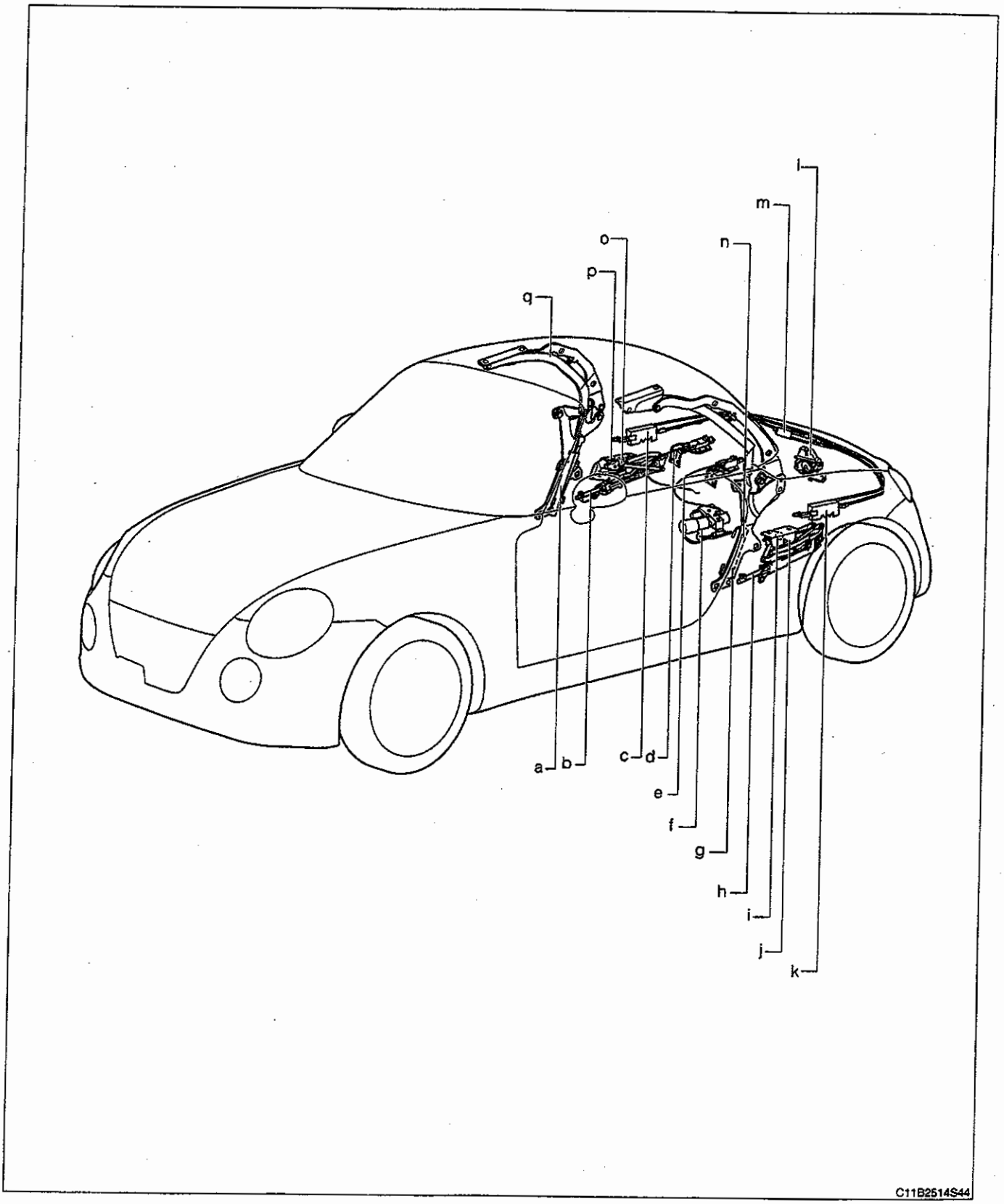
- Roof open/close sensor
- Trunk lid open/close sensor

C11B5170_1ES30

11-5 LOCATION OF COMPONENTS



	Part name		Part name
a	Combination meter (vehicle speed signal)	j	Trunk lid open switch
b	Warning buzzer	k	FR door regulator motor LH
c	Roof lock SW RH	l	Quarter window regulator Ay LH
d	Quarter window regulator Ay RH	m	Luggage partition SW
e	Roof lock SW LH	n	Opening cover SW
f	FR door regulator motor RH	o	Power window ECU
g	Warning lamp	p	Roof ECU
h	Roof open/close SW	q	Trunk lid courtesy SW
i	Parking brake SW	–	–


l
m
o
n
p
q
a
b
c
d
e
f
g
h
i
j
k
C11B2514S44

	Part name		Part name
a	Roof hydraulic cylinder RH	j	Luggage link LH
b	Luggage hydraulic cylinder RH	k	Side latch LH
c	Side latch RH	l	Center latch (center latch half lock switch, rear center latch open switch, rear center latch closed switch)
d	Roof stay RH	m	Back door lock actuator Ay (trunk lid latch speed sensor)
e	Roof stay LH	n	Roof hydraulic cylinder LH(roof open sensor, roof closed sensor)
f	Hydraulic pump (motor temperature sensor)	o	Luggage link RH
g	Roof link LH	p	Side latch sensor RH
h	Luggage hydraulic cylinder (trunk lid open sensor, trunk lid closed sensor)	q	Roof link RH
i	Side latch sensor LH	–	–

11-6 HOW TO PROCEED WITH TROUBLE SHOOTING

The active top system (power open/close roof system) features diagnostic function for troubleshooting, which provides an important clue as to malfunction diagnosis. The diagnosis of the active top system features the battery backup. (function that supplies power to diagnostic memory even if the ignition switch is turned "OFF".)

11-6-1 DIAGNOSTIC INTERVIEW

When trying to remove the cause of the problem occurred to the vehicle, the phenomenon of the malfunction must be identified. Otherwise, whatever operation is done to the vehicle, the vehicle may never be back to normal. Diagnostic interview provides information from the user prior to identifying the phenomenon of the malfunction, which will be a very important clue as to reproduce the malfunction phenomenon.

(1) INTERVIEW SHEET FOR DIAGNOSTIC PROCEDURE

1.The diagnostic interview sheet is a checklist that can be used when conducting malfunction diagnosis of the active top system (power open/close roof system). Use this sheet for diagnostic interview with your customer or for malfunction diagnosis procedure.

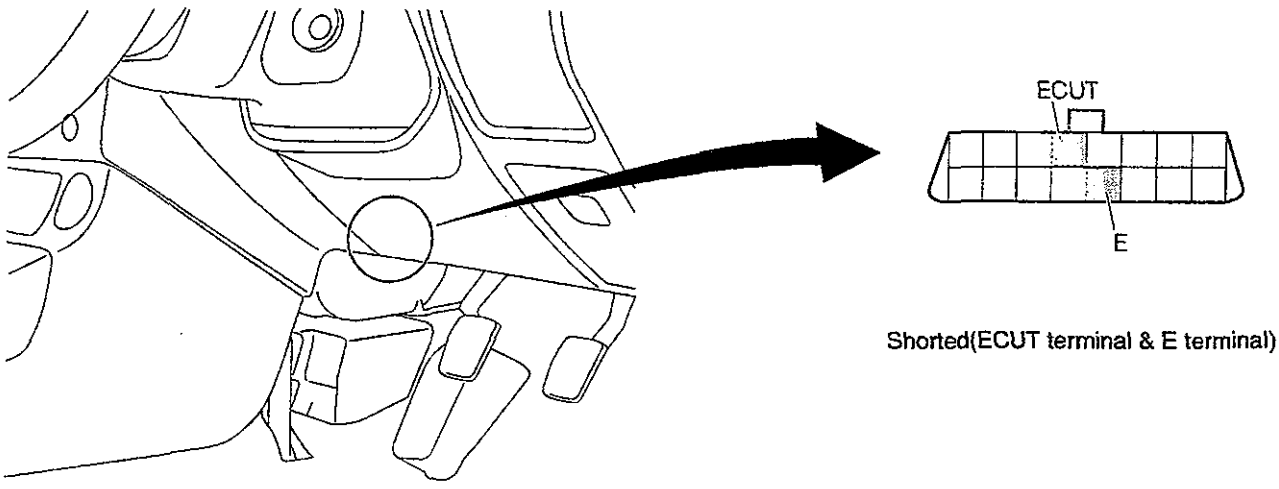
Diagnosis interview sheet					
Date when diagnosis interview was made . .		Name of customer	Vehicle model —		
Detailed information about vehicle	Frame No.	Registration/notification date . .	Date when malfunction occurred .	Mileage Km	
	[Sex] of customer (driver) Male Female	[Age] (approx.)	[Job]	[Principal place of use] Downtown /Suburb / Seashore / Mountain / Cold region / Others	[Parking place] Outdoor / indoor
Since when malfunction started		• Since new vehicle	• Recently(from month of year)		
Frequency of occurrence		• Always	• Sometimes	• Under a certain condition ( )	
Use environmental conditions		• Always • Fine • Cloudy • Rain • Snow • Other ( ) • Temperature (Approx. °C) (Spring , summer , autumn , winter)			
Current condition (condition before trouble shooting)		1 Malfunction persists. 2 Operation is currently normal → A. Operation was restored by itself. (The causes) Operation was restored by opening/closing trunk. Since the roof stopped midway, the roof was fully closed by hand and the operation was restored.			
Vehicle conditions	Under what condition did operation stop?	• During operation of system opening direction • When roof is fully opened • When trunk lid is fully opened • Engine ON	• During operation of system closing direction • When roof is fully closed • When trunk lid is fully closed • Engine OFF	• Moving in roof opening direction • Moving in trunk lid opening direction	• Moving in roof closing direction • Moving in trunk lid closing direction
	Trunk mode (rear opening) operation	• Does not open.		• Does not close.	
	Center & side latch operation	• Operating		• Does not operate	
	Latch operating sound when system is operated	• Provided		• Not provided	
	Each latch condition when the trunk lid is closed	• The center latch is properly locked (If it is not locked, there is an excessive play or gap at the rear end of the trunk lid.) • The side latch is properly locked (If it is not locked, there is an excessive play or gap at the rear end of the trunk lid.)			
	Warning lamp condition	• Illuminated	• Flashing (at time of roof open/close SW operation)	• Extinguished	
	Whether power window operative or inoperative	System full open condition System full close condition	• Operation • Operation • Power window will not operate because the system will not fully close nor fully open.	• Inoperative (Inoperative window) • Inoperative (Inoperative window)	
	Hydraulic pump sound when roof open/close SW is operated	• Exists.		• Does not exist.	
	Battery voltage	( )V			
	Is communication line between power window ECU and roof ECU normal with the IG switch set to ON position?	Normal or no communication(Power window ECU→Roof ECU→Roof ECU→Power window ECU)			
	Trunk lid opener condition for (emergency use)	• Not pulled		• Kept pulled	
	Side latch at time of stop Emergency cable condition	• Not pulled		• Kept pulled	
	Check the buzzer while running with the system fully closed.	• ounds continuously.		• Does not sound continuously.	

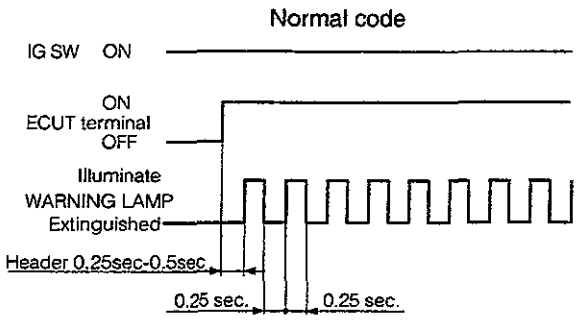
Indication of diagnosis			
	During inspection	• Normal	• Malfunction code( )
	2nd	• Normal	• Malfunction code( )

11-7 DIAGNOSIS

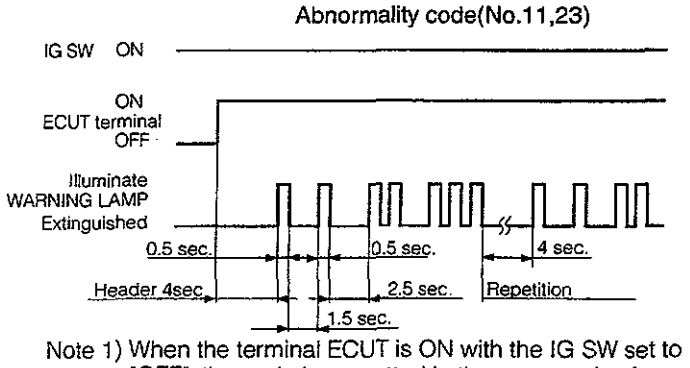
11-7-1 CHECKING METHOD OF DIAGNOSIS

1. When the diagnosis code is indicated, confirm whether the malfunction took place sometimes in the system or is still persisting. Also it is necessary to check any relation between the code and the reproduced malfunction. For this purpose, the diagnosis code should be indicated twice, namely before and after the confirmation of the phenomena.
2. The malfunction codes are displayed by flashing the warning lamp located in the heater control when the ECUT terminal and E terminal of the diagnostic check connector (installed under the instrument panel) are short-circuited and the ignition switch is turned "ON". All the malfunction codes stored are displayed repeatedly in numeric order, starting from the small number.





Note 1) Header 0.25sec.-0.5sec.
Note 2) When the terminal ECUT is ON with the IG SW set to "OFF", the code is outputted in three seconds after IG SW is set to "ON".



Note 1) When the terminal ECUT is ON with the IG SW set to "OFF", the code is outputted in three seconds after IG SW is set to "ON".

C11B1073ES30

11-7-2 CANCELING METHOD OF DIAGNOSIS

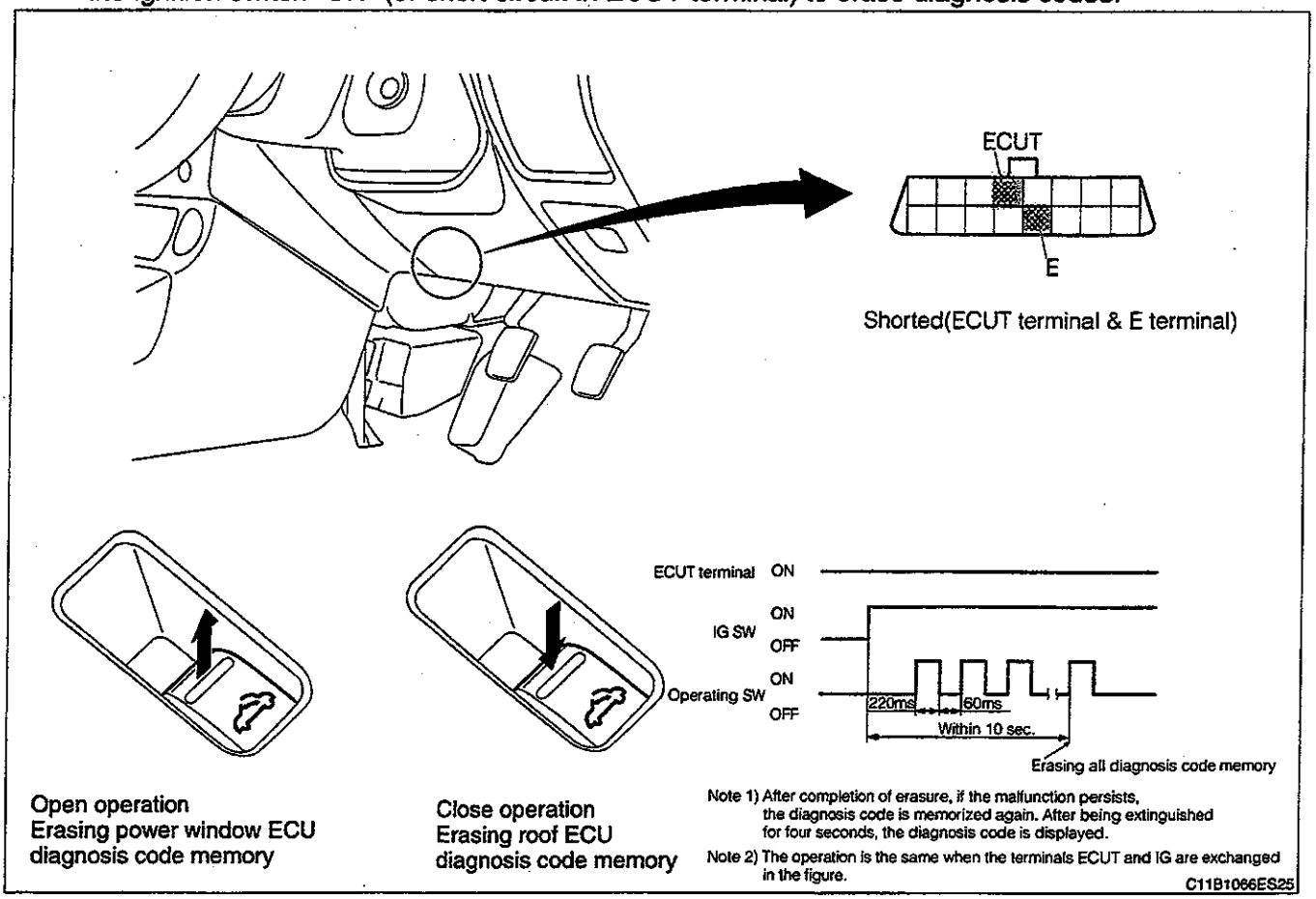
1.Diagnosis codes can be erased by short-circuiting the ECUT-terminal of the diagnosis check connector to the E-terminal, followed by operations below within 10seconds of the ignition switch "ON".

NOTE

- The sequence of the ignition switch "ON" →short-circuiting the diagnosis check connector can be reversed. In this case, diagnosis codes can be erased by conducting the following operation within 10 seconds of short-circuit the terminal.

CAUTION

- When erasing diagnosis codes, allow 60ms or more for the switch "OFF" and 220ms for "ON". If time allowed for switch "ON" and "OFF" is too short, diagnosis codes will not be erased.
- Perform the switch operation shown in the illustration below four times or more within 10seconds of the ignition switch "ON" (or short-circuit in ECUT-terminal) to erase diagnosis codes.



11-7-3 CONTENTS OF DIAGNOSIS

CONTENTS OF DIAGNOSIS

ECU measuring point	Trouble area	Code No. 2 digits	Code No. 4 digits	Diagnosis contents
Roof ECU	Roof	11	B2527	Malfunction of the roof open sensor, or open wire or short circuit.
		12	B2522	Malfunction of the roof closed sensor, or open wire or short circuit.
		13	B2599	The control output and the output signal for the hydraulic pump motor relay disagree.
		14	B2598	Hydraulic pump heating
		15	B2597	Roof operate time out
	Trunk lid	21	B2531	Malfunction of the trunk lid open sensor or open wire or short
		22	B2528	Malfunction of the trunk lid closed sensor or open wire or short
		23	B2596	Malfunction of the trunk lid valve
		24	B2595	①The control output and the output signal for the center latch motor relay disagree. ②The status of the center latch and the information of the center latch half lock switch disagree. ③Time out of the center latch action time
		25	B2536	The status of the trunk lid courtesy switch and the center latch/side latch sensors disagree.
		26	B2594	Trunk lid operation time out
	Side latch	31	B2529	Malfunction, open or short-circuit of the side latch sensor RH
		32	B2530	Malfunction, open or short-circuit of the side latch sensor LH
		33	B2561	①Abnormal pulse of the trunk lid latch drive speed sensor ②The output signal is different from the control output for the side latch motor relay
	General	41	B2554	The information of the roof location and the trunk lid location disagree.
		42	B2593	Low-temperature hydraulic pump shutdown
		43	B2592	Stuck trunk lid open switch ("ON" malfunction)
		44	B2591	Roof ECU supply voltage too low (less than 9V)
		45	B2590	Roof ECU supply voltage too high (exceeding 16.8V)
	Roof ECU	51	B2553	Data from roof ECU not received (malfunction of roof ECU)
		52	B2553	Erratic data sent from roof ECU to power window ECU
		53	B2553	A/D conversion time out of ECU
Power window ECU	Operation switch	61	B2537	Open "ON" state and close "ON" state of roof open/close switch occurs simultaneously.
	Luggage partition SW	62	B2535	Short the luggage partition SW, and opening cover SW
	Roof lock SW	63	B2520	Short the roof lock SW RH
		64	B2519	Short the roof lock SW LH
	Vehicle speed	65	B2589	Discontinued vehicle speed signal
	Power window	66	B2588	During the auto or roof operation, the full open state cannot be detected for ten seconds or more after energizing the driver's seat power window motor.
		67	B2587	During the roof operation, full open status is not detected for 10 seconds or more after the passenger seat power window motor is turned on.
		68	B2516	During the roof operation, full open status is not detected for 10 seconds or more after the quarter window motor RH is turned on.
		69	B2517	During the roof operation, full open status is not detected for 10 seconds or more after the quarter window motor LH is turned on
	General	71	B2586	Power window ECU supply voltage too low (less than 9V)
		72	B2585	Power window ECU supply voltage too high (17V or more)
	Power window ECU	81	B2584	Transmitting error from the power window ECU to the roof ECU. (malfunction in the power window ECU)

11-8 FAIL-SAFE FUNCTION

1. In case abnormality has occurred in the input-output control system of the power window ECU or the roof ECU, system operation will be shut down or limited, or the warning lamp will be illuminated. Once abnormality is detected and later recovered, fail-safe function will be released, but the diagnostic results will be stored.

FAIL-SAFE SPECIFICATIONS

Cord No.	Lamp indication	Contents of malfunction	Contents of control
11	Illuminated	Abnormality of the roof open sensor	Roof open disabled
12		Abnormality of the roof closed sensor	
13		Hydraulic pump relay	Roof open/close disabled
		Abnormal of hydraulic system temperature sensor	
14		Hydraulic pump heating(level 1)	Roof open disabled
		Hydraulic pump heating(level 2)	Roof open/close disabled
15		Roof operate time out	–
21		Abnormality of the trunk lid open sensor	Roof open/close disabled
22		Abnormality of the trunk lid closed sensor	Roof open disabled
23		Trunk lid bulb malfunctioning	Roof open/close disabled
24		Abnormality of center latch relay	Roof and trunk lid open/close disabled
		Center latch status error	Roof open/close disabled
		Center latch half lock switch status error	Roof open disabled
25		Trunk lid courtesy lamp switch status error	–
26		Trunk lid operation time out	–
31		Abnormality of side latch sensor RH	Roof and trunk lid open/close disabled
32		Abnormality of side latch sensor	
33		Side latch motor relay error	Roof open/close disabled
		Side latch motor error	
	–	Side latch operating time out	–
41	Illuminated	The information of the trunk lid location and the roof location disagree.	Roof open/close disabled
42	Flashing	Low-temperature operation prohibited	
43	Illuminated	Abnormality of trunk lid open SW	–
44		Roof ECU supply voltage too low (less than 9V)	Roof and trunk lid open/close disabled
		Sudden drop of supply voltage	
45		Roof ECU supply voltage too high (exceeding 17V)	
51		There is no data transmission from the roof ECU.	Roof open/close disabled
52		Erratic data sent from roof ECU to power window ECU	
53		A/D conversion time out of ECU	Roof and trunk lid open/close disabled
61		Open "ON" state and close "ON" state of roof open/close switch occurs simultaneously.	Roof open/close disabled
62		Short the luggage partition SW	
		Short opening cover SW	

CordNo.	Lamp indication	Contents of malfunction	Contents of control
63	–	Short the roof lock SW RH.	–※1
64		Short the roof lock SW LH.	
65		Discontinued vehicle speed signal	–
66	–	"Full open" or "full close" is not detected for 10seconds or more after the power window motor on the driver's seat is turned on.	Pause※2
67		During the roof operation, full open status is not detected for 10 seconds or more after the passenger seat power window motor is turned on.	
68		During the roof operation, full open status is not detected for 10 seconds or more after the quarter window motor RH is turned on.	
69		During the roof operation, full open status is not detected for 10 seconds or more after the quarter window motor LH is turned on.	
71		Power window ECU supply voltage too low. (less than 9V)	Roof open/close disabled
72		Power window ECU supply voltage too high. (17V or more)	
81	Illuminated	Transmitting error from the power window ECU to the roof ECU.	

※1:Open operation is disabled when both of the roof lock switches RH/LH are short-circuited.
※2:Operation resumes when the switch is operated again after a pause.

11-9 TROUBLE SHOOTING ACCORDING TO DIAGNOSIS CODE

11-9-1 DIAGNOSIS CODE No.11(ROOF OPEN SENSOR SYSTEM)

➤1.VISUAL CHECK OF ROOF OPEN SENSOR

1.Check the sensor for external appearance.

SPECIFIED VALUE: The sensor should not be damaged and dropped. Also, the sensor should exhibit no excessive play.

If OK, proceed to ➤2.
If it is NG, replace the hydraulic pump Ay.

➤2.CHECK CONTINUITY BETWEEN THE SIDE LATCH MOTOR AND THE ROOF ECU

1.Disconnect the connector from the roof open sensor and roof ECU.
2.Check the harness between the roof open sensor and the roof ECU.
(1) Vehicle harness side connector 1 of roof open sensor – Vehicle harness side connector 9 (SENSC) of roof ECU.
(2) Vehicle harness side connector 3 of roof open sensor – Vehicle harness side connector 2 (TOS) of roof ECU.

SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤3.
If it is NG, repair the harness and connector.

➤3.CHECK OF VOLTAGE BETWEEN ROOF OPEN SENSOR TERMINALS

1.Check the voltage between the roof open sensor terminals.
Refer to Page I5-98.

If it is OK, replace of the roof ECU.
If it is NG, replace the hydraulic pump Ay.

11-9-2 DIAGNOSIS CODE No.12(ROOF CLOSED SENSOR SYSTEM)

➤1.VISUAL CHECK OF ROOF CLOSED SENSOR

1.Check the sensor for external appearance.

SPECIFIED VALUE: The sensor should not be damaged and dropped. Also, the sensor should exhibit no excessive play.

If it is OK, go to ➤2.

If it is NG, replace the hydraulic pump Ay.

➤2.CHECK CONTINUITY BETWEEN THE ROOF CLOSED SENSOR AND THE ROOF ECU

1.Disconnect the connector from the roof closed sensor and roof ECU.

2.Check the harness between the roof closed sensor and the roof ECU.

(1) Vehicle harness side connector 2 of roof closed sensor — Vehicle harness side connector 9 (SENSC) of roof ECU.

(2) Vehicle harness side connector 4 of roof closed sensor — Vehicle harness side connector 3 (TCS) of roof ECU.

If it is OK, go to ➤3.

If it is NG, repair the harness and connector.

➤3.CHECK OF VOLTAGE BETWEEN ROOF CLOSED SENSOR TERMINALS

1.Check the voltage between the roof closed sensor terminals.

Refer to Page I5-98.

If it is OK, replace of the roof ECU.

If it is NG, replace the hydraulic pump assembly.

11-9-3 DIAGNOSIS CODE No.13(HYDRAULIC PUMP CONTROL SYSTEM)

➤1.CHECK OF CONDITIONS OF HYDRAULIC SYSTEM AND EACH OPERATING SECTION

1.Check that there is no oil leakage. Also, check the hydraulic hose for breakage and bending.

2.Check that no obstacle is present on the operating path of the roof, back panel and trunk lid.

3.Check that the roof, back panel and trunk lid exhibit no seizure.

4.Check that the sliding sections of the roof link and luggage link exhibit no abnormal resistance.

5.Check to see if the cable of the roof stay is operating.

6.Check to see if the cylinder is operating.

NOTE

- If the active top is not operated for several week, the hydraulic pressure of the active top will drop. When the active top is actuated, it will take a little time until the hydraulic pressure is built up, even though you can hear an operating sound.
  Then, when you operate the active top, it can operate normally, only requiring an ordinary operating time. The aforesaid phenomena are not showing a malfunction.

If it is OK (there is no abnormality at the hydraulic system side.), proceed to ➤2.

If it is NG (there is an abnormality at the hydraulic system side.), repair the malfunctioning sections among the sections that have been checked above.

➤2.CHECK CONTINUITY BETWEEN HYDRAULIC PUMP MOTOR AND ROOF ECU
1.Disconnect the connector from the hydraulic pump motor and roof ECU.
2.Check the harness between the hydraulic pump motor and the roof ECU.
(1) Vehicle harness side connector 1 of hydraulic pump — Vehicle harness side connector 50 (PD2) of roof ECU.
(2) Vehicle harness side connector 5 of hydraulic pump — Vehicle harness side connector 46(PD1) of roof ECU.
(3) Vehicle harness side connector 3 of hydraulic pump — Vehicle harness side connector 38(GND TS) of roof ECU.
(4) Vehicle harness side connector 8 of hydraulic pump — Vehicle harness side connector 29(TS) of roof ECU.
(5) Vehicle harness side connector 45 (30HYD) of roof ECU — Battery ⊕ terminal.
SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤3.
If it is NG, repair the harness and connector.

➤3.CHECK RESISTANCE HYDRAULIC PRESSURE PUMP TERMINALS
1.Measure the resistance between the hydraulic pump side connectors 3 and 8.
SPECIFIED VALUE: Within 400kΩ

If it is OK, replace of the roof ECU.
If it is NG, replace the hydraulic pump Ay.

11-9-4 DIAGNOSIS CODE No.14(HYDRAULIC PUMP HEATED)
➤1.CHECK OF CONDITIONS OF HYDRAULIC PUMP
1.Wait until the temperature of the hydraulic pump drops.
2.Check to see if the pump operates.
SPECIFIED VALUE: The hydraulic pump operates at normal temperatures.

If it is OK, this section is normal.
If it is NG, go to ➤2.

➤2.CHECK RESISTANCE HYDRAULIC PRESSURE PUMP TERMINALS
1.Keep the hydraulic pump in a thoroughly cooled-down state.
2.Measure the resistance between the hydraulic pump side connectors 3 and 8.
SPECIFIED VALUE: Within 60kΩ

If it is OK, go to ➤3.
If it is NG, replace the hydraulic pump.

➤3.CHECK OF CONDITIONS OF HYDRAULIC SYSTEM AND EACH OPERATING SECTION

1.Check that there is no oil leakage. Also, check the hydraulic hose for breakage and bending.
2.Check that no obstacle is present on the operating path of the roof, back panel and trunk lid.
3.Check that the roof, back panel and trunk lid exhibit no seizure.
4.Check that the sliding sections of the roof link and luggage link exhibit no abnormal resistance.
5.Check to see if the cable of the roof stay is operating.
6.Check to see if the cylinder is operating.

NOTE

- If the active top is not operated for several week, the hydraulic pressure of the active top will drop. When the active top is actuated, it will take a little time until the hydraulic pressure is built up, even though you can hear an operating sound.
  Then, when you operate the active top, it can operate normally, only requiring an ordinary operating time. The aforesaid phenomena are not showing a malfunction.

If it is OK (there is no abnormality at the hydraulic system side.), the system is functioning normally.
If it is NG (there is an abnormality at the hydraulic system side.), repair the malfunctioning sections among the sections that have been checked above.

11-9-5 DIAGNOSIS CODE No.15(ROOF OPERATED TIME OUT)

➤1.OPERATION CHECK OF ROOF

1.Check the operating condition of the roof.

NOTE

- It is assumed that the trunk lid operates.

If the roof operates normally, proceed to ➤4.
If the trunk lid operates and the roof fails to operate normally, proceed to ➤2.

➤2.CONFIRMATION OF ROOF OPERATIONAL ENVIRONMENT

1.Have you ever operated the roof at low temperature or at low voltage?
If YES, proceed to➤3.
If NO, proceed to➤4.

➤3.OPERATION CHECK OF ROOF WITH TRUNK LID OPENED

1.Manually move the trunk lid to a fully-opened position. (open at the front)
2.Confirm the condition at the time when the roof open switch is operated.
SPECIFIED VALUE: The roof operates.

If OK, the system is satisfactory.

NOTE

- There are cases where the operation becomes slow at a low temperature or with a low voltage.

If it is NG, proceed to ➤4.

➤4.CHECK OF CONDITIONS OF HYDRAULIC SYSTEM AND EACH OPERATING SECTION

1.Check that there is no oil leakage. Also, check the hydraulic hose for breakage and bending.
2.Check that no obstacle is present on the operating path of the roof, back panel and trunk lid.
3.Check that the roof, back panel and trunk lid exhibit no seizure.
4.Check that the sliding sections of the roof link and luggage link exhibit no abnormal resistance.
5.Check to see if the cable of the roof stay is operating.
6.Check to see if the cylinder is operating.

NOTE

- If the active top is not operated for several week, the hydraulic pressure of the active top will drop. When the active top is actuated, it will take a little time until the hydraulic pressure is built up, even though you can hear an operating sound.
  Then, when you operate the active top, it can operate normally, only requiring an ordinary operating time. The aforesaid phenomena are not showing a malfunction.

If it is OK (there is no abnormality at the hydraulic system side.), the system is functioning normally.
If it is NG (there is an abnormality at the hydraulic system side.), repair the malfunctioning sections among the sections that have been checked above.

11-9-6 DIAGNOSIS CODE No.21(TRUNK LID OPEN SENSOR SYSTEM)

➤1.VISUAL CHECK OF TRUNK LID OPEN SENSOR

1.Check the sensor for external appearance.

SPECIFIED VALUE: It should not be damaged and dropped. Also, there should be no excessive play.

If it is OK, go to ➤2.
If it is NG, replace the hydraulic pump Ay.

➤2.CHECK CONTINUITY BETWEEN THE TRUNK LID OPEN SENSOR AND THE ROOF ECU

1.Disconnect the connector from the trunk lid open sensor and roof ECU.

2.Check the harness between the trunk lid open sensor and the roof ECU.

(1) Vehicle harness side connector 2 of trunk lid open sensor – Vehicle harness side connector 9(SENSC) of roof ECU.

(2) Vehicle harness side connector 4 of trunk lid open sensor – Vehicle harness side connector 4(LOS) of roof ECU.

SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤3.
If it is NG, repair the harness and connector.

➤3. CHECK OF VOLTAGE BETWEEN ROOF OPEN SENSOR TERMINALS

1.Check the voltage between the roof open sensor terminals.

Refer to Page I5-98.

If it is OK, replace of the roof ECU.
If it is NG, replace the hydraulic pump Ay.

11-9-7 DIAGNOSIS CODE No.22(TRUNK LID CLOSED SENSOR SYSTEM)

➤1.VISUAL CHECK OF TRUNK LID CLOSED SENSOR

1.Check the sensor for external appearance.

SPECIFIED VALUE: It should not be damaged and dropped. Also, there should be no excessive play.

If it is OK, go to ➤2.
If it is NG, replace the hydraulic pump Ay.

➤2.CHECK CONTINUITY BETWEEN THE TRUNK LID CLOSED SENSOR AND THE ROOF ECU

1.Disconnect the connector from the trunk lid closed sensor and roof ECU.

2.Check the harness between the trunk lid closed sensor and the roof ECU.

(1) Vehicle harness side connector 1 of trunk lid closed sensor – Vehicle harness side connector 9 (SENSC) of roof ECU.

(2) Vehicle harness side connector 3 of trunk lid closed sensor – Vehicle harness side connector 5 (LOS) of roof ECU.

SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤3.
If it is NG, repair the harness and connector.

➤3.CHECK OF VOLTAGE BETWEEN TRUNK LID CLOSED SENSOR TERMINALS

1.Check the voltage between the trunk lid closed sensor terminals.
Refer to Page I5-98.

If it is OK, replace of the roof ECU.
If it is NG, replace the hydraulic pump Ay.

11-9-8 DIAGNOSIS CODE No.23(BOOT LID BULB SYSTEM)

➤1.CHECK CONTINUITY BETWEEN THE TRUNK LID BULB AND ROOF ECU

1.Disconnect the connector from the trunk lid valve and roof ECU.
2.Check the harness between the trunk lid valve and the roof ECU.
(1) Vehicle harness side connector 2 of hydraulic pump — Vehicle harness side connector 48(LV GND) of roof ECU.
(2) Vehicle harness side connector 6 of hydraulic pump — Vehicle harness side connector 43(LV) of roof ECU.

SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤2.
If it is NG, repair the harness and connector.

➤2.CHECK OF RESISTANCE BETWEEN TRUNK LID VALVE HYDRAULIC PUMP TERMINALS

1.Separate connector at the trunk lid bulb.
2.Measure the resistance between the hydraulic pump side connectors 2 and 6.

SPECIFIED VALUE: Resistance value within a range between 9 and 15Ω.

If it is OK, go to ➤3.
If it is NG, replace the hydraulic pump Ay.

➤3.CHECK SIGNAL BETWEEN ROOF ECU TERMINALS

1.Measure the voltage between the roof ECU 43 (LV) and 48 (LV GND) while the roof open/close switch is operated.

SPECIFIED VALUE: 10 V or more.

If it is OK, replace the hydraulic pump Ay.
If it is NG, replace of the roof ECU.

11-9-9 DIAGNOSIS CODE No.24/25(CENTER LATCH OR TRUNK LID COURTESY SWITCH SYSTEM)

➤1.CHECK OF TRUNK LID COURTESY SW CONDITIONS

1.When the trunk lid is closed, check the condition of the trunk lid courtesy switch.
SPECIFIED VALUE: Ensure that the switch is pushed down positively.

If it is OK, go to ➤2.
If it is NG, adjust the trunk lid alignment.

➤2.CHECK CONTINUITY BETWEEN THE TRUNK LID COURTESY SW AND ROOF ECU

1.Disconnect the connector from the trunk lid courtesy switch and roof ECU.
2.Check the harness between the trunk lid courtesy switch and the roof ECU.
(1) Vehicle harness side connector 1 of trunk lid courtesy switch—Vehicle harness side connector 8 (LSW) of roof ECU.
(2) Vehicle harness side connector 2 of trunk lid courtesy switch—Vehicle harness side connector 19 (GND LSW) of roof ECU.

If it is OK, go to ➤3.
If it is NG, repair the harness and connector.

➤3.UNIT CHECK OF TRUNK LID COURTESY SW

1.Perform the unit check of the trunk lid courtesy switch.
Refer to Page I5-101.

If it is OK, go to ➤4.
If it is NG, replace the trunk lid courtesy SW.

➤4.CHECK CONTINUITY BETWEEN THE CENTER LATCH AND THE ROOF ECU

1.Disconnect the connector from the center latch and roof ECU.
2.Check the harness between the center latch and the roof ECU.
(1) Vehicle harness side connector 1 of center latch — Vehicle harness side connector 26 (OPN) of roof ECU.
(2) Vehicle harness side connector 3 of center latch — Vehicle harness side connector 37 (GND CL) of roof ECU.
(3) Vehicle harness side connector 4 of center latch — Vehicle harness side connector 28 (CTY) of roof ECU.
(4) Vehicle harness side connector 5 of center latch — Vehicle harness side connector 27 (CLS) of roof ECU.
(5) Vehicle harness side connector 2 of center latch — Vehicle harness side connector 40 (LCM+) of roof ECU.
(6) Vehicle harness side connector 6 of center latch — Vehicle harness side connector 31 (LCM—) of roof ECU.
SPECIFIED VALUE: Continuity exists

If it is OK, go to ➤5.
If it is NG, repair the harness and connector.

➤5.CHECK CONTINUITY ROOF ECU POWER SUPPLY SYSTEM
1.Disconnect the connector from the roof ECU.
2.Check the power supply system of the roof ECU.
(1) Vehicle harness side connector 30 (30 LAT) of roof ECU – Battery ⊕.
(2) Vehicle harness side connector 21 (GND LAT) of roof ECU – Body ground.
SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤6.
If it is NG, repair the harness and connector.

➤6.CENTER LATCH UNIT CHECK
1.If OK, the system is satisfactory.
Refer to Page I5-96.

If OK, the system is satisfactory.
If it is NG, replace of the center latch.

11-9-10 DIAGNOSIS CODE No.26(TRUNK LID OPERATED TIME OUT)

➤1.CHECK OF ROOF OPERATION CONDITION
1.Check the operating condition of the roof.
NOTE
- It is assumed that the trunk lid operates.

If the roof operates normally, proceed to ➤4.
If the trunk lid operates and the roof fails to operate normally, proceed to ➤2.

➤2.CONFIRMATION OF ROOF OPERATIONAL ENVIRONMENT
1.Have you ever operated the roof at low temperature or at low voltage?
If YES, proceed to ➤3.
If NO, proceed to➤4.

➤3.OPERATION CHECK OF ROOF WITH TRUNK LID OPENED
1.Manually move the trunk lid to a fully-opened position (open at the front).
2.Confirm the condition at the time when the roof open switch is operated.
SPECIFIED VALUE: The roof operates.

If OK, the system is satisfactory.
NOTE
- There are cases where the operation becomes slow at a low temperature or with a low voltage.

If it is NG, proceed to ➤4.

➤4.CHECK OF CONDITIONS OF HYDRAULIC SYSTEM AND EACH OPERATING SECTION

1.Check that there is no oil leakage. Also, check the hydraulic hose for breakage and bending.
2.Check that no obstacle is present on the operating path of the roof, back panel and trunk lid.
3.Check that the roof, back panel and trunk lid exhibit no seizure.
4.Check that the sliding sections of the roof link and luggage link exhibit no abnormal resistance.
5.Check to see if the cable of the roof stay is operating.
6.Check to see if the cylinder is operating.

NOTE

- If the active top is not operated for several week, the hydraulic pressure of the active top will drop. When the active top is actuated, it will take a little time until the hydraulic pressure is built up, even though you can hear an operating sound.
  Then, when you operate the active top, it can operate normally, only requiring an ordinary operating time. The aforesaid phenomena are not showing a malfunction.

If it is OK (there is no abnormality at the hydraulic system side.), the system is functioning normally.
If it is NG (there is an abnormality at the hydraulic system side.), repair the malfunctioning sections among the sections that have been checked above.

11-9-11 DIAGNOSIS CODE No.31/32(SIDE LATCH SENSOR RH/LH)

CAUTION

- The diagnosis code No. 31 means a malfunction of the side latch sensor RH system, whereas the diagnosis code No. 32 denotes a malfunction of the side latch sensor LH system. In instances where only one of these diagnosis codes is indicated, the sensor for which the diagnosis code is not indicated is functioning normally. Be sure to check and repair the sensor for which the diagnosis code is indicated.

➤1.VISUAL CHECK OF SIDE LATCH SENSOR RH/LH

1.Check the sensor for external appearance.
SPECIFIED VALUE: It should not be damaged and dropped. Also, there should be no excessive play.

If it is OK, go to ➤2.
If it is NG, replace of the side latch sensor.

➤2.CHECK CONTINUITY OF THE SIDE LATCH SENSOR BETWEEN THE ROOF ECU

1.Disconnect the connector from the trunk lid courtesy switch and roof ECU.
2.Check the harness between the trunk lid courtesy switch and the roof ECU.
(1) Vehicle harness side connector 1 of side latch sensor RH – Vehicle harness side connector 9 (SENSC) of roof ECU.
(2) Vehicle harness side connector 2 of side latch sensor RH – Vehicle harness side connector 7 (RIL) of roof ECU.
(3) Vehicle harness side connector 1 of side latch sensor LH – Vehicle harness side connector 9 (SENSC) of roof ECU.
(4) Vehicle harness side connector 2 of side latch sensor LH – Vehicle harness side connector 6 (LEL) of roof ECU.
SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤3.
If it is NG, repair the harness and connector.

➤3.CHECK OF VOLTAGE BETWEEN THE SIDE LATCH SENSOR RH/LH TERMINALS

1.Check the voltage between the side latch sensor RH/LH terminals.
Refer to Page I5-99.

If it is OK, replace of the roof ECU.
If it is NG, replace of the side latch sensor.

11-9-12 DIAGNOSIS CODE No.33(SIDE LATCH MOTOR SYSTEM)

➤1.VISUAL CHECK OF SIDE LATCH OPERATION

1.Check that no foreign matter is caught in the side latch.

SPECIFIED VALUE: Ensure that there is no foreign body.

If it is OK, go to ➤2.

If it is NG, remove the foreign matter.

➤2.CHECK OF THE SIDE LATCH MOTOR

1.Disconnect the connector from the side latch motor.

2.Connect the SST.

3.Check the condition when it is forcibly driven in locking and unlocking directions.

SST: 09842-97208-000

SPECIFIED VALUE: Ensure that the operation is smooth.

If it is OK, go to ➤3.

If it is NG, replace of the side latch S/A.

➤3.CHECK OF MARKING POSITION OF TRUNK LID STRIKER

1.Check that the marking of the trunk lid striker is not deviated.

SPECIFIED VALUE: Ensure that the marking is not deviated.

If it is OK, go to ➤4.

If it is NG, adjust the striker.

➤4.CHECK CONTINUITY BETWEEN THE SIDE LATCH MOTOR AND THE ROOF ECU

1.Disconnect the connector from the side latch motor and roof ECU.

2.Check the harness between the side latch motor and the roof ECU.

(1) Vehicle harness side connector 1 of side latch motor – Vehicle harness side connector 11(SLDM+) of roof ECU.

(2) Vehicle harness side connector 2 of side latch motor – Vehicle harness side connector 18(SSSLD) of roof ECU.

(3) Vehicle harness side connector 3 of side latch motor – Vehicle harness side connector 9(SENSC) of roof ECU.

(4) Vehicle harness side connector 4 of side latch motor – Vehicle harness side connector 19(GND LSW) of roof ECU.

(5) Vehicle harness side connector 5 of side latch motor – Vehicle harness side connector 20(SLDM−) of roof ECU.

If it is OK, go to ➤5.

If it is NG, repair the harness and connector.

➤5.CHECK CONTINUITY POWER SUPPLY SYSTEM OF THE ROOF ECU

1.Disconnect the connector from the roof ECU.

2.Check the power supply system of the roof ECU.

(1) Vehicle harness side connector 30 (30 LAT) of roof ECU – Battery ⊕.

(2) Vehicle harness side connector 21 (GND LAT) of roof ECU – Body ground.

SPECIFIED VALUE: Continuity exists

If it is OK, go to ➤6.

If it is NG, repair the harness and connector.

➤6.SIDE LATCH MOTOR UNIT CHECK

1.Perform the unit check of the side latch motor.
Refer to Page I5-96.

If it is OK, replace of the roof ECU.
If it is NG, replace of the side latch motor.

11-9-13 DIAGNOSIS CODE No.41(SYSTEM POSITION RECOGNIZED SYSTEM)

➤1.CHECK OF TRUNK LID OPERATION

1.Manually close the trunk lid fully. Then, check that the abnormality is remedied.
SPECIFIED VALUE: The operation becomes normal.

If OK, the system is satisfactory.

NOTE

- The error position was taken due to an inevitable reason.

If it is NG, go to ➤2.

➤2.VISUAL CHECK EACH SENSOR

1.Check the following sensors, etc. for external appearance.
(1) Roof open sensor.
(2) Roof closed sensor.
(3) trunk lid open sensor.
(4) trunk lid closed sensor.
SPECIFIED VALUE: It should not be damaged and dropped. Also, there should be no excessive play.

If it is OK, go to ➤3.
If it is NG, replace the hydraulic pump Ay.

➤3.CHECK CONTINUITY BETWEEN ROOF AND TRUNK LID OPEN/CLOSED SENSORS AND ROOF ECU

1.Disconnect the connector from the roof and trunk lid open/closed sensors and from the roof ECU.
2.Check continuity between the roof and trunk lid open/close sensor as well as between the roof ECU.
(1) Vehicle harness side connector 1 of roof open sensor – Vehicle harness side connector 9 (SENSC) of roof ECU.
(2) Vehicle harness side connector 3 of roof open sensor – Vehicle harness side connector 2 (TOS) of roof ECU.
(3) Vehicle harness side connector 2 of roof closed sensor – Vehicle harness side connector 9 (SENSC) of roof ECU.
(4) Vehicle harness side connector 4 of roof closed sensor – Vehicle harness side connector 3 (TCS) of roof ECU.
(5) Vehicle harness side connector 2 of trunk lid open sensor – Vehicle harness side connector 9(SENSC) of roof ECU.
(6) Vehicle harness side connector 4 of trunk lid open sensor – Vehicle harness side connector 4(LOS) of roof ECU.
(7) Vehicle harness side connector 1 of trunk lid closed sensor – Vehicle harness side connector 9 (SENSC) of roof ECU.
(8) Vehicle harness side connector 3 of trunk lid closed sensor – Vehicle harness side connector 5 (LOS) of roof ECU.
SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤4.
If it is NG, repair the harness and connector.

➤4.SENSOR UNIT CHECK

1.Perform the unit check of the roof open/closed sensors and trunk lid open/closed sensors.
(1) Roof open sensor unit check.
Refer to Page I5-98.

(2) Roof closed sensor unit check.
Refer to Page I5-98.

(3) Trunk lid open sensor unit check.
Refer to Page I5-98.

(4) Trunk lid closed sensor unit check.
If OK, the system is satisfactory.

NOTE

- The error position was taken due to an inevitable reason.

If it is NG, go to ➤5.

➤5.CHECK OF VOLTAGE BETWEEN ROOF ECU AND BODY GROUND

1.Check the voltage between the ECU side connector 9 (SECSC) of the roof and the body ground.
SPECIFIED VALUE: Approx. 12V (Battery voltage).

If it is OK, replace the hydraulic pump Ay.
If it is NG, replace of the roof ECU.

11-9-14 DIAGNOSIS CODE No.42 (LOW-TEMPERATURE OPERATION PROHIBITED)

➤1.CHECK OF ROOF OPEN SWITCH OPERATION

1.Check the opening operation of the roof at −10°C or above under a condition where it is not frozen.
SPECIFIED VALUE: Ensure that there is no abnormality.

If OK, the system is satisfactory.

NOTE

- The operation stops due to low temperature.

If it is NG, replace of the roof ECU.

11-9-15 DIAGNOSIS CODE No.43 (TRUNK LID OPEN SWITCH SYSTEM)

➤1.TRUNK LID OPEN SW UNIT CHECK

1.Perform the unit check of the trunk lid open switch.
Refer to Page I5-100.

If it is OK, go to ➤2.
If it is NG, replace of the trunk lid open SW.

➤2.CHECK SHORT BETWEEN TRUNK LID OPEN SW AND POWER WINDOW ECU & ROOF ECU

1.Disconnect the connector from between the trunk lid open switch and the power window ECU & roof ECU.
2.Ensure that no continuity exists between the following terminals of the trunk lid open switch and power window ECU & roof ECU.
(1) Vehicle harness side connector 40 (TRLID) of power window ECU − Body ground.
(2) Harness side connector 25 of roof ECU − Body ground.
SPECIFIED VALUE: No continuity exists.

If OK, the system is satisfactory..

NOTE

- Because the switch has been pushed continuously for 30 seconds or more.

If it is NG, repair the harness and connector.

11-9-16 DIAGNOSIS CODE No.44/45(ROOF ECU POWER SUPPLY SYSTEM)

CAUTION

- The diagnosis code No. 44 means the drop of supply voltage to the roof ECU, whereas the diagnosis code No. 45 denotes excessive supply voltage to the roof ECU.
- Since the low-voltage error and over-voltage error are not caused by malfunctions of the ECU, it is not necessary to replace the ECU.

➤1.BATTERY VOLTAGE CHECK

1.Measure the battery voltage with the engine in a stopped state.
SPECIFIED VALUE: 10−14V.

If it is OK, go to ➤2.
If it is NG, replace of the battery.

➤2.CHECK CONTINUITY BETWEEN THE ROOF ECU AND THE BATTERY
1.Disconnect the connector from the roof ECU.
2.Check the harness between the roof ECU and the battery.
(1) Vehicle harness side connector 49 (ECU+B) of roof ECU — Battery⊕.
(2) Vehicle harness side connector 47 (GND MC) of roof ECU — Battery ⊕.
SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤3.
If it is NG, repair the harness and connector.

➤3.VISUAL CHECK OF HARNESS AND BATTERY TERMINALS
1.Check the battery terminals and harness for external appearance.
SPECIFIED VALUE: Ensure that there is no corrosion. (At time of low-voltage error)

If it is OK, go to ➤4.
If it is NG, replace the terminal or harness.

➤4.CHECK THE ALTERNATOR
1.Check that the alternator exhibits no abnormality.
SPECIFIED VALUE: Ensure that there is no abnormality.

If OK, the system is satisfactory. Observe for a while.
If it is NG, repair or replace the alternator.

11-9-17 DIAGNOSIS CODE NO.51 (COMMUNICATION SYSTEM BETWEEN THE ROOF ECU AND THE POWER WINDOW ECU)

CAUTION

- The diagnosis code No. 51 means the time out of data sending from the roof ECU to the power window ECU, whereas the diagnosis code No. 52 denotes abnormal data sent from the roof ECU to the power window ECU.

➤1.CHECK CONTINUITY BETWEEN THE POWER WINDOW ECU AND THE ROOF ECU.
1.Disconnect the connector from the power window ECU and roof ECU.
2.Check the harness between the power window ECU and the roof ECU.
(1) Vehicle harness side connector 15 (TX) of power window ECU — Vehicle harness side connector 24 (RX) of roof ECU.
(2) Vehicle harness side connector 32 (RX) of power window ECU — Vehicle harness side connector 23 (TX) of roof ECU.
SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤2
If it is NG, repair the harness and connector.

➤2.CHECK CONTINUITY POWER SUPPLY SYSTEM OF THE ROOF ECU

1.Disconnect the connector from the roof ECU.

2.Check that there is no open wire in the harness of the roof ECU power supply system.

(1) Vehicle harness side connector 49 (ECU+B) of roof ECU – Battery ⊕.

(2) Vehicle harness side connector 47 (GND MC) of roof ECU – Body ground.

(3) Vehicle harness side connector 22 (IG) of roof ECU – Ignition switch (IG1).

SPECIFIED VALUE: Continuity exists.

If it is OK, replace of the roof ECU.

If it is NG, repair the harness and connector.

11-9-18 DIAGNOSIS CODE No.53 (ROOF ECU ABNORMALITY)

The diagnosis code No. 53 means abnormality inside the roof ECU. Replace the roof ECU.

11-9-19 DIAGNOSIS CODE No.61(ROOF OPEN/CLOSE SWITCH SYSTEM)

➤1.CHECK CONTINUITY BETWEEN THE ROOF CLOSED SENSOR AND THE POWER WINDOW ECU

1.Disconnect the connector from the roof open/close switch and power window ECU.

2.Check the harness between the roof open/close switch and the power window ECU.

(1) Vehicle harness side connector 1 of roof open/close SW — Vehicle harness side connector 23(CLOSE) of power window ECU.

(2) Vehicle harness side connector 3 of roof open/close SW — Vehicle harness side connector 24 (OPEN) of power window ECU.

(3) Vehicle harness side connector 4 of roof SW — Ignition SW(IG1).

SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤2.
If it is NG, repair the harness and connector.

➤2.ROOF OPEN/CLOSE SW UNIT CHECK

1.Perform the unit check of the roof open/close switch.
Refer to Page I5-100.

If OK, the system is satisfactory.
If it is NG, replace of the roof open/closed SW.

11-9-20 DIAGNOSIS CODE No.62 (OPENING COVER SWITCH OR LUGGAGE PARTITION SWITCH SYSTEM)

➤1.VISUAL CHECK OF OPENING COVER SWITCH AND LUGGAGE PARTITION SWITCH

1.Check that no foreign matter is caught in the switch sections of the opening cover switch and luggage partition switch.

SPECIFIED VALUE: Ensure that there is no foreign body.

If it is OK, go to ➤2.
If it is NG, remove the foreign matter.

➤2.CHECK SHORT BETWEEN LUGGAGE PARTITION SW & OPENING COVER SW AND POWER WINDOW ECU

1.Disconnect the connectors between the luggage partition switch and the opening cover switch and power window ECU.

2.Check the harness between the luggage partition switch & opening cover switch and the power window ECU.

(1) Vehicle harness side connector 1 of luggage partition switch — Vehicle harness side connector 50 (COVER−) of power window ECU.

(2) Vehicle harness side connector 2 of luggage partition switch — Vehicle harness side connector 1 of power window ECU.

(3) Vehicle harness side connector 2 of opening cover switch — Vehicle harness side connector 16 (COVER+) of power window ECU.

SPECIFIED VALUE: Ensure that no continuity exists between the connector enumerated above and the body ground.

If it is OK, go to ➤3.
If it is NG, repair the harness and connector.

➤3.LUGGAGE PARTITION SW UNIT CHECK
1.Perform the unit check of the luggage partition switch.
Refer to Page I5-100.

If it is OK, go to ➤3.
If it is NG, replace of the luggage partition SW.

➤4.OPENING COVER SW UNIT CHECK
1.Perform the unit check of the opening cover switch.
Refer to Page I5-100.

If OK, the system is satisfactory.
If it is NG, replace of the opwning cover SW.

11-9-21 DIAGNOSIS CODE No63 (ROOF LOCK SWITCH RH SYSTEM)

➤1. VISUAL CHECK OF ROOF LOCK LEVER
1.Check the condition at the time when the roof lock lever is applied to the hook.
SPECIFIED VALUE: Ensure that the lever is engaged securely.

If it is OK, go to ➤2.
If it is NG, perform the fitting adjustment or replace the center lock catch RH Ay.

➤2.VISUAL CHECK OF ROOF LOCK SWITCH
1.Check that no foreign matter is caught in the roof lock switch.
SPECIFIED VALUE: Ensure that there is no foreign body.

If it is OK, go to ➤3.
If it is NG, remove the foreign matter.

➤3. CHECK SHORT BETWEEN ROOF LOCK SW LH AND POWER WINDOW ECU
1.Separate connector at the roof lock SW RH and power window ECU.
2.Check the harness between the roof lock switch RH and the power window ECU.
(1) Vehicle harness side connector 1 of roof lock switch RH – Vehicle harness side connector 51 (LOCK RH−) of power window ECU.
(2) Vehicle harness side connector 2 of roof lock switch RH – Vehicle harness side connector 18 (LOCK RH+) of power window ECU.
SPECIFIED VALUE: Ensure that no continuity exists between the connector enumerated above and the body ground.

If it is OK, go to ➤4.
If it is NG, repair the harness and connector.

➤4.ROOF LOCK SW UNIT CHECK
1.Perform the unit check of the roof lock switch.
Refer to Page I5-99.

If OK, the system is satisfactory.
If it is NG, replace the center lock catch RH Ay.

11-9-22 DIAGNOSIS CODE No64 (ROOF LOCK SWITCH LH SYSTEM)

➤1.ROOF LOCK SW UNIT CHECK

1.Check the condition at the time when the roof lock lever is applied to the hook.

SPECIFIED VALUE: Ensure that the lever is engaged securely.

If it is OK, go to ➤2.

If it is NG, perform the fitting adjustment or replace the center lock catch LH Ay.

➤2.VISUAL CHECK OF ROOF LOCK

1.Check that no foreign matter is caught in the roof lock switch.

SPECIFIED VALUE: Ensure that there is no foreign body.

If it is OK, go to ➤3.

If it is NG, remove the foreign matter.

➤3. CHECK SHORT BETWEEN ROOF LOCK SW LH AND POWER WINDOW ECU

1.Separate connector at the roof lock SW RH and power window ECU.

2.Check the harness between the roof lock switch and the power window ECU.

(1) Vehicle harness side connector 1 of roof lock switch LH – Vehicle harness side connector 51 (LOCK LH–) of power window ECU.

(2) Vehicle harness side connector 2 of roof lock switch LH – Vehicle harness side connector 17 (LOCK LH+) of power window ECU.

SPECIFIED VALUE: Ensure that no continuity exists between the connector enumerated above and the body ground.

If it is OK, go to ➤4.

If it is NG, repair the harness and connector.

➤4.ROOF LOCK SW UNIT CHECK

1.Perform the unit check of the roof lock switch.

If OK, the system is satisfactory.

If it is NG, replace of the center lock catch LH Ay.

11-9-23 DIAGNOSIS CODE No65 (VEHICLE SPEED SENSOR SYSTEM)

➤1.CHECK CONTINUITY BETWEEN THE POWER WINDOW ECU AND THE COMBINATION METER

1.Separate connector at the power window ECU and combination meter.

2.Check the harness between the power window ECU and the combination meter

(1) Vehicle harness side connector 19 (SPD) of power window ECU – Vehicle harness side connector 14 (vehicle speed sensor) of combination meter.

SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤2.

If it is NG, repair the harness and connector.

➤2.CHECK OF SPEEDOMETER
1.Drive the vehicle. Then, check the pointer indicating position of the speedometer.
SPECIFIED VALUE: The pointer is indicating the speed correctly.

If OK, the system is satisfactory.
If it is NG, check the combination meter or vehicle speed sensor.

11-9-24 DIAGNOSIS CODE No.66 to No.69 (POWER WINDOW SYSTEM)

CAUTION

- The diagnosis codes No. 66 to No. 69 denote malfunctions of the power window system, not malfunctions of the ECU. Therefore, it is not necessary to replace the power window ECU.

➤1.BATTERY VOLTAGE CHECK
1.Measure the battery voltage with the engine in a stopped state.
SPECIFIED VALUE: 10—14V.

If it is OK, go to➤2.
If it is NG, this section is normal.

➤2.CHECK OF POWER WINDOW SWITCH OPERATION
1.Check the operation of the power window at normal temperatures under a condition where it is not frozen.
SPECIFIED VALUE: Ensure that there is no abnormality.

If OK, the system is satisfactory.
If it is NG, proceed to the troubleshooting of the power window.
Refer to Page I3-12.

Refer to Page I5-95.

11-9-25 DIAGNOSIS CODE No71/72 (POWER WINDOW ECU POWER SUPPLY SYSTEM)

CAUTION

- The diagnosis code No. 71 means the drop of supply voltage to the power window ECU, whereas the diagnosis code No. 72 denotes excessive supply voltage to the power window ECU. Furthermore, since the low-voltage error and over-voltage error are not caused by malfunctions of the ECU, it is not necessary to replace the ECU.

➤1.BATTERY VOLTAGE CHECK
1.Measure the battery voltage with the engine in a stopped state.
SPECIFIED VALUE: 10—14V.

If it is OK, go to ➤2.
If NG, charge or replace the battery.

➤2.VISUAL CHECK OF BATTERY TERMINALS AND HARNESS
1.Check the battery terminals and harness for external appearance.
SPECIFIED VALUE: Ensure that there is no corrosion. (At time of low-voltage error)

If it is OK, go to ➤3.
If it is NG, replace the terminals and harness.

➤3.CHECK THE ALTERNATOR
1.Check that the alternator exhibits no abnormality.
SPECIFIED VALUE: Ensure that there is no abnormality.

If OK, the system is satisfactory.
If it is NG, repair or replace the alternator.

11-9-26 DIAGNOSIS CODE NO. 81 (POWER WINDOW ECU BETWEEN ROOF ECU COMMUNICATION SYSTEM)

➤1.CHECK CONTINUITY BETWEEN THE POWER WINDOW ECU AND THE ROOF ECU.
1.Separate connector at the power window ECU and roof ECU.
2.Check the harness between the power window ECU and the roof ECU.
(1) Vehicle harness side connector 15 (TX) of power window ECU – Vehicle harness side connector 24 (RX) of roof ECU.
(2) Vehicle harness side connector 32 (RX) of power window ECU – Vehicle harness side connector 23 (TX) of roof ECU.
SPECIFIED VALUE: Continuity exists.

If it is OK, replace the power window ECU
If it is NG, repair the harness and connector.

11-10 TROUBLE SHOOTING ACCORDING TO MALFUNCTION PHENOMENA

11-10-1 THE TRUNK LID WILL NOT OPEN AT THE FRONT (THE DIAGNOSIS CODE IS NORMAL)

➤1.VISUAL CHECK OF TRUNK LID
1.Check if debris is trunk lid.
SPECIFIED VALUE: Ensure that the door is not open.

If it is OK, go to ➤2.
If it is NG, confirm the operation with the trunk lid closed.

➤2.CHECK OF TRUNK LID OPEN SW OPERATION
1.Check to see if the trunk lid operates by pushing the trunk open switch.
SPECIFIED VALUE: The door opens at the rear.

CAUTION
- The check should be conducted with the trunk lid fully closed.

If it is OK, go to ➤3.
If it is NG, proceed to the troubleshooting of the center latch and side latch.
Refer to Page I5-56.

Refer to Page I5-58.

Refer to Page I5-60.

➤3.CHECK OF THE ROOF LOCK OPRATION

1.Check the illuminating condition of the roof warning lamp when the roof lock is released one at a time.
SPECIFIED VALUE: Warning lamp goes on.

CAUTION

- The check should be conducted with the roof fully closed.
- The check should be conducted for each of the right and left sides at a time.

If it is OK, go to ➤4.
If it is NG, check the roof lock switch, harness and roof lock switch lever.
Refer to Page I5-67.

Refer to Page I5-68.

➤4.CHECK OF THE ROOF OPEN/CLOSE SW

1.Check the illuminating condition of the roof warning lamp when the roof open/close switch is operated in an opening or closing direction.
SPECIFIED VALUE: The warning lamp flashes.

If it is NG, go to ➤5.
If it is OK, check the following switches and harnesses.
(1) Opening cover SW and harness.
Refer to Page I5-66.

(2) Luggage partition SW and harness.
Refer to Page I5-66.

(3) Trunk lid courtesy SW and harness.
Refer to Page I5-66.

(4) Center latch half lock SW and harness.
Refer to Page I5-66.

➤5.CHECK OF TRUNK LID OPENER (FOR EMERGENCY USE)

1.Check the condition of the trunk lid opener cable.
SPECIFIED VALUE: Ensure that the cable is not pulled.

If it is OK, go to ➤6.
If it is NG, carry out the following operations.
(1) Return the cable.
(2) Open the trunk lid at the rear.
(3) Push the trunk lid open switch.
(4) When the latch operates, close the trunk lid.

➤6.CHECK OF TRUNK LID COURTESY SWITCH CONDITIONS

1.Check the condition of the emergency cable.

SPECIFIED VALUE: Ensure that the cable is not pulled.

If it is OK, go to ➤7.

If it is NG, carry out the following operations.

(1) Return the cable.

(2) Finish the roof mode while pushing the forward end of the trunk lid at both sides.

NOTE

- Perform this operation in order to set the side latch sensor to the ON condition.

➤7.CHECK OF PUMP OPERATING SOUND

1.Check the pump for operating sound when the roof open/close switch is operated.

SPECIFIED VALUE: The operating sound is emitted.

If it is OK, go to ➤8.

If it is NG, go to ➤9.

➤8.CHECK OF CONDITIONS OF HYDRAULIC SYSTEM AND EACH OPERATING SECTION

1.Check that there is no oil leakage. Also, check the hydraulic hose for breakage and bending.

2.Check that no obstacle is present on the operating path of the roof, back panel and trunk lid.

3.Check that the roof, back panel and trunk lid exhibit no seizure.

4.Check that the sliding sections of the roof link and luggage link exhibit no abnormal resistance.

5.Check to see if the cable of the roof stay is operating.

6.Check to see if the cylinder is operating.

NOTE

- If the active top is not operated for several week, the hydraulic pressure of the active top will drop. When the active top is actuated, it will take a little time until the hydraulic pressure is built up, even though you can hear an operating sound.
  Then, when you operate the active top, it can operate normally, only requiring an ordinary operating time. The aforesaid phenomena are not showing a malfunction.

If it is OK (there is no abnormality at the hydraulic system side.), the system is functioning normally.

If it is NG (there is an abnormality at the hydraulic system side.), repair the malfunctioning sections among the sections that have been checked above.

➤9.CHECK CONTINUITY BETWEEN PARKING BRAKE SWITCH AND POWER WINDOW ECU

1.Separate connector at the power window ECU and parking brake.

2.Check the harness between the power window ECU and the parking brake.

(1) Vehicle harness side connector 22 of power window ECU – Parking brake SW 1.

SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤10.

If it is NG, repair or replace the parking brake switch and replace the harness.

➤10.CHECK CONTINUITY ROOF OPEN/CLOSE SW AND HARNESS

1.Check continuity between the roof open/close SW and harness.
Refer to Page I5-66.

If it is OK, go to ➤11.
If it is NG, repair or replace the roof open/close switch, and replace the harness.

➤11.CHECK CONTINUITY HYDRAULIC PUMP MOTOR AND HARNESS

1.Check the harness of the hydraulic pump motor.
Refer to Page I5-50.

If it is OK, go to ➤12.
If it is NG, replace the harness and connector of the hydraulic pump motor.

➤12.CYLINDER HOLE SENSOR VOLTAGE CHECK

1.Check the voltage of the cylinder hall sensor.
Refer to Page I5-98.

If it is OK, go to ➤13.
If it is NG, check the harness of the cylinder hall sensor.

➤13.CHECK CONTINUITY THE ROOF ECU AND POWER WINDOW ECU POWER SUPPLY SYSTEM

1.Separate connector at the roof ECU and the power window ECU.
2.Check the harness between the roof ECU and the power window ECU.
(1) Vehicle harness side connector 49 (ECU+B) of roof ECU – Battery ⊕terminal.
(2) Vehicle harness connector 47(GND MC) of roof ECU – Body ground.
(3) Vehicle harness side connector 14 (+B1) of power window – Battery ⊕ terminal.
(4) Vehicle harness side connector 25 (+B2) of power window – Battery ⊕terminal.
(5) Vehicle harness side connector 47 (ECU E) of power window ECU – Body ground.
(6) Vehicle harness side connector 5 (IG) of power window ECU – Ignition switch.
SPECIFIED VALUE: Continuity exists

If it is OK, replace of the roof ECU.
If it is NG, repair the harness.

11-10-2 THE ROOF WILL NOT OPEN

➤1.VISUAL CHECK OF DOOR & QUARTER WINDOW

1.Check the door and quarter window operation.
SPECIFIED VALUE: It operates properly.

CAUTION
- Check the quarter window by operating the roof open/close switch.

If it is OK, go to ➤2.
If it is NG, proceed to the troubleshooting of the power window.
Refer to Page I3-12.

Refer to Page I5-95.

➤2.ROOF LOCK OPERATION CHECK

1.Check the illuminating condition of the roof warning lamp when the roof lock is released one at a time.
SPECIFIED VALUE: Warning lamp goes on.

CAUTION
- The check should be conducted with the roof fully closed.
- The check should be conducted for each of the right and left sides at a time.

If it is OK, go to ➤3.
If it is NG, check the roof lock switch, harness and roof lock switch lever.
Refer to Page I5-67.

Refer to Page I5-68.

➤3.CHECK OF THE ROOF OPEN/CLOSE SWITCH OPERATION

1.Check the illuminating condition of the roof warning lamp when the roof open/close switch is operated in an opening direction.
SPECIFIED VALUE: The warning lamp flashes.

If it is NG, go to ➤4.
If it is OK, check the following switches and harnesses.
(1) Opening cover SW and harness.
Refer to Page I5-66.

(2) Luggage partition SW and harness.
Refer to Page I5-66.

(3) Trunk lid courtesy SW and harness.
Refer to Page I5-66.

(4) Center latch half lock SW and harness.
Refer to Page I5-66.

➤4.CHECK OF SIDE LATCH EMERGENCY CABLE CONDITIONS

1.Check the condition of the emergency cable.

SPECIFIED VALUE: Ensure that the cable is not pulled.

If it is OK, go to ➤5.

If it is NG, carry out the following operations.

(1) Return the cable.

(2) Finish the roof mode while pushing the forward end of the trunk lid at both sides.

NOTE

- Perform this operation in order to set the side latch sensor to the ON condition.

➤5.CHECK OF PUMP FOR OPERATING SOUND

1.Check the pump for operating sound when the roof open/close switch is operated.

SPECIFIED VALUE: The operating sound is emitted.

If it is OK, go to ➤6.

If it is NG, go to ➤7.

➤6.CHECK OF CONDITIONS OF HYDRAULIC SYSTEM AND EACH OPERATING SECTION

1.Check that there is no oil leakage. Also, check the hydraulic hose for breakage and bending.

2.Check that no obstacle is present on the operating path of the roof, back panel and trunk lid.

3.Check that the roof, back panel and trunk lid exhibit no seizure.

4.Check that the sliding sections of the roof link and luggage link exhibit no abnormal resistance.

5.Check to see if the cable of the roof stay is operating.

6.Check to see if the cylinder is operating.

NOTE

- If the active top is not operated for several week, the hydraulic pressure of the active top will drop. When the active top is actuated, it will take a little time until the hydraulic pressure is built up, even though you can hear an operating sound.
  Then, when you operate the active top, it can operate normally, only requiring an ordinary operating time. The aforesaid phenomena are not showing a malfunction.

If it is OK (there is no abnormality at the hydraulic system side.), the system is functioning normally.

If it is NG (there is an abnormality at the hydraulic system side.), repair the malfunctioning sections among the sections that have been checked above.

➤7.CHECK CONTINUITY PARKING BRAKE SWITCH AND HARNESS

1.Check the illuminating condition of the brake warning lamp when the parking brake is operated.

SPECIFIED VALUE: The lamp goes on.

2.Separate connector at the power window ECU and parking brake.

3.Check the harness between the power window ECU and the parking brake.

(1) Vehicle harness side connector 22 of power window ECU — Parking brake SW 1.

SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤8.

If it is NG, repair or replace the parking brake switch and replace the harness.

➤8.CHECK CONTINUITY ROOF OPEN/CLOSE SW AND HARNESS
1.CHECK THE ROOF OPEN/CLOSE AND HARNESS.
Refer to Page I5-66.

If it is OK, go to ➤9.
If it is NG, repair or replace the roof open/close switch, and replace the harness.

➤9.CHECK CONTINUITY HYDRAULIC PUMP MOTOR
1.Check the harness of the hydraulic pump motor.
Refer to Page I5-50.

If it is OK, go to ➤10.
If it is NG, replace the harness and connector of the hydraulic pump motor.

➤10.CYLINDER HALL SENSOR VOLTAGE CHECK
1.Check the voltage of the cylinder hall sensor.
Refer to Page I5-98.

If it is OK, go to ➤11.
If it is NG, check the harness of the cylinder hall sensor.

➤11.CHECK CONTINUITY BETWEEN THE ROOF ECU AND POWER WINDOW ECU POWER SUPPLY SYSTEM
1.Separate connector at the roof ECU and the power window ECU.
2.Check the harness between the roof ECU and the power window ECU.
(1) Vehicle harness side connector 49 (ECU+B) of roof ECU — Battery ⊕ terminal.
(2) Vehicle harness connector 47(GND MC) of roof ECU — Body ground.
(3) Vehicle harness side connector 14 (+B1) of power window — Battery ⊕ terminal.
(4) Vehicle harness side connector 25 (+B2) of power window — Battery ⊕ terminal.
(5) Vehicle harness side connector 47 (ECU E) of power window ECU — Body ground.
(6) Vehicle harness side connector 5 (IG) of power window ECU — Ignition switch.
SPECIFIED VALUE: Continuity exists.

If it is OK, replace of the roof ECU.
If it is NG, repair the harness.

11-10-3 THE ROOF WILL NOT BE CLOSED

➤1.CHECK OF DOOR & QUARTER WINDOW OPERATION
1.Check the door and quarter window operation.
SPECIFIED VALUE: It operates properly.

CAUTION
- Check the quarter window by operating the roof open/close switch.

If it is OK, go to ➤2.
If it is NG, proceed to the troubleshooting of the power window or quarter window.
Refer to Page I3-12.

Refer to Page I5-95.

➤2.CHECK OF ROOF OPEN/CLOSE SWITCH OPERATION

1.Check the illuminating condition of the roof warning lamp when the roof open/close switch is operated in an opening or closing direction.

SPECIFIED VALUE: The warning lamp flashes.

If it is NG, go to ➤3.

If it is OK, check the following switches and harnesses.

(1) Opening cover SW and harness.

Refer to Page I5-66.

(2) Luggage partition SW and harness.

Refer to Page I5-66.

(3) Trunk lid courtesy SW and harness.

Refer to Page I5-56.

(4) Center latch half lock SW and harness.

Refer to Page I5-56.

➤3.CHECK OF SIDE LATCH EMERGENCY CABLE CONDITIONS

1.Check the condition of the emergency cable.

SPECIFIED VALUE: Ensure that the cable is not pulled.

If it is OK, go to ➤4.

If it is NG, carry out the following operations.

(1) Return the cable.

(2) Finish the roof mode while pushing the forward end of the trunk lid at both sides.

NOTE

- Perform this operation in order to set the side latch sensor to the ON condition.

➤4.CHECK OF PUMP FOR OPERATING SOUND

1.Check the pump for operating sound when the roof open/close switch is operated.

SPECIFIED VALUE: The operating sound is emitted.

If it is OK, go to ➤5.

If it is NG, go to ➤6.

➤5.CHECK OF CONDITIONS OF HYDRAULIC SYSTEM AND EACH OPERATING SECTION

1.Check that there is no oil leakage. Also, check the hydraulic hose for breakage and bending.
2.Check that no obstacle is present on the operating path of the roof, back panel and trunk lid.
3.Check that the roof, back panel and trunk lid exhibit no seizure.
4.Check that the sliding sections of the roof link and luggage link exhibit no abnormal resistance.
5.Check to see if the cable of the roof stay is operating.
6.Check to see if the cylinder is operating.

NOTE

- If the active top is not operated for several week, the hydraulic pressure of the active top will drop. When the active top is actuated, it will take a little time until the hydraulic pressure is built up, even though you can hear an operating sound.
  Then, when you operate the active top, it can operate normally, only requiring an ordinary operating time. The aforesaid phenomena are not showing a malfunction.

If it is OK (there is no abnormality at the hydraulic system side.), the system is functioning normally.
If it is NG (there is an abnormality at the hydraulic system side.), repair the malfunctioning sections among the sections that have been checked above.

➤6.CHECK PARKING BRAKE SWITCH AND HARNESS POWER SUPPLY SYSTEM

1.Check the illuminating condition of the brake warning lamp when the parking brake is operated.
SPECIFIED VALUE: The lamp goes on.

2.Separate connector at the power window ECU and parking brake.
3.Check the harness between the power window ECU and the parking brake.
(1) Vehicle harness side connector 22 of power window ECU — Parking brake SW 1.
SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤7.
If it is NG, repair or replace the parking brake switch and replace the harness.

➤7.CHECK CONTINUITY ROOF OPEN/CLOSE SWITCH AND HARNESS

1.Check the roof open/close and harness.
Refer to Page I5-66.

If it is OK, go to ➤8.
If it is NG, repair or replace the roof open/close switch and harness.

➤8.CHECK CONTINUITY HYDRAULIC PUMP MOTOR

1.Check the harness of the hydraulic pump motor.
Refer to Page I5-50.

If it is OK, go to ➤9.
If it is NG, replace the harness and connector of the hydraulic pump motor.

➤9.CYLINDER HALL SENSOR VOLTAGE CHECK

1.Check the voltage of the cylinder hall sensor.
Refer to Page I5-98.

If it is OK, go to ➤10.
If it is NG, check the harness of the cylinder hall sensor.

➤10.CHECK CONTINUITY THE ROOF ECU & POWER WINDOW ECU POWER SUPPLY SYSTEM

1.Separate connector at the roof ECU and the power window ECU.
2.Check the harness between the roof ECU and the power window ECU.
(1) Vehicle harness side connector 49 (ECU+B) of roof ECU — Battery ⊕ terminal.
(2) Vehicle harness connector 47(GND MC) of roof ECU — Body ground.
(3) Vehicle harness side connector 14 (+B1) of power window — Battery ⊕ terminal.
(4) Vehicle harness side connector 25 (+B2) of power window — Battery ⊕ terminal.
(5) Vehicle harness side connector 47 (ECU E) of power window ECU — Body ground.
(6) Vehicle harness side connector 5 (IG) of power window ECU — Ignition switch.
SPECIFIED VALUE: Continuity exists

If it is OK, replace of the roof ECU.
If it is NG, repair the harness.

11-10-4 THE TRUNK LID WILL NOT BE CLOSED AT THE FRONT (THE DIAGNOSIS CODE IS NORMAL)

➤1.CHECK OF PARKING BRAKE SWITCH

1.Check the illuminating condition of the brake warning lamp when the parking brake is operated.
SPECIFIED VALUE: The lamp goes on.

If it is OK, go to ➤2.
If it is NG, repair or replace the parking brake switch and replace the harness.

➤2.CHECK OF ROOF LOCK OPERATION

1.Check the illuminating condition of the roof warning lamp when the roof lock is released one at a time.
SPECIFIED VALUE: Warning lamp goes on.

CAUTION

- The check should be conducted with the roof fully closed.
- The check should be conducted for each of the right and left sides at a time.

If it is OK, go to ➤3.
If it is NG, check the roof lock switch, harness and roof lock switch lever.
Refer to Page I5-67.

Refer to Page I5-68.

➤3.CHECK OF THE ROOF OPEN/CLOSE SW

1.Check the illuminating condition of the roof warning lamp when the roof open/close switch is operated in an opening or closing direction.
SPECIFIED VALUE: The warning lamp flashes.

If it is NG, go to ➤4.
If it is OK, check the following switches and harnesses.
(1) Opening cover SW and harness.
Refer to Page I5-66.

(2) Luggage partition SW and harness.
Refer to Page I5-66.

(3) Trunk lid courtesy SW and harness.
Refer to Page I5-56.

(4) Center latch half lock SW and harness.
Refer to Page I5-56.

➤4.CHECK OF TRUNK LID OPENER (FOR EMERGENCY USE) CONDITIONS

1.Check the condition of the trunk lid opener cable.

SPECIFIED VALUE: Ensure that the cable is not pulled.

If it is OK, go to ➤5.

If it is NG, carry out the following operations.

(1) Return the cable.

(2) Open the trunk lid at the rear.

(3) Push the trunk lid open switch.

(4) When the latch operates, close the trunk lid.

➤5.CHECK OF SIDE LATCH EMERGENCY CABLE CONDITIONS

1.Check the condition of the emergency cable.

SPECIFIED VALUE: Ensure that the cable is not pulled.

If it is OK, go to ➤6.

If it is NG, carry out the following operations.

(1) Return the cable.

(2) Finish the roof mode while pushing the forward end of the trunk lid at both sides.

NOTE

- Perform this operation in order to set the side latch sensor to the ON condition.

➤6.CHECK OF PUMP FOR OPERATING SOUND

1.Check the pump for operating sound when the roof open/close switch is operated.

SPECIFIED VALUE: The operating sound is emitted.

If it is OK, go to ➤7.

If it is NG, go to ➤8.

➤7.CHECK OF CONDITIONS OF HYDRAULIC SYSTEM AND EACH OPERATING SECTION

1.Check that there is no oil leakage. Also, check the hydraulic hose for breakage and bending.

2.Check that no obstacle is present on the operating path of the roof, back panel and trunk lid.

3.Check that the roof, back panel and trunk lid exhibit no seizure.

4.Check that the sliding sections of the roof link and luggage link exhibit no abnormal resistance.

5.Check to see if the cable of the roof stay is operating.

6.Check to see if the cylinder is operating.

If it is OK (there is no abnormality at the hydraulic system side.), the system is functioning normally.

If it is NG (there is an abnormality at the hydraulic system side.), repair the malfunctioning sections among the sections that have been checked above.

NOTE

- If the active top is not operated for several week, the hydraulic pressure of the active top will drop. When the active top is actuated, it will take a little time until the hydraulic pressure is built up, even though you can hear an operating sound.
  Then, when you operate the active top, it can operate normally, only requiring an ordinary operating time. The aforesaid phenomena are not showing a malfunction.
-

➤8.CHECK CONTINUITY ROOF OPEN/CLOSE
1.CHECK THE ROOF OPEN/CLOSE AND HARNESS.
Refer to Page I5-66.

If it is OK, go to ➤9.
If it is NG, repair or replace the roof open/close switch, and replace the harness.

➤9.CHECK CONTINUITY HYDRAULIC PUMP MOTOR
1.Check the harness of the hydraulic pump motor.
Refer to Page I5-50.

If it is OK, go to ➤10.
If it is NG, replace the harness and connector of the hydraulic pump motor.

➤10.CYLINDER HALL SENSOR VOLTAGE CHECK
1.Check the voltage of the cylinder hall sensor.
Refer to Page I5-98.

If it is OK, go to ➤11.
If it is NG, check the harness of the cylinder hall sensor.

➤11.CHECK CONTINUITY ROOF ECU AND POWER WINDOW ECU POWER SUPPLY SYSTEM
1.Separate connector at the roof ECU and the power window ECU.
2.Check the harness between the roof ECU and the power window ECU.
(1) Vehicle harness side connector 49 (ECU+B) of roof ECU — Battery ⊕ terminal.
(2) Vehicle harness connector 47(GND MC) of roof ECU — Body ground.
(3) Vehicle harness side connector 14 (+B1) of power window — Battery ⊕ terminal.
(4) Vehicle harness side connector 25 (+B2) of power window — Battery ⊕ terminal.
(5) Vehicle harness side connector 47 (ECU E) of power window ECU — Body ground.
(6) Vehicle harness side connector 5 (IG) of power window ECU — Ignition switch.
SPECIFIED VALUE: Continuity exists

If it is OK, replace of the roof ECU.
If it is NG, repair the harness and connector.

11-10-5 THE TRUNK LID DOES NOT OPEN TO THE REAR(DIAGNOSIS CODE IS NORMAL)

➤1.CHECK OF THE ROOF AND INDICATOR CONDITION
1.Check the conditions of the roof and indicator.
SPECIFIED VALUE: Roof : Fully opened or fully closed
Indicator : Extinguished

If it is OK, go to ➤2.
If it is NG, fully open or fully close the roof system.

➤2.CHECK OF SIDE LATCH INITIALIZATION
1.Push the trunk lid open switch for at least 10 seconds.
2.Once release your hand from the switch. Then, within two seconds push the switch again. At this time, check the operation of the trunk lid.
SPECIFIED VALUE: The trunk lid opens.

If OK, the system is satisfactory.
If it is NG, go to ➤3.

➤3.CHECK OF LINK MECHANISM
1.Perform the following checks given below.
(1) Presence of an obstacle on the operating path
(2) Seizure of luggage door
(3) Abnormal resistance of luggage link sliding section
(4) Abnormal resistance of stay damper
If it is OK, go to ➤4.
If it is NG, repair the abnormal point.

➤4.VISUAL CHECK OF SIDE LATCH RH/LH
1.Check that no foreign matter is caught in the side latch.
SPECIFIED VALUE: Ensure that there is no foreign body.

If it is OK, go to ➤5.
If it is NG, remove the foreign matter.

➤5.CHECK OF TRUNK LID COURTESY SWITCH CONDITIONS
1.When the trunk lid is closed, check the condition of the trunk lid courtesy switch.
SPECIFIED VALUE: It is firmly pushed.

If it is OK, go to ➤6.
If it is NG, adjust the trunk lid alignment.

➤6.VISUAL CHECK OF SIDE LATCH SENSOR RH/LH
1.Check the sensor for external appearance.
SPECIFIED VALUE: It should not be damaged and dropped. Also, there should be no excessive play.

If it is OK, go to ➤7.
If it is NG, install or replace the sensor.

➤7.CHECK CONTINUITY BETWEEN TRUNK LID OPEN SWITCH AND POWER WINDOW ECU
1.Separate connector at the trunk lid open SW and power window ECU.
2.Check the harness between the trunk lid open switch and power window ECU.
(1) Vehicle harness side connector 1 of trunk lid open SW — Body ground.
(2) Vehicle harness side connector 2 of trunk lid open switch — Vehicle harness side connector 40(TRLID) of power window ECU.
SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤8.
If it is NG, repair the harness and connector.

➤8.CHECK CONTINUITY BETWEEN TRUNK LID OPEN SWITCH AND ROOF ECU
1.Separate connector at the trunk lid open SW and roof ECU.
2.Check the harness between the trunk lid open switch and roof ECU.
(1) Vehicle harness side connector 2 of trunk lid open switch — Vehicle harness side connector 25(TLO) of roof ECU.
If it is OK, go to ➤9.
If it is NG, repair the harness and connector.

➤9.TRUNK LID OPEN SW UNIT CHECK

1.Perform the unit check of the trunk lid open switch.
Refer to Page I5-100.

If it is OK, go to ➤10.
If it is NG, replace of the trunk lid open SW.

➤10.CHECK OF TRUNK LID KEY-LESS ENTRY OPERATION

1.Check the operation of the keyless entry system of the trunk lid.
SPECIFIED VALUE: It operates properly.

If it is OK, go to ➤11.
If it is NG, proceed to the troubleshooting of the keyless entry system.
Refer to Page I4-15.

➤11.CHECK CONTINUITY BETWEEN CENTER LATCH AND ROOF ECU

1.Separate connector at the center latch and roof ECU.
2.Check the harness between the center latch and the roof ECU.
(1) Vehicle harness side connector 1 of center latch — Vehicle harness side connector 26 (OPN) of roof ECU.
(2) Vehicle harness side connector 3 of center latch — Vehicle harness side connector 37 (GND CL) of roof ECU.
(3) Vehicle harness side connector 4 of center latch — Vehicle harness side connector 28 (CTY) of roof ECU.
(4) Vehicle harness side connector 5 of center latch — Vehicle harness side connector 27 (CLS) of roof ECU.
(5) Vehicle harness side connector 2 of center latch — Vehicle harness side connector 40 (LCM+) of roof ECU.
(6) Vehicle harness side connector 6 of center latch — Vehicle harness side connector 31 (LCM−) of roof ECU.
SPECIFIED VALUE: Continuity exists

If it is OK, go to ➤12.
If it is NG, repair the harness and connector.

➤12.CENTER LATCH UNIT CHECK

1.Perform the unit check of the center latch.
Refer to Page I5-96.

If it is OK, go to ➤13.
If it is NG, replace of the center latch.

➤13.CHECK CONTINUITY BETWEEN TRUNK LID COURTESY SWITCH AND ROOF ECU

1.Disconnect the connectors of the trunk lid courtesy SW and roof ECU.

2.Check the harness between the trunk lid courtesy switch and the roof ECU.

(1) Vehicle harness side connector 1 of trunk lid courtesy switch — Vehicle harness side connector 8 (LSW) of roof ECU.

(2) Vehicle harness side connector 2 of trunk lid courtesy switch — Vehicle harness side connector 19 (GND LSW) of roof ECU.

SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤14.
If it is NG, repair the harness and connector.

➤14.UNIT CHECK OF TRUNK LID COURTESY SW

1.Perform the unit check of the trunk lid courtesy switch.
Refer to Page I5-101.

If it is OK, go to ➤15.
If it is NG, replace the trunk lid courtesy SW.

➤15.CHECK CONTINUITY BETWEEN SIDE LATCH SENSOR AND ROOF ECU

1.Separate connector at the side latch sensor and roof ECU.

2.Check the harness between the side latch sensor and roof ECU.

(1) Vehicle harness side connector 1 of side latch sensor RH — Vehicle harness side connector 9 (SENSC) of roof ECU.

(2) Vehicle harness side connector 2 of side latch sensor RH — Vehicle harness side connector 7 (RIL) of roof ECU.

(3) Vehicle harness side connector 1 of side latch sensor LH — Vehicle harness side connector 9 (SENSC) of roof ECU.

(4) Vehicle harness side connector 2 of side latch sensor LH — Vehicle harness side connector 6 (LEL) of roof ECU.

SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤16.
If it is NG, repair the harness and connector.

➤16.SIDE LATCH SENSOR RH/LH UNIT CHECK

1.Perform the unit check of the side latch sensor.
Refer to Page I5-99.

CAUTION

- Perform the check both at the right and left.

If it is OK, go to ➤17.
If it is NG, replace of the side latch sensor.

➤17.CHECK CONTINUITY BETWEEN SIDE LATCH MOTOR AND ROOF ECU
1.Separate connector at the side latch motor and roof ECU.
2.Check the harness between the side latch motor and the roof ECU.
(1) Vehicle harness side connector 1 of side latch motor — Vehicle harness side connector 11(SLDM+) of roof ECU.
(2) Vehicle harness side connector 2 of side latch motor — Vehicle harness side connector 18(SSSLD) of roof ECU.
(3) Vehicle harness side connector 3 of side latch motor — Vehicle harness side connector 9(SENSC) of roof ECU.
(4) Vehicle harness side connector 4 of side latch motor — Vehicle harness side connector 19(GND LSW) of roof ECU.
(5) Vehicle harness side connector 5 of side latch motor — Vehicle harness side connector 20(SLDM−) of roof ECU.
SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤18.
If it is NG, repair the harness and connector.

➤18.SIDE LATCH MOTOR UNIT CHECK
1.Perform the unit check of the side latch motor.
Refer to Page I5-96.

If it is OK, go to ➤19.
If it is NG, replace of the side latch sensor.

➤19.CHECK CONTINUITY BETWEEN ROOF ECU AND BATTERY
1.Separate connector at the roof ECU and the battery.
2.Check the harness between the roof ECU and the battery.
(1) Vehicle harness side connector 49 (ECU+B) of roof ECU — Battery ⊕ terminal.
(2) Vehicle harness side connector 47 (GND MC) of roof ECU — Body ground.
SPECIFIED VALUE: Continuity exists.

If it is OK, replace of the roof ECU.
If it is NG, repair the harness and connector.

11-10-6 THE TRUNK LID DOES NOT CLOSE AT THE REAR(NORMAL DIAGNOSIS CODE)

➤1.CHECK OF THE ROOF AND INDICATOR CONDITION
1.Check the conditions of the roof and indicator.
SPECIFIED VALUE: Roof : Fully opened or fully closed
Indicator : Extinguished

If it is OK, go to ➤2.
If it is NG, fully open or fully close the roof system.

➤2.CHECK OF TRUNK LID OPEN SW OPERATION
1.Check the operation of the trunk lid when the trunk lid open switch is pressed.
SPECIFIED VALUE: It operates properly.

If OK, the system is satisfactory.
If it is NG, go to ➤3.

➤3.CHECK OF LINK MECHANISM
1.Perform the following checks given below.
(1) Presence of an obstacle on the operating path.
(2) Seizure of trunk lid.
(3) Abnormal resistance of luggage link sliding section.
(4) Abnormal resistance of stay damper.
If it is OK, go to ➤4.
If it is NG, repair the abnormal point.

➤4.CHECK OF TRUNK LID OPENER (FOR EMERGENCY USE) CONDITIONS
1.Check the condition of the trunk lid opener cable.
SPECIFIED VALUE: Ensure that the cable is not pulled.

If it is OK, go to ➤5.
If it is NG, carry out the following operations.
(1) Return the cable.
(2) Check the operation of the trunk lid opener again.

➤5.CHECK OF SIDE LATCH EMERGENCY CABLE CONDITIONS
1.Check the condition of the emergency cable.
SPECIFIED VALUE: Ensure that the cable is not pulled.

If it is OK, go to ➤6.
If it is NG, carry out the following operations.
(1) Return the emergency cable to the original position by hand.
(2) Confirm the operation of the side latch again.

➤6.CHECK OF SIDE LATCH FOR PRESENCE OF FOREIGN MATTERS
1.Check that no foreign matter is caught in the side latch.
SPECIFIED VALUE: Ensure that there is no foreign body.

If it is OK, go to ➤7.
If it is NG, remove the foreign matter.

➤7.CHECK OF TRUNK LID COURTESY SW CONDITIONS
1.When the trunk lid is closed, check the condition of the trunk lid courtesy switch.
SPECIFIED VALUE: It is firmly pushed.

If it is OK, go to ➤8.
If it is NG, adjust the trunk lid alignment.

➤8.VISUAL CHECK OF SIDE LATCH SENSOR RH/LH
1.Check the sensor for external appearance.
SPECIFIED VALUE: It should not be damaged and dropped. Also, there should be no excessive play.

If it is OK, go to ➤9.
If it is NG, install or replace the sensor.

➤9.CHECK CONTINUITY BETWEEN TRUNK LID OPEN SWITCH AND POWER WINDOW ECU

1.Separate connector at the trunk lid open SW and power window ECU.

2.Check the harness between the trunk lid open switch and power window ECU.

(1) Vehicle harness side connector 1 of trunk lid open SW — Body ground.

(2) Vehicle harness side connector 2 of trunk lid open switch — Vehicle harness side connector 40(TRLID) of power window ECU.

SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤10.

If it is NG, repair the harness and connector.

➤10.TRUNK LID OPEN SW UNIT CHECK

1.Perform the unit check of the trunk lid open switch.

Refer to Page I5-100.

If it is OK, go to ➤11.

If it is NG, replace of the trunk lid open SW.

➤11.CHECK CONTINUITY BETWEEN CENTER LATCH AND ROOF ECU

1.Separate connector at the center latch and roof ECU.

2.Check the harness between the center latch and the roof ECU.

(1) Vehicle harness side connector 1 of center latch — Vehicle harness side connector 26 (OPN) of roof ECU.

(2) Vehicle harness side connector 3 of center latch — Vehicle harness side connector 37 (GND CL) of roof ECU.

(3) Vehicle harness side connector 4 of center latch — Vehicle harness side connector 28 (CTY) of roof ECU.

(4) Vehicle harness side connector 5 of center latch — Vehicle harness side connector 27 (CLS) of roof ECU.

(5) Vehicle harness side connector 2 of center latch — Vehicle harness side connector 40 (LCM+) of roof ECU.

(6) Vehicle harness side connector 6 of center latch — Vehicle harness side connector 31 (LCM−) of roof ECU.

SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤12.

If it is NG, repair the harness and connector.

➤12.CENTER LATCH UNIT CHECK

1.Perform the unit check of the center latch.

Refer to Page I5-96.

If it is OK, go to ➤13.

If it is NG, replace of the center latch.

➤13.CHECK CONTINUITY BETWEEN TRUNK LID COURTESY SWITCH AND ROOF ECU

1.Disconnect the connectors of the trunk lid courtesy SW and roof ECU.

2.Check the harness between the trunk lid courtesy switch and the roof ECU.

(1) Vehicle harness side connector 1 of trunk lid courtesy switch — Vehicle harness side connector 8 (LSW) of roof ECU.

(2) Vehicle harness side connector 2 of trunk lid courtesy switch — Vehicle harness side connector 19 (GND LSW) of roof ECU.

SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤14.

If it is NG, repair the harness and connector.

➤14.UNIT CHECK OF TRUNK LID COURTESY SW

1.Perform the unit check of the trunk lid courtesy switch.

Refer to Page I5-101.

If it is OK, go to step 15.

If it is NG, replace the trunk lid courtesy SW.

➤15.CHECK CONTINUITY CHECK BETWEEN SIDE LATCH SENSOR AND ROOF ECU

1.Separate connector at the side latch sensor and roof ECU.

2.Check the harness between the side latch sensor and roof ECU.

(1) Vehicle harness side connector 1 of side latch sensor RH — Vehicle harness side connector 9 (SENSC) of roof ECU.

(2) Vehicle harness side connector 2 of side latch sensor RH — Vehicle harness side connector 7 (RIL) of roof ECU.

(3) Vehicle harness side connector 1 of side latch sensor LH — Vehicle harness side connector 9 (SENSC) of roof ECU.

(4) Vehicle harness side connector 2 of side latch sensor LH — Vehicle harness side connector 6 (LEL) of roof ECU.

SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤16.

If it is NG, repair the harness and connector.

➤16.SIDE LATCH SENSOR RH/LH UNIT CHECK

1.Perform the unit check of the side latch sensor.

Refer to Page I5-99.

CAUTION

- Perform the check both at the right and left.

If it is OK, go to ➤17.

If it is NG, replace of the side latch sensor.

➤17.CHECK CONTINUITY BETWEEN SIDE LATCH MOTOR AND ROOF ECU

1.Separate connector at the side latch motor and roof ECU.

2.Check the harness between the side latch motor and the roof ECU.

(1) Vehicle harness side connector 1 of side latch motor – Vehicle harness side connector 11(SLDM+) of roof ECU.

(2) Vehicle harness side connector 2 of side latch motor – Vehicle harness side connector 18(SSSLD) of roof ECU.

(3) Vehicle harness side connector 3 of side latch motor – Vehicle harness side connector 9(SENSC) of roof ECU.

(4) Vehicle harness side connector 4 of side latch motor – Vehicle harness side connector 19(GND LSW) of roof ECU.

(5) Vehicle harness side connector 5 of side latch motor – Vehicle harness side connector 20(SLDM−) of roof ECU.

SPECIFIED VALUE: Continuity exists

If it is OK, go to ➤18.
If it is NG, repair the harness and connector.

➤18.SIDE LATCH MOTOR UNIT CHECK

1.Perform the unit check of the side latch motor.
Refer to Page I5-96.

If it is OK, go to ➤19.
If it is NG, replace of the side latch sensor.

➤19.CHECK CONTINUITY BETWEEN ROOF ECU AND BATTERY

1.Separate connector at the roof ECU and the battery.

2.Check the harness between the roof ECU and the battery.

(1) Vehicle harness side connector 49 (ECU+B) of roof ECU – Battery ⊕ terminal.

(2) Vehicle harness side connector 47 (GND MC) of roof ECU – Body ground.

SPECIFIED VALUE: Continuity exists.

If it is OK, replace of the roof ECU.
If it is NG, repair the harness and connector.

11-10-7 THE WARNING LAMP DOES NOT GO ON

➤1.CHECK OF WARNING LAMP OPERATION

1.Check the lighting state of the warning lamp at the time of the bulb checking immediately after the IG switch is set to "ON" position.

SPECIFIED VALUE: The lamp goes on.

If OK, the system is satisfactory.

If it is NG, go to ➤2.

➤2.CHECK CONTINUITY BETWEEN WARNING BUZZER AND POWER WINDOW ECU

1.Separate connector at the warning buzzer and power window ECU.

2.Check the harness between the warning lamp and the power window ECU.

(1) Vehicle harness side connector 2 of warning lamp – 44 (WRNG LAMP).

(2) Vehicle harness side connector 3 of warning lamp – Ignition SW(IG1).

SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤3.

If it is NG, repair the harness and connector.

➤3.WARNING LAMP UNIT CHECK

1.Perform the unit check of the warning lamp.

Refer to Page I5-101.

If it is OK, replace of the power window ECU.

If it is NG, replace of the indicator.

11-10-8 WARNING LAMP REMAINS ILLUMINATED(NORMAL OF THE DIAGNOSIS CODE)

NOTE

- When the ECU has detected a diagnosis code, the warning lamp is illuminated. In this case perform the troubleshooting according to diagnosis codes.

➤1.WARNING LAMP CHECK

1.Set the IG switch to the "OFF" position and set it to the "ON" position again. At this time, check the lighting state of the warning lamp.

SPECIFIED VALUE: It does not go on.

If OK, the system is satisfactory..

NOTE

- Lighting due to operation time-out, etc.

If it is NG, go to ➤2.

➤2.CHECK OF MOTOR DRIVEN OPENING ROOF SYSTEM CONDITIONS

1.Check the conditions of the motor driven opening roof system.

SPECIFIED VALUE: The roof is not midway.

If it is OK, go to ➤8.

If it is NG, go to ➤3.

➤3.WARNING LAMP CHECK

1.Check the warning lamp for the lighting state when the motor-driven opening/closing type roof system is opened fully or closed fully.

SPECIFIED VALUE: Not illuminated.

If OK, the system is satisfactory..

If it is NG, go to ➤4.

➤4.CHECK OF THE ROOF LOCK LEVER CONDITION.

1.Check the state of the lever when the hook is applied.

SPECIFIED VALUE: It is engaged securely.

If it is OK, go to ➤5.

If it is NG, adjust the alignment, or replace the center lock catch Ay (RH or LH).

➤5.VISUAL CHECK OF ROOF LOCK SW

1.Check that no foreign matter is caught in the roof lock switch.

SPECIFIED VALUE: Ensure that there is no foreign body.

If it is OK, go to ➤6.

If it is NG, remove the foreign matter.

➤6.CONTINUITY CHECK BETWEEN ROOF LOCK SWITCH RH/LH AND POWER WINDOW ECU

1.Separate connector at the roof lock SW RH/LH and power window ECU.

2.Check the harness between the roof lock switch RH and the power window ECU.

(1) Vehicle harness side connector 1 of roof lock switch RH — Vehicle harness side connector 51 (LOCK RH−) of power window ECU.

(2) Vehicle harness side connector 2 of roof lock switch RH — Vehicle harness side connector 18 (LOCK RH+) of power window ECU.

(3) Vehicle harness side connector 1 of roof lock switch LH — Vehicle harness side connector 51 (LOCK LH−) of power window ECU.

(4) Vehicle harness side connector 2 of roof lock switch LH — Vehicle harness side connector 17 (LOCK LH+) of power window ECU.

SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤7.

If it is NG, repair the harness and connector.

➤7.ROOF LOCK SW UNIT CHECK

1.Perform the unit check of the roof lock switch.

Refer to Page I5-99.

Refer to Page I5-68.

If it is OK, go to ➤8.

If it is NG, replace the center lock catch Ay (RH or LH).

➤8.CHECK CONTINUITY BETWEEN WARNING LAMP AND POWER WINDOW ECU

1.Separate connector at the warning buzzer and power window ECU.

2.Check the harness between the warning lamp and the power window ECU.

(1) Vehicle harness side connector 1 of warning lamp — Vehicle harness side connector 44(WRNG LAMP) of power window ECU.

(2) Vehicle harness side connector 2 of warning lamp — Ignition SW(IG1).

SPECIFIED VALUE: Continuity exists.

3.Perform short check with the body ground.

SPECIFIED VALUE: No continuity exists.

If it is OK, replace of the power window ECU.

If it is NG, repair the harness and connector.

11-10-9 WARNING BUZZER CONTINUOUS SOUND

➤1.CONFIRMATION OF BUZZER SOUNDING CONDITION

1.Check to see if the buzzer keeps sounding only when the vehicle is running with the motor driven opening roof system fully closed. (The buzzer does not sound when the roof is full open.)

If it is OK, go to ➤2.

If it is NG, go to ➤3.

➤2.CHECK OF THE ROOF LOCK SW AND THE HARNESS

1.Check the roof lock switch and harness.

Refer to Page I5-67.

Refer to Page I5-68.

If it is OK, go to ➤3.

If it is NG, replace the center lock catch roof lock catch RH/LH Ay or replace the harness.

➤3.CHECK CONTINUITY BETWEEN WARNING BUZZER AND POWER WINDOW ECU

1.Separate connector at the warning buzzer and power window ECU.

2.Check the harness between the warning buzzer and the power window ECU.

(1) Vehicle harness side connector 1 of warning buzzer — Vehicle harness side connector 43(BZZR) of power window ECU.

(2) Vehicle harness side connector 2 of warning buzzer — Ignition SW (IG1).

SPECIFIED VALUE: Continuity exists.

3.Perform short check with the body ground.

SPECIFIED VALUE: No continuity exists.

If it is OK, go to ➤4.

If it is NG, repair the harness and connector.

➤4.WARNING BUZZER UNIT CHECK

1.Perform the unit check of the warning buzzer.

Refer to Page I5-101.

If it is OK, replace of the power window ECU.

If it is NG, replace of the warning buzzer.

