MITSUBISHI
3000GT
WORKSHOP MANUAL

FILING INSTRUCTION

Please keep these manual pages in the binder which is keeping the manual [PWUE9119].
File these pages according to the signs "ADDED", "REVISED" and "DELETED" on the "list of effective pages" which are interpreted below.

ADDED: File the pages with this sign additionally in your manual.

REVISED, DELETED: Replace the existing pages with the corresponding pages with this sign.

Missing sheets will be supplied upon request.

Pub. No. PWUE9119-D

MITSUBISHI MOTORS CORPORATION

LIST OF EFFECTIVE PAGES

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Foreword			
1	C	Dec. 1993	
2 thru 4		May 1992	
00 General			
1	**D**	**July 1994**	**REVISED**
2 thru 6		May 1992	
7 thru 10	**D**	**July 1994**	**REVISED**
11	B	July 1993	
11-1 thru 11-2	B	July 1993	
12 thru 19		May 1992	
11 Engine			
1		May 1992	
2 thru 4	B	July 1993	
5		May 1992	
6 thru 7	B	July 1993	
7-1 thru 7-2	B	July 1993	
8 thru 10	B	July 1993	
11 thru 14		May 1992	
15	B	July 1993	
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12 Lubrication			
1 thru 3		May 1992	
4	B	July 1993	
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13 Fuel			
1	**D**	**July 1994**	**REVISED**
2		May 1992	
3 thru 4	**D**	**July 1994**	**REVISED**
5	B	July 1993	
6	**D**	**July 1994**	**REVISED**
7	B	July 1993	
8 thru 10		May 1992	
11	B	July 1993	
12 thru 16		May 1992	
17 thru 18	**D**	**July 1994**	**REVISED**
19 thru 30		May 1992	
31	**D**	**July 1994**	**REVISED**
32	B	July 1993	
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35 thru 37	B	July 1993	
38 thru 43		May 1992	
44	B	July 1993	
45 thru 47		May 1992	
48	**D**	**July 1994**	**REVISED**
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51	**D**	**July 1994**	**REVISED**
51-1 thru 51-2	**D**	**July 1994**	**ADDED**
52	B	July 1993	
53 thru 57		May 1992	
58	B	July 1993	
59 thru 62		May 1992	
63	B	July 1993	
64 thru 67		May 1992	
68	B	July 1993	
69 thru 70		May 1992	
71	B	July 1993	
72		May 1992	
73	B	July 1993	
74 thru 75		May 1992	
76	B	July 1993	
77		May 1992	
78	**D**	**July 1994**	**REVISED**
79		May 1992	
80	**D**	**July 1994**	**REVISED**
81	A	Dec. 1992	
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85	B	July 1993	
86		May 1992	
87	B	July 1993	
88 thru 89	**D**	**July 1994**	**REVISED**
90		May 1992	
91 thru 92	B	July 1993	
93 thru 95		May 1992	
96	B	July 1993	
97 thru 98		May 1992	
99	B	July 1993	
100		May 1992	
100-1 thru 100-2	**D**	**July 1994**	**ADDED**
101		May 1992	
102	B	July 1993	
103		May 1992	
104	B	July 1993	
105 thru 108		May 1992	
109	B	July 1993	
110 thru 113		May 1992	
114	B	July 1993	
115 thru 118		May 1992	
119	B	July 1993	
120 thru 121		May 1992	
122	B	July 1993	
123		May 1992	
124	B	July 1993	
125 thru 126		May 1992	
127	B	July 1993	
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135 thru 136	**D**	**July 1994**	**REVISED**
137 thru 144		May 1992	
145	**D**	**July 1994**	**REVISED**
146		May 1992	
14 Cooling			
1		May 1992	
2	**D**	**July 1994**	**REVISED**
3 thru 8		May 1992	
9 thru 10	**D**	**July 1994**	**REVISED**
11 thru 13		May 1992	
15 Intake and Exhaust			
1	**D**	**July 1994**	**REVISED**
2 thru 4		May 1992	

Group/ Page	Revision code	Date	Remarks
5 thru 10	**D**	**July 1994**	**REVISED**
11		May 1992	
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16 Engine Electrical			
1 thru 2		May 1992	
3 thru 6	B	July 1993	
7 thru 25		May 1992	
17 Emission Control			
1 thru 2	**D**	**July 1994**	**REVISED**
3		May 1992	
4 thru 5	**D**	**July 1994**	**REVISED**
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15	**D**	**July 1994**	**REVISED**
15-1 thru 15-2	**D**	**July 1994**	**ADDED**
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21 Clutch			
1 thru 9		May 1992	
10	**D**	**July 1994**	**REVISED**
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13 thru 15	**D**	**July 1994**	**REVISED**
22 Manual Transmission			
1 thru 2	**D**	**July 1994**	**REVISED**
3		May 1992	
4	**D**	**July 1994**	**REVISED**
5 thru 6		May 1992	
7	**D**	**July 1994**	**REVISED**
8 thru 12		May 1992	
13	**D**	**July 1994**	**REVISED**
14		May 1992	
25 Propeller Shaft			
1		May 1992	
2	**D**	**July 1994**	**REVISED**
3 thru 11		May 1992	
26 Front Axle			
1 thru 16		May 1992	
27 Rear Axle			
1 thru 38		May 1992	
31 Wheel and Tyre			
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32 Power Plant Mount			
1	C	Dec. 1993	
2 thru 4		May 1992	
5 thru 6	**D**	**July 1994**	**REVISED**
7 thru 8		May 1992	
33A Front Suspension			
1		May 1992	
2	B	July 1993	
3		May 1992	
4	B	July 1993	
5		May 1992	
6 thru 7	B	July 1993	
8 thru 11		May 1992	
33B Electronic Control Suspension <ECS>			
1	C	Dec. 1993	
2	B	July 1993	
2-1 thru 2-2	B	July 1993	
3	B	July 1993	
4		May 1992	
5 thru 7	B	July 1993	
8	**D**	**July 1994**	**REVISED**
9		May 1992	
10 thru 11	B	July 1993	
12	**D**	**July 1994**	**REVISED**
13 thru 18	B	July 1993	
19 thru 21		May 1992	
22 thru 23	**D**	**July 1994**	**REVISED**
24		May 1992	
25 thru 28	**D**	**July 1994**	**ADDED**
34 Rear Suspension			
1		May 1992	
2	B	July 1993	
3 thru 4		May 1992	
5	B	July 1993	
6 thru 19		May 1992	
35 Service Brakes			
1	**D**	**July 1994**	**REVISED**
2		May 1992	
3 thru 4	B	July 1993	
4-1 thru 4-2	B	July 1993	
5	B	July 1993	
6 thru 8		May 1992	
9	**D**	**July 1994**	**REVISED**
10	B	July 1993	
11	**D**	**July 1994**	**REVISED**
12 thru 13		May 1992	
14	**D**	**July 1994**	**REVISED**
15	B	July 1993	
15-1 thru 15-2	**D**	**July 1994**	**ADDED**
16 thru 17		May 1992	
18	**D**	**July 1994**	**REVISED**
19		May 1992	
20	**D**	**July 1994**	**REVISED**
20-1 thru 20-2	**D**	**July 1994**	**ADDED**
23	C	Dec. 1993	
24	B	July 1993	
25 thru 36		May 1992	
37	**D**	**July 1994**	**REVISED**
38	B	July 1993	
39	**D**	**July 1994**	**REVISED**
40	B	July 1993	

Group/ Page	Revision code	Date	Remarks
41 thru 42	**D**	**July 1994**	**REVISED**
43 thru 62		May 1992	
36 Parking Brakes			
1	C	Dec. 1993	
2 thru 4		May 1992	
4-1	A	Dec. 1992	
5 thru 7		May 1992	
8	C	Dec.1993	
9 thru 10		May 1992	
37A Steering			
1 thru 2	**D**	**July 1994**	**REVISED**
3 thru 32		May 1992	
37B 4-Wheel Steering System <4WS>			
1 thru 12		May 1992	
42 Body			
1	**D**	**July 1994**	**REVISED**
2 thru 3		May 1992	
4	B	July 1993	
5 thru 7	**D**	**July 1994**	**REVISED**
8		May 1992	
9	**D**	**July 1994**	**REVISED**
9-1 thru 9-2	**D**	**July 1994**	**ADDED**
10		May 1992	
11	B	July 1993	
12		May 1992	
13	B	July 1993	
13-1 thru 13-2	B	July 1993	
14	B	July 1993	
15	**D**	**July 1994**	**REVISED**
16 thru 44		May 1992	
51 Exterior			
1	**D**	**July 1994**	**REVISED**
2 thru 3		May 1992	
4	B	July 1993	
5 thru 6	**D**	**July 1994**	**REVISED**
7		May 1992	
8 thru 9	**D**	**July 1994**	**REVISED**
9-1 thru 9-2	**D**	**July 1994**	**ADDED**
10	**D**	**July 1994**	**REVISED**
10-1 thru 10-2	**D**	**July 1994**	**ADDED**
11	**D**	**July 1994**	**REVISED**
11-1 thru 11-2	**D**	**July 1994**	**ADDED**
12 thru 13	**D**	**July 1994**	**REVISED**
13-1 thru 13-2	**D**	**July 1994**	**ADDED**
14 thru 17		May 1992	
18	**D**	**July 1994**	**REVISED**
19	A	Dec. 1992	
20 thru 29		May 1992	
30	**D**	**July 1994**	**REVISED**
30-1 thru 30-2	**D**	**July 1994**	**ADDED**
31 thru 34		May 1992	

Group/ Page	Revision code	Date	Remarks
52A Interior			
1	C	Dec. 1993	
3 thru 4	C	Dec. 1993	
5 thru 22		May 1992	
52B Supplemental Restraint System <SRS>			
1 thru 9	C	Dec. 1993	
10	**D**	**July 1994**	**REVISED**
11 thru 13	C	Dec. 1993	
14	**D**	**July 1994**	**REVISED**
15	C	Dec. 1993	
16 thru 17	**D**	**July 1994**	**REVISED**
18 thru 21	C	Dec. 1993	
22	**D**	**July 1994**	**REVISED**
22-1 thru 22-2	**D**	**July 1994**	**ADDED**
23 thru 25	C	Dec. 1993	
26	**D**	**July 1994**	**REVISED**
26-1 thru 26-2	**D**	**July 1994**	**ADDED**
27	**D**	**July 1994**	**REVISED**
28	C	Dec. 1993	
29	**D**	**July 1994**	**REVISED**
29-1 thru 29-2	**D**	**July 1994**	**ADDED**
30	C	Dec. 1993	
31	**D**	**July 1994**	**REVISED**
32	C	Dec. 1993	
33	**D**	**July 1994**	**REVISED**
34 thru 37	C	Dec. 1993	
38 thru 39	**D**	**July 1994**	**REVISED**
40 thru 41	C	Dec. 1993	
42	**D**	**July 1994**	**REVISED**
43	C	Dec. 1993	
44	**D**	**July 1994**	**REVISED**
45 thru 46	C	Dec. 1993	
47 thru 48	**D**	**July 1994**	**REVISED**
49 thru 54	C	Dec. 1993	
55	**D**	**July 1994**	**REVISED**
56 thru 58	C	Dec. 1993	
59	**D**	**July 1994**	**REVISED**
60	C	Dec. 1993	
61	**D**	**July 1994**	**REVISED**
62 thru 69	C	Dec. 1993	
70	**D**	**July 1994**	**REVISED**
70-1 thru 70-2	**D**	**July 1994**	**ADDED**
71	C	Dec. 1993	
72	**D**	**July 1994**	**REVISED**
73 thru 76	C	Dec. 1993	
77	**D**	**July 1994**	**REVISED**
78 thru 85	C	Dec. 1993	
54 Chassis Eletrical			
1	**D**	**July 1994**	**REVISED**
2 thru 17		May 1992	
18 thru 19	**D**	**July 1994**	**REVISED**
19-1 thru 19-2	B	July 1993	
20	**D**	**July 1994**	**REVISED**
21 thru 24		May 1992	
24-1 thru 24-4	**D**	**July 1994**	**ADDED**

Group/ Page	Revision code	Date	Remarks
25 thru 28	**D**	**July 1994**	**REVISED**
29 thru 33		May 1992	
33-1 thru 33-4	**D**	**July 1994**	**ADDED**
34 thru 36	**D**	**July 1994**	**REVISED**
37 thru 41		May 1992	
41-1 thru 41-2	**D**	**July 1994**	**ADDED**
42 thru 43	**D**	**July 1994**	**REVISED**
44 thru 46		May 1992	
47thru 50	**D**	**July 1994**	**REVISED**
50-1 thru 50-2	**D**	**July 1994**	**ADDED**
51	**D**	**July 1994**	**REVISED**
51-1 thru 51-2	**D**	**July 1994**	**ADDED**
52		May 1992	
53 thru 54	**D**	**July 1994**	**REVISED**
54-1 thru 54-2	**D**	**July 1994**	**ADDED**
55	**D**	**July 1994**	**REVISED**
56		May 1992	
57	**D**	**July 1994**	**REVISED**
58		May 1992	
59	**D**	**July 1994**	**REVISED**
60 thru 64		May 1992	
65	**D**	**July 1994**	**REVISED**
66 thru 93		May 1992	
94	B	July 1993	
95 thru 96		May 1992	
97	B	July 1993	
97-1 thru 97-2	B	July 1993	
98 thru 99		May 1992	
100	B	July 1993	
100-1 thru 100-5	B	July 1993	
100-6 thru 100-7	**D**	**July 1994**	**REVISED**
100-8	B	July 1993	
101 thru 102		May 1992	
103 thru 104	B	July 1993	
105 thru 110		May 1992	

55 Heater, Air Conditioner and Ventilation

1 thru 2	C	Dec. 1993	
3	B	July 1993	
3-1	B	July 1993	
4 thru 16		May 1992	
17 thru 20	B	July 1993	
20-1	B	July 1993	
21	B	July 1993	
22 thru 23		May 1992	
24	B	July 1992	
25 thru 28		May 1992	
29	B	July 1993	
29-1 thru 29-4	B	July 1993	
30	B	July 1993	
30-1	B	July 1993	
31 thru 41		May 1992	
42 thru 43	B	July 1993	
43-1	B	July 1993	
44 thru 46	B	July 1993	
46-1	B	July 1993	
47	B	July 1993	
47-1	B	July 1993	
48 thru 49	B	July 1993	
50		May 1992	
51 thru 54	B	July 1993	
54-1	B	July 1993	
55	B	July 1993	
56 thru 58		May 1992	

RJST410022-278
RJST312028-120
RJST307028-284
RJST212027-14
RJST205028-882

NOTES

MITSUBISHI 3000GT

WORKSHOP MANUAL

FOREWORD

This Workshop Manual contains procedures for removal, disassembly, inspection, adjustment, reassembly and installation, etc. for service mechanics. Use the following manuals in combination with this manual as required.

TECHNICAL INFORMATION MANUAL	PYUE9201
WORKSHOP MANUAL	
ENGINE GROUP	PWEE □□□□ (Looseleaf edition)
ELECTRICAL WIRING	PHUE9201 (Looseleaf edition)
PARTS CATALOGUE	B608K40□A□ B608K454A□

All information, illustrations and product descriptions contained in this manual are current as at the time of publication. We, however, reserve the right to make changes at any time without prior notice or obligation.

MITSUBISHI MOTORS CORPORATION

 Dec. 1993 PWUE9119-C REVISED

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – AIR BAG

(1) A Supplemental Restraint System (SRS), which uses a driver-side air bag, has been installed in this vehicle.
(2) The SRS includes the following components: impcat sensors, SRS diagnosis unit; SRS warning lamp, air bag module, clock spring, interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

The Supplemental Restraint System (SRS)-related components are shown on the MASTER TABLE OF CONTENTS in the following page. Be sure to carefully read and understand the WARNING below before proceeding.

WARNING!
(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver (from rendering the SRS inoperative).
(2) If it is possible that the SRS components are subjected to heat over 93°C (200°F) in baking or in drying after painting, remove the SRS components (air bag module, SRS diagnosis unit, front impact sensors) beforehand.
(3) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
(4) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B–Supplemental Restraint System (SRS), before beginning any service or maintenance of any component of the SRS or any SRS-related component.

GENERAL

CONTENTS

E01CA--

NOTE

MASTER TABLE OF CONTENTS

Group number	Group name	SRS-related components
13	FUEL	CRUISE CONTROL SYSTEM
22	MANUAL TRANSMISSION	TRANSMISSION CONTROL
32	POWER PLANT MOUNT	RIGHT MEMBER, LEFT MEMBER AND CROSSMEMBER
33B	ELECTRONIC CONTROL SUSPENSION	STEERING ANGULAR VELOCITY SENSOR
35	SERVICE BRAKES	G SENSOR
36	PARKING BRAKES	PARKING BRAKE LEVER AND PARKING BRAKE CABLE
37A	STEERING	STEERING WHEEL AND SHAFT
		POWER STEERING GEAR BOX
42	BODY	FENDER
52A	INTERIOR	INSTRUMENT PANEL
		FLOOR CONSOLE
		FRONT SEAT
		SEAT BELT
54	CHASSIS ELECTRICAL	COLUMN SWITCH
		HORN SWITCH
		IGNITION SWITCH
55	HEATER, AIR CONDITIONER AND VENTILATION	AIR-CONDITIONER CONTROL PANEL AND AIR-CONDITIONER CONTROL UNIT
		HEATER UNIT
		DAMPER CONTROL MOTOR ASSEMBLY
		VENTILATORS (INSTRUMENT PANEL)

NOTE

GENERAL

CONTENTS

NOTE

HOW TO USE THIS MANUAL

E01BAAV

SCOPE OF MAINTENANCE, REPAIR AND SERVICING EXPLANATIONS

This manual provides explanations, etc. concerning procedures for the inspection, maintenance, repair and servicing of the subject model. Note, however, that for engine and transmission-related component parts, this manual covers only on-vehicle inspections, adjustments, and the removal and installation procedures for major components. For detailed information concerning the inspection, checking, adjustment, disassembly and reassembly of the engine, transmission and major components after they have been removed from the vehicle, please refer to the separate manuals covering the engine and the transmission.

SERVICE ADJUSTMENT PROCEDURES

"Service adjustment procedures" are procedures for performing inspections and adjustments of particularly important locations with regard to the construction and for maintenance and servicing, but other inspections (for looseness, play, cracking, damage, etc.) must also be performed.

INSPECTION

Under this title are presented inspection and checking procedures to be performed by using special tools and measuring instruments and by feeling, but, for actual maintenance and servicing procedures, visual inspections should always be performed as well.

DEFINITION OF TERMS

STANDARD VALUE

Indicates the value used as the standard for judging the quality of a part or assembly on inspection or the value to which the part or assembly is corrected and adjusted. It is given by tolerance.

LIMIT

Shows the standard for judging the quality of a part or assembly on inspection and means the maximum or minimum value within which the part or assembly must be kept functionally or in strength. It is a value established outside the range of standard value.

REFERENCE VALUE

Indicates the adjustment value prior to starting the work (presented in order to facilitate assembly and adjustment procedures, and so they can be completed in a shorter time).

CAUTION

Indicates the presentation of information particularly vital to the worker during the performance of maintenance and servicing procedures in order to avoid the possibility of injury to the worker, or damage to component parts, or a reduction of component or vehicle function or performance, etc.

MODEL INDICATIONS

The following abbreviations are used in this manual for classification of model types.

M/T: Indicates the manual transmission, or models equipped with the manual transmission.

MPI: Indicates the multi-point injection, or engines equipped with the multi-point injection.

DOHC: Indicates an engine with the double overhead camshaft, or a model equipped with such an engine.

ABS: Indicates the anti-lock braking system or models equipped with the anti-lock braking system.

ECS: Indicates the electronic control suspension or models equipped with the electronic control suspension.

4WS: Indicates the 4-wheel steering system or models equipped with the 4-wheel steering system.

EXPLANATION OF MANUAL CONTENTS

Indicates procedures to be performed before the work in that section is started, and procedures to be performed after the work in that section is finished.

Maintenance and Servicing Procedures

(1) A diagram of the component parts is provided near the front of each section in order to give the reader a better understanding of the installed condition of component parts.
(2) The numbers provided within the diagram indicate the sequence for maintenance and servicing procedures; the symbol N indicates a nonreusable part; the tightening torque is provided where applicable.

- Removal steps:
  The part designation number corresponds to the number in the illustration to indicate removal steps.
- Disassembly steps:
  The part designation number corresponds to the number in the illustration to indicate disassembly steps.
- Installation steps:
  Specified in case installation is impossible in reverse order of removal steps.
  Omitted if installation is possible in reverse order of removal steps.
- Reassembly steps:
  Specified in case reassembly is impossible in reverse order of disassembly steps.
  Omitted if reassembly is possible in reverse order of disassembly steps.

Indicates (by symbols) where lubrication is necessary. In this example, multipurpose grease is to applied (where indicated) to the steering gear box.

Classifications of Major Maintenance/Service Points

When there are major points relative to maintenance and servicing procedures (such as essential maintenance and service points, maintenance and service standard values, information regarding the use of special tools, etc.), these are arranged together as major maintenance and service points and explained in detail.

◆■ : Indicates that there are essential points for removal or disassembly.
■◆ : Indicates that there are essential points for installation or reassembly.

Symbols for Lubrication, Sealants and Adhesives

Information concerning the locations for lubrication and for application of sealants and adhesives is provided, by using symbols, in the diagram of component parts or on the page following the component parts page, and explained.


: Grease (multipurpose grease unless there is a brand or type specified)


: Sealant or adhesive


: Brake fluid or automatic transmission fluid


: Engine oil, gear oil or air conditioner compressor oil

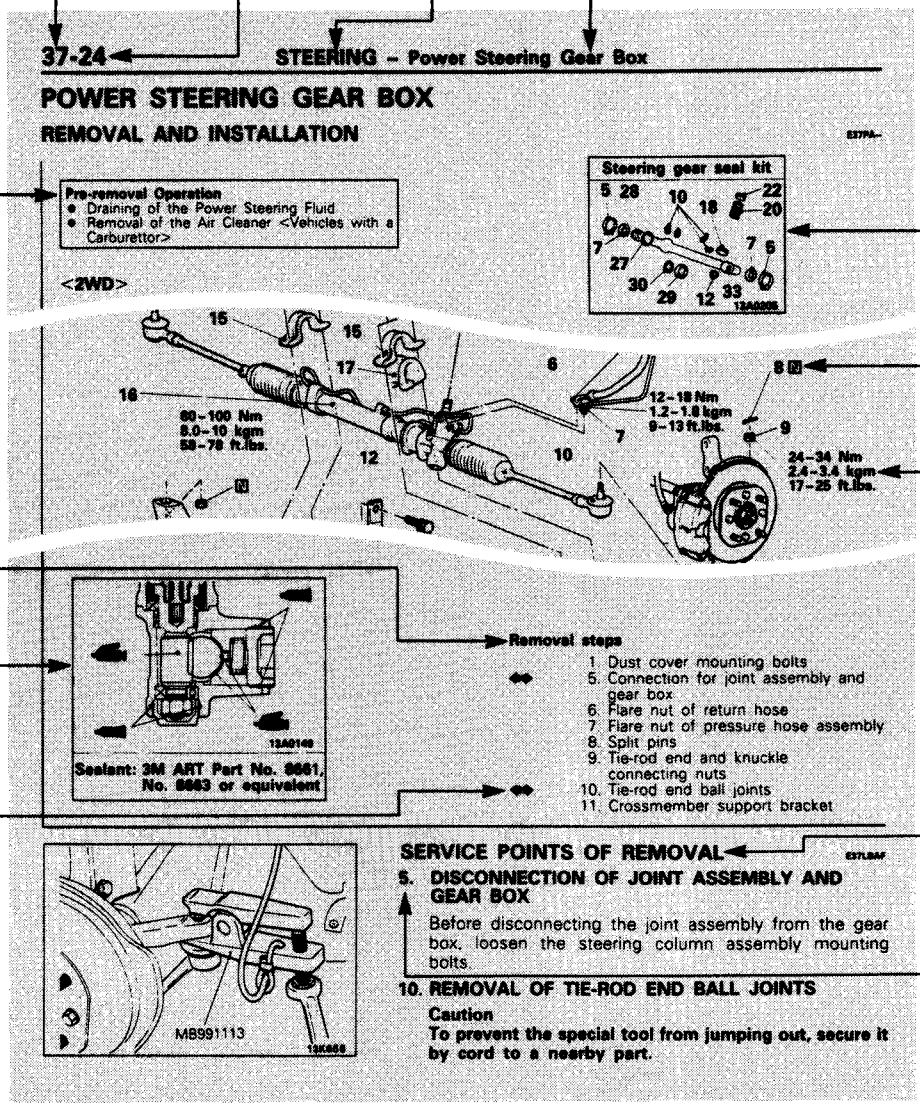

: Adhesive tape or butyl rubber tape

Indicates the group number.

Indicates the page number.

Indicates the group title.

Indicates the section title.



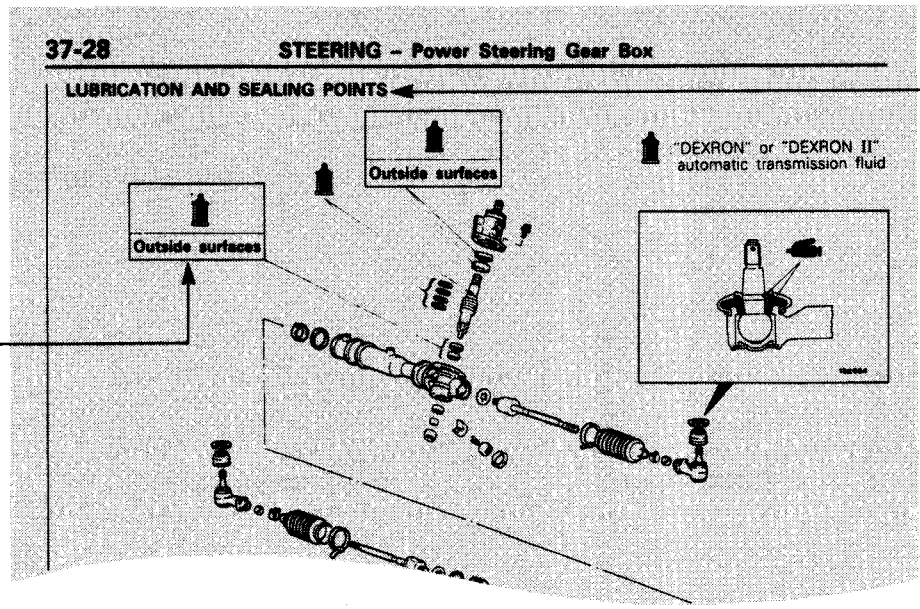
Repair kit or set parts are shown. (Only very frequently used parts are shown.)

Denotes non-reusable part.

Denotes tightening torque.

Operating procedures, cautions, etc. on removal, installation, disassembly and reassembly are described.

This number corresponds to the number appearing in "Removal steps", "Disassembly steps", "Installation steps" or "Reassembly steps".

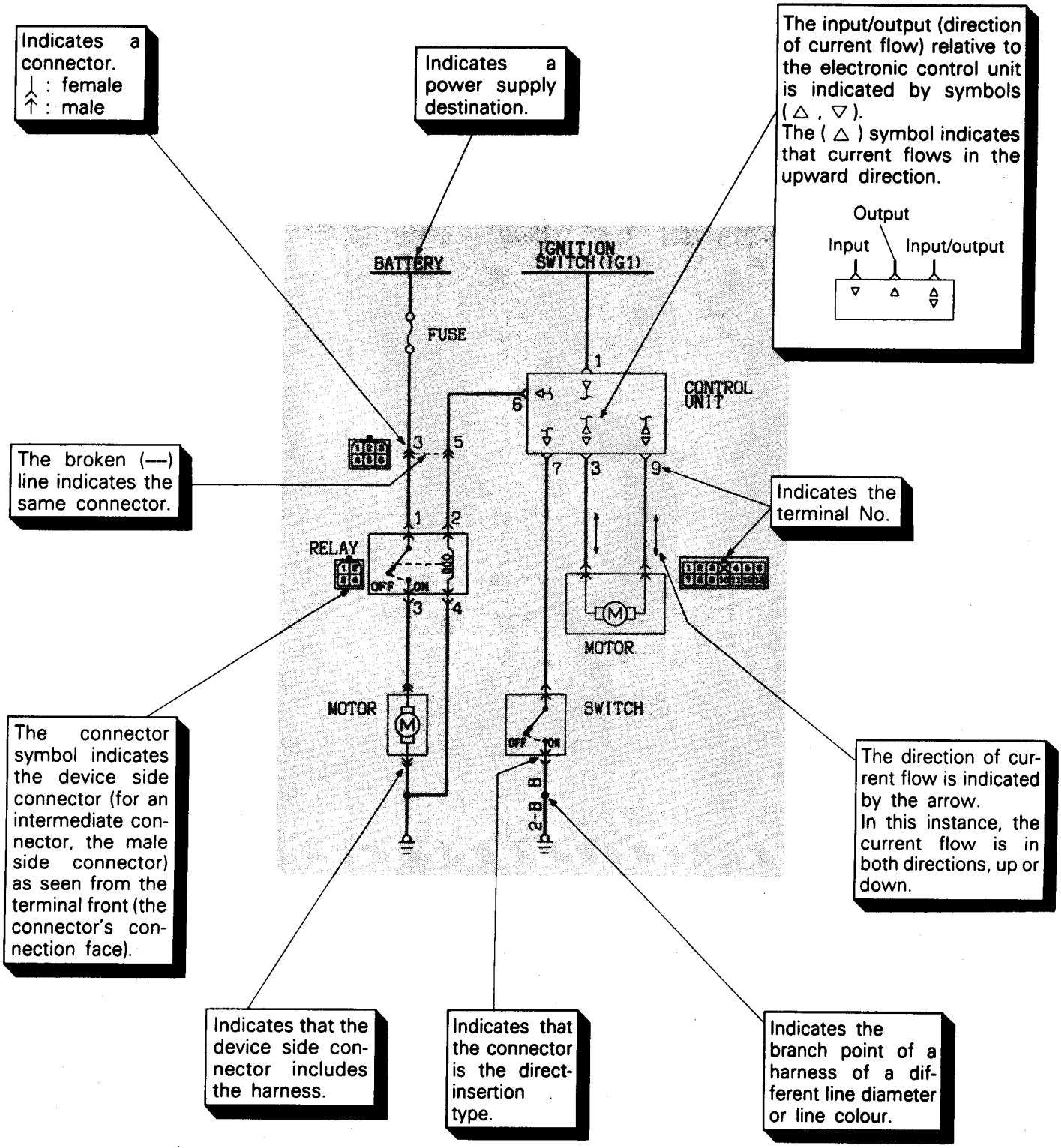


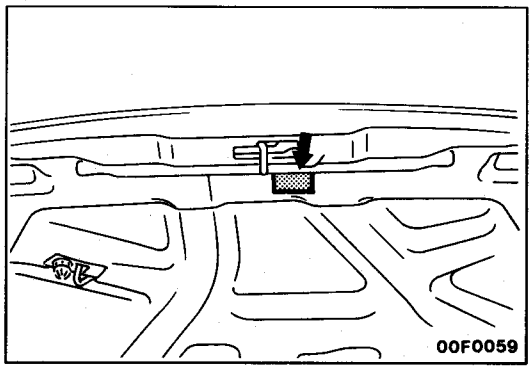
The title of the page (following the page on which the diagram of component parts is presented) indicating the locations of lubrication and sealing procedures.

EXPLANATION OF CIRCUIT DIAGRAMS

The symbols used in circuit diagrams are used as described below.

NOTE
For detailed information concerning the reading of circuit diagrams, refer to the separate manual of "ELECTRICAL WIRING".



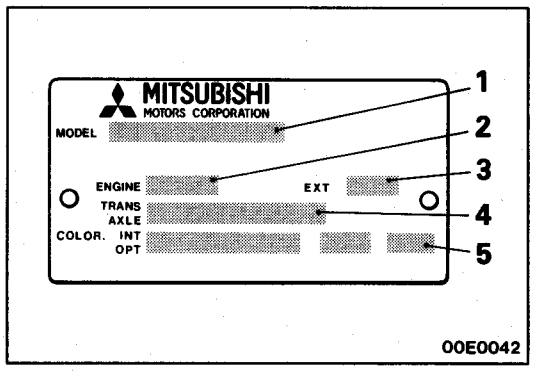


VEHICLE IDENTIFICAITON

VEHICLE INFORMATION CODE PLATE E01DD--

LOCATION

Vehicle information code plate is riveted on the hood panel inner.



CODE PLATE DESCRIPTION

The plate shows model code, engine model, transmission model, and body colour code.

1. MODEL **Z16AM NGFL6**
   - NGFL6: Model series
   - Z16AM: Vehicle model
2. ENGINE **6G72**
   - 6G72: Engine model
3. EXT **CA6**
   - CA6: Exterior code
4. TRANS AXLE **W5MG1 3545**
   - 3545: Rear differential reduction
   - W5MG1: Transmission model
5. COLOR INT OPT **R25 87V 03V**
   - 03V: Equipment code
   - 87V: Interior colour code
   - R25: Body colour code

MODELS

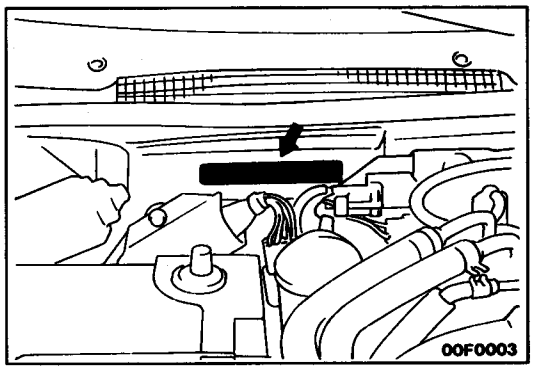
Model code	Engine model	Transmission model	Fuel supply system
Z16AMNGFL6	6G72 [2,972 cm^3 (181.4 cu.in.)	W5MG1	MPI
Z16AMNGFR6			
Z16AMJGFL6 *1		W6MG1	
Z16AMJGFR6 *1			

NOTE
*1: From 1995 models

MODEL CODE

Z1	6	A	M	N	G	F	L	6
1	2	3	4	5	6	7	8	9

1. Development order (& Drive Train)
   Z1 – MITSUBISHI 3000GT
   (Full time 4WD)
2. Engine type
   6 – 2,972 cc (181.4 cu.in.), Gasoline
3. Sort
   A – Passenger car
4. Body style
   M – 2-door hatchback
5. Transmission type
   N – 5-speed manual transmission
   J – 6-speed manual transmission
6. Trim code
7. Specified engine feature
   F – Turbocharger (with intercooler)
8. Steering wheel location
   L – Left hand
   R – Right hand
9. Destination
   6 – For Europe

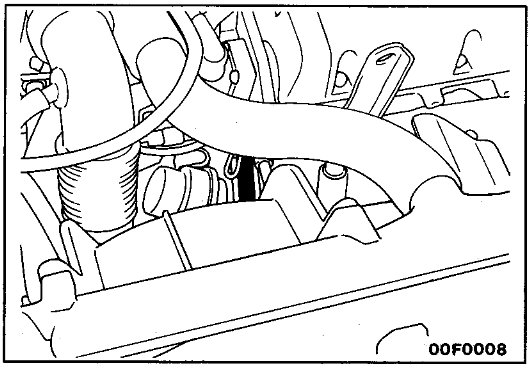


CHASSIS NUMBER

The chassis number is stamped on the toeboard inside the engine compartment.

▲	J	M	B	M	N	Z16	A	P	Y	000001	▲
	1	2	3	4	5	6	7	8	9	10	

1. Asia
2. Japan
3. MITSUBISHI
   A – For Europe, right hand drive
   B – For Europe, left hand drive
4. Body style
   M – 2-door hatchback
5. Transmission type
   N – 5-speed manual transmission
   J – 6-speed manual transmission
6. Development order
   Z16 – 2,972 cc (181.4 cu.in.)
   (Full time 4WD)
7. Sort
   A – Passenger car
8. Model year
   P – 1993
   R – 1994
   S – 1995
9. Plant
   Y – Ohe Motor Vehicle Works
10. Serial number



ENGINE MODEL NUMBER

1. The engine number is stamped on the engine cylinder block as shown in the illustration.

Engine model	Engine displacement cm3 (cu. in.)
6G72	2,972 (181.4)

2. The engine serial number is stamped near the engine model number, and the serial number cycles, as shown belows.

<Vehicles built up to May, 1993>

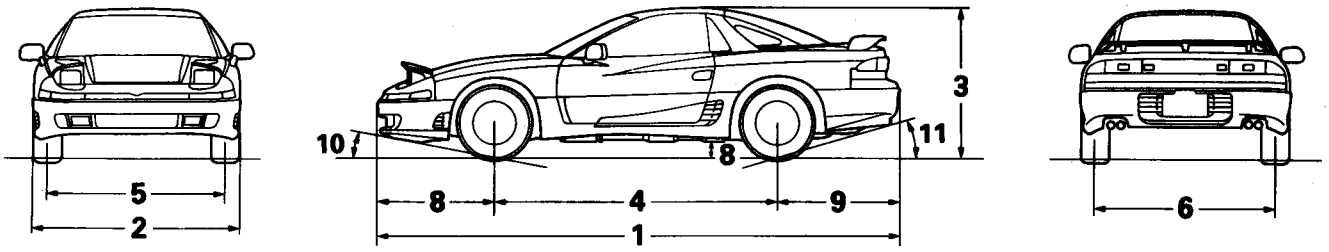
Engine serial number cycling
AA0201 ---→ AA9999 — AB0001 → AY9999 — BA0001 ---→ YY9999

<Vehicles built from June, 1993>

Engine serial number cycling
A09990 ---→ A99999 — B00001 → Y99999

MAJOR SPECIFICATIONS

E01FA--



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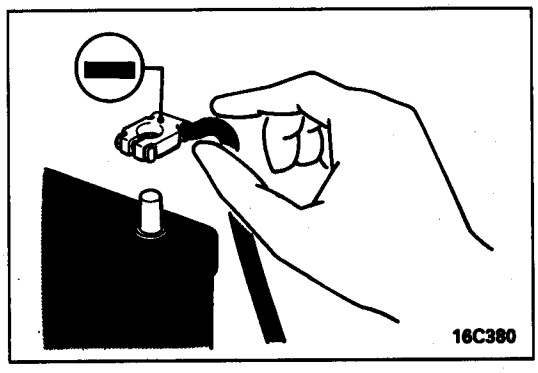
Items	Up to 1994 models	From 1995 models	
	Z16AMNGFL6 Z16AMNGFR6	Z16AMNGFL6 Z16AMNGFR6	Z16AMJGFL6 Z16AMJGFR6
Dimensions mm (in.)			
Overall length 1	4,560 (179.5)	4,570 (179.9)	
Overall width 2	1,840 (72.4)	1,840 (72.4)	
Overall height (unladen) 3	1,285 (50.6)	1,285 (50.6)	
Wheelbase 4	2,470 (97.2)	2,470 (97.2)	
Track–front 5	1,560 (61.4)	1,560 (61.4)	
Track–rear 6	1,580 (62.2)	1,580 (62.2)	
Ground clearance (unladen) 7	145 (5.7)	140 (5.5)	
Overhang–front 8	1,030 (40.6)	1,030 (40.6)	
Overhang–rear 9	1,060 (41.7)	1,070 (42.1)	
Angle of approach degrees 10	11.2°	11.0°	
Angle of departure degrees 11	17.3°	17.6°	
Weight kg (lbs.)			
Kerb weight	1,740 (3,836)	1,720 (3,792)	1,730 (3,858)
Gross vehicle weight	2,120 (4,674)	2,120 (4,674)	2,120 (4,674)
Max. axle weight			
front	1,150 (2,535)	1,150 (2,535)	1,150 (2,535)
rear	1,020 (2,249)	1,020 (2,249)	1,020 (2,249)
Seating capacity	4		
Engine			
Model	6G72		
Total displacement cm^3 (cu.in.)	2,972 (181.4)		
Transmission			
Model	W5MG1		W6MG1
Type	5-speed manual		6-speed manual

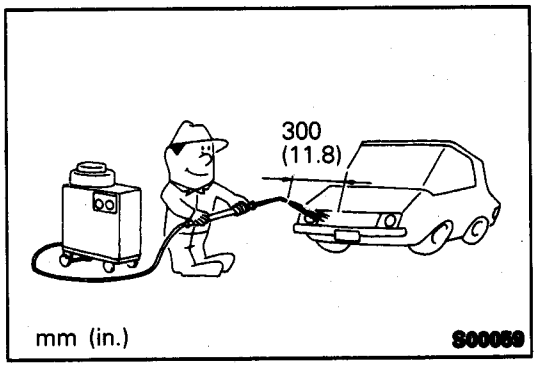


PRECAUTIONS BEFORE SERVICE E01GA-

SERVICING THE ELECTRICAL SYSTEM

Before replacing a component related to the electrical system and before undertaking any repair procedures involving the electrical system, be sure to first disconnect the negative (–) cable from the battery in order to avoid damage caused by short-circuiting.

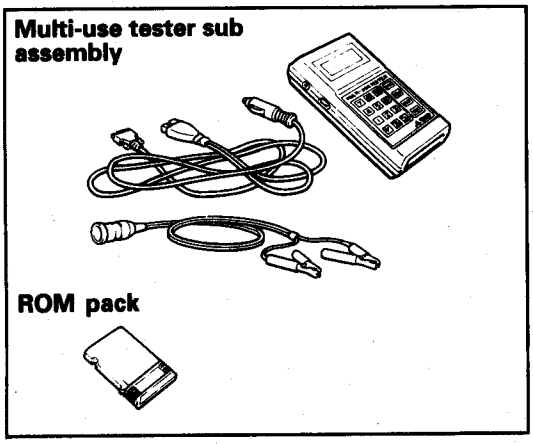
Caution
Before connecting or disconnecting the negative (–) cable, be sure to turn off the ignition switch and the lighting switch.
(If this is not done, there is the possibility of semiconductor parts being damaged.)



VEHICLE WASHING

If high-pressure car-washing equipment or steam car-washing equipment is used to wash the vehicle, be sure to note the following information in order to avoid damage to plastic components, etc.

- Spray nozzle distance: 300 mm (11.8 in.) or more
- Spray pressure: 4 Mpa (40 kg/cm^2, 569 psi) or less
- Spray temperature: 82°C (180°F) or less
- Time of concentrated spray to one point: within 30 sec.



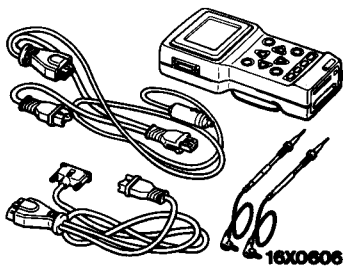
MULTI-USE TESTER <1993 models>

1. Refer to the MULTI-USE TESTER INSTRUCTION MANUAL for instructions on handling the multi-use tester.
   Caution
   Connection and disconnection of the multi-use tester should always be made with the ignition switch in the OFF position.

2. Always use a ROM pack that is appropriate for the vehicle.

ROM pack No.	MB991419

MUT-II sub assembly



ROM pack

MUT-II <All models>

Refer to the MUT-II OPERATING INSTRUCTIONS for instructions on handling the MUT-II.

Caution
Connection and disconnection of the MUT-II should always be made with the ignition switch in the OFF position.

NOTES

IN ORDER TO PREVENT VEHICLES FROM FIRE

"Improper installation of electrical or fuel related parts could cause a fire. In order to retain the high quality and safety of the vehicle, it is important that any accessories that may be fitted or modifications/repairs that may be carried out which involve the electrical or fuel systems, MUST be carried out in accordance with MMC's Information/Instructions".

ENGINE OILS

Health Warning

Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer. Adequate means of skin protection and washing facilities must be provided.

Recommended Precautions

The most effective precaution is to adapt working practices which prevent, as far as practicable, the risk of skin contact with mineral oils, for example by using enclosed systems for handling used engine oil and by degreasing components, where practicable, before handling them.

Other precautions:

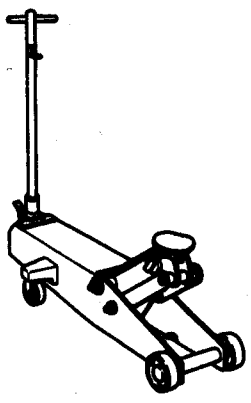
- Avoid prolonged and repeated contact with oils, particularly used engine oils.
- Wear protective clothing, including impervious gloves where practicable.
- Avoid contaminating clothes, particularly underpants, with oil.
- Do not put oily rags in pockets, the use of overalls without pockets will avoid this.
- Do not wear heavily soiled clothing and oil-impregnated foot-wear. Overalls must be cleaned regularly and kept separate from personal clothing.
- Where there is a risk of eye contact, eye protection should be worn, for example, chemical goggles or face shields; in addition an eye wash facility should be provided.
- Obtain First Aid treatment immediately for open cuts and wounds.
- Wash regularly with soap and water to ensure all oil is removed, especially before meals (skin cleansers and nail brushes will help). After cleaning, the application of preparations containing lanolin to replace the natural skin oils is advised.
- Do not use petrol, kerosine, diesel fuel, gas oil, thinners or solvents for cleaning skin.
- Use barrier creams, applying them before each work period, to help the removal of oil from the skin after work.
- If skin disorders develop, obtain medical advice without delay.

SUPPORT LOCATIONS FOR LIFTING AND JACKING

E01LB–

Caution
Do not support the vehicle at locations other than specified supporting points. If do so, this will cause damage etc.

SUPPORT POSITIONS FOR A GARAGE JACK



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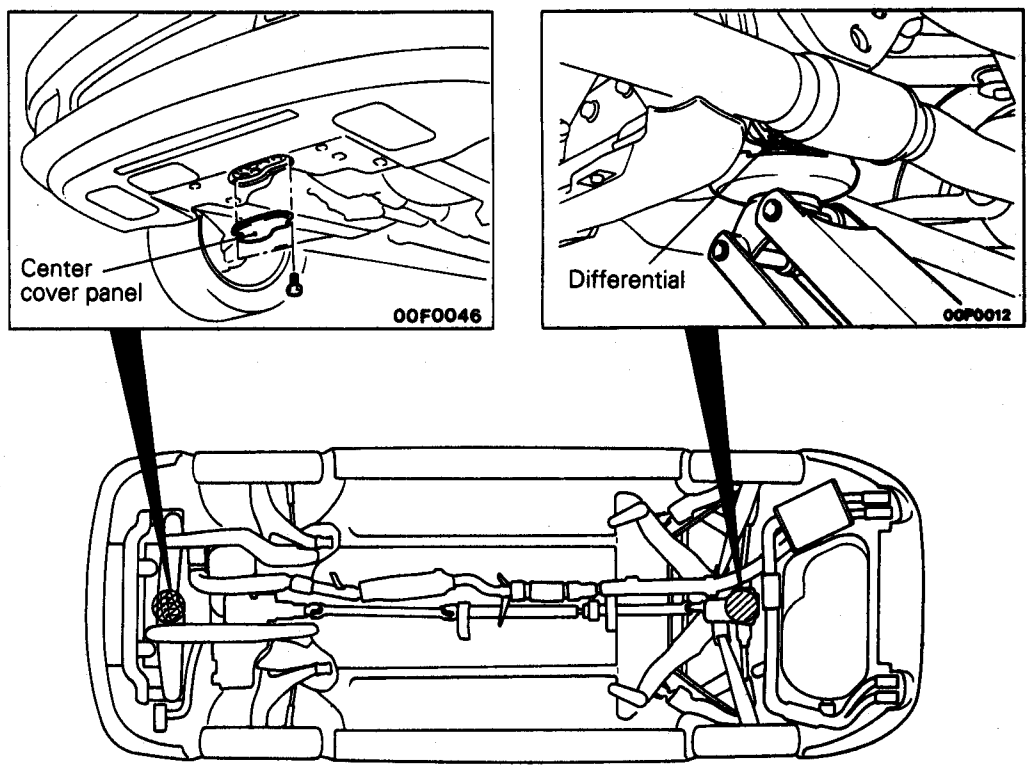

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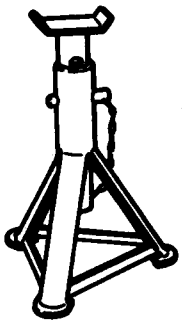
NOTE
Always remove the center cover panel to jack up a front part.

SUPPORT POSITIONS FOR AXLE STANDS, A SINGLE-POST LIFT OR DOUBLE-POST LIFT

Caution
When service procedures require removing rear suspension, fuel tank, spare tyre and rear bumper, place additional weight on rear end of vehicle or anchor vehicle to hoist to prevent tipping of centre of gravity changes.

AXLE STANDS



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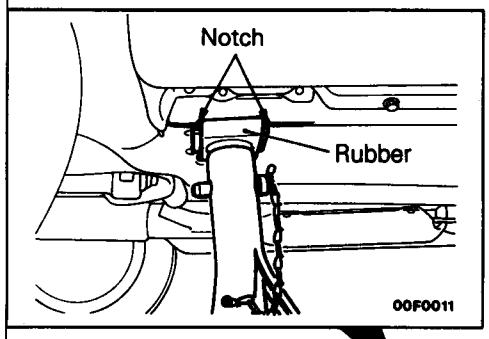

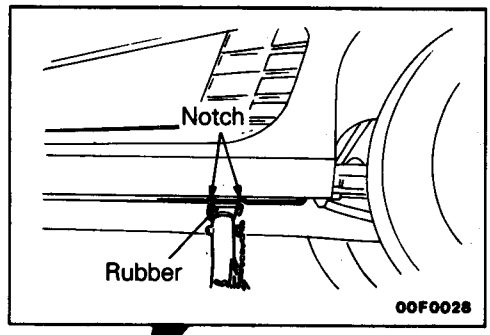

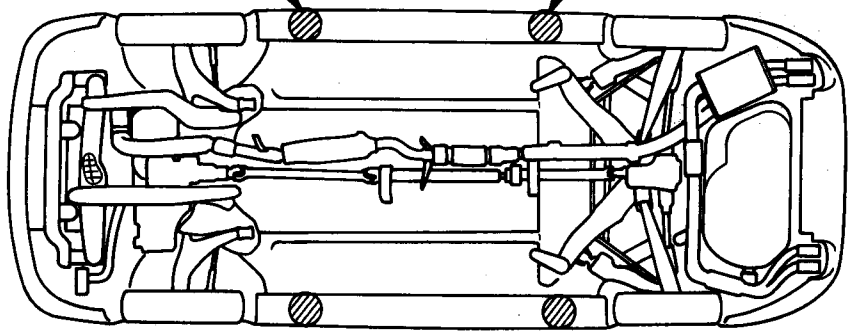

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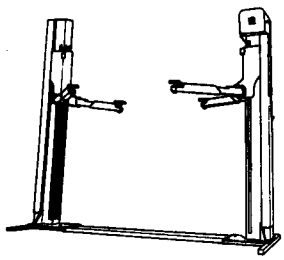
DOUBLE-POST LIFT



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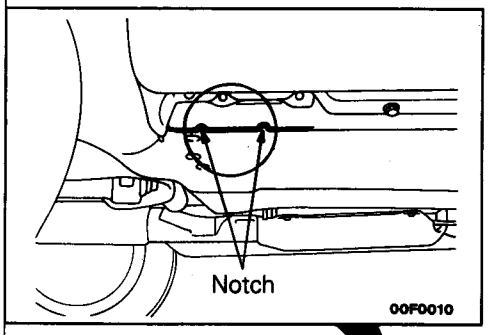
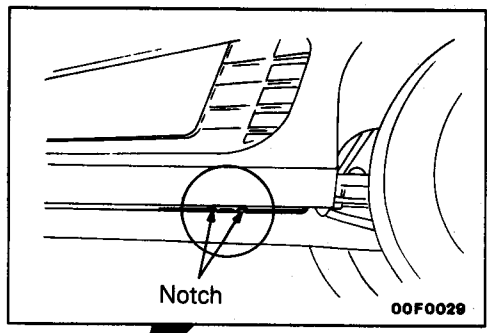
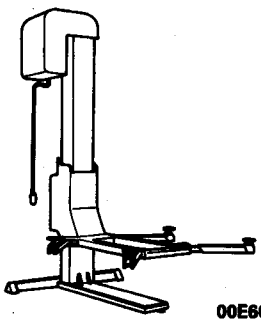




SINGLE-POST LIFT



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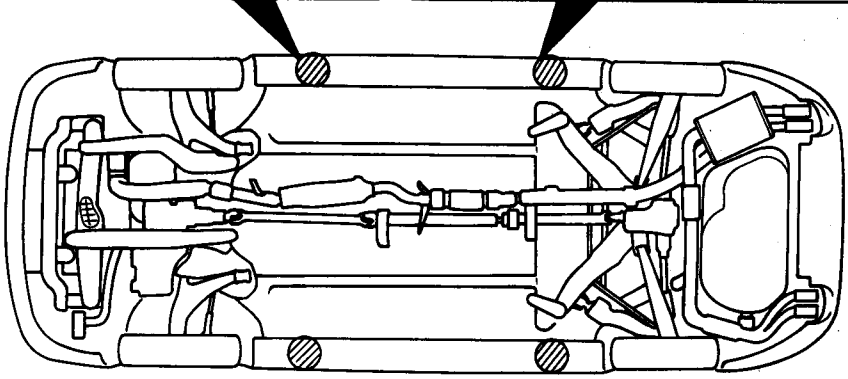

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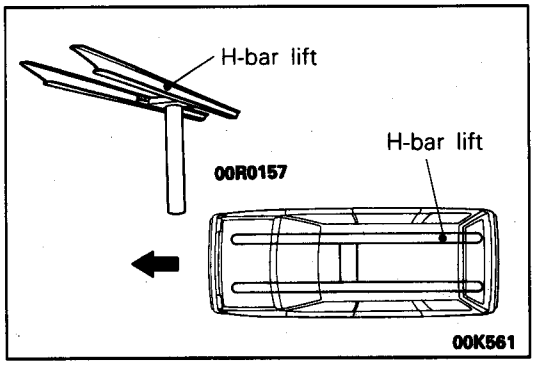
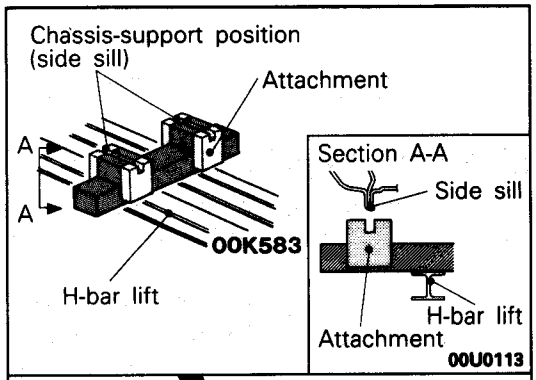
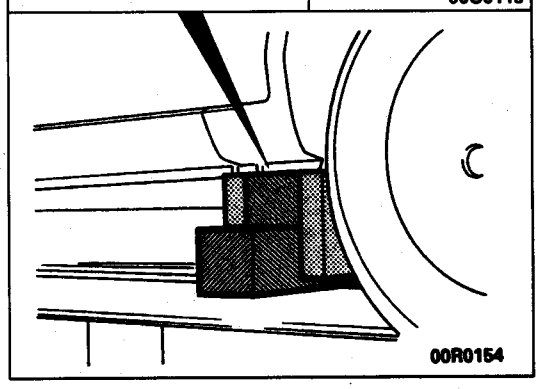






SUPPORT POSITIONS AND SUPPORT METHOD FOR AN H-BAR LIFT

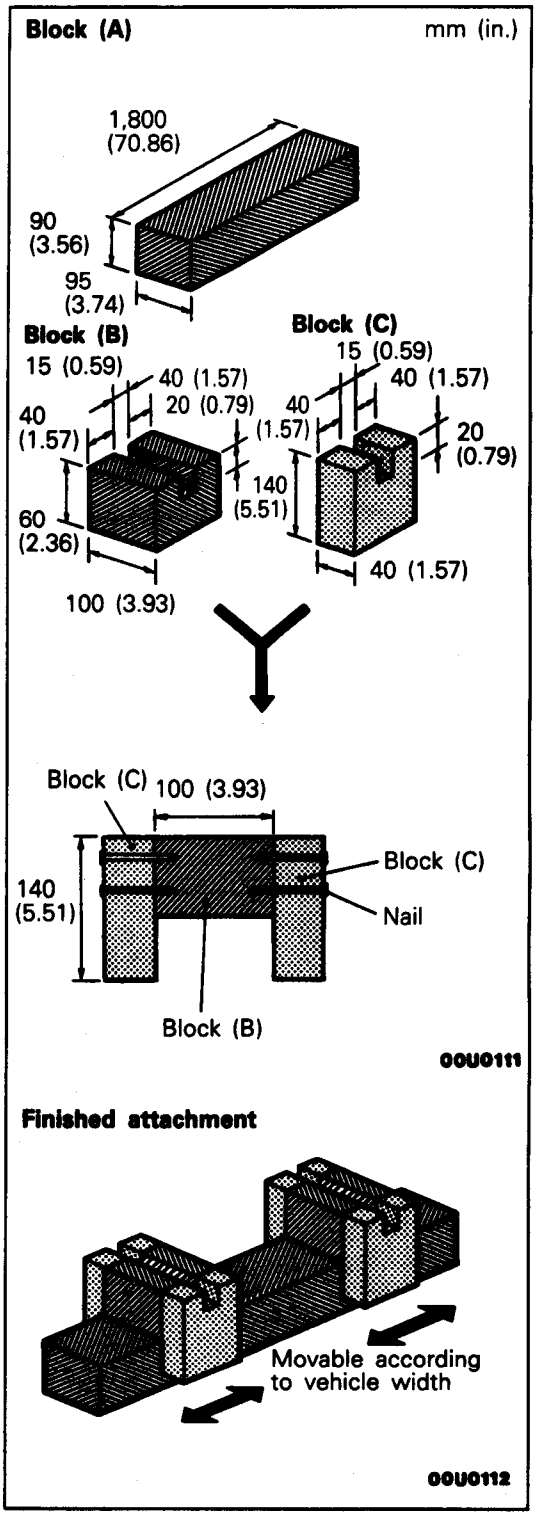
Caution
When service procedures require removing rear suspension, fuel tank, spare tyre and rear bumper, place additional weight on rear end of vehicle or anchor vehicle to hoist to prevent tipping of centre of gravity changes.

When H-bar lift is used to lift up vehicles, use of metallic attachment attached to the H-bar lift may cause damage to the suspension arm etc. Therefore, lift up the vehicle by the following procedure.

(1) Place the vehicle on the H-bar lift (same direction).
(2) Place attachments on the H-bar lift at the designated chassis-support positions. When making the attachments, refer to the section concerning making them.

Caution
If support is at any location other than the designated positions, the body or suspension might be deformed or otherwise damaged, so care should be taken to support only at the correct (designated) positions.

(3) Raise the H-bar lift to the height at which the vehicle is slightly raised and check to be sure that the vehicle is correctly and sufficiently secured; then raise the vehicle.



PREPARATION OF "ATTACHMENTS"

(1) Prepare the blocks (wooden) and nails as shown in the figure.

Item	Dimensions mm (in.)	Q'ty
Block (A)	90 × 95 × 1,800 (3.54 × 3.74 × 70.86)	2
Block (B)	60 × 100 × 95 (2.36 × 3.93 × 3.74)	4
Block (C)	140 × 40 × 95 (5.51 × 1.57 × 3.74)	8
Nail	70 (2.76) or more	32

Caution
The wood selected for the blocks must be hard.

(2) For the (B) blocks and (C) blocks, use a saw and chisel or similar tool to make grooves of the dimensions shown in the figure.

(3) Make four "ATTACHMENTS" such as shown in the figure, nailing (B) and (C) blocks so that each (B) block is sandwiched between (C) blocks.

STANDARD PARTS-TIGHTENING-TORQUE TABLE

E01MA-

Each torque value in the table is a standard value for tightening under the following conditions.
(1) Bolts, nuts and washers are all made of steel and plated with zinc.
(2) The threads and bearing surface of bolts and nuts are all in dry condition.

The values in the table are not applicable:
(1) If toothed washers are inserted.
(2) If plastic parts are fastened.
(3) If bolts are tightened to plastic or die-cast inserted nuts.
(4) If self-tapping screws or self-locking nuts are used.

Standard bolt and nut tightening torque

Bolt nominal diameter (mm)	Pitch (mm)	Torque Nm (kgm, ft.lbs.)		
		Head mark ④	Head mark ⑦	Head mark ⑧
M5	0.8	2.5 (0.25, 1.8)	5 (0.5, 3.6)	6 (0.6, 4.3)
M6	1.0	5 (0.5, 3.6)	9 (0.9, 6.5)	10 (1.0, 7.2)
M8	1.25	12 (1.2, 8.7)	22 (2.2, 16)	25 (2.5, 18)
M10	1.25	24 (2.4, 17)	45 (4.5, 33)	53 (5.3, 38)
M12	1.25	42 (4.2, 30)	83 (8.3, 60)	98 (9.8, 71)
M14	1.5	73 (7.3, 53)	140 (14.0, 101)	160 (16.0, 116)
M16	1.5	113 (11.3, 82)	210 (21.0, 152)	240 (24.0, 174)
M18	1.5	170 (17.0, 123)	310 (31.0, 224)	350 (35.0, 253)
M20	1.5	230 (23.0, 166)	420 (42.0, 304)	490 (49.0, 354)
M22	1.5	310 (31.0, 224)	570 (57.0, 412)	660 (66.0, 477)
M24	1.5	400 (40.0, 289)	750 (75.0, 542)	870 (87.0, 629)

Flange bolt and nut tightening torque

Bolt nominal diameter (mm)	Pitch (mm)	Torque Nm (kgm, ft.lbs.)		
		Head mark ④	Head mark ⑦	Head mark ⑧
M6	1.0	5 (0.5, 3.6)	10 (1.0, 7.2)	12 (1.2, 8.7)
M8	1.25	13 (1.3, 9.4)	24 (2.4, 17)	28 (2.8, 20)
M10	1.25	26 (2.6, 19)	50 (5.0, 36)	58 (5.8, 42)
M10	1.5	24 (2.4, 17)	45 (4.5, 33)	55 (5.5, 40)
M12	1.25	47 (4.7, 34)	95 (9.5, 69)	105 (10.5, 76)
M12	1.75	43 (4.3, 31)	83 (8.3, 60)	98 (9.8, 71)

Taper thread tightening torque

Thread size	Torque Nm (kgm, ft.lbs.)	
	Female thread material: Light alloy	Female thread material: Steel
NPTF 1/6	7 (0.7, 5.0)	10 (1.0, 7.2)
PT 1/8	10 (1.0, 7.2)	18 (1.8, 13)
PT 1/4, NPTF 1/4	25 (2.5, 18)	40 (4.0, 29)
PT 3/8	48 (4.8, 35)	68 (6.8, 49)

NOTE: NPTF is dry seat pipe thread, while PT is pipe thread.

MAIN SEALANT AND ADHESIVE TABLE

E00ZA--

Application	Recommended brand
1. Sealants for engine accessories	
(1) Sealing between rocker cover and camshaft bearing cap (4G6 DOHC and 6G7 engines only)	3M ATD Part No. 8660 or equivalent
(2) • Sealing between semi-circular packing and rocker cover and between semi-circular packing and cylinder head • Oil pressure switch (except 4G1 and 6G7 engines)	3M ATD Part No. 8660 or equivalent
(3) Engine coolant temperature switch, Engine coolant temperature sensor, Thermo valve, Thermo switch, Joints, Engine coolant temperature gauge unit (large size)	3M Nut Locking Part No. 4171 or equivalent
(4) Engine coolant temperature gauge unit (small size, MD091056 only)	3M ATD Part No. 8660 or equivalent
(5) Oil pan (except 4G5 engine)	MITSUBISHI GENUINE Part No. MD997110 or equivalent
2. Sealing between glass and weatherstrip	
(1) • Sealing between tempered glass and weatherstrip	3M ATD Part No. 8513 or equivalent
• Sealing between body flange and weatherstrip	3M ATD Part No. 8509 or equivalent
(2) Sealing between laminated glass and weatherstrip	3M ATD Part No. 8509 or equivalent

Application	Recommended brand
3. Adhesion with ribbon sealer • Waterproof film for door • Fender panel • Splash shield • Mud guard • Rear combination lamp	3M ATD Part No. 8625 or equivalent
4. Adhesives for interior trim	
(1) Adhesion of polyvinyl-chloride sheet	3M Part No. EC-1368 or equivalent
(2) Adhesion of door weatherstrip to body	3M ATD Part No. 8001 or 3M ATD Part No. 8011 or equivalent
(3) Sealing between grommet or packing and metal seal	3M ATD Part No. 8513 or equivalent
(4) • Adhesion of headlining and other interior trim materials • Adhesion of fuel tank to pad	3M Part No. EC-1368 or 3M ATD Part No. 8080 or equivalent
5. Body sealant • Sealing of sheet metal, drip rail, floor, body side panel, trunk, front panel and the like joints • Sealing of tailgate hinges	3M ATD Part No. 8531 or 3M ATD Part No. 8646 or equivalent

Application	Recommended brand
6. Chassis sealant (1) ● Sealing of flange surfaces and threaded portions ● Fuel gauge unit packing	3M ATD Part No. 8659 or equivalent
(2) Sealing of flange surfaces, threaded portions, packing and dust cover ● Differential carrier packing ● Dust covers for ball joint and linkage ● Steering gear box packing and shims ● Steering gear housing rack support cover and top cover ● Mating surface of knuckle arm flange	3M ATD Part No. 8663 or equivalent
(3) Sealing between accelerator arm bracket and toeboard	Drying sealant
(4) Sealant for drum brake shoe hold-down pin and wheel cylinder	3M ATD Part No. 8513 or equivalent
7. Fast bonding adhesive Adhesion of all materials except polyethylene, polypropylene, fluorocarbon resin or other materials with highly absorbent surface	3M ATD Part No. 8155 or equivalent
8. Anaerobic fast bonding adhesives (1) Fixing of bolts and screws ● Tightening of drive gear to differential case ● Bolts for coupling tilt steering upper column with lower column (2) Fixing of bearing, fan, pulley and gear connections (3) Sealing of small recess or flange surface	3M Stud locking Part No. 4170 or equivalent
9. Undercoat	3M ATD Part No. 8864 or equivalent

NOTES

ENGINE

CONTENTS

E11AA-

SPECIFICATIONS

GENERAL SPECIFICATIONS

E11CA--

Items		Specifications
Number of cylinder and arrangement		6, V-type
Total displacement	cm^3 (cu.in.)	2,972 (181.4)
Bore x Stroke	mm (in.)	91.1 x 76
Compression ratio		8.0
Firing order		1-2-3-4-5-6
Combustion chamber		Pentroof type
Lash adjuster		Equipped

SERVICE SPECIFICATIONS

E11CB--

Items		Specifications
Standard value		
Drive belt		
For alternator and air conditioner compressor		
Deflection	mm (in.)	
Inspection		4.0–5.5 (0.157–0.216)
New belt		3.5–4.0 (0.138–0.157)
Used belt		4.0–5.0 (0.157–0.197)
For power steering pump		
Deflection	mm (in.)	
Inspection		9.5–13.5 (0.374–0.531)
New belt		7.5–9.0 (0.295–0.354)
Used belt		10.5–12.5 (0.413–0.492)
Tension	N (kg, lbs.)	
Inspection		250–500 (25–50, 55–110)
New belt		500–700 (50–70, 110–154)
Used belt		350–400 (35–40, 77–88)
Timing belt tension torque	Nm (kgm, ft.lbs.)	10 (1.0, 7.2)
Auto tensioner rod protrusion	mm (in.)	3.8–4.5 (0.15–0.18)
Ignition timing		5° BTDC ± 3°
Engine idle speed	r/min.	700 ± 100
Intake manifold vacuum	mmHg (in.Hg)	Approx. 495 (19)
Limit		
Engine compression pressure	kpa (kg/m^2, psi)	min. 810 (8,1, 115)/250–400 r/min
Engine compression pressure difference between each cylinder	kPa (kg/cm^2, psi)	Max. 100 (1.0, 14)

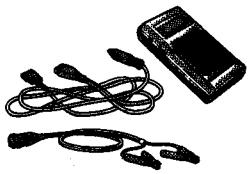
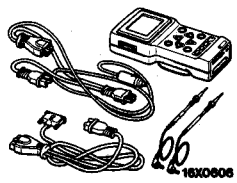
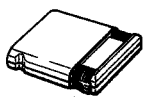
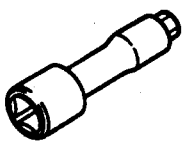
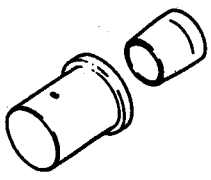
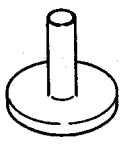
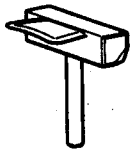
SEALANTS

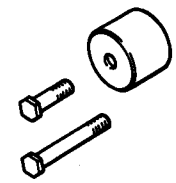
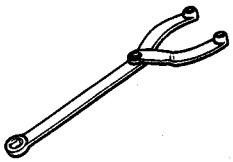
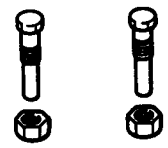
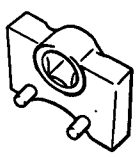
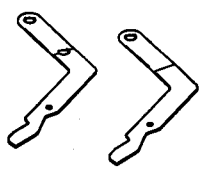
E11CE--

Items	Specified sealants	Remarks
Rocker cover and camshaft bearing cap seal	3M ATD Part No. 8660 or equivalent	Semi-drying sealant
Oil pan	MITSUBISHI GENUINE Part No. MD970389 or equivalent	

SPECIAL TOOLS

E11DA--

Tool	Number	Name	Use
	MB991341	Multi-use tester sub assembly	1993 models ● Idle speed inspection ● Dashpot inspection
	[For the number, refer to GROUP 00 – Precautions Before Service]	ROM pack	
 16X0606	MB991502	MUT-II sub assembly	All models ● Idle speed inspection ● Dashpot inspection
 16X0607		ROM pack	
	MD998051	Cylinder head bolt wrench	Loosening and tightening of cylinder head bolt
	MD998717	Crankshaft front oil seal installer	Installation of crankshaft front oil seal
	MD998718	Crankshaft rear oil seal installer	Installation of crankshaft rear oil seal
	MD998727	Oil pan remover	Removal of oil pan

Tool	Number	Name	Use
	MD998761	Camshaft oil seal installer	Installation of camshaft oil seal
	MB990767	End yoke holder	Supporting the sprocket and shaft pulley when attaching or detaching them
	MD998754	Crankshaft pulley holder	Supporting the crankshaft pulley when crankshaft bolt and pulley are removed or reinstalled. Use together with MB990767
	MD998767	Socket wrench	Adjustment of timing belt
	MB990968	Torque wrench	Adjustment of timing belt
	MD998769	Crankshaft pulley spacer	Used if the crankshaft needs to be rotated to attach the timing belt etc.
	MD998782	Valve lifter set	Removal of roller rocker arm

SERVICE ADJUSTMENT PROCEDURES

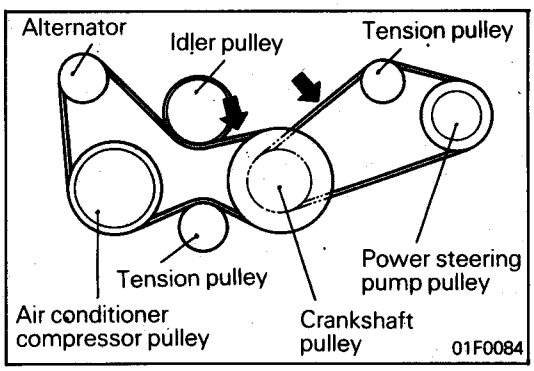
E11FQBP

DRIVE BELTS TENSION ADJUSTMENT

(1) Check that the belts are not damaged and are properly fit into the pulley grooves.

Caution

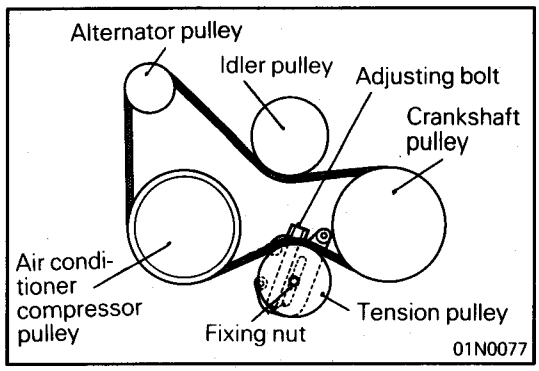
1. **When installing the V-ribbed belt, check that the V-ribs are properly fit without misalignment.**
2. **If creaking or slippage is observed, check the belt for wear, damage, or breakage on the pulley contact surface, check the pulley for scoring, in addition to sag inspection.**
3. **Check that the V-ribbed belt is not resting on the tension pulley or idler pulley flange.**



(2) Apply 100 N (10 kg, 22 lbs.) force to the belt back midway between the pulleys as shown in the illustration, measure the deflection or by using a belt-tension gauge, check the belt's tension.

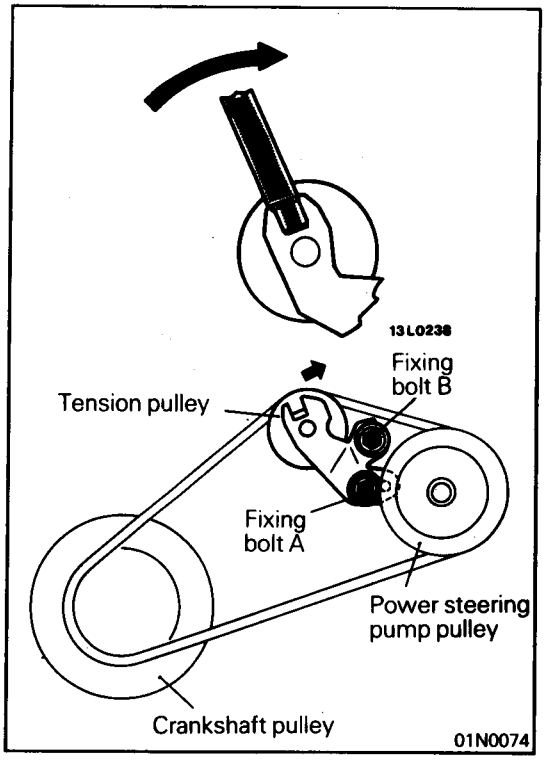
Standard value:

Items		Check value	Adjustment value	
			New belt	Used belt
For alternator and A/C compressor	Deflection mm (in.)	4.0–5.5 (0.157–0.216)	3.5–4.0 (0.138–0.157)	4.0–5.0 (0.157–0.197)
For P/S pump	Deflection mm (in.)	9.5–13.5 (0.374–0.531)	7.5–9.0 (0.295–0.354)	10.5–12.5 (0.413–0.492)
	Tension N (kg, lbs.)	250–500 (25–50, 55–110)	500–700 (50–70, 110–154)	350–400 (35–40, 77–88)



DEFLECTION ADJUSTMENT OF THE ALTERNATOR AND AIR CONDITIONER COMPRESSOR DRIVE BELT

(1) Use straight handle box wrench to loosen tension pulley fixing nut.
(2) Adjust belt deflection with adjusting bolt.
(3) Use straight handle box wrench to tighten fixing nut.
(4) Run the engine one time or more.
(5) Check the belt deflection. Readjust, if necessary.



DEFLECTION ADJUSTMENT OF POWER STEERING PUMP DRIVE BELT

(1) Insert an extension bar (insertion depth 12.7 mm), etc. into the opening at the end of the tension pulley bracket.
(2) Loosen the tension pulley fixing bolts in the order of B and A.
(3) Move the extension bar installed to the tension pulley in the direction of arrow to adjust the belt tension.
(4) Tighten the tension pulley fixing bolts in the order of A and B.

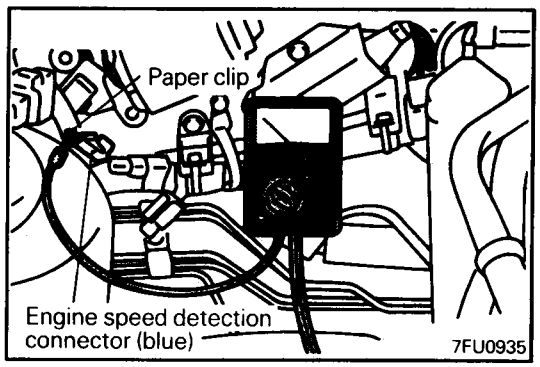
Tightening torque: 42 Nm (4.2 kgm, 30 ft.lbs.)

(5) Give the crankshaft two turns in normal direction (clockwise) to run in the belt.
(6) Check the belt deflection. Readjust, if necessary.

IGNITION TIMING INSPECTION E11FUBB

(1) Before inspection and adjustment set vehicle in the following condition.
- Engine coolant temperature: 80–95°C (176–203°F)
- Lamps, electric cooling fan and all accessories: OFF
- Transmission: Neutral

(2) Insert a paper clip into the 1-pin connector (blue) as shown in the illustration.



(3) Connect a primary-voltage-detection type of tachometer to the paper clip.

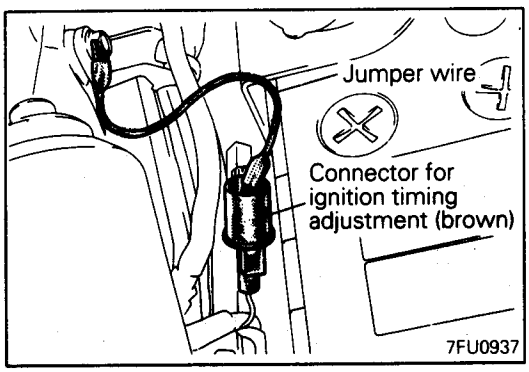
NOTE
Do not use the Multi-use tester (MUT)or MUT-II.
If tested with the MUT or MUT-II connected to the diagnosis connector, the ignition timing will not be the basic timing but be ordinary timing.

(4) Set the timing light.
(5) Start the engine and run at idle.
(6) Check that engine idle speed is within the standard value.

Standard value: 700± 100 r/min.

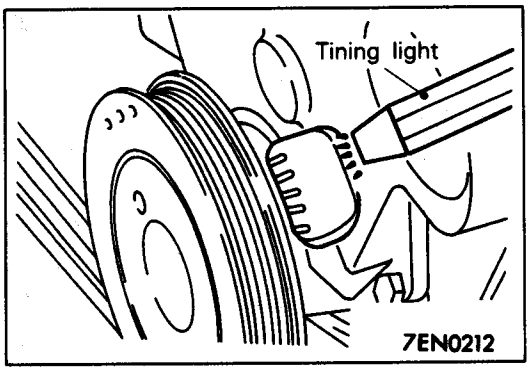
NOTE
The engine speed indicated is a third of actual speed. In other words, the reading of the tachometer times 3 is actual speed.

(7) Turn the ignition switch to OFF.



(8) Remove the waterproof connector from the ignition timing adjustment connector (brown).
(9) Connect the jumper wire with the clip to the ignition timing adjustment terminal, and earth this to the body as illustrated.

NOTE
Grounding this terminal sets the engine to the basic ignition timing.



(10) Start the engine and run at idle.
(11) Check that basic ignition timing is within the standard value.

Standard value: 5° BTDC ± 3°

(12) If there is a deviation from the standard value, refer to GROUP 13 – On-vehicle Inspection of MPI Components and then check the crankshaft angle sensor.
(13) Stop the engine, remove the jumper wire from the ignition timing adjustment connector (brown), and return the connector to its original condition.
(14) Start the engine and check that ignition timing is at the standard value.

Standard value: Approx. 15° BTDC

NOTE
1. Ignition timing is variable within about ± 7°, even under normal operating.
2. And it is automatically further advanced by about 5° from 15° BTDC at higher altitudes.

IDLE SPEED INSPECTION E11FXCS

(1) Before inspection and adjustment set vehicles in the following condition.
- Engine coolant temperature: 80–95°C (176–203°F)
- Lamps, electric cooling fan and all accessories: OFF
- Transmission: Neutral

(2) Check the basic ignition timing. (Refer to P.11–6.)

Standard value: 5° BTDC ± 3°

(3) After turning the ignition switch to OFF, connect the Multi-use tester (MUT) or MUT-II to the diagnosis connector (white).
(4) Start the engine and run it at idle.
(5) Run the engine at idle for 2 minutes.
(6) Check the idle speed.

Curb idle speed: 700 ± 100 r/min.

NOTE
1. The idle speed is adjusted automatically by the idle speed control (ISC) system.
2. The engine speed indicated is a third of actual speed. In other words, the reading of the tachometer times 3 is actual speed.

(7) If there is a deviation from the standard value refer to GROUP 13 – Check Chart Classified by Problem Symptoms, and check the MPI components.

IDLE MIXTUTRE INSPECTION

(1) Before inspection and adjustment, set vehicles in the following condition:
- Engine coolant temperature: 80–95°C (176–203°F)
- Lamps, electric cooling fan and all accessories: OFF
- Trans mission: Neutral

(2) Verify if the basic ignition timing is within the standard value.
Standard value: 5°±3°BTDC

(3) After turning the ignition switch to OFF, connect either MUT or MUT-II to the diagnosis connector (white).

(4) Start the engine and run it at 2,500 rpm for 2 minutes.

(5) Set the CO, HC tester.

(6) Check the CO concentration and the HC concentration at idle.
Standard value:
CO concentration: 0.5% or less
HC concentration: 100 ppm or less

(7) If the concentrations are outside the standard value, check the following items:
- Self-diagnosis output
- Feed back control (When the feedback control is carried out normally,the output signal of the oxygen sensor changes between 0–400mV and 600–1,000mV at idle.)
- Combustion pressure
- Injector
- Ignition coil, spark plug cable, spark plug
- Leak in the EGR system and in the EGR valve
- Evaporative emission control system
- Compression pressure

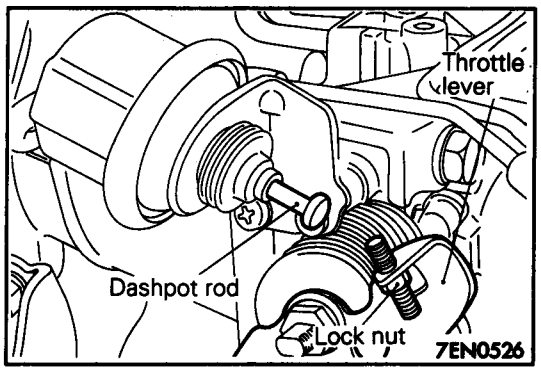
NOTE
Change the three-way catalyst when the CO and HC concentrations do not remain inside the standard value, even though the result of the inspection is normal on all items.

NOTES

DASHPOT INSPECTION AND ADJUSTMENT

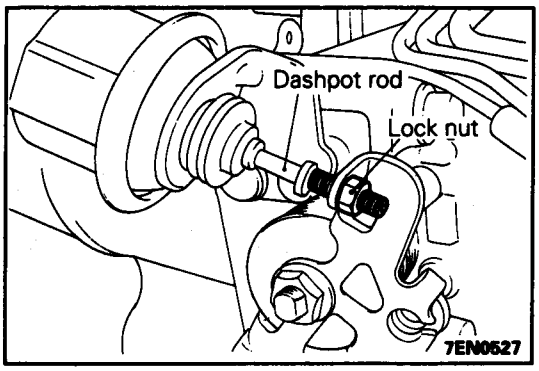
(1) Inspect the idle speed before inspection and adjustment of the dashpot.
(2) Set the vehicle in the following conditions before dashpot inspection and adjustment.
- Engine coolant temperature: 80 – 95°C (176 – 203°F)
- Lamps, electrical cooling fan and accessories: OFF
- Transmission: Neutral

(3) Connect the Multi-use tester (MUT) or MUT-II to the diagnosis connector (white).
(4) Start the engine.



(5) Open the throttle valve until the dashpot rod makes a full stroke.
(6) Close the throttle valve slowly to find a point where the throttle lever contacts the dashpot rod (a point where the dashpot starts to contract). Hold the throttle valve at this point.
(7) Check the engine speed (at which the dashpot starts to operate).

Standard value: 2,200 ± 200 r/min.



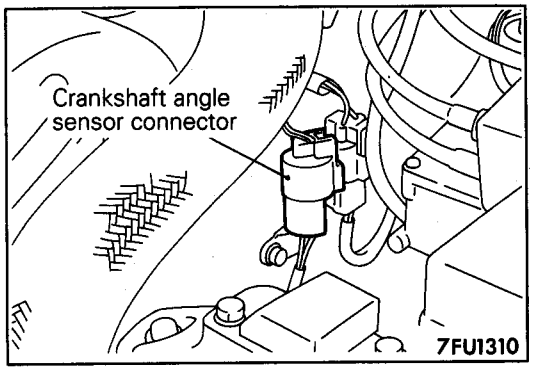
(8) If the engine speed is not within the specified limit, loosen the lock nut on the rod and turn the rod to make adjustment for proper dashpot starting engine speed.
(9) Release the throttle valve to make sure that the engine speed slowly drops to the idle speed.

COMPRESSION PRESSURE INSPECTION E11FGBN

(1) Before inspection, check that the engine oil, starter and battery are normal. Also, set the vehicle to the following condition:
- Engine coolant temperature: 80 – 95°C (176 – 203°F)
- Lamps, electrical cooling fan and accessories: OFF
- Transmission: Neutral

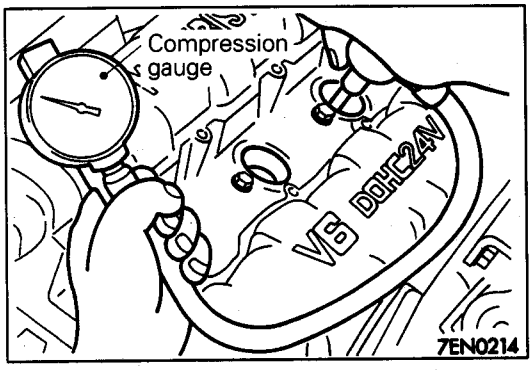
(2) Remove the air intake plenum.
(3) Disconnect the spark plug cables.
(4) Remove all of the spark plugs.
(5) Disconnect the crankshaft angle sensor connector.

NOTE
Doing this will prevent the engine control unit from carrying out ignition and fuel injection.



(6) Cover the spark plug hole with a rag etc., and after the engine has been cranked, check that no foreign material is adhering to the rag.

Caution
1. **Keep away from the spark plug hole when cranking.**
2. **If compression is measure with water, oil, fuel, etc., that has come from cracks inside the cylinder, these materials will become heated and will gush out from the spark plug hole, which is dangerous.**



(7) Set compression gauge to one of the spark plug holes.
(8) Crank the engine with the throttle valve fully open and measure the compression pressure.

Standard value (at engine speed of 250 – 400 r/min.): 1,100 kPa (11.0 kg/cm^2, 156 psi)
Limit (at engine speed speed of 250 – 400 r/min.): 810 kPa (8.1 kg/cm^2, 115 psi)

(9) Measure the compression pressure for all the cylinders, and check that the pressure differences of the cylinders are below the limit.

Limit: Max. 100 kPa (1.0 kg/cm^2, 14 psi.)

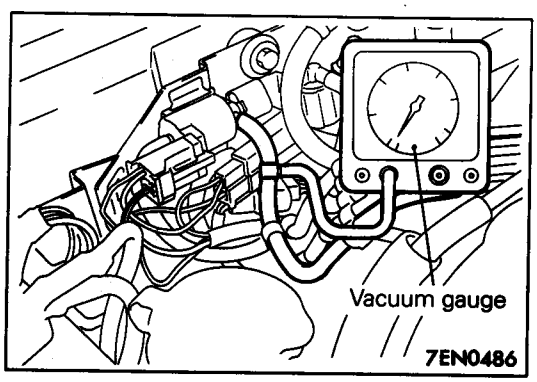
(10) If there is a cylinder with compression or a compression difference that is outside the limit, pour a small amount of engine oil through the spark plug hole, and repeat the operations in steps (8) and (9).
- ① If the compression increases after oil is added, the cause of the malfunction is a worn or damaged piston ring and/or cylinder inner surface.
- ② If the compression does not rise after oil is added, the cause is a burnt or defective valve seat, or pressure is leaking from the gasket.

(11) Connect the crankshaft angle sensor connector.
(12) Install the spark plugs and spark plug cables.

Tightening torque: 25 Nm (2.5 kgm, 18 ft.lbs.)

(13) Install the air intake plenum.
(14) Use the Multi-use tester (MUT) or MUT-II to erase the self-diagnosis codes.

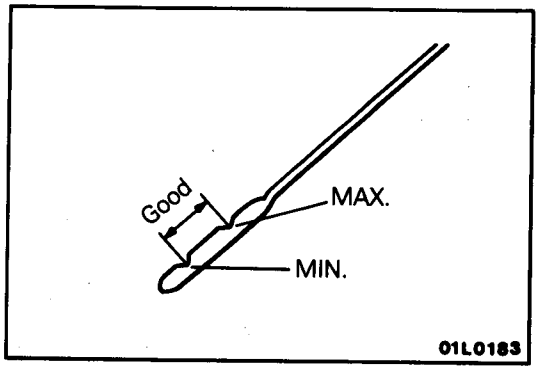
NOTE
This will erase the problem code resulting from the crankshaft angle sensor connector being disconnected.



MANIFOLD VACUUM INSPECTION E11FWAT

(1) Before inspection, set the vehicle to the following condition:
- Engine coolant temperature: 80–95°C (176–203°F)
- Lamps, electric cooling fan and all accessories: OFF
- Transmission: Neutral

(2) Connect the Multi-use tester (MUT) or MUT-II to the diagnosis connector (White).
(3) Check that the idle speed is at the standard value.
(4) Install the T-joint to the vacuum hose between the air intake plenum and the fuel pressure solenoid valve, and connect the vacuum gauge.
(5) Check the manifold vacuum when the engine is idling.
Standard value: Approx. 495 mmHg (19 in.Hg)

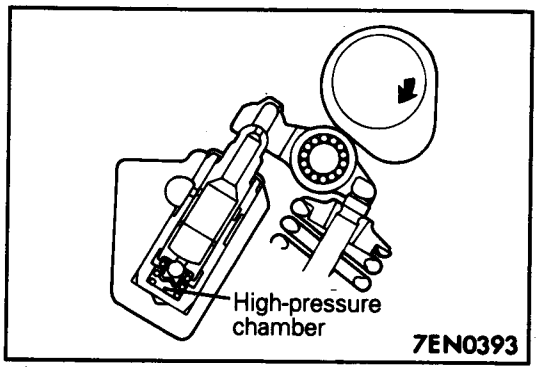


LASH ADJUSTER CHECK E11FBAF2

NOTE
Soon after the engine is started or while it is running, abnormal noise (clattering) which may be attributed to the adjuster sounds but does not stop. In this case, check the following.

(1) Check the engine oil, and refill or replace oil if necessary.
NOTE
1. If the oil amount is small, air will be sucked from the oil strainer and mixed in the oil passage.
2. If the oil amount is excessive, the oil will be stirred by the crank and mixed with a large amount of air.
3. Air and oil can not be separated easily in the deteriorated oil, and the amount of air mixed in the oil increases.

If such mixed-in air enters the high pressure chamber in the lash adjuster, the air in the high-pressure chamber will be compressed while the valve is opened, the lash adjuster will be excessively compressed and abnormal noise will be produced when the valve is closed.
This is the same phenomenon which occurs when the valve clearance is improperly adjusted to be excessively large.
However, it will return to be normal if the air entrapped in the adjuster is released in this case.



(2) Start the engine, and slowly race* it several times (10 times or less).
If the abnormal noise is eliminated by racing the engine, it means that the air is released from the high-pressure chamber of the lash adjuster and the function of the lash adjuster is returned to normal.
* Gradually increase the engine speed from the idle speed to 3,000 r/min. (for 30 seconds), and then gradually slow down the engine to the idling speed (for 30 seconds).

NOTE
1. If the vehicle is parked on a slope for a long time, the oil will be sometimes reduced in the lash adjuster, and air will enter the high-pressure chamber when the engine is started.
2. After the vehicle is parked for a long time, the oil will go out of the oil passage. Since it takes a little time to supply oil to the lash adjuster, air sometimes enters the high-pressure chamber.

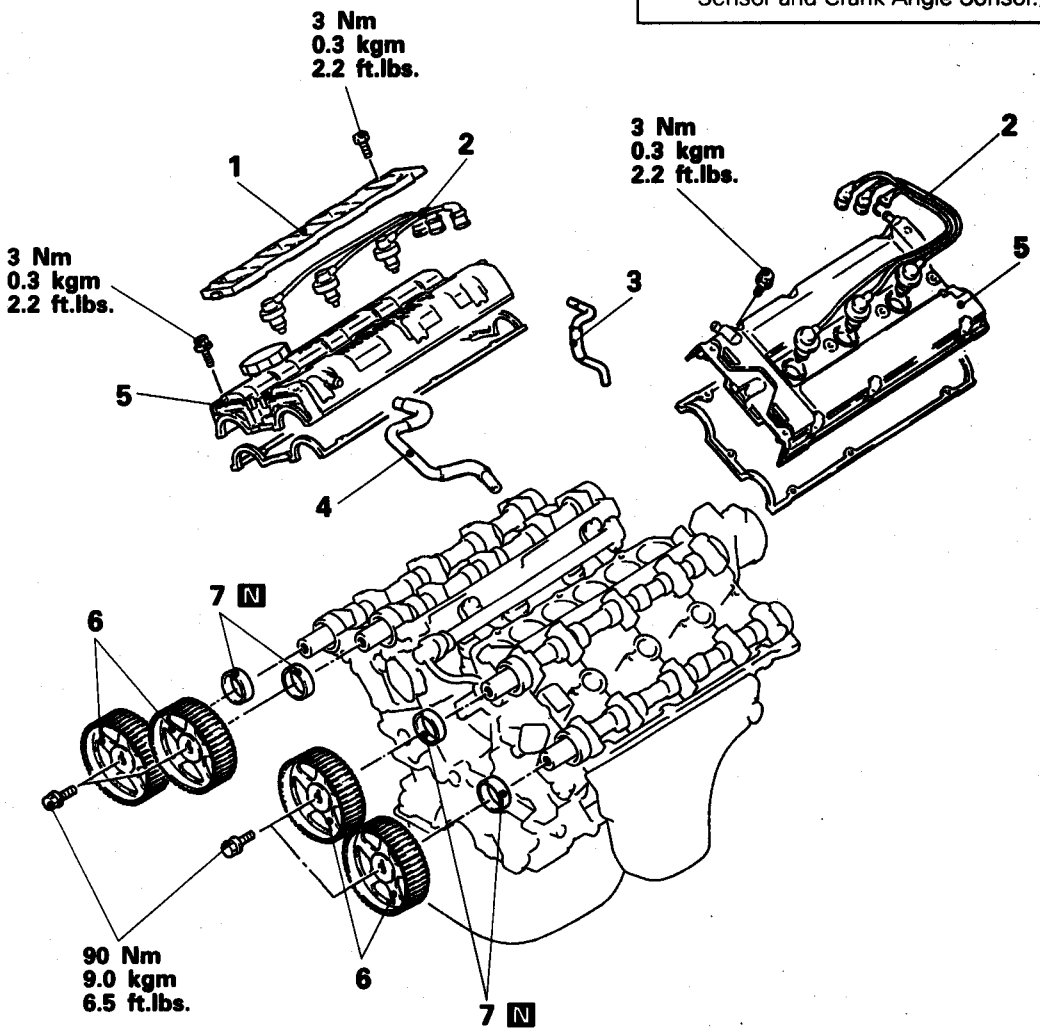
CAMSHAFT OIL SEALS

E11VA--

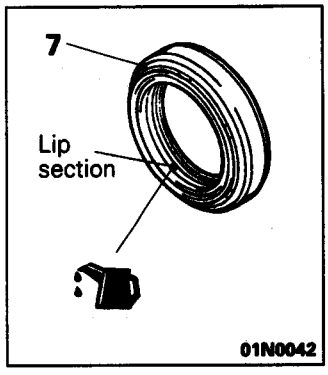
REMOVAL AND INSTALLATION

Pre-removal Operation
- Removal of Air Intake Plenum
- Removal of Timing Belt (Refer to P.11-23.)
- Removal of Cam Position Sensor (Refer to GROUP 16 – Cam Position Sensor and Crank Angle Sensor.)

Post-installation Operation
- Installation of Timing Belt (Refer to P.11-23.)
- Installation of Air Intake Plenum
- Accelerator Cable Adjustment (Refer to GROUP 13 – Service Adjustment Procedures.)
- Installation of Cam Position Sensor (Refer to GROUP 16 – Cam Position Sensor and Crank Angle Sensor.)



Removal steps
1. Centre cover
2. Spark plug cable
3. PCV hose
4. Blow-by hose
5. Rocker cover
6. Camshaft sprocket
7. Camshaft oil seal



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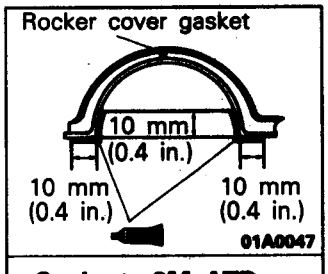
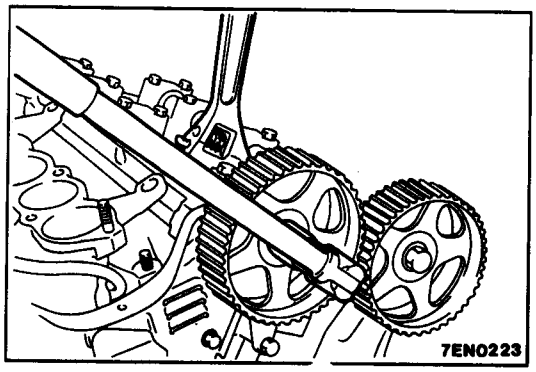


Sealant: 3M ATD Part No. 8660 or equivalent

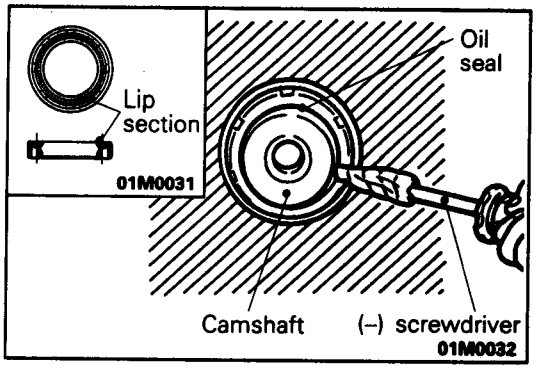


SERVICE POINTS OF REMOVAL E11VBAB

6. REMOVAL OF CAMSHAFT SPROCKET

Hold the hexagonal section of the camshaft with a wrench, etc., and loosen the camshaft sprocket bolt.

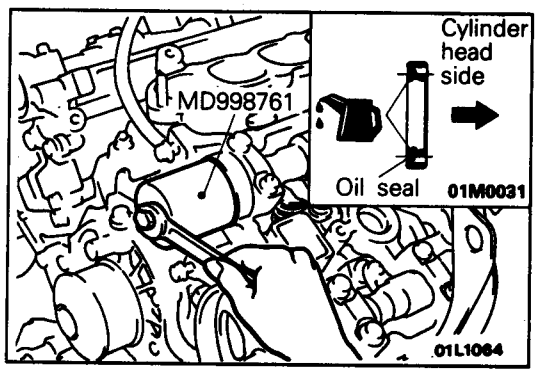
Caution
As the sprocket could become damaged, do not apply the wrench to the camshaft sprocket.



7. REMOVAL OF CAMSHAFT OIL SEAL

(1) Make a notch in the oil seal lip section with a knife, etc.
(2) Cover the end of a (–) screwdriver with a rag and insert into the notched section of the oil seal, and lever out the oil seal to remove it.

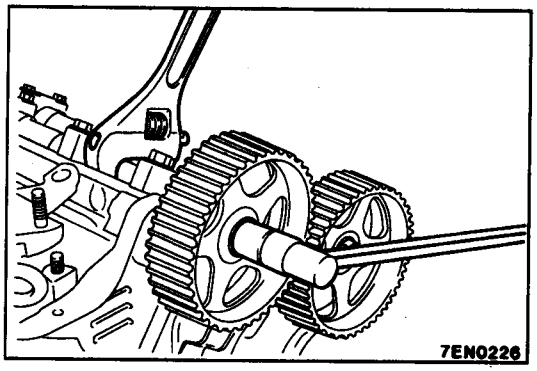
Caution
Be careful not to damage the camshaft and the cylinder head.



SERVICE POINTS OF INSTALLATION E11VCAB

7. INSTALLATION OF CAMSHAFT OIL SEAL

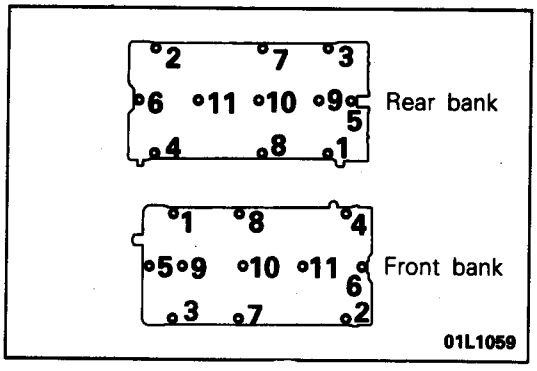
(1) Apply a small amount of engine oil to the oil seal lip and then insert.
(2) Press fitting the oil seal into the cylinder head.



6. INSTALLATION OF CAMSHAFT SPROCKET

Hold the hexagonal section of the camshaft with a wrench, etc., and tighten the camshaft sprocket bolt.

Caution
Do not apply the wrench to the camshaft sprocket, as the sprocket could become damaged.



5. INSTALLATION OF ROCKER COVER

Tighten the rocker cover bolts in the order shown in the illustration.

NOTE
(1) Only No. 5 bolt in the rear bank differs from other bolts in length:
Rear Bank No. 5 Bolt ..... 20 mm (0.79 in.)
All other Bolts ..... 10 mm (0.39 in.)
(2) Bolts are colour coded for the front and rear banks as follows:
Front bank ..... Black
Rear bank ..... Green
(3) When the rocker cover gasket has been replaced, tighten bolts in this order and then, retighten bolts 1 to 6 to 4 Nm (0.4 kgm, 2.9 ft.lbs.).

PWUE9119

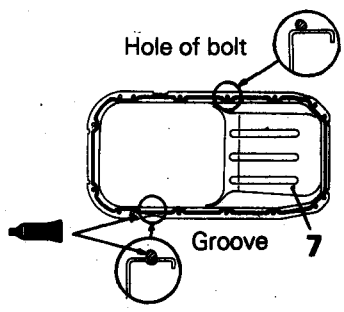
OIL PAN

E11KA--

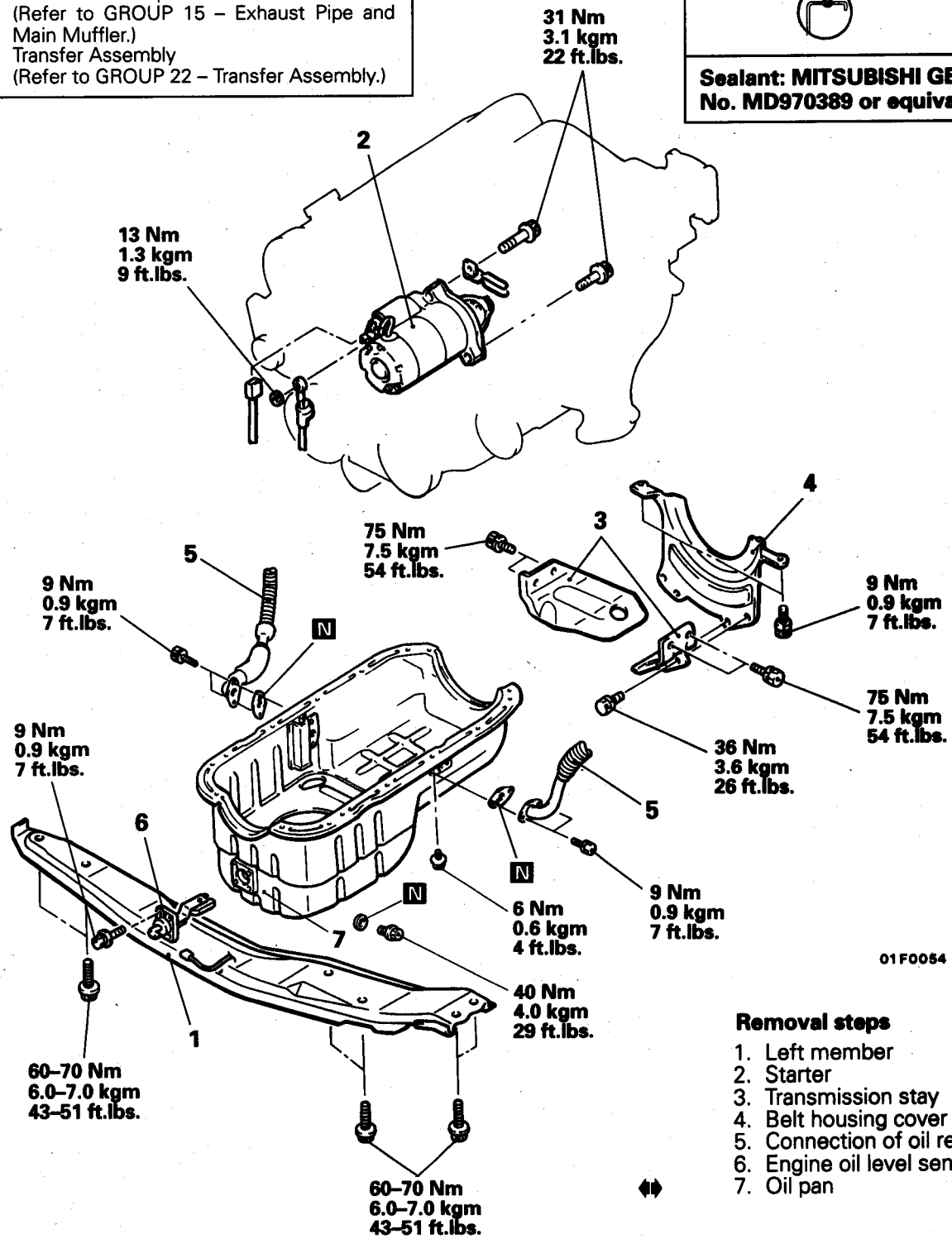
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
Draining and Refilling
- Engine Oil
  (Refer to GROUP 12 – Service Adjustment Procedures.)

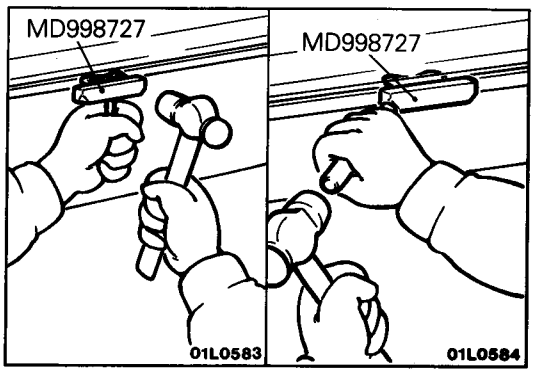
Removal and Installation
- Front Under Cover Panel
  (Refer to GROUP 51 – Bumper.)
- Under Cover
- Front Exhaust Pipe
  (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Transfer Assembly
  (Refer to GROUP 22 – Transfer Assembly.)



Sealant: MITSUBISHI GENUINE Part No. MD970389 or equivalent



Removal steps
1. Left member
2. Starter
3. Transmission stay
4. Belt housing cover
5. Connection of oil return pipes
6. Engine oil level sensor
7. Oil pan



SERVICE POINT OF REMOVAL

E11KBBQ

7. REMOVAL OF OIL PAN

After removing the bolt, remove the oil pan from the cylinder block with the special tool or a brass bar.

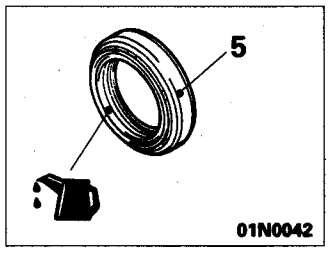
Caution
Perform this carefully to avoid deformation of the oil pan flange.

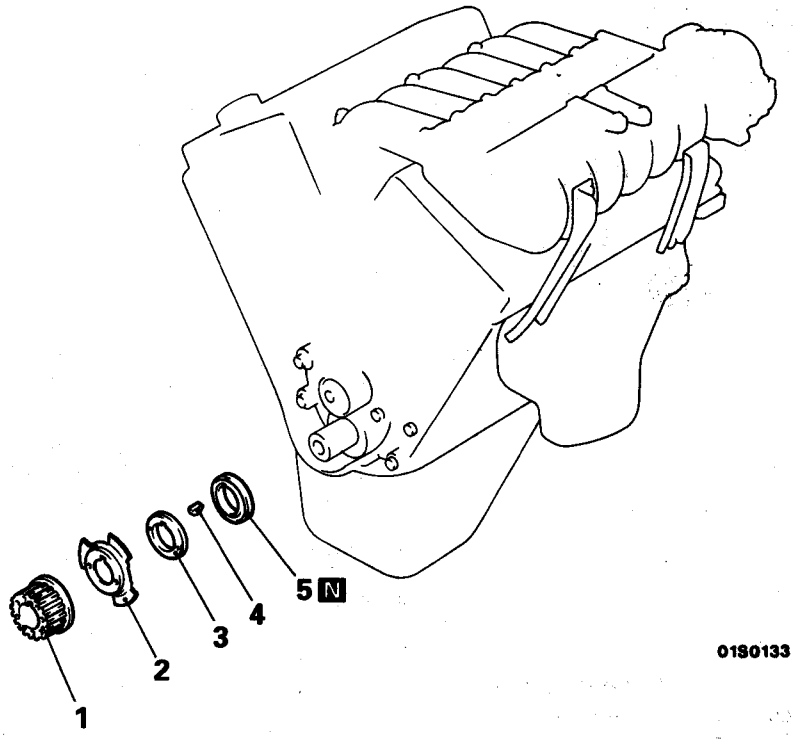
CRANKSHAFT FRONT OIL SEAL

E11UA-A

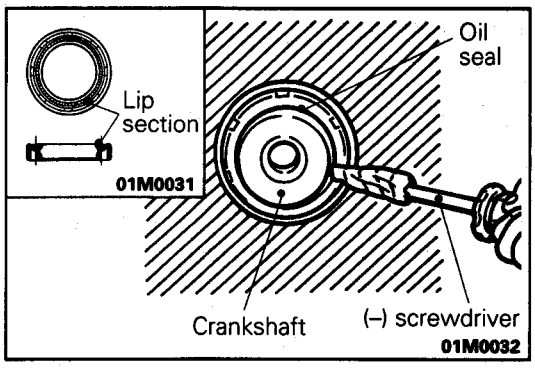
REMOVAL AND INSTALLATION

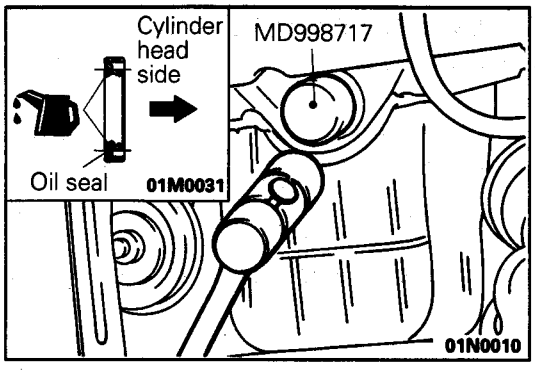
Pre-removal and Post-installation Operation
- Removal and Installation of Timing Belt (Refer to P.11-23.)
- Removal and Installation of Crank Angle Sensor (Refer to GROUP 16 – Cam Position Sensor and Crank Angle Sensor.)





Removal steps
1. Crankshaft sprocket
2. Crankshaft sensing blade
3. Crankshaft spacer
4. Key
5. Crankshaft front oil seal





SERVICE POINTS OF REMOVAL

E11UBAA

5. REMOVAL OF CRANKSHAFT FRONT OIL SEAL

(1) Make a notch in the oil seal lip section with a knife, etc.
(2) Cover the end of a (–) screwdriver with a rag and insert into the notched section of the oil seal, and lever out the oil seal to remove it.

Caution
Be careful not to damage the crankshaft and the oil pump case.

SERVICE POINTS OF INSTALLATION

E11UCAD

5. INSTALLATION OF CRANKSHAFT FRONT OIL SEAL

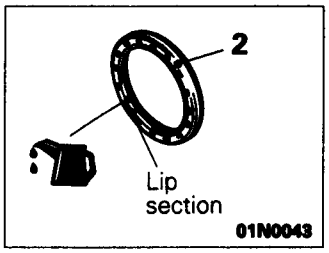
(1) Apply a small amount of engine oil to the oil seal lip and then insert.
(2) Tap the oil seal into the cylinder block.

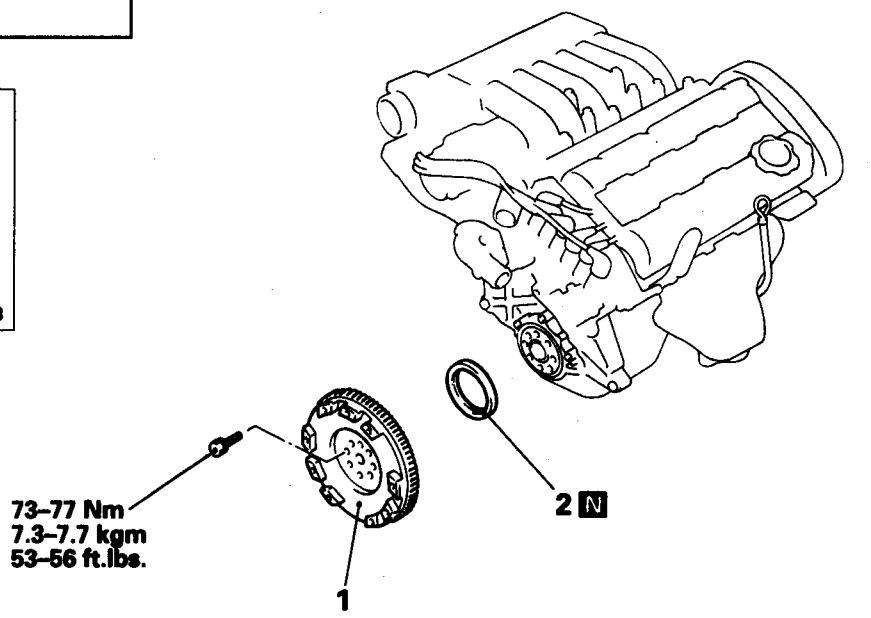
CRANKSHAFT REAR OIL SEAL

E11UA-B

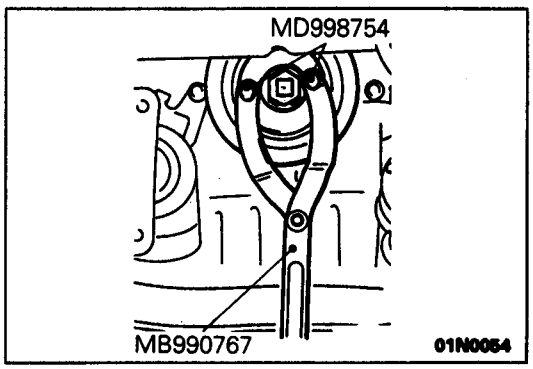
REMOVAL AND INSTALLATION

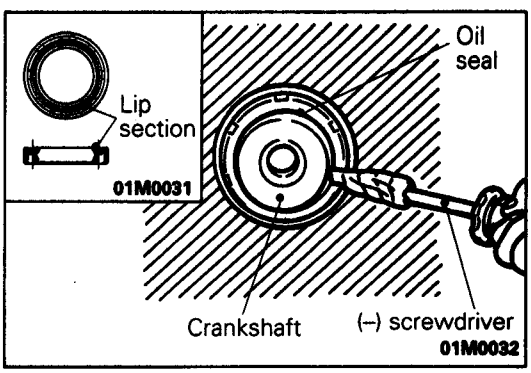
Pre-removal and Post-installation Operation
- Removal and Installation of Transmission Assembly (Refer to GROUP 22 – Transmission Assembly)
- Removal and Installation of Clutch Cover and Clutch Disc





Removal steps
1. Flywheel
2. Crankshaft rear oil seal





SERVICE POINTS OF REMOVAL

E11UBAH

1. REMOVAL OF FLYWHEEL

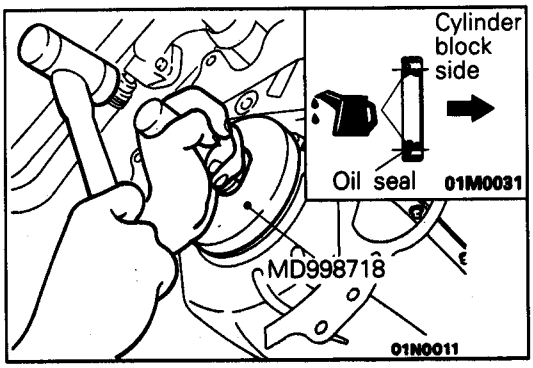
Stop the crankshaft pulley from turning, and remove the flywheel.

Caution
Use only the specified special tools, otherwise the crankshaft pulley damper could be damaged.

2. REMOVAL OF CRANKSHAFT REAR OIL SEAL

(1) Make a notch in the lip section of the oil seal with a knife, etc.
(2) Cover the end of (–) screwdriver with a rag, and insert into the notched section of the oil seal, and lever out the oil seal to remove it.

Caution
Be careful not to damage the crankshaft and the oil seal case.



SERVICE POINTS OF INSTALLATION E11UCAN

2. INSTALLATION OF CRANKSHAFT REAR OIL SEAL

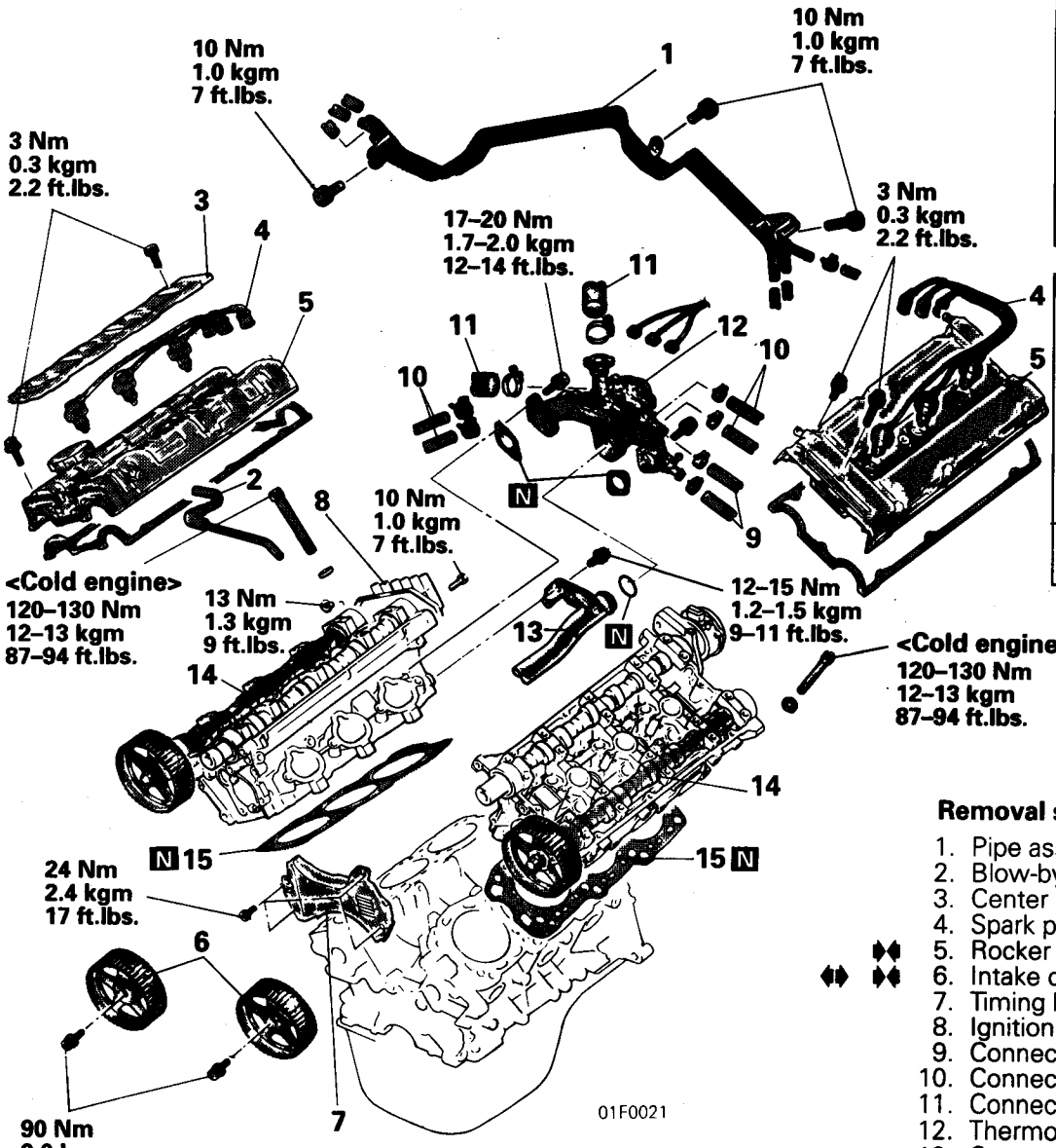
(1) Apply a small amount of engine oil to the oil seal lip and then insert.
(2) Tap the oil seal into the cylinder block.

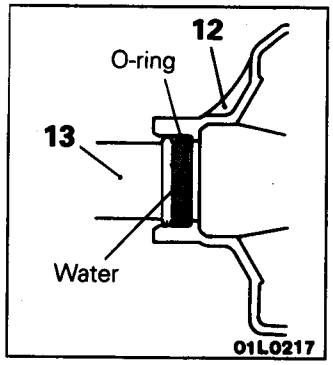
CYLINDER HEAD GASKET

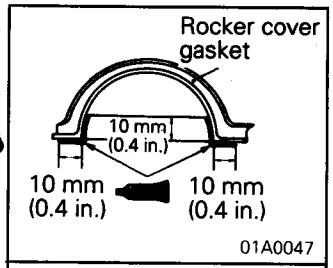
REMOVAL AND INSTALLATION

Pre-removal Operation
- Removal of Turbocharger (Refer to GROUP 15 – Turbocharger.)
- Removal of Exhaust Manifold (Refer to GROUP 15 – Exhaust Manifold.)
- Draining of Engine Coolant (Refer to GROUP 14 – Service Adjustment Procedures.)
- Removal of Intake Manifold
- Removal of Timing Belt (Refer to P.11-23.)

Post-installation Operation
- Installation of Timing Belt (Refer to P.11-23.)
- Installation of Intake Manifold
- Installation of Exhaust Manifold (Refer to GROUP 15 – Exhaust Manifold.)
- Installation of Turbocharger (Refer to GROUP 15 – Turbocharger.)
- Supplying of Engine Coolant (Refer to GROUP 14 – Service Adjustment Procedures.)
- Accelerator Cable Adjustment (Refer to GROUP 13 – Service Adjustment Procedures.)
- Engine Adjustment (Refer to P.11-6.)

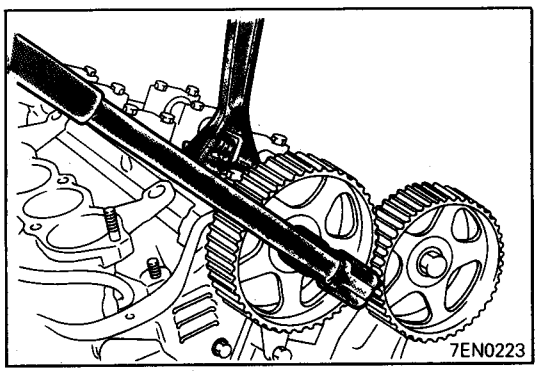






Sealant: 3M ATD Part No. 8660 or equivalent

Removal steps
1. Pipe assembly
2. Blow-by hose
3. Center cover (Front bank)
4. Spark plug cable
5. Rocker cover
6. Intake camshaft sprocket
7. Timing belt rear cover (Center)
8. Ignition coil
9. Connection of heater hose
10. Connection of water hoses
11. Connection of radiator hose
12. Thermostat housing
13. Connection of water inlet pipe (Front bank)
14. Cylinder head assembly
15. Cylinder head gasket



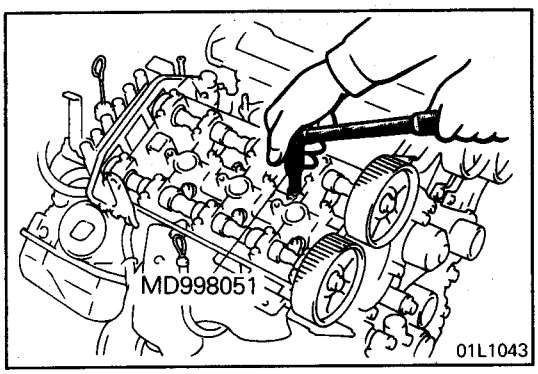
SERVICE POINTS OF REMOVAL E11JBCJ

6. REMOVAL OF INTAKE CAMSHAFT SPROCKET

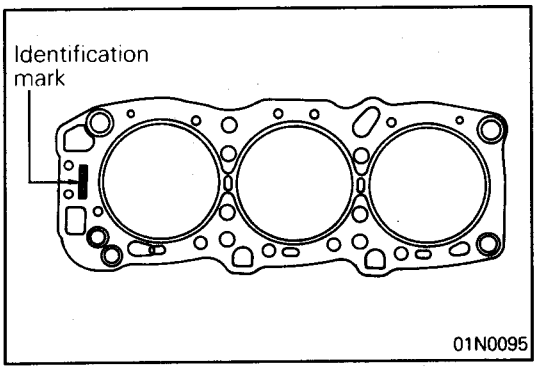
(1) Using a wrench, hold the camshaft at its hexagon and remove the camshaft sprocket bolt.

Caution
Locking the camshaft sprocket with a tool damages the sprocket.

(2) Remove the camshaft sprockets.



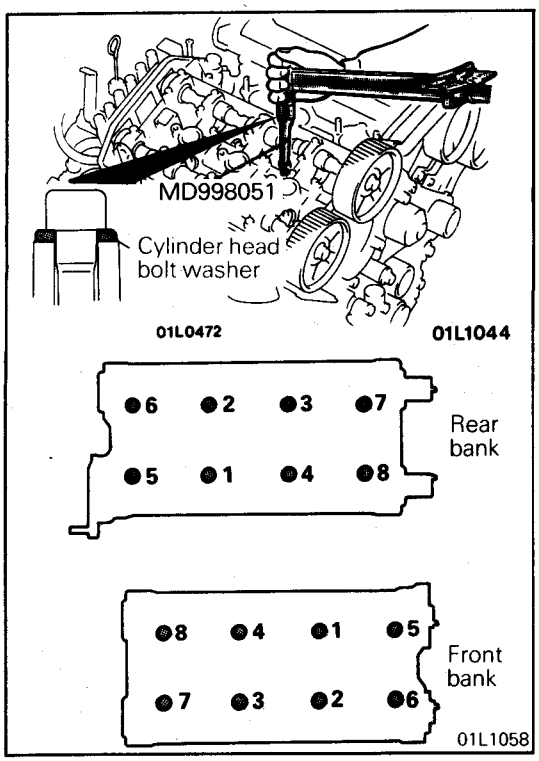
14. REMOVAL CYLINDER HEAD ASSEMBLY



SERVICE POINTS OF INSTALLATION E11JDCZ

15. INSTALLATION OF CYLINDER HEAD GASKET

(1) Make sure that the gasket has the proper identification mark for the engine.
(2) Lay the cylinder head gasket on the cylinder block with the identification mark at the front top.



14. INSTALLATION OF CYLINDER HEAD ASSEMBLY

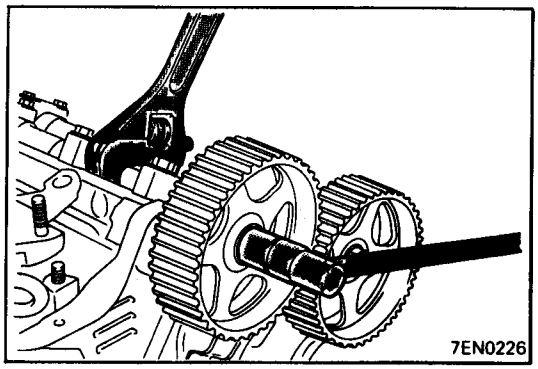
(1) Use a scraper to clean the gasket surface of the cylinder head assembly.

Caution
Take care that no foreign material gets into the cylinder, coolant passages or oil passages.

(2) Using the special tool and a torque wrench, tighten the bolts to the specified torque in the order shown in the illustration. (in two or three cycles)

Caution
Install the head bolt washers with shear droop upward as shown in the illustration.

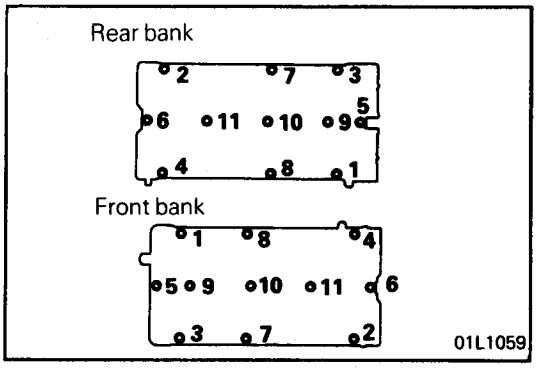
(3) Back off the bolts once and tighten them to the specified torque as shown in step (2).



6. INSTALLATION OF INTAKE CAMSHAFT SPROCKET

Using a wrench, hold the camshaft at its hexagon and tighten the bolt to specification.

Caution
Locking the camshaft sprocket with a tool damages the sprocket.



5. INSTALLATION OF ROCKER COVER

Tighten the rocker cover bolts in the order shown in the illustration.

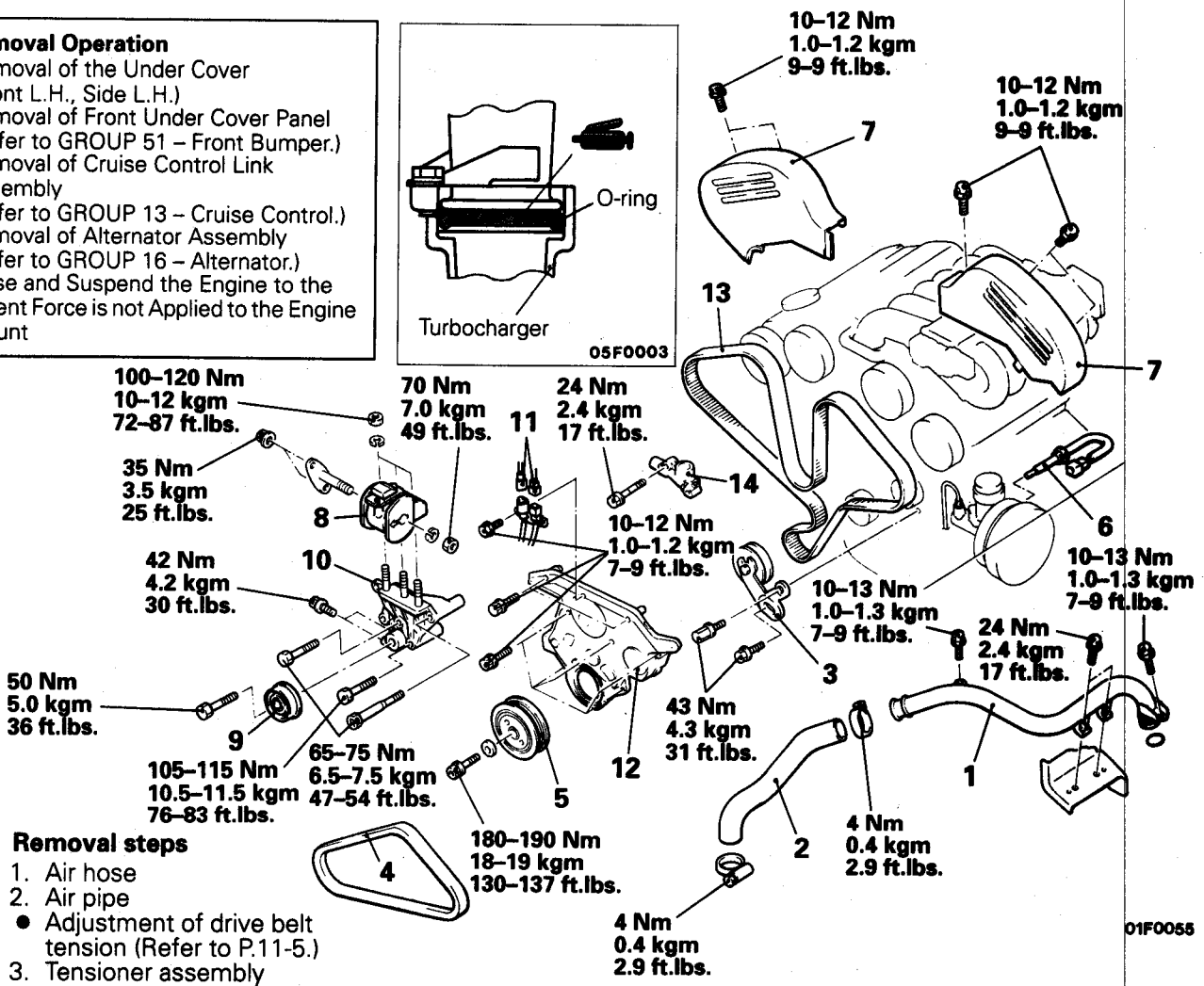
NOTE
When the rocker cover gasket has been replaced, tighten bolts in this order, and then re-tighten bolts 1 to 6 to 4 Nm (0.4 kgm, 2.9 ft.lbs.).

TIMING BELT

E11GA–

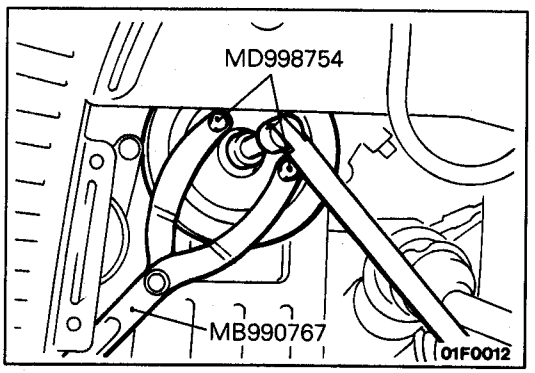
REMOVAL AND INSTALLATION

Pre-removal Operation
- Removal of the Under Cover (Front L.H., Side L.H.)
- Removal of Front Under Cover Panel (Refer to GROUP 51 – Front Bumper.)
- Removal of Cruise Control Link Assembly (Refer to GROUP 13 – Cruise Control.)
- Removal of Alternator Assembly (Refer to GROUP 16 – Alternator.)
- Raise and Suspend the Engine to the Extent Force is not Applied to the Engine Mount



Removal steps
1. Air hose
2. Air pipe
   - Adjustment of drive belt tension (Refer to P.11-5.)
3. Tensioner assembly
4. Drive belt (power steering)
5. Crankshaft pulley
6. Brake fluid level sensor
7. Timing belt upper cover
8. Engine mount bracket
9. Idler pulley (alternator/air conditioner)
10. Engine support bracket
11. Cam position sensor and crank angle sensor connector
12. Timing belt lower cover
    - Adjustment of timing belt tension
13. Timing belt
14. Auto tensioner

Post-installation Operation
- Installation of Alternator Assembly (Refer to GROUP 16 – Alternator.)
- Installation of the Under Cover (Front L.H., Side L.H.)
- Installation of Front Under Cover Panel (Refer to GROUP 51 – Front Bumper.)
- Installation of Cruise Control Link Assembly (Refer to GROUP 13 – Cruise Control.)
- Adjustment of the Engine (Refer to P.11-6.)

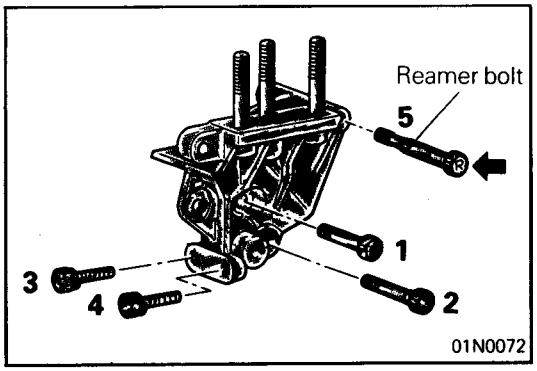


SERVICE POINTS OF REMOVAL

E11GBFF

5. REMOVAL OF CRANKSHAFT PULLEY

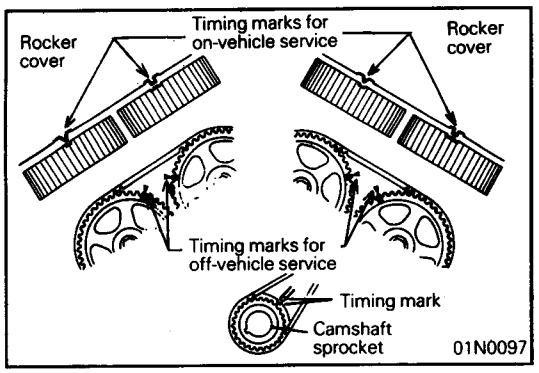
Caution
Use only the specified special tools, or a damaged pulley damper could result.



10. REMOVAL OF ENGINE SUPPORT BRACKET

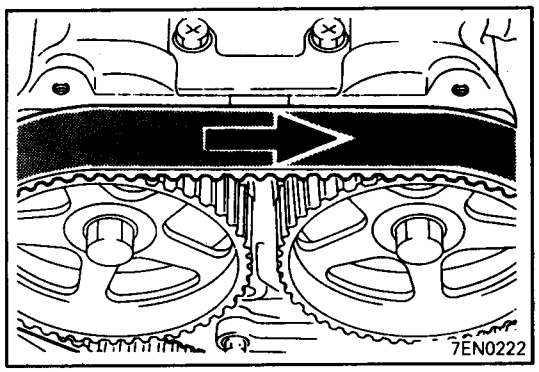
Remove the engine support bracket in the numbered sequence shown in the illustration.
Spraying lubricant, slowly remove the bolt (reamer bolt) indicated by the arrow.

Caution
Keep in mind that the reamer bolt is sometimes heat seized on the engine support bracket.



12. REMOVAL OF TIMING BELT

(1) Align the timing marks.

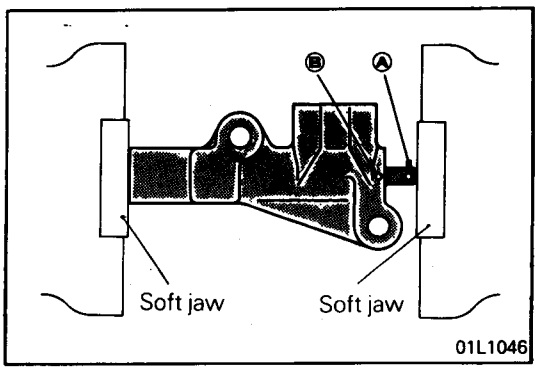


(2) Make a mark on the back of the timing belt indicating the direction of rotation so it may be reassembled in the same direction if it is to be reused.
(3) Loosen the center bolt on the tensioner pulley to remove the timing belt.

Caution
Water or oil on the belt shorten its life drastically, so the removed timing belt, sprocket, and tensioner must be free from oil and water. These parts should not be washed. Replace parts if seriously contaminated.
If there is oil or water on each part check the front case oil seals, camshaft oil seal and water pump for leaks.

SERVICE POINTS OF INSTALLATION E11GDFF

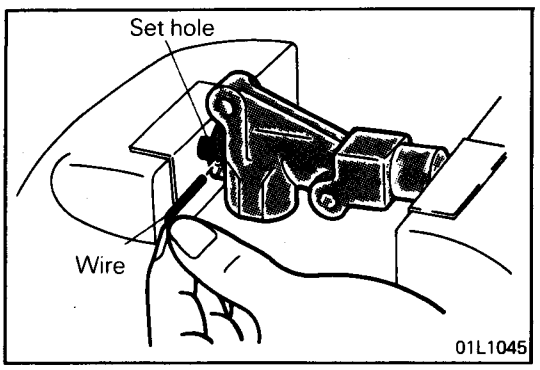
13. INSTALLATION OF AUTO TENSIONER



(1) If the auto tensioner rod is in its fully extended position, reset it as follows.
  ① Keep the auto tensioner level and, in that position, clamp it in the vise with soft jaws.
  ② Push in the rod little by little with the vise until the set hole Ⓐ in the rod is aligned with that Ⓑ in the cylinder.

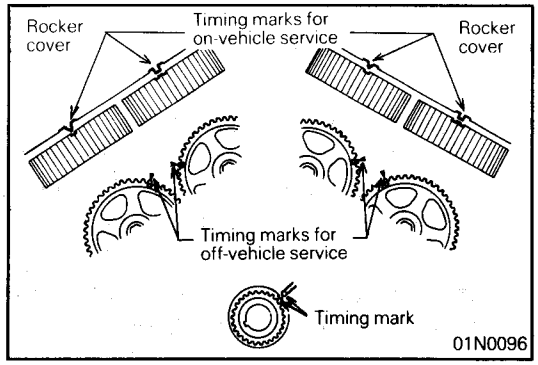
  Caution
  Push in the rod slowly to prevent the push rod from being damaged.

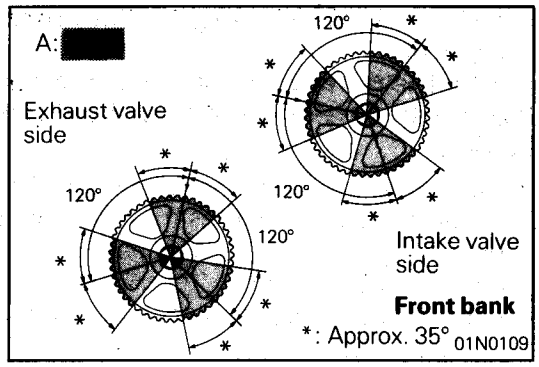
  ③ Insert a wire [1.4 mm (0.055 in.) in diameter] into the set holes.
  ④ Unclamp the auto tensioner from the vise.

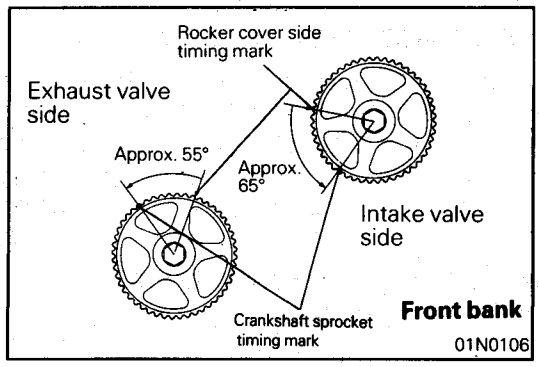


(2) Install the auto tensioner.

Caution
Leave the wire installed in the auto tensioner.







12. INSTALLATION OF TIMING BELT

(1) Align the timing marks on the respective sprockets. In case of the camshaft sprockets in the front bank, proceed as follows:

① Install the crankshaft pulley. Shift the timing mark on the crankshaft sprocket by three teeth to lower the piston in No. 1 cylinder slightly from the top dead center on compression stroke.

Caution
Turning the camshaft sprocket with the piston in No. 1 cylinder located at TDC on compression stroke may cause the valves to interfere with the piston.

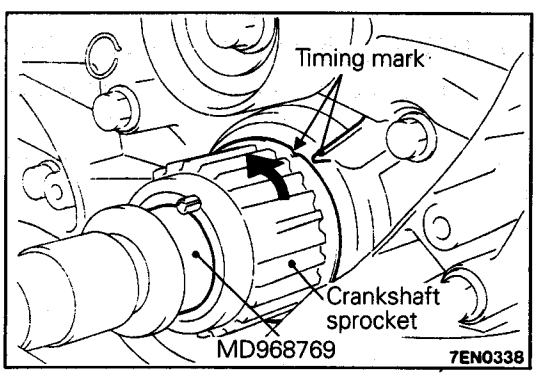
② Make sure that the timing marks on the camshaft sprockets for intake and exhaust valves are not within the range A in the illustration at left.
If the timing mark is within range A, turn the camshaft sprocket to move the timing mark to the area closest to the range A.

Caution
In range A, the cam lobe on the camshaft lifts the valve through the rocker arm and the camshaft sprocket is apt to rotate by reaction force of the valve spring. Therefore, be careful not to have the finger pinched between the sprockets.

③ Turn the camshaft sprocket for either the intake or exhaust valve to locate the timing mark as shown in the illustration at left. Then turn the other crankshaft to locate the timing mark as shown in the illustration at left.

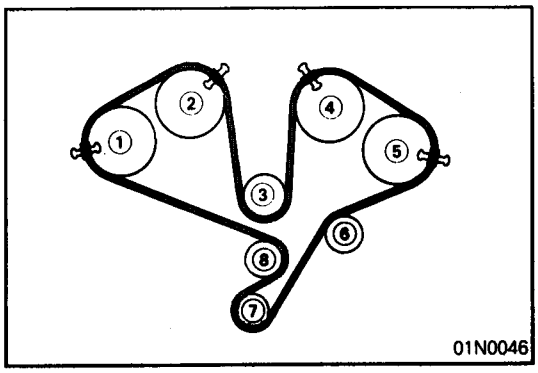
Caution
If the intake and exhaust valves of the same cylinder lift simultaneously, interference with each other may result. Therefore, turn the intake valve camshaft sprocket and the exhaust valve camshaft alternately.

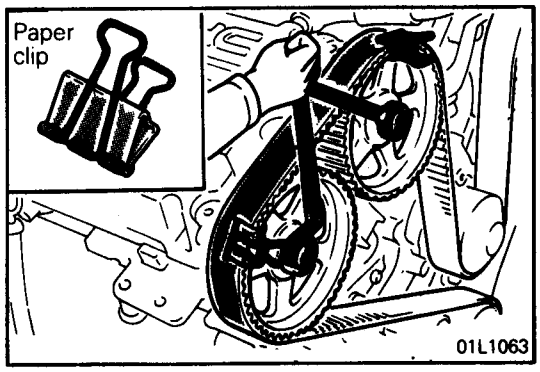
④ Turn the camshaft sprocket clockwise to align the timing marks.
If the camshaft sprocket has been turned excessively, turn it counterclockwise to align the timing marks.

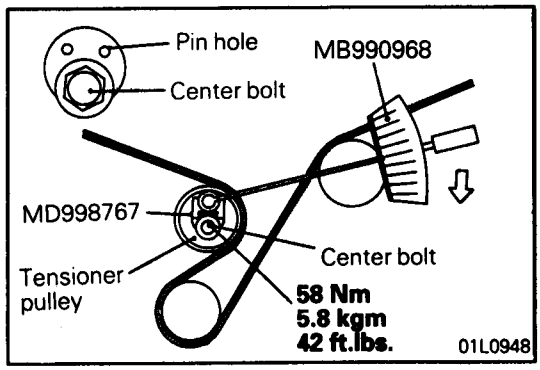


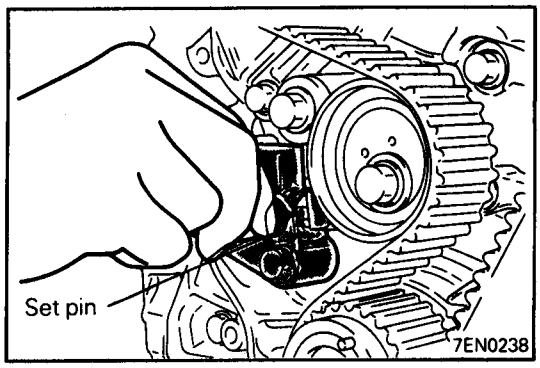
⑤ Align the timing mark of the crankshaft sprocket.

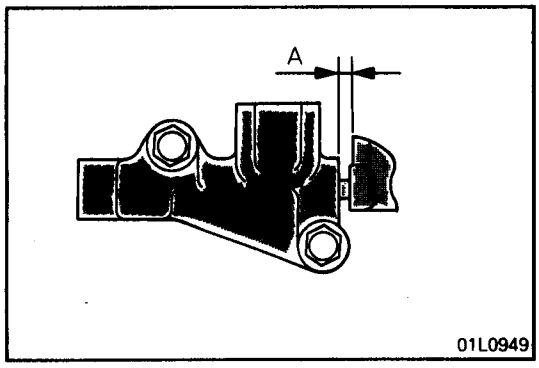
NOTE
Shift the timing mark of the crankshaft sprocket one teeth in counterclockwise direction to facilitate belt installation.











(2) Using paper clips, install the timing belt in the following order with care not to allow the belt to slack.

① Exhaust camshaft sprocket (front bank side) → ② Intake camshaft sprocket (front bank side) → ③ Water pump pulley → ④ Intake camshaft sprocket (rear bank side) → ⑤ Exhaust camshaft sprocket → ⑥ Idler pulley → ⑦ Crankshaft sprocket → ⑧ Tensioner pulley

NOTE
Since the camshaft sprockets turn easily, secure them with box wrenches to install the timing belt.

Caution
1. **Be careful, the camshaft is turned by the reaction of valve spring.**
2. **If the timing belt is reused, install it so that the arrow marks made at removal are in the direction of rotation.**

(3) Turn the tensioner pulley so that its pin holes are located above the center bolt. Then, press the tensioner pulley against the timing belt and, at the same time, temporarily tighten the center bolt.
(4) Check that the timing marks on all sprockets are aligned properly.
(5) Remove the four clips.

- **ADJUSTMENT OF TIMING BELT TENSION**

(1) Rotate the crankshaft 1/4 turn counterclockwise, then rotate it clockwise until the timing marks are aligned.
(2) Loosen the center bolt on the tensioner pulley. Using the special tool and torque wrench, apply tensioning torque to the timing belt and, at the same time, tighten the center bolt to specification.

Specified torque: 10 Nm (1.0 kgm, 7 ft.lbs.)
[Timing belt tensioning torque]

Caution
When tightening the center bolt, make sure that the tensioner pulley is not rotated together.

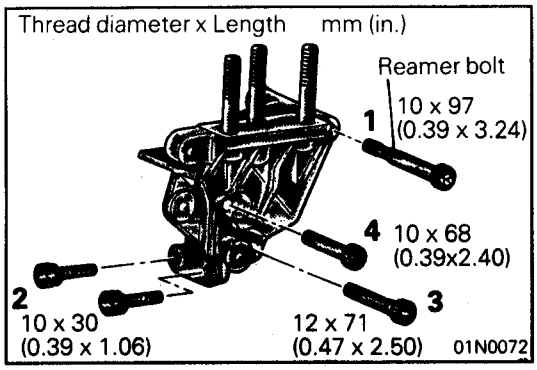
(3) Remove the set pin from the auto tensioner. At this time, make sure that the set pin can be easily removed.
(4) Rotate the crankshaft two turns clockwise and leave it as is for five minutes or more. Then, check again that the set pin can be easily removed from, and installed to, the auto tensioner.

NOTE
Even if the set pin cannot be easily inserted, the auto tensioner is normal if its rod protrusion is within specification.

Standard value (A): 3.8 – 4.5 mm (0.149 – 0.177 in.)

If the protrusion is out of specification, repeat steps (1) to (4).

(5) Check again that timing marks on all sprockets are aligned properly.



10. INSTALLATION OF ENGINE SUPPORT BRACKET

Since the mounting bolts of engine support bracket are different in size depending on location, insert them in numbered sequence.

Caution
When installing the reamer bolt, tighten it, slowly spraying lubricant on the reamer area.

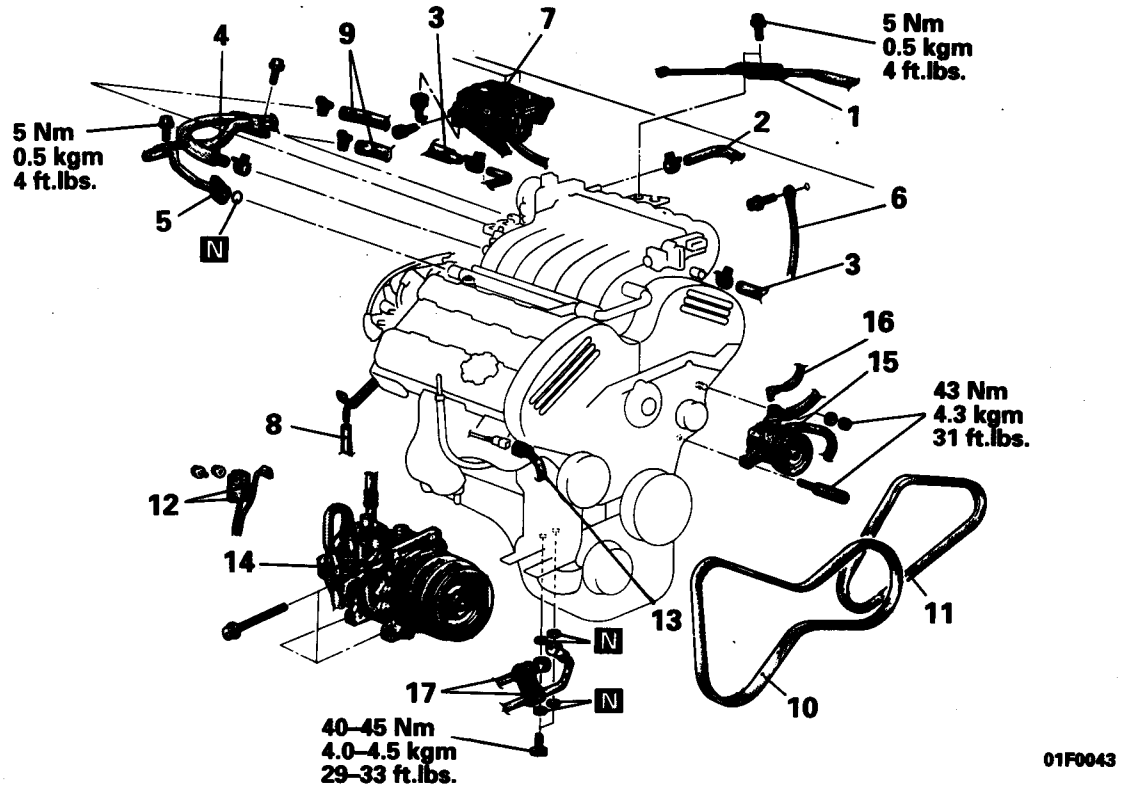
ENGINE ASSEMBLY

E11TA--

REMOVAL AND INSTALLATION

Pre-removal Operation
- Release of Residual Pressure from High Pressure Fuel Hose
  (Refer to GROUP 13 – Service Adjustment Procedures.)
- Removal of Cruise Control Pump and Link Assembly
  (Refer to GROUP 13 – Cruise Control.)
- Removal of Hood
  (Refer to GROUP 42A – Hood.)
- Removal of Air Hose and Air Pipe
  (Refer to GROUP 15 – Intercooler.)
- Removal of Front Exhaust Pipe
  (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Removal of Transmission Assembly
  (Refer to GROUP 22 – Transmission Assembly.)
- Removal of Radiator
  (Refer to GROUP 14 – Radiator.)

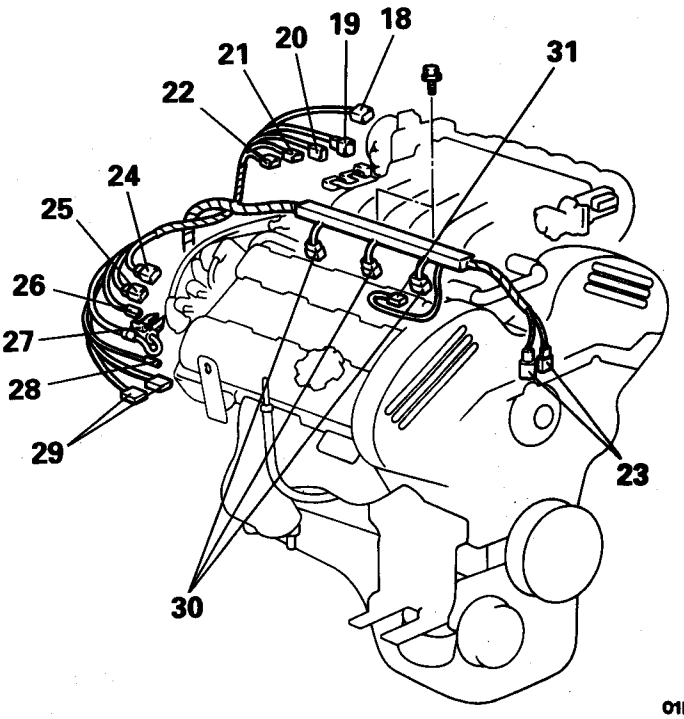
Post-installation Operation
- Installation of Radiator
  (Refer to GROUP 14 – Radiator.)
- Installation of Cruise Control Pump and Link Assembly
  (Refer to GROUP 13 – Cruise Control.)
- Installation of Transmission Assembly
  (Refer to GROUP 22 – Transmission Assembly.)
- Installation of Front Exhaust Pipe
  (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Installation of Air Hose and Air Pipe
  (Refer to GROUP 14 – Intercooler.)
- Installation of Hood
  (Refer to GROUP 42A – Hood.)
- Adjustment of the Accelerator Cable
  (Refer to GROUP 13 – Engine Control.)



Removal steps
1. Connection for accelerator cable
2. Connection for brake booster vacuum hose
3. Connection for booster vacuum hose
4. Connection for fuel return hose
5. Connection for high pressure fuel hose ◆◆
6. Connection for earth cable ◆◆
7. Solenoid valve assembly
8. Connection of vapour hose
9. Connection of heater hose
- Adjustment of drive belt tension
  (Refer to P.11-5.)

10. Drive belt (Alternator and air conditioner)
11. Drive belt (Power steering)
12. Connection for alternator harness
13. Oxygen sensor connector
14. Air conditioner compressor
15. Power steering oil pump
16. Oil pressure switch connector (Power steering)
17. Connection of oil cooler pipes

18. ISC servo connector
19. TPS connector
20. Oil pressure switch and oil pressure gauge unit connector
21. Fuel injector harness connector
22. Detonation sensor connector
23. Crankshaft angle sensor and cam position sensor connector
24. Engine coolant temperature switch connector (Air conditioner)
25. Engine coolant temperature sensor connector
26. Engine coolant temperature gauge unit connector
27. Condenser connector
28. Ignition coil connector
29. Power transistor connector
30. Fuel injector connector
31. Oxygen sensor connector



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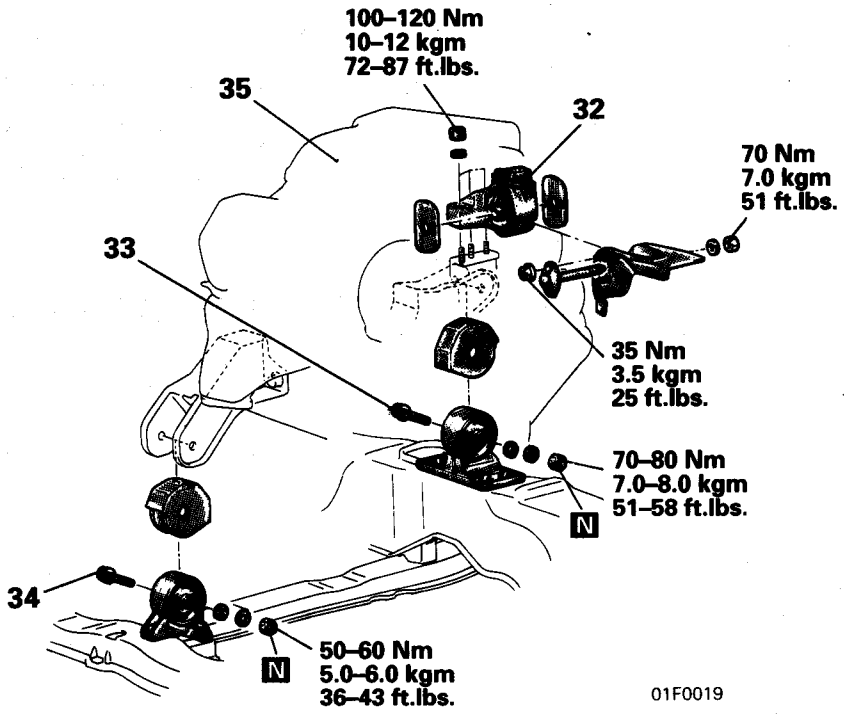

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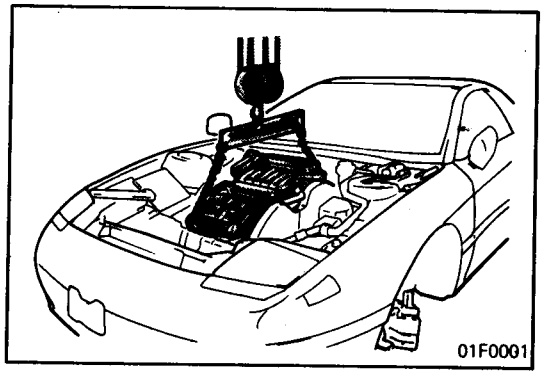
◆◆ ◆◆ 32. Engine mounting bracket
33. Rear roll stopper bracket and engine connection bolt
34. Front roll stopper bracket and engine connection bolt
◆◆ ◆◆ 35. Engine assembly

SERVICE POINTS OF REMOVAL E11TBAR

14. DISCONNECTION OF AIR CONDITIONER COMPRESSOR / 15. POWER STEERING OIL PUMP

Disconnect air conditioner compressor and power steering oil pump (with the hose).

NOTE
The removed air conditioner compressor and power steering oil pump should be fastened (by using rope, etc.) in a position that will not interfere with the removal/installation of the engine assembly.



32. REMOVAL OF ENGINE MOUNT BRACKET

Before removing the engine mount bracket installation bolt, use a chain block or similar arrangement to suspend the engine assembly (to the extent that there is no looseness of the chain).

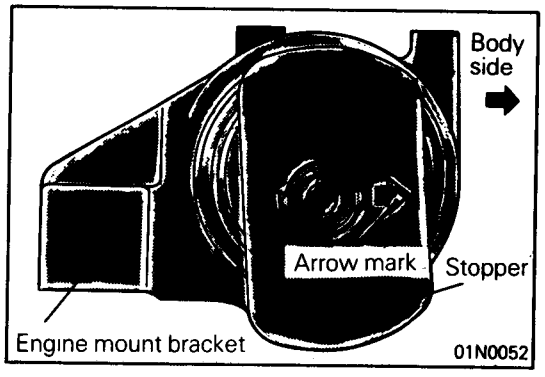
35. REMOVAL OF ENGINE ASSEMBLY

After checking that the cables, hoses, harness connectors, etc. are all removed, slowly raise the chain block to lift the engine assembly upward out of the engine compartment.

SERVICE POINTS OF INSTALLATION E11TDAT

35. INSTALLATION OF ENGINE ASSEMBLY

When mounting the engine, check to be sure that the cables, hoses, harness connectors, etc. are all in the correct position.



32. INSTALLATION OF ENGINE MOUNT BRACKET

Attach the engine mounting bracket so that the arrow mark on the mounting stopper is in the direction as shown in the illustration.

LUBRICATION

CONTENTS

E12AA-

GENERAL INFORMATION

E12BAAH

ENGINE OILS

Health Warning

Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer. Adequate means of skin protection and washing facilities must be provided.

Recommended Precautions

The most effective precaution is to adapt working practices which prevent, as far as practicable, the risk of skin contact with mineral oils, for example by using enclosed systems for handling used engine oil and by degreasing components, where practicable, before handling them.

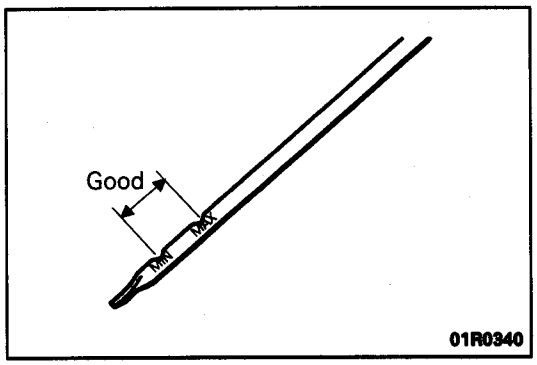
Other precautions:

- Avoid prolonged and repeated contact with oils, particularly used engine oils.
- Wear protective clothing, including impervious gloves where practicable.
- Avoid contaminating clothes, particularly underpants, with oil.
- Do not put oily rags in pockets, the use of overalls without pockets will avoid this.
- Do not wear heavily soiled clothing and oil-impregnated foot-wear. Overalls must be cleaned regularly and kept separate from personal clothing.
- Where there is a risk of eye contact, eye protection should be worn, for example, chemical goggles or face shields; in addition an eye wash facility should be provided.
- Obtain First Aid treatment immediately for open cuts and wounds.
- Wash regularly with soap and water to ensure all oil is removed, especially before meals (skin cleansers and nail brushes will help). After cleaning, the application of preparations containing lanolin to replace the natural skin oils is advised.
- Do not use petrol, kerosine, diesel fuel, gas oil, thinners or solvents for cleaning skin.
- Use barrier creams, applying them before each work period, to help the removal of oil from the skin after work.
- If skin disorders develop, obtain medical advice without delay.

SPECIFICATIONS

LUBRICANTS

Items	Specification
Engine oil	
Quantity dm^3 (U.S.qts, Imp.qts.)	
Oil pan	4.0 (4.2, 3.5)
Oil filter	0.3 (0.32, 0.26)
Oil cooler	0.2 (0.21, 0.18)
Brand (API classification)	SG or higher



SERVICE ADJUSTMENT PROCEDURES

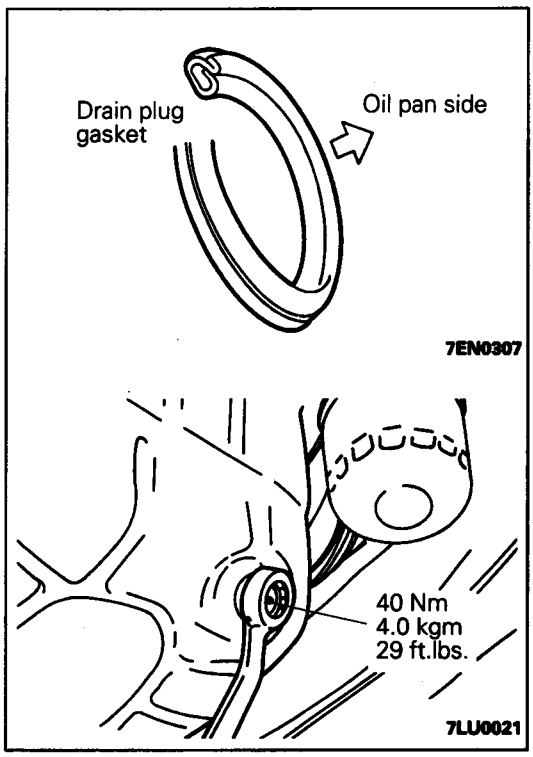
ENGINE OIL INSPECTION E12FCAA

1. Pull out the oil level gauge and remove oil adhered to the level gauge, wiping with clean cloth.
2. Insert the level gauge into the oil level gauge guide.
3. Pull out the level gauge slowy and check that the oil level is in the illustrated range.

   NOTE
   1. For this inspection, place the vehicle on a level surface.
   2. Check while the engine is stationary. If the engine has been started, stop it and allow for some time before inspection.
4. If below the minimum level, supply with specified oil.

   Specified oil: (API classification) SG or higher

   Caution
   Refilling beyond the maximum level has adverse effect on engine performance.
5. Run the engine at idle and stop. Then allow some time and check oil level again to make sure it is within the specified range.
6. Check to ensure that the oil is not noticeably dirty or mixed with coolant or gasoline, and that it has the proper viscosity.



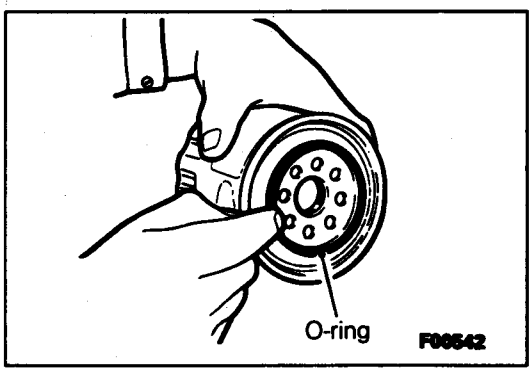
ENGINE OIL REPLACEMENT E12FAAB

1. Warm up the engine.
2. Drain the engine oil by removing the filler cap and then removing the drain plug.
3. Replace the drain plug gasket and install so it faces in the direction shown in the illustration. Then tighten the drain plug to the specified torque.
4. Fill with new engine oil.

   Specified oil (API classification): SG or higher

   Oil quantity: 4.0 dm^3 (4.2 U.S qts., 3.5 Imp. qts) (excluding residual oil in the oil filter and oil cooler)

   Caution
   Cover the alternator with a rag so that if the oil is spilt it will not get on the alternator.
5. Race the engine for a few minutes.
6. Stop the engine and check the oil level with a level gauge.



OIL FILTER REPLACEMENT E12FBAC

1. Warm up the engine.
2. Drain the engine oil by removing the filler cap and then removing the drain plug.
3. Use an oil filter wrench to remove the engine oil filter.
4. Clean the surface of the filter bracket attachment.
5. Lubricate the O-ring of the new oil filter with a small amount of engine oil.
6. Screw in the oil filter by hand, and after the O-ring contacts the flange surface, tighten it another 3/4 turns with a filter wrench, etc. [approx. 14 Nm (1.4 kgm, 10 ft.lbs.)]
7. Install the drain plug and refill the engine oil. (Refer to P.12-4 Engine Oil replacement)
8. Race the engine two or three times to make sure that no engine oil leaks from the oil filter seal.

OIL LEVEL SENSOR INSPECTION E12FDAA

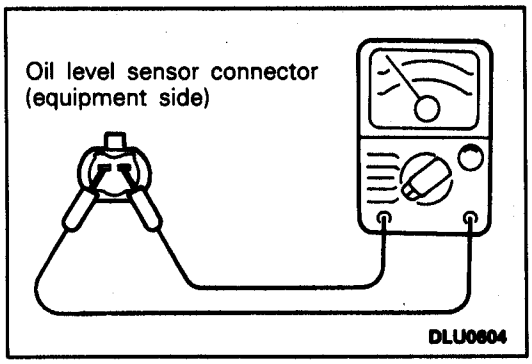
(1) Check that the proper amount of oil has been filled.
(2) When the ignition switch is turned to ON (do not start the engine), check that the oil level warning lamp illuminates.

NOTE
If the oil level warning lamp does not illuminate, the cause is probably a blown lamp, or a malfunction in the relay.

(3) When the engine is started, check that the oil level warning lamp turns off.

NOTE
If the oil level warning indicator does not turn off, the cause is probably malfunction in the oil level sensor or in the relay.

(4) Disconnect the oil level sensor connector. Check that the oil level warning lamp illuminates after approximately 20 seconds.



(5) Check the continuity between the oil level sensor terminals.

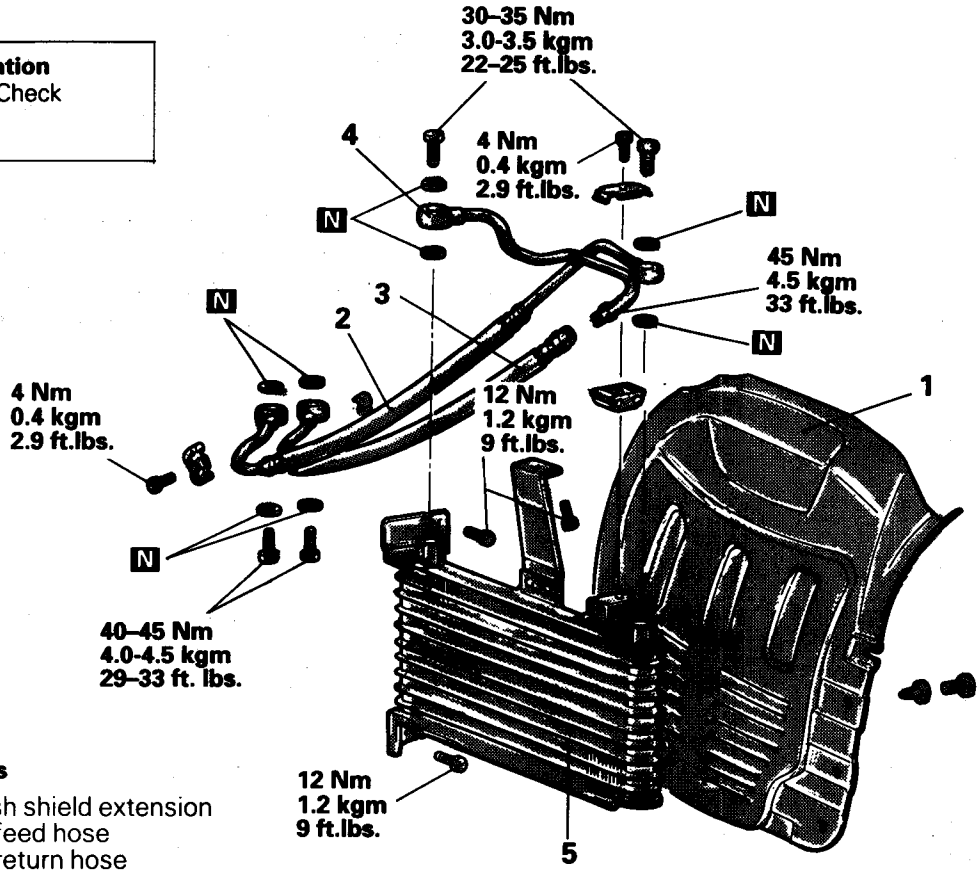
Engine oil temperature	Oil level	Continuity
At 40°C (104°F) or lower	Normal (proper volume)	Continuity
	Low (drained)	Continuity
At 70°C (158°F) or higher	Normal (proper volume)	Continuity
	Low (drained)	No continuity

ENGINE OIL COOLER

E12JA--

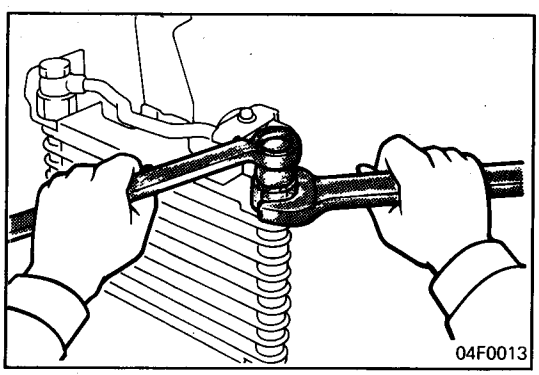
REMOVAL AND INSTALLATION

Post-installation Operation
- Engine Oil Refill and Check (Refer to P.12-3)



Removal steps

1. Front splash shield extension
2. ◆◆ Engine oil feed hose
3. Engine oil return hose
4. ◆◆ Engine oil return tube
5. Engine oil cooler



SERVICE POINTS OF REMOVAL

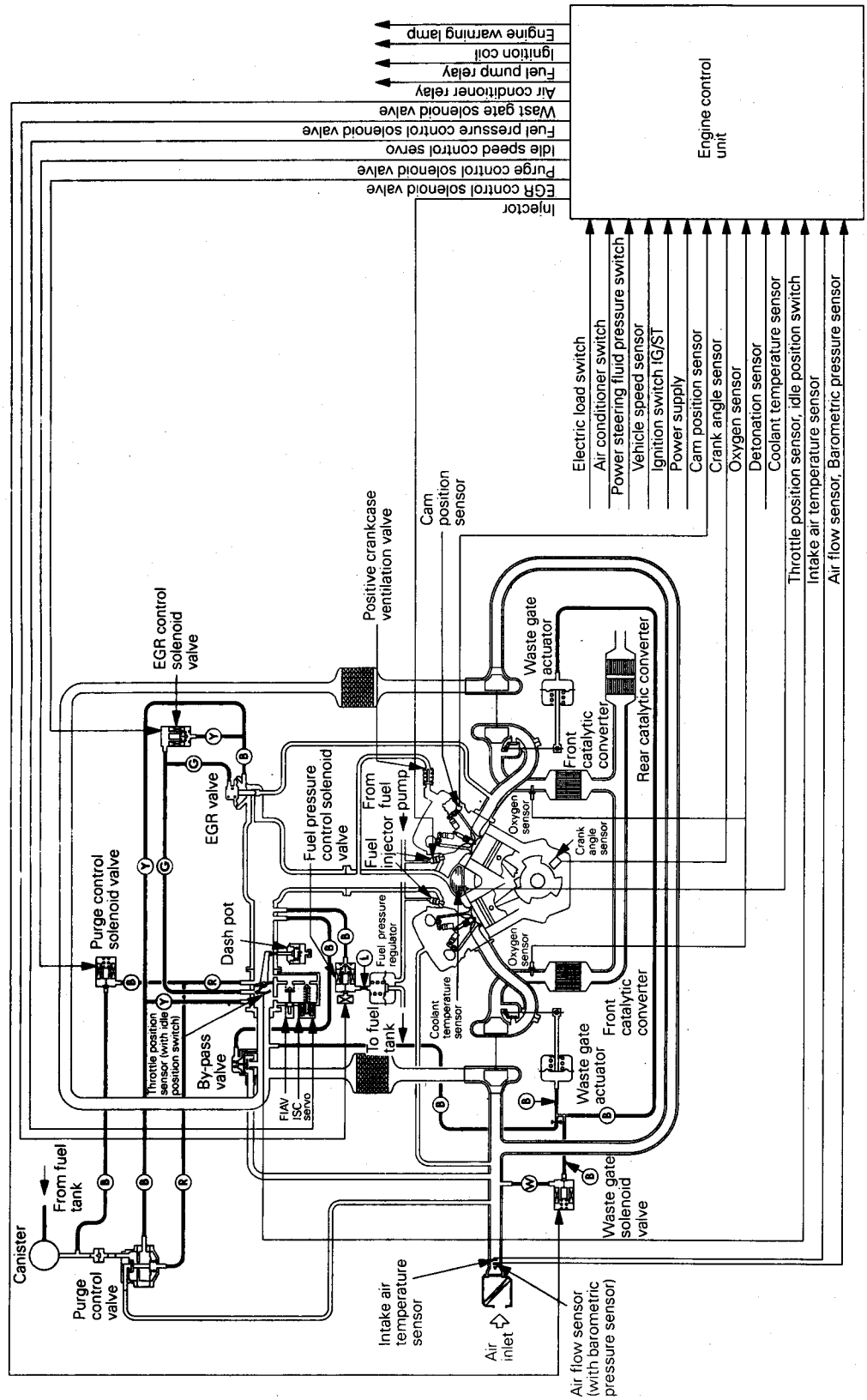
E12JBAG

2. REMOVAL OF ENGINE OIL FEED HOSE / 4. ENGINE OIL RETURN TUBE

Caution
Be sure to hold the weld nut of the oil cooler while loosening the eye bolt.

GENERAL INFORMATION

MPI SYSTEM DIAGRAM



FUEL

CONTENTS

E13AA–

SPECIFICATIONS

GENERAL SPECIFICATIONS

E13CA-A

Items	Specifications
Fuel	
Tank capacity dm^3 (U.S. qts., Imp. qts.)	75 (79, 66)
Return system	Equipped
Filter	High pressure type
Fuel pump	
Type	Electrical, in-tank type
Driven by	Electric motor
Throttle body	
Throttle bore mm (in.)	60 (2.36)
Throttle position sensor	Variable resistor type
Idle speed control servo	Stepper motor type Stepper motor type by-pass air control system with the first idle air valve
Idle position switch	Rotary contact type
Engine control unit	<5M/T – Up to 1994 models>
Identification model No.	E2T35679 <LHD> E2T35680 <RHD> <5M/T – From 1995 models> E2T61478 <LHD> E2T61479 <RHD> <6M/T> E2T35695 <LHD> E2T35696 <RHD>
Sensors	
Air flow sensor	Karman vortex type
Barometric pressure sensor	Semiconductor type
Intake air temperature sensor	Thermistor type
Engine coolant temperature sensor	Thermistor type
Oxygen sensor	Zirconia type
Vehicle speed sensor	Reed switch type
Detonation sensor	Piezoelectric type
Cam position sensor	Hall element type
Crank angle sensor	Hall element type
Power steering fluid pressure switch	Contact switch type

Items	Specifications
Actuators	
Control relay type	Contact switch type
Injector type and number	Electromagnetic, 6
Purge control solenoid valve	ON/OFF type solenoid valve
EGR control solenoid valve	Duty cycle type solenoid valve
Fuel pressure control solenoid valve	ON/OFF type solenoid valve
Waste gate solenoid valve	Duty cycle type solenoid valve
Fuel pressure regulator	
Regulated pressure kPa (kg/cm^2 psi)	300 (3.0, 43.5)

SERVICE SPECIFICATIONS

E13CB-A

Items		Specifications
Basic ignition timing		5° ± 3° BTDC at curb idle
Curb idle speed	r/min	700 ± 100
Idle speed when air conditioner is on	r/min	900 at neutral position
Basic idle speed	r/min	700 ± 50
Throttle position sensor adjusting voltage	V	0.4 – 1.0
Throttle position sensor resistance	kΩ	3.5 – 6.5
Idle speed control servo (stepper motor) coil resistance	Ω	28 – 33 [at 20°C (68°F)]
Intake air temperature sensor resistance	kΩ	2.7 [at 20°C (68°F)]
Engine coolant temperature sensor resistance	kΩ	
20°C (68°F)		2.4
80°C (176°F)		0.3
Fuel pressure	kPa (kg/cm^2, psi)	
Vacuum hose disconnection		295 – 315 (2.95 – 3.15, 43 – 45) at curb idle
Vacuum hose connection		Approx. 235 (34) at curb idle
Injector coil resistance	Ω	2 – 3 [at 20°C (68°F)]

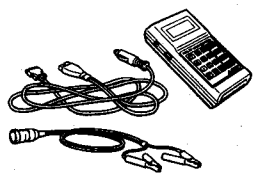
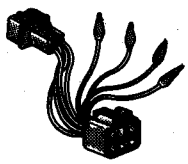
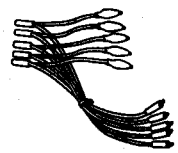
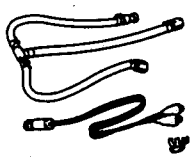
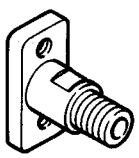
SEALANTS

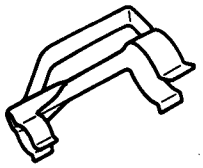
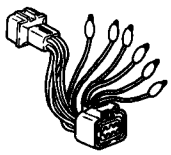
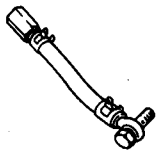
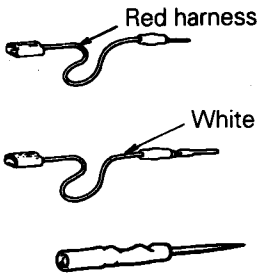
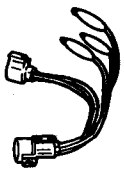
E13CE-A

Items	Specifications	Remarks
Engine coolant temperature sensor threaded portion	3M NUT Locking Part No. 4171 or equivalent	Drying sealant
Fuel tank hole cover	3M ATD Part No. 8509 or equivalent	–

SPECIAL TOOLS

E13DA--

Tool	Number	Name	Use
	MB991341	Multi-use tester sub assembly	1993 models ● Reading diagnosis code ● MPI system inspection ● Auto-cuise control system inspection
	(For the number, refer to GROUP 00 – Precautions before service.)	ROM pack	
 16X0606	MB991502	MUT-II sub assembly	All models ● Reading diagnosis code ● MPI system inspection ● Auto-cruise control system inspection
 16X0607		ROM pack	
	MB998464	Test harness (4 pin, square)	● Oxygen sensor inspection
	MB991348	Test harness set	● Idle switch and throttle position sensor adjustment ● Inspection with analyzer
	MD998706	Injector test set	Inspection of injector
	MD998741	Injector test adaptor	

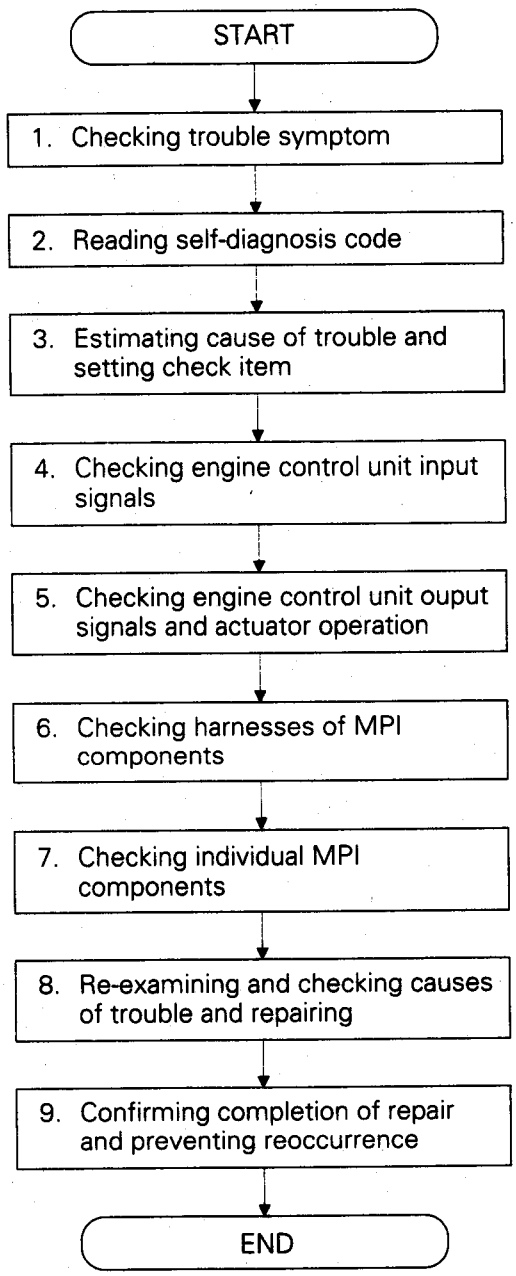
Tool	Number	Name	Use
	MD998746	Clip	Inspection of injector
	MD998463	Test harness (6 pin, square)	• Inspection of Idle speed control servo • Inspection with analyzer
	MD998709	Adaptor hose	Fuel pressure measurement
	MD998742	Hose adaptor	
	MD991223	Test harness set for inspection • Pin contact pressure inspection harness • Probe for ordinary tester connection (for general connector)	Measurement of terminal voltage
	MD998478	Test harness (3 pin, triangle)	Inspection by osilloscope

TROUBLESHOOTING

E13EFAM

EXPLANATION OF TROUBLESHOOTING PROCEDURES

The troubleshooting procedures that are effective for malfunctions of the MPI system are explained in the following.



(1) Checking trouble symptom
- Reproduce the trouble symptom and check the contents of the trouble and the conditions under which the symptom occurs (engine condition, operating state, etc.).

(2) Reading self-diagnosis code
- Read the self-diagnosis code and correct the malfunction when a malfunction code is output, referring to the diagnostic chart.

(3) Estimating cause of trouble and setting check item
- Referring to CHECK CHART CLASSIFIED BY PROBLEM SYMPTOMS, determine the check items and procedures to be followed.

(4) Checking engine control unit input signals
- Use the multi-use tester (MUT) or MUT-II or an analyzer to check the signals input to the engine control unit.
- If the input signals are normal, the sensor input is judged to be normal. Then, check the next check item.

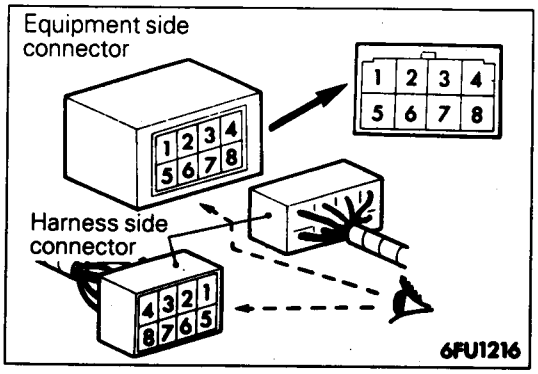
(5) Checking engine control unit output signals and actuator operation
- Use the multi-use tester (MUT) or MUT-II to check the signals output from the engine control unit. Also, force-drive the actuator using the actuator test function to check the actuator operation.
- Use an analyzer to check the signals output from the engine control unit.
- If the signals output from the engine control unit and the operation of the actuator are normal, the actuator control is judged to be normal. Then, check the next check item.

(6) Checking harnesses of MPI components
- If the input and output signals for the engine control unit are not normal, check the body harnesses of the MPI components and repair as necessary.
- After repairing, check the input and output signals for the engine control unit again. If they are normal this time, check the input and output signals for the next check item.

(7) Checking individual MPI components
- If the body harnesses are normal but the input and output signals for the engine control unit are still abnormal, check the MPI components individually and repair or replace as necessary.
- After repair or replacement, check the input and output signals of the engine control unit again. If they are normal this time, check the input and output signals of the next check item.

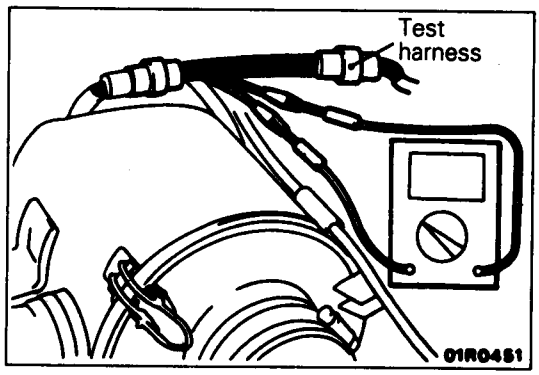
(8) Re-examining and checking causes of trouble and repairing
- If the results of the harness check and individual component check are normal but the input and output signals for the engine control unit are still abnormal, re-examine the causes of the trouble, referring to the troubleshooting hints. Then, carry out checking and repairing including other groups.

(9) Confirming completion of repair and preventing reoccurrence
- Try to reproduce the trouble symptom to make sure that the symptom does not occur again.
- Remove the true cause of the trouble to prevent its reoccurrence.

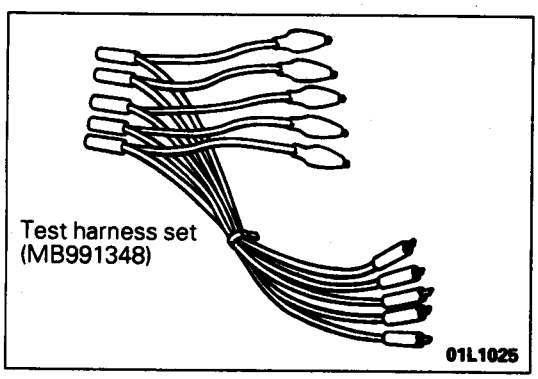


EXPLANATION AND CAUTIONS FOR CIRCUIT CHECKING

- The connector symbols show the pin arrangement as seen from the direction of the terminal end of the connector actually mounted in the vehicle.
- When the standard value when checking the voltage is recorded as SV, this is an abbreviation for system voltage.

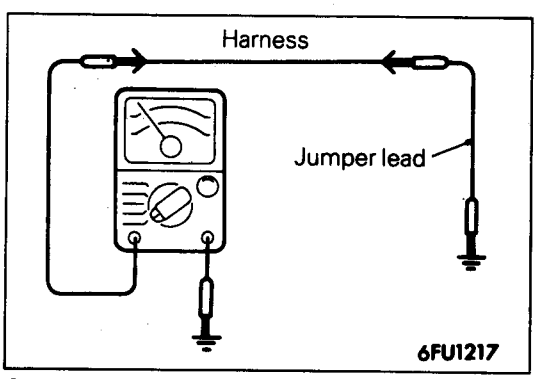


- When checking a waterproof connector with the circuit in a live state, be sure to use the special tool (test harness).
  Inserting the test probe from the harness side should never be done, as it will adversely affect waterproof performance, which may lead to corrosion.
  Furthermore, the test harness is used for each setting, so the appropriate item for the connector should be selected.

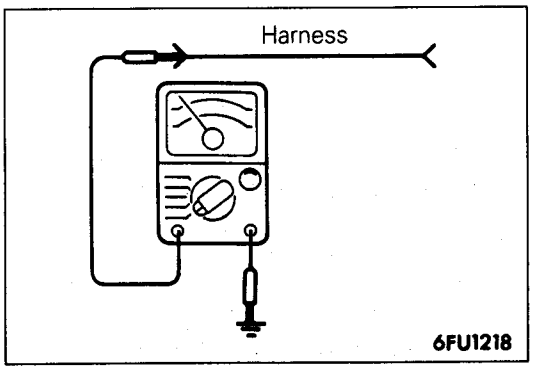


- In addition, if there is no test harness for the appropriate connector, the test harness set (MB991348) which can be connected directly between the terminals can be used.

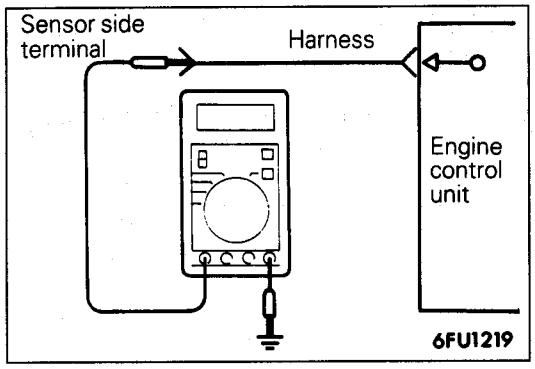
- When checking the terminal voltage, etc., with the connectors disconnected, do not insert the test probe if the check terminal has female pins. Use the special tool (inspection harness set MB991223) instead.
  Forcing the test probe into such a terminal can cause poor contact.



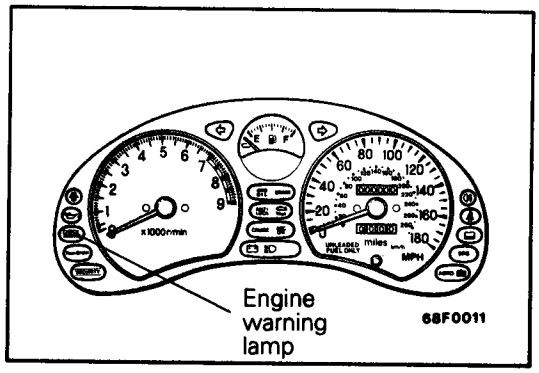
- When checking for a open circuit in a harness with both ends of the harness separated physically, use a jumper lead to earth one end and check continuity between the other end and the earth. This enables checking for a open circuit in the harness to be made. If there is no continuity, repair the harness.
  However, when checking for a open circuit in the power supply line, check the continuity between both ends directly, without using a jumper lead to earth one end of the harness.



- When checking for a harness short-circuit, open one end of the harness and check for continuity between the other end and the earth.
  If there is continuity, the harness is short-circuited to earth, so repair the harness.
- As a rule, use an analog type ohmmeter (or circuit tester) to measure the continuity.



- If the harness is normal, but the impressed voltage to the sensor is not normal, replace the engine control unit and recheck.
- As a rule, use a digital type voltmeter (or circuit tester) to measure the voltage.
  However, for checking the power transistor drive voltage, use an analog type voltmeter.



ENGINE WARNING LAMP (CHECK ENGINE LAMP)

Among the self-diagnosis items, an engine warning lamp comes on to notify the driver of the emission control items when an irregularity is detected.
However, when an irregular signal returns to normal and the engine control unit judges that it has returned to normal, the engine warning lamp goes out.
Moreover, when the ignition switch is turned off, the lamp goes out. Even if the ignition switch is turned on again, the lamp does not come on until the irregularity is detected.
Here, immediately after the ignition switch is turned on, the engine warning lamp is lit for 5 seconds to indicate that the engine warning lamp operates normally.

ITEMS INDICATED BY THE ENGINE WARNING LAMP

Engine control unit
Oxygen sensor
Air flow sensor
Intake air temperature sensor
Throttle position sensor
Engine coolant temperature sensor
Crank angle sensor
Cam position sensor
Barometric pressure sensor
Detonation sensor
Ignition timing adjustment signal
Injector
Ignition coil, Power transistor unit

Caution
Malfunction indicator lamp will come on even when terminal for ignition timing adjustment is short-circuited. Therefore, it is not abnormal that the lamp comes on even when terminal for ignition timing adjustment is short-circuited at the time of ignition timing adjustment.

ENGINE WARNING LAMP INSPECTION

(1) Check that when the ignition switch is turned ON, the lamp illuminates for about 5 seconds and then goes out.
(2) If the lamp does not illuminate, check for open circuit in harness, blown fuse and blown bulb.

SELF-DIAGNOSIS

The engine control unit monitors the input/output signals (some signals at all times and the others under specified conditions) of the engine control unit.
When it is noticed that an irregularity has continued for a specified time or longer from when the irregular signal is initially monitored, passing a certain number, the engine control unit judges that an irregularity has occurred, memorizes the malfunction code, and outputs the signal to the self-diagnosis output terminal.
There are 18 diagnosis items, including the normal state, and the diagnosis results can be read out with a multi-use tester (MUT) or MUT-II.
Moreever, since memorization of the malfunction codes is backed up directly by the battery, the diagnosis results are memorized even if the ignition key is turned off. The malfunction codes will, however, be erased when the battery terminal or the engine control unit connector is disconected.
Furthermore, the malfunction code can also be erased by sending the malfunction code erase signal from the multi-use tester (MUT) or MUT-II to the engine control unit with turning the ignition switch to ON.

Caution
If the sensor connector is disconnected with the ignition switch turned on, the malfunction code is memorized. In this case, send the malfuction code erase signal from the multi-use tester (MUT) or MUT-II to the engine control unit, and the diagnosis memory will be erased.

The 18 diagnosis items are provided as follows, and if plural items are activated, they are all indicated sequentially from the smallest code number.

Caution
The malfunction code for the ignition timing adjustment signal is output when the circuit for the ignition timing adjustment terminal is short circuited. Consequently when adjusting the ignition timing and the ignition timing adjustment terminal is earthed, the engine warning lamp will also illuminate, thus does not indicate an abnormality exists.

DIAGNOSIS CHART

Output preference order	Diagnosis item	Malfunction code		Check item (Remedy)
		No.	Memory	
1	Engine control unit	–	–	(Replace engine control unit)
2	Oxygen sensor (Rear bank)	11	Retained	• Harness and connector • Fuel pressure • Injectors (Replace it defective.) • Intake air leaks • Oxygen sensor
3	Air flow sensor	12	Retained	• Harness and connector (If harness and connector are normal, replace air flow sensor assembly.)
4	Intake air temperature sensor	13	Retained	• Harness and connector • Intake air temperature sensor
5	Throttle position sensor	14	Retained	• Harness and connector • Throttle position sensor • Idle position switch
6	Engine coolant temperature sensor	21	Retained	• Harness and connector • Engine coolant temperature sensor
7	Crank angle sensor	22	Retained	• Harness and connector (If harness and connector are normal, replace crank angle sensor assembly.)
8	Cam position sensor	23	Retained	• Harness and connector (If harness and connector are normal, replace crank angle sensor assembly.)
9	Vehicle speed sensor (reed switch)	24	Retained	• Harness and connector • Vehicle speed sensor (reed switch)
10	Barometric pressure sensor	25	Retained	• Harness and connector (If harness and connector are normal, replace barometric pressure sensor assembly.)
11	Detonation sensor	31	Retained	• Harness and connector (If harness and connector are normal, replace detonation sensor)

Output preference order	Diagnosis item	Malfunction code		Check item (Remedy)
		No.	Memory	
12	Ignition timing adjustment signal	36	–	• Harness and connector
13	Oxygen sensor (Front bank)	39	Retained	• Harness and connector • Fuel pressure • Injectors (Replace it defective.) • Intake air leaks • Oxygen sensor
14	Injector	41	Retained	• Harness and connector • Injector coil resistance
15	Ignition coil, Power transistor unit (For No. 1–4 cylinders)	44	Retained	• Harness and connector • Ignition coil • Power transistor unit
16	Ignition coil, Power transistor unit (For No. 2–5 cylinders)	52	Retained	• Harness and connector • Ignition coil • Power transistor unit
17	Ignition coil, Power transistor unit (For No. 3–6 cylinders)	53	Retained	• Harness and connector • Ignition coil • Power transistor unit
18	Normal state	–	–	–

NOTE
1. Replace the engine control unit if a malfunction code is output although the inspection reveals that there is not problem with the check items.
2. Codes are displayed according to numerical order.

TROUBLE DIAGNOSIS QUICK REFERENCE CHART

Trouble code No.	Diagnosis item	Description	Major cause	Remarks (Symptoms, etc.)
–	Engine control unit	Trouble in engine control unit itself	–	• Engine stalls. • Engine cannot be started.
11	Oxygen sensor (Rear bank)	Air-fuel ratio feedback control (closed loop control) is in effect but oxygen sensor signal voltage does not change (air-fuel mixture lean/rich).	(1) Defective oxygen sensor (2) Open or short circuit in oxygen sensor circuit, or connector in loose contact	• Poor exhaust emission purifying performance
			(3) Improper fuel pressure (4) Defective injector (5) Air drawn in through gasket clearance, etc. (6) Defective engine control unit	• Poor exhaust emission purifying performance • Poor startability • Unstable idling • Poor acceleration
12	Air flow sensor	Air flow sensor signal frequency 10Hz or less even with engine running	(1) Defective air flow sensor (2) Open or short circuit in air flow sensor circuit, or connector in loose contact (3) Defective engine control unit	• Poor acceleration* • Improper idling speed* • Unstable idling*
13	Intake air temperature sensor	(1) Intake air temperature sensor signal voltage over 4.5V (2) Intake air temperature sensor signal voltage less than 0.27V	(1) Defective intake air temperature sensor (2) Open or short circuit in intake air temperature sensor circuit, or connector in loose contact (3) Defective engine control unit	• Somewhat poor driveability* • At high temperatures (a) Poor startability* (b) Unstable idling*
14	Throttle position sensor	(1) Throttle position sensor signal voltage less than 0.2V (2) Throttle position sensor signal voltage over 2V even with idle position switch at ON	(1) Throttle position sensor out of order or maladjusted (2) Open or short circuit in throttle position sensor circuit, or connector in poor contact	• Somewhat poor acceleration • Engine stalls
			(3) Idle position switch ON failure (4) Short circuit in idle position signal line (5) Defective engine control unit	• Engine stalls. • Engine cannot be raced.
21	Engine coolant temperature sensor	(1) Engine coolant temperature sensor signal voltage over 4.6V (2) Engine coolant temperature sensor signal voltage less than 0.11V (3) Engine coolant temperature sensor signal indicates a low engine coolant temperature while the engine is in warmup operation.	(1) Defective engine coolant temperature sensor (2) Open or short circuit in engine coolant temperature sensor circuit, or connector in poor contact (3) Defective engine control unit	With engine cold • Poor startability* • Unstable idling* • Poor acceleration*

NOTE
*: Failsafe/backup function is in operation

Trouble code No.	Diagnosis item	Description	Major cause	Remarks (Symptoms, etc.)
22	Crank angle sensor	(1) Cranking the engine for more than four seconds does not cause the crank angle sensor signal voltage to change (go high or low). (2) Abnormal crank angle sensor signal	(1) Defective crank angle sensor (2) Open or short circuit in crank angle sensor circuit, or connector in loose contact (3) Defective cam position sensor, or connector in loose contact (4) Defective engine control unit	• Engine stalls. • Engine cannot be started.
23	Cam position sensor	(1) Cam position sensor signal voltage does not change (go high or low) even with the engine running. (2) Abnormal top dead center signal pattern	(1) Defective cam position sensor (2) Open or short circuit in cam position sensor circuit, or connector in loose contact (3) Defective crank angle sensor, or connector in loose contact (4) Defective engine control unit	• Engine stalls.*
24	Vehicle speed sensor (reed switch)	With the engine in accelerated operation at an engine speed of over 3,000 r/min, the vehicle speed sensor signal voltage does not change (go high or low).	(1) Defective vehicle speed sensor (2) Open or short circuit in vehicle speed sensor circuit, or connector in loose contact (3) Defective engine control unit	When the vehicle is stopped with the engine in decelerated operation, the engine might stall.
25	Barometric pressure sensor	(1) Barometric pressure sensor signal voltage over 4.5V (2) Barometric pressure sensor signal voltage less than 0.2V	(1) Defective barometric pressure sensor (2) Open or short circuit in barometric pressure sensor circuit, or connector in loose contact (3) Defective engine control unit	• Unstable idling* • Poor acceleration* • Poor startability*
31	Detonation sensor	Abnormal detonation sensor signal voltage	(1) Defective detonation sensor (2) Open or short circuit in detonation sensor circuit, or connector in loose contact (3) Defective engine control unit	• Poor acceleration*
36	Ignition timing adjustment signal	Ignition timing adjustment signal line short-circuited to earth	(1) Ignition timing adjustment signal line short-circuited to earth (2) Defective engine control unit	• Poor acceleration • Overheated engine
39	Oxygen sensor (Front bank)	Air-fuel ratio feedback control (closed loop control) is in effect but oxygen sensor signal voltage does not change (air-fuel mixture lean/rich).	(1) Defective oxygen sensor (2) Open or short circuit in oxygen sensor circuit, or connector in loose contact	• Poor exhaust emission purifying performance*
			(3) Improper fuel pressure (4) Defective injector (5) Air drawn in through gasket clearance, etc. (6) Defective engine control unit	• Poor exhaust emission purifying performance* • Poor startability • Unstable idling • Poor acceleration
41	Injector	Injector is not driven for more than four consecutive seconds during engine cranking or idling operation.	(1) Defective injector (2) Open or short circuit in injector circuit, or connector in loose contact (3) Defective engine control unit	• Poor idling • Poor acceleration • Poor startability

Trouble code No.	Diagnosis item	Description	Major cause	Remarks (Symptoms, etc.)
44	Ignition coil and power transistor unit for 1-4 cylinders	With the engine running, no ignition signal is input (except in cases where no ignition signal is input to all the cylinders)	(1) Defective ignition coil (2) Open or short circuit in primary ignition circuit, or connector in loose contact (3) Defective power transistor unit (4) Defective engine control unit	• Unstable idling* • Poor acceleration* • Poor startability*
52	Ignition coil and power transistor unit for 2-5 cylinders	With the engine running, no ignition signal is input (except in cases where no ignition signal is input to all the cylinders)	(1) Defective ignition coil (2) Open or short circuit in primary ignition circuit, or connector in loose contact (3) Defective power transistor unit (4) Defective engine control unit	• Unstable idling* • Poor acceleration* • Poor startability*
53	Ignition coil and power transistor unit for 3-6 cylinders	With the engine running, no ignition signal is input (except in cases where no ignition signal is input to all the cylinders)	(1) Defective ignition coil (2) Open or short circuit in primary ignition circuit, or connector in loose contact (3) Defective power transistor unit (4) Defective engine control unit	• Unstable idling* • Poor acceleration* • Poor startability*

LIST OF FAIL-SAFE/BACK-UP FUNCTIONS

When the failure of a major sensor is detected by the self diagnosis functions, the preset control logic provides controls to assure safe operation of the vehicle.

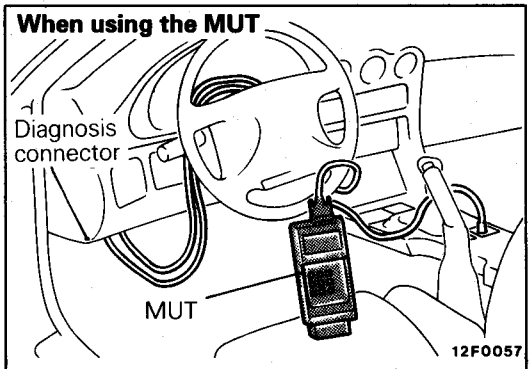
Trouble item	Controls to be provided in the event of trouble
Air flow sensor	(1) Fuel injection timing and ignition timing determined on the basis of throttle position sensor (TPS) signal and engine speed signal (crank angle sensor signal) (2) Idle speed control servo fixed at predetermined position, and no idling speed control achieved
Intake air temperature sensor	Controls provided on the assumption that intake air temperature is 25°C (77°F)
Throttle position sensor (TPS)	No additional fuel injection provided on the basis of throttle position sensor signal at acceleration
Engine coolant temperature sensor	Controls provided on the assumption that engine coolant temperature is 80°C (176°F) (Even if the sensor signal returns to normal, this control mode is retained until the ignition switch is set to OFF.)
Cam position sensor	(1) Fuel injected into all cylinders simultaneously (Provided that no No. 1 cylinder top dead center has been detected since the ignition switch was placed in the ON position) (2) Fuel cut 4 seconds after a failure was detected (Provided that no No. 1 cylinder top dead center has been detected since the ignition switch was placed in the ON position)
Barometric pressure sensor	Controls provided on the assumption that barometric pressure is 101 kPa (760 mmHg, 14.7 psi)
Detonation sensor	Ignition timing in normal state further retarded to assure knocking-free ignition timing
Ignition coil and power transistor unit	Fuel cut for cylinders whose ignition signal is abnormal
Oxygen sensor	No air-fuel ratio feedback control (closed loop control) achieved

READ OUT OF MALFUNCTION CODE

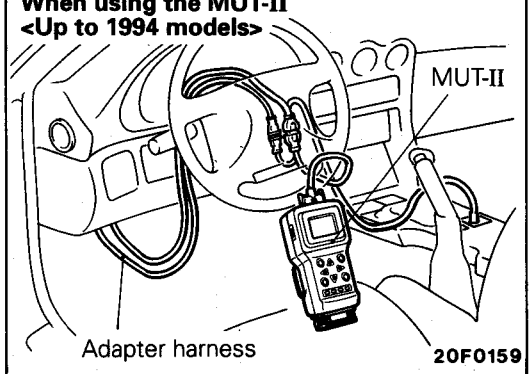
Precautions for Operation

(1) When battery voltage is low, no detection of failure is possible. Be sure to check the battery for voltage and other conditions before starting the test.
(2) Diagnosis item is erased if the battery or the engine control unit connector is disconnected. Do not disconnect the battery before the diagnosis result is completely read.
(3) Be sure to connect or disconnect the Multi-use tester (MUT) or MUT-II with the ignition switch turned off.

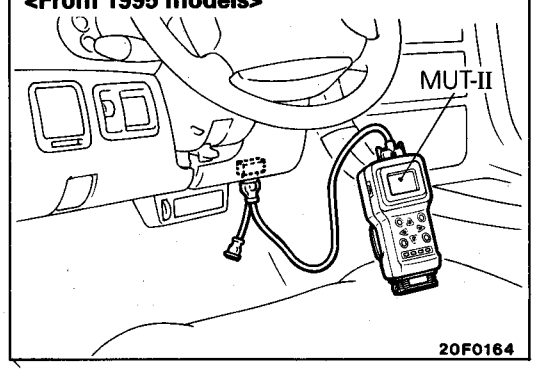
When using the MUT



When using the MUT-II
<Up to 1994 models>



<From 1995 models>



READ OUT PROCEDURE-USING MULTI-USE TESTER (MUT) OR MUT-II

Caution
Connection and disconnection of the MUT or MUT-II should always be made with the ignition switch in the OFF position.

(1) Connect the MUT or MUT-II to the diagnosis connector.

NOTE
When connecting MUT-II to 1994 models, use the adapter harness which belongs to MUT-II sub-assembly.

(2) Turn the ignition switch ON.
(3) Read and record the self-diagnosis output.
(4) Referring to the diagnosis chart, repair the faulty part.
(5) Turn the ignition switch OFF and then turn it ON.
(6) Erase the malfunction code.
(7) Recheck the self-diagnosis code and make sure that normal code is output.

NOTE
Connect the MUT or MUT-II to the white diagnosis connector.

Diagnosis by DIAGNOSIS 2 MODE (INCREASED SENSITIVITY)

(1) Using the multi-use tester (MUT) or MUT-II changeover the diagnosis mode of the engine control unit to DIAGNOSIS 2 MODE. (INCREASED SENSITIVITY)
(2) Road test the vehicle.
(3) Read the diagnosis code in the same manner as "READ OUT OF MALFUNCTION CODE" and repair the malfunctioning part.
(4) Turn the ignition switch OFF and then turn it ON again.

NOTE
By turning the ignition switch OFF, the engine control unit will change over the diagnosis mode from DIAGNOSIS 2 MODE to DIAGNOSIS 1 MODE.

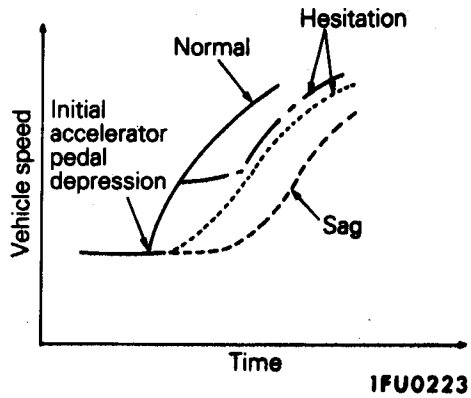
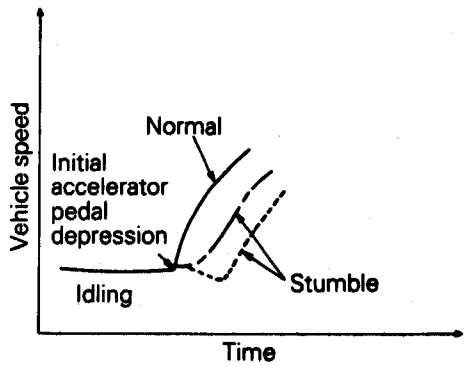
(5) Erase the malfunction codes.

CHECK CHART CLASSIFIED BY PROBLEM SYMPTOMS

Problem symptoms / Check items	Starting		Idling stability			Driving						Stopping	Reference page
	Will not start	Starting problem	Idling instability (Rough idling)	Incorrect idling speed	Improper idling continuity	Hesitation, sag	Poor acceleration	Stumble	Shock	Surge	Knocking	Run-on (Dieseling)	
Power supply and ignition switch-IG	① [1]												P.13-52
Engine control unit power earth	② [2]												P.13-55
Fuel pump	③ [3]	① [1]			① [1]	① [1]	① [1]						P.13-56
Air flow sensor					⑬ [11]	⑨ [9]		⑤ [5]	⑤ [5]		④ [4]		P.13-62
Intake air temperature sensor			⑤			⑤ [5]	⑥ [6]				② [2]		P.13-67
Barometric pressure sensor			⑦			⑧ [8]	⑧ [8]				③ [3]		P.13-70
Engine coolant temperature sensor			⑥ [5]	① [1]	⑤ [5]	⑦ [7]	⑦ [7]	④ [4]		③ [3]			P.13-72
Throttle position sensor						⑥ [6]		③ [3]	④ [4]				P.13-75
Idle position switch			③ [3]	② [2]	④ [4]								P.13-78
Cam position sensor	⑤ [5]	⑦ [7]			⑧ [7]				② [2]				P.13-80
Crank angle sensor	⑥ [6]	⑧ [8]			⑨ [8]				③ [3]				P.13-84
Ignition switch-ST	④ [4]	③ [4]											P.13-87
Vehicle speed sensor					⑥				⑥				P.13-88
Power steering fluid pressure switch				③									P.13-90
Air conditioner switch and power relay				④									P.13-92
Detonation sensor											① [1]		P.13-94
Electrical load switch				⑤									P.13-96
Oxygen sensor			⑩										P.13-98
Fan motor relay (radiator fan, condenser fan <From 1995 models>				⑥	⑪ [10]								P.13-100 -1
Injectors	⑧ [8]	② [2]	② [2]		③ [3]	② [2]	② [2]	① [1]		① [1]		①	P.13-101
Idle speed control servo (stepper motor type)		④ [5]	① [1]	⑦ [3]	② [2]				⑧ [6]				P.13-108
Ignition coil and power transistor	⑦ [7]				⑩ [9]		⑨ [9]		① [1]		⑤ [5]		P.13-113
Purge control solenoid valve			⑧										P.13-119
EGR control solenoid valve						④ [4]		⑥ [6]		④ [4]			P.13-121
Fuel pressure control valve		⑥	⑨		⑫		④ [4]						P.13-123
Waste gate control solenoid valve							⑤ [5]						P.13-126
Anti-lock braking signal									⑦				P.13-130
Fuel pressure		⑤ [6]	④ [4]		⑦ [6]	③ [3]	③ [3]	② [2]		② [2]			P.13-131

○ : Warm engine (number inside indicates check order)
□ : Cold engine (number inside indicates check order)

PROBLEM SYMPTOMS TABLE (FOR YOUR INFORMATION)

Items		Symptom
Starting	Won't start (no initial combustion)	The starter is used to crank the engine, but there is no combustion within the cylinders, and the engine won't start.
	Starting problem (initial combustion, then stall)	There is combustion within the cylinders, but then the engine soon stalls.
	(Starting takes a long time.)	Engine won't start quickly.
Idling stability	Idling instability (Rough idling)	Engine speed doesn't remain constant; changes during idling. Usually, a judgement can be based upon the movement of the tachometer pointer, and the vibration transmitted to the steering wheel, shift lever, body, etc. This is called rough idling.
	Incorrect idling speed	The engine doesn't idle at the usual correct speed.
	Improper idling continuity Die out Pass out	This non-continuity of idling includes the following elements. (1) Die out ..... The engine stalls when the foot is taken from the accelerator pedal, regardless of whether the vehicles is moving or not. (2) Pass out ... The engine stalls when the accelerator pedal is depressed or while it is being used.
Driving	Engine r.p.m. does not rise.	Engine r.p.m. does not increase even when the accelerator pedal is depressed.
	Hesitation Sag	"Hesitation„ is the delay in response of the vehicle speed (engine rpm) that occurs when the accelerator is depressed in order to accelerate from the speed at which the vehicle is now traveling, or a temporary drop in vehicle speed (engine rpm) during such acceleration. Serious hesitation is called "sag".  1FU0223
	Poor acceleration	Poor acceleration is inability to obtain an acceleration corresponding to the degree of throttle opening, even though acceleration is smooth, or the inability to reach maximum speed.
	Stumble	Engine rpm response is delayed when the accelerator pedal is initially depressed for acceleration from the stopped condition.  1FU0224
	Shock	The feeling of a comparatively large impact or vibration when the engine is accelerated or decelerated.
	Surge	This is repeated surging ahead during constant speed travel or during variable speed travel.
	Knocking	A sharp sound like a hammer striking the cylinder walls during driving and which adversely affects driving.
Stopping	Run-on (Dieseling)	The engine continues to run even after the switch is turned OFF. This is called dieseling.

TROUBLESHOOTING <CRUISE CONTROL SYSTEM>

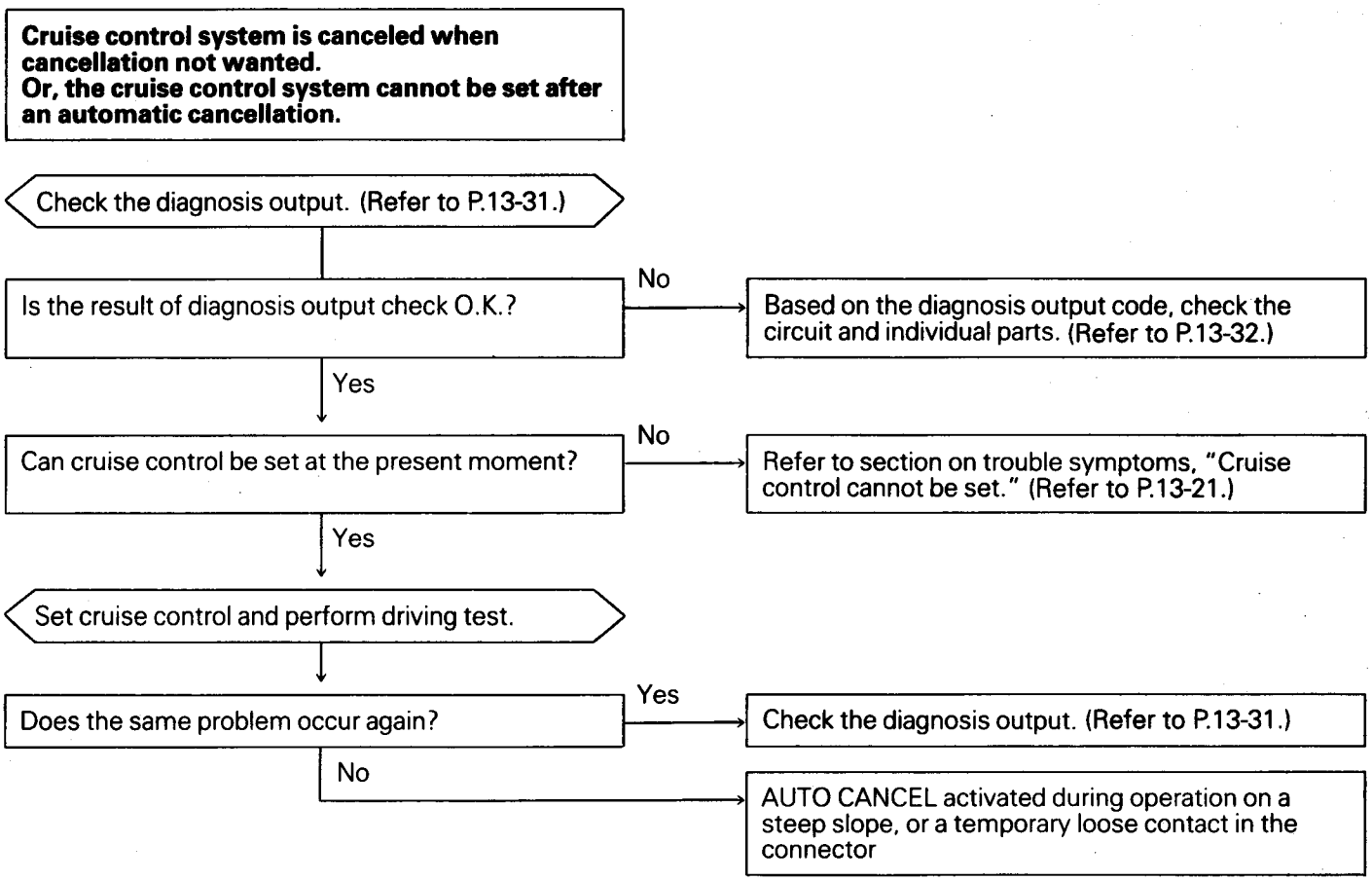
E13EDAH

PRELIMINARY INSPECTION

Check the following points and repair defective points, if any, before troubleshooting.

(1) Check that the vacuum pump assembly, link assembly, actuator and all cables and vacuum hoses are properly installed and that the cables and vacuum hoses are correctly routed.
(2) Check that the link assembly and all cables move smoothly.
(3) Check each of the cables for excessive play or tension.

TROUBLESHOOTING QUICK REFERENCE CHART



Cruise control system cannot be set.

NOTE
This chart contains troubleshooting procedures to perform when a problem cannot be detected by self diagnosis.

Check input. (Refer to P.13-32.)

Is the result of input check O.K.?

Yes → Check vacuum pump assembly circuit. (Refer to P.13-28.)

No

NOTE
If the results of checks on the vacuum pump assembly circuit and actuator parts (refer to P.13-46.) indicate that they are good, replace the control unit.

Result of check	Probable cause	Remedy	Reference page
None of the codes appear even if input operations are performed.	Open circuit in control unit power supply circuit.	Replace main switch or repair harness.	P.13-24
	Open circuit in control switch circuit	Replace control switch or repair harness.	P.13-25
	Defective control unit	Replace control unit	–
Even when SET switch is set to OFF, code No. 21 does not go away.	SET switch ON malfunction	Replace the control switch.	P.13-25
Even when RESUME switch is set to OFF, code No. 22 does not go away.	RESUME switch ON malfunction	Replace control switch.	P.13-25
Even when CANCEL switch is set to OFF, code No. 27 does not go away.	CANCEL switch ON malfunction	Replace control switch.	P.13-25
Even when brake pedal is depressed, code No. 23 is not displayed.	Defective stop lamp switch circuit	Replace stop lamp switch or repair harness.	P.13-29
Even when brake pedal is released, code No. 23 does not go away.			
Even when clutch pedal is released, code No. 26 does not go away.	Defective clutch switch circuit	Replace clutch switch or repair harness.	P.13-29
Code No. 25 is not displayed even when vehicle speed is less than about 40 km/h (25 mph).	Defective vehicle speed sensor circuit	Check and repair vehicle speed sensor circuit.	P.13-27
Even when vehicle speed is increased to more than about 40 km/h (25 mph), code No. 25 does not go away. Code No. 24 is not displayed, either.			

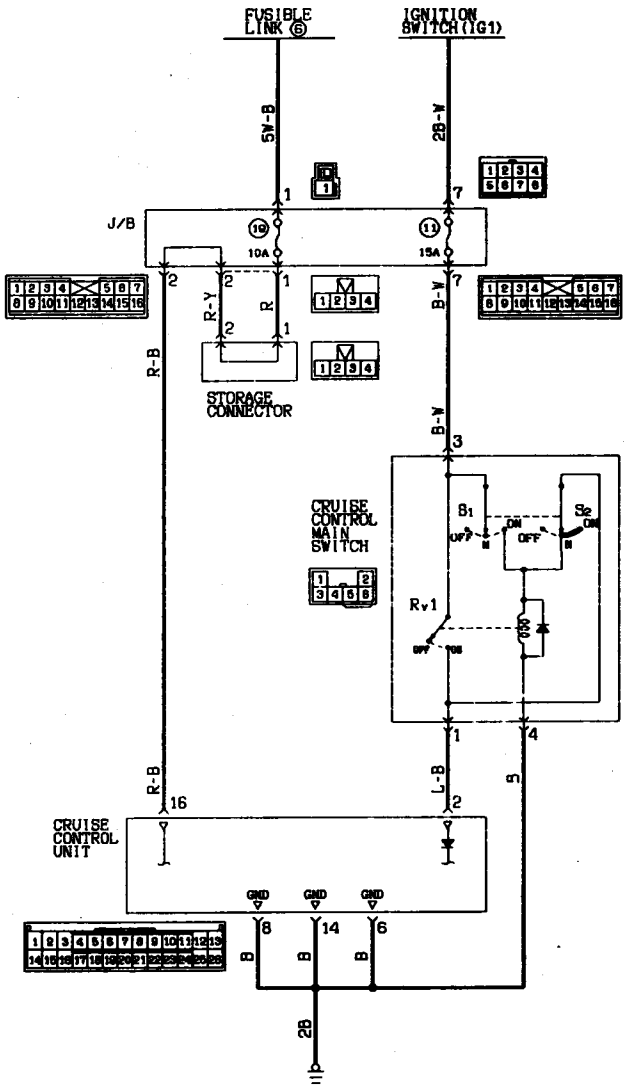
Trouble symptom	Probable cause	Check chart No.	Remedy
• The set vehicle speed varies greatly upward or downward. • "Hunching" (repeated alternating acceleration and deceleration) occurs after setting is made.	Malfunction of the vehicle speed sensor circuit	No. 4	Repair the vehicle speed sensor system, or replace the part.
	Vacuum pump assembly circuit poor contact	No. 5	Repair the actuator system, or replace the part.
	Malfunction of the vacuum pump assembly (including air leaks from negative pressure passage)		
	Malfunction of the ECU	–	Replace the ECU.
The cruise control system is not canceled when the brake pedal is depressed.	Stop lamp switch (for cruise control) malfunction (short-circuit)	No. 6	Repair the harness or replace the stop lamp switch.
	Vacuum pump assembly drive circuit short-circuit	No. 5	Repair the harness or replace the vacuum pump assembly.
	Malfunction of the ECU	–	Replace the ECU.
The cruise control system is not canceled when the clutch pedal is depressed. (It is canceled, however, when the brake pedal is depressed.)	Damaged or disconnected wiring of clutch switch input circuit	If the input check code No. 26 indicates a malfunction No. 7	Repair the harness, or repair or replace the clutch switch.
	Clutch switch improper installation (won't switch ON)		
	Malfunction of the ECU	–	Replace the ECU.
Cannot decelerate by using the SET switch.	Temporary damaged or disconnected wiring of control switch input circuit	No. 2	Repair the harness or replace the control switch.
	Vacuum pump assembly circuit poor contact	No. 5	Repair the harness or replace the vacuum pump assembly.
	Malfunction of the vacuum pump assembly		
	Malfunction of the ECU	–	Replace the ECU.
Cannot accelerate or resume speed by using the RESUME switch.	Open or short circuit in RESUME switch circuit in control switch	No. 2	Replace the control switch.
	Vacuum pump assembly circuit poor contact	No. 5	Repair the harness or replace the vacuum pump assembly.
	Malfunction of the vacuum pump assembly (including air leaks from negative pressure passage)		
	Malfunction of the ECU	–	Replace the ECU

NOTE
ECU: Electronic control unit

Trouble symptom	Probable cause	Check chart No.	Remedy
Even when CANCEL switch is set to ON, cruise control is not canceled (Cruise control, however, is canceled when brake pedal is depressed.)	Open or short circuit in CANCEL switch circuit in control switch	If the input check code No. 27 indicates a malfunction. No. 2	Replace the control switch.
	Malfunction of the ECU	–	Replace the ECU
The cruise control system can be set while traveling at a vehicle speed of less than 40 km/h (25 mph), or there is no automatic cancellation at that speed.	Malfunction of the vehicle-speed sensor circuit	No. 4	Repair the vehicle speed sensor system, or replace the part.
	Malfunction of the ECU	–	Replace the ECU.
The cruise control indicator lamp of the combination meter does not illuminate. (But cruise control system is normal)	Damaged or disconnected bulb of indicator lamp	No. 3	Repair the harness or replace the lamp bulb.
	Harness damaged or disconnected		
	Malfunction of the ECU	–	Replace the ECU.
Cruise control ON indicator lamp does not come on. (However, cruise control is functional.)	Burned-out indicator lamp bulb	No. 3	Repair the harness or replace the main switch.
	Open or short circuit in harness		

CHECK CHART

1	Inspection of control unit power supply circuit



XX36-AK-R1301-EC

(PLOT-OUT SCALE=0.5 93Rcar forEC)

DESCRIPTION OF OPERATION

The power is supplied through the ignition switch (IG_1) and cruise control main switch to the control unit.

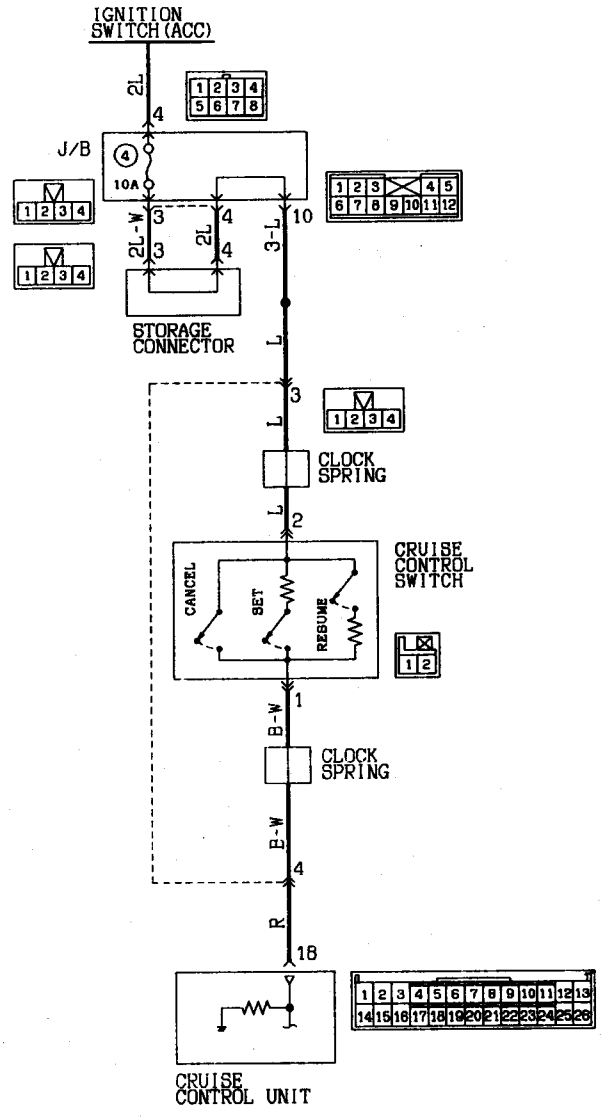
1. When the cruise control main switch is set to ON with the ignition switch at ON, the current from switch S_1 flows through relay Ry_1 in the switch. Accordingly, the contact of relay Ry_1 is closed and the power is supplied to the control unit.
2. When the main switch is released, it automatically returns to the neutral position. Since the current from switch S_2 flows to relay Ry_1, the contact of relay Ry_1 remains closed.
3. When the main switch is set to OFF, current to relay Ry_1 is interrupted. This opens the contact of relay Ry_1 to stop the power supply to the control unit. When the switch is released, it automatically returns to the neutral position, but relay Ry_1 stays in the OFF state.
4. When the ignition switch is set to OFF while relay Ry_1 in the main switch is ON, relay Ry_1 is forced to the OFF state just like when the main switch is set to OFF. Even if the ignition switch is set to ON again, relay Ry_1 stays in the OFF state until the main switch is set to ON.

TROUBLESHOOTING HINTS

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
2	Control unit power supply	Main switch ON and neutral position thereafter	System voltage
		Main switch OFF and neutral position thereafter	0V
6, 8, 14	Control unit earth	At all times	0V
16	Control unit back up power supply	At all times	System voltage

2 Inspection of control switch circuit



KX35-AK-R1S02-EC

DESCRIPTION OF OPERATION

The control switch is a switch in which the SET, RESUME and CANCEL switches are integrated. Therefore, different resistance values are used for the individual switches to change the outputs (voltages) to the control unit. Current flows through fuse No. ④ of J/B and through the control switch to the control unit.

200 * 125

1. SET switch

When the cruise control switch is ON, if the SET switch is set to ON while vehicle speed is within a range from about 40 to ~~145 km/h~~ (25 to ~~90~~ mph), the vehicle starts cruising at the speed. If the SET switch is kept at ON during cruise operation, the vehicle coasts, and starts cruising at the speed reached when the SET switch is set to OFF.

2. RESUME switch

Even if cruise operation is canceled, the vehicle resumes cruising at the speed set before the cancellation. Both when the main switch is set to OFF and when the vehicle speed is reduced to less than 40 km/h (25 mph) , the vehicle will not resume cruising at the previously set speed even if the RESUME switch is set to ON. If the RESUME switch is kept at ON during cruise operation, the engine accelerates, and the vehicle starts cruising at the speed reached when the RESUME switch was set to OFF. (However, when the vehicle speed is raised to more than 145 km/h (90 mph), the vehicle cruises at approximately ~~145 km/h (90 mph).~~ 200 125 *

3. CANCEL switch

When the CANCEL switch is set to ON during cruise operation, the cancel signal is input to the control unit which internally interrupts the power supply to the vacuum pump assembly for cancellation of cruise operation.

* HBT 54/57

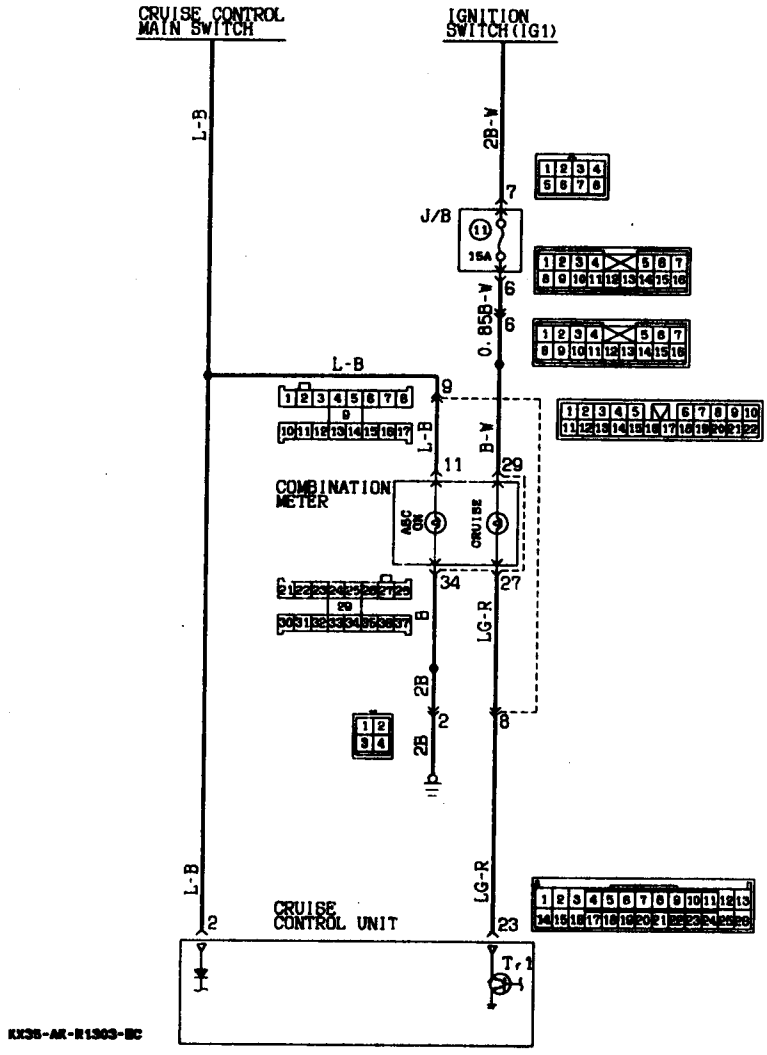
TROUBLESHOOTING HINTS

Diagnosis No. 15 (Automatically canceled)

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
18	Control switch	When all switches are OFF	0V
		When SET switch is ON	3V
		When RESUME switch is ON	6V
		When CANCEL switch is ON	System voltage

3	Inspection of indicator lamp circuit



DESCRIPTION OF OPERATION

1. Cruise control ON (ASC ON) indicator lamp

Located in the combination meter, it lights as soon as the main switch is set to ON.

2. Cruise control (CRUISE) indicator lamp

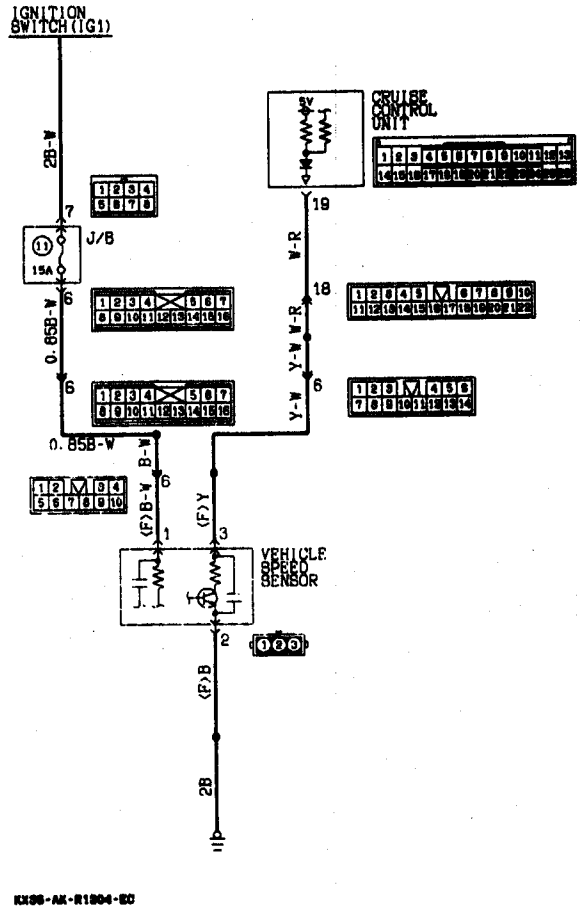
During cruise control operation, transistor Tr_1 in the control unit is kept in the ON state to keep the indicator lamp on.

TROUBLESHOOTING HINTS

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
23	Cruise control (CRUISE) indicator lamp	When cruise control is active	0V
		When cruise control is inactive	System voltage

4	Inspection of vehicle speed sensor circuit



DESCRIPTION OF OPERATION

The vehicle speed sensor, mounted in the transmission, delivers pulse signals proportional to the rotational speed of the transmission output gear (vehicle speed) to the control unit. (Four pulse signals generated per rotation of the output gear) Since the vehicle speed sensor is of the electronic type, the power is supplied through the ignition switch (IG_1).

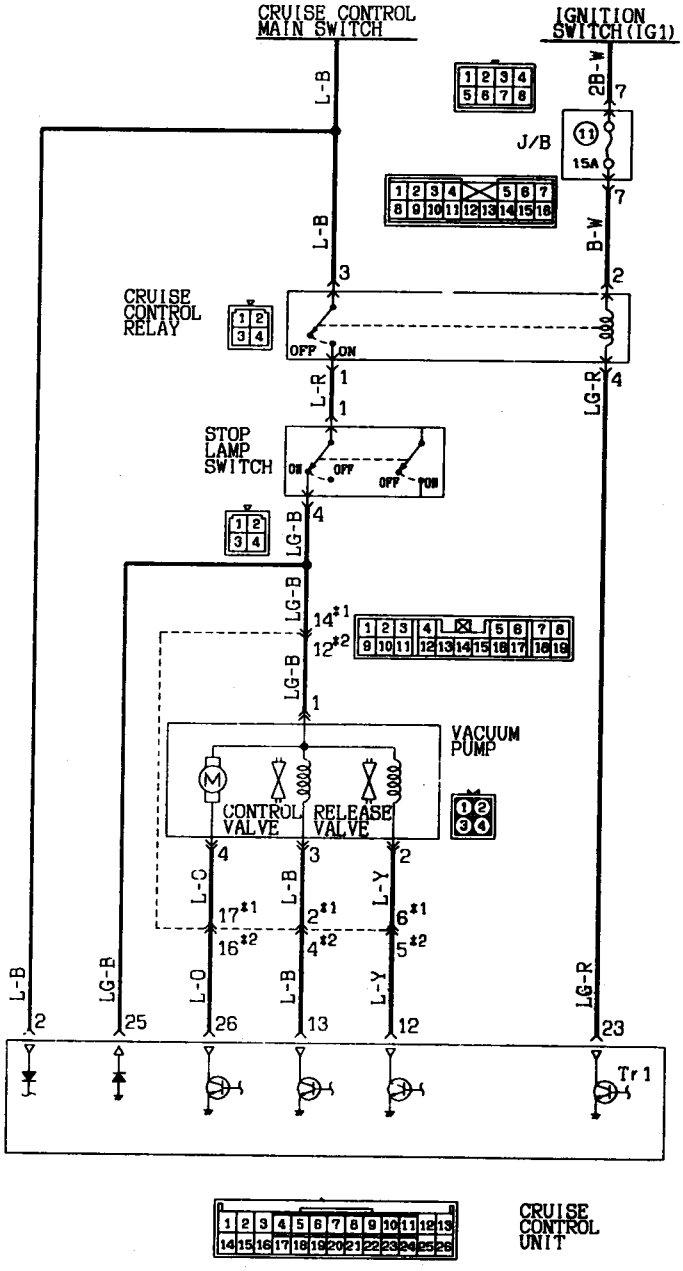
TROUBLESHOOTING HINTS

Diagnosis No. 12 (Automatically canceled)

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
19	Vehicle speed sensor	Slowly drive forward with shift lever at "1st Speed"	0 to 0.6V ↕ Flashing 2V or more

5 Inspection of vacuum pump assembly drive circuit



NOTE
*1:L.H. drive vehicles
*2:R.H. drive vehicles

DESCRIPTION OF OPERATION

The input signal from the control switch causes transistor Tr_1 to be ON. Accordingly, the cruise control relay is placed in the ON state to supply power to the vacuum pump assembly.
The vacuum pump assembly consists of a diaphragm type negative pressure pump that is driven by a DC motor, and two solenoid valves (control valve and release valve) and is controlled by the control unit as shown in the following table.
When the brake pedal is depressed during cruise control operation, the power supply to the vacuum pump assembly is cut off.

Cruise control operation	DC motor (ON: Current flows) (OFF: No current flows)	Solenoid valve ON: open OFF: closed	
		Control valve	Release valve
Acceleration	ON	ON	ON
Hold	OFF	ON	ON
Deceleration	OFF	OFF	ON
Release	OFF	OFF	OFF

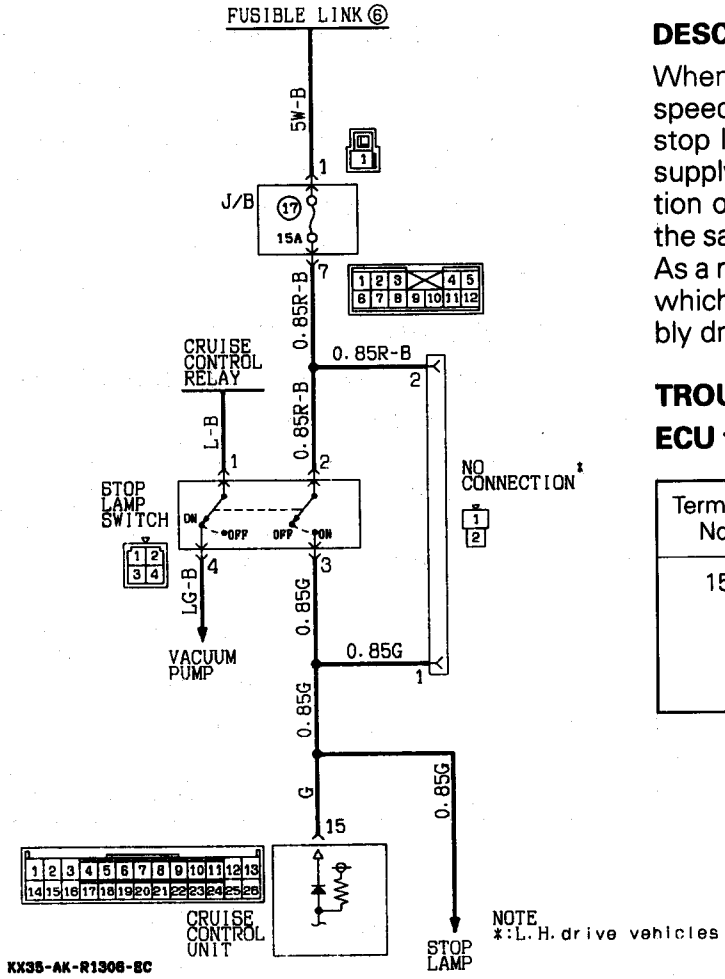
TROUBLESHOOTING HINTS

Diagnosis No. 11 (Automatically canceled)

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
12	Release valve drive signal	When release valve is ON	0V
		When release valve is OFF	System voltage
13	Control valve drive signal	When control valve is ON	0V
		When control valve is OFF	System voltage
26	DC motor drive signal	When DC motor is running	0V
		When DC motor is stationary	System voltage
25	Surge absorption circuit terminal	When main switch is ON	System voltage

6 Inspection of stop lamp switch circuit



DESCRIPTION OF OPERATION

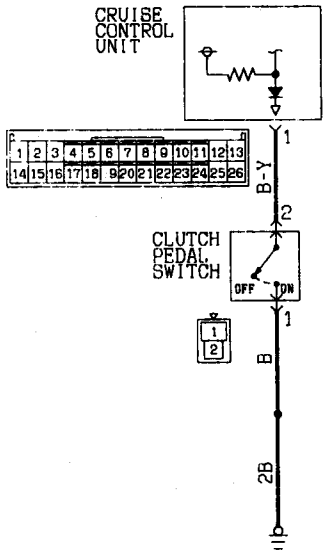
When the brake pedal is depressed during vehicle speed control, the cruise control (NC) contact of the stop lamp switch is opened to interrupt the power supply to the vacuum pump assembly for cancellation of vehicle speed control. (Refer to P.13-28.) At the same time, the stop lamp (NO) contact is closed. As a result, a cancel signal is input to the control unit which internally interrupts the vacuum pump assembly drive circuit.

TROUBLESHOOTING HINTS

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
15	Stop lamp switch	When brake pedal is depressed	System voltage
		When brake pedal is not depressed	0V

7 Inspection of clutch switch circuit



DESCRIPTION OF OPERATION

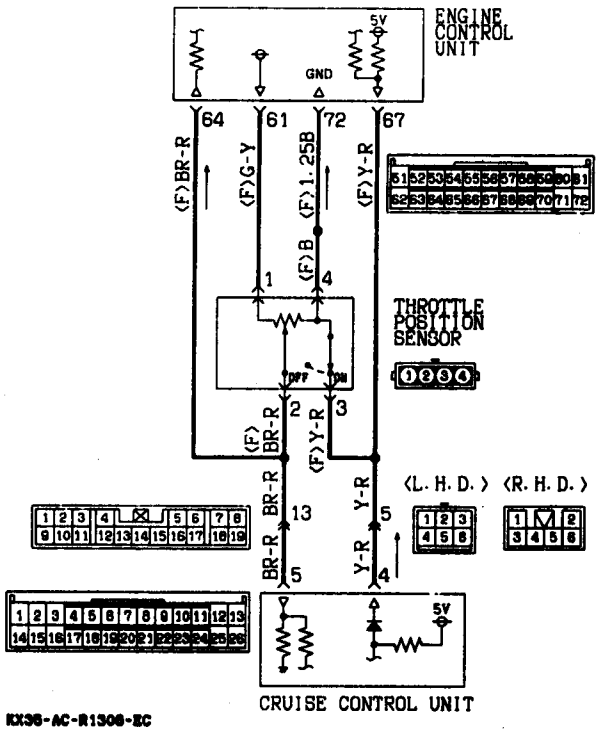
When the clutch pedal is depressed during vehicle speed control, the contact of the clutch switch is closed. As a result, a cancel signal is input to the control unit which internally interrupts the power supply to the vacuum pump assembly drive circuit for cancellation of vehicle speed control.

TROUBLESHOOTING

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
1	Clutch switch	When clutch pedal is depressed	0V
		When clutch pedal is not depressed	System voltage

8 Inspection of throttle position sensor circuit



DESCRIPTION OF OPERATION

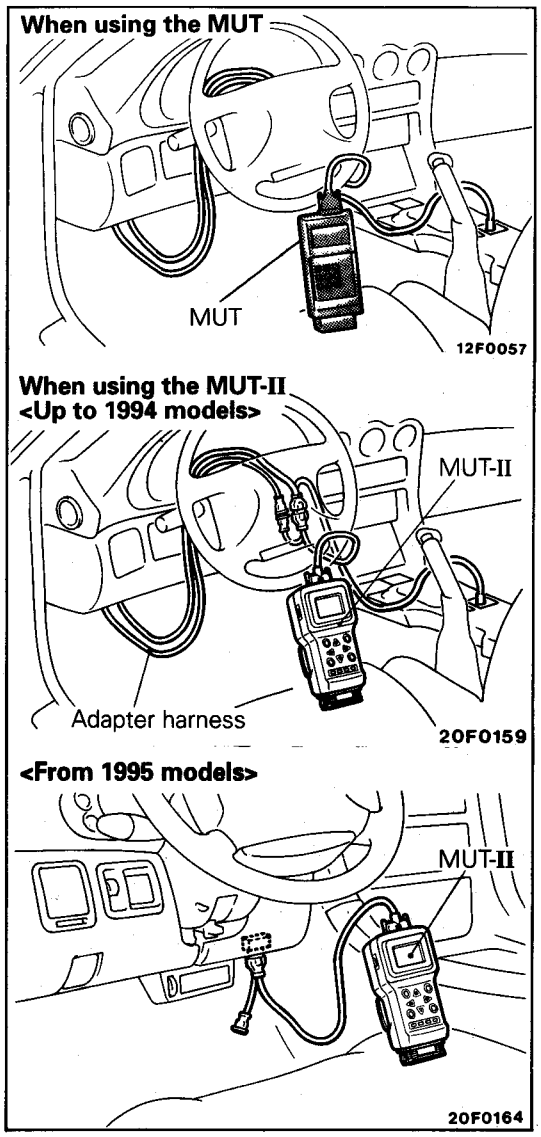
The throttle position sensor (with built-in idle switch) is used for engine control as well as cruise control. The throttle position sensor sends data to the control unit, regarding the opening of the accelerator. The idle switch inputs the data to the control unit on whether or not the accelerator pedal is operated.

TROUBLESHOOTING HINTS

Diagnosis No. 17 (Not automatically canceled)

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
4	Idle switch	When accelerator pedal is depressed	0V
		When accelerator pedal is not depressed	4.5 – 5.5V
5	Throttle position sensor	During idle	0.48 – 0.72V
		When fully opened	4.0 – 5.5V



SELF-DIAGNOSIS CHECKING

Self-diagnosis checking is performed when there has been an automatic cancellation, without cancel switch operation.

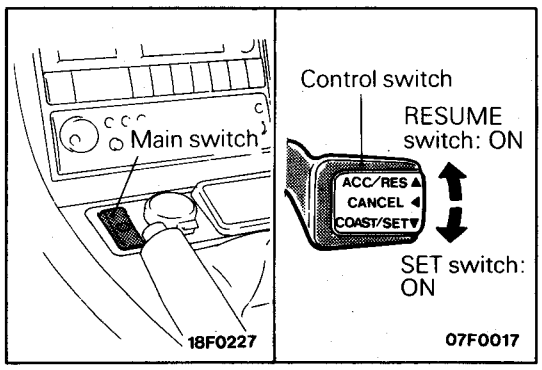
NOTE
Even when the ignition key is placed in the OFF position, all diagnosis codes are stored and retained, until the battery cable is disconnected, to make sure that the problems encountered in the past can be checked.

(1) Connect either MUT or MUT-II.

NOTE
When connecting MUT-II to 1994 models, use the adapter harness which belongs to MUT-II sub-assembly.

Caution
Connect and disconnect either MUT or MUT-II with the ignition switch in the OFF position.

(2) Read the self-diagnosis code.
(3) Refer to the diagnosis chart and repair the defective point.



(4) Clear the self-diagnosis codes by the following procedure.
① Place the ignition switch in the ON position.
② With the SET switch in the ON state, set the main switch to ON. In less than 1.0 second thereafter, set the RESUME switch to ON.
③ With the SET switch in the ON state again, keep the stop light switch in the ON state for more than 5 seconds.
④ Temporarily place the main switch in the OFF position to let the control unit escape from the input check mode. Then place the main switch in the ON position again.
⑤ Check the self-diagnosis code to verify that a normal code is output.

DIAGNOSIS DISPLAY PATTERNS AND CODES

Code No.	Probable cause	Check chart No.
11	Vacuum pump assembly drive output system out of order	5
12	Vehicle speed signal system out of order	4
15	Control switch out of order (When SET or RESUME switch is kept in ON state continuously for more than 60 seconds)	2
16	Control unit out of order	–
17*	Throttle position sensor or idle switch out of order	8

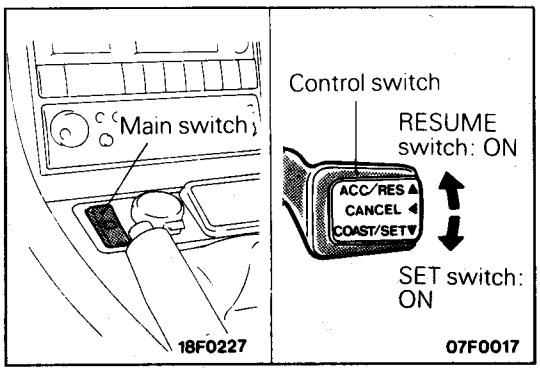
NOTE
1. When two or more problems occur simultaneously, the three latest code numbers are displayed in the order of lowest code number first.
2. Even if the problem represented by the code number marked * occurs during cruise control operation, the cruise control mode will not be cancelled.

INPUT CHECKING

Input checks should be made when the cruise control system cannot be set and when it is necessary to check (when a malfunction related to the cruise control system occurs) whether or not the input signals are normal.

NOTE
1. If inspection of self-diagnosis is necessary, confirm diagnosis code first and conduct input check.
2. Input check can be conducted by setting operations. Self-diagnosis terminal outputs display patters.
3. Display codes are displayed only if the circuit is normal according to the conditions shown in the input check table.

Perform checks using the following procedures.
(1) Connect a multi-use tester (MUT) or MUT-II to the diagnosis inspection connector of the junction block.



(2) Calling up a code

① Set the ignition switch to ON.
② With the SET switch in the ON state, set the main switch to ON. In less than 1.0 second thereafter, set the RESUME switch to ON. Then the input check results can be displayed.

(3) Reading a code

① Perform the individual input operations according to the input check table and read the codes.

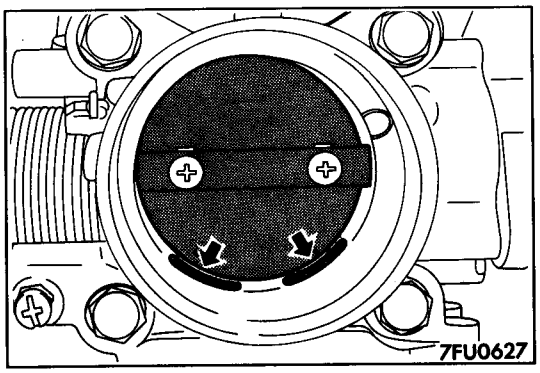
NOTE

1. When two or more input operations are performed simultaneously, all the associated code numbers are output in ascending order.
2. If no code is output by performing any of the input operations, the control unit power supply circuit or SET and RESUME switches are probably defective. Check the check tables 1 and 2 (P.13-24, 25).

② Set the main switch OFF.

INPUT CHECK TABLE

Code No.	Input operation	Check results
21	SET switch ON	SET switch circuit normal
22	RESUME switch ON	RESUME switch normal
23	Stop lamp switch ON (brake pedal depressed)	Stop lamp switch circuit normal
24	Vehicle speed more than approx. 40 km/h (25 mph)	Vehicle speed sensor circuit normal if code Nos. 24 and 25 are displayed
25	Vehicle speed less than approx. 40 km/h (25 mph)	
26	Clutch switch ON (clutch pedal depressed)	Clutch switch circuit normal
27	CANCEL switch ON	CANCEL switch circuit normal
28	TPS output voltage 1.5V or more (Accelerator pedal depressed more than half the way)	Throttle position sensor circuit normal
29	Idle switch OFF (Accelerator pedal depressed)	Idle switch circuit normal



SERVICE ADJUSTMENT PROCEDURES

THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

E13HAJA

(1) Start the engine, warm it up until engine coolant temperature rises to 80°C (176°F), and stop the engine.
(2) Disconnect the air intake hose at the throttle body side.
(3) Put a plug in the inlet of bypass passage in the throttle body.

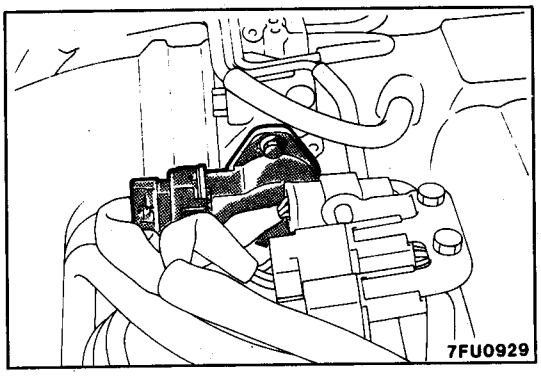
Caution
Never allow cleaning agent to flow into the bypass passage.

(4) Spray cleaning agent from the intake port of the throttle body to the valve and leave as it is for 5 minutes or so.
(5) Start the engine and race it several times. Then, run it idle for approx. one minute.

NOTE
If the engine idle speed becomes unstable (and fails in the worst case) after plugging the bypass passage, run the engine with the throttle valve slightly opened.

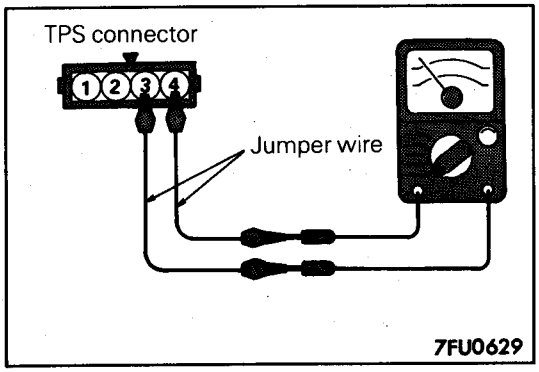
(6) If the deposit cannot be removed from the throttle valve, repeat steps (4) and (5).
(7) Disconnect the plug from the inlet of the bypass passage.
(8) Install the air intake hose.
(9) Use a multi-use tester (MUT) or MUT-II to erase the self-diagnosis code.
(10) Adjust the basic idle speed (speed adjusting screw). (Refer to P.13-37.)

NOTE
If the engine hunts while it is idling after adjustment of the basic idle speed, disconnect the negative cable from the battery terminal for more than 10 seconds and then idle the engine again.

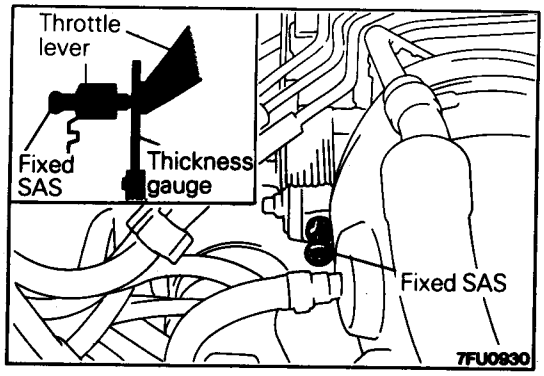


ADJUSTMENT OF IDLE POSITION SWITCH AND THROTTLE POSITION SENSOR (TPS)

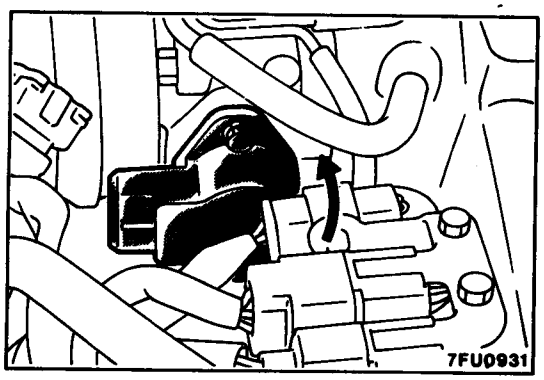
(1) Disconnect the throttle position sensor connector.



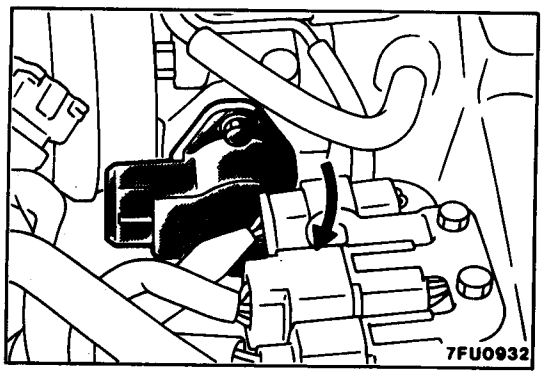
(2) Using jumper wires, connect an ohmmeter across terminal ③ (idle position switch) and terminal ④ (sensor earth) of the throttle position sensor.



(3) Insert a 0.65-mm (0.025 in.)-thick thickness gauge between the fixed SAS and throttle lever.



(4) Loosen the throttle position sensor mounting bolts and turn the throttle position sensor body fully counterclockwise.
(5) In this condition, check that there is continuity across terminals ③ and ④

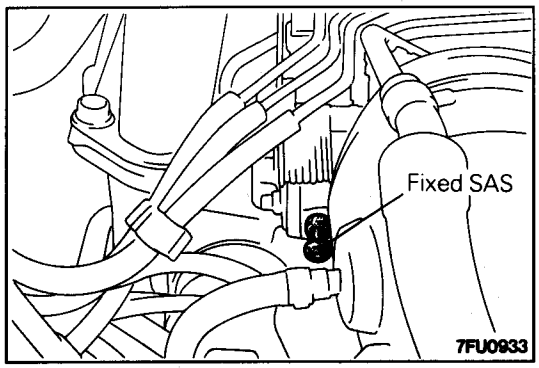


(6) Slowly turn the throttle position sensor clockwise until you find a point at which there is no continuity across terminals ③ and ④. Then, tighten the throttle position sensor mounting bolt securely.
(7) Connect the throttle position sensor connector.

(8) When using the multi-use tester (MUT) or MUT-II, connect it to the diagnosis connector.
(9) Turn the ignition switch ON (but do not start the engine).
(10) When using the MUT or MUT-II, select item No. 14 and read the throttle position sensor output voltage.

Standard value: 0.4 – 1.0V

(11) If the voltage is out of specification, check the throttle position sensor and associated harnesses.
(12) Remove the thickness gauge.
(13) Turn the ignition switch OFF.



ADJUSTMENT OF FIXED SAS E13FIDC

NOTE
1. The fixed SAS has been factory-adjusted. Never attempt to move it.
2. Should it be out of proper adjustment, adjust by following the procedure given below.

(1) Sufficiently slacken the accelerator cable.
(2) Loosen the lock nut on the fixed SAS.
(3) Sufficiently loosen the fixed SAS by turning it counterclockwise to fully close the throttle valve.
(4) Tighten the fixed SAS slowly to find a point at which it contacts the throttle lever (where the throttle valve starts opening). From that point, tighten the fixed SAS further 1 1/4 turns.
(5) Holding the fixed SAS to prevent it from turning, tighten the lock nut securely.
(6) Adjust the accelerator cable tension. (Refer to P.13-41.)
(7) Adjust the basic idle speed. (Refer to P.13-37.)
(8) Adjust the idle position switch and throttle position sensor (TPS). (Refer to P.13-35.)

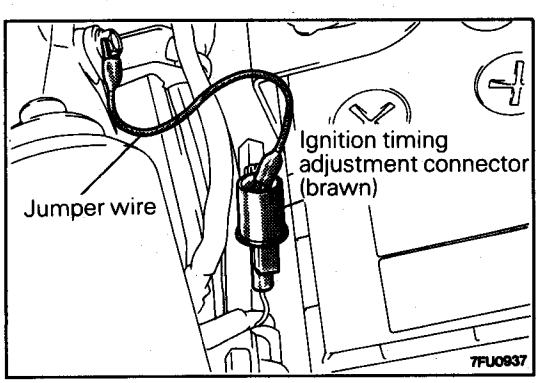
BASIC IDLE SPEED ADJUSTMENT

NOTE
(1) The basic idle speed has been factory-adjusted with the speed adjusting screw (SAS) and does not normally require adjustment.
(2) If the adjustment is required, first check that the ignition plug, injector, ISC servo, and compression pressure are normal.

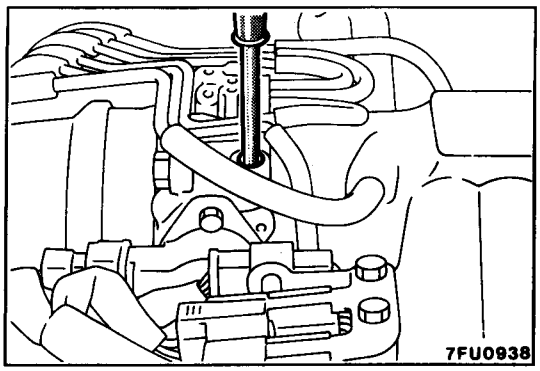
(1) Before starting the inspection and adjustment procedures, set the vehicle in the following conditions:
- Engine coolant temperature: 80 to 95°C (176 to 203°F)
- Lamp, electric cooling fan, accessories: OFF
- Transmission: Neutral

(2) When using the multi-use tester (MUT) or MUT-II, connect it to the diagnosis connector.

NOTE
The connection of the MUT or MUT-II earthes the diagnosis control terminal.



(3) Remove the waterproof female connector from the ignition timing adjusting connector (brawn).
(4) Using a jumper wire, earth the ignition timing adjusting terminal.



(5) Start the engine and run at idle.
(6) Check the basic idle speed.

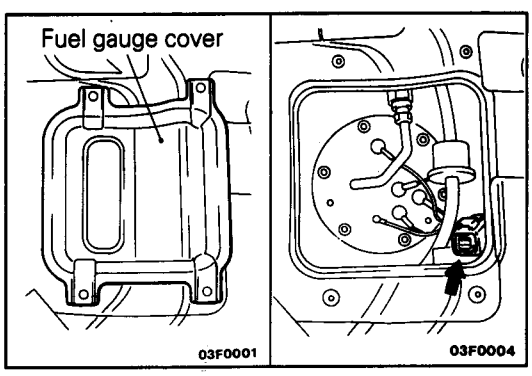
Basic idle speed: 700 ± 50 r/min.

NOTE
1. The engine speed may be low by 20 to 100 rpm while the vehicle is new [distance driven approx. 500 km (300 miles) or less], but no adjustment is necessary.
2. If the engine stalls or speed is low despite a sufficient distance driven [approx. 500 km (300 miles) or more], it is probably due to deposits on the throttle valve. In this case, clean the throttle valve. (Refer to P.13-35.)
3. The tachometer should read 1/3 of the actual engine speed. This means that the actual engine speed is the tachometer reading multiplied by 3.

(7) If the basic idle speed is out of specification, adjust by turning the speed adjusting screw (SAS).

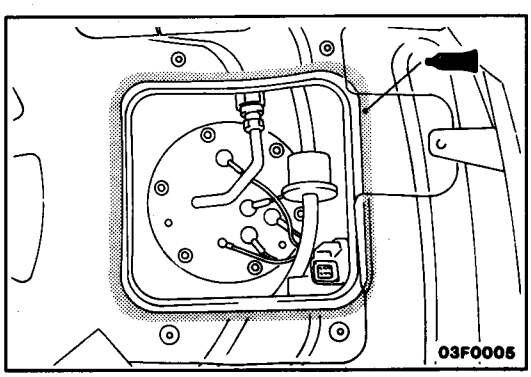
NOTE
If the idle speed is higher than the standard value even with SAS fully tightened, check to see if there is evidence of the idle switch being moved. If the idle switch seems to have been moved, adjust it. If it does not seem to have been moved, there may be a leak caused by deteriorated fast idle air valve (FIAV). In such a case, replace the throttle body.

(8) Turn the ignition switch OFF.
(9) Remove the jumper wire from the ignition timing adjusting terminal and replace the connector back again.
(10) Start the engine again and run at idle for 10 minutes to make sure that the engine runs at proper idle speed.



RELEASE OF RESIDUAL PRESSURE FROM HIGH PRESSURE FUEL HOSE E13HABL

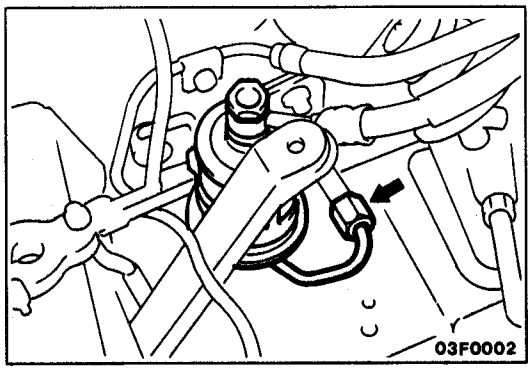
Make the following operations to release the pressure remaining in fuel pipe line so that fuel will not flow out.
(1) Remove the fuel gauge cover in the luggage compartment.
(2) Disconnect the fuel pump harness connector.
(3) Start the engine and after it stops by itself, turn the ignition switch to OFF.
(4) Connect the fuel pump harness connector.



(5) Apply the specified sealant to the rear floor pan.

Specified sealant: 3M ATD Part No. 8509 or equivalent

(6) Install the fuel gauge cover.

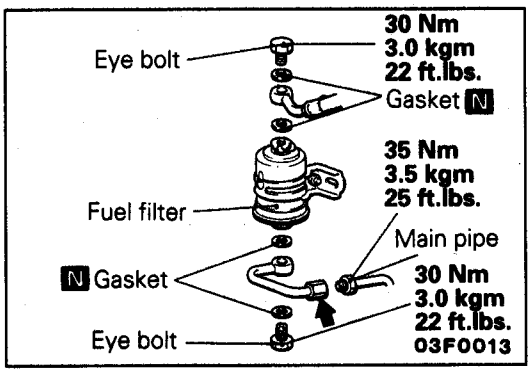


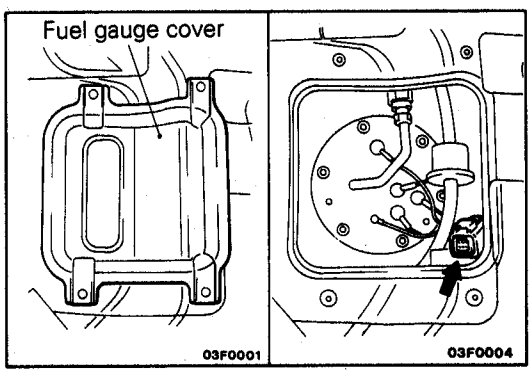
FUEL FILTER REPLACEMENT E13FZAQ

(1) Release the residual pressure inside the fuel line.
(2) Remove the battery and washer tank.
(3) Remove the air intake hose.
(4) Hold the fuel filter with a spanner, and remove the high pressure fuel hose and the eye bolt.

Caution
The fuel pipe line has some residual pressure, so cover it with a rag, etc.

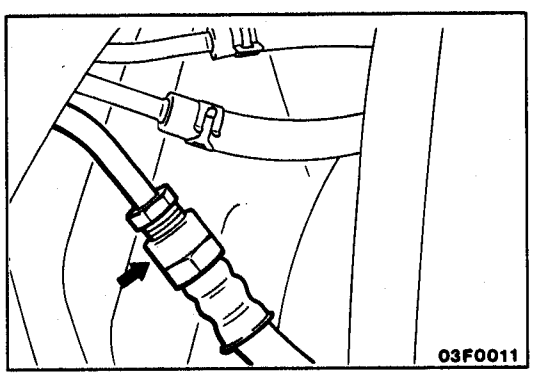
(5) After holding the nut shown in the illustration, loosen the flare nut and disconnect the fuel main pipe.
(6) Remove the fuel filter.
(7) When installing the fuel filter, use a new gasket, and tighten the high pressure fuel hose and fuel main pipe flare nuts at the specified torque.
(8) After installation, check that there are no fuel leakages.
   ① Apply the battery voltage to the fuel pump drive terminal and operate the fuel pump. (Refer to P.13-40.)
   ② Check for fuel leakages when the fuel is under pressure.





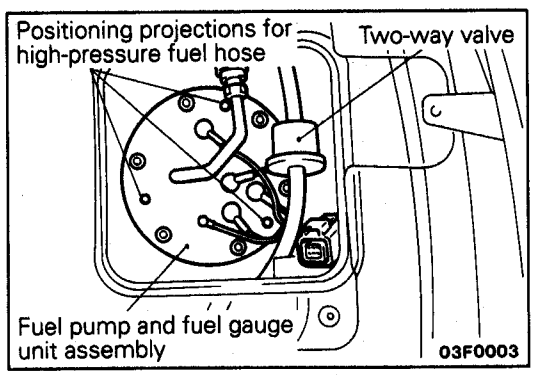
FUEL GAUGE UNIT REPLACEMENT E13FDAJ

(1) Remove the fuel gauge cover in the luggage compartment.
(2) Disconnect the fuel pump harness connector.
(3) Start the engine and after it stops by itself, turn the ignition switch to OFF.



(4) Disconnect the high-pressure fuel hose connection on the body side.

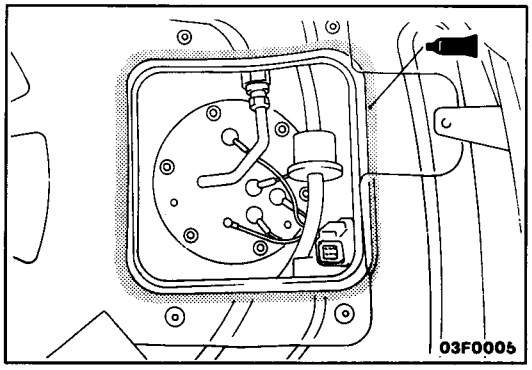
Caution
The fuel pipe line has some residual pressure, so cover it with a rag, etc.

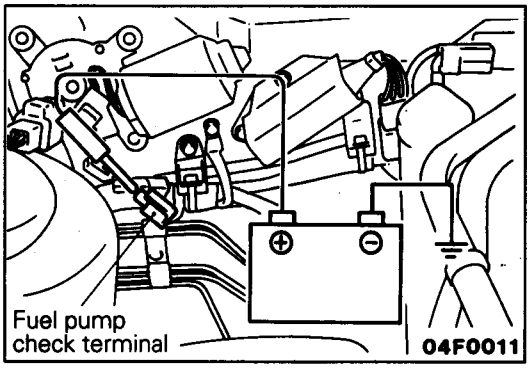


(5) Disconnect the high-pressure fuel hose connection on the pump side.

NOTE
Hold the nut on the pump side with a spanner and turn the nut on the hose side.

(6) Remove the two-way valve and remove the fuel pump and fuel gauge unit assembly.
(7) When installing the fuel pump and fuel gauge unit assembly, align the positioning tabs (3 locations) on the packing with the holes in the fuel pump and fuel gauge unit assembly.





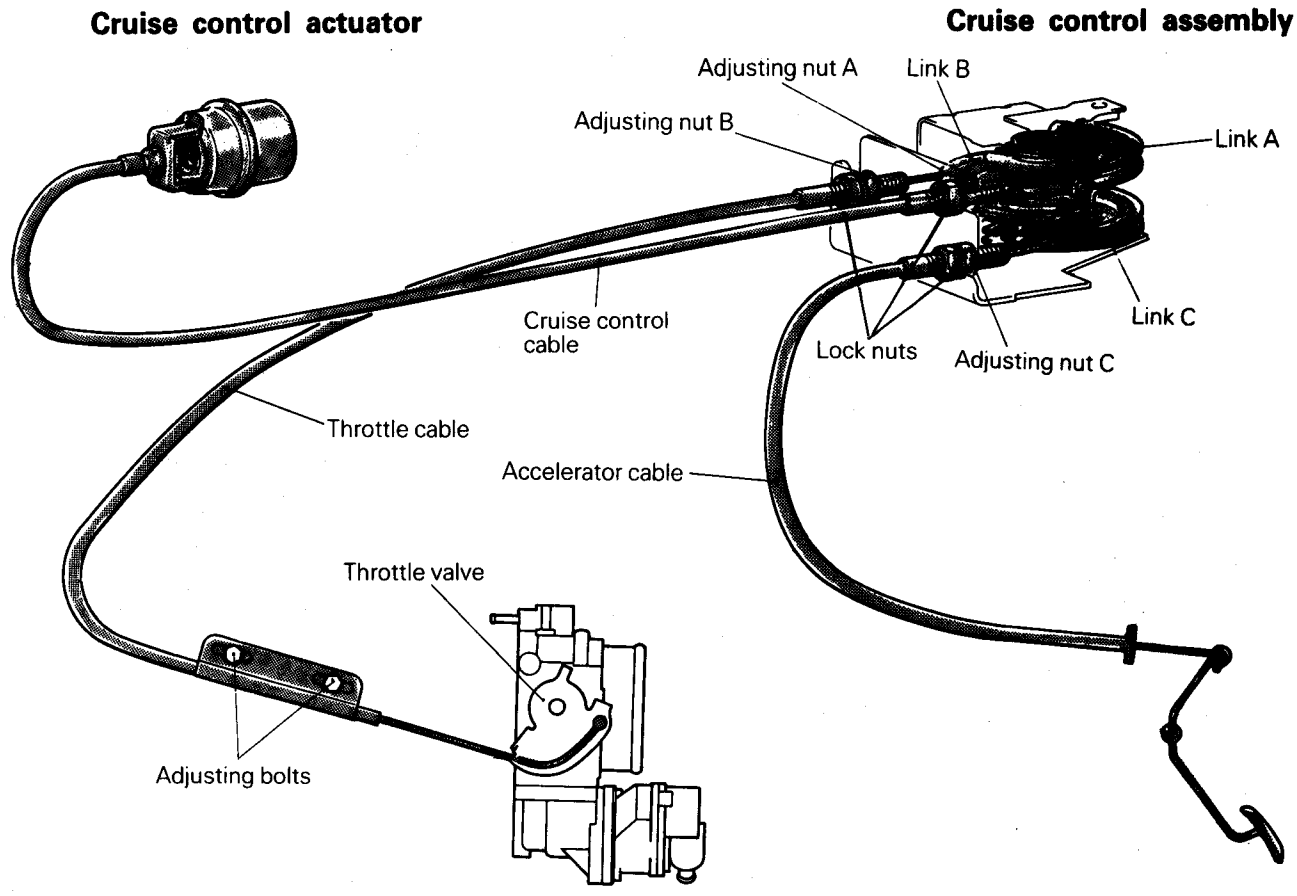
(8) After installation, check that there are no fuel leakages.
  ① Apply the battery voltage to the fuel pump drive terminal and operate the fuel pump. (Refer to P.13-40.)
  ② Check for fuel leakages when the fuel is under pressure
(9) Apply the specified sealant to the rear floor pan.
  Specified sealant: 3M ATD Part No. 8509 or equivalent
(10) Install the fuel gauge cover.

FUEL PUMP OPERATION CHECK E13FGCH

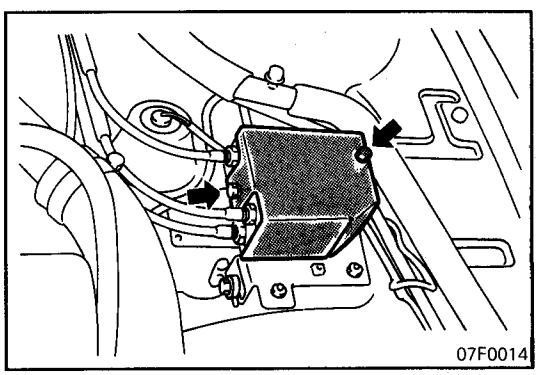
(1) Set the ignition switch at OFF.
(2) Check that when the battery voltage is directly applied to the fuel pump check terminal (black), the operating sound of the pump can be heard.
  NOTE
  Since the fuel pump is installed in the fuel tank, its operating sound cannot be readily heard. Remove the fuel tank cap and listen to the operating sound through the filter port.
(3) Hold the high pressure fuel hose between your fingers and check that the fuel pressure can be felt.

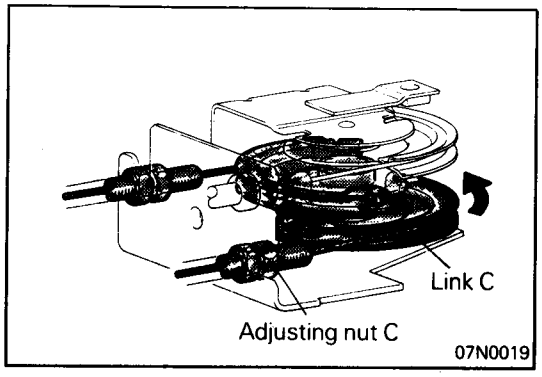
CRUISE CONTROL CABLE INSPECTION AND ADJUSTMENT

E13FYAI



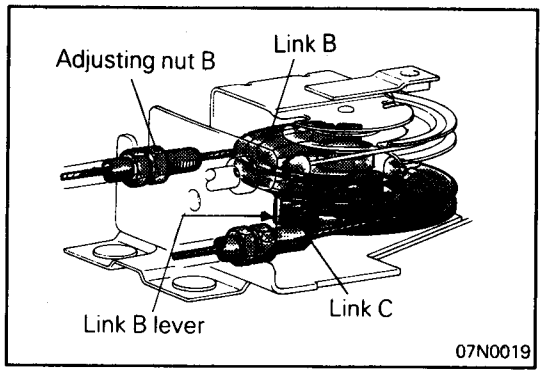
(1) Set the air conditioner, lights and other switches to OFF for inspection at no load.
(2) Let the engine warm up until it runs at idle.
(3) Check that the idle speed is within the specified range.
(4) Stop the engine and set the ignition switch to OFF.
(5) Check that the accelerator cable, cruise control cable and throttle cable are routed without sharp bends.
(6) Depress the accelerator pedal to check that the throttle lever moves smoothly from the fully-closed to fully-opened position.
(7) Check the free travel state of the inner cables of the accelerator cable, cruise control cable and throttle cable.
(8) If the inner cables are too loose or have no free travel at all, check using the following procedure.
    ① Remove the link protector.
    ② Loosen the adjusting and lock nuts of the throttle lever and intermediate links A, B and C to place the throttle lever and intermediate links A, B and C in the free state.





③ Set the ignition switch to ON (do not start the engine).
④ Rotate intermediate link C in the direction shown until it is blocked by the stopper, turn down adjusting nut C in the direction that the free travel of the inner cable is reduced, and back off adjusting nut C the specified number of turns just before intermediate link C begins to move.

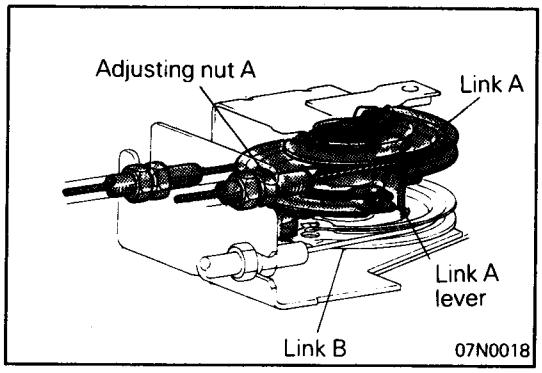
Amount adjusting nut C is to be backed off:
About 1/2 turn [inner cable free travel 0 – 1 mm (0 – 0.04) in.)]



⑤ Secure the accelerator cable with the lock nut.
⑥ Turn down adjusting nut B in the direction that the free travel of the inner cable of the throttle cable is reduced. At the position where the lever of intermediate link B is brought into contact with intermediate link C, back off adjusting nut B the specified number of turns.

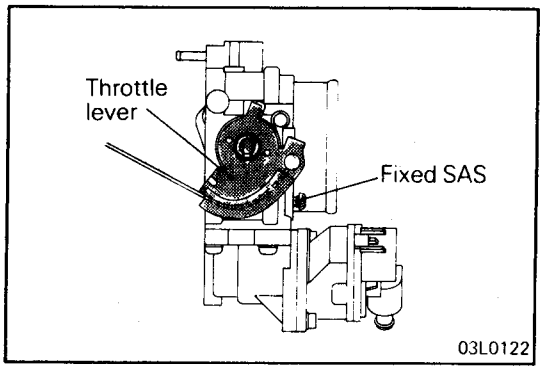
Amount adjusting nut B is to be backed off:
About one turn [inner cable free travel 1 to 2 mm (0.04 to 0.08 in.)]

⑦ Secure the throttle cable with the lock nut.

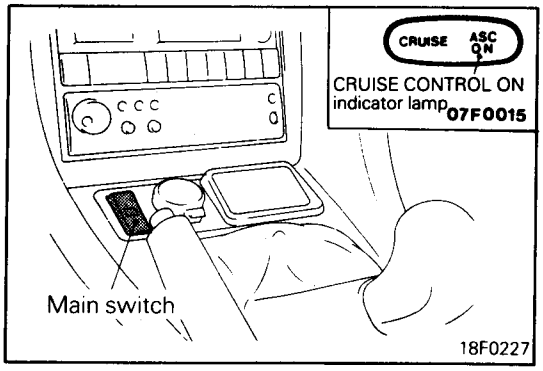


⑧ Secure the adjusting bolt of the air intake plenum.
⑨ Turn down adjusting nut A in the direction that the free travel of the inner cable of the cruise control cable is reduced. At the position where the lever of intermediate link A is brought into contact with intermediate link B, back off adjusting nut A the specified number of turns.

Amount adjusting nut B is to be backed off:
About one turn [inner cable free travel 1 to 2 mm (0.04 to 0.08 in.)]



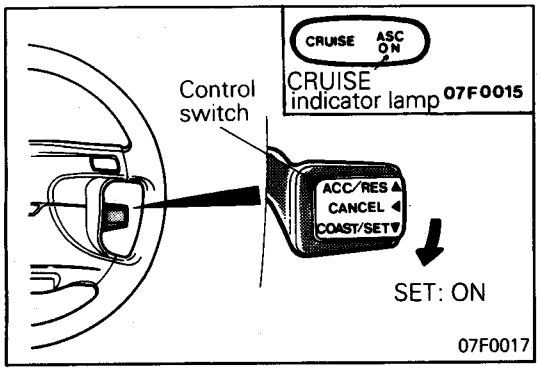
⑩ Secure the cruise control cable with the lock nut.
⑪ After adjustment, check to see that the end of the fixed SAS is in contact with the stopper of the throttle lever.

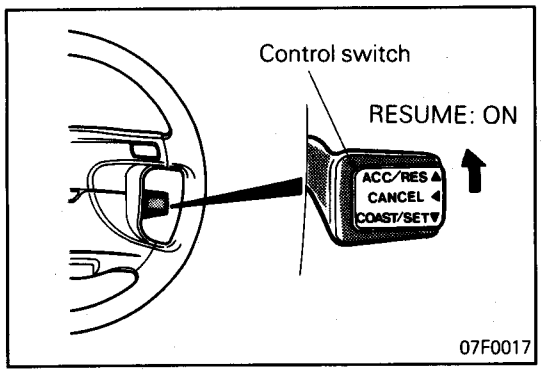


CRUISE CONTROL SYSTEM INSPECTION E13FYAK

CRUISE CONTROL MAIN SWITCH CHECK

(1) Turn the ignition key to ON.
(2) check to be sure that the CRUISE CONTROL ON indicator lamp within the combination meter illuminates when the main switch is switched ON.