11-10-10 THE WARNING BUZZER DOES NOT SOUND

➤1.CHECK CONTINUITY BETWEEN WARNING BUZZER AND POWER WINDOW ECU

1.Separate connector at the warning buzzer and power window ECU.

2.Check the harness between the warning buzzer and the power window ECU.

(1) Vehicle harness side connector 1 of warning buzzer – Vehicle harness side connector 43(BZZR) of power window ECU.

(2) Vehicle harness side connector 2 of warning buzzer – Ignition SW (IG1).

SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤2.

If it is NG, repair the harness and connector.

➤2.WARNING BUZZER UNIT CHECK

Refer to Page I5-101.

If it is OK, replace of the power window ECU.

If it is NG, replace of the warning buzzer.

11-10-11 THE QUARTER WINDOW WILL NOT OPERATE

➤1.CHECK CONTINUITY BETWEEN QUARTER WINDOW MOTOR AND POWER WINDOW ECU

1.Separate connector at the power window ECU and quarter window ECU.

2.Check the harness between the quarter window motor and the power window ECU.

(1) Vehicle harness side connector 1 of quarter window motor RH – Vehicle harness side connector 55(QL−) of power window ECU.

(2) Vehicle harness side connector 2 of quarter window motor RH – Vehicle harness side connector 45(QR−) of power window ECU.

(3) Vehicle harness side connector 1 of quarter window motor LH – Vehicle harness side connector 6(QL+) of power window ECU.

(4) Vehicle harness side connector 2 of quarter window motor LH – Vehicle harness side connector 6(QL−) of power window ECU.

SPECIFIED VALUE: Continuity exists.

If it is OK, go to ➤2.

If it is NG, repair the harness and connector.

➤2.QUARTER WINDOW MOTOR UNIT CHECK

1.Perform the unit check of the quarter window motor.

Refer to Page I5-101.

If it is OK, replace of the power window ECU.

If it is NG, replace the quarter window regulator Ay.

11-10-12 THE BOOT LID OPENER SWITCH WILL NOT OPERATE

➤1.CHECK OF TRUNK LID KEY-LESS ENTRY OPERATION

1.Check the operation of the keyless entry system of the trunk lid.

SPECIFIED VALUE: It operates properly.

If it is OK, proceed to the troubleshooting of the trunk lid not opening at the rear. (normal diagnosis code.)

Refer to Page I5-82.

If it is NG, proceed to the troubleshooting of the keyless entry system.

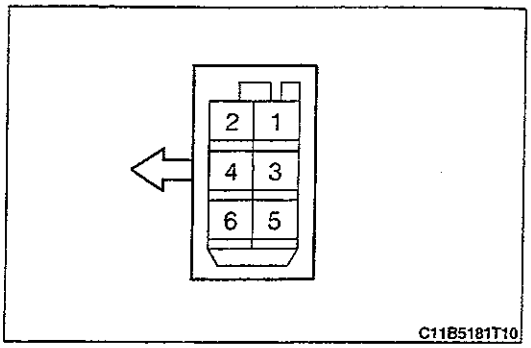
Refer to Page I4-15.

11-11 UNIT CHECK

11-11-1 CENTER LATCH

1."LOCK" and "UNLOCK" the latch to check continuity between the connector terminal ④ and ③.

Position of the center latch	Continuity
LOCK	No continuity exists
UNLOCK	Continuity exists



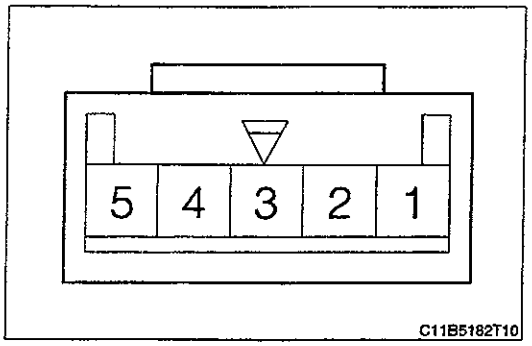
2.Check proper operation of the motor when battery voltage is applied between the connector terminals ② and ⑥.

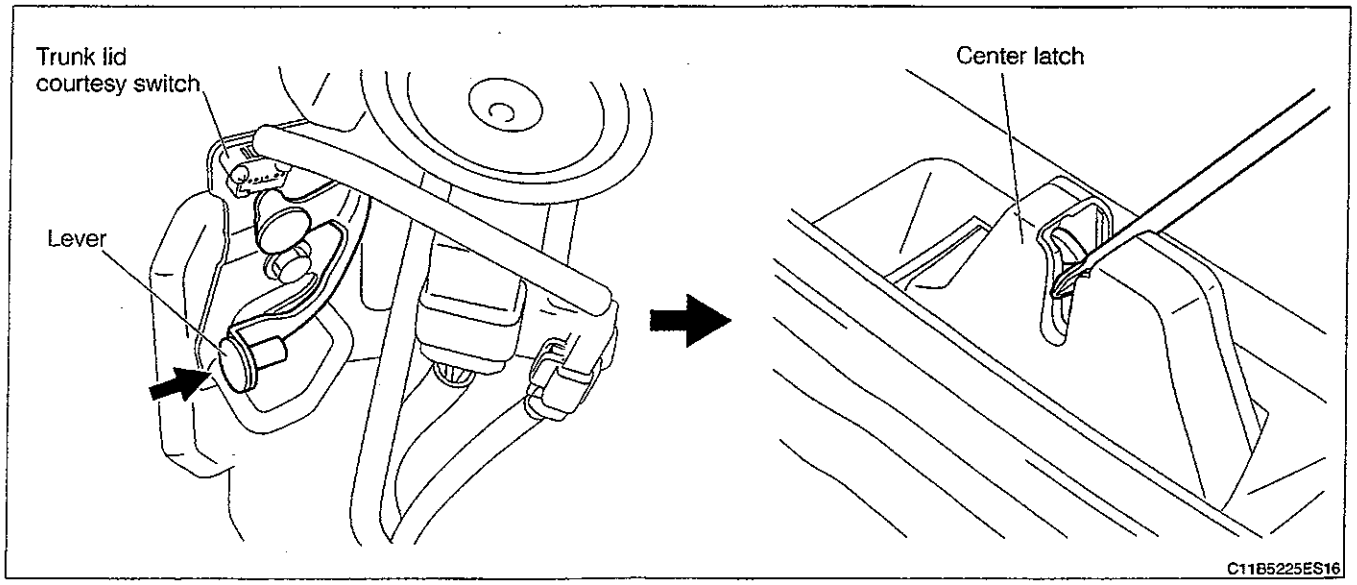
Check condition	Motor rotating direction
Battery +→terminal② Battery −→terminal⑥	Right turn
Battery +→terminal⑥ Battery −→terminal②	Left turn

11-11-2 SIDE LATCH MOTOR

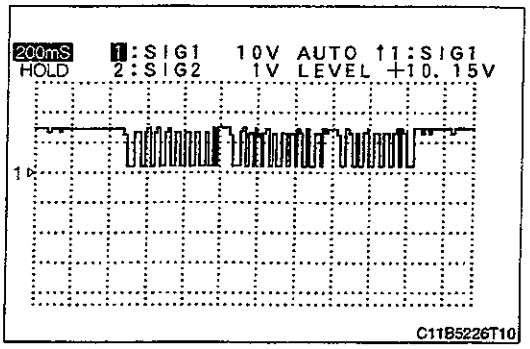
(1) PULSE OUTPUT CHECK

1.Measure pulse between the connector terminals ② and ③ when pressing the center latch using a screwdriver while pushing the trunk lid courtesy switch lever.





2.Shown is the wave profile measured using oscilloscope function of the diagnostic tester (DS-21).
(1) Measuring terminals :②—③
(2) Condition : side latch motor is operating.
(3) Measuring terminals : 10V (voltage axis), 1S (time axis) .

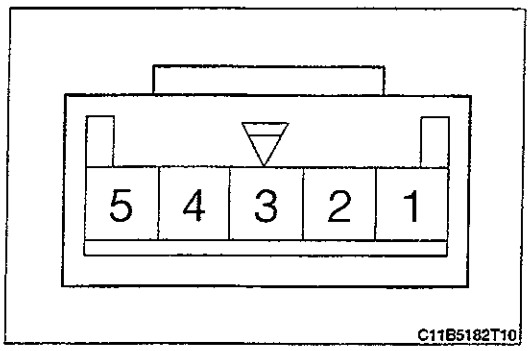


(2) MOTOR CHECK

1.When the battery voltage is applied to between the connector terminals ① and ⑤, check the operation of the side latch. (side latch motor.)

CAUTION

- **Do not remove the motor when checking proper operation of the side latch motor.**
- **When supplying voltage, rotate the motor in several small steps.**



Check condition	Motor rotating direction
Battery +→terminal⑤ Battery −→terminal①	UNLOCK
Battery +→terminal① Battery −→terminal⑤	LOCK

(3) AFTER COMPLETION OF THE CHECK OPERATION

After checking the side latch motor, initialize the side latch by pressing the trunk lid open switch once with the trunk lid open.

11-11-3 ROOF & TRUNK LID OPEN/CLOSE SENSOR

1.Use the SST (for the sensor check) to open/close the trunk lid (front opening) and measure voltage at "OPEN" or "full close".

SST: 09842-97207-000

MEASURING TERMINALS

Kinds of sensor	Check connector measure terminal
Roof open sensor	Hydraulic cylinder①-③
Roof closed sensor	Hydraulic cylinder②-④
Trunk lid open sensor	Hydraulic cylinder②-④
Trunk lid closed sensor	Hydraulic cylinder①-③

SPECIFIED VALUE

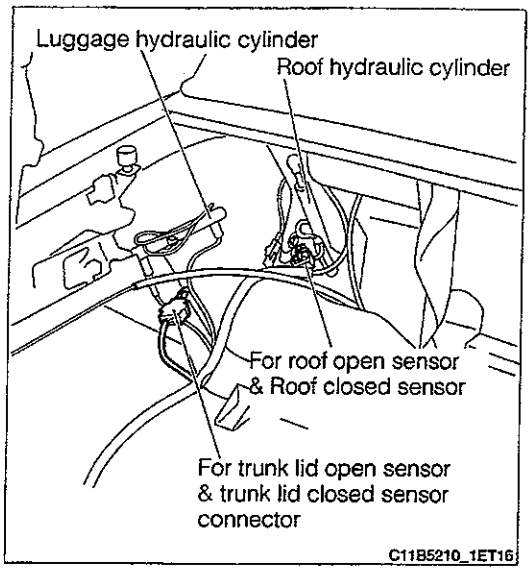
Kinds of sensor	Measure the voltage(V)	
	Fully opened	Fully closed
Roof open sensor	11.4	8.2
Roof closed sensor	8.2	11.4
Trunk lid open sensor	11.4	8.2
Trunk lid closed sensor	8.2	11.4

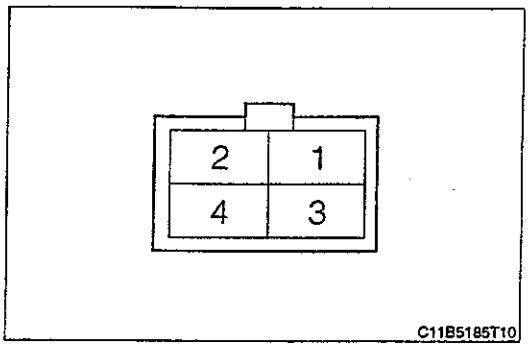
NOTE

- Measurements and reference values might somewhat vary according to the tester used.
- Reference voltage refers to the value at the ignition switch "ON".

CAUTION

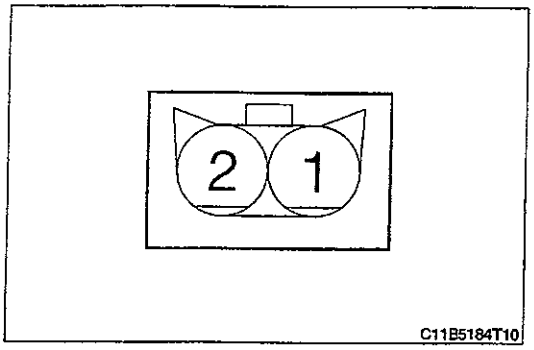
- When the trunk lid is closed manually, the hydraulic cylinder might not reach "full close" position, which will not allow the trunk lid closed sensor to take accurate measurement. Open the trunk lid to the rear and push the sliding hook fully before taking measurements.





11-11-4 SIDE LATCH SENSOR RH/LH

1.Use the SST (for the sensor check) to open/close the trunk lid (rear opening) and measure voltage at "open" or "full close".
SST: 09842-97207-000



MEASURING TERMINALS

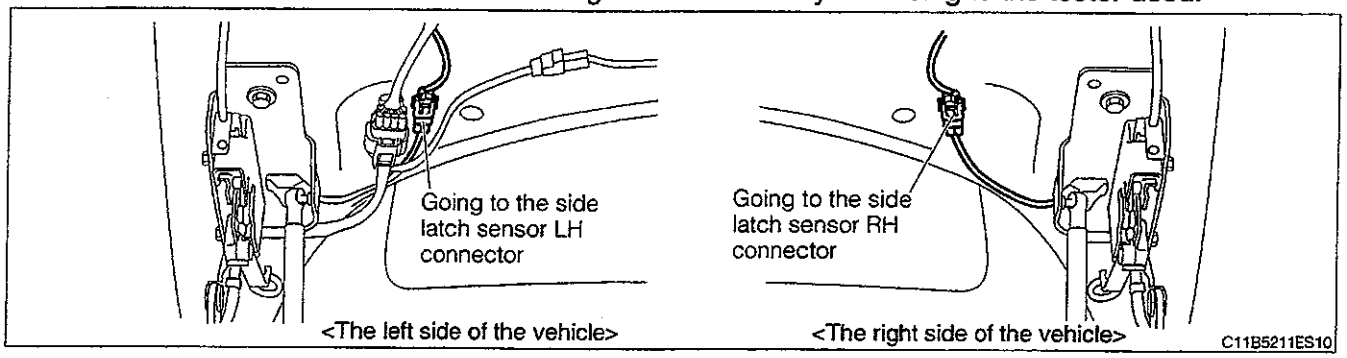
Kinds of sensor	Check connector measure terminal
Side latch sensor	Side latch ①-②

SPECIFIED VALUE

Kinds of sensor	Measure the voltage(V)	
	Open	Fully closed
Side latch sensor RH	8.2	11.4
Side latch sensor LH	8.2	11.4

NOTE

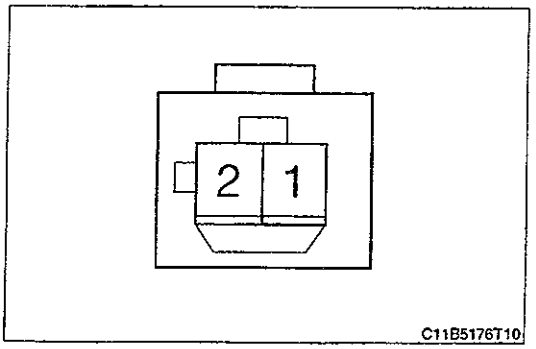
- Measurements and reference values might somewhat vary according to the tester used.



11-11-5 ROOF LOCK SW

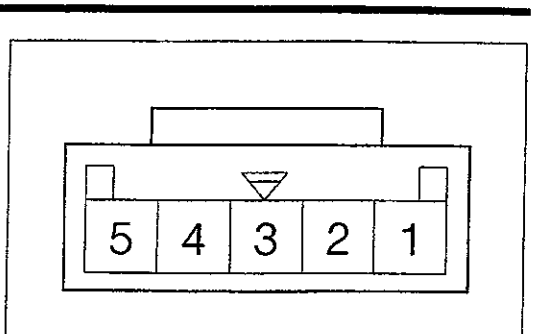
Check continuity between connector terminals when the roof lock switch lever is pressed.

Check condition	Continuity
Not operated	No continuity exists
When the roof lock switch lever is pressed	Continuity exists



11-11-6 ROOF OPEN/CLOSE SW

Check continuity between connector terminals when the switch is pressed.



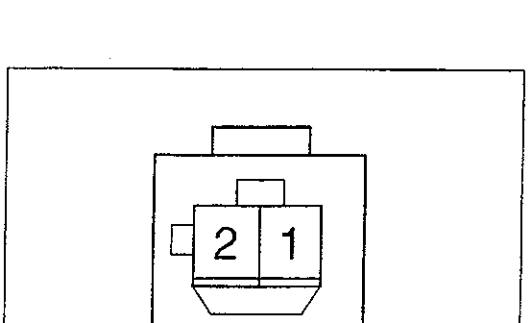
○—○: Continuty exist

Position \ Terminal No.	⑤	③	④	①	②
PULL		○—○		○—○	
↕	×	×		×	
OFF	○—○			○—○	
↕	×	×		×	
PUSH	○—○		○—○		

C11B5187EL08

11-11-7 TRUNK LID OPEN SW

Check continuity between connector terminals when the switch is pressed.



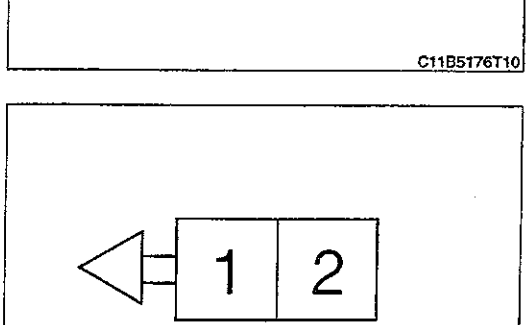
○—○: Continuty exist

Position \ Terminal No.	②	①
Free		
Full stroke	○—○	

C11B5186EL06

11-11-8 LUGGAGE PARTITION SW

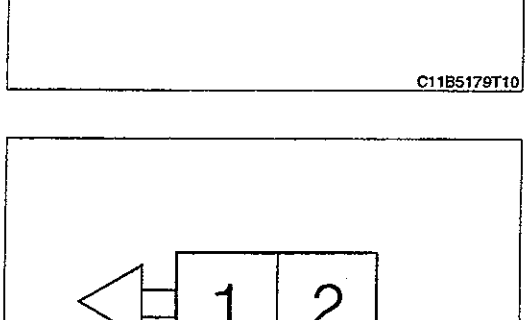
Check continuity between connector terminals when the switch is pressed.



Check condition	Continuity
Not operated	No continuity exists
When the switch is pressed	Continuity exists

11-11-9 OPENING COVER SW

Check continuity between connector terminals when the switch is pressed.

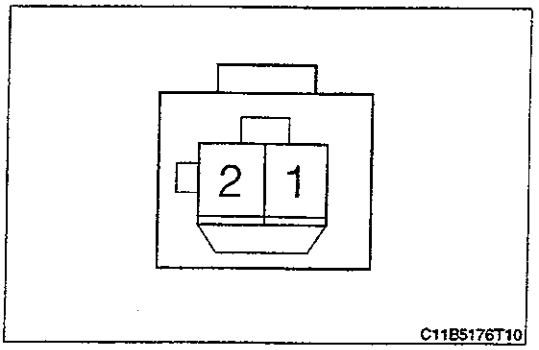


Check condition	Continuity
Not operated	Continuity exists
When the switch is pressed	No continuity exists

11-11-10 TRUNK LID COURTESY SWITCH

Check continuity between connector terminal when the lever is pressed.

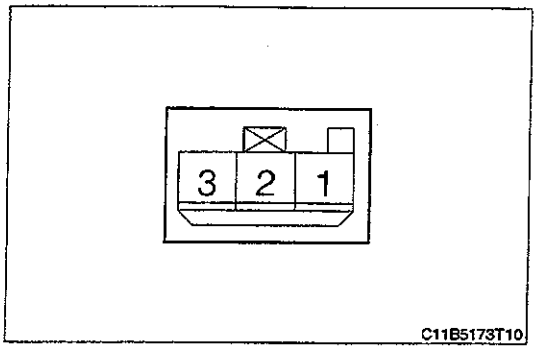
Check condition	Continuity
Not operated	Continuity exists
When the switch is pressed	No continuity exists



11-11-11 WARNING LAMP

Check if the lamp is lit up when battery voltage is applied between the connector terminals ① and ②.

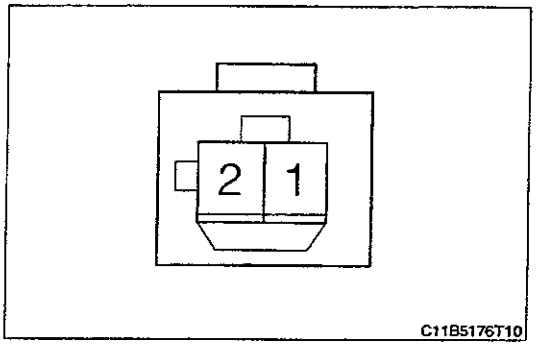
Check condition	Lamp condition
Battery +→terminal② Battery −→terminal①	Illuminated



11-11-12 WARNING BUZZER

Check if the buzzer sounds when the battery voltage is applied between the connector terminals ① and ②.

Check condition	Buzzer condition
Battery +→terminal① Battery −→terminal②	Sound signal

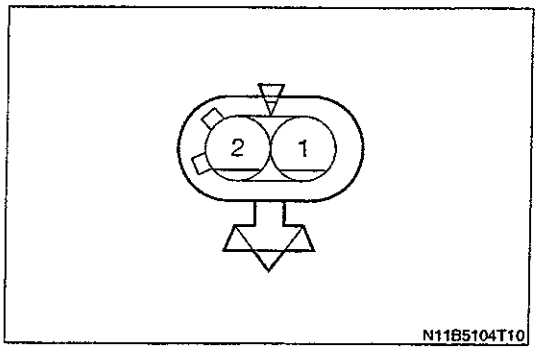


11-11-13 QUARTER MOTOR UNIT CHECK

Use the SST (for the sensor check) to check if the motor rotates when the battery voltage is applied between the connector terminals ① and ②.

SST: 09842-97208-000

Check condition	Motor rotating direction
Battery +→terminal② Battery −→terminal①	Right turn
Battery +→terminal① Battery −→terminal②	Left turn



TO INDEX

J1 LIGHTING

LIGHTING---------- J1 - 1
BASIC CHECK AND ADJUSTMENT --- J1 - 1
FUNCTION CHECK ---------- J1 - 3
UNIT CHECK---------- J1 - 3
HEADLAMP AY---------- J1 - 7
REMOVAL AND INSTALLATION--------- J1 - 7
HEAD LAMP BULB(LOW BEAM)---------- J1 - 9
REMOVAL AND INSTALLATION--------- J1 - 9
HEAD LAMP BULB(HIGH BEAM) --------- J1 - 10
REMOVAL AND INSTALLATION ------- J1 - 10
CLEARANCE LAMP BULB ---------- J1 - 10
REMOVAL AND INSTALLATION ------- J1 - 10
FRONT FOG LAMP AND TURN
SIGNAL LAMP AY---------- J1 - 11
REMOVAL AND INSTALLATION ------- J1 - 11
FRONT FOG LAMP BULB---------- J1 - 12
REMOVAL AND INSTALLATION ------- J1 - 12
FRONT TURN SIGNAL LAMP BULB ---- J1 - 12
REMOVAL AND INSTALLATION ------- J1 - 12
SIDE TURN SIGNAL LAMP BULB ------- J1 - 13
REMOVAL AND INSTALLATION ------- J1 - 13
TAIL AND STOP LAMP BULB ---------- J1 - 14
REMOVAL AND INSTALLATION ------- J1 - 14
BACK UP LAMP BULB ---------- J1 - 15
REMOVAL AND INSTALLATION ------- J1 - 15
REAR TURN SIGNAL LAMP BULB ------ J1 - 15
REMOVAL AND INSTALLATION ------- J1 - 15
REAR FOG LAMP BULB---------- J1 - 15
REMOVAL AND INSTALLATION ------- J1 - 15
LICENSE PLATE LAMP BULB ---------- J1 - 16
REMOVAL AND INSTALLATION ------- J1 - 16
HIGH MOUNTED STOP LAMP AY ------- J1 - 17
REMOVAL AND INSTALLATION ------- J1 - 17
ROOM LAMP AY ---------- J1 - 18
REMOVAL AND INSTALLATION ------- J1 - 18
MULTI-USE LEVER SWITCH---------- J1 - 19
REMOVAL AND INSTALLATION ------- J1 - 19

1 LIGHTING

1-1 BASIC CHECK AND ADJUSTMENT

1-1-1 HEADLAMP PHOTOMETRIC AXIS ADJUSTMENT

(1) OPERATION PRIOR TO PHOTOMETRIC AXIS ADJUSTMENT

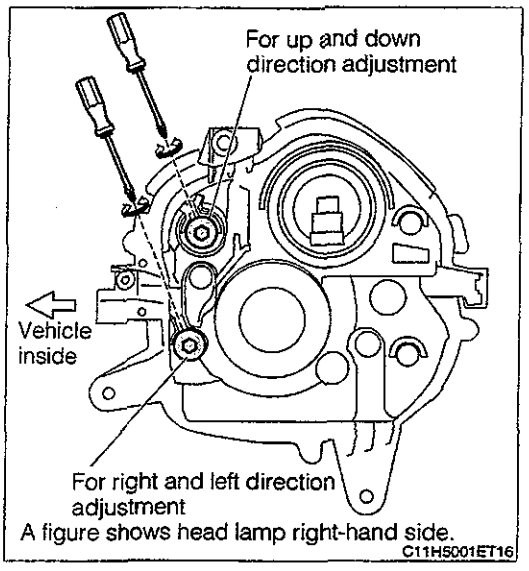
1.Adjust the tire air inflation pressure to the specified value.
2.Seat one person at the Driver's seat.
3.Replenish oils to the specified levels. Fill gasoline to the full capacity.
4.Mount the tools, jack and spare tire at the specified positions.
5.Rock the vehicle in the up-and-down direction as well as in the right-and-left direction so that the suspension may bed well.
6.Set the engine speed to a level of 1500 rpm or more. (If the engine speed is too low, the lamp terminal voltage drops, thus making it difficult to recognize the cut-off line.

NOTE

- Cut-off line: Boundary line between the bright zone and dark zone in the low beam.

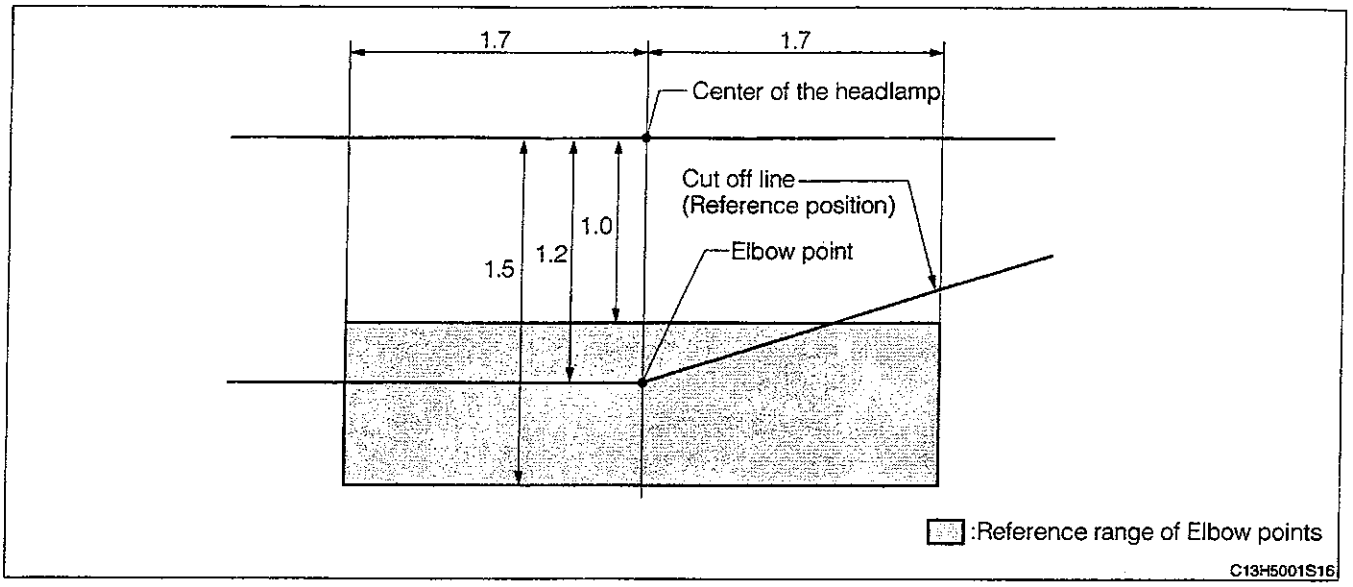
(2) PHOTOMETRIC AXIS ADJUSTMENT

1.Adjust the photometric axis of the low beam according to the instruction manual of the headlamp tester to be used.



SPECIFIED VALUE: REFERENCE RANGE OF CUT-OFF LINE ELBOW POINTS

Vertical position	Range from 1.0% to 1.5% below the horizontal line that passes through the lamp center (Reference position: 1.2% below)
Horizontal position	Range between 1.7 % right and left from the vertical line that passes through the lamp center (Reference position: On the vertical line that passes through the lamp center)



Unit : %

NOTE

- Elbow point: Point where the cut-off line is articulated

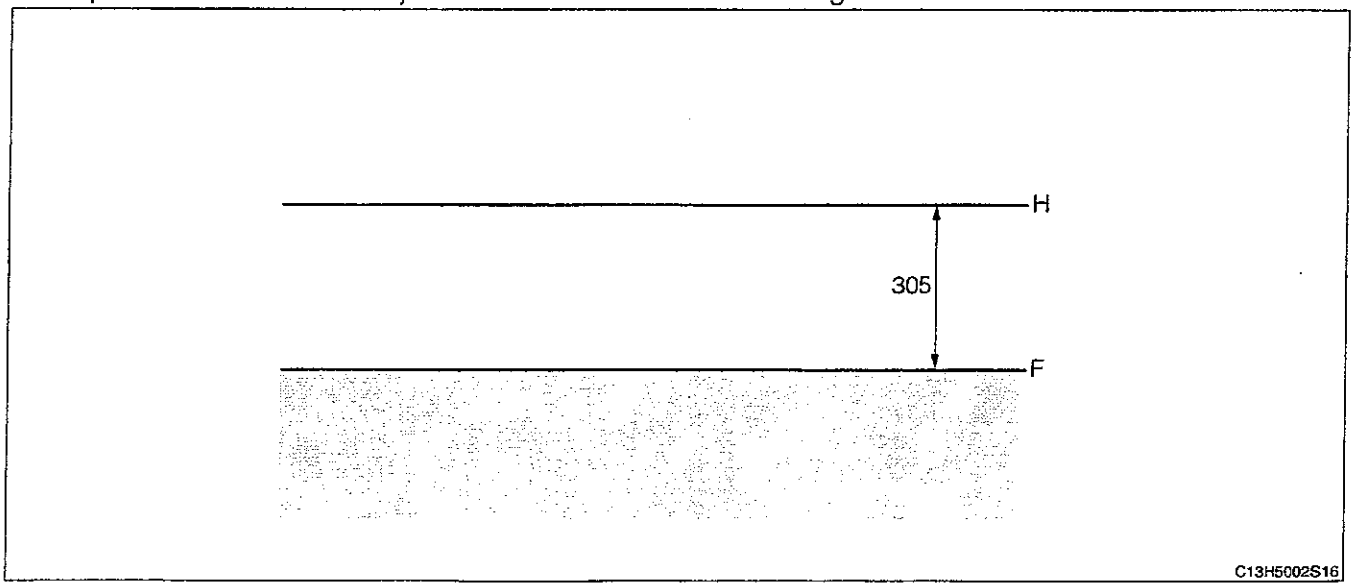
1-1-2 FRONT FOG LAMP PHOTOMETRIC AXIS ADJUSTMENT

(1) OPERATION PRIOR TO PHOTOMETRIC AXIS ADJUSTMENT

1.Turn over the fender liner only to such an extent that allows the photometric adjustment.
2.Adjust the tire air inflation pressure to the specified value.
3.Set the engine speed to a level of 1500 rpm or more.

(2) PHOTOMETRIC AXIS ADJUSTMENT

1.Prepare a screen for the adjustment use as indicated in the figure.



Unit : mm

2.Place the screen normally at a distance of three meters ahead of the lamp. Align line H with the center of the headlamp.

NOTE

- This normal placing can be carried out easily when a screen is affixed to the lens of the headlamp tester .

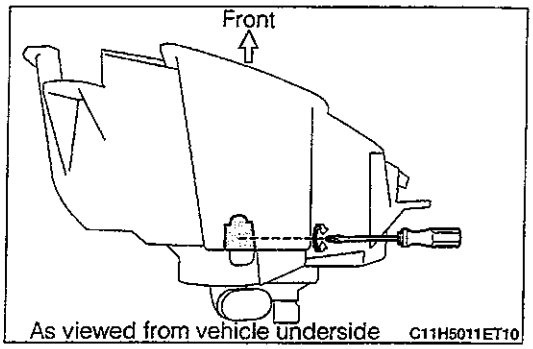
3.Turn ON the front fog lamp. Perform adjustment in such a way that the light distribution comes in the shaded section on the screen.

CAUTION

- Perform the adjustment by turning the aiming screw in the tightened direction. (When performing the adjustment in the loosening direction, first loosen the screw, then turn it in the tightened direction.)

NOTE

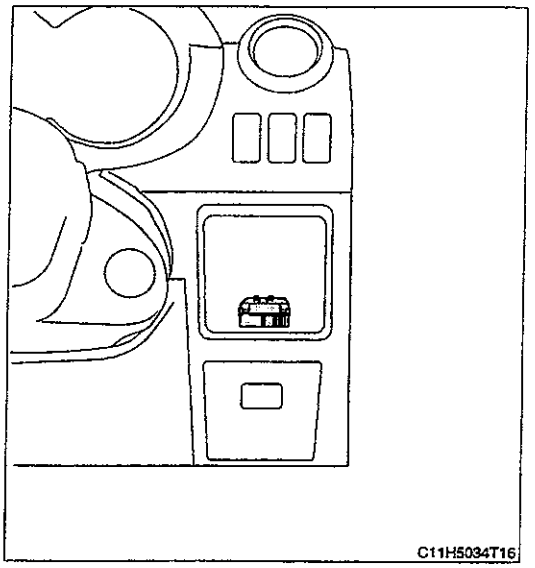
- No screw is provided for the right-and-left adjustment.



1-2 FUNCTION CHECK

1-2-1 REAR FOG LAMP ON & LIGHT ON WARNING BUZZER, KEY REMAINING-STATE & LIGHT ON WARNING BUZZER

1.Make sure that the buzzer is set off according to the operation table.



Operation table (European specifications)

IG SW	Rear fog lamp SW	Tail SW	Courtesy SW	Buzzer
OFF	-	-	OFF	×
OFF	ON	OFF	ON	○
OFF	OFF	ON	ON	○
OFF	ON	ON	ON	○

※○ indicates condition to activate.

Operation table (Australian specifications)

IG SW	Key SW	Tail SW	Courtesy SW	Buzzer
OFF	-	-	OFF	×
OFF	ON	OFF	ON	○
OFF	OFF	ON	ON	○
OFF	ON	ON	ON	○

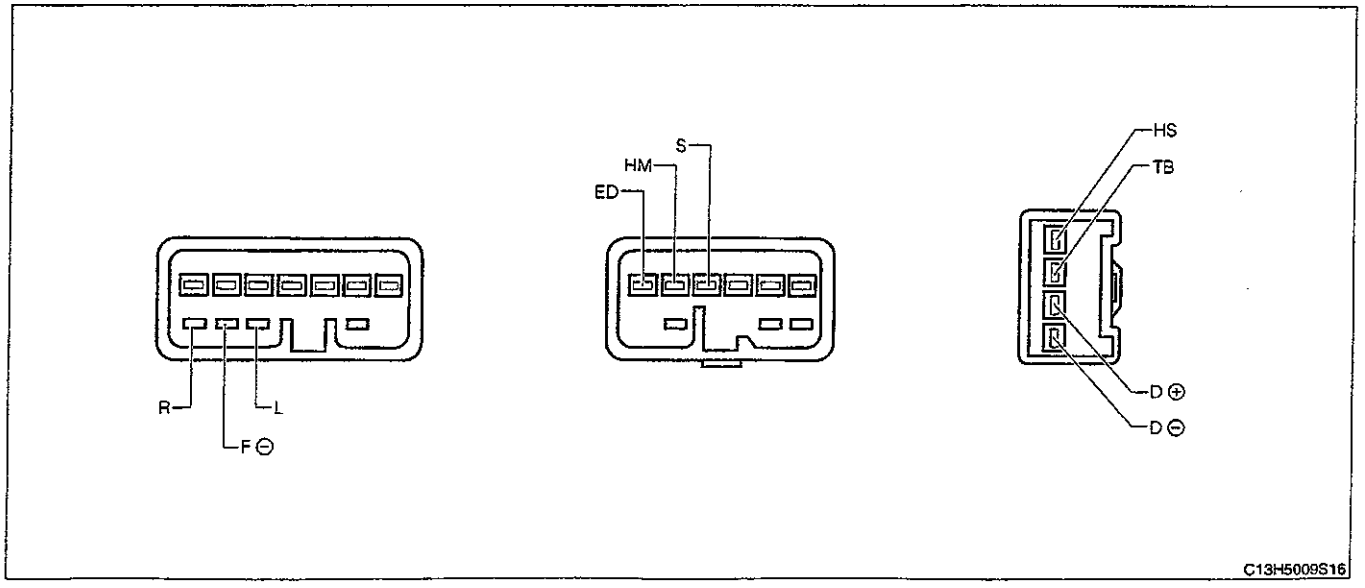
※○ indicates condition to activate.

1-3 UNIT CHECK

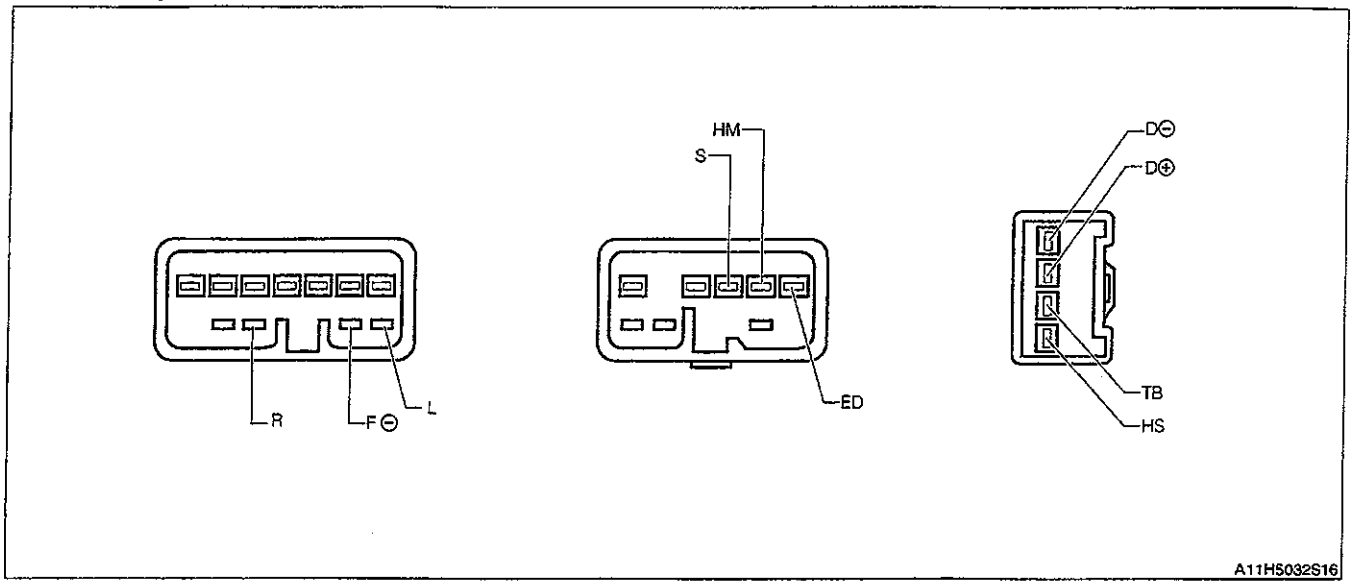
1-3-1 LIGHTING SWITCH

1.Check continuity between terminals in each state of the switch.

European specifications



Australian specifications



A11H5032S16

Light & dimmer passing switch ○—○:Continuity exists

Light \ Terminal / Dimmer Passing		HM	HS	ED	TB	S	D⊕	D⊖
OFF	HF	○		○			○	○
	HL		○	○				
	HU	○		○				
I	HF	○		○	○	○	○	○
	HL		○	○	○	○		
	HU	○		○	○	○		
II	HF	○		○	○	○	○	○
	HL		○	○	○	○	○	○
	HU	○		○	○	○	○	○

HF:Passing HL:Low HU: High

A11H5046EL14

Turn signal swich ○—○:Continuity exists

Turn signal \ Terminal	F⊖	L	R
L	○	○	
N			
R	○		○

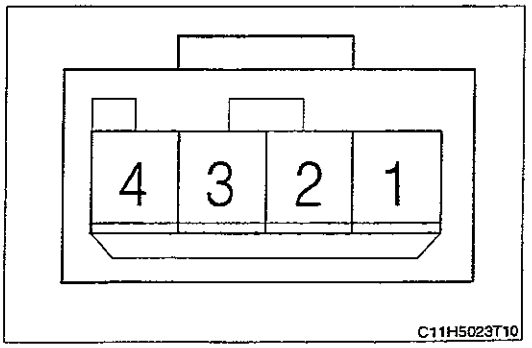
A11H5047EL06

1-3-2 FRONT FOG LAMP SWITCH

1.Check continuity between terminals when the front fog lamp switch is turned ON.

SPECIFIED VALUE:

Switch condition	Terminal No.	Standard
ON	3 - 4	Continuity exists.



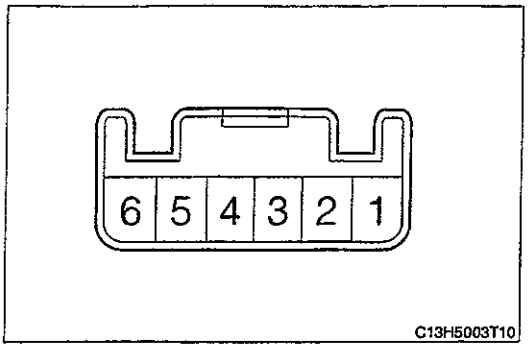
C11H5023T10

1-3-3 REAR FOG LAMP SWITCH

1.Check continuity between terminals when the rear fog lamp switch is turned ON.

SPECIFIED VALUE:

Switch condition	Terminal No.	Standard
ON	3 - 4	Continuity exists.

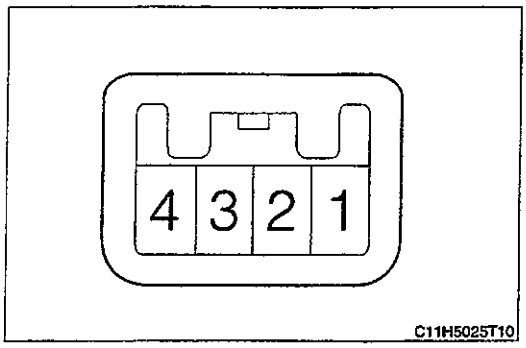


1-3-4 HAZZARD SWITCH

1.Check continuity between terminals when the hazzard switch is turned ON.

SPECIFIED VALUE:

Switch condition	Terminal No.	Standard
ON	2 - 3	Continuity exists.



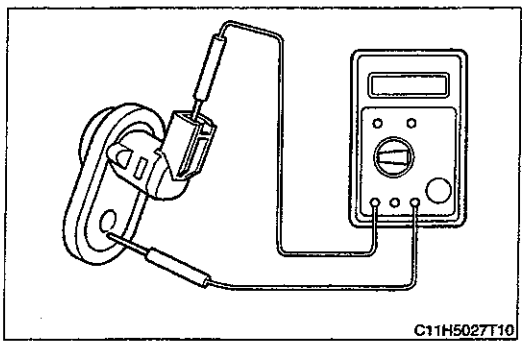
1-3-5 COURTESY SWITCH

1.With the courtesy switch shaft extended, check continuity between the switch side connector terminal and the switch body.

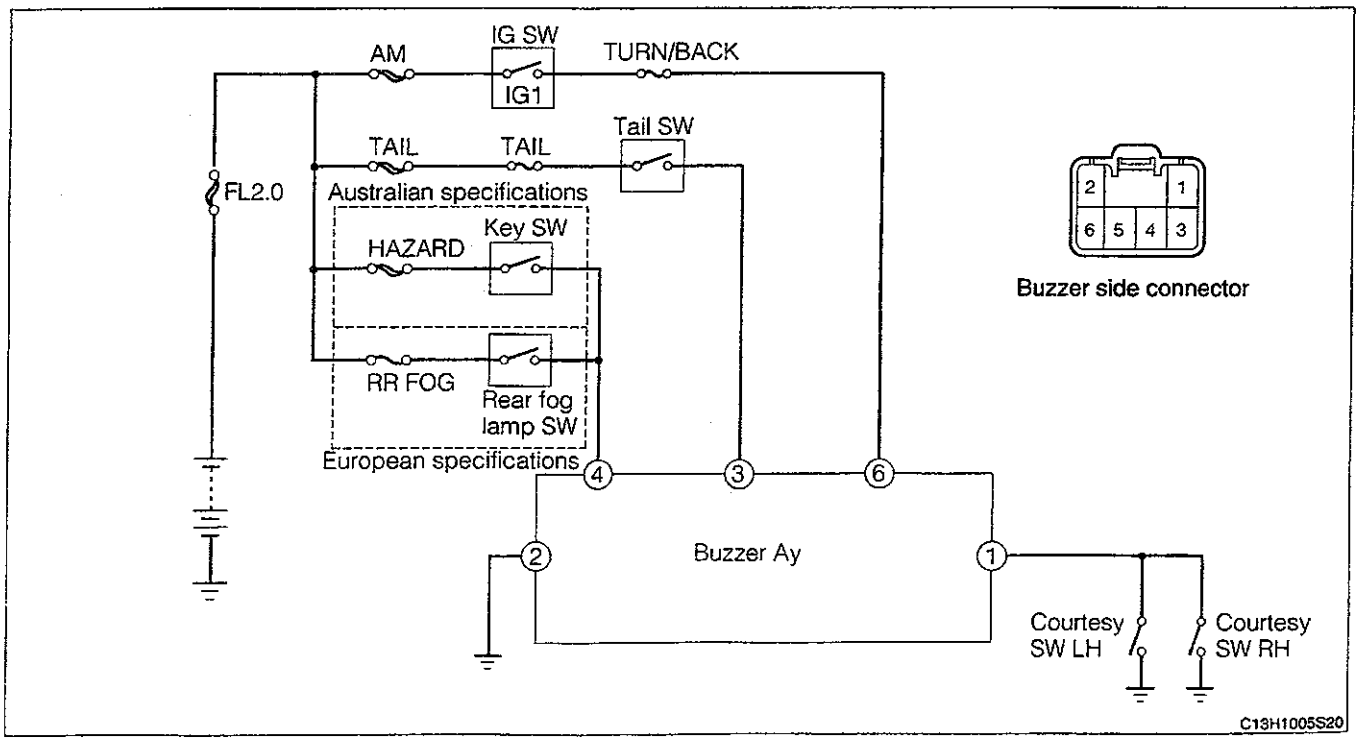
SPECIFIED VALUE: Continuity exists.

2.With the shaft retracted, perform continuity check.

SPECIFIED VALUE: No continuity exists.



1-3-6 REAR FOG LAMP ON & LIGHT ON WARNING BUZZER, KEY REMAINING-STATE & LIGHT ON WARNING BUZZER



1.When the terminal 4 is connected to the battery positive terminal and the terminals 1 and 2 are connected to the battery negative terminal, ensure that the buzzer is set off.
2.When the terminal 3 is connected to the battery positive terminal and the terminals 1 and 2 are connected to the battery negative terminal, ensure that the buzzer is set off.

2 HEADLAMP AY

2-1 REMOVAL AND INSTALLATION

2-1-1 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

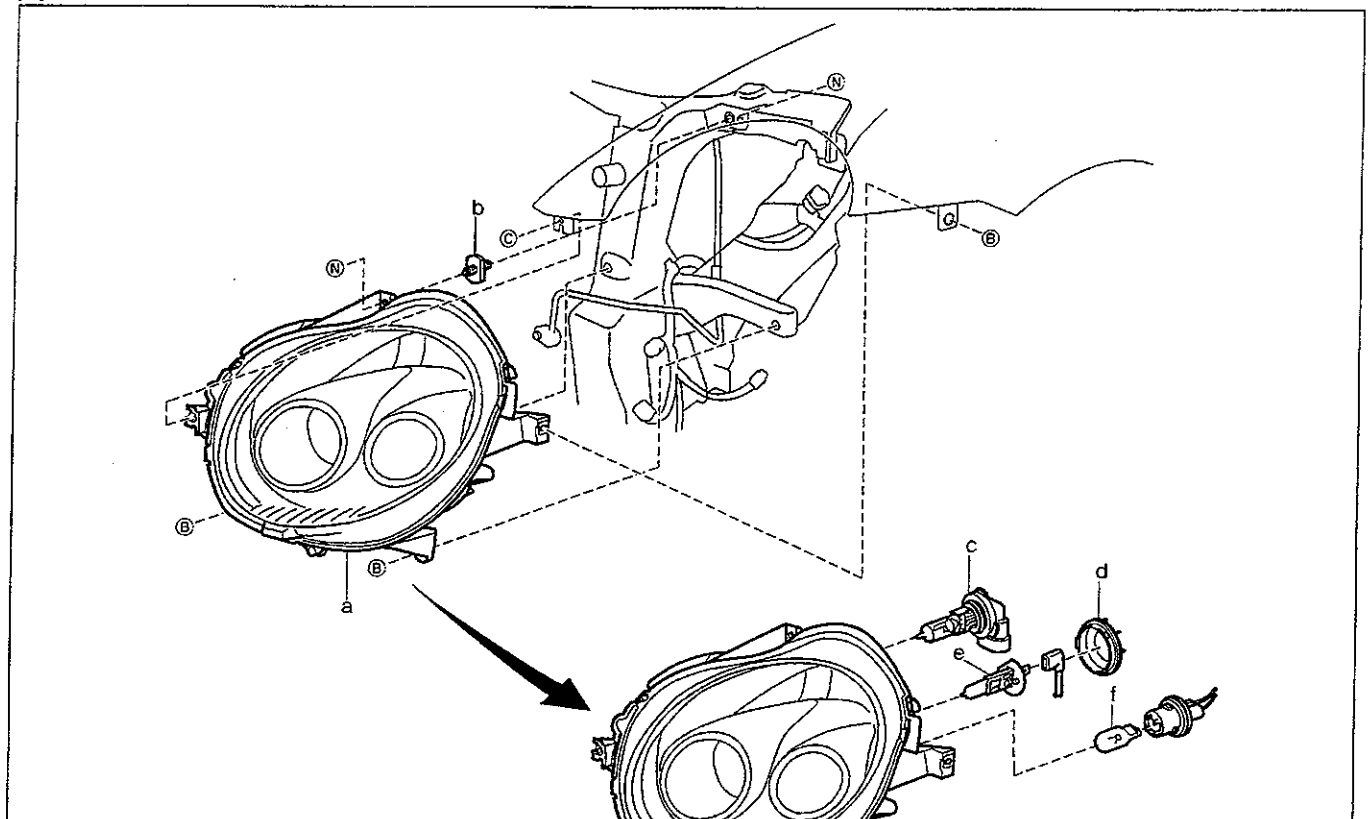
Protective tape

2-1-2 OPERATION BEFORE REMOVAL

1.Remove the front bumper cover.
Refer to Page I2-2.

2-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

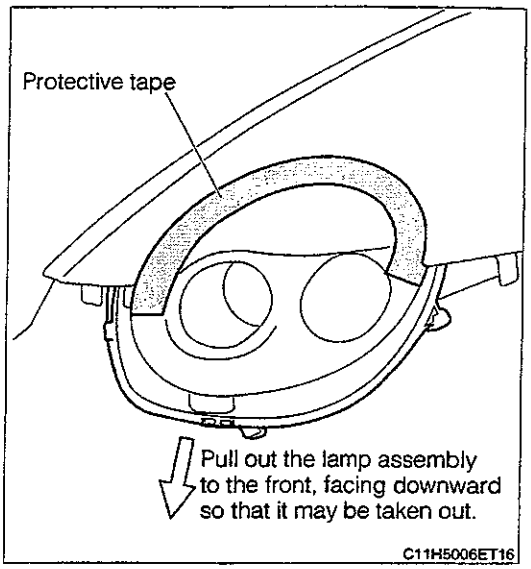
▼ 1 a Headlamp Ay
2 b Bolt, stud
▼ 3 c Bulb (high beam)
4 d Cover
▼ 5 e Bulb (low beam)
▼ 6 f Bulb (clearance lamp)

2-1-4 POINTS OF REMOVAL

(1) HEADLAMP AY

1.When the headlamp assembly is taken out from the vehicle, the lens may interfere with the fender panel. Hence, affix a protective tape to the lens so that no scratch may be made.

2.After the attaching bolts, nuts and clips have been removed, lightly float the fender panel. Pull out the lamp assembly to the front, facing downward so that it may be taken out.



2-1-5 OPERATION AFTER INSTALLATION

1.Install the front bumper cover.
Refer to Page I2-2.

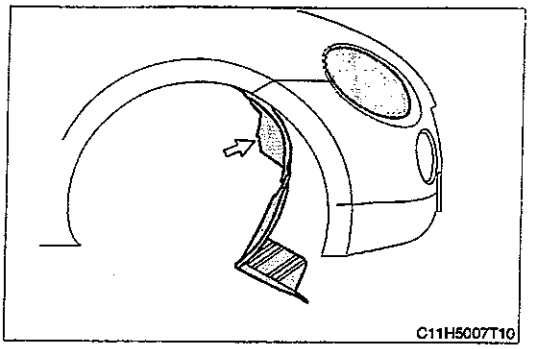
2.Perform the photometric axis adjustment for the headlamp.
Refer to Page J1-1.

3 HEAD LAMP BULB(LOW BEAM)

3-1 REMOVAL AND INSTALLATION

3-1-1 OPERATION BEFORE REMOVAL

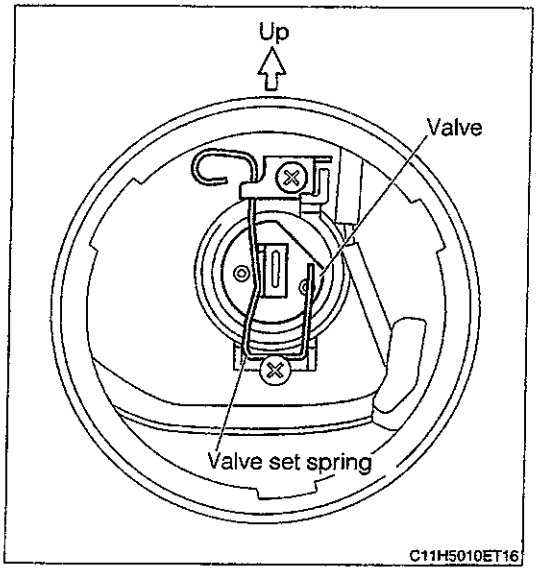
1.Turn over the fender liner so as to assure a space that allows the removal of the bulb.



3-1-2 POINTS OF REMOVAL

(1) BULB (LOW BEAM)

1.After the cover has been removed, remove the socket and bulb spring.



3-1-3 OPERATION AFTER INSTALLATION

1.Return the fender liner to the original state.

4 HEAD LAMP BULB(HIGH BEAM)

4-1 REMOVAL AND INSTALLATION

4-1-1 OPERATION BEFORE REMOVAL

1.Remove the headlamp assembly.
Refer to Page J1-7.

4-1-2 POINTS OF REMOVAL

(1) BULB (HIGH BEAM)

1.Disconnect the bulb from the headlamp assembly.

4-1-3 OPERATION AFTER INSTALLATION

1.Install the headlamp assembly.
Refer to Page J1-7.

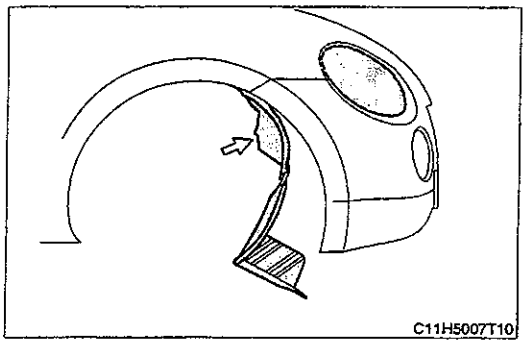
2.Perform the photometric axis adjustment for the headlamp.
Refer to Page J1-1.

5 CLEARANCE LAMP BULB

5-1 REMOVAL AND INSTALLATION

5-1-1 OPERATION BEFORE REMOVAL

1.Turn over the fender liner so as to assure a space that allows the removal of the bulb.



5-1-2 POINTS OF REMOVAL

(1) BULB (CLEARANCE LAMP)

1.Disconnect the bulb from the headlamp assembly.

5-1-3 OPERATION AFTER INSTALLATION

1.Return the fender liner to the original state.

6 FRONT FOG LAMP AND TURN SIGNAL LAMP AY

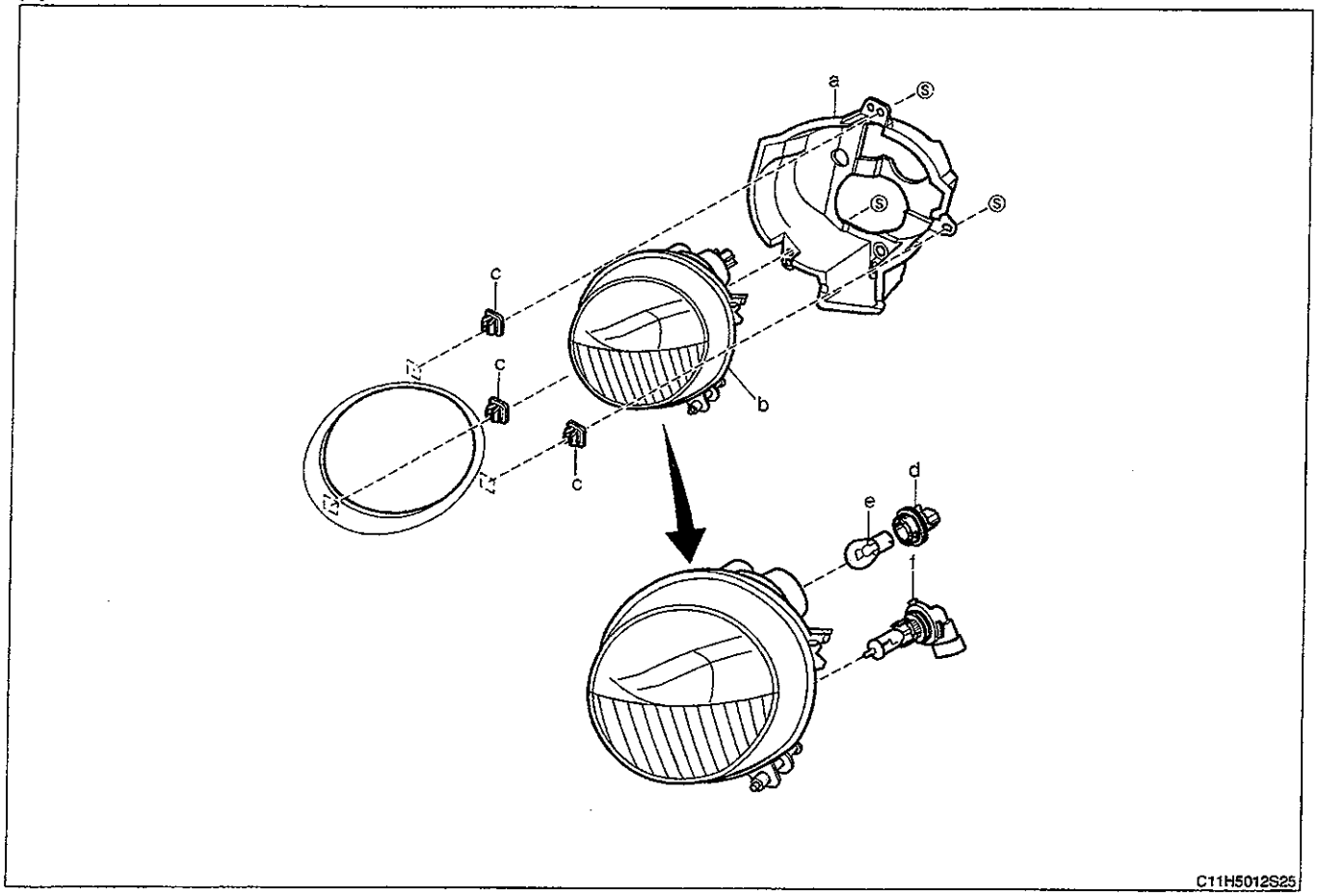
6-1 REMOVAL AND INSTALLATION

6-1-1 OPERATION BEFORE REMOVAL

1.Remove the front bumper cover.
Refer to Page I2-2.

6-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Bracket, fog lamp
2 b Lamp Ay, front fog & turn
3 c Grommet,screw
4 d Socket
▼ 5 e Bulb (turn signal lamp)
▼ 6 f Bulb (front fog lamp)

6-1-3 OPERATION AFTER INSTALLATION

1.Install the front bumper cover.
Refer to Page I2-2.

2.Perform the photometric axis adjustment for the front fog lamp
Refer to Page J1-2.

7 FRONT FOG LAMP BULB

7-1 REMOVAL AND INSTALLATION

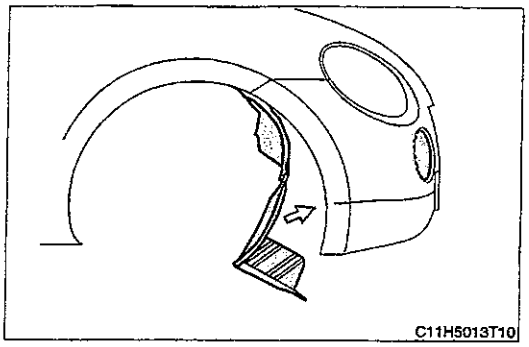
7-1-1 OPERATION BEFORE REMOVAL

1.Turn over the fender liner so as to assure a space that allows the removal of the bulb.

7-1-2 POINTS OF REMOVAL

(1) BULB (FRONT FOG LAMP)

1.Disconnect the bulb from the lamp assembly.



7-1-3 OPERATION AFTER INSTALLATION

1.Return the fender liner to the original state.

8 FRONT TURN SIGNAL LAMP BULB

8-1 REMOVAL AND INSTALLATION

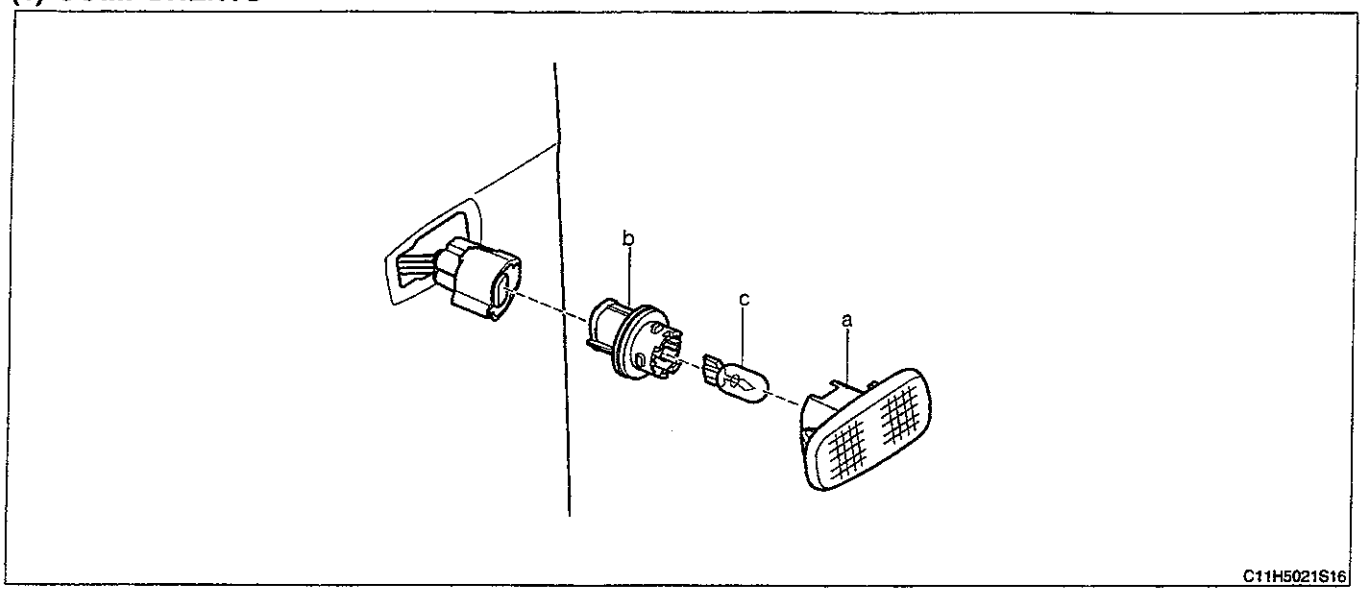
1.Remove the front turn signal lamp bulb in the same way as the front fog lamp bulb.
Refer to Page J1-12.

9 SIDE TURN SIGNAL LAMP BULB

9-1 REMOVAL AND INSTALLATION

9-1-1 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



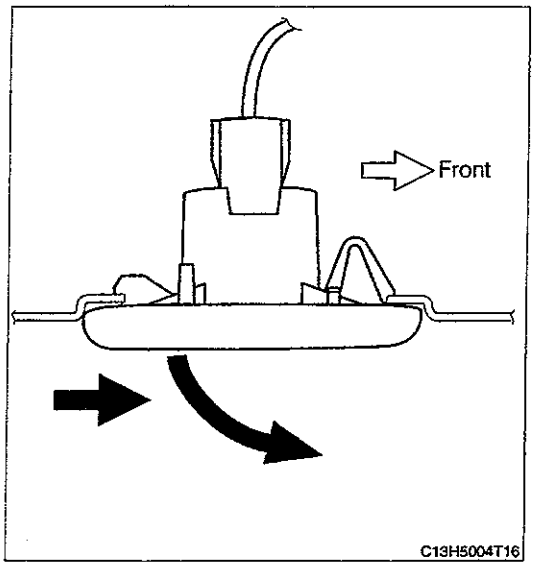
(2) REMOVAL AND INSTALLATION PROCEDURES

▼ 1 a Lens, side turn signal lamp
2 b Socket
3 c Bulb (side turn signal lamp)

9-1-2 POINTS OF REMOVAL

(1) SIDE TURN SIGNAL LAMP LENS

1.While pushing the lens from the front side of the vehicle, remove the lens from the vehicle.

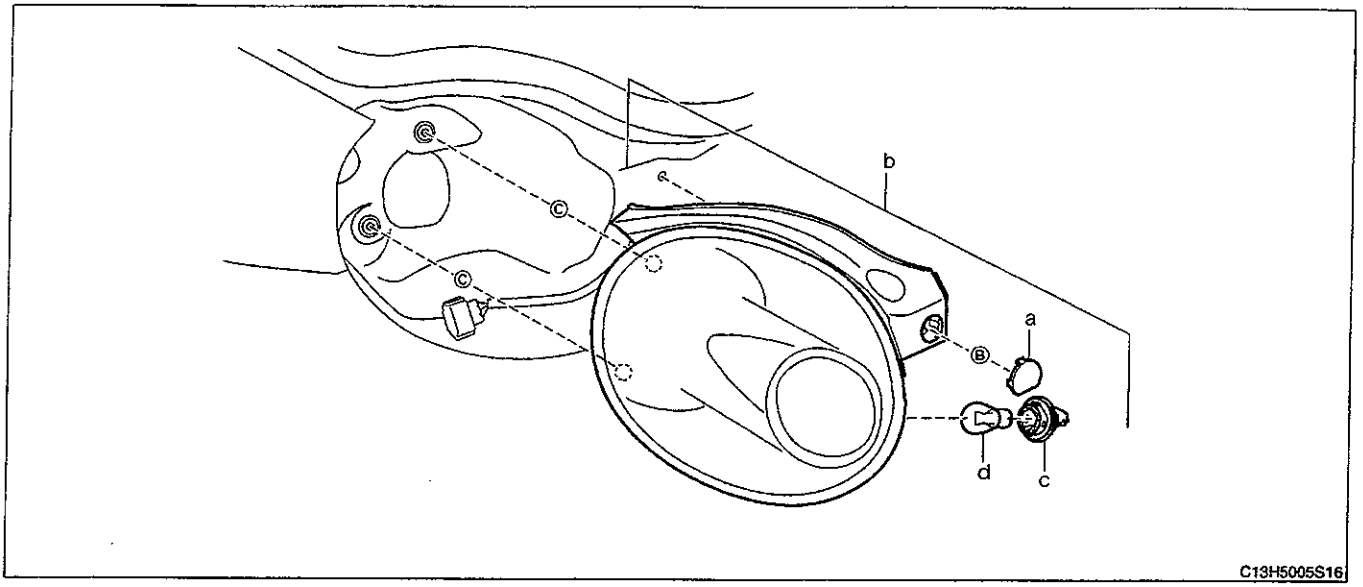


10 TAIL AND STOP LAMP BULB

10-1 REMOVAL AND INSTALLATION

10-1-1 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



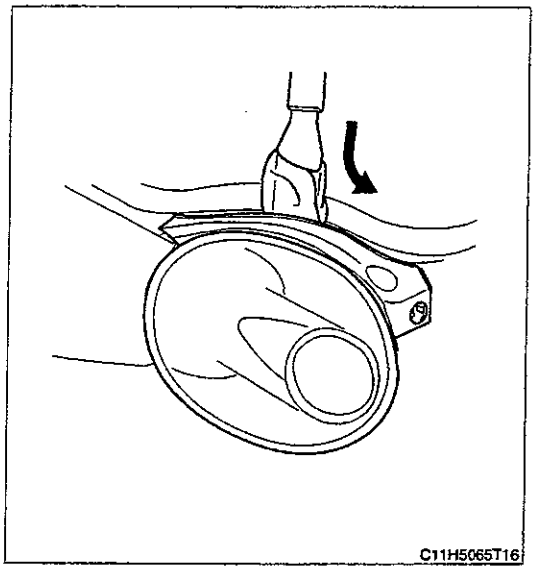
(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Cover, rear lamp
▼ 2 b Lamp Ay, rear combination
3 c Socket
4 d Bulb (tail & stop lamp)

10-1-2 POINTS OF REMOVAL

(1) REAR COMBINATION LAMP AY

1. After the bolts have been removed, remove the rear combination lamp assembly by inserting a spatula wound by a cloth, as indicated in the figure.

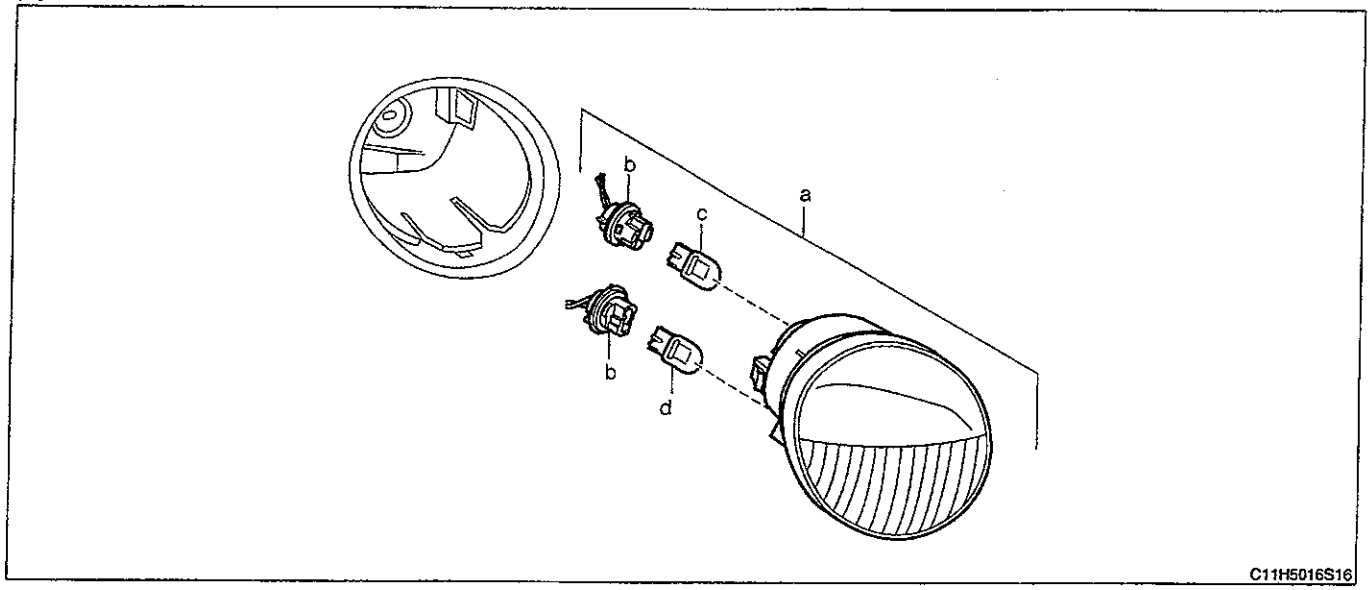


11 BACK UP LAMP BULB

11-1 REMOVAL AND INSTALLATION

11-1-1 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



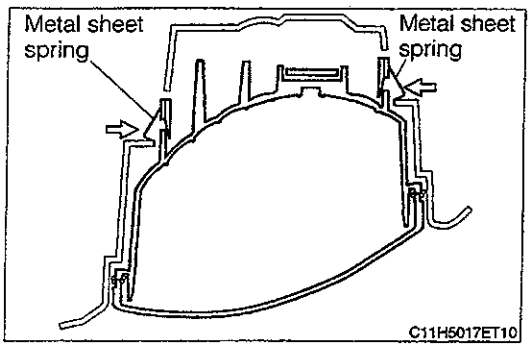
(2) REMOVAL AND INSTALLATION PROCEDURES

▼ ▲ 1 a Lamp Ay, back-up
2 b Harness Ay
3 c Bulb (turn signal lamp)
4 d Bulb (back-up lamp or rear fog lamp)

11-1-2 POINTS OF REMOVAL

(1) BACKUP LAMP AY

1.Working from the backside of the rear bumper, push the metal sheet spring so as to remove the lamp assembly.



11-1-3 POINTS OF INSTALLATION

(1) BACKUP LAMP AY

1.When installing the lamp assembly onto the rear bumper, make sure that you hear a clicking sound emitted as the sheet spring fits.

12 REAR TURN SIGNAL LAMP BULB

12-1 REMOVAL AND INSTALLATION

1.Remove the rear turn signal lamp bulb in the same way as the back-up lamp bulb.
Refer to Page J1-15.

13 REAR FOG LAMP BULB

13-1 REMOVAL AND INSTALLATION

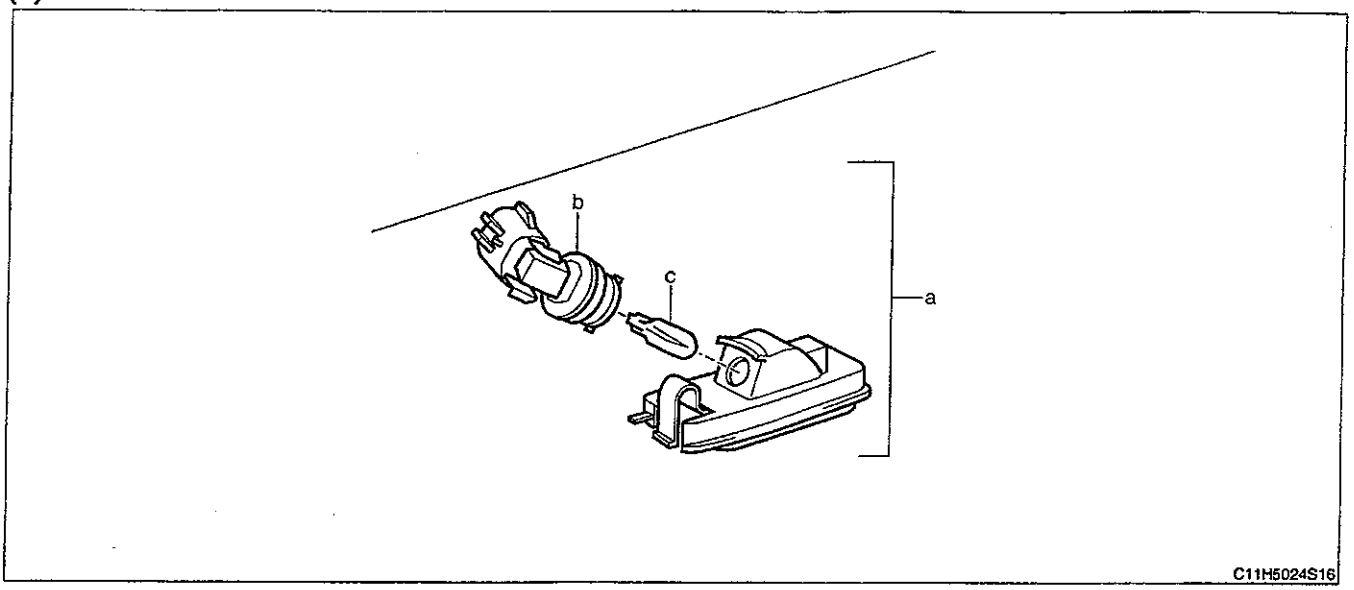
1.Remove the rear fog lamp bulb in the same way as the back-up lamp bulb.
Refer to Page J1-15.

14 LICENSE PLATE LAMP BULB

14-1 REMOVAL AND INSTALLATION

14-1-1 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

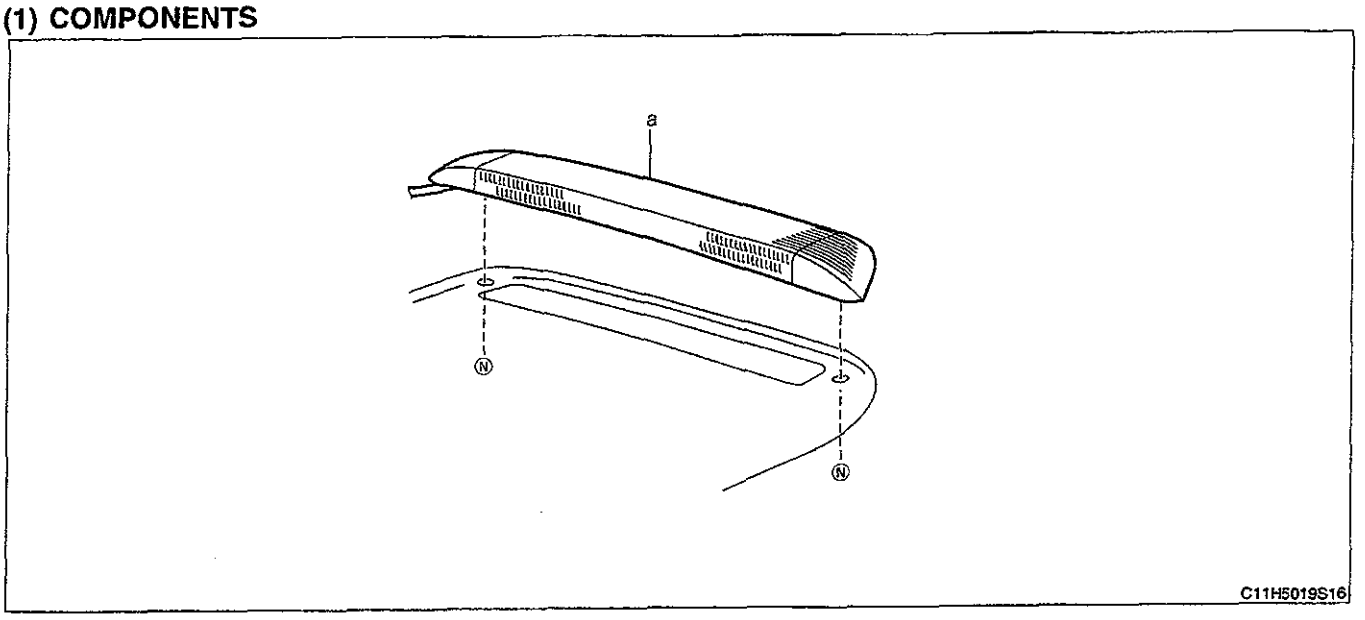
1 a Lamp Ay, licence plate
2 b Socket
3 c Bulb (license plate lamp)

15 HIGH MOUNTED STOP LAMP AY

15-1 REMOVAL AND INSTALLATION

15-1-1 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

▲ 1 a Lamp Ay, stop center

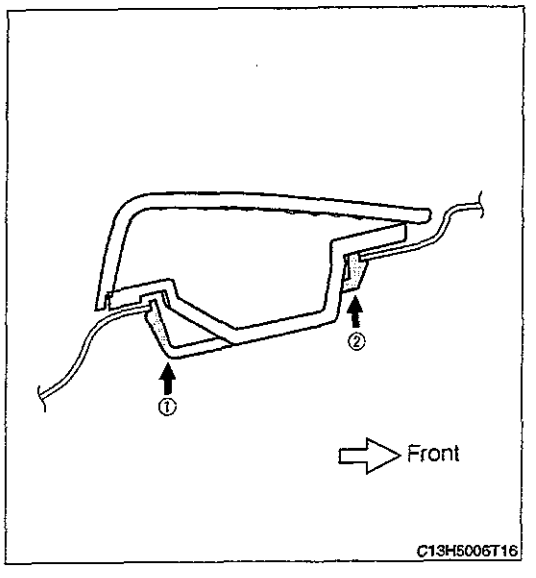
15-1-2 POINTS OF INSTALLATION

(1) STOP CENTER LAMP AY

1.After the claw ① has been attached, make the claw ① deflected, and fit the claw ② into place.

CAUTION

- If a complete fitting fails to be performed, there is a possibility of water leakage.

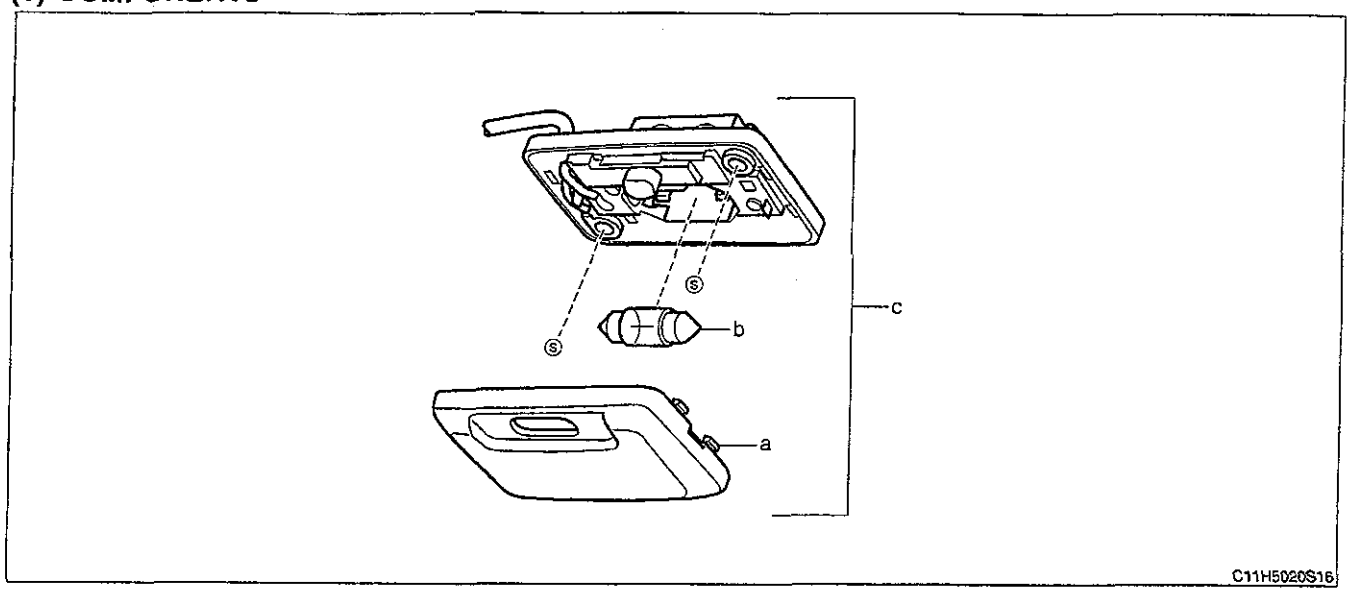


16 ROOM LAMP AY

16-1 REMOVAL AND INSTALLATION

16-1-1 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Lens, map lamp
2 b Bulb (map lamp)
3 c Lamp Ay, map

17 MULTI-USE LEVER SWITCH

17-1 REMOVAL AND INSTALLATION

WARNING

- The following operations will affect the SRS airbag. Hence, prior to the operation, be sure to confirm the instructions for the SRS airbag in order to perform reliable operations.

Refer to Page H1-1.

17-1-1 OPERATION BEFORE REMOVAL

1.Remove the steering wheel.
Refer to Page H1-7.

Refer to Page G1-1.

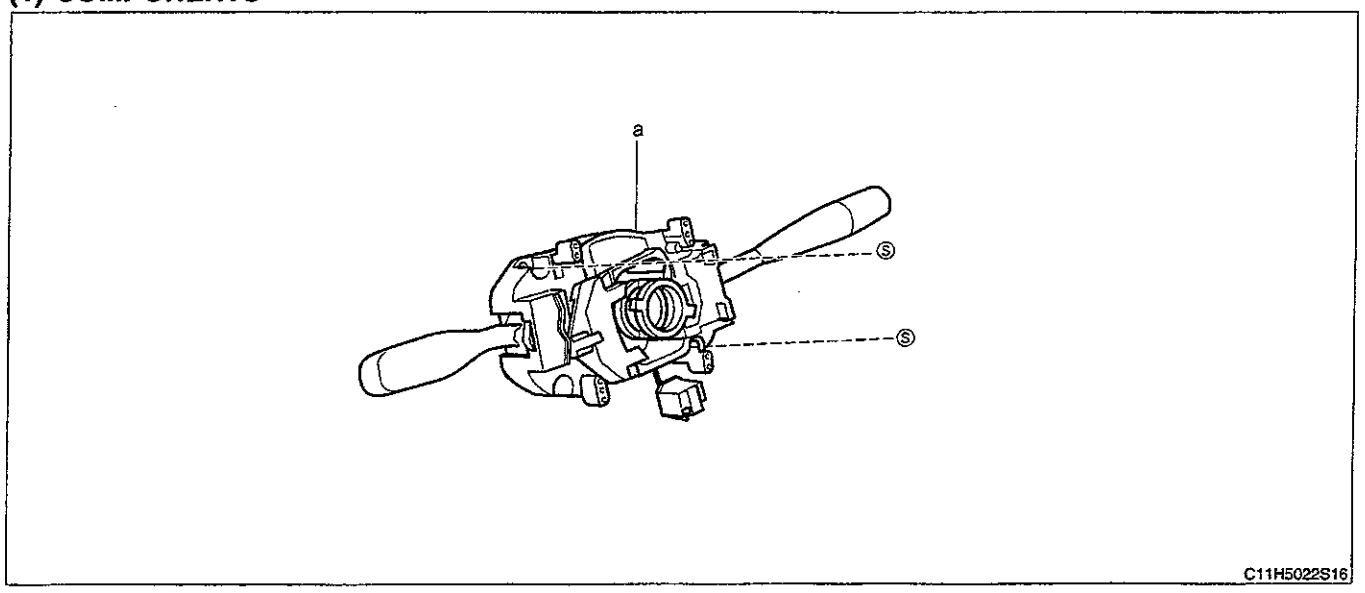
2.Remove the steering roll connector.
Refer to Page H1-14.

NOTE

- The multi-use lever switch can be removed even if the steering roll connector is attached.

17-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Switch S/A, turn signal

17-1-3 OPERATION AFTER INSTALLATION

1.Install the steering roll connector.
Refer to Page H1-14.

2.Install the steering wheel.
Refer to Page G1-1.

Refer to Page H1-7.

TO INDEX

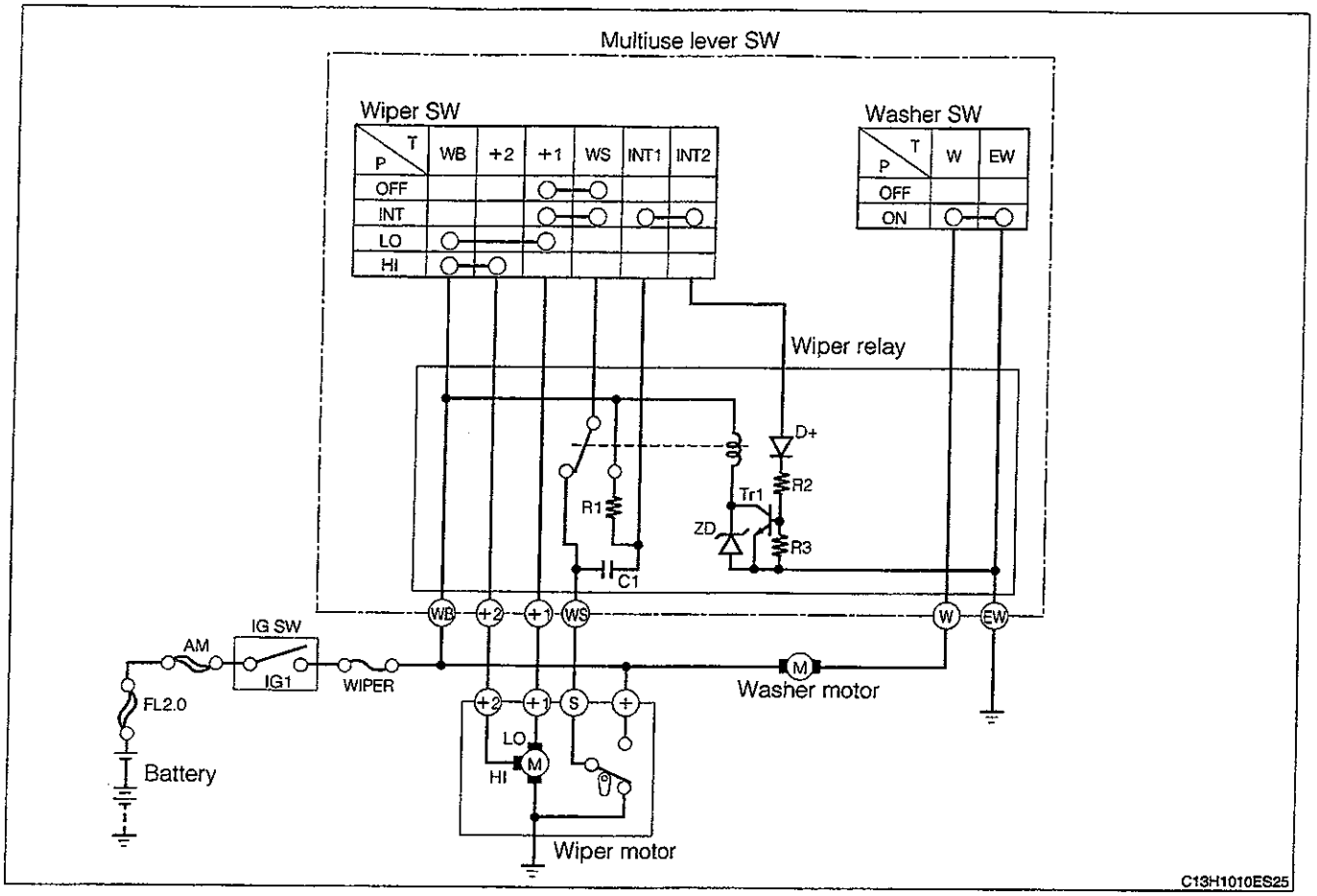
J2 WIPER & WASHER

WIPER AND WASHER---------- J2 - 1
SYSTEM WIRING DIAGRAM---------- J2 - 1
BASIC CHECK AND ADJUSTMENT --- J2 - 2
UNIT CHECK---------- J2 - 2
FRONT WIPER---------- J2 - 6
REMOVAL AND INSTALLATION--------- J2 - 6
FRONT WASHER---------- J2 - 9
REMOVAL AND INSTALLATION--------- J2 - 9

1 WIPER AND WASHER

1-1 SYSTEM WIRING DIAGRAM

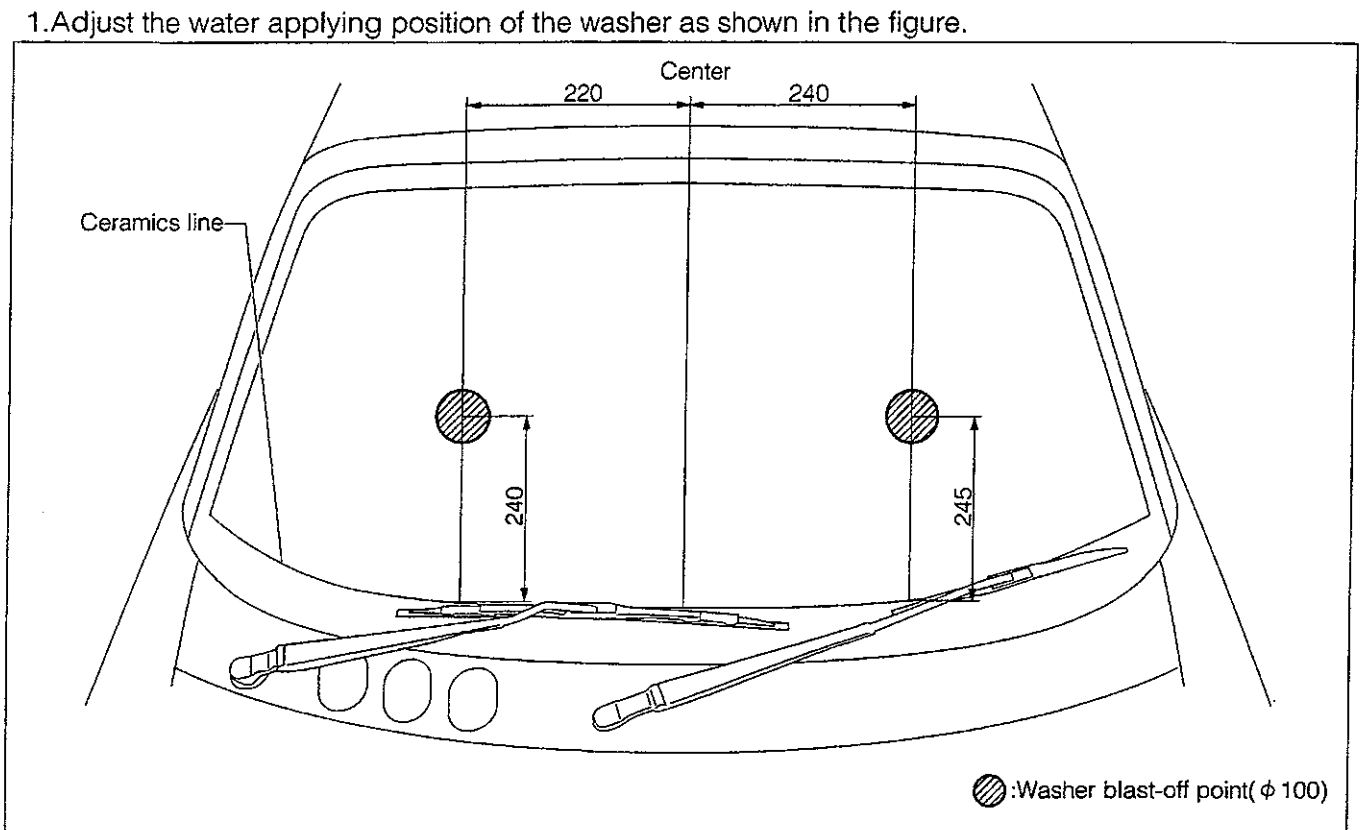
1-1-1 FRONT WIPER & WASHER



1-2 BASIC CHECK AND ADJUSTMENT

1-2-1 WATER APPLYING POSITION OF WASHER

1.Adjust the water applying position of the washer as shown in the figure.



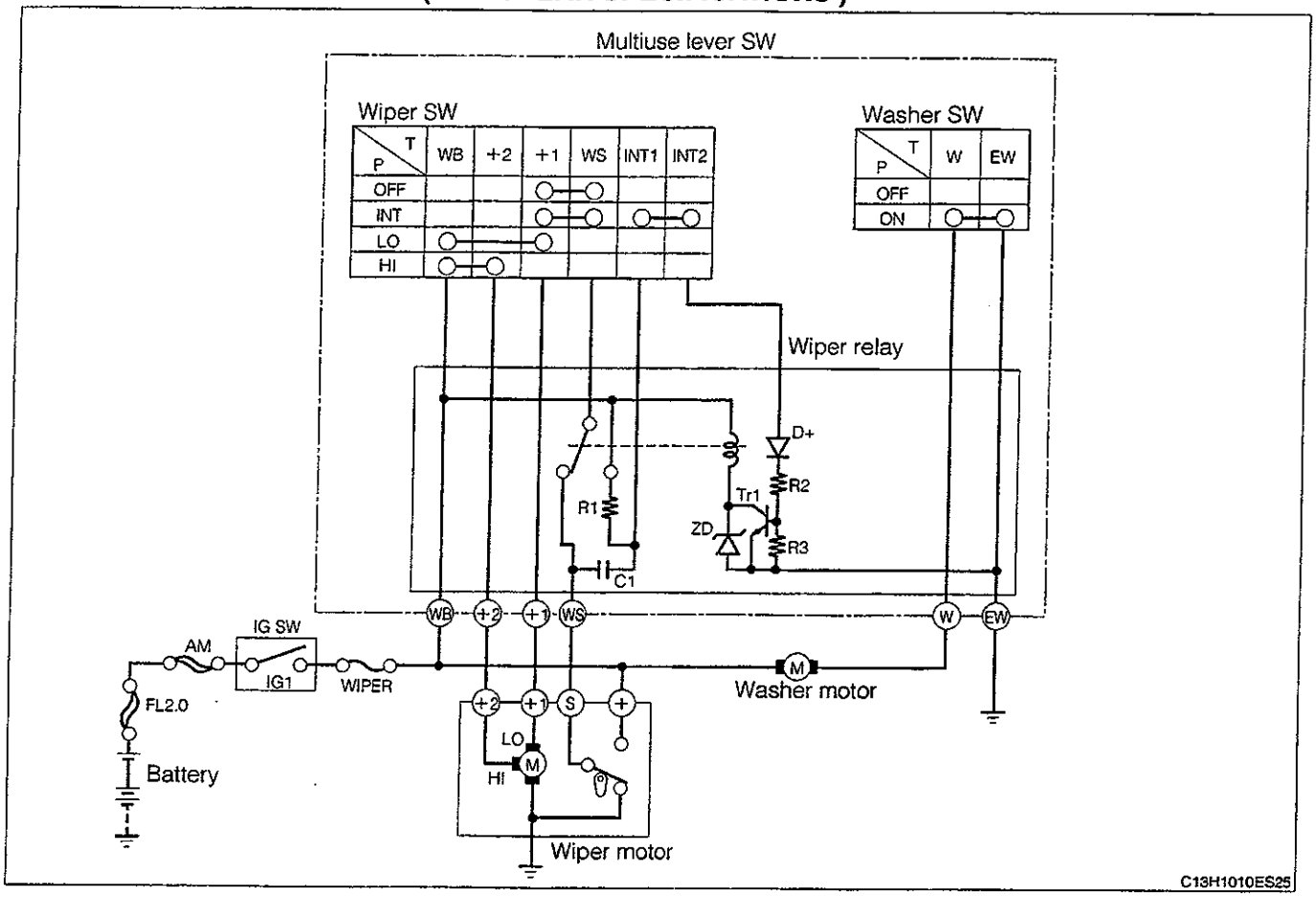
Unit : mm

1-3 UNIT CHECK

1-3-1 FRONT WIPER MOTOR

Refer to Page J2-7.

1-3-2 FRONT WIPER SWITCH (EUROPEAN SPECIFICATIONS)

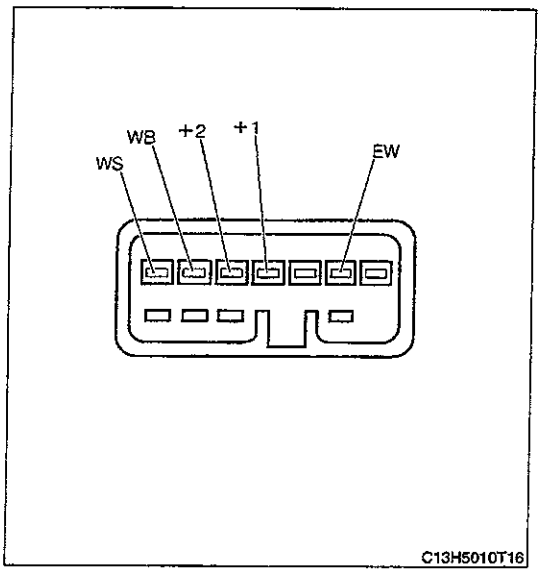


1.Remove the multi-use lever switch.
Refer to Page J1-19.

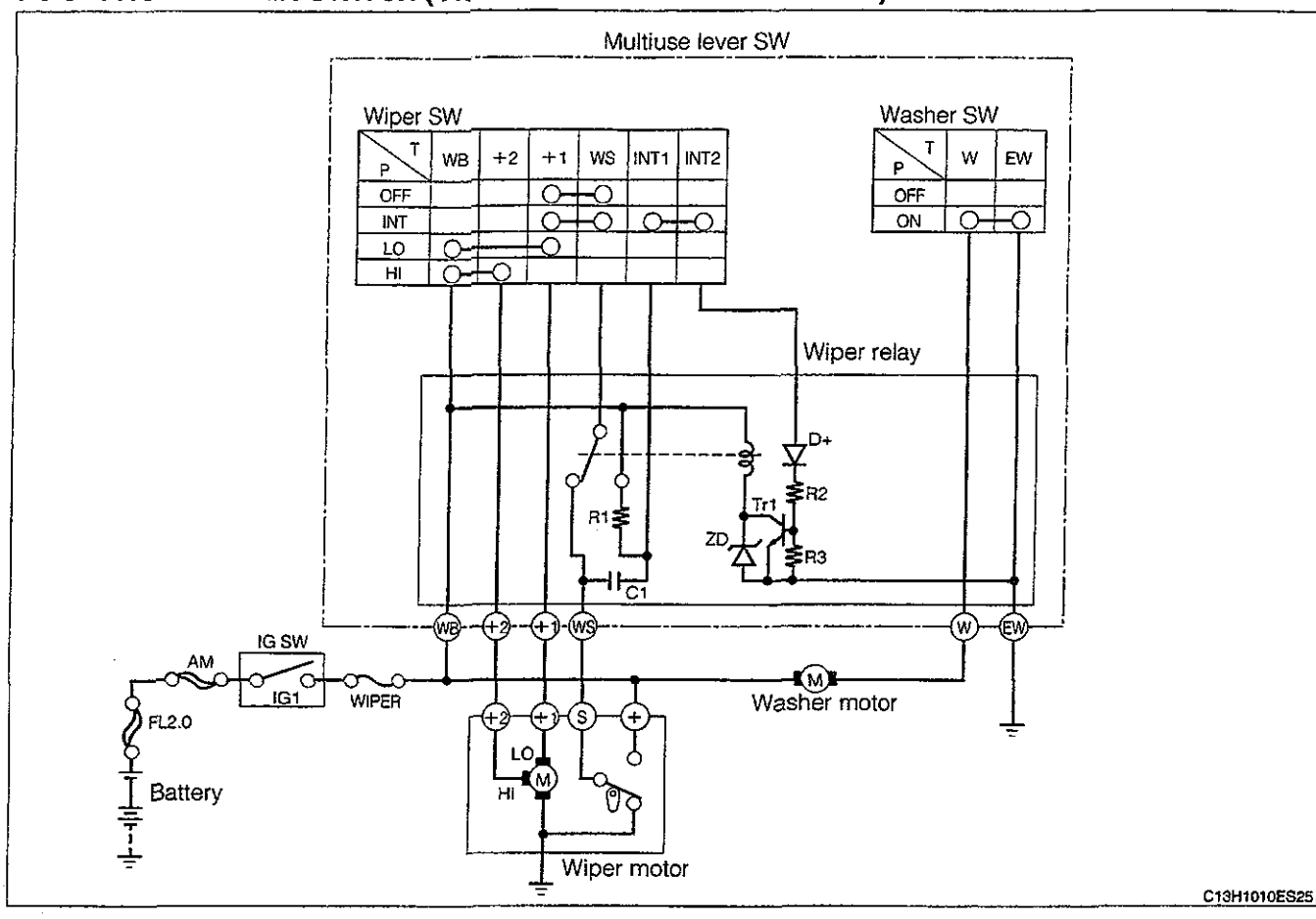
2.With the wiper switch set to the [OFF], [LO] or [HI] position, respectively, ensure that there is continuity between the terminals according to the connection table.

3.With the switch set to the [INT] position, connect the terminal [WB] to the battery positive terminal and connect the terminal [EW] to the battery negative terminal. Ensure that there occurs an operating sound of the relay.

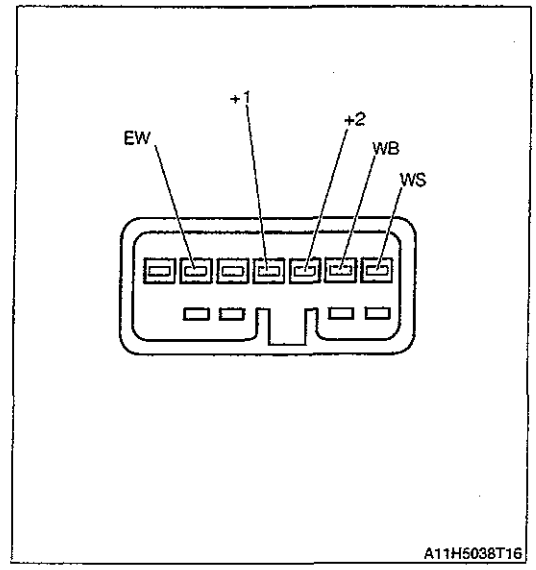
4.Under the state of Item 2, connect the positive terminal of the battery to the terminal [WS]. After one second of connecting the terminal, this time connect the negative terminal of the battery to the terminal [WS]. At this point, ensure that there occurs an operating sound of the relay. Moreover ensure that, about four seconds later, there occurs an operating sound of the relay again.



1-3-3 FRONT WIPER SWITCH (AUSTRALIAN SPECIFICATIONS)



1.Remove the multi-use lever switch.
Refer to Page J1-19.