CRUISE CONTROL SETTING CHECK

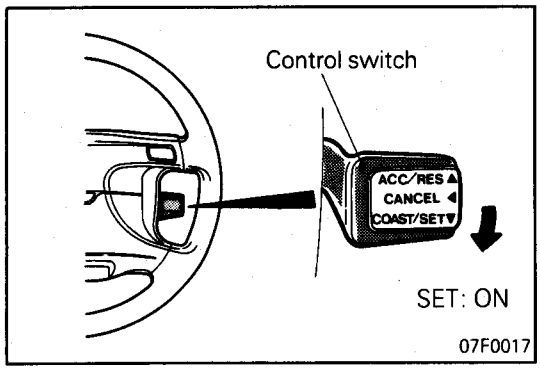
(1) Switch ON the main switch.
(2) Drive at the desired speed within the range of approximately 40 – 200 km/h (25 – 125 mph).
(3) Operate the control switch downward. (SET switch: ON)
(4) Check to be sure that the speed is the desired constant speed when the switch is released, and also check to be sure that the CRUISE indicator lamp (within the combination meter)illuminates.

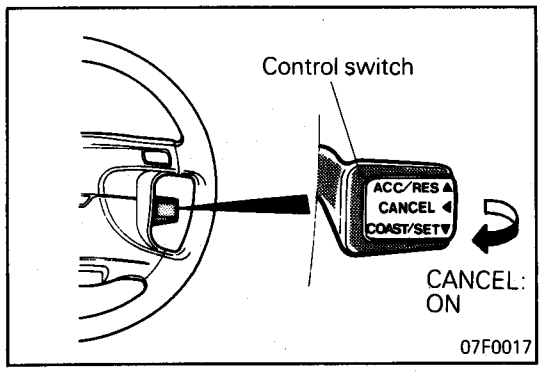
NOTE
If the vehicle speed decreases to approximately 15 km/h (9 mph) below the set speed, because of climbing a hill for example, the cruise control will be cancelled.

SPEED-INCREASE SETTING CHECK

(1) Set to the desired speed.
(2) Operate the control switch upward. (RESUME switch: ON)
(3) Check to be sure that acceleration continues while the switch is hold, and that when it is released the constant speed at the time when it was released becomes the driving speed.

NOTE
Even if, during acceleration, the vehicle speed reaches or exceeds the high limit [approximately 200 km/h (125 mph)], acceleration will continue, however, when the switch is released, the set speed ("memorized speed") will become the high limit of the vehicle speed.





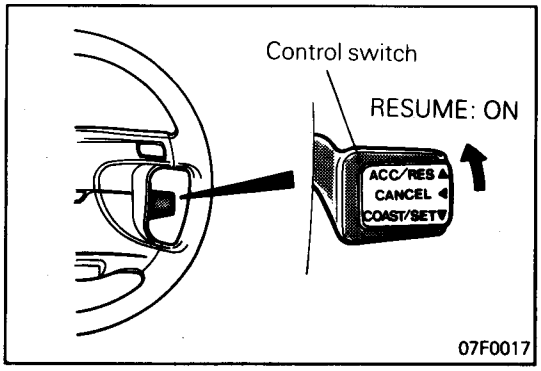
SPEED REDUCTION SETTING CHECK

(1) Set to the desired speed.
(2) Operate the control switch downward. (SET switch: ON)
(3) Check to be sure that deceleration continues while the switch is held, and that when it is released the constant speed at the time when it was released becomes the driving speed.

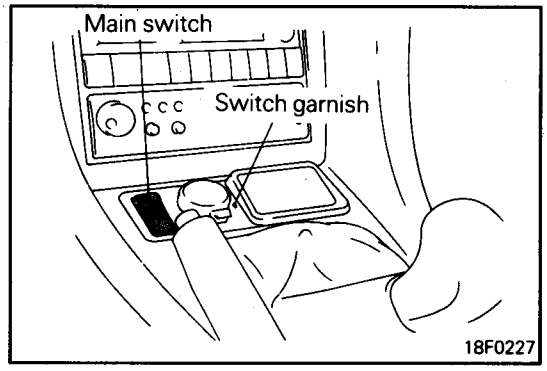
NOTE
When the vehicle speed reaches the low limit [approximately 40 km/h (25 mph)] during deceleration, the cruise control will be cancelled.

CRUISE CONTROL CANCELLATION AND SET SPEED RESUME CHECK

(1) Set cruise control.
(2) In the cruising condition of the cruise control mode, check that when any of the following operations are performed, the normal drive mode is restored and the vehicle coasts smoothly.
   ① Move the control switch toward you. (CANCEL switch: ON)
   ② Depress the brake pedal.
   ③ Depress the clutch pedal.



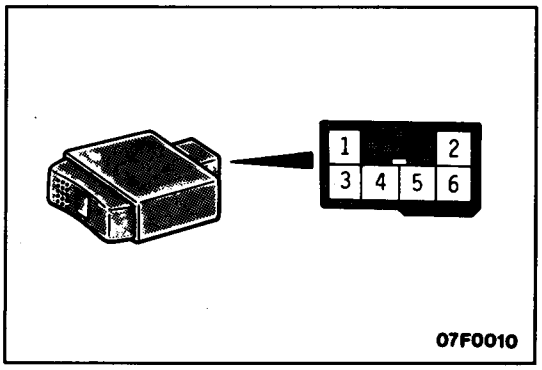
(3) With the vehicle at a speed of more than about 40 km/h (25 mph), check that when the control switch is moved upward (RESUME switch: ON), the vehicle resumes cruising at the speed held before cancellation of the cruise control mode.
(4) In the cruise control mode, check that when the main switch is set to OFF, the normal drive mode is restored and the vehicle coasts smoothly.



INDIVIDUAL PART INSPECTION E13HAEG

CRUISE CONTROL MAIN SWITCH INSPECTION

(1) Remove the main switch together with the switch garnish.
(2) Remove the main switch from the switch garnish.

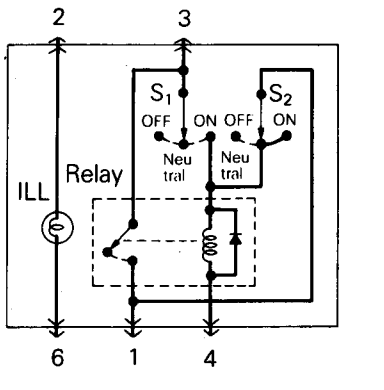


(3) Operate the main switch and check for continuity across the individual terminals.

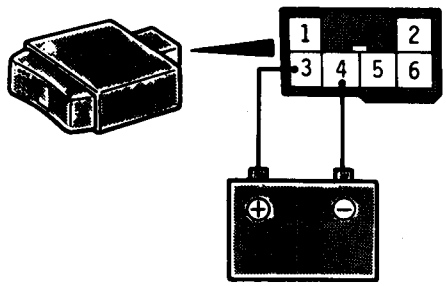
Switch state \ Terminal No.	6	ILL	2	3	4	1
Press OFF.	○	○	○			
Neutral position	○	○	○		○	○
Press ON.	○	○	○	○	○	○

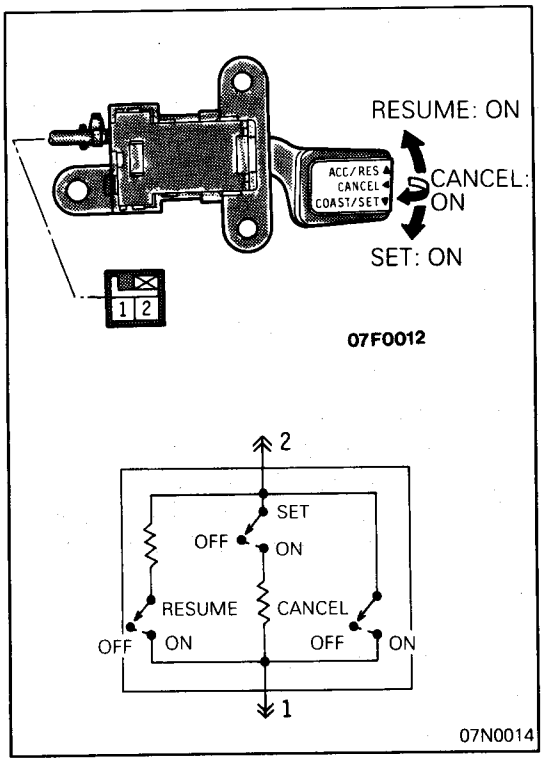
NOTE
(1) ○–○ denotes continuity across the terminals.
(2) ILL: Illumination lamp

(4) Connect a positive lead from the battery to terminal ③ and a negative lead from the battery to terminal ④ and check that battery voltage is available across terminal ① and the earth during the period the ON side of the main switch is pressed and during the period before the OFF side is pressed thereafter.
Check that when the OFF side of the main switch is pressed thereafter, the battery voltage available across terminal ① and the earth is reduced to 0 V.



ILL: Illumination lamp





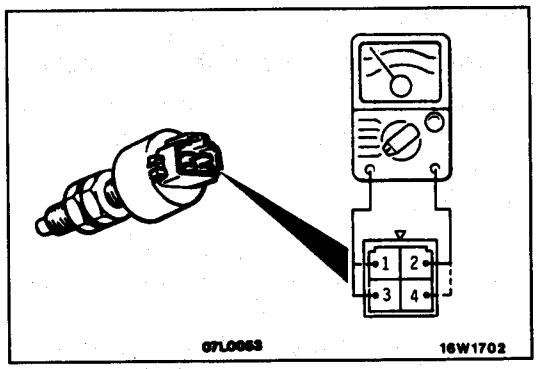
CRUISE CONTROL SWITCH INSPECTION

(1) Remove the air bag module.

Caution
Before removal of air bag module, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.

(2) Disconnect the connector of the control switch and operate the control switch to measure the resistance between the individual terminals.
If the readings are as shown below, the control switch may be considered good.

Switch operation	Resistance between terminals
When switch is not operated	No continuity
When switch is operated toward you (CANCEL switch: ON)	Approx. 0 Ω
When switch is operated upward (RESUME switch: ON)	Approx. 820 Ω
When switch is operated downward (SET switch: ON)	Approx. 2,700 Ω

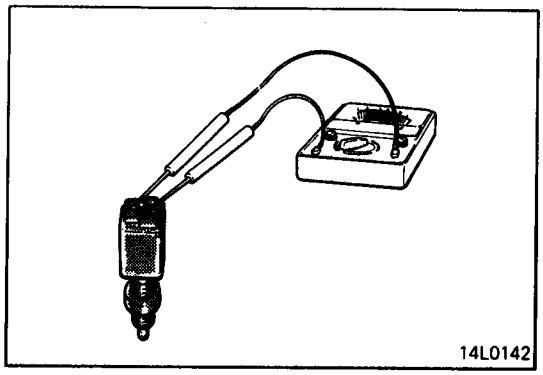


STOP LAMP SWITCH/BRAKE SWITCH INSPECTION

(1) Disconnect the connector.
(2) Check for continuity between the terminals of the switch.

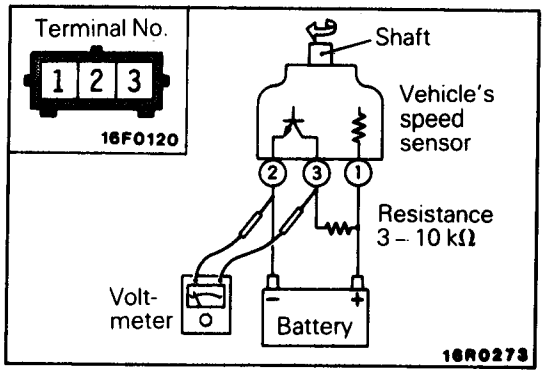
O–O: Continuity

Switch / Terminal / Measurement conditions	Brake switch		Stop lamp switch	
	1	4	2	3
When brake pedal depressed.			O—O	
When brake pedal not depressed.	O—O			



CLUTCH SWITCH INSPECTION

(1) Disconnect the connector.
(2) Check that there is continuity between the terminals when the clutch pedal is depressed, and that there is no continuity when the pedal is released.



VEHICLES SPEED SENSOR INSPECTION

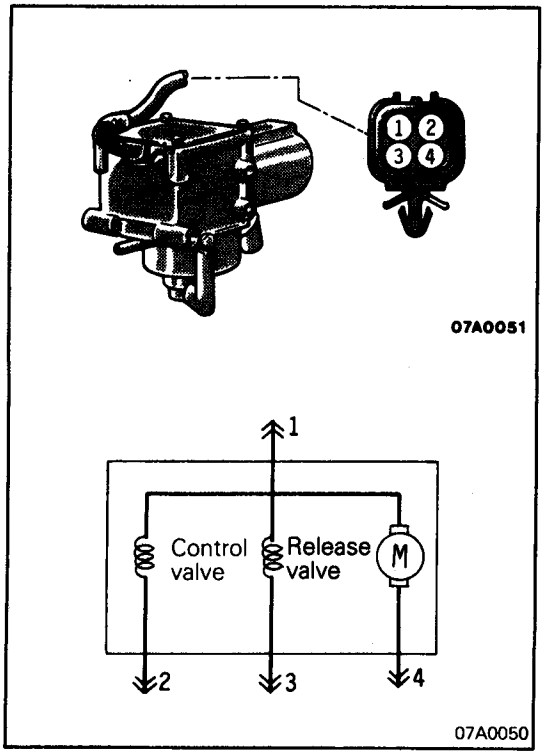
(1) Remove the vehicle's speed sensor and connect as shown in the illustration, using a 3 – 10 kΩ resistance.
(2) Use a voltmeter to check for voltage at terminals ② and ③ when the pulse generator shaft is turning. (One revolution is four pulses.)

THROTTLE POSITION SENSOR INSPECTION

For inspection, refer to P.13-77.

IDLE POSITION SWITCH INSPECTION

For inspection, refer to P.13-79.



VACUUM PUMP INSPECTION

Inspection of Solenoid Valves (Control and Release Valves)

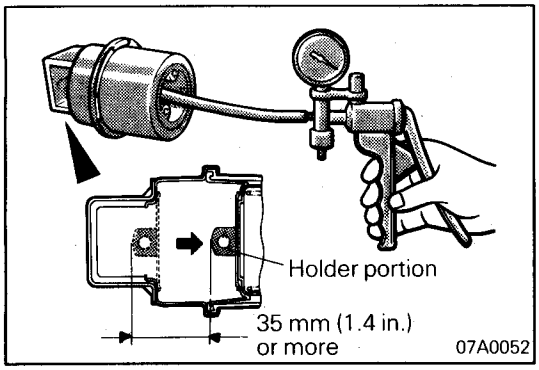
(1) Disconnect the connector of the vacuum pump assembly.
(2) Measure the resistance values across terminals ① and ② and across terminals ① and ③.

Standard value: 50 – 60 Ω

(3) Check that when the battery voltage is applied across terminals ① and ② and across terminals ① and ③, the operating sounds of the solenoid valves are heard.
(4) If the solenoid valves are defective, replace the vacuum pump assembly.

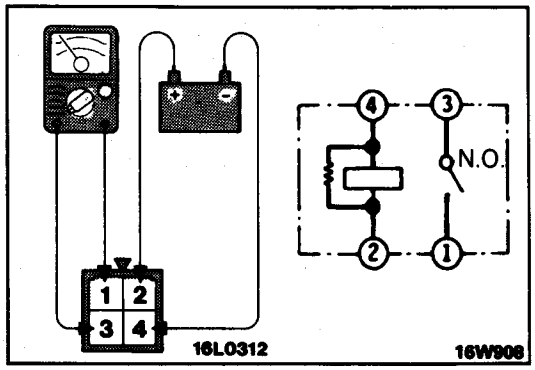
Inspection of Motor

(1) Disconnect the connector of the vacuum pump assembly.
(2) Check that when the battery voltage is applied across terminals ① and ④, the motor operates.



ACTUATOR INSPECTION

(1) Remove the actuator.
(2) Using a vacuum pump, apply a negative pressure to the actuator to check that the holder portion moves more than 35 mm (1.4 in.). Retain the negative pressure in that state to check that the holder portion does not change its position.
(3) After the actuator has been mounted, check and adjust the cruise control cable. (Refer to P.13-41.)



CRUISE CONTROL RELAY INSPECTION

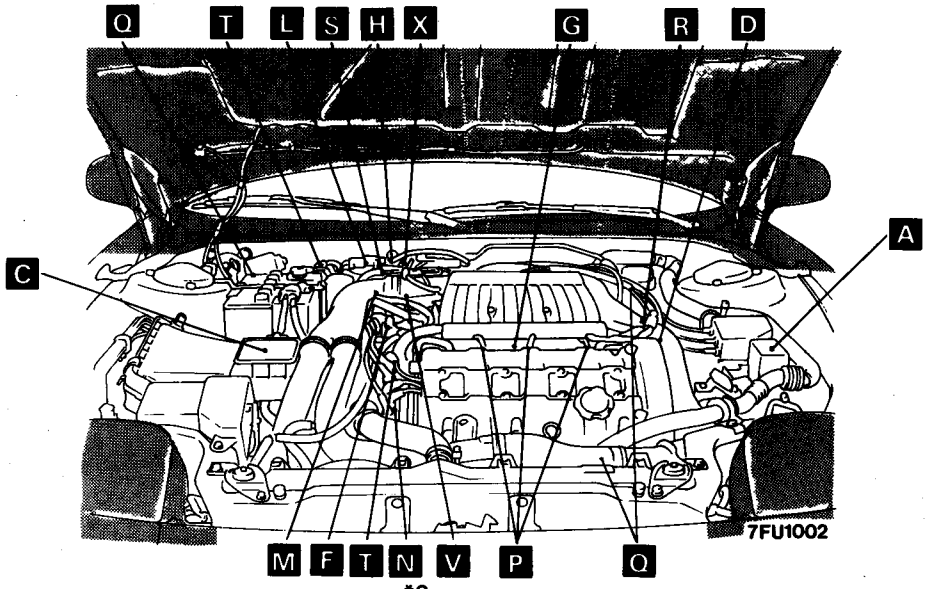
(1) Remove the cruise control relay.
(2) Apply battery power to terminal ② and connect terminal ④ to the earth. Check for continuity across the terminals.

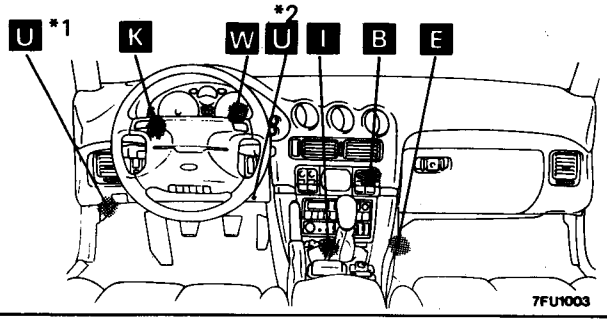
When power is supplied	Across terminals 1–3	Continuity
When no power is supplied	Across terminals 1–3	No continuity
	Across terminals 2–4	Continuity

ON-VEHICLE INSPECTION OF MPI COMPONENTS

COMPONENT LOCATION

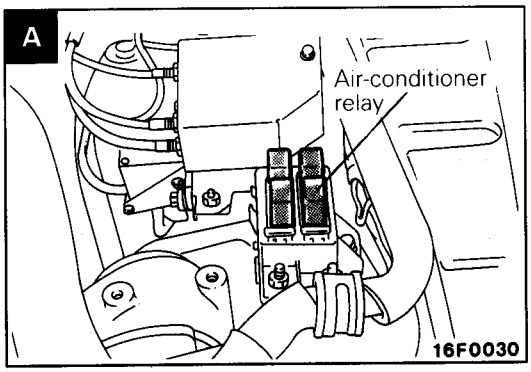
Name	Symbol	Name	Symbol
Air conditioner relay	A	Fuel pressure control valve	L
Air conditioner switch	B	Idle speed control servo	M
Air flow sensor (incorporating intake air temperature sensor and barometric pressuire sensor)	C	Ignition coil (power transistor)	N
		Ignition timing adjustment terminal	O
		Injector	P
Cam position sensor	D	Oxygen sensor	Q
Control relay	E	Power steering fluid pressure switch	R
Crank angle sensor	F	Purge control solenoid valve	S
Detonation sensor	G	Resistor	T
EGR control solenoid valve	H	Self-diagnosis connector	U
Engine control unit	I	Throttle position sensor (with idle position switch)	V
Engine coolant temperature sensor	J		
Engine warning lamp (Malfunction indicator lamp)	K	Vehicle speed sensor	W
		Waste gate solenoid valve	X





NOTE
*1: Up to 1994 models
*2: From 1995 models

A



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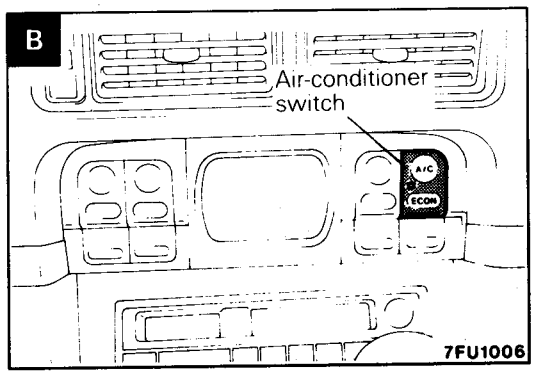

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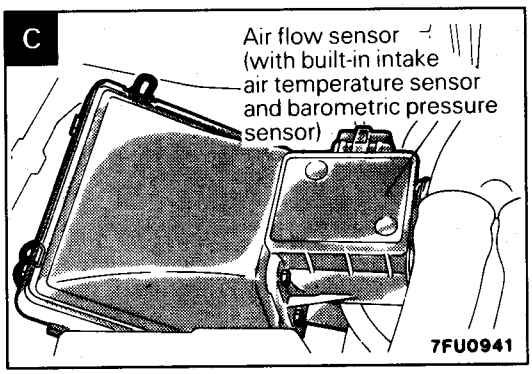

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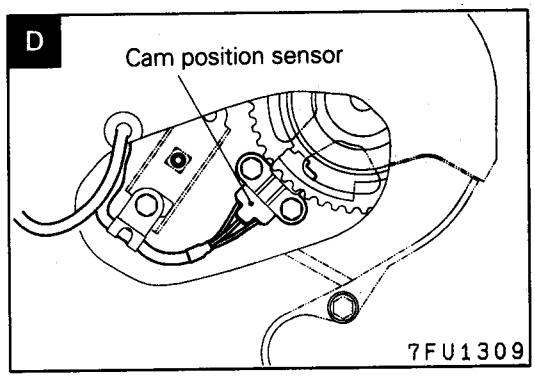

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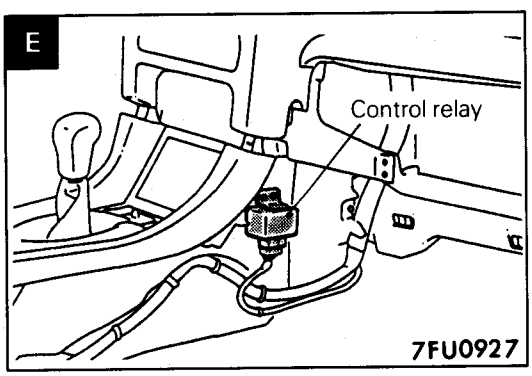

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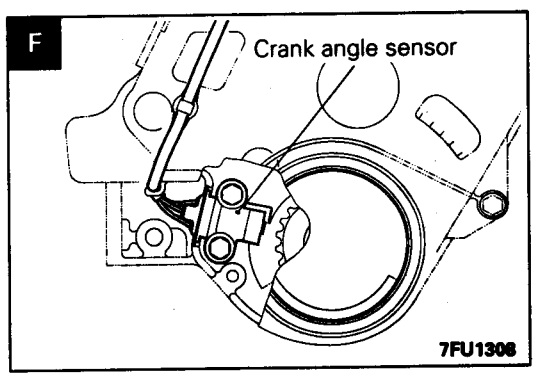

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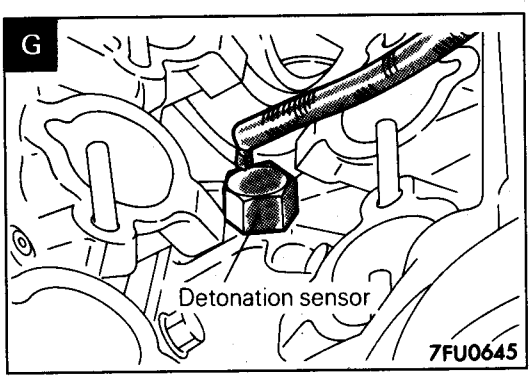

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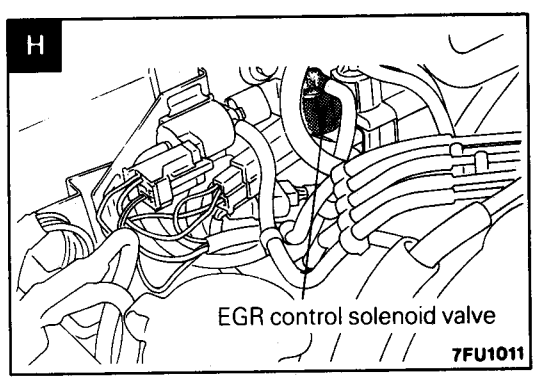

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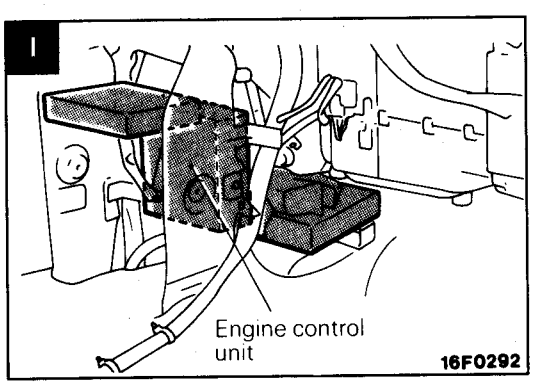

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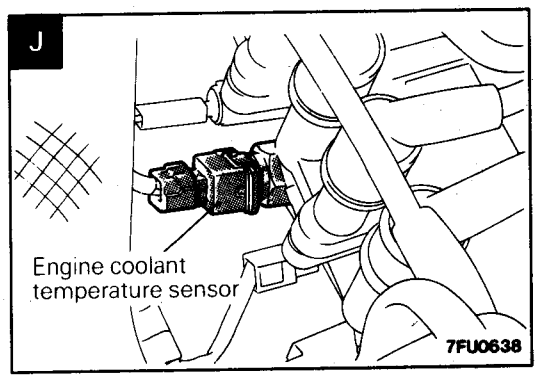

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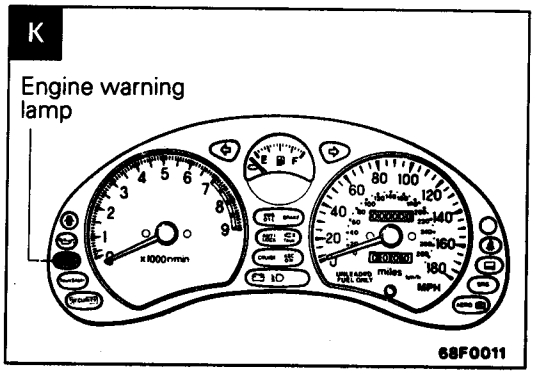

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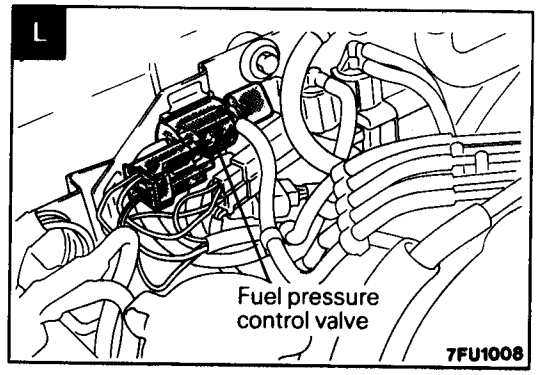

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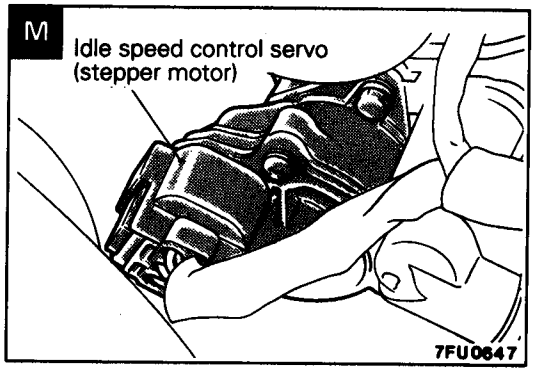

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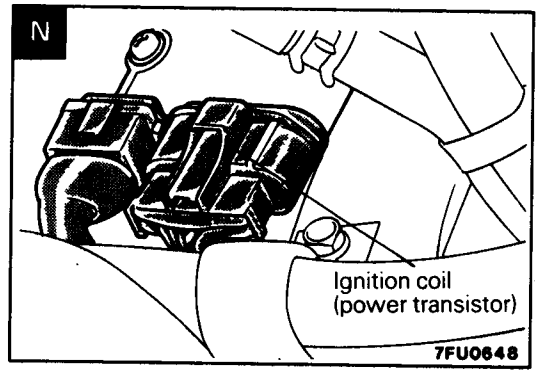

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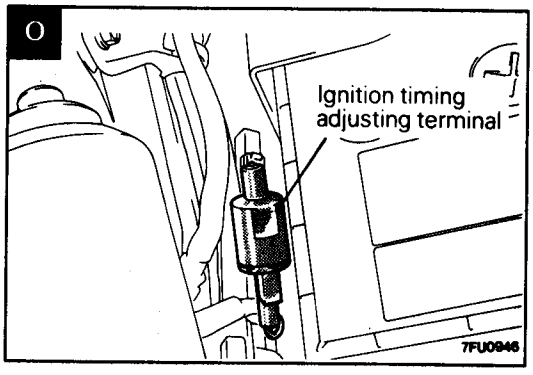

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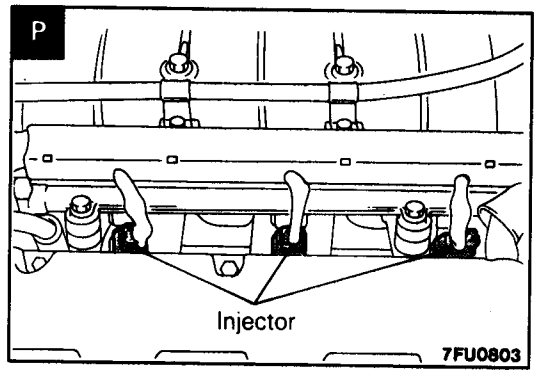

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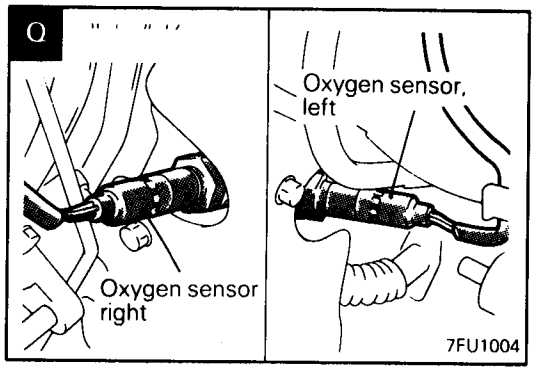

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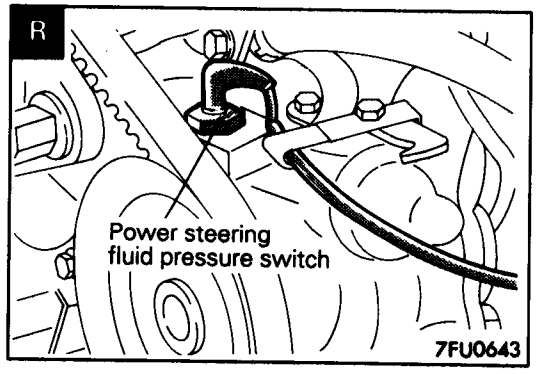

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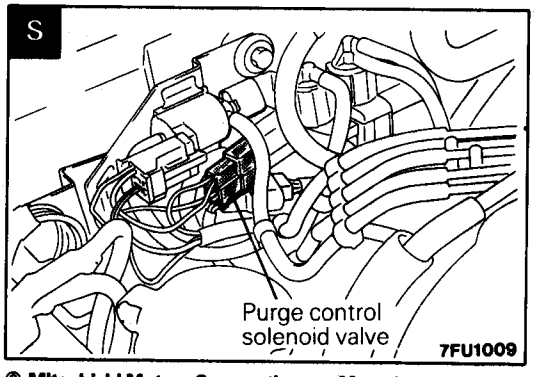

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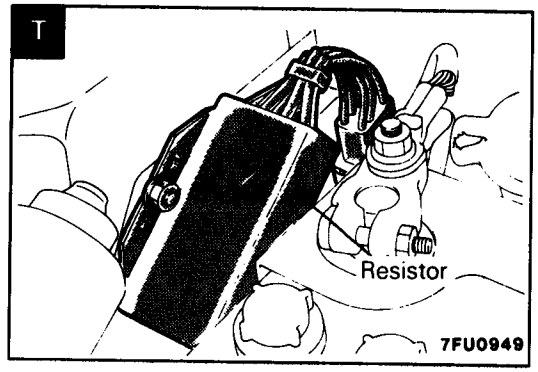
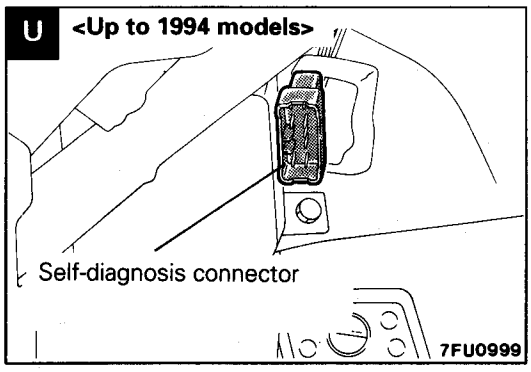


U <Up to 1994 models>



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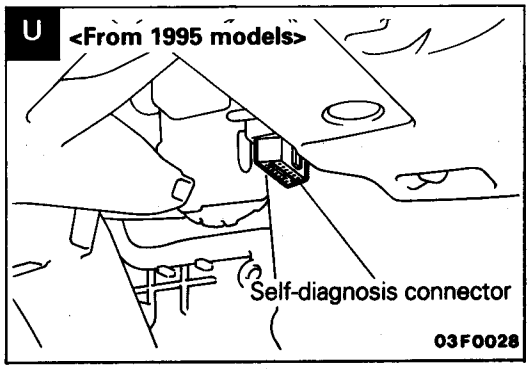

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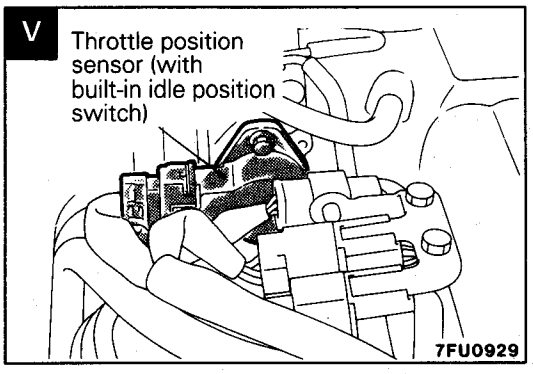

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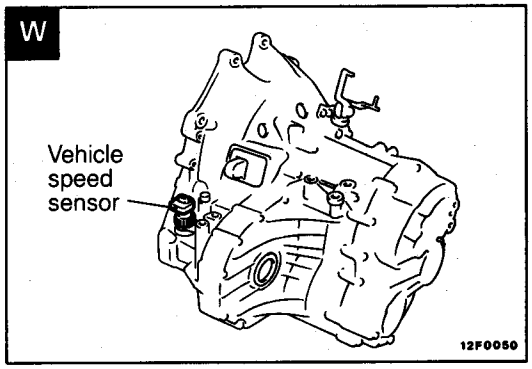

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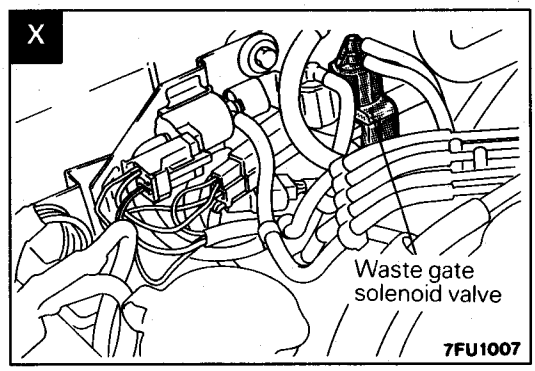
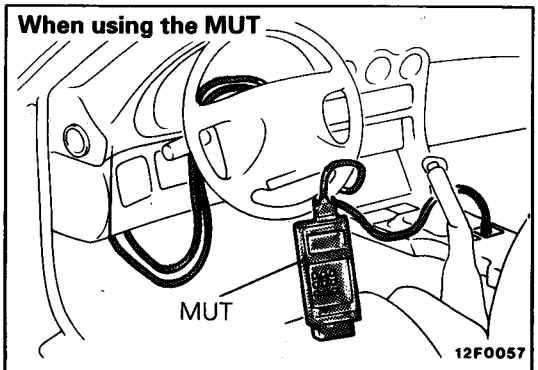
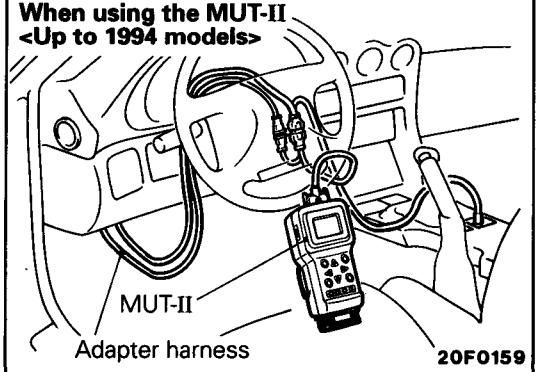


When using the MUT



When using the MUT-II
<Up to 1994 models>



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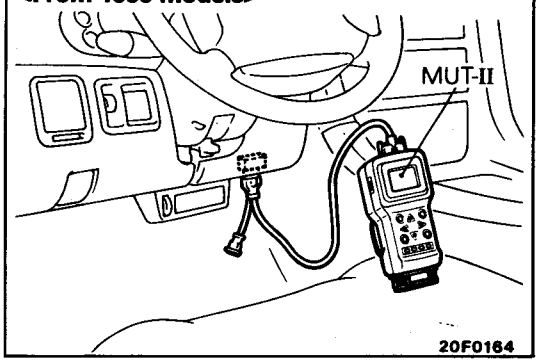


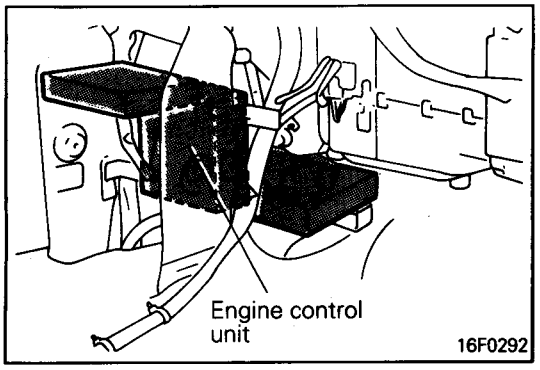
COMPONENT INSPECTION PROCEDURE E13YBAC

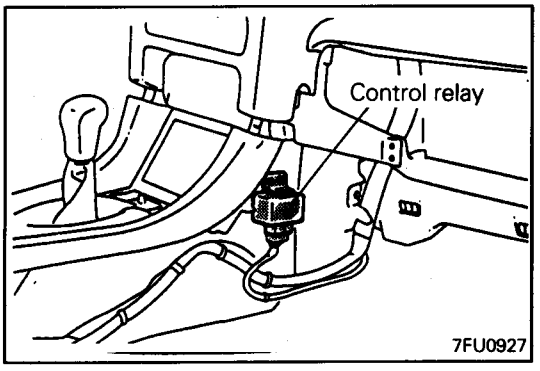
USING MULTI-USE TESTER (MUT) OR MUT-II

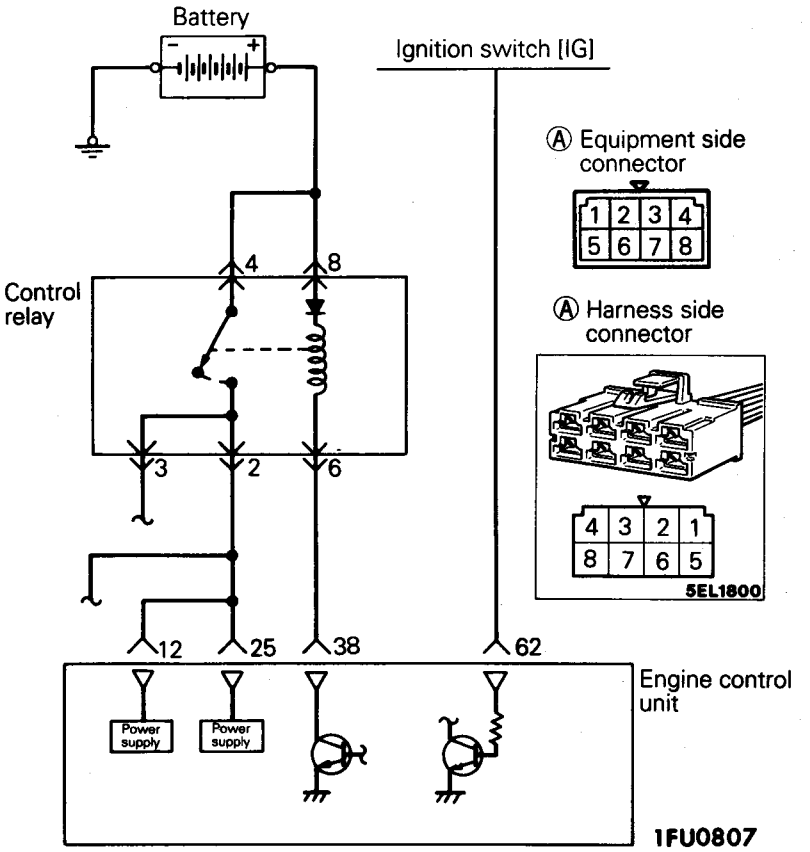
(1) Check by the data reading and actuator test function. If any abnormality is found, check the body harness, components, etc. and repair as necessary.
(2) After repair, check again with the MUT or MUT-II to make sure that the input and output signals are now normal.
(3) Erase the self-diagnosis trouble code in memory.
(4) Disconnect the MUT or MUT-II.
(5) Start the engine and perform running test, etc. to make sure that the troubles have been corrected.

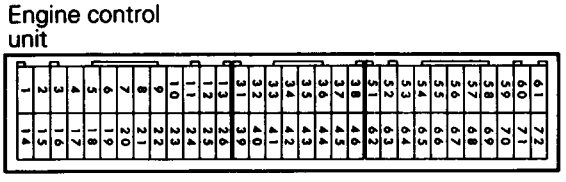
NOTES

POWER SUPPLY AND IGNITION SWITCH-IG









9FU0101

OPERATION

- While the ignition switch is ON, battery power is supplied to the engine control unit, the injector, the air flow sensor, etc.
- When the ignition switch is turned ON, the battery voltage is applied from the ignition switch to the engine control unit, which then turns ON the power transistor to energize the control relay coil. This turns ON the control relay switch and the power is supplied from the battery to the engine control unit through the control relay switch.

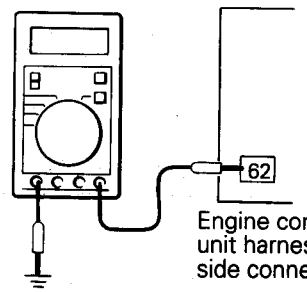
INSPECTION

Using Multi-use Tester (MUT) or MUT-II

Function	Item No.	Data display	Check condition	Standard value
Data reading	16	Engine control unit power voltage	Ignition switch: ON	SV

HARNESS INSPECTION

1



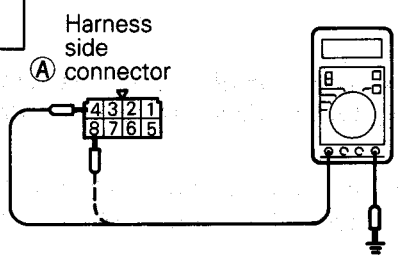
Measure the ignition switch (IG) terminal input voltage.

- Engine control unit connector: Disconnected

Ignition switch	Voltage (V)
OFF	0–1
ON	SV

OK → 2 Repair the harness. (Ignition switch – 62) or check the ignition switch

2



Measure the power supply voltage of the control relay.

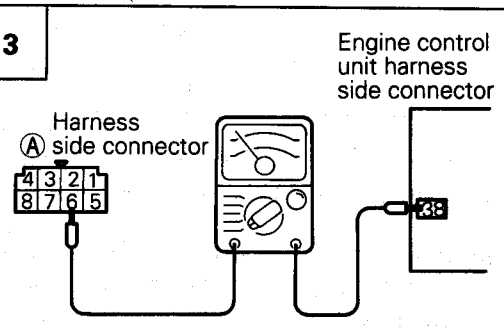
- Ignition switch: OFF
- Control relay connector: Disconnected

Voltage (V)
SV

OK → 3

NG → Repair the harness. (Battery – Ⓐ4, Ⓐ8)

3



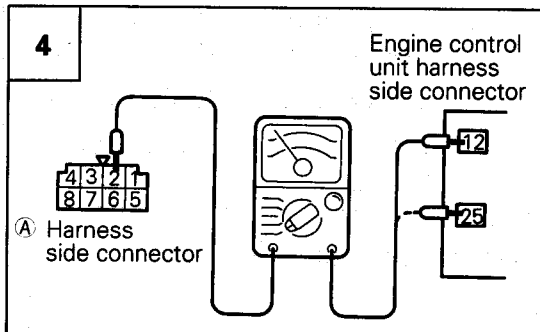
Check for an open-circuit, or a short-circuit to earth, between the engine control unit and the control relay.

- Engine control unit connector: Disconnected
- Control relay connector: Disconnected

OK → 4

NG → Repair the harness. (Ⓐ6 – 38)

4



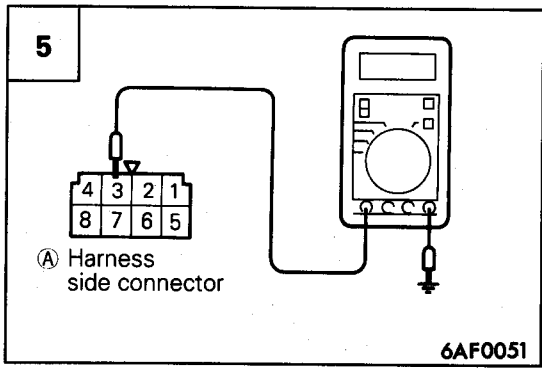
Check for an open-circuit, or a short-circuit to earth between the engine control unit and the control relay.

- Control relay connector: Disconnected
- Engine control unit connector: Disconnected

OK → STOP

NG → Repair the harness. (Ⓐ2 – 12, 25)

5



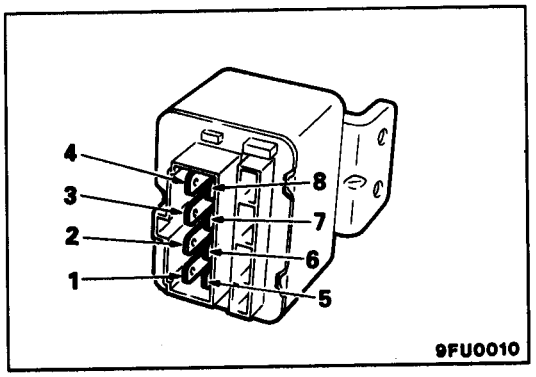
Measure power voltage to the actuator.

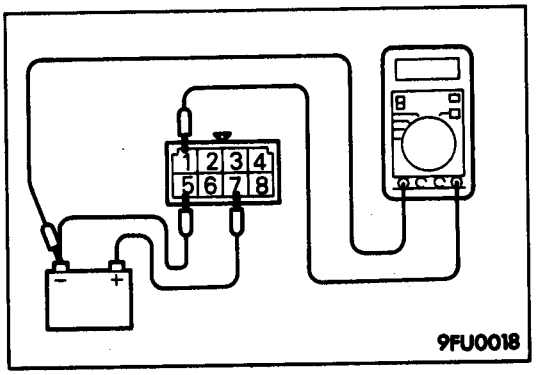
- Control relay connector: Connected
- Engine control unit connector: Connected

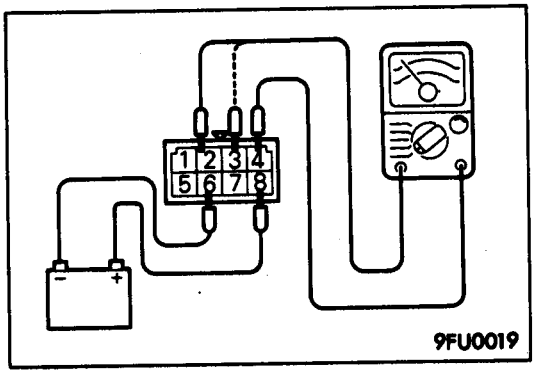
Engine	Voltage (V)
Cranking	8V oder higher
Racing	SV

OK →

NG → Replace the control relay or defective engine control unit







CONTROL RELAY INSPECTION

(1) Remove the control relay.
(2) Check for continuity between control relay terminals

Terminal No.	Continuity
5 – 7	Conductive
6 – 8	Conductive (only one direction)

(3) Using jumper wires, connect terminal ⑦ of control relay to battery ⊕ terminal and terminal ⑤ of control relay to battery ⊖ terminal.

Caution
When connecting jumper wires, make sure that it is applied to correct terminal. Otherwise, the relay could be damaged.

(4) Connecting and disconnecting the jumper wire to battery ⊖ terminal, measure the voltage at terminal ① of the control relay.

Jumper wire	Voltage
Connected	SV
Disconnected	0V

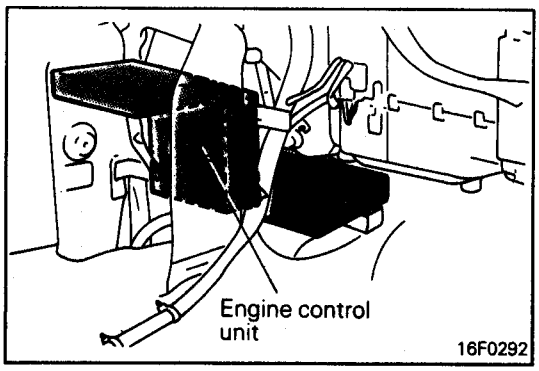
(5) Using jumper wires, connect terminal ⑧ of control relay to battery ⊕ terminal and terminal ⑥ of control relay to battery ⊖ terminal.
(6) Connecting and disconnecting the jumper wire to battery ⊖ terminal, check the continuity across terminals ② and ④ (or ③ and ④) of the control relay.

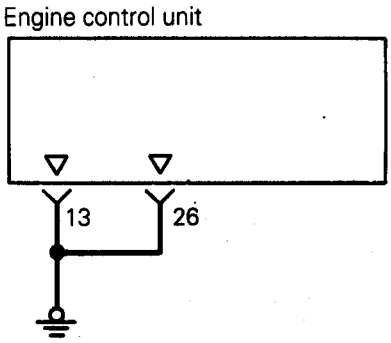
Jumper wire	Continuity across terminals 2 and 4	Continuity across terminals 3 and 4
Connected	Conductive (0 Ω)	Conductive (0 Ω)
Disconnected	Nonconductive (∞ Ω)	Nonconductive (∞ Ω)

(7) Replace the control relay if any defect is evident.

ENGINE CONTROL UNIT POWER EARTH

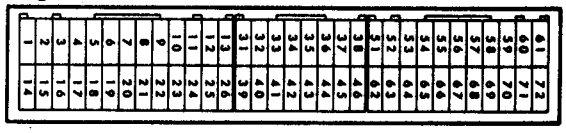
E13YDAA





01A0101

Engine control unit connector



9FU0101

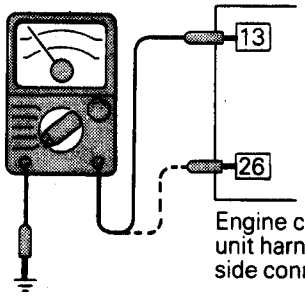
OPERATION

Earth the engine control unit.

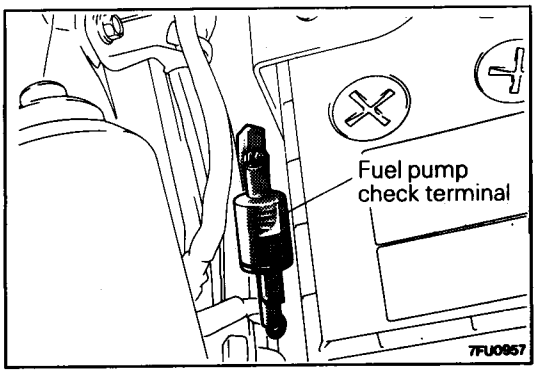
TROUBLESHOOTING HINTS

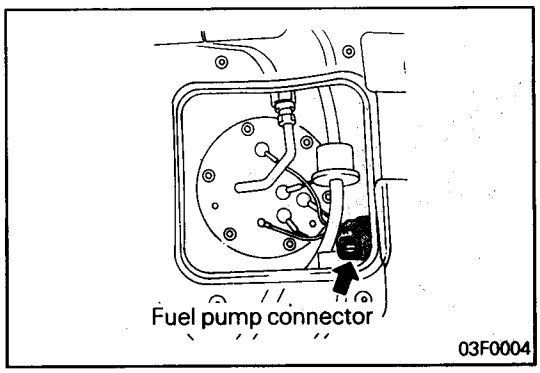
If the earth wire of the engine control unit is not connected securely to earth, the unit will not operate correctly.

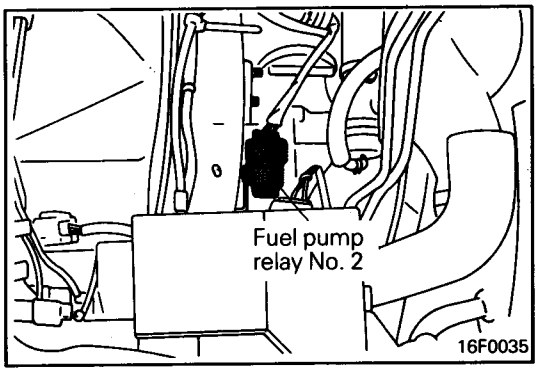
HARNESS INSPECTION

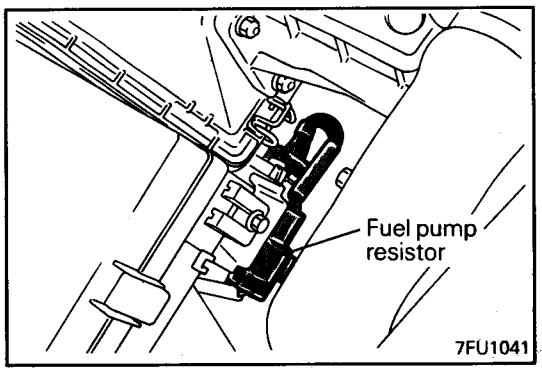
1		Check for continuity of the earth circuit ● Engine control unit connector: Disconnected	OK → STOP NG → Repair the harness. (13 – Earth) (26 – Earth)

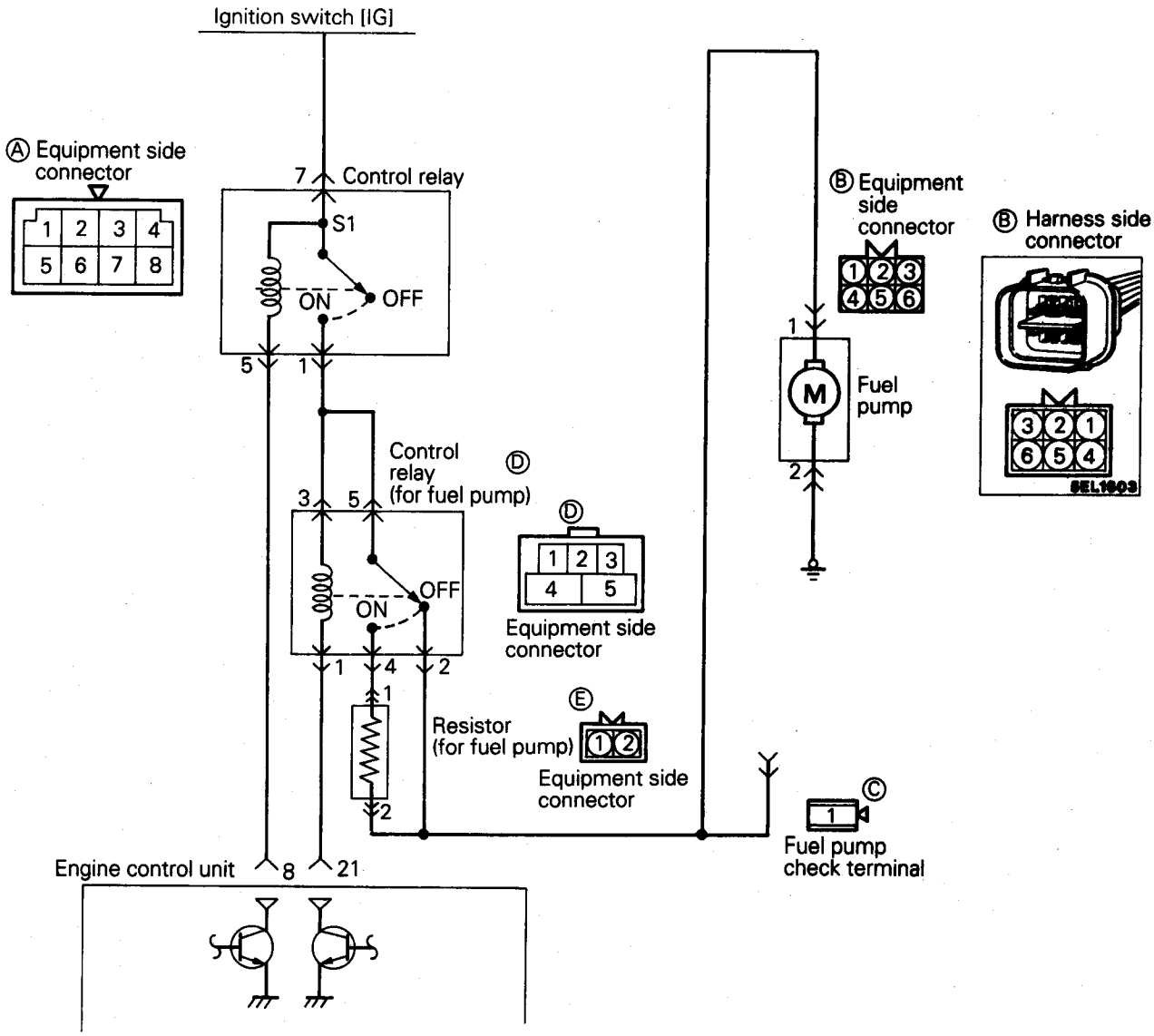
FUEL PUMP


Fuel pump
check terminal
7FU0957

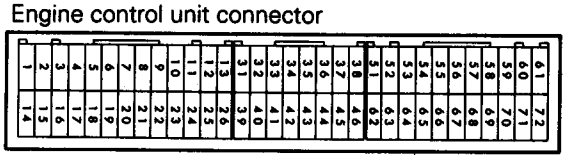

Fuel pump connector
03F0004


Fuel pump
relay No. 2
16F0035


Fuel pump
resistor
7FU1041



Engine control unit connector



9FU0101

OPERATION

Control Relay Operation

- Drives the fuel pump during cranking and engine operation.
- While the engine is cranking or idling, the engine control unit turns the power transistor ON to energize the control relay coil. This causes the control relay switch to turn ON, and current for driving the fuel pump is supplied from the ignition switch to the fuel pump via the control relay switch.

Fuel Pump Relay No. 2 Operation

- Change the fuel pump discharge in two stages by ON-OFF operation of the relay switch for fuel pump relay No. 2.
- If the amount of inlet air is small (the engine load is low), the engine control unit turns on the power transistor to energize the coil of fuel pump relay No. 2, sending drive power to the fuel pump through the resistor. If the amount of inlet air is large (the engine load is high), the engine control unit turns off the power transistor to send drive power directly to the fuel pump without passing through the resistor.

INSPECTION

Using Multi-use Tester (MUT) or MUT-II

<Fuel Pump>

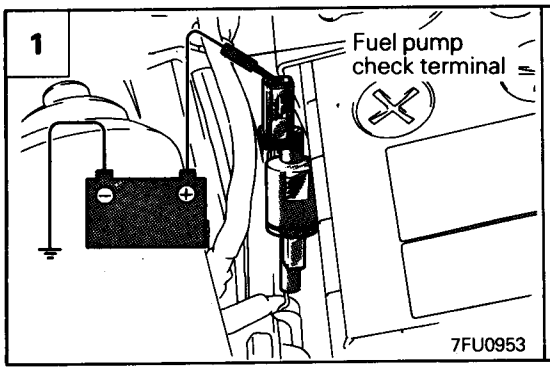
Function	Item No.	Operation	Check condition	Check item	Normal condition
Actuator test	07	Fuel pump is driven to circulate fuel	• Engine cranking • Forced drive of fuel pump Check is made for above two conditions	Hold return hose with fingers to feel pulsation indicating fuel flow	Pulsation is felt
				Listen to pump operating sound near fuel tank	Operating sound is heard

<Fuel Pump Relay No. 2>

Function	Item No.	Operation	Check condition	Normal condition
Actuator test	13	Turn the fuel pump relay No. 2 from OFF to ON	Ignition switch: ON	Operating sound is heard.

HARNESS INSPECTION

1



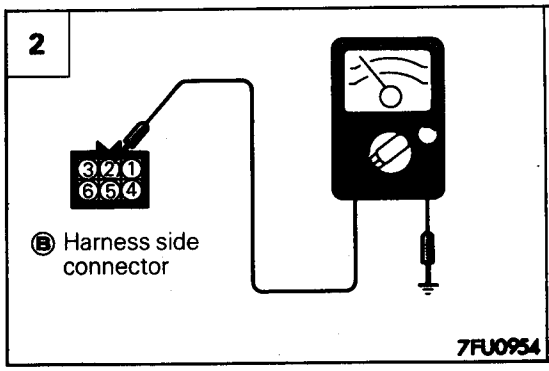
Check the fuel pump.

- Apply battery voltage to the checking terminal and operate the pump.

OK → 4

NG → 2

2



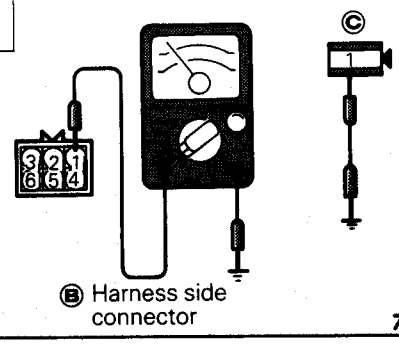
Check the earth circuit of the fuel pump.

- Fuel pump connector: Disconnected

OK → 3

NG → Repair the harness. (B 2 – Earth)

3

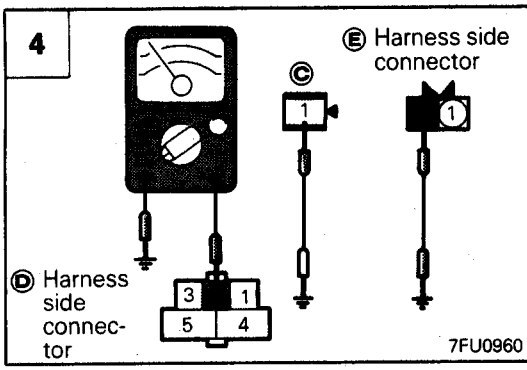


Check for continuity between the fuel pump and the checking terminal.
- Connector: Disconnected

OK → 4

NG → Repair the harness. (Ⓑ1 – Ⓒ1)

4

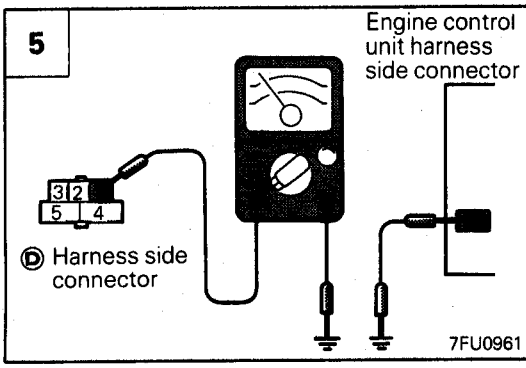


Check for continuity between the checking terminal and the control relay (for fuel pump), and between the resistor (for fuel pump).
- Control relay (for fuel pump) connector: Disconnected
- Resistor (for fuel pump) connector: Disconnected
- Fuel pump connector: Disconnected

OK → 5

NG → Repair the harness. (Ⓒ1 – Ⓓ2) (Ⓓ2 – Ⓔ2)

5

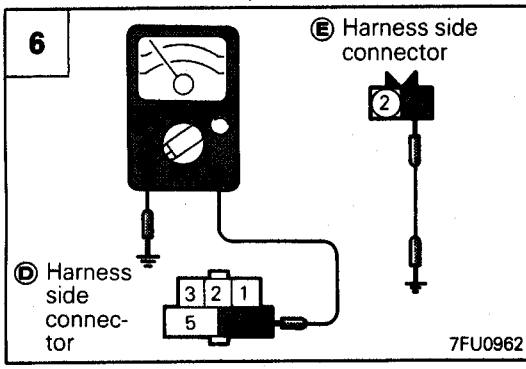


Check for an open-circuit, or a short-circuit to earth, between the control relay (for fuel pump) and the engine control unit.
- Control relay (for fuel pump) connector: Disconnected
- Engine control unit connector: Disconnected

OK → 6

NG → Repair the harness. (Ⓓ1 – 21)

6

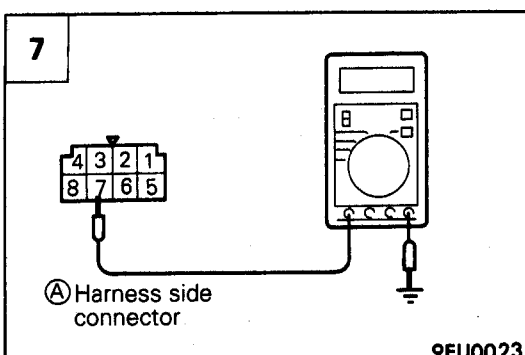


Check for continuity between the control relay (for fuel pump) and the resistor (for fuel pump).
- Control relay (for fuel pump) connector: Disconnected
- Resistor (for fuel pump) connector: Disconnected

OK → 7

NG → Repair the harness. (Ⓓ4 – Ⓔ1)

7



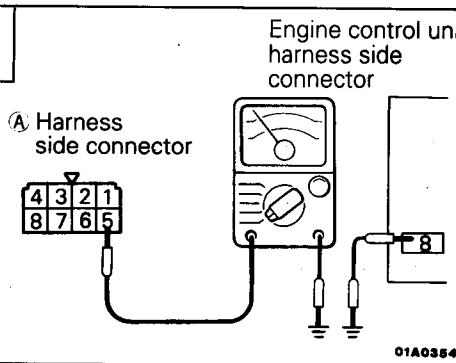
Measure the power supply voltage of the control relay.
- Control relay connector: Disconnected

Ignition switch	Voltage (V)
OFF	0–1
ON	SV

OK → 8

NG → Repair the harness. (Ignition switch – Ⓐ7) or check the ignition switch.

8

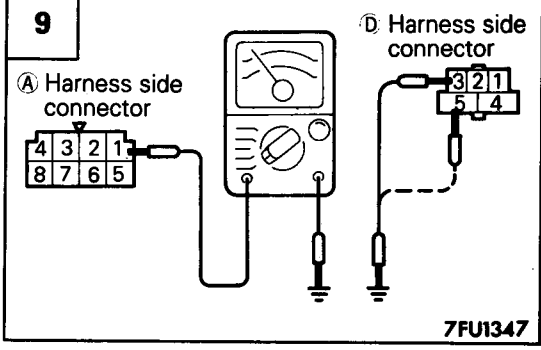


Check for an open-circuit, or a short-circuit to earth between the control relay and the engine control unit.
- Control relay connector: Disconnected
- Engine control unit connector: Disconnected

OK → 9

NG → Repair the harness. (Ⓐ5 – 8)

9

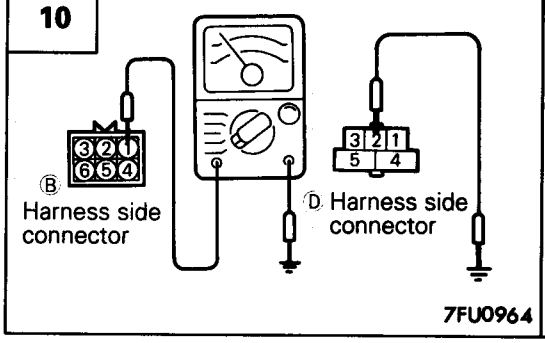


Check for continuity between the control relay and the control relay (for fuel pump)
- Control relay connector: Disconnected
- Control relay (for fuel pump) connector: Disconnected

OK → 10

NG → Repair the harness. (Ⓐ1 – Ⓓ3) (Ⓐ1 – Ⓓ5)

10



Check for an open-circuit, or a short-circuit to earth, between the control relay (for fuel pump) and the fuel pump.
- Control relay (for fuel pump) connector: Disconnected)
- Fuel pump connector: Disconnected

OK → STOP

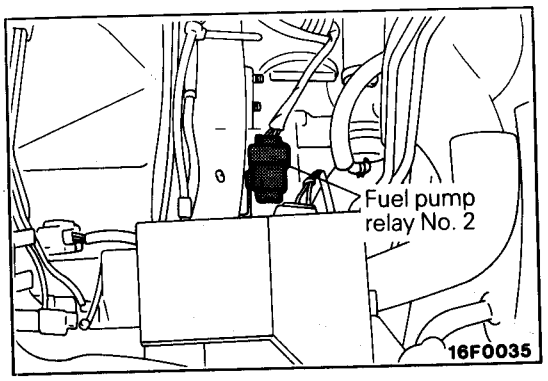
NG → Repair the harness. (Ⓑ1 – Ⓓ2)

CONTROL RELAY INSPECTION

Refer to P.13-54.

FUEL PUMP INSPECTION

Refer to P.13-40.

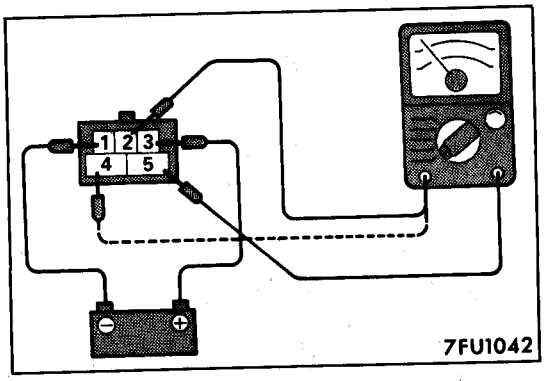


FUEL PUMP RELAY NO. 2

E13RGAA

INSPECTION

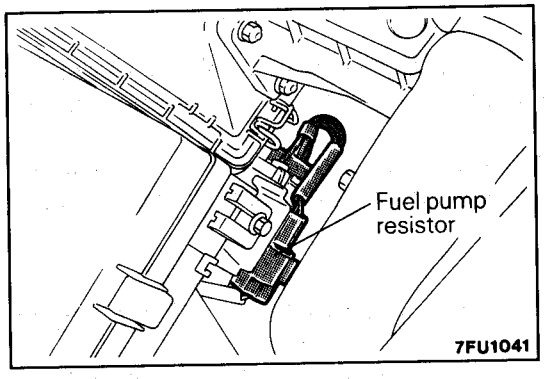
(1) Remove fuel pump relay No. 2.



(2) Use a jumper wire to connect terminal ③ of fuel pump relay No. 2 and the positive terminal of the battery and use another jumper wire to connect terminal ① and the negative terminal of the battery.
(3) With the jumper wire connected to and disconnected from the negative terminal of the battery, check the continuity between terminals ② and ⑤ of fuel pump relay No. 2 and between terminals ④ and ⑤ of fuel pump relay No. 2.

Jumper wire	Continuity between terminals 2 and 5	Continuity between terminals 4 and 5
Connected	No continuity	Continuity present
Disconnected	Continuity present	No continuity

(4) Replace fuel pump relay No. 2 if it is faulty.

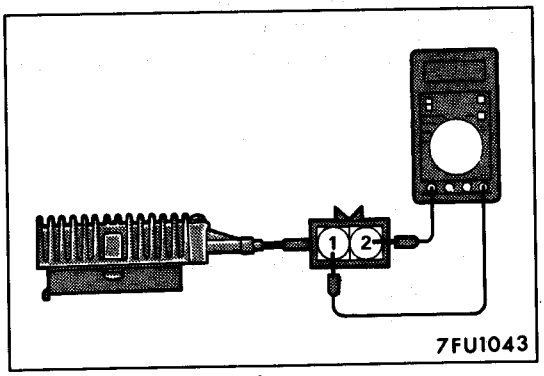


FUEL PUMP RESISTOR

E13RHAA

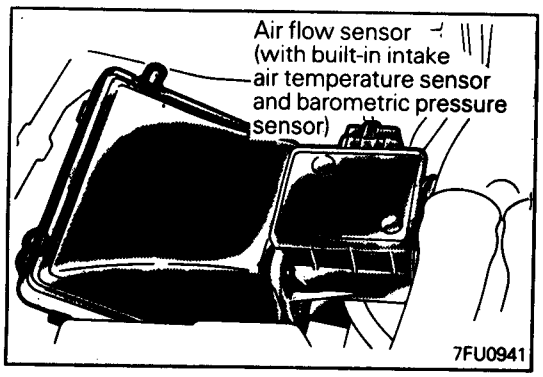
INSPECTION

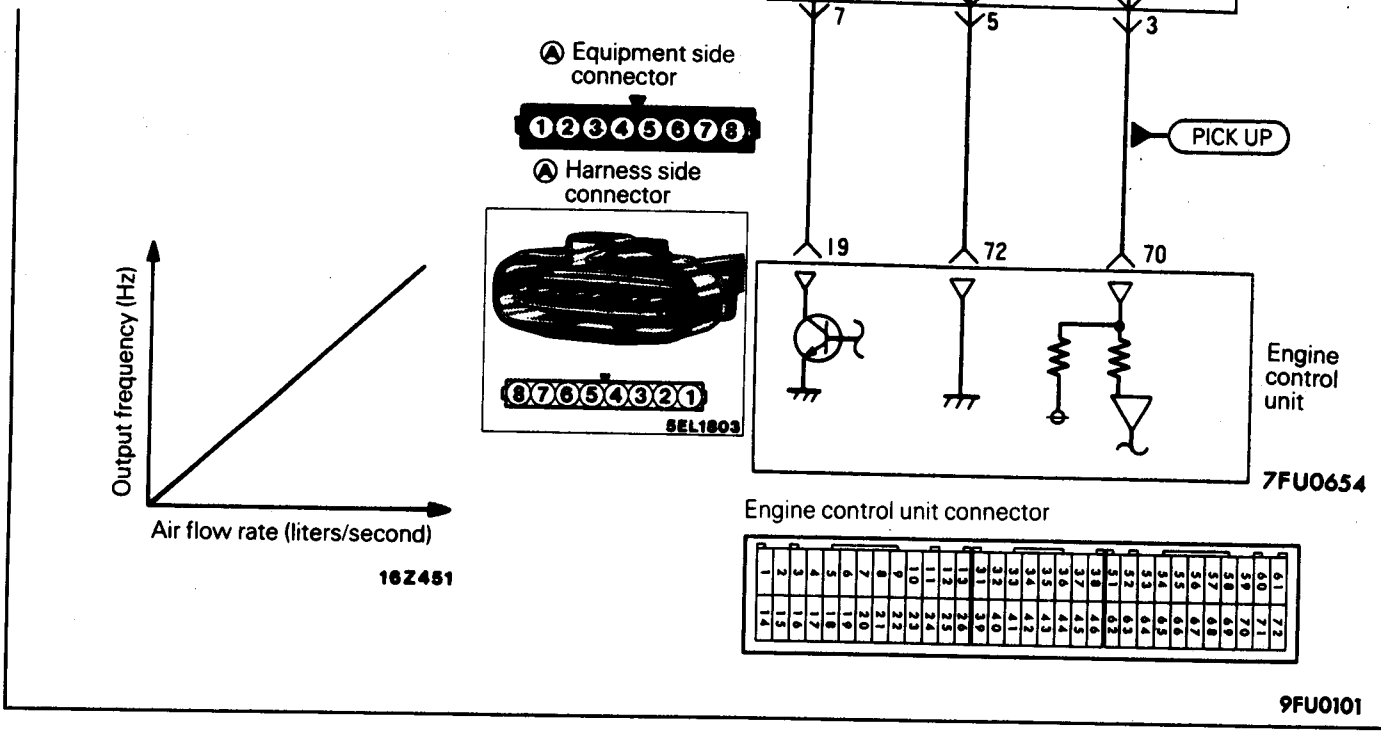
(1) Disconnect the connectors for the fuel pump resistor.



(2) Measure the resistance between the terminals.
Standard value: 0.6 – 0.9 Ω
(3) If the resistance deviates from the standard value, replace the fuel pump resistor.

AIR FLOW SENSOR





9FU0101

OPERATION

- The air flow sensor located in the air cleaner converts the engine intake air volume into a pulse signal of frequency proportional to the air volume and inputs it to the engine control unit, which then computes the fuel injection rate, etc. based on the input signal.
- The air flow sensor power is supplied from the control relay to the air flow sensor and is earthed in the engine control unit. The air flow sensor generates a pulse signal as it repeatedly opens and closes between the 5 V voltage supplied from the engine control unit and earth.

TROUBLESHOOTING HINTS

Hint 1: If the engine stalls occasionally, crank the engine and shake the air flow sensor harness. If the engine stalls, poor contact of the air flow sensor connector is suspected.

Hint 2: If the air flow sensor output frequency is other than 0 when the ignition switch is turned on (but not starting the engine), faulty air flow sensor or engine control unit is suspected.

Hint 3: If the engine can be run idle even though the air flow sensor output frequency is out of specification, troubles are often found in other than the air flow sensor itself.

[Examples]

(1) Disturbed air flow in the air flow sensor
(Disconnected air duct, clogged air cleaner element)

(2) Poor combustion in the cylinder
(Faulty ignition plug, ignition coil, injector, incorrect compression pressure, etc.)

(3) Air leaking into the intake manifold through gap of gasket, etc.

(4) Loose EGR valve seat

INSPECTION

Using Multi-use Tester (MUT) or MUT-II

<Air Flow Sensor>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	12	Sensor air volume (frequency)	• Engine coolant temperature: 80 to 95°C (176 to 203°F) • Lamps and accessories: OFF • Transmission: Neutral	700 r/min (Idle)	22 – 48 Hz
				2,000 r/min	60 – 108 Hz
				Racing	Frequency increases with racing

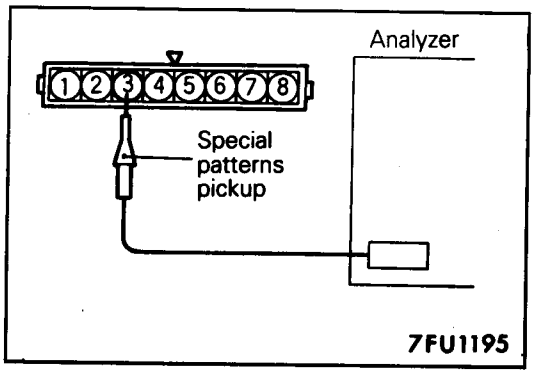
NOTE
When the vehicle is new [within initial operation of about 500 km (300 miles)], the air flow sensor output frequency may be about 10% higher.

<Air Flow Sensor Reset Signal>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data list	34	Reset signal condition	• Engine warm up	700 r/min (Idle)	ON
				2,000 r/min	OFF

<Volumetric Efficiency>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data list	37	Volumetric efficiency	• Engine coolant temperature: 80 to 95°C (176 to 203°F) • Lamps, electric cooling fan and accessory operation: OFF • Transmission: Neutral	700 r/min (Idle)	15 – 35%
				2,000 r/min	15 – 35%
				Sudden racing	Frequency increases with racing

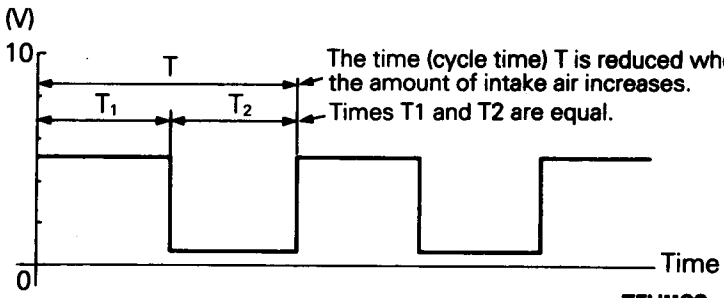


Wave Pattern Inspection Using an Analyzer

Measurement method

(1) Disconnect the air flow sensor connector, and connect the special tool (test harness: MB991348) in between. (All terminals should be connected.)
(2) Connect the analyzer special patterns pickup to terminal ③ of the air flow sensor connector.

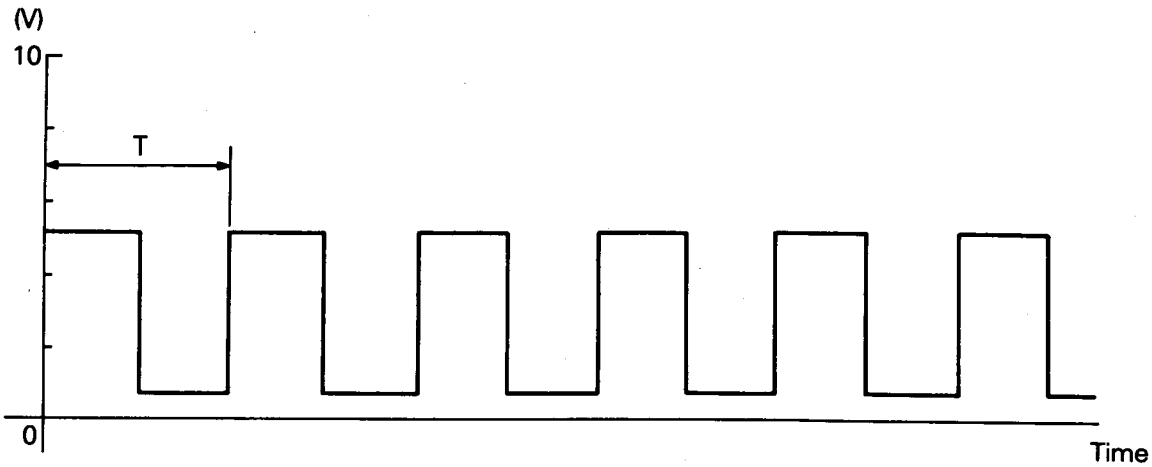
Standard wave pattern



Observation conditions

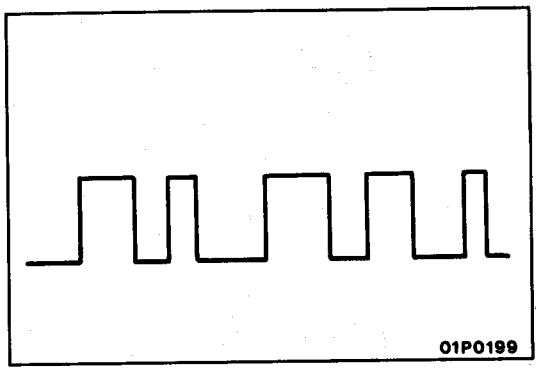
Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine r/min.	Idle r/min. (700 r/min.)

Observation conditions (from conditions on above engine speed is increased by racing.)



Wave pattern observation points

Check that cycle time T becomes shorter and the frequency increases when the engine speed is increased.



Examples of abnormal wave patterns

- Example 1

  Cause of problem
  Sensor interface malfunction

  Wave pattern characteristics
  Rectangular wave pattern is output even when the engine is not started.

- Example 2

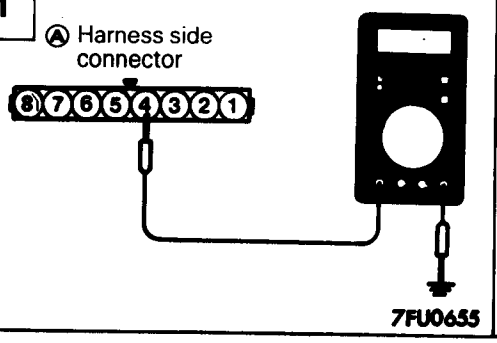
  Cause of problem
  Damaged rectifier or vortex generation column

  Wave pattern characteristics

  Unstable wave pattern with non-uniform frequency. However, when an ignition leak occurs during acceleration, the wave pattern will be distorted temporarily, even if the air flow sensor is normal.

HARNESS INSPECTION

1



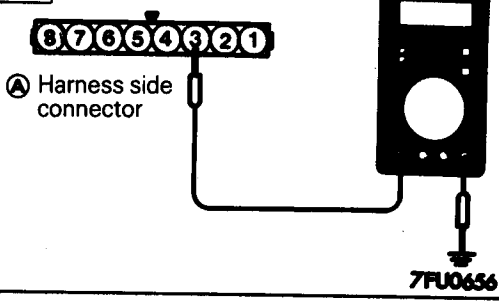
Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
SV

OK → 2

NG → Repair the harness (Ⓐ4 – Control relay) or check the control relay.

2



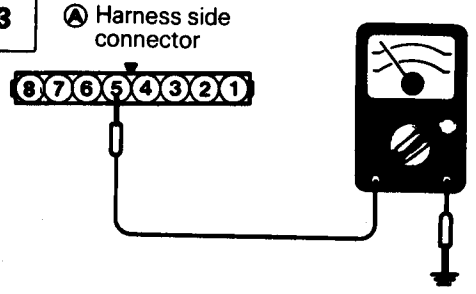
Measure the terminal voltage.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.8 – 5.2

OK → 3

NG → Repair the harness (Ⓐ3 – 70)

3

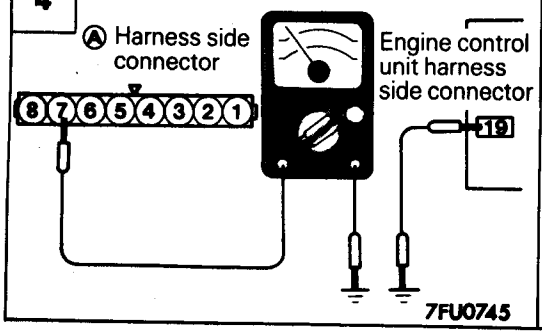


Check for continuity of the earth circuit.
- Connector: Disconnected

OK → 4

NG → Repair the harness. (Ⓐ5 – 72)

4



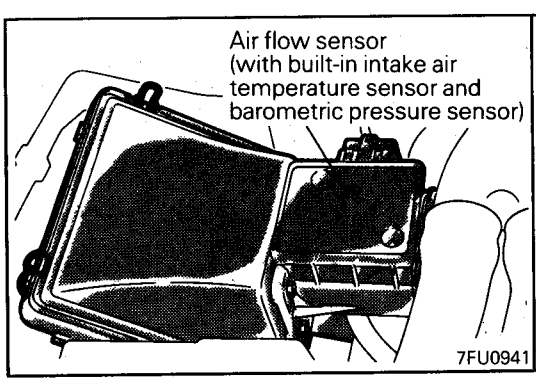
Check for continuity between the air flow sensor and the engine control unit.
- Air flow sensor connector: Disconnected
- Engine control unit connector: Disconnected

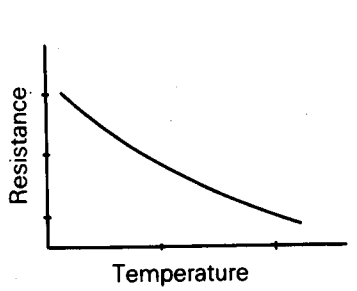
OK → STOP

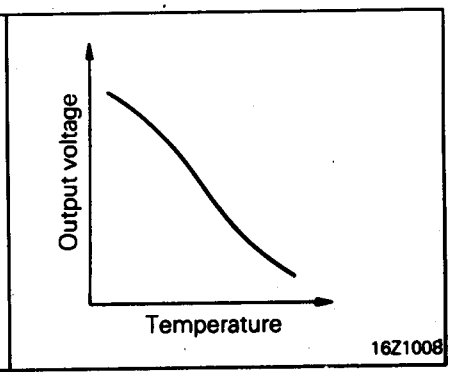
NG → Repair the harness. (Ⓐ7 – 19)

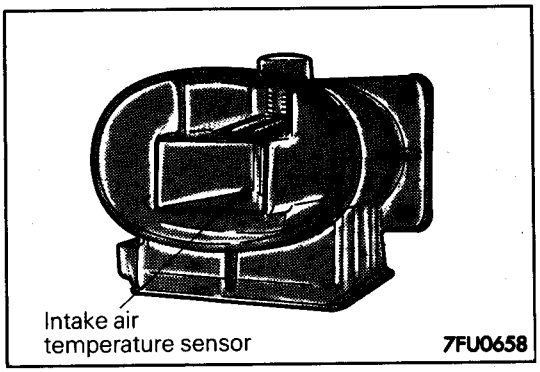
INTAKE AIR TEMPERATURE SENSOR

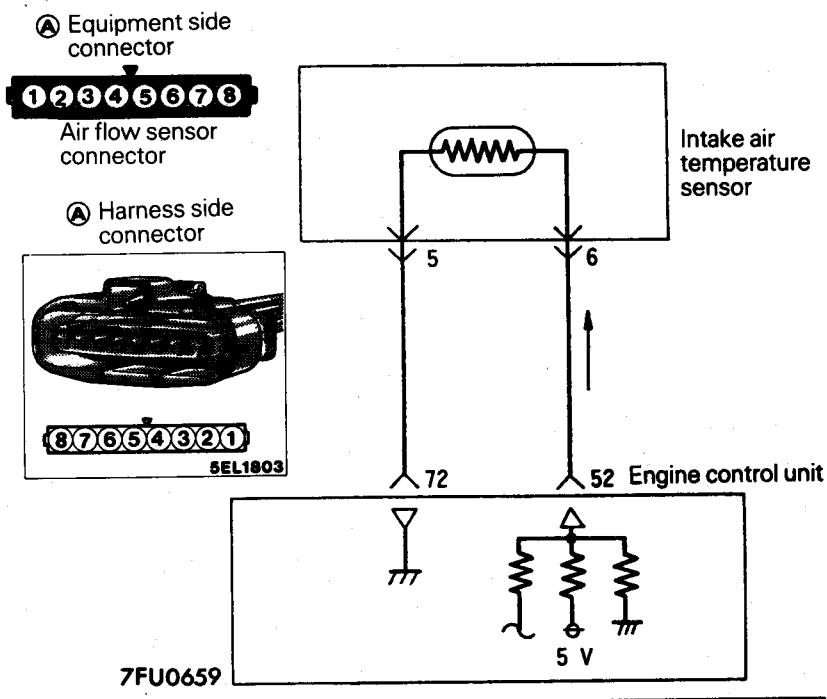
E13YGAA2











OPERATION

- The intake air temperature sensor converts the engine intake air temperature into a voltage and inputs it to the engine control unit, which then corrects the fuel injection rate, etc. based on the input signal.
- The 5 V power in the engine control unit is supplied via a resistor in the unit to the intake air temperature sensor. Via the sensor which is a kind of resistor, it is earthed in the engine control unit. The intake air temperature sensor resistor has such characteristic that its resistance decreases as the intake air temperature rises.
- The intake air temperature sensor terminal voltage increases or decreases as the sensor resistance increases or decreases. Therefore, the intake air temperature sensor terminal voltage changes with the intake air temperature, decreasing as the temperature rises.

TROUBLESHOOTING HINTS

The intake air temperature sensor senses the intake air temperature in the air cleaner so that it may indicate a temperature different from outside temperature depending on engine operating state.

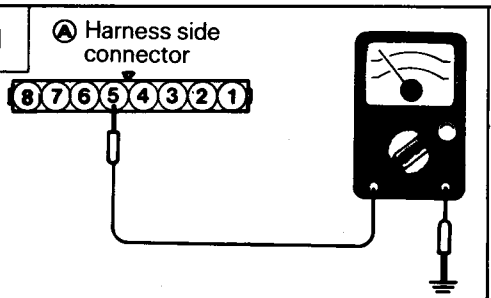
INSPECTION

Using Multi-use Tester (MUT) or MUT-II

Function	Item No.	Data display	Check condition	Intake air temperature	Standard value
Data reading	13	Sensor temperature	Ignition switch: ON or engine running	At –20°C (–4°F)	–20°C
				At 0°C (32°F)	0°C
				At 20°C (68°F)	20°C
				At 40°C (104°F)	40°C
				At 80°C (176°F)	80°C

HARNESS INSPECTION

1 Ⓐ Harness side connector



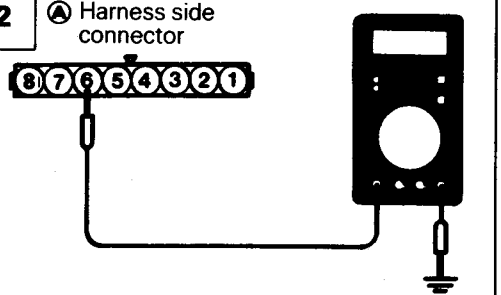
7FU0657

Check for continuity of the earth circuit.
- Connector: Disconnected

OK → 2

NG → Repair the harness. (Ⓐ5 – 72)

2 Ⓐ Harness side connector



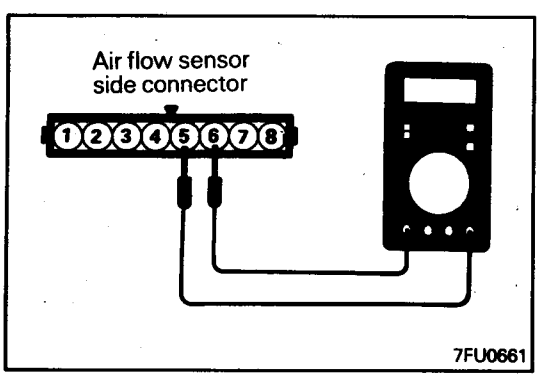
7FU0660

Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.5 – 4.9

OK → STOP

NG → Repair the harness. (Ⓐ6 – 52)

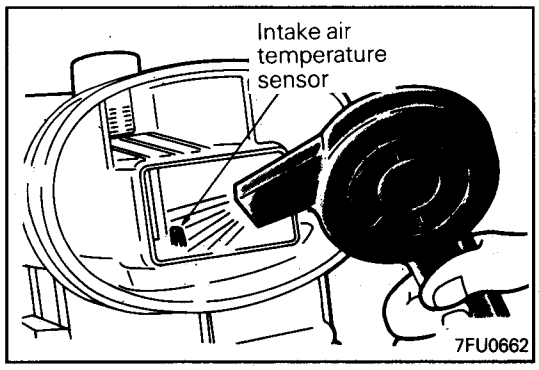


7FU0661

SENSOR INSPECTION

(1) Disconnect the air flow sensor connectors.
(2) Measure resistance between terminals ⑤ and ⑥.

Temperature [°C (°F)]	Resistance (kΩ)
0 (32)	6.0
20 (68)	2.7
80 (176)	0.4



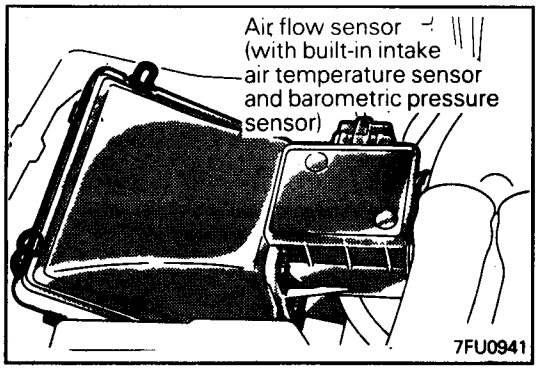
(3) Measure resistance while heating the sensor using a hair drier.

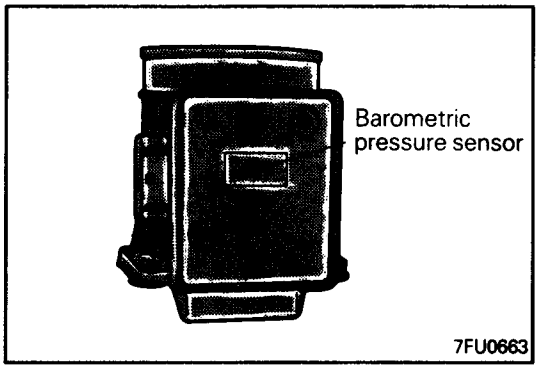
Temperature [°C (°F)]	Resistance (kΩ)
Higher	Smaller

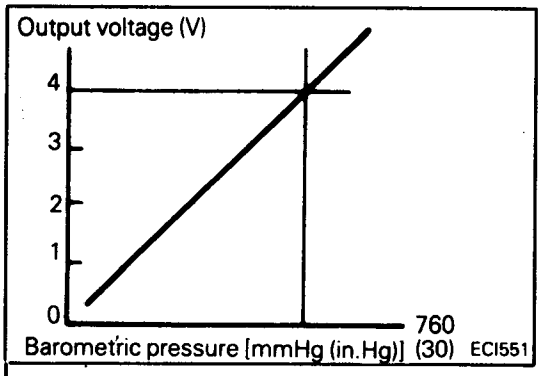
(4) If the value deviates from the standard value or the resistance remains unchanged, replace the air flow sensor assembly.

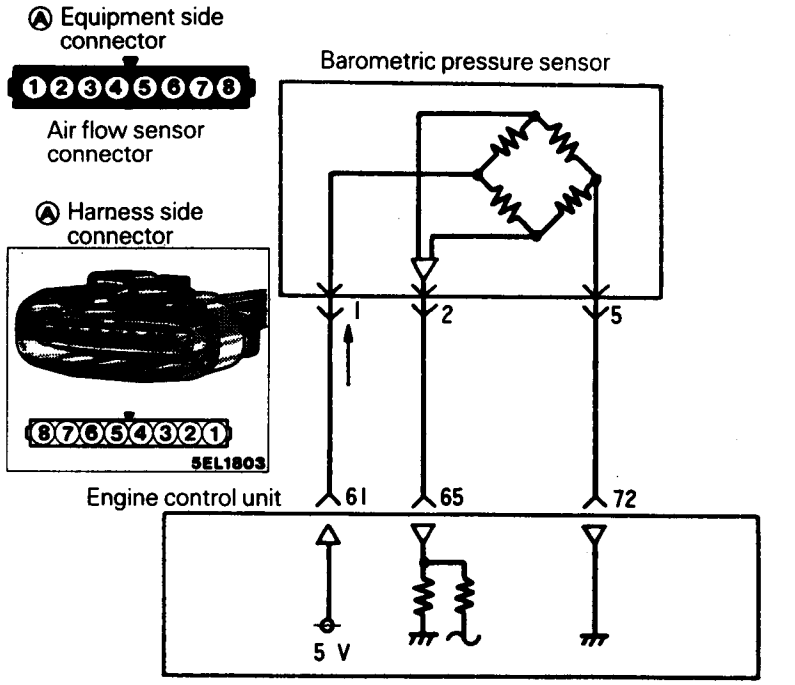
BAROMETRIC PRESSURE SENSOR

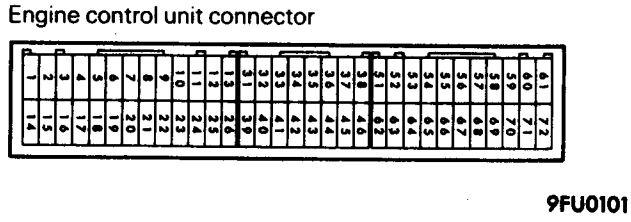
E13YHAA2











OPERATION

- The barometric pressure sensor converts the barometric pressure into a voltage and inputs it to the engine control unit, which then corrects the fuel injection rate, etc. based on the input signal.
- The 5 V power in the engine control unit is supplied to the barometric pressure sensor. Through the circuit in the sensor, it is earthed in the engine control unit.
- The barometric pressure sensor output voltage which is proportional to the barometric pressure (absolute pressure) is supplied to the engine control unit.

TROUBLESHOOTING HINTS

Hint 1: If the barometric pressure sensor is faulty, poor driveability is caused at high altitude, in particular.
Hint 2: If the pressure indication of the barometric pressure sensor drops significantly during high speed driving, check the air cleaner for clogging.

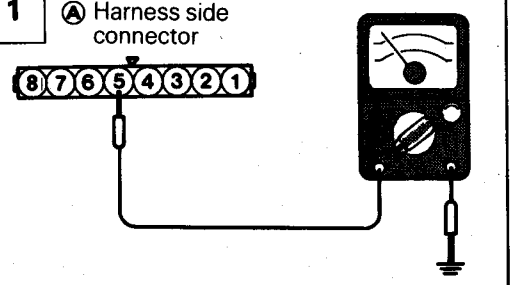
INSPECTION

Using Multi-use Tester (MUT) or MUT-II

Function	Item No.	Data display	Check condition	Altitude	Standard value
Data reading	25	Sensor pressure	Ignition switch: ON	At 0 m (0 ft.)	101 kPa {760 mmHg}
				At 600 m (1,969 ft.)	95 kPa {710 mmHg}
				At 1,200 m (3,937 ft.)	88 kPa {660 mmHg}
				At 1,800 m (5,906 ft.)	81 kPa {610 mmHg}

HARNESS INSPECTION

1

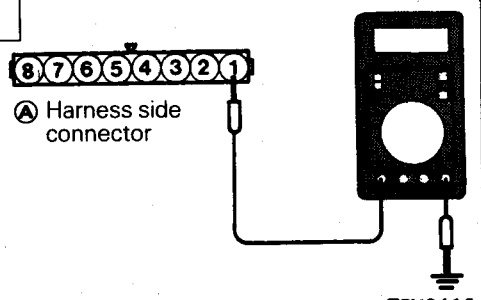


Check for continuity of the earth circuit.
- Connector: Disconnected

OK → 2

NG → Repair the harness. (Ⓐ5 – 72)

2



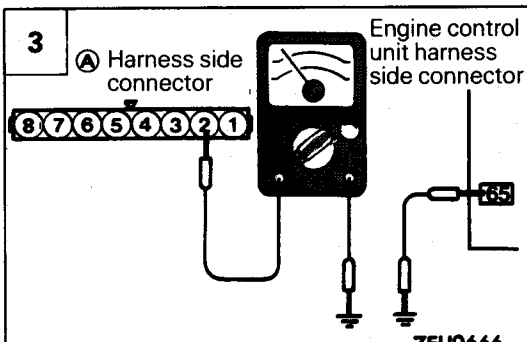
Measure the power supply voltage of the barometric pressure sensor.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.8 – 5.2

OK → 3

NG → Repair the harness. (Ⓐ1 – 61)

3



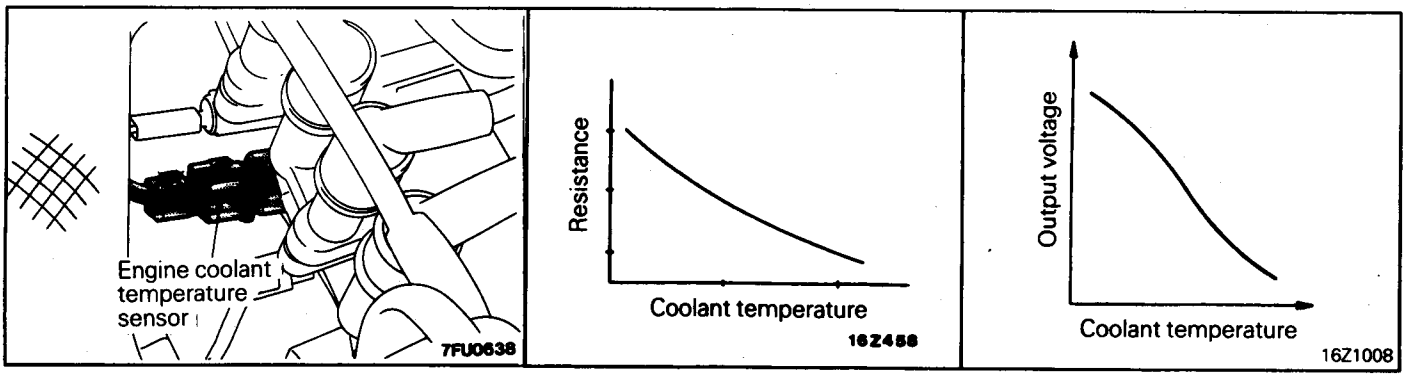
Check for an open-circuit, or a short-circuit to earth between the engine control unit and the barometric pressure sensor.
- Air flow sensor connector: Disconnected
- Engine control unit connector: Disconnected

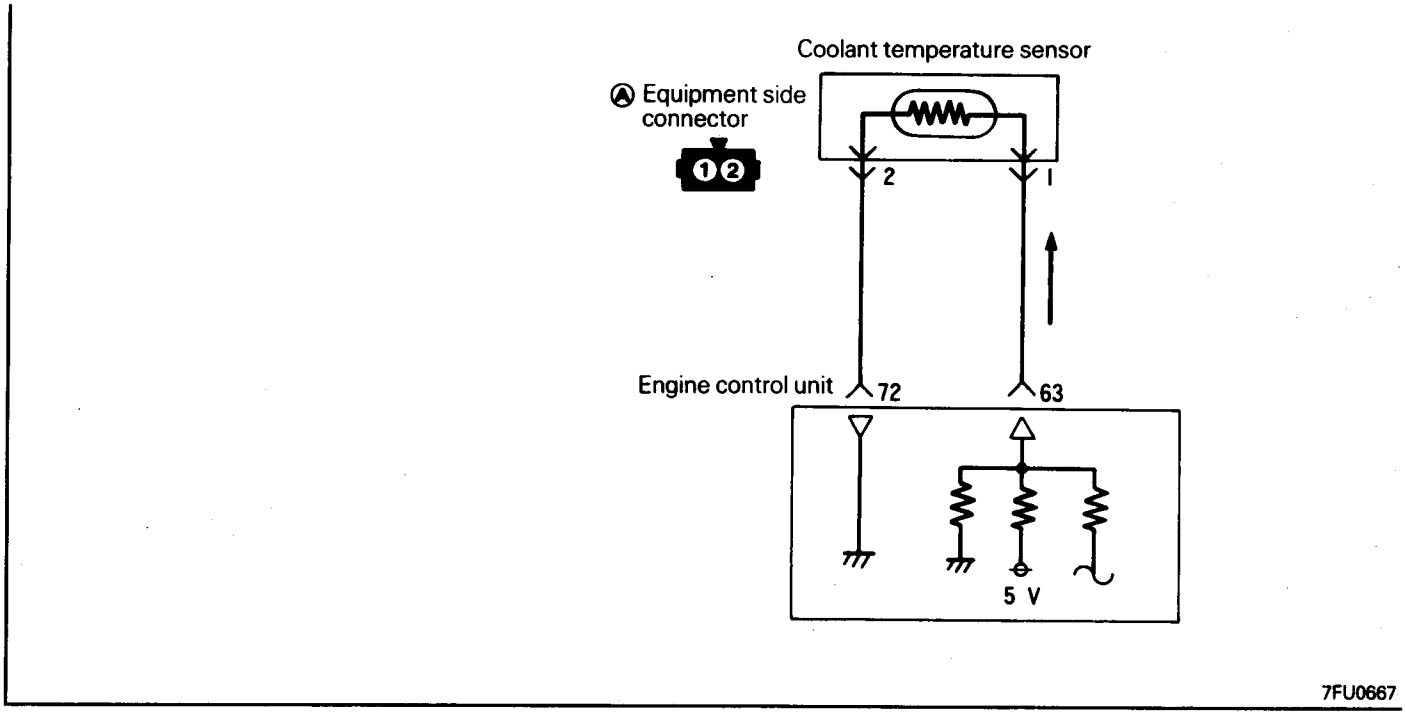
OK → STOP

NG → Repair the harness. (Ⓐ2 – 65)

ENGINE COOLANT TEMPERATURE SENSOR

E13YIAA2





OPERATION

- The engine coolant temperature sensor converts the engine coolant temperature into a voltage and inputs it to the engine control unit, which then controls the fuel injection rate and fast idle speed when the engine is cold based on the input signal.
- The 5 V power in the engine control unit is supplied via a resistor in the unit to the engine coolant temperature sensor. Through the sensor which is a kind of resistor, it is earthed in the engine control unit. The engine coolant temperature sensor resistor has such characteristic that its resistance decreases as the coolant temperature rises.
- The engine coolant temperature sensor terminal voltage increases or decreases as the sensor resistance increases or decreases. Therefore, the engine coolant temperature sensor terminal voltage changes with the coolant temperature, decreasing as the temperature rises.

TROUBLESHOOTING HINTS

If the fast idle speed is inadequate or the engine emits dark smoke during engine warm up operation, the engine coolant temperature sensor is often faulty.

INSPECTION

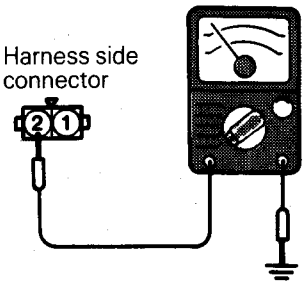
Using Multi-use Tester (MUT) or MUT-II

Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	21	Sensor temperature	Ignition switch: ON or engine operating	At –20°C (–4°F)	–20°C
				At 0°C (32°F)	0°C
				At 20°C (68°F)	20°C
				At 40°C (104°F)	40°C
				At 80°C (176°F)	80°C

HARNESS INSPECTION

1

Ⓐ Harness side connector



7FU0668

Check for continuity of the earth circuit.

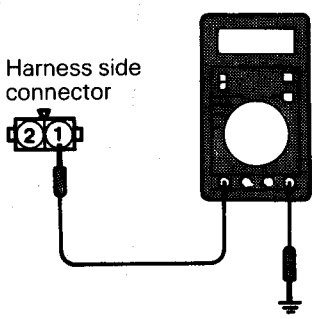
- Connector: Disconnected

OK → 2

NG → Repair the harness. (Ⓐ2 – 72)

2

Ⓐ Harness side connector



7FU0669

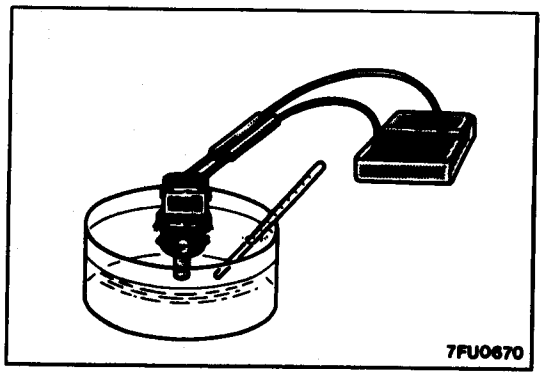
Measure the power supply voltage.

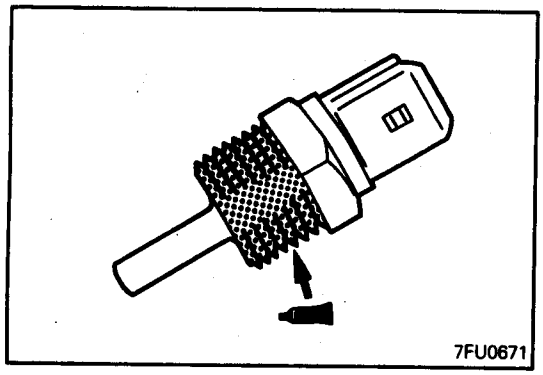
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.5 – 4.9

OK → STOP

NG → Repair the harness. (Ⓐ1 – 83)





SENSOR INSPECTION

(1) Remove engine coolant temperature sensor from the intake manifold.
(2) With temperature sensing portion of engine coolant temperature sensor immersed in hot water, check resistance.

Temperature °C (°F)	Resistance (kΩ)
0 (32)	5.8
20 (68)	2.4
40 (104)	1.1
80 (176)	0.3

(3) If the resistance deviates from the standard value greatly, replace the sensor.

INSTALLATION

(1) Apply sealant to threaded portion.

Specified sealant: 3M NUT locking Part No. 4171 or equivalent

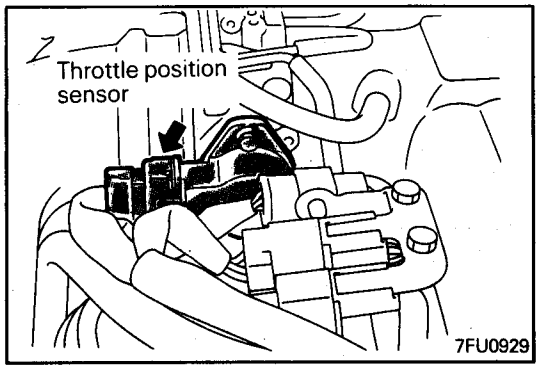
(2) Install engine coolant temperature sensor and tighten it to specified torque.

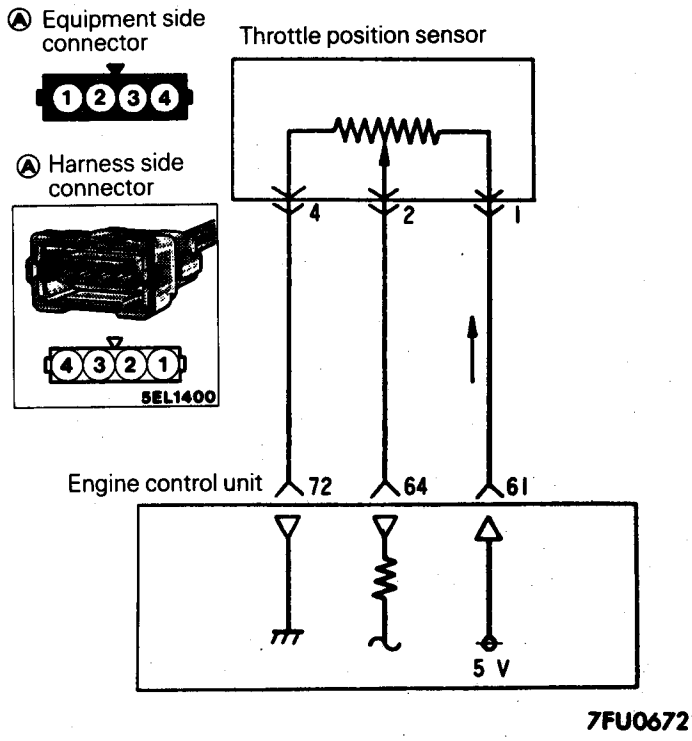
Sensor tightening torque: 30 Nm (22 ft.lbs.)

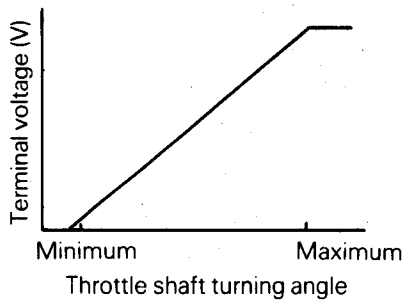
(3) Fasten harness connectors securely.

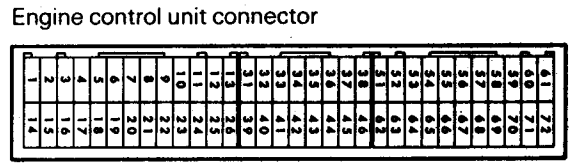
THROTTLE POSITION SENSOR

E13YJAC









OPERATION

- The throttle position sensor converts the throttle position opening into a voltage and inputs it to the engine control unit, which then controls the fuel injection based on the input signal.
- The 5 V power in the engine control unit is supplied to the throttle position sensor. Through the resistor in the sensor, it is earthed in the engine control unit.
- As the throttle valve shaft rotates from the idle position to wide open position, the resistance between the variable resistor terminal of the throttle position sensor and the earth terminal increases. As a result, the voltage at the throttle position sensor variable resistance terminal also increases.

TROUBLESHOOTING HINTS

Hint 1: The throttle position sensor signal is more important in the control of automatic transaxle than in the engine control. Shifting shock and other troubles will be caused if this sensor is faulty.

Hint 2: If the output voltage of the throttle position sensor is out of specification, adjust the sensor and check the voltage again. If there is an evidence of disturbed fixed SAS setting, adjust the fixed SAS.

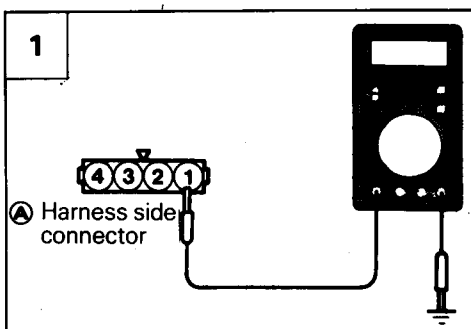
INSPECTION

Using Multi-use Tester (MUT) or MUT-II

Function	Item No.	Data display	Check condition	Throttle valve	Standard value
Data reading	14	Sensor voltage	Ignition switch: left ON for 15 seconds or more	At idle position	300 – 1,000 mV
				Open slowly	Increases with valve opening
				Open widely	4,500 – 5,500 mV

HARNESS INSPECTION

1



6FU1241

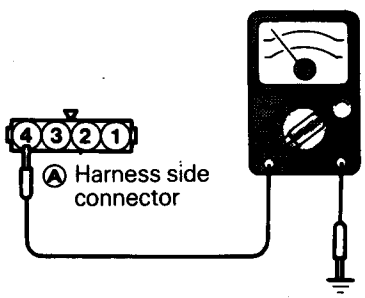
Measure the power supply voltage of the throttle position sensor.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.8 – 5.2

OK → 2

NG → Repair the harness. (Ⓐ1 – 61)

2



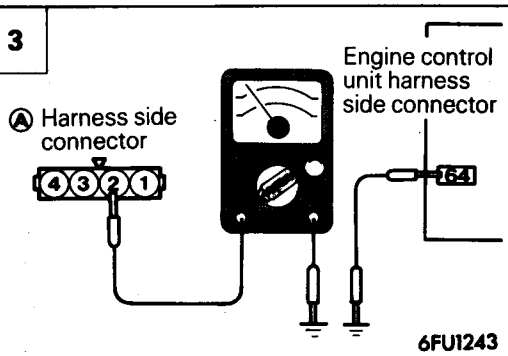
6FU1242

Check for continuity of the earth circuit
- Connector: Disconnected

OK → 3

NG → Repair the harness. (Ⓐ4 – 72)

3

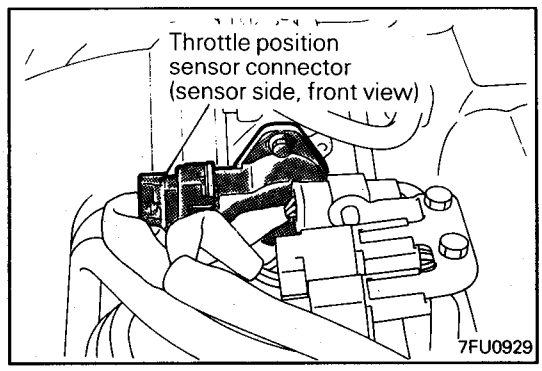


6FU1243

Check for an open circuit, or a short-circuit to earth between the engine control unit and the throttle position sensor.
- Throttle position sensor connector: Disconnected
- Engine control unit connector: Disconnected

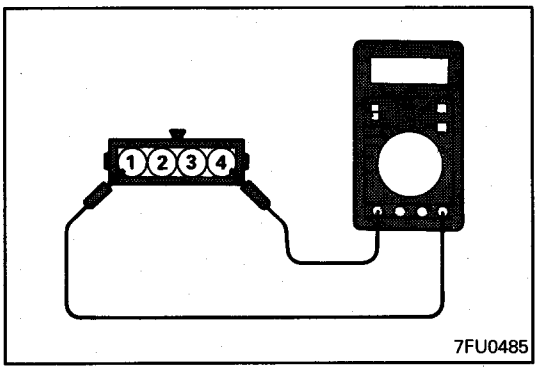
OK → STOP

NG → Repair the harness. (Ⓐ2 – 64)



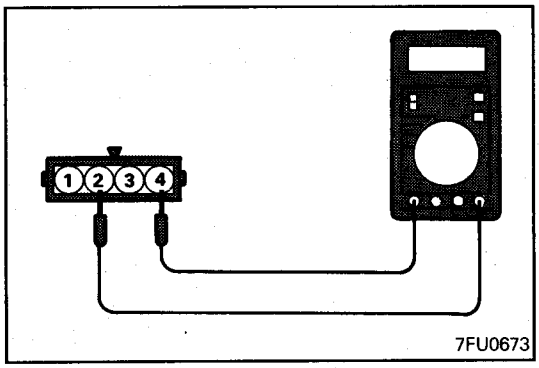
SENSOR INSPECTION

(1) Disconnect the throttle position sensor connector.



(2) Measure resistance between terminal ④ (sensor earth) and terminal ① (sensor power).

Standard value: 3.5 – 6.5 kΩ

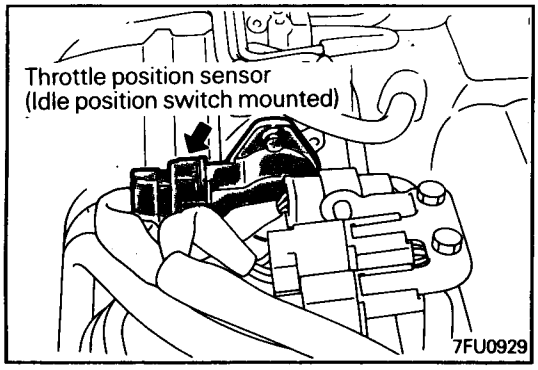


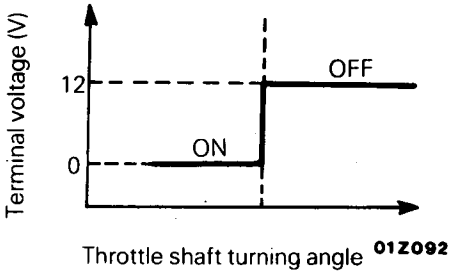
(3) Connect a pointer type ohmmeter between terminal ④ (sensor earth) and terminal ② (sensor output).
(4) Operate the throttle valve slowly from the idle position to the full open position and check that the resistance changes smoothly in proportion with the throttle valve opening angle.
(5) If the resistance is out of specification, or fails to change smoothly, replace the throttle position sensor.

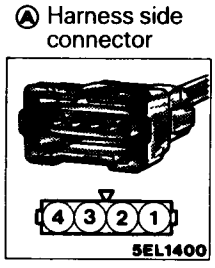
For the idle position switch and throttle position sensor adjusting procedure, refer to P.13-35.

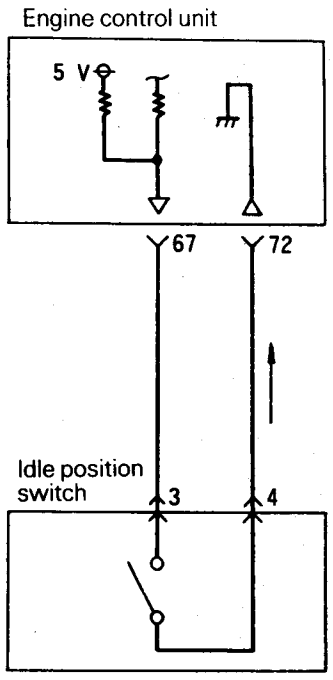
IDLE POSITION SWITCH

E13YKAD









OPERATION

- The idle position switch senses whether the accelerator pedal is depressed or not, converts it into high/low voltage and inputs the voltage to the engine control unit, which then controls the idle speed control servo based on the input signal.
- The voltage in the engine control unit is applied to the idle position switch through a resistor. When the accelerator pedal is released, the idle position switch is turned on to conduct the voltage to earth. This causes the idle position switch terminal voltage to go low from high.

TROUBLESHOOTING HINTS

If the idle position switch harness and individual part check results are normal but the idle position switch output is abnormal, the following troubles are suspected.
(1) Poorly adjusted accelerator cable or auto-cruise control cable
(2) Poorly adjusted fixed SAS

INSPECTION

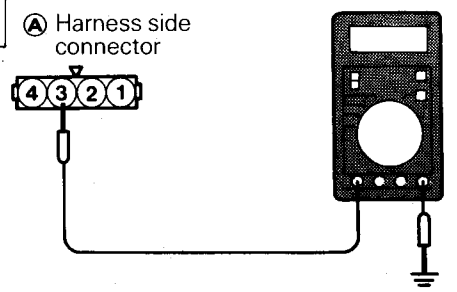
Using Multi-use Tester (MUT) or MUT-II

Function	Item No.	Data display	Check condition	Throttle valve	Normal indication
Data reading	26	Switch state	Ignition switch: ON (check by operating accelerator pedal repeatedly)	At idle position	ON
				Open a little	OFF*

NOTE
*: The condition is normal if the idle switch turns off after the throttle position sensor voltage increases to a value which is 50 – 100 mV higher than the value at the idle position. If the switch turns back on again after the throttle valve opens, adjust the idle switch or the throttle position sensor.

HARNESS INSPECTION

1



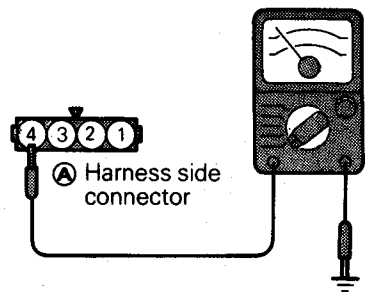
Measure the power supply voltage of the idle position switch.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4 or more

OK → 2

NG → Repair the harness. (Ⓐ3 – 67)

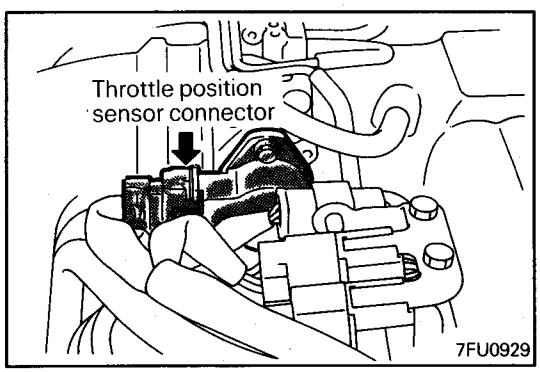
2



Check for continuity of the earth circuit.
- Connector: Disconnected

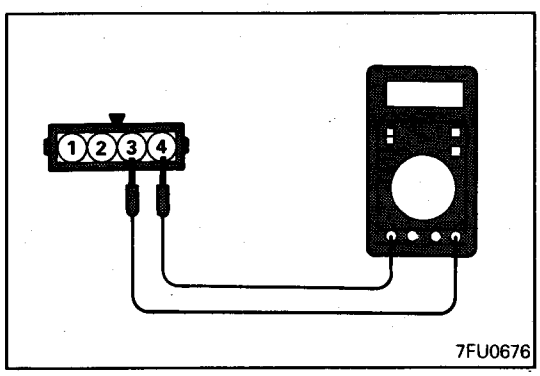
OK → STOP

NG → Repair the harness. (Ⓐ4 – 72)



SENSOR INSPECTION

(1) Disconnect the throttle position sensor connector.



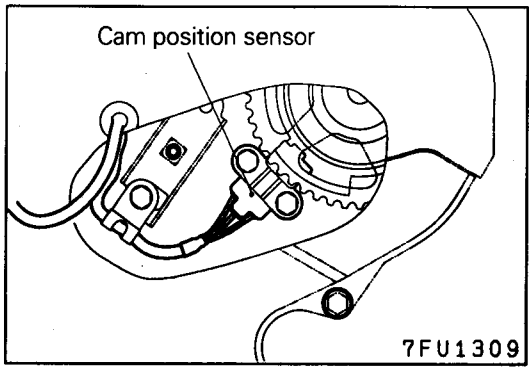
(2) Check the continuity between terminal ③ and ④.

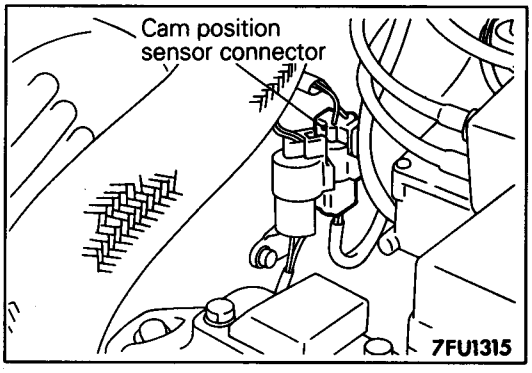
Accelerator pedal	Continuity
Depressed	Non-conductive (∞ Ω)
Released	Conductive (0Ω)

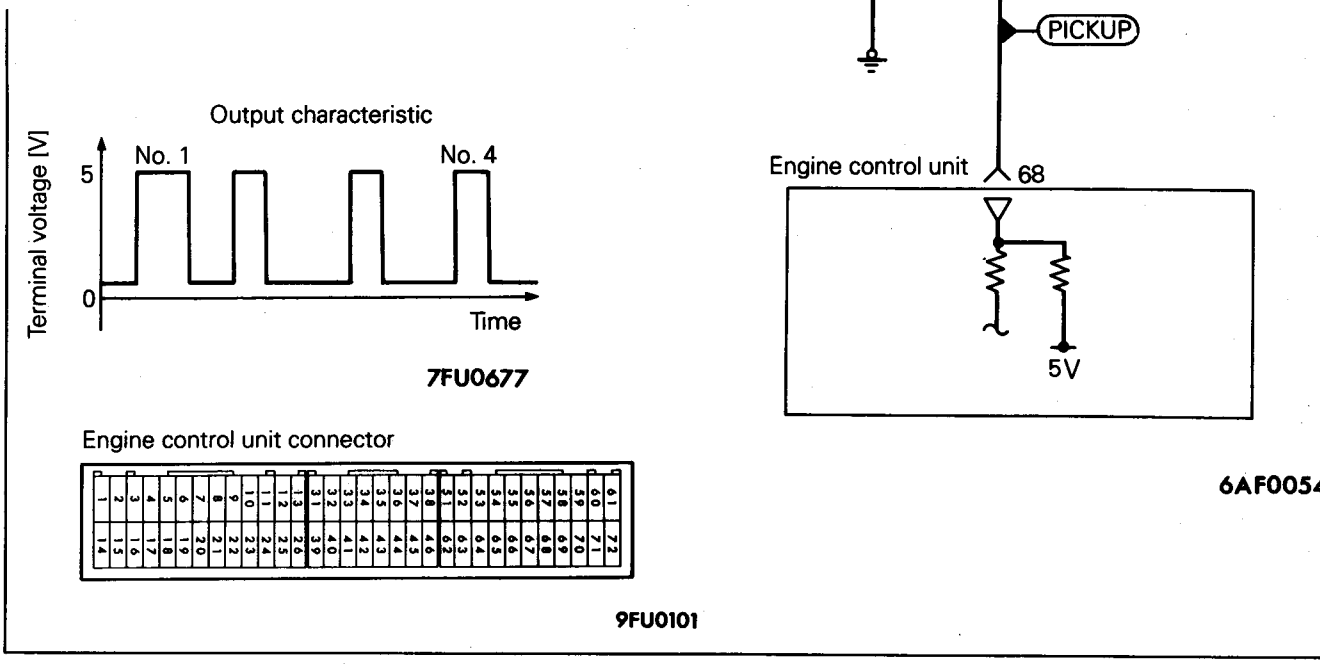
(3) If out of specification, replace the throttle position sensor assembly.

NOTE
Adjust the idle position switch and throttle position sensor after replacement. (Refer to page 13-35.)

CAM POSITION SENSOR







OPERATION

- The cam position sensor senses the top dead center on compression stroke, converts it into a pulse signal and inputs it to the engine control unit, which then computes the fuel injection sequence, etc. based on the input signal.
- Power to the cam position sensor is supplied from the control relay and is earthed to the body. The cam position sensor generates a pulse signal as it repeatedly connects and disconnects between 5 V voltage supplied from the engine control unit and earth.

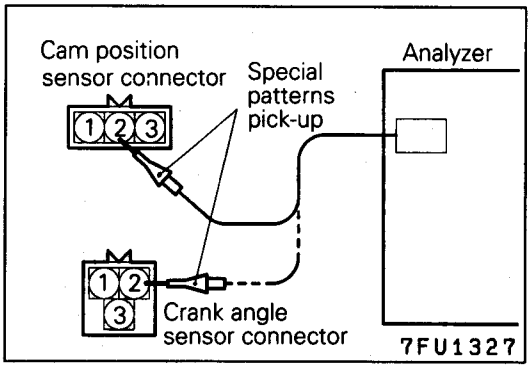
TROUBLESHOOTING HINTS

Hint 1: If the cam position sensor does not function correctly, correct sequential injection is not made so that the engine may stall, run irregularly at idle or fail to accelerate normally.

Hint 2: If the sensor outputs a pulse signal when the ignition switch is turned ON (with the engine no running), a faulty cam position sensor or engine control unit is suspected.

INSPECTION

Waveform inspection with analyzer



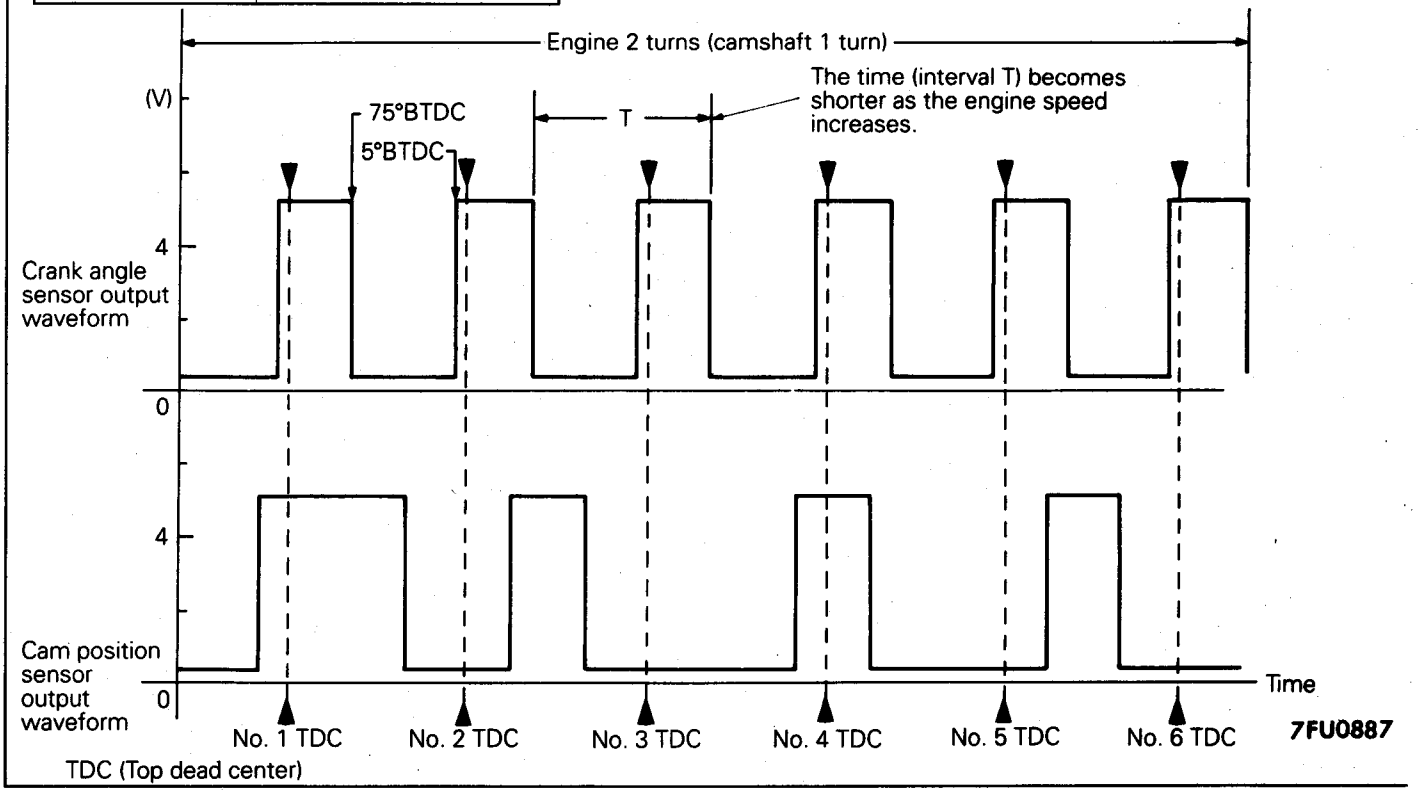
Measuring method

(1) Disconnect the connector of camshaft position sensor, and connect the special tool (test harness: MB991223) and jumper wire in between. (All terminals should be connected.)
(2) Connect the special patterns pick-up of the analyzer to camshaft position sensor terminal ②.
(3) Disconnect the connector of the crank angle sensor, and connect the special tool (test harness: MD998478) across the disconnected connector terminals.
(4) Connect the special patterns pick-up of the analyzer to crank angle sensor terminal ②.

Standard waveform

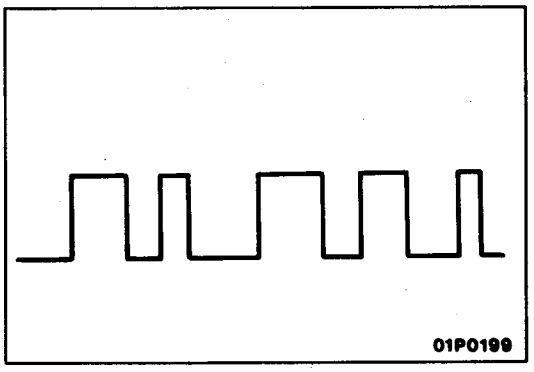
Observation conditions

Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine speed	Idling speed (700 r/min)



Waveform observing point

Confirm that cycle T becomes shorter as the engine speed increases.



Abnormal waveform example

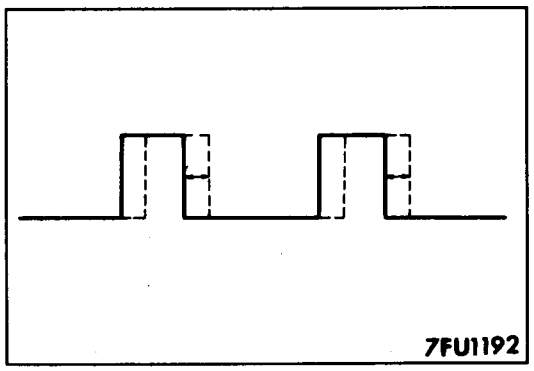
- Example 1

  Trouble cause

  The sensor interface is troubled.

  Waveform feature

  The engine does not start, but the rectangular waveform is output.



- Example 2

  Trouble cause

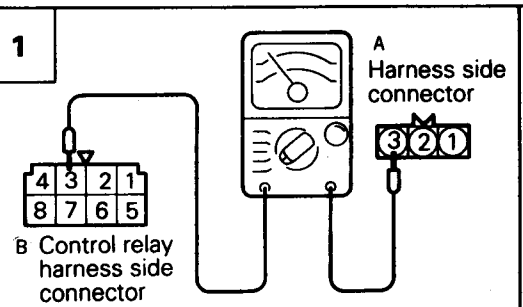
  The timing belt is loose.

  The sensor disc is abnormal.

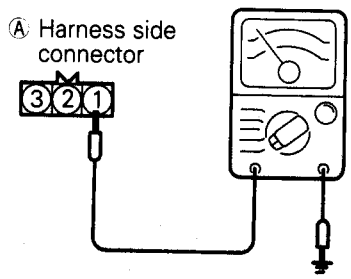
  Waveform feature

  The waveform fluctuates fore and aft.

HARNESS INSPECTION

1		Check for continuity between the cam position sensor and control relay. • Cam position sensor connector :Disconnected • Control relay connector: Disconnected NOTE Touch ohmmeter probes to both ends of the harness.	OK → 2 NG → Repair the harness. (Ⓐ3 — Ⓑ3)

2



6AF0057

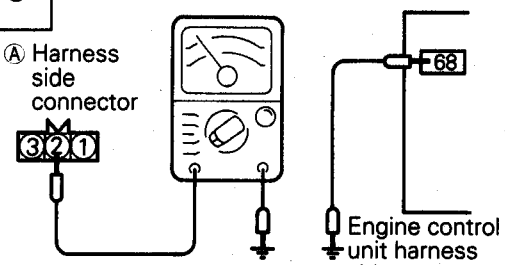
Check for continuity of the earth circuit.

- Cam position sensor connector: Disconnected

OK → 3

NG → Repair the harness. (Ⓐ 1 – Earth)

3



6AF0058

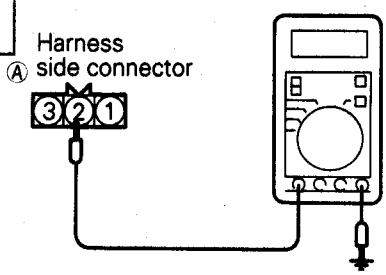
Check for an open-circuit, or a short-circuit to earth between the cam position sensor and the engine control unit.

- Engine control unit connector: Disconnected
- Cam position sensor connector: Disconnected

OK → 4

NG → Repair the harness. (Ⓐ 2 – 68)

4



6AF0059

Measure the impressed voltage

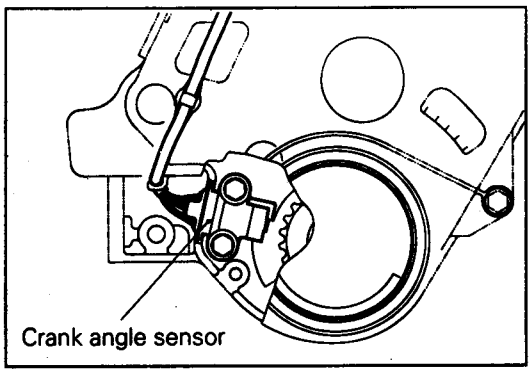
- Cam position sensor connector: Disconnected
- Engine control unit connector: Connected
- Ignition switch: ON

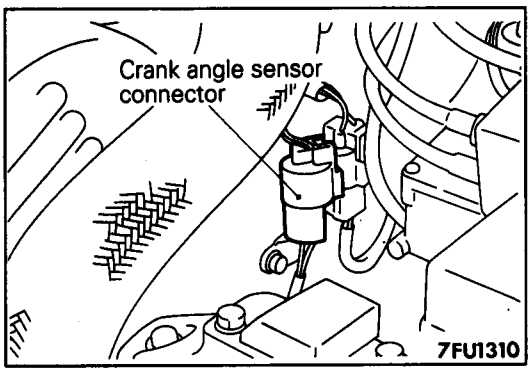
Voltage (V)
4.8 – 5.2

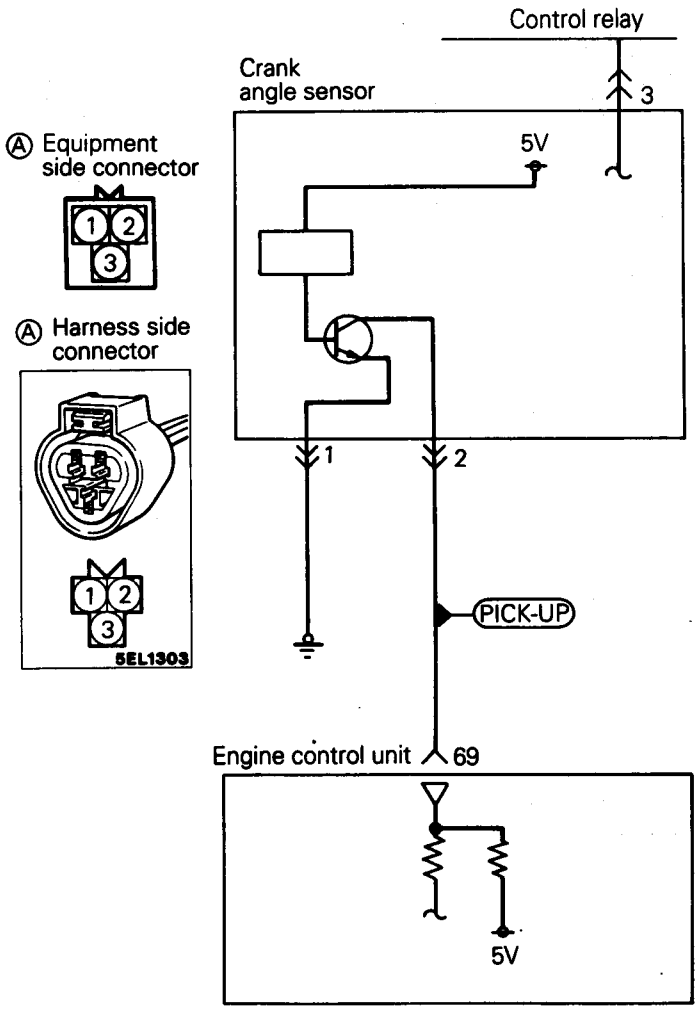
OK → STOP

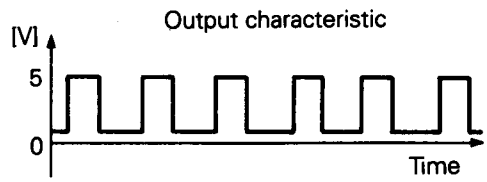
NG → Replace the engine control unit.

CRANK ANGLE SENSOR





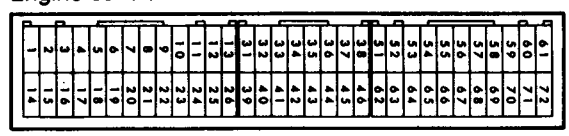




7FU0682

6AF0060

Engine control unit connector



9FU0101

OPERATION

- The crank angle sensor senses the crank angle (piston position) of each cylinder, converts it into a pulse signal and inputs it to the engine control unit, which then computes the engine speed and controls the fuel injection timing and ignition timing based on the input signal.
- Power to the crank angle sensor is supplied from the control relay and is earthed to the body. The crank angle sensor generates a pulse signal as it repeatedly connects and disconnects between 5 V voltage supplied from the engine control unit and earth.

TROUBLESHOOTING HINTS

Hint 1: If unexpected shocks are felt during driving or the engine stalls suddenly during idling, shake the crank angle sensor harness. If this causes the engine to stall, poor contact of the sensor connector is suspected.
Hint 2: If the crank angle sensor outputs a pulse signal when the ignition switch is turned ON (with the engine not running), a faulty crank angle sensor or engine control unit is suspected.
Hint 3: If the tachometer reads 0 r/min when the engine that has failed to start is cranked, faulty crank angle sensor or broken timing belt is suspected.
Hint 4: If the tachometer reads 0 r/min when the engine that has failed to start is cranked, the primary current of the ignition coil is not turned on and off. Therefore, troubles in the ignition circuit and ignition coil or faulty power transistor is suspected.
Hint 5: If the engine can be run at idle even though the crank angle sensor reading is out of specification, troubles are often in other than the crank angle sensor.

[Examples]
(1) Faulty engine coolant temperature sensor
(2) Faulty idle speed control servo
(3) Poorly adjusted reference idle speed

INSPECTION

Using Multi-use Tester (MUT) or MUT-II

Function	Item No.	Data display	Check condition	Check content	Normal state
Data reading	22	Cranking speed	• Engine cranking • Tachometer connected	Compare cranking speed and multi-use tester reading	Indicated speed to agree

NOTE
(1) The tachometer indicates a third of the actual engine speed. Therefore, 3 times the tachometer indication is the actual engine speed.
(2) When the tachometer is set to the 2-cylinder range, it indicates actual engine speed.

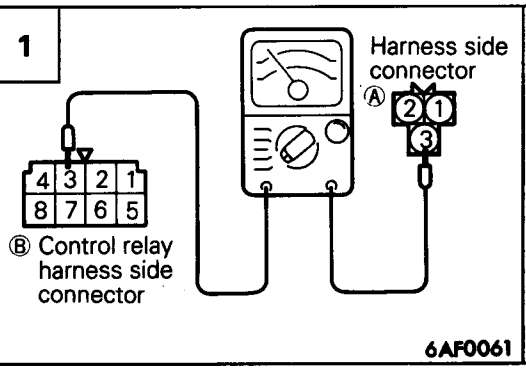
Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	22	Idle speed	• Engine: Running at idle • Idle position switch: ON	At –20°C (–4°F)	1,300 – 1,500 r/min
				At 0°C (32°F)	1,250 – 1,450 r/min
				At 20°C (68°F)	1,100 – 1,300 r/min
				At 40°C (104°F)	950 – 1,150 r/min
				At 80°C (176°F)	600 – 800 r/min

Wave Pattern Inspection Using an Analyzer

Refer to cam position sensor section (P.13-81.)

HARNESS INSPECTION

1



6AF0061

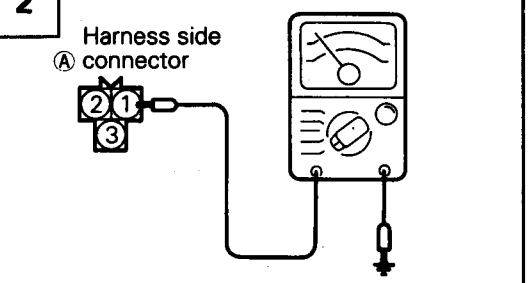
Check for continuity between the crank angle sensor and the control relay.
- Crank angle sensor connector: Disconnected
- Control relay connector: Disconnected

NOTE
Touch ohmmeter probes to both ends of the harness

OK → 2

NG → Repair the harness. (Ⓐ3 – Ⓑ3)

2



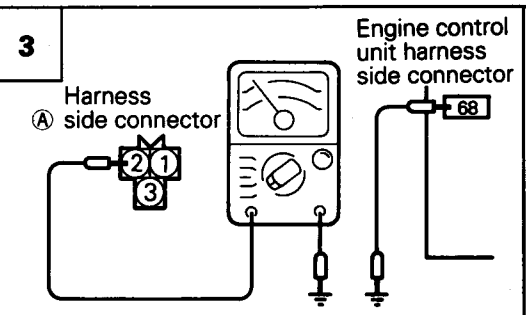
6AF0062

Check for continuity of the earth circuit.
- Crank angle sensor connector: Disconnected

OK → 3

NG → Repair the harness. (Ⓐ1 – Earth)

3



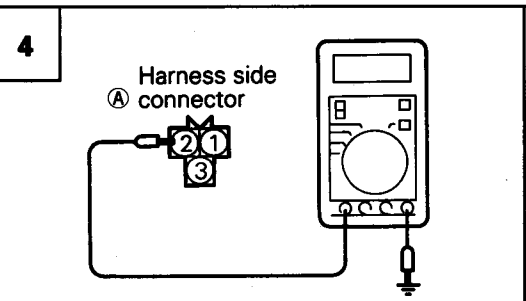
6AF0063

Check for an open-circuit, or a short-circuit to earth between the crank angle sensor and the engine control unit.
- Engine control unit connector: Disconnected
- Crank angle sensor connector: Disconnected

OK → 4

NG → Repair the harness. (Ⓐ2 – 68)

4



6AF0064

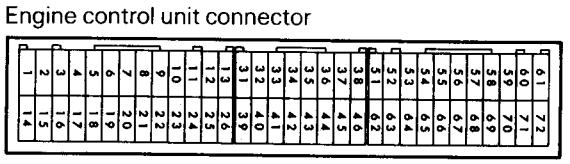
Measure the impressed voltage.
- Crank angle sensor connector: Disconnected
- Engine control unit connector: Connected
- Ignition switch: ON

Voltage (V)
4.8–5.2

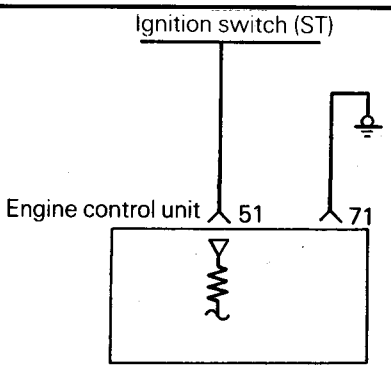
OK → STOP

NG → Replace the engine control unit.

IGNITION SWITCH-ST



9FU0101



OPERATION

- The ignition switch-ST inputs a high signal to the engine control unit while the engine is cranking. The engine control unit provides fuel injection control, etc., at engine startup based on this signal.
- When the ignition switch is set to START, the battery voltage at cranking is applied through the ignition switch to the engine control unit, which detects that the engine is cranking.

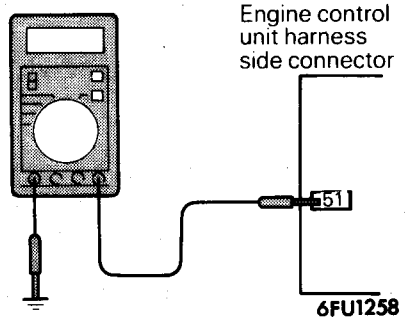
INSPECTION

Using Multi-use Tester (MUT) or MUT-II

Function	Item No.	Data display	Check condition	Engine	Normal indication
Data reading	18	Switch state	Ignition switch: ON	Stop	OFF
				Cranking	ON

HARNESS INSPECTION

1



Measure the input voltage to the engine control unit.

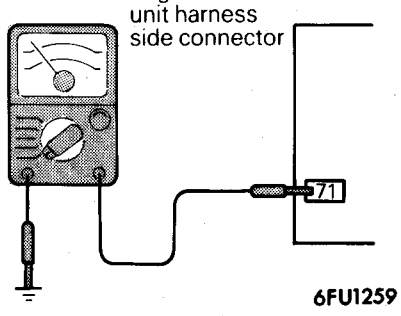
- Engine control unit connector: Disconnected
- Ignition switch: START

Voltage (V)
8 or more

OK → 2

NG → Repair the harness. (51 – Ignition switch)

2



Check for continuity of the earth circuit.

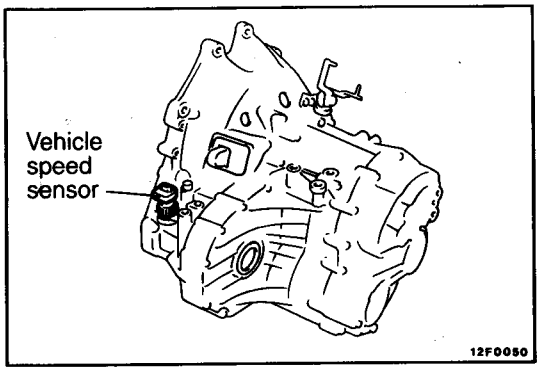
- Engine control unit connector: Disconnected

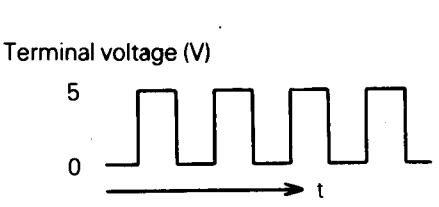
OK → STOP

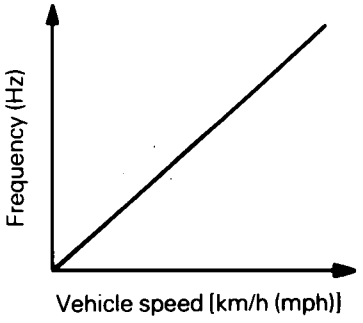
NG → Repair the harness. (71 – Earth)

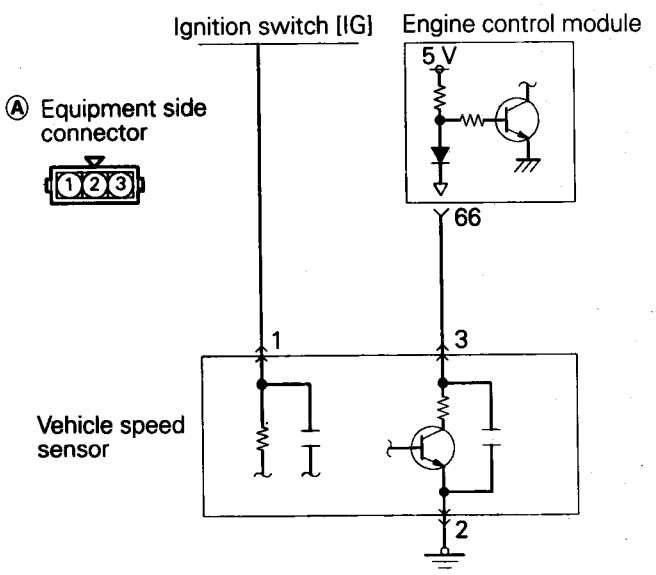
VEHICLE SPEED SENSOR

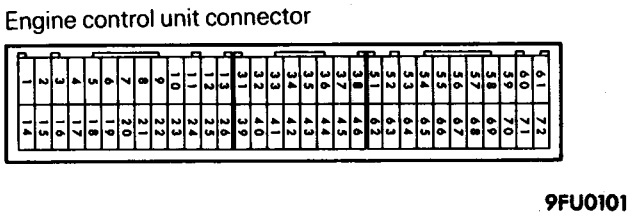
E13YPAA











OPERATION

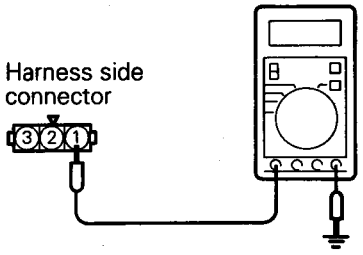
- The vehicle speed sensor which is located in the speedometer converts the vehicle speed into a pulse signal and inputs it to the engine control unit, which then provides the idle speed control, etc. based on this signal.
- The vehicle speed sensor generates the vehicle speed signal by repeatedly opening and closing between the voltage of about 5 V applied from the engine control unit and earth using a reed switch.

TROUBLESHOOTING HINTS

If there is an open or short circuit in the vehicle speed sensor signal circuit, the engine may stall when the vehicle is decelerated to stop.

HARNESS INSPECTION

1



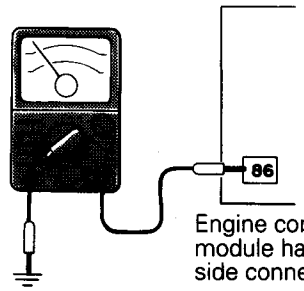
Measure the line voltage of the vehicle speed sensor.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 2

NG → Repair the harness. (Ⓐ 1–Ignition switch)

2



Check the vehicle speed sensor output circuit for continuity.

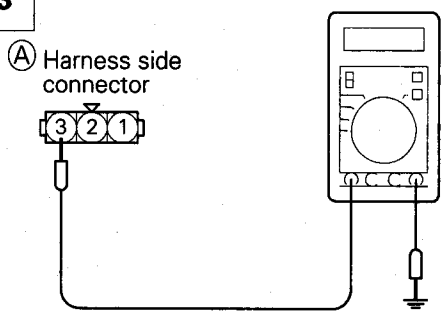
- Engine control module connector: Disconnected
- Ignition switch: ON
- Move the vehicle

Continuity

OK → STOP

NO → 3

3



Measure the power supply voltage of the vehicle speed sensor.

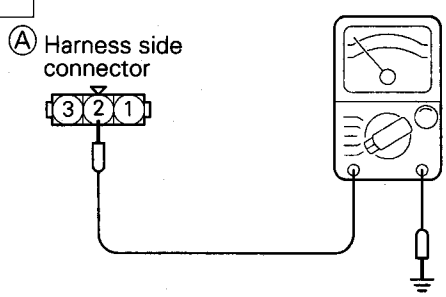
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.5 – 4.9

OK → 4

NO → Repair the harness. (Ⓐ 3 – 66)

4



Check for continuity of the ground circuit.

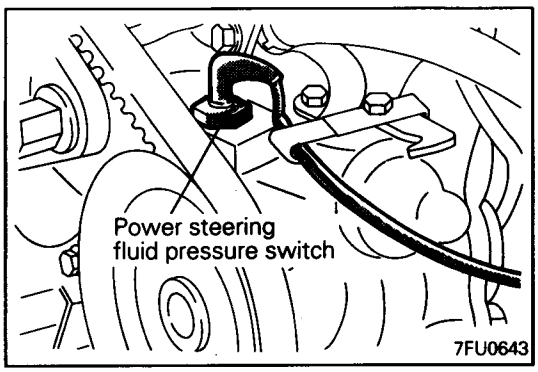
- Connector: Disconnected

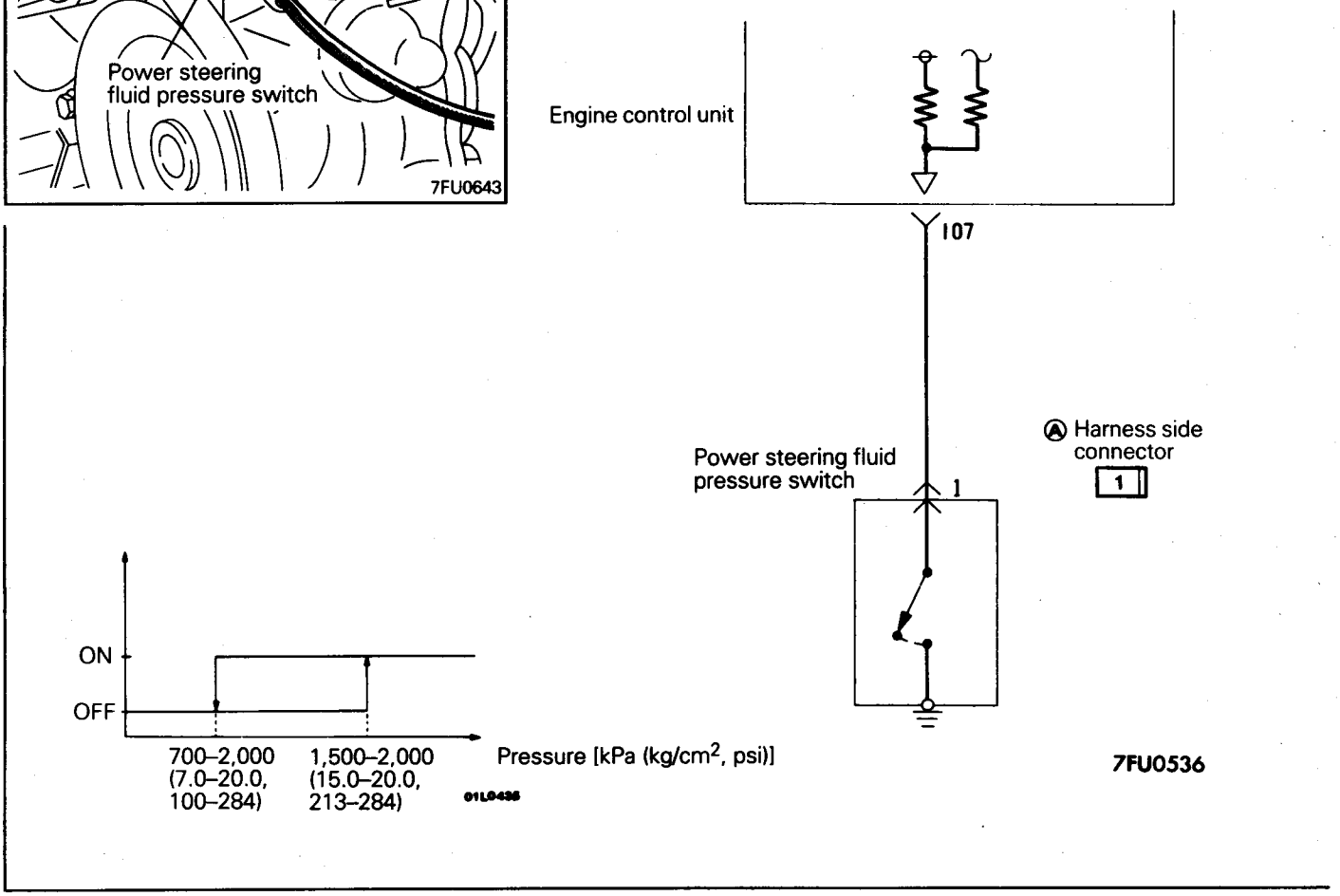
OK → STOP

NO → Repair the harness. (Ⓐ 2 – Ground)

POWER STEERING FLUID PRESSURE SWITCH

E13YQAA





OPERATION

- The power steering fluid pressure switch converts presence/absence of power steering load into low/high voltage and inputs it to the engine control unit, which then controls the idle speed control servo based on this signal.
- The battery voltage in the engine control unit is applied through a resistor to the power steering fluid pressure switch. Steering operation causes the power steering fluid pressure to increase, turning the switch on. As a result, continuity is produced between the battery voltage applied and earth. This causes the power steering fluid pressure terminal voltage to go from high to low.

INSPECTION

Using Multi-use Tester (MUT) or MUT-II

Function	Item No.	Data display	Check condition	Steering wheel	Normal indication
Data reading	27	Switch state	Engine: Idling	Steering wheel neutral position (wheels straight-ahead direction)	OFF
				Steering wheel half turn	ON

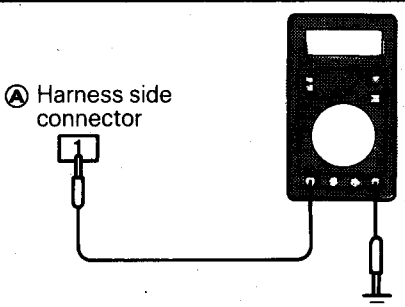
Checking Fluid Pressure

Steering wheel	Fluid pump delivery pressure (ref. value)
Straight forward	700 – 1,200 kPa (7.0 – 12.0 kg/cm^2, 100 – 171 psi)
Turned	1,500 – 2,000 kPa (15.0 – 20.0 kg/cm^2, 213 – 284 psi)

HARNESS INSPECTION

1

Ⓐ Harness side connector



7FU0505

Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
5V

OK → STOP

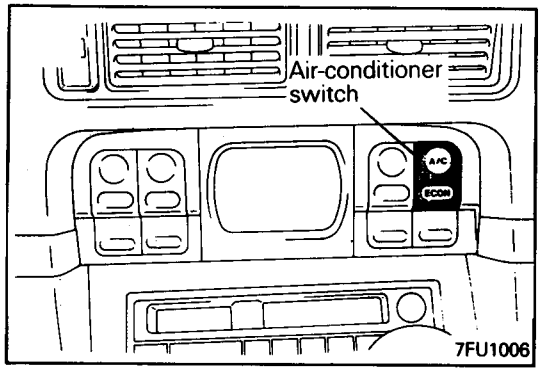
NG → Repair the harness. (Ⓐ1 – 107)

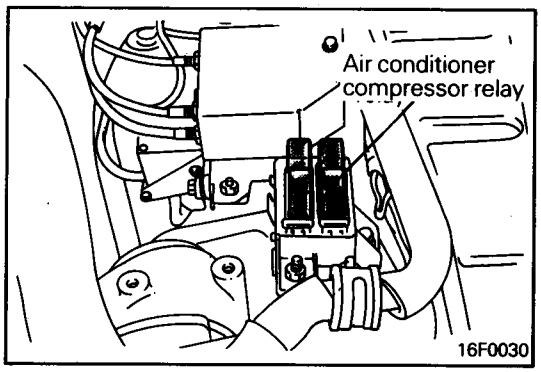
SENSOR INSPECTION

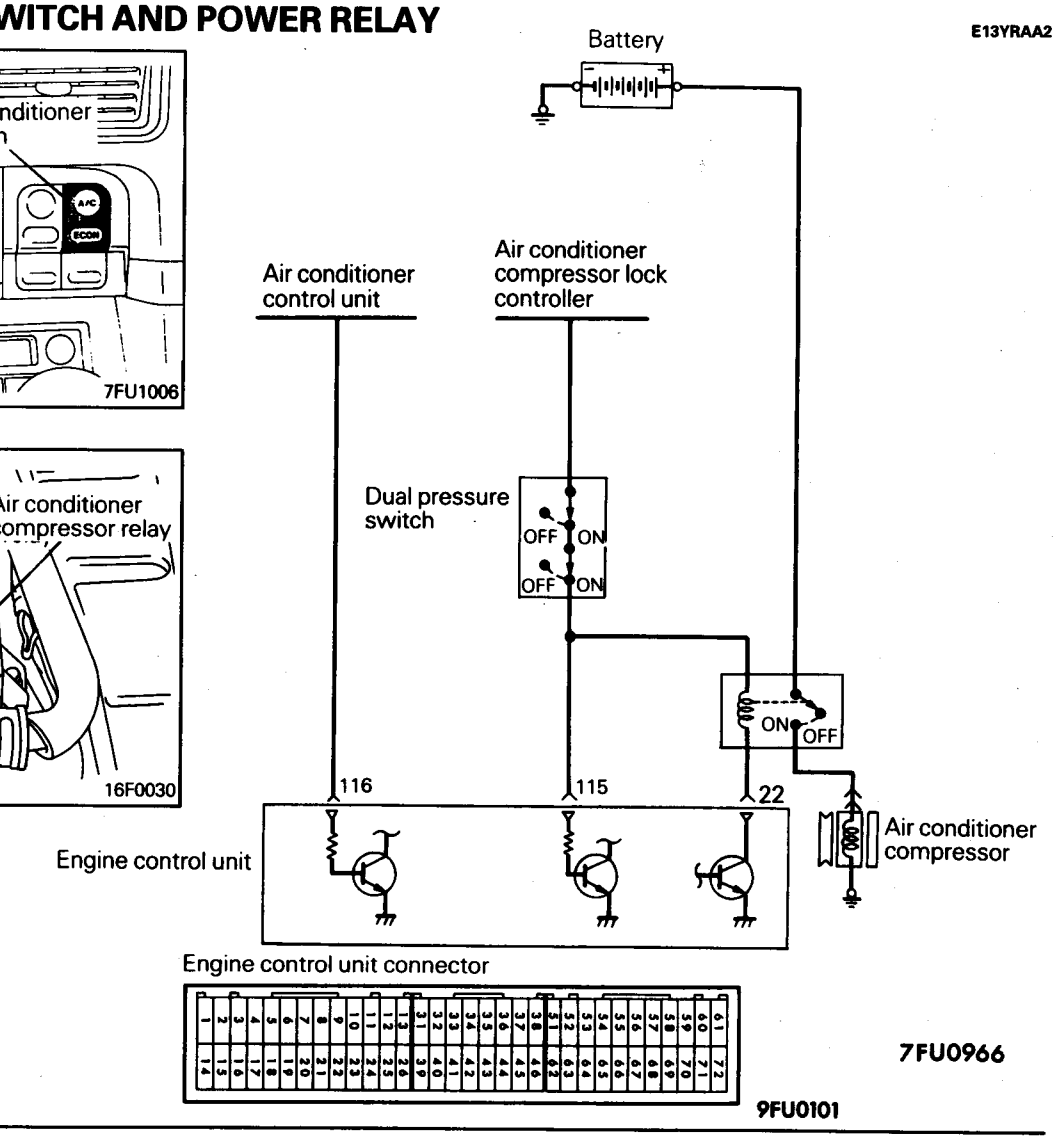
Refer to GROUP 37 – Service Adjustment Procedures.

AIR CONDITIONER SWITCH AND POWER RELAY

E13YRAA2







OPERATION

- The air conditioner switch applies the battery voltage to the engine control unit when the air conditioner is turned on.
- When the air conditioner ON signal is input, the engine control unit drives the idle speed control servo and turns ON the power transistor. As a result, the air conditioner power relay coil is energized to turn ON the relay switch, which activates the air compressor magnetic clutch.

TROUBLESHOOTING HINTS

If the air compressor magnet clutch is not activated when the air conditioner switch is turned ON during idling, faulty air conditioner control system is suspected.

INSPECTION

Using Multi-use Tester (MUT) or MUT-II

AIR CONDITIONER SWITCH

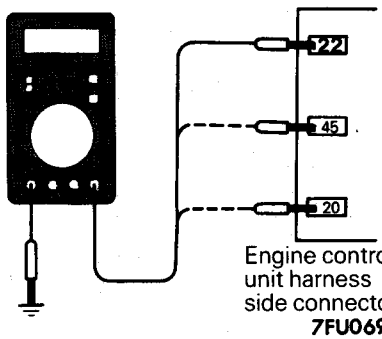
Function	Item No.	Data display	Check condition	Air conditioner switch	Normal indication
Data reading	28	Switch state	Engine: Idling (air compressor to be running when air conditioner switch is ON)	OFF	OFF
				ON	ON

AIR CONDITIONER POWER RELAY

Function	Item No.	Data display	Check condition	Air conditioner switch	Normal indication
Data reading	49	Air conditioner relay state	Engine: Idling after warm-up	OFF	OFF (compressor clutch non-activation)
				ON	ON (compressor clutch activation)

HARNESS INSPECTION

1



Engine control unit harness side connector
7FU0695

Measure the power supply voltage of the air conditioner circuit.

- Air conditioner switch: ON
- Engine control unit connector: Disconnected
- Ignition switch: ON
- Dual air conditioner switch: ON

Voltage (V)
5V

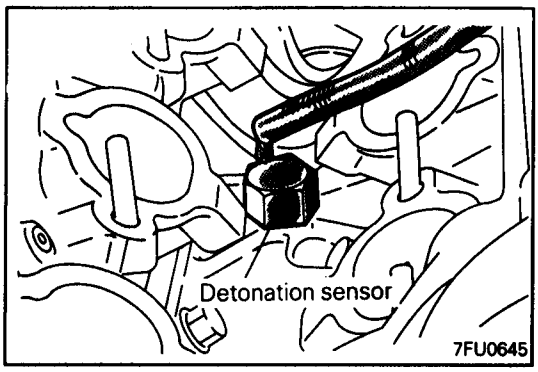
OK → STOP

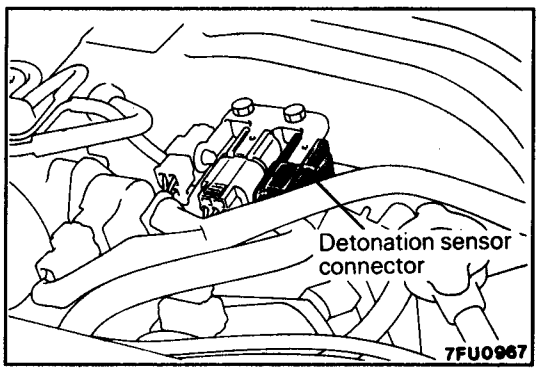
NOT OK → Check the air conditioner circuit.

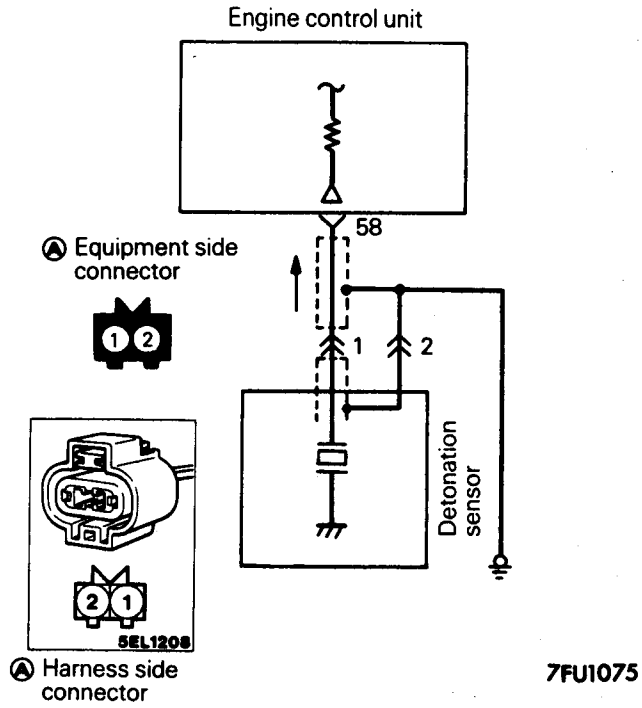
AIR CONDITIONER INSPECTION

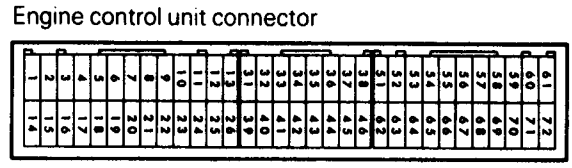
Refer to GROUP 55 – Service Adjustment Procedures.

DETONATION SENSOR









OPERATION

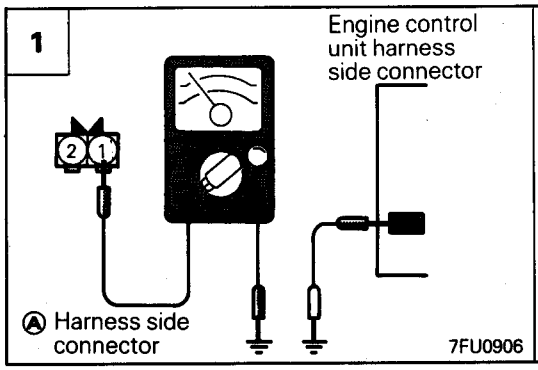
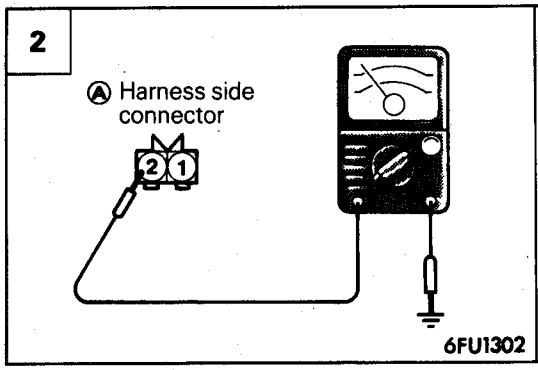
The detonation sensor generates a voltage proportional to the magnitude of cylinder block vibration due to knocking and inputs it to the engine control unit. Based on this signal, the engine control unit provides retard control of the ignition timing.

TROUBLESHOOTING HINTS

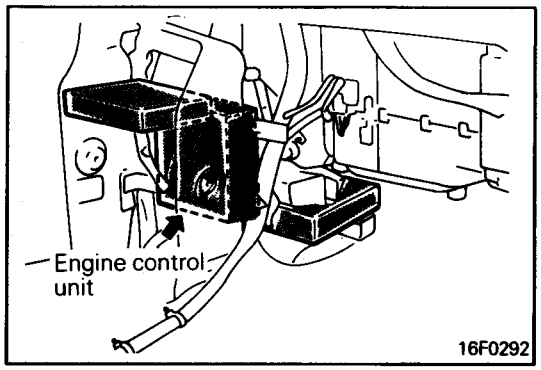
When knocking occurs while driving under high-load conditions, the following problems are suspected in addition to the detonation sensor itself.

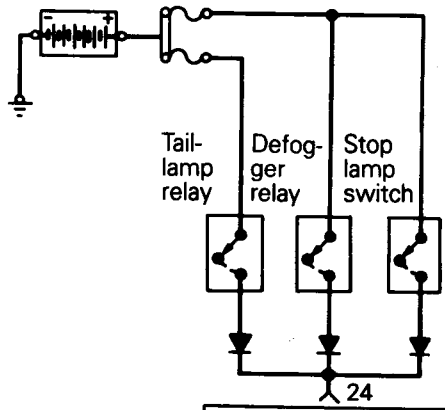
(1) Inappropriate ignition plug heat range
(2) Inappropriate gasoline
(3) Incorrectly adjusted reference ignition timing

HARNESS INSPECTION

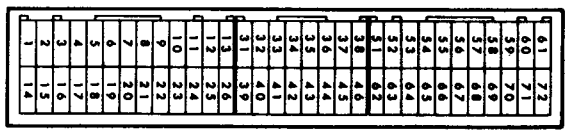
1 	Check for an open-circuit or a short-circuit to earth, between the engine control unit and detonation sensor. • Detonation sensor connector: Disconnected • Engine control unit connector: Disconnected	OK →	2
		NG →	Repair the harness. (Ⓐ1 – 58)
2 	Check for continuity of the earth circuit. • Connector: Disconnected	OK →	STOP
		NG →	Repair the harness. (Ⓐ2 – Earth)

ELECTRICAL LOAD SWITCH





Engine control unit connector



9FU0101

7FU0688

OPERATION

- The electrical load switch inputs ON/OFF state of the switch of equipment that consumes much power during idling, namely, equipment with a large electrical load, to the engine control unit. Based on this signal, the engine control unit controls the idle-speed control servo.
- When the switch of equipment with a large electrical load is turned ON, the battery voltage is applied to the engine control unit to indicate that the equipment switch is turned ON.

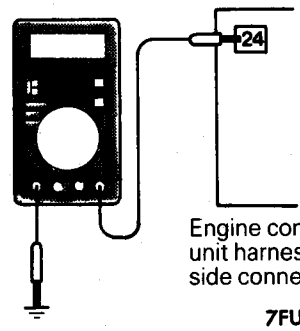
INSPECTION

Using Multi-use Tester (MUT) or MUT-II

Function	Item No.	Data display	Check condition	Equipment state	Normal display
Data reading	33	Switch state	Operation of equipment: OFF	Lighting switch only: OFF → ON	OFF → ON
				Rear defogger switch only: OFF → ON	OFF → ON
				Brake pedal only: depressed → Released	ON → OFF

HARNESS INSPECTION

1



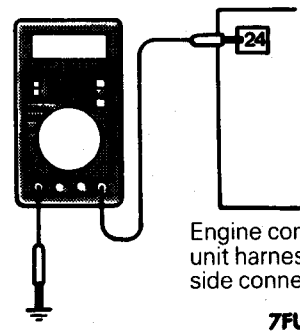
Measure the input voltage of engine control unit.
- Engine control unit connector: Disconnected
- Lighting switch: ON (Tail lamp relay ON)

Voltage (V)
SV

OK → 2

NG → Check circuit related to tail lamp relay

2



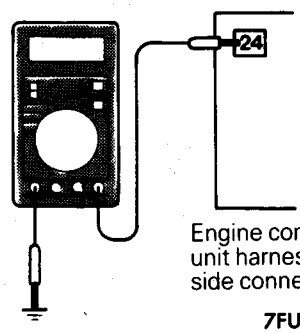
Measure the input voltage of engine control unit.
- Engine control unit connector: Disconnected
- Defogger switch: ON (Defogger relay ON)

Voltage (V)
SV

OK → 3

NG → Check circuit related to defogger relay

3



Measure the input voltage of engine control unit.
- Engine control unit connector: Disconnected
- Brake pedal: Depressed (Stop lamp switch ON)

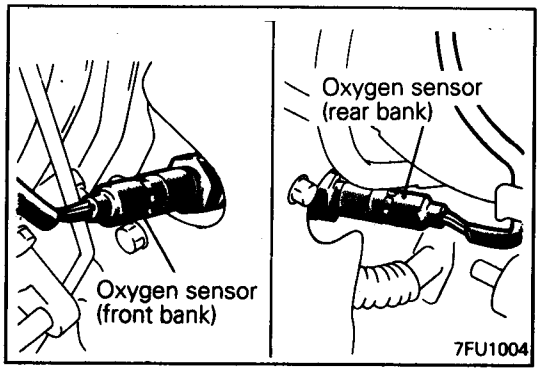
Voltage (V)
SV

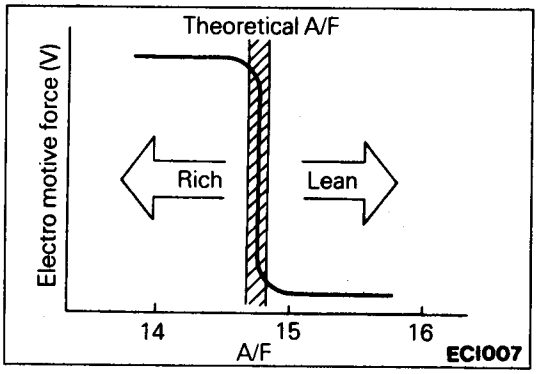
OK → STOP

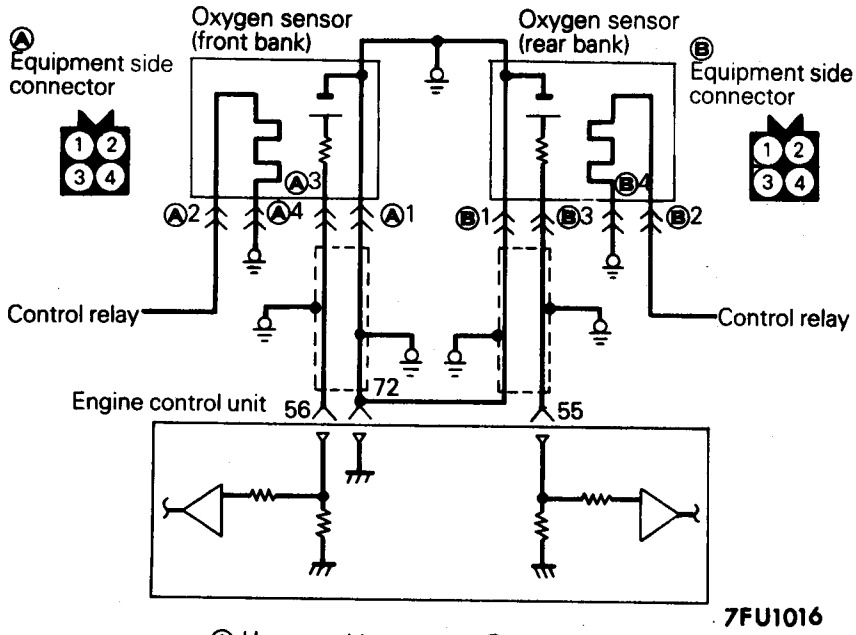
NG → Check circuit related to stop lamp relay

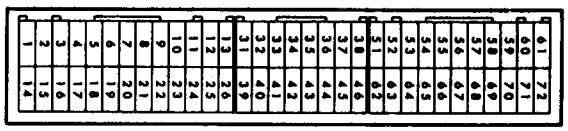
OXYGEN SENSOR

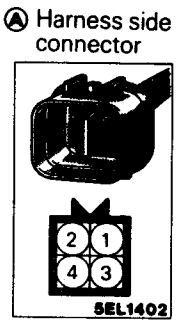
E13YHAA2

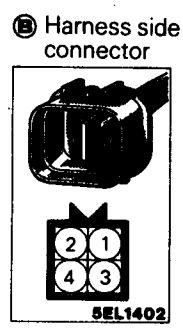












9FU0101

OPERATION

- The oxygen sensor senses the oxygen concentration in exhaust gas, converts it into a voltage and inputs it to the engine control unit.
- The oxygen sensor outputs about 1 V when the air fuel ratio is richer than the theoretical ratio and outputs about 0 V when the ratio is leaner (higher oxygen concentration in exhaust gas).
- The engine control unit controls the fuel injection ratio based on this signal so that the air fuel ratio may be kept at the theoretical ratio.
- The battery voltage is supplied to the oxygen sensor through the control relay. Therefore, the sensor element is heated by the heater so that the oxygen sensor remains responsive even when the exhaust temperature is low.

TROUBLESHOOTING HINTS

Hint 1: Poor cleaning of exhaust gas will result if the oxygen sensor fails.

Hint 2: If the oxygen sensor check has resulted normal but the sensor output voltage is out of specification, troubles of parts related to air fuel ratio control system are suspected.

[Examples]

(1) Faulty injector
(2) Air leaking into the intake manifold through gasket gap, etc.
(3) Faulty air flow sensor, intake air temperature sensor, barometric pressure sensor, engine coolant temperature sensor

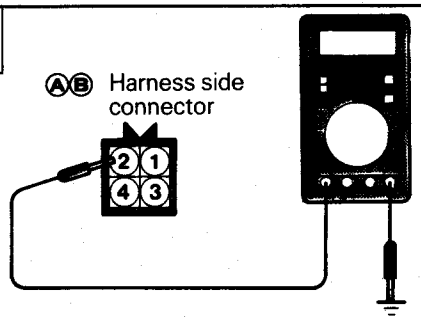
INSPECTION

Using Multi-use Tester (MUT) or MUT-II

Function	Item No.	Data display	Check condition	Engine condition	Standard value
Data reading	11 (rear bank) 39 (front bank)	Sensor detection voltage	Engine: Warm-up (Make the mixture lean by engine speed reduction, and rich by racing)	When sudden deceleration from 4,000 r/min	200 mV or lower
				When engine is suddenly raced	600 – 1,000 mV
			Engine: Warm-up (Using the oxygen sensor signal, check the air/fuel mixture ratio, and also check the condition of control by the engine control unit)	700 r/min (Idling)	400 mV or lower ↕ (changes) 600 – 1,000 mV
				2,000 r/min.	

HARNESS INSPECTION

1



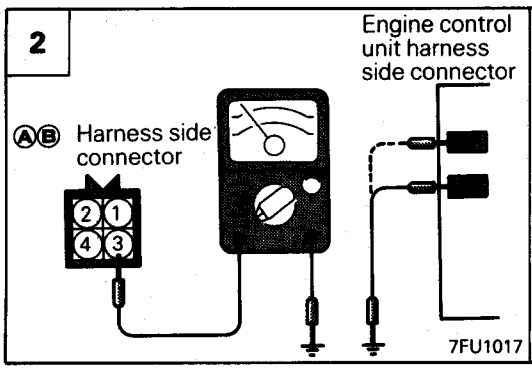
Measure the power supply voltage of the oxygen sensor.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
SV

OK → 2

NG → Repair the harness. (A-2, B-2 – Control relay)

2

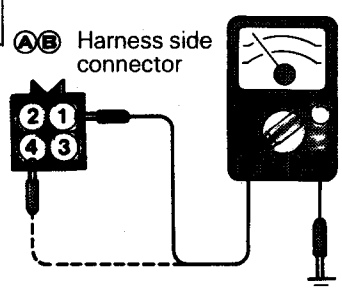


Check for an open-circuit, or a short-circuit to earth, between the engine control unit and the oxygen sensor.
- Oxygen sensor connector: Disconnected
- Engine control unit connector: Disconnected

OK → 3

NG → Repair the harness. (A-3 – 56) (B-3 – 55)

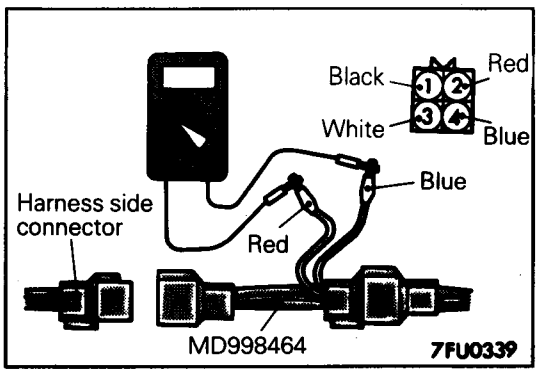
3

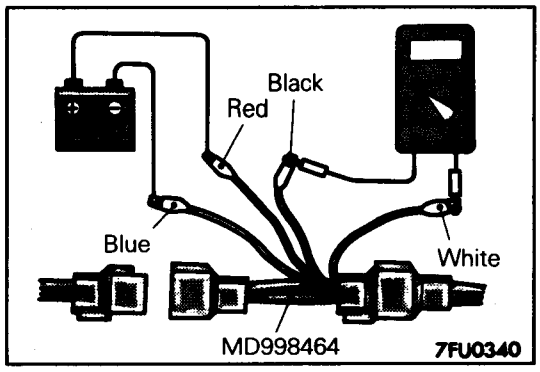


Check for continuity of the earth circuit.
- Connector: Disconnected

OK → STOP

NG → Repair the harness. (A-1, B-1 – 72) (A-4, B-4 – Earth)





SENSOR INSPECTION

(1) Disconnect the oxygen sensor (rear bank) connector and connect the special tool, Test Harness, to the oxygen sensor (rear bank) connector.
(2) Check that there is continuity [approx. 20 Ω at 20°C (68°F)] across terminals ② and ④ of the oxygen sensor (rear bank) connector.
(3) If there is no continuity, replace the oxygen sensor (rear bank).

(4) Warm up the engine until the engine coolant temperature becomes 80°C (176°F) or higher.
(5) Using jumper wires, connect terminals ② (red clip of special tool) and ④ (blue clip) of the oxygen sensor connector to battery ⊕ and ⊖ terminals respectively.

Caution
Ensure that the jumper wires are connected correctly, as wrong connections result in a broken oxygen sensor.

(6) Connect a digital voltmeter across terminals ① (black clip of the special tool) and ③ (white clip).
(7) Race the engine repeatedly and measure the output voltage of the oxygen sensor (rear bank).

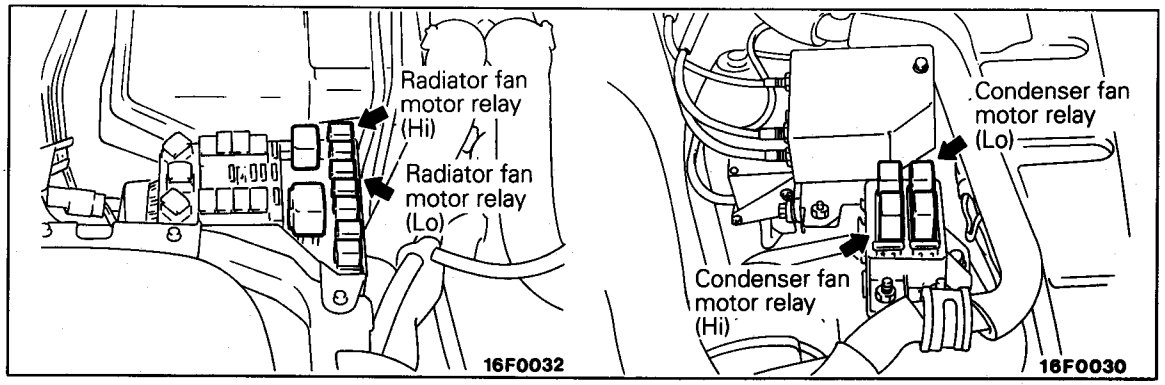
Engine	Oxygen sensor output voltage	Remarks
When engine is raced	0.6 – 1.0V	When the air-fuel mixture becomes richer as a result of repeated racing, the oxygen sensor should output a voltage of 0.6 – 1.0V.

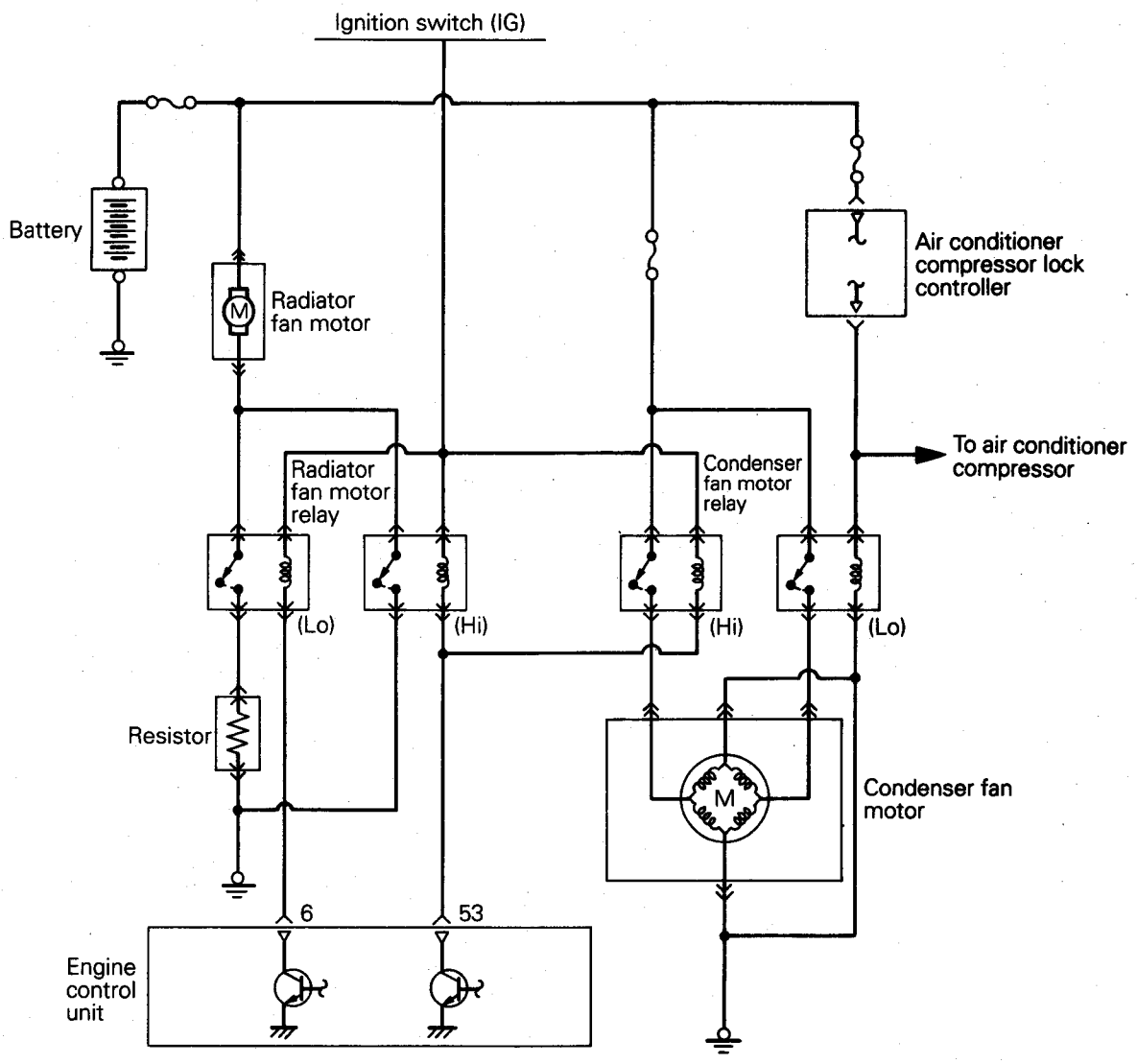
(8) If the measurements are not as specified, defective oxygen sensor (rear bank) is suspected.
(9) check the oxygen sensor (front bank) in the same way by following steps (1) through (8).

INSTALLATION

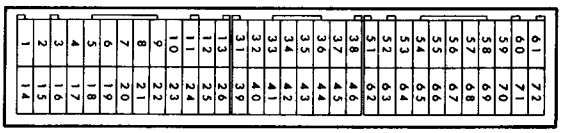
(1) For removal and installation of oxygen sensor, refer to GROUP 15 – Exhaust Manifold.
(2) Tighten the oxygen sensor to specified torque.

FAN MOTOR RELAY (RADIATOR FAN, CONDENSER FAN) <From 1995 models>





Engine control unit connector



9FU0101

OPERATION

- The engine control unit controls the radiator fan motor and condenser fan motor according to the engine coolant temperature and vehicle speed via the power transistors (low speed side and high speed side) inside the engine control unit.
- If the engine control unit turns ON the low speed side power transistor inside the engine control unit, the radiator fan motor relay (Lo) coil operates to send driving power supply (for low speed rotation) from the battery to the radiator fan motor.
  If the air conditioner compressor lock controller outputs the air conditioner compressor driving power supply, the current flows to the condenser fan motor relay (Lo).
  The condenser fan motor relay b(Lo) will operate to send driving power supply (for low speed rotation) from the battery to the condenser fan motor.
  If the engine control unit turns ON the high speed side power transistor inside the engine control unit, the radiator fan motor relay (Hi) and condenser fan motor relay (Hi) will operate to send the driving power supply (for high speed rotation) to the radiator fan motor and condenser fan motor.

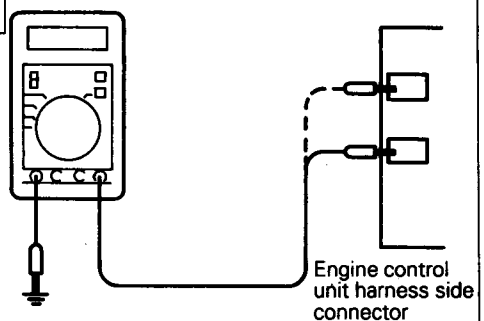
INSPECTION

Using Multi-use Tester (MUT) or MUT-II

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	20	Radiator fan motor and condenser fan motor are driven at high speeds.	Ignition switch: ON	Radiator fan motor and condenser fan motor rotate at high speeds.
	21	Radiator fan motor and condenser fan motor are driven at low speeds.	Ignition switch: ON	Radiator fan motor and condenser fan motor rotate at low speeds.

HARNESS INSPECTION

1



Measure input voltage applied to engine control unit
- Engine control unit connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

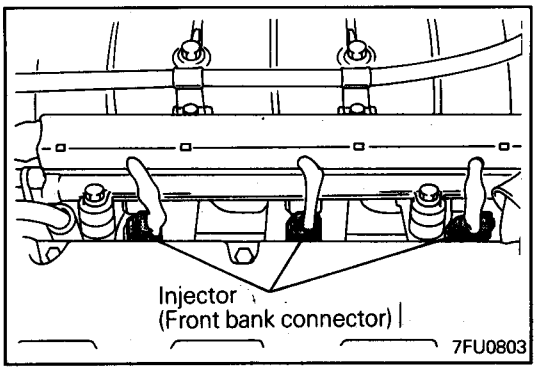
OK → STOP

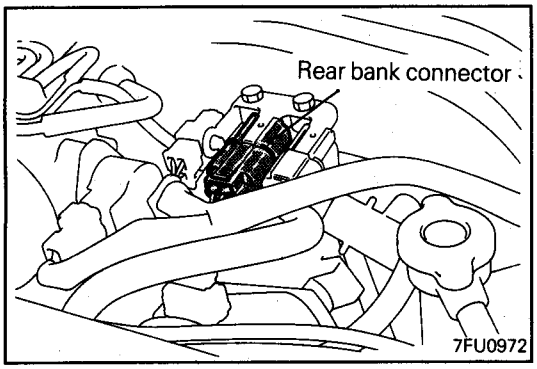
OK → Check the fan motor relay circuit

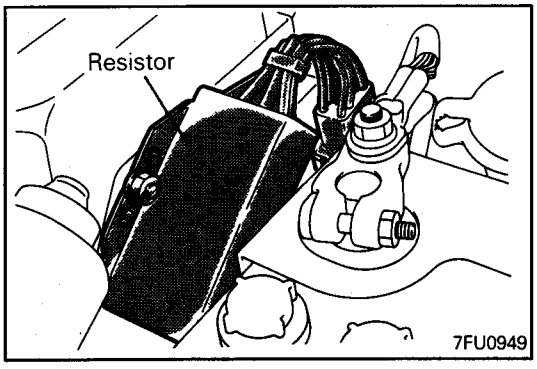
FAN MOTOR RELAY INSPECTION

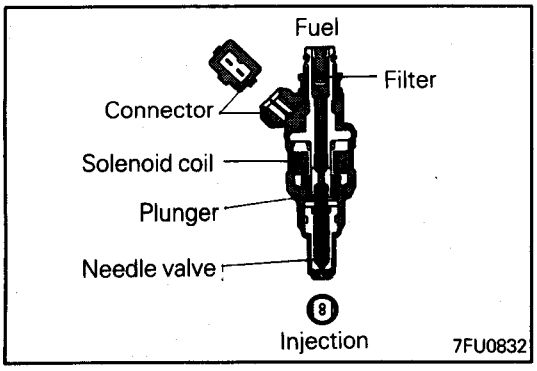
Refer to GROUP 14 Radiator and GROUP 55 – Service Adjustment Procedures.

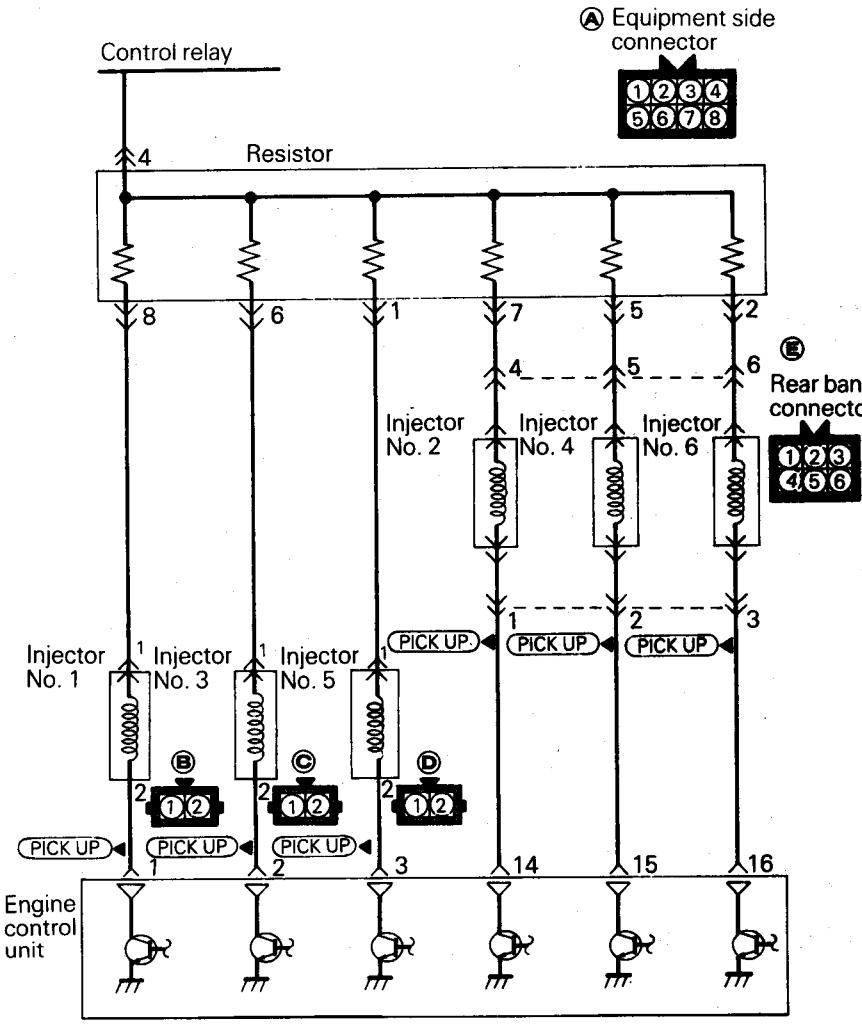
INJECTORS



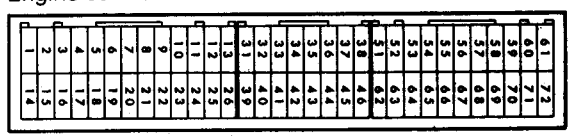








Engine control unit connector



9FU0101

OPERATION

- The injector is an injection nozzle with a solenoid valve which injects fuel according to the injection signal coming from the engine control unit.
- The injector has a fixed nozzle opening area and the fuel pressure against manifold inside pressure is regulated to a fixed level. Therefore, the volume of fuel injected by the injector is determined by the time during which the needle valve is open, namely, by the time during which the solenoid coil is energized.
- The battery voltage is applied through the control relay to this injector. When the engine control unit turns on the power transistor in the unit, the solenoid coil is energized to open the injector valve, which then injects fuel.

TROUBLESHOOTING HINTS

Hint 1: If the engine is hard to start when hot, check fuel pressure and check the injector for leaks.
Hint 2: If the injector does not when the engine that is hard to start is cranked, the following as well as the injector itself may be responsible.
(1) Faulty power supply circuit to the engine control unit, faulty earth circuit.
(2) Faulty control relay
(3) Faulty crank angle sensor, cam position sensor.
Hint 3: If there is any cylinder whose idle state remains unchanged when the fuel injection of injectors is cut one after another during idling, make following checks about such cylinder.
(1) Injector and harness check
(2) Ignition plug and high tension cable check
(3) Compression pressure check
Hint 4: If the injector harness and individual part checks have resulted normal but the injector drive time is out of specification, the following troubles are suspected.
(1) Poor combustion in the cylinder (faulty ignition plug, ignition coil, compression pressure, etc.)
(2) Loose EGR valve seating
(3) High engine resistance

INSPECTION

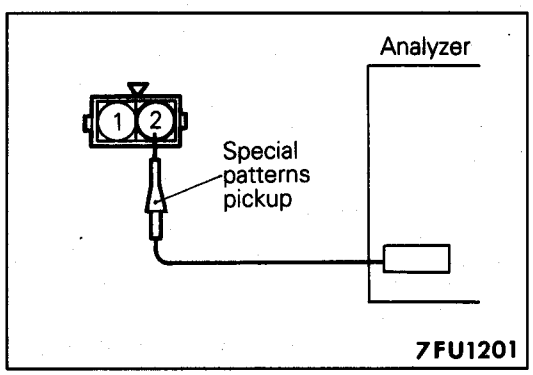
Using Multi-use Tester (MUT) or MUT-II

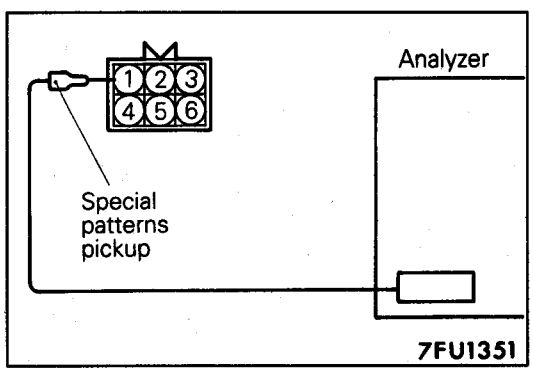
Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	41 (Rear bank) 47 (Front bank)	Drive time *1	Engine: Cranking	0°C (32°F)*2	Approx. 9 ms
				20°C (68°F)	Approx 28 ms
				80°C (176°F)	Aprox. 6 ms

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	41 (Rear bank) 47 (Front bank)	Drive time *3	• Engine coolant temperature: 80 to 95°C (176 to 203°F) • Lamps, electric cooling fan, accessory units: All OFF • Transmission: Neutral	700 r/min (Idle)	1.6 – 2.8 ms
				2,000 r/min	1.4 – 2.6 ms
				When sharp racing is made	To increase

NOTE
*1: The injector drive time refers to when the supply voltage is 11 V and the cranking speed is less than 250 r/min.
*2: When coolant temperature is low than 0°C (32°F), injection is made by six cylinders simultaneously.
*3 When the vehicle is new [within initial operation of about 500 km (300 miles)], the injector drive time may be about 10% longer

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	01	No. 1 injector shut off	Engine: Idling after warm-up (Shut off the injectors in sequence during after engine warm-up, check the idling condition)	Idle state to change further (becoming less stable or stalling)
	02	No. 2 injector shut off		
	03	No. 3 injector shut off		
	04	No. 4 injector shut off		
	05	No. 5 injector shut off		
	06	No. 6 injector shut off		





Wave Pattern Inspection Using an Analyzer

Measurement method

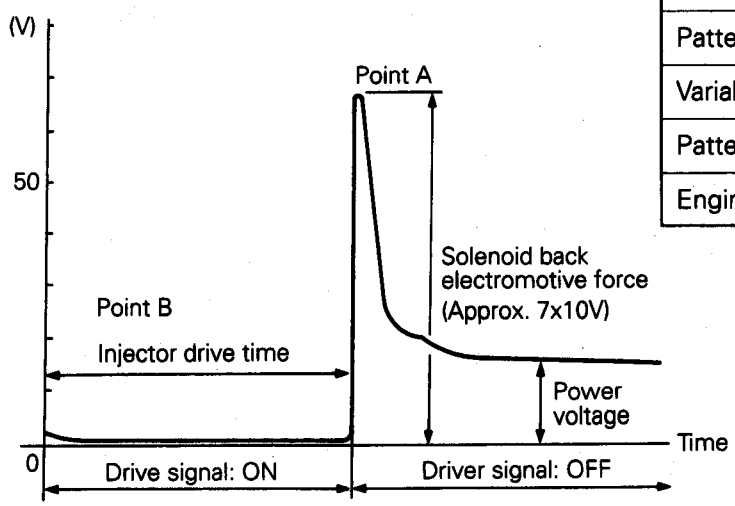
FOR FRONT BANK CYLINDERS (No. 1, No. 3, No.5)

(1) Disconnect the injector connector, and connect the special tool (test harness: MB991348) in between. (The power side and the engine control unit side terminals should both be connected.)
(2) Connect the analyzer special patterns pickup to the engine control unit test harness clip.

FOR REAR BANK CYLINDERS (No. 2, No.4, No.6)

(1) Disconnect the injector connector for the rear bank and connect the special tool (test harness MD998463).
(2) Connect the analyzer special patterns pickup to the male side connector terminal ① (Red clip on the special tool) to analyze the No. 2 cylinder, connection terminal ② (White clip) for No. 4 cylinder, and connection terminal ③ (blue clip) for No. 6 cylinder respectively.

Standard wave pattern



7FU1202

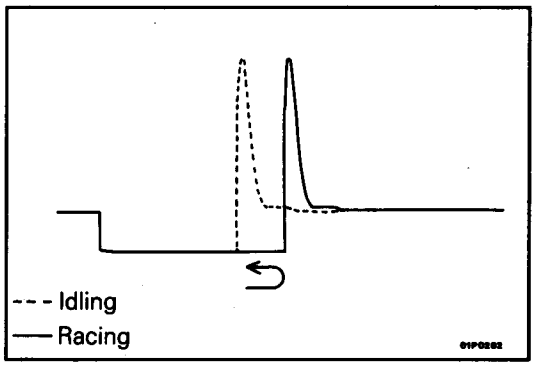
Observation conditions

Function	Special patterns
Pattern height	Variable
Variable knob	Adjust by monitoring wave
Pattern selector	Display
Engine r/min.	Idle r/min. (700 r/min.)

Wave pattern observation points

(Point A): Height of back electromotive force in the solenoid coil

Contrast with standard wave pattern	Probable cause
Solenoid coil back electromotive force is low or doesn't appear at all.	Short in the injector solenoid

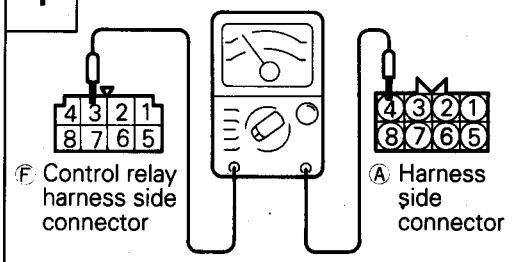


(Point B): Injector drive time

- The injector drive timing will synchronized with the MUT or MUT-II display.
- When the engine is suddenly raced, the drive time will be greatly extended at first, but the drive time will soon match the engine speed.

HARNESS INSPECTION

1



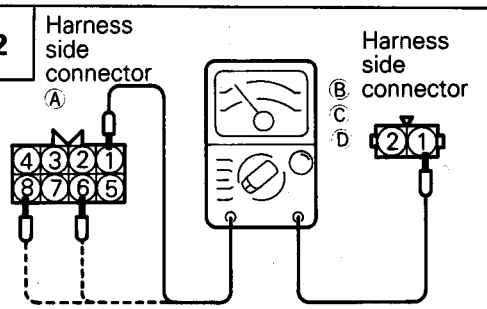
Check for continuity between resistor and control relay.
- Resistor connector: Disconnected
- Control relay connector: Disconnected

NOTE
Touch the ohmmeter probes to both ends of the harness.

OK → 2

NG → Repair the harness. (Ⓕ3—Ⓐ4)

2

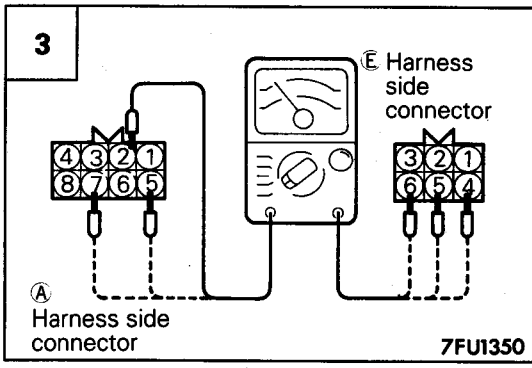


Check for continuity between the front bank side injector and the resistor.
- Injector connector: Disconnected
- Resistor connector: Disconnected

OK → 3

NG → Repair the harness. (Ⓐ168—ⒹⒸⒷ1)

3

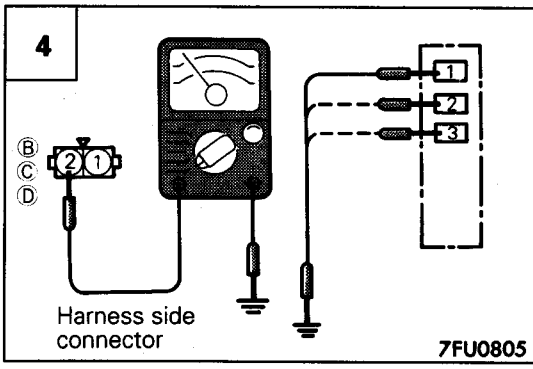


Check for continuity between the rear bank side injector and the resistor.
- Injector intermediate harness connector: Disconnected
- Resistor connector: Disconnected

OK → 4

NG → Repair the harness. (Ⓐ257—Ⓔ654)

4

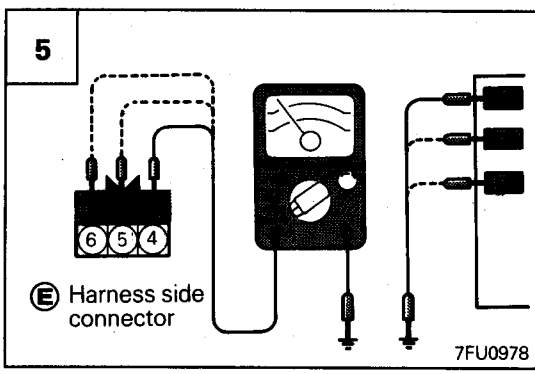


Check for an open-circuit, or a short-circuit between the front bank injector and the engine control unit.
- Injector connector: Disconnected
- Engine control unit connector: Disconnected

OK → 5

NG → Repair the harness. (ⒷⒸⒹ2—123)

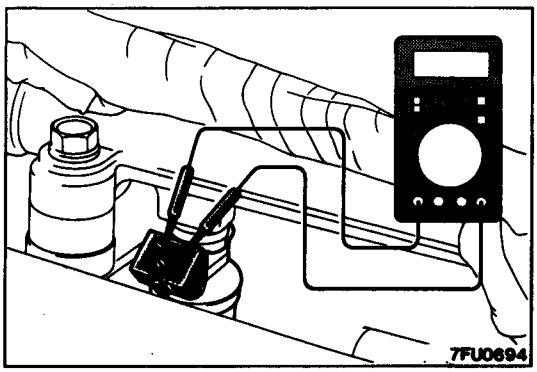
5



Check for an open-circuit, or a short-circuit between the rear bank injector and the engine control unit.
- Connector: Disconnected
- Engine control unit connector: Disconnected

OK → STOP

NG → Repair the harness. (Ⓔ123—14 15 16)

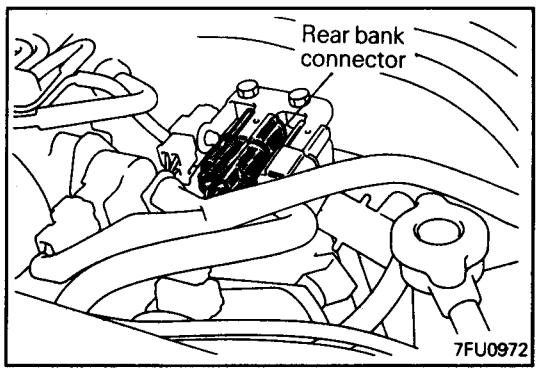


ACTUATOR INSPECTION

INJECTORS

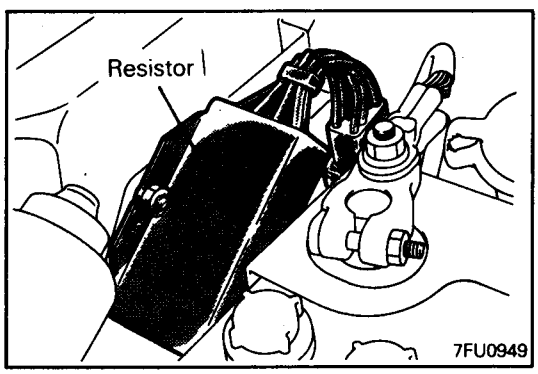
Measurement of Resistance between Front Bank Terminals

(1) Disconnect the injector connector.
(2) Measure the resistance between terminals.
Standard value: 2 – 3 Ω [at 20°C (68°F)]
(3) Reconnect the injector connector.



Measurement of Resistance between Rear Bank Terminals

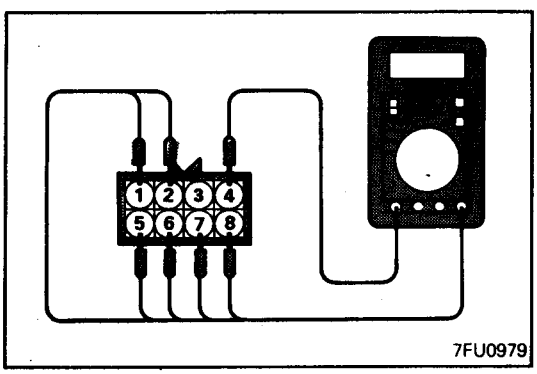
(1) Disconnect the injector connector.
(2) Measure the resistance between terminals.
Standard value: 2 – 3 Ω [at 20°C (68°F)]
(3) Reconnect the injector connector.



RESISTOR

Measurement of Resistance between Terminals

(1) Disconnect the resistor connector.



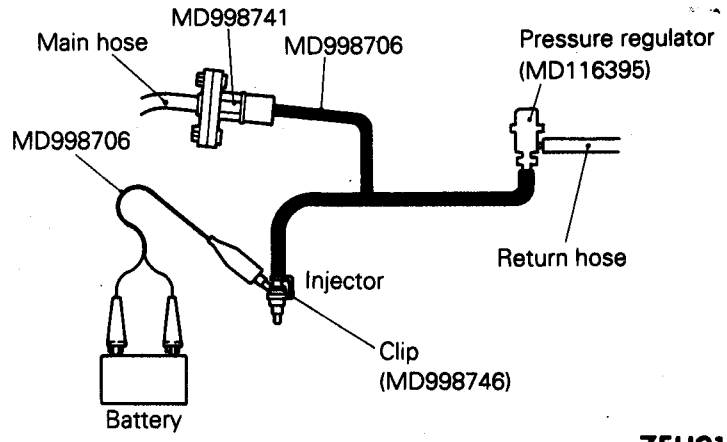
(2) Measure the resistance between terminals.

Measuring terminals	Resistance
1–4 2–4 5–4 6–4 7–4 8–4	5.5 – 6.5 Ω [At 20°C (68°F)]

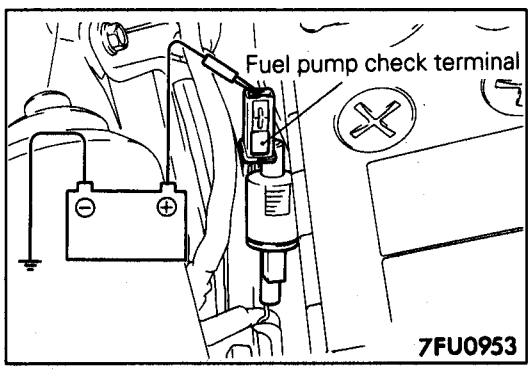
(3) If the resistance is out of specification, replace the resistor.

Checking the Injection Condition

(1) Following the steps below, bleed out the residual pressure within the fuel pipe line to prevent flow of the fuel. (Refer to P.13-39.)
(2) Remove the injector.
(3) Arrange the special tool (injector test set), adaptor, fuel pressure regulator and clip as shown in the illustration below.

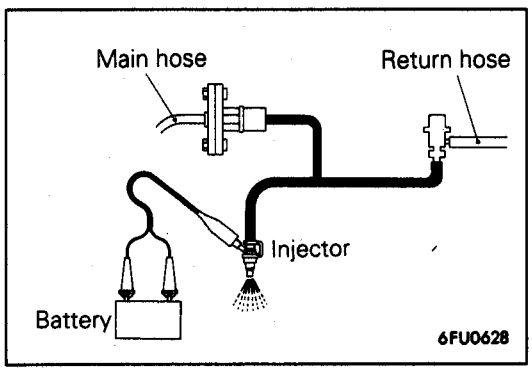


7FU0145



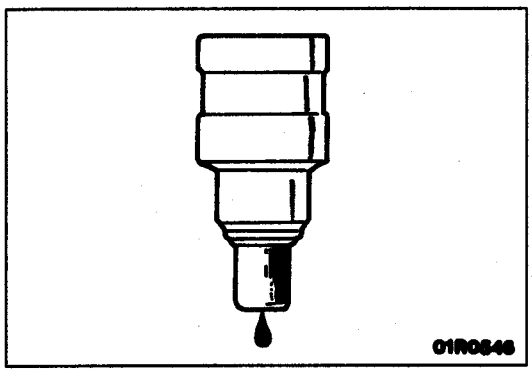
7FU0953

(4) Connect the battery's negative (–) terminal.
(5) Apply battery voltage to the fuel pump check terminal (black) and activate the fuel pump.



6FU0628

(6) Activate the injector and check the atomized spray condition of the fuel.
The condition can be considered satisfactory unless it is extremely poor.



01R0848

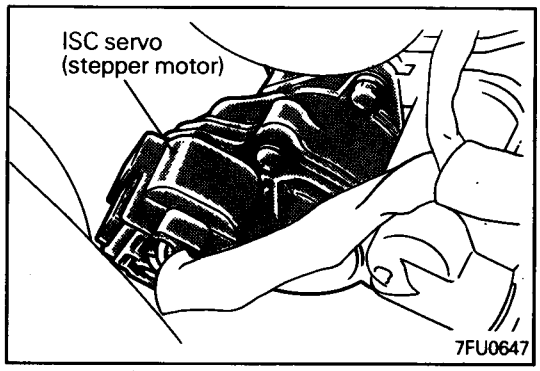
(7) Stop the actuation of the injector, and check for leakage from the injector's nozzle.

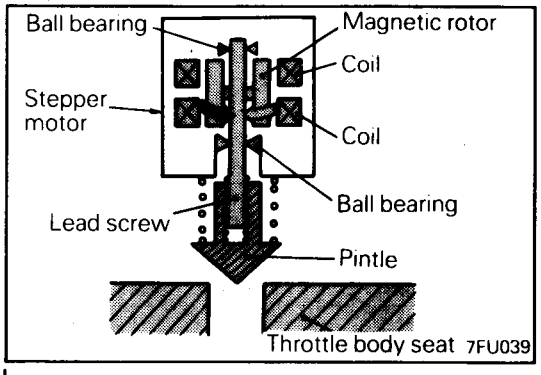
Standard value: 1 drop or less per minute

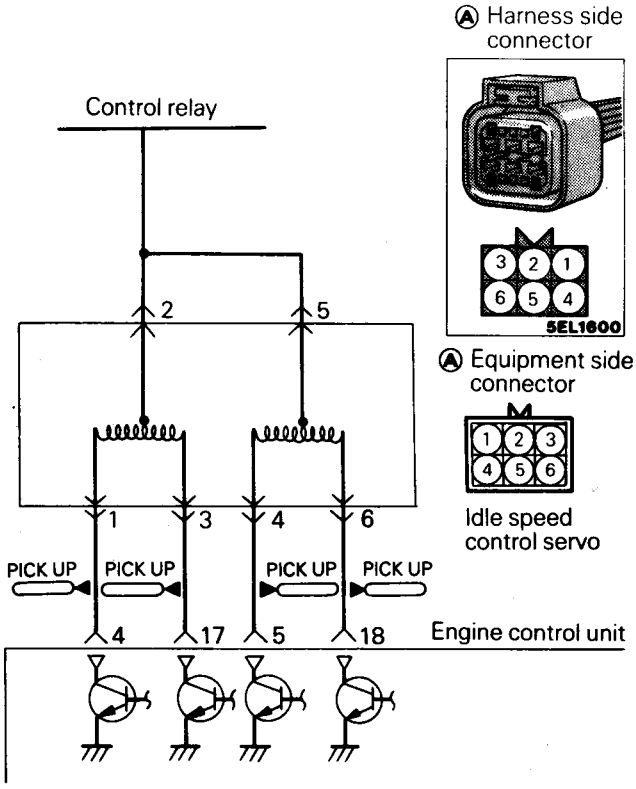
(8) Activate the injector without activating the fuel pump; then, when the spray emission of fuel from the injector stops, disconnect the special tool and restore it to its original condition.

IDLE SPEED CONTROL SERVO (STEPPER MOTOR TYPE)

E13YUAD

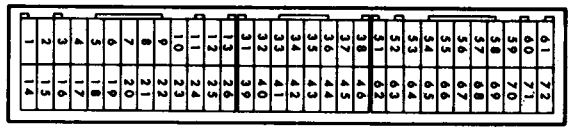






7FU0518

Engine control unit connector



9FU0101

OPERATION

- The intake air volume during idling is controlled by opening or closing the servo valve provided in the air path that bypasses the throttle valve.
- The servo valve is opened or closed by operating the stepper motor in the speed control servo in normal or reverse direction.
- The battery power is supplied to the stepper motor through the control relay. As the engine control unit turns on power transistors in the unit one after another, the stepper motor coil is energized and the motor rotates in normal or reverse direction.

TROUBLESHOOTING HINTS

Hint 1: If the stepper motor step increases to 100 to 120 steps or decreases to 0 step, faulty stepper motor or open circuit in the harness is suspected.

Hint 2: If the idle speed control servo harness and individual part checks have resulted normal but the stepper motor steps are out of specification, the following faults are suspected.

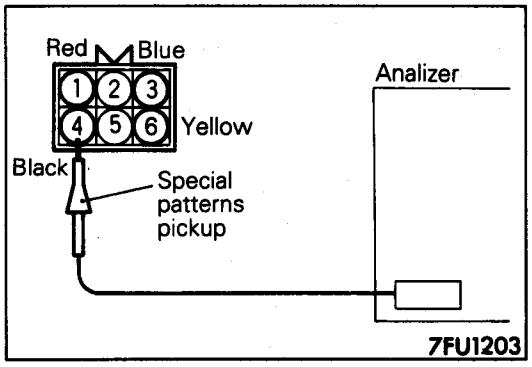
(1) Poorly adjusted reference idle speed
(2) Deposit on the throttle valve
(3) Air leaking into the intake manifold through gasket gap
(4) Loose EGR valve seat
(5) Poor combustion in the cylinder (faulty ignition plug, ignition coil, injector, low compression pressure, etc.)

INSPECTION

Using Multi-use Tester (MUT) or MUT-II

Function	Item No.	Data display	Check condition	Load state	Standard value
Data reading	45	Stepper motor steps	• Engine coolant temperature: 80 to 95°C (176 to 203°F) • Lamps, electric cooling fan, accessory units: All OFF • Transmission: Neutral • Idle position switch: ON (compressor clutch to be ON if air conditioner switch is ON) • Engine: Idling	Air conditioner switch: OFF	2 – 25 stp
				Air conditioner switch: ON	Increase by 10 – 70 stp

NOTE
When the vehicle is new [within initial operation of about 500 km (300 miles)], the stepper motor steps may be about 30 steps more than standard.



Wave Pattern Inspection Using an Analyzer

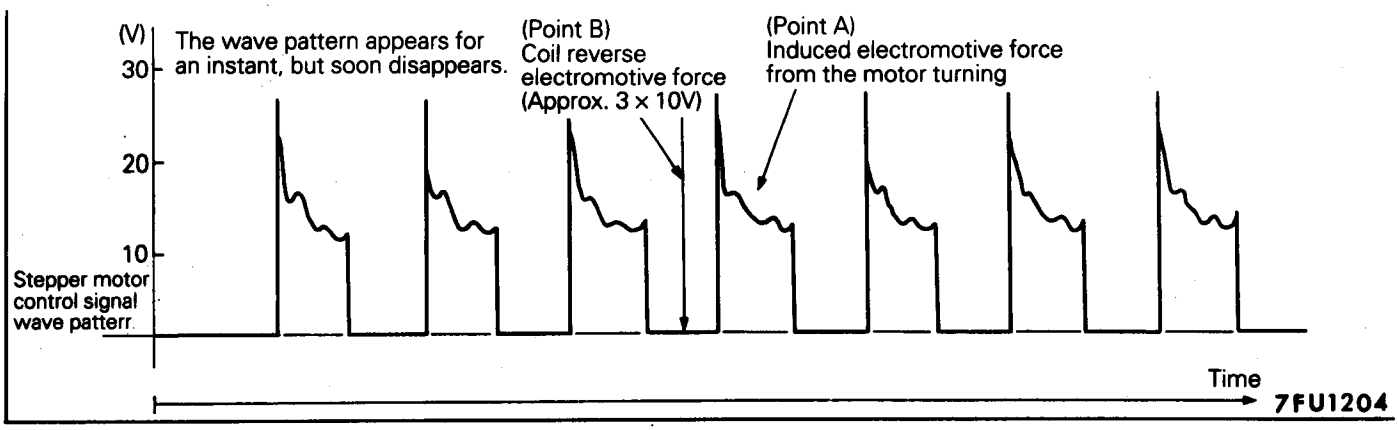
Measurement method

(1) Disconnect the stepper motor connector, and connect the special tool (test harness: MB998463) in between.
(2) Connect the analyzer special patterns pickup to the stepper motor-side connector terminal ① (red clip on the special tool), terminal ③ (blue clip), terminal ④ (black clip) and terminal ⑥ (yellow clip) respectively.

Standard wave pattern

Observation conditions

Function	Special patterns
Pattern height	High
Pattern selector	Display
Engine condition	Turn the ignition switch from OFF to ON (without starting the engine).
	While the engine is idling, turn the air conditioner switch to ON.
	Immediately after starting the warm engine (approx. 1 minute).



Wave pattern observation points

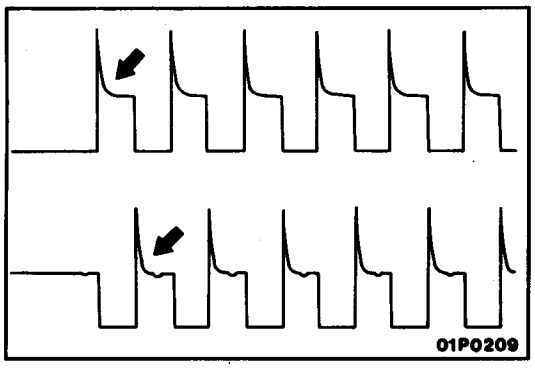
Check that the standard wave pattern appears when the stepper motor is operating.

(Point A): Presence or absence of induced electromotive force from the motor turning. (Refer to the abnormal wave pattern.)

Contrast with standard wave pattern	Probable cause
Induced electromotive force does not appear or is extremely small.	Motor is malfunctioning

(Point B): Height of coil reverse electromotive force

Contrast with standard wave pattern	Probable cause
Coil reverse electromotive force does not appear or is extremely small.	Short in the coil



Abnormal wave pattern

Cause of problem

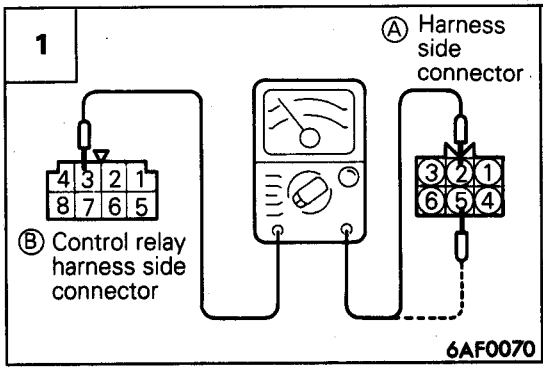
Motor is malfunctioning. (Motor is not operating.)

Wave pattern characteristics

Induced electromotive force from the motor turning does not appear.

HARNESS INSPECTION

1



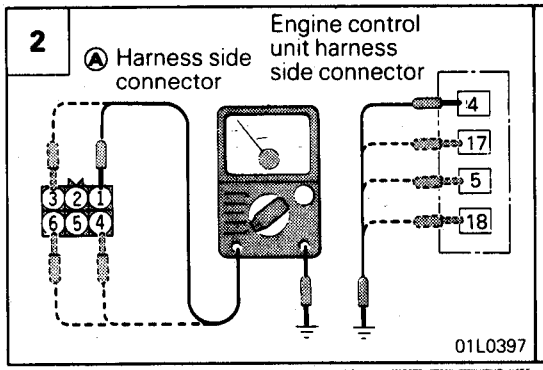
Check for continuity between the idle speed control servo and the control relay.
- Idle speed control servo connector: Disconnected
- Control relay connector: Disconnected

NOTE
Touch the ohmmeter probes to both ends of the harness.

OK → 2

NG → Repair the harness. (Ⓐ2 5–Ⓑ3)

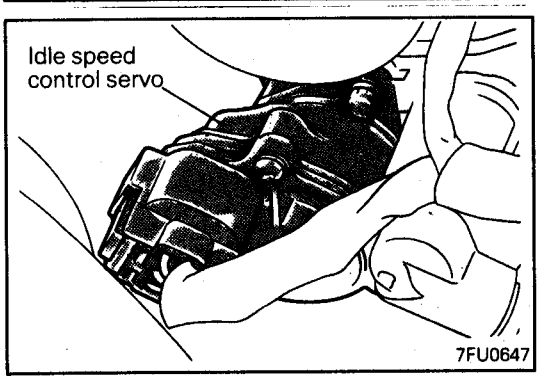
2



Check for an open-circuit, or a short-circuit to earth between the engine control unit and the idle speed control servo.
- Engine control unit connector: Disconnected
- Idle speed control servo connector: Disconnected

OK → STOP

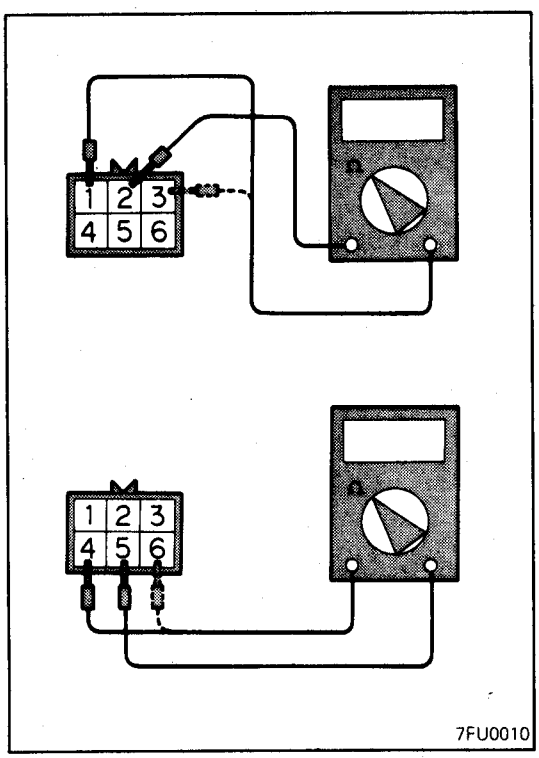
NG → Repair the harness.
(Ⓐ1 – 4)
(Ⓐ3 – 17)
(Ⓐ4 – 5)
(Ⓐ6 – 18)



ACTUATOR INSPECTION

Checking the Operation Sound

(1) Check that the operation sound of the stepper motor can be heard after the ignition is switched ON (but without starting the motor).
(2) If the operation sound cannot be heard, check the stepper motor's activation circuit.
If the circuit is normal, it is probable that there is a malfunction of the stepper motor or of the engine control unit.



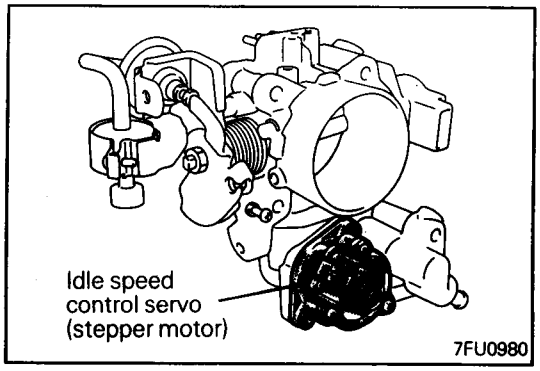
Checking the Coil Resistance

(1) Disconnect the idle speed control servo connector and connect the special tool (test harness).
(2) Measure the resistance between terminal ② (white clip of the special tool) and either terminal ① (red clip) or terminal ③ (blue clip) of the connector at the idle speed control servo side.

Standard value: 28 – 33 Ω at 20°C (68°F)

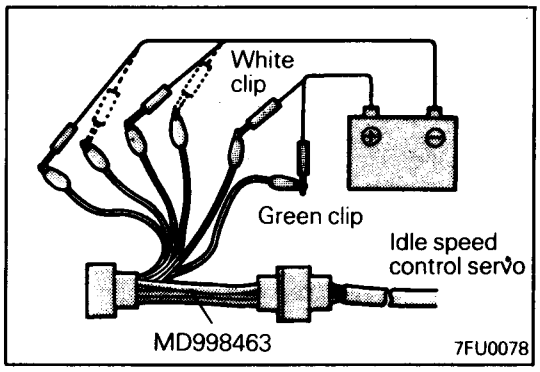
(3) Measure the resistance between terminal ⑤ (green clip of the special tool) and either terminal ⑥ (yellow clip) or terminal ④ (black clip) of the connector at the idle speed control servo side.

Standard value: 28 – 33 Ω at 20°C (68°F)

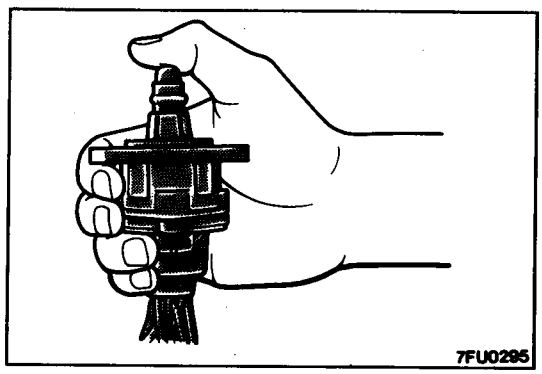


Operational Check

(1) Remove the throttle body.
(2) Remove the stepper motor.



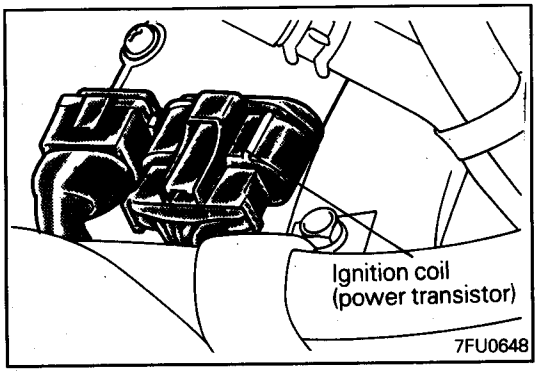
(3) Connect the special tool (test harness) to the idle speed control servo connector.
(4) Connect the positive ⊕ terminal of a power supply (approx. 6 V) to the white clip and the green clip.

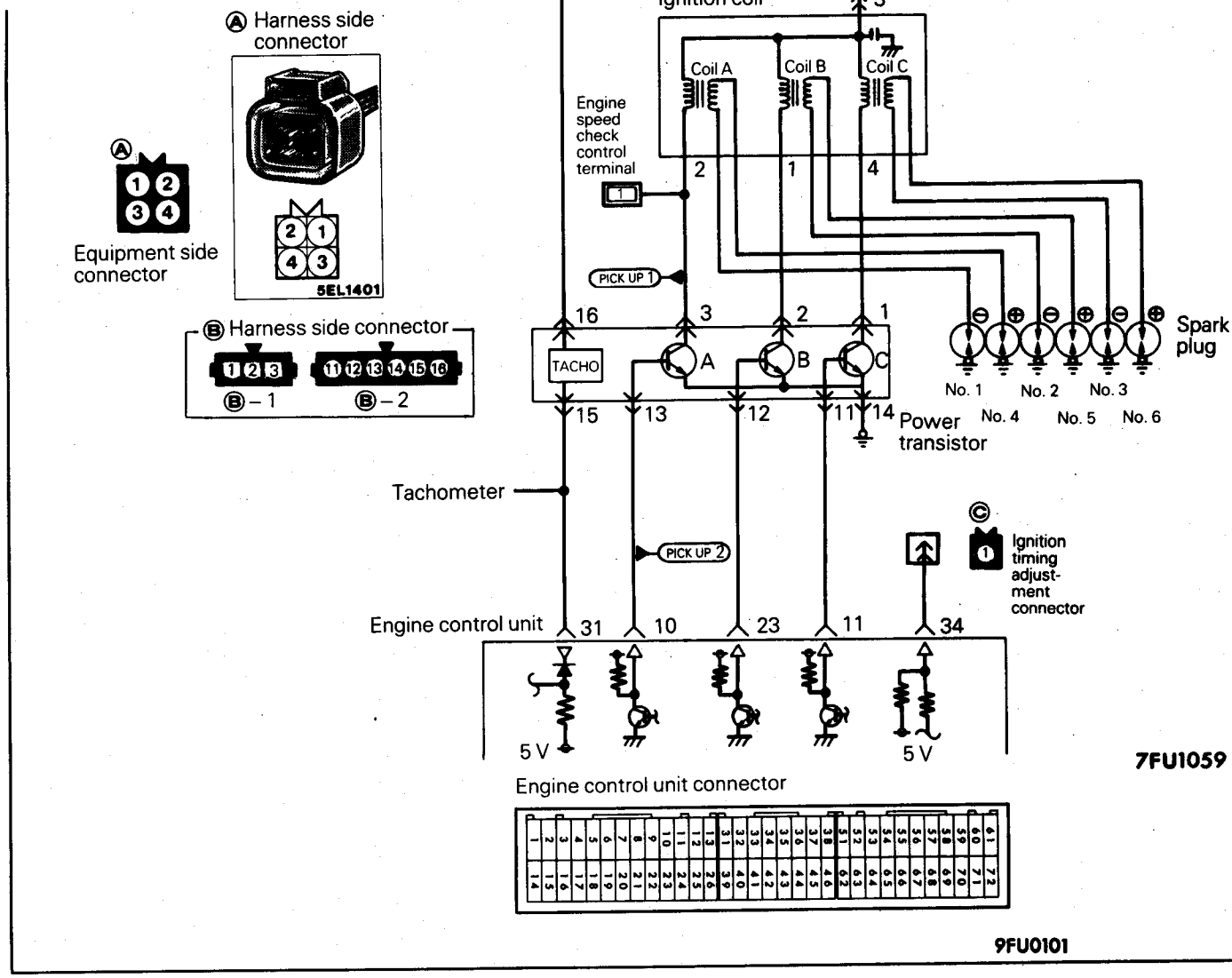


(5) With the idle speed control servo as shown in the illustration, connect the negative ⊖ terminal of the power supply to each clip as described in the following steps, and check whether or not a vibrating feeling (a feeling of very slight vibration of the stepper motor) is generated as a result of the activation of the stepper motor.
   ① Connect the negative ⊖ terminal of the power supply to the red and black clip.
   ② Connect the negative ⊖ terminal of the power supply to the blue and black clip.
   ③ Connect the negative ⊖ terminal of the power supply to the blue and yellow clip.
   ④ Connect the negative ⊖ terminal of the power supply to the red and yellow clip.
   ⑤ Connect the negative ⊖ terminal of the power supply to the red and black clip.
   ⑥ Repeat the tests in sequence from ⑤ to ①.
(6) If, as a result of these tests, vibration is detected, the stepper motor can be considered to be normal.

IGNITION COIL AND POWER TRANSISTOR

E13YVAB





OPERATION

- When the power transistor unit A is turned ON by the signal from the engine control unit, primary current flows to the ignition coil A. When the power transistor unit A is turned OFF, the primary current is shut off and a high voltage is induced in the secondary coil A, causing the ignition plugs of No. 1 and No. 4 cylinders to spark. When the power transistor unit B is turned OFF, the ignition plugs of No. 2 and No. 5 cylinders spark. In addition, when the power transistor unit C is turned OFF, the ignition plugs of No. 3 and No. 6 cylinders spark.
- When the engine control unit turns OFF the transistor in the unit, the battery voltage in the unit is applied to the power transistor unit to turn it ON. When the engine control unit turns ON the transistor in the unit, the power transistor unit is turned OFF.

INSPECTION

Using Multi-use Tester (MUT) or MUT-II

<Spark Advance>

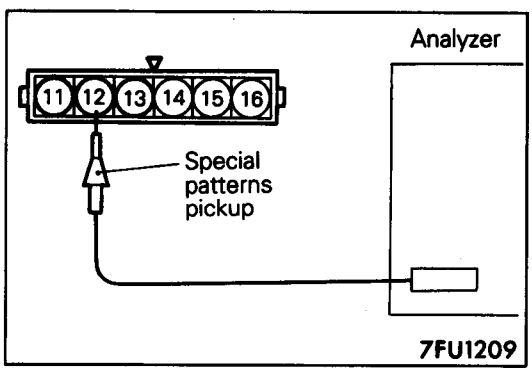
Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	44	Ignition advance	• Engine: Warming up • Timing lamp: Set (set timing lamp to check actual ignition timing)	750 r/min (Idle)	17 – 33°BTDC
				2,000 r/min	23 – 43°BTDC

<Ignition Timing Adjustment Mode>

Function	Item No.	Data display	Check condition	Terminal condition	Normal indication
Data list	36	Continuity present or not present between ignition timing adjustment terminal and earth	• Engine: Idling	Ignition timing adjustment terminal is earthed	ON
				Ignition timing adjustment terminal is disconnected from earth	OFF

<Standard Ignition Timing>

Function	Item No.	Drive	Check condition	Normal condition
Actuator test	17	Set to ignition timing adjustment mode	• Engine: idling • Timing lamp: set	5°BTDC



Wave Pattern Inspection Using an Analyzer

- Ignition coil primary signal

Refer to GROUP 16 – Ignition System.

- Power transistor control signal.

<Measurement method>

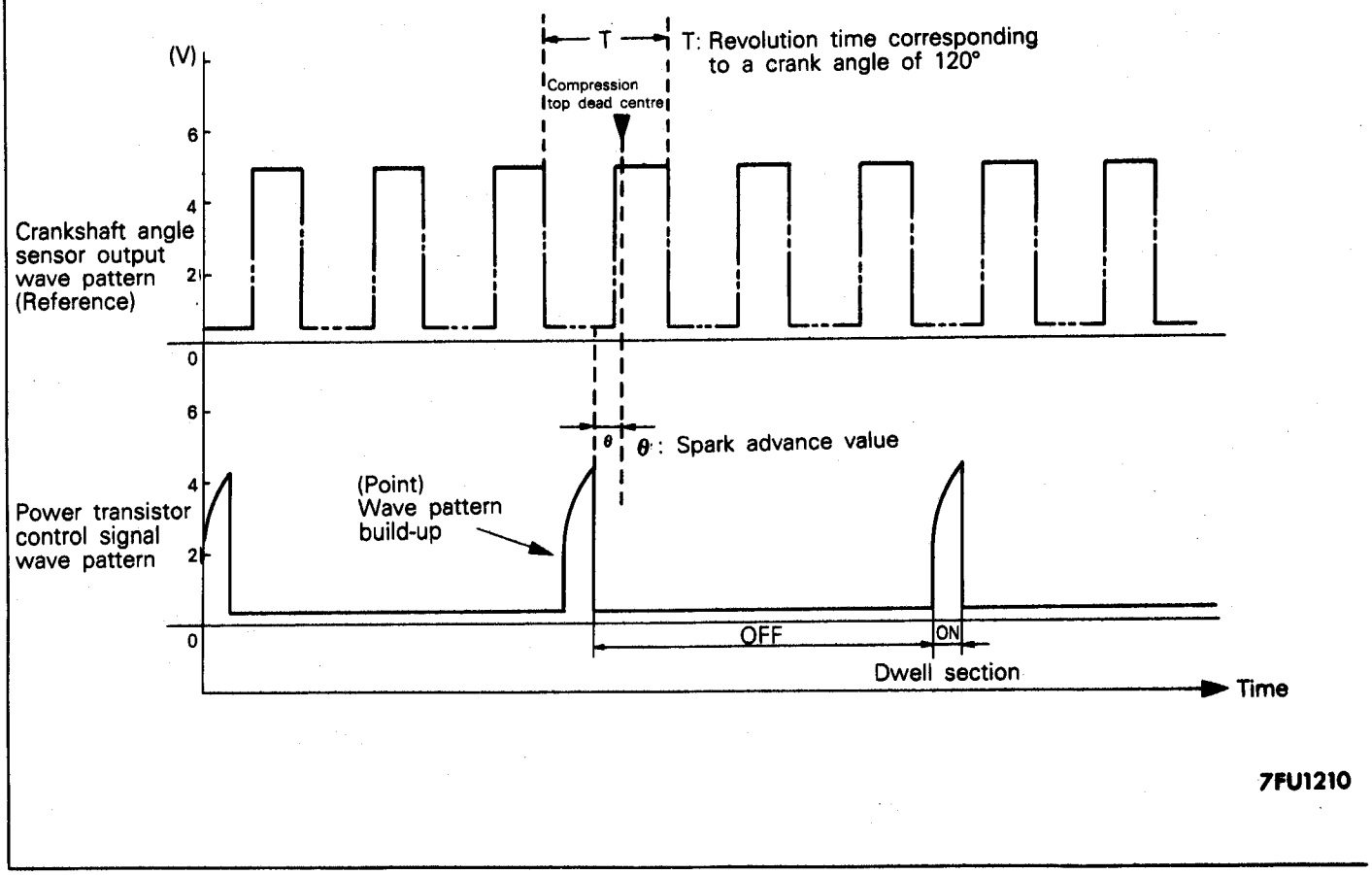
(1) Disconnect the power transistor connector, and connect the special tool (test harness: MB991348) in between. (All terminals should be connected.)

(2) Connect the analyzer special patterns pickup to the connector terminals ⑪ (No. 3 – No. 6), ⑫ (No. 2 – No. 5) and ⑬ (No. 1 – No. 4) in that order.

Standard wave pattern

Observation conditions

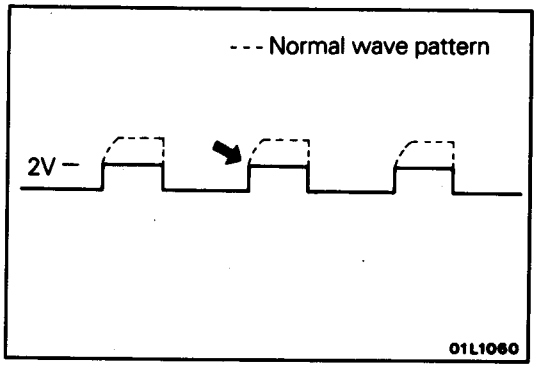
Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine revolutions	Approx. 1200 r/min.



Wave pattern observation points

(Point): Condition of wave pattern build-up and maximum voltage (Refer to abnormal wave pattern examples 1 and 2.)

Condition of wave pattern build-up and maximum voltage	Probable cause
Rise to the right to approximately 4.5V from around 2V.	Normal
Becomes a rectangular wave at approx. 2V	Broken wire in ignition primary circuit
Becomes a rectangular wave at power voltage	Malfunction of the power transistor



Examples of abnormal wave patterns

- Example 1

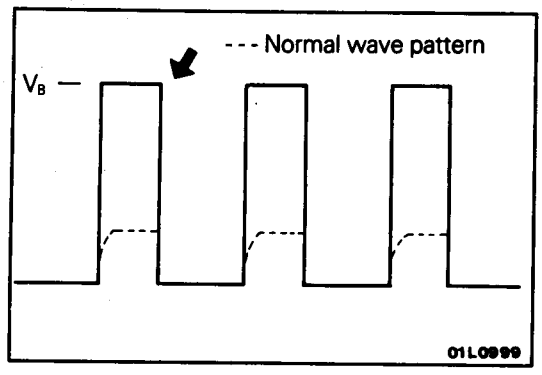
Wave pattern during engine cranking

Cause of problem

Broken wire in ignition primary circuit

Wave pattern characteristics

Top-right part of the build-up section cannot be seen, and voltage value is approximately 2V too low.



- Example 2

Wave pattern during engine cranking

Cause of problem

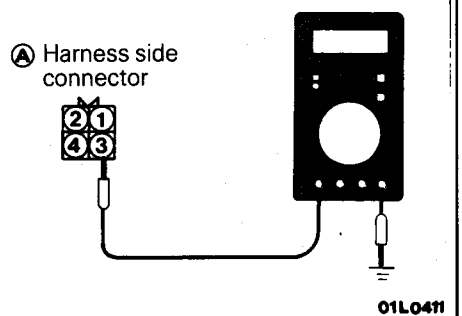
Malfunction in power transistor

Wave pattern characteristics

Power voltage results when the power transistor is ON.

HARNESS INSPECTION

1



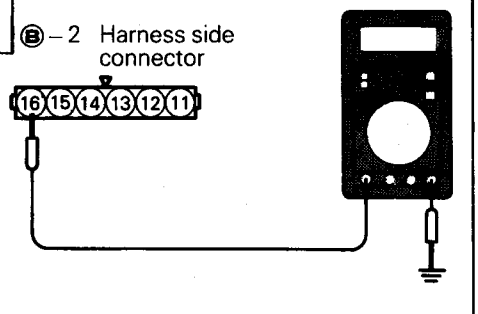
Measure the power supply voltage of the ignition coil.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
SV

OK → 2

NO → Repair the harness. (Ⓐ3 – Ignition switch)

2



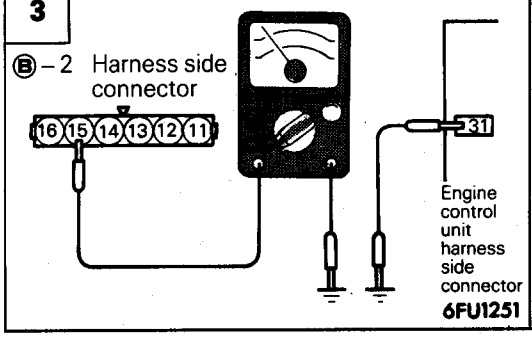
Measure the power supply voltage of the ignition coil.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
SV

OK → 3

NO → Repair the harness. (Ⓑ16 – Ignition switch)

3

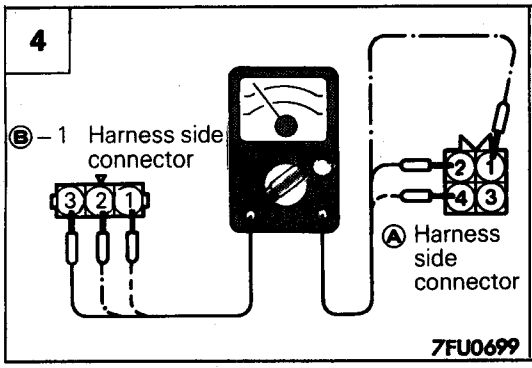


Check for an open-circuit, or a short-circuit to earth between the engine control unit and the power transistor.
- Engine control unit connector: Disconnected
- Power transistor connector: Disconnected

OK → 4

NO → Repair the harness. (Ⓑ15 – 31)

4



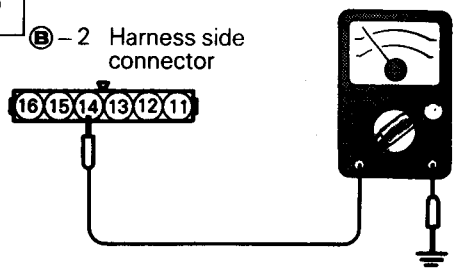
Check for an open-circuit, or a short-circuit to earth between the power transistor and the ignition coil.
- Ignition coil connector: Disconnected
- Power transistor connector: Disconnected

OK → 5

NO → Repair the harness.
(Ⓐ2 – Ⓑ3)
(Ⓐ1 – Ⓑ2)
(Ⓐ4 – Ⓑ1)

5

Ⓑ – 2 Harness side connector



7FU0700

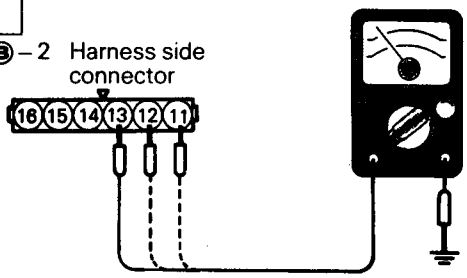
Check for continuity of the earth circuit
- Connector: Disconnected

OK → 6

NG → Repair the harness. (Ⓑ14 – Earth)

6

Ⓑ – 2 Harness side connector



7FU0701

Measure the voltage of the control signal circuit of the power transistor.
- Connector: Disconnected
- Ignition switch: START

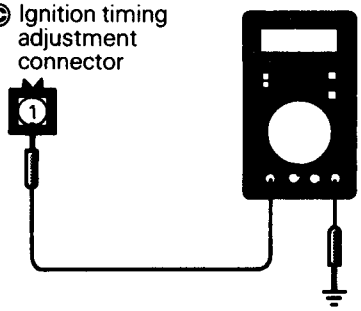
Voltage (V)
0.5 – 4.0

OK → 7

NG → Repair the harness. (Ⓑ13 – 10) (Ⓑ12 – 23) (Ⓑ11 – 11)

7

Ⓒ Ignition timing adjustment connector



7FU1060

Measure the voltage of the ignition timing adjustment terminal.
- Ignition switch: ON

Voltage (V)
4.0 – 5.2

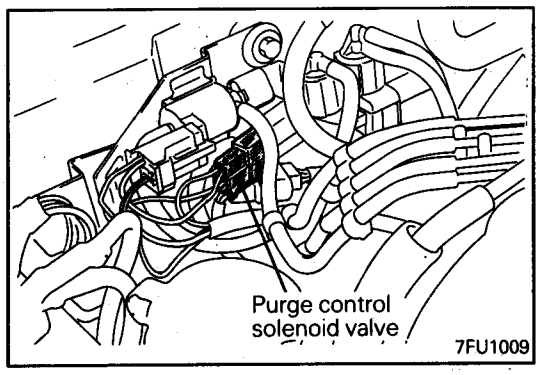
OK → STOP

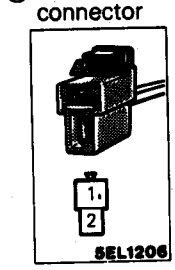
NG → Repair the harness. (Ⓒ1 – 34)

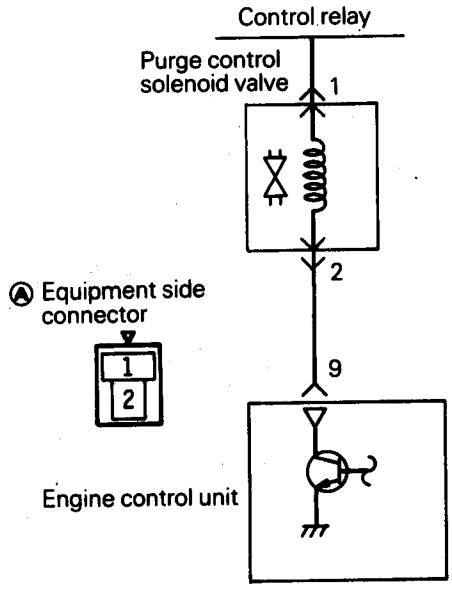
ACTUATOR INSPECTION

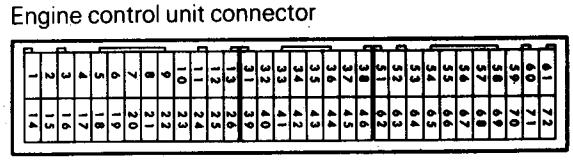
Refer to GROUP 16 – Ignition System.

PURGE CONTROL SOLENOID VALVE









OPERATION

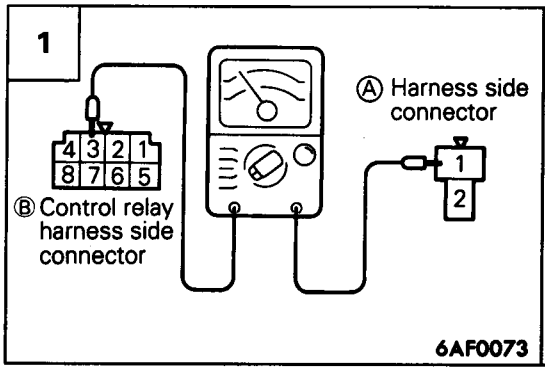
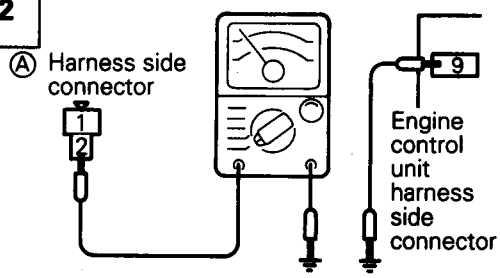
- The purge control solenoid valve is an ON-OFF type one which controls introduction of purge air from the canister into the intake air plenum.
- The battery power is supplied to the purge control solenoid valve through the control relay. When the engine control unit turns ON the power transistor in the unit, current flows to the coil, introducing purge air.

INSPECTION

Using Multi-use Tester (MUT) or MUT-II

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	08	Solenoid valve from OFF to ON	Ignition switch: ON	Operating sound is heard when driven

HARNESS INSPECTION

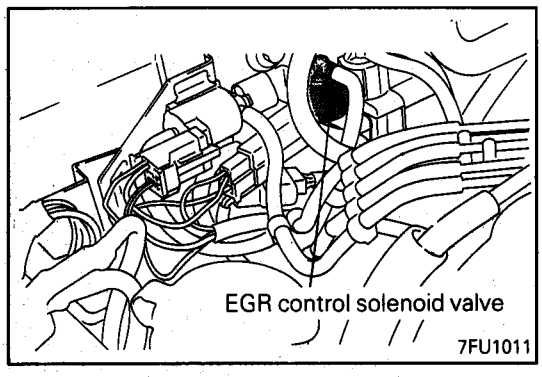
1  6AF0073	Check for continuity between purge control solenoid valve and control relay. • Purge control solenoid valve connector: Disconnected • Control relay connector: Disconnected NOTE Touch the ohmmeter probes to both ends of the harness	OK → 2 NG → Repair the harness. (Ⓐ1 – Ⓑ3)
2  9FU0040	Check for an open-circuit, or a short-circuit to earth, between the purge control solenoid valve and the engine control unit. • Purge control solenoid valve connector: Disconnected • Engine control unit connector: Disconnected	OK → STOP NG → Repair the harness. (Ⓐ2 – 9)

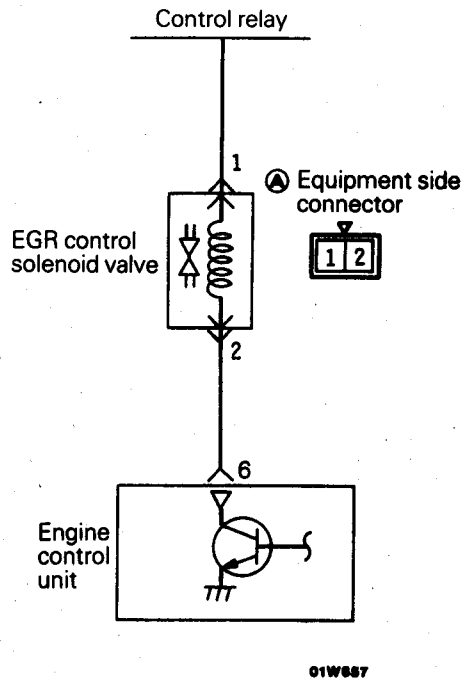
ACTUATOR INSPECTION

Refer to GROUP 17 – Evaporative Emission Control System.

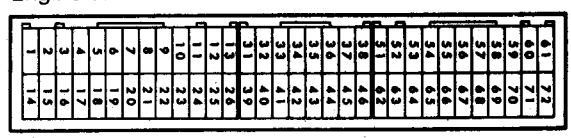
EGR CONTROL SOLENOID VALVE

E13YZBA





Engine control unit connector



OPERATION

- The EGR control solenoid valve is a duty control type solenoid valve. It makes control by leaking EGR valve operating negative pressure to the throttle body A port.
- Power supply from the battery is sent through the control relay to the EGR control solenoid valve. When the engine control unit turns off the power transistor inside the unit, current no more flows through the coil and EGR valve operating negative pressure leaks.

TROUBLESHOOTING HINT

If the results of EGR control solenoid valve on-vehicle and off-vehicle inspections are normal but the self-diagnosis code for EGR system failure is displayed, check the EGR valve, vacuum hose and EGR passage for blocking.

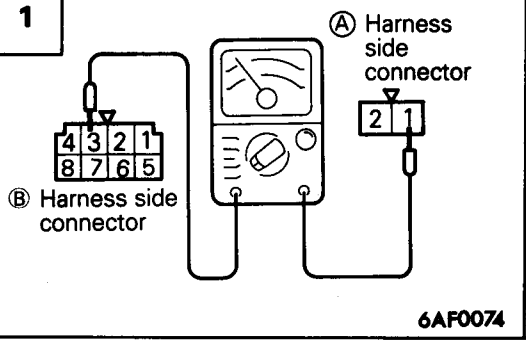
INSPECTION

Using Multi-use Tester (MUT) or MUT-II

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	10	Change solenoid valve from OFF to ON state	Ignition switch: ON	Operating sound is heard when driven

HARNESS INSPECTION

1



Check for continuity between EGR control solenoid valve and control relay

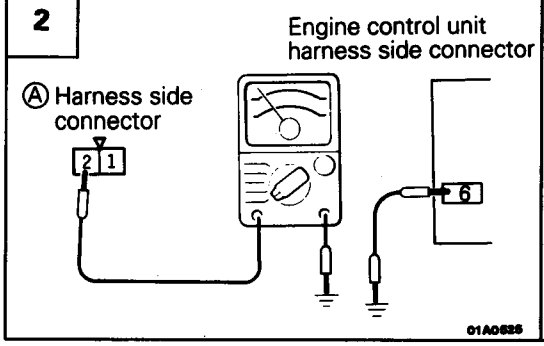
- EGR control solenoid valve connector: Disconnected
- Control relay connector: Disconnected

NOTE
Touch the ohmmeter probes to both ends of the harness

OK → 2

NG → Repair the harness. (Ⓐ1 – Ⓑ3)

2



Check for an open-circuit, or a short-circuit to earth, between the EGR control solenoid valve and the engine control unit.

- EGR control solenoid valve connector: Disconnected
- Engine control unit connector: Disconnected

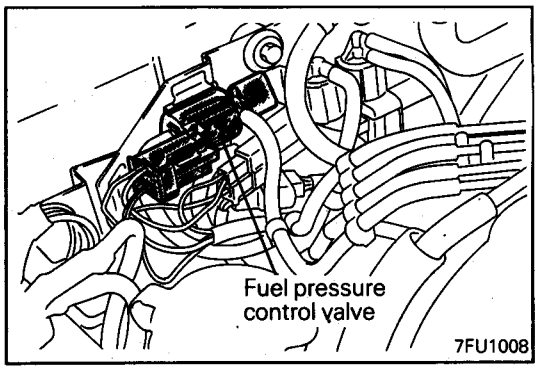
OK → STOP

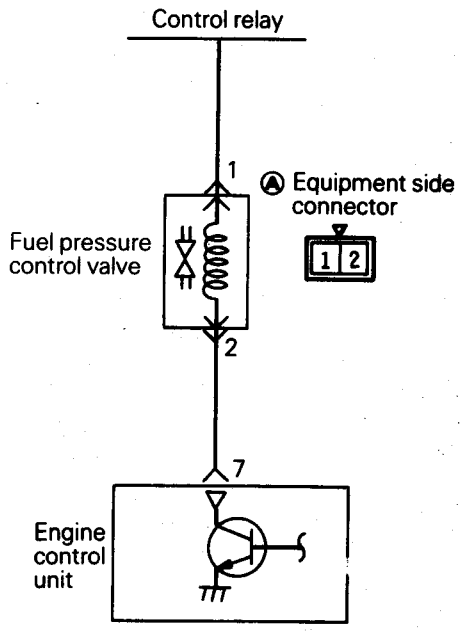
NG → Repair the harness. (Ⓐ2 – 6)

ACTUATOR INSPECTION

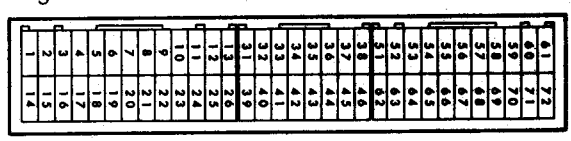
Refer to GROUP 17 – Exhaust Gas Recirculation (EGR)System.

FUEL PRESSURE CONTROL VALVE





Engine control unit connector



OPERATION

- The fuel pressure control valve is an ON-OFF type solenoid valve that switches the pressure introduced to the fuel pressure regulator between either intake manifold pressure or barometric pressure.
- Battery power is supplied to this valve via the control relay. When the engine control unit turns ON the internal power transistor, the coil is energized to allow barometric pressure to be introduced to the fuel pressure regulator.

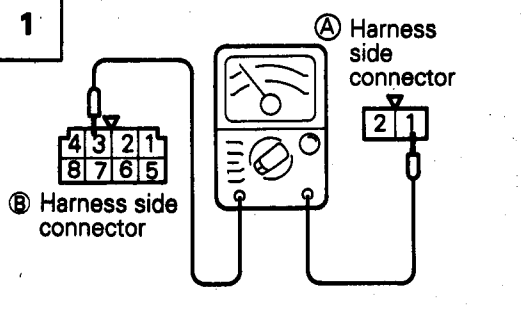
INSPECTION

Using Multi-use Tester (MUT) or MUT-II

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	09	Change solenoid valve from OFF to ON state	Ignition switch: ON	Operating sound is heard when driven

HARNESS INSPECTION

1



Check for continuiity between fuel pressure control solenoid valve and control relay

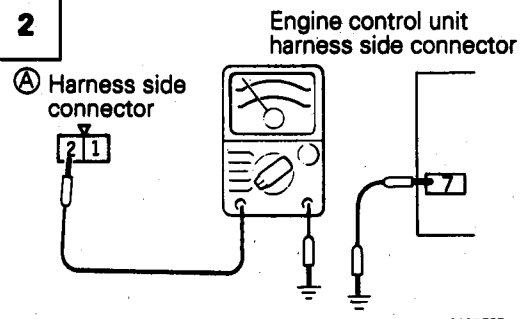
- Fuel pressure control solenoid valve connector: Disconnected
- Control relay connector: Disconnected

NOTE
Touch the ohmmeter probes to both ends of the harness

OK → 2

NG → Repair the harness. (Ⓐ1 – Ⓑ3)

2

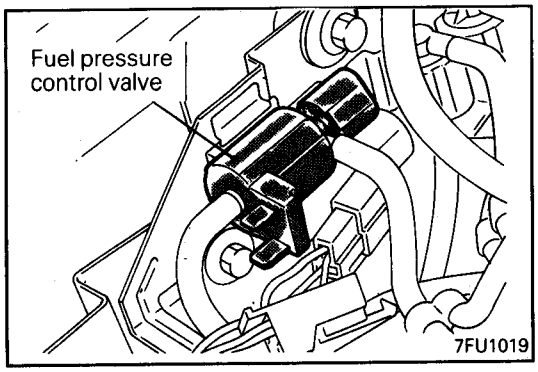


Check for an open-circuit, or a short-circuit to earth, between the fuel pressure control solenoid valve and the engine control unit.

- Fuel pressure control solenoid valve connector: Disconnected
- Engine control unit connector: Disconnected

OK → STOP

NG → Repair the harness. (Ⓐ2 – 7)

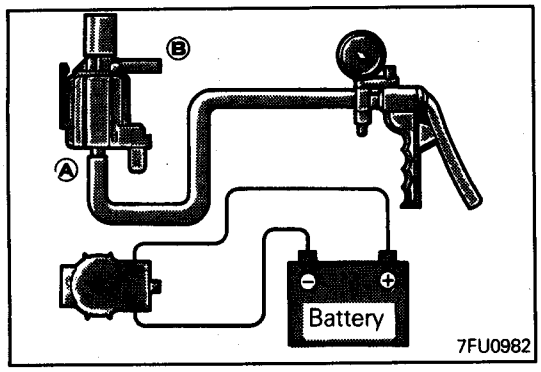


ACTUATOR INSPECTION

Operation Check

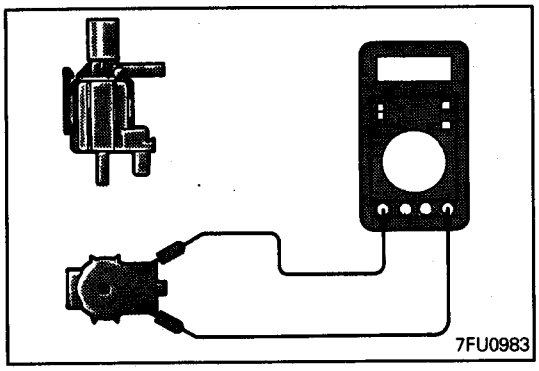
NOTE
Before disconnecting the vacuum hose, mark it to ensure reconnection at the correct position.

(1) Remove the vacuum hose (blue stripe on black) from the solenoid valve.
(2) Disconnect the harness connector.



(3) Apply a negative pressure to the nipple to which the black vacuum hose has been connected and check air-tightness with and without the battery voltage applied to the solenoid valve terminal.

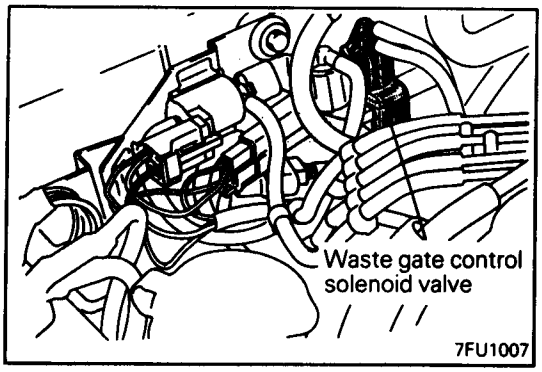
Battery voltage	The other nipple of solenoid valve	Normal state
Not applied	Open	Negative pressure leaks
	Close with finger	Negative pressure is held
Applied	Open	Negative pressure is held

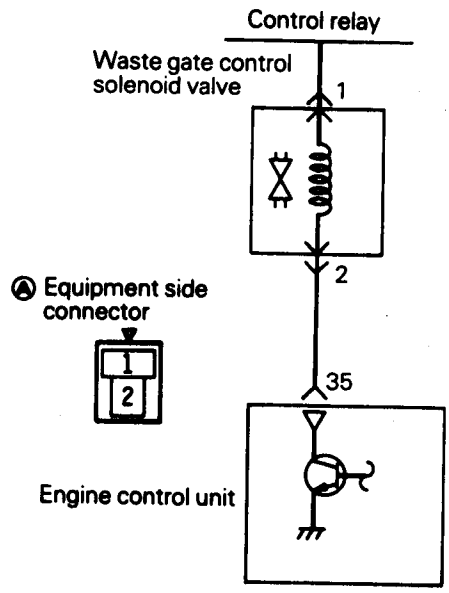


Coil Resistance Check

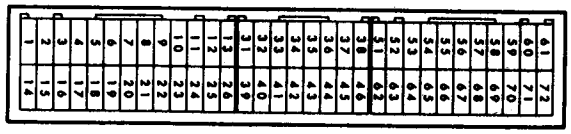
(1) Measure the coil resistance with a circuit tester.
Standard value: 36 – 46 Ω [at 20°C (68°F)]

WASTE GATE CONTROL SOLENOID VALVE





Engine control unit connector



9FU0101

OPERATION

- The waste gate control solenoid valve is an ON-OFF type solenoid valve that controls the boost pressure that is introduced to the waste gate actuator.
- Battery power is supplied to this valve via the control relay. When the engine control unit turns ON the internal power transistor, the coil is energized to release part of the boost pressure applied to the waste gate actuator.

TROUBLESHOOTING HINTS

If the waste gate control solenoid valve harness and the unit itself are normal, but poor acceleration or other abnormalities are experienced, the follwing problems are suspected.

(1) Faulty boost pressure control system
(2) Poor connection of intake air hose
(3) Faulty turbocharger or waste gate actuator
(4) Clogged exhaust system

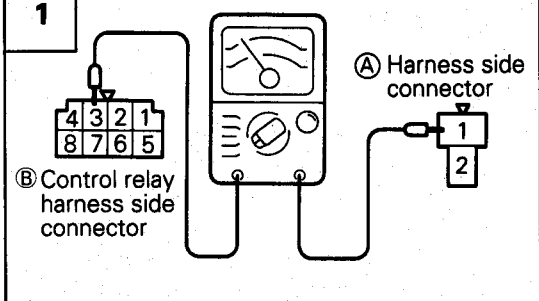
INSPECTION

Using Multi-use Tester (MUT) or MUT-II

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	12	Change solenoid valve from OFF to ON state	Ignition switch: ON	Operating sound is heard when driven

HARNESS INSPECTION

1



Check for continuity between waste gate control solenoid valve and control relay.

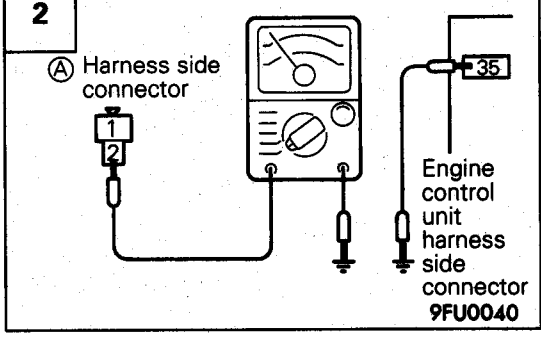
- Waste gate control solenoid valve connector: Disconnected
- Control relay connector: Disconnected

NOTE
Touch the ohmmeter probes to both ends of the harness

OK → 2

NG → Repair the harness. (Ⓐ1 – Ⓑ3)

2



Check for an open-circuit, or a short-circuit to earth, between the waste gate control solenoid valve and the engine control unit.

- Waste gate control solenoid valve connector: Disconnected
- Engine control unit connector: Disconnected

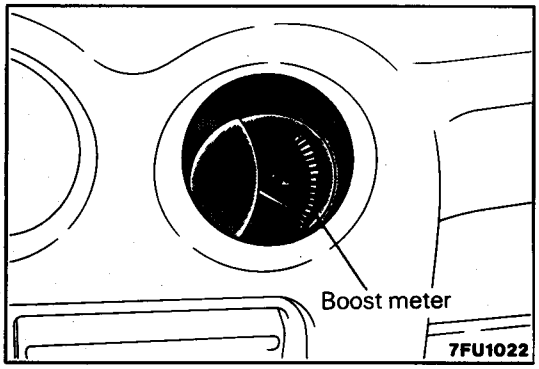
OK → STOP

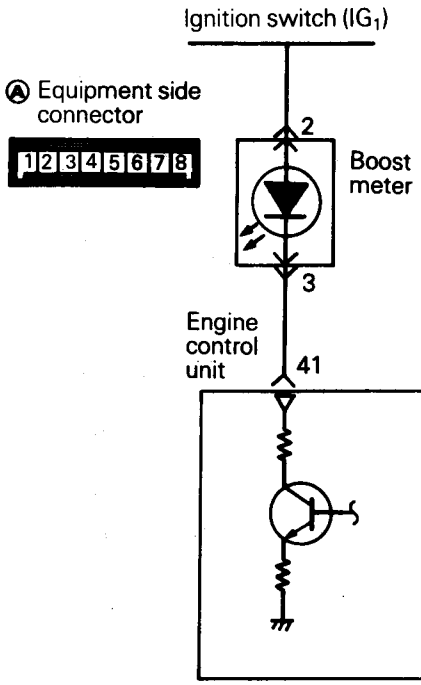
NG → Repair the harness. (Ⓐ2 – 35)

ACTUATOR INSPECTION

Refer to GROUP 15 – Service Adjustment Procedures.

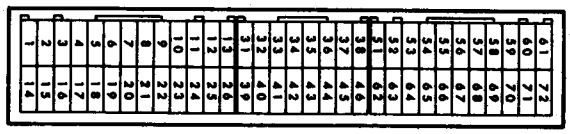
BOOST METER





7FU0985

Engine control unit connector

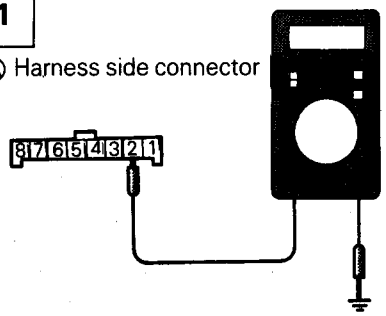


9FU0101

HARNESS INSPECTION

1

Ⓐ Harness side connector



Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
SV

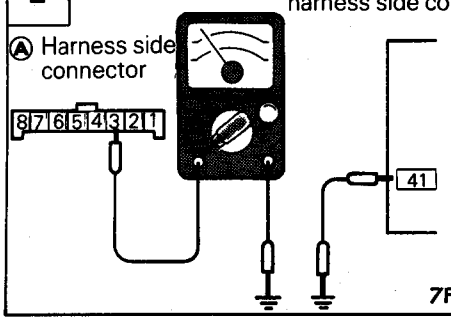
OK → 2

NG → Repair the harness. (Ⓐ2 – Ignition coil [IG])

2

Ⓐ Harness side connector

Engine control unit harness side connector



Check for an open-circuit or a short-circuit to earth between the engine control unit and the boost meter.
- Boost meter connector: Disconnected
- Engine control unit connector: Disconnected

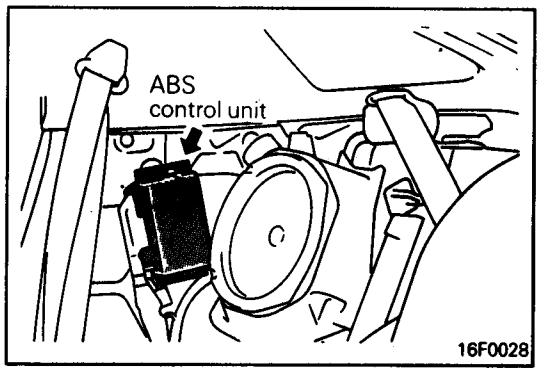
OK → STOP

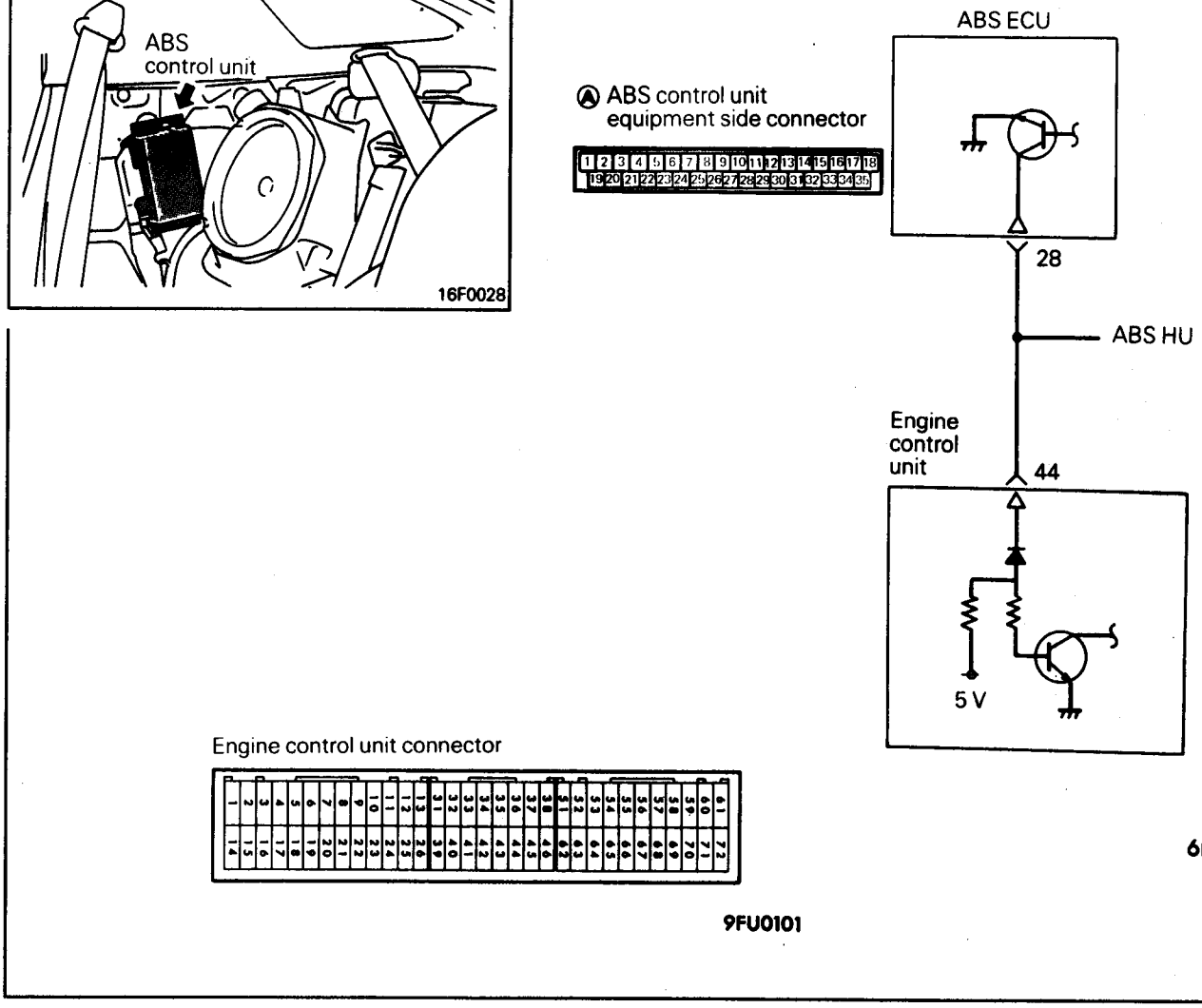
NG → Repair the harness. (Ⓐ3 – 41)

ACTUATOR INSPECTION

Refer to GROUP 54 – Meters and Gauges.

ANTI-LOCK BRAKING SIGNAL

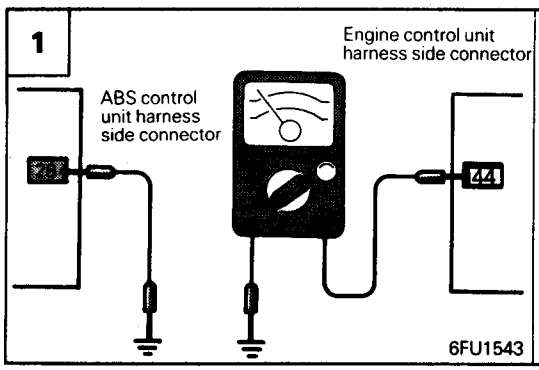


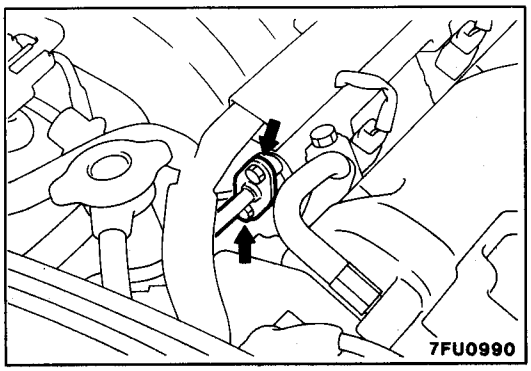


OPERATION

- The anti-lock braking signal is input to the engine control unit from the anti-lock braking system (ABS) control unit as a signal to indicate whether or not the motor relay is activated. Based on this signal, the engine control unit controls the idle-speed control servo to secure effective anti-lock braking.
- When the motor relay is activated, the ABS control unit turns ON the power transistor, short-circuiting the terminal to earth. This causes the anti-lock braking signal to go from high to low.

HARNESS INSPECTION

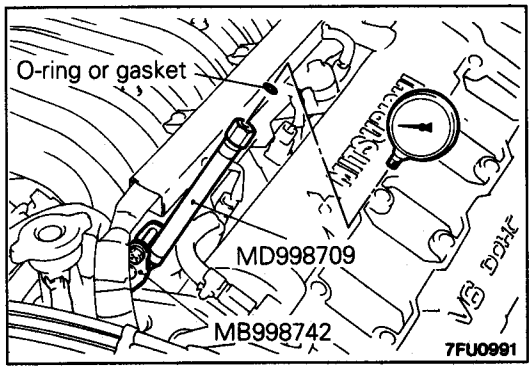
1 	Check for an open-circuit or a short-circuit to earth, between the ABS control unit and the engine control unit. • ABS control unit connector: Disconnected • Engine control unit connector: Disconnected	OK → STOP NG → Repair the harness. (Ⓐ28 – 44)



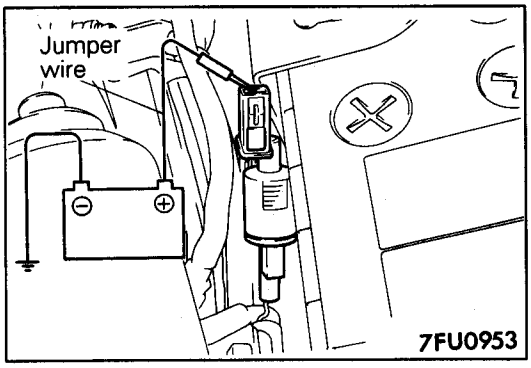
FUEL PRESSURE TEST

(1) Reduce the internal pressure of the fuel pipes and hoses. (Refer to P.13-39.)
(2) Disconnect the high pressure fuel hose at the delivery pipe side.

Caution
Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

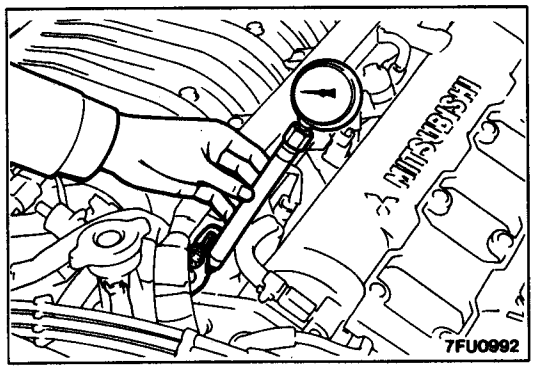


(3) Set a fuel pressure gauge on the special tool, placing adequate O-ring or gasket between the gauge and special tool to prevent fuel leaks.
(4) Attach the special tool set in step (3) to the delivery pipe.
(5) Connect the negative battery cable



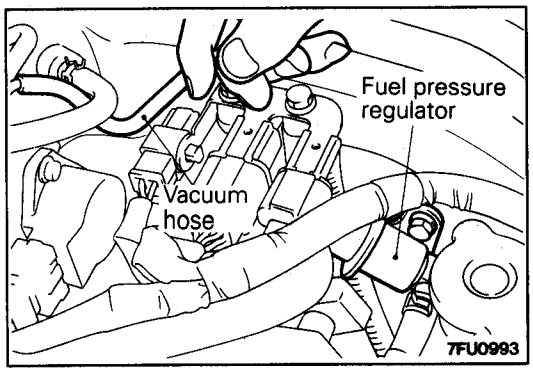
(6) Connect a jumper wire to the terminal (black) for activation of the fuel pump and to the positive (+) terminal of the battery to activate the fuel pump. With fuel pressure applied, check to be sure that there is no fuel leakage from the fuel pressure gauge and the special tool connection part.
(7) Disconnect the jumper wire (from the terminal for activation of the fuel pump) to stop the fuel pump.
(8) Start the engine and let it idle.
(9) Measure the fuel pressure during idling.

Standard value: Approx. 235 kPa (2.35 kg/cm^2, 34 psi) at curb idle



(10) Disconnect the vacuum hose from the fuel pressure regulator, and then measure the fuel pressure while using finger to plug the end of the hose.

Standard value: 295 – 315 kPa (2.95 – 3.15 kgm/cm^2, 47 – 50 psi) at curb idle speed



(11) Check to be sure that the fuel pressure during idling does not decrease even after the engine is raced a few times.
(12) Use a finger to gently press the fuel return hose while repeatedly racing the engine, and check to be sure that there is fuel pressure in the return hose also.

NOTE
There will be no fuel pressure in the return hose if there is insufficient fuel flow.

(13)If the fuel pressure measured in steps (9) to (12) deviates from the standard value range, check for the probable cause by referring to the table below, and then make the appropriate repair.

Condition	Probable cause	Remedy
• Fuel pressure is too low. • Fuel pressure drops during racing. • No fuel pressure in fuel return hose.	Fuel filter is clogged.	Replace the fuel filter.
	Malfunction of the valve seat within the fuel pressure regulator, or fuel leakage to return side caused by spring deterioration.	Replace the fuel pressure regulator.
	Fuel pump low discharge pressure.	Replace the fuel pump.
Fuel pressure is too high.	The valve within the fuel pressure regulator is sticking.	Replace the fuel pressure regulator.
	Clogging of the fuel return hose and/or the pipe.	Clean or replace the hose and/or pipe.
No change of the fuel pressure when the vacuum hose is connected and when not connected.	Damaged vacuum hose or nipple clogging.	Replace the vacuum hose, or clean the nipple.
	Malfunction of the fuel pressure control system	Checking the fuel pressure control system

(14)Stop the engine and check for a change of the value indicated by the fuel pressure gauge. The condition is normal if there is no decrease of the indicated value within two minutes.
If there is a decrease of the indicated value, monitor the speed of the decrease, and, referring to the table below, determine the cause of the problem and make the appropriate repair.

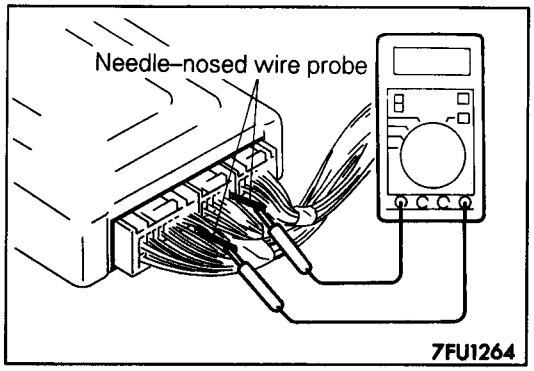
Condition	Probable cause	Remedy
After the engine is stopped, the fuel pressure drops gradually.	Injector leakage.	Replace the injector.
	Leakage at the fuel pressure regulator valve seat.	Replace the fuel pressure regulator.
There is a sudden sharp drop of the fuel pressure immediately after the engine is stopped.	The check valve (within the fuel pump) is not closed.	Replace the fuel pump.

(15)Remove all remaining pressure from inside the fuel pipe. (Refer to P.13-39.)

(16)Disconnect the fuel pressure gauge and the special tools from the delivery pipe.

Caution
Because there will be a slight amount of remaining pressure in the fuel pipe line, use rags to cover so that fuel doesn't splatter.

(17)Replace the O-ring at the end of the fuel high-pressure hose with a new one.
(18)After connecting the fuel high-pressure hose to the delivery pipe, tighten the installation bolt.
(19)Check to be sure that there is no fuel leakage.
① Apply battery voltage to the terminal for activation of the fuel pump so as to activate the fuel pump.
② With fuel pressure applied, check for leakage of the fuel line.



ENGINE CONTROL UNIT TERMINAL VOLTAGE CHECK

(1) Connect a needle-nosed wire probe (test harness: MB991223 or paper clip) to a voltmeter probe.
(2) Insert the needle-nosed wire probe into each of the engine control unit connector terminals from the wire side, and measure the voltage while referring to the check chart.

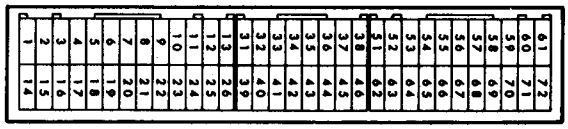
NOTE
1. Make the voltage measurement with the engine control unit connectors connected.
2. Make the voltage measurement between terminal No. 26 (earth terminal) and each terminal.
3. You may find it convenient to pull out the engine control unit to make it easier to reach the connector terminals.
4. The checks can be carried out off the order given in the chart.

Caution
Short-circuiting the positive (+) probe between a connecter terminal and earth could damage the vehicle wiring, the sensor, engine control unit, or all there. Use care to prevent this!

(3) If voltmeter shows any division from standard value, check the corresponding sensor, actuator and related electrical wiring, then repair or replace.
(4) After repair or replacement, recheck with the volt-meter to confirm that the repair has corrected the problem.

TERMINAL VOLTAGE CHECK CHART

Engine Control Unit Connector Terminal Configuration



9FU0101

Terminal No.	Check point	Check conditions (Engine conditions)	Standard value	Remarks
60	Back-up power supply	Ignition switch: OFF	SV	
12	Power supply	Ignition switch: ON	SV	
25				
62	Ignition switch IG	Ignition switch: ON	SV	
38	Control relay (power supply)	Ignition switch: OFF	SV	
		Ignition switch: ON	0 – 3V	
8	Control relay (fuel pump)	Ignition switch: ON	SV	
		Engine: Running at idle	0 – 3V	
61	Sensor impressed voltage	Ignition switch: ON	4.5 – 5.5V	

Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
70	Air flow sensor	Engine: Running at idle		2.2–3.2V	
		Engine speed: 2,000 r/min			
19	Air flow sensor reset signal	Engine: Running at idle		0–1V	
		Engine speed: 3,000 r/min		6–9V	
52	Intake air temperature sensor	Ignition switch: ON	When intake temperature is 0°C (32°F)	3.2–3.8V	
			When intake temperature is 20°C (68°F)	2.3–2.9V	
			When intake temperature is 40°C (104°F)	1.5–2.1V	
			When intake temperature is 80°C (176°F)	0.4–1.0V	
65	Barometric pressure sensor	Ignition switch: ON	When altitude is 0 m (0 ft.)	3.7–4.3V	
			When altitude is 1,200 m (3,937 ft.)	3.2–3.8V	
63	Water temperature sensor	Ignition switch: ON	When water temperature is 0°C (32°F)	3.2–3.8V	
			When water temperature is 20°C (68°F)	2.3–2.9V	
			When water temperature is 40°C (104°F)	1.3–1.9V	
			When water temperature is 80°C (176°F)	0.3–0.9V	
64	Throttle position sensor	Ignition switch: Kept in ON state for more than 15 seconds	Throttle valve placed in idle position	0.3–1.0V	
			Throttle valve placed in fully opened position	4.5–5.5V	
67	Idle position switch	Ignition switch: ON	Throttle valve placed in idle position	0–1V	
			Throttle valve placed in slightly opened position	4V or more	
68	Cam position sensor	Engine: Cranked		0.2–3.0V	
		Engine: Running at idle			
69	Crank angle sensor	Engine: Cranked		0.2–3.0V	
		Engine: Running at idle			
51	Ignition switch–ST	Engine: Cranked		8V or more	
66	Vehicle speed sensor	• Ignition switch: ON • Move the vehicle slowly forward		0 ↔ 5V (Changes repeated)	
37	Power steering fluid pressure switch	Engine: Running at idle after warmup	Steering wheel placed in neutral (straight ahead) position	SV	
			Steering wheel turned half a turn	0–3V	

Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
45	Air conditioner switch 1	Engine: Running at idle	Airconditioner switch set to OFF	0–3V	
			Airconditioner switch set to ON (Airconditioner compressor in driven state)	SV	
20	Air conditioner switch 2	Engine: Running at idle	Airconditioner switch set to OFF	0–3V	
			• Airconditioner switch set to ON • Indoor set temperature brought closer to atmospheric temperature	SV	
22	Air conditioner relay	• Engine: Running at idle • Airconditioner switch: OFF → ON (Air compressor in driven state)		SV or 6V or more for a moment → 0 – 3V	
6	Fan motor relay (Lo)	Radiator fan not operating (Coolant temperature: below 90°C [194°F])		B+	1995 and later model
		Radiator fan operating at low speeds (Coolant temperature: 95 – 105°C [203 – 221°F])		0 – 3V	
53	Fan motor relay (Hi)	Radiator fan not operating (Coolant temperature: below 90°C [194°F])		B+	1995 and later model
		Radiator fan operating at high speeds (Coolant temperature: above 105°C [221°F])		0–3V	
24	Electric load switch	Engine: Running at idle	Lighting switch set to OFF	0–3V	
			Lighting switch set to ON	SV	
56 55	Oxygen sensor	Engine: Kept running at 2,000 r/min after warmup (Digital voltmeter to be used for checking)		0 ↔ 0.8V (Changes repeated)	Terminal 55 for rear bank
1	No. 1 injector	Engine: Running at idle after warmup, and accelerated abruply by depressing accelerator pedal		Falls temporarily a little from 11–14V.	
14	No. 2 injector				
2	No. 3 injector				
15	No. 4 injector				
3	No. 5 injector				
16	No. 6 injector				
4	Stepper motor coil <A1>	Engine: Just after the warmed-up engine has started (for 1 minute)		SV ↑↓ 0–3V (Changed repated)	
17	Stepper motor coil <A2>				
5	Stepper motor coil <B1>				
18	Stepper motor coil <B2>				

Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
70	Air flow sensor	Engine: Running at idle		2.2 – 3.2V	
		Engine speed: 2,000 r/min			
19	Air flow sensor reset signal	Engine: Running at idle		0 – 1V	
		Engine speed: 3,000 r/min		6 – 9V	
52	Intake air temperature sensor	Ignition switch: ON	When intake temperature is 0°C (32°F)	3.2 – 3.8V	
			When intake temperature is 20°C (68°F)	2.3 – 2.9V	
			When intake temperature is 40°C (104°F)	1.5 – 2.1V	
			When intake temperature is 80°C (176°F)	0.4 – 1.0V	
65	Barometric pressure sensor	Ignition switch: ON	When altitude is 0 m (0 ft.)	3.7 – 4.3V	
			When altitude is 1,200 m (3,937 ft.)	3.2 – 3.8V	
63	Water temperature sensor	Ignition switch: ON	When water temperature is 0°C (32°F)	3.2 – 3.8V	
			When water temperature is 20°C (68°F)	2.3 – 2.9V	
			When water temperature is 40°C (104°F)	1.3 – 1.9V	
			When water temperature is 80°C (176°F)	0.3 – 0.9V	
64	Throttle position sensor	Ignition switch: Kept in ON state for more than 15 seconds	Throttle valve placed in idle position	0.3 – 1.0V	
			Throttle valve placed in fully opened position	4.5 – 5.5V	
67	Idle position switch	Ignition switch: ON	Throttle valve placed in idle position	0 – 1V	
			Throttle valve placed in slightly opened position	4V or more	
68	Cam position sensor	Engine: Cranked		0.2 – 3.0V	
		Engine: Running at idle			
69	Crank angle sensor	Engine: Cranked		0.2 – 3.0V	
		Engine: Running at idle			
51	Ignition switch – ST	Engine: Cranked		8V or more	

Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
66	Vehicle speed sensor	• Ignition switch: ON • Move the vehicle slowly forward		0 ↔ 5V (Changes repeated)	
37	Power steering fluid pressure switch	Engine: Running at idle after warmup	Steering wheel placed in neutral (straight ahead) position	SV	
			Steering wheel turned half a turn	0 – 3V	
45	Air conditioner switch 1	Engine: Running at idle	Airconditioner switch set to OFF	0 – 3V	
			Airconditioner switch set to ON (Airconditioner compressor in driven state)	SV	
20	Air conditioner switch 2	Engine: Running at idle	Airconditioner switch set to OFF	0 – 3V	
			• Airconditioner switch set to ON • Indoor set temperature brought closer to atmospheric temperature	SV	
22	Air conditioner relay	• Engine: Running at idle • Airconditioner switch: OFF → ON (Air compressor in driven state)		SV or 6V or more for a moment → 0 – 3V	
24	Electric load switch	Engine: Running at idle	Lighting switch set to OFF	0 – 3V	
			Lighting switch set to ON	SV	
56 55	Oxygen sensor	Engine: Kept running at 2,000 r/min after warmup (Digital voltmeter to be used for checking)		0 ↔ 0.8V (Changes repeated)	Terminal 55 for rear bank
1	No. 1 injector	Engine: Running at idle after warmup, and accelerated abruptly by depressing accelerator pedal		Falls temporarily a little from 11 – 14V.	
14	No. 2 injector				
2	No. 3 injector				
15	No. 4 injector				
3	No. 5 injector				
16	No. 6 injector				
4	Stepper motor coil <A1>	Engine: Just after the warmed-up engine has started (for 1 minute)		SV ↑ ↓ 0 – 3V (Changed repeated)	
17	Stepper motor coil <A2>				
5	Stepper motor coil <B1>				
18	Stepper motor coil <B2>				

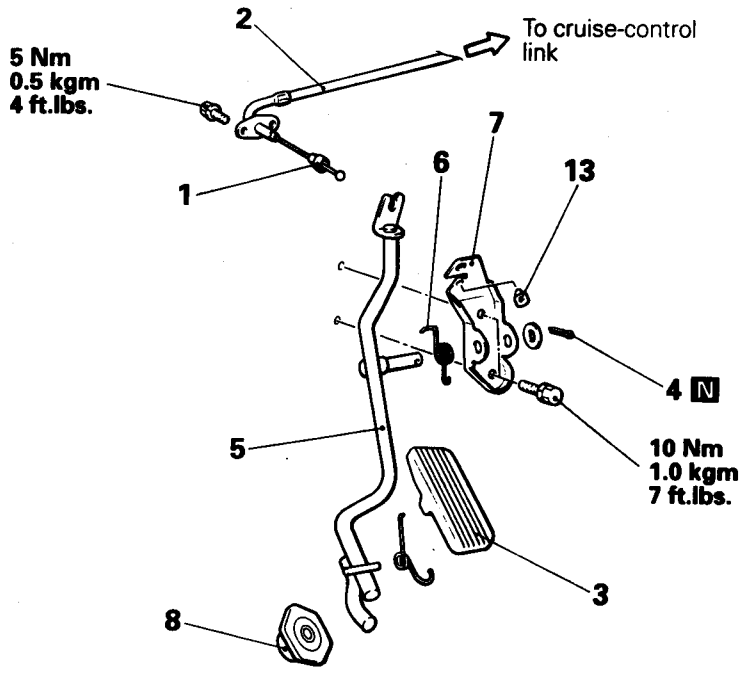
Terminal No.	Check point	Check conditions (Engine conditions)	Standard value	Remarks
10	Power transistor unit A	Engine speed: 3,000 r/min	0.3 – 3V	
23	Power transistor unit B			
11	Power transistor unit C			
9	Purge control solenoid valve	Ignition switch: ON	SV	
		Start the warmed-up engine and keep the engine speed at 3,000 r/min	0 – 3V	
7	Fuel pressure control valve	Ignition switch: ON	SV	
		Engine: From cranking to idling (within approx. 2 minutes)	0 – 3V ↓ SV	
35	Waste gate solenoid valve	Ignition switch: ON	SV	
		Engine: Idling (when the premium gasoline is used)	0 – 3V	
41	Turbo meter	Ignition switch: ON	4 – 13V	
		Engine: Depress the accelerator pedal abruptly while the engine is idling	Falls temporarily from SV	
21	Fuel pump relay 2	Engine: Depress the accelerator pedal abruptly while the engine is idling	Rises temporarily from 0 – 3V	
31	Engine ignition signal	Engine: 3,000 rpm	0.3 – 3V	
34	Ignition timing adjustment terminal	Ignition switch: ON; Ignition timing adjustment terminal connected to earth	0 – 1V	
		Ignition timing adjustment terminal disconnected from earth	4.0–5.5V	
36	Engine warning lamp	Ignition switch: OFF → ON	0 – 3V ↓ 9 – 13V (Several seconds later)	
6	EGR control solenoid valve	Ignition switch: ON	SV	
		Engine: Running at idle and accelerated abruptly by depressing accelerator pedal	Falls temporarily from SV.	
44	Anti-lock braking signal	Engine: Running at idle	SV	
		• When vehicle is started in motion for the first time after the ignition switch was placed in ON position • Vehicle speed: 0 → 10 km/h (0 → 0.6 mph)	SV ↓ 0 – 3V (for a moment)	

ACCELERATOR CABLE AND PEDAL

E13OA--

REMOVAL AND INSTALLATION

<L.H. drive vehicles>



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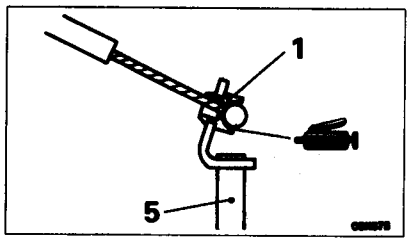
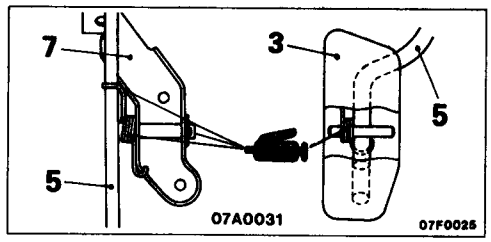
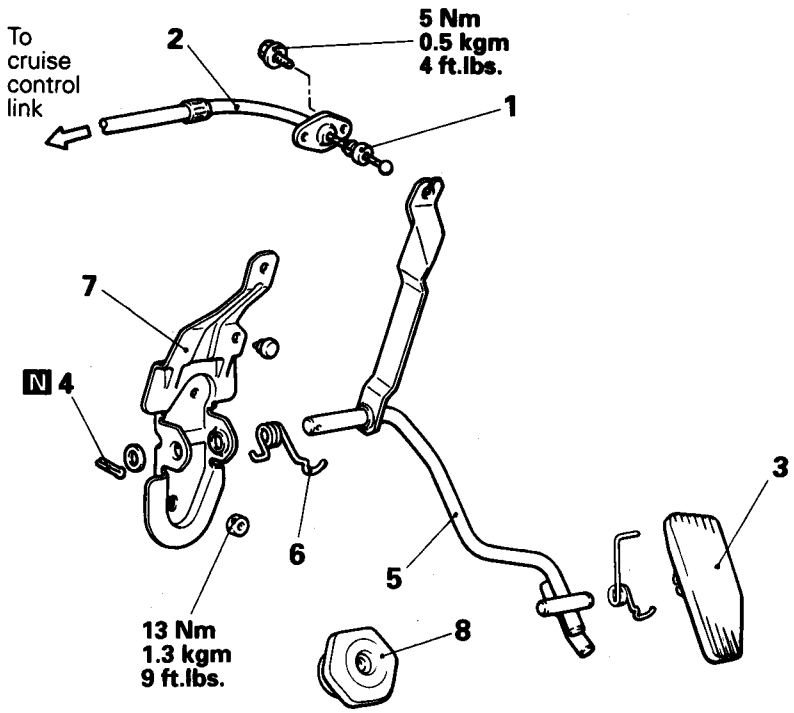
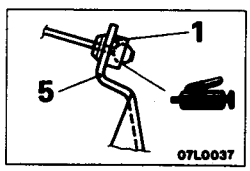
Post-installation Operation
- Accelerator Cable Adjustment (Refer to P.13-41.)

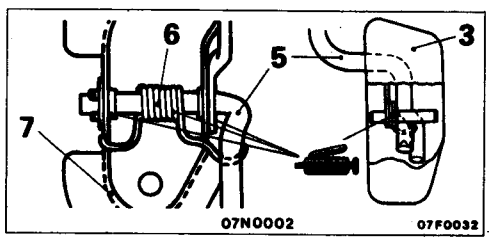




<R.H. drive vehicles>







Removal steps

1. Bushing
2. Accelerator cable
3. Accelerator pedal
4. Split pin
5. Accelerator arm
6. Return spring
7. Accelerator arm bracket
8. Stopper

03F0023

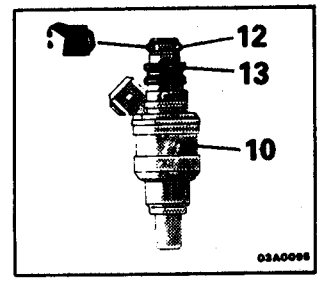
INJECTOR

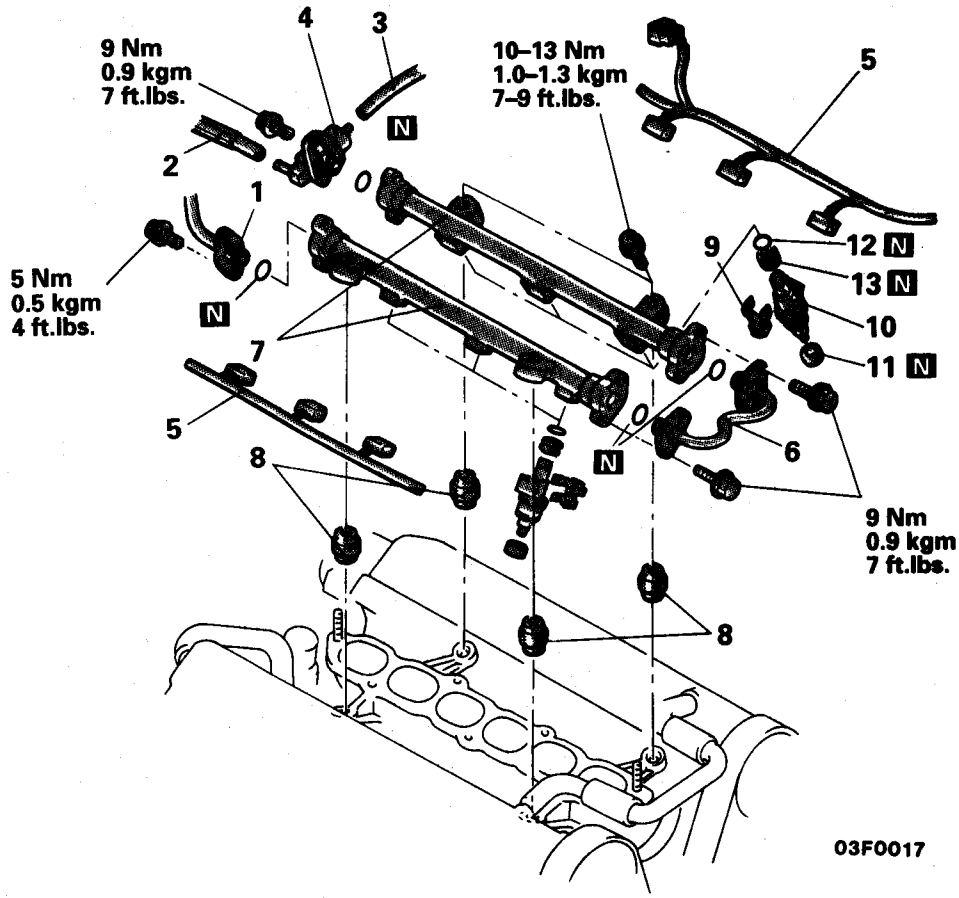
E13JA--

REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining of the Engine Coolant
- Removal of Air Intake Plenum
- Release of Residual Pressure from High Pressure Hose. (Refer to P.13-39.)

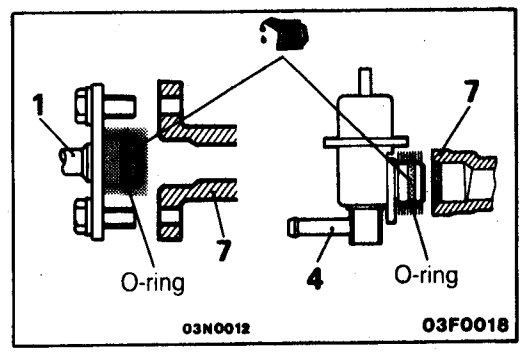
Post-installation Operation
- Supplying of Engine Coolant
- Installation of Air Intake Plenum
- Checking for Fuel Leakage

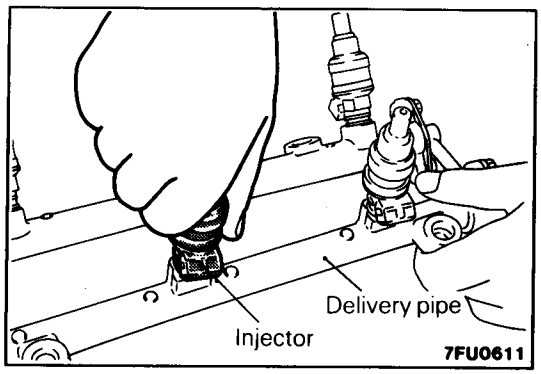




Removal steps

- ◆◆ 1. Connection of high pressure fuel hose
- 2. Connection of fuel return hose
- 3. Connection of vacuum hose
- ◆◆ 4. Fuel pressure regulator
- 5. Connection of control harness
- 6. Fuel pipe
- 7. Delivery pipe
- 8. Insulator
- 9. Injector support
- ◆◆ 10. Injector
- 11. Insulator
- 12. O-ring
- 13. Grommet





SERVICE POINTS OF INSTALLATION E13JDAE

10. INSTALLATION OF INJECTOR

While turning the injector to the left and right, install it to the delivery pipe.
Check to be sure that the injector turns smoothly.

Caution
If it does not turn smoothly, the O-ring may be trapped. Remove the injector and then re-insert it into the delivery pipe and check once again.

4. INSTALLATION OF FUEL PRESSURE REGULATOR

When connecting the fuel pressure regulator to the delivery pipe, apply light oil or petrol to the O-ring, and then insert, being careful not to damage the O-ring.

1. CONNECTION OF HIGH PRESSURE FUEL HOSE

When connecting the high pressure fuel hose to the delivery pipe, apply petrol to the hose union, and then insert, being careful not to damage the O-ring.

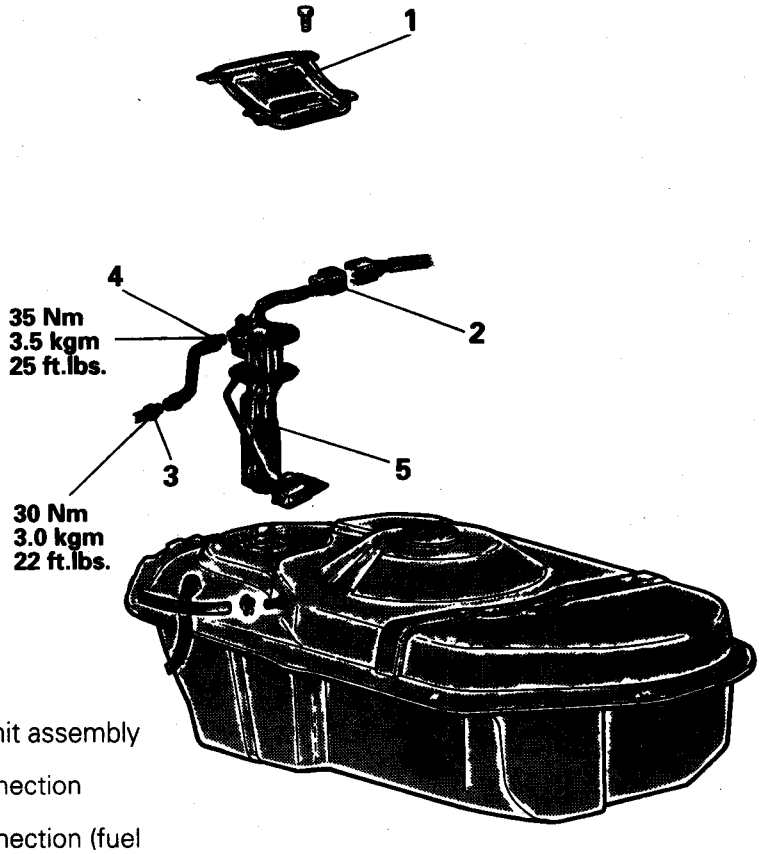
FUEL PUMP AND FUEL GAUGE UNIT ASSEMBLY

REMOVAL AND INSTALLATION

E13LA--

Pre-removal Operation
- Draining of the Fuel
- Release of Residual Pressure from High Pressure Hose (Refer to P.13-39.)

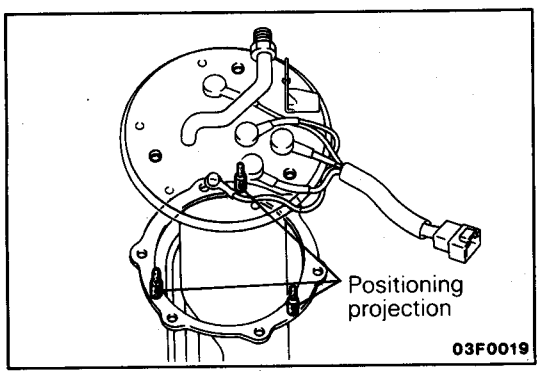
Post-installation Operation
- Supplying of the Fuel
- Checking for Fuel Leakage



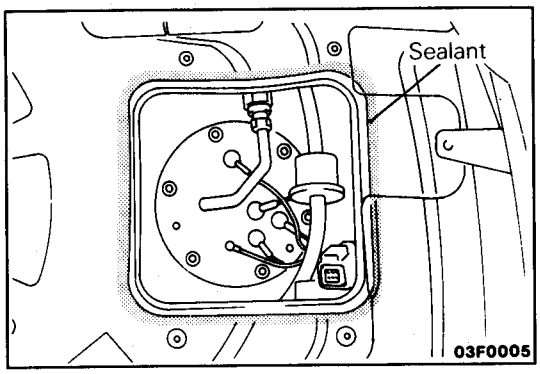
03F0007

Removal steps

◆◆ 1. Fuel gauge unit cover
2. Fuel pump and fuel gauge unit assembly connector
3. High pressure fuel hose connection (body side)
4. High pressure fuel hose connection (fuel pump side)
◆◆ 5. Fuel pump and fuel gauge unit assembly



03F0019



03F0005

SERVICE POINTS OF INSTALLATION

E13LDAE

5. INSTALLATION OF FUEL PUMP AND FUEL GAUGE UNIT ASSEMBLY

Align the three positioning projections of the packing with the holes in the fuel pump and fuel gauge unit assembly.

1. INSTALLATION OF FUEL GAUGE UNIT COVER

Before installing the fuel gauge unit cover, apply the specified sealant to the rear floor pan.

Specified sealant: 3M ATD Part No. 8509 or equivalent

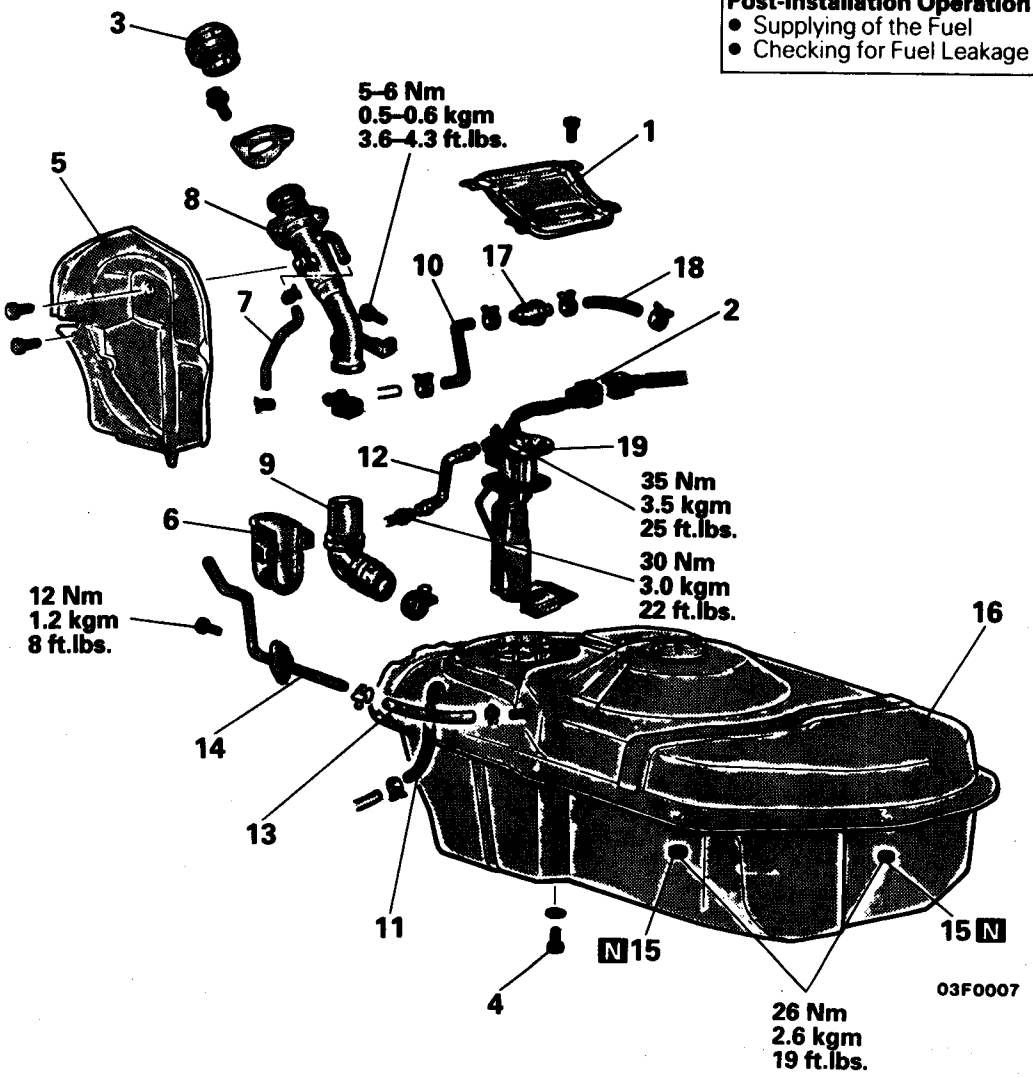
FUEL TANK

M13GA--

REMOVAL AND INSTALLATION

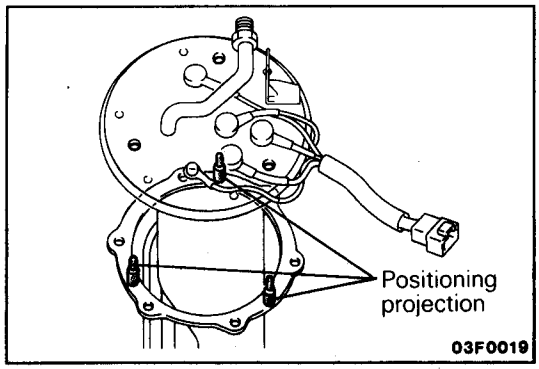
Pre-removal Operation
- Draining of the Fuel
- Release of Residual Pressure from High Pressure Hose. (Refer to P.13-39.)

Post-installation Operation
- Supplying of the Fuel
- Checking for Fuel Leakage



Removal steps

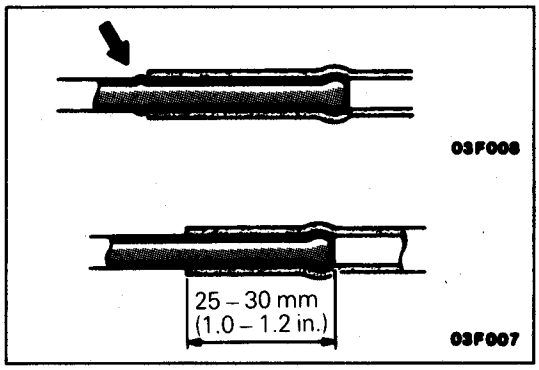
- ◆◆ 1. Fuel gauge unit cover
- 2. Fuel pump and fuel gauge unit assembly connector
- 3. Fuel tank cap
- 4. Drain plug
- 5. Splash shield
- 6. Fuel filler neck protector
- ◆◆ 7. Vapour hose
- 8. Fuel filler neck
- 9. Fuel filler hose
- ◆◆ 10. Vapour hose
- ◆◆ 11. Return hose
- 12. High pressure fuel hose
- ◆◆ 13. Vapour hose
- 14. Leveling pipe
- 15. Self-locking nut
- 16. Fuel tank
- ◆◆ 17. Two-way valve
- ◆◆ 18. Vapour hose
- ◆◆ 19. Fuel pump and fuel gauge unit assembly



SERVICE POINTS OF INSTALLATION E13GDBE

19. INSTALLATION OF FUEL PUMP AND FUEL GAUGE UNIT ASSEMBLY

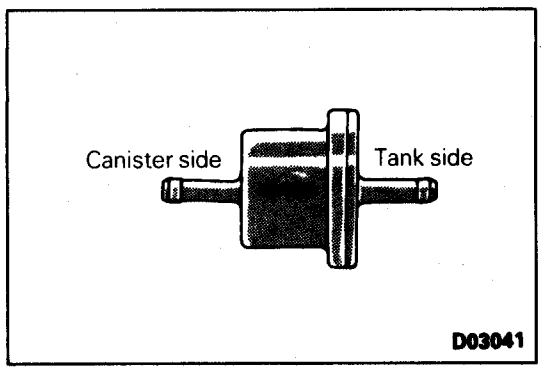
Align the three positioning projections of the packing with the holes in the fuel pump and fuel gauge unit assembly.



18. / 13. / 10. / 7. CONNECTION OF VAPOUR HOSE

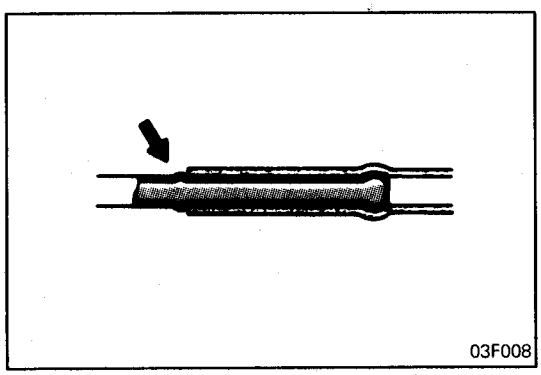
(1) If the pipe has a stepped part, connect the vapour hose to the pipe securely, up to the stepped part, as shown in the illustration.
(2) If the pipe does not have a stepped part, connect the vapour hose to the pipe securely, so that it is the standard value.

Standard value: 25 – 30 mm (1.0 – 1.2 in.)



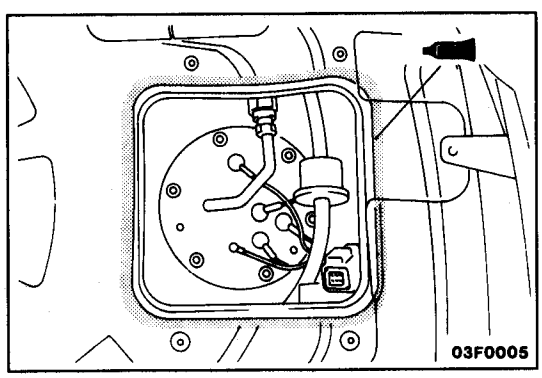
17. INSTALLATION OF TWO-WAY VALVE

Install so that the two-way valve is facing in the direction shown in the illustration.



11. CONNECTION OF RETURN HOSE

Connect the return hose to the pipe securely, up to the stepped part, as shown in the illustration.



1. INSTALLATION OF FUEL GAUGE UNIT COVER

Before installing the fuel gauge unit cover, apply the specified sealant to the rear floow pan.

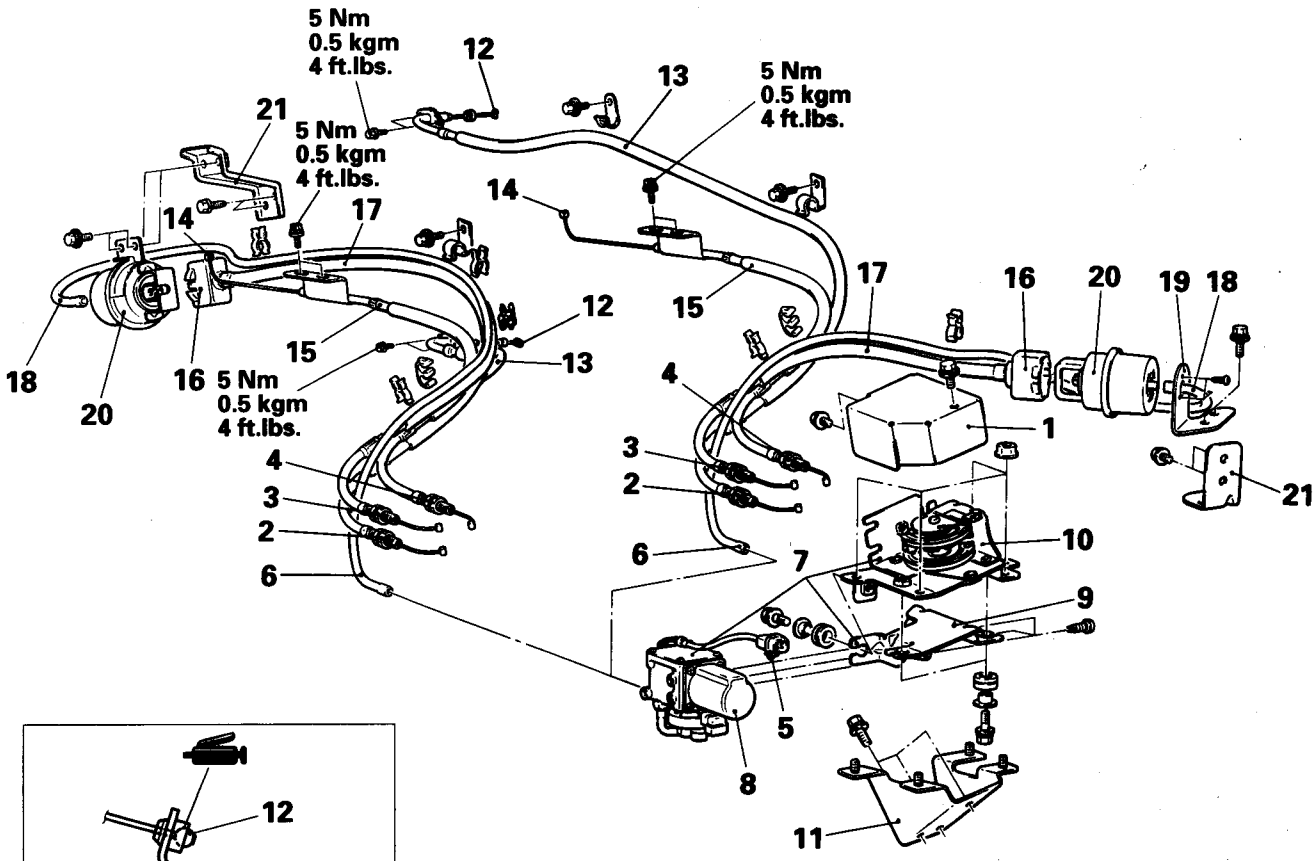
Specified sealant: 3M ATD Part No. 8509 or equivalent

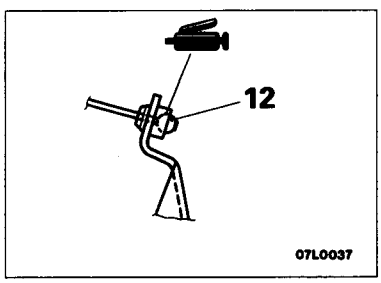
CRUISE CONTROL SYSTEM

E13SA--

REMOVAL AND INSTALLATION

<L.H. drive vehicles> <R.H. drive vehicles>



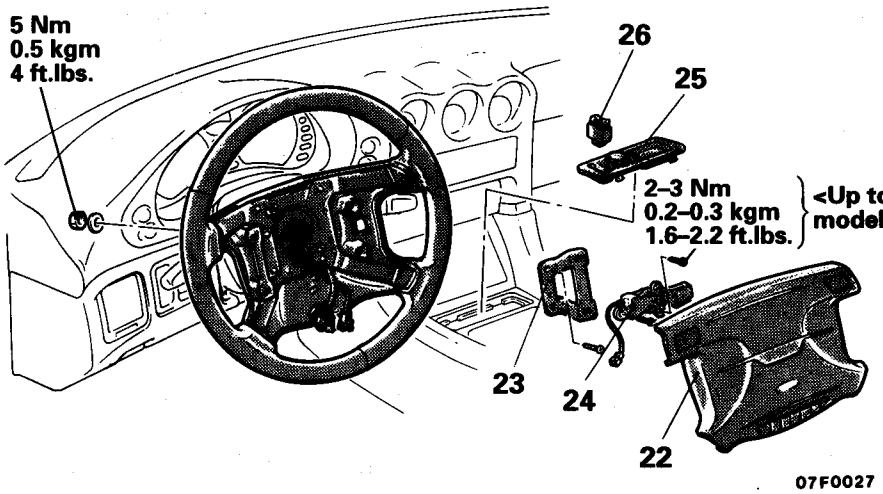


Post-installation Operation
- Cruise Control Cables Adjustment (Refer to P.13-41.)

Actuator removal steps

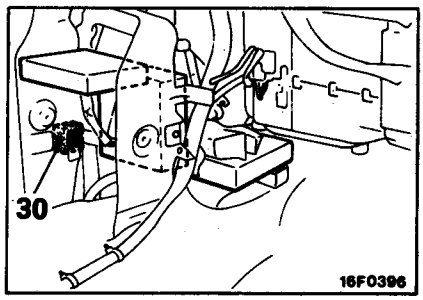
1. Link protector
2. Accelerator cable and link assembly connection
3. Cruise control cable and link assembly connection
4. Throttle cable and link assembly connection
5. Vacuum pump connector
6. Vacuum hose and vacuum pump connection
7. Link assembly and vacuum pump
8. Vacuum pump
9. Pump bracket
10. Link assembly
11. Link bracket
12. Accelerator cable and accelerator pedal connection
13. Accelerator cable
14. Throttle cable and throttle body connection
15. Throttle cable
16. Cruise control cable and actuator connection
17. Cruise control cable
18. Vacuum hose
19. Bracket
20. Actuator
21. Bracket

CAUTION: SRS
Before removal of air bag module, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.



Control switches removal steps

22. Air bag module (Refer to GROUP 52B – Air Bag Module and Clock Spring.)
23. Air bag module bracket <Up to 1994 models>
24. Cruise control switch
25. Switch garnish
26. Main switch

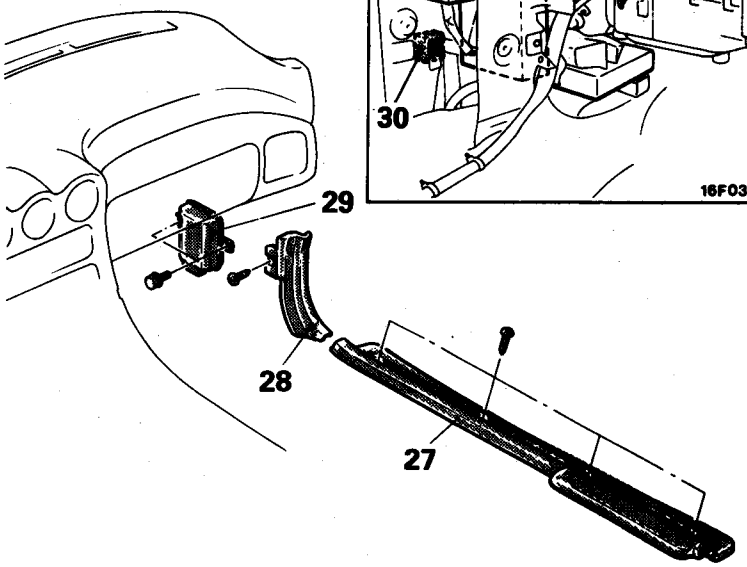


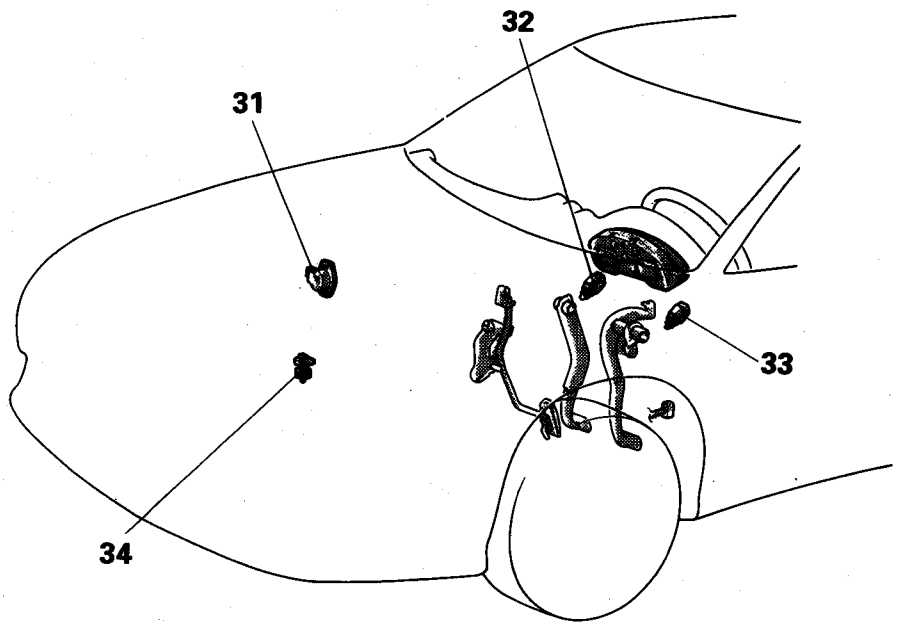
Control unit and relay removal steps

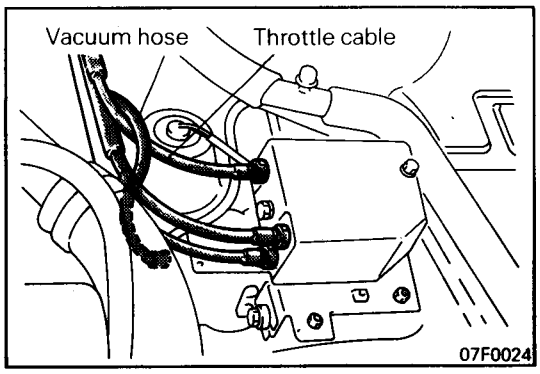
27. Scuff plate (Passenger's side)
28. Cowl side trim (Passenger's side)
29. Cruise control unit
30. Cruise control relay

Sensors and switches removal steps

31. Throttle position sensor
32. Stop lamp switch
33. Clutch switch
34. Vehicle speed sensor (Refer to GROUP 54 – Meters and Gauges.)







SERVICE POINT OF INSTALLATION E13SDAC

6. CONNECTION OF VACUUM HOSE TO VACUUM PUMP

Route the vacuum hose over the throttle cable and connect the hose to the vacuum pump so as to prevent the slackened hose from interfering with other parts.

COOLING

CONTENTS

E14AA--

SPECIFICATIONS

GENERAL SPECIFICATIONS

E14CA–

Items	Specifications
Cooling method	Water-cooled, pressurized, forced circulation with electrical fan
Radiator	
Type	Pressurized corrugated fin type
Radiator fan motor	
Type	Direct current ferrite type
Water pump	
Type	Centrifugal impeller type
Thermostat	
Type	Wax type with jiggle valve
Identification mark	76.5 (Stamped on flange)

SERVICE SPECIFICATIONS

E14CB–

Items	Specifications
Standard value	
Range of coolant antifreeze concentration %	30 – 60
Thermostat	
Valve opening temperature of thermostat °C (°F)	76.5 (170)
Full-opening temperature of thermostat °C (°F)	90 (194) or more
Opening pressure of cap high pressure valve kPa (kg/cm^2, psi)	75-105 (0.75-1.05, 11-15)
Thermo sensor (on radiator) operating temperature <Up to 1994 models>	
<For radiator fan>	
OFF → ON °C (°F)	81 – 89 (178 – 192)
ON → OFF °C (°F)	77 (171) or less
<For condenser fan>	
OFF → ON °C (°F)	91 – 99 (196 – 210)
ON → OFF °C (°F)	87 (189) or less
Limit	
Opening pressure cap high pressure valve kPa (kg/cm^2, psi)	65 (0.65, 9.2)

LUBRICANT

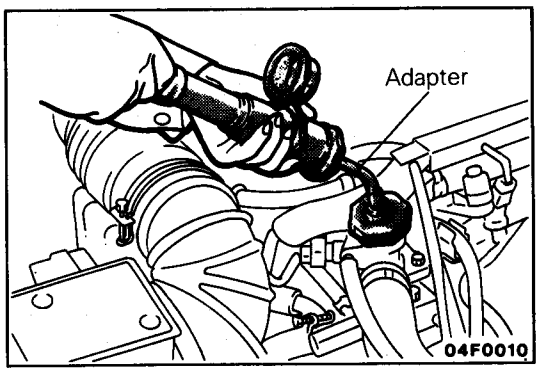
E14CD–

Item	Specified lubricant	Quantity
Engine coolant dm^3 (U.S. qts., Imp. qts.)	High quality ethylene glycol antifreeze coolant	8.0 (8.5, 7.0)

SEALANT

E14CE–

Items	Specified sealants	Remarks
Engine coolant temperature gauge unit Engine coolant temperature sensor (Engine control) Engine coolant temperature sensor (Air conditioner) Cylinder block drain plug	3M Nut Locking Part No.4171 or equivalent	Drying sealant



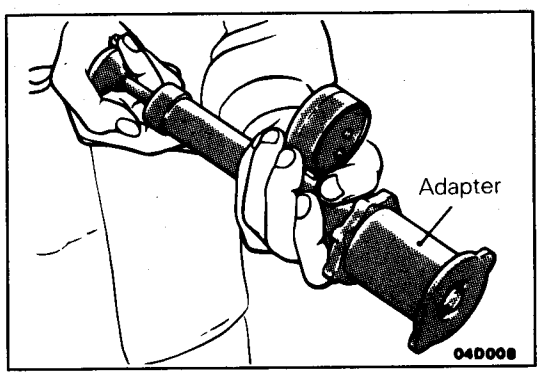
SERVICE ADJUSTMENT PROCEDURES

ENGINE COOLANT LEAK CHECK

E14FAAC

1. Loosen cap.
2. Confirm that the engine coolant level is up to the filler neck.
3. Install an adapter to the water outlet fitting and apply 160 kPa (1.6 kg/cm^2, 23 psi) pressure. Hold pressure for two minutes, while checking for leakage from the radiator, hose or connections.

   Caution
   Be sure to completely clean away any moisture from the places checked.
   When the tester is removed, be careful not to spill any engine coolant from it.
   Be careful, when installing and removing the tester and when testing, not to deform the water outlet fitting.
4. If there is leakage, repair or replace the appropriate part.



CAP PRESSURE TEST

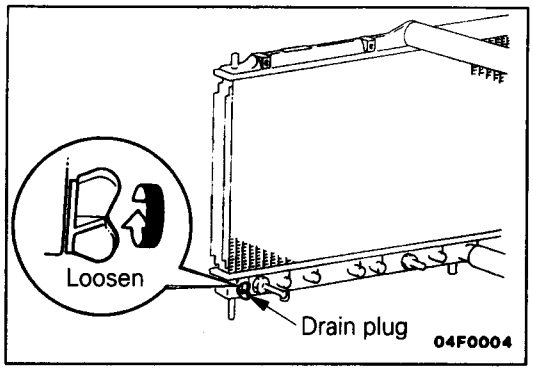
E14FBAD

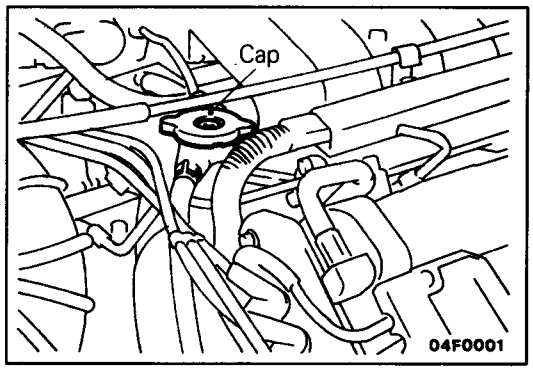
1. Use a adapter to attach the cap to the tester.
2. Increase the pressure until the indicator of the gauge stops moving.

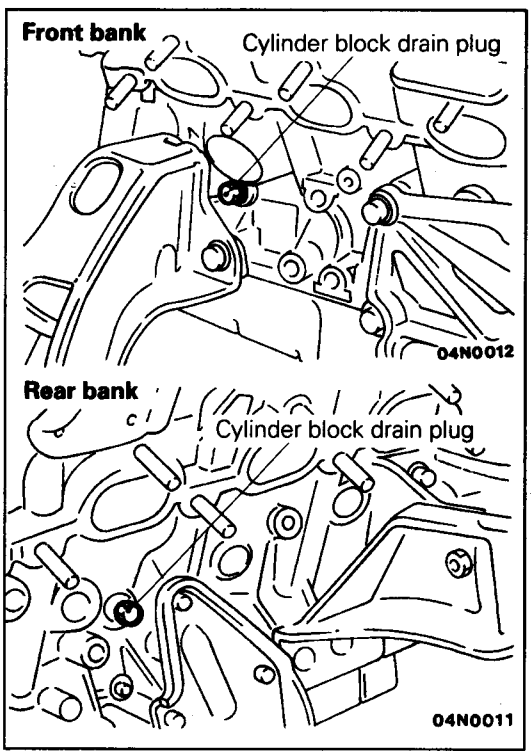
   Limit: 65 kPa (0.65 kg/cm^2, 9.2 psi)

   Standard value: 75 – 105 kPa (0.75–1.05 kg/cm^2, 11–15 psi)
3. Replace the cap if the reading does not remain at or above the limit.

   NOTE
   Be sure that the cap is clean before testing, since rust or other foreign material on the cap seal will cause an improper indication.







ENGINE COOLANT REPLACEMENT E14FCAW

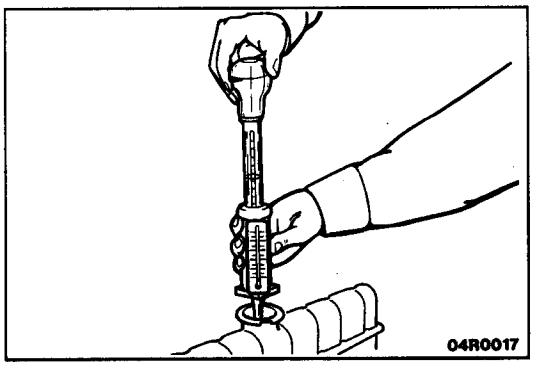
1. Lift up the vehicle.
2. Loosen the radiator drain plug, remove the drain plug from the rear bank of the engine and remove the radiator cap to discharge coolant.
3. Remove the reservoir tank and discharge coolant.
4. When coolant has been discharged, pour water through the filler port to flush coolant passage.
5. Coat the threads of the cylinder block drain plugs with the specified sealant and tighten the plugs to specification.

   Specified sealant: 3M Nut Locking Part No. 4171 or equivalent
   Tightening torque: 40 Nm (4.0 kgm, 29 ft.lbs.)
6. Fit the radiator drain plug securely.
7. Mount the reserve tank.
8. Slowly pour coolant into the radiator to the brim and also into the reserve tank up to the FULL line.

   Recommended antifreeze:
   HIGH QUALITY ETHYLENE GLYCOL ANTIFREEZE COOLANT

Quantity	**dm^3 (U.S.qts., Imp.qts.)**
	8.0 (8.5, 7.0)

   NOTE
   For Norway, the non-amine type of antifreeze should be used.
9. Install the radiator cap securely.
10. Start the engine and warm up until the thermostat opens.
11. Race the engine up to around 3,000 rpm several times, then stop the engine.
12. When the engine has cooled down, remove the radiator cap and add coolant up to the brim. Add coolant to the reserve tank up to the FULL line.



CONCENTRATION MEASUREMENT E14FDAB

Measure the temperature and specific gravity of the engine coolant to check the antifreeze concentration.

Standard value: 30–60 % (allowable concentration range)

RECOMMENDED ANTIFREEZE

Antifreeze	Allowable concentration
HIGH QUALITY ETHYLENE GLYCOL ANTIFREEZE COOLANT	30–60 %

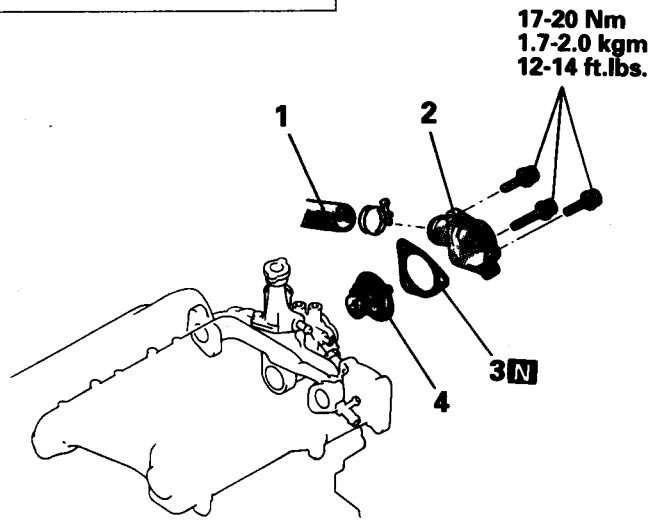
Caution
If the concentration of the antifreeze is below 30%, the anti-corrosion property will be adversely affected.
In addition, if the concentration is above 60%, both the anti-freezeing and engine cooling properties will decrease, affecting the engine adversely. For these reasons, be sure to maintain the concentration level within the specified range.

THERMOSTAT

E14GA--

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Draining and Supplying of the Engine Coolant (Refer to P.14–4.)
- Removal and Installation of Air Intake Hose (Refer to GROUP 15-Air Cleaner.)



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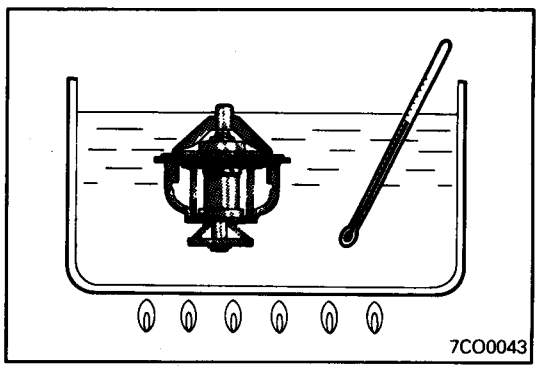
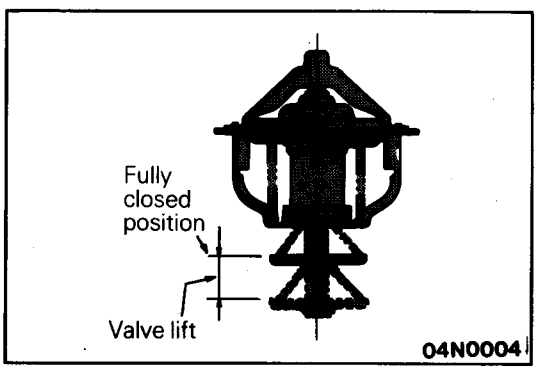
Removal steps
1. Connection of radiator lower hose
2. Water inlet fitting
3. Gasket
◆◆ 4. Thermostat



INSPECTION

E14GCAX

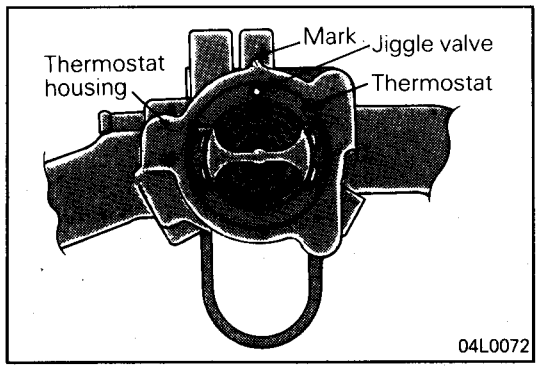
Immerse thermostat in container of water. Stir to raise water temperature and check that thermostat opening valve temperature and the temperature with valve fully open [valve lift-over 8 mm (0.31 in.)] are at the standard value.



Standard value:

Opening valve temperature	**76.5°C (170°F)**
Full-open temperature	**90°C (194°F)**

NOTE
Measure valve height when fully closed. Calculate lift by measuring the height when fully open.



SERVICE POINTS OF INSTALLATION E14GDAO

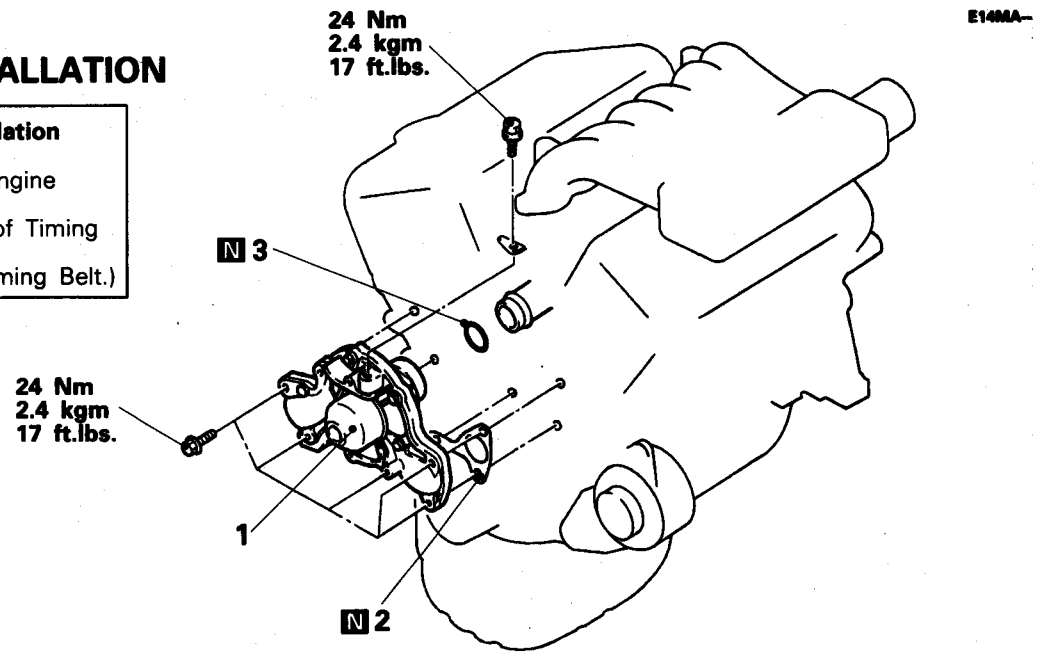
4. INSTALLATION OF THERMOSTAT

Install the thermostat with its jiggle valve lined up with the mark on the thermostat housing.

WATER PUMP

REMOVAL AND INSTALLATION

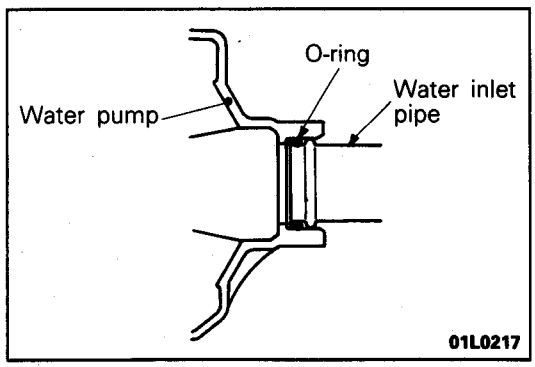
Pre-removal and Post-installation Operation
- Draining and Adding of Engine Coolant
- Removal and Installation of Timing Belt
  (Refer to GROUP 11 – Timing Belt.)



E14MA--

Removal steps
- ◆◆ 1. Water pump
  2. Gasket
- ◆◆ 3. O-ring

01N0003

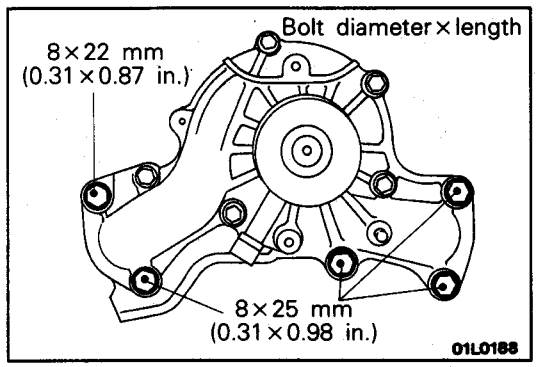


SERVICE POINTS OF INSTALLATION E14MDSB

3. INSTALLATION OF O-RING

Insert the O-ring to the water inlet pipe, and coat the outer circumference of the O-ring with water.

Caution
Care must be taken not to permit engine oil or other greases to adhere to the O-ring.



1. INSTALLATION OF WATER PUMP

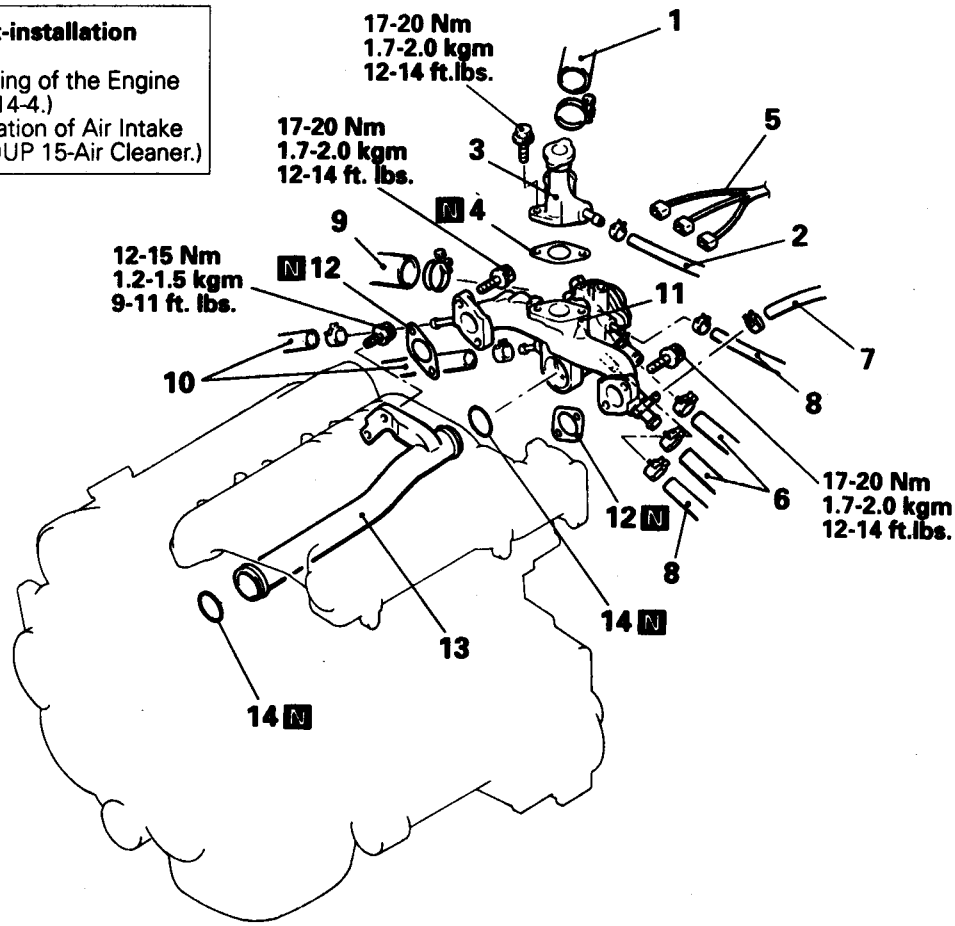
Water pump installation bolt size are different and caution must be paid to ensure that they are properly installed.

WATER PIPE AND WATER HOSE

REMOVAL AND INSTALLATION

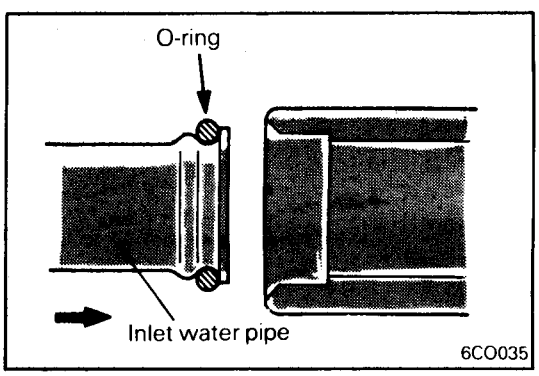
E14TA--

Pre-removal and Post-installation Operation
- Draining and Supplying of the Engine Coolant (Refer to P.14-4.)
- Removal and Installation of Air Intake Hose (Refer to GROUP 15-Air Cleaner.)



Removal steps

1. Connection for radiator upper hose
2. Connection for water hose
3. Water outlet fitting
4. Gasket
5. Harness connector
6. Connection for heater hose
7. Connection for water hose A
8. Connection for water hose
9. Connection for radiator lower hose
10. Connection for water hose
11. Thermostat housing
12. Gasket
13. Inlet water pipe
14. O-ring



SERVICE POINTS OF INSTALLATION

E14TDAJ

14. INSTALLATION OF O-RING/13. INLET WATER PIPE

Replace the O-rings at both ends of the water inlet pipe with new ones and apply water to the outside of O-rings to help smooth insertion of the pipe into the water pump, thermostat housing.

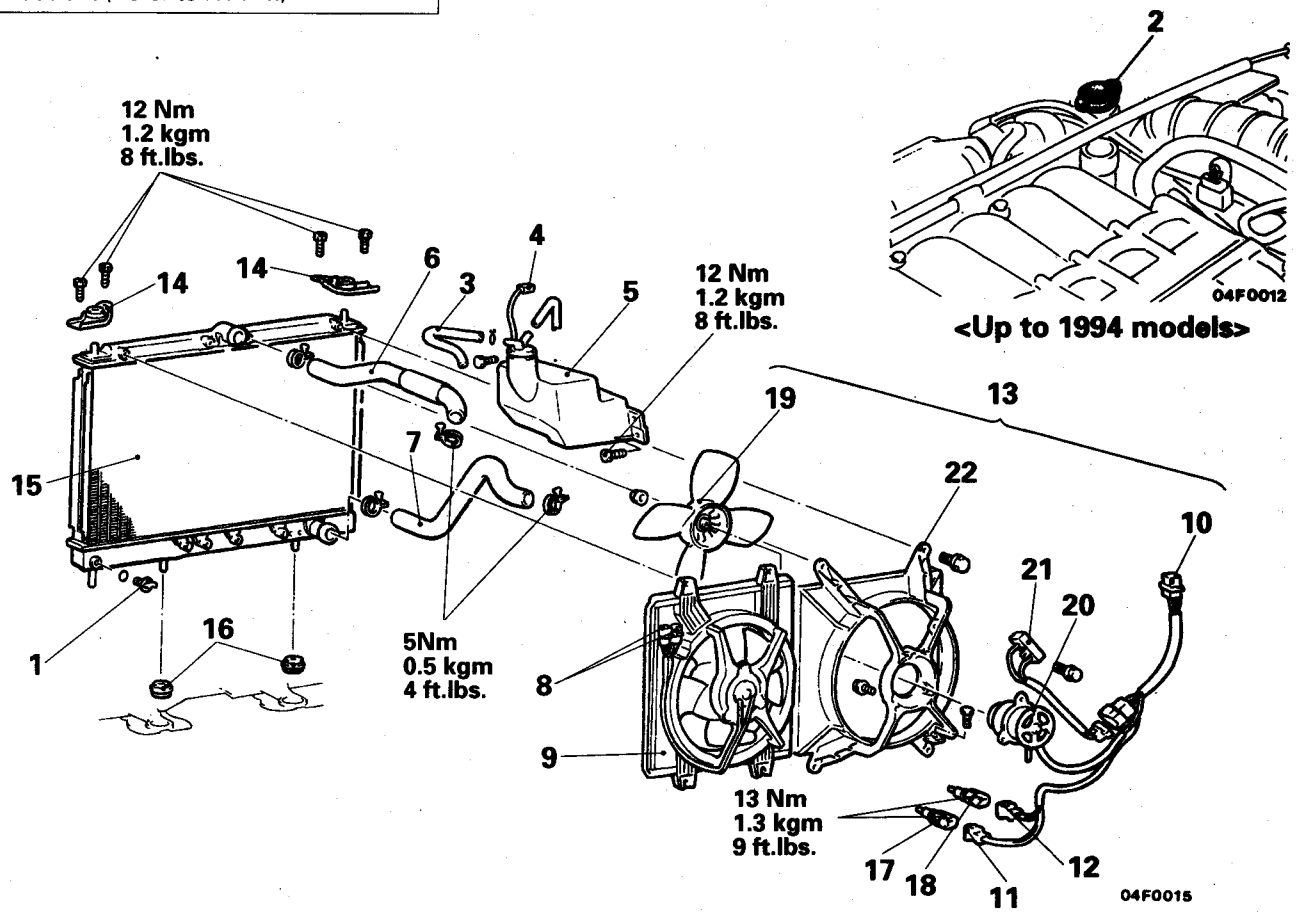
Caution
Care must be taken not to permit engine oil or other greases to adhere to the O-ring.

RADIATOR

REMOVAL AND INSTALLATION

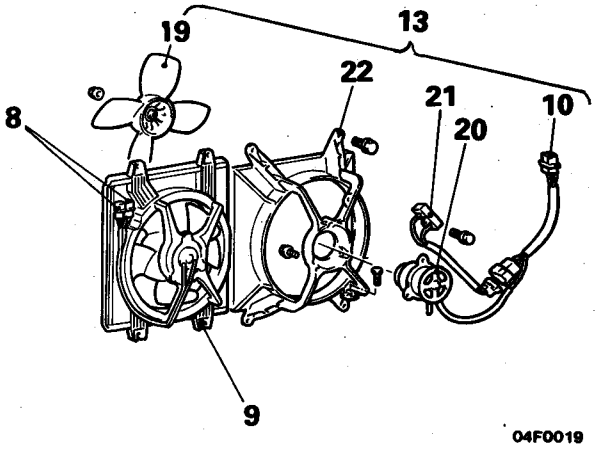
E14QA--

Pre-removal and Post-installation Operation
- Draining and Refilling of the Engine Coolant (Refer to P.14–4.)



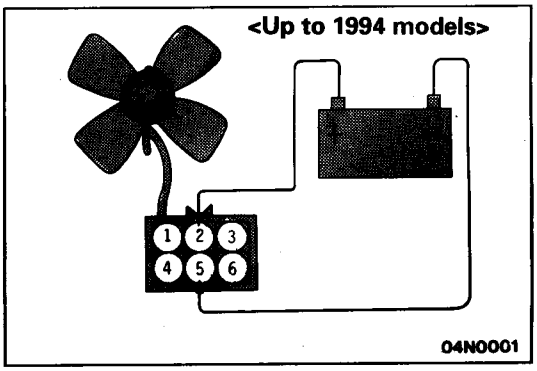
<Up to 1994 models>

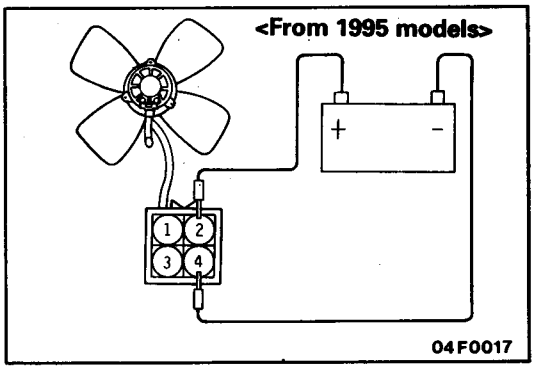
<From 1995 models>



Removal steps

1. Drain plug
2. Cap
3. Overflow tube
4. Water level sensor connector
5. Reserve tank
6. Radiator upper hose
7. Radiator lower hose
8. Condenser fan motor connector
9. Condenser fan motor assembly
10. Radiator fan motor connector
11. Thermo sensor connector (For radiator fan) } <Up to 1994 models
12. Thermo sensor connector (For condenser fan) } <Up to 1994 models
13. Radiator fan motor assembly
14. Upper insulator
15. Radiator assembly
16. Lower insulator
17. Thermo sensor (For radiator fan) } <Up to 1994 models
18. Thermo sensor (For condenser fan) } <Up to 1994 models
19. Fan
20. Radiator fan motor
21. Resistor
22. Shroud



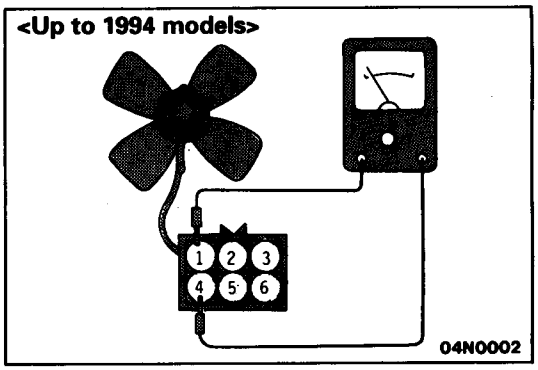


INSPECTION

E14QCAP

RADIATOR FAN MOTOR INSPECTION

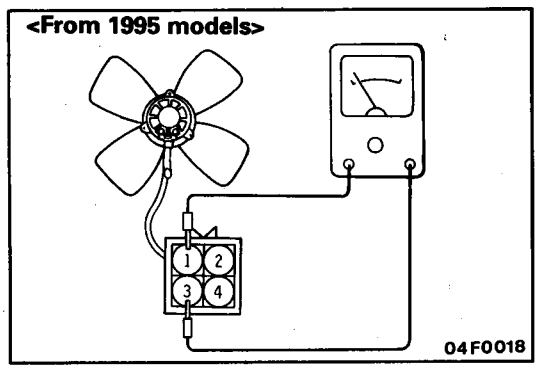
(1) Check to be sure that the radiator fan rotates when battery voltage is applied between terminals (as shown in the figure).
(2) Check to see that abnormal noises are not produced, while motor is turning.



INSPECTION OF RESISTOR <Up to 1994 models>

(1) Measure the resistance between connector terminals ① and ④ of the radiator fan motor.
(2) The resistor is normal if the resistance is within the following range.

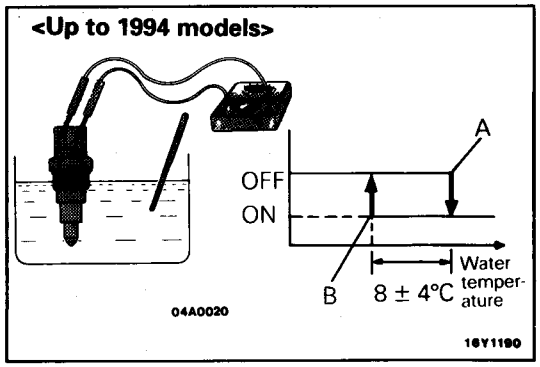
Resistance: 0.29 – 0.35 Ω



INSPECTION OF RESISTOR <From 1995 models>

(1) Measure the resistance between connector terminals ① and ③ of the radiator fan motor.
(2) The resistor is normal if the resistance is within the following range.

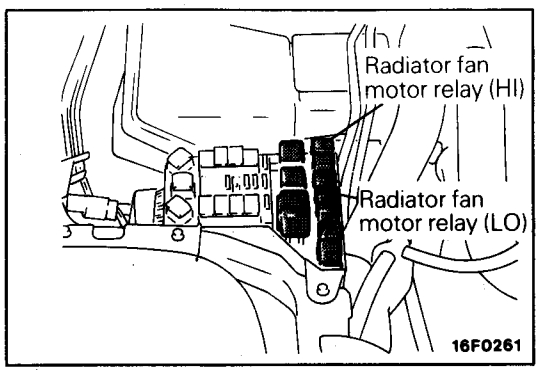
Resistance: 0.29 – 0.35 Ω



THERMO SENSOR INSPECTION <up to 1994 models>

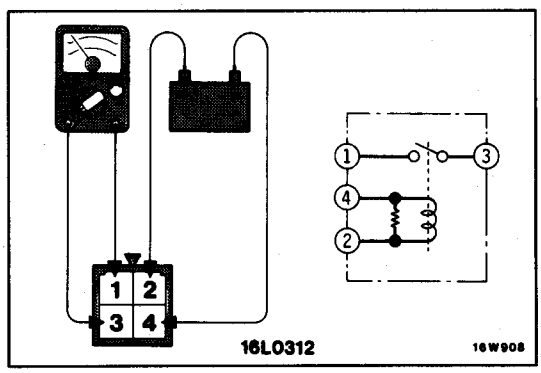
(1) Immerse the water temperature switch in hot water as shown.
(2) Change the water temperature and check continuity with a circuit tester. If it is as specified below, the switch is functioning correctly.

Item	For condenser fan	For radiator fan
With continuity (temperature of point A)	91 – 99°C (196 – 210°F)	81 – 89°C (178 – 192°F)
Without continuity (temperature of point B)	87°C (189°F) or less	77°C (171°F) or less



RADIATOR FAN MOTOR RELAY INSPECTION

(1) Remove radiator fan motor relay from the relay box located at the right side in the engine compartment.



(2) Check for continuity between the terminals when the battery power-supply is applied to terminal ②, and terminal ④ is grounded.

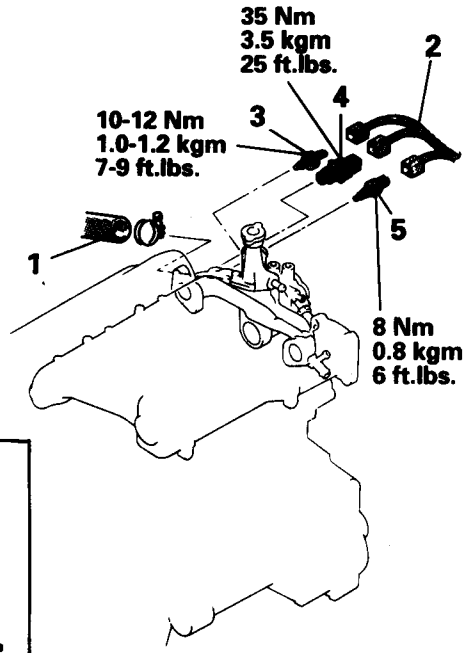
When current flows	Between terminals 1 – 3	Continuity
When no current flows	Between terminals 1 – 3	No continuity
	Between terminals 2 – 4	Continuity

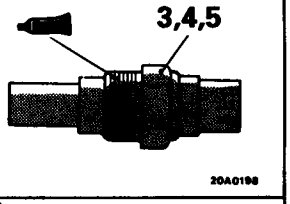
ENGINE COOLANT TEMPERATURE GAUGE UNIT, ENGINE COOLANT TEMPERATURE SENSOR AND ENGINE COOLANT TEMPERATURE SWITCH

REMOVAL AND INSTALLATION

E14UA--

Pre-removal and Post-installation Operation
- Draining and Supplying of the Engine Coolant (Refer to P.14-4.)
- Removal and Installation of Air Intake Hose (Refer to GROUP 15-Air Cleaner.)





Sealant:
3M Nut Locking Part No. 4171 or equivalent

01F0038

Removal steps
1. Connection of radiator upper hose
2. Harness connector
3. Engine coolant temperature gauge unit
4. Engine coolant temperature sensor (Engine control)
5. Engine coolant temperature switch (Air conditioner)

INSPECTION

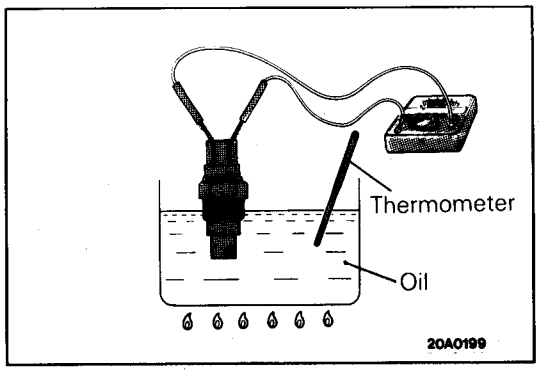
E14UCA8

ENGINE COOLANT TEMPERATURE GAUGE UNIT

Refer to GROUP 54 – Meters and Gauges.

ENGINE COOLANT TEMPERATURE SENSOR (Engine control)

Refer to GROUP 13 – Service Adjustment Procedures



ENGINE COOLANT TEMPERATURE SWITCH (Air conditioner)

(1) Immerse the engine coolant temperature switch in oil and then heat (by using a gas stove flame or similar method) so as to increase the oil temperature.
(2) Check to be sure that the engine coolant temperature switch is switched OFF when the oil temperature reaches the standard value.

Standard value: 112 – 118°C (234 – 244°F)

Caution
The oil used above should be engine oil and should be stirred well while being heated; do not heat more than necessary.

NOTES

INTAKE AND EXHAUST

CONTENTS

E15AA-

SPECIFICATIONS

GENERAL SPECIFICATIONS

E15CA--

Items	Specifications
Air cleaner	
Element	Unwoven cloth type
Exhaust system	
Front exhaust pipe	Dual type
Muffler	Expansion resonance type
Coupling	Flat coupling, insertion type
Suspension system	Rubber hangers
Turbocharger	
Type	Exhaust gas turbine type
Identification No.	TD04–09BS–6
Supercharging pressure control	Waste gate actuator and solenoid valve
Intercooler	
Type	Air cooled type

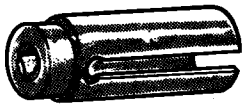
SERVICE SPECIFICATIONS

E15CB–

Items	Standard	Limit
Intake manifold and air intake plenum		
Distortion of cylinder head contacting surface mm (in.)	Less than 0.15 (0.0059)	0.2 (0.008)
Supercharging pressure solenoid valve terminal resistance [at 20°C (68°F)] Ω	36 – 44	

SPECIAL TOOL

E15DA--

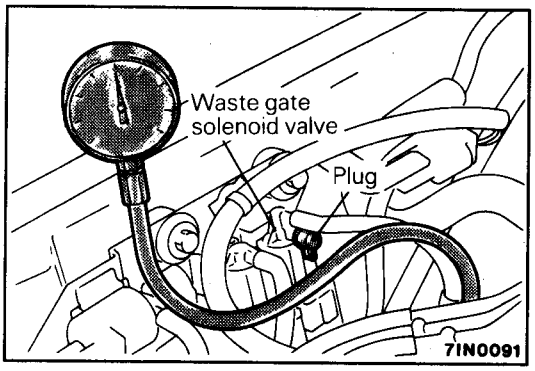
Tool	Number	Name	Use
	MD998770	Oxygen sensor wrench	Removal/Installation of oxygen sensor

SERVICE ADJUSTMENT PROCEDURES

TURBOCHARGER SUPERCHARGING PRESSURE INSPECTION

Caution
Perform running inspection with two passengers in the vehicle and where full throttle acceleration can be safely made. The pressure gauge reading is taken by a front seat passenger.

(1) Disconnect the hose (black) from the waste gate solenoid valve, and connect the pressure gauge to the hose. Plug the nipple of the solenoid valve from which the hose (black) has been disconnected.



(2) Drive the vehicle with full throttle and accelerate the engine to a speed of more than 3,500 r/min. at 2nd gear. Measure the supercharging pressure when the pointer is stabilized.

Caution
When the indicated supercharging does not become positive pressure, check the following items.

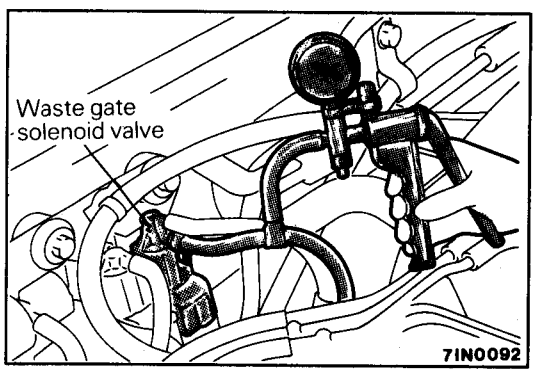
Malfunction of the waste gate actuator.
Leakage of supercharging pressure.
Malfunction of the turbocharger.

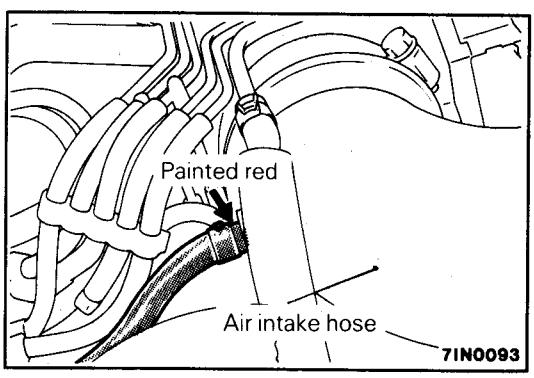
When the indicated supercharging is 60 kPa (0.6 kg/cm^2, 8.7 psi) or more, supercharging control may be faulty, therefore check the following.

Disconnection or cracks of the waste gate actuator rubber hose.
Malfunction of the waste gate actuator.
Malfunction of the waste gate valve.

SUPERCHARGING PRESSURE CONTROL SYSTEM INSPECTION

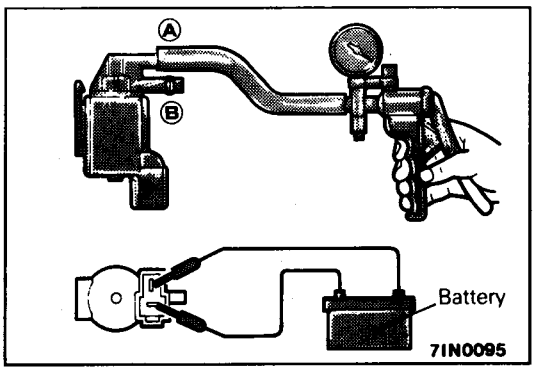
(1) After the self-diagnosis code of MPI system is completely read, turn off the ignition switch.
(2) Disconnect the hose (black) from the waste gate solenoid valve and connect a three-way joint between the hose and the solenoid.
(3) Conncet a hand vacuum pump to the three-way joint.
(4) Disconnect the hose (with its end painted red) from the wastegate actuator control boost nipple and plug the nipple.
(5) Applying a negative pressure with the hand vacuum pump, check tightness both when the hose end (with its end painted red) is closed and when it is open.





Engine state	Hose (with its end painted red)	Normal state
Stop (Ignition switch: ON)	Opened	Negative pressure leaks.
	Closed by finger	Negative pressure is maintained.
Idling (after warm-up)	Closed by finger	Negative pressure leaks.

NOTE
If this check indicates an abnormal condition, the waste gate actuator, waste gate solenoid valve or hose is broken.
PWUE9119

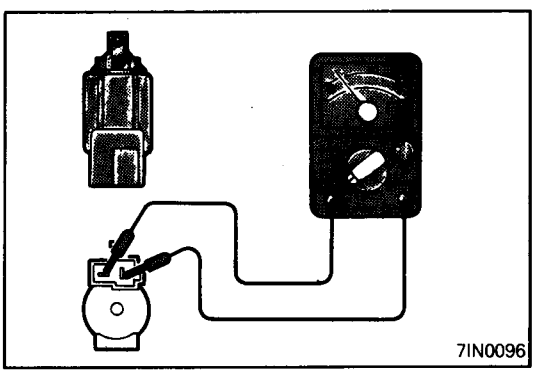


SUPERCHARGING PRESSURE RELIEF SOLENOID VALVE INSPECTION

OPERATION INSPECTION

(1) Connect a hand vacuum pump to the solenoid valve nipple Ⓐ (see the illustration to the left).
(2) Using a jumper wire, connect between the solenoid valve terminal and battery terminal.
(3) Connecting and disconnecting the jumper wire at the battery negative terminal to apply a negative pressure, check tightness.

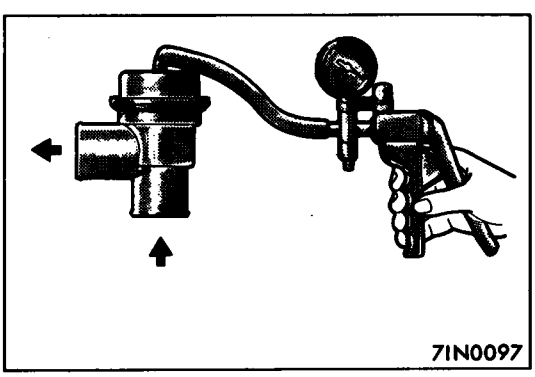
Jumper wire	Ⓑ nipple condition	Normal condition
Connected	Open	Negative pressure leaks.
	Close	Negative pressure is held.
Disconnected	Open	Negative pressure is held.



COIL RESISTANCE INSPECTION

Measure resistance between solenoid valve terminals.

Standard value: 36 – 44 Ω [at 20°C (68°F)]



AIR BYPASS VALVE INSPECTION

(1) Remove the air bypass valve.
(2) Connect the hand vacuum pump to the nipple of the air bypass valve.
(3) Apply a negative pressure of approx. 400 mmHg (16 in.Hg), and check operation of the valve. Also check that air tightness is maintained.

Negative pressure	Valve operation
About 400 mmHg (16 in.Hg)	It starts opening

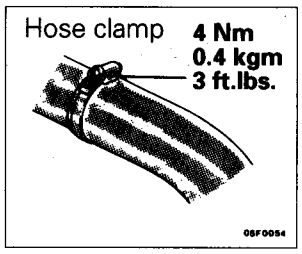
INTAKE MANIFOLD VACUUM INSPECTION

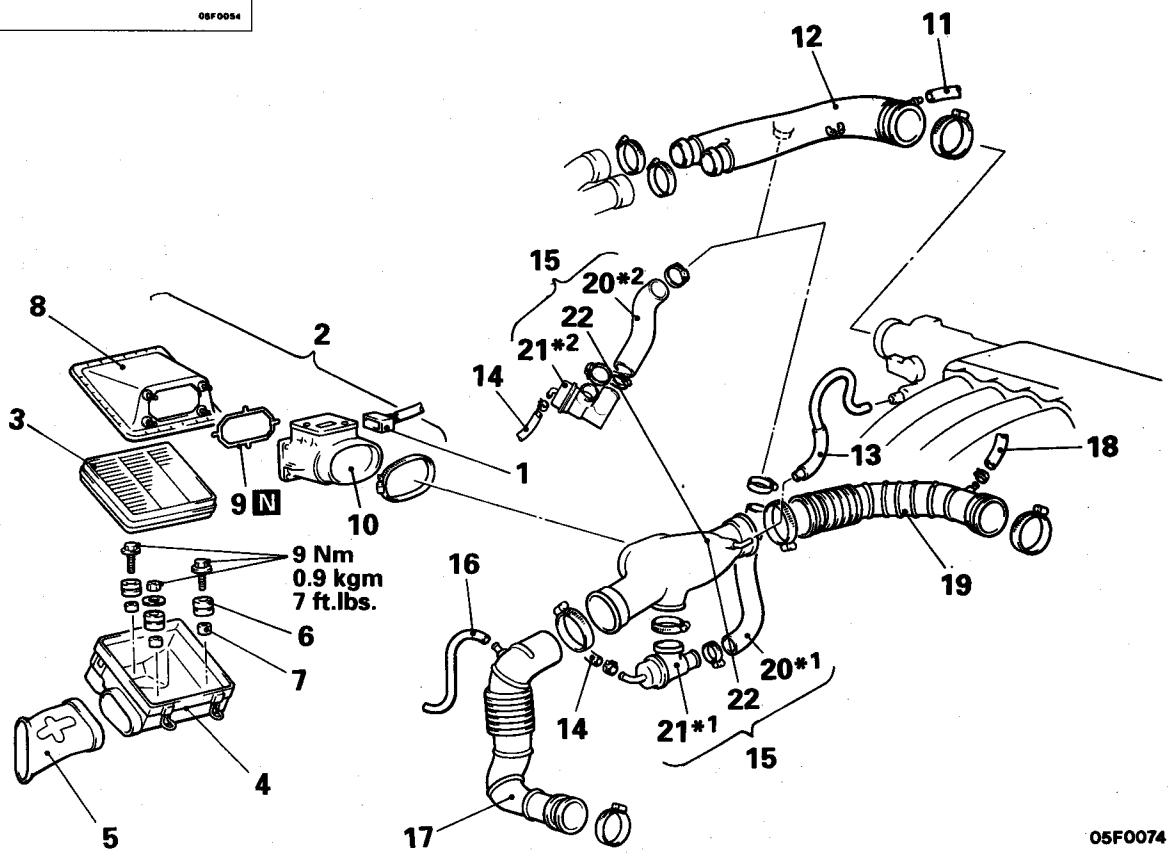
Refer to GROUP 11 – Service Adjustment Procedures.

AIR CLEANER

REMOVAL AND INSTALLATION

E150A--





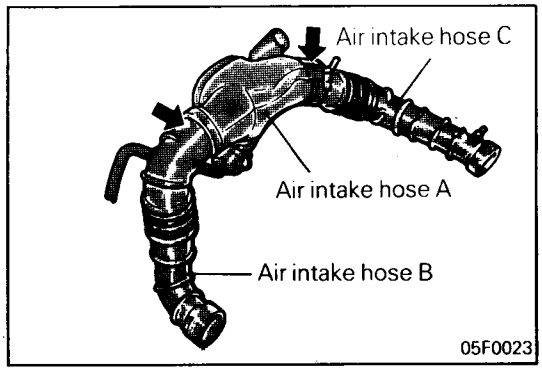
Removal steps of air cleaner

1. Air flow sensor connector
2. Air cleaner cover and air flow sensor assembly
3. Air cleaner element
4. Air cleaner body
5. Air duct
6. Insulator
7. Collar
8. Air cleaner cover
9. Air flow sensor gasket
10. Air flow sensor assembly

Removal steps of air intake hose

11. Connection of hose
◆◆ 12. Air hose A
13. Breather hose
14. Connection of vacuum hose
◆◆ 15. Air intake hose A, air by-pass valve and air by-pass hose
16. Connection of purge hose
◆◆ 17. Air intake hose B
18. Connection of boost hose
◆◆ 19. Air intake hose C
20. Air by-pass hose
21. Air by-pass valve
22. Air intake hose A

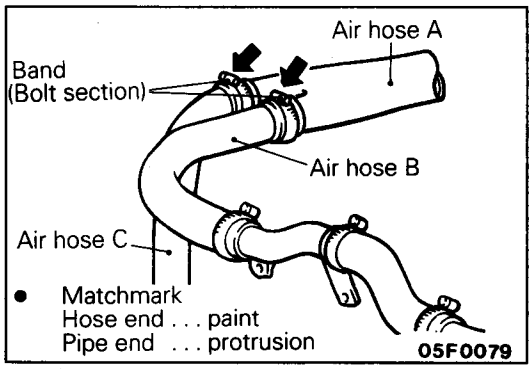
NOTE
*1: 5-speed manual transmission
*2: 6-speed manual transmission



SERVICE POINTS OF INSTALLATION E150DAC

19. INSTALLATION OF AIR INTAKE HOSE C / 17. AIR INTAKE HOSE B / 15. AIR INTAKE HOSE A, AIR BY-PASS VALVE AND AIR BY-PASS HOSE

Engaging the notch with the △ mark at points indicated by the arrows, insert air intake hoses B and C until seated. Insert the turbocharger end of air intake hoses B and C completely.



12. INSTALLATION OF AIR HOSE A

(1) Connect the air hoses ensuring that alignment marks are aligned with projections.
Insert air hoses B and C into pipe all the way to its step.

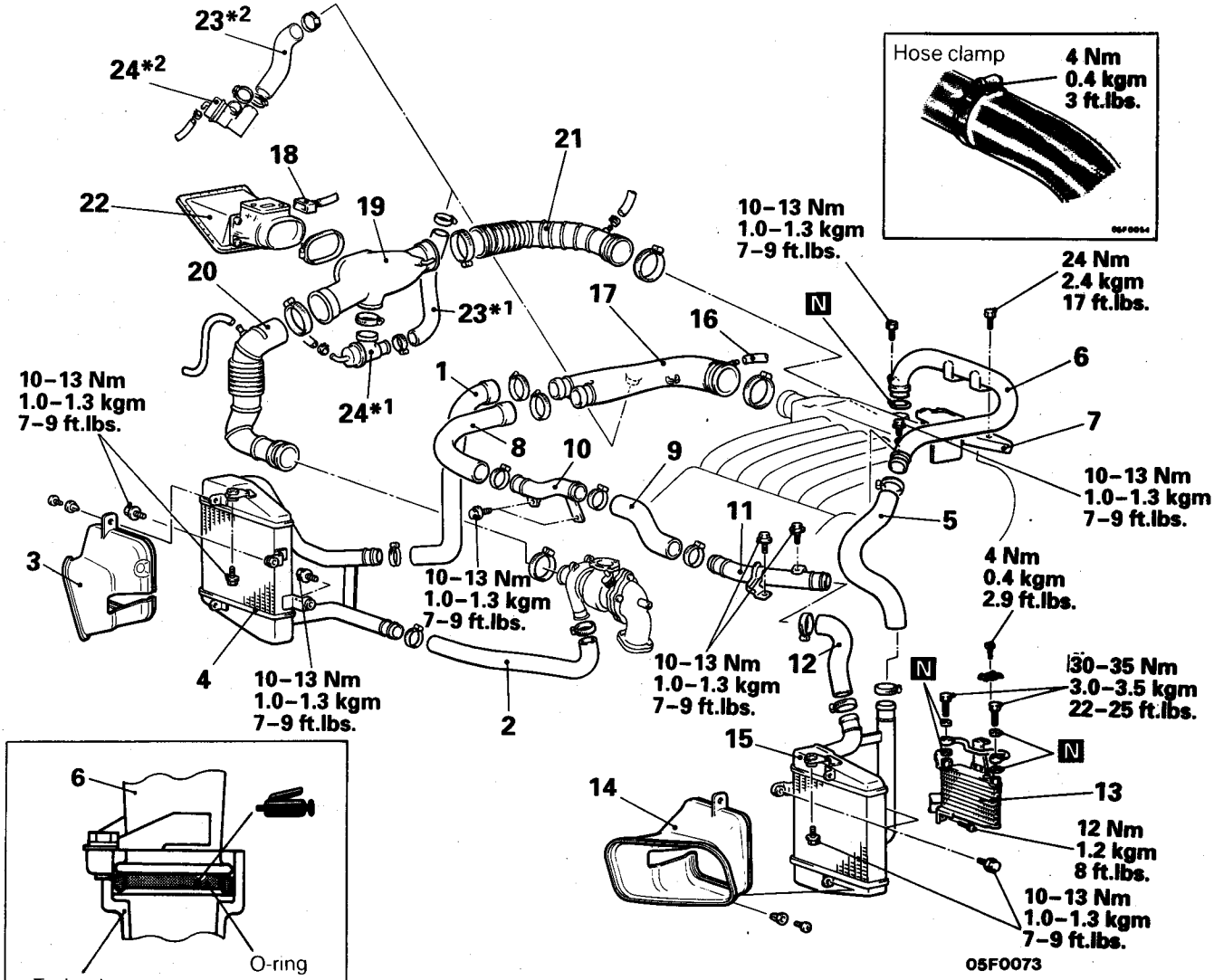
Caution
Be careful not to allow any foreign matter to get into the hoses, pipes, or the intercooler itself.

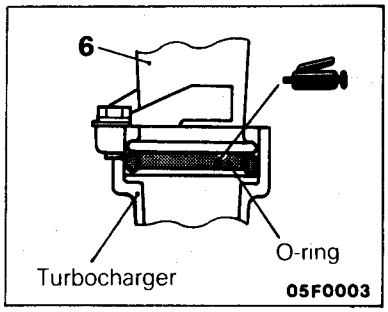
(2) Connect the hoses with the bolt section of the band upward.

INTERCOOLER

REMOVAL AND INSTALLATION

E15HA--





Pre-removal Operation
- Removal of Front Bumper (Refer to GROUP 51 – Front Bumper.)

Post-installation Operation
- Supplying of Engine Oil (When equipped with intercooler left)
- Installation of Front Bumper (Refer to GROUP 51 – Front Bumper.)

Removal steps of intercooler right

◆◆ 1. Air hose C
◆◆ 2. Air hose D
3. Intercooler duct (RH)
◆◆ 4. Intercooler right

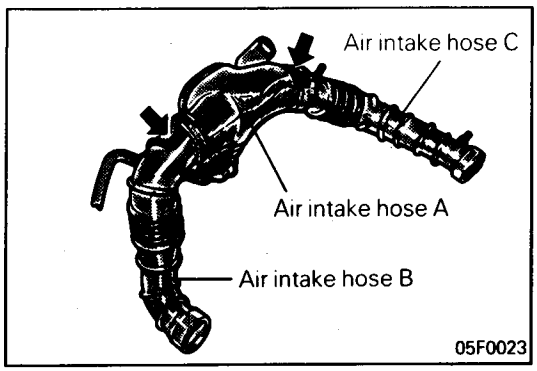
Removal steps of intercooler left

◆◆ 5. Air hose G
6. Air pipe A
7. Heat protector F
◆◆ 8. Air hose B
◆◆ 9. Air hose E
10. Air pipe B
11. Air pipe C
◆◆ 12. Air hose F
13. Engine oil cooler
14. Intercooler duct (LH)
◆◆ 15. Intercooler left

Removal steps of air intake hose

16. Connection of boost hose
17. Air hose A
18. Connection of air flow sensor connector
◆◆ 19. Air intake hose A
◆◆ 20. Air intake hose B
◆◆ 21. Air intake hose C
22. Air cleaner
23. Air by-pass hose
24. Air by-pass valve

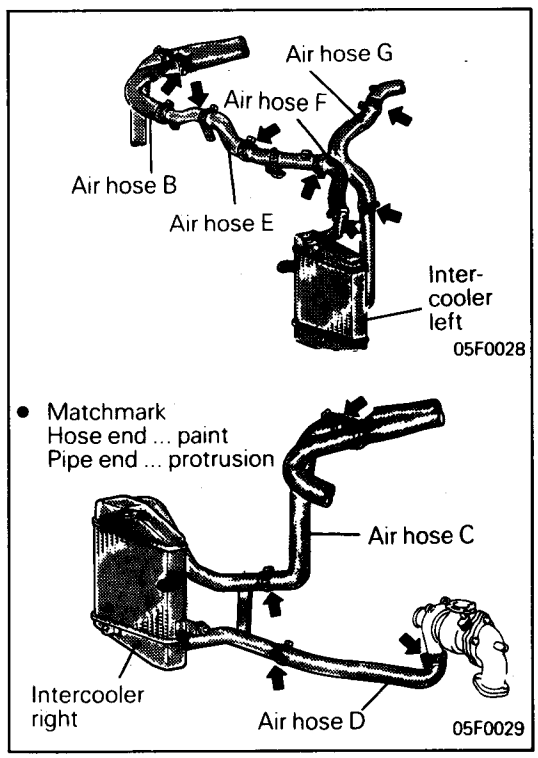
NOTE
*1: 5-speed manual transmission
*2: 6-speed manual transmission



SERVICE POINTS OF INSTALLATION E15HDAC

21. INSTALLATION OF AIR INTAKE HOSE C / 20. AIR INTAKE HOSE B / 19. AIR INTAKE HOSE A

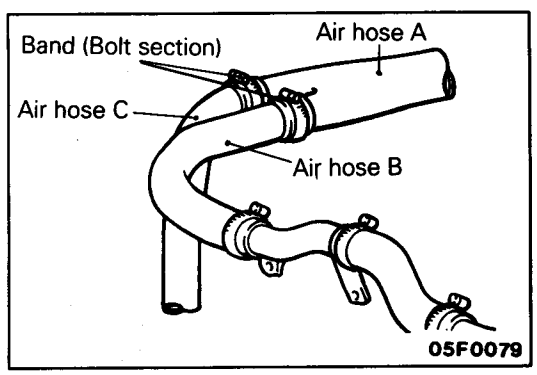
Engaging the notch with the △ mark at points indicated by the arrows, insert air intake hoses B and C until seated. Insert the turbocharger end of air intake hoses B and C completely.



15. INSTALLATION OF INTERCOOLER LEFT/ 12. AIR HOSE F / 9. AIR HOSE E / 8. AIR HOSE B / 5. AIR HOSE G / 4. INSTALLATION OF INTERCOOLER RIGHT / 2. AIR HOSE D / 1. AIR HOSE C

(1) Aligning the marks at the points indicated by the arrows, insert securely into the stepped portion of the pipe or until seated.

Caution
Be careful not to allow any foreign matter to get into the hoses, pipes, or the intercooler itself.



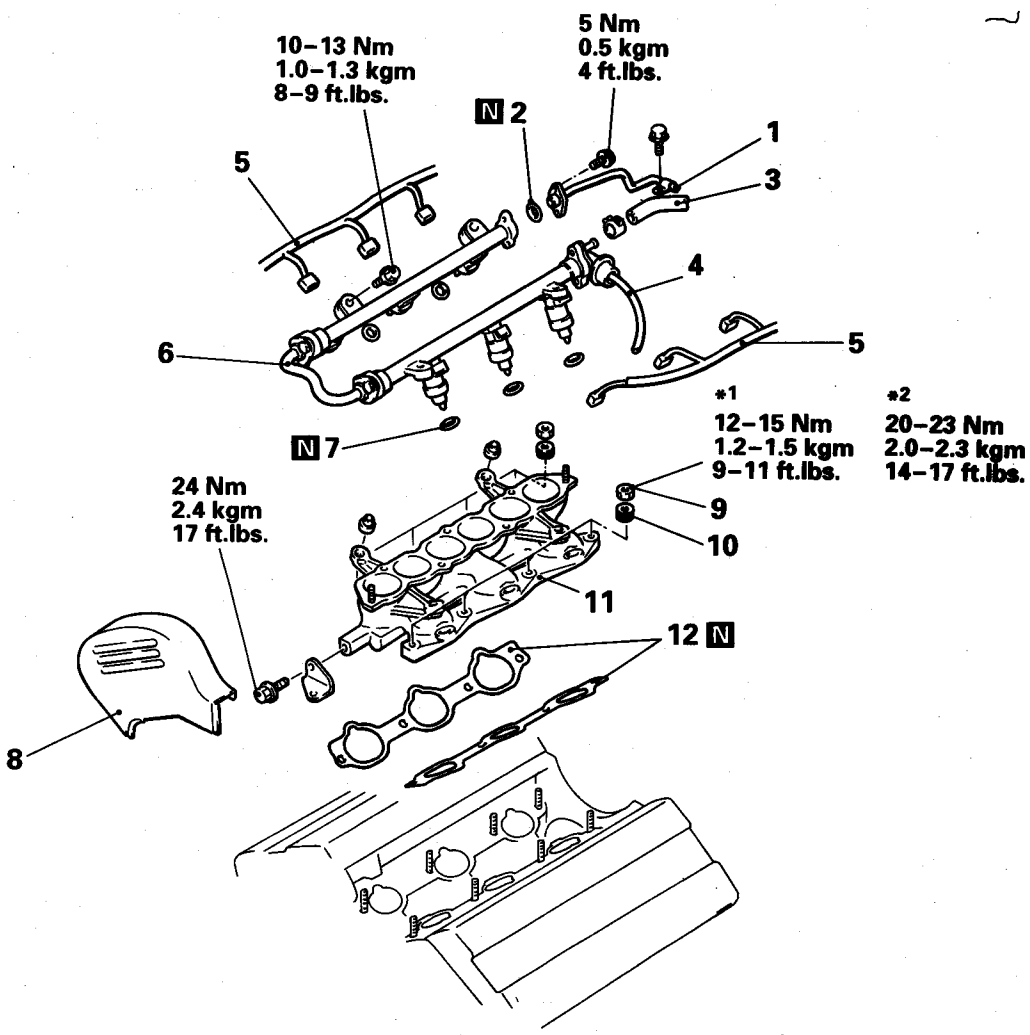
(2) Connect the hoses with the bolt section of the band upward.

INTAKE MANIFOLD

REMOVAL AND INSTALLATION

Pre-removal Operation
- Release of Residual Pressure from High Pressure Fuel Hose (Refer to GROUP 13 – Service Adjustment Procedures.)
- Draining of Engine Coolant
- Removal of Air Intake Plenum

Pre-removal Operation
- Installation of Air Intake Plenum
- Filling of Engine Coolant
- Adjustment of Accelerator Cable (Refer to GROUP 13 – Service Adjustment Procedures.)
- Checking for Fuel Leakage



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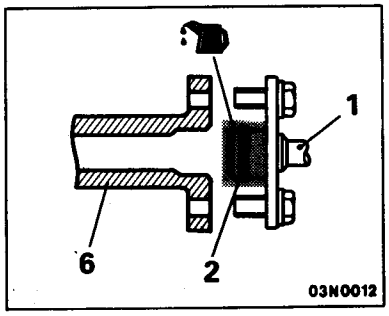
Removal steps
1. Connection for high-pressure fuel hose
2. O-ring
3. Connection for fuel return hose
4. Connection for vacuum hoses
5. Injector connector
6. Delivery pipe (with injectors)
7. Insulators
8. Timing belt upper cover
- ◆◆ 9. Intake manifold mounting nut
10. Cone disc spring
11. Intake manifold
- ◆◆ 12. Intake manifold gasket



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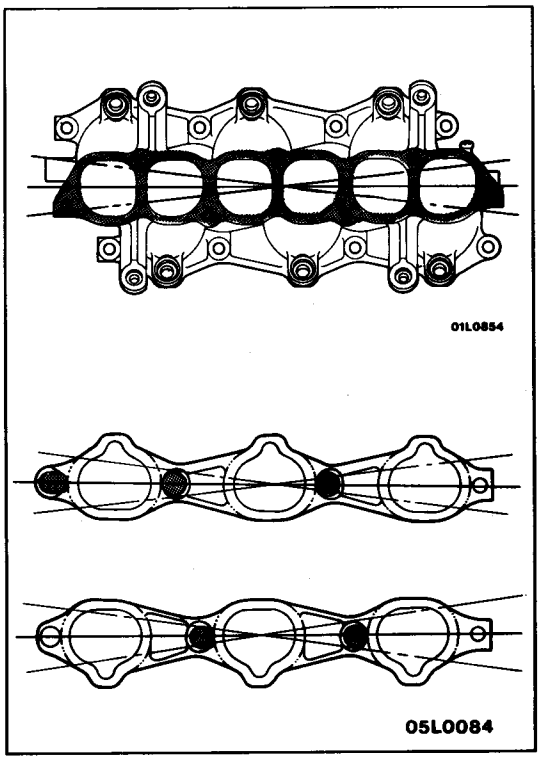
NOTE
*1: <Vehicles built up to November 1993>
*2: <Vehicles built from December 1993>



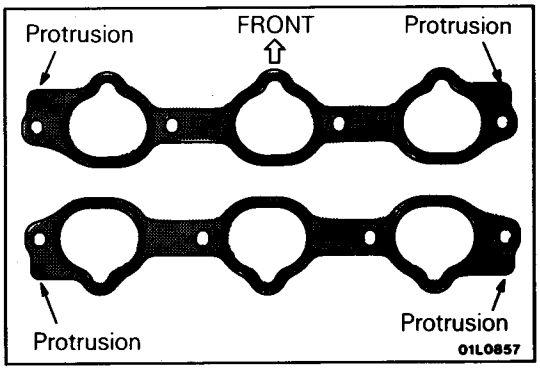
INSPECTION E15MBBI

Check the following points; replace the part if a problem is found.

INTAKE MANIFOLD

(1) Check for damage or cracking of any part.
(2) Clogging of the negative pressure (vacuum) outlet port, or clogging of the gas passages.
(3) Check deflection of installation surface with straight edge and thickness gauge.

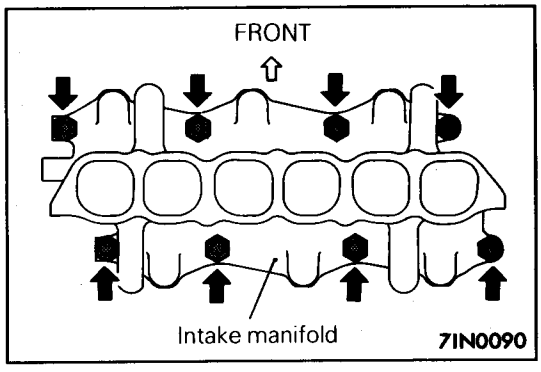
Standard value: 0.15 mm (0.0059 in.) or less
Limit: 0.2 mm (0.008 in.)



SERVICE POINTS OF INSTALLATION E15MBCQ

12. INSTALLATION OF INTAKE MANIFOLD GASKET

Install with gasket protrusions in the position illustrated.



9. INSTALLATION OF INTAKE MANIFOLD MOUNTING NUT

Tighten the intake manifold mounting nuts one bank after the other by the following procedure.

<Vehicles built up to November 1993>

(1) Tighten the nuts in the front bank to 3 to 5 Nm (0.3 to 0.5 kgm, 2.2 to 3.6 ft.lbs.).
(2) Tighten the nuts in the rear bank to 12 to 15 Nm (1.2 to 1.5 kgm, 9 to 11 ft.lbs.).
(3) Tighten the nuts in the front bank to 12 to 15 Nm (1.2 to 1.5 kgm, 9 to 11 ft.lbs.).
(4) Repeat steps (2) and (3) one more time respectively.

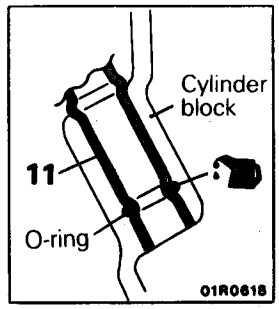
<Vehicles built from December 1993>

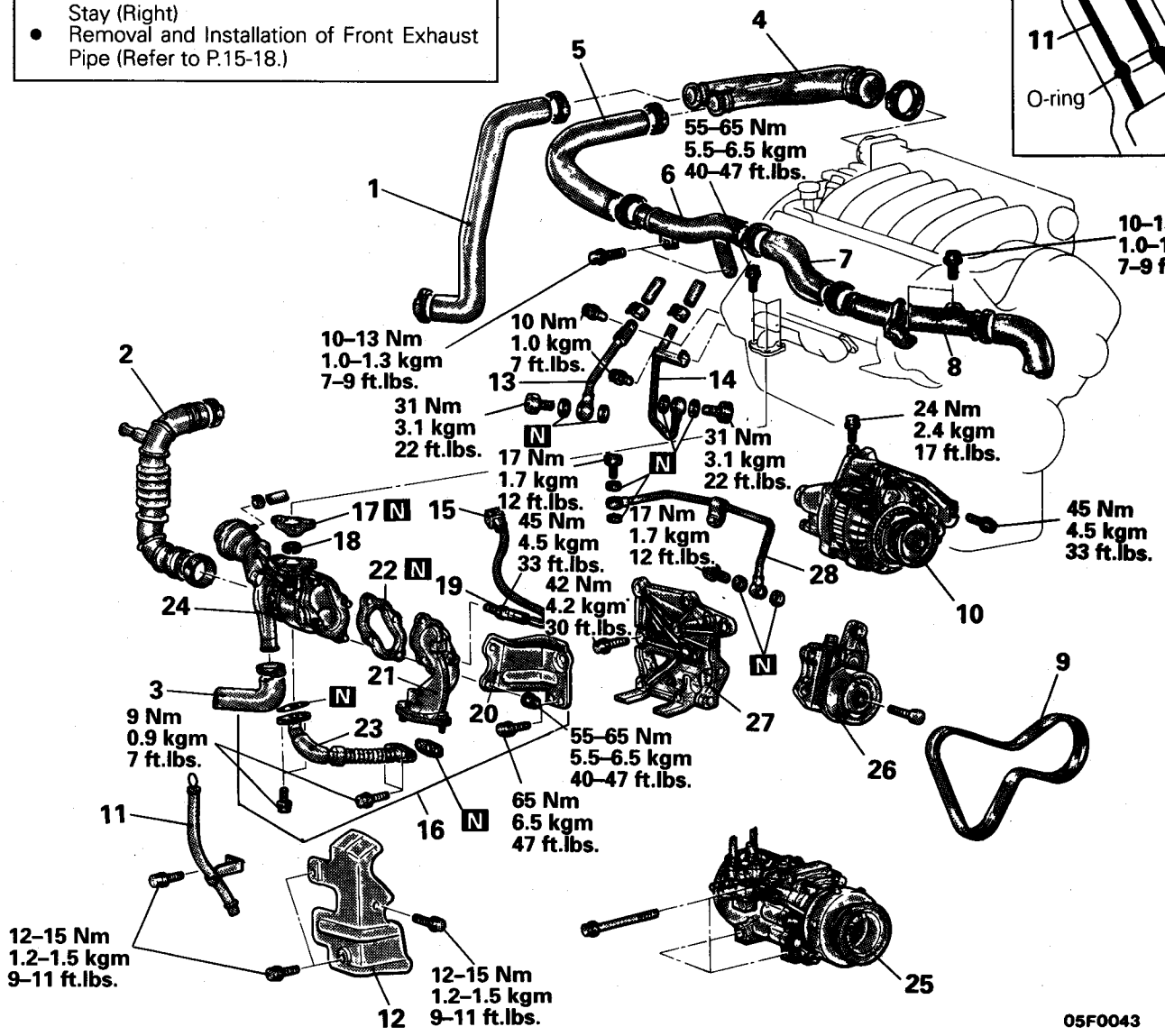
(1) Tighten the nuts in the front bank to 5 to 8 Nm (0.5 to 0.8 kgm, 4 to 6 ft.lbs.)
(2) Tighten the nuts in the rear bank to 20 to 23 Nm (2.0 to 2.3 kgm, 14 to 17 ft.lbs.)
(3) Tighten the nuts in the front bank to 20 to 23 Nm (2.0 to 2.3 kgm, 14 to 17 ft.lbs.)
(4) Repeat steps (2) and (3) one more time respectively.

TURBOCHARGER (FRONT)

REMOVAL AND INSTALLATION

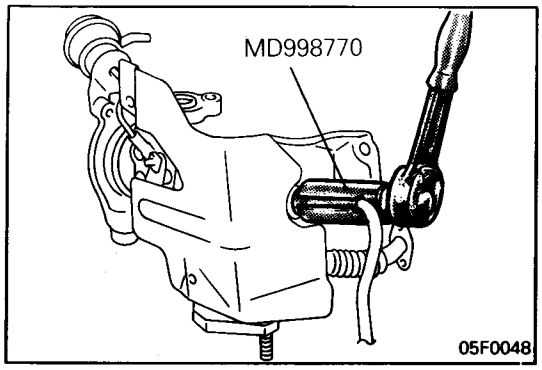
Pre-removal and Post-installation Operation
- Removal and Installation of Radiator (Refer to GROUP 14 – Radiator.)
- Removal and Installation of Transmission Stay (Right)
- Removal and Installation of Front Exhaust Pipe (Refer to P.15-18.)





Removal steps

1. Air hose C
2. Air intake hose B
3. Air hose D
4. Air hose A
5. Air hose B
6. Air pipe B
7. Air hose E
8. Air pipe C
   - Adjustment of drive belt tension (Refer to GROUP 11 – Service Adjustment Procedures.)
9. Drive belt
10. Alternator assembly
11. Engine oil level gauge guide
12. Heat protector B
13. Water pipe A
14. Water pipe B
15. Oxygen sensor connector
16. Turbocharger & fitting assembly
17. Gasket
18. Ring
19. Oxygen sensor
20. Turbocharger stay
21. Exhaust pipe fitting
22. Gasket
23. Oil return pipe
24. Turbocharger assembly
25. Air conditioner compressor
26. Tension pulley bracket
27. Air conditioner compressor bracket
28. Oil pipe



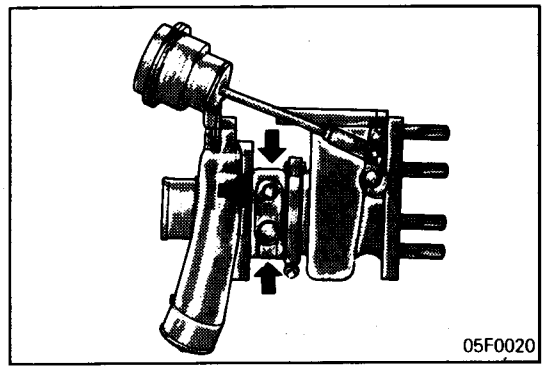
SERVICE POINTS OF REMOVAL E15LBDC

19. REMOVAL OF OXYGEN SENSOR

25. DISCONNECTION OF AIR CONDITIONER COMPRESSOR

Disconnect air conditioner compressor with hoses from the bracket.

NOTE
The removed air conditioner compressor should be fastened (by using rope, etc.) in a position that will not interfere with the removal/installation of the turbocharger assembly.

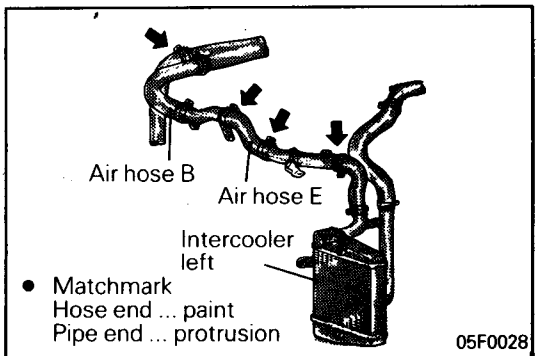


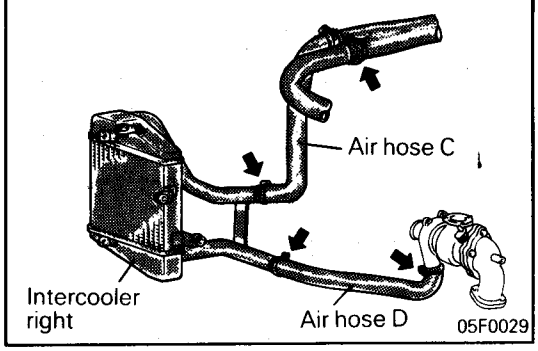
SERVICE POINTS OF INSTALLATION E15LDDC

24. INSTALLATION OF TURBOCHARGER ASSEMBLY

Clean the alignment surfaces shown in the illustration. Supply clean engine oil through the oil pipe installation hole of the turbocharger assembly.

Caution
When cleaning, care must be taken so that a piece of the gasket does not enter the oil passage hole.

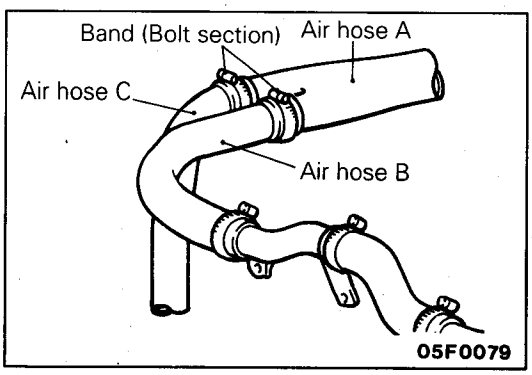




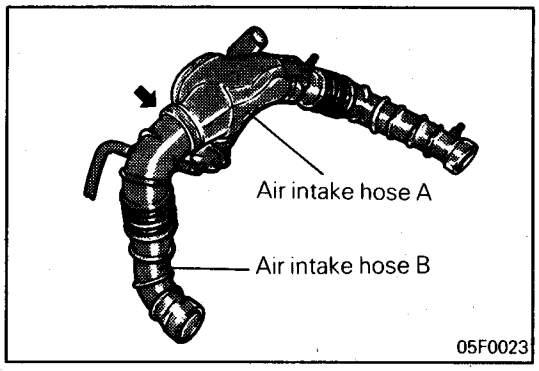
7. INSTALLATION OF AIR HOSE E / 5. AIR HOSE B
3. AIR HOSE D / 1. AIR HOSE C

(1) Aligning the marks at the points indicated by the arrows, insert securely into the stepped portion of the pipe or until seated.

Caution
Be careful not to allow any foreign matter to get into the hoses or pipes.



(2) Connect the hoses with the bolt section of the band upward.



2. INSTALLATION OF AIR INTAKE HOSE B

Engaging the notches with △ marks at the points indicated by the arrows, insert until seated.
Insert the turbocharger end of air intake hose B completely.

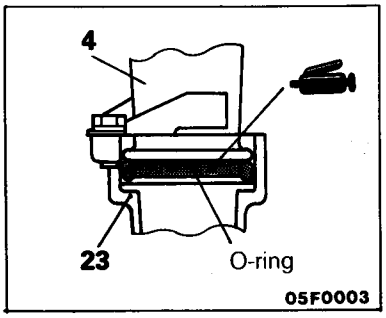
TURBOCHARGER (REAR)

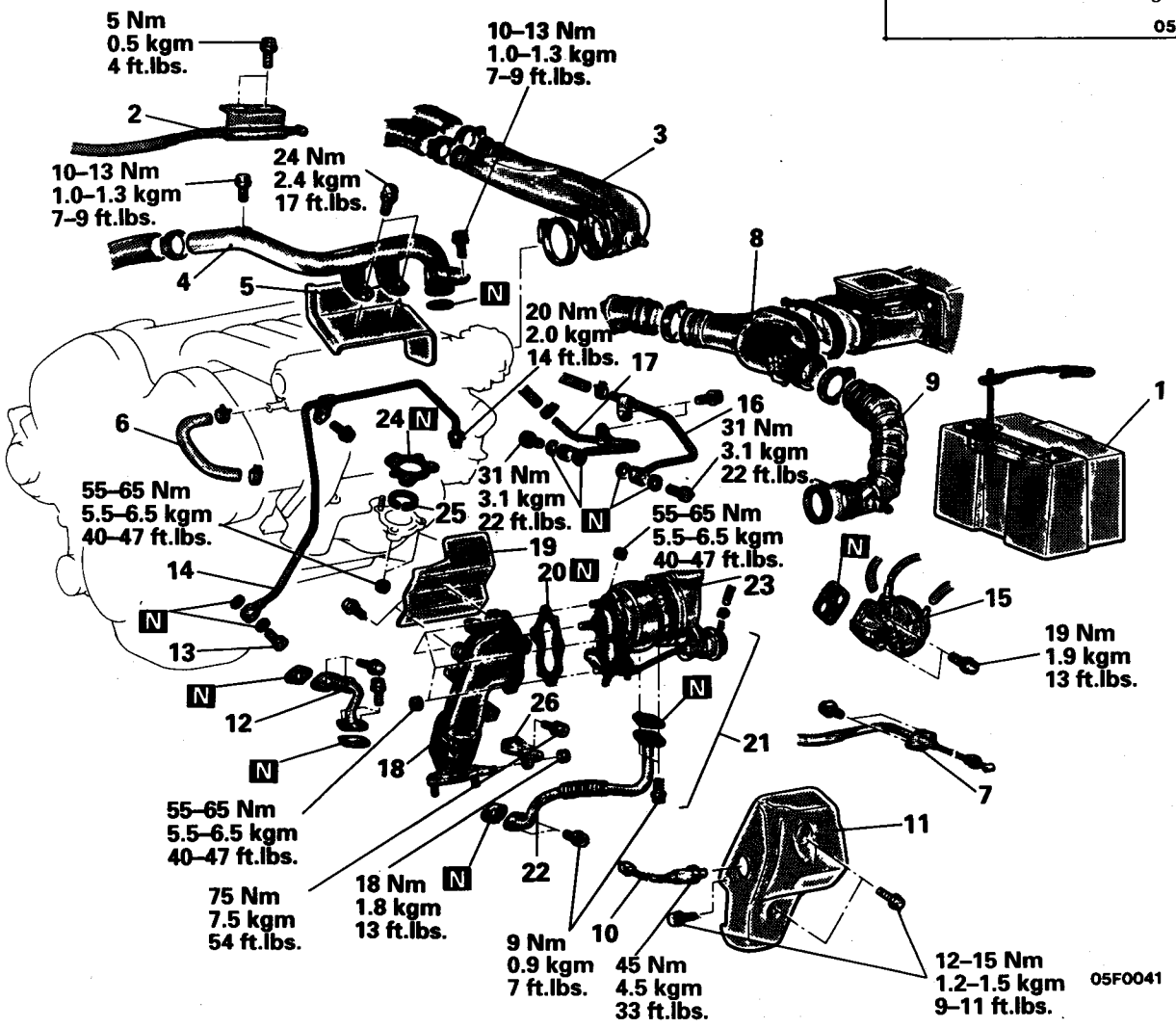
E15LA-B

REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining of the Engine Coolant
- Removal of Front Exhaust Pipe (Refer to P.15-18.)

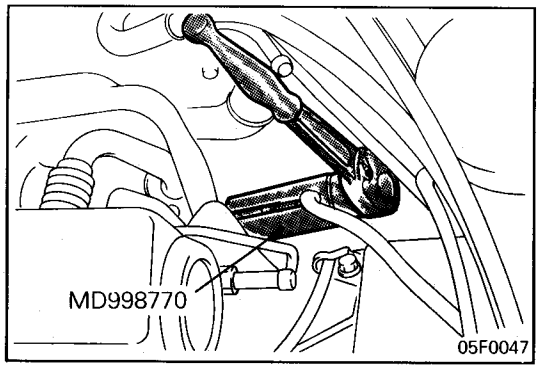
Post-installation Operation
- Installation of Front Exhaust Pipe (Refer to P.15-18.)
- Refilling of the Engine Coolant
- Adjustment of Accelerator Cable (Refer to GROUP 13 – Service Adjustment Procedures.)





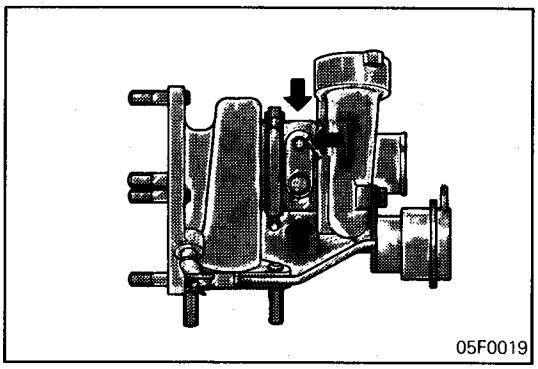
Removal steps

1. Battery
2. Connection for accelerator cable (engine side)
3. Air hose A
4. Air pipe A
5. Heat protector F
6. Clutch booster vacuum hose
7. Connection for accelerator cable (pedal side) <L.H.drive vehicles>
8. Air intake hose A
9. Air intake hose C
10. Oxygen sensor
11. Heat protector D
12. EGR pipe
13. Eye bolt
14. Oil pipe
15. EGR valve
16. Water pipe A
17. Water pipe B
18. Catalytic converter (Left)
19. Heat protector E
20. Gasket
21. turbocharger & return pipe assembly
22. Oil return pipe
23. Turbocharger assembly
24. Gasket
25. Ring
26. Exhaust fitting stay



SERVICE POINT OF REMOVAL E15LBDD

10. REMOVAL OF OXYGEN SENSOR



SERVICE POINTS OF INSTALLATION E15LDDD

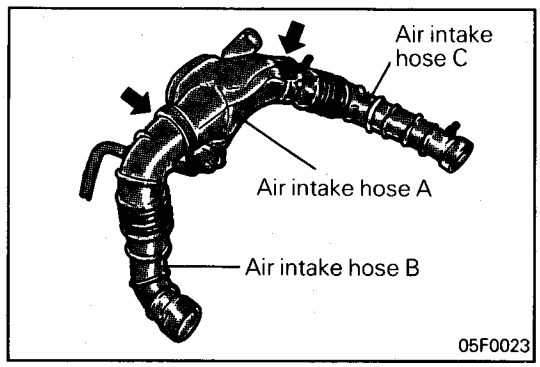
23. INSTALLATION OF TURBOCHARGER ASSEMBLY

Clean the alignment surfaces shown in the illustration.

Caution
When cleaning, care must be taken so that a piece of the gasket does not enter the oil passage hole.

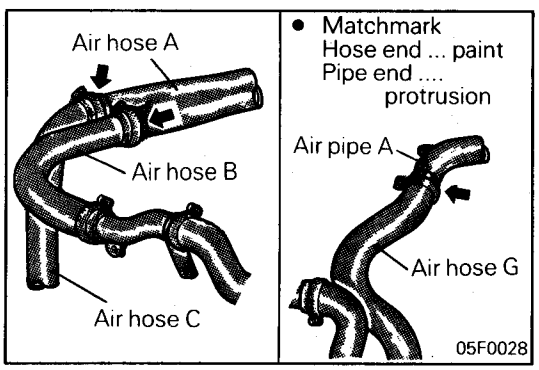
14. INSTALLATION OF OIL PIPE

Supply clean engine oil through the oil pipe installation hole of the turbocharger assembly.



9. INSTALLATION OF AIR INTAKE HOSE C / 8. AIR INTAKE HOSE A

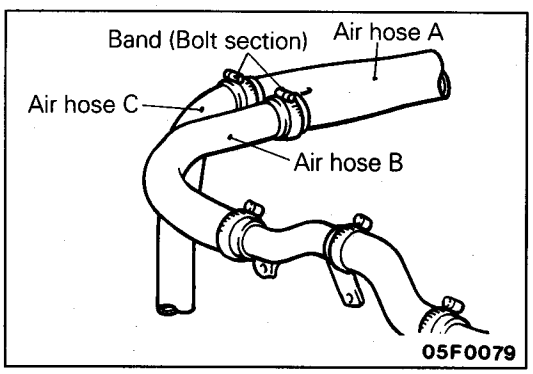
Engaging the notches with △ marks at the points indicated by the arrows insert until seated.
Insert the turbocharger end of air intake hose C completely.



4. INSTALLATION OF AIR PIPE A / 3. AIR HOSE A

(1) Aligning the marks at the points indicated by the arrows, insert securly into the stepped portion of the pipe.

Caution
Be careful not to allow any foreign matter to get into the hoses or pipes.



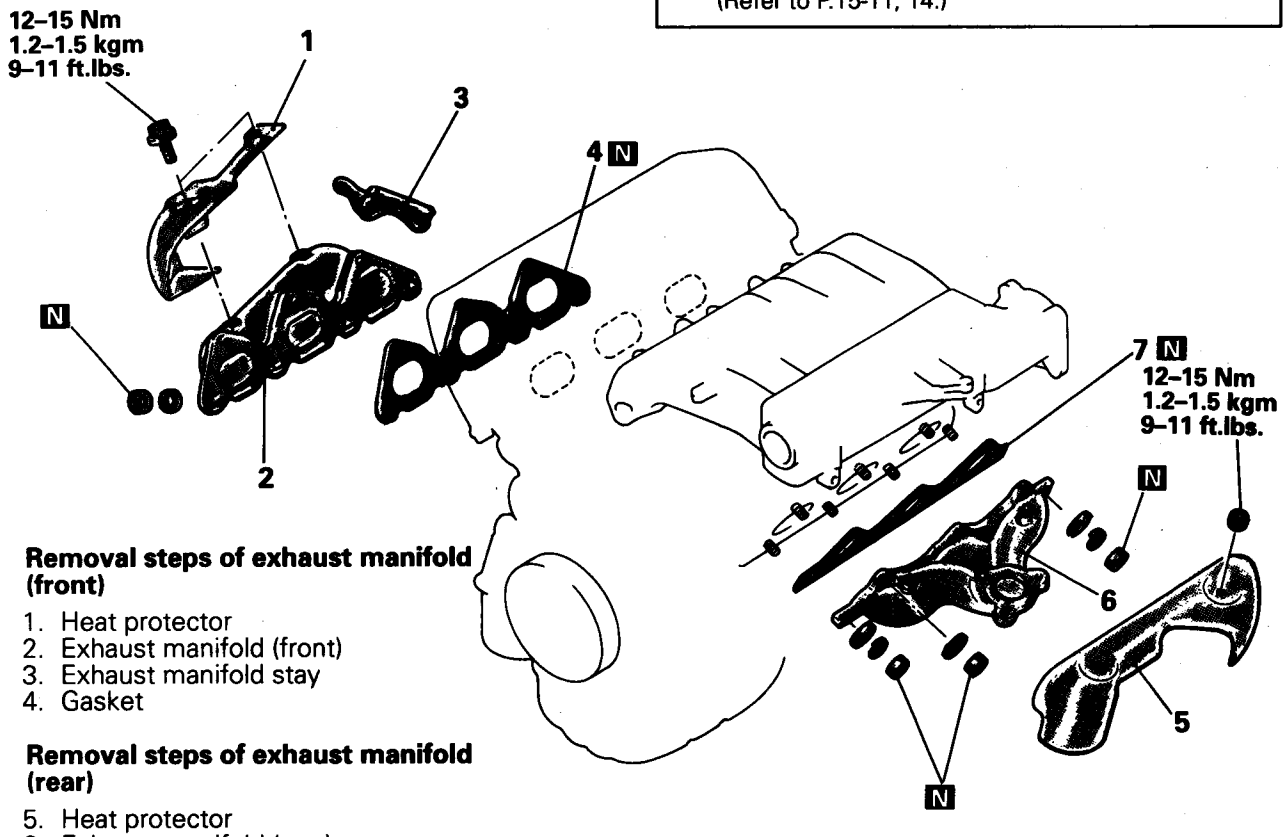
(2) Connect the hoses with the bolt section of the band upward.

EXHAUST MANIFOLD

E15NA--

REMOVAL AND INSTALLATION

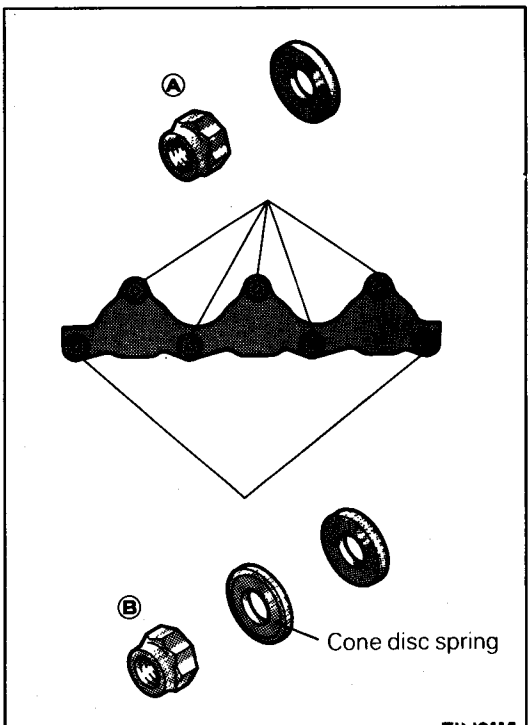
Pre-removal and Post-installation Operation
- Removal and Installation of Turbocharger Assembly (Refer to P.15-11, 14.)



Removal steps of exhaust manifold (front)
1. Heat protector
2. Exhaust manifold (front)
3. Exhaust manifold stay
4. Gasket

Removal steps of exhaust manifold (rear)
5. Heat protector
6. Exhaust manifold (rear)
7. Gasket

05F0025



7IN0115

SERVICE POINTS OF INSTALLATION

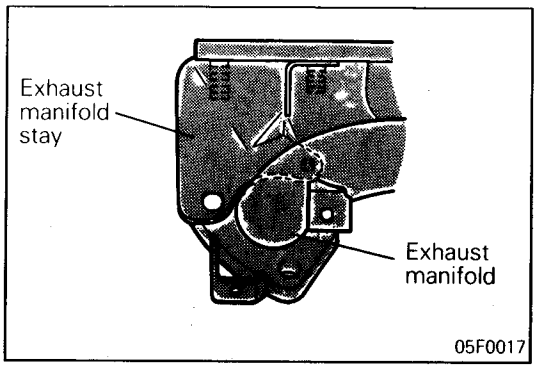
E15NDAC

6. INSTALLATION OF EXHAUST MANIFOLD (REAR)

Tighten the nuts in the following order.

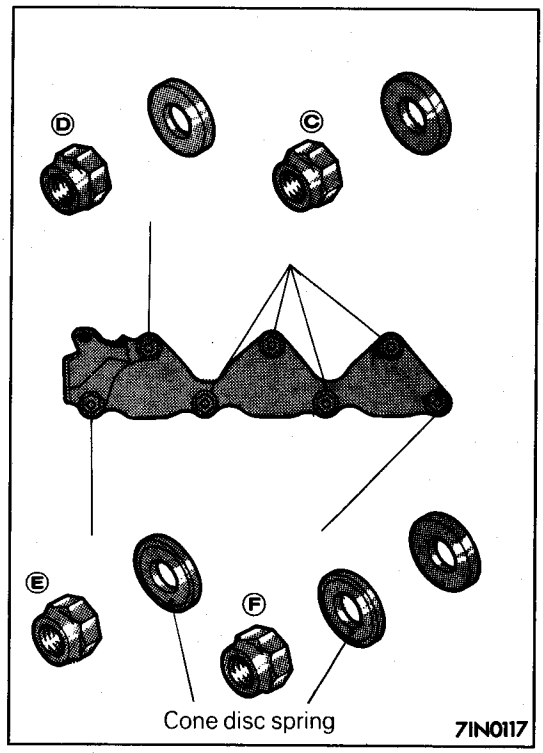
(1) Tighten five nuts to 30 Nm (3.0 kgm, 22 ft.lbs.).
(2) Tighten nuts Ⓑ to 47–53 Nm (4.7–5.3 kgm, 34–38 ft.lbs.).
(3) Back off nuts Ⓑ until torque value of 10 Nm (1.0 kgm, 7 ft.lbs.) is achieved.
(4) Tighten nuts Ⓑ to 29–31 Nm (2.9–3.1 kgm, 21–22 ft.lbs.).

NOTE
1. Fit the cone disc spring with the grooved side facing the nut.
2. Install the nut, cone disc spring and washer in the order shown in the illustration.



3. INSTALLATION OF EXHAUST MANIFOLD STAY

With the exhaust manifold stay resting on the exhaust manifold, fit it along with the exhaust manifold over the studs.



2. INSTALLATION OF EXHAUST MANIFOLD (FRONT)

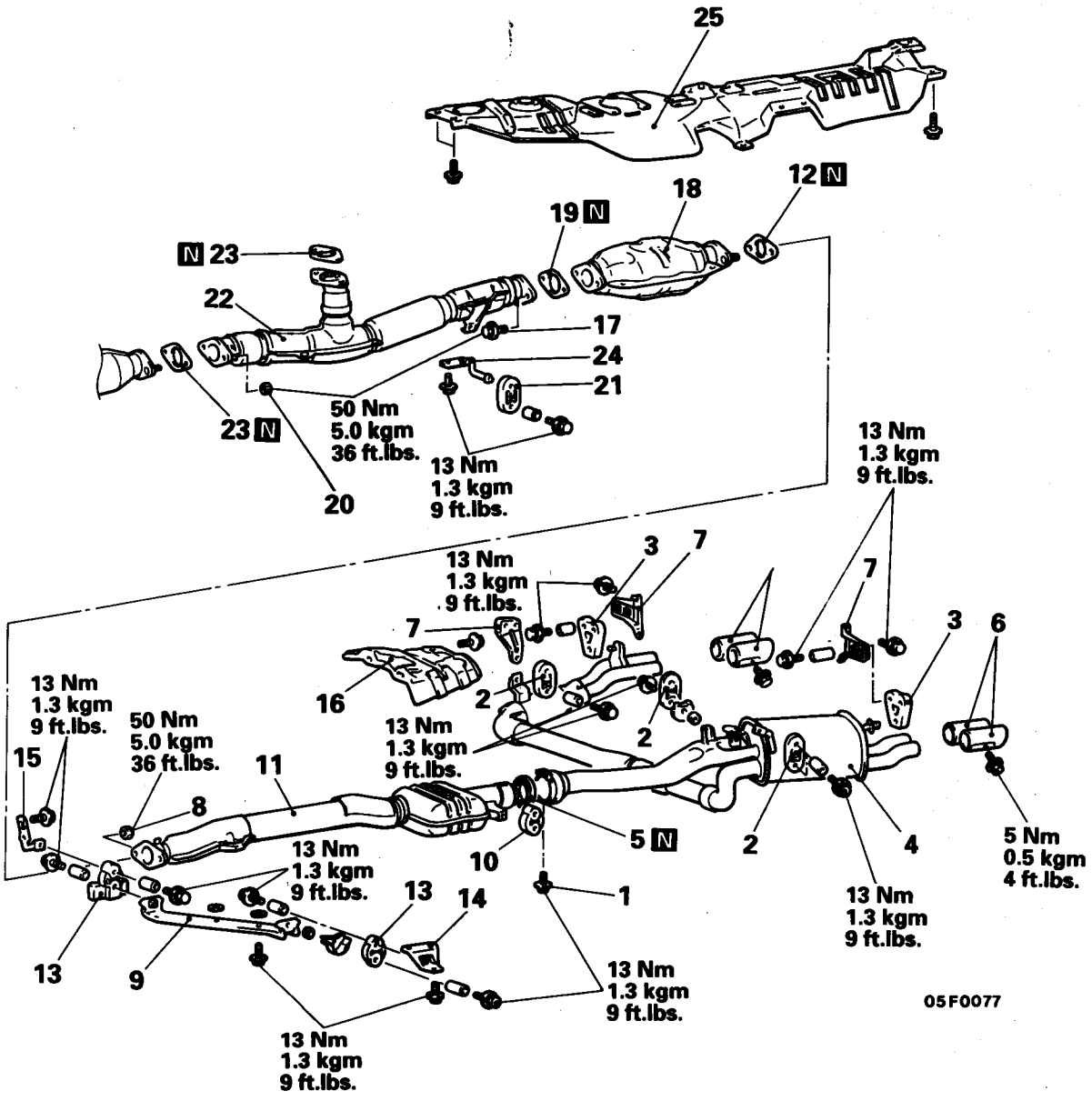
Tighten the nuts in the following order.

(1) Tighten four nuts Ⓒ to 30 Nm (3.0 kgm, 22 ft.lbs.).
(2) Temporarily tighten the turbocharger to the exhaust manifold.
(3) Tighten nut Ⓓ to 30 Nm (3.0 kgm, 22 ft.lbs.).
(4) Tighten nuts Ⓔ and Ⓕ to 47–53 Nm (4.7–5.3 kgm, 34–38 ft.lbs.).
(5) Back off nuts Ⓔ and Ⓕ until torque value of 10 Nm (1.0 kgm, 7 ft.lbs.) is achieved.
(6) Tighten nuts Ⓔ and Ⓕ to 29–31 Nm (2.9–3.1 kgm, 21–22 ft.lbs.).

NOTE
1. Fit the cone disc spring with the grooved side facing the nut.
2. Install the nut, cone disc spring and washer in the order shown in the illustration.

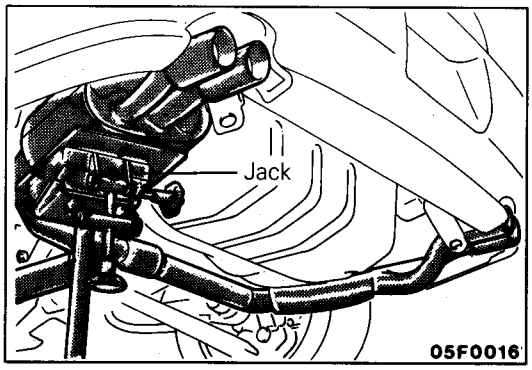
EXHAUST PIPE AND MAIN MUFFLER

REMOVAL AND INSTALLATION



Removal steps

1. Main muffler and center exhaust pipe installation bolts.
2. Rubber hangers
3. Rubber hangers
4. Main muffler
5. Gasket
6. Mouldings
7. Hanger brackets
8. Catalytic converter and center exhaust pipe installation nuts
9. Hanger bracket
10. Rubber hangers
11. Center exhaust pipe
12. Gasket
13. Rubber hangers
14. Hanger brackets
15. Hanger bracket
16. Rear floor heat protector
17. Catalytic converter and front exhaust pipe installation bolts
18. Catalytic converter
19. Gasket
20. Self-locking nuts
21. Rubber hanger
22. Front exhaust pipe
23. Gaskets
24. Hanger bracket
25. Front floor heat protector



SERVICE POINTS OF REMOVAL E15RBAA

2./3. REMOVAL OF RUBBER HANGERS / 4. MAIN MUFFLER

Support with a transmission jack, etc.

NOTES

ENGINE ELECTRICAL

CONTENTS

E16AA-

CHARGING SYSTEM

SPECIFICATIONS

GENERAL SPECIFICATIONS

ALTERNATOR

Items		Specifications
Type		Battery voltage sensing
Rated output	V/A	12/110
Voltage regulator		Electronic built-in type

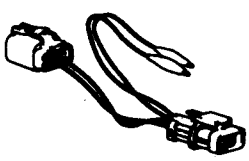
SERVICE SPECIFICATIONS

E16BB

Items		Specifications
Alternator		
Standard value		
Regulated voltage		
Ambient temp. at voltage regulator	V	
–20°C (–4°F)		14.2–15.4
20°C (68°F)		13.9–14.9
60°C (140°F)		13.4–14.6
80°C (176°F)		13.1–14.5
Limit		
Output current	A	77

SPECIAL TOOL

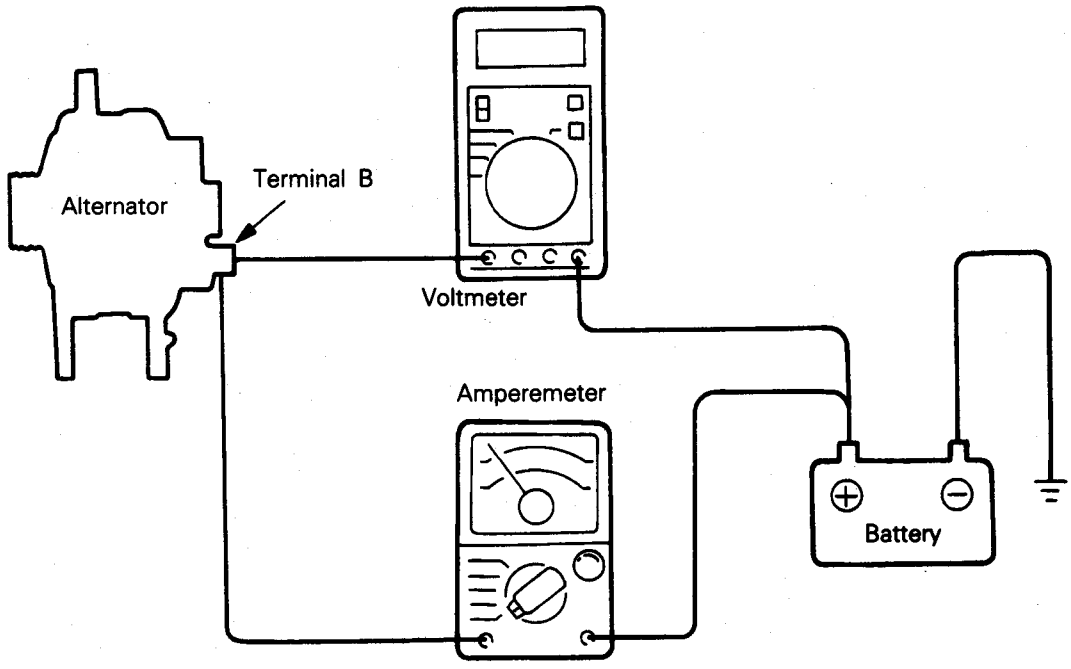
E16BF

Tool	Number	Name	Use
	MD998467	Alternator harness connector	Checking the alternator (S terminal voltage)

SERVICE ADJUSTMENT PROCEDURES

E18BGAG

VOLTAGE DROP TEST OF ALTERNATOR OUTPUT LINE



5EL0015

This test determines whether the wiring from the alternator "B" terminal to the battery (+) terminal (including the fusible link) is in a good condition or not.

(1) Always be sure to check the following before the test.
- Alternator installation
- Alternator drive belt tension (Refer to GROUP 11 – Service Adjustment Procedures.)
- Fusible link
- Abnormal noise from the alternator while the engine is running

(2) Turn the ignition switch to the OFF position.
(3) Disconnect the negative battery cable.
(4) Disconnect the alternator output wire from the alternator "B" terminal and connect a DC test ammeter with a range of 0 – 100 A in series between the "B" terminal and the disconnected output wire. (Connect the (+) lead of the ammeter to the "B" terminal, and then connect the (–) lead of the ammeter to the disconnected output wire.)

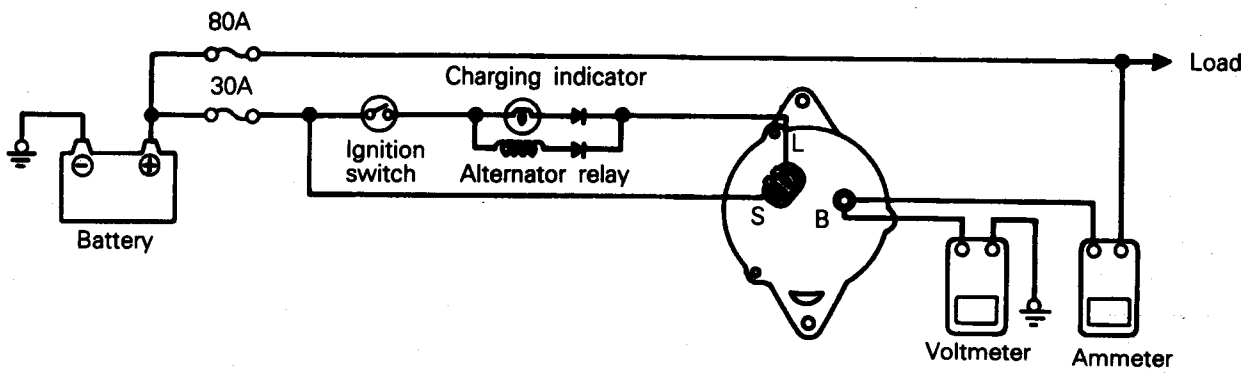
NOTE
A clamp-type ammeter which enables measurements to be taken without disconnecting the alternator output wire should be recommended. Because, if a vehicle in which the voltage may have dropped due to an imperfect connection at the alternator "B" terminal is being inspected, and so if the alternator "B" terminal is loosened and a test ammeter is connected, the connection will be complete at the time of connection and the possibility of finding problems will be reduced.

(5) Connect a digital-type voltmeter between the alternator "B" terminal and the battery (+) terminal. (Connect the (+) lead of the voltmeter to the "B" terminal, and then connect the (–) lead of the voltmeter to the battery (+) cable.)
(6) Connect a tachometer. (For the procedure for connecting the tachometer, refer to GROUP 11 – Service Adjustment Procedures.)
(7) Reconnect the negative battery cable.
(8) Leave the hood open.
(9) Start the engine.
(10) With the engine running at 2500 r/min., turn the headlamps and other lamps on and off to adjust the alternator load so that the value displayed on the ammeter is slightly above 30 A.
Adjust the engine speed by gradually decreasing it until the value displayed on the ammeter is 30 A. Take a reading of the value displayed on the voltmeter at this time.
Limit value: Max. 0.3 V

NOTE
When the alternator output is high and the value displayed on the ammeter does not decrease until 30A, set the value to 40A. Read the value displayed on the voltmeter at this time.
In this case the limit value becomes max. 0.4V.

(11) If the value displayed on the voltmeter is above the limit value, there is probably a malfunction in the alternator output wire, so check the wiring between the alternator "B" terminal and the battery (+) terminal (including fusible link).
If a terminal is not sufficiently tight or if the harness has become discolored due to overheating, repair and then test again.
(12) After the test, run the engine at idle.
(13) Turn off all lamps and turn the ignition switch to the OFF position.
(14) Disconnect the negative battery cable.
(15) Disconnect the ammeter, voltmeter and tachometer.
(16) Connect the alternator output wire to the alternator "B" terminal.
(17) Connect the negative battery cable.

OUTPUT CURRENT TEST



16P0482

This test determines whether the alternator outputs normal current.

(1) Before the test, always be sure to check the following.
- Alternator installation
- Battery (Refer to GROUP 54 – Battery.)

NOTE
The battery to be used should be slightly discharged. The load in a fully-charged battery will be insufficient and the test may not be able to be carried out correctly.
- Alternator drive belt tension (Refer to GROUP 11 – Service Adjustment Procedures.) dures.)
- Fusible link
- Abnormal noise from the alternator while the engine is running.

(2) Turn the ignition switch to the OFF position.
(3) Disconnect the negative battery cable.
(4) Disconnect the alternator output wire from the alternator "B" terminal and connect a DC test ammeter with a range of 0 – 100 A in series between the "B" terminal and the disconnected output wire. (Connect the (+) lead of the ammeter to the "B" terminal, and then connect the (–) lead of the ammeter to the disconnected output wire.)

Caution
Never use clips but tighten bolts and nuts to connect the line. Otherwise loose connections (e.g. using clips) will lead to a serious accident because of high current.

NOTE
A clamp-type ammeter which enables measurements to be taken without disconnecting the alternator output wire should be recommended.

(5) Connect a voltmeter with a range of 0–20 V between the alternator "B" terminal and the earth. (Connect the (+) lead of the voltmeter to the "B" terminal, and then connect the (–) lead of the voltmeter to the earth.)
(6) Connect a tachometer. (For the procedure for connecting the tachometer, refer to GROUP 11 – Service Adjustment Procedures.)
(7) Connect the negative battery cable.
(8) Leave the hood open.
(9) Check to be sure that the reading on the voltmeter is equal to the battery voltage.

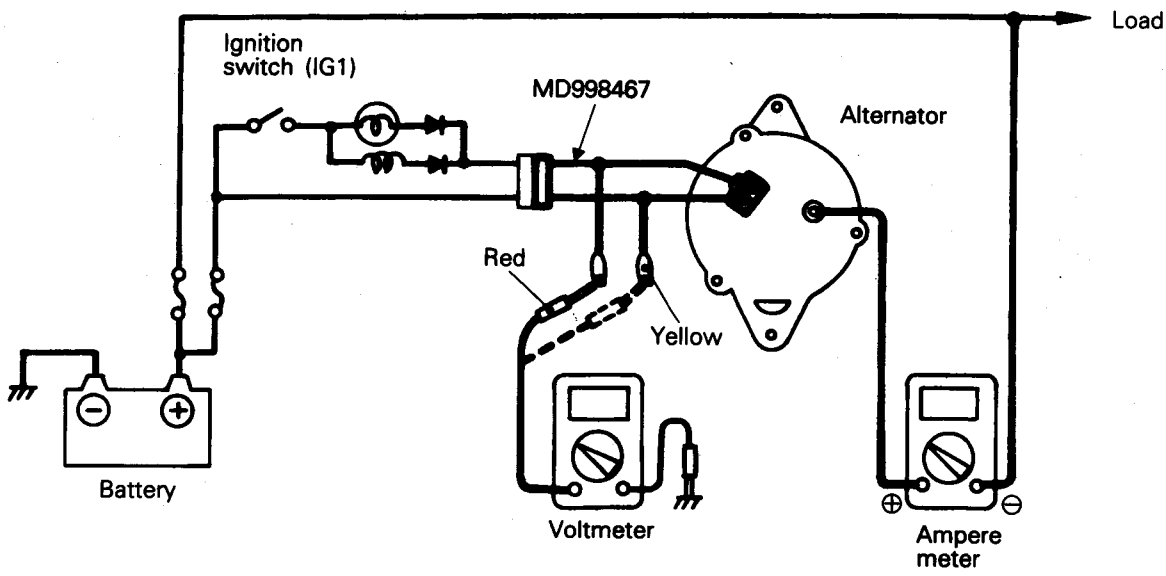
NOTE
If the voltage is 0 V, the cause is probably an open circuit in the wire or fusible link between the alternator "B" terminal and the battery (+) terminal.

(10) After turning the light switch on and turning on the headlamps, start the engine.
(11) Immediately after setting the headlamps to high beam and turning the heater blower switch to the high revolution position, increase the engine speed to 2,500 r/min. and read the maximum current output value displayed on the ammeter.
Limit value: 70% of normal current output

NOTE
- For the nominal current output, refer to the Alternator Specifications.
- Because the current from the battery will soon drop after the engine is started, the above step should be carried out as quickly as possible in order to obtain the maximum current output value.
- The current output value will depend on the electrical load and the temperature of the alternator body.
- If the electrical load is small while testing, the specified level of current may not be output even though the alternator is normal. In such cases, increase the electrical load by leaving the headlamps turned on for some time to discharge the battery or by using the lighting system in another vehicle, and then test again.
- The specified level of current also may not be output if the temperature of the alternator body or the ambient temperature is too high. In such cases, cool the alternator and then test again.

(12) The reading on the ammeter should be above the limit value. If the reading is below the limit value and the alternator output wire is normal, remove the alternator from the engine and check the alternator.
(13) Run the engine at idle speed after the test.
(14) Turn the ignition switch to the OFF position.
(15) Disconnect the negative battery cable.
(16) Disconnect the ammeter, voltmeter and tachometer.
(17) Connect the alternator output wire to the alternator "B" terminal.
(18) Connect the negative battery cable.

REGULATED VOLTAGE TEST



This test determines whether the voltage regulator is correctly controlling the alternator output voltage.

(1) Always be sure to check the following before the test.
- Alternator installation
- Check to be sure that the battery installed in the vehicle is fully charged. (Refer to GROUP 54 – Battery.)
- Alternator drive belt tension (Refer to GROUP 11 – Service Adjustment Procedures.)
- Fusible link
- Abnormal noise from the alternator while the engine is running

(2) Turn the ignition switch to the OFF position.
(3) Disconnect the negative battery cable.
(4) Connect a digital-type voltmeter between the alternator "S" terminal and the earth. (Connect the (+) lead of the voltmeter to the "S" terminal, and then connect the (–) lead of the voltmeter to a secure earth or to the battery (–) terminal.)
(5) Disconnect the alternator output wire from the alternator "B" terminal.
(6) Connect a DC test ammeter with a range of 0 – 100 A in series between the "B" terminal and the disconnected output wire. (Connect the (+) lead of the ammeter to the "B" terminal, and then connect the (–) lead of the ammeter to the disconnected output wire.)
(7) Connect a tachometer. (Refer to GROUP 11 – Service Adjustment Procedures.)
(8) Reconnect the negative battery cable.
(9) Turn the ignition switch to the ON position and check that the reading on the voltmeter is equal to the battery voltage.

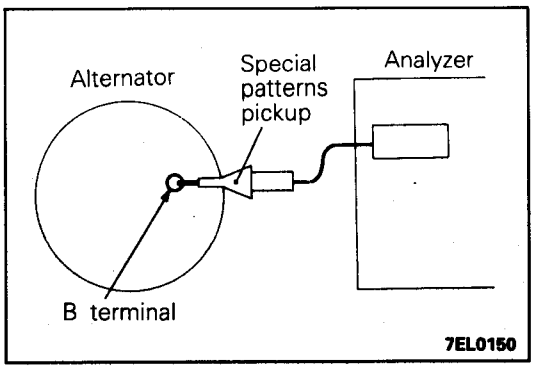
NOTE
If the voltage is 0 V, the cause is probably an open circuit in the wire or fusible link between the alternator "S" terminal and the battery (+) terminal.

(10) Check to be sure that all lamps and accessories are off.
(11) Start the engine.
(12) Increase the engine speed to 2,500 r/min.
(13) Read the value displayed on the voltmeter when the current output by the alternator becomes 10 A or less.
(14) If the voltage reading conforms to the value in the voltage regulation table, then the voltage regulator is operating normally.
If the voltage is outside the standard value, there is a malfunction of the voltage regulator or of the alternator.

Voltage Regulation Table

Inspection terminal	Voltage regulator ambient temperature °C (°F)	Standard value V
Terminal "S"	–20 (–4)	14.2–15.4
	20 (68)	13.9–14.9
	60 (140)	13.4–14.6
	80 (176)	13.1–14.5

(15) After the test, lower the engine speed to the idle speed.
(16) Turn the ignition switch to the OFF position.
(17) Disconnect the negative battery cable.
(18) Disconnect the ammeter, voltmeter and tachometer.
(19) Connect the alternator output wire to the alternator "B" terminal.
(20) Connect the negative battery cable.



INSPECTION USING AN ANALYZER

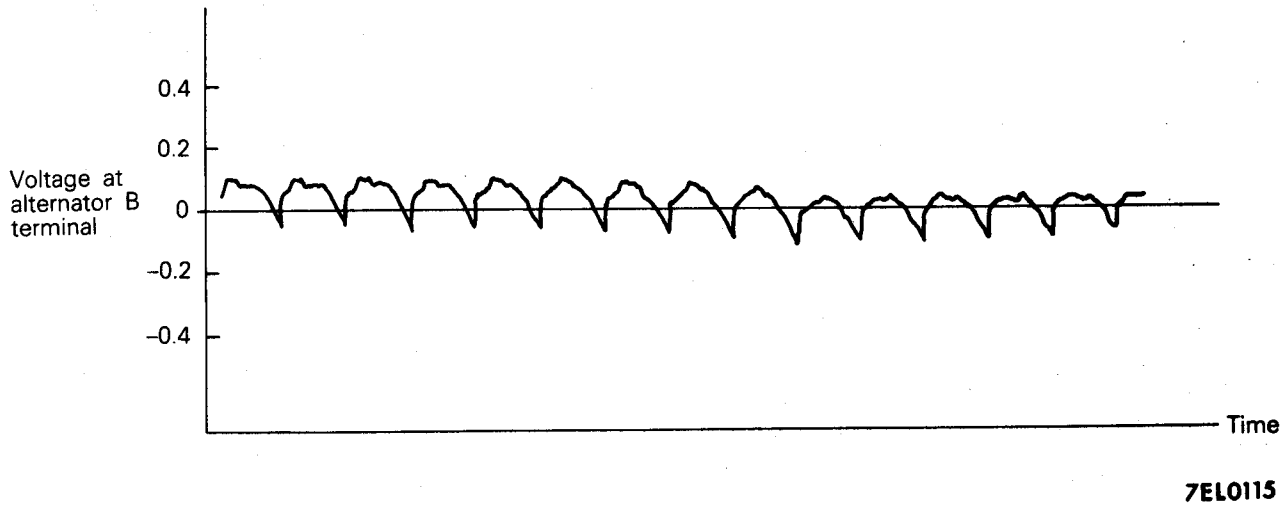
MEASUREMENT METHOD

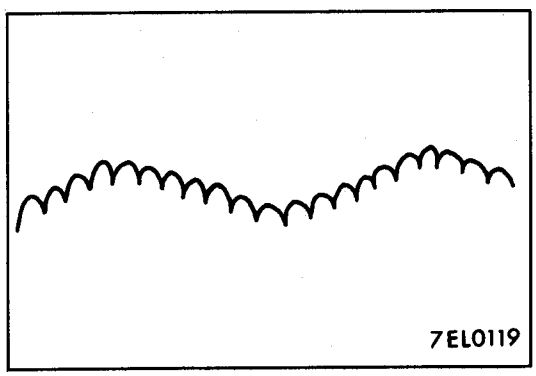
Connect the analyzer special patterns pick-up to the alternator B terminal.

STANDARD WAVEFORM

Observation Conditions

FUNCTION	SPECIAL PATTERNS
PATTERN HEIGHT	VARIABLE
VARIABLE knob	Adjust while viewing the wave pattern
PATTERN SELECTOR	RASTER
Engine speed	Idle (700r/min.)

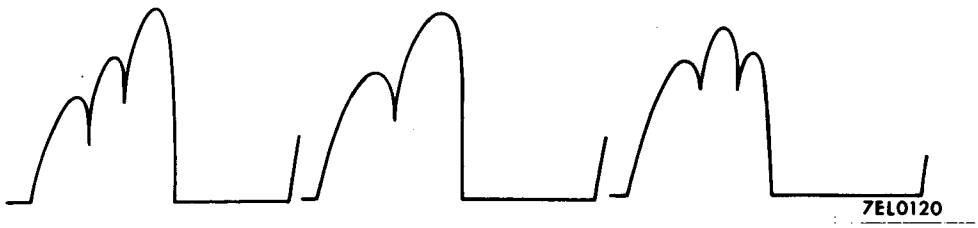
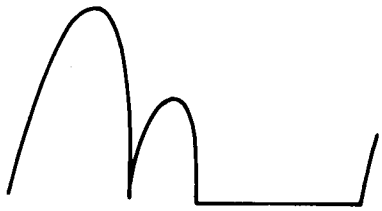
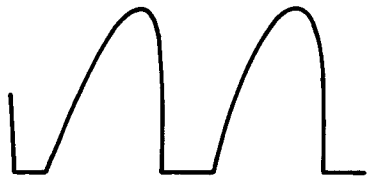




NOTE
Furthermore, the voltage waveform of the alternator B terminal can undulate as shown at left. This waveform is produced when the regulator operates according to fluctuations in the alternator load (current), and is normal for the alternator.

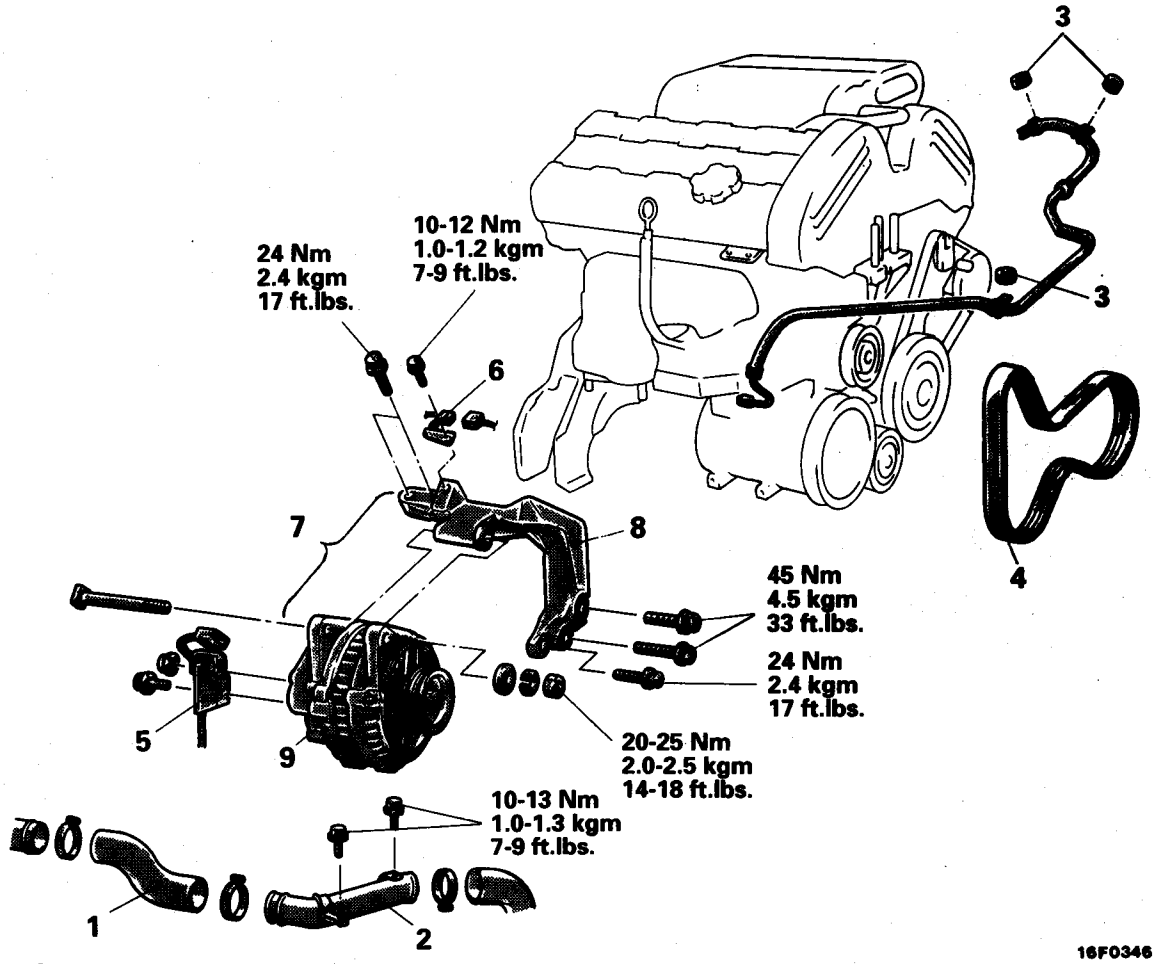
EXAMPLES OF ABNORMAL WAVEFORMS

NOTE
1. The size of the waveform patterns differs largely depending on the adjustment of the variable knob on the analyzer.
2. Identification of abnormal waveforms is easier when there is a large output current (regulator is not operating). (Waveforms can be observed when the headlamps are illuminated.)
3. Check the conditions of the charge lamp (illuminated/ not illuminated) also, and carry out a total check.

Abnormal waveforms	Problem cause
Example 1  7EL0120	• Open diode
Example 2  7EL0121	• Short in diode
Example 3  7EL0122	• Broken wire in stator coil
Example 4  7EL0123	• Short in stator coil
Example 5  NOTE: At this time, the charge lamp is illuminated. 7EL0124	• Open supplementary diode

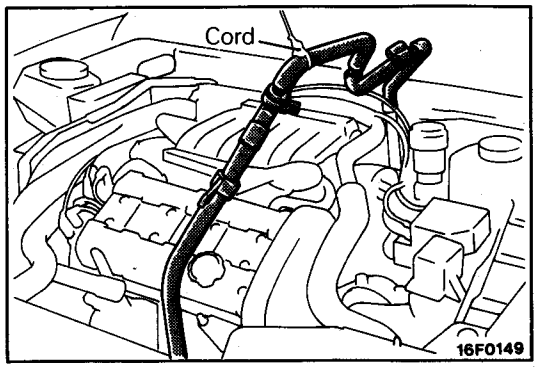
ALTERNATOR

REMOVAL AND INSTALLATION



Removal steps

1. Air hose E
2. Air pipe C
3. Clamp nuts of suction hose
   - Drive belt tension adjustment (Refer to GROUP 11 - Service Adjustment Procedures.)
4. Drive belt (for alternator and air conditioner)
5. Alternator connector
6. Oxygen sensor connector
7. Alternator and alternator bracket assembly
8. Alternator bracket
9. Alternator



SERVICE POINT OF REMOVAL

3. REMOVAL OF CLAMP NUT

On vehicles with an air conditioner, remove the clamp nut, raise the suction hose and suspend it from the engine hood using a cord.

STARTING SYSTEM

SPECIFICATIONS

GENERAL SPECIFICATIONS

STARTER MOTOR

Items		Specifications
Type		Reduction drive with planetary gear
Identification No.		M1T72583
Part No.		MD172863
Rated output	kW/V	1.2/12
No. of pinion teeth		8

IGNITION SYSTEM

SPECIFICATIONS

GENERAL SPECIFICATIONS

TDC SENSOR (CAM POSITION SENSOR) AND CRANK ANGLE SENSOR

Items	Specifications
Type	Contact pointless
Advance mechanism	Electronic

IGNITION COIL

Items	Specifications
Type	Molded 3 coil type
Identification No.	F-536
Part No.	MD152648

SPARK PLUG

Items	Specifications
NGK	PFR6J-11
NIPPON DENSO	PK20PR-P11

SERVICE SPECIFICATIONS

E16DE--

IGNITION COIL

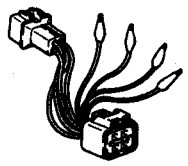
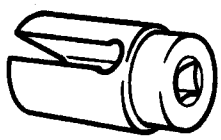
Items		Specifications
Primary coil resistance	Ω	0.67 – 0.81
Secondary coil resistance	kΩ	11.3 – 15.3

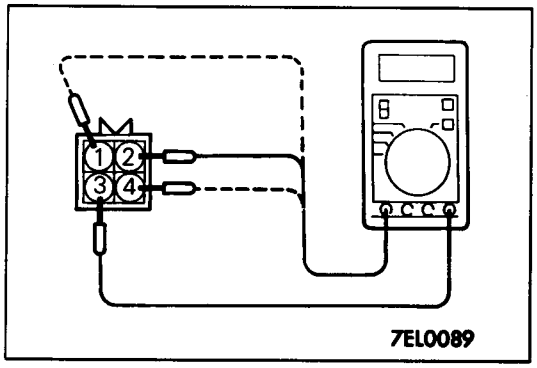
SPARK PLUG

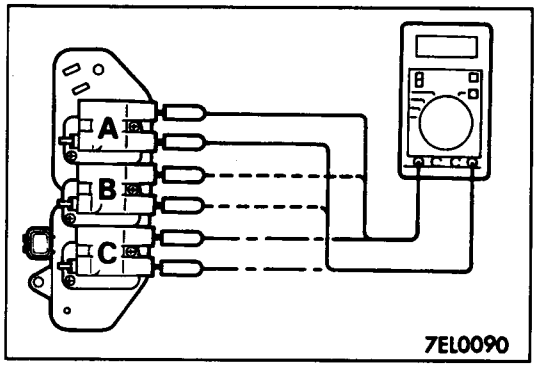
Items		Specification
Standard value		
Spark plug gap	mm (in.)	1.0 – 1.1 (0.039 – 0.043)
Limit		
Spark plug gap (Platinum plug only)	mm (in.)	1.3 (0.051)

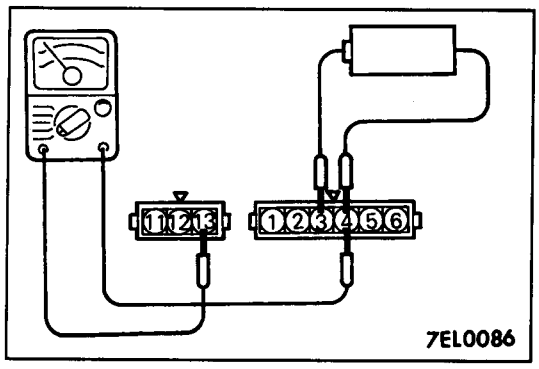
SPECIAL TOOLS

E16DF--

Tool	Number	Name	Use
	MD998464	Harness connector (4 pin, square)	Inspection of ignition primary voltage (ignition coil connection)
	MD998773	Detonation sensor wrench	Removal/installation of detonation sensor







SERVICE ADJUSTMENT PROCEDURES

E16DGAQ

IGNITION COIL INSPECTION

Primary Coil Resistance

Measure the resistance between connector terminal ③ (power) and each coil terminal.

Measuring point:

Coil A (No. 1 – No. 4 cylinder side coil) .....②–③
Coil B (No. 2 – No. 5 cylinder side coil) .....①–③
Coil C (No. 3 – No. 6 cylinder side coil) .....④–③

Standard value: 0.67–0.81 Ω

Secondary Coil Resistance

Measure the resistance between each coil high voltage terminals.

Measuring point:

Coil A (No. 1 – No. 4 cylinder side coil)
Coil B (No. 2 – No. 5 cylinder side coil)
Coil C (No. 3 – No. 6 cylinder side coil)

Standard value: 11.3–15.3 kΩ

POWER TRANSISTOR INSPECTION

NOTE
An analog-type circuit tester should be used.

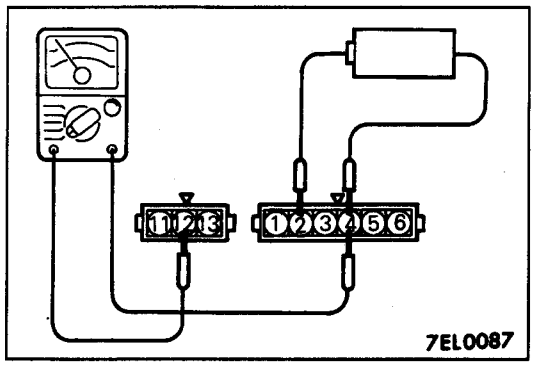
No. 1 – No. 4 coil side

(1) Connect the negative (–) terminal of the 1.5 V power supply to terminal ④ of the power transistor; then check whether there is continuity between terminal ⑬ and terminal ④ when terminal ③ and the positive (+) terminal are connected and disconnected.

NOTE
Connect the (–) probe of the circuit tester to terminal ⑬

Terminal 3 and (+) terminal	Terminal 13 and terminal 4
Connected	Continuity
Unconnected	No continuity

(2) Replace the power transistor if there is a malfunction.



No. 2 – No. 5 coil side

(1) Connect the negative (–) terminal of the 1.5 V power supply to terminal ④ of the power transistor; then check whether there is continuity between terminal ⑫ and terminal ④ when terminal ② and the positive (+) terminal are connected and disconnected.

NOTE
Connect the (–) probe of the circuit tester to terminal ⑫

Terminal 3 and (+) terminal	Terminal 12 and terminal 4
Connected	Continuity
Unconnected	No continuity

(2) Replace the power transistor if there is a malfunction.

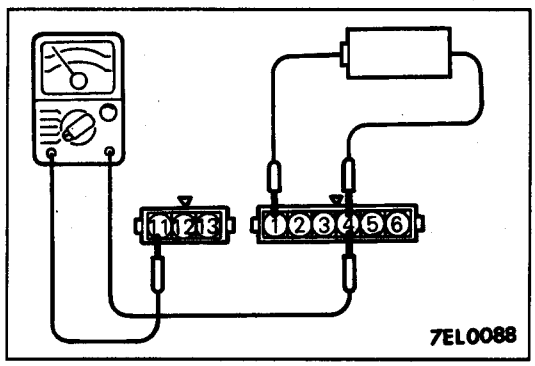
No. 3 – No. 6 coil side

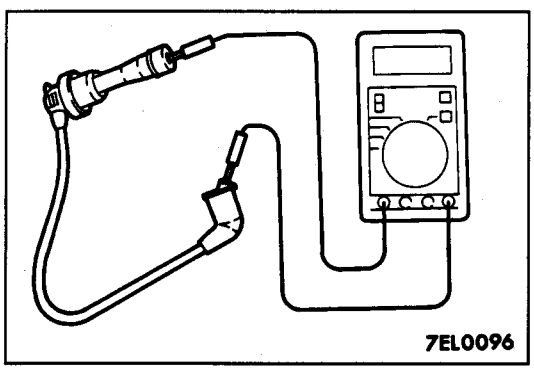
(1) Connect the negative (–) terminal of the 1.5 V power supply to terminal ④ of the power transistor; then check whether there is continuity between terminal ⑪ and terminal ④ when terminal ① and the positive (+) terminal are connected and disconnected.

NOTE
Connect the (–) probe of the circuit tester to terminal ⑪

Terminal 1 and (+) terminal	Terminal 11 and terminal 4
Connected	Continuity
Unconnected	No continuity

(2) Replace the power transistor if there is a malfunction.





RESISTIVE CODE INSPECTION

Measure the resistance of the high tension cable and all spark plug leads.
(1) Check cap and coating for cracks.
(2) Measure resistance.

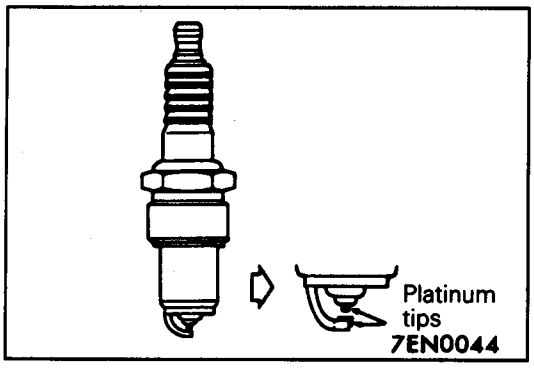
Unit: kΩ

Spark plug cable					
No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
8.5	13.4	6.3	11.0	4.5	11.0

CHECKING THE DETONATION SENSOR

Check the detonation sensor circuit if self-diagnosis code, No. 31 is shown.

NOTE
For information concerning the self-diagnosis codes, refer to GROUP 13 – Troubleshooting.



SPARK PLUG CHECK

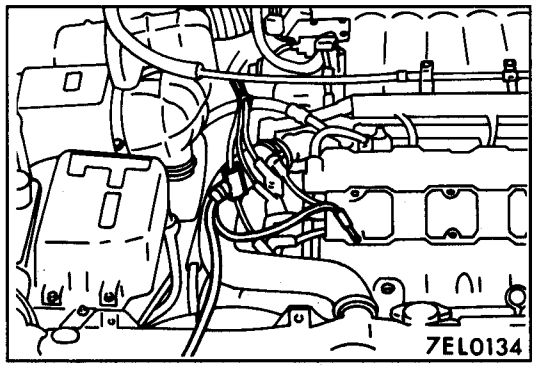
(1) Remove the center cover from the front bank.
(2) Remove the air intake plenum from the rear bank.
(3) Remove the spark plug cables.

Caution
When pulling off the spark plug cable from the plug, always hold the cable cap, not the cable.

(4) Remove the spark plugs.
(5) Check the plug gap and replace if the limit is exceeded.

Standard value: 1.0–1.1 mm (0.039–0.043 in.)
Limit: 1.3 mm (0.051 in.)

Caution
1. **Do not attempt to adjust the gap of the platinum plug.**
2. **Cleaning of the platinum plug may result damage the platinum tip. Therefore, if carbon deposits must be removed, use a plug cleaner and complete cleaning within 20 seconds for protection of the electrode. Do not use wire brushes.**



INSPECTION USING AN ANALYZER (SECONDARY AND PRIMARY IGNITION VOLTAGE WAVEFORMS)

INSPECTION OF SECONDARY IGNITION VOLTAGE

MEASUREMENT METHOD

(1) Clamp the SECONDARY PICKUP around spark plug cable.

NOTE
1. The peak of the ignition voltage will be reversed when the spark cables of No.4, No.5, No.6 cylinders are clamped and when the spark plug cables of No.1, No.2, and No.3 cylinders are clamped.
2. Because of the two-cylinder simultaneous ignition system, the waves for two cylinders in each group appear during wave observation (No.1 cylinder - No.4 cylinder, No.2 cylinder - No.5 cylinder, No.3 cylinder - No.6 cylinder). However, wave observation is carried out for the cylinder with the spark plug cable clamped by the secondary pickup.

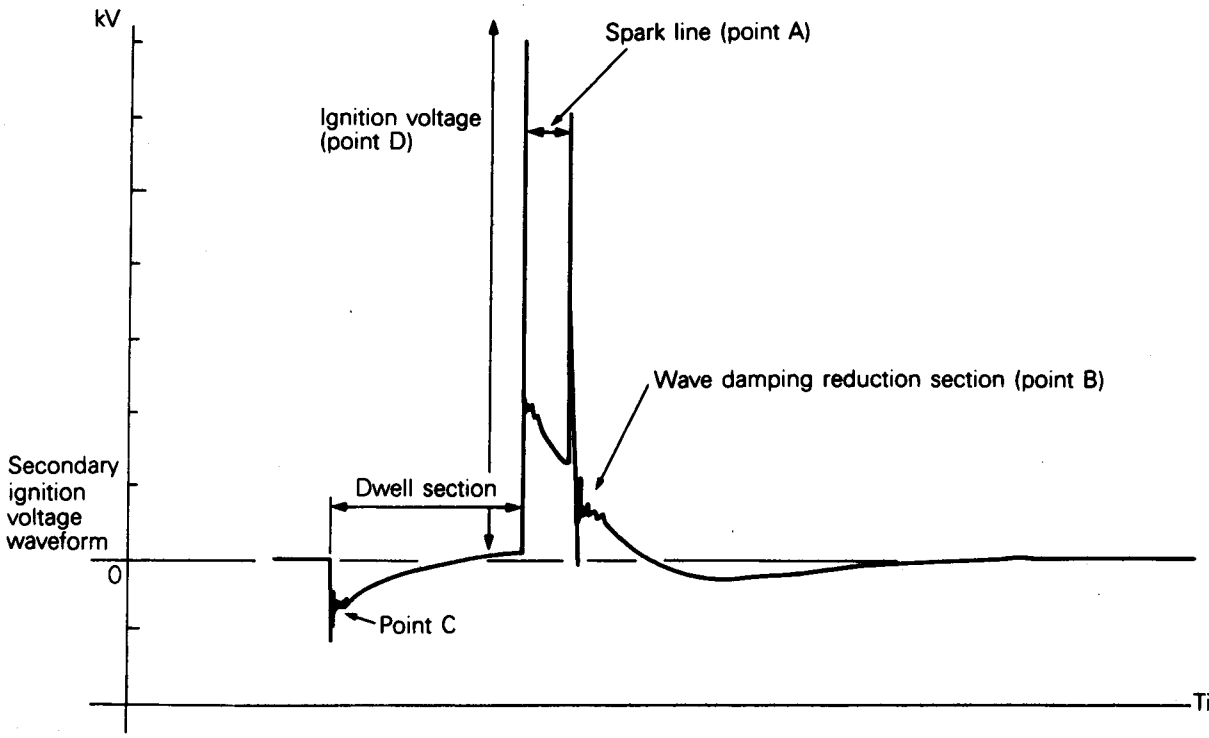
(2) Clamp the spark plug cable with the Trigger pickup.

NOTE
1. Clamp the spark plug cable for the No.1, No.2 or No.3 cylinder of the same group with the cylinder that is clamped with the secondary pickup.
2. Identification of which cylinder wave pattern is displayed can be difficult, but the wave pattern of the cylinder which is clamped with the secondary pickup will be stable, so this can be used as a reference for identification.

STANDARD WAVEFORM

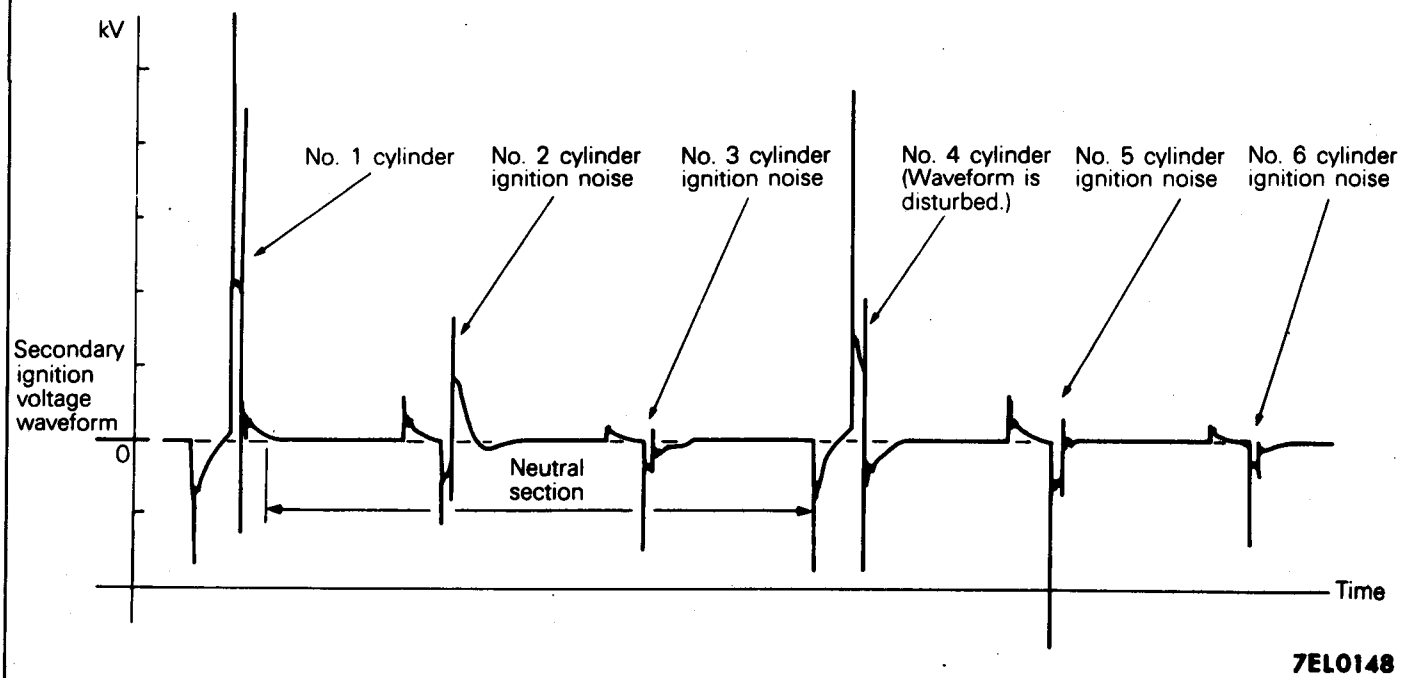
Observation Conditions

Function	Secondary
Pattern height	High (or Low)
Pattern selector	Raster
Engine speed	Idle (700 r/min.)



Observation Condition (Only pattern selector below changes from the above conditions.)

Pattern selector	Display.



WAVEFORM OBSERVATION POINTS

Point A : The height, length and slope of the spark line (refer to abnormal waveform examples 1, 2, 3 and 4) show the following trends.

Spark line		Plug gap	Condition of electrode	Compression force	Concentration of air mixture	Ignition timing	Spark plug cable
Length	Long	Small	Normal	Low	Rich	Advanced	Leak
	Short	Large	Large wear	High	Lean	Retarded	High resistance
Height	High	Large	Large wear	High	Lean	Retarded	High resistance
	Low	Small	Normal	Low	Rich	Advanced	Leak
Slope		Large	Plug is fouled	–	–	–	–

Point B : Number of vibrations in reduction vibration section (Refer to abnormal waveform example 5)

Number of vibrations	Coil and condenser
Three or more	Normal
Except above	Abnormal

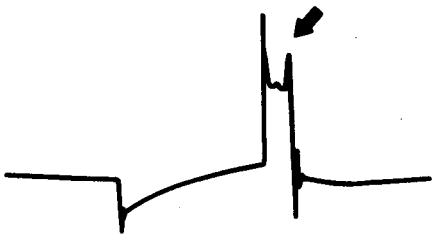
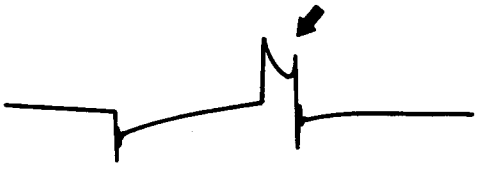
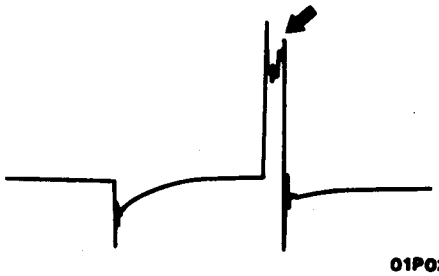
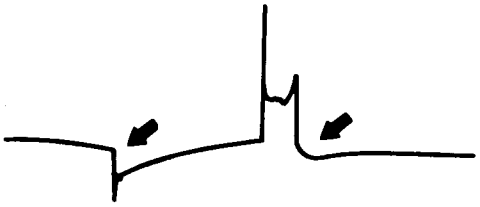
Point C : Number of vibrations at beginning of dwell section (Refer to abnormal waveform example 5)

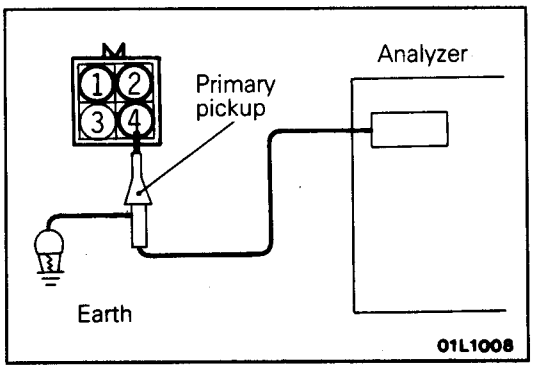
Number of vibrations	Coil
5–6 or higher	Normal
Except above	Abnormal

Point D : Ignition voltage height (distribution per each cylinder) shows the following trends.

Ignition voltage	Plug gap	Condition of electrode	Compression force	Concentration of air mixture	Ignition timing	Spark plug cable
High	Large	Large wear	High	Lean	Retarded	High resistance
Low	Small	Normal	Low	Rich	Advanced	Leak

EXAMPLES OF ABNORMAL WAVEFORMS

Abnormal waveform	Wave characteristics	Cause of probrem
Example 1  01P0215	Spark line is high and short.	Spark plug gap is too large.
Example 2  01P0216	Spark line is low and long, and is sloping. Also, the second half of the spark line is distorted. This could be a result of mis-firing.	Spark plug gap is too small.
Example 3  01P0217	Spark line is low and long, and is sloping. However, there is almost no spark line distortion.	Spark plug gap is fouled.
Example 4  01P0218	Spark line is high and short. Difficult to distinguish between this and abnormal wave pattern example 1.	Spark plug cable is nearly falling off. (Causing a dual ignition)
Example 5  01P0219	No waves in wave damping section.	Rare short in ignition coil.



INSPECTION OF PRIMARY IGNITION VOLTAGE

MEASUREMENT METHOD

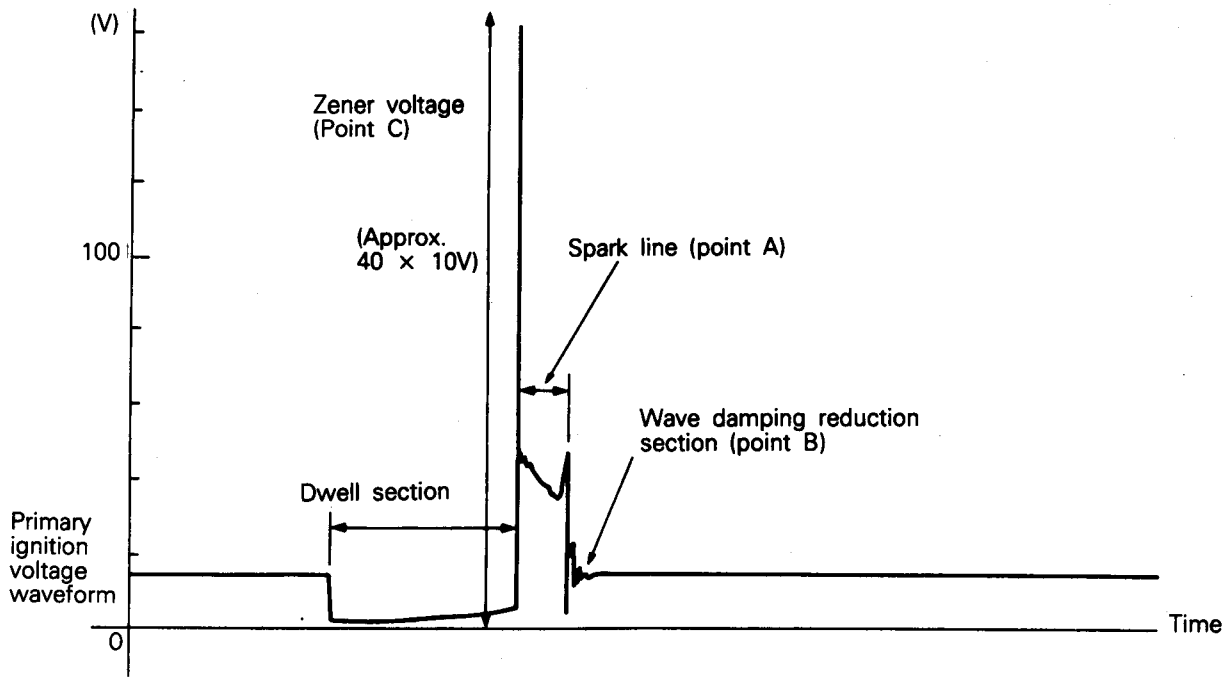
(1) Disconnect the ignition coil connector and connect the special tool (harness connector: MB998464) in between.
(2) Connect the analyzer primary pickup to the ignition coil connector terminal (2) (black clip on the special tool) when observing the No. 1 - No. 4 cylinder group, terminal (1) (red clip) for the No. 2 - No. 5 cylinder group, and terminal [4] (white clip) for the No. 3 - No. 6 cylinder group.
(3) Connect the primary pickup earth terminal.
(4) Clamp the spark plug with the trigger pickup.

NOTE
1. Clamp the spark plug cable for No.1, No.2 and No.3 cylinders of the same group with the cylinder that is connected to the primary pickup.
2. The wave pattern of either cylinder in the same group will appear at the left edge of the screen.

STANDARD WAVEFORM

Observation Conditions

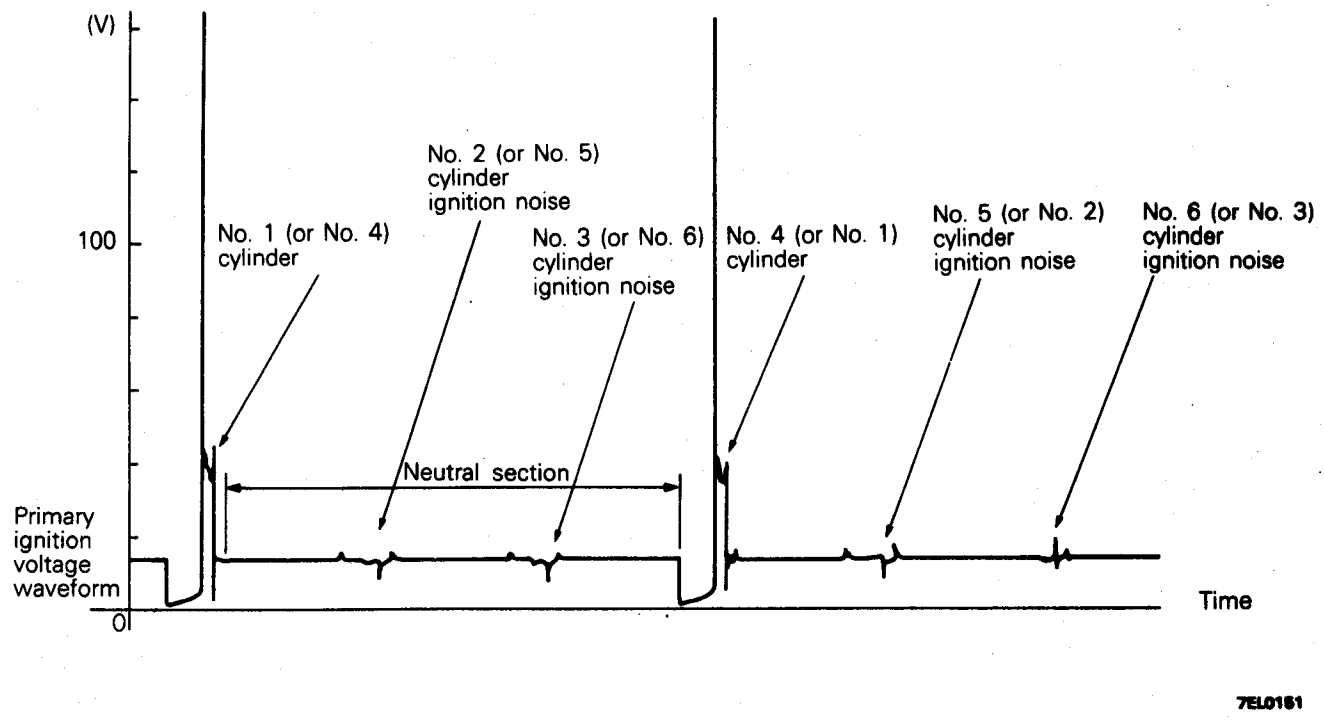
Function	Secondary
Pattern height	High (or Low)
Pattern selector	Raster
Engine speed	Idle (700 r/min.)



7EL0149

Observation Conditions (Only pattern selector below changes from the above conditions.)

Pattern selector	Display



WAVEFORM OBSERVATION POINTS

Point A : The height, length and slope of the spark line (refer to abnormal waveform examples 1, 2, 3 and 4) show the following trends.

Spark line		Plug gap	Condition of electrode	Compression force	Concentration of air mixture	Ignition timing	High tension cable
Length	Long	Small	Normal	Low	Rich	Advanced	Leak
	Short	Large	Large wear	High	Lean	Retarded	High resistance
Height	High	Large	Large wear	High	Lean	Retarded	High resistance
	Low	Small	Normal	Low	Rich	Advanced	Leak
Slope		Large	Plug is fouled	–	–	–	–

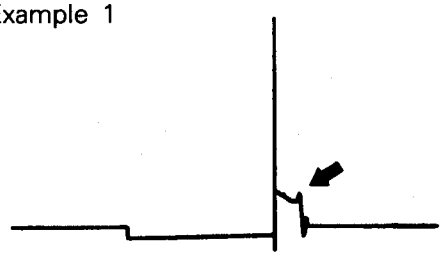
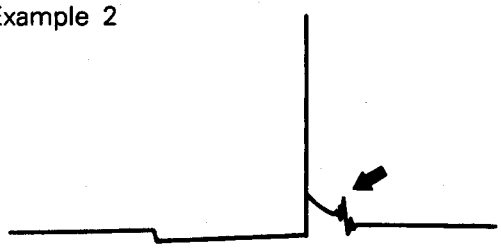
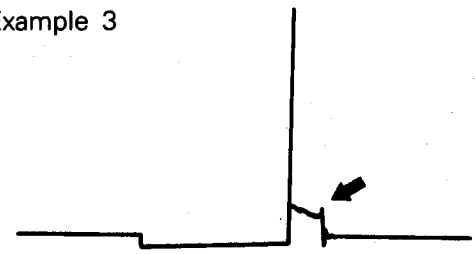
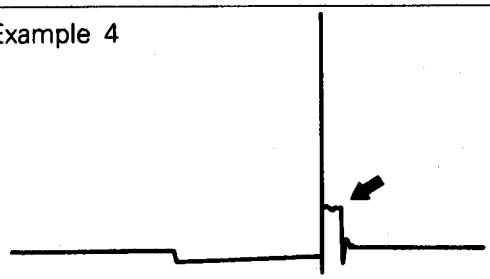
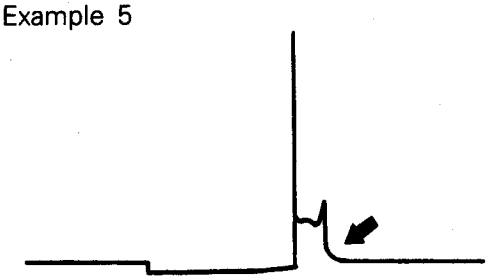
Point B : Number of vibrations in reduction vibration section (Refer to abnormal waveform example 5)

Number of vibrations	Coil, condenser
3 or higher	Normal
Except above	Abnormal

Point C : Height of Zener voltage

Height of Zener voltage	Probable cause
High	Problem in Zener diode
Low	Abnormal resistance in primary coil circuit

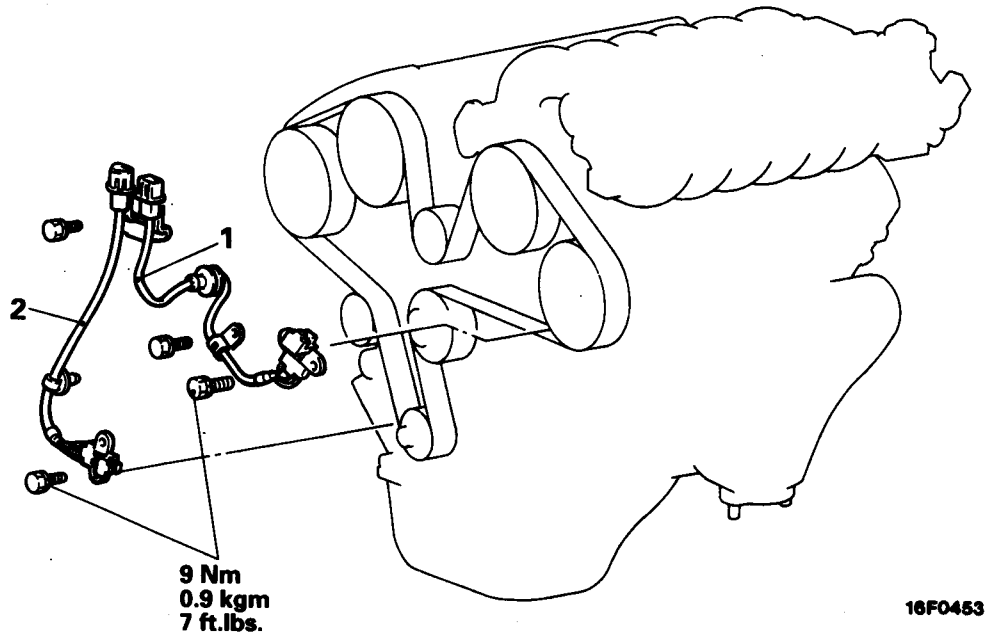
EXAMPLES OF ABNORMAL WAVEFORMS

Abnormal waveform	Wave characteristics	Cause of problem
Example 1  01P0210	Spark line is high and short.	Spark plug gap is too large.
Example 2  01P0211	Spark line is low and long, and is sloping. Also, the second half of the spark line is distorted. This could be a result of mis-firing.	Spark plug gap is too small.
Example 3  01P0212	Spark line is low and long, and is sloping. However, there is almost no spark line distortion.	Spark plug gap is fouled.
Example 4  01P0213	Spark line is high and short	Spark plug cable is nearly falling off. (Causing a dual ignition)
Example 5  01P0214	No waves in wave damping section.	Rare short in ignition coil.

CAM POSITION SENSOR AND CRANK ANGLE SENSOR

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of Timing Belt Cover (Refer to GROUP 11 – Timing Belt.)

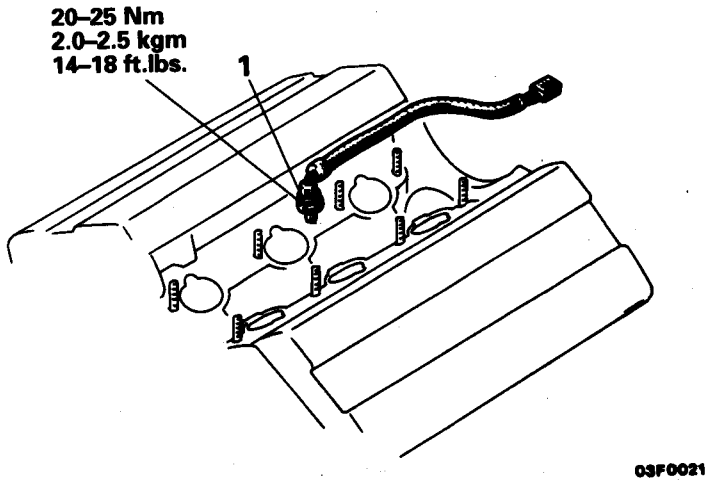


Removal steps
1. Cam position sensor
2. Crank angle sensor

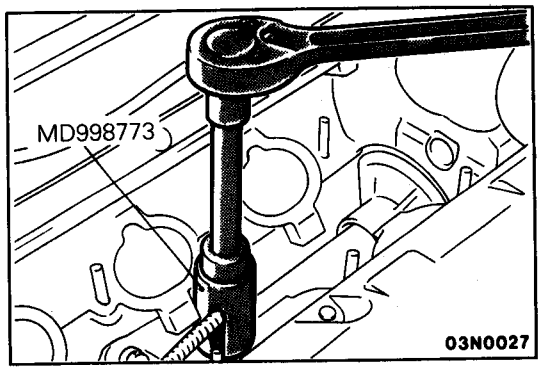
DETONATION SENSOR

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of the Intake Manifold (Refer to GROUP 15 – Intake Manifold.)



◆◆ ◆◆ 1. Detonation sensor



SERVICE POINT OF REMOVAL

1. REMOVAL OF DETONATION SENSOR

SERVICE POINT OF INSTALLATION

1. INSTALLATION OF DETONATION SENSOR

When the detonation sensor is installed, be sure to tighten it precisely to the specified torque as its installation affects the engine control.

NOTES

EMISSION CONTROL

CONTENTS

E17AA-

SPECIFICATIONS

E17CA--

GENERAL SPECIFICATIONS

Items	Name	Specification
Crankcase emission control system	Positive crankcase ventilation (PCV) valve	Variable flow type (Purpose: HC reduction)
Evaporative emission control system	Canister Purge control solenoid valve	Equipped ON-OFF solenoid valve (Purpose: HC reduction)
Exhaust emission control system	Air-fuel ratio control device–MPI system	Oxygen sensor feedback type (Purpose: CO, HC, NOx reduction)
	Exhaust gas recirculation system EGR valve EGR control solenoid valve	Single type Duty cycle type solenoid valve (Purpose: NOx reduction)
	Catalytic converter	Monolith type (Purpose: CO, HC, NOx reduction)

SERVICE SPECIFICATIONS

E17CB--

Items		Specifications
Purge control solenoid valve coil resistance [at 20°C (68°F)]	Ω	36–44
EGR control solenoid valve coil resistance [at 20°C (68°F)]	Ω	36–44

SEALANTS AND ADHESIVE

E17CE--

Items	Specified sealant and adhesive	Remarks
Engine coolant temperature sensor	3M Nut Locking Part No. 4171 or equivalent	Drying sealants

SPECIAL TOOL

Tool	Number	Name	Use
	MD998770	Oxygen sensor wrench	Removal/Installation of oxygen sensor

SERVICE ADJUSTMENT PROCEDURES

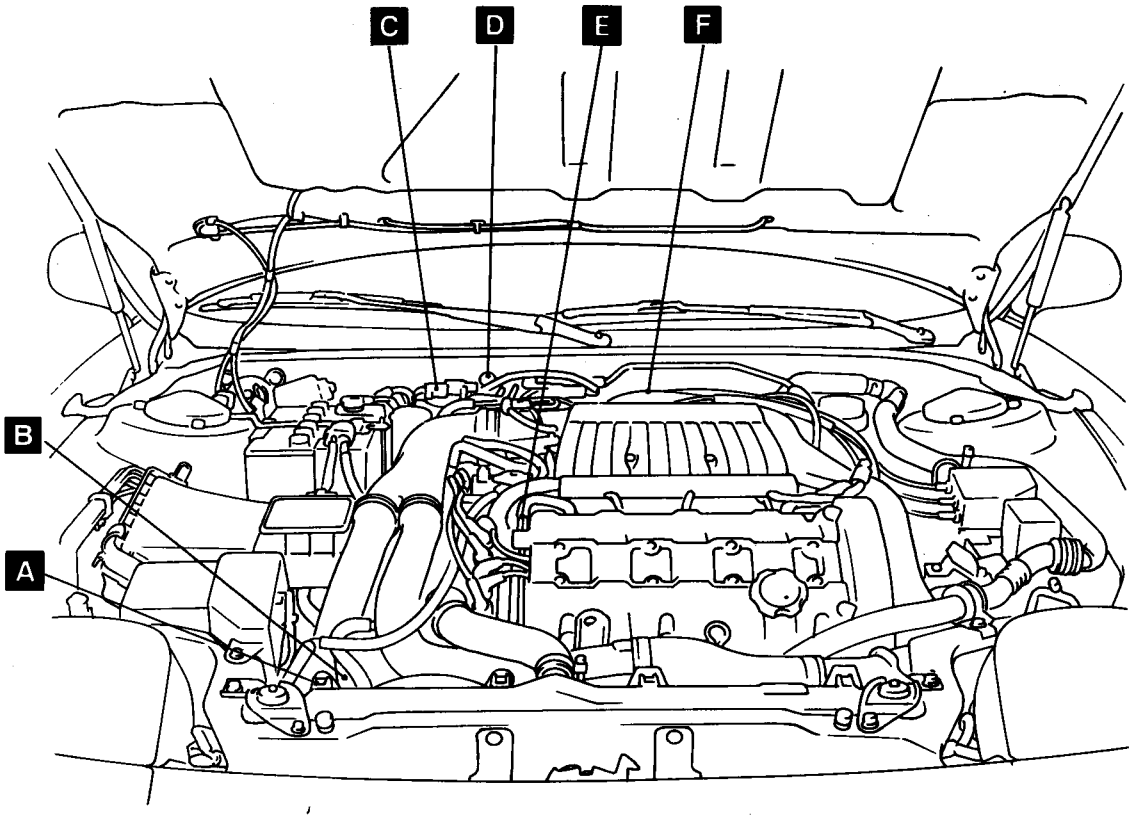
E17FE--

EMISSION CONTROL DEVICE REFERENCE TABLE

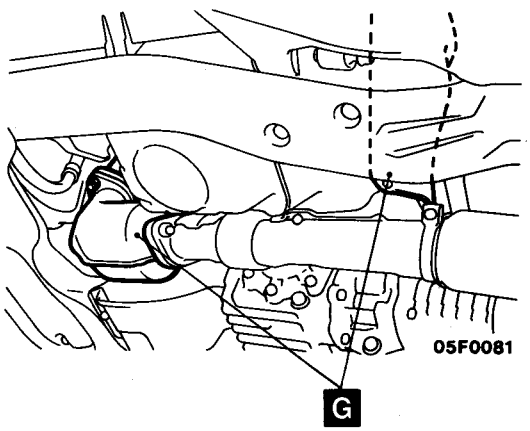
Emission control system / Related parts	Crankcase emission control system	Evaporative emission control system	Air fuel ratio control system	Catalytic converter	Exhaust emission control system	Reference page for each part inspection
PCV valve	X					17–8
Purge control solenoid valve		X				17–11
MPI system component		X	X			Fuel (Group 13)
EGR valve					X	17–13
EGR control solenoid valve					X	17–14
Catalytic converter				X		17–15

COMPONENT LAYOUT

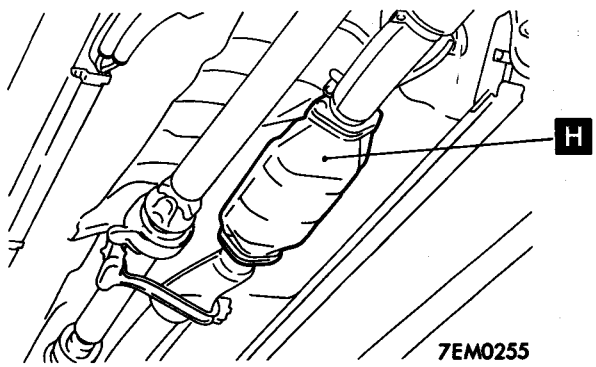
Name	Symbol	Name	Symbol
Canister	A	EGR valve	F
Catalytic converter	G, H	PCV valve	E
EGR control solenoid valve	D	Purge control solenoid valve	C
		Purge control valve	B



7FU1002

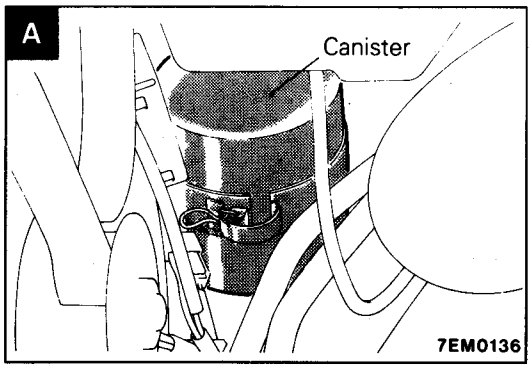


05F0081

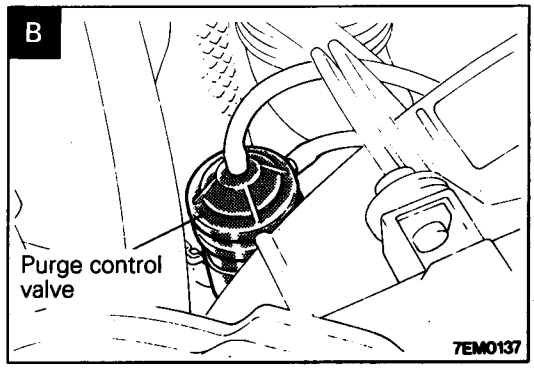


7EM0255

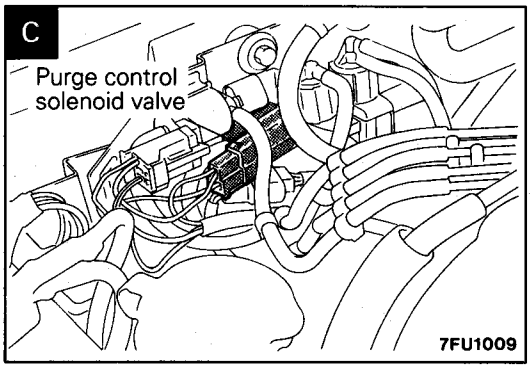
A


Canister
7EM0136

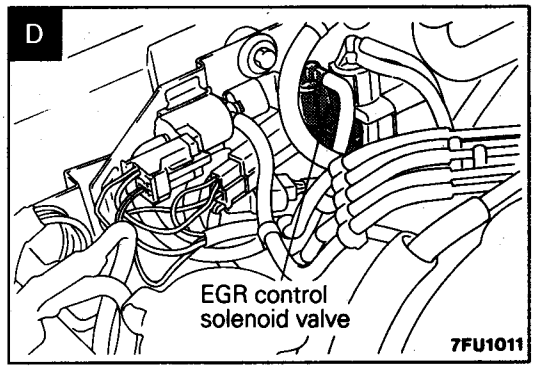
B


Purge control valve
7EM0137

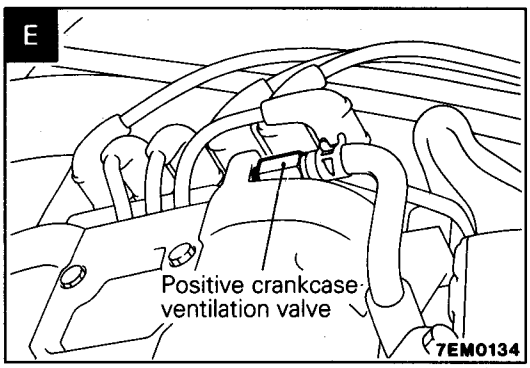
C


Purge control solenoid valve
7FU1009

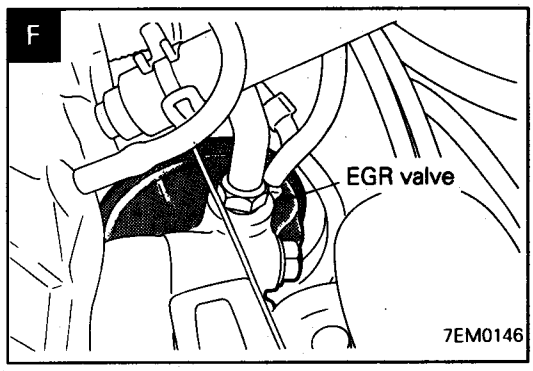
D


EGR control solenoid valve
7FU1011

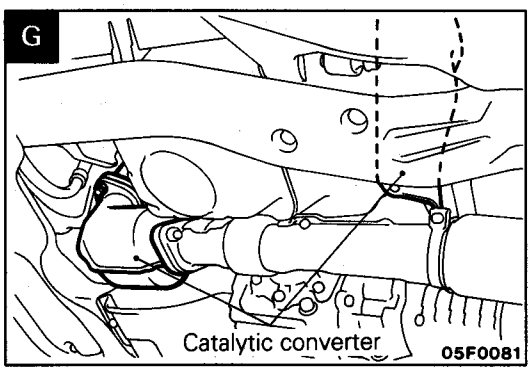
E


Positive crankcase ventilation valve
7EM0134

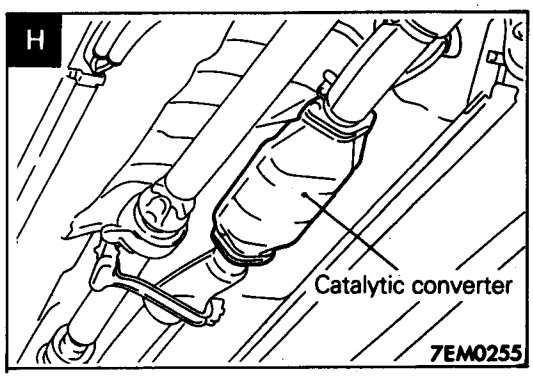
F


EGR valve
7EM0146

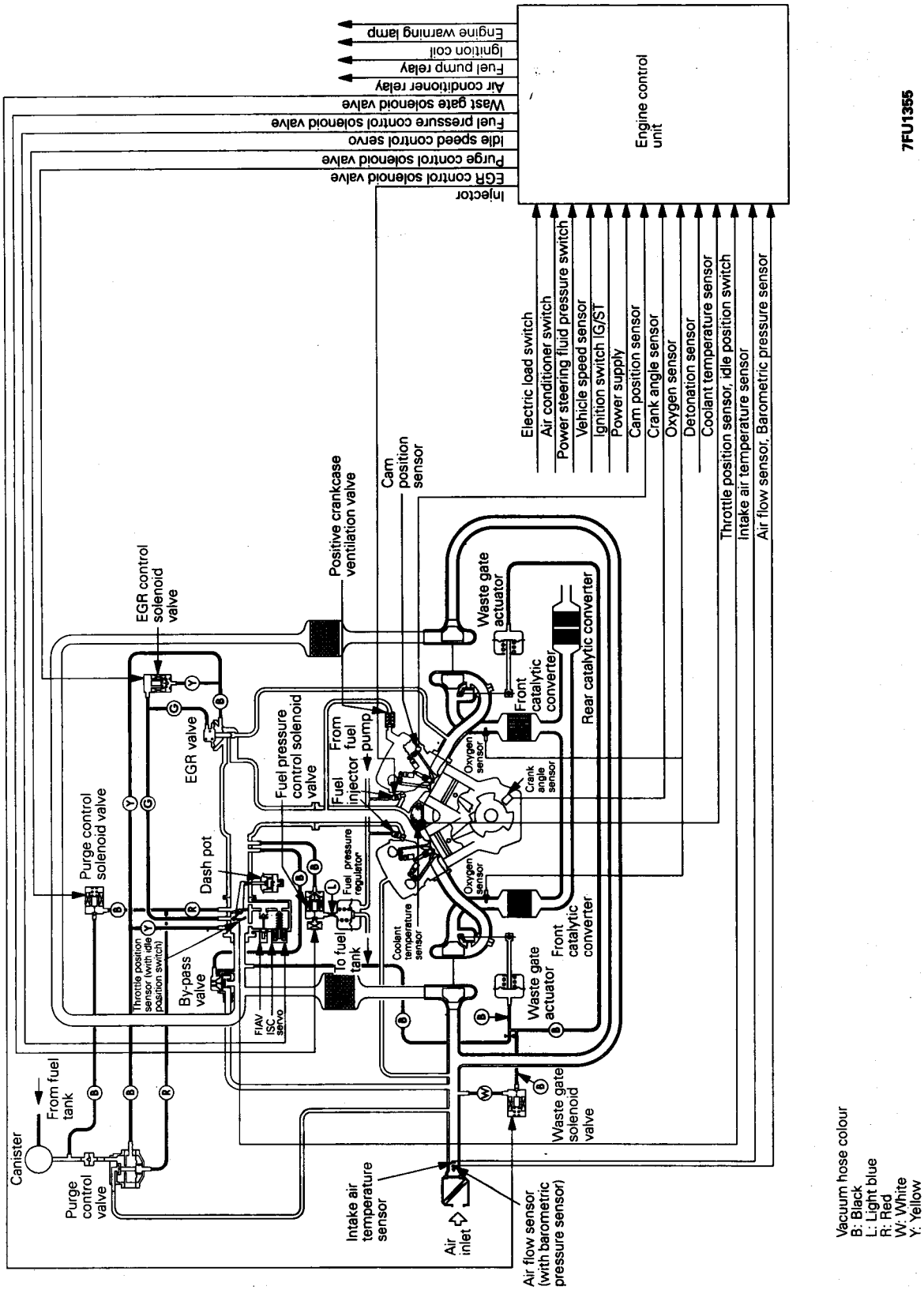
G


Catalytic converter
05F0081

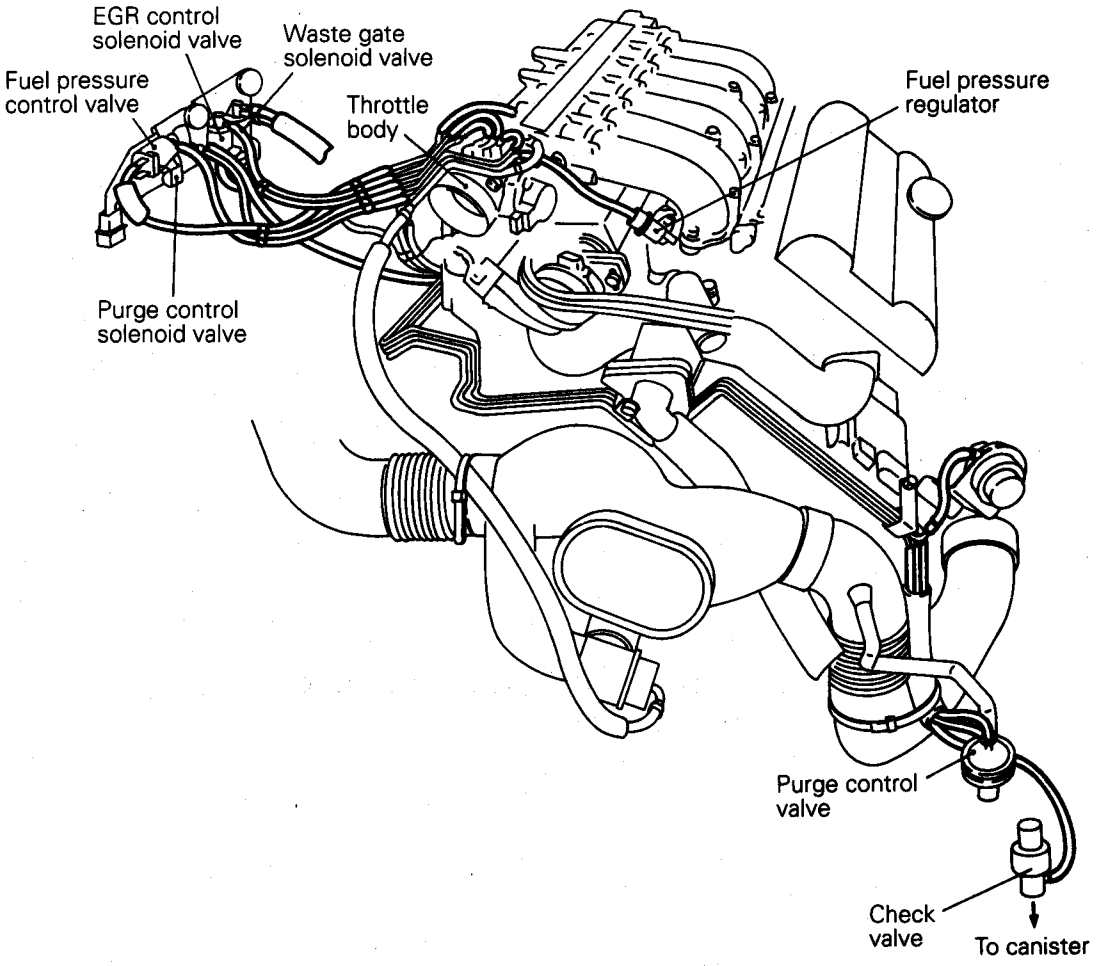
H


Catalytic converter
7EM0255

VACUUM HOSE PIPING DIAGRAM



VACUUM HOSE LAYOUT



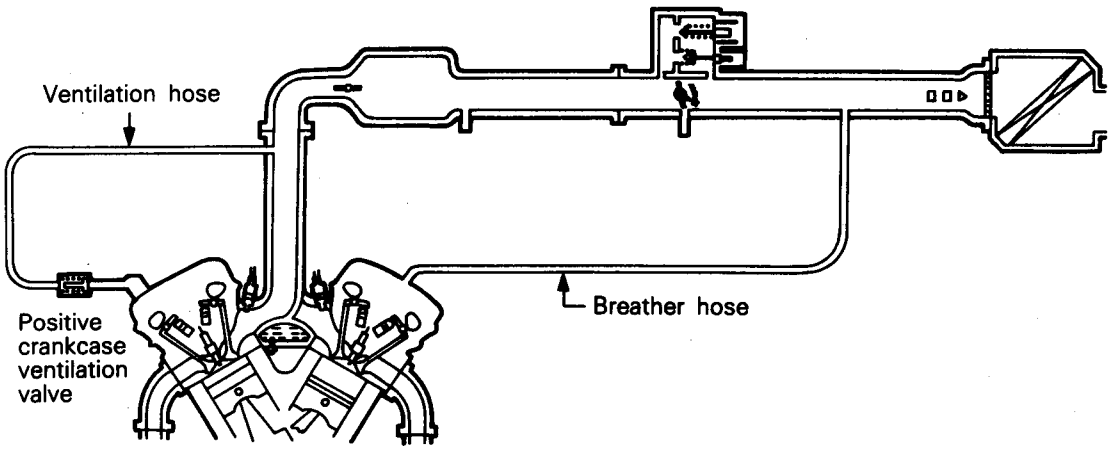
7EM0256

CAUTIONS ON INSPECTION E17FFAE

1. Inspect the various devices only after completing engine adjustment.
2. Inspect the hoses to make sure there are no disconnections, connection errors or damage.
3. Make sure there is no hose, pipe or port clogging, or cracks or damage in the hoses and pipes.
4. When replacing device hoses, always mount the replacement hose in the same position (direction) as the original.
5. When finished, check the connections as described in the workshop manual or service label.

CRANKCASE EMISSION CONTROL SYSTEM

E17FAAM



7EM0258

POSITIVE CRANKCASE VENTILATION SYSTEM

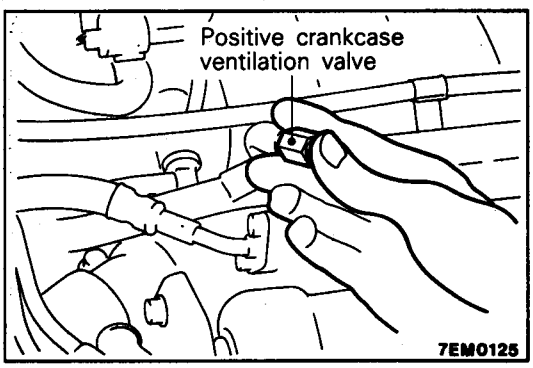
System Inspection

(1) Remove the ventilation hose from the positive crankcase ventilation valve.
(2) Remove the positive crankcase ventilation valve from the rocker cover.
(3) Reinstall the positive crankcase ventilation valve at the ventilation hose.
(4) Start the engine and run at idle.
(5) Place a finger at the opening of the positive crankcase ventilation valve and confirm that negative pressure of the intake manifold is felt.

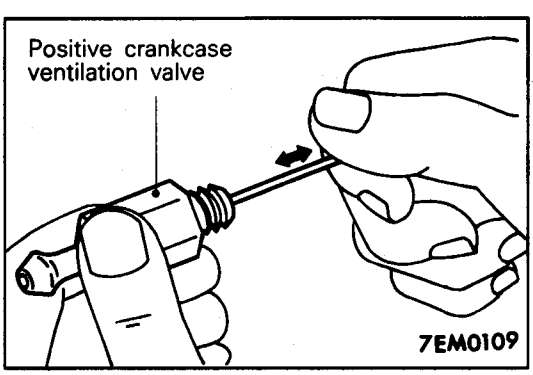
NOTE
At this moment, the plunger in the positive crankcase ventilation valve moves forward and backward.

(6) If negative pressure is not felt, clean the positive crankcase ventilation valve or replace it.
(7) Tighten the positive crankcase ventilation valve with the specified torque.

Tightening torque: 10 Nm (1.0 kgm, 7.2 ft.lbs.)



7EM0125



7EM0109

Positive Crankcase Ventilation (PCV) Valve Inspection

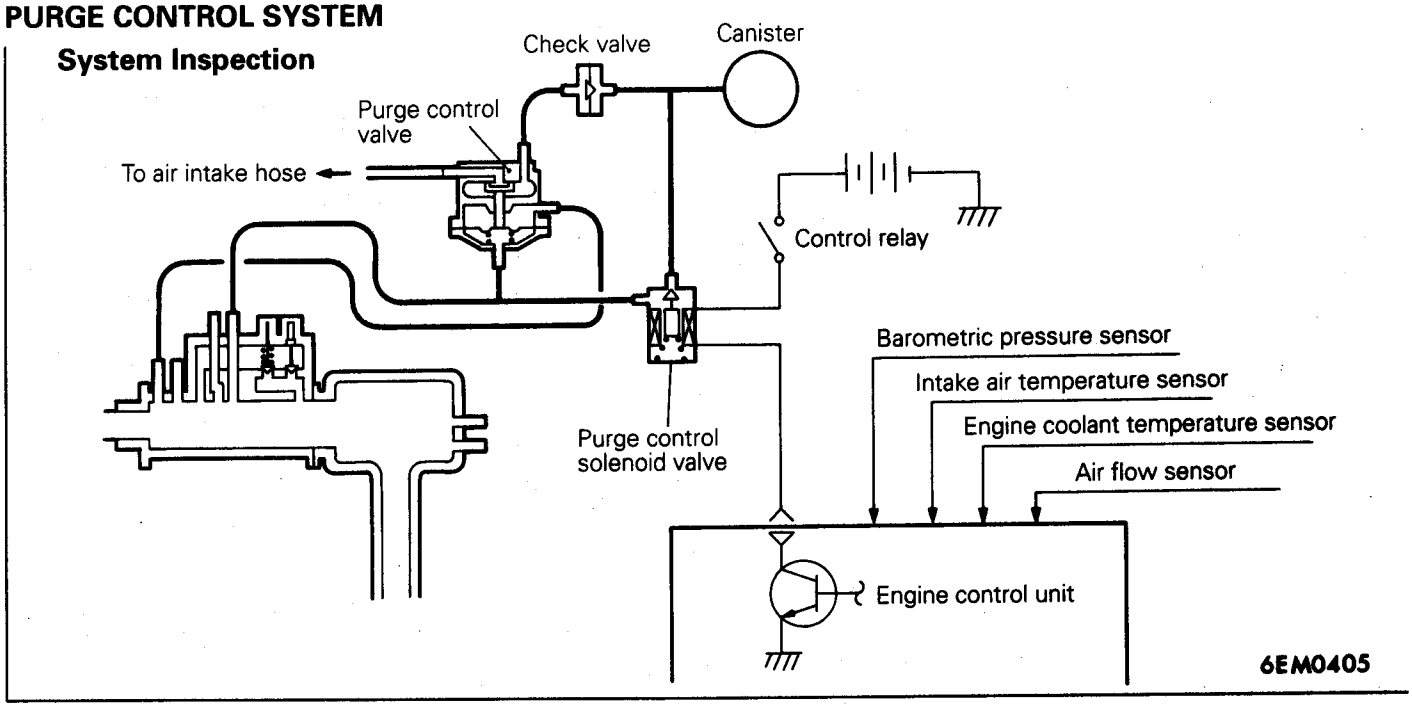
(1) Slide in a narrow stick at the threaded side of the positive crankcase ventilation valve and make sure that the plunger moves.
(2) If the plunger does not move, there is a clogging in the positive crankcase ventilation valve. In this case, clean or replace the valve.

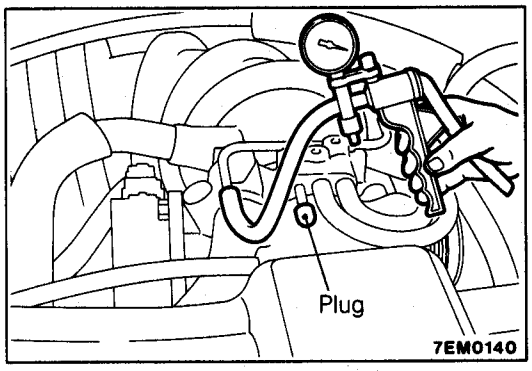
EVAPORATIVE EMISSION CONTROL SYSTEM

E17FBAZ

PURGE CONTROL SYSTEM

System Inspection





(1) Disconnect the vacuum hose (red stripes) from the throttle body and connect it to a hand vacuum pump.
(2) Plug the nipple from which the vacuum hose is disconnected.
(3) Under the engine conditions shown below, check by applying vacuum from a hand vacuum pump.

When engine is cold-engine coolant temperature: 40°C (108°F) or less

Engine operating condition	Applying vacuum	Result
3,000 r/min.	375 mmHG (14.8 in.HG.)	Vacuum is maintained

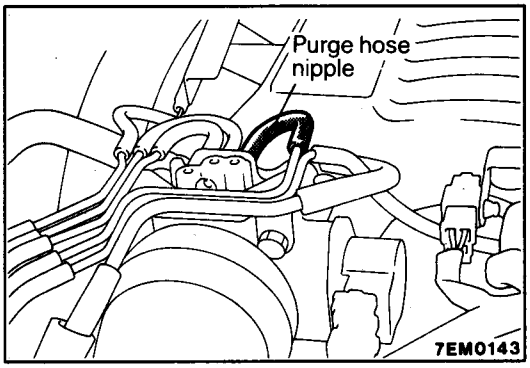
When engine is hot-engine coolant temperature: 80°C (176°F) or higher

Engine operating condition	Applying vacuum	Result
3,000 r/min. within three minutes after starting engine	Try applying vacuum	Vacuum leaks
3,000 r/min. after three minutes have elapsed after starting engine	375 mmHg (14.8 in.H.G.)	Vacuum will be maintained momentarily, after which it will leak. NOTE The vacuum will leak continuously if the altitude is 2,200 m (7,200 ft.) or higher, or the intake air temperature is 50°C (122°F) or higher.

(4) Re-connect the vacuum hose (red stripes) that was disconnected in step (1) to nipple P of the throttle body.
(5) Disconnect the purge air hose from the air intake hose, and plug the air intake hose. Then, connect the hand vacuum pump to the purge air hose.
(6) Under the engine conditions shown below, check by applying vacuum from a hand vacuum pump.

When engine is hot-engine coolant temperature: 80°C (176°F) or higher

Applying vacuum	Engine operating condition	Result
375 mmHg (14.8 in.Hg.)	Idling	Vacuum is maintained
	Sudden racing	Vacuum leaks

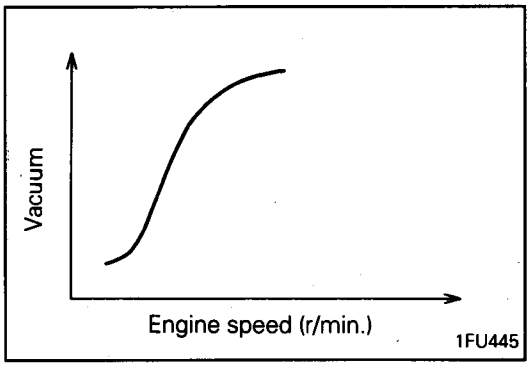


Purge Port Vacuum Inspection E171BKD

Check Condition

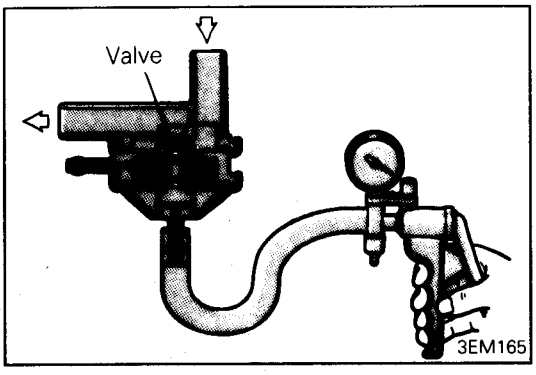
Engine coolant temperature: 80 – 95°C (176 – 203°F)

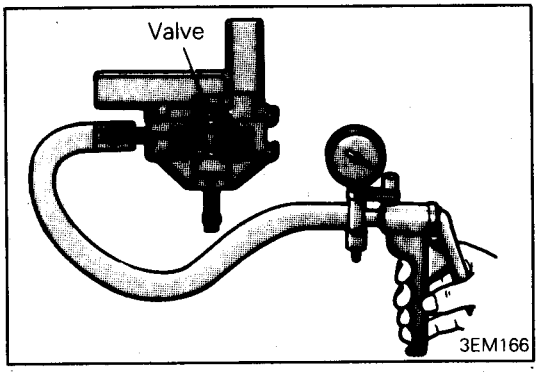
(1) Disconnect the vacuum hose from the throttle body purge hose nipple and connect a hand vacuum pump to the nipple.



(2) Start the engine and increase the engine speed by racing. At this time, check to be sure that the purge vacuum increases in correspondence to the increase in engine speed.

NOTE
If the vacuum does not increase, it is possible that the purge port of the throttle body is blocked and requires cleaning.





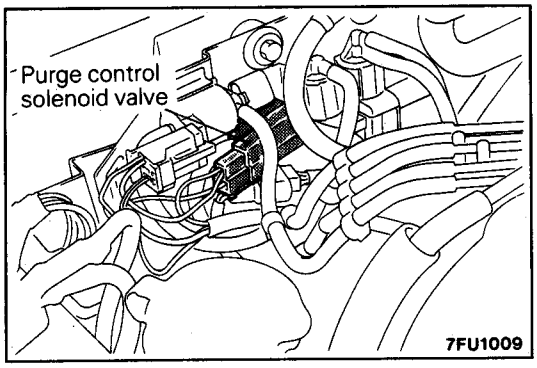
Purge Control Valve E17IBCE

Inspection

(1) Remove the purge control valve.
(2) Connect a hand vacuum pump to the vacuum nipple of the purge control valve.
(3) Apply a vacuum of 400 mmHg (15.7 in.Hg.) and check air-tightness.
(4) Blow in air lightly from the canister side nipple and check conditions as follows.

Hand vacuum pump vacuum	Normal condition
0 mmHg (0 in.Hg.) (No vacuum is applied)	Air does not blow through
200 mmHg (8.0 in.Hg.) or more	Air blow through

(5) Connect a hand vacuum pump to the positive pressure nipple of the purge control valve.
(6) Apply a vacuum of 400 mmHg (15.7 in.Hg.) and check air-tightness.

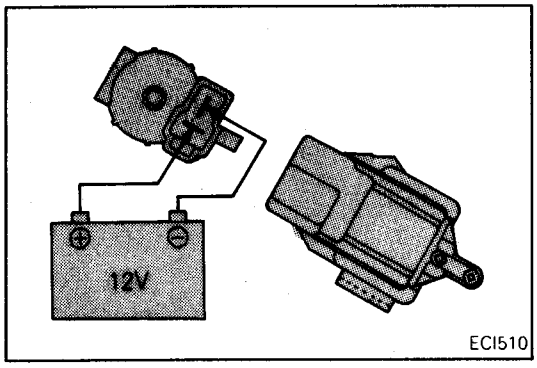


Purge Control Solenoid Valve E171BFI

Inspection

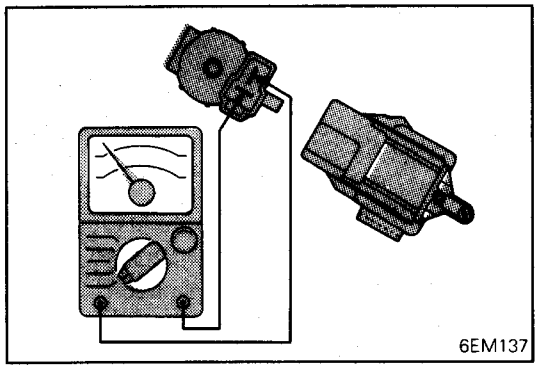
NOTE
When disconnecting the vacuum hose, make an identification mark on it so that it can be reconnected to the original position.

(1) Disconnect the vacuum hoses (non stripe and red stripe hose) from the solenoid valve.
(2) Disconnect the harness connector from solenoid valve.
(3) Connect a hand vacuum pump to the nipple to which the red-striped vacuum hose was connected.



(4) Apply a vacuum and check for air tightness when voltage applied directly to the purge control solenoid valve and when the voltage is discontinued.

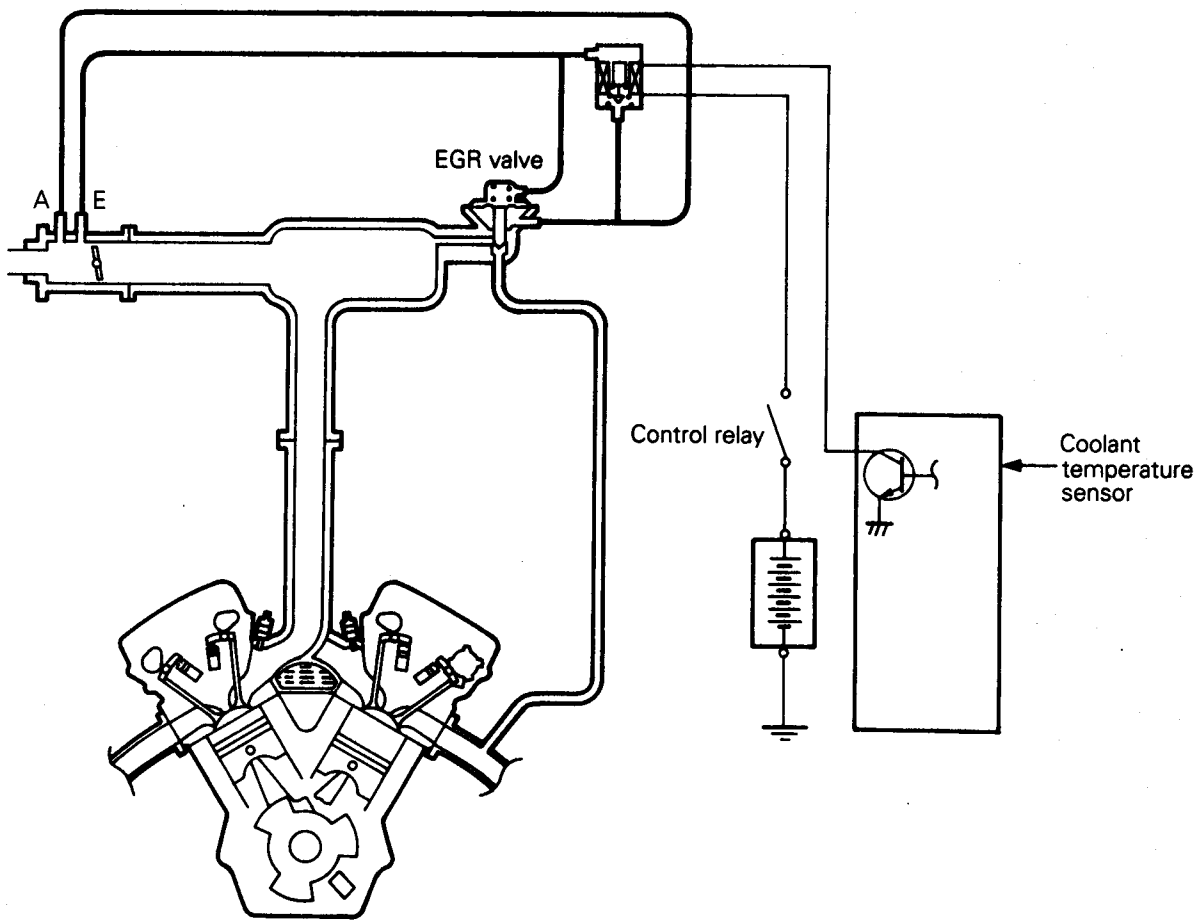
Battery voltage	Result
When applied	Vacuum leaks
When discontinued	Vacuum is maintained



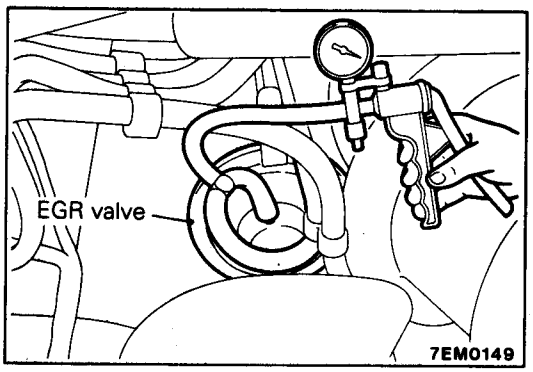
(5) Measure the resistance between the terminals of the solenoid valve.
Standard value: 36 – 44 Ω [at 20°C (68°F)]

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

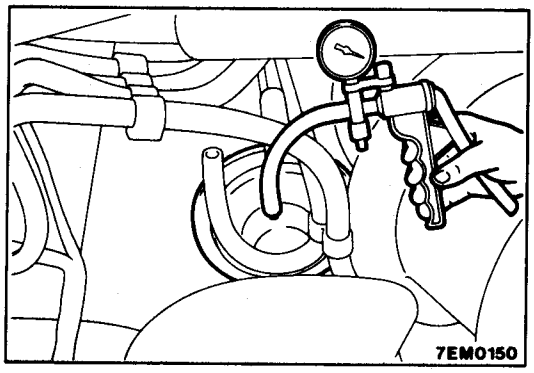
System Inspection



7EM0259



7EM0149



7EM0150

(1) Disconnect the vacuum hose (green stripe) from the EGR valve and connect a hand vacuum pump through the three-way terminal.
(2) Regarding cold condition [coolant temperature: 20°C (68°F) or less] and warm condition [coolant temperature: 80°C (176°F) or more] of the engine, check the following two points:

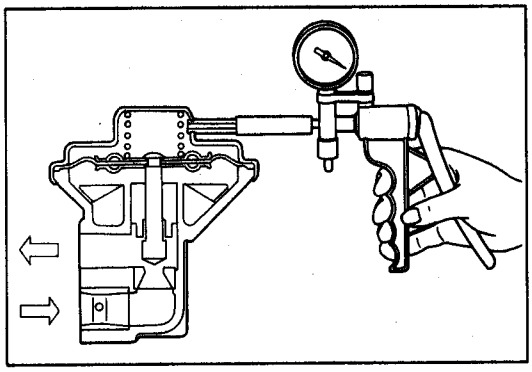
<Cold condition of engine>

Engine operation	Normal state
Race the engine by rapidly pressing in the accelerator pedal.	The negative pressure does not vary. (Atmospheric pressure)

<Warm condition of engine>

Engine operation	Normal state
Race the engine by rapidly pressing in the accelerator pedal.	The negative pressure rises to 100 mmHg (3.9 in.Hg) or more.

(3) Disconnect the three-way terminal, and connect the hand vacuum pump to the EGR valve.
(4) When a vacuum of 230 mmHg (9.1 in.Hg.) is applied during idling, check that the engine stops or idles unstably.



EGR Valve Inspection

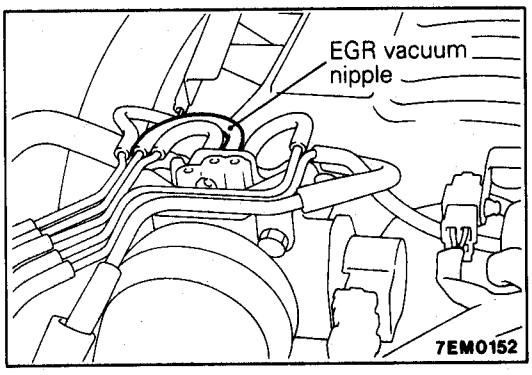
(1) Remove the EGR valve and check it for sticking, deposit of carbon, etc.
If such condition exists, clean with adequate solvent to ensure tight valve seat contact.
(2) Connect a hand vacuum pump to the EGR valve.
(3) Apply a vacuum of 500 mmHg (19.8 in.Hg.) and check airtightness.
(4) Blow in air from one passage of the EGR to check condition as follows.

Applying vacuum	Result
45 mmHg (1.8 in.Hg.) or less	Air does not blow through
230 mmHg (9.1 in.Hg.) or more	Air blow through

Installation

Install a new gasket and EGR valve, tighten bolts to specified torque.

Specified tightening torque: 19 Nm (13 ft.lbs.)

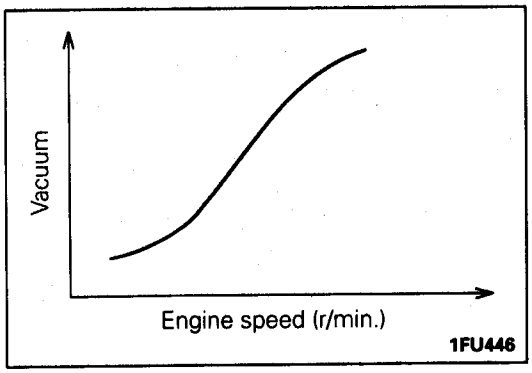


EGR Valve Control Vacuum Inspection

Check Condition

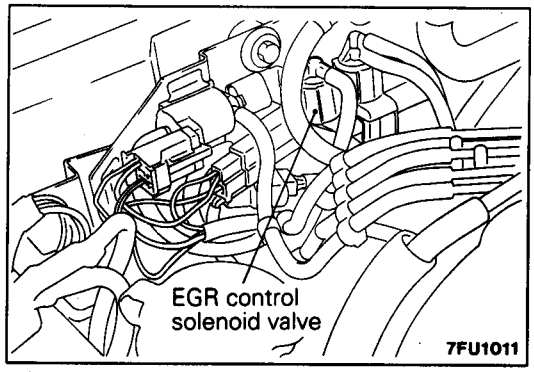
Engine coolant temperature: 80 – 95°C (176 – 205°F)

(1) Disconnect the vacuum hose from the throttle body EGR vacuum nipple and connect a hand vacuum pump to the nipple.



(2) Start the engine and check to see that, after raising the engine speed by racing the engine, vacuum raises proportionately with the rise in engine speed.

NOTE
If there is a problem with the change in vacuum, it is possible that the throttle body port may be clogged and require cleaning.

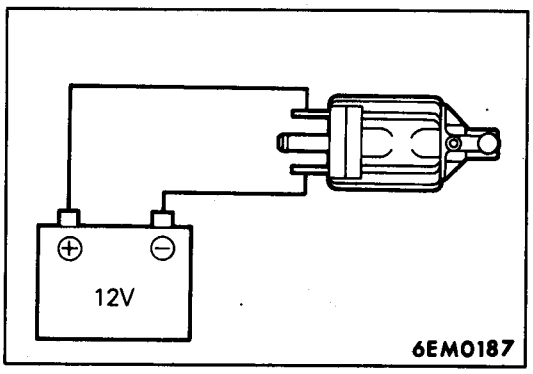


EGR Control Solenoid Valve

Inspection

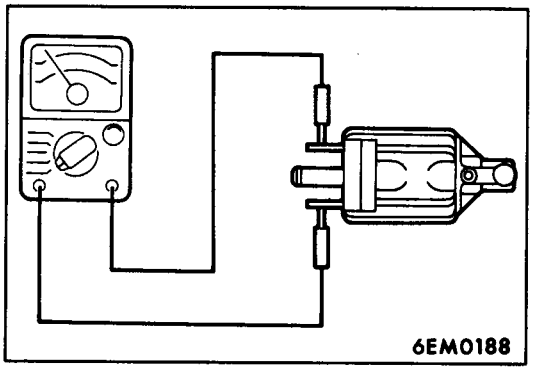
NOTE
When disconnecting the vacuum hose, make an identification mark on it so that it can be reconnected to the original position.

(1) Disconnect the vacuum hose (yellow and green stripe) from the solenoid valve.
(2) Disconnect the harness connector.
(3) Connect a hand vacuum pump to the nipple to which the green-striped vacuum hose was connected.



(4) Apply a vacuum and check for air-tightness when voltage applied directly to the EGR control solenoid valve and when the voltage is discontinued.

Battery voltage	Result
When applied	Vacuum is maintained
When discontinued	Vacuum leaks

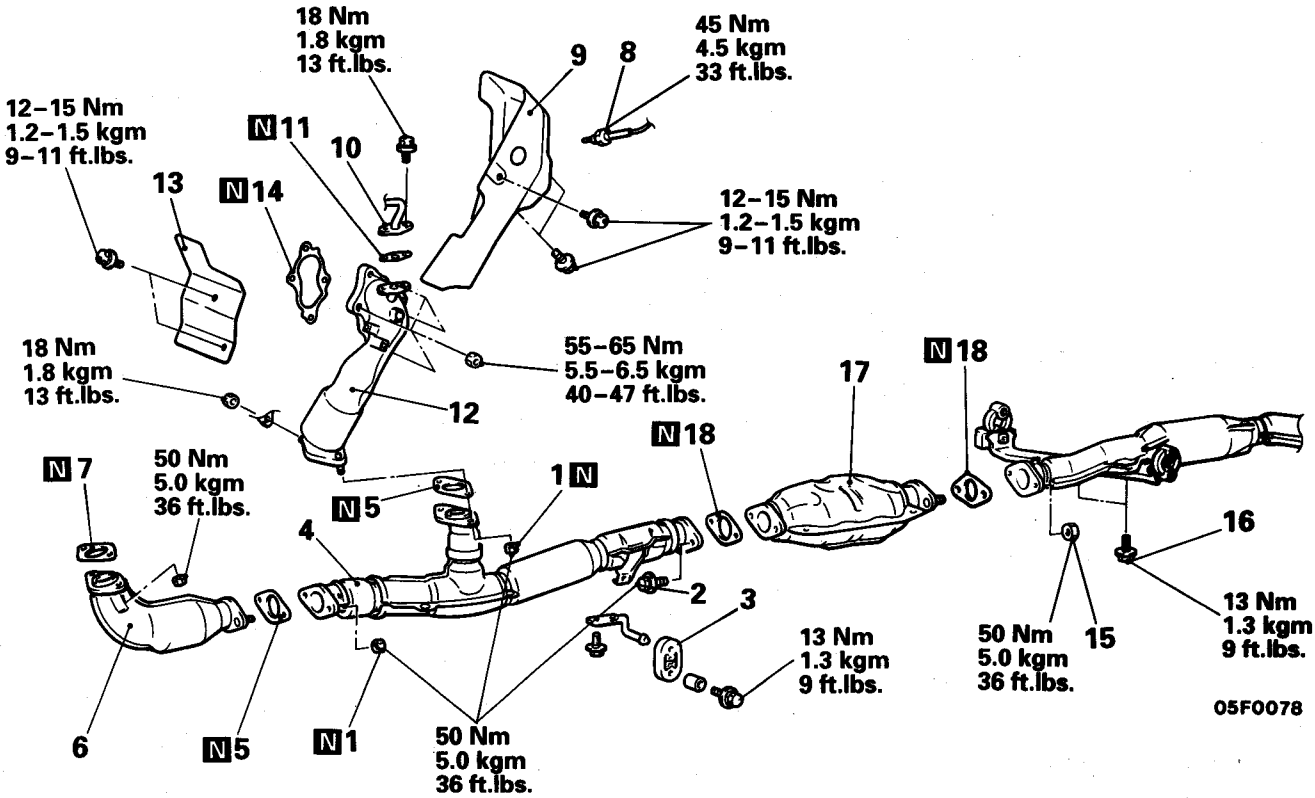


(5) Measure the resistance between the terminals of the solenoid valve.

Standard value: 36 – 44 Ω [at 20°C (68°F)]

CATALYTIC CONVERTER

REMOVAL AND INSTALLATION



Catalytic Converter (Right) removal steps

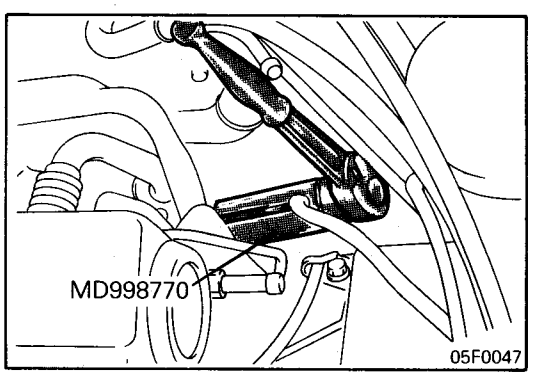
1. Self-locking nuts
2. Bolts
3. Rubber hanger
4. Center exhaust pipe
5. Gasket
6. Catalytic converter (Right)
7. Gasket

Catalytic Converter (Left) removal steps

1. Self-locking nuts
2. Bolts
3. Rubber hanger
4. Center exhaust pipe
5. Gasket
- ◆◆ 8. Oxygen sensor connection
9. Heat protector D
10. EGR pipe connection
11. Gasket
12. Catalytic converter (Left)
13. Heat protector E
14. Gasket

Catalytic Converter removal steps

2. Bolts
15. Nuts
16. Hanger bracket installation bolts
17. Catalytic converter
18. Gasket



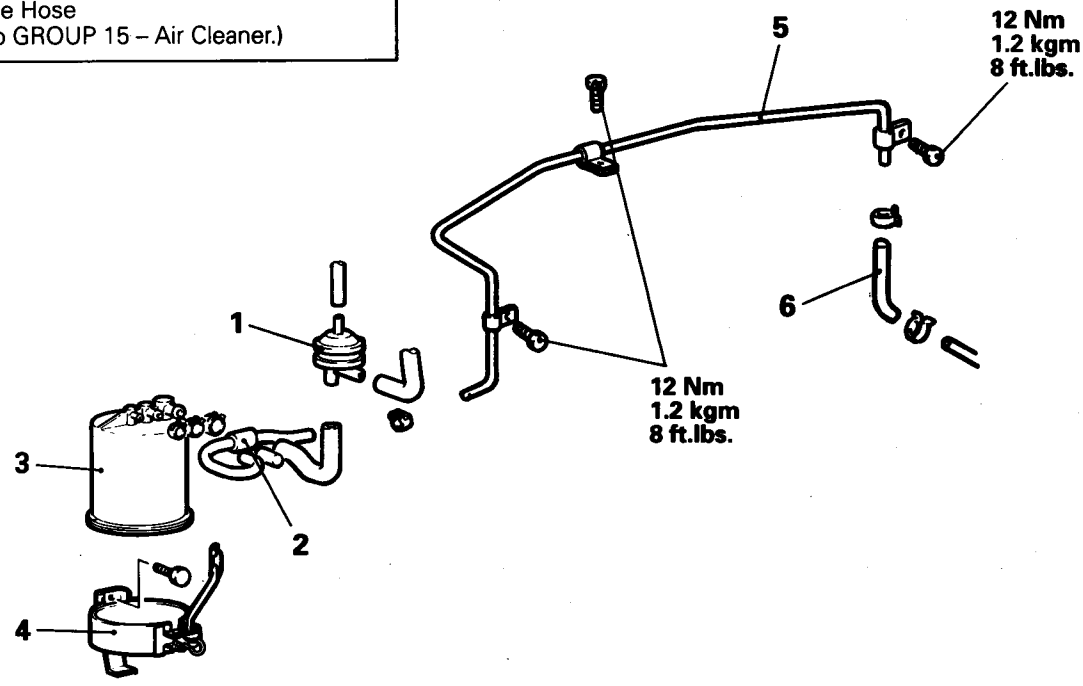
SERVICE POINTS OF REMOVAL

8. REMOVAL OF OXYGEN SENOR

CANISTER

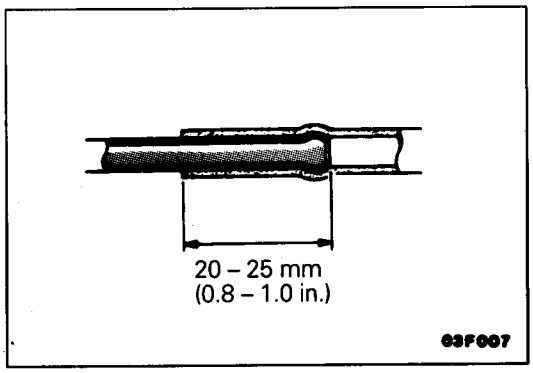
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of Air Cleaner and Air Intake Hose
  (Refer to GROUP 15 – Air Cleaner.)



Removal steps
1. Purge control valve
◆◆ 2. Fuel vapour hose
3. Canister
4. Canister bracket
5. Vapour pipe
◆◆ 6. Fuel vapour hose

NOTES



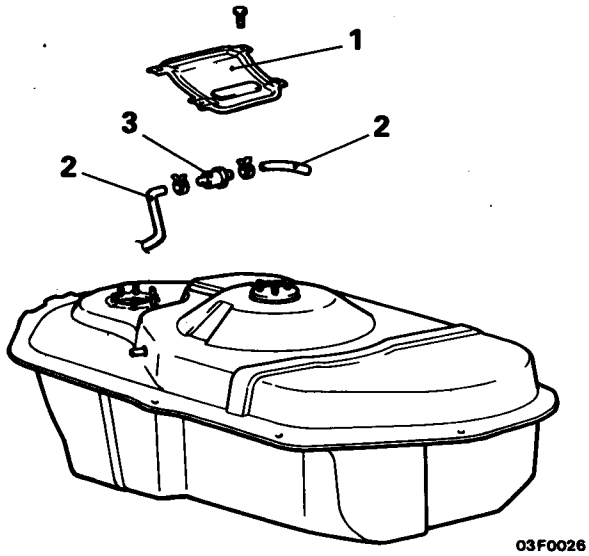
SERVICE POINTS OF INSTALLATION

6./2. INSTALLATION OF FUEL VAPOUR HOSE

If the pipe has a stepped part, connect securely up to the stepped part. If the pipe has no stepped part, insert so that the inserted portion is 20 – 25 mm (0.8 – 1.0 in.) long.

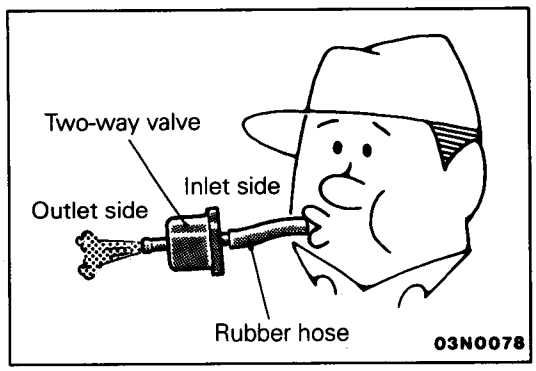
TWO-WAY VALVE

REMOVAL AND INSTALLATION



Removal steps

- ◆◆ 1. Fuel gauge unit cover
- 2. Connection for vapour hose
- ◆◆ 3. Two-way valve

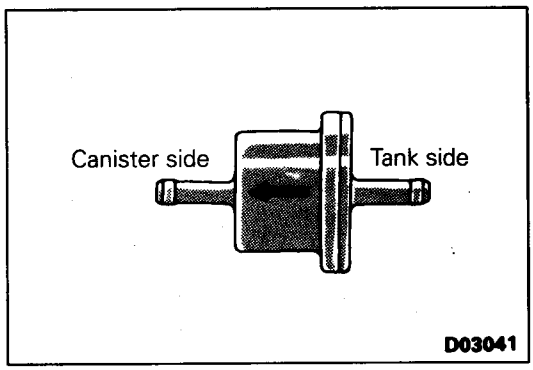


INSPECTION

TWO-WAY VALVE

Connect a clean rubber hose to the two-way valve and check for operation.

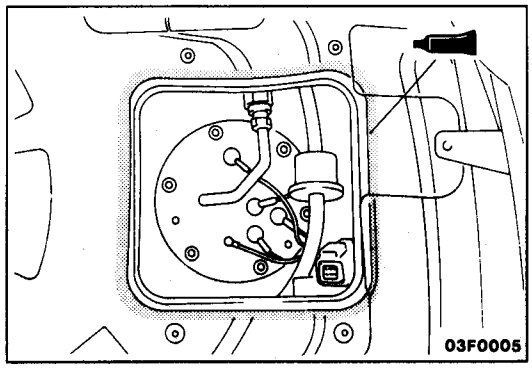
Inspection procedure	Normal condition
Lightly blow from the inlet (fuel tank) side	Air passes through after a slight resistance
Lightly blow from the outlet (canister) side	Air passes through



SERVICE POINTS OF INSTALLATION

3. INSTALLATION OF TWO-WAY VALVE

Install so that the two-way valve is facing in the direction shown in the illustration.



1. INSTALLATION OF FUEL GAUGE UNIT COVER

Before installing the fuel gauge unit cover, apply the specified sealant to the rear floor pan.

Specified sealant: 3M ATD Part No. 8509 or equivalent

NOTES

CLUTCH

CONTENTS

E21AA-

SPECIFICATIONS

GENERAL SPECIFICATIONS

E21CA--

Items		Specifications
Clutch operating method		Hydraulic type
Clutch disc		
Type		Single dry disc type
Facing diameter		
O.D. x I.D.	mm (in.)	250 x 160 (9.8 x 6.3)
Clutch cover assembly		
Type		Diaphragm spring strap drive type
Setting load	N (kg, lbs.)	9,200 (920, 2,024)
Clutch release cylinder		
I.D.	mm (in.)	17.46 (11/16)
Clutch master cylinder		
I.D	mm (in.)	15.87 (5/8)
Clutch booster		
Type		Vacuum type
Effective dia. of power cylinder	mm (in.)	101 (4.0)
Boosting ratio [Clutch pedal depressing force]		1.7 [at 110 N (11 kg, 24 lbs.)]

SERVICE SPECIFICATIONS

E21CB--

Items		Specifications
Standard value		
Clutch pedal height	mm (in.)	183 – 188 (7.20 – 7.40)
Clutch pedal clevis pin play	mm (in.)	1 – 3 (0.04 – 0.12)
Clutch pedal free play	mm (in.)	12 – 20 (0.49 – 0.79)
Distance between the clutch pedal and the firewall when the clutch is disengaged	mm (in.)	55 (2.2) or more
Booster push rod to master cylinder piston clearance	mm (in.)	0.21 – 0.46 (0.0082 – 0.0181)

LUBRICANTS

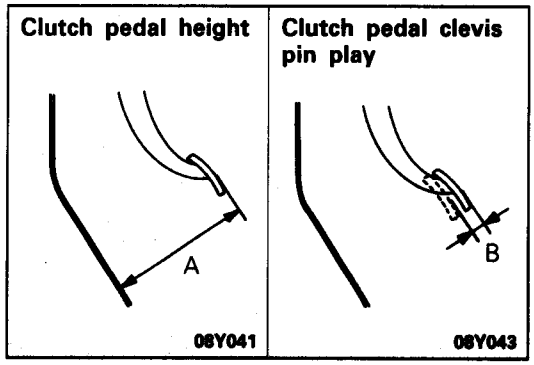
E21CD--

Items	Specified lubricants	Quantity
Release cylinder push rod end	MITSUBISHI genuine grease Part No. 0101011 or equivalent	As required
Clutch fluid Inner surface of clutch master cylinder and outer circumference of piston assembly	DOT3 or DOT4	

SEALANT

E21CE--

Items	Specified lubricants	Remarks
Thread part fitting	3M ADT Part No. 8661 or equivalent	Semi-drying sealant



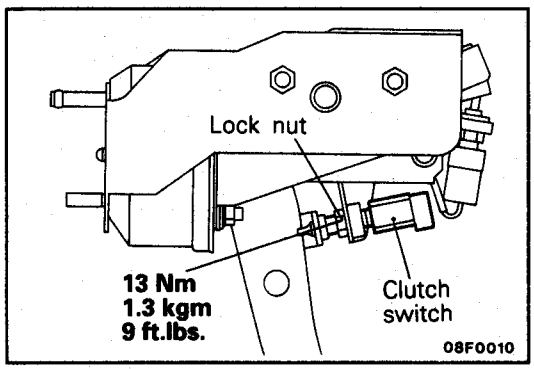
SERVICE ADJUSTMENT PROCEDURES

CLUTCH PEDAL INSPECTION AND ADJUSTMENT

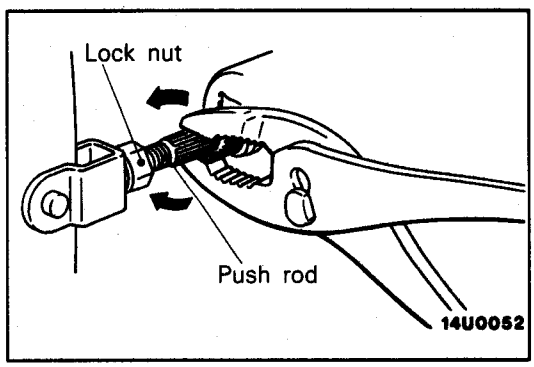
E21FAAR

1. Measure the clutch heidal height (from the face of the pedal pad to the toeboard) and the clutch pedal clevis pin play (measured at the face of the pedal pad.)

Standard value (A): 183 – 188 mm (6.97 – 7.17 in.)
Standard value (B): 1–3 mm (0.04–0.12 in.)

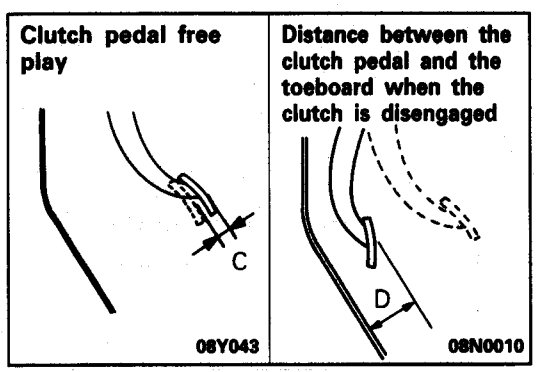


2. If either the clutch pedal height or the clutch pedal clevis pin play are not within standard value range, adjust as follows:
   (1) Disconnect the clutch switch connector and turn the switch for standard clutch pedal height. Then lock with the lock nut.



   (2) Turn the push rod to adjust the clutch pedal clevis pin play to agree with the standard value and then secure the push rod with the lock nut.

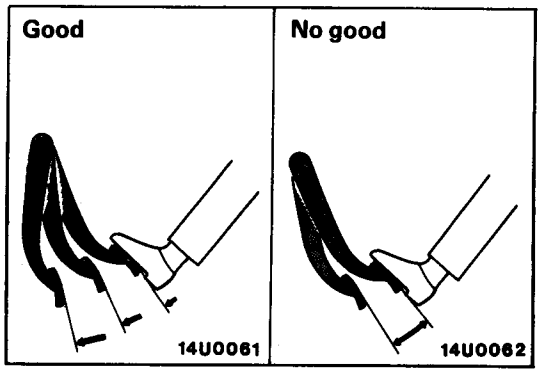
Caution
When adjusting the clutch pedal clevis pin play, be careful not to push the push rod toward the master cylinder.