2.With the wiper switch set to the [OFF], [LO] or [HI] position, respectively, ensure that there is continuity between the terminals according to the connection table.

3.With the switch set to the [INT] position, connect the terminal [WB] to the battery positive terminal and connect the terminal [EW] to the battery negative terminal. Ensure that there occurs an operating sound of the relay.

4.Under the state of Item 2, connect the positive terminal of the battery to the terminal [WS]. After one second of connecting the terminal, this time connect the negative terminal of the battery to the terminal [WS]. At this point, ensure that there occurs an operating sound of the relay. Moreover ensure that, about four seconds later, there occurs an operating sound of the relay again.

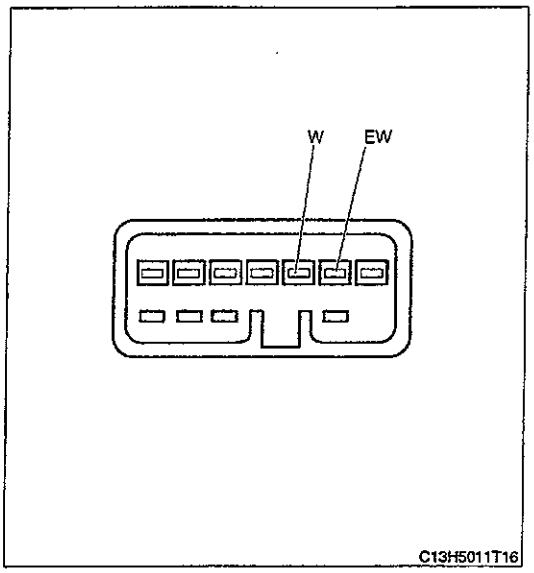
1-3-4 WASHER PUMP

Refer to Page J2-10.

1-3-5 FRONT WASHER SWITCH (EUROPEAN SPECIFICATIONS)

1.Remove the multi-use lever switch.
Refer to Page J1-19.

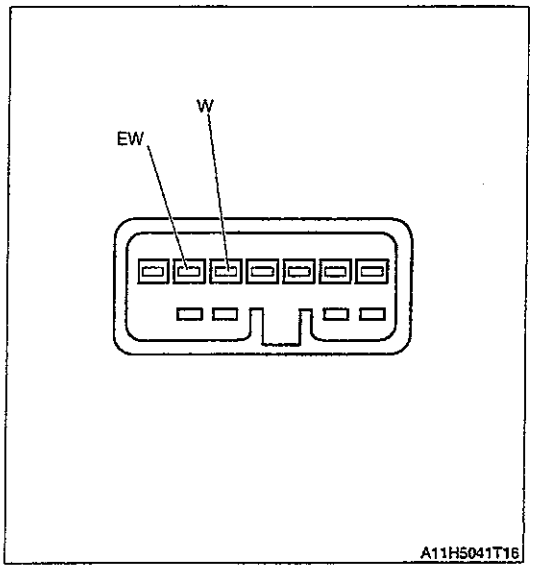
2.With the washer switch set to ON position, ensure that continuity exists between the (EW) terminal and (W) terminal.



1-3-6 FRONT WASHER SWITCH (AUSTRALIAN SPECIFICATIONS)

1.Remove the multi-use lever switch.
Refer to Page J1-19.

2.With the washer switch set to ON position, ensure that continuity exists between the (EW) terminal and (W) terminal.

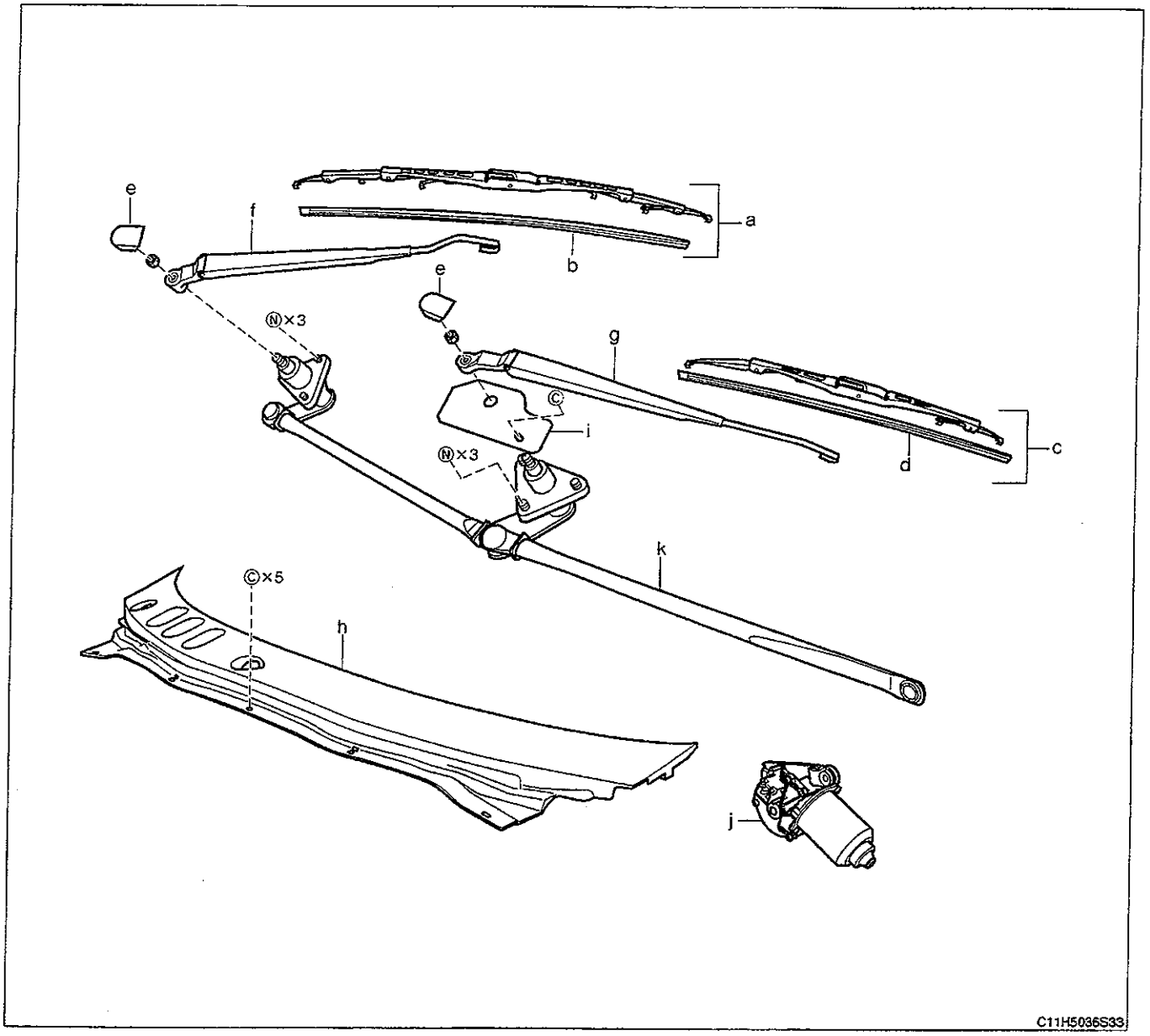


2 FRONT WIPER

2-1 REMOVAL AND INSTALLATION

2-1-1 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

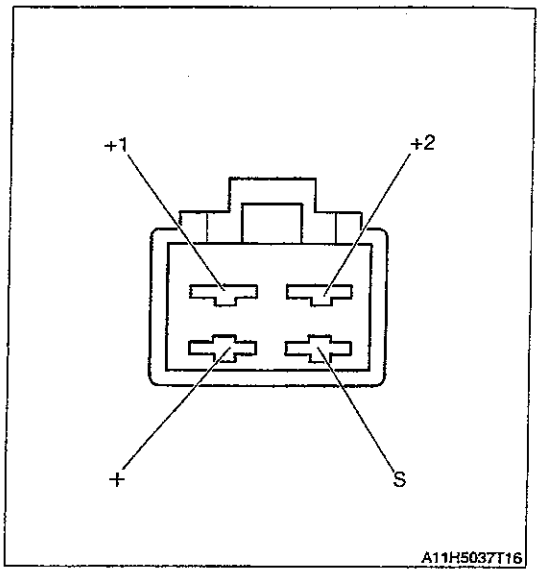
▲ 1 a Blade, front wiper, RH
2 b Rubber, wiper blade, RH
▲ 3 c Blade, front wiper, LH
4 d Rubber, wiper blade, LH
5 e Cap, wiper arm head
▲ 6 f Arm Ay, wiper, No.1
▲ 7 g Arm Ay, wiper, No.2
8 h Louver S/A, cowl top ventilator
▲ 9 i Packing, wiper link
10 j Motor & bracket Ay, wiper
11 k Link Ay, front wiper

2-1-2 INSPECTION

(1) WIPER MOTOR AND BRACKET AY

① LOW OPERATION CHECK

1.Connect the earth of the wiper motor to the negative (−) terminal of the battery.
2.Connect the (+1) terminal to the battery (+) terminal. Ensure that the motor operates at a low speed.



② HIGH OPERATION CHECK

1.Connect the earth of the wiper motor to the negative (−) terminal of the battery.
2.Connect the (+2) terminal to the battery (+) terminal. Ensure that the motor operates at a high speed.

③ OPERATION CHECK FOR AUTOMATIC STOP POSITION

1.In the LO operation check, while operating the wiper motor at a low speed, remove the terminal (+1) from the positive (+) terminal of the battery, thereby stopping the motor crank at a position other than the automatic stop position.
2.After shorting the terminal (+1) with the terminal (S), connect the terminal (+) to the positive (+) terminal of the battery. At this time, ensure that the motor operates again at the low speed and that the crank stops at the automatic stop position.

2-1-3 POINTS OF INSTALLATION

(1) WIPER LINK PACKING

1.Be very careful not to inadvertently leave the wiper link packing disconnected, for example, after the removal/installation of the cowl top ventilator louver or front wiper link assembly.

CAUTION

- **If it should be left disconnected, water may get to the link joint sections, resulting in an operating malfunction.**

(2) FRONT WIPER BLADE

1.When assembling the front wiper blade to the front wiper arm, take into consideration the following blade length as they differ in length between the right and left.

Wiper blade dimensions

	Driver's seat side	Front passenger seat side
Blade length (mm)	450	400

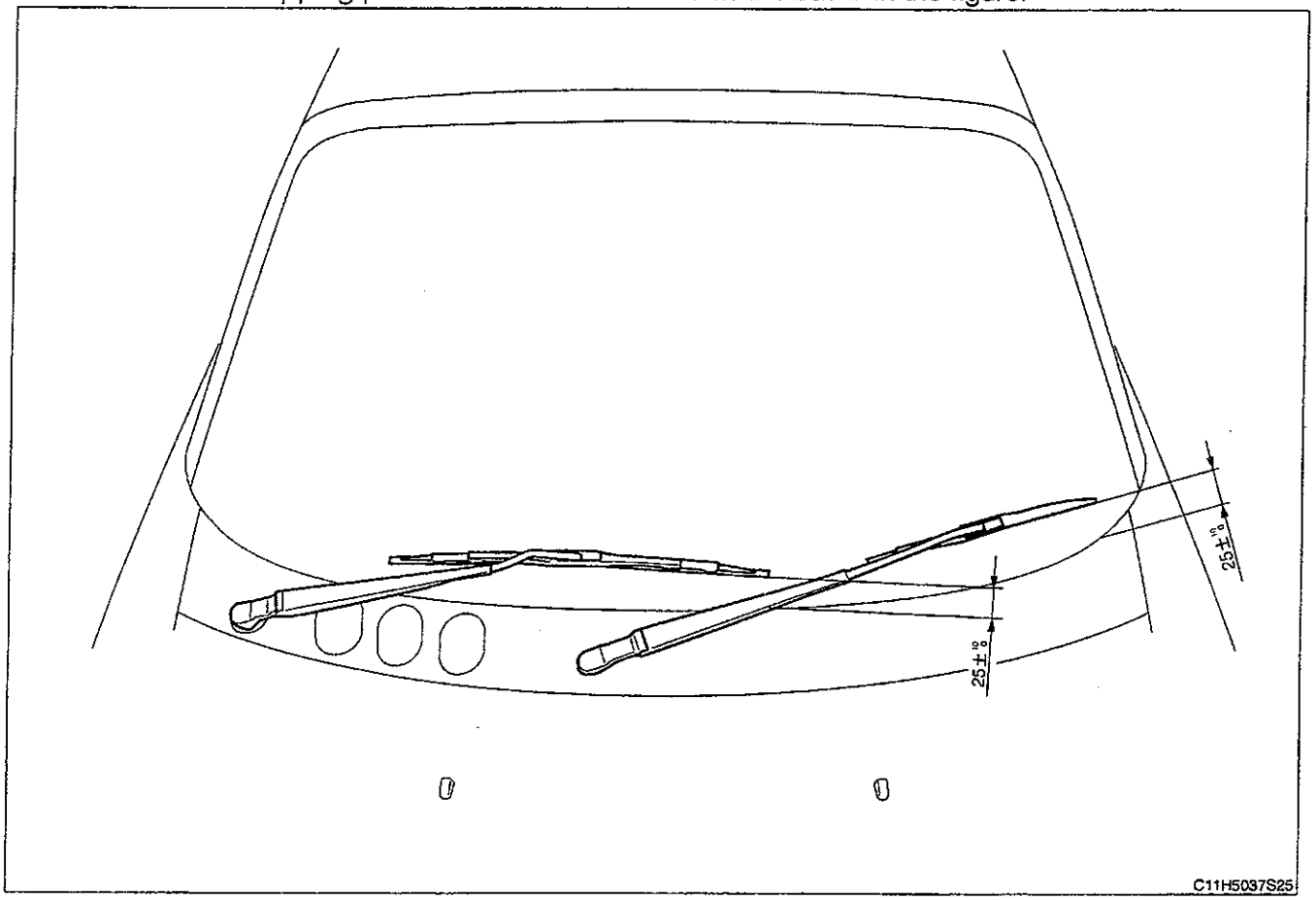
(3) WIPER ARM AY

1.When assembling the front wiper arm, take into consideration the following arm length as they differ in length between the right and left.

Wiper arm dimensions

	Driver's seat side	Front passenger seat side
Arm length (mm)	406	495

2.Ensure that the stopping position of the blade comes as indicated in the figure.



Unit : mm

3 FRONT WASHER

3-1 REMOVAL AND INSTALLATION

3-1-1 OPERATION BEFORE REMOVAL

1.Remove the battery.

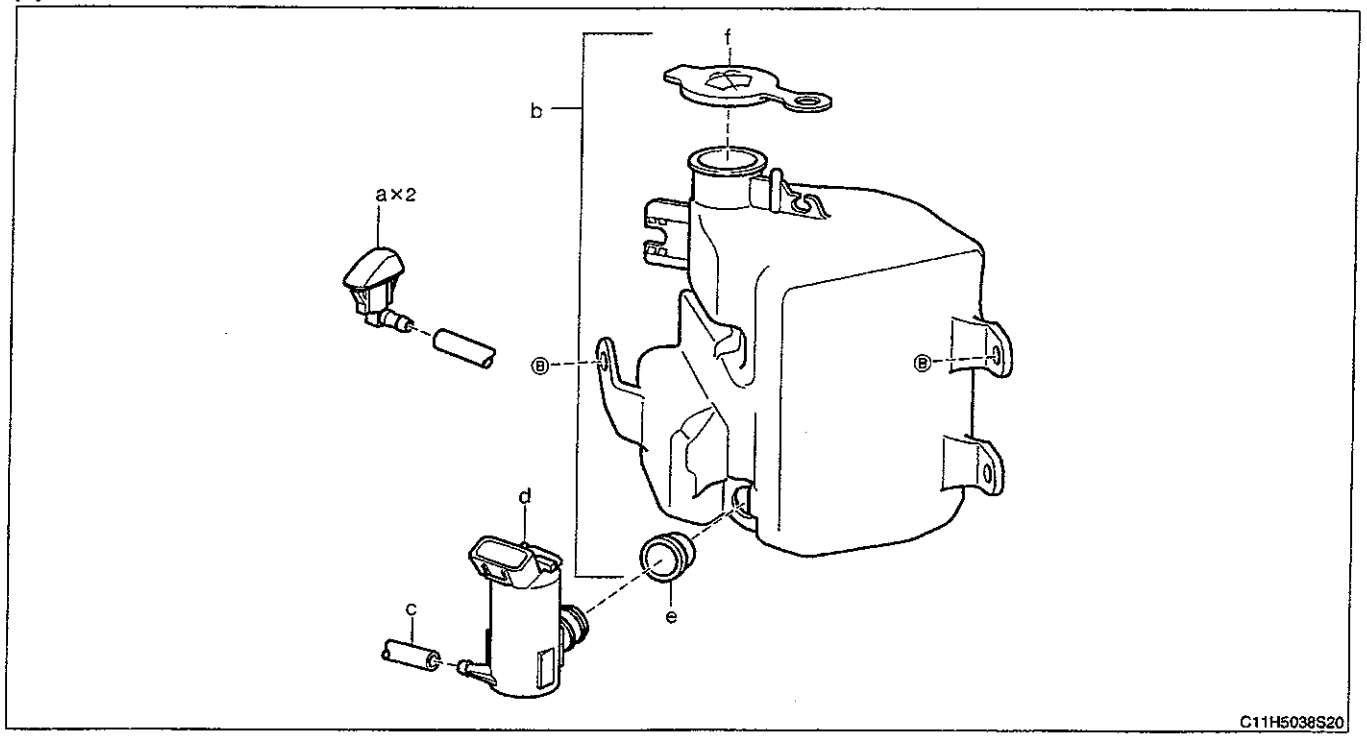
CAUTION

- When the battery negative (-) terminal is disconnected, it should be noted that diagnosis results and memories of the radio are erased simultaneously.

2.Remove the battery carrier.

3-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



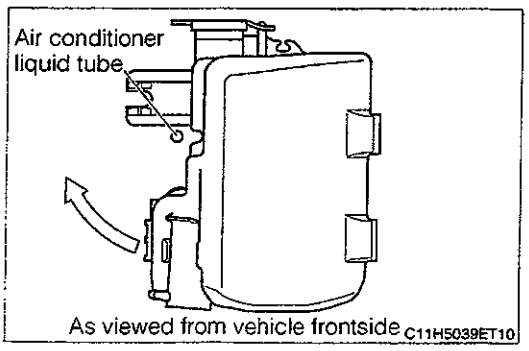
(2) REMOVAL AND INSTALLATION PROCEDURES

▲ 1 a Nozzle, windshield washer
▼ 2 b Jar Ay, windshield washer
3 c Hose Ay
4 d Motor & pump Ay, windshield washer
5 e Grommet
6 f Cap, windshield washer jar

3-1-3 POINTS OF REMOVAL

(1) WINDSHILD WASHER JAR AY

When you take out the washer jar from the vehicle, turn the jar, as indicated in the figure. Then, let the jar pass through below the liquid tube and take it out from the vehicle.

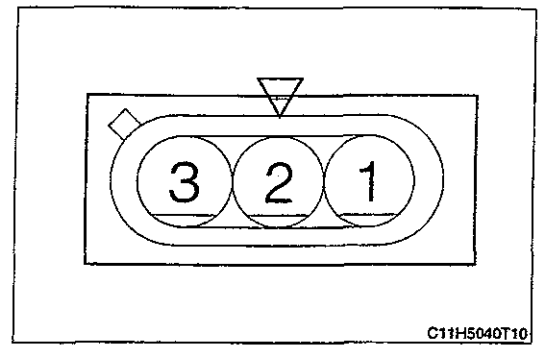


3-1-4 INSPECTION

(1) WINDSHIELD WASHER MOTOR & PUMP AY

1.Put water into the washer jar.

2.Connect the connector terminal 1 of the washer pump to the battery (−) terminal; the terminal 2 to the battery (+) terminal. At this time, ensure that the water is sent from the pump under a pressurized condition.



3-1-5 POINTS OF INSTALLATION

(1) WINDSHILD WASHER NOZZLE

1.Check and adjust the water applying position of the washer. Refer to Page J2-2.

3-1-6 OPERATION AFTER INSTALLATION

1.Install the battery carrier.

2.Install the battery.

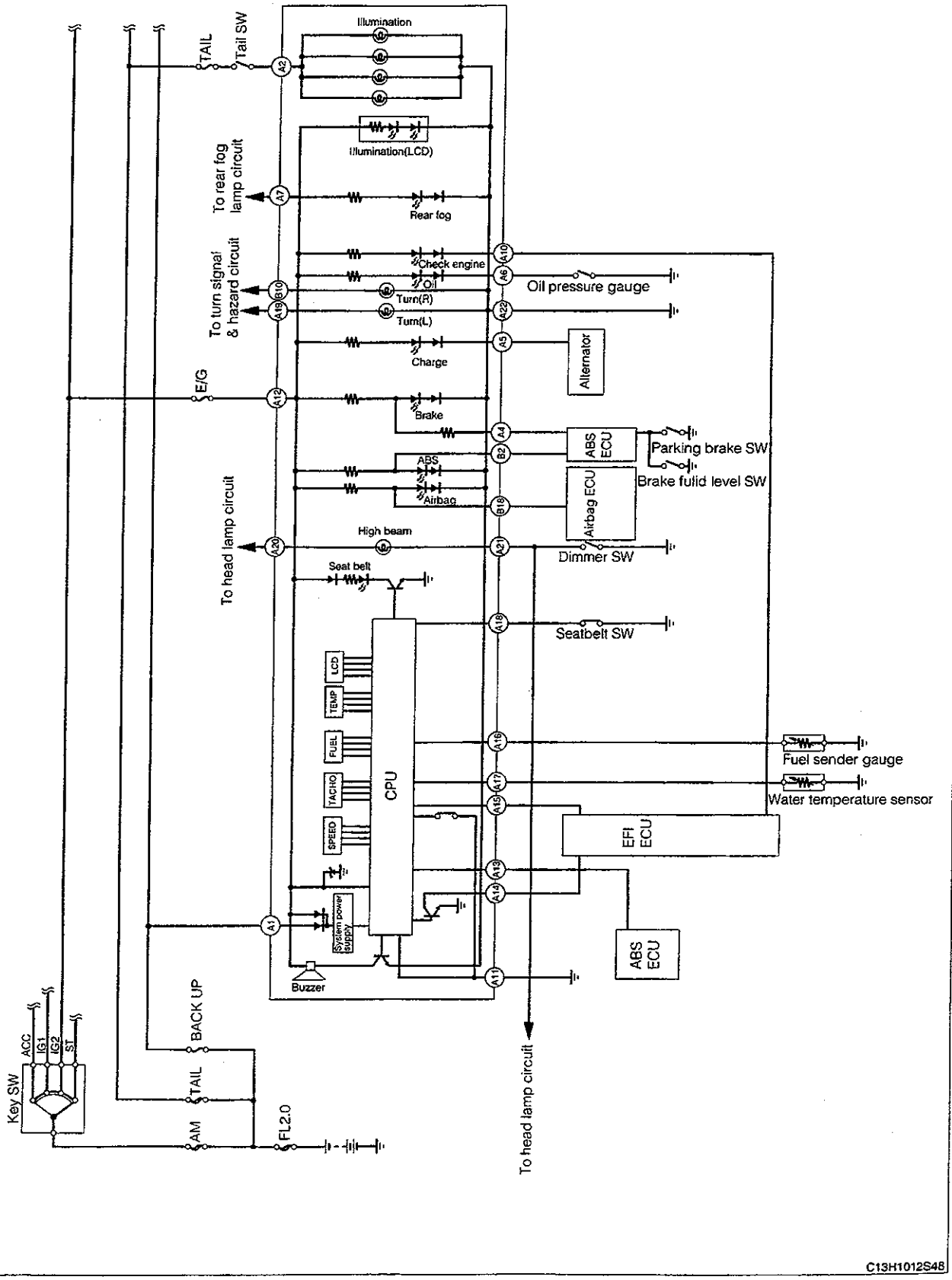
TO INDEX

J3 METER

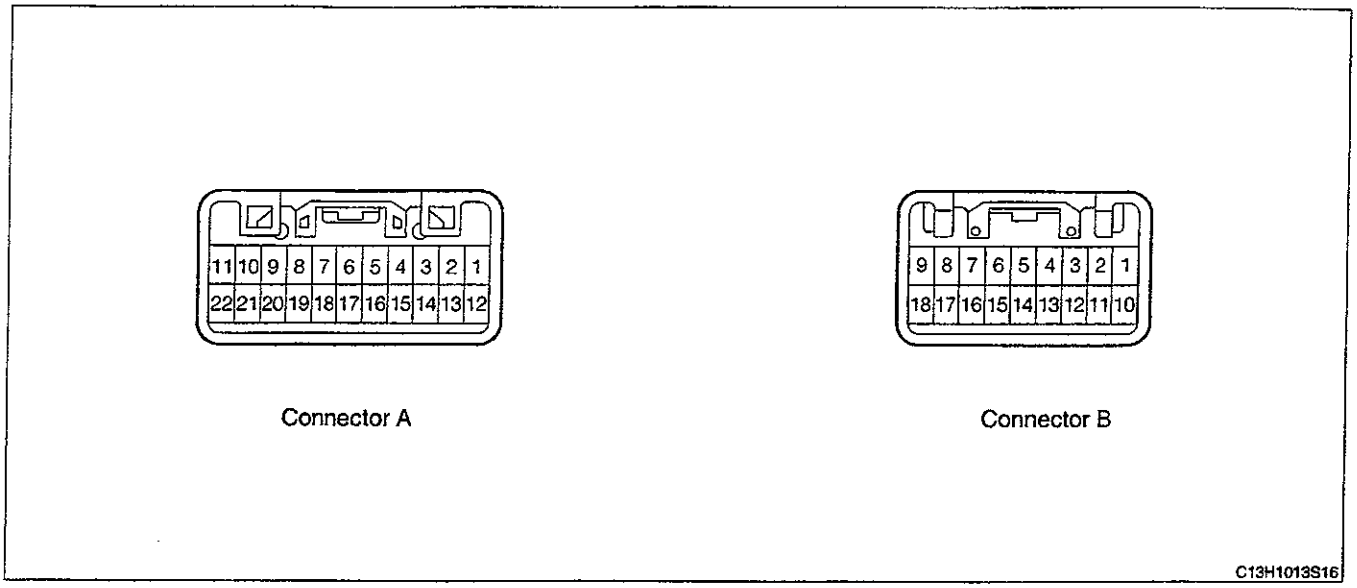
METER ---------- J3 - 1
SYSTEM WIRING DIAGRAM---------- J3 - 1
FUNCTION CHECK ---------- J3 - 3
UNIT CHECK---------- J3 - 5
COMBINATION METER ---------- J3 - 6
DISASSEMBLING AND
ASSEMBLING ---------- J3 - 6

1 METER

1-1 SYSTEM WIRING DIAGRAM



METER CONNECTOR TERMINAL ARRANGEMENT DIAGRAM



METER TERMINAL NAME

CONNECTOR A			CONNECTOR B		
A1	+B	+B power supply	B1	–	–
A2	ILL+	Illumination +	B2	ABS	ABS
A3	–	–	B3	–	–
A4	BRK	Brake	B4	–	–
A5	CHG	Charge	B5	–	–
A6	OIL	Oil	B6	–	–
A7	RRFG	Rear fog lamp	B7	–	–
A8	–	–	B8	–	–
A9	–	–	B9	–	–
A10	E/G	Check engine	B10	TRNR	Turn RH
A11	GGND	Gauge earth	B11	–	–
A12	IG+	IG power supply	B12	–	–
A13	SPDI	Speed IN	B13	–	–
A14	SPDO	Speed OUT	B14	–	–
A15	TACHO	Engine rotation signal	B15	–	–
A16	FL	Fuel	B16	–	–
A17	TMP	Water temperature	B17	–	–
A18	SBLT	Seat belt	B18	A/B	Airbag
A19	TRNL	Turn LH			
A20	BM+	Beam +			
A21	BM–	Beam –			
A22	IGND	Indicator earth			

1-2 FUNCTION CHECK

1-2-1 SPEEDOMETER

1.Place the vehicle on a speedometer tester.

2.Check the measured speed of the speedometer tester at the time when the speedometer of the test vehicle registers 60 km/h reading.

Specifications	Standard
European specifications	52 - 59 km/h
Australian specifications	54 - 64 km/h

NOTE

- Indicating errors are caused by excessive or lack of the tire air inflation pressure and tire wear.

3.Check to see if the speedometer pointer exhibits oscillations at the time when the speedometer registers 40 km/h reading.

SPECIFIED VALUE: Within ±3km/h

4.Check that the odometer is functioning properly.

1-2-2 VEHICLE SPEED SIGNAL

(1) VEHICLE SPEED SIGNAL INPUT CHECK

1.Check the frequency of the voltage pulses between the terminal SPDI and GGND when the vehicle is running at the speed of 10 km/h.

Terminal No. (Nomenclature of terminal)	Frequency
A13(SPDI) - A11(GGND)	Approx. 7Hz

CAUTION

- With the connector connected, perform the check from behind the connector at the vehicle harness side.

NOTE

- For easier check, follow the procedure given below.
  1. Insert a lead wire to the back of the vehicle harness side connector.
  2. Secure the vehicle harness and lead wire with adhesive tape.
  3. Check the signal from the lead wire.

(2) VEHICLE SPEED SIGNAL OUTPUT CHECK

1.Check the frequency of the voltage pulses between the terminal SPDO and GGND when the vehicle is running at the speed of 10 km/h.

Terminal No. (Nomenclature of terminal)	Frequency
A14(SPDO) - A11(GGND)	Approx. 7Hz

CAUTION

- With the connector connected, perform the check from behind the connector at the vehicle harness side.

NOTE

- For easier check, follow the procedure given below.
  1. Insert a lead wire to the back of the vehicle harness side connector.
  2. Secure the vehicle harness and lead wire with adhesive tape.
  3. Check the signal from the lead wire.

1-2-3 TACHOMETER

1.With a tachometer connected, start the engine. Check the indicating error of the tachometer.

CAUTION

- Do not raise the engine revolution beyond the permissible revolution speed (red zone).

Standard revolution speed	800	1000	2000	3000	4000	5000	6000	7000	8000
Indication error	±100	±100	±125	±150	±150	±170	±190	±210	±225

1-2-4 FUEL GAUGE

CAUTION

- After the vehicle stops, if the negative terminal of the battery is removed before performing this check, run the vehicle once. Then, perform this check.

1.Remove the connector of the fuel sender gauge.

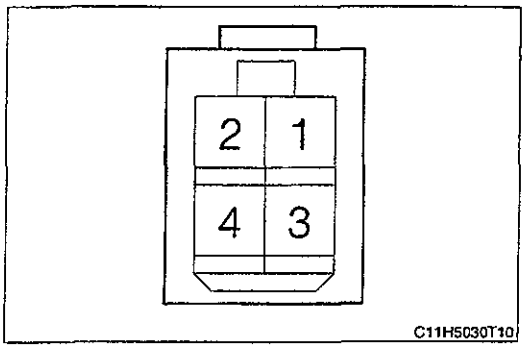
2.Check the state of the indicator when the IG switch is set to the ON position (without running the engine).

SPECIFIED VALUE: The pointer of the fuel gauge registers "E".

3.Short the vehicle harness side connector terminal 1 and terminal 2 of the fuel sender gauge.

4.Check the state of the indicator when the IG switch is set to the ON position (without running the engine).

SPECIFIED VALUE: The pointer should register "F".



1-2-5 WATER TEMPERATURE GAUGE

WARNING

- While conducting this check, the radiator fan will start rotating due to the fail-safe function of the radiator fan motor control. Therefore, care must be exercised so as not to be caught-in.

CAUTION

- When this check is conducted, the diagnosis code No. 42 will be outputted by the engine control computer. Therefore, it is necessary to cancel the code concerned after completion of the check.

1.Remove the connector of the water temperature sensor.

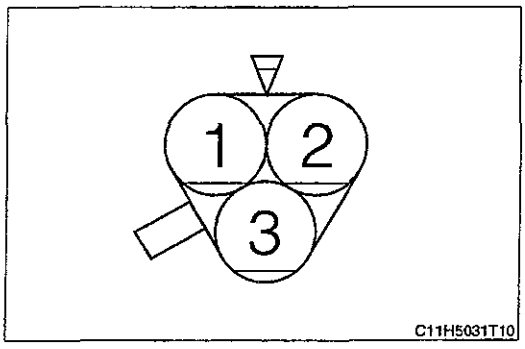
2.Check the state of the indicator when the IG switch is set to the ON position (without running the engine).

SPECIFIED VALUE: The pointer should register "C".

3.Earth the vehicle harness side connector terminal 3 of the water temperature sensor to the body.

4.Check the state of the indicator when the IG switch is set to the ON position (without running the engine).

SPECIFIED VALUE: The pointer should register "H".



1-3 UNIT CHECK

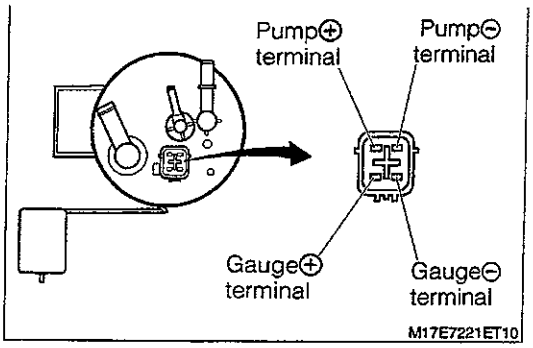
1-3-1 FUEL SENDER GAUGE

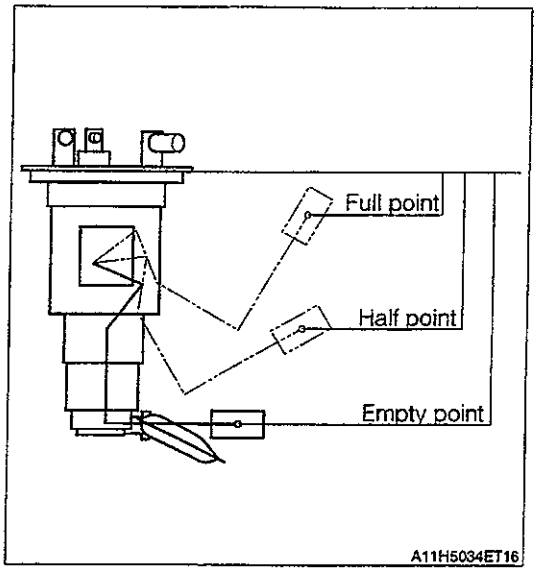
1.Remove the fuel sender gauge.
Refer to Page B7-7.

2.Ensure that the float can move without any binding.

3.Move the float position from the point E to the point F. Check the resistance between the terminals.

Level	Float position (mm)	Resistance (Ω)
F	28.1	3±1
1/2	108.7	32.5±3
E	176.2	120±1

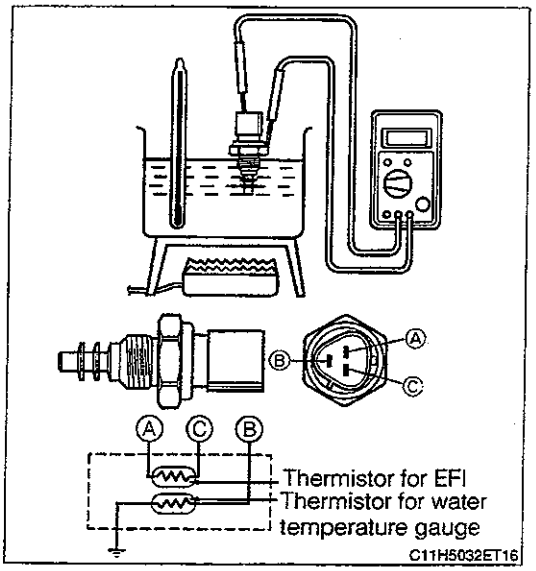




1-3-2 WATER TEMPERATURE SENSOR

1.Measure the resistance between the sensor terminal Ⓑ and the sensor body.

Temperature (°C)	Resistance (Ω)
50	176±35
115	20±1.5



1-3-3 MOTOR DRIVEN OPENING ROOF WARNING BUZZER

Refer to Page J3-6.

2 COMBINATION METER

2-1 DISASSEMBLING AND ASSEMBLING

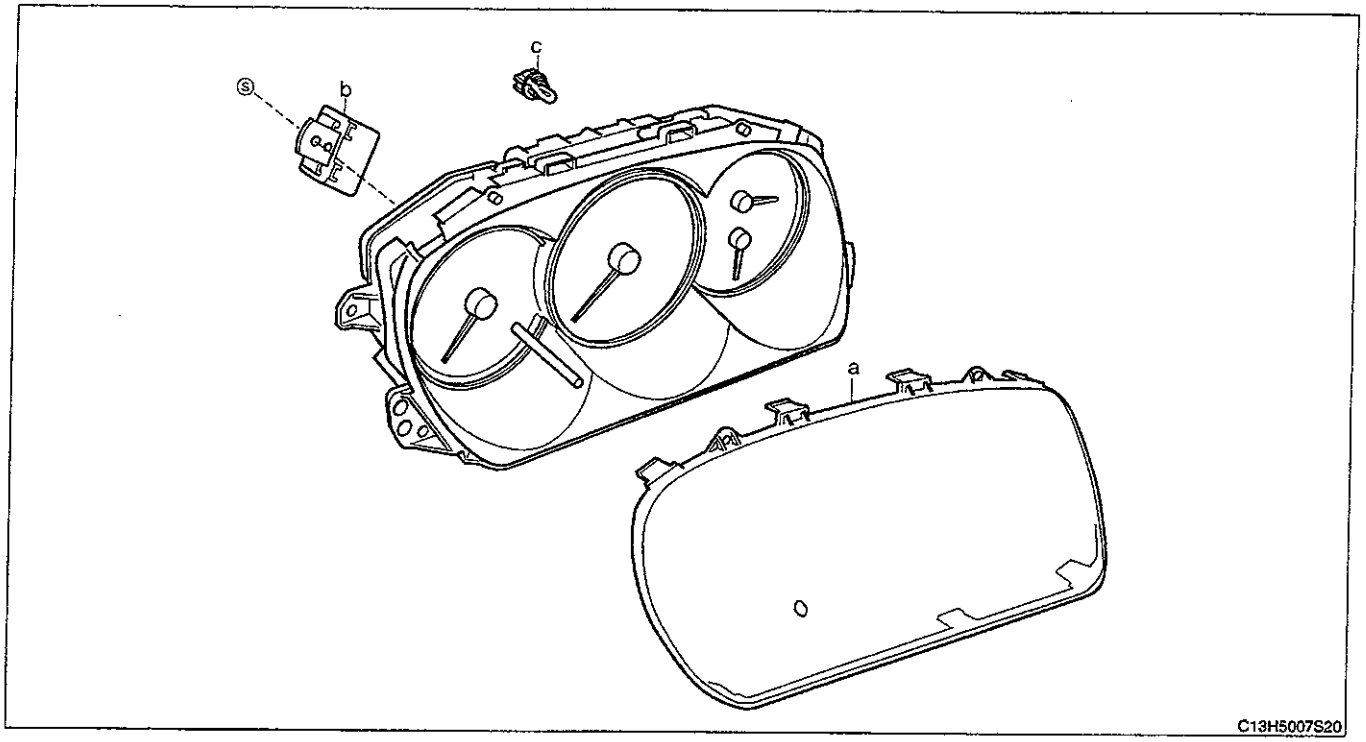
2-1-1 OPERATION BEFORE DISASSEMBLY

1.Lower the steering column as far as it will go.
2.Remove the instrument cluster finish panel.
Refer to Page I2-22.

3.Remove the combination meter.

2-1-2 DISASSEMBLY AND ASSEMBLY PROCEDURES

(1) COMPONENTS



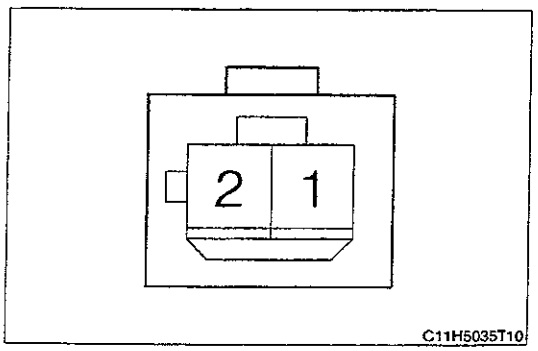
(2) DISASSEMBLING AND ASSEMBLING PROCEDURE

1 a Glass, combination meter
2 b Buzzer Ay
3 c Bulb, w/socket

2-1-3 INSPECTION

(1) BUZZER AY

1.Ensure that the buzzer sounds when the terminal 1 is connected to the battery negative terminal; the terminal 2 to the battery positive terminal.



2-1-4 OPERATION AFTER ASSEMBLY

1.Install the combination meter.
Refer to Page I2-22.

2.Install the instrument cluster finish panel.
3.Return the steering column to the specified position.

TO INDEX

J4 AUDIO & VISUAL SYSTEM

SPEAKER---------- J4 - 1
REMOVAL AND INSTALLATION--------- J4 - 1
ANTENNA ---------- J4 - 2
REMOVAL AND INSTALLATION--------- J4 - 2

1 SPEAKER

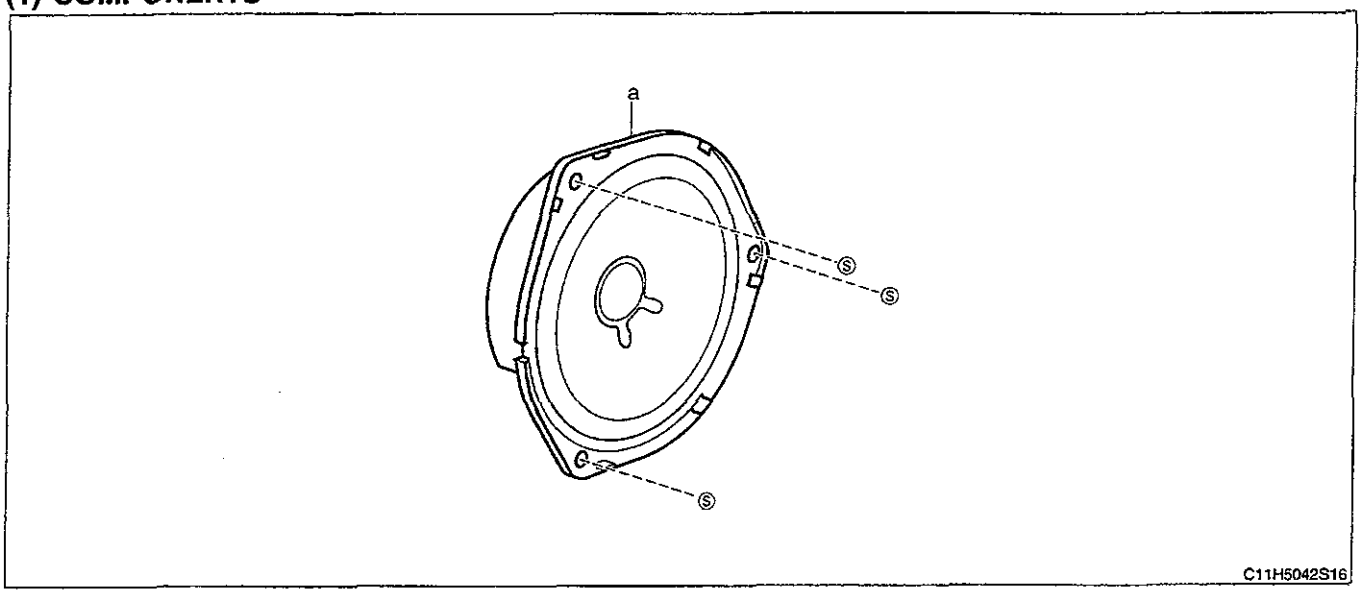
1-1 REMOVAL AND INSTALLATION

1-1-1 OPERATION BEFORE REMOVAL

1.Remove the door trim.
Refer to Page JI1-15.

1-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Speaker Ay, w/box

1-1-3 OPERATION AFTER INSTALLATION

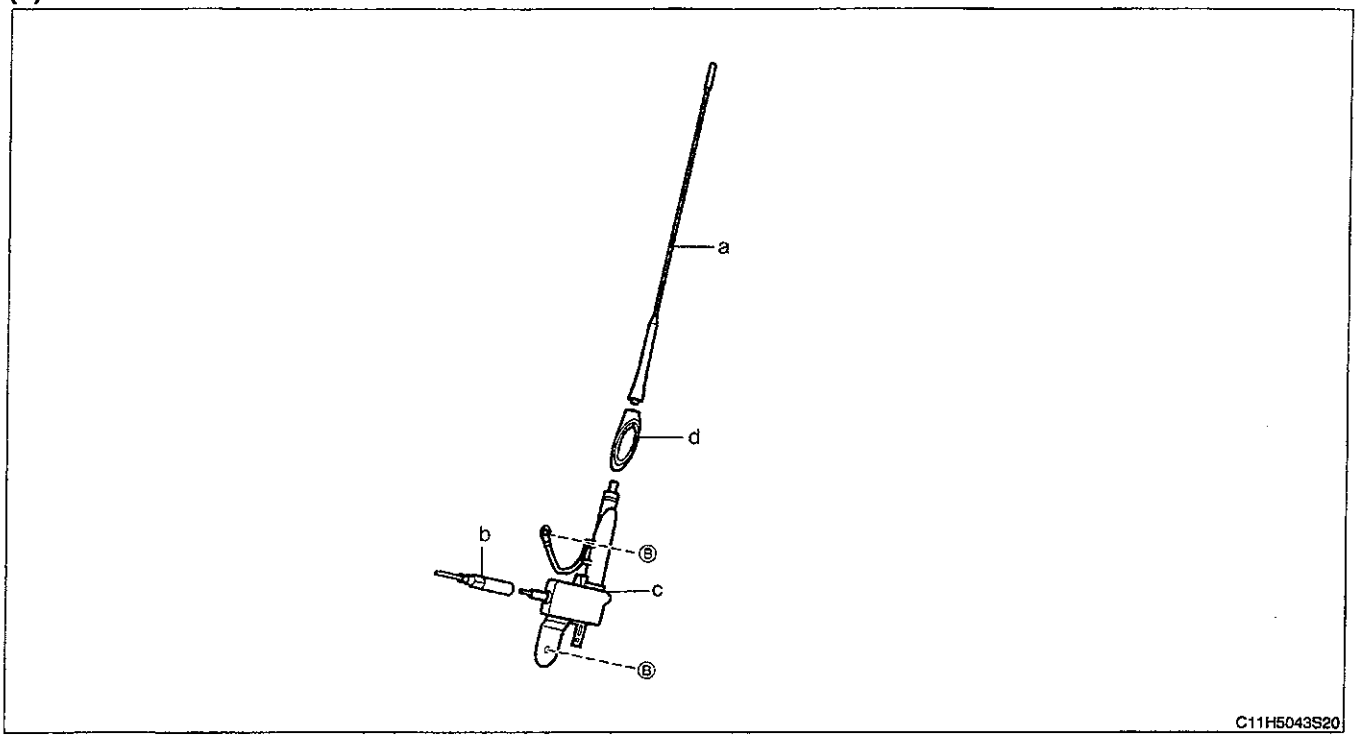
1.Install the door trim.
Refer to Page JI1-15.

2 ANTENNA

2-1 REMOVAL AND INSTALLATION

2-1-1 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Rod, antenna
2 b Cable, antenna
▲ 3 c Antenna Ay, Amplifier
▲ 4 d Holder Ay, antenna

2-1-2 POINTS OF INSTALLATION

(1) ANTENNA HOLDER AY

1.Be sure to securely install the antenna holder assembly so that no water enters.

(2) AMPLIFIER ANTENNA AY

1.Be sure to securely insert the antenna assembly into the holder assembly so that no water enters.

TO INDEX

K1 HEATER & AIR CONDITIONER

HEATER AND AIR CONDITIONER ------- K1 - 1
INSTRUCTIONS FOR SERVICE
OPERATION ---------- K1 - 1
ARTICLES TO BE PREPARED ---------- K1 - 2
BASIC CHECK AND ADJUSTMENT --- K1 - 3
FUNCTION CHECK ---------- K1 - 3
REFRIGERANT ---------- K1 - 4
REPLACEMENT ---------- K1 - 4
HEATER CONTROL PANEL ---------- K1 - 5
REMOVAL AND INSTALLATION -------- K1 - 5
HEATER UNIT ---------- K1 - 8
REMOVAL AND INSTALLATION -------- K1 - 8
COOLING UNIT ---------- K1 - 10
REMOVAL AND INSTALLATION ------ K1 - 10
COMPRESSOR ---------- K1 - 15
REMOVAL AND INSTALLATION ------ K1 - 15
CONDENSER ---------- K1 - 20
REMOVAL AND INSTALLATION ------ K1 - 20

1 HEATER AND AIR CONDITIONER

1-1 INSTRUCTIONS FOR SERVICE OPERATION

1-1-1 REFRIGERANT AND COMPRESSOR OIL SPECIFICATIONS

Refrigerant	HFC−134a
Refrigerant replenishing amount (g)	350±30
Compressor oil	ND−OIL8

CAUTION

- During the adjustment of the refrigerant replenishing amount, all of the refrigerant in the cycle should be recovered. Then, fill in the refrigerant of the replenishing amount above. [Prohibition of additional replenishment]

NOTE

- Refrigerant service can
  100g:88728−87501−000
  250g:88728−87601−000

1-1-2 INSTRUCTIONS FOR REFRIGERANT AND SERVICE CAN

WARNING

- Any wrong handling may cause toxic substances to generate or the service can to explode, thus leading to serious injuries. Or, the liquid may splash, resulting in blindness, frostbite, etc.

1. Be sure to use the refrigerant HFC−134a.
2. When taking out the refrigerant during the repair, etc. of the air conditioner, be sure to use a refrigerant recovery machine. Never allow the refrigerant to be discharged to the atmosphere.
3. Be sure to recover the refrigerant when the vehicle is scrapped or the car air conditioner is disposed of.
4. When the refrigerant gas is exposed to open flame or very high temperature, it will be dissolved, thus generating toxic substances. Therefore, utmost care must be exercised so that the refrigerant gas may not leak at such a place.
5. Do not perform operations at a place with poor ventilation.
6. Never use a halide torch type leak detector, which not only is incapable of detecting leakage of HFC−134a gas, but also dissolves the inhaled HFC−134a, thus generating toxic substances.
7. Do not heat up the service can. When heating of the service can is absolutely necessary, use hot water at a temperature below 40°C.
8. Do not recycle the can by returning the refrigerant into the service can.
9. Be very careful not to shake the service can strongly. There is a danger that the can valve may be detached if it has been installed improperly.
10. Do not handle the can near your face in preparation for the explosion of the can. Also, be certain to wear protective goggles.
11. Do not open the valve of the manifold gauge at the high-pressure side while the engine is running. There is a danger that the high-pressure gas flows backward, thus leading to the explosion of the can.
12. In cases where the refrigerant should enter your eyes, do not rub your eyes with your hands or handkerchief, but immediately wash your eyes with clean water for more than 15 minutes. Then, immediately receive medical treatment at an eye doctor.

1-1-3 INSTRUCTIONS FOR COMPRESSOR OIL

1.Make sure to use the compressor oil ND—OIL8.
2.The compressor oil has high moisture-absorption characteristics. Hence, when an air conditioner part is removed, be sure to immediately shut off the exposure to the atmosphere, using plugs, vinyl tape, etc.
3.The compressor oil has an adverse influence on the paint surface and resin. Therefore, utmost care must be exercised so that the compressor oil may not adhere to such places. If the compressor oil should be adhered to such places, immediately wipe off the oil, using cloth.

1-1-4 INSTRUCTIONS FOR INSTALLATION OF O-RINGS AND PIPES

1.Be certain to use O-rings for HFC—134a.
2.Be sure to use new O-rings when the pipes are connected.
3.When the O-rings are detached, use a soft object, such as a toothpick, being very careful not to damage the pipes.
4.Liberally apply compressor oil to the O-ring.
5.Route the hose pipes naturally. Be very careful not to twist them or bend them forcibly.
6.If a foreign substance, such as a lint, is adhered to the joint section of the pipes and O-rings, it will cause the refrigerant gas to leak. Therefore, make sure that no foreign substance is present before connecting the pipes. Also, do not touch the joint section of the pipes and O-rings with cotton work gloves.
7.When the pipes are replaced with new ones, replenish the following amount of compressor oil.

Replacement parts	Pipes and hoses
Replenishing amount of compressor oil	5 cc (per 1 piece)

1-2 ARTICLES TO BE PREPARED

Instrument

Dial gauge,Torque wrench,Tachometer,Dry and wet bulb hygrometer,Temperature gauge

Tool

Manifold gauge

1-3 BASIC CHECK AND ADJUSTMENT

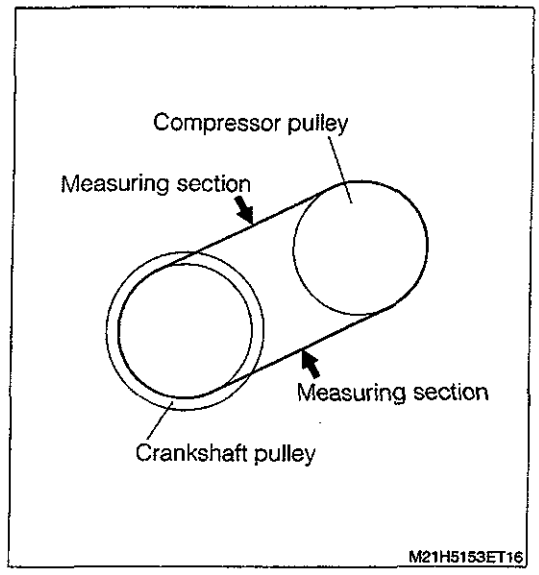
1-3-1 CHECK AND ADJUSTMENT OF AIR CONDITIONER COMPRESSOR BELT TENSION (DEFLECTION AMOUNT)

1.Remove the air cleaner.
Refer to Page B3-2.

2.Adjust the compressor belt tension (deflection amount) to the specified value.

Specified value

	New belt	Used belt When conducting adjustment again
Belt tension (N{kgf})	490±49 {50±5}	343±49 {35±5}
Belt deflection amount (mm) (Pushing force: 98N{10kgf})	8 - 11	11 - 14



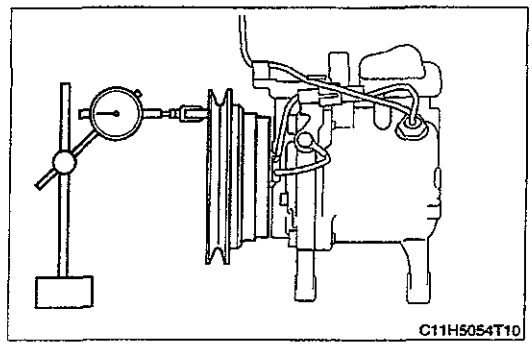
CAUTION

- When a new belt is assembled, perform the adjustment to the mid-value of the specified value for the "New belt."
- In the case of the belt that has been used for more than five minutes, perform the adjustment to the mid-value of the specified value for the "Used belt, When conducting adjustment again."

1-3-2 CHECK AND ADJUSTMENT OF MAGNET CLUTCH AIR GAP

1.Remove the compressor.
Refer to Page K1-15.

2.Install the dial gauge to the magnet clutch hub vertically.
3.Connect the connector terminal of the magnet clutch to the positive (+) terminal of the battery, and the body earth of the compressor to the negative (−) terminal of the battery. Then, start the operation of the magnet clutch. At this time, check the air gap.
SPECIFIED VALUE: $0.5^{+0.15}_{0.20}$mm
4.If the check results fail to conform to the specified value, remove the magnet clutch hub and perform the adjustment by means of the plate washer.



CAUTION

- The number of plate washers to be used should be 3 pcs. or less.

1-4 FUNCTION CHECK

1-4-1 HEATER CONTROL PANEL

1.Make sure that all controls, the selection dials for air discharging ports, the temperature setting dial and the selection lever for inside /outside air, are functioning properly from one end to the other end. Also, ensure that no reaction force occurs.

2 REFRIGERANT

2-1 REPLACEMENT

CAUTION

- During the adjustment of the refrigerant replenishing amount, all of the refrigerant in the cycle should be recovered. Then, fill in the refrigerant of the replenishing amount the following. [Prohibition of additional replenishment]

2-1-1 ARTICLES TO BE PREPARED

Tool

Vacuum pump,Manifold gauge,Halogen leak detector

Lubricant,adhesive,others

Chlorofluorocarbon recovery and regenerating machine,Refrigerant gus HFC－134a(R134a)

2-1-2 REPLACING PROCEDURE

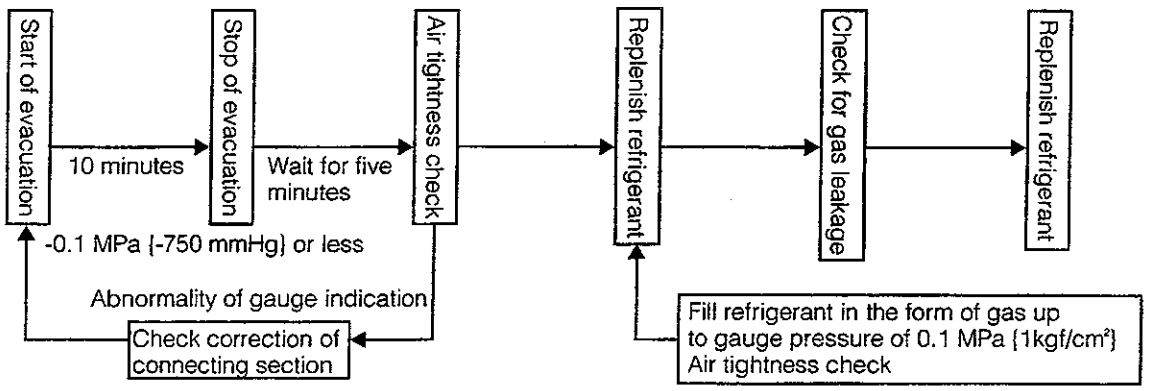
(1) RECOVERY PROCEDURE

1.Turn ON the A/C switch.

2.Start the engine and operate the compressor for about 5 to 6 minutes. Recirculate the cycle together with the refrigerant so that the residual compressor oil in each function part may be recovered to the compressor.

3.Perform the recovery of the refrigerant, following the instruction manual of the refrigerant recovery and recycling machine to be used.

(2) REPLENISHING PROCEDURE



C11H5050_1ES16

SPECIFIED VALUE: Replenishing amount of refrigerant: 350±30g

NOTE

- Refrigerant service can
  100g:88728－87501－000
  250g:88728－87601－000

3 HEATER CONTROL PANEL

3-1 REMOVAL AND INSTALLATION

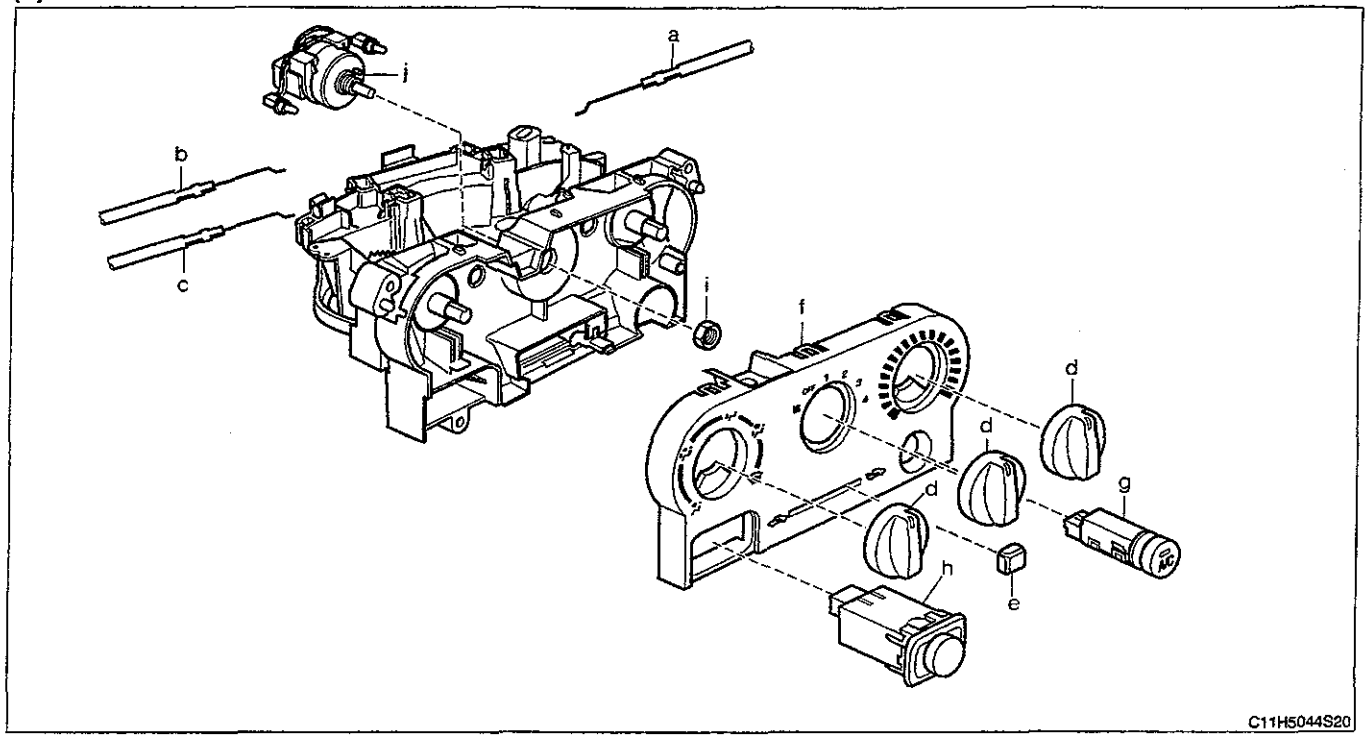
3-1-1 ARTICLES TO BE PREPARED

Tool

Snap ring pliers

3-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



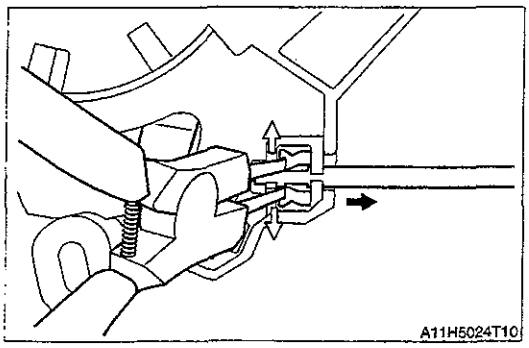
(2) REMOVAL AND INSTALLATION PROCEDURES

▼ ▲ 1 a Cable S/A, defroster damper control
▼ ▲ 2 b Cable S/A, temperature damper control
▼ ▲ 3 c Cable S/A, air inlet damper control
4 d Knob S/A, control
5 e Knob, heater control lever
6 f Plate, heater control name
7 g Switch Ay, air conditioner control
8 h Lamp Ay, telltale
9 i Nut, heater blower switch
10 j Switch, heater blower

3-1-3 POINTS OF REMOVAL

(1) DAMPER CONTROL CABLE S/A

1. In cases where the damper control cable subassembly is removed from the heater control panel, perform the removal operation, while opening the pawl section of the cable clip, using snap ring pliers, as indicated in the figure.



CAUTION

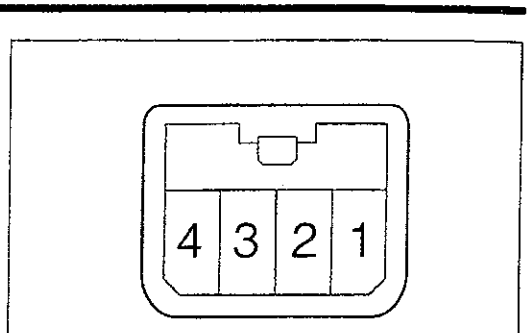
- The cable at the heater control panel side is of a pawl securing type. Therefore, there is the possibility that, if the pawl is opened forcibly, the securing force becomes weak, thus becoming unable to secure the cable again. Hence, be sure to use snap ring pliers.

3-1-4 INSPECTION

(1) AIR CONDITIONER CONTROL SWITCH AY

1.Operate the switch. At this time, check continuity between the terminals 2 and 4.

Switch condition	Standard
ON	Continuity exists.
OFF	No continuity exists.



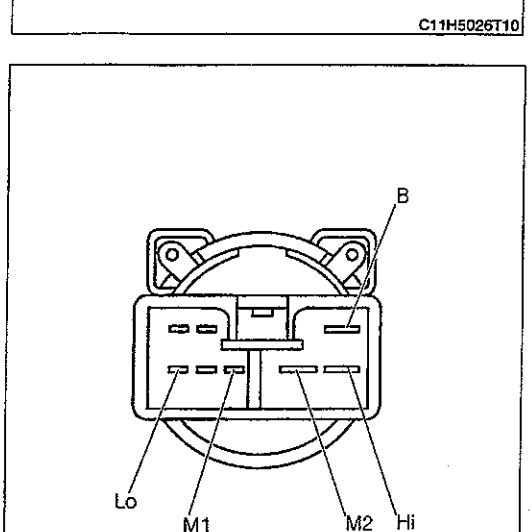
(2) HEATER BLOWER SWITCH

1.Ensure that continuity exists between the respective terminals of the connector, as indicated in the connection table.

○—○:Continuity exists

Position \ Terminal	B	Lo	M1	M2	Hi
OFF	○				
1	○	○			
2	○	○	○		
3	○	○		○	
4	○	○			○

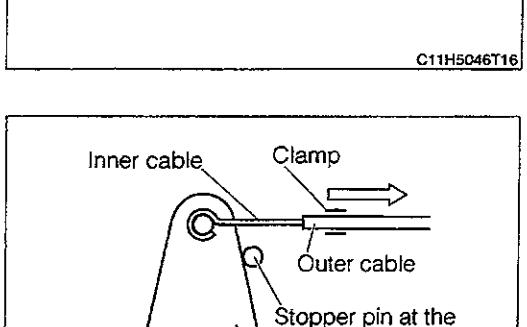
C11H5045EL08



3-1-5 POINTS OF INSTALLATION

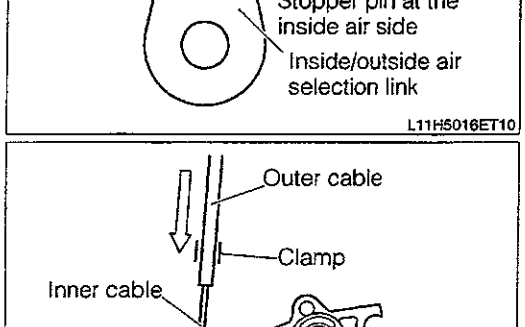
(1) AIR INLET DAMPER CONTROL CABLE S/A

1.Set the inside/outside air selection lever to the inside air.
2.Push the inside/outside air selection link of the cooler unit against the stopper pin at the inside air side.
3.While pulling the cable outer in the arrowheaded direction, clamp the cable.



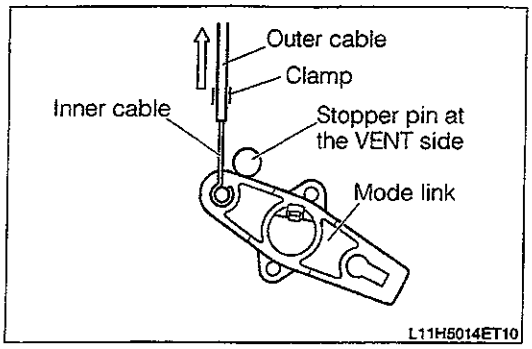
(2) TEMP DAMPER CONTROL CABLE S/A

1.Set the temperature adjusting dial to the MAX COOL.
2.Push the control link of the heater unit against the stopper pin at the COOL side.
3.While pushing the cable outer in the arrowheaded direction, clamp the cable.



(3) DEFROSTER DAMPER CONTROL CABLE S/A

1. Set the register selection dial to the VENT position.
2. Push the mode link of the heater unit against the stopper pin at the VENT side.
3. While pulling the cable outer in the arrowheaded direction, clamp the cable.



4 HEATER UNIT

4-1 REMOVAL AND INSTALLATION

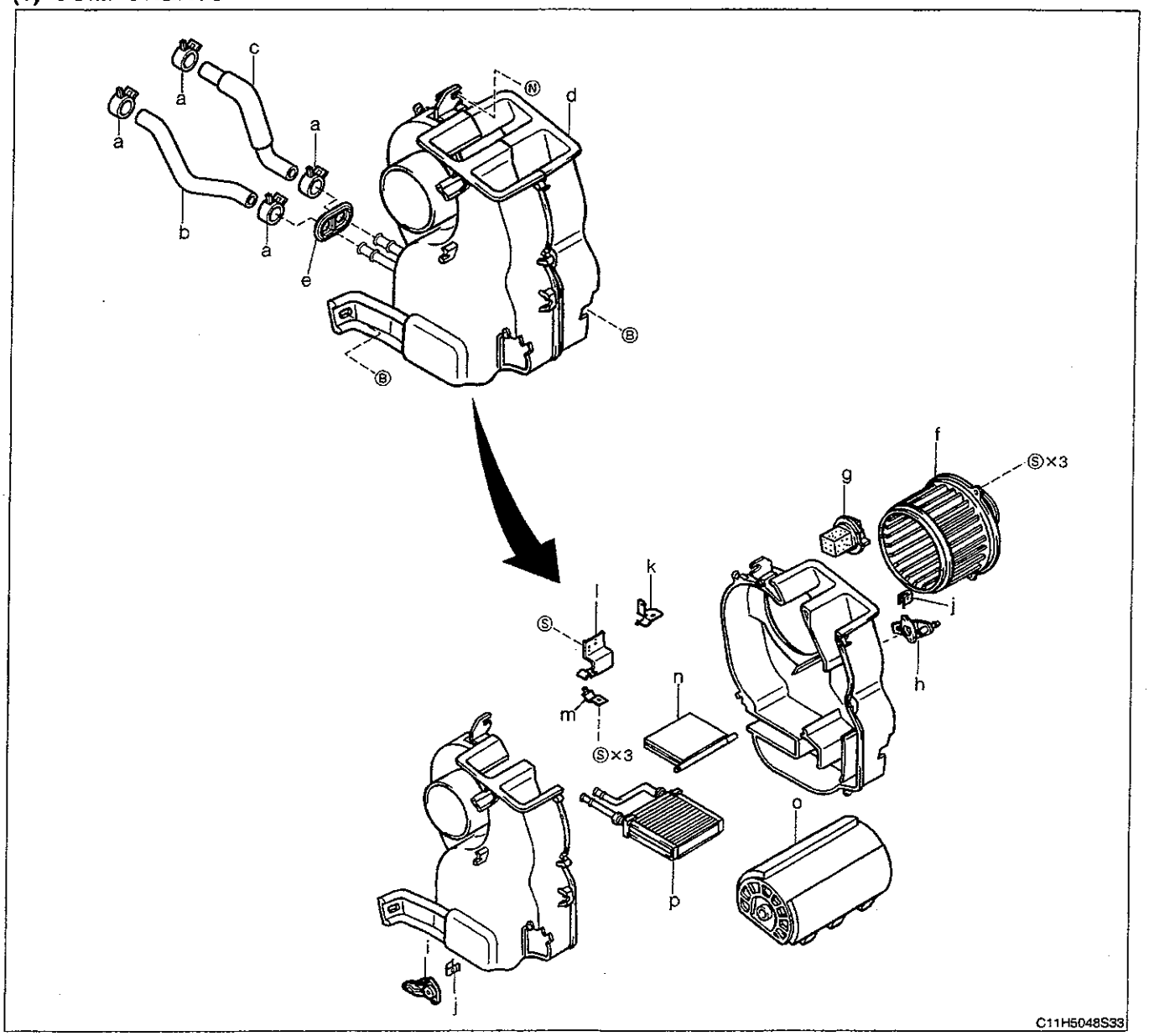
4-1-1 OPERATION BEFORE REMOVAL

1.Remove the instrument panel.
Refer to Page I2-22.

2.Remove the P-P member.

4-1-2 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



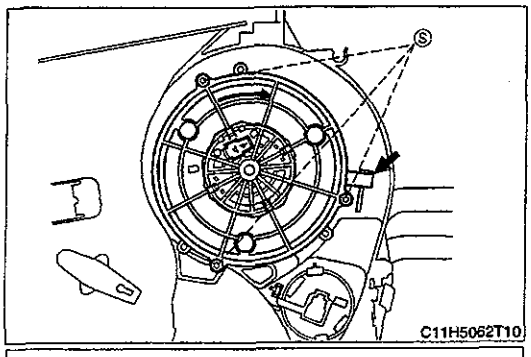
(2) REMOVAL AND INSTALLATION PROCEDURES

	1	a	Clamp, hose	9	i	Element, air refiner (air mix lever)
	2	b	Hose, heater outlet water	10	j	Clamp
	3	c	Hose, heater inlet water	11	k	Clamp, piping
	4	d	Heater Ay, front	12	l	Bracket
	5	e	Grommet	13	m	Clamp
▼	6	f	Motor S/A, heater blower	14	n	Damper, heater duct (air mix door)
	7	g	Resistor, heater blower	15	o	Damper, heater duct (mode door)
	8	h	Element, air refiner (mode lever)	16	p	Unit S/A, radiator heater

4-1-3 POINTS OF REMOVAL

(1) HEATER BLOWER MOTOR S/A

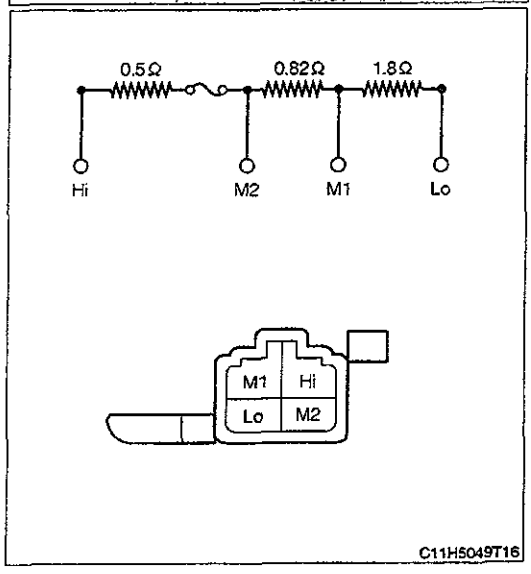
1.Detach the three screws. Detach the heater blower motor subassembly while turning it in the arrowheaded direction, and pushing the claw toward you.



4-1-4 INSPECTION

(1) HEATER BLOWER REGISTER

1.Measure the resistance between the respective terminals of the connector of the blower register.



4-1-5 OPERATION AFTER INSTALLATION

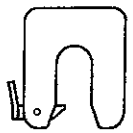
1.Install the P-P member.
2.Install the instrument panel.
Refer to Page I2-22.

5 COOLING UNIT

5-1 REMOVAL AND INSTALLATION

5-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09870-00025-000	Remover, quick joint

Lubricant,adhesive,others

Compressor oil (ND—OIL8)

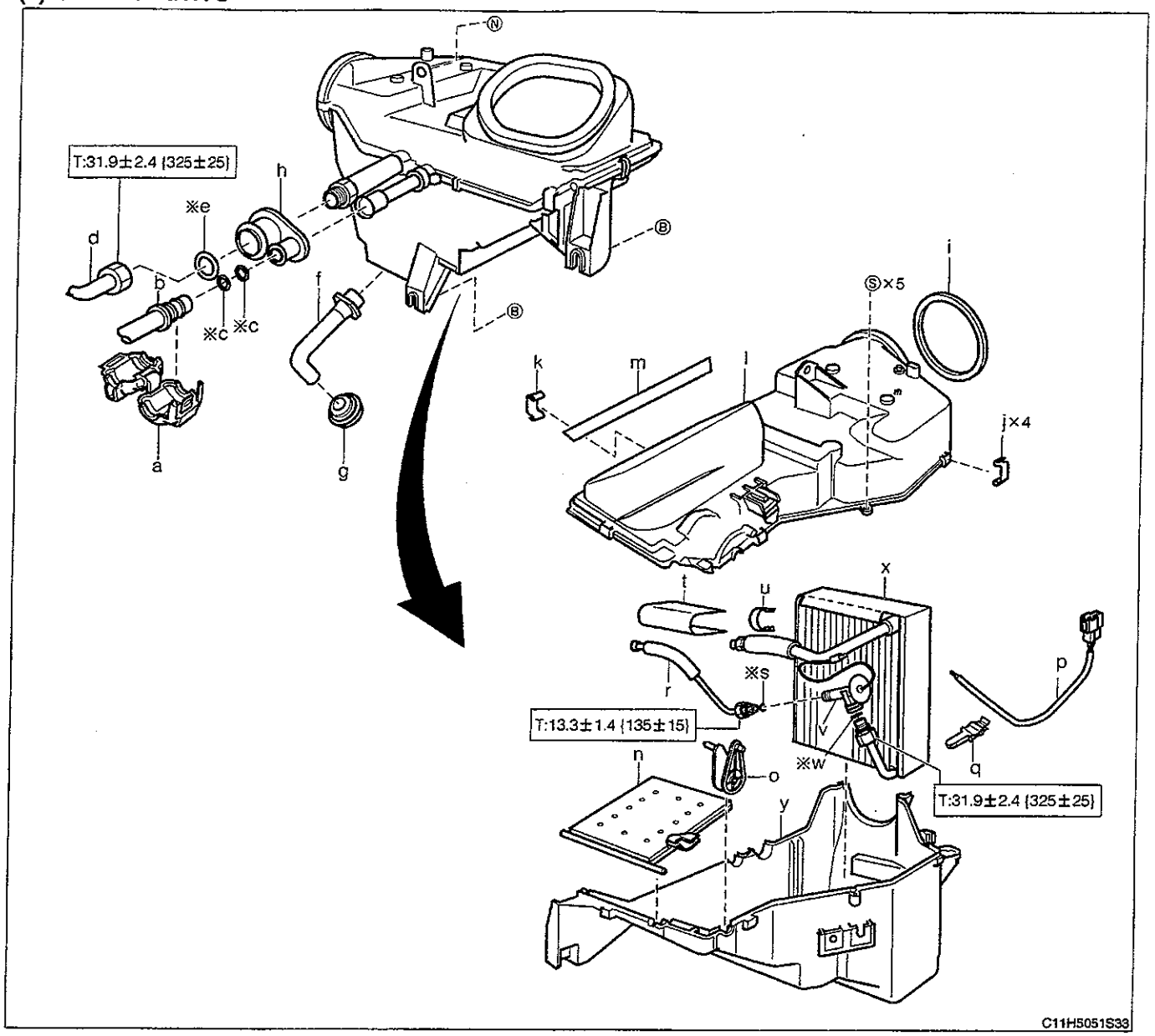
5-1-2 OPERATION BEFORE REMOVAL

1.Drain the refrigerant.
Refer to Page K1-4.

2.Remove the instrument panel.
Refer to Page I2-22.

5-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non - reusable parts

Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

▼ ▲ 1 a Clamp, piping
2 b Tube, liquid
3 c O-ring
▼ ▲ 4 d Hose, suction
5 e O-ring
6 f Hose, drain
7 g Grommet
8 h Grommet
9 i Cover, cooler
10 j Spring, holding
11 k Spring
12 l Case, cooling unit
13 m Packing
14 n Damper S/A
15 o Cover, cooler
16 p Thermistor
17 q Parts, cooling unit
18 r Tube, liquid
19 s O-ring
20 t Packing
21 u Holder, remote bulb, parts
22 v Valve, expansion
23 w O-ring
▲ 24 x Evaporator S/A
25 y Case S/A, cooling unit

5-1-4 POINTS OF REMOVAL

(1) PIPING CLAMP

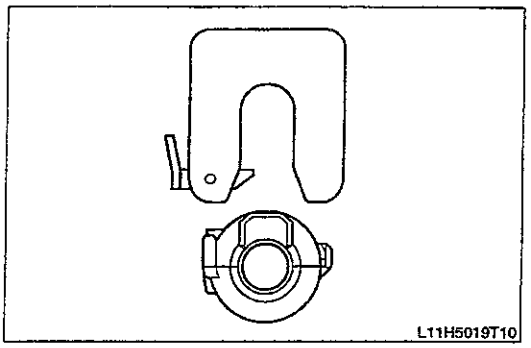
WARNING

- When removing the piping clamps, first ensure that the pressure inside the freezing cycle is 0MPa {0kgf/cm²}. If the gas should remain, the gas may blow out, resulting in injuries, such as frostbite.

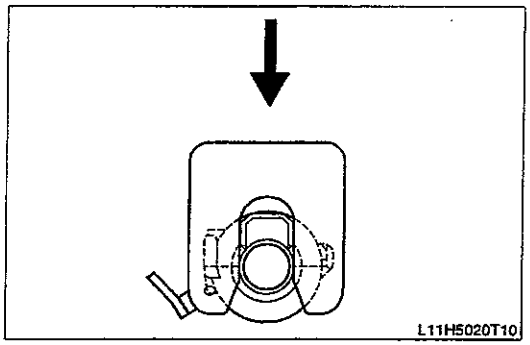
CAUTION

- The use of tools other than the quick joint remover may cause damage to the clamp. Therefore, be certain to employ the quick joint remover.

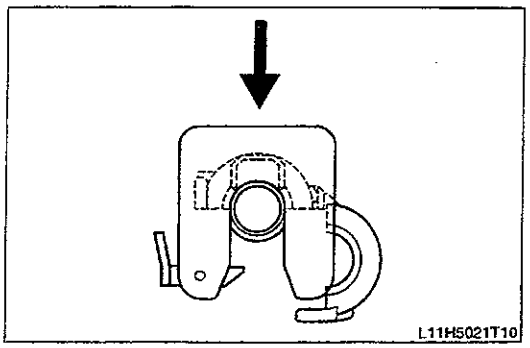
1.Prior to the use of a quick joint remover, make sue to confirm the correct direction in using the tool. See to it that the two claws of the remover are inserted into the hole of the clamp.



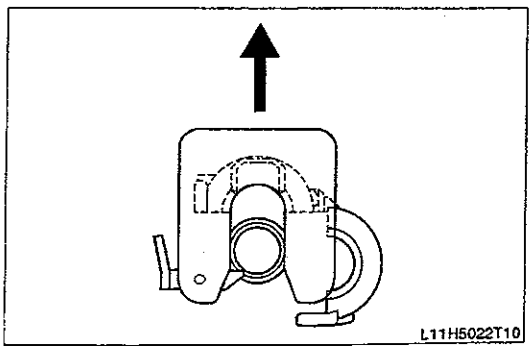
2.Insert the remover.



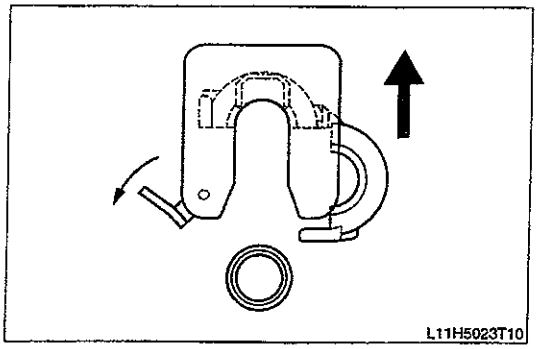
3.Ensure that the clamp is released.



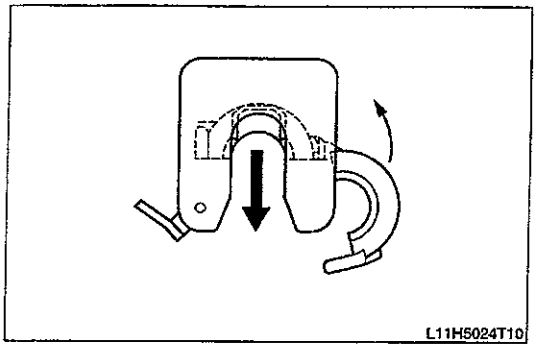
4.Raise the remover once so that the clamp may be separated from the pipe.



5.Pull out the remover from the pipe, while pushing the lock release lever.



6.Take out the clamp from the remover.

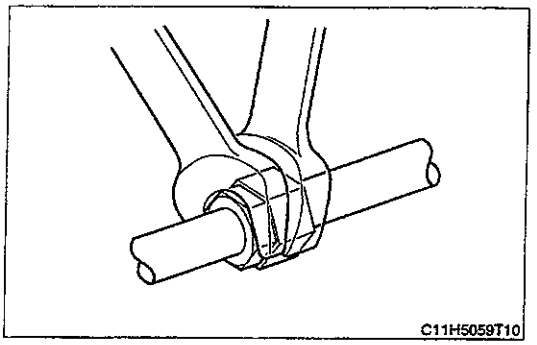


(2) SUCTION HOSE

1.When you loose the nut of the suction hose, be sure to employ two spanners, as indicated in the figure.

CAUTION

- **If you fail to use two spanners in loosing the nut, there is a possibility that the pipe is distorted.**

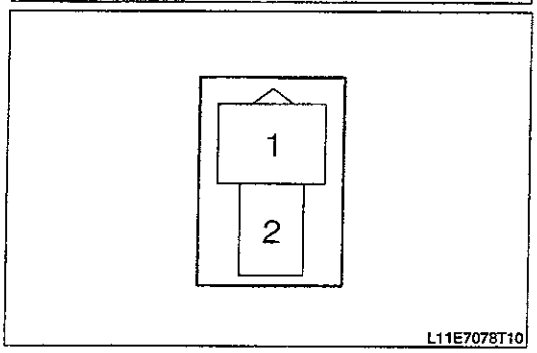


5-1-5 INSPECTION

(1) THERMISTOR

1.Measure the resistance between the connector terminals

Temperature (°C)	Resistance (kΩ)
0	4.8 - 5.1
15	2.2 - 2.6



5-1-6 POINTS OF INSTALLATION

(1) EVAPORATOR S/A

1.When the evaporator is replaced with a new one, replenish the following amount of compressor oil.

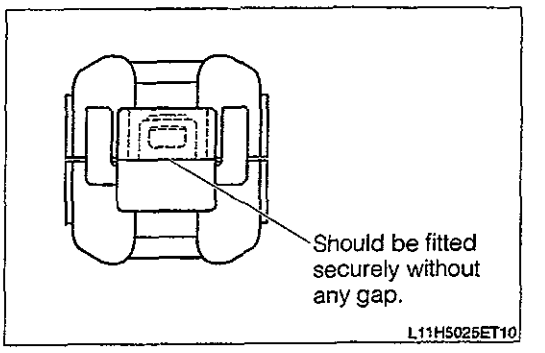
REPLACEMENT PARTS	Evaporator
Replenishing amount of compressor oil (cc)	25

(2) PIPING CLAMP

1.Ensure that the each clamp is fitted securely.

NOTE

- After completion of the assembly, the clamp may move, if turned. This, however, is not a defect.

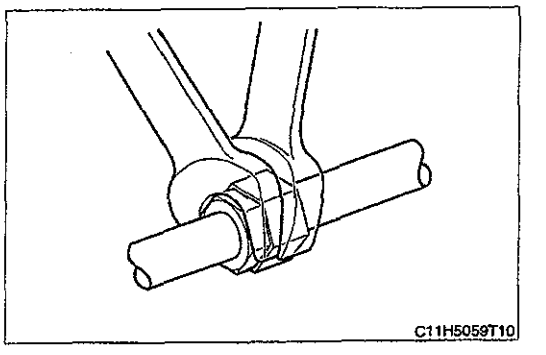


(3) SUCTION HOSE

1.When you tighten the nut of the suction hose, be sure to employ two spanners, as indicated in the figure.

CAUTION

- If you fail to use two spanners in tightening the nut, there is a possibility that the pipe is distorted.



5-1-7 OPERATION AFTER INSTALLATION

1.Install the instrument panel.
Refer to Page I2-22.

2.Replenish refrigerant.
Refer to Page K1-4.

6 COMPRESSOR

6-1 REMOVAL AND INSTALLATION

6-1-1 ARTICLES TO BE PREPARED

Tool

Snap ring pliers

Lubricant,adhesive,others

Cloth

6-1-2 OPERATION BEFORE REMOVAL

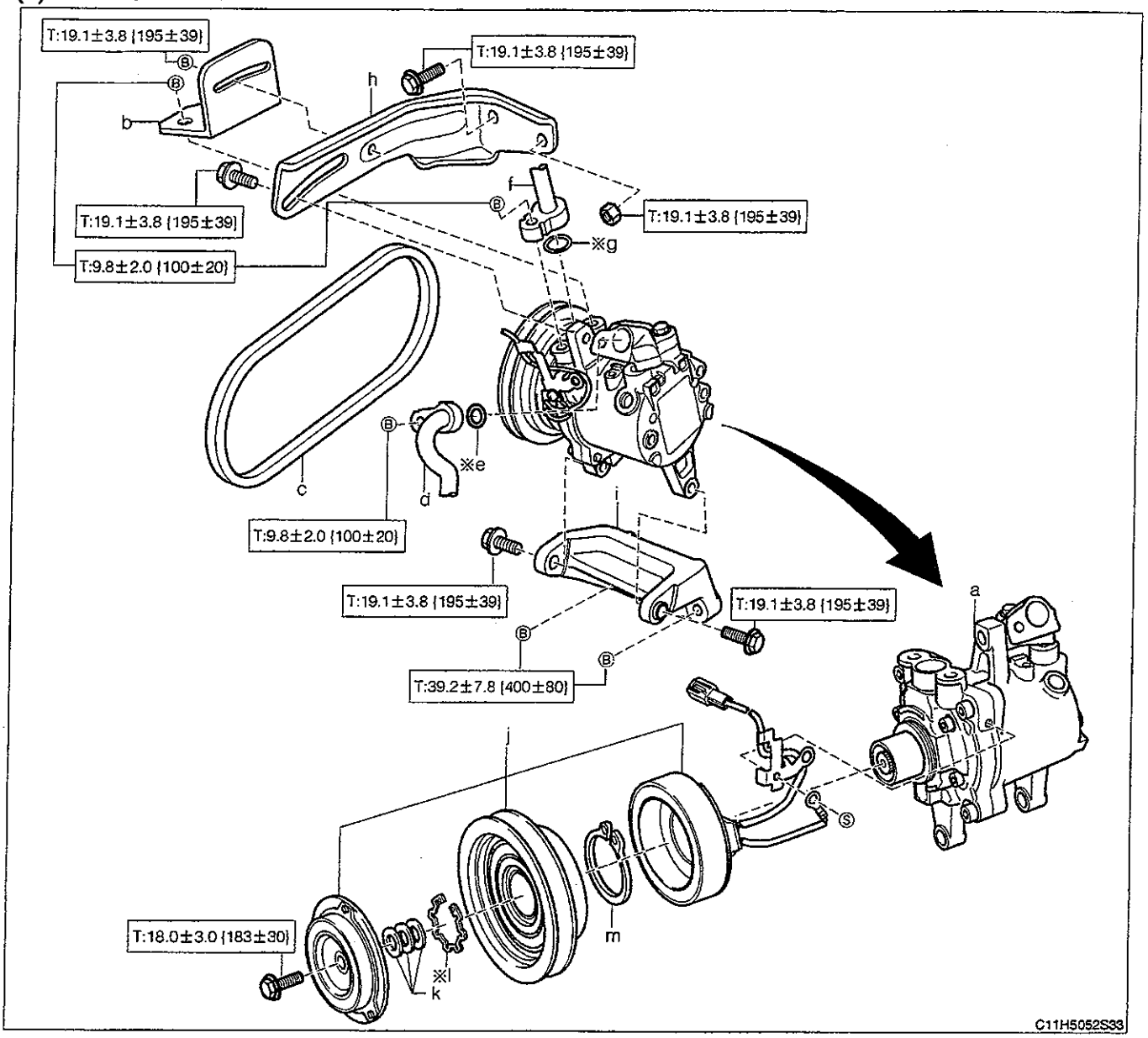
1.Drain the refrigerant.
Refer to Page K1-4.

2.Remove the front bumper.
Refer to Page I2-2.

3.Remove the air cleaner.
Refer to Page B3-2.

6-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non - reusable parts

Unit:N·m{kgf·cm}

(2) REMOVAL PROCEDURES

	1	a	COMPRESSOR AY	8	h	Bar, adjusting
▼	2	b	Stay,compressor	9	i	Bracket, compressor mounting
	3	c	Belt, V (air conditioner)	▼ 10	j	Clutch Ay, magnet
	4	d	Hose, discharge	11	k	Washer, plate
	5	e	O-ring	12	l	Ring, snap
	6	f	Hose, suction	13	m	Ring, snap
	7	g	O-ring			

(3) INSTALLATION PROCEDURES

▲ 1 a Compressor Ay
▲ 2 m Ring, snap
3 l Ring, snap
4 k Washer, plate
▲ 5 j Clutch Ay, magnet
6 i Bracket, compressor mounting
▲ 7 h Bar, adjusting
8 g O-ring
9 f Hose, suction
10 e O-ring
11 d Hose, discharge
▲ 12 c Belt, V (air conditioner)
13 b Stay,compressor
▲ 14 a Compressor Ay
▲ 15 j Clutch Ay, magnet

6-1-4 POINTS OF REMOVAL

(1) COMPRESSOR STAY

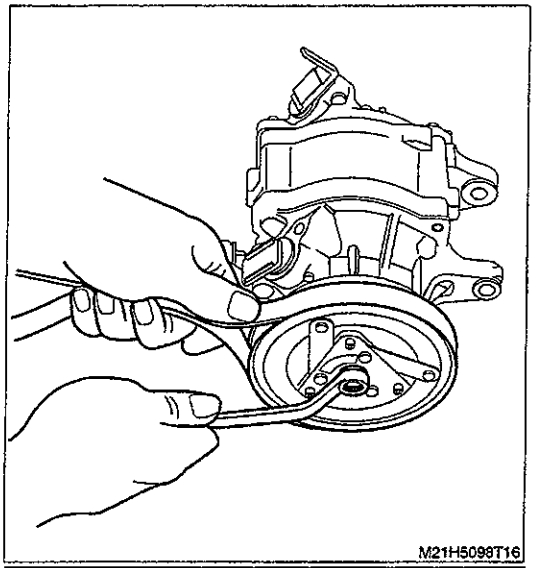
1.When you remove the V-belt (air conditioner), prior to the removal, remove the bolt that is retaining the compressor stay and adjusting bar.

NOTE

- Slackening the bolt does not release completely the compressor. Therefore, the belt can not be removed under this state.

(2) MAGNET CLUTCH AY

1.Energize the magnet clutch, thus securing the hub and rotor.
2.Wind the V-belt around the pulley section and secure it by your hand.
3.Remove the bolt.


M21H5098T16

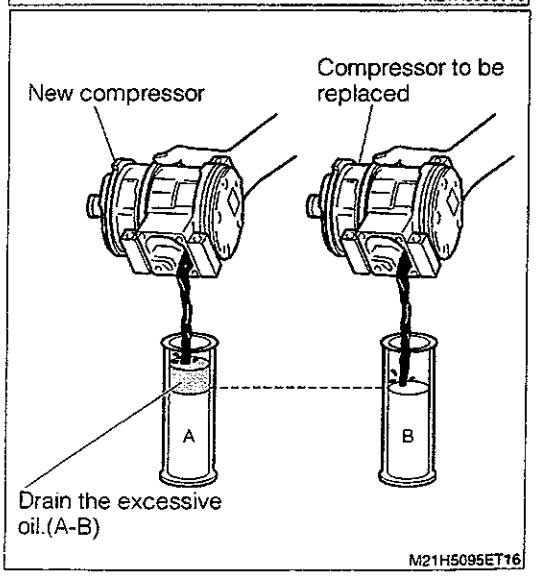
6-1-5 POINTS OF INSTALLATION

(1) COMPRESSOR AY

1.When a new compressor assembly is installed, drain the excessive oil of the new compressor so that the amount of the oil may become the same as that of the oil inside the compressor to be replaced.

NOTE

- Oil necessary for the entire air conditioner cycle has been sealed in a new compressor. Therefore, when only the compressor is replaced, oil is remaining inside the condenser and cooling unit. Hence, it is necessary to drain the oil of the amount concerned.



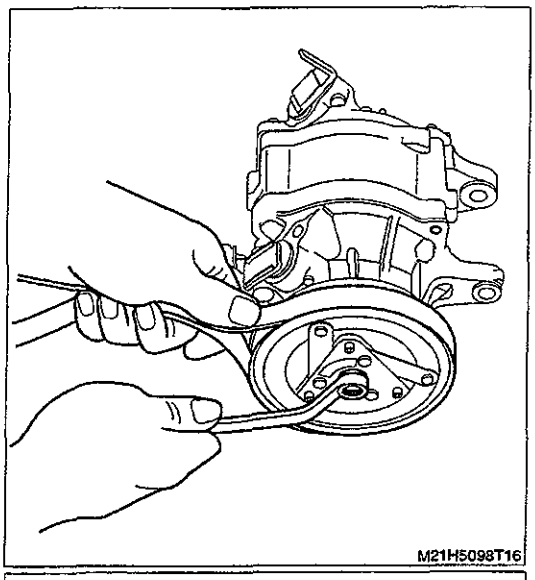
M21H5095ET16

(2) SNAP RING

1.Install the snap ring in such a way that the chamfered side faces upward.

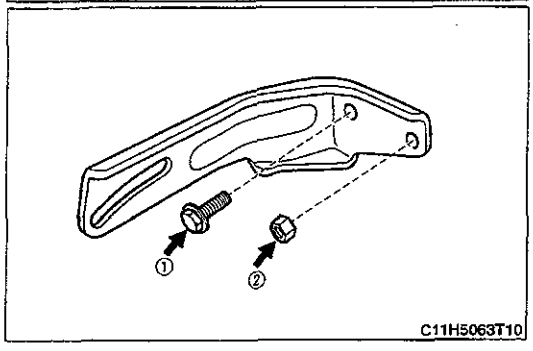
(3) MAGNET CLUTCH AY

1.Tighten the magnet clutch assembly attaching bolt as far as it can be tightened.
2.Energize the magnet clutch, thus securing the hub and rotor.
3.Wind the V-belt around the pulley section and secure it by your hand.
4.Securely tighten the bolt.
5.Check the air gap of the magnet clutch. If the check results fail to conform to the specified value, remove the magnet clutch hub and perform the adjustment by means of the plate washer.
Refer to Page K1-3.


M21H5098T16

(4) ADJUSTING BAR

1.The bolt and nut attaching the adjusting bar should be tightened in the sequence of ① and ② in order to prevent abnormal noise and looseness of the belt.



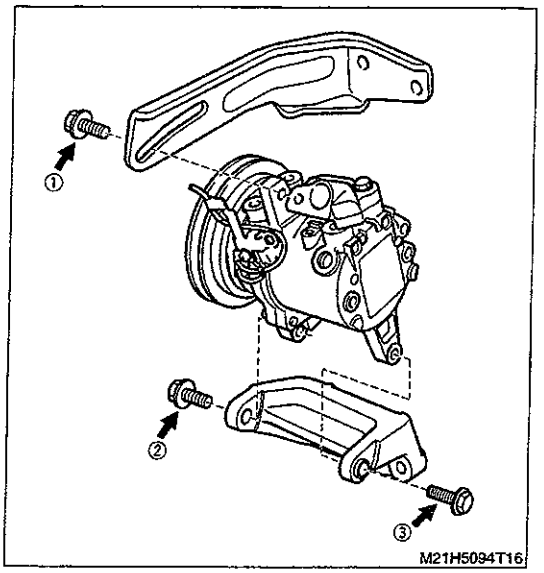
C11H5063T10

(5) V BELT

1.After the belt has been assembled, adjust the belt tension (deflection amount). When a new belt has been assembled, there is an initial stretch of the belt. Therefore, operate the compressor for five minutes or more after the refrigerant has been replenished. Then, adjust the belt tension (deflection amount) again.
Refer to Page K1-3.

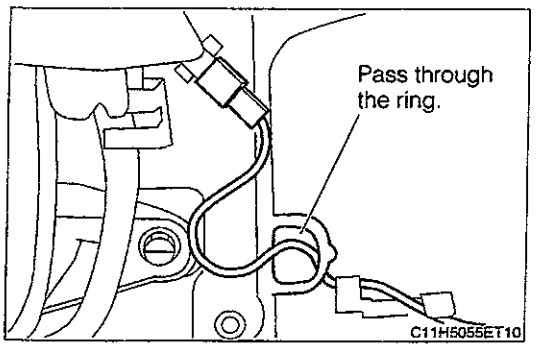
(6) COMPRESSOR AY

1.The bolts attaching the compressor should be tightened in the sequence of ①, ② and ③ in order to prevent abnormal noise and looseness of the belt.



(7) MAGNET CLUTCH AY

1.Be certain to route the lead wire of the magnetic clutch in such a way that the lead wire passes through the radiator support ring.



6-1-6 OPERATION AFTER INSTALLATION

1.Replenish refrigerant.
Refer to Page K1-4.

2.When a new belt has been assembled, operate the compressor for five minutes or more. Then, adjust the belt tension (deflection amount) again.
Refer to Page K1-3.

3.Install the air cleaner.
Refer to Page B3-2.

4.Install the front bumper.
Refer to Page I2-2.

7 CONDENSER

7-1 REMOVAL AND INSTALLATION

7-1-1 ARTICLES TO BE PREPARED

Lubricant,adhesive,others

Compressor oil (ND−OIL8)

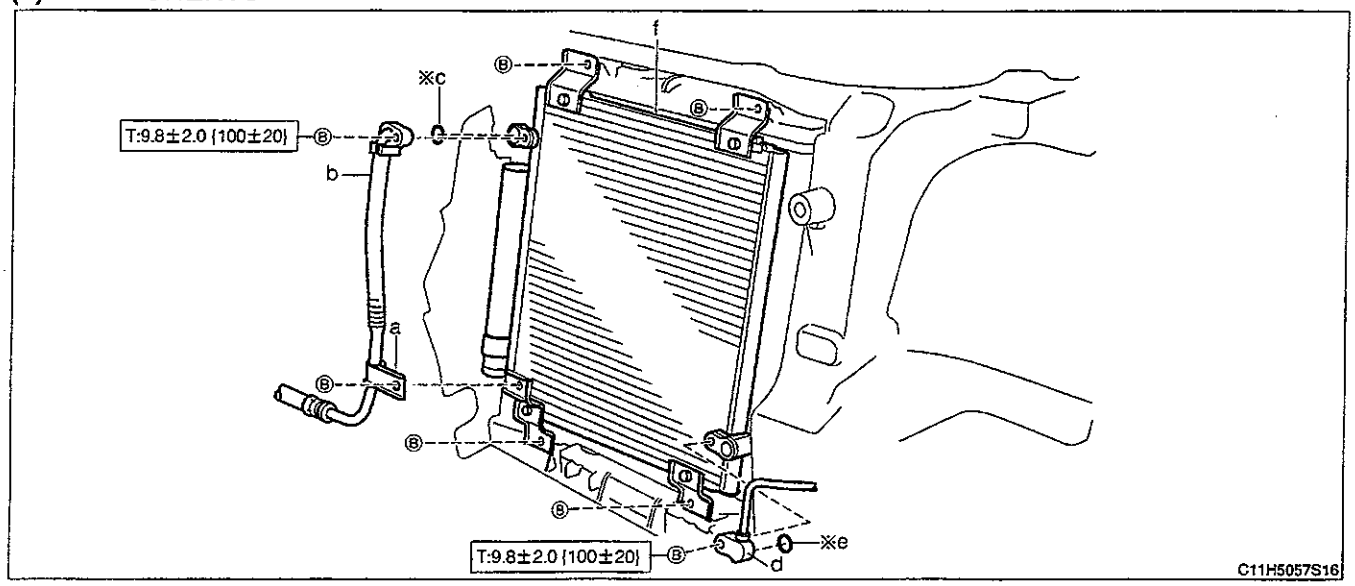
7-1-2 OPERATION BEFORE REMOVAL

1.Drain the refrigerant.
<RefCode=SK1_002>

2.Remove the front bumper.
<RefCode=B101>

7-1-3 REMOVAL AND INSTALLATION PROCEDURES

(1) COMPONENTS



※:Non - reusable parts
Unit:N·m{kgf·cm}

(2) REMOVAL AND INSTALLATION PROCEDURES

1 a Clamp, piping
2 b Hose, discharge
3 c O-ring
4 d Tube, liquid
5 e O-ring
▲ 6 f Condenser Ay

7-1-4 POINTS OF INSTALLATION

(1) CONDENSER AY

1.When the condenser is replaced with a new one, replenish the following amount of compressor oil.

REPLACEMENT PARTS	CONDENSER
Replenishing amount of compressor oil (cc)	20

7-1-5 OPERATION AFTER INSTALLATION

1.Install the front bumper.
Refer to Page I2-2.

2.Replenish refrigerant.
Refer to Page K1-4.

TO INDEX

A GENERAL INFORMATION

CONFIGURATION OF THIS MANUAL ----- A - 1
HOW TO READ THIS MANUAL ---------- A - 2
HANDLING INSTRUCTIONS ---------- A - 5
  HANDLING OF HARNESS AND CONNECTOR ---------- A - 5
  RELEASE OF CONNECTOR LOCK ----- A - 7
  INSPECTION ---------- A - 8
CAUTIONS ON HANDLING OF SRS AIRBAG ---------- A - 10
ITEMS OMITTED IN THIS MANUAL ------ A - 10
ABBREVIATION CODES ---------- A - 11
SYMBOL MARK ---------- A - 12
MODEL VARIATION ---------- A - 13
  EUROPEAN SPECIFICATIONS --------- A - 13
  AUSTRALIAN SPECIFICATIONS ------- A - 13

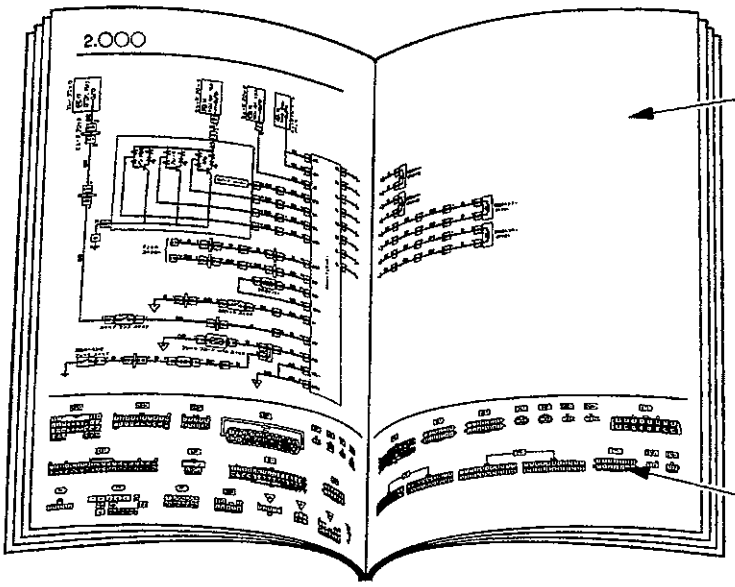
A-1

1 CONFIGURATION OF THIS MANUAL

1.This wiring diagram manual consists of the following five sections given below.