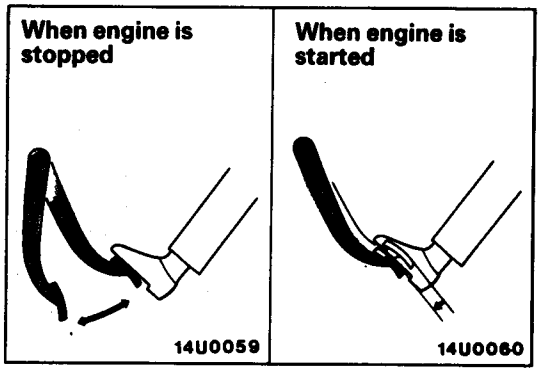


3. After completing the adjustments, confirm that the clutch pedal free play (measured at the face of the pedal pad) and the distance between the clutch pedal (the face of the pedal pad) and the toeboard when the clutch is disengaged are within the standard value ranges.

Standard value (C): 12 – 20 mm (0.49 – 0.79 in.)
Standard value (D): 55 mm (2.2 in.) or more

4. If the clutch pedal free play and the distance between the clutch pedal and the toeboard when the clutch is disengaged do not agree with the standard values. It is probably the result of either air in the hydraulic system or a faulty master cylinder or clutch. Bleed the air, or disassemble and inspect the master cylinder or clutch.





CLUTCH BOOSTER OPERATING INSPECTION E21FFAA

For simple checking of clutch booster operation, carry out the following tests.

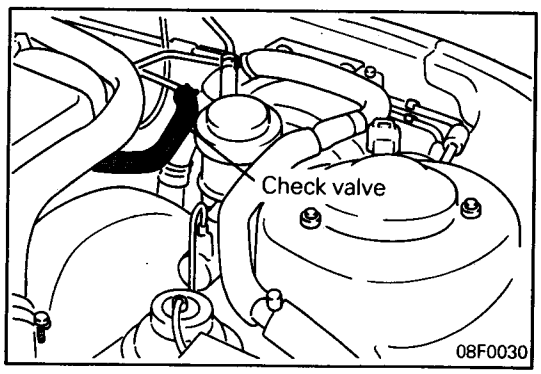
(1) Run the engine for one or two minutes, and then stop it.

(2) Step on the clutch pedal several times with normal pressure.
If the pedal depressed fully the first time but gradually becomes higher when depressed succeeding times, the booster is operating properly.
If the pedal height remains unchanged, the booster is faulty.

(3) With the engine stopped, step on the clutch pedal several times with the same foot pressure to make sure that the pedal height will not change.
Then step on the clutch pedal and start the engine.
If the pedal moves downward slightly, the booster is in good condition. If there is no change, the booster is faulty.

(4) With the engine running, step on the clutch pedal and then stop the engine.
Hold the pedal depressed for 30 seconds. If the pedal height does not change, the booster is in good condition.
If the pedal rises, the booster is faulty.

If the above three tests are okay, the booster performance can be determined as good.
If one of the above three tests is not okay at last, the check valve, vacuum hose, or booster will be faulty.

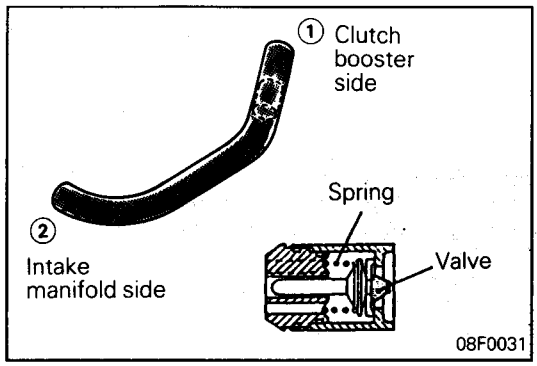


CHECK VALVE OPERATION CHECK E21FGAA

When checking the check valve, keep the check valve fit in the vacuum hose.

1. Remove the vacuum hose.

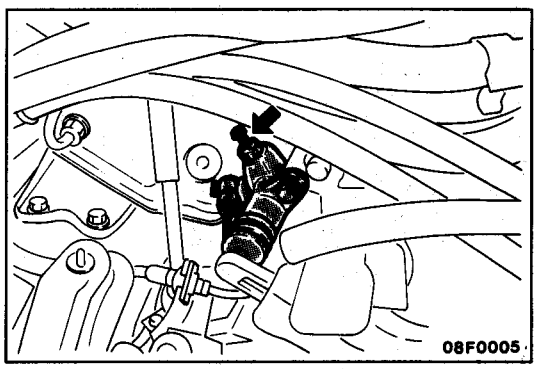
Caution
The check valve is press-fit inside the vacuum hose and do not remove the check valve from the vacuum hose.



2. Check the operation of the check valve by using a vacuum pump.

Vacuum pump connection	Accept/reject criteria
Connection at the clutch booster side ①	A negative pressure (vacuum) is created and held.
Connection at the intake manifold side ②	A negative pressure (vacuum) is not created.

Caution
If the check valve is defective, replace it as an assembly unit together with the vacuum hose.



BLEEDING E21FEAB

Whenever the clutch tube, the clutch hose, and/or the clutch master cylinder have been removed, or if the clutch pedal is spongy, bleed the system.

Specified fluid: DOT3 or DOT4

Caution
Use the specified fluid. Avoid using a mixture of the specified fluid and other fluid.

CLUTCH PEDAL

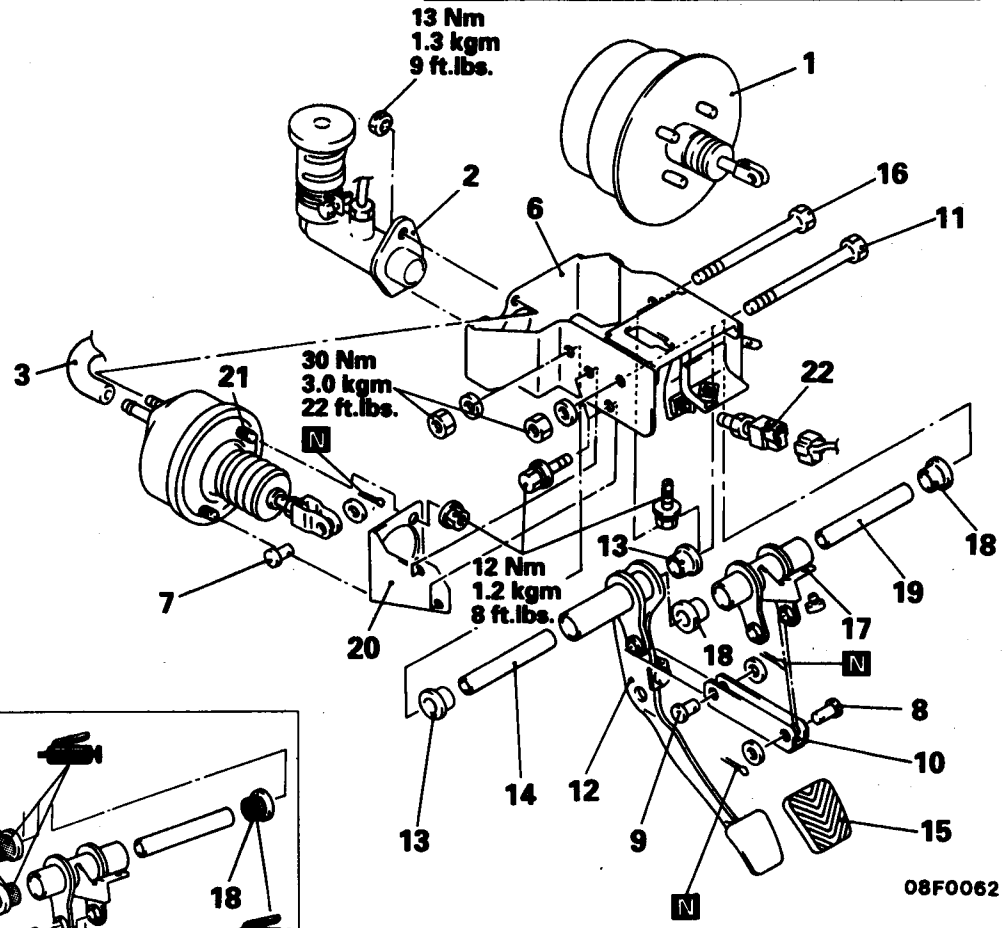
E21PA–

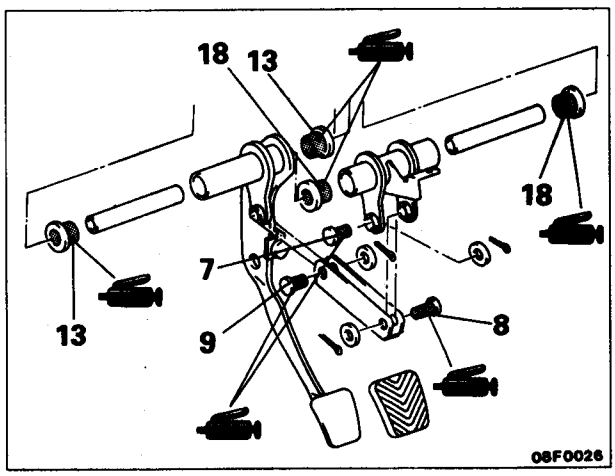
REMOVAL AND INSTALLATION

<L.H. drive vehicles>

Pre-removal Operation
- Removal of Steering Column Assembly (Refer to GROUP 37A – Steering Wheel and Shaft.)

Post-installation Operation
- Installation of Steering Column Assembly (Refer to GROUP 37A – Steering Wheel and Shaft.)
- Adjustment of Clutch Pedal (Refer to P.21 – 3.)



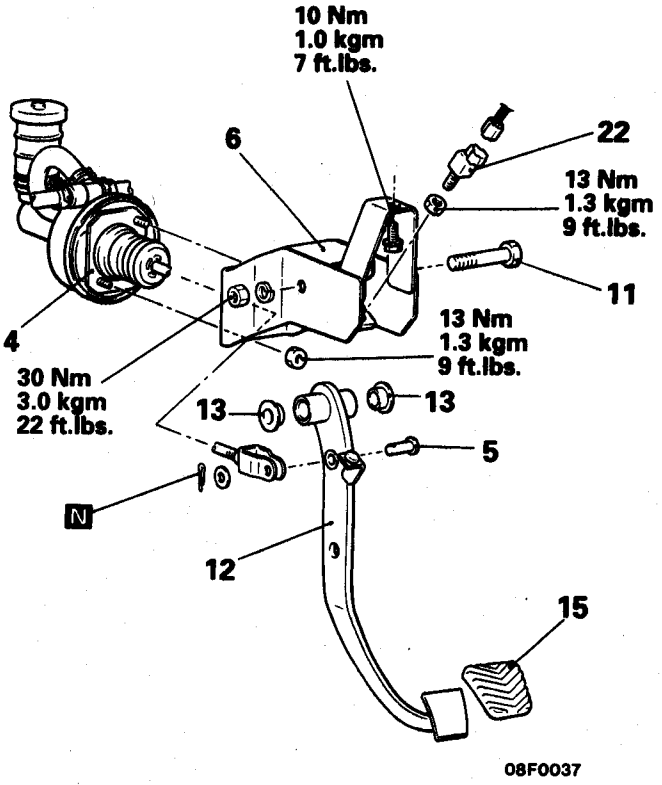


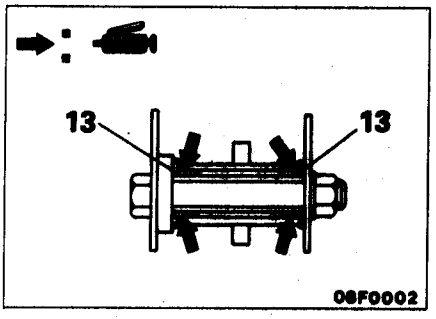
Removal steps

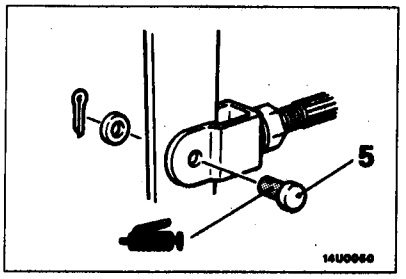
1. Brake booster (Refer to GROUP 35 – Brake Booster.)
2. Connection of clutch master cylinder
3. Connection for vacuum hose
6. Pedal support bracket
7. Clevis pin
8. Clevis pin
9. Clevis pin
10. Yoke
11. Clutch pedal shaft
12. Clutch pedal
13. Bushing
14. Spacer
15. Clutch pedal pad
16. Bolt
17. Lever assembly
18. Bushing
19. Spacer
20. Support bracket
21. Clutch booster
22. Clutch switch

<R.H. drive vehicles>

Post-installation Operation
- Adjustment of Clutch Pedal (Refer to P.21 – 3.)







Removal steps
4. Connection for clutch booster
5. Clevis pin
6. Pedal support member
11. Pedal shaft
12. Clutch pedal
13. Bushing
15. Pedal pad
22. Clutch switch

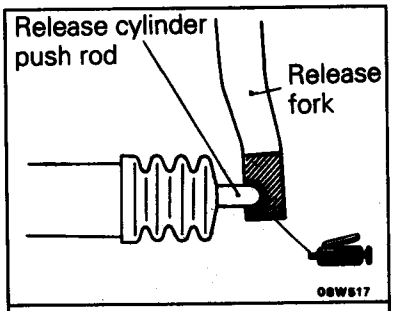
CLUTCH CONTROL

E21JA--

REMOVAL AND INSTALLATION

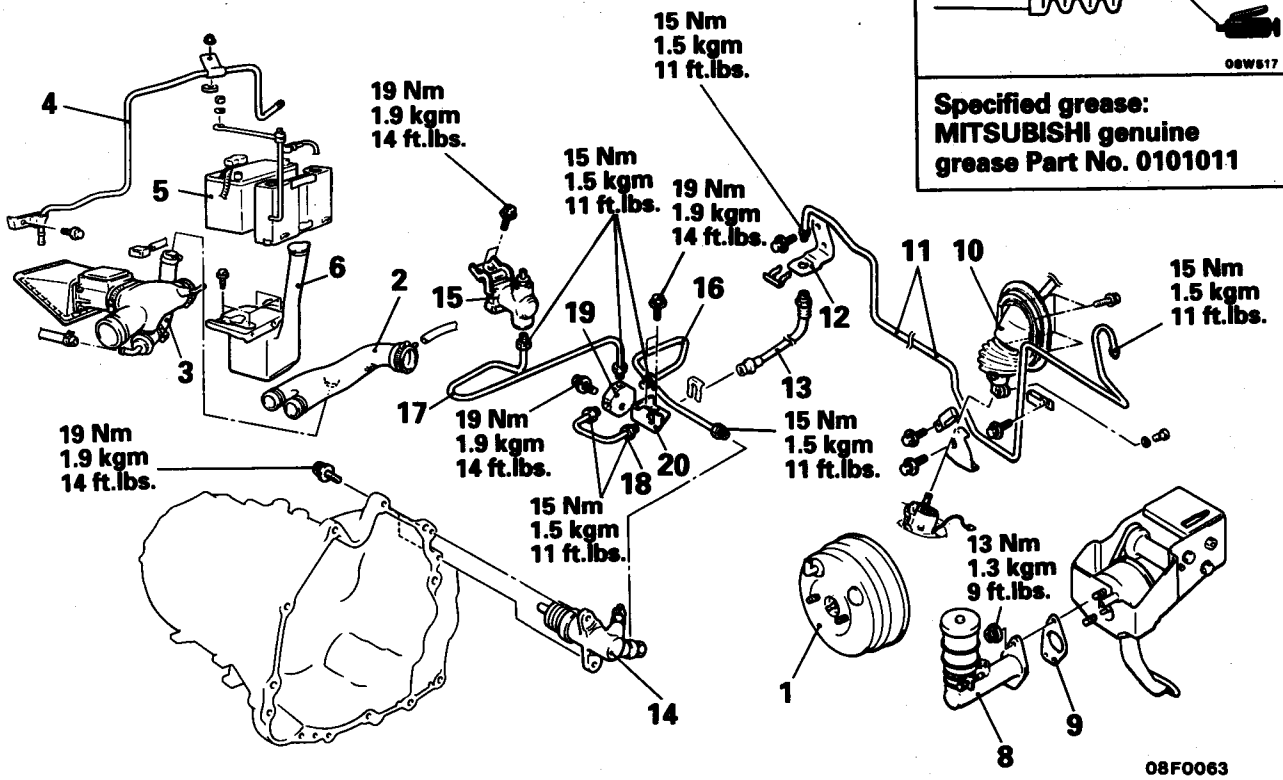
Pre-removal Operation
- Draining of the Clutch Fluid

Post-installation Operation
- Supplying of Clutch Fluid
- Bleeding of the Clutch Line (Refer to P.21 – 5.)
- Adjustment of Clutch Pedal (Refer to P.21 – 3.)



Specified grease: MITSUBISHI genuine grease Part No. 0101011

<L.H. drive vehicles>



Clutch master cylinder removal steps

1. Brake booster (Refer to GROUP 35 – Brake Booster.)
8. Clutch master cylinder
◆◆ ● Adjustment of piston to push rod clearance
9. Sealer

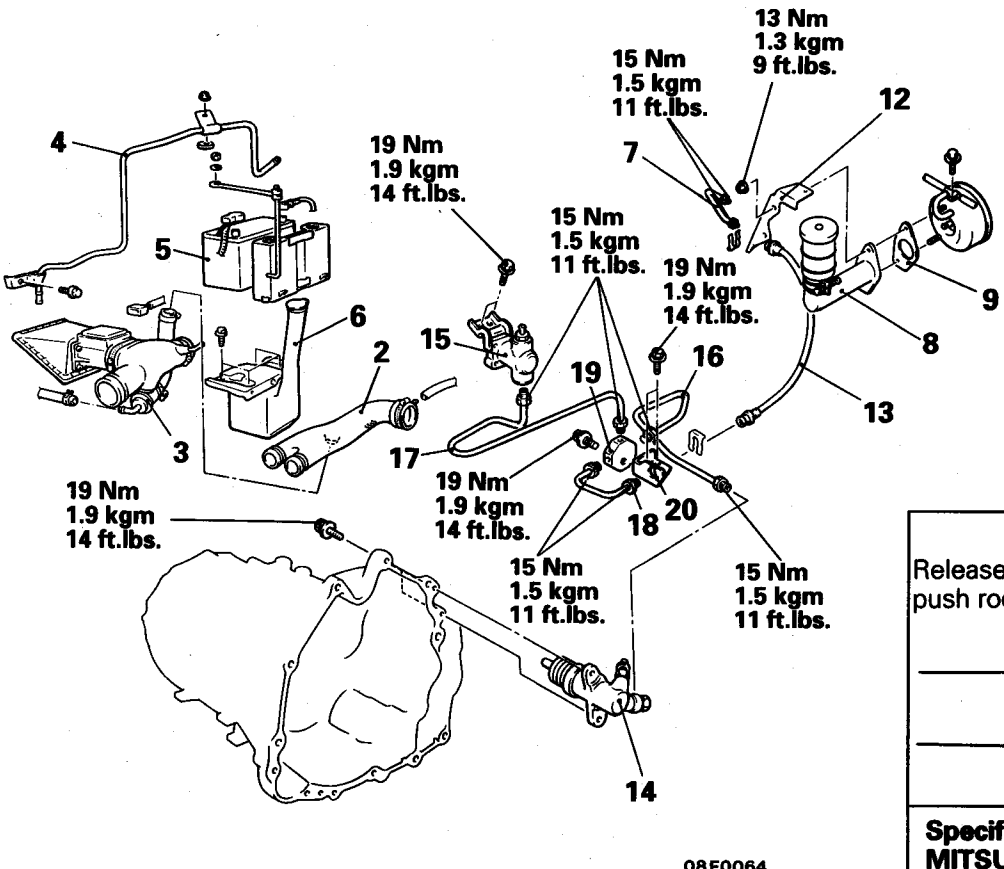
Clutch release cylinder removal steps

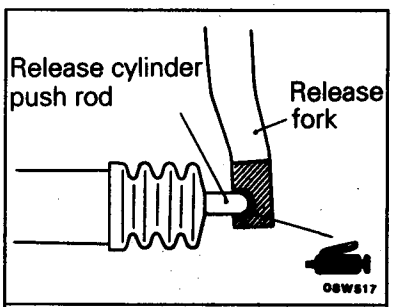
◆◆ 2. Air hose A
◆◆ 3. Air cleaner cover, air intake hose A
◆◆ 4. Vacuum pipe
5. Battery
6. Battery seat, washer tank
◆◆ 14. Clutch release cylinder

Clutch line removal steps

1. Brake booster (Refer to GROUP 35 – Brake Booster.)
◆◆ 2. Air hose A
◆◆ 3. Air cleaner cover, air intake hose A
◆◆ 4. Vacuum pipe
5. Battery
6. Battery seat, washer tank
10. Steering column assembly (Refer to GROUP 37A – Steering Wheel and Shaft.)
11. Clutch tube
12. Clutch hose bracket
13. Clutch hose
15. Clutch damper
16. Clutch tube B
17. Clutch tube C
18. Clutch tube D
19. Connector
20. Clutch tube bracket

<R.H. drive vehicles>





Specified grease: MITSUBISHI genuine grease Part No. 0101011

Clutch master cylinder removal steps

- 2. Air hose A
- 3. Air cleaner cover, air intake hose A
- 4. Vacuum pipe
- 5. Battery
- 6. Battery seat, washer tank
- 7. Connection for clutch tube A
- 8. Clutch master cylinder
- ● Adjustment of piston to push rod clearance
- 9. Sealer

Clutch release cylinder removal steps

- 2. Air hose A
- 3. Air cleaner cover, air intake hose A
- 4. Vacuum pipe
- 5. Battery
- 6. Battery seat, washer tank
- 14. Clutch release cylinder

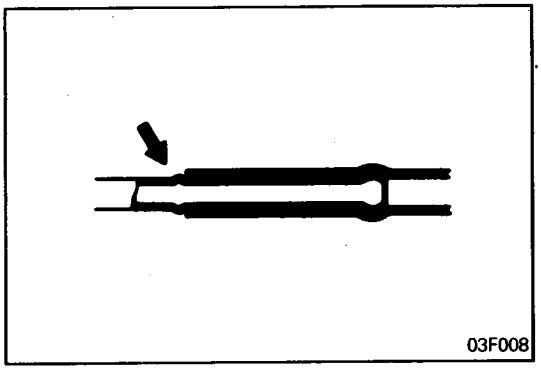
Clutch line removal steps

- 2. Air hose A
- 3. Air cleaner cover, air intake hose A
- 4. Vacuum pipe
- 5. Battery
- 6. Battery seat, washer tank
- 7. Clutch tube A
- 12. Clutch hose bracket
- 13. Clutch hose
- 15. Clutch damper
- 16. Clutch tube B
- 17. Clutch tube C
- 18. Clutch tube D
- 19. Connector
- 20. Clutch tube bracket

SERVICE POINTS OF REMOVAL E21JBBI

14. REMOVAL OF CLUTCH RELEASE CYLINDER

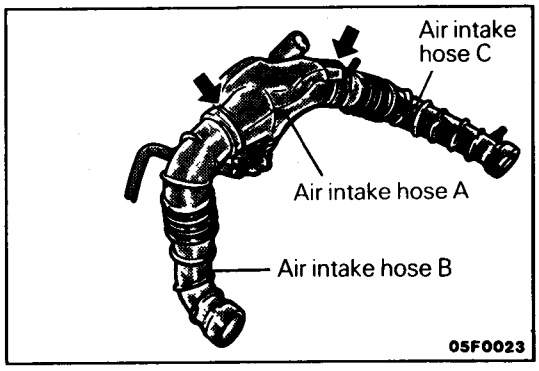
Use a flat type short box wrench to remove the clutch release cylinder mounting bolts.



SERVICE POINTS OF INSTALLATION E21JDBH

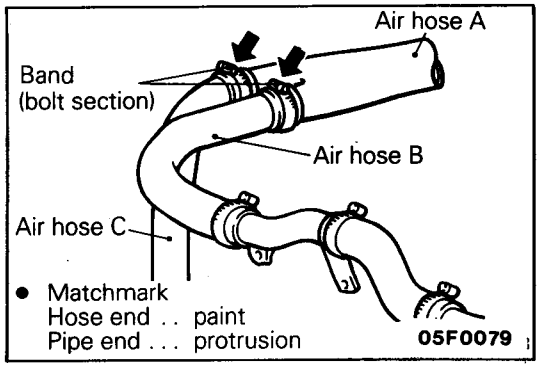
4. INSTALLATION OF VACUUM PIPE

If the vacuum pipe has a stepped part, connect the vacuum hose to the pipe securely, up to the stepped part, as shown in the illustration.



3. INSTALLATION OF AIR CLEANER COVER, AIR INTAKE HOSE A

Align slots indicated by arrows in air intake hose A with △ markings on air intake hoses B and C; then, insert hoses B and C all the way into air intake hose A.
Insert air intake hoses B and C all the way up to the roots on the turbocharger end.

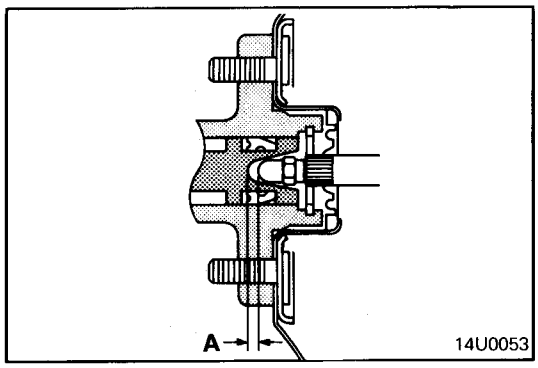


2. INSTALLATION OF AIR HOSE A

(1) Connect the air hoses ensuring that paint marks on hose end are aligned with protrusions.
Insert air hoses B and C into pipe all the way to its step.

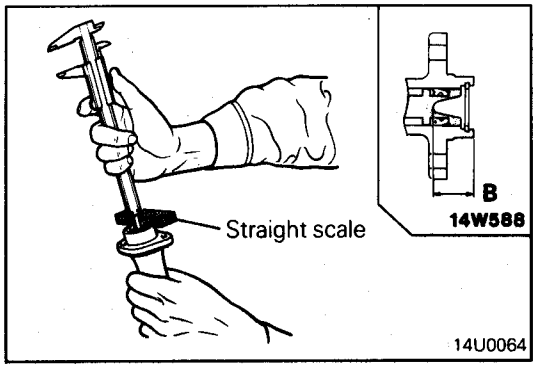
Caution
Be careful not to allow any foreign matter to get into the hoses, pipes, or the intercooler itself.

(2) Connect the hoses with the bolt section of the band upward.



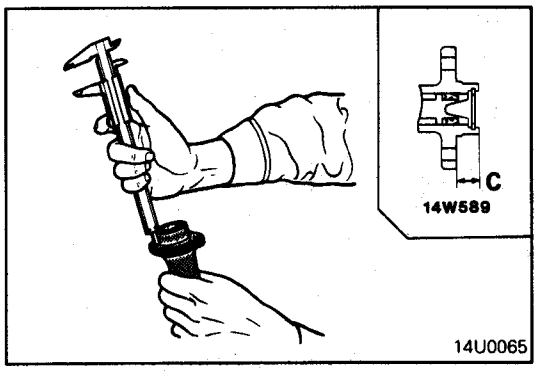
• ADJUSTMENT OF CLEARANCE BETWEEN CLUTCH BOOSTER PUSH ROD AND PISTON

Adjust the clearance (A) between the clutch booster push rod and piston as follows:

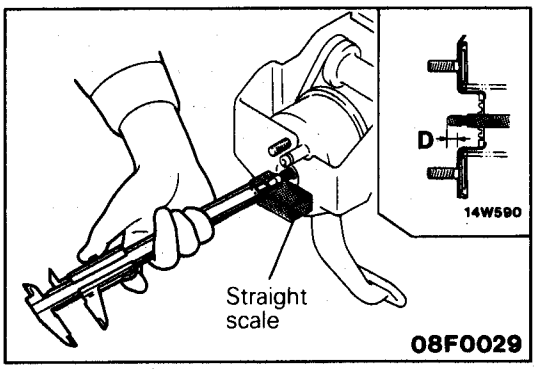


(1) Measure the dimension (B) between the master cylinder end face and piston.

NOTE
To obtain (B), first take measurement with a square placed on the master cylinder end face. Then, subtract the thickness of the square to arrive at (B).



(2) Obtain the dimension (C) between the clutch booster mounting surface on the master cylinder and the end face.



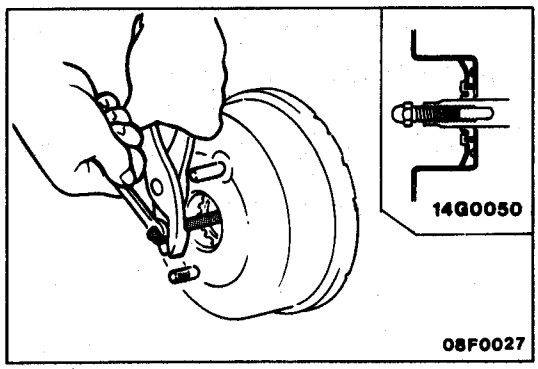
(3) Measure the dimension (D) between the master cylinder mounting surface on clutch booster and the push rod end.

NOTE
To obtain (D), first take measurement with a square placed on the clutch booster. Then, subtract the thickness of the square to arrive at (D).

(4) Using the measured values obtained in (1) through (3), obtain the clearance (A) between the clutch booster push rod and piston.

Standard value: [A (A = B – C – D)]
0.21 – 0.46 mm (0.0082 – 0.0181 in.)
[Atmospheric pressure]

[When the clutch booster negative pressure of 66.7 kPa (0.67 kg/cm^2, 9.7 psi) is applied, the clearance (A) becomes 0.1 to 0.3 mm (0.0039 to 0.0118 in.).]



(5) If the clearance is not within the standard value range, adjust by changing the push rod length by turning the adjustable end of the push rod.

Caution
Insufficient clearance may cause the slippage or seizure of the clutch.

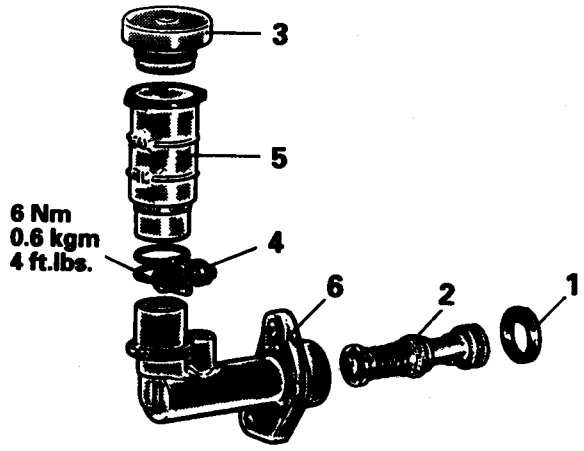
CLUTCH MASTER CYLINDER

E21SE--

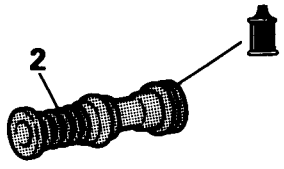
DISASSEMBLY AND REASSEMBLY

Disassembly steps

1. Snap ring
2. Piston assembly
3. Reservoir cap
4. Reservoir band
5. Reservoir
6. Master cylinder body



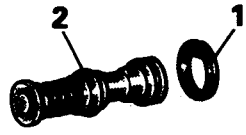
08F0038



08F0041

Brake fluid:
DOT3 or DOT4

Master cylinder kit



09F0134

SERVICE POINTS OF DISASSEMBLY

E219FAG

2. REMOVAL OF PISTON ASSEMBLY

Caution

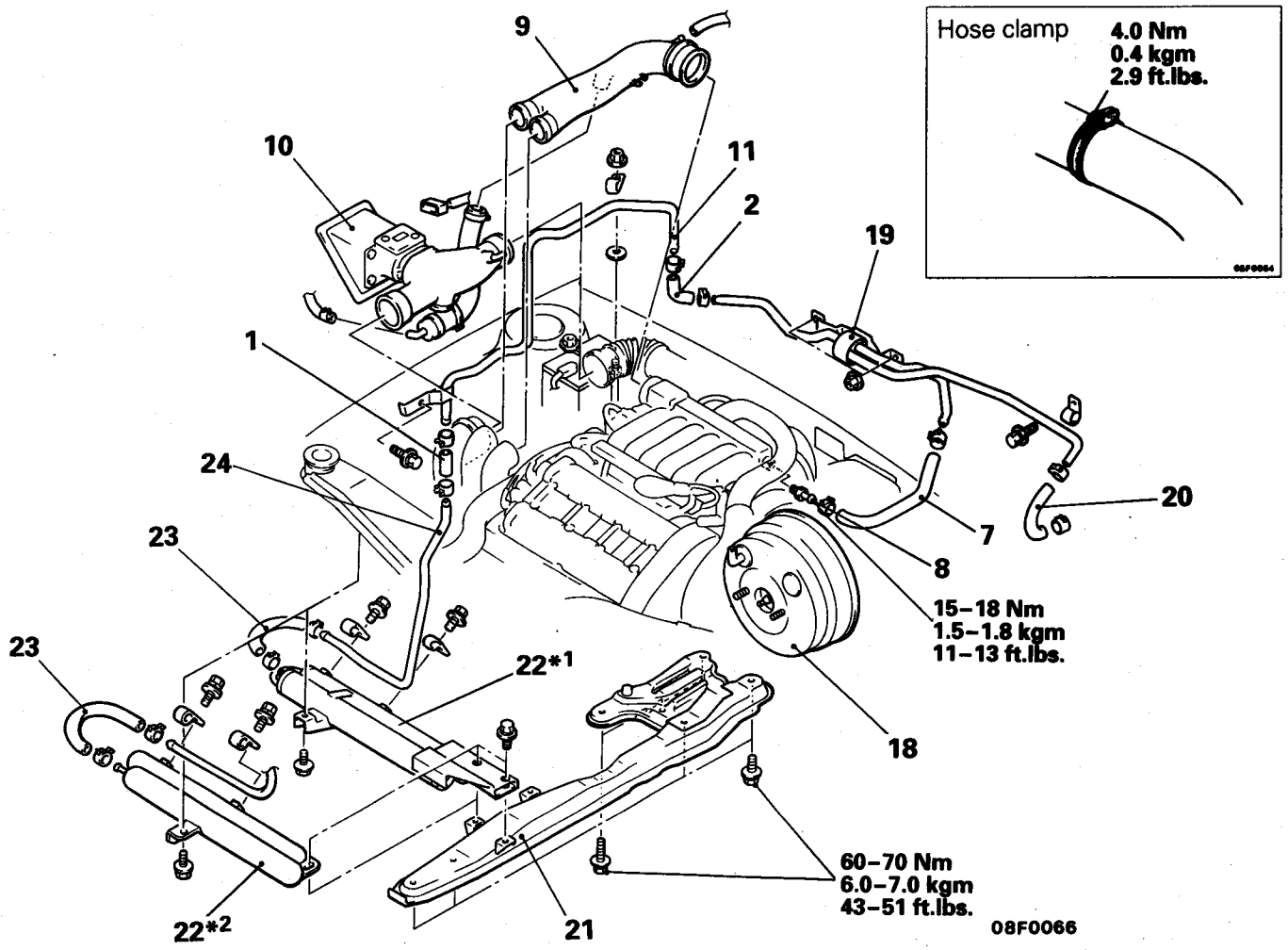
1. **Do not damage the master cylinder body and piston assembly.**
2. **Do not disassemble piston assembly.**

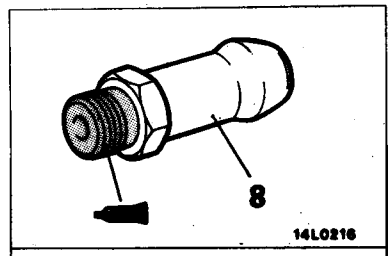
CLUTCH VACUUM LINE, VACUUM TANK

REMOVAL AND INSTALLATION

E21VA-

<L.H. drive vehicles>





Sealant:
3M ATD Part No. 8661
or equivalent

◆◆ 1. Vacuum hose A
◆◆ 2. Vacuum hose B
◆◆ 7. Vacuum hose with check valve
8. Fitting

Vacuum pipe and hose removal steps

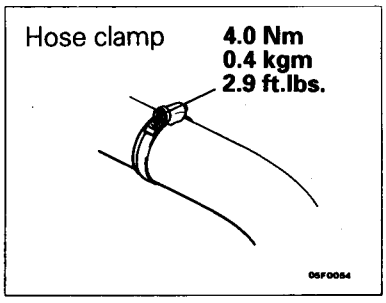
◆◆ 9. Air hose A
◆◆ 10. Air cleaner cover, air intake hose A
11. Vacuum pipe
18. Brake booster
(Refer to GROUP 35 – Brake Booster.)
19. Vacuum pipe
◆◆ 20. Vacuum hose

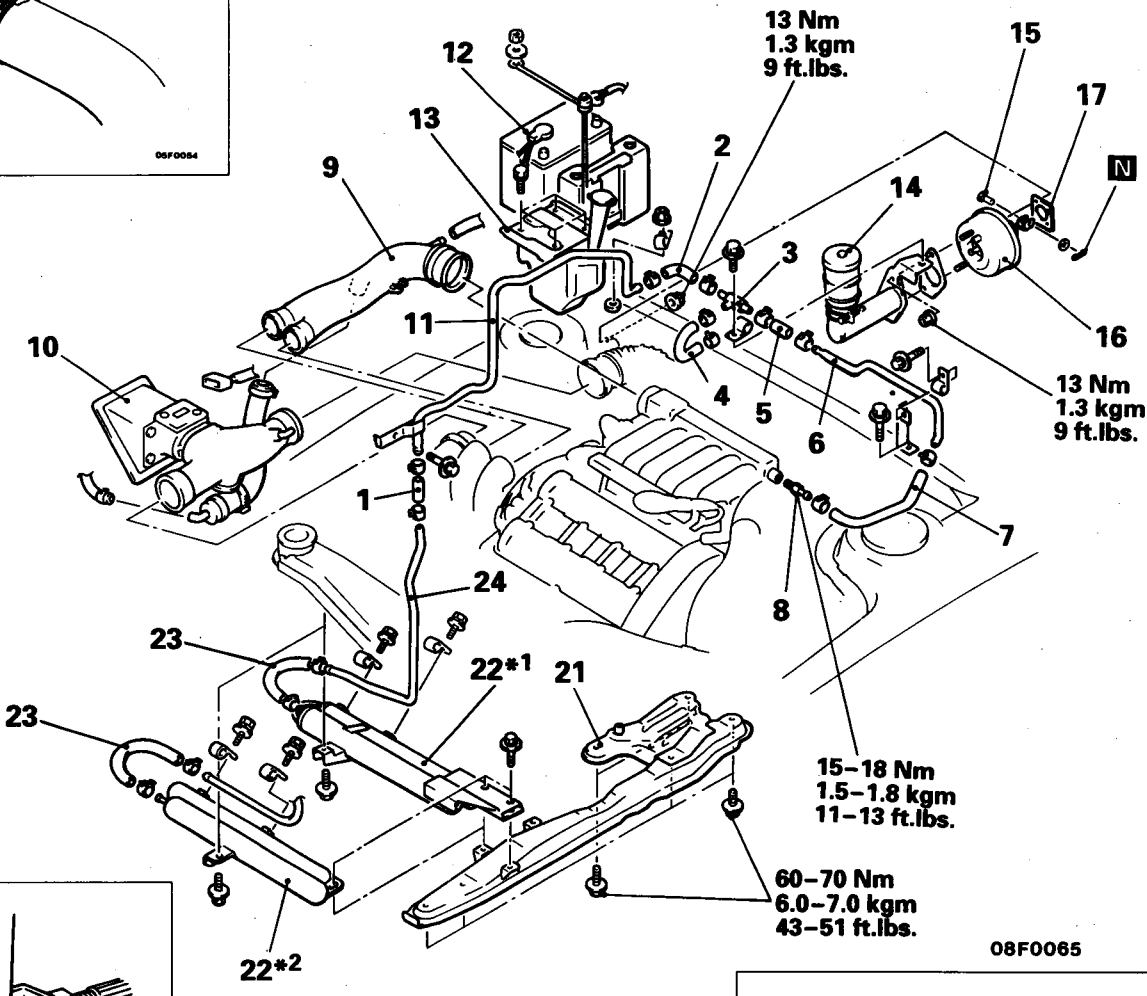
Vacuum tank assembly removal steps

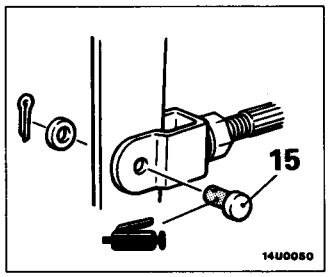
21. Right member
22. Vacuum tank assembly
◆◆ 23. Vacuum hose
24. Vacuum pipe

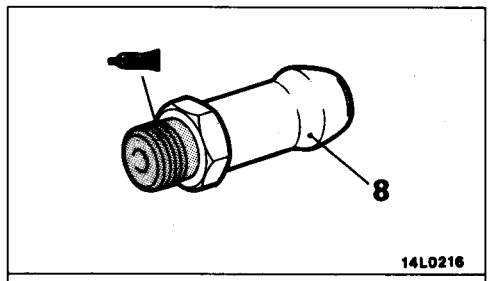
NOTE
*1: 5-speed manual transmission
*2: 6-speed manual transmission

<R.H. drive vehicles>









Sealant: 3M ATD Part No. 8661 or equivalent

- 1. Vacuum hose A
- 2. Vacuum hose B
- 3. Connector
- 4. Vacuum hose C
- 5. Vacuum hose D
- 6. Vacuum pipe
- 7. Vacuum hose with check valve
- 8. Fitting

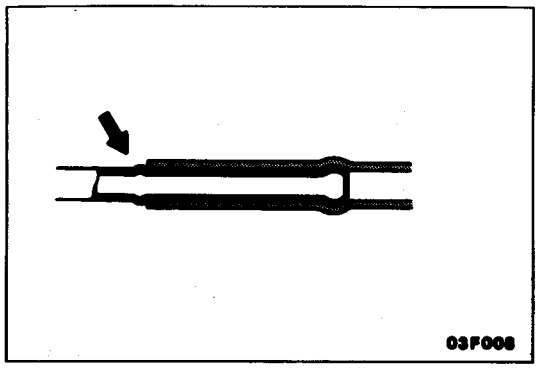
Vacuum pipe and clutch booster removal steps

- 9. Air hose A
- 10. Air cleaner cover, air intake hose A
- 11. Vacuum pipe
- 12. Battery
- 13. Battery seat, washer tank
- 14. Connection for clutch master cylinder
- 15. Clevis pin
- 16. Clutch booster
- 17. Spacer

Vacuum tank removal steps

- 21. Right member
- 22. Vacuum tank
- 23. Vacuum hose
- 24. Vacuum pipe

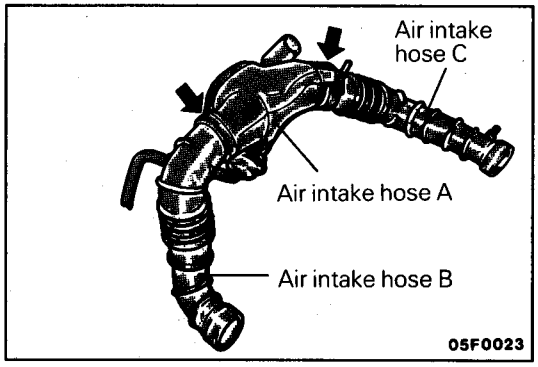
NOTE
*1: 5-speed manual transmission
*2: 6-speed manual transmission



SERVICE POINTS OF INSTALLATION E21VDAA

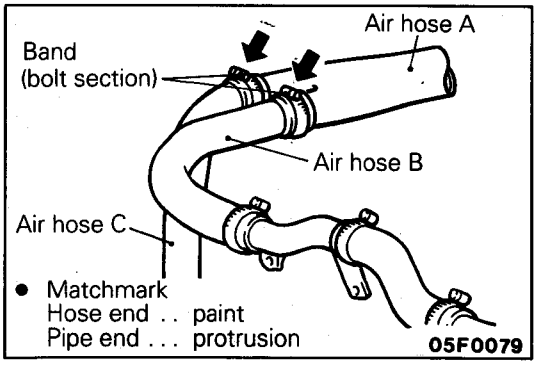
23. INSTALLATION OF VACUUM HOSE / 7. VACUUM HOSE WITH CHECK VALVE / 5. VACUUM HOSE D / 2. VACUUM HOSE B / 1. VACUUM HOSE A

Make sure to insert the hose to the stepped portion of the pipe.



10. INSTALLATION OF AIR CLEANER COVER, AIR INTAKE HOSE A

Align slots indicated by arrows in air intake hose A with △ markings on air intake hoses B and C; then, insert hoses B and C all the way into air intake hose A.
Insert air intake hoses B and C all the way up to the roots on the turbocharger end.



9. INSTALLATION OF AIR HOSE A

(1) Connect the air hoses ensuring that paint marks on hose end are aligned with protrusions.
Insert air hoses B and C into pipe all the way to its step.

Caution
Be careful not to allow any foreign matter to get into the hoses, pipes, or the intercooler itself.

(2) Connect the hoses with the bolt section of the band upward.

NOTES

MANUAL TRANSMISSION

CONTENTS

E22AA-

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service pervice personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).

(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE
The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIFICATIONS

E22CA--

GENERAL SPECIFICATIONS

Items	W5MG1	W6MG1
Applicable engine	6G72 – DOHC	6G72 – DOHC
Type	5-speed transmission floor shift	6-speed transmission floor shift
Gear ratio		
1st	3.071	3.266
2nd	1.739	1.904
3rd	1.103	1.241
4th	0.823	0.918
5th	0.659	0.733
6th	–	0.589
Reverse	3.076	3.153
Reduction ratio		
Primary	1.375	1.222
Front differential	2.888	3.400
Transfer	0.814	0.958
Speedometer gear ratio (driven/drive)	27/36	27/36

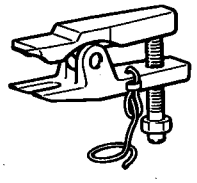
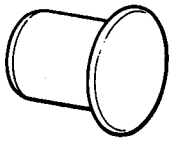
LUBRICANTS

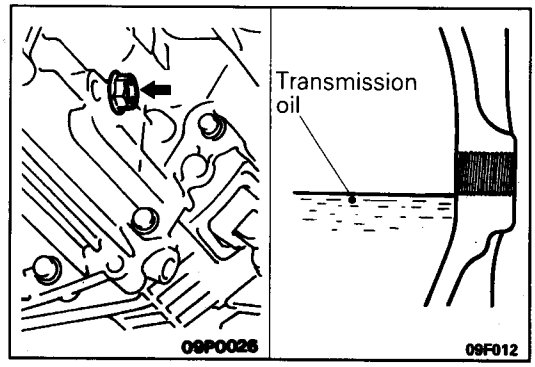
E22CD--

Items	Specified lubricants	Quantity
Transmission oil	Hypoid gear oil, SAE 75W–90 or 75W–85W conforming to API classification GL–4	2.4 dm^3 (2.5 U.S. qts., 2.1 Imp. qts.)
Transfer oil	Hypoid gear oil, SAE 75W–90 or 75W–85W conforming to API classification GL–4	<5M/T> 0.27 dm^3 (0.29 U.S. qts., 0.24 Imp. qts.) <6M/T> 0.60 dm^3 (0.63 U.S. qts., 0.53 Imp. qts.)
Sleeve yoke	Hypoid gear oil, SAE 75W–90 or 75W–85W conforming to API classification GL–4	As required

SPECIAL TOOLS

E22DA--

Tool	Number	Name	Use
	MB991113	Steering linkage puller	Disconnection of the coupling of the knuckle and lower arm ball joint Disconnection of the coupling of the knuckle and tie–rod end ball joint
	MB991193	Plug	Preventing foreign substances from entering transfer



SERVICE ADJUSTMENT PROCEDURES

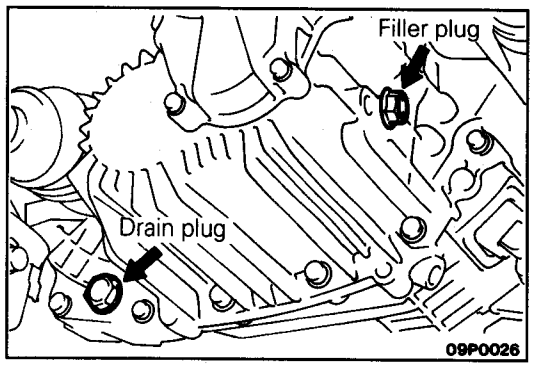
E22FDAS

TRANSMISSION OIL LEVEL CHECK

Inspect each component for evidence of leakage, and check the oil level by remaining the filler plug. If the oil is contaminated, it is necessary to replace it with new oil.

(1) Oil level should be at the lower portion of the filler plug hole.
(2) Check that the transmission oil is not noticeably dirty, and that it has a suitable viscosity.
(3) Tighten filler plug to specified torque.

Specified torque: 27 Nm (2.8 kgm, 20 ft.lbs.)



TRANSMISSION OIL REPLACEMENT

(1) Remove transmission drain plug.
(2) Drain oil.
(3) Tighten drain plug to specified torque.

Specified torque: 27 Nm (2.8 kgm, 20 ft.lbs.)

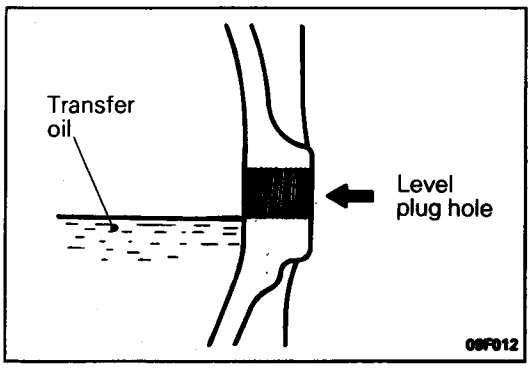
(4) Remove filler plug and fill with specified oil till the level comes to the lower portion of filler plug hole.

Specified oil: Hypoid gear oil SAE 75 W–90 or 75W–85W conforming to API classification GL–4

Quantity: 2.4 dm^3 (2.5 U.S qts., 2.1 Imp. qts.)

(5) Tighten filler plug to specified torque.

Specified torque: 27 Nm (2.8 kgm, 20 ft.lbs.)

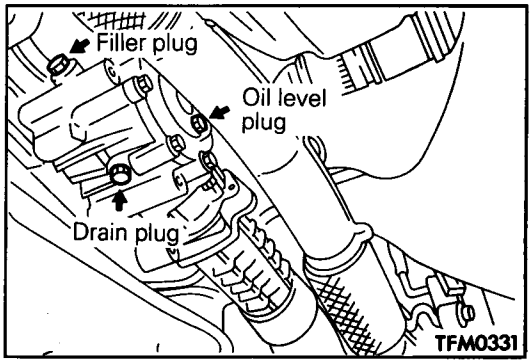


TRANSFER OIL LEVEL CHECK

E22FDAU

(1) Remove the oil level plug.
(2) Check to ensure that the oil level reaches to the bottom edge of the oil level plug hole.
(3) Check to ensure that the oil is not exceptionally dirty, and that it is of sufficient viscosity.
(4) Install the oil level plug, tightening it to the specified torque.

Specified torque: 7.5 Nm (0.76 kgm, 5.5 ft.lbs.)



TRANSFER OIL REPLACEMENT

(1) Remove the oil drain plug and drain the oil.
(2) Install the oil drain plug and tighten it to the specified torque.

Specified torque: 35 Nm (3.6 kgm, 26 ft.lbs.)

(3) Remove the oil filler plug and oil level plug and fill with oil until the level reaches the bottom edge of the oil level plug hole.

Specified transmission oil:
Hypoid gear oil SAE 75W–90 or 75W–85W conforming to API classification GL–4

Quantity: <5M/T> 0.27 dm^3 (0.29 U.S. qts., 0.24 Imp. qts.)
<6M/T> 0.60 dm^3 (0.63 U.S. qts., 0.53 Imp. qts.)

(4) Install the oil filler plug and the oil level plug and tighten it to the specified torque.

Specified torque: <Oil level plug> 7.5 Nm (0.76 kgm, 5.5 ft.lbs.)
<Oil filler plug> 35 Nm (3.6 kgm, 26 ft.lbs.)

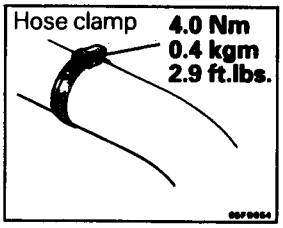
TRANSMISSION CONTROL

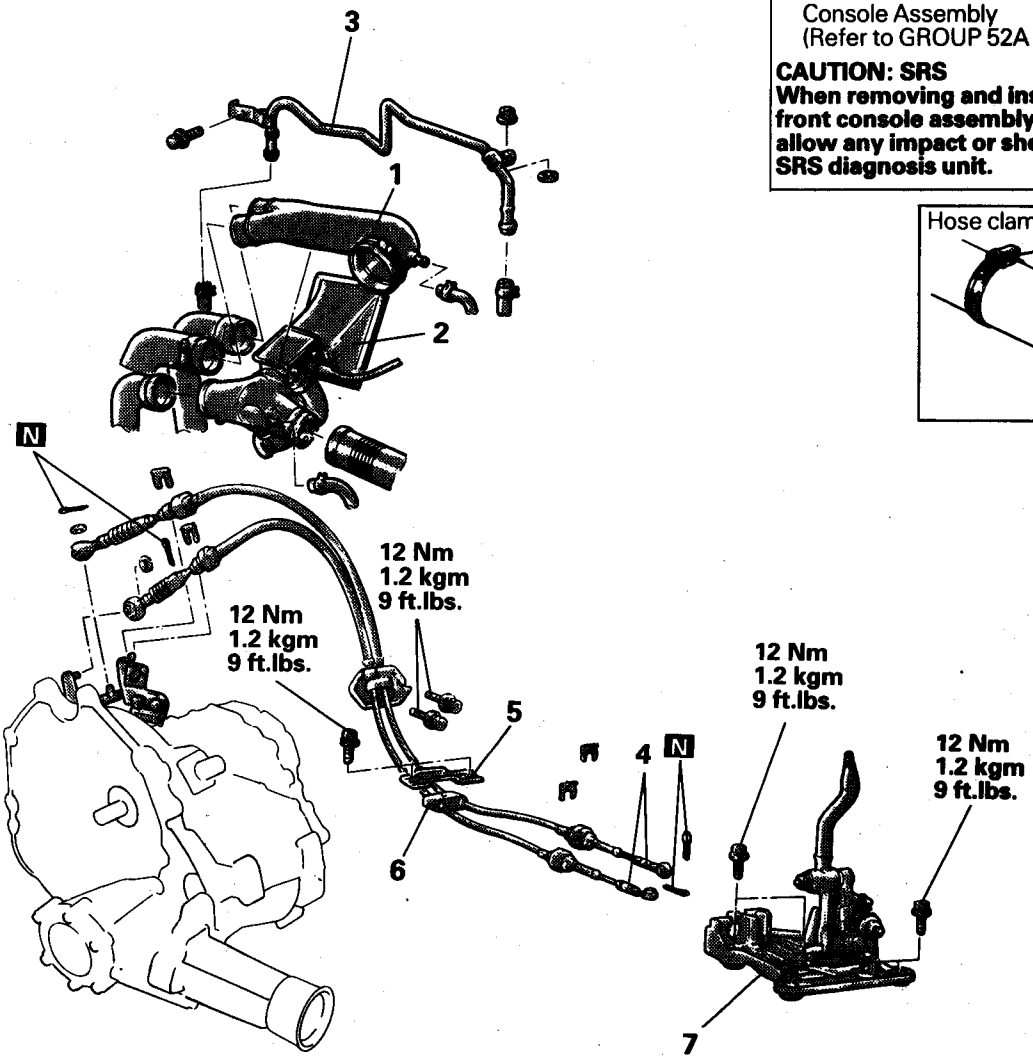
E22HA--

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of Front Console Assembly (Refer to GROUP 52A – Floor Console.)

CAUTION: SRS
When removing and installing the front console assembly, don't allow any impact or shock to the SRS diagnosis unit.

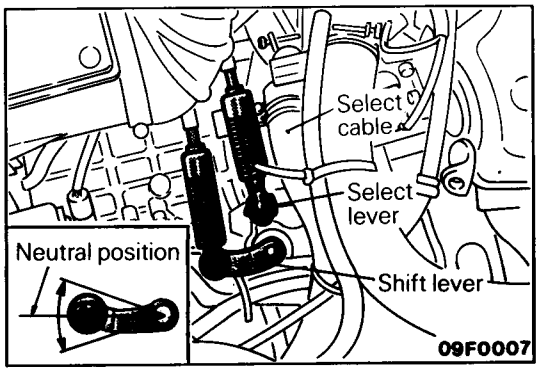




09F0080

Transmission control cable assembly removal steps
- 1. Air hose A
- 2. Air cleaner cover, Air intake hose A
- 3. Vacuum pipe
- 4. Connection for transmission control cable assembly (Shift lever assembly side)
- 5. Retainer
- 6. Transmission control cable assembly

Shift lever assembly removal steps
- 4. Connection for transmission control cable assembly (Shift lever assembly side)
- 7. Shift lever assembly

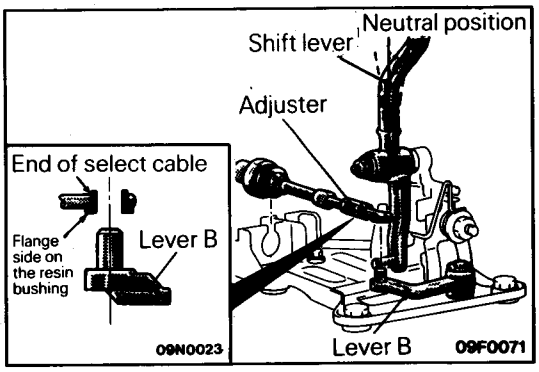


SERVICE POINTS OF INSTALLATION E22HDAQ

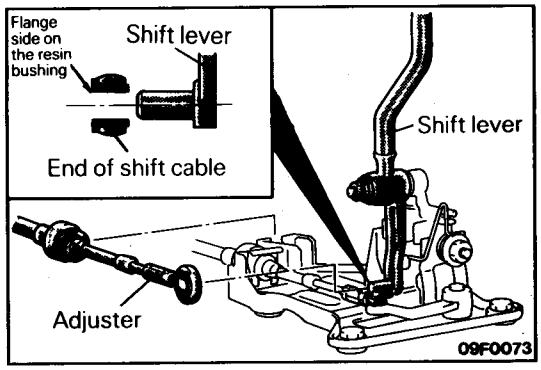
4. CONNECTION OF TRANSMISSION CONTROL CABLE ASSEMBLY (SHIFT LEVER ASSEMBLY SIDE)

(1) Move the transmission shift lever to the neutral position.

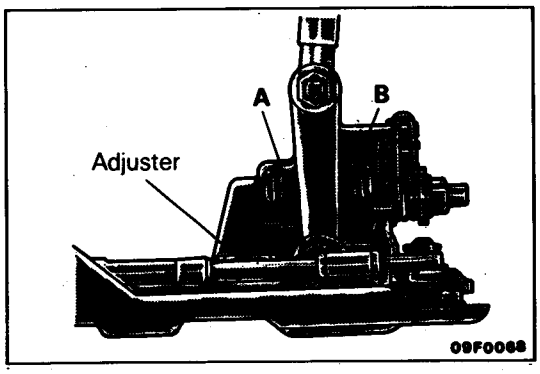
NOTE
The select lever will be set to the neutral position when the transmission shift lever is moved to the neutral position.



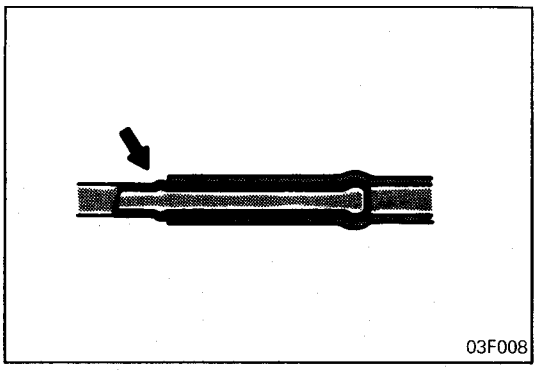
(2) With the shift lever on the passenger compartment side in the neutral position, turn adjuster on select cable so that select cable end is positioned as shown with reference to lever B of shift lever.
(3) Install the select cable so that the flange side of the plastic bushing at the end of select cable is on the end face side of lever B.



(4) Turn adjuster on shift cable so that shift cable end is positioned as shown with reference to shift lever on the passenger compartment side.
(5) Install the shift cable so that the flange side of the plastic bushing at the end of shift cable is on the split pin side.

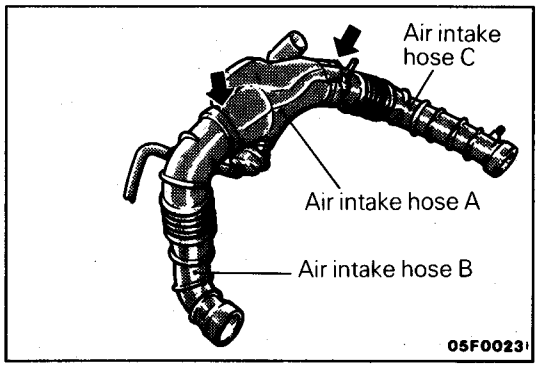


(6) Connect the shift cable, then turn adjuster on shift cable so that dimension A equals dimension B.
(7) Move the shift lever to each position and check that the shifting is smooth.



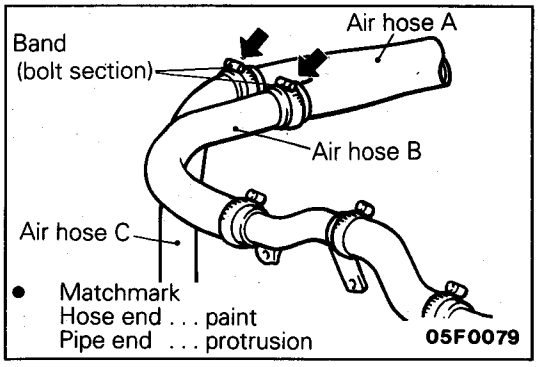
3. INSTALLATION OF VACUUM PIPE

If the vacuum pipe has a stepped part, connect the vacuum hose to the pipe securely, up to the stepped part, as shown in the figure.



2. CONNECTION OF AIR CLEANER COVER, AIR INTAKE HOSE A

Align slots indicated by arrows in air intake hose A with △ markings on air intake hoses B and C; then, insert hoses B and C all the way into air intake hose A.



1. CONNECTION OF AIR HOSE A

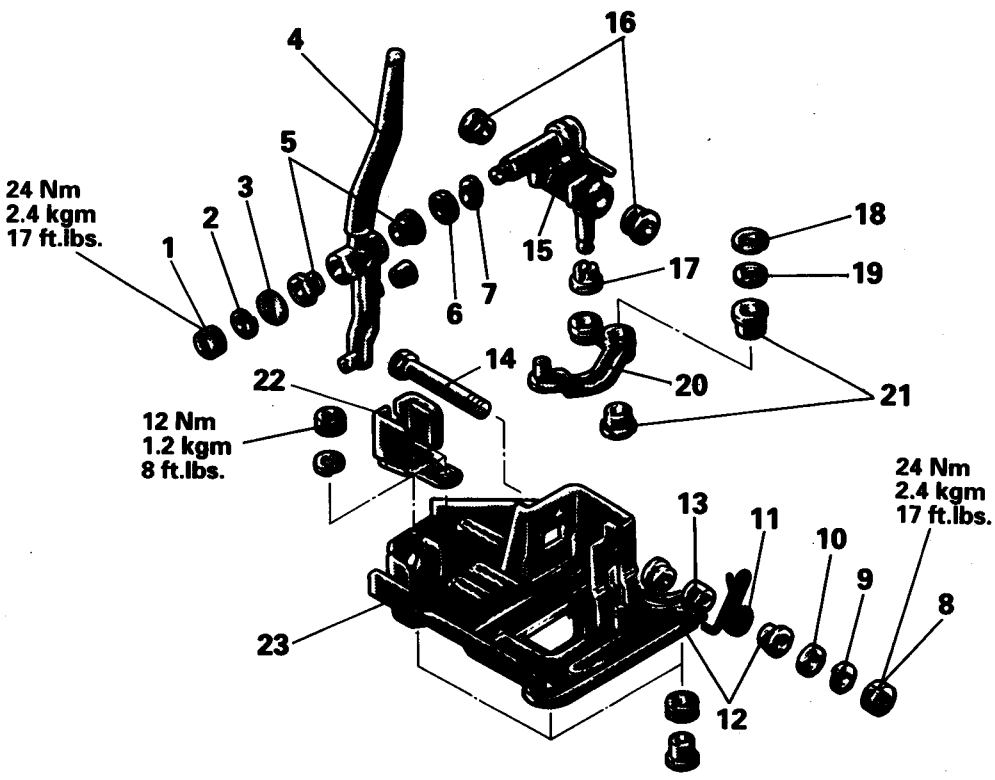
(1) Connect the hoses ensuring that paint marks on hose end are aligned with protrusion.
Insert air hoses B and C into air hose A all the way, or up to the step in hose A.

Caution
Be careful not to allow any foreign matter to get into the hoses, pipes, or the intercooler itself.

(2) Connect the hoses with the bolt section of the band upward.

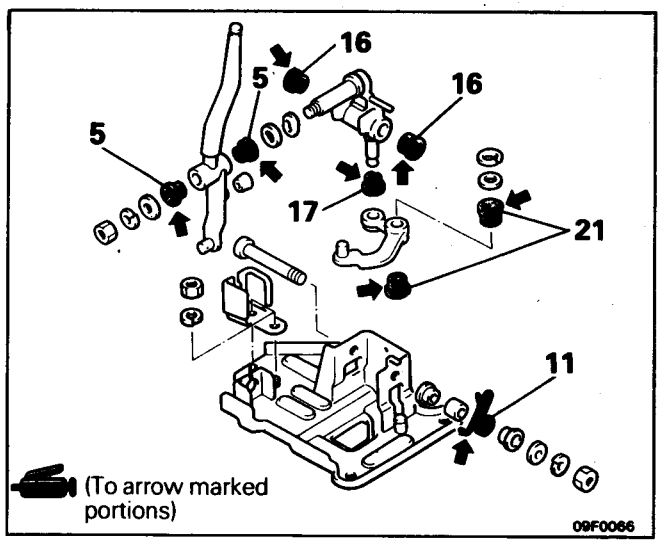
SHIFT LEVER ASSEMBLY DISASSEMBLY AND REASSEMBLY

E22HE--



Disassembly steps

1. Nut
2. Spring washer
3. Plain washer
4. Shift lever
5. Bushing
6. Plain washer
7. Wave washer
8. Nut
9. Spring washer
10. Plain washer
11. Return spring
12. Bushing
13. Pipe
14. Bolt
15. Lever (A)
16. Bushing
17. Bushing
18. Snap ring
19. Washer
20. Lever (B)
21. Bushing
22. Cable bracket
23. Bracket assembly



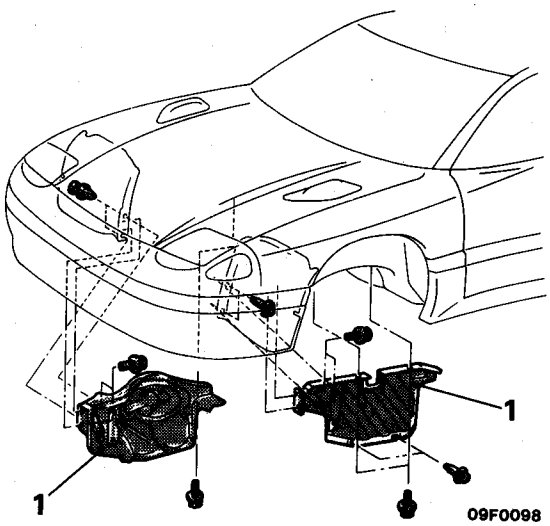
TRANSMISSION ASSEMBLY

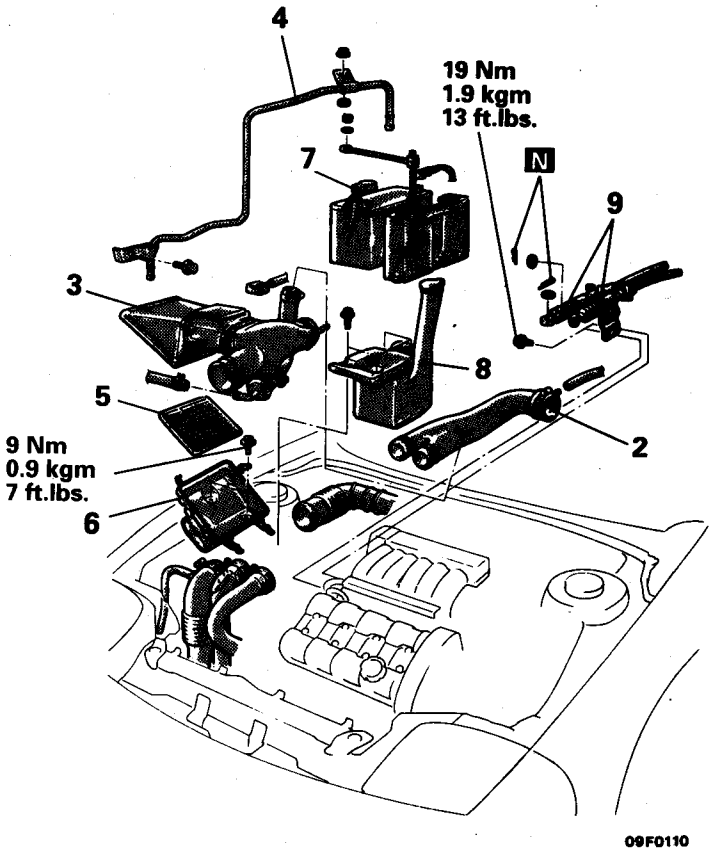
E22JA--

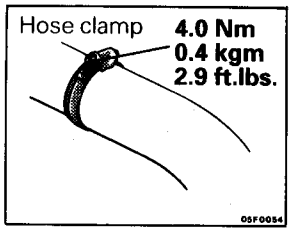
REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining of Transmission Oil (Refer to P.22-3.)
- Removal of Transfer Assembly (Refer to P.22-14.)

Post-installation Operation
- Installation of Transfer Assembly (Refer to P.22-14.)
- Supplying of Transmission Oil (Refer to P.22-3.)
- Checking Operation of Shift Lever at Each Position
- Checking the Operation of Meters and Gauges

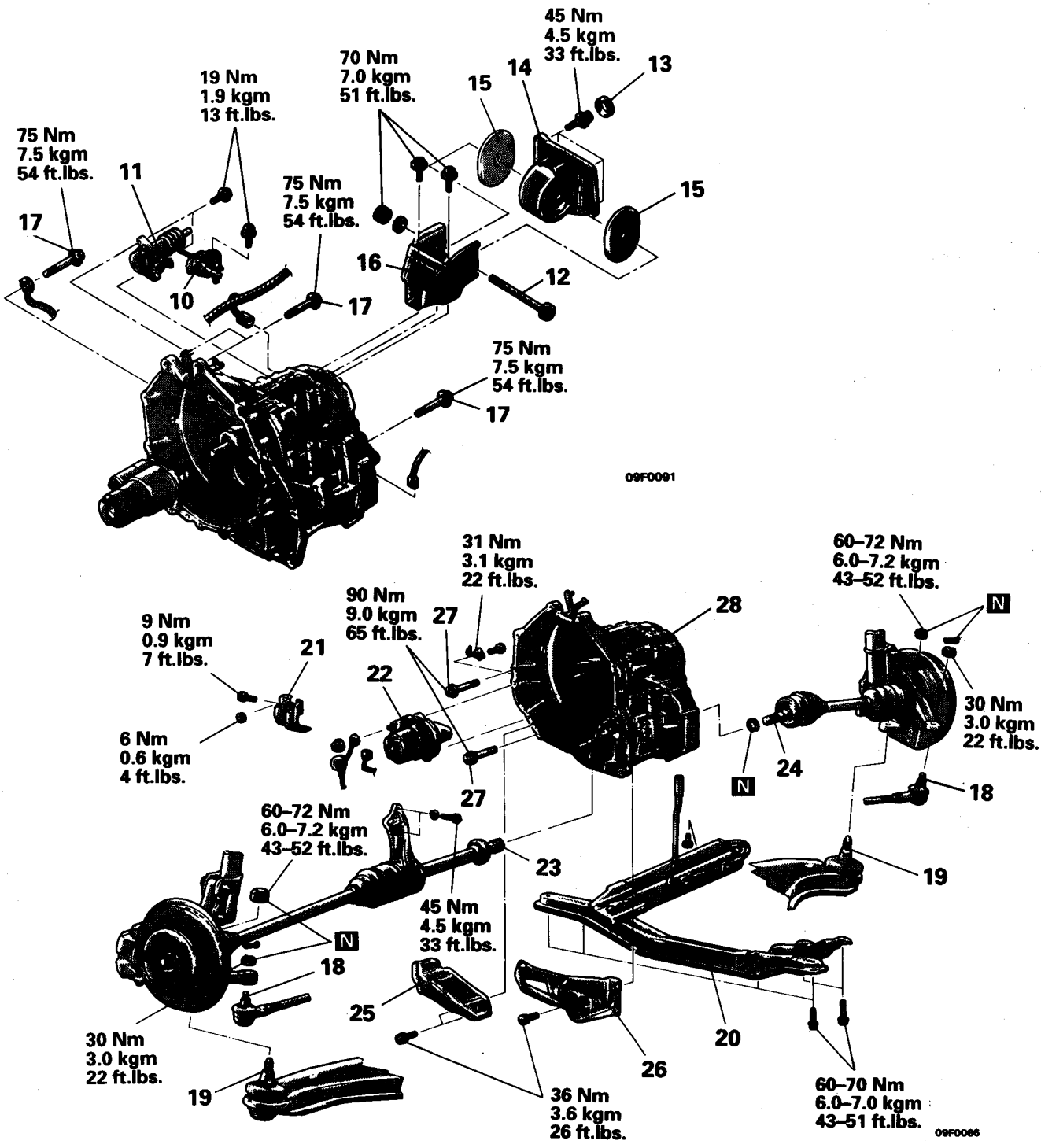






Removal steps

1. Side under cover
◆◆ 2. Air hose A
◆◆ 3. Air cleaner cover, Air intake hose A
◆◆ 4. Vacuum pipe
5. Air cleaner element
6. Air cleaner body
7. Battery
8. Battery seat, Washer tank
9. Connection for transmission control cable



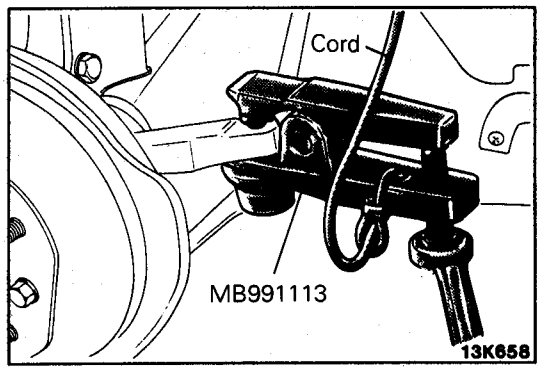
10. Connection for clutch tube bracket
11. Connection for clutch release cylinder
12. Transmission mount insulator bolt
13. Plug
14. Transmission mount bracket (Body side)
15. Mounting stopper
16. Transmission mount bracket (Transmission side)
17. Transmission assembly lower part coupling bolt
18. Connection for tie rod end
19. Connection for lower arm ball joint
20. Right member
21. Starter cover
22. Starter
23. Drive shaft (Left side), Inner shaft assembly
24. Drive shaft (Right side)
25. Connection for transmission stay (Front bank side)
26. Connection for transmission stay (Rear bank side)
27. Transmission assembly lower part coupling bolt
28. Transmission assembly

SERVICE POINTS OF REMOVAL E22JBCO

12. REMOVAL OF TRANSMISSION MOUNT INSULATOR BOLT

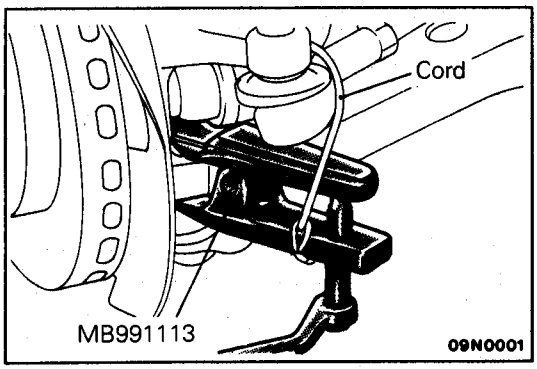
Raise transmission assembly with a jack up to a level where mount bracket no longer receives its weight and remove transmission mount insulator bolt.

Caution
Support the transmission assembly with the jack so that no localized force is applied to the assembly.



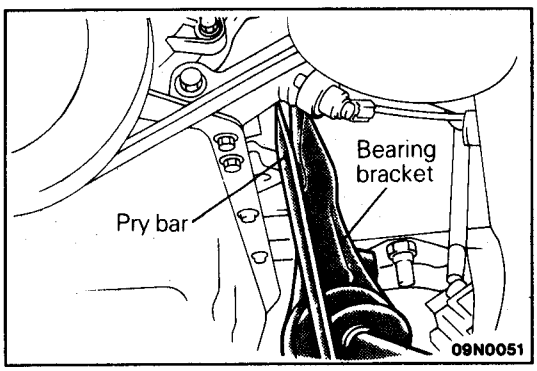
18. DISCONNECTION OF TIE ROD END

Caution
1. **Be sure to tie the cord of the special tool to the nearby part.**
2. **Loosen the nut but do not remove it.**



19. DISCONNECTION OF LOWER ARM BALL JOINT

Caution
1. **Be sure to tie the cord of the special tool to the nearby part.**
2. **Loosen the nut but do not remove it.**

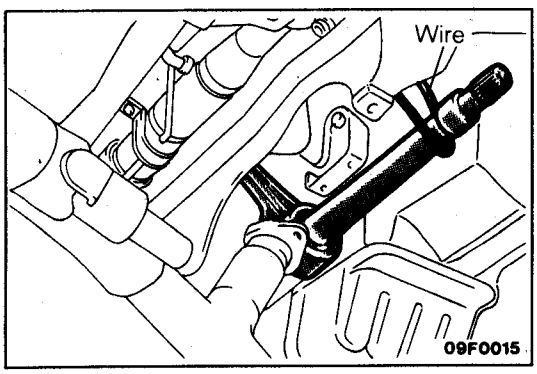


23. REMOVAL OF DRIVE SHAFT (LEFT SIDE), INNER SHAFT ASSEMBLY

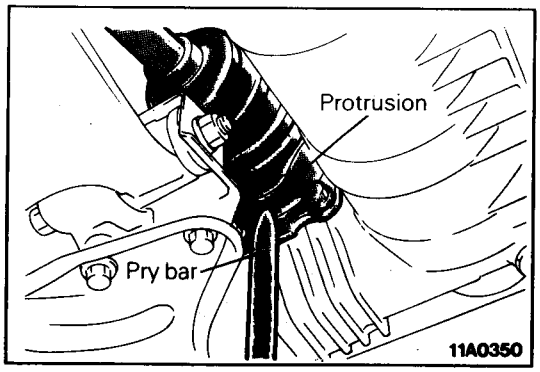
(1) Remove the bearing bracket mounting bolts and insert the pry bar between the bearing bracket and the cylinder block.

(2) Remove drive shaft (left side) and inner shaft assembly from transmission assembly.

NOTE
Remove drive shaft and inner shaft assembly as an assembly together with hub, knuckle, and other parts.



(3) Suspend the removed drive shaft (left side) and inner shaft assembly with wire or something similar to prevent it from sharply bending or turning at each joint.

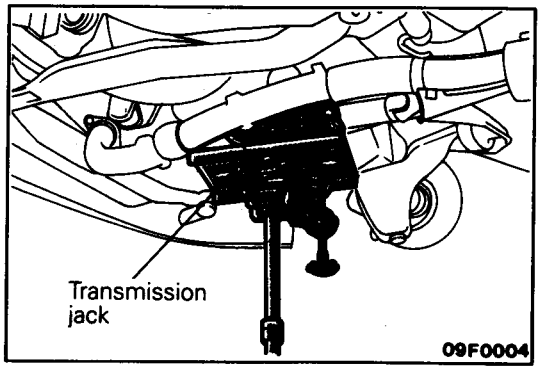


24 REMOVAL OF DRIVE SHAFT (RIGHT SIDE)

(1) To remove drive shaft (right side) from transmission assembly, apply pry bar to the protrusion.

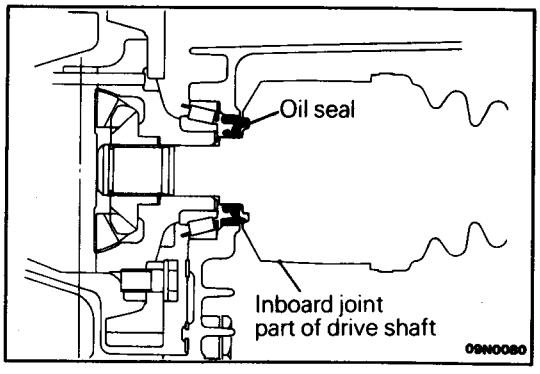
NOTE
Remove drive shaft (right side) as an assembly together with hub, knuckle, and other parts.

(2) Suspend the removed drive shaft (right side) with wire or something similar to prevent it from sharply bending or turning at each joint.



27. REMOVAL OF TRANSMISSION ASSEMBLY LOWER PART COUPLING BOLT / 28. TRANSMISSION ASSEMBLY

Support transmission assembly with a transmission jack and remove transmission assembly lower part coupling bolt; then, lower transmission assembly.

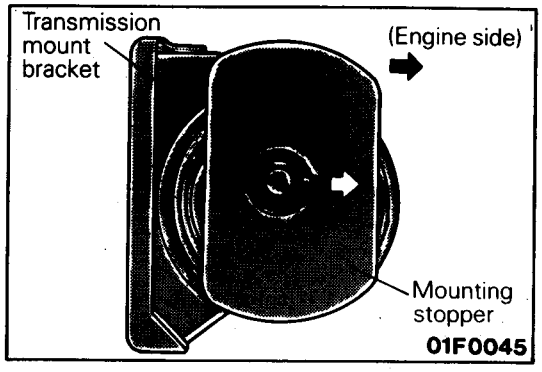


SERVICE POINTS OF INSTALLATION E22JD8L

24. INSTALLATION OF DRIVE SHAFT (RIGHT SIDE)

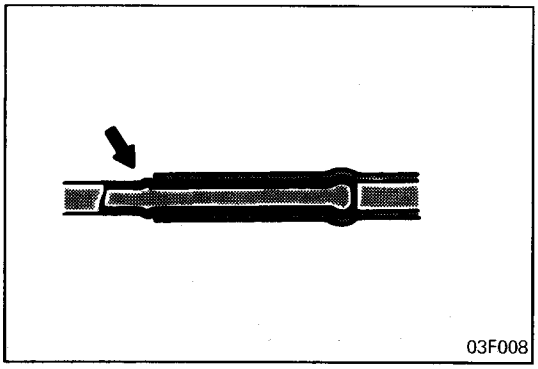
Provisionally install the drive shaft (right side) so that the inboard joint part of the drive shaft (right side) is straight, and not bent relative to the transmission.

Caution
Care must be taken to ensure that the oil seal lip part of the transmission is not damaged by the serrated part of the drive shaft (right side).



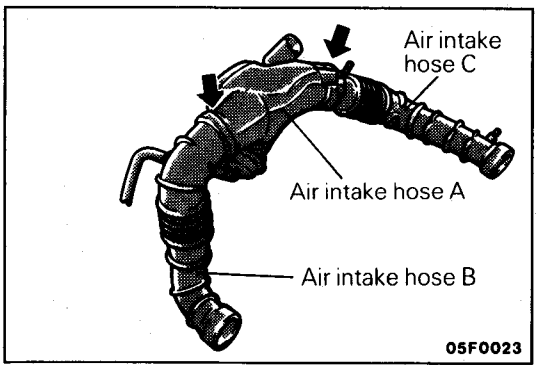
15. INSTALLATION OF MOUNTING STOPPER

Install mounting stopper in the direction shown.



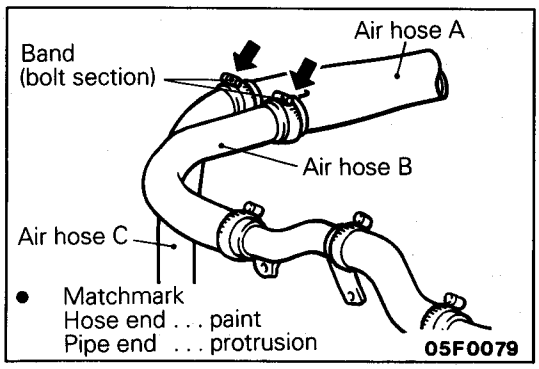
4. INSTALLATION OF VACUUM PIPE

If the vacuum pipe has a stepped part, connect the vacuum hose to the pipe securely, up to the stepped part, as shown in the figure.



3. INSTALLATION OF AIR CLEANER COVER, AIR INTAKE HOSE A

Align slots indicated by arrows in air intake hose A with △ markings on air intake hoses B and C; then, insert hoses B and C all the way into air intake hose A.
Insert air intake hoses B and C all the way up to the roots on the turbocharger end.



2. INSTALLATION OF AIR HOSE A

(1) Connect the air hoses ensuring that paint marks on hose end are aligned with protrusion.
Insert air hoses B and C into pipe all the way to its step.

Caution
Be careful not to allow any foreign matter to get into the hoses, pipes, or the intercooler itself.

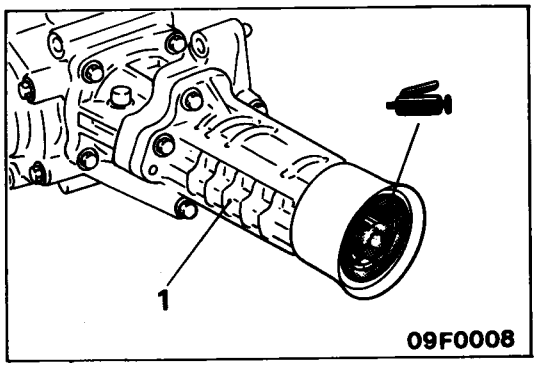
(2) Connect the hoses with the bolt section of the band upward.

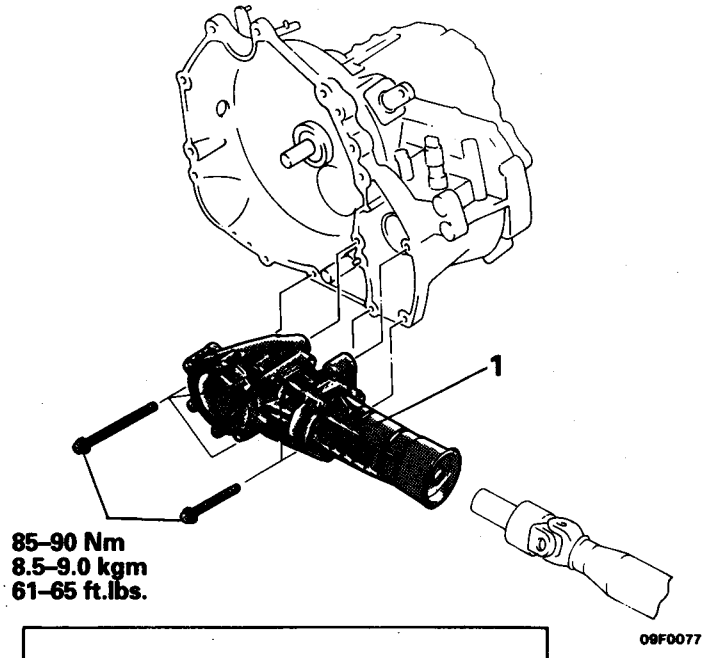
TRANSFER ASSEMBLY

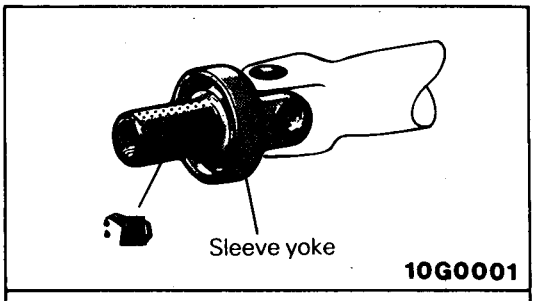
E22KA--

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Draining and Supplying of Transfer Oil (Refer to P.22–4.)
- Removal and Installation of Active Front Venturi Skirt (Refer to GROUP 51 – Front Bumper.)
- Removal and Installation of Front Exhaust Pipe (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)

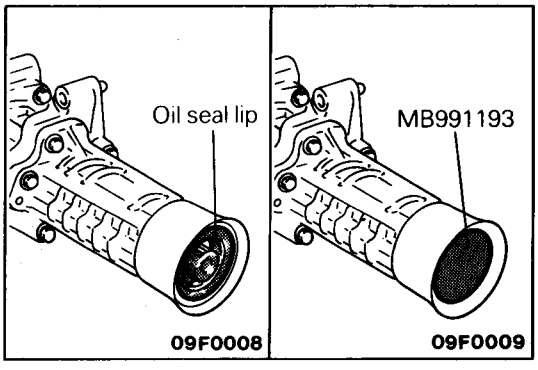


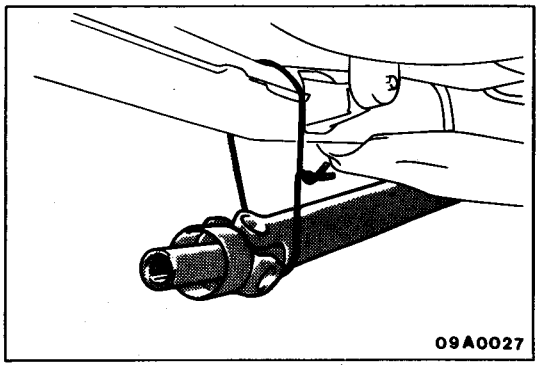




Gear oil: Hypoid gear oil, SAE 75W-90 or 75W-85W conforming to API classification GL-4

◆◆ 1. Transfer assembly





SERVICE POINT OF REMOVAL

E22KAAC

1. REMOVAL OF TRANSFER ASSEMBLY

Caution

1. **Be cautious to avoid damaging the transfer oil seal lip.**
2. **Cover the transfer opening with the special tool to prevent transmission oil discharge and the entry of foreign objects.**
3. **The propeller shaft should be suspended so that it is not sharply bent.**

PROPELLER SHAFT

CONTENTS

E25AA-

SPECIFICATIONS

E25CA--

GENERAL SPECIFICATIONS

Items	Specifications
Propeller shaft	
Type	4 joint propeller shaft
Length × O.D. mm (in.)	
Front	
5 M/T	673.5 × 65 (26.52 × 2.56)
6 M/T	698.5 × 65 (27.50 × 2.56)
Center	662.5 × 65 (26.08 × 2.56)
Rear	555.5 × 75 (21.87 × 2.95)
Universal joint	
Type	
No. 1 (front)	Cross type
No. 2 (center front)	Cross type
No. 3 (center rear) [Löbro joint]	Constant velocity type
No. 4 (rear)	Cross type
Lubrication	Pre-packed type
Size mm (in.)	
Cross type joint journal O.D.	17.996 (0.7085)
Constant velocity joint O.D.	99.73 (3.93)

NOTE
Propeller shaft length indicates the length between the center points of each joint.

SERVICE SPECIFICATIONS

E25CB--

Items	Specifications
Limit	
Propeller shaft runout (Dial indicator reading)	
Front mm (in.)	0.6 (0.024) or less
Center mm (in.)	0.6 (0.024) or less
Rear mm (in.)	0.6 (0.024) or less

LUBRICANTS

E25CD--

Items	Specified lubricant	Quantity
Sleeve yoke surface	Hypoid gear oil SAE 75W-90W or 75W-85W conforming to API GL-4 or higher	As required
Löbro joint assembly		
Outer and inner races ball grooves	Repair kit grease	As required
Löbro joint assembly inner part	Repair kit grease	45–55g (1.59–1.94 oz.)

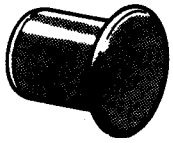
SEALANT AND ADHESIVES

E25CE--

Items	Specified sealants and adhesives	Remarks
Löbro joint rubber packing	3M ATD Part No. 8121 or equivalent	Quick-fix adhesive

SPECIAL TOOL

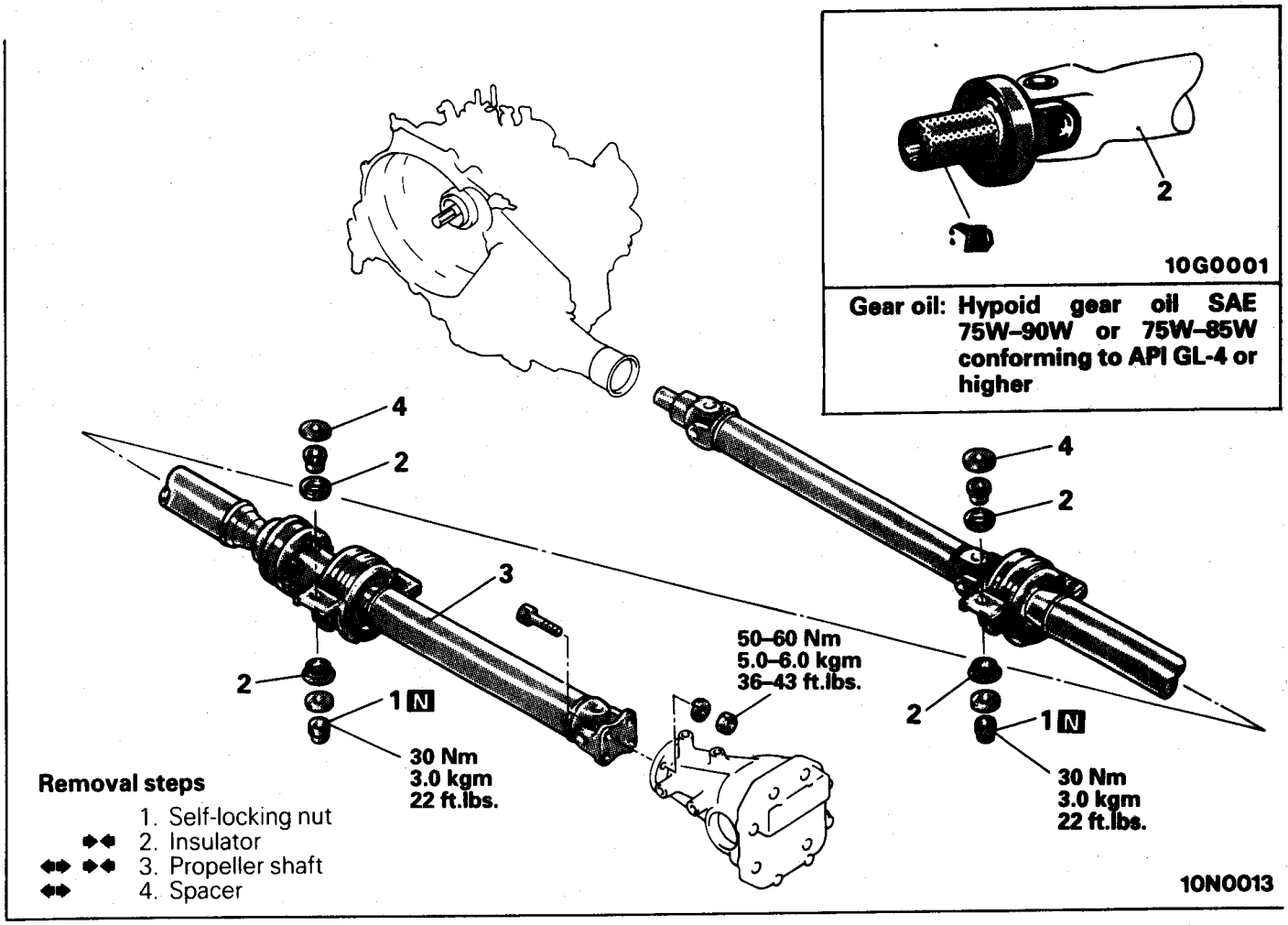
E25DA--

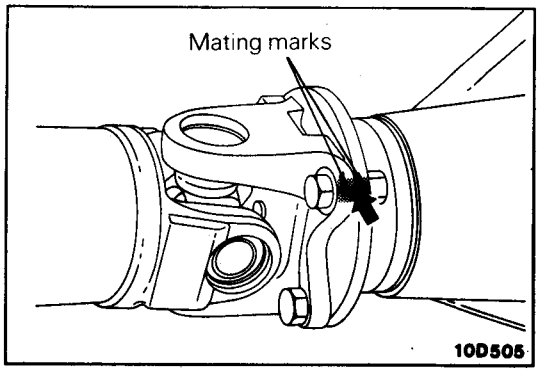
Tool	Number	Name	Use
	MB991193	Plug	Prevention of entry of foreign objects into the transaxle and transfer

PROPELLER SHAFT

REMOVAL AND INSTALLATION

E25GA--

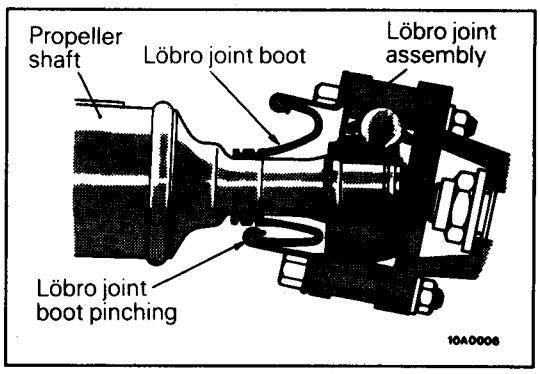




SERVICE POINTS OF REMOVAL E25GBCE

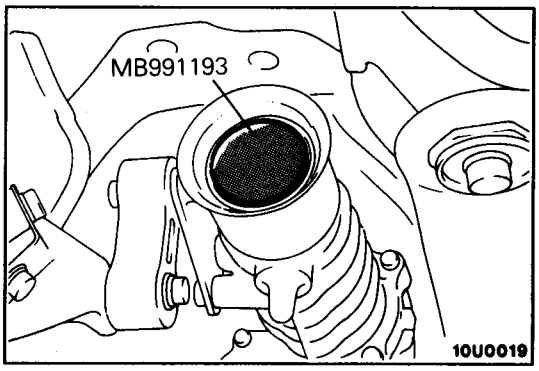
3. REMOVAL OF PROPELLER SHAFT

(1) Make mating marks on the differential companion flange and flange yoke.



Caution
Remove the propeller shaft in a straight and level manner so as to ensure that the boot is not damaged through pinching.

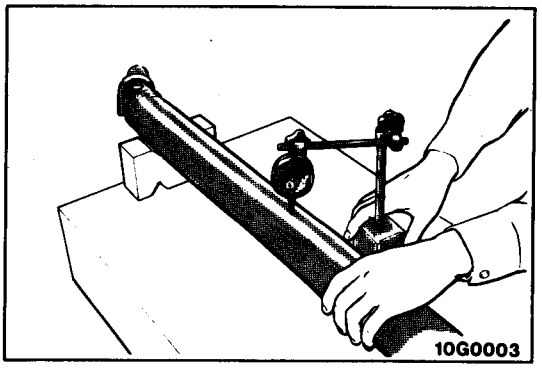
NOTE
Damage to the boot can be avoided, and the work will be easier, if a piece of cloth or similar material is inserted in the boot.



(2) Use the special tool provided as a cover to prevent the entry of foreign objects into the transfer.

4. REMOVAL OF SPACER

The number of spacers necessary may differ from one location to another (front, rear, right, left). Record the number of spacers used to ensure correct installation.



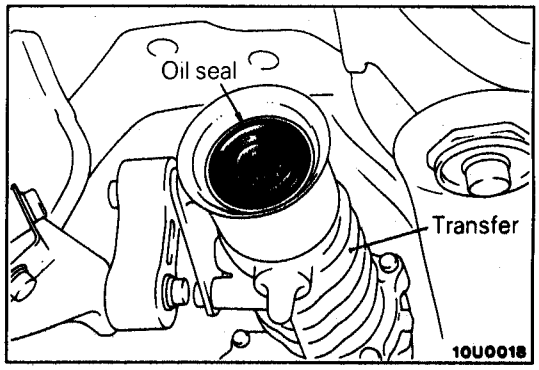
INSPECTION E25GCAK

PROPELLER SHAFT RUNOUT

Limit:

Front propeller shaft	**0.6 mm (0.024 in.) or less**
Center propeller shaft	**0.6 mm (0.024 in.) or less**
Rear propeller shaft	**0.6 mm (0.024 in.) or less**

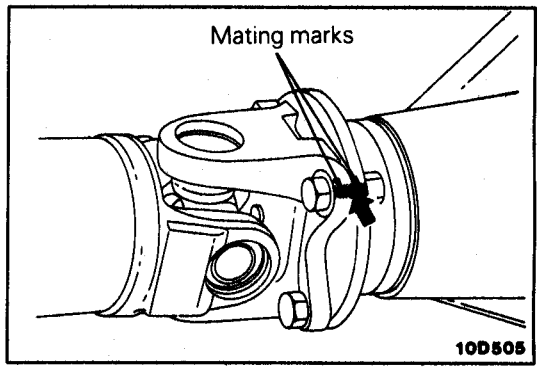
NOTE
Set the V-blocks as much as possible to the end of the shaft. Measure deflection at the center of the shaft.



SERVICE POINTS OF INSTALLATION E25GDAK

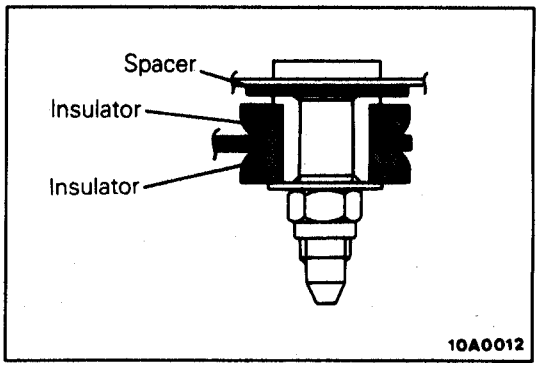
3. INSTALLATION OF PROPELLER SHAFT

(1) **Caution**
Be cautious to avoid damage to the oil seal lip of the transfer.



(2) Install the propeller shaft to the companion flange with the mating marks properly aligned.

Caution
Tighten installation bolts after removing oil and grease from threads to prevent them from loosening due to lubrication.



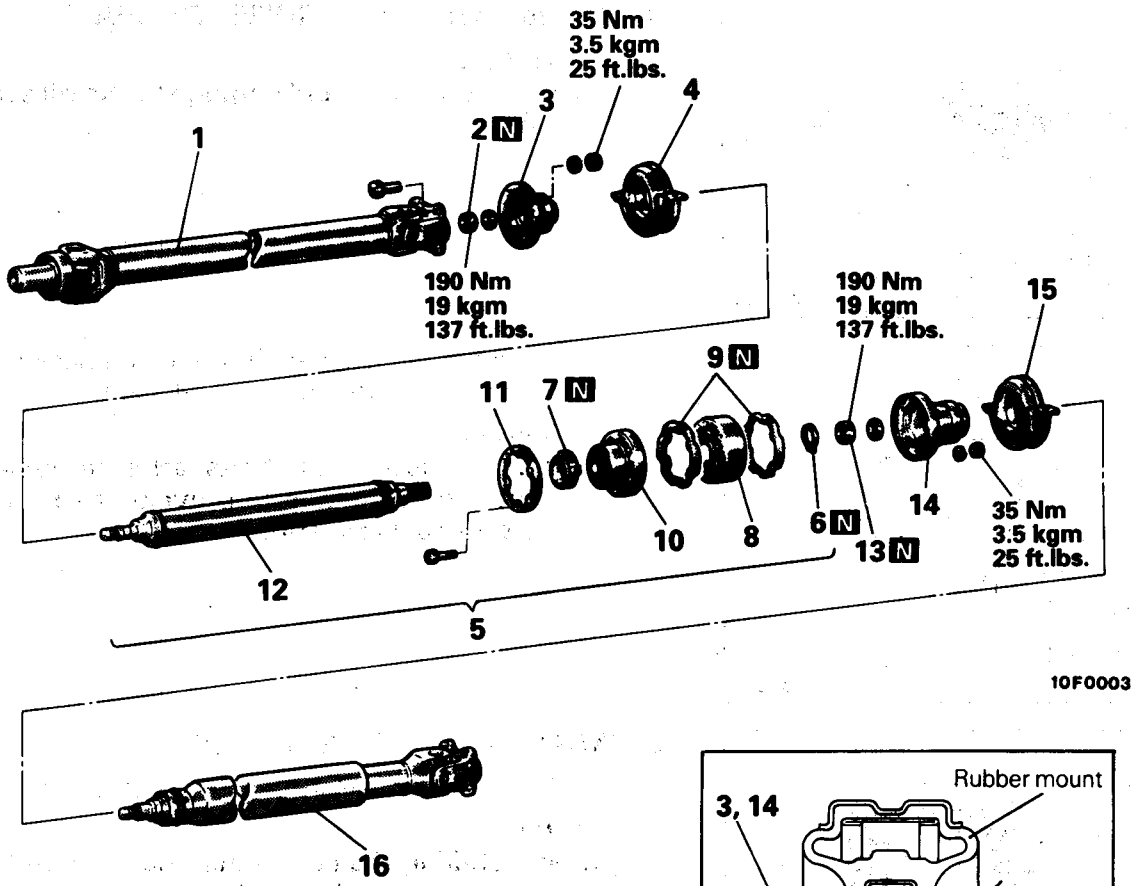
2. INSTALLATION OF INSULATOR

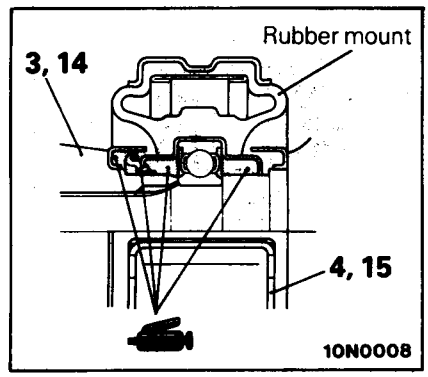
Install spacers and insulators as indicated in the illustration.

Caution
When installing the center bearing, assemble the same spacers as removed from it (or new spacers of equal thickness).

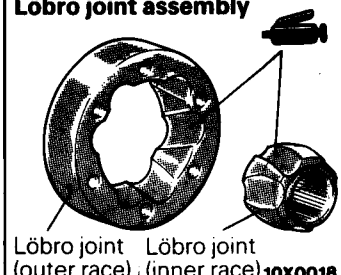
DISASSEMBLY AND REASSEMBLY

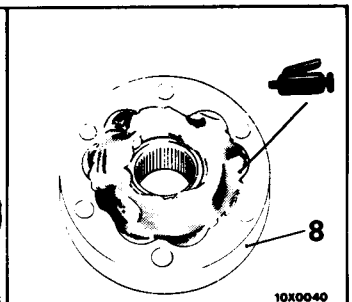
E25GE--



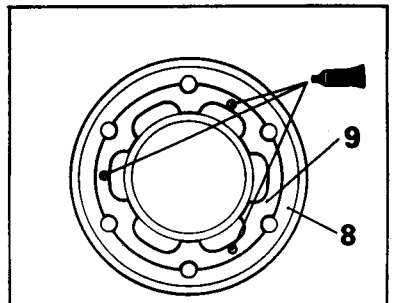


Löbro joint assembly





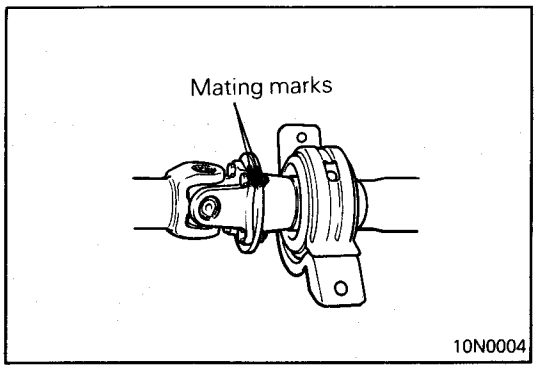
Grease: Repair kit grease [45 – 55 g (1.59 – 1.94 oz.)]



Adhesive: 3M ATD Part No. 8121 or equivalent

Disassembly steps

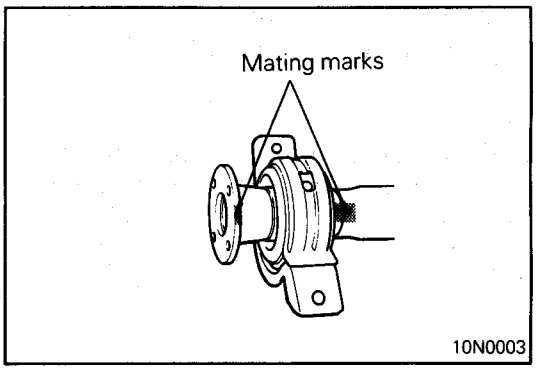
- ◆◆ 1. Front propeller shaft assembly
- ◆◆ 2. Self-locking nut
- ◆◆ ◆◆ 3. Companion flange
- ◆◆ ◆◆ 4. Center bearing assembly
- ◆◆ ◆◆ 5. Center propeller shaft assembly
- 6. Snap ring
- ◆◆ 7. Boot band
- ◆◆ ◆◆ 8. Löbro joint assembly
- 9. Rubber packing
- ◆◆ ◆◆ 10. Löbro joint boot
- 11. Washer
- 12. Center propeller shaft
- ◆◆ 13. Self-locking nut
- ◆◆ ◆◆ 14. Companion flange
- ◆◆ ◆◆ 15. Center bearing assembly
- 16. Rear propeller shaft



SERVICE POINTS OF DISASSEMBLY E25GFAO

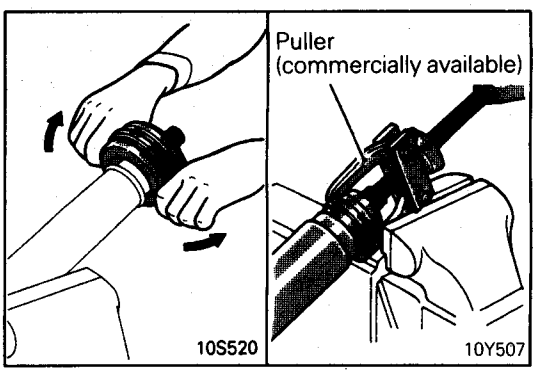
1. REMOVAL OF FRONT PROPELLER SHAFT ASSEMBLY

Put mating marks on the front propeller shaft flange yoke and the companion flange before removing the front propeller shaft assembly.



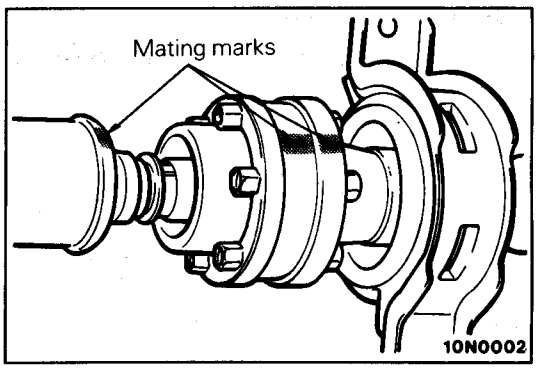
3. REMOVAL OF COMPANION FLANGE

Put mating marks on the companion flange and the center propeller shaft before removing the companion flange.



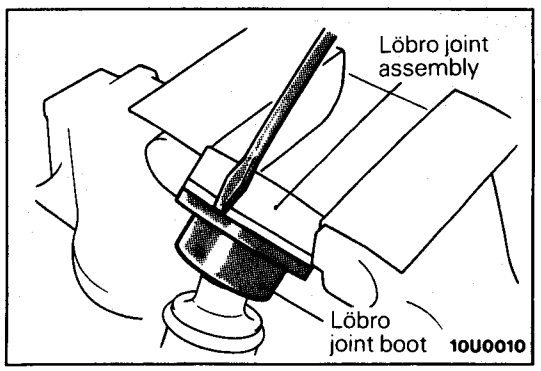
4. REMOVAL OF CENTER BEARING ASSEMBLY

First remove the center bearing bracket and then remove the center bearing using a puller (commercially available).



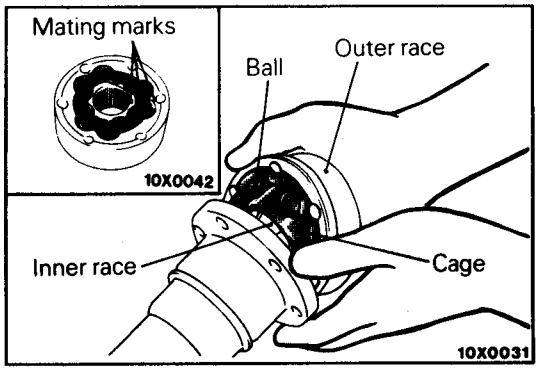
5. REMOVAL OF CENTER PROPELLER SHAFT ASSEMBLY

Put mating marks on the center propeller shaft, the Löbro joint assembly and the companion flange before removing the center propeller shaft assembly.



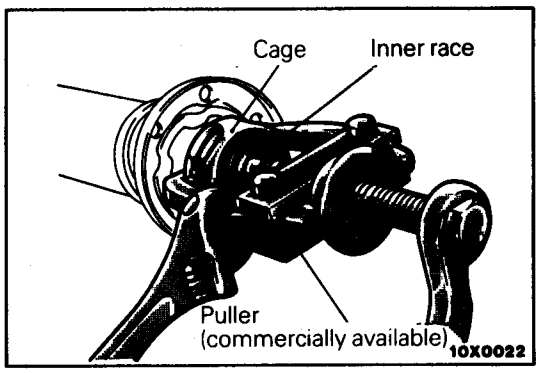
8. REMOVAL OF LÖBRO JOINT ASSEMBLY

(1) Remove the Löbro joint boot from the Löbro joint assembly.



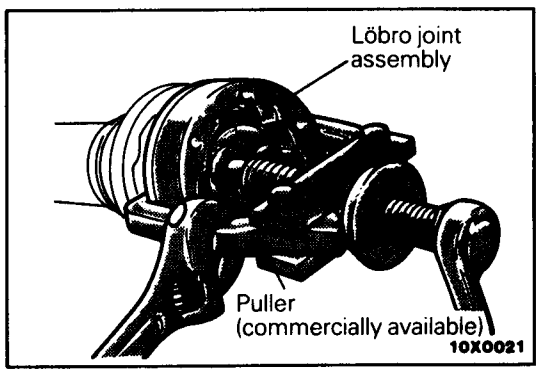
(2) Put mating marks on the outer race, cage and inner race with a scriber before removing the outer race and balls.

Caution
Note the positions of balls so that they can be reinstalled in their original positions.

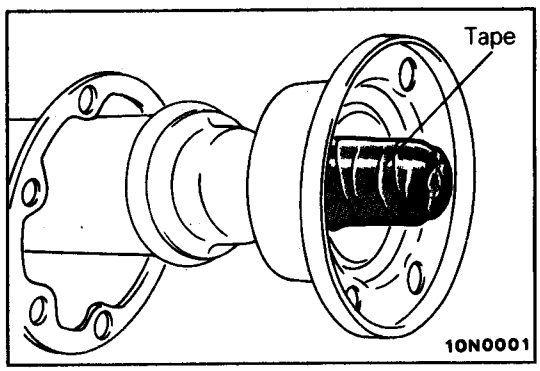


(3) Remove the inner race with cage from the center propeller shaft by using a puller (commercially available).

NOTE
When changing the grease on the Löbro joint assembly, wipe off the grease and clean the outer and inner races, cage and balls.

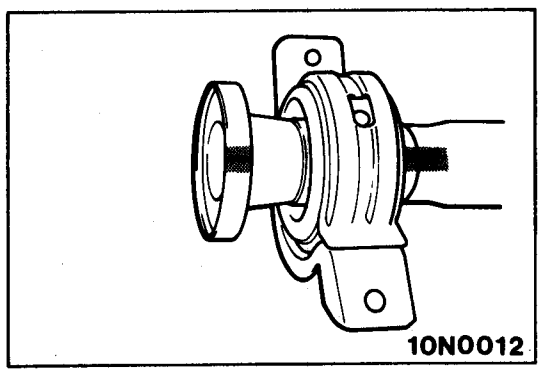


(4) If the outer race cannot be removed, remove the complete Löbro joint assembly from the center propeller shaft by using a puller (commercially available).



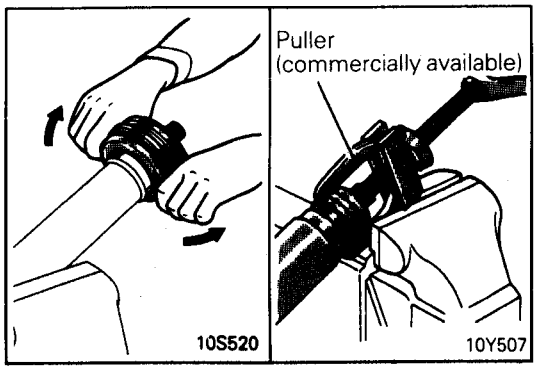
10. REMOVAL OF LÖBRO JOINT BOOT

Tape the serration of the center propeller shaft and then remove the Löbro joint boot.



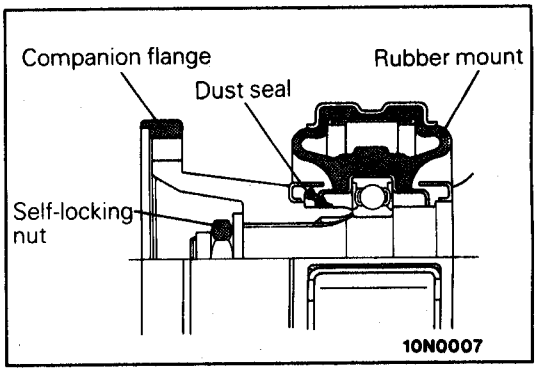
14. REMOVAL OF COMPANION FLANGE

Put mating marks on the companion flange and the rear propeller shaft before removing the companion flange.



15. REMOVAL OF CENTER BEARING ASSEMBLY

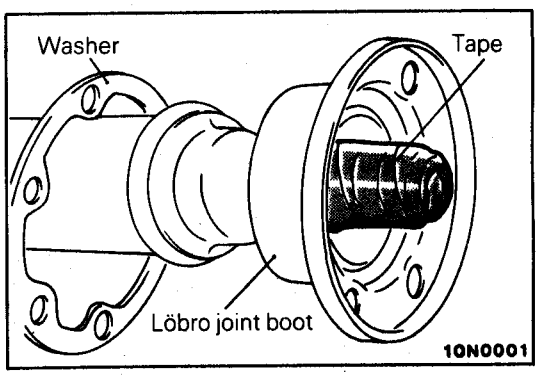
First remove the center bearing bracket and then remove the center bearing using a puller (commercially available).



SERVICE POINTS OF REASSEMBLY E25GHAN

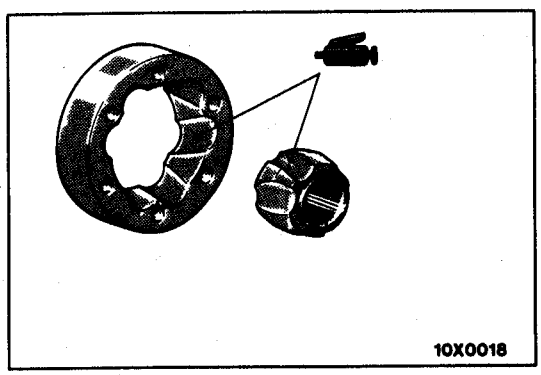
15. INSTALLATION OF CENTER BEARING ASSEMBLY / 14. COMPANION FLANGE / 13. SELF-LOCKING NUT

(1) Install the bearing in the rubber mount groove of the center bearing bracket.
(2) Install the center bearing assembly to the rear propeller shaft with its dust seal facing the companion flange side.
(3) Install, lining up the mating marks on the companion flange and the rear propeller shaft.
(4) While tightening the self-locking nut, install the center bearing assembly with the companion flange.



10. INSTALLATION OF LÖBRO JOINT BOOT

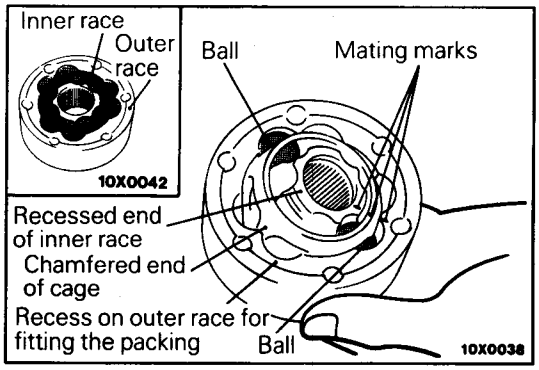
Tape the serration of the center propeller shaft and then install the Löbro joint boot.



8. INSTALLATION OF LÖBRO JOINT ASSEMBLY

Assemble the Löbro joint as follows:
(1) Apply a thin coat of the specified grease to the ball grooves of the inner and outer races.

Specified grease: Repair kit grease



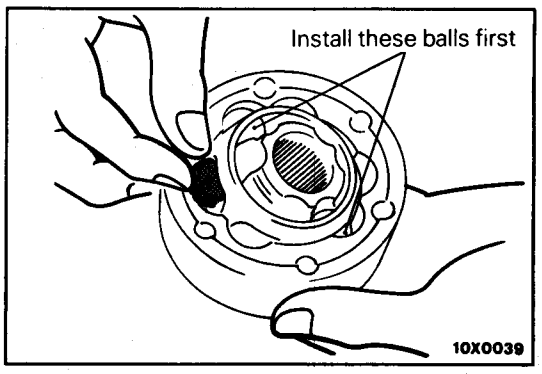
(2) Put the cage on the inner race with the mating marks aligned and install two balls, one in a groove and the other in the groove opposite to that groove.
Both balls should be placed in the grooves where they were before disassembly.

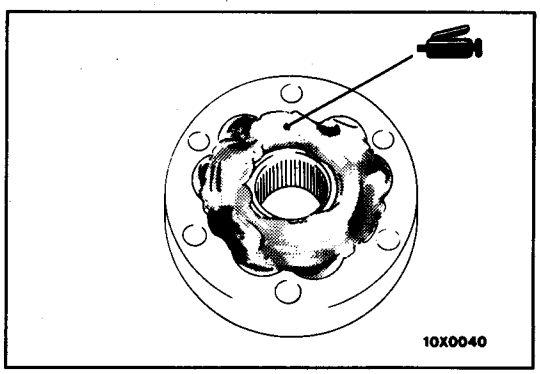
(3) Assemble the inner race and cage in the outer race with their mating marks aligned.

NOTE
Make sure that the recessed end (where snap ring will be fitted) of the inner race, the recessed end (where packing will be fitted) of the outer race, and the chamfered end of the cage are all on the same side. Also ensure that the relative positions of the inner and outer races are as shown in the illustration.

(4) Install the remaining balls in their original positions.

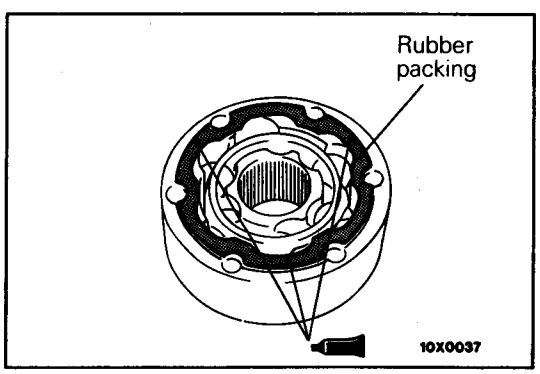
(5) Check that the outer race rotates on the inner race smoothly.





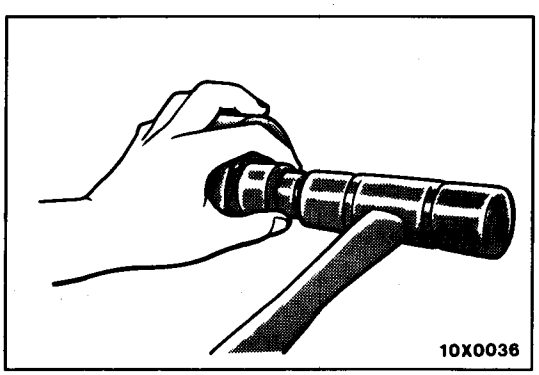
(6) Apply specified grease to the Löbro joint assembly.

Specified grease: Repair kit grease [45 – 55 g (1.59 – 1.94 oz.)]

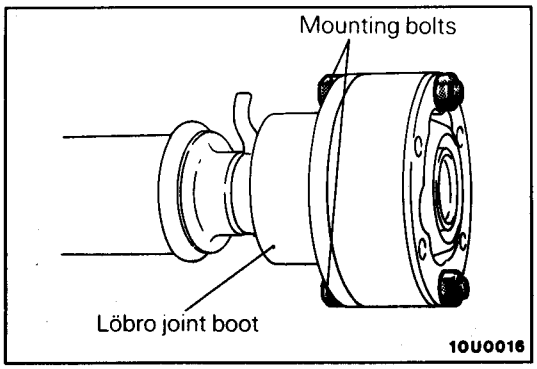


(7) Apply a small amount of specified adhesive in three equally divided places on the surface of the Löbro joint ball groove where there is a stepped section for the Löbro joint assembly packing, and then fit the rubber packing.

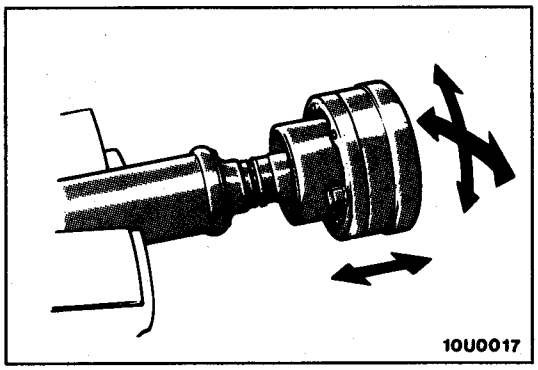
Specified adhesive: 3M ATD Part No. 8121 or equivalent



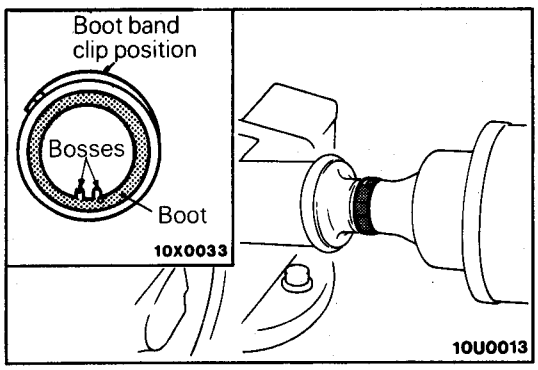
(8) Lining up the mating marks on the Löbro joint assembly and the center propeller shaft and applying the socket to the inner race of the Löbro joint assembly, install the Löbro joint assembly to the center propeller shaft.



(9) Using the center propeller shaft bolt, align the bolt holes of the Löbro joint boot and the Löbro joint assembly and install the Löbro joint boot to the Löbro joint assembly.



(10)Check that the Löbro joint assembly moves smoothly.

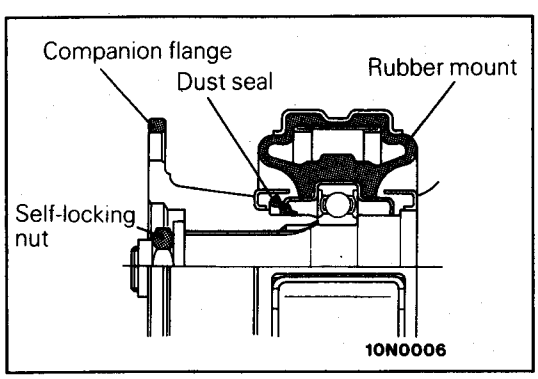


7. INSTALLATION OF BOOT BAND

Caution
Position the boot band clip on the side opposite to the bosses which are provided in the boot for ventilation. Be sure to remove grease, if present, from around the bosses. Grease obstructs the ventilation air passage.

5. INSTALLATION OF CENTER PROPELLER SHAFT ASSEMBLY

Install, lining up the mating marks on the center propeller shaft, the Löbro joint assembly and the companion flange.



4. INSTALLATION OF CENTER BEARING ASSEMBLY / 3. COMPANION FLANGE / 2. SELF-LOCKING NUT

(1) Install the bearing in the rubber mount groove of the center bearing bracket.
(2) Install the center bearing assembly to the center propeller shaft with its dust seal facing the companion flange side.
(3) Install, lining up the mating marks on the companion flange and the center propeller shaft.
(4) While tightening the self-locking nut, install the center bearing assembly with the companion flange.

NOTES

FRONT AXLE

CONTENTS

E26AA-

SPECIFICATIONS

GENERAL SPECIFICATIONS

E26CA--

Items	Specifications
Wheel bearing Type	Unit ball bearing
Drive shaft Joint type Outer Inner Length mm (in.) L.H. shaft R.H. shaft	 B.J. T.J. 419 (16.5) 391 (15.4)

SERVICE SPECIFICATIONS

E26CB--

Items	Specifications
Standard value Setting of T.J. boot length mm (in.) L.H. R.H.	 85 ± 3 (3.35 ± 0.12) 85 ± 3 (3.35 ± 0.12)
Limit Hub axial play mm (in.) Wheel bearing starting torque (Hub starting torque) Nm (kgcm, in.lbs.)	 0.05 (0.002) 1.8 (18,16)

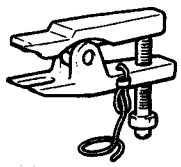
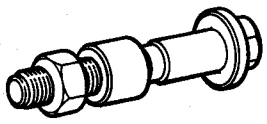
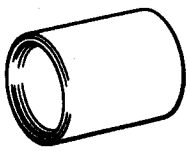
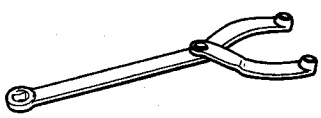
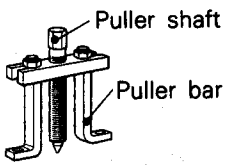
LUBRICANTS

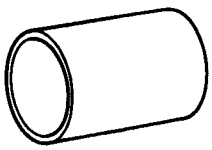
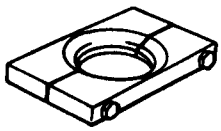
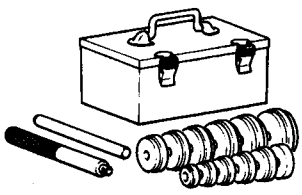
E26CD--

Items	Specified lubricants	Quantity
T.J. boot grease	Repair kit grease	160 g (5.64 oz.)
Dust seal inner Dust seal outer	Multipurpose grease	14-20 g (0.49-0.71 oz.) 8-12 g (0.28-0.42 oz.)

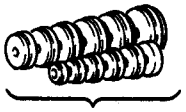
SPECIAL TOOLS

E26DA--

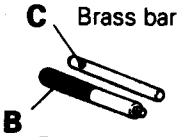
Tool	Number	Name	Use
	MB991113	Steering linkage puller	Removal of the lower arm ball joint and tie rod
	MB990998	Front hub remover and installer	Removal or press-in the hub
	MB990685	Torque wrench	Measurement of the front hub unit bearing rotation starting torque
	MB990326	Preload socket	
	MB990890	Rear suspension bushing base	Press-fitting of the dust seals
	MB990767	End yoke holder	Removal of the drive shaft
	MB990241 (MB990242 MB990244)	Axle shaft puller Puller bar Puller shaft)	
	MB991354	Puller body	

Tool	Number	Name	Use
	MB991172	Adapter	Press-fitting of the inner shaft
	MB991248 or MD998801	Inner shaft remover	Press-out of the inner shaft and press-fitting seal plate
	MB990925	Bearing and oil seal installer set	Removal of wheel bearing and oil seal Press-fitting of center bearing MB990932 MB990938 Press-out of center bearing MB990930 MB990938 Press-fitting of dust seal outer MB990934

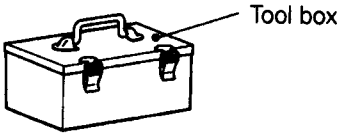
MB990925



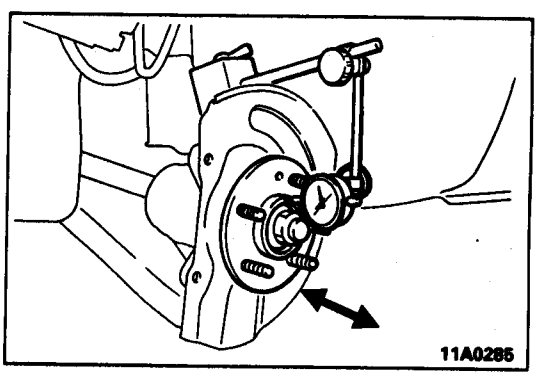
A
Installer adapter



Bar (snap-in type)



Type	Tool number	O.D. mm (in.)	Type	Tool number	O.D. mm (in.)
A	MB990926	39 (1.54)	A	MB990933	63.5 (2.50)
	MB990927	45 (1.77)		MB990934	67.5 (2.66)
	MB990928	49.5 (1.95)		MB990935	71.5 (2.81)
	MB990929	51 (2.01)		MB990936	75.5 (2.97)
	MB990930	54 (2.13)		MB990937	79 (3.11)
	MB990931	57 (2.24)	B	MB990938	–
	MB990932	61 (2.40)	C	MB990939	–



SERVICE ADJUSTMENT PROCEDURES

E26FEAH

HUB AXIAL PLAY INSPECTION

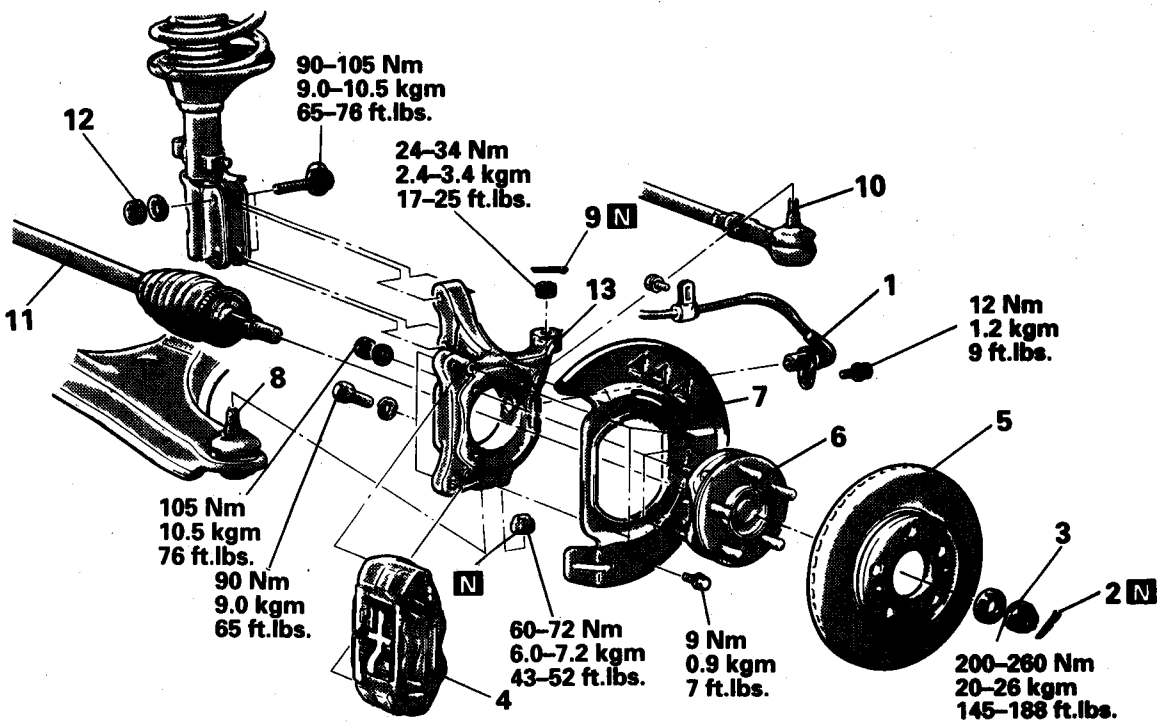
1. Jack up the vehicle and remove the front wheels.
2. Remove the disc brake caliper and suspend it with a wire.
3. Remove the brake disc from the front hub.
4. Attach a dial indicator as shown in the illustration, and then measure the axial play while moving the hub back and forth.

   Limit: 0.05 mm (0.0020 in.)
5. If end play exceeds the limit, replace the front hub unit bearing.

HUB AND KNUCKLE

REMOVAL AND INSTALLATION

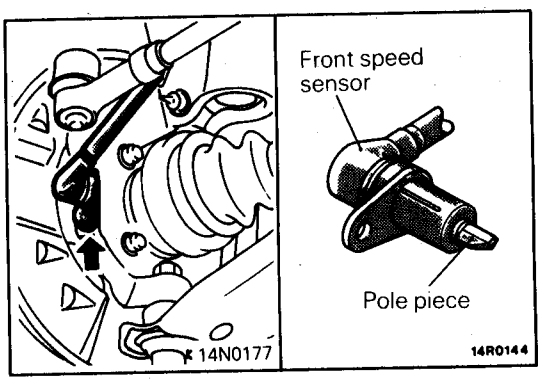
E26HA--



11F0026

Removal steps

1. Front speed sensor connection
2. Split pin
3. Drive shaft nut
4. Caliper assembly
5. Brake disc
6. Front hub unit bearing
7. Dust shield
8. Lower arm ball joint connection
9. Split pin
10. Tie rod end connection
11. Drive shaft
12. Front strut mounting bolt
13. Knuckle



SERVICE POINTS OF REMOVAL

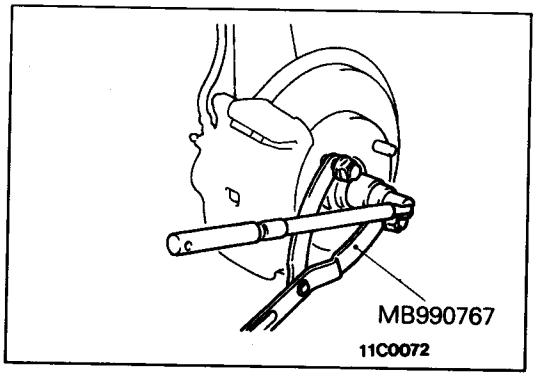
E26HBAK

1. DISCONNECTION OF FRONT SPEED SENSOR

Remove the mounting bolts which hold the speed sensor bracket to the knuckle, and then remove the speed sensor.

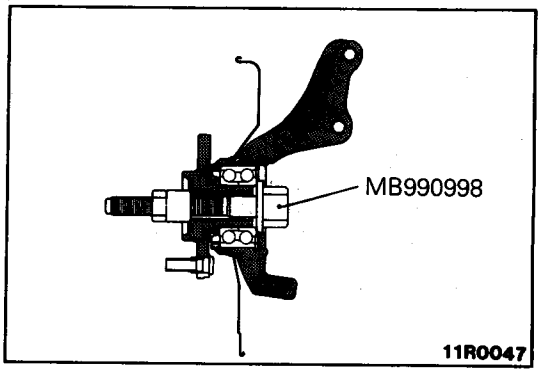
Caution

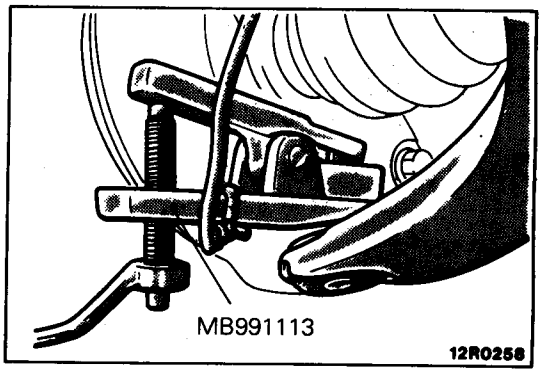
Be careful when handling the pole piece at the tip of the speed sensor and the toothed edge of the rotor so as not to damage them by striking against other parts.



3. REMOVAL OF DRIVE SHAFT NUT

Caution
Do not apply vehicle load to the wheel bearing loosing the drive shaft nut. If, however, vehicle load must be applied to the bearing in moving the vehicle, temporarily secure the wheel bearing by using the special tools, MB990998, etc.



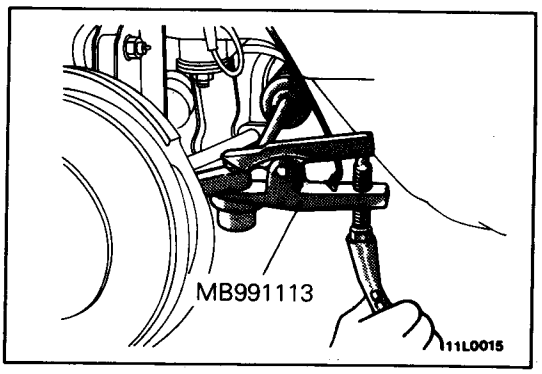


4. REMOVAL OF CALIPER ASSEMBLY

Remove the caliper assembly and suspend it with wires.

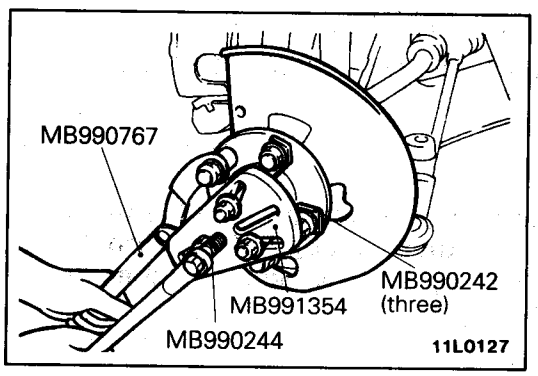
8. DISCONNECTION OF LOWER ARM BALL JOINT

Caution
1. **Be sure to tie the cord of the special tool to the nearby part.**
2. **Loosen the nut but do not remove it.**



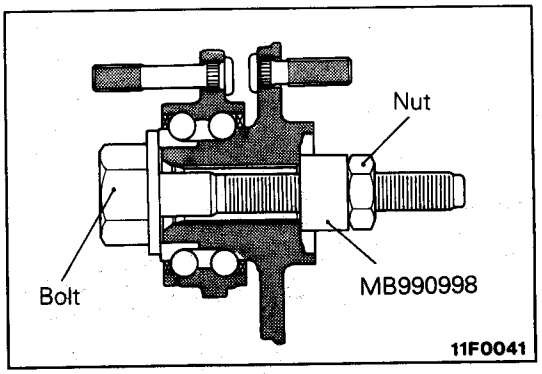
10. DISCONNECTION OF TIE ROD END

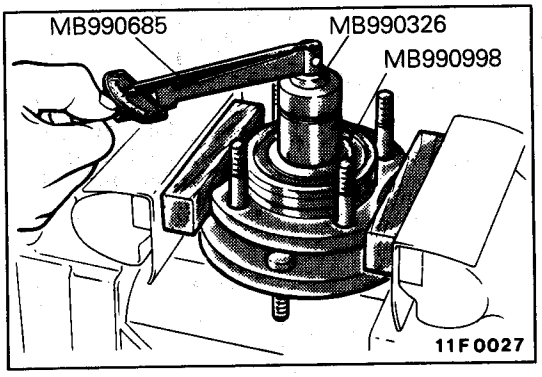
Caution
1. **Be sure to tie the cord of the special tool to the nearby part.**
2. **Loosen the nut but do not remove it.**

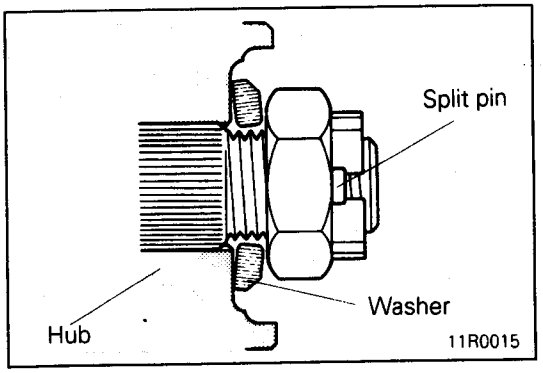


11. REMOVAL OF DRIVE SHAFT

Caution
Take care not to damage the rotor for A.B.S. installed to the B.J. outer race.







INSPECTION E26HCAE

MEASUREMENT OF FRONT HUB UNIT BEARING ROTATION STARTING TORQUE

(1) Set the special tool to the front hub unit bearing.
(2) Holding the special tool (bolt), tighten its nut to 200 to 260 Nm (20 to 26 kgm, 145 to 188 ft. lbs.).
(3) Turn the hub to cause grease to distribute evenly over the bearing.

(4) Measure the rotation starting torque of the hub.
Limit: 1.8 Nm (18 kgcm, 16 in.lbs.) or less

SERVICE POINT OF INSTALLATION E26HDAJ

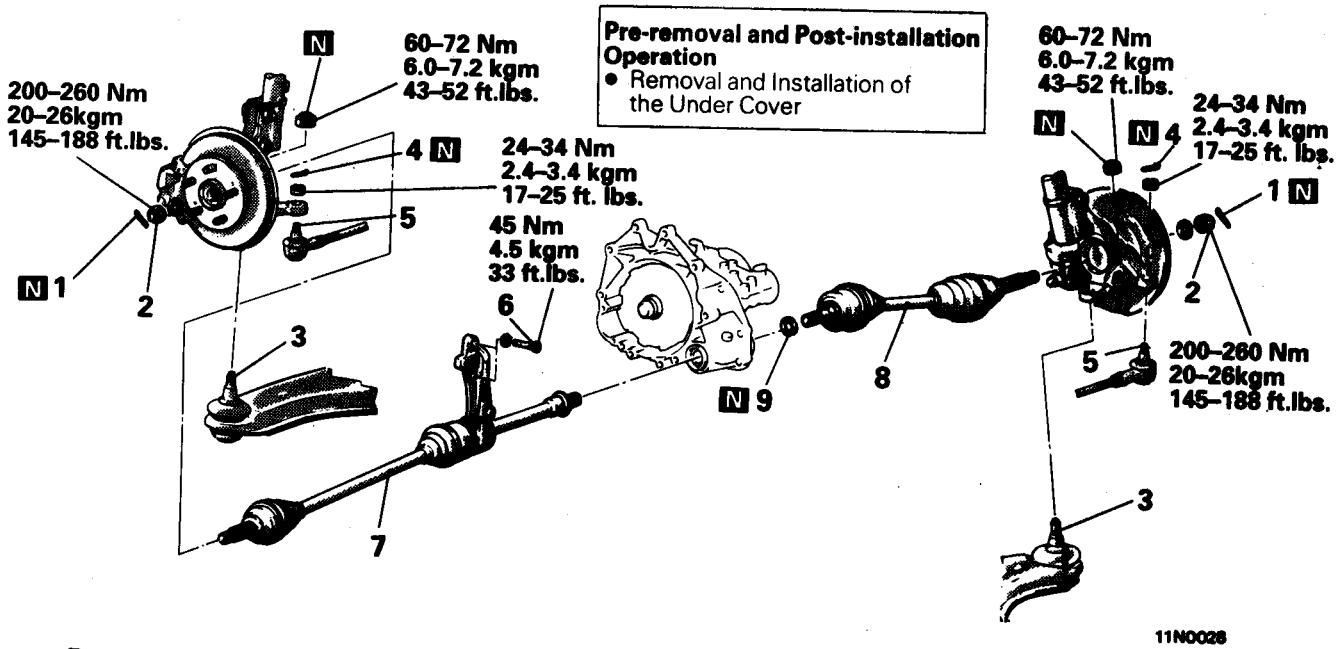
3. INSTALLATION OF DRIVE SHAFT NUT/2. SPLIT PIN

(1) Be sure to install the washer and wheel-bearing nut in the specified direction.
(2) After installing the wheel, lower the vehicle to the ground and finally tighten the wheel bearing nut.
(3) If the position of the split pin holes does not match, tighten the nut up to 260 Nm (26 kgm, 188 ft.lbs.) in maximum.
(4) Install the split pin in the first matching holes and bend it securely.

DRIVE SHAFT

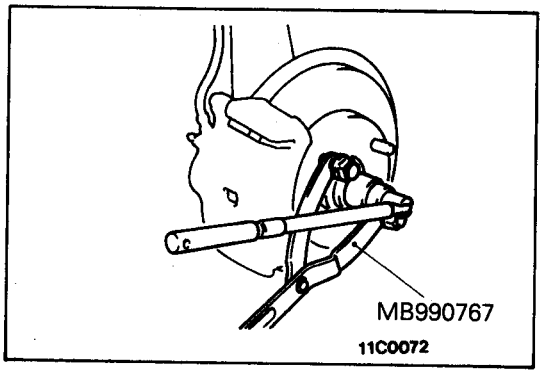
E26QA--

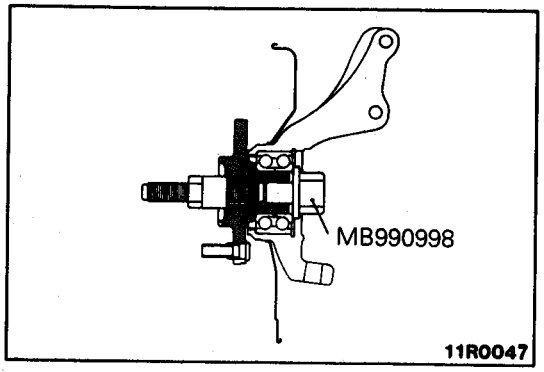
REMOVAL AND INSTALLATION



Removal steps

1. Split pin
2. Drive shaft nut
3. Lower arm ball joint connection
4. Split pin
5. Tie rod end connection
6. Center bearing bracket installation bolt
7. Drive shaft and inner shaft assembly (L.H.)
8. Drive shaft (R.H.)
9. Circlip





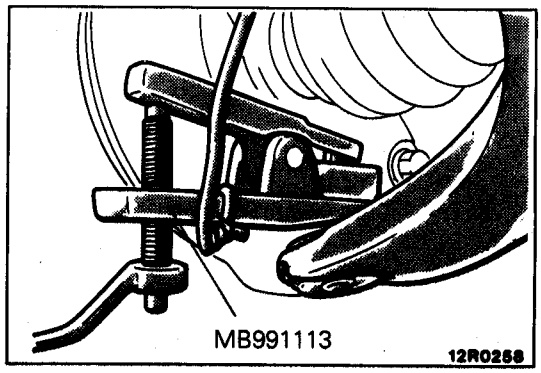
SERVICE POINTS OF REMOVAL

E26QBDB

2. REMOVAL OF DRIVE SHAFT NUT

Caution

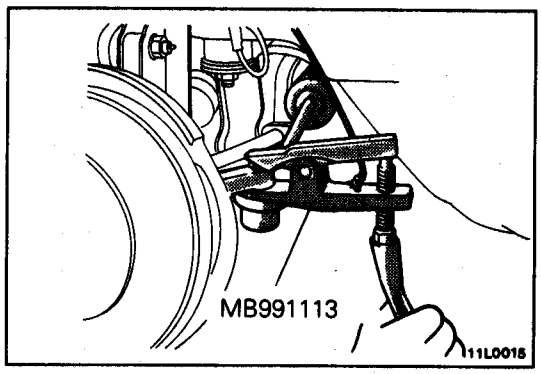
Do not apply vehicle load to the wheel bearing loosing the drive shaft nut. If, however, vehicle load must be applied to the bearing in moving the vehicle, temporarily secure the wheel bearing by using the special tools, MB990998, etc.



3. DISCONNECTION OF LOWER ARM BALL JOINT

Caution

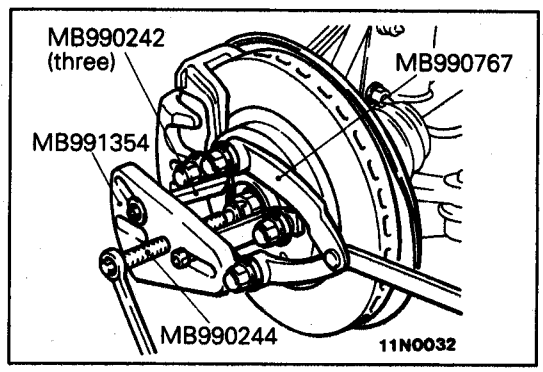
1. **Be sure to tie the cord of the special tool to the nearby part.**
2. **Loosen the nut but do not remove it.**



5. DISCONNECTION OF TIE ROD END

Caution

1. **Be sure to tie the cord of the special tool to the nearby part.**
2. **Loosen the nut but do not remove it.**

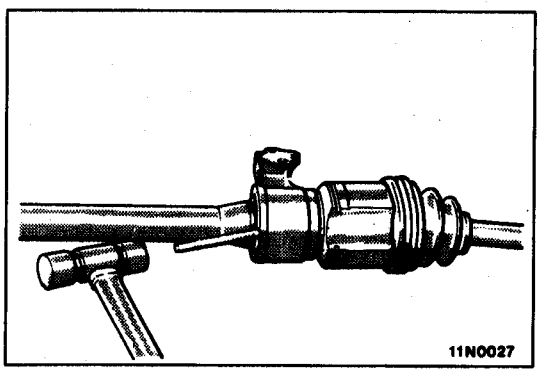


7. REMOVAL OF DRIVE SHAFT AND INNER SHAFT ASSEMBLY (L.H.) / 8. DRIVE SHAFT (R.H.)

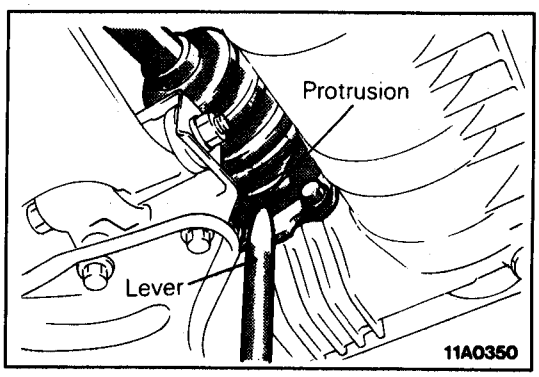
(1) Using the special tool, push out the drive shaft and inner shaft assembly (L.H.) or the drive shaft (R.H.) from the hub.

Caution

Take care not to damage the rotor for A.B.S. installed to the B.J. outer race.



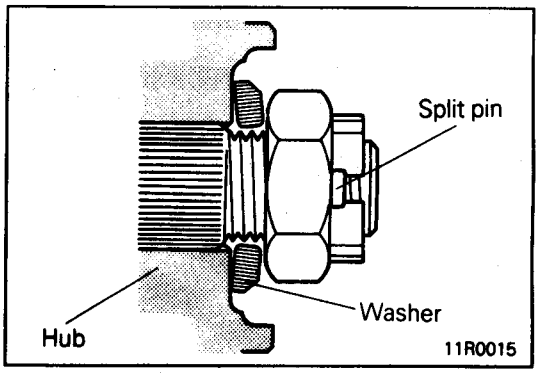
(2) If the inner shaft is hard to remove from the transmission, strike the center bearing bracket lightly with a plastic hammer.



(3) To remove the drive shaft (R.H.) from the transmission, pry off the shaft using a lever against the protrusion of the drive shaft.

Caution

Pulling the drive shaft can cause damage to the T.J. Be sure to use a lever.



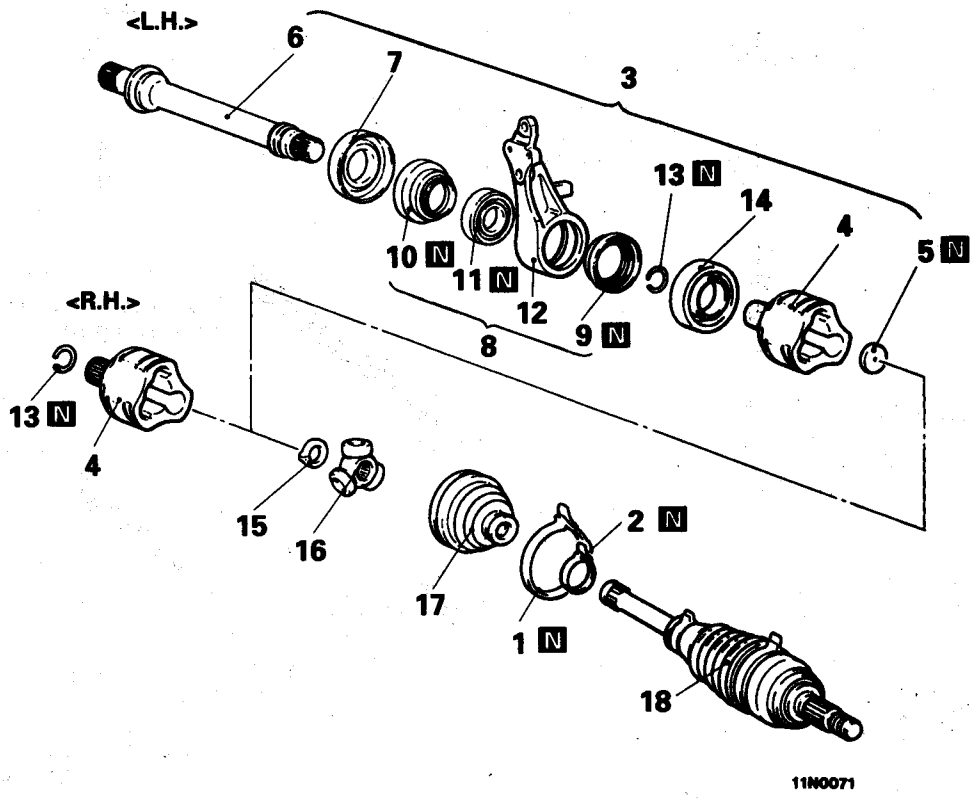
SERVICE POINT OF INSTALLATION E26QDDB

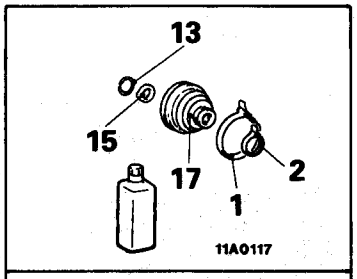
2. INSTALLATION OF DRIVE SHAFT NUT

(1) Be sure to install the washer and wheel bearing nut in the specified direction.
(2) After installing the wheel, lower the vehicle to the ground and finally tighten the wheel bearing nut.
(3) If the position of the split pin holes does not match, tighten the nut up to 260 Nm (26 kgm, 188 ft.lbs.) in maximum.
(4) Install the split pin in the first matching holes and bend it securely.

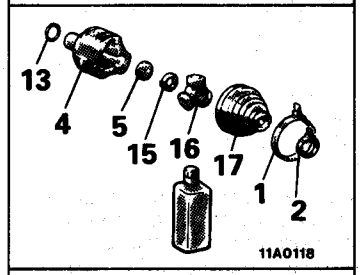
DISASSEMBLY AND REASSEMBLY

E26QE--

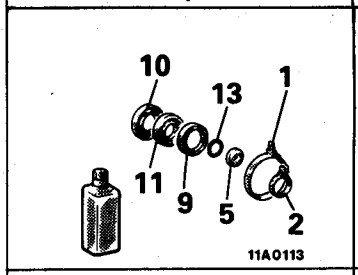




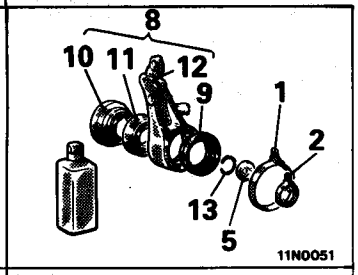
T.J. Boot Repair Kit



T.J. Repair Kit



Bearing Dust Seal Repair Kit



Bracket Assembly Repair Kit

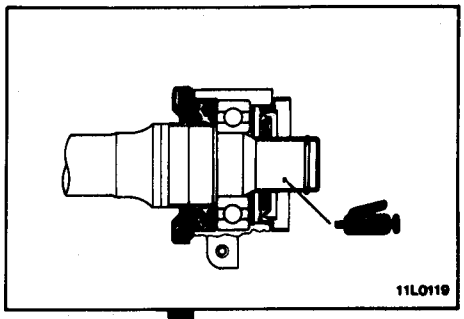
Disassembly steps

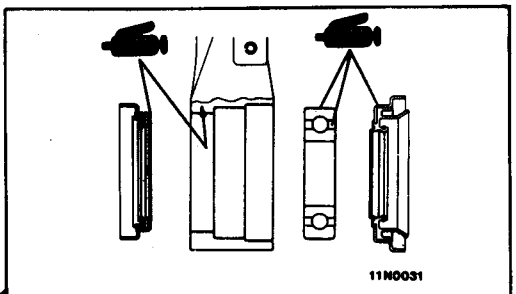
- ◆◆ 1. T.J. boot band (large)
- ◆◆ 2. T.J. boot band (small)
- ◆◆ 3. T.J. case and inner shaft assembly
- 4. T.J. case
- 5. Seal plate
- ◆◆ ◆◆ 6. Inner shaft
- 7. Dust shield
- 8. Bracket assembly
- ◆◆ 9. Dust seal outer
- ◆◆ 10. Dust seal inner
- ◆◆ ◆◆ 11. Center bearing
- 12. Center bearing bracket
- 13. Circlip
- 14. Dust shield
- 15. Snap ring
- ◆◆ 16. Spider assembly
- ◆◆ ◆◆ 17. T.J. boot
- 18 B.J. assembly

Caution

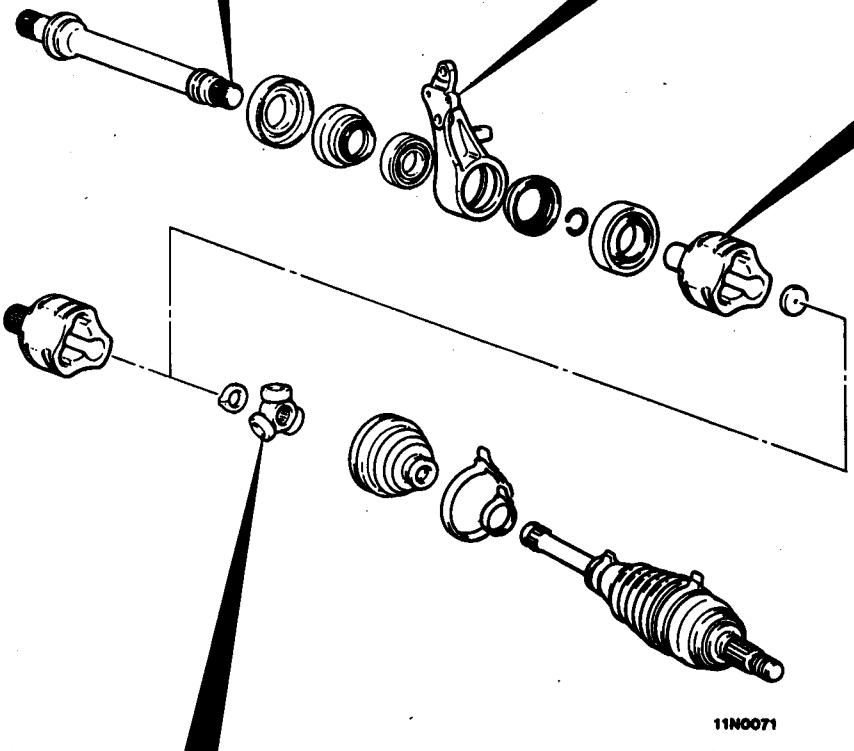
1. **Take care not to damage the rotor installed to the B.J. outer race.**
2. **Never disassemble B.J. assembly.**

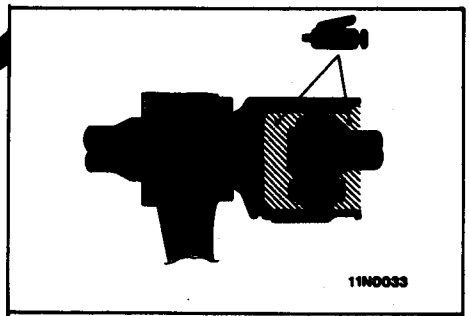
Lubrication Points





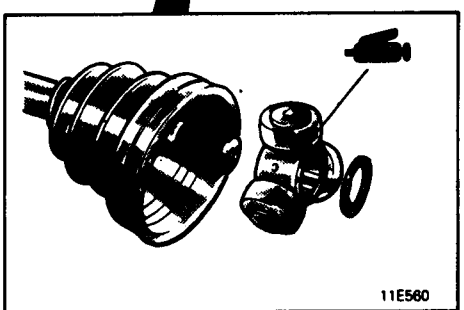
Dust seal inner 14-20 g (0.49-0.71 oz.)
Dust seal outer 8-12 g (0.28-0.42 oz.)



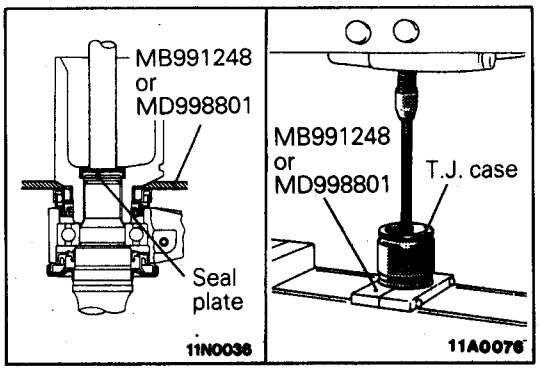


Grease: Repair kit grease
160 g (5.64 oz.)

Caution
The grease in the repair kit should be divided in half for use, respectively, at the joint and inside the boot.
Special grease is used to lubricate the joint. Do not mix old and new grease or different types of grease.



Grease: Repair kit grease

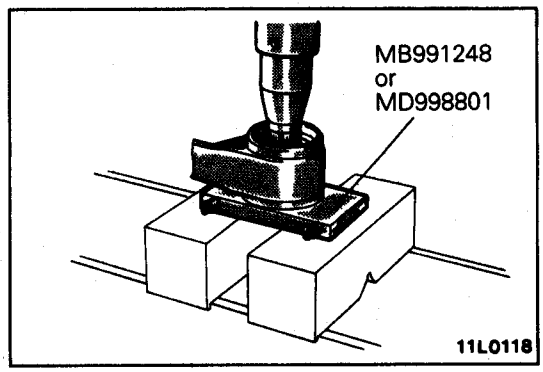


SERVICE POINTS OF DISASSEMBLY E26QFCJ

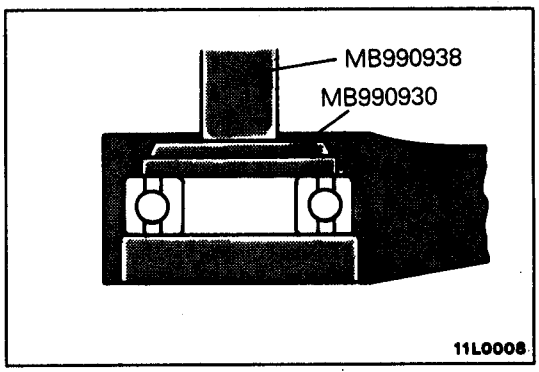
6. REMOVAL OF INNER SHAFT

(1) Using the special tool, remove the inner shaft assembly, together with the seal plate, from the T.J. case.

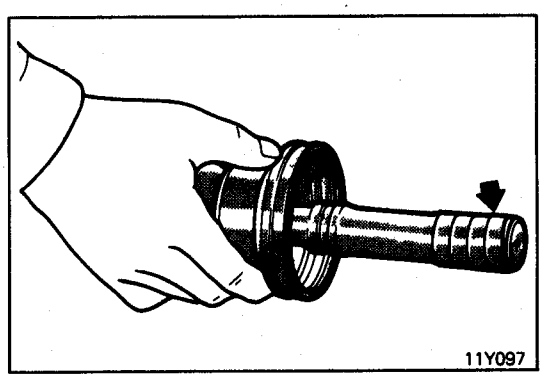
NOTE
Press the tool directly against the seal plate. The tool under pressure will puncture and deform the seal plate, and push out the inner shaft underneath.



(2) Use the special tool to remove the inner shaft from the center bearing bracket.



11. REMOVAL OF CENTER BEARING



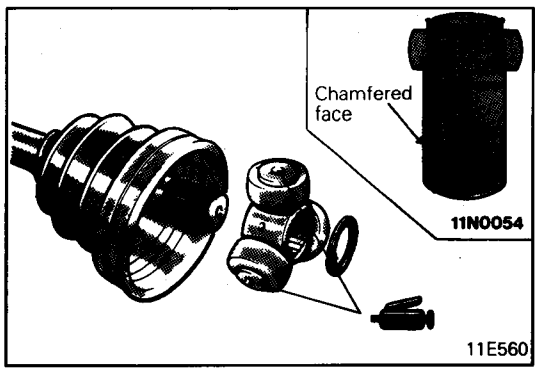
17. REMOVAL OF T.J. BOOT

(1) Wipe off grease around the shaft spline part.
(2) To reuse T.J. boot, wrap plastic tape around the shaft spline part so that it is not damaged when removed.

SERVICE POINTS OF REASSEMBLY

17. INSTALLATION OF T.J. BOOT E26QHCJ

Wrap plastic tape around the shaft spline to assemble T.J. boot band (small) and T.J. boot.



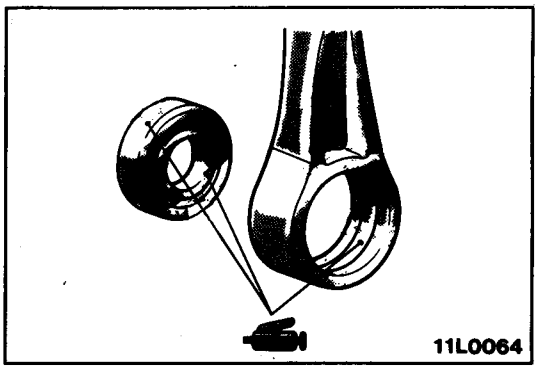
16. INSTALLATION OF SPIDER ASSEMBLY

(1) Pack specified grease amply between the spider shaft and rollers of the spider assembly.

Specified grease: Repair kit grease

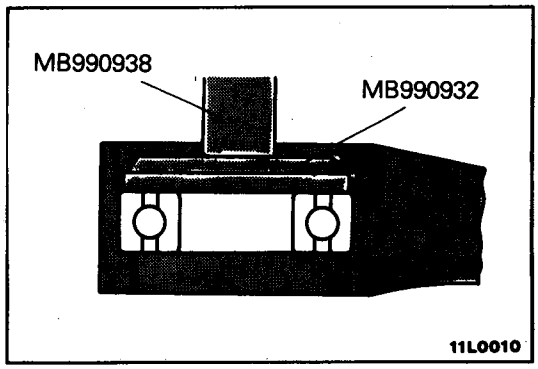
Caution
Special grease is used to lubricate the joint. Do not mix old and new grease or different types of grease.

(2) To install the spider assembly to the shaft, insert the shaft from the chamfered end of the spider.

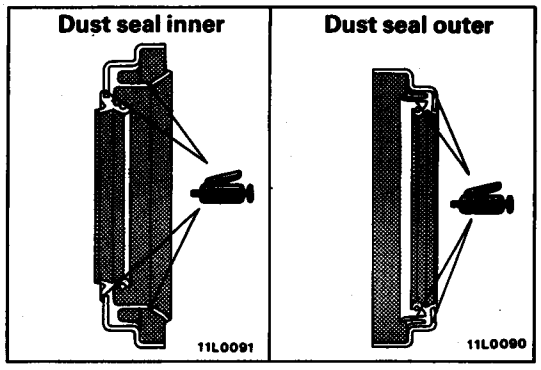


11. INSTALLATION OF CENTER BEARING

(1) Apply multipurpose grease to the center bearing and inside the center bearing bracket.



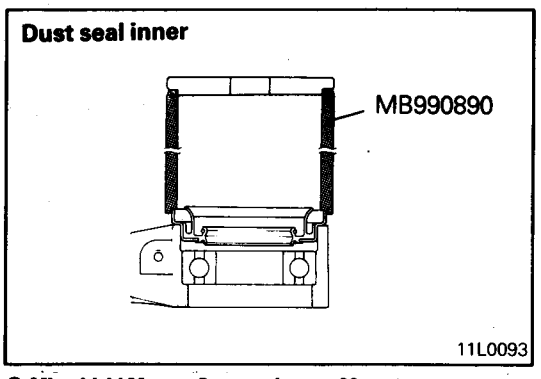
(2) Use the special tools to press-fit the center bearing into the center bearing bracket.



10. 9. INSTALLATION OF DUST SEALS

(1) Apply multipurpose grease to the rear surfaces of all dust seals.

Dust seal inner: 14–20 g (0.49–0.71 oz.)
Dust seal outer: 8–12 g (0.28–0.42 oz.)

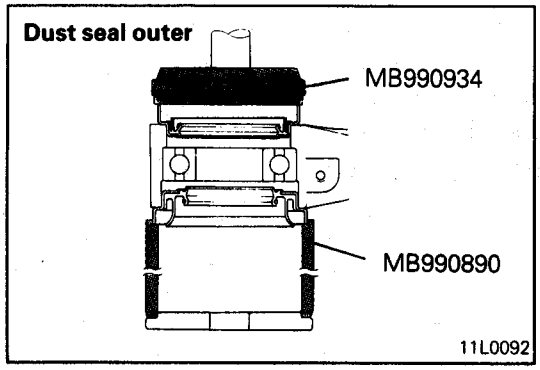


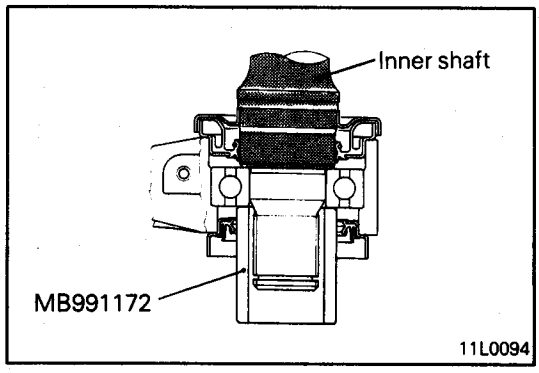
(2) Press the oil seal into the center bearing bracket using the special tool.

Caution
Take care not to damage the rubber part on the periphery of the dust seal.

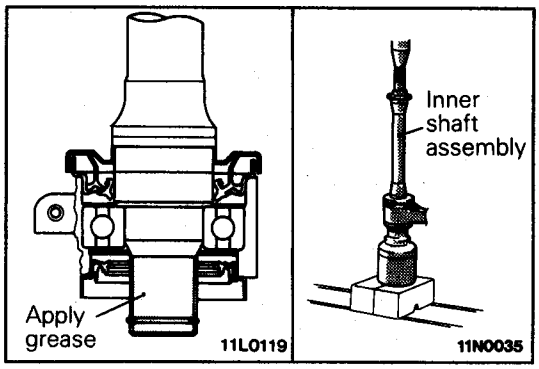
(3) Apply multipurpose grease to the lip of each dust seal.

NOTE
When applying grease, make sure that it does not adhere to anything outside the lip.



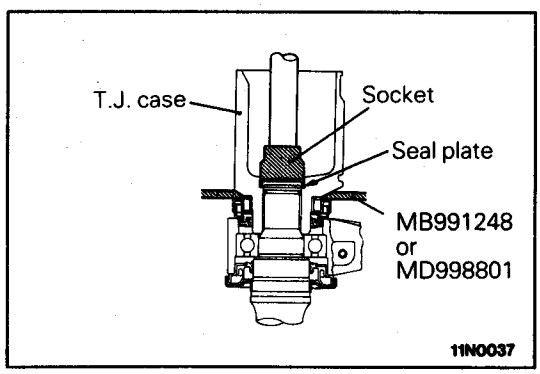


6. INSTALLATION OF INNER SHAFT

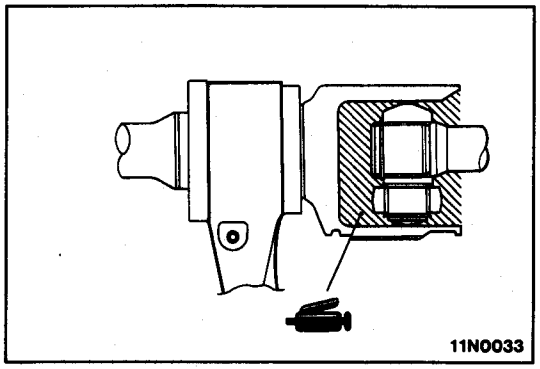


3. INSTALLATION OF T.J. CASE AND INNER SHAFT ASSEMBLY

(1) Apply multipurpose grease to the inner shaft spline, then press fit it into the T.J. case.



(2) Using the special tool, press the seal plate into the T.J. case.

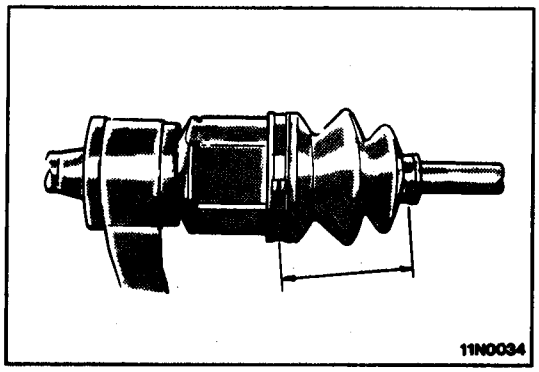


(3) Fill the specified grease furnished in the repair kit to the T.J. case.

Specified grease: Repair kit grease
160 g (5.64 oz.)

Caution

1. **The grease in the repair kit should be divided in half for use, respectively, at the joint and inside the boot.**
2. **The drive shaft joint uses special grease. Do not mix old and new or different types of grease.**



2. 1. INSTALLATION OF T.J. BOOT BANDS

Set the T.J. boot bands at the specified distance in order to adjust the amount of air inside the T.J. boot, and then tighten the T.J. boot band securely.

Standard value: 85 ± 3 mm (3.35 ± 0.12 in.)

REAR AXLE

CONTENTS

B27AA-

SPECIFICATIONS

GENERAL SPECIFICATIONS

E27CA--

Items	Specifications
Axle shaft	
Type	Semi-floating type
Shaft dimensions mm (in.)	
Outer bearing portion dia.	35 (1.38)
Inner bearing portion dia.	28 (1.10)
Center portion dia.	34.5 (1.36)
Overall length	245.4 (9.7)
Bearing	
O.D. x I.D. mm (in.)	
Outer	72 x 35 (2.83 x 1.38)
Inner	58 x 28 (2.28 x 1.10)
Drive shaft	
Joint type	
Outer	B.J.
Inner	T.J.
Length (joint to joint) x diameter mm (in.)	395 x 28 (15.6 x 1.10)
Differential	
Reduction gear type	Hypoid gear
Reduction ratio	3.545
Differential gear type and configuration	
Side gear	Straight bevel gear x 2*
Pinion gear	Straight bevel gear x 4
Number of teeth	
Drive gear	39
Drive pinion	11
Side gear	16
Pinion gear	10
Bearing	
O.D. x I.D. mm (in.)	
Side	82.500 x 45.242 (3.25 x 1.78)
Front	68.263 x 30.163 (2.69 x 1.19)
Rear	76.200 x 36.513 (3.00 x 1.44)

NOTE
*: Denotes the gear (L.H.) which is in a single body with the viscous coupling.
B.J.: Birfield Joint
T.J.: Tripod Joint

SERVICE SPECIFICATIONS

E27CB–

Items	Specifications
Standard value	
Rear wheel bearing rotary-sliding resistance N (kg, lbs.)	12 (1.2, 2.6) or less
Setting of T.J. boot length mm (in.)	85±3 (3.35±0.12)
Final drive gear backlash mm (in.)	0.11–0.16 (0.004–0.006)
Differential gear backlash (Limited slip differential) mm (in.)	0.03–0.09 (0.0012–0.0035)
Drive pinion rotation torque Nm (kgcm, in.lbs)	
With oil seal	
New part (with rust-prevention oil)	0.5–0.7 (5.0–7.0, 4–6)
New part/reusable part (gear oil application)	0.35–0.45 (3.5–4.5, 3–4)
Without oil seal	
New part (with rust-prevention oil)	0.3–0.5 (3.0–5.0, 3–4)
New part/reusable part (gear oil application)	0.15–0.25 (1.5–2.5, 1–2)
Limit	
Rear axle total backlash mm (in.)	5 (0.2)
Drive gear runout mm (in.)	0.05 (0.002)
Rear wheel bearing end play mm (in.)	0.8 (0.031)

LUBRICANTS

E27CD–

Items	Specified lubricants	Quantity
Rear axle gear oil	Hypoid Gear Oil SAE No. 90 conforming to API classification GL-5 or higher	1.1 dm3 (1.16 U.S.qts., 0.97 Imp. qts.)
B.J. boot grease T.J. boot grease	Repair kit grease	125 g (4.41 oz.) 135 g (4.76 oz.)

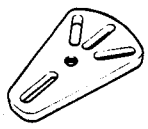
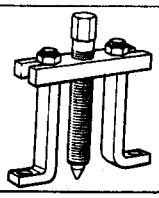
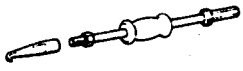
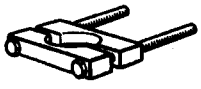
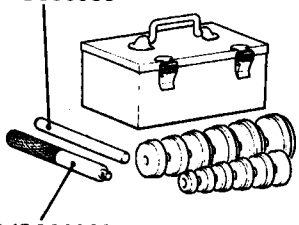
SEALANTS AND ADHESIVES

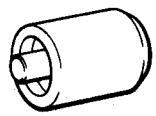
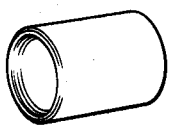
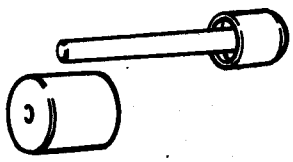
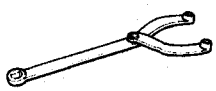
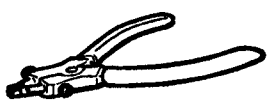
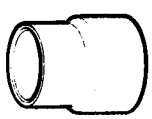
E27CE–

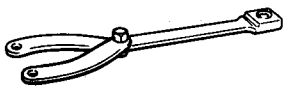
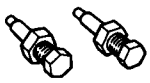
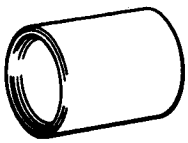
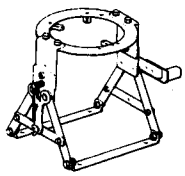
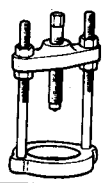
Items	Specified sealants and adhesives	Remarks
Drive gear threaded hole	3M Stud Locking Part No. 4170 or equivalent	Anaerobic adhesive
Vent plug	3M ATD Part No. 8661 or equivalent	Semi-drying sealant
Differential cover		

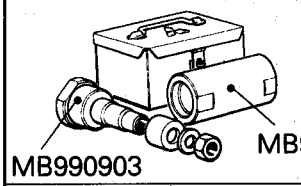
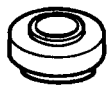
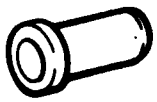
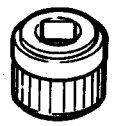
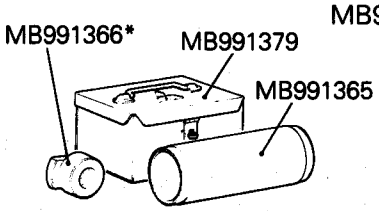
SPECIAL TOOLS

E27DA--

Tool	Number	Name	Use
	MB991354	Puller body	Driving-out of the axle shaft
	MB990241	Rear axle shaft puller	
	MB990242 MB990244	Puller bar Puller shaft	
	MB990211	Sliding hammer	
	MB991380	Oil seal installer	Driving-out of axle shaft dust cover and outer bearing Pressing-in of outer bearing Driving-out and press-fitting of the rotor
	MB990560	Bearing remover	Driving-out of the outer wheel bearing inner race Driving-out and press-fitting of the rotor
MB990939  MB990938	MB990925	Bearing and oil seal installer set	Driving-out of axle shaft inner bearing and oil seal MB990938, MB990928 Pressing-in of axle shaft inner bearing (MB990938, MB990931) Press-fitting of the drive pinion rear bearing outer race MB990936, MB990938 Press-fitting of the drive pinion front bearing outer race MB990934, MB990938 Press-fitting of the differential side oil seal MB990938 (Use in conjunction with MB991380) Measurement of the tooth contact of differential final gear, Driving-out the oil seal, drive pinion front bearing and drive pinion rear bearing outer-race, Press-fitting the side bearing outer race MB990939

Tool	Number	Name	Use
	MB991153	Bushing remover & installer arbor	Driving-out and press-fitting of differential support bushing and differential support member bushing
	MB990831	Bushing remover & installer ring	
	MB990847	Bushing remover & installer base	
	MB990641	Lower arm bushing installer and remover A	Installation of oil seal
	MB990685	Torque wrench	Measurement of the drive pinion preload
	MB990326	Preload socket	
	MB990767	End yoke holder	Fixing of the hub
	MB990628	Snap ring pliers	To remove and install the snap ring of the drive shaft
	MB990799	Ball joint dust shield installer	Press-fitting of rear axle shaft dust shield

Tool	Number	Name	Use
	MB991367	Special spanner	Removal and installation of side bearing nut
	MB991385	Pin	
	MB990890 or MB990891	Rear suspension bushing base	Pressing-in of drive gear (for rear wheel oil pump driving)
	MB990909	Warking base	Supporting of the differential carrier
 MB991116	MB991116	Warking base adapter	
	MB990810	Side bearing puller	Removal of the side bearing inner race Removal of the companion flange
	MB990850	End yoke holder	Removal and installation of the companion flange
	MB990339	Bearing puller	Removal of the drive pinion rear bearing inner race
	MB990648	Pinion bearing remover	

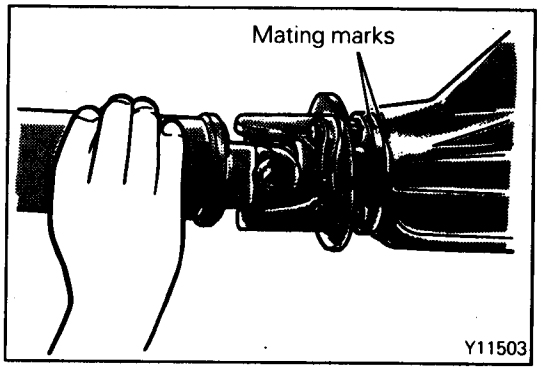
Tool	Number	Name	Use
	MB990901	Drive pinion setting gauge set	Measurement of the drive pinion height
	MB990728	Bearing installer	Press-fitting of the drive pinion rear bearing inner race Press-fitting of the side bearing inner race
	MB991168	Drive pinion oil seal installer	Press-fitting of the drive pinion oil seal
	MB990813	Tap	Removal of sealant
	MB991294	Side gear holding tool	Inspection of the differential gear backlash
	MB991378	Drive pinion setting gauge set	Measurement of drive pinion height Use only MB991366* instead of MB990901 (See above)

SERVICE ADJUSTMENT PROCEDURES

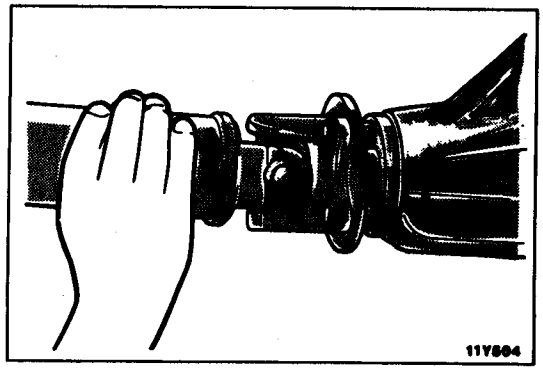
REAR AXLE TOTAL BACKLASH CHECK E27FCAG

If the vehicle vibrates and produces a booming sound due to an imbalance of the driving system, measure the rear axle total backlash by the following procedures to see if the differential carrier assembly required removal.

(1) Place the gearshift lever in the neutral position, apply the parking brake and jack up the vehicle.

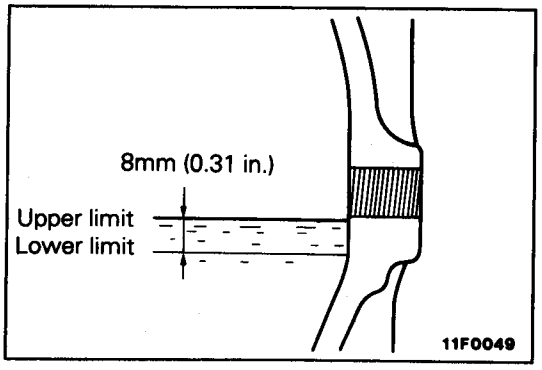


(2) Manually turn the propeller shaft clockwise as far as it will go and make mating marks on the companion flange dust shield and the differential carrier.



(3) Manually turn the propeller shaft counterclockwise as far as it will go and measure the movement of the mating marks.
Limit: 5 mm (0.2 in.)

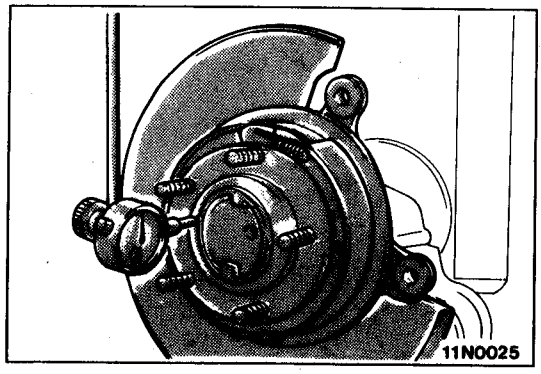
(4) If the backlash exceeds the limit, remove the differential carrier assembly and adjust the backlash. (Refer to P.27-26.)



GEAR OIL LEVEL CHECK E27FGAG

1. Remove the filler plug, and check the oil level.
2. The oil level is sufficient if it reaches the filler plug hole.

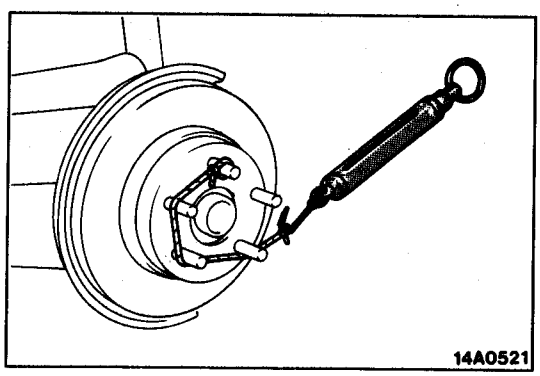
Specified gear oil:
Hypoid Gear Oil SAE No. 90 conforming to API classification GL-5 or higher [1.1 dm^3 (1.16 U.S. qts., 0.97 Imp. qts.)]



REAR WHEEL BEARING AXIAL PLAY CHECK E27FHAF

1. Support the vehicle on axle stands positioned at the specified locations and remove the rear wheel.
2. Separate the parking brake cable from the rear brake.
3. Remove the caliper assembly and brake disc.
4. Place a dial gauge as shown in the illustration, and then measure the play when the axle shaft is moved in the axial direction.

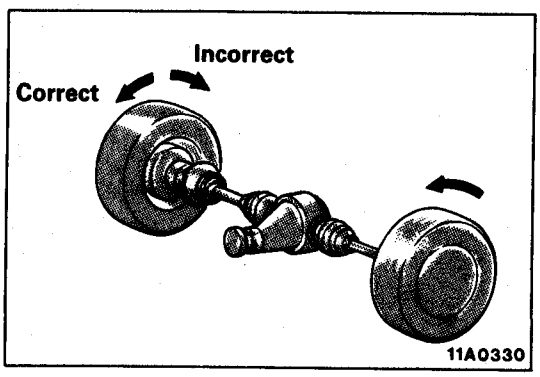
   Limit: 0.8 mm (0.031 in.)
5. If the play exceeds the limit, check the tightening torque of the companion flange of the axle shaft; if it is correct, replace the wheel bearing.



REAR WHEEL BEARING ROTARY-SLIDING RESISTANCE CHECK E27FMAD

1. Remove the drive shaft from the companion flange.
2. Remove the brake pad or caliper assembly.
3. Attach a spring balance to the hub bolt, then, pulling the balance at a right angle to the hub bolt, measure the rotary-sliding resistance to see whether it is within the standard value.

   Standard value: 12 N (1.2kg, 2.6 lbs.)
4. If the rotary-sliding resistance exceeds the standard value, check the tightening torque of the axle shaft companion flange. If it is normal, replace the bearing.



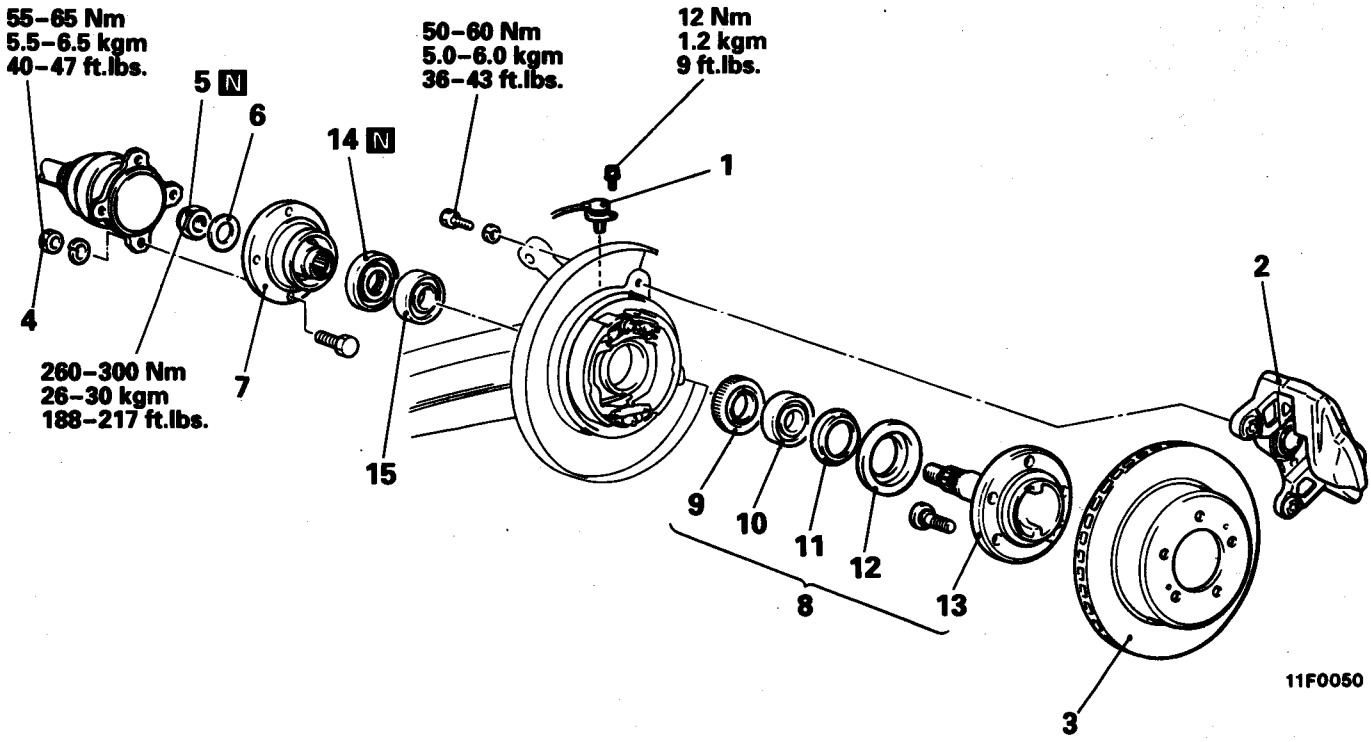
LIMITED-SLIP DIFFERENTIAL CHECK E27FPAB

1. Block the front wheels and move the shift lever to neutral.
2. Completely release the parking brake.
3. Jack up the rear wheels and place a rigid rack at the specified part of the side sill.
4. Disconnect the coupling of the differential and propeller shaft.
5. When one wheel is slowly rotated, check whether or not the wheel on the other side turns in the same direction.
6. If it turns in the opposite direction, replace the viscous unit.

AXLE SHAFT

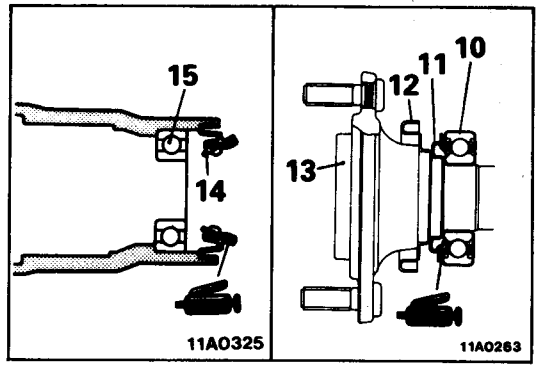
REMOVAL AND INSTALLATION

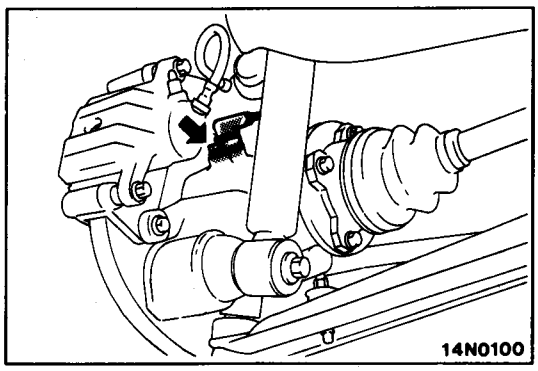
E27HA–



Removal steps

- 1. Rear speed sensor
- 2. Brake caliper assembly
- 3. Brake disc
- 4. Drive shaft mounting nut
- 5. Self-locking nut
- 6. Washer
- 7. Companion flange
- 8. Axle shaft assembly
- 9. Rear rotor
- 10. Outer bearing
- 11. Dust shield
- 12. Dust shield
- 13. Axle shaft
- 14. Oil seal
- 15. Inner bearing





SERVICE POINTS OF REMOVAL

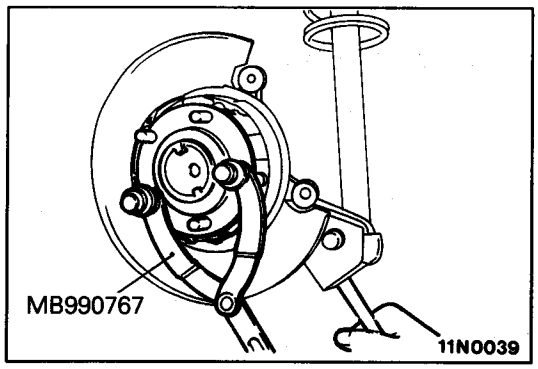
E27HBBF

1. REMOVAL OF REAR SPEED SENSOR

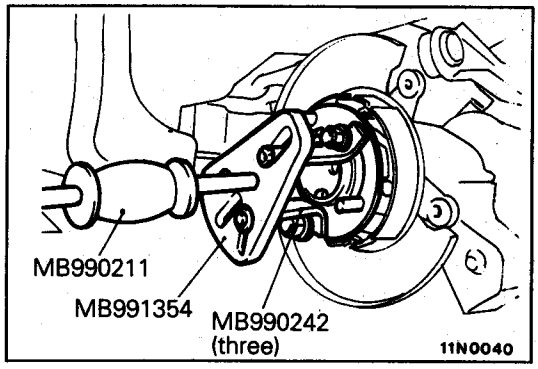
Caution
Be cautious to ensure that the tip of the pole piece does not come in contact with other parts when removing the speed sensor.

2. REMOVAL OF BRAKE CALIPER ASSEMBLY

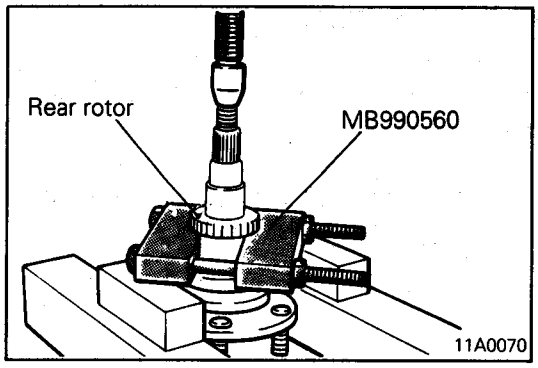
Remove the brake caliper assembly and suspend it with a piece of wire.



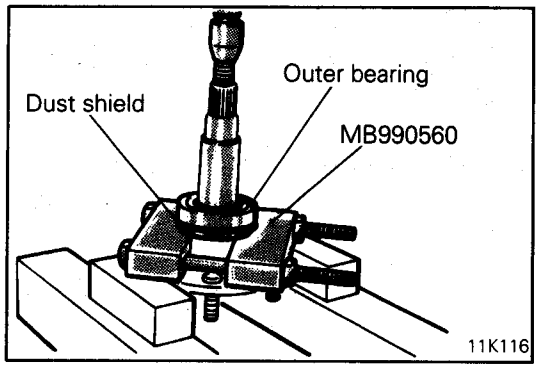
5. REMOVAL OF SELF-LOCKING NUT



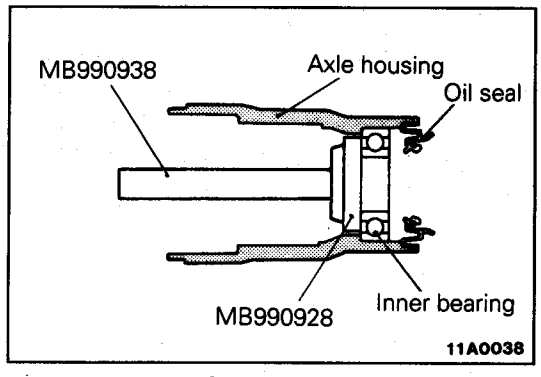
8. REMOVAL OF AXLE SHAFT ASSEMBLY



9. REMOVAL OF REAR ROTOR



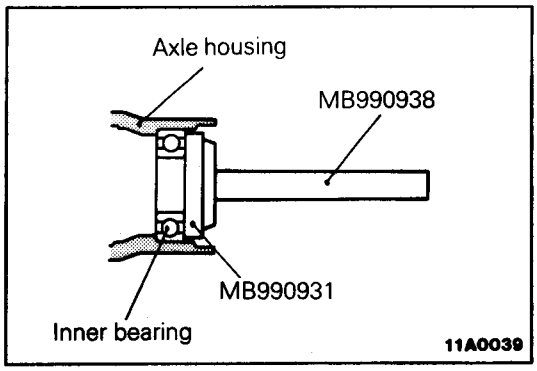
10. REMOVAL OF OUTER BEARING / 11. DUST SHIELD



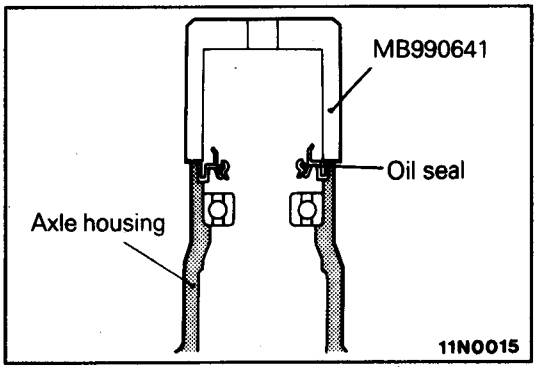
14. REMOVAL OF OIL SEAL / 15. INNER BEARING

SERVICE POINTS OF INSTALLATION E27HDBH

15. INSTALLATION OF INNER BEARING



14. INSTALLATION OF OIL SEAL

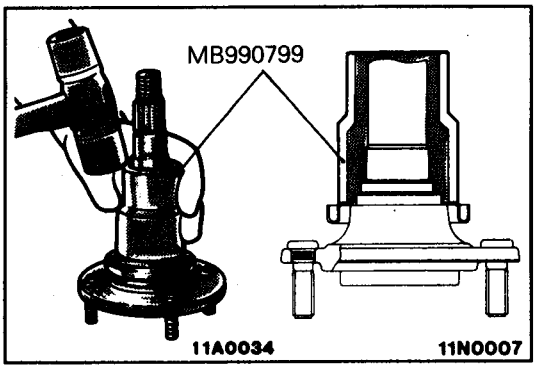


(1) With the special tool, press the oil seal onto the axle housing with the depression in the oil seal facing upward, and until it contacts the shoulder on the inside of the axle housing.

NOTE
When tapping the oil seal in, use a plastic hammer to lightly tap the top and circumference of the special tool, press fitting gradually and evenly.

(2) Apply multipurpose grease to the oil seal lip.

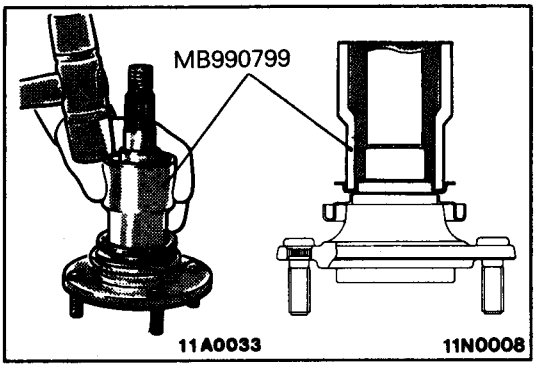
12. INSTALLATION OF DUST SHIELD



Orienting the dust shield as shown in the illustration, and using the special tool, press fit the dust shield until it contacts the axle shaft shoulder.

NOTE
When tapping the oil seal in, use a plastic hammer to lightly tap the top and circumference of the special tool, press fitting gradually and evenly.

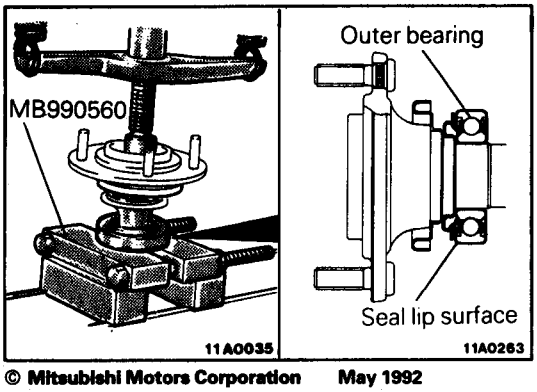
11. INSTALLATION OF DUST SHIELD



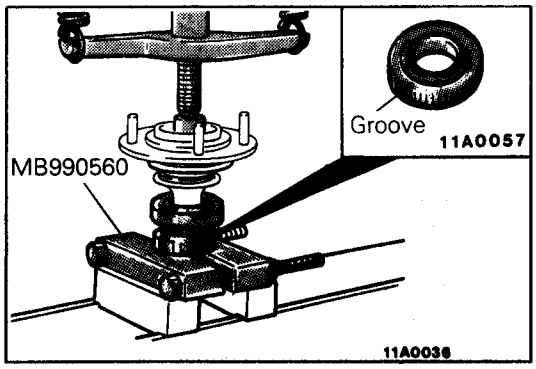
With the special tool, install the dust shield so that the depression is facing upward.

NOTE
When tapping the oil seal in, use a plastic hammer to lightly tap the top and circumference of the special tool, press fitting gradually and evenly.

10. INSTALLATION OF OUTER BEARING



(1) Apply multipurpose grease around the entire circumference of the inner side of the outer bearing seal lip.
(2) Use the special tool to press fit the outer bearing to the axle shaft so that the bearing seal lip surface is facing towards the axle shaft flange.



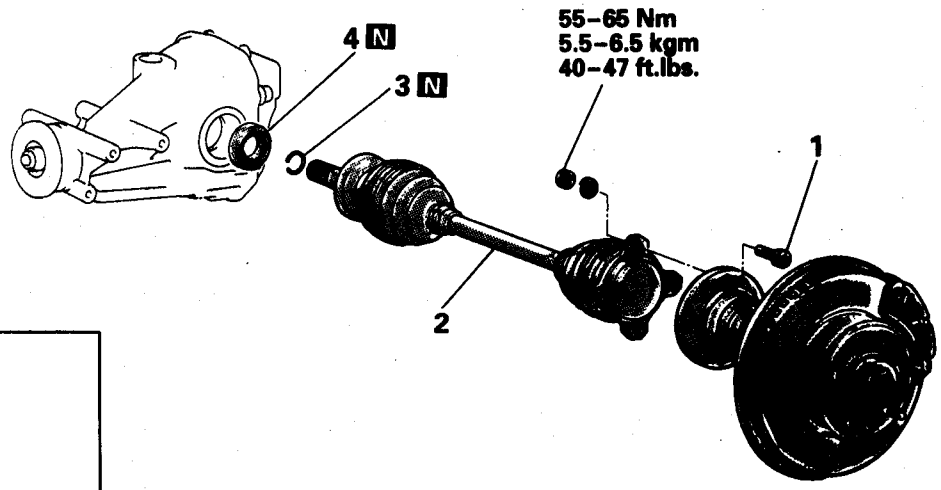
9. INSTALLATION OF REAR ROTOR

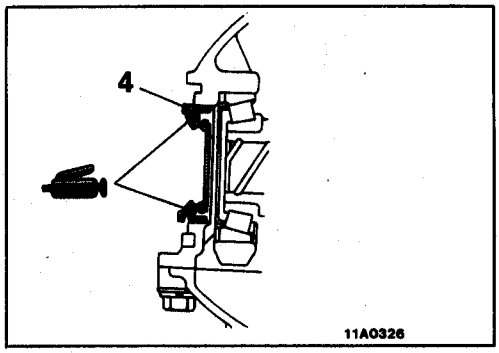
Use the special tool to press fit the rear rotor to the axle shaft with the rear rotor groove surface toward the axle shaft flange.

DRIVE SHAFT

E27KA–

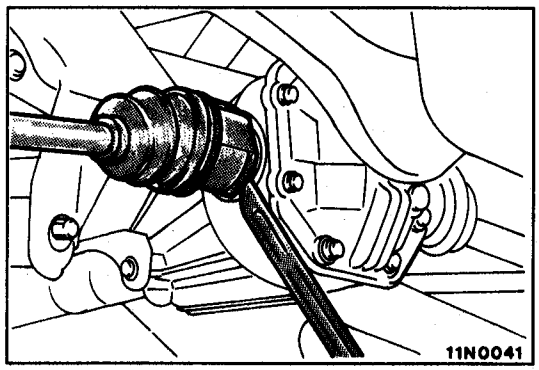
REMOVAL AND INSTALLATION





Removal steps

1. Bolt
2. Drive shaft
3. Circlip
4. Oil seal

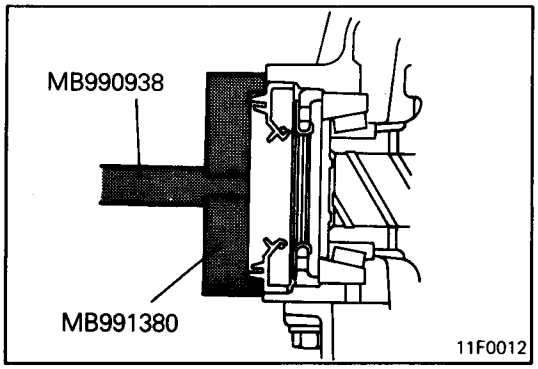


SERVICE POINT OF REMOVAL

E27KBAD

2. REMOVAL OF DRIVE SHAFT

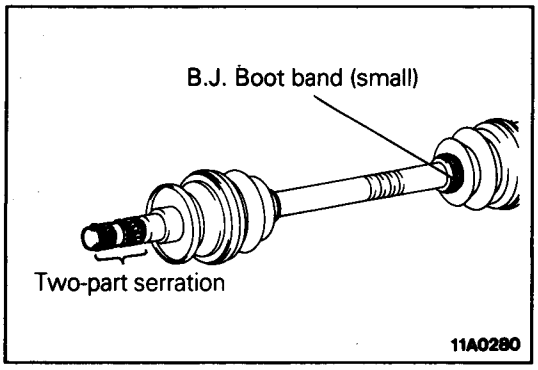
Using a tire lever, etc. remove the drive shaft from the differential carrier.



SERVICE POINTS OF INSTALLATION E27KDAD

4. INSTALLATION OF OIL SEAL

(1) Use the special tool to press in the oil seal so that it is flush with differential carrier.
(2) Apply the multipurpose grease to the oil seal lip.



2. INSTALLATION OF DRIVE SHAFT

Caution

1. **Be cautious to ensure that the differential carrier oil seal is not damaged by the drive shaft spline.**
2. **The right drive shaft has a two-part serration. Be very careful to install each one on the correct side.**

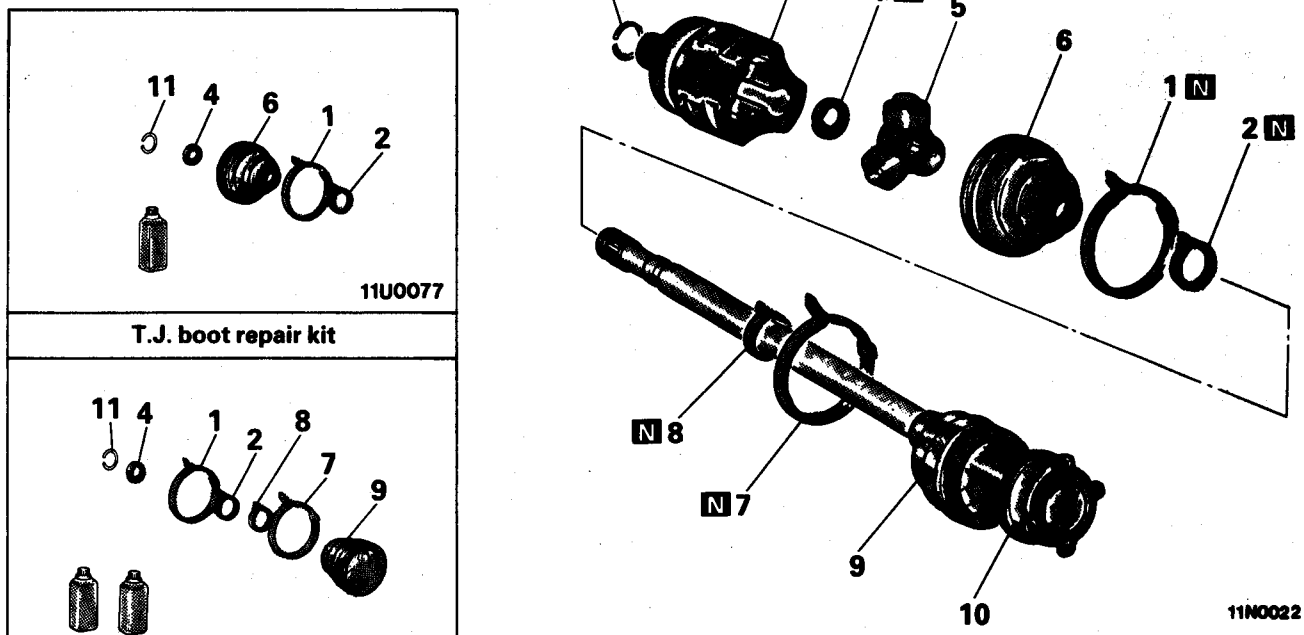
NOTE
The left and right drive shafts can also be distinguished from each other by the identification colour of B.J. boot band (small).

Item	Drive shaft	
	LH	RH
B.J. Boot band (small) identification colour	White	Blue

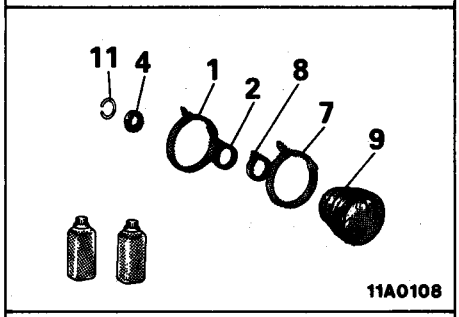
Caution
Be sure to thoroughly remove any oil or grease, etc. from the threaded part of the bolt and nut used for installation to the companion flange, because any oil, grease, etc. on these parts might cause later loosening even though tightening is at the specified torque.

DISASSEMBLY AND REASSEMBLY

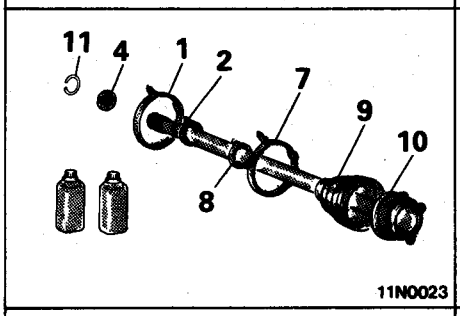
E27KE–



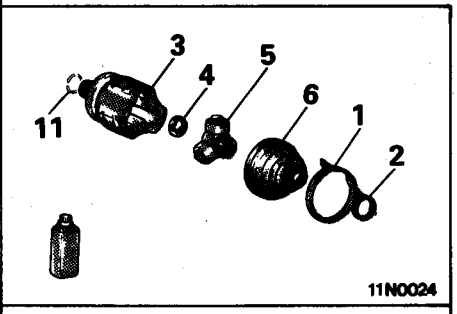
T.J. boot repair kit



B.J. boot repair kit



B.J. repair kit

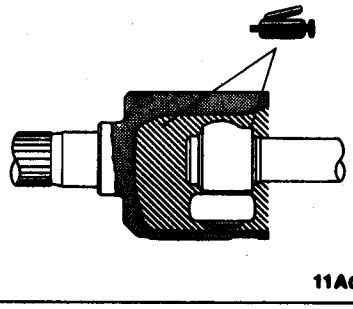


T.J. repair kit

Disassembly steps

- ◆◆ 1. T.J. boot band (large)
- ◆◆ 2. T.J. boot band (small)
- 3. T.J. case
- ◆◆ 4. Snap ring
- ◆◆ ◆◆ 5. Spider assembly
- ◆◆ ◆◆ 6. T.J. boot
- ◆◆ 7. B.J. boot band (large)
- ◆◆ 8. B.J. boot band (small)
- ◆◆ ◆◆ 9. B.J. boot
- ◆◆ 10. B.J. assembly
- 11. Circlip

Lubrication Points



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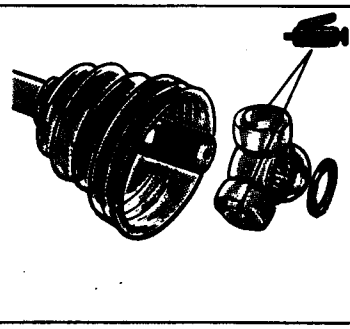
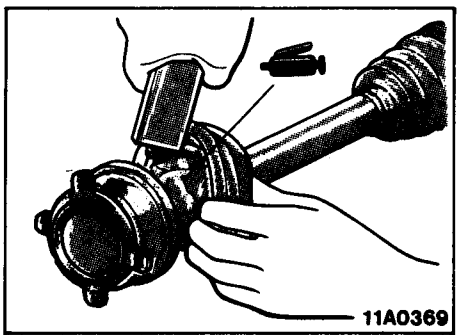


11E560

Grease: Repair kit grease
Quantity to use: 135 g (4.76 oz.)

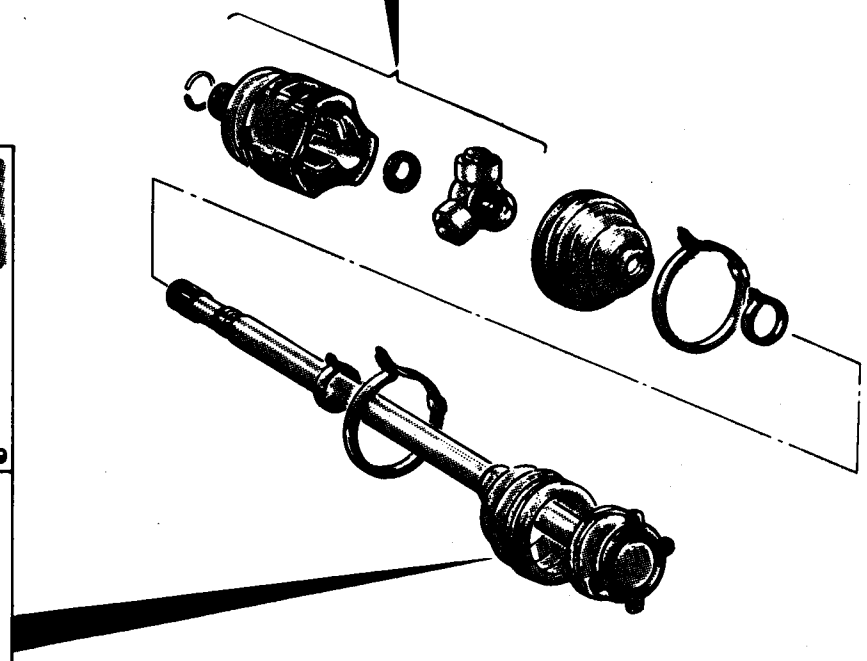
Caution
Apply all of the grease from the repair kit to the joint and boot, a half to each as a rule.
Special grease is used for the joint. Do not mix old grease with new or mix different types.



11A0369

Grease: Repair kit grease
Quantity to use: 125 g (4.41 oz.)

Caution
Apply all of the grease from the repair kit to the joint and boot, a half to each as a rule.
Special grease is used for the joint. Do not mix old grease with new or mix different types.



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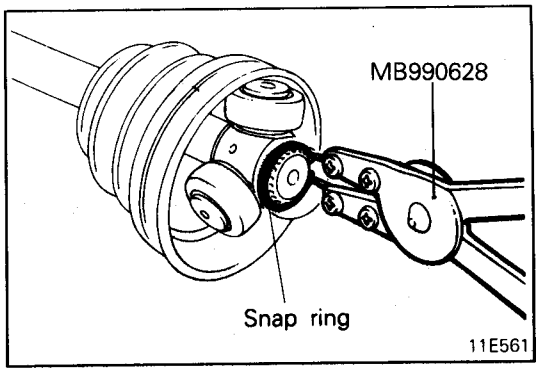
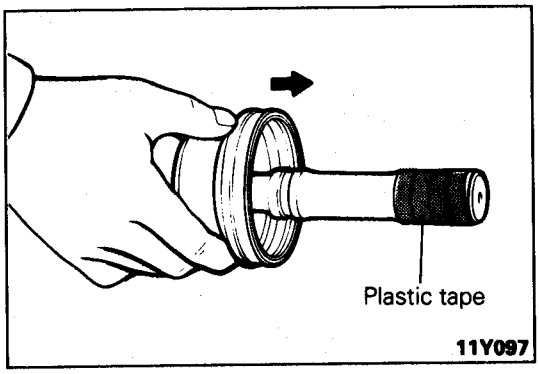
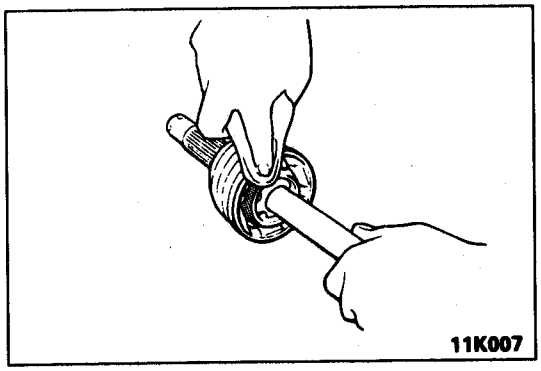






SERVICE POINTS OF DISASSEMBLY E27KFAH

4. REMOVAL OF SNAP RING / 5. SPIDER ASSEMBLY

(1) Remove the snap ring from the drive shaft with the snap ring pliers or the special tool.
(2) Take out the spider assembly from the drive shaft.
(3) Clean the spider assembly.

Caution
1. Do not disassemble the spider assembly.
2. If the T.J. of the drive shaft assembly is bent, the joint may be damaged. Use care in handling the drive shaft.
3. The drive shaft joint use special grease. Do not add another type of grease.

6. REMOVAL OF T.J. BOOT / 9. B.J. BOOT

(1) Wipe off grease around the shaft spline part.
(2) To reuse T.J. boot and B.J. boot, wrap plastic tape around the shaft spline part so that they are not damaged when removed.

10. REMOVAL OF GREASE FROM B.J.

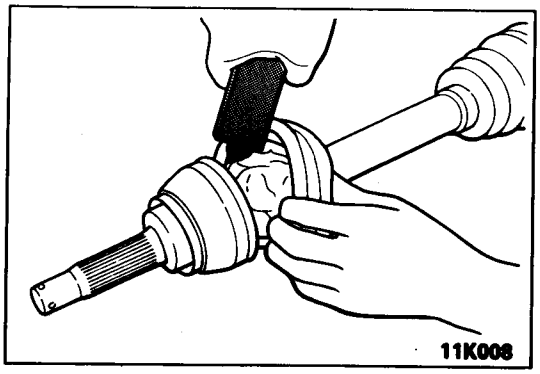
Wipe out the grease from the B.J.

Caution
Do not disassemble the B.J.

SERVICE POINTS OF REASSEMBLY E27KHAH

9. INSTALLATION OF B.J. BOOT / 8. B.J. BOOT BAND (SMALL) / 7. B.J. BOOT BAND (LARGE) / 6. T.J. BOOT

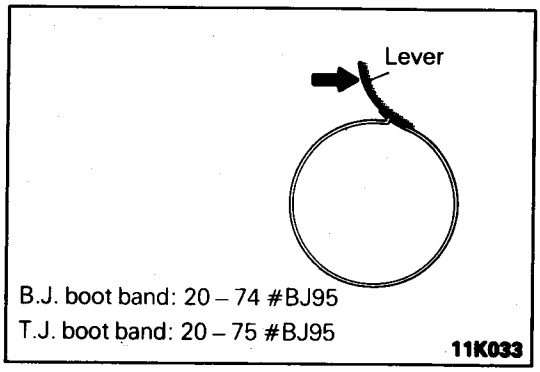
(1) Wrap vinyl tape around the drive shaft spline.
(2) Insert the drive shaft in B.J. boot, boot bands, T.J. boot in that sequence.



(3) Fill the inside of the B.J. and B.J. boot with the specified grease.

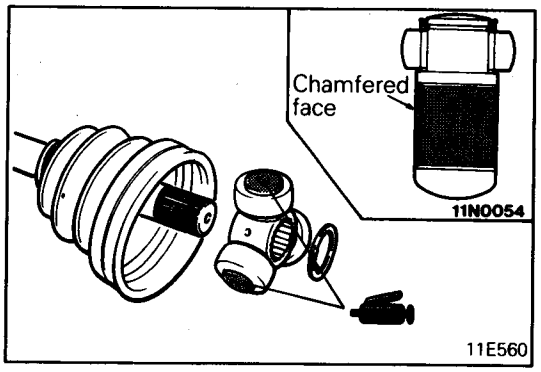
Specified grease: Repair kit grease 125 g (4.41oz.)

Caution
The grease in the repair kit should be divided in half for use, respectively, at the joint and inside the boot.
A special type of grease is used on the joint. Be cautious to ensure that not other grease is allowed to come in contact with the joint.



(4) Secure the boot bands.

Caution
1. **The boot bands should be tightened with the drive shaft at a 0° joint angle.**
2. **The B.J. boot band and T.J. boot band are identified by the identification number stamped on the lever. Install correct ones at correct positions.**

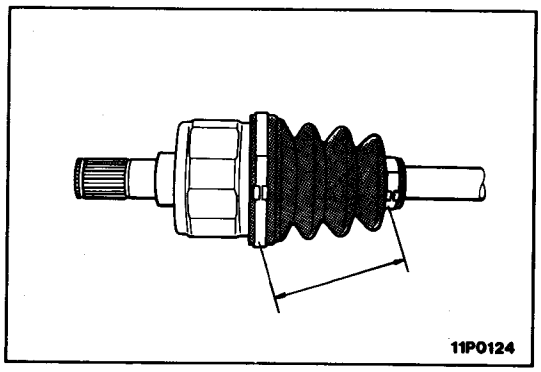


5. INSTALLATION OF SPIDER ASSEMBLY

(1) Apply the specified grease furnished in the repair kit to the spider assembly.

Specified grease: Repair kit grease

(2) Install the spider assembly with the chamfered spline end first.



2. 1. INSTALLATION OF T.J. BOOT BANDS

Set the T.J. boot bands at the specified distance in order to adjust the amount of air inside the T.J. boot, and then tighten the T.J. boot band securely.

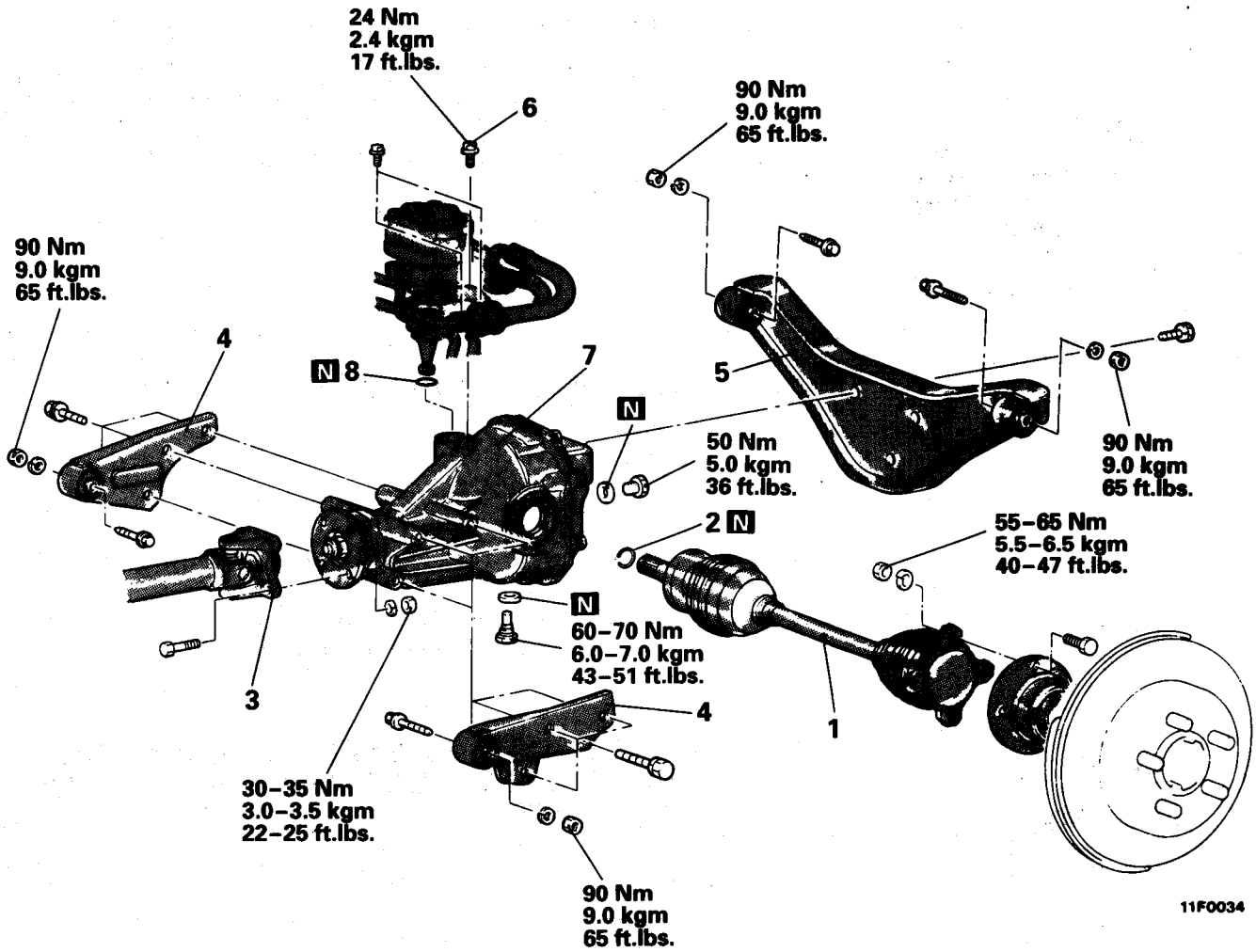
Standard value: 85 ± 3 mm (3.35 ± 0.12 in.)

DIFFERENTIAL CARRIER

E27QA--

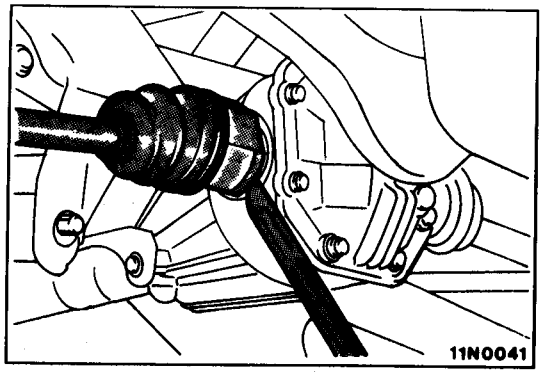
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Draining and Filling of Differential Gear Oil
- Removal and Installation of Main Muffler (Refer to Group 15 – Exhaust Pipe and Muffler.)



Removal steps

1. Drive shaft
2. Circlip
3. Propeller shaft connection
4. Differential support assembly
5. Differential support member assembly
6. Rear wheel oil pump installation bolt
7. Differential carrier
8. O-ring

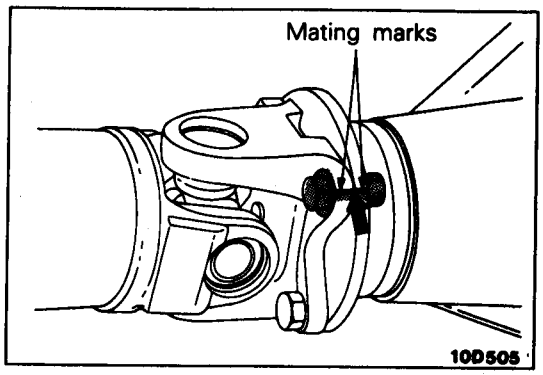


SERVICE POINTS OF REMOVAL E27QBAM

1. REMOVAL OF DRIVE SHAFT

With a tire lever, etc., remove the drive shaft from the differential carrier.

NOTE
Be cautious to ensure that the differential carrier oil seal is not damaged by the drive shaft spline.



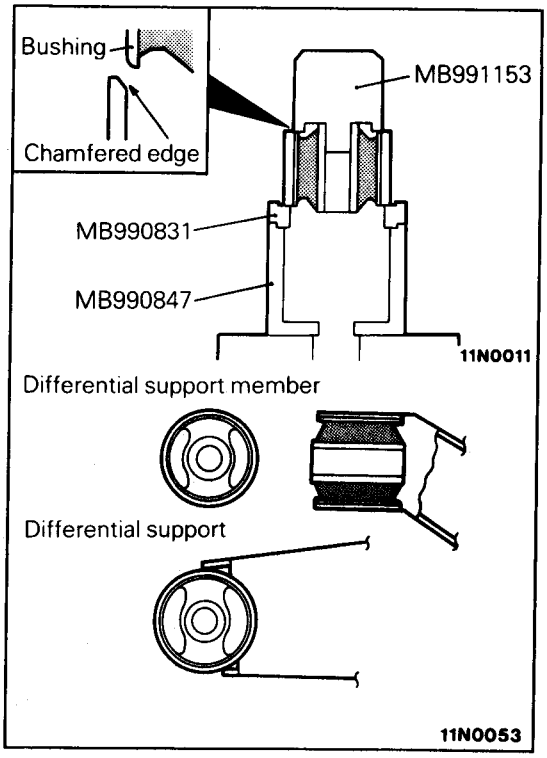
3. DISCONNECTION OF PROPELLER SHAFT

(1) Make mating marks on the differential companion flange and the propeller shaft flange yoke for reference during reassembly.
(2) Remove the differential carrier and propeller shaft connection.
(3) Support the propeller shaft with wire.

7. REMOVAL OF DIFFERENTIAL CARRIER

Holding the bottom of the differential carrier and removing the rear wheel oil pump through the mounting hole, remove the differential carrier.

Caution
1. Use care not to damage the rear wheel oil pump gears.
2. Use care not to allow dirt or foreign matter to fall into the differential carrier.



DIFFERENTIAL SUPPORT BUSHING AND DIFFERENTIAL SUPPORT MEMBER BUSHING REPLACEMENT E27QKAC

Install or remove the bushing using the special tool. Install the bushing with its hollow portion facing in the direction shown.

Caution
Install the bushing with the differential support and differential support member chamfered end first and install until the bushing outer case end face is flush with the support and support member.

SERVICE POINTS OF INSTALLATION E27QCAN

7. INSTALLATION OF DIFFERENTIAL CARRIER

Install the rear wheel oil pump by inserting it through the mounting hole and install the differential carrier securely.

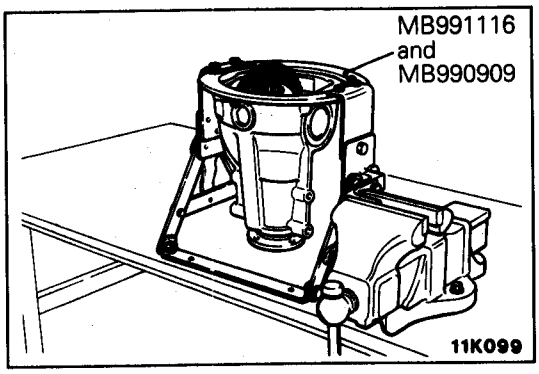
Caution
Use care not to damage the rear wheel oil pump gears.

3. CONNECTION OF PROPELLER SHAFT

Align the mating marks on the flange yoke and the companion flange to install the propeller shaft.

INSPECTION BEFORE DISASSEMBLY E27QDAN

Hod the special tool in a vice, and attach the differential carrier to the special tool.

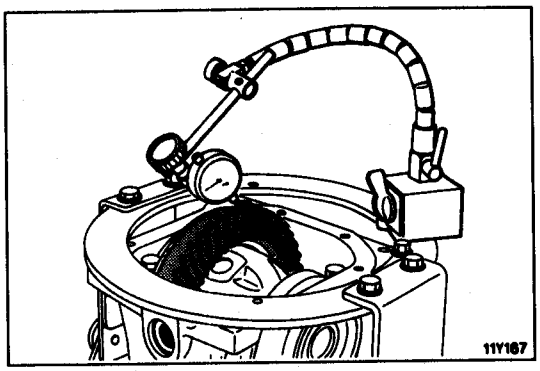


FINAL DRIVE GEAR BACKLASH

With the drive pinion locked in place, measure the final drive gear backlash with a dial indicator on the drive gear.

NOTE
Measure at four points or more on the circumference of the drive gear.

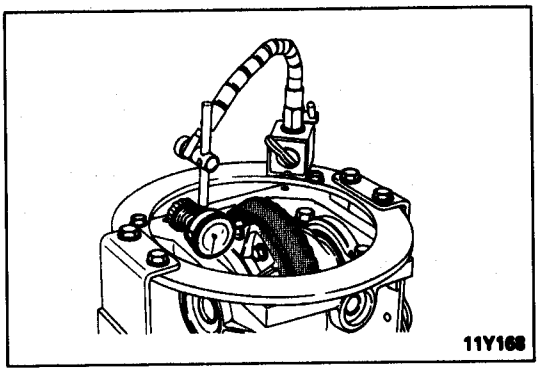
Standard value: 0.11–0.16 mm (0.004–0.006 in.)



DRIVE GEAR RUNOUT

Measure the drive gear runout at the shoulder on the reverse side of the drive gear.

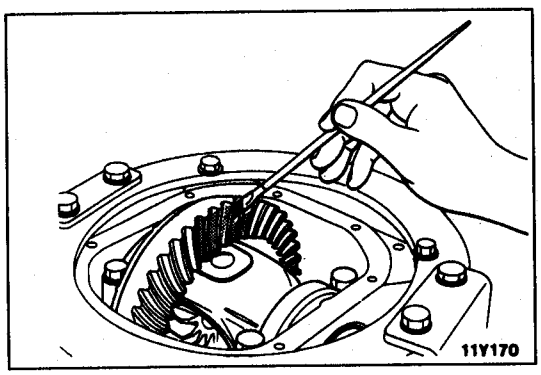
Limit: 0.05 mm (0.002 in.)

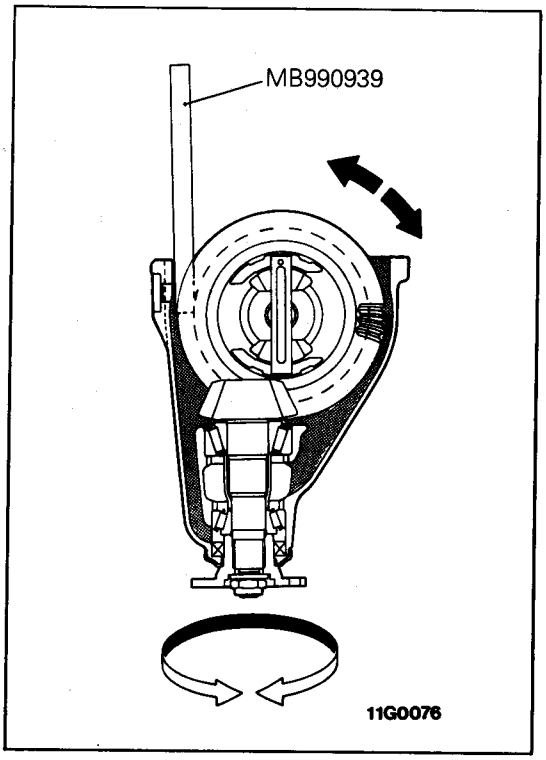


FINAL DRIVE GEAR TOOTH CONTACT

Check the final drive gear tooth contact by following the steps below.

(1) Apply a thin, uniform coat of machine blue to both surfaces of the drive gear teeth.





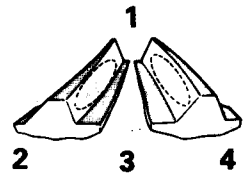
(2) Insert the special tool between the differential carrier and the differential case, and the rotate the companion flange by hand (once in the normal direction, and then once in the reverse direction) while applying a load to the drive gear, so that the revolution torque [approximately 2.5–3.0 Nm (25–30 kgcm, 28–33 in.lbs.)] is applied to the drive pinion.

Caution
If the drive gear is rotated too much, the tooth contact pattern will become unclear and difficult to check.

(3) Check the tooth contact condition of the drive gear and drive pinion.

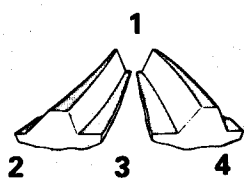
Standard tooth contact pattern

1 Narrow tooth side
2 Drive-side tooth surface (the side applying power during forward movement)
3 Wide tooth side
4 Coast-side tooth surface (the side applying power during reverse movement)



Problem	Solution

Tooth contact pattern resulting from excessive pinion height



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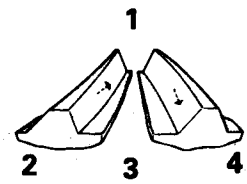
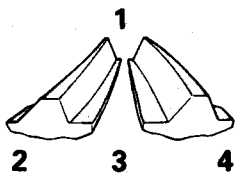


The drive pinion is positioned too far from the centre of the drive gear.

Increase the thickness of the pinion height adjusting shim, and position the drive pinion closer to the centre of the drive gear.
Also, for backlash adjustment, position the drive gear farther from the drive pinion.

Tooth contact pattern resulting from insufficient pinion height



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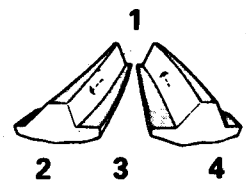


The drive pinion is positioned too close to the centre of the drive gear.

Decrease the thickness of the pinion height adjusting shim, and position the drive pinion farther from the centre of the drive gear.
Also, for backlash adjustment, position the drive gear closer to the drive pinion.

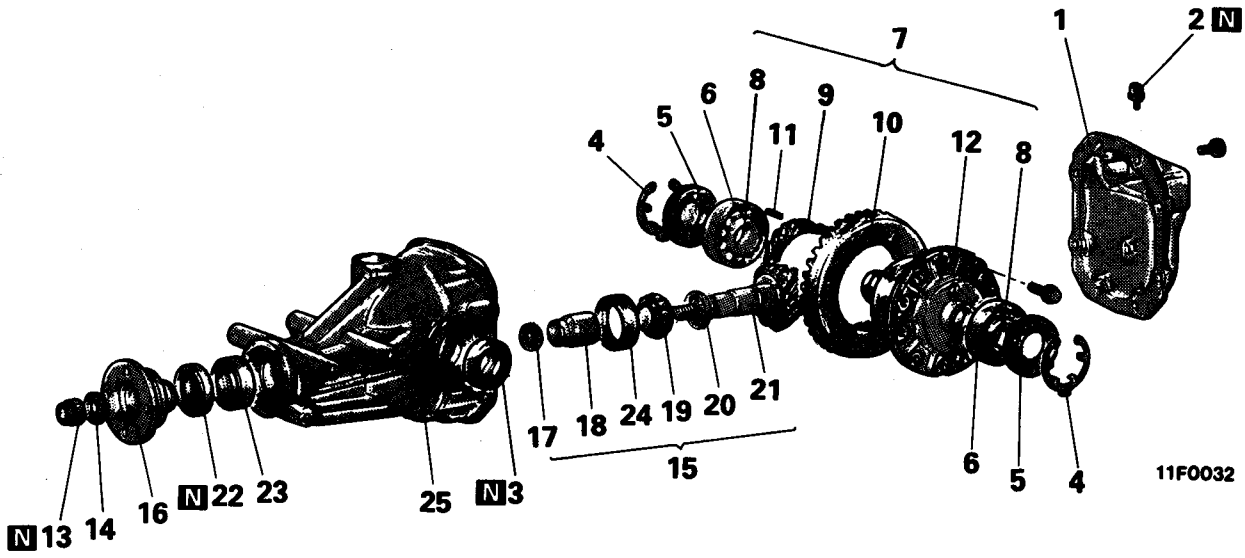
11S642

NOTE
(1) Tooth contact pattern is a method for judging the result of the adjustment of drive pinion height and final drive gear backlash. The adjustment of drive pinion height and final drive gear backlash should be repeated until tooth contact patterns bear a similarity to the standard tooth contact pattern.
(2) When adjustment is not able to obtain a correct pattern, it may be judged that the drive gear and drive pinion have exceed their usage limits and both gears should be replaced as a set.

DISASSEMBLY

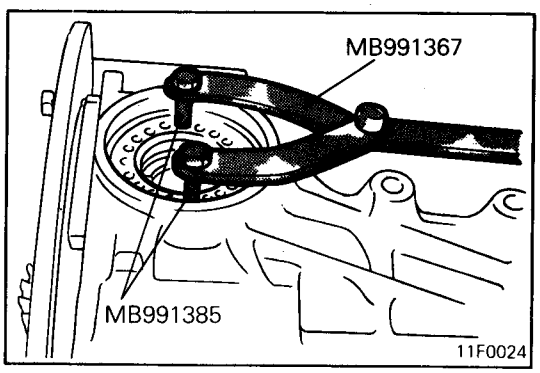
E27QI--

Inspection Before Disassembly
- Final Drive Gear Backlash (Refer to P. 27-21.)
- Drive Gear Runout (Refer to P. 27-21.)
- Final Drive Gear Tooth Contact (Refer to P. 27-21.)



Disassembly steps

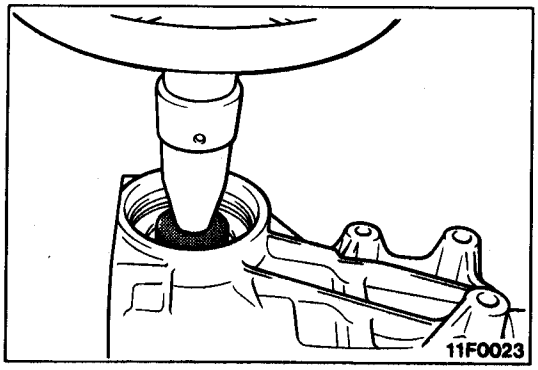
1. Differential cover assembly
2. Vent plug
3. Oil seal
4. Snap ring
5. ◆◆ Side bearing nut
6. ◆◆ Side bearing outer race
7. Differential case assembly
8. ◆◆ Side bearing inner race
9. ◆◆ Drive gear (for rear wheel oil pump drive)
10. ◆◆ Drive gear
11. Spring pin
12. ◆◆ LSD case (refer to P.27-34.)
13. ◆◆ Self-locking nut
14. Washer
15. ◆◆ Drive pinion assembly
16. Companion flange
17. Drive pinion front shim (for preload adjustment)
18. Drive pinion spacer
19. ◆◆ Drive pinion rear bearing inner race
20. Drive pinion rear shim (for pinion height adjustment)
21. Drive pinion
22. ◆◆ Oil seal
23. ◆◆ Drive pinion front bearing
24. ◆◆ Drive pinion rear bearing outer race
25. Differential carrier



SERVICE POINTS OF DISASSEMBLY

E27QFAG

5. REMOVAL OF SIDE BEARING NUT

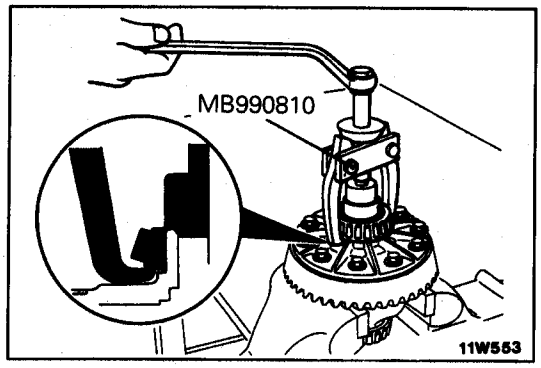


6. REMOVAL OF SIDE BEARING OUTER RACE

(1) Using a press, push the differential case until it is pressed against the carrier.
(2) Remove the differential case from the press. Insert two spacers in diagonally opposed positions between the side bearing outer race to be removed and the inner race. Using the press again, remove the outer race.

Caution
Use care not to drop the side bearing outer race.

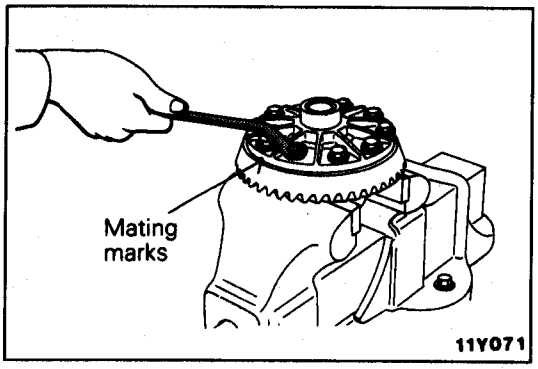
NOTE
(1) Identify the right- and left-hand side bearing outer races for correct reassembly.
(2) Use a spacer, approx. 30 mm (1.18 in.) long, 10 mm (0.39 in.) wide and 1 to 2 mm (0.04 to 0.08 in.) high, made of copper sheet or the like to prevent damage to the bearing.



8. REMOVAL OF SIDE BEARING INNER RACES/9. DRIVE GEAR (FOR REAR WHEEL OIL PUMP DRIVE)

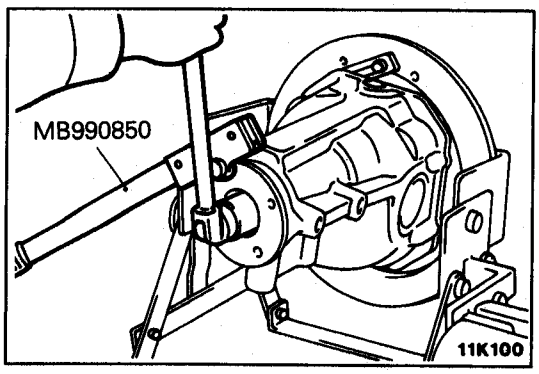
Pull out the side bearing inner races by using the special tools.

NOTE
(1) Remove the side bearing inner race on the drive gear (for rear wheel oil pump drive) side together with the drive gear.
(2) Use the notches on the differential case side (2 places) to set the claw of the special tool to the side bearing inner race.

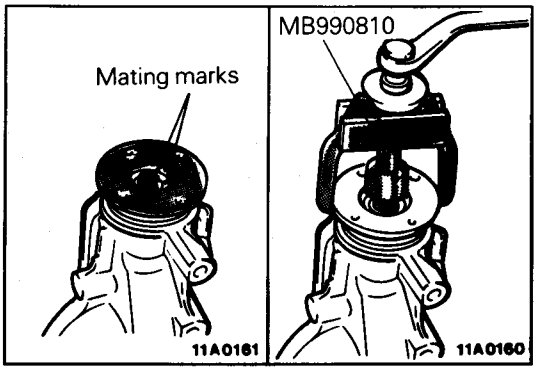


10. REMOVAL OF DRIVE GEAR

(1) Make the mating marks to the differential case and the drive gear.
(2) Loosen the drive gear attaching bolts in diagonal sequence to remove the drive gear.



13. REMOVAL OF SELF-LOCKING NUT

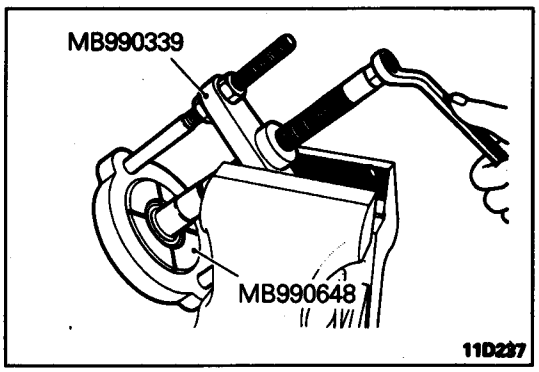


15. REMOVAL OF DRIVE PINION ASSEMBLY

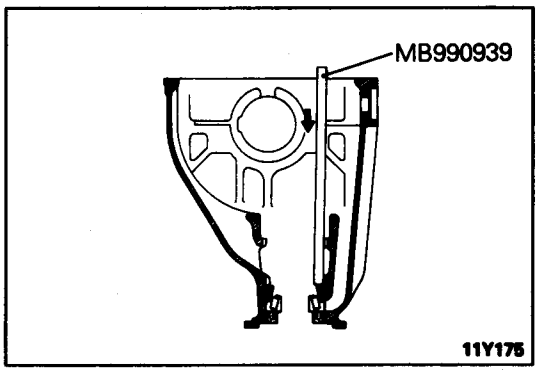
(1) Make the mating marks to the drive pinion and companion flange.

NOTE
Mating marks should not be made to the contact surfaces of companion flange and propeller shaft.

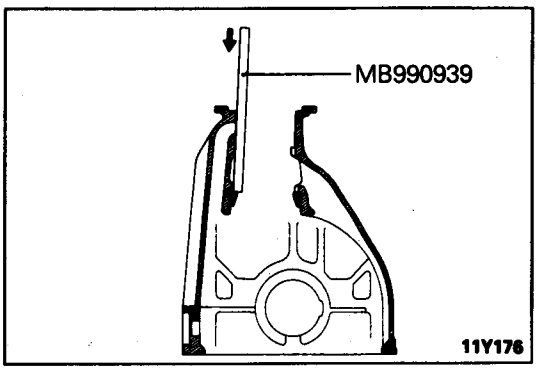
(2) Drive out the drive pinion together with the drive pinion spacer and drive pinion front shims.



19. REMOVAL OF DRIVE PINION REAR BEARING INNER RACE



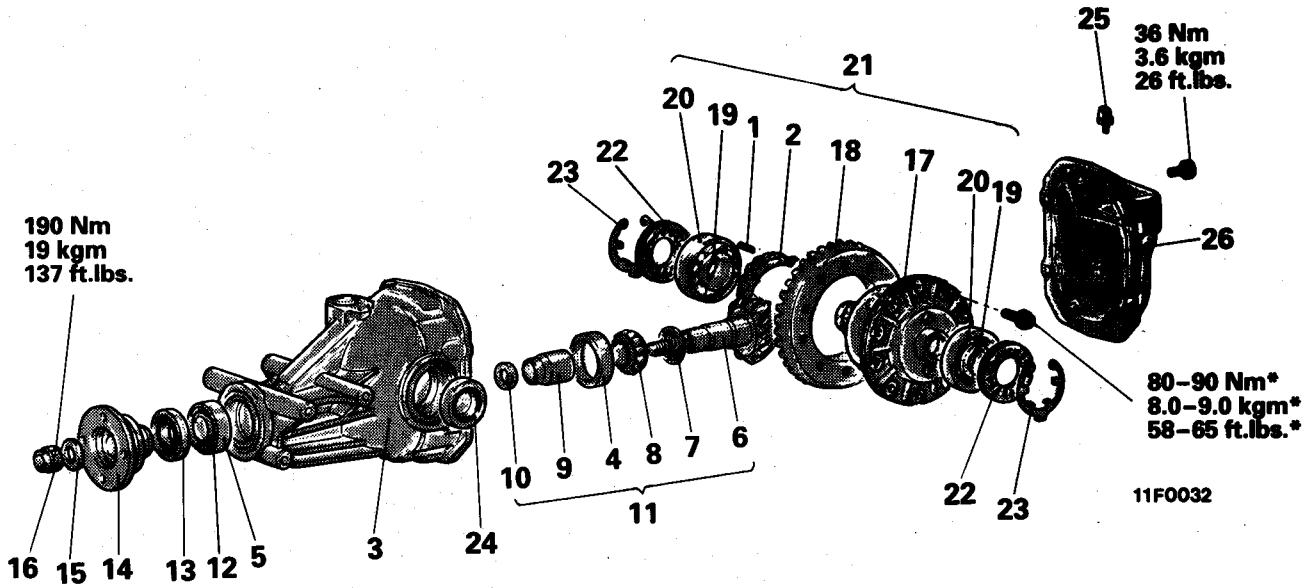
22. REMOVAL OF OIL SEAL / 23. DRIVE PINION FRONT BEARING



24. REMOVAL OF DRIVE PINION REAR BEARING OUTER RACE

REASSEMBLY

E27QJ–

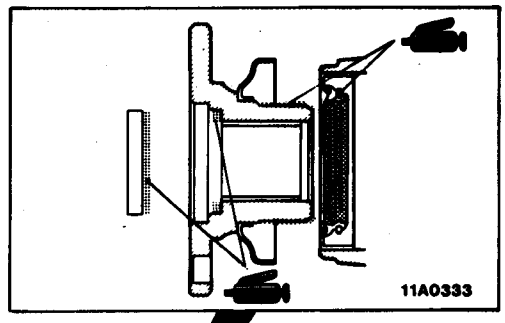


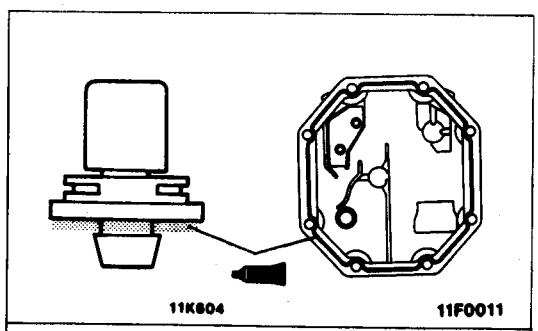
Reassembly steps

- ◆◆ 1. Spring pin
- ◆◆ 2. Drive gear (for rear wheel oil pump drive)
- 3. Differential carrier
- ◆◆ 4. Drive pinion rear bearing outer race
- ◆◆ 5. Drive pinion front bearing outer race
- ◆◆ Drive pinion height adjustment
- 6. Drive pinion
- 7. Drive pinion rear shim (for drive pinion height adjustment)
- 8. Drive pinion rear bearing inner race
- 9. Drive pinion spacer
- ◆◆ Drive pinion preload adjustment
- 10. Drive pinion front shim
- 11. Drive pinion assembly
- 12. Drive pinion front bearing inner race
- 13. Oil seal
- 14. Companion flange
- 15. Washer
- 16. Self-locking nut
- 17. LSD case (Refer to P.27-34.)
- ◆◆ 18. Drive gear
- ◆◆ 19. Side bearing inner race
- 20. Side bearing outer race
- ◆◆ Final drive gear backlash adjustment
- 21. Differential case assembly
- 22. Side bearing nut
- 23. Snap ring
- ◆◆ 24. Oil seal
- 25. Vent plug
- 26. Differential cover assembly

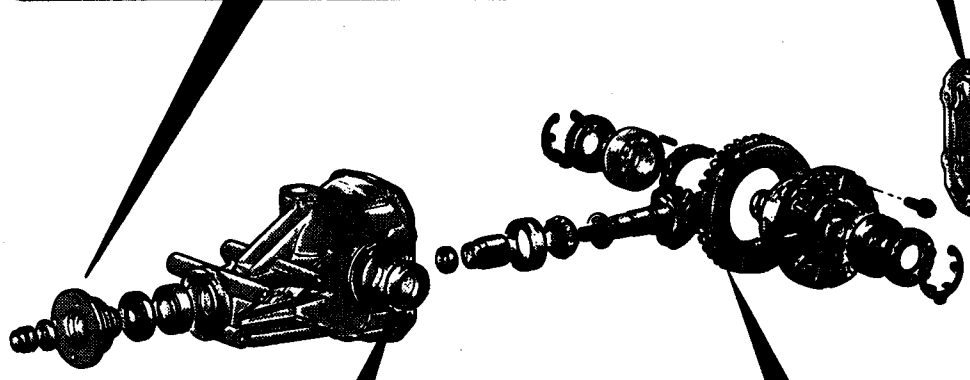
NOTE
*: Tightening torque with oil applied.

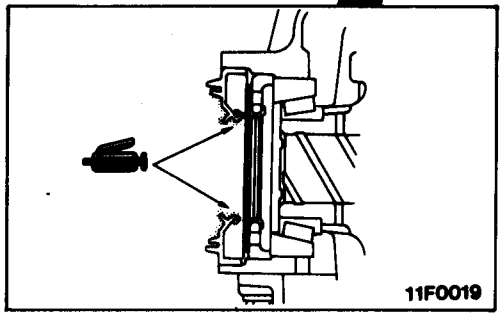
LUBRICATION, SEALING AND ADHESION POINTS

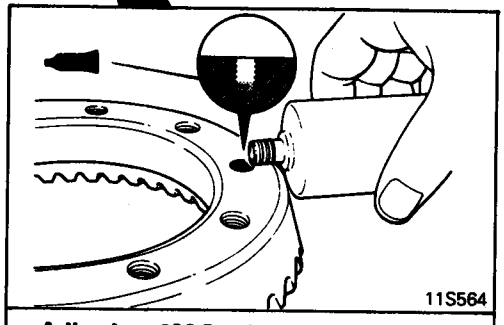




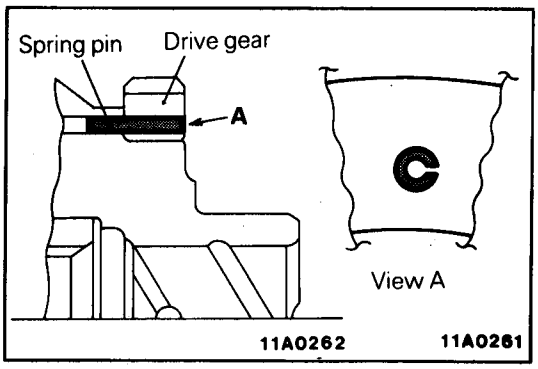
Sealant: 3M ATD Part No. 8661 or equivalent







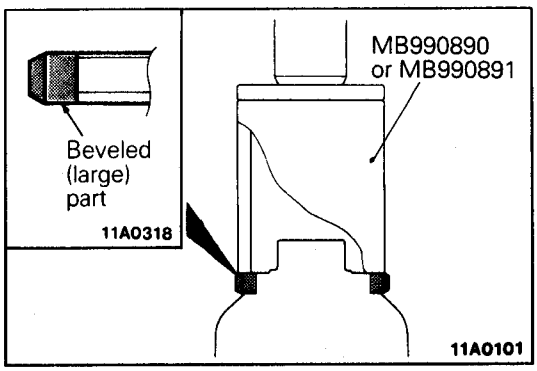
Adhesive: 3M Stud Locking Part No. 4170 or equivalent



SERVICE POINTS OF REASSEMBLY E27QHAJ

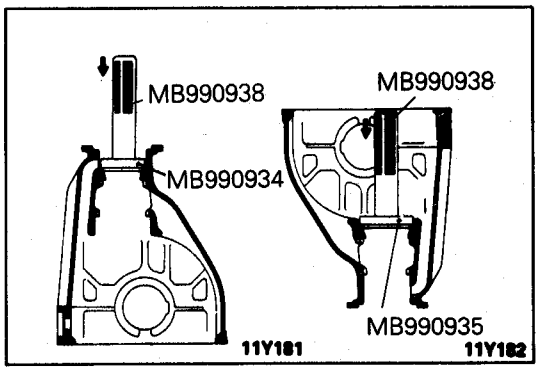
1. INSTALLATION OF SPRING PIN

Tap the spring pin into the differential case to the position shown in the illustration before press fitting the rear wheel oil pump drive gear. The notch on the spring pin should be in the position shown in the illustration.



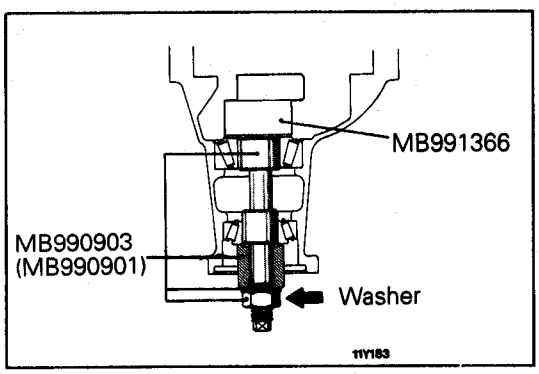
2. PRESS-IN OF THE DRIVE GEAR (FOR REAR WHEEL OIL PUMP DRIVE)

(1) With the beveled (large) part of the rear wheel oil pump drive gear at the inner side, press in the drive gear (by using the special tool) until the drive gear contacts the end surface of the differential case.
(2) Check to ensure that the drive gear and the spring pin are flush.



4. INSTALLATION OF DRIVE PINION REAR BEARING OUTER RACE / 5. DRIVE PINION FRONT BEARING OUTER RACE

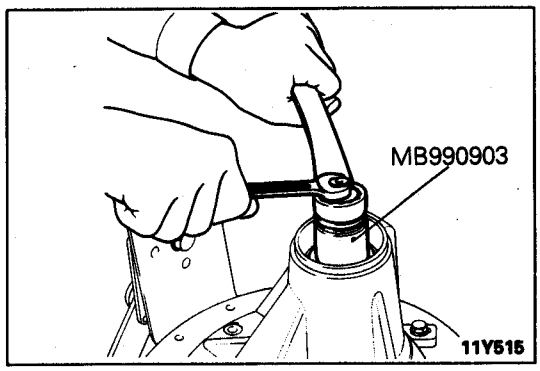
Caution
Be careful not to press in the outer race at an angle.



• DRIVE PINION HEIGHT ADJUSTMENT

Adjust the drive pinion height by the following procedures:
(1) Install special tools and drive pinion front and rear bearing inner races on the gear carrier in the sequence shown in the illustration.

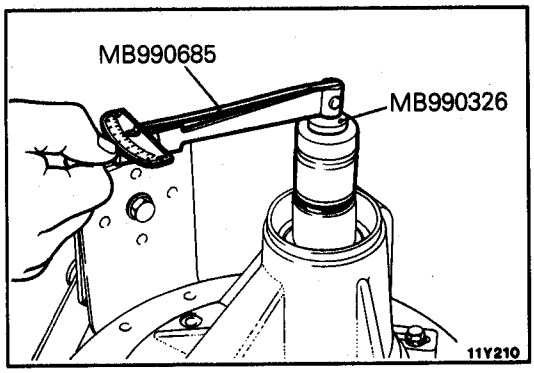
NOTE
Apply a thin coat of multipurpose grease to the mating face of the washer of the special tool.



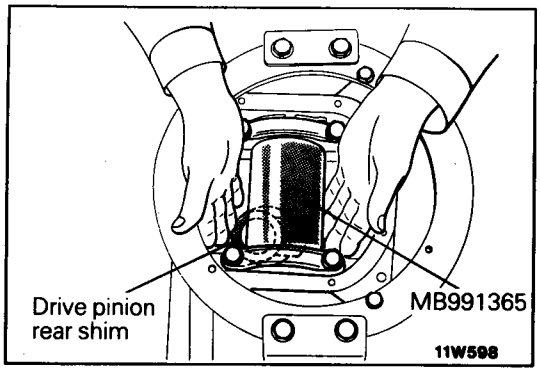
(2) Tighten the handle of the special tool until the standard value of drive pinion rotation torque is obtained.
(3) Measure the drive pinion rotation torque (without the oil seal).

Standard value

Bearing classification	Bearing lubrication	Rotation torque Nm (kgcm, in.lbs.)
New	None (with rust-prevention oil)	0.3–0.5 (3.0–5.0, 3–4)
New/reused	Gear oil application	0.15–0.25 (1.5–2.5, 1–2)

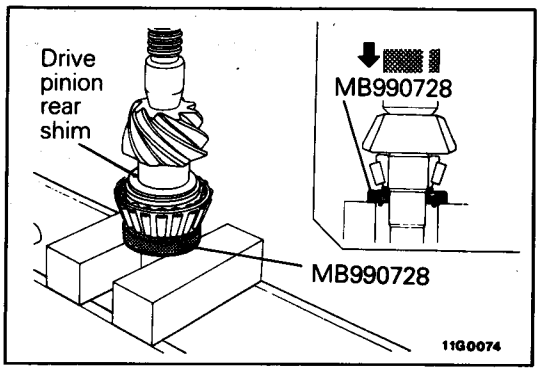


NOTE
(1) Gradually tighten the nut of the special tool while checking the drive pinion rotation torque.
(2) Because the special tool cannot be turned one turn, turn it several times within the range that it can be turned; then, after fitting to the bearing, measure the rotation torque.

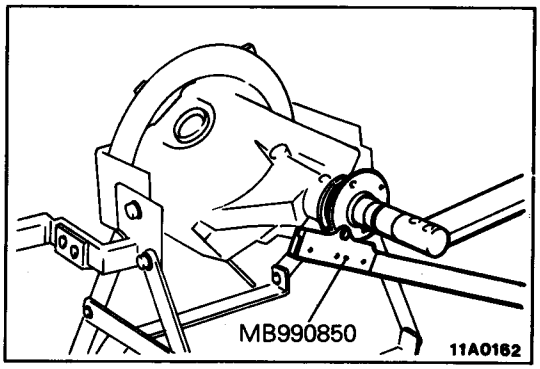


(4) Position the special tool in the side bearing seat of the gear carrier, and then select a drive pinion rear shim of a thickness which corresponds to the gap between the special tools.

NOTE
Clean the side bearing seat thoroughly.
When selecting the drive pinion rear shims, keep the number of shims to a minimum.



(5) Fit the selected drive pinion rear shim(s) to the drive pinion, and press-fit the drive pinion rear bearing inner race by using the special tool.



- **DRIVE PINION PRELOAD ADJUSTMENT**

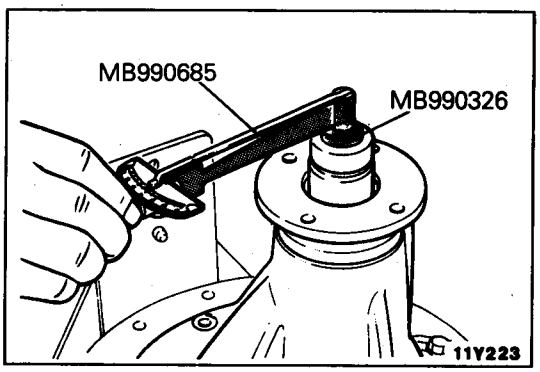
Adjust the drive pinion rotation torque by using the following procedures:

(1) Fit the drive pinion front shim(s) between the drive pinion spacer and the drive pinion front bearing inner race.

(2) Tighten the companion flange to the specified torque by using the tools.

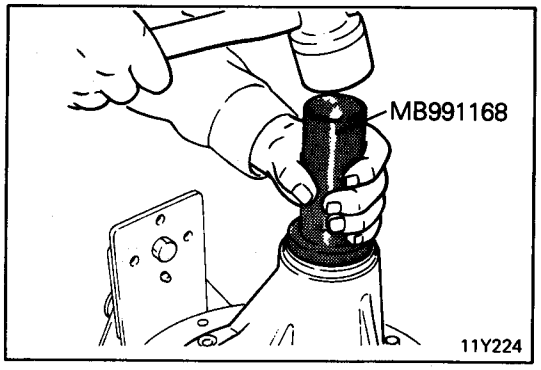
NOTE
Do not install the oil seal.

(3) Measure the drive pinion rotation torque (without the oil seal) by using the special tools.



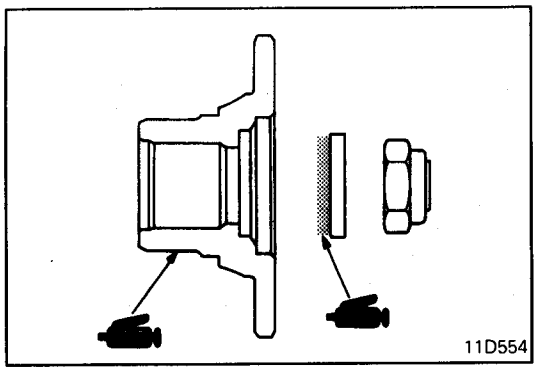
Standard value

Bearing classification	Bearing lubrication	Rotation torque Nm (kgcm, in.lbs.)
New	None (with rust-prevention oil)	0.3–0.5 (3.0–5.0, 3–4)
New/reused	Gear oil application	0.15–0.25 (1.5–2.5, 1–2)

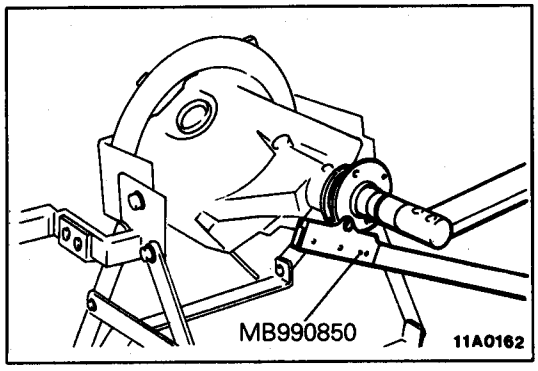


(4) If the drive pinion rotation torque is not within the range of the standard value, adjust the rotation torque by replacing the drive pinion front shim(s) or the drive pinion spacer.

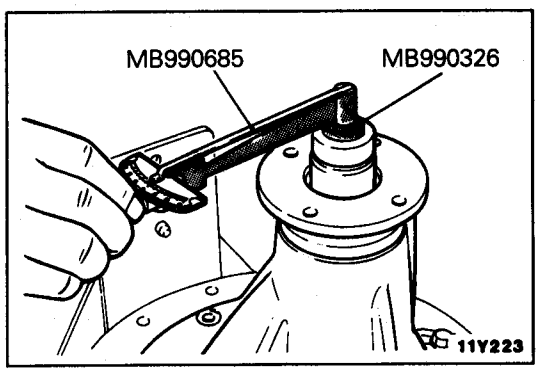
NOTE
When selecting the drive pinion front shims, if the number of shims is large, reduce the number of shims to a minimum by selecting the drive pinion spacers.



(5) Remove the companion flange and drive pinion once again.
Drive the oil seal into the gear carrier front lip by using the special tool.
Apply multipurpose grease to the oil seal lip.
(6) Apply a thin coat of multipurpose grease to the companion flange contacting surface of the washer before installing drive pinion assembly.



(7) Install the drive pinion assembly and companion flange with mating marks properly aligned, and tighten the companion flange self-locking nut to the specified torque by using the special tools.

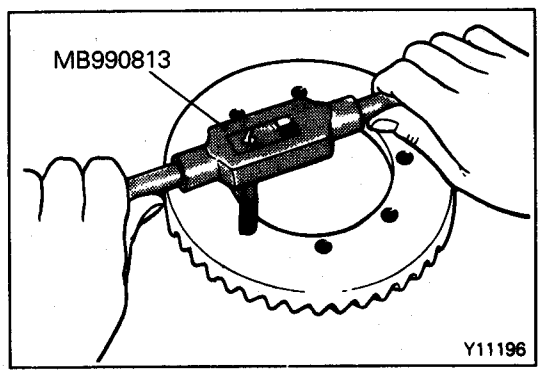


(8) Measure the drive pinion rotation torque (with oil seal) to verify that the drive pinion rotation torque complies with the standard value.

Standard value

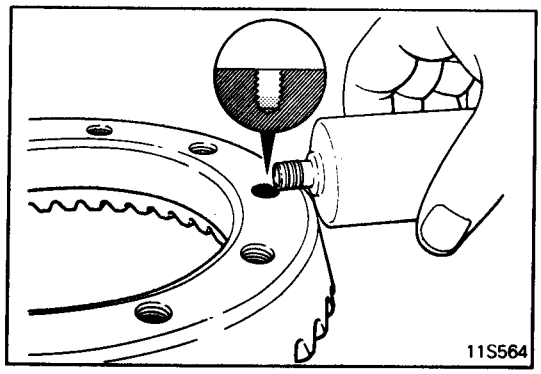
Bearing classification	Bearing lubrication	Rotation torque Nm (kgcm, in.lbs.)
New	None (with rust-prevention oil)	0.5–0.7 (5.0–7.0, 4–6)
New/reused	Gear oil application	0.35–0.45 (3.5–4.5, 3–4)

If there is a deviation from the standard value, check whether or not there is incorrect tightening torque of the companion flange tightening self-locking nut, or incorrect fitting of the oil seal.



18. INSTALLATION OF DRIVE GEAR

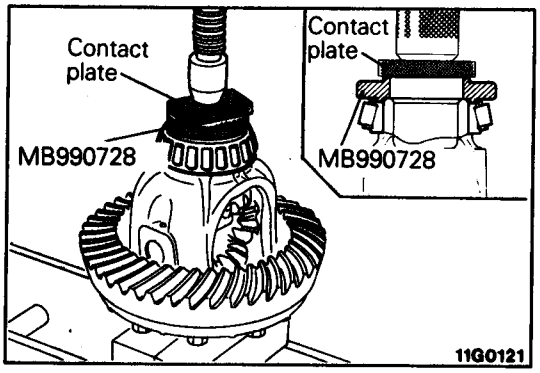
(1) Clean the drive gear attaching bolts.
(2) Remove the adhesive adhering to the threaded holes of the drive gear by turning the special tool (tap M10 × 1.25), and then clean the threaded holes by applying compressed air.



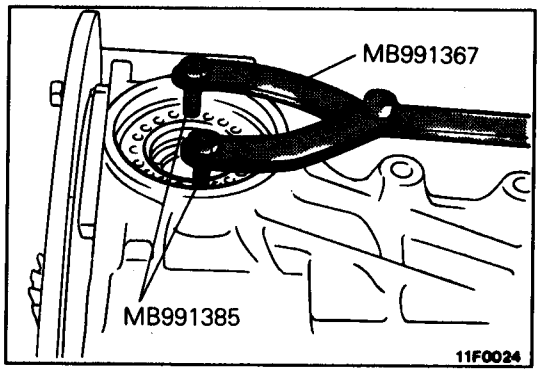
(3) Apply multipurpose adhesive to the threaded holes of the drive gear.

Specified adhesive: 3M Stud Locking Part No. 4170 or equivalent

(4) Install the drive gear onto the differential case with the mating marks properly aligned. Tighten the bolts to the specified torque in a diagonal sequence.

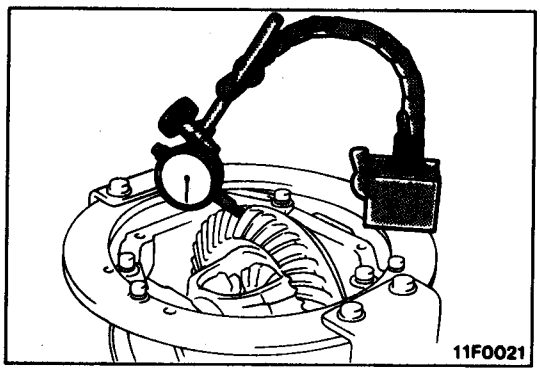


19. PRESS-FITTING OF SIDE BEARING INNER RACE



- **FINAL DRIVE GEAR BACKLASH ADJUSTMENT**

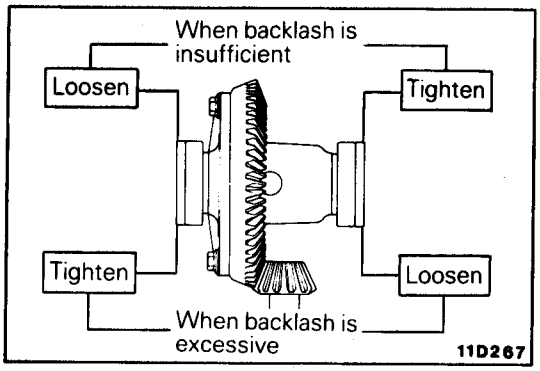
(1) Using the special tool, temporarily tighten the side bearing nut until it is in the state just before preloading of the side bearing.



(2) Measure the final drive gear backlash.

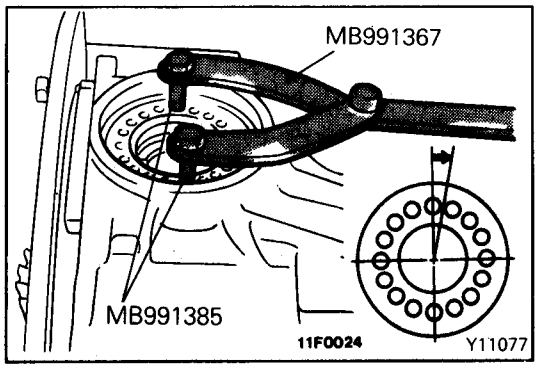
Standard value: 0.11–0.16 mm (0.004–0.006 in.)

NOTE
Measure at four or more points around the drive gear circumference.

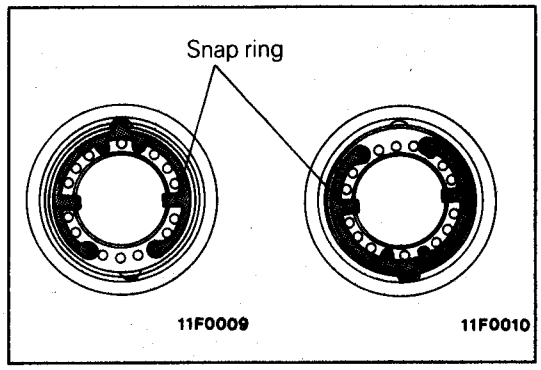


(3) Using the special tool (MB991367 and MB991385), adjust the backlash to standard value by moving the side bearing nut as shown.

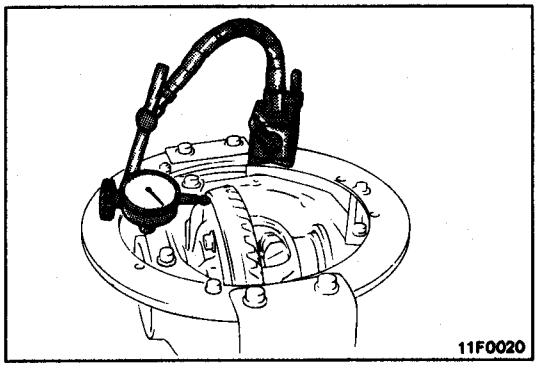
NOTE
First turn the side bearing nut for loosening, and then turn (by the same amount) the side bearing nut for tightening.



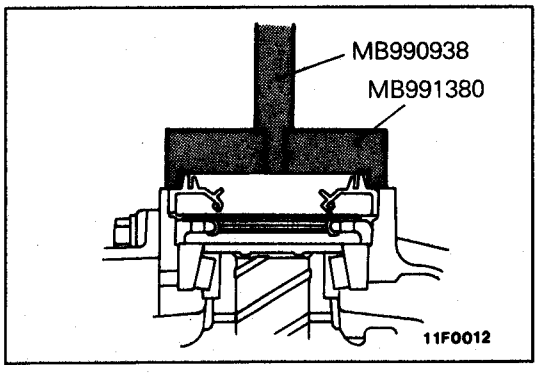
(4) Using the special tool, to apply the preload, turn down both right and left side bearing nuts on half the distance between centers of two neighboring holes.



(5) Fit the snap ring at either position shown to lock the side bearing nut.
(6) Check the drive gear and drive pinion for tooth contact. If poor contact is evident, make adjustment. (Refer to P.27-23.)



(7) Measure the drive gear runout at the shoulder on the reverse side of the drive gear.
Limit: 0.05 mm (0.002 in.)
(8) If the drive gear runout exceeds the limit, reinstall by changing the phase of the drive gear and differential case, and remeasure.



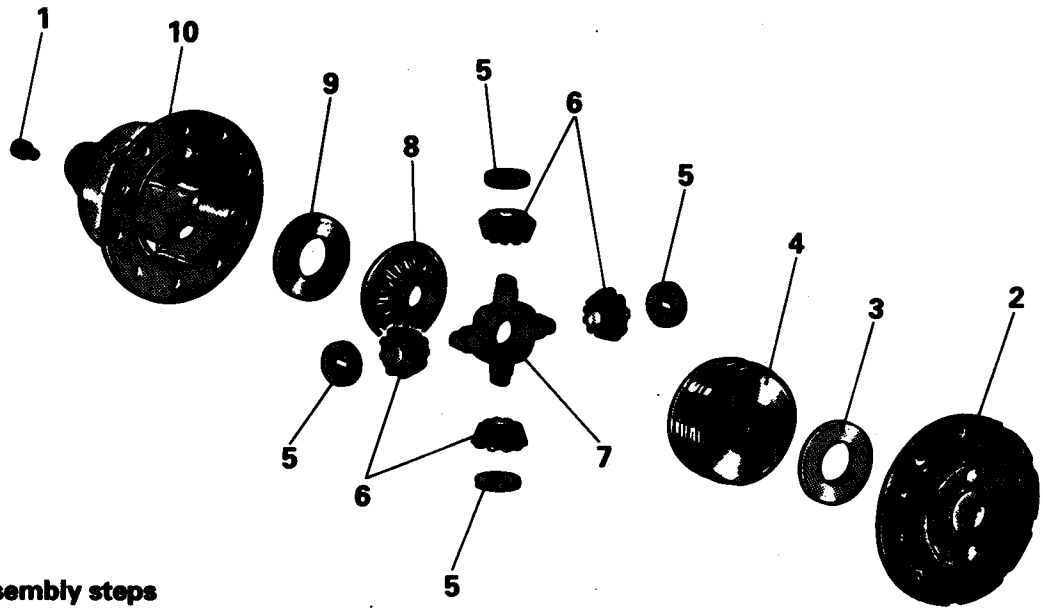
24. INSTALLATION OF OIL SEAL

(1) Using the special tool, install the oil seal flush with the gear carrier end face.
(2) Apply a thin coat of Multi-purpose grease to the oil seal lip.

LSD CASE ASSEMBLY

DISASSEMBLY AND REASSEMBLY

E27TI--



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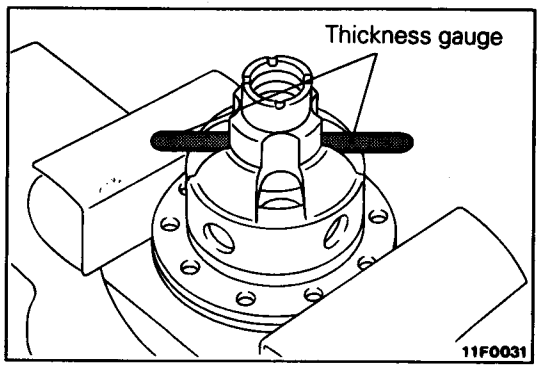
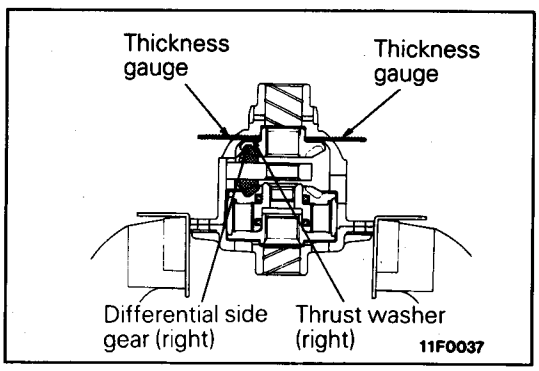
Disassembly steps

1. Screw
2. Differential case A
3. Thrust washer (L.H.)
4. Viscous unit
5. Pinion mate washer
6. Differential pinion mate
7. Differential pinion shaft
8. Differential side gear (R.H.)
9. Thrust washer (R.H.)
10. Differential case B





INSPECTION BEFORE DISASSEMBLY

E27TMAA

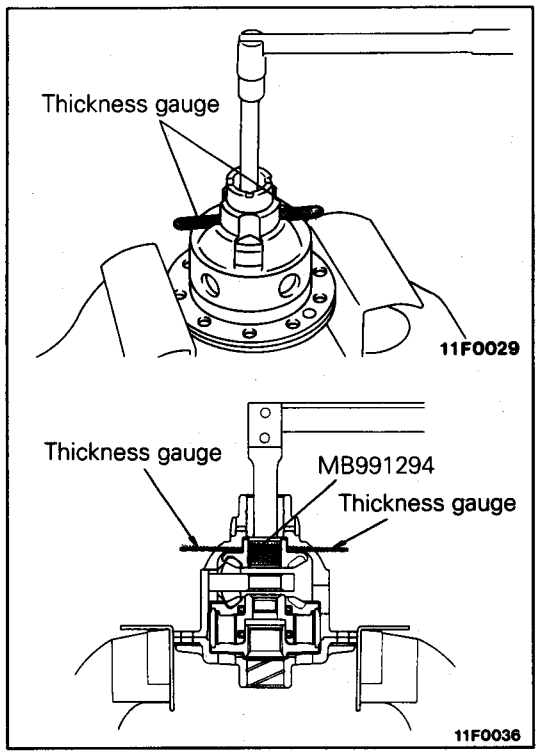
1. CHECKING THE DIFFERENTIAL GEAR BACKLASH

(1) Secure the differential case assembly in a vise so that the differential side gear (right) is facing upward.

Caution
When securing the vise, be sure not to hold the differential case assembly too tightly.

(2) Insert a 0.03 mm (0.0012 in.) thickness gauge at two places (diagonally) between differential case B and the thrust washer (right).

Caution
Do not insert a thickness gauge in the oil groove of differential case B.



(3) Insert the special tool at the spline part of differential case B (right) and check to be sure the side gear (right) rotates.
(4) Then insert a 0.09 mm (0.0035 in.) thickness gauge to replace a 0.03 mm (0.0012 in.) gauge.
(5) Insert the special tool at the spline part of the differential side gear (right) and check to be sure the side gear (right) does not rotate.

Differential gear backlash
Standard value (clearance in thrust direction of side gear): 0.03–0.09 mm (0.0012–0.0035 in.)

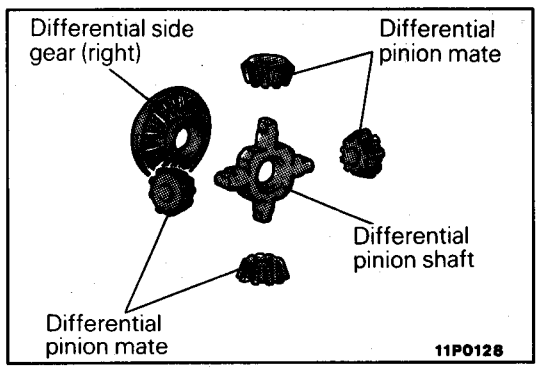
NOTE
If the clearance in the thrust direction of the side gear is within the standard value range, the backlash of the differential gear is normal.

(6) If the clearance in the thrust direction of the side gear is not within the standard value range, remove differential case A and make the adjustment by adjusting the thickness of the thrust washer (left).

SERVICE POINTS OF DISASSEMBLY E27TJAH

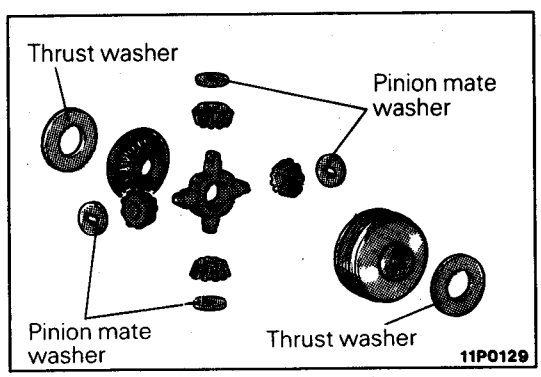
3. REMOVAL OF THE THRUST WASHER (LEFT) / 9. THRUST WASHER (RIGHT)

The thrust washers (left and right) are of different thickness, and so should be discriminated in some way for reference during installation.

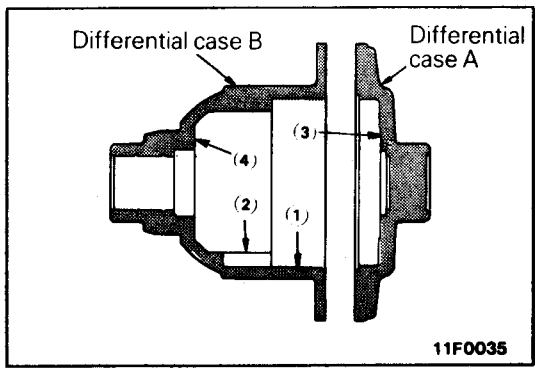


INSPECTION E27TKAF

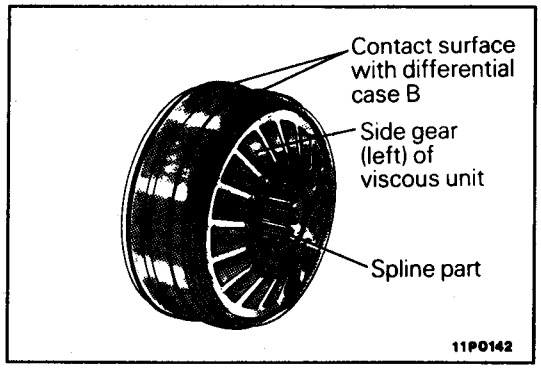
(1) Check the gears and differential pinion shaft for unusual wear or damage.
(2) Check the spline part of the differential side gear (right) for stepped wear or damage.



(3) Check the thrust washer and pinion mate washer for unusual wear of contact surfaces, heat damage or other damage.



(4) Check differential cases A and B for unusual wear of contact surfaces, heat damage or other damage.
①: Contact surface with the viscous unit
②: Contact surface with the pinion mate washer
③ and ④: Contact surfaces with thrust washer

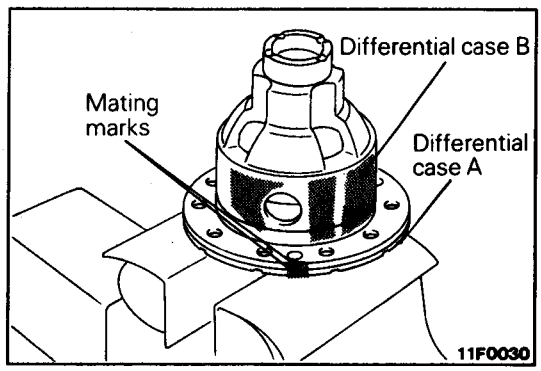


(5) Check the spline part of the viscous unit for stepped wear or damage, and check the contact surface with differential case B.
(6) Check the side gear (left) of the viscous unit for unusual wear or damage.

SERVICE POINTS OF REASSEMBLY E27TLAJ

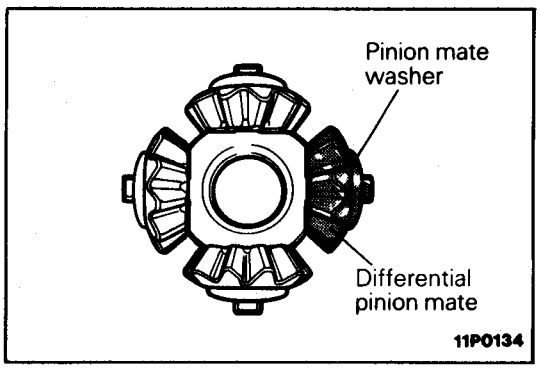
10. INSTALLATION OF THE DIFFERENTIAL CASE B / 2. DIFFERENTIAL CASE A

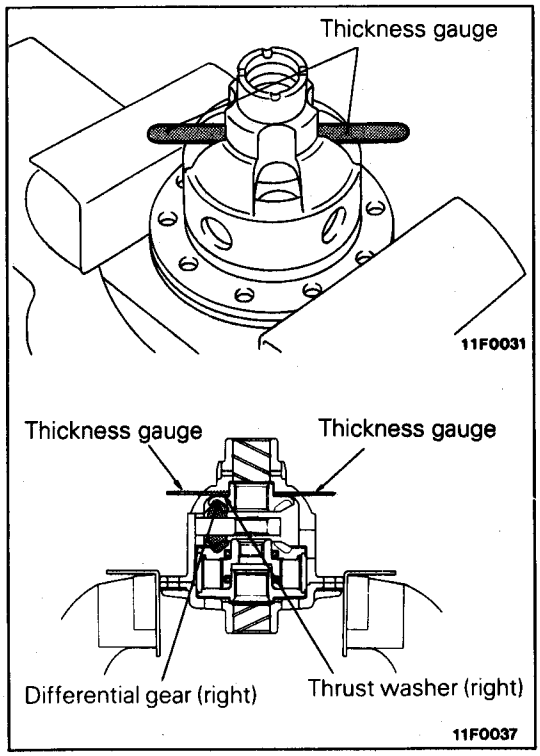
Align the mating marks of differential cases B and A, and assemble the cases.



6. INSTALLATION OF THE DIFFERENTIAL PINION MATE / 5. PINION MATE WASHER

With the washer in the position shown in the illustration, install to the differential pinion shaft, and then install to differential case B.





3. SELECTION OF THE THRUST WASHER (LEFT)

If the differential side gear and pinion mate gear have been replaced, select the thrust washer (left) by following the steps below.

(1) Wash the differential side gear and pinion mate gear in unleaded gasoline to remove all oil, grease, etc.

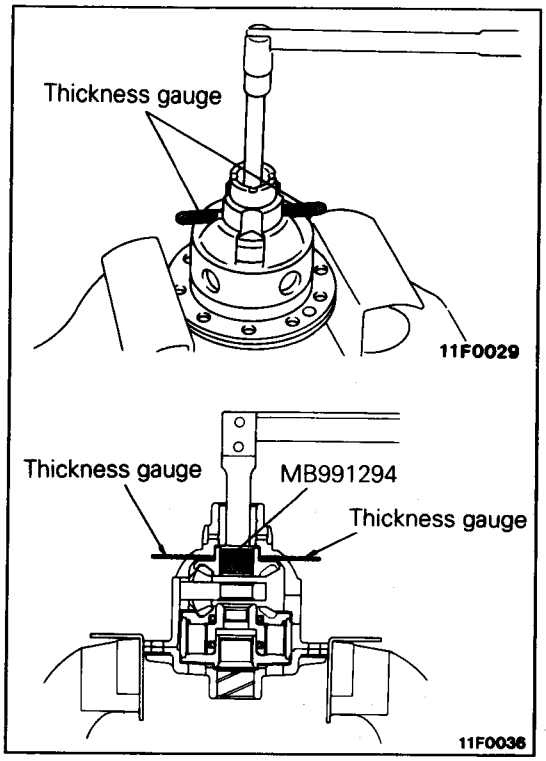
(2) Install the previously used thrust washers (being careful the left and right ones are used at the correct side), together with the gears, viscous unit, pinion mate washer and pinion shaft, to differential cases A and B, and then, using screws, secure them temporarily.

(3) Secure the differential case assembly in a vise so that the differential side gear (right) is facing upward.

Caution
When securing in the vise, be sure not to hold the differential case assembly too tightly.

(4) Insert a 0.03 mm (0.0012 in.) thickness gauge at two places (diagonally) between differential case B and the thrust washer (right).

Caution
Do not insert a thickness gauge in the oil groove of differential case B.



(5) Insert the special tool at the spline part of differential side gear (right) and check to be sure the side gear (right) rotates.
(6) Then insert a 0.09 mm (0.0035 in.) thickness gauge to replace a 0.03 mm (0.0012 in.) gauge.
(7) Insert the special tool at the spline part of the differential side gear (right) and check to be sure the side gear (right) does not rotate.

Differential gear backlash
Standard value (clearance in thrust direction of side gear): 0.03–0.09 mm (0.0012–0.0035 in.)

NOTE
If the clearance in the thrust direction of the side gear is within the standard value range, the backlash of the differential side gear is normal.

(8) If the clearance in the thrust direction of the side gear is not within the standard value range, remove differential case A and make the adjustment by adjusting the thickness of the thrust washer (left).

Thrust washer (left)	
Part No.	Thickness mm (in.)
MB569243	0.8 (0.031)
	0.9 (0.035)
	1.0 (0.039)
	1.1 (0.043)
	1.15 (0.045)
	1.2 (0.047)
	1.25 (0.049)
	1.3 (0.051)
	1.35 (0.053)
	1.4 (0.055)
	1.5 (0.059)

Thrust washer (right) (reference)	
Part No.	Thickness mm (in.)
MB569528	0.8 (0.031)

NOTE
Select one thrust washer (left) from the eleven types in the kit.

WHEEL AND TYRE

CONTENTS

E31AA-

SPECIFICATIONS

E31CA--

GENERAL SPECIFICATIONS

Items		Specifications
Wheel		
Tyre size		225/50R17
Wheel type		Aluminum type
Wheel size		17 x $7^1/_2$ JJ
Amount of wheel offset	mm (in.)	46 (1.8)
Tyre inflation pressure	kPa (kg/cm^2, psi)	
Front		220 (2.2, 32)
Rear		200 (2.0, 29)

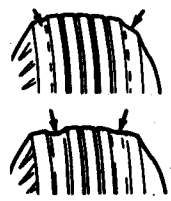
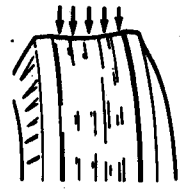
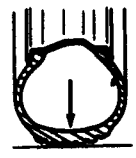
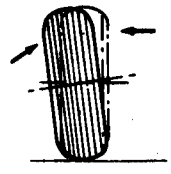
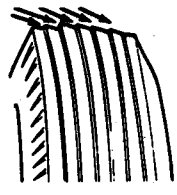
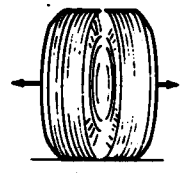
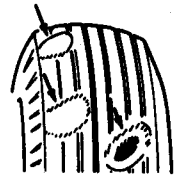
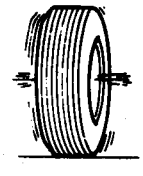
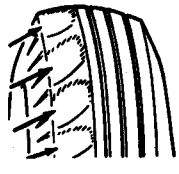
SERVICE SPECIFICATIONS

E31CB--

Items		Specifications
Limit		
Wheel runout		
Radial	mm (in.)	1.0 or less (0.04 or less)
Lateral	mm (in.)	1.0 or less (0.04 or less)
Tread depth of tyre	mm (in.)	1.6 (0.06)

TROUBLESHOOTING

E31EA–

Symptom	Probable cause	Remedy	Reference page
Rapid wear at shoulders 	Under-inflation or lack of rotation 	Adjust the tyre pressure	Refer to P.31-2.
Rapid wear at centre 	Over-inflation or lack of rotation 		
Cracked treads 	Under-inflation		
Wear on one side 	Excessive camber 	Inspect the camber	Refer to GROUP 33A – Service Adjustment Procedures.
Featherd edge 	Incorrect toe-in 	Adjust the toe-in	
Bald spots 	Unbalanced wheel 	Adjust the imbalanced wheels	–
Scalloped wear 	Lack of rotation of tyres or worn or out-of-alignment suspension	Rotate the tyres inspect the front suspension alignment	Refer to GROUP 33A – Service Adjustment Procedures.

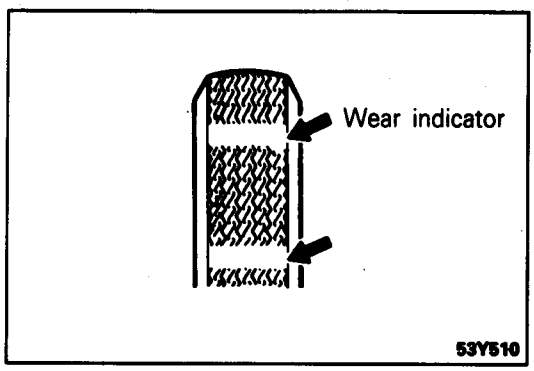
11U0047

SERVICE ADJUSTMENT PROCEDURES

E31FAA

TYRE INFLATION PRESSURE CHECK

Check the inflation pressure of the tyres. If it is not within the standard value, make the necessary adjustment.



TYRE WEAR CHECK

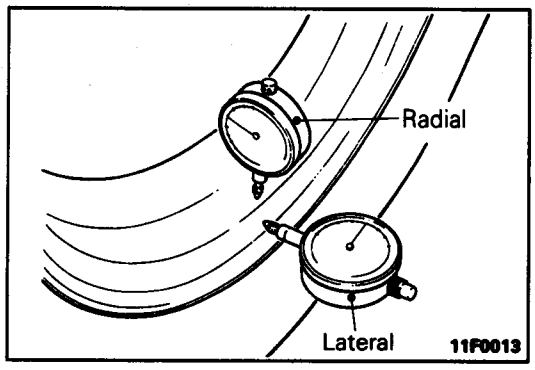
E31FBAA

Measure the tread depth of tyres.

Limit: 1.6 mm (0.06 in.)

If the remaining tread depth is less the limit, replace the tyre.

NOTE
When the tread depth of tyres is reduced to 1.6 mm (0.06 in.) or less, wear indicators will appear.



WHEEL RUNOUT CHECK

E31FCAA

Jack up the vehicle so that the wheels are clear of the floor. While slowly turning the wheel, measure wheel runout with a dial indicator.

Limit: Radial 1 mm or less (0.04 in. or less)
Lateral 1 mm or less (0.04 in. or less)

If wheel runout exceeds the limit, replace the wheel.

WHEEL AND TYRE

E31GDAH

SERVICE POINTS OF INSTALLATION

Tighten the wheel nut to the specified torque.

Tightening torque: 120–140 Nm (12–14 kgm, 87–101 ft.lbs.)

POWER PLANT MOUNT

CONTENTS

E32AA-

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver (from rendering the SRS inoperative).

(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

 Dec. 1993 PWUE9119-C REVISED

SPECIFICATIONS

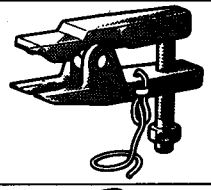
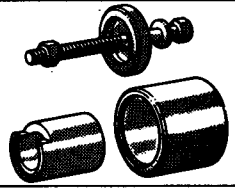
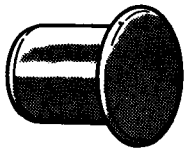
SERVICE SPECIFICATIONS

E32CB–

Items		Specifications
Standard value		
No. 1 crossmember		
Bushing (B) projection	mm (in.)	7.5–10.5 (0.30–0.41)
Crossmember		
Bushing (A) projection	mm (in.)	7.2–10.2 (0.28–0.40)
Bushing (B) projection	mm (in.)	6.5–9.5 (0.26–0.37)

SPECIAL TOOLS

E32DA–

Tool	Number	Name	Use
	MB991113	Steering linkage puller	Removal of the lower arm ball joint and tie rod
	MD991045	Bushing remover and installer	Removal and installation of the crossmember bushing
	MB991193	Plug	Prevention of transfer oil discharge and foreign object entry

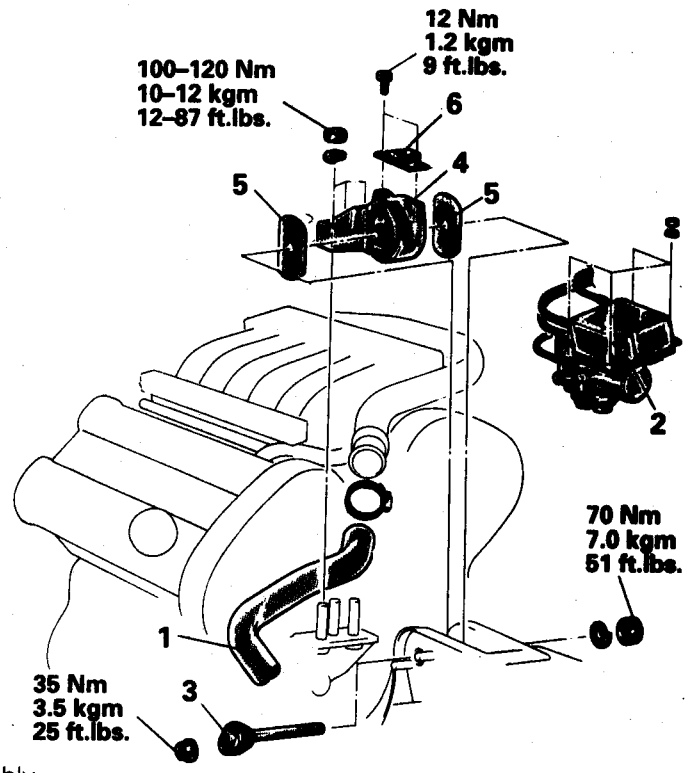
ENGINE MOUNTING

E32JA-

REMOVAL AND INSTALLATION

Pre-removal Operation
- Raise and Suspend the Engine to the Extent Force is not Applied to the Engine Mount

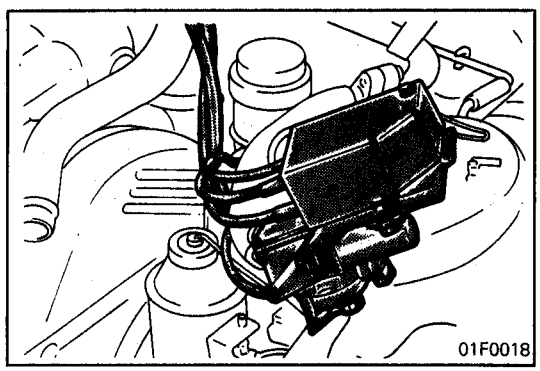
Post-installation Operation
- Lower the Engine.



Removal steps

1. Connection for air hose G
2. ◆◆ Cruise control pump and link assembly
3. Engine mount bracket and body connection bolt
4. Engine mount bracket
5. ◆◆ Mounting stopper
6. Dynamic damper

01F0050

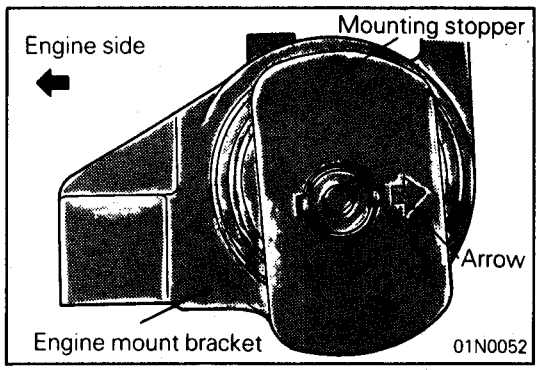


SERVICE POINT OF REMOVAL

E32JB0

2. REMOVAL OF CRUISE CONTROL PUMP AND LINK ASSEMBLY

Remove the actuator mounting nuts and place the actuator where it will not interfere with the work.



SERVICE POINT OF INSTALLATION

E32JD0

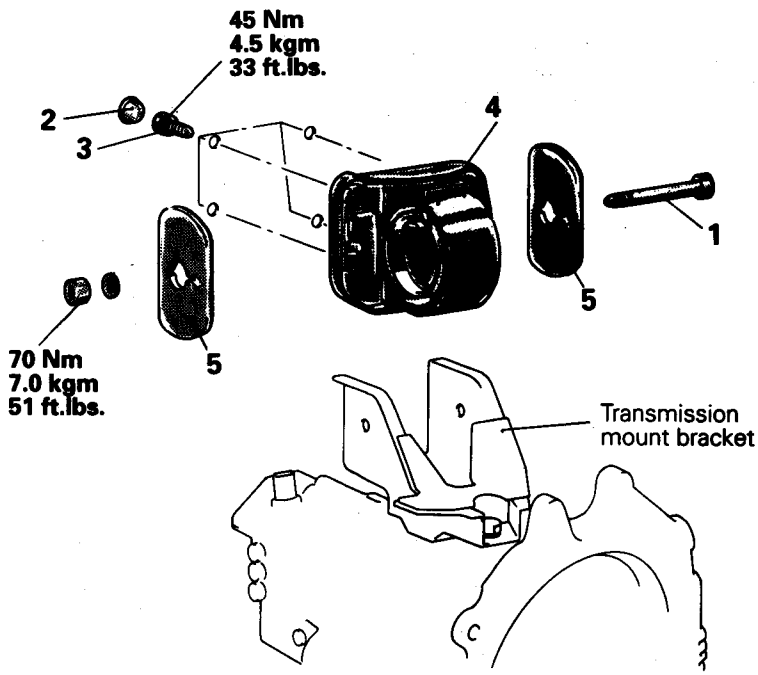
5. INSTALLATION OF MOUNTING STOPPER

Attach the engine mounting bracket so that the arrow mark on the mounting stopper is in the direction as shown in the illustration.

TRANSMISSION MOUNTING

E32KA--

REMOVAL AND INSTALLATION

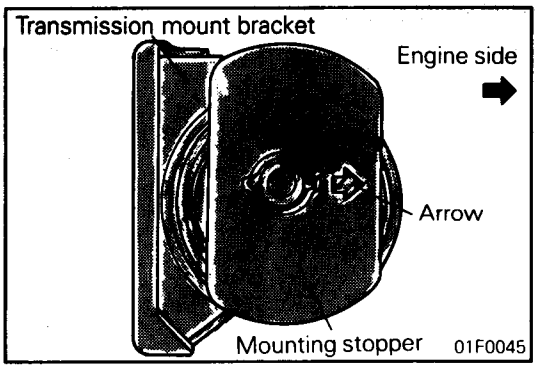


Pre-removal Operation
- Raise and Suspend the Transmission to the Extent Force is not Applied to the Transmission Mount
- Removal of the Air Cleaner (Refer to GROUP 15 – Air Cleaner.)

Post-installation Operation
- Lower the Transmission
- Installation of Air Cleaner (Refer to GROUP 15 – Air Cleaner.)

Removal Steps
1. Transmission bracket and transmission connection bolt
2. Cap
3. Transmission mount bracket installation bolt
4. Transmission mount bracket
◆◆ 5. Mounting stopper

01F0044



SERVICE POINT OF INSTALLATION

E32JDBD

5. INSTALLATION OF MOUNTING STOPPER

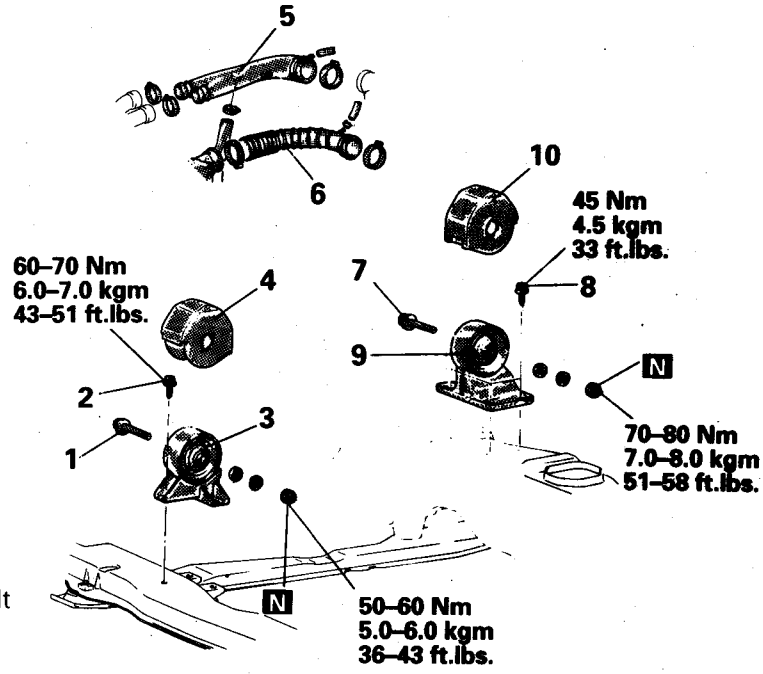
Attach the transmission mounting bracket so that the arrow mark on the mounting stopper is in the direction as shown in the illustration.

ENGINE ROLL STOPPER

E32SA--

REMOVAL AND INSTALLATION

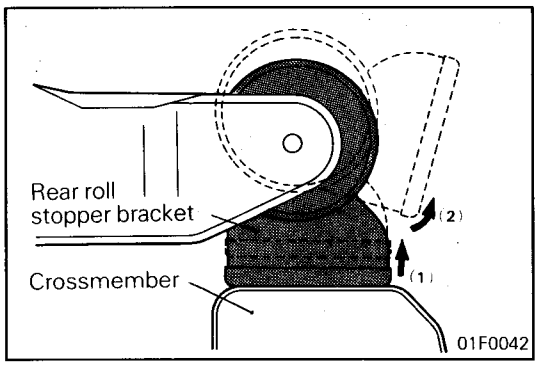
Pre-removal and Post-installation Operation
- Removal and Installation of Condenser Fan Motor Assembly (Refer to GROUP 55 – Condenser and Condenser Fan Motor.)
- Removal and Installation of Catalytic Converter (Left) (Refer to GROUP 15 – Turbocharger <Rear>.)



Front stopper bracket removal steps
1. Front roll stopper bracket and engine connection bolt
2. Front roll stopper bracket installation bolt
3. Front roll stopper bracket
4. Heat protector

Rear roll stopper bracket removal steps
5. Air hose A (Refer to GROUP 15 – Air Cleaner.)
6. Air intake hose C
- ◆◆ 7. Rear roll stopper bracket and engine connection bolt
8. Rear roll stopper bracket installation bolt
- ◆◆ ◆◆ 9. Rear roll stopper bracket
10. Heat protector

01F0030

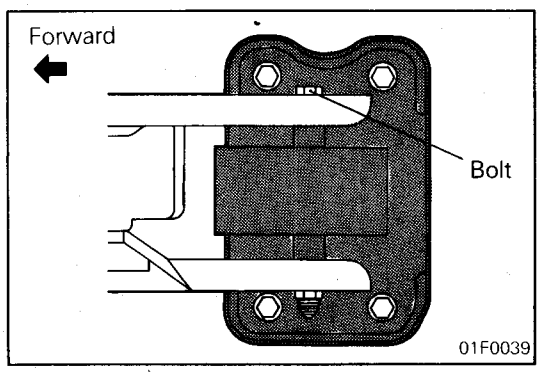


SERVICE POINT OF REMOVAL

E32SBAB

9. REMOVAL OF REAR ROLL STOPPER BRACKET

(1) Slightly raise the rear roll stopper bracket.
(2) Turn the rear roll stopper bracket in the direction shown in the illustration and lift upward to remove.



SERVICE POINTS OF INSTALLATION

E32SDAB

9. INSTALLATION OF REAR ROLL STOPPER BRACKET

Install the rear roll stopper bracket as shown in the illustration.

7. INSTALLATION OF REAR ROLL STOPPER BRACKET AND ENGINE CONNECTION BOLT

Install the bolt as shown in the illustration.

RIGHT MEMBER, LEFT MEMBER AND CROSSMEMBER

E32TA--

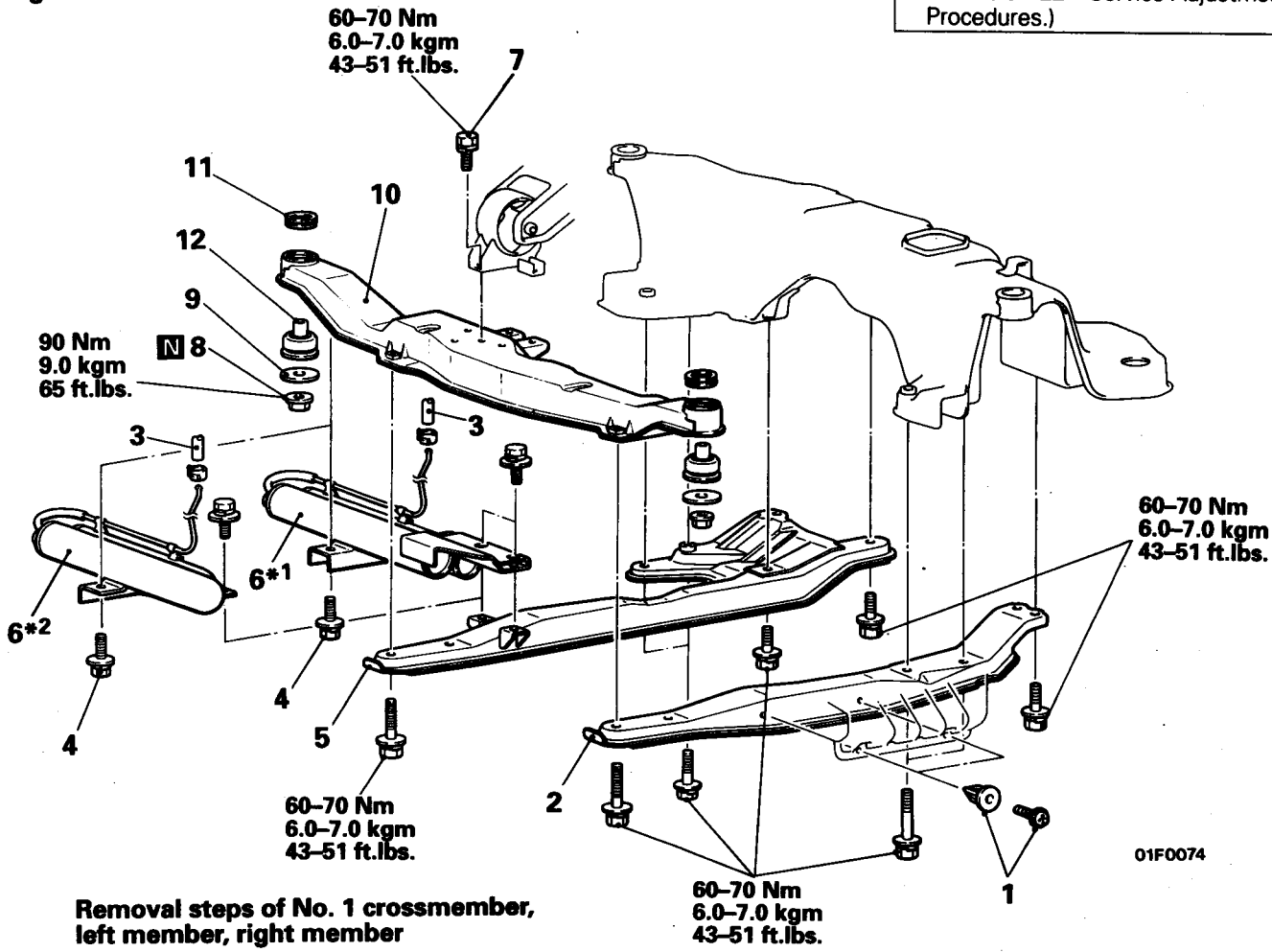
REMOVAL AND INSTALLATION

CAUTION: SRS
Before removal of steering gear box, refer to GROUP 52B – SRS, center front wheels and remove ignition key. Failure to do so may damage SRS clock spring and render SRS system inoperative, risking serious driver injury.

Pre-removal Operation
- Removal of Under Cover (Refer to GROUP 51 – Front Bumper.)

Post-installation Operation
- Installation of Under Cover (Refer to GROUP 51 – Front Bumper.)
- Air Bleeding of the Power-steering Fluid (Refer to GROUP 37A – Service Adjustment Procedures.)
- Adjustment of the Front Wheel Alignment (Refer to GROUP 33A – Service Adjustment Procedures.)
- Supplying of Transfer Oil (Refer to GROUP 22 – Service Adjustment Procedures.)

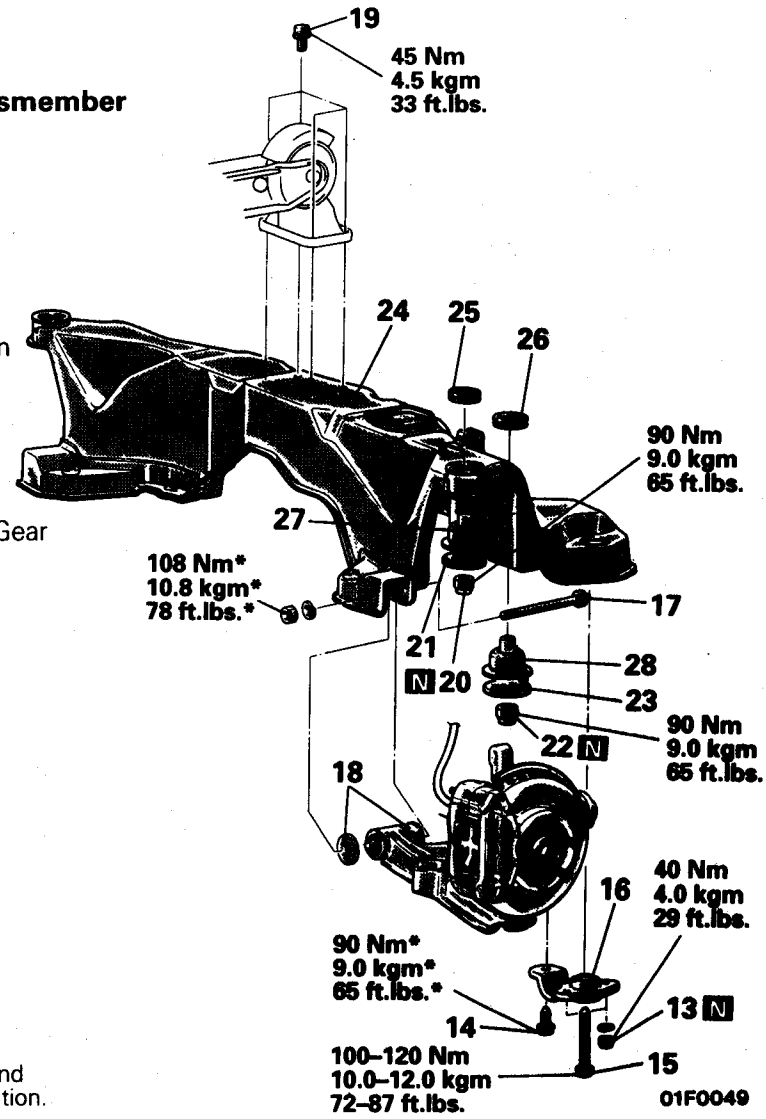
No. 1 crossmember, Left member, Right member



Removal steps of No. 1 crossmember, left member, right member

1. Cover installation screw
2. Left member
3. Connection of clutch vacuum hose
4. Vacuum tank installation bolt
5. Right member
6. Vacuum tank
7. Front roll stopper installation bolt
8. No. 1 crossmember installation nut
9. Lower plate
10. No. 1 crossmember
11. Stopper (B)
12. Bushing (B)

NOTE
*1: 5-speed manual transmission
*2: 6-speed manual transmission

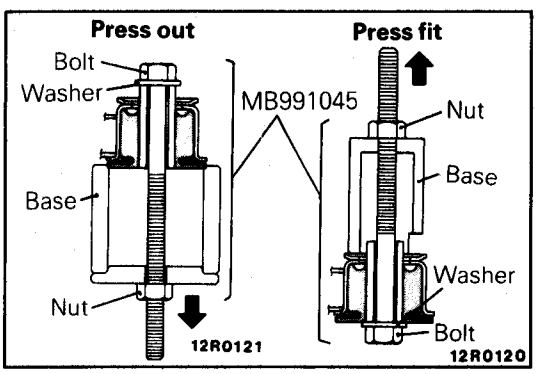


Removal steps of crossmember

- Front exhaust pipe
  (Refer to GROUP 15 – Exhaust Pipe, Main Muffler and Catalytic Converter.)
- Transfer
  (Refer to GROUP 22 – Transfer.)
- Stabilizer bar
  (Refer to GROUP 33A – Stabilizer Bar.)
- Steering gear box
  (Refer to GROUP 37A – Power Steering Gear Box.)

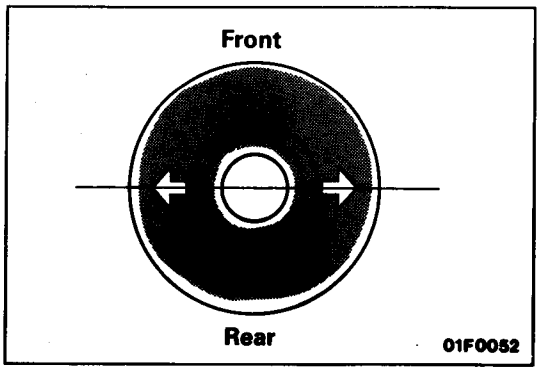
13. Self-locking nut
14. Clamp installation bolt (short)
15. Clamp installation bolt (long)
16. Clamp
17. Lower arm mounting bolt
18. Stopper
19. Rear roll stopper bracket mounting bolt
20. Self-locking nut
21. Lower plate
22. Self-locking nut
23. Lower plate
24. Crossmember
25. Stopper B
26. Stopper A
27. Bushing B
28. Bushing A

NOTE
*: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle in the unladen condition.



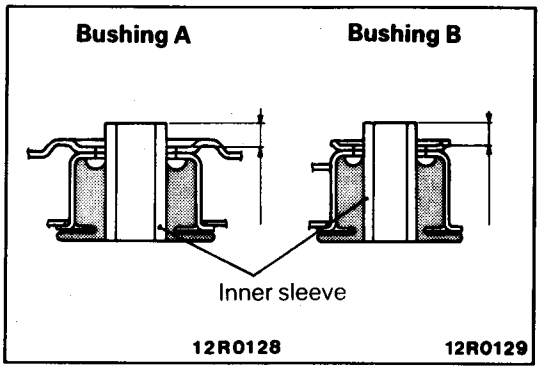
BUSHING A AND B REPLACEMENT E32TCAB

Use the special tool to remove and press in bushings A and B.



Press in bushings A and B so that the arrows on their bottom surfaces may be directed in the crosswise direction.

Caution
Shifting of the arrow in the direction of rotation shall be within ±5° of the crosswise direction.



Press in bushings A and B so that the projecting amount of the inner sleeve agrees with the standard value.

Standard value:

No. 1 crossmember	
Bushing B	**7.5 – 10.5 mm (0.30 – 0.41 in.)**
Crossmember	
Bushing A	**7.2 – 10.2 mm (0.28 – 0.40 in.)**
Bushing B	**6.5 – 9.5 mm (0.26 – 0.37 in.)**

Caution
When pressing in, apply a solution of soap and water to the sliding part of the bushings, and then press them in without stopping one after the other.
If there is a pause during the pressing operation, the frictional resistance will prevent installation.

FRONT SUSPENSION

CONTENTS

E33AA-A

SPECIFICATIONS

Vorderradaufhängung

GENERAL SPECIFICATIONS

E33CA-A

Items	Specifications
Suspension system	McPherson strut coil spring and compression rod type
Coil spring	
Wire dia. × O.D. × free length mm (in.)	15.4 × 185.4 × 293 (0.61 × 7.30 × 11.54)*1 15.2 × 185.2 × 291.5 (0.60 × 7.29 × 11.48)*2
Coil spring identification colour	Pink × 2*1 Purple × 1*2
Spring constant N/mm (kg/mm, lbs./in)	38.2 (3.9, 218)
Shock absorber	
Type	Hydraulic,cylindrical double acting type
Stroke mm (in.)	150 (5.91)
Damping force [at 0.3m/sec. (0.984 ft./sec.)	
Expansion N (kg. lbs.)	Hard: 2,650 (265, 584) Medium: 1,650 (165, 363) Soft: 650 (65, 143)
Contraction N (kg, ibs.)	Hard: 1,200 (120, 265) Medium: 1,150 (115, 253) Soft: 1,000 (100, 220)
Stabilizer bar	
Mounting method	Pillow ball type
O.D. mm (in.)	23 (0.91)

NOTE
*1 Vehicles built up to June, 1993
*2 Vehicles built from July, 1993

SERVICE SPECIFICATIONS

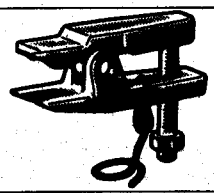
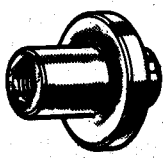
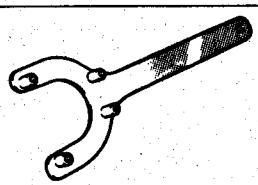
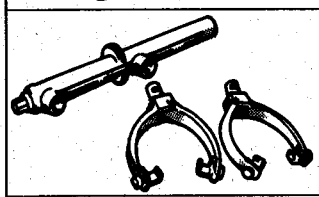
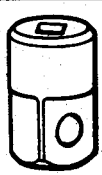
E33CB-A

Items	Specifications
Standard value	
Camber (Radsturz)	0° ± 30'
Caster (Nachlauf)	3°55' ± 30'
Kingpin inclination	14°2'
Toe-in (Spur) mm (in.)	
At the center of tyre tread	−3 to 3 (− 0.12 to 0.12)
Toe angle (per wheel) (grad pro Rad)	−8' to 8'
Toe-out angle on turns (inner wheel when outer wheel at 20°) (Spurdifferenz)	22°
Lower arm ball joint starting torque Nm (kgcm, in.lbs.)	10 – 22 (100 – 220, 86 – 191)
Stabilizer link ball joint starting torque Nm (kgcm, in.lbs.)	1.7 – 3.2 (17 – 32, 15 – 28)

3000 GT

SPECIAL TOOLS

E33DA-A

Tool	Number	Name	Use
	MB991113	Steering linkage puller	Removal of the lower arm ball joint and tie rod
	MB991004	Wheel alignment gauge attachment	Measurement of the wheel alignment
	MB991176	Spring seat holder	Disassembly/assembly of the strut assembly
	MB991237 MB991238	Spring compressor body Arm set	Compression of the front coil spring
	MB990799	Ball joint remover and installer	Installation of the dust shield
	MB990326	Preload socket	Measurement of the lower arm ball joint starting torque Measurement of the stabilizer link rotation-starting torque
	MB990968	Torque wrench	

SERVICE ADJUSTMENT PROCEDURES

FRONT WHEEL ALIGNMENT INSPECTION AND ADJUSTMENT

E33FABA

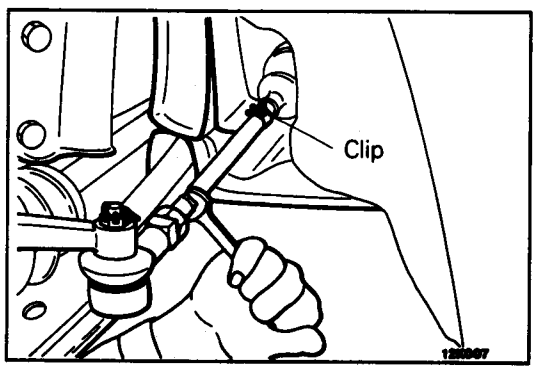
TOE-IN

1. Measure the toe-in.

   Standard value:

   At the centre of tyre tread – 3 to 3 mm (–0.12 to 0.12 in.)

   Toe angle (per wheel) –8′ to 8′



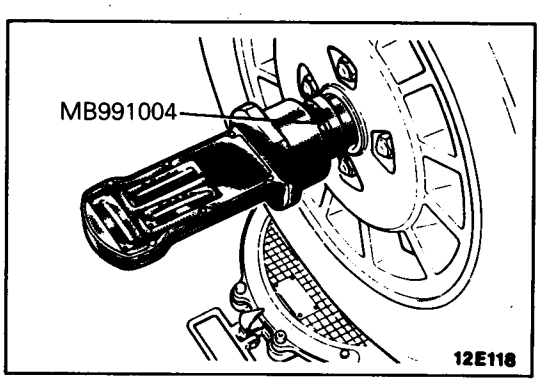
2. If the toe-in is not within the standard value, adjust the toe-in by undoing the clips and turning the left and right tie rod turnbuckles by the same amount (in opposite directions).
3. After making the adjustments, use a turning radius gauge to confirm that the steering wheel turning angle is within the standard value range. (Refer to GROUP 37A–Service Adjustment Procedures.).

TOE-OUT ANGLE ON TURNS

To check the steering linkage, especially after the vehicle has been involved in an accident or if an accident is presumed, it is advisable to check the toe-out angle on turns in addition to the wheel alignment.
Conduct this test on the left turn as well as on the right turn.

Standard value:

22° (inner wheel when outer wheel at 20°)



CAMBER, CASTER AND KINGPIN INCLINATION

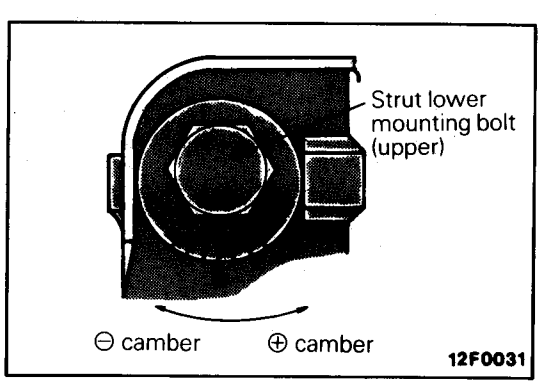
Standard value:

Camber	**0° ± 30′**
Caster	**3°55′ ± 30′**
Kingpin inclination	**14°2′**

Install the special tool by tightening it to the same torque as that applied to the drive shaft nut.
To adjust camber, turn the strut lower mounting bolt (upper).
One graduation is equivalent to about 20′ in camber. Caster and kingpin inclination has been factory-adjusted to the standard value and requires no adjustment.

Caution

1. **One camber graduation changes toe by about 0.5 mm (0.02 in.). Be sure to adjust toe after camber has been adjusted.**
2. **The difference in camber between right and left should be within 0°30′.**

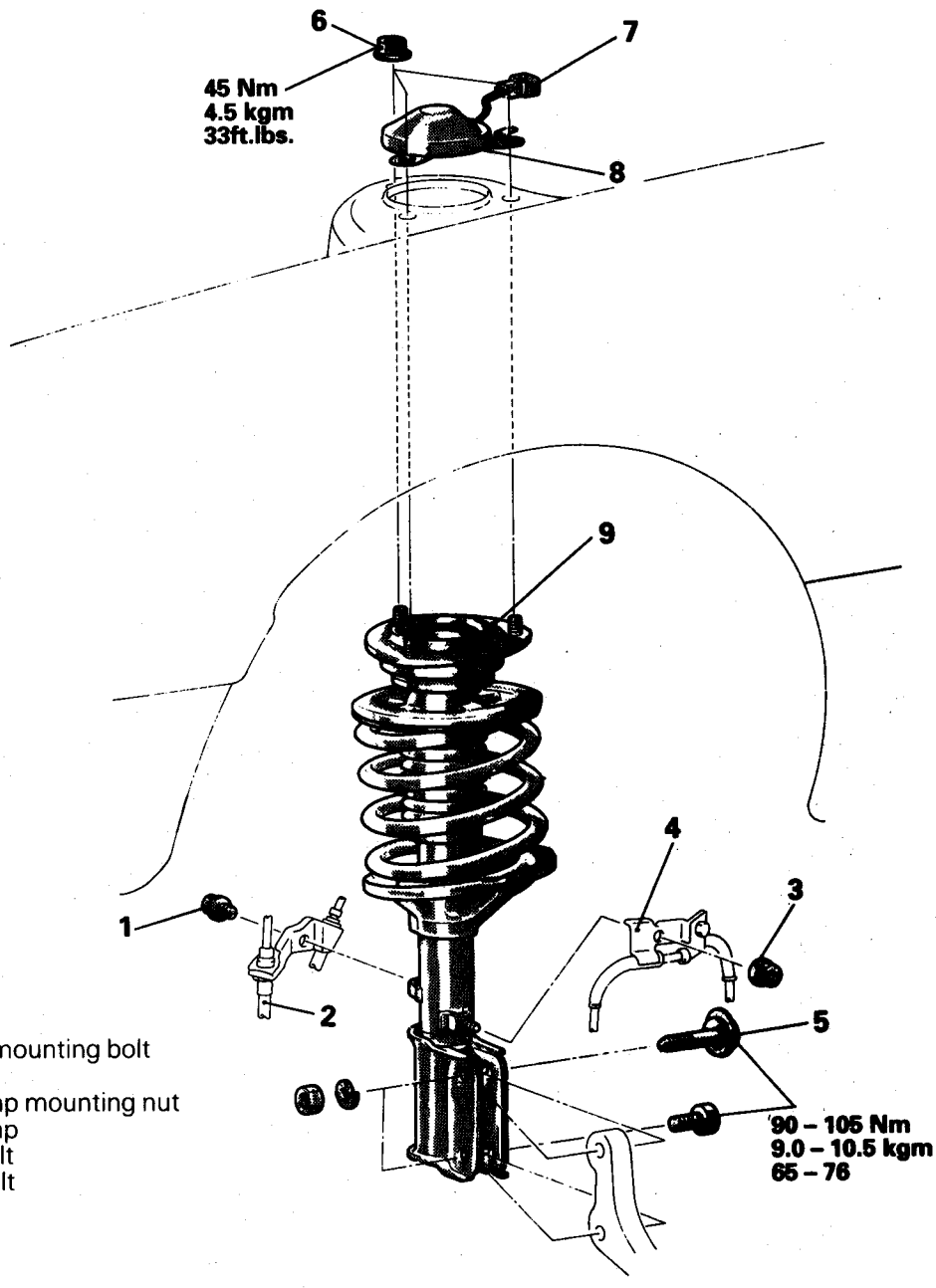


STRUT ASSEMBLY

E33LA–

REMOVAL AND INSTALLATION

Post-installation Operation
- Adjustment of Wheel Alignment (Refer to P.33A-4.)

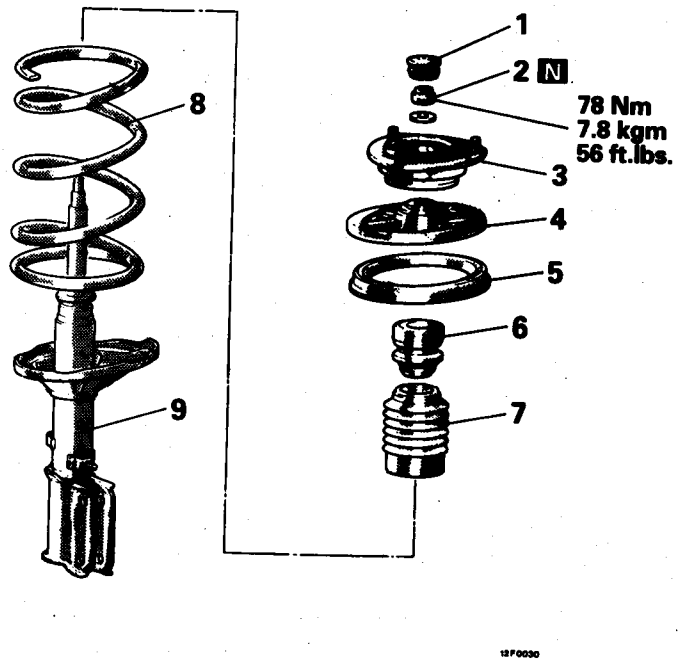


Removal steps

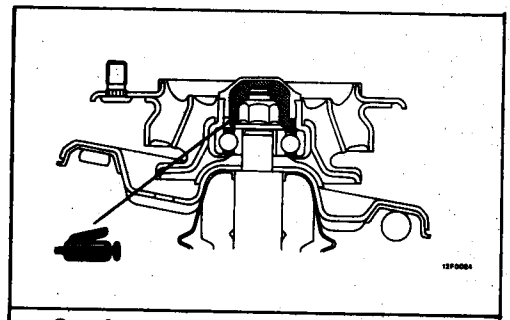
1. Brake hose tube clamp mounting bolt
2. Brake hose tube clamp
3. Front speed sensor clamp mounting nut
4. Front speed sensor clamp
5. Strut lower mounting bolt
6. Strut upper mounting bolt
7. ECS connector
8. Cap
9. Strut assembly

DISASSEMBLY AND REASSEMBLY

E33LE--



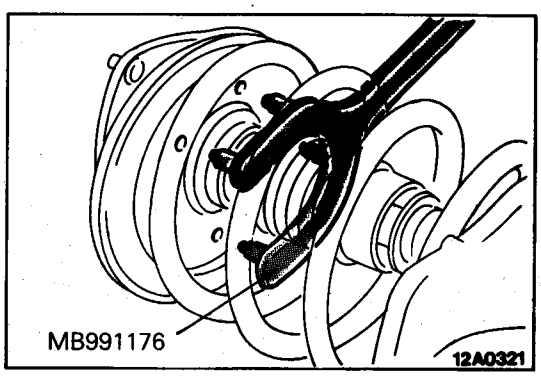
12F0030

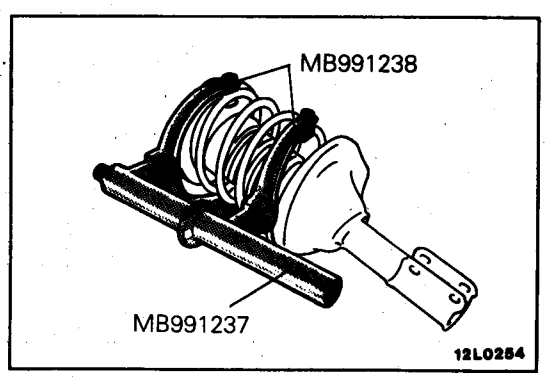


Caution
When applying the grease, take care that grease does not adhere to the insulator's rubber part.

Disassembly steps

1. Dust shield
2. Self-locking nut
3. Strut insulator assembly
4. Spring upper seat assembly
5. Upper spring pad
6. Bump rubber
7. Dust shield
8. Front coil spring
9. Strut assembly





SERVICE POINT OF DISASSEMBLY

E33LFAI

2. REMOVAL OF SELF-LOCKING NUT

(1) Holding the spring upper seat with the special tool, loosen the self-locking nut.

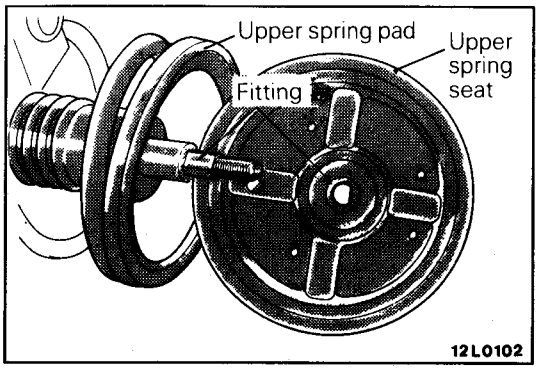
Caution

(1) The self-locking nut should be loosened only, not removed.
(2) Do not use an air tool.

(2) Using the special tools, compress the coil spring, and then remove the self-locking nut.

Caution

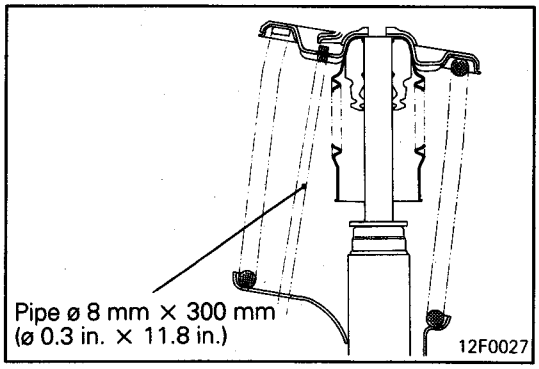
(1) Install the special tools evenly, and so that the max-imum length will be attained within the installation range.
(2) Do not use an air tool to tighten the bolt of the special tool and to remove the self-locking nut.



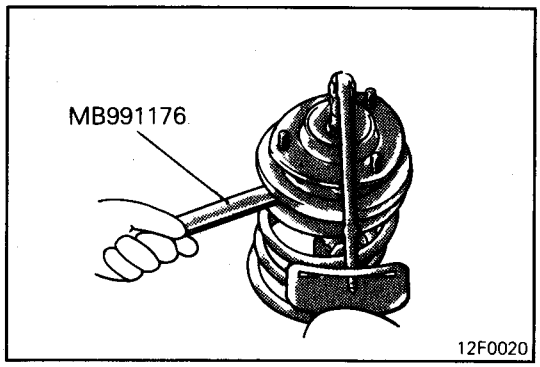
SERVICE POINTS OF REASSEMBLY E33LHAQ

4. INSTALLATION OF SPRING UPPER SEAT ASSEMBLY

(1) Assemble the spring upper seat to the piston rod, fitting the notch in the rod to the shaped hole in spring seat.



(2) Using pipes, line up the holes in the strut assembly spring lower seat with the hole in the spring upper seat.



2. INSTALLATION OF SELF-LOCKING NUT

(1) With the coil spring held compressed by the special tools (MB991237 and MB991238), provisionally tighten the self-locking nut.

Caution

Do not use an air tool to tighten the bolt of the special tool.

(2) Correctly align both ends of the coil spring with the grooves in the spring seat, and then loosen the special tools (MB991237 and MB991238).

(3) Using the special tool, tighten the strut insulator at the specified torque.

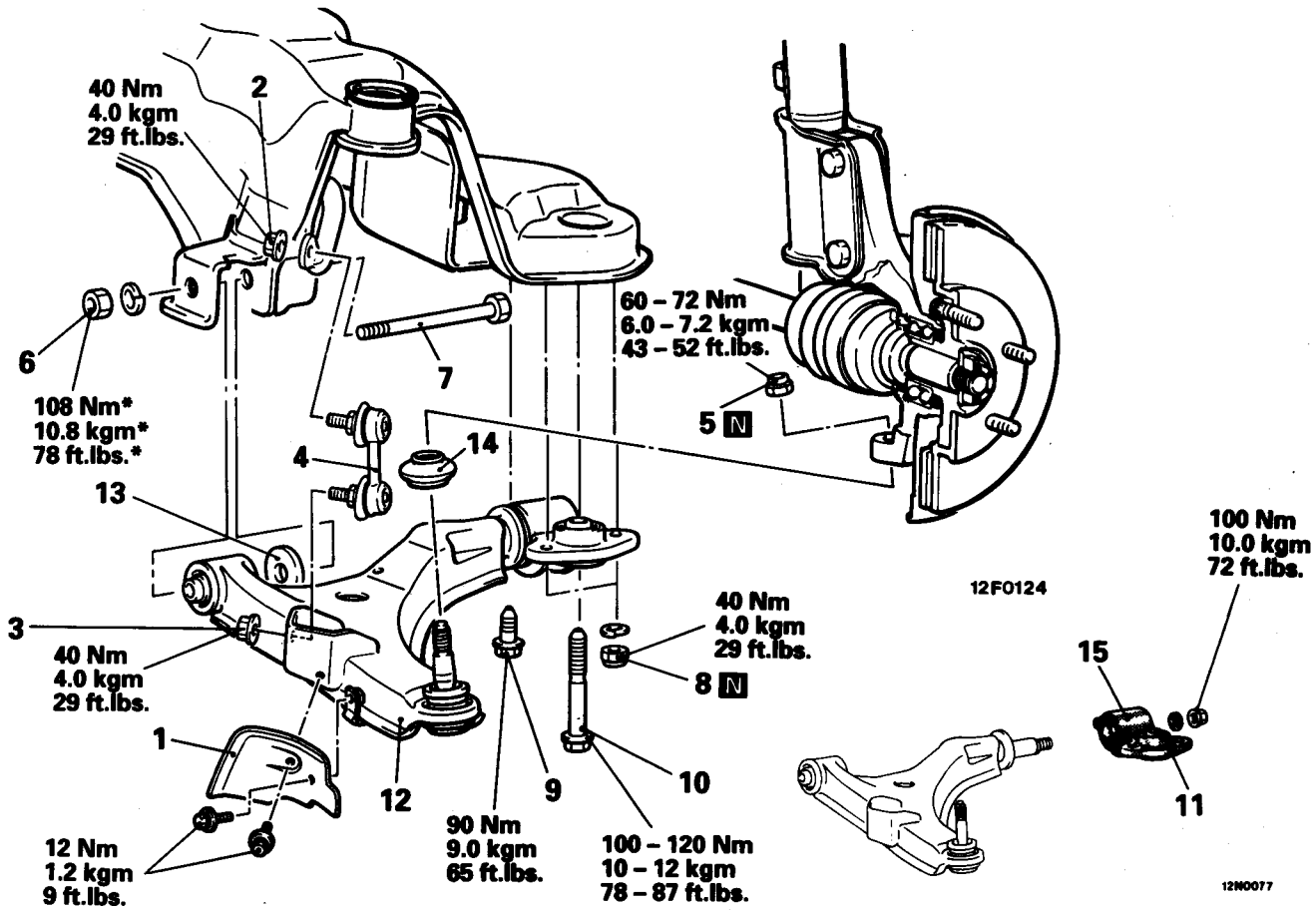
Caution

Do not use an air tool.

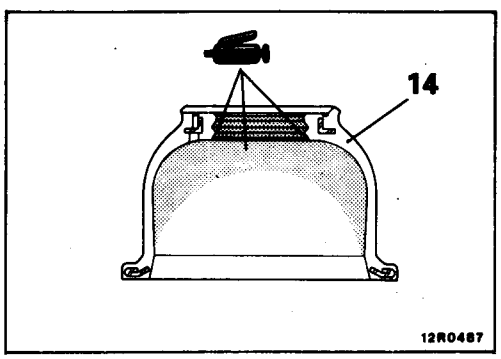
LOWER ARM

E33OA--

REMOVAL AND INSTALLATION



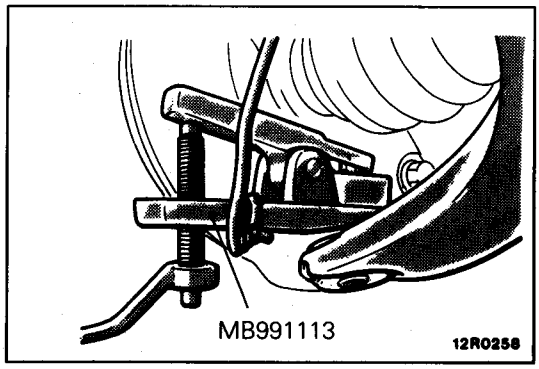
Post-installation Operation
- Adjustment of Wheel Alignment (Refer to P.33A-4.)



Removal steps

1. Air guide plate
2. Stabilizer link mounting nut (stabilizer bar side)
3. Stabilizer link mounting nut (lower arm side)
4. Stabilizer link
◀◆▶ 5. Self-locking nut connecting lower arm ball joint to knuckle
6. Lower arm mounting nut
7. Lower arm mounting bolt
8. Clamp mounting self-locking nut
9. Clamp mounting bolt (small)
10. Clamp mounting bolt (large)
▶◀ 11. Lower arm mounting clamp
12. Lower arm
13. Stopper
14. Dust shield
15. Rod bushing

NOTE
For tightening points marked with *, first temporarily tighten them, then ground the vehicle and torque to specification where the vehicle is empty.



SERVICE POINT OF REMOVAL E330BAK

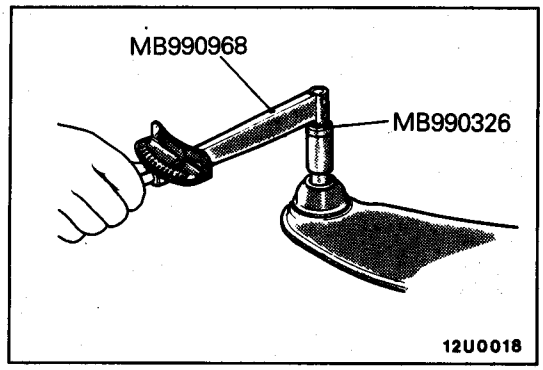
5. REMOVAL OF LOWER ARM BALL JOINT

Using the special tool, disconnect the knuckle from the lower arm ball joint.

NOTE

(1) Do not remove the nut from the ball joint, but just loosen it.

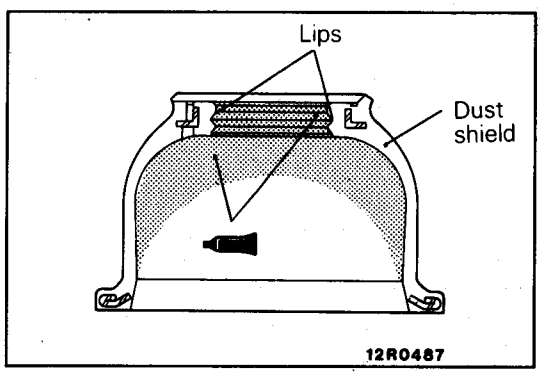
(2) Suspend the special tool with a rope to prevent it from dropping.



INSPECTION E330CAL

CHECKING BALL JOINT FOR STARTING TORQUE

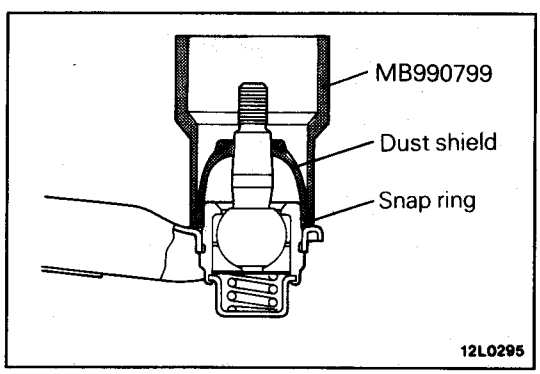
Standard value: 10 – 22 Nm (100 – 220 kgcm, 86 – 191 in.lbs.)



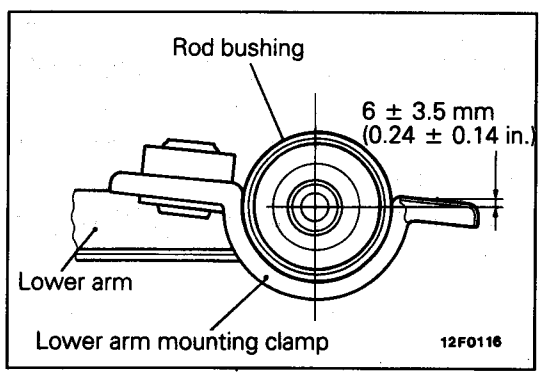
BALL JOINT DUST SHIELD REPLACEMENT E330DAD

(1) Remove the dust shield.

(2) Apply multipurpose grease to the lip and inside of the dust shield.



(3) Drive in the dust shield with special tool until it is fully seated.



SERVICE POINT OF INSTALLATION E330EAN

11. INSTALLATION OF LOWER ARM MOUNTING CLAMP

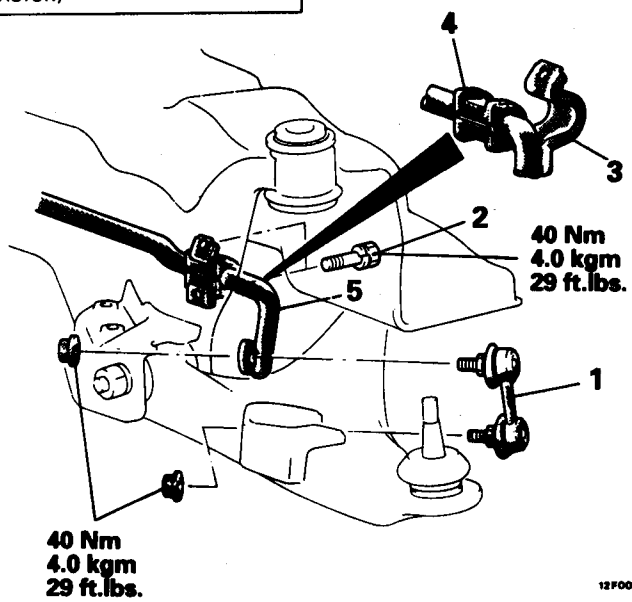
Install the lower arm mounting clamp so that it is at the dimension shown in the illustration.

STABILIZER BAR

E33RA--

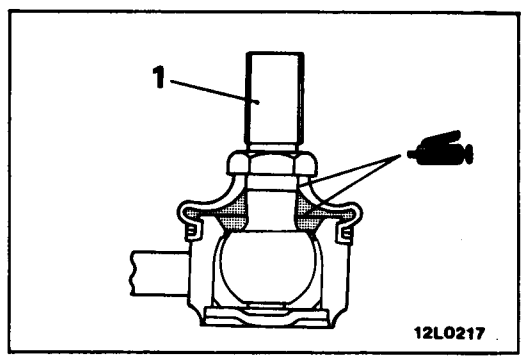
REMOVAL AND INSTALLATION

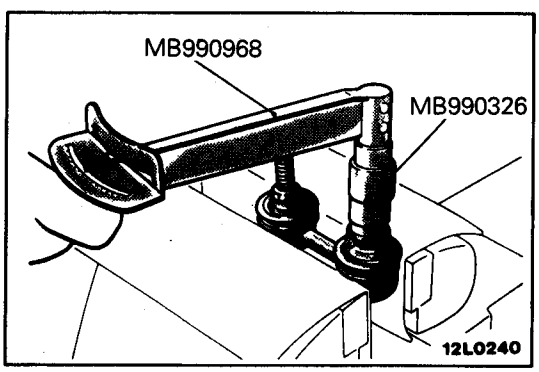
Pre-removal and Post-installation Operation
- Removal and Installation of the Front Exhaust Pipe (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Removal and Installation of the Under Cover
- Removal and Installation of the Left Member and Right Member (Refer to GROUP 32 – Right Member, Left Member and Crossmember.)
- Removal and Installation of the Transfer (Refer to GROUP 22 – Transfer.)



Removal steps

1. Stabilizer link
2. Stabilizer bar bracket mounting bolt
◆◆ 3. Stabilizer bar bracket
4. Bushing
5. Stabilizer bar





INSPECTION

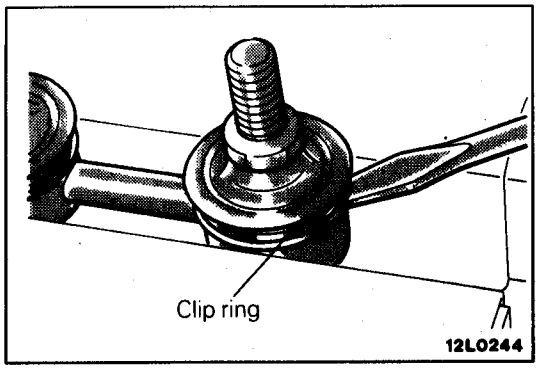
E33RCAI

CHECKING STABILIZER LINK BALL JOINT STARTING TORQUE

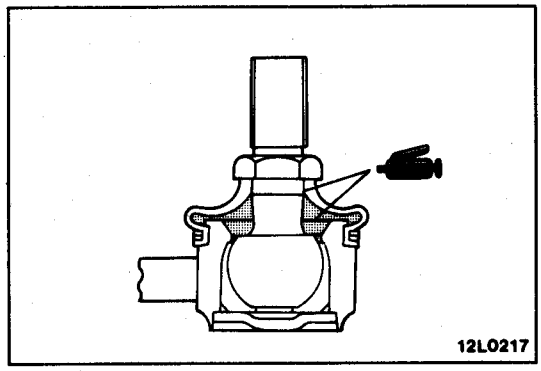
Mount two nuts on the ball joint, and then measure the ball joint starting torque using the special tools.

Standard value: 1.7 – 3.2 Nm (17 – 32 kgcm, 15 – 28 in.lbs.)

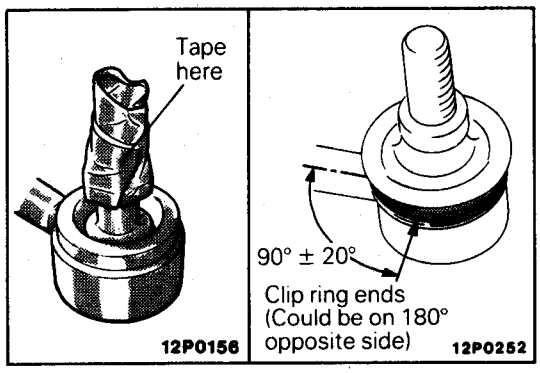
BALL JOINT DUST SHIELD REPLACEMENT E33REAE



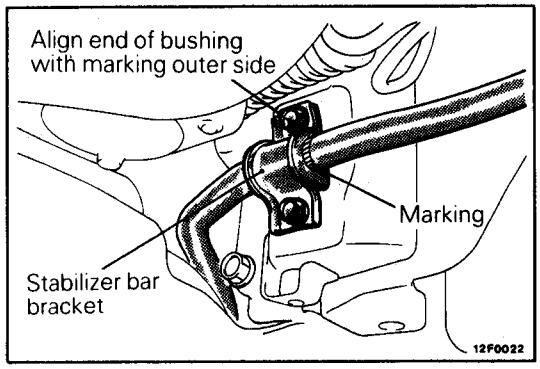
(1) Remove the clip ring and the dust shield.



(2) Apply multipurpose grease to the lip and inside of the dust shield.



(3) Use vinyl tape to tape the stabilizer link where shown in the illustration, and then install the dust shield to the stabilizer link.
(4) Secure the dust shield by the clip link.
At this time, make sure that the clip ring ends are located at a point 90° ± 20° with reference to the link axis.



SERVICE POINT OF INSTALLATION E33RDAL

3. POSITIONING OF STABILIZER BAR BRACKET

(1) Align the bushing (LH) with the stabilizer bar marking end and temporarily tighten the stabilizer bar bracket (LH).
(2) In this condition, mount the stabilizer bar bracket (RH) and temporarily tighten it.
(3) Temporarily fix the both ends of the stabilizer bar to the link and tighten the stabilizer bar bracket mounting bolts to specification.

NOTES

ELECTRONIC CONTROL SUSPENSION

CONTENTS

E23AA-B

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver (from rendering the SRS inoperative).

(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

 Dec. 1993 PWUE9119-C REVISED

SPECIFICATIONS

GENERAL SPECIFICATIONS

E33CA-B

FRONT SUSPENSION

Items	Specifications
Suspension system	McPherson strut with coil spring and compression rod type
Coil spring	
Wire dia. × O.D. × free length mm (in.)	15.4 × 185.4 × 293 (0.61 × 7.30 × 11.54)*1 15.2 × 185.2 × 291.5 (0.60 × 7.29 × 11.48)*2
Coil spring identification color	Pink × 2*1 Purple × 1*2
Spring constant N/m (kg/mm, lbs./in.)	38.2 (3.9, 218)
Shock absorber	
Type	Hydraulic, cylindrical double acting type
Stroke mm (in.)	150 (5.91)
Damping force [at 0.3m/sec. (0.984 ft. sec.)]	
Expansion N (kg, lbs.)	Hard: 2,650 (265, 584) Medium: 1,650 (165, 363) Soft: 650 (65, 143)
Contraction N (kg, lbs.)	Hard: 1,200 (120, 265) Medium: 1,150 (115, 253) Soft: 1,000 (100, 220)
Stabilizer bar	
Mounting method	Pillow ball type
O.D. mm (in.)	23 (0.91)

NOTE
*1: Vehicles built up to June, 1993
*2: Vehicles built from July, 1993

REAR SUSPENSION

Items		Specifications
Suspension system		Double wishbone suspension type
Coil spring		
Wire dia. × O.D. × free length	mm (in.)	12.2 × 117.2 × 379.3 (0.48 × 4.61 × 14.93)*1 11.5 × 116.5 × 379.3 (0.45 × 4.59 × 14.93)*2
Coil spring identification color		Blue × 2*1 Brown × 2*2
Spring constant	N/m (kg/mm, lbs./in.)	27.5 (2.8, 157)
Shock absorber		
Type		Hydraulic, cylindrical, double-acting type
Stroke	mm (in.)	203 (8.0)
Damping force [at 0.3m/sec. (0.984 ft. sec.)]		
Expansion	N (kg, lbs.)	Hard: 1,700 (171, 377) Medium: 1,160 (116, 256) Soft: 560 (56, 123)
Contraction	N (kg, lbs.)	Hard: 1,010 (101, 223) Medium: 880 (88, 194) Soft: 670 (67, 148)
Stabilizer bar		
Mounting method		Pillow ball type
O.D.	mm (in.)	22 (0.86)

NOTE
*1: Vehicles built up to June, 1993
*2: Vehicles built from July, 1993

NOTES

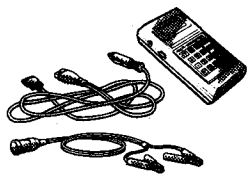
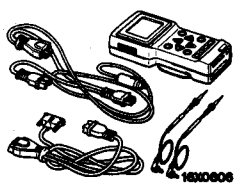
SERVICE SPECIFICATIONS

E33CB-B

Items	Front Suspension	Rear suspension
Standard value		
Camber	0° ± 30′	–0°10′ ± 30′
Caster	3°55′ ± 30′	–
Toe-in mm (in.)		
At the centre of tyre tread	–3 to 3 (–0.12 to 0.12)	–2 to 3 (–0.08 to 0.12)
Toe angle (per wheel)	–8′ to 8′	–5′ to 8′

SPECIAL TOOLS

E33DA-B

Tool	Number	Name	Use
	MB991341	Multi-use tester sub-assembly	1993 models Inspection of electronic control suspension system ● Reading and erasing self-diagnosis codes ● Reading service data ● Actuator test
		ROM pack (For the number, refer to GROUP 00 – Precautions Before Service.)	
	MB991502	MUT-II sub-assembly	All models Inspection of electronic control suspension system ● Reading and erasing self-diagnosis codes ● Reading service data ● Actuator test
 16X0607		ROM pack	

TROUBLESHOOTING

E33EAAG

QUICK REFERENCE CHART FOR TROUBLESHOOTING

Symptoms	Associated components										Pages to refer to
	ECS switch	ECS indicator lamp	Steering angular velocity sensor*2	Stop lamp switch	Throttle position sensor*4	Vehicle speed sensor*3	G sensor*1	Position detection switch	Damping force change-over actuator	ECS control unit	
When self diagnosis code No. 11 is output. *1							○			○	P.33B-5
When self diagnosis code No. 21 is output. *2			○							○	P.33B-6
When self diagnosis code No. 24 is output. *3						○				○	P.33B-7
When self diagnosis code Nos. 61 through 64 are output.								○	○	○	P.33B-8
ECS indicator lamp does not switch when ECS switch is operated.	○	○								○	P.33B-9
Anti-roll control only stops. *2			○							○	P.33B-6
Anti-dive control only stops.				○						○	P.33B-10
Anti-squat control only stops. *4					○					○	P.33B-11

TROUBLESHOOTING HINTS

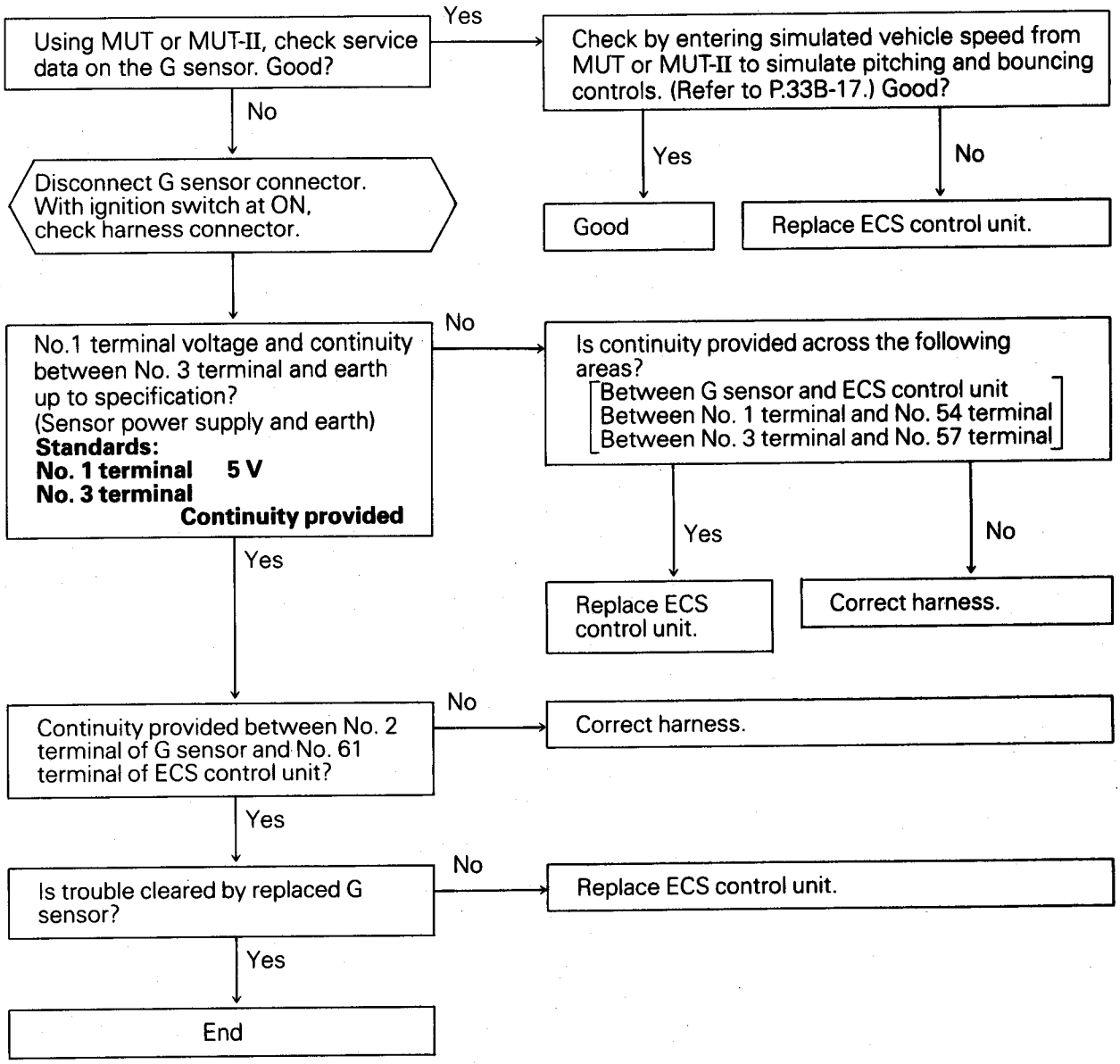
*1. The G sensor is a sensor associated with ride control (detecting pitching, bouncing and rough road). If it fails, therefore, ride control stops.

*2. A self diagnostic decision on the steering angular velocity sensor is made by the ECS control unit which internally detects the voltages of the two sensor output lines connected to the ECS control unit to detect an open circuit in the signal line. When the signal line is short-circuited or when the power line is open-circuited, however, it cannot be detected. In a situation where anti-roll control only stops, if self-diagnosis code No. 21 is not on display, a short-circuited sensor output line or open-circuited sensor power line is suspected.

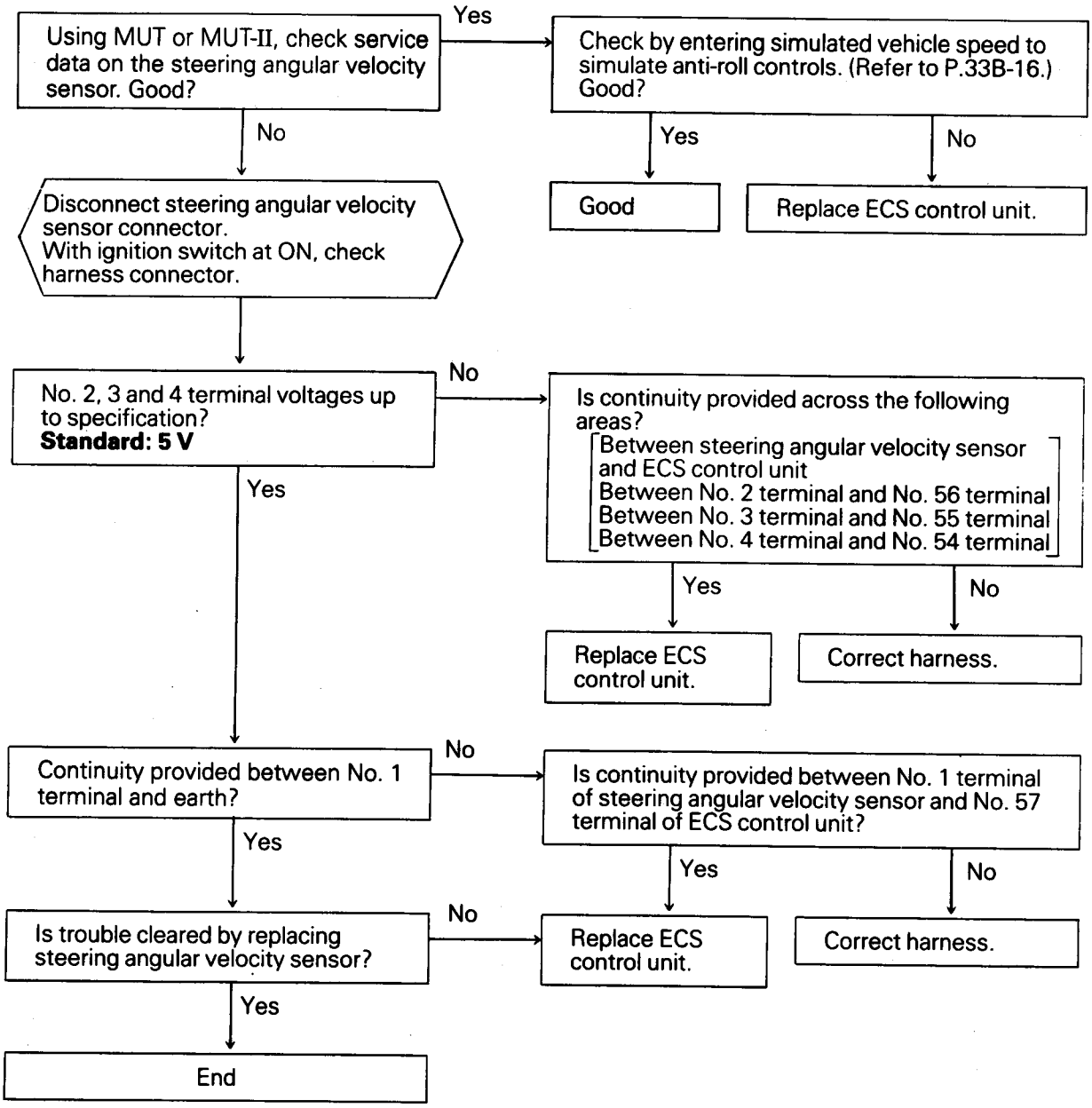
*3. The vehicle speed sensor is a sensor associated with attitude controls (anti-dive, anti-squat) and steering stability controls (anti-roll, high speed sensitive controls). If all these controls stop, therefore, trouble in the sensor is suspected. The vehicle speed sensor is also in use for operation of the speedometer and for the other electronics controlled systems for the engine, etc.

*4. The sensor associated with anti-squat control is the throttle position sensor. The sensor is also used for control of the engine. If the sensor fails, therefore, the check engine lamp in the combination meter will light, and engine self-diagnosis code No. 14 will be output. In a situation where anti-squat control only stops, therefore, if the check engine lamp does not light, defective wiring is suspected between the ECS control unit and throttle position sensor.

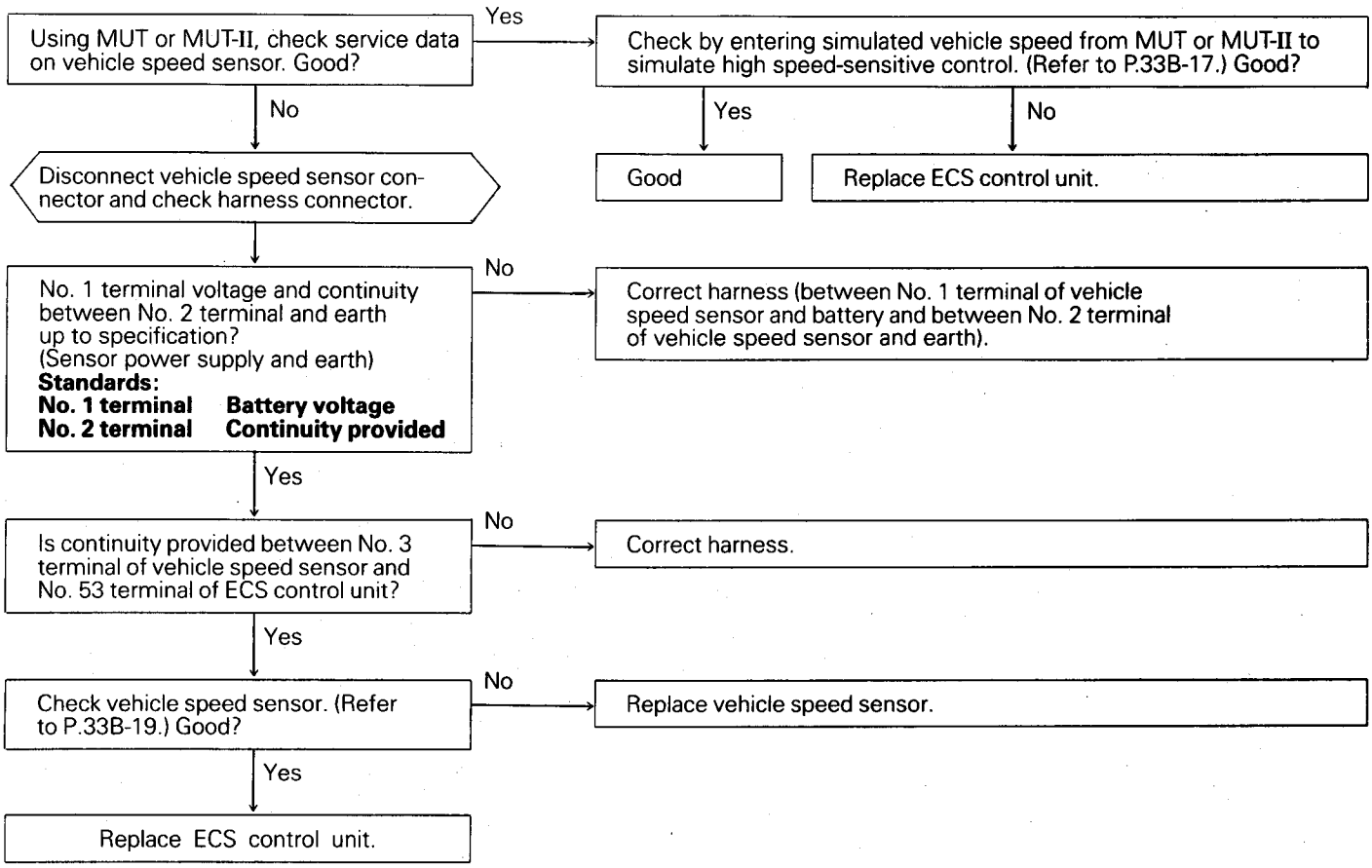
1 When diagnosis code No. 11 is output



2 When diagnosis code No. 21 is output, or when anti-roll control only stops.



3 When diagnosis code No. 24 is output



4 When diagnosis code Nos. 61, 62, 63 and 64 are output.

Using MUT or MUT-II, check actuator. (Refer to P.33B-15.) Good?
- Yes → Good
- No → Remove cap at top of shock absorber associated with diagnosis code No., disconnect connector directly connected to shock absorber, and check harness connector with ignition switch at ON.

No. 1 and 3 terminal voltages up to specification?
Standard: 5 V
- No → Is continuity provided across the following areas of shock absorber associated with diagnosis code No.?

Shock absorber terminal	ECS control unit terminal
FR No. 1	No. 27
FR No. 3	No. 26
FL No. 1	No. 30
FL No. 3	No. 29
RR No. 1	No. 33
RR No. 3	No. 32
RL No. 1	No. 36
RL No. 3	No. 35

  - No → Correct harness.
  - Yes → Is continuity provided between the body earth and the No. 1 terminal and between the body earth and the No. 3 terminal of the shock absorber associated with diagnosis code No.?
    - No → Replace ECS control unit.
    - Yes → Correct harness.
- Yes

Is continuity provided between No. 2 and 4 terminals and earth?
- No → Correct harness (between No. 2 and 4 terminals of shock absorber and earth).
- Yes

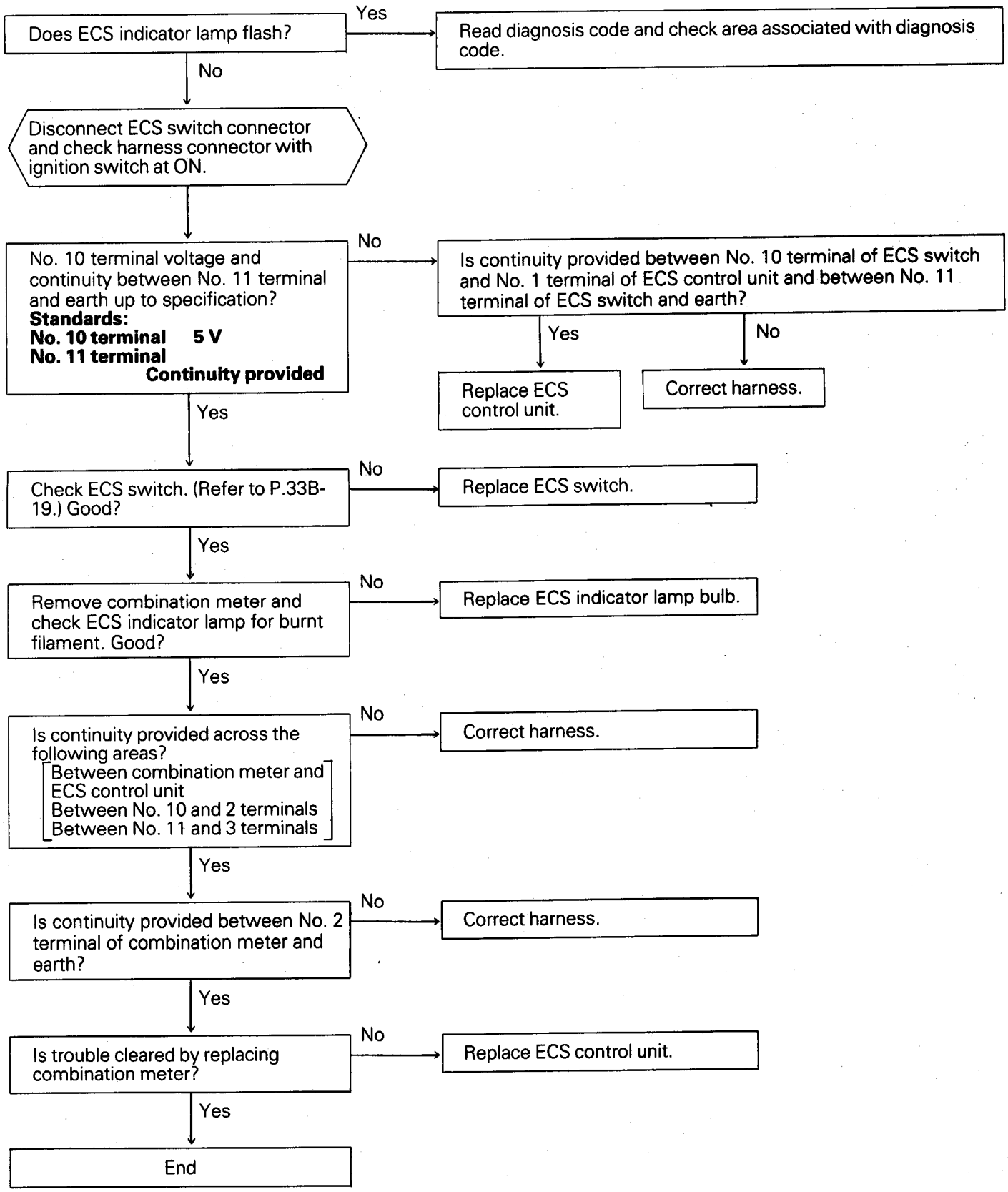
While measuring No. 5 terminal voltage, force-drive actuator by MUT or MUT-II. Is terminal voltage up to specification?
Standard: 9V during forced drive of actuator (for approx. 1 sec.)
0 V except during force drive
- No → Is continuity provided across the following areas of shock absorber associated with diagnosis code No.?

Shock absorber terminal	ECS control unit terminal
FR No. 5	No. 25
FL No. 5	No. 28
RR No. 5	No. 31
RL No. 5	No. 34

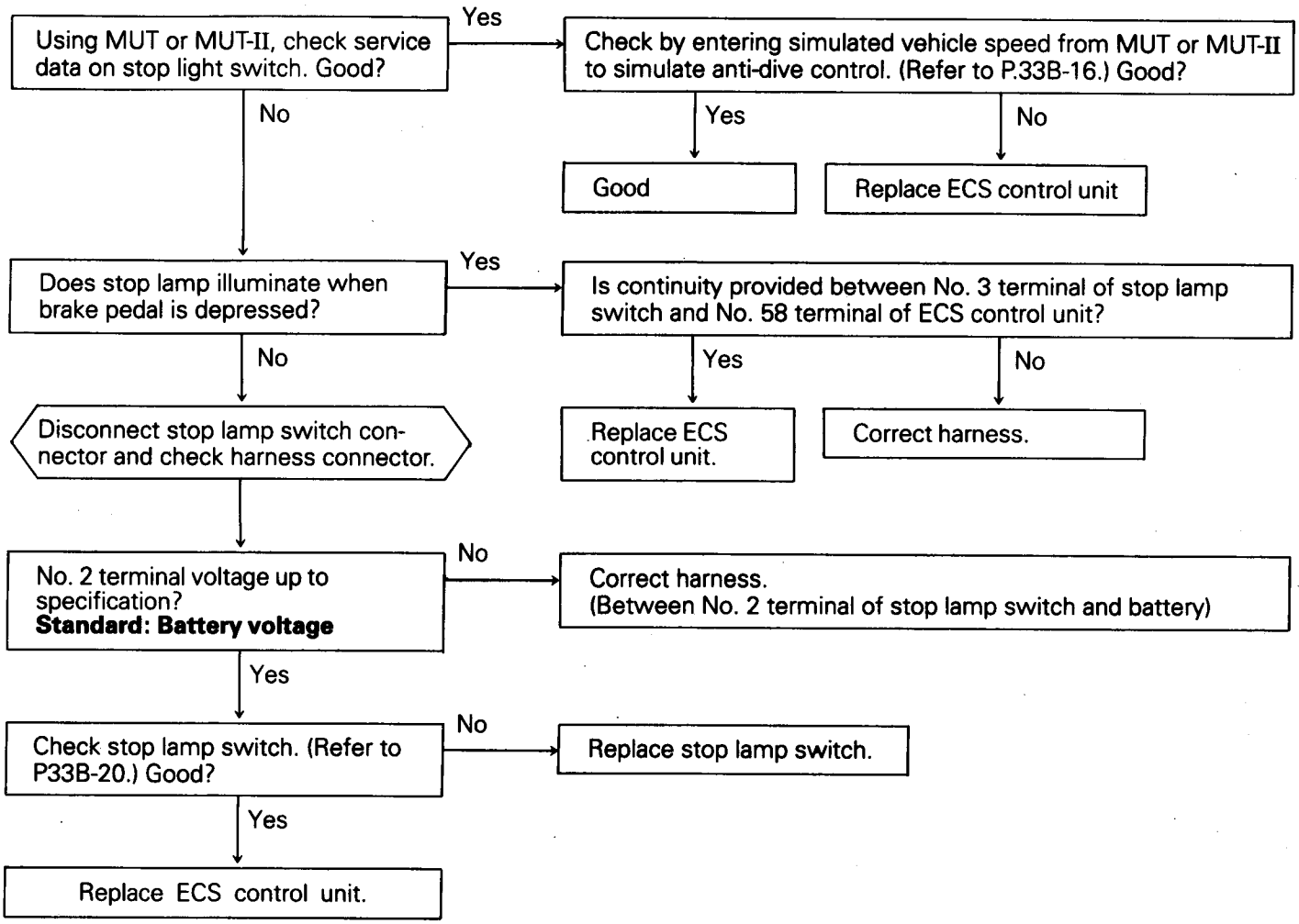
  - Yes → Is continuity provided between the body earth and the No. 5 terminal of the shock absorber associated with diagnosis code No.?
    - No → Replace ECS control unit.
    - Yes → Correct harness.
  - No → Correct harness.
- Yes

Is trouble corrected by replacing shock absorber (including damping force changeover actuator and position detection switch) associated with diagnosis code No.?
- No → Replace ECS control unit.
- Yes → End

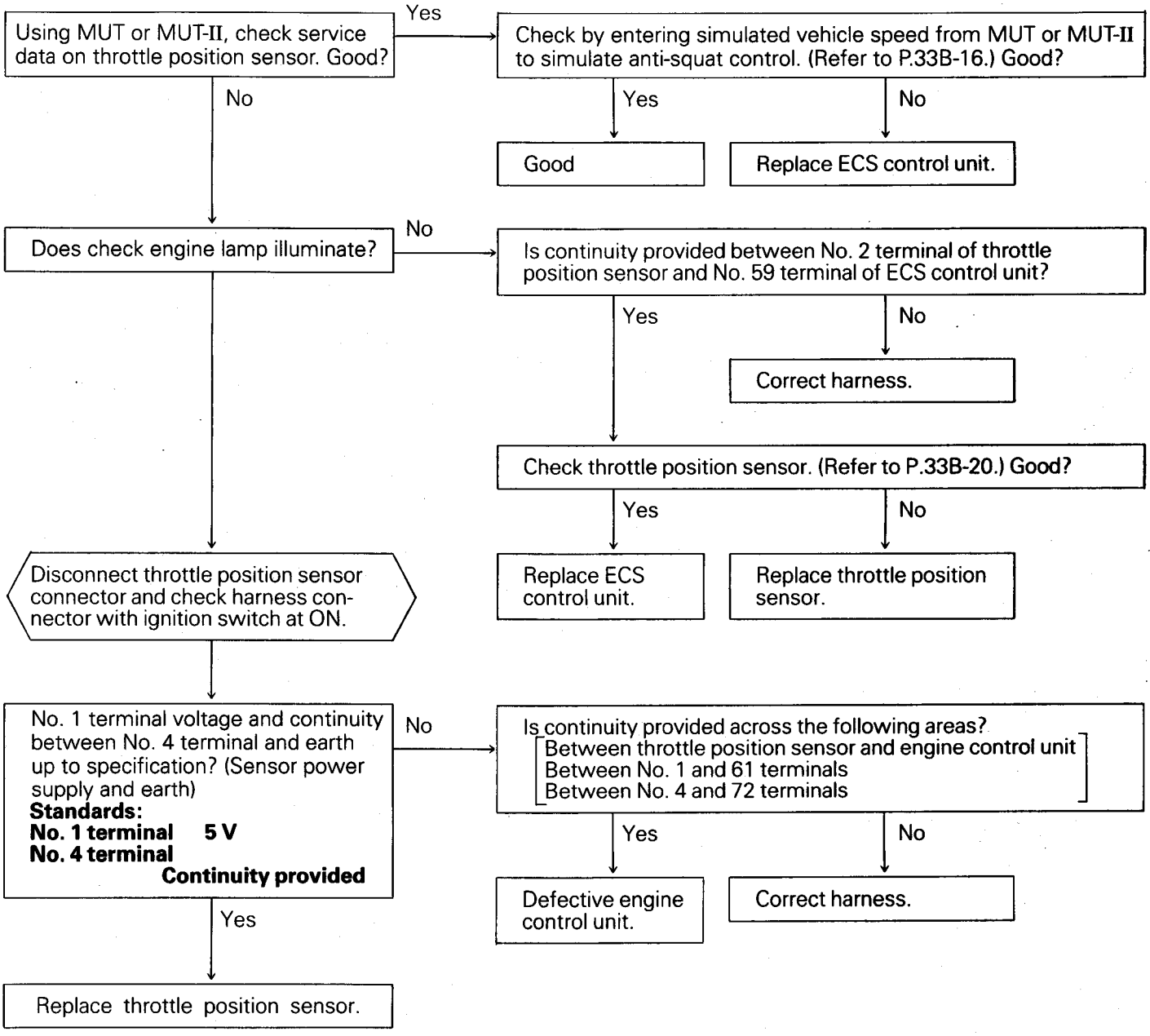
5 ECS indicator lamp does not switch when ECS switch is operated.

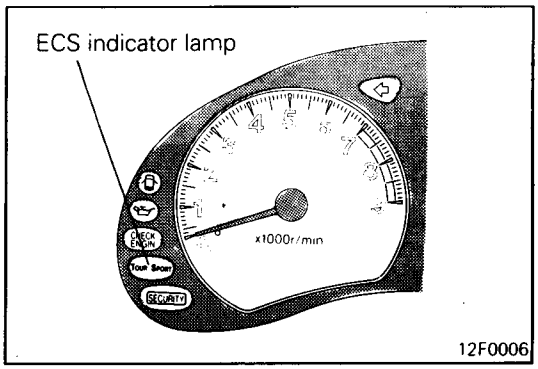


6 Anti-dive control only stops.



7 Anti-squat control only stops.





SERVICE ADJUSTMENT PROCEDURES

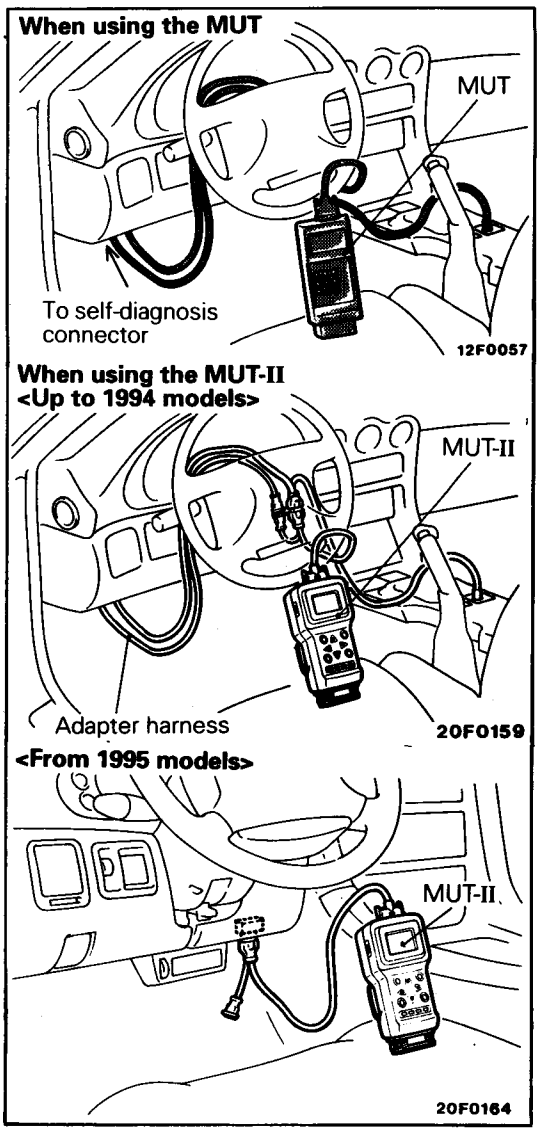
WARNING INDICATION BY ECS INDICATOR LAMP

E33FFAF

If a problem associated with the following items occurs, the ECS indicator lamp (Tour Sport) in the combination lamp flashes at intervals of 0.5 sec. At the same time, the self-diagnosis code associated with the problem is output to the diagnosis connector.

WARNING INDICATION ITEMS

- G sensor
- Steering angular velocity sensor
- Vehicle speed sensor
- Damping force changeover actuator (including position detection switch)



SELF-DIAGNOSIS OUTPUT CHECK

When using the multi-use tester (MUT) <Up to 1993 models> or MUT-II <all models>

(1) Connect MUT or MUT-II to the self-diagnosis connector. When connecting the MUT-II to a vehicle up to 1994 model, use the adapter harness supplied together with the MUT-II.

Caution
Connect and disconnect either MUT or MUT-II with the ignition switch in the OFF position.

(2) Check the self-diagnosis code.
(3) After the defective portion has been repaired, erase the self-diagnosis code. (if the defective portion is not completely repaired, it may be impossible to erase the self-diagnosis code by the MUT or MUT-II.)
(4) Perform self-diagnosis output check again and check that the self-diagnosis code is good.

FAIL SAFE AND DIAGNOSIS LIST

Output Code No.	Diagnosis Item	Fail Safe
0	[Good]	[Good]
11	G sensor defective*	• Ride controls (pinching and bouncing control, bad road detection control) stop.
21	Steering angular velocity sensor open-circuited*	• Anti-roll control stops.
24	Vehicle speed sensor open-circuited*	• Steering stability controls (anti-roll, high speed sensitive controls) and attitude controls (anti-drive, anti-squat) stop. • Shock absorber damping force fixed at MEDIUM
61	F. R. damping force changeover actuator defective	• ALL ECS controls stop. • Normal shock absorber damping force fixed at HARD.
62	F. L. damping force changeover actuator defective	
63	R. R. damping force changeover actuator defective	
64	R. L. damping force changeover actuator defective	

NOTE
(1) Control stop, warning indication and fixed damping force return to normal when the ignition switch is set to OFF. When any of the problems marked* occurs, if no subsequent problem occurs (for example, when the problem is transient), normal operation will be restored even if the ignition switch is not set to OFF.
(2) Even if control stop, warning indication and fixed damping force return to normal as described above, the self-diagnosis code is stored in the memory in the ECS control unit.
(3) The self-diagnosis code can be force-cleared by use of the MUT or MUT-II or by stopping the power supply to the ECS control unit. In addition, it is automatically cleared if the ON/OFF control of the ignition switch is repeated 60 times after the self-diagnosis code has been output, provided that no new self-diagnosis code is output during the period.

SELF-DIAGNOSIS DETERMINATION CONDITIONS

Code No.	What is Defective	Self-Diagnosis Determination Conditions
11	G sensor defective	When sensor input of 0.5 or less or 4.5 V or more lasts for more than 10 seconds,
21	Steering angular velocity sensor open-circuited	Open circuit detected on the basis of difference in voltage level of sensor signal.
24	Vehicle speed sensor defective	When throttle opening of 30% (1.5 V) or more lasts for more than 60 seconds with the ignition switch at ON and if there is no input from the vehicle speed sensor during the period, it is regarded as a problem.
61 – 64	Damping force changeover actuator defective	If no damping force changeover is made in a second after actuator drive signal has been output (position detection switch output pattern does not change to that of target damping force), it is regarded as a problem.

SERVICE DATA OUTPUT CHECK

Using the MUT or MUT-II, check the service data.

SERVICE DATA INSPECTION LIST

Item No.	Check Point	Check Condition	Soundness Determination Value				
11	G sensor	Vehicle in stationary condition	2.0 – 3.0 V				
		Shake vehicle up and down	Indicated value increases or decreases from 2.5 V				
14	Throttle position sensor	Throttle fully closed	300 – 1,000 mV				
		(Slowly depress accelerator pedal.)	Smoothly increases.				
		Throttle fully opened	4,500 – 5,500 mV				
21	Steering angular velocity sensor	Slowly turn steering wheel counterclockwise	ST1 and ST2 indications change in the following combinations.				
			ST1	ON	ON	OFF	OFF
			ST2	ON	OFF	OFF	ON
		Slowly turn steering wheel clockwise.	ST1	ON	OFF	OFF	ON
			ST2	ON	ON	OFF	OFF

Item No.	Check Point	Check Condition	Soundness Determination Value
24	Vehicle speed sensor	Check by actually operating vehicle.	Speedometer indication and MUT or MUT-II indication coincide.
26	Stop lamp switch	Depress brake pedal.	ON
		Do not depress brake pedal.	OFF
61	F.R. actuator	Tour mode with vehicle stationary	SOFT
		Sport mode with vehicle stationary	HARD
62	F.L. actuator	Tour mode with vehicle stationary	SOFT
		Sport mode with vehicle stationary	HARD
63	R.R. actuator	Tour mode with vehicle stationary	SOFT
		Sport mode with vehicle stationary	HARD
64	R.L. actuator	Tour mode with vehicle stationary	SOFT
		Sport mode with vehicle stationary	HARD

ACTUATOR CHECK

(1) Using the MUT or MUT-II, force-drive the actuator and fix the damping force changeover.
(2) Check service data (Item No. 61 through 64) to verify that the actuator has been force-driven.

NOTE
(1) All of the four actuators in the shock absorbers are simultaneously changed over by forced drive.
(2) The damping force changed over and fixed by forced drive is cleared by the following three conditions.
   1. Ignition switch OFF
   2. Vehicle speed 3 km/h (1.9 mph) or more
   3. MUT or MUT-II disconnected.

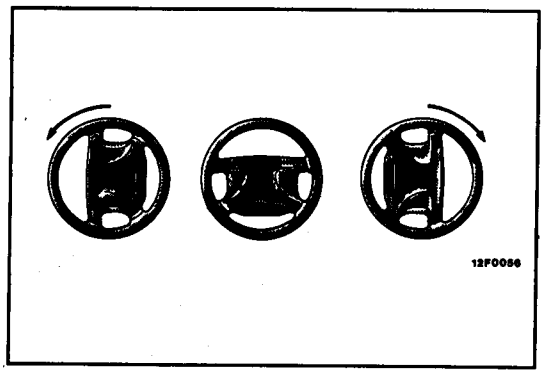
ACTUATOR CHECK LIST

Item No.	Check Point	Check Condition	MUT or MUT-II Service Data Item No. 61 – 64 Indicated
01	Damping force SOFT	Vehicle in stationary condition	SOFT
03	Damping force MEDIUM		MEDIUM
04	Damping force HARD		HARD

CONTROL FUNCTION SIMULATION CHECK

Using the MUT or MUT-II, check all control functions during operation with the vehicle in stationary condition.

ANTI-ROLL CONTROL FUNCTION CHECK



(1) Raise the front wheels on a jack and have them supported by rigid racks.
(2) Place the steering wheel in straight ahead position.
(3) Select the Tour mode by the ECS switch.
(4) Enter a simulated vehicle speed of 100 km/h (62 mph) from the MUT or MUT-II.
(5) Using the MUT or MUT-II, check the indications of service data items No. 61 through 64.

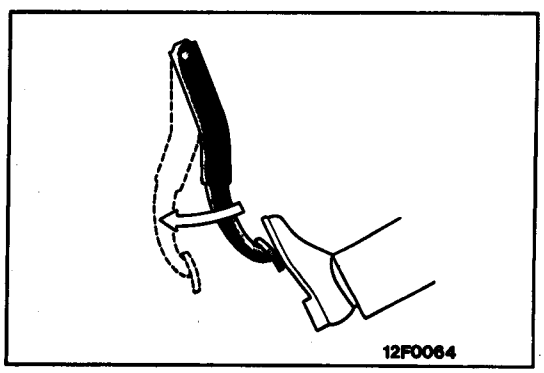
MUT or MUT-II indication: SOFT

(6) Turn the steering wheel clockwise or counterclockwise from the straight ahead position.
(7) Using the MUT or MUT-II, check that the indications of service data items No. 61 through 64 change over.

Steering turning speed	MUT or MUT-II indication
Approx. 0.3 seconds for 90° rotation	MEDIUM
Approx. 0.2 seconds for 90° rotation	HARD

(8) Check that the original damping force indication (SOFT) is restored a second later.

ANTI-DIVE CONTROL FUNCTION CHECK



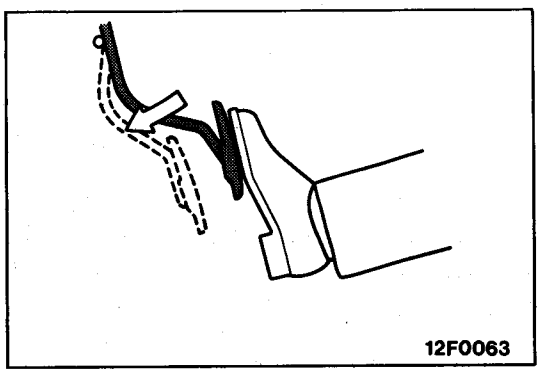
(1) Select the Tour mode by the ECS switch.
(2) Enter a simulated vehicle speed of 100 km/h (62 mph) from the MUT or MUT-II.
(3) Using the MUT or MUT-II, check the indications of service data items No. 61 through 64.

MUT or MUT-II indication: SOFT

(4) Depress the brake pedal and simultaneously change the entered simulated vehicle speed by the MUT or MUT-II. (Change the speed in 0.4 seconds after depressing the brake pedal.)
(5) Using the MUT or MUT-II, check that the indications of service data items No. 61 through 64 change over.

Changing entered simulated vehicle speed	MUT or MUT-II indication
100 km/h (62 mph) to 80 km/h (50 mph)	HARD

(6) Check that the original damping force indication (SOFT) is restored a second later.



ANTI-SQUAT CONTROL FUNCTION CHECK

(1) Select the Tour mode by the ECS switch.
(2) Enter a simulated vehicle speed of 30 km/h (19 mph) from the MUT or MUT-II.
(3) Using the MUT or MUT-II, check the indications of service data items No. 61 through 64.

MUT or MUT-II indication: SOFT

(4) Check that when the accelerator pedal is operated, the indications of service data items No. 61 through 64 on the MUT or MUT-II change as shown in the following table.
(5) With the simulated vehicle speed at 60 km/h (37 mph) and 90 km/h (56 mph), similarly operate the accelerator pedal and check that the MUT or MUT-II indications change over.

Entered simulated vehicle speed	Accelerator operating condition	
	Quickly depress	A second later with pedal depressed
30 km/h (19 mph)	HARD	MEDIUM
60 km/h (37 mph)	MEDIUM	MEDIUM
90 km/h (56 mph)	SOFT	MEDIJM

(6) Check that when the accelerator pedal is released, the original damping force (SOFT) is restored in less than a second.

HIGH SPEED SENSITIVE CONTROL FUNCTION CHECK

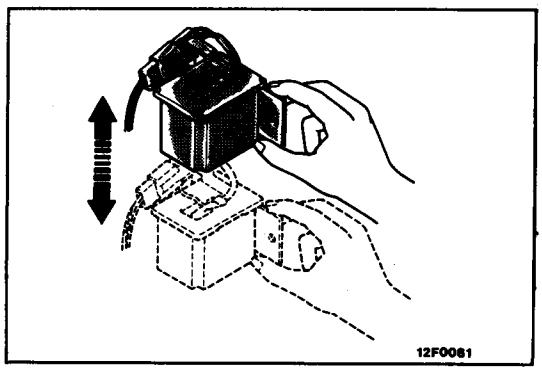
(1) Select the Tour mode by the ECS switch.
(2) Check that when the entered simulated vehicle speed is changed by the MUT or MUT-II, the indications of service data items No. 61 through 64 change.
(If the simulated vehicle speed is continuously changed by the ⇧ and ⇩ keys of the MUT or MUT-II, however, the indications of service data items No. 61 through 64 do not change during the period the ⇧ or ⇩ key is pressed.

Changing entered simulated vehicle speed	MUT or MUT-II indication
Acceleration 129 km/h (80 mph) to 130 km/h (81 mph)	SOFT → MEDIUM
Deceleration 120 km/h (75 mph) to 119 km/h (74 mph)	MEDIUM → SOFT

PITCHING AND BOUNCING CONTROL FUNCTION CHECK

(1) Select the Tour mode by the ECS switch.
(2) Using the MUT or MUT-II, check the indications of service data items No. 61 through 64.

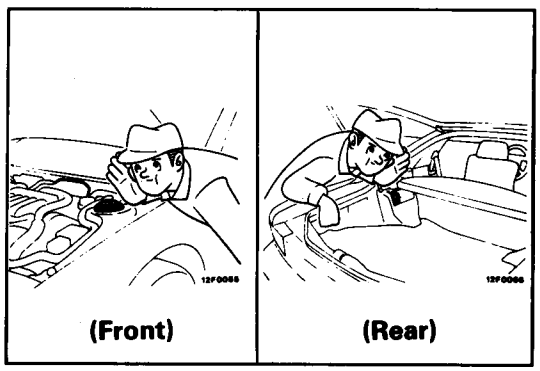
MUT or MUT-II indication: SOFT



(3) Remove the G sensor, slowly shake it up and down through a space of about 5 cm (1.9 in.) with the connector connected, and check that the indications of service data items No. 61 through 64 change.

G sensor status	MUT or MUT-II indication
Shake up and down at a speed of a round trip in a second.	HARD

(4) Check that when the G sensor is held stationary, the original damping force indication (SOFT) is restored.



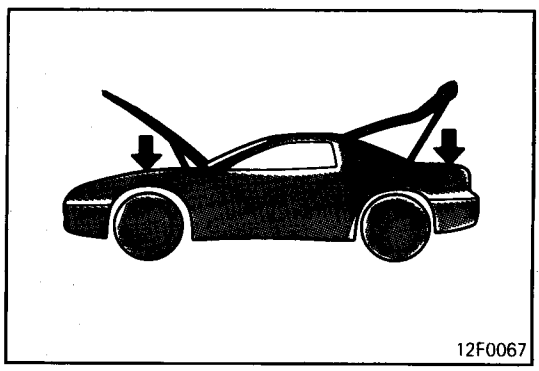
ACTUATOR OPERATION CHECK

ACTUATOR OPERATING SOUND CHECK

(1) Set the ignition switch to ON.
(2) Bring your ear near the top of the shock absorber.

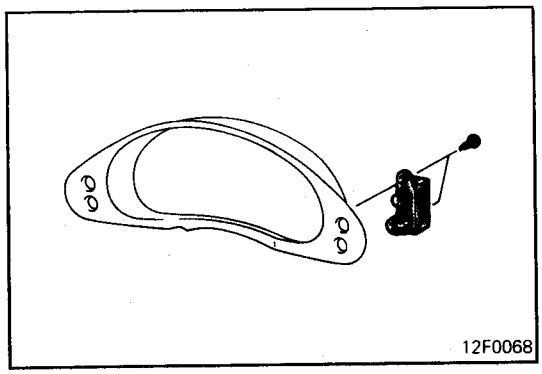
NOTE
In the case of the rear shock absorbers, remove the trim cover at the top of the shock absorber before bringing your ear near the shock absorber.

(3) Check that the operating sound of the actuator in the shock absorber can be heard each time the control modes are changed by pressing the ECS switch.



DAMPING FORCE CHECK

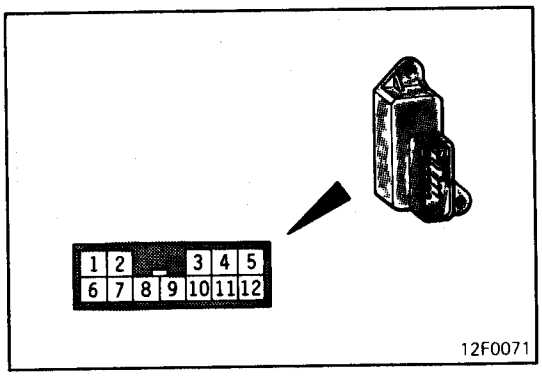
(1) Set the ignition switch to ON.
(ECS indicator Tour ON, damping force SOFT)
(2) Check the damping force SOFT state by shaking the top mounting points of the front shock absorbers or the top of the rear end panels of the rear shock absorbers up and down.
(3) Press the ECS switch to change the control mode to Sport.
(ECS indicator Sport ON, damping force HARD)
(4) Shake the vehicle up and down to check that the damping force is harder than in the SOFT state.


12F0068

ECS SWITCH

E33ZM--

To mount or remove the ECS switch, refer to GROUP 54 – Meters and Gauges. Remove the meter bezel before mounting or removing the ECS switch.



12F0071

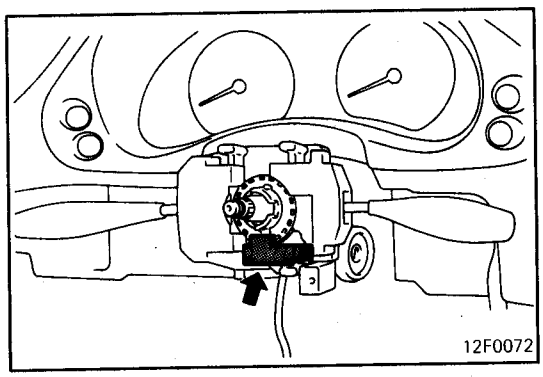
INSPECTION

E33ZM8A

Operate the switch to check for continuity between the individual terminals.

Switch position \ Terminal		3	4	10	11
ECS switch	ON	O—O		O—O	
	OFF	O—O			

NOTE
O—O indicates that there is continuity between the terminals.

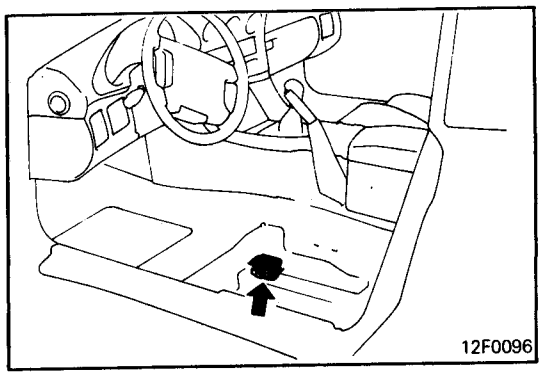

12F0072

STEERING ANGULAR VELOCITY SENSOR

E33ZF--

To mount or remove the steering angular velocity sensor, refer to GROUP 54 – Column Switch. Remove the steering wheel and clock spring before mounting or removing the sensor.

CAUTION: SRS
Before removal of air bag module, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.


12F0096

G SENSOR

E33ZN--

To mount or remove the G sensor, refer to GROUP 52A – Front Seat. Remove the front seat (L.H.) before removing or mounting the sensor.

VEHICLE SPEED SENSOR

E33ZO--

To mount or remove the vehicle speed sensor, refer to GROUP 54 – Meters and Gauges.

INSPECTION

E33ZO8A

Refer to GROUP 54 – Meters and Gauges.

THROTTLE POSITION SENSOR E33ZPBA

INSPECTION AND ADJUSTMENT

Refer to GROUP 13 – Fuel System.

STOP LAMP SWITCH E33ZQ-

To remove or mount the stop lamp switch, refer to GROUP 35 – Brake Pedal.

INSPECTION E33ZQBA

Refer to GROUP 35 – Brake Pedal.

POSITION DETECTION SWITCH / DAMPING FORCE CHANGEOVER ACTUATOR E33ZR-

To remove or mount the position detection switch and damping force changeover actuator, refer to GROUP 33A – Strut Assembly and GROUP 34 – Shock Absorber Assembly.

Caution

The position detection switch and damping force changeover actuator are built into the shock absorber assemblies of front and rear suspensions. Since they are of the non-disassembly type, remove or mount them in the form of a strut assembly or shock absorber assembly.

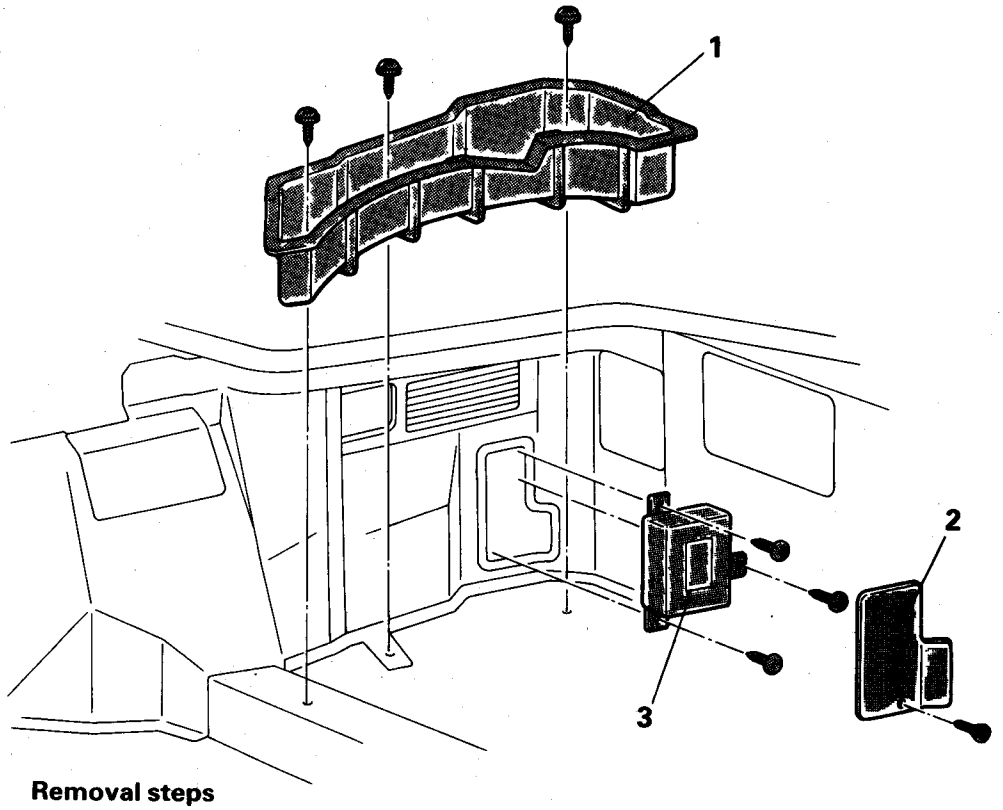
ECS INDICATOR LAMP E33ZJ-

To remove or mount the ECS indicator lamp, refer to GROUP 54 – Meters and Gauges.

ECS CONTROL UNIT

E33ZH--

REMOVAL AND INSTALLATION



12F0098

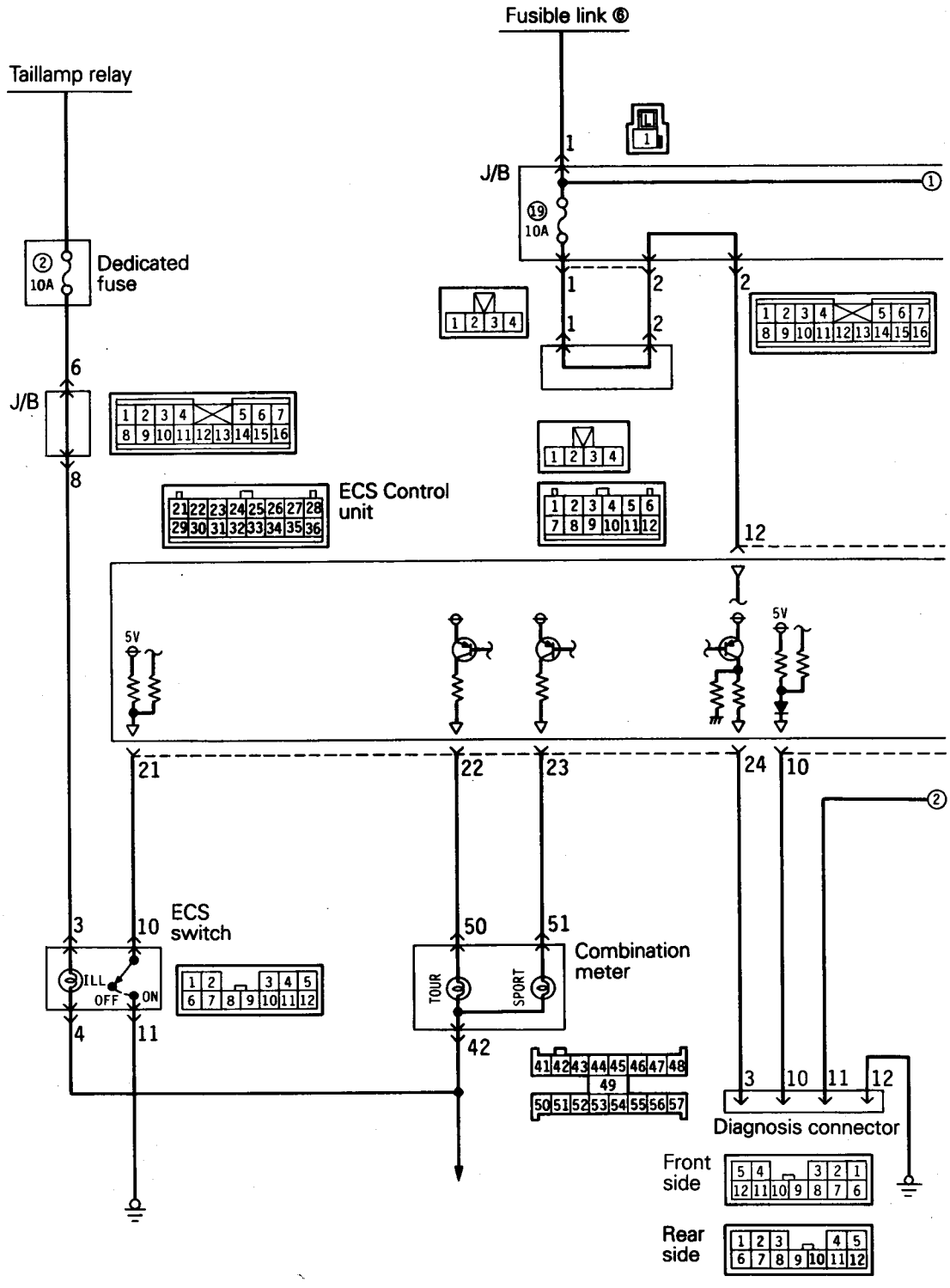
Removal steps

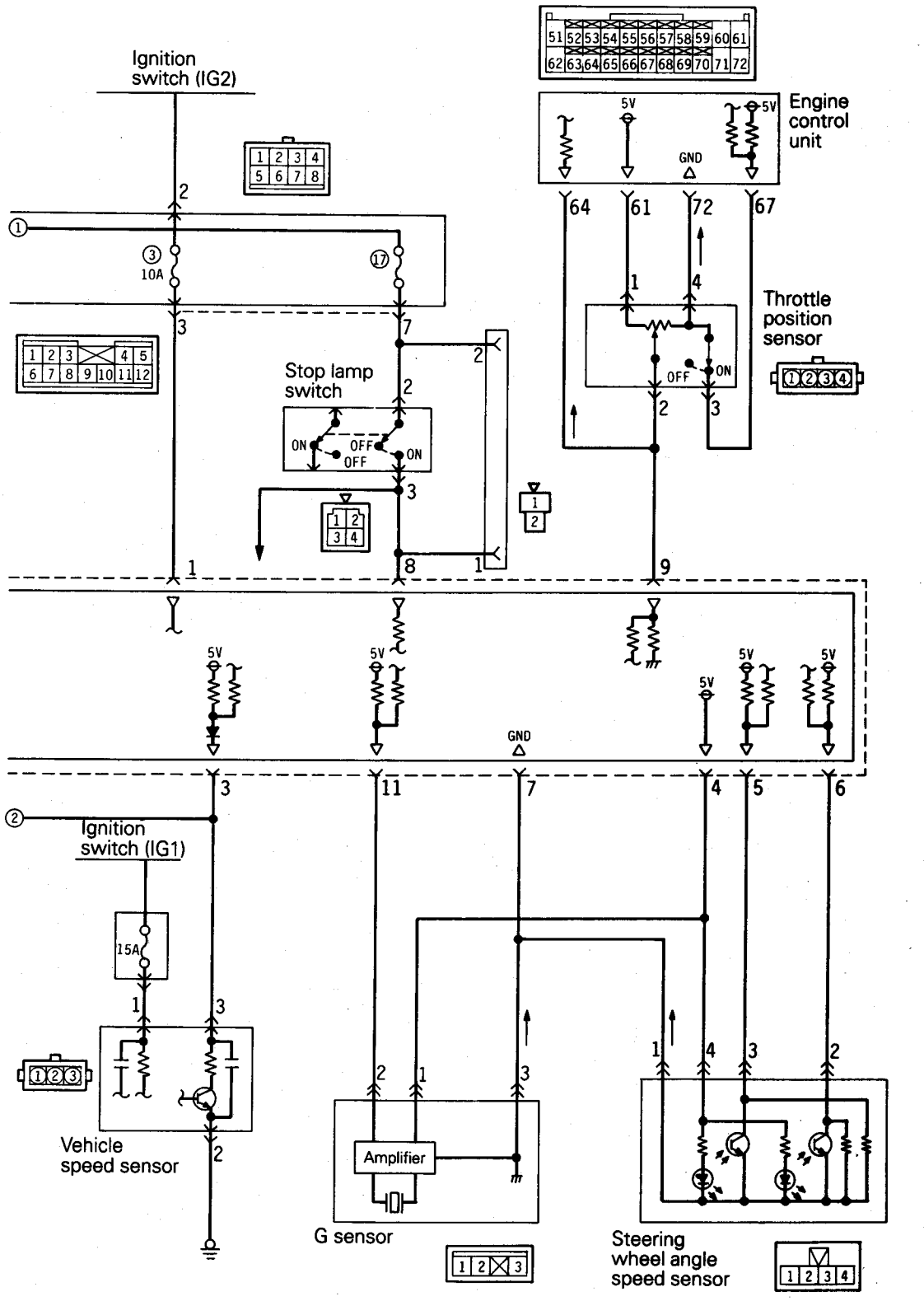
1. Cargo floor box (R.H.)
2. Lid
3. ECS control unit

CIRCUIT DIAGRAM

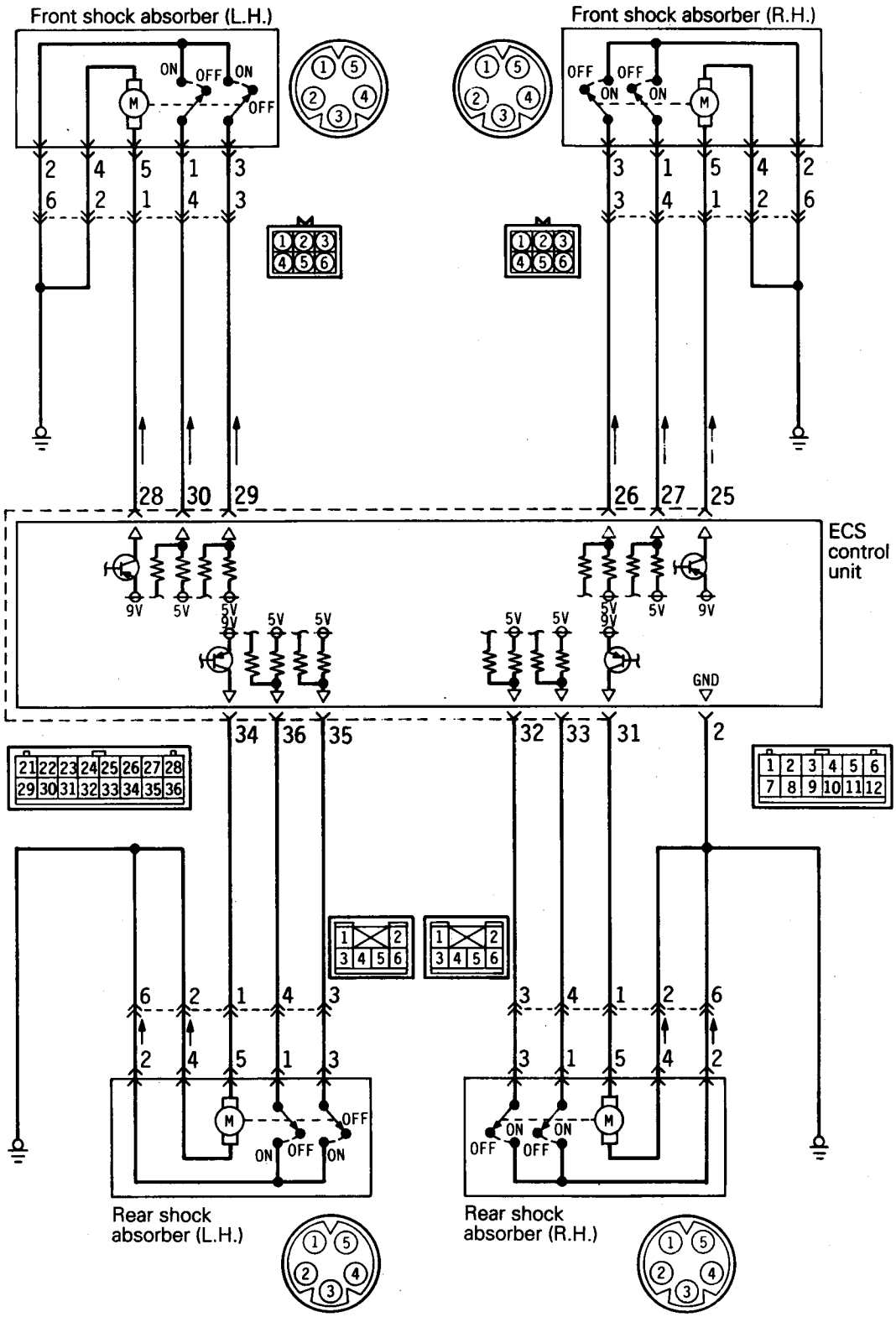
<Up to 1994 models>

E33ZS--




Ignition switch (IG2)
Engine control unit
Throttle position sensor
Stop lamp switch
Ignition switch (IG1)
Vehicle speed sensor
Amplifier
G sensor
Steering wheel angle speed sensor
10A
15A
5V
GND
ON
OFF

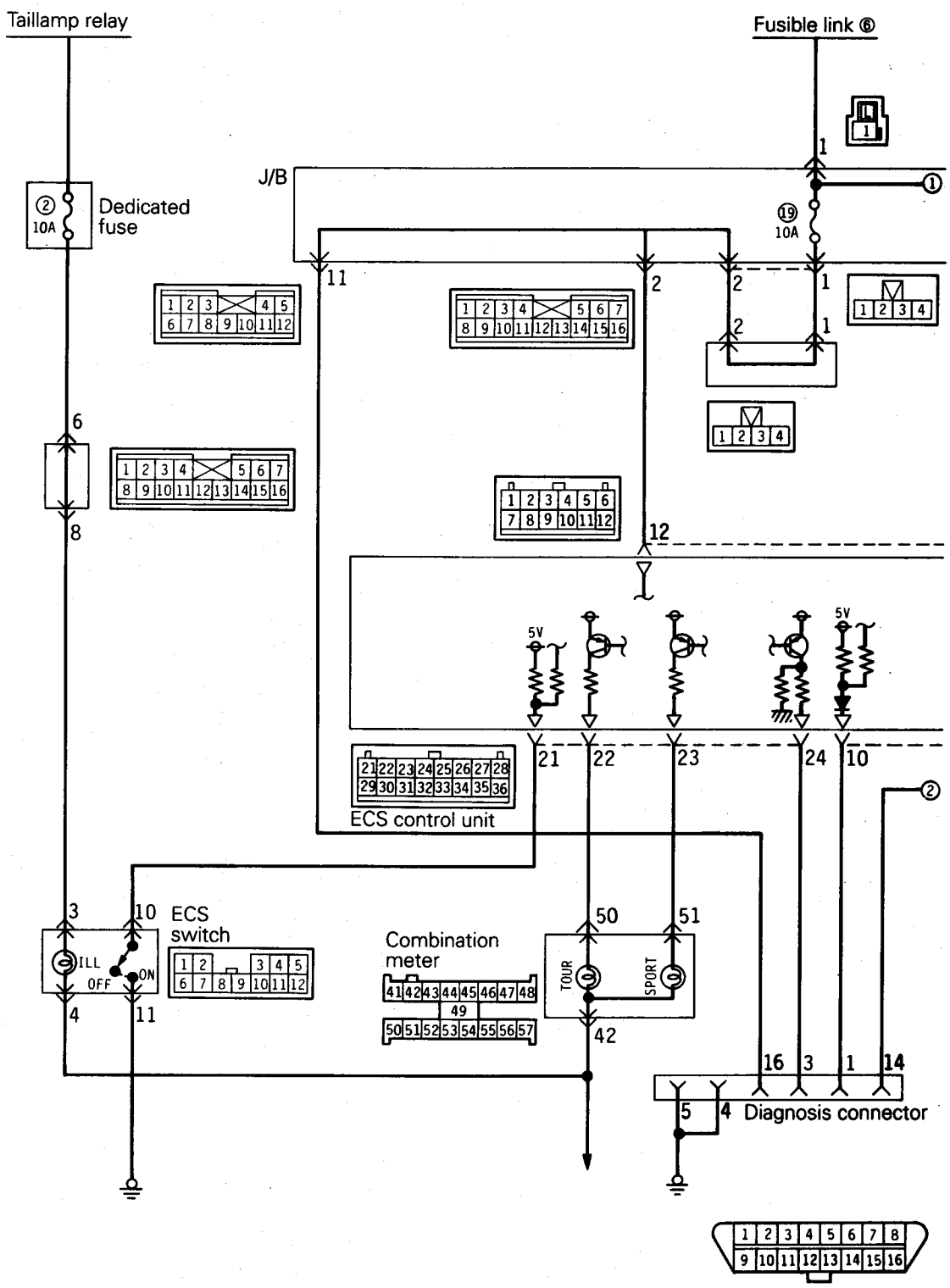
12F0122

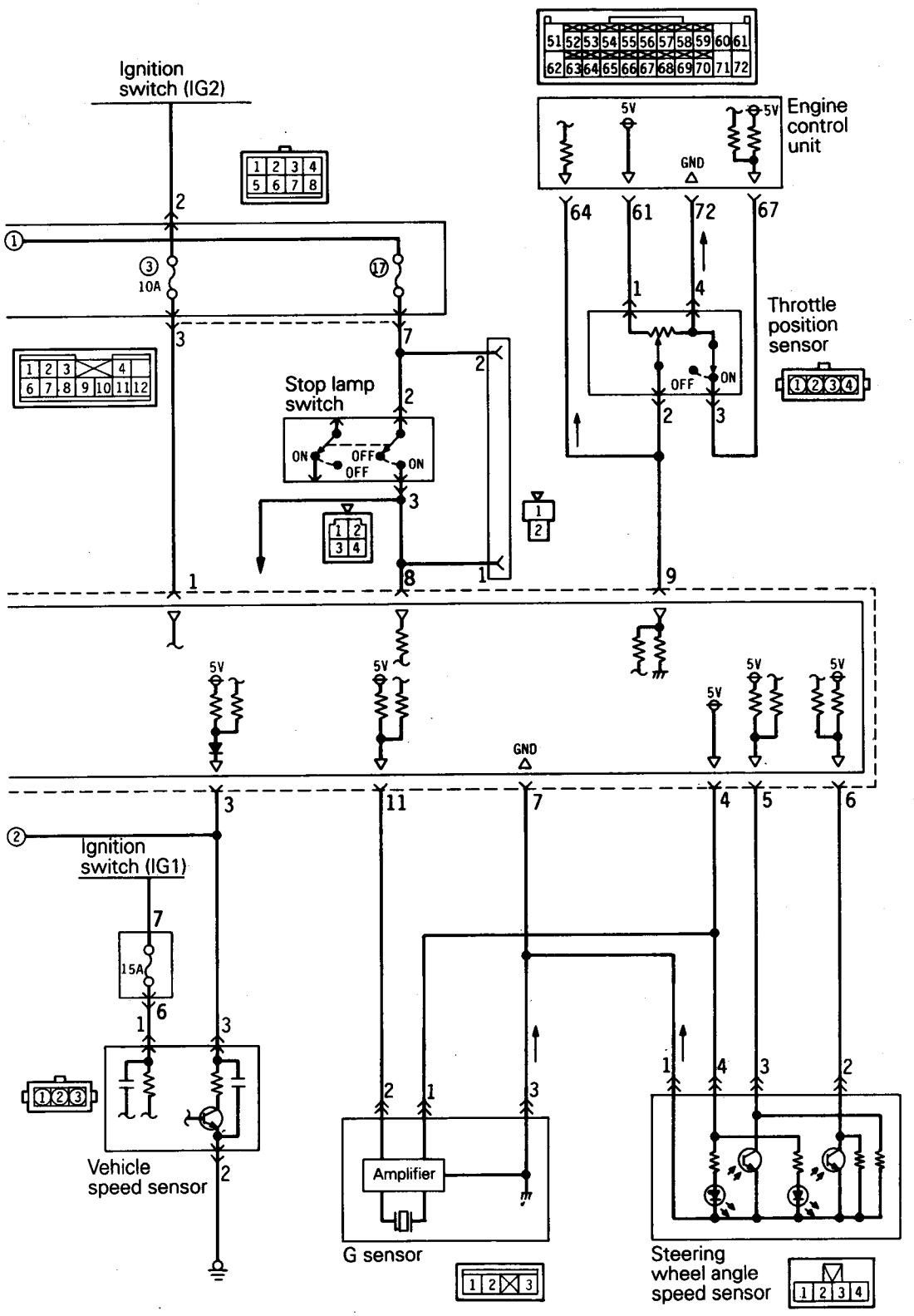

Front shock absorber (L.H.)
Front shock absorber (R.H.)
ON
OFF
M
28
30
29
26
27
25
ECS control unit
9V
5V
GND
34
36
35
32
33
31
2
Rear shock absorber (L.H.)
Rear shock absorber (R.H.)

12F0121

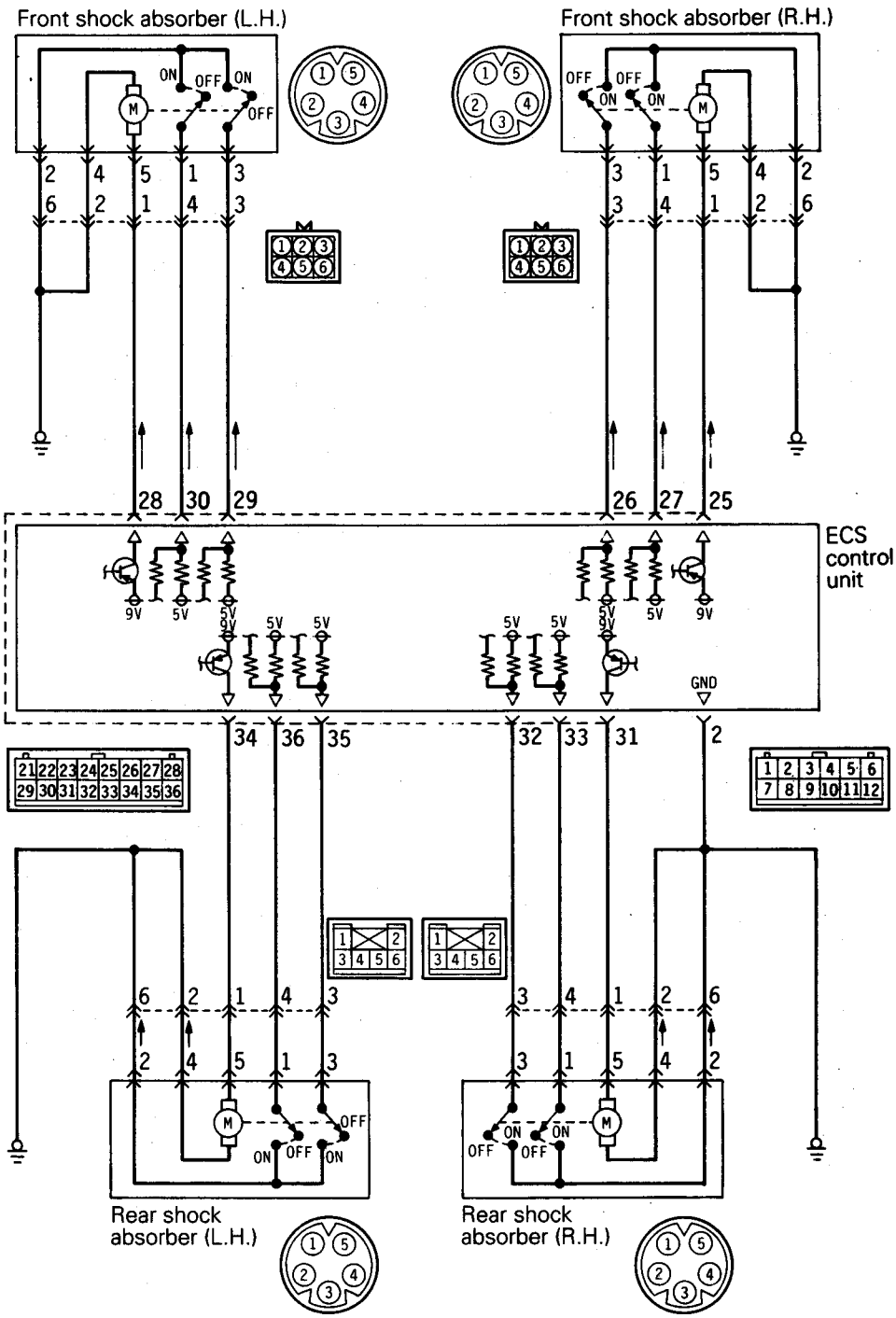
CIRCUIT DIAGRAM

<From 1995 models>




Ignition switch (IG2)
10A
Stop lamp switch
ON
OFF
OFF
ON
Engine control unit
5V
GND
64
61
72
67
Throttle position sensor
OFF
ON
5V
GND
Ignition switch (IG1)
15A
Vehicle speed sensor
Amplifier
G sensor
Steering wheel angle speed sensor

12F0127


Front shock absorber (L.H.)
Front shock absorber (R.H.)
ON OFF ON OFF
OFF OFF ON ON
M
2 4 5 1 3
6 2 1 4 3
3 1 5 4 2
3 4 1 5 6
1 2 3
4 5 6
28 30 29
26 27 25
ECS control unit
9V 5V 5V 5V 5V
5V 5V 5V 5V 9V
GND
34 36 35
32 33 31 2
21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36
1 2 3 4 5 6
7 8 9 10 11 12
6 2 1 4 3
2 4 5 1 3
3 4 1 2 6
3 1 5 4 2
ON OFF ON OFF
OFF ON OFF ON
Rear shock absorber (L.H.)
Rear shock absorber (R.H.)
1 5 2 4 3

12F0121

NOTES

REAR SUSPENSION

CONTENTS

E34AA-

SPECIFICATIONS

Hinterradaufhängung

E34CA--

GENERAL SPECIFICATIONS

Items		Specifications
Suspension system		Double wishbone suspension type
Coil Spring		
Wire dia × O.D. × free length	mm (in.)	12.2 × 117.2 × 379.3 (0.48 × 4.61 × 14.93)*1 11.5 × 116.5 × 379.3 (0.45 × 4.59 × 14.93)*2
Coil spring identification color		Blue × 2*1 Brown × 2*2
Spring constant	N/mm (kg/mm lbs./in.)	27.5 (2.8, 157)
Shock absorber		
Type		Hydraulic, cylindrical, double-acting type
Stroke	mm (in.)	203 (8.0)
Damping force [at 0.3 m/sec. (0.984 ft./sec.)]		
Expansion	N (kg.lbs.)	Hard: 1,710 (171,377) Medium: 1,160 (116,256) Soft: 560 (56,123)
Contraction	N (kg.lbs.)	Hard: 1,010 (101,233) Medium: 880 (88,194) Soft: 670 (67,148)
Stabilizer bar		
Mounting method		Pillow ball type
O.D.	mm (in.)	22 (0.86)

NOTE
*1 Vehicles built up to June, 1993
*2 Vehicles built from July, 1993

SERVICE SPECIFICATIONS

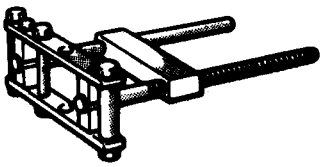
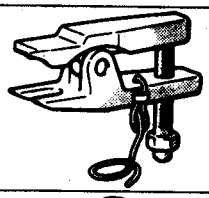
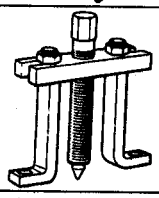
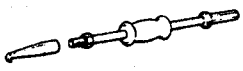
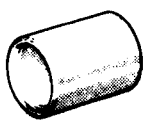
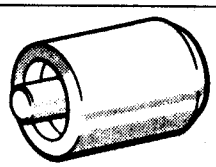
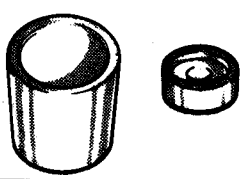
E34CB–

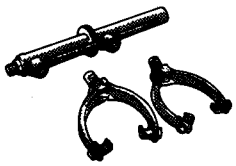
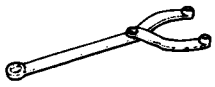
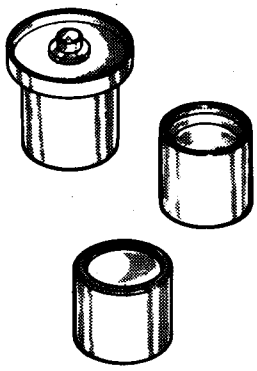
Items		Specifications
Standard value		
Toe-in (Spur)	mm (in.)	
At the centre of tyre tread		–2 to 3 (–0.08 to 0.12)
Toe angle (per wheel) (in grad)		–5′ to 8′
Camber (Radsturz)		–0°10′±30′
Protruding length of stabilizer bar mounting bolt	mm (in.)	5 – 7 (0.197 – 0.276)
Lower arm ball joint starting torque	Nm (kgcm, in.lbs.)	2.0 – 9.0 (20 – 90, 17 – 78)
Stabilizer link ball joint starting torque	Nm (kgcm, in.lbs.)	1.7 – 3.2 (17 – 32, 15 – 28)
Crossmember support bushing projection	mm (in.)	
Upper part		15.5 (0.59)
Lower part		2.1 – 3.7 (0.08 – 0.15)
Differential support bushing projection	mm (in.)	6.7 – 7.3 (0.26 – 0.29)

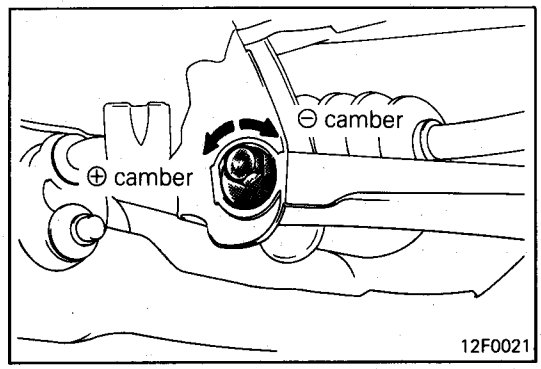
300 GT

SPECIAL TOOLS

E34DA-

Tool	Number	Name	Use
	MB990800	Ball joint remover and installer	Installation of the ball joint dust cover
	MB991254	Rod remover and installer	Replacement of trailing arm connecting rod
	MB991113	Steering linkage puller	Disconnection of the ball joint
	MB990241 MB990242 MB990244	Axle shaft puller Puller bar Puller shaft	Removal of the rear axle shaft
	MB990211	Sliding hammer	
	MB991354	Puller body	
	MB990847	Base	Removal and press-fitting of the trailing arm bushing
	MB990880	Arbor	
	MB991071 MB991072 MB991073	Bushing remover and installer Arbor Base	Removal and installation of lower arm bushings

Tool	Number	Name	Use
	MB990958	Arbor	Removal and installation of crossmember bushings
	MB991237 MB991239	Spring compressor body Arm set	Compression of the coil spring
	MB990685	Torque wrench	Measurement of ball joint starting torque
	MB990326	Preload socket	
	MB990767	End yoke holder	Fixing of the hub
	MB991387 MB991388 MB990890	Arbor Base Base	Removal and installation of the crossmember bushing



SERVICE ADJUSTMENT PROCEDURES

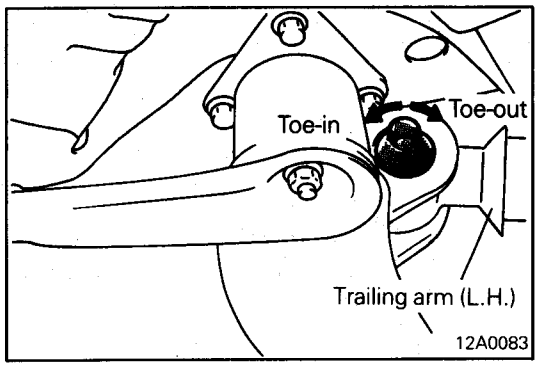
REAR WHEEL ALIGNMENT INSPECTION E34FAAS

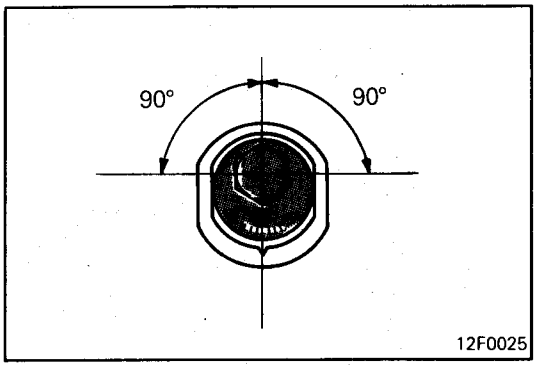
CAMBER

Standard value: –0°10′ ± 30′

To adjust camber, turn the lower arm mounting bolt on the crossmember side.

NOTE
Left wheel: Clockwise (⊖ camber)
Right wheel: Clockwise (⊕ camber)
The difference between the right and left wheels should be 30′ or less.
One graduation changes camber by about 12′.





TOE-IN

Standard value:
At the centre of tyre tread – 2 to 3 mm (– 0.08 to 0.12 in.)
Toe angle (per wheel) –5′ to 8′

To adjust toe, turn the trailing arm mounting bolts on the crossmember side on both sides the same amount.

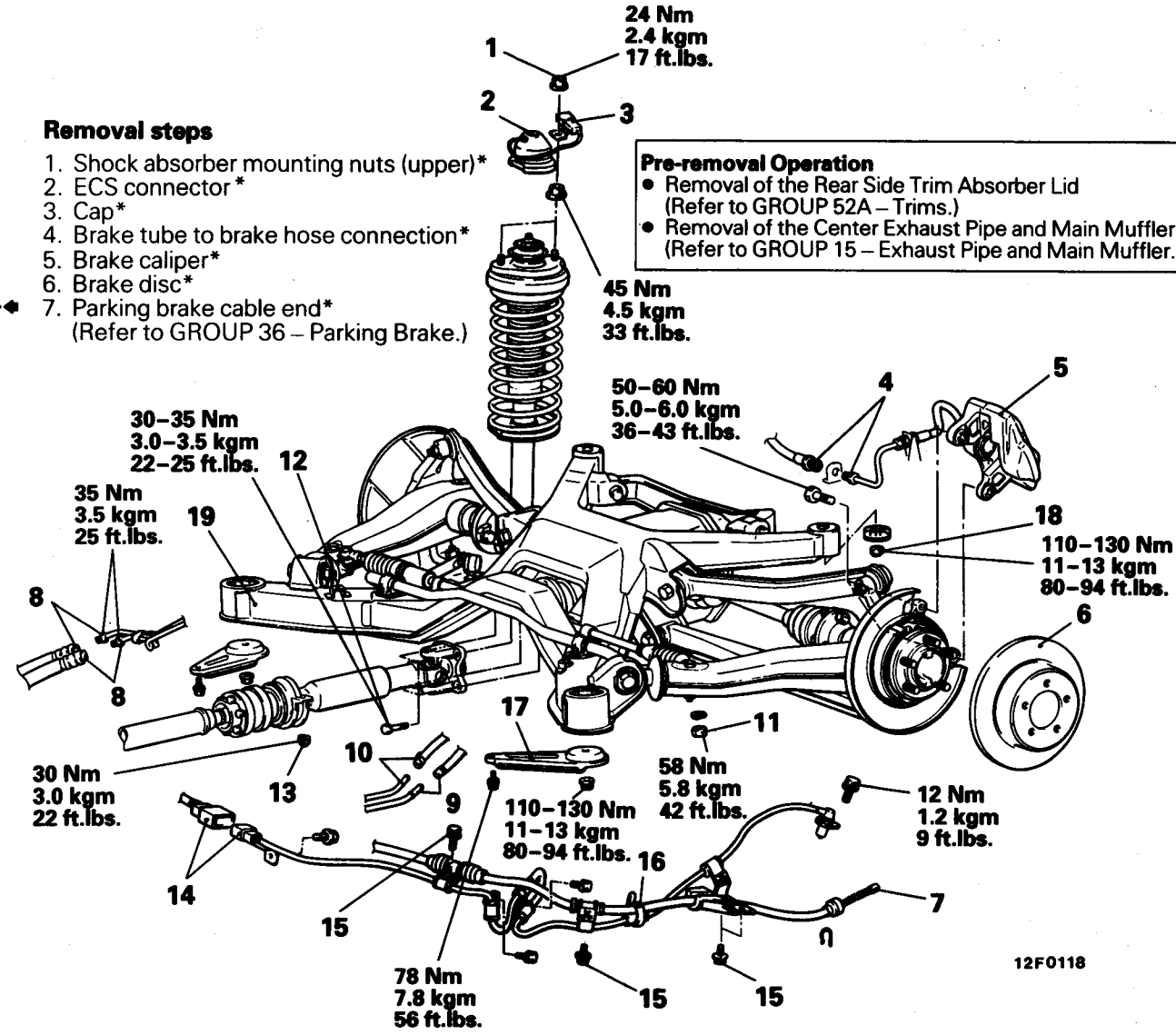
NOTE
Left wheel: Clockwise (toe-out)
Right wheel: Clockwise (toe-in)
The difference between right and left wheels should be 3 mm (0.12 in.) or less.
One graduation changes toe by about 2 mm (0.08 in.).

Caution
1. **Adjust the eccentric cam bolt within 90° from the central position.**
2. **To adjust, remove the tie-rod end and trailing arm connection and adjust camber and toe-in that order. When camber has been adjusted, toe must always be adjusted also.**

REAR SUSPENSION ASSEMBLY

E34GA--

REMOVAL AND INSTALLATION



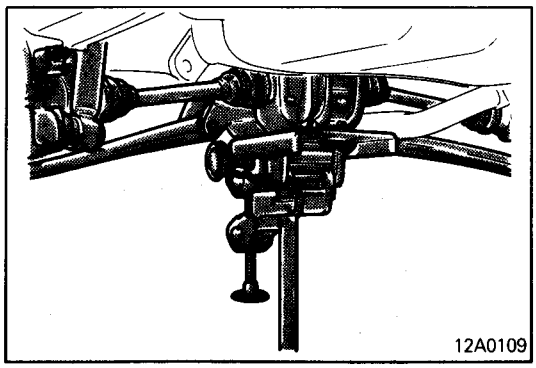
Removal steps

1. Shock absorber mounting nuts (upper)*
2. ECS connector*
3. Cap*
4. ◀▶ Brake tube to brake hose connection*
5. Brake caliper*
6. Brake disc*
7. ◀▶ ▶◀ Parking brake cable end* (Refer to GROUP 36 – Parking Brake.)
8. Pressure tube assembly to pipe assembly connection
9. Feed pipe assembly to suction hose connection
10. Return pipe assembly to rubber hose connection
11. Power cylinder tie rod coupling nut*
12. Differential carrier to propeller shaft coupling bolt and nut
13. Center bearing mounting nut
14. Harness connector connection*
15. Parking brake cable and ABS sensor fixing bolt*
16. Cable band*
17. ◀▶ Crossmember bracket*
18. ◀▶ Crossmember mounting nut (on differential side)*
19. ◀▶ Rear suspension assembly

NOTE
Parts marked with * are symmetrical.

Pre-removal Operation
- Removal of the Rear Side Trim Absorber Lid (Refer to GROUP 52A – Trims.)
- Removal of the Center Exhaust Pipe and Main Muffler (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)

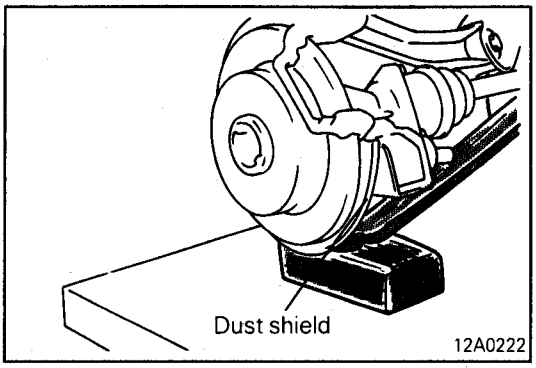
Post-installation Operation
- Installation of the Center Exhaust Pipe and Main Muffler (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Installation of the Rear Side Trim Absorber Lid (Refer to GROUP 52A – Trims.)
- Refilling and Bleeding of the Power Steering System (Refer to GROUP 37A – Service Adjustment Procedures.)
- Checking Wheel Alignment (Refer to P.34–5.)
- Bleeding of 4WS System (Refer to GROUP 37B – Service Adjustment Procedures.)
- Operation Inspection of the 4WS System (Refer to GROUP 37B – Service Adjustment Procedures.)
- Checking the Parking Brake Lever Stroke (Refer to GROUP 36 – Service Adjustment Procedures.)



SERVICE POINTS OF REMOVAL E34GBAR

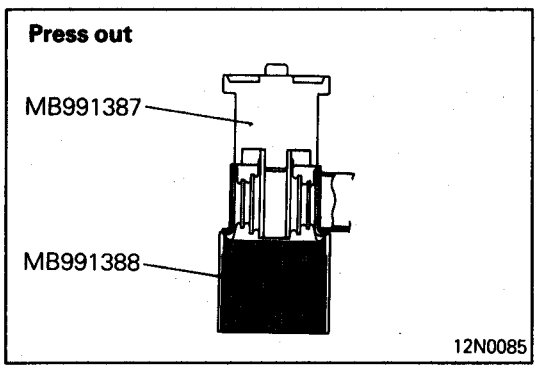
17. REMOVAL OF CROSSMEMBER BRACKET / 18. CROSSMEMBER MOUNTING NUT (ON DIFFERENTIAL SIDE) / 19. REAR SUSPENSION ASSEMBLY

(1) Before removing the crossmember bracket, support the differential case with the transmission jack.
(2) Remove the crossmember mounting bolt and nut.



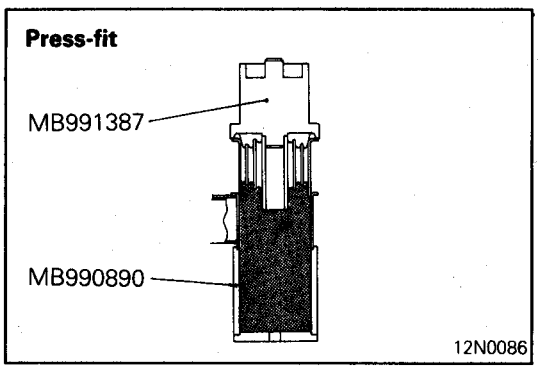
NOTE
Lowering the rear suspension assembly down from the transmission jack requires three persons, as the rear suspension assembly is very heavy. (Assign one person to the differential and one each to the left and right lower arm.)

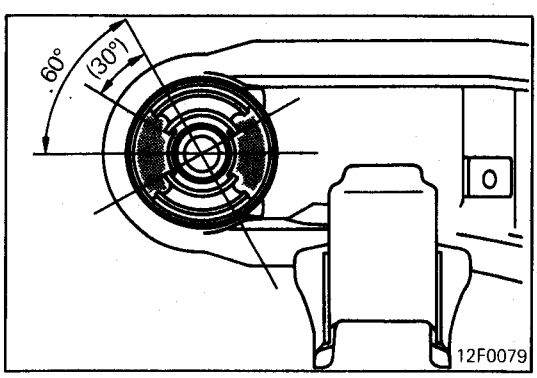
(3) Apply a wood block to the ball joint of the lower arm to prevent the dust shield from being deformed.



CROSSMEMBER SUPPORT BUSHING (FRONT) REPLACEMENT E34GJAA

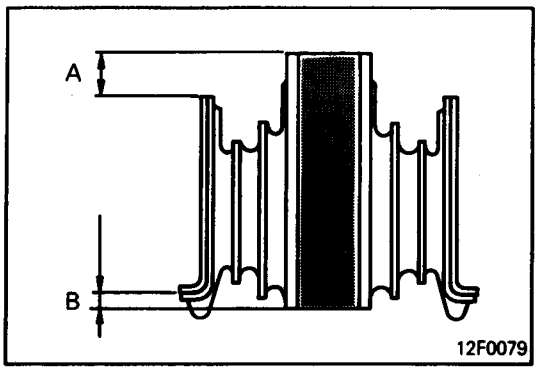
(1) Using the special tool, remove and press-fit the crossmember support bushing.





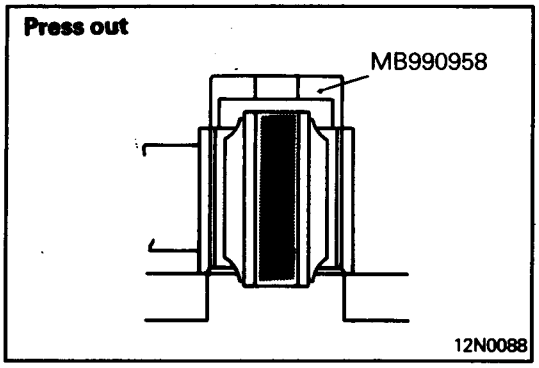
(2) When press-fitting the bushing, make sure that the hollow portions are positioned as shown.

NOTE
Ensure that the shift in rotating direction is within ± 5°.



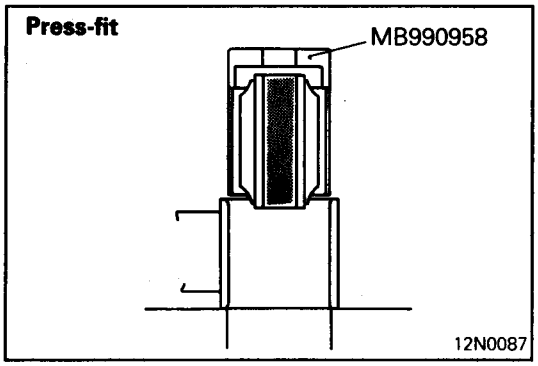
(3) Make sure that the protrusion of the inner sleeve (dimension A and B) are up to specifications.

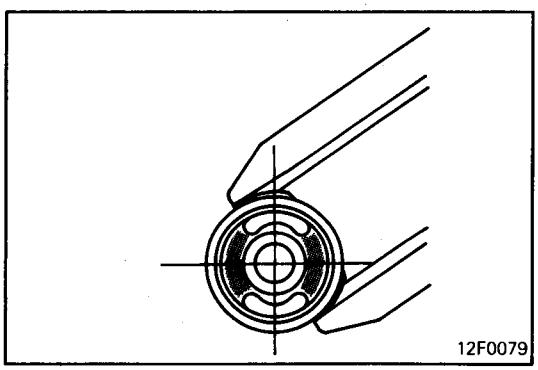
Standard value
Dimension A: 15.5 mm (0.59 in.)
Dimension B: 2.1–3.7 mm (0.08–0.15 in.)



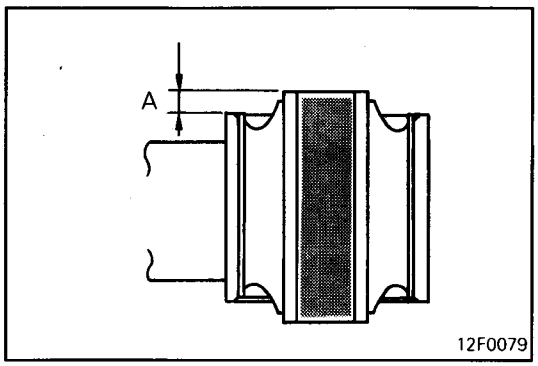
CROSSMEMBER BUSHING (REAR) REPLACEMENT E34GJAB

(1) Using the special tool, remove and press-fit the bushing.





(2) When press-fitting, position the bushing as shown.
NOTE
Ensure that the shift in rotating direction is within ± 5°.



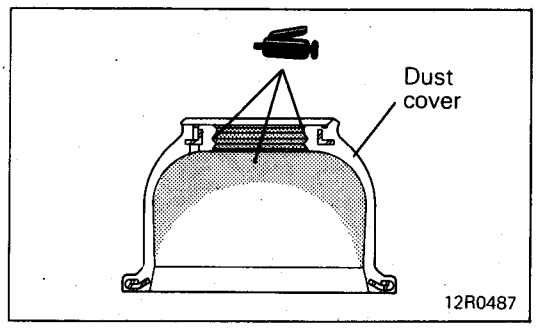
(3) Make sure that the protrusion of the inner sleeve (dimension A) is up to specification.

Standard value: 6.7–7.3 mm (0.26–0.29 in.)

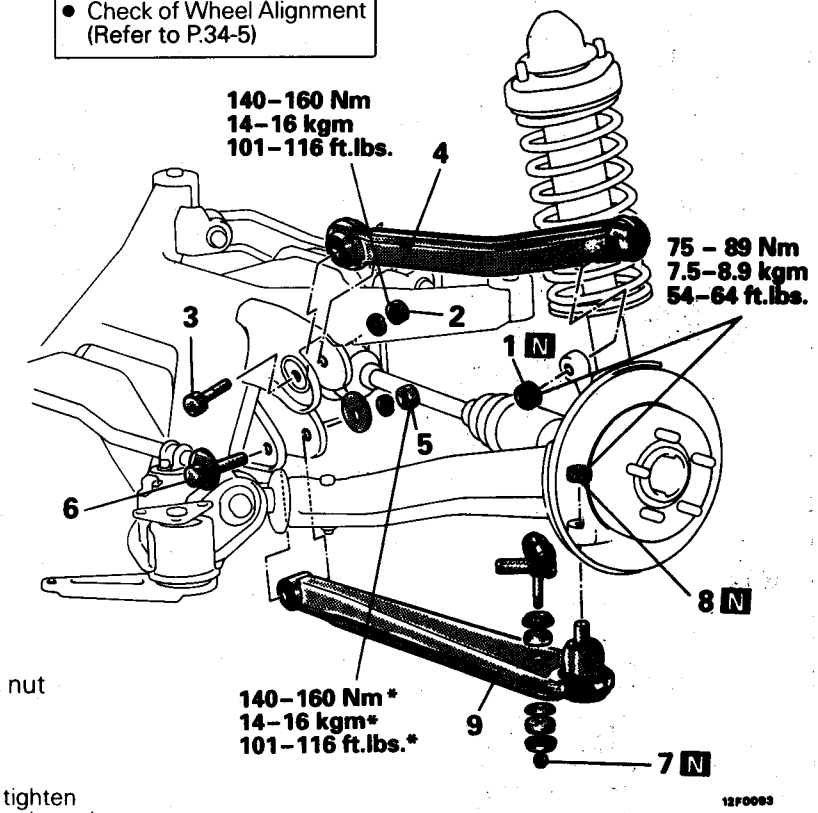
UPPER AND LOWER ARM

E34LA-

REMOVAL AND INSTALLATION



Post-installation Operation
- Check of Wheel Alignment (Refer to P.34-5)



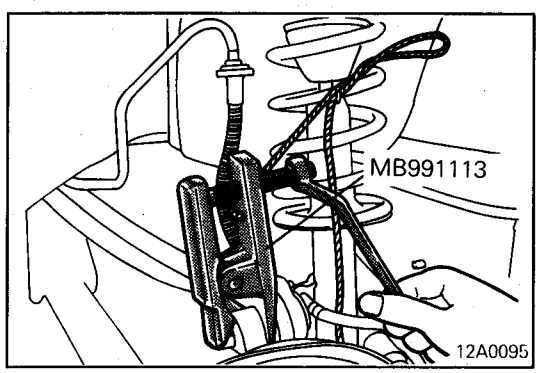
Upper arm removal steps

1. Self-locking nut
2. Upper arm mounting nut
3. Upper arm mounting bolt
4. Upper arm

Lower arm removal steps

5. Lower arm mounting nut
6. Lower arm mounting bolt
7. Stabilizer link to lower arm coupling nut
8. Self-locking nut
9. Lower arm

NOTE
For tightening points marked with *, first temporarily tighten and then ground the vehicle to torque to specification where the vehicle is empty.



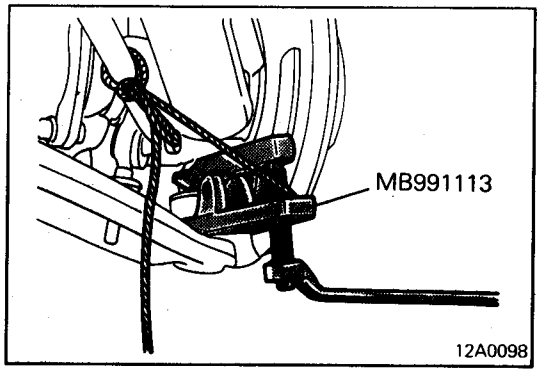
SERVICE POINTS OF REMOVAL

E34LBAE

1. REMOVAL OF SELF-LOCKING NUT

Using the special tool, disconnect the upper arm ball joint from the knuckle.

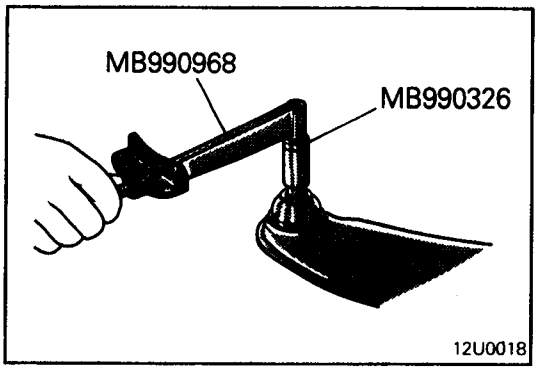
NOTE
(1) Do not remove the nut from the ball joint, but just loosen it.
(2) Suspend the special tool with a rope to prevent it from dropping.



8. REMOVAL OF SELF-LOCKING NUT

Lower down the lower arm on the crossmember side. Then, install the special tool and disconnect the lower arm ball joint from the knuckle.

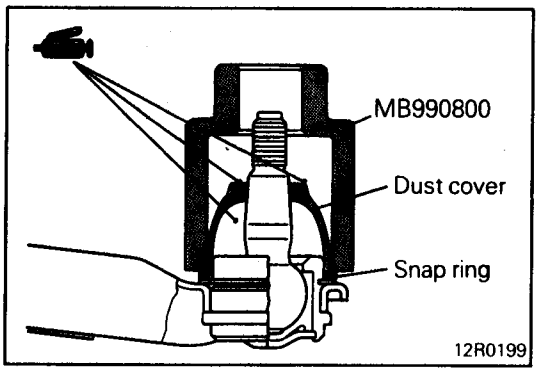
NOTE
(1) Do not remove the nut from the ball joint, but just loosen it.
(2) Suspend the special tool with a rope to prevent it from dropping.



INSPECTION E34LCAD

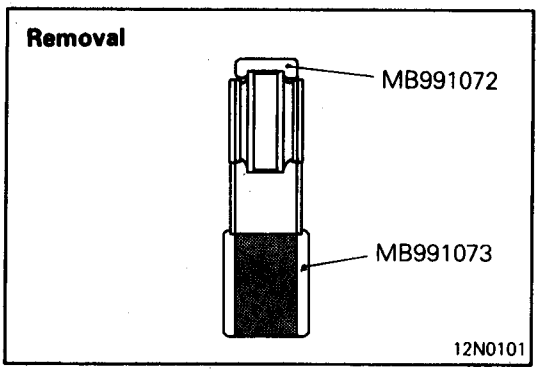
CHECKING OF BALL JOINT FOR STARTING TORQUE

Standard value: 2–9 Nm (20–90 kgcm, 17–78 in.lbs.)



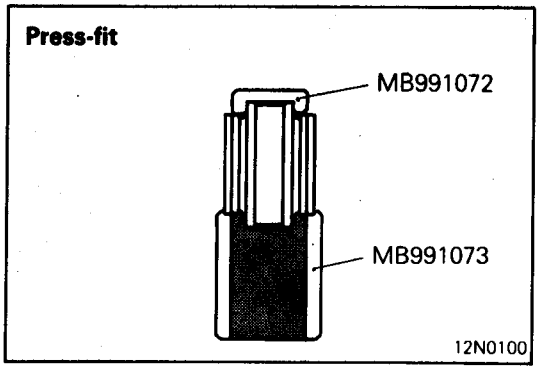
BALL JOINT DUST COVER REPLACEMENT E34LEAA

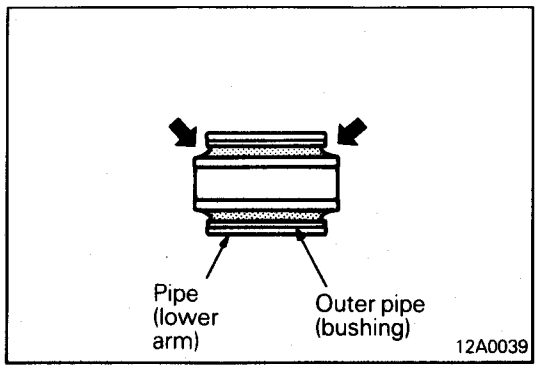
(1) Remove the dust cover.
(2) Apply multipurpose grease to the lip and inside of the dust cover.
(3) Drive in the dust cover with special tool until it is fully seated.



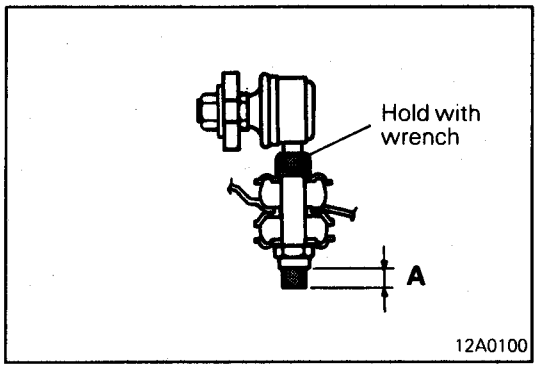
LOWER ARM BUSHING REPLACEMENT E34 LFAA

(1) Use the special tool to remove and press-fit the bushing.





(2) Press-fit the lower arm bushing until the bushing outer pipe edge flush with the lower arm pipe edge.



SERVICE POINT OF INSTALLATION E34LDAA

7. INSTALLATION OF STABILIZER LINK TO LOWER ARM COUPLING NUT

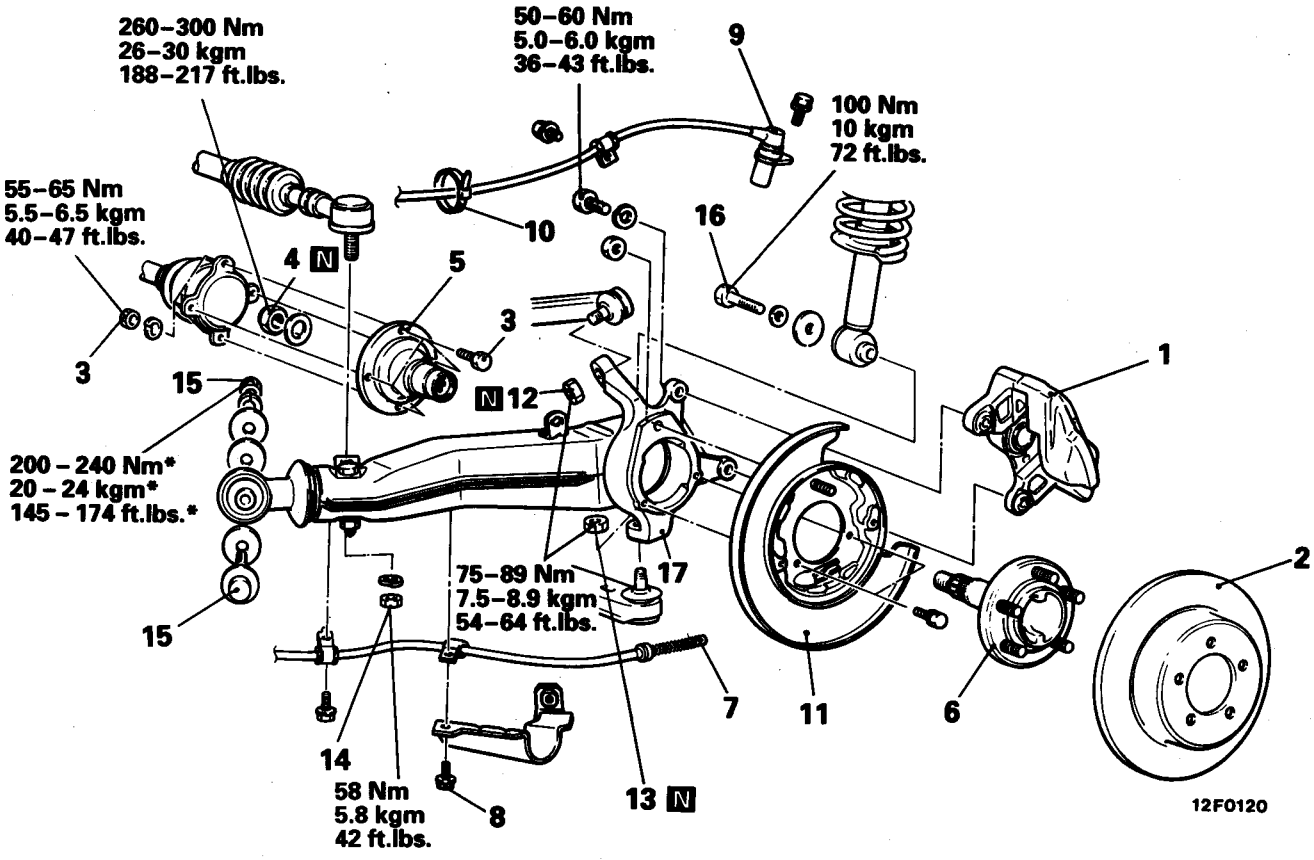
Holding the stabilizer link with a wrench, tighten the self-locking nut so that the protrusion of the stabilizer link (dimension A indicated in illustration) is within the standard value.

Standard value: 5 – 7 mm (0.197 – 0.276 in.)

TRAILING ARM

E340A–

REMOVAL AND INSTALLATION

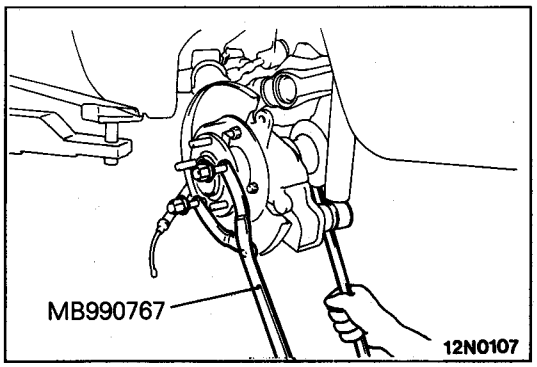


Removal steps

1. Rear brake caliper assembly
2. Rear brake disc
3. Drive shaft to companion flange mounting bolt and nut
4. ◆◆ Self-locking nut
5. Companion flange
6. ◆◆ Rear axle shaft
7. Parking brake cable end
8. Parking brake cable clamp bolt
9. Rear speed sensor
10. Rear speed sensor cable and parking brake cable bands
11. Dust shield
12. ◆◆ Self-locking nut (upper arm)
13. ◆◆ Self-locking nut (lower arm)
14. Tie rod end mounting nut
15. Trailing arm mounting bolt and nut
16. Rear shock absorber mounting bolt
17. Trailing arm

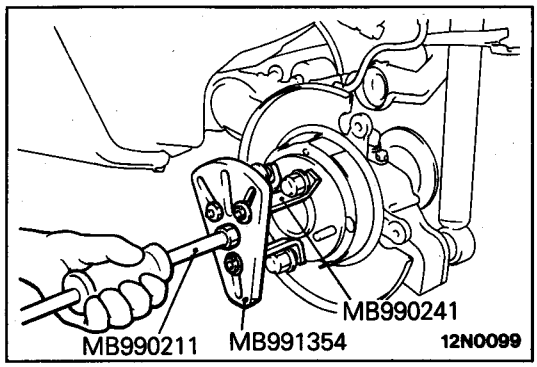
NOTE
For tightening points marked with *, first temporarily tighten and then ground the vehicle to torque to specification where the vehicle is empty.

Post-installation Operation
- Check of Wheel Alignment (Refer to P.34-5)
- Check of Parking Brake Lever Stroke (Refer to GROUP 36 – Service Adjustment Procedures.)
- Rear Brake Disc Run-out Check (Refer to GROUP 35 – Service Adjustment Procedures.)

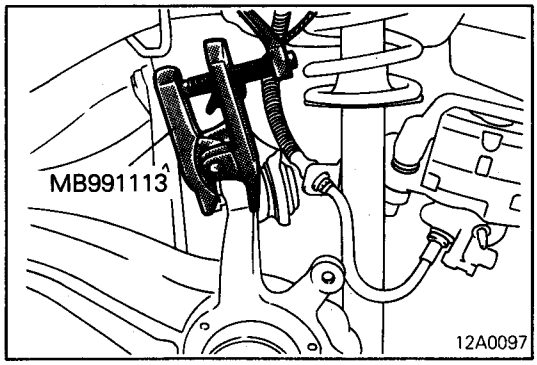


SERVICE POINTS OF REMOVAL E340BAE

4. REMOVAL OF SELF-LOCKING NUT



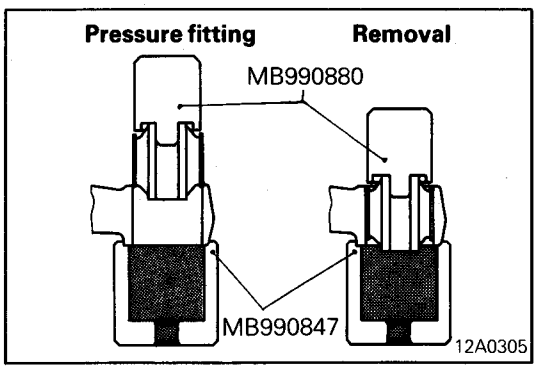
6. REMOVAL OF REAR AXLE SHAFT



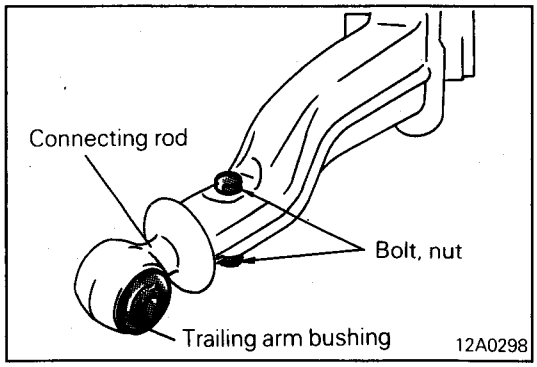
12. REMOVAL OF SELF-LOCKING NUT (UPPER ARM) / 13. SELF-LOCKING NUT (LOWER ARM)

Using the special tool, disconnect the ball joint from the knuckle.

NOTE
(1) Do not remove the nut from the ball joint, but just loosen it.
(2) Suspend the special tool with a rope to prevent it from dropping.

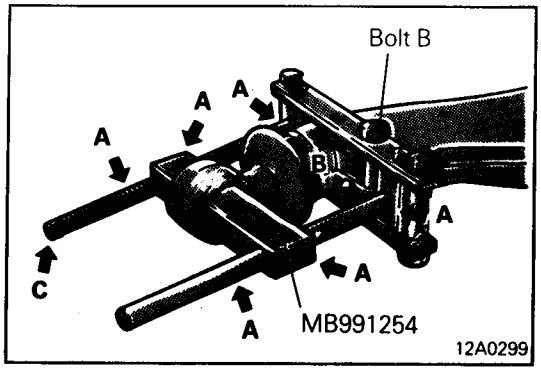


TRAILING ARM BUSHING REPLACEMENT E340EAA



CONNECTING ROD REPLACEMENT E340FAA

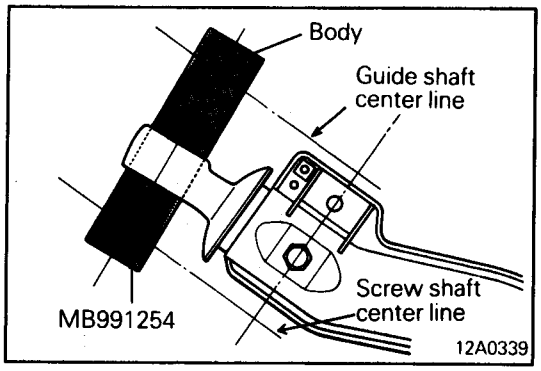
Replace the connecting rod using the following procedure:
(1) Remove the trailing arm bushing.
(2) Remove the bolt and nut.



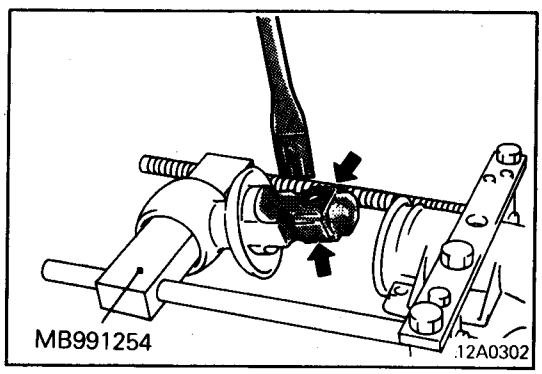
(3) Set the special tool onto the trailing arm as shown in the illustration.

NOTE
(1) Apply lubricant to the sliding portion of the special tool (at the arrow marked "A" in the illustration).
(2) Install bolt B to the trailing arm, at the point shown in the figure.

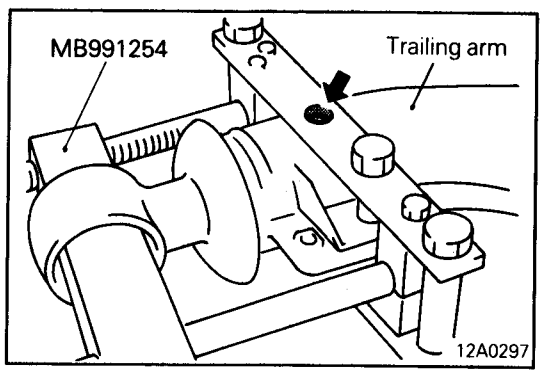
(4) Use a spanner, etc., to turn the portion marked "C" in the illustration to remove the connecting rod.



(5) Installation of the body (special tool) should be performed with the screw shaft and guide shaft center lines oriented as shown in the illustration.



(6) Apply soapy water to the rubber portion of the connecting rod.
(7) Reverse the removal procedures to press-fit.



(8) Remove the special tool after aligning the holes in the special tool and trailing arm.
(9) Tighten the bolts and nuts to the specified torque.

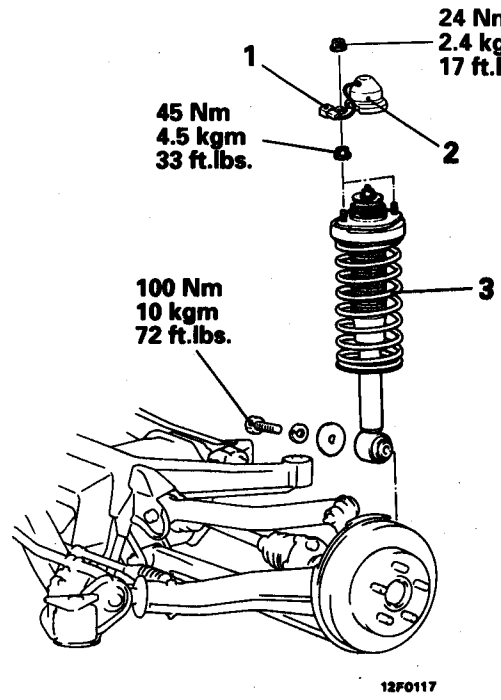
Tightening torque: 98 Nm (9.8 kgm, 71 ft.lbs.)

(10) Press-fit the trailing arm bushing. (Refer to P.34-13.)

SHOCK ABSORBER ASSEMBLY

E34MA--

REMOVAL AND INSTALLATION



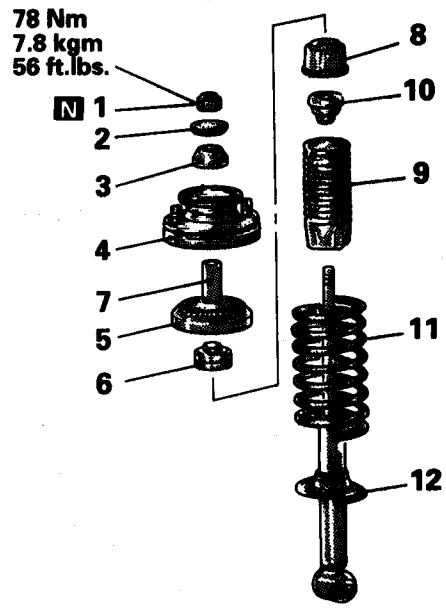
Pre-removal and Post-installation Operation
- Removal and Installation of the Rear Side Trim Absorber Lid
  (Refer to GROUP 52A – Trims.)

Removal steps

1. ECS connector
2. Cap
3. Shock absorber assembly

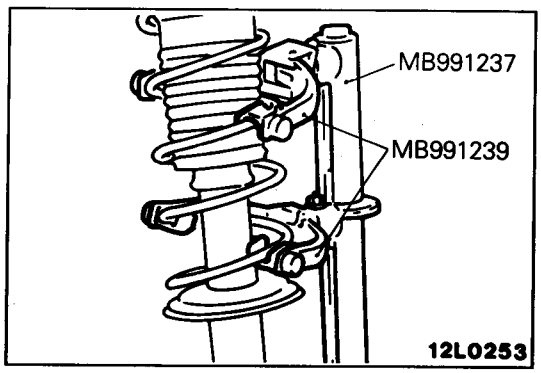
DISASSEMBLY AND REASSEMBLY

E34ME--



Disassembly steps

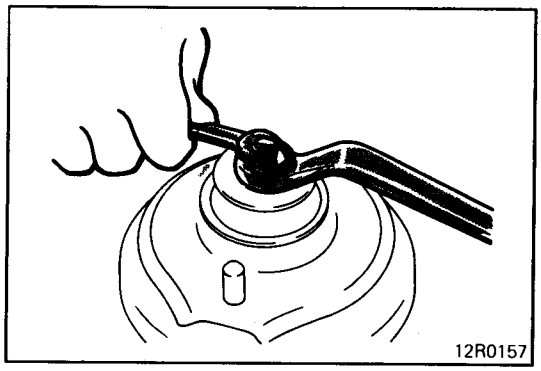
1. Piston rod tightening nut
2. Washer
3. Upper bushing (A)
4. Bracket assembly
5. Spring pad
6. Upper bushing (B)
7. Collar
8. Cup assembly
9. Dust cover
10. Bump rubber
11. Coil spring
12. Shock absorber



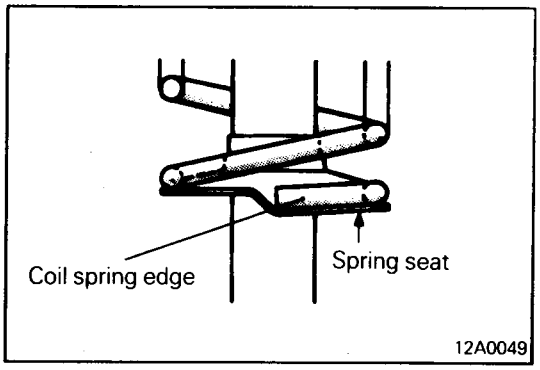
SERVICE POINT OF DISASSEMBLY E34MFAC

1. REMOVAL OF PISTON ROD TIGHTENING NUT

(1) Before removing the piston rod tightening nut, compress the coil spring using the special tool.



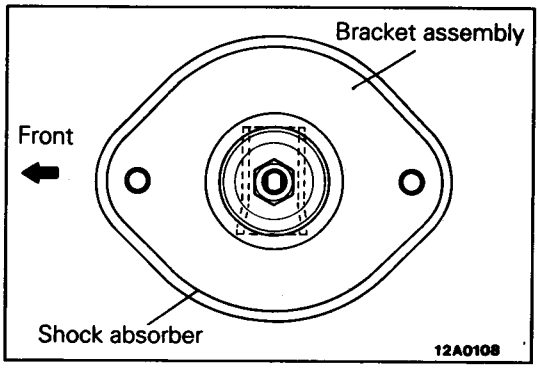
(2) While holding the piston rod, remove the piston rod tightening nut.



SERVICE POINTS OF REASSEMBLY E34MHAK

11. INSTALLATION OF COIL SPRING

(1) Use the special tool MB991237, MB991239 to compress the coil spring and insert it in the shock absorber.
(2) Align the edge of the coil spring to the position of the shock absorber spring seat as shown.



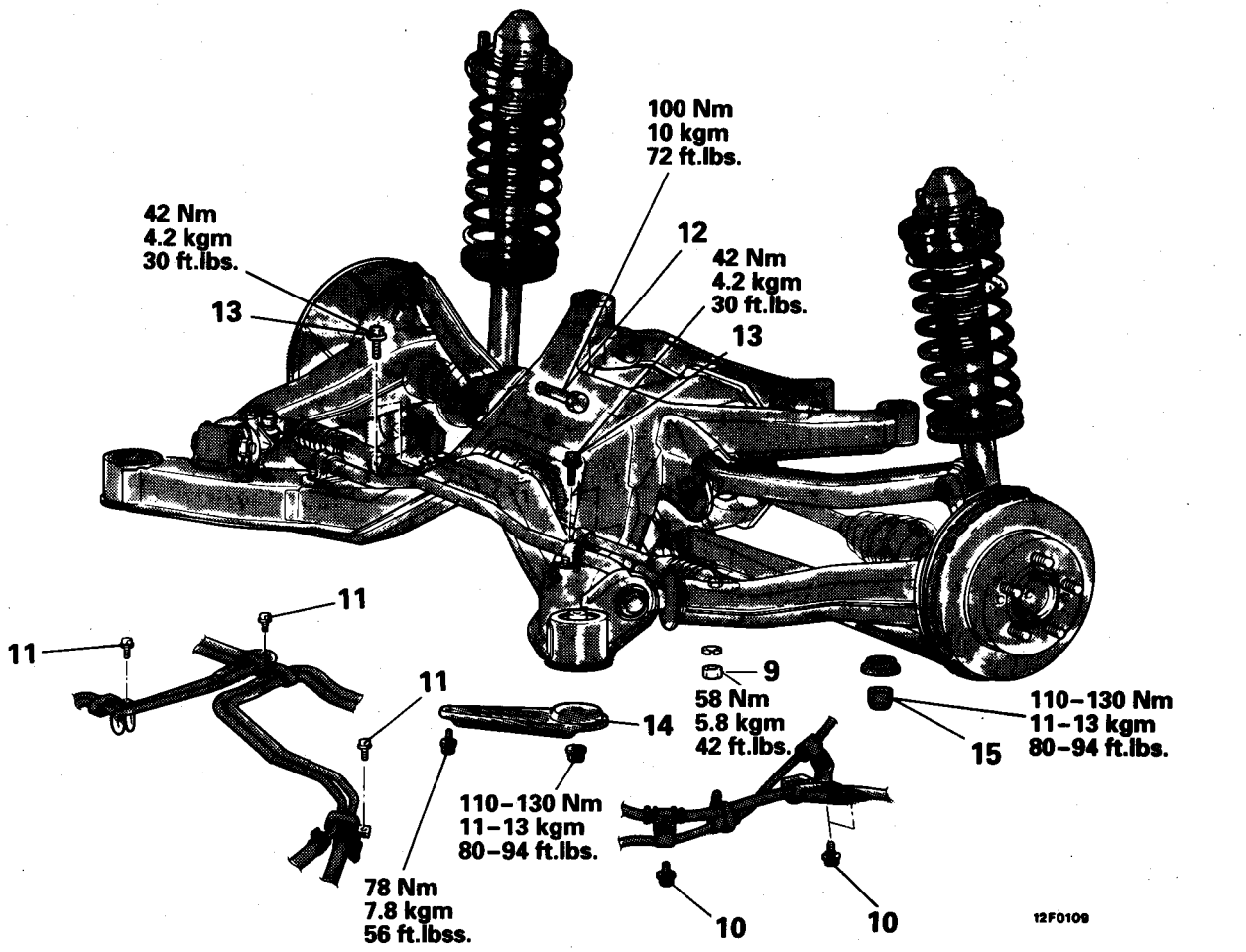
4. INSTALLATION OF BRACKET ASSEMBLY / 1. PISTON ROD TIGHTENING NUT

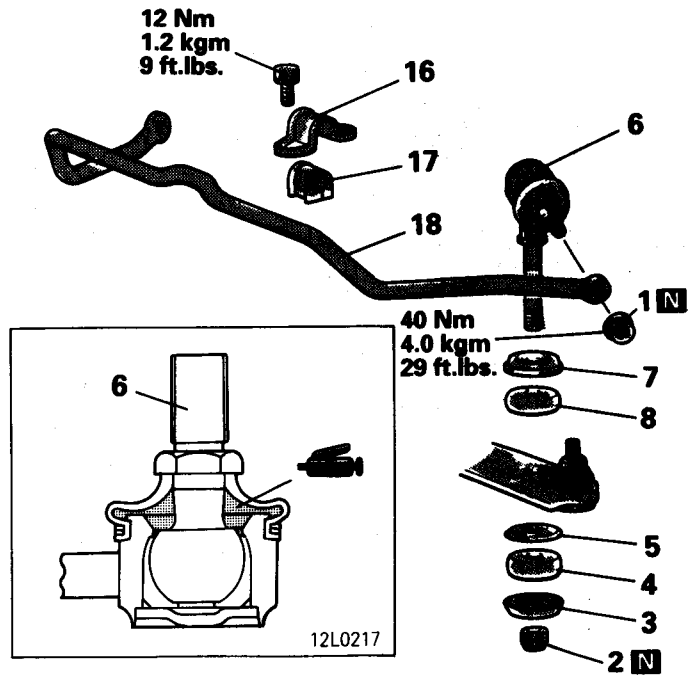
(1) With the position of the bracket assembly as shown in the figure, tighten the tightening nut to the specified torque.
(2) Install the coil spring so that the lower edge fits into the spring seat groove and the upper edge fits into the spring pad groove, then remove the special tool (MB991237, MB991239).

STABILIZER BAR

E34KA--

REMOVAL AND INSTALLATION



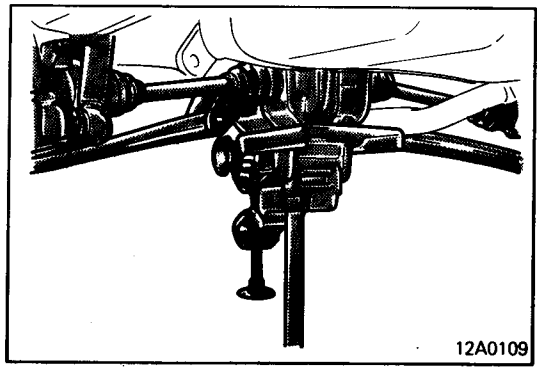


Removal steps

- ◆◆ 1. Self-locking nut*
- ◆◆ 2. Self-locking nut*
- 3. Joint cup A*
- 4. Stabilizer rubber*
- 5. Joint cup B*
- ◆◆ 6. Stabilizer link*
- 7. Joint cup A*
- 8. Stabilizer rubber*
- 9. Tie rod end mounting nut*
- 10. Parking brake cable bracket mounting bolt*
- 11. 4WS piping fixing bolt
- 12. Rear shock absorber mounting bolt
- 13. Power cylinder mounting bolt
- ◆◆ 14. Crossmember bracket*
- ◆◆ 15. Crossmember mounting nut*
- 16. Stabilizer bracket*
- 17. Bushing*
- ◆◆ 18. Stabilizer bar

NOTE
Parts marked with * are symmetrical.

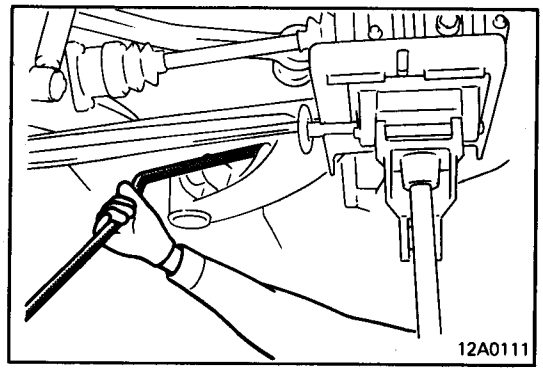
12A0113



SERVICE POINTS OF REMOVAL E34KBAF

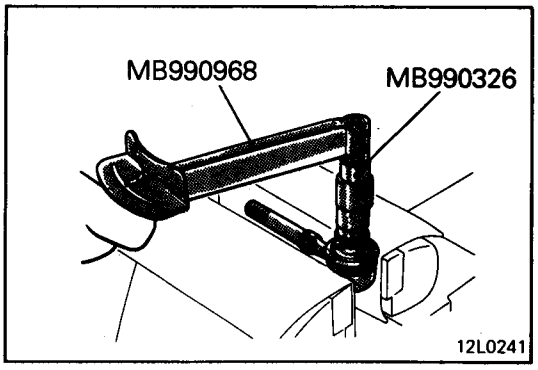
14. REMOVAL OF CROSSMEMBER BRACKET / 15. CROSSMEMBER MOUNTING NUT

(1) Support the rear suspension assembly with the transmission jack.
(2) Remove the crossmember bracket and crossmember mounting nut.



18. REMOVAL OF STABILIZER BAR

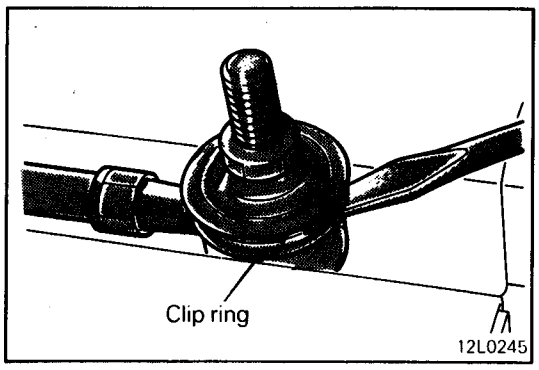
(1) Lower the transmission jack a little to obtain a gap between the rear suspension and body.
(2) Remove the stabilizer bar.



INSPECTION E34KCAF

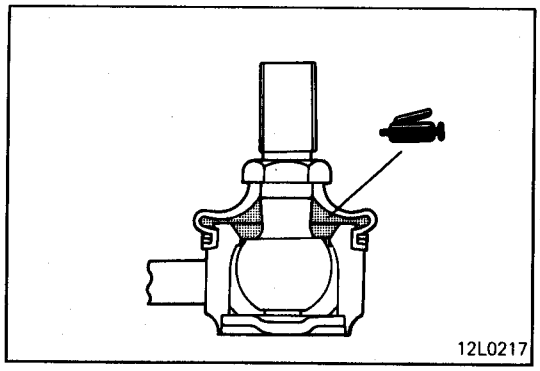
CHECKING OF STABILIZER LINK BALL JOINT FOR STARTING TORQUE

Standard value: 1.7–3.2 Nm (17–32 kgcm, 15–28 in.lbs.)

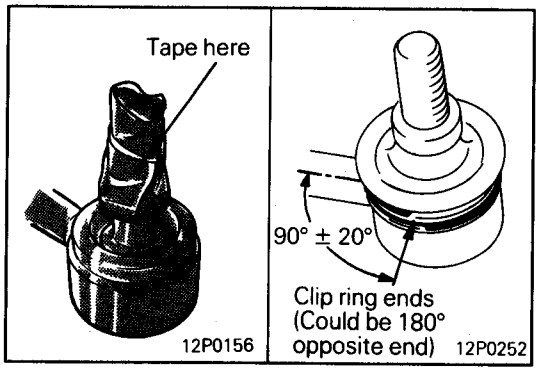


BALL JOINT DUST COVER REPLACEMENT E34KEAC

(1) Remove the clip ring and the dust cover.



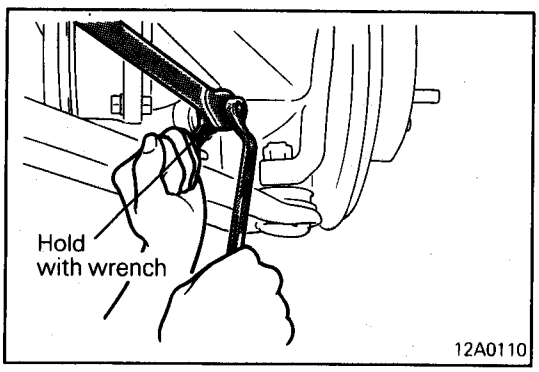
(2) Apply multipurpose grease to the lip and inside of the dust cover.



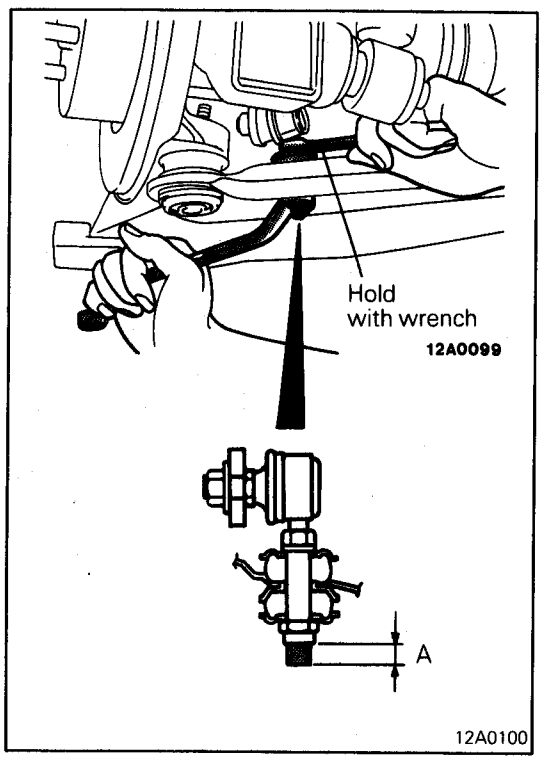
(3) Wind tape around the threads of the stabilizer link stud and install the dust cover.
(4) Secure the dust cover with the clip ring.
At this time, make sure that the clip ring ends are located at a point 90° ± 20° with reference to the link axis.

SERVICE POINTS OF INSTALLATION E34KDAL

6. INSTALLATION OF STABILIZER LINK / 2. SELF-LOCKING NUT / 1. SELF-LOCKING NUT



(1) Secure the stabilizer link ball stud with a wrench and mount the self-locking nut.



(2) Hold the stabilizer link with a wrench so that its protrusion on the lower arm side (dimension A) is up to specification, then mount the self-locking nut.

Standard value: 5–7 mm (0.197–0.276 in.)

NOTES

SERVICE BRAKES

CONTENTS

E35AA-

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).

(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE
The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIFICATIONS

E35CA--

GENERAL SPECIFICATIONS

Items	Specifications
Master cylinder	
Type	Tandem type (with level sensor)
I.D. mm (in.)	26.9 (1 1/16)
Brake booster	
Type	Vacuum type, tandem
Effective dia. of power cylinder mm (in.)	205 (8.0) + 230 (9.0)
Boosting ratio	5.5
Proportioning valve	
Split point MPa (kg/cm², psi)	3.75–4.25 (37.5–42.5, 533 – 604)
Decompression ratio	0.37
Front brakes	
Type	Rigid caliper, 4-piston, ventilated disc (M-R76Z)
Disc effective dia. mm (in.)	270 (10.6)
Disc thickness mm (in.)	30 (1.18)
Pad thickness mm (in.)	15 (0.59)
Wheel cylinder I.D. mm (in.)	40.4 (1 19/32)×2+42.8 (1 11/16)×2
Clearance adjustment	Automatic
Rear brakes	
Type	Rigid caliper, 2-piston, ventilated disc (M-R68X)
Disc effective dia. mm (in.)	250 (9.8)
Disc thickness mm (in.)	20 (0.79)
Pad thickness mm (in.)	15.5 (0.61)
Wheel cylinder I.D. mm (in.)	38.1 (1 1/2)×2
Clearance adjustment	Automatic
Rotor teeth	
Front wheel side	47
Rear wheel side	47
Speed sensor	Magnet coil type

SERVICE BRAKES

CONTENTS

E35AA-

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – AIR BAG

(1) A Supplemental Restraint System (SRS), which uses a driver-side air bag, has been installed in this vehicle.
(2) The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring, interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

WARNING!
(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver (from rendering the SRS inoperative).
(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
(3) MITSUBISHI dealer personnel must thoroughtly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS), before beginning any service or maintenance of any component of the SRS or any SRS-related component.

SPECIFICATIONS

E35CA--

GENERAL SPECIFICATIONS

Items		Specifications
Master cylinder		
Type		Tandem type (with level sensor)
I.D.	mm (in.)	26.9 (1 1/16)
Brake booster		
Type		Vacuum type, tandem
Effective dia. of power cylinder	mm (in.)	205 (8.0) + 230 (9.0)
Boosting ratio		5.5
Proportioning valve		
Split point	MPa (kg/cm2, psi)	3.75–4.25 (37.5–42.5, 533 – 604)
Decompression ratio		0.37
Front brakes		
Type		Rigid caliper, 4-piston, ventilated disc (M-R76Z)
Disc effective dia.	mm (in.)	270 (10.6)
Disc thickness	mm (in.)	30 (1.18)
Pad thickness	mm (in.)	15 (0.59)
Wheel cylinder I.D.	mm (in.)	40.4 (1 19/32)×2+42.8 (1 11/16)×2
Clearance adjustment		Automatic
Rear brakes		
Type		Rigid caliper, 2-piston, ventilated disc (M-R68X)
Disc effective dia.	mm (in.)	250 (9.8)
Disc thickness	mm (in.)	20 (0.79)
Pad thickness	mm (in.)	15.5 (0.61)
Wheel cylinder I.D.	mm (in.)	38.1 (1 1/2)×2
Clearance adjustment		Automatic
Rotor teeth		
Front wheel side		47
Rear wheel side		47
Speed sensor		Magnet coil type

SERVICE SPECIFICATIONS

E35CB--

Items	Specifications
Standard value	
Brake pedal height mm (in.)	177–182 (7.0–7.2)
Brake pedal freen play mm (in.)	3–8 (0.1–0.3)
Brake pedal to floorboard clearance mm (in.)	80 (3.1) or more
Pad thickness mm (in.)	10.0 (0.39)
Front disc thickness mm (in.)	30.0 (1.18)
Rear disc thickness mm (in.)	20.0 (0.79)
Brake lining thickness mm (in.)	2.8 (0.11)
Brake disc inside diameter mm (in.)	168 (6.6)
Proportioning valve pressure MPa (kg/cm2 psi)	
Split point	3.75–4.25 (37.5–42.5, 533–604)
Output pressure [input pressure]	4.68–5.18 (46.8–51.8, 666–737) [6.5 (65, 925)]
Booster push rod to master cylinder piston clearance mm (in.)	
8+9 inch brake booster	0.65–0.85 (0.026–0.033)
Disc brake drag force (tangential force of wheel mounting bolts) N (kg, lbs.)	70 (7.0, 15.4) or less
Speed sensor's internal resistance kΩ	
Front	0.8–1.2
Rear	0.8–1.2
Rear speed sensor pole piece-to-rotor tooth surface clearance mm (in.)	28.15–28.45 (1.11–1.12)
Limit	
Left/right proportioning valve output pressure difference MPa (kg/cm2, psi)	0.4 (4, 57)
Front disc run-out mm (in.)	0.1 (0.004) or less
Pad thickness mm (in.)	2.0 (0.08)
Front disc thickness mm (in.)	28.4 (1.12)
Front hub axial play mm (in.)	0.05 (0.002)
Rear disc thickness mm (in.)	18.4 (0.72)
Rear disc run-out mm (in.)	0.08 (0.0031) or less
Rear hub axial play mm (in.)	0.8 (0.031)
Brake lining thickness mm (in.)	1.0 (0.04)
Brake disc inside diameter mm (in.)	169 (6.7)

LUBRICANTS

E35CD--

Items	Specified lubricant
Brake fluid	DOT3 or DOT4
Inside of shim A and shim B	Brake grease SAE J310, NLGI No.1
Piston boot inner surface	Repair kit grease

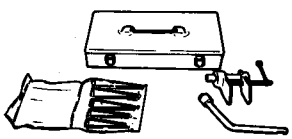
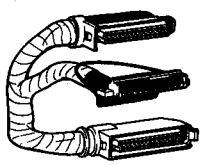
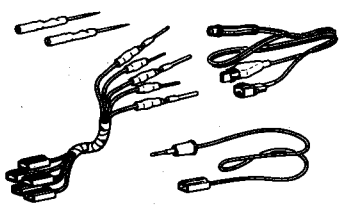
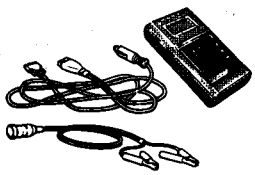
SEALANTS AND ADHESIVES

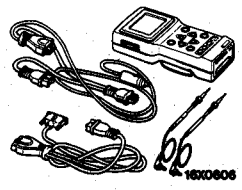
E35CE--

Items	Specified sealant	Remarks
Thread part fitting	3M ATD part No. 8661 or equivalent	Semi-drying sealant

SPECIAL TOOLS

E35DA--

Tool	Number	Name	Use
	MB990964 MB990520	Brake tool set	Pressing-out of disc brake piston
	MB991356	A.B.S. check harness	Measurement of A.B.S. control unit terminal voltage
	MB991223	Check harness set Harness for connector pin contact pressure check Probe for commercial tester (for general connector)	Measurement of terminal voltage
	MB991341	Multi-use tester sub assembly	1993 models For checking of A.B.S.
		ROM pack For the number, refer to GROUP 00 – Precautions Before Service.	
	MB991377	Adapter harness	

Tool	Number	Name	Use
 16X0606	MB991502	MUT-II sub assembly	All models For checking A.B.S.
 16X0607		ROM pack	

NOTES

SERVICE SPECIFICATIONS

E35C8–

Items	Specifications
Standard value	
Brake pedal height mm (in.)	177–182 (7.0–7.2)
Brake pedal freen play mm (in.)	3–8 (0.1–0.3)
Brake pedal to floorboard clearance mm (in.)	80 (3.1) or more
Pad thickness mm (in.)	10.0 (0.39)
Front disc thickness mm (in.)	30.0 (1.18)
Rear disc thickness mm (in.)	20.0 (0.79)
Brake lining thickness mm (in.)	2.8 (0.11)
Brake disc inside diameter mm (in.)	168 (6.6)
Proportioning valve pressure MPa (kg/cm2 psi)	
Split point	3.75–4.25 (37.5–42.5, 533–604)
Output pressure [input pressure]	4.68–5.18 (46.8–51.8, 666–737) [6.5 (65, 925)]
Booster push rod to master cylinder piston clearance mm (in.)	
8+9 inch brake booster	0.65–0.85 (0.026–0.033)
Disc brake drag force (tangential force of wheel mounting bolts) N (kg, lbs.)	70 (7.0, 15.4) or less
Speed sensor's internal resistance kΩ	
Front	0.8–1.2
Rear	0.8–1.2
Rear speed sensor pole piece-to-rotor tooth surface clearance mm (in.)	28.15–28.45 (1.11–1.12)
Limit	
Left/right proportioning valve output pressure difference MPa (kg/cm2, psi)	0.4 (4, 57)
Front disc run-out mm (in.)	0.1 (0.004) or less
Pad thickness mm (in.)	2.0 (0.08)
Front disc thickness mm (in.)	28.4 (1.12)
Front hub axial play mm (in.)	0.05 (0.002)
Rear disc thickness mm (in.)	18.4 (0.72)
Rear disc run-out mm (in.)	0.08 (0.0031) or less
Rear hub axial play mm (in.)	0.8 (0.031)
Brake lining thickness mm (in.)	1.0 (0.04)
Brake disc inside diameter mm (in.)	169 (6.7)

LUBRICANTS

E35CD--

Items	Specified lubricant
Brake fluid	DOT3 or DOT4
Inside of shim A and shim B	Brake grease SAE J310, NLGI No.1
Piston boot inner surface	Repair kit grease

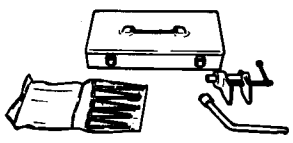
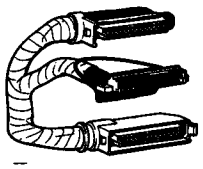
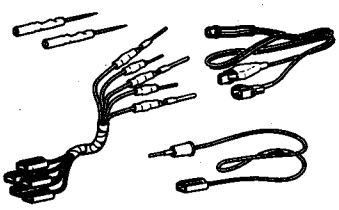
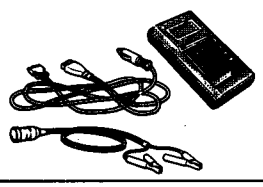
SEALANTS AND ADHESIVES

E35CE--

Items	Specified sealant	Remarks
Thread part fitting	3M ATD part No. 8661 or equivalent	Semi-drying sealant

SPECIAL TOOLS

E35DA--

Tool	Number	Name	Use
	MB990964 MB990520	Brake tool set	Pressing-out of disc brake piston
	MB991356	A.B.S. check harness	Measurement of A.B.S. control unit terminal voltage
	MB991223	Check harness set Harness for connector pin contact pressure check Probe for commercial tester (for general connector)	Measurement of terminal voltage
	MB991341	Multi-use tester assembly	For checking of A.B.S.
		ROM pack (For the number, refer to GROUP 00 – Precautions Before Service.)	
	MB991377	Adapter harness	

ANTI-LOCK BRAKING SYSTEM TROUBLESHOOTING

E35EC--

PARTICULAR PHENOMENA OF THE ANTI-LOCK BRAKING SYSTEM

Models equipped with the anti-lock braking system (ABS) may exhibit one or more of the following phenomena from time to time, but none of these are abnormal.

(1) A pulsing feeling in the brake pedal, or vibration of the body or the steering wheel, when the anti-lock braking system is activated by sudden braking or by braking on a slippery road surface. Actually, this phenomenon is an indication that the anti-lock braking system is functioning normally.

(2) When the vehicle speed reaches approximately 6 km/h (4 mph) after the engine is started and the vehicle starts off (for the first time), a whining motor noise may be heard from the engine compartment if the vehicle is traveling in a quiet place, but this noise is simply the result of a self-check being made of the anti-lock braking system operation.

TROUBLESHOOTING METHODS

Problems related to the anti-lock braking system (ABS) can be classified into two general categories: problems in the electrical system and those in the hydraulic system.

For problems in the electrical system, the self-diagnosis function is built into the electronic control unit (E.C.U.) causing the ABS warning light to illuminate as a warning to the driver. In this instance, checks can be made by using the multi-use tester and oscilloscope.

Problems in the hydraulic system (poor braking, etc.) can be located in the same way as for ordinary brakes. There is, however, the necessity to check to determine whether the problem is related to ordinary brake components or to the components related to the ABS. To make this check, use the multi-use tester (MUT) or MUT-II.

HOW TO USE THE TROUBLESHOOTING FLOW CHART

(1) Using the flow chart, check the ABS warning lamp light-up sequence. Read the diagnosis codes and check the condition of braking operation.

(2) Following the check chart listed in the remedy column, perform the checks. There are [Explanation] and [Hint] in each check chart. Refer to them when troubleshooting.

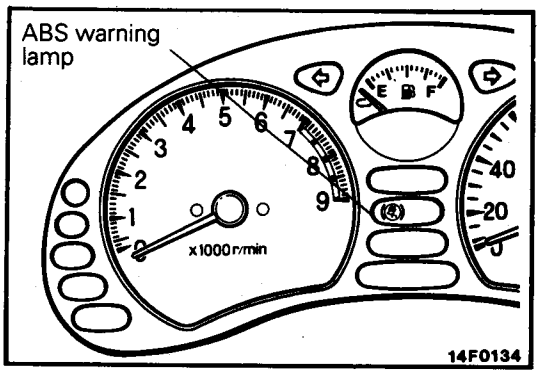
NOTE
ECU: Electronic control unit
HU: Hydraulic unit
MUT: Multi-use tester

TROUBLESHOOTING

Confirm condition in the following way and diagnosis accordingly.

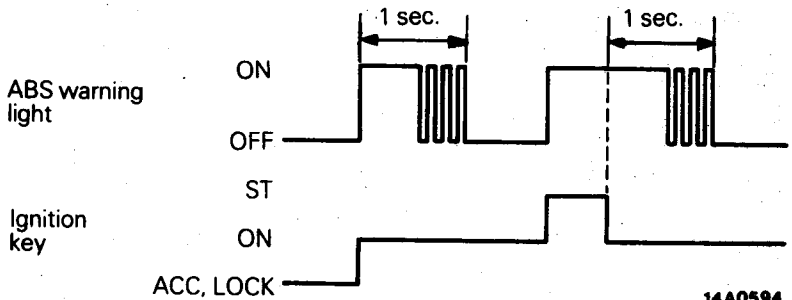
Does the ABS warning lamp illuminate as described below up to the time the engine starts?

(1) When the ignition key is turned to the "ON" position, the ABS ECU causes the ABS warning lamp to flash four times in about one second (during which the valve relay self check is made) and then causes it to go out.



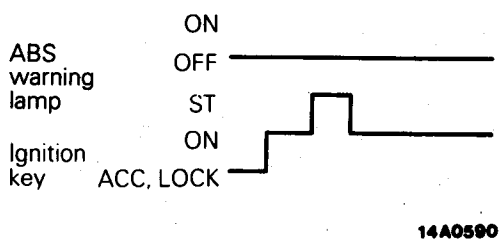
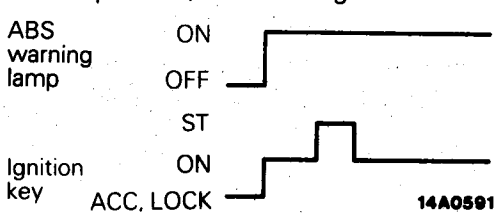
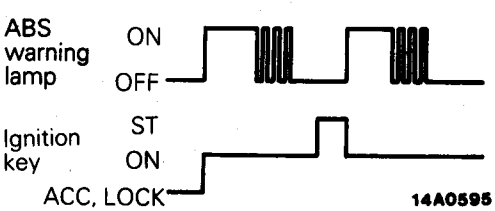
(2) With the ignition key in the "START" position, power to the ABS ECU is interrupted and the ABS warning lamp remains lit because the valve relay is OFF.

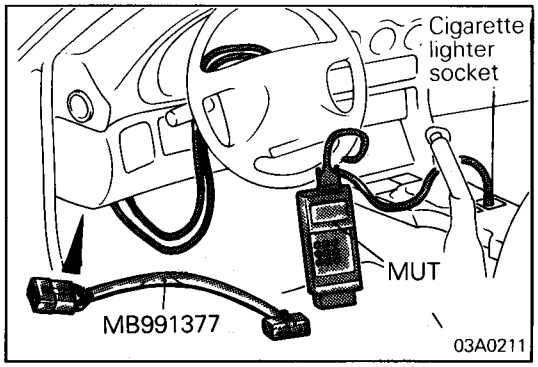
(3) When the ignition key is returned from the "START" position to the "ON" position, the ABS warning lamp flashes four times in about one second (during which the valve relay self check is made again) and then goes out.



Yes → CONTINUED ON NEXT PAGE

No ↓

No.	Trouble condition	Major causes	Remedy
1	ABS warning lamp does not light up at all. 	• ABS warning lamp bulb is burnt out. • Open in ABS warning lamp electrical circuit (check for blown fuse)	Check, using flow chart A (Refer to P.35-11.)
2	When the ignition key is turned to the "ON" position, it remains lighted. 	• Fail safe is functioning due to ECU self diagnosis. • Short in ECU warning lamp drive circuit • Malfunction of ECU	Check, using flow chart B (Refer to P.35-14.)
3	Does not illuminate when ignition key is in "START" position. 	• Malfunction of valve relay • Break in harness between ABS warning lamp and HU • Break in harness between HU and body ground	Check, using flow chart C (Refer to P.35-16.)



CHECK USING SELF DIAGNOSIS FUNCTION

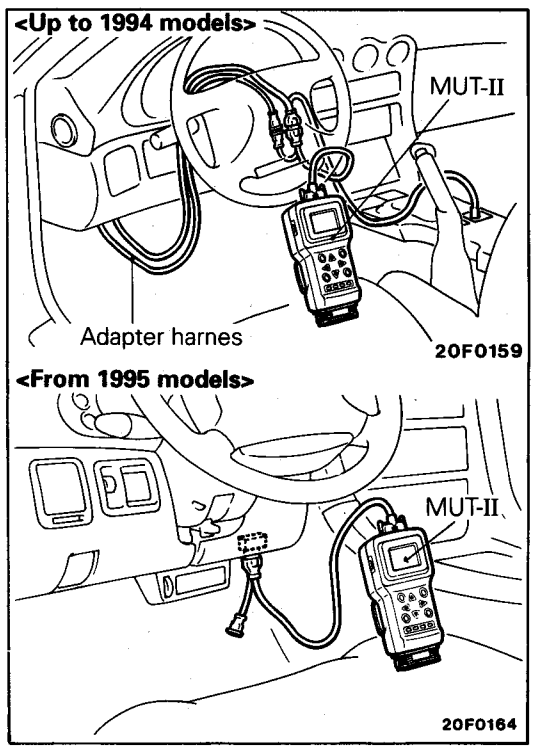
WHEN USING THE MULTI-USE TESTER (MUT) < 1993 models >

(1) With the ignition switch OFF, connect the MUT through the adapter harness.

Caution
Connect and disconnect the MUT with the ignition switch in the OFF position.

Turn the ignition ON and select the ABS system. (The ABS warning lamp lights up, it goes into the MUT mode. **In the MUT mode, ABS does not function.**)
If it does not go into the MUT mode, check the ECU power circuit and the harness between the ECU and diagnosis check terminals.

(2) Read the diagnosis output codes from the ECU memory.
(3) Clear the diagnosis codes once from memory. (Refer to P.35-10.)
If the memory cannot be cleared, the ECU is currently detecting the trouble and the ABS ECU is in fail safe. If it can be cleared, the trouble is either temporary or appears only when driving.
(4) When the trouble codes cannot be cleared, or when the ABS ECU goes into fail safe during another test drive and trouble codes are output, check according to trouble code check charts (E-1–E-7).



WHEN USING THE MUT-II < All models >

(1) With the ignition switch OFF, connect the MUT-II to 1994 models. Use the adapter harness which belongs to MUT-II sub-assembly.

Caution
Connect and disconnect the MUT-II with the ignition switch in the OFF position.

Turn the ignition ON and select the ABS system. (The ABS warning lamp lights up, it goes into the MUT mode. **In the MUT mode, ABS does not function.**)
If it does not go into the MUT-II mode, check the ECU power circuit and the harness between the ECU and diagnosis check terminals.

(2) Read the diagnosis output codes from the ECU memory.
(3) Clear the diagnosis codes once from memory. (Refer to P.35-10.)
If the memory cannot be cleared, the ECU is currently detecting the trouble and the ABS ECU is in fail safe. If it can be cleared, the trouble is either temporary or appears only when driving.
(4) When the trouble codes cannot be cleared, or when the ABS ECU goes into fail safe during another test drive and trouble codes are output, check according to trouble code check charts (E-1–E-7).

DIAGNOSIS CODE CHART

Diagnosis code No.	Check chart name or remedy	Reference page	Diagnosis code No.	Check chart Name or remedy	Reference page
11	E-1	P.35-18	41	E-5	P.35-22
12			42		
13			43		
14			51	E-6	P.35-23
15	E-2	P.35-18	52	E-7	P.35-24
21	E-3	P.35-20	55	ECU replacement	–
22	E-4	P.35-21			

METHOD OF CLEARING DIAGNOSIS CODE MEMORY

Caution

When servicing is finished, clear the diagnosis code memory

Trouble codes cannot be cleared from memory when the ABS-ECU system is in fail safe mode. Proceed to diagnosis and repair.

(1) Clear memory using MUT or MUT-II
(2) After clearing, recheck the diagnosis codes, and check that memory is cleared.

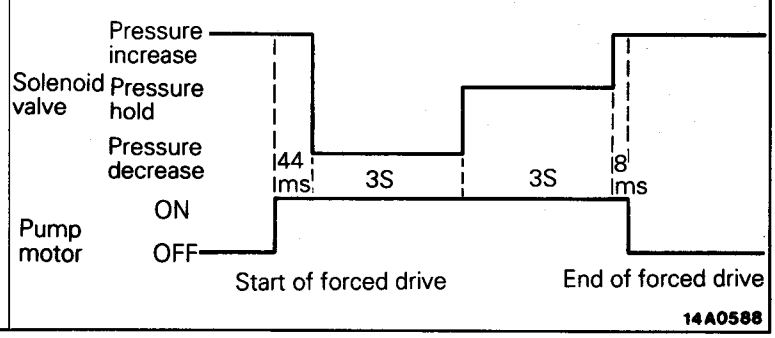
ACTUATOR TEST FUNCTION

The actuator can be forcibly driven in the following way by using the MUT or MUT-II

NOTE

(1) The actuator test cannot be carried out when the ABS ECU system is in fail safe mode.
(2) When using forced drive using the MUT or MUT-II, the vehicle must be stopped.
(3) During forced drive using the MUT or MUT-II, forced drive operation is stopped when any wheel speed reaches 10 km/h (6 mph).

Actuator test specifications

No.	Drive solenoid valve and motor	Drive pattern
04	Solenoid valve and pump motor for each HU corres-ponding channel. <Manual pattern>	
05		

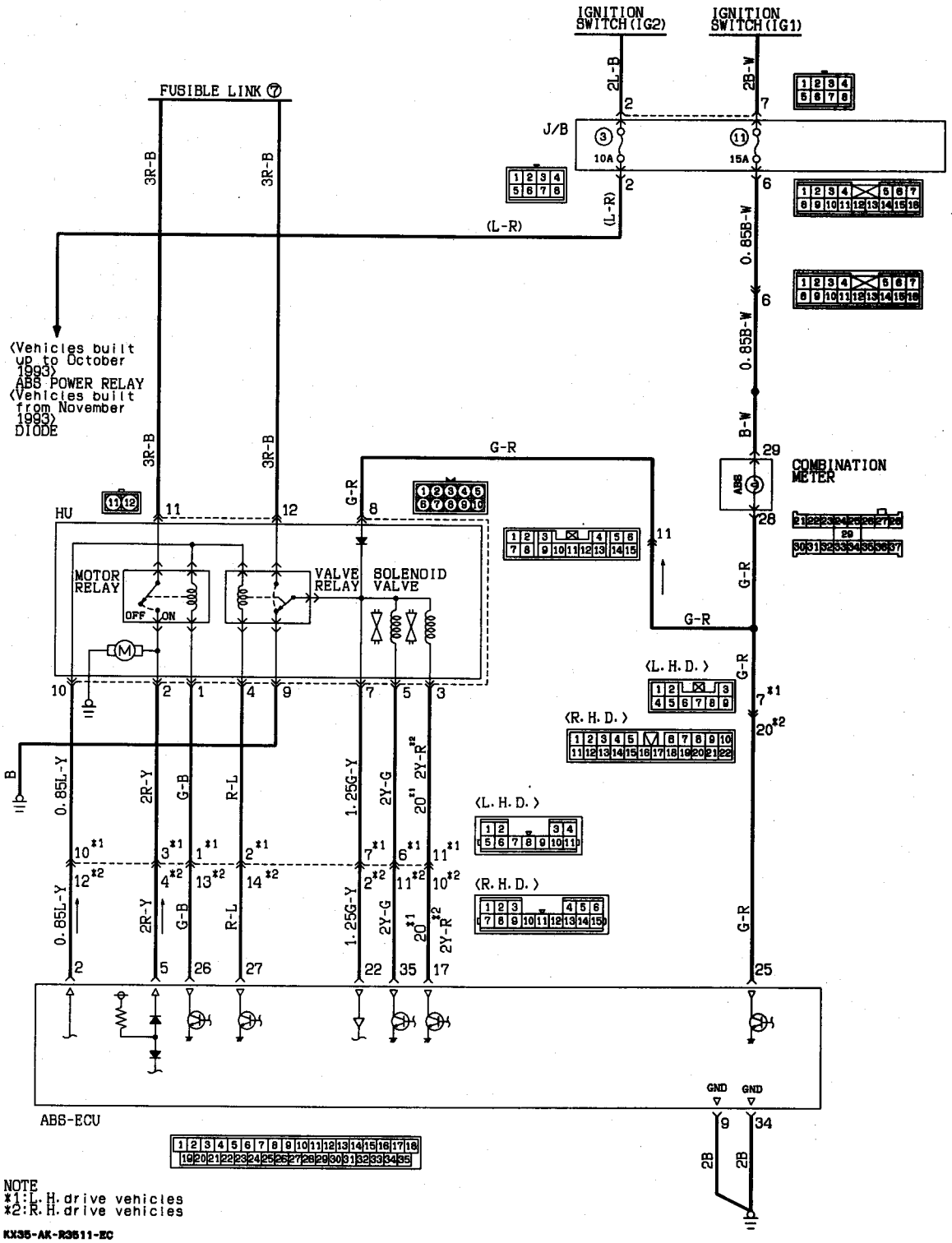
A	ABS warning lamp does not light at all.

[Explanation]

When it does not light up at all, there is a strong possibility that there is trouble with ABS warning lamp or with power to the lamp.

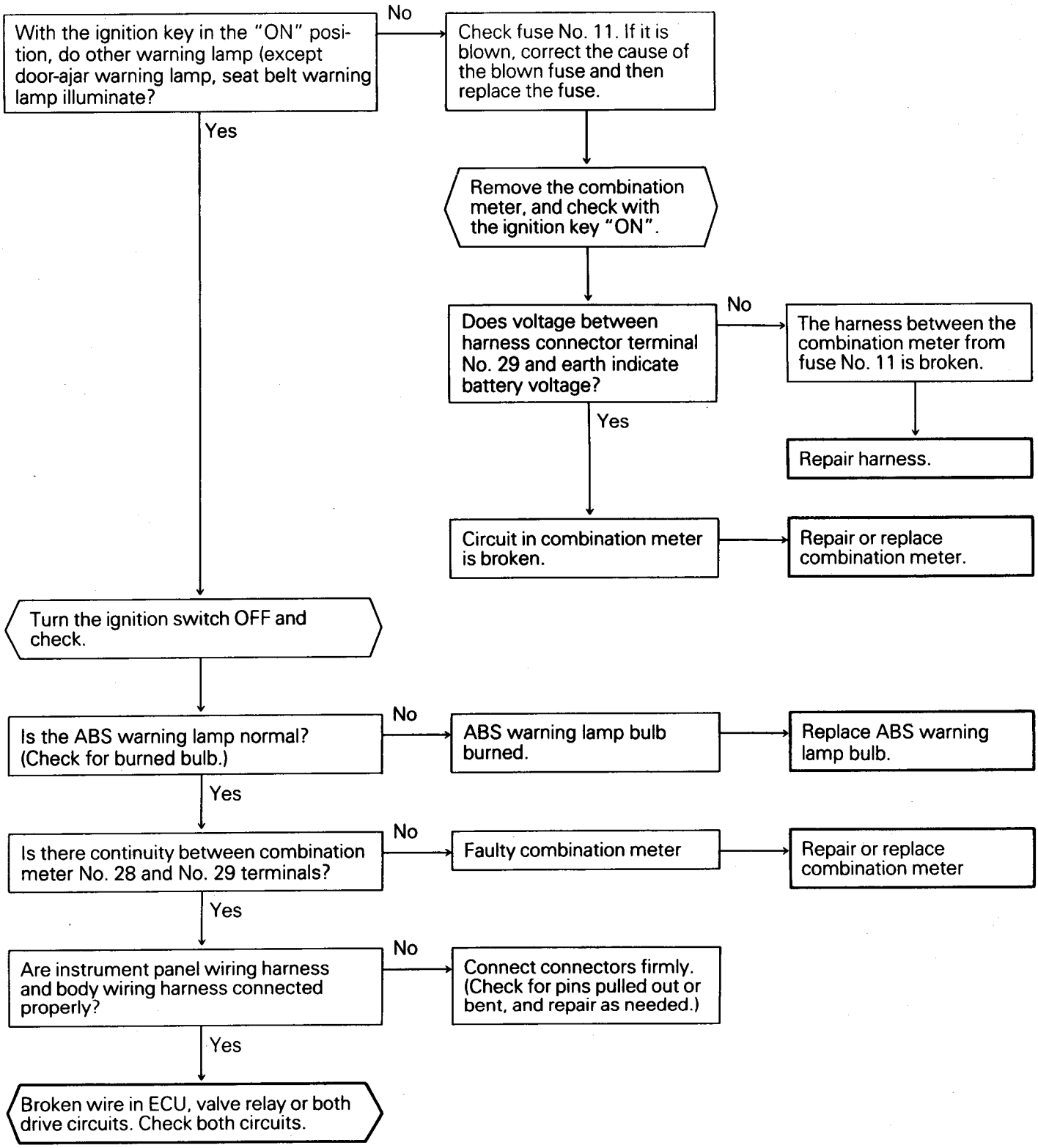
[Hint]

If other warning lamp do not light up either, fuse is probably blown.



NOTE
*1: L.H. drive vehicles
*2: R.H. drive vehicles

KX35-AK-R3511-EC



Check ABS ECU.

↓

Remove the ECU connector and check.

↓

Does the voltage between ECU harness connector terminal No. 25 and earth indicate battery voltage while the ignition key is in the "ON" position?

No → Broken wire between ABS warning lamp and ECU → Repair harness.

Yes → ABS ECU malfunction → Replace ABS ECU.

Check valve relay.

↓

Remove valve relay and check.

↓

Is valve relay normal? (Refer to P.35-41.)

No → Valve relay malfunction → Replace valve relay.

Yes

↓

Install the valve relay, remove the HU connector and check.

↓

Does voltage between the HU harness connector terminal No. 8 and earth indicate battery voltage while the ignition key is in the "ON" position?

No → Broken harness wire between ABS warning lamp and HU → Repair harness.

Yes

↓

Is there continuity between HU harness connector terminal No. 9 and earth?

No → Broken harness wire between HU and earth → Repair harness.

Yes

↓

Is there continuity between HU harness connector terminals No. 8 and No. 9?

No → HU malfunction → Replace HU.

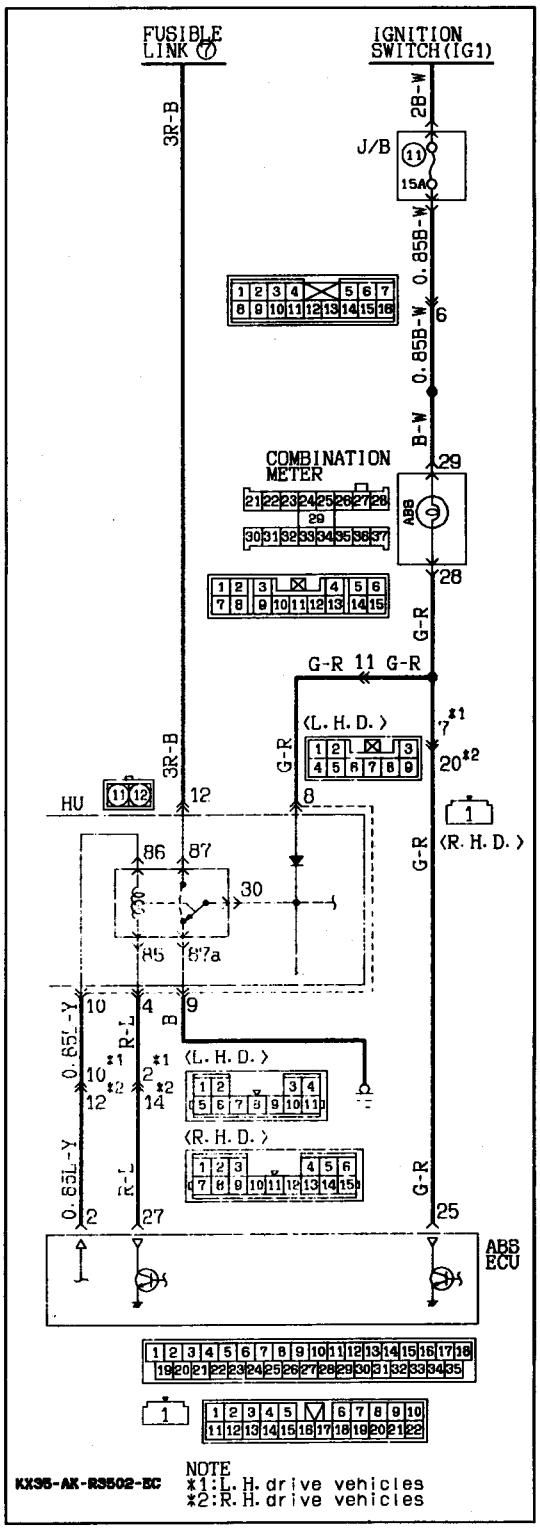
Yes → Connector not connected securely. → Replace connector.

B	ABS warning lamp stays on when the ignition key is in the "ON" position.

<Vehicles built up to October 1993>

[Explanation]

This is the symptom when the ABS ECU does not power up due to broken ECU power circuit, etc., when the fail safe function operates and isolates the system or when the warning lamp drive circuit is short circuited.

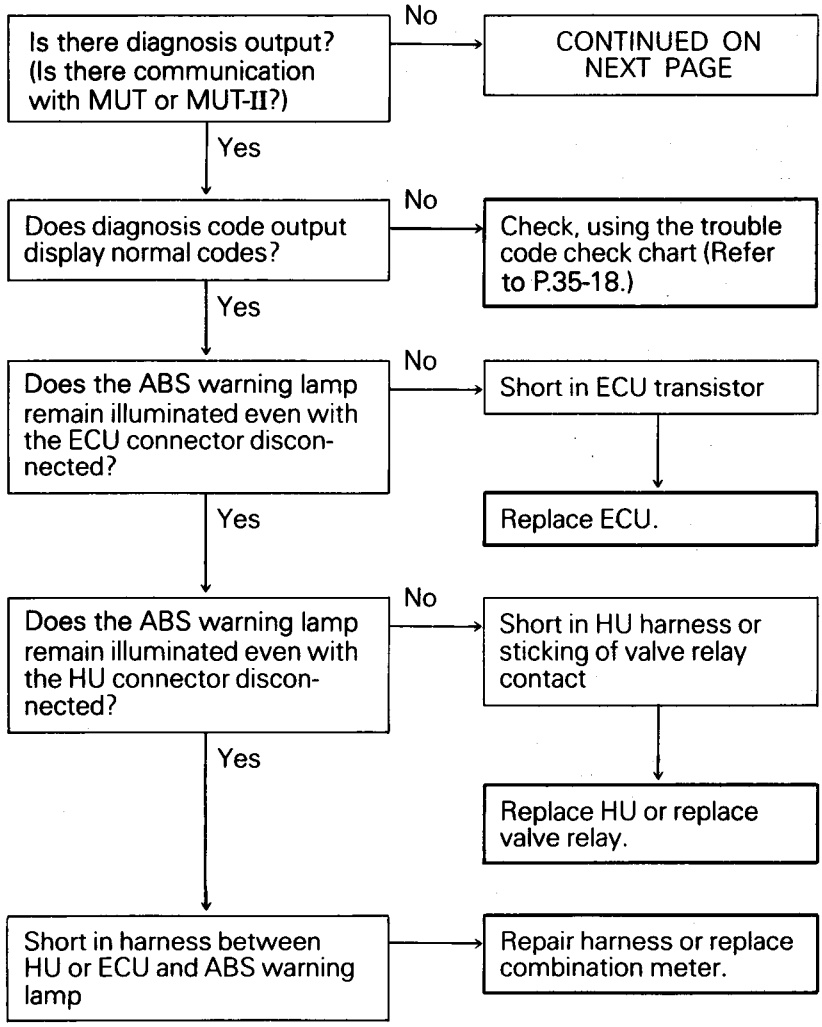


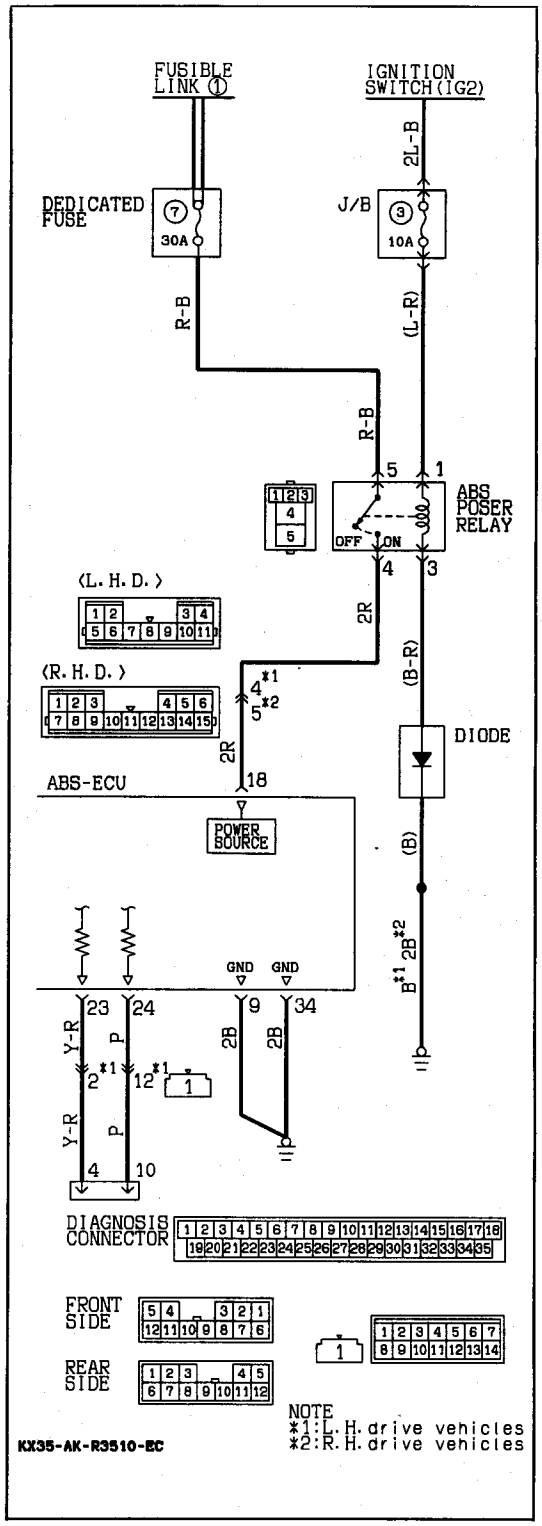
[Hint]

Check the diagnosis output and if there is no output voltage or if the MUT or MUT-II and ABS ECU cannot communicate, there is a good possibility that power is not flowing to the ECU.

Caution

If the trouble code is output, the system can be in the fail safe mode. In such a case, erase the trouble code and then restart the engine to check if the system is currently in a fault condition.





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Can other electronic control systems communicate with MUT or MUT-II?
- No → MUT or MUT-II related malfunction. Repair and recheck.
- Yes ↓

Is fuse No. 3 normal?
- No → Correct cause of blown fuse and replace fuse.
- Yes ↓

Is power relay normal? (Refer to P.35-41.)
- No → Power relay malfunction → Replace power relay.
- Yes ↓

Disconnect ECU connector and check harness connector

↓

With the ignition key in the "ON" position, does voltage between ECU connector terminal No. 18 and earth indicate the battery voltage?
- No → Harness wire between power relay and ECU is broken → Repair harness.
- Yes ↓

Is there continuity between body harness terminals No. 9 and No. 34 and earth?
- No → ECU earth line broken → Repair harness.
- Yes ↓

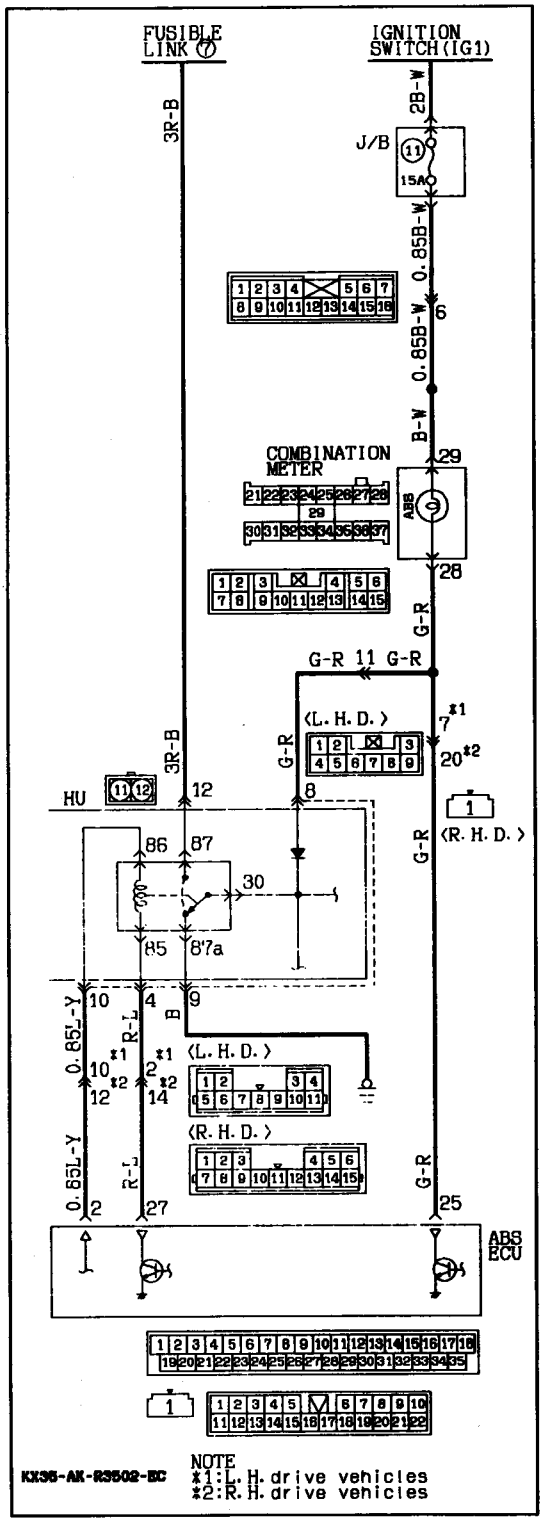
Is there continuity between body harness connector terminals No. 23 and No. 24, and diagnosis inspection terminals No. 4 & No. 10?
- No → Harness wire between diagnosis inspection terminal and ABS ECU is broken. → Repair harness.
- Yes ↓

Malfunction of ABS ECU → Replace ABS ECU.

<Vehicles built from November 1993>

[Explanation]

This is the symptom when the ABS ECU does not power up due to broken ECU power circuit, etc., when the fail safe function operates and isolates the system or when the warning lamp drive circuit is short circuited.

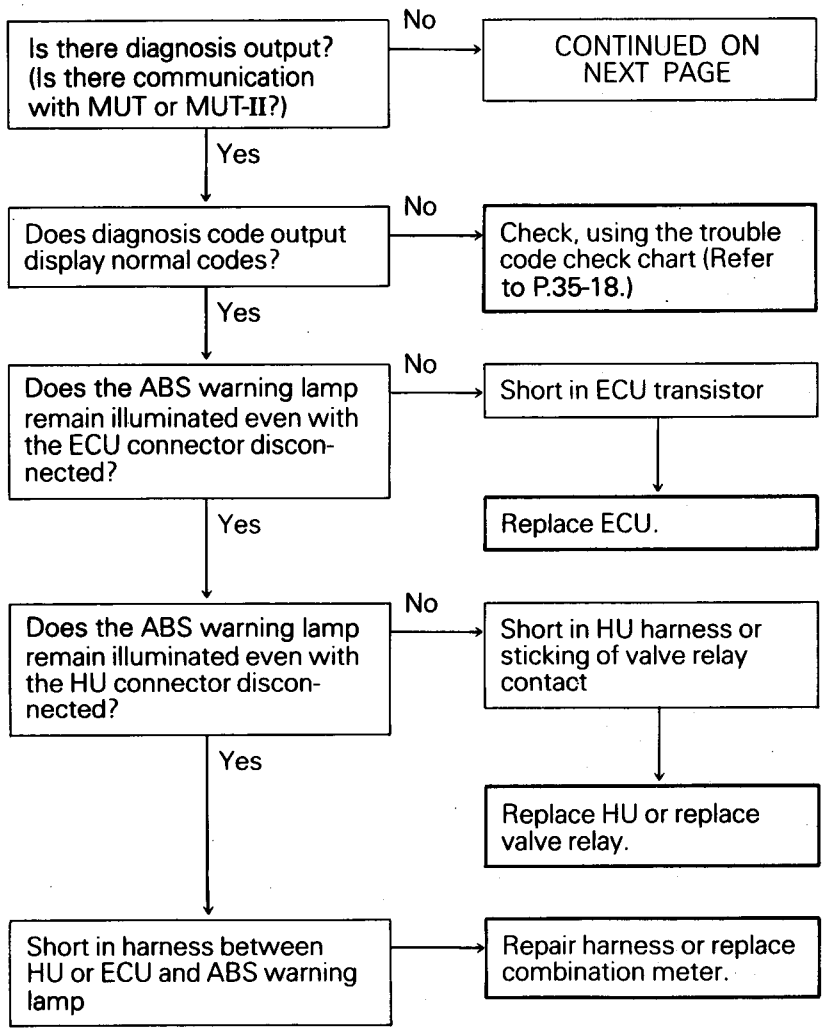


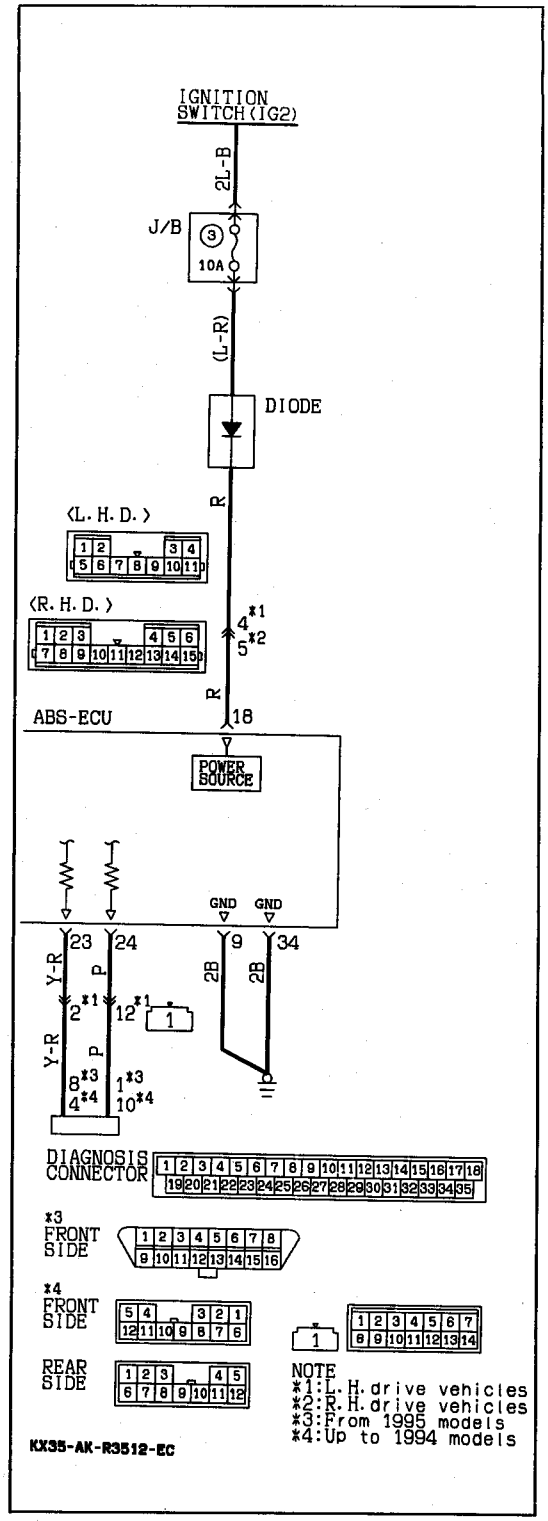
[Hint]

Check the diagnosis output and if there is no output voltage or if the MUT or MUT-II and ABS ECU cannot communicate, there is a good possibility that power is not flowing to the ECU.

Caution

If the trouble code is output, the system can be in the fail safe mode. In such a case, erase the trouble code and then restart the engine to check if the system is currently in a fault condition.





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Can other electronic control systems communicate with MUT or MUT-II?
- No → MUT or MUT-II related malfunction Repair and recheck.
- Yes ↓

Is fuse No. 3 normal?
- No → Correct cause of blown fuse and replace fuse.
- Yes ↓

Disconnect ECU connector and check harness connector

Yes ↓

With the ignition key in the "ON" position, does voltage between ECU connector terminal No. 18 and earth indicate the battery voltage?
- No → Harness wire between power relay and ECU is broken → Repair harness.
- Yes ↓

Is there continuity between body harness terminals No. 9 and No. 34 and earth?
- No → ECU earth line broken → Repair harness.
- Yes ↓

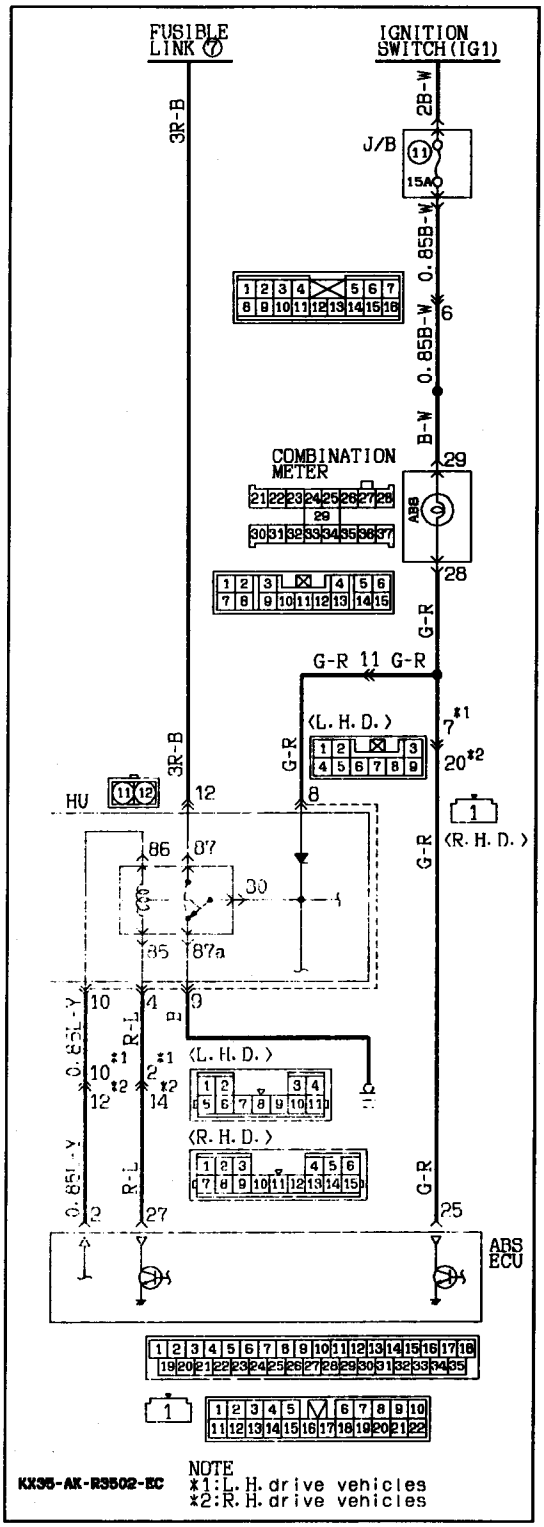
Is there continuity between body harness connector terminals No. 23 and No. 24, and diagnosis inspection terminals No. 4 & No. 10 or No. 8 & No. 1?
- No → Harness wire between diagnosis inspection terminal and ABS ECU is broken. → Repair harness.
- Yes ↓

Malfunction of ABS ECU → Replace ABS ECU.

C	ABS warning lamp does not illuminate when the ignition key is in the "START" position.

[Explanation]

The ABS ECU uses the IG_2 power source which is turned off in the "START" position. The ABS warning light uses the IG_1 power source which is not turned off even in the "START" position. Consequently, in the "START" position, power is off and the ECU turns the valve relay OFF. If the warning lamp does not illuminate at this time, there is trouble in the warning lamp circuit on the valve relay side.



Remove the hydraulic unit (HU) connector and junction block No. 3 fuse (ECU) and check them.

With the ignition key in the "ON" position, does voltage between body connector terminal No. 8 and earth indicate the battery voltage?
- No → Harness wire between HU and warning lamp is broken.
- Yes ↓

Is there continuity between body connector terminal No. 9 and earth?
- No → Broken line between HU and body earth
- Yes ↓

Is there continuity between HU connector terminal No. 8 and terminal No. 9? *
- No → Valve relay malfunction or break in HU harness wire
- Yes ↓

Remove the valve relay. Is there continuity between terminal No. 87a and No. 30?
- No → Valve relay malfunction → Replace valve relay.
- Yes ↓

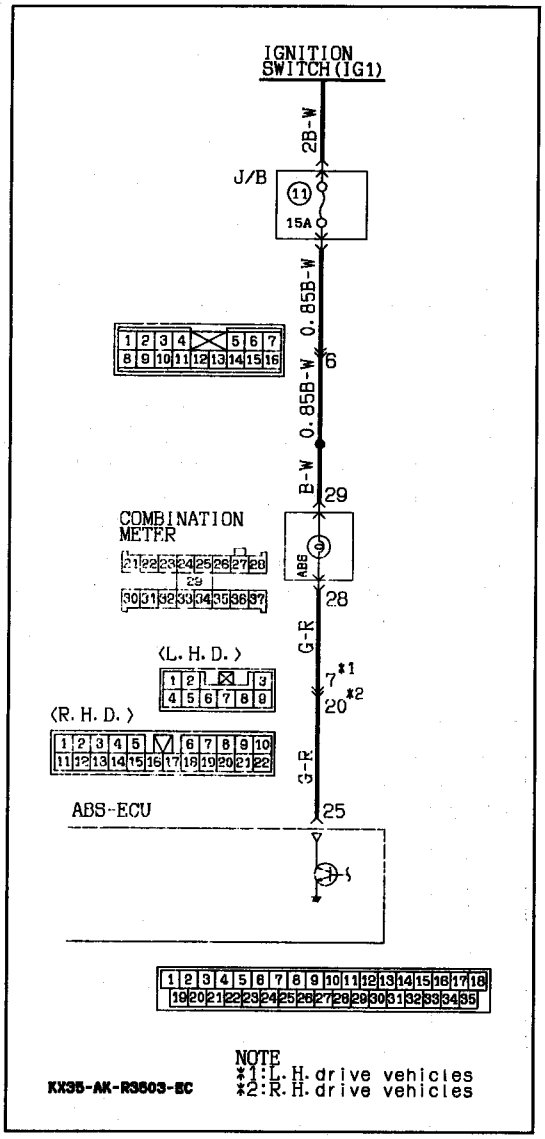
HU harness malfunction → Replace HU.

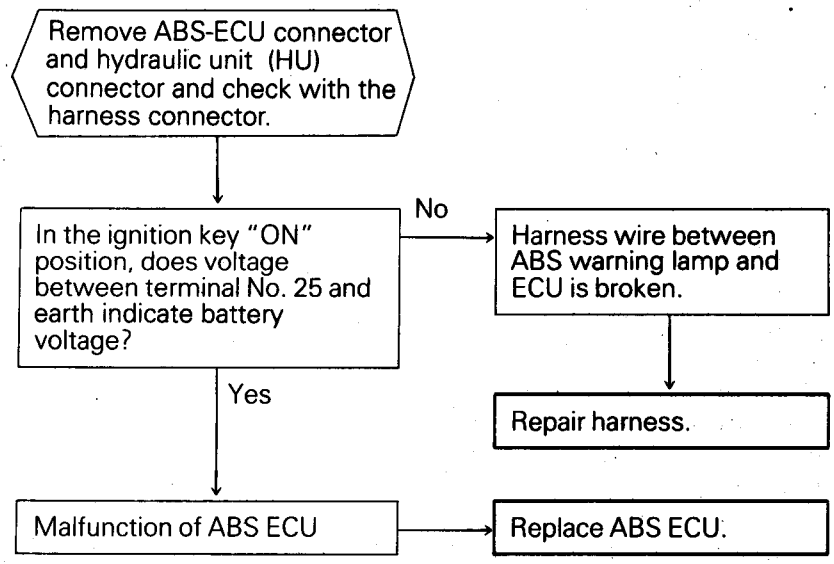
NOTE
When performing the check marked *, note polarity of the diode (refer to the circuit diagram).

D	**ABS warning lamp blinks once after the ignition key is turned to the "ON" position. It illuminates in the "START" position and blinks once again when turned to the "ON" position.**

[Explanation]

When power flows, the ABS ECU turns on the warning lamp for approximately 1 sec. while it performs a valve relay test. If there is a break in the harness between the ECU and the warning lamp, the lamp illuminates only when the valve relay is off in the valve relay test, etc.





E-1 When the following diagnosis codes are displayed No. 11, No. 12, No. 13, No. 14

[Explanation]

The ABS ECU detects breaks in the wheel speed sensor wire. This trouble code is output if the wheel speed sensor signal is not input (or short circuited) or if its output is low when starting to drive or while driving.

[Hint]

In addition to a broken wire/short circuit in the wheel speed sensor, also check whether the sensor gap is too large, sensor harness wire is broken, or sensor harness and body connector are not properly connected.

E-2 When diagnosis code No. 15 is displayed

[Explanation]

This trouble code is output when there is an abnormality (other than broken wire or short circuit) in any of the wheel speed sensor output signals while driving.

[Hint]

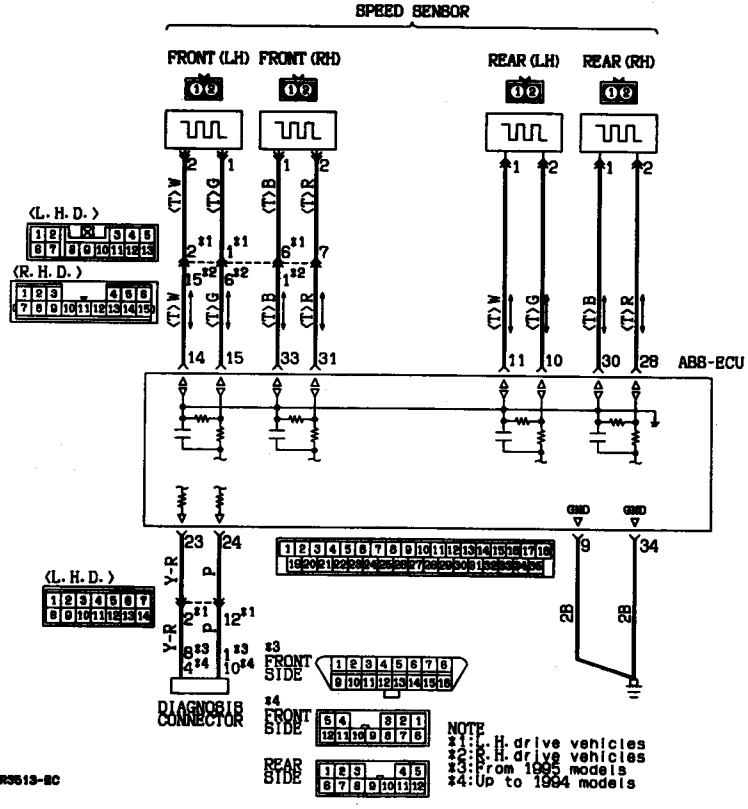
The following can be considered as the cause of the wheel speed sensor output abnormality.

- Distortion of rotor, teeth missing
- Low frequency noise interference when sensor harness wire is broken
- Noise interference in sensor signal
- Sensor output signal is below the standard value or amplitude modulation is over the standard value. Using an oscilloscope to measure the wave shape of the wheel speed sensor output signal is very effective.
- Broken sensor harness
- Poor connection of connector

NOTE

(1) If contact is poor, check the sensor cable by bending and lightly stretching it.

(2) Except for the case where a fault condition exists in the system, but the inspection results are normal; if an abnormality cannot be found in the sensor circuit displayed as abnormal, erase the diagnosis code and turn the ignition switch to OFF once, and then test-drive again.
If the same trouble code is output, replace the ABS ECU. If the trouble does not occur anymore, the problem is likely to be with the ABS ECU.
(If the trouble is in the speed sensor circuit, but is difficult to recreate, it will recur even after the ABS ECU has been replaced.)



Check flow connected with wheel speed sensor

NOTE
Check speed sensor harness and connector connection and then observe with oscilloscope. (Refer to P.35-36.)

Is the resistance value of the wheel speed sensor part normal? (Refer to P. 35-59)
Standard value:
<Internal resistance> 0.8–1.2 kΩ
<Insulation resistance> 100kΩ

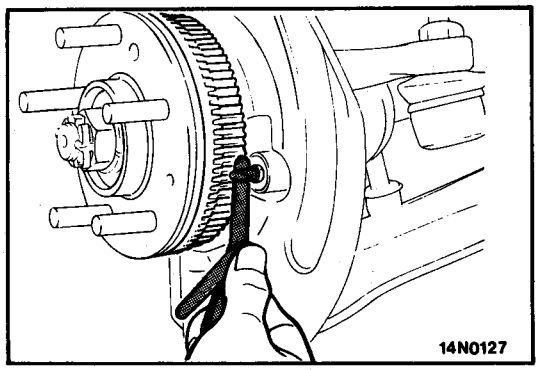
No → Malfunction of wheel speed sensor → Replace wheel speed sensor

Yes ↓

Is the resistance value at the ECU connector normal?
Standard value: 0.8 – 1.2 kΩ

No → Harness wire for wheel speed sensor circuit is broken → Repair harness.

Yes ↓



Is the front wheel speed sensor-to-rotor clearance normal?
Standard value:
0.3–0.9 mm (0.012–0.035 in.)

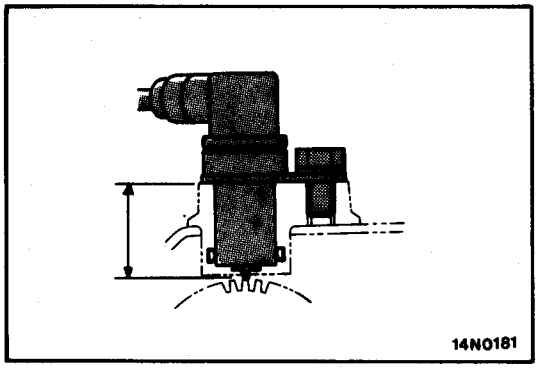
No → Adjust the gap between the wheel speed sensor and rotor.

Yes ↓

Are there any abnormalities such as a loose rear speed sensor mounting bolt?

No → Retighten or correct abnormalities.

Yes ↓



Is the rear speed sensor mounting surface-to-rotor tooth flank (all around) distance normal?
Standard value:
28.15 – 28.45 mm (1.11 – 1.12 in.)

No → Replace rear axle shaft or rotor (refer to GROUP 27 – Axle Shaft.)

Yes ↓

Is the wheel speed sensor rotor normal, with no missing or damaged teeth?

No → Replace rotor that has missing or damaged teeth.

Yes ↓

Check the output of each wheel speed sensor with an oscilloscope, including the waveform. (Refer to P.35-36.) Is the output voltage for each wheel speed sensor over the standard value and is the waveform normal?

No → Recheck if below the standard value or if the sensor has a poor waveform. Replace sensor or rotor.

Yes ↓

If the above checks are normal, there is a malfunction of ABS ECU when this trouble code reoccurs often.

→ Replace the ABS ECU and check that the trouble code does not reoccur.

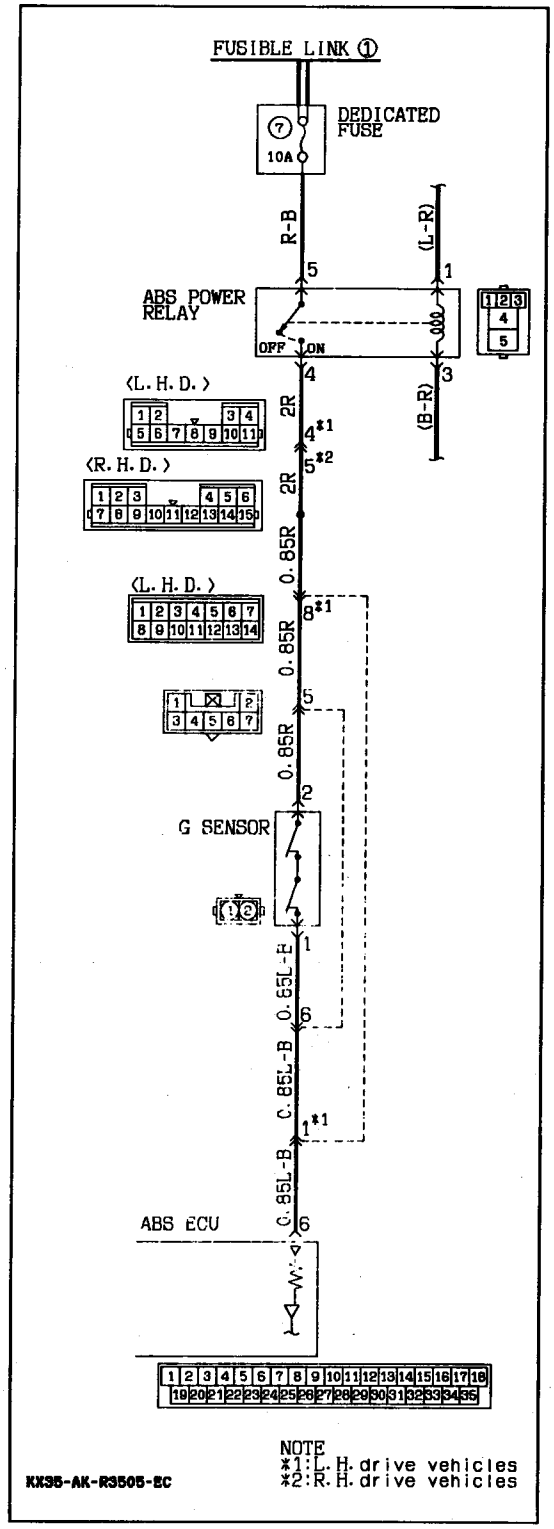
E-3	When diagnosis code No. 21 is displayed

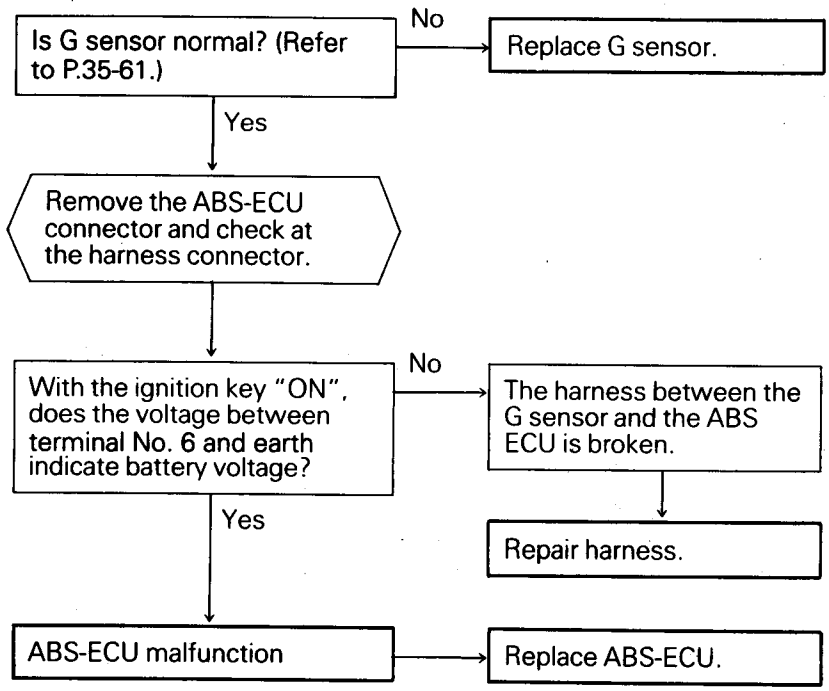
<Vehicles built up to October 1993>

[Explanation]

The ABS-ECU outputs this trouble code in the following cases.