Section		Contents of configuration
A	GENERAL INFORMATION	This section explains the configuration of this manual, how to read this manual, handling instructions, cautions on handling of SRS airbags, items omitted in this manual, abbreviation, symbol marks, table of vehicle models and table of harness codes.
B	POWER SUPPLY SYSTEM DIAGRAM	This diagram explains systems (functions) which the wirings from the positive ⊕ terminal of the battery to the main fuse as well as to various fuses are used for.
C	EARTH SYSTEM DIAGRAM	This diagram explains the earth route of each system (function).
D	CIRCUIT DIAGRAM BY FUNCTION	This section consists of two portions, namely circuit diagrams and equipment diagrams. The circuit diagrams show electric circuits from the battery or fuse of each system (function) to the earth. Also the circuit diagrams explain the shapes of the connectors used in that system (function) and connector terminal arrangement. The equipment diagrams explain the installing positions of all the connectors used in that system (function), the number of connector pins, connector colors and connector names.
E	INDEX	The index shows page which each part can be found at.

2 HOW TO READ THIS MANUAL

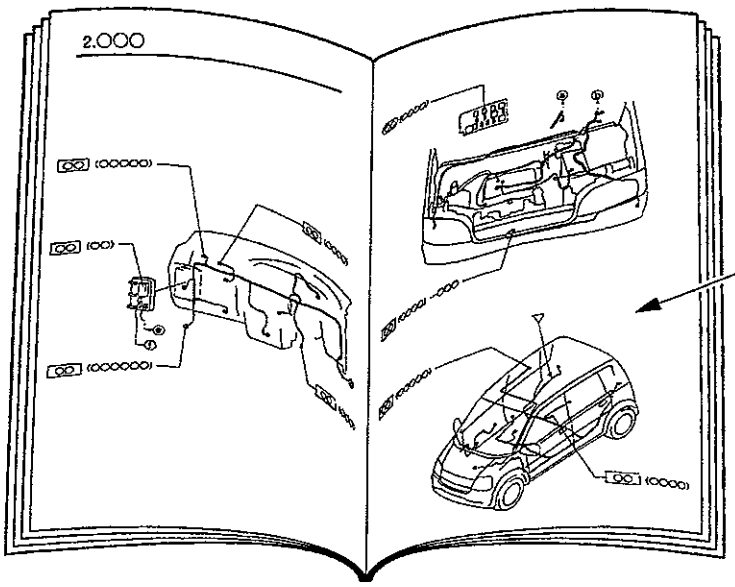


Circuit diagram by function

Circuits from each fuse to the earth are posted according to the system.

Connector diagram

The connector diagram indicates the connector numbers and connector terminal arrangement of the circuit diagram by function of that particular page.

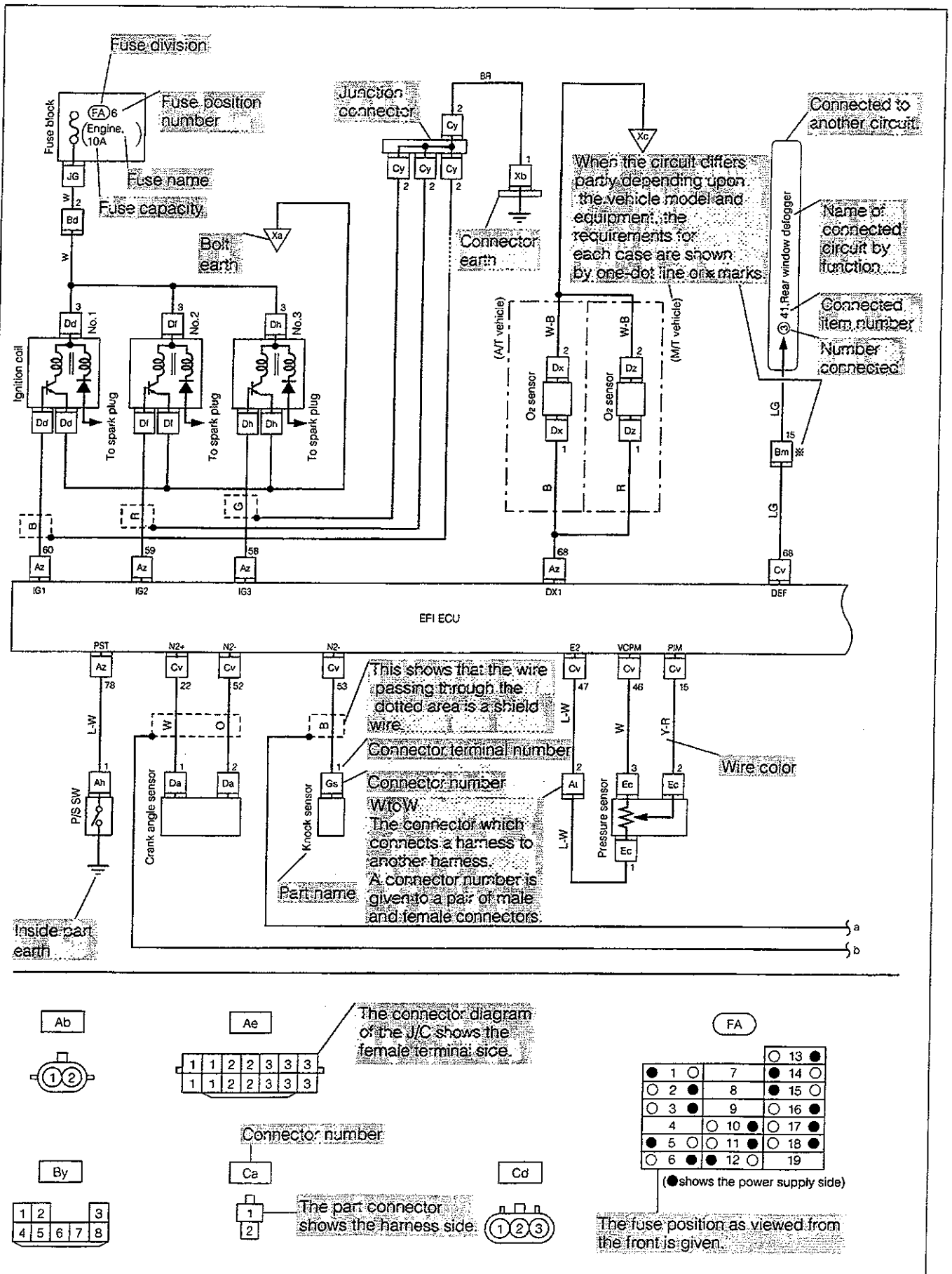


Equipment diagram

The equipment diagram illustrates the installation positions of each connector, ground and unit as well as the harness routing on the actual vehicle.

S15W3030ES49

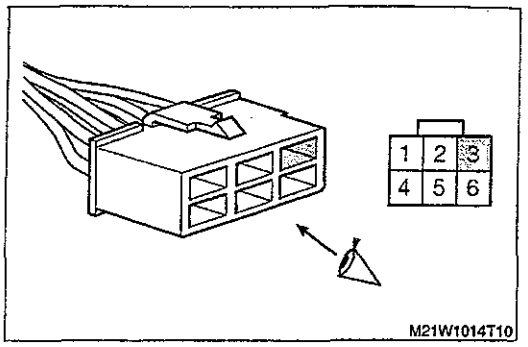
A-3



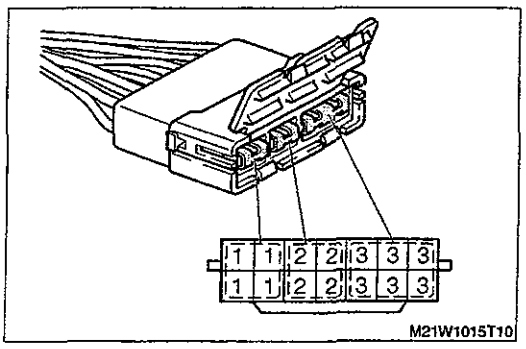
S15W3031ES49

1.CONNECTOR TERMINAL NUMBER

(1) The connector terminal position indicates a position when the connector is viewed from the joint surface direction. Only the female connector side is indicated. Blank terminals are also given numbers.



(2) The same terminal number is given to the terminals that are shorted in the same short terminal.



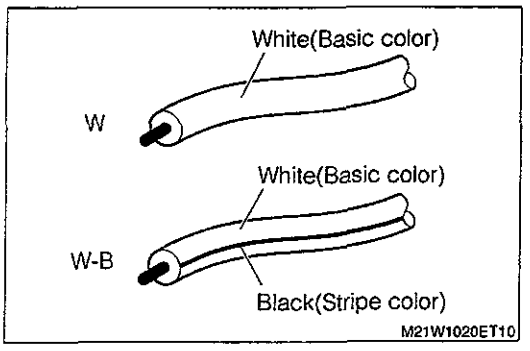
2.WIRE COLOR CODE

(1) The wire color in the circuit diagram is indicated by a code. The table showing the relationship between the code and color is given at right table.

Code	Color	Code	Color
B	Black	V	Violet
G	Green	W	White
L	Blue	Y	Yellow
O	Orange	BR	Brown
P	Pink	GR	Gray
R	Red	LG	Light green

L21W1005ET10

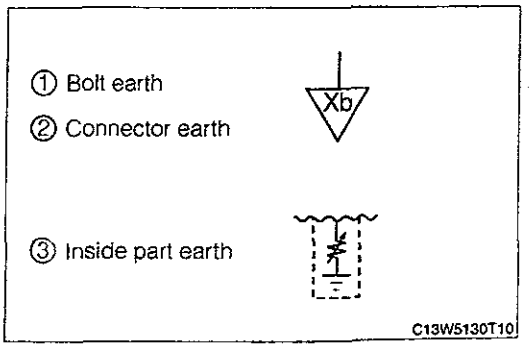
(2) The wires come in two kinds; mono-color wires and dual color wires. The mono-color wire has only a basic color, whereas the dual color wire has stripes on the basic color background.



3.EARTH

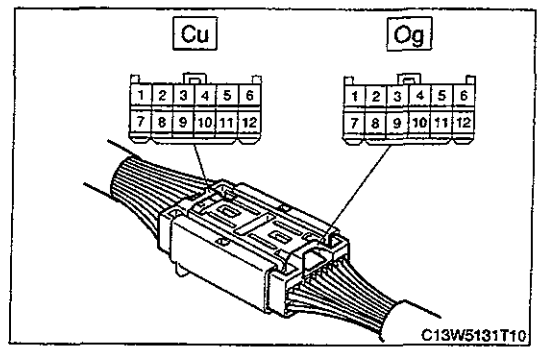
The circuit diagram by function in this manual explains three kinds of earth.

Bolt earth	The terminal is directly bolted to the vehicle body.
Connector earth	More than one harness are combined to one connector, then which is bolted to the vehicle body.
Inside part earth	Earth connection is made within a part, and this part is directly bolted to the vehicle body.



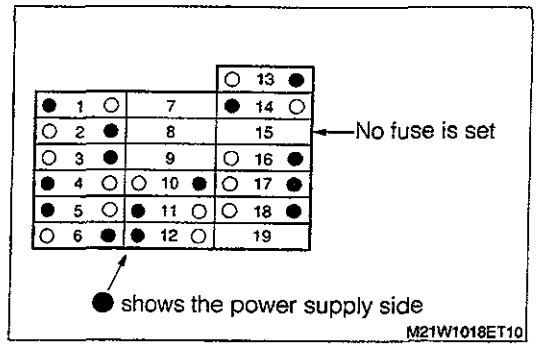
4.WIRE TO WIRE JUNCTION CONNECTOR (W to W J/C)

(1) This connector is a junction connector in which a shorting pin shorts two connectors. The connector diagram of the W to W J/C is given at the right figure.



5.FUSE BLOCK, RELAY BLOCK

(1) The position of each fuse is indicated when the fuse block or relay block is viewed from the front. The ●mark indicates the power supply plus side of the fuse and the ○mark indicates the power supply minus side of the fuse. No fuse is provided where no ● ○ mark is provided.

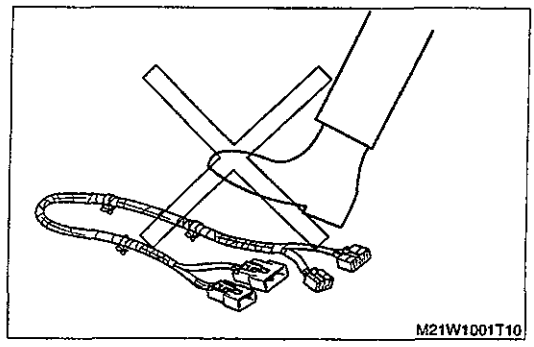


3 HANDLING INSTRUCTIONS

3-1 HANDLING OF HARNESS AND CONNECTOR

1.When assembling the wire harness, do not pull or step on the connectors. Be careful not to allow the harness to be damaged by burrs or edges.

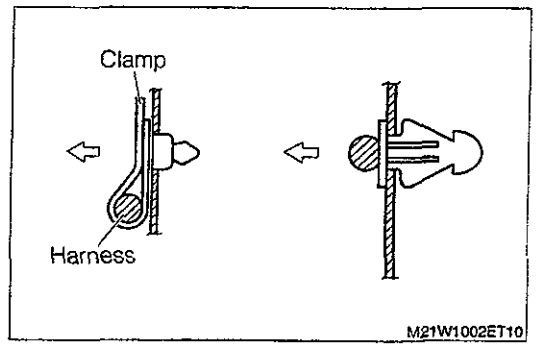
2.When installing the harness, be careful not to allow the harness to wind or twist.



3.Ensure that the clamp section of the resin clamp has been inserted into the body hole.

CAUTION

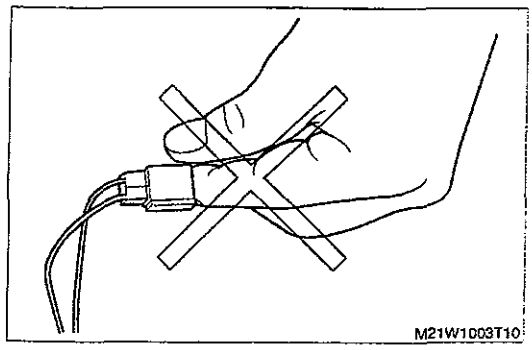
- **Ensure that the clamp section cannot be pulled out by lightly pulling it.**



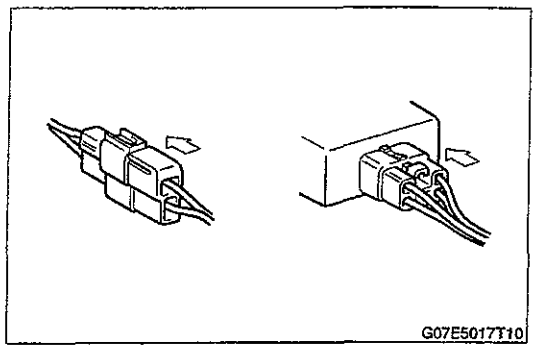
4.Never touch the terminal of connector directly by hand.

5.Modification of wire harness.The wire diameter and capacity of each harness have been determined to assure the normal operation of the electrical system. Hence, do not take power for accessories carelessly through the original wiring harness. Failure to observe this caution may cause system malfunction or fire.

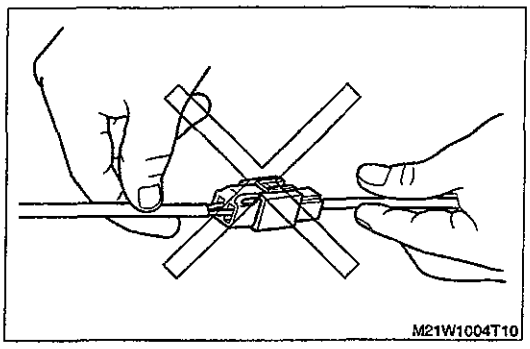
6.When a band type resin clamp is used, never use tools, such as pliers or radio pliers.



7. In the case of a locking connector, be sure to connect it firmly by pushing and inserting it. After connecting the connector, confirm that it has been locked by lightly pulling it.
8. Be careful not to pull out the connected connector by forcibly pulling the harness.



9. When disconnecting connectors, be sure to hold the connector itself with the connector unlocked.

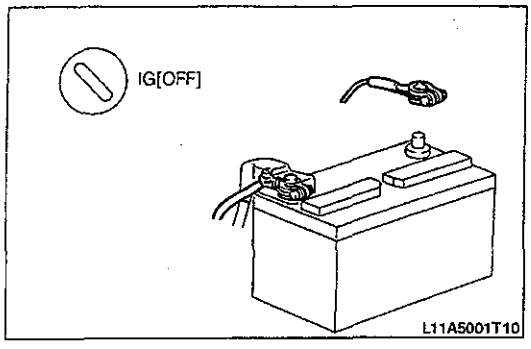


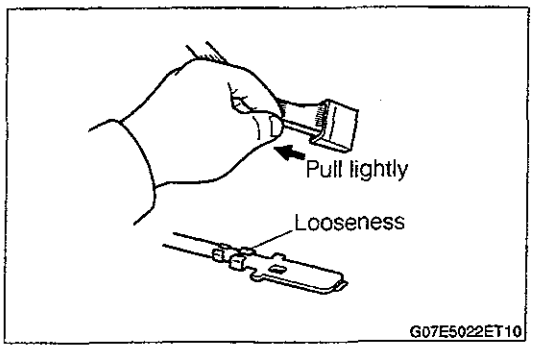
10. Connection or disconnection of the connector and each terminal shall be performed basically after the removal of negative terminal of the battery.

CAUTION

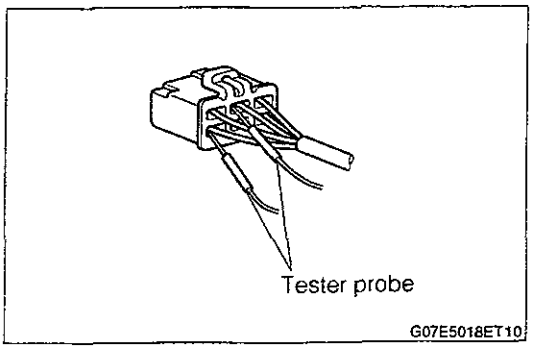
- **However, there may be the case that diagnosis code is erased when remove the negative terminal of battery, so confirm the diagnosis code first before the removal of battery negative terminal when need to confirm.**

11. Check visually the rust generation or mixing of the foreign material at connector terminal portion.
12. Check whether there are looseness, damage at the staking portion and check coming out from the coupler by pulling the wire harness lightly.

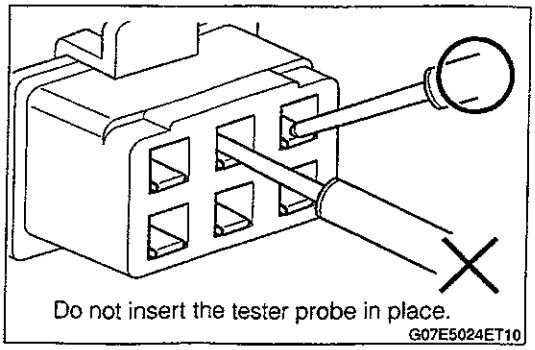




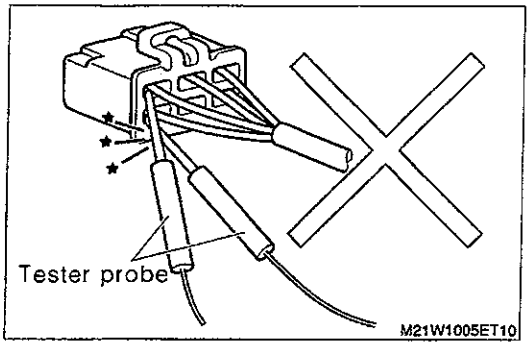
13. When inserting tester probes into a connector, insert them from the rear side of the connector.



14.For water−proof connectors which cannot be accessed from behind, take good care not to deform the connector terminals.



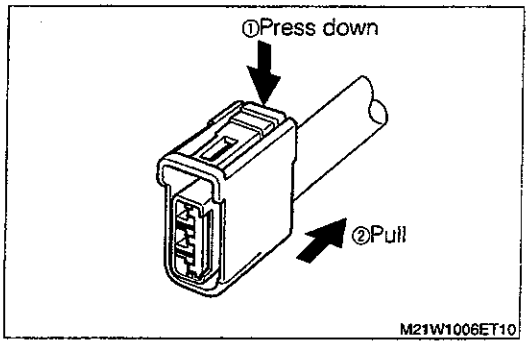
15.When a tester probe is applied to a terminal to which voltage is applied, care must be exercised so that two tester probes may not come in contact with each other so that short circuit may not take place.



3-2 RELEASE OF CONNECTOR LOCK

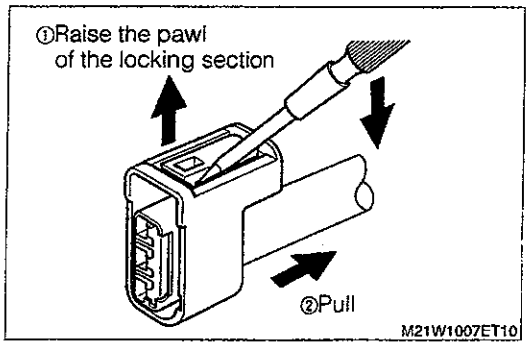
3-2-1 PUSH TYPE

1.To pull out the connector, unlock the connector by pushing down the pawl of the locking section in the arrow direction with your finger or a tool.



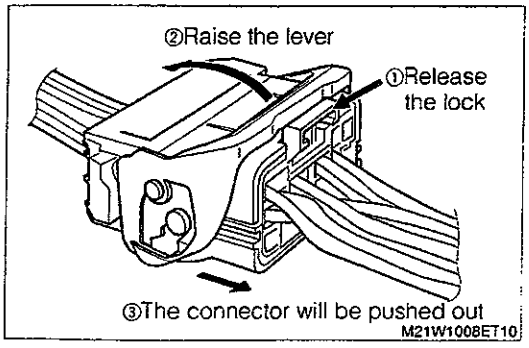
3-2-2 PULL-UP TYPE

1.To pull out the connector, unlock the connector by pushing up the pawl of the locking section in the arrow direction with your finger or a tool.



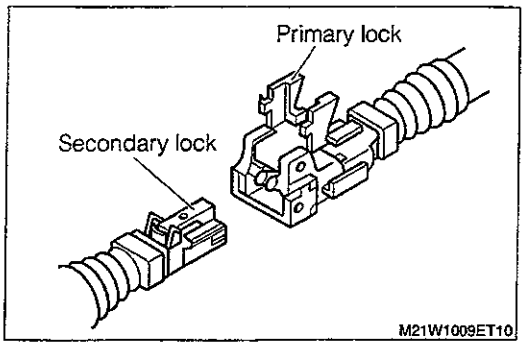
3-2-3 LEVER TYPE

1.Detach the pawl and raise the lock lever in the arrow direction. Then, the mating connector will be pushed out.



3-2-4 DOUBLE LOCK TYPE

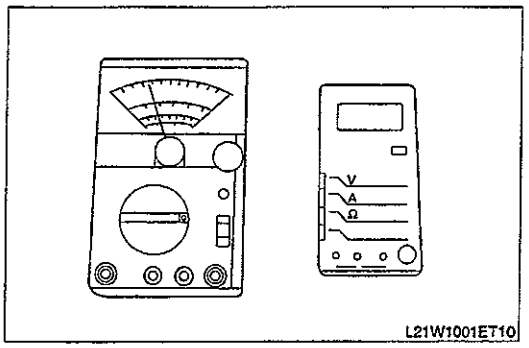
1.First unlock the primary locking. Then, disconnect the connector by unlocking the secondary locking in the same way as the aforesaid push type connector.



3-3 INSPECTION

3-3-1 TESTER (Volt/ohmmeter)

1.For the inspection, use a tester having an internal resistance of more than 10 kilo−ohms/V. Use of a tester with a low internal resistance may cause wrong measurement or secondary troubles.



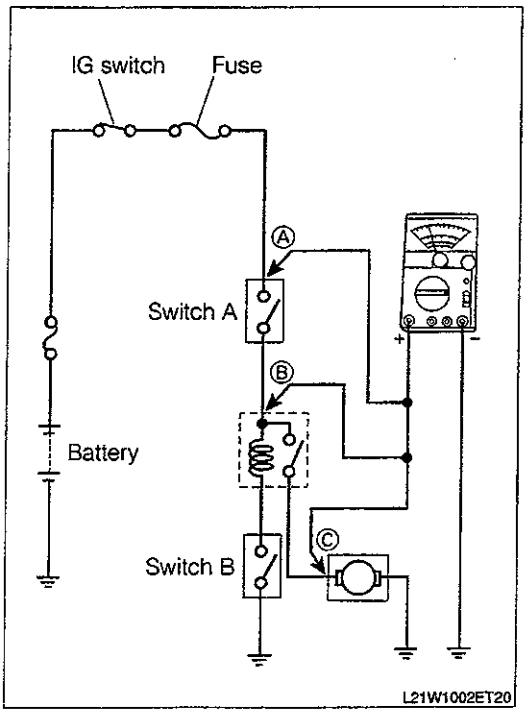
3-3-2 VOLTAGE CHECK

1.When conducting this check, let the voltage apply to the check point.

2.Connect the (−) line of the voltmeter to the ground or (−) terminal of the battery; the (+) line to the connector terminal. This check can be performed by using a test lamp instead of a voltmeter.

Example

Check point	Connecting condition
A	Ignition switch:ON
B	Ignition switch:ON, Switch A:ON
C	Ignition switch:ON, Switch B:ON, Relay:ON

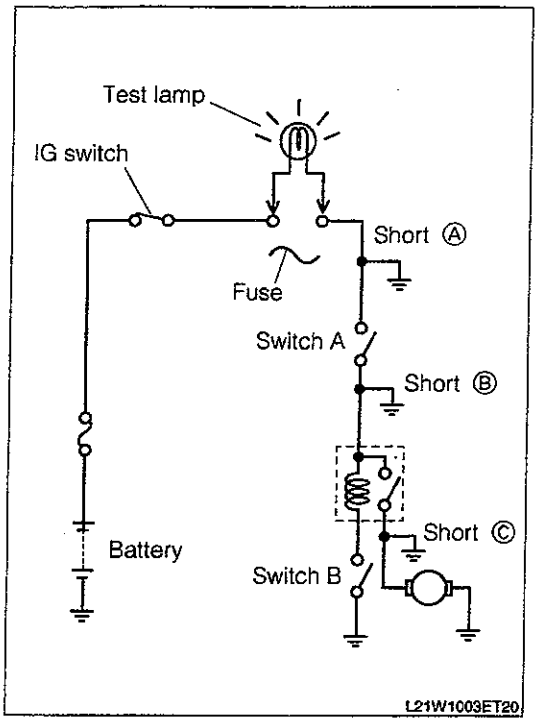


3-3-3 INSPECTION OF SHORT CIRCUIT

1.Remove a melt fuse or fusible link.
2.Disconnect all connectors for loads being applied to the melt fuse.
3.Connect a test lamp at the position where the melt fuse or fusible link was installed.
4.Search for the short circuit by providing the minimum conditions which make the test lamp glow.
5.Perform repairs or wiring harness replacement, as required.

Example

Short section	Connecting condition
A	Ignition switch : ON
B	Ignition switch : ON, Switch A : ON
C	Ignition switch : ON, Switch A : ON, Switch B : ON, Relay : ON

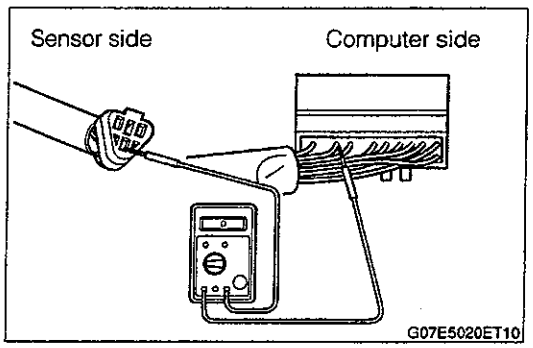


3-3-4 RESISTANCE AND CONTINUITY CHECK

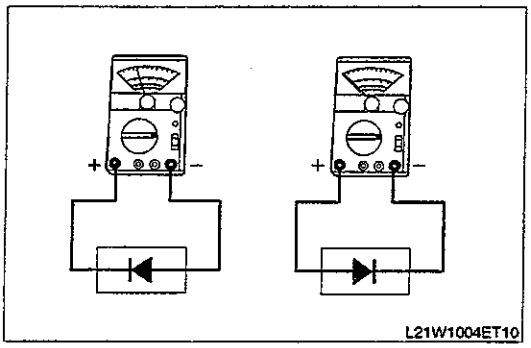
1.Remove the connector of corresponding harness on both ends.
2.Measure the electrical resistance between corresponding terminals of connector on both end.

CAUTION

- **Measure the electrical resistance while shaking wire harness in top and down and right and left lightly.**

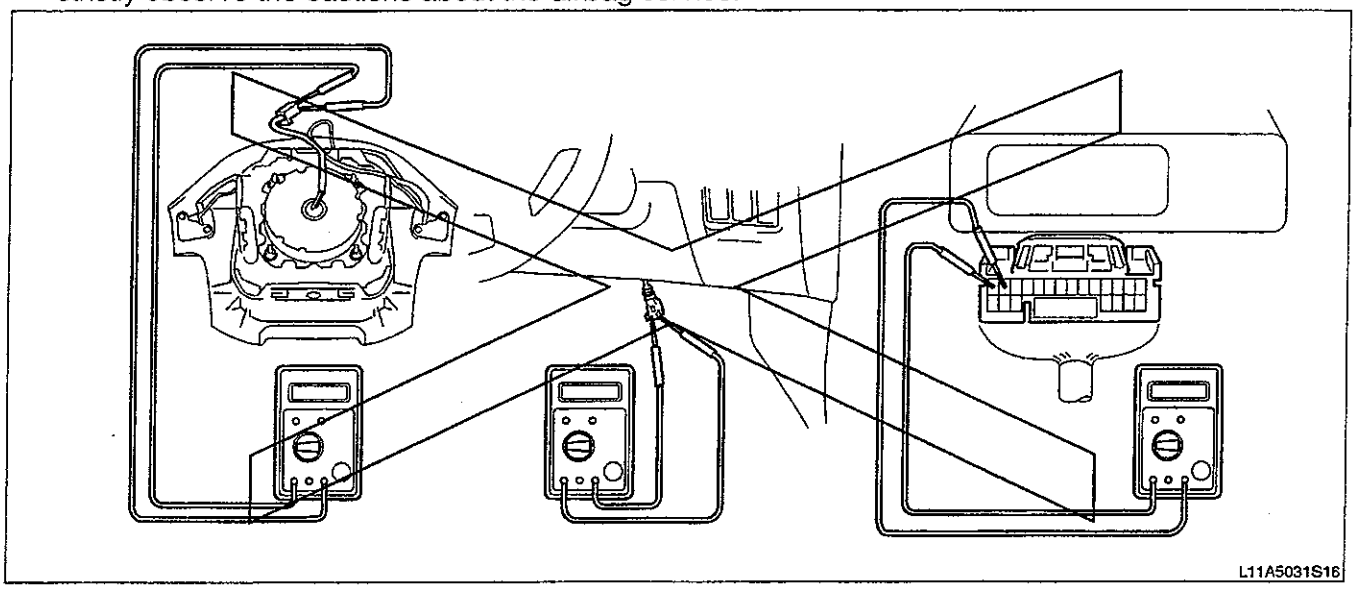


3.If a diode is built in the circuit, perform continuity test by changing the polarities of the measuring terminals. In case of a general type tester, ensure that continuity exists when the negative (−) lead of the tester is connected to the positive (+) side of the diode; the positive (+) lead of the tester to the negative (−) side of the diode. Also ensure that no continuity exists when the polarities are changed. Since some testers have different polarities, be sure to read the instruction manual of a tester to be used for the check before using it. The inspection procedure for light emitting diodes (LED) is the same as normal diodes. However, there may be cases where the LED emits no light, unless a tester with LED check mode is used. If an adequate tester is not available, apply the battery voltage to the LED and ensure that the LED emits light.



4 CAUTIONS ON HANDLING OF SRS AIRBAG

1.If the SRS airbag is not handled with the correct procedure and method, the airbag may be deployed unexpectedly during the operation, resulting in a serious accident. Moreover, if wrong repairs are made, there is the possibility that the airbag fails to operate when it should operate. Therefore, the airbag-related service (installation, check and replacement of parts) should be performed with the correct procedure and method. For that purpose, please read the repair manual carefully. Also, strictly observe the cautions about the airbag service.



5 ITEMS OMITTED IN THIS MANUAL

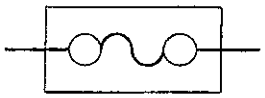
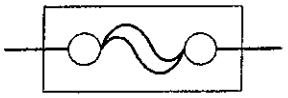
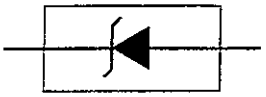
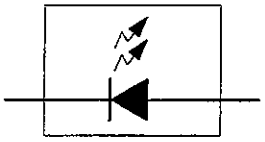
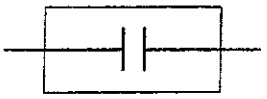
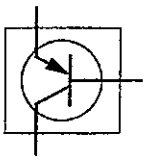
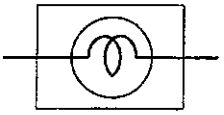
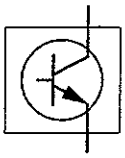
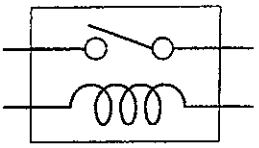
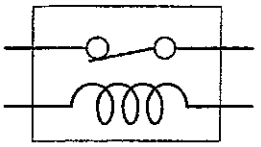
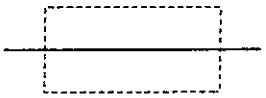
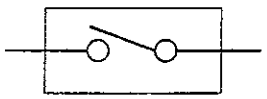
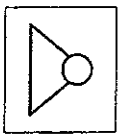
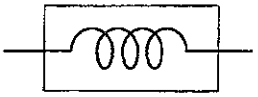
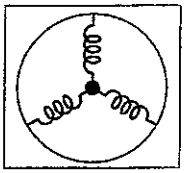
1.This manual does not cover the following item given below. When performing the electric system checks and service, please read the General section of this manual and related repair manuals. Moreover, before starting the check operations and service, be sure to be well versed in those operations by reading the General sections of the repair manuals.

(1) GENERAL SERVICE INSTRUCTION
(2) SUPPORTING POINTS FOR JACKS AND SAFETY STANDS
(3) SUPPORTING POINTS OF LIFTS
(4) SERVICE INSTRUCTIONS FOR FOUR WHEEL DRIVE VEHICLES
(5) DATA LINK CONNECTOR
(6) INSTRUCTIONS FOR SYSTEM INSPECTION
(7) INSTRUCTIONS FOR RADIO INSTALLATION

6 ABBREVIATION CODES

ABBREVIATION CODE	ORIGINAL WORD
2WD	Two wheel drive
4WD	Four wheel drive
ABS	Anti−lock brake system
ABV	Air bypass valve
A/B	Airbag
ACC	Accessory
ACV	Air control valve
A/C	Air conditioner
A/T	Automatic transaxle, Automatic transmission
E−A/T	Electronic automatic transaxle, Electronic automatic transmission
EBD	Electronic brake force distribution
ECU	Electronic control unit
EFI	Electronic fuel injection
EPS	Electronic power steering
FR	Front
F/L	Fusible link
G	Gravity
GND	Ground
IG	Ignition
ILL	Illumination
ISC	Idle speed control
J/C	Junction connector
LCD	Liquid crystal display
LED	Light emitting diode
LH	Left−hand
M/T	Manual transaxle, Manual transmission
P/S	Power steering
RAD	Radiator
RH	Right−hand
RR	Rear
R/B	Relay block
SRS	Supplemental restrain system
SW	Switch
TEMP.	Temperature
VSV	Vacuum switching valve
W to W	Wire to wire connector

7 SYMBOL MARK

Fuse	Fusible link	Diode	Zener diode
			
LED	**Resistor**	**Variable resistor**	**Condenser**
			
PNP transistor	**Reed switch**	**Bulb**	**Motor**
			
NPN transistor	**Relay(Normally open)**	**Relay(Normally closed)**	**Shielding wire**
			
Switch	**Horn**	**Solenoid**	**Stator coil**
			

M21W1019ES40

8 MODEL VARIATION

8-1 EUROPEAN SPECIFICATIONS

Model code	Steering position	Engine	Drive	Transmission	Body type
L880RK−KMVZW	RHD	JB−DET	2WD	5M/T	Open top

8-2 AUSTRALIAN SPECIFICATIONS

Model code	Steering position	Engine	Drive	Transmission	Body type
L880RK−KMVZQ	RHD	JB−DET	2WD	5M/T	Open top

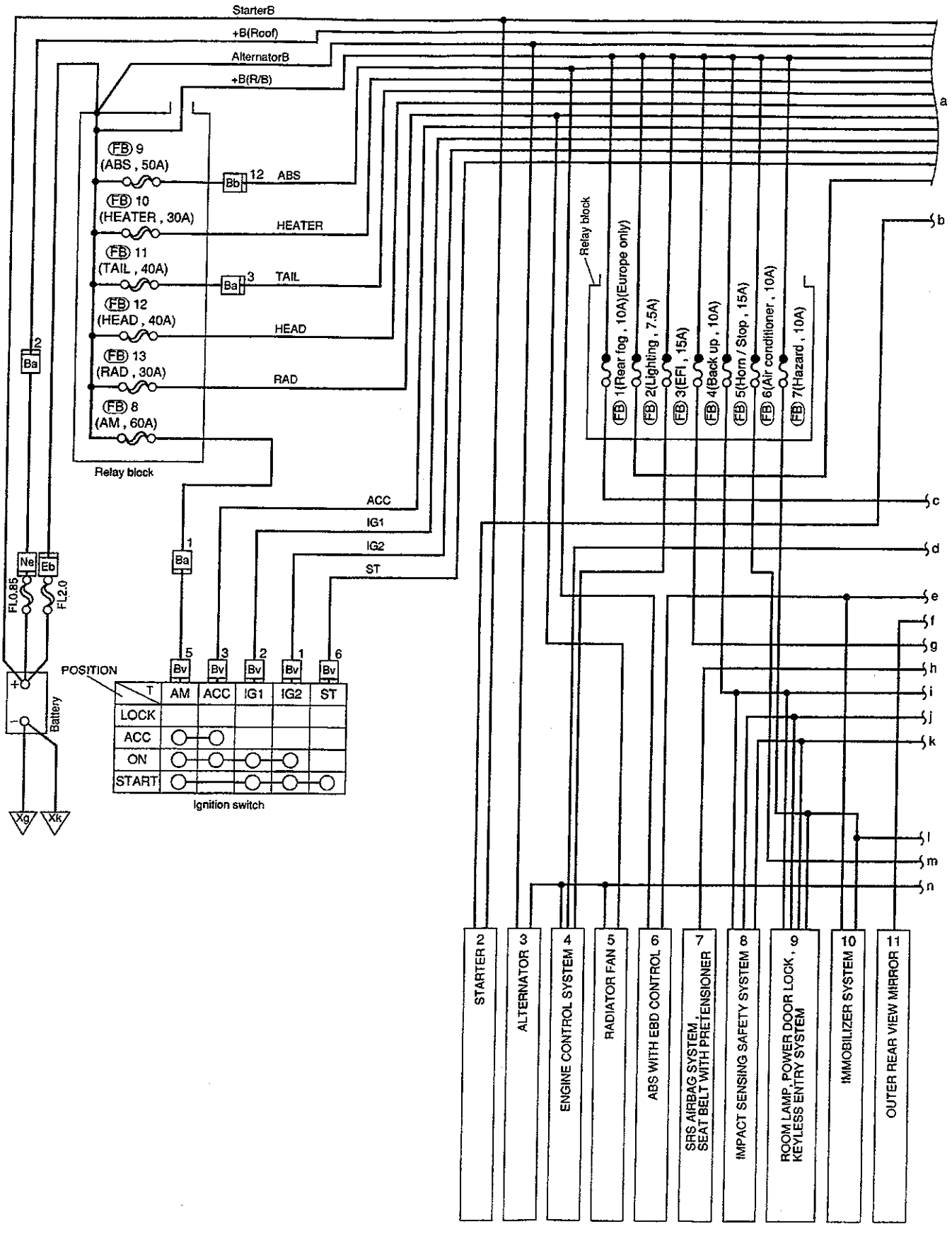
TO INDEX

B POWER SUPPLY SYSTEM DIAGRAM

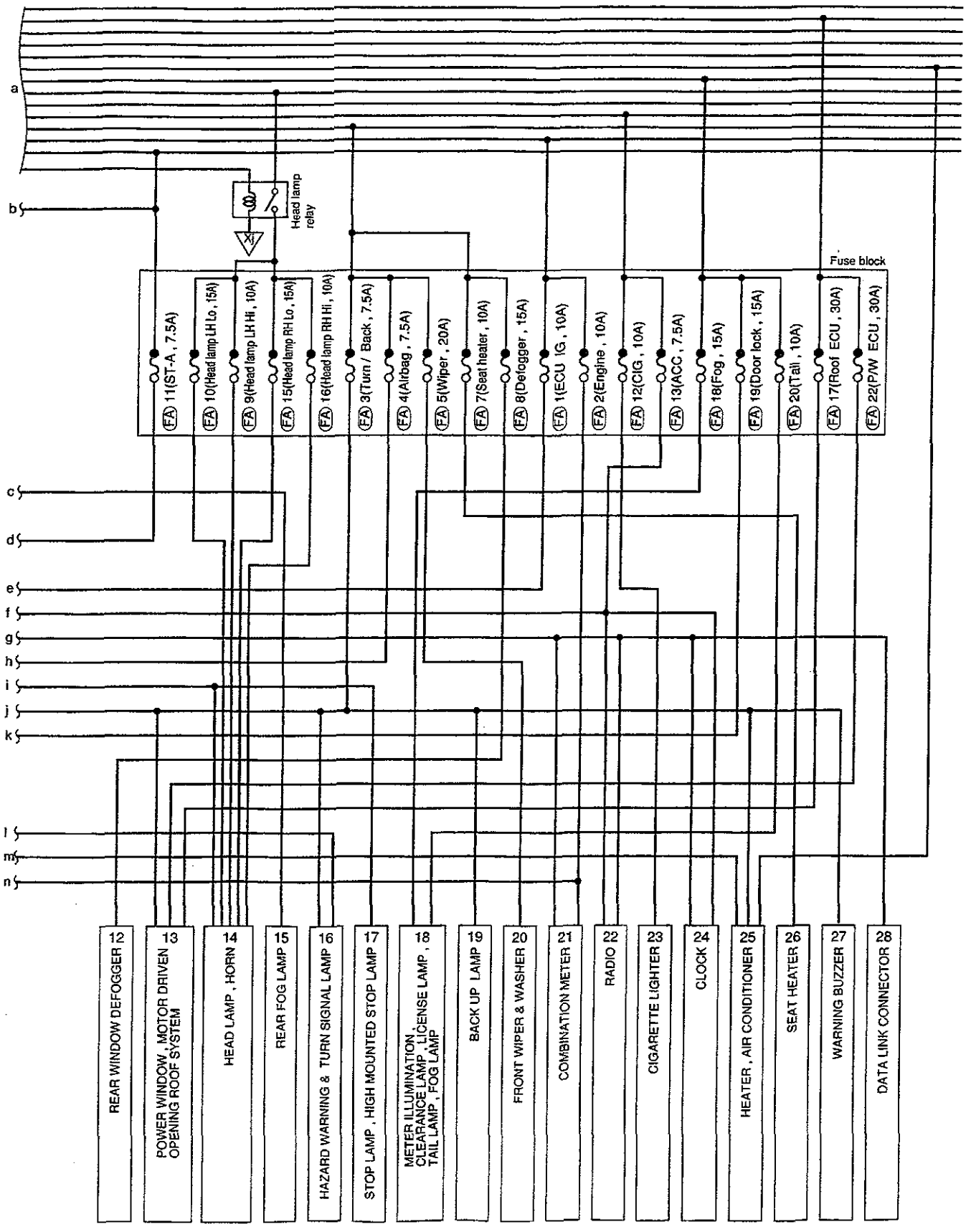
POWER SUPPLY SYSTEM DIAGRAM ---- B - 1

B–1

1 POWER SUPPLY SYSTEM DIAGRAM



C13W5001ES48



C13W5002ES48

TO INDEX TO NEXT SECTION

TO INDEX

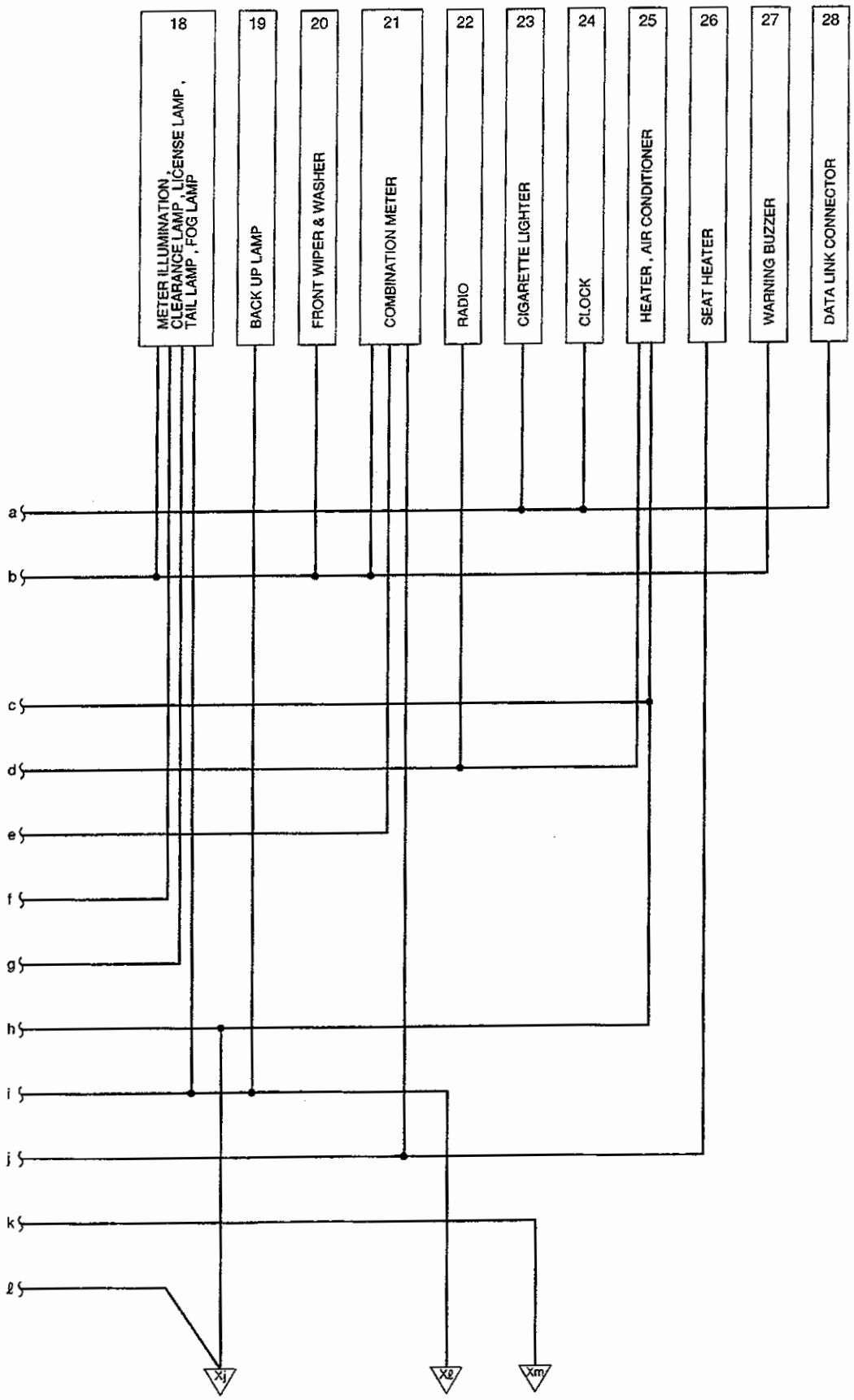
C EARTH SYSTEM DIAGRAM

EARTH SYSTEM DIAGRAM---------- C - 1

C-1

1 EARTH SYSTEM DIAGRAM

Section		Contents of configuration
A	GENERAL INFORMATION	This section explains the configuration of this manual, how to read this manual, handling instructions, cautions on handling of SRS airbags, items omitted in this manual, abbreviation, symbol marks, table of vehicle models and table of harness codes.
B	POWER SUPPLY SYSTEM DIAGRAM	This diagram explains systems (functions) which the wirings from the positive ⊕ terminal of the battery to the main fuse as well as to various fuses are used for.
C	EARTH SYSTEM DIAGRAM	This diagram explains the earth route of each system (function).
D	CIRCUIT DIAGRAM BY FUNCTION	This section consists of two portions, namely circuit diagrams and equipment diagrams. The circuit diagrams show electric circuits from the battery or fuse of each system (function) to the earth. Also the circuit diagrams explain the shapes of the connectors used in that system (function) and connector terminal arrangement. The equipment diagrams explain the installing positions of all the connectors used in that system (function), the number of connector pins, connector colors and connector names.
E	INDEX	The index shows page which each part can be found at.



C13W5118ES48

TO INDEX TO NEXT SECTION

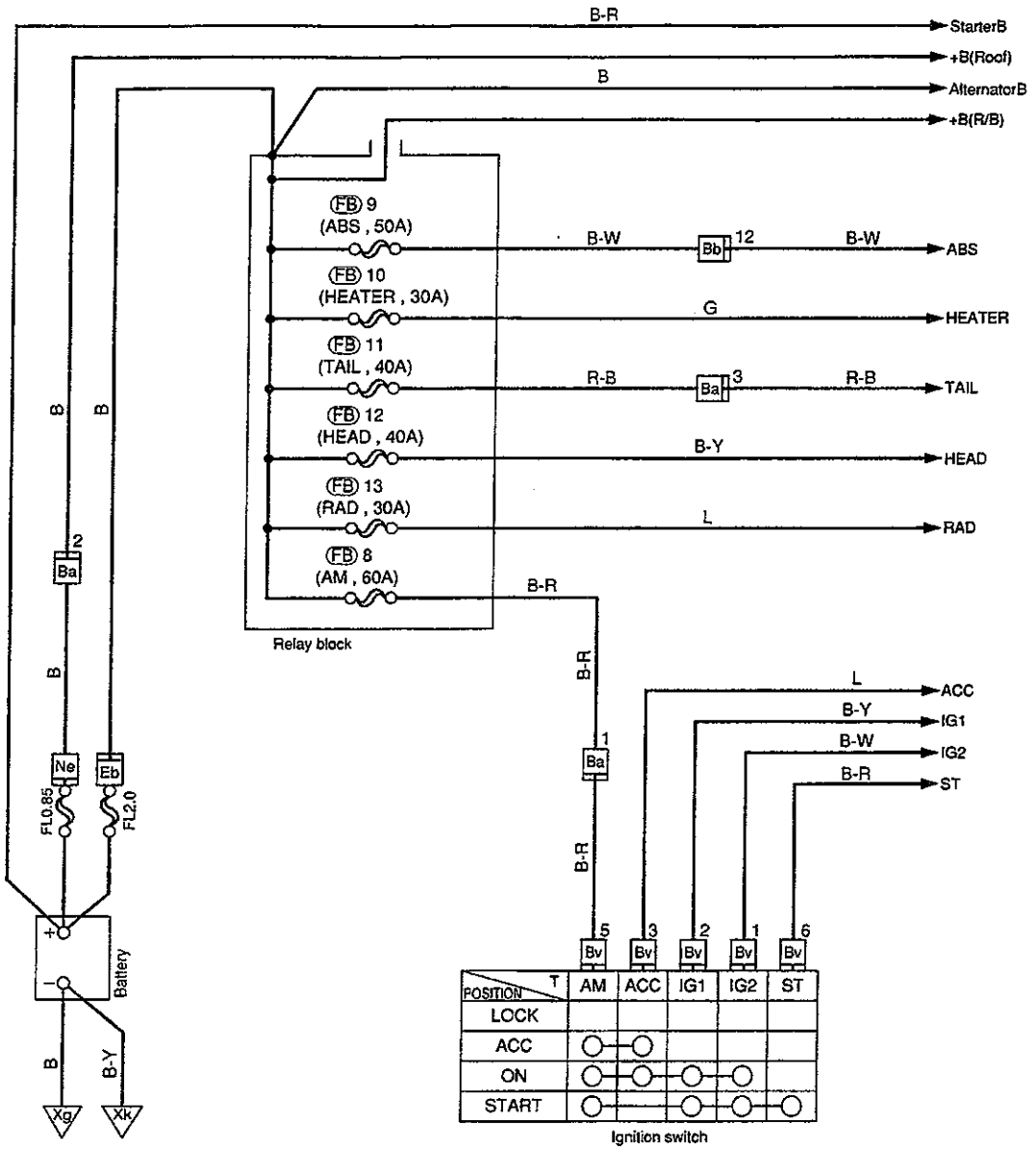
TO INDEX

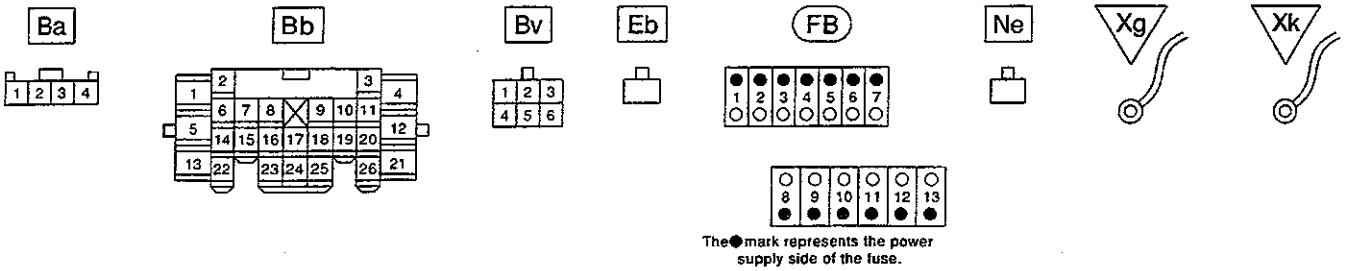
D CIRCUIT DIAGRAM BY FUNCTION

POWER SOURCE ---------- D - 1
STARTING SYSTEM ---------- D - 3
CHARGING SYSTEM ---------- D - 5
ENGINE CONTROL SYSTEM ---------- D - 7
FOR AUSTRALIA ---------- D - 7
FOR EUROPE ---------- D - 11
RADIATOR FAN ---------- D - 15
ABS WITH EBD CONTROL ---------- D - 17
SRS AIRBAG SYSTEM, SEAT BELT WITH PRETENSIONER ---------- D - 21
IMPACT SENSING SAFETY SYSTEM --- D - 25
ROOM LAMP, POWER DOOR LOCK, KEYLESS ENTRY SYSTEM ---------- D - 29
IMMOBILIZAR SYSTEM ---------- D - 33
OUTER REAR VIEW MIRROR ---------- D - 35
REAR WINDOW DEFOGGER ---------- D - 39
POWER WINDOW, MOTOR DRIVEN OPENING ROOF SYSTEM ---------- D - 43
HEAD LAMP, HORN ---------- D - 47
REAR FOG LAMP ---------- D - 51
FOR EUROPE ---------- D - 51
HAZARD WARNING & TURN SIGNAL LAMP ---------- D - 55
STOP LAMP, HIGH MOUNTED STOP LAMP ---------- D - 59
METER ILLUMINATION, CLEARANCE LAMP, LICENSE LAMP, TAIL LAMP, FOG LAMP ---------- D - 63
BACK UP LAMP ---------- D - 67
FRONT WIPER & WASHER ---------- D - 71
COMBINATION METER ---------- D - 73
RADIO ---------- D - 77
CIGARETTE LIGHTER ---------- D - 81
CLOCK ---------- D - 83
FOR EUROPE ---------- D - 83
HEATER, AIR CONDITIONER ---------- D - 85
SEAT HEATER ---------- D - 89
WARNING BUZZER ---------- D - 93
DATA LINK CONNECTOR ---------- D - 95

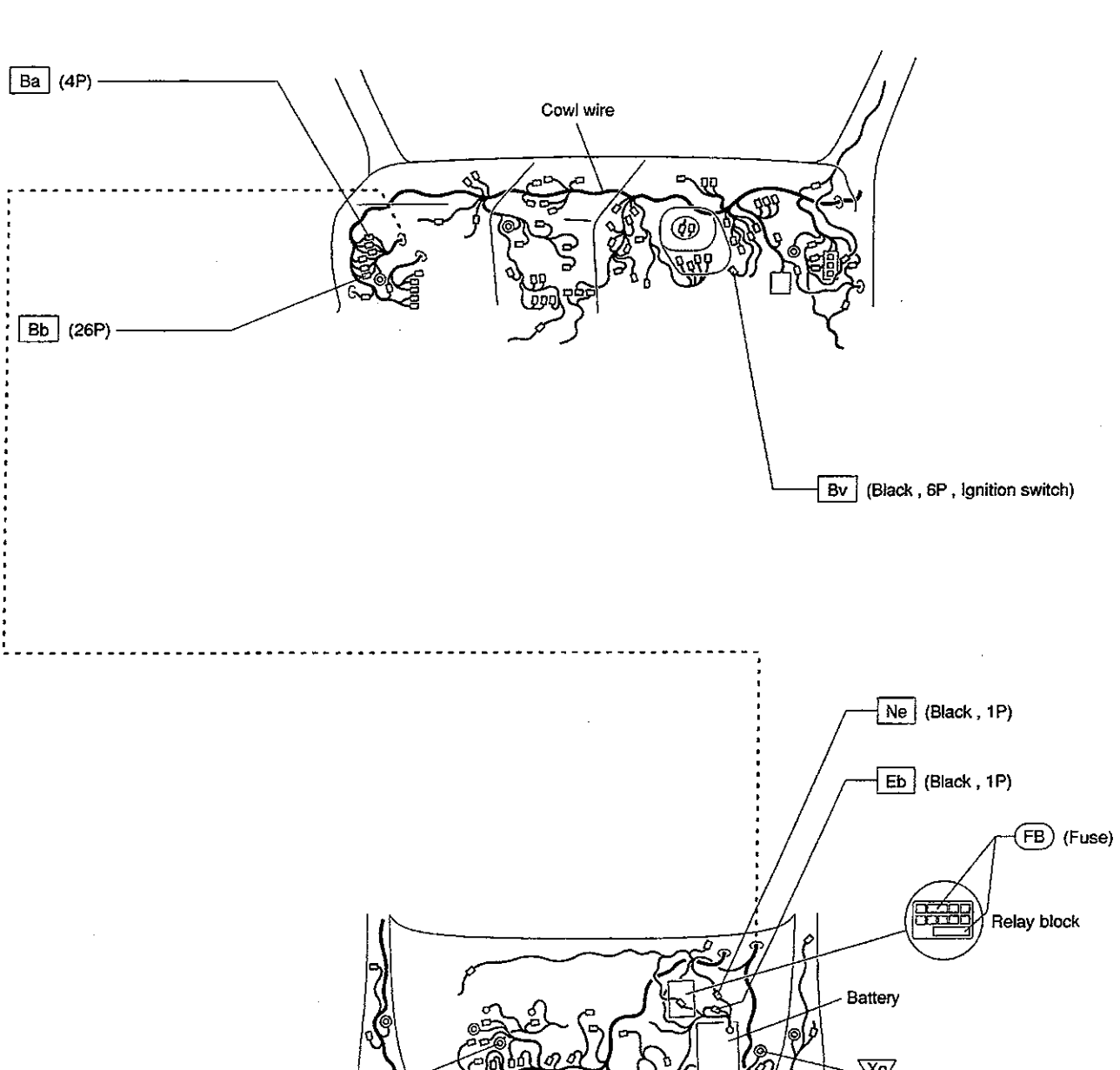
D-1

1 POWER SOURCE





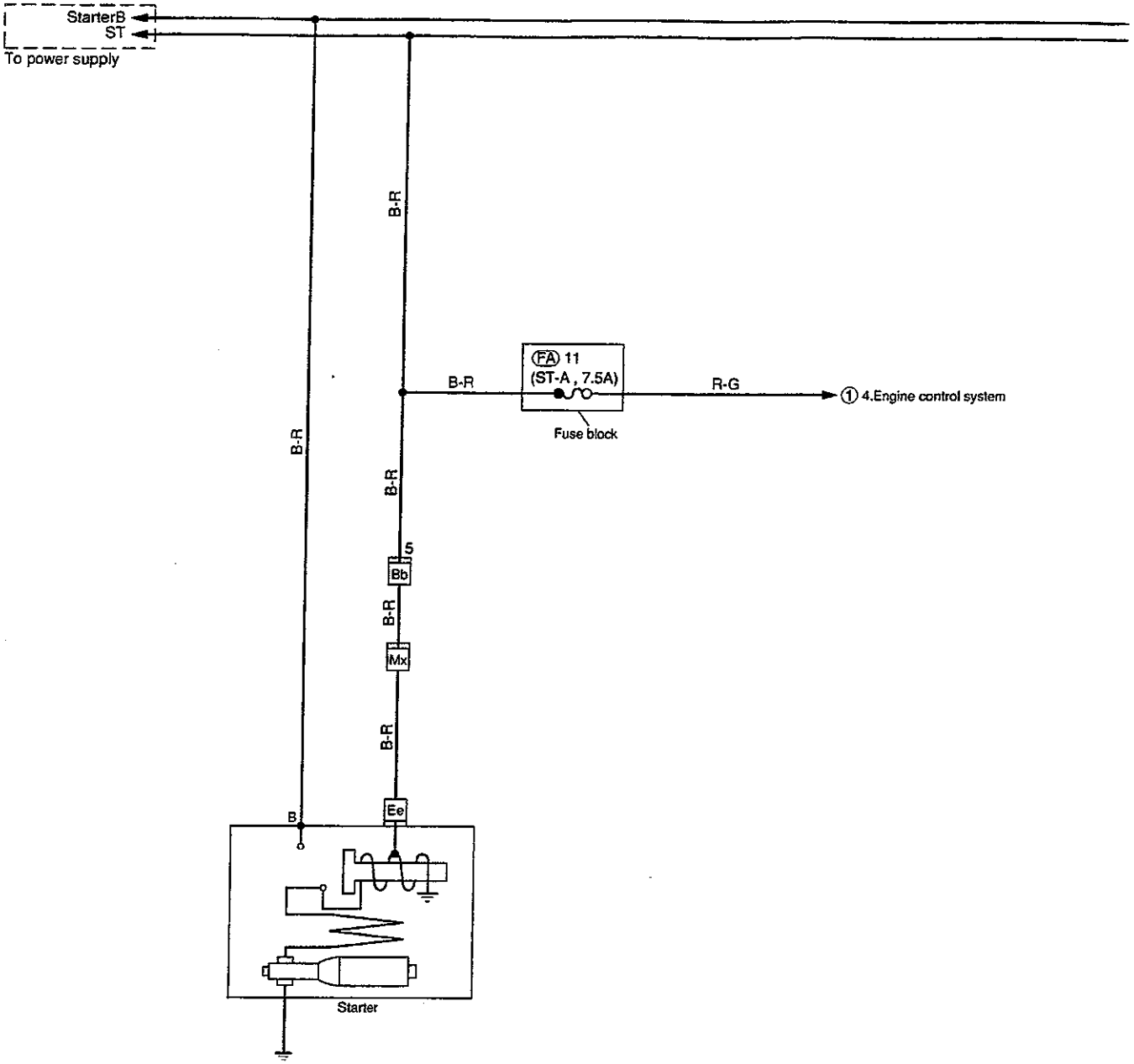
C13W5003ES48



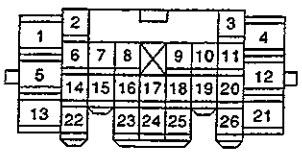
C13W5004ES48

D-3

2 STARTING SYSTEM



Bb



Ee



FA

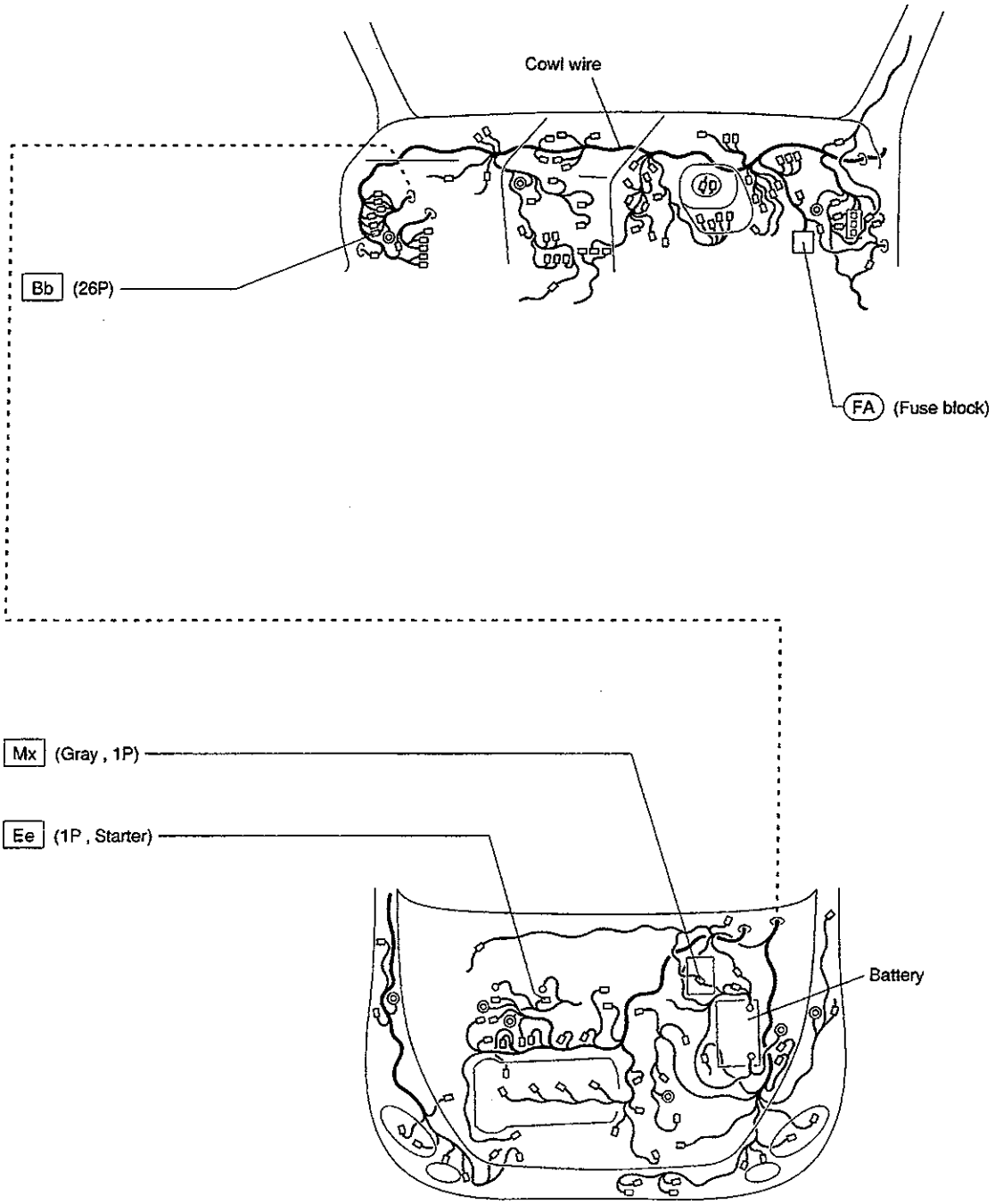
● 1 ○	○ 9 ●	● 17 ○
● 2 ○	○ 10 ●	
● 3 ○	○ 11 ●	● 18 ○
● 4 ○	○ 12 ●	● 19 ○
● 5 ○	○ 13 ●	● 20 ○
6	14	21
● 7 ○	○ 15 ●	● 22 ○
● 8 ○	○ 16 ●	

The● mark represents
the power supply of the fuse

Mx

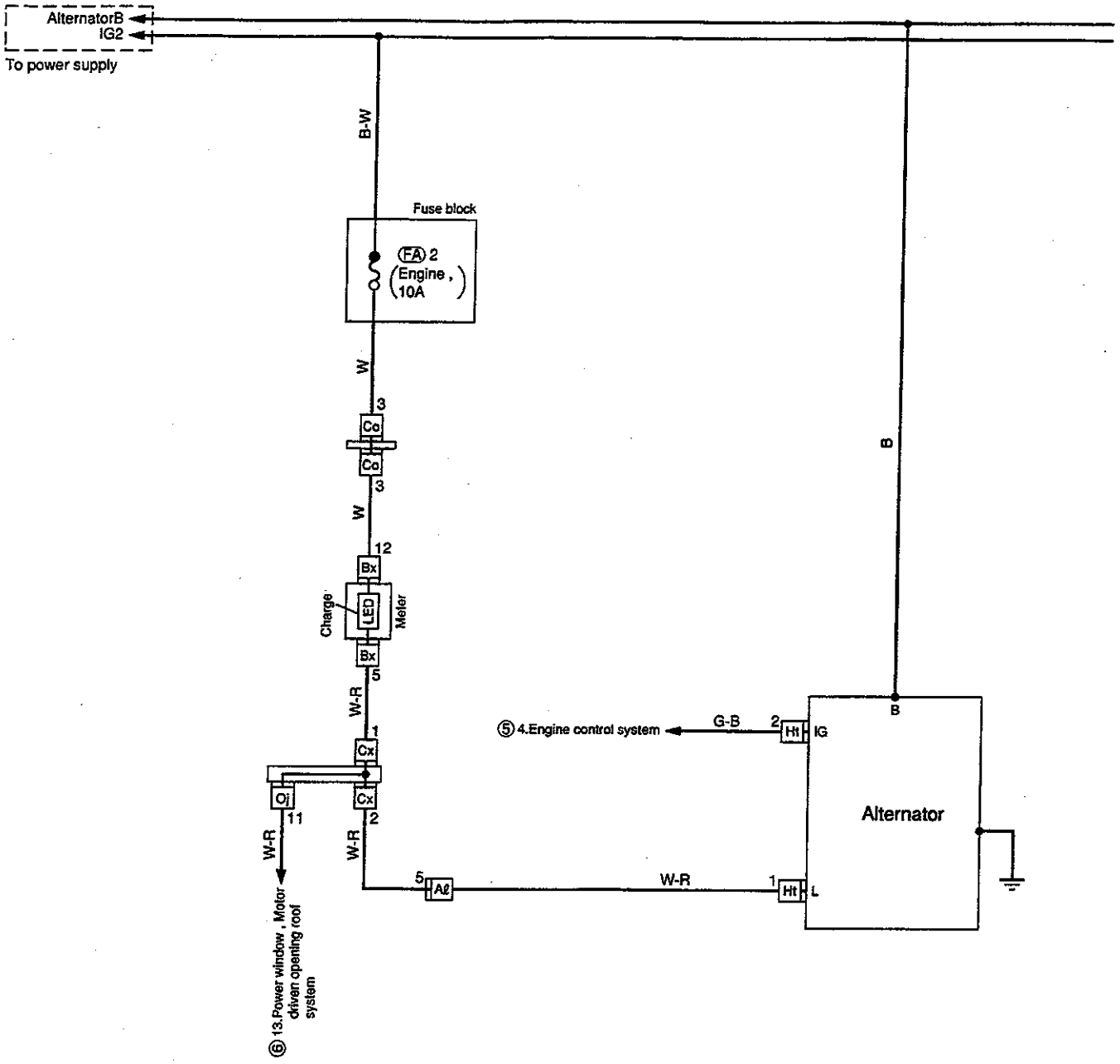


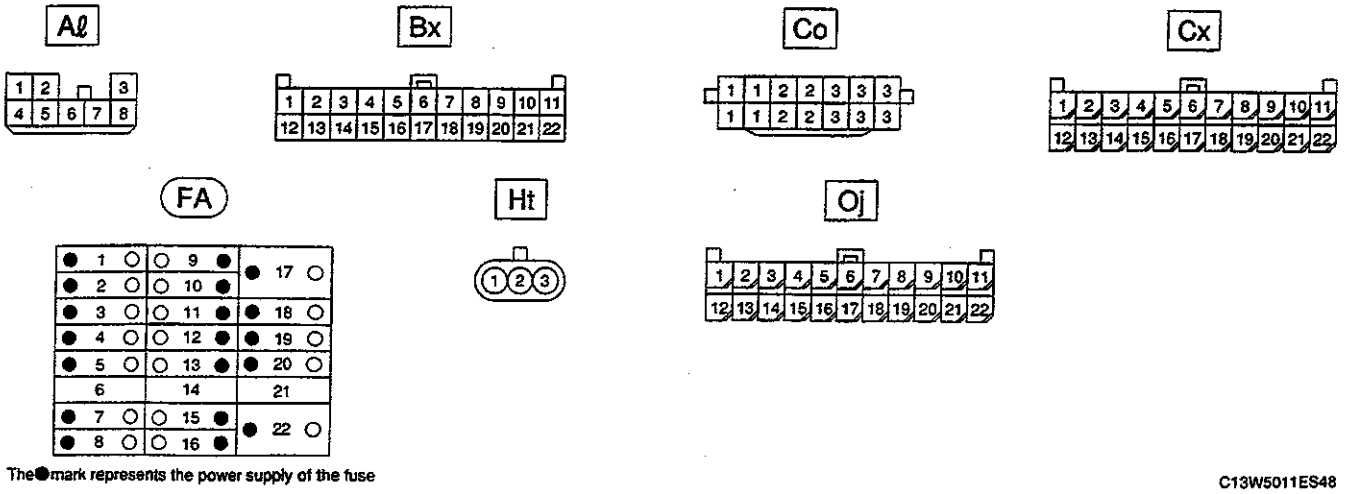
C13W5009ES48



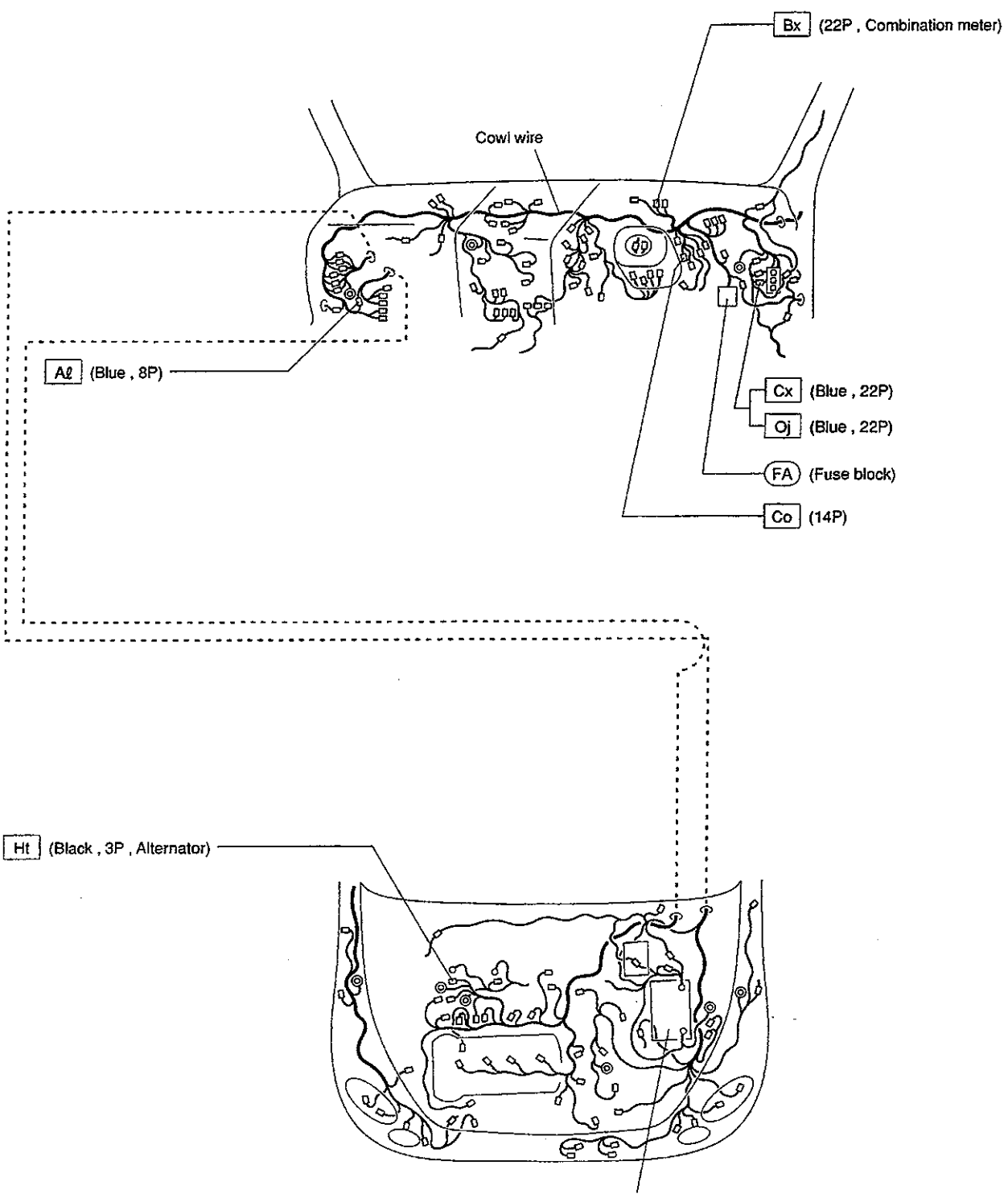
C13W5010ES48

3 CHARGING SYSTEM





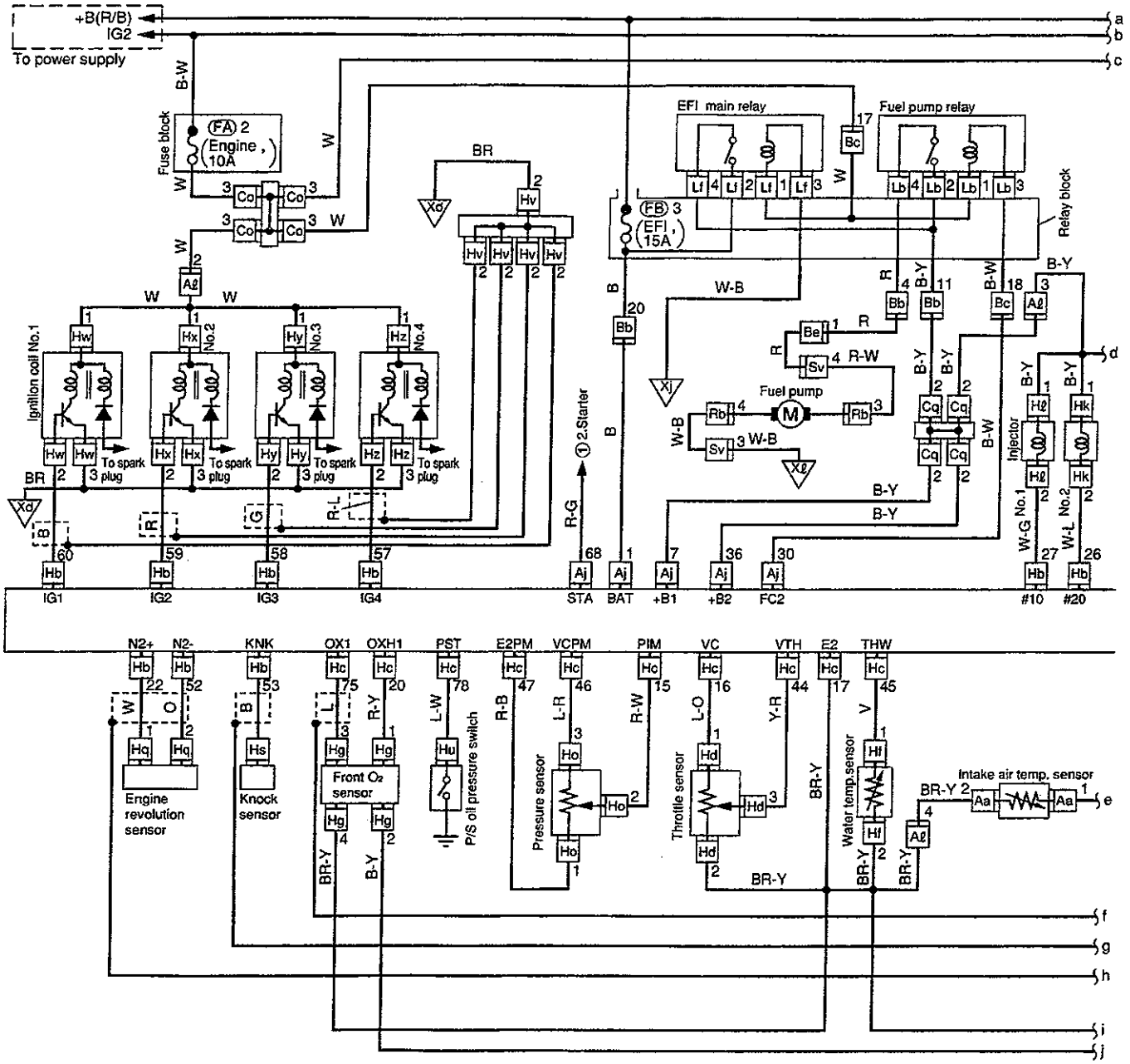
C13W5011ES48

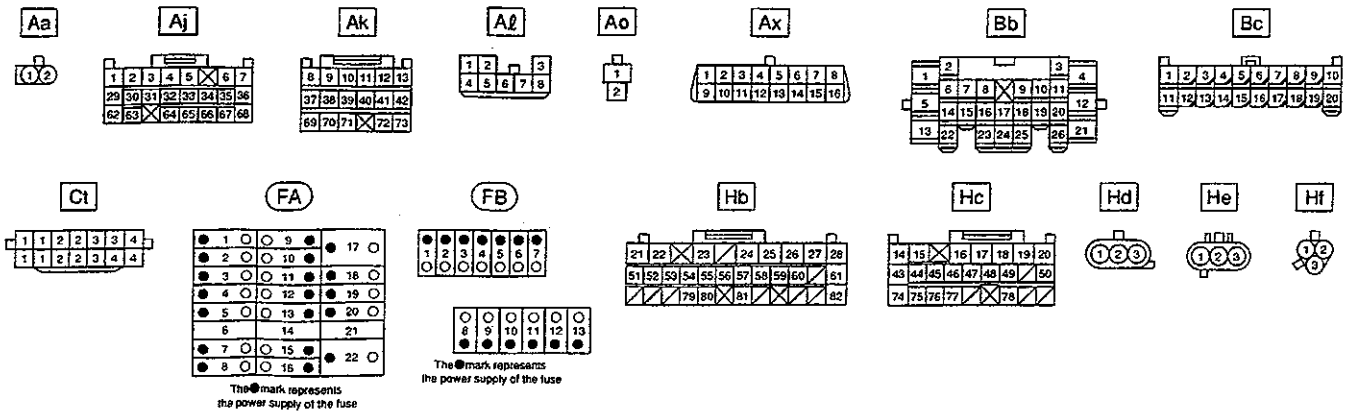


C13W5013ES48

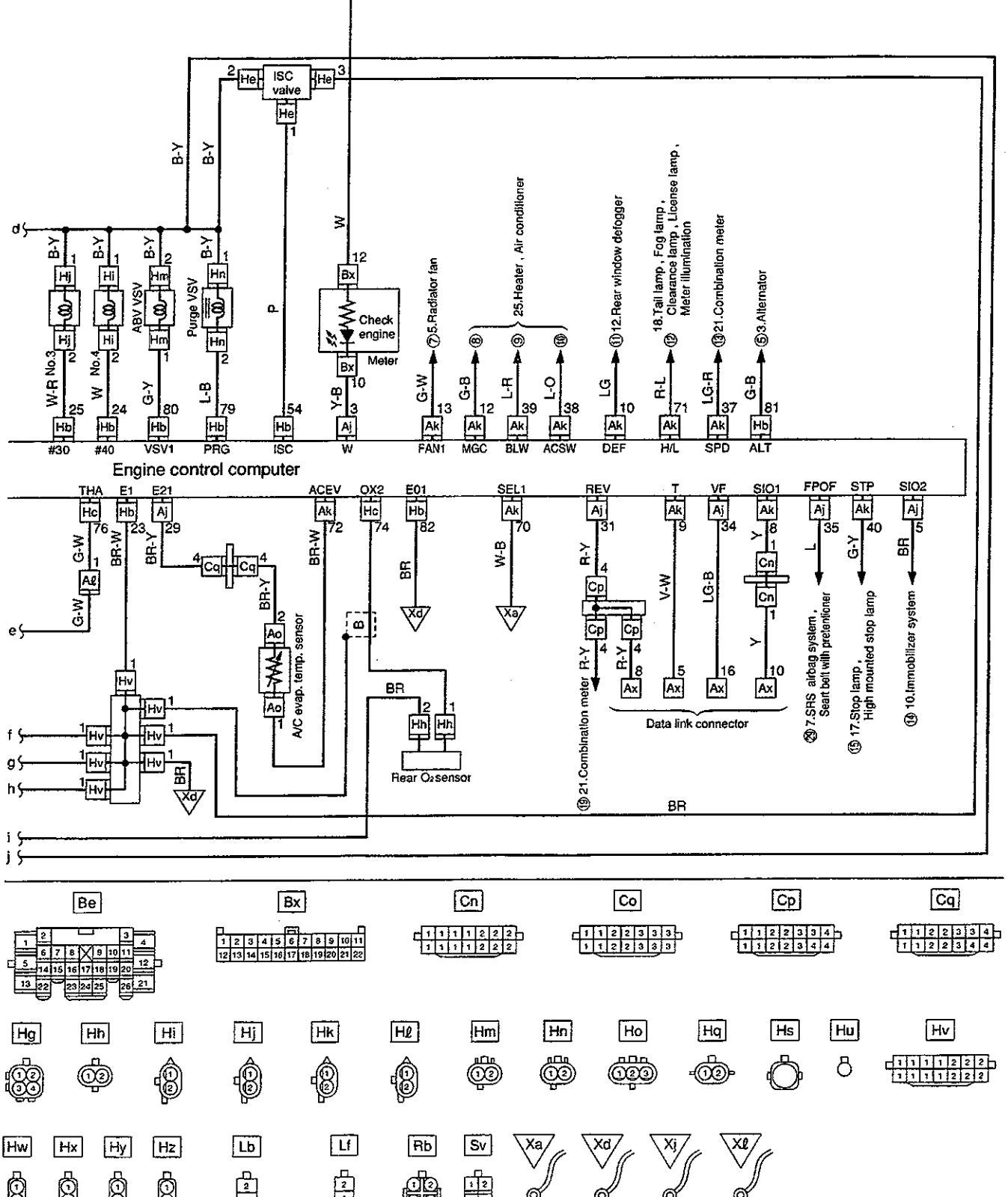
4 ENGINE CONTROL SYSTEM

4-1 FOR AUSTRALIA

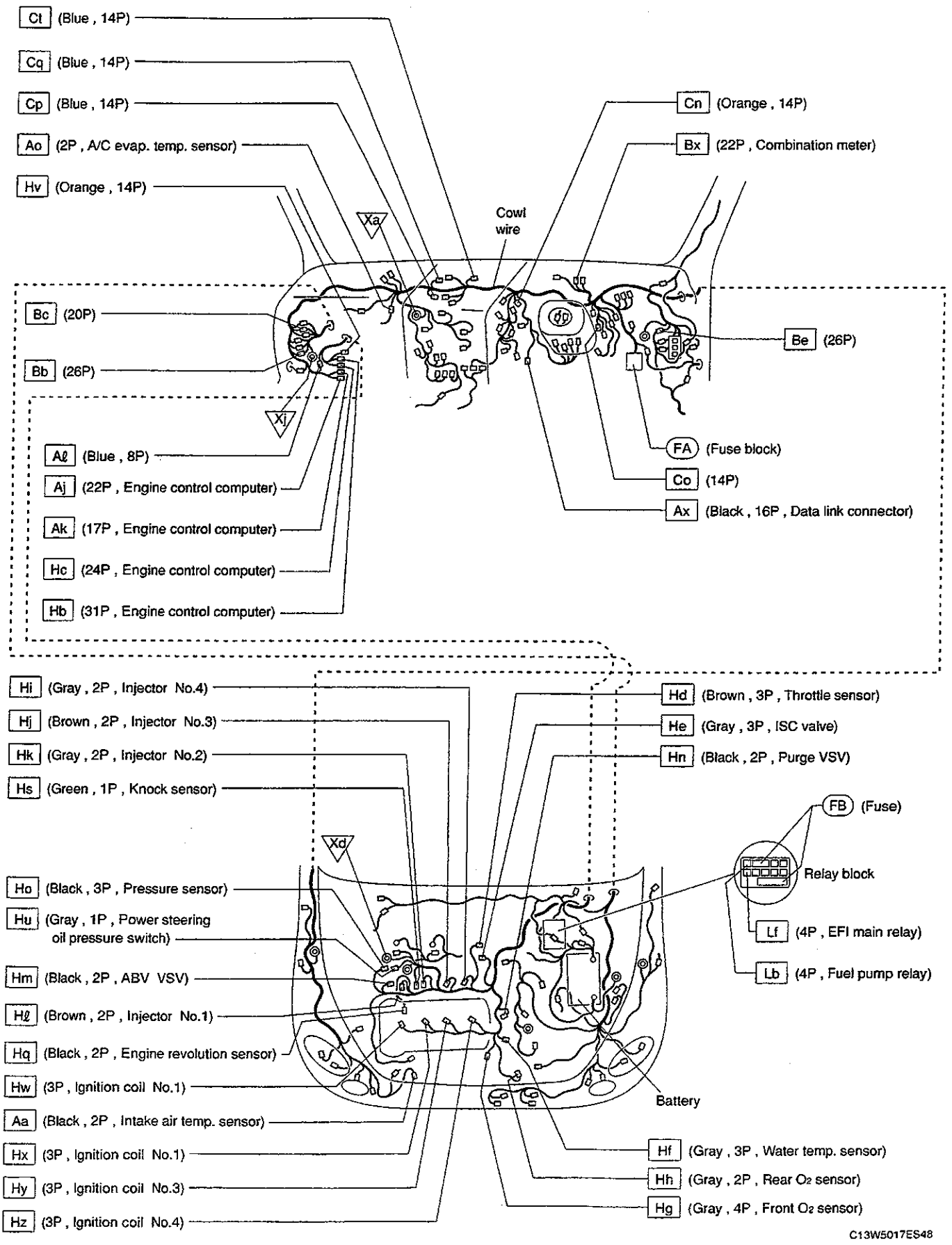


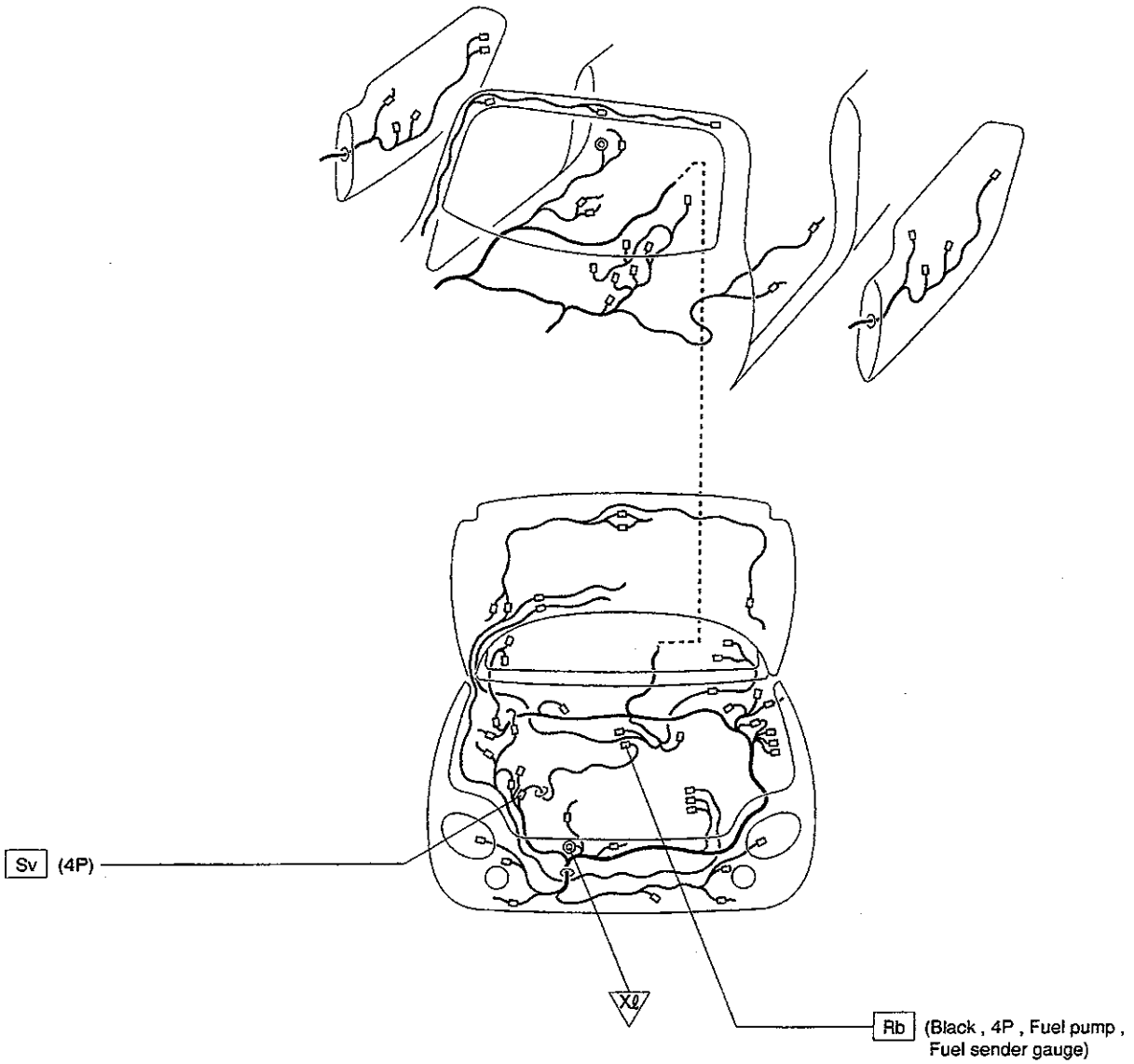


C13W5015ES48



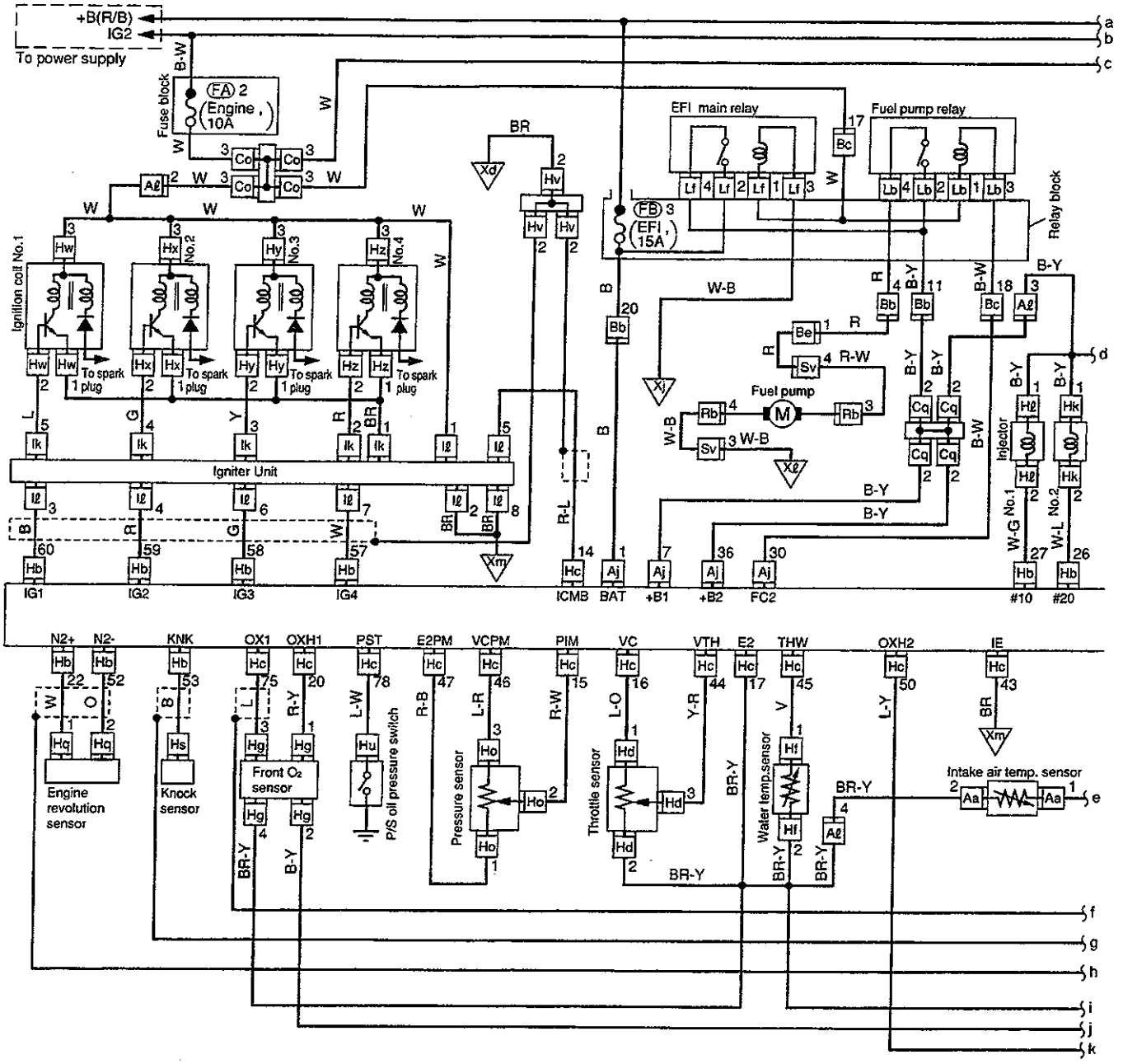
C13W5016ES48

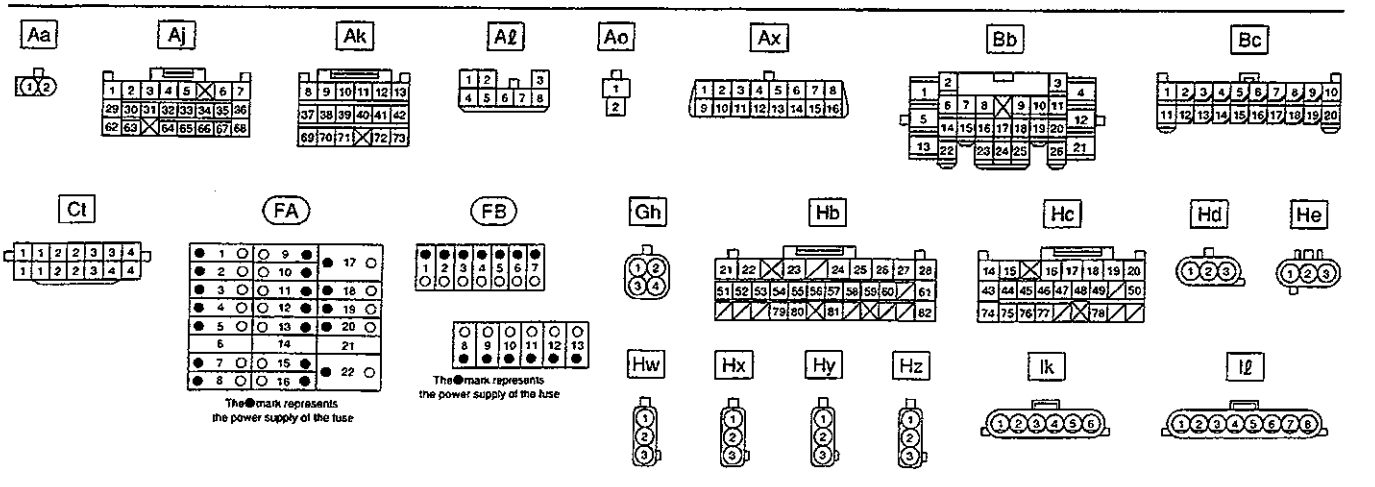

Ct (Blue , 14P)
Cq (Blue , 14P)
Cp (Blue , 14P)
Ao (2P , A/C evap. temp. sensor)
Hv (Orange , 14P)
Cn (Orange , 14P)
Bx (22P , Combination meter)
Xa
Cowl wire
Bc (20P)
Bb (26P)
Be (26P)
Xj
Aℓ (Blue , 8P)
Aj (22P , Engine control computer)
Ak (17P , Engine control computer)
Hc (24P , Engine control computer)
Hb (31P , Engine control computer)
FA (Fuse block)
Co (14P)
Ax (Black , 16P , Data link connector)
Hi (Gray , 2P , Injector No.4)
Hj (Brown , 2P , Injector No.3)
Hk (Gray , 2P , Injector No.2)
Hs (Green , 1P , Knock sensor)
Hd (Brown , 3P , Throttle sensor)
He (Gray , 3P , ISC valve)
Hn (Black , 2P , Purge VSV)
FB (Fuse)
Xd
Relay block
Ho (Black , 3P , Pressure sensor)
Hu (Gray , 1P , Power steering oil pressure switch)
Lf (4P , EFI main relay)
Lb (4P , Fuel pump relay)
Hm (Black , 2P , ABV VSV)
Hℓ (Brown , 2P , Injector No.1)
Hq (Black , 2P , Engine revolution sensor)
Hw (3P , Ignition coil No.1)
Aa (Black , 2P , Intake air temp. sensor)
Hx (3P , Ignition coil No.1)
Hy (3P , Ignition coil No.3)
Hz (3P , Ignition coil No.4)
Battery
Hf (Gray , 3P , Water temp. sensor)
Hh (Gray , 2P , Rear O2 sensor)
Hg (Gray , 4P , Front O2 sensor)
C13W5017ES48