- G sensor OFF trouble (It is judged that the G sensor continues to be OFF for more than approximately 13 seconds except when the vehicle is stopped or when there is stop lamp switch input.)
- When there is a broken wire or short circuit in the harness for the G sensor system.

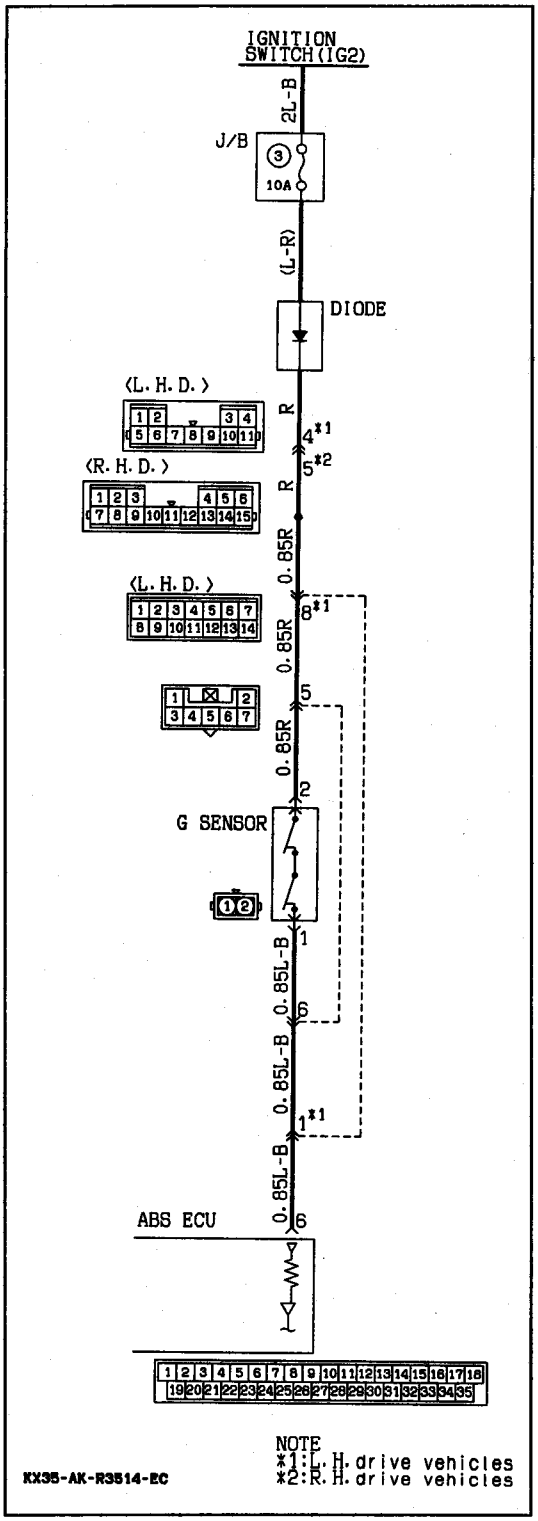


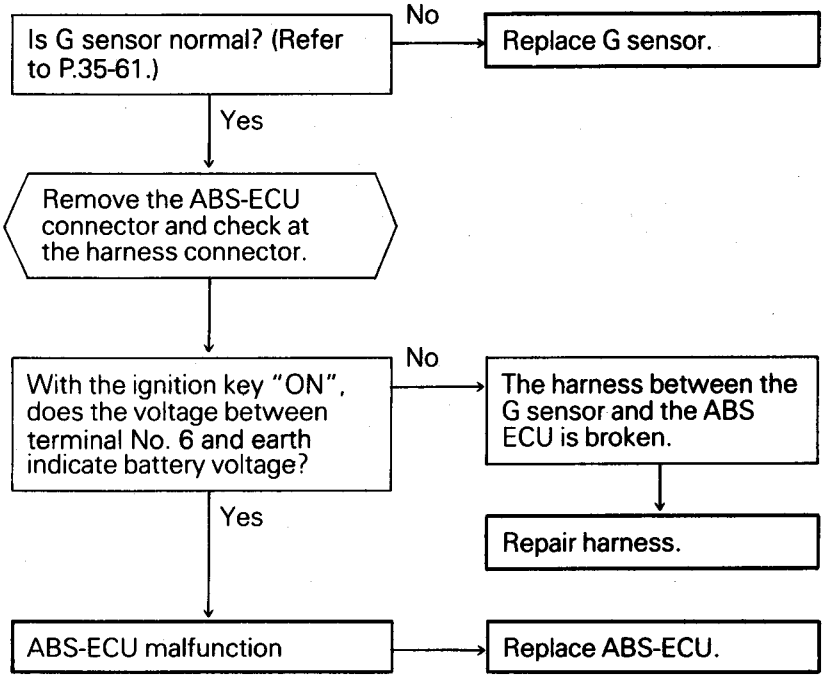


<Vehicles built from November 1993>
[Explanation]

The ABS-ECU outputs this trouble code in the following cases.

- G sensor OFF trouble (It is judged that the G sensor continues to be OFF for more than approximately 13 seconds except when the vehicle is stopped or when there is stop lamp switch input.)
- When there is a broken wire or short circuit in the harness for the G sensor system.





NOTES

E-4 When diagnosis code No. 22 is displayed

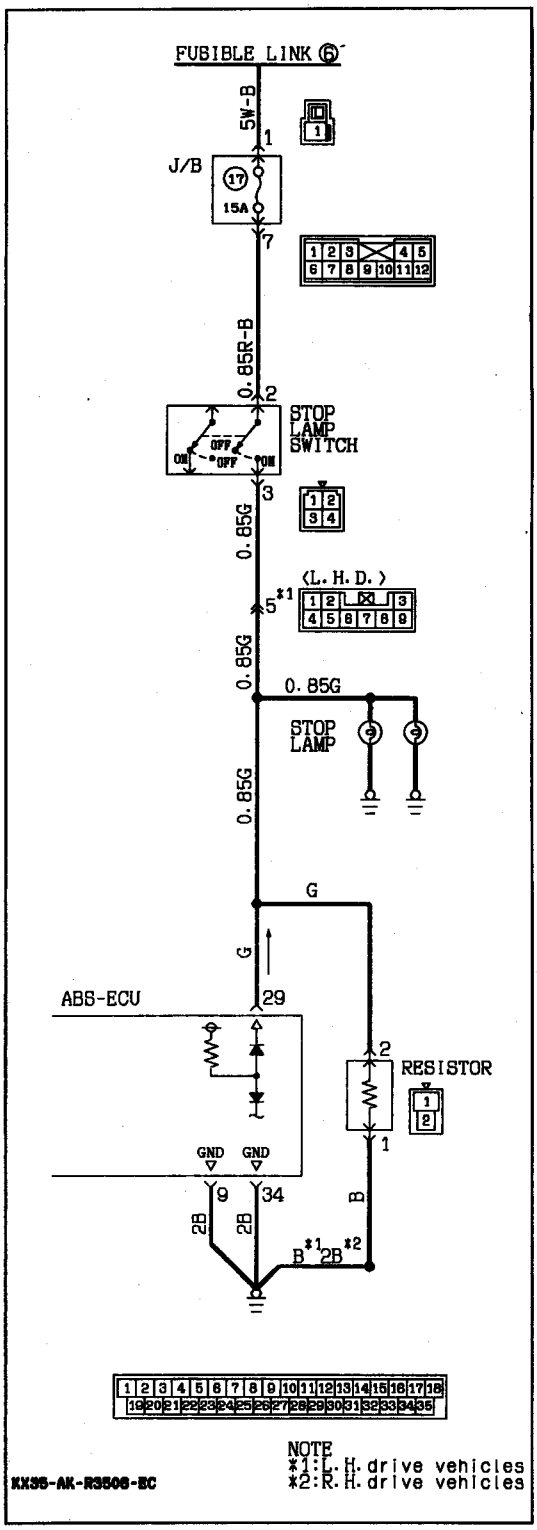
[Explanation]

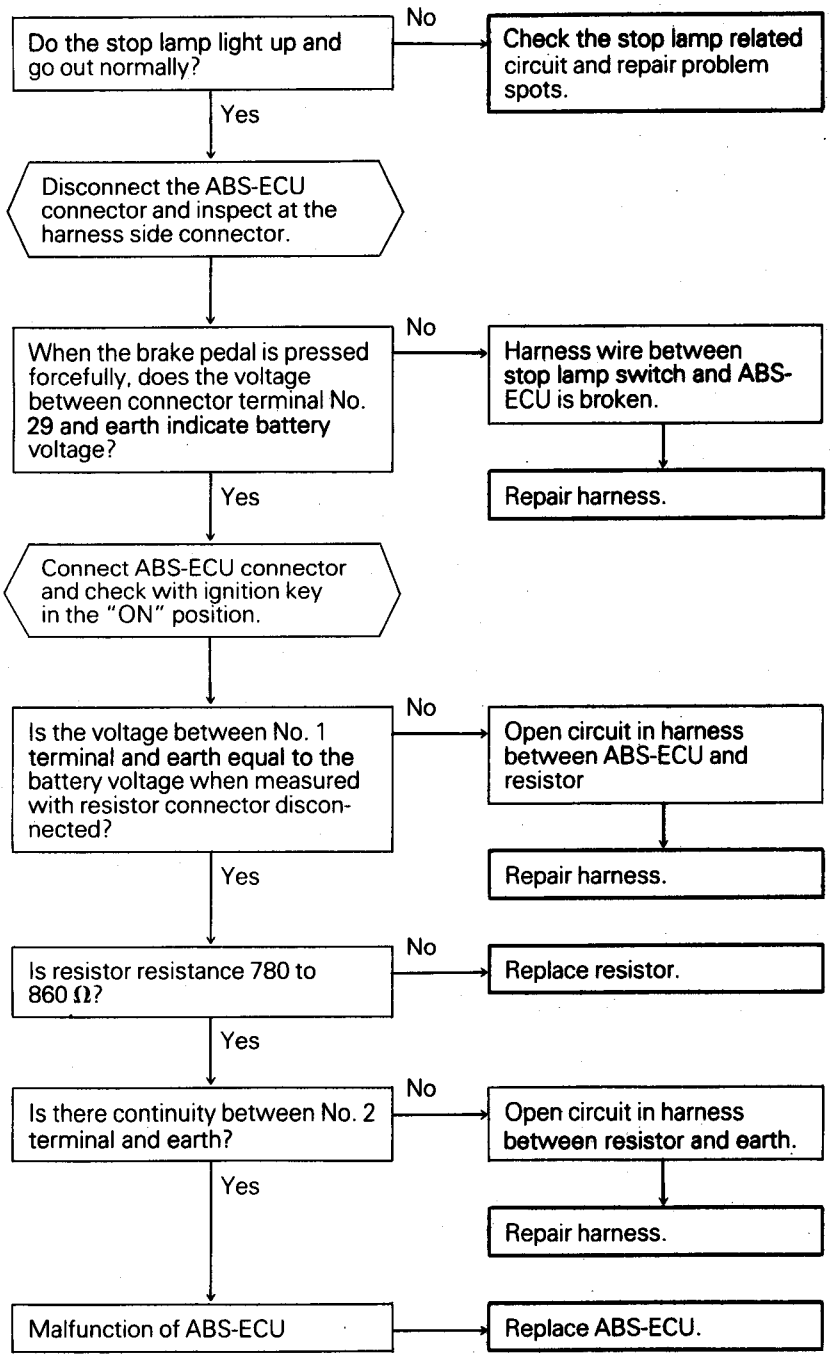
The ABS-ECU outputs this trouble code in the following cases.

- Stop lamp switch remains on for more than 15 minutes while the ABS is not functioning.
- The harness wire for the stop lamp switch may be open.

[Hint]

If the stop lamp operates normal, the harness for the stop lamp switch input circuit is broken or there is a malfunction in the ABS-ECU.

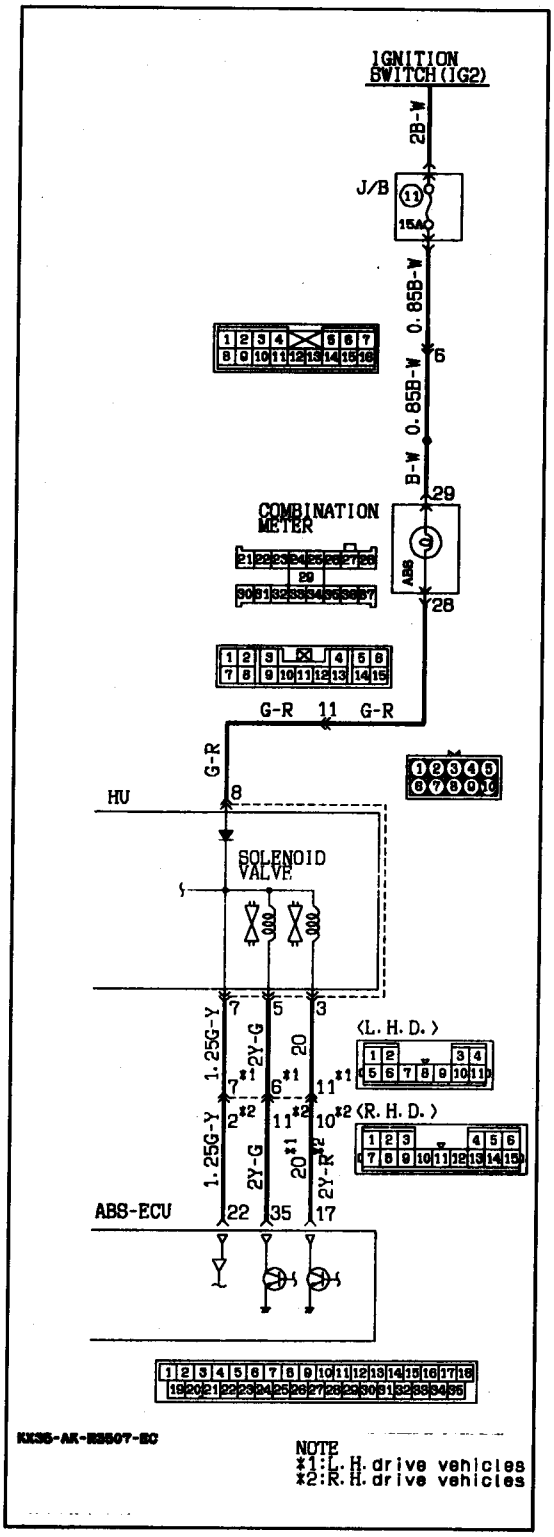




E-5	When diagnosis codes No. 41, No. 42, No. 43 are displayed.

[Explanation]

The ABS-ECU normally monitors the solenoid valve drive circuit.
If no current flows in the solenoid even if the ECU turns the solenoid ON or if it continues to flow even when turned OFF, the ECU determines the solenoid coil wire is broken/short-circuited or the harness is broken/short-circuited, and then these trouble codes are output.
ABS-ECU controls the solenoid valve current and if the current value of the solenoid valves differs from each other in the same mode, solenoid valve drift error is produced and the ABS-ECU goes into the failsafe mode.



Remove HU 10P connector and check with the HU side connector.

↓

In the resistance value for the solenoid valve within the range of the standard values?
Standard value: 1.0–1.3Ω

No → Replace HU.

Yes ↓

Connect HU 10P connector, disconnect ECU connector and check.

↓

Is the solenoid valve resistance value within the range of the standard values when measured at the ECU connector?
Standard value: 1.0–1.3Ω

No → The harness wire for the solenoid valve circuit whose resistance value is outside the range of the standard value is broken or short circuited.

→ Repair harness.

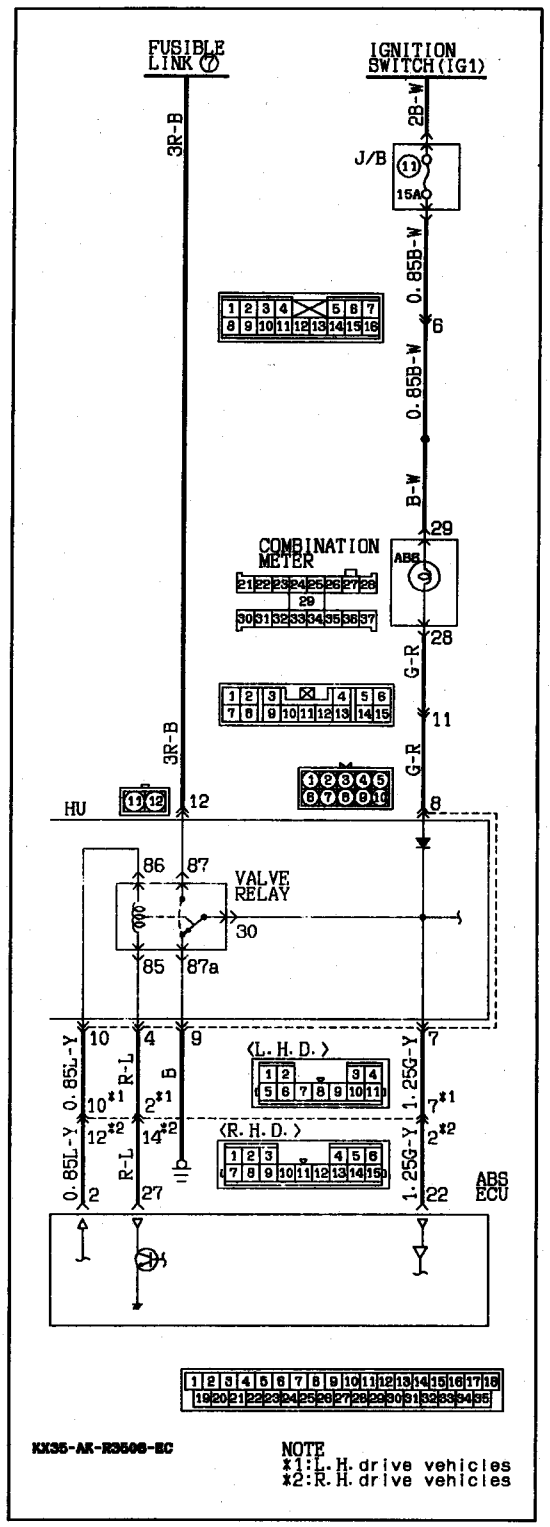
Yes ↓

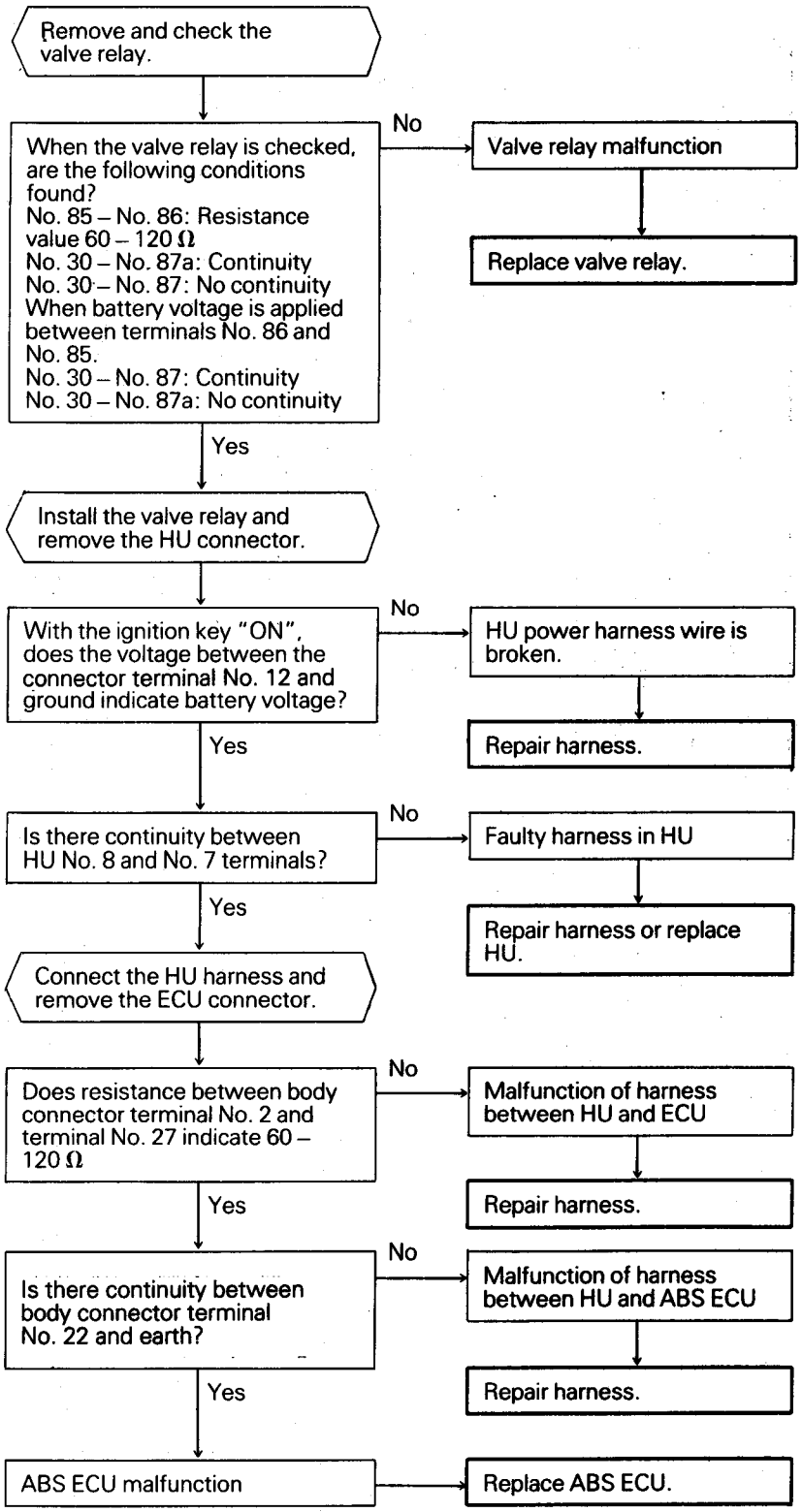
Malfunction of ABS-ECU → Replace ABS-ECU.

E-6 When diagnosis code No. 51 is displayed

[Explanation]

When the ignition switch is turned ON, the ABS ECU switches the valve relay OFF and ON for an initial check, compares the voltage of the signal to the valve relay and valve power monitor line voltage to check whether the valve relay operation is normal. In addition, normally it monitors whether or not there is power in the valve power monitor line since the valve relay is normally ON. If the supply of power to the valve power monitor line is interrupted, this trouble code will be output.





E-7 When diagnosis code No. 52 is displayed

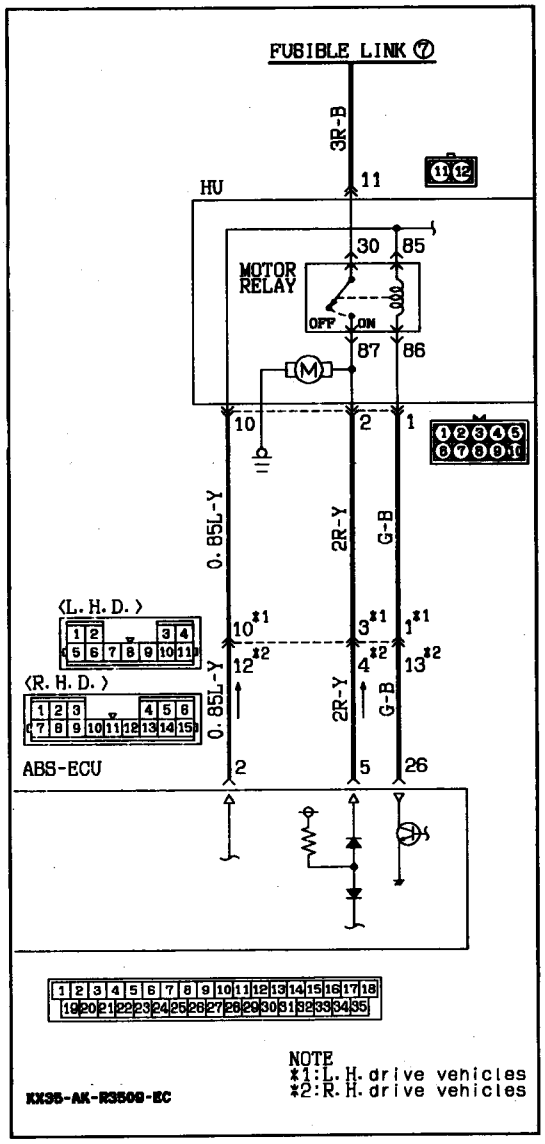
[Explanation]

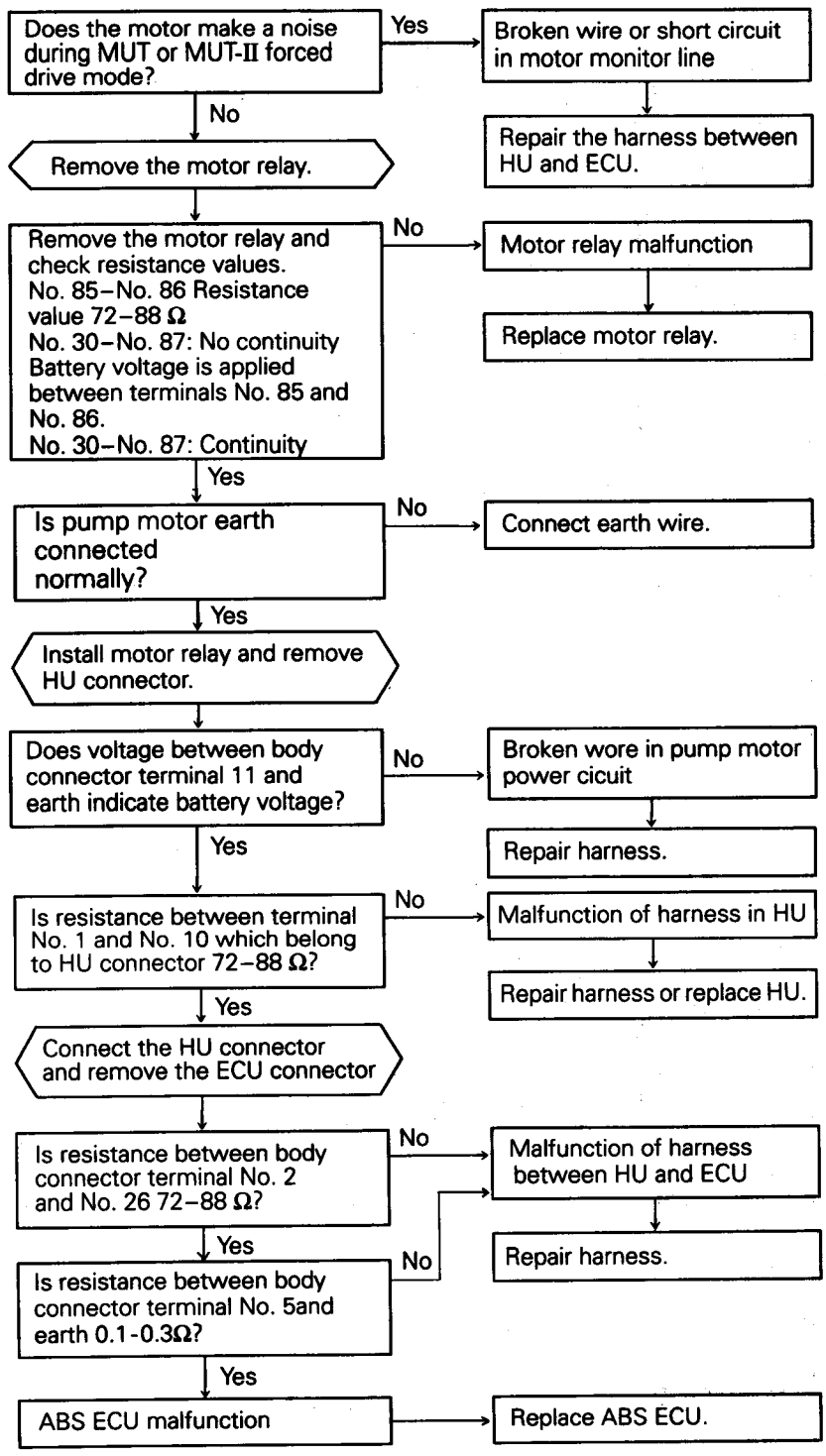
The ABS ECU outputs this trouble code for the motor relay and motor in the following cases.

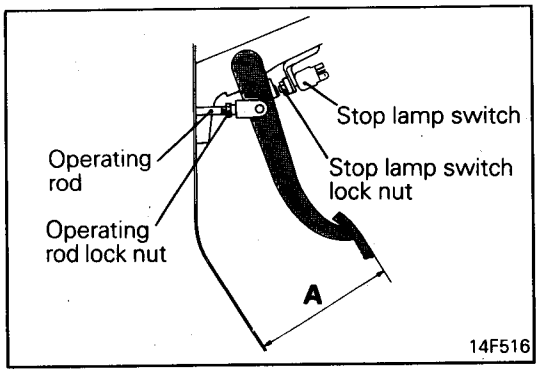
- When the motor relay does not function
- When there is trouble with the motor itself and it does not revolve
- When the motor ground is disconnected and the motor does not revolve
- When the motor continues to revolve

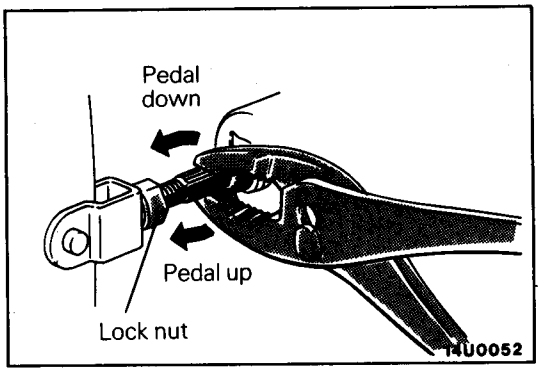
[Hint]

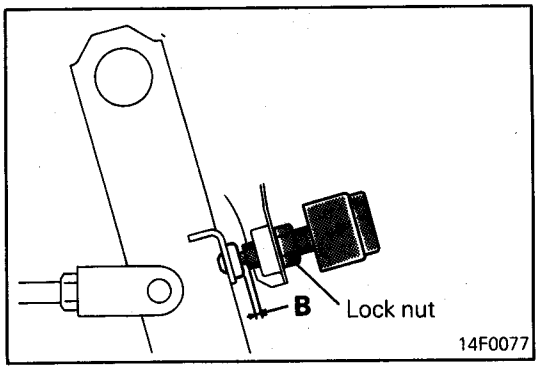
If there is motor operation noise during MUT or MUT-II forced drive mode, there is a broken or short circuited motor monitor wire.

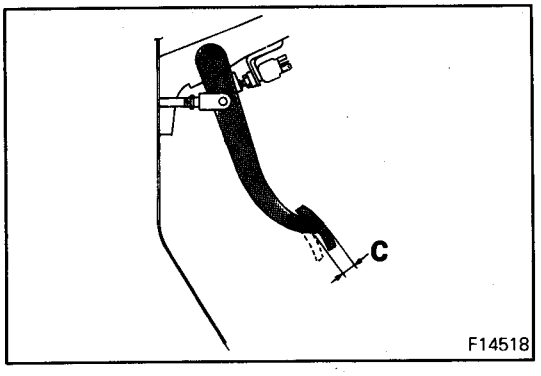


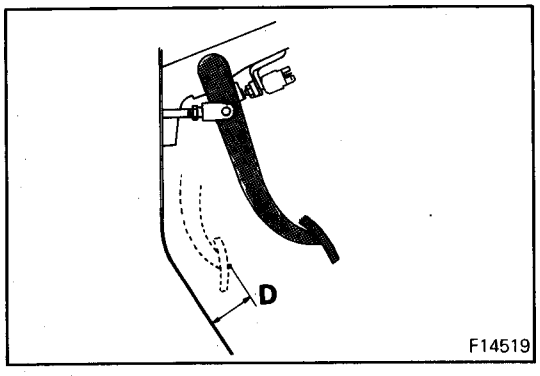












SERVICE ADJUSTMENT PROCEDURES

E35FAAK

BRAKE PEDAL INSPECTION AND ADJUSTMENT

1. Measure the brake pedal height as illustrated. If the brake pedal height is not within the standard value, adjust as follows.

   Standard value (A): 177 – 182 mm (7.0 – 7.2 in.)

   (1) Disconnect the stop lamp switch connector, lossen the lock nut, and move the stop lamp switch to a position where it does not contact the brake pedal arm.
   (2) Adjust the brake pedal height by turning the operating rod with pliers (with the operating rod lock nut loosened), until the correct brake pedal height is obtained.
   (3) After screwing in the stop lamp switch until it contacts the brake pedal stopper (just before the brake pedal is caused to move), return the stop lamp switch 1/2 to 1 turn and secure by tightening the lock nut.

   (4) Connect the connector of the stop lamp switch.
   (5) Check to be sure that the stop lamp is not illuminated with the brake pedal unpressed.

   Reference value (B): 0.5–1.0 mm (0.02–0.04 in.)

2. With the engine stopped, depress the brake pedal two or three times. After eliminating the vacuum in the power brake booster, press the pedal down by hand, and confirm that the amount of movement before resistance is met (the free play) is within the standard value range.

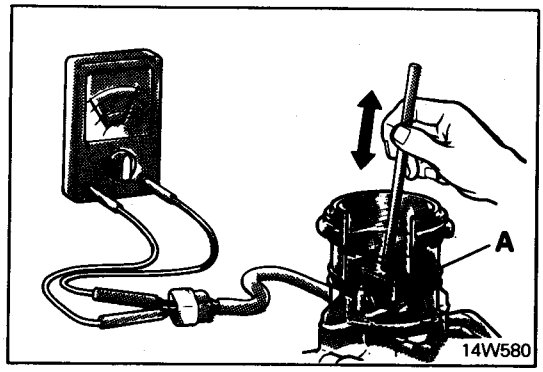
   Standard value (C): 3–8 mm (0.1–0.3 in.)

   If the free play is less than the standard value, confirm that the clearance between the stop lamp switch and brake pedal is within the standard value.
   If the free play exceeds the standard value, it is probably due to excessive play between the clevis pin and brake pedal arm. Check for excessive clearance and replace faulty parts as required.

3. Start the engine, depress the brake pedal with approximately 500 N (50 kg, 110 lbs.) of force, and measure the clearance between the brake pedal and the floorboard.

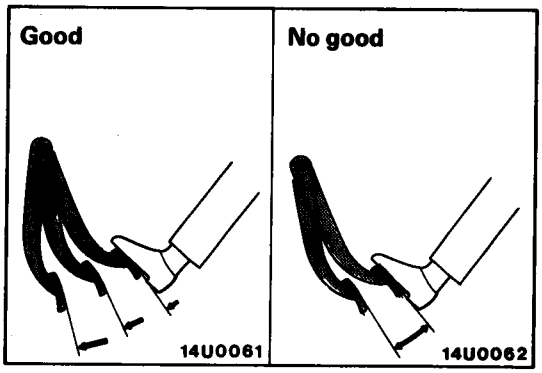
   Standard value (D): 80 mm (3.1 in.) or more

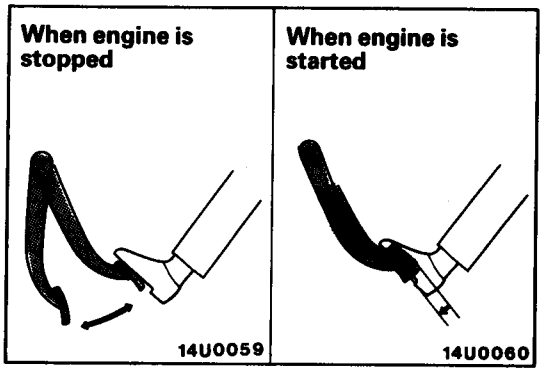
   If the clearance is less than the standard value, check for air trapped in the brake line and for brake fluid leaks. If necessary, check the brake system mechanism (excessive shoe clearance due to faulty auto adjuster) and repair faulty parts as required.



BRAKE FLUID LEVEL SENSOR CHECK E35FBAH

1. Connect a circuit tester to the brake fluid level sensor.
2. Move the float from top to bottom and check for continuity.
3. The brake fluid level sensor is in good condition if there is no continuity when the float surface is above "A", and if there is continuity when the float surface is below "A".





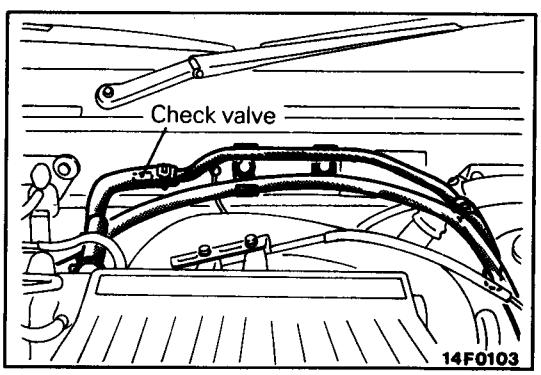
BRAKE BOOSTER OPERATING INSPECTION

E35FCAF

For simple checking of brake booster operation, carry out the following tests.

1. Run the engine for one or two minutes, and then stop it.
2. Step on the brake pedal several times with normal pressure.
   If the pedal depresses fully the first time but gradually becomes higher when depressed succeeding times, the booster is operating properly.
   If the pedal height remains unchanged, the booster is faulty.
3. With the engine stopped, step on the brake pedal several times with the same pressure to make sure that the pedal height will not change.
   Then step on the brake pedal and start the engine.
   If the pedal moves downward slightly, the booster is in good condition. If there is no change, the booster is faulty.
4. With the engine running, step on the brake pedal and then stop the engine.
   Hold the pedal depressed for 30 seconds. If the pedal height does not change, the booster is in good condition. If the pedal rises, the booster is faulty.

If the above three tests are okay, the booster performance can be determined as good.
If one of the above three tests is not okay at last, the check valve, vacuum hose, or booster will be faulty.

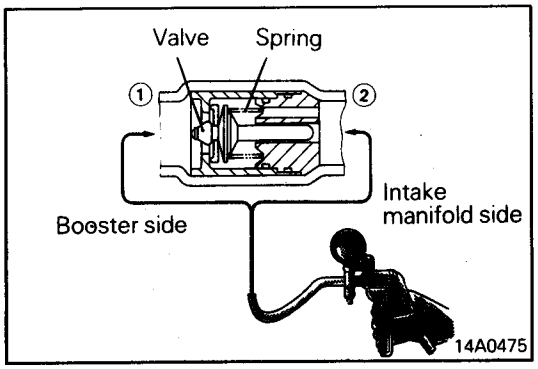


CHECK VALVE OPERATION CHECK E35FEAM

When checking the check valve, keep the check valve fit in the vacuum hose.

1. Remove the vacuum hose.

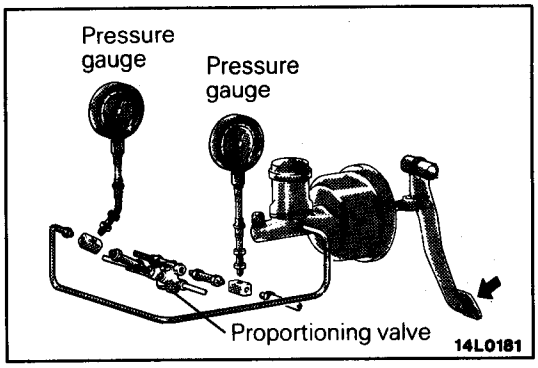
   Caution
   The check valve is press-fit inside the vacuum hose and do not remove the check valve from the vacuum hose.

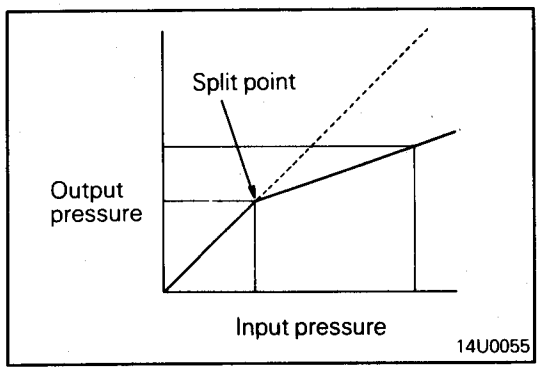


2. Check the operation of the check valve by using a vacuum pump.

Vacuum pump connection	Accept/reject criteria
Connection at the brake booster side ①	A negative pressure (vacuum) is created and held.
Connection at the intake manifold side ②	A negative pressure (vacuum) is not created.

Caution
If the check valve is defective, replace it as an assembly unit together with the vacuum hose.





PROPORTIONING VALVE FUNCTION TEST E36PKCI

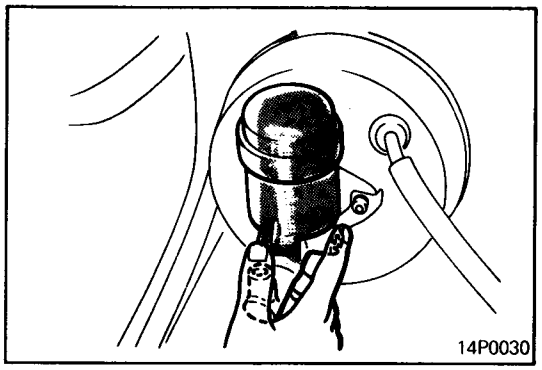
1. Connect two pressure gauges, one each to the input side and output side of the proportioning valve, as shown.
2. Air bleed the brake line and the pressure gauge.
3. While gradually depressing the brake pedal, make the following measurements and check to be sure that the measured values are within the allowable range.
   (1) Output pressure begins to drop relative to input pressure (split point).
   Standard value: 3.75–4.25 MPa (37.5–42.5 kg/cm^2, 533–604 psi)
   (2) Output fluid pressure when input fluid pressure is 6.5 MPa (65 kg/cm^2, 925 psi)
   Standard value: 4.68–5.18 MPa (46.8–51.8 kg/cm^2, 666–737 psi)
   (3) Output pressure difference between left and right brake lines
   Limit: 0.4 MPa (4 kg/cm^2, 57 psi)
4. If the measured pressures are not within the permissible ranges, replace the proportioning valve.

BLEEDING

E35FYAL

Caution
Use the specified brake fluid. Avoid using a mixture of the specified brake fluid and other fluid.

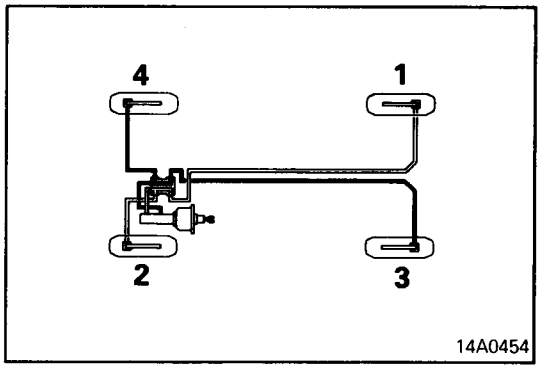
Specified brake fluid: DOT3 or DOT4



BLEEDING THE MASTER CYLINDER

If the master cylinder is empty of brake fluid, bleed the cylinder as follows.

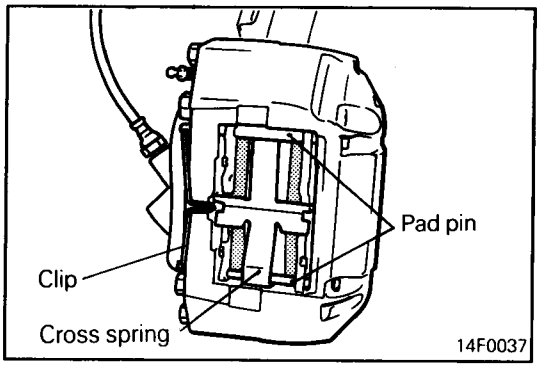
(1) Fill the reserve tank with brake fluid.
(2) Depress and hold the brake pedal.
(3) Let your fellow worker plug the master cylinder outlet with finger.
(4) Keeping the condition (3), release the brake pedal.
(5) Repeat steps (2) to (4) three to four times while filling the master cylinder with brake fluid.



BLEEDING THE BRAKE PIPE LINE

Bleed the brake pipe line with the engine running in the order shown in the illustration.

Caution
When adding brake fluid, be sure to fit the filter to the reserve tank.



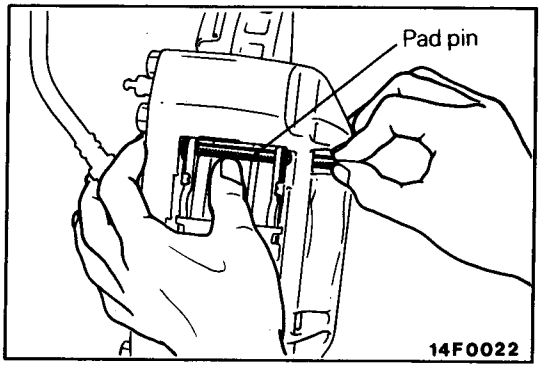
FRONT DISC BRAKE PAD CHECK AND REPLACEMENT

E35FQA0

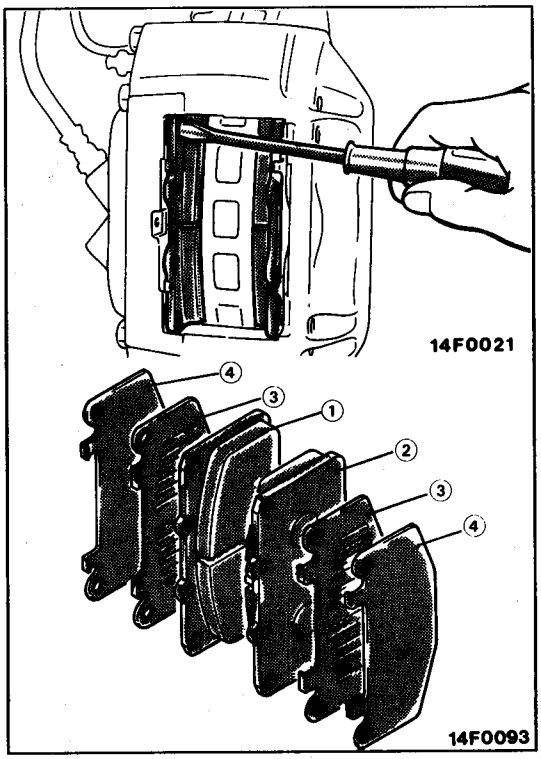
1. Visually check the brake pad thickness. Through the opening in the caliper body.

   Standard value: 10.0 mm (0.39 in.)
   Limit: 2.0 mm (0.08 in.)

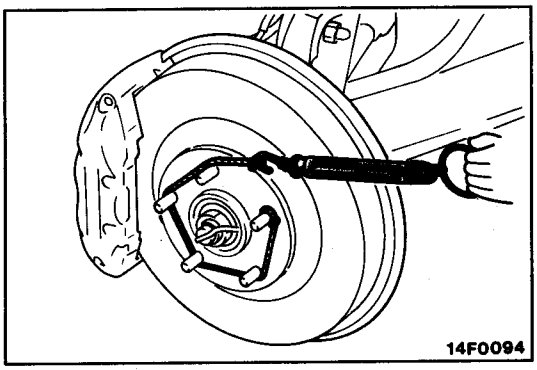
   Caution
   Replace the pad if worn beyond the limit. At this time, replace the pads on right and left wheels as a set.



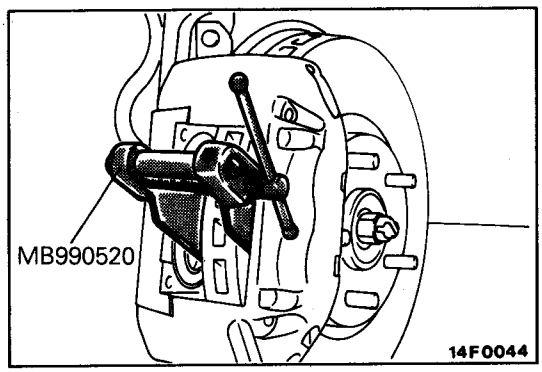
2. Remove the clip and, holding the cross spring with hand, remove the pad pins.



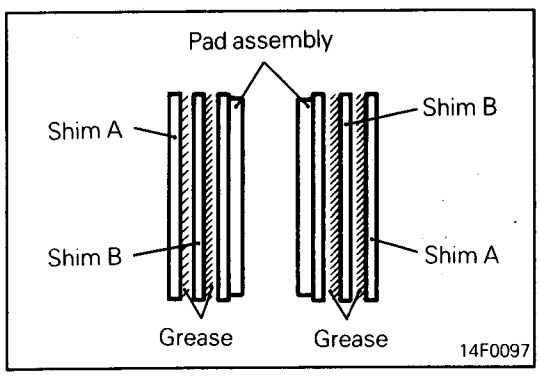
3. Using a screwdriver, remove the pads and shims.
   ① Inner pad (with wear indicator)
   ② Outer pad
   ③ Shim B
   ④ Shim A



4. To measure the disc brake drag torque after removing the drive shaft from the knuckle and installing the pads, use a spring balance to measure the rotation resistance of the hub in the forward direction with the pads removed.



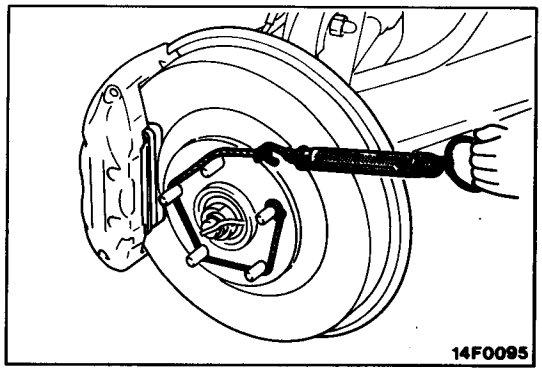
5. Clean the piston and then use the special tool to push the piston into the cylinder.



6. Apply repair kit grease to both sides of the inner shims and install the pad.

   Specified grease: Brake grease SAE J310, NLGI No. 1

   Caution
   1. **Make sure that the friction surfaces of pads and brake discs are free of grease and other contaminants.**
   2. **The grease should never squeeze out from around the shim.**

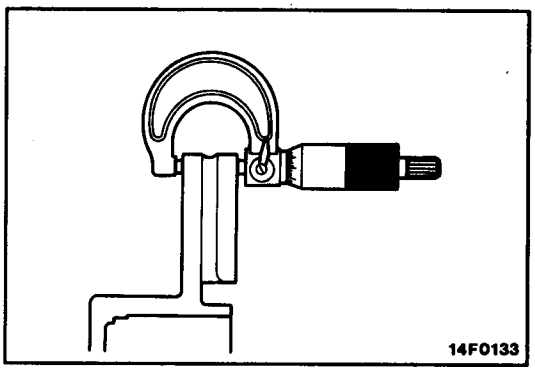

14F0095

7. Start the engine, and after depressing the brake pedal hard two or three times, stop the engine.
8. Turn brake disc forward 10 times.
9. Use a spring balance to measure the rotation resistance of the hub in the forward direction.
10. Calculate the drag torque of the disc brake (difference between measured values in 9 and 4).

    Standard value: 70 N (7.0 kg, 15.4 lbs.) or less

11. If the difference in the disc brake drag torque exceeds the standard value, disassemble the piston and check the sliding section of the piston for dirt and rust and the piston seal for deterioration.

FRONT BRAKE DISC THICKNESS CHECK E35FRAE

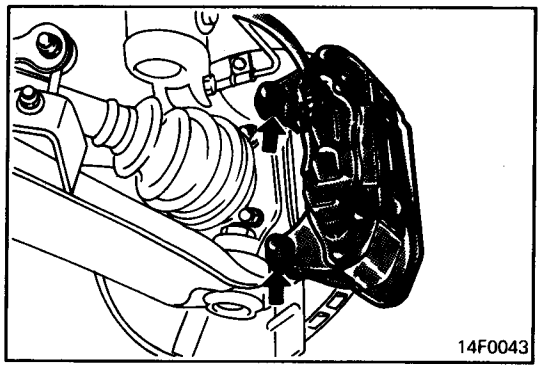

14F0133

1. Using a micrometer, measure disc thickness at eight positions, approximately 45° apart and 10 mm (0.39 in.) in from the outer edge of the disc.

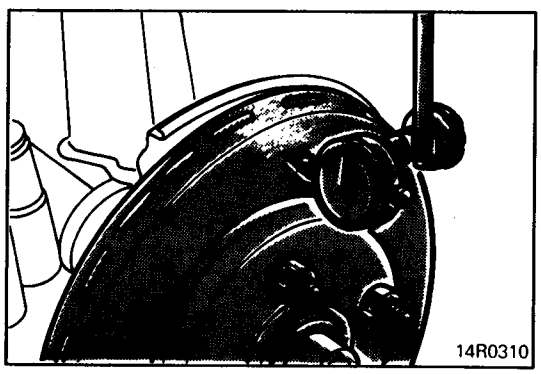
   Standard value: 30.0 mm (1.18 in.)
   Limit: 28.4 mm (1.12 in.)

   NOTE
   The difference between any thickness measurements should not be more than 0.015 mm (0.0006 in.)
2. If the disc is beyond the limits for thickness, remove it and install a new one.
   If thickness variation exceeds the specifications, replace the disc or turn rotor with on-the-car type brake lathe ("MAD, DL-8700PF or equivalent).

FRONT BRAKE DISC RUN-OUT CHECK E35FSAH


14F0043

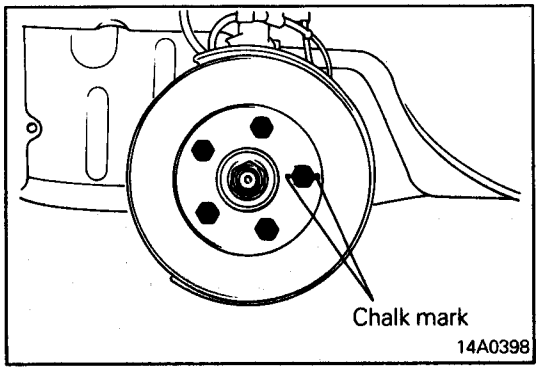
1. Remove the front brake assembly; and support it with a wire, etc.
2. Check the disc surface for grooves, cracks and rust.
   Clean the disc throughly and remove all rust.


14R0310

3. Place a dial gauge approximately 5 mm (0.2 in.) from the outer circumference of the brake disc, and measure the run-out of the disc.

   Limit: 0.10 mm (0.004 in.) or less

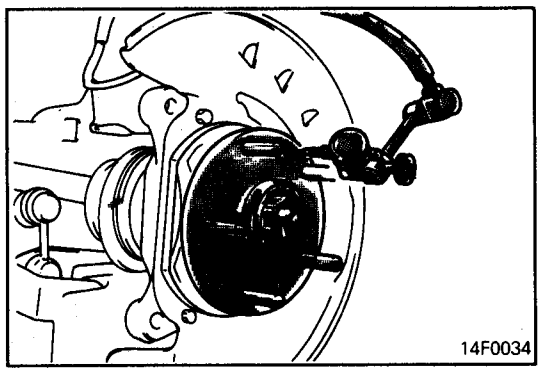
   NOTE
   Secure the disc to the hub with wheel nuts.



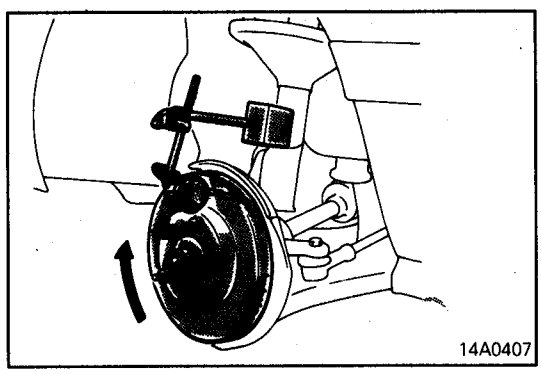
FRONT BRAKE DISC RUN-OUT CORRECTION

E35FTAE

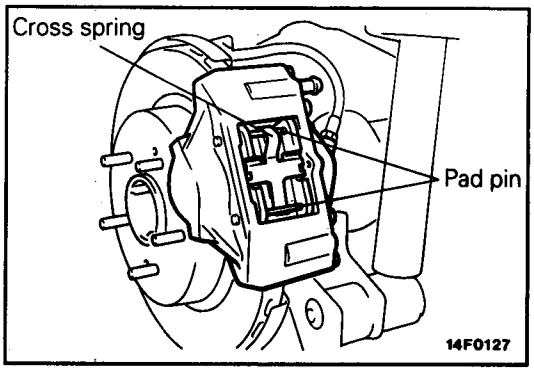
1. If the run-out of the brake disc is equivalent to or exceeds the limit specification, change the phase of the disc and hub, and then measure the run-out again.
   (1) Before removing the brake disc, chalk both sides of the wheel stud on the side at which run-out is greatest.



   (2) Remove the brake disc, and then place a dial gauge as shown in the illustration; then move the hub in the axial direction and measure the play.
   Limit: 0.05 mm (0.002 in.)
   If the play is equivalent to or exceeds the limit, replace the front hub unit bearing.



   (3) If the play does not exceed the limit specification, and then check the run-out of the brake disc once again. Mount the brake disc on the position dislocated from the chalk mark.
2. If the run-out cannot be corrected by changing the phase of the brake disc, replace the disc or turn rotor with on-the-car type brake lathe ("MAD, DL-8700PF or equivalent)



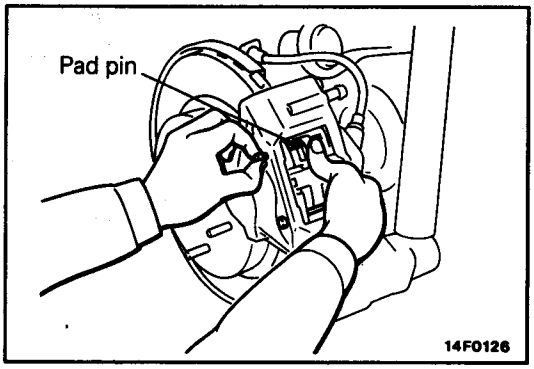
REAR DISC BRAKE PAD CHECK AND RELACEMENT

E35FUAJ

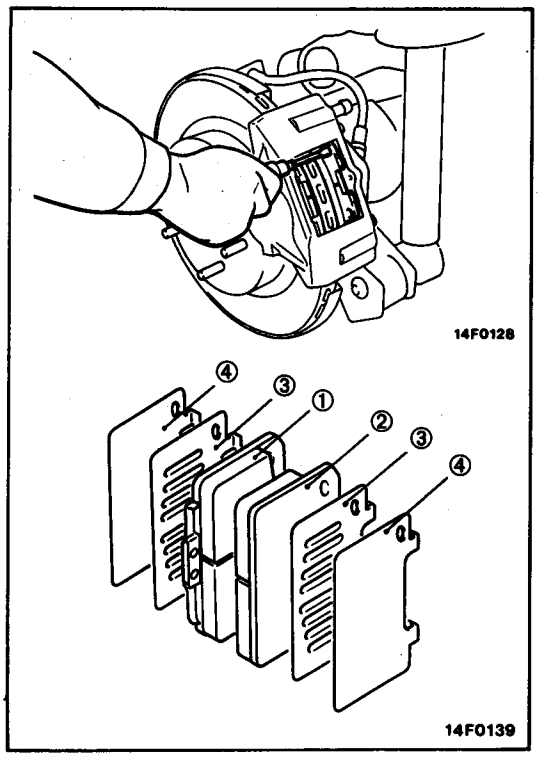
1. Visually check the brake pad thickness. Through the opening in the caliper body.

   Standard value: 10.0 mm (0.39 in.)
   Limit: 2.0 mm (0.08 in.)

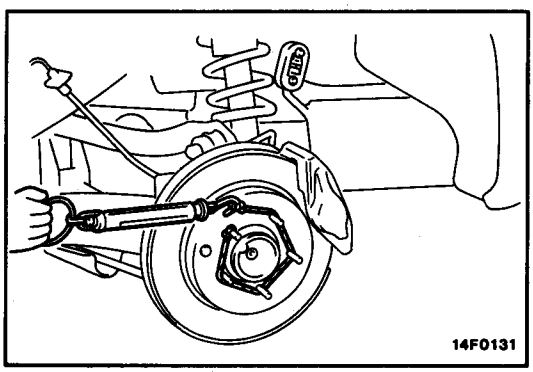
   Caution
   Replace the pad if worn beyond the limit. At this time, replace the pads on right and left wheels as a set.



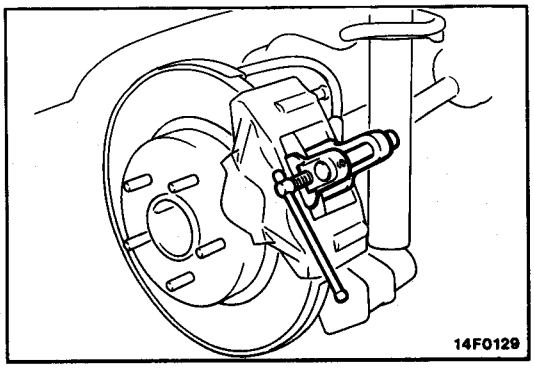
2. Remove the clip and, holding the cross spring with hand, remove the pad pins.



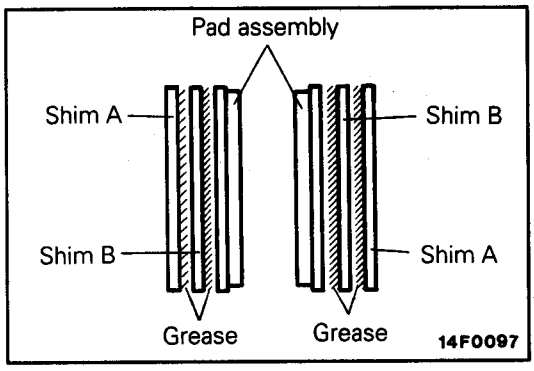
3. Using a screwdriver, remove the pads and shims.
   ① Inner pad (with wear indicator)
   ② Outer pad
   ③ Shim B
   ④ Shim A



4. To measure the disc brake drag torque after removing the drive shaft and companion flange connection and installing the pads, use a spring balance to measure the rotation resistance of the hub in the forward direction with the pads removed.



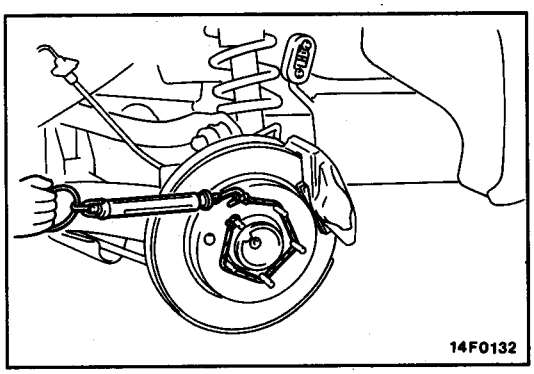
5. Clean the piston and then use the special tool to push the piston into the cylinder.



6. Apply repair kit grease to both sides of the inner shims, and install the pad.

   Specified grease: Brake grease SAE J310, NLGI No. 1

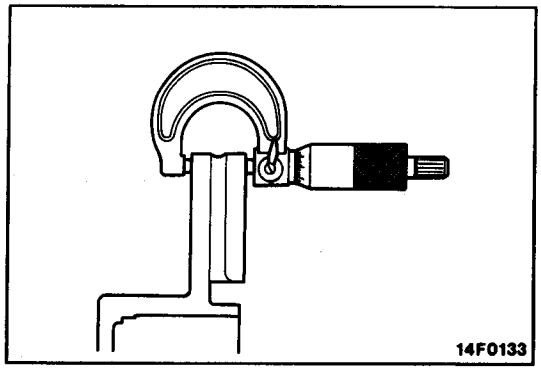
   Caution
   1. **Make sure that the friction surfaces of pads and brake discs are free of grease and other contaminants.**
   2. **The grease should never squeeze out from around the shim.**



7. Start the engine, and after depressing the brake pedal hard two or three times, stop the engine.
8. Turn brake disc forward 10 times.
9. Use a spring balance to measure the rotation resistance of the hub in the forward direction.
10. Calculate the drag torque of the disc brake (difference between measured values in 9 and 4).

    Standard value: 70 N (7.0 kg, 15.4 lbs.) or less

11. If the difference in the disc brake drag torque exceeds the standard value, disassemble the piston and check the sliding section of the piston for dirt and rust and the piston seal for deterioration.

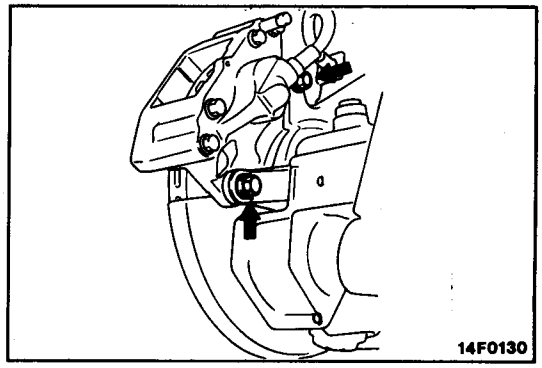


REAR BRAKE DISC THICKNESS CHECK E35FVAB

1. Remove dirt and rust from brake disc surface.
2. Measure disc thickness at 4 locations or more.

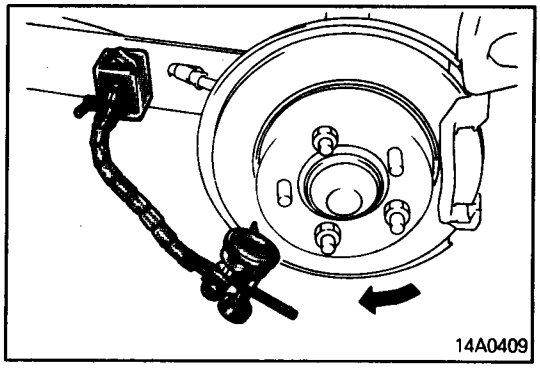
Standard value: **20.0 mm (0.79 in.)**
Limit: **18.4 mm (0.72 in.)**

Replace the discs and pad assembly for both sides left and right of the vehicle if they are worn beyond the specified limit.



REAR BRAKE DISC RUN-OUT CHECK E35FWAB

1. Remove the rear brake assembly, and support it by a wire, etc.



2. Place a dial gauge approximately 5 mm (0.2 in.) from the outer circumference of the brake disc, and measure the run-out of the disc.

Limit: 0.08 mm (0.0031 in.) or less

NOTE
Tighten nuts to secure the disc to the hub.

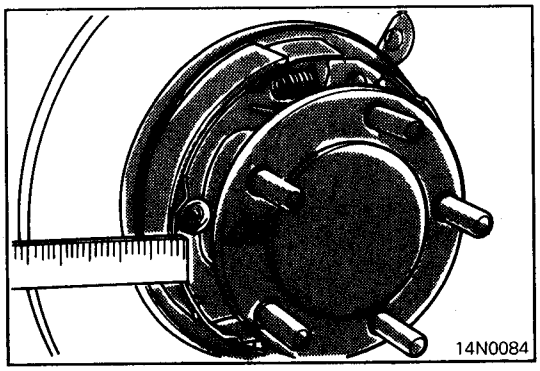
REAR BRAKE DISC RUN-OUT CORRECTION E35FLAA

1. If the run-out of the brake disc is equivalent to or exceeds the limit specification, change the phase of the disc and hub, and then measure the run-out again.

NOTE
The procedures for checking by changing the installation phase of the disc are the same as those for the front brake discs. Note, however, that the axial play (limit) in the hub differs. (Refer to P.35-31.)

Limit: **0.8 mm (0.031 in.)**

2. If the problem cannot be corrected by changing the phase of the brake disc, replace the disc.

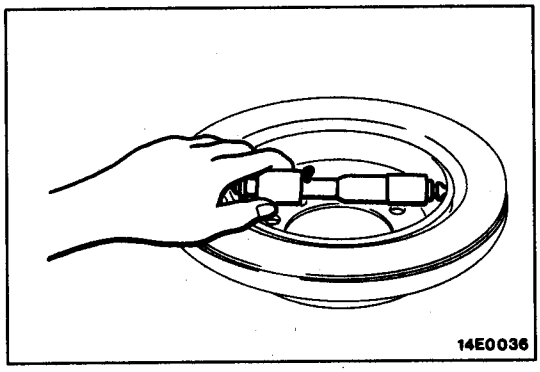


BRAKE LINING THICKNESS CHECK E35FFAC

1. Remove the rear brake assembly, and support it by a wire, etc.
2. Remove the brake disc.
3. Measure the wear of the brake lining at the place worn the most.

   Standard value: 2.8 mm (0.11 in.)
   Limit: 1.0 mm (0.04 in.)
4. Replace the shoe and lining assembly if brake lining thickness is less than the limit and/or if it is not worn evenly.

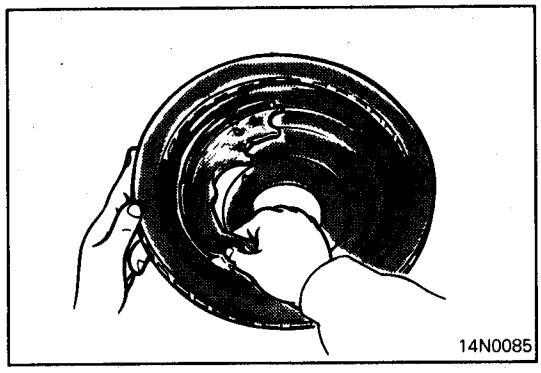
   Caution
   Whenever the shoe and lining assembly is replaced, replace both RH and LH assemblies as a set to prevent car from pulling to one side when braking.



BRAKE DISC INSIDE DIAMETER CHECK E35FGAC

1. Remove the rear brake assembly, and support it by a wire, etc.
2. Remove the brake disc.
3. Measure the inside diameter of the brake disc at two or more locations.

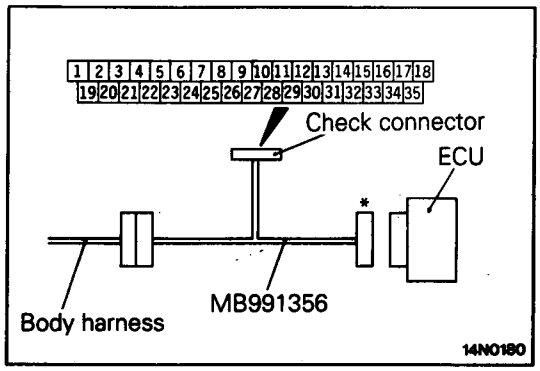
   Standard value: 168.0 mm (6.6 in.)
   Limit: 169.0 mm (6.7 in.)
4. Replace brake disc and shoe and lining assembly when wear exceeds the limit value or is badly imbalanced.



BRAKE LINING AND BRAKE DISC CONNECTION CHECK E35FLAC

1. Remove the rear brake assembly, and support it by a wire, etc.
2. Remove the brake disc.
3. Remove the shoe and lining assembly.
4. Chalk inner surface of brake disc and rub with shoe and lining assembly.
5. Replace shoe and lining assembly or brake disc if very irregular contact area.

   NOTE
   Clean off chalk after check.



MEASUREMENT OF WHEEL SPEED SENSOR OUTPUT VOLTAGE

E35FRBC

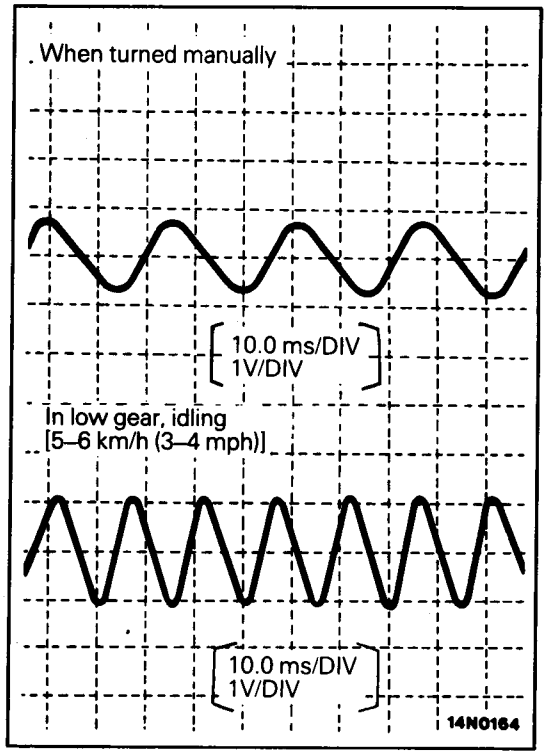
1. Lift up the vehicle and release the parking brake.
2. Disconnect the ECU harness connector and measure with the adapter harness (MB991356) connected to the harness side connector.

Caution

1. Never insert a probe, etc. into the connector as it may result in poor contact later.

2. Do not connect the connector (Special Tool) marked with "*" except when recording the waveform on a driving test. In such a case, connect the connector to the ECU.

Terminal No.			
FL	RR	FR	RL
4	24	21	8
5	26	23	9



3. Manually turning the wheel to be measured by 1/2 to 1 turn/second, measure the output voltage with a circuit tester or oscilloscope.
   Output voltage:
   When measured with circuit tester: 70 mV or more
   When measured with oscilloscope (max. voltage): 100 mV or more
   Probable causes of low output voltage
   - Speed sensor pole piece-to-rotor clearance too large
   - Faulty speed sensor
4. Then, in order to observe the output state of the wheel speed sensors, shift into low gear and drive the wheels, observe the output voltage waveform of each wheel speed sensor with an oscilloscope.

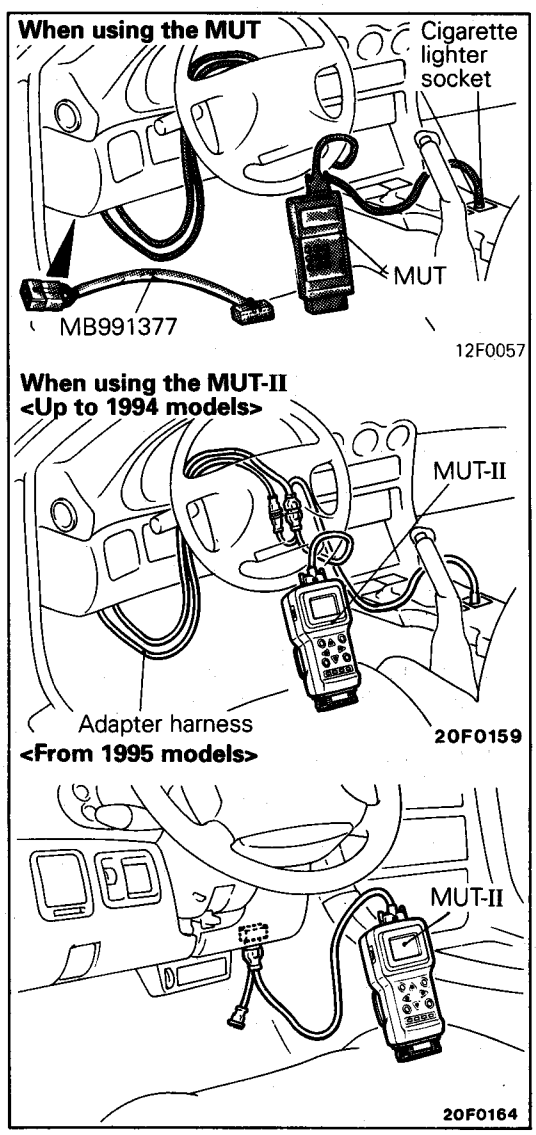
NOTE

1. Waveform may also be observed by actually driving the vehicle.
2. The output voltage is low when the wheel speed is low and increases as the wheel speed increases.

POINTS IN WAVEFORM MEASUREMENT

Symptom	Probable causes	Remedy
Too small or zero waveform amplitude	Faulty wheel speed sensor	Replace sensor
	Incorrect pole piece-to-rotor clearance	Adjust clearance
Waveform amplitude fluctuates excessively (this is no problem if the minimum amplitude is 100 mV or more)	Axle hub eccentric or with large runout	Replace hub
Noisy or disturbed waveform	Open circuit in sensor	Replace sensor
	Open circuit in harness	Correct harness
	Incorrectly mounted wheel speed sensor	Mount correctly
	Rotor with missing or damaged teeth	Replace rotor

NOTE
The wheel speed sensor cable moves following motion of the front or rear suspension. Therefore, it is likely that it has an open circuit only when driving on rough roads and it functions normally on ordinary roads. It is, therefore, recommended to observe sensor output voltage waveform also under special conditions, such as rough road driving.



INSPECTION OF HYDRAULIC UNIT

INSPECTION BY FEEL

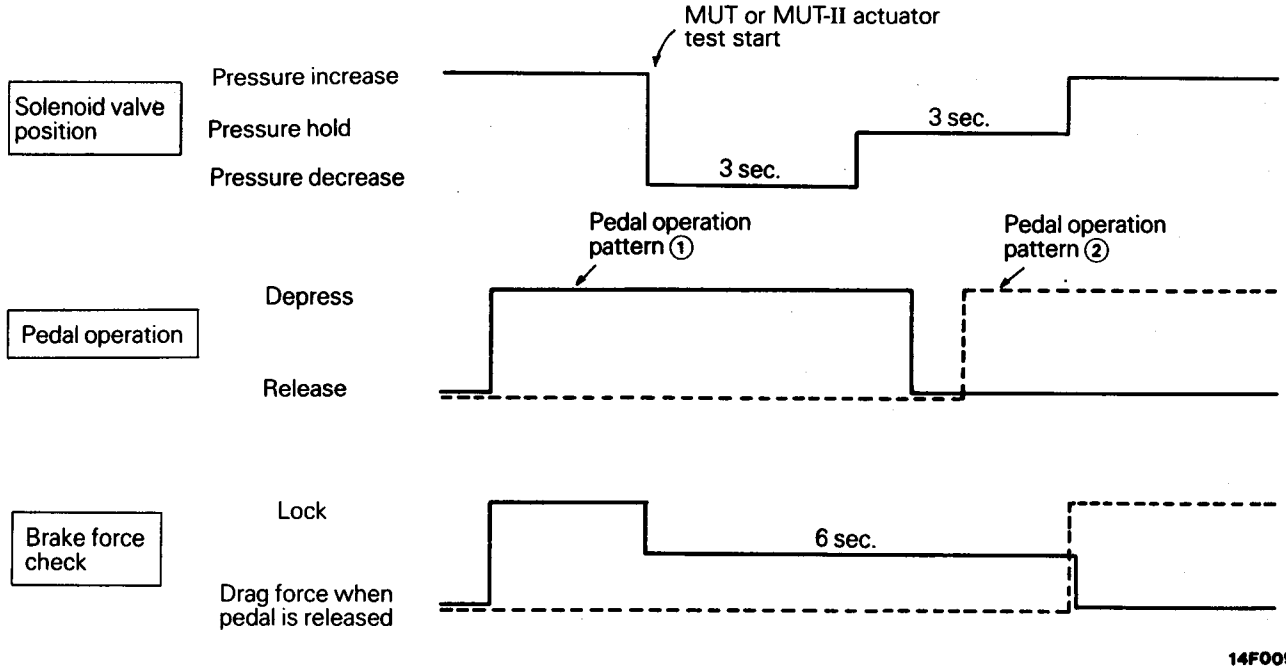
WHEN USING THE MULTI-USE TESTER (MUT) < 1993 models > OR MUT-II < All models >

(1) Jack up the vehicle and support the vehicle with rigid racks placed at the specified jack-up points.
(2) Release the parking brake and determine the drag force (drag torque) of each wheel by feel.
(3) Connect either MUT or MUT-II.

NOTE
When connecting MUT, use the adapter harness of the special tool. When connecting MUT-II to 1994 models, use the adapter harness which belongs to MUT-II sub-assembly.

Caution
Connect and disconnect either MUT or MUT-II with the ignition switch in the OFF position.

(4) After confirming that the shift lever is in the neutral position, start the engine.
The ABS warning lamp lights up, it goes into the MUT or MUT-II mode.
In the MUT or MUT-II mode, ABS does not function.
(5) Operate the MUT or MUT-II to force actuator to operate (item No.04, 05).
(6) Turning the wheel manually, check the change of the braking force when the brake pedal is depressed.
The change should be as shown in the following illustration.
NOTE
While the ABS is in the fail safe mode, the MUT or MUT-II actuator test cannot be made.



(7) If any abnormality is found in the check, take corrective action according to the following "Judgement in Inspection by Feel" table.

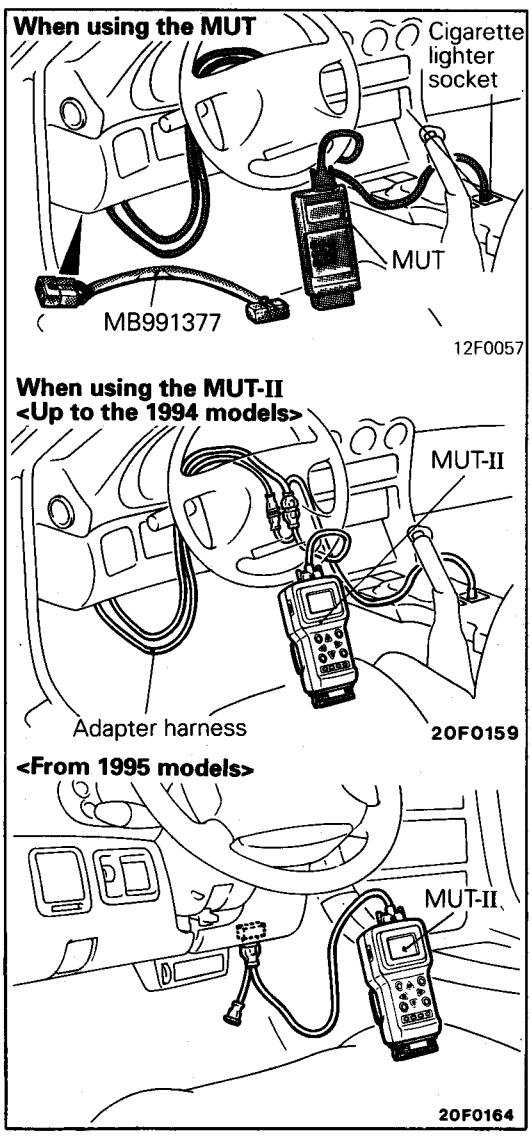
Judgement in Inspection by Feel

No.	Operation	Judgement		Probable cause	Remedy
		Normal	Abnormal		
04	(1) Depress brake pedal to lock wheel. (2) Using the MUT or MUT-II, select the wheel to be checked and force the actuator to operate. (3) Turn the selected wheel manually to check the change of brake force.	Brake force released for 6 seconds after locking	Wheel does not lock when brake pedal is depressed.	Clogged brake line other than HU	Check and clean brake line
				Clogged hydraulic circuit in HU	Replace HU assembly
05			Brake force is not released	Incorrect HU brake tube connection	Connect correctly
				HU solenoid valve not functioning correctly	Replace HU assembly

INSPECTION BY USING BRAKE FORCE TESTER

WHEN USING THE MULTI-USE TESTER (MUT) < 1993 MODELS > OR MUT-II < All models >

NOTE
(1) The brake force tester roller and tire must be dry during the test.
(2) When testing the front brakes, apply the parking brake and when testing the rear brakes, apply chocks to the front wheels to lock them.



(1) Place the front or rear wheels on the brake force tester roller.
(2) Connect either MUT or MUT-II.
NOTE
When connecting MUT, use the adapter harness of the special tool.
When connecting MUT-II to 1994 models, use the adapter harness which belongs to MUT-II sub-assembly.

Caution
Connect and disconnect either MUT or MUT-II with the ignition switch in the OFF position.

(3) After confirming that the shift lever or selector lever is in the neutral position, start the engine.
(The ABS warning lamp lights up, it goes into the MUT or MUT-II mode. In the MUT or MUT-II mode, ABS does not function.)
(4) Operate the brake force tester roller.
(5) Depress the brake pedal until the brake force tester indicates the following value and keep the brake force at this level during the test.

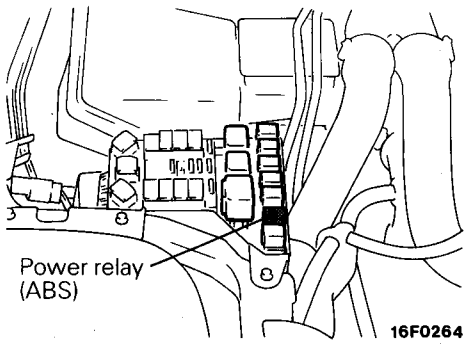
Front wheels: 1,000 N (100 kg, 220 lbs.)
Rear wheels: 650 N (65 kg, 143 lbs.)

(6) Allow the brake tester indication to stabilize before operating the MUT or MUT-II to perform actuator test (Item N. 04, 05). Then, read change of tester indication.
Referring to the following "Judgment in Inspection by Using Brake Force Tester" table, judge and take corrective action if necessary.
NOTE
While the ABS is in the fail mode, the MUT or MUT-II actuator test cannot be made.

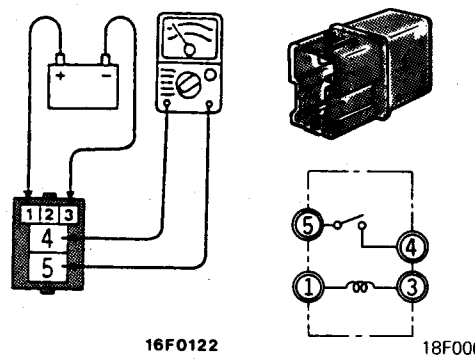
Judgement in Inspection by Using Brake Force Tester

No.	Operation	Judgement (reading of brake force tester)		Probable cause	Remedy
		Normal	Abnormal		
04	Alter brake force tester indication has stabilized, operate MUT or MUT-II to force the actuator to operate and check the change in brake force.	(1) When the actuator is driven by MUT or MUT-II, brake force changes as shown below. Front wheels: N (kg, lbs.) 1,000 (100, 220) Step 1 ↓ 350 ± 200 (35 ± 20, 77 ± 44) Step 2 (In approx. 6s) ↓ 1,000 ± 200 (100 ± 20, 220 ± 44) Rear wheels: 650 (65, 143) Step 1 ↓ 350 ± 150 (30 ± 15, 66 ± 33) Step 2 (In approx. 6s) ↓ 600 ± 150 (65 ± 15, 143 ± 33)	Brake force in Step 1 shows very little or almost no decrease.	Incorrect HU brake tube connection	Connect correctly
				Faulty HU	Replace HU assembly
05			Brake force decreases in Step 1 but in Step 2, it shows very little or almost no increase.	Clogged brake line other than HU	Check and clean brake line
				Faulty HU	Replace HU assembly
		(2) Inmmediately after checking Step 2 value (in approx. 3s), increasing brake pedal depression force does not increase brake force	Increasing brake pedal depression force increases brake force.	Fluid leaking in HU (poor sealing)	Replace HU assembly

NOTE
(1) During forced drive using the MUT or MUT-II, forced drive operation is stopped when any wheel speed reaches 10 km/h (6 mph).
(2) Failure to keep the brake pedal depression force constant can result in misjudgement.
Even if the judgement has resulted in NG, it might be that the depression force was not kept constant. Therefore, repeat the same check again as necessary.
(3) The probable causes given above all assume that all the other brake parts are normal.



16F0264



16F0122 18F0061

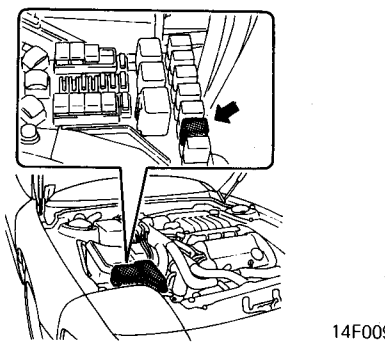
INSPECTION OF POWER RELAY <Vehicles built up to October 1993>

E35FPDB

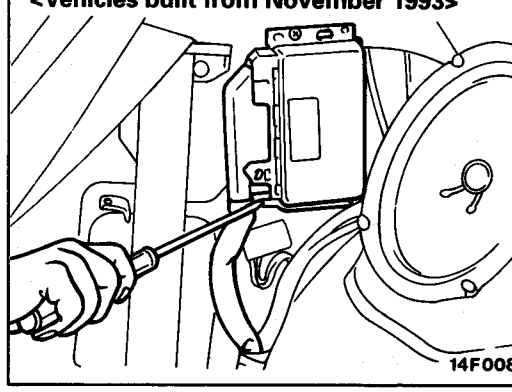
1. Remove the relay box cover in the engine compartment and remove the power relay.
2. Apply the battery voltage to the terminal ① and check for continuity between the following terminals when the terminal ③ is short-circuited to earth.

When energized	Between terminals 4 and 5	Continuity
When de-energized	Between terminals 4 and 5	No continuity
	Between terminals 1 and 3	Continuity

<Vehicles built up to October 1993>


14F0098

<Vehicles built from November 1993>


14F0084

REMEDY IN CASE OF DISCHARGED BATTERY

E35FPEB

<Vehicles built up to October 1993>

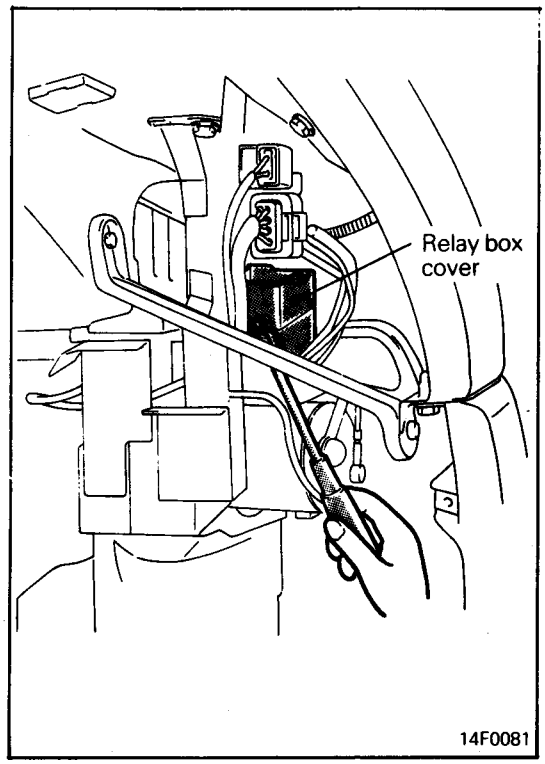
If the engine is jump-started, because of a completely discharged battery, the vehicle may suffer misfiring and fail to start if an attempt is made to start without allowing the battery to recover sufficiently. This is because the ABS consumes a great deal of current for its self check. In such a case, allow the battery to sufficiently charge or perform the following procedures.

<Vehicles built up to October 1993>

Remove the ABS power relay in the engine compartment to disable the ABS. Removing the ABS causes the ABS warning lamp to light. After the battery is charged sufficiently, install the power relay and restart the engine to check that the ABS warning lamp goes out.

<Vehicles built from November 1993>

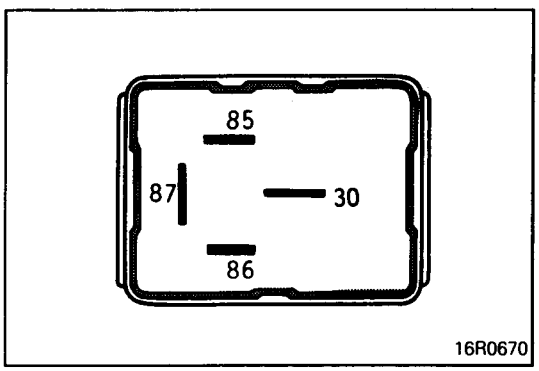
Disconnect the ABS-ECU connector. (Refer to P.35-62.)
Removing the ABS causes the ABS warning lamp to lamp. After the battery is charged sufficiently, connect the ABS-ECU connector, restart the engine to check that the ABS warning lamp goes out.



INSPECTION OF VALVE RELAY AND MOTOR RELAY

E35FPFA

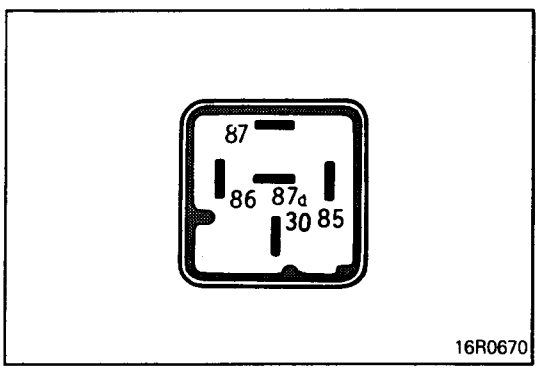
1. Remove the splash shield (FR) and remove the relay box cover by inserting a screwdriver between the hydraulic unit and cover to pry off the lock.
2. Remove the relays. The one closest to you (larger one) is the motor relay and the one farthest from you (smaller one) is the valve relay.



3. Check continuity of the relays both when they are energized and de-energized.

Motor Relay

When de-energized	Between terminals (85) and (86)	72–88 Ω
	Between terminals (30) and (87)	No continuity (∞Ω)
When energized between terminals (85) and (86)	Between terminals (30) and (87)	Continuity (approx. 0Ω)



Valve Relay

When de-energized	Between terminals (85) and (86)	60 – 120 Ω
	Between terminals (30) and (87a)	Continuity (approx. 0Ω)
	Between terminals (30) and (87)	No continuity (∞Ω)
When energized between terminals (85) and (86)	Between terminals (30) and (87a)	No continuity (∞Ω)
	Between terminals (30) and (87)	Continuity (approx. 0Ω)

BRAKE PEDAL

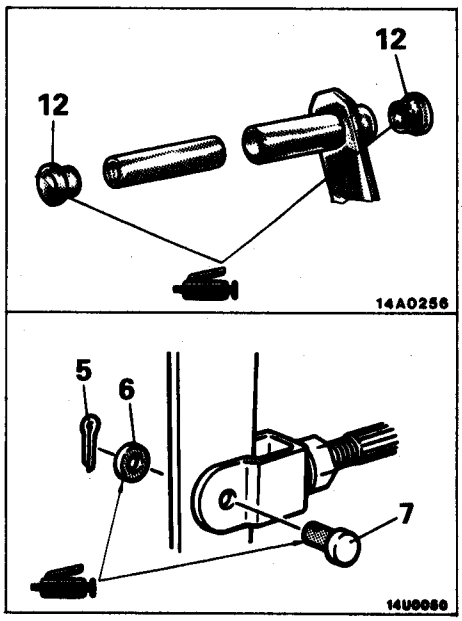
REMOVAL AND INSTALLATION

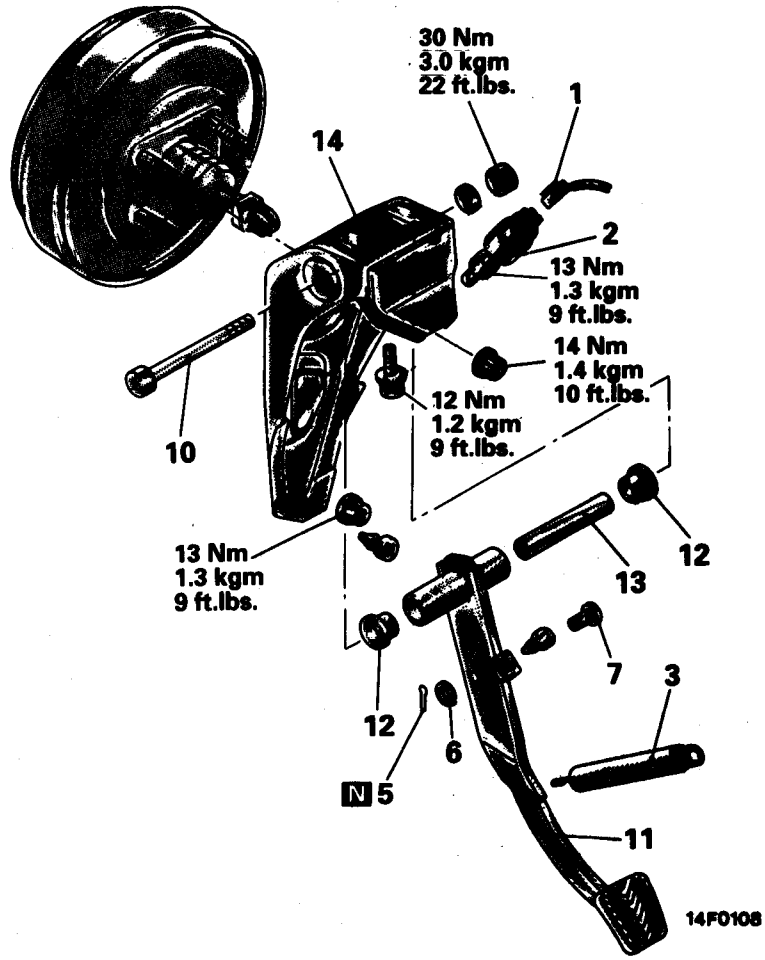
E35GA--

<L.H. drive vehicles>

Pre-removal Operation
- Removal of Steering Column Assembly
  (Refer to GROUP 37A–Steering Wheel and Shaft.)

Posi-installation Operation
- Installation of Steering Column Assembly
  (Refer to GROUP 37A–Steering Wheel and Shaft.)
- Brake Pedal Adjustment
  (Refer to P.35-25.)





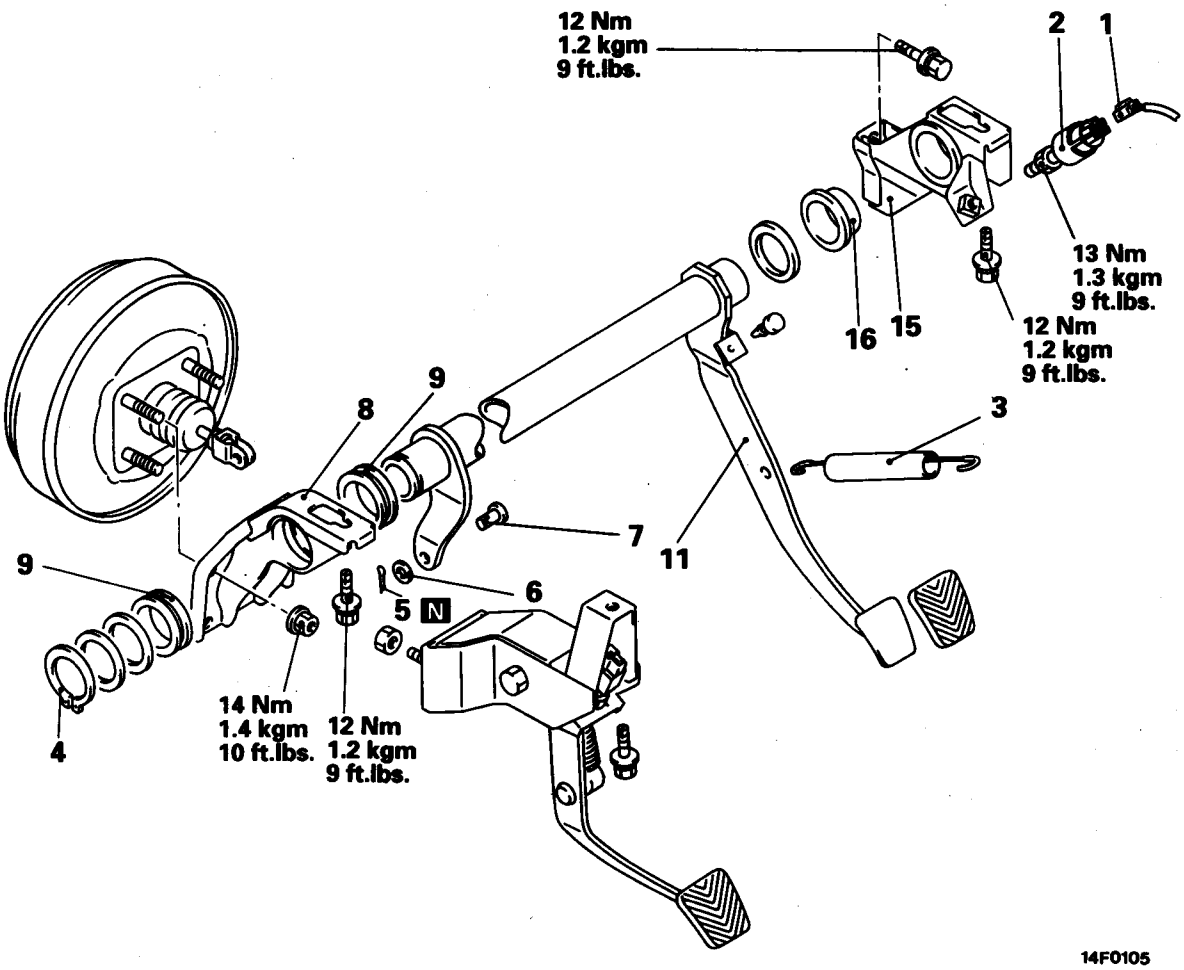
Stop lamp switch removal steps
1. Stop lamp switch connector
2. Stop lamp switch

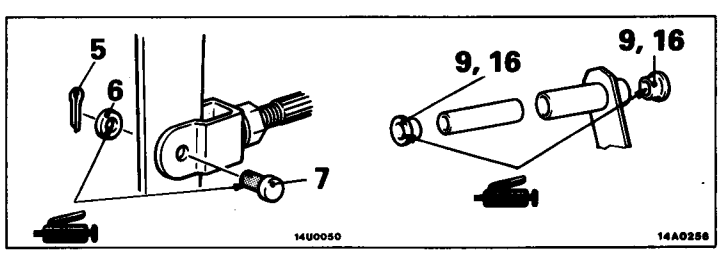
Brake pedal removal steps
1. Stop lamp switch connector
- ◆◆ 3. Return spring
5. Split pin
6. Washer
7. Clevis pin
10. Brake pedal shaft bolt
11. Brake pedal
12. Bushing
13. Spacer
14. Brake pedal support member

<R.H. drive vehicles>

Pre-removal Operation
- Removal of Instrument Panel (Refer to GROUP 52A–Instrument Panel.)
- Removal of Blower Case Assembly (Refer to GROUP 55–Blower Assembly.)
- Removal of Cooling Unit (Refer to GROUP 55–Cooling Unit.)
- Removal of Heater Unit (Refer to GROUP 55–Heater Unit.)

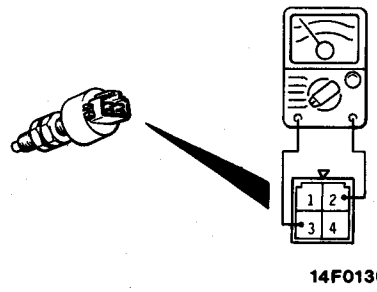
Posi-installation Operation
- Installation of Heater Unit (Refer to GROUP 55–Heater Unit.)
- Installation of Cooling Unit (Refer to GROUP 55 – Cooling Unit.)
- Installation of Blower Case Assembly (Refer to GROUP 55 – Blower Assembly.)
- Installation of Instrument Panel (Refer to GROUP 52A – Instrument Panel.)
- Brake Pedal Adjustment (Refer to P. 35 – 25.)



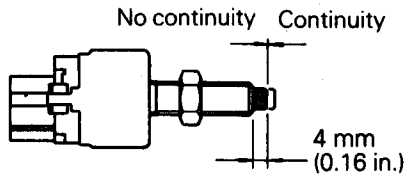


Stop lamp switch removal steps
1. Stop lamp switch connector
2. Stop lamp switch

Brake pedal removal steps
1. Stop lamp switch connector
3. Return spring ◆◆
4. Snap ring
5. Split pin
6. Washer
7. Clevis pin
8. Brake booster braket
9. Bushing
11. Brake pedal
15. Pedal support bracket
16. Bushing



14F0136

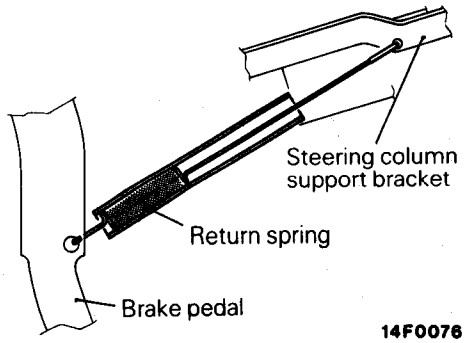


14L0171

INSPECTION E35GCAK

STOP LAMP SWITCH

(1) Connect an ohmmeter between stop lamp switch connector terminal ② and ③.
(2) The stop lamp switch is in good condition if there is no continuity when the plunger is pushed in to a depth of within 4 mm (0.16 in.) from the outer case edge surface, and if there is continuity when it is released.



14F0076

SERVICE POINT OF INSTALLATION E35GDBN

3. INSTALLATION OF RETURN SPRING

Install the return spring with the shorter hook on the brake pedal.

MASTER CYLINDER AND BRAKE BOOSTER

E35IA--

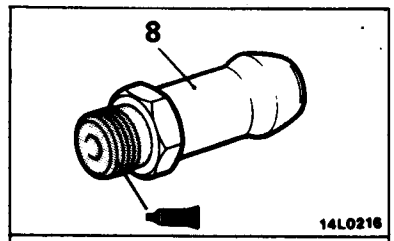
REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining Brake Fluid

Post-installation Operation
- Supplying Brake Fluid
- Bleeding (Refer to P.35-28.)
- Adjustment of Brake Pedal (Refer to P.35-25.)

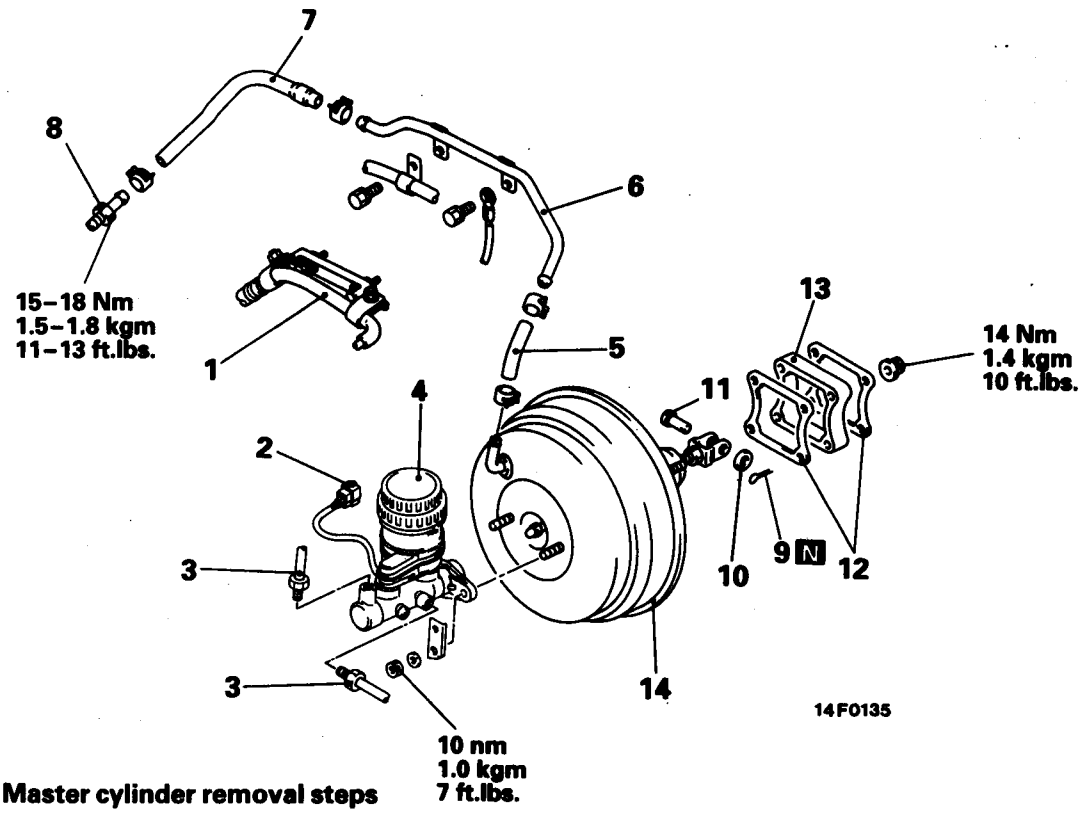
Brake tube flare nut
15 Nm
1.5 kgm
11 ft.lbs.

14F038



14L0216

Sealant: 3M ATD Part No. 8661 or equivalent



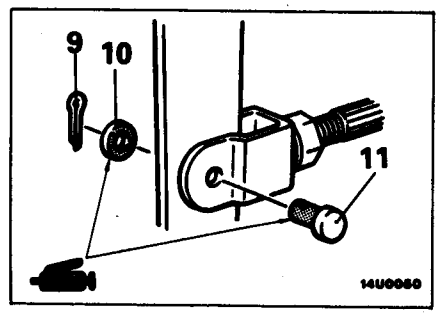
14F0135

Master cylinder removal steps

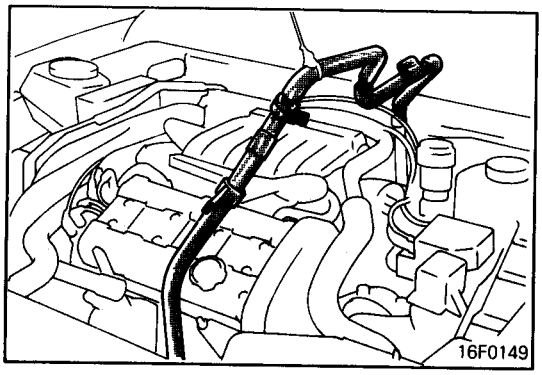
◀▶ 1. Low-pressure hose
2. Brake fluid level sensor connector
3. Brake tube connection
4. Master cylinder
◀◆ ● Adjustment of clearance between brake booster push rod and primary piston

Brake booster removal steps

4. Master cylinder
5. Vacuum hose
6. Vacuum tube
◆◀ 7. Vacuum hose with check valve
8. Fitting
9. Cotter pin
10. Washer
11. Clevis pin
12. Sealer
13. Spacer
14. Brake booster



14U0060

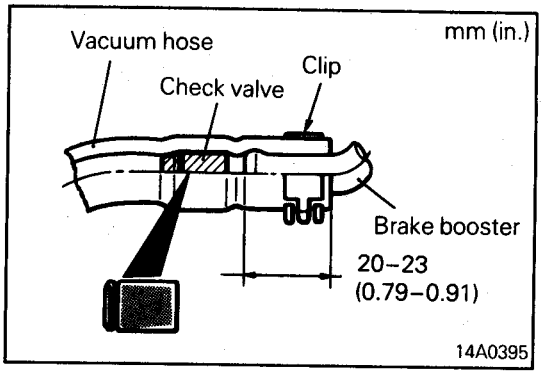


SERVICE POINT OF REMOVAL E35IBAM

1. MOVING LOW-PRESSURE HOSE

Remove the nuts and bolts securing low-pressure hose shown in the illustration, and using a wire, suspend the hose from the hood to a position where it does not hamper the removal and installation of the brake booster.

Caution
Move the hose slowly with care not to bend it.



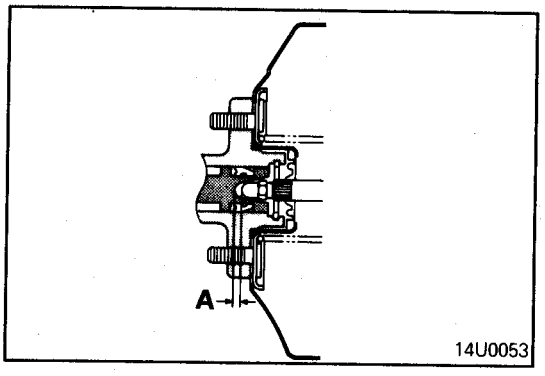
SERVICE POINTS OF INSTALLATION E35IDAI

7. INSTALLATION OF VACUUM HOSE WITH CHECK VALVE

(1) Insert the vacuum hose of the brake booster to obtain the dimension shown, with care not to allow it to contact the check valve. Then, secure the hose with hose clip.

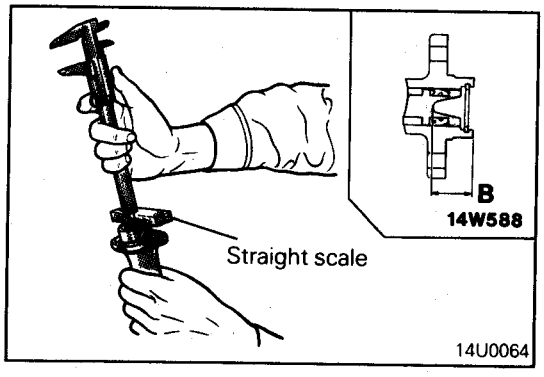
(2) The vacuum hose at the engine should be securely connected until it contacts the hexagonal edge of the fitting, and then should be secured by the hose clip.

Caution
If the check valve is defective, replace the vacuum hose.



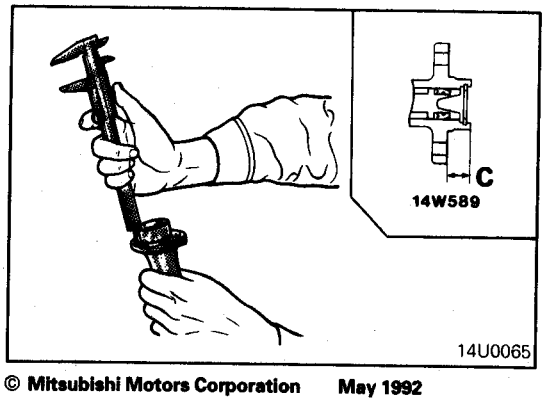
• ADJUSTMENT OF CLEARANCE BETWEEN BRAKE BOOSTER PUSH ROD AND PRIMARY PISTON

Adjust the clearance (A) between the brake booster push rod and primary piston as follows:

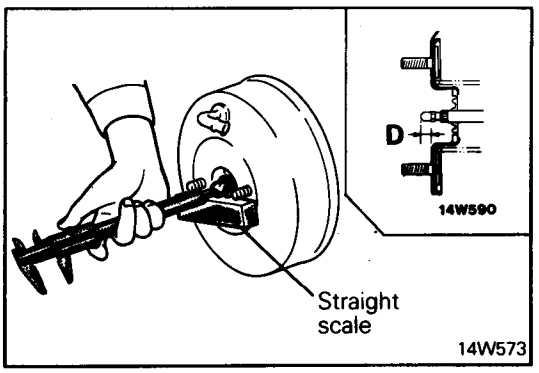


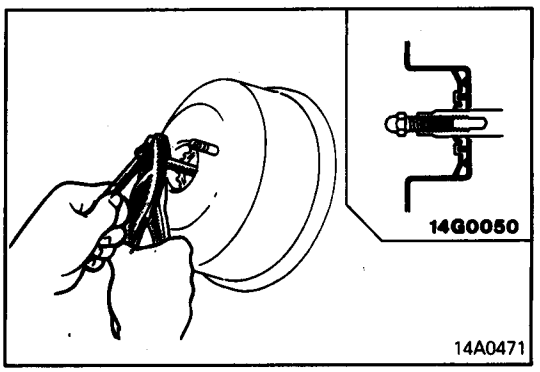
(1) Measure the dimension (B) between the master cylinder end face and piston.

NOTE
To obtain (B), first take measurement with a square placed on the master cylinder end face. Then, subtract the thickness of the square to arrive at (B).



(2) Obtain the dimension (C) between the brake booster mounting surface on the master cylinder and the end face.





(3) Measure the dimension (D) between the master cylinder mounting surface on brake booster and the push rod end.

NOTE
To obtain (D), first take measurement with a square placed on the brake booster. Then, subtract the thickness of the square to arrive at (D).

(4) Using the measured values obtained in (1) through (3), obtain the clearance (A) between the brake booster push rod and primary piston.

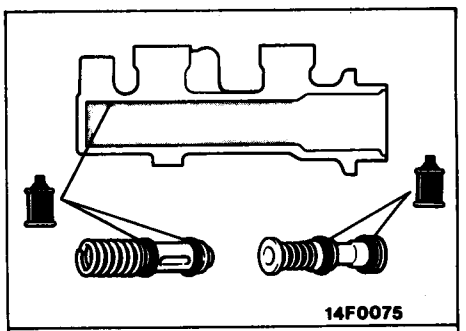
Standard value: A (A = B – C – D)
0.65–0.85 mm (0.26–0.33 in.)

(5) If the clearance is not within the standard value range, adjust by changing the push rod length by turning the adjustable end of the push rod.

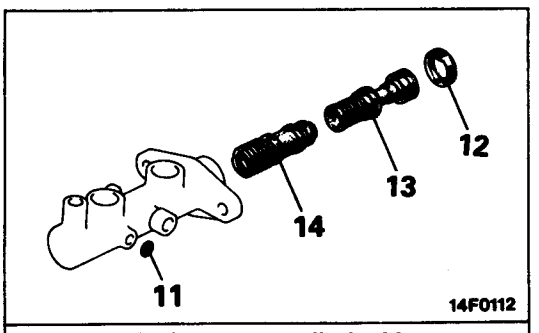
Caution
Improper clearance may cause excessive brake drag.

DISASSEMBLY AND REASSEMBLY

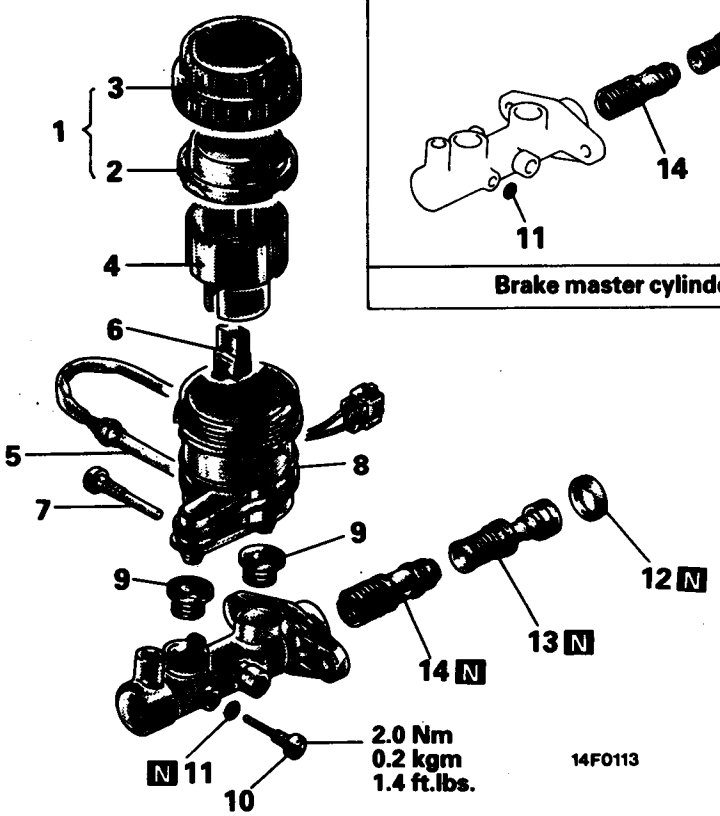
E35IE–



Brake fluid: DOT3 or DOT4



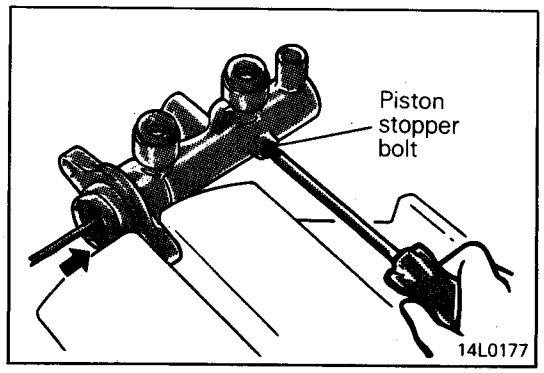
Brake master cylinder kit



Disassembly steps

1. Reservoir cap assembly
2. Diaphragm
3. Reservoir cap
4. Filter
5. Brake fluid level sensor
6. Float
7. Reservoir stopper bolt
8. Reservoir
9. Reservoir seal
10. ◆◆ Piston stopper bolt
11. Gasket
12. ◆◆ Piston stopper ring
13. Primary piston assembly
14. ◆◆ Secondary piston assembly
15. Master cylinder body

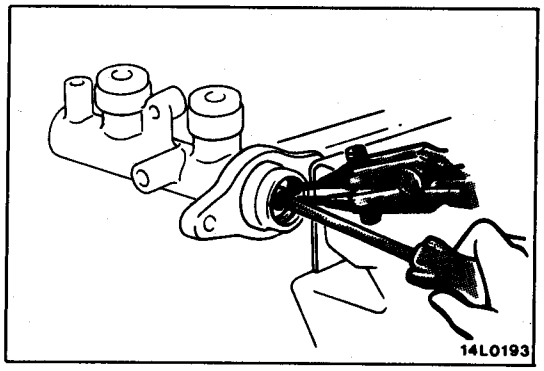
Caution
Do not disassemble the primary and secondary piston assembly.



SERVICE POINTS OF DISASSEMBLY E35IFAH

10. DISASSEMBLY OF PISTON STOPPER BOLT

Remove the piston stopper bolt, while depressing the piston.



12. DISASSEMBLY OF PISTON STOPPER RING

Remove the piston stopper ring, while depressing the piston.

14. DISASSEMBLY OF SECONDARY PISTON ASSEMBLY

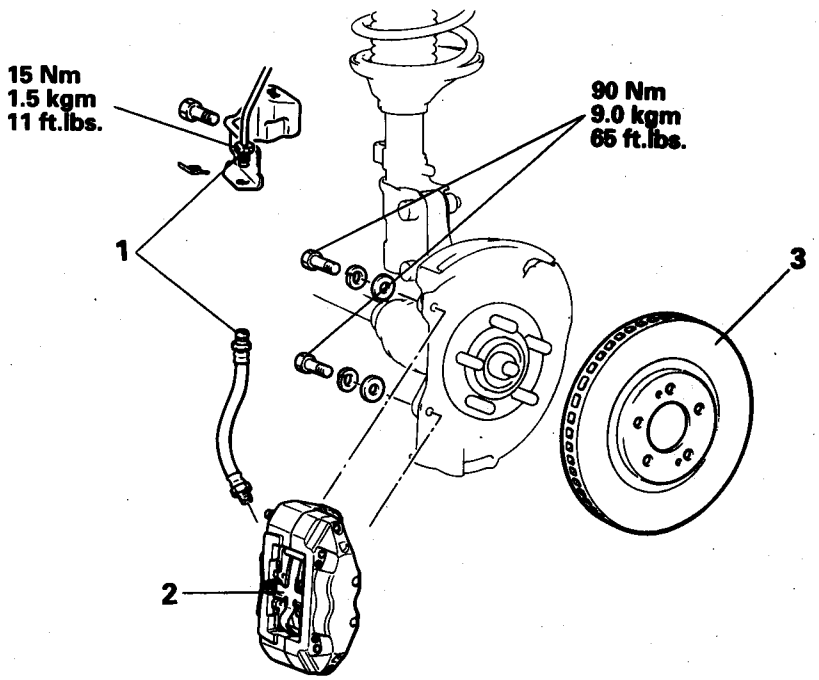
NOTE
If it is hard to remove the secondary piston from the cylinder, gradually apply compressed air from the outlet port on the secondary end of the master cylinder.

FRONT DISC BRAKE E35LA–

REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining of Brake Fluid

Post-installation Operation
- Supplying Brake Fluid
- Bleeding (Refer to P. 35-28.)



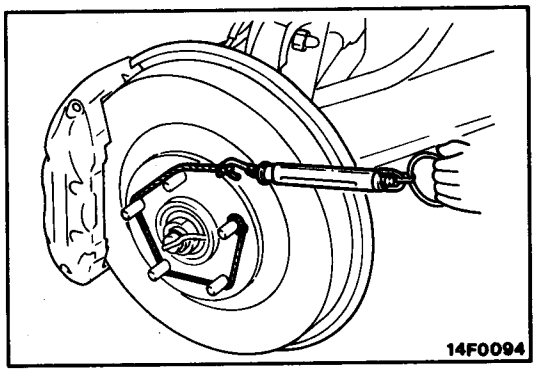
Removal steps

1. Brake hose and the brake tube connection
2. ◆◆ Front brake assembly
3. Brake disc

INSPECTION E35LCAE

BRAKE DISC

(1) Check disc for wear. (Refer to P.35-30.)
(2) Check disc for runout. (Refer to P.35-30.)


14F0094

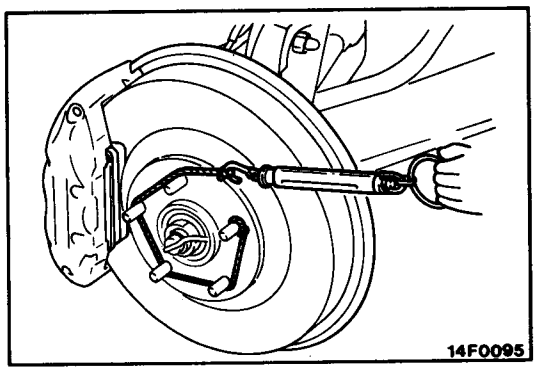
SERVICE POINTS OF INSTALLATION E35LDAJ

2. INSTALLATION OF FRONT BRAKE ASSEMBLY

Measure the disc brake drag force after installation of the brake assembly by the following procedure.

(1) With the drive shaft removed from the knuckle and the brake assembly removed, use a spring balance to measure the rotation sliding resistance of the hub in the forward direction.

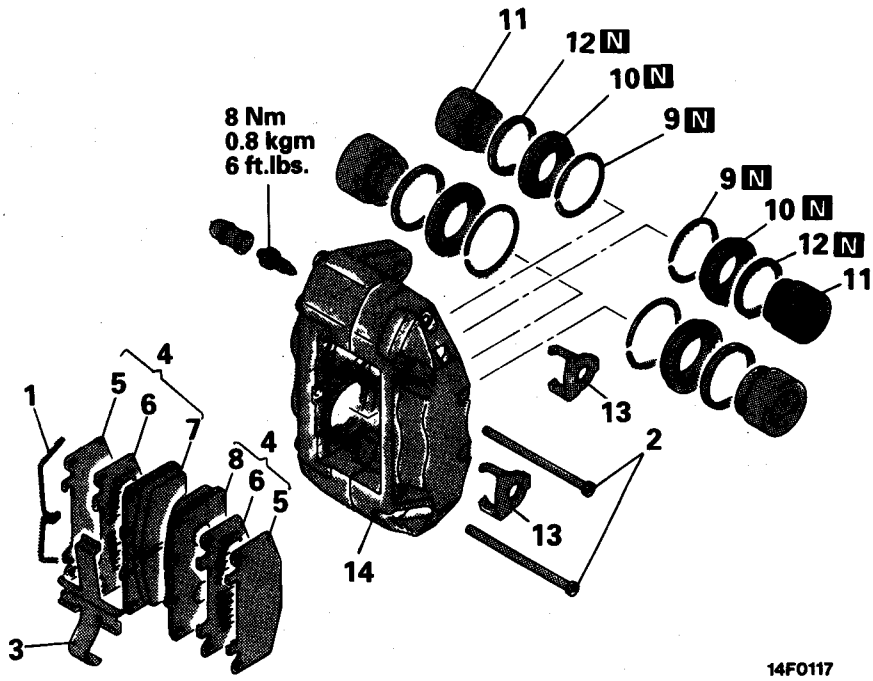
(2) Install the brake assembly.

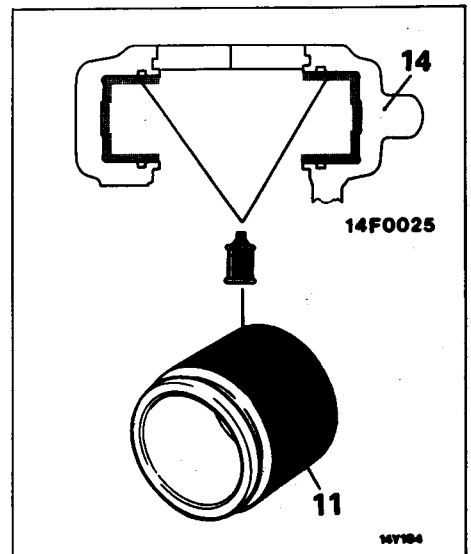

14F0095

(3) Start the engine, and after depressing the brake pedal hard two or three times, stop the engine.
(4) Turn brake disc forward 10 times.
(5) Use a spring balance to measure the rotation resistance of the hub in the forward direction.
(6) Calculate the drag torque of the disc brake (difference between measured values in 5 and 1).
Standard value: 70 N (7.0 kg, 15.4 lbs.) or less
(7) If the difference in the disc brake drag torque exceeds the standard value, disassemble the piston and check the sliding section of the piston for dirt and rust and the piston seal for deterioration.

DISASSEMBLY AND REASSEMBLY

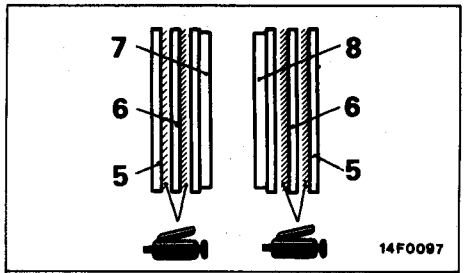
E35LF–



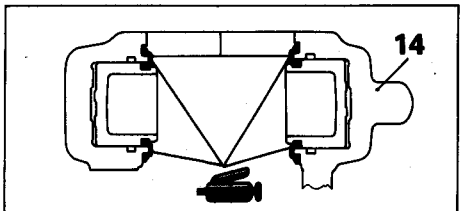


Caution
The piston seal contained in the seal and boot kit is coated with special grease.
Do not wipe off the grease.

Brake fluid: DOT3 or DOT4

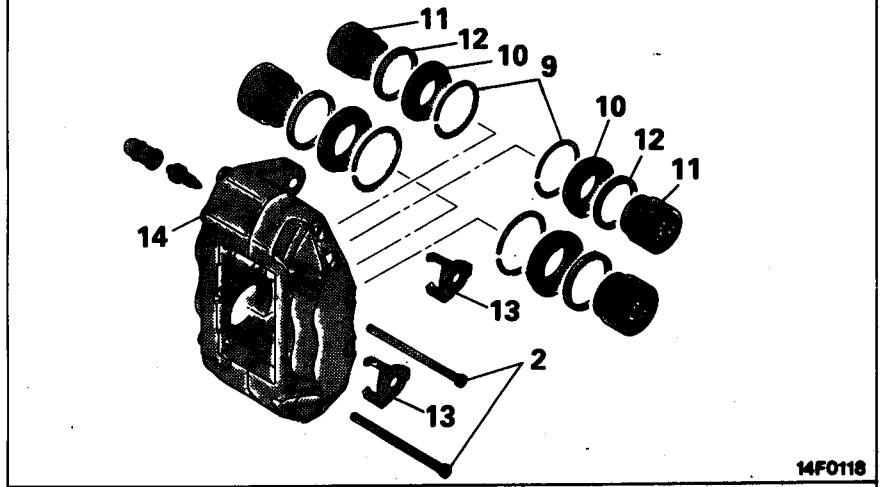


Grease: Brake grease SAE J310, NLGI No. 1

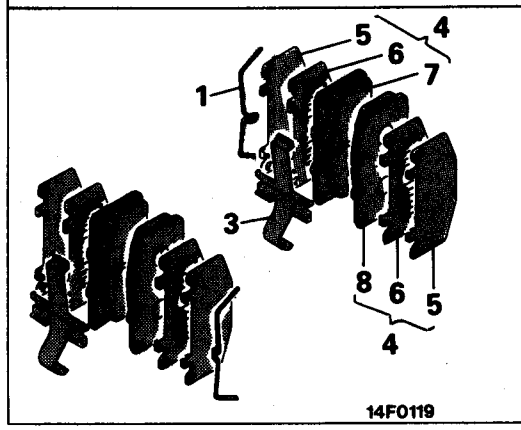


Grease: Repair kit grease (orange)

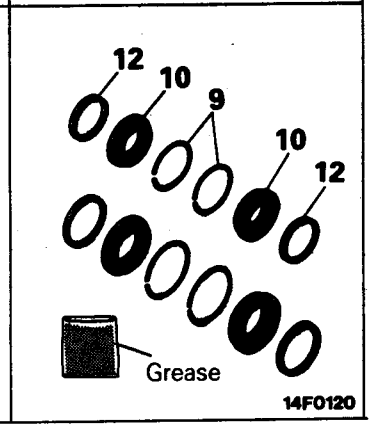
Brake caliper kit



Pad kit

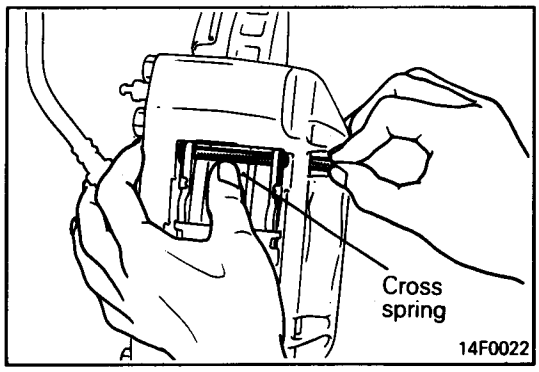


Seal and boot kit



Disassembly steps

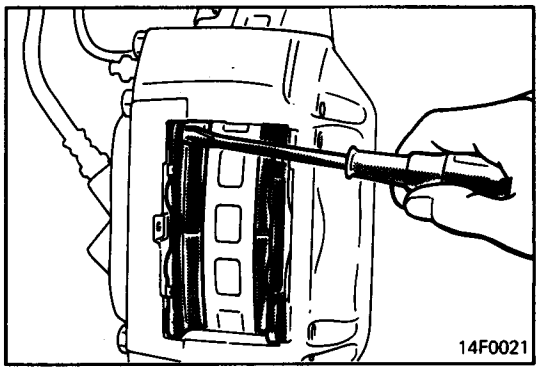
1. Clip
2. ◆◆ Pad pin
3. Cross spring
4. ◆◆ Pad assembly
5. Shim A
6. Shim B
7. Inner pad (with wear indicator)
8. Outer pad
9. Retaining ring
10. Piston boot
11. ◆◆ Piston
12. ◆◆ Piston seal
13. Washer
14. Caliper body



SERVICE POINTS OF DISASSEMBLY E35LGAK

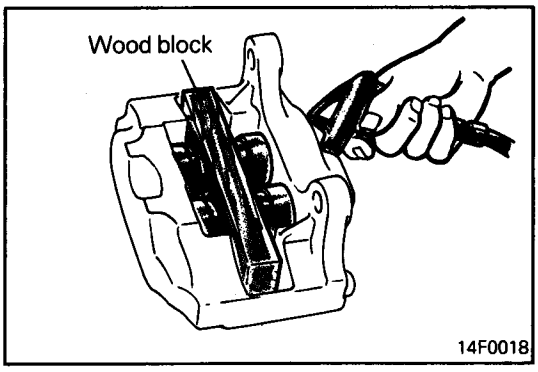
2. REMOVAL OF PAD PIN

Holding the cross spring with hand, remove the pad pin.



4. REMOVAL OF PAD ASSEMBLY

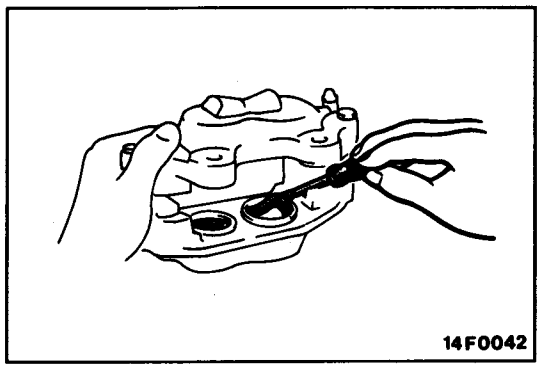
Using a screwdriver, remove the pad assembly.



11. REMOVAL OF PISTONS

Install a wood block as shown and send compressed air through the port, to which brake hose is attached, to remove the pistons.
At this time, make sure that the four pistons come out evenly.

Caution
1. Be careful not to get your fingers to be pinched.
2. Use care not to let the brake fluid splash.



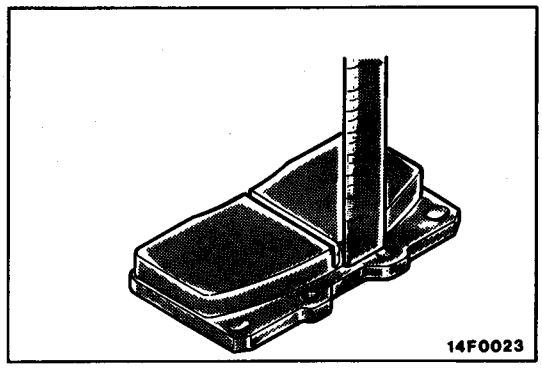
12. REMOVAL OF PISTON SEAL

(1) Remove the piston seal.

Caution
Do not damage the cylinder inner surface.

(2) Clean the piston surfaces and cylinder inner surfaces with trichloroethylene, alcohol, or the specified brake fluid.

Specified brake fluid: DOT3 or DOT4



INSPECTION E35LHAF

INSPECTION OF PAD WEAR

Measure the thickness of the pad at a point which wears most. Replace the pad assembly if the measurement is less than the limit.

Standard value: 10.0 mm (0.39 in.)
Limit: 2.0 mm (0.08 in.)

Caution
Whenever the pad is to be replaced, replace the pads on the right and left wheels as a set.

REAR DISC BRAKE

M35MA--

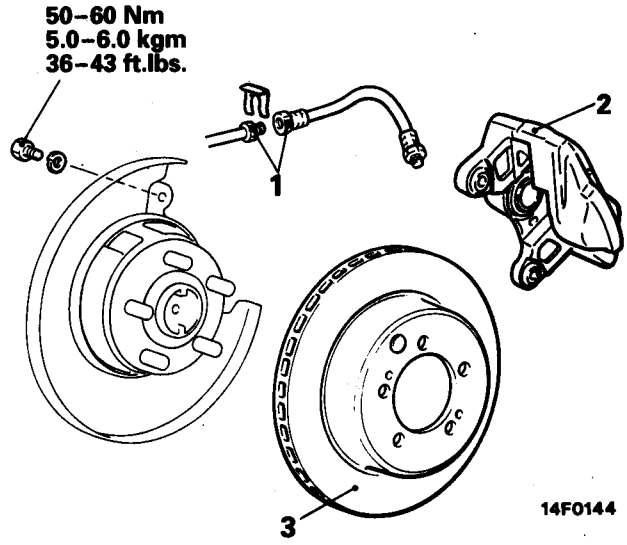
REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining of Brake Fluid

Post-installation Operation
- Brake Fluid Filling
- Brake Line Bleeding (Refer to P. 35-28.)

Flared brake line nuts
15 Nm
1.5 kgm
11 ft.lbs.


14F038



14F0144

Removal steps
1. Brake hose
◆◆ 2. Rear brake assembly
3. Brake disc

INSPECTION

E36RCAE

BRAKE DISC

(1) Check disc for wear. (Refer to P. 35-30.)
(2) Check disc for runout. (Refer to P. 35-30.)

SERVICE POINT OF INSTALLATION

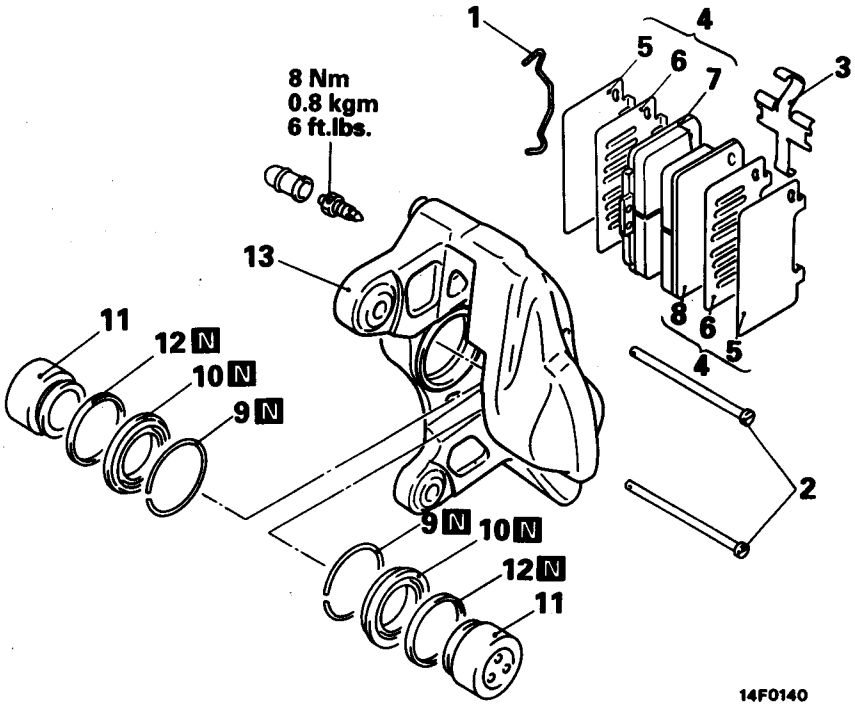
E36RDAG

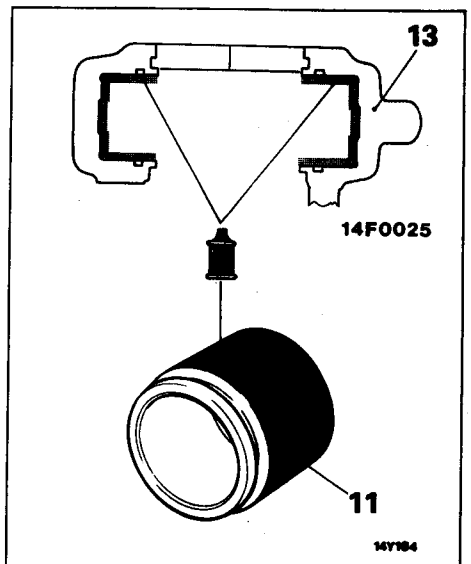
2. INSTALLATION OF THE REAR BRAKE ASSEMBLY

Install the rear brake assembly using the same procedure as that for the front brake assembly. (Refer to P. 35-49.)

DISASSEMBLY AND REASSEMBLY

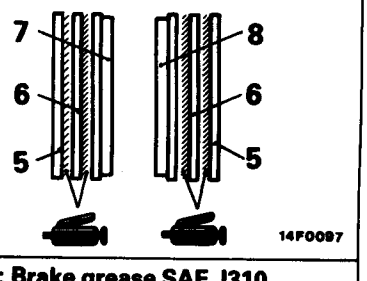
E36RF--



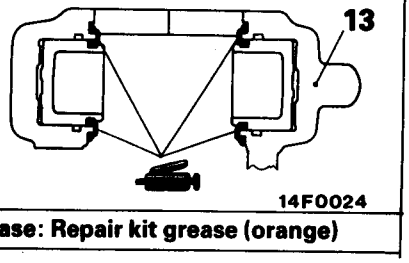


Caution
The piston seal contained in the seal and boot kit is coated with special grease.
Do not wipe off the grease.

Brake fluid: DOT3 or DOT4

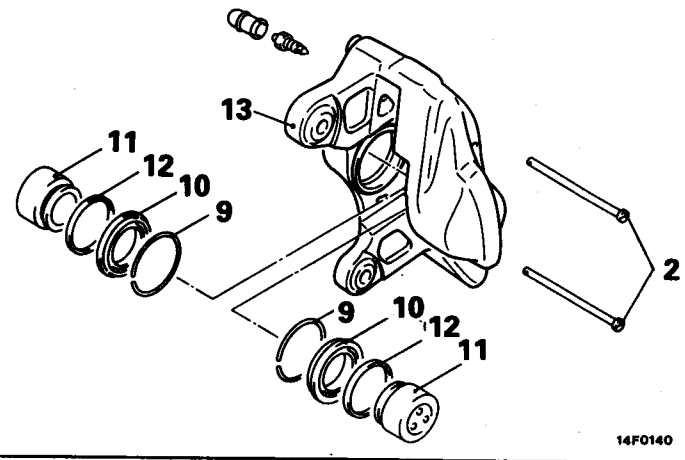


Grease: Brake grease SAE J310, NLGI No. 1

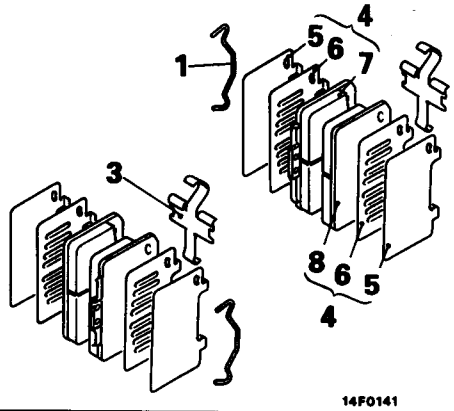


Grease: Repair kit grease (orange)

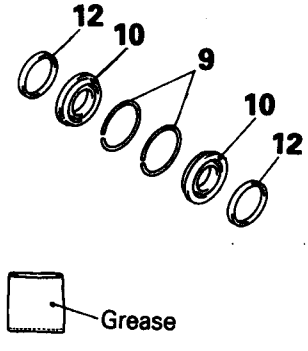
Brake caliper kit



Pad kit

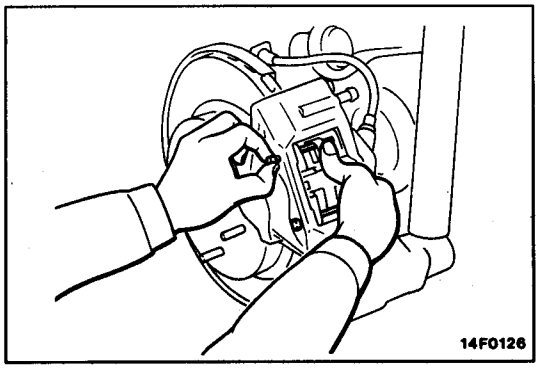


Seal and boot kit



Disassembly steps

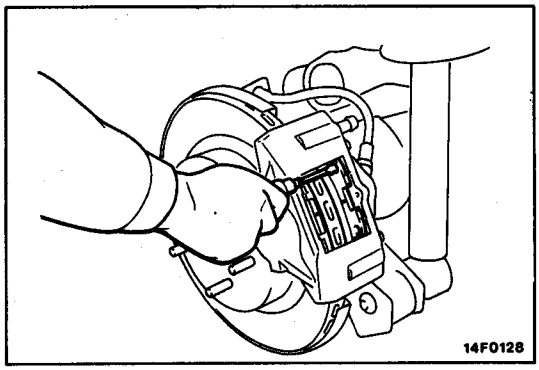
1. Clip
2. ◆◆ Pad pin
3. Cross spring
4. ◆◆ Pad assembly
5. Shim A
6. Shim B
7. Inner pad (with wear indicator)
8. Outer pad
9. Retaining ring
10. Piston boot
11. ◆◆ Piston
12. ◆◆ Piston seal
13. Caliper body



SERVICE POINTS OF DISASSEMBLY E35RGAH

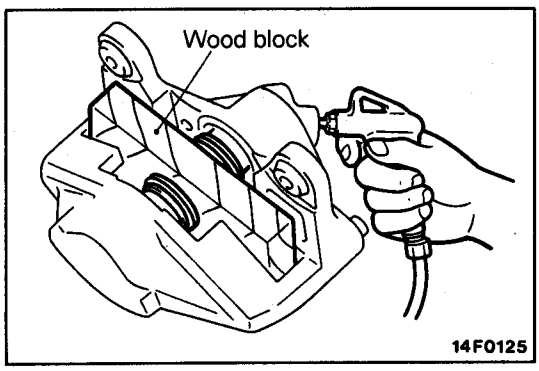
2. REMOVAL OF PAD PIN

Holding the cross spring with hand, remove the pad pin.



4. REMOVAL OF PAD ASSEMBLY

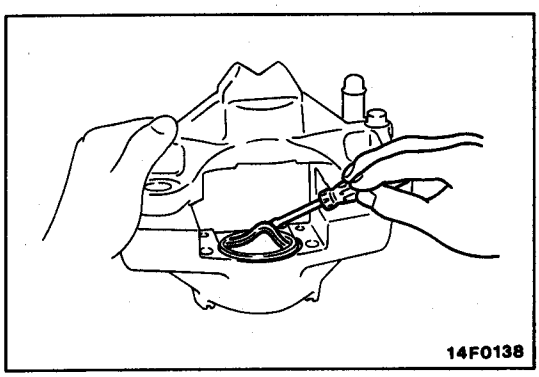
Using a screwdriver, remove the pad assembly.



11. REMOVAL OF PISTONS

Install a wood block as shown and send compressed air through the port, to which brake hose is attached, to remove the pistons.
At this time, make sure that the four pistons come out evenly.

Caution
1. Be careful not to get your fingers to be pinched.
2. Use care not to let the brake fluid splash.



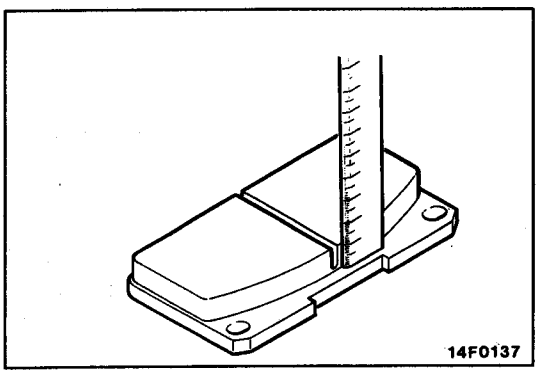
12. REMOVAL OF PISTON SEAL

(1) Remove the piston seal.

Caution
Do not damage the cylinder inner surface.

(2) Clean the piston surfaces and cylinder inner surfaces with trichloroethylene, alcohol, or the specified brake fluid.

Specified brake fluid: DOT3 or DOT4



INSPECTION E36RHAF

INSPECTION OF PAD WEAR

Measure the thickness of the pad at a point which wears most. Replace the pad assembly if the measurement is less than the limit.

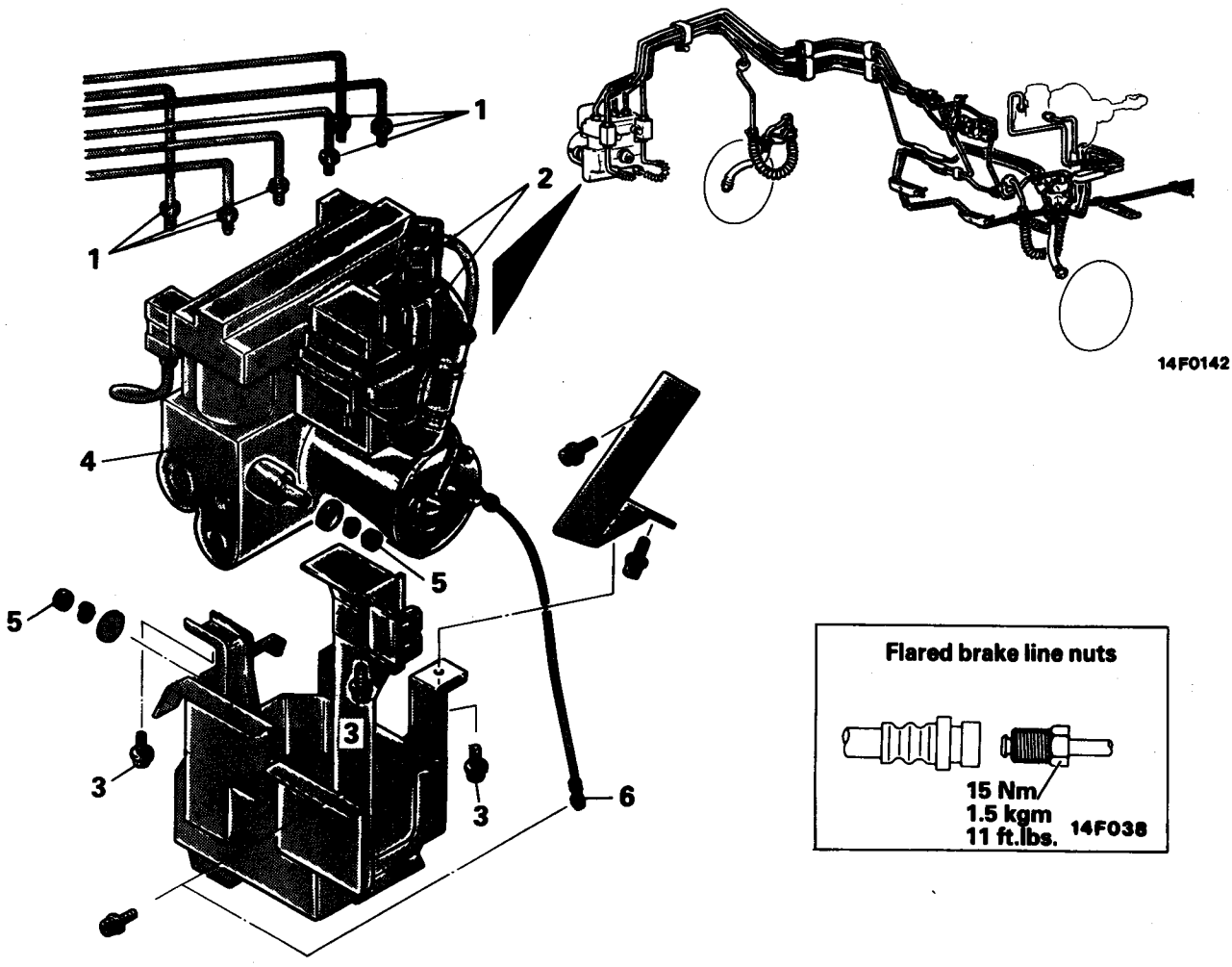
Standard value: 10.0 mm (0.39 in.)
Limit: 2.0 mm (0.08 in.)

Caution
Whenever the pad is to be replaced, replace the pads on the right and left wheels as a set.

HYDRAULIC UNIT

REMOVAL AND INSTALLATION

E35WA--



Removal steps

- ⇔ 1. Brake tube connection
- 2. Harness connector connection
- 3. Bracket bolt
- ⇔ 4. Hydraulic unit (with bracket)
- 5. Hydraulic unit nut
- 6. Grounding wire connection

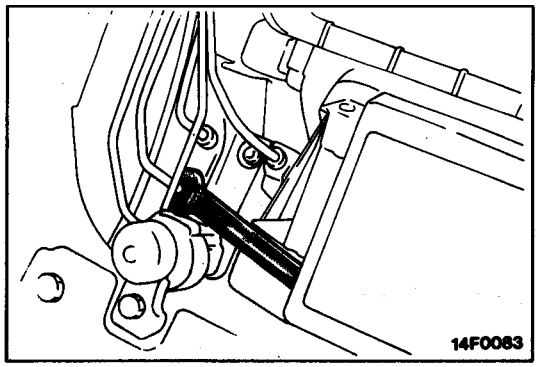
Installation steps

- ⇔ 6. Grounding wire connection
- 5. Hydraulic unit nut initial tightening
- 4. Hydraulic unit (with bracket)
- 3. Bracket bolt
- 2. Harness connector connection
- ⇔ 1. Brake tube connection
- 5. Securely tightening of hydraulic unit nut

Pre-removal Operation
- Removal of Splash Shield
- Draining of Brake Fluid
- Removal of Relay Box
- Removal of Air Duct

Post-installation Operation
- Installation of Splash Shield
- Installation of Air Duct
- Installation of Relay Box
- Charging of Brake Fluid and Air Bleeding
- Inspection with HU Checker

19F0127



SERVICE POINTS OF REMOVAL E35WBAJ

1. REMOVAL OF BRAKE TUBES

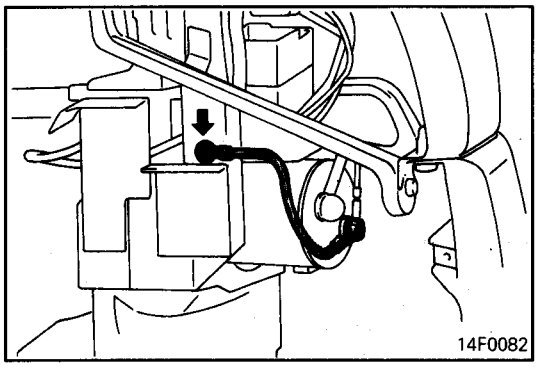
Pull up the relay box with harness attached and inserting a hand under the relay box, remove the brake tubes using the flare nut wrench.

4. REMOVAL OF HYDRAULIC UNIT (HU)

Remove the hydraulic unit together with the bracket from the wheel house.

Caution

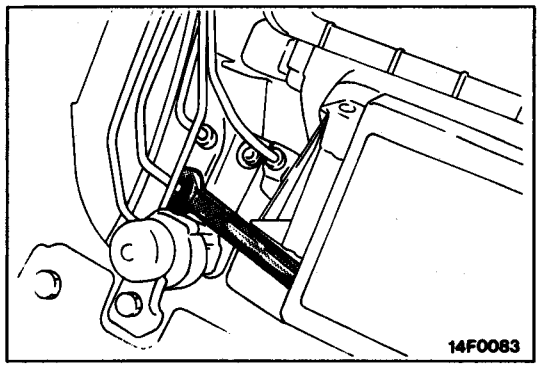
1. **The HU is heavy. Use care when removing it.**
2. **The HU cannot be disassembled. Never loosen its nuts or bolts.**
3. **Do not drop or shock the HU.**
4. **Do not turn the HU upside down or lay it on its side.**



SERVICE POINTS OF INSTALLATION E35WDAF

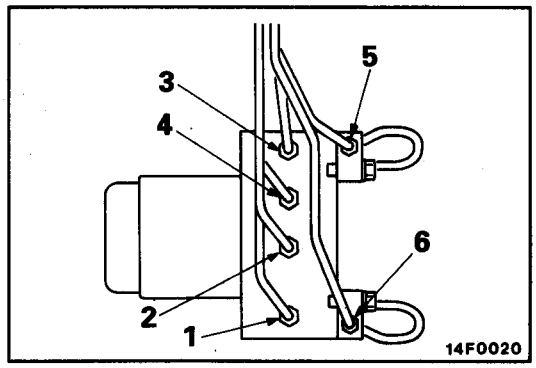
6. CONNECTION OF GROUNDING WIRE

Connect the grounding wire at the point shown in the illustration.



1. INSTALLATION OF BRAKE TUBE

(1) Pull up the relay box with harness attached and inserting a hand under the realy box, install the brake tubes using flare nut wrench.



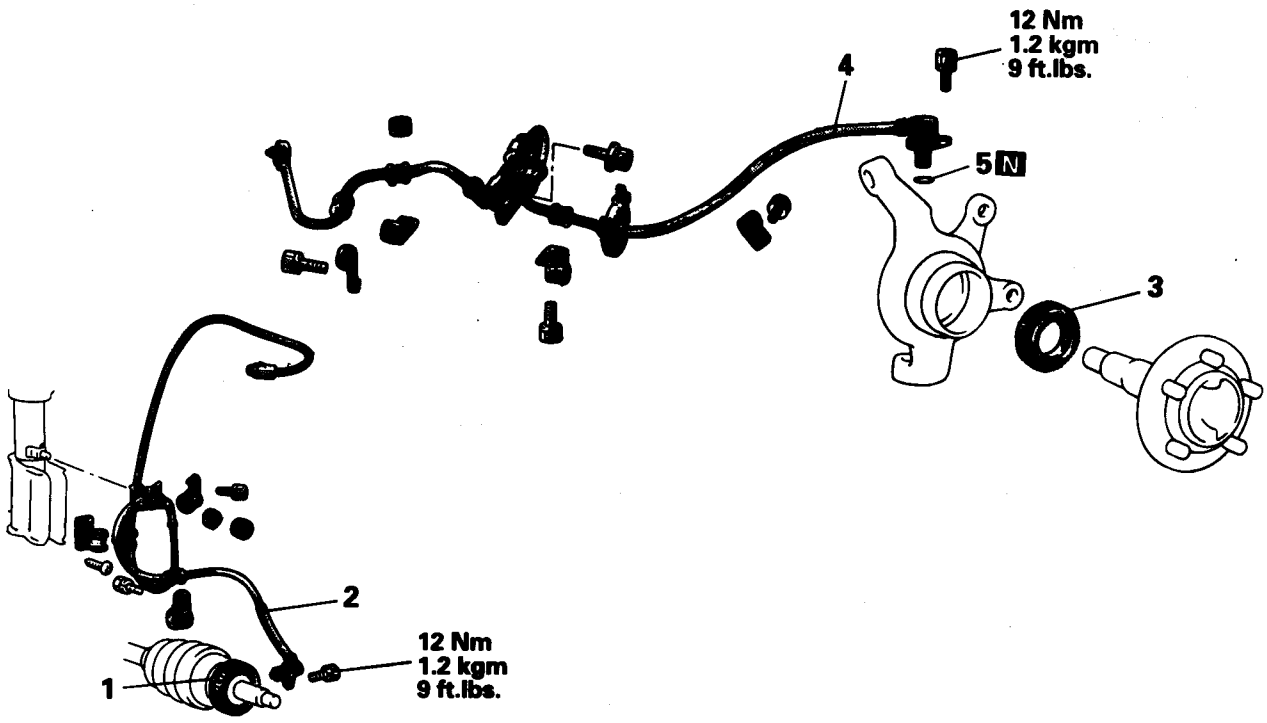
(2) Connect brake tubes to the hydraulic unit as shown in the illustration.

1. From the hydraulic unit to the front brake (L.H.)
2. From the hydraulic unit to the rear brake (R.H.)
3. From the hydraulic unit to the front brake (R.H.)
4. From the hydraulic unit to the rear brake (L.H.)
5. From the master cylinder (for left front and right rear)
6. From the master cylinder (for right front and left rear)

WHEEL SPEED SENSOR

E35YA--

REMOVAL AND INSTALLATION



Removal steps

1. Front rotor
2. Front speed sensor
3. Rear rotor (Refer to GROUP 27 – Axle Shaft.)
4. Rear speed sensor
5. O–ring

Pre-removal Operation
- Removal of Splash Shield (Front Only) (Refer to GROUP 42 – Fender.)

Post-installation Operation
- Installation of Splash Shield (Front Only) (Refer to GROUP 42 – Fender.)
- Inspection of A.B.S. (Refer to P.35-5.)

NOTE
The front rotor is integrated with the drive shaft and is not to be disassembled.

14F0100

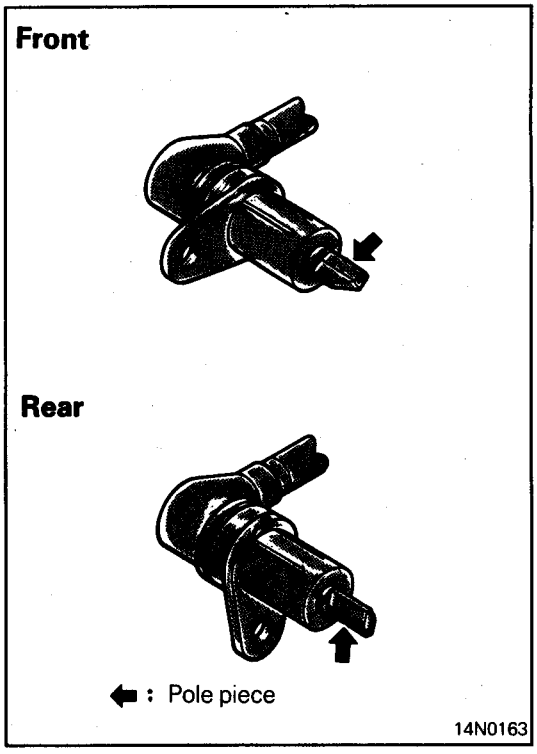
SERVICE POINTS OF REMOVAL E35YBAG

1. REMOVAL OF FRONT ROTOR/3. REMOVAL OF REAR ROTOR

Caution
Do not damage rotor teeth and never drop the rotor. If the rotor has missing teeth or is deformed, accurate wheel speed detection cannot be expected and the system may fail to function normally.
Use particular care with the front rotor, as it is integrated with the drive shaft and is not to be disassembled.

2. REMOVAL OF FRONT SPEED SENSOR / 4. REAR SPEED SENSOR

Caution
When removing the speed sensor from the knuckle, use care not to strike the tip of the pole piece against the rotor teeth or any other parts.

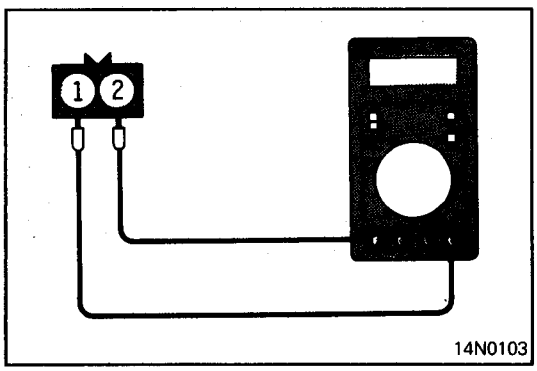


INSPECTION E35YLAC

RESISTANCE BETWEEN SPEED SENSOR TERMINALS

(1) Check the tip of the speed sensor pole piece for deposits of metal or other foreign matter and clean the pole piece as necessary.
Also check the pole piece for damage and replace if damaged.

Caution
The speed sensor pole piece is magnetized by a built-in magnet inside the sensor, so it tends to attract metal. If the pole piece is damaged, accurate wheel speed detection may not be expected.



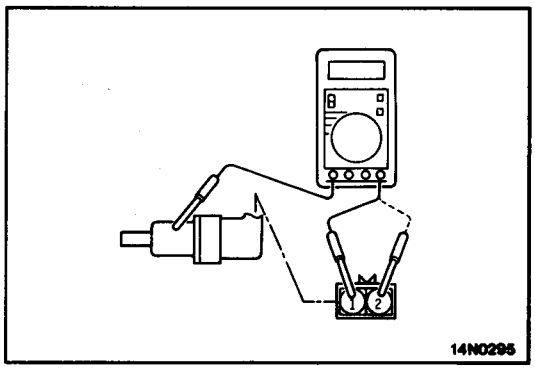
(2) Measure resistance between speed sensor terminals.

Standard value: 0.8–1.2 kΩ

If the internal resistance of the speed sensor is out of specification, replace with a new one.

(3) Check the speed sensor cable for open circuit and replace if faulty.

NOTE
Remove the cable clamp from the body and, while flexing the cable near the clamp, check for temporary open circuit. Also check connector connection and terminal insertion.

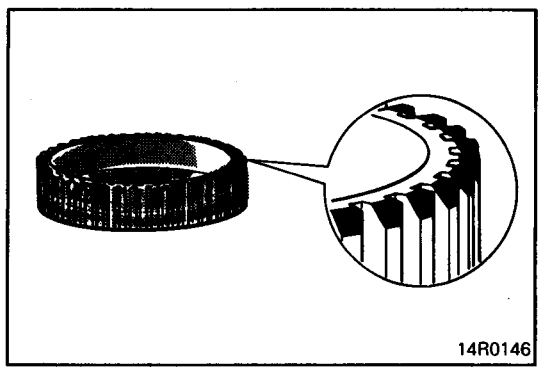


SPEED SENSOR INSULATION INSPECTION

(1) Remove all connections from the speed sensor, and then measure the resistance between terminals (1) and (2) and the body of the speed sensor.

Standard value: 100 kΩ

(2) If the speed sensor insulation resistance is outside the standard value range, replace with a new speed sensor.



INSPECTION OF ROTOR

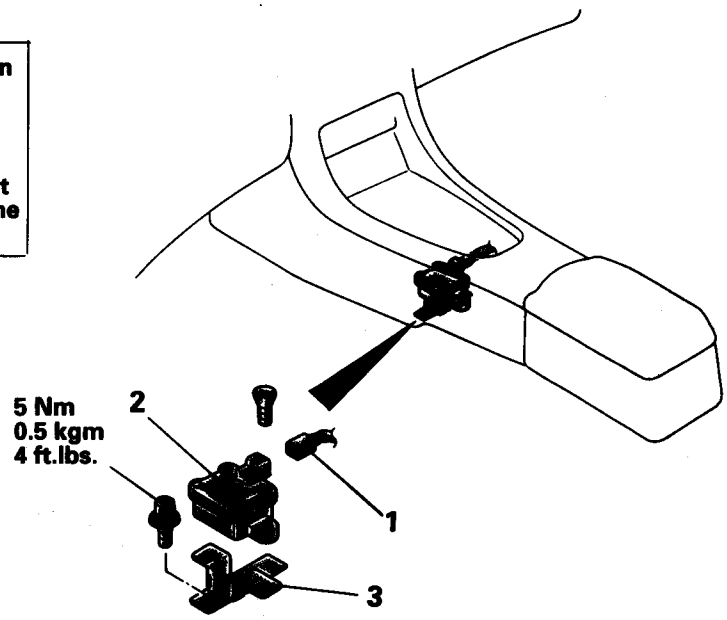
Check the rotor for missing or worn teeth and replace if faulty.

G SENSOR

REMOVAL AND INSTALLATION

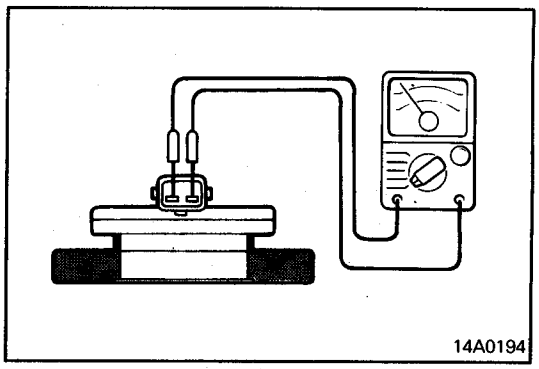
E35NA--

Pre-removal and Post-installation Operation
Removal and Installation of Front and Rear Console Assemblies
(Refer to GROUP 52A – Console Box.)
CAUTION: SRS
When installing or removing the instrument panel, don't allow any impact or shock to the SRS diagnosis unit.



14F0115

Removal steps
1. G sensor connector
2. G sensor
3. G sensor bracket



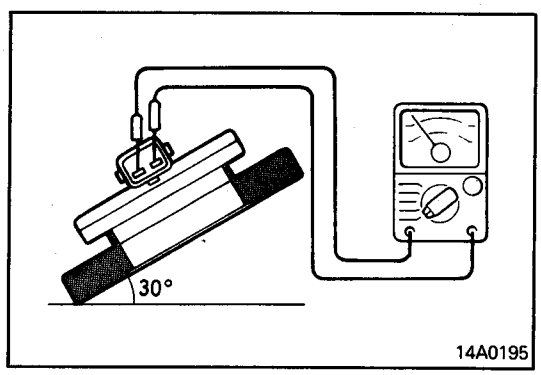
14A0194

INSPECTION

E35NCAA

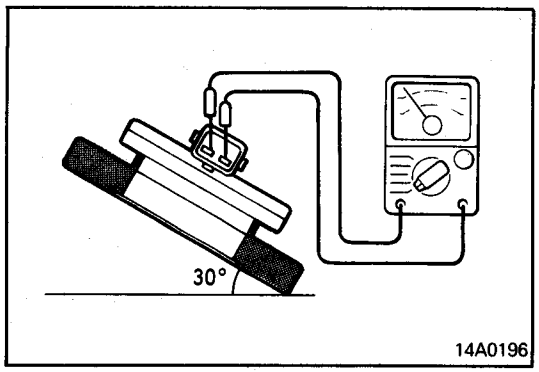
INSPECTION OF G SENSOR

(1) Lay the G sensor on a level surface and check for continuity between its terminals.



14A0195

(2) Incline the G sensor toward the vehicle front gradually and check that continuity is lost at an angle of 30° or more.



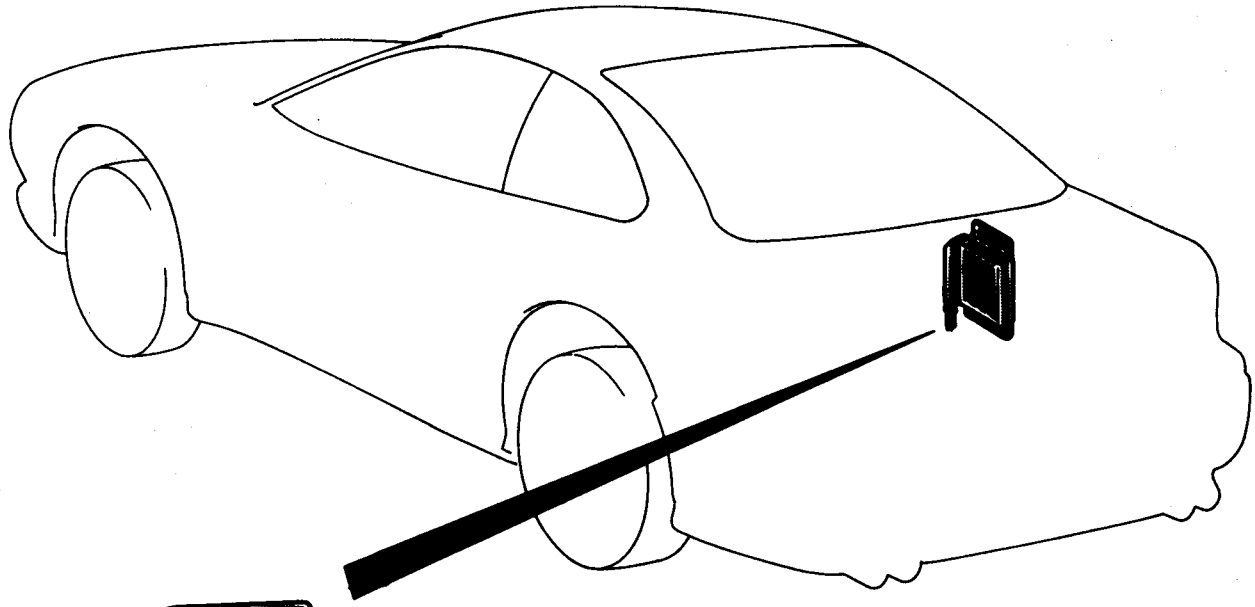
14A0196

(3) Incline the G sensor toward the vehicle rear gradually and check that continuity is lost at an angle of 30° or more.

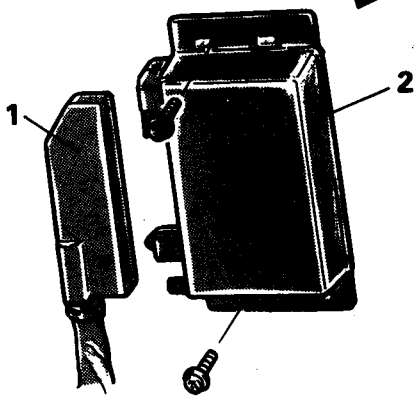
ELECTRONIC CONTROL UNIT

REMOVAL AND INSTALLATION

E35ZA-



14F0080



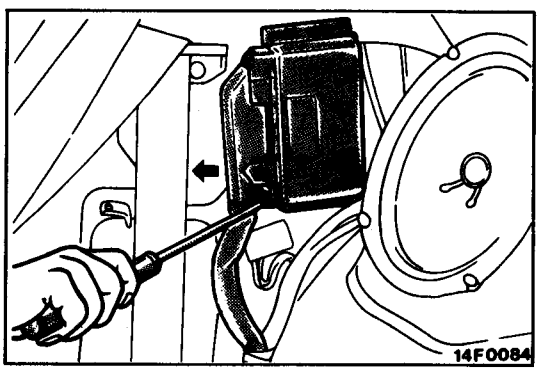
14F0079

Pre-removal Operation
- Removal of Rear Seat Cushion
- Removal of Rear Seatback (R)
- Removal of Quarter Trim

Post-installation Operation
- Installation of Quarter Trim
- Installation of Rear Seatback (R)
- Installation of Rear Seat Cushion
- Inspection of A.B.S. (Refer to P.35-5.)

Removal steps

⇔ 1. Control unit connector connection
2. Electronic control unit



14F0084

SERVICE POINT OF REMOVAL

E35ZBAG

1. REMOVAL OF CONTROL UNIT CONNECTOR

Insert a screwdriver into the lock section as illustrated and pull out the connector from below.

PARKING BRAKES

CONTENTS

E36AA-

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver (from rendering the SRS inoperative).

(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

 Dec. 1993 PWUE9119-C REVISED

SPECIFICATIONS

E36CA--

GENERAL SPECIFICATIONS

Items	Specifications
Parking brakes	
Type	Mechanical brake acting on rear wheels
Brake lever type	Lever type
Cable arrangement	V-type

SERVICE SPECIFICATIONS

E36CB--

Items	Specifications
Standard value	
Parking brake lever stroke	3 – 5 notches
Brake lining thickness mm (in.)	2.8 (0.11)
Brake disc I.D. mm(in.)	168.0 (6.6)
Limit	
Brake lining thickness mm (in.)	1.0 (0.039)
Brake disc I.D. mm(in.)	169.0 (6.7)

LUBRICANTS

E36CD--

Items	Specified lubricant
Rear brake shoe and backing plate contact surfaces Contact surface between shoe & lining assembly's strut and adjuster Contact surface between shoe & lining assembly and shoe-adjustment bolt and shoe-support piece	Brake grease SAE J310, NLGI No. 1

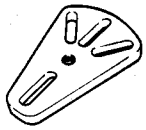
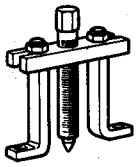
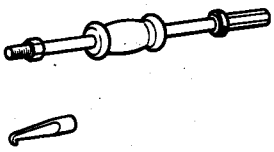
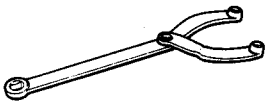
SEALANTS AND ADHESIVES

E36CE--

Items	Specified sealant	Remarks
Shoe hold-down pin installation surface	3M ATD Part No. 8513 or equivalent	Drying sealant

SPECIAL TOOLS

E36DA--

Tool	Number	Name	Use
	MB991354	Puller body	Removal of the rear axle shaft assembly
	MB990241	Rear axle shaft puller	
	MB990242 MB990244	Puller bar Puller shaft	
	MB990211	Sliding hammer	
	MB990767	End yoke holder	Fixing of the hub

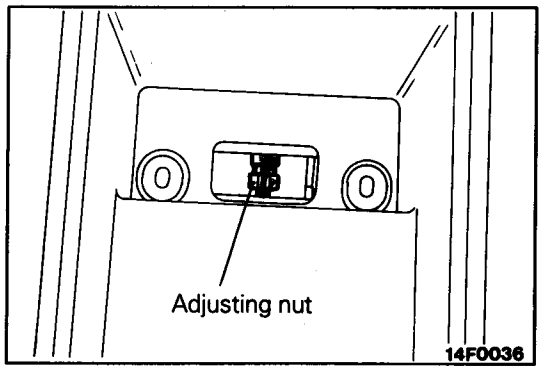
SERVICE ADJUSTMENT PROCEDURES

PARKING BRAKE LEVER STROKE CHECK E36FAAZ

1. Pull the parking brake lever with a force of approx. 200 N (20 kg, 45 lbs.), and count the number of notches.

   Caution
   The 200 N (20 kg, 45 lbs.) force of the parking brake lever must be strictly observed.

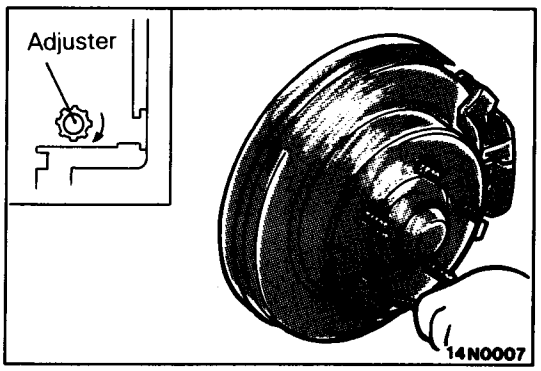
   Standard value: 3 – 5 notches

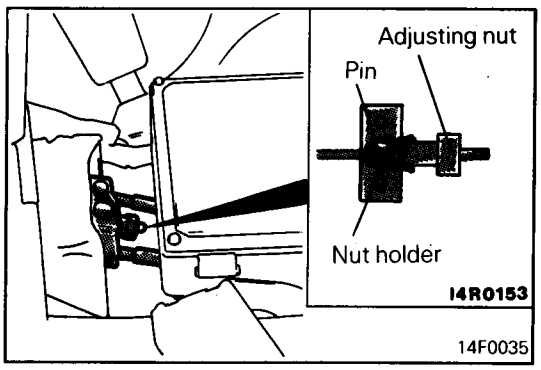


2. If the parking brake lever stroke is not the standard value, adjust as described below.
   (1) Remove the cup holder and plug and loosen the adjusting nut to the cable end so that the cable becomes free.
   (2) Repeat depressing the brake pedal until the pedal stroke becomes stable.

   NOTE
   When the brake pedal is repeatedly depressed, shoe clearance is adjusted properly.

   (3) Disengage the drive shaft and companion flange.
   (4) Remove the adjusting hole plug. Using a screwdriver, turn the adjuster in the direction of the arrow (to expand the shoe) until brake is lightly applied [where the disc cannot be turned with both hands: approx. 2.7 Nm (27 kgcm, 23in.lbs.)]. Then, turn the adjuster five notches in the direction opposite the arrow.
   (Reference: Shoe clearance on one side 0.19 mm [0.0075 in.])





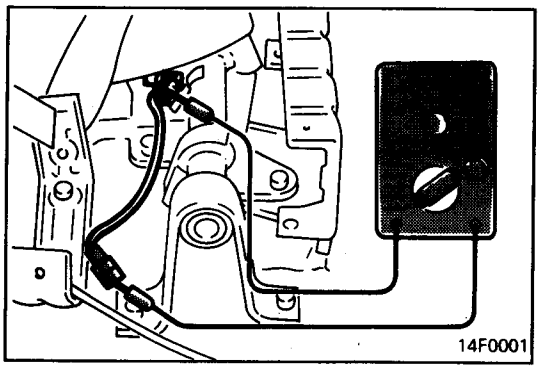
   (5) Turn the adjusting nut to obtain specified parking brake lever stroke. After the adjustment, check that there is no play between the adjusting nut and pin.

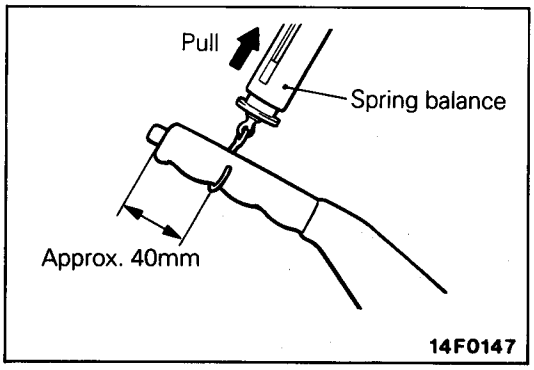
   Caution
   Do not adjust parking brake lever stroke too tight, less than the standard value, or brake drag could result.

   (6) After the parking brake lever stroke has been adjusted, jack up the rear part of the vehicle. Loosen the parking brake and turn the rear wheel to check that the parking brake does not drag.

PARKING BRAKE SWITCH CHECK E36FCAD

1. Disconnect the connector of the parking brake switch, and connect an ohmmeter to the parking brake switch and the switch installation bolt.
2. The parking brake switch is good if there is continuity when the parking brake lever is pulled and there is no continuity when it is returned.





LINING RUNNING-IN

Carry out running-in by the following procedures when replacing the parking brake lining or the rear brake disc rotors, or when brake performance is insufficient.

Caution
Carry out running-in in place with good visibility, and pay careful attention to safety.

(1) Adjust the parking brake stroke to the specified value.
(2) Hook a spring balance onto the centre of the parking brake lever grip and pull it with a force of 98–147 N in a direction perpendicular to the handle.
(3) Drive the vehicle at a constant speed of 35–50 km/h (22–31 mph) for 100 metres.
(4) Release the parking brake and let the brakes cool for 5–10 minutes.
(5) Repeat the procedure in steps (2) to (4) 4–5 times.

NOTES

PARKING BRAKE LEVER AND PARKING BRAKE CABLE

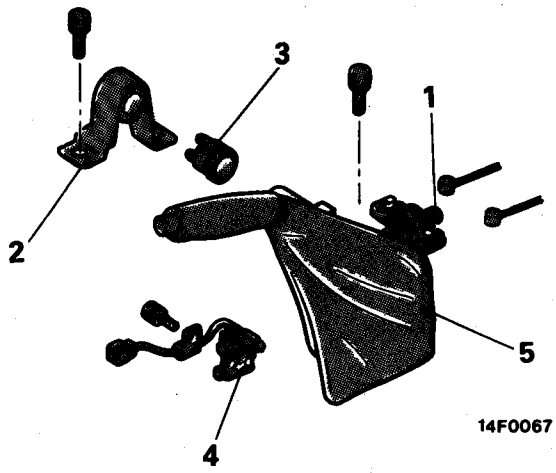
E36LA--

REMOVAL AND INSTALLATION

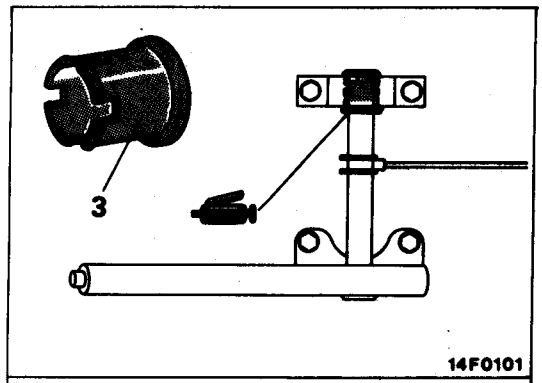
Pre-removal Operation
- Removal of Front and Rear Console (Refer to GROUP 52A – Console Box.)

CAUTION: SRS
When installing or removing the floor console, don't allow any impact or shock to the SRS diagnosis unit.

Post-installation Operation
- Parking Brake Lever Stroke Adjustment (Refer to P.36-4.)
- Installation of Front and Rear Console (Refer to GROUP 52A – Console Box.)



14F0067



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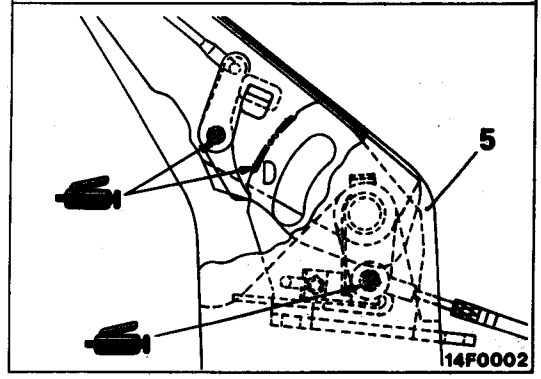

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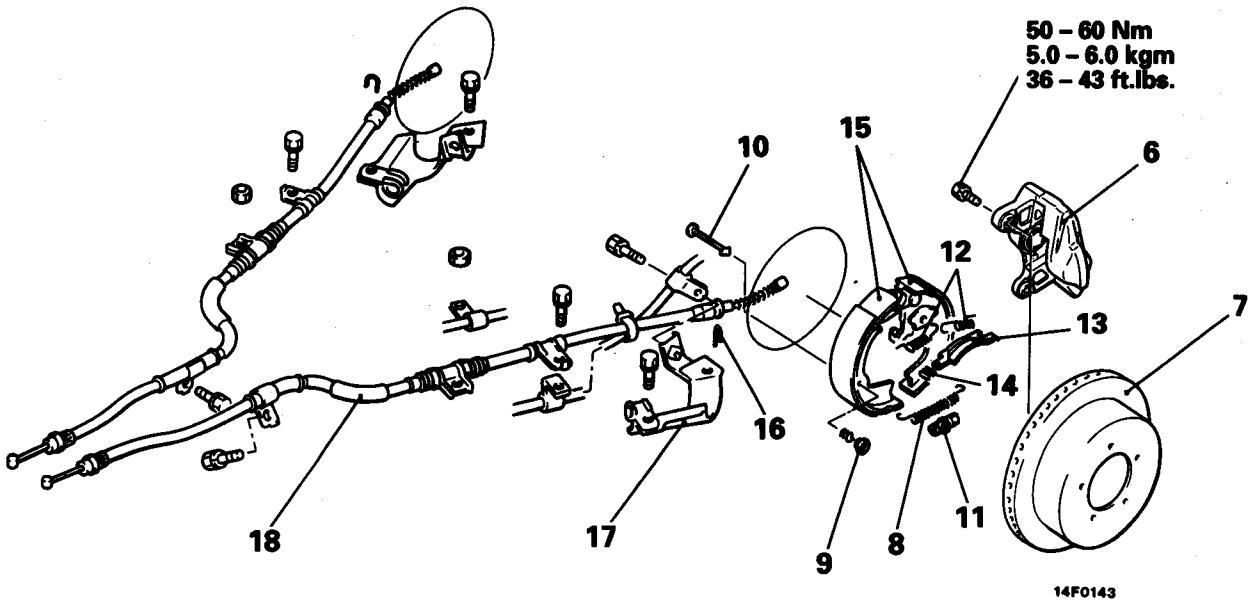
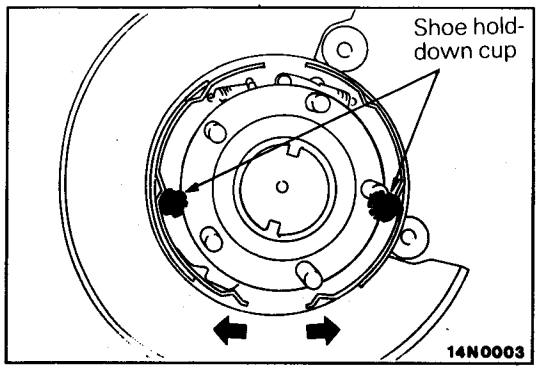
Parking brake lever removal steps
1. Cable adjuster
2. Parking brake stay
3. Bushing
4. Parking brake switch
5. Parking brake lever



Parking brake cable removal steps

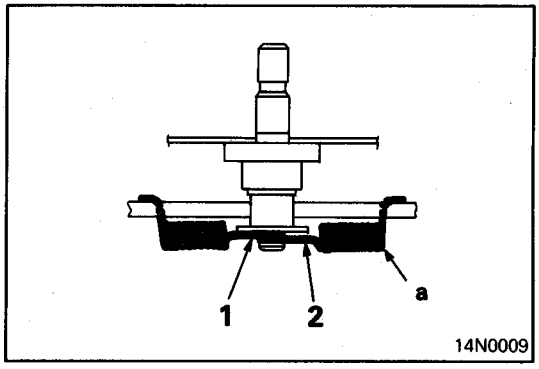
1. Cable adjuster
6. Rear brake assembly
7. Rear brake disc
8. Adjusting wheel spring
◆◆ 9. Shoe hold-down cup
10. Shoe hold-down pin
◆◆ 11. Adjuster
◆◆ 12. Shoe-to-anchor spring
13. Strut
14. Strut return spring
15. Shoe & lining assembly
16. Clip
17. parking cable protector
18. Parking brake cable



SERVICE POINTS OF REMOVAL E36LOAG

9. REMOVAL OF SHOE HOLD DOWN CUP

Expand the shoe & lining assembly and remove the shoe hold down cup.



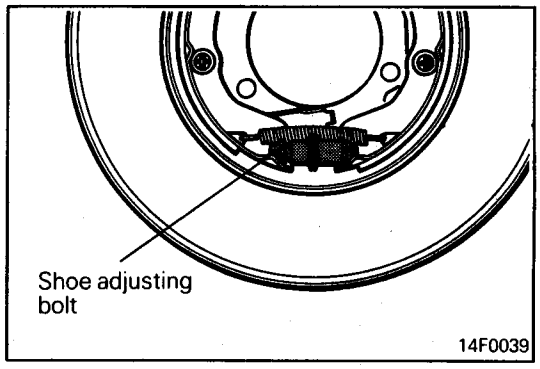
SERVICE POINTS OF INSTALLATION E36LDAG

12. INSTALLATION OF SHOE TO ANCHOR SPRINGS

The shoe-to-anchor spring must be installed in the sequence shown in the illustration.

Caution
Each shoe-to-anchor spring has a unique spring load and the spring "a" is painted to prevent erroneous installation.

NOTE
The figure shows the left wheel; for the right wheel, the position in symmetrical.



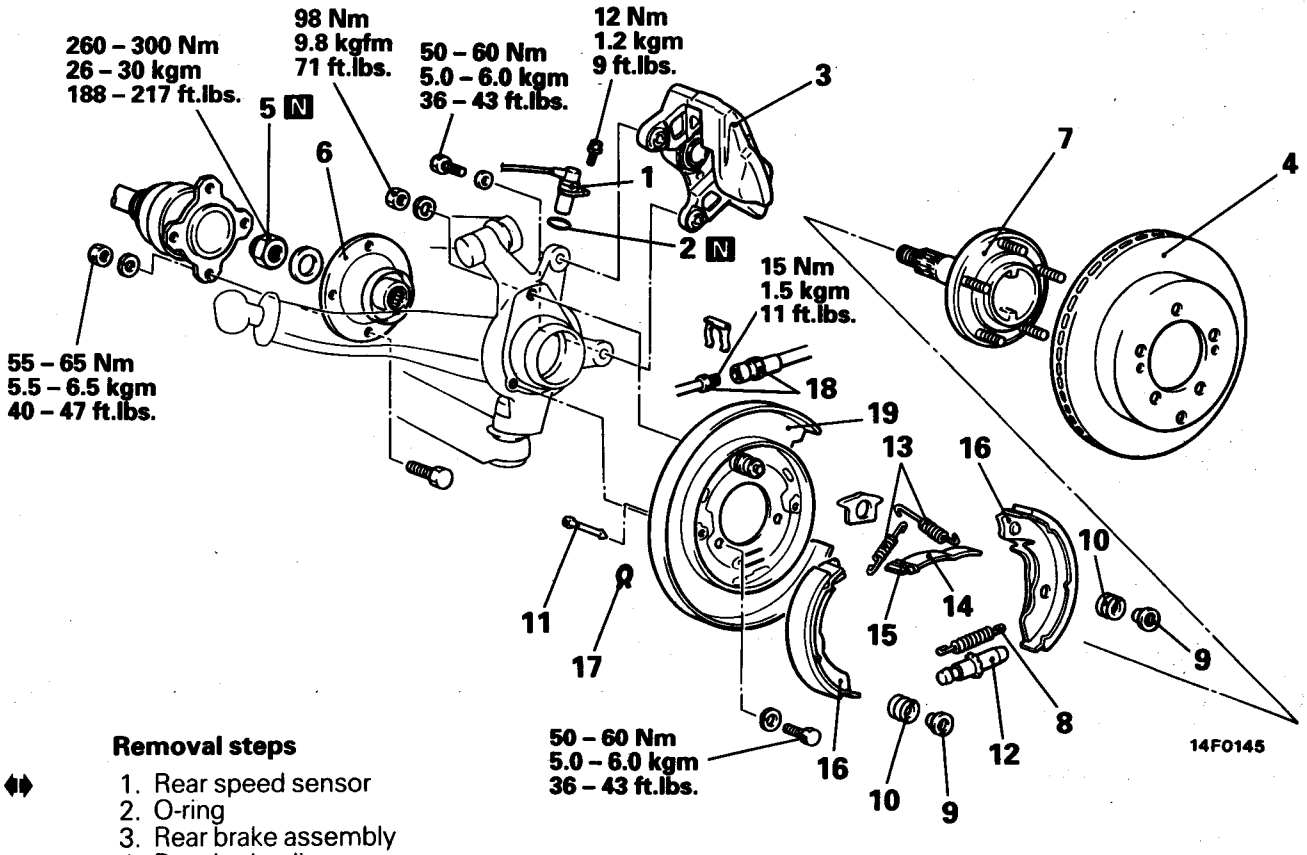
11. INSTALLATION OF ADJUSTER

Install the adjuster facing the left adjusting bolt to the vehicle front and right adjusting bolt to the vehicle rear.

PARKING BRAKE

E36RA---

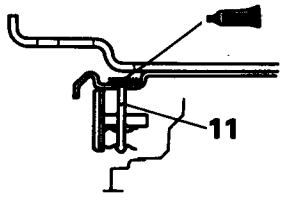
REMOVAL AND INSTALLATION



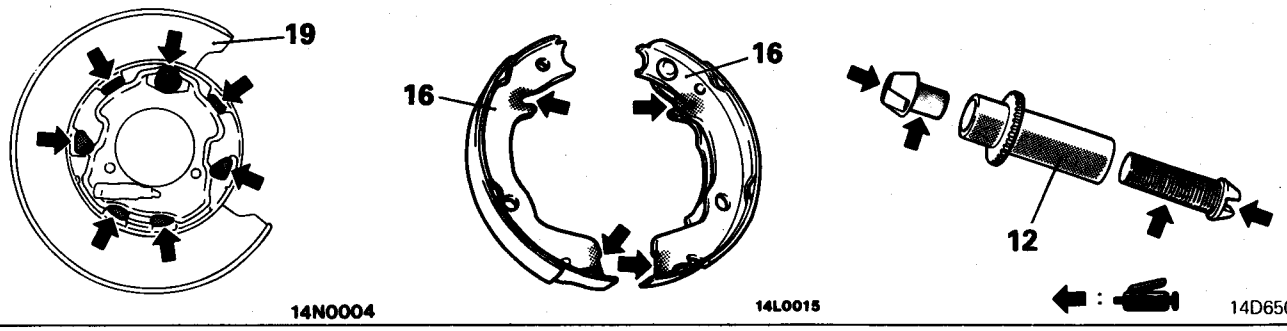
Removal steps

- ◆◆ 1. Rear speed sensor
- 2. O-ring
- 3. Rear brake assembly
- 4. Rear brake disc
- ◆◆ 5. Self-locking nut
- 6. Companion flange
- ◆◆ 7. Rear axle shaft
- 8. Adjusting wheel spring
- 9. Shoe hold-down cup
- 10. Shoe hold-down spring
- 11. Shoe hold-down pin
- ◆◆ 12. Adjuster
- ◆◆ 13. Shoe-to-anchor spring
- 14. Strut
- 15. Strut return spring
- 16. Shoe & lining assembly
- 17. Clip
- 18. Brake tube connection
- 19. Backing plate

Post-installation Operation
- Parking Brake Lever Stroke Adjustment (Refer to P.36-4.)



Sealant: 3M ATD Part No. 8513 or equivalent

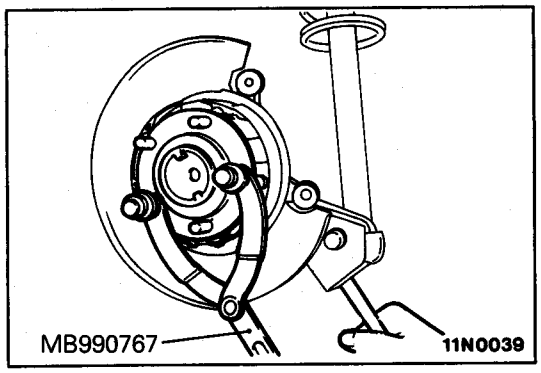


Grease: Brake grease SAE J310, NLGI No. 1

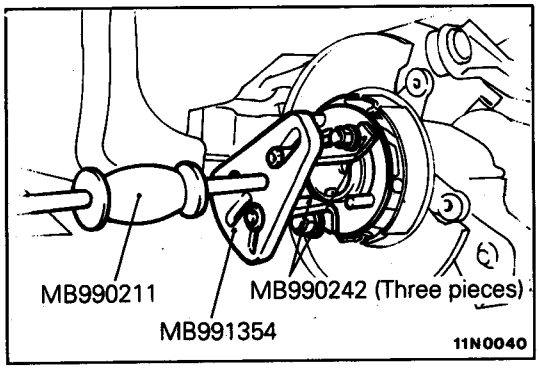
SERVICE POINTS OF REMOVAL E36RBAF

1. REMOVAL OF REAR SPEED SENSOR

Caution
When removing the speed sensor from the knuckle, use care not to hit the pole piece at its tip against the rotor teeth or other parts.



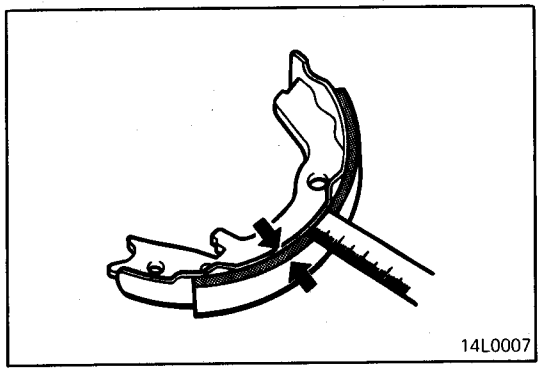
5. REMOVAL OF SELF-LOCKING NUT



7. REMOVAL OF AXLE SHAFT ASSEMBLY

INSPECTION E36RCAA

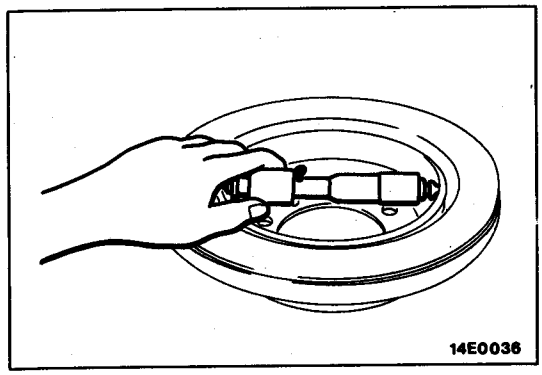
CHECKING FOR UNUSUAL WEAR OF THE BRAKE LINING AND BRAKE DRUM



(1) Measure the thickness of the brake lining at several places.

Standard value: 2.8 mm (0.110 in.)
Limit: 1.0 mm (0.039 in.)

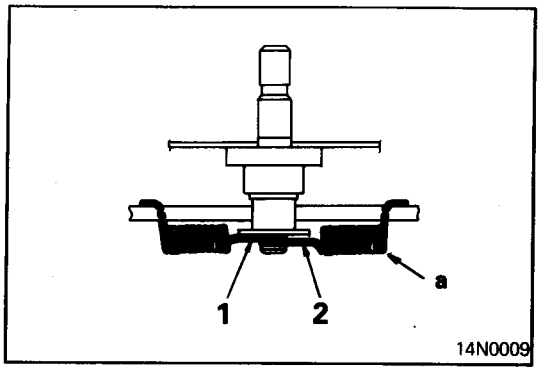
Caution
Replace the brake shoes if the thickness of the brake lining is the limit value or less.

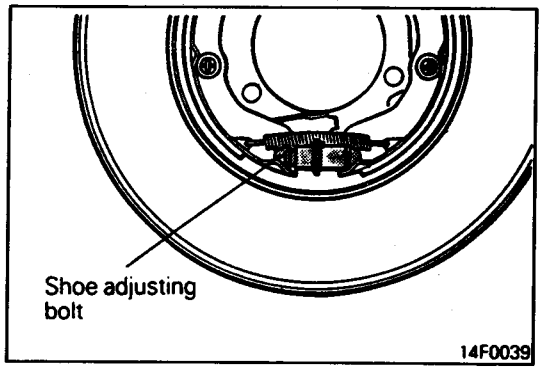


(2) Measure the brake disc drum inner diameter at two or more places.

Standard value: 168.0 mm (6.6 in.)
Limit: 169.0 mm (6.7 in.)

Caution
Replace if the brake disc drum inner diameter is the limit value or more.





SERVICE POINTS OF INSTALLATION E36RDAG

13. INSTALLATION OF SHOE-TO-ANCHOR SPRING

The shoe-to-anchor spring must be installed in the sequence shown in the illustration.

Caution
Each shoe-to-anchor spring has a unique spring load and the spring "a" is painted to prevent erroneous installation.

NOTE
The figure shows the left wheel; for the right wheel, the position in symmetrical.

12. INSTALLATION OF ADJUSTER

Install the adjuster facing the left adjusting bolt to the vehicle front and right adjusting bolt to the vehicle rear.

STEERING

CONTENTS

M37AA-A

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).

(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE
The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIFICATIONS

GENERAL SPECIFICATIONS

E37CA--

Items	Specifications
Steering wheel	
Steering wheel O.D. mm (in.)	
<Up to 1994 models>	390 (15.4)
<From 1995 models>	386 (15.2)
Gear box	
Steering gear type	Rack and pinion
Power steering oil pump	
Oil pump type	Vane type
Displacement cm^3/rev.(cu.in./rev.)	9.6 (0.59)
Relief set pressure MPa (kg/cm^2, psi)	8 (80, 1,138)

SERVICE SPECIFICATIONS

E37CB--

Items	Specifications
Standard value	
Steering wheel free play (with engine stopped) mm (in.)	11 (0.43)
Steering angle	
Inner wheel	33°45' ± 2°
Outer wheel	28°21'
Tie rod end ball joint starting torque Nm (kgcm, in.lbs.)	1.0 –3.0 (10 – 30, 9 – 26)
Stationary steering effort N (kg, lbs.)	35 (3.5, 8) or less
V-belt deflection mm (in.)	
When belt tension is inspected	9.5 – 13.5 (0.37 – 0.53)
When belt tension is readjusted	10.5 – 12.5 (0.41 – 0.49)
When new belt is installed	7.5 – 9.0 (0.30 – 0.35)
Oil pump pressure MPa (kg/cm^2, psi)	
Pressure gauge valve closed	7.5 – 8.2 (75 – 82, 1,067 – 1,166)
Pressure gauge valve opened	0.8 – 1.0 (8 –10, 114 –142)
Oil pressure switch operating pressure MPa (kg/cm^2, psi)	
Oil pressure switch contacts closed (continuity)	1.5 – 2.0 (15 – 20, 213 – 284)
Oil pressure switch contacts opened (no continuity)	0.7 – 1.2 (7 – 12, 100 – 171)
Total pinion preload Nm (kgcm, in.lbs.)	0.7 – 1.3 (7 – 13, 5 – 11)
Tie-rod joint swing resistance N (kg, lbs.)	8 – 18 (0.8 – 2.0, 1.8 – 4.0)
Tie-rod joint swing torque Nm (kgcm, in.lbs.)	2 – 5 (20 – 50, 17 – 43)
Limit	
Steering wheel free play (when hydraulic operation) mm (in.)	30 (1.2)
Variation of tie rod end ball joint shaft direction mm (in.)	1.5 (0.059)
Oil pump pressure	
Pressure gauge valve opened MPa (kg/cm^2, psi)	1.5 (15, 213)
Space between vane and rotor mm (in.)	0.06 (0.0024)

LUBRICANTS

E37CD--

Items	Specified lubricant	Quantity
Power steering gear box Bearing O-ring Oil seal Special tool (MB991213) Pinion and valve assembly seal ring part	Automatic transmission fluid "DEXRON" or "DEXRON II"	As required
Bellows	Silicone grease	
Power steering oil pump Power steering fluid	Automatic transmission fluid "DEXRON" or "DEXRON II"	0.9 dm^3 (0.95 U.S. qt., 0.79 Imp.qt)
Flow control valve Friction surface of rotor, vane, cam ring and pump cover O-ring		As required

SEALANT AND ADHESIVES

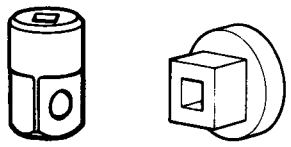
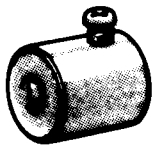
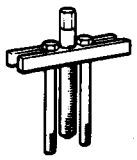
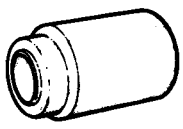
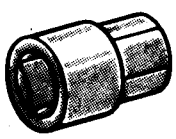
E37CE--

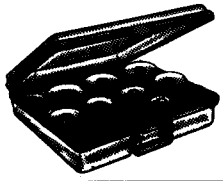
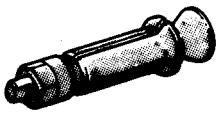
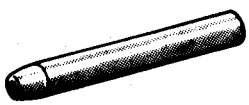
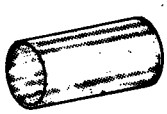
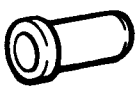
Items	Specified sealant and adhesive	Remarks
Steering column assembly Cover assembly hole	3M ATD Part No. 8661 or equivalent	Semi-drying sealant
Power steering gear box End plug screw Power steering rack support cover screw Dust cover	3M ATD Part No. 8661 or equivalent	Semi-drying sealant

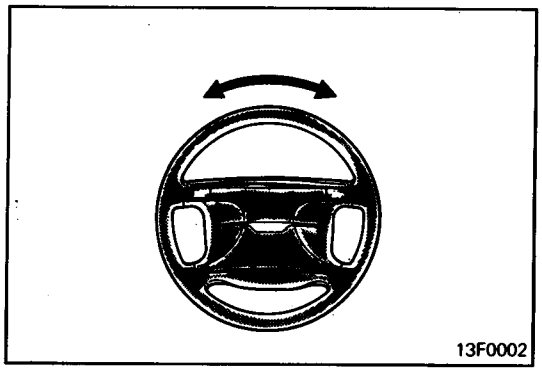
SPECIAL TOOLS

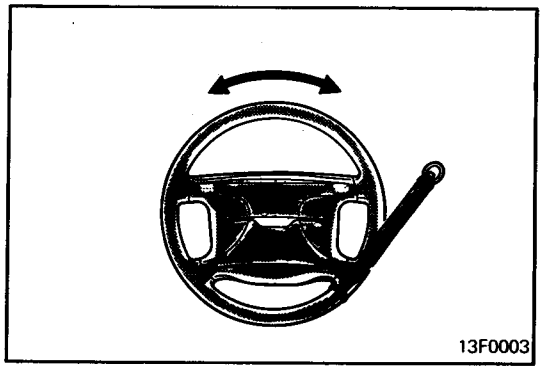
E37DA--

Tool	Number	Name	Use
	MB991113 or MB990635	Steering linkage puller	Disconnection of tie-rod end
	MB990685	Torque wrench	Measurement of the ball joint staring torque Measurement of the pinion shaft preload

Tool	Number	Name	Use
	MB990326 or CT-1046	Preload socket	Measurement of the ball joint starting torque
	MB991006	Preload socket	Measurement of the total pinion torque
	MB990803	Steering wheel puller	Removal of steering wheel
	MB990662	Oil pressure gauge assembly	Measurement of oil pressure
	MB990993	Power steering oil pressure gauge adapter (pump side)	Measurement of oil pressure
	MB990994	Power steering oil pressure gauge adapter (hose side)	Measurement of oil pressure
	MB990826	Torque wrench	Removal and installation of the tilt bracket or upper bracket
	MB990776	Front axle base	Installation of the dust cover
	MB991204	Torque wrench socket	Removal and installation of the rack support cover

Tool	Number	Name	Use
	MB990925	Bearing and oil seal installer set (Refer to GROUP 26)	Installation of the oil seal and bearing MB990927 MB990938 MB990939
	MB991120	Needle bearing puller	Removal of rack housing needle bearing
	MB991197	Bar (long type)	To press in the oil seal for the rack
	MB991199	Oil seal installer	To press in the oil seal for the rack
	MB991099	Oil seal installer attachment	Oil seal installer guide
	MB991202	Oil seal & bearing installer	Press fitting of rack housing bearing
	MB991213	Rack installer	Rack installation
	MB991317	Seal ring installer	Compression of the seal rings after replacement of the pinion seal rings
	MB991152	Dust cover installer	To press in the column tube lower part bearing


13F0002


13F0003

SERVICE ADJUSTMENT PROCEDURES

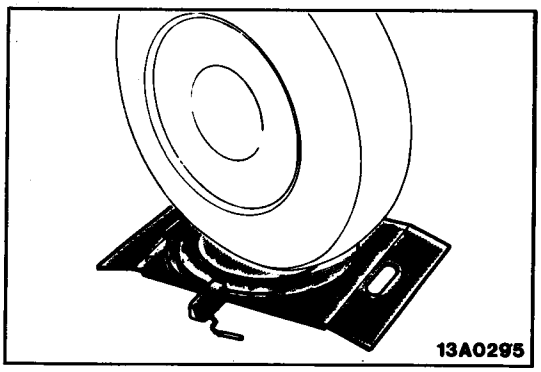
STEERING WHEEL FREE PLAY CHECK E37FABC

1. With engine running (hydraulic operation), set front wheels straight ahead.
2. Measure the play on steering wheel circumference before wheels start to move when slightly moving steering wheel in both directions.

   Limit: 30 mm (1.2 in.)
3. When the play exceeds the limit, check for play on steering shaft connection and steering linkage. Correct or replace.
4. If the free play still exceeds the limit value set steering wheel straight ahead with engine stopped. Load 5 N (0.5 kg, 1lb.) towards steering wheel circumference and check play.

   Standard values (steering wheel play with engine stopped): 11mm (0.43 in.)

   If the play exceeds the standard value, remove steering gear box and check total pinion torque.

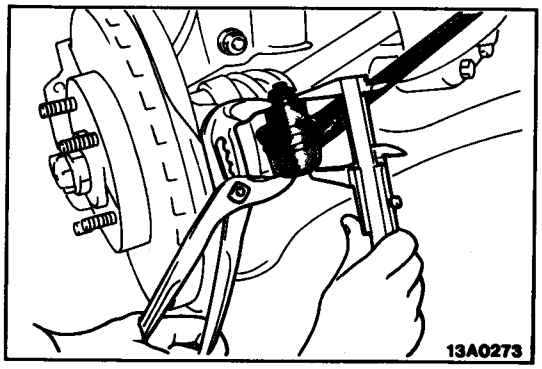

13A0295

STEERING ANGLE CHECK E37FDAE

1. Set front wheels on turning radius gauge and measure steering angle.

   Standard values:

Inner wheel	**33°45′ ± 2°**
Outer wheel	**28°21′**
2. When not within the standard value, it is probably a toe problem. Adjust toe (refer to GROUP 33A – Service Adjustment Procedures) and recheck.

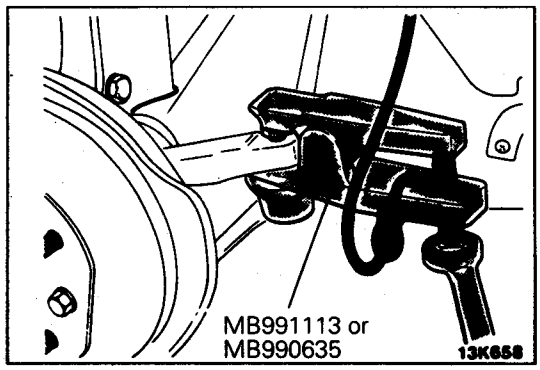

13A0273

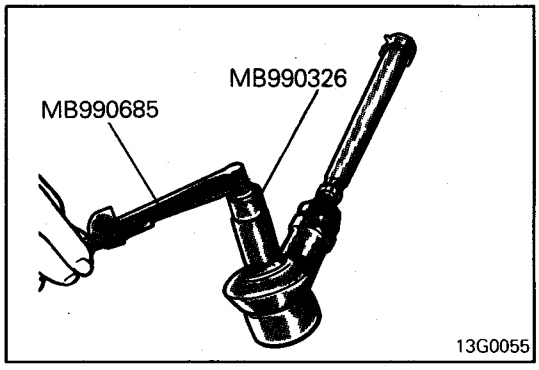
TIE ROD END BALL JOINT VARIATION CHECK (SHAFT DIRECTION) E37FVAA

1. Hold the ball joint with pliers.
2. Set a caliper gauge as illustrated and measure the displacement with the ball stud compressed.

   Limit: 1.5 mm (0.059 in.)
3. If the measured displacement exceeds the limit, replace the tie-rod end.

   Caution
   Even if the variation is within the limit, check ball joint starting torque.





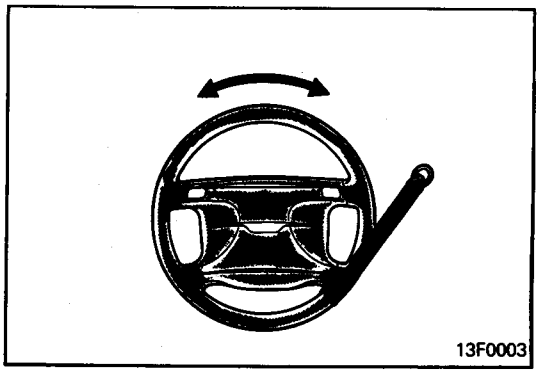
TIE ROD END BALL JOINT STARTING TORQUE CHECK

E37FMAA

1. Disconnect tie rod and knuckle with special tool.
2. Move ball joint stud several times and install nut on stud. Measure ball joint starting torque with special tools.

   Standard value: 1.0 –3.0 Nm (10 –30 kgcm, 9 – 26 in.lbs.)

3. When starting torque exceeds the standard value, replace tie rod end.
4. When the starting torque is under the standard value, check for play or ratcheting in ball joint. If none of these, it is still serviceable.


13F0003

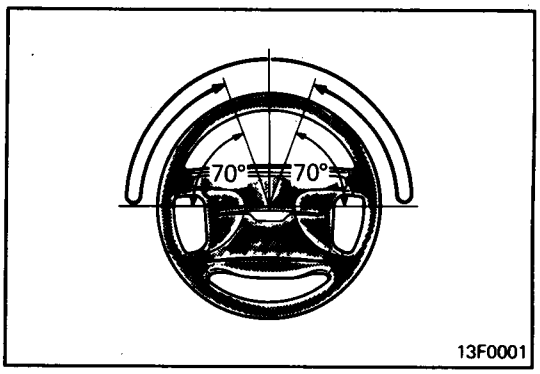
STATIONARY STEERING EFFORT CHECK E37FFAH

1. With the vehicle stopped on a flat, paved surface, turn the steering wheel to the straight ahead position.
2. Start the engine and set it to 1,000 ± 100 rpm.

   Caution
   After checking the engine speed, there must be a return to the standard idling speed.
3. Attach a spring balance to the outer circumference of the steering wheel and measure the steering force required to turn the steering wheel from the straight ahead position to the left and right (within a range of 1.5 turns).
   Also check to be sure that there is no significant fluctuation of the required steering force.

   Standard value:

Steering effort	**35 N (3.5 kg, 8 lbs.) or less**
Fluctuation allowance	**6 N (0.6 kg, 1.3 lbs.) or less**



13F0001

STEERING WHEEL RETURN TO CENTRE CHECK

E37FHAK

To make this test, conduct a road test and check as follows.

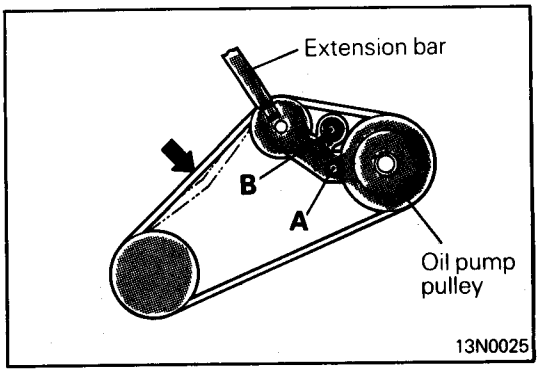
1. Make both gradual and sudden turns and check the steering "feeling" to be sure that there is no difference in the steering force required and the wheel return between left and right turns.
2. At a speed of 35 km/h (22 mph), turn the steering wheel 90°, and release the steering wheel after 1 or 2 seconds. If the steering wheel then returns 70° or more, the return can be judged to the satisfactory.

   NOTE
   There will be a momentary feeling of "heaviness" when the wheel is turned quickly, but this is not abnormal. (This is because the oil pump discharge amount is especially apt to be insufficient during idling.)

DRIVE BELT TENSION CHECK E37FHAM

Check to be sure that the belt is not damaged and that the drive belt is correctly attached to the groove of the pulley.

NOTE
If there is abnormal noise or belt slippage, check the belt tension and check for unusual wear or abrasion, or damage, of the pulley contact surface, and for scars or scratches on the pulley.

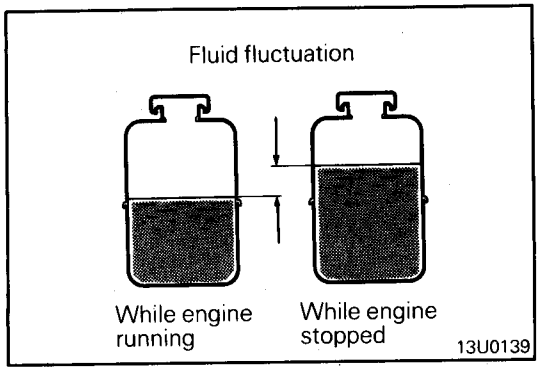


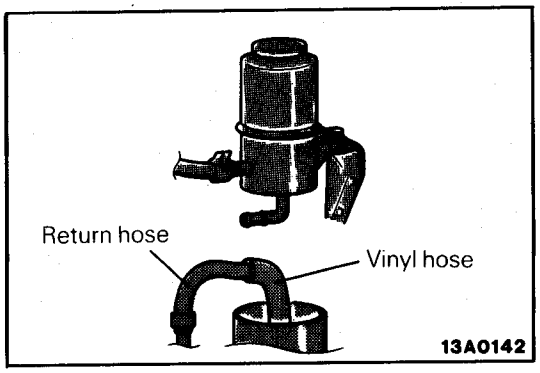
1. Press in drive belt at the illustrated position with about 100 N (10 kg, 22 lbs.) and measure deflection.

   Standard value:

When belt tension is inspected	9.5 – 13.5 mm (0.37 – 0.53 in.)
When belt tension is readjusted	10.5 – 12.5 mm (0.41 – 0.49 in.)
When new belt is installed	7.5 – 9.0 mm (0.30 – 0.35 in.)

2. If the deflection is out of the standard values, adjust the belt tension using the following procedure.
   (1) Loosen the tension pulley's securing bolts A and B.
   (2) Mount the extension bar on the tension pulley.
   (3) While increasing the tension of the drive belt with the extension bar, retighten the tension pulley's securing bolts A and B in the order mentioned.





FLUID LEVEL CHECK E37RAD

1. Park the vehicle on a flat, level surface, start the engine, and then turn the steering wheel several times to raise the temperature of the fluid to approximately 50 – 60°C (122 – 140°F).
2. With the engine running, turn the wheel all the way to the left and right several times.
3. Check the fluid in the oil reservoir for foaming or milkiness. Check the difference of the fluid level when the engine is stopped, and while it is running. If the fluid level changes considerably, air bleeding should be done.

FLUID REPLACEMENT E37FJAF

1. Raise the front wheels on a jack, and then support them with rigid racks.
2. Disconnect the return hose connection.
3. Connect a vinyl hose to the return hose, and drain the oil into a container.
4. Disconnect the high-tension cable, and then while operating the starting motor intermittently, turn the steering wheel all the way to the left and right several times to drain all of the fluid.

   Caution
   Be careful not to position the high-tension cable near the carburetor or the delivery pipe.
5. Connect the return hoses securely, and then secure it with the clip.
6. Fill the oil reservoir with the specified fluid up to the lower position of the filter, and then bleed the air.

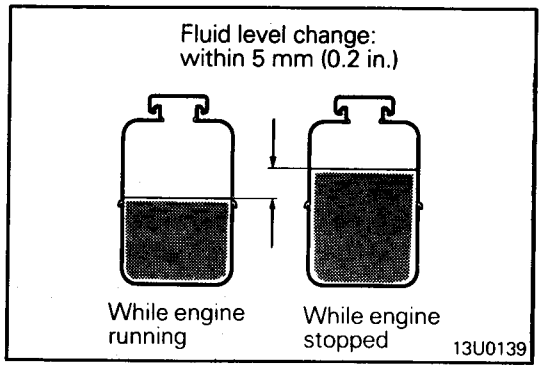
   Specified fluid: Automatic transmission fluid "DEXRON" or "DEXRON II"

BLEEDING

E37FKAL

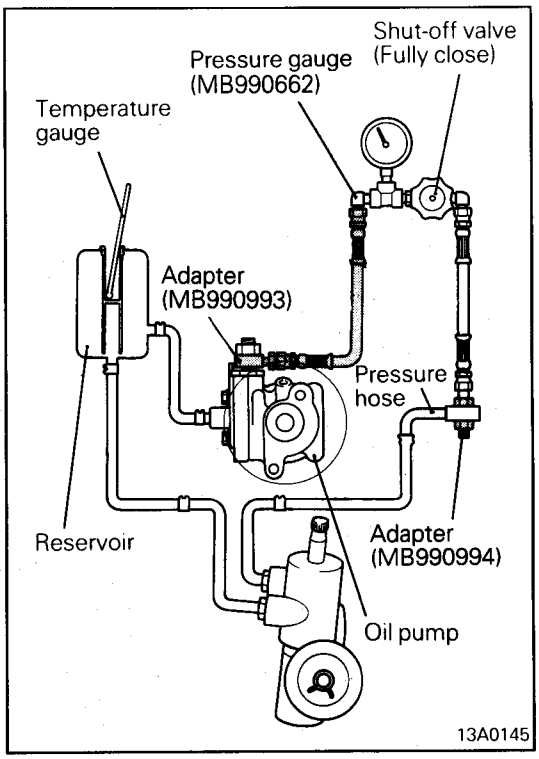
1. Jack up the front wheels and support them by using a floor stand.
2. Manually turn the oil pump pulley a few times.
3. Turn the steering wheel all the way to the left and to the right several times.
4. Disconnect the high-tension cable, and then, while operating the starting motor intermittently, turn the steering wheel all the way to the left and right several times (for 15 to 20 seconds).

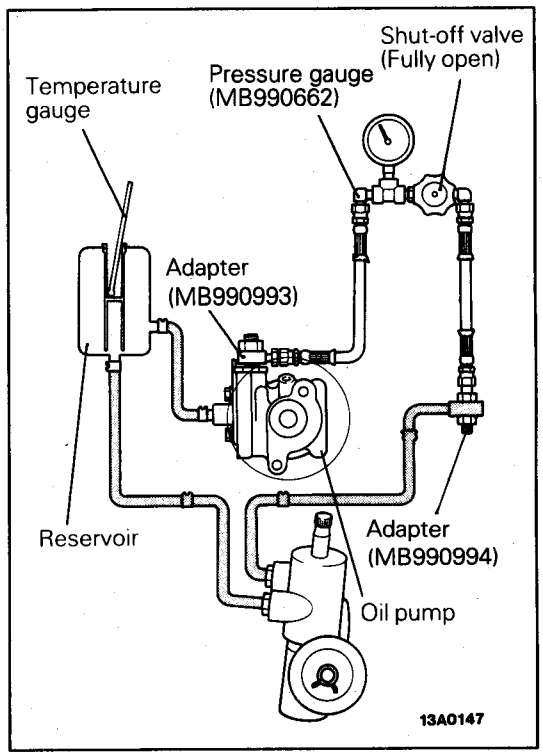
   Caution
   1. **During air bleeding, replenish the fluid supply so that the level never falls below the lower position of the filter.**
   2. **If air bleeding is done while engine is running, the air will be broken up and absorbed into the fluid; be sure to do the bleeding only while cranking.**
5. Connect the ignition cable, and then start the engine (idling).
6. Turn the steering wheel to the left and right until there are no air bubbles in the oil reservoir.
7. Confirm that the fluid is not milky, and that the level is up to the specified position on the level gauge.
8. Confirm that there is very little change in the fluid level when the steering wheel is turned left and right.



9. Check whether or not the change in the fluid level is within 5 mm (0.2 in.) when the engine is stopped and when it is running.

   Caution
   1. **If the change of the fluid level is 5 mm (0.2 in.) or more, the air has not been completely bled from the system, and thus must be bled completely.**
   2. **If the fluid level rises suddenly after the engine is stopped, the air has not been completely bled.**
   3. **If air bleeding is not complete, there will be abnormal noises from the pump and the flow-control valve, and this condition could cause a lessening of the life of the pump, etc.**





OIL PUMP PRESSURE TEST E37FLAE

CHECKING THE OIL PUMP RELIEF PRESSURE

1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50 – 60°C (122 – 140°F).
3. Start the engine and idle it at 1,000 ± 100 rpm.
4. Fully close the shut-off valve of the pressure gauge and measure the oil pump relief pressure to confirm that it is within the standard value range.

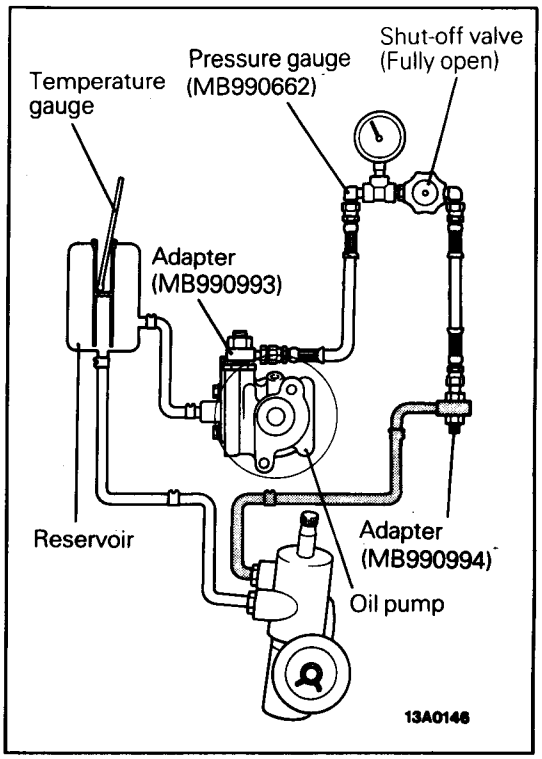
   Standard value:
   7.5 – 8.2 MPa (75 – 82 kg/cm^2, 1,067 – 1,166 psi)

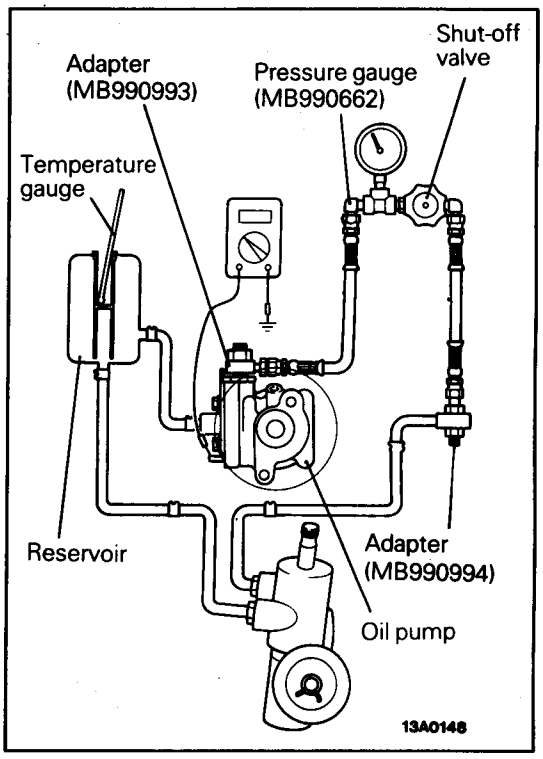
   Caution
   Pressure gauge shut off valve must not remain closed for more than 10 seconds.
5. If it is not within the standard value, overhaul the oil pump.
6. Remove the special tools, and then tighten the pressure hose to the specified torque.
7. Bleed the system.

CHECKING THE PRESSURE UNDER NO-LOAD CONDITIONS

1. Disconnect the pressure hose from the oil pump, and then connect the special tool.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50 – 60°C (122 – 140°F).
3. Start the engine and idle it at 1,000 ± 100 rpm.
4. Check whether or not the hydraulic pressure is the standard value when no-load conditions are created by fully opening the shut-off valve of the pressure gauge.

   Standard value:
   0.8 – 1.0 MPa (8 – 10 kg/cm^2, 114 – 142 psi)
   Limit: 1.5 MPa (15 kg/cm^2, 213 psi)
5. If it is not within the standard value, the probable cause is a malfunction of the oil line or steering gear box, so check these parts and repair as necessary.
6. Remove the special tools, and then tighten the pressure hose to the specified torque.
7. Bleed the system.





CHECKING THE STEERING GEAR RETENTION HYDRAULIC PRESSURE

1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50 – 60°C (122 – 140°F).
3. Start the engine and idle it at 1,000 ± 100 rpm.
4. Fully close and fully open the shut-off valve of the pressure gauge.
5. Turn the steering wheel all the way to the left or right; then check whether or not the retention hydraulic pressure is the standard value.

   Standard value:
   7.5 – 8.2 MPa (75 – 82 kg/cm^2, 1,067 – 1,166 psi)
6. When not within the standard value, overhaul the steering gear box.
   Remeasure fluid pressure.
7. Remove the special tools, and then tighten the pressure hose to the specified torque.
8. Bleed the system.

OIL PRESSURE SWITCH CHECK E37FQAA

1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50 – 60°C (122 – 140°F).
3. The engine should be idling.
4. Disconnect the connector for the oil pressure switch, and place an ohmmeter in position.
5. Gradually close the shut-off valve of the pressure gauge and increase the hydraulic pressure then check whether or not the hydraulic pressure that activates the switch is the standard value.

   Standard value:
   1.5 – 2.0 MPa (15 – 20 kg/cm^2, 213 – 284 psi)
6. Gradually open the shut-off valve and reduce the hydraulic pressure; then check whether the hydraulic pressure that deactivates the switch is the standard value.

   Standard value:
   0.7 – 1.2 MPa (7 – 12 kg/cm^2, 100 – 171 psi)
7. Remove the special tools, and then tighten the pressure hose to the specified torque.
8. Bleed the system.

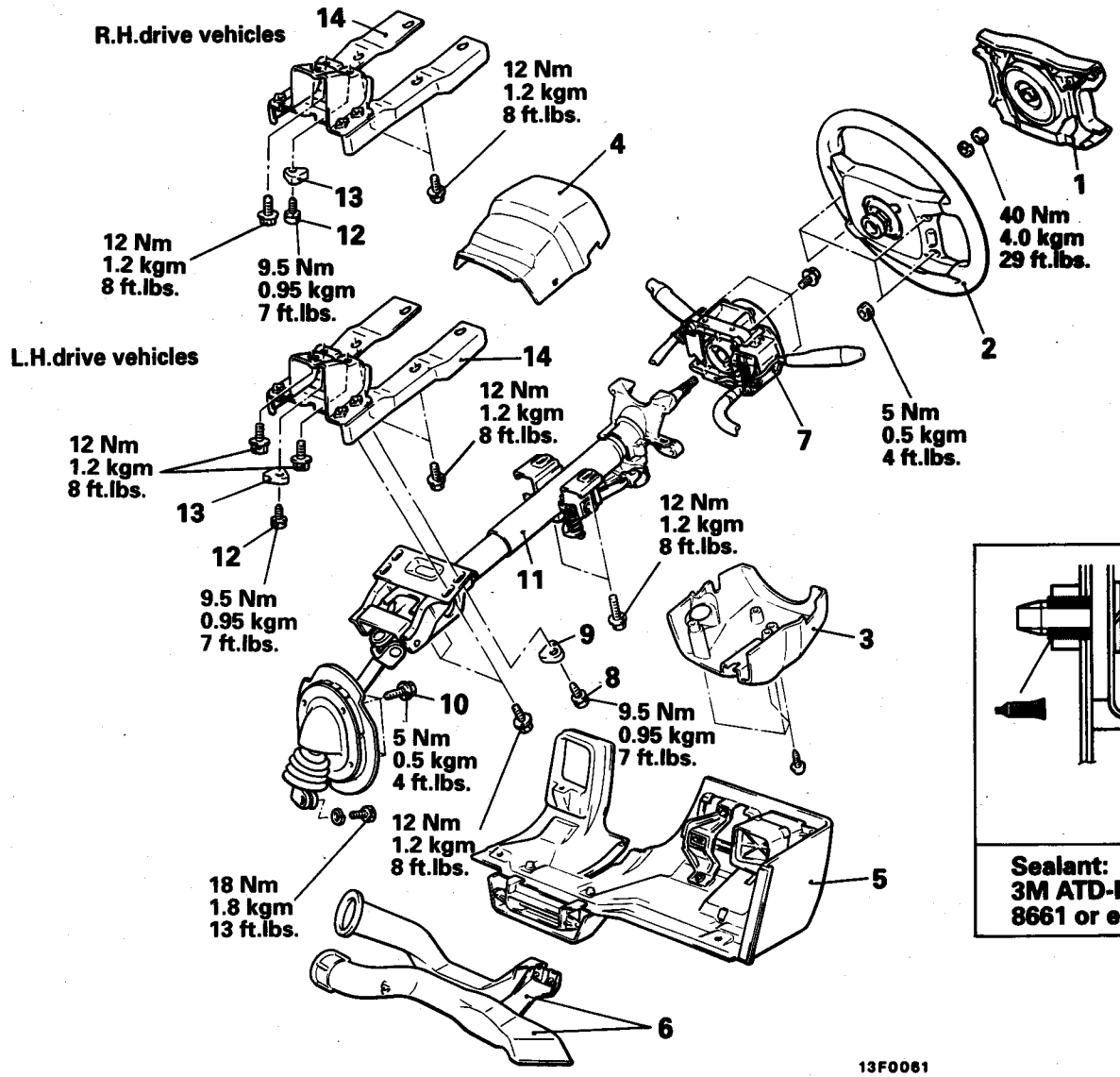
STEERING WHEEL AND SHAFT

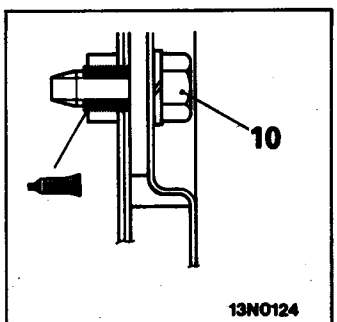
E37HA--

REMOVAL AND INSTALLATION

CAUTION: SRS
Before removal of air bag module, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.

Post-installation Operation
- Checking of Steering Wheel Position with Wheels Straight Ahead

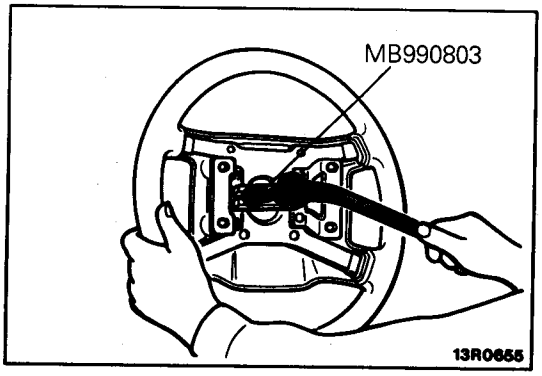




Sealant:
3M ATD-Part No. 8661 or equivalent

Removal steps

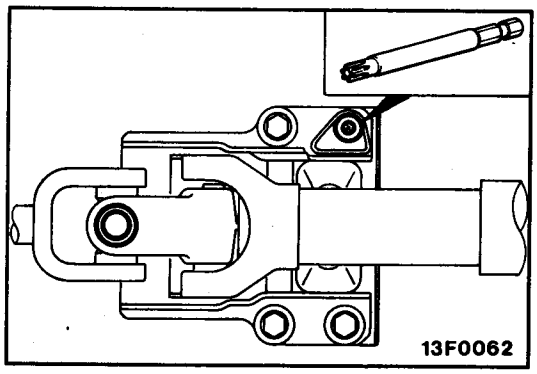
1. Air bag module (Refer to GROUP 52B – Air Bag Module and Clock Spring.)
2. Steering wheel
3. Lower column cover
4. Upper column cover
5. Knee protector (Refer to GROUP 52A – Instrument Panel.)
6. Lap cooler duct and foot shower duct
7. Column switch assembly
8. Special screw
9. Special washer
10. Cover assembly attachment bolt
11. Steering column assembly
12. Special screw
13. Special washer
14. Column support assembly



SERVICE POINTS OF REMOVAL E37HBAZ

2. REMOVAL OF STEERING WHEEL

Caution
Do not hammer on the steering wheel to remove it; doing so may damage the collapsible mechanism.

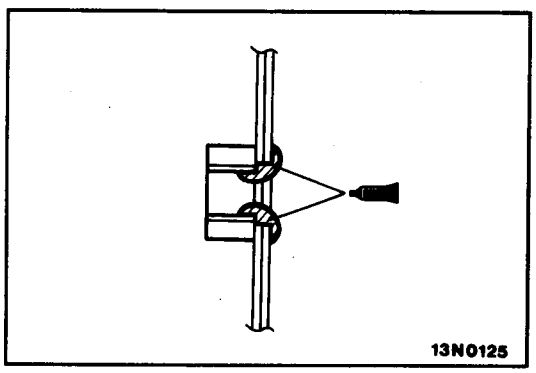


8./12. REMOVAL OF SPECIAL SCREW

SERVICE POINT OF INSTALLATION

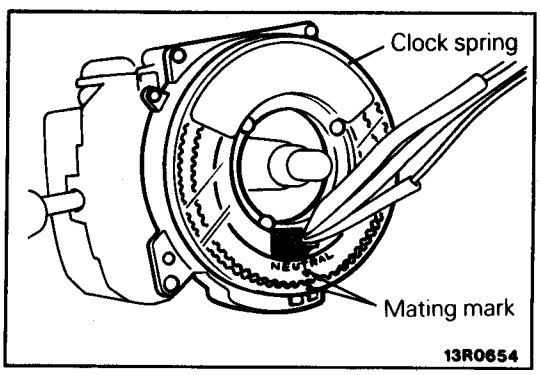
12./8. INSTALLATION OF SPECIAL SCREW

Tighten the special screw using the special tool.



10. INSTALLATION OF COVER ASSEMBLY ATTACHMENT BOLT

Before installing the bolt, apply specified sealant to the cover assembly attachment hole in the toeboard.



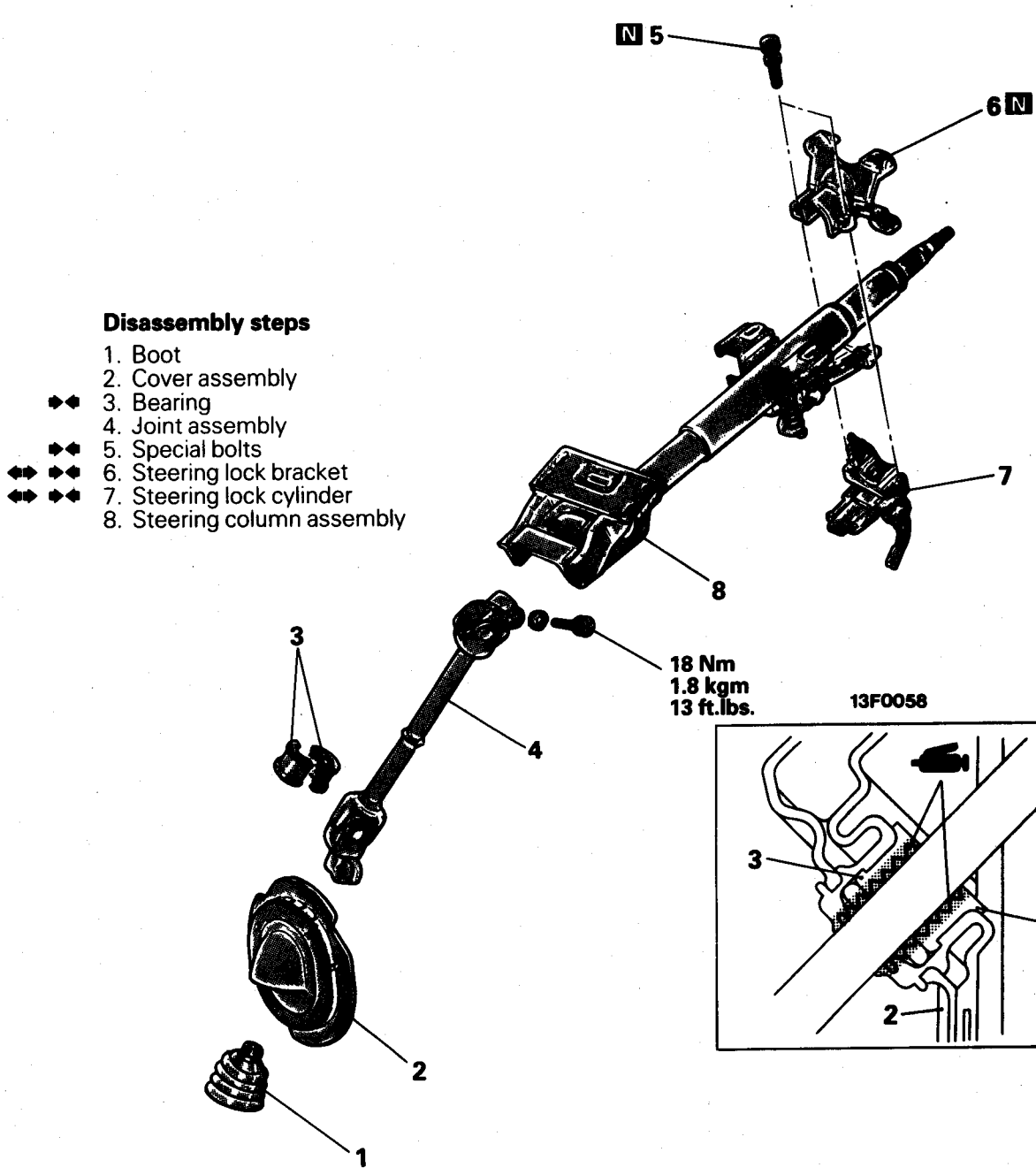
2. INSTALLATION OF STEERING WHEEL E37HDAM

Line up the "NEUTRAL" mark of the clock spring with the mating mark before installing the steering wheel.

Caution
If the clock spring's mating mark is not properly aligned, the steering wheel may not be completely rotational during a turn, or the flat cable within the clock spring may be severed, obstructing normal operation of the SRS and possibly leading to serious injury to the vehicle's driver.

DISASSEMBLY AND REASSEMBLY

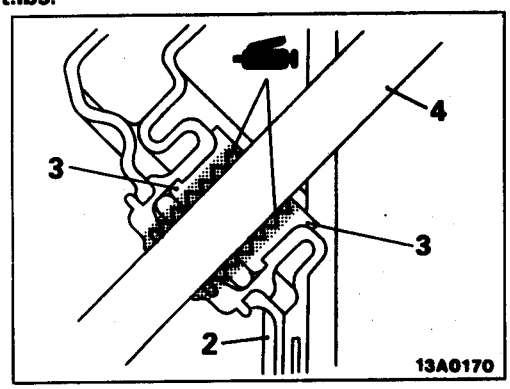
E37HE--

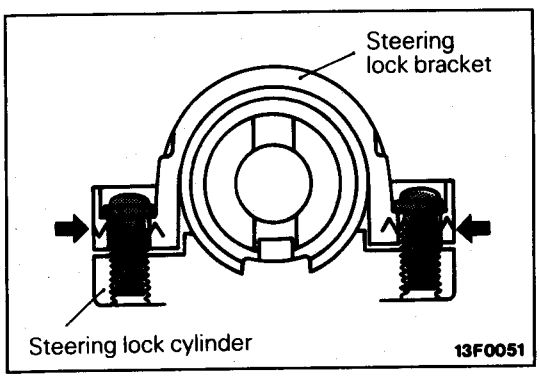


Disassembly steps

1. Boot
2. Cover assembly
3. Bearing
4. Joint assembly
5. Special bolts
6. Steering lock bracket
7. Steering lock cylinder
8. Steering column assembly

13F0058





SERVICE POINTS OF DISASSEMBLY

E37HFAU

6. REMOVAL OF STEERING LOCK BRACKET / 7. STEERING LOCK CYLINDER

If it is necessary to remove the steering lock cylinder, use a hacksaw to cut the special bolts at the steering lock bracket side.

INSPECTION

E37HGAQ

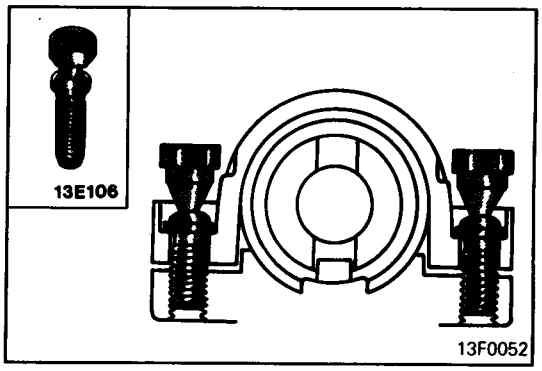
- Check the steering shaft for play and round movement.
- Check the joints for play, damage, or rough movement.
- Check the joint bearing for wear and damage.
- Check the dust shield for damage.

SERVICE POINTS OF REASSEMBLY

E37HHAU

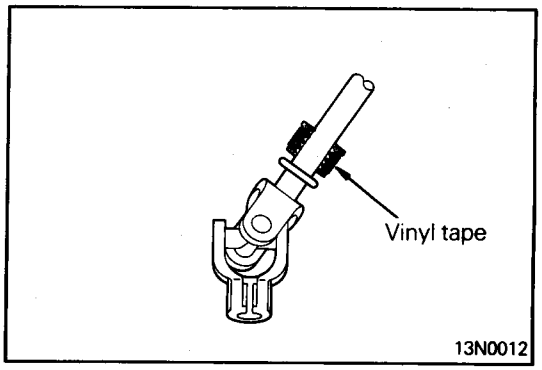
7. INSTALLATION OF STEERING LOCK CYLINDER / 6. STEERING LOCK BRACKET / 5. SPECIAL BOLT

(1) When installing the steering lock cylinder and steering lock bracket to the column tube, temporarily install the steering lock in alignment with the column boss.



(2) After checking that the lock works properly, tighten the special bolts until the head twists off.

Caution
The steering lock bracket and bolts must be replaced with new ones when the steering lock cylinder is installed.



3. INSTALLATION OF BEARING

(1) Fill the inside of the bearing with multipurpose grease.
(2) Install the bearings to the shaft on the joint assembly.
(3) Wrap vinyl tape approximately one and one-half times around the concave circumferences of the bearings, and then press fit the bearings into the cover assembly.

POWER STEERING GEAR BOX

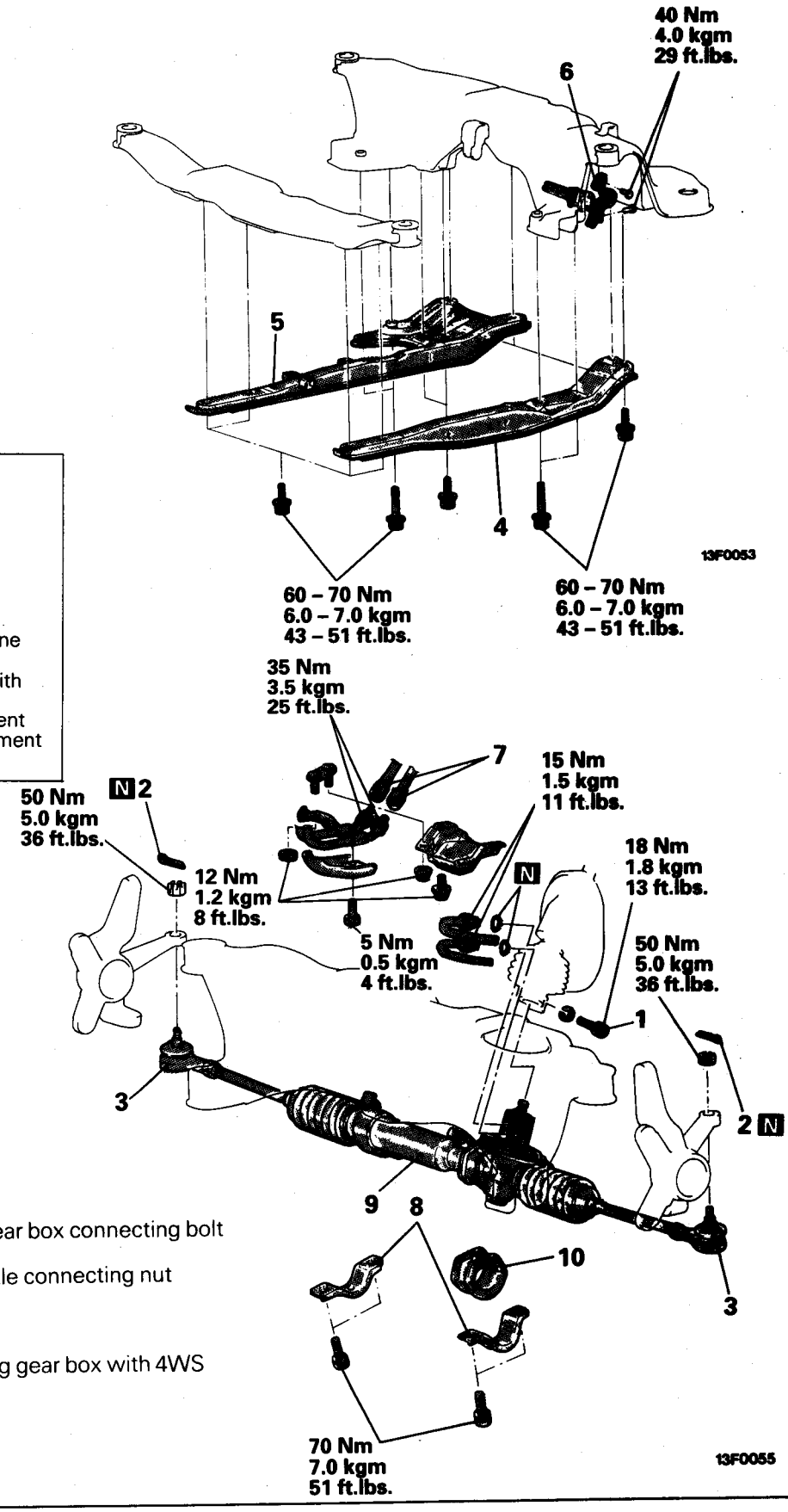
E37PA--

REMOVAL AND INSTALLATION

CAUTION: SRS
Before removal of steering gear box, refer to GROUP 52B – SRS, center front wheels and remove ignition key.
Failure to do so may damage SRS clock spring and render SRS system inoperative, risking serious driver injury.

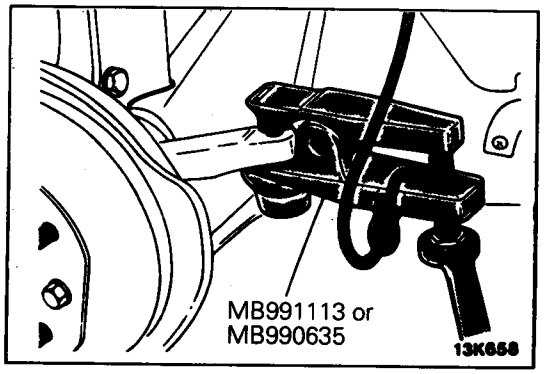
Pre-removal Operation
- Draining of the Power Steering Fluid (Refer to P.37A-9.)
- Removal of Front Exhaust Pipe (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Removal of Transfer Assembly (Refer to GROUP 22 – Transfer.)

Post-installation Operation
- Installation of Transfer Assembly (Refer to GROUP 22 – Transfer.)
- Installation of Front Exhaust Pipe (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Supplying of the Power Steering Fluid (Refer to P.37A-9.)
- Bleeding of the Power Steering Fluid Line (Refer to P.37A-10.)
- Checking of Steering Wheel Position with Wheels Straight Ahead
- Adjustment of the Front Wheel Alignment (Refer to GROUP 33A – Service Adjustment Procedures.)



Removal steps

1. Joint assembly and gear box connecting bolt
2. Cotter pin
3. Tie-rod end and knuckle connecting nut
4. Left member
5. Right member
6. Stabilizer bar bracket
7. Connection of steering gear box with 4WS oil line
8. Clamp
9. Gear box assembly
10. Mounting rubber



SERVICE POINTS OF REMOVAL E37PBAI

3. DISCONNECTION OF TIE-ROD END

9. REMOVAL OF GEAR BOX ASSEMBLY

(1) Move the rack completely to the right and then remove the gear box from the crossmember.
(2) While tilting the gear box downward, remove it to the left.

Caution
When removing the gear box, pull it out carefully and slowly to avoid damaging the boots.

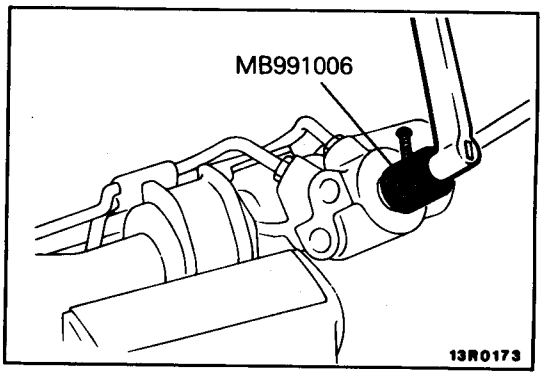
INSPECTION E37PCAI

GEAR BOX FOR TOTAL PINION PRELOAD

Using the special tools, rotate the pinion gear at the rate of one rotation in approximately 4 to 6 seconds to check the total pinion preload.

Standard value: 0.7 – 1.3 Nm (7 – 13 kgcm, 5 – 11 in.lbs.)

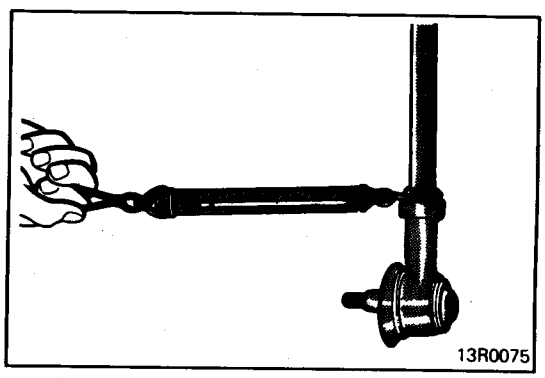
NOTE
Msasure the pinion preload through the whole stroke of the rack.
If the measured value is not within the standard range, first adjust the rack support cover, and then check the total pinion starting torque again.
If the total pinion starting torque cannot be adjusted to within the standard range by adjusting the rack support cover, check the rack support cover, rack support spring, rack support and replace any parts necessary.



CHECK THE TIE ROD FOR SWING RESISTANCE

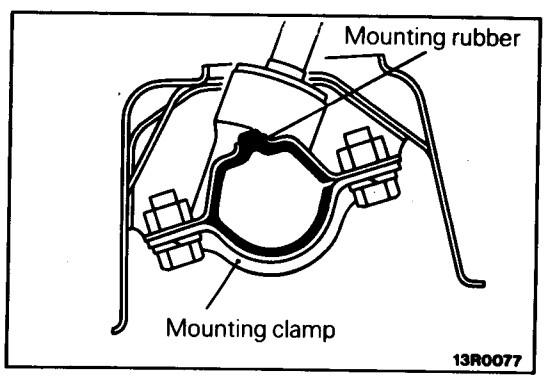
(1) Give 10 hard swings to the tie rod.
(2) Measure the tie rod swing resistance with a spring balance.

Standard value:
8 – 18 Nm (0.8 – 2.0 kgcm, 1.8 – 4.0 in.lbs.)
[2 – 5 Nm (20 – 50kgcm, 17 – 43 in.lbs.)]



(3) If the measured value exceeds the standard value, replace tie rod assembly.

NOTE
Even if the measured value is below the standard value, the tie rod which swings smoothly without excessive play may be used.



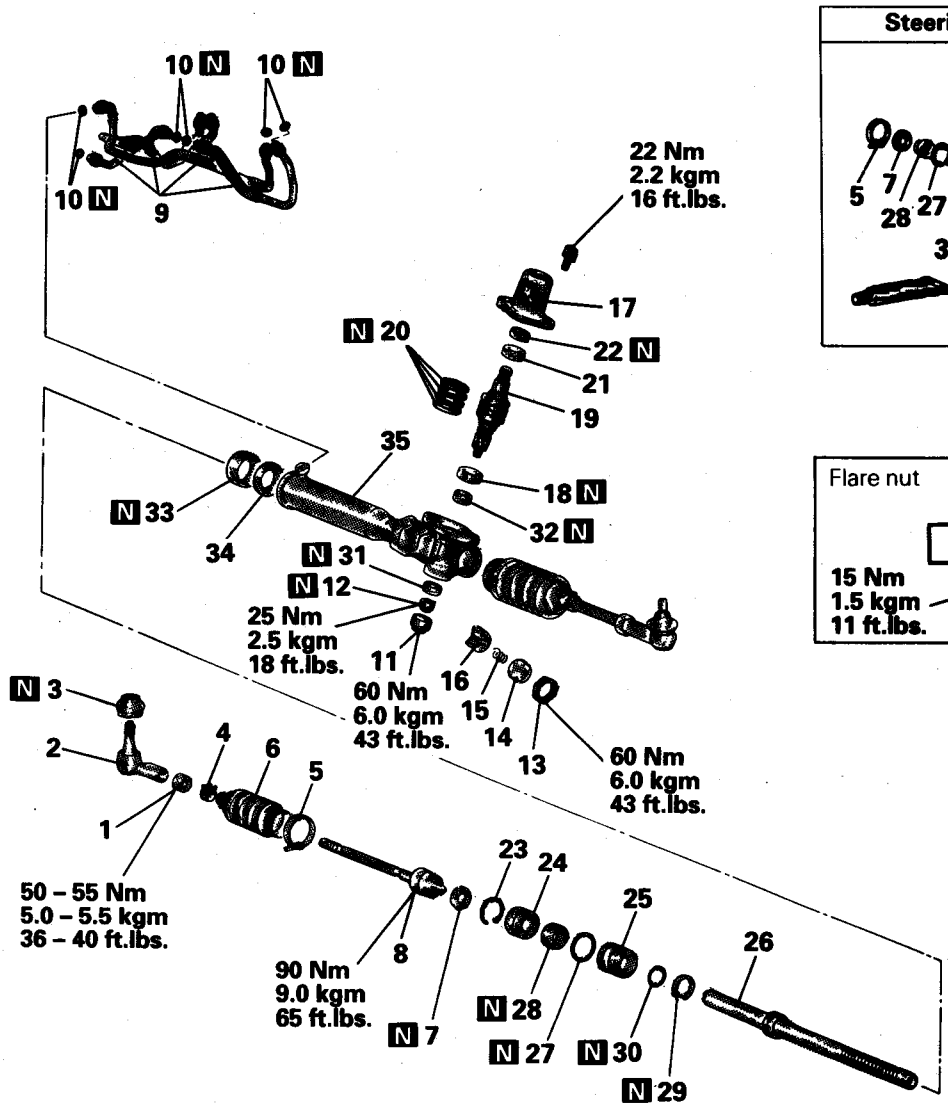
SERVICE POINTS OF INSTALLATION E37PDAB

10. INSTALLATION OF MOUNTING RUBBER / 9. GEAR BOX ASSEMBLY

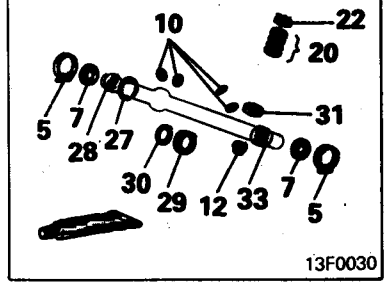
When installing the mounting rubber, align the projection of the mounting rubber with the indentation in the crossmember to install the gear box.

DISASSEMBLY AND REASSEMBLY

E37PE--

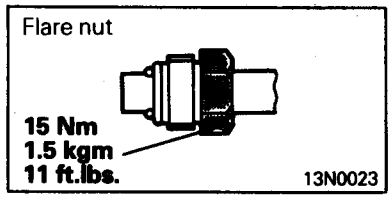


Steering gear seal kit



13F0030

Flare nut



13N0023

13F0030

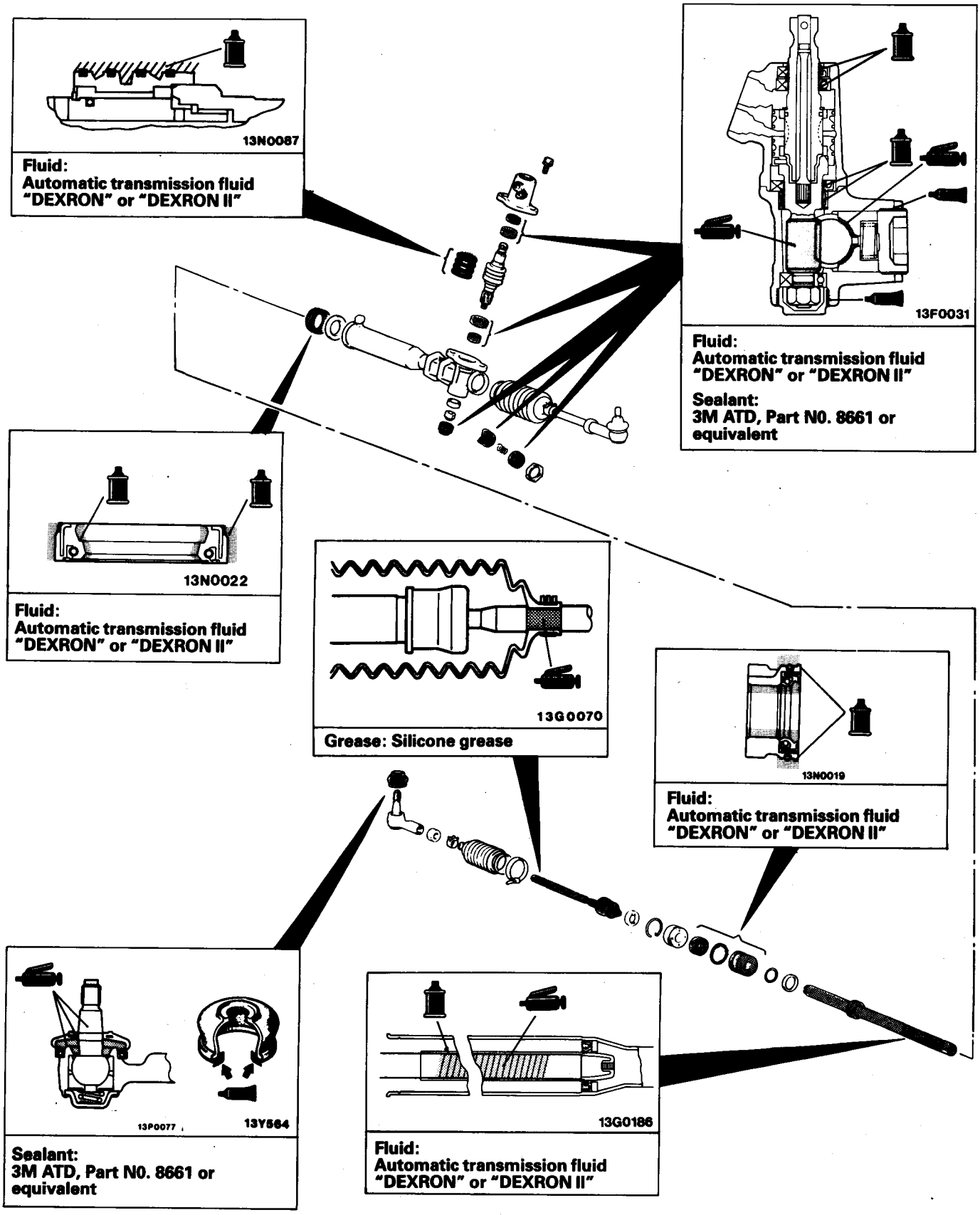
Disassembly steps

1. Tie rod end locking nuts
2. Tie rod ends
3. Dust shield
4. Bellows clips
5. Bellows bands
6. Bellows
7. Tab washers
8. Tie rods
9. Feed tubes
10. O-rings

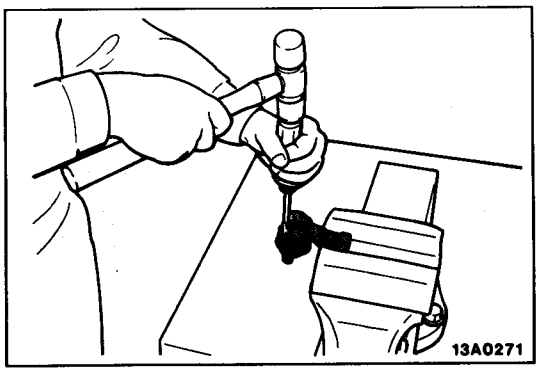
Adjustment of total pinion torque

11. End plug
12. Self-locking nut
13. Locking nut
14. Rack support cover
15. Rack support spring
16. Rack support
17. Valve housing
18. Oil seal
19. Pinion and valve assembly
20. Seal rings
21. Ball bearing
22. Oil seal
23. Circlip
24. Rack stopper
25. Rack bushing
26. Rack
27. O-ring
28. Oil seal
29. Seal rings
30. O-ring
31. Ball bearing
32. Needle roller bearing
33. Oil seal
34. Back-up washer
35. Rack housing

LUBRICATION AND SEALING POINTS



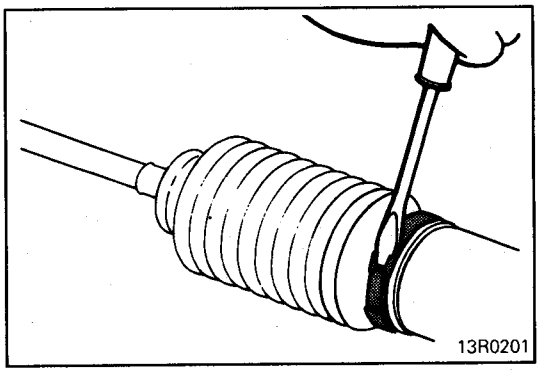
13F0030



SERVICE POINTS OF DISASSEMBLY E37PFAO

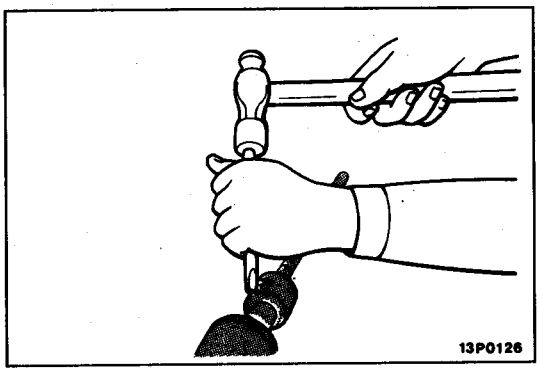
3. REMOVAL OF DUST SHIELD

Remove the dust shield from the tie rod end.



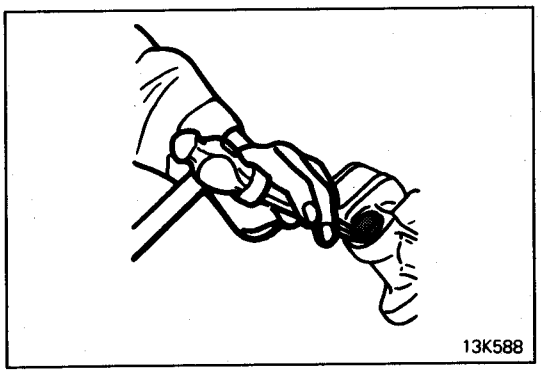
5. REMOVAL OF BELLOWS BANDS

Using a screwdriver or similar tool, loosen and then remove the boot retaining band.



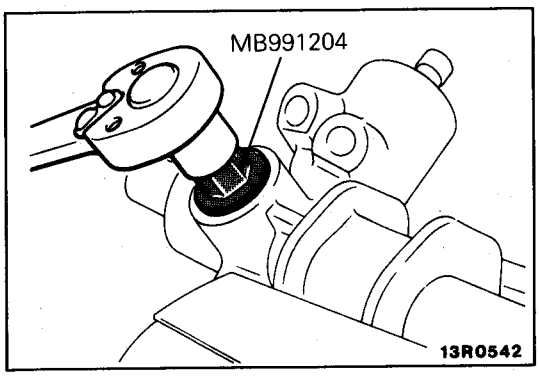
7. REMOVAL OF TAB WASHER

Unstake the tab washer which fixes the tie rod and rack with a chisel.



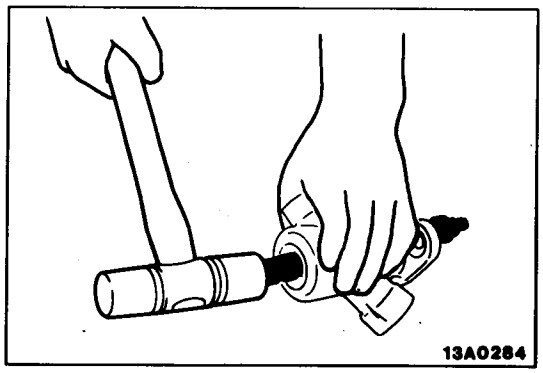
11. REMOVAL OF END PLUG

Disconnect end plug caulking and remove end plug.



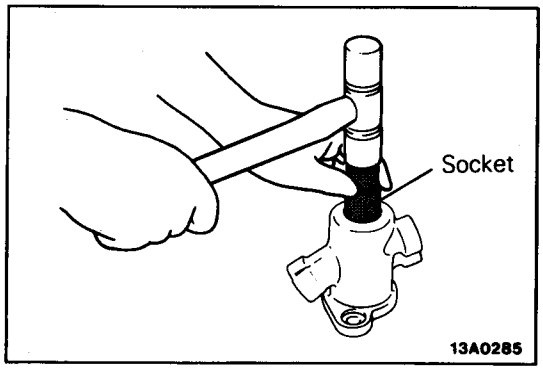
14. REMOVAL OF RACK SUPPORT COVER

Using the special tool, remove the rack support cover from the gear box.



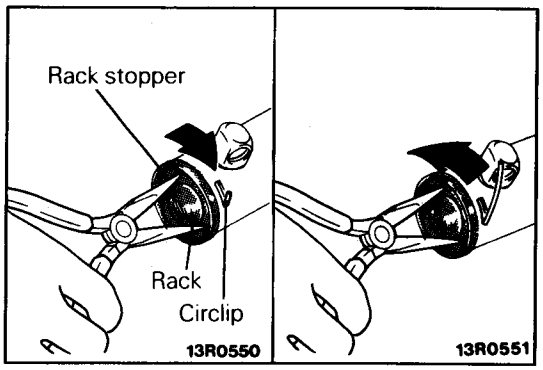
18. REMOVAL OF OIL SEAL

Using a plastic hammer, gently tap the pinion to remove it.



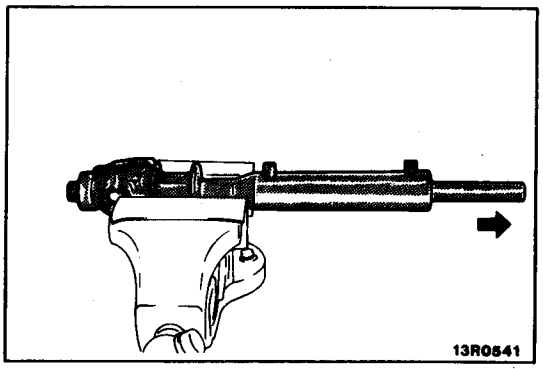
21. REMOVAL OF BALL BEARING / 22. OIL SEAL

Using a socket, remove the oil seal and the ball bearing from the valve housing simultaneously.



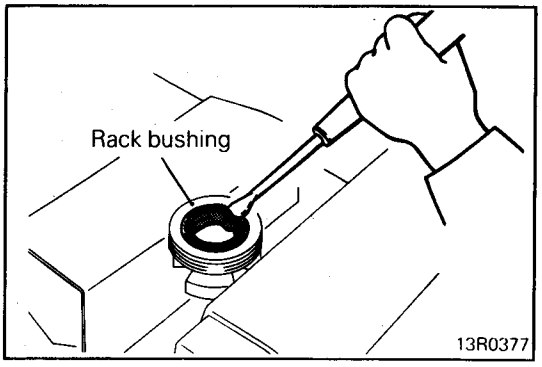
23. REMOVAL OF CIRCLIP

(1) Turn the rack stopper clockwise until the end of the circlip comes out of the slot in the rack housing.
(2) Turn the rack stopper anticlockwise to remove the circlip.



26. REMOVAL OF RACK

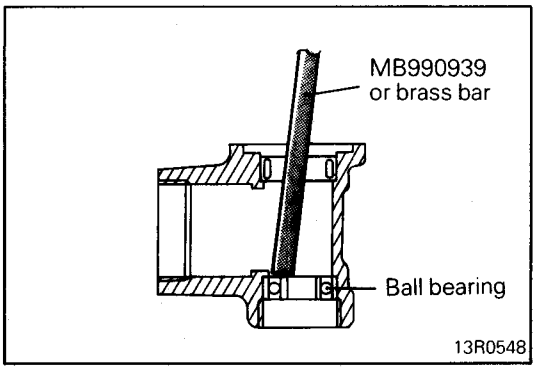
Pull out the rack slowly.
At this time also take out the rack stopper and the rack bushing simultaneously.



28. REMOVAL OF OIL SEAL

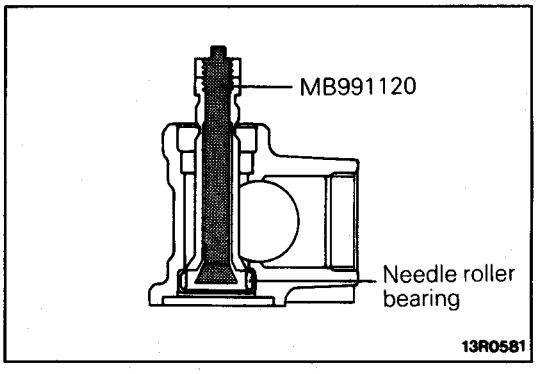
Partially bend oil seal and remove from rack bushing.

Caution
Do not damage oil seal press fitting surface.



31. REMOVAL OF BALL BEARING

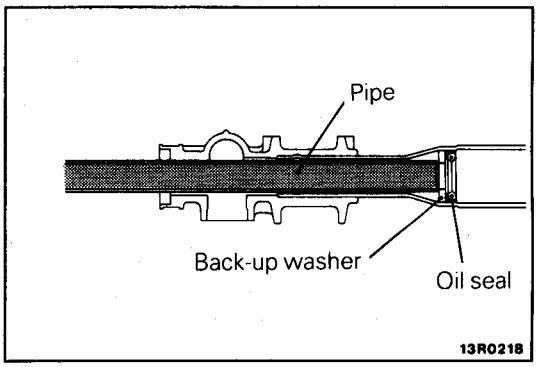
Use a brass bar to remove the ball bearing from the gear housing.



32. REMOVAL OF NEEDLE ROLLER BEARING

Use the special tool to remove the needle roller bearing from the rack housing.

Caution
Do not open special tool excessively to prevent damaging housing interior.



33. REMOVAL OF OIL SEAL / 34. BACK-UP WASHER

Use a piece of pipe or similar tool to remove the back-up washer and oil seal from the gear housing.

Caution
Be careful not to damage the inner surface of the rack cylinder of the gear housing.

INSPECTION E37PGAG

RACK

- Check the rack tooth surfaces for damage or wear.
- Check the oil seal contact surfaces for uneven wear.
- Check the rack for bends.

PINION AND VALVE ASSEMBLY

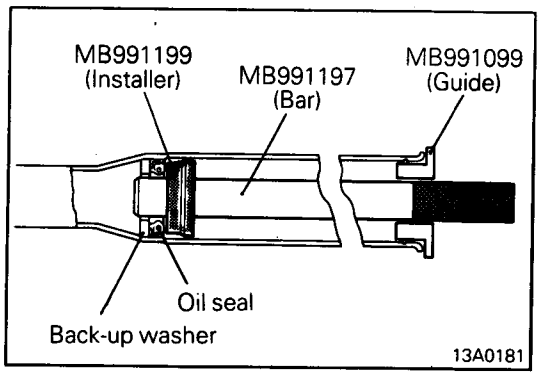
- Check the pinion gear tooth surfaces for damage or wear.
- Check for worn or defective seal ring.

BEARING

- Check for roughness or abnormal noise during bearing operation.
- Check the bearing for play.
- Check the needle roller bearings for roller slip-off.

OTHERS

- Check the cylinder inner surface of the rack housing for damage.
- Check the boots for damage, cracking or deterioration.
- Check the rack support for uneven wear or dents.
- Check the rack bushing for uneven wear or damage.



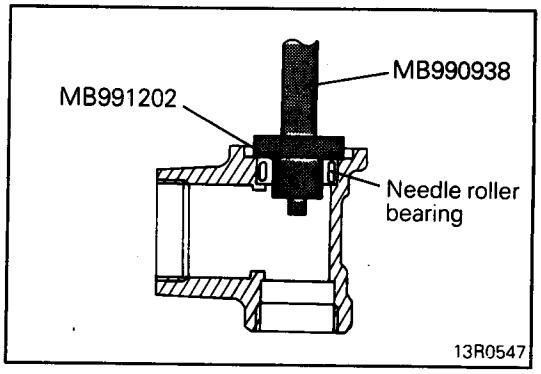
SERVICE POINTS OF REASSEMBLY E37PHAS

34. INSTALLATION OF BACK-UP WASHER / 33. OIL SEAL

(1) Apply a coating of the specified fluid to the outside of the oil seal.

Specified fluid: Automatic transmission fluid "DEXRON" or "DEXRON II"

(2) Using the special tool, press the back-up washer and the oil seal into the rack housing to the specified position (where the upper surface of the press-in guide coincides with the stepped part of the press-in tool).



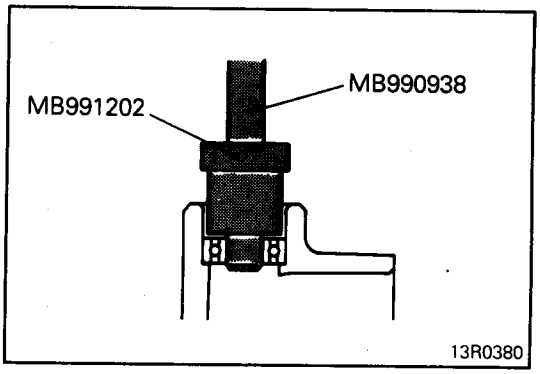
32. INSTALLATION OF NEEDLE ROLLER BEARING

(1) Apply specified fluid to housing, bearing and oil seal press fitting surface.

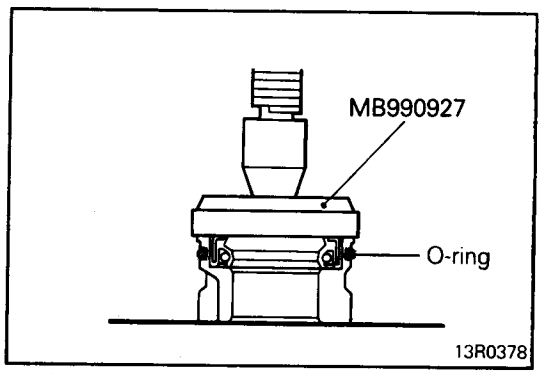
Specified fluid: Automatic transmission fluid "DEXRON" or "DEXRON II"

(2) Use the special tppls to press fit needle roller bearing.

Caution
Press fit straight as valve housing is aluminium.



31. INSTALLATION OF BALL BEARING

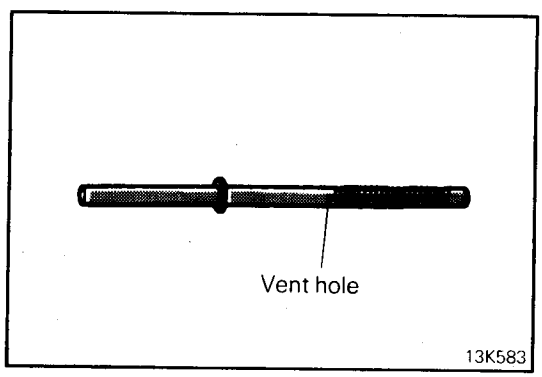


28. INSTALLATION OF OIL SEAL / 27. O-RING

(1) Apply a coating of the specified fluid to the outside of the oil seal and O-ring.

Specified fluid: Automatic transmission fluid "DEXRON" or "DEXRON II"

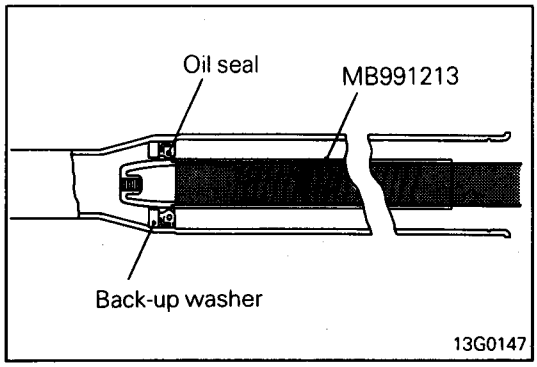
(2) Press fit oil seal until it touches rack bush end.



26. INSTALLATION OF RACK

(1) Apply a coating of multipurpose grease to the rack teeth face.

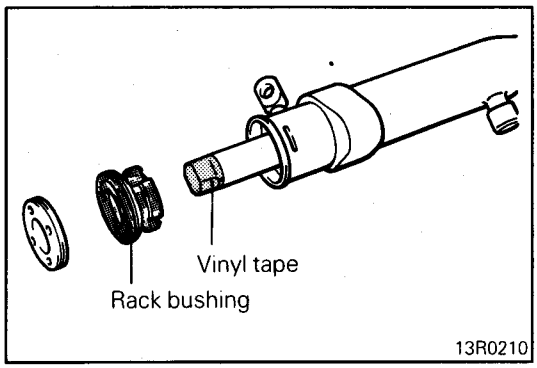
Caution
Do not close the vent hole in the rack with grease.



(2) Cover rack serrations with special tool.
(3) Apply specified fluid on special tool.

Specified fluid: Automatic transmission fluid "DEXRON" or "DEXRON II"

(4) Match oil seal center with rack to prevent retainer spring from slipping and slowly insert rack from power cylinder side.

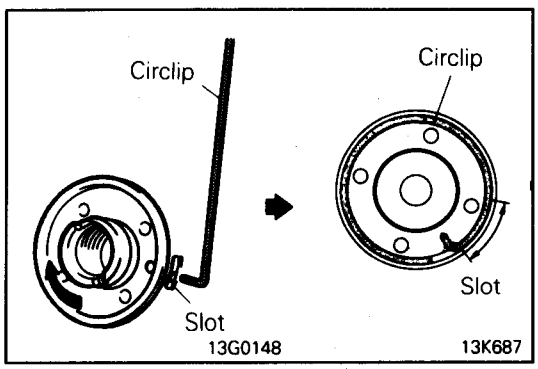


25. INSTALLATION OF RACK BUSHING

Wrap the rack end with vinyl tape, apply a coating of the specified fluid, and then install the rack bushing and rack stopper.

Specified fluid: Automatic transmission fluid "DEXRON" or "DEXRON II"

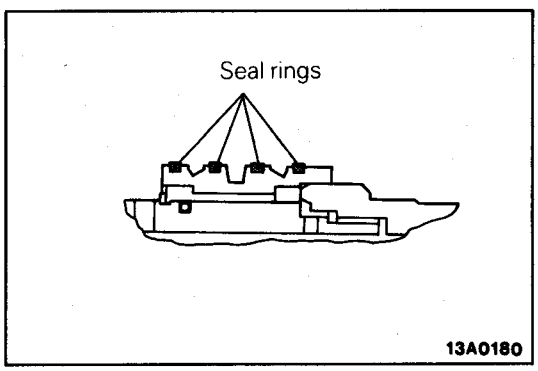
Caution
Do not allow oil seal retainer spring to slip out.



23. INSTALLATION OF CIRCLIP

Insert circlip to rack stopper hole through cylinder hole. Turn rack stopper clockwise and insert circlip firmly.

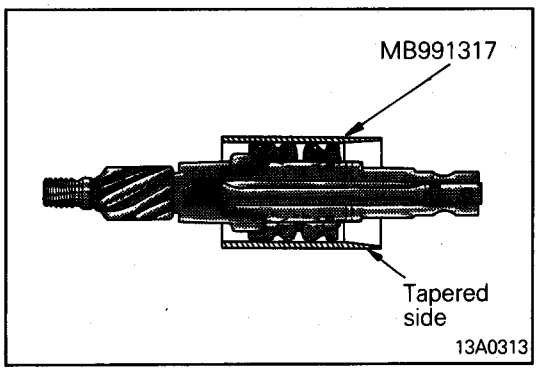
Caution
Insert circlip to rack stopper hole while turning rack stopper clockwise.



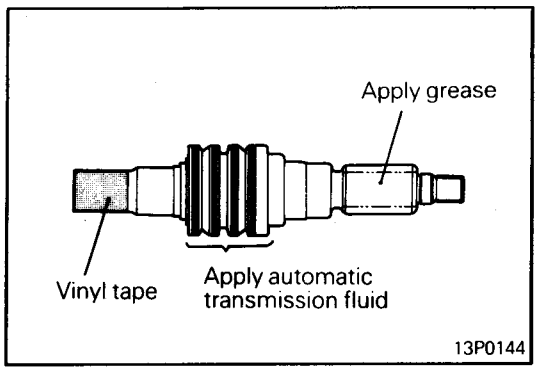
20. INSTALLATION OF SEAL RINGS / 19. PINION AND VALVE ASSEMBLY

(1) When installing seal rings, press firmly into valve groove. Apply specified fluid.

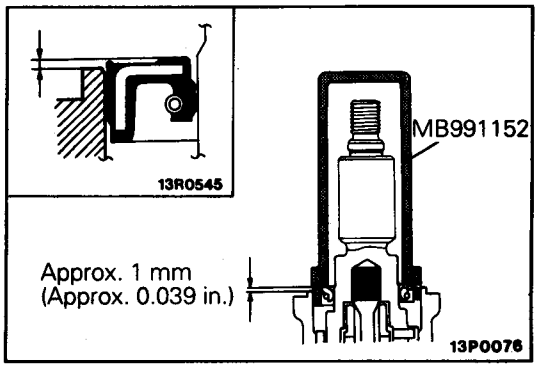
Specified fluid: Automatic transmission fluid "DEXRON" or "DEXRON II"



NOTE
Because the seal rings expand at the time of installation, use the special tool to compress the seal rings so that they are well seated.