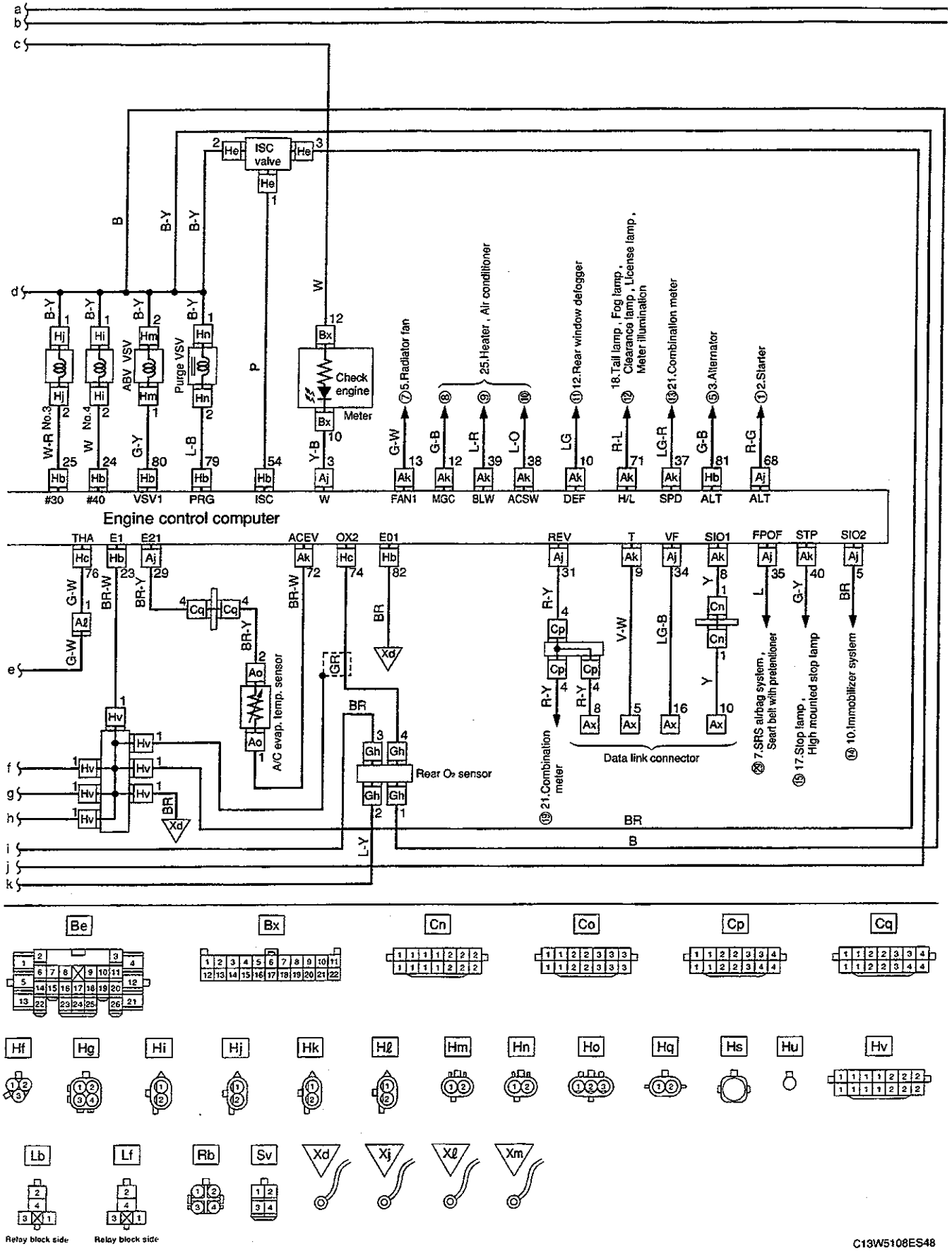
C13W5018ES48

4-2 FOR EUROPE

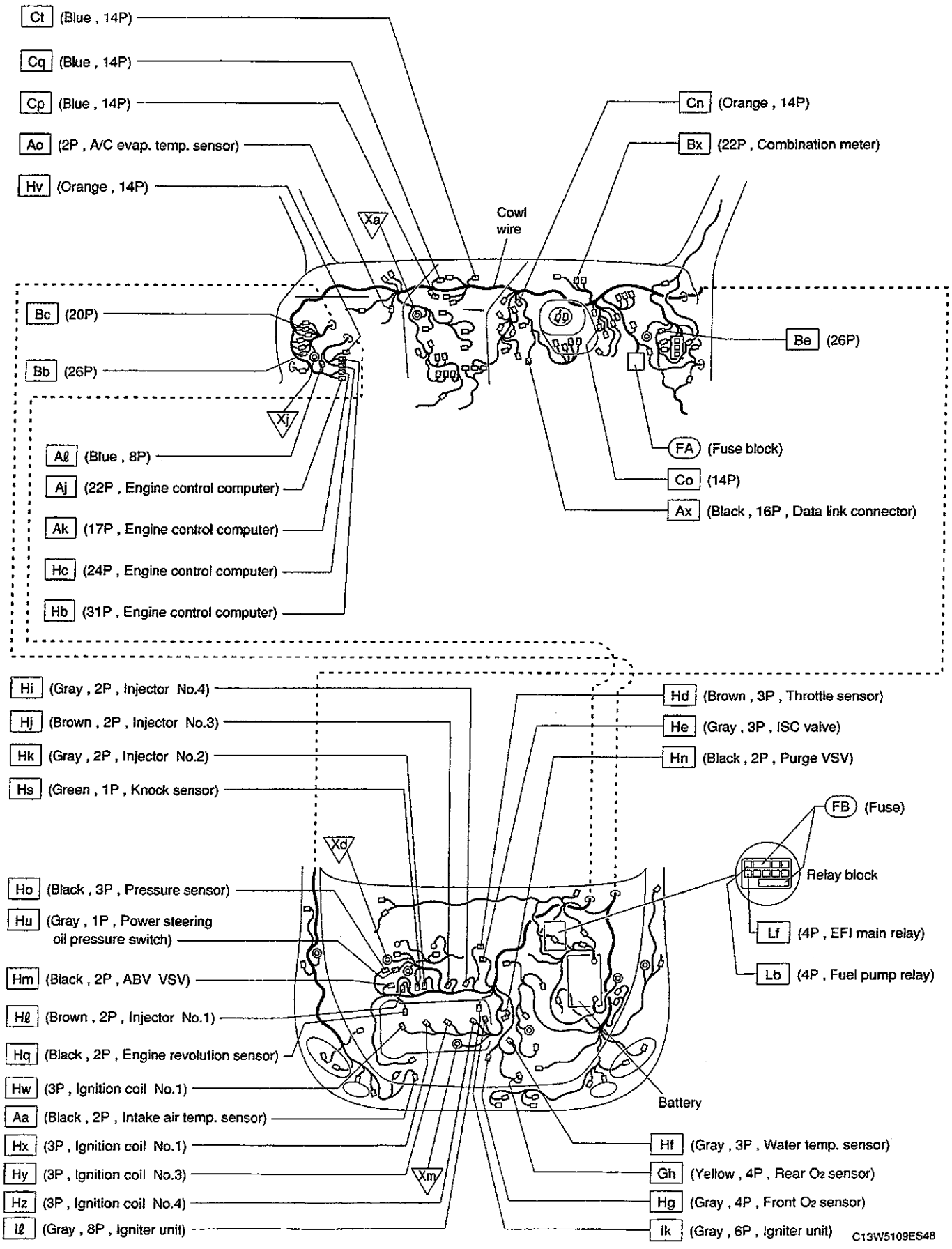


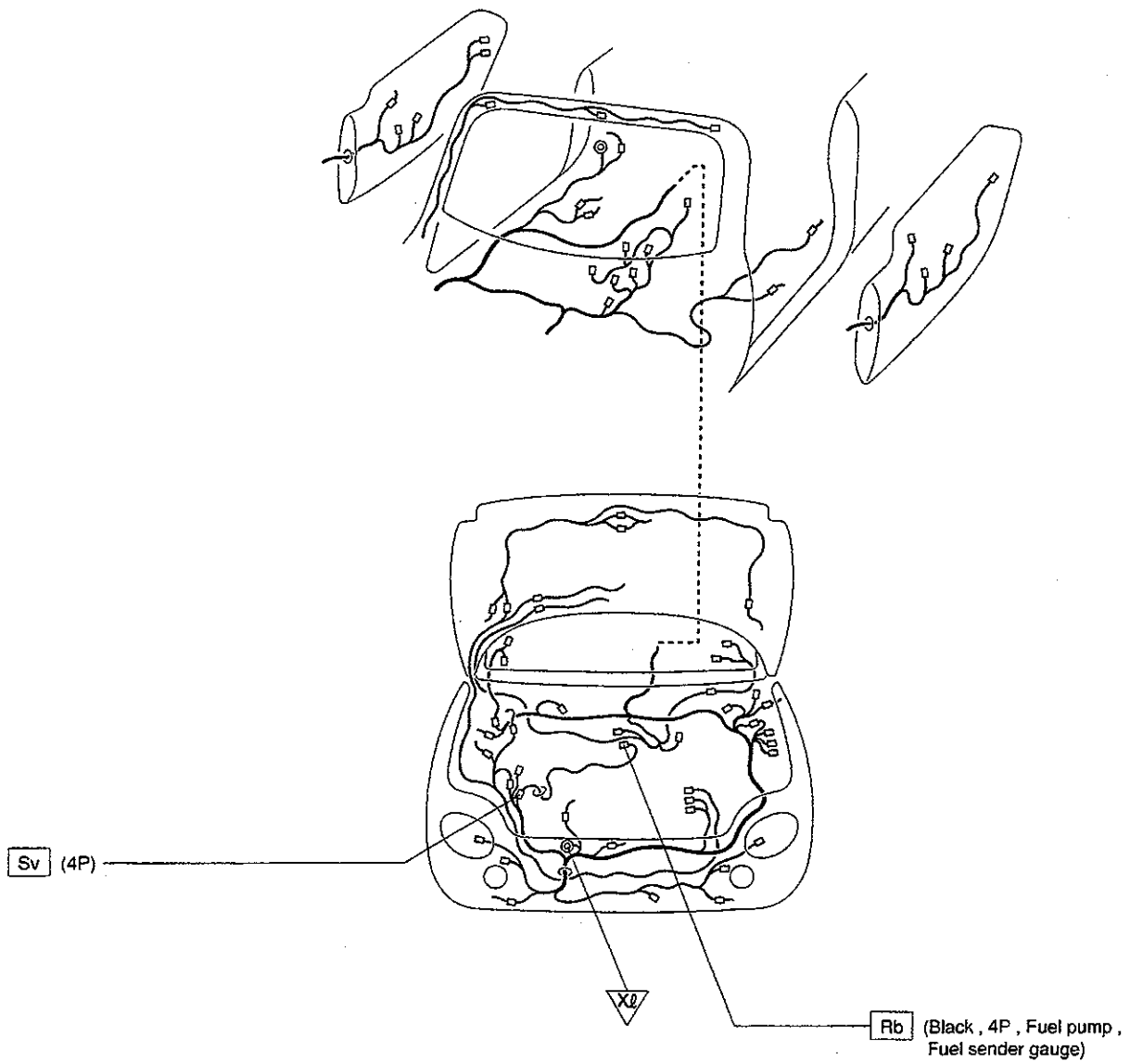


C13W5107ES48



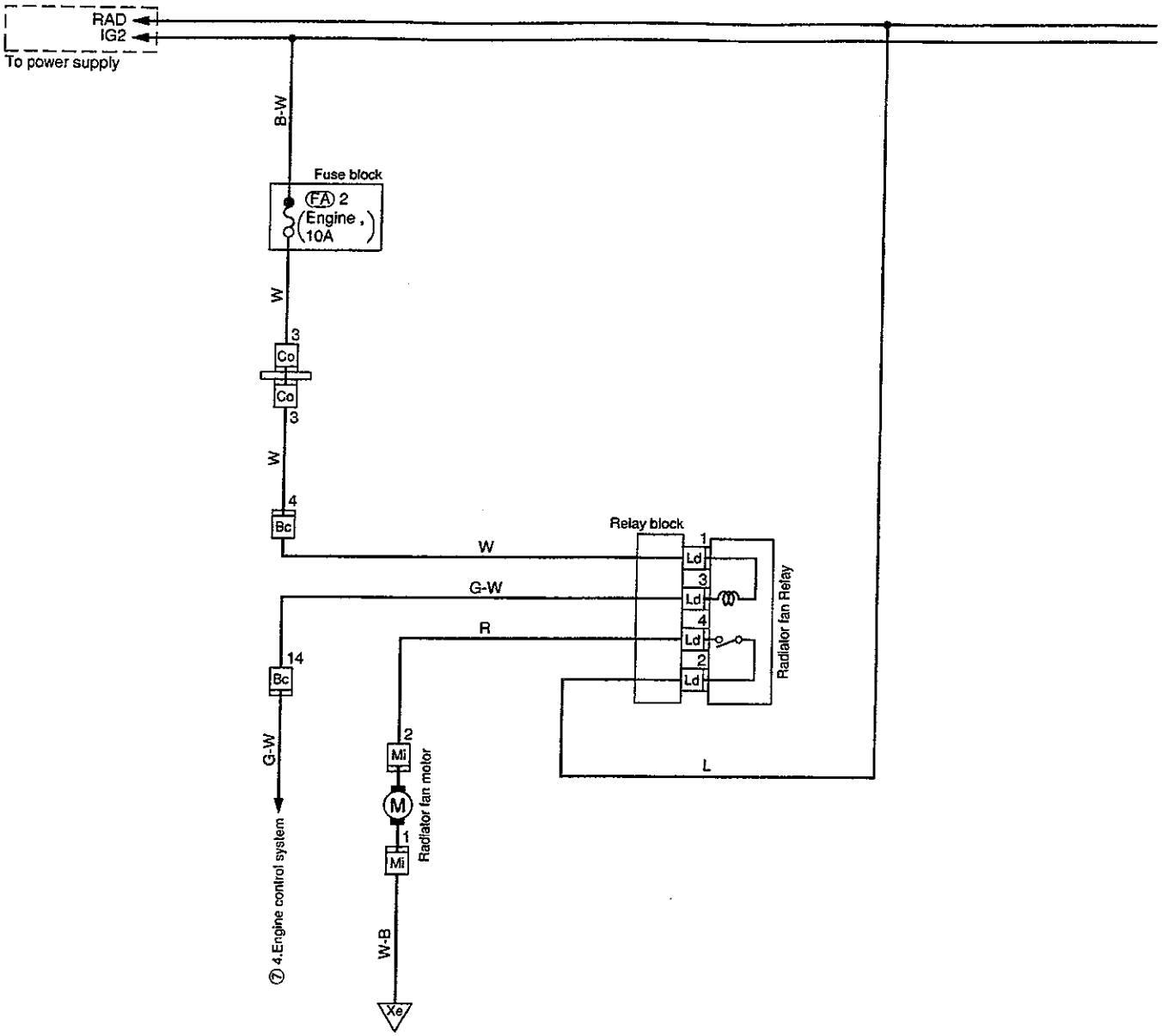
C13W5108ES48

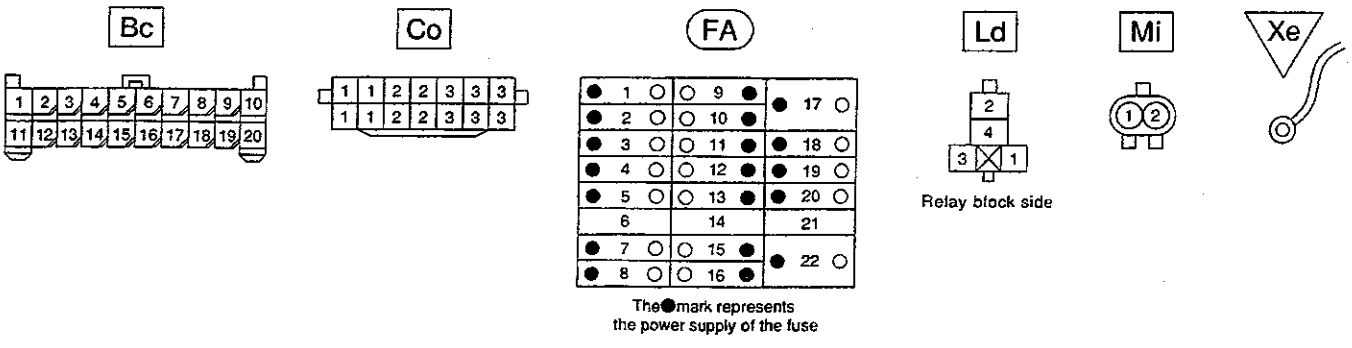

Ct (Blue , 14P)
Cq (Blue , 14P)
Cp (Blue , 14P)
Ao (2P , A/C evap. temp. sensor)
Hv (Orange , 14P)
Cn (Orange , 14P)
Bx (22P , Combination meter)
Xa
Cowl wire
Bc (20P)
Bb (26P)
Be (26P)
Xj
Aℓ (Blue , 8P)
Aj (22P , Engine control computer)
Ak (17P , Engine control computer)
Hc (24P , Engine control computer)
Hb (31P , Engine control computer)
FA (Fuse block)
Co (14P)
Ax (Black , 16P , Data link connector)
Hi (Gray , 2P , Injector No.4)
Hj (Brown , 2P , Injector No.3)
Hk (Gray , 2P , Injector No.2)
Hs (Green , 1P , Knock sensor)
Hd (Brown , 3P , Throttle sensor)
He (Gray , 3P , ISC valve)
Hn (Black , 2P , Purge VSV)
FB (Fuse)
Xd
Relay block
Ho (Black , 3P , Pressure sensor)
Hu (Gray , 1P , Power steering oil pressure switch)
Lf (4P , EFI main relay)
Lb (4P , Fuel pump relay)
Hm (Black , 2P , ABV VSV)
Hℓ (Brown , 2P , Injector No.1)
Hq (Black , 2P , Engine revolution sensor)
Hw (3P , Ignition coil No.1)
Aa (Black , 2P , Intake air temp. sensor)
Hx (3P , Ignition coil No.1)
Hy (3P , Ignition coil No.3)
Hz (3P , Ignition coil No.4)
Iℓ (Gray , 8P , Igniter unit)
Battery
Xm
Hf (Gray , 3P , Water temp. sensor)
Gh (Yellow , 4P , Rear O2 sensor)
Hg (Gray , 4P , Front O2 sensor)
Ik (Gray , 6P , Igniter unit)
C13W5109ES48



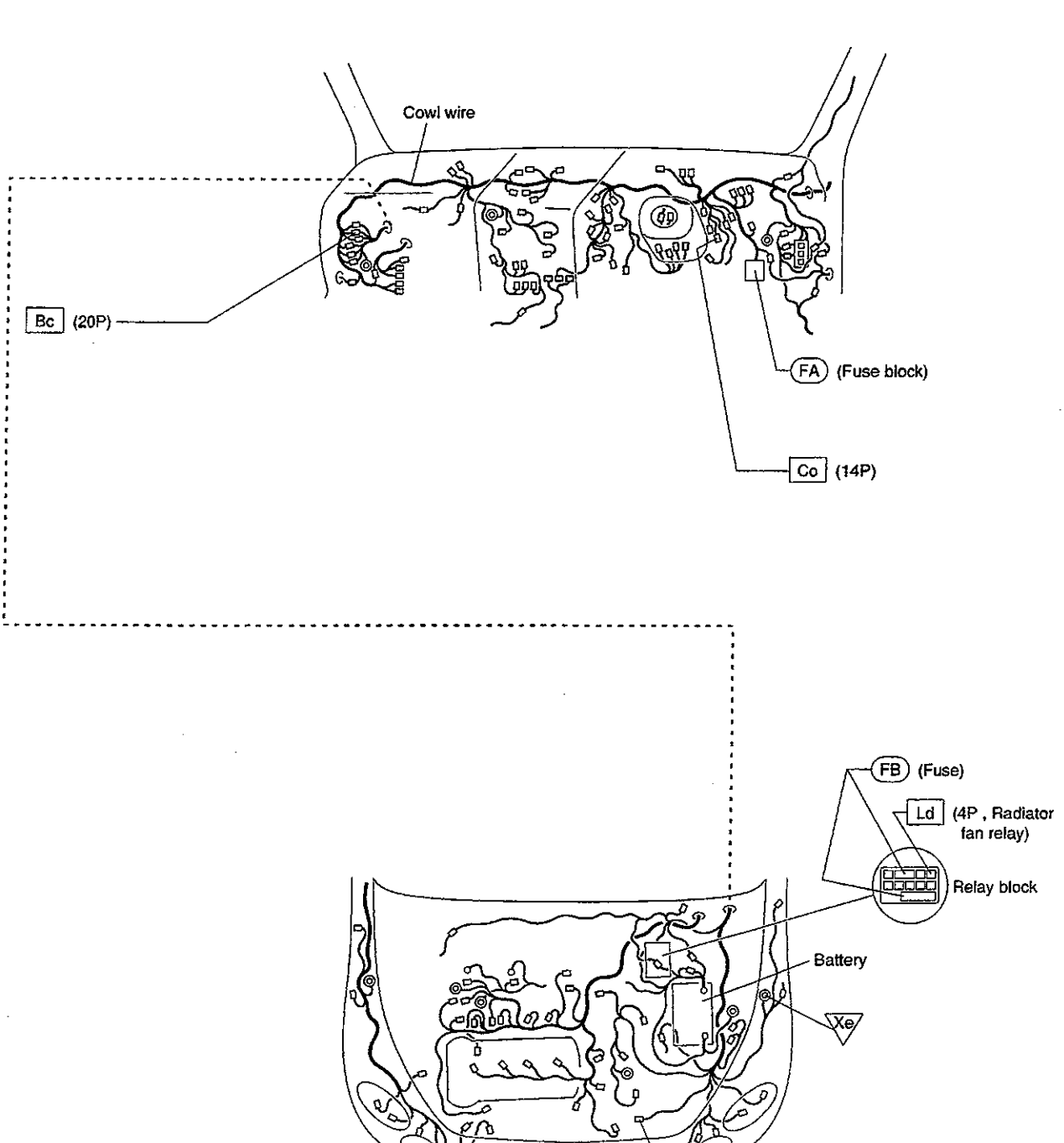
C13W5018ES48

5 RADIATOR FAN



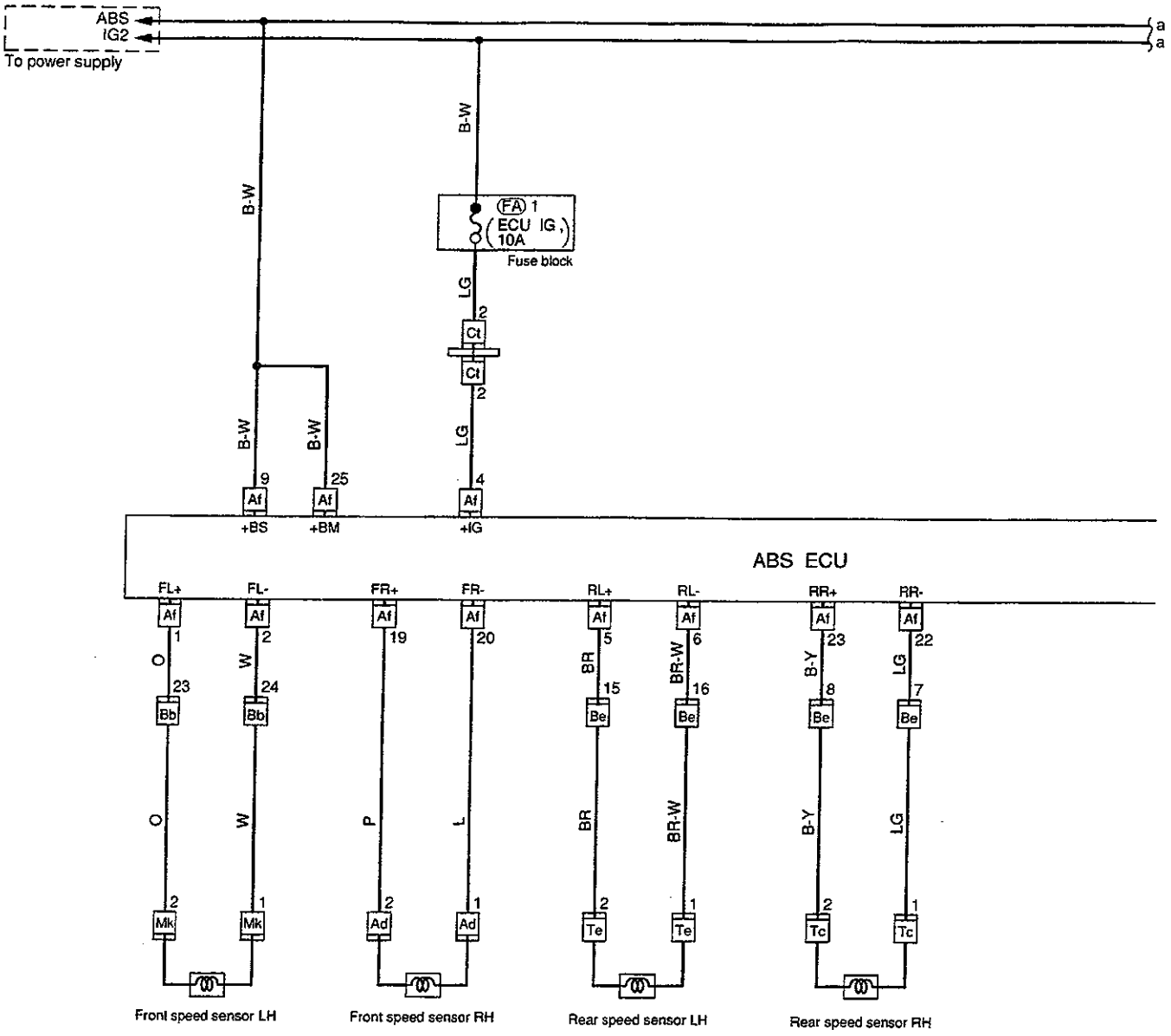


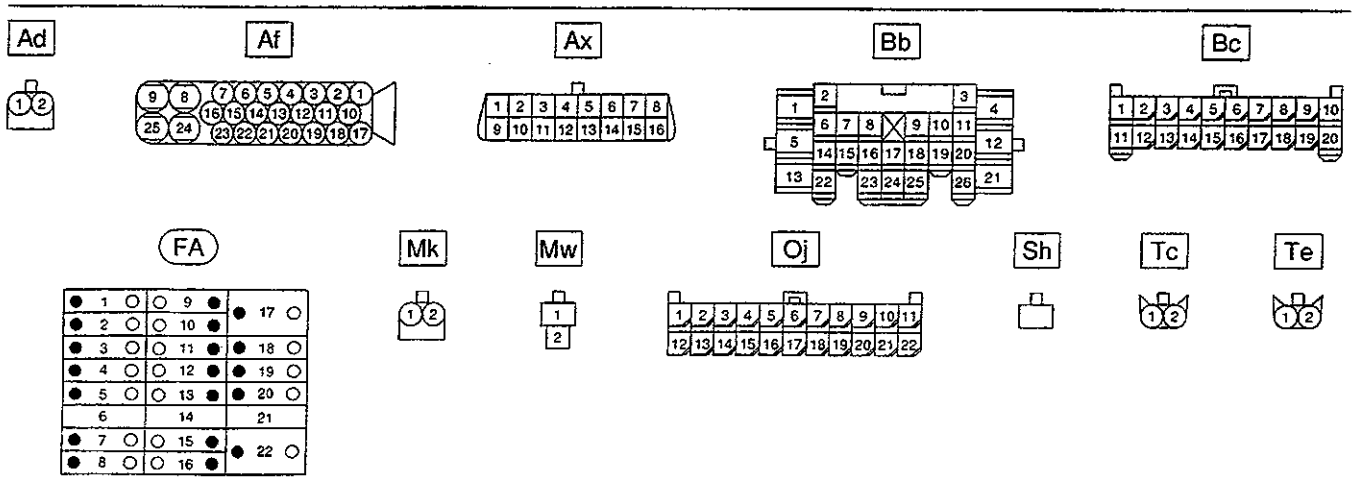
C13W5019ES48



C13W5020ES48

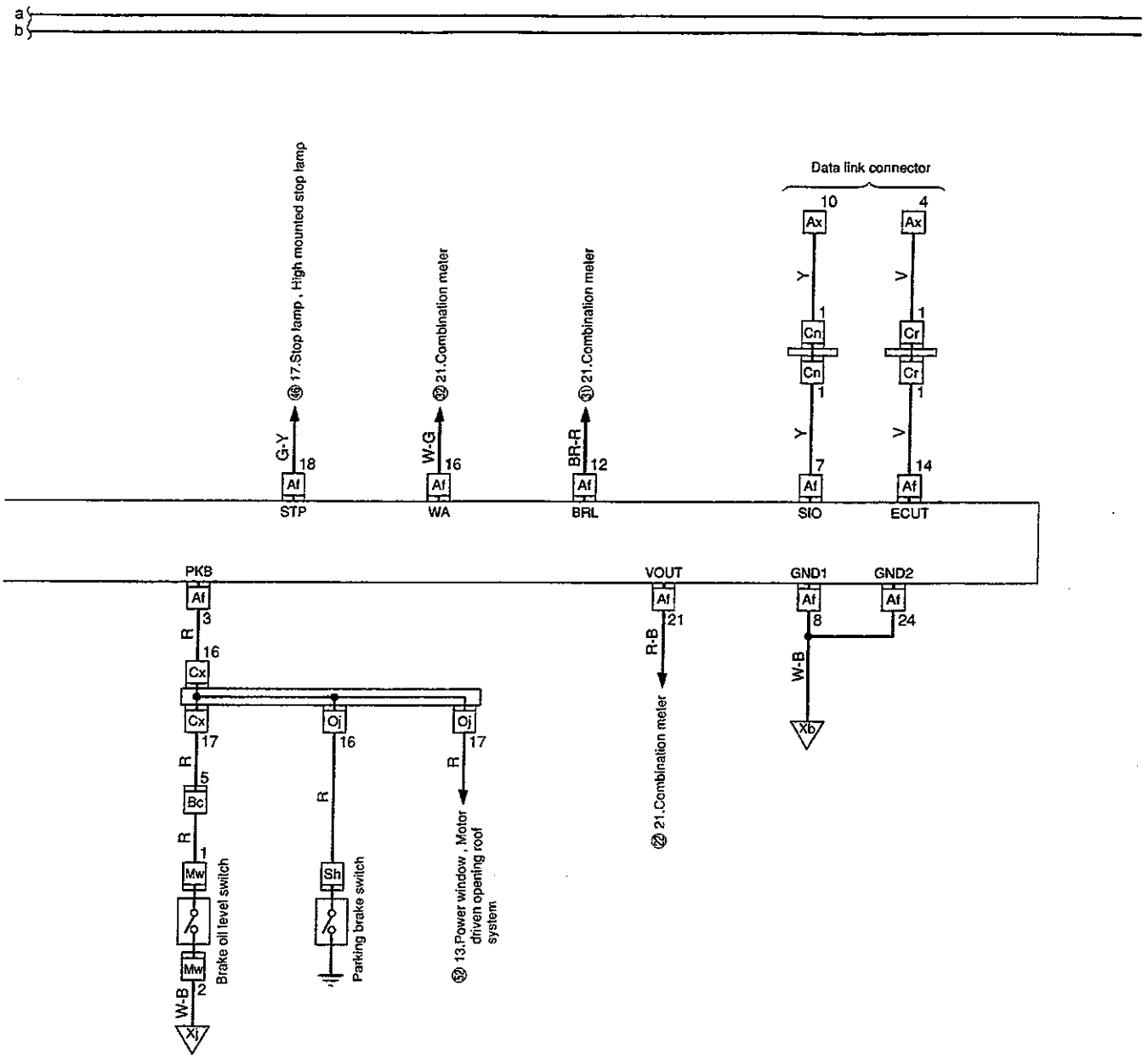
6 ABS WITH EBD CONTROL

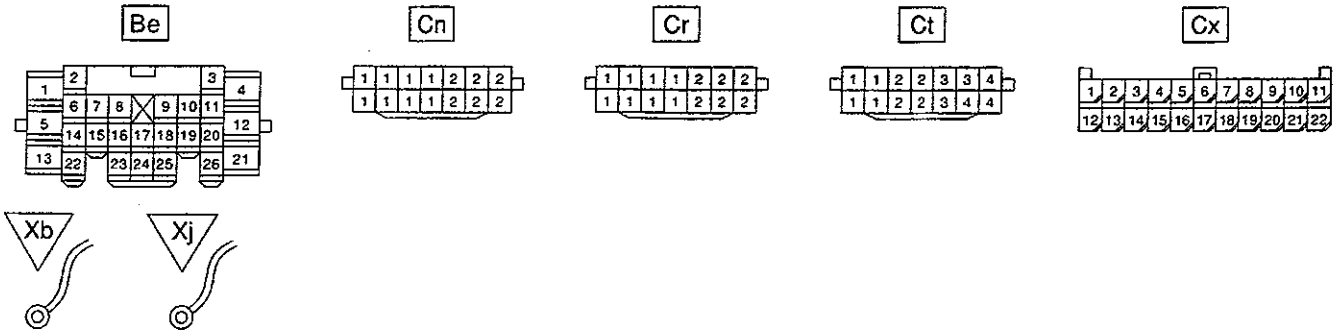




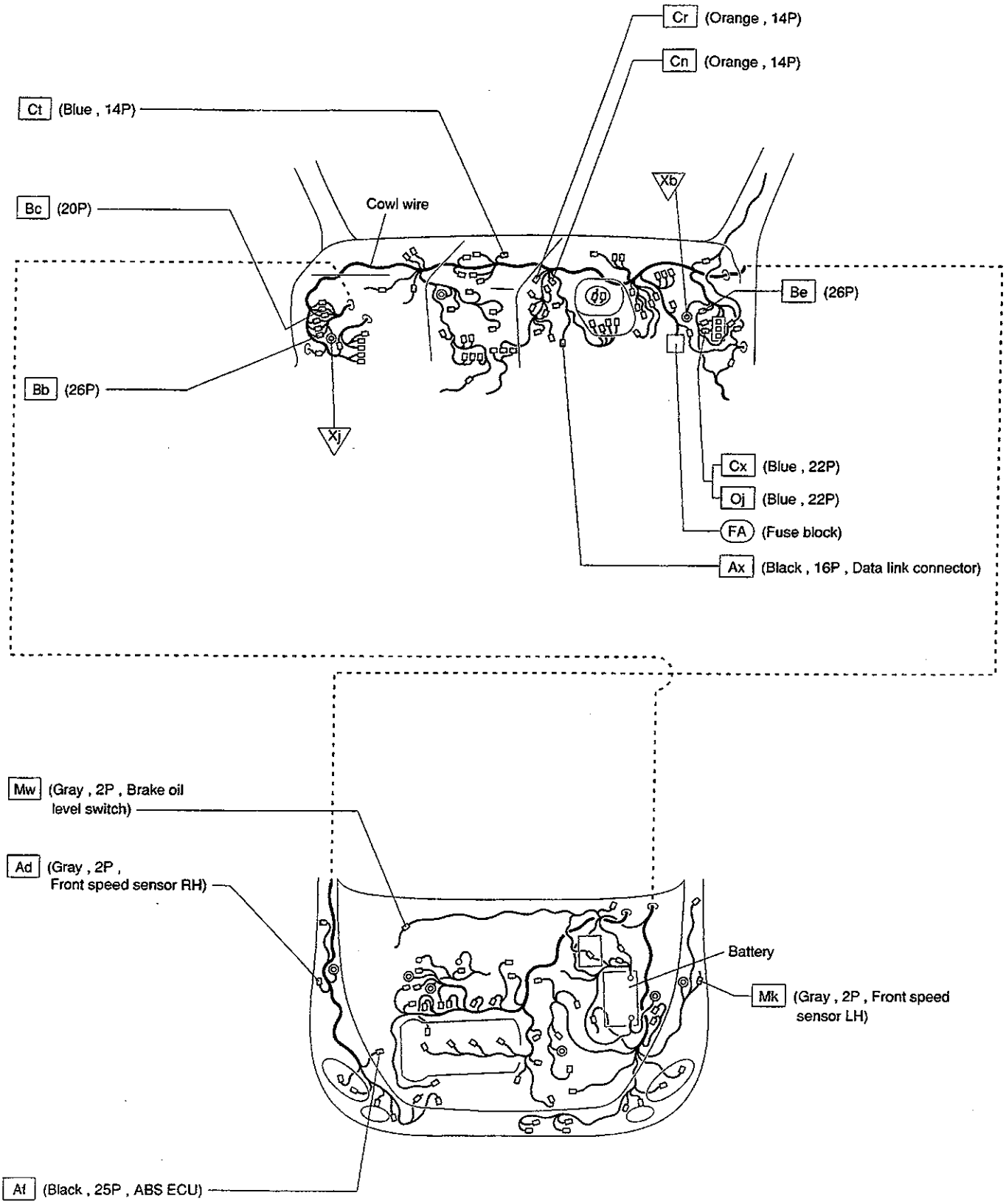
The● mark represents the power supply side of the fuse.

C13W5022ES48

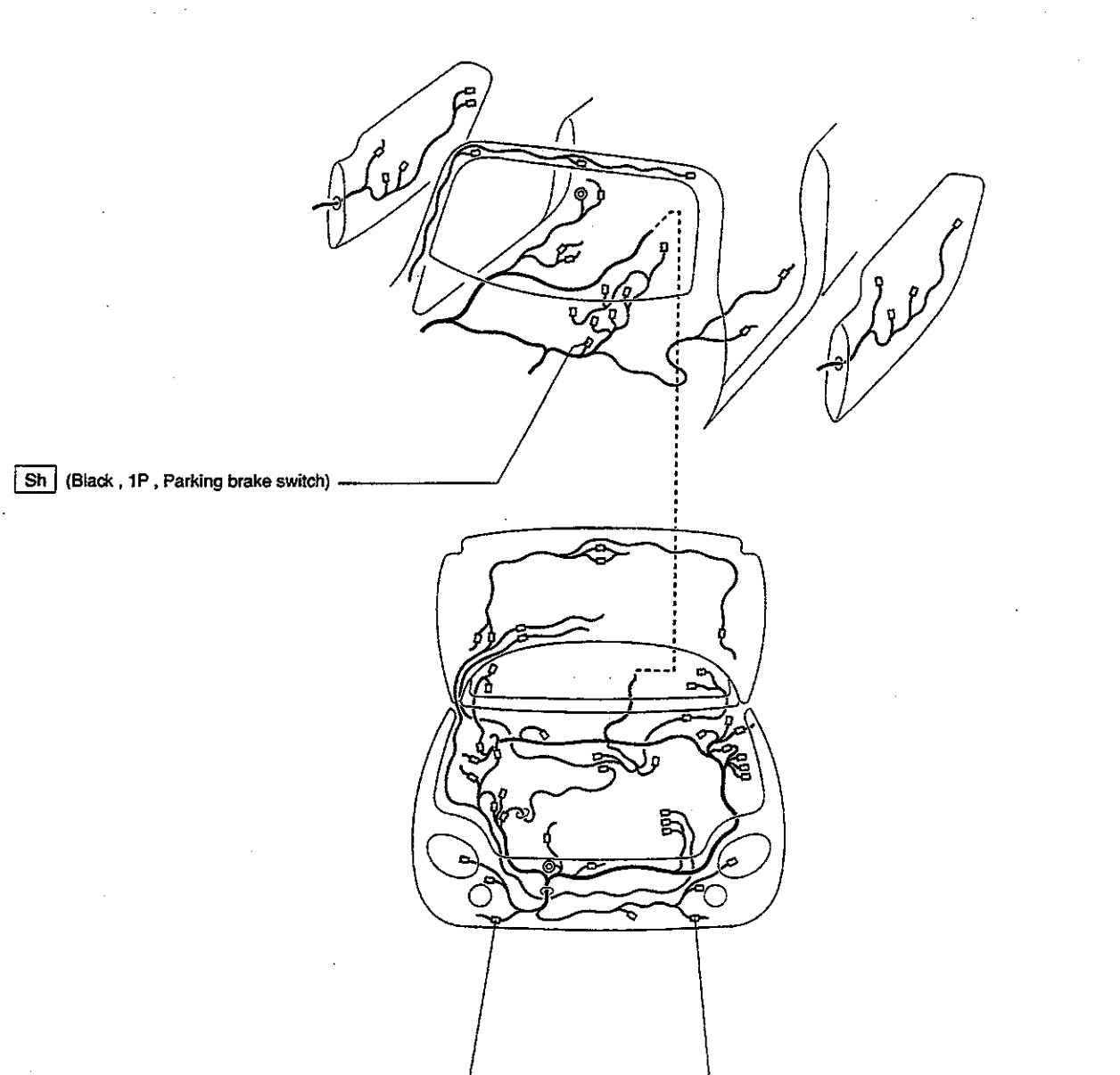




C13W5023ES48

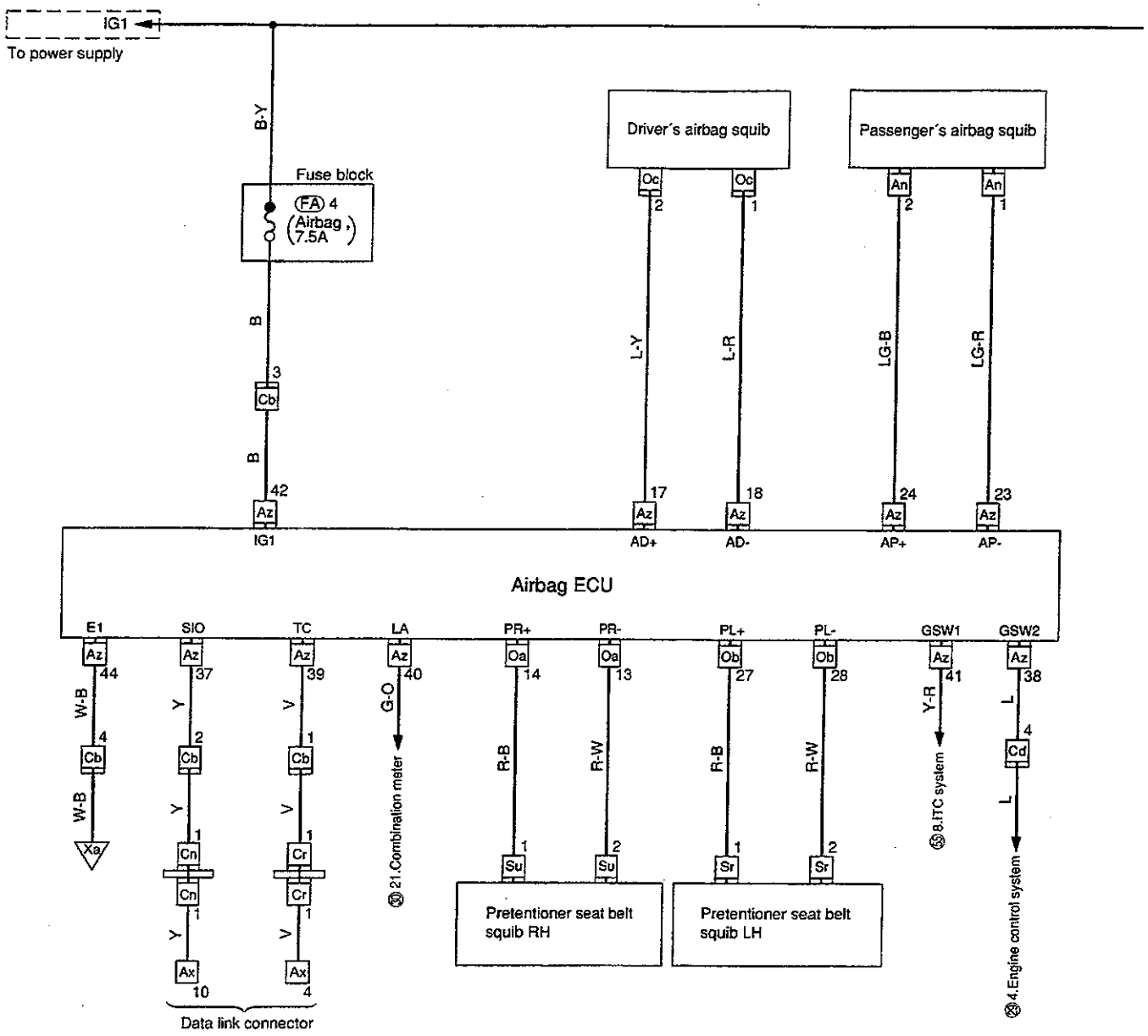


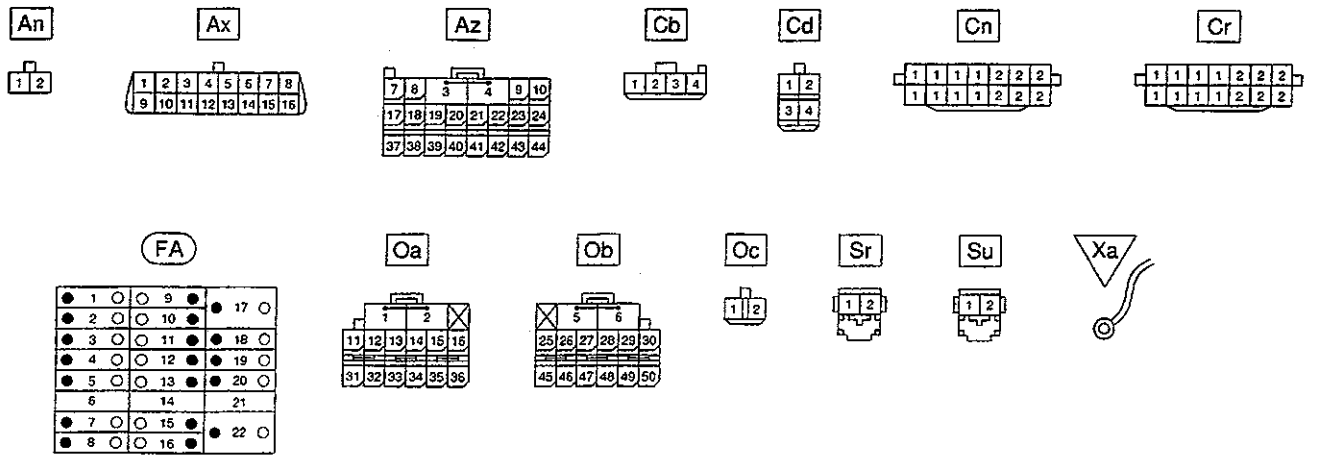
C13W5024ES48



C13W5025ES48

7 SRS AIRBAG SYSTEM, SEAT BELT WITH PRETENSIONER

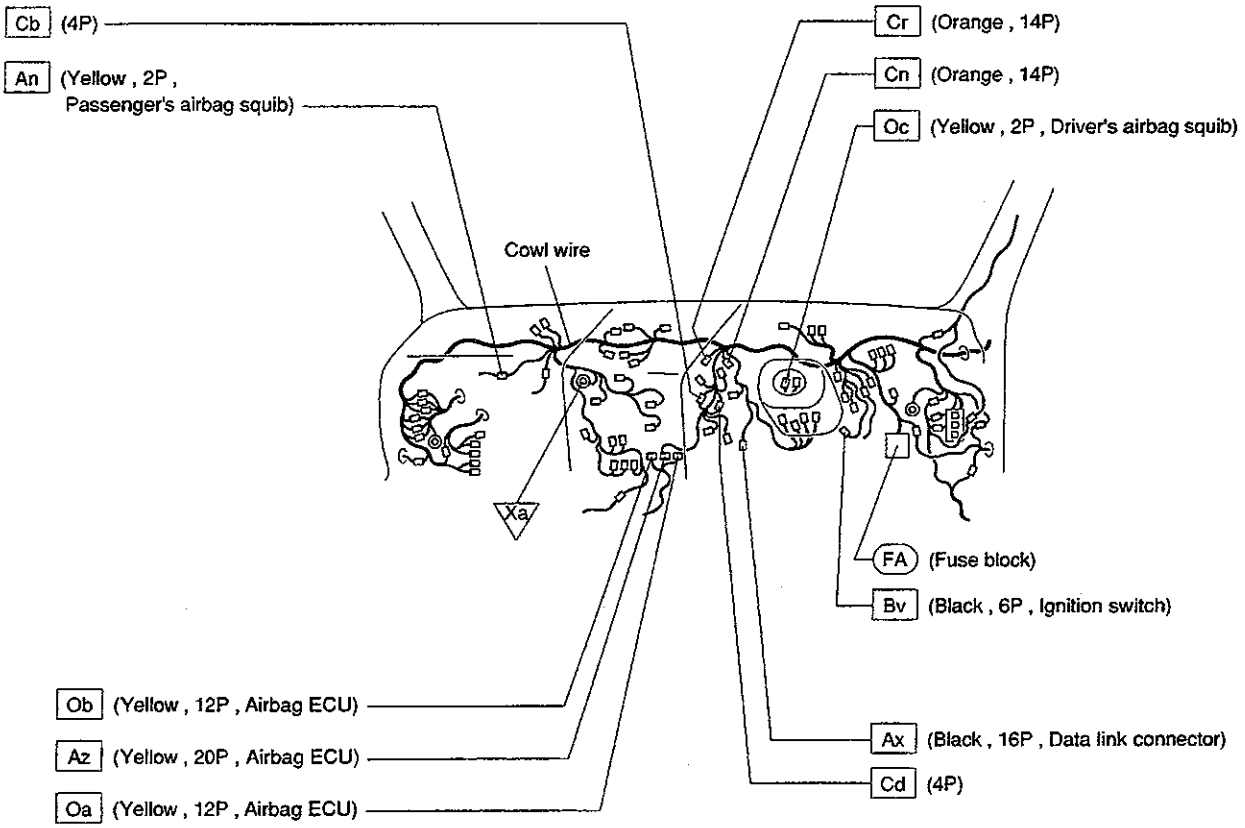




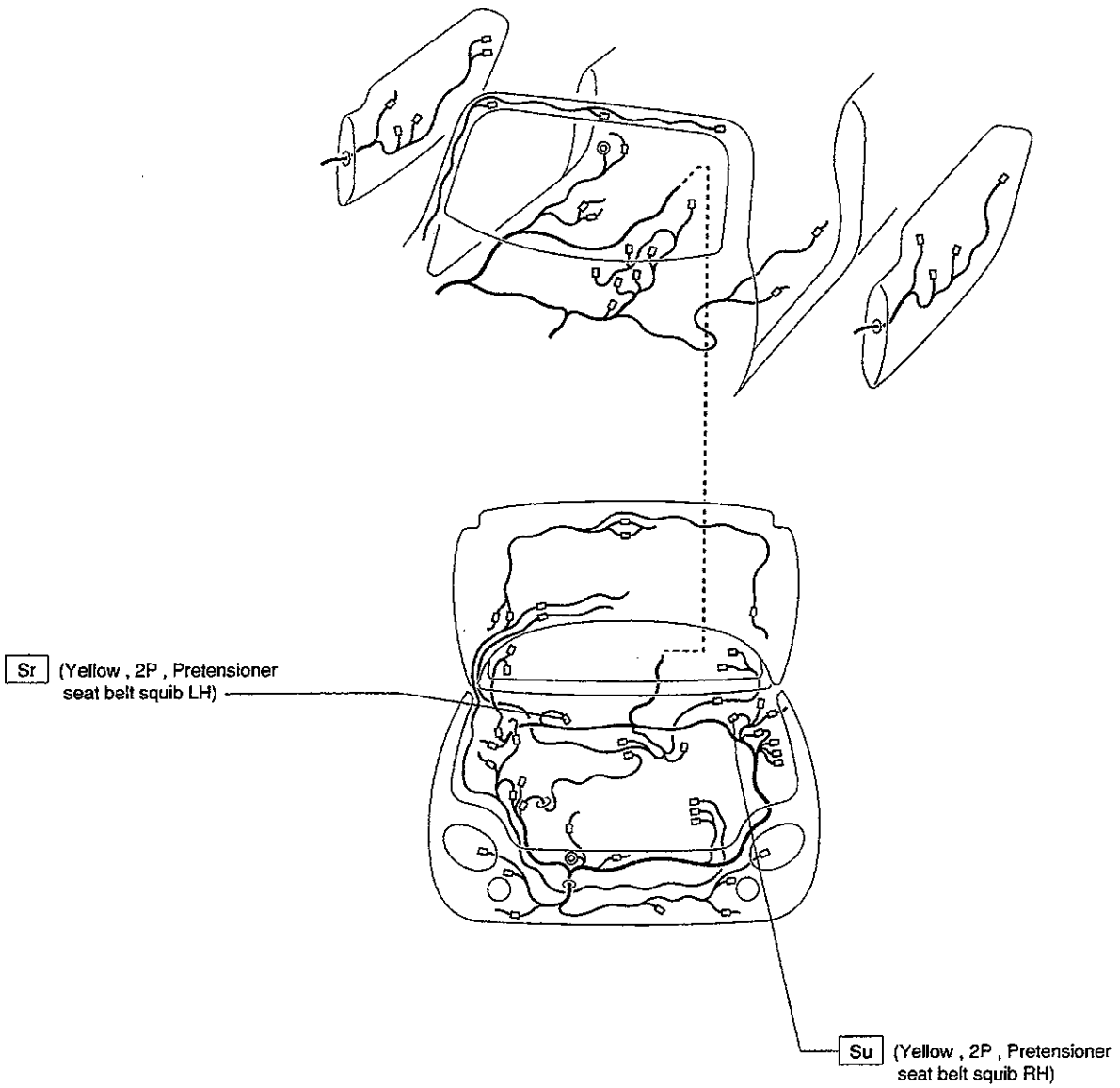
The ● mark represents the power supply side of the fuse.

C13W5033ES48

(MEMO)

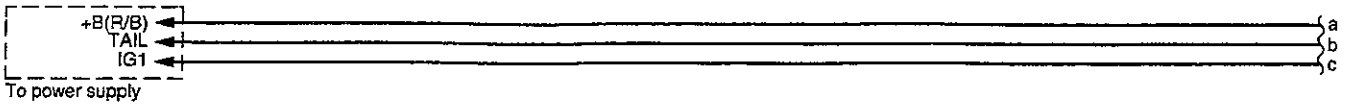


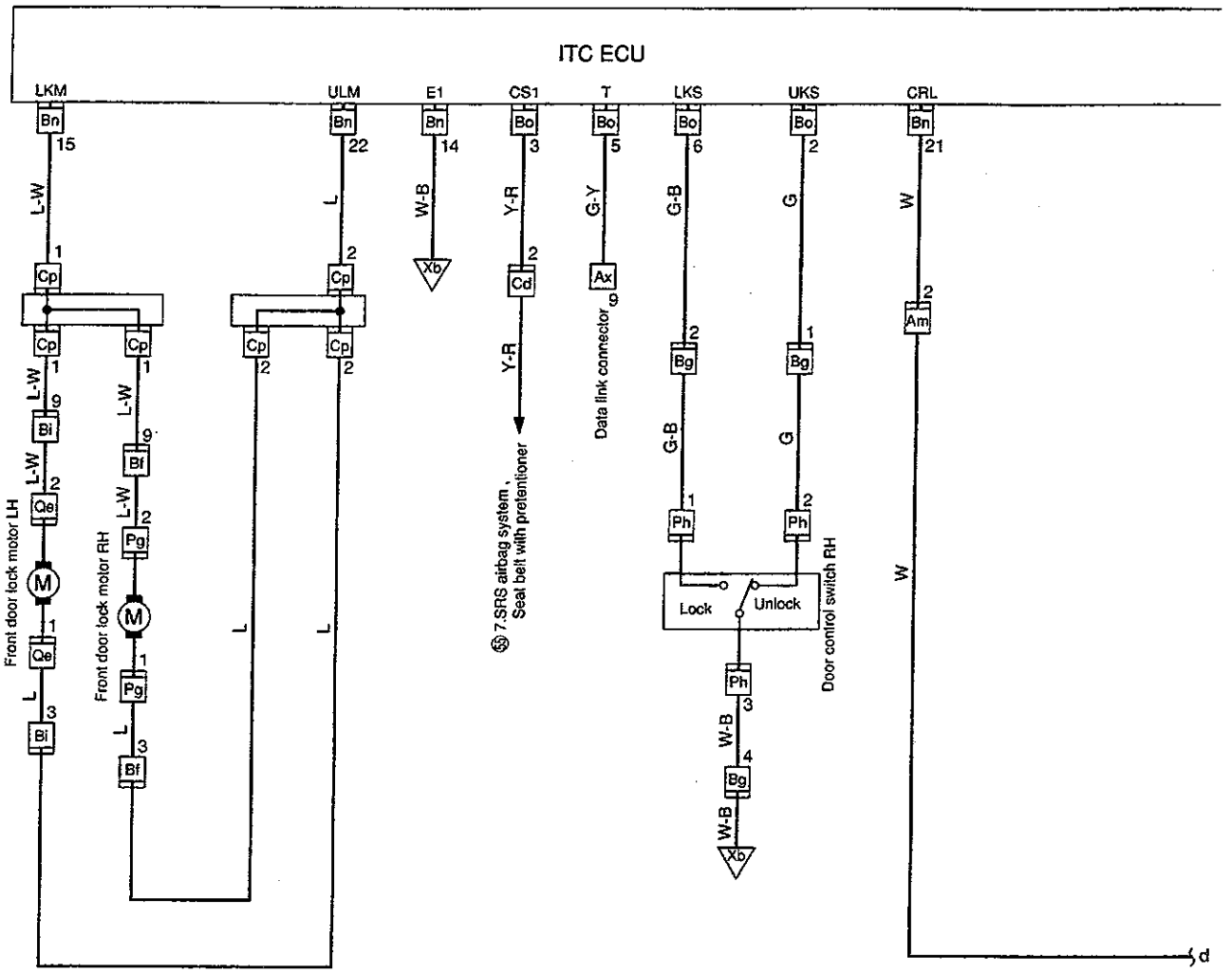
C13W5034ES48

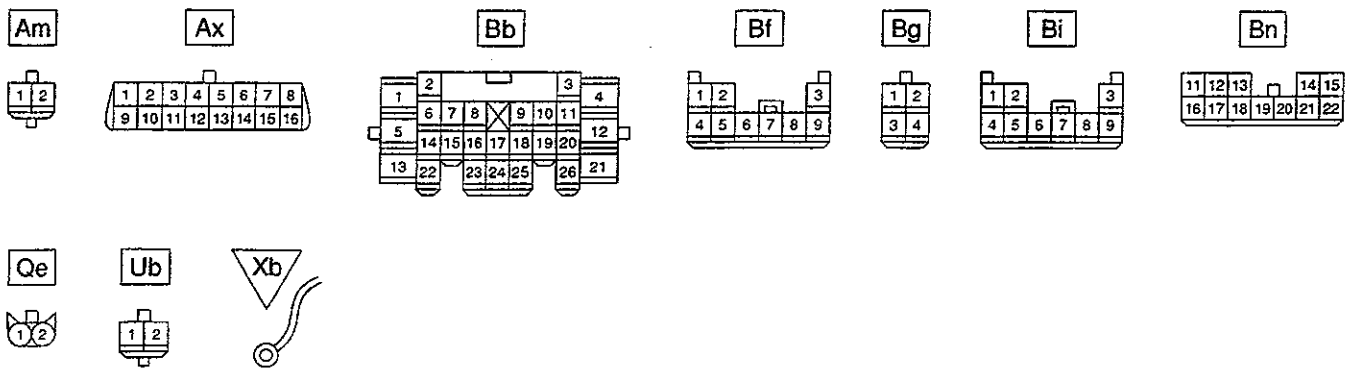


C13W5035ES48

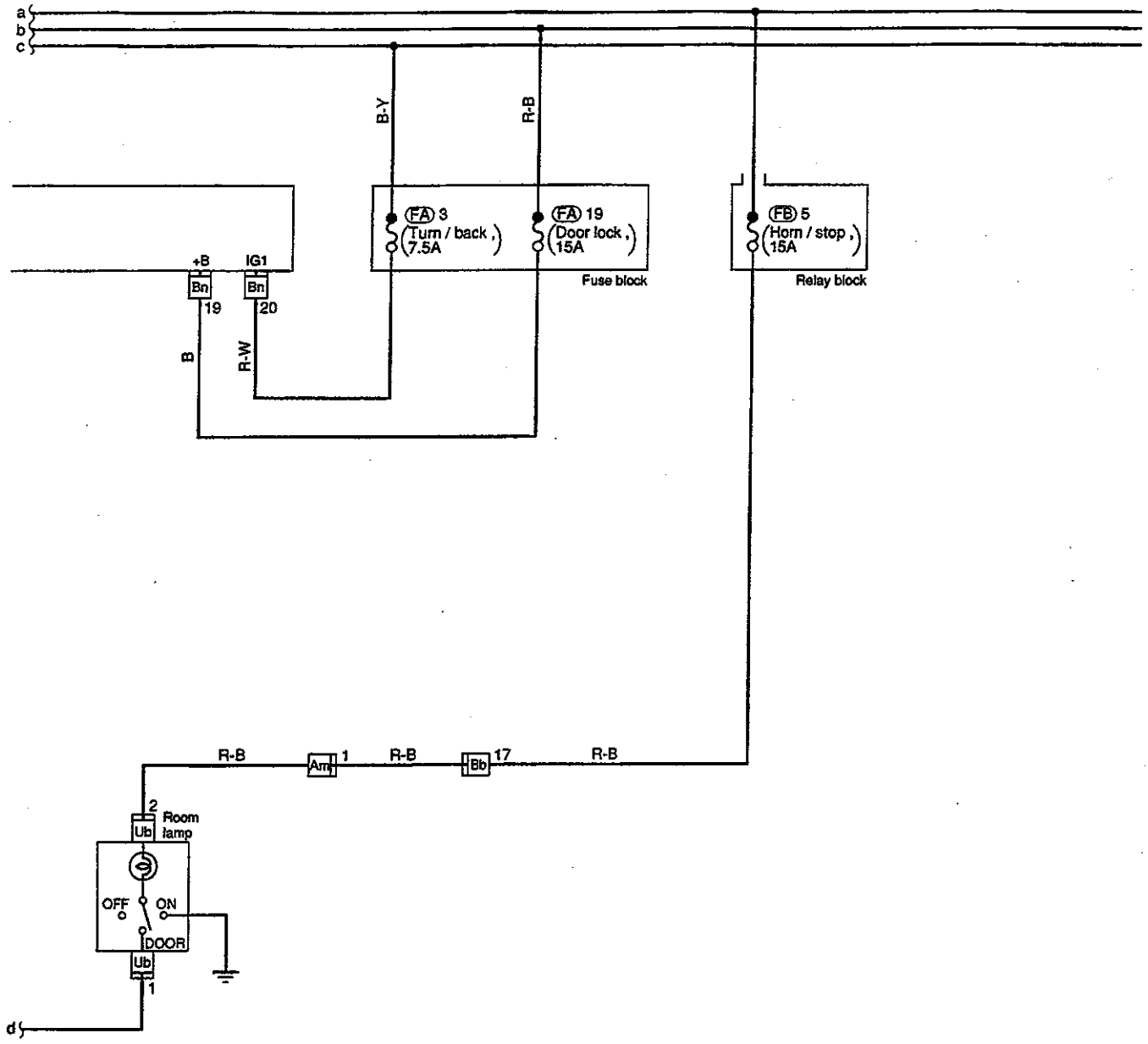
8 IMPACT SENSING SAFETY SYSTEM

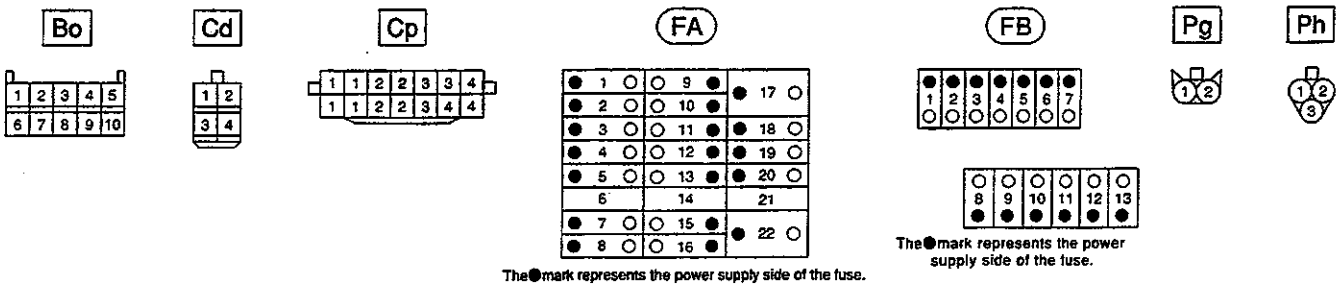




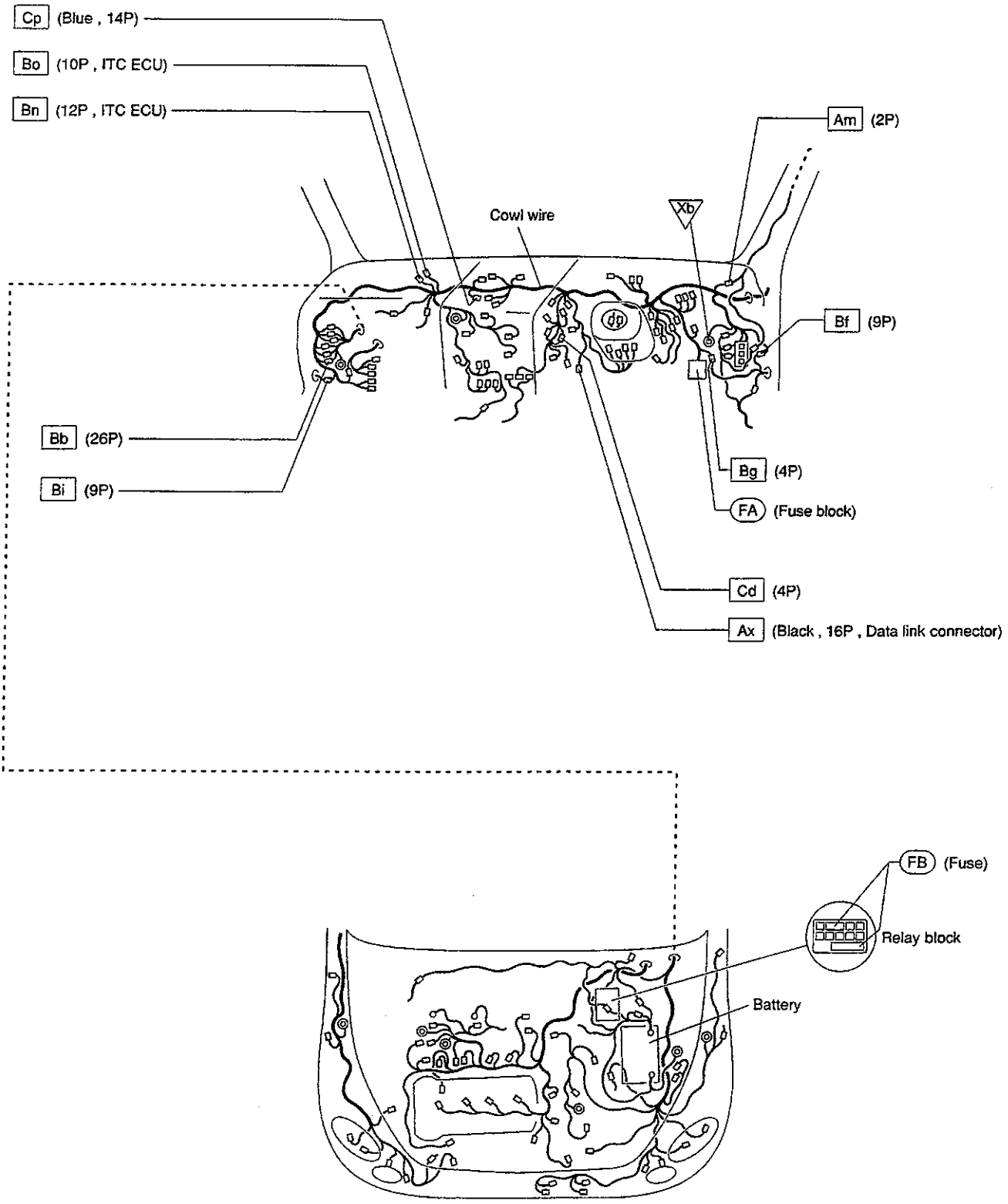


C13W5036ES48

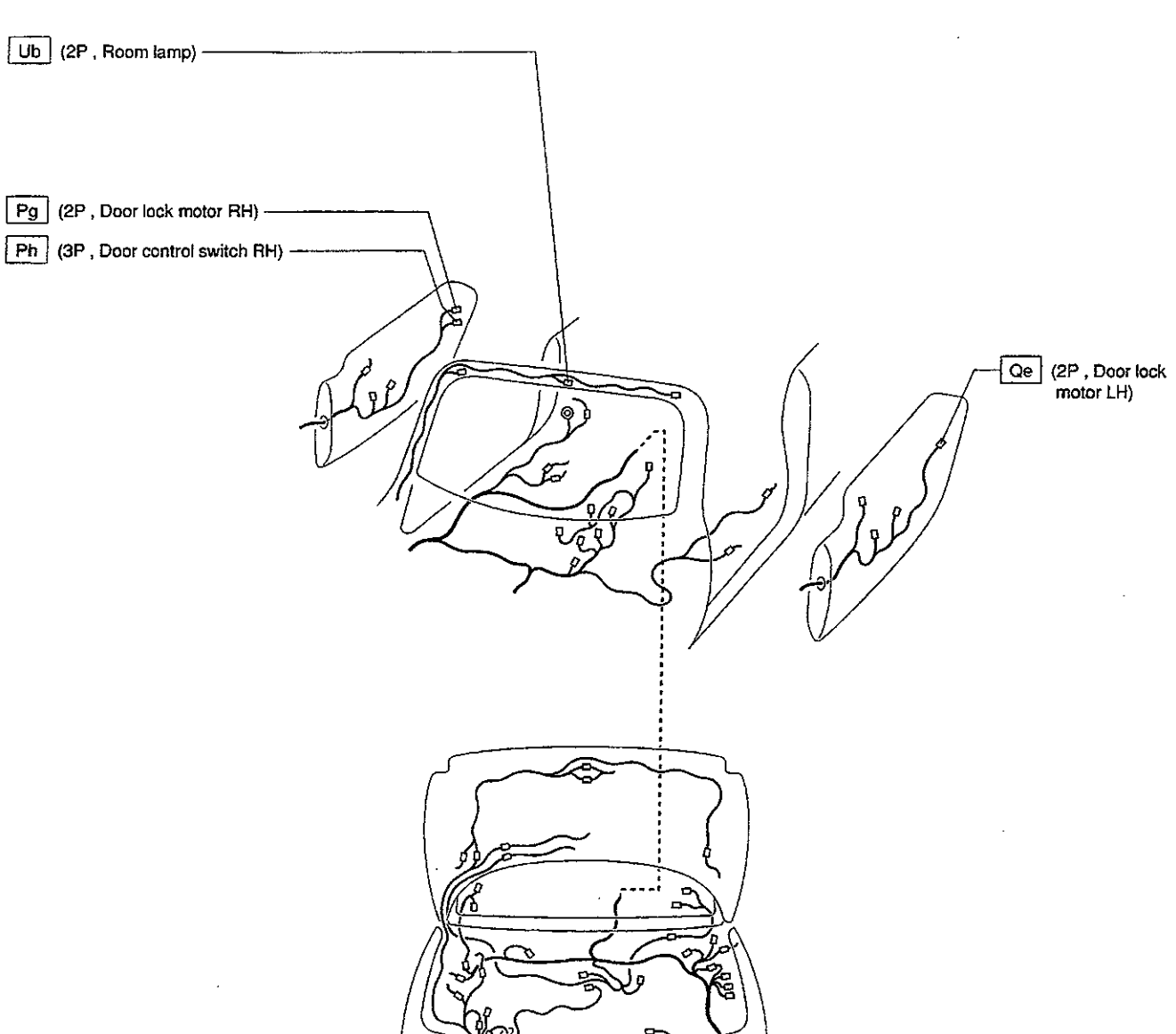




C13W5037ES48

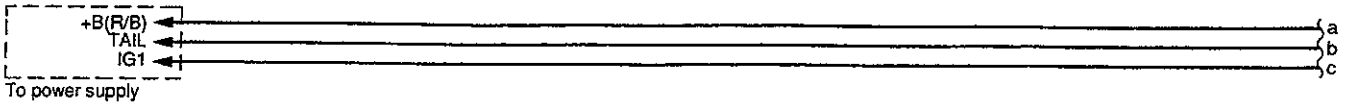


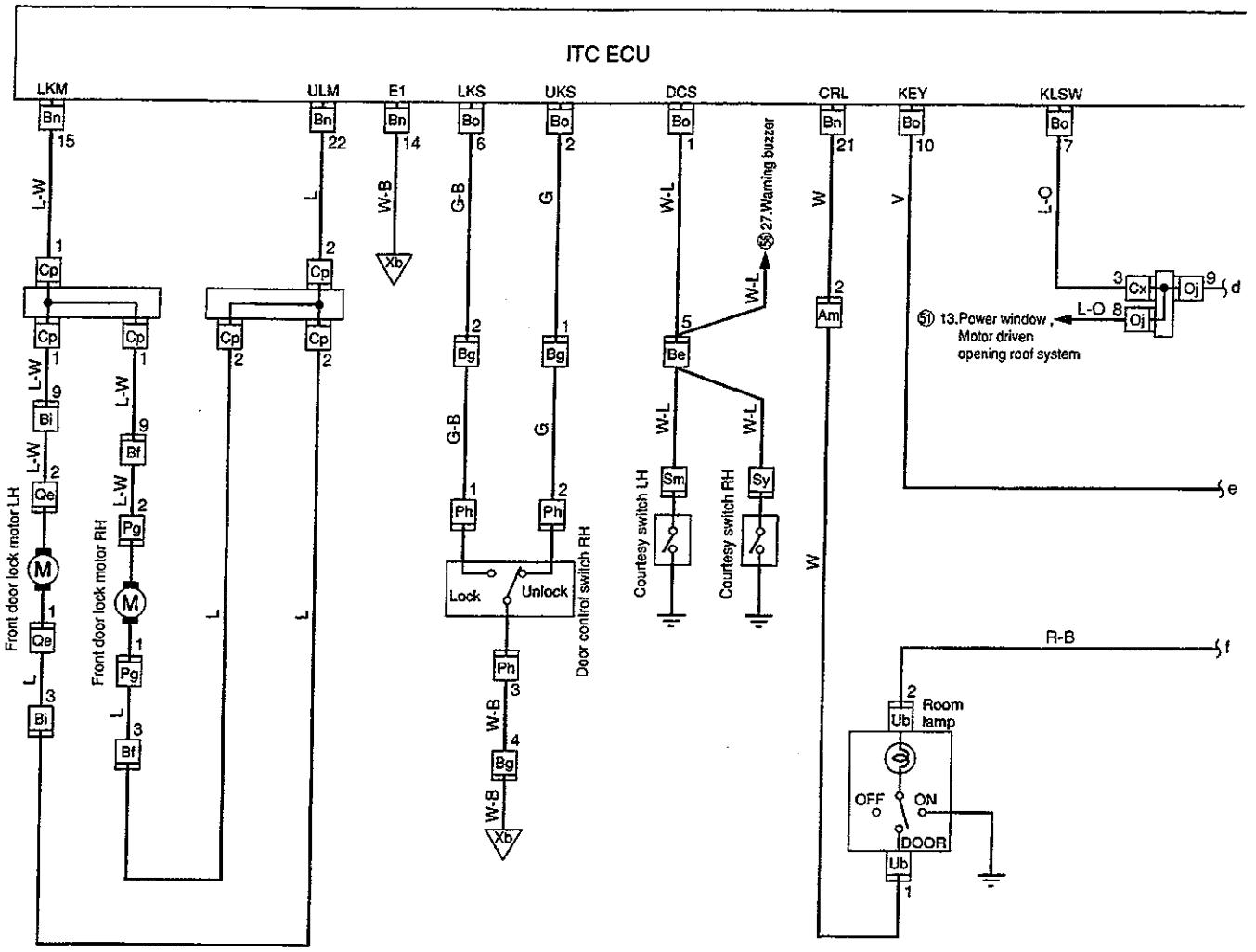
C13W5038ES48

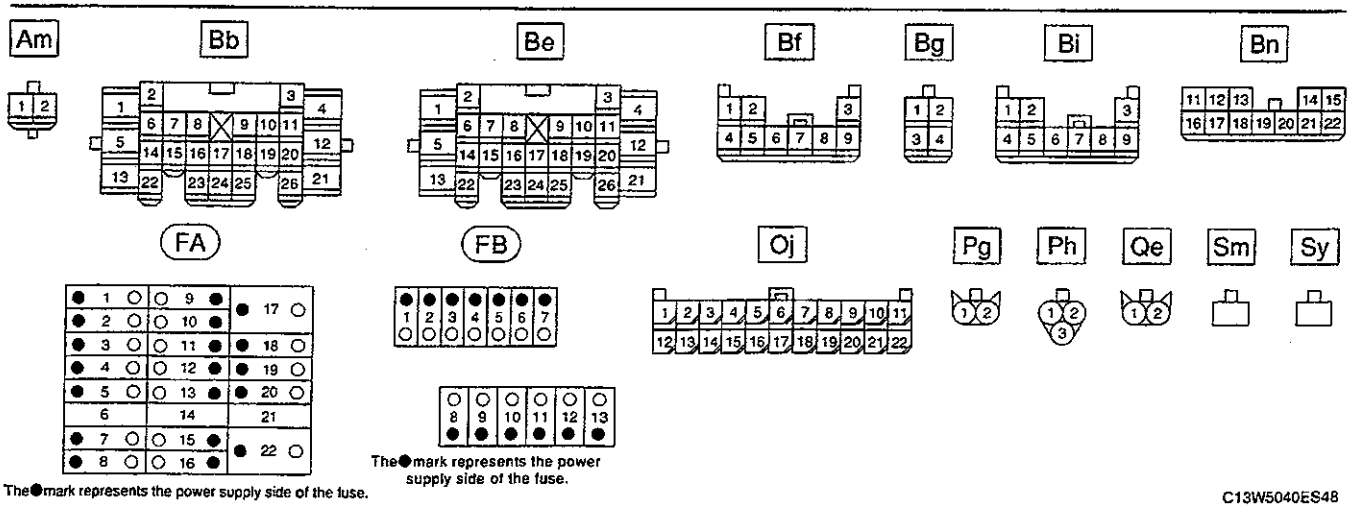


C13W5039ES48

9 ROOM LAMP, POWER DOOR LOCK, KEYLESS ENTRY SYSTEM



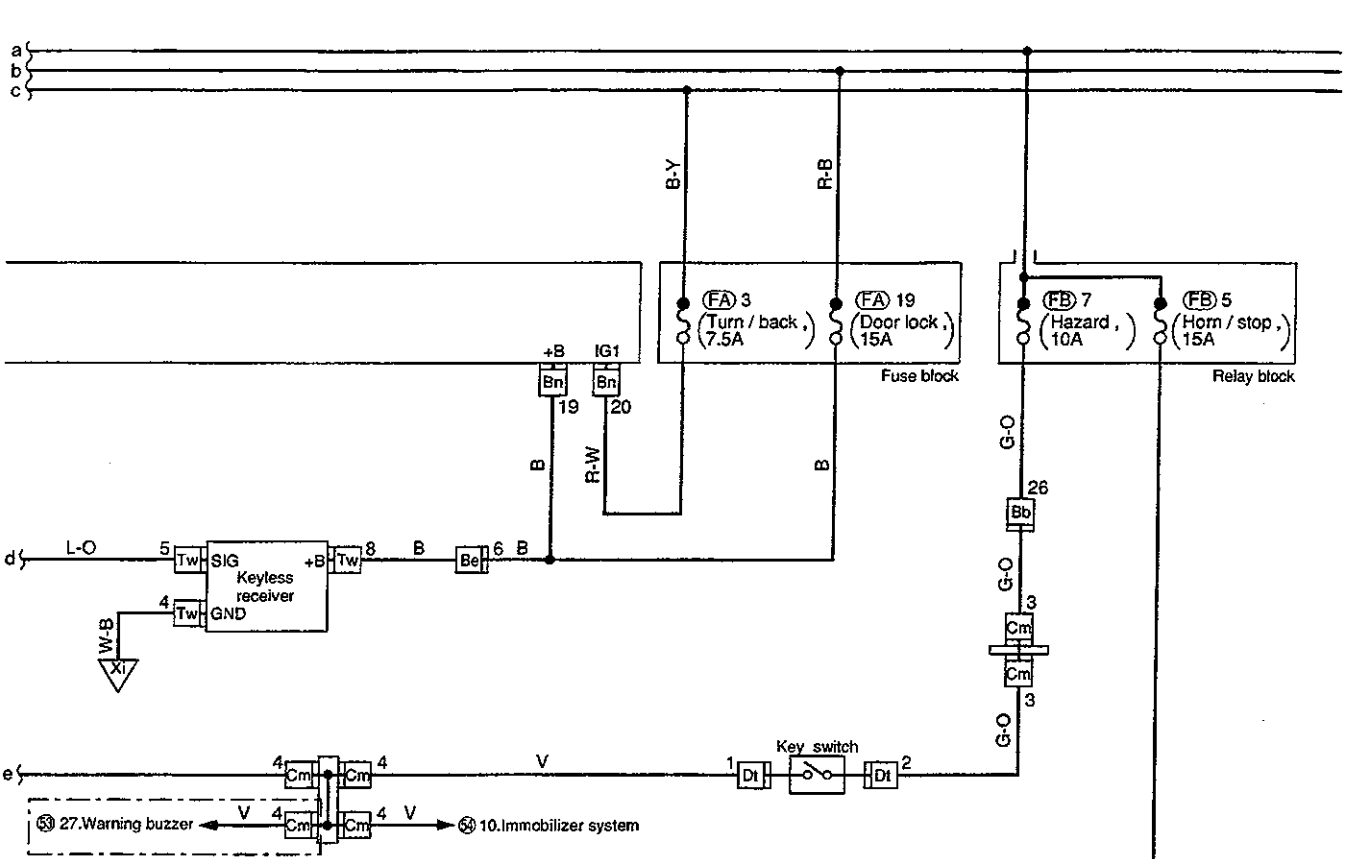


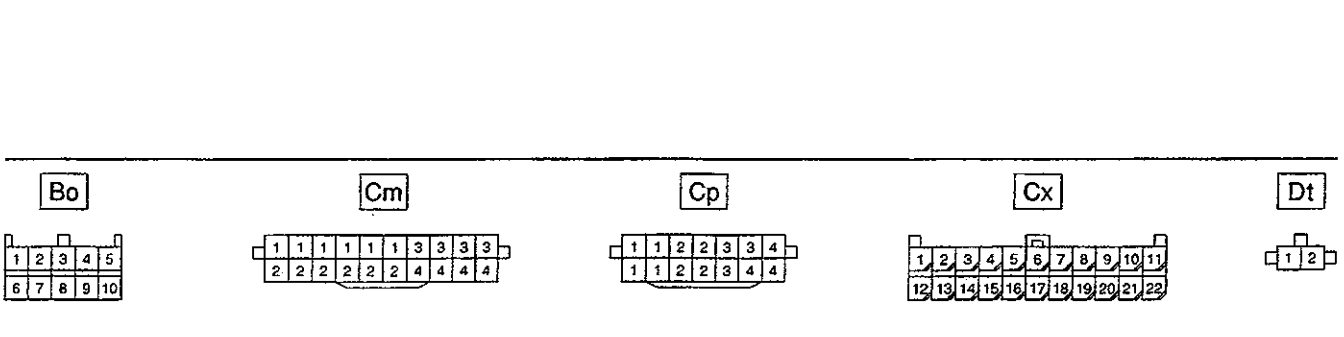


The●mark represents the power supply side of the fuse.

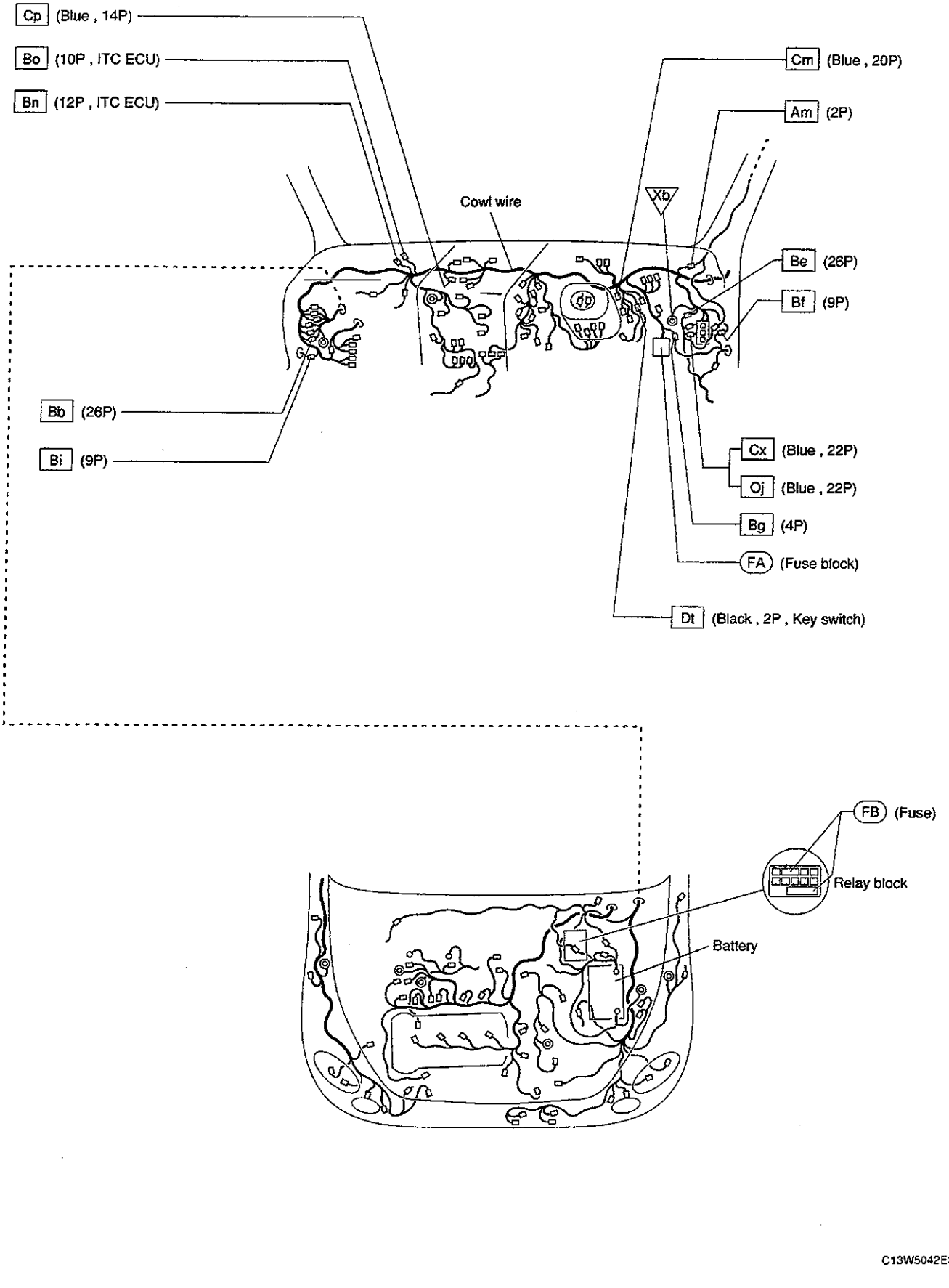
The●mark represents the power supply side of the fuse.

C13W5040ES48

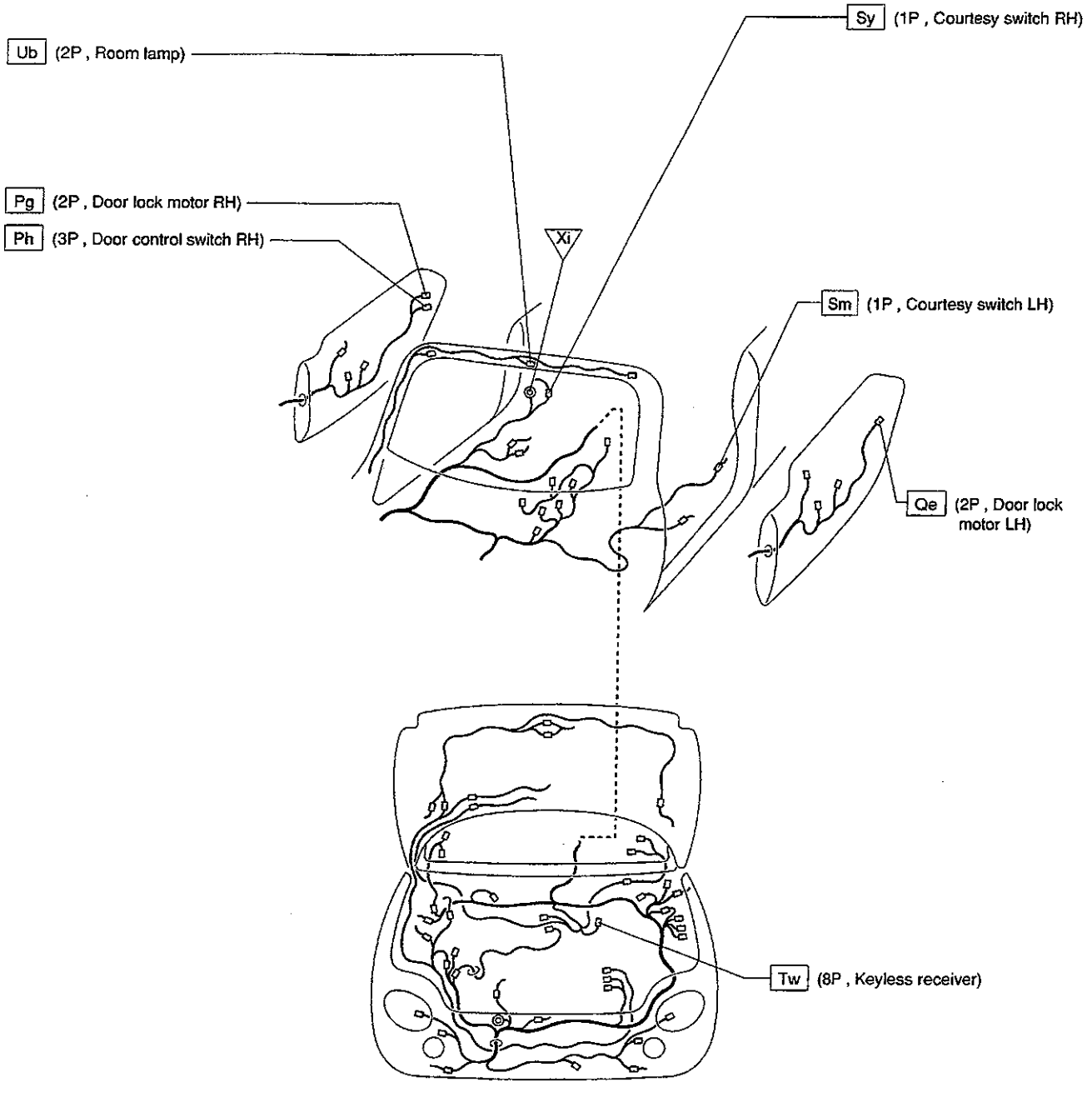




C13W5041ES48

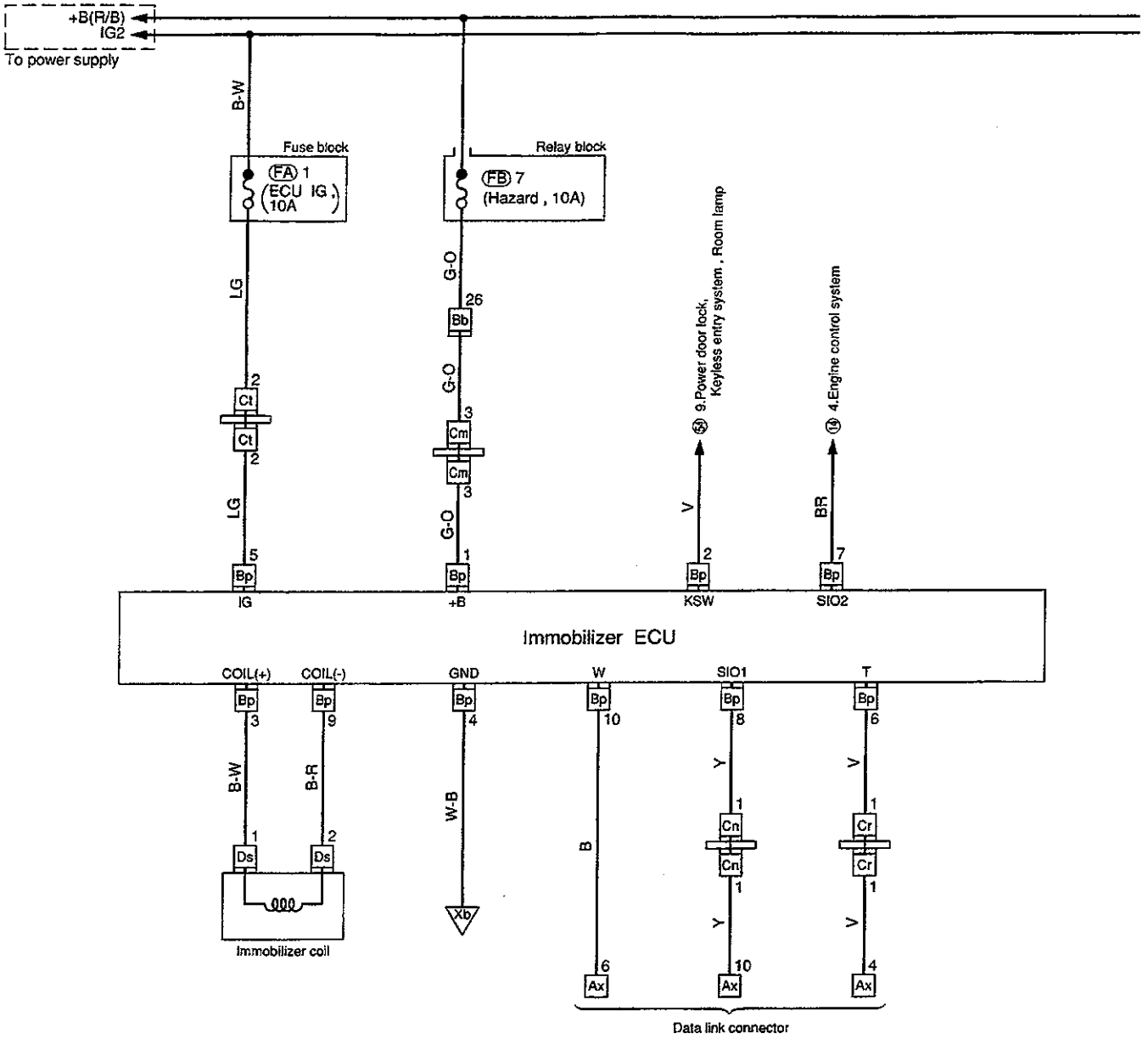


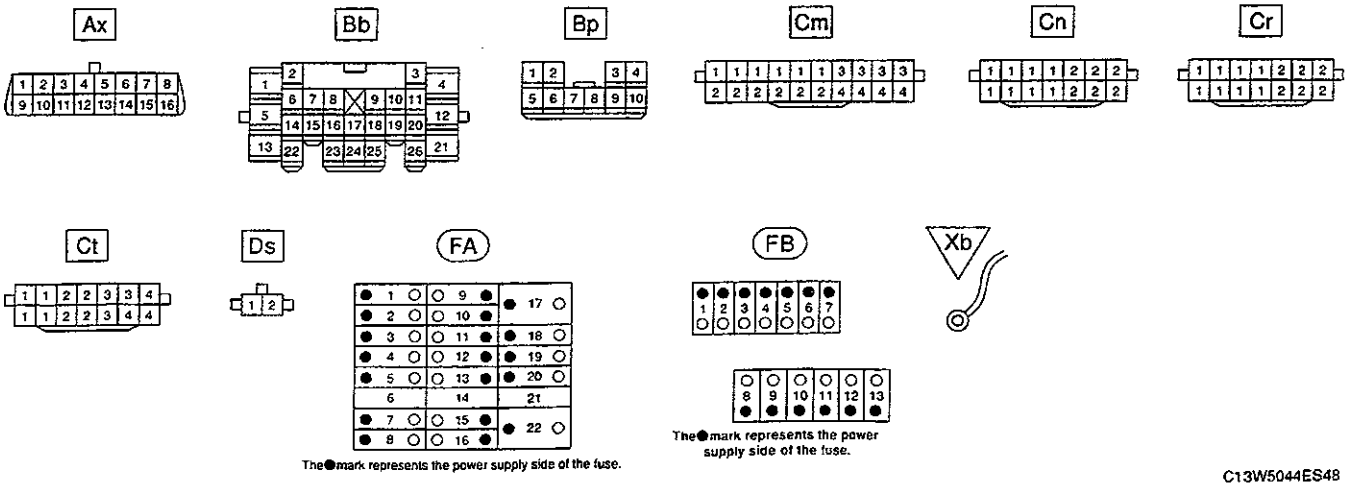
C13W5042ES48



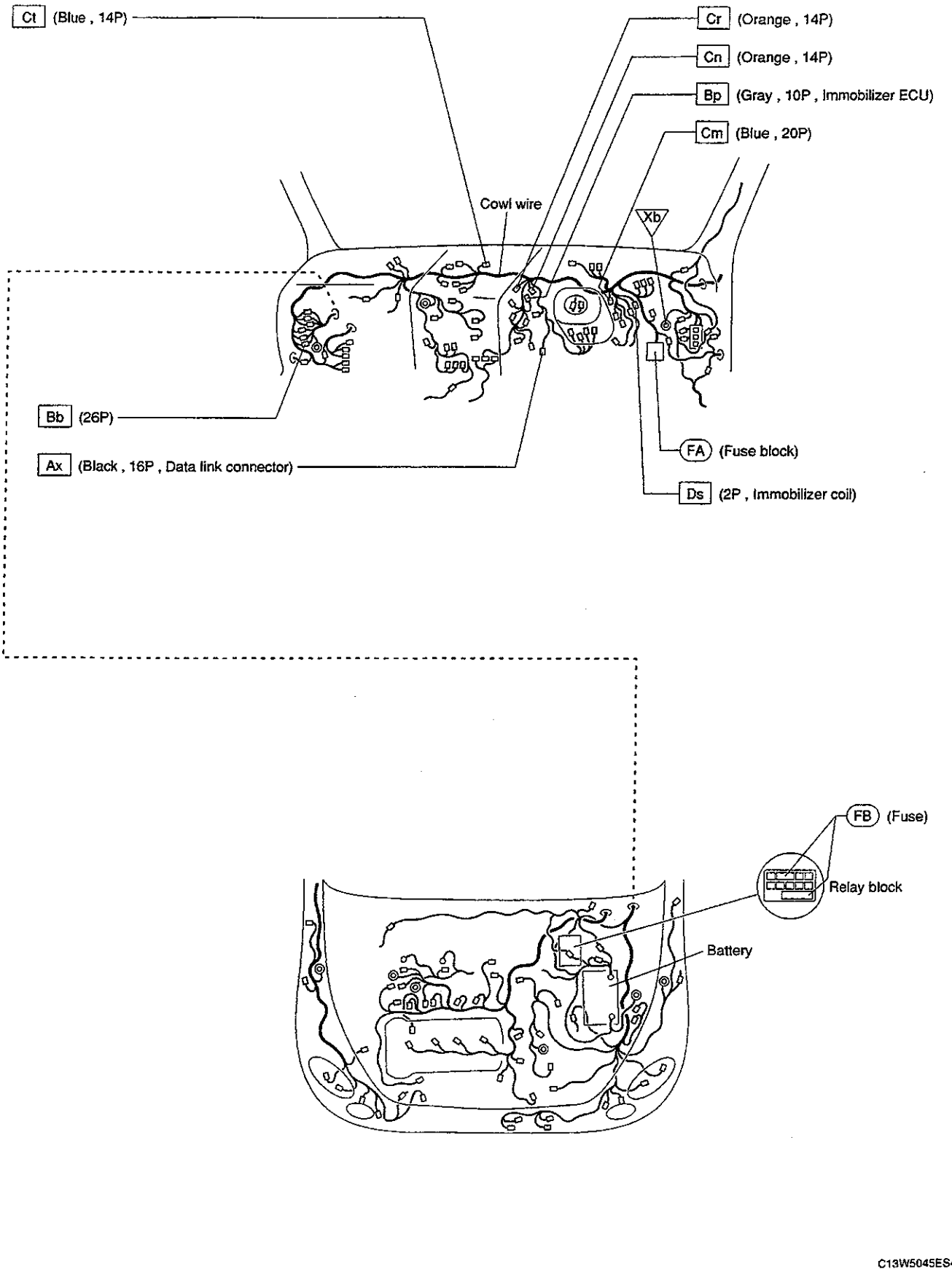
C13W5043ES48

10 IMMOBILIZAR SYSTEM



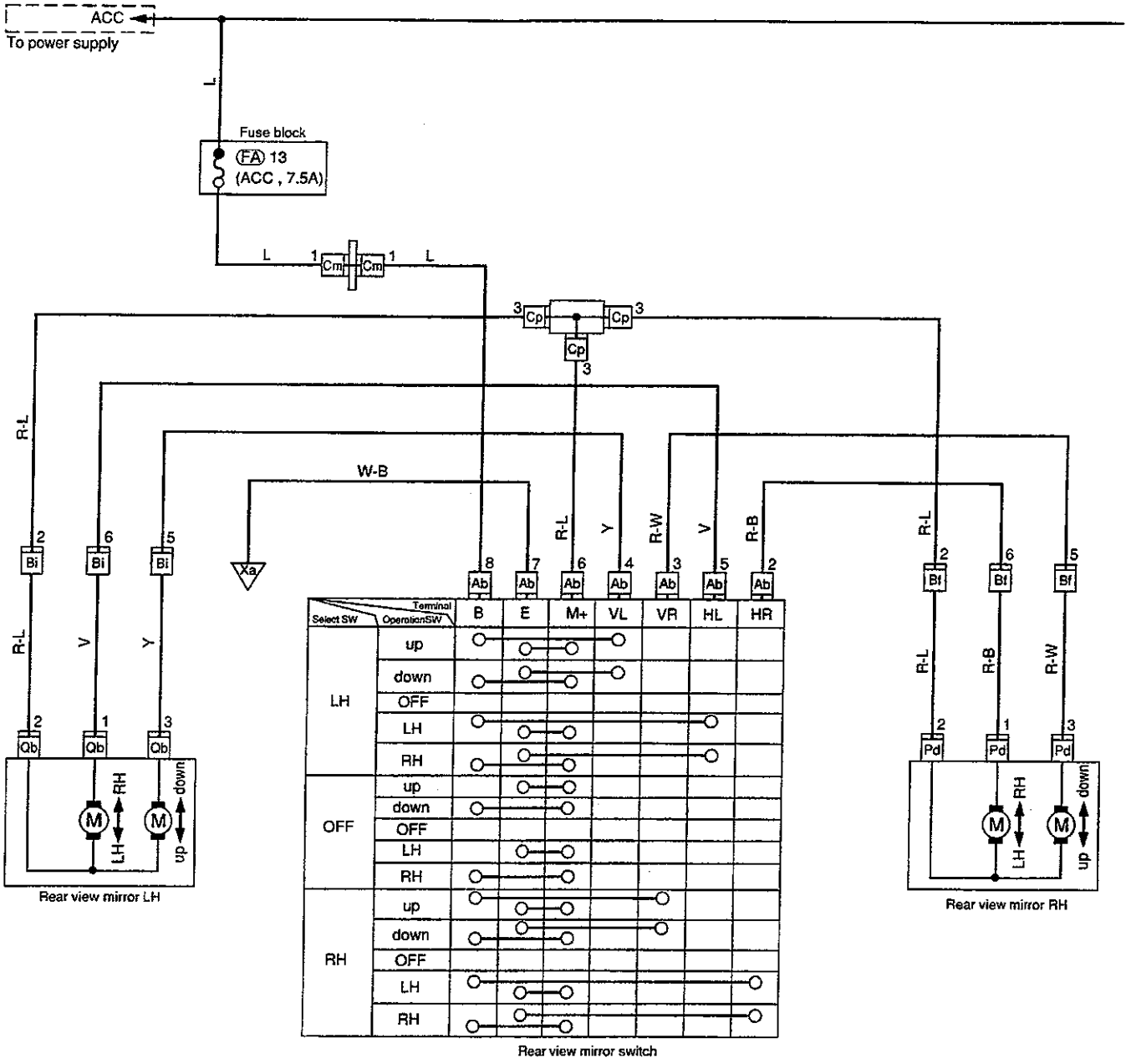


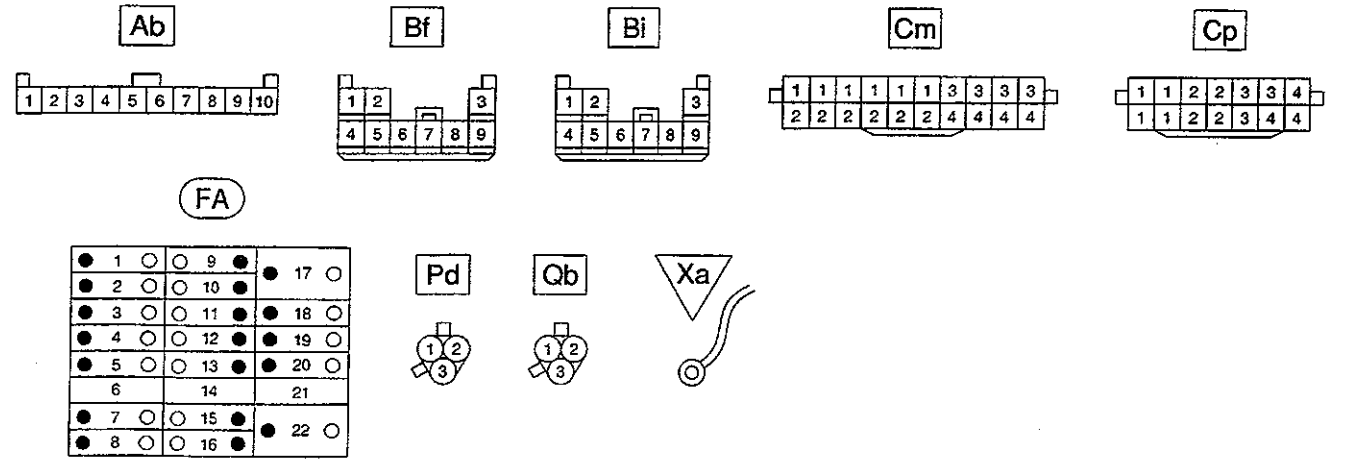
C13W5044ES48



C13W5045ES48

11 OUTER REAR VIEW MIRROR

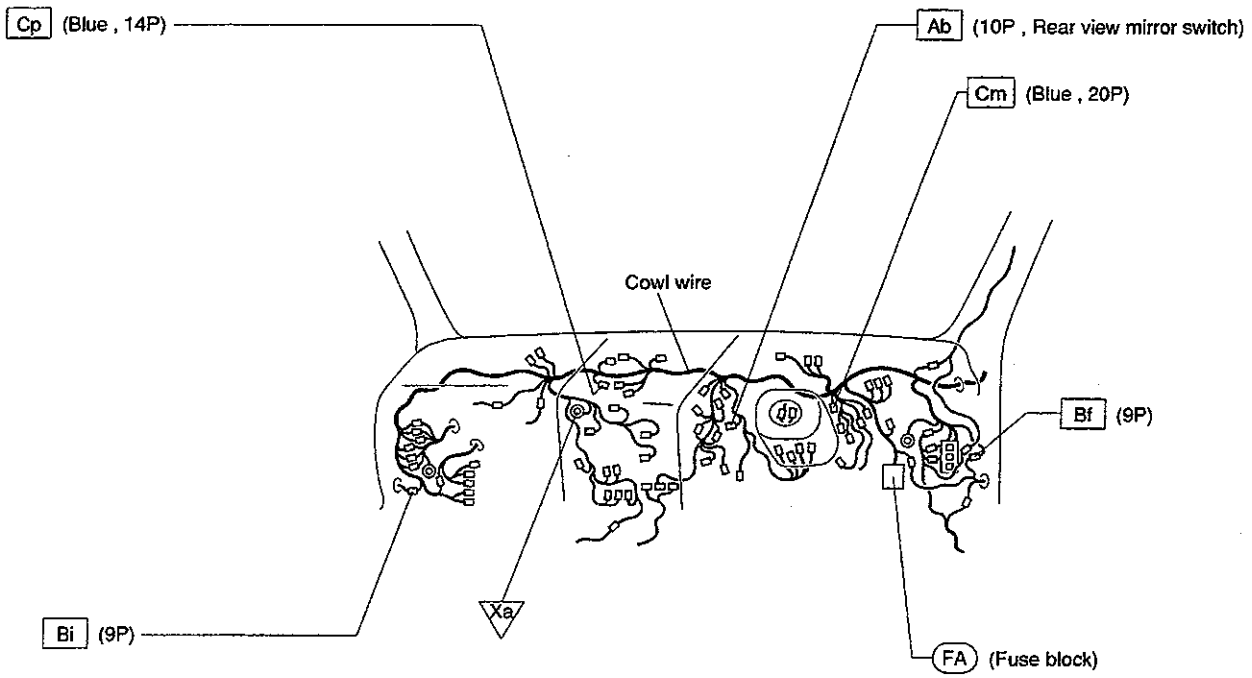




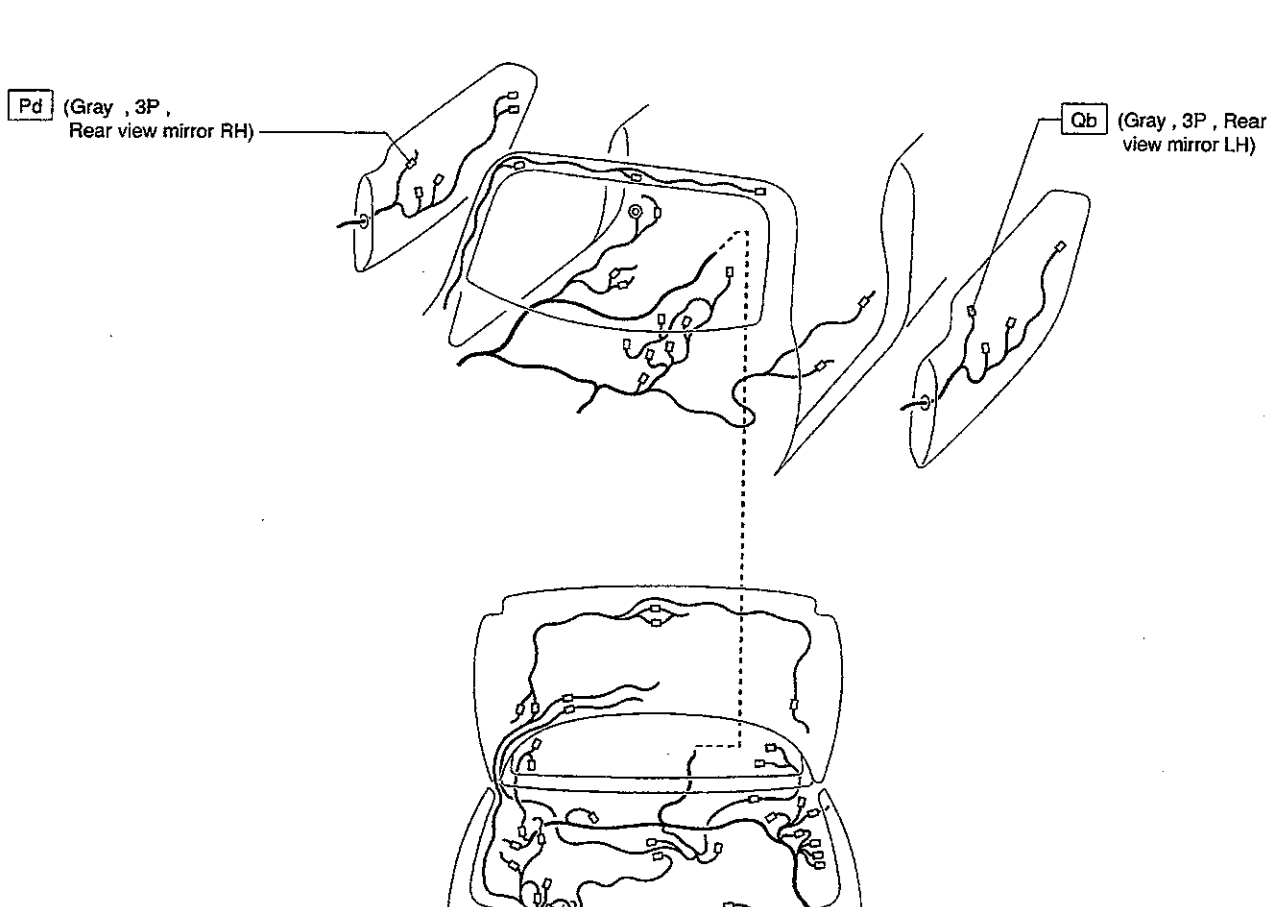
The● mark represents the power supply side of the fuse.

C13W5047ES48

(MEMO)

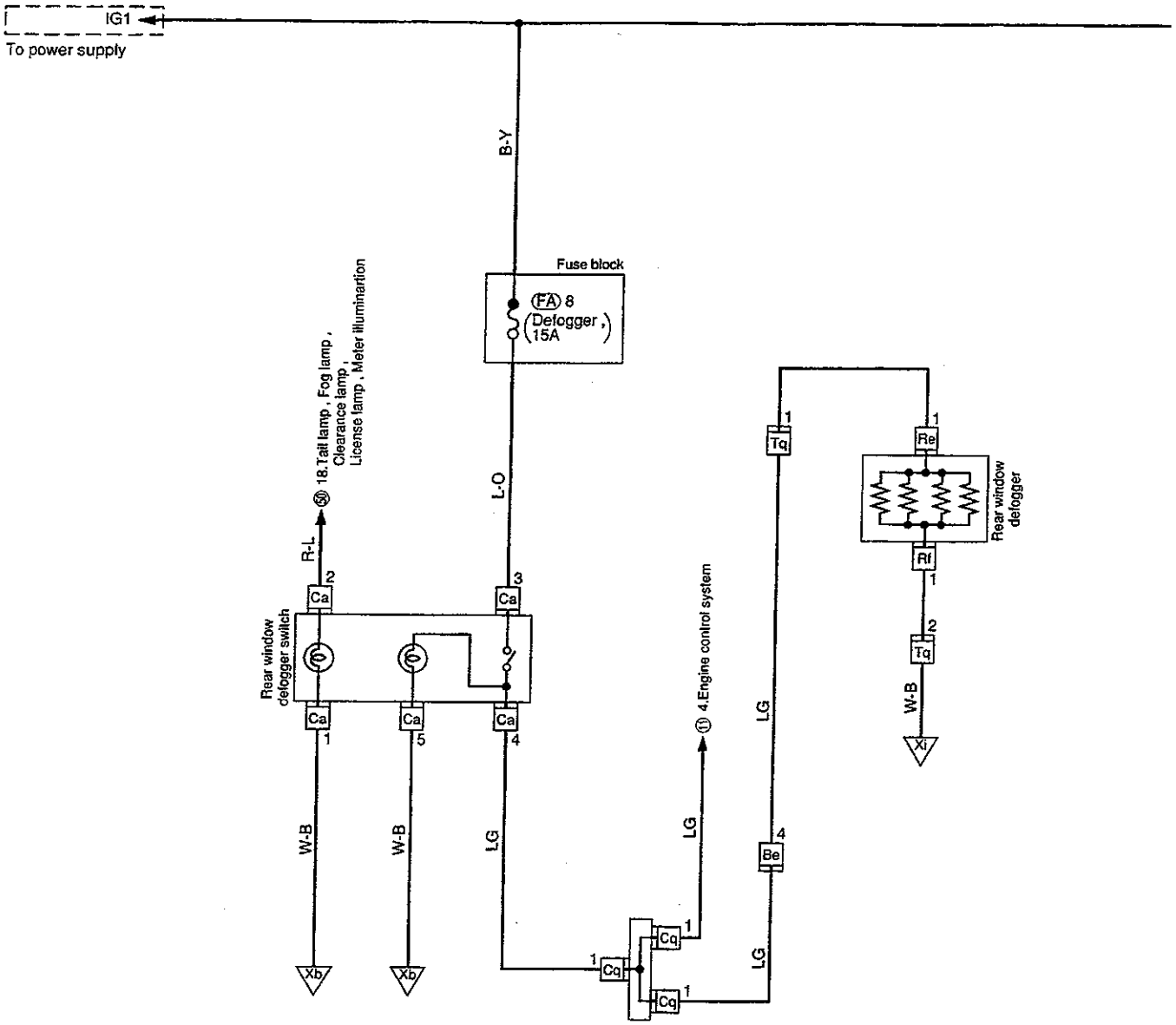


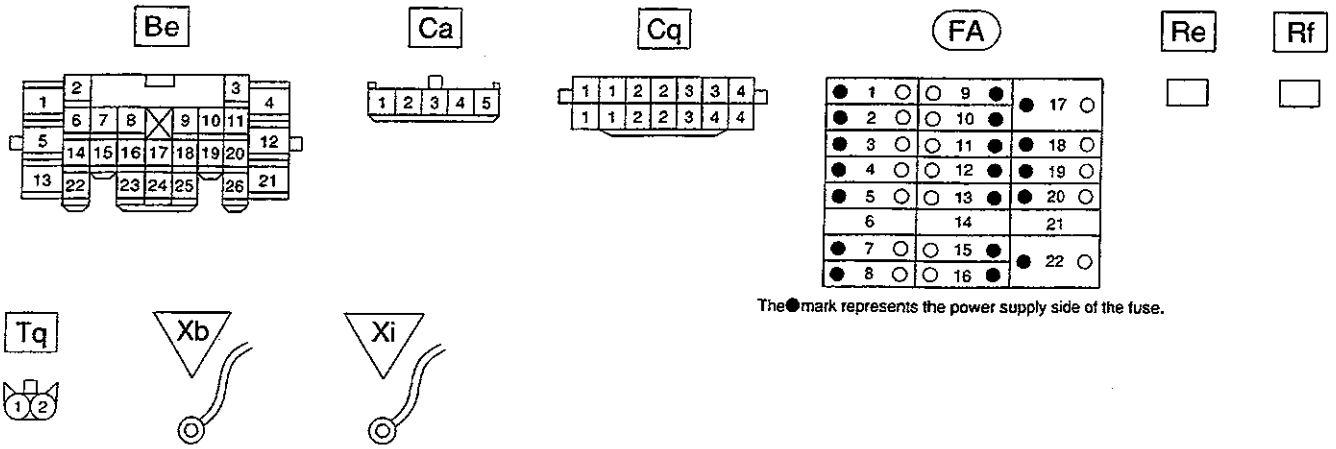
C13W5049ES48



C13W5050ES48

12 REAR WINDOW DEFOGGER

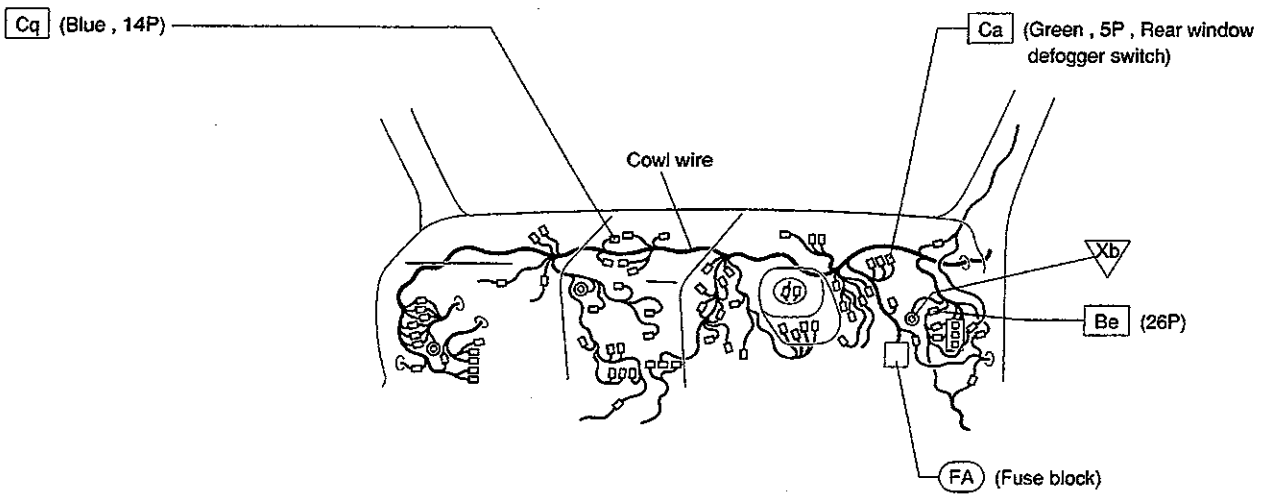




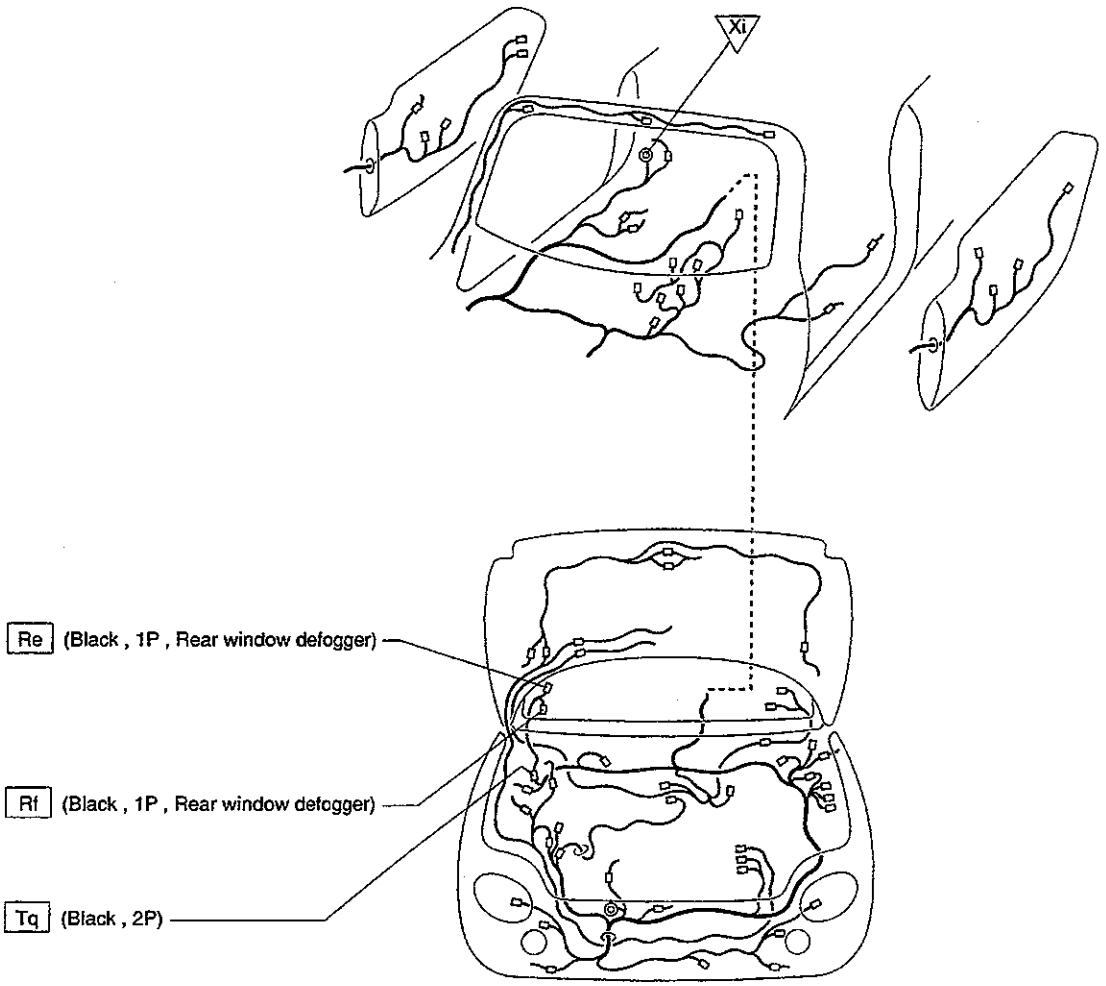
The● mark represents the power supply side of the fuse.

C13W5054ES48

(MEMO)

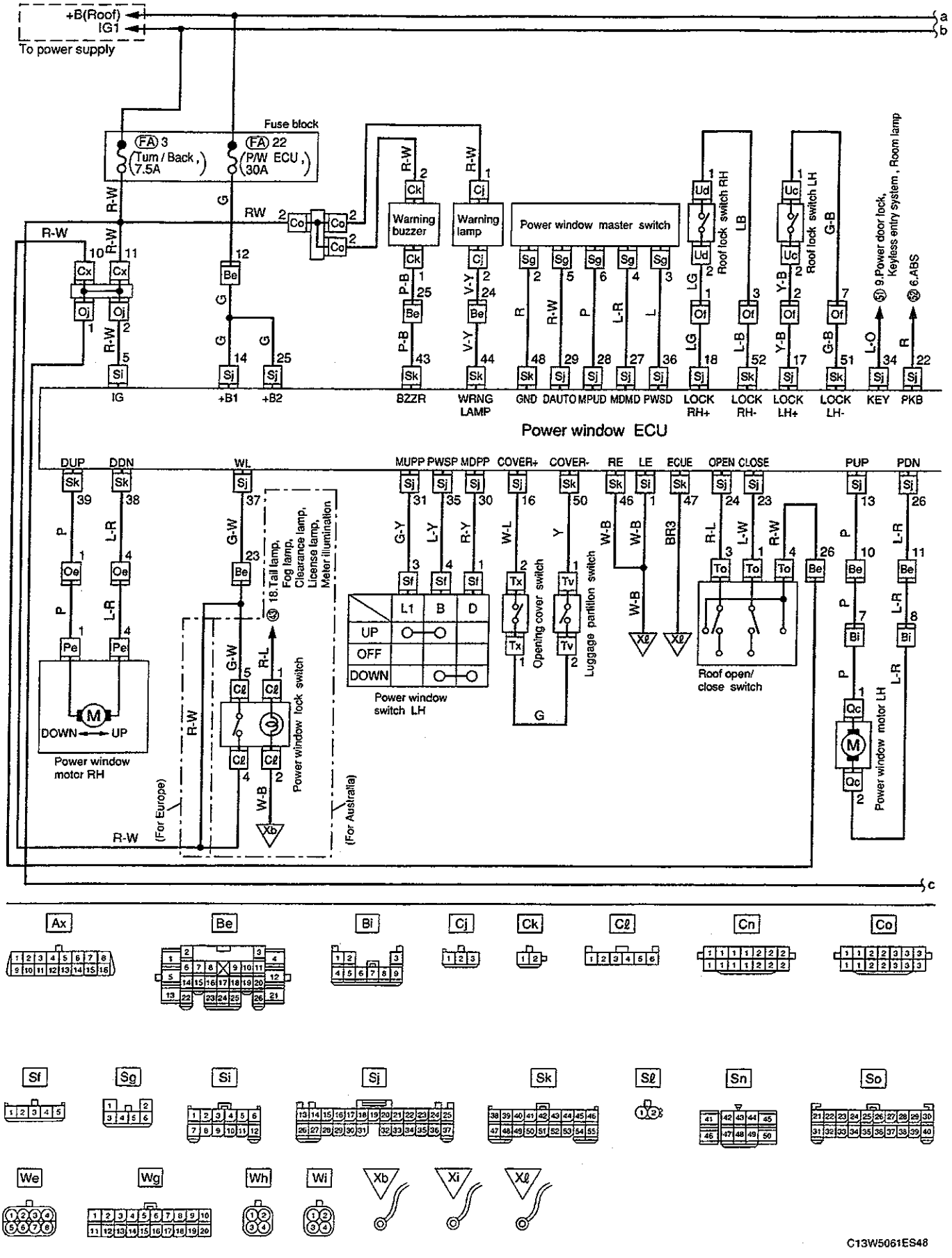


C13W5055ES48

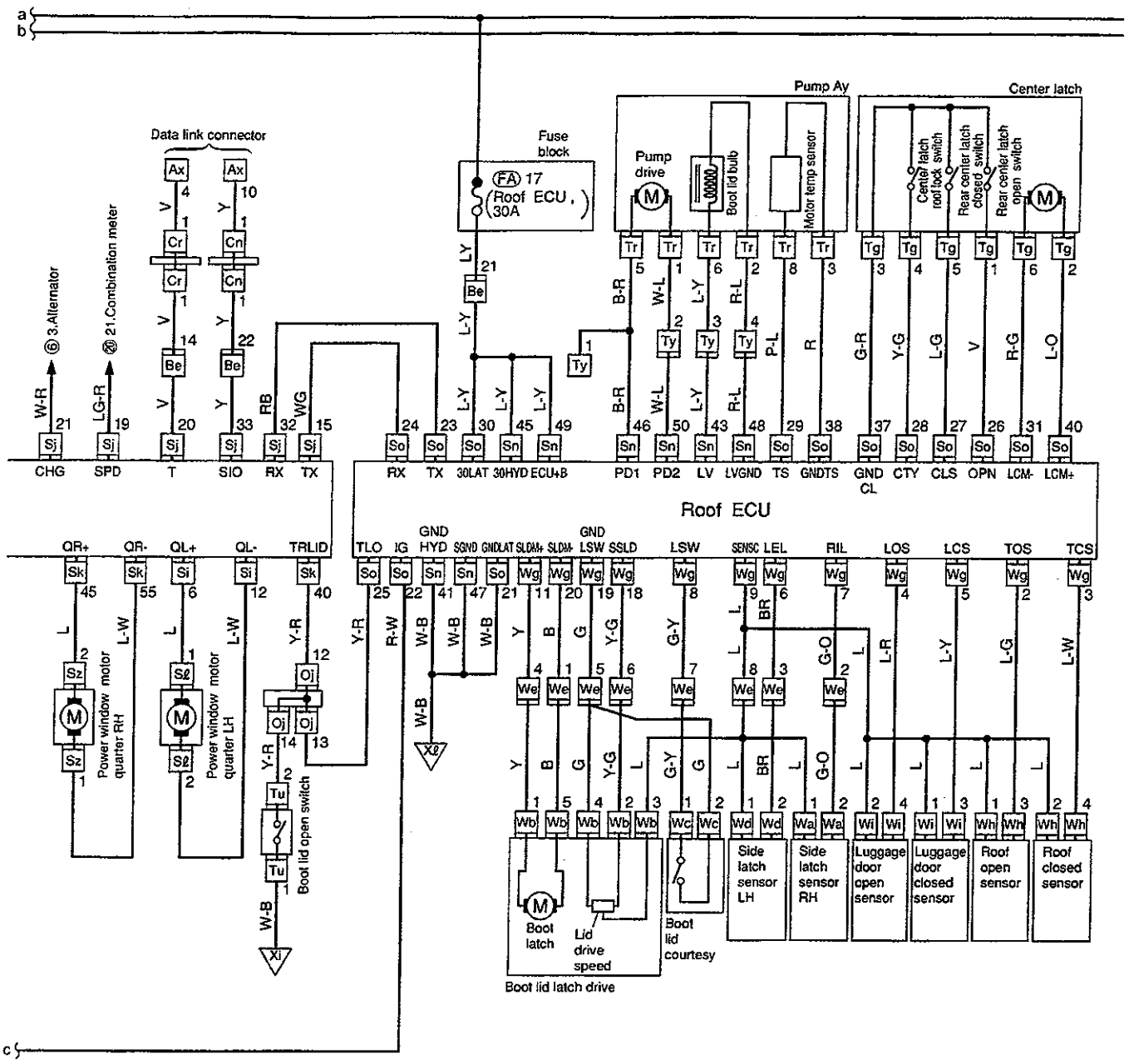


C13W5056ES48

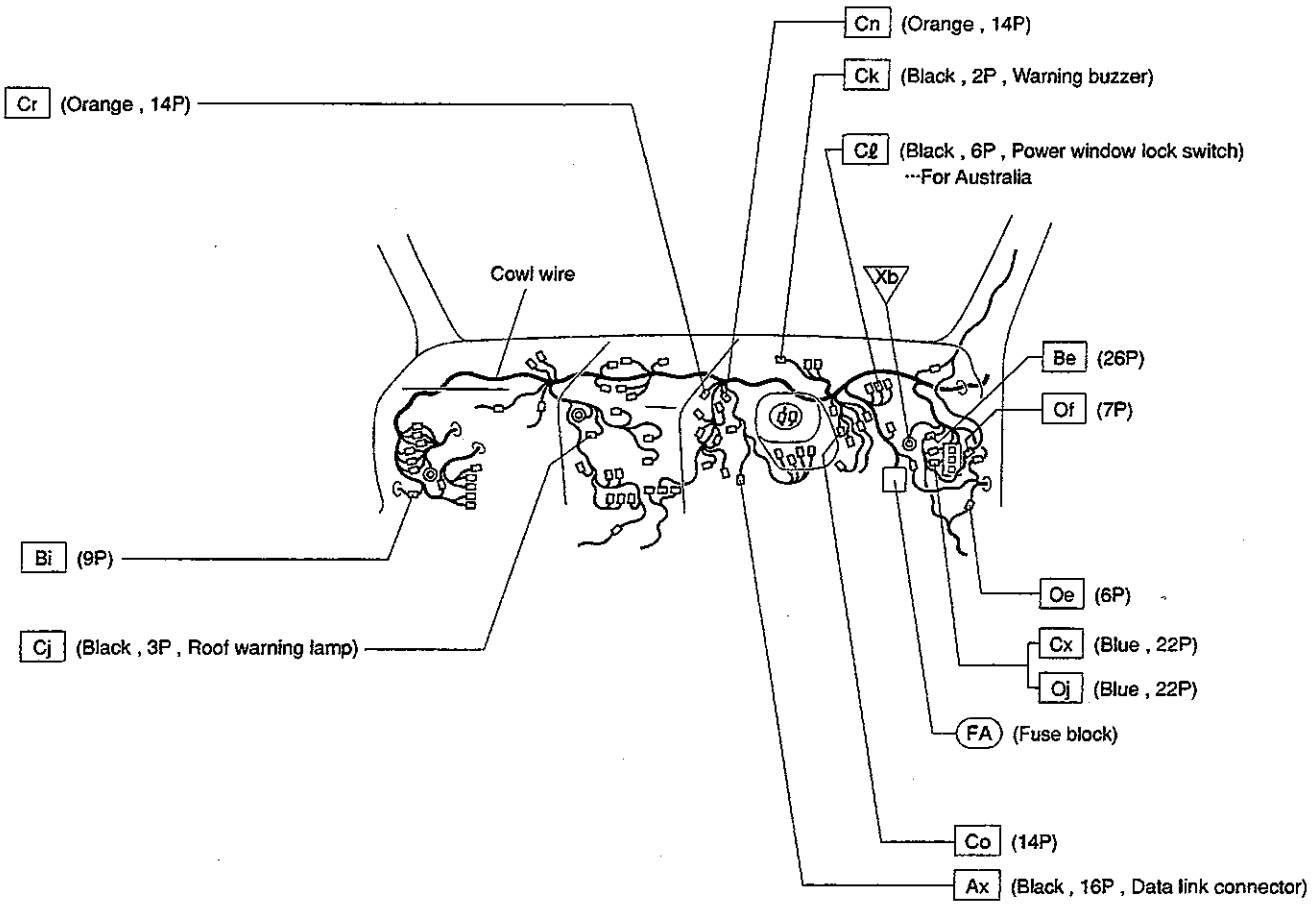
13 POWER WINDOW, MOTOR DRIVEN OPENING ROOF SYSTEM



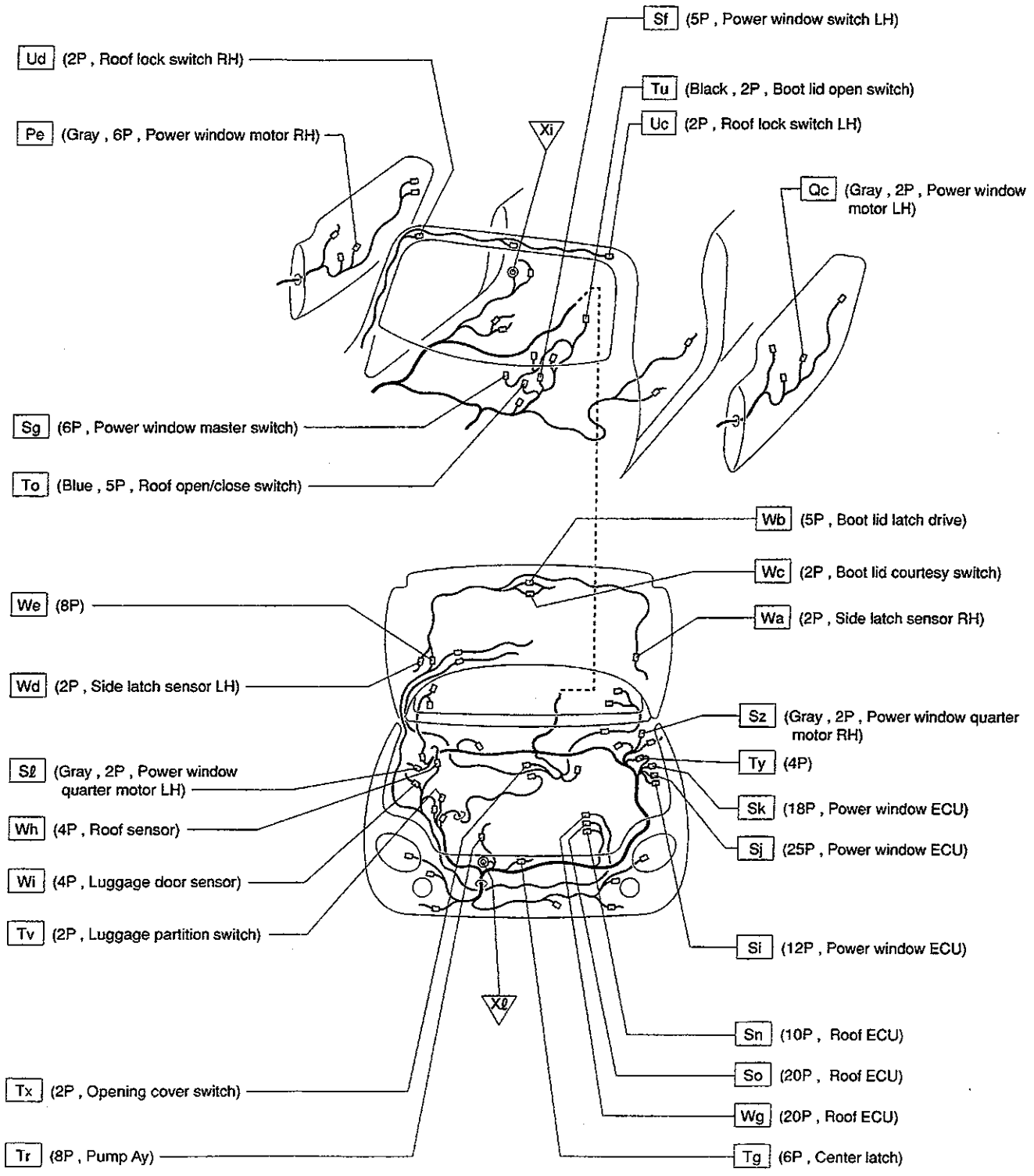
C13W5061ES48



C13W5062ES48

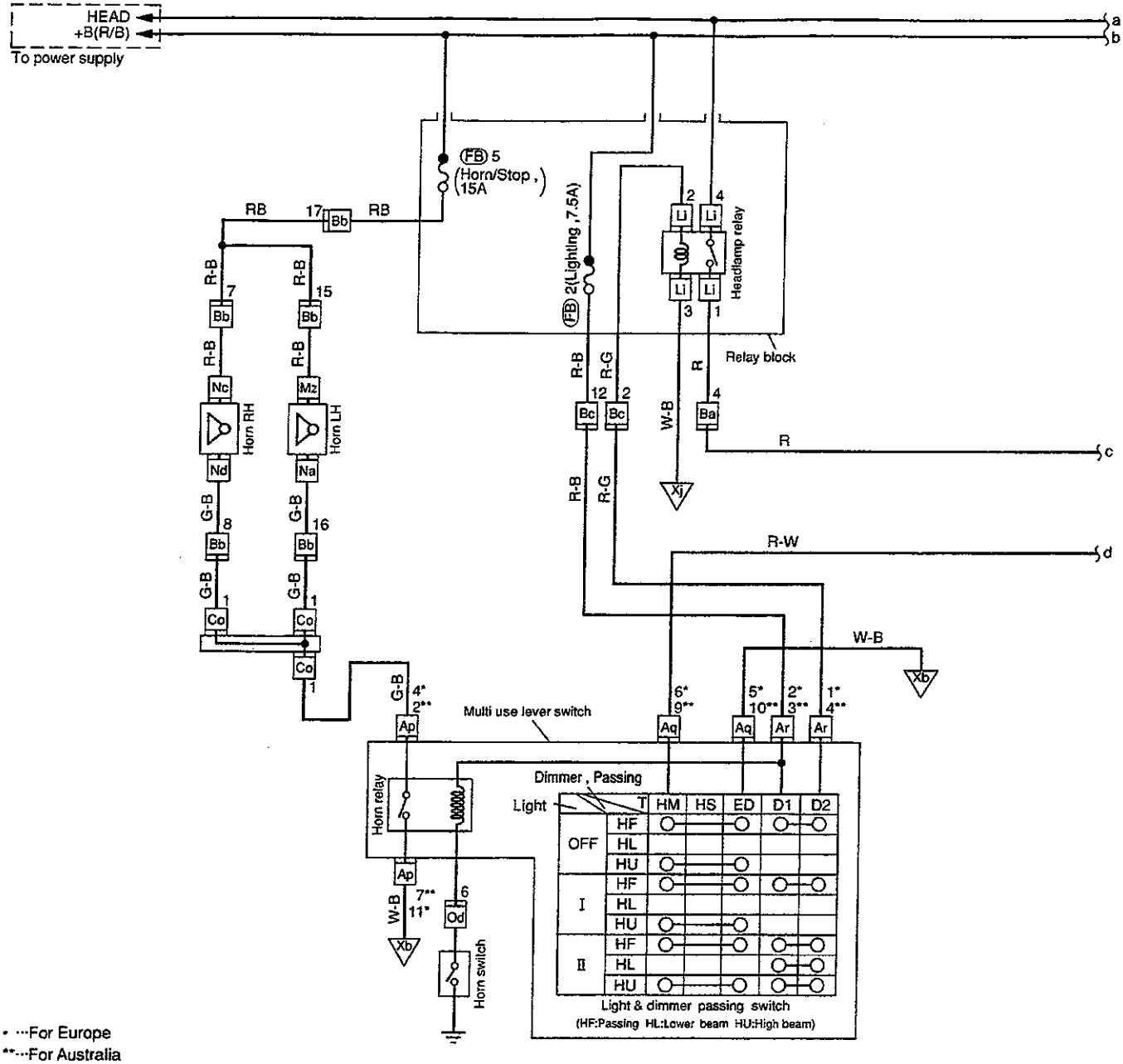


C13W5063ES48

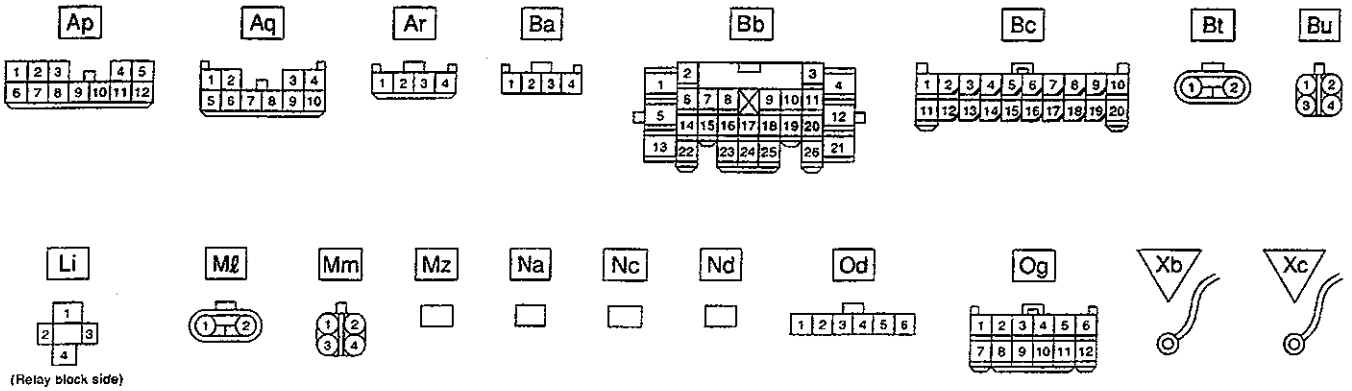


C13W5064ES48

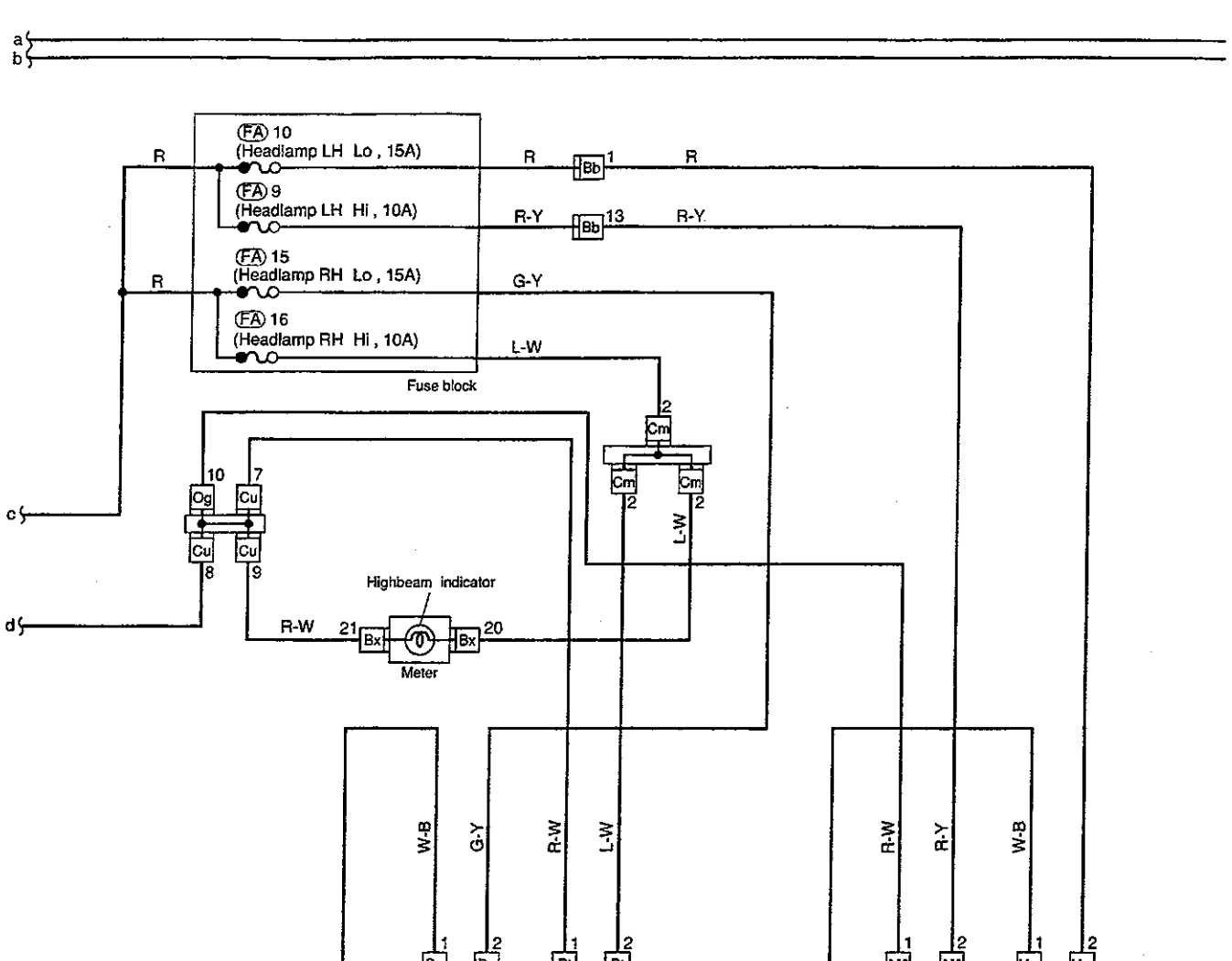
14 HEAD LAMP, HORN

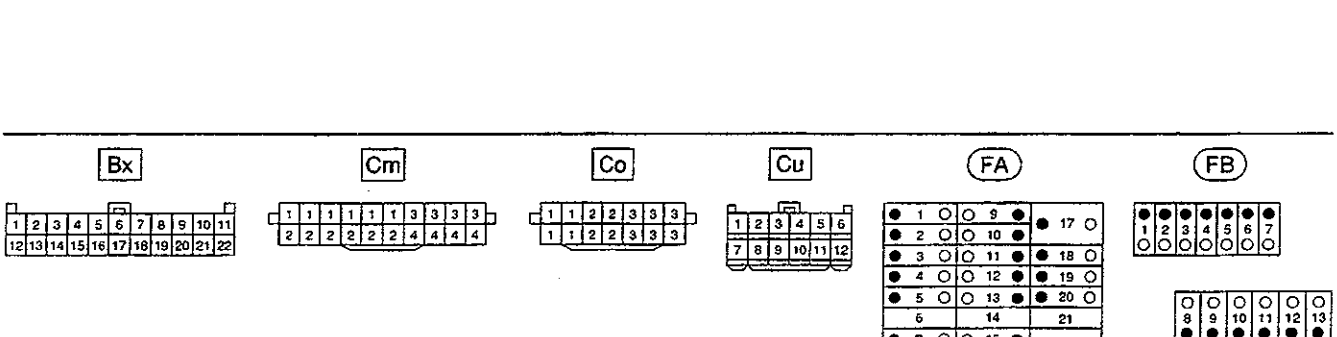


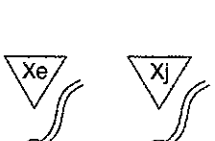
* ···For Europe
**···For Australia



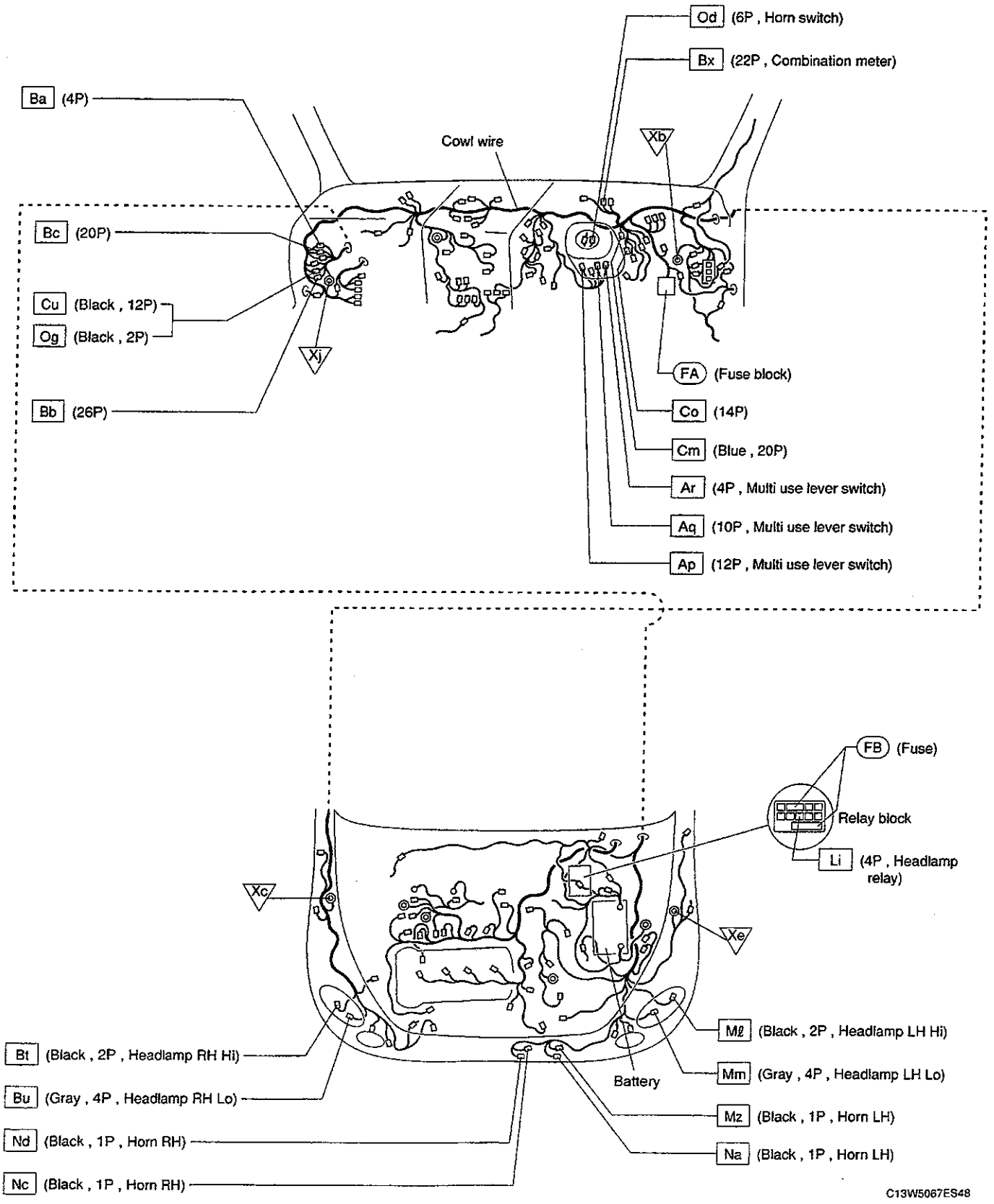
C13W5065ES48







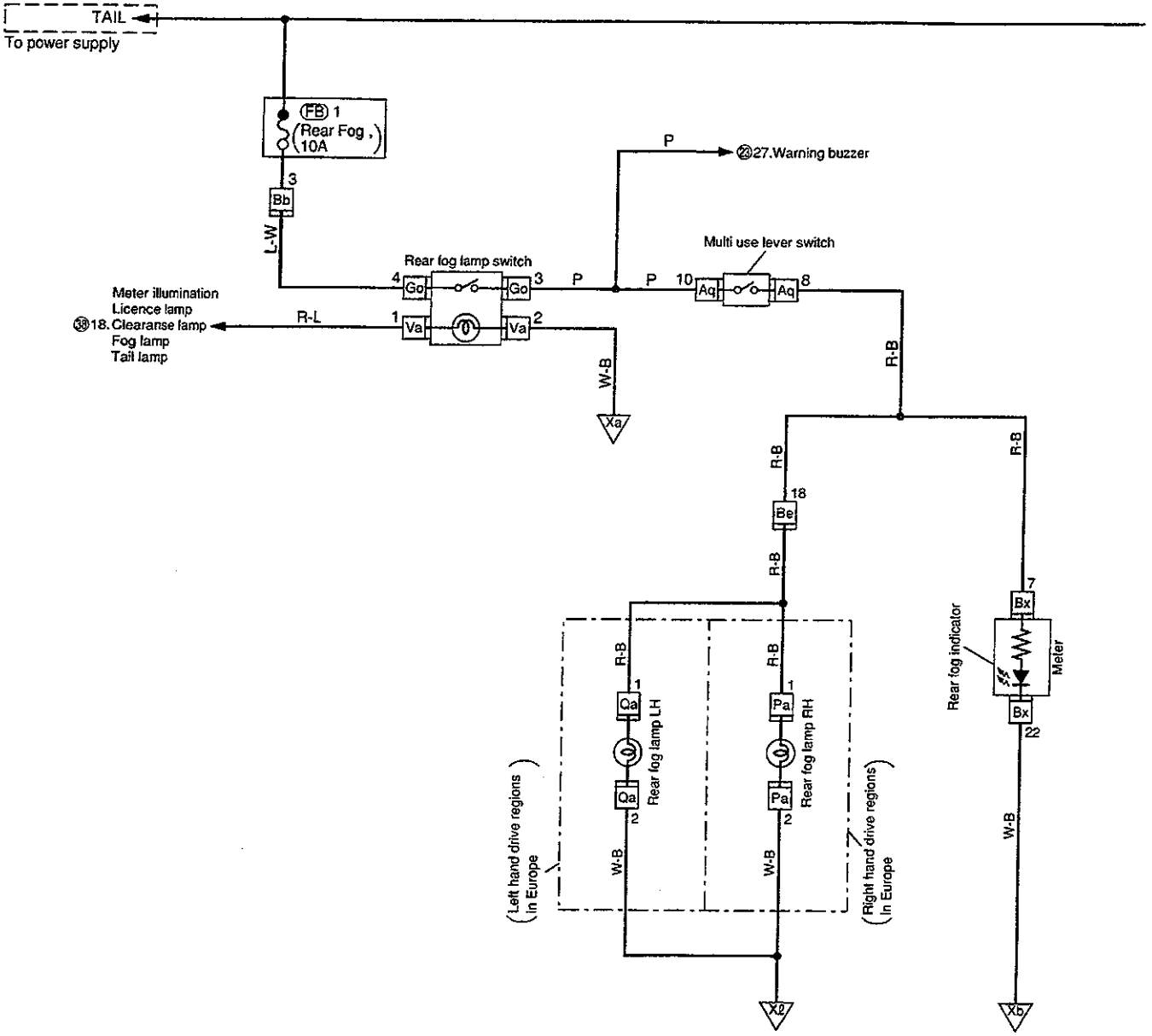
C13W5066ES48

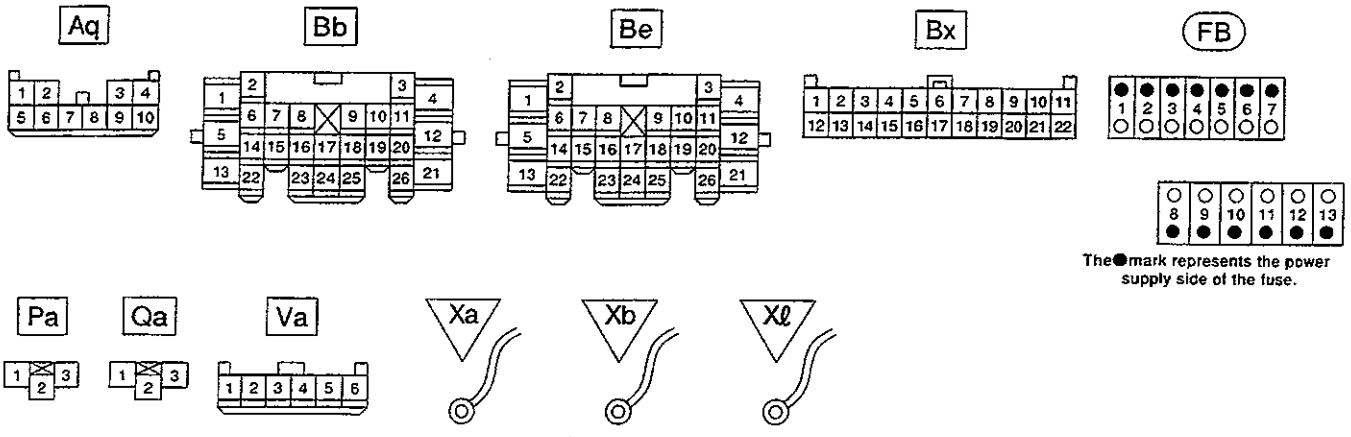

Od (6P , Horn switch)
Bx (22P , Combination meter)
Ba (4P)
Cowl wire
Xb
Bc (20P)
Cu (Black , 12P)
Og (Black , 2P)
Xj
Bb (26P)
FA (Fuse block)
Co (14P)
Cm (Blue , 20P)
Ar (4P , Multi use lever switch)
Aq (10P , Multi use lever switch)
Ap (12P , Multi use lever switch)
FB (Fuse)
Relay block
Li (4P , Headlamp relay)
Xc
Xe
Bt (Black , 2P , Headlamp RH Hi)
Bu (Gray , 4P , Headlamp RH Lo)
Nd (Black , 1P , Horn RH)
Nc (Black , 1P , Horn RH)
Battery
Mℓ (Black , 2P , Headlamp LH Hi)
Mm (Gray , 4P , Headlamp LH Lo)
Mz (Black , 1P , Horn LH)
Na (Black , 1P , Horn LH)
C13W5067ES48

(MEMO)

15 REAR FOG LAMP

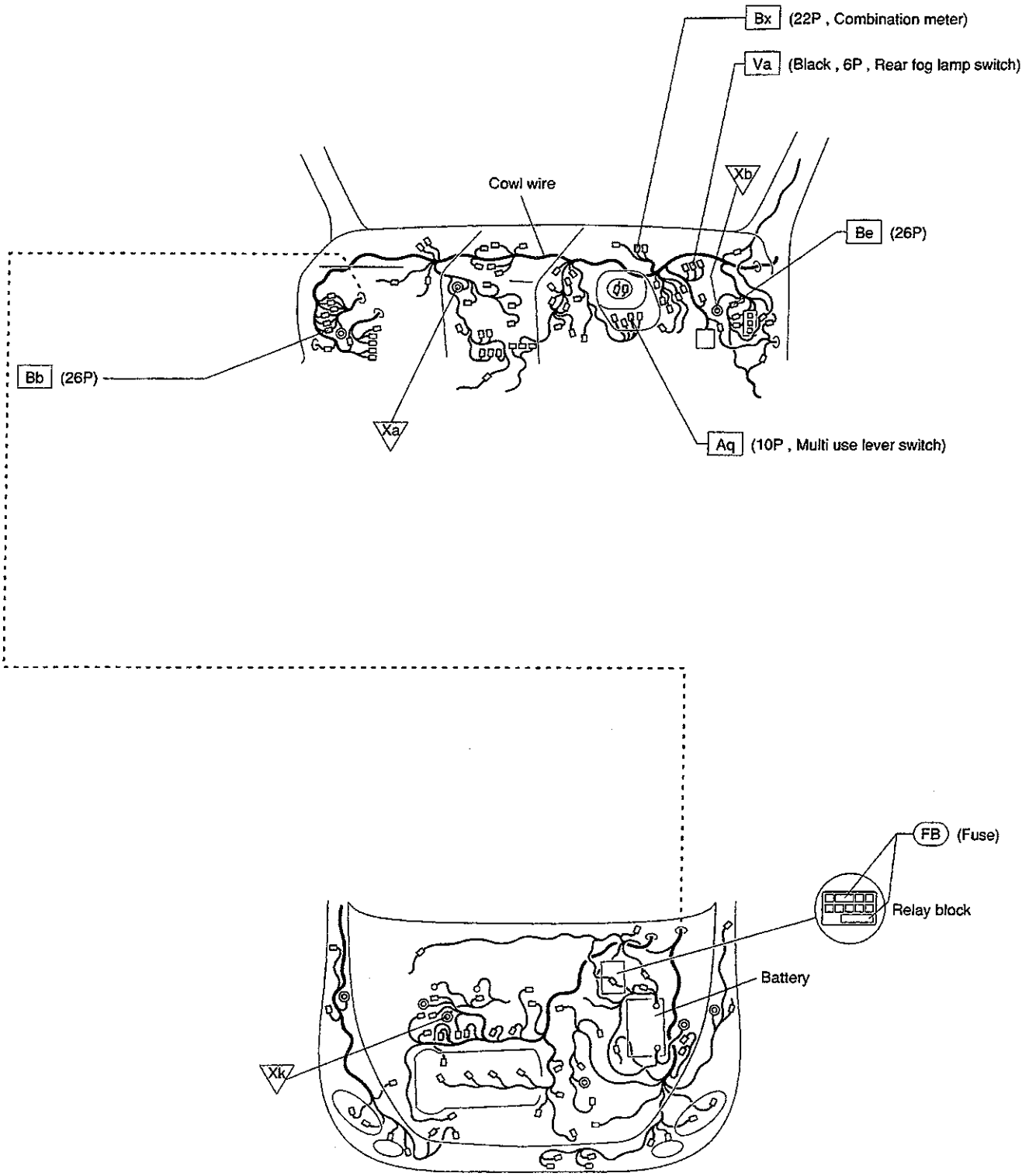
15-1 FOR EUROPE



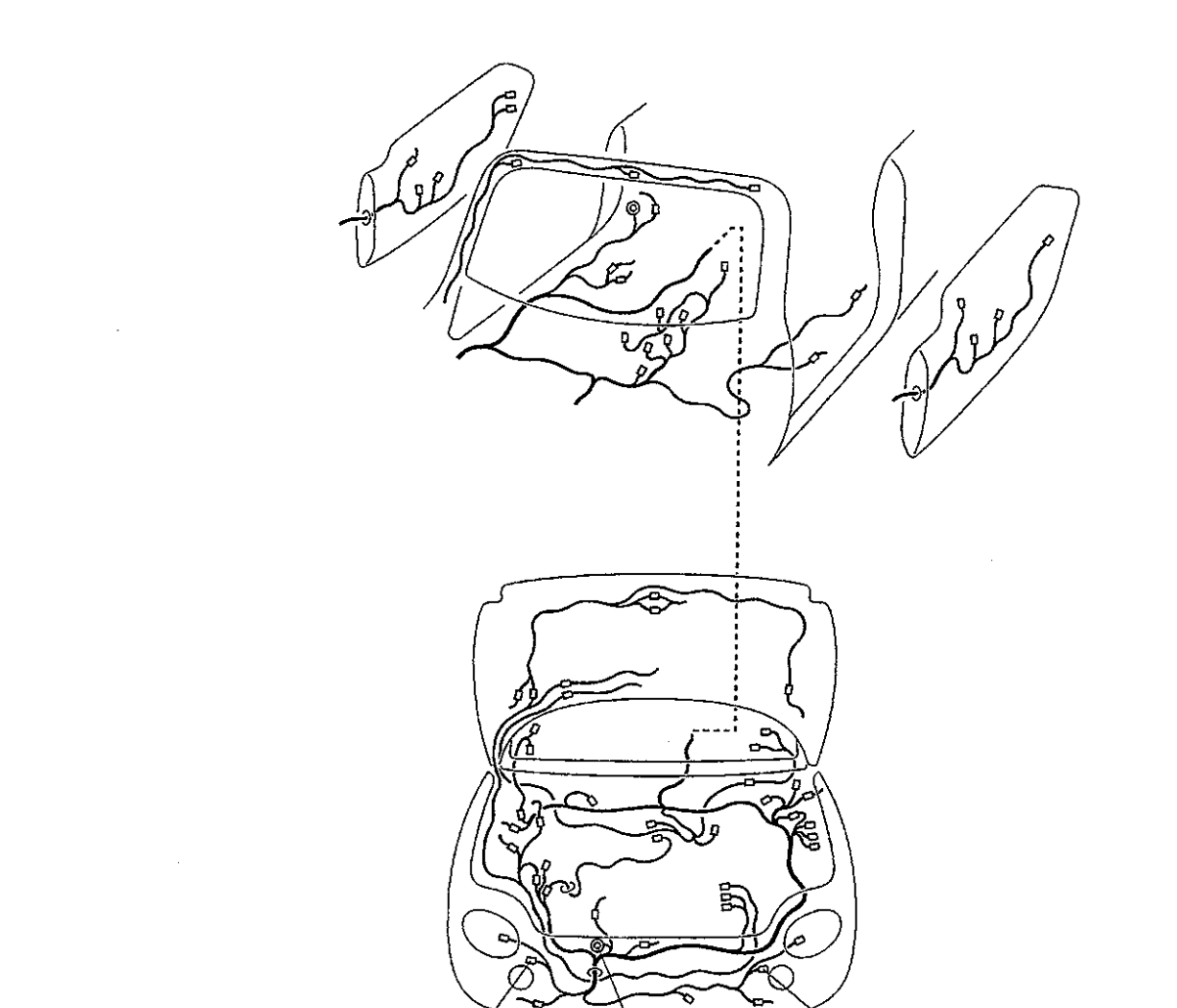


C13W5111ES48

(MEMO)

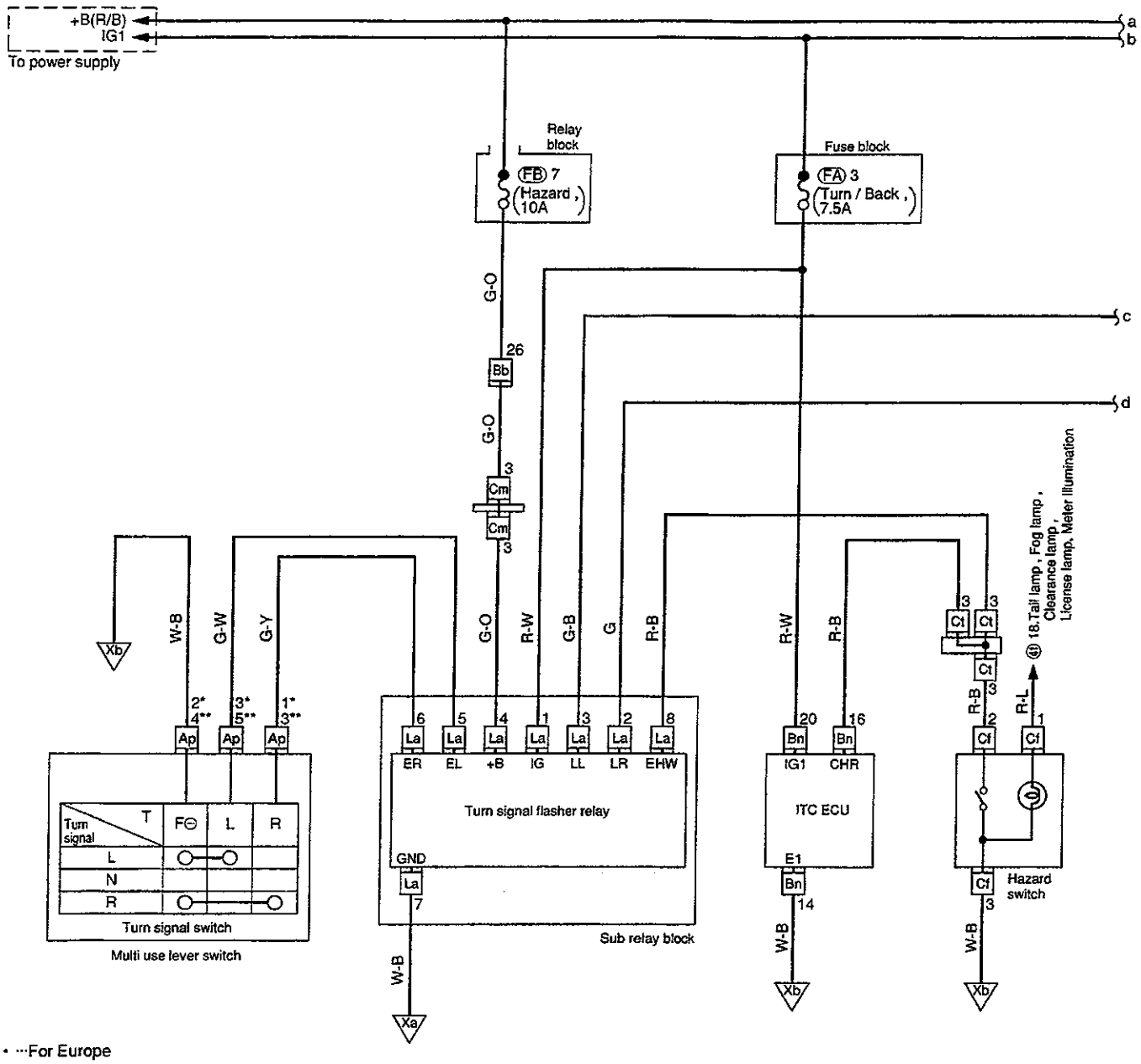


C13W5113ES48

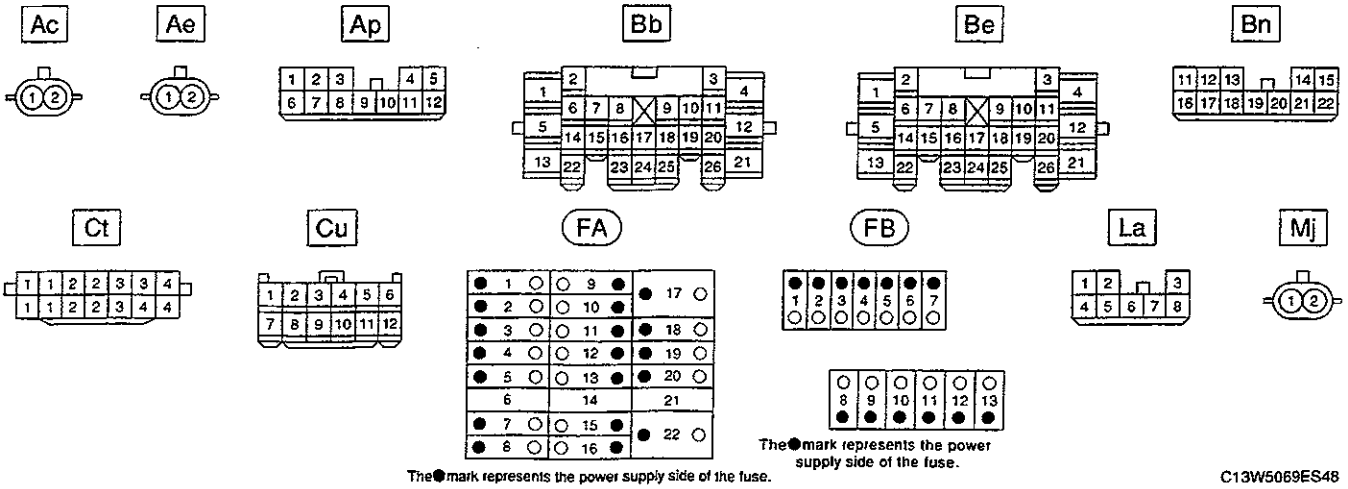


C13W5114ES48

16 HAZARD WARNING & TURN SIGNAL LAMP



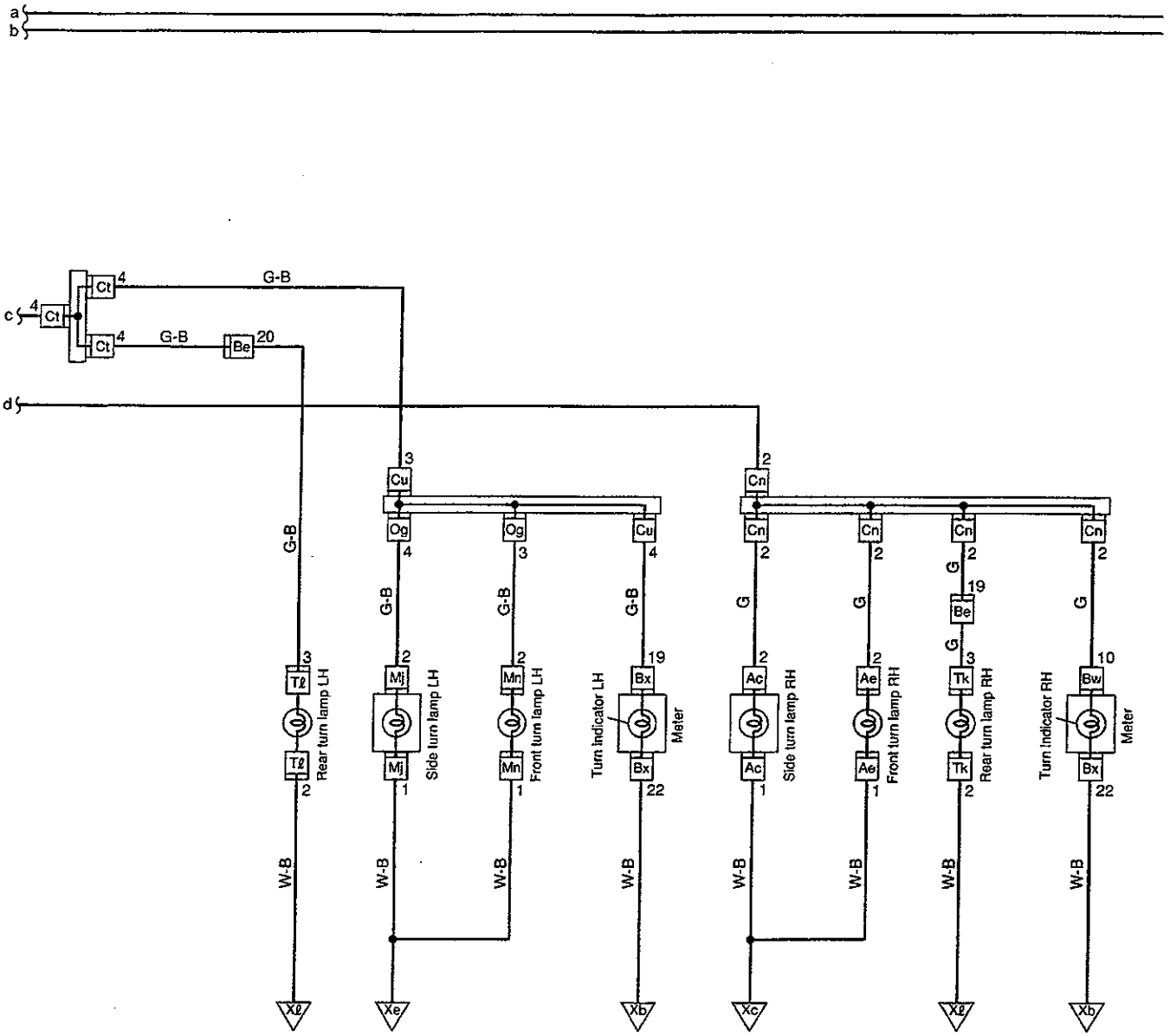
* ···For Europe
**···For Australia

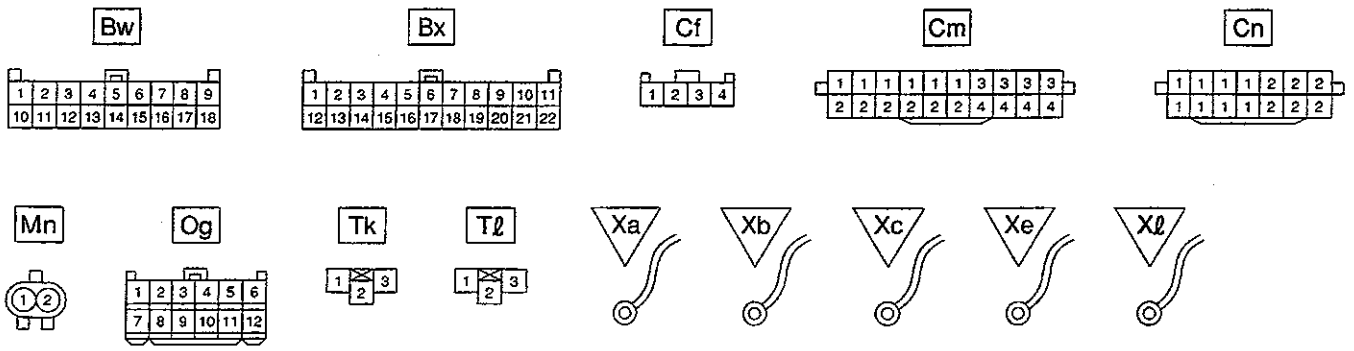


The● mark represents the power supply side of the fuse.

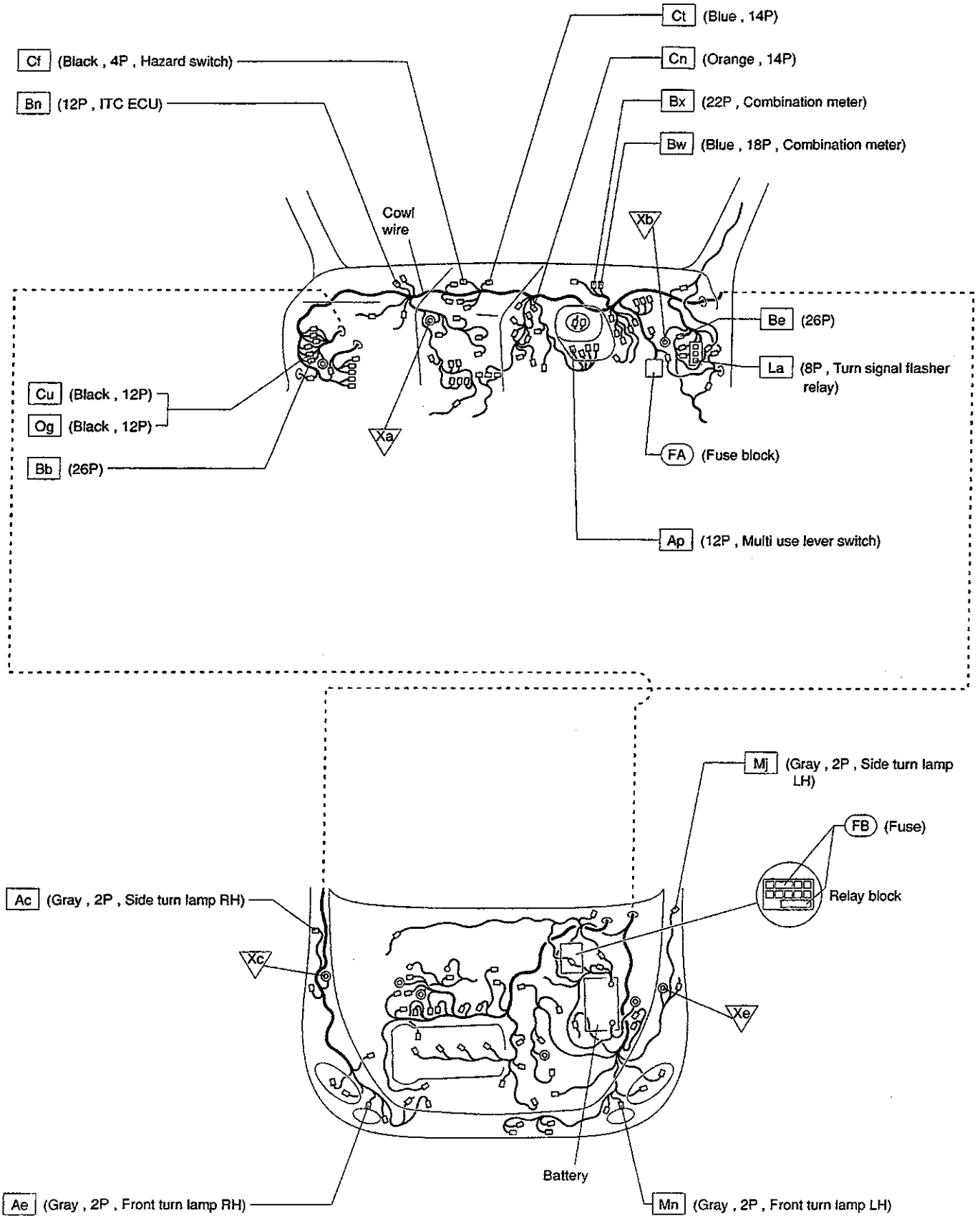
The● mark represents the power supply side of the fuse.

C13W5069ES48

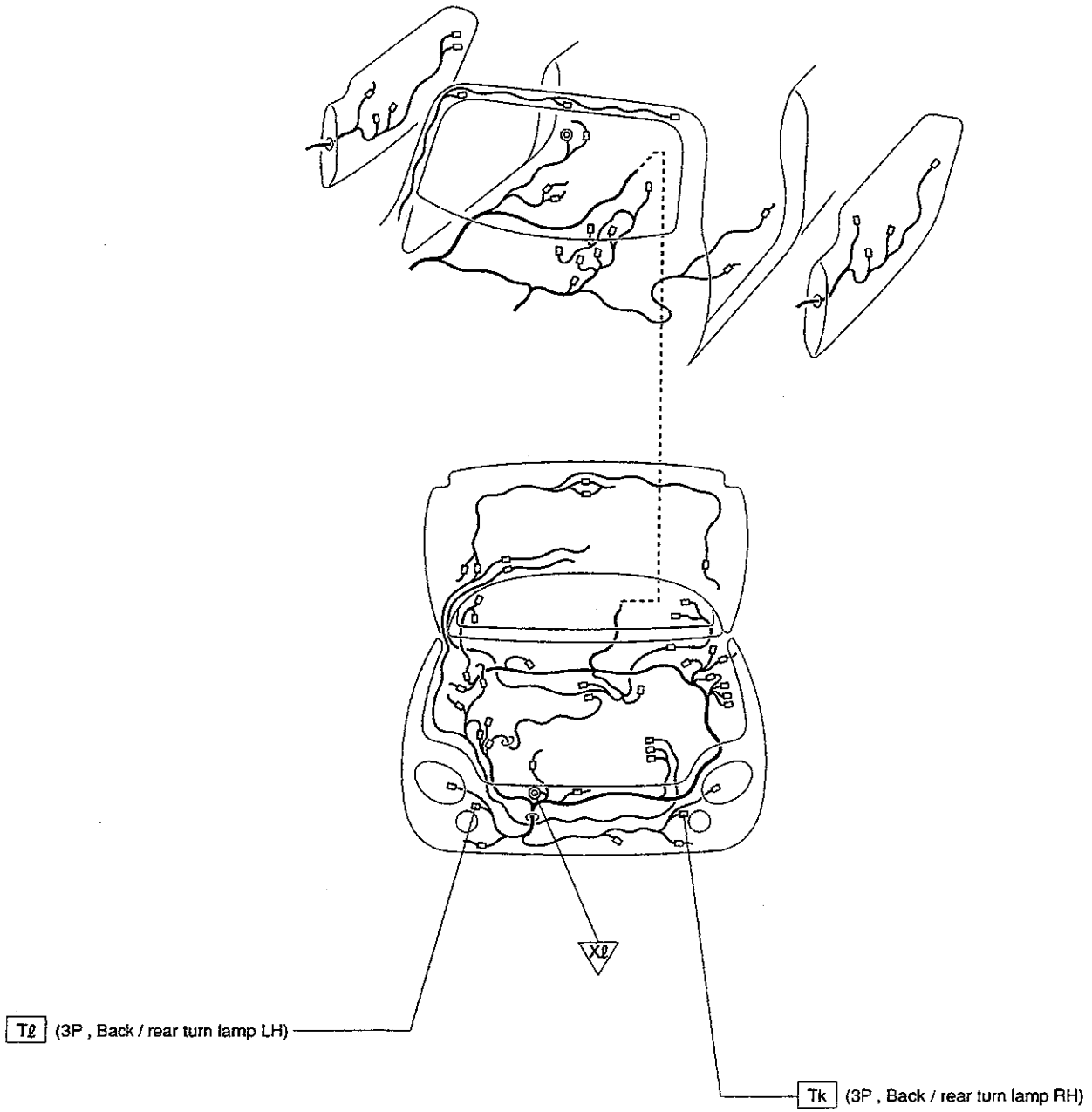




C13W5070ES48

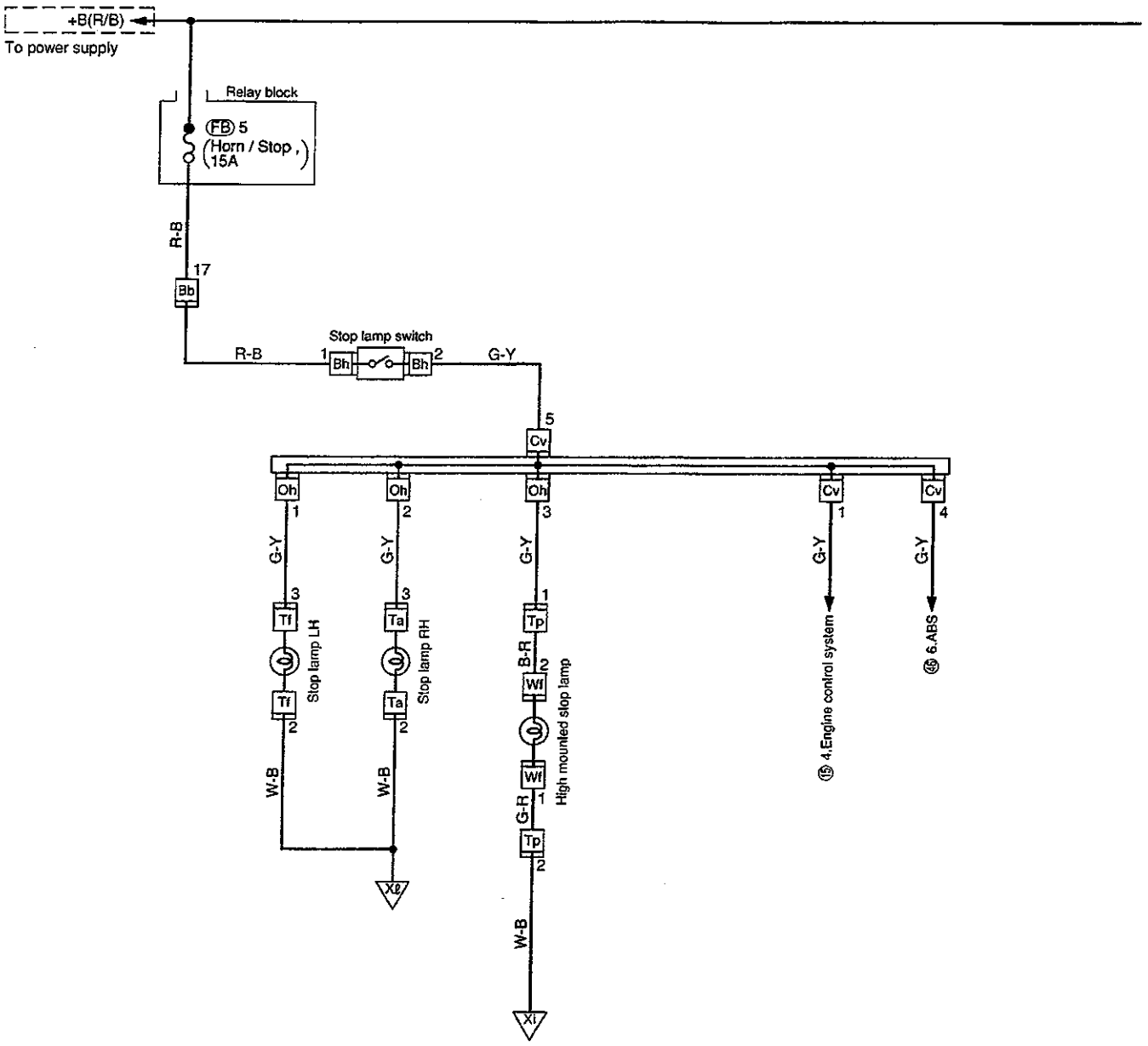


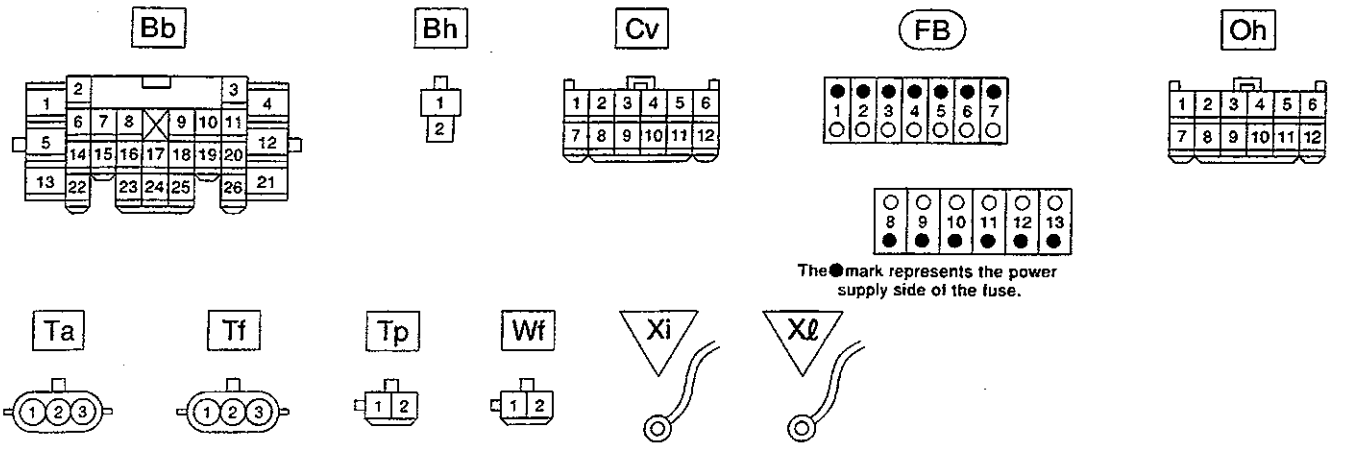
C13W5071ES48



C13W5072ES48

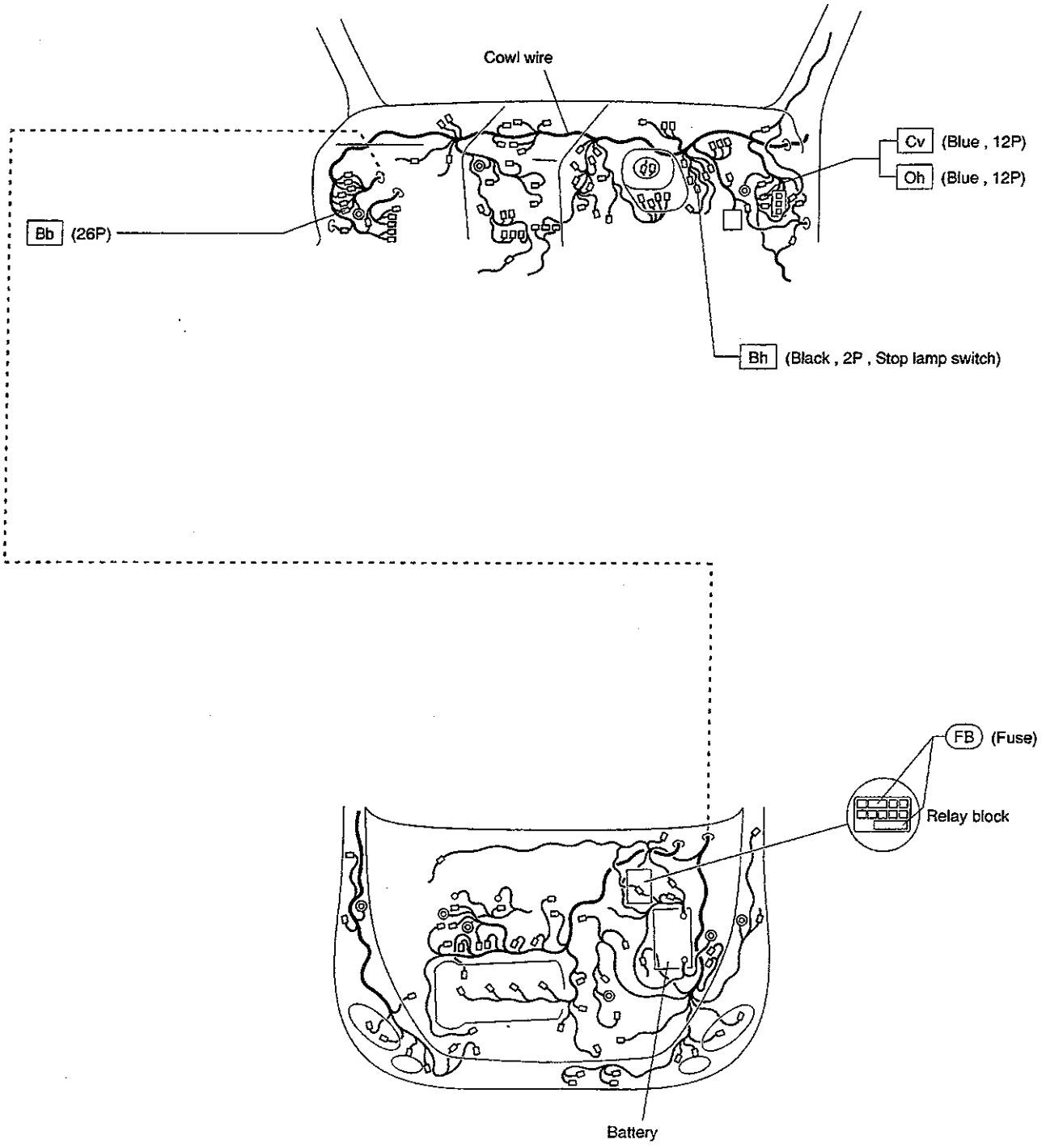
17 STOP LAMP, HIGH MOUNTED STOP LAMP



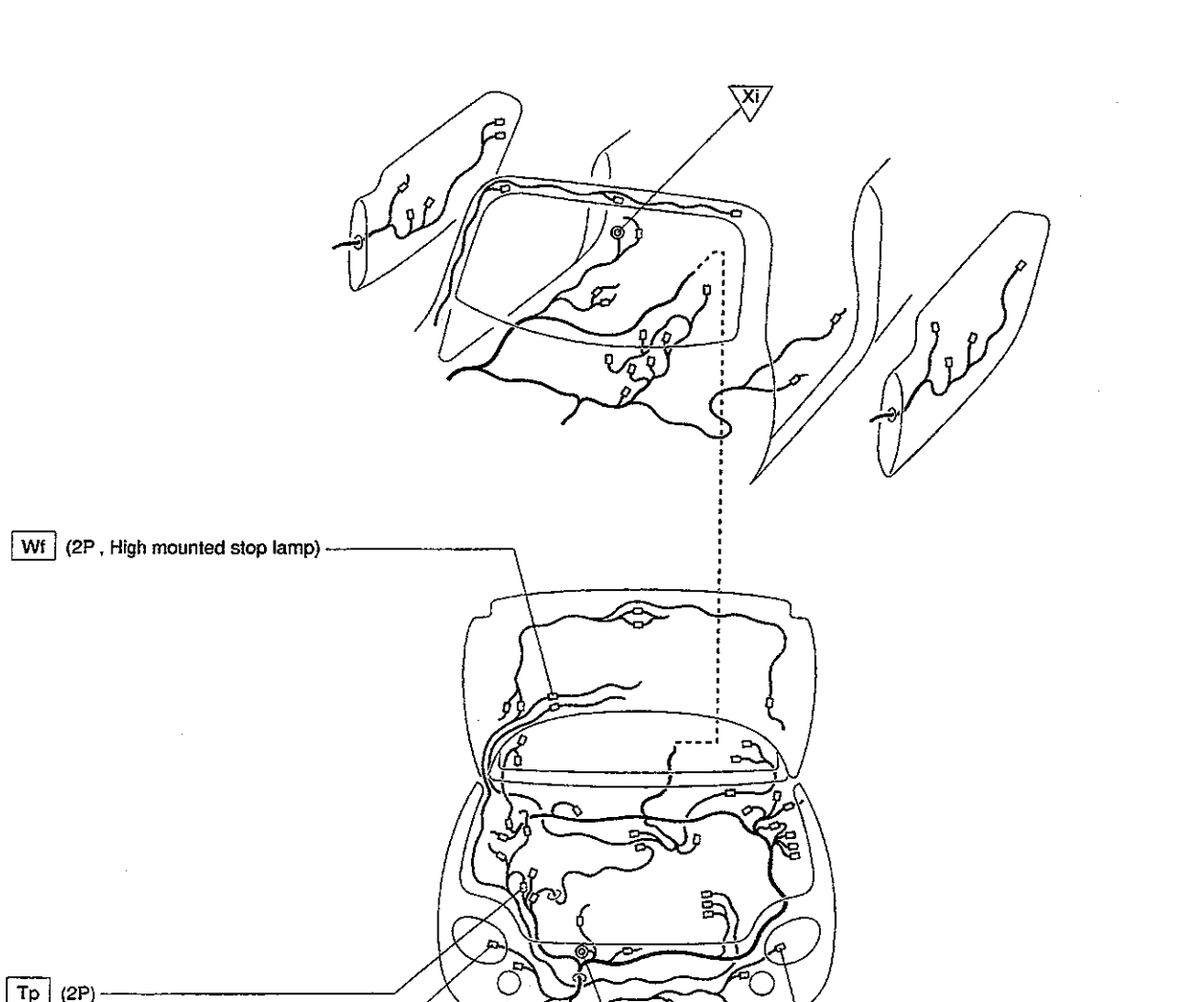


C13W5073ES48

(MEMO)

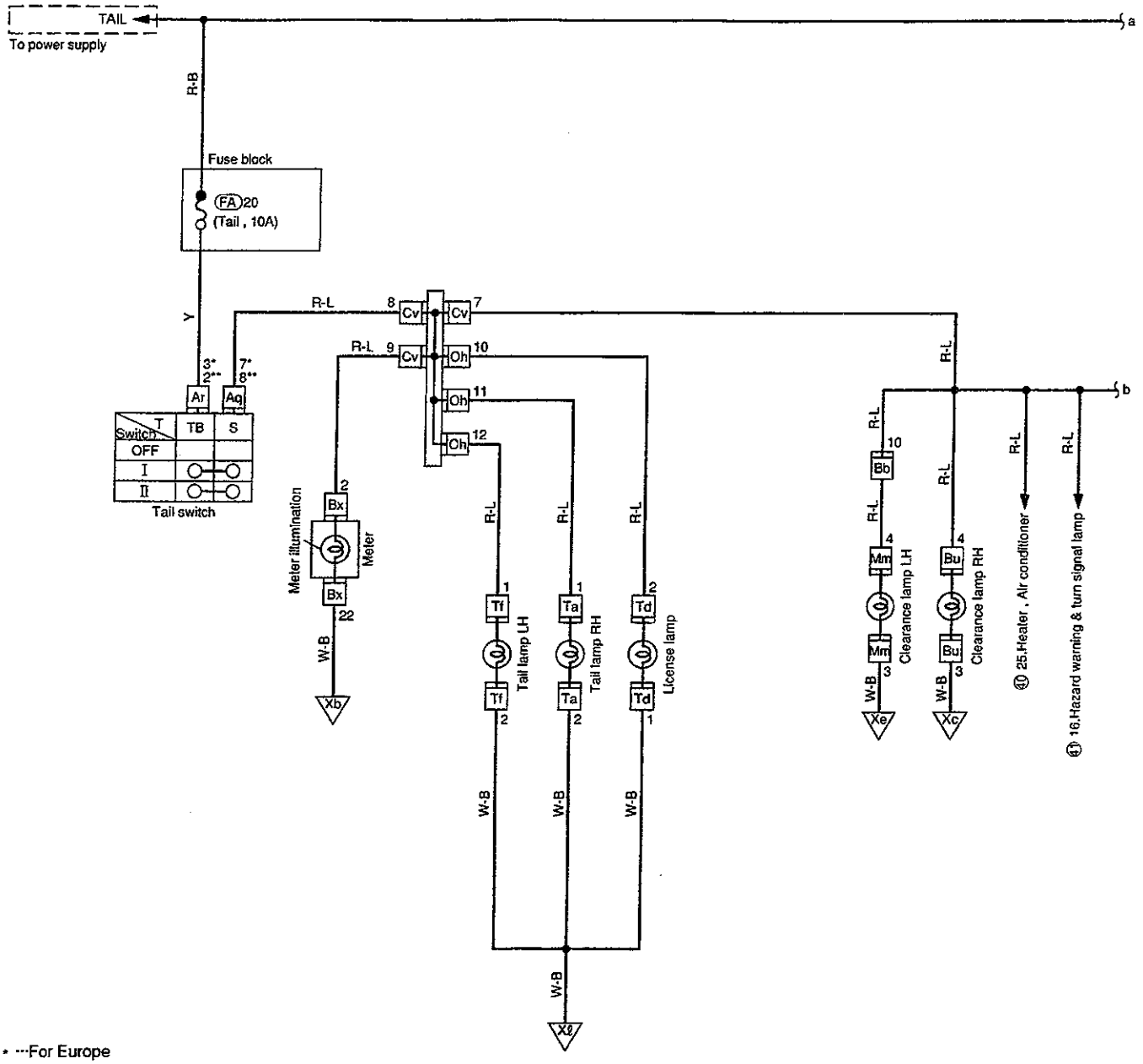


C13W5074ES48

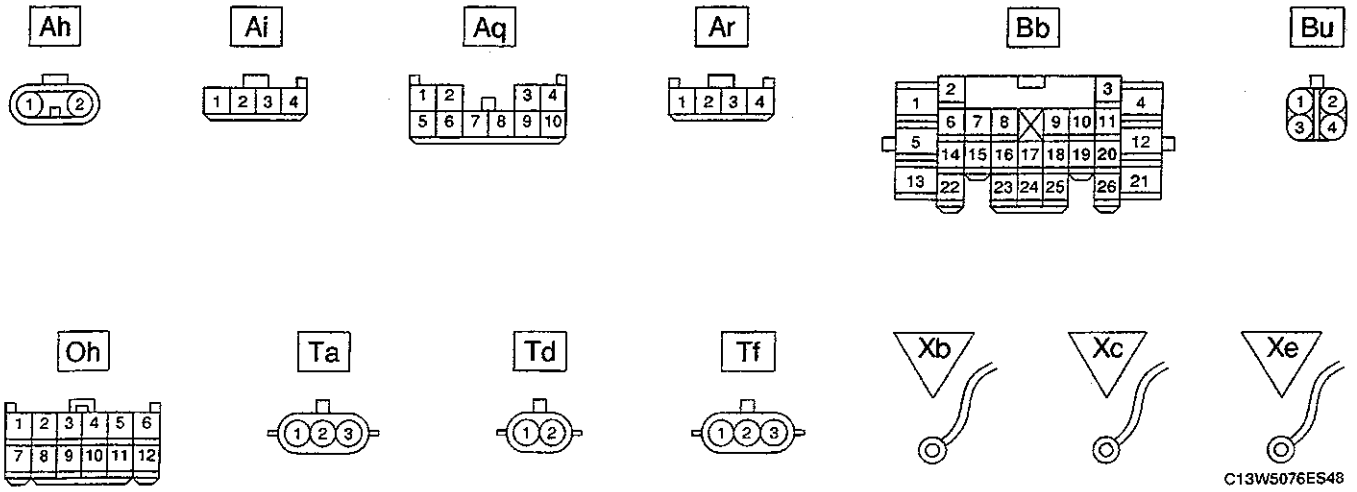


C13W5075ES48

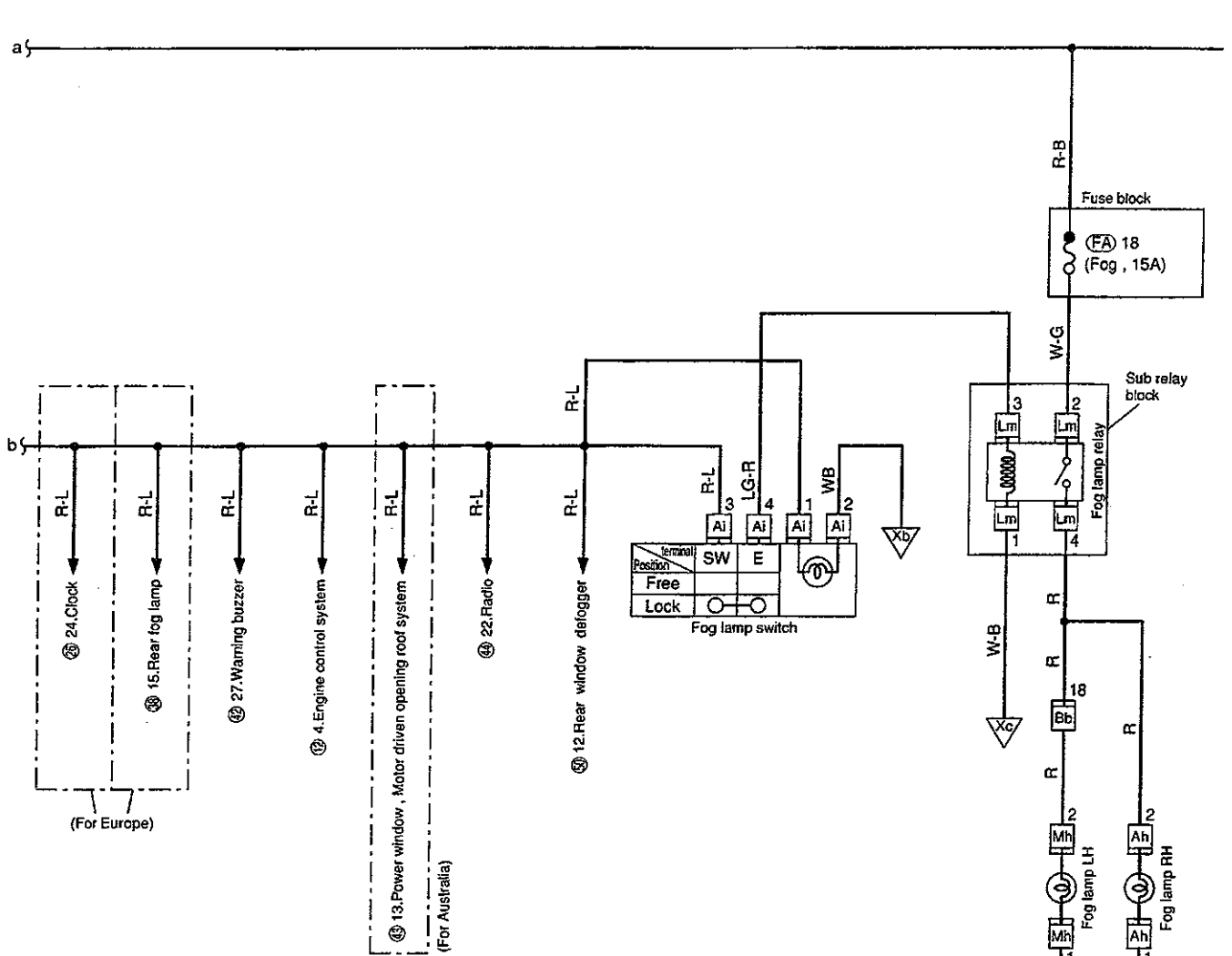
18 METER ILLUMINATION, CLEARANCE LAMP, LICENSE LAMP, TAIL LAMP, FOG LAMP

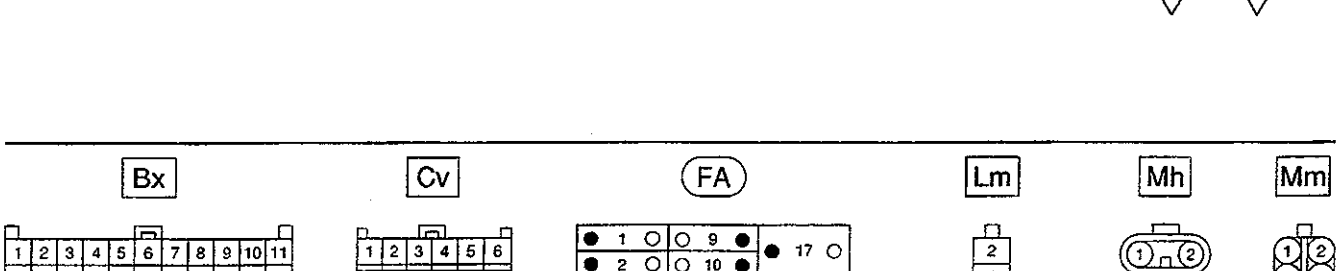


* ···For Europe
**···For Australia

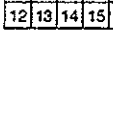


C13W5076ES48

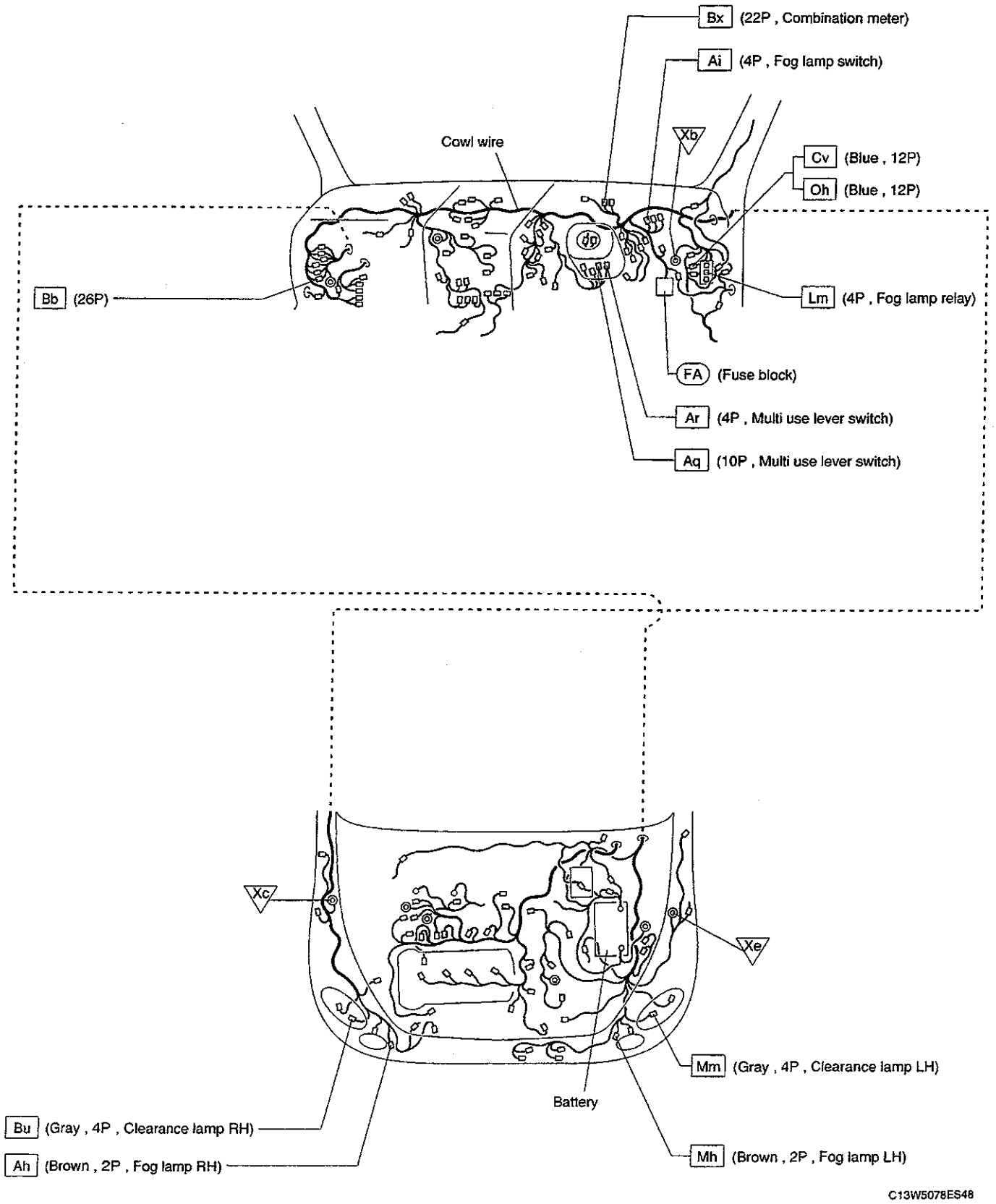




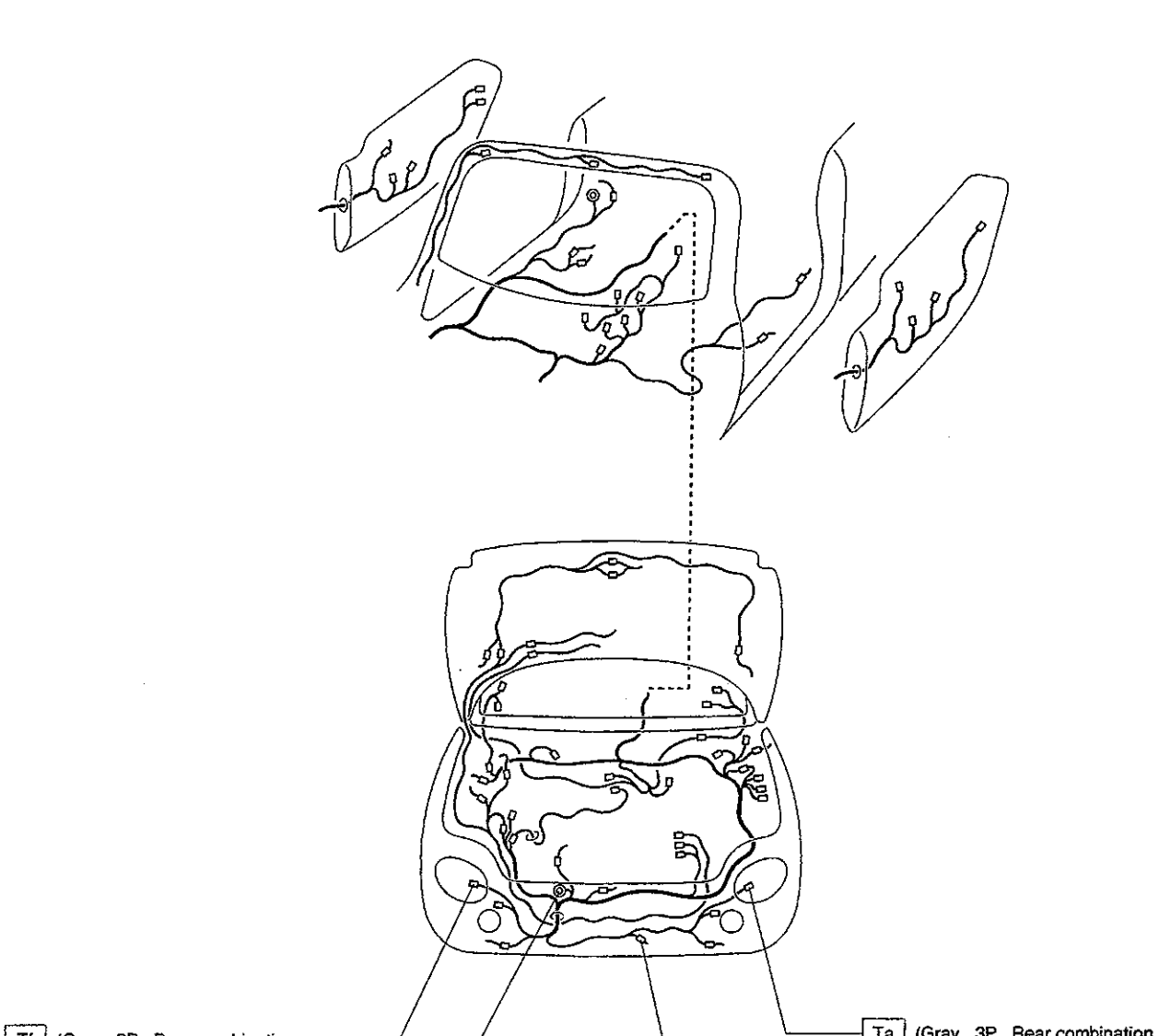
The● mark represents the power supply side of the fuse.