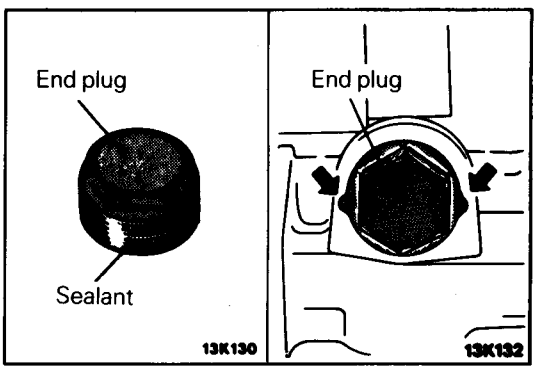
(2) Apply multipurpose grease to pinion gear and housing bearing.
(3) Wrap vinyl tape around the serrated part so that the oil seal won't be damaged when the pinion and valve assembly is installed to the valve housing.
(4) Mount the pinion and valve assembly to the valve housing.



18. INSTALLATION OF OIL SEAL

Using the special tool, press the oil seal into the valve housing.

Caution
In order to eliminate a seal malfunction at the valve housing alignment surface, the upper surface of the oil seal should project outward approximately 1 mm (0.039 in.) from the housing edge surface.

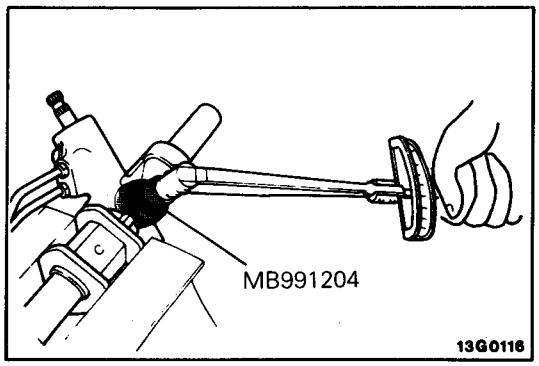


11. INSTALLATION OF END PLUG

(1) Apply the semi-drying sealant to the threaded part of the end plug.

Specified sealant: 3M ATD Part No. 8661 or equivalent

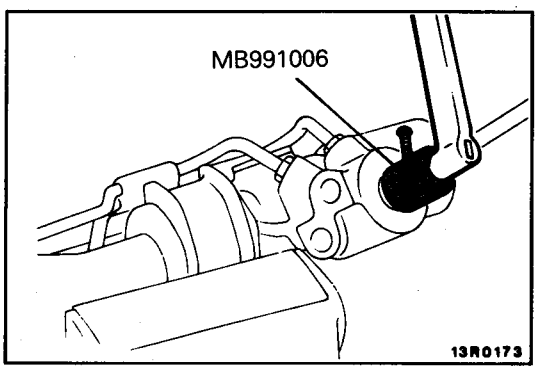
(2) Secure the threaded portion of the end plug at two places by using a punch.



• ADJUSTMENT OF TOTAL PINION PRELOAD

(1) Position rack at its center. With special tool, tighten rack support cover to 15 Nm (1.5 kgm, 11 ft.lbs.)
(2) In neutral position, rotate pinion shaft clockwise one turn/4 – 6 seconds with special tool. Return rack support cover 30° – 60° and adjust torque to the standard value.

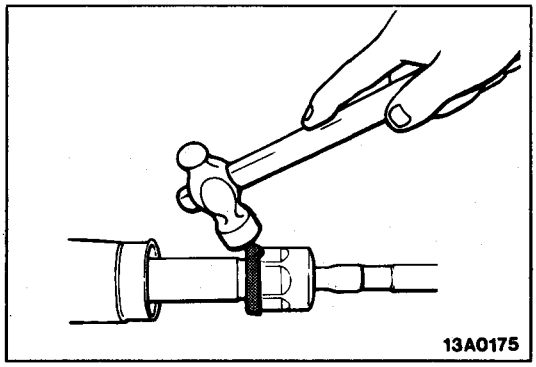
Standard value: 0.7 – 1.3 Nm (7 – 1.3 kgcm, 5 – 11 in.lbs.)



Caution
1. **When adjusting, set the standard value at its highest value.**
2. **Assure no ratcheting or catching when operating rack towards the shaft direction.**

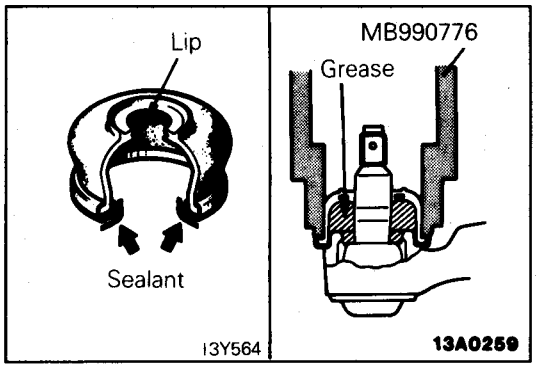
NOTE
When it cannot be adjusted within the specified return angle, check rack support cover components or replace.

(3) After adjusting, lock rack support cover with lock nut.



8. INSTALLATION OF TIE ROD

After installing tie rod to rack, fold tab washer end (2 locations) to tie rod notch.

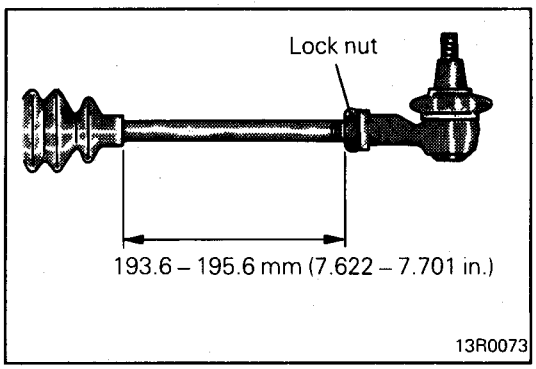


3. INSTALLATION OF DUST SHIELD

(1) Pack dust shield interior and lip with multipurpose grease.
(2) Apply semi-drying sealant to dust shield.

Specified sealant: 3M ATD Part No. 8661 or equivalent

(3) Using the special tool, press dust shield to tie rod end.



2. INSTALLATION OF TIE ROD END

Screw in tie rod end to have its right and left length as illustrated. Lock with lock nut.

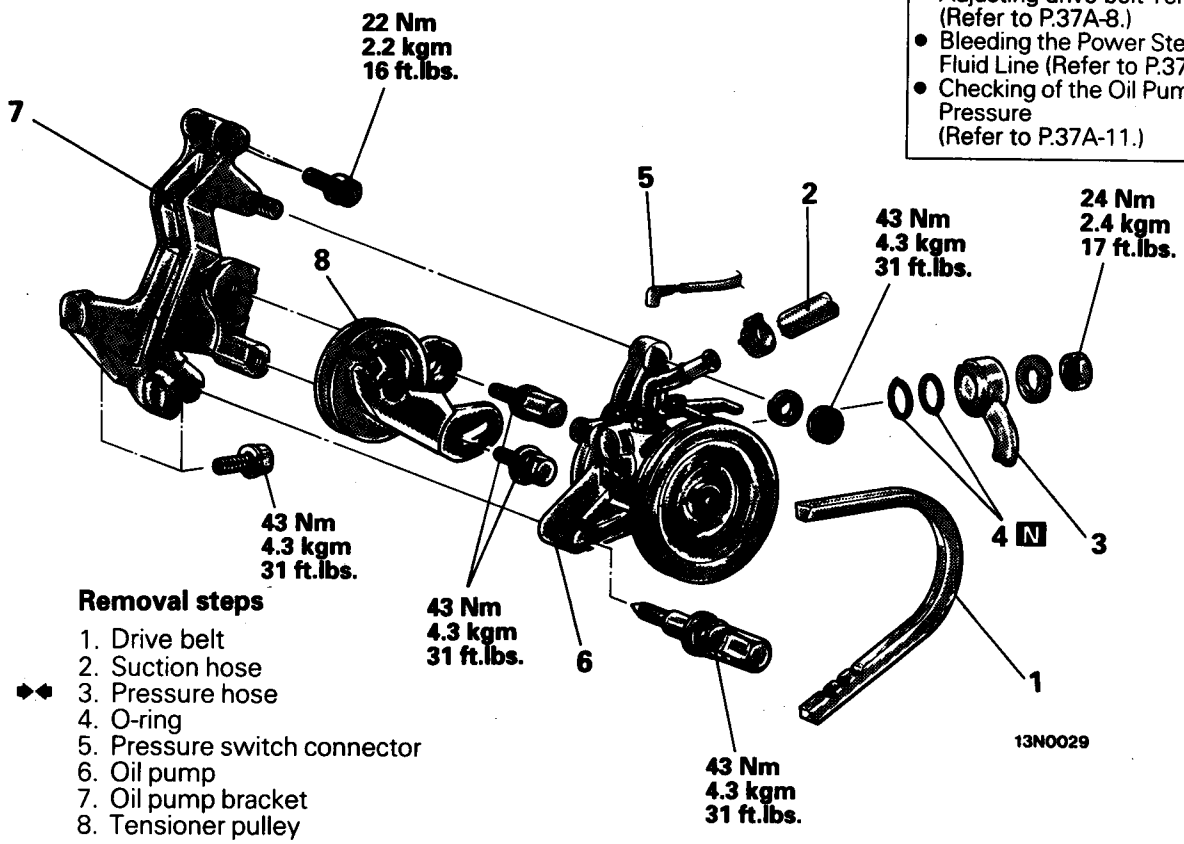
POWER STEERING OIL PUMP

E37RA--

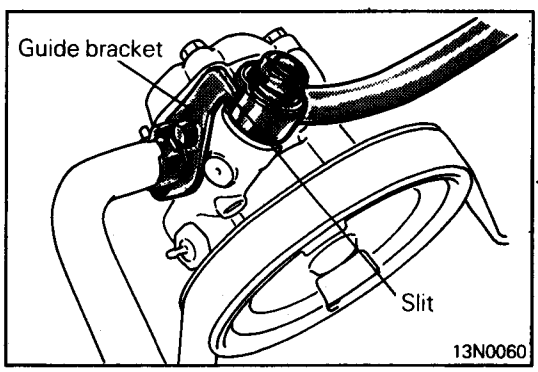
REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining the Power Steering Fluid

Post-installation Operation
- Supplying of the Power Steering Fluid
- Adjusting drive belt Tension (Refer to P.37A-8.)
- Bleeding the Power Steering Fluid Line (Refer to P.37A-10.)
- Checking of the Oil Pump Pressure (Refer to P.37A-11.)



Removal steps
1. Drive belt
2. Suction hose
3. ◆◆ Pressure hose
4. O-ring
5. Pressure switch connector
6. Oil pump
7. Oil pump bracket
8. Tensioner pulley



SERVICE POINT OF INSTALLATION

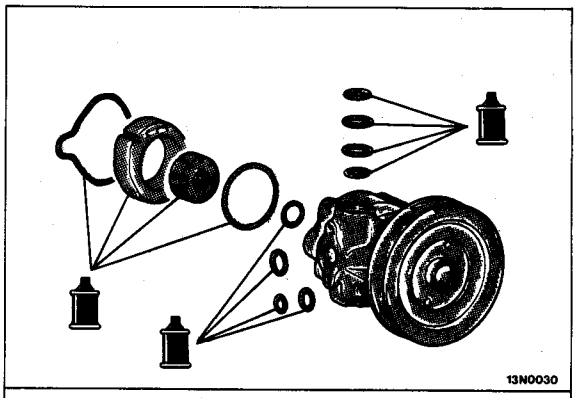
E37RDAN

3. INSTALLATION OF PRESSURE HOSE

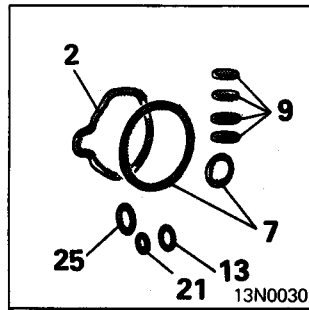
Connect the pressure hose so that its slit part contacts the oil pump's guide bracket.

DISASSEMBLY AND REASSEMBLY

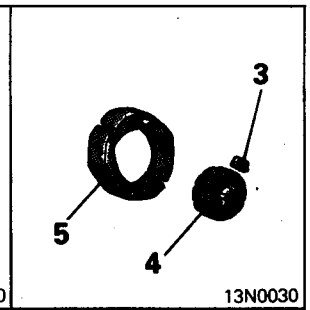
E37RE--



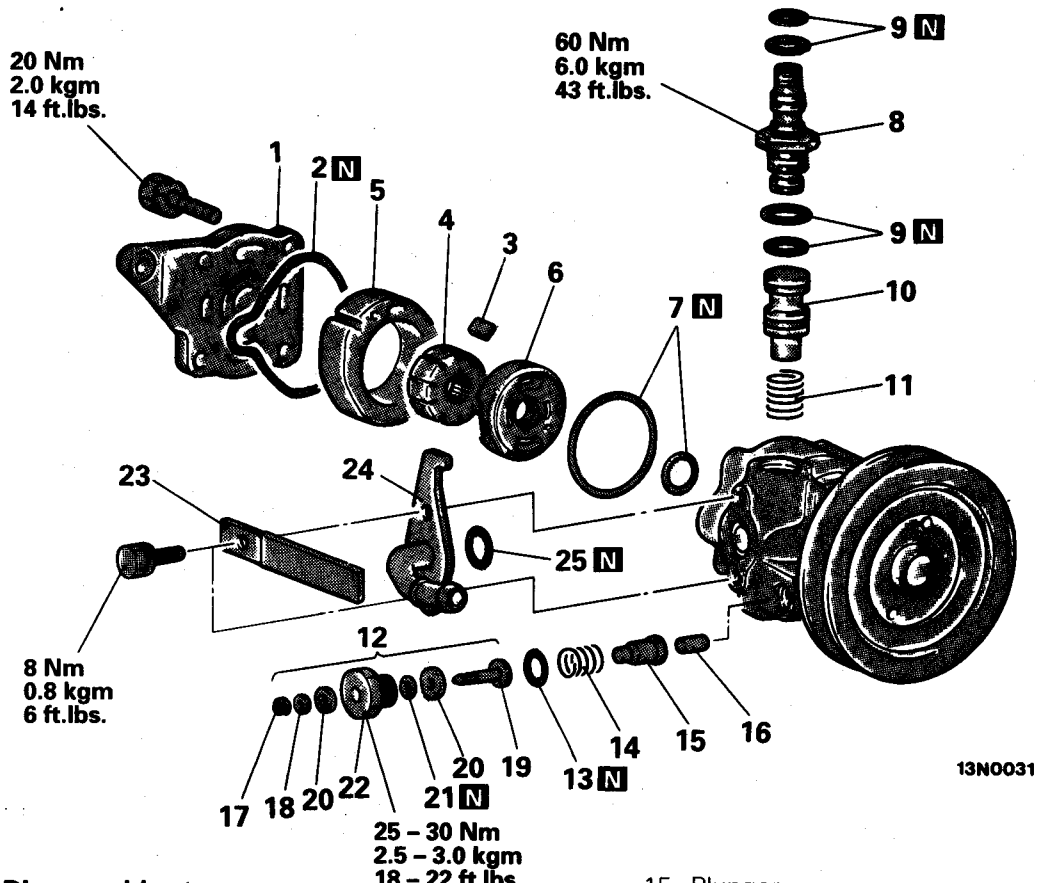
Fluid:
Automatic transmission fluid
"DEXRON" or "DEXRON II"



Oil pump seal kit



Oil pump cartridge kit



Disassembly steps

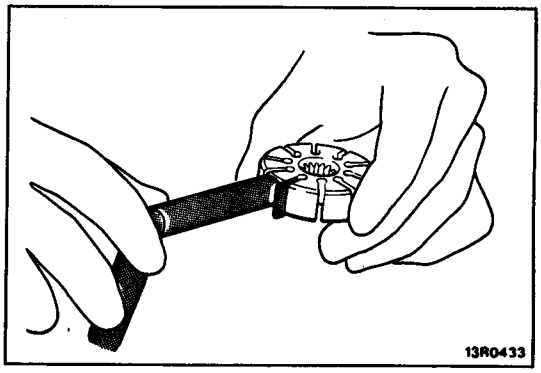
1. Pump cover
2. O-ring
3. ◆◆ Vanes
4. Rotor
5. ◆◆ Cam ring
6. ◆◆ Side plate
7. ◆◆ O-ring
8. Connector
9. ◆◆ O-ring
10. Flow control valve
11. Flow control spring
12. Terminal assembly
13. ◆◆ O-ring
14. ◆◆ Spring
15. Plunger
16. Piston rod
17. Snap ring
18. Terminal
19. Washer
20. Insulator
21. ◆◆ O-ring
22. Plug
23. Clip
24. Suction connector
25. ◆◆ O-ring
26. Oil pump body and Pulley assembly

Caution
Do not disassemble the flow control valve.

INSPECTION

E37RGAI

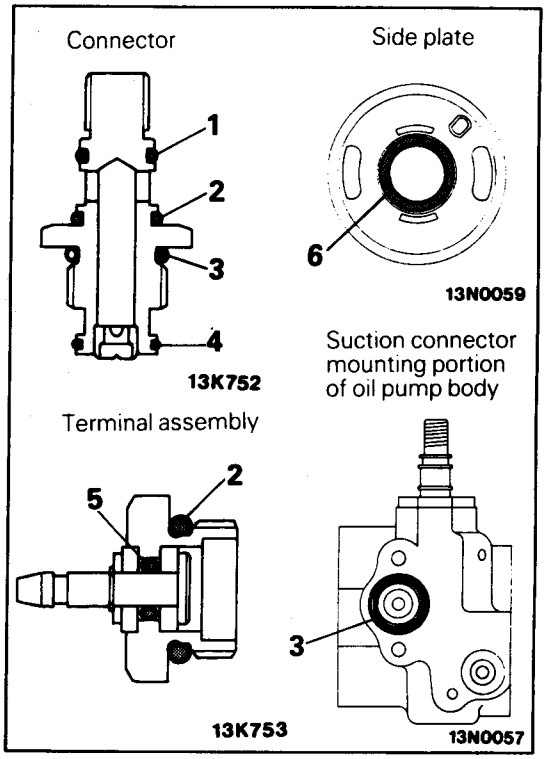
- Check the flow control spring for wear.
- Check the shaft of the pulley for play and round movement.
- Check the groove of rotor vane for "stepped" wear.
- Check the contact surface of cam ring and vanes for "stepped" wear.
- Check the vanes for breakage.



CHECK OF GAP BETWEEN VANE AND ROTOR GROOVE

Install vane to rotor groove as illustrated. Measure the gap between vane and rotor groove with thickness gauge.

Limit: 0.06 mm (0.0024 in.)



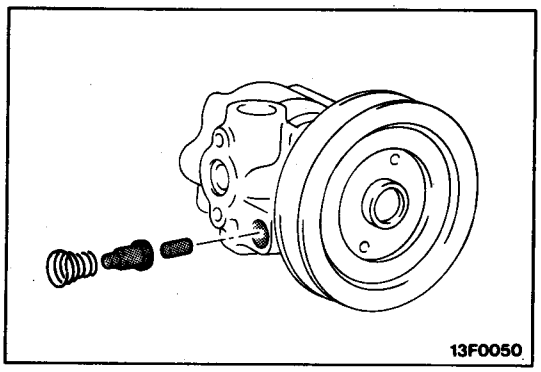
SERVICE POINTS OF REASSEMBLY

E37RHAK

25. 21. 13. 9. 7. INSTALLATION OF O-RINGS

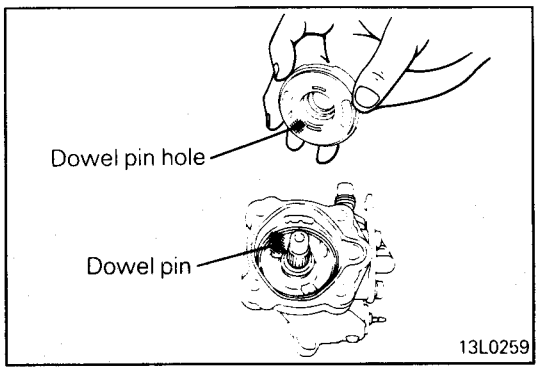
Apply specified fluid on O-rings to install.

No.	I.D. x Width	mm (in.)
1	11 × 1.9	(0.433 × 0.075)
2	13 × 1.9	(0.512 × 0.075)
3	17.8 × 2.4	(0.701 × 0.094)
4	13.5 × 1.5	(0.531 × 0.059)
5	3.8 × 1.9	(0.150 × 0.075)
6	16.8 × 2.4	(0.661 × 0.094)



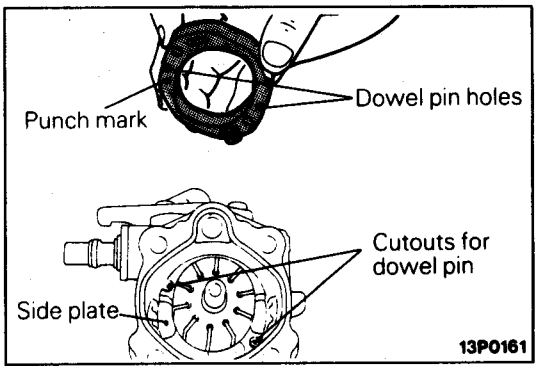
14. INSTALLATION OF SPRING

Fit the spring to the oil pump body with the larger-diameter end at the terminal assembly side.



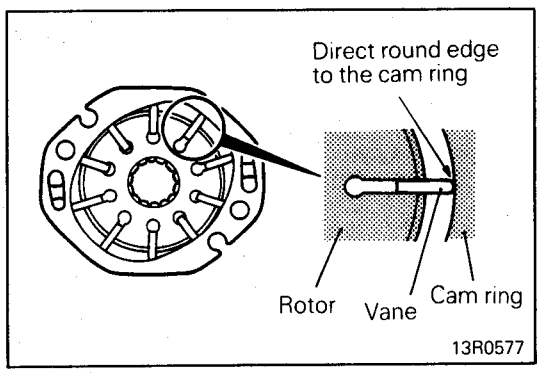
6. INSTALLATION OF SIDE PLATE

Line up the dowel pin hole of the side plate with the dowel pin of the pump body when installing the side plate.



5. INSTALLATION OF CAM RING

Install the cam ring with the punch mark facing the side plate.



3. INSTALLATION OF VANES

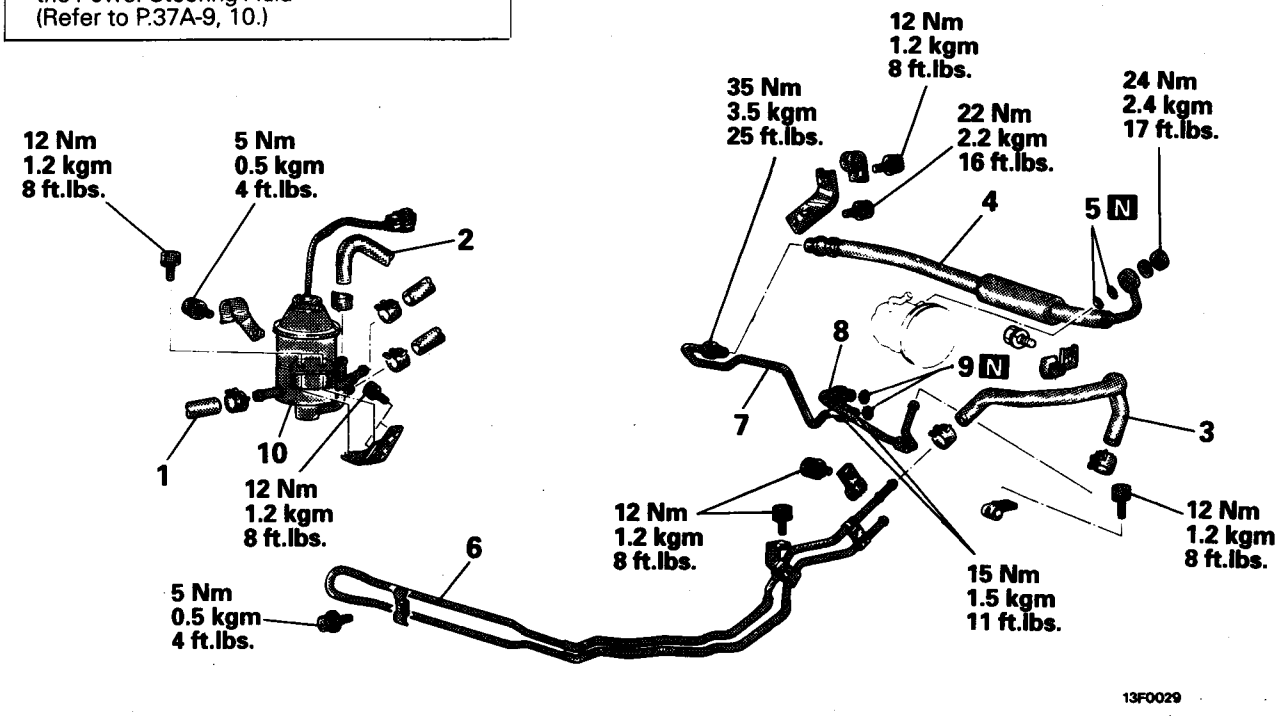
Install the vanes on the rotor, paying close attention to the installation direction.

POWER STEERING HOSES

E37TA--

REMOVAL AND INSTALLATION

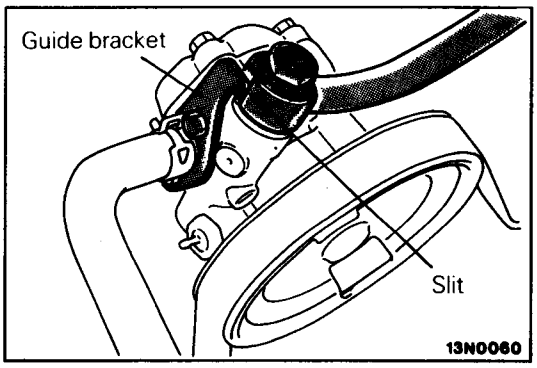
Pre-removal and Post-installation Operation
- Draining, Supplying, and Bleeding of the Power Steering Fluid (Refer to P.37A-9, 10.)



13F0029

Removal steps

1. Return hose
2. Suction hose
3. Return hose
- ◆◆ 4. Pressure hose
5. O-ring
6. Cooler tube
7. Pressure tube
8. Return tube
9. O-ring
10. Oil reservoir



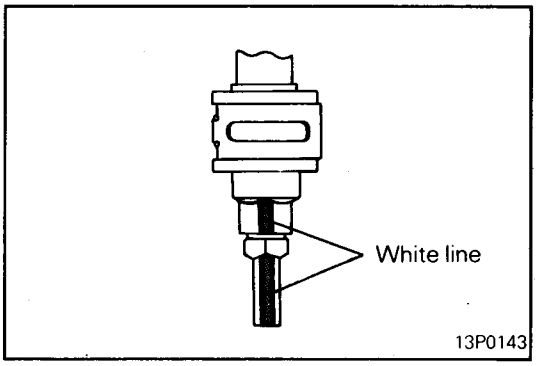
13N0060

SERVICE POINT OF INSTALLATION

E37TDAF

4. INSTALLATION OF PRESSURE HOSE

(1) Connect the pressure hose so that its slit part contacts the oil pump's guide bracket.



13P0143

(2) When the pressure hose is installed, align the white line on the pressure hose with the white line on the pressure tube so that together they form a straight line.

4-WHEEL STEERING SYSTEM (4WS)

CONTENTS

E37AA-1

SPECIFICATIONS

GENERAL SPECIFICATIONS

E37CA-1

Items	Specifications
Power steering gear box	
Type	Rack and pinion
Oil pump	
Type	Vane type
Displacement cm³/rev. (cu.in./rev.)	9.6 (0.59)
Relief set pressure MPa (kg/cm², psi)	8 (80, 1,138)
Rear oil pump	
Type	Vane type
Displacement cm³/rev. (cu.in./rev.)	3.3 (0.20)
Relief set pressure MPa (kg/cm², psi)	4 (40, 569)
Power cylinder	
Type	Hydraulic double action type
Stroke mm (in.)	20.2 (0.8) [one side 10.1 (0.39)]

SERVICE SPECIFICATIONS

E37CB-2

Items	Specifications
Standard value	
Rear oil pump displacement [at speedometer reading of 31 mph (50 km/h) for 30 seconds] dm³ (U.S.qt. Imp. qt.)	Approx. 1.0 (1.06, 0.88)
Power cylinder ball joint rotation starting torque Nm (kgcm, in.lbs.)	0.5 (50, 4.0) or less
Power cylinder tie rod swing torque N (kg, lbs.) [Nm (kgcm, in.lbs.)]	9–55 (0.9–5.5, 2–12) [0.5–3.0 (5–30, 4–26)]

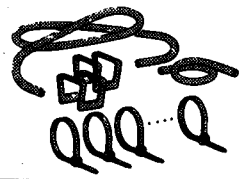
LUBRICANTS

E37CD-B

Items	Specified lubricant	Quantity
Power steering fluid	Automatic Transmission fluid "DEXRON" or "DEXRON II"	1.45 dm³ (1.53 U.S. qts. 1.28 lam. qt.)
Dust cover	Silicone grease	As required

SPECIAL TOOLS

E37DA-B

Tool	Number	Name	Use
	MB991230	Air bleeder set	Air bleed
	MB990993	Power steering oil pressure gauge adapter	Measurement of fluid flow volume

TROUBLESHOOTING

E37EAAK

Before inspecting, check the following items:
- Ensure that the suspension has not been modified
- Tire and wheel size, specifications, air pressure, balance and amount of wear
- Steering wheel type
- Wheel alignment
- Oil pump drive belt tension
- Power steering fluid level, and air in the system
- Engine idle speed and even idle
- Oil leakage

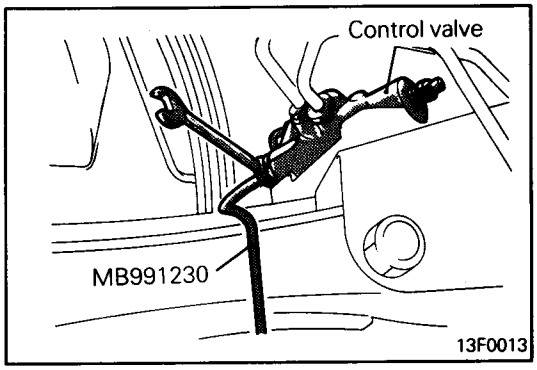
Malfunction symptom	Malfunctioning system	Inspection item
4WS does not operate	Power cylinder	Tie rod swing torque
		Power cylinder slide resistance
	Rear oil pump	Flow volume check
	Control valve	–
Poor steering feeling Feeling of friction in steering Poor steering return	Steering gears and linkage	Rack cracks or deformation
Steering wheel efforts excessive	Control valve	Oil leakage from control valve joint
	Power cylinder	Oil leakage from piston rod
	Oil line	Pressure hose breakage
	Oil reservoir	Oil reservoir deformation or oil leakage
Rear wheels cannot be steered Poor rear wheels return Hydraulic pressure for rear wheel is constantly high	Control valve	Stuck control valve spool
	Power cylinder	Stuck power cylinder
	Rear oil pump	Relief valve remains open
Long rear wheel steering delay Poor steering response Poor steering return	Power cylinder	Excessive power cylinder friction
		Looseness in power cylinder tie rod ball joint
		Ball joint dust cover cracks
Poor rear wheel steering response Poor rear wheel steering range	Control valve	Oil leakage from control valve spool
	Power cylinder	Oil leakage from power cylinder
	Rear oil pump	Extreme oil pump internal wear
Poor steerability (extreme tire wear)	Power cylinder	Tie rod length improperly adjusted after toe-in adjustment

SERVICE ADJUSTMENT PROCEDURES

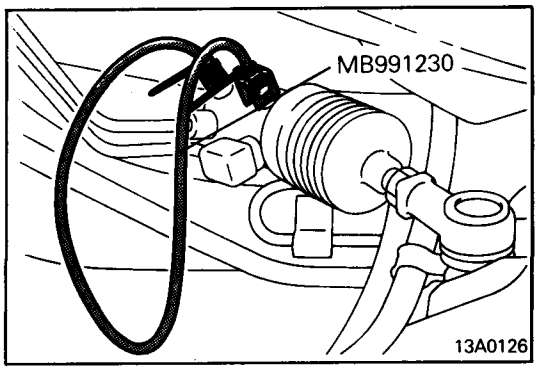
E37FAAH

BLEEDING

(1) Bleed air from power steering system (Refer to GROUP 37A – Service Adjustment Procedures.)
(2) Lift up the vehicle.
(3) Start the engine and let it idle.



(4) Loosen the bleeder screw on the left side of the control valve and set the special tool to the bleeder screw.
(5) Turn the steering wheel all the way to the left, immediately returning it half way back.
At this time confirm that air is discharged with the fluid.
(6) Repeat step (5) two or three times and check to be sure that all air has been bled from the system. Then, after tightening the bleeder screw, remove the special tool.
(7) Repeat steps (4) through (6) for the right side bleeder screw, turning the steering wheel to the right this time.



(8) Loosen the power cylinder bleeder screw and set the special tool to the bleeder screw.

Caution
Loosen the bleeder screw about 30 to 45 degrees, and secure it with the special tool (rotation prevention metal fixtures) so as not to be loosened more.

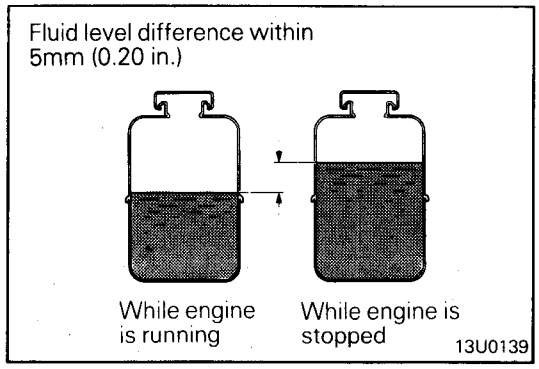
(9) Start the engine, and with the front wheels in the straight-forward position, increase the engine speed temporarily until the speedometer reading is 70–80 km/h (43–50 mph) to operate the rear wheel oil pump.

Caution
Take care as all four wheels will be rotating.

NOTE
When the engine speed is increased, the fluid in the rear wheel oil pump will circulate, but it will not circulate inside the tube (special tool).

(10) Maintain the speedometer reading at 30–40 km/h (19–25 mph) and turn the steering wheel all the way to both the left and right.
Check to be sure that the pressure rises and air circulates inside the tube (special tool), and that the air is discharged from the reservoir tank.

(11) Repeat step (10) several times and check to be sure that all air has been bled from the system. Then, after tightening the bleeder screw, remove the special tool.

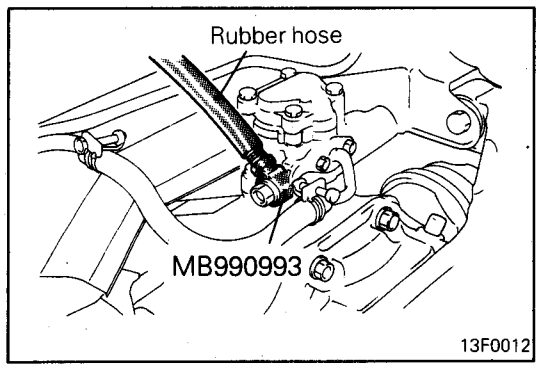


(12)Ensure that the difference in the fluid levels when the engine is running and when it is stopped are within 5 mm (0.20 in.).
If the difference exceeds 5 mm (0.20 in.), there is still air in the system and it must be bled again.

Caution
If air has not been completely bled from the system, the pump will make a humming sound or an unusual noise will come from the flow control valve; this also contributes to shortened pump life.

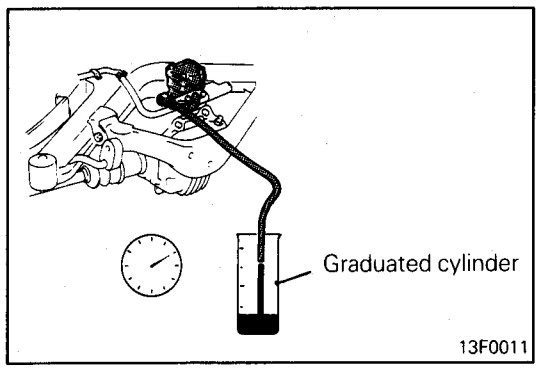
FUNCTION CHECK E37FRAA

(1) Raise the vehicle so that all four wheels may turn freely.
(2) Start the engine, running the vehicle at an indicated speed of about 80 km/h (50 mph).
(3) Turn the steering wheel all the way to left and right and turn it swiftly, checking to ensure that the rear wheels steer to the same directions as the front wheels.



REAR OIL PUMP DISCHARGE FLOW VOLUME CHECK E37F8AC

(1) Disconnect the pressure hose from the rear oil pump and install the special tool with a rubber hose.
(2) Place the other end of the rubber hose in a container which permits measurement of flow rate [2–dm^3 (2.1 U.S.qts., 1.8 Imp.qts.) graduated cylinder.]

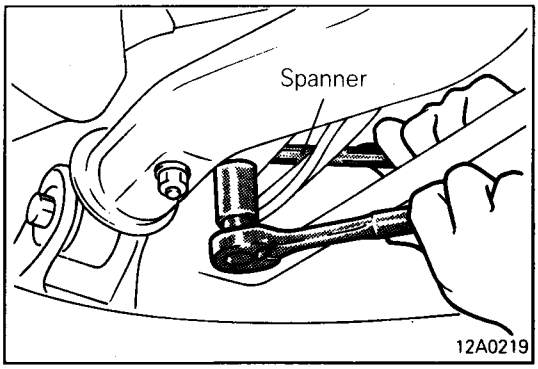


(3) Start the engine. Increase speed slowly, then hold the indicated speed of 50 km/h (31 mph), measuring discharge flow volume for 30 seconds.

Caution
While performing this work, continuously add fluid into the oil reservoir.

Standard value: Approximately 1.0 dm^3 (1.06 qts., 0.88 lamp.qt.)

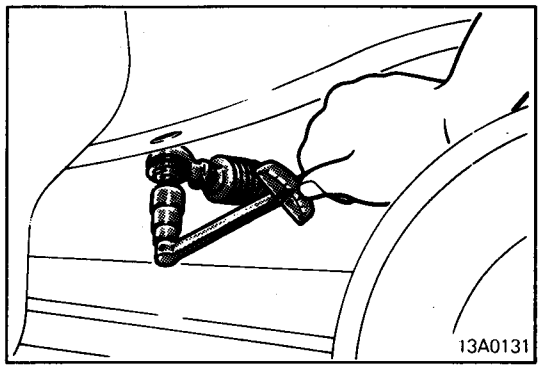
(4) If the discharge flow volume is extremely high or low, the rear oil pump should be replaced.



BALL JOINT ROTATION STARTING TORQUE CHECK

E37FTAC

(1) Holding the power cylinder tie rod with a spanner, disconnect the tie rod and trailing arm.



(2) After swinging the ball joint stud several times, install the stud nut, then measure the ball joint rotation starting torque with the special tool.

Standard value: 0.5 Nm (50 kgcm, 4 in.lbs.) or less

(3) If the rotation starting torque exceeds the standard value, replace the tie rod end.

(4) If the rotation starting torque is less than the standard value, check that the ball joint is not loose and operates smoothly. If not, it may be reused.

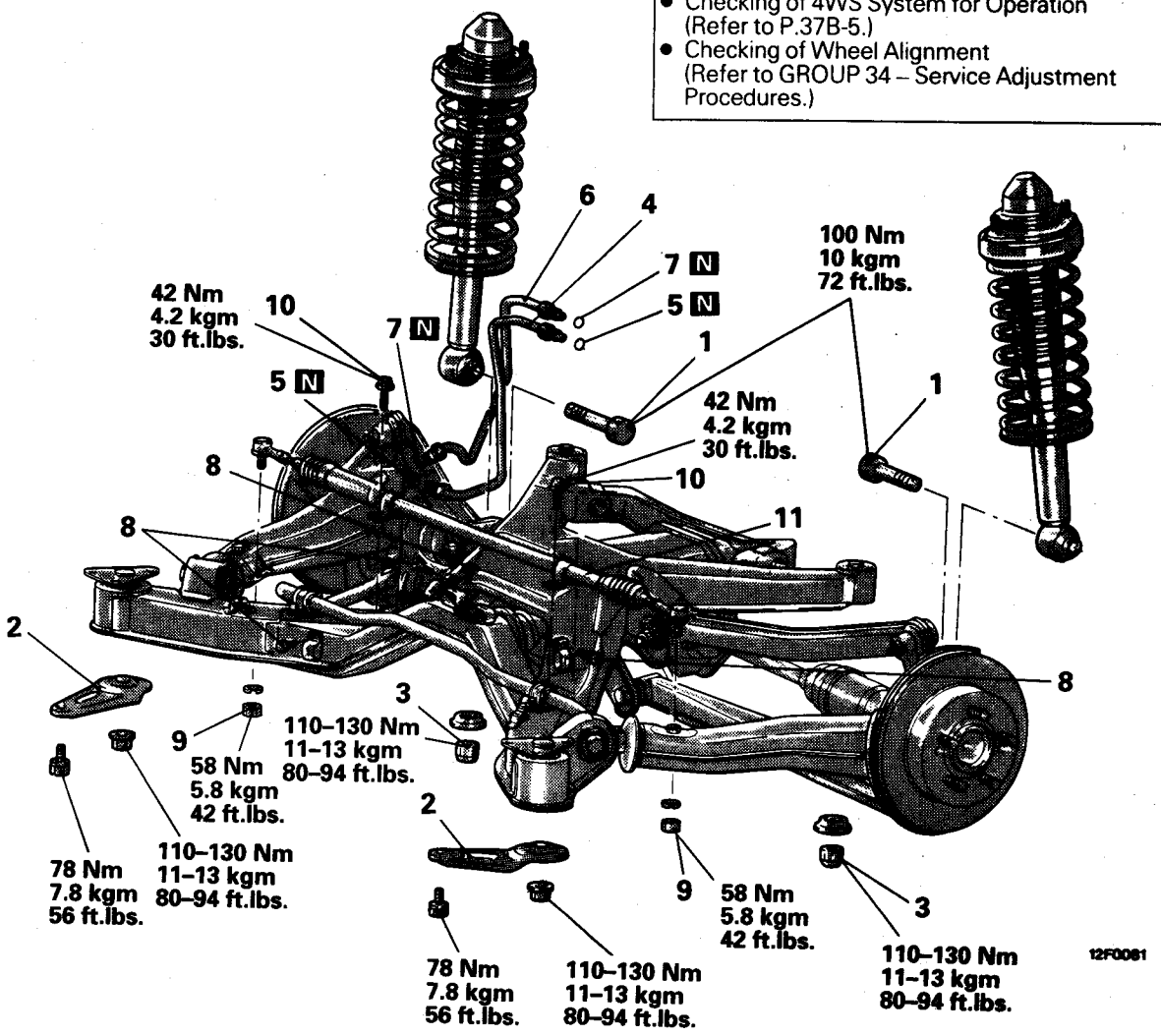
POWER CYLINDER

E37KA--

REMOVAL AND INSTALLATION

Pre-removal Operation
- Cleaning of Pipings with Steam
- Draining of Power Steering Fluid (Refer to GROUP 37A – Service Adjustment Procedures.)
- Removal of Main Muffler Assembly (Refer to GROUP 15 – Exhaust Pipe and Muffler.)

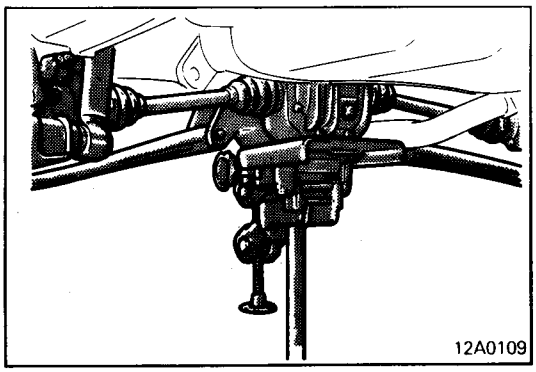
Post-installation Operation
- Installation of Main Muffler Assembly (Refer to GROUP 15 – Exhaust Pipe and Muffler.)
- Refilling and Bleeding of Power Steering System (Refer to GROUP 37A – Service Adjustment Procedures.)
- Bleeding of 4WS System (Refer to P.37B-4.)
- Checking of 4WS System for Operation (Refer to P.37B-5.)
- Checking of Wheel Alignment (Refer to GROUP 34 – Service Adjustment Procedures.)



Removal steps

1. Rear shock absorber lower mounting bolt
2. Crossmember bracket
3. ◆1◆ Crossmember mounting nut (on differential side)
4. Pressure tube (RL)
5. O-ring
6. Pressure tube (RR)
7. O-ring
8. Oil line clamp bolt
9. ◆1◆ Tie rod end nut
10. ◆2◆ Power cylinder installation bolt
11. ◆2◆ Power cylinder

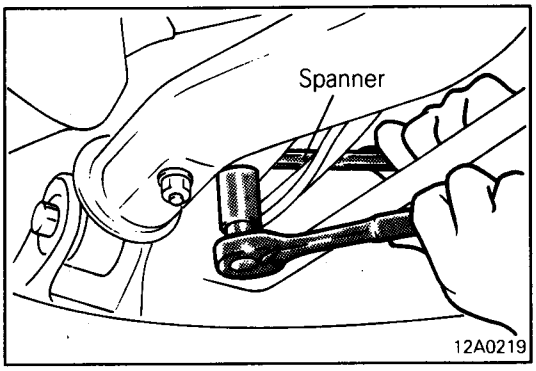
Fluid line flared nut
15 Nm
1.5 kgm
11 ft.lbs.



SERVICE POINTS OF REMOVAL E37KBAB

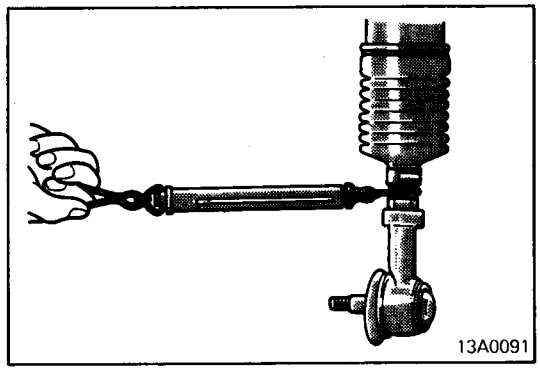
3. REMOVAL OF CROSSMEMBER MOUNTING NUT

(1) Before removing the self-locking nuts, support the differential case with a transmission jack.
(2) Remove the self-locking nuts.



9. REMOVAL OF TIE ROD END NUT

Secure the power cylinder on the tie rod side with a spanner and remove the power cylinder mounting nut.



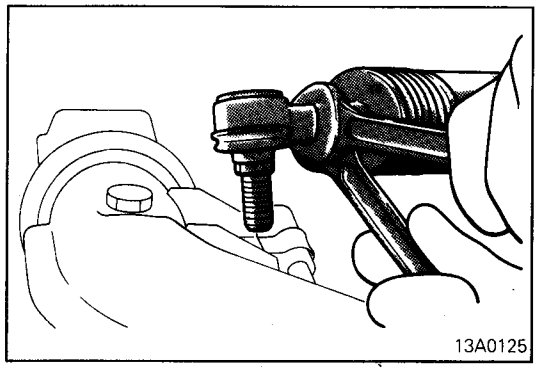
INSPECTION E37KCAA

TIR ROD SWING TORQUE INSPECTION

(1) Swing the tie rod ten times, hard.
(2) Point the tie rod end down, then attach a spring balance as shown in the illustration to measure swing resistance (swing torque).

Standard value: 9 – 55 N (0.9–5.5 kg, 2 – 12 lbs.) [0.5 – 3 Nm (5–30 kgcm, 4 – 26 in.lbs.)]

(3) If the swing resistance exceeds the standard value, replace the tie rod.
(4) If the swing resistance is less than the standard value, the ball joint may be reused as long as it is not loose and operates smoothly.



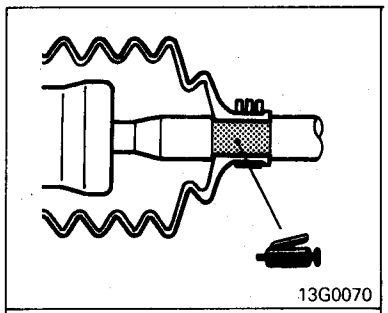
SERVICE POINTS OF INSTALLATION E37KDAA

11. INSTALLATION OF POWER CYLINDER / 10. POWER CYLINDER INSTALLATION BOLTS

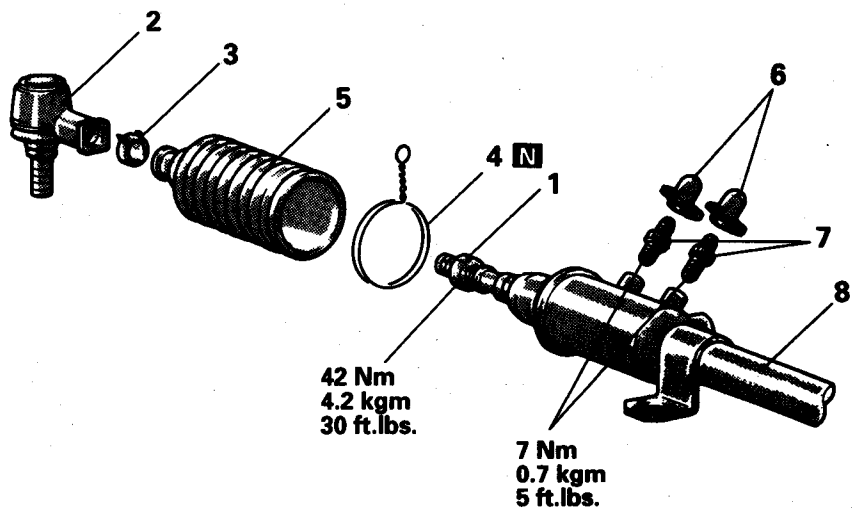
(1) Secure the power cylinder to the crossmember.
(2) When the tie rod ends and the installation holes at the trailing arm do not meet, loosen the tie rod end securing nut, then adjust the length. The dust cover fastener clip should be removed for this.
(3) The difference between the lengths of the left and right tie rods should be less than 1 mm (0.039 in.).

NOTE
The threads of the tie rod ends may be used as a guide for this.

DISASSEMBLY AND REASSEMBLY E37KE–



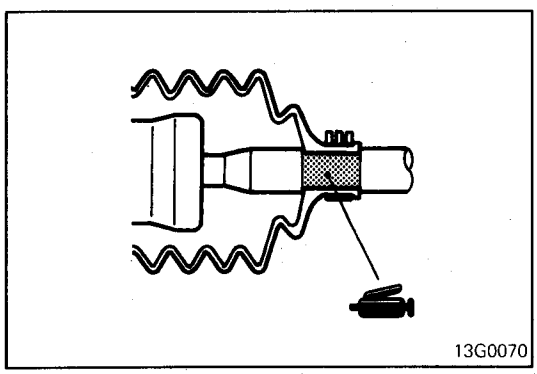
Grease: Silicone grease



13A0128

Disassembly steps

1. Nut
◆◆ 2. Tie rod end assembly
3. Clip
4. Wire
◆◆ 5. Dust cover
6. Bleeder caps
7. Bleeder screws
8. Cylinder assembly

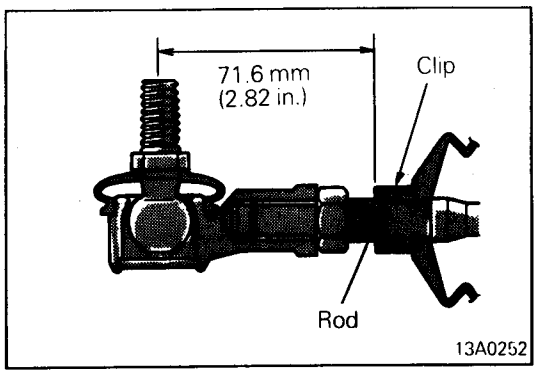


SERVICE POINTS OF REASSEMBLY E37KHAA

5. INSTALLATION OF DUST COVER

Apply the specified grease to the place indicated in the illustration, then install the dust cover to the cylinder assembly.

Specified grease: Silicone grease



2. INSTALLATION OF TIE ROD END ASSEMBLY

Temporarily attach the tie rod end assembly to the cylinder assembly at the place of dimension as illustrated.

NOTE
To adjust the assembly dimensions of the tie rod end assembly, remove the dust cover clip and rotate the rod.

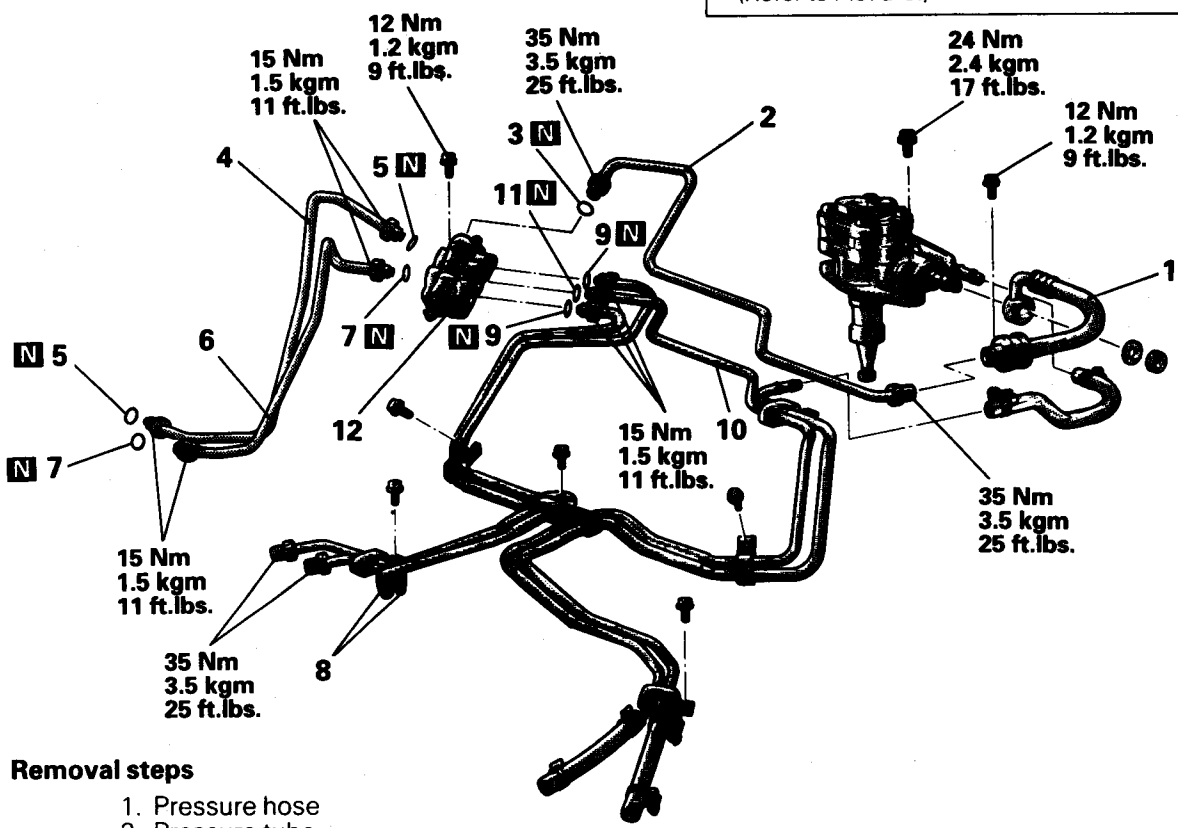
CONTROL VALVE

E37MA--

REMOVAL AND INSTALLATION

Pre-removal Operation
- Cleaning of Pipings with Steam
- Draining of Power Steering Fluid (Refer to GROUP 37A – Service Adjustment Procedures.)
- Removal of Rear Suspension Assembly (Refer to GROUP 34 – Rear Suspension Assembly.)

Post-installation Operation
- Installation of Rear Suspension Assembly (Refer to GROUP 34 – Rear Suspension Assembly.)
- Refilling and Bleeding of Power Steering System (Refer to GROUP 37A – Service Adjustment Procedures.)
- Bleeding of 4WS System (Refer to P.37B-4.)
- Checking of 4WS System for Operation (Refer to P.37B-5.)



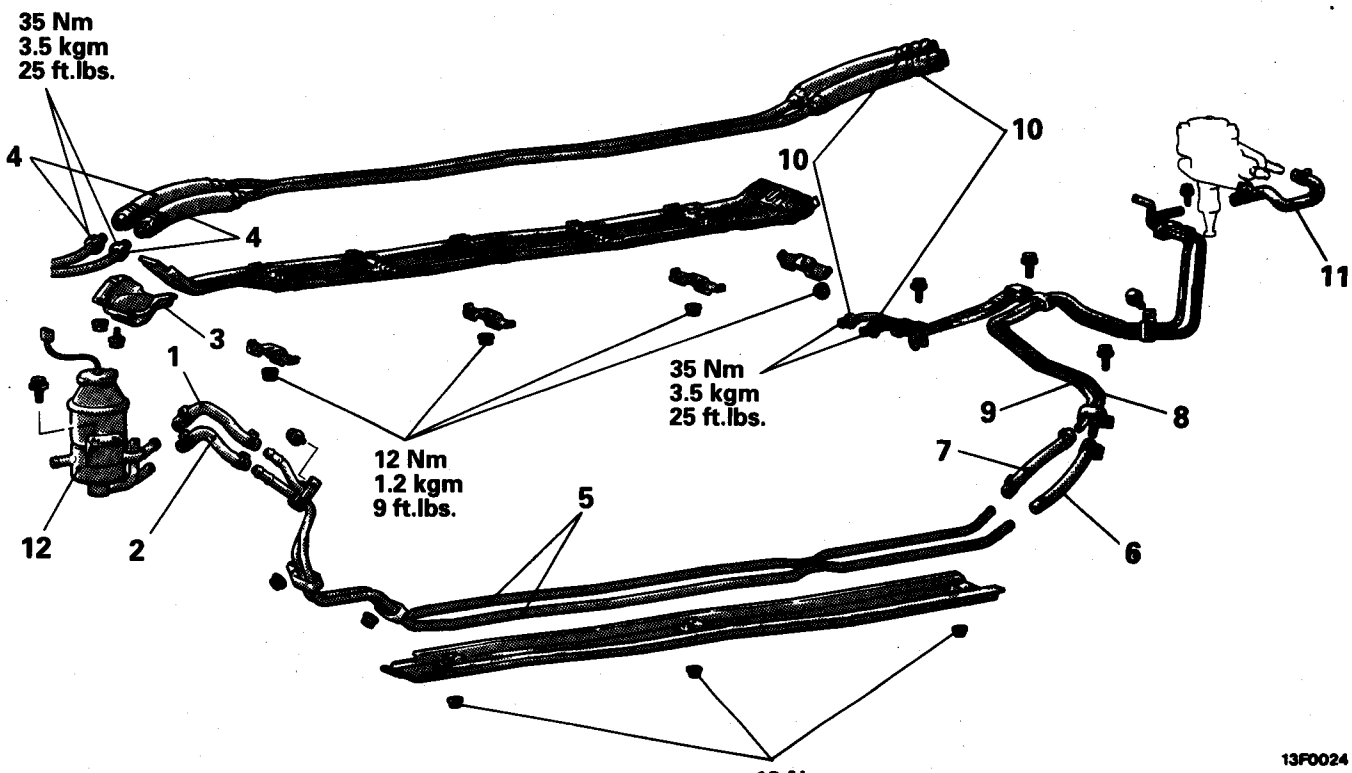
Removal steps

1. Pressure hose
2. Pressure tube
3. O-ring
4. Pressure tube (RR)
5. O-ring
6. Pressure tube (RL)
7. O-ring
8. Pressure tube (FL, FR)
9. O-ring
10. Return pipe
11. O-ring
12. Control valve

REAR OIL LINE

E370A--

REMOVAL AND INSTALLATION



Removal steps

1. Return hose
2. Suction hose
3. Protector
4. Pipe assembly to pressure tube connection
5. Pipe assembly
6. Suction hose
7. Rubber hose
8. Feed pipe assembly
9. Return pipe assembly
10. Pressure tube assembly to pipe assembly connection
11. Suction hose
12. Reserve tank

Pre-removal Operation
- Cleaning of Pipings with Steam
- Draining of Power Steering Fluid (Refer to GROUP 37A – Service Adjustment Procedures.)

Post-installation Operation
- Refilling and Bleeding of Power Steering System (Refer to GROUP 37A – Service Adjustment Procedures.)
- Bleeding of 4WS System (Refer to P.37B-4.)
- Checking of 4WS System for Operation (Refer to P.37B-5.)

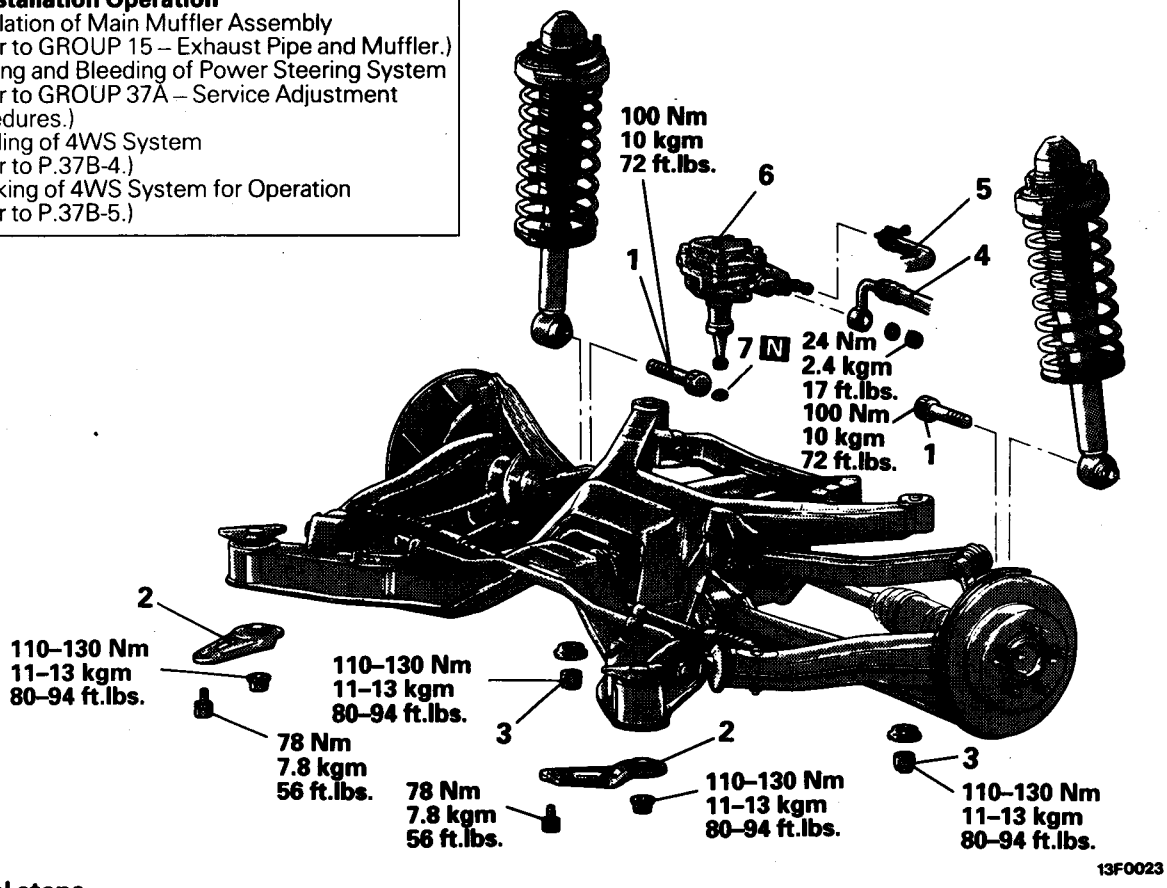
REAR OIL PUMP

E37RA--

REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining of Power Steering Fluid (Refer to GROUP 37A – Service Adjustment Procedures.)
- Removal of Main Muffler Assembly (Refer to GROUP 15 – Exhaust Pipe and Muffler.)

Post-installation Operation
- Installation of Main Muffler Assembly (Refer to GROUP 15 – Exhaust Pipe and Muffler.)
- Refilling and Bleeding of Power Steering System (Refer to GROUP 37A – Service Adjustment Procedures.)
- Bleeding of 4WS System (Refer to P.37B-4.)
- Checking of 4WS System for Operation (Refer to P.37B-5.)

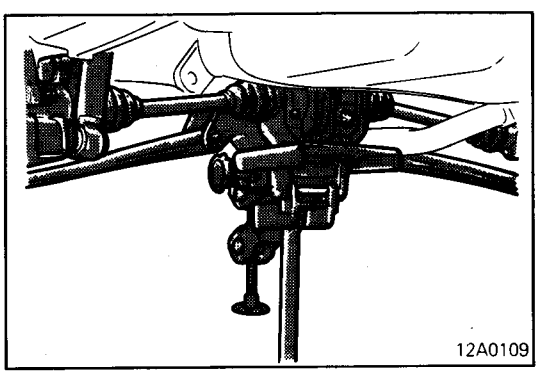


13F0023

Removal steps

1. Rear shock absorber lower mounting bolt
2. ◆◆ Crossmember bracket
3. ◆◆ Crossmember mounting nut (on differential side)
4. Pressure hose
5. Suction hose
6. Rear-wheel oil pump
7. O-ring

NOTE
Do not disassemble the rear-wheel oil pump.



12A0109

SERVICE POINTS OF REMOVAL

E37RBAL

2. REMOVAL OF CROSSMEMBER BRACKET / 3. CROSSMEMBER MOUNTING NUT (ON DIFFERENTIAL SIDE)

(1) Support the differential case with the transmission jack, then remove the crossmember bracket and crossmember mounting nut (on the differential side).
(2) Slightly lower the crossmember.

BODY

CONTENTS

E42AA--

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).

(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE
The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIFICATIONS

E42CA--

GENERAL SPECIFICATIONS

Items	Specifications
Hood	
Type	Rear hinged, front opening type (with gas damper)
Door	
Construction	Front-hinged, sashless
Regulator system	Wire type
Locking system	Pin-fork type
Tailgate	
Type	Inner-hinged, with gas damper
Glass installation method	
Windshield glass	Adhesive type
Quarter window glass	Adhesive type
Tailgate window glass	Adhesive type
Glass thickness mm (in.)	
Windshield glass	5.3 (0.21)
Tailgate window glass	3.5 (0.14)
Door glass	5.0 (0.20)
Quarter window glass	3.5 (0.14)
Power window motor	
Type	Permanent magnet type (Built-in circuit breaker)
Revolutions under no load rpm	75 or more
Revolutions under load rpm	
At 1 Nm (0.1 kgm, 0.72 ft.lbs.)	45 – 75
At 2 Nm (0.2 kgm, 1.45 ft.lbs.)	50 – 80
Bound current A	34 or less
Direction of rotation	Clockwise and counter-clockwise
Power window main switch	
Type	Automatic reset type
Rated load current A	
Lock switch	10
Power window switch	10
Power window sub switch	
Type	Automatic reset type
Rated load current A	10
Power window relay	
Maximum contact current A	20
Rated coil current A	Max. 0.2
Voltage drop between terminals V (At 12 V and the rated load current)	0.2 or less

Item	Specifications
Door lock power relay	
Range of voltage used V	8 – 16
Rated load current (at 13.5 V) A	10
Rated coil current A	0.2 or less
Voltage drop between terminals V	0.2 or less
Door lock actuator	
Bound current (at 12 V) A	2.5 – 4.5
Operating voltage range V	9 – 15
*Tripping time (at 12 V) second	5 – 30

NOTE
*: Tripping time is the time consumed until current reaches 0.5 A after power connection.

SERVICE SPECIFICATIONS

E42CB–

Items			Standard value
Play of door inside handle mm (in.)	A (play)		7 (0.28)
	B (OPEN)		46 ± 9 (1.81 ± 0.35)
	C (FULL)		69 (2.72)
Clearance of window glass to weatherstrip holder mm (in.)	Adjustment of glass inclination amount	Front pillar	11.7 ± 1.0 (0.46 ± 0.04)
		Roof	11.8 ± 1.0 (0.46 ± 0.04)
		Quarter pillar	20.5 ± 1.0 (0.80 ± 0.04)
	Adjustment of glass longitudinal inclination	Front pillar	7.0 ± 1.0 (0.28 ± 0.04)
		Roof	7.7 ± 1.0 (0.30 ± 0.04)
		Quarter pillar	12.0 ± 1.0 (0.47 ± 0.04)

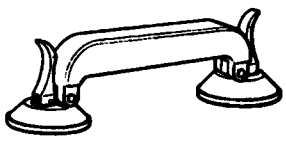
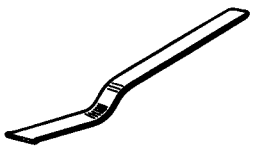
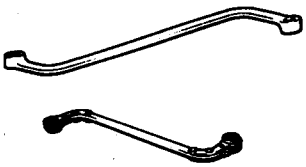
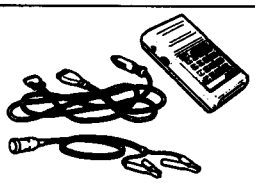
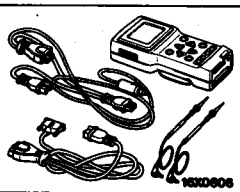
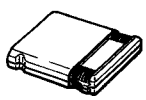
SEALANTS AND ADHESIVES

E42CE–

Items	Specified sealant	Remarks
Front fender panel Splash shield Waterproof film	3M ATD Part No. 8625 or equivalent	Ribbon sealer
Windshield Quarter window glass Tailgate glass	3M SUPER FAST URETHAN 8609 or equivalent and 3M SUPER FAST URETHAN PRIMER 8608 or equivalent	–

SPECIAL TOOLS

E42DA–

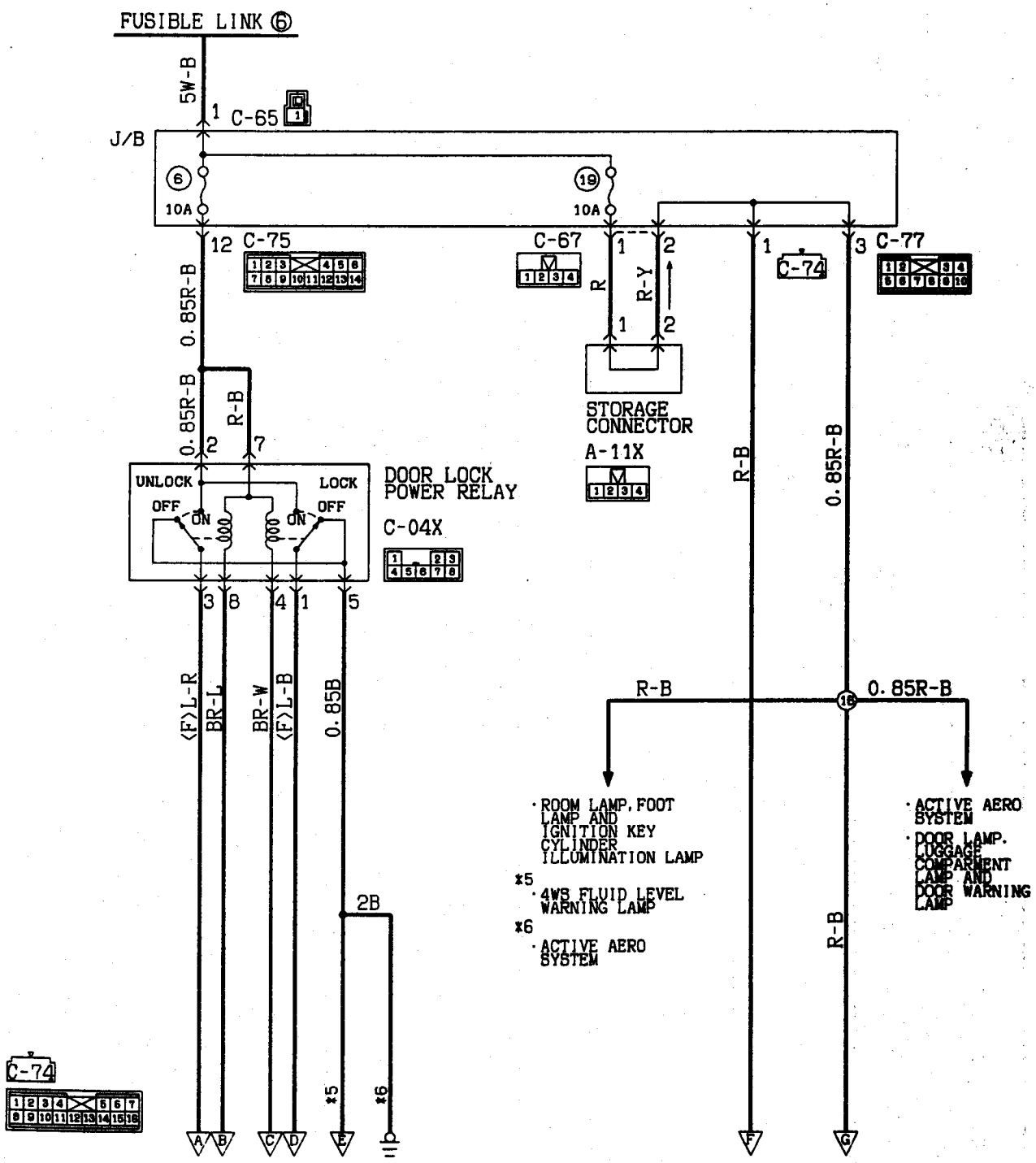
Tool	Number	Name	Use
	MB990480	Glass holder	Removal and installation of windshield
	MB990449	Window moulding remover	Removal of the window moulding
	MB990900 or MB991164	Door adjusting wrench	Adjustment of door fit
	MB991341	Multi-use tester sub-assembly	1993 models ETACS input check
	(For the number, refer to GROUP 00 - Precautions Before Service.)	ROM Pack	
	MB991502	MUT-II sub assembly	All models ETACS input check
 16X0607		ROM pack	
	MB990784	Ornament remover	Removal of the window moulding and interior parts

TROUBLESHOOTING

E42ED--

CENTRAL DOOR LOCKING

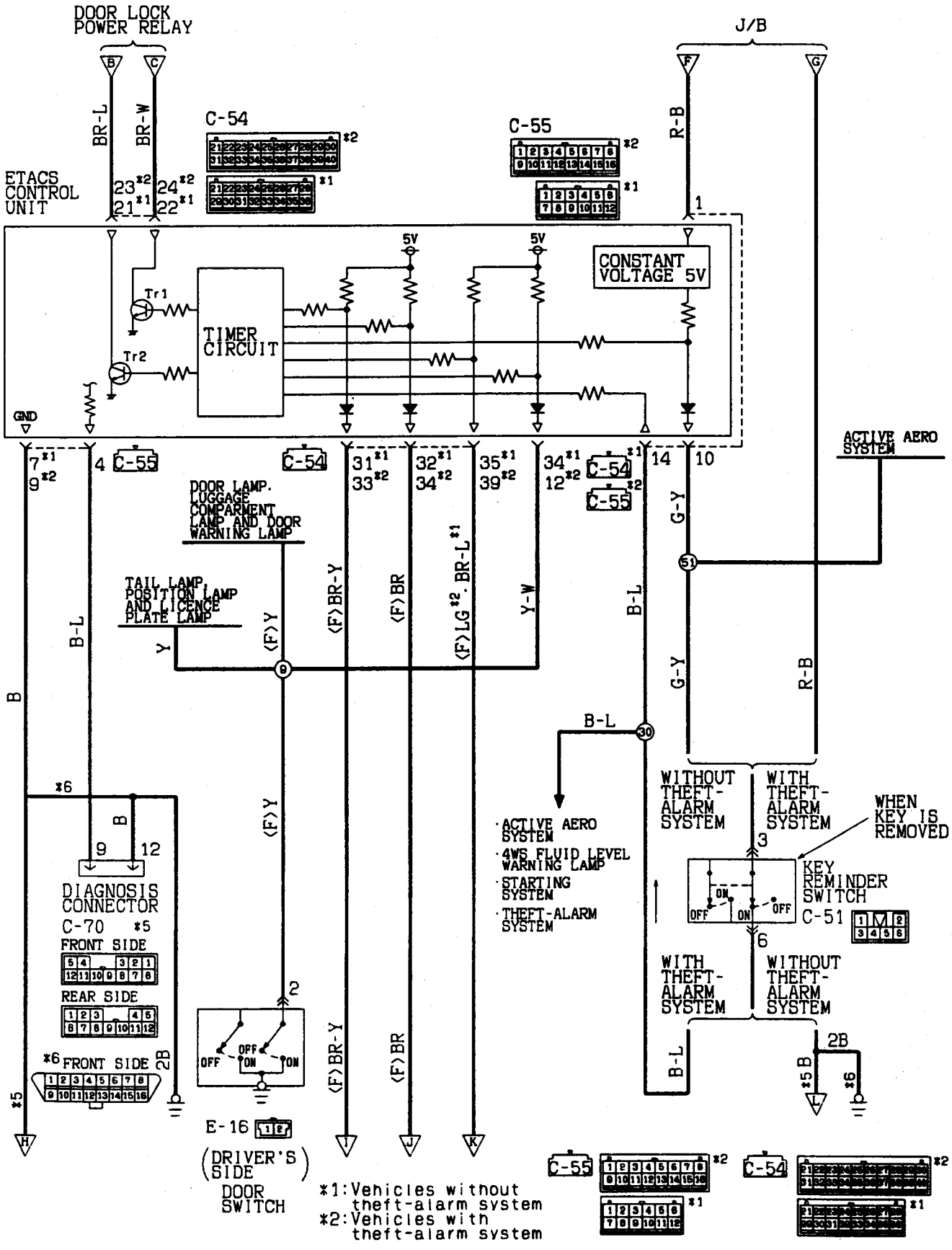
CIRCUIT DIAGRAM

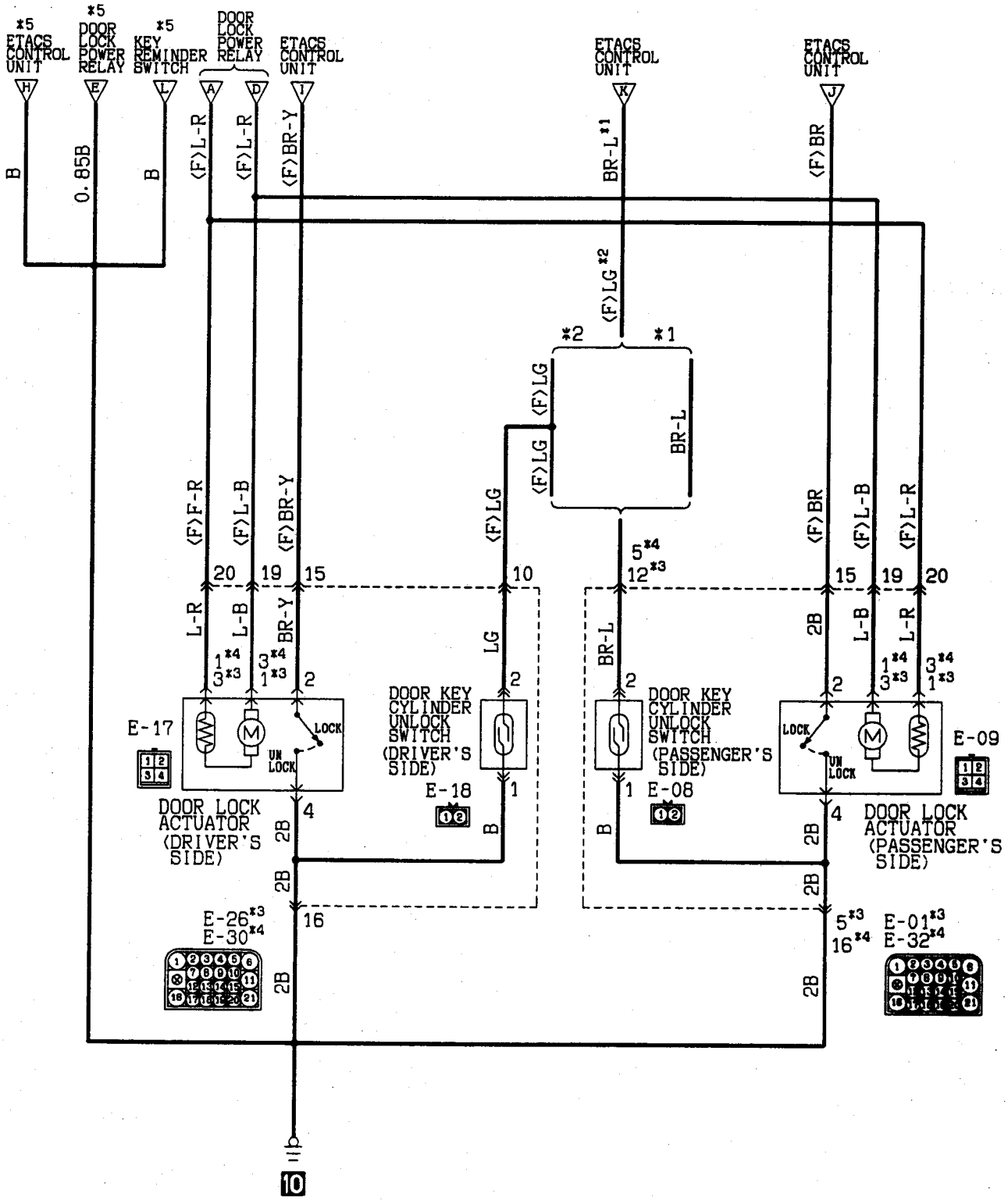


Wire colour code

B:Black	LG:Light green	G:Green	L:Blue	W:White	Y:Yellow	SB:Sky blue	
BR:Brown	O:Orange	GR:Gray	R:Red	P:Pink	V:Violet		

KX35-AK-R4201-EC


DOOR LOCK POWER RELAY
J/B
ETACS CONTROL UNIT
C-54
C-55
BR-L
BR-W
R-B
CONSTANT VOLTAGE 5V
TIMER CIRCUIT
Tr1
Tr2
5V
GND
ACTIVE AERO SYSTEM
DOOR LAMP, LUGGAGE COMPARTMENT LAMP AND DOOR WARNING LAMP
TAIL LAMP, POSITION LAMP AND LICENCE PLATE LAMP
B-L
Y
(F)Y
(F)BR-Y
(F)BR
(F)LG*2, BR-L*1
Y-W
G-Y
WITHOUT THEFT-ALARM SYSTEM
WITH THEFT-ALARM SYSTEM
WHEN KEY IS REMOVED
KEY REMINDER SWITCH
C-51
·ACTIVE AERO SYSTEM
·4WS FLUID LEVEL WARNING LAMP
·STARTING SYSTEM
·THEFT-ALARM SYSTEM
DIAGNOSIS CONNECTOR
C-70 *5
FRONT SIDE
REAR SIDE
*6 FRONT SIDE
E-16
(DRIVER'S SIDE DOOR SWITCH)
*1:Vehicles without theft-alarm system
*2:Vehicles with theft-alarm system



*1:Vehicles without theft-alarm system
*2:Vehicles with theft-alarm system
*3:LHD
*4:RHD
*5:Up to 1994 MODELS
*6:FROM 1995 MODELS

KX35-AK-R4201A-EC

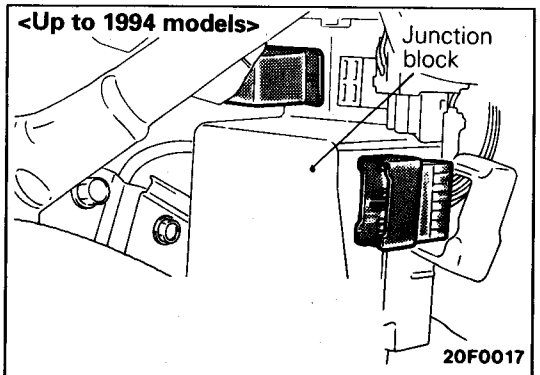
OPERATION

- When the driver's side inside lock knob is set to the lock (or unlock) position, the switch inside the driver's side door lock actuator turns OFF (or ON), and the timer function of the ETACS unit causes transistor Tr1 (or Tr2) to turn ON for 0.5 seconds. This causes the LOCK (or UNLOCK) side of the door lock relay to turn ON, thereby operating the passenger's side door lock actuator.
- When the passenger's side door is locked (or unlocked) by key operation, the door key cylinder unlock switch turns ON and the switch inside the passenger's side door lock actuator turns OFF (or ON), and the timer function of the ETACS unit causes transistor Tr1 (or Tr2) to turn ON for 0.5 seconds. This causes the LOCK (or UNLOCK) side of the door lock relay to turn ON, thereby operating the driver's side door lock actuator.
  The driver's side door lock actuator cannot be operated by operating the passenger's side inside lock knob.
- If the driver's side door is opened and the inside lock knob is set to the LOCK position while the key is left inserted in the ignition switch, the timer function of the ETACS unit causes transistor Tr2 to turn ON. This causes the UNLOCK side of the door lock relay to turn ON, thereby unlocking all doors.

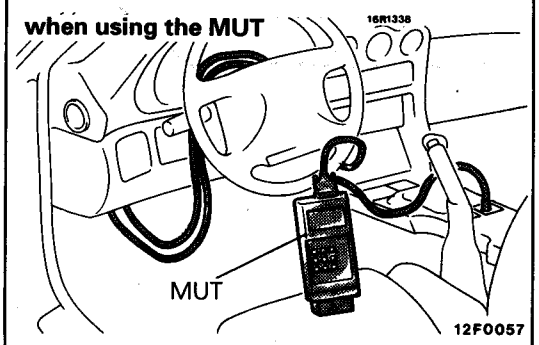
TROUBLESHOOTING HINTS

Phenomenon	Inspection method
One of the door lock actuators fails to operate	• Check the door actuator which fails to operate.
The passenger's side door doesn't lock or unlock even if the driver's side door lock knob is operated.	• Check the door lock actuator switch input signal. • Check the door lock actuator switch.(Refer to P.42 – 42.) • Check the door lock power relay.(Refer to P.42 – 42.)
The driver's side door is not locked (or unlocked) by the passenger's side door key operation.	• Check the door key cylinder unlock switch input signal. • Check the door key cylinder unlock switch. (Refer to P.42 – 41.) • Check the door lock actuator switch input signal. • Check the door lock actuator switch.(Refer to P.42 – 42.) • Check the door lock power relay.(Refer to P.42 – 42.)
No unlock operation can be made by pressing door lock knob after fulfillment of following conditions. • Insertion of key in ignition switch (Key reminder switch OFF) • Opening of driver's side door (door switch ON)	• Check the key reminder switch input signal. • Check the key reminder switch.(Refer to GROUP 54 – Ignition Switch.) • Check the driver's side door switch input signal. • Check the driver's side door switch.(Refer to P.42 – 37.)
Neither the central door locking function nor the key reminder function operates.	• Check the door lock actuator switch input signal. • Check the door lock actuator switch. (Refer to P.42 – 42.) • Check the door lock power relay. (Refer to P.42 – 42.)

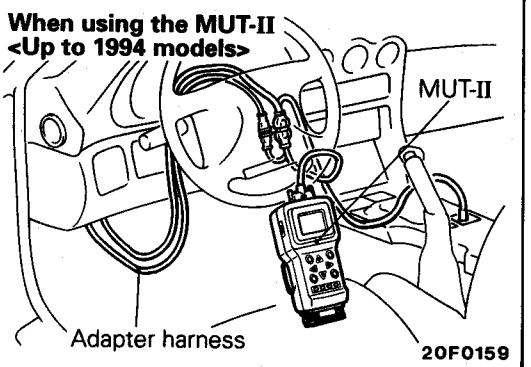
<Up to 1994 models>



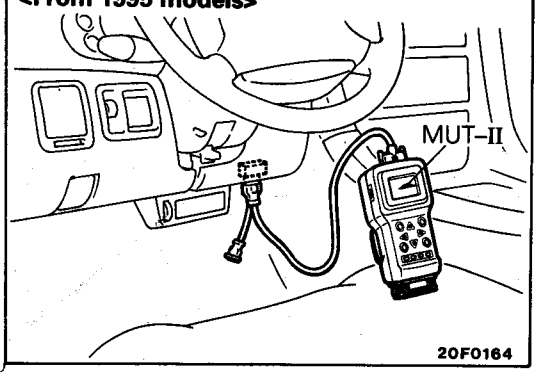
when using the MUT



When using the MUT-II
<Up to 1994 models>



<From 1995 models>



INPUT SIGNAL

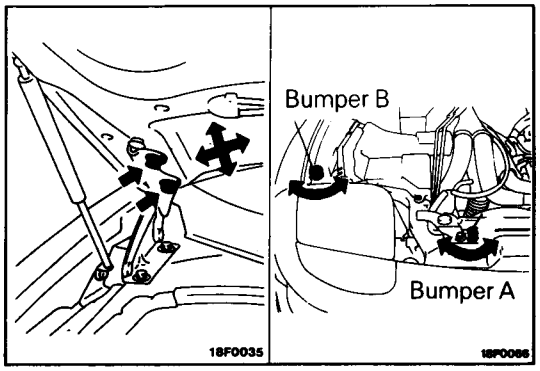
Using the MUT-II, check whether or not the input signals from each switch are being input to the ETACS unit.

(1) Connect the MUT or MUT-II to the diagnosis check connector.

NOTE
When connecting the MUT-II to a vehicle up to 1994 model, use the adapter harness supplied together with the MUT-II.

Caution
Connect and disconnect either MUT or MUT-II with the ignition switch in the OFF position.

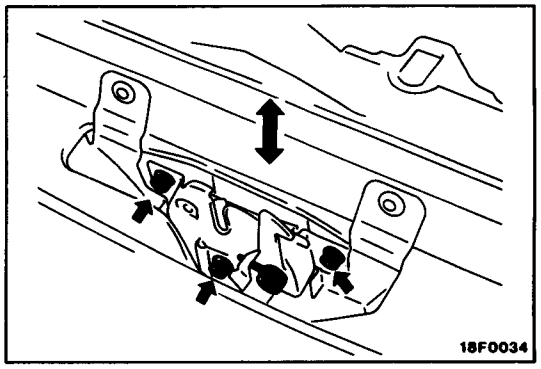
(2) Check if the buzzer of the MUT or MUT-II sounds when each switch is operated.
If the buzzer sounds, the input signals are being input to the ETACS unit, so that switch can be considered to be functioning normally. If not, the switch or switch input circuit is faulty. Check the switch and the switch input circuit.



SERVICE ADJUSTMENT PROCEDURES

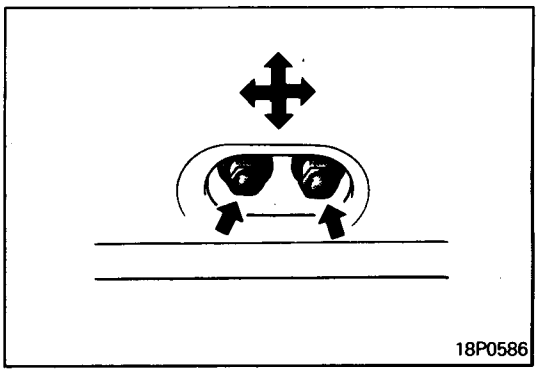
HOOD ADJUSTMENT E42FBAE

1. Loosen the hood mounting bolts, and then adjust the hood by moving it so that the clearance is equal on all sides.
2. Turn the bumpers A and B, adjust the height of the hood.



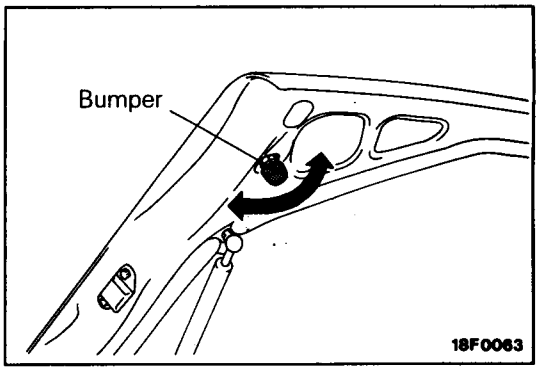
3. Loosen the hood latch mounting bolts, and move the hood latch to adjust the attachment between the hood latch and hood striker.

NOTES

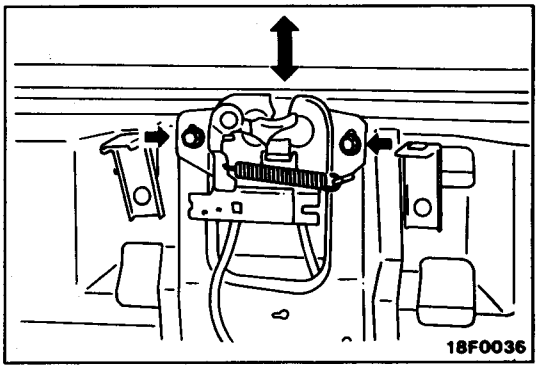


TAILGATE ADJUSTMENT E42FMAH

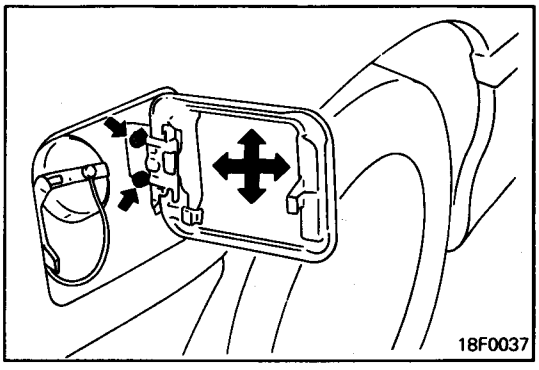
1. Loosen the tailgate hinges mounting bolts, and then adjust the tailgate by moving it so that the clearance is equal on all sides.



2. Turn the bumper to adjust the tailgate height.

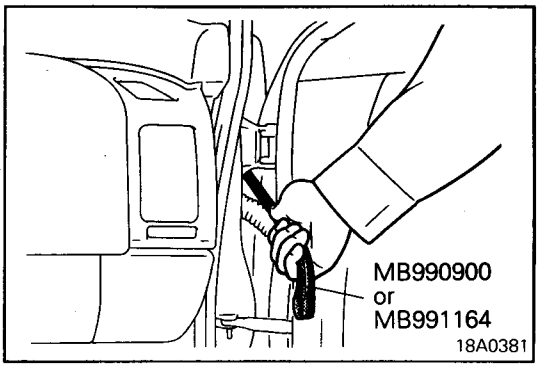


3. Loosen the tailgate latch mounting bolts, and move the tailgate latch to adjust the attachment between the tailgate latch and tailgate striker.



FUEL FILLER DOOR ADJUSTMENT E42FCAF

Loosen the fuel filler door mounting screw and adjust the fuel filler door so that the clearance around the fuel filler door is even without any height differences.

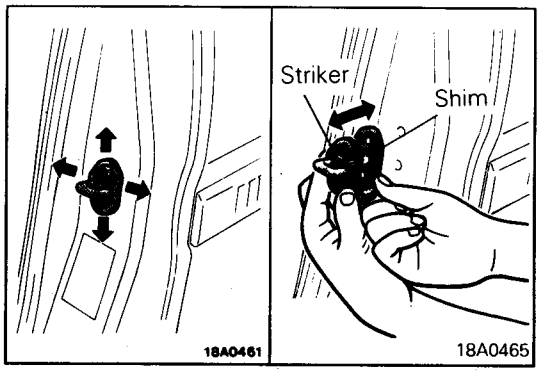


DOOR ADJUSTMENT E42FDAG

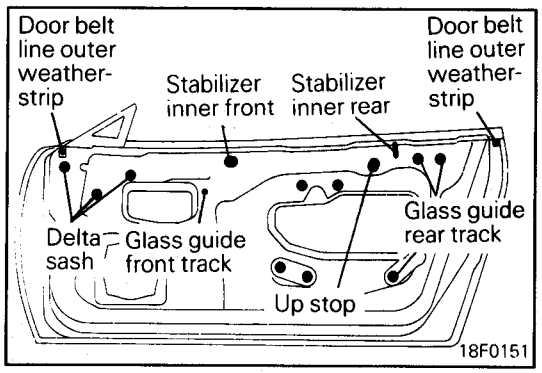
1. Use the special tool to loosen the hinge mounting bolts on the body side, and then adjust the clearance around the door so that it is uniform on all sides.
2. If the door is not flush with the body, remove the spring pin from the door check, use the special tool to loosen the bolts for mounting the door hinges to the door. Move the door to adjust the door position along the body surface.

Caution
Attach protection tape to the fender edges where the hinge is installed.

PWUE9119



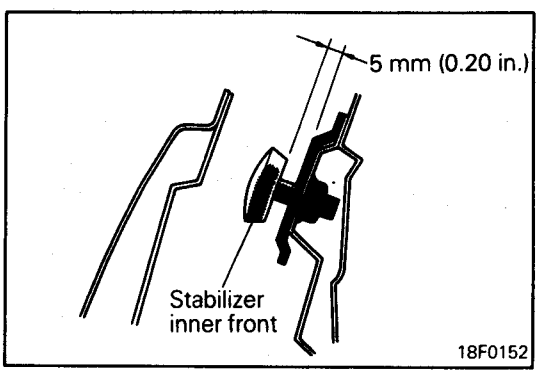
3. If the door does not open freely, adjust the engagement of the striker with the door latch by means of the striker mounting shim and move the striker up and down or from side to side.



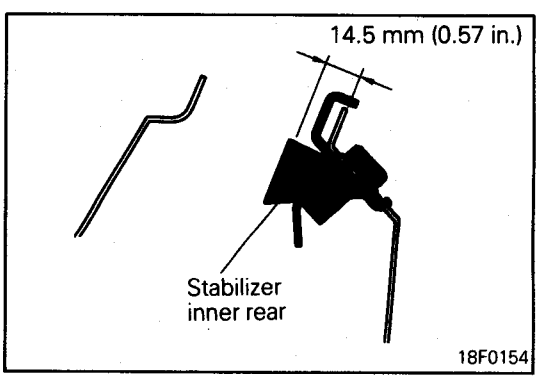
DOOR WINDOW GLASS ADJUSTMENT (When removing and installing the door window glass) E42FEAP

1. Remove the door trim and waterproof film. (Refer to P.42 – 37)
2. Remove the front pillar trim.
3. Remove the drip line weatherstrip.
4. Loosen the bolts and nuts of the following parts.
   - Glass guide front track
   - Glass guide rear track
   - Delta sash
   - Stabilizer inner front
   - Stabilizer inner rear
   - Up stop
   - Door belt line outer weatherstrip

   NOTE
   Move the window glass down to the lowest position before removing the delta sash bolt.



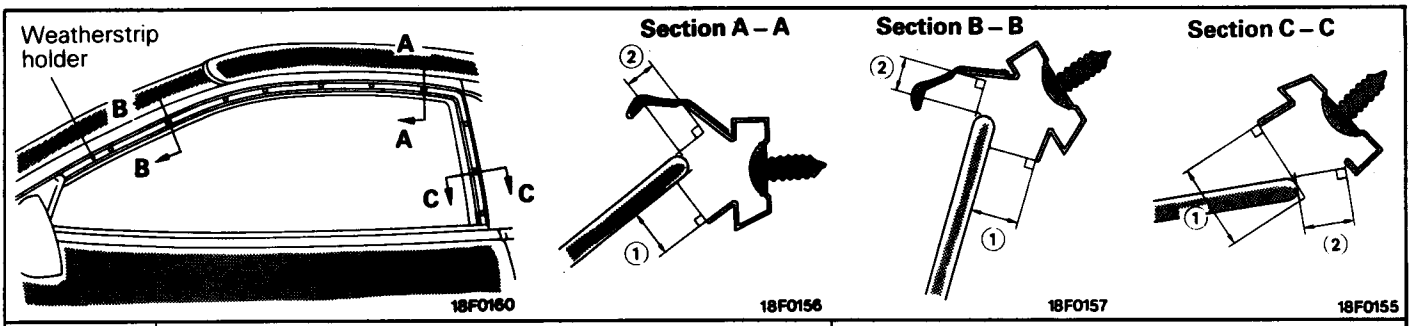
5. Remove the stabilizer inner front and adjust the adjusting bolt for the dimension shown here.

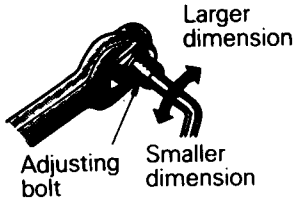
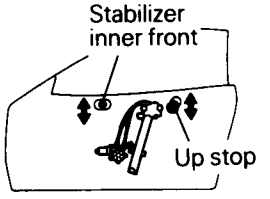


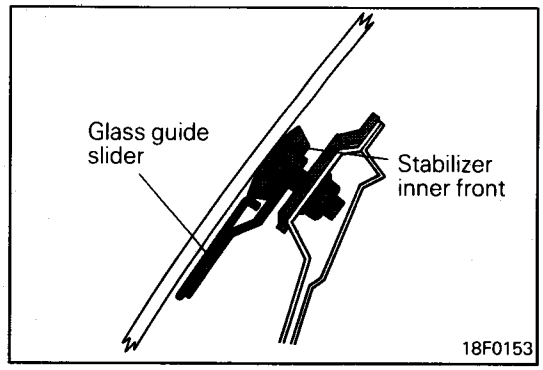
6. Adjust the adjusting bolt for the stabilizer inner rear dimension shown here.
7. Raise door window glass. Push glass against the outer stabilizer of the door belt line outer weatherstrip and insert cloth or the like between the door inner panel and glass.

8. Adjust glass to have standard clearance between the weatherstrip holder and window glass.

Caution
Measure the clearance, specified in section A-A, B-B and C-C, at the corresponding weatherstrip holder screws as shown in the illustration.

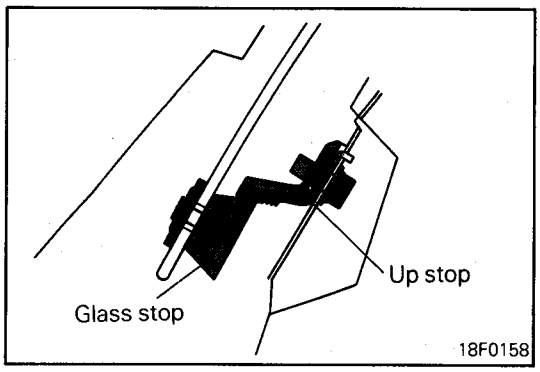


	Adjustment	Adjustment procedures	Standard value mm (in.) Section A-A (1)	Section A-A (2)	Section B-B (1)	Section B-B (2)	Section C-C (1)	Section C-C (2)
1	Adjustment of inward tilt of glass	Adjust by turning the adjusting bolts of the glass guide front track and glass guide rear track. **Caution** **Turn the two adjusting bolts of the glass guide rear track same amount.** 	11.7 ± 1.0 (0.46 ± 0.04)	–	11.8 ± 1.0 (0.46 ± 0.04)	–	20.5 ± 1.0 (0.80 ± 0.04)	–
2	Adjustment of forward or backward tilt of glass	Move the stabilizer inner front and up stop up and down to adjust the forward or rearward tilt of glass when glass is fully closed. **Caution** **Do not turn the stabilizer inner front adjusting bolt.** 	–	7.0 ± 1.0 (0.28 ± 0.04)	–	7.7 ± 1.0 (0.30 ± 0.04)	–	12.0 ± 1.0 (0.47 ± 0.04)



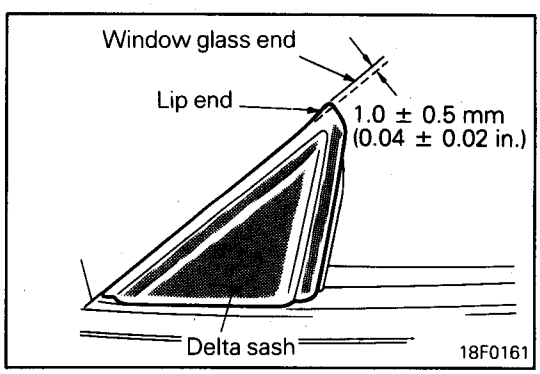
NOTE
Adjust both inward tilt and forward or backward tilt of glass at the same time.

9. Force the stabilizer inner front onto the glass guide slider of the window glass assembly and tighten in position.



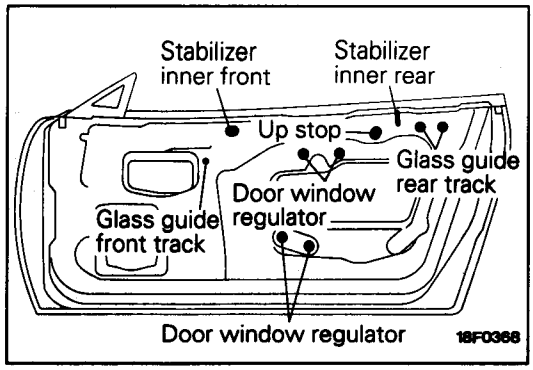
10. Force the up stop onto the glass stop of the window glass assembly and tighten in position.
11. Tighten the glass guide front and rear tracks.

Caution
Do not turn the adjusting bolts of guide tracks.



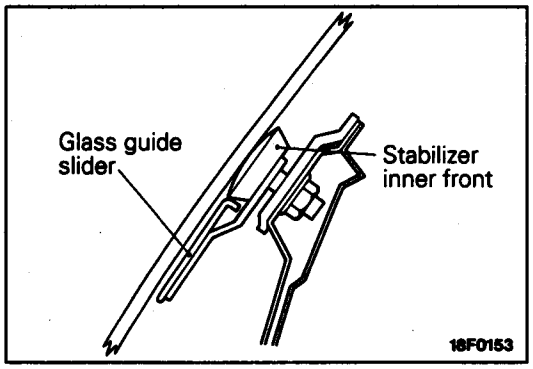
12. Adjust the delta sash so that the window glass end and the delta sash lip end are positioned as illustrated and tighten in position.

13. Install the drip line weatherstrip.
14. Install the front pillar trim.
15. Install the door trim and the waterproof film. (Refer to P.42 – 37)
16. Open and close the door and move up and down the window glass to check fitting of the door.

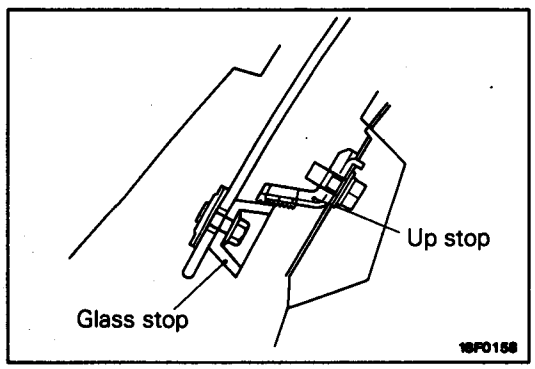


DOOR WINDOW GLASS ADJUSTMENT (When not removing and installing the door window glass)

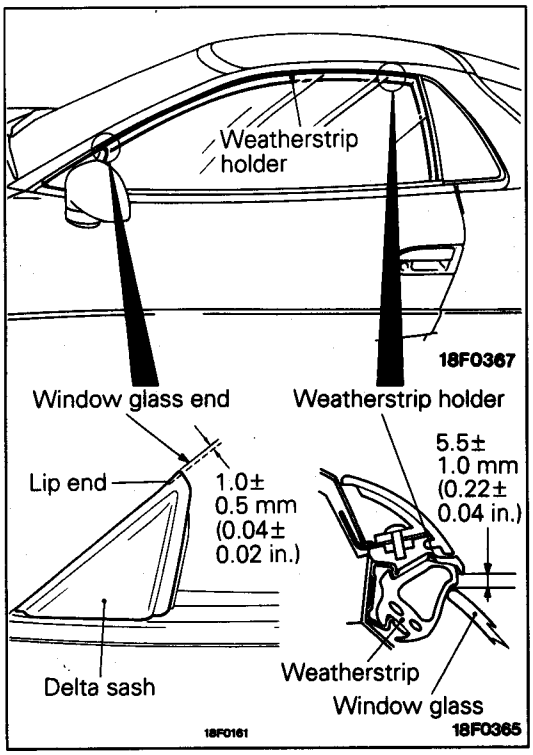
1. Remove the door trim and waterproof film. (Refer to P.42 – 37)
2. Loosen the bolts and nuts of the following parts.
   - Glass guide front track
   - Glass guide rear track
   - Door window regulator
   - Stabilizer inner front
   - Stabilizer inner rear
   - Up stop
3. Lift the window glass up to its highest position.



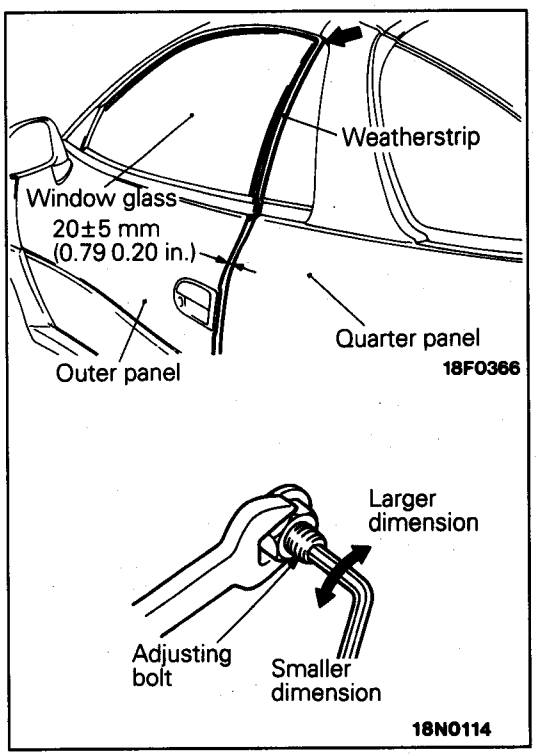
4. Tighten the stabilizer inner front so that it presses against the glass guide slider of the window glass assembly.



5. Tighten the up stop so that it presses against the glass stop of the window glass assembly.
6. Tighten the stabilizer inner rear so that it presses against the window glass assembly.

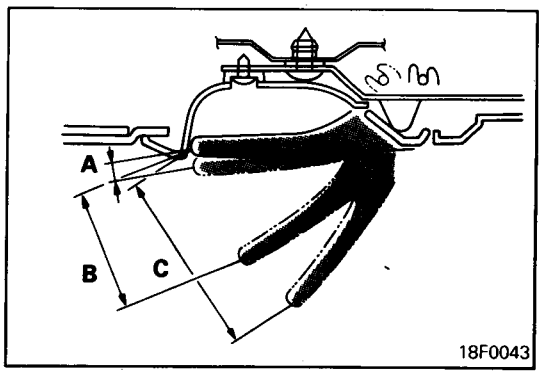


7. Check that the clearance between the weatherstrip holder and the top edge of the window glass is as shown in the illustration when the top edge of the window glass is touching the weatherstrip.
8. Check that the relative position of the window glass end the lip end of the delta sash is as shown in the illustration. the illustration.
9. If the clearance or the position is not at the standard values, repeat the procedures in steps 4 and 5.



10. Turn the adjusting bolts of the glass guide rear track and the glass guide front track to adjust so that the corner of the window glass touches the weatherstrip when the door is opened by the amount shown in the illustration.

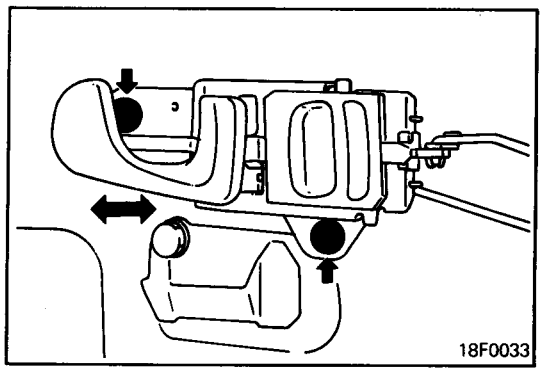
11. Install the door trim and the waterproof film. (Refer to P.42 – 37)
12. Open and close the door and move up and down the window glass to check fitting of the door.



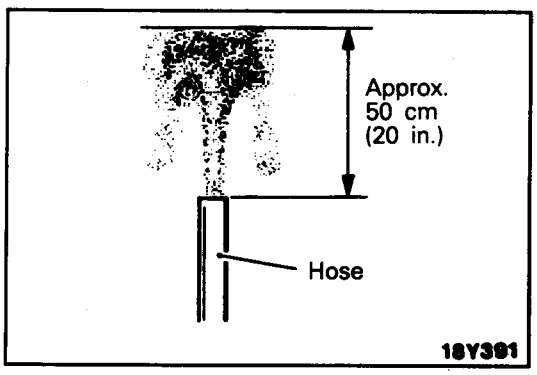
DOOR INSIDE HANDLE PLAY CHECK E42FGAF

1. Check that the door inside handle play is as specified.

Standard value
A (play): 7 mm (0.28 in.)
B (OPEN): 46 ± 9 mm (1.81 ± 0.35 in.)
C (FULL): 69 mm (2.72 in.)

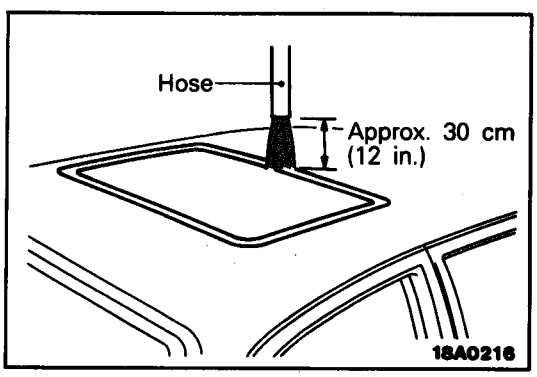


2. If out of specifications, adjust as described below.
   ① Remove the door trim. (Refer to P.42 – 37)
   ② Loosen the screw attaching the inside handle and slide the inside handle back and forth to adjust the inside handle play.



WATER LEAK TEST E42F0AA

1. Close sunroof tightly.
2. Hold hose upward and adjust water fountain to about 50 cm (20 in.) high.



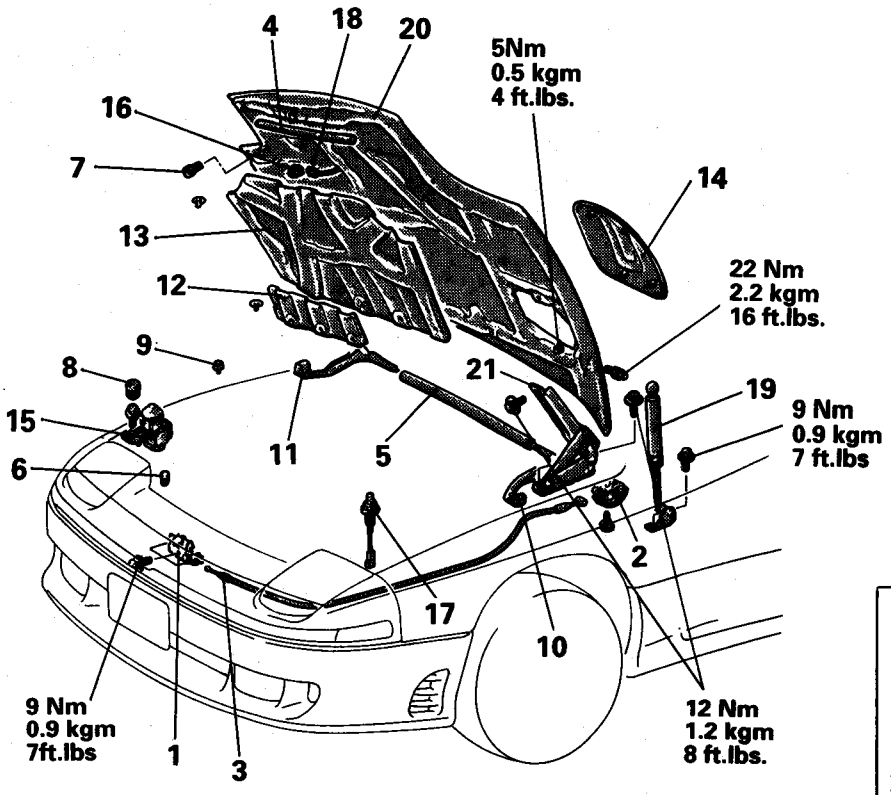
3. Pour water over the roof from about 30 cm (12 in.) above roof for more than 5 minutes.
4. While pouring water, check for leak around sunroof.
5. In the event of leakage, check weatherstrip contact and others.

HOOD

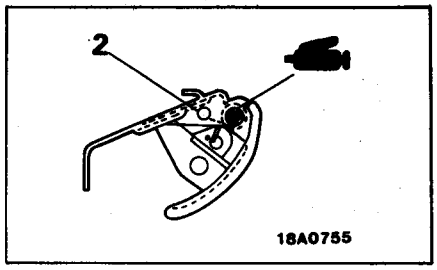
E42HAAO

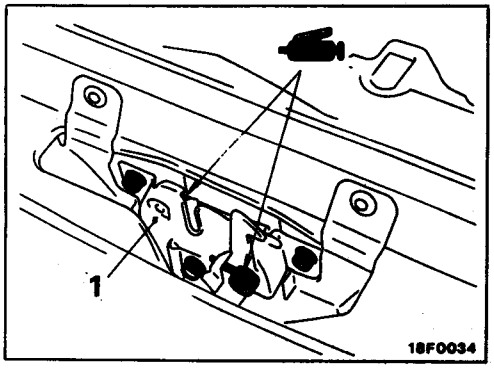
REMOVAL AND INSTALLATION

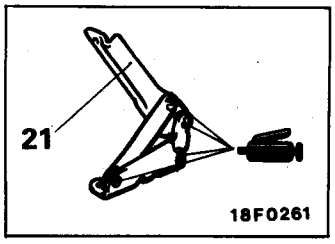
Post-installation Operation
- Hood Adjustment (Refer to P.42-9)



18F0127





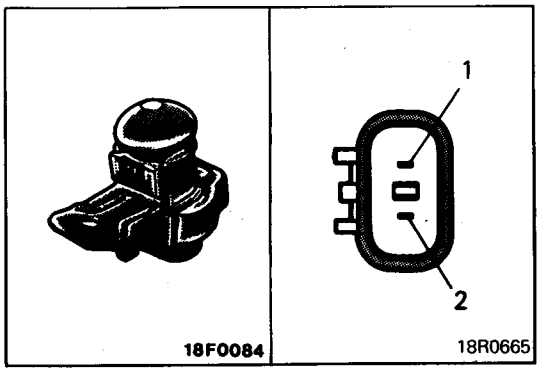


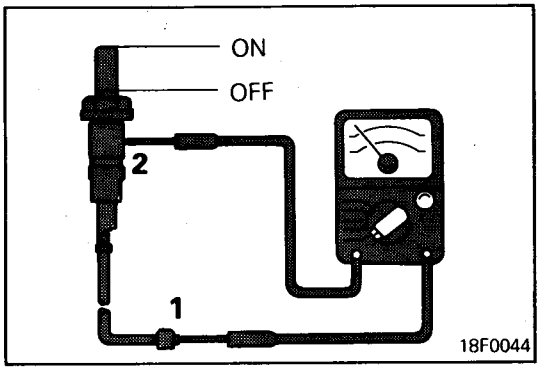
1. Hood latch
2. Hood lock release handle
3. Hood lock release cable
4. Hood weatherstrip (Front)
5. Hood weatherstrip (Rear)
6. ◆◆ Bumper A (Body side)
7. ◆◆ Bumper A (Hood side)
8. ◆◆ Bumper B
9. Bumper
10. Hood side weatherstrip (LH)
11. Hood side weatherstrip (RH)
12. Heat protector panel
13. Heat protector
14. Hood garnish assembly <Up to 1994 models>
15. Hood switch (Vehicles with theft-alarm system)
16. Engine room inspection lamp
17. Inspection lamp switch

Hood hinge removal steps
- Washer tube (Refer to GROUP 51 – Windshield Wiper and Washer.)

18. Inspection lamp wiring harness
19. Hood gas spring
20. Hood
21. Hood hinge

Caution
1. **Never try to disassemble the hood gas spring or burn it.**
2. **Always bore a hole in the gas spring to release the interior gas before the spring is discarded.**





INSPECTION

HOOD SWITCH

Check the continuity between the terminal.

Terminal	1	2
Hood switch unpressed	○	○
Hood switch depressed		

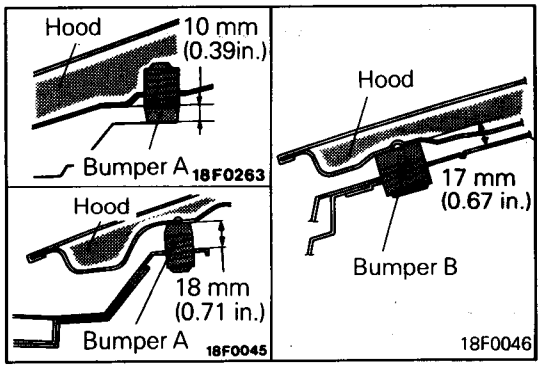
NOTE
○–○ indicates that there is continuity between the terminals.

INSPECTION LAMP SWITCH

Turn the switch ON/OFF and check continuity between terminals (between the connector terminal and the switch body).

Terminal / Switch position	1 (Connector terminal)	2 (Switch body)
ON	○	○
OFF		

NOTE
○–○ indicates that there is continuity between the terminals.



SERVICE POINTS OF INSTALLATION

8. 7. 6. INSTALLATION OF BUMPER B, A

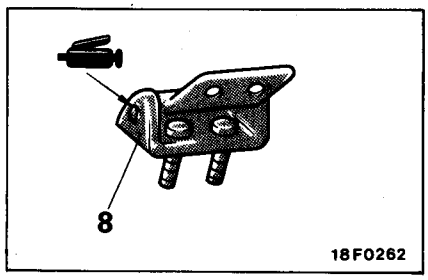
Install the bumpers as illustrated.

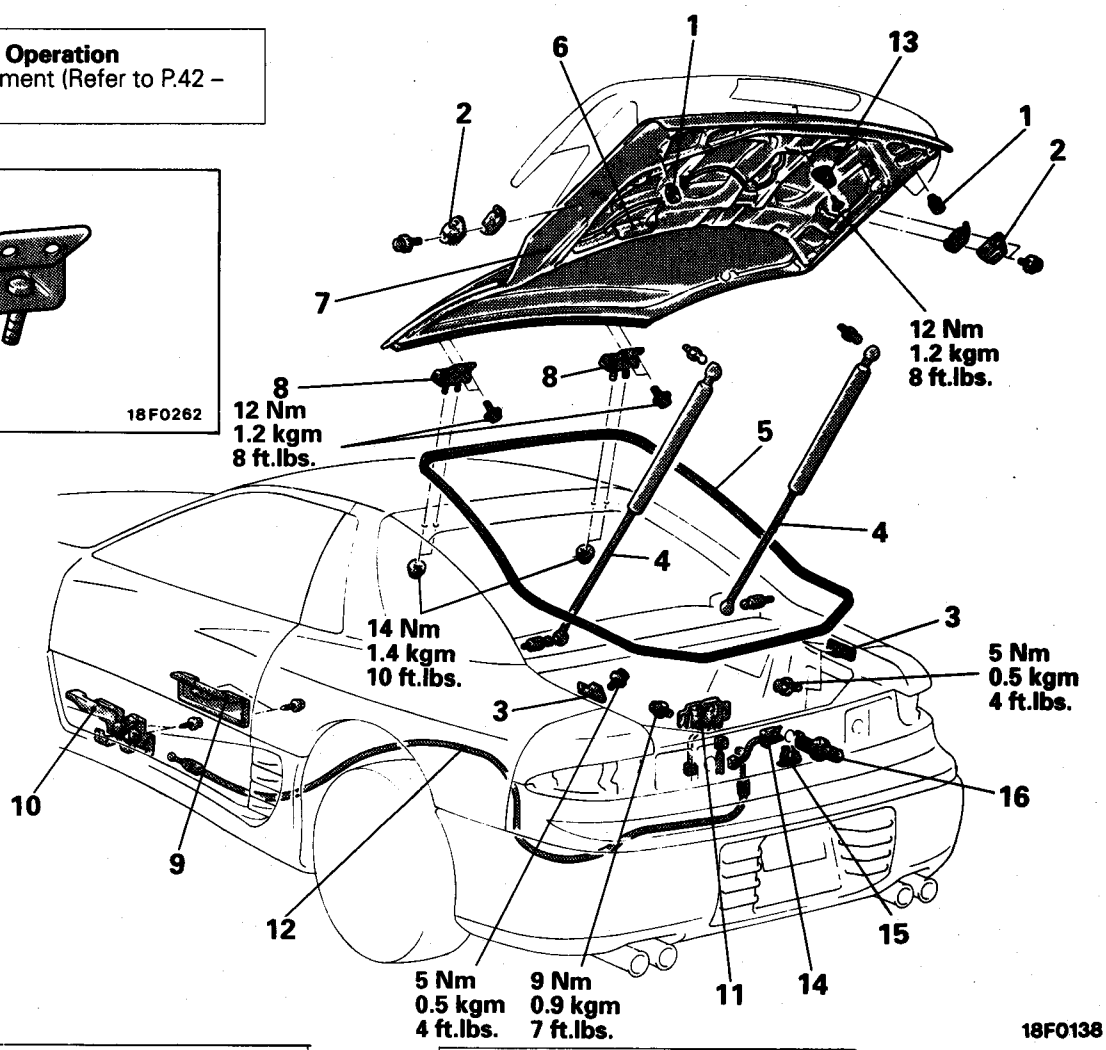
TAILGATE

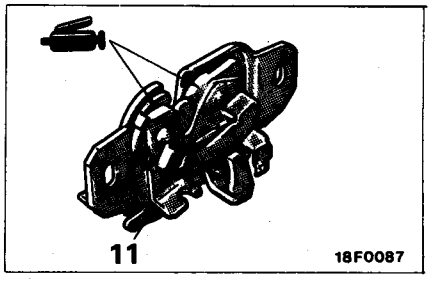
REMOVAL AND INSTALLATION

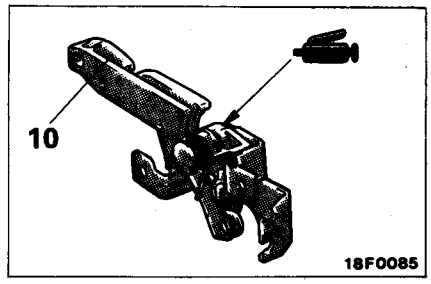
E420AAP

Post-installation Operation
- Tailgate Adjustment (Refer to P.42 – 10.)









1. Bumper
2. Tailgate damper (upper)
3. Tailgate damper (lower)

Tailgate gas spring and tailgate opening weatherstrip removal steps

- Tailgate trim } (Refer to GROUP
- Rear side trim } 52A – Trims.)

4. Tailgate gas spring
5. Tailgate opening weatherstrip

Tailgate and tailgate hinge removal steps

- Washer tube (Refer to GROUP 51 – Windshield Wiper and Washer.)
- Tailgate trim } (Refer to GROUP
- Tailgate side trim (LH) } 52A–Trims.)
- Rear side trim }

4. Tailgate gas spring
6. Connection for tailgate wiring harness
7. Tailgate
- Headlining (Refer to GROUP 52A – Headlining.)

8. Tailgate hinge

Tailgate lock release cable and handle removal steps

- Scuff plate (driver's side) (Refer to GROUP 52A – Trims.)

9. Release handle cover
10. Tailgate lock release handle
    - Quarter trim
    - Rear side trim
    - Rear end trim

    } (Refer to GROUP 52A–Trims.)
11. Tailgate latch
12. Tailgate lock release cable

Tailgate latch removal steps

- Rear end trim (Refer to GROUP 52A – Trims.)

11. Tailgate latch

Tailgate striker removal steps

- Tailgate trim (Refer to GROUP 52A – Trims.)

13. Tailgate striker

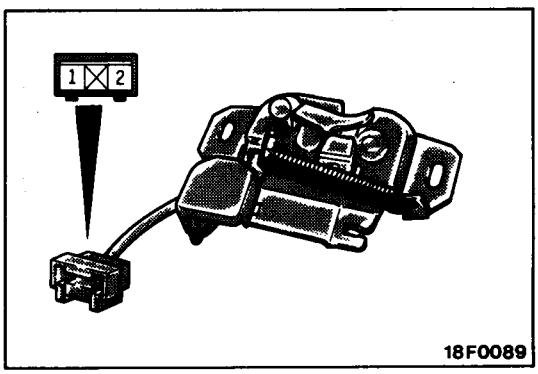
Tailgate lock cylinder removal steps

- Rear end trim (Refer to GROUP 52A – Trims.)
- Rear combination lamp
- Rear panel garnish

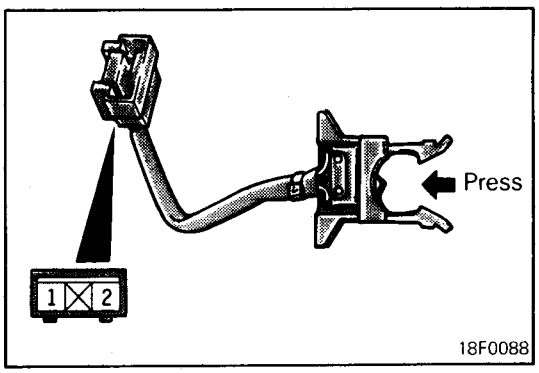
} (Refer to GROUP 51–Garnishes and Mouldings.)

14. Tailgate lock cylinder switch <Vehicles with theft–alarm system>
15. Retainer
16. Tailgate lock cylinder

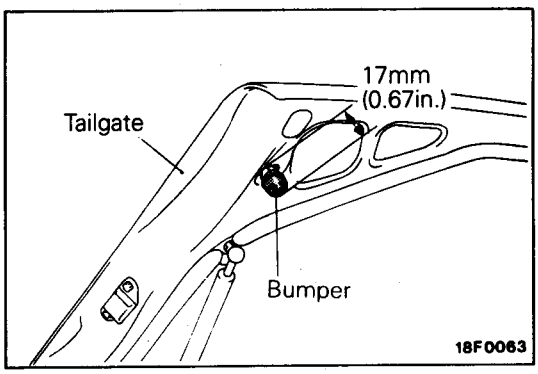
Caution
1. **Never try to disassemble the tailgate gas spring or burn it.**
2. **Always bore a hole in the gas spring to release the interior gas before the spring is discarded.**



18F0089



18F0088



18F0063

INSPECTION

TAILGATE LATCH SWITCH <VEHICLES WITH THEFT-ALARM SYSTEM>

(1) Unlock the tailgate latch.
(2) Check the continuity between the terminals.

Terminal	1	2
Tailgate latch locked		
Tailgate latch unlocked	○	○

NOTE
○–○ indicates that there is continuity between the terminals.

TAILGATE LOCK CYLINDER SWITCH <VEHICLES WITH THEFT-ALARM SYSTEM>

Check the continuity between the terminals.

Terminal	1	2
When switch is pressed		
When switch is not pressed	○	○

NOTE
○–○ indicates that there is continuity between the terminals.

SERVICE POINT OF INSTALLATION

1. INSTALLATION OF BUMPER

Install the bumper so that the amount of projection from the tailgate is as shown in the illustration.

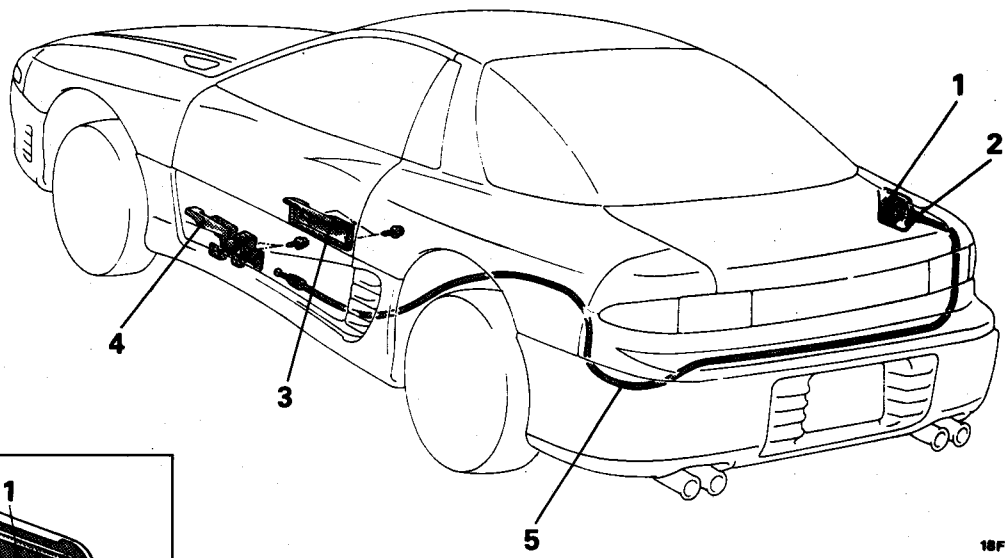
FUEL TANK FILLER DOOR

E42JBAR

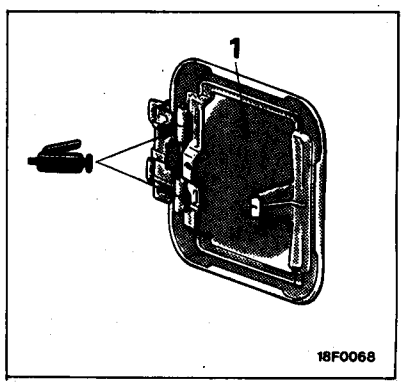
REMOVAL AND INSTALLATION

Post-installation Operation
- Installation of Rear Side trim, Quarter Trim and Scuff Plate (Refer to GROUP 52A – Trims.)
- Fuel Filler Door Adjustment (Refer to P.42-10.)

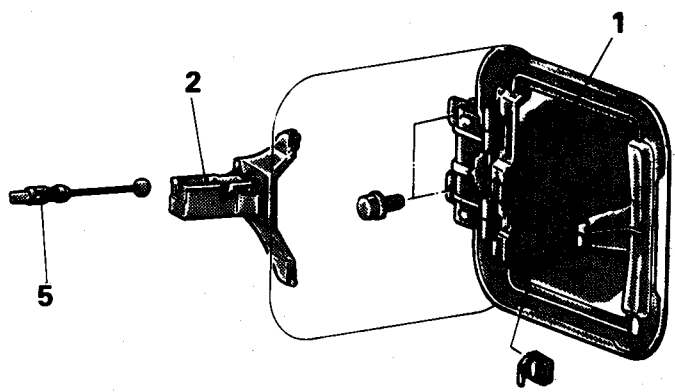
Pre-removal Operation
- Removal of Rear Side Trim, Quarter Trim and Scuff Plate (Refer to GROUP 52A – Trims.)



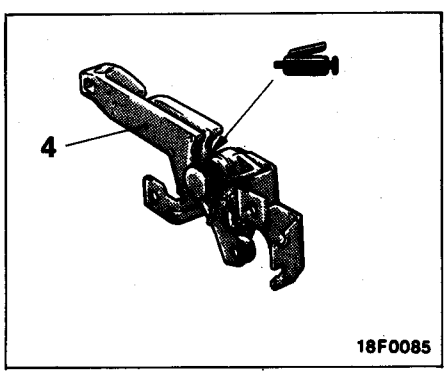
18F0130



18F0068



18F0069



18F0085

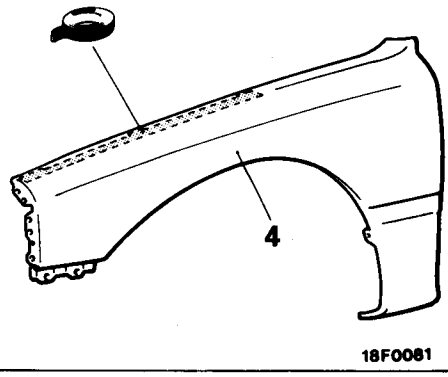
Removal steps
1. Fuel filler door
2. Fuel filler door hook
3. Release handle cover
4. Fuel filler door lock release handle
5. Fuel filler door lock release cable

FENDER

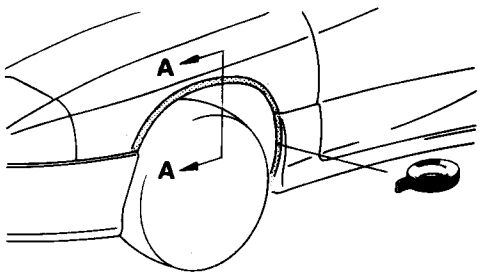
E42KAAX

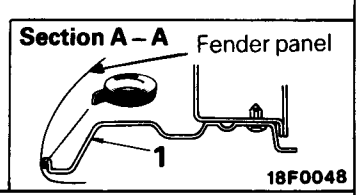
REMOVAL AND INSTALLATION

CAUTION: SRS
When removing and installing the front fender panel, do not allow any impact or shock to the front impact sensor.

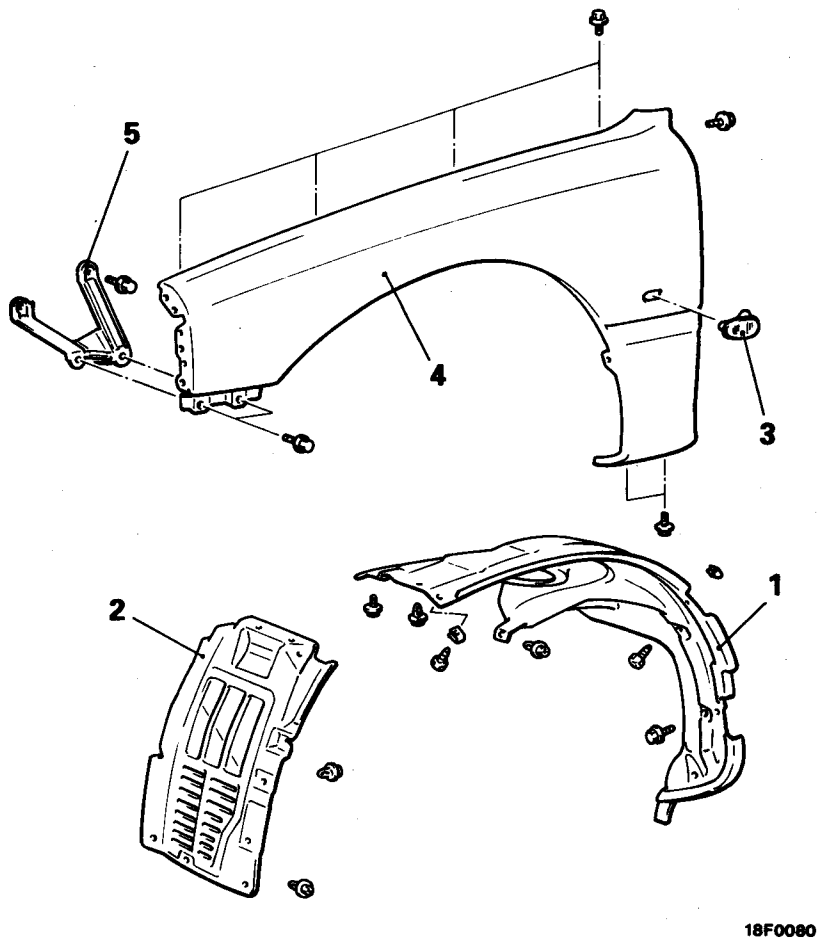


Sealant:
3M ATD Part No. 8625 or equivalent





Sealant:
3M ATD Part No. 8625 or equivalent



Removal steps

1. Front splash shield
   - Side airdam
     (Refer to GROUP 51 – Aero Parts.)
2. Front splash shield
   - Front bumper
     (Refer to GROUP 51 – Front Bumper.)
3. Side turn signal lamp
4. Front fender panel
5. Front fender bracket

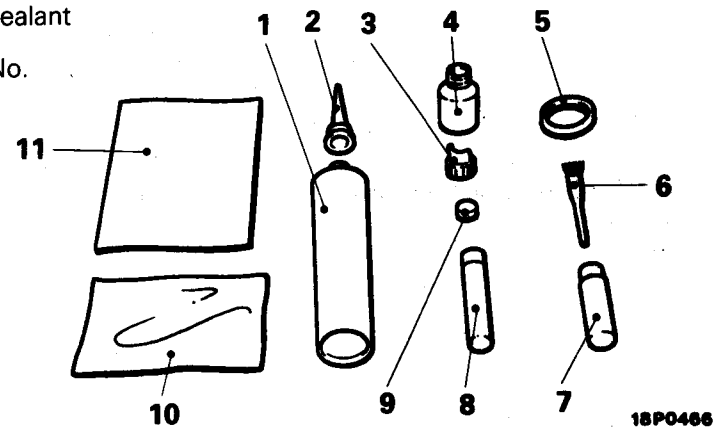
WINDOW GLASS

E42LGAB

WINDSHIELD REPAIR

- Adhesive: 3M Super Fast Urethan Auto Glass Sealant Part No. 8609 or equivalent
  Primer: 3M Super Fast Urethan Primer Part No. 8608 or equivalent
- Auto Window Sealer Kit TEROSON-127, 37V

1. Sealer
2. Nozzle
3. Primer container
4. Primer container cap
5. Piano wire
6. Brush
7. Cleaner
8. Primer
9. Filter
10. Gauge
11. Instruction manual



NOTE
When using TEROSON-127, 37V, follow the instructions of the manual included in the kit.

Additional material required	
Spacers	Available as service part
Dam	Available as service part
Anti-rust solvent (or Tectyl 506T....Valvoline Oil Company)	For rust prevention
Isopropyl alcohol	For grease removal from bonded surface
Steel piano wire	Dia. × length....0.6 mm × 1 m (0.024 in. × 3 ft.)
	For cutting adhesive
Adhesive gun	For pressing-out adhesive

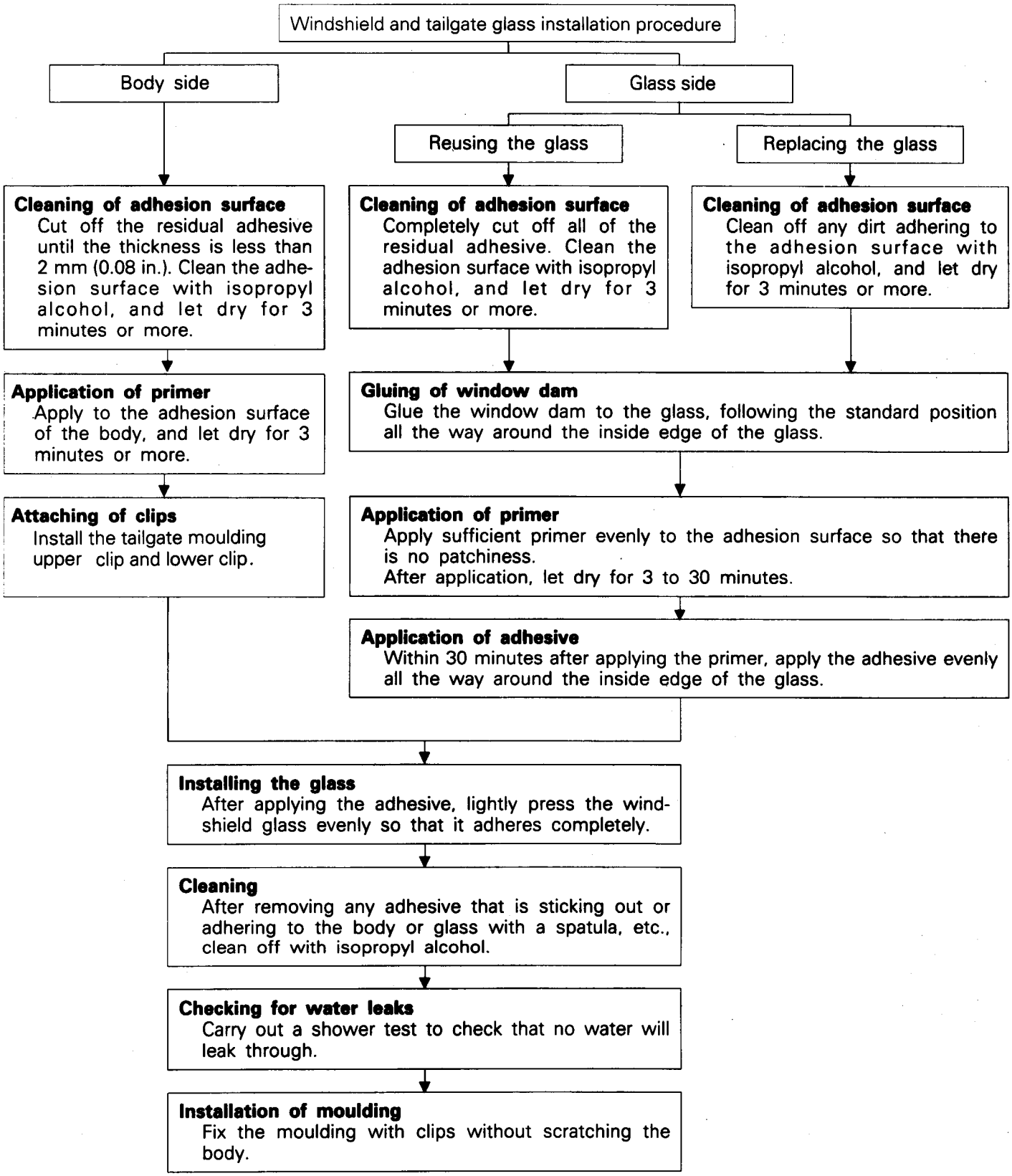
HANDLING OF AUTO WINDOW SEALER

Keep the sealant in a cool place, not exposed to the direct rays of the sun.
Do not place any heavy article on the sealant nor press it, otherwise it will become deformed.
Avoid storing the sealant for more than 6 months, because it will lose its sealing effect.

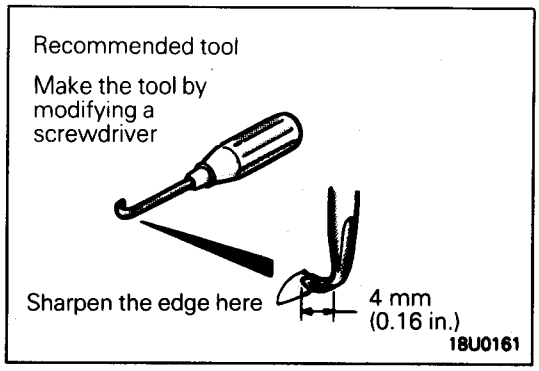
BODY PINCH-WELD FLANGE SERVICING

Before servicing the body pinch-weld flange, remove old adhesive completely.
If the flange requires painting, bake it after painting is completed.

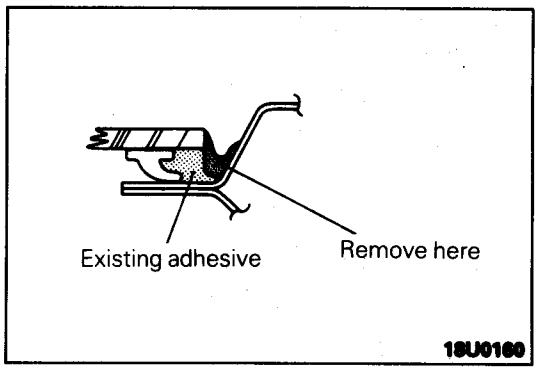
WORKING PROCESS



REPLACEMENT OF MOULDING (BONDING TYPE)

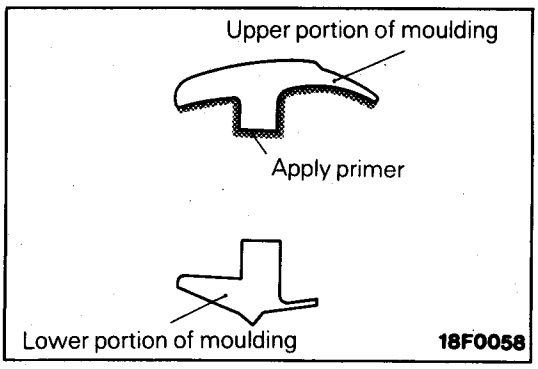


1. Remove the mouldings.
2. To cut the existing adhesive, make a tool such as the one shown.



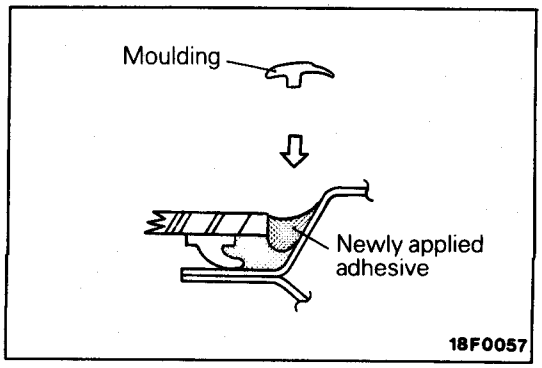
3. Using the tool, scoop out the existing adhesive.

Caution
1. Do not remove existing adhesive more than necessary.
Use care not to damage the coated surface.
2. If the coated surface is damaged, apply paint.



4. Cut off the lower portion of a new moulding and install the moulding temporarily to check that it is seated securely.
5. Apply primer to the moulding.

Caution
Never touch the primer coated surface.



6. Apply adhesive to the illustrated area and install the moulding before it hardens.

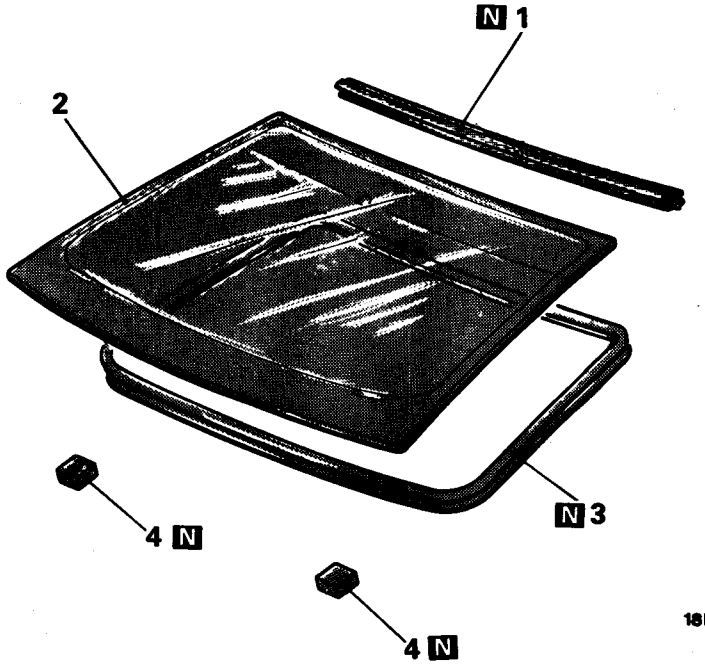
7. Scrape away excessive sealant forced out during installation of the moulding from the glass or body and wipe the surfaces clean with isopropyl alcohol.
8. After the work, leave the vehicle as it is until the adhesive hardens.

WINDSHIELD

E42LABR

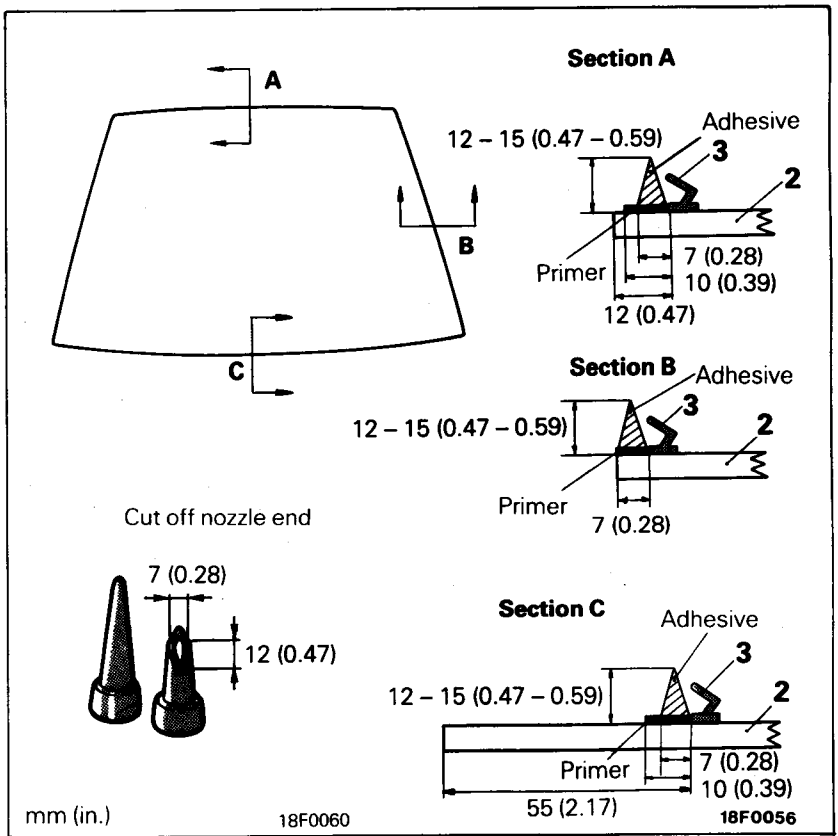
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of Deck Garnish (Refer to GROUP 51 – Garnishes and Mouldings.)
- Removal and Installation of Roof Drip Moulding (Refer to GROUP 51 – Garnishes and Mouldings.)
- Removal and Installation of Headlining (Refer to GROUP 52A – Headlining.)
- Removal and Installation of Front Pillar Trim (Refer to GROUP 52A – Trims.)



18F0059

Removal steps
1. Windshield moulding
2. Windshield glass
3. Window dam
4. Side spacer

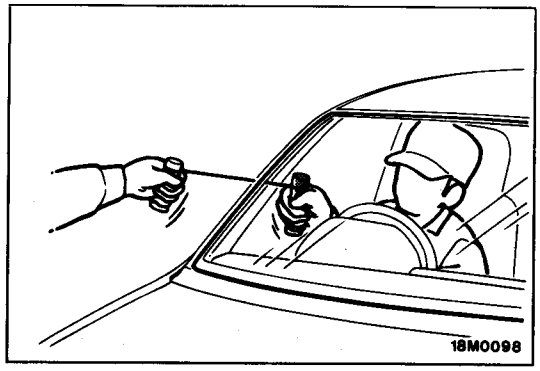


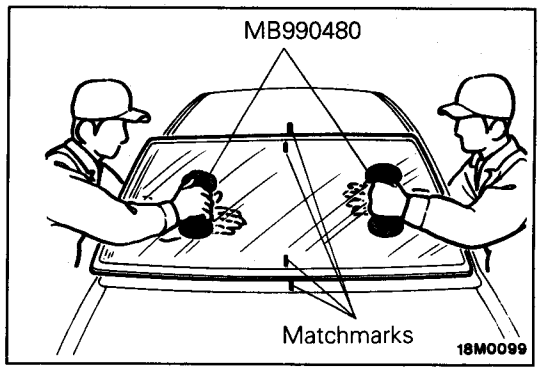
mm (in.)

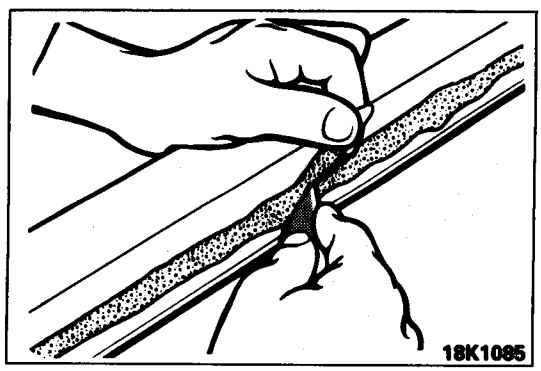
18F0060

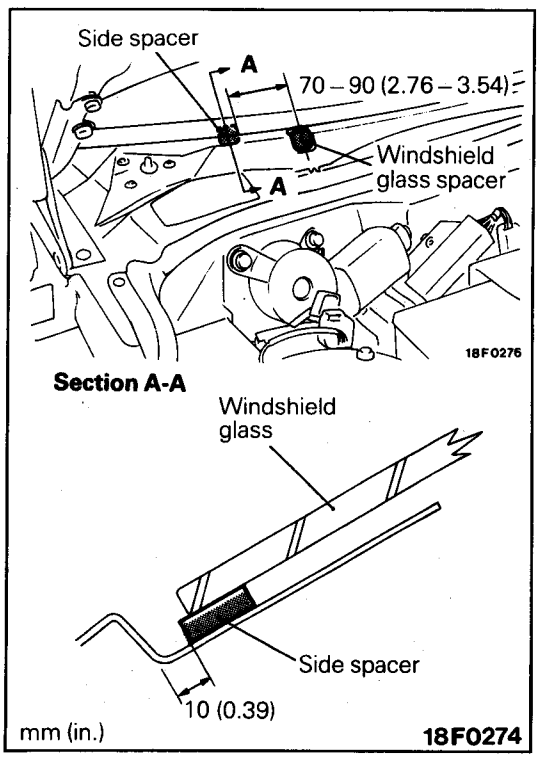
18F0056

Adhesive:
3M SUPER FAST URETHAN 8609 or equivalent
Primer:
3M SUPER FAST URETHAN PRIMER 8608 or equivalent









SERVICE POINT OF REMOVAL

2. REMOVAL OF WINDSHIELD GLASS

Remove windshield using the following procedure.

(1) For protection of the body (coated surface), apply cloth tape to all around the body where the glass is installed.
(2) Using a drill of sharp bit, drill a hole through the adhesive fixing the windshield glass.
(3) Run a wire through the hole from inside of the compartment.
(4) Pull the wire alternately from inside and outside of the compartment to cut off the adhesive.

Caution
Use care to prevent contact of the wire with the windshield glass edge.

(5) Put matchmarks on the body and the glass.
(6) Using the special tools, remove the windshield glass.

(7) Using a sharp knife, scoop out existing adhesive from the body flange to 2 mm (0.08 in.) or less thickness all around the window opening.
(8) Finish smooth the flange surfaces.

Caution
1. **Do not remove the adhesive more than necessary.**
2. **Use care not to damage the coated surface of the body with the knife. If it is damaged, apply retouch paint of anti-corrosive.**

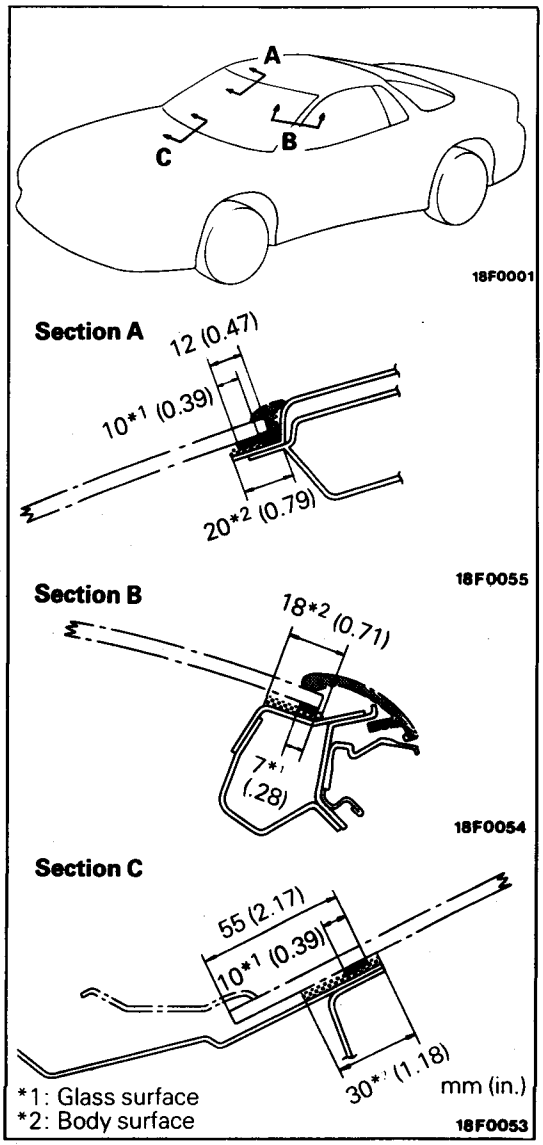
(9) If the glass is reused, scoop out existing adhesive and fragments of the window dam completely from the glass and degrease with isopropyl alcohol.
equivalent.
(10) Degrease the body same way.

Caution
After degreasing, allow three minutes or more to dry well before next work. Do not touch the degreased surface.

SERVICE POINTS OF INSTALLATION

4. INSTALLATION OF SIDE SPACER

Fix the side spacers as shown in the illustration.



2. INSTALLATION OF WINDSHIELD GLASS

(1) When replacing glass, fit a new glass once to the body and put matchmarks on the body and glass.

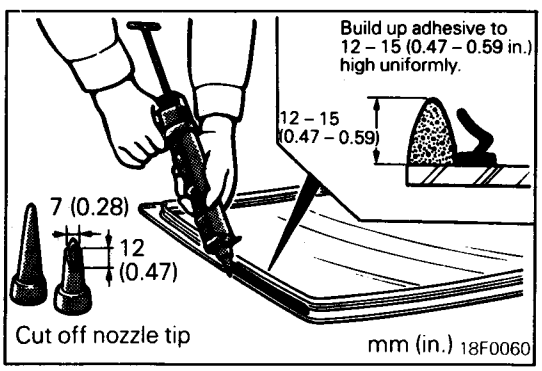
(2) Apply a uniform coat of primer to the illustrated areas of the body and glass making sure it is applied without breaks or thin spots.

Adhesive: 3M SUPER FAST URETHAN PRIMER 8608 or equivalent

Caution

1. **The primer is used to strengthen bonding power. Make sure that it covers the surfaces completely. Note that the primer if applied to thick can cause loss of bonding power.**
2. **Never touch the primer coated surface.**

(3) Allow 3 to 30 minutes to dry the primer.

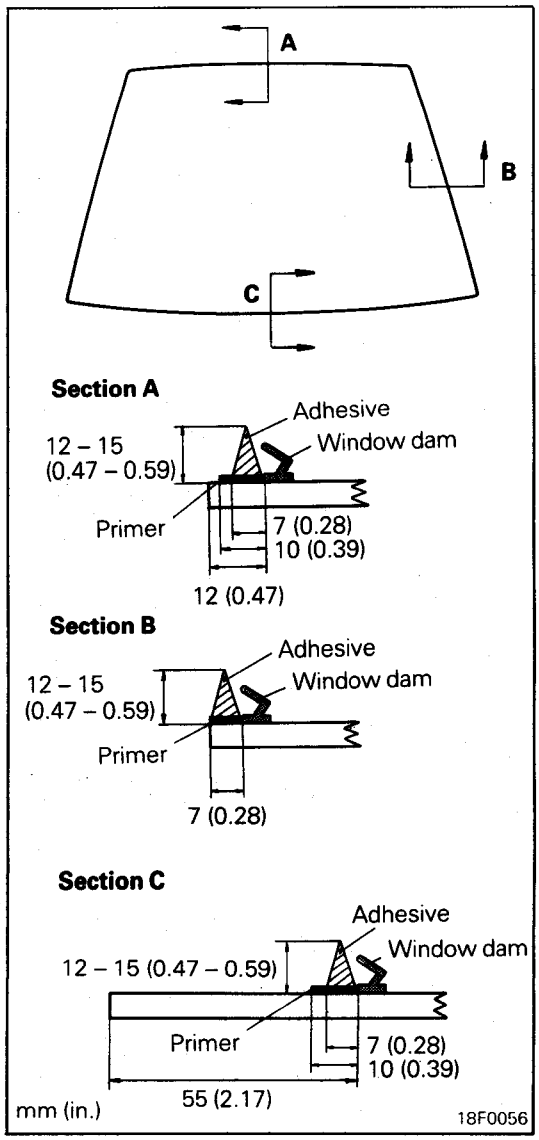


(4) Within 30 minutes of primer application, apply the adhesive all around the windshield glass uniformly.

Adhesive: 3M SUPER FAST URETHAN 8609 or equivalent

NOTE
Cutting the nozzle tip of the sealant gun to a V-shape will help application.

(5) Install the windshield moulding.



(6) After application of the adhesive, line up the match-marks on the glass and body and force the glass lightly and evenly onto the body for complete fitting.
(7) Remove adhesive from around and on the glass and body surfaces using a spatula and wipe the surfaces clean.
(8) After the work (installation of the glass), allow to stand until the adhesive hardens.

Caution
If an infrared lamp or other means are used for quicker hardening, keep the surface temperature 60°C (140°F) or lower.

(9) After about 30 minutes or more following bonding of the windshield glass to the body, check for water leaks.

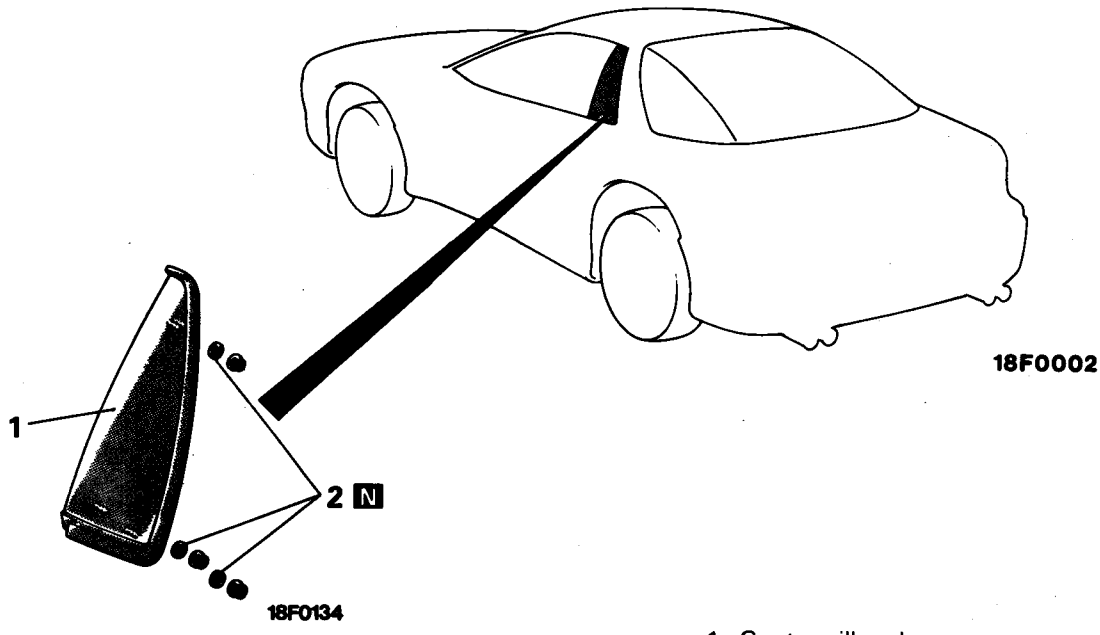
Caution
1. **If the vehicle is to be moved, do so gently.**
2. **When checking for water leaks, do not apply water with the hose end squeezed.**

CENTER PILLAR GLASS

E42LHAA

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of Quarter Upper Trim (Refer to GROUP 52A – Trims.)
- Removal and Installation of Center Pillar Garnish (Refer to GROUP 51 – Garnishes and Mouldings.)



18F0002

18F0134

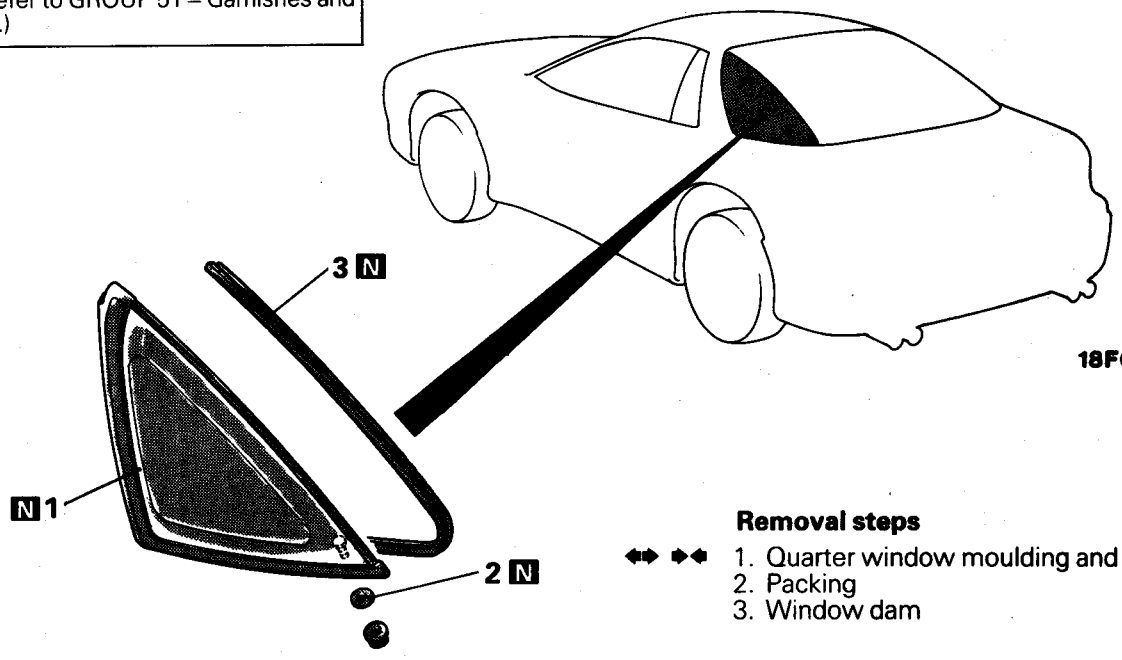
1. Center pillar glass
2. Packing

QUARTER WINDOW GLASS

E42LBDF

REMOVAL AND INSTALLATION

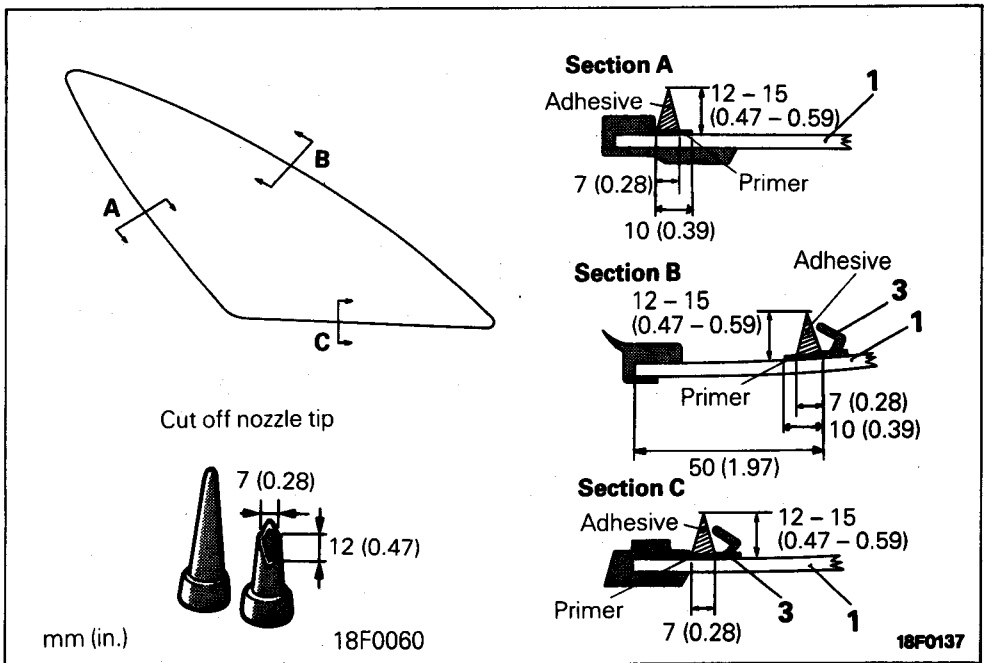
Pre-removal and Post-installation Operation
- Removal and Installation of Quarter Upper Trim (Refer to GROUP 52A – Trims.)
- Removal and Installation of Center Pillar Garnish (Refer to GROUP 51 – Garnishes and Mouldings.)



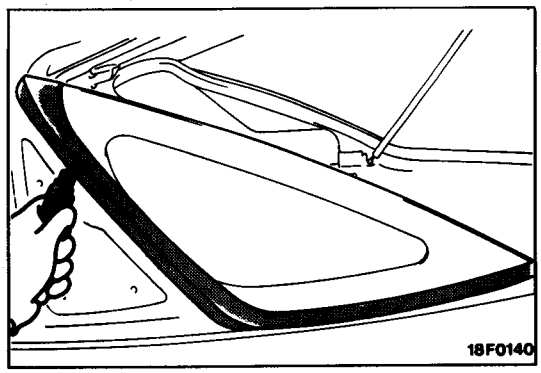
18F0002

18F0132

Removal steps
1. Quarter window moulding and glass
2. Packing
3. Window dam



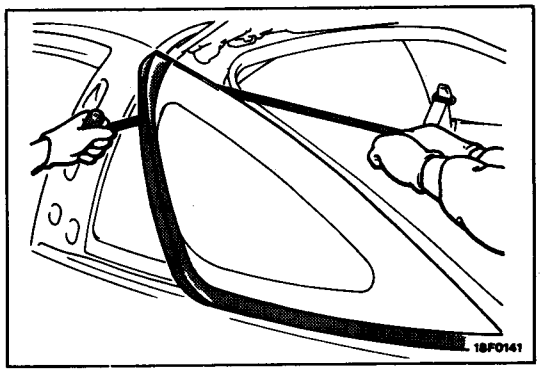
Adhesive: 3M SUPER FAST URETHAN 8609 or equivalent
Primer: 3M SUPER FAST URETHAN PRIMER 8608 or equivalent



SERVICE POINT OF REMOVAL

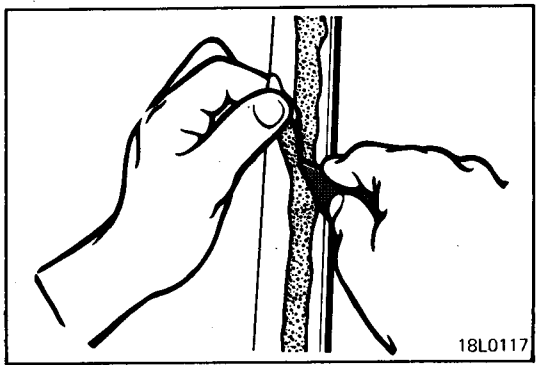
1. REMOVAL OF QUARTER WINDOW MOULDING AND GLASS

(1) For protection of the body (coated surface), apply cloth tape to all around the body where the glass is installed.
(2) Using a cutter knife, cut off the quarter window moulding along its edge.



(3) Run a wire between the glass and the body at the upper portion of the quarter window and pull it back and forth along the glass to cut through the adhesive.
When doing so, pay attention to the bolt.

Caution
Hold the window glass with the special tool (MB990480) to prevent it from falling when the adhesive is cut through.

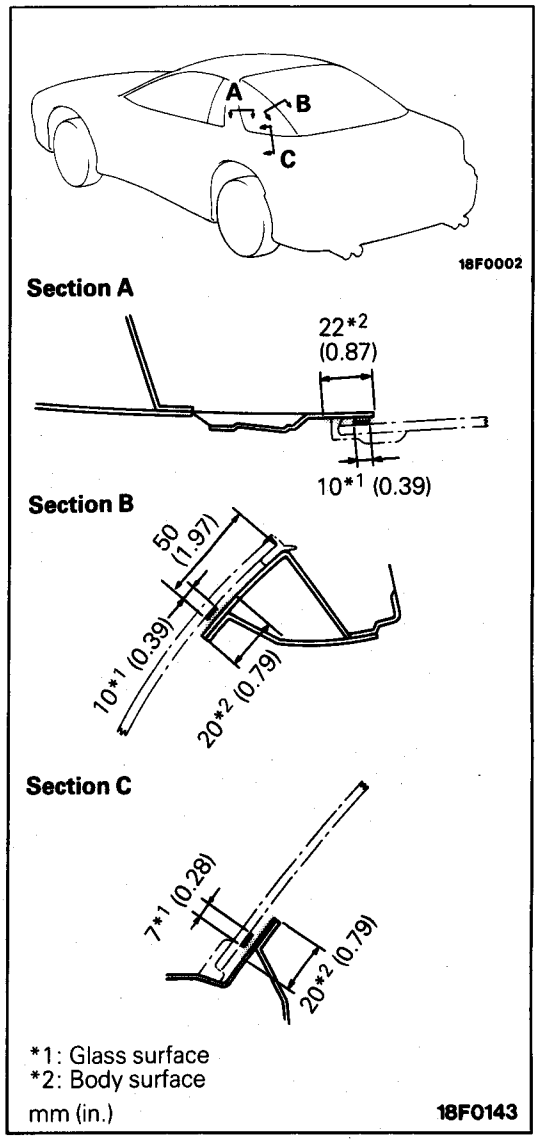


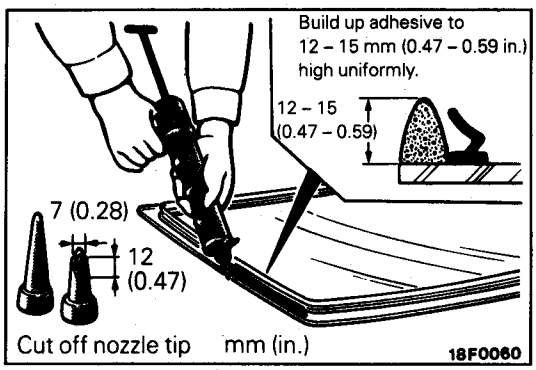
(4) Using a sharp knife, scoop out existing adhesive from the body flange to 2 mm (0.08 in.) or less thickness all around the window opening.
(5) Finish smooth the flange surface.

Caution
1. **Do not remove the adhesive more than necessary.**
2. **Use care not to damage the coated surface of the body with the knife. If it is damaged, apply retouch paint or anti-corrosive.**

(6) Degrease with isopropyl alcohol.

Caution
After degreasing, allow three minutes or more to dry well before next work. Do not touch the degreased surface.





SERVICE POINT OF INSTALLATION

1. INSTALLATION OF QUARTER WINDOW MOULDING AND GLASS

(1) Apply a uniform coat of primer to the illustrated areas of the body and glass making sure it is applied without breaks or thin spots.

Caution

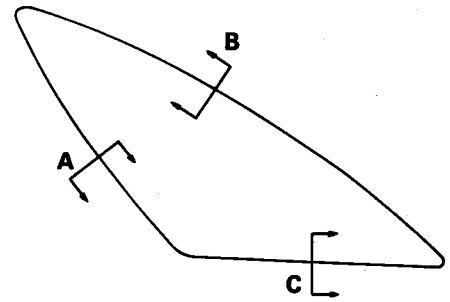
1. **The primer is used to strengthen bonding power. Make sure that it covers the surfaces completely. Note that the primer if applied to thick can cause loss of bonding power.**
2. **Never touch the primer coated surface.**

(2) Allow 3 to 30 minutes to dry the primer.

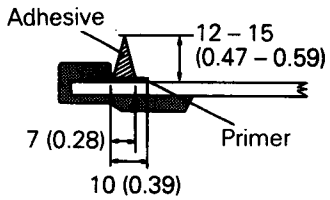
(3) Within 30 minutes of primer application, apply the adhesive all around the windshield glass uniformly.

Adhesive: 3M SUPER FAST URETHAN 8609 or equivalent

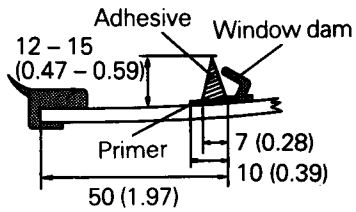
NOTE
Cutting the nozzle tip of the sealant gun to a V-shape will help application.



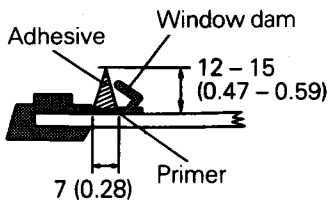
Section A



Section B



Section C



mm (in.) 18F0137

(4) After application of the adhesive, line up the match-marks on the glass and body and force the glass lightly and evenly onto the body for complete fitting.
(5) Remove adhesive from around and on the glass and body surfaces using a spatula and wipe the surfaces clean.
(6) After the work (installation of the glass), allow to stand until the adhesive hardens.

Caution
If an infrared lamp or other means are used for quicker hardening, keep the surface temperature 60°C (140°F) or lower.

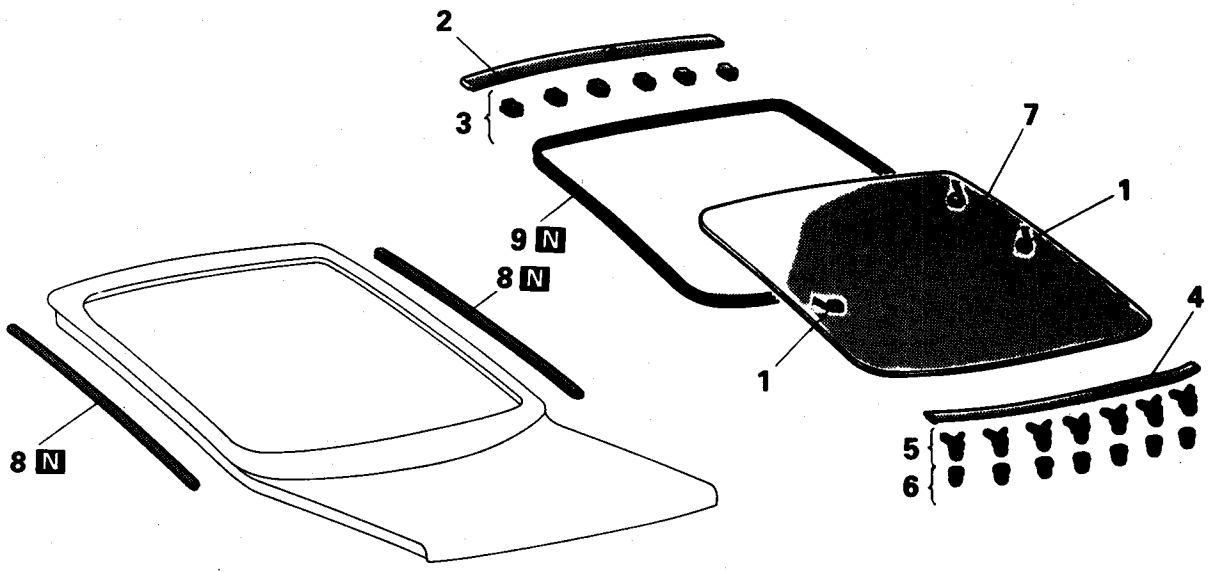
(7) After about 30 minutes or more following bonding of the windshield glass to the body, check for water leaks.

Caution
1. **If the vehicle is to be moved, do so gently.**
2. **When checking for water leaks, do not squeeze the hose end.**

TAILGATE GLASS

E42LCBH

REMOVAL AND INSTALLATION

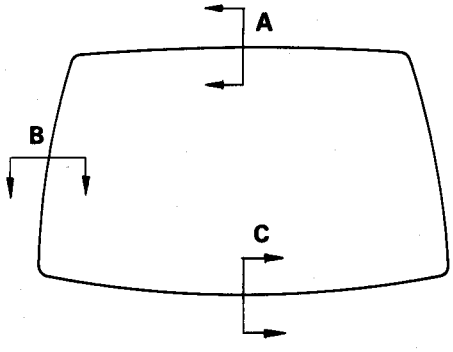


18F0145

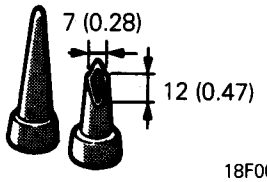
Removal steps

1. Defogger connector
2. Tailgate moulding upper
3. Tailgate moulding upper clip
4. Tailgate moulding lower
5. Tailgate moulding lower clip
6. Clip grommet
7. Tailgate glass
8. Tailgate moulding side
9. Window dam

Pre-removal and Post-installation Operation
- Removal and Installation of Rear Wiper Arm (Refer to GROUP 51 – Windshield Wiper and Washer.)
- Removal and Installation of Tailgate Upper Trim (Refer to GROUP 52A – Trims.)
- Removal and Installation of Tailgate Trim (Refer to GROUP 52A – Trims.)
- Removal and Installation of Tailgate Side Trim (Refer to GROUP 52A – Trims.)



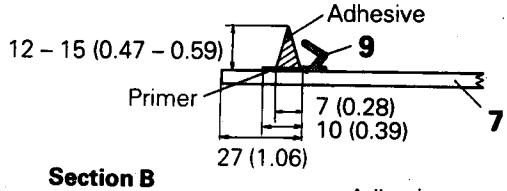
Cut off nozzle tip



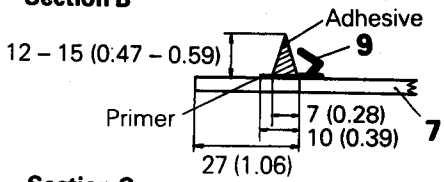
mm (in.)

18F0060

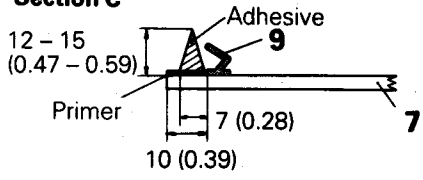
Section A



Section B

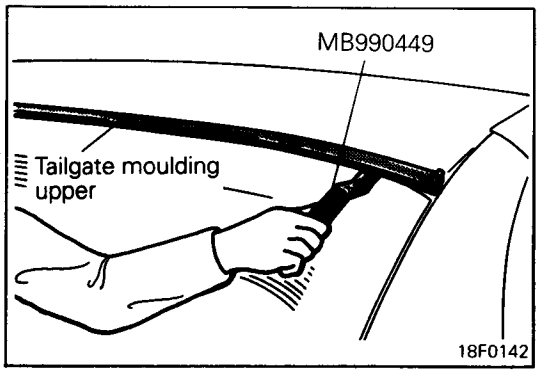


Section C



18F0149

Adhesive:
3M SUPER FAST URETHAN 8609 or equivalent
Primer:
3M SUPER FAST URETHAN PRIMER 8608 or equivalent

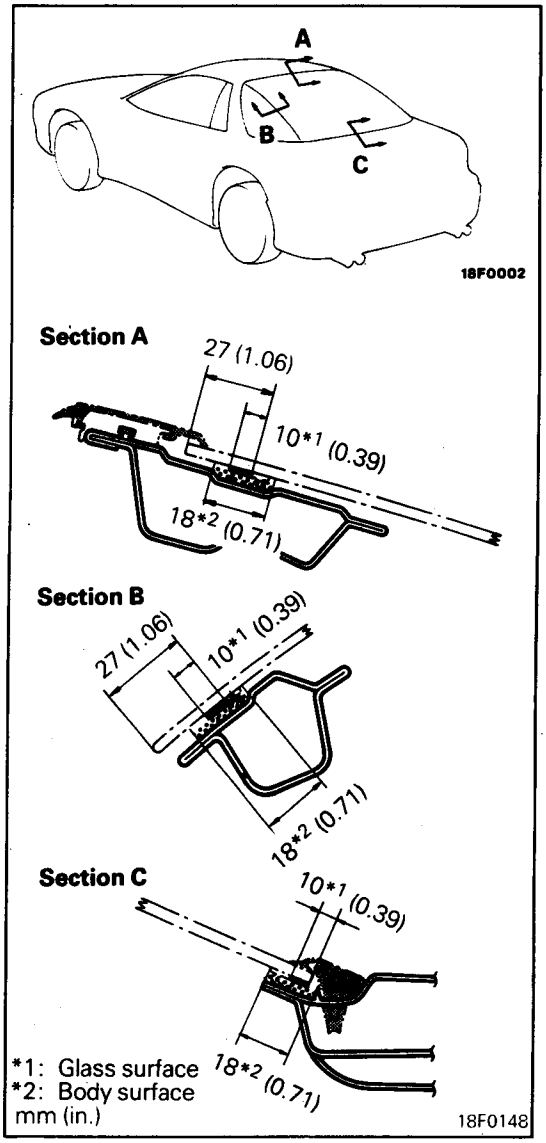


SERVICE POINTS OF REMOVAL

2. REMOVAL OF TAILGATE MOULDING UPPER / 4. TAILGATE MOULDING LOWER

7. REMOVAL OF TAILGATE GLASS

Remove the same way as the windshield glass. (Refer to P.42-25.)



SERVICE POINT OF INSTALLATION

7. INSTALLATION OF TAILGATE GLASS

(1) Apply a uniform coat of primer to the illustrated areas of the body and glass making sure it is applied without breaks or thin spots.

Adhesive: 3M SUPER FAST URETHAN PRIMER 8608 or equivalent

Caution

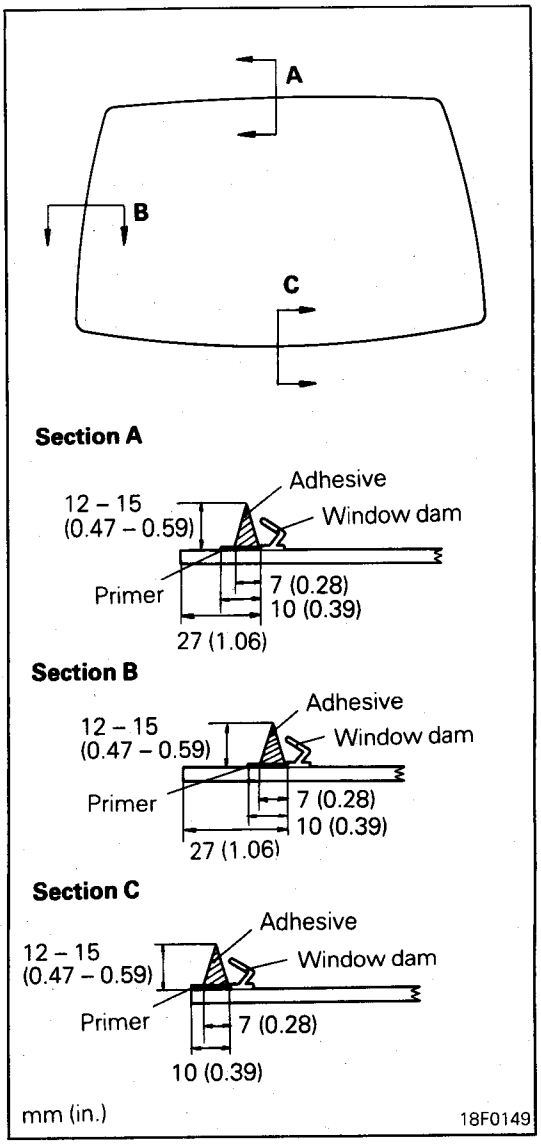
1. **The primer is used to strengthen bonding power. Make sure that it covers the surfaces completely. Note that the primer if applied to thick can cause loss of bonding power.**
2. **Never touch the primer coated surface.**

(2) Allow 3 to 30 minutes to dry the primer.

(3) Within 30 minutes of primer application, apply the adhesive all around the liftgate glass uniformly.

Adhesive: 3M SUPER FAST URETHAN 8609 or equivalent

NOTE
Cutting the nozzle tip of the sealant gun to a V-shape will help application.



(4) After application of the adhesive, line up the match–marks on the glass and tailgate and force the glass lightly and evenly for complete fitting.
(5) Remove adhesive from around and on the glass and body surfaces using a spatula and wipe the surfaces clean.
(6) After the work (installation of the glass), allow to stand until the adhesive hardens.

Caution
If an infrared lamp or other means are used for quicker hardening, keep the surface temperature 60°C (140°F) or lower.

(7) After about 30 minutes or more following bonding of the tailgate glass to the tailgate, check for water leaks.

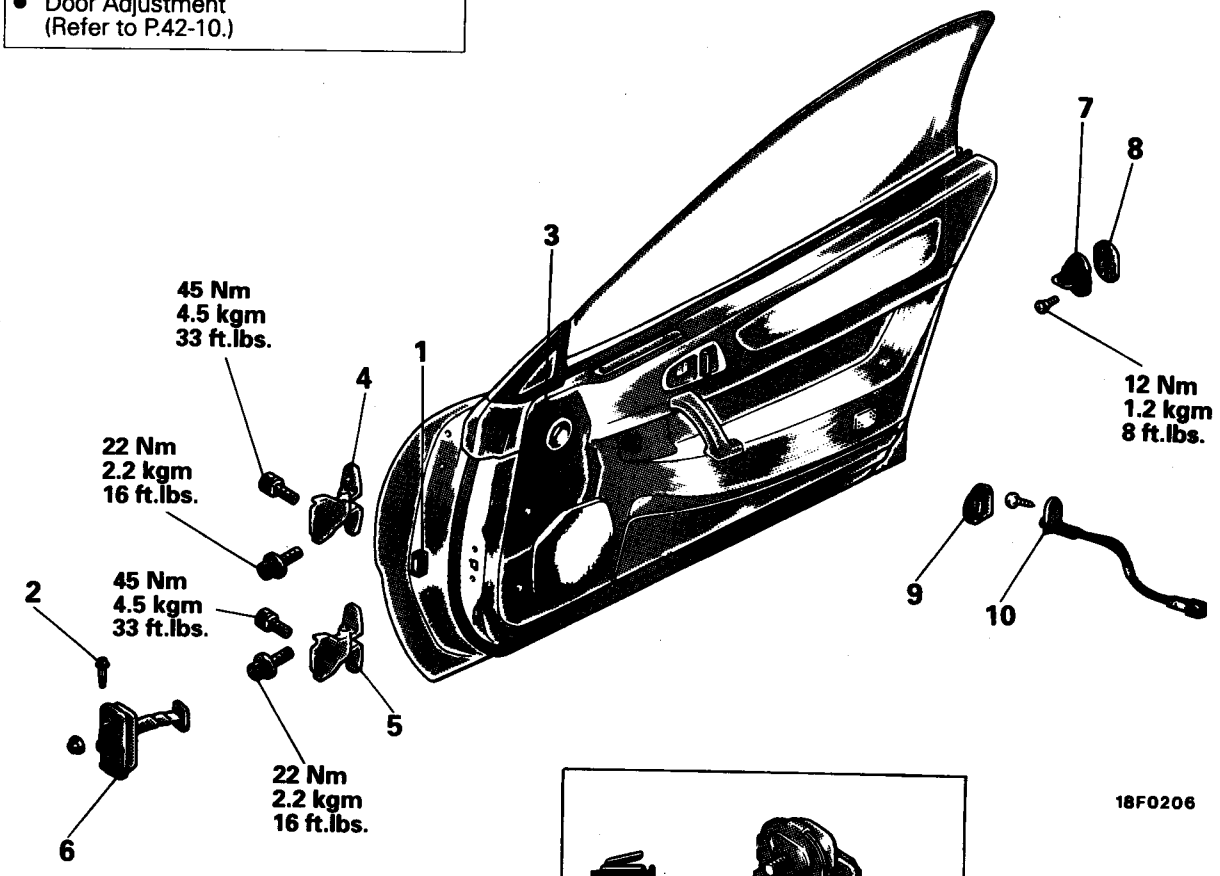
Caution
1. **If the vehicle is to be moved, do so gently.**
2. **When checking for water leaks, do not squeeze the hose end.**

DOOR ASSEMBLY

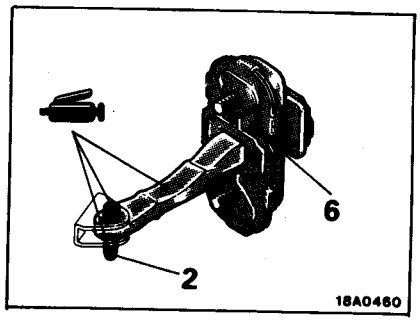
E42MAAS

REMOVAL AND INSTALLATION

Post-installation Operation
- Door Adjustment (Refer to P.42-10.)



18F0206



18A0460

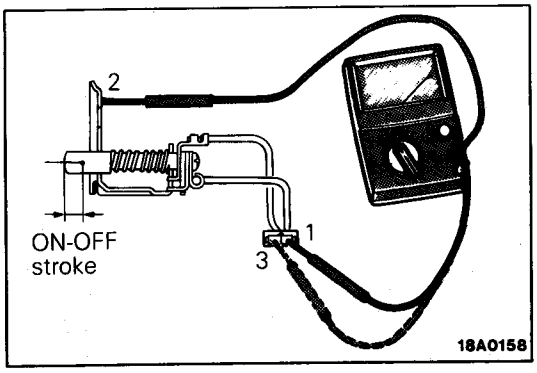
Door assembly removal steps
1. Connection for door wiring harness connector
2. Spring pin
3. Door assembly
4. Upper hinge
5. Lower hinge

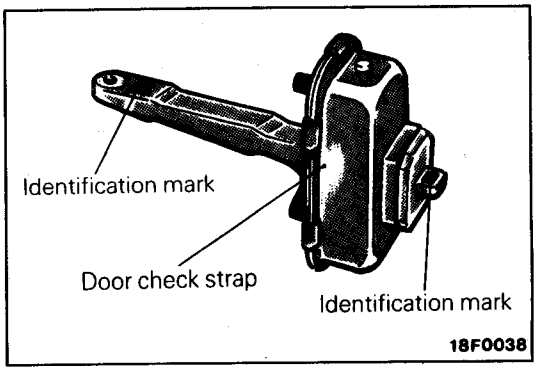
Door check strap removal steps
- Door trim (Refer to P.42-37.)
- Waterproof film (Refer to P.42-37.)

2. Spring pin
6. Door check strap

Striker removal steps
7. Striker
8. Striker shim

Door switch removal steps
9. Door switch cap
10. Door switch





INSPECTION

DOOR SWITCH

Operate the switch, and check the continuity between the terminals.

Switch position		Terminal 1	2	3
Switch	Open (ON)	○	○	○
	Depressed (OFF)			

NOTE
○–○ indicates that there is continuity between the terminals.

SERVICE POINT OF INSTALLATION

6. INSTALLATION OF DOOR CHECK STRAP

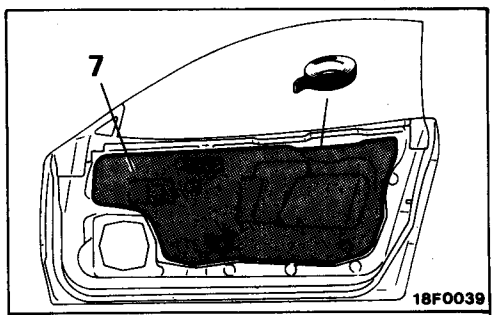
Install the door check strap with the identification mark facing up.

Position	Identification mark	
Door (LH)	WL	L
Door (RH)	WR	R

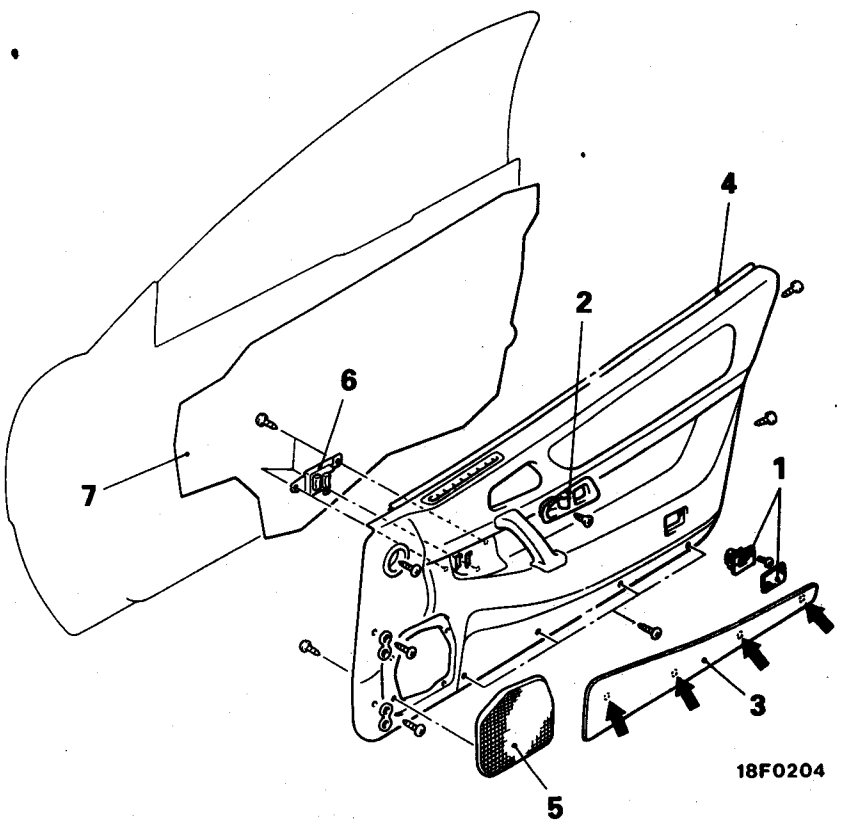
DOOR TRIM AND WATERPROOF FILM

E42MBBC

REMOVAL AND INSTALLATION



Sealant:
3M ATD Part No. 8625 or equivalent



Removal steps

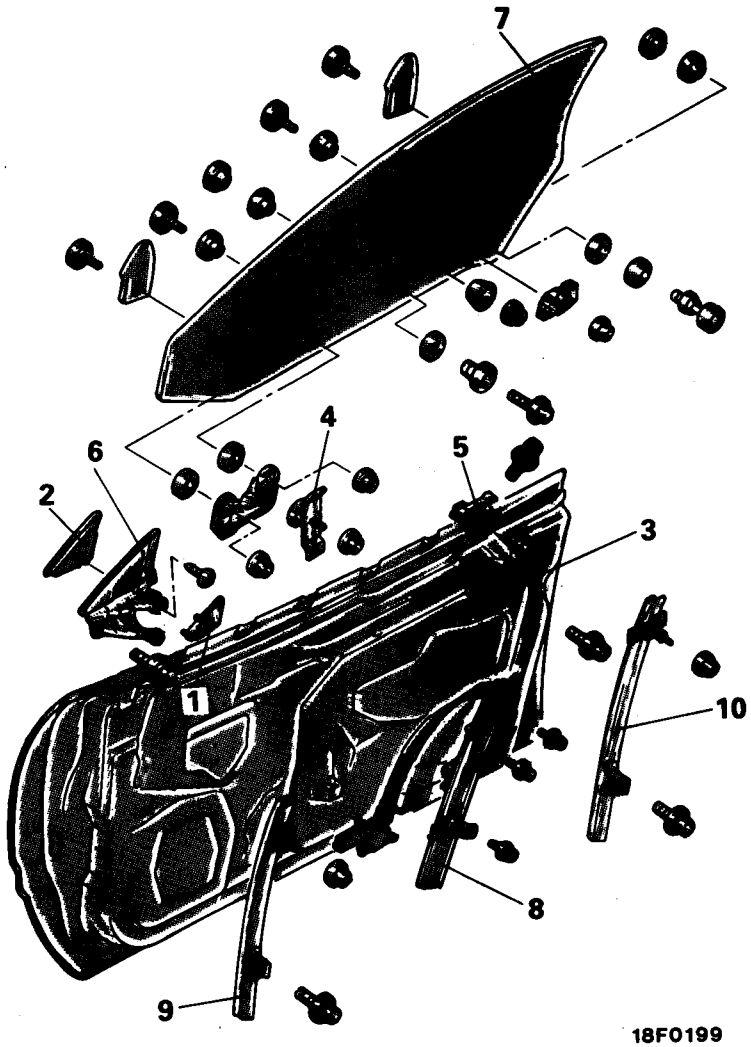
1. Door lamp
2. Inside handle cover
3. Door trim carpet
4. Door trim
5. Speaker garnish
6. Power window switch
7. Waterproof film

NOTE
⬅: Clip locations

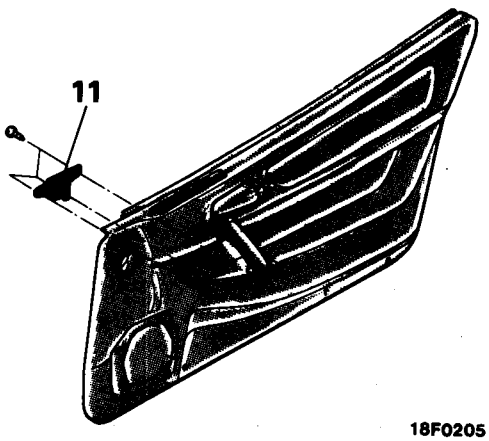
DOOR GLASS AND REGULATOR

E42MCAR

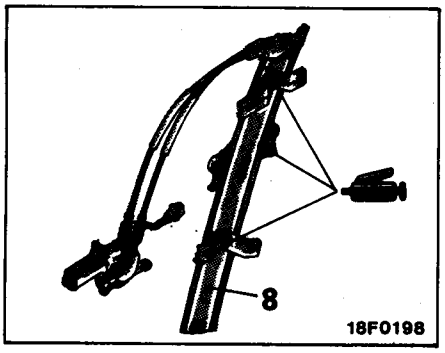
REMOVAL AND INSTALLATION



18F0199



18F0205



18F0198

Door window regulator assembly removal steps

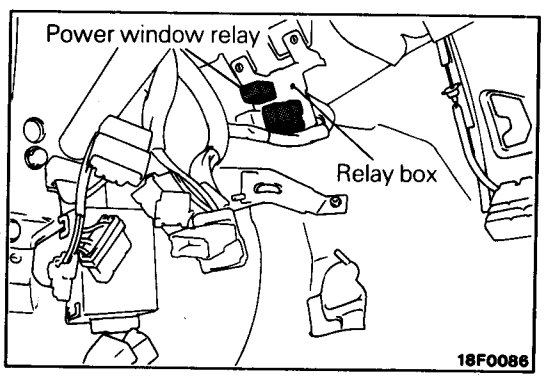
- Door trim (Refer to P.42-37.)
- Waterproof film (Refer to P.42-37.)
- Door window glass adjustment (Refer to P.42-11.)

1. Delta cover inner
2. Delta cover outer
   - Door belt line outer weatherstrip (Refer to P.42–43.)
3. Up stop
4. Stabilizer inner front
5. Stabilizer inner rear
6. Delta sash
7. Door window glass
8. Door window regulator assembly
9. Door glass guide track front
10. Door glass guide track rear

Power window switch assembly removal steps

- Door trim (Refer to P.42-37.)

11. Power window switch assembly

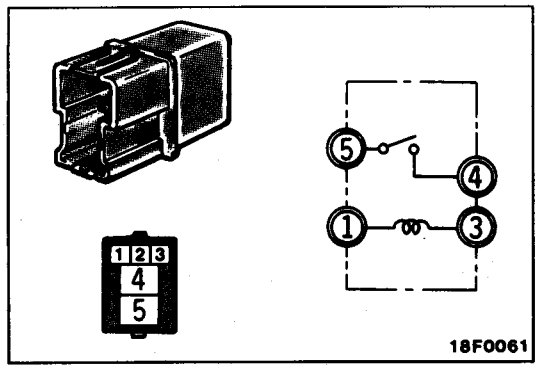


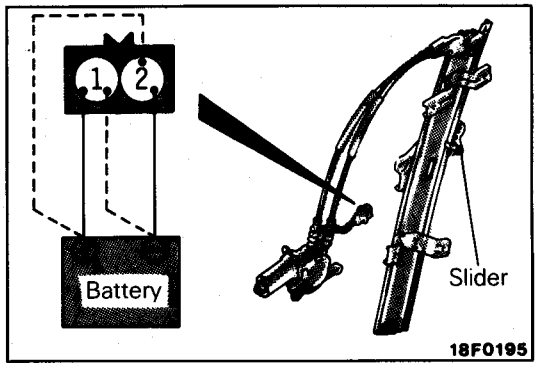
18F0086

INSPECTION

POWER WINDOW RELAY

(1) Remove the knee protector assembly. (Refer to GROUP 52A – Instrument Panel.)
(2) Remove the power window relay from indoor relay box.





(3) Apply battery voltage to terminal 1, and check for continuity when terminal 3 is grounded.

Terminal / Battery voltage	1	3	4	5
Continuity no voltage	O	O		
Continuity with voltage			O	O

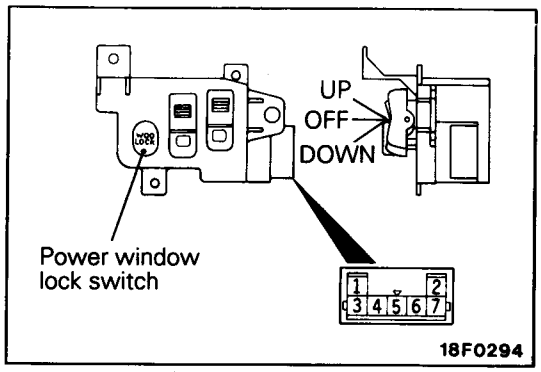
NOTE
O–O indicates that there is continuity between the terminals.

POWER WINDOW MOTOR

(1) Connect the battery directly to the motor terminal and check that the slider moves smoothly.
(2) Connect the battery in reverse polarity and check that the slider moves in opposite direction.

CIRCUIT BREAKER (INCORPORATED IN THE POWER WINDOW MOTOR)

(1) Press the UP switch to fully close the window glass, and continue to press the switch for 10 seconds.
(2) At the moment that the UP switch is released, press the DOWN switch. The circuit breaker can be considered good if at this time the door window glass begins to open within 60 seconds.

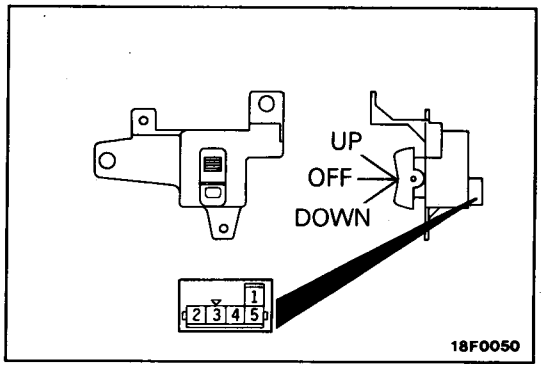


POWER WINDOW MAIN SWITCH

Check for continuity in accordance to the following connection table.

Terminal \ Switch position		Power window switch			Power window lock switch	
		UP	OFF	DOWN	NORMAL	LOCK
Driver's side switch	7 (3)	○		○		
	6 (4)	○	○	○		
	1 (2)	○	○	○		
	3 (7)	○	○	○		
Passenger's side switch	7 (3)	○		○		
	4 (6)	○	○	○		
	5	○	○	○		
	3 (7)	○	○	○		
Power window lock switch	7 (3)				○	
	2 (1)				○	

NOTE
(1) ○–○ indicates that there is continuity between the terminals.
(2) ( ) indicates R.H. drive vehicles.



POWER WINDOW SUB SWITCH

Check for continuity in accordance to the following connection table.

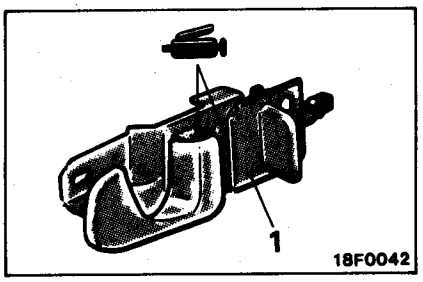
Terminal \ Switch position		Sub switch		
		UP	OFF	DOWN
Sub switch	2	○		○
	3	○	○	○
	4		○	○
	5	○	○	○
	1	○	○	

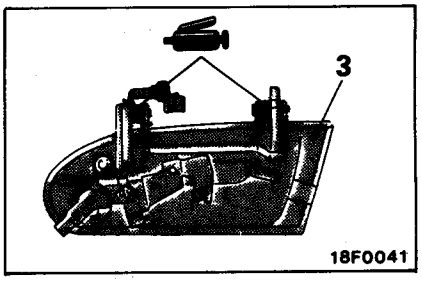
NOTE
○–○ indicates that there is continuity between the terminals.

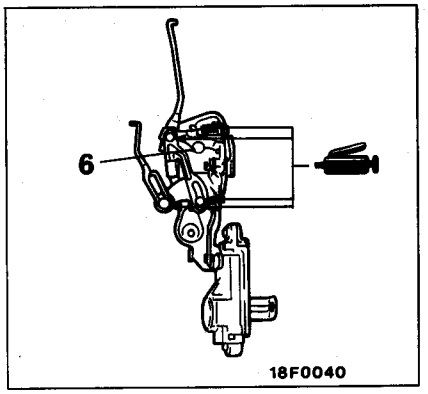
DOOR HANDLE AND LATCH

E42MDBA

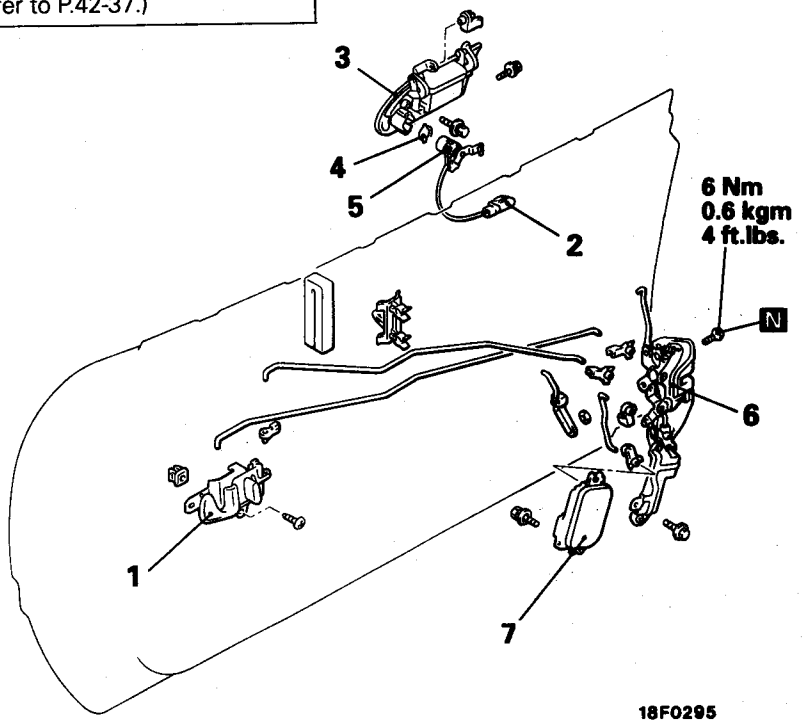
REMOVAL AND INSTALLATION







Pre-removal and Post-installation Operation
- Removal and Installation of Door Trim and Waterproof Film (Refer to P.42-37.)



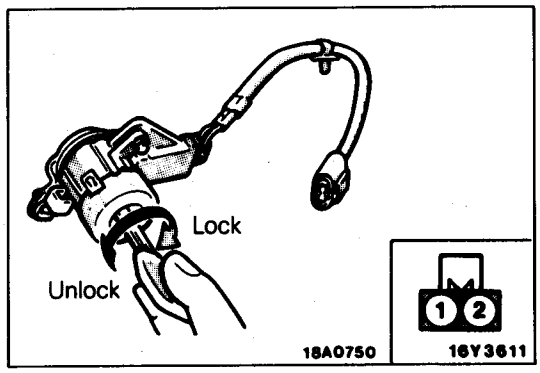
Door inside handle removal

Door Inside Handle Play Check (Refer to P.42-13.)

1. Door inside handle

Door outside handle and latch removal steps

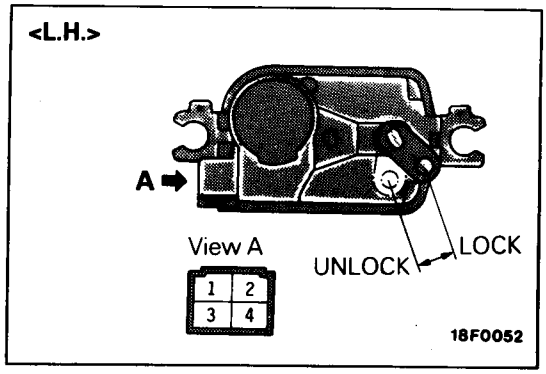
2. Door key cylinder unlock switch connector
3. Door outside handle
4. Ring
5. Door lock key cylinder
6. Door latch assembly
7. Door lock actuator

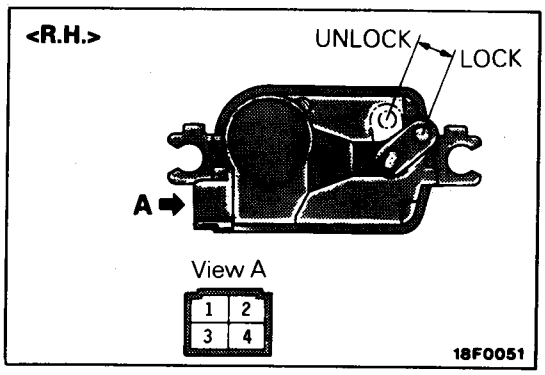


INSPECTION

DOOR KEY CYLINDER UNLOCK SWITCH

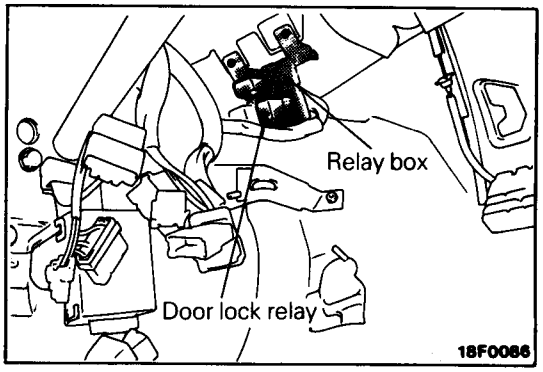
The key cylinder unlock switch is normal if there is not continuity between terminals 1 and 2 when the key is turned approx. 20° clockwise or counterclockwise from the neutral position, and there is continuity when it is turned further.





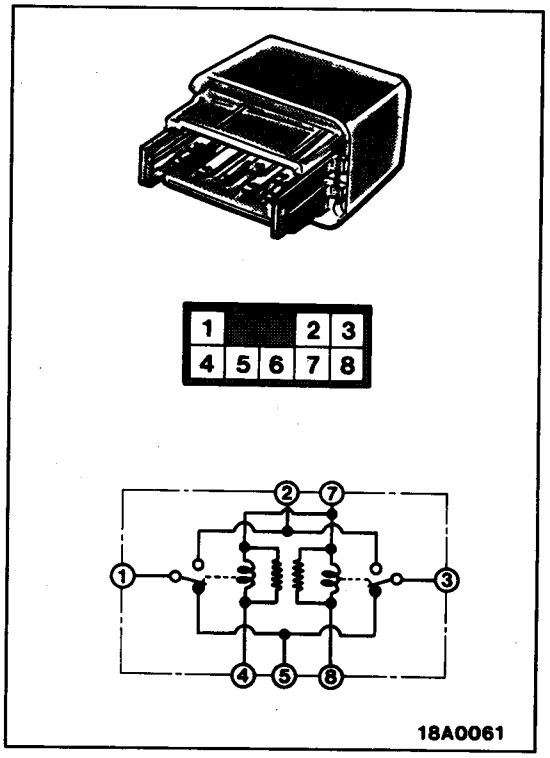
DOOR LOCK ACTUATOR

(1) Place the rod in the LOCK position, apply the battery power to the terminal [(3) for L.H. or (1) for R.H.] and check to see that when the terminal [(1) for L.H. or (3) for R.H.] is earthed, the rod moves to the UNLOCK position.
(2) Then place the rod in the UNLOCK position, apply the battery power to the terminal [(1) for L.H. or (3) for R.H.], and check to see that when the terminal [(3) for L.H. or (1) for R.H.] is earthed, the rod moves to the LOCK position.
(3) Check to ensure that when the rod is placed in the UNLOCK position, there is a continuity between the terminals (2) and (4), and that when the rod is placed in the LOCK position, there is no continuity.



DOOR LOCK RELAY

(1) Remove the knee protector assembly.
(Refer to GROUP 52A – Instrument Panel.)
(2) Remove the door lock relay from indoor relay box.



(3) Check for continuity between terminals under the conditions described below.

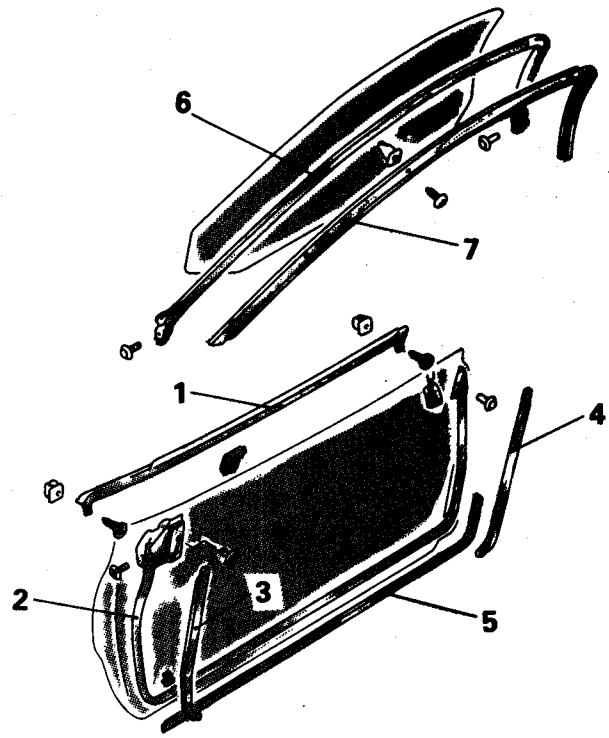
Terminal / Battery voltage	1	2	3	4	5	7	8
Continuity no voltage	○	○	○	○	○	○	○
Continuity with voltage	○	○	○	⊖		⊕	⊖

NOTE
(1) ○–○ indicates that there is continuity between the terminals.
(2) ⊕···⊖ indicates terminals to which battery voltage is applied.

DRIP LINE WEATHERSTRIP

E42MHAI

REMOVAL AND INSTALLATION



Removal steps

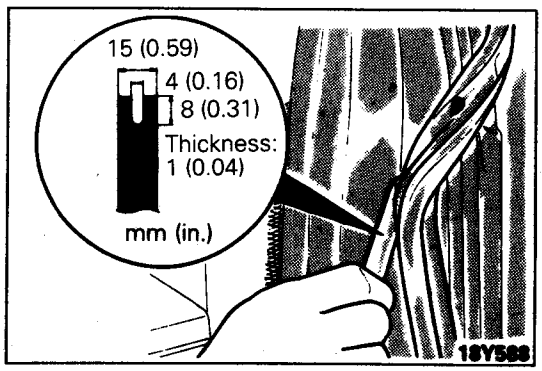
- Delta cover inner } (Refer to
- Delta cover outer } P.42-38.)
- Door trim (Refer to P.42-37.)

1. Door belt line outer weatherstrip
2. Door outer opening weatherstrip
3. Door inner opening weatherstrip front
4. Door inner opening weatherstrip rear
5. Door opening weatherstrip lower

Drip line weatherstrip removal steps

6. Drip line weatherstrip
7. Door weatherstrip holder

18F0219



SERVICE POINT OF REMOVAL

2. REMOVAL OF DOOR OUTER OPENING WEATHERSTRIP

Make a tool as shown in the illustration to remove the door opening weatherstrip.

SERVICE POINT OF INSTALLATION

2. INSTALLATION OF DOOR OUTER OPENING WEATHERSTRIP

The clip color identifies the left and right weatherstrips, so be sure to use the colors so as to install correctly.

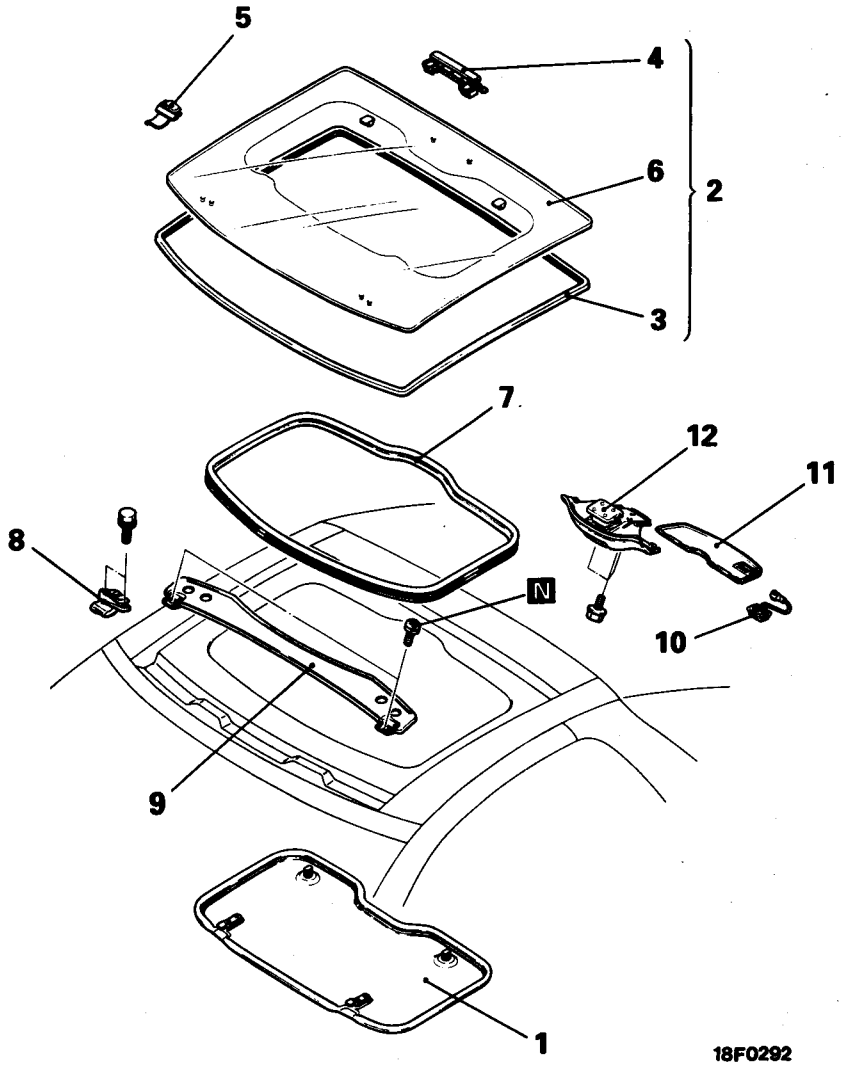
Identification color	Applicable side
White	Left door
Orange	Right door

SUNROOF

REMOVAL AND INSTALLATION

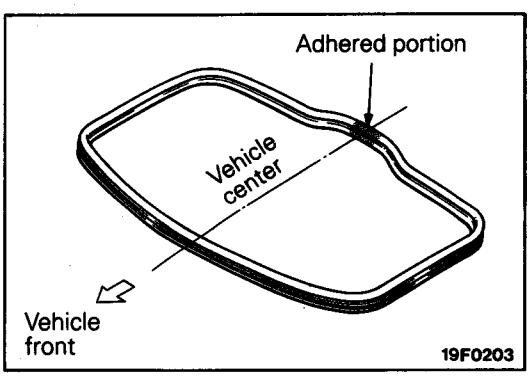
E42TBAG

Post-installation Operation
- Water Leak Test
  (Refer to P.42-14.)



Sunroof glass removal steps
1. Sunroof trim assembly
2. Glass assembly
3. Weatherstrip
4. Sliding lock latch assembly
5. Sunroof male hinge
6. Glass
◆◆ 7. Sunroof inner weatherstrip
8. Sunroof female hinge
9. Deflector

Sunroof regulator assembly removal steps
1. Sunroof trim assembly
2. Glass assembly
10. Interior temperature sensor
11. Regulator cover
12. Sunroof regulator assembly



SERVICE POINTS OF INSTALLATION

7. INSTALLATION OF SUNROOF INNER WEATHERSTRIP

Install so that the adhered portion of the sunroof inner weatherstrip is at the vehicle center (rear side).

EXTERIOR

CONTENTS

E51AA--

SPECIFICATIONS

GENERAL SPECIFICATIONS

E51CA--

Items	Specifications
Windshield wiper motor	
Type	Ferrite-magnet type
Speed control system	Third brush system
Braking system	Dynamic brake system
rpm at load of 1 Nm (0.1 kgm, 0.72 ft.lbs.)	
Low speed	48 ± 4
High speed	70 ± 7
Nominal torque Nm (kgm, ft.lbs.)	24 (2.4 kgm, 17)
Rear wiper motor	
Motor type	Ferrite-magnet type
Braking system	Dynamic braking system
rpm at load of 0.6 Nm (6 kgcm, 0.43 ft.lbs.)	38 ± 5
Windshield wiper blade	
Wiping angle	
Driver's side	88° (LHD) 87° (RHD)
Passenger's side	90°
Wiper blade length mm (in.)	
Driver's side	525 (20.7)
Passenger's side	500 (19.7)
Rear wiper blade	
Wiping angle	87° ± 1.5°
Wiper blade length mm (in.)	550 (21.7)
Windshield washer motor and pump	
Motor type	Direct current ferrite magnet type
Pump type	Centrifugal type
Power consumption A	3.8 or less
Time of continuous use sec.	
With washer fluid	Max. 60
Empty operation	Max. 20
Nozzle jet pressure kPa (kg/cm^2, psi)	120 (1.2, 17) or more
Tank capacity dm^3 (U.S qts., Imp. qts.)	2.0 (2.1, 1.8) or more
Rear window washer motor and pump	
Motor type	Direct current ferrite magnet type
Pump type	Centrifugal type
Power consumption A	3.8 or less
Time of continuous use sec.	
With washer fluid	Max. 60
Empty operation	Max. 20
Nozzle jet pressure kPa (kg/cm^2, psi)	120 (1.2, 17) or more
Tank capacity dm^3 (U.S qts., Imp. qts.)	1.2 (1.3, 1.1) or more

Items	Specifications
Headlamp washer motor and pump	
Motor type	Direct current ferrite magnet type
Pump type	Centrifugal type
Rated current A	21 or less
Tank capacity dm^3 (U.S qts., Imp. qts.)	3.5 (3.7, 3.1) or more
Check valve	
Valve opening and closing pressure kPa (kg/cm^2, psi)	50–110 (0.5–1.1, 7.1–15.6)
Headlamp washer relay	
Timer operation time sec.	0.52
Windshield wiper and washer switch	
Rated load A	
Wiper switch	
LO, HI	4
INT	0.22 ± 0.05
Washer switch	Max. 4
Voltage drop (at 12V and the rated load) V	
Wiper switch	0.2 or less
Washer switch	0.5 or less
Headlamp washer switch	0.5 ± 0.1
Rear wiper and washer switch	
Rated load A	
Wiper switch	5
Washer switch	5
Voltage drop V	0.1 or less
Intermittent wiper relay	
<Front (incorporated in column switch)>	
Intermittent interval (min.-max.) sec.	
Variable-interval intermittent wiper	Approx. 3 – 12
Delay time in washer moving sec.	0.6
<Rear>	
Intermittent interval sec.	8 ± 2
Door mirror	
Printed heater lines	
Working voltage V	10 – 15
Operating current A	3.5 or less
Resistance Ω	7.7 – 10.2

SERVICE SPECIFICATIONS

E51CB--

Items	Specifications
Standard value Front wiper blade park position (A) mm (in.)	$15\ ^{+5}_{-0}\ (0.6\ ^{+0.2}_{-0})$

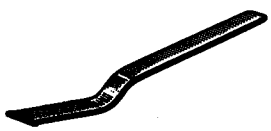
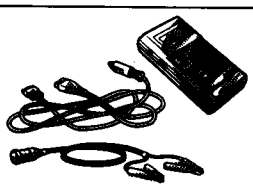
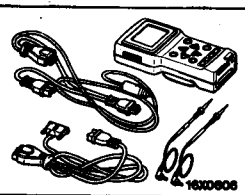
SEALANTS AND ADHESIVES

E51CE--

Items	Specified adhesive
Side protect moulding	3M ATD Part No. 8609 SUPER FAST URETHAN or equivalent
Side air dam	3M ATD Part No. 6382 or equivalent
Side garnish, Cushion	

SPECIAL TOOLS

E51DA--

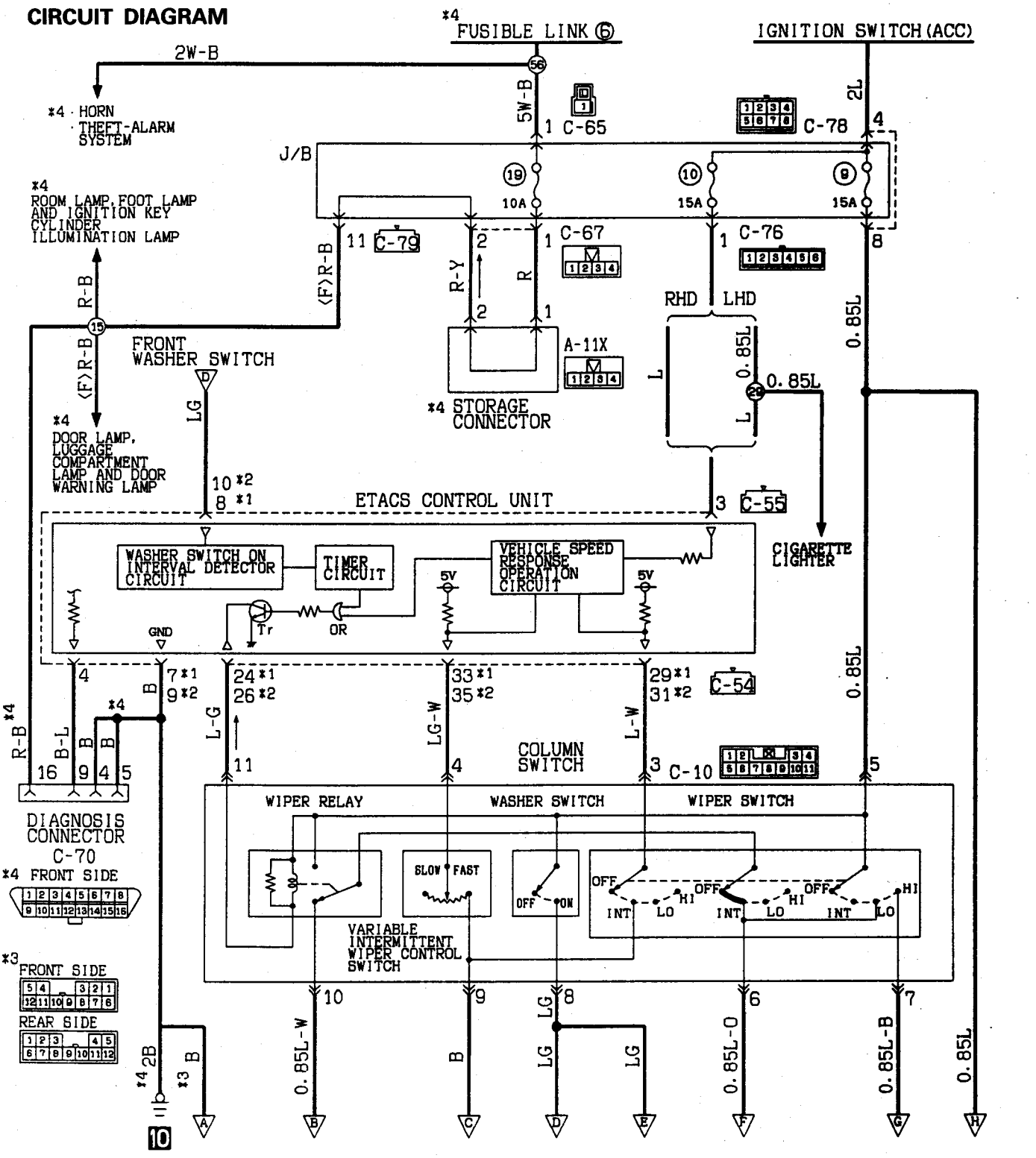
Tool	Number	Name	Use
	MB990449	Window moulding remover	Removal of tailgate moulding, upper and tailgate moulding, lower
	MB991341	Multi-use tester sub assembly	1993 models ETACS input check and active aero system inspection
 (For the number, refer to GROUP 00 – Precautions Service)		ROM pack	
	MB991502	MUT-II sub assembly	All models ETACS input check and active aero system inspection
 16X0607		ROM pack	

TROUBLESHOOTING

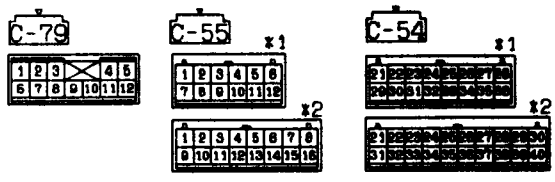
E51EA--

WINDSHIELD WIPER AND WASHER

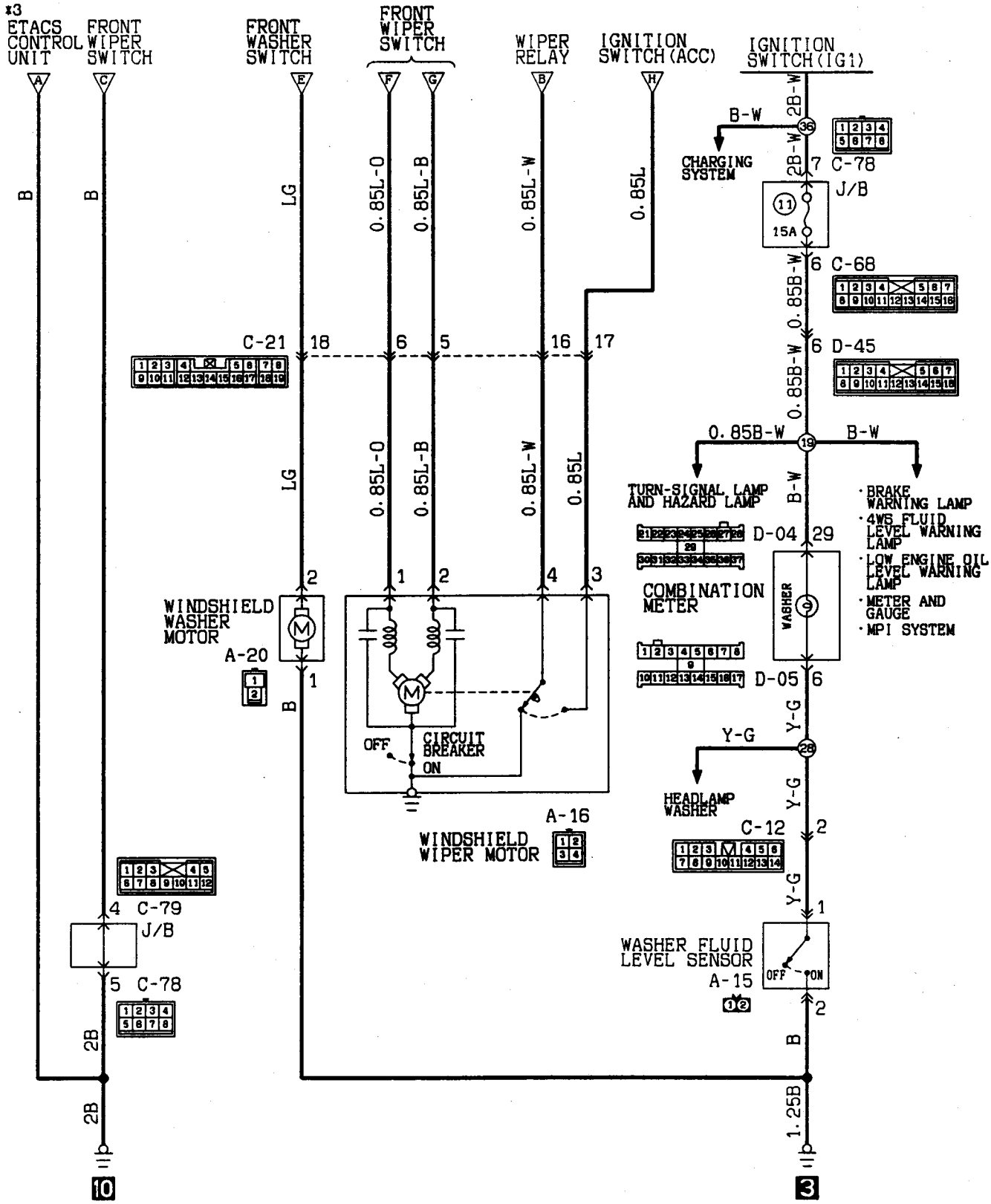
CIRCUIT DIAGRAM



Remarks
(1) *:1:Vehicles without theft-alarm system.
(2) *:2:Vehicles with theft-alarm system.
(3) *:3:Up to 1994 models.
(4) *:4:From 1995 models.



KX35-AK-R5101-EC



Wire colour code
B:Black LG:Light green G:Green L:Blue W:White Y:Yellow SB:Sky blue
BR:Brown O:Orange GR:Gray R:Red P:Pink V:Violet

OPERATION

<Low-speed (and high-speed) wiper>

- When the wiper switch is placed in the LO position with the ignition switch in the ACC or ON position, wipers operate continuously at low speed.
- Placing the wiper switch in the HI position causes the wipers to operate at high speed.

<Intermittent wiper>

- If the wiper switch is turned to the INT position when the ignition switch is in the ON or ACC position, the voltage value from the intermittent variable volume switch is input to the intermittent time detection circuit.
- The intermittent time detection circuit outputs an H signal at the intermittent time according to the set value of the intermittent variable volume switch and, via OR, turns the Tr on and off to operate the wiper.

<Auto wiper stop>

- When the wiper switch is placed in the OFF position, the cam contacts of wiper motor causes current to flow through the auto wiper stop circuit, allowing the wiper blades to cycle before they reach to the stop positions.

<Mist wiper>

- If the washer switch is on for 0.6 second or less when the ignition switch is at ON or ACC with the wiper switch turned off, the washer liquid will not be poured but the transistor will be turned on to operate the wipers one time.

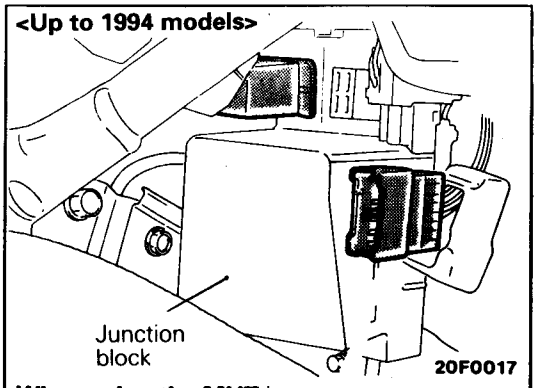
<Wiper linked with washer>

- If the washer switch is on for 0.6 second or more when the ignition switch is at ON or ACC with the wiper switch turned off, the washer liquid will be poured and the transistor will be turned on 0.6 second later to operate the wipers two or three times.

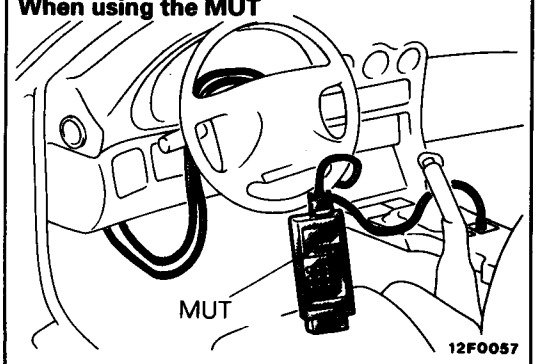
TROUBLESHOOTING HINTS

Phenomenon		Inspecting method
Wipers do not operate continuously.	Washer does not operate.	• Check the multi-purpose fuse No. ⑨
	Washer operates.	• Check the wiper motor. (Refer to P.51–24.) • Check the column switch. (Refer to P.51–25.)
Low-speed (or high-speed) wiper operation only is inoperative.		• Check the column switch. (Refer to P.51–25.)
Wipers do not operate intermittently. (They operate continuously.)		• Check the wiper switch "INT" input signal. (Refer to P.51 – 8.) • Check the column switch. (Refer to P.51–25.)
Wipers do not stop.		• Check the wiper switch "INT" input signal. (Refer to P.51 – 8.) • Check the column switch. (Refer to P.51–25.) • Check the wiper motor. (Refer to P.51–24.)
The intermittent time will not vary even if the variable intermittent wiper control switch is operated.		• Check the variable intermittent wiper control switch input signal. (Refer to P.51–8.) • Check the column swith. (Refer to P.51–25.)
Even if the washer switch is on for 0.6 second or more, the washer will not operate.	The wipers linked with the washer operate.	• Check the washer motor. (Refer to P.51–25.) • Check the washer nozzle and washer tube.
	The wipers linked with the washer do not operate.	• Check the washer switch input signal. • Check the washer switch. (Refer to P.51–25.)

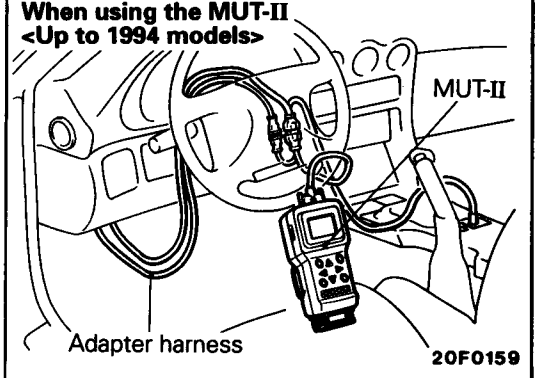
<Up to 1994 models>



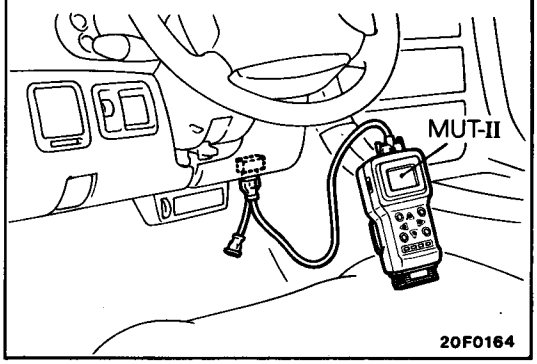
When using the MUT

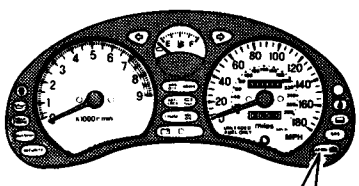


When using the MUT-II
<Up to 1994 models>



<From 1995 models>





INPUT SIGNAL

Using the MUT or MUT-II, check whether or not the input signals from each switch are being input to the ETACS unit.

(1) Connect the MUT or MUT-II to the diagnosis check connector.

NOTE
When connecting the MUT-II to a vehicle up to 1994 model, use the adapter harness supplied together with the MUT-II.

Caution
Connect and disconnect either MUT or MUT-II with the ignition switch in the OFF position.

(2) Check if the buzzer of the MUT or MUT-II sounds when each switch is operated.
If the buzzer sounds, the input signals are being input to the ETACS unit, so that switch can be considered to be functioning normally. If not, the switch or switch input circuit is faulty. Check the switch and the switch input circuit.

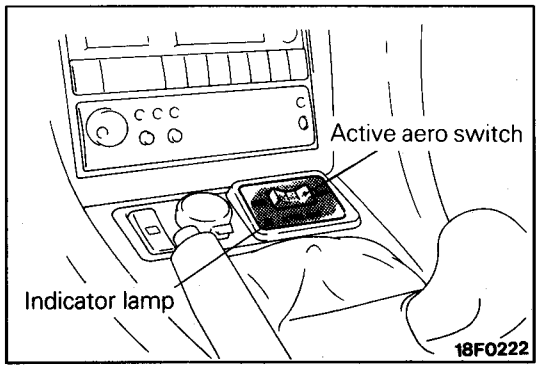
SERVICE ADJUSTMENT PROCEDURES

INSPECTION OF ACTIVE AERO SYSTEM E51FHAA

1. INSPECTION BY WARNING LAMP

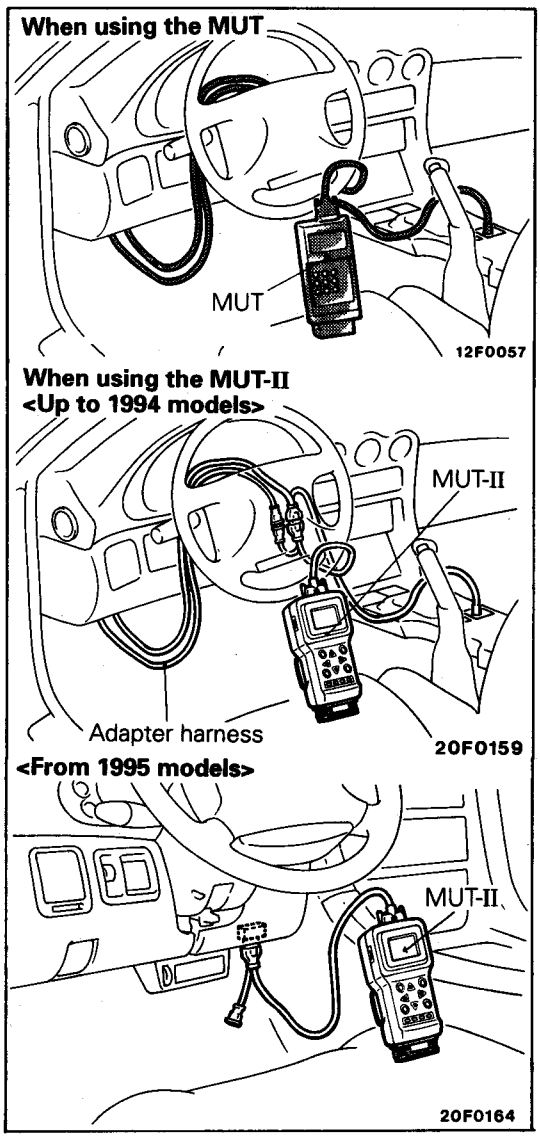
Turn the ignition switch from "OFF" to "ON" to see if the warning lamp is lit for approx. three seconds and then goes out. If not, replace the control unit.

NOTE
(1) The active aero control unit has a self-check function which is designed as follows: Turn the ignition switch from "OFF" to "ON". If the unit is in normal condition, the warning lamp is lit for approx. three seconds and then goes out.
(2) If the front venturi skirt does not return to the standard condition properly in normal use, the warning lamp comes on.



2. INSPECTION BY ACTIVE AERO SWITCH AT AUTO 2

(1) With the vehicle stopped, insert the key in the ignition key cylinder.
(2) Set the active aero switch to AUTO 2 to make sure that the active aero system is placed in the operative condition and the indicator lamp comes on. Then turn off the active aero switch to confirm that the system returns to the standard condition and the indicator lamp goes out.
(3) If there is abnormality, check the following parts.
- Active aero switch
- Lighting monitor switch
- Air dam link assembly and rear spoiler
- Wiring harness



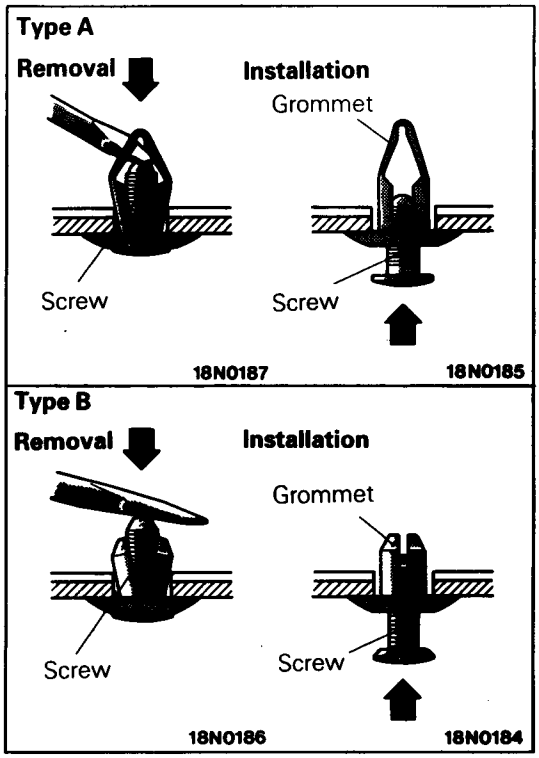
3. INSPECTION WITH MULTI-USE TESTER (MUT) <1993 models> OR MUT-II <All models>

Using pseudo vehicle speed input function of the MUT or MUT-II, inspection can be made by means of vehicle speed.
(1) Set the MUT or MUT-II to the diagnosis connector.

NOTE
When connecting the MUT-II to a vehicle up to 1994 model, use the adapter harness supplied together with the MUT-II.

Caution
Connect and disconnect either MUT or MUT-II with the ignition switch in the OFF position.

(2) Turn the ignition switch to "ACC" or "ON".
(3) Place the active aero switch to AUTO 1.
(4) Using the MUT or MUT-II, increase the vehicle speed to approx. 80 km/h (50 mph) or more to make sure that the active aero system is placed to the operative condition. Then decrease the vehicle speed to approx. 50 km/h (30 mph) or less to confirm that the system returns to the standard conditions.



FRONT BUMPER

E51GABR

REMOVAL AND INSTALLATION OF CLIP WITH SCREW

Normally, remove the clip with a Phillips screwdriver. If, however, there is enough space to insert a screwdriver or the like behind the clip, use the following procedure for ease of work.

1. **Removal**

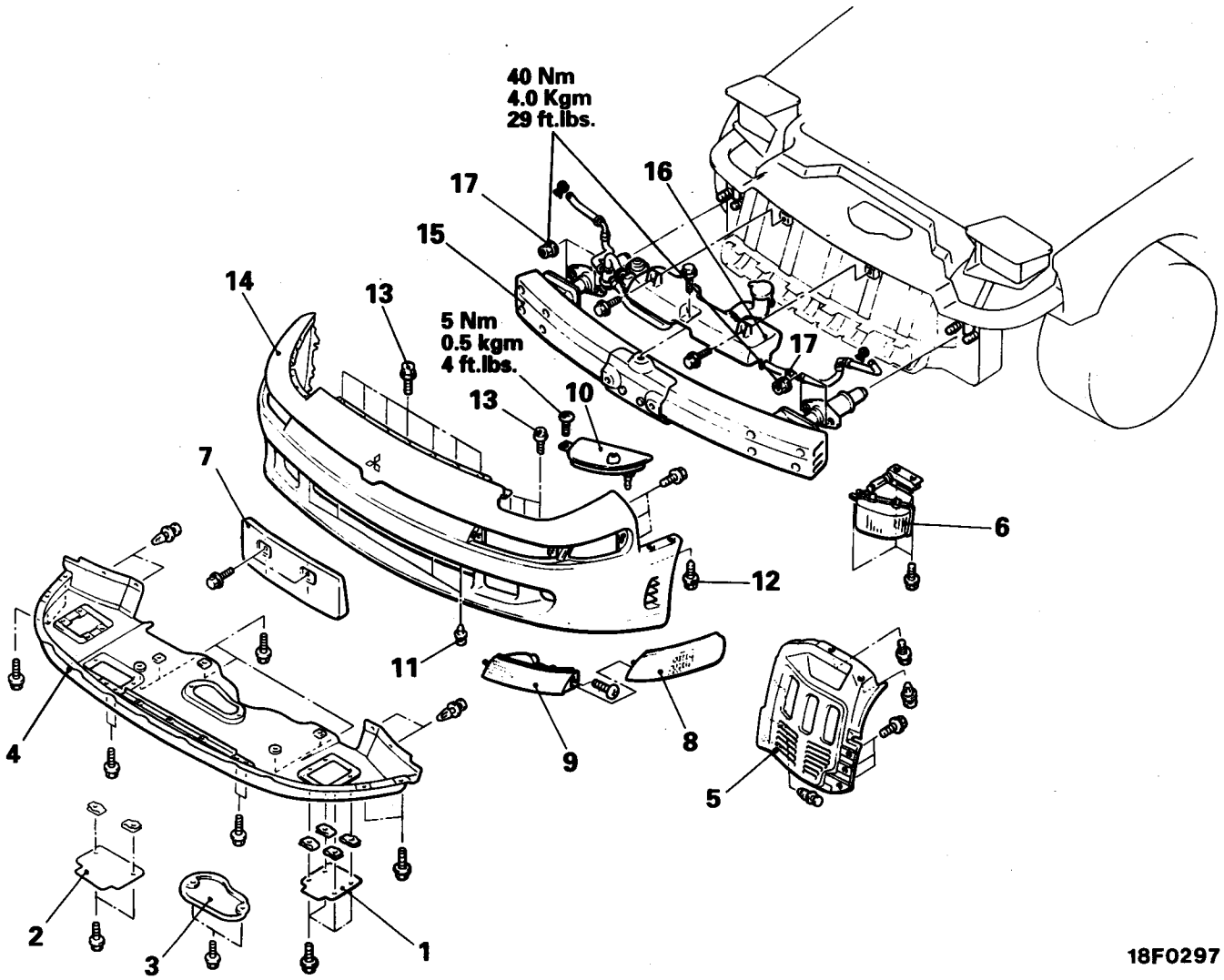
   Using a screwdriver or the like, press the screw from the inside of the bumper to remove the clip.

2. **Installation**

   With the grommet inserted in the hole, press the screw in.

NOTES

REMOVAL AND INSTALLATION <UP TO 1994 MODELS>



Removal steps

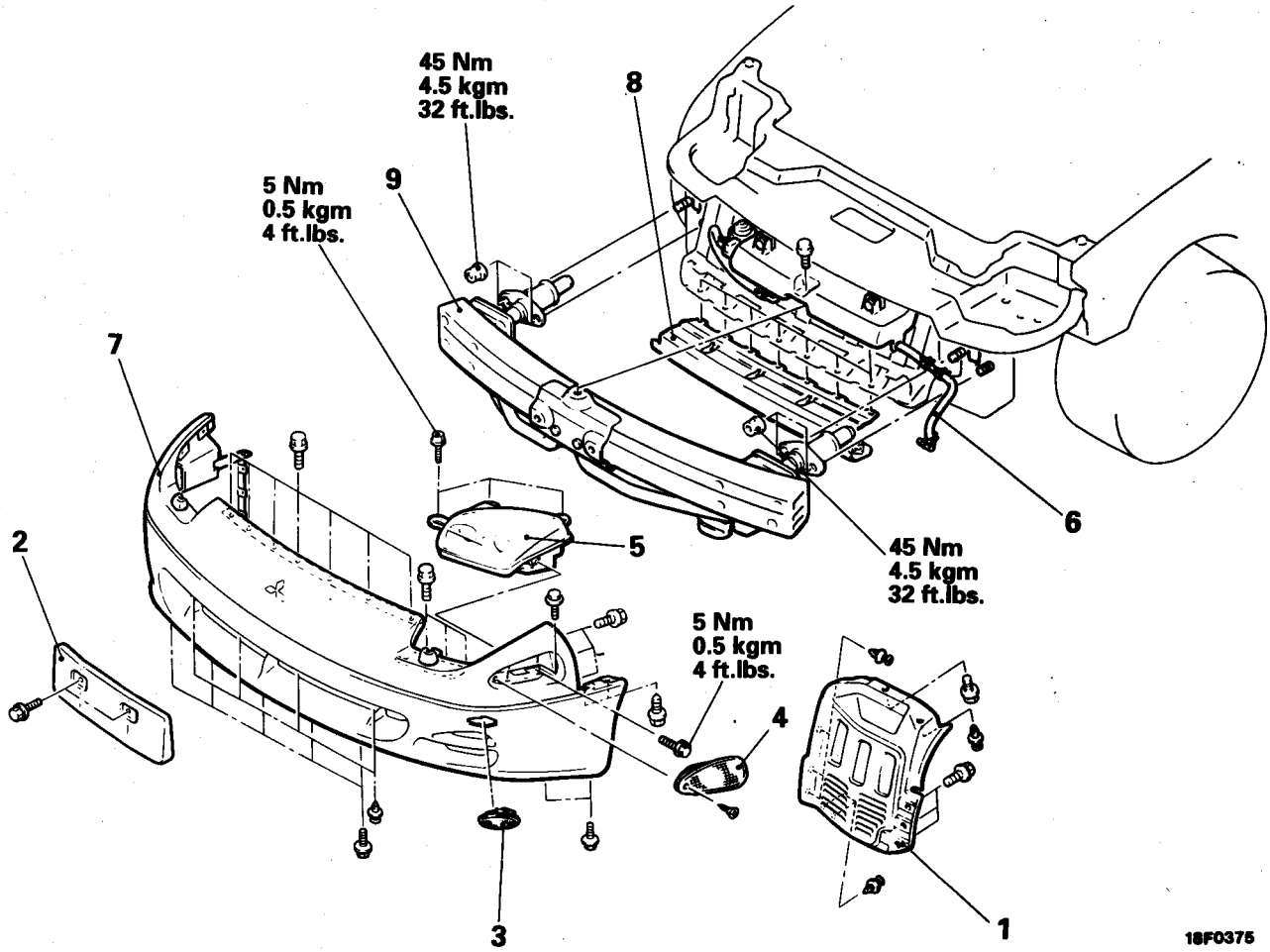
1. Side cover panel
2. Front cover panel
3. Center cover panel
◆◆ 4. Front under cover panel
5. Front splash shield extension
6. Driving lamp
7. License plate bracket
8. Front combination lamp garnish
9. Front combination lamp
10. Headlamp cover
11. Clips with screw
12. Tapping screws
13. Bolts
14. Bumper face assembly
15. Bumper reinforcement assembly
16. Headlamp washer tank and hose assembly
17. Nuts

SERVICE POINT OF INSTALLATION

4. INSTALLATION OF FRONT UNDER COVER PANEL

Install the air dam link assembly in the operative condition for ease of front under cover panel.

REMOVAL AND INSTALLATION <FROM 1995 MODELS>

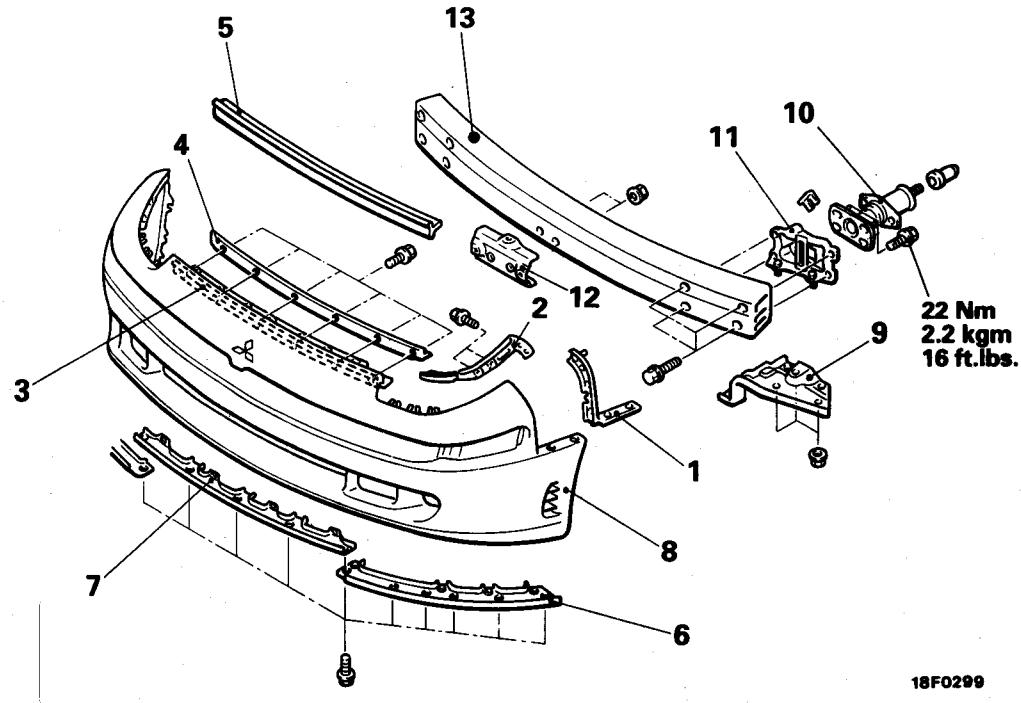


Removal steps

1. Front splash shield extension
2. License plate bracket
3. Position lamp
4. Front turn signal lamp
5. Headlamp
6. Headlamp washer hose connection
7. Bumper face assembly
8. Center lower bracket
9. Bumper reinforcement assembly

NOTES

DISASSEMBLY AND REASSEMBLY < UP TO 1994 MODELS>

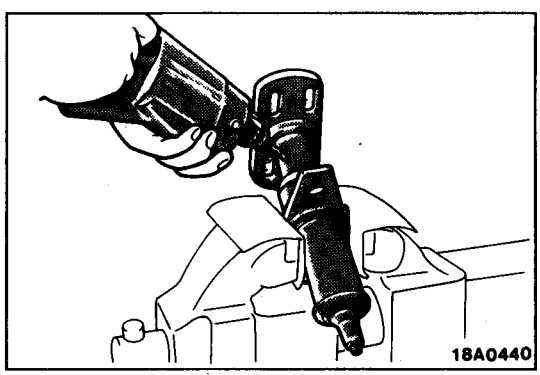


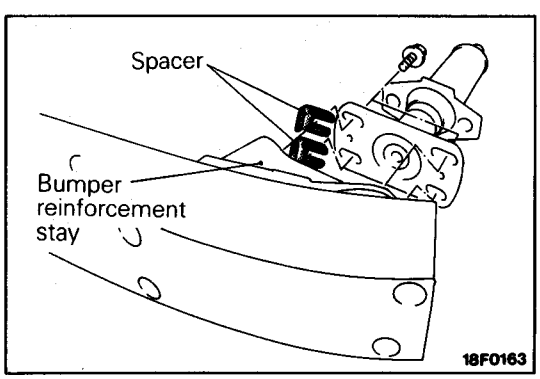
Bumper face disassembly steps

1. Bumper face side plate
2. Bumper face corner plate
3. Bumper face upper front plate
4. Bumper face upper center plate
5. Bumper face protector
6. Side lower plate
7. Center lower plate
8. Bumper face

Bumper reinforcement disassembly steps

9. Driving lamp bracket
◆◆ ◆◆ 10. Bumper absorber
11. Bumper reinforcement stay
12. Headlamp washer tank lower bracket
13. Bumper reinforcement





SERVICE POINT OF DISASSEMBLY

10. REMOVAL OF BUMPER ABSORBER

Caution

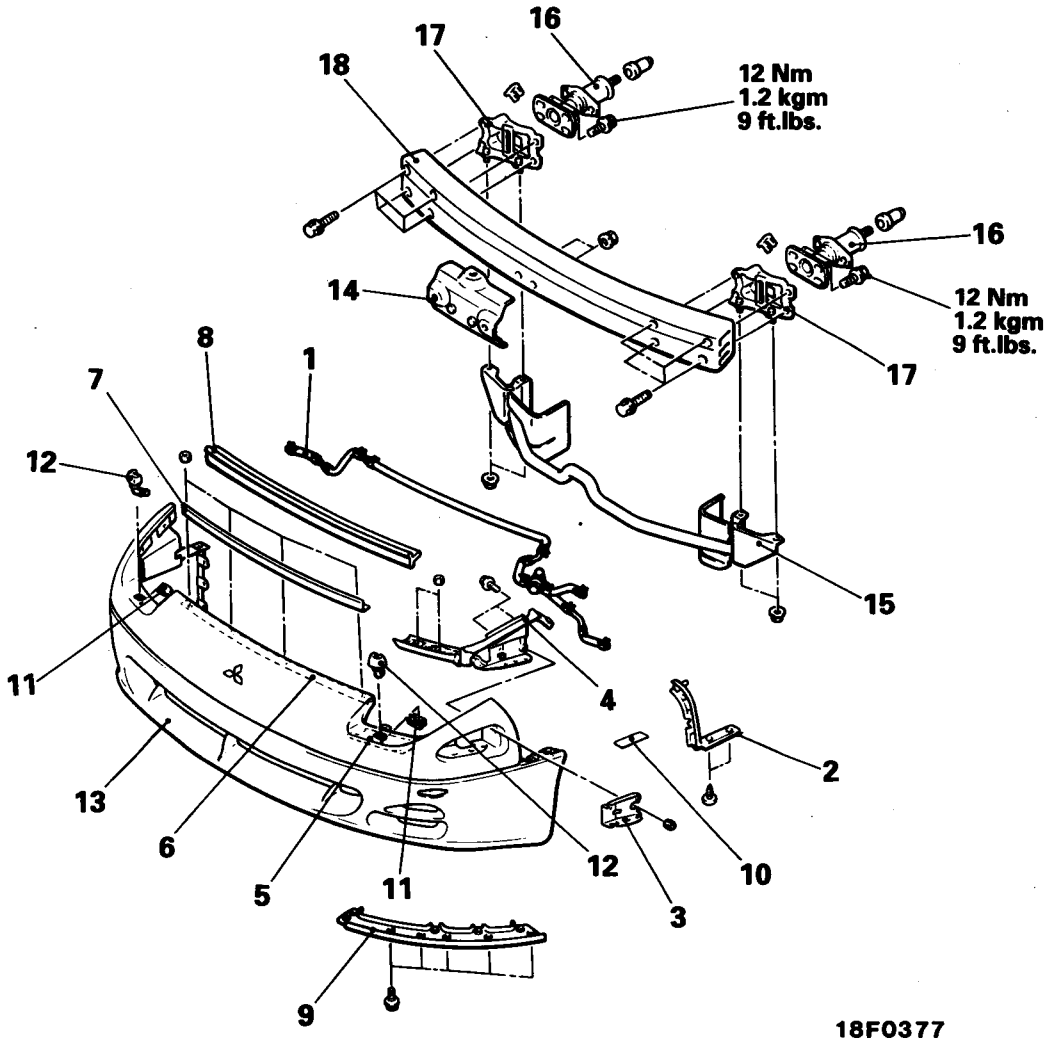
1. **Do not attempt to repair a bumper absorber that has been compressed in an accident; replace it with a new one.**
2. **Before discarding the bumper absorber, drill a 3 mm (0.13 in.) diameter hole to discharge the gas contained in the unit. Be sure to wear safety goggles while performing this operation as the gas is not harmful but chips may be ejected with it.**
3. **If the bumper absorber is to be discarded, do not burn it.**

SERVICE POINT OF REASSEMBLY

10. INSTALLATION OF BUMPER ABSORBER

If the squareness between the bumper reinforcement stay and the bumper absorber is improper, adjust it by putting a spacer between them.

DISASSEMBLY AND REASSEMBLY <FROM 1995 MODELS>

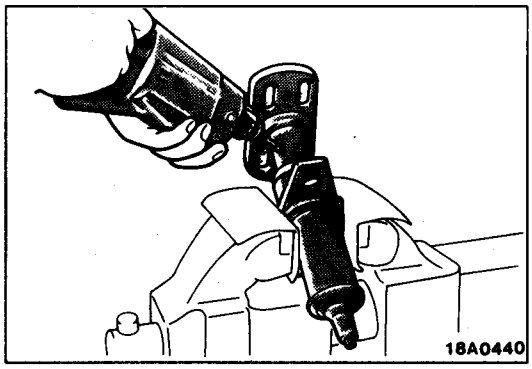


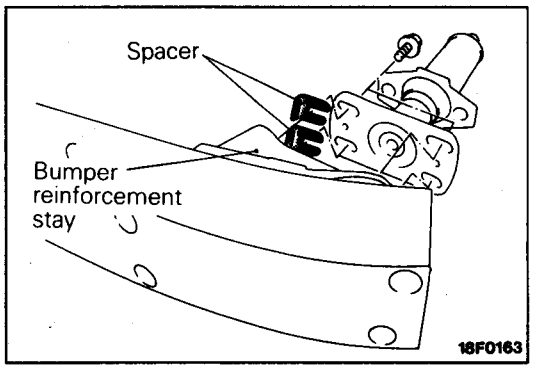
Bumper face disassmbly steps

1. Headlamp washer hose assembly
2. Bumper face side plate
3. Bumper face corner plate
4. Bumper face outer corner plate
5. Bumper face inner corner plate
6. Bumper face upper front plate
7. Bumper face upper center plate
8. Bumper face protector
9. Side lower plate
10. Pad
11. Clip
12. Headlamp washer nozzle
13. Bumper face

Bumper reinforcement disassembly steps

14. Headlamp washer tank lower bracket
15. Front end lower bar assembly
16. Bumper absorber
17. Bumper reinforcement stay
18. Bumper reinforcement





SERVICE POINT OF DISASSEMBLY

16. REMOVAL OF BUMPER ABSORBER

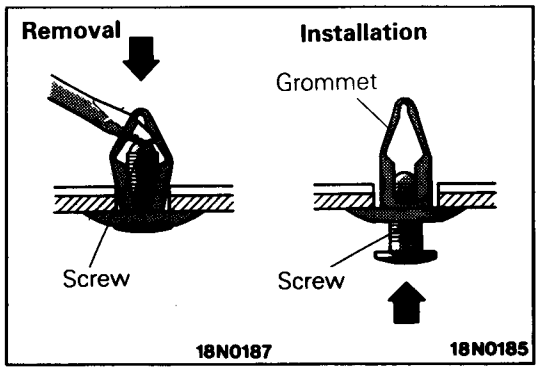
Caution

1. **Do not attempt to repair a bumper absorber that has been compressed in an accident; replace it with a new one.**
2. **Before discarding the bumper absorber, drill a 3 mm (0.13 in.) diameter hole to discharge the gas contained in the unit. Be sure to wear safety goggles while performing this operation as the gas is not harmful but chips may be ejected with it.**
3. **If the bumper absorber is to be discarded, do not burn it.**

SERVICE POINT OF REASSEMBLY

16. INSTALLATION OF BUMPER ABSORBER

If the squarness between the bumper reinforcement stay and the bumper absorber is improper, adjust it by putting a spacer between them.



REAR BUMPER

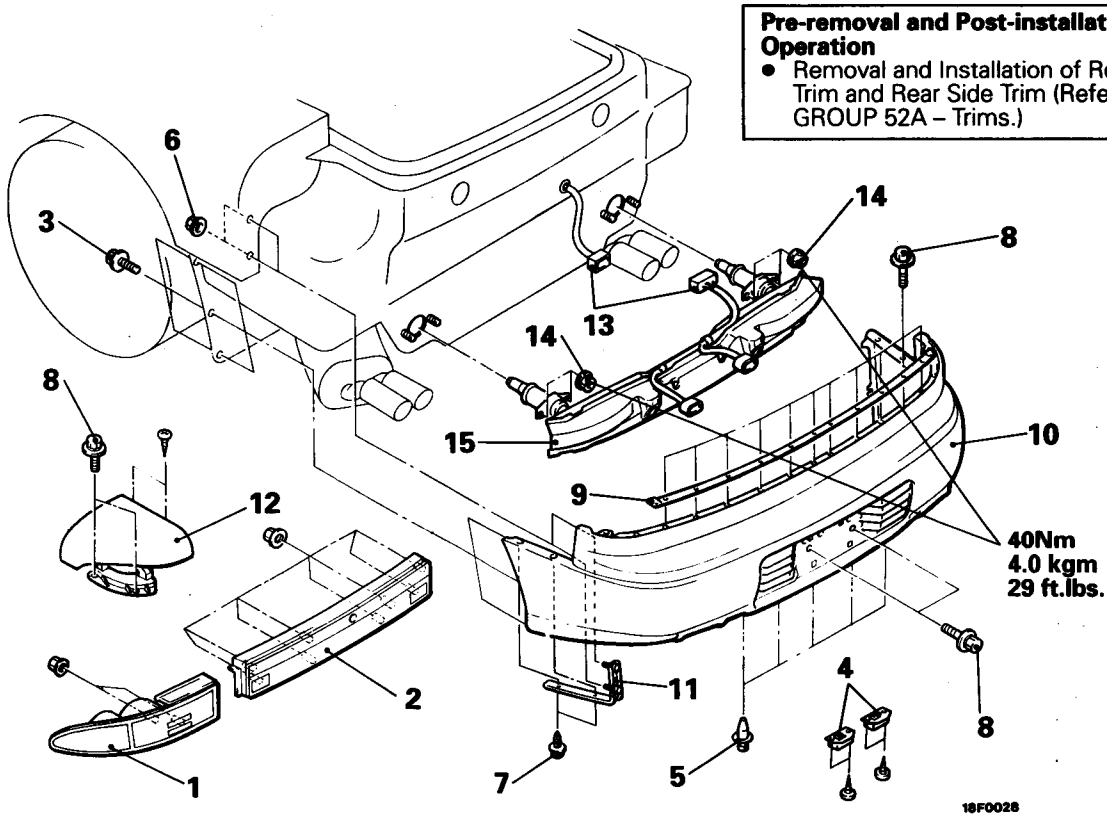
E51GABS

REMOVAL AND INSTALLATION OF CLIP WITH SCREW

Normally, remove the clip with a Phillips screwdriver. If, however, there is enough space to insert a screwdriver or the like behind the clip, use the following procedure for ease of work.

1. **Removal**
   Using a screwdriver or the like, press the screw from the inside of the bumper to remove the clip.
2. **Installation**
   With the grommet inserted in the hole, press the screw in.

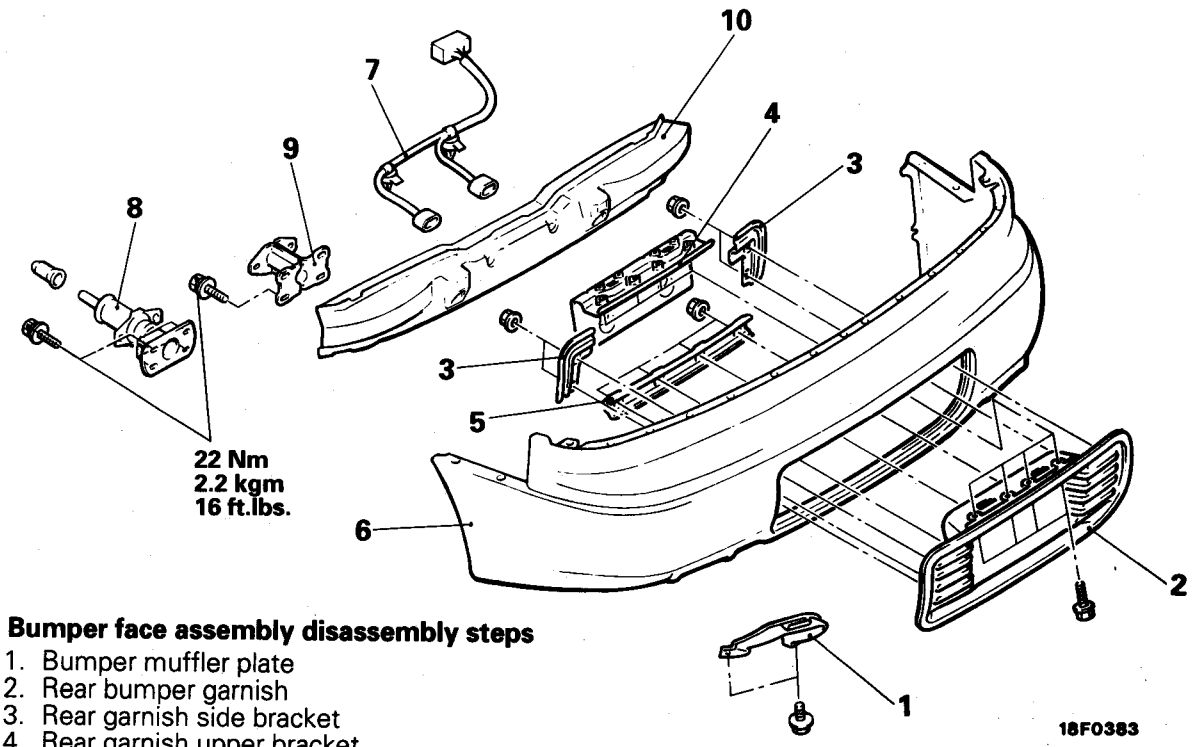
REMOVAL AND INSTALLATION



Removal steps

ECS control unit (Refer to GROUP 33B – ECS Control Unit.)
1. Rear combination lamp
2. Rear panel garnish
3. Bolts
4. License plate lamp
5. Clips with screw
6. Nuts
7. Tapping screws
8. Bolts
9. Bumper face upper plate
10. Bumper face assembly
11. Bumper face side plate
12. Rear bumper upper extension
13. Rear bumper harness connector
14. Nuts
15. Bumper reinforcement assembly

DISASSEMBLY AND REASSEMBLY <UP TO 1994 MODELS>

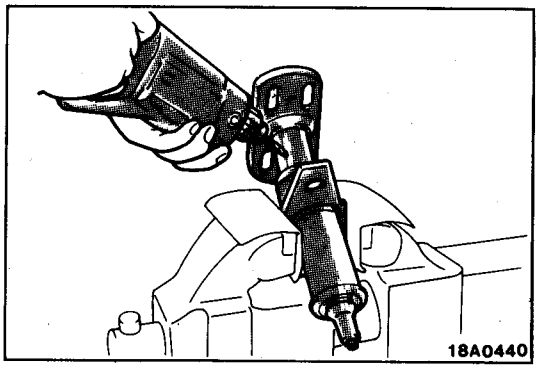


Bumper face assembly disassembly steps

1. Bumper muffler plate
2. Rear bumper garnish
3. Rear garnish side bracket
4. Rear garnish upper bracket
5. Rear garnish lower bracket
6. Bumper face

Bumper reinforcement assembly disassembly steps

7. Rear bumper harness
8. ◆◆ Bumper absorber (vehicles built up to June, 1993)
9. Rear bumper stay assembly (vehicles built from July, 1993)
10. Bumper reinforcement



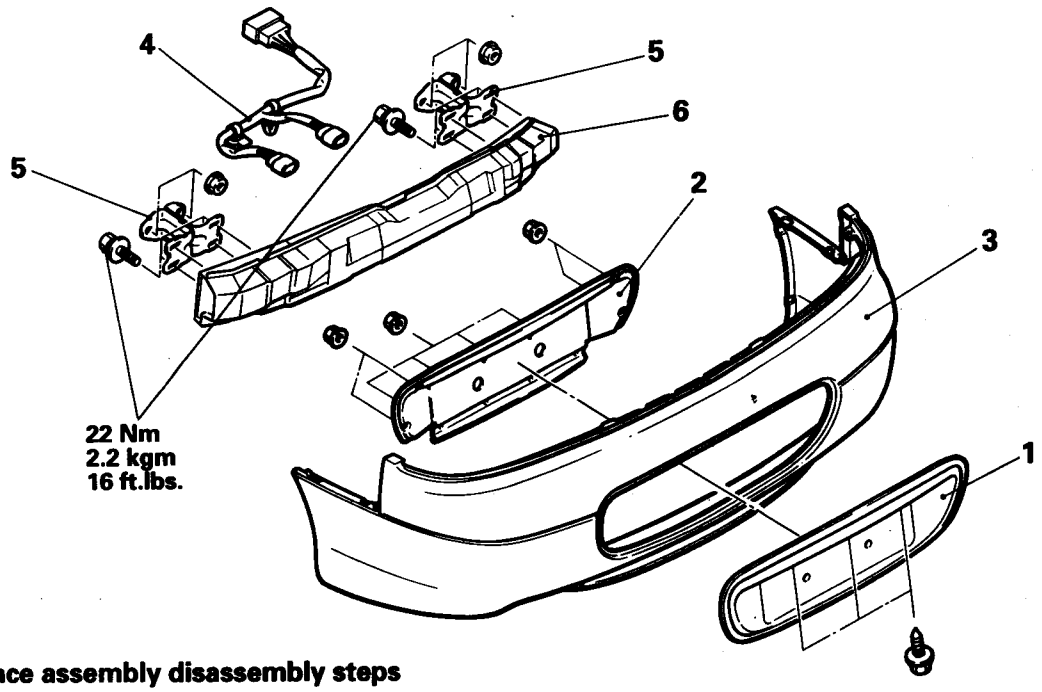
SERVICE POINT OF DISASSEMBLY

8. REMOVAL OF BUMPER ABSORBER

Caution

1. **Do not attempt to repair a bumper absorber that has been compressed in an accident; replace it with a new one.**
2. **Before discarding the bumper absorber, drill a 3 mm (0.13 in.) diameter hole to discharge the gas contained in the unit. Be sure to wear safety goggles while performing this operation as the gas is not harmful but chips may be ejected with it.**
3. **If the bumper absorber is to be discarded, do not burn it.**

DISASSEMBLY AND REASSEMBLY <FROM 1995 MODELS>



Bumper face assembly disassembly steps

1. Rear bumper garnish
2. Rear garnish bracket
3. Bumper face

18F0376

Bumper reinforcement assembly disassembly steps

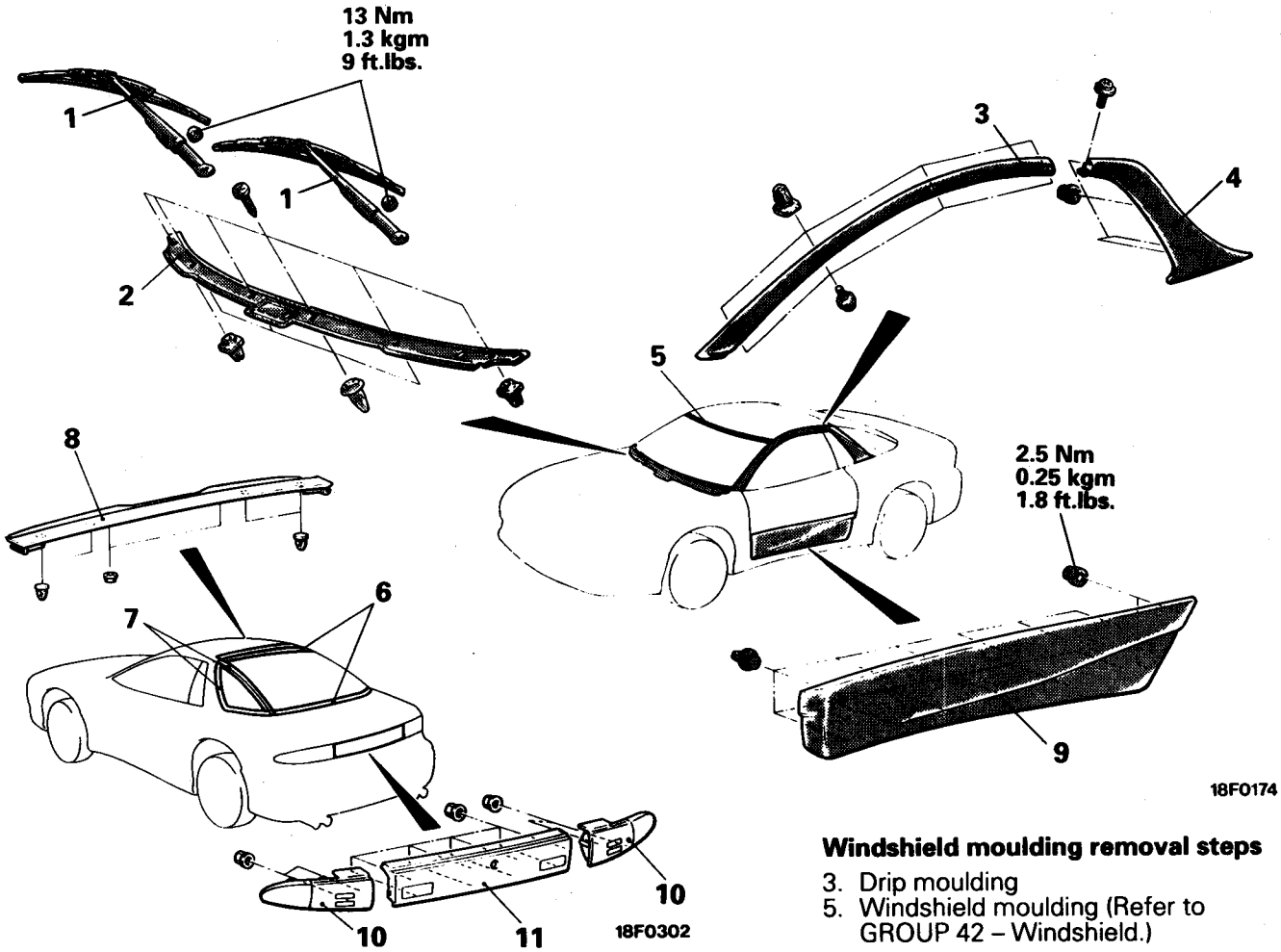
4. Rear bumper harness
5. Rear bumper stay assembly
6. Bumper reinforcement

NOTES

GARNISHES AND MOULDINGS

E51HAAF

REMOVAL AND INSTALLATION



Front deck garnish removal steps

1. Wiper arm assembly
2. Front deck garnish

Drip moulding and center pillar garnish removal steps

Drip line weatherstrip, Door weatherstrip holder } (Refer to GROUP 42 – Drip Line Weatherstrip.)

3. Drip moulding
   Quarter upper trim (Refer to GROUP 52A – Trims.)
4. Center pillar garnish

Windshield moulding removal steps

3. Drip moulding
5. Windshield moulding (Refer to GROUP 42 – Windshield.)

Tailgate moulding removal step

6. Tailgate moulding (Refer to GROUP 42 – Tailgate Glass.)

Quarter window moulding and glass removal steps

4. Center pillar garnish
7. Quarter window moulding and glass (Refer to GROUP 42 – Quarter Window Glass.)

Rear roof extension removal steps <Vehicles with sunroof>

Headlining (Refer to GROUP 52A– Headlining)

8. Rear roof extension

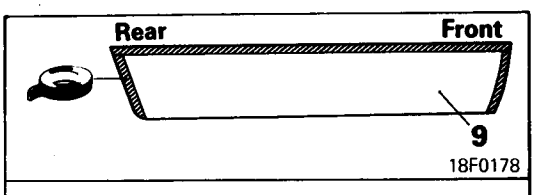
Side garnish removal

◆◆ ◆◆ 9. Side garnish

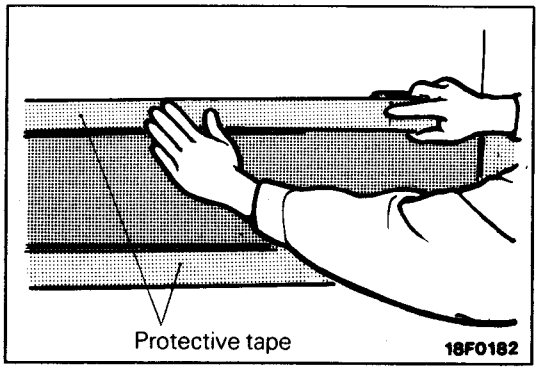
Rear panel garnish removal steps

Rear end trim, Rear side trim } (Refer to GROUP 52A – Trims.)