C13W5077ES48

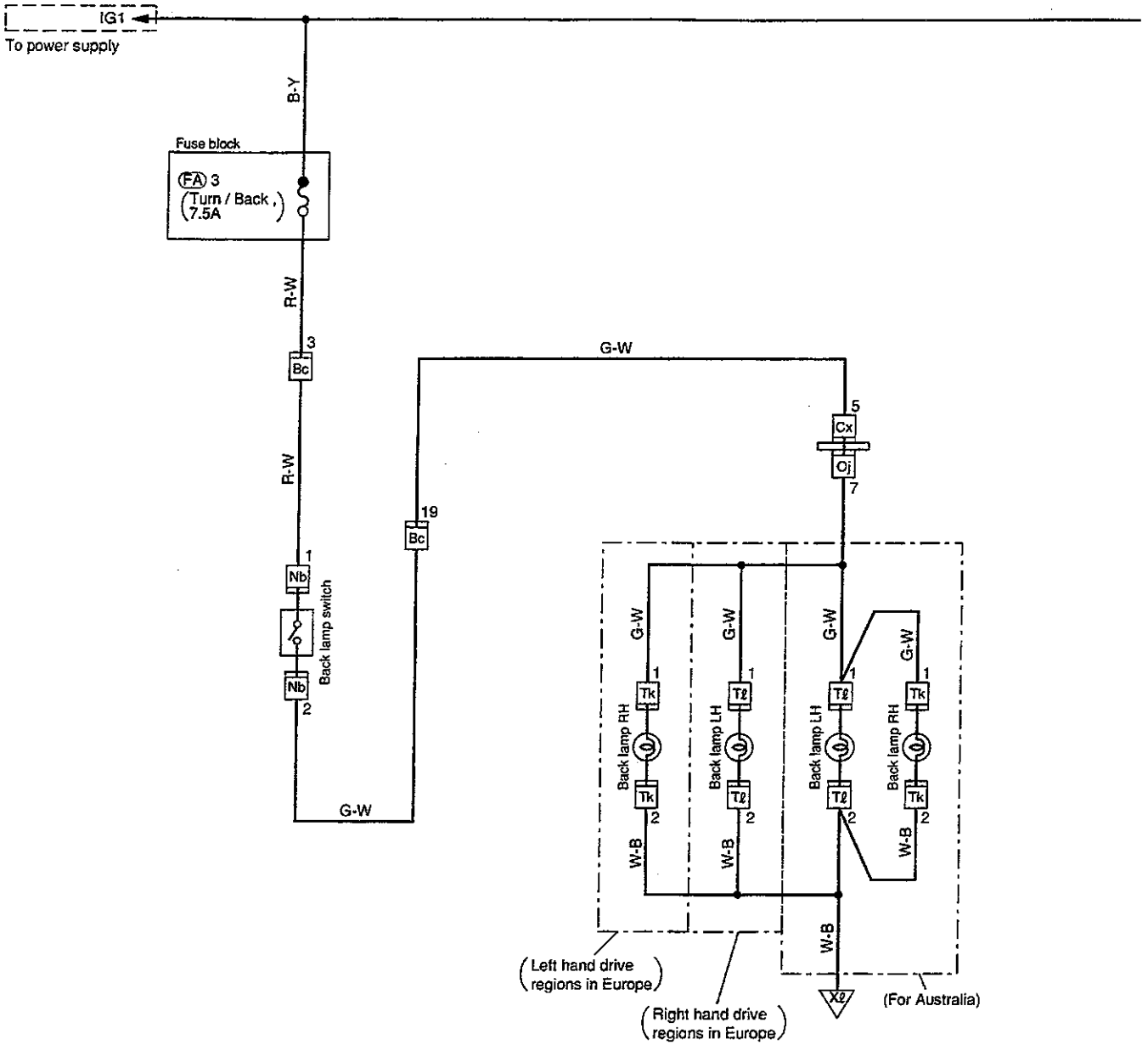


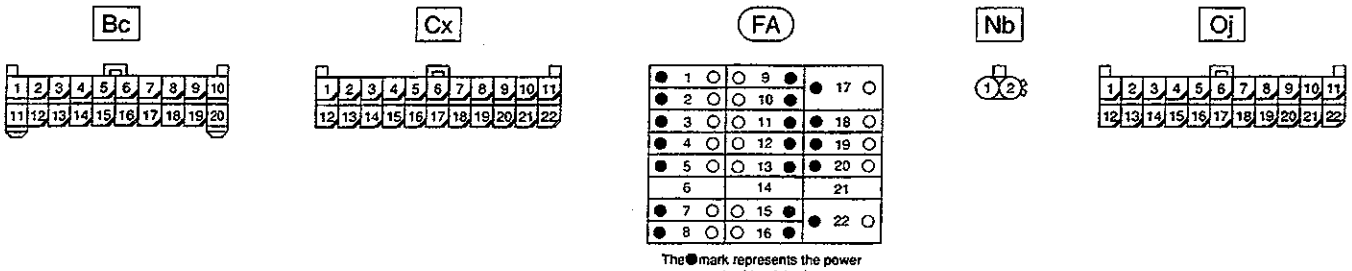
C13W5078ES48

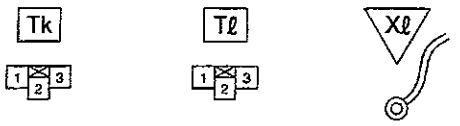


C13W5079ES48

19 BACK UP LAMP

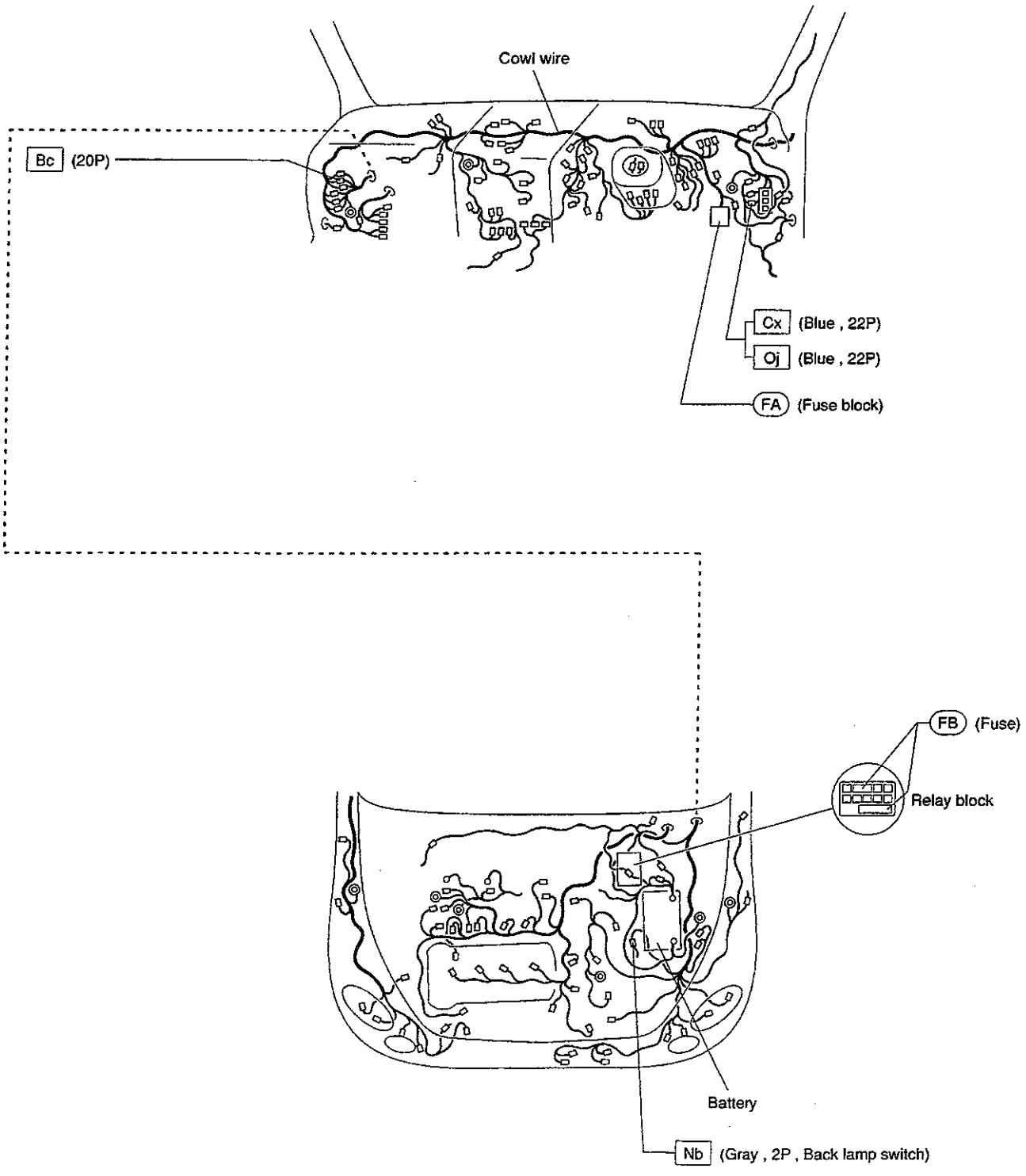




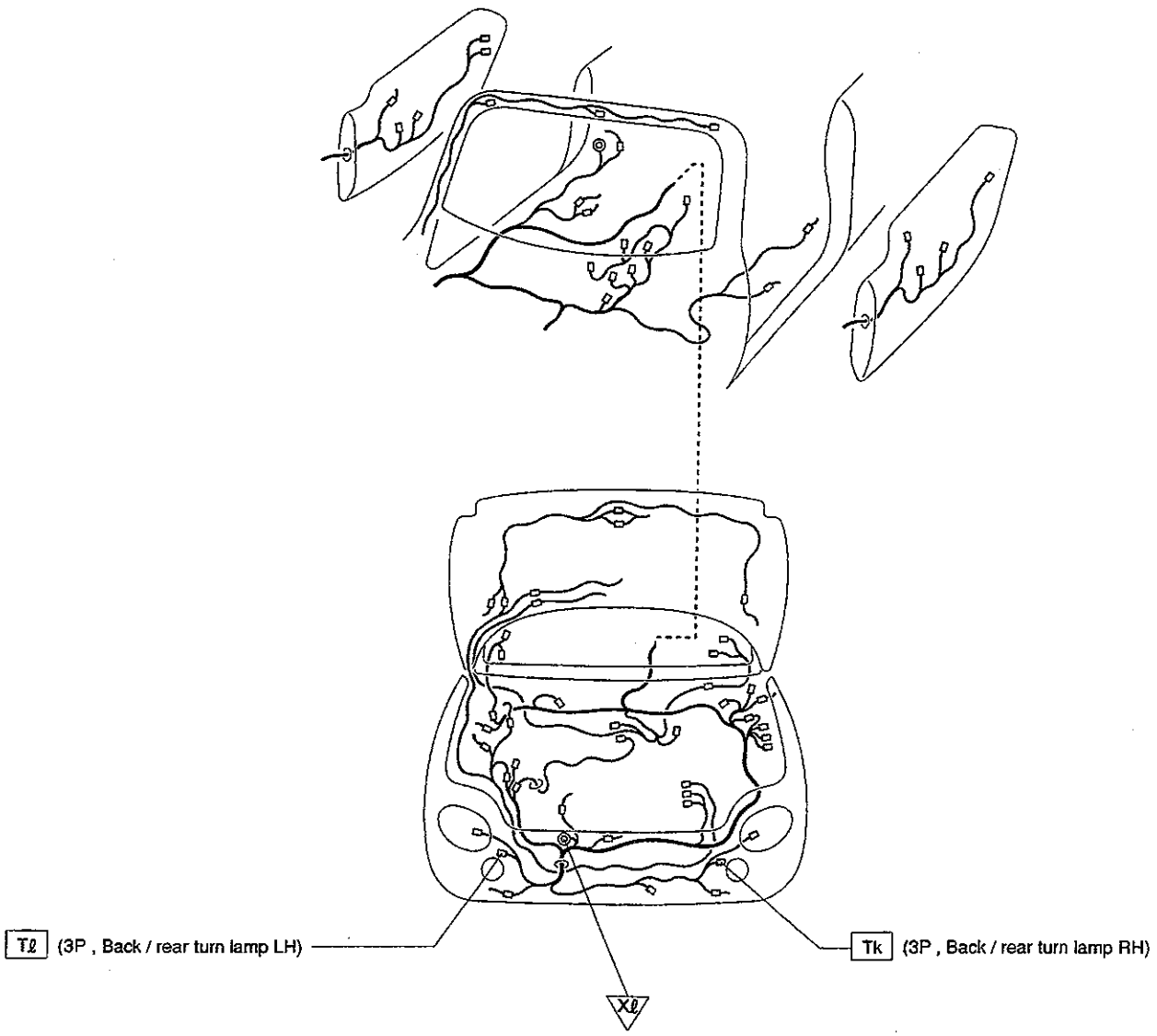


C13W5080ES48

(MEMO)

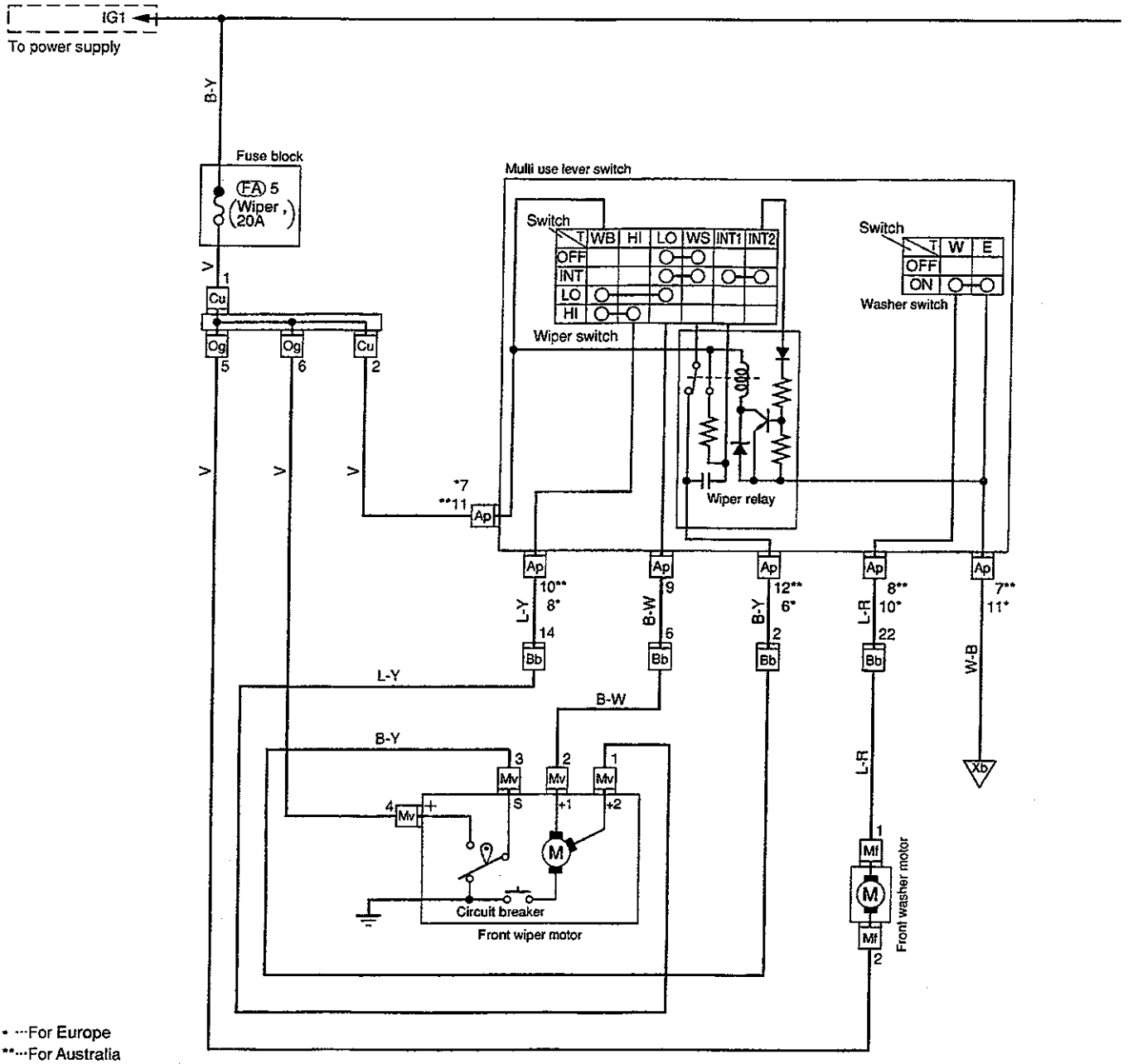


C13W5081ES48



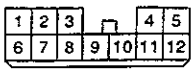
C13W5082ES48

20 FRONT WIPER & WASHER

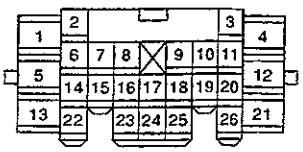


* ···For Europe
**···For Australia

Ap



Bb



Cu

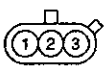


FA

1			9	17	
2			10		
3			11	18	
4			12	19	
5			13	20	
6			14	21	
7			15	22	
8			16		

The● mark represents the power supply side of the fuse.

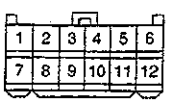
Mf



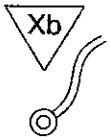
Mv



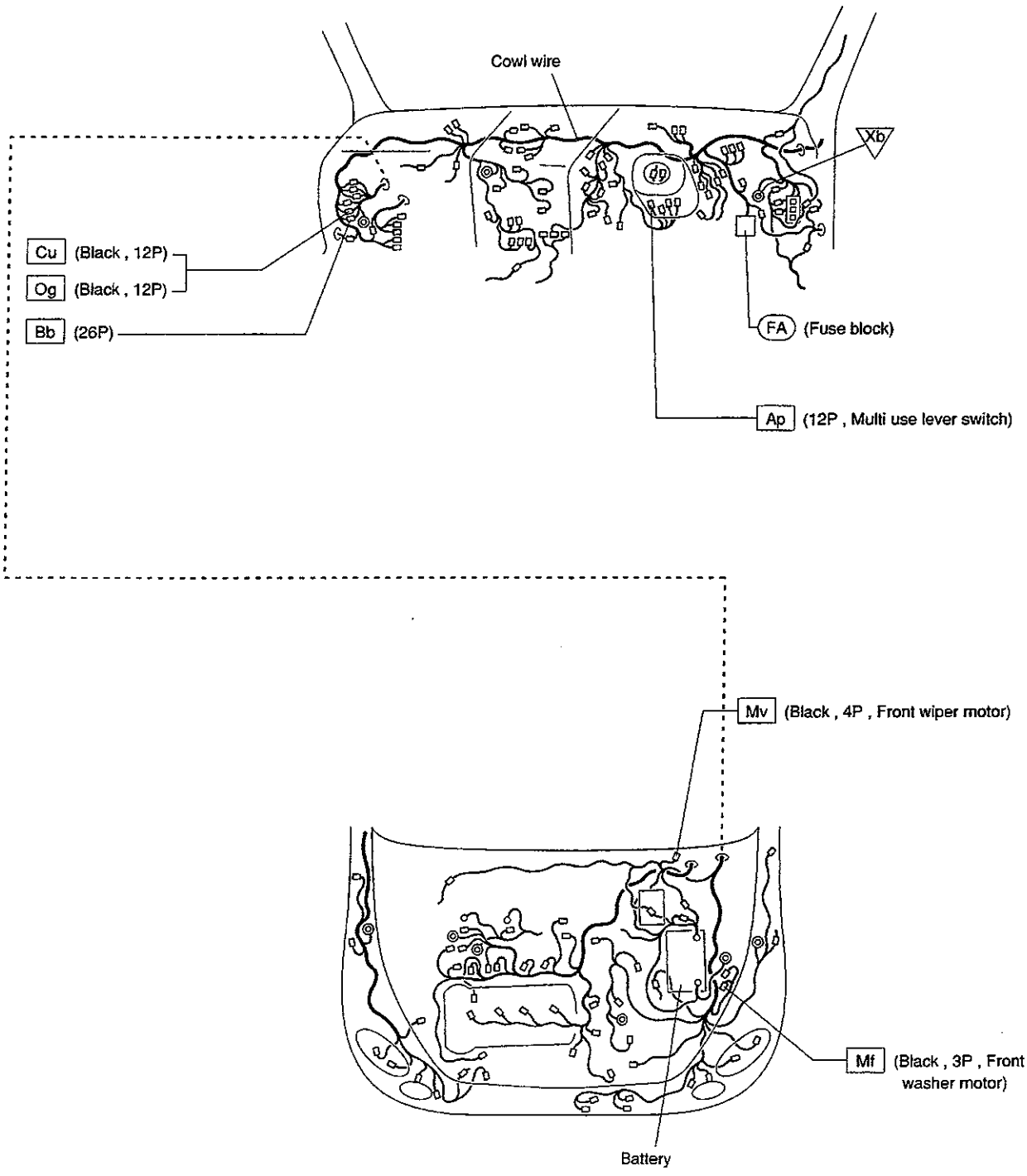
Og



Xb

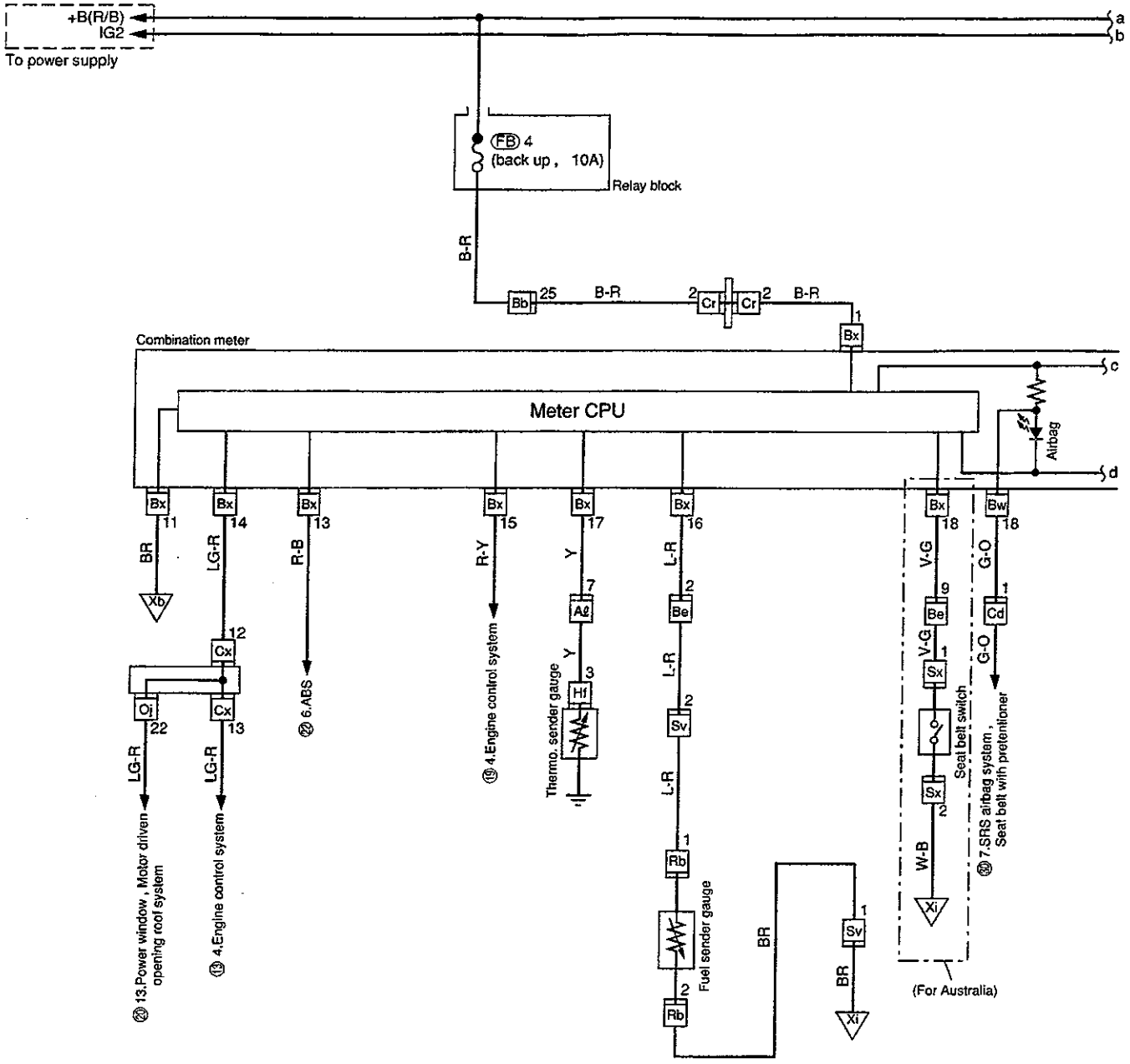


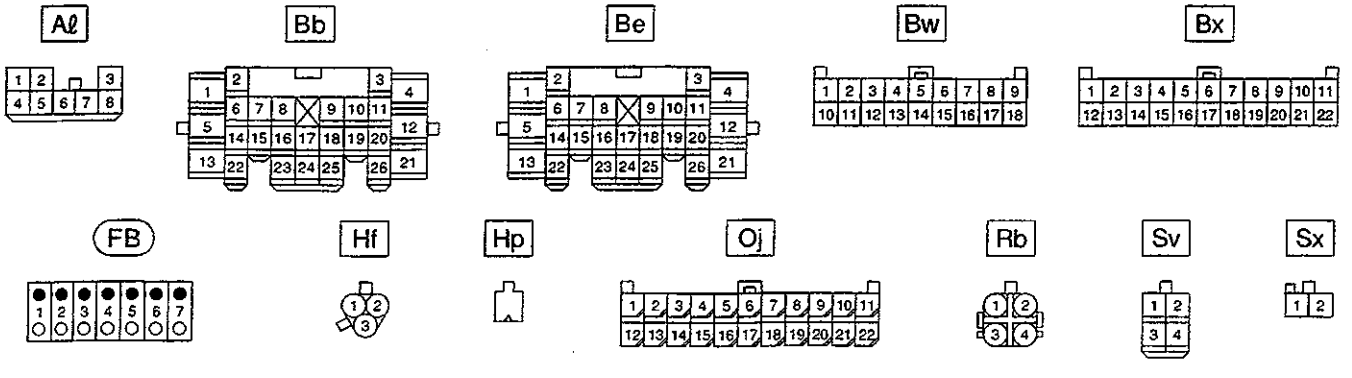
C13W5083ES48



C13W5084ES48

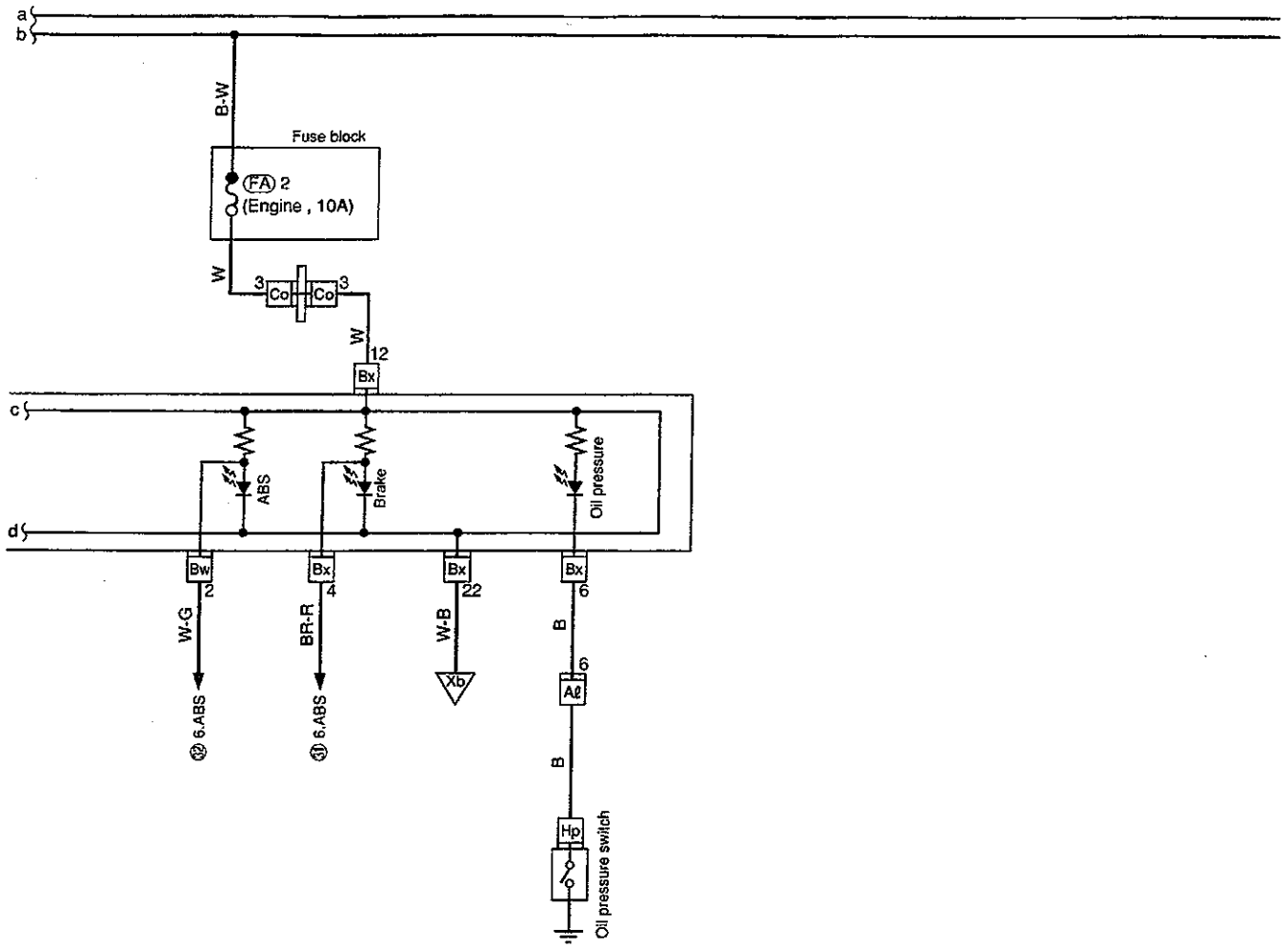
21 COMBINATION METER

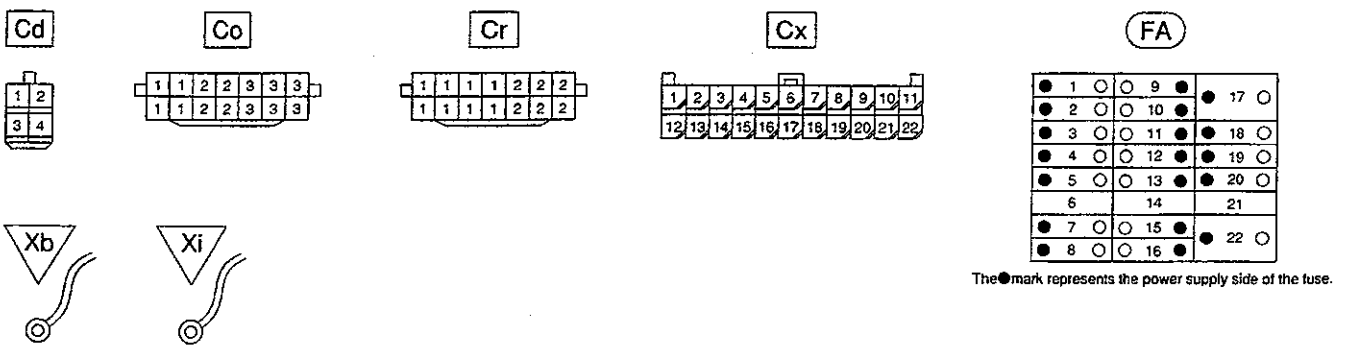




The● mark represents the power supply side of the fuse.

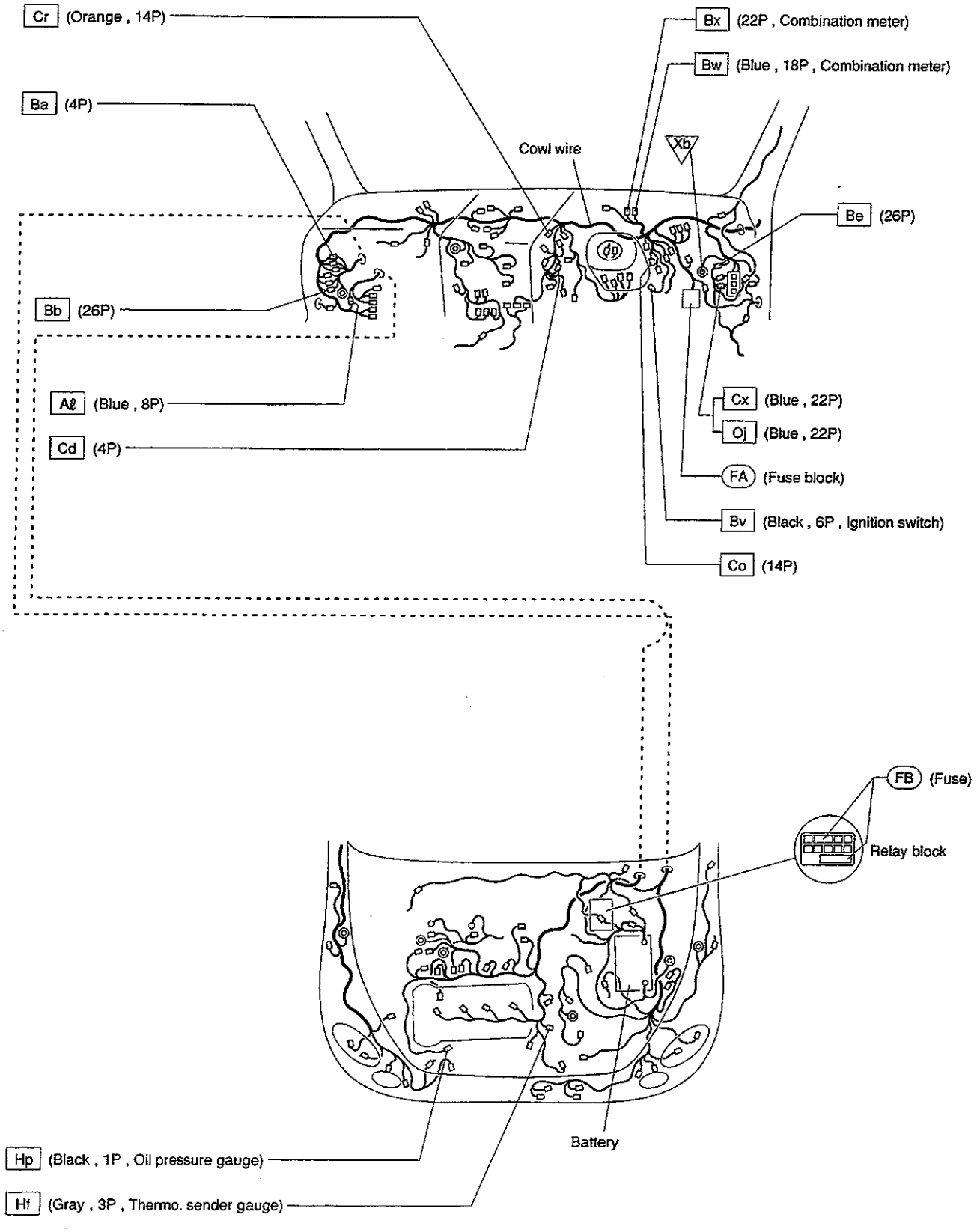
C13W5086ES48



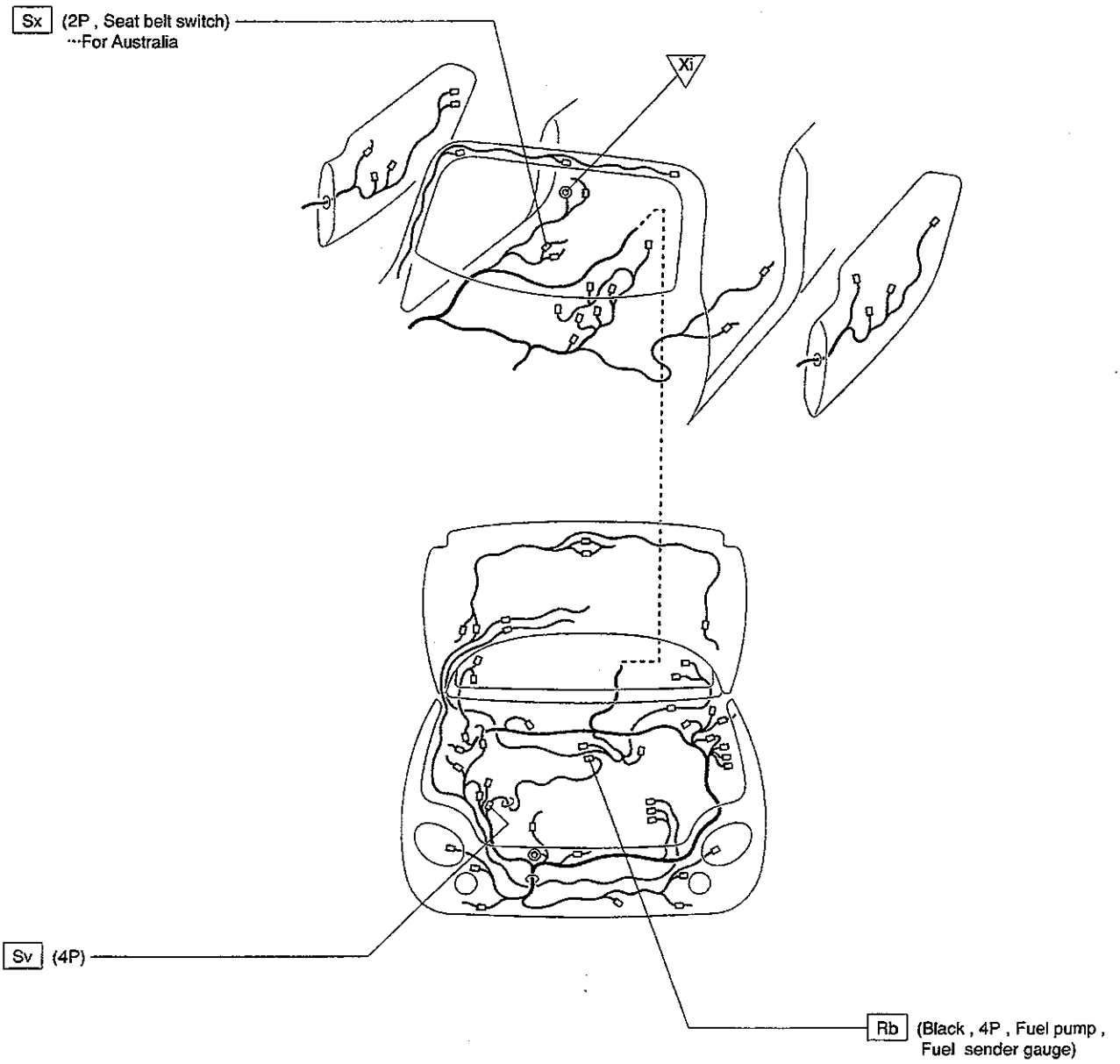


The● mark represents the power supply side of the fuse.

C13W5087ES48

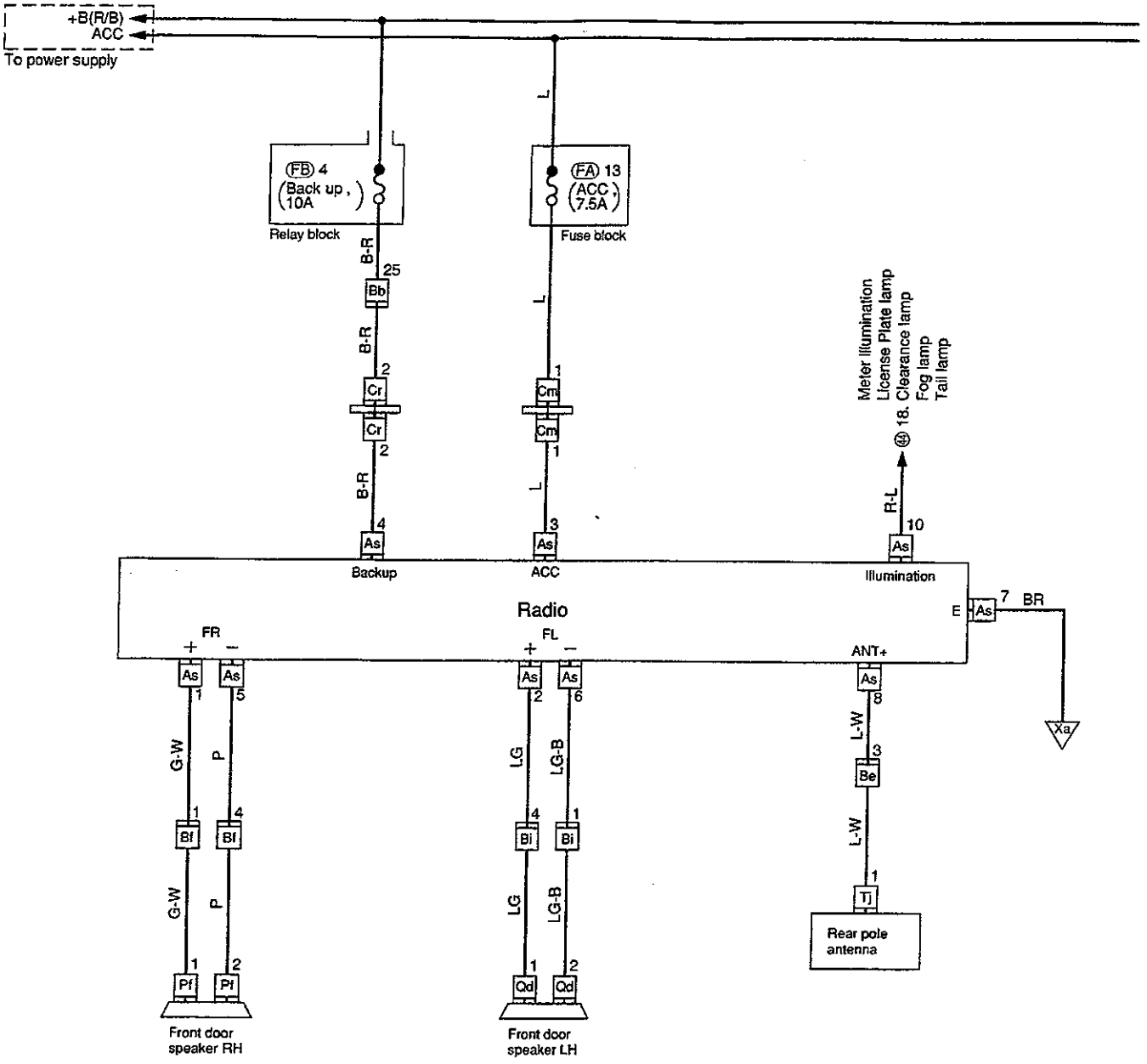


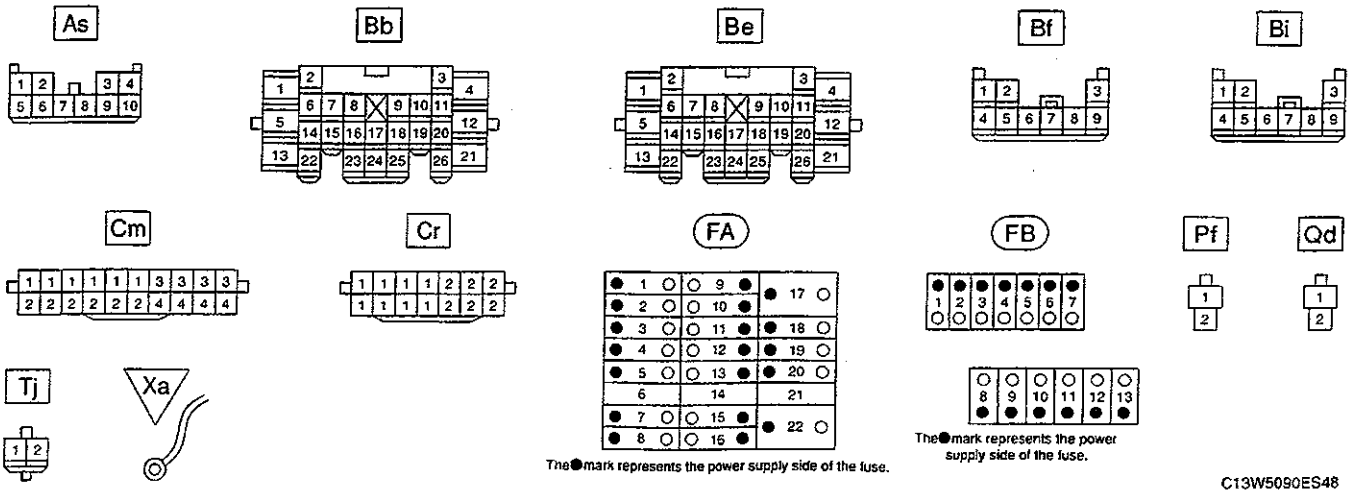
C13W5088ES48



C13W5089ES48

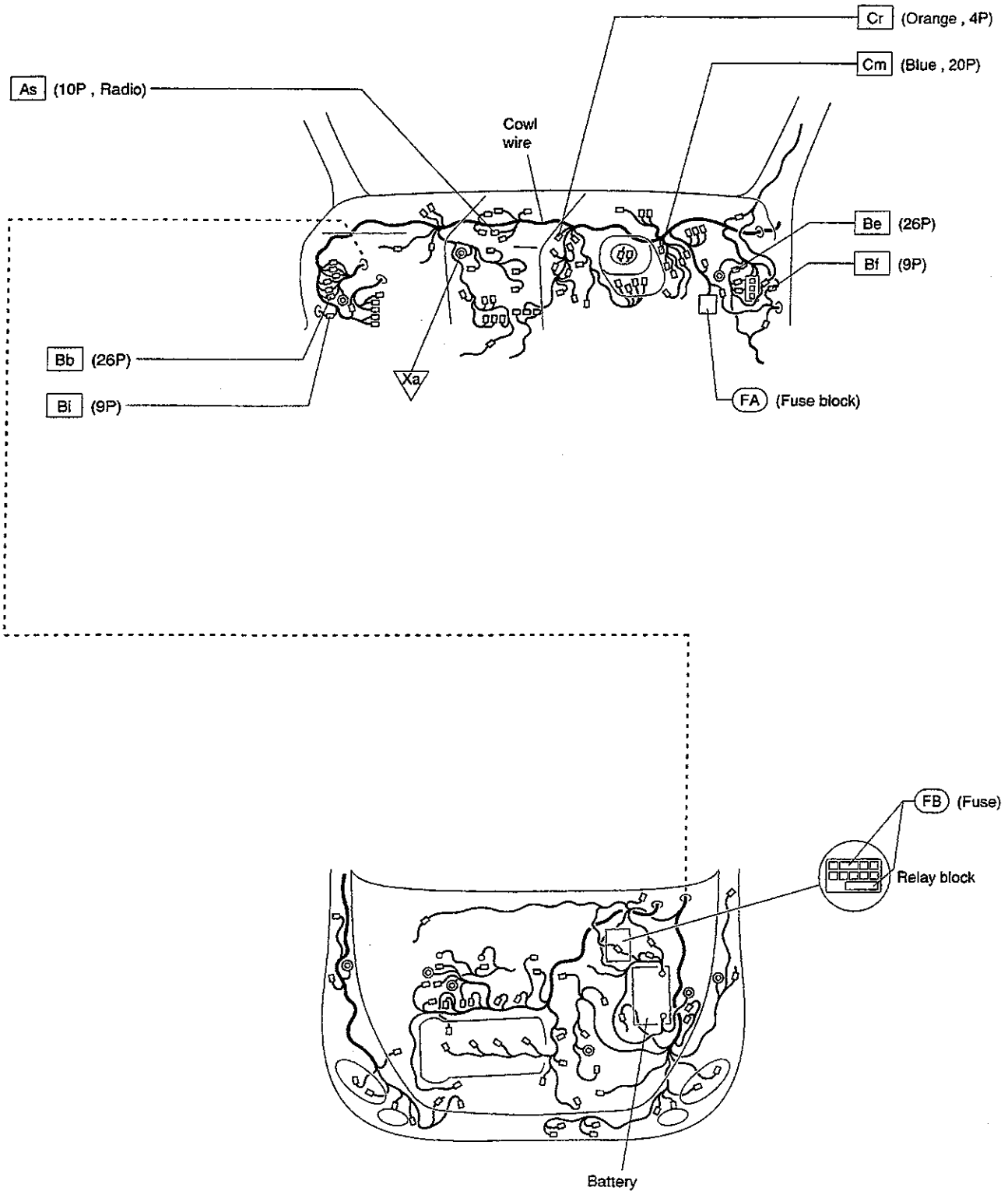
22 RADIO



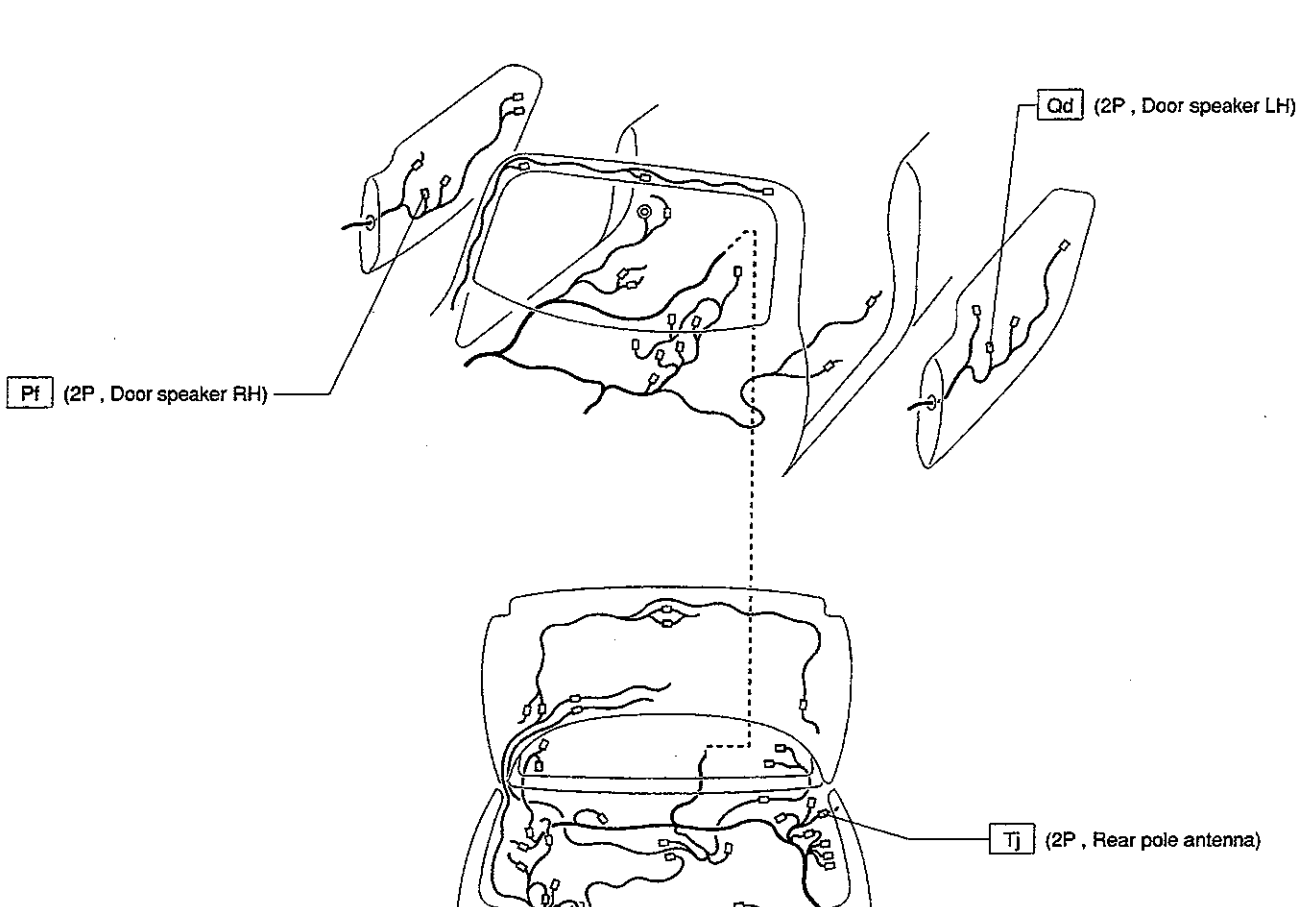


C13W5090ES48

(MEMO)

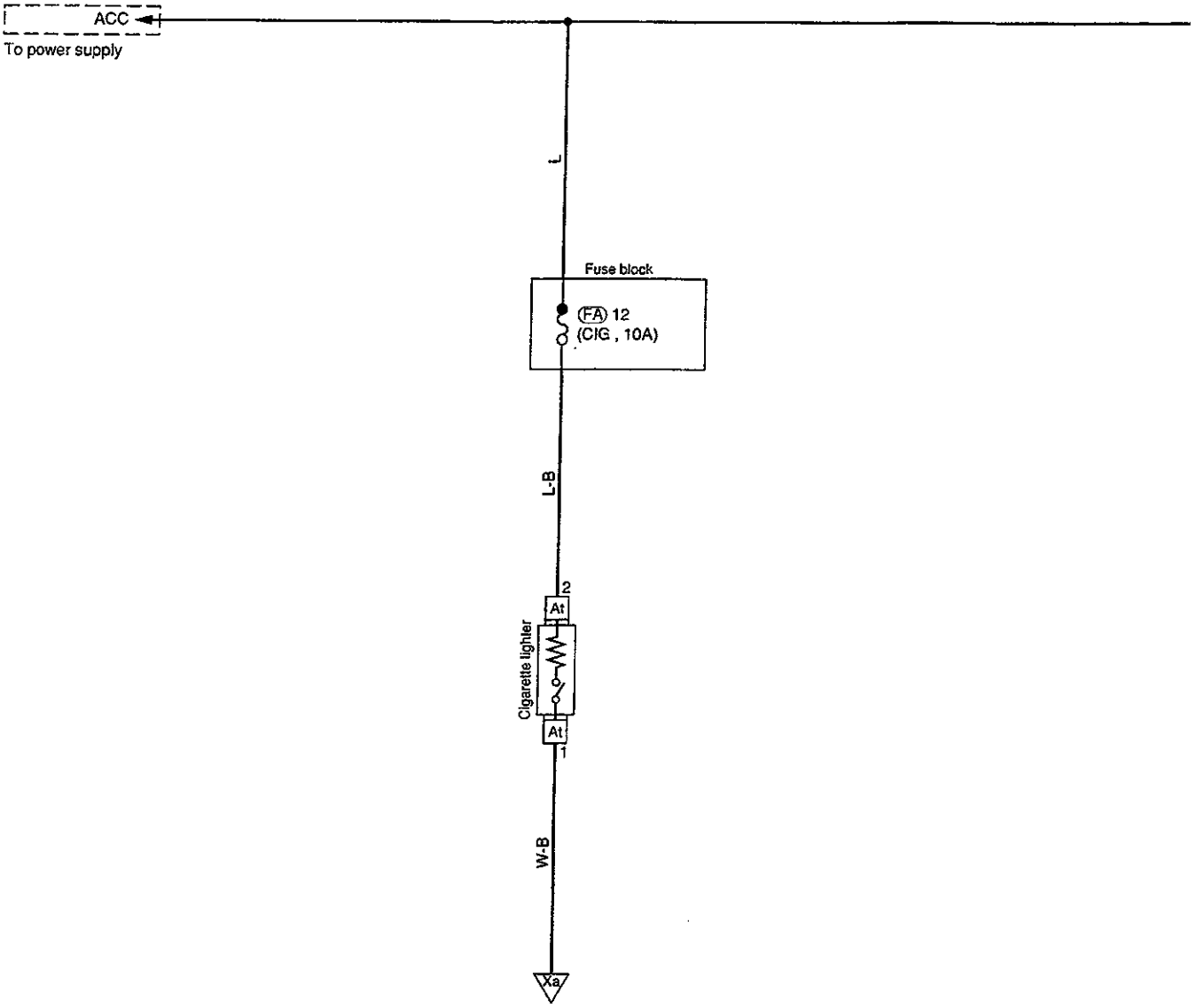


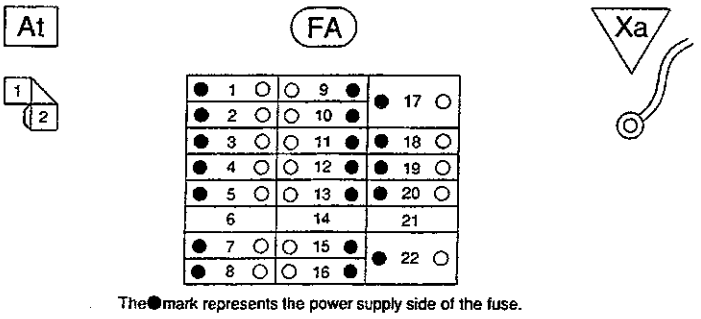
C13W5091ES48



C13W5092ES48

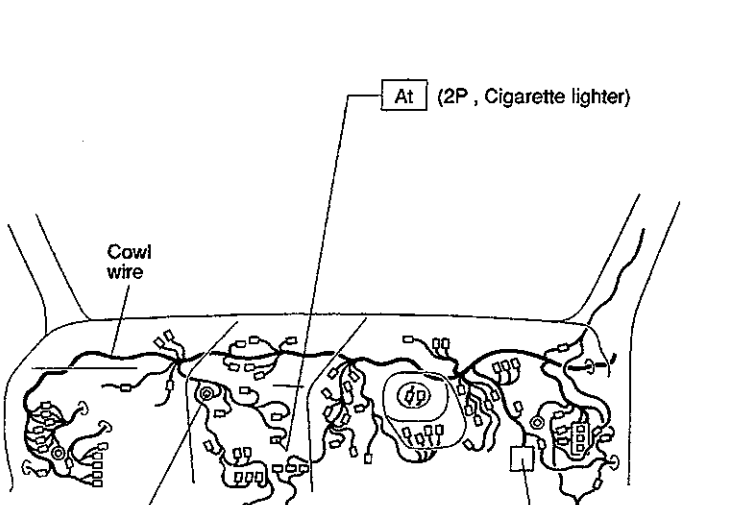
23 CIGARETTE LIGHTER





The● mark represents the power supply side of the fuse.

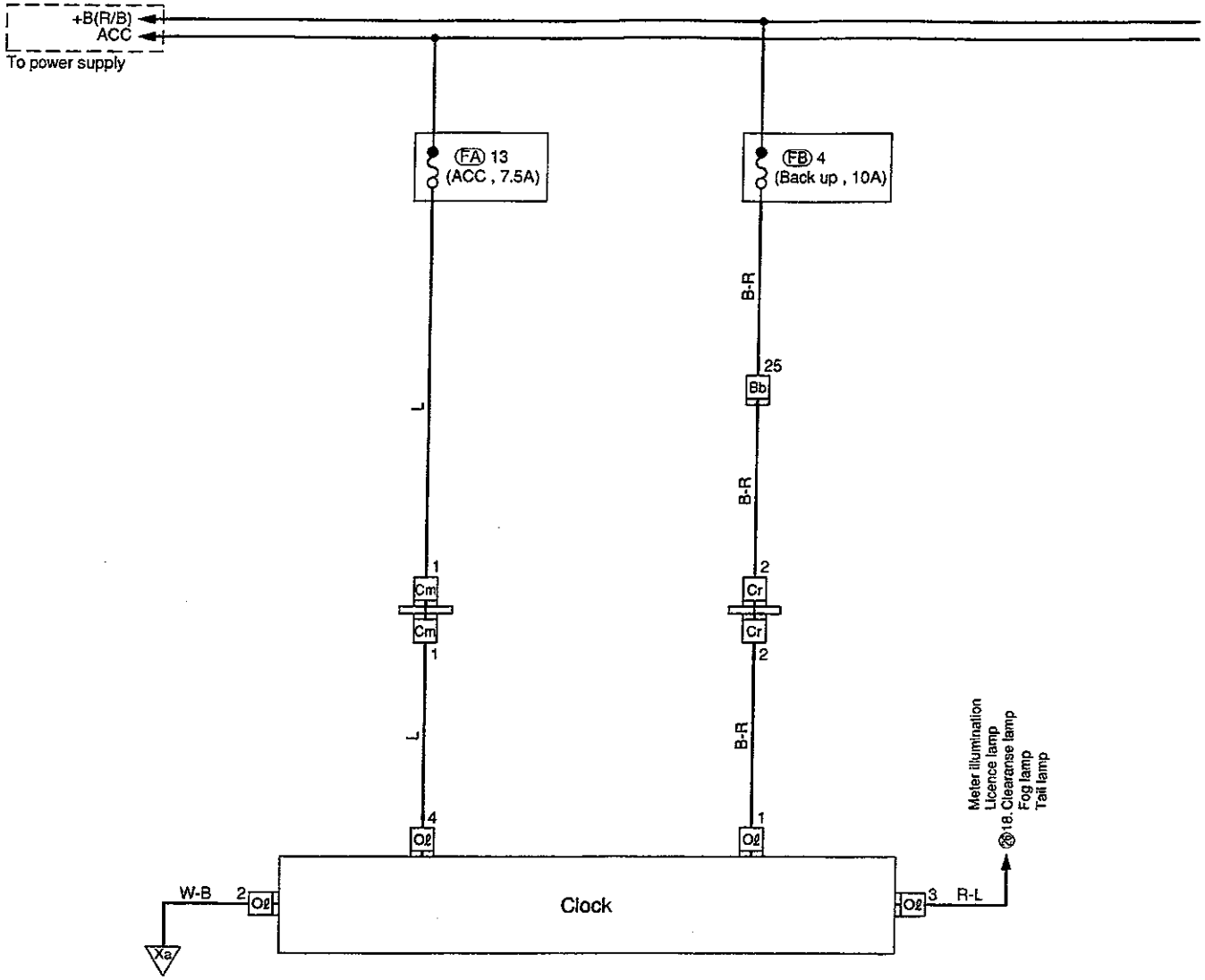
C13W5093ES48

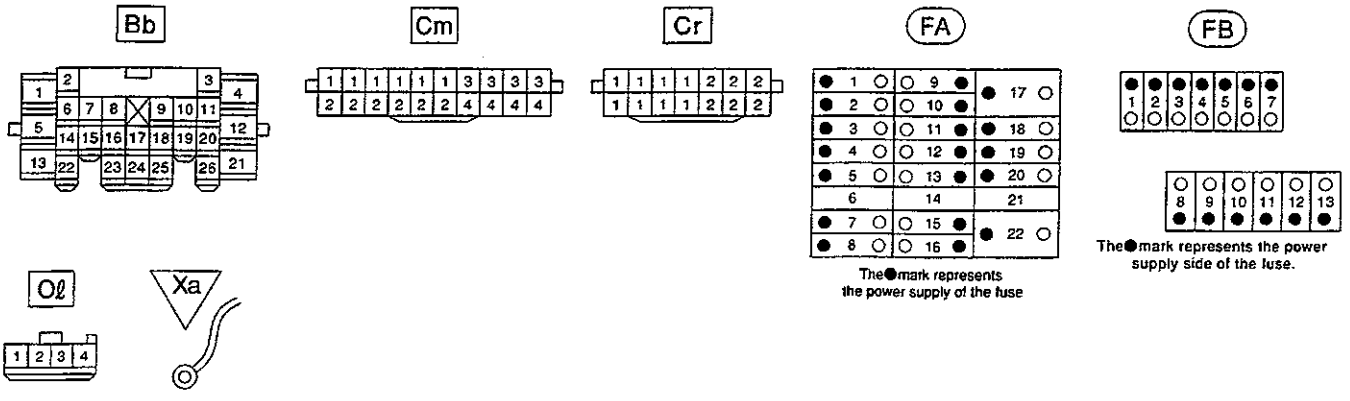


C13W5094ES48

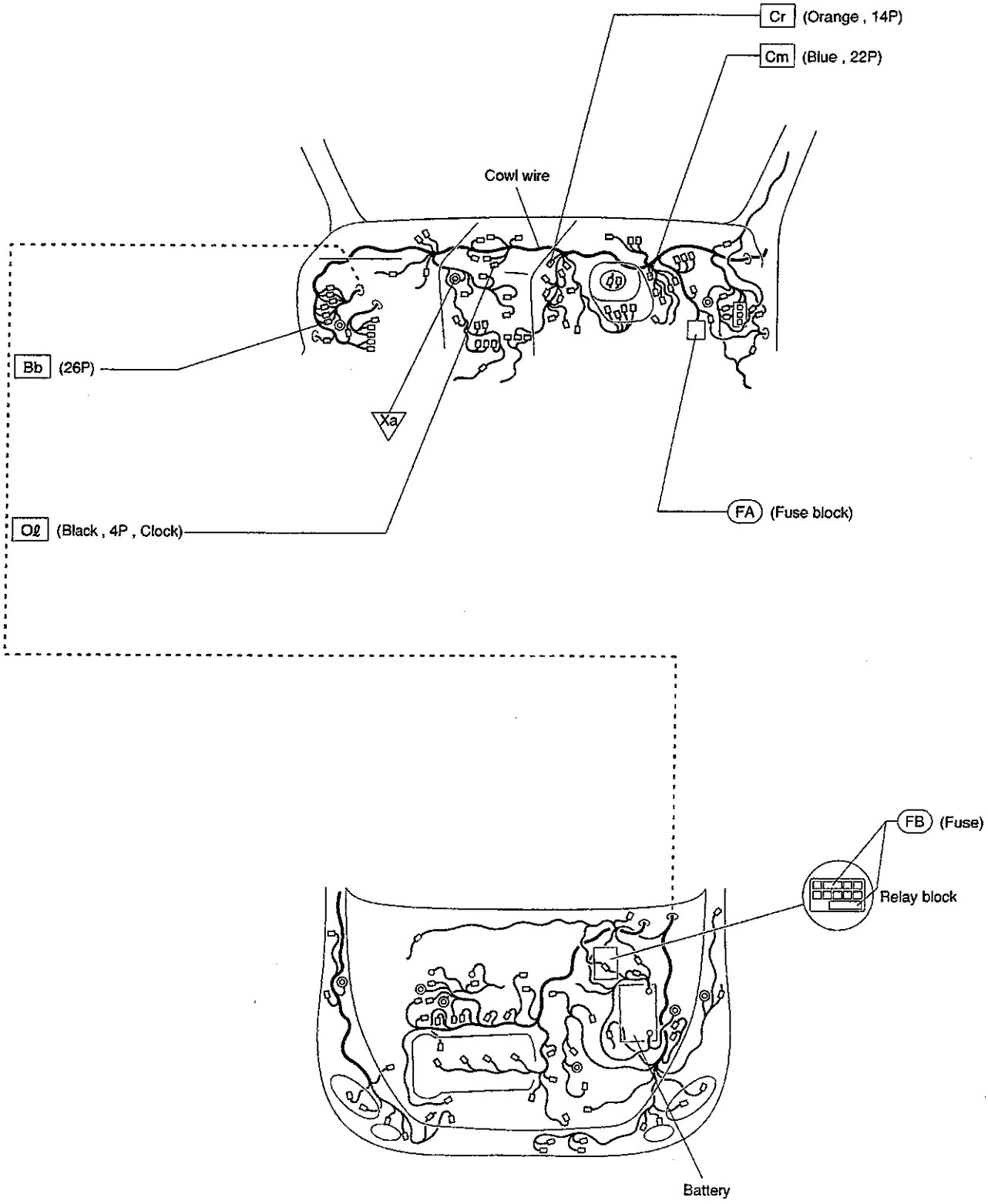
24 CLOCK

24-1 FOR EUROPE



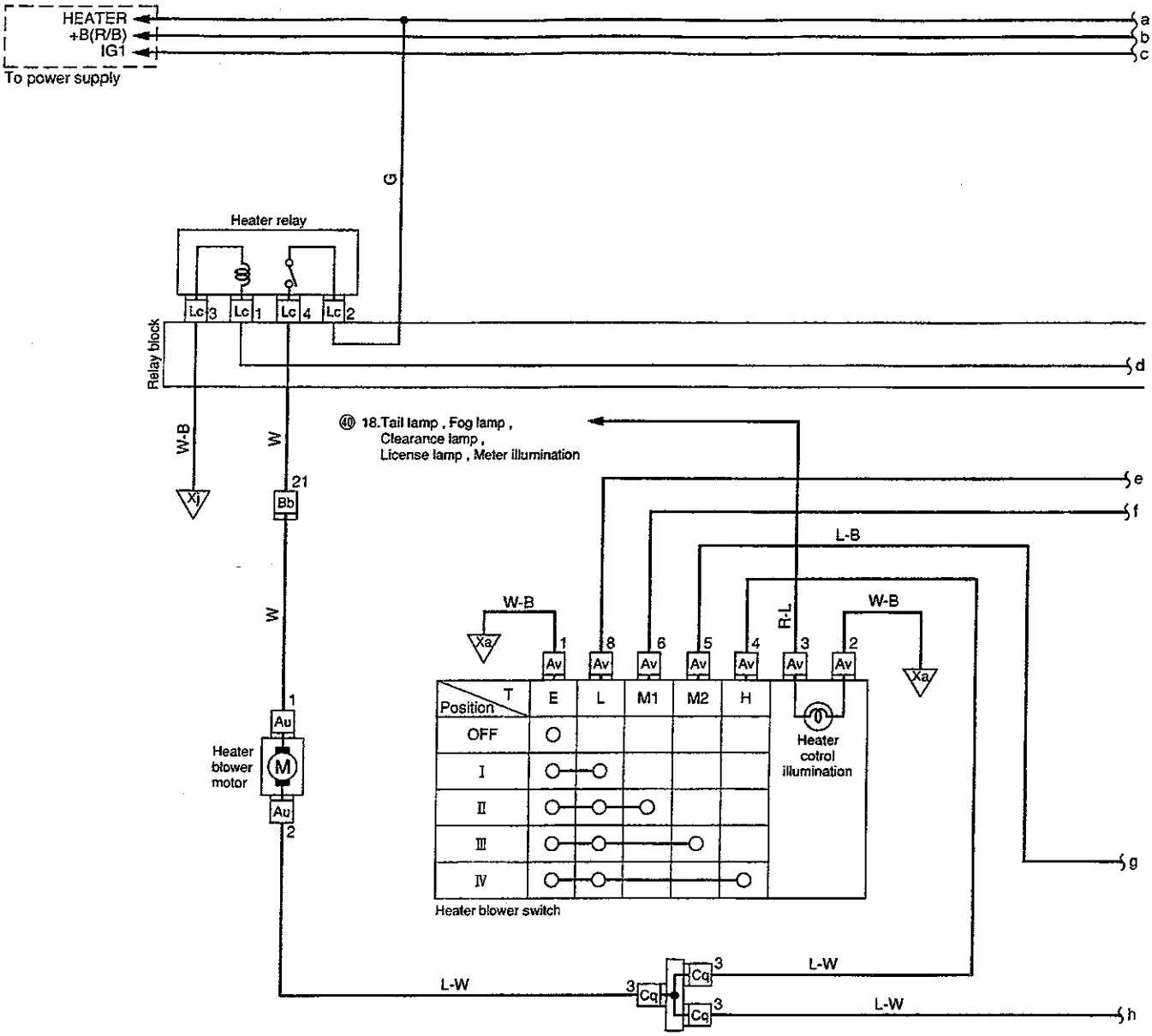


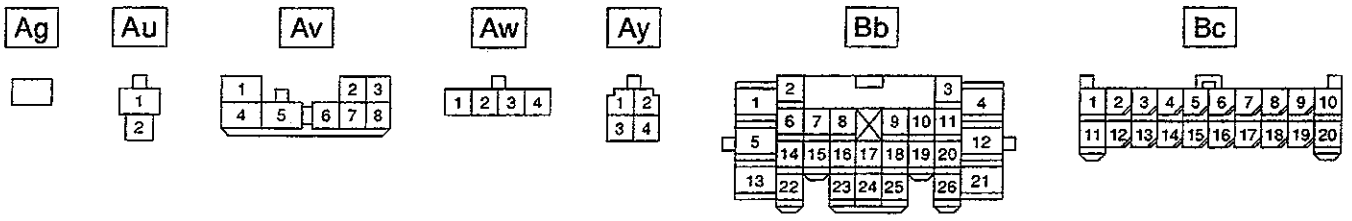
C13W5115ES48

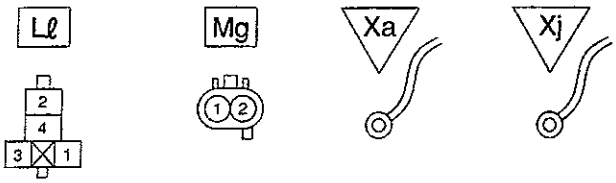


C13W5116ES48

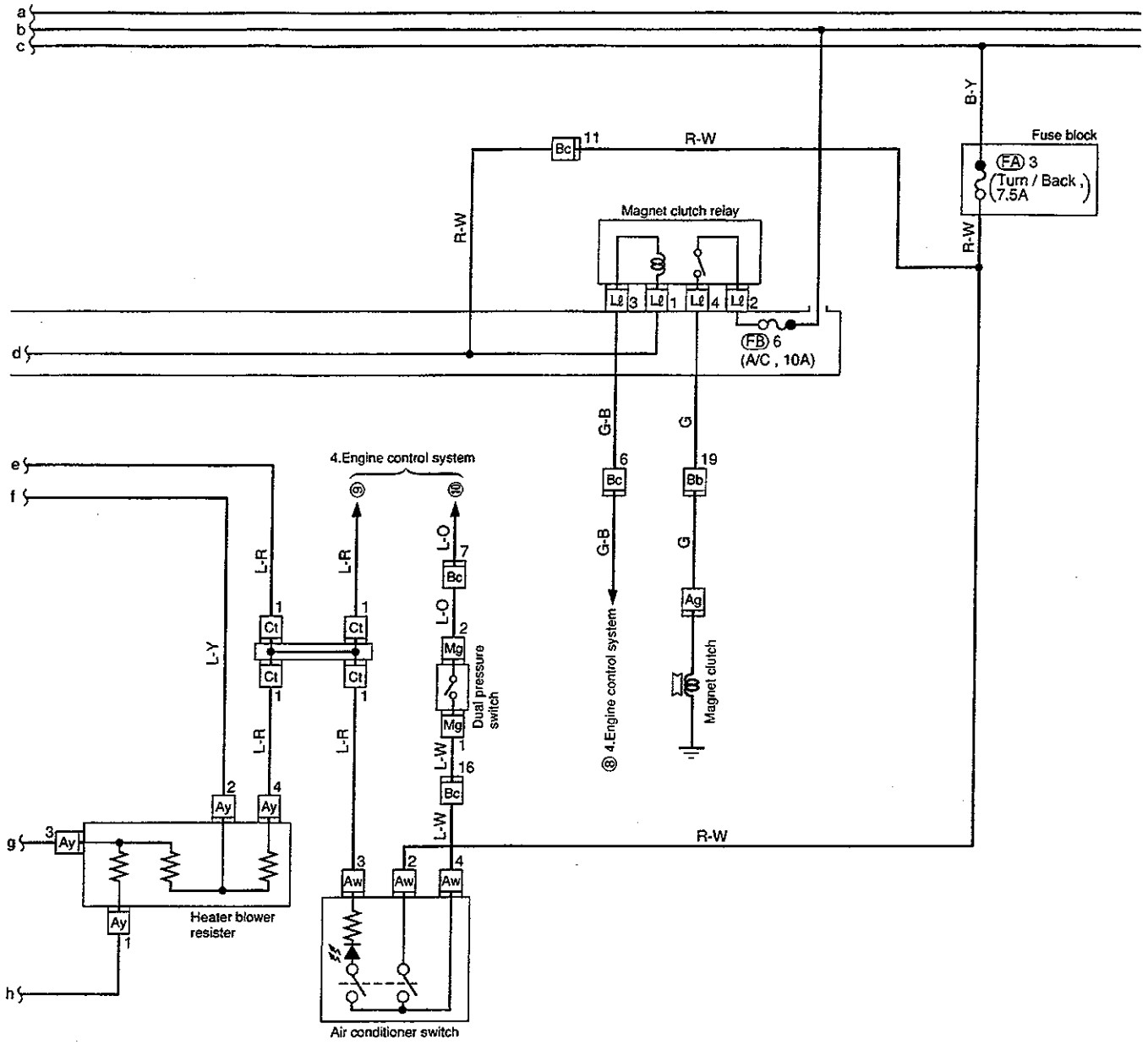
25 HEATER, AIR CONDITIONER

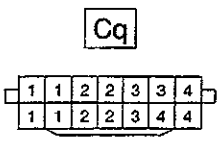


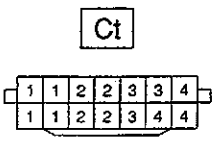


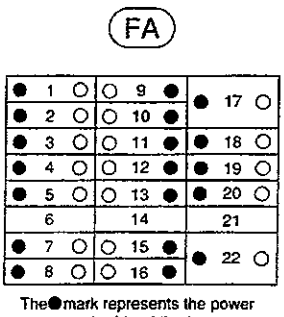


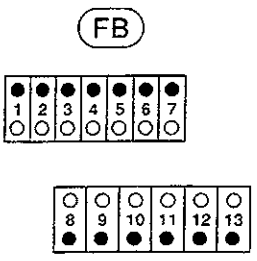
C13W5096ES48

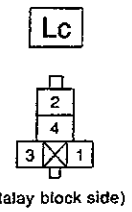




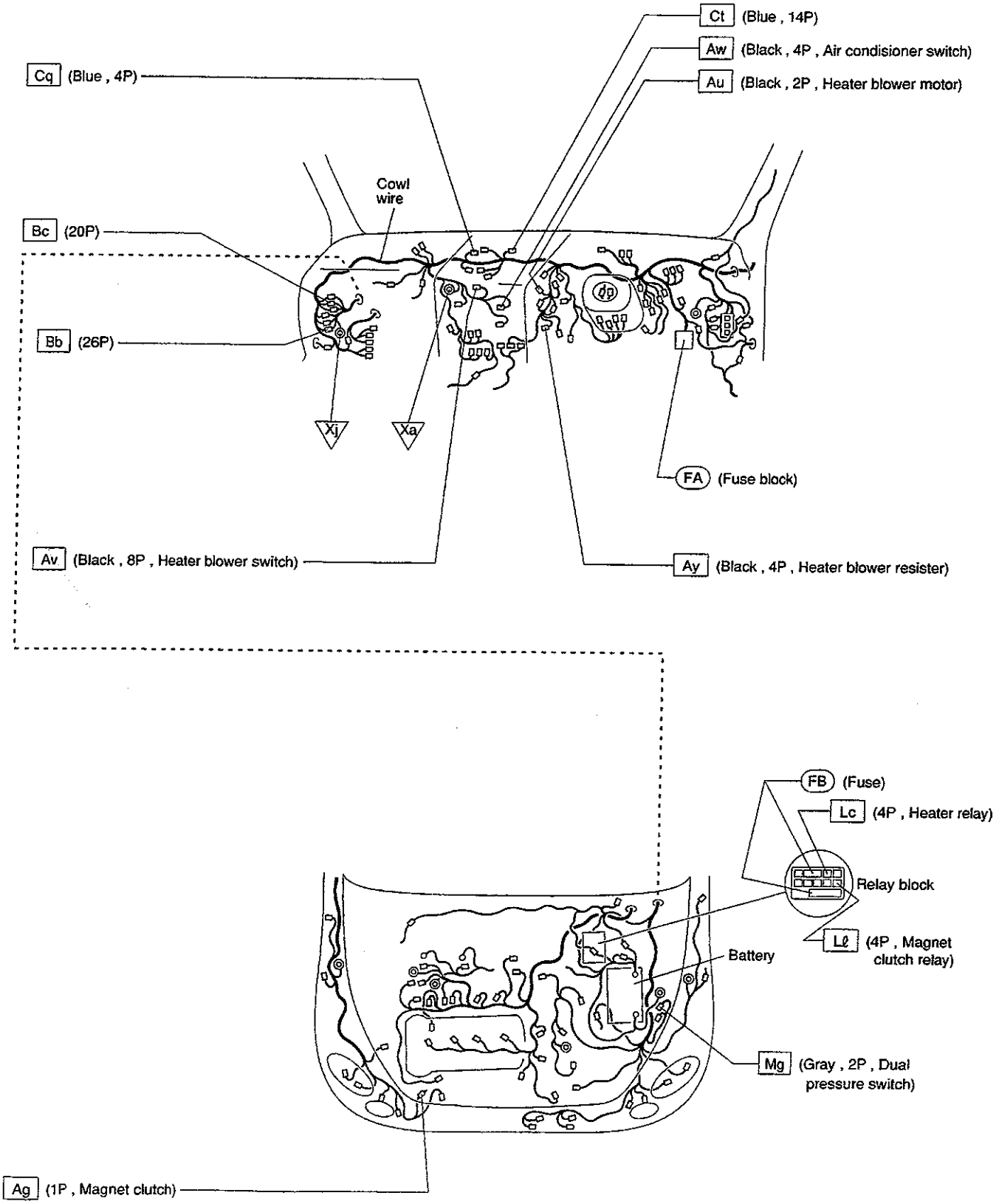








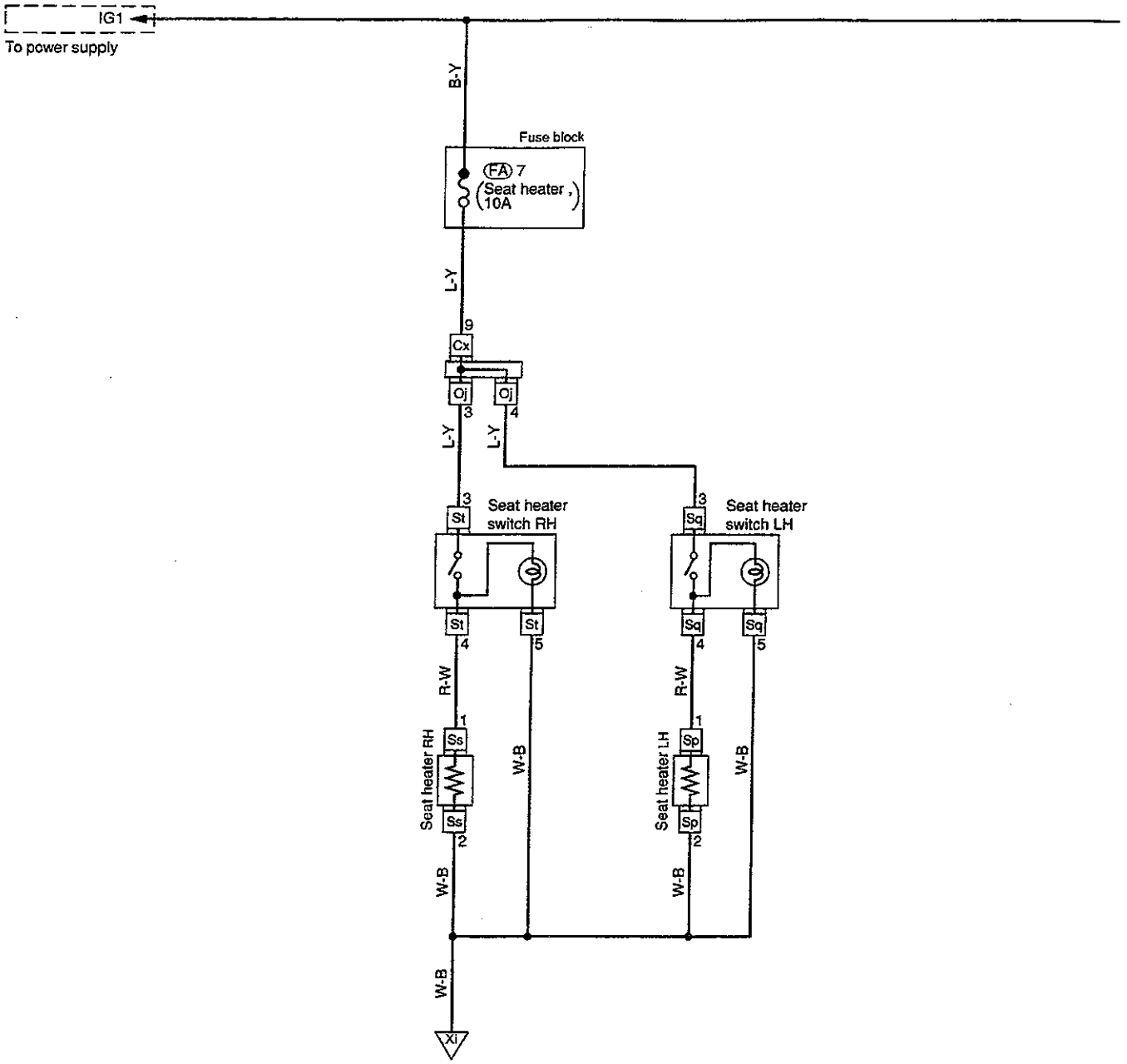
C13W5097ES48

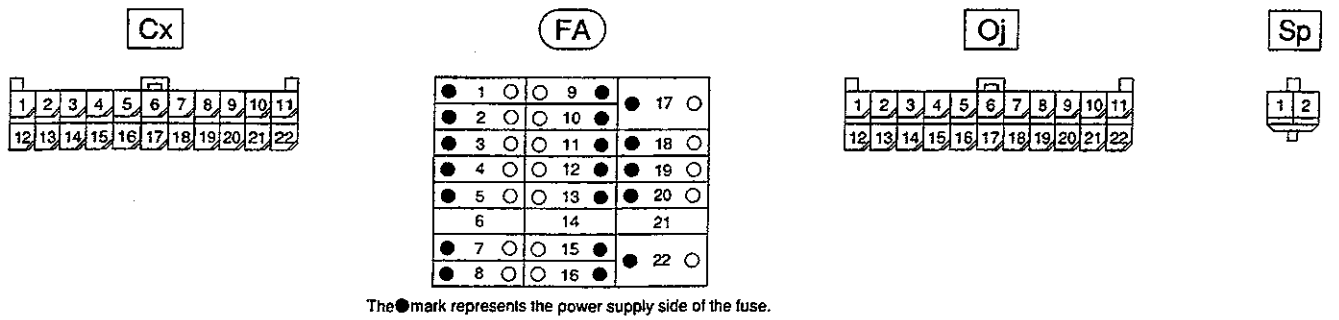


C13W5098ES48

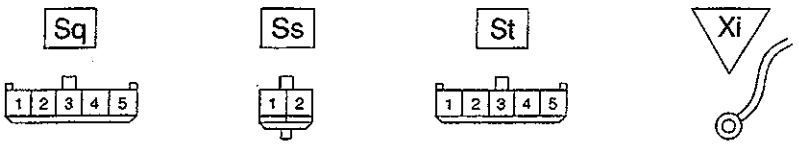
(MEMO)

26 SEAT HEATER



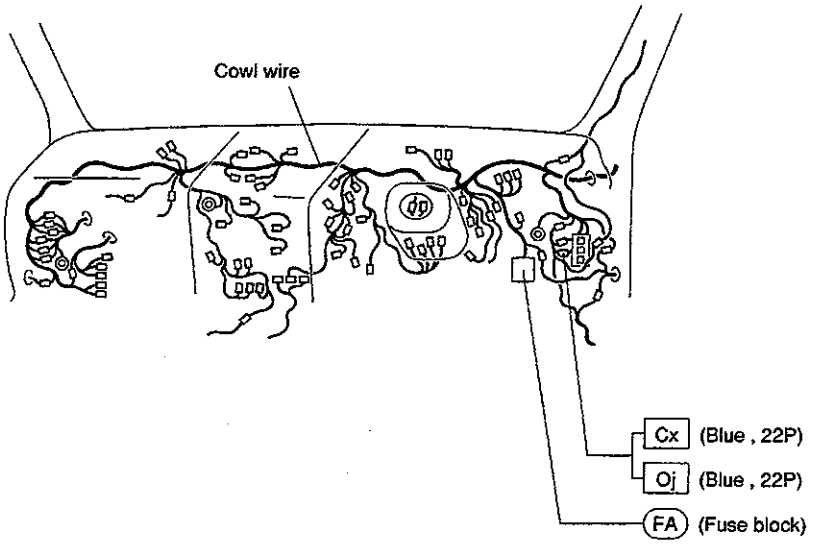


The● mark represents the power supply side of the fuse.

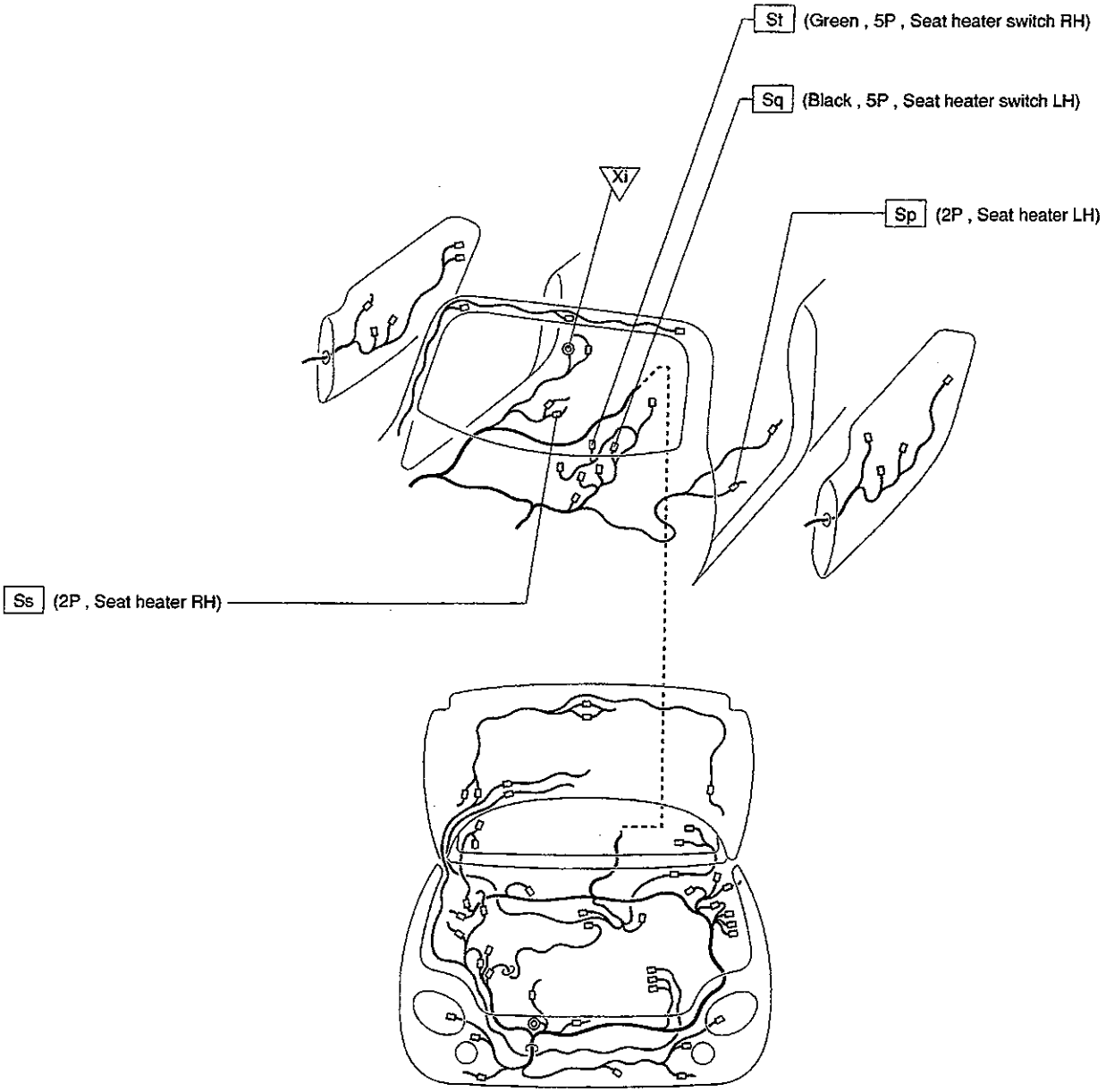


C13W5100ES48

(MEMO)

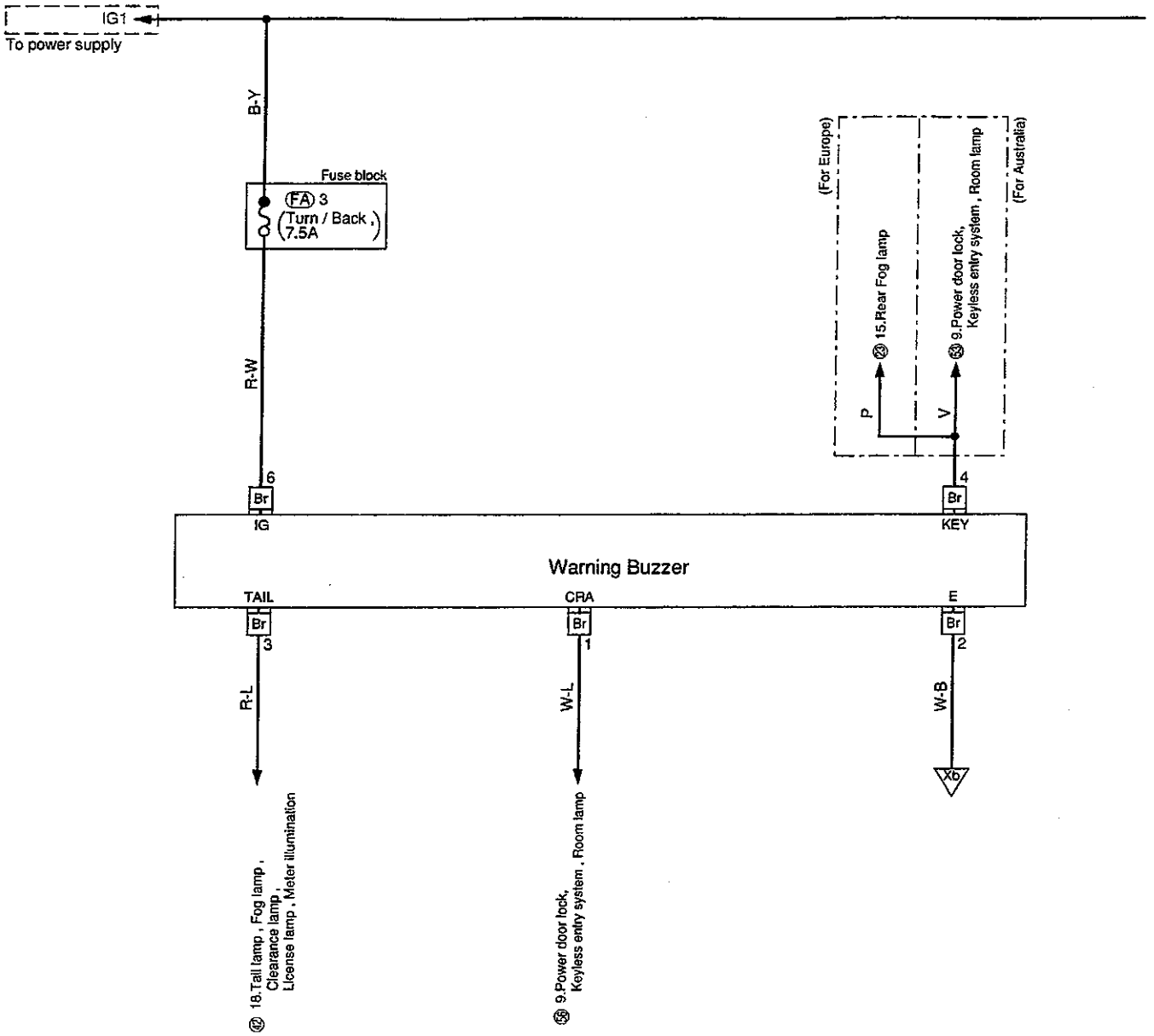


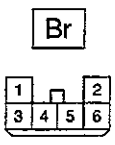
C13W5101ES48

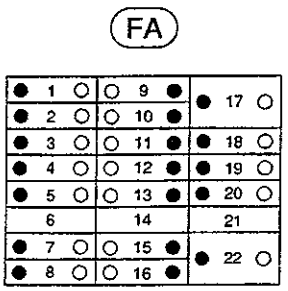


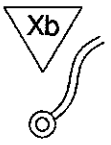
C13W5102ES48

27 WARNING BUZZER



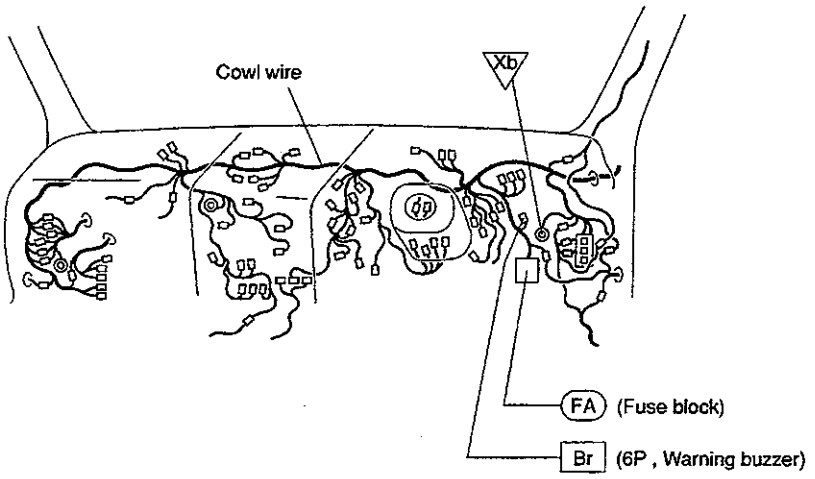






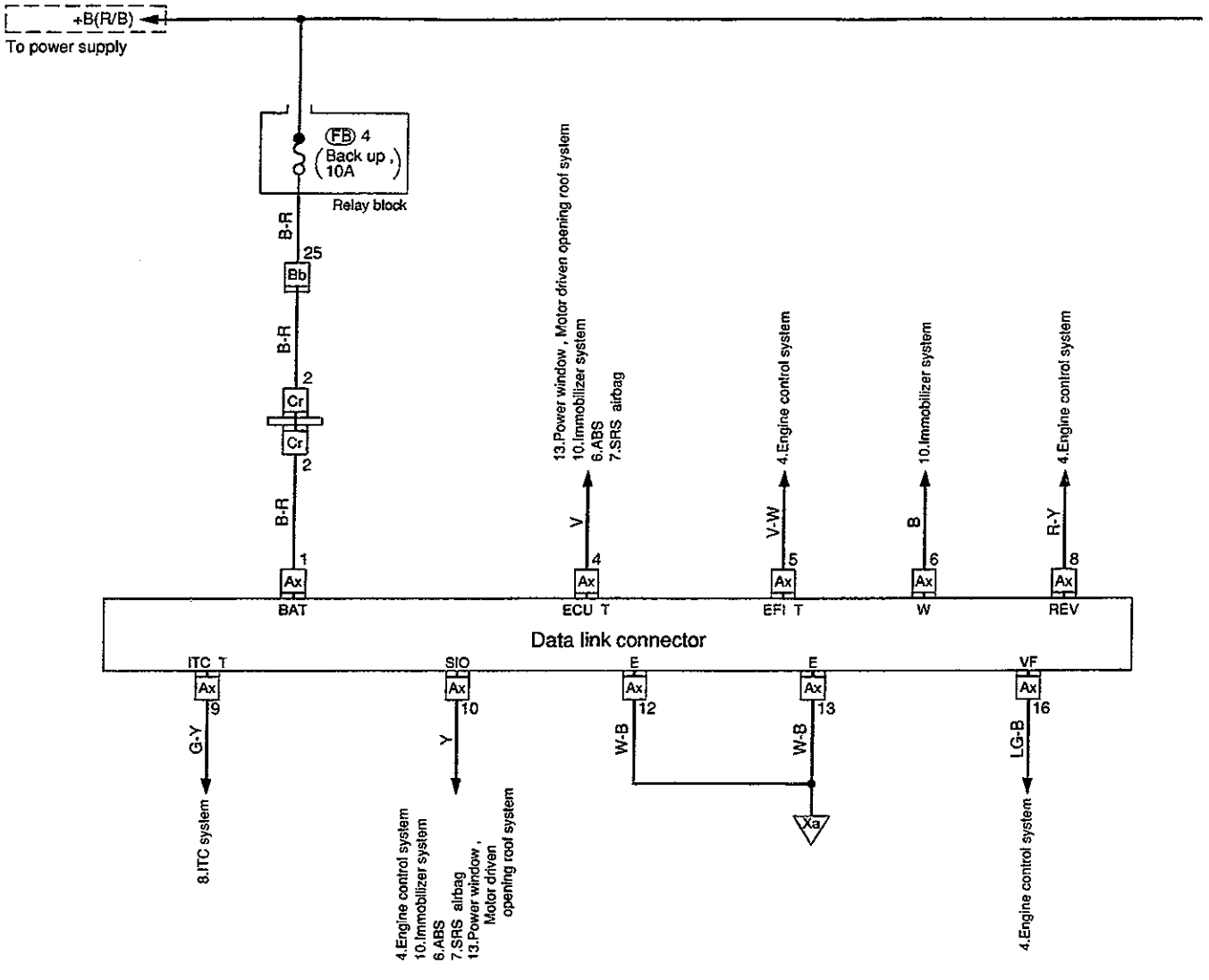
The● mark represents the power supply side of the fuse.

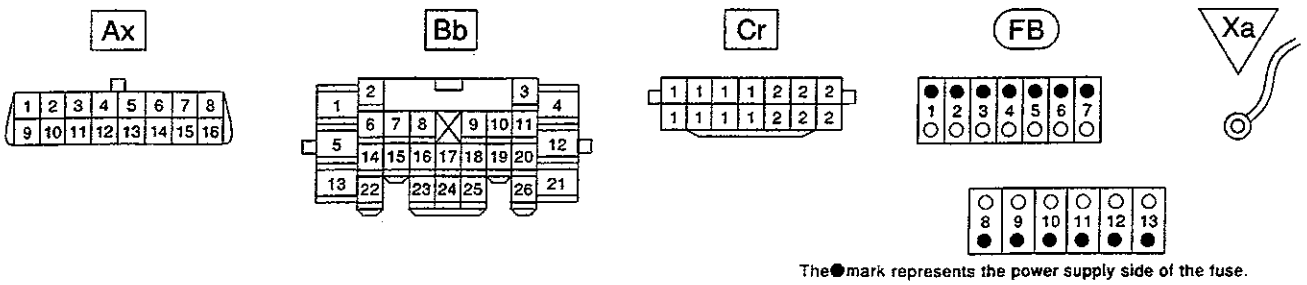
C13W5103ES48



C13W5104ES48

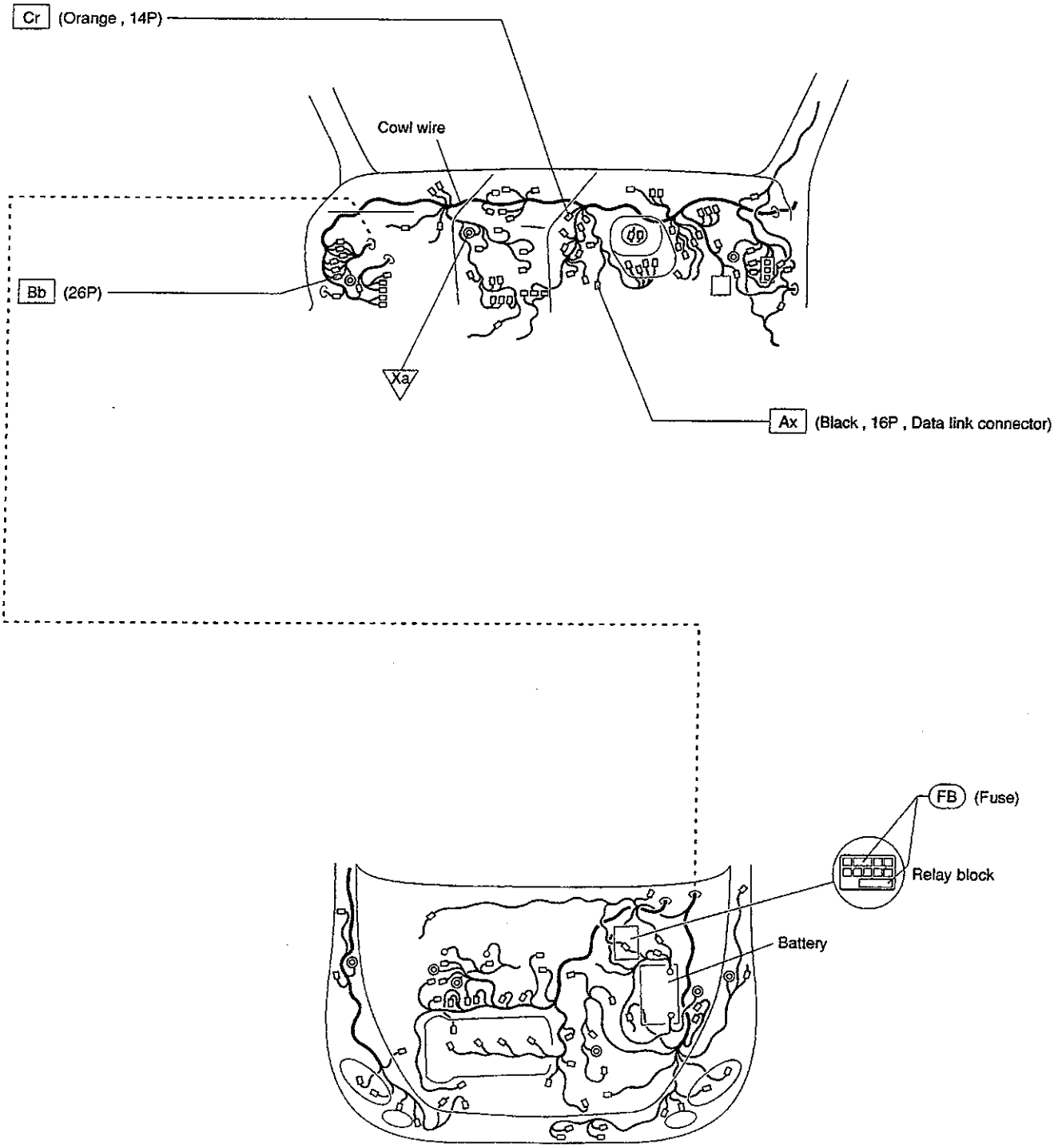
28 DATA LINK CONNECTOR





The● mark represents the power supply side of the fuse.

C13W5105ES48



C13W5106ES48

TO INDEX TO NEXT SECTION

TO INDEX

E INDEX

INDEX---------- E - 1

E-1

1 INDEX

ITEM	PAGE	ITEM	PAGE
A/C evap. temp. sensor (AUS)	D-8	Door control switch RH (Keyless entry system)	D-29
A/C evap. temp. sensor (EU)	D-12	Driver´s airbag squib	D-21
		Dual pressure switch	D-85
ABS ECU	D-17	EFI main relay (AUS)	D-7
ABV VSV (AUS)	D-8	EFI main relay (EU)	D-11
ABV VSV (EU)	D-12	Engine control computer (AUS)	D-8
Air conditioner switch	D-85		
Airbag ECU	D-21	Engine control computer (EU)	D-12
Alternator	D-5		
Back lamp	D-67	Engine revolution sensor (AUS)	D-7
Back lamp switch	D-67		
Boot lid courtesy	D-44	Engine revolution sensor (EU)	D-11
Boot lid latch drive	D-44		
Boot lid open switch	D-44	Fog lamp	D-64
Brake oil level switch	D-18	Fog lamp relay	D-64
Center latch	D-44	Fog lamp switch	D-64
Cigarette lighter	D-81	Front door lock motor (Impact sensing safety system)	D-25
Clearance lamp	D-63		
Clock	D-83		
Courtesy switch	D-29	Front door lock motor (Keyless entry system)	D-29
Data link connector	D-95		
Data link connector (Motor driven opening roof system)	D-44	Front door speaker	D-77
		Front O2 sensor (AUS)	D-7
		Front O2 sensor (EU)	D-11
Data link connector (ABS)	D-18	Front passenger´s seat pretensioner mechanism squib	D-21
Data link connector (Airbag)	D-21		
Data link connector (AUS)	D-8	Front passenger´s seat side airbag squib	D-21
Data link connector (EU)	D-12		
Data link connector (Immobilizar)	D-33	Front speed sensor	D-17
		Front turn lamp	D-56
Data link connector (ITC)	D-25	Front washer motor	D-71
Door control switch RH (Impact sensing safety system)	D-25	Front wiper motor	D-71
		Fuel pump (AUS)	D-7
		Fuel pump (EU)	D-11

C13W5120ES48

ITEM	PAGE	ITEM	PAGE
Fuel pump relay (AUS)	D-7	Knock sensor (AUS)	D-7
Fuel pump relay (EU)	D-11	Knock sensor (EU)	D-11
Fuel sender gauge	D-73	License lamp	D-63
H Hazard switch	D-55	Luggage door closed sensor	D-44
Headlamp	D-48		
Headlamp relay	D-47	Luggage door open sensor	D-44
Heater blower motor	D-85		
Heater blower resister	D-85	Luggage partition switch	D-43
Heater blower switch	D-85	Magnet clutch	D-85
Heater relay	D-85	Magnet clutch relay	D-85
High mounted stop lamp	D-59	Meter: ABS	D-74
Horn	D-47	Meter: Airbag	D-73
Horn relay	D-47	Meter: Brake	D-74
Horn switch	D-47	Meter: Charge	D-5
I Igniter Unit	D-11	Meter: Check engine (AUS)	D-8
Ignition coil (AUS)	D-7	Meter: Check engine (EU)	D-12
Ignition coil (EU)	D-11	Meter: CPU	D-73
Ignition switch	D-1	Meter: Highbeam indicator	D-48
Immobilizer ECU	D-33	Meter: Illumination	D-63
Immobilizer coil	D-33	Meter: Oil pressure	D-74
Injector (AUS)	D-7	Meter: Rear fog indicator	D-51
Injector (EU)	D-11	Meter: Turn indicator	D-56
Intake air temp. sensor (AUS)	D-7	Multi use lever switch (Front wiper & washer)	D-71
Intake air temp. sensor (EU)	D-11	Multi use lever switch (Head lamp,Horn)	D-47
ISC valve (AUS)	D-8	Multi use lever switch (Rear fog lamp)	D-51
ISC valve (EU)	D-12		
ITC ECU	D-25	Multi use lever switch (Turn signal switch)	D-55
ITC ECU (Hazard warning & Turn signal lamp)	D-55	Oil pressure switch	D-74
		Opening cover switch	D-43
ITC ECU (Keyless entry system)	D-29	P/S oil pressure switch (AUS)	D-7
K Key switch	D-30	P/S oil pressure switch (EU)	D-11
Keyless receiver	D-30		

C13W5121ES48

	ITEM	PAGE	ITEM	PAGE	
P	Parking brake switch	D-18	Room lamp (Impact sensing safety system)	D-26	
	Passenger's airbag squib	D-21			
	Power window ECU	D-43			
	Power window lock switch	D-43	Room lamp (Keyless entry system)	D-29	
	Power window motor	D-43	Seat belt switch	D-73	S
	Power window motor quarter	D-44	Seat heater	D-89	
			Seat heater switch	D-89	
	Power window switch	D-43	Side latch sensor	D-44	
	Pressure sensor (AUS)	D-7	Side turn lamp	D-56	
	Pressure sensor (EU)	D-11	Starter	D-3	
	Pretensioner seat belt squib LH	D-21	Stop lamp	D-59	
			Stop lamp switch	D-59	
	Pretensioner seat belt squib RH	D-21	Tail lamp	D-63	T
			Tail switch	D-63	
	Pump Assy	D-44	Thermo. sender gauge	D-73	
R	Radiator fan motor	D-15	Throttle sensor (AUS)	D-7	
	Radiator fan Relay	D-15	Throttle sensor (EU)	D-11	
	Radio	D-77	Turn signal flasher relay	D-55	
	Rear fog lamp	D-51	Turn signal switch	D-55	
	Rear fog lamp switch	D-51	Warning buzzer	D-93	W
	Rear O2 sensor (AUS)	D-8	Warning buzzer (Motor driven opening roof system)	D-43	
	Rear O2 sensor (EU)	D-12			
	Rear pole antenna	D-77			
	Rear speed sensor	D-17	Warning lamp (Motor driven opening roof system)	D-43	
	Rear turn lamp	D-56			
	Rear view mirror	D-35			
	Rear view mirror switch	D-35	Washer switch	D-71	
	Rear window defogger	D-39	Water temp.sensor (AUS)	D-7	
	Rear window defogger switch	D-39	Water temp.sensor (EU)	D-11	
			Wiper relay	D-71	
	Roof closed sensor	D-44	Wiper switch	D-71	
	Roof ECU	D-44			
	Roof lock switch	D-43			
	Roof open sensor	D-44			
	Roof open/close switch	D-43			

C13W5122ES48

TO INDEX TO NEXT SECTION

TO INDEX

C ENGINE ELECTRICAL

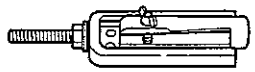
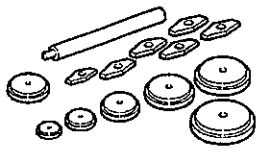
STARTER ---------- C - 1
DISASSEMBLING AND
ASSEMBLING ---------- C - 1
CIRCUIT DIAGRAM ---------- C - 1
ALTERNATOR ---------- C - 21
DISASSEMBLING AND
ASSEMBLING ---------- C - 21
CIRCUIT DIAGRAM ---------- C - 21

1 STARTER

1-1 DISASSEMBLING AND ASSEMBLING

1-1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09208-87701-000	Remover, oil seal
	09608-87302-000	Tool set, axle hub bearing & drive pinion bearing

Tool

Soldering iron

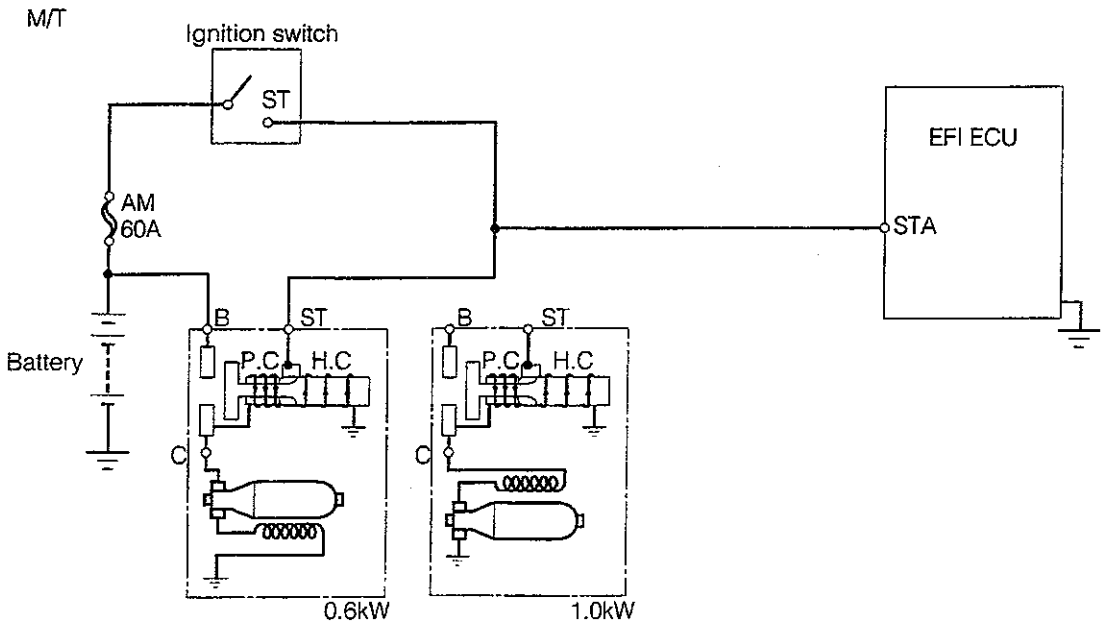
Instrument

Torque wrench,Spring separates ,Dial gauge,Vernier calipers,Voltage tester,V-shaped blocks

Lubricant,adhesive,others

High-temperature grease

1-2 CIRCUIT DIAGRAM



Starter performance

Rated output (kW)	0.6	1.0
No-load characteristics	50A or less [at time of 11.5 V] 6000 rpm or more	90A or less [at time of 11.5 V] 3000 rpm or more
Number of pinion teeth	9	10
Rotational direction	Counterclockwise as viewed from pinion side	Counterclockwise as viewed from pinion side
Weight (kg)	3.1	3.05

1-2-1 Starter unit check

CAUTION

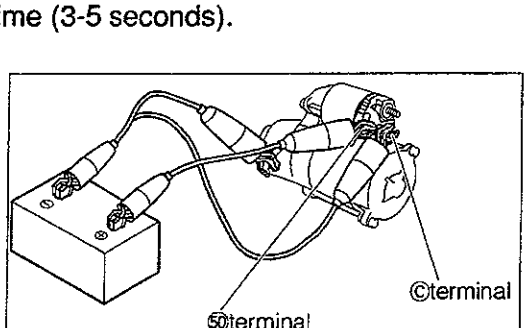
- Each check should be performed within a short length of time (3-5 seconds).

(1) Pull-in check

1.Apply the battery voltage to the terminal ⑤⓪. Connect the earth wire to the terminal C and the starter body. Ensure that the pinion gear jumps out.

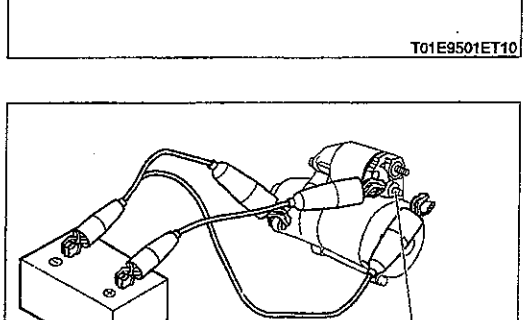
CAUTION

- This test should be carried out with the lead wire of the magnet switch disconnected.



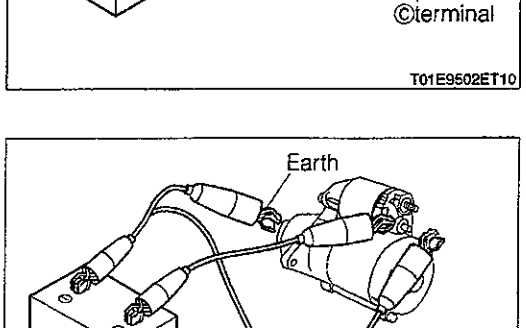
(2) Retention check of holding coil

1.Under the pull-in check state, disconnect the wire leading to the terminal C. Ensure that the pinion gear remains in the jump-out state.



(3) Plunger return check

1.Under the retention check state of the holding coil, disconnect the earth wire from the starter body. Ensure that the pinion gear returns.



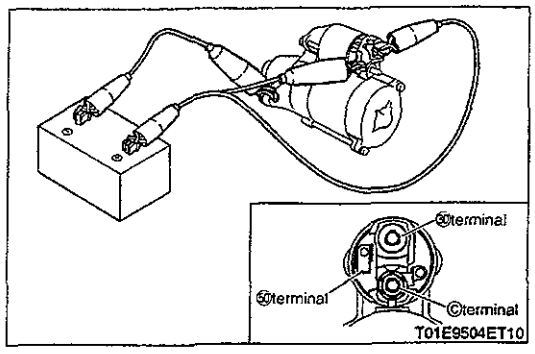
(4) No-load test

1.Clamp the starter in a vice, etc.

2.Hook up the cables and tester, as indicated in the figure. (At this time, do not connect a wire to the terminal ⑤⓪.)

3.Connect the terminal ⑤⓪. Read the current reading when the reading of the ammeter has stabilized.

SPECIFIED VALUE: 0.6 kW type: 50 A or less at 11.5 V
1.0 W type: 90 A or less at 11.5 V

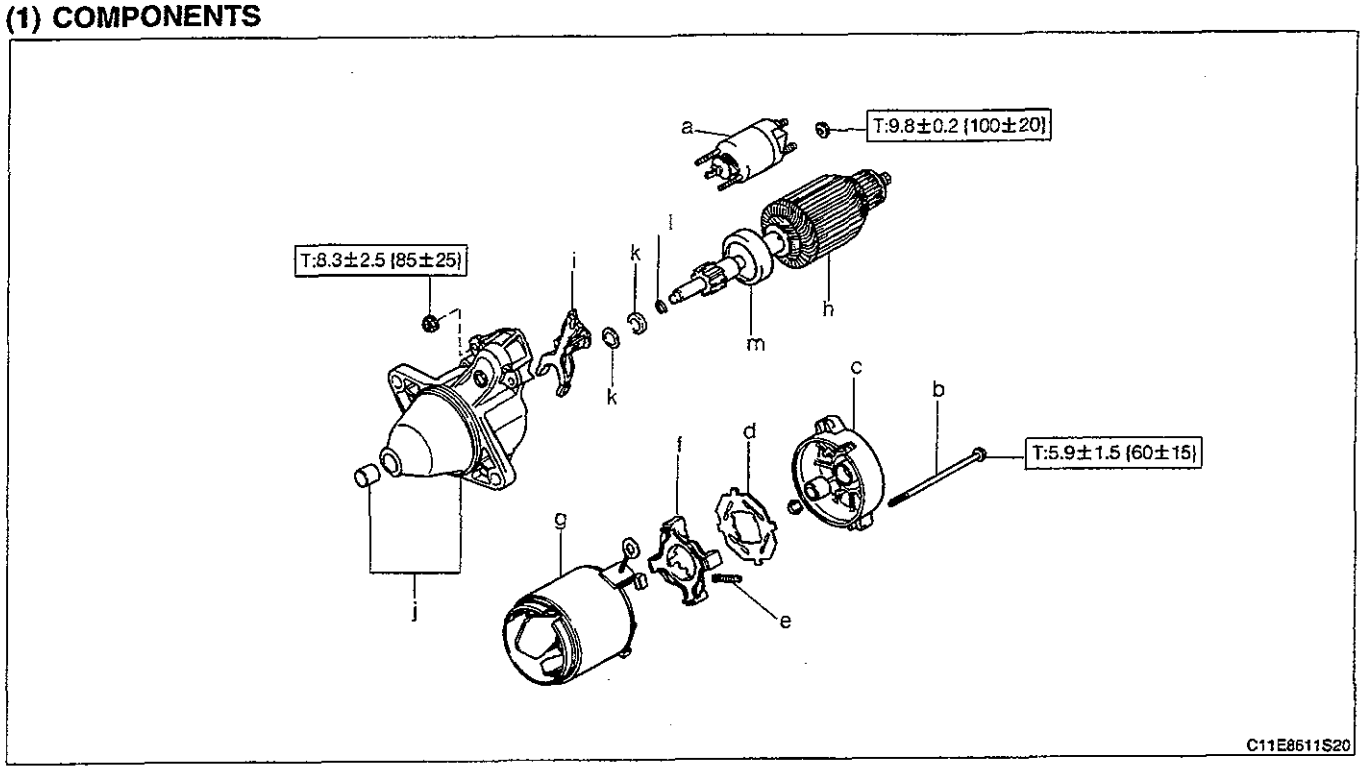


CAUTION

- A comparatively large current flows during the test. Therefore a heavy lead wire should be employed.

1-2-2 Starter disassembling and assembling (0.6 kW type)

(1) COMPONENTS



※: Non-reusable parts

Unit :N·m{kgf·cm}

1 a Magnet switch
2 b Through bolt
3 c Starter commutator end frame
4 d Brush holder insulator
5 e Spring
6 f Starter brush holder
7 g Starter york Ay
8 h Starter armature Ay
9 i Starter drive pinion lever
10 j Starter drive housing Ay
11 k Starter pinion stop nut or collar
12 l Snap ring

(2) Disassembling

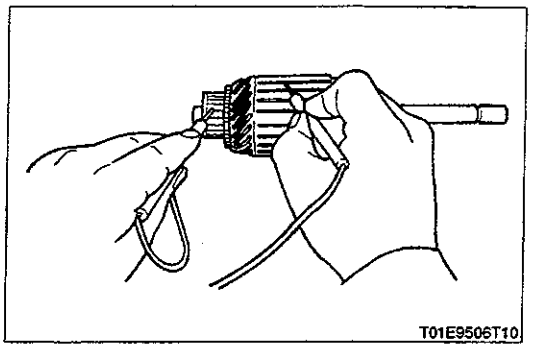
1.Remove the parts in the sequence of the Components diagram.

(3) Inspection

1.Armature check

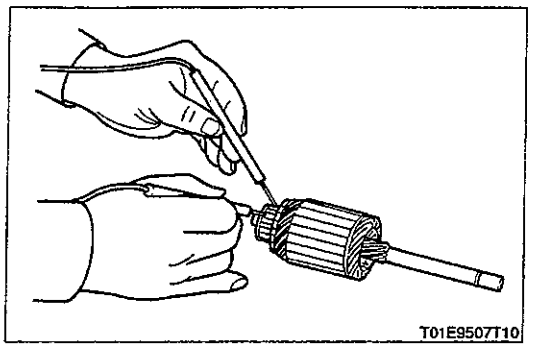
(1) Check the insulation between the commutator and armature coil core.

SPECIFIED VALUE: No continuity exists.



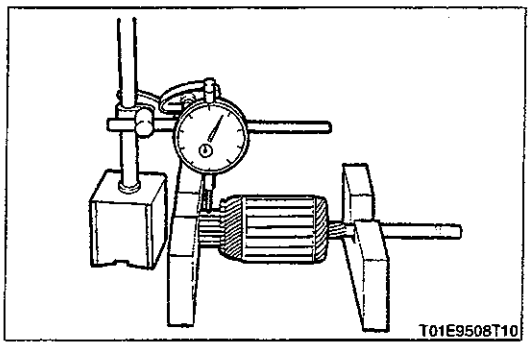
(2) Check continuity between segments.

SPECIFIED VALUE: Continuity should exist between each segment.



(3) Check the run-out of the commutator.

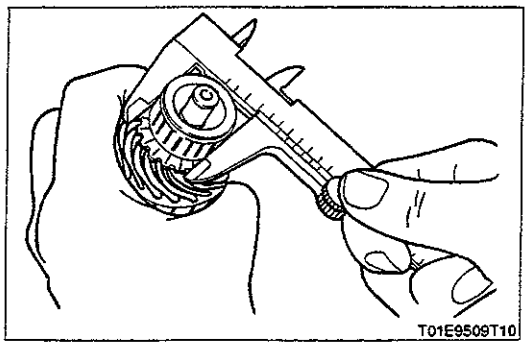
ALLOWABLE LIMIT: 0.4 mm



(4) Measure the outer diameter of the commutator.

SPECIFIED VALUE: 28 mm

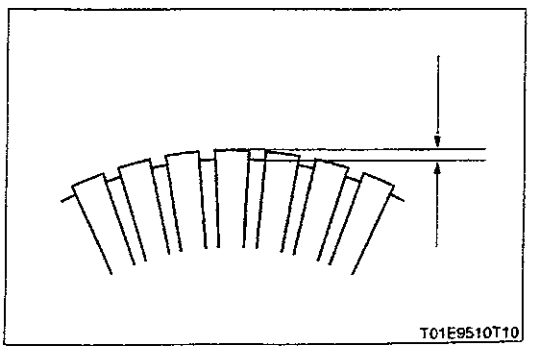
ALLOWABLE LIMIT: 27 mm



(5) Check the under-cut depth of each segment.

SPECIFIED VALUE: 0.60±0.15 mm

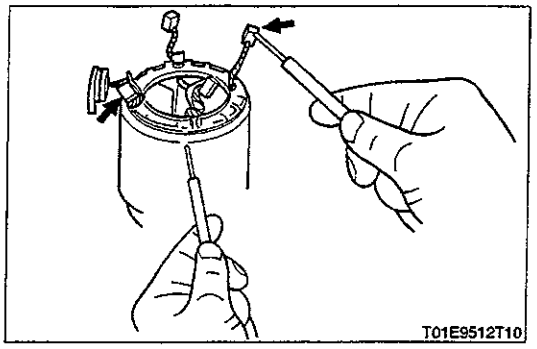
ALLOWABLE LIMIT: 0.2 mm



2.Field coil check

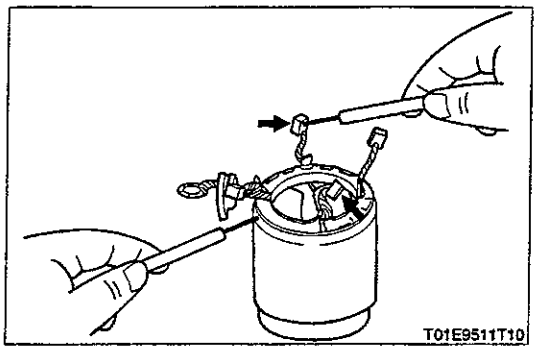
(1) Check the continuity between the field coil flange C terminal lead wires.

SPECIFIED VALUE: No continuity exists.



(2) Check the insulation between the field coil brush and the field.

SPECIFIED VALUE: Continuity exists.



3.Brush check

(1) Check the roughness of the contact surface and brush length.

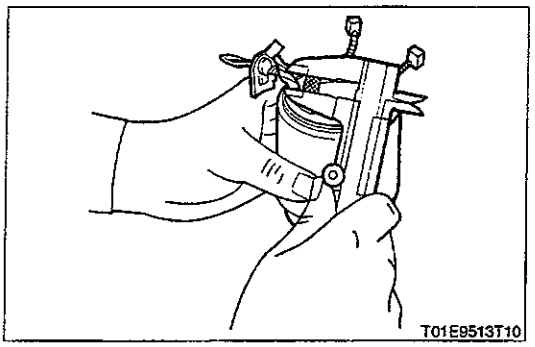
SPECIFIED VALUE: 10.0 mm

ALLOWABLE LIMIT: 6.0 mm

CAUTION

- The measurement of brush length should be conducted at the center recessed section.

(2) When the contact surface is corrected or replaced, wrap an abrasive paper (400#) around the commutator and remedy the contact surface.



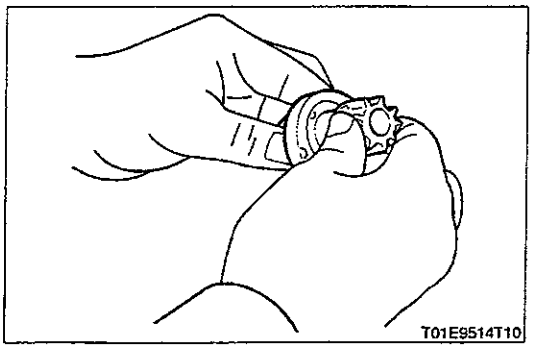
4.Spring check

(1) Visually inspection for spring.

5.Starter clutch check

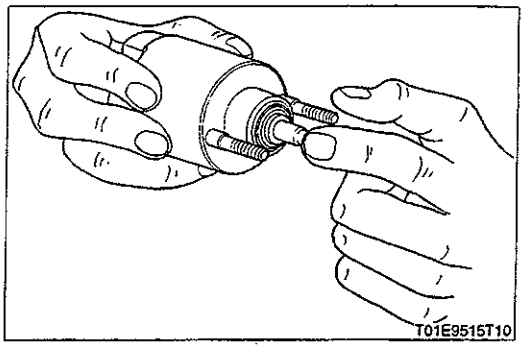
(1) Check the gear for wear and damage.

(2) Ensure that the gear locks when the gear is turned in the driving direction (M/T, clockwise). Furthermore, ensure that the gear turns smoothly when the gear is turned in the opposite direction.



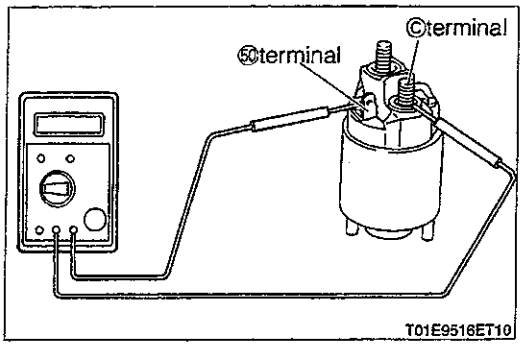
6.Magnet clutch check

(1) When the plunger is pushed in and released, ensure that the plunger returns quickly to the original position.



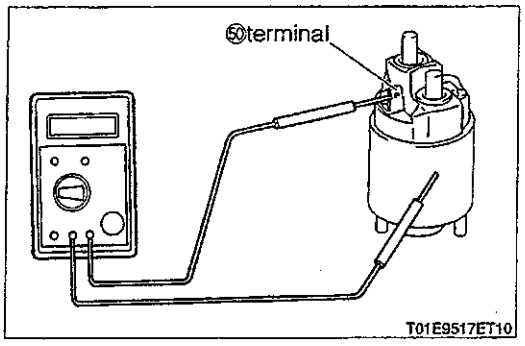
(2) Check continuity between the terminal ⑤⓪ and the terminal Ⓒ.

SPECIFIED VALUE: Continuity exists.



(3) Check continuity between the terminal ⑤⓪ and the magnet switch body.

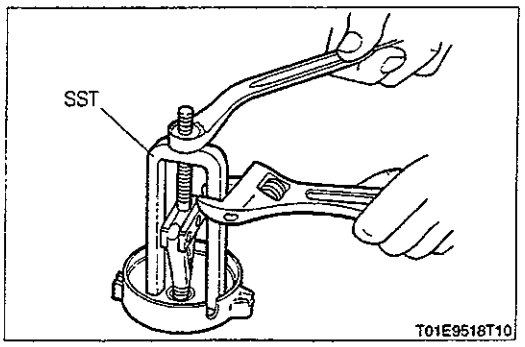
SPECIFIED VALUE: Continuity exists.



7.Bush replacement

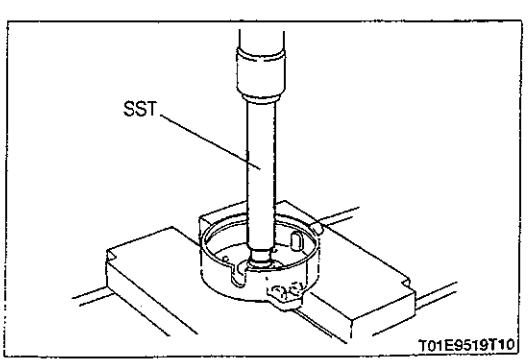
(1) Remove the bush, using the SST.

SST: 09208-87201-000



(2) Press the bush, using the SST in combination with a press.

SST: 09608-87302-000

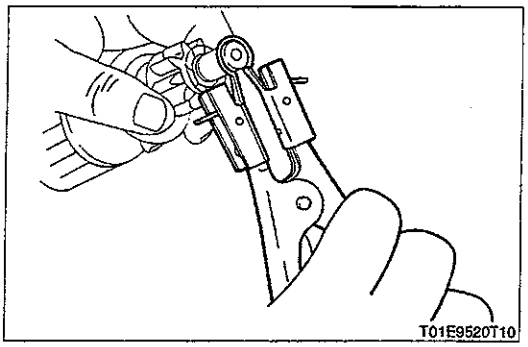


(4) Assembling

1.Apply High-temperature grease to the starter clutch bush and spline section.
LUBRICANT: High-temperature grease

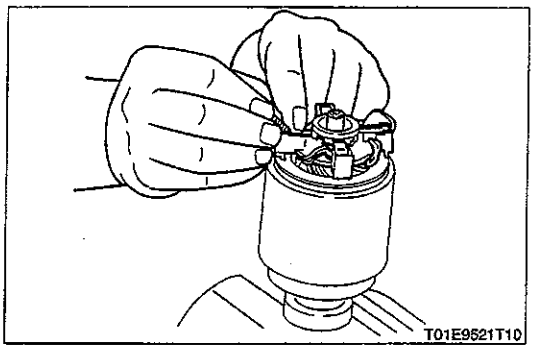
2.Assemble the starter clutch assembly, starter pinion stop nut or collar.

3.Assemble the snap ring, following the procedure given below.
(1) Install one collar onto the armature and put the snap ring onto the shaft.
(2) Fit the snap ring into the groove of the collar by pushing the snap ring with a screwdriver or the like.

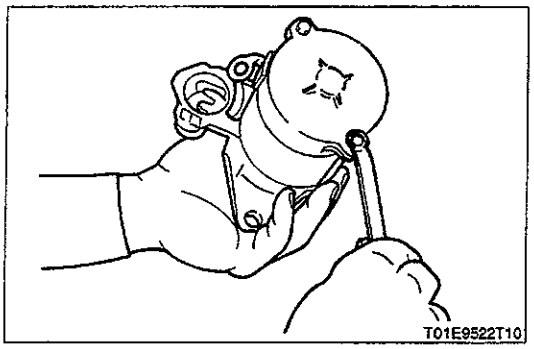


CAUTION
- Be sure to use a new snap ring.

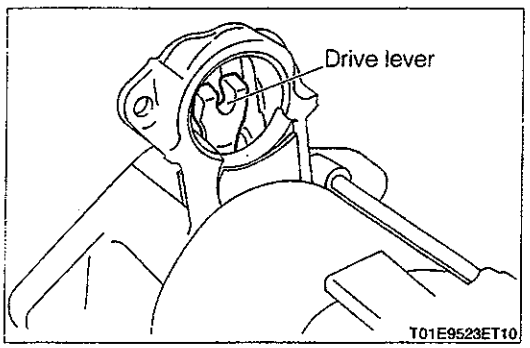
4.Set the spring to the starter brush holder. Then, assemble the brush holder insulator.



5.Set the starter commutator end frame, starter armature Ay, starter drive pinion lever and starter drive housing Ay. Assemble them by means of the through bolts.
TIGHTENING TORQUE: 5.9±1.4 N·m {60±14 kgf·cm}

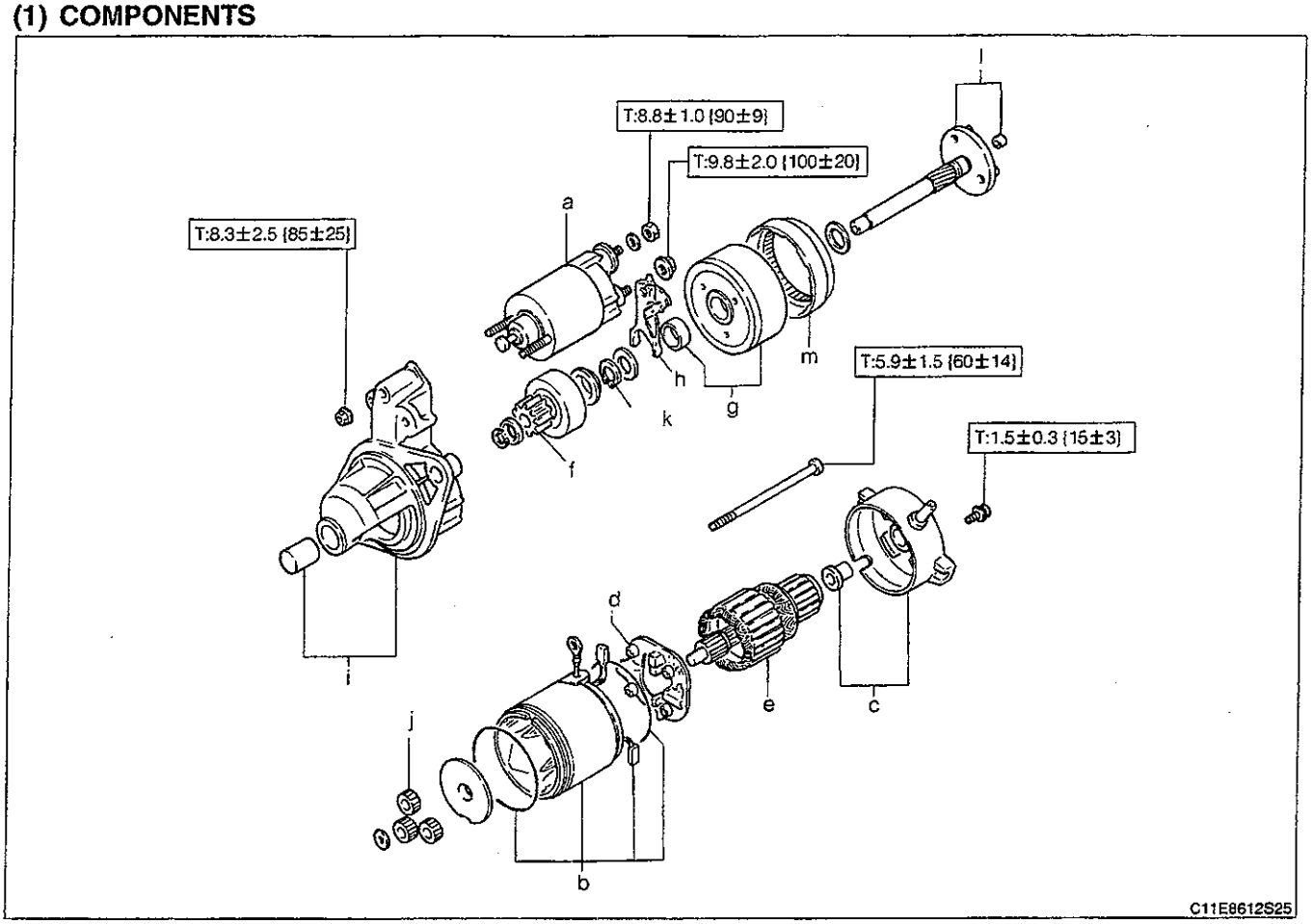


6.With the joint section attached securely to the drive pinion lever, install the magnet switch.
TIGHTENING TORQUE: Magnet switch retaining nut :
8.3±2.5 N·m {85±25 kgf·cm}
C terminal retaining nut :
9.8±2.0 N·m {100±20 kgf·cm}



1-2-3 Assembling/disassembling procedure (1.0 kW type)

(1) COMPONENTS

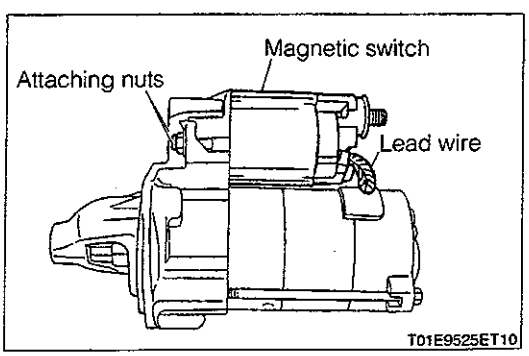


※: Non-reusable parts
Unit :N·m{kgf·cm}

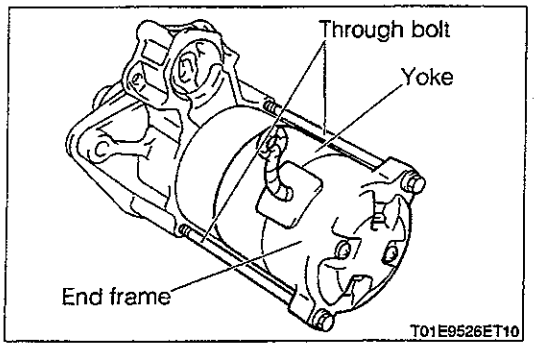
1 a Switch Ay, starter magnet
2 b Yoke Ay, starter
3 c Frame Ay, starter commutator end
4 d Holder Ay, starter brush
5 e Armature Ay, starter
6 f Clutch S/A, starter
7 g Bearing S/A, center
8 h Lever, starter pinion drive
9 i Housing Ay, starter drive
10 j Gear S/A, planetary
11 k Ring, snap
12 l Shaft S/A, planet carrier
13 m Gear, internal

(2) Disassembling

1.Remove the magnet starter switch Ay.



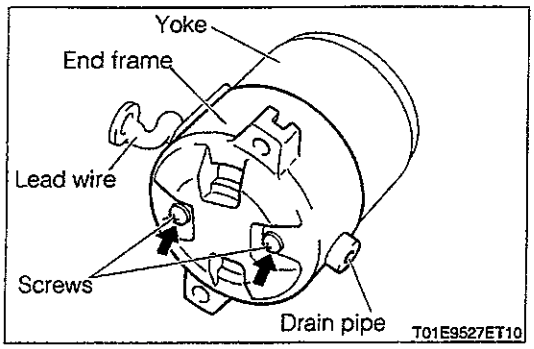
2.Remove the two through bolts. Remove the starter yoke Ay and starter commutator end frame Ay as a set.



3.Remove the starter commutator end frame Ay.

CAUTION

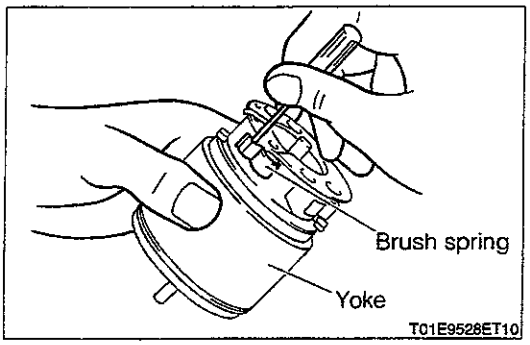
- **Remove the end frame, while tilting it so as to prevent the interfering of the brush holder with the water drain cover at the inside.**
- **Remove the lead wire, while pushing it toward the yoke side so that it may not be pulled by the end frame.**



4.Remove the starter brush holder with the following procedure.

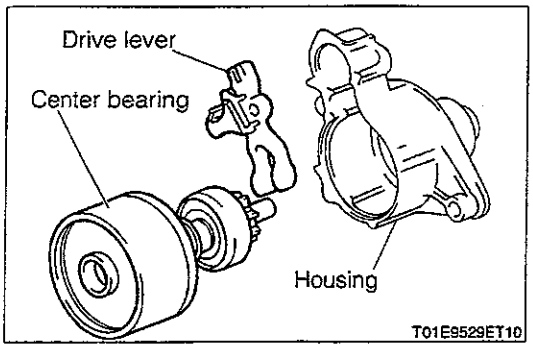
(1) Lift the brush spring and remove the brush.

(2) Remove the brush holder from the yoke.

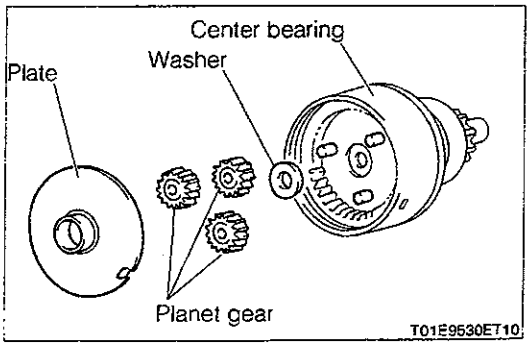


5.Remove the starter armature Ay and starter clutch S/A.

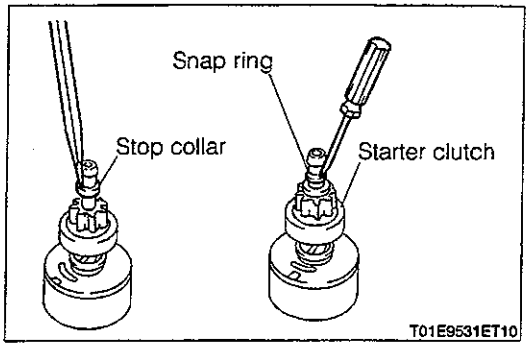
6.Disassemble the center bearing S/A, starter pinion drive lever and starter drive housing as shown in the right figure.



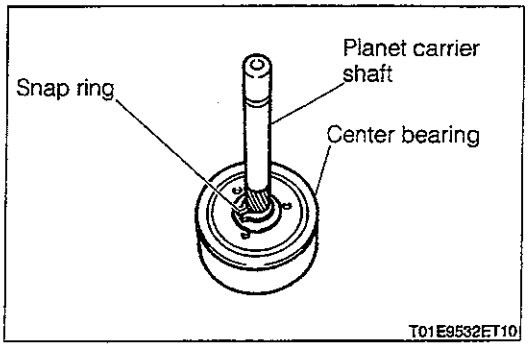
7.Remove the plate as shown in the right figure and remove the planetary gear assembly (three gears).



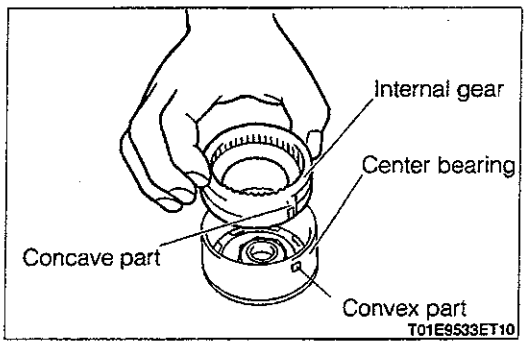
8.As shown in the right figure, remove the snap ring and stop collar so as to separate the clutch.



9.Remove the snap ring and disassemble the center bearing and planet carrier shaft S/A.



10.Disassemble the recessed section of the internal gear circumference, center bearing and planet carrier shaft S/A.

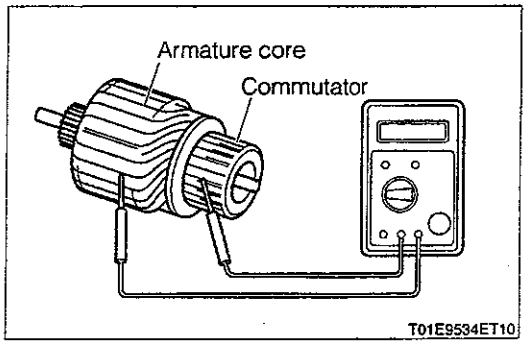


(3) Inspection

1.Armature coil

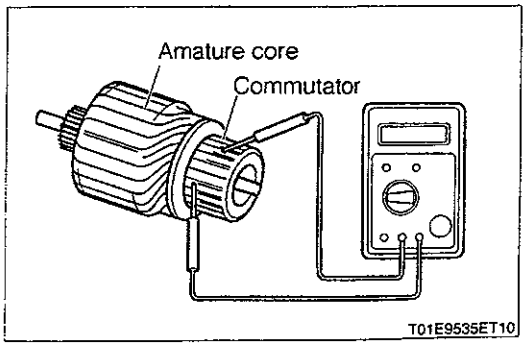
(1) Check the insulation between the commutator and the armature coil core.

SPECIFIED VALUE: No continuity exists.

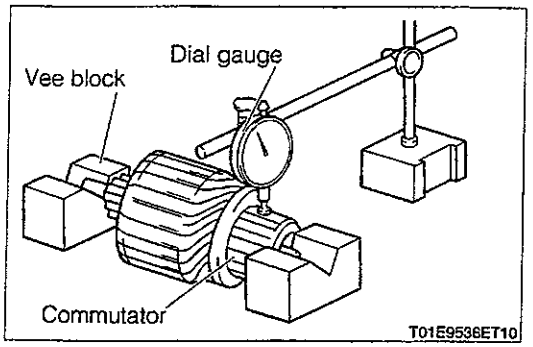


(2) Check the continuity between segments.

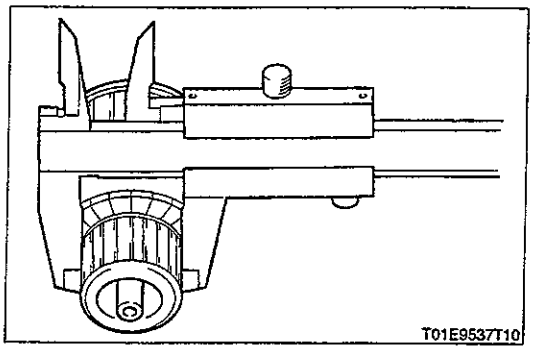
SPECIFIED VALUE: Continuity should exist between the segments.



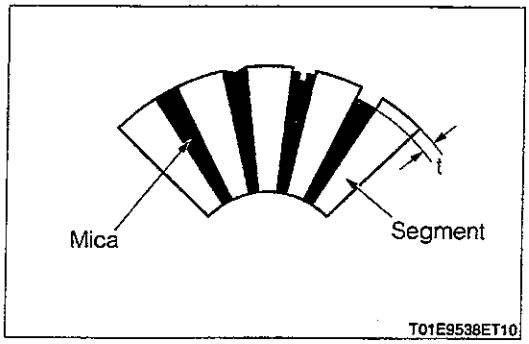
(3) Check the runout of the commutator.
ALLOWABLE LIMIT: 0.05 mm



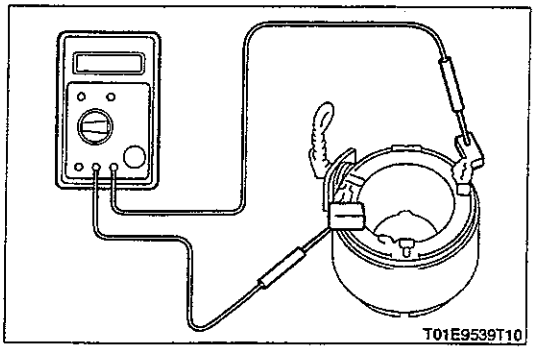
(4) Measure the outer diameter of the commutator.
SPECIFIED VALUE: 28.00 mm
ALLOWABLE LIMIT: 27.0 mm



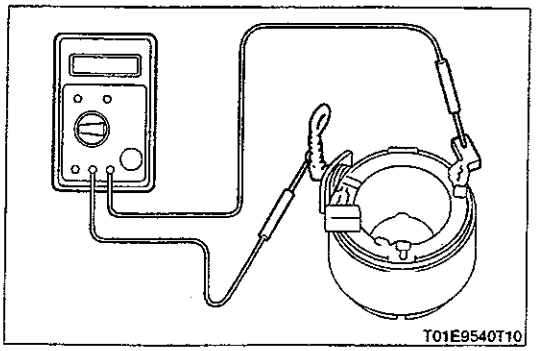
(5) Check the under-cut depth of each segment.
SPECIFIED VALUE: 0.60±0.15 mm
ALLOWABLE LIMIT: 0.2 mm



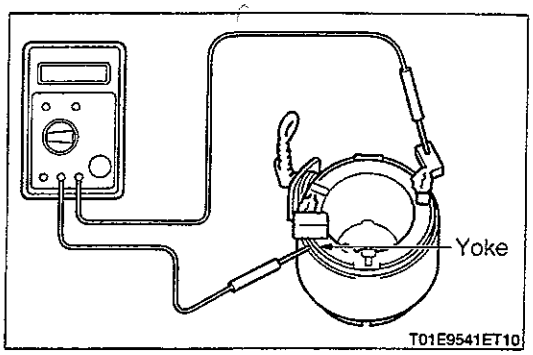
2.Yoke check
(1) Field coil check
Confirm continuity between the brushes.



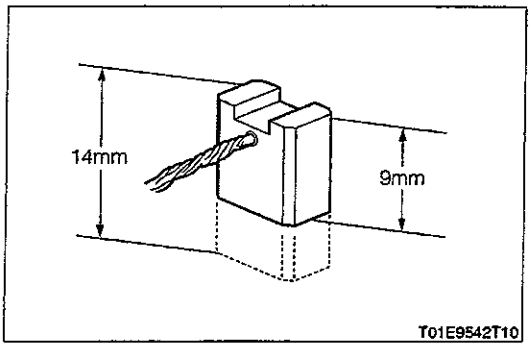
(2) Check continuity between the brush and the C terminal lead wire.
SPECIFIED VALUE: Continuity exists.
CAUTION
- Check the both brush.



(3) Check the insulation between the brush and yoke.
SPECIFIED VALUE: No continuity exists.



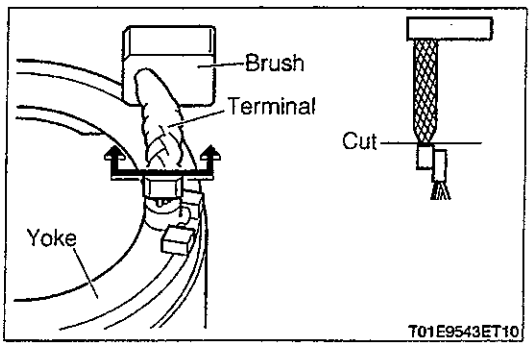
(4) Brush check
Check the roughness of the contact surface and brush length.
ALLOWABLE LIMIT: 9 mm



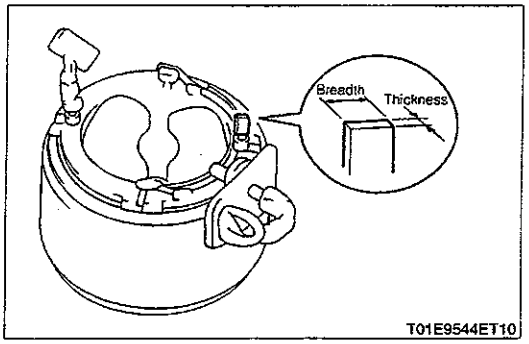
(5) Brush replacement procedure
(6) ① Cut the brush lead wire at the terminal side.

CAUTION

- It is possible to replace the two brushes only at the yoke side (⊕ side). As for the ⊖ side brush, however, the replacement can be made only by the brush holder unit.

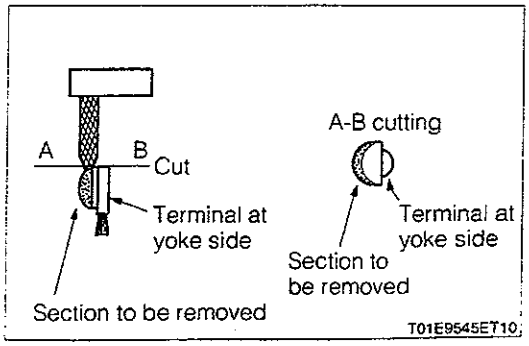


(7) ② Grind the welding trace of the brush terminal by means of a file, etc. so that the terminal may be remedied to the specified dimensions.
SPECIFIED VALUE: Thickness 1.4±0.1 mm
Width 5 mm



CAUTION

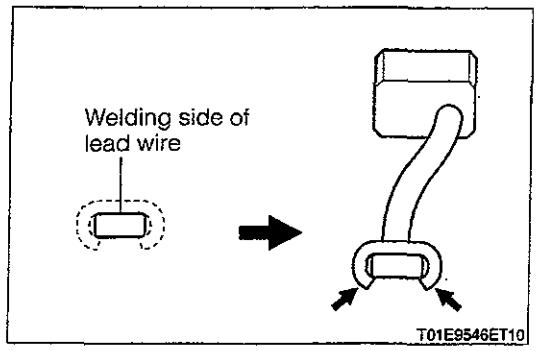
- Grind the area of the brush holder unit. as indicated in the right figure. Since the section to be ground is very narrow, care must be exercised not to scratch the field coil.



(8) ③ Overlap the plate section of the replacement brush onto the lead wire fusing side and press-fit the section with pliers.

CAUTION

- Make sure not to make a mistake concerning the removal direction of the brush lead wire.

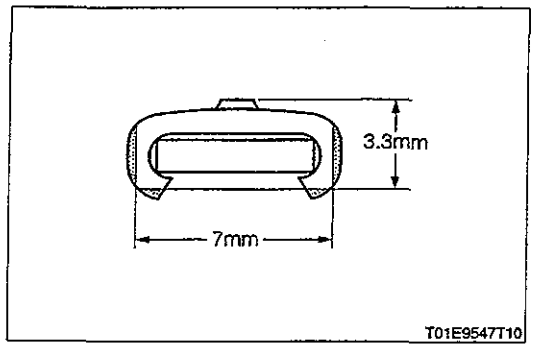


(9) ④ Solder the press-fitting section. Grind the area with a file or the like so as to attain the specified dimensions as indicated in the right figure.

TOOL: Soldering iron

CAUTION

- When performing the soldering, thoroughly heat the section to be soldered so that no solder may flow to the positive side lead wire.
- Make sure that the solder flows thoroughly to the inside of the plate.
- Ensure that the solder may not drip onto the field side.

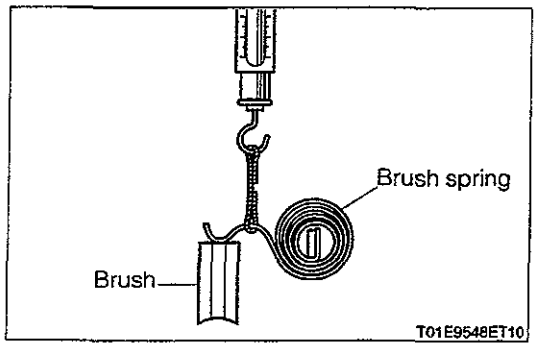


(10) Check of brush spring load

Using a spring scale, observe the reading at the moment when the spring separates from the brush.

SPECIFIED VALUE: 15.7±2.0 N·m {160±20 kgf·cm}

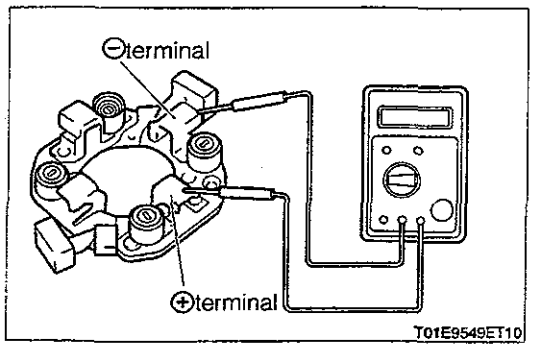
ALLOWABLE LIMIT: 8.8 N·m {90 kgf·cm}



(11) Check of brush holder

Conduct an insulation check between the brush holder at the ⊕ side and the brush holder at the ⊖ side.

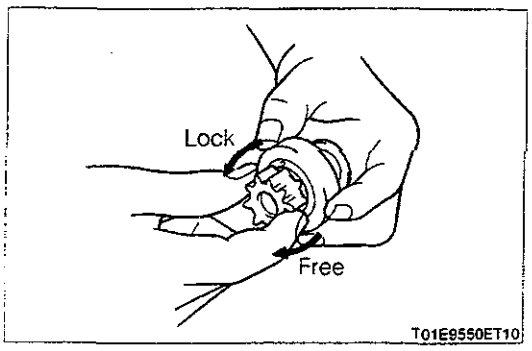
SPECIFIED VALUE: No continuity exists.



3.Clutch check

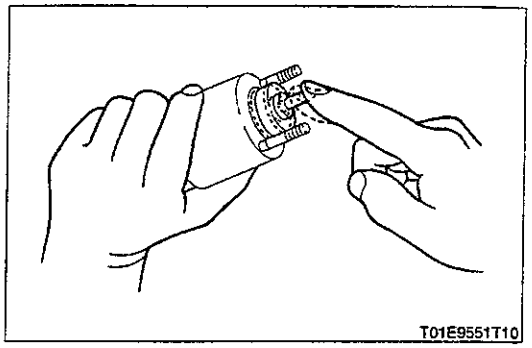
(1) Check the gear for wear and damage.

(2) Ensure that the gear locks when the gear is turned in the driving direction (M/T, clockwise). Furthermore, ensure that the gear turns smoothly when the gear is turned in the opposite direction.



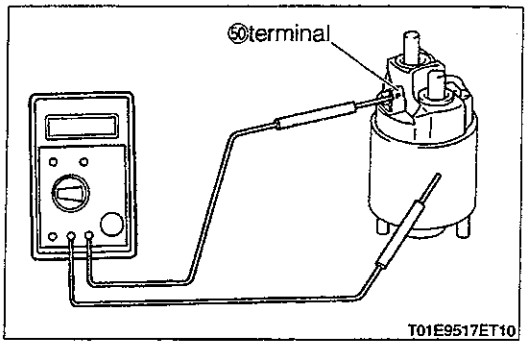
4.Magnet switch check

(1) When the plunger is pushed in and released, ensure that the plunger returns quickly to the original position.



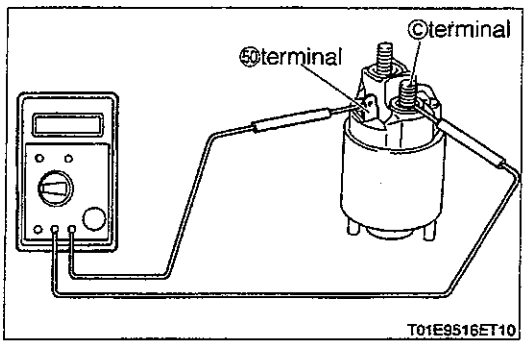
(2) Check continuity between the terminal ⑤⓪ and the magnet switch body.

SPECIFIED VALUE: Continuity exists.



(3) Check continuity between the terminal ⑤⓪ and the terminal Ⓒ.

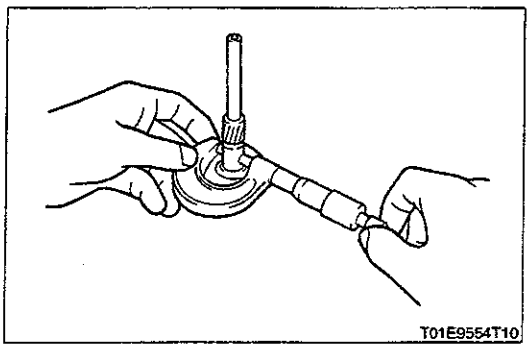
SPECIFIED VALUE: Continuity exists.



5.Check of planet carrier shaft

Measure the outer diameter of the center bearing sliding section of the planet carrier shaft.

SPECIFIED VALUE: 15 mm



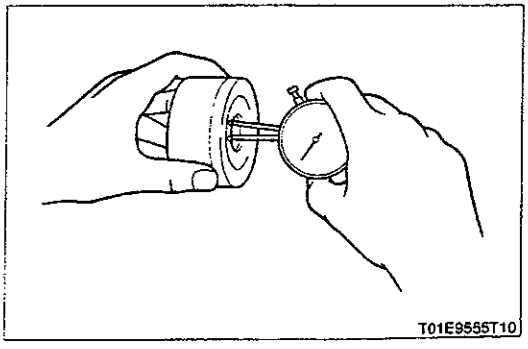
6.Check of center bearing oil clearance

(1) Measure the inner diameter of the center bearing. Determine the clearance from the outer diameter of the planet carrier shaft obtained at Step 4.

If the clearance exceeds the allowable limit, replace the oilless bearing or the planet carrier shaft, as required.

SPECIFIED VALUE: 0.03 mm

ALLOWABLE LIMIT: 0.10 mm



(2) Bearing replacement

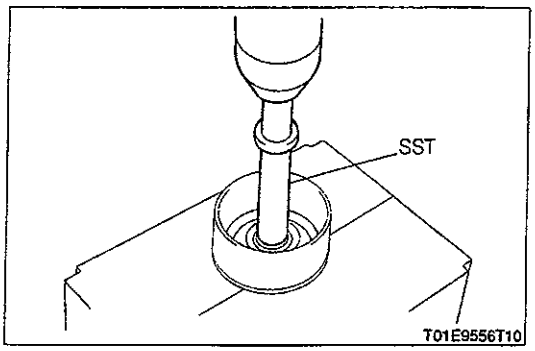
① Remove the bearing, using the SST in combination with a press, etc.

CAUTION

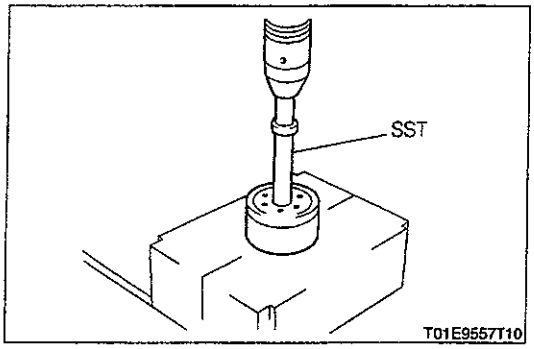
- When removing the bearing, be sure to remove it, starting from the inside, as indicated in the right figure.

NOTE

- The SST is handled by Denso. "95208−10090"



② Install a new bearing, using the SST in combination with a press, etc.



NOTE

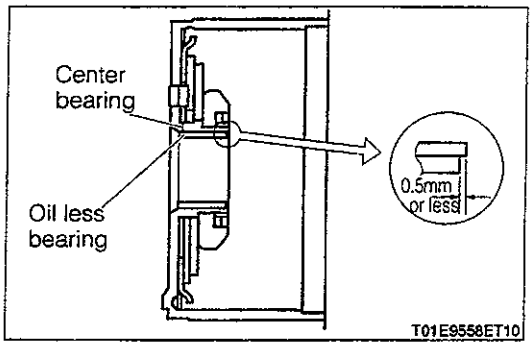
- The SST is handled by Denso. "95208−10090"

CAUTION

- When installing the bearing, be sure to install it starting from the outside.

CAUTION

- Drive the bearing into place in such a way that the bearing is 0.5 mm or less in relation to the edge of the center bearing.

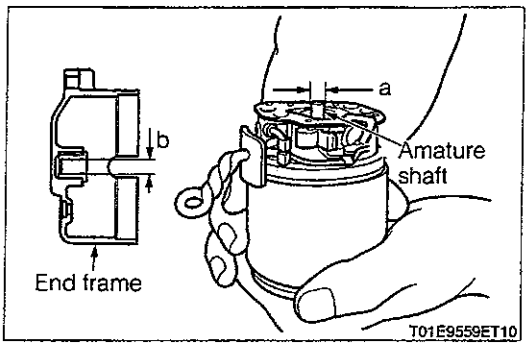


7.Check of end frame oil clearance

(1) As is the case with the center bearing oil clearance, measure the outer diameter "a" of the end frame sliding section of the armature shaft. Also, measure the inner diameter "b" of the end frame so as to determine the clearance. If the clearance exceeds the allowable limit, replace either part, as required.

SPECIFIED VALUE: a:0.035 mm

ALLOWABLE LIMIT: a−b:0.10 mm

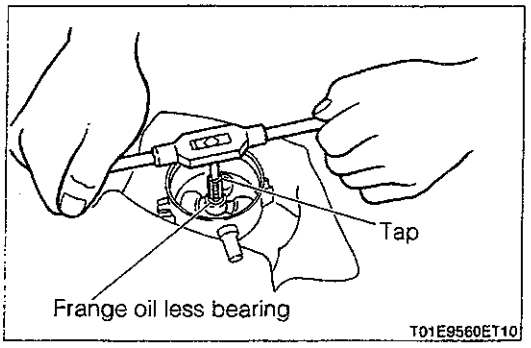


(2) Replacement of flange oilless bearing

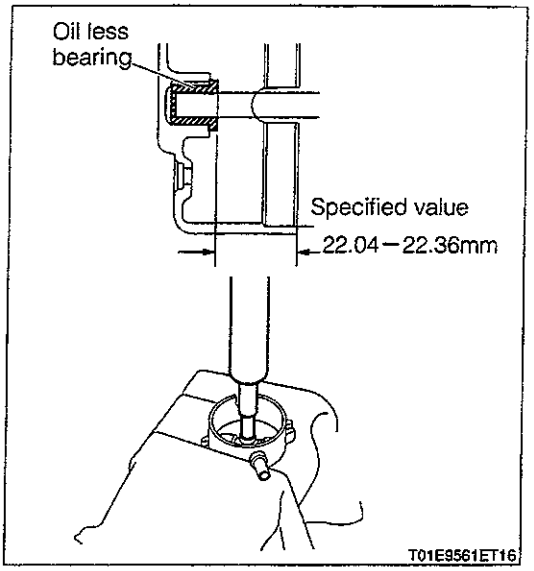
① Remove the oilless bearing, using a tap, as indicated in the right figure.

CAUTION

- When clamping the end frame in a vice, care must be exercised not to deform or damage the fitting section.



② Press a new oilless bearing, as indicated in the right figure.
Install the bearing.

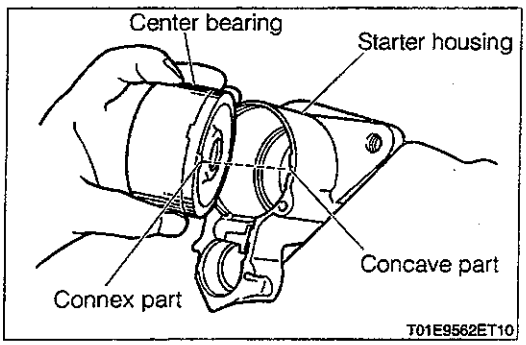


8.Check of shock absorber of enter bearing

(1) Clamp the flange section of the starter housing in a vice. Install the center bearing, using the guide mark.

CAUTION

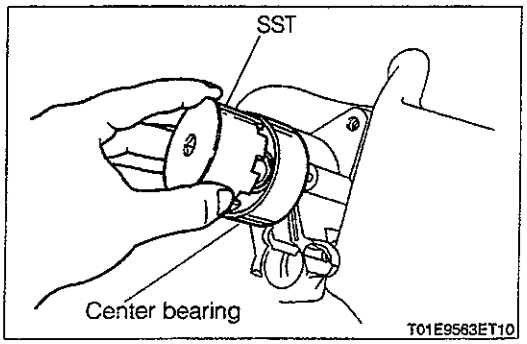
- **When clamping the starter housing in a vice, do not tighten the housing forcibly. Tighten the housing only to such an extent that the housing will not move.**
- **Assemble the center bearing. Confirm that the center bearing will not turn.**



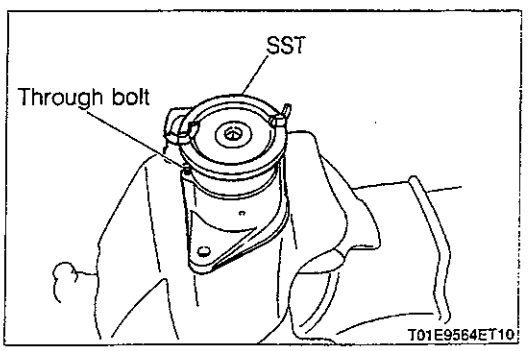
(2) Assemble the SST, as indicated in the right figure. Turn the SST slightly so that it may engage with the shock absorber.

NOTE

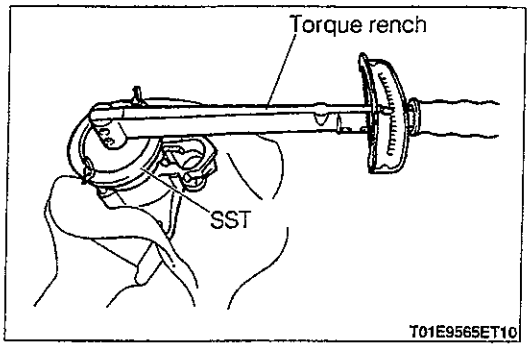
- **The SST is handled by Denso. "95208−10100"**



(3) Working from above the center bearing, as indicated in the right figure, secure the SST to the through-bolt attaching section of the starter housing.



(4) As indicated in the right figure, using a torque wrench, apply torque through the SST. Observe a sliding torque reading at the moment when the rotation starts.
When the reading is deviated from the allowable limit, the replacement should be made together with the center bearing.



SPECIFIED VALUE: 29.4±3.9 N·m {300±40 kgf·cm}
ALLOWABLE LIMIT: 21.6 N·m{220 kgf·cm}

CAUTION

- Never disassemble or wash the shock absorber section. If it has been disassemble or washed, do not reuse it.

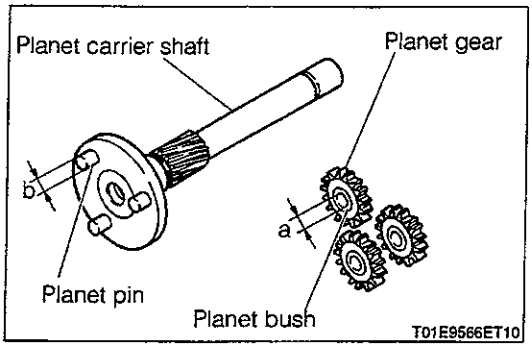
NOTE

- The SST is handled by Denso. "95208−10100"

9.Check of planet bush oil clearance

Determine the oil clearance based on the planet pin diameter "b" and the planet bush inner diameter "a"
If the allowable limit is exceeded, determine the clearance based on the planet bush inner diameter "a".

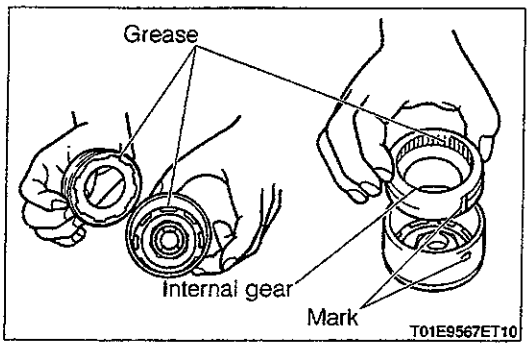
SPECIFIED VALUE: 0.03 mm
SPECIFIED VALUE: 0.10 mm



(4) Assembling

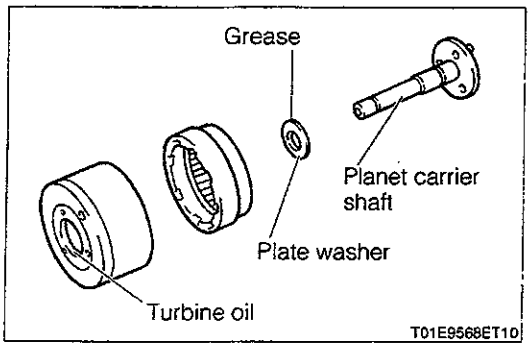
1.Apply 2g or more of High-temperature grease to the fitting section between the internal gear and the shock absorber as well as to the inside of the internal gear, as indicated in the right figure. Assemble them, aligning with the guide marks.

LUBRICANT: High-temperature grease



2.Apply turbine oil to the inner bore of the center bearing. Also, apply High-temperature grease to both sides of the washer. Assemble it to the planet carrier shaft and proceed to assemble the center bearing.

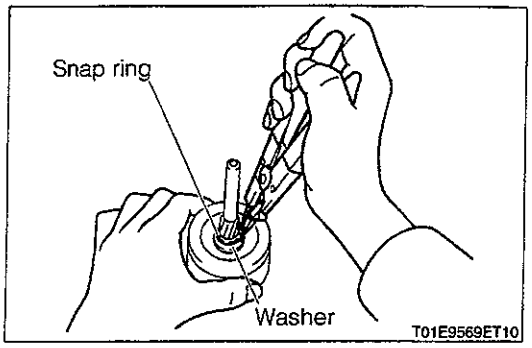
LUBRICANT: High-temperature grease



3.Install a new snap ring.

CAUTION

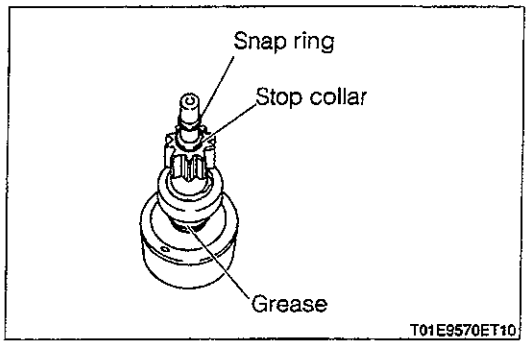
- Do not reuse the snap ring.
- Ensure that the washer has been installed.



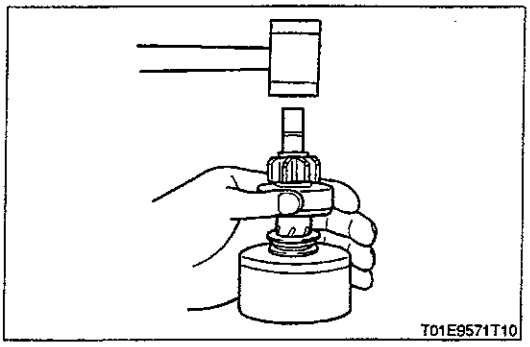
4.Assemble the starter clutch S/A, following the procedure given below.

(1) Apply High-temperature grease to the contact section between the clutch and the spline as well as to the stop collar snap ring.

LUBRICANT: High-temperature grease



(2) While holding the outer periphery of the pinion, tap lightly the planet carrier shaft, using a plastic hammer so that the stop collar may move toward over the snap ring.

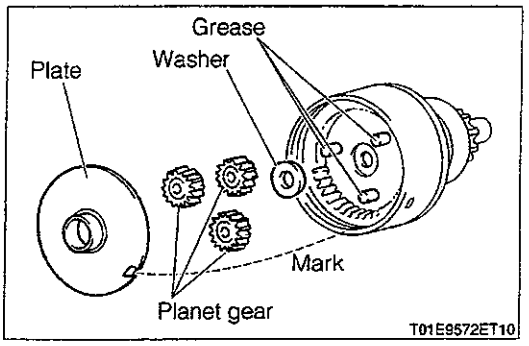


5.Apply 0.5g or more of High-temperature grease, as indicated in the right figure. Proceed to install the planetary gear S/A (three gears) and washer.

LUBRICANT: High-temperature grease

CAUTION

- Install the plate in place, aligning with the guide mark of the center bearing.

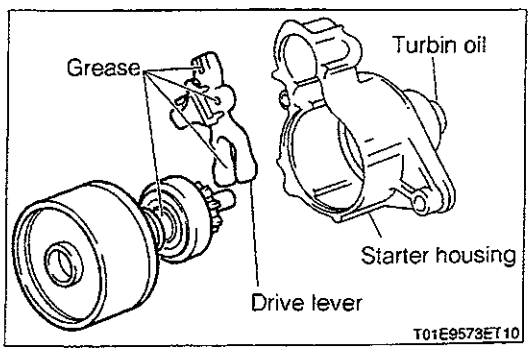


6.Apply 0.5g or more of High-temperature grease, as indicated in the right figure. Proceed to install the planetary gear S/A (three gears) and washer.

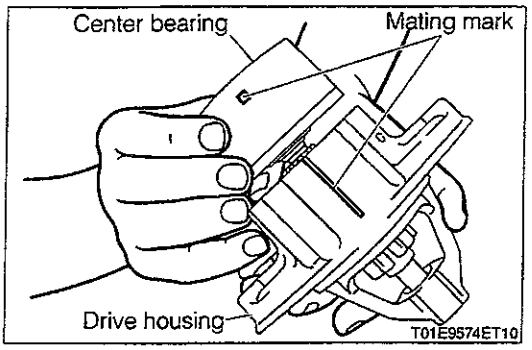
LUBRICANT: High-temperature grease

CAUTION

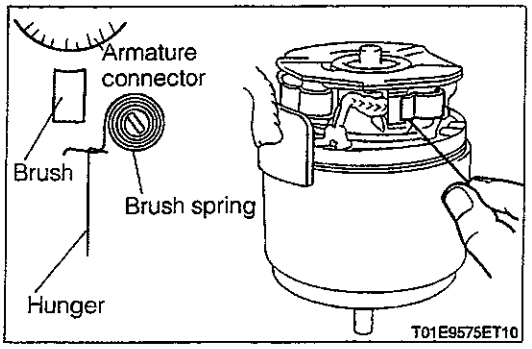
- Install the plate in place, aligning with the guide mark of the center bearing.



7.As indicated in the right figure, assemble the drive housing and center bearing S/A, respectively, aligning with the guide marks.

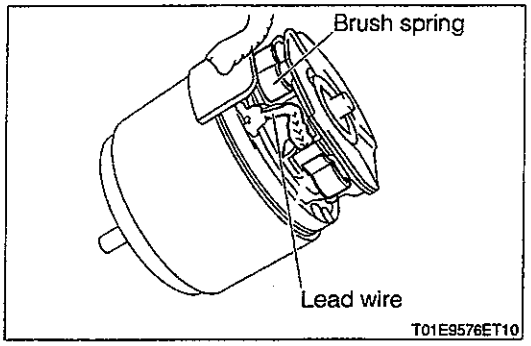


8.Install the brush spring to the starter brush holder assembly. Erect the brush spring and install the brush to the starter armature assembly.



CAUTION

- **Make sure that the lead wire of the brush is not interfering with the brush spring.**

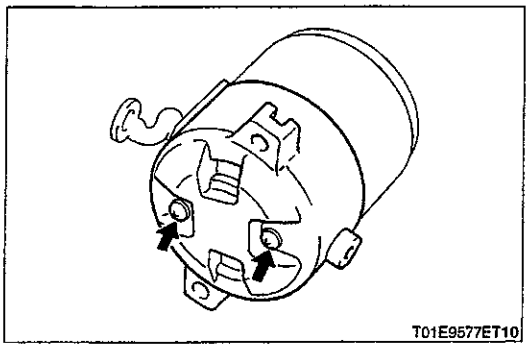


9. Install the spring commutator end frame assembly.

CAUTION

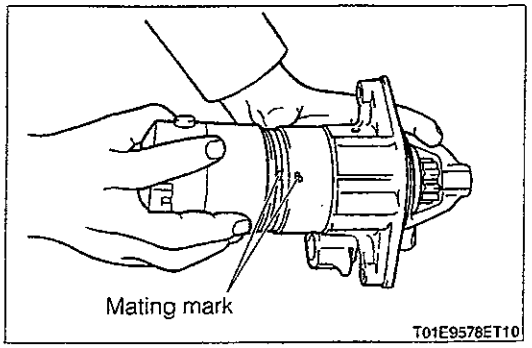
- **Install the end frame, while tilting it so as to prevent the interfering of the brush holder with the water drain cover at the inside.**

TIGHTENING TORQUE: 1.5±0.3 N·m {15±3 kgf·cm}

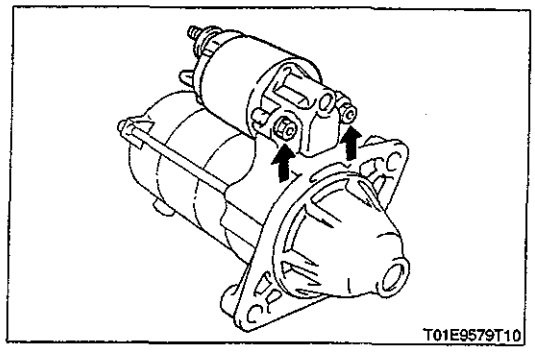


10.The installation should be made, while the recessed section of the starter yoke assembly, the protruding section of the plate and the protruding section of the center bearing are aligned with.
Then, install the through bolt.

TIGHTENING TORQUE: 5.9±1.5 N·m {60±15 kgf·cm}



11. Attach the stud bolt of the magnet starter switch assembly to the drive lever, working from above the lever and secure it with two nuts.
Furthermore, install the terminal C of the magnet switch and lead wire.
TIGHTENING TORQUE: 8.3±2.5 N·m {85±25 kgf·cm}

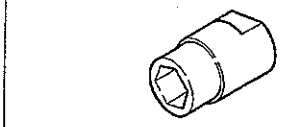
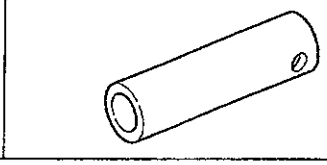
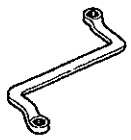


2 ALTERNATOR

2-1 DISASSEMBLING AND ASSEMBLING

2-1-1 ARTICLES TO BE PREPARED

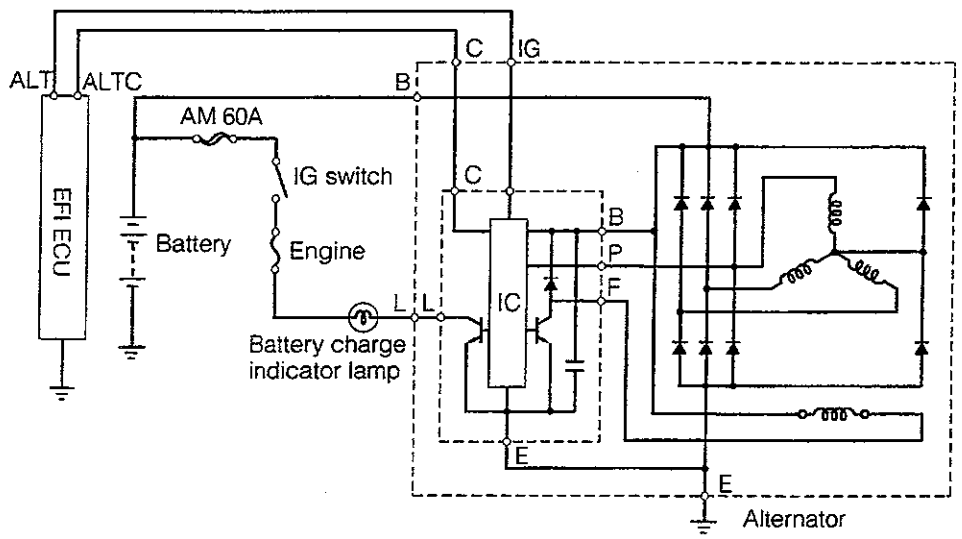
SST

Shape	Part No.	Part name
	09820-87202-000	Wrench alternator pulley set nut
	09612-10061-000	Replacer, steering pinion bearing
	09812-00010-000 (09812-22010-000)	Wrench door hinge set bolt

Instrument

Torque wrench,Vernier calipers,Voltage tester

2-2 CIRCUIT DIAGRAM



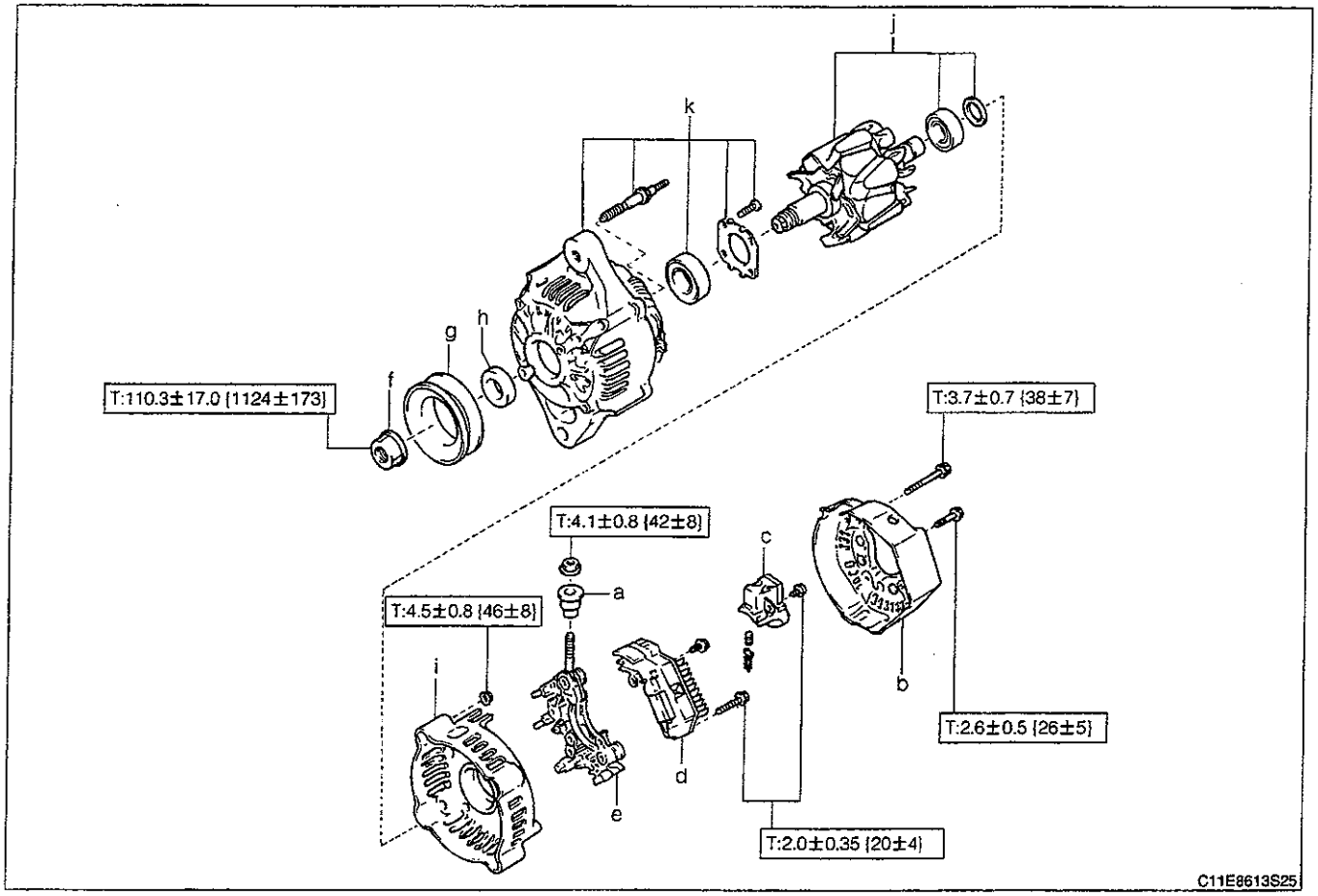
C11E1015ES20

Alternator performance

Engine type / ITEM	JB-DET (M/T vehicle)
Rated voltage — Rated output (V—A)	12—65
Output characteristics [13.5V, 5000rpm] (A)	67 or more
Permissible max. revolution speed (rpm)	18,000
Regulator regulating voltage [5,000rpm, 10A, 25] (V)	14.2-14.8
Rotational direction	Clockwise as viewed from pulley side
Pulley ratio [Crankshaft/alternator]	125.5/63
Weight (kg)	3.29

2-2-1 Alternator disassembling & Assembling

(1) COMPONENTS

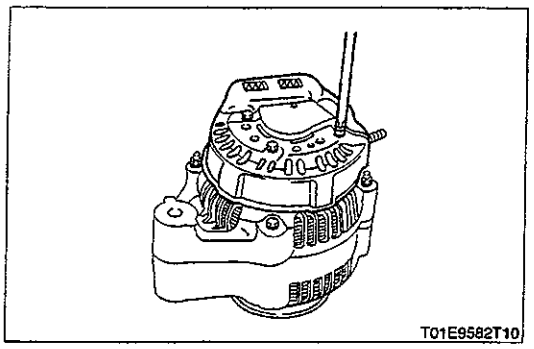


Unit :N·m {kgf·cm}

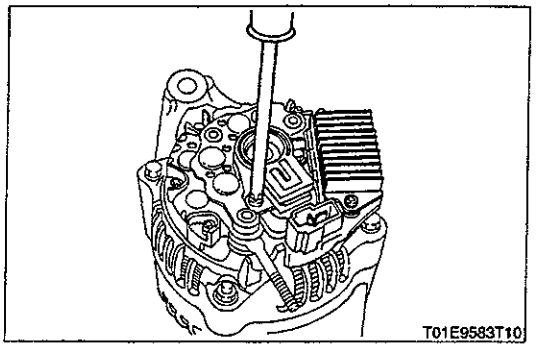
1 a Insulator, terminal, No. 2
2 b Cover, rear end
3 c Holder alternator brush
4 d Regulator Ay, generator
5 e Holder, alternator W/rectifier
6 f Nut, pulley lock
7 g Pulley, alternator
8 h Collar, spacer
9 i Frame Ay, rectifier end
10 j Rotor Ay, alternator
11 k Frame Ay, alternator drive end

(2) DISASSEMBLING

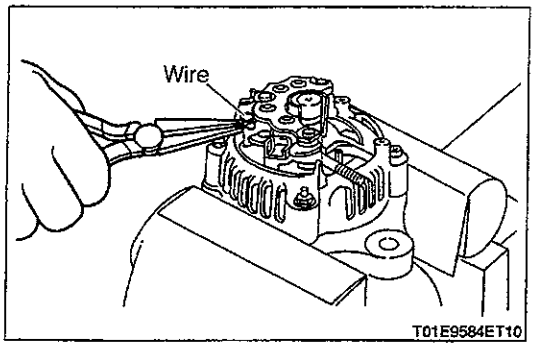
1.Remove the terminal insulator No.2 and rear end cover.



2.Remove the alternator brush holder and generator regulator assembly.



3.After removing the screws, remove the alternator holder W/rectifier by extending the wire.



4.Remove the pulley lock nut, alternator pulley and spacer collar, following the procedure given below.

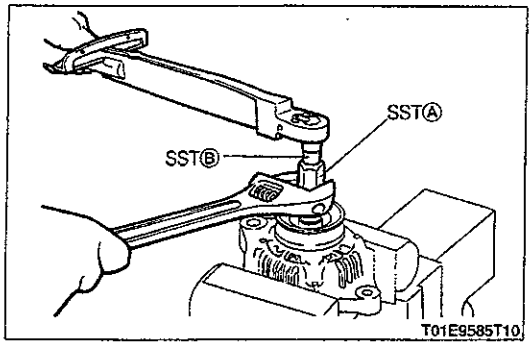
(1) Tighten the SST Ⓑ to the specified torque. Secure the SST Ⓐ to the pulley shaft section.

TIGHTENING TORQUE: 39 N·m{400 kgf·cm}

CAUTION

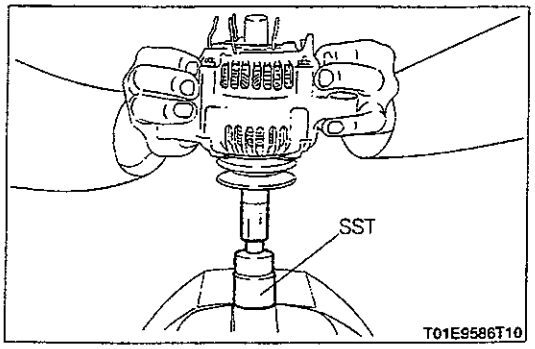
- **Attach the SST to the pulley shaft section securely.**

SST: 09820-87201-000[09820-06010-000]

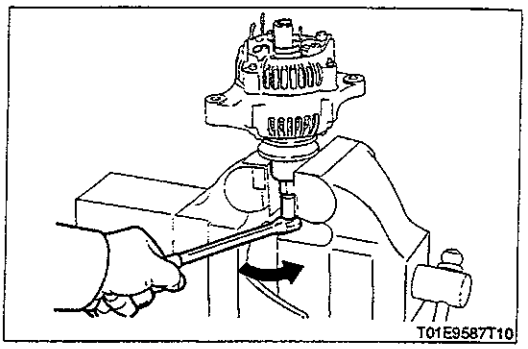


(2) Clamp the SST in a vice. Under the state above, set the SST.

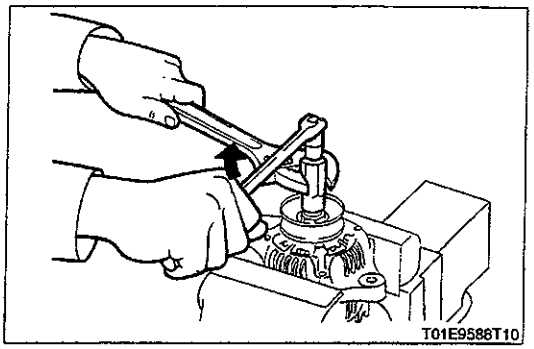
SST: 09820-87201-000[09820-87202-000]



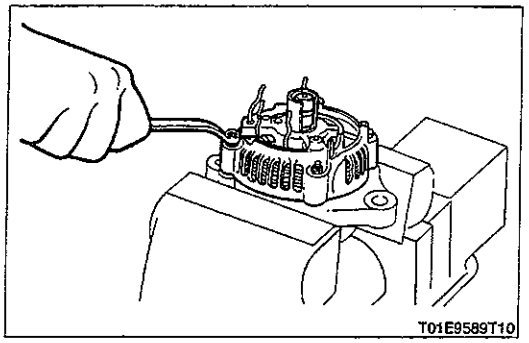
(3) Turn the SST Ⓐ in the arrowheaded direction so as to slacken the pulley nut.



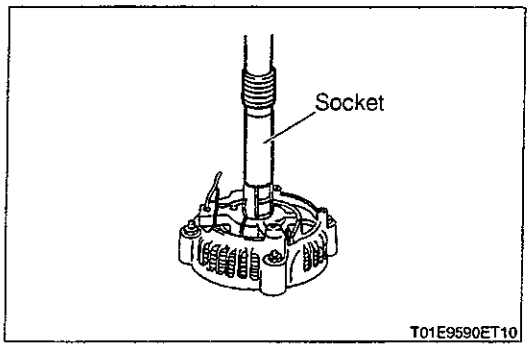
(4) Turn the SST Ⓑ in the arrowheaded direction so as to remove the SST Ⓑ from the alternator.
(5) Remove the alternator pulley and spacer collar.



5.Remove the end frame.



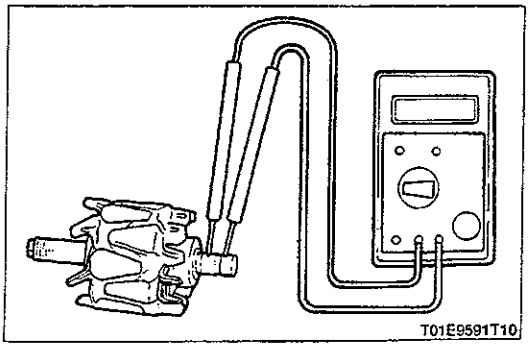
6.Separate the alternator rotor assembly from the alternator drive end frame assembly, using a press.



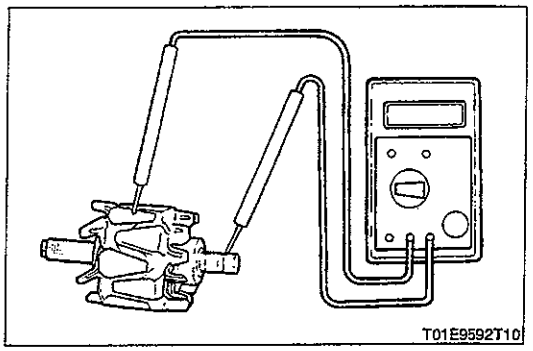
(3) INSPECTION

1.Rotor check

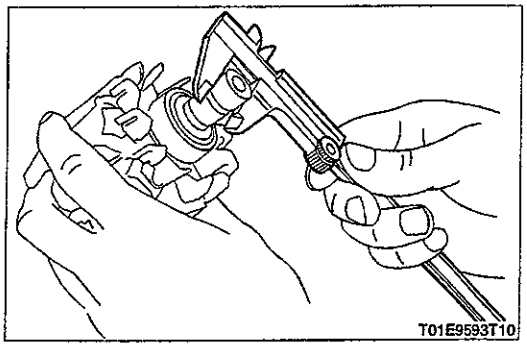
(1) Measure the resistance between the two slip rings.
SPECIFIED VALUE: 2.3±0.1 Ω



2.Measure the insulation resistance between the slip ring and the rotor core.
SPECIFIED VALUE: No continuity exists.

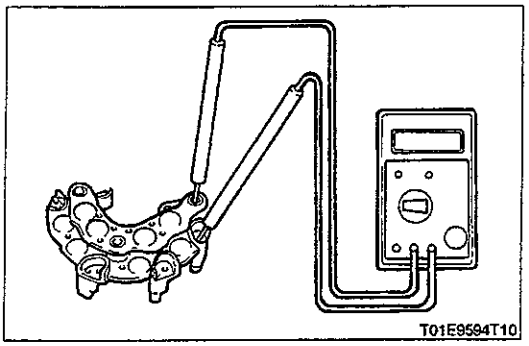


3.Slip ring check
(1) Check the slip ring for damage.
If the slip ring exhibits damage, rectify it, using an abrasive paper (#400).
(2) Measure the outer diameter of the slip ring.
SPECIFIED VALUE: 14.4 mm
ALLOWABLE LIMIT: 12.8 mm



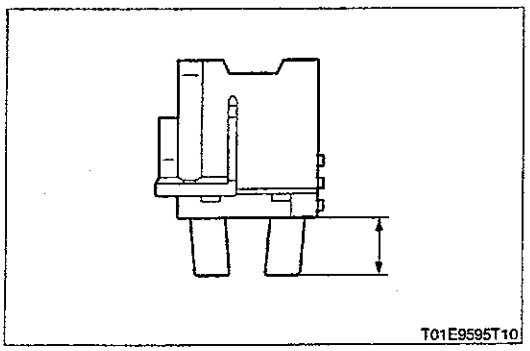
4.Rectifier check
(1) Conduct the continuity test, using the kΩ range.
SPECIFIED VALUE: Change the polarity. There should be continuity in one direction, while there should be no continuity in the opposite direction.

CAUTION
- The diode has such a property that it allows current to flow in one direction only.
When the test is conducted by means of an electrical tester or a circuit tester, a current flows from the internal cell of the tester to the diode.
The continuity of a diode (good or bad) is judged based on whether or not that current flows. However, the value of resistance varies, for the current being flown differs depending upon testers.



5.Brush length
(1) Check the brush length.
SPECIFIED VALUE: 10.5 mm
ALLOWABLE LIMIT: 1.5 mm

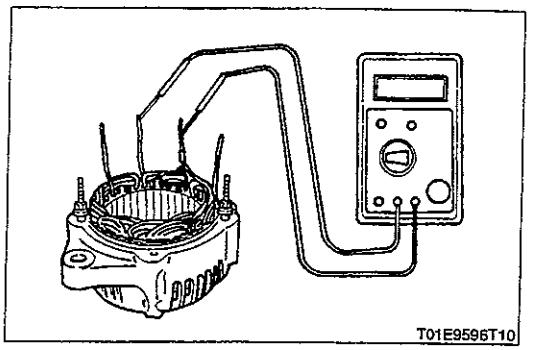
CAUTION
- Replace the brush, if it exceeds the allowable limit.



6.Stator coil check

(1) Measure the resistance between the phases.

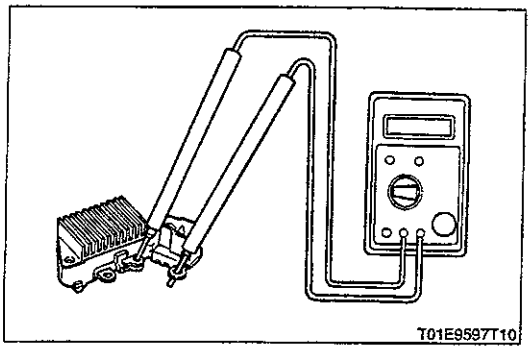
SPECIFIED VALUE: Approx. 0.1-0.2 Ω



7.Diode check of IC regulator

(1) Conduct the continuity test for the diode between the terminal B and the terminal F, using the kΩ range of the tester.

SPECIFIED VALUE: There should be continuity in one direction, while there should be no continuity in the opposite direction.

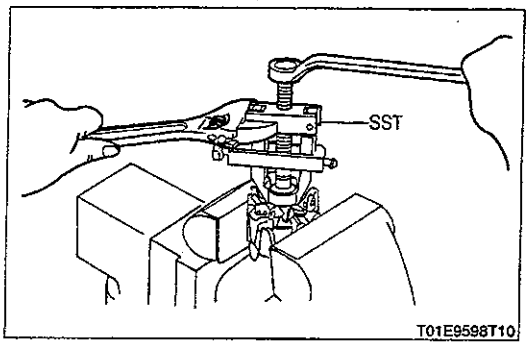


8.Rear bearing replacement

(1) Check the bearing. Replace the bearing if it exhibits defect.

(2) Remove the bearing, using the SST.

SST: 09820-00021-000

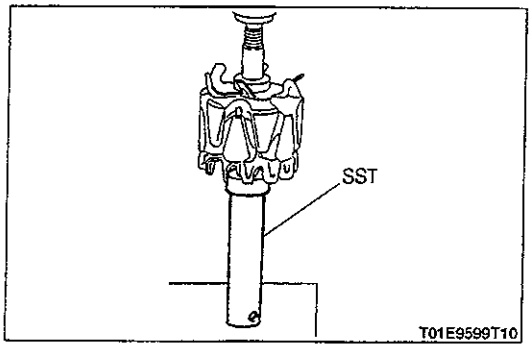


(3) Press the bearing, using the SST in combination with a press.

SST: 09612-87180-000[09612-10061-000]

CAUTION

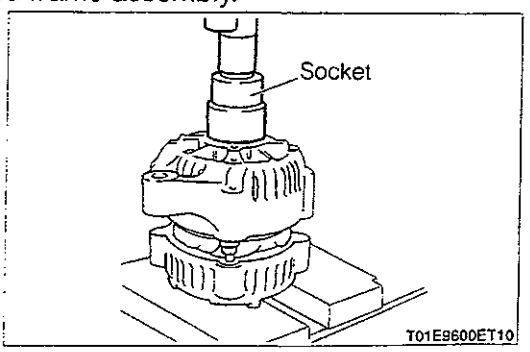
- Perform the press-fitting at the inner race side of the bearing.



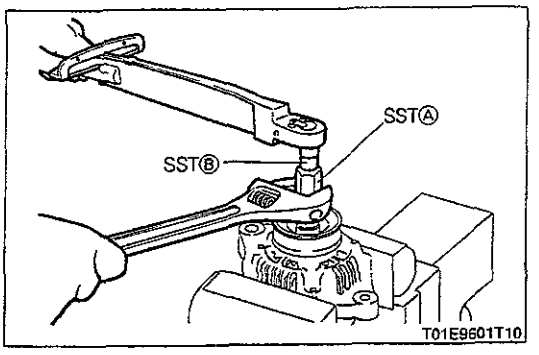
(4) ASSEMBLING

1.Attach the alternator rotor assembly to the alternator drive end frame assembly.

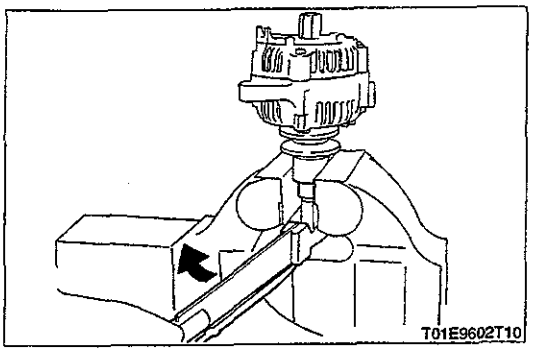
2.Press the rectifier end frame assembly, using a 29 mm socket wrench in combination with a press.



3.Install the spacer collar, alternator pulley and pulley lock nut, following the procedure given below.
(1) Install the spacer collar and alternator pulley to the pulley shaft. Tighten them with the nut.
(2) Tighten the SST Ⓑ to the specified torque so that the SST Ⓐ may be attached to the pulley shaft.
SST: 09820-87201-000[09820-06010-000]
TIGHTENING TORQUE: 39 N·m{400 kgf·cm}
CAUTION
- Install the SST to the pulley shaft securely.

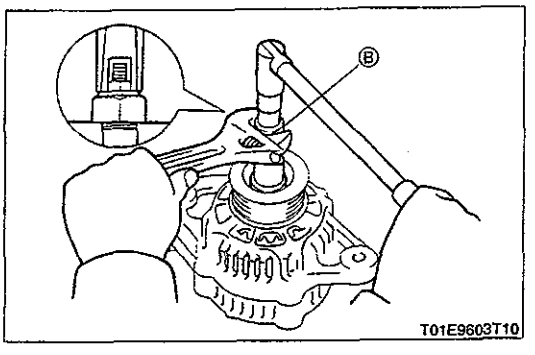


(3) Clamp the SST in a vice. Set the alternator and the SST.
SST: 09820-87201-000[09820-87202-000]
(4) Tighten the nut by turning the SST Ⓐ.
TIGHTENING TORQUE:



(5) Remove the alternator from the SST. Slacken the SST Ⓑ so as to remove the SSTs Ⓐ and Ⓑ.

4.Install the alternator holder with rectifier wire, as indicated in the right figure.



5.Install the generator regulator assembly, alternator brush holder, rear end cover and terminal insulator No.2 in this sequence.