10. Rear combination lamp
11. Rear panel garnish



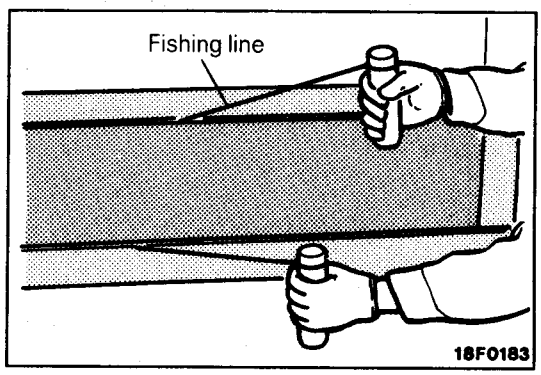
Adhesive tape:
3M ATD Part No. 6382 or equivalent



SERVICE POINT OF REMOVAL

9. REMOVAL OF SIDE GARNISH

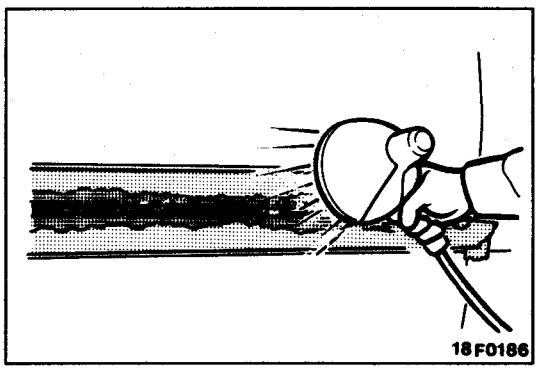
(1) Remove the side garnish mounting nuts.
(2) Affix protective tape to the periphery of the side garnish.



(3) Insert a fishing line [φ0.8 mm (0.03 in.)] between the body and the side garnish and grip each end of the fishing line. Cut through adhesive material by pulling wire in a sawing motion and remove the side garnish.

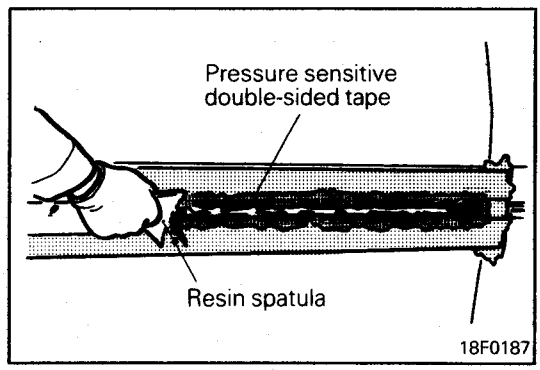
(4) When the side garnish is fastened with a clip or bolt, pull the side garnish toward you to remove the clip or the bolt.

Caution
1. **To reuse the side garnish, remove it by pulling the fishing line along the body so as not to damage the edges of the side garnish.**
2. **If it is hard to cut through adhesive material, heat it to approx. 40°C (104°F).**

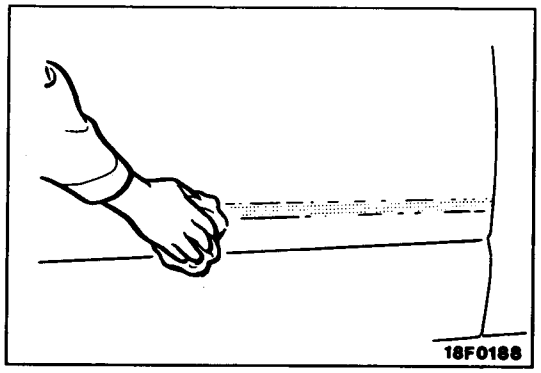


(5) Use an infrared lamp or the like to heat the pressure sensitive double-sided tape remaining on the body to 40 to 60°C (104 to 140°F) for 5 to 10 minutes.

Caution
Do not overheat the tape until its surface dries to turn white.



(6) Use a resin spatula to scrape off the pressure sensitive adhesive double coated tape.



(7) Wipe off application surface of body with clean cloth dampened with degreaser (3M ATD Part No. 8906 or equivalent).

NOTE
After wiping surface, leave surface as it is to volatilize degreaser.

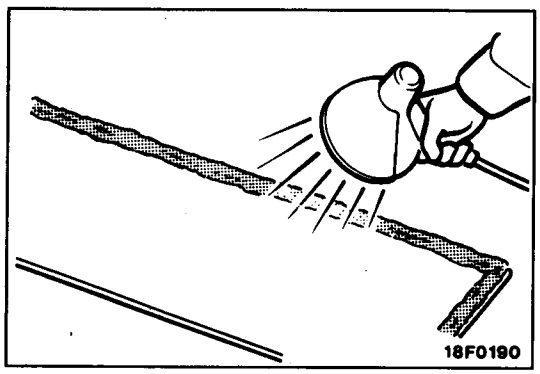
SERVICE POINT OF INSTALLATION

9. INSTALLATION OF SIDE GARNISH

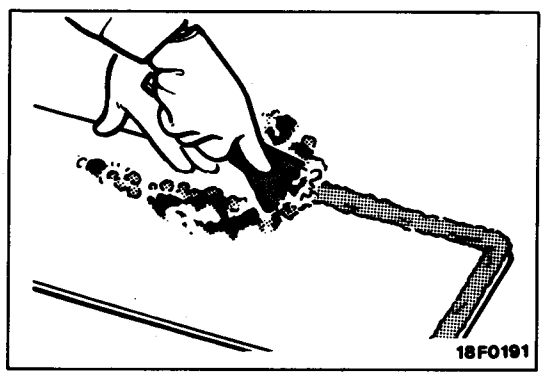
Adhesion of Pressure Sensitive Double-sided Tape to Side Garnish (For Reuse)

(1) Use an infrared lamp or the like to heat the pressure sensitive double-sided tape to 40 to 60°C (104 to 140°F) for 5 to 10 minutes.

Caution
Do not overheat the tape until its surface dries to turn white.

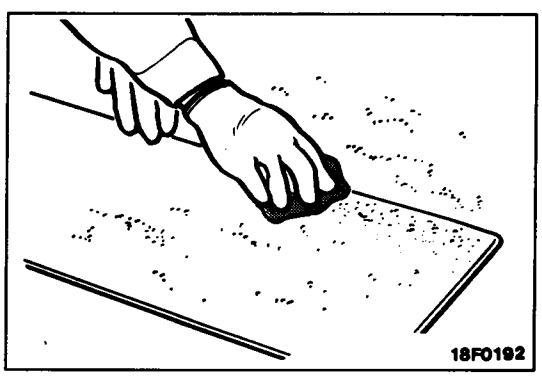


(2) Using a resin spatula or gasket scraper, scrape off the pressure sensitive double-sided tape.
(3) If the pressure sensitive double-sided tape remains on the side garnish, repeat steps (1) and (2).



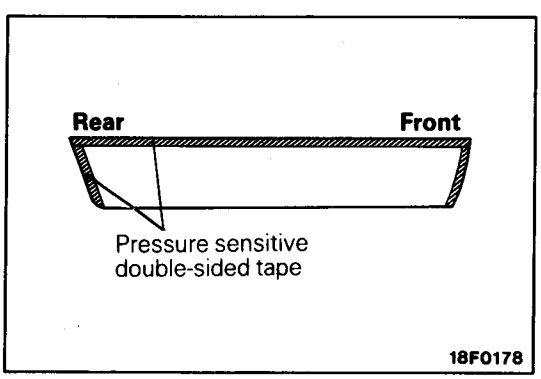
(4) Use cloth moistened with degreaser (3M ATD Part No. 8906 or equivalent) to wipe the side garnish clean.
(5) Scrape old adhesive slightly.

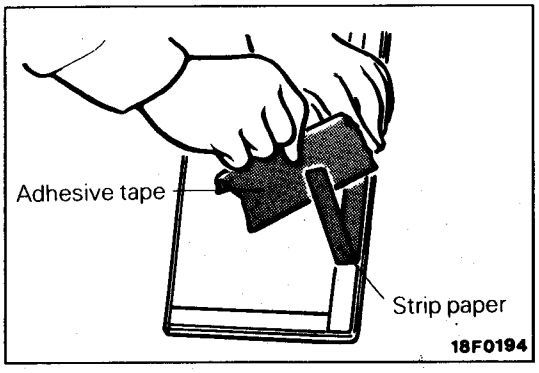
Caution
Do not scrape off all old adhesive.

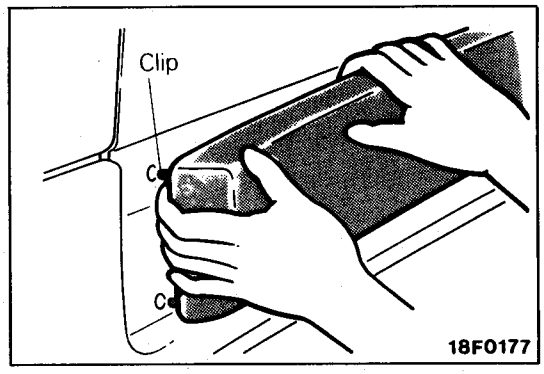


(6) Affix specified pressure sensitive double-sided tape to the side garnish.

Specified adhesive tape: 3M ATD Part No. 6382 or equivalent







Installation of Side Garnish

(1) Remove strip paper from the pressure sensitive double-sided tape.

NOTE
Affix adhesive tape to the end of strip paper for ease of strip paper removal.

(2) With its clips and bolts aligned with the respective holes in the body, install the side garnish to the body.

NOTE
If it is hard to affix the pressure sensitive double-sided tape in winter, heat the application surface of the body and the adhesive surface of the side garnish before affixing the tape.

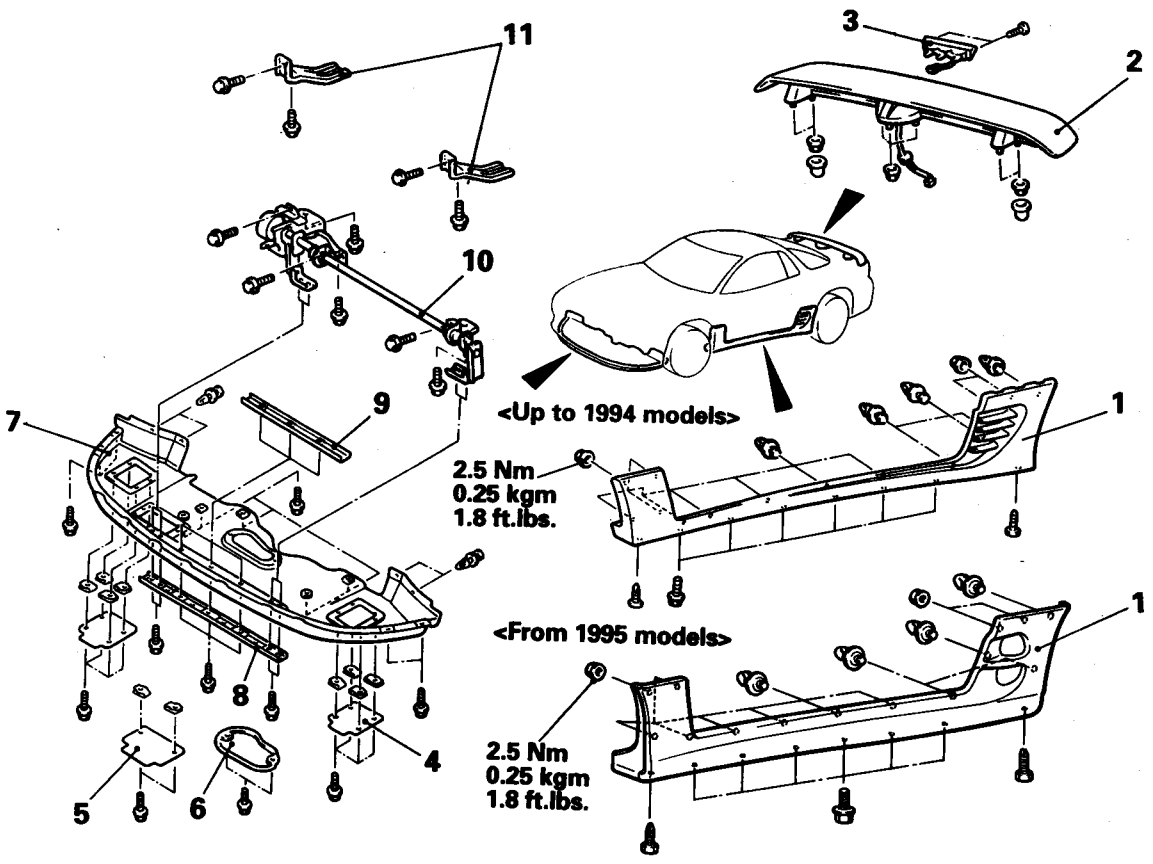
Body	40 – 60°C (104 – 140°F)
Side garnish	20 – 30°C (68 – 86°F)

(3) Apply pressure fully to the side garnish.

AERO PARTS

E51HBAR

REMOVAL AND INSTALLATION



18F0338

Side air dam removal steps

Front splash shield
(Refer to GROUP 42 – Fender.)

◀▶ ◆◆ 1. Side air dam

Rear spoiler removal steps

Tailgate lower trim
(Refer to GROUP 52A – Trims.)

2. Rear spoiler assembly
3. High mounted stop lamp <L.H. drive vehicles>

Front under cover panel, air dam link assembly removal steps

4. Side cover panel (L.H.)
5. Front cover panel
6. Center cover panel
7. Front under cover panel
8. Lower plate
9. Upper plate

◆◆ 10. Air dam link assembly

11. Under cover bracket

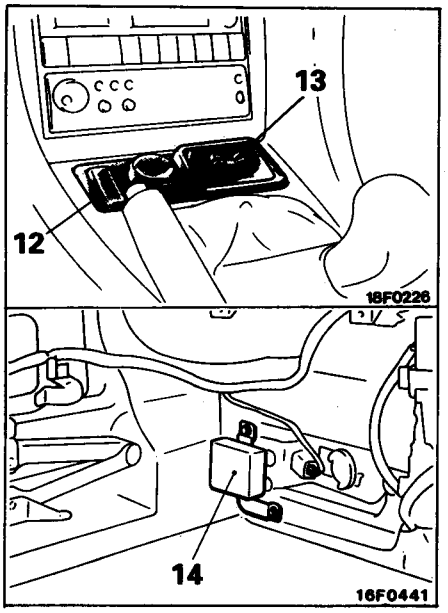
Active aero switch removal steps

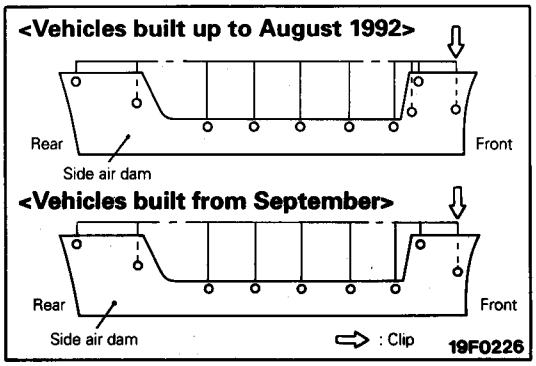
12. Switch garnish C
13. Active aero switch

Active aero control unit removal steps

Rear side trim (L.H.)
(Refer to GROUP 52A – Trims.)

14. Active aero control unit

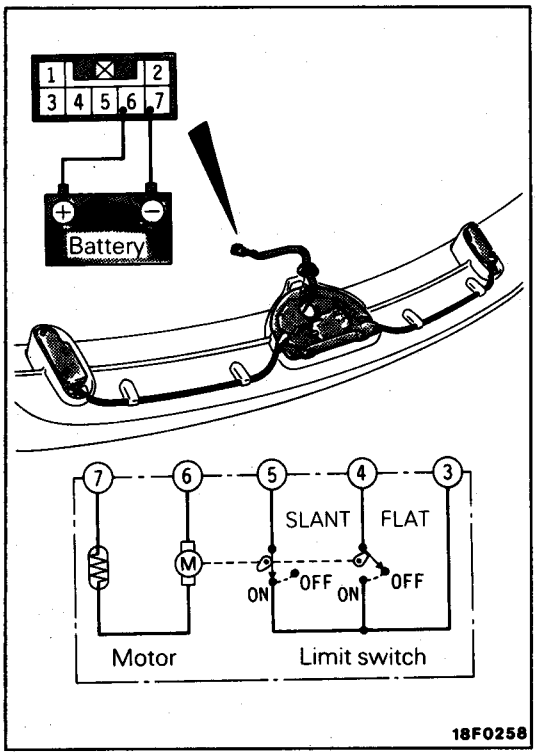




SERVICE POINT OF REMOVAL

1. REMOVAL OF SIDE AIR DAM

Remove the side air dam by the same procedure as the side garnish. (Refer to P.51–15.)



INSPECTION

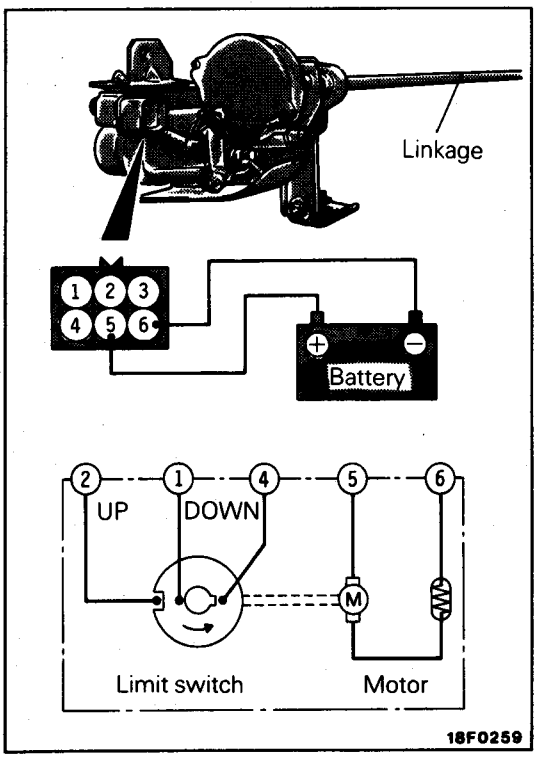
1. INSPECTION OF REAR SPOILER MOTOR AND LIMIT SWITCH

(1) Connect the battery, see illustration to ensure that the motor and spoiler operate freely. Then connect the battery with the reversed polarity to ensure that the motor and spoiler operate freely.

(2) While performing the inspection described in (1) above, check the limit switch for continuity.

Spoiler position \ Terminal	3	4	5
FLAT (standard position)	○		○
During operation	○	○	
	○		○
SLANT (operative position)	○	○	

NOTE
○–○ indicates that there is continuity between the terminals.



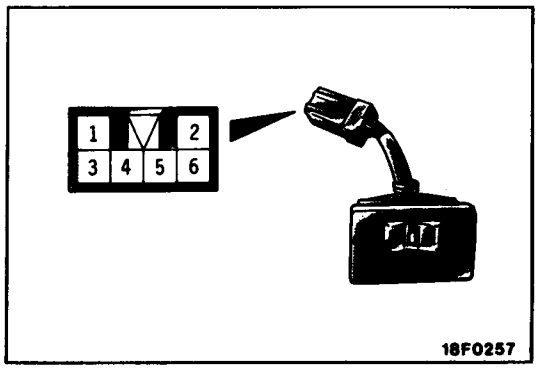
2. INSPECTION OF AIR DAM LINK ASSEMBLY MOTOR AND LIMIT SWITCH

(1) Connect the battery, see illustration to ensure that the motor and the linkage operate freely.

(2) While performing the inspection described in (1) above, check the limit switch for continuity.

Linkage position \ Terminal	1	2	4
UP (standard position)	○		○
During operation		○	○
	○		○
DOWN (operative position)		○	○

NOTE
○–○ indicates that there is continuity between the terminals.



3. INSPECTION OF ACTIVE AERO SWITCH

Operate the switch to check the continuity between the terminals.

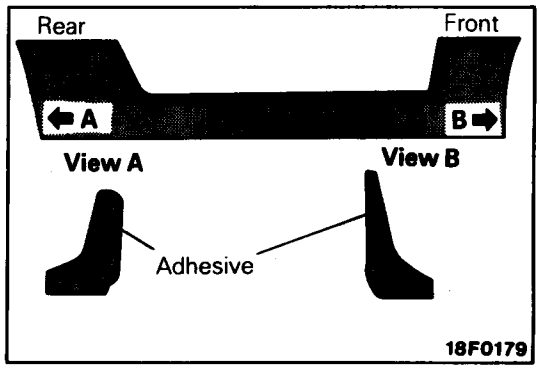
Switch position \ Terminal	5	1	2	4	6	3
OFF	ILL	○—○	○—○	○—○	○—○	IND
AUTO 1		○—○	○—○		○—○	
AUTO 2 (Automatic reset type)				○—○		

NOTE
○—○ indicates that there is continuity between the terminals.

SERVICE POINTS OF INSTALLATION

10. INSTALLATION OF AIR DAM LINK ASSEMBLY

Install the air dam link assembly in the operative condition for ease of front under cover panel.

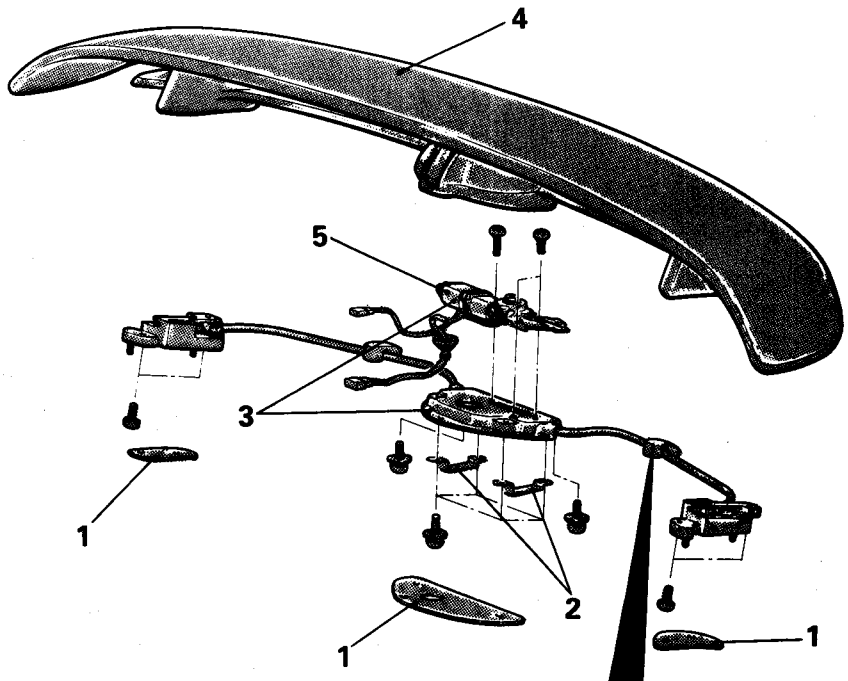


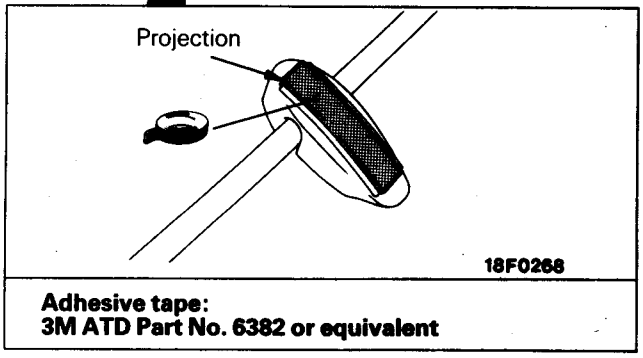
1. INSTALLATION OF SIDE AIR DAM

Install the side air dam by the same procedure as the side garnish (refer to P.51–16), provided that specified adhesive is used.

Specified adhesive: 3M ATD Part No. 8609 SUPER FAST URETHAN or equivalent

DISASSEMBLY AND REASSEMBLY <REAR SPOILER ASSEMBLY>



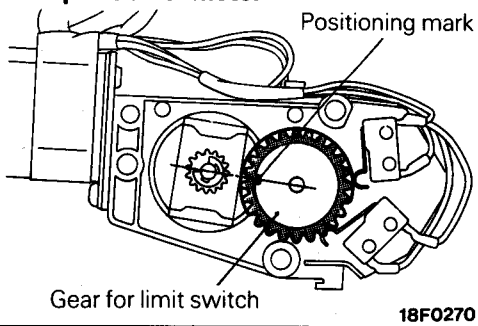


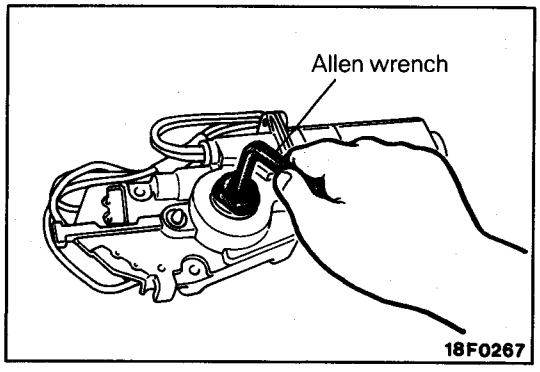
Adhesive tape:
3M ATD Part No. 6382 or equivalent

Disassembly steps

1. Spacer
2. Bracket
3. ◆◆ Motor and cable assembly
4. Rear spoiler
5. ◆◆ Motor

Neutral position of motor



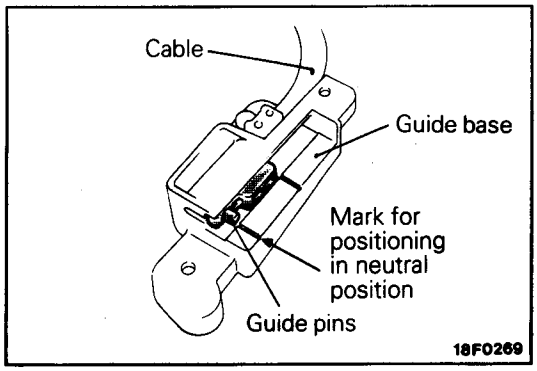


SERVICE POINTS OF REASSEMBLY

5. INSTALLATION OF MOTOR

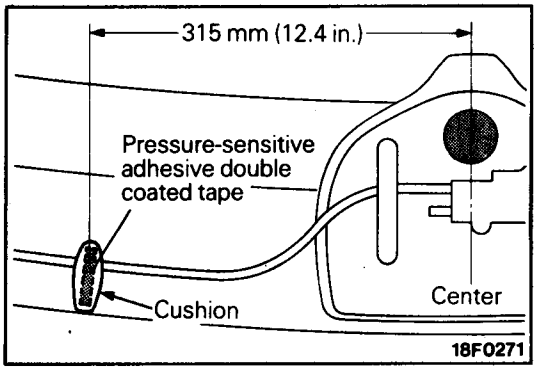
(1) See illustration to ensure that the motor is in the neutral position.

(2) If the motor is not in the neutral position, use allen wrench to turn the gear for the limit switch until the motor is in the neutral position.



(3) Align the centre of the guide pin with the positioning mark of the guide base to set the cable in the neutral position.
(4) Install the motor to the cable assembly.

NOTE
When the motor is installed to the cable assembly, the drive gear of the motor may not engage with the cable. In such a case, they can be engaged with each other by tightening the motor mounting screw.



3. INSTALLATION OF MOTOR AND CABLE ASSEMBLY

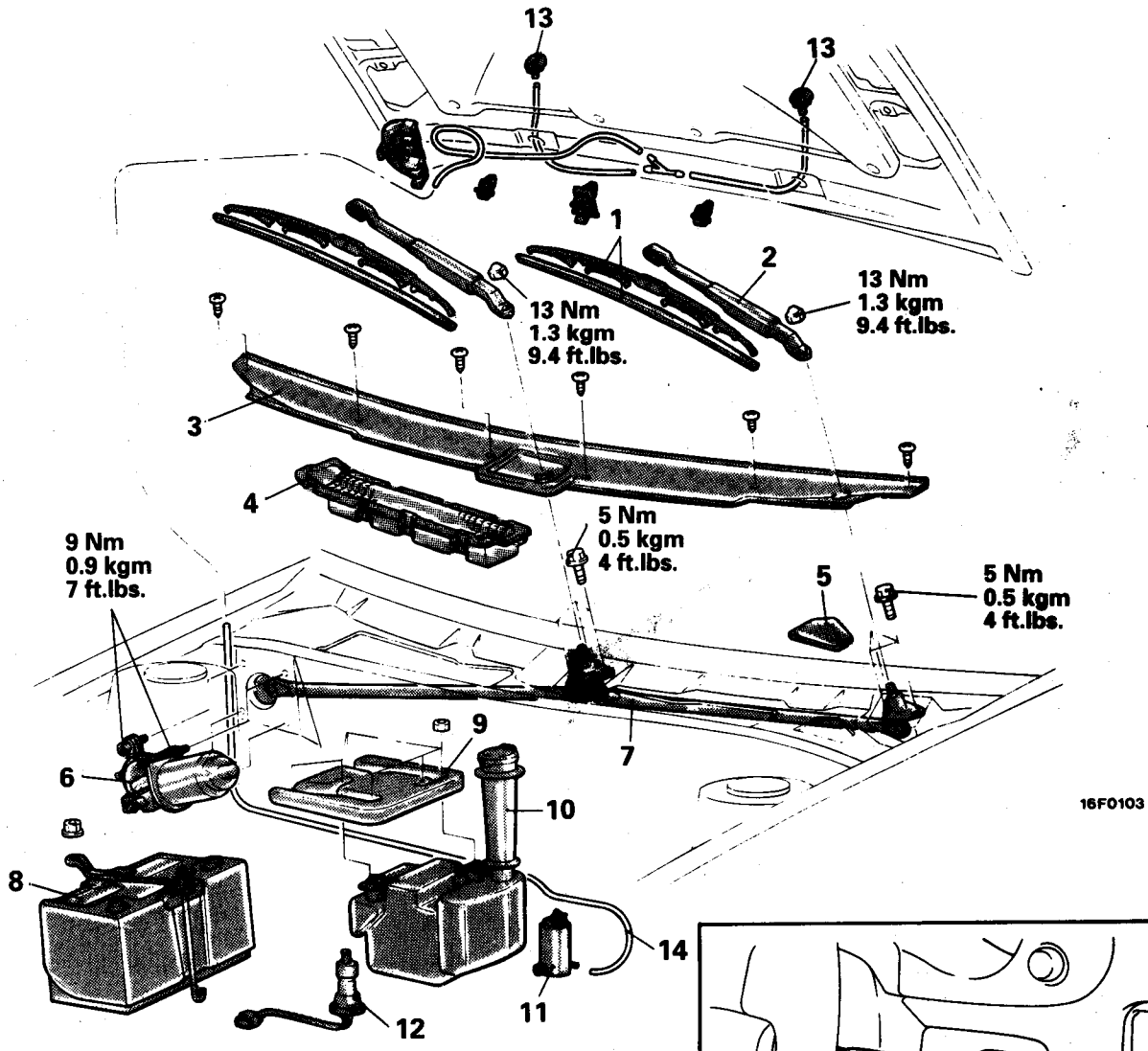
Affix pressure-sensitive adhesive double coated tape to the projection of each cushion and install the cushion in the position shown in the illustration.

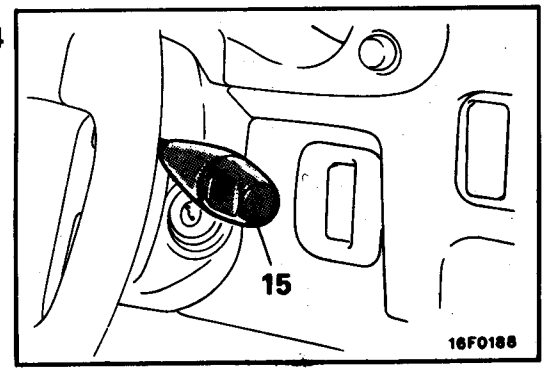
Specified adhesive tape:
3M ATD Part No. 6382 or equivalent

WINDSHIELD WIPER AND WASHER

REMOVAL AND INSTALLATION

E51KAA0





Linkage removal steps

1. Wiper blade
2. Wiper arm
3. Front deck garnish
4. Air inlet garnish (RH)
5. Hole cover
6. Wiper motor
7. Linkage

Wiper motor removal steps

1. Wiper blade
2. Wiper arm
5. Hole cover
6. Wiper motor

Column switch (wiper and washer switch) removal

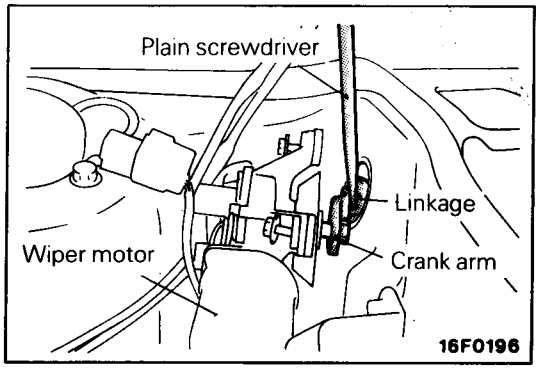
15. Column switch (Refer to GROUP 54 – Column Switch.)

Washer tank removal steps

8. Battery
9. Battery tray
10. Washer tank
11. Washer motor
12. Washer fluid level sensor

Washer tube removal steps

8. Battery
9. Battery tray
13. Washer nozzle
14. Washer tube

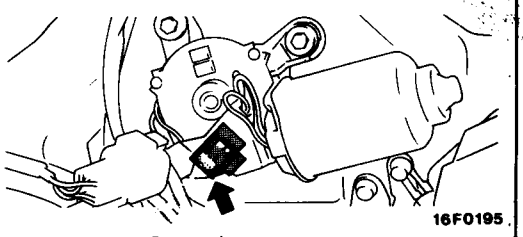


SERVICE POINT OF REMOVAL

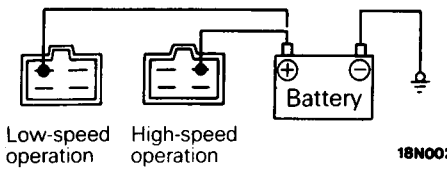
6. REMOVAL OF WIPER MOTOR

(1) Remove the wiper motor mounting bolts.
(2) Using a plain screwdriver, detach the crank arm of the wiper motor from the linkage to remove the wiper motor.

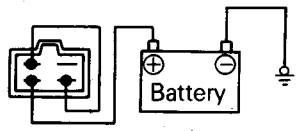
Caution
Do not remove the crank arm from the wiper motor except when necessary, as the auto stop angle has been preset. When the crank arm is to be removed, make a mark on both of them before removal.



Inspection of Operation



Inspection of Stop Position



INSPECTION

INSPECTION OF WIPER MOTOR

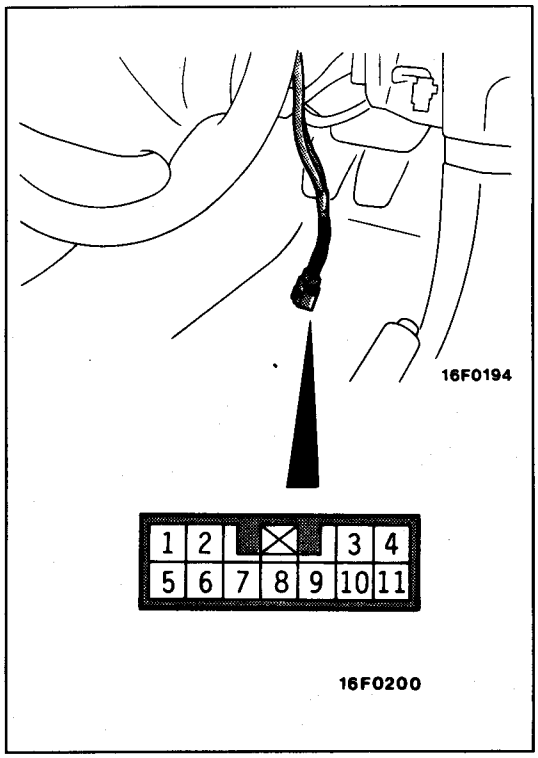
Inspect the wiper motor mounted on the vehicle with its connector disconnected.

Inspection of Wiper Motor Operation at LOW and HIGH Speeds

Connect the battery to the wiper motor as shown, and check its operation at LOW and HIGH speeds.

Inspection of Wiper Motor STOP Position

(1) Operate the wiper motor at LOW speed and intermediately disconnect the battery to let the wiper motor stop.
(2) Connect the terminals as well as the battery, as shown, and check that the wiper motor stops at the automatically-stopped position following LOW-speed operation.



INSPECTION OF COLUMN SWITCH

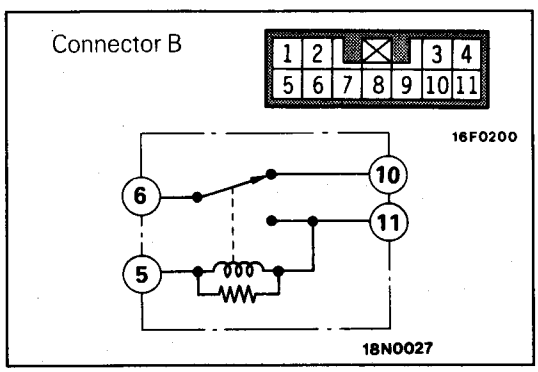
(1) Remove the knee protector.
(Refer to GROUP 52A – Instrument Panel.)
(2) Remove the column cover.
(3) Remove the column switch right coupling connector (11 terminals).

Inspection of Wiper and Washer Switch

Operate the switch to check for continuity between the terminals.

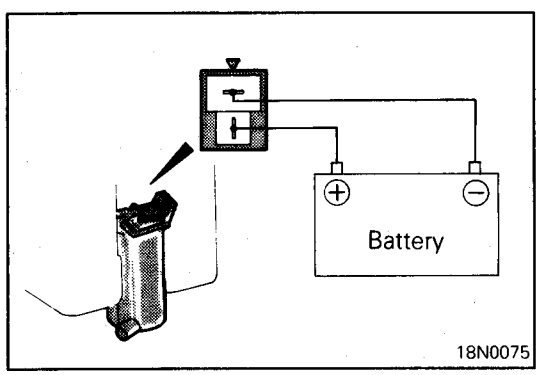
Switch position \ Terminal No.		3	4	5	6	7	8	9	10
Wiper switch	OFF				○	—	—	—	○
	INT	○	—	—	—	—	—	○	—
					○	—	—	—	○
	LO			○	○				
	HI			○	—	○			
Variable intermittent wiper control switch			○	—	—	—	—	○	
Washer switch				○	—	—	○		

NOTE
○–○ denotes that there is continuity between the terminals.



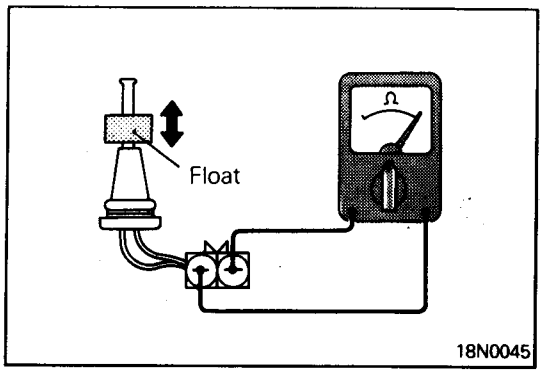
Inspection of Wiper Relay (Built-in Column Switch)

(1) Check to ensure that there is continuity between terminals ⑤ and ⑪ and between the terminals ⑥ and ⑩, and that there is no continuity between terminals ⑥ and ⑪.
(2) Connect the positive terminal of the battery to terminal ⑤ and the negative terminal to terminal ⑪ to check that the battery voltage is available at terminal ⑥.



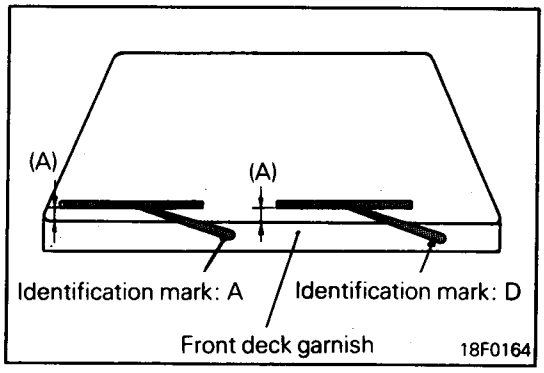
INSPECTION OF WASHER MOTOR

(1) When the washer motor is inspected, make sure that it is mounted on the washer tank and that the washer tank is filled with water.
(2) Connect the battery as shown to check whether water is pumped out.



INSPECTION OF WASHER FLUID LEVEL SENSOR

(1) Connect a circuit tester to the connector of the level sensor as shown.
(2) Check that when the float is moved down, the circuit is closed and that when the float is moved up, the circuit is opened.



SERVICE POINT OF INSTALLATION

2. INSTALLATION OF WIPER ARM

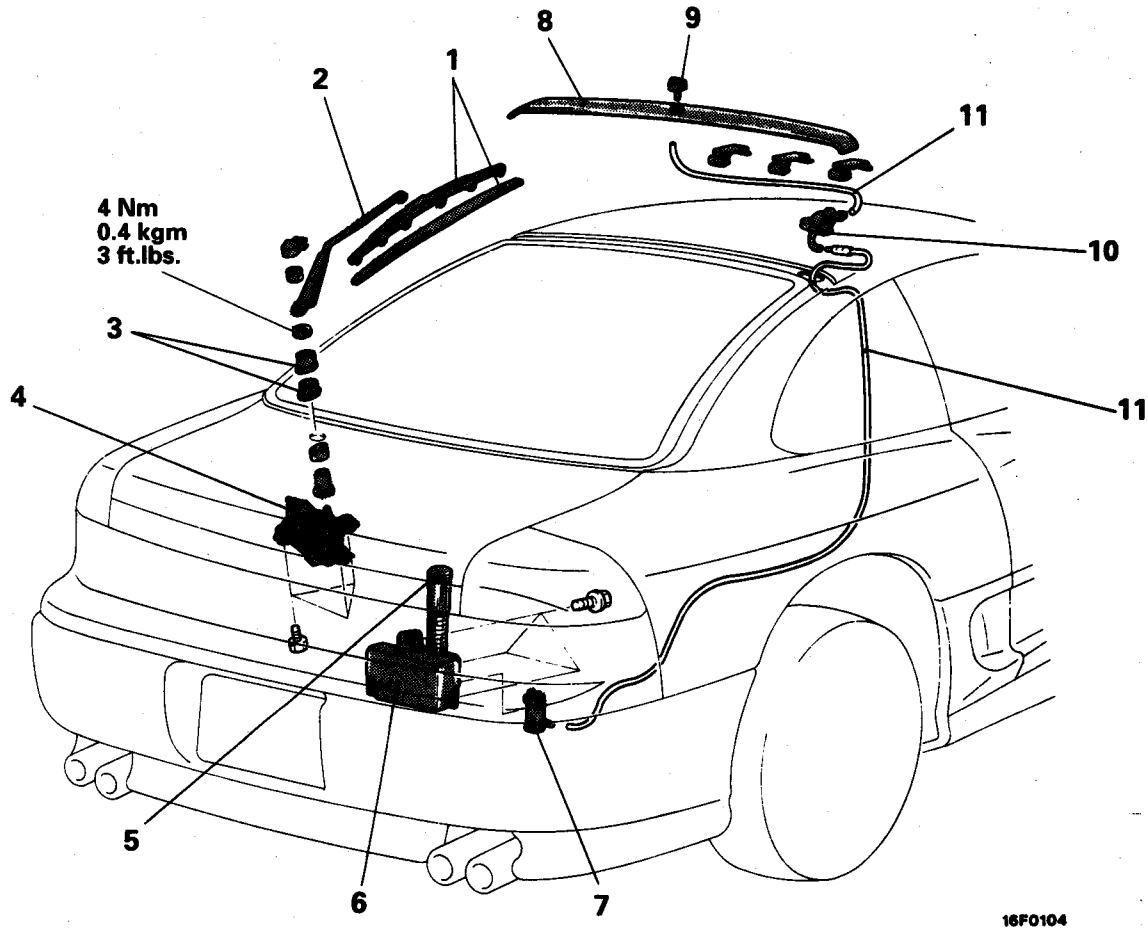
(1) The wiper arms, right and left, are different in shape. Check the identification symbol.
(2) After the wiper blades have been set, install them in such a way that the ends of the wiper blades will stop at the specified positions (standard values).

Standard value: (A) 15^{+5}_{-0} mm ($0.6^{+0.2}_{-0}$ in.)

REAR WIPER AND WASHER

E51LAAO

REMOVAL AND INSTALLATION



Wiper motor removal steps

1. Wiper blade
2. Wiper arm
3. Spacer
   Tailgate lower trim (Refer to GROUP 52A – Trims.)
4. Wiper motor

Washer tank removal steps

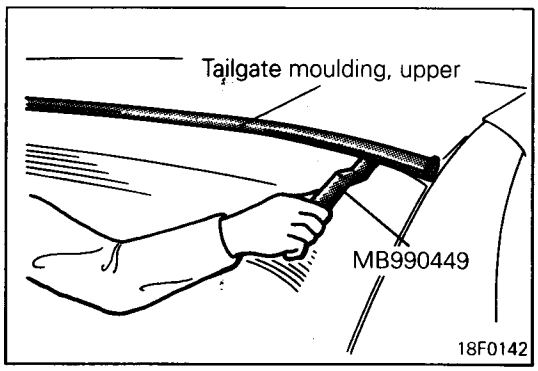
Rear end trim (Refer to GROUP 52A – Trims.)

5. Cap
6. Washer tank
7. Washer motor

Washer tube removal steps

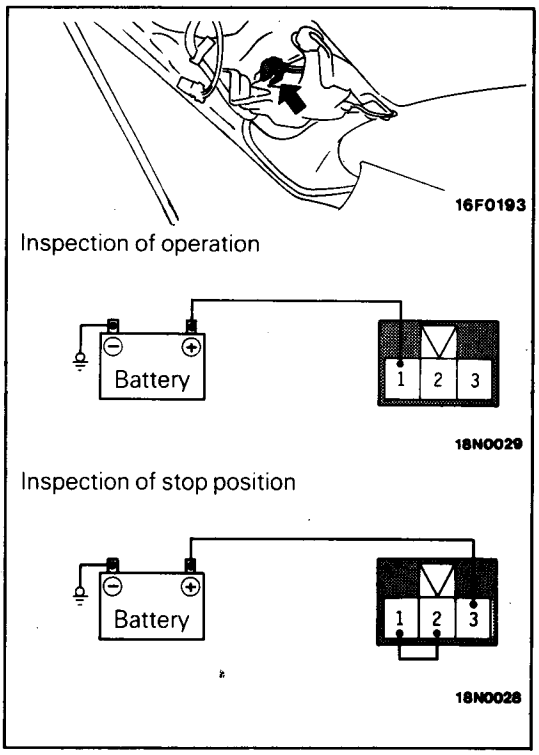
Front pillar trim (RH)
Quarter trim (RH)
Quarter upper trim (RH)
Rear roof rail trim
Rear side trim (RH)
} (Refer to GROUP 52A – Trims.)

8. Tailgate moulding, upper
9. Washer nozzle
10. Tube and grommet assembly
11. Washer tube



SERVICE POINT OF REMOVAL

8. REMOVAL OF TAILGATE MOULDING, UPPER



INSPECTION

WIPER MOTOR

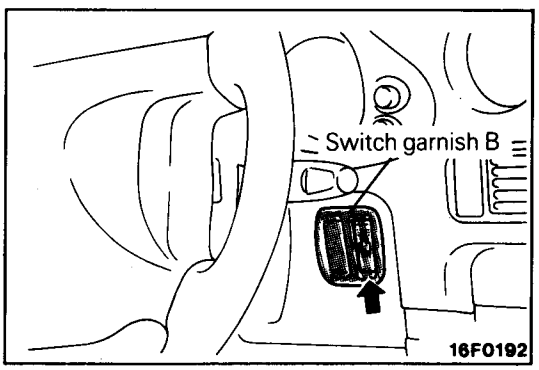
Check the wiper motor with it mounted on the vehicle and with its harness connector disconnected.

Operation of Wiper Motor

Connect a battery to the wiper motor, as shown, to check the operation of the wiper motor.

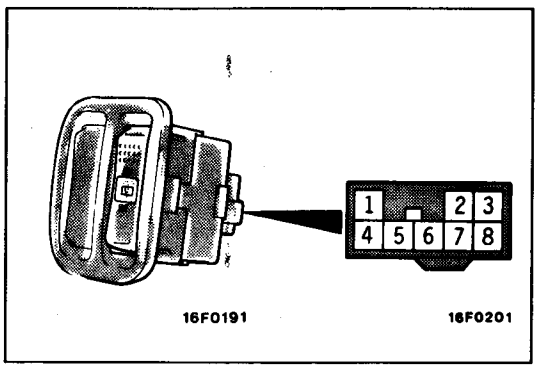
Wiper Motor Stop Position

(1) Operate the wiper motor by the procedure described above and intermediately disconnect the battery to let the wiper motor stop.
(2) Reconnect the battery as shown and check that the wiper motor stops at the automatically-stopped position after operation.



WIPER WASHER SWITCH

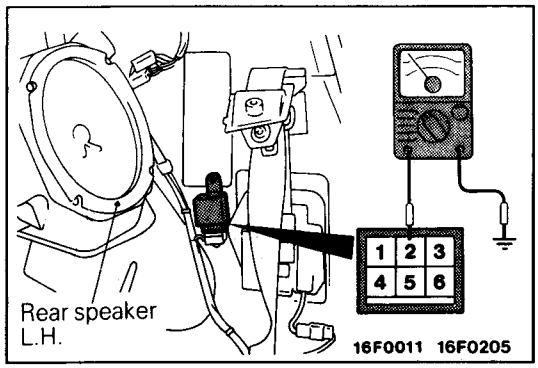
(1) Remove switch garnish B from the knee protector.



(2) Operate the switch to check for continuity between the terminals.

Switch position \ Terminal		2	4	5	6	7	8	1	3
Wiper switch	OFF		○—○					ILL	
	INT		○—○			○—○			
	ON			○—○					
Washer switch	OFF								
	ON	○—		—○					

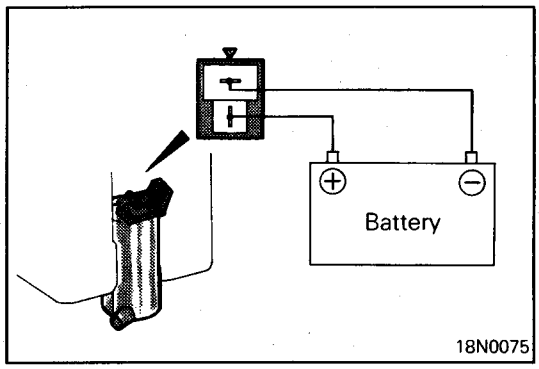
NOTE
○—○ denotes that there is continuity between the terminals.



INTERMITTENT WIPER RELAY

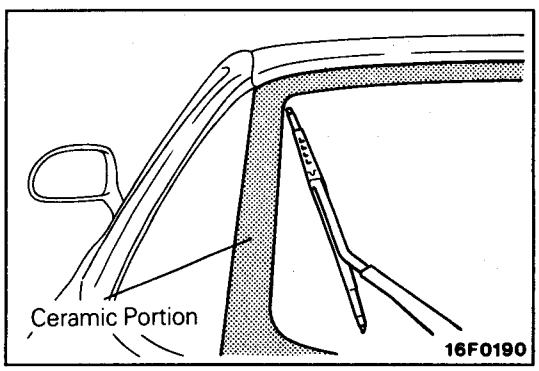
(1) Remove the quarter trim. (Refer to GROUP 52A – Trims.)
(2) With the intermittent wiper relay connected to the wiring harness connector, let the wiper operate intermittently and check the voltage at terminal ②.

Condition	Standard
When wiper is stationary	0V
When wiper is in operation	System voltage



WASHER MOTOR

(1) When the washer motor is inspected, make sure that it is mounted on the washer tank and that the washer tank is filled with water.
(2) Connect the battery as shown to check whether water is pumped out.



SERVICE POINT OF INSTALLATION

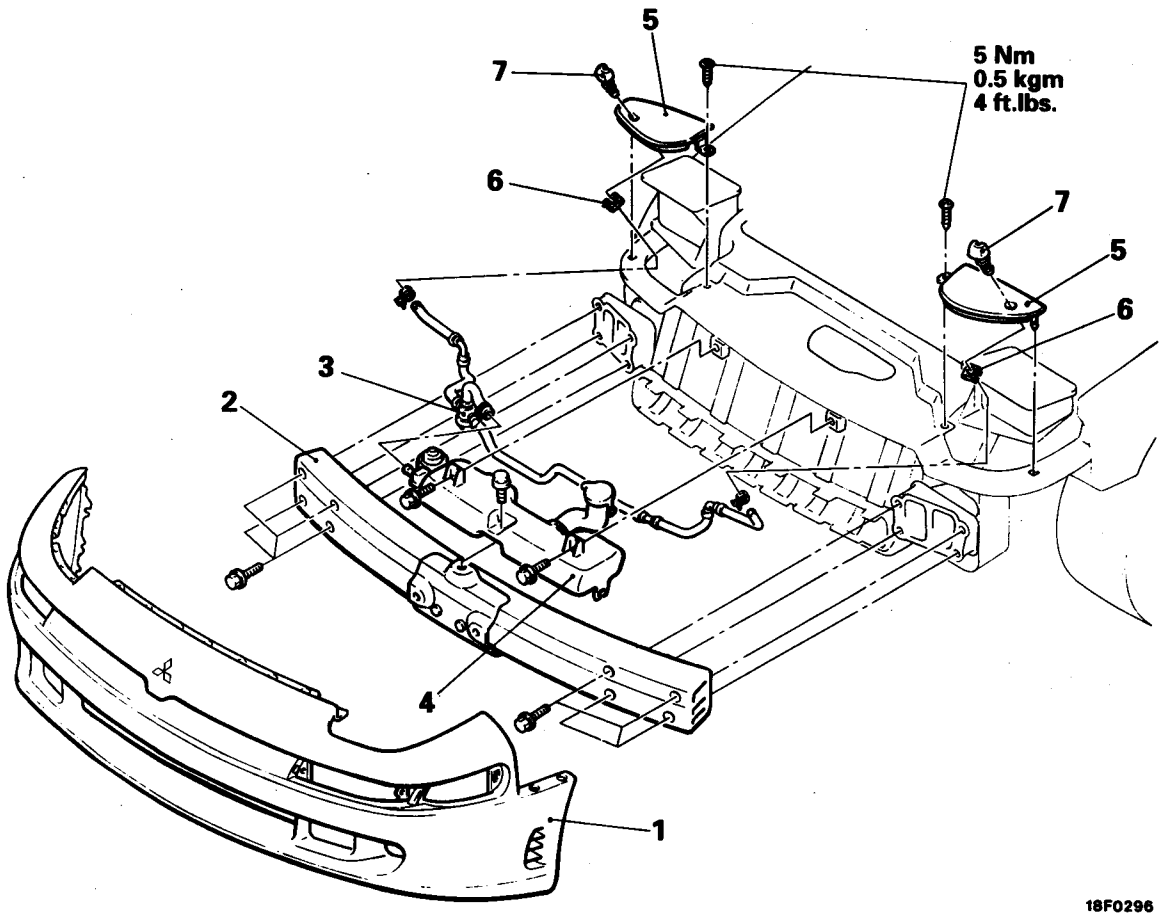
2. INSTALLATION OF WIPER ARM

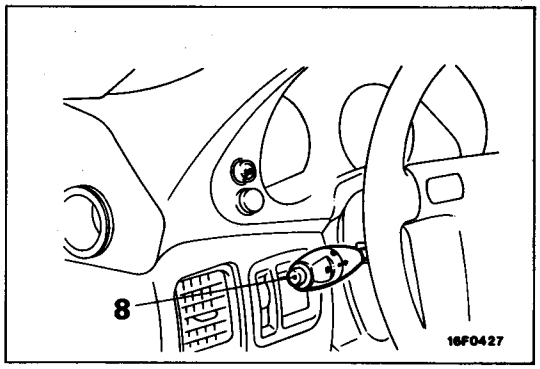
After assembling the wiper blade to the wiper arm, install the wiper arm with its tip positioned along the ceramic part.

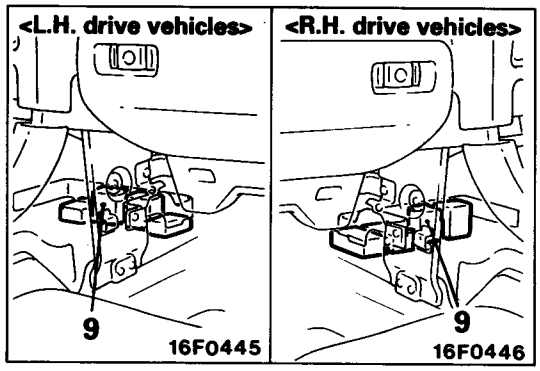
HEADLAMP WASHER

E51MAAP

REMOVAL AND INSTALLATION <UP TO 1994 MODELS>







Headlamp washer tank removal steps

1. Front bumper face (Refer to P.51-9-1.)
2. Front bumper reinforcement assembly
3. Headlamp washer hose assembly
4. Headlamp washer tank

Headlamp washer nozzle removal steps

5. Headlamp cover
6. Clip
7. Headlamp washer nozzle

Column switch (headlamp washer switch) removal

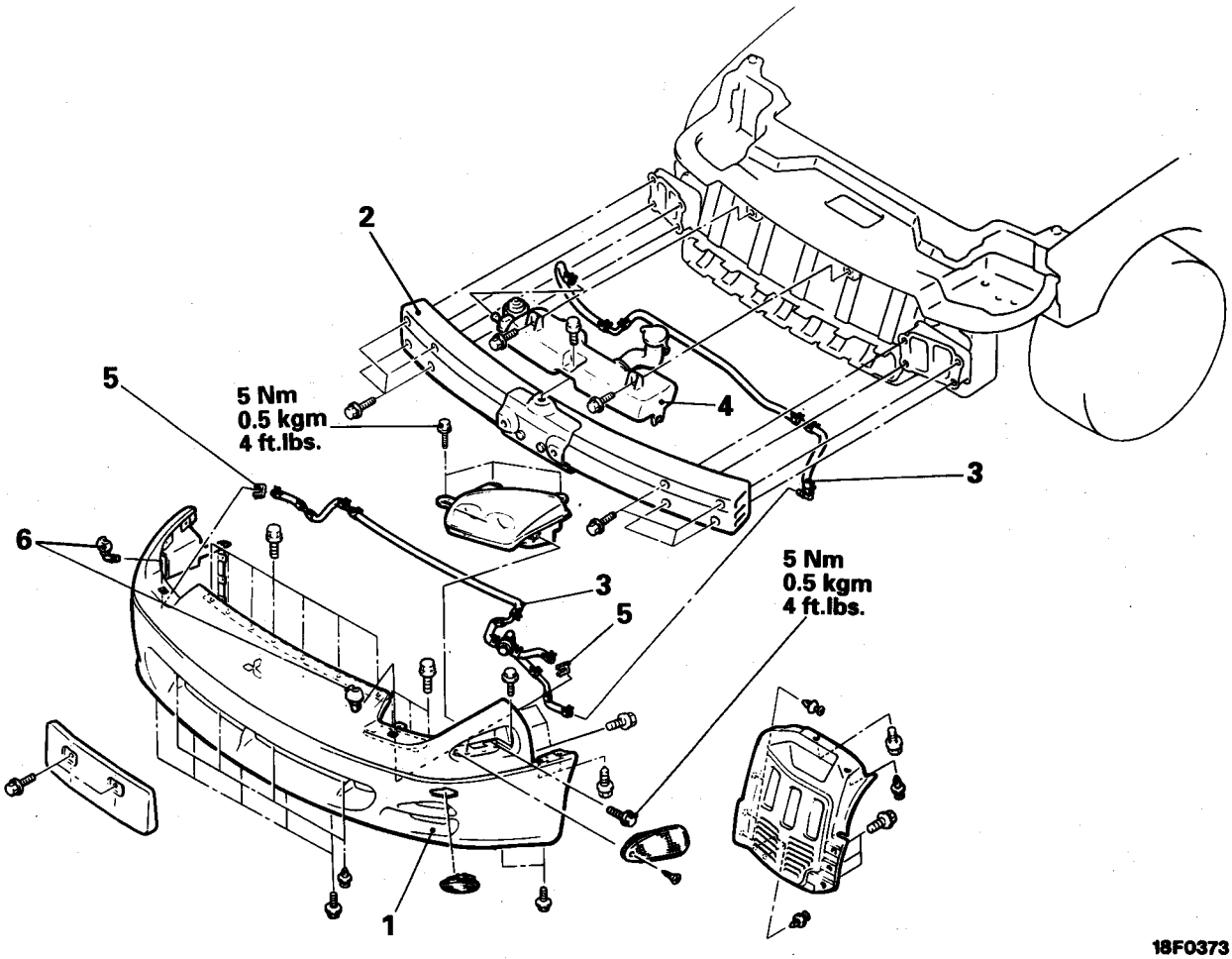
8. Column switch (Refer to GROUP 54 – Column switch.)

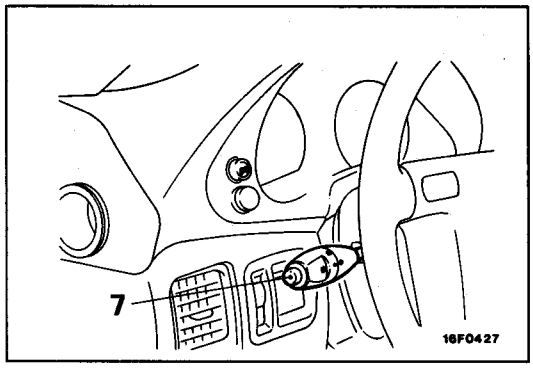
Headlamp washer relay removal steps

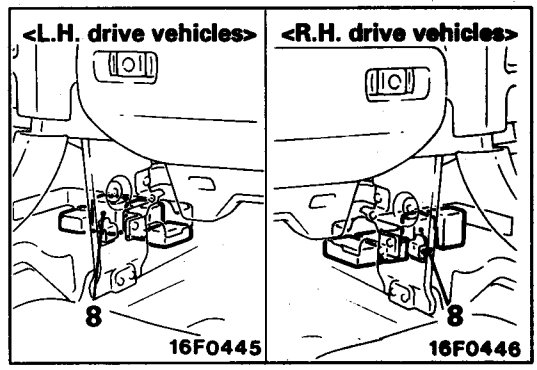
Floor console assembly
(Refer to GROUP 52A – Floor console.)

9. Headlamp washer relay

REMOVAL AND INSTALLATION <FROM 1995 MODELS>







Headlamp washer tank removal steps

1. Front bumper face (Refer to P.51-9-1.)
2. Front bumper reinforcement assembly
3. Headlamp washer hose assembly
4. Headlamp washer tank

Headlamp washer nozzle removal steps

5. Clip
6. Headlamp washer nozzle

Column switch (headlamp washer switch) removal

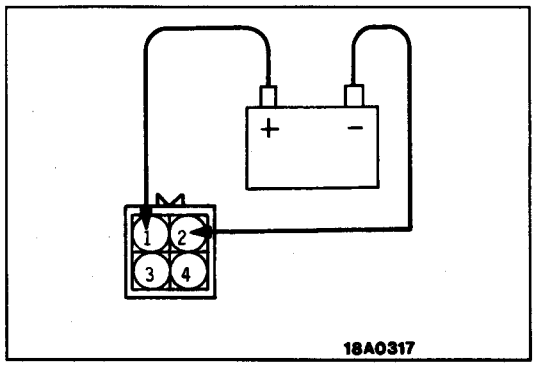
7. Column switch (Refer to GROUP 54 – Column switch.)

Headlamp washer relay removal steps

Floor console assembly
(Refer to GROUP 52A – Floor console.)

8. Headlamp washer relay

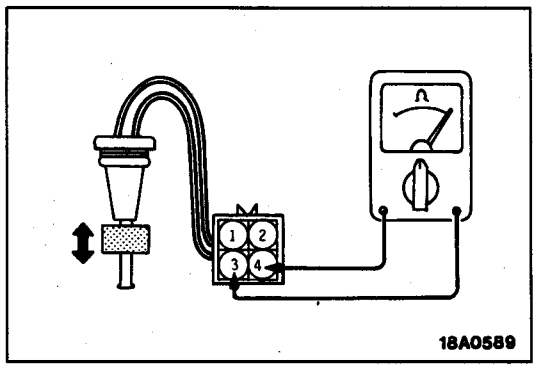
NOTES



INSPECTION

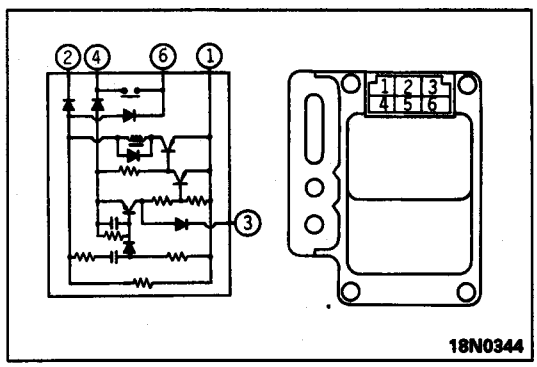
HEADLAMP WASHER MOTOR

(1) With the washer motor installed to the washer tank, fill the washer tank with water.
(2) Connect battery (+) and (–) cables to terminals 2 and 1 respectively to see that the washer motor runs and water is injected.

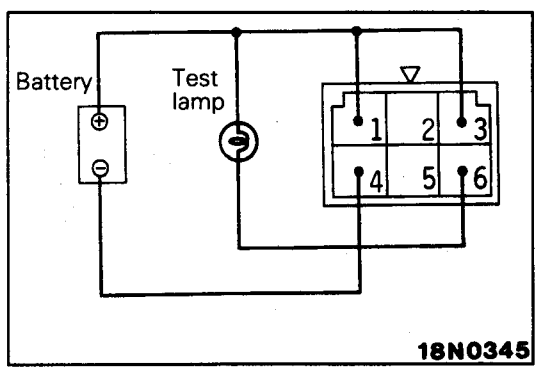


WASHER FLUID LEVEL SENSOR

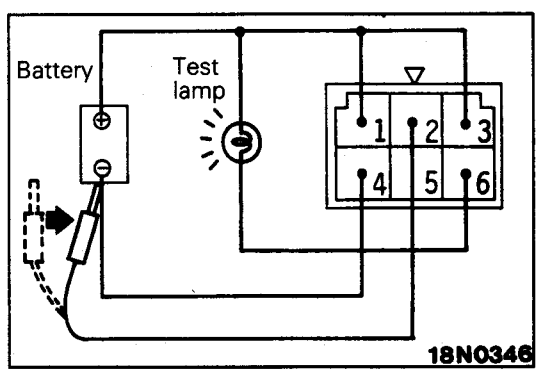
(1) Remove the washer fluid level sensor from the washer tank.
(2) Connect a circuit tester to the connector of washer fluid level sensor.
(3) Move the float up and down.
(4) Make sure that when the float is raised, there is no continuity and when it is lowered, there is continuity.



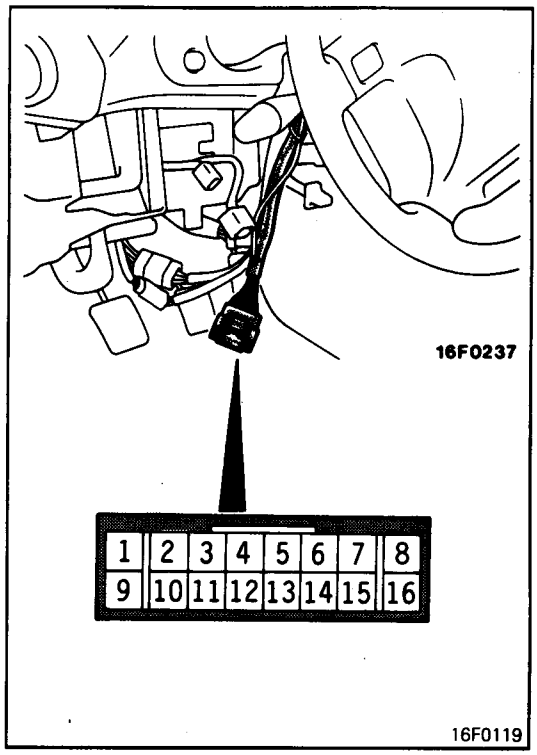
HEADLAMP WASHER RELAY



(1) Connect battery and test lamp to the relay as illustrated.



(2) The relay is normal if the lamp lights for approximately 0.5 second upon connection of terminal 2 to battery (–).

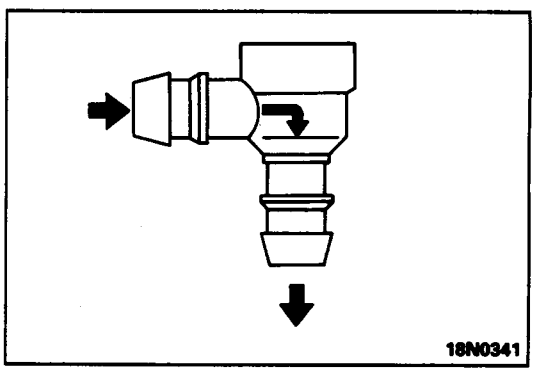


HEADLAMP WASHER SWITCH

Disconnect the column switch connector and check the continuity between the terminals for each switch.

Switch position \ Terminal	11	14
OFF		
ON	○———	———○

NOTE
○—○ indicates that there is continuity between the terminals.



CHECK VALVE

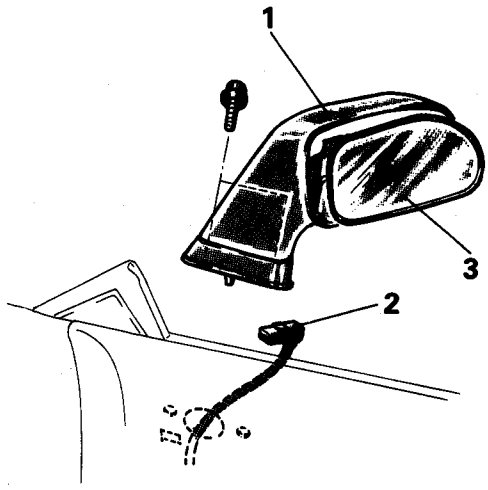
Apply pressure to the inlet of the check valve to check its opening pressure.

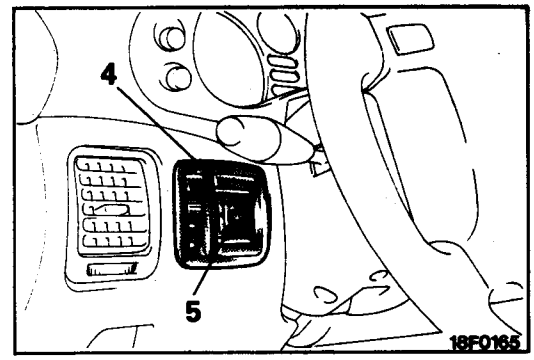
Opening pressure: 50 – 110 kPa
(0.5 – 1.1 kg/cm², 7.1 – 15.6 psi)

DOOR MIRROR

E51JAAV

REMOVAL AND INSTALLATION





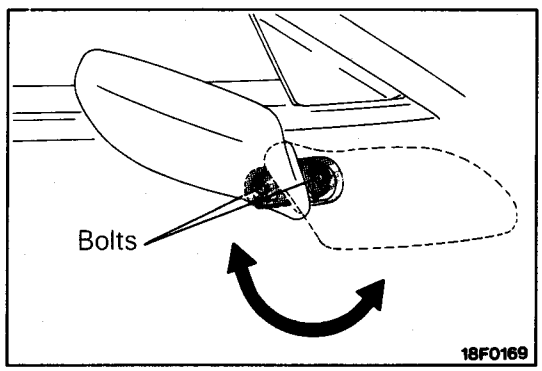
18F0166

Door mirror removal steps

- ◆◆ 1. Door mirror
- 2. Harness connector
- ◆◆ 3. Mirror

Electric remote controlled mirror switch removal

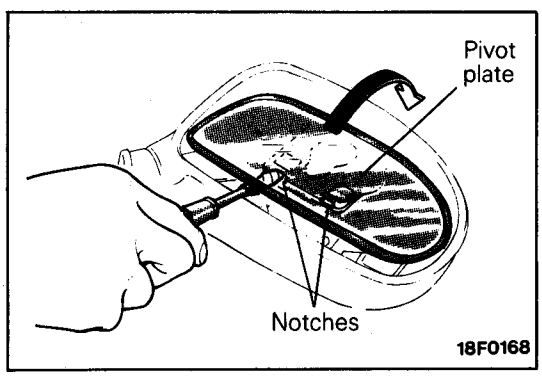
4. Instrument panel switch
5. Electric remote controlled mirror switch



SERVICE POINTS OF REMOVAL

1. REMOVAL OF DOOR MIRROR

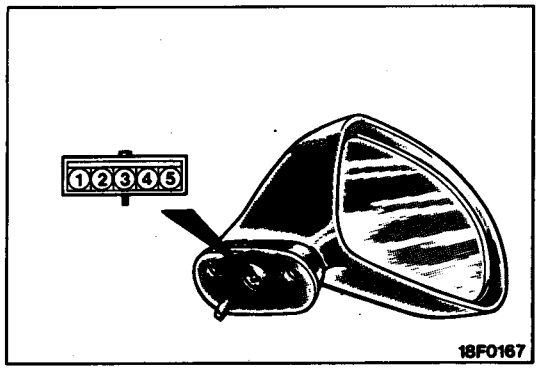
Tilt the door mirror backward and forward to remove the attaching bolts.



3. REMOVAL OF MIRROR

Tilt the mirror upward and fit a screwdriver blade covered with protective tape in the notch between the mirror and the pivot plate to pry up the mirror.

Caution
Do not fit the screwdriver blade between the pivot plate and actuator assembly.



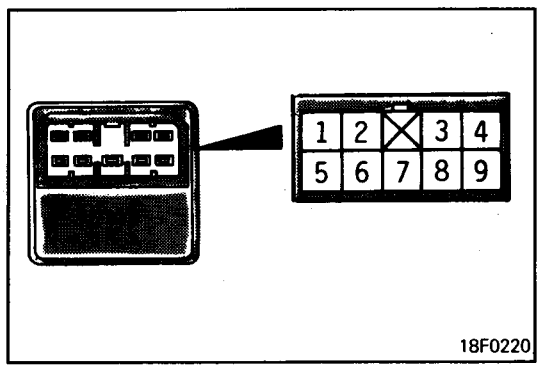
INSPECTION

DOOR MIRROR

(1) Check to be sure that the mirror moves as described in the table when each terminal is connected to the battery.
(2) Check to see that there is continuity between terminals 1 and 5.

Connection / Direction	Battery		Terminal				
	(+)	(–)	2	3	4	1	5
UP	○	○	○		○		
DOWN	○	○	○		○		
RIGHT	○	○	○	○			
LEFT	○	○	○	○			

NOTE
○–○ indicates that each terminal is connected to the battery.



ELECTRIC REMOTE CONTROL MIRROR SWITCH

Operate switches and check for continuity between terminals.

Terminal / Direction	Left side					Right side				
	3	4	6	7	8	2	4	6	7	9
UP		○	○	○	○	○	○			
DOWN		○	○	○	○	○		○	○	
LEFT	○	○	○	○			○	○	○	○
RIGHT	○	○	○	○			○	○	○	○

NOTE
○–○ indicates that there is continuity between the terminals.

INTERIOR

CONTENTS

E52AA--

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver (from rendering the SRS inoperative).
(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIAL TOOL

E52DA--

Tool	Number	Name	Use
	MB990784	Ornament remover	Removal of center air outlet

INSTRUMENT PANEL

E52GAAN

For installation of the instrument panel, the bolts and screws described below are used. They are indicated by symbols in the illustration.

Name	Symbol	Size mm (in.) (D x L)	Color	Shape
Tapping screw	A	5 × 16 (0.20 × 0.63)	–	
	B	5 × 30 (0.20 × 1.2)	–	
	C	4 × 12 (0.16 × 0.47)	Black	
	D	5 × 16 (0.20 × 0.63)	Black	
	E	4 × 16 (0.16 × 0.63)	–	
Washer assembled screw	F	5 × 16 (0.20 × 0.63)	–	
	G	4 × 12 (0.16 × 0.47)	–	
Washer assembled bolt	H	6 × 16 (0.24 × 0.63)	–	
	I	6 × 16 (0.24 × 0.63)	–	 19N0001
	J	6 × 20 (0.24 × 0.79)	–	
	K	6 × 20 (0.24 × 0.79)	Black	
	L	6 × 25 (0.24 × 0.98)	Black	

NOTE
D = Thread diameter
L = Effective thread length

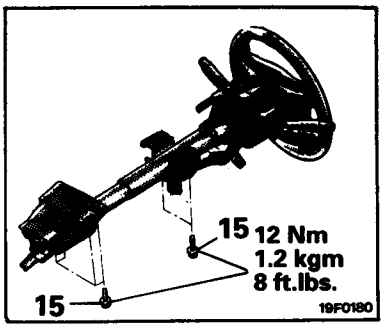
REMOVAL AND INSTALLATION

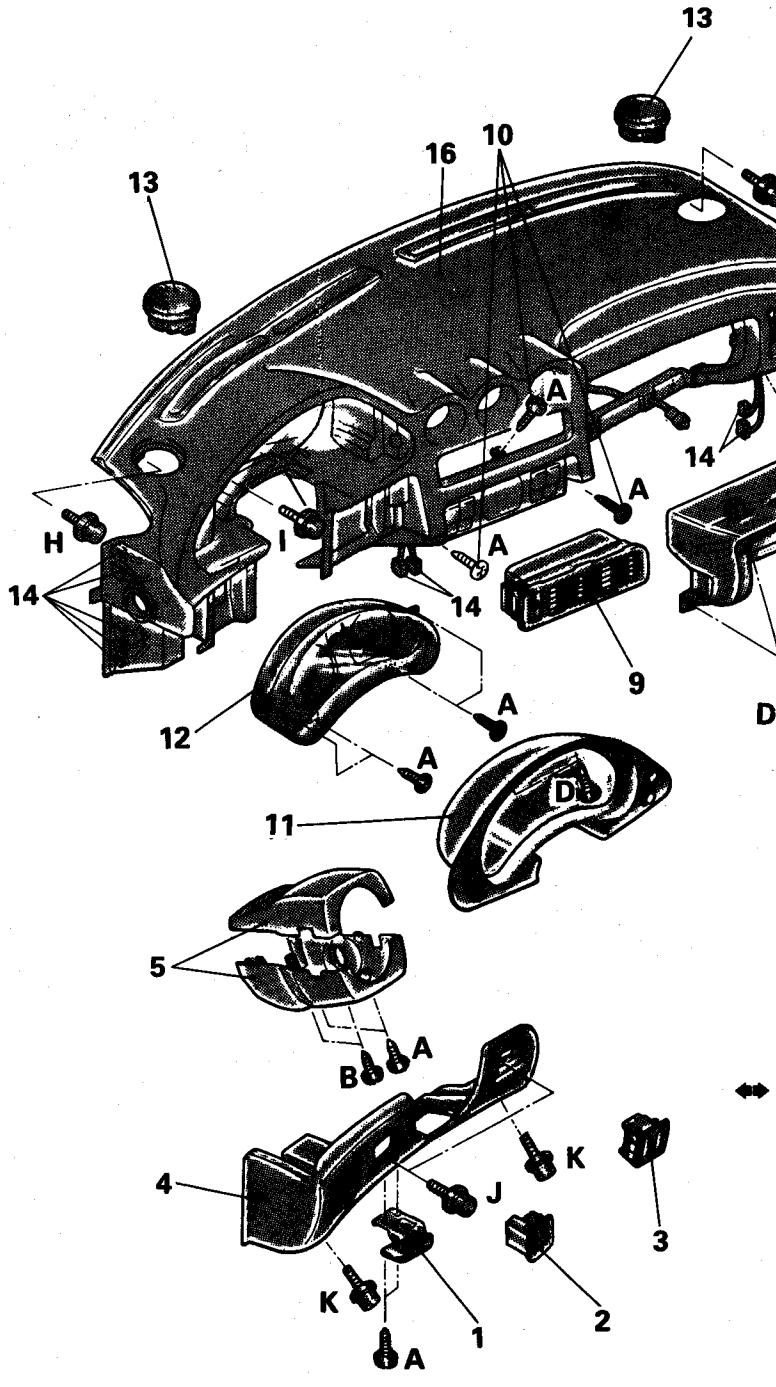
E52GB–

<Vehicles without front passenger's air bag>

Pre-removal and Post-installation Operation
- Removal and Installation of Floor Console (Refer to P.52A–5.)

CAUTION: SRS
When removing and installing the floor console assembly, don't allow any impact or shock to the SRS diagnosis unit.





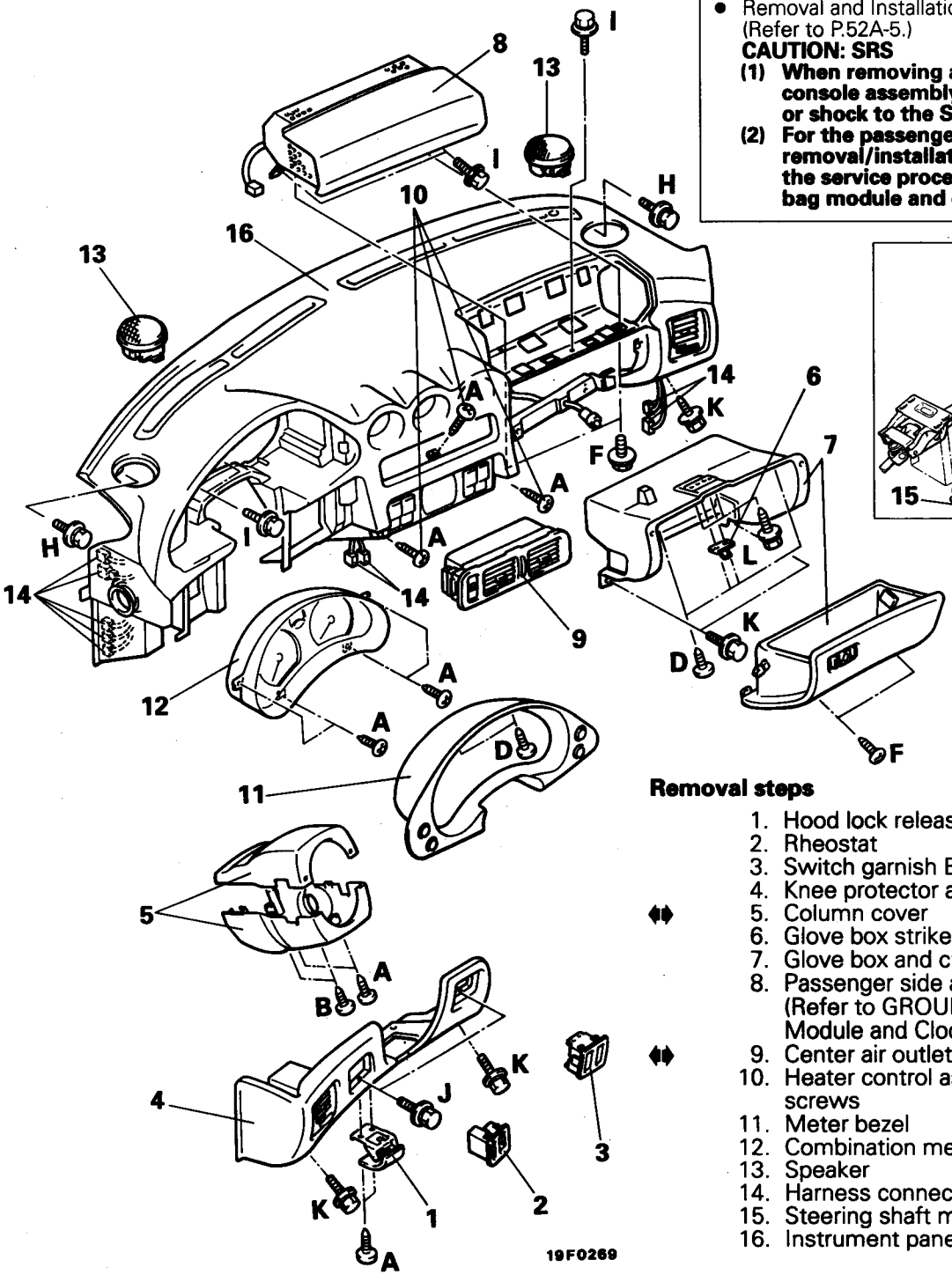
Removal steps

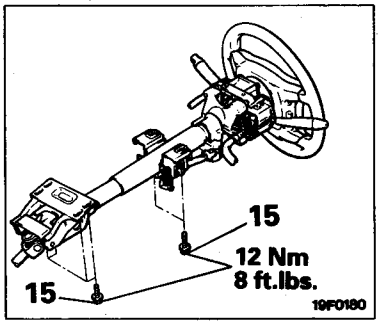
1. Hood lock release handle
2. Rheostat
3. Switch garnish B
4. Knee protector assembly
5. Column cover
6. Glove box striker
7. Glove box and cross pipe cover
9. Center air outlet assembly
10. Heater control assembly installation screws
11. Meter bezel
12. Combination meter
13. Speaker
14. Harness connector
15. Steering shaft mounting bolts
16. Instument panel assembly

<Vehicles with front passenger's air bag>

Pre-removal and Post-installationOperation
- Removal and Installation of Floor Console (Refer to P.52A-5.)

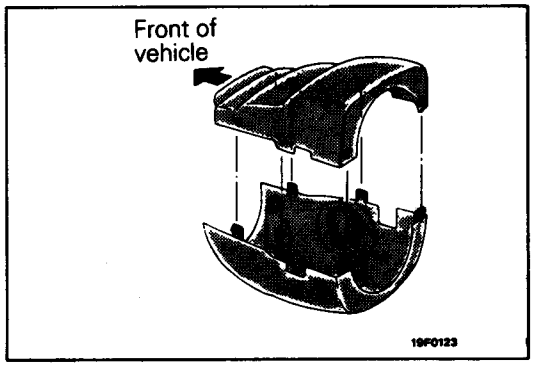
CAUTION: SRS
(1) When removing and installing the floor console assembly, don't allow any impact or shock to the SRS diagnosis unit.
(2) For the passenger side air bag module removal/installation, always observe the service procedures of Group 52B – Air bag module and clocks spring.





Removal steps

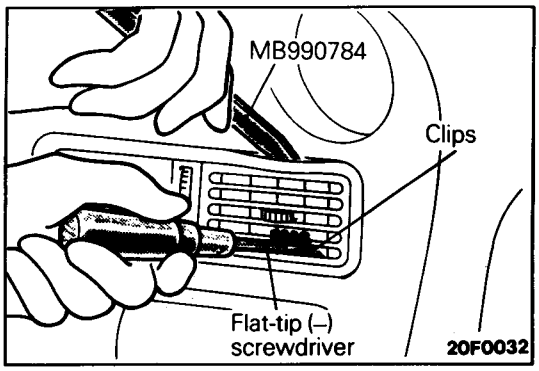
1. Hood lock release handle
2. Rheostat
3. Switch garnish B
4. Knee protector assembly
5. Column cover ◆◆
6. Glove box striker
7. Glove box and cross pipe cover
8. Passenger side air bag module (Refer to GROUP 52B – Air Bag Module and Clock Spring)
9. Center air outlet assembly ◆◆
10. Heater control assmbly installation screws
11. Meter bezel
12. Combination meter
13. Speaker
14. Harness connector
15. Steering shaft mounting bolts
16. Instrument panel assembly



SERVICE POINTS OF REMOVAL

5. REMOVAL OF COLUMN COVER

Remove the screws and remove the column cover while using care not to break the claws.

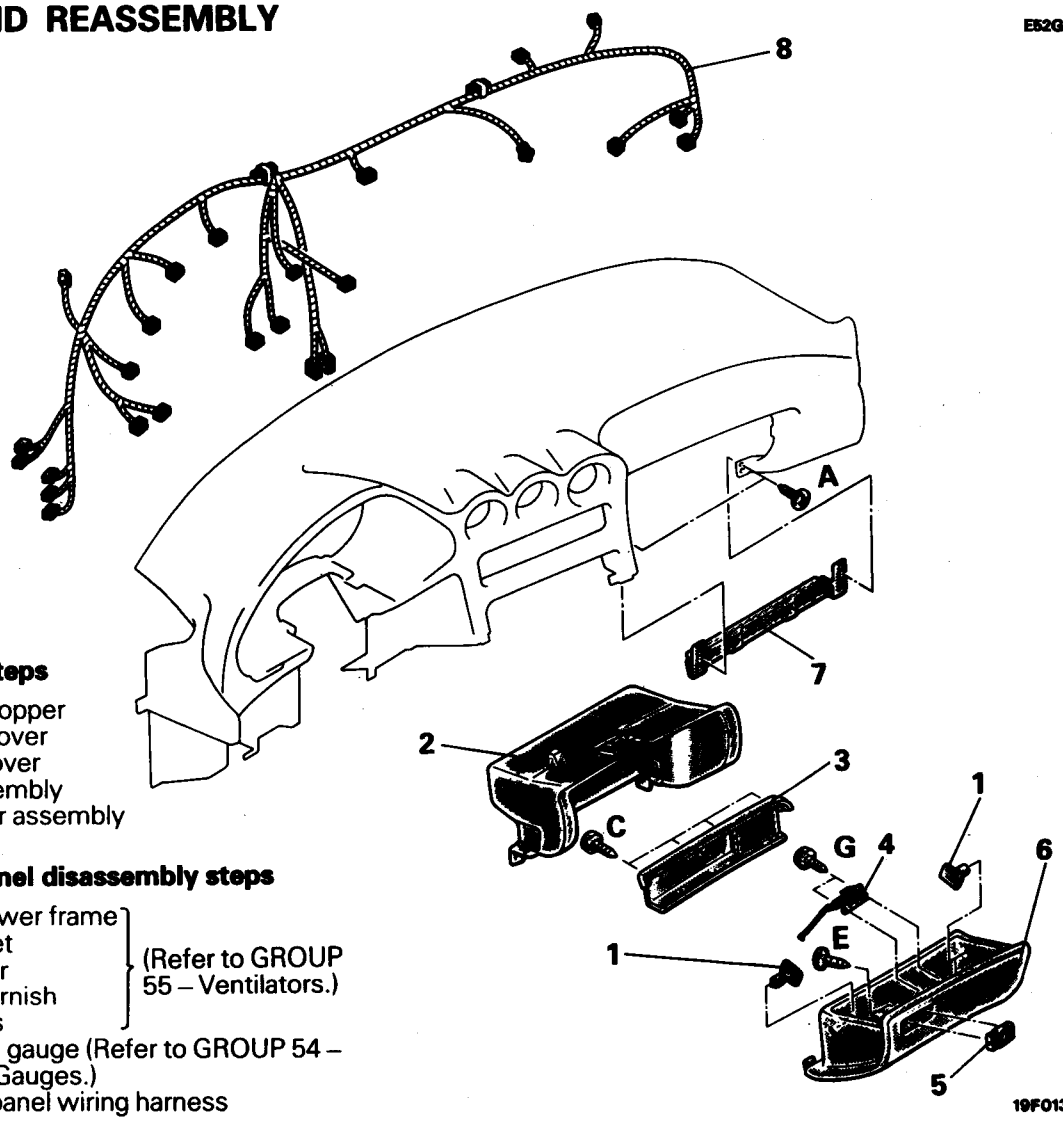


9. REMOVAL OF CENTER AIR OUTLET ASSEMBLY

Disengaging the clips of the center air outlet assembly with a flat tip (–) screwdriver, remove the center air outlet assembly with the special tool.

DISASSEMBLY AND REASSEMBLY

E52GF–



Glove box disassembly steps

1. Glove box stopper
2. Cross pipe cover
3. Glove box cover
4. Ratchet assembly
5. Lock cylinder assembly
6. Glove box

Instrument panel disassembly steps

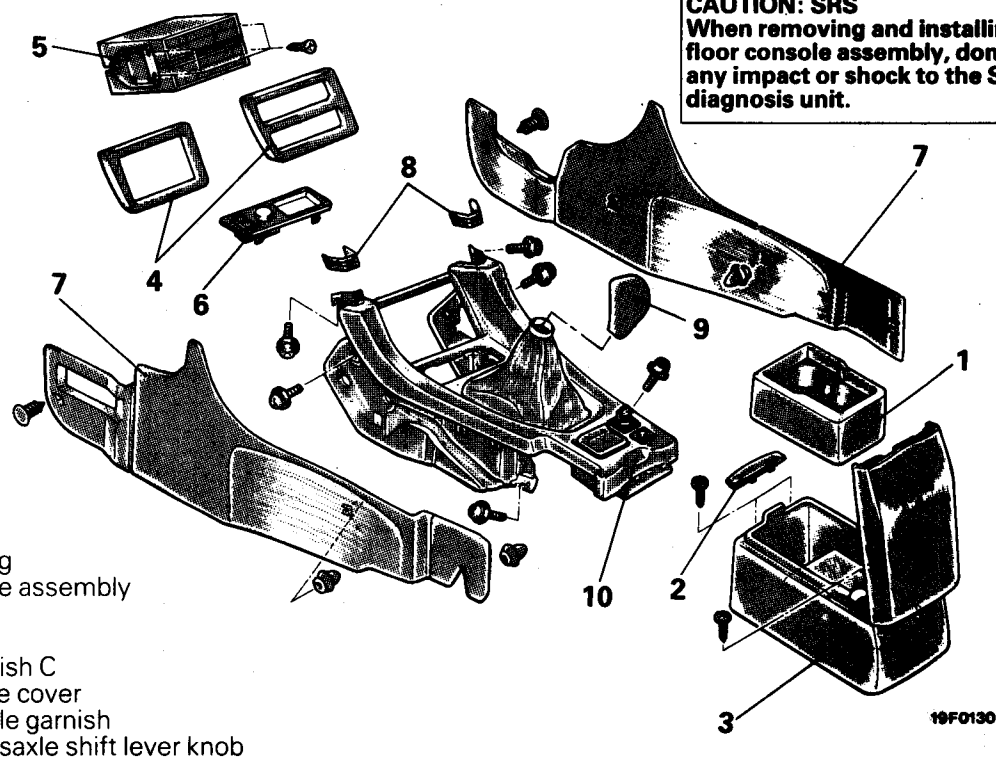
7. Glove box lower frame
   Side air outlet
   Photo sensor
   Defroster garnish
   Heater ducts
   } (Refer to GROUP 55 – Ventilators.)
   Combination gauge (Refer to GROUP 54 – Meters and Gauges.)
8. Instrument panel wiring harness

FLOOR CONSOLE

E52HA--

REMOVAL AND INSTALLATION

CAUTION: SRS
When removing and installing the floor console assembly, don't allow any impact or shock to the SRS diagnosis unit.

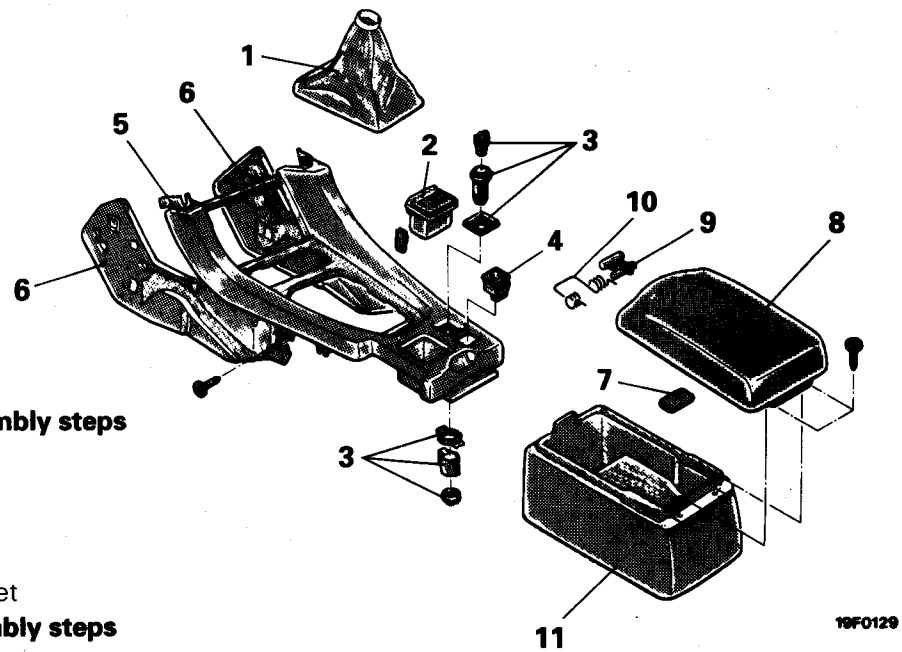


Removal steps

1. Cup holder
2. Console plug
3. Rear console assembly
4. Radio panel
5. Radio
6. Switch garnish C
7. Console side cover
8. Front console garnish
9. Manual transaxle shift lever knob
10. Front console assembly

DISASSEMBLY AND REASSEMBLY

E52HE--

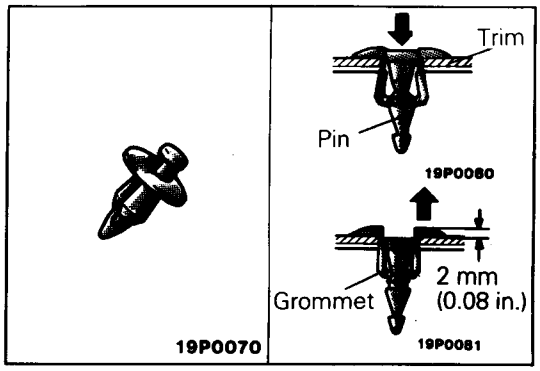


Front console disassembly steps

1. Shift lever cover
2. Ashtray
3. Cigarette lighter
4. Power seat switch
5. Front console
6. Front console bracket

Rear console disassembly steps

7. Plug
8. Console lid
9. Lock lever
10. Spring
11. Rear console



TRIMS

E52JA--

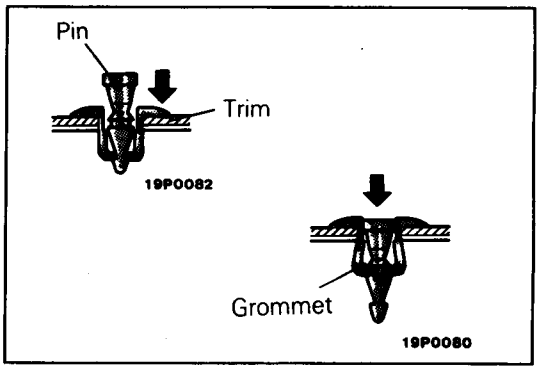
TRIM CLIP REMOVAL/INSTALLATION PROCEDURES

The type of clip shown in the illustration, which is used for the installation of instrument panel, should be removed and installed by the following procedures described below.

REMOVAL

(1) Use a cross-tip (+) screwdriver to push inward the pin (at the centre of the trim clip) to a depth of about 2 mm (0.08 in.).
(2) Pull the trim clip outward to remove it.

Caution
Do not push the pin inward more than necessary because it may damage the grommet, or the pin may fall in, if pushed too far.

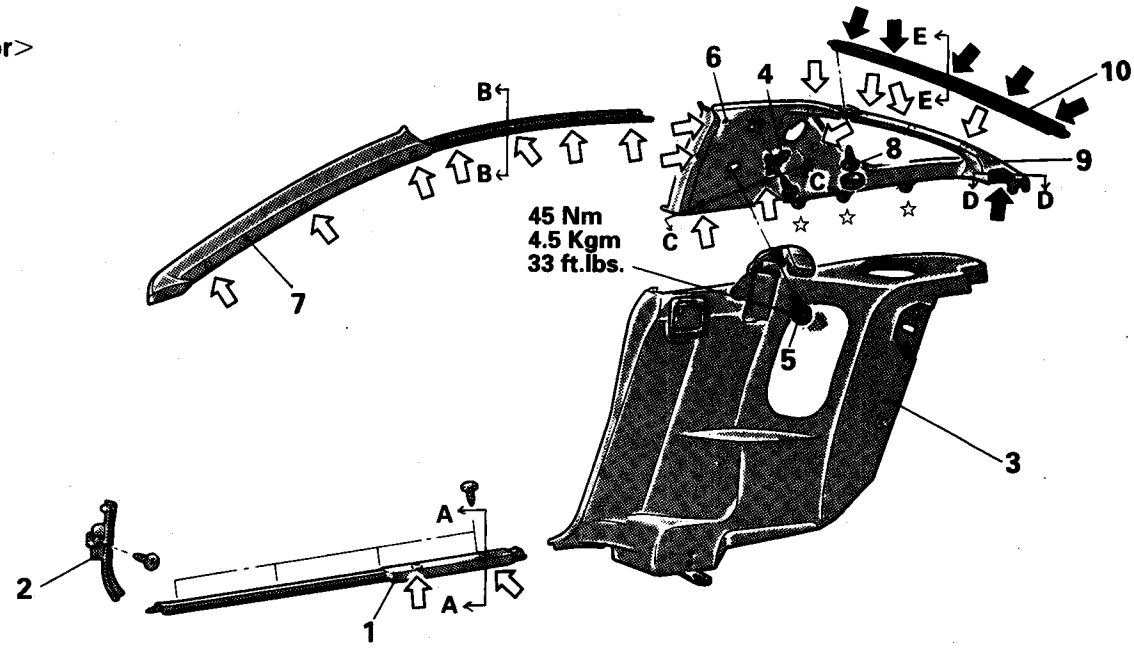


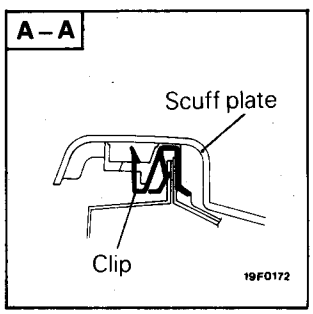
INSTALLATION

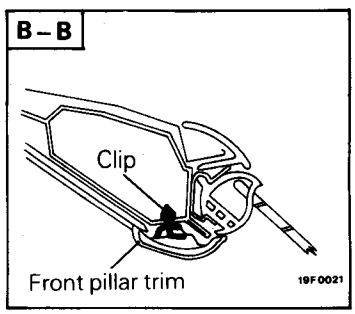
(1) With the pin pulled out, insert the trim clip into the hole in the trim.
(2) Push the pin inward until the pin's head is flush with the grommet.
(3) Check whether the trim is secure.

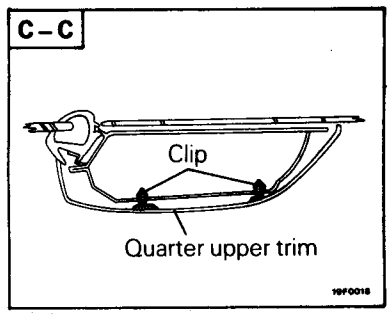
REMOVAL AND INSTALLATION

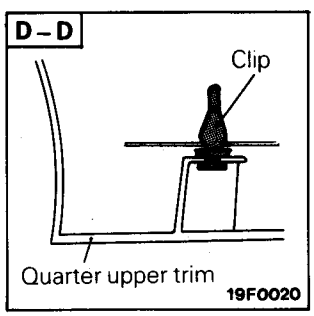
<Interior>

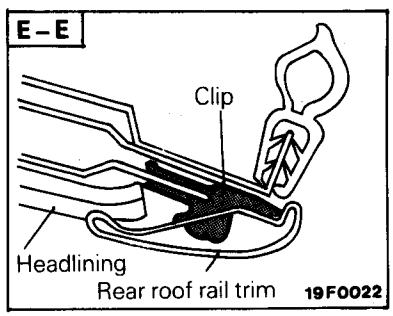












Cowl side trim removal steps

1. Scuff plate
2. Cowl side trim

Front pillar trim removal steps

4. Hanger bracket
5. Sash guide cover mounting bolt
6. Clip
7. Front pillar trim

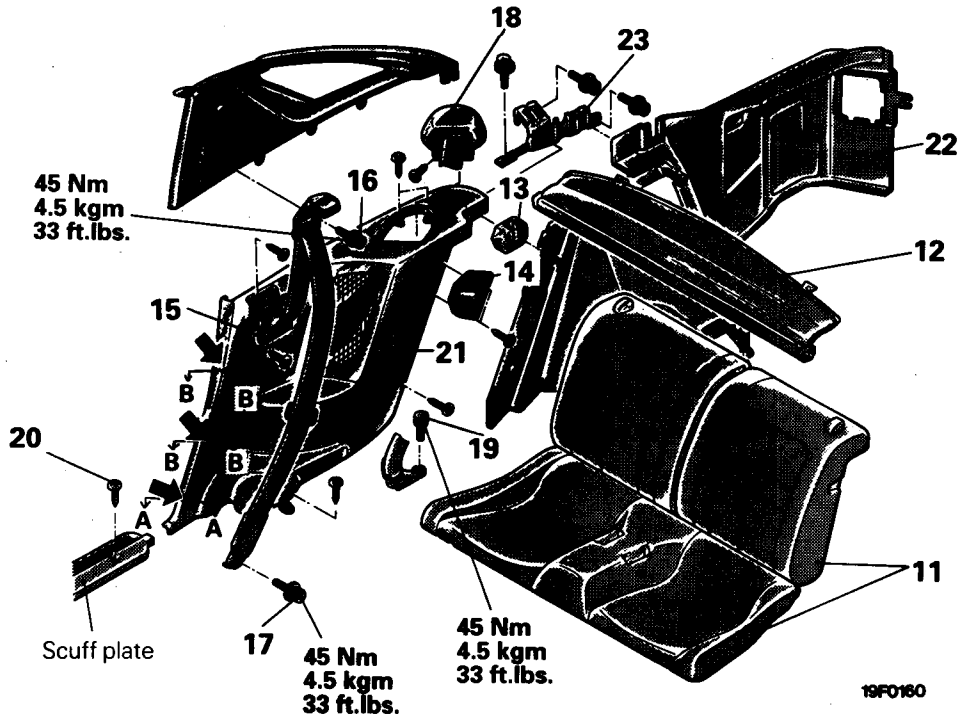
Quarter upper trim removal steps

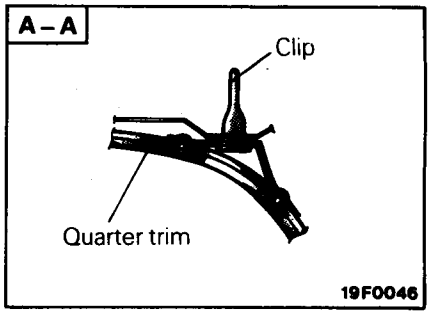
3. Quarter trim (Refer to P.52A-8)
4. Coat hanger
8. Screw
9. Quarter upper trim

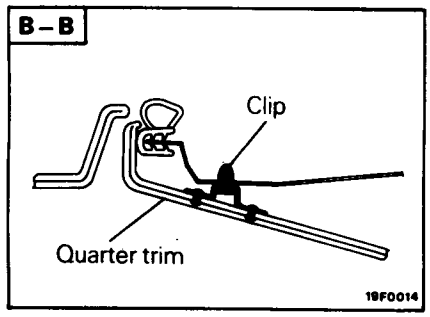
Rear roof rail trim removal steps

8. Screw
10. Rear roof rail trim

NOTE
(1) ⇦ : Location of metallic clip
(2) ⬅ : Location of resin clip
(3) ☆ indicates trim clip. (Refer to P.52A-6)
(4) For door trim, refer to GROUP 42 – Door Trim and Waterproof Film.



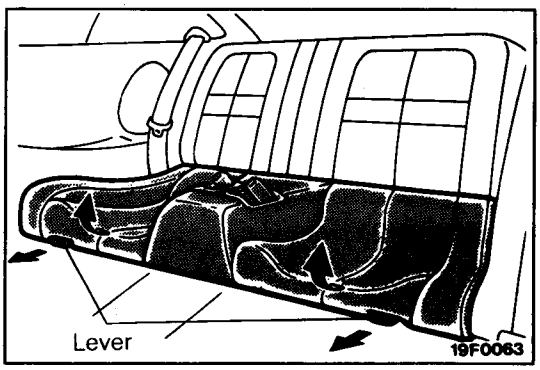




Quarter trim removal steps

◆◆ ◆◆ 11. Rear seat
12. Shelf cover assembly
13. Shelf catcher
14. Cover
15. Garnish
16. Sash guide cover mounting bolt
17. Front seat belt anchor plate mounting bolt
18. Retractor cover
19. Rear seat belt anchor plate mounting bolt
20. Screw
21. Quarter trim
22. Rear side trim (Refer to P.52A-9.)
23. Quarter trim bracket

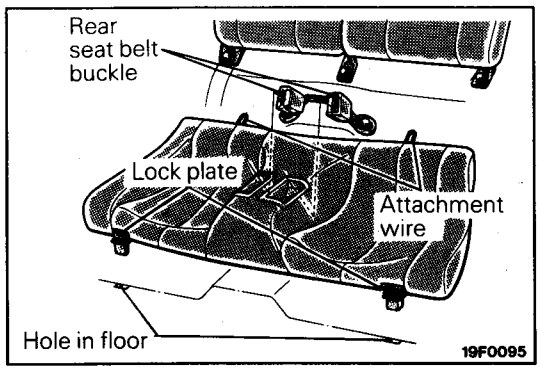
NOTE
◆◆: Location of resin clip



SERVICE POINT OF REMOVAL E52JBAN

11. REMOVAL OF REAR SEAT

With the lever pulled forward, raise the seat cushion to remove it.

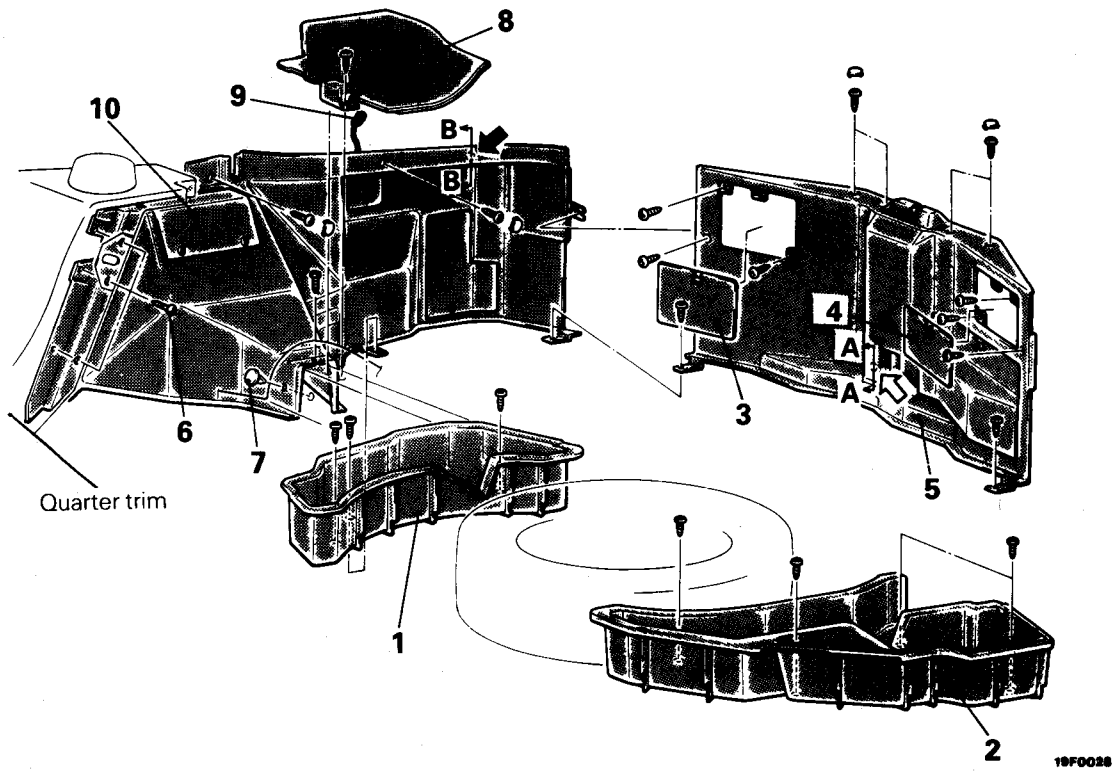


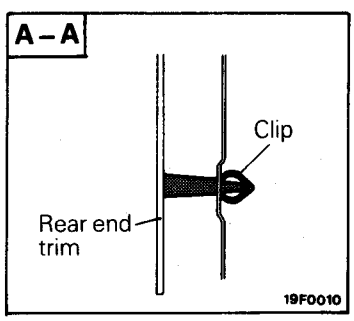
SERVICE POINT OF INSTALLATION E52JDAD

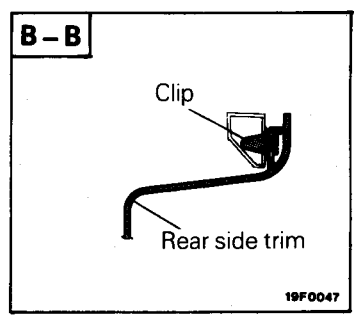
11. INSTALLATION OF REAR SEAT

(1) Fit the seat cushion attachment wire under the seat-back positively.
(2) Pass the rear seat belt buckles through the seat cushion.
(3) Insert the lock plate of seat cushion in the hole provided in the floor positively.

<Luggage compartment>





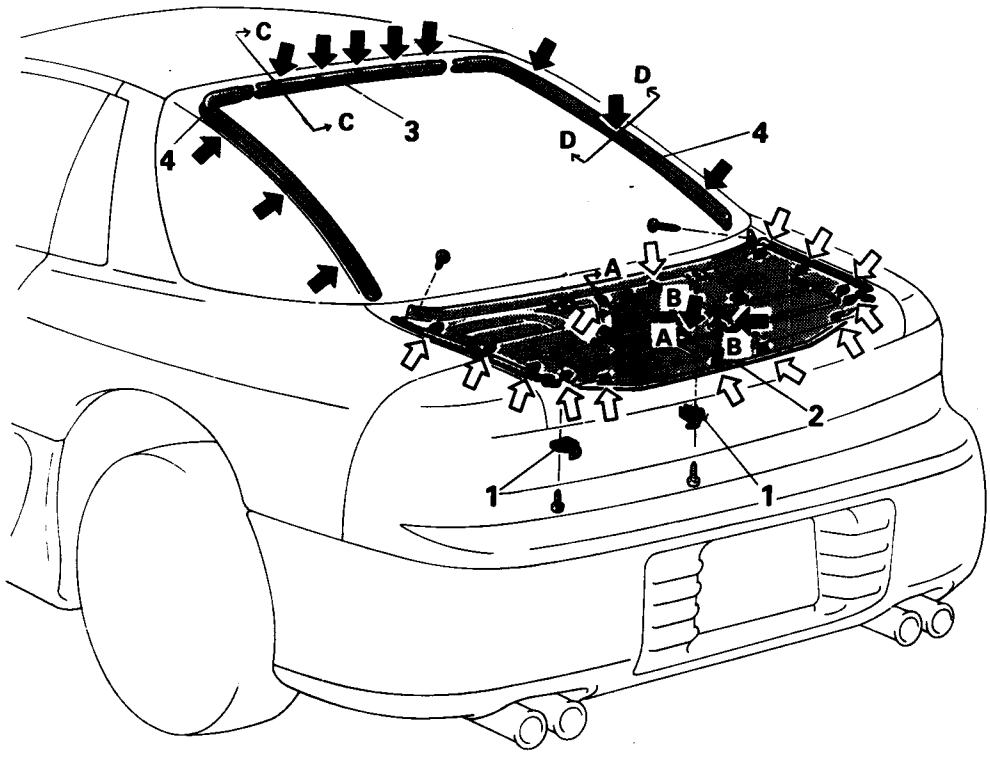


Rear side trim, rear end trim removal steps

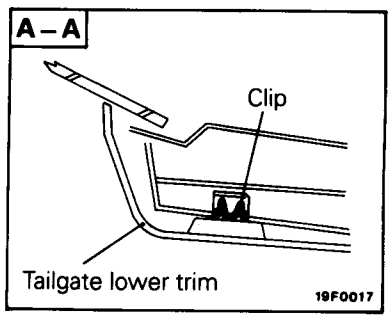
1. Luggage compartment floor box (R.H.)
2. Luggage compartment floor box (L.H.)
3. Lid (R.H.)
4. Lid (L.H.)
5. Rear end trim
6. Screws
7. Floor mat mounting clip
8. High floor center board
9. Luggage compartment lamp connector connection
10. Rear side trim

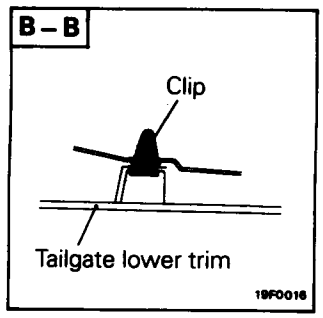
NOTE
(1) ⇦ : Location of metallic clip
(2) ⬅ : Location of resin clip

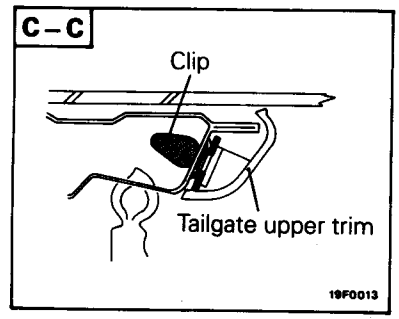
<Tailgate>

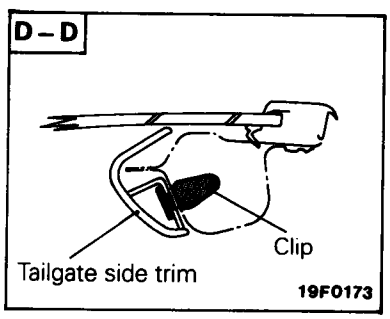


19F0027









Tailgate trim removal steps

1. Shelf hook
2. Tailgate lower trim
3. Tailgate upper trim
4. Tailgate side trim

NOTE
(1) ⇦ : Location of metallic clip
(2) ⬅ : Location of resin clip

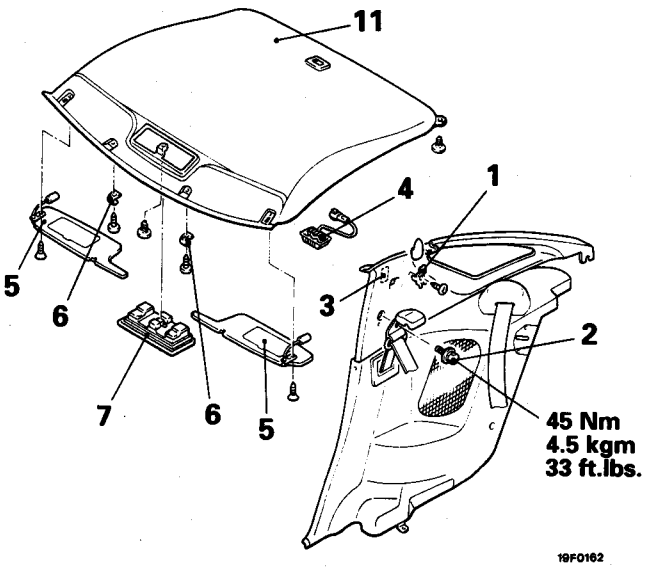
HEADLINING

E52IA--

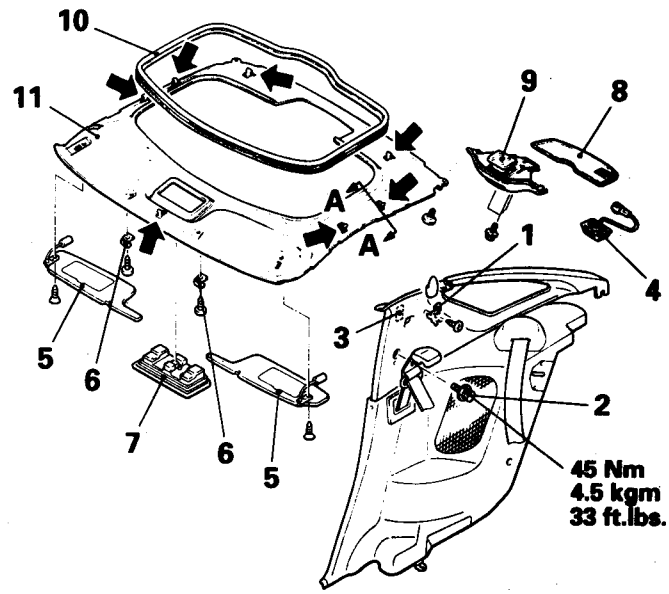
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of Sunroof Glass and Sunroof Trim (Refer to GROUP 42 – Sunroof)
- Removal and Installation of Rear Roof Rail Trim (Refer to P.52A-7.)
- Removal and Installation of Front Pillar Trim (Refer to P.52A-7.)

<Vehicles without sunroof>



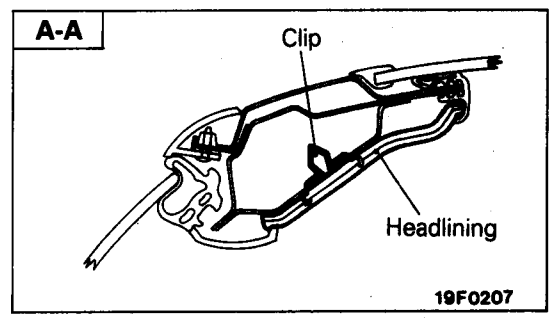
<Vehicles with sunroof>

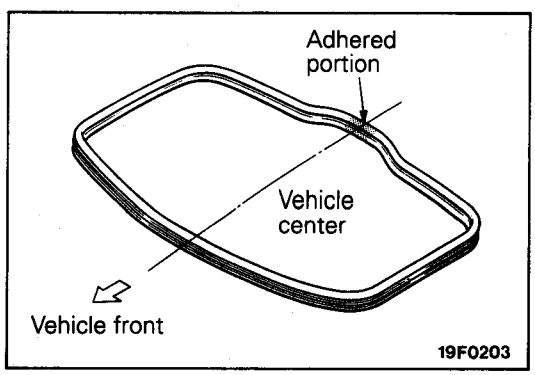


Removal steps

1. Hanger bracket
2. Sash guide cover mounting bolt
3. Clip
4. Interior temperature sensor
5. Sunvisor assembly
6. Sunvisor holder
7. Room lamp assembly
8. Regulator cover
9. Sunroof regulator
- ◆◆ 10. Sunroof inner weatherstrip } <Vehicles with sunroof>
11. Headlining

NOTE
◆: Location of resin clip





SERVICE POINT OF INSTALLATION

E52IBC0

10. INSTALLATION OF SUNROOF INNER WEATHERSTRIP

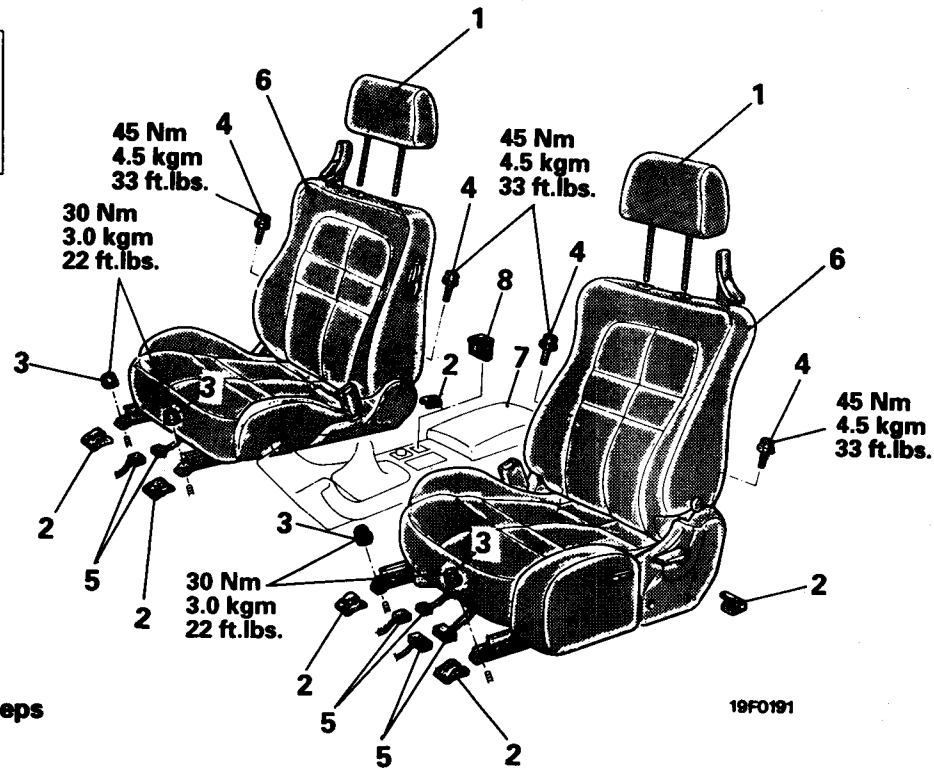
Install so that the adhered portion of the roof weatherstrip is at the vehicle centre (rear side).

FRONT SEAT

E52KA--

REMOVAL AND INSTALLATION

CAUTION: SRS
When removing and installing the floor console assembly, don't allow any impact or shock to the SRS diagnosis unit.



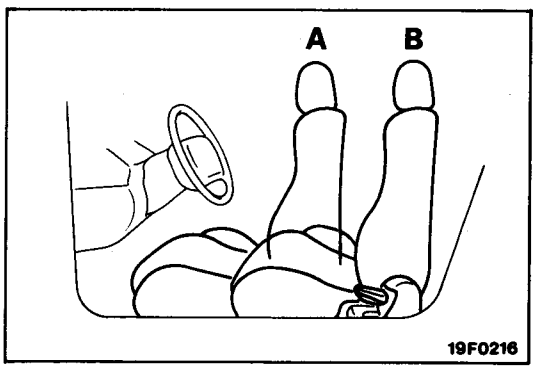
1. Head restraint

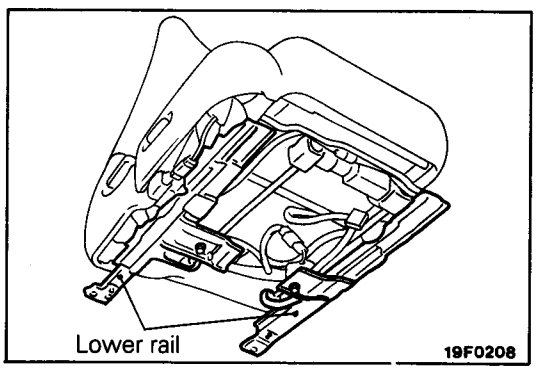
Front seat removal steps

◆◆ 2. Seat anchor covers
3. Seat mounting nut
4. Seat mounting bolt
5. Harness connector
◆◆ 6. Front seat assembly

Power seat switch removal steps

7. Front console assembly (Refer to P.52A-5.)
8. Power seat switch A





REMOVAL AND INSTALLATION POINTS OF FRONT SEAT ASSEMBLY WHEN THERE IS A MALFUNCTION IN THE POWER SEAT SLIDE MECHANISM

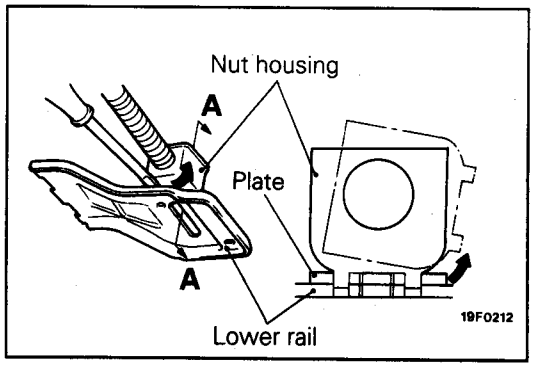
E52KBAR

If removal of the seat mounting nut and bolt is impossible when there is a malfunction in the slide motor or the slide switch and the seat cannot slide, remove the install the front seat assembly by the following procedure.
There are two sets of removal and installation points established in accordance with the seat position.

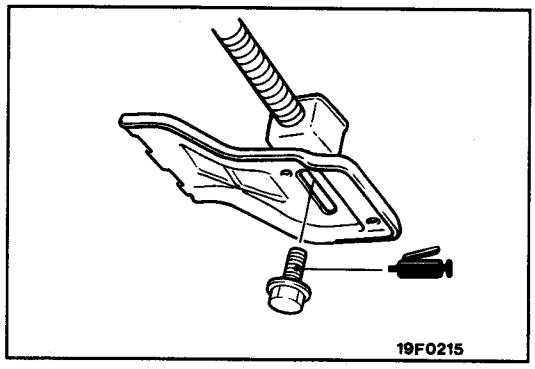
- Position in illustration A – Refer to 1.
- Position in illustration B – Refer to 2.

1. REMOVAL AND INSTALLATION POINTS WHEN THE SEAT IS STOPPED IN THE FORWARD POSITION

(1) Remove the bolts underneath the seat cushion shown in the illustration from the rear of the seat.



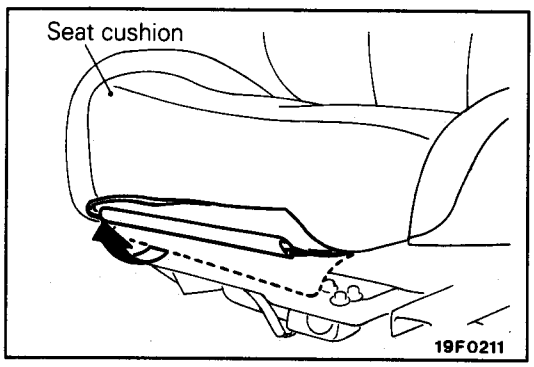
(2) Insert a flat-tipped screwdriver between the plate and the nut housing, and turn the nut housing to remove the tab from the plate hole.
(3) Slide the seat and remove the seat mounting nuts and bolts.



(4) When re-using the power seat adjuster assembly, apply specified adhesive to the mounting bolts and install them.

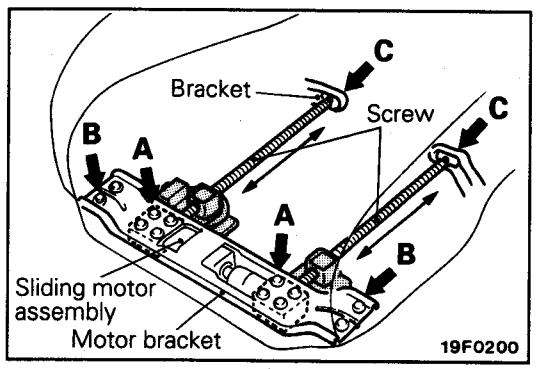
Specified adhesive: 3M Stud locking 4171 or equivalent

Caution
Align the positions of the left and right nut housings.



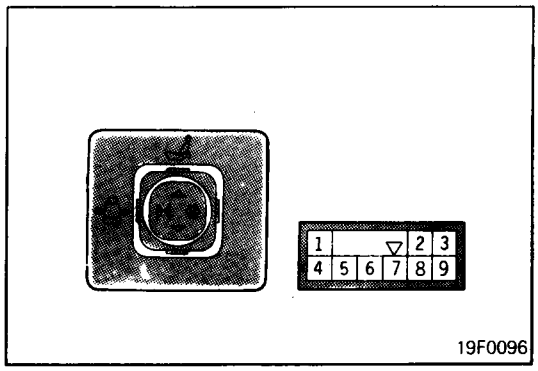
2. REMOVAL AND INSTALLATION POINTS WHEN THE SEAT IS STOPPED IN THE BACK POSITION

(1) Turn up the cover at the front of the seat cushion.



(2) Remove the slide motor mounting bolts (8 bolts in the positions A shown in illustration), move the slide motor assembly forward slightly and remove the screw and bracket connections (sections C in illustration).
- Depending on the seat position, the slide motor may not move if only the bolts shown at A in the illustration are removed. In this case, remove the motor bracket mounting nuts (4 nuts shown at B in the illustration) again.

(3) Slide the seat and remove the seat mounting nuts and bolts.
NOTE
- If the seat will not slide sufficiently and the seat mounting nuts and bolts cannot be removed, slide the seat as far forward as possible and remove the seat by following procedure 1.



INSPECTION E52KCBB

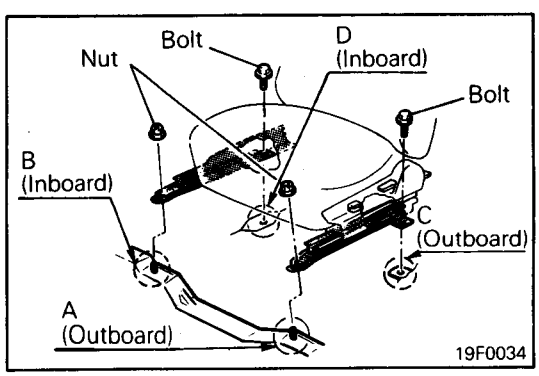
POWER SEAT SWITCH A INSPECTION

Operate the power seat switch A to check for continuity.

Lumbar support				
Terminal No. / Switch position	2	3	5	7
PUSH (△)	○—○		○—○	
OFF	○—○		○	
RELEASE (▽)	○	○	○	○

Side support				
Terminal No. / Switch position	1	2	7	8
SPREAD (◁▷)	○—○		○—○	
OFF	○—○			○
CLOSE (▷◁)	○	○	○	○

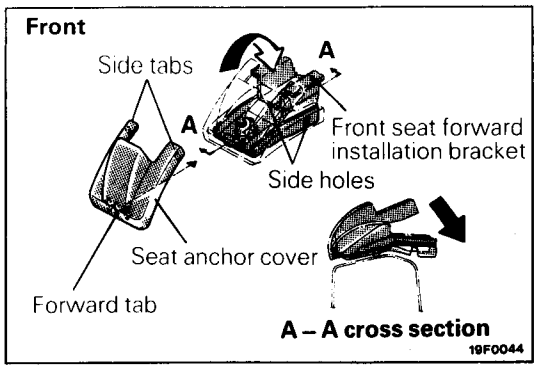
NOTE
○–○ indicates that there is continuity between the terminals.

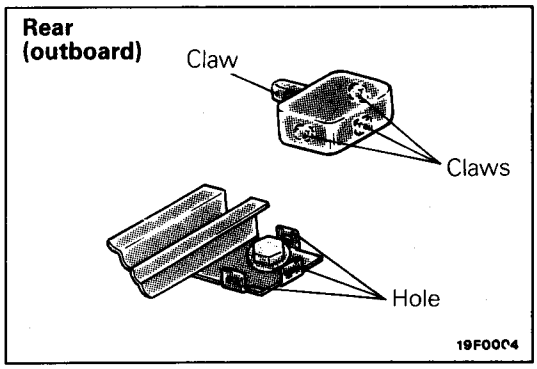


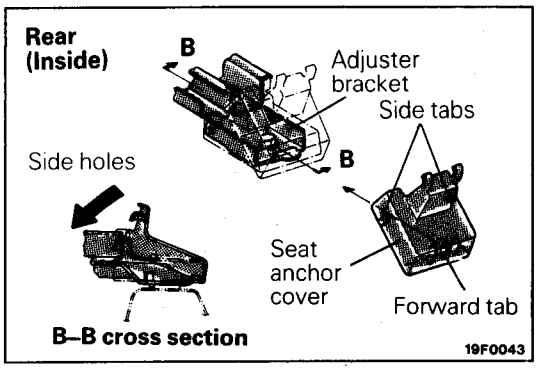
SERVICE POINTS OF INSTALLATION E52KDAT

6. INSTALLATION OF FRONT SEAT ASSEMBLY

(1) After checking that the seat adjuster is locked at both sides, provisionally tighten (in the A, B, C and D sequence) the seat installation nuts and the seat installation bolts; then fully tighten at the specified torque.







2. INSTALLATION OF SEAT ANCHOR COVERS

(1) Install the forward tab of the front seat anchor cover to the front seat forward mounting bracket positively. Then rotate the cover in the direction of arrow to install the side tabs in the side holes of the bracket.

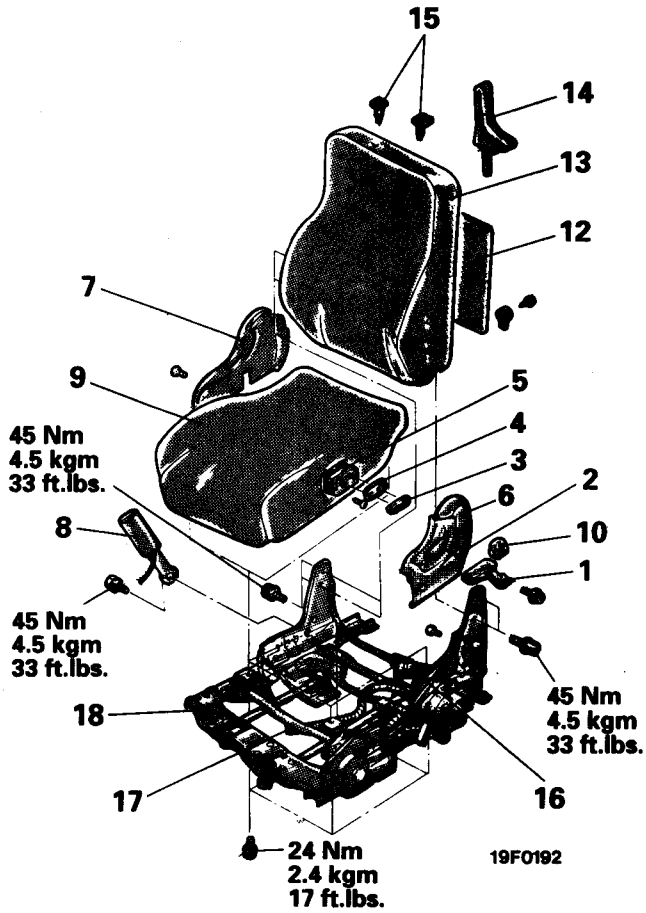
(2) Insert the rear side seat anchor cover (outer side) to the front seat rearward installation bracket, and then attach each tab of the seat anchor cover to the hole of the bracket.

(3) Insert the rear tab of the rear seat anchor cover in the front seat rear mounting bracket positively. Then rotate the cover in the direction of arrow to install the side tabs in the side holes of the bracket.

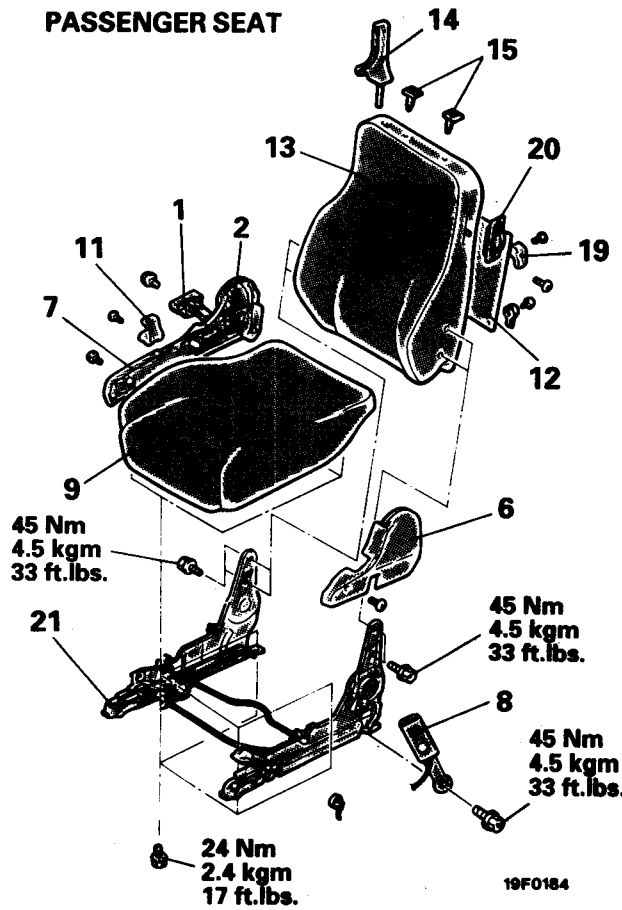
DISASSEMBLY AND REASSEMBLY

E52KE-A

DRIVER SEAT



PASSENGER SEAT



Removal steps

1. Reclining adjuster knob
2. Plug
3. Power seat adjuster lever
4. Garnish
5. Power seat switch B

(Driver seat)

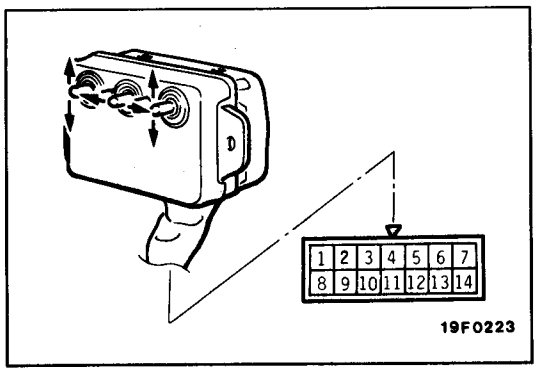
6. Side shield cover (L.H.)
7. Side shield cover (R.H.)
8. ◆◆ Inner seat belt
9. Seat cushion assembly
10. Memory reclining knob (Driver seat)
11. Sliding adjuster knob
12. Seat back panel
13. Seat back assembly
14. Seat belt guide
15. Head restraint guide
16. Reclining adjuster lower cover (Driver seat)
17. Power seat harness
18. Power seat adjuster

(Driver seat)

19. Walk-in knob
20. Walk-in knob garnish

(Passenger seat)

21. Slide adjuster



INSPECTION

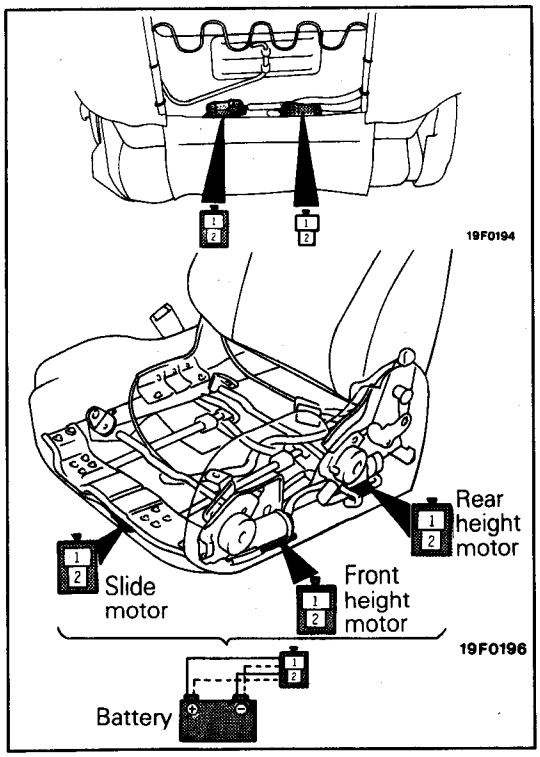
E52KGCB

POWER SEAT SWITCH B INSPECTION

Operate the power seat switch to check for continuity.

Switch position		Terminal No. 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Slide switch	Forward		○	○											○
	Backward	○		○	○										○
Front height switch	Up									○	○				○
	Down								○		○	○			○
Rear height switch	Up						○	○					○		○
	Down					○		○					○		○
All switches	OFF														

NOTE
○–○ indicates that there is continuity between the terminals.

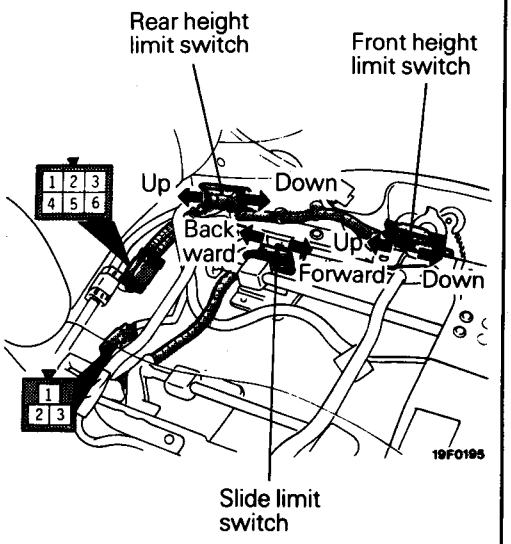


INSPECTION OF ALL POWER SEAT MOTORS

(1) Disconnect each motor at the connector. To disconnect the lumbar support and side support motors, remove the seatback panel in advance.
(2) Connect the terminals of each motor directly with the battery and check to see that the motor turns freely and each adjusting mechanism operates in the directions shown in the table below.
(3) If there is any abnormality, replace the power seat adjuster assembly or seatback assembly.

Name of motor	Direction of operation	Terminal No. 1	2	Stop position
Lumbar support	Push	⊖	⊕	Stops within the range of operation
	Release	⊕	⊖	
Side support	Close	⊖	⊕	
	Spread	⊕	⊖	
Front height, Rear height	Up	⊕	⊖	Stops when limit switch is turned off
	Down	⊖	⊕	
Slide	Forward	⊕	⊖	
	Backward	⊖	⊕	

PWUE9119



INSPECTION OF LIMIT SWITCH

(1) Disconnect each limit switch at the connector and connect a circuit tester between the terminals.
(2) Operate each switch to check for continuity between the terminals.
(3) If there is any abnormality, replace the power seat adjuster assembly.

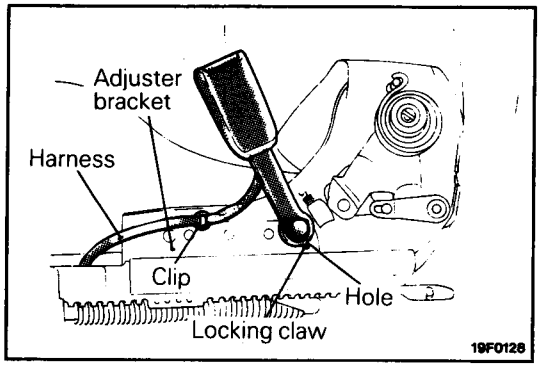
<Slide limit switch>

Switch position \ Terminal No.	1	2	3
Forward	○		○
Backward	○	○	
Middle (ON)	○	○	○

<Front and rear height limit switch>

Switch position \ Terminal No.	Front height			Rear height		
	1	2	3	4	5	6
Up	○		○	○		○
Down	○	○		○	○	
Middle (ON)	○	○	○	○	○	○

NOTE
○–○ indicates that there is continuity between the terminals.



SERVICE POINT OF REASSEMBLY E52KHAE

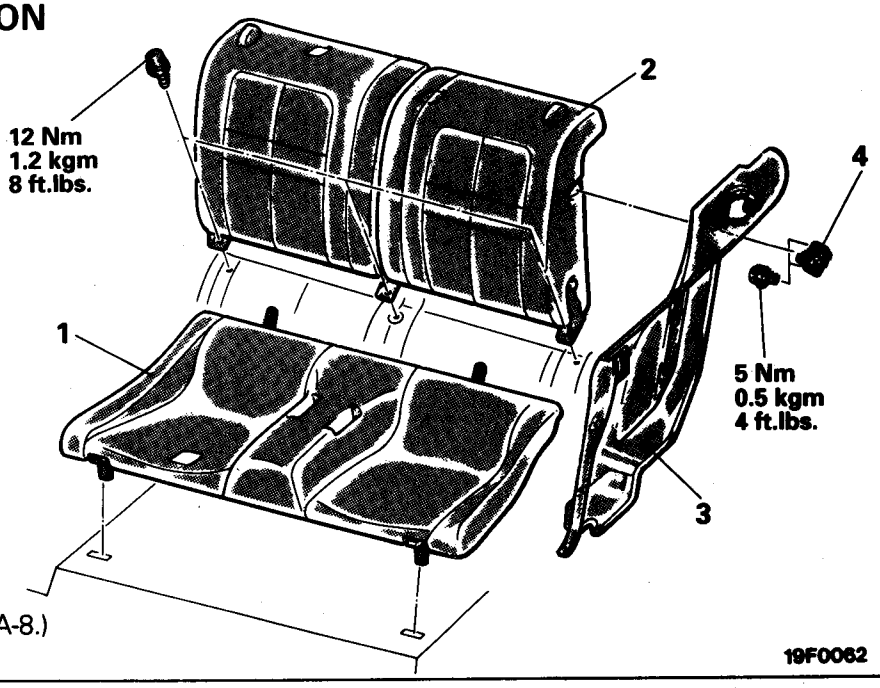
8. INSTALLATION OF INNER SEAT BELT

(1) Route the seat belt switch connector harness on the adjuster bracket.
(2) Use clips to secure the harness to the adjuster bracket.
(3) Fit the locking claw of the inner seat belt positively in the locking hole provided in the seat bracket.

REAR SEAT

E52KA-B

REMOVAL AND INSTALLATION

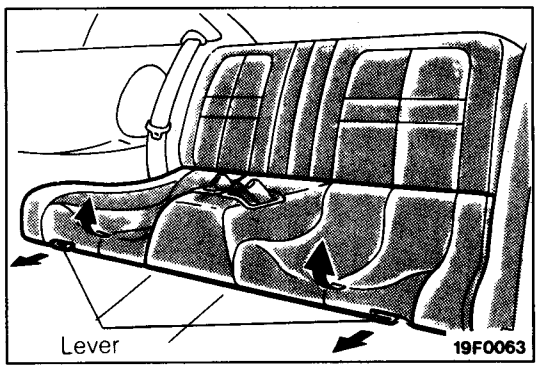


Rear seat removal steps

◀▶ ▶◀ 1. Rear seat cushion
2. Rear seat back

Striker removal steps

3. Quarter trim (Refer to P.52A-8.)
4. Striker

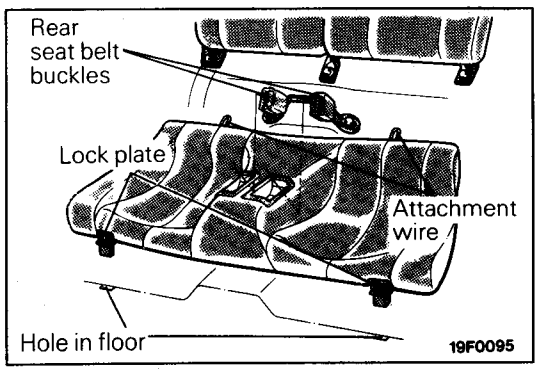


SERVICE POINT OF REMOVAL

E52KBAS

1. REMOVAL OF REAR SEAT CUSHION

With the lever pulled, raise the seat cushion, and remove the seat cushion.



SERVICE POINT OF INSTALLATION

E52KDAU

1. INSTALLATION OF REAR SEAT CUSHION

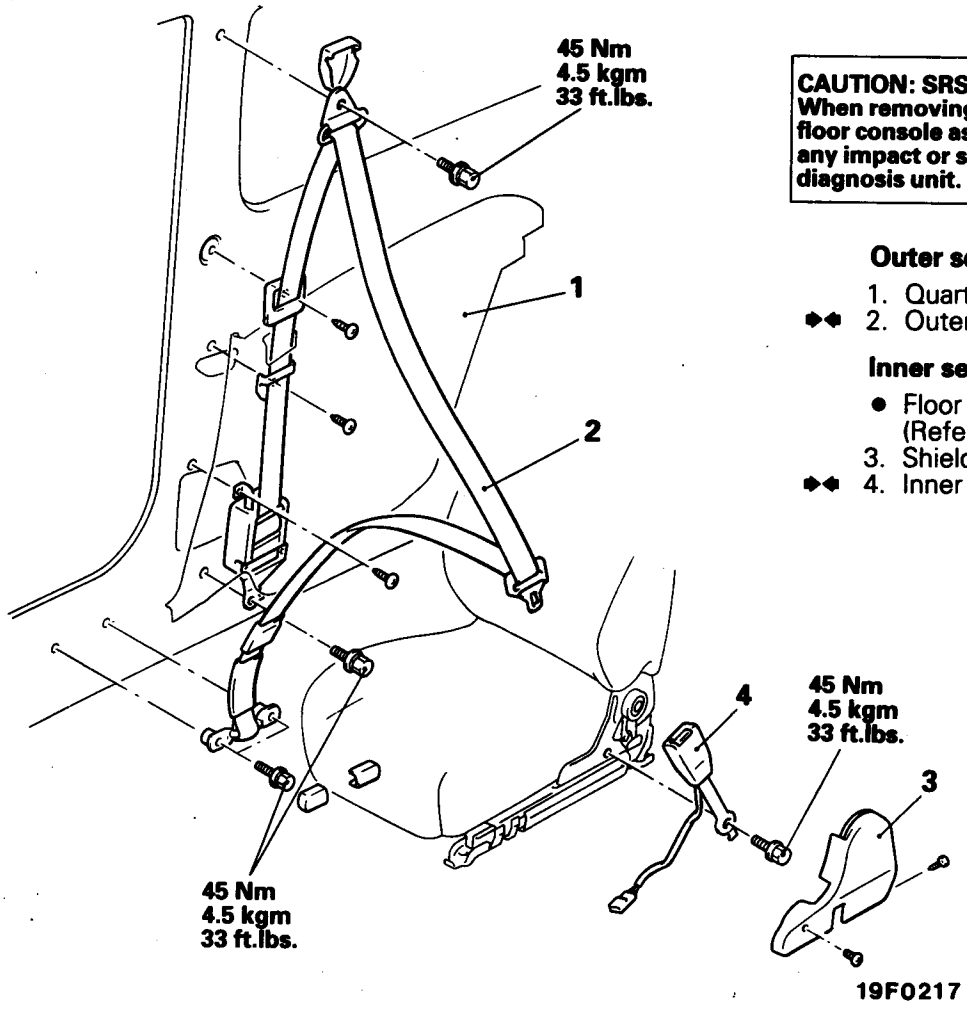
(1) Fit the attachment wire of the seat cushion under the seatback positively.
(2) Pass the rear seat belt buckle through the seat cushion.
(3) Insert the lock plate of the seat cushion in the respective holes provided in the floor.

SEAT BELT

E52MA--

REMOVAL AND INSTALLATION

<Front Seat Belt>

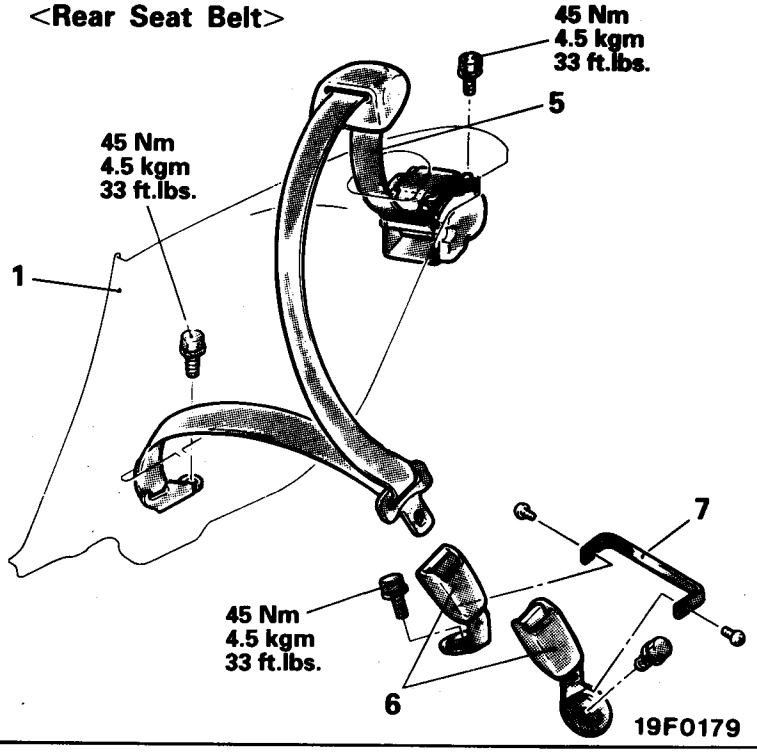


CAUTION: SRS
When removing and installing the floor console assembly, don't allow any impact or shock to the SRS diagnosis unit.

Outer seat belt removal steps
1. Quarter trim (Refer to P.52A-8.)
◆◆ 2. Outer seat belt

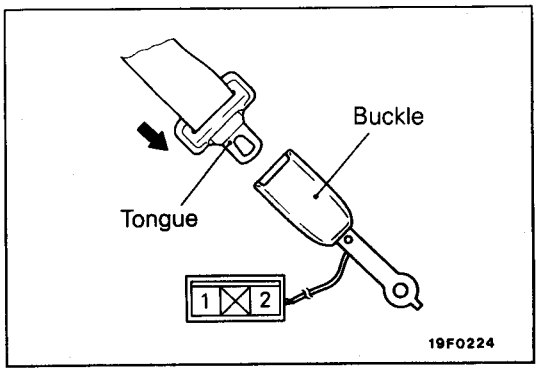
Inner seat belt removal steps
● Floor console assembly (Refer to P.52A-5.)
3. Shield cover
◆◆ 4. Inner seat belt

<Rear Seat Belt>



Outer seat belt removal steps
1. Quarter trim (refer to P.52A-8.)
◆◆ 5. Outer seat belt

Inner seat belt removal steps
● Rear seat cushion (Refer to P.52A-19.)
6. Inner seat belt
7. Inner seat belt bracket



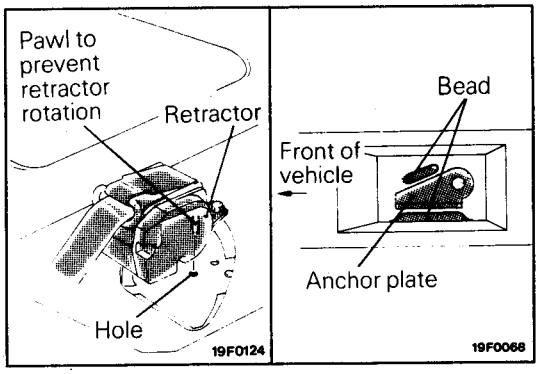
INSPECTION E52MCAF

BUCKLE SWITCH

(1) Disconnect the buckle switch connector.
(2) Check the continuity between the terminals.

Terminal	1	2
Buckle unlock		
Buckle lock	O	O

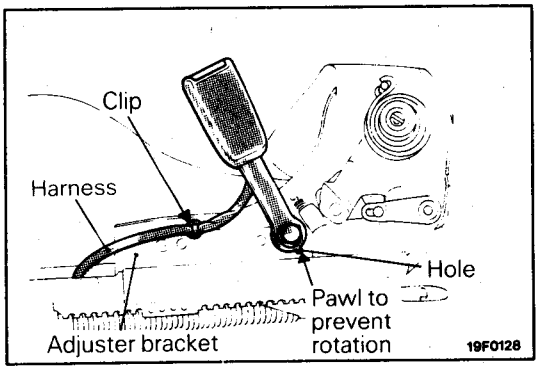
NOTE
O–O indicates that there is continuity between the terminals.



SERVICE POINTS OF INSTALLATION E52MDAT

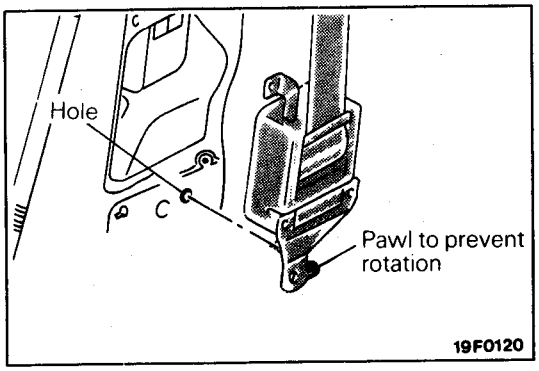
5. INSTALLATION OF OUTER SEAT BELT

(1) Positively insert the pawl to prevent the retractor from rotating in the hole provided on the body.
(2) Install the anchor plate along the bead of the body.



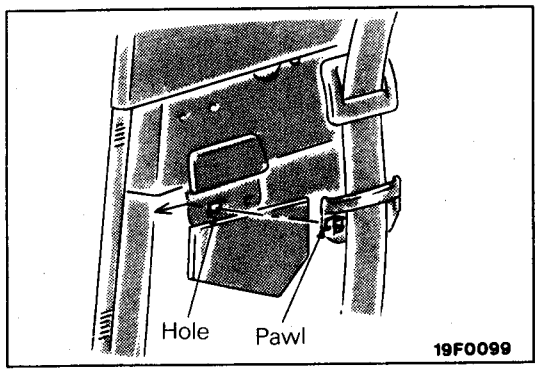
4. INSTALLATION OF INNER SEAT BELT

(1) Route the seat belt switch connector harness on the adjuster bracket.
(2) Use clips to secure the harness to the adjuster bracket.
(3) Fit the locking claw of the inner seat belt positively in the locking hole provided in the seat bracket.



2. INSTALLATION OF OUTER SEAT BELT

(1) Positively insert the pawl to prevent the retractor from rotating in the hole provided on the body.



(2) Insert the pawl of the belt guide in the hole provided on the body.
(3) Install the final anchor of the front seat belt with the belt twisted 180° at the section between the sash guide and the final anchor so that the tip of the tongue is directed toward the front of the vehicle.

NOTES

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

CONTENTS

E52AA-

CAUTION
- **Carefully read and observer the information in the SRS SERVICE PRECAUTIONS (P.52B-4) prior to any service.**
- **For information concerning troubleshooting or maintenance, always observe the procedures in the Troubleshooting (P.52B-10) or the SRS Maintenance (P.52B-50) sections respectively.**
- **If any SRS components are removed or replaced in connection with any service procedures, be sure to follow the procedures in the INDIVIDUAL COMPONENT SERVICE section (P.52B-59) for the components involved.**
- **If you have any questions about the SRS, please contact your local distributor.**

GENERAL INFORMATION

E52BAAF

<Vehicles without front passenger's air bag>

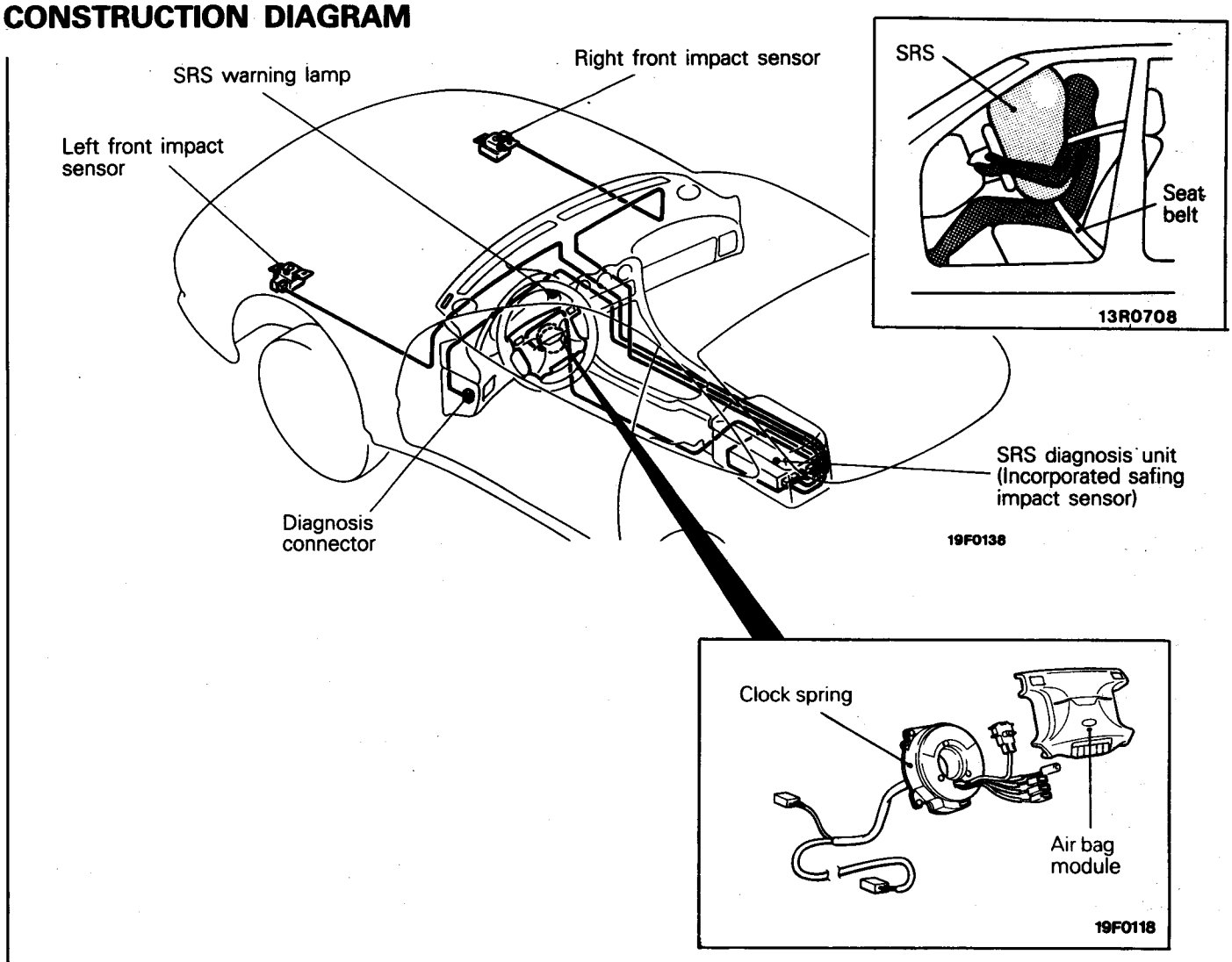
The Supplemental Restraint System (SRS) is designed to supplement the driver's seat belt to help reduce the risk or severity of injury to the driver by activating and deploying an air bag in certain frontal colisions.

The SRS consists of: left front and right front impact sensors one located, on the right and left front upper frame lowers; an air bag module located in the centre of the steering wheel, which contains the folded air bag and an inflator unit; the SRS diagnosis unit located under the rear console assembly, which monitors the system, and which contains a safing impact sensor; an SRS warning lamp located on the instrument panel, which indicates the operational status of the SRS; a clock spring interconnection located within the steering column; wiring.

The SRS is designed so that the air bag will deploy when the safing sensor, plus either or both of the left front and right front impact sensors simultaneously activate while the ignition switch is "ON". That is designed to occur in frontal or near-frontal impacts of moderate to severe force.

Only authorized service personnel should do work on or around the SRS components. Those service personnel should read this manual carefully before starting any such work. Extreme care must be used when servicing the SRS to avoid injury to the service personnel (by inadvertent deployment of the air bag)or the driver (by rendering the SRS inoperative).

CONSTRUCTION DIAGRAM

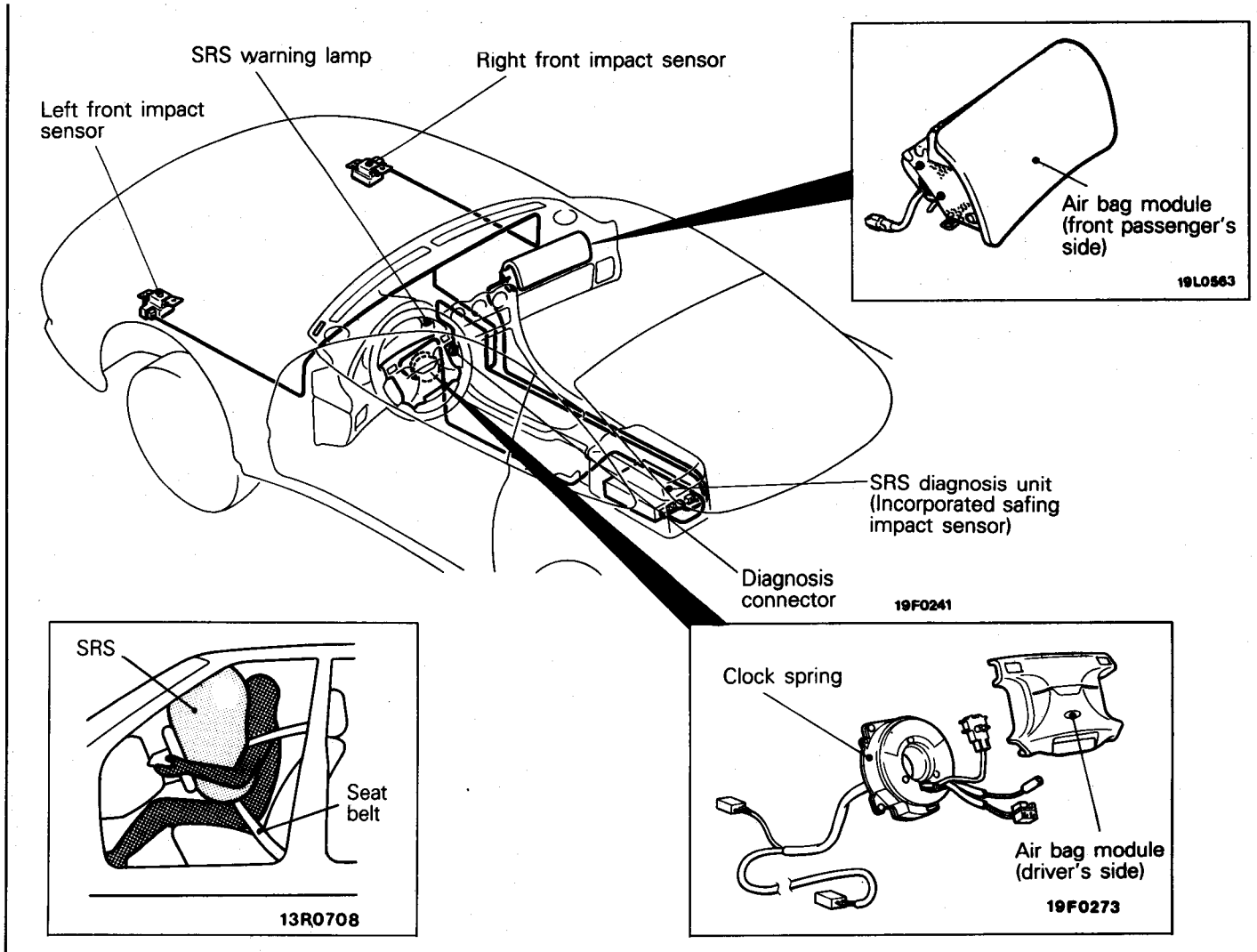


GENERAL INFORMATION
<Vehicles with front passenger's air bag>

The Supplemental Restraint System (SRS) is designed to supplement the front seat belts to help reduce the risk or severity of injury to the front seat occupants by activating and deploying two air bags during certain frontal collisions.
The SRS consists of: left front and right front impact sensors (located on the right and left front upper frame lowers), air bag modules for the driver (located in the centre of the steering wheel) and for the front seat passenger (located above the glove box).Each module contains a folded air bag and an inflator unit. The SRS also contains SRS Diagnosis Unit with safing impact sensor (located under the floor console assembly), and SRS warning lamp to indicate the operational status of the SRS (located on the instrument panel), clock spring (mounted behind the steering wheel), and wiring.

The SRS is designed so that the air bags will deploy when the safing sensor, plus either or both of the left front and right front impact sensors simultaneously activate while the ignition switch is in the ON position. These sensors are designed to activated in frontal or near-frontal impacts of moderate to server force.
Only authorized service personnel should work on or around SRS components. Those personnel should read this manual carefully before starting such work. Extreme care must be used when servicing the SRS to avoid injury to service personnel (by inadvertent deployment of the air bags) or vehicle occupant (by rendering the SRS inoperative).

CONSTRUCTION DIAGRAM



SRS SERVICE PRECAUTIONS

E52QAAA

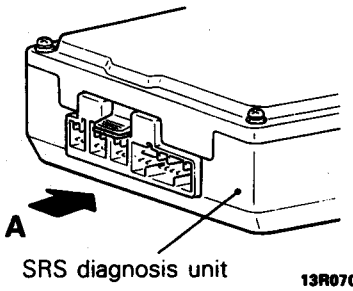
1. In order to avoid injury to yourself or others from accidental deployment of the air bag during servicing, read and carefully follow all the precautions and procedures described in this manual.
2. Do not use any electrical test equipment on or near SRS components, except those specified on P.52B-8.
   Never use an analogue ohmmeter.
3. **Never Attempt to Repair the Following Components:**
   - Front Impact Sensors
   - SRS Diagnosis Unit (SDU)
   - Clock Spring
   - Air Bag Module

   If any of these components are diagnosed as faulty, they should only be replaced, in accordance with the INDIVIDUAL COMPONENT SERVICE procedures in this manual, starting at page [52B-59].
4. Do not attempt to repair the wiring harness connectors of the SRS. If any of the connectors are diagnosed as faulty, replace the wiring harness. If the wires are diagnosed as faulty, replace or repair the wiring harness according to the following table.

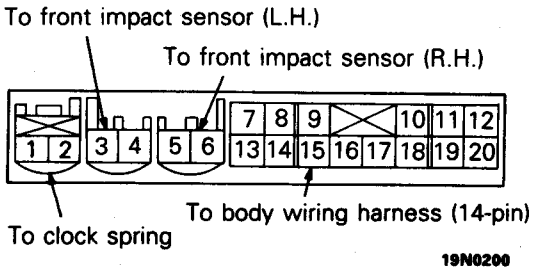
<VEHICLES WITHOUT FRONT PASSENGER'S AIR BAG>

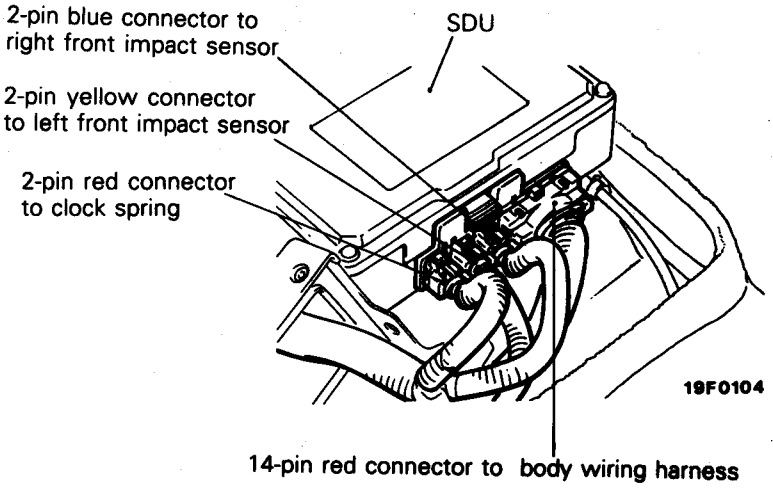
SDU Terminal No.	Harness Connector (No. of Terminals, Color)	Destination of Harness	Corrective Action
1	2 pins, red	Clock spring → Air bag module	Replace clock spring.
2			
3	2 pins, yellow	Body wiring harness → Front wiring harness → Front impact sensor (LH)	Replace with sensor cable.*
4			
5	2 pins, blue	Body wiring harness → Front wiring harness → Front impact sensor (RH)	
6			
7 and 8	14 pins, red	—	—
9		Body wiring harness → Diagnosis check pin	Correct or replace each wiring harness.
10		Body wiring harness → Control wiring harness → Ignition switch (ST)	
11		Body wiring harness → Junction block (fuse No. 11)	
12		Body wiring harness → Junction block (fuse No. 18)	
13		Body wiring harness → Instrument panel wiring harness → SRS warning lamp	
14			
15 to 18		—	—
19		Body wiring harness → Junction block → Body wiring harness → Earth	Correct or replace body wiring harness.
20			

NOTE
(1) The sensor cable marked with * is available as service part.
(2) The sensor cable used as a replacement part is routed along the front wiring harness.


A
SRS diagnosis unit
13R0704

View A

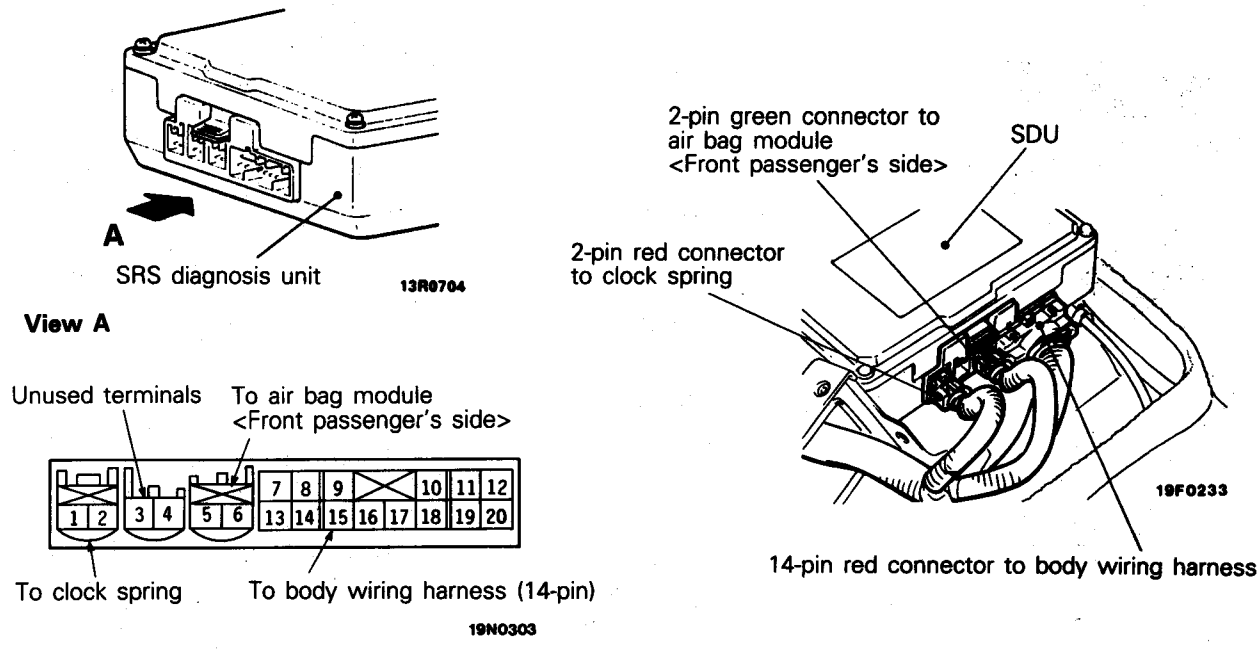

To front impact sensor (L.H.)
To front impact sensor (R.H.)
1 2 3 4 5 6 7 8 9 10 11 12
13 14 15 16 17 18 19 20
To clock spring
To body wiring harness (14-pin)
19N0200


2-pin blue connector to right front impact sensor
SDU
2-pin yellow connector to left front impact sensor
2-pin red connector to clock spring
19F0104
14-pin red connector to body wiring harness

<VEHICLES WITH FRONT PASSENGER'S AIR BAG>

SDU Terminal No.	Harness Connector (No. of Terminals, Color)	Destination of Harness	Corrective Action
1, 2	2 pins, red	Clock spring → Air bag module (Driver's side)	Replace clock spring.
3, 4	No connection	—	—
5, 6	2 pins, green	Body wiring Harness → Air bag module (Front passenger's side)	Correct or replace body wiring harness
7, 8	14 pins, red	—	—
9		Body wiring Harness → Diagnosis check pin	Correct or replace control wiring, instrument panel wiring harness or body wiring harness.
10		Body wiring Harness → Control wiring harness → Ignition switch (ST)	
11		Body wiring Harness → General purpose fuse No. 11	
12		Body wiring Harness → General purpose fuse No. 18	
13, 14		Body wiring Harness → Instrument panel wiring harness → SRS warning lamp	
15		Body wiring Harness → Front wiring Harness → Front impact sensor (R.H.) positive (+) terminal	• Correct or replace body wiring harness or replace with sensor cable*
16		Body wiring Harness → Front wiring Harness → Front impact sensor (L.H.) positive (+) terminal	
17		Body wiring Harness → Front wiring Harness → Front impact sensor (L.H.) negative (–) terminal	
18		Body wiring Harness → Front wiring Harness → Front impact sensor (R.H.) negative (–) terminal	
19, 20		Body wiring Harness → Junction block → Body wiring harness → Earth	Correct or replace body wiring harness.

NOTE
(1) The sensor cable marked with * is available as service part.
(2) The sensor cable used as a replacement part is routed along the body wiring harness.



5. **After disconnecting the battery cable, wait 60 seconds or more before proceeding with the following work. The SRS system is designed to retain enough voltage to deploy the air bag for a short time even after the battery has been disconnected, so serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cables are disconnected.**
6. SRS components should not be subjected to heat over 93°C (200°F), so remove the front impact sensors, SRS diagnosis unit, air bag module and clock spring before drying or baking the vehicle after painting.
   Recheck SRS system operability after re-installing the components.
7. Whenever you finish servicing the SRS, check the SRS warning lamp operation to make sure that the system functions properly. (Refer to P.52B-10.)
8. Make certain that the ignition switch is OFF when the Multi-use Tester or MUT-II is connected or disconnected.
9. If you have any questions about the SRS, please contact your local distributor.

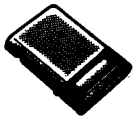
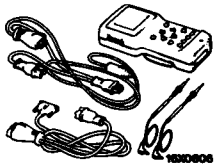
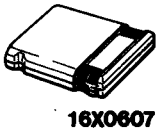
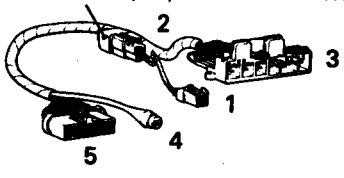
NOTE
SERIOUS INJURY CAN RESULT FROM UNINTENDED AIR BAG DEPLOYMENT, SO USE ONLY THE PROCEDURES AND EQUIPMENT SPECIFIED IN THIS MANUAL.

SPECIFICATIONS

SERVICE SPECIFICATION

Items	Specification
Standard value	
Front impact sensor resistance Ω	2,000 ± 40
Clock spring resistance Ω	less than 0.4

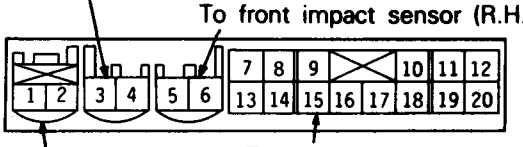
SPECIAL TOOLS AND TEST EQUIPMENT

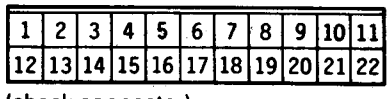
Tool	Number	Name	Use
	MB991341	Multi-use tester sub assembly	<1993 models> ● Reading diagnosis codes ● Erasing diagnosis code ● Reading trouble period ● Reading erase times [Refer to MULTI-USE TESTER INSTRUCTION MANUAL]
	(For the number, refer to GROUP 00 – Precautions Before Service.)	ROM pack (for multi-use tester)	
	MB991502	MUT-II	<All models> ● Reading diagnosis codes ● Erasing diagnosis code ● Reading trouble period ● Reading erase times [Refer to MUT-II OPERATING INSTRUCTIONS]
 16X0607		ROM pack (for MUT-II)	
Resistor (3Ω) 	MB991349	SRS Check Harness	<Vehicles without front passenger's air bag> ● Checking the SRS electrical circuitry with a digital multi-meter NOTE SRS check harness is used on various Diagnostic Tests. For details, refer to DIAGNOSTIC SEQUENCE (P.52B-11–P.52B-49)

1  ← To SDU connector for clock spring

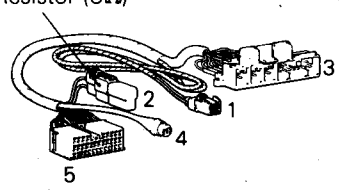
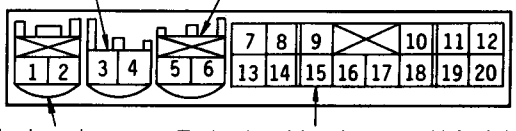
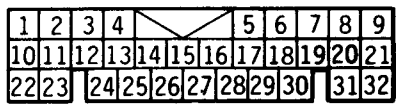
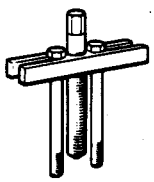
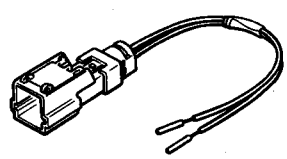
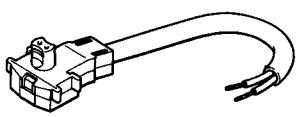
2  (connected 3Ω resistor)

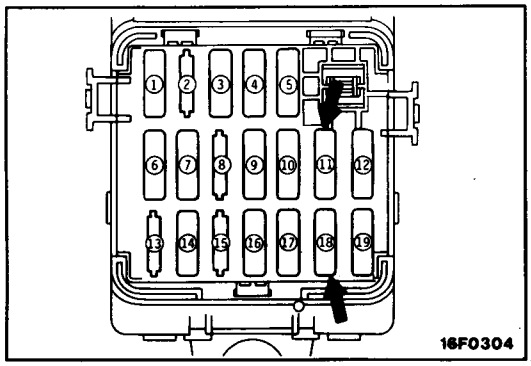
4  White paint; To clock spring connector for air bag module

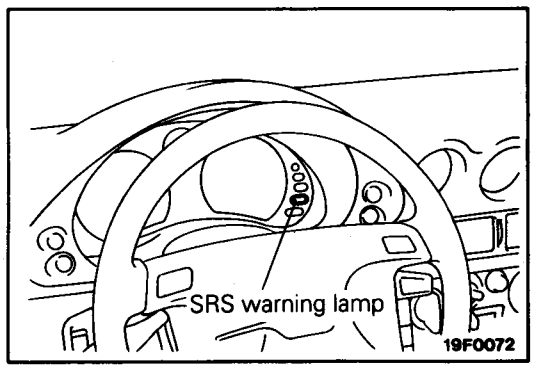
3  To front impact sensor (L.H.); To front impact sensor (R.H.); To clock spring; To body wiring harness (14-pin)

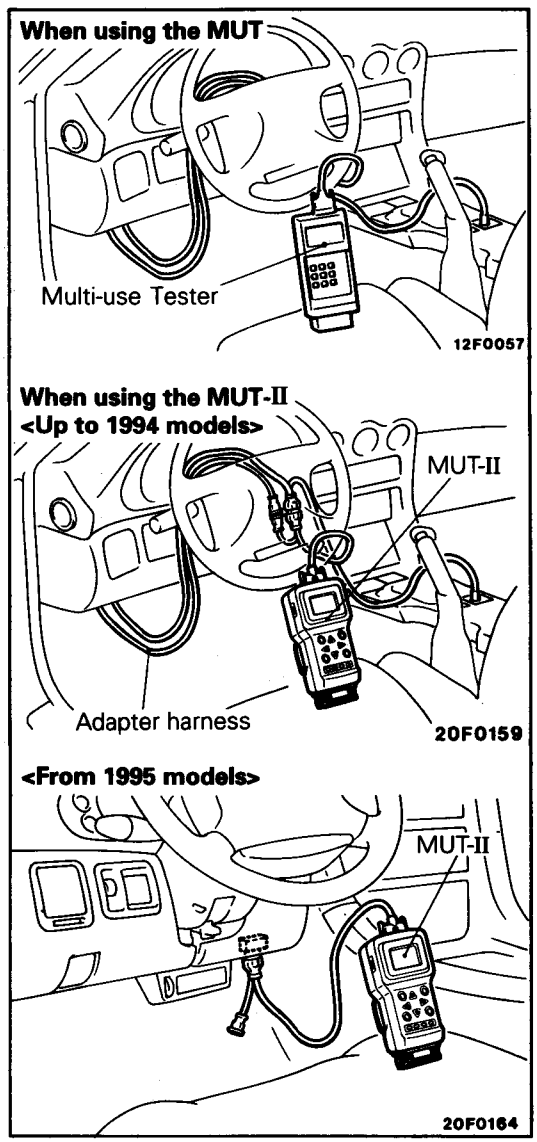
5  (check connector)

1990258

Tool	Number	Name	Use
Resistor (3Ω) 	MB991530	SRS Check Harness	<Vehicles with front passenger's bag> ● Checking the SRS electrical circuitry with a digital multi-meter NOTE SRS check harness is used on various Diagnostic Tests. For details, refer to DIAGNOSTIC SEQUENCE (P.52B-11–P.52B-49)
1  ← To SDU connector for clock spring **2**  (connected 3Ω resistor) No connection To air bag module (front passenger's side) **3**  To clock spring To body wiring harness (14-pin) 19N0303			**4**  ← To clock spring connector for air bag module **5**  (check connector) 19N0325	
 13R0746	[Use a multi-meter for which the maximum test current is 2 mA or less at the minimum range of resistance measurement.]	Digital multi-meter	Checking the SRS electrical circuitry with SRS Check Harness
	MB990803	Steering wheel puller	Removal of steering wheel
 13R0732	MB686560	SRS AIR BAG ADAPTER HARNESS A	● Deployment of air bag module inside the vehicle ● Deployment of air bag module (front passenger's side) outside the vehicle
 13R0751	MB628919	SRS AIR BAG ADAPTER HARNESS B	Deployment of air bag module (driver's side) outside the vehicle







TROUBLESHOOTING

E52EA--

SRS DIAGNOSTIC PROCEDURES – INITIAL STEPS

FOLLOW THESE STEPS WHEN BEGINNING ANY SRS SERVICE:

1. Check the SRS fuses (multi-purpose fuses No. 11 and No. 18).
   If either is loose, tighten it; if damaged or blown, replace it.

2. After performing step 1. turn the ignition key "ON". Does "SRS" warning lamp illuminate for about 7 seconds and then turn OFF? If yes, SRS system is functioning properly. If no, continue with following steps.

   NOTE
   The SRS warning lamp will also illuminate if the battery voltage drops. In such cases, if the battery voltage returns to normal, the SRS warning lamp will switch off.

3. Turn the ignition key to the "LOCK" position.
4. Connect the Multi-use Tester <1993 models> or MUT-II <All models> to the diagnosis connector.

   NOTE
   When connecting MUT-II to 1994 models, use the adapter harness which belongs to MUT-II sub-assembly.

   Caution
   Make certain that the ignition switch is OFF when the Multi-use Tester or MUT-II is connected or disconnected.

5. Start the SRS diagnosis, by conducting TEST 1 (SRS warning lamp does not extinguish) or TEST 2 (SRS warning lamp does not illuminate) which begins on this page.

DIAGNOSTIC SEQUENCE

TEST 1	SRS WARNING LAMP DOES NOT EXTINGUISH

(1) Read (and write down) all of the displayed diagnosis codes and service data (fault duration and how many time memories are erased) using the Multi-use Tester <1993 models> or MUT-II <all models>.

NOTE
(1) If the Multi-use Tester or MUT-II displays "CAN'T COMM", check the Multi-use Tester or MUT-II and vehicle side diagnosis connector for poor connections (Refer to the previous page.) and perform TEST 3.
(2) Maximum stored period: 9999 minutes (approximately 7 days)
(3) Maximum number of times to be stored: 250

(2) Erase in diagnosis codes following the Multi-use Tester or MUT-II messages.

(3) Start engine.
Does "SRS" warning lamp illuminate for about 7 seconds, turn OFF and then remain extinguished for at least 45 seconds?
If yes, SRS system is functioning properly now.
If no, check the diagnosis codes written down at step (1), refer to SELF-DIAGNOSIS QUICK REFERENCE CHART (P.52B-12) and perform service indicated there.

TEST 2	SRS WARNING LAMP DOES NOT ILLUMINATE

(1) Read (and write down) all of the displayed diagnosis codes and service data (fault duration and how many times memories are erased) using the Multi-use Tester <1993 models> or MUT-II <all models>.

NOTE
(1) If the Multi-use Tester or MUT-II displays "CAN'T COMM", check the Multi-use Tester or MUT-II and vehicle side diagnosis connector for poor connections (Refer to P.52B-10) and perform TEST 4.
(2) Maximum stored period: 9999 minutes (approximately 7 days)
(3) Maximum number of times to be stored: 250

(2) Check diagnosis codes against SELF-DIAGNOSIS QUICK REFERENCE CHART and perform service indicated there.

SELF-DIAGNOSIS QUICK REFERENCE CHART

After carrying out test 1 or 2, use the following table to repair.

Diagnosis code No.	Explanation	Service
—	Normal, The SRS is in good order.	—
11	The circuits for the front impact sensor are shorted together, the (–) side of the harness between the air bag module and the SDU is shorted to the earth, or the (+) side of the harness between the front impact sensor and the SDU is shorted to the earth.	Perform TEST 5 (<Vehicles without front passenger's air bag> refer to P.52B-20 <Vehicles with front passenger's air bag> refer to P.52B-24)
12	Right or left impact sensor circuit is open or the wire from the sensor to the SDU is open-circuit.	
13	Right and left impact sensor circuits are open or the wires from the sensors to the SDU are open-circuit.	
21	The circuits for the driver's side air bag module (squib) are shorted together other or the circuit is earthed	Perform TEST 6 (<Vehicles without front passenger's air bag> refer to P.52B-27 <Vehicles with front passenger's air bag> refer to P.52B-31)
22	The driver's side air bag module (squib) circuit is open or the wire from the driver's side air bag module to the SDU (clock spring) is open circuit, the harness connection is defective, or the (+) side of the harness between the driver's side air bag module and the SDU is shorted to the earth.	
24	The circuits for the front passenger's side air bag module (squib) are shorted together other or the circuit is earthed	Perform TEST 13 (Refer to P.52B-47.)
25	The front passenger's side air bag module (squib) circuit is open or the wire from the front passenger's side air bag module to the SDU (clock spring) is open circuit, the harness connection is defective or the (+) side of the harness between the front passenger's side air bag module and the SDU is shorted to the earth.	

Diagnosis code No.	Explanation	Service
31	The capacitor (integrated in the SDU) terminal voltage is higher than the specified value for 5 seconds.	Replace the SDU. (Refer to P.52B-62.)
32	The capacitor (integrated in the SDU) terminal voltage is lower than the specified value for 5 seconds. Or the battery runs short.	If the battery voltage is normal, replace SDU. (Refer to P.52B-62.) If the battery is run down, turn the ignition key to the "LOCK" position, disconnect the negative battery cable and wrap the terminal with tape for insulation. Then, charge the battery.
33*2	The circuit for the cranking signal is shorted to some power supply circuits. It takes at least 45 seconds that the SDU detects this fault.	Perform TEST 7 (Refer to P.52B-35.)
34*2	The lock switch (short bar) of the SDU double lock connector is open.	Perform TEST 8 (Refer to P.52B-38.)
41*1, *2	The multi-purpose fuse (No. 11) is blown or the wire from the fuse to the SDU is open-circuit or its resistance value is increased, or the battery runs short. It takes at least 5 seconds that the SDU detects this fault.	If the battery voltage is normal, perform TEST 9. (Refer to P.52B-39.) If the battery is run down, turn the ignition key to the "LOCK" position, disconnect the negative battery cable and wrap the terminal with tape for insulation. Then, charge the battery.
42*1, *2	The multi-purpose fuse (No. 18) is blown or the wire from the fuse to the SDU is open-circuit or its resistance value is increased, or the battery runs short. It takes at least 5 seconds that the SDU detects this fault.	If the battery voltage is normal, perform TEST 10. (Refer to P.52B-39.) If the battery is run down, turn the ignition key to the "LOCK" position, disconnect the negative battery cable and wrap the terminal with tape for insulation. Then, charge the battery.
43*2	The SRS warning lamp circuits are open or the wire from the lamp to the SDU is earthed. It takes at least 5 seconds with the lamp OFF that the SDU detects this fault.	When SRS warning lamp does not extinguish: Perform TEST 11 (Refer to P.52B-42.) When SRS warning lamp does not illuminate: Perform TEST 12 (Refer to P.52B-44.)
44	The SRS warning lamp drive transistor (integrated in the SDU) is open-circuit.	Replace the SDU. (Refer to P.52B-62.)
45	The EEP ROM or A/D converter (integrated in the SDU) is defective.	

NOTE

(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester or MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

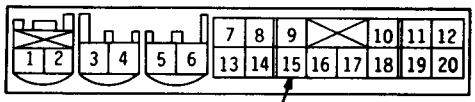
(3) * : If the vehicle has a discharged battery it will store the fault codes 41 or 42. When these diagnosis codes are displayed, check the battery.

(4) If a malfunction that corresponds to codes marked by *2 reoccurs, the SRS warning lamp will switch off and the function will return to normal.

TEST 3

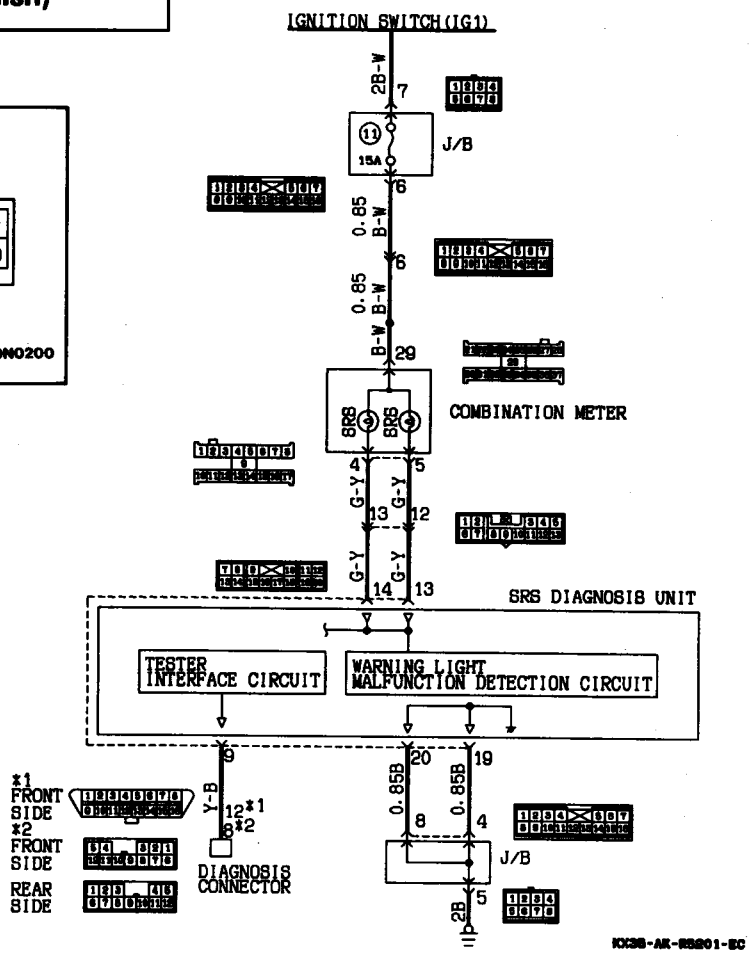
NO COMMUNICATION BETWEEN MULTI-USE TESTER OR MUT-II AND SDU (SRS warning lamp does not extinguish)

SDU connector

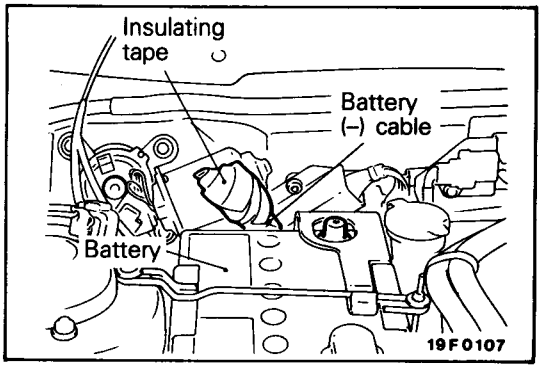


To body wiring harness (14-pin)

19N0200



NOTE
*1: From 1995 models
*2: Up to 1994 models

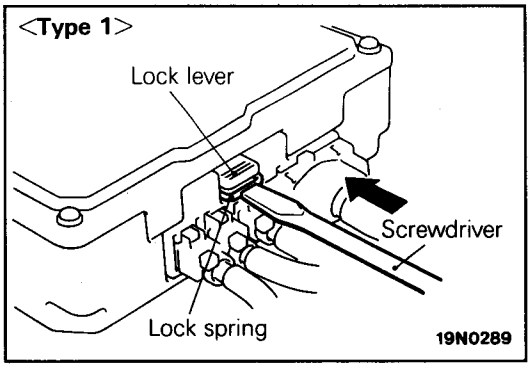


(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

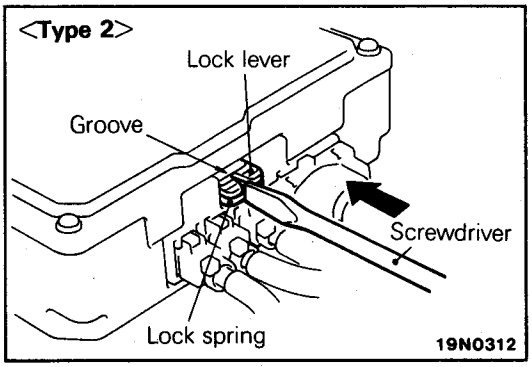
Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-7 No. 5.)

(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

<Type 1>



<Type 2>



(3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution
(1) Do not use excessive force to raise the lock lever.
(2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

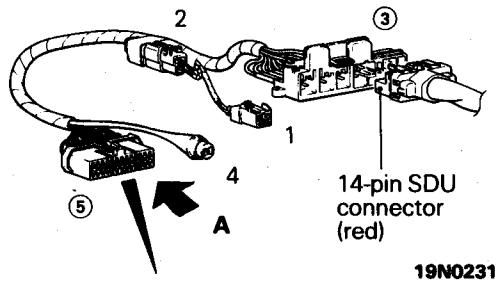
In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution
Do not use excessive force to raise the lock lever.

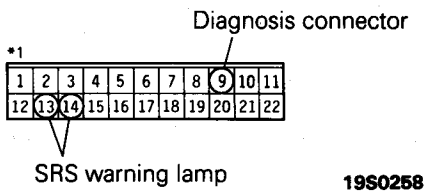
(4) Disconnect the red 14-pin connector from the SDU.

MB991349*1
MB991530*2
SRS Check Harness

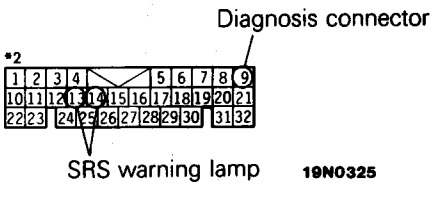


(5) Connect the red harness-side SDU connector (14-pin) to the connector ③ of the SRS Check Harness.
(6) Check according to the flow chart below, using the specified digital multi-meter.

View A
SRS Check Harness connector ⑤



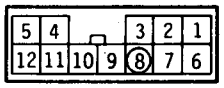
NOTE
*1 : Vehicles without front passenger's air bag
*2 : Vehicles with front passenger's air bag



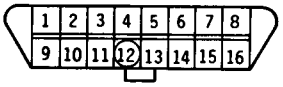
Is there continuity between the No. 9 terminal of SRS Check Harness connector ⑤ and the No. 8 or No. 12 terminal of the diagnosis connector (next to the right side of the junction block)?

Diagnosis connector

<Up to 1994 models>



<From 1995 models>



19F0277

No → Body wiring harness damaged or disconnected between the SDU and the diagnosis connector → Repair or replace the body wiring harness. (Refer to P.52B-4.)

Yes

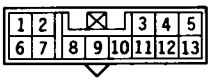
Is there continuity between the No. 13 or No. 14 terminal of SRS Check Harness connector ⑤ and earth?

No → Malfunction of the SDU. → Replace the SDU (Refer to P.52B-62.)

Yes

Disconnect the connector between the body wiring harness and instrument panel wiring harness.

Check for continuity between the earth and terminal No. 12 or No. 13 of the body wiring harness's connector which is connected to the instrument panel wiring harness.



16F0404

No → The harness between SDU and instrument panel wiring harness is short-circuited. → Repair or replace the body wiring harness at the location of the short circuit. (Refer to P.52B-4.)

Yes → The instrument panel wiring harness between SRS warning lamp and body wiring harness is short-circuited. → Repair or replace the instrument panel wiring harness at the location of the short circuit.

NOTE – IMPORTANT

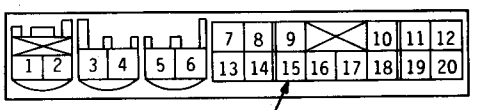
(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester or MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

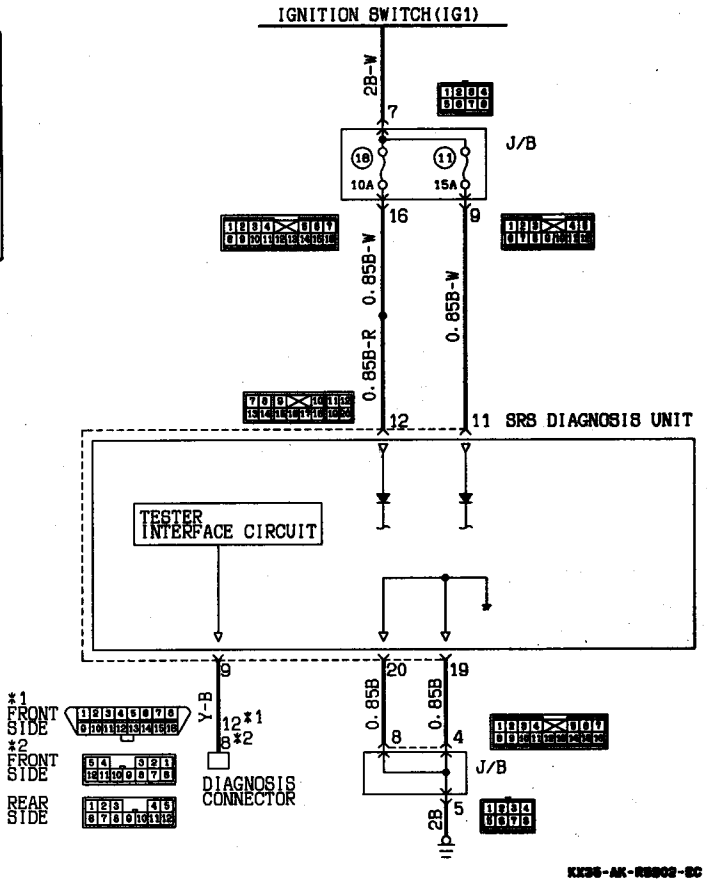
TEST 4

NO COMMUNICATION BETWEEN MULTI-USE TESTER OR MUT-II AND SDU (SRS warning lamp does not illuminate)

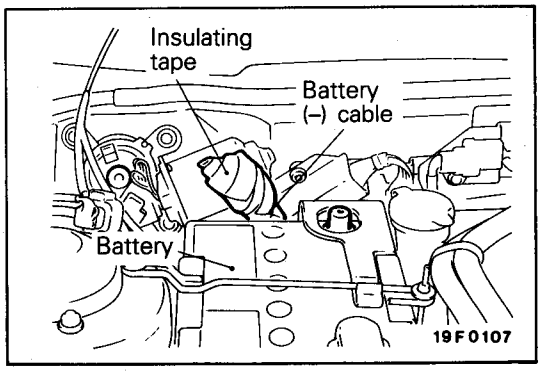
SDU connector



To body wiring harness (14-pin) 19N0200



NOTE
*1: From 1995 models
*2: Up to 1994 models

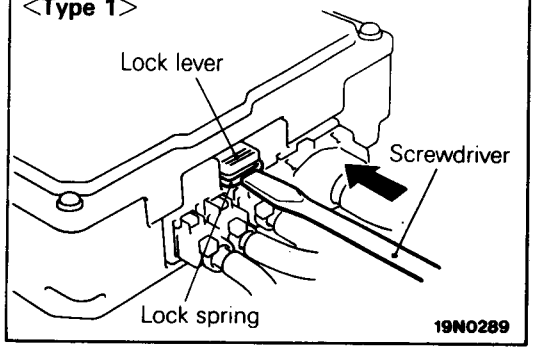


(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

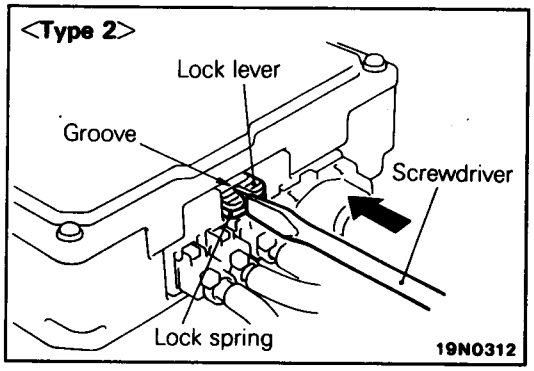
Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-7 No. 5.)

(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

<Type 1>



<Type 2>



(3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution
(1) Do not use excessive force to raise the lock lever.
(2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a groove on the lock lever (Type 2)

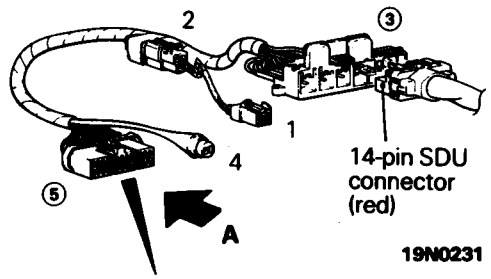
Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution
Do not use excessive force to raise the lock lever.

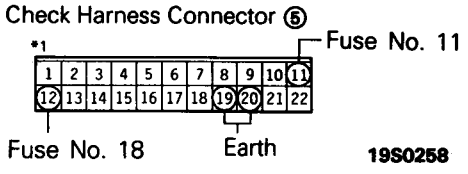
(4) Disconnect the red 14-pin connector from the SDU.

MB991349*1
MB991530*2
SRS Check Harness

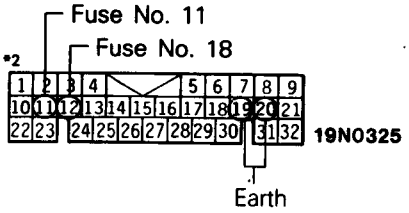
(5) Connect the red harness-side SDU connector (14-pin) to the connector ③ of the SRS Check Harness.
(6) Check according to the flow chart below, using the specified digital multi-meter.

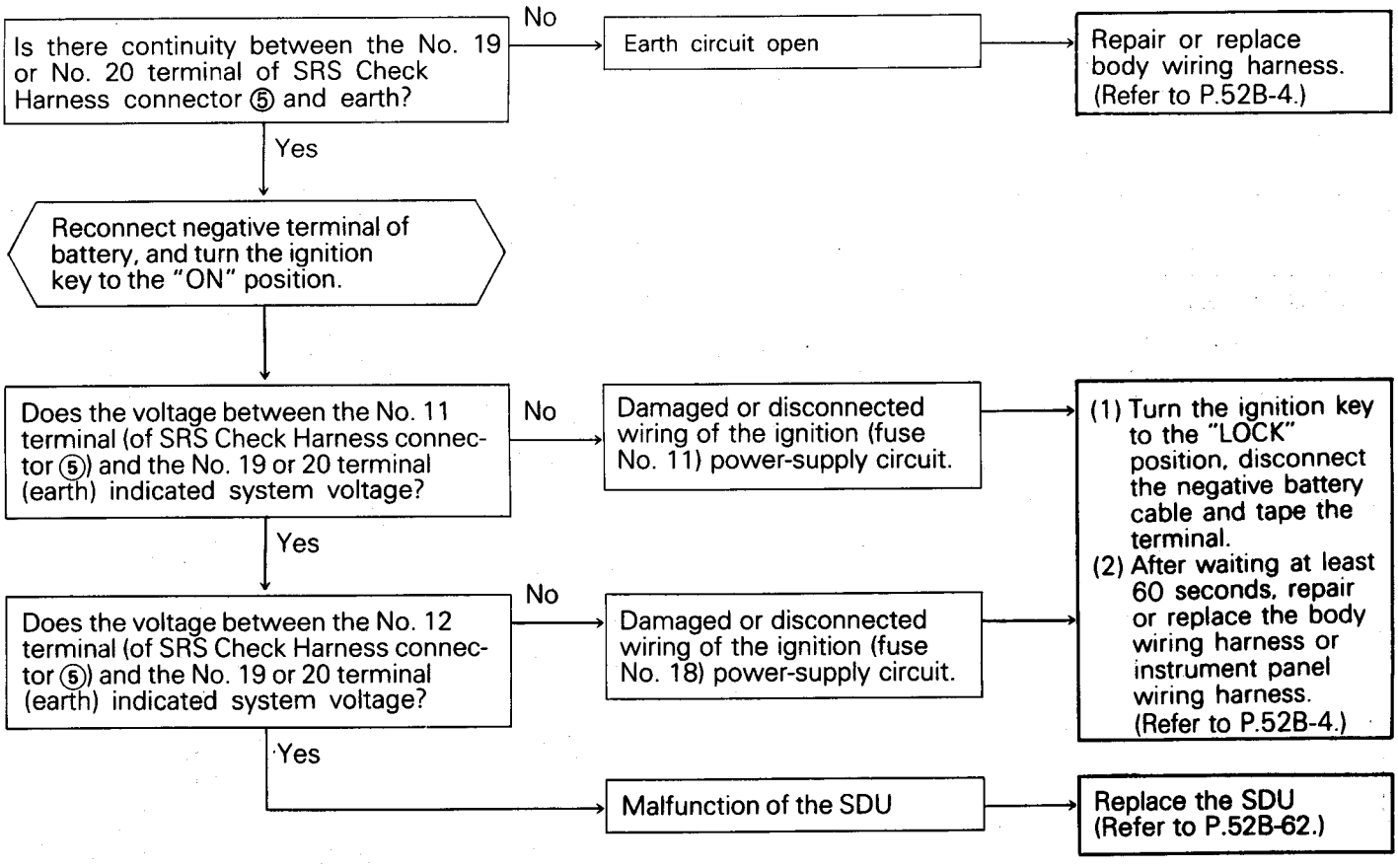


View A
SRS Check Harness Connector ⑤



NOTE
*1 : Vehicles without front passenger's air bag
*2 : Vehicles with front passenger's air bag





NOTE – IMPORTANT

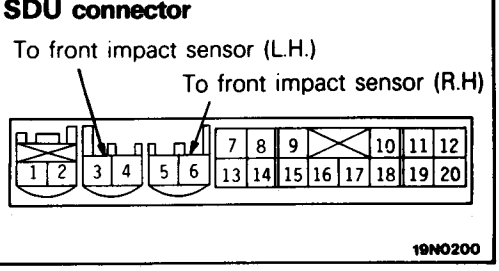
(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester or MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

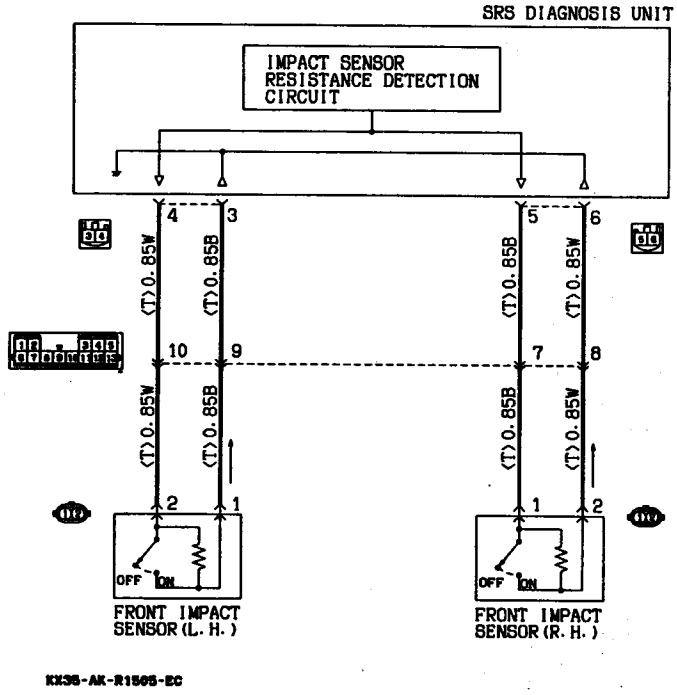
(2) SDU = SRS Diagnosis Unit

TEST 5 <Vehicles without front passenger's air bag>

WHEN DIAGNOSIS CODE NO. 11, NO. 12 OR NO. 13 IS DISPLAYED

SDU connector

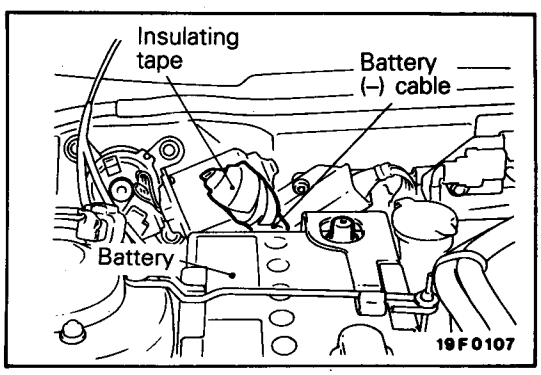




NOTE
If combined front impact sensor and air bag module (squib) failure modes simultaneously occur in two places, the preconditions for the respective detection circuits will go out of order. For this reason, both diagnosis codes may not be stored but only one of them may be indicated.
Their relationships are shown in the following table.

		Front impact sensors		
		Short-circuited	One open-circuited	Two open-circuited
Air bag module (Squib)	Short-circuited	11 and/or 21	12 and/or 21	13 and/or 21
	Open-circuited	11 and/or 22	12 and/or 22	13 and/or 22

The numbers in the boxes are diagnosis codes numbers. (Refer to P.52B-12.)

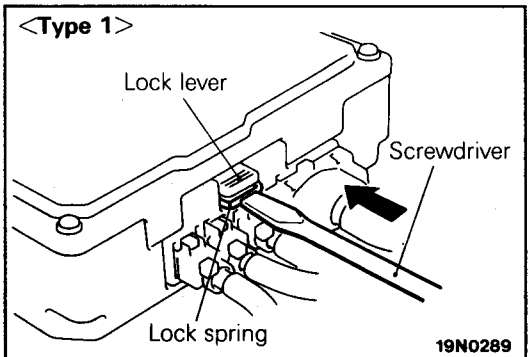


(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

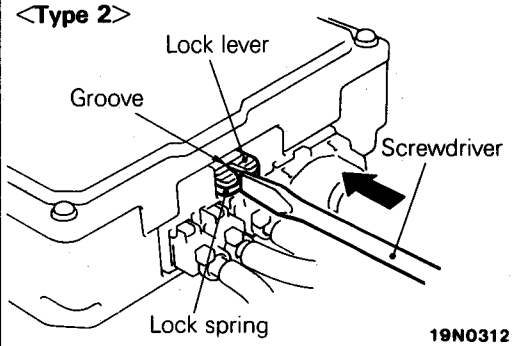
Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-7 No. 5.)

(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

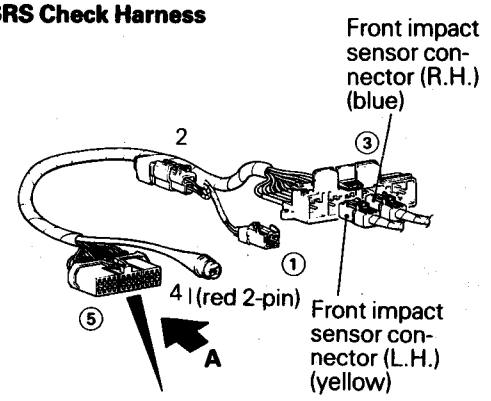
<Type 1>



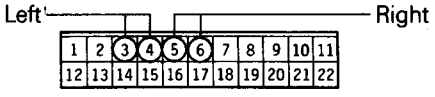
<Type 2>



MB991349
SRS Check Harness



View A
SRS Check Harness connector ⑤



(3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution
(1) Do not use excessive force to raise the lock lever.
(2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution
Do not use excessive force to raise the lock lever.

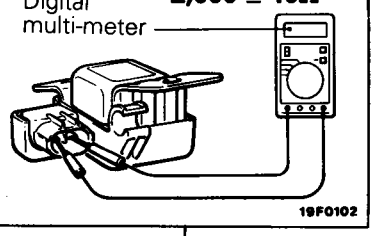
(4) Disconnect each connector other than 14-pin connector from the SDU.

(5) Locate the blue and yellow connectors for the wiring leading to the front impact sensors, which were connected to the now-disconnected harness-side connector of the SDU. Connect those blue and yellow connectors to connector ③ of the SRS Check Harness.

(6) Check according to the flow chart below, using the specified digital multi-meter and Multi-use Tester or MUT-II.

Is the resistance between the No. 3 terminal of SRS Check Harness connector ⑤ and the No. 4 terminal normal?
Standard value: 2,000 ± 40Ω

No → Is the resistance between the terminals of the left front impact sensor normal?
Standard value: 2,000 ± 40Ω



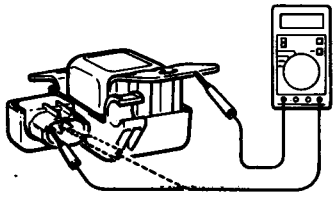
No → Replace the left front impact sensor. (Refer to P.52B-60.)

Yes → Front wiring harness is earthed or open. → Replace the sensor cables. (Refer to P.52B-4.)

Yes

Is there continuity between the No. 3 or No. 4 terminal of SRS Check Harness connector ⑤ and the body earth?

Yes → Is there continuity between the terminal of left front impact sensor and the sensor bracket?



Yes → Replace the left front impact sensor.

No → The harness between left front impact sensor and SRS diagnosis unit is short-circuited. → Repair or replace the harness.*

No

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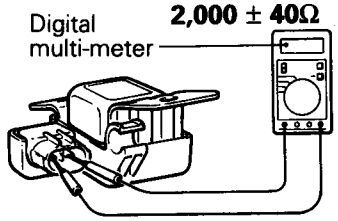
Is the resistance between the No. 5 terminal of SRS Check Harness connector ⑤ and the No. 6 terminal normal?
Standard value: 2,000 ± 40Ω

No → Is the resistance between the terminals of the right front impact sensor normal?
Standard value: 2,000 ± 40Ω



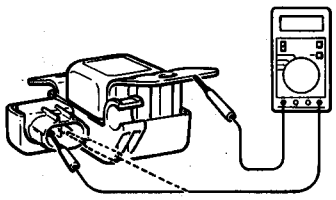
No → Replace the right front impact sensor. (Refer to P.52B-60.)

Yes → Front wiring harness is earthed or open. → **Replace the sensor cables.** (Refer to P.52B-4.)

Yes

Is there continuity between the No. 5 or No. 6 terminal of SRS Check Harness connector ⑤ and the body earth?

Yes → Is there continuity between the terminal of right front impact sensor and the sensor bracket?



Yes → Replace the right front impact sensor.

No → The harness between right front impact sensor and SRS diagnosis unit is short-circuited. → Repair or replace the harness.*

No

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NOTES

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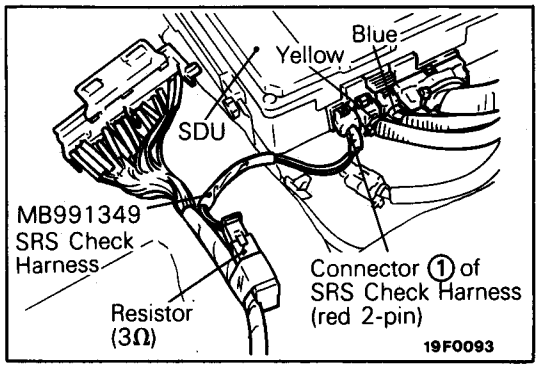


(1) Connect the red 2-pin connector ① of the SRS Check Harness to the SDU in place of the now-disconnected clock spring-SDU connector.

NOTE
A 3-ohm resistor that corresponds to the resistance of the air bag module (squib) and the wiring resistance is connected between the terminals of the connector ① of the SRS Check Harness.

(2) Reconnect blue and yellow connectors, for the wiring leading to the front impact sensors, to the SDU and double lock them.

NOTE
If double locking cannot be made, the connector is incorrectly or incompletely inserted; re-check to insert the connector correctly and securely.

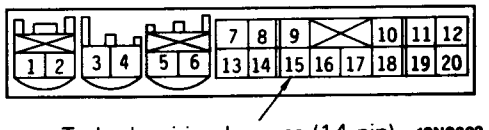
CONTINUED ON P.52B-29 *
(TEST 6 <Vehicles without front passenger's air bag>

NOTE – IMPORTANT
(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester or MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)
(2) SDU = SRS Diagnosis Unit

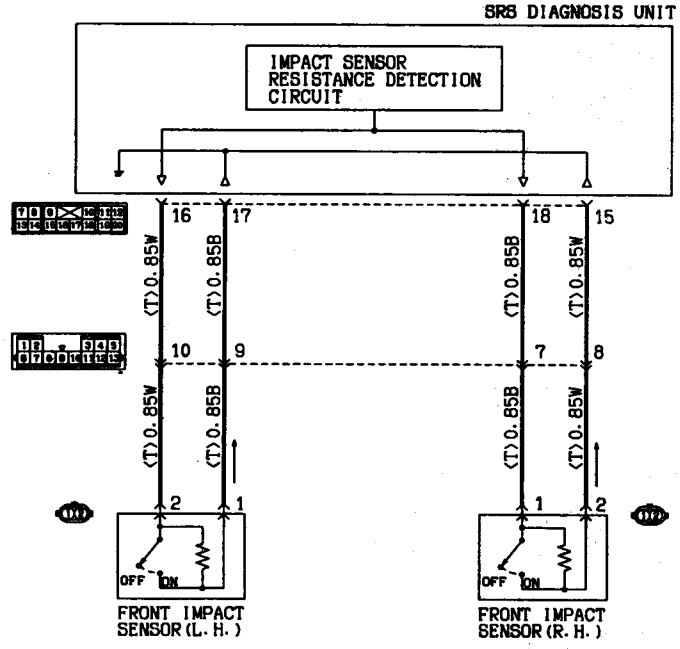
TEST 5 <Vehicles with front passenger's air bag>

WHEN DIAGNOSIS CODE NO. 11, NO. 12 OR NO. 13 IS DISPLAYED

SDU connector



To body wiring harness (14-pin) 19N0303

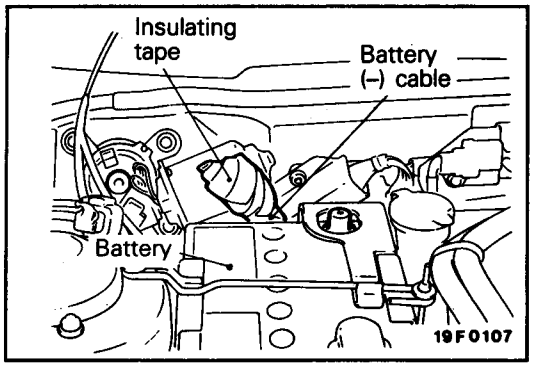


K335-AK-R1506-EC

NOTE
If combined front impact sensor and air bag module (squib) failure modes simultaneously occur in two places, the preconditions for the respective detection circuits will go out of order. For this reason, both diagnosis codes may not be stored but only one of them may be indicated.
Their relationships are shown in the following table.

		Front impact sensors		
		Short-circuited	One open-circuited	Two open-circuited
Driver's side air bag module (Squib)	Short-circuited	11 and/or 21	12 and/or 21	13 and/or 21
	Open-circuited	11 and/or 22	12 and/or 22	13 and/or 22
Front passenger's side air bag module (Squib)	Short-circuited	11 and/or 24	12 and/or 24	13 and/or 24
	Open-circuited	11 and/or 25	12 and/or 25	13 and/or 25

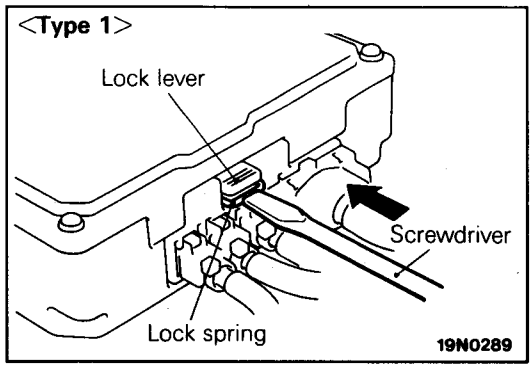
The numbers in the boxes are diagnosis codes numbers. (Refer to P.52B-12.)

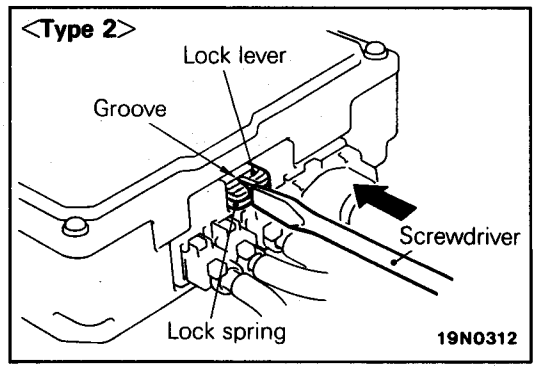


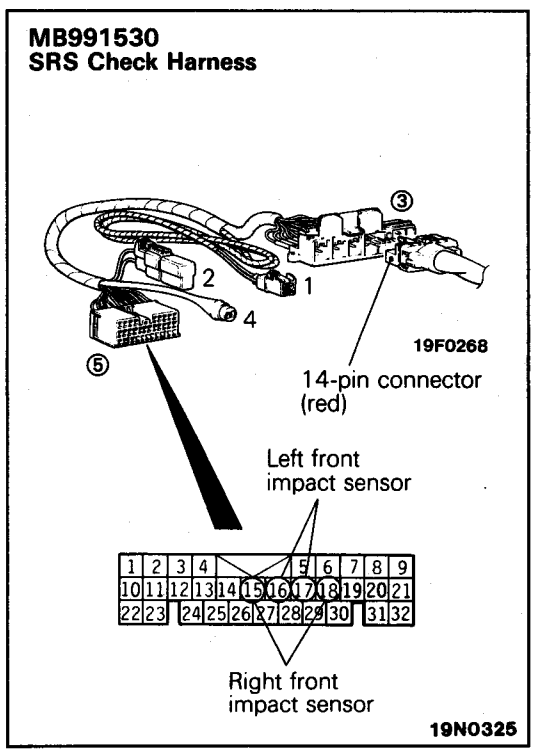
(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-7 No. 5.)

(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)







(3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution
(1) Do not use excessive force to raise the lock lever.
(2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

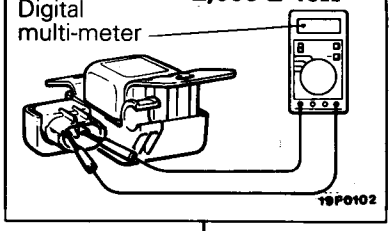
Caution
Do not use excessive force to raise the lock lever.

(4) Disconnect the red 14-pin connector from the SDU.

(5) Connect the now disconnected red harness-side SDU connector (14-pin) to the connector ③ of the SRS Check Harness.
(6) Check according to the flow chart below, using the specified digital multi-meter and MUT-II.

Is the resistance between the No. 16 terminal of SRS Check Harness connector ⑤ and the No. 17 terminal normal?
Standard value: 2,000 ± 40Ω

No → Is the resistance between the terminals of the left front impact sensor normal?
Standard value: 2,000 ± 40Ω



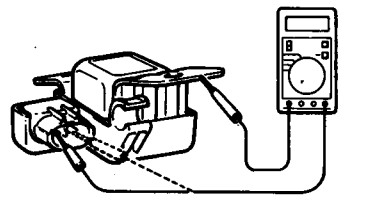
No → Replace the left front impact sensor. (Refer to P.52B-60.)

Yes → Front wiring harness is earthed or open. → Replace the sensor cables. (Refer to P.52B-4.)

Yes

Is there continuity between the No. 16 or 17 terminal of SRS Check Harness connector ⑤ and the body earth?

Yes → Is there continuity between the terminal of left front impact sensor and the sensor bracket?



Yes → Replace the left front impact sensor.

No → The harness between left front impact sensor and SRS diagnosis unit is short-circuited. → Repair or replace the harness.*

No

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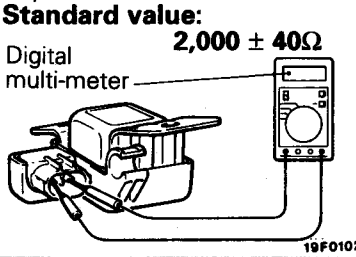
Is the resistance between the No. 15 terminal of SRS Check Harness connector ⑤ and the No. 18 terminal normal?
Standard value: 2,000 ± 40Ω

No → Is the resistance between the terminals of the right front impact sensor normal?
Standard value: 2,000 ± 40Ω

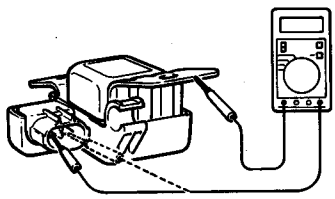


No → Replace the right front impact sensor. (Refer to P.52B-60.)

Yes → Front wiring harness is earthed or open. → **Replace the sensor cables.** (Refer to P.52B-4.)

Yes → Is there continuity between the No. 15 or No. 18 terminal of SRS Check Harness connector ⑤ and the body earth?

Yes → Is there continuity between the terminal of right front impact sensor and the sensor bracket?



Yes → Replace the right front impact sensor.

No → The harness between right front impact sensor and SRS diagnosis unit is short-circuited. → Repair or replace the harness.*

No →

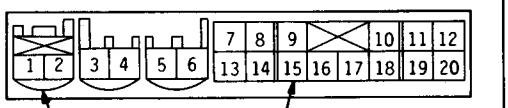
- Check the driver's side air bag module (squib) system TEST 6 <Vehicles with front passenger's air bag> (P.52B-31)
- Check the front passenger's side air bag module (squib) system TEST 13 <Vehicles with front passenger's air bag> (P.52B-47)

NOTES

TEST 6 <Vehicles without front passenger's air bag>

WHEN DIAGNOSIS CODE NO. 21 OR NO. 22 IS DISPLAYED

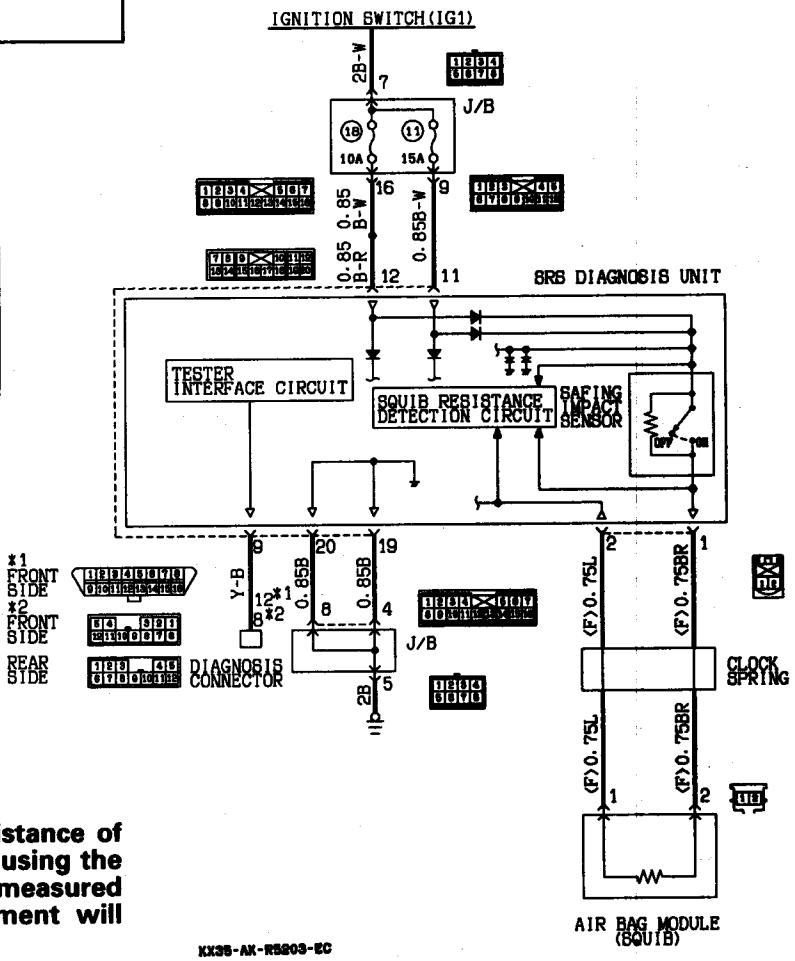
SDU connector



To clock spring

To body wiring harness (14-pin)

19N0200



NOTE
*1: From 1995 models
*2: Up to 1994 models

Caution
Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

Have the other diagnosis code test(s) been finished?

No → Perform the other diagnosis code test(s) prior to this test.

Yes

NOTE
If combined front impact sensor and air bag module (squib) failure modes simultaneously occur in two places, the preconditions for the respective detection circuits will go out of order. For this reason, both diagnosis codes may not be stored but only one of them may be indicated.
Their relationships are shown in the following table.
Perform TEST 5 if it does not become proper even through TEST 6 is executed.

		Front impact sensors		
		Short-circuited	One open-circuited	Two open-circuited
Air bag module (Squib)	Short-circuited	11 and/or 21	12 and/or 21	13 and/or 21
	Open-circuited	11 and/or 22	12 and/or 22	13 and/or 22

The numbers in the boxes are diagnosis codes numbers. (Refer to P.52B-12.)

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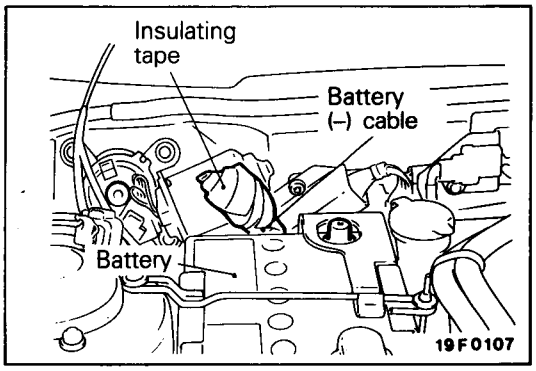


(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-9 No. 5.)

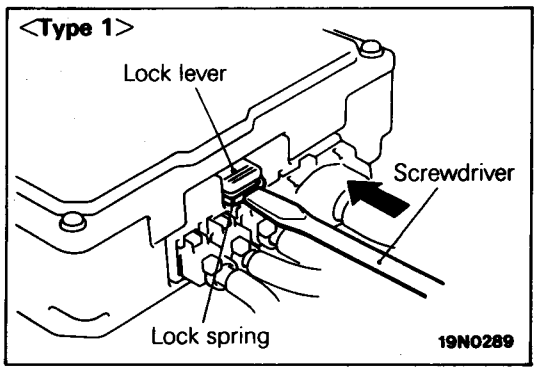
(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

(3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

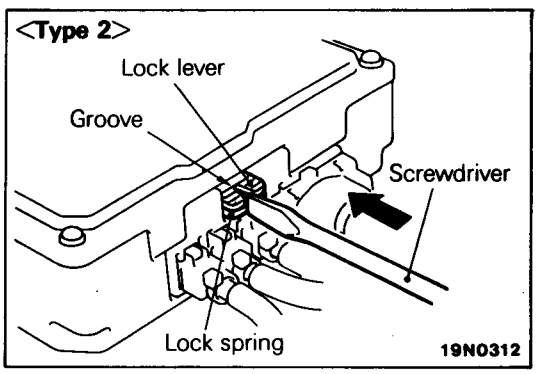
Caution
(1) Do not use excessive force to raise the lock lever.
(2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.



In case that there is a groove on the lock lever (Type 2)

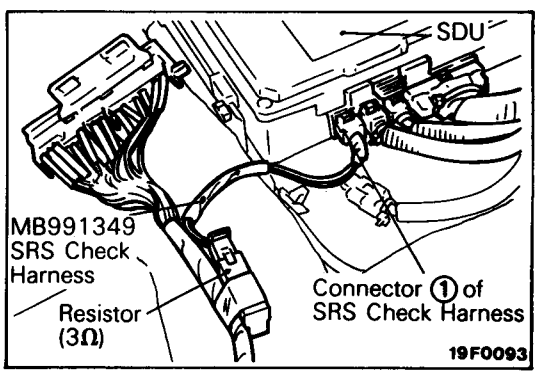
Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution
Do not use excessive force to raise the lock lever.



(4) Disconnect the red 2-pin connector from the SDU.
(5) Connect the red connector ① of the SRS Check Harness to the SDU instead of the now-disconnected harness-side connector of the SDU, which were connected to the air bag module (squib) through the clock spring.

NOTE
A 3-ohm resistor that corresponds to the resistance of the air bag module (squib) and the wiring resistance is connected between the terminals of the connector ① of the SRS Check Harness.



(6) Make the double locking.

NOTE
If double locking cannot be made, the connector is incorrectly or incompletely inserted; re-check to insert the connector correctly and securely.

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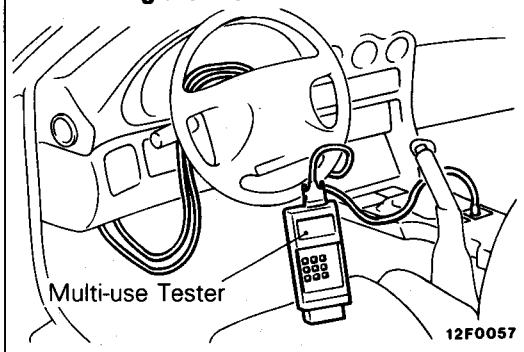
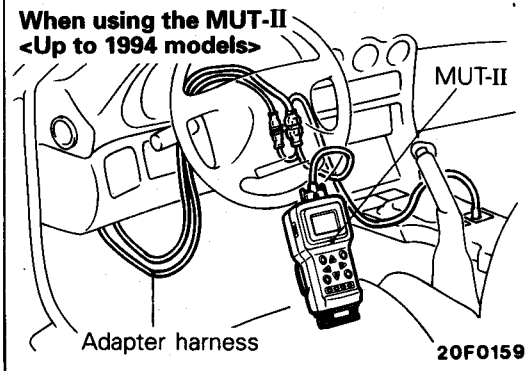
* CONTINUED FROM P.52B-23 (TEST 5 <Vehicles without front passenger's air bag.>)

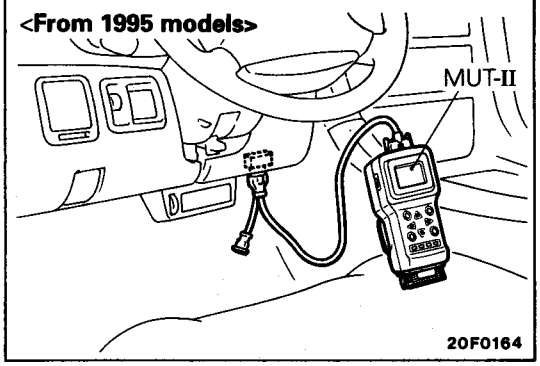
When using the MUT



When using the MUT-II
<Up to 1994 models>



<From 1995 models>



(1) Reconnect negative terminal of battery.
(2) Connect either Multi-use Tester or MUT-II.

NOTE
When connecting MUT-II to 1994 models use the adapter harness which belongs to MUT-II sub-assembly.

Caution
Connect and disconnect either Multi-use Tester or MUT-II with the ignition switch in the OFF position.

(3) Turn the ignition key to the "ON" position.
Using the Multi-use Tester or MUT-II, erase the diagnosis code memory. (Refer to TEST 1.)
(4) Return the ignition key from the "ON" to the "LOCK" position and then back to the "ON" position.

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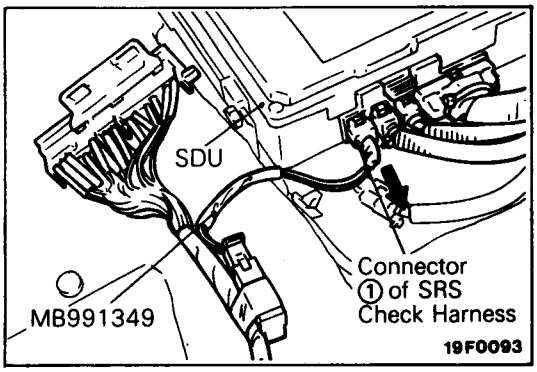
Is the SRS warning lamp operation normal?

No → Malfunction of the SDU. → Replace the SDU. (Refer to P.52B-62.)

Yes



(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-7 No. 5.)

(2) Disconnect the red 2-pin connector 1 of the SRS Check Harness from the SDU.

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NOTES

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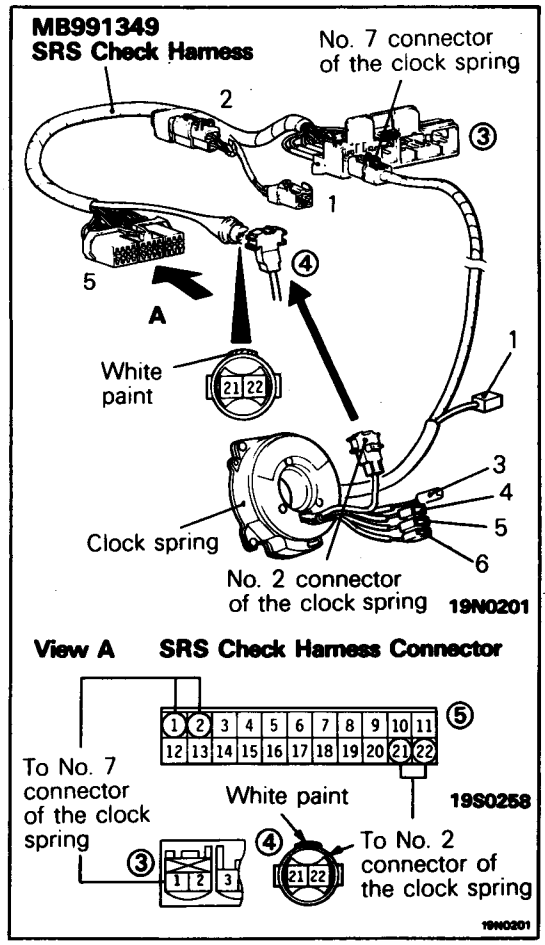


(1) Remove the air bag module. (Refer to P.52B-65.)
(2) Join the No. 2 and No. 7 connectors of the clock spring to SRS Check Harness connector ④ and SRS Check Harness connector ③, respectively.

NOTE
When joining SRS Check Harness connector ④, align its white paint with the hollow portion of the No. 2 connector of the clock spring.

(3) Is the resistance between terminal 1 and terminal 21 of SRS Check Harness connector ⑤, and between terminal 2 and terminal 22 of SRS Check Harness connector ⑤ normal?

Standard value: less than 0.4Ω

Yes

No

Malfunction of the clock spring. → Replace the clock spring. (Refer to P.52B-65.)

Malfunction of the air bag module. → Replace the air bag module. (Refer to P.52B-65.)

Caution
Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

NOTE – IMPORTANT

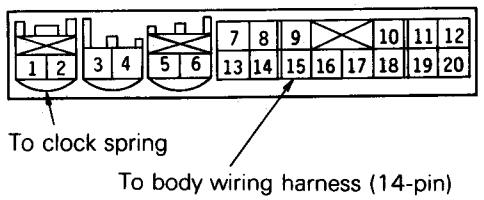
(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester or MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

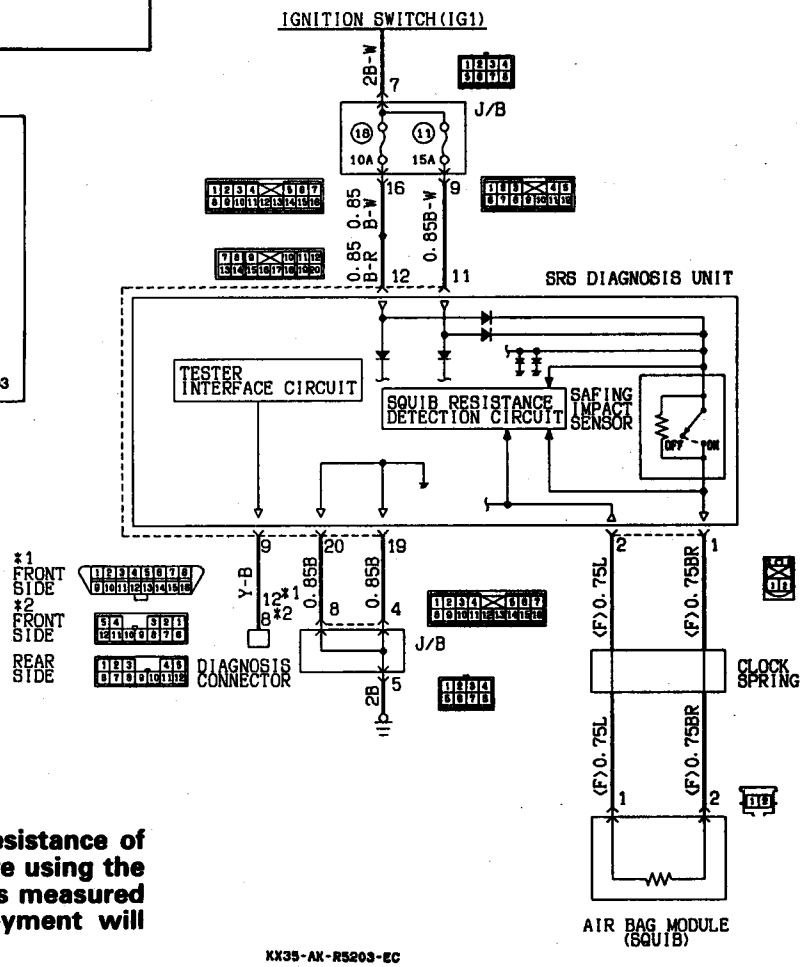
(2) SDU = SRS Diagnosis Unit

TEST 6 <Vehicles with front passenger's air bag>

WHEN DIAGNOSIS CODE NO. 21 OR NO. 22 IS DISPLAYED

SDU connector





NOTE
*1: From 1995 models
*2: Up to 1994 models

Caution
Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

Have the other diagnosis code test(s) been finished?

No → Perform the other diagnosis code test(s) prior to this test.

Yes

NOTE
If combined front impact sensor and air bag module (squib) failure modes simultaneously occur in two places, the preconditions for the respective detection circuits will go out of order. For this reason, both diagnosis codes may not be stored but only one of them may be indicated.
Their relationships are shown in the following table.
Perform TEST 5 if it does not become proper even through TEST 6 is executed.

		Front impact sensors		
		Short-circuited	One open-circuited	Two open-circuited
Driver's side air bag module (Squib)	Short-circuited	11 and/or 21	12 and/or 21	13 and/or 21
	Open-circuited	11 and/or 22	12 and/or 22	13 and/or 22

The numbers in the boxes are diagnosis codes numbers. (Refer to P.52B-12.)

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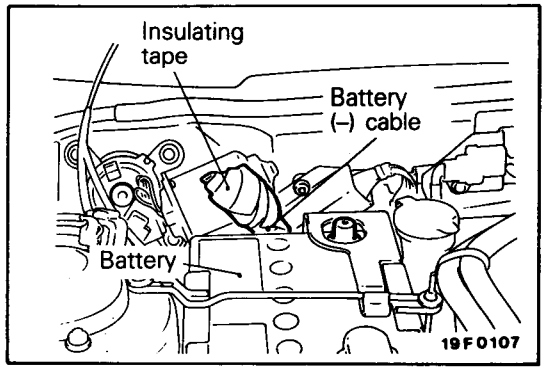
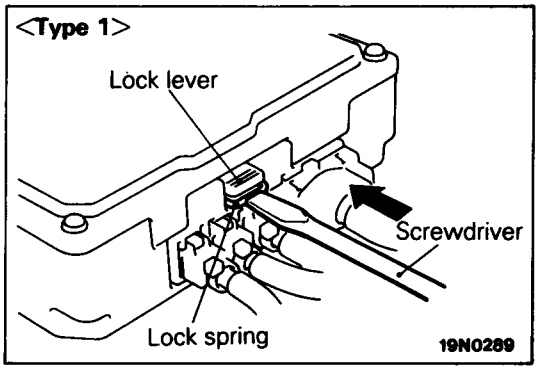


(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work.
(Refer to P.52B-7 No. 5.)

(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

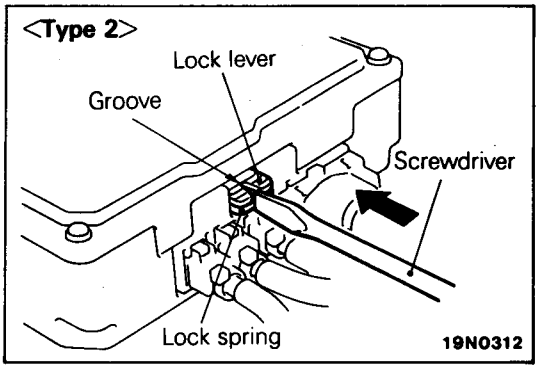


(3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution
(1) Do not use excessive force to raise the lock lever.
(2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.



In case that there is a groove on the lock lever (Type 2)

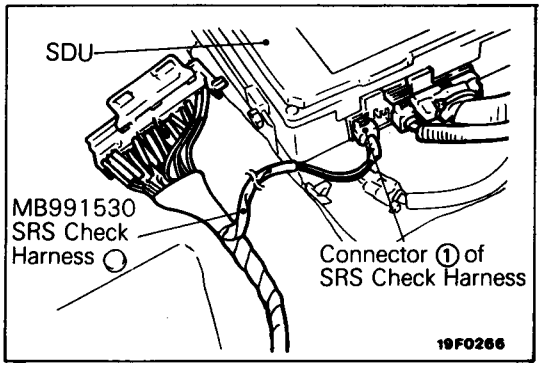
Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution
Do not use excessive force to raise the lock lever.

(4) Disconnect the red 2-pin connector from the SDU.

(5) Connect the red connector ① of the SRS Check Harness to the SDU instead of the now-disconnected harness-side connector of the SDU, which were connected to the air bag module (squib) through the clock spring.

NOTE
A 3-ohm resistor that corresponds to the resistance of the air bag module (squib) and the wiring resistance is connected between the terminals of the connector ① of the SRS Check Harness.



(6) Make the double locking.

NOTE
If double locking cannot be made, the connector is incorrectly or incompletely inserted; re-check to insert the connector correctly and securely.

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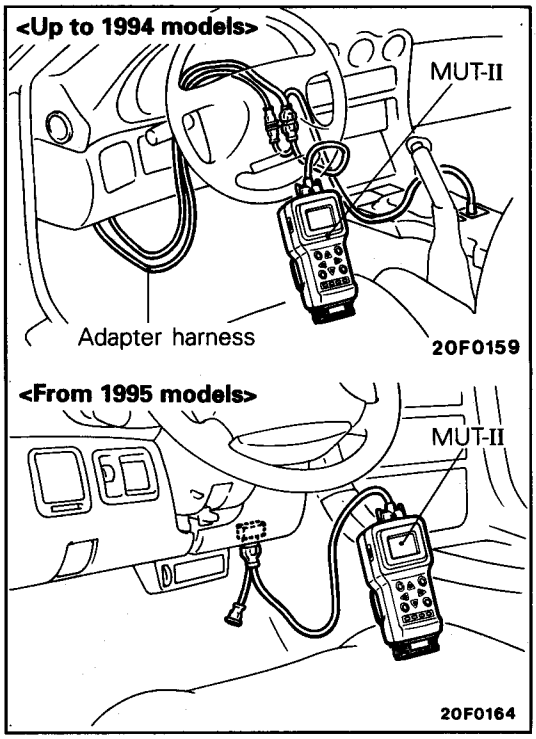


(1) Reconnect negative terminal of battery.
(2) Connect the MUT-II.

NOTE
When connecting MUT-II to 1994 models, use the adapter harness which belongs to MUT-II sub-assembly.

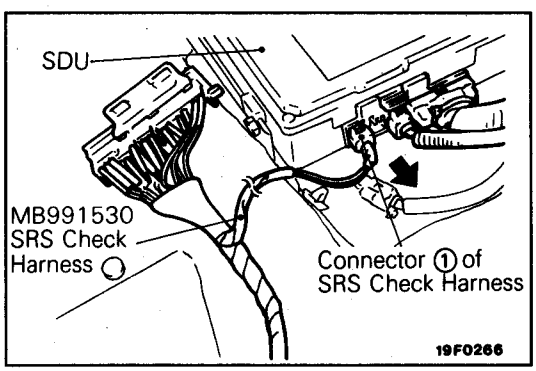
Caution
Connect and disconnect the MUT-II with the ignition switch in the OFF position.

(3) Turn the ignition key to the "ON" position.
Using the MUT-II, erase the diagnosis code memory. (Refer to TEST 1.)
(4) Return the ignition key from the "ON" to the "LOCK" position and then back to the "ON" position.

Is the SRS warning lamp operation normal?

No → Malfunction of the SDU. → Replace the SDU. (Refer to P.52B-62.)

Yes



(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-7 No. 5.)

(2) Disconnect the red 2-pin connector 1 of the SRS Check Harness from the SDU.

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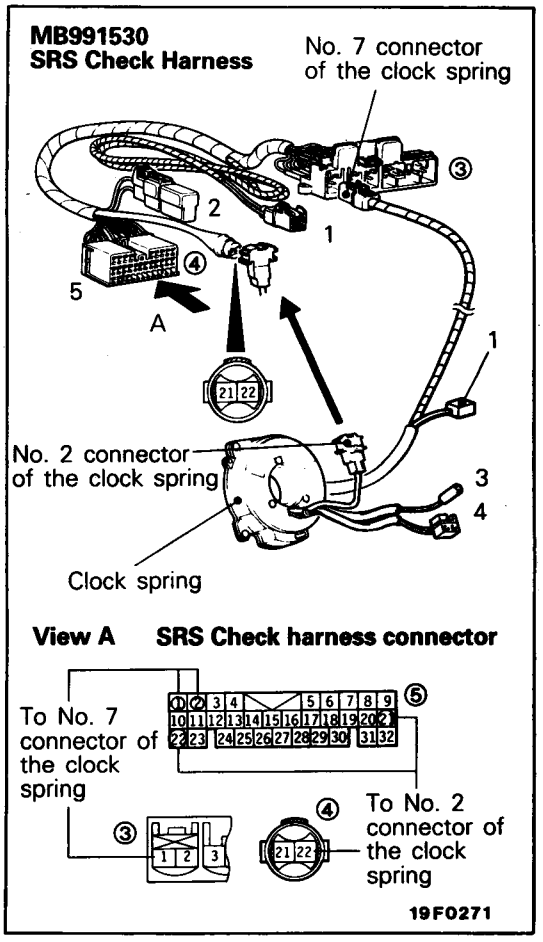


(1) Remove the air bag module. (Refer to P.52B-72.)
(2) Join the No. 2 and No. 7 connectors of the clock spring to SRS Check Harness connector ④ and SRS Check Harness connector ③, respectively.
(3) Is the resistance between terminal 1 and terminal 21 of SRS Check Harness connector ⑤, and between terminal 2 and terminal 22 of SRS Check Harness connector ⑤ normal?
Standard value: less than 0.4Ω

Yes

No

Malfunction of the clock spring. → Replace the clock spring. (Refer to P.52B-72.)

Malfunction of the driver's side air bag module. → Replace the driver's side air bag module. (Refer to P.52B-72.)

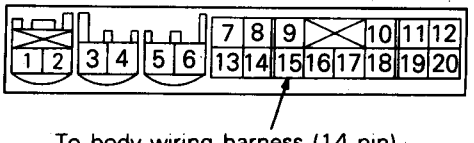
Caution
Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

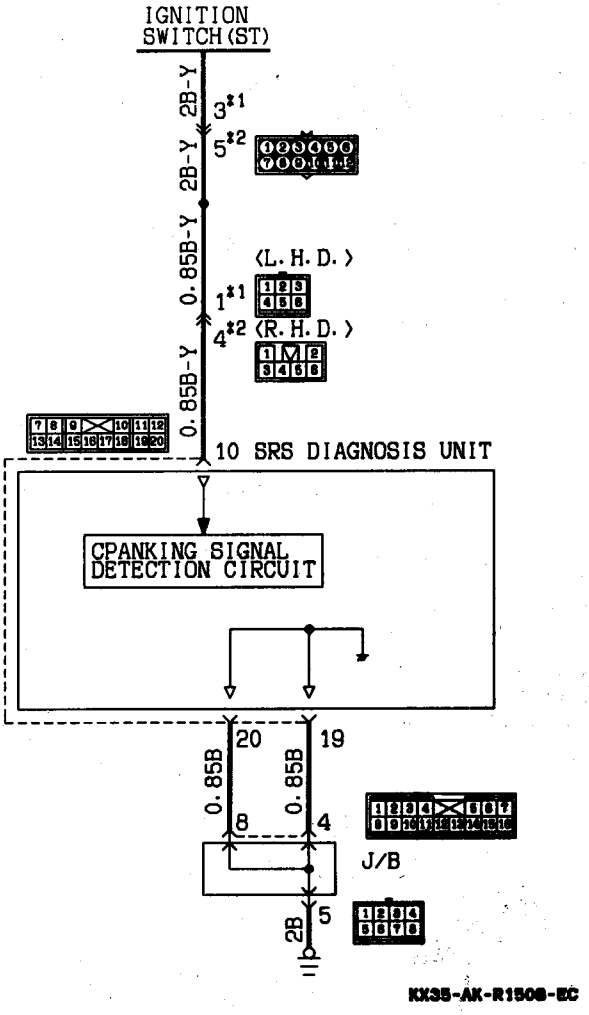
NOTE – IMPORTANT
(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)
(2) SDU = SRS Diagnosis Unit

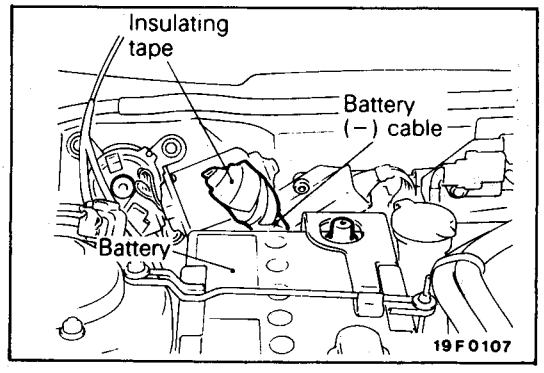
TEST 7

WHEN DIAGNOSIS CODE NO. 33 IS DISPLAYED

SDU connector





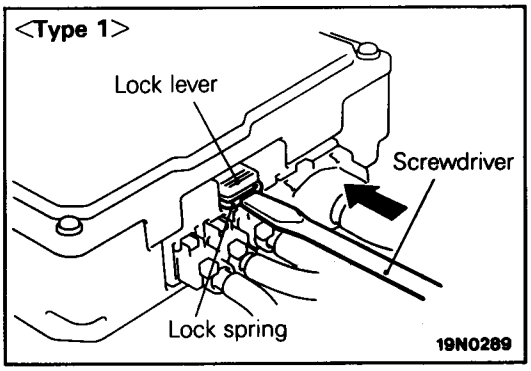


(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

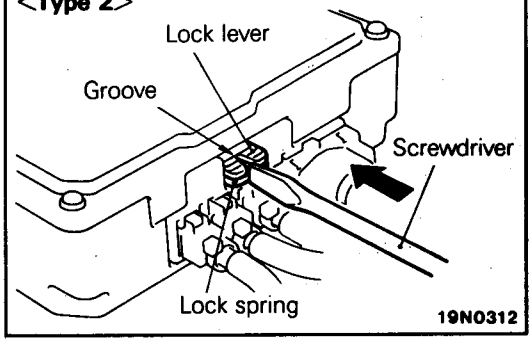
Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-7 No. 5.)

(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

<Type 1>



<Type 2>



(3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution
(1) Do not use excessive force to raise the lock lever.
(2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

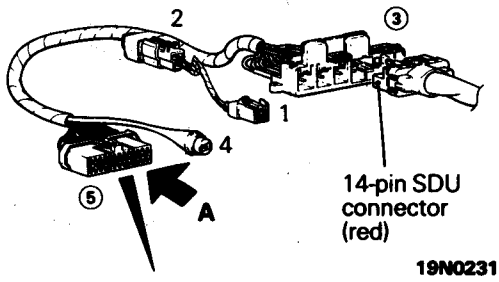
In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution
Do not use excessive force to raise the lock lever.

(4) Disconnect the red 14-pin connector from the SDU.

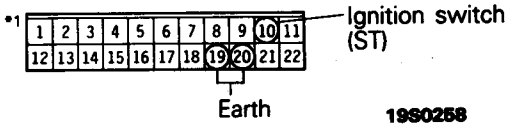
MB991349*1
MB991530*2
SRS Check Harness

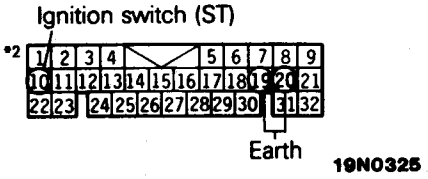


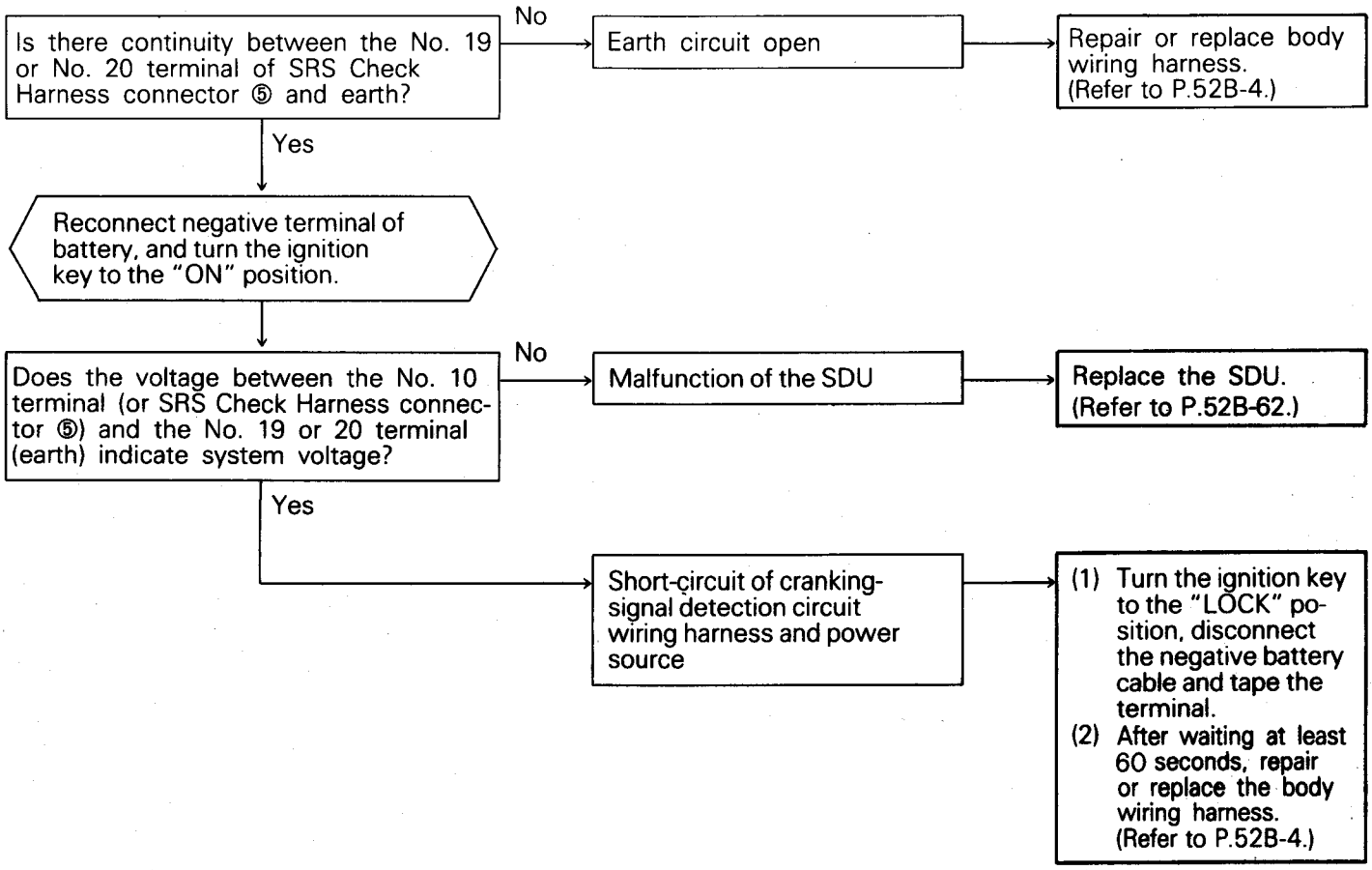
(5) Connect the red harness-side SDU connector (14-pin) to the connector ③ of the SRS Check Harness.
(6) Check according to the flow chart below, using the digital multi-meter.

NOTE
*1 : Vehicles without front passenger's air bag
*2 : Vehicles with front passenger's air bag

View A
SRS Check Harness connector ⑤







NOTE – IMPORTANT

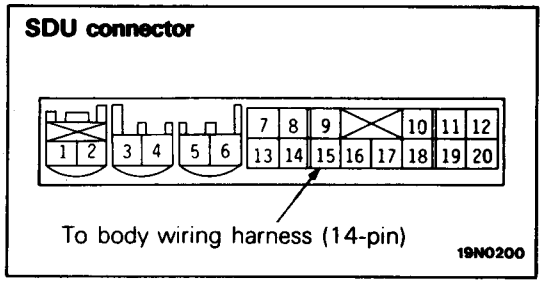
(1) If more than 45 seconds of cranking is required to start up the engine, the diagnosis code will be stored in memory, but if there is no problem, the diagnosis code will be cleared and the SRS will return to normal.

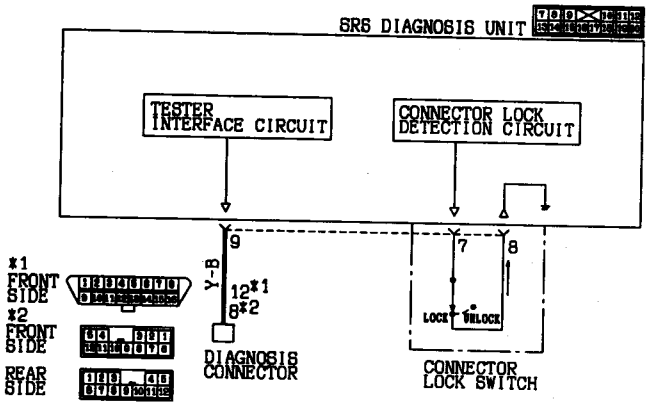
(2) After repairing the SRS, reconnect the battery cable and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

(3) SDU = SRS Diagnosis Unit

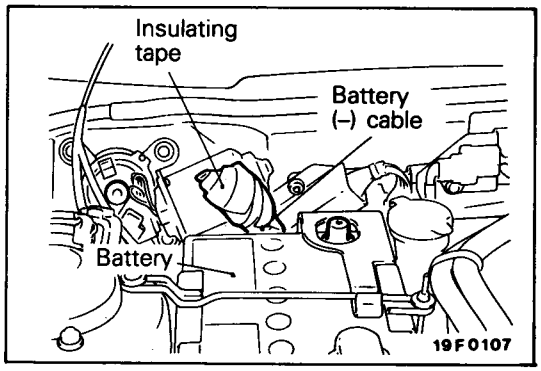
TEST 8

WHEN DIAGNOSIS CODE NO. 34 IS DISPLAYED





NOTE
*1: From 1995 models
*2: Up to 1994 models



(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-7 No. 5.)

(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

Is the SDU lock lever securely locked?
- No → Insert the all four SDU connectors correctly and securely to lock the lock lever.
- Yes → Malfunction of the SDU → Replace the SDU. (Refer to P.52B-62.)

NOTE – IMPORTANT
(1) After repairing the SRS, reconnect the battery cable and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)
(2) SDU = SRS Diagnosis Unit

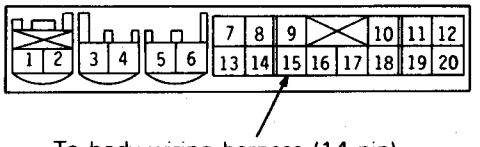
TEST 9

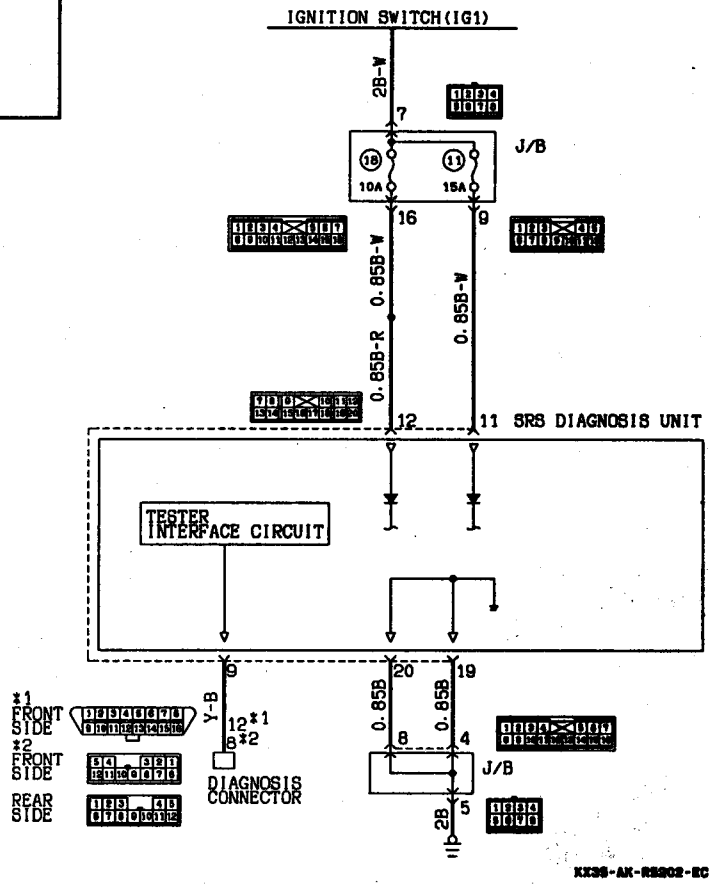
WHEN DIAGNOSIS CODE NO. 41 IS DISPLAYED

TEST 10

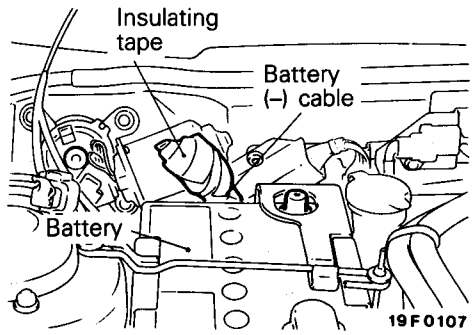
WHEN DIAGNOSIS CODE NO. 42 IS DISPLAYED

SDU connector





NOTE
*1: From 1995 models
*2: Up to 1994 models

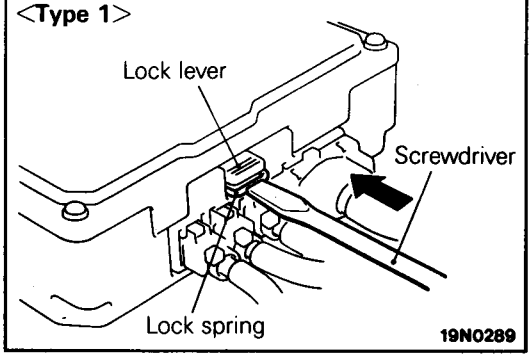


(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

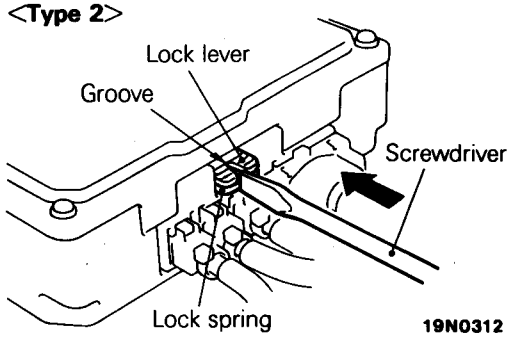
Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-7 No. 5.)

(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

<Type 1>



<Type 2>



(3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution
(1) Do not use excessive force to raise the lock lever.
(2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

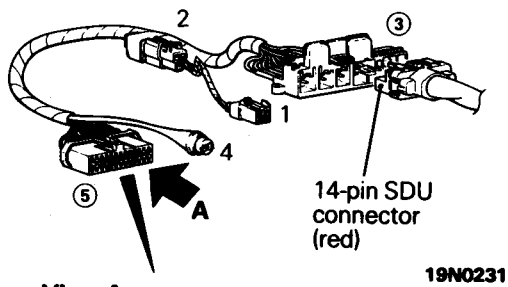
In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution
Do not use excessive force to raise the lock lever.

(4) Disconnect the red 14-pin connector from the SDU.

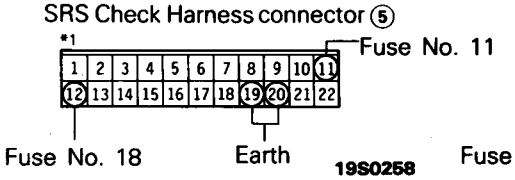
MB991349*1
MB991530*2
SRS Check Harness

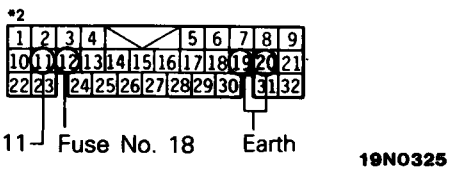


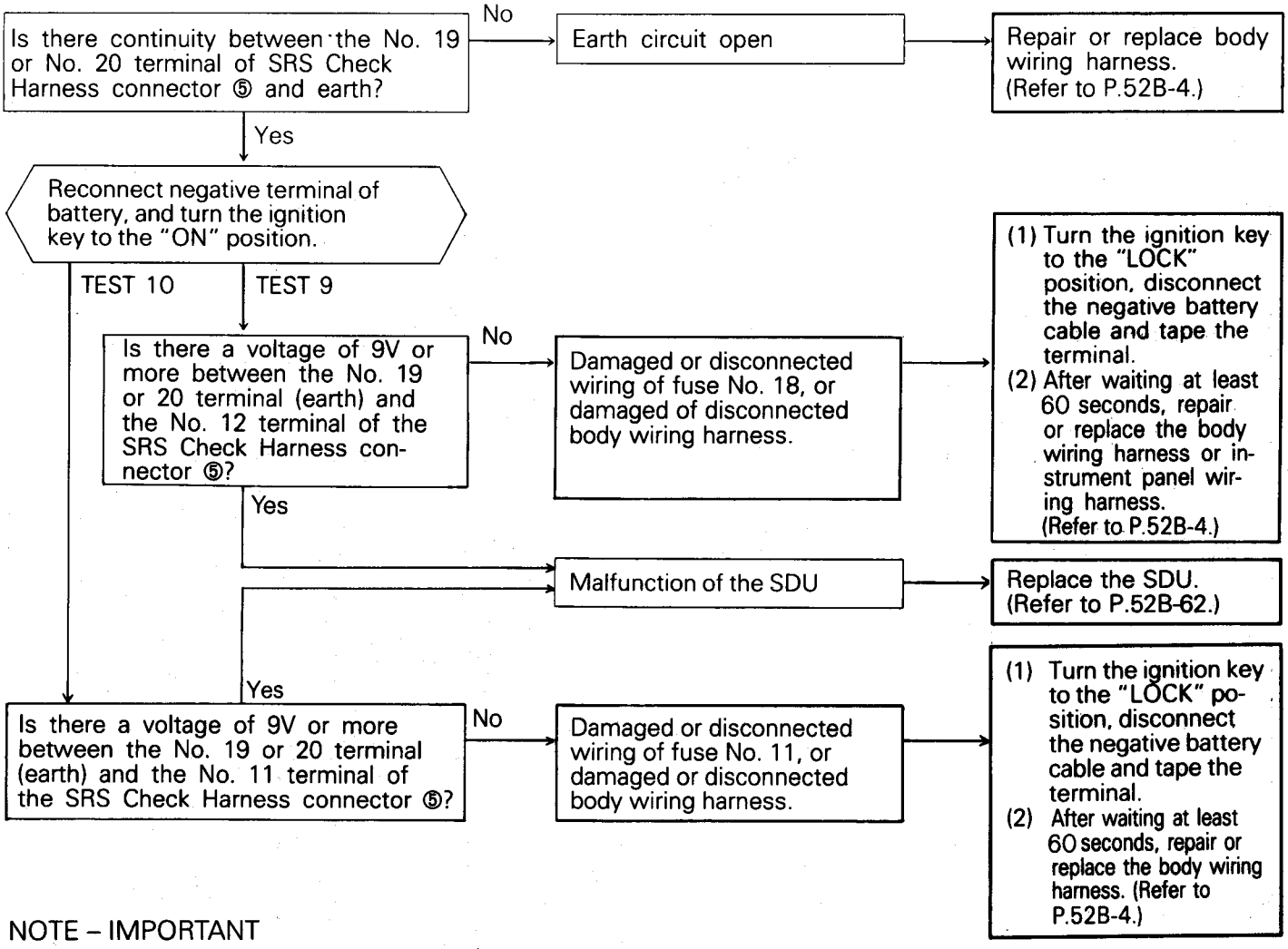
(5) Connect the now disconnected red harness-side SDU connector (14-pin) to the connector ③ of the SRS Check Harness.
(6) Check according to the flow chart below, using the specified digital multi-meter.

NOTE
*1 : Vehicles without front passenger's air bag
*2 : Vehicles with front passenger's air bag

View A
SRS Check Harness connector ⑤







NOTE – IMPORTANT

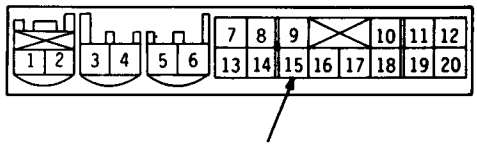
(1) After repairing the SRS, reconnect the battery cable and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

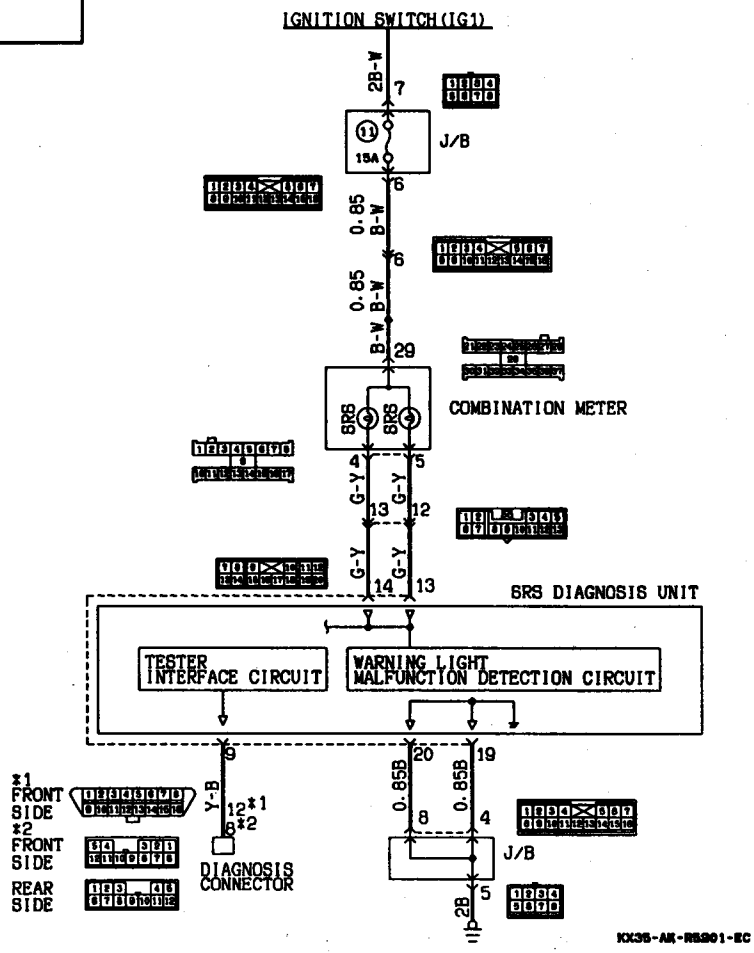
(2) SDU = SRS Diagnosis Unit

TEST 11

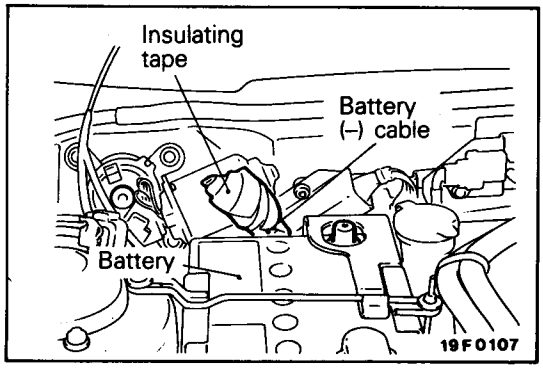
WHEN DIAGNOSIS CODE NO. 43 IS DISPLAYED
(SRS warning lamp does not extinguish)

SDU connector





NOTE
*1: From 1995 model
*2: Up to 1994 model

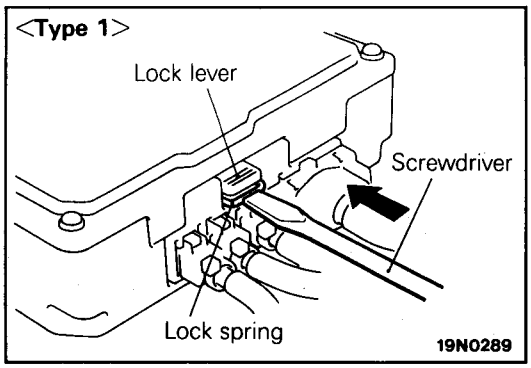


(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

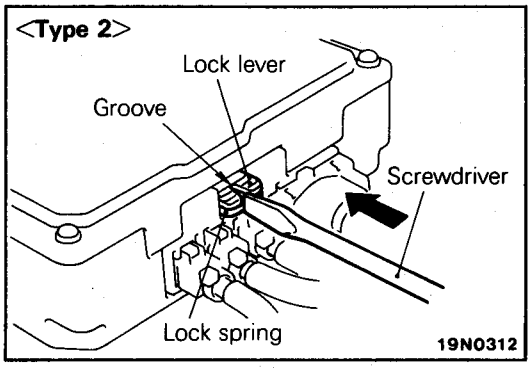
Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-7 No. 5.)

(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

<Type 1>



<Type 2>



(3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

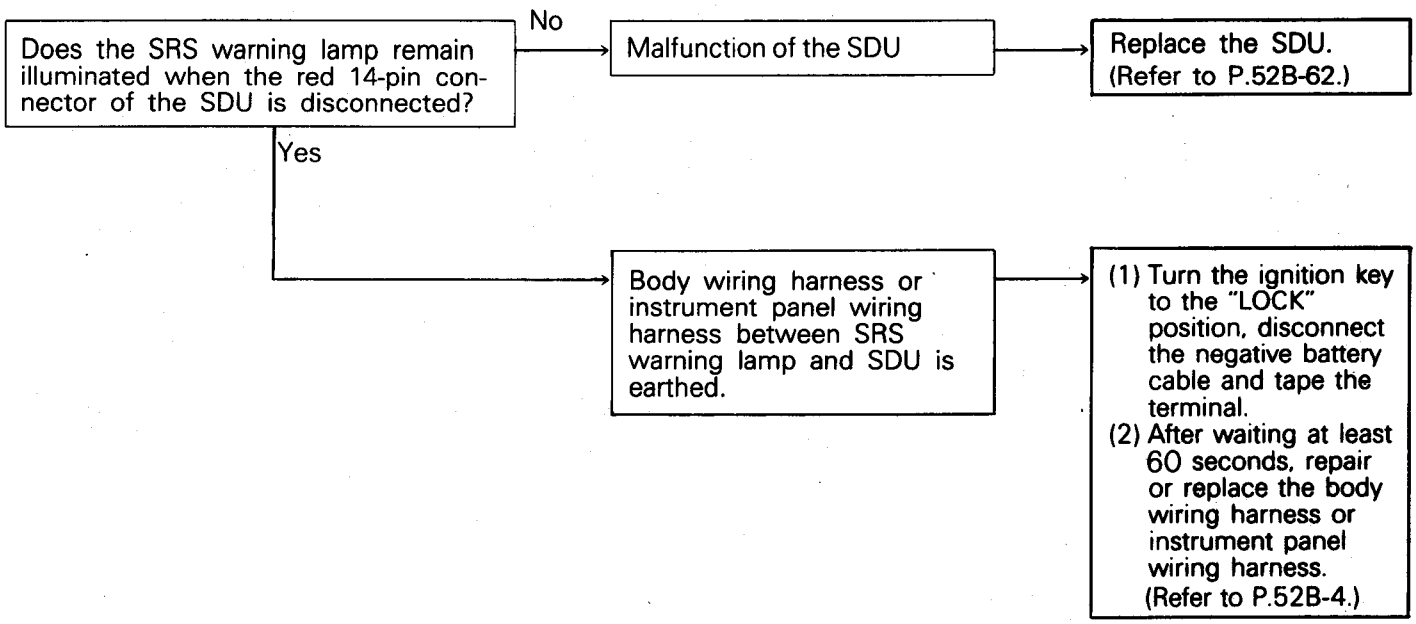
Caution
(1) Do not use excessive force to raise the lock lever.
(2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution
Do not use excessive force to raise the lock lever.

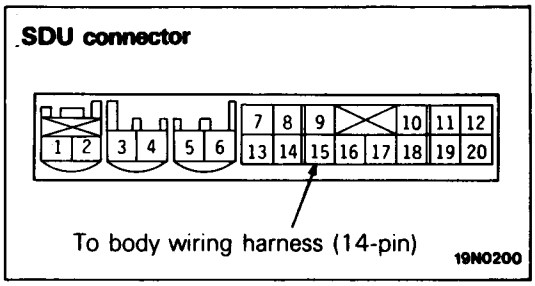
(4) Disconnect the red 14-pin connector from the SDU.
(5) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.
(6) Check according to the flow chart below.

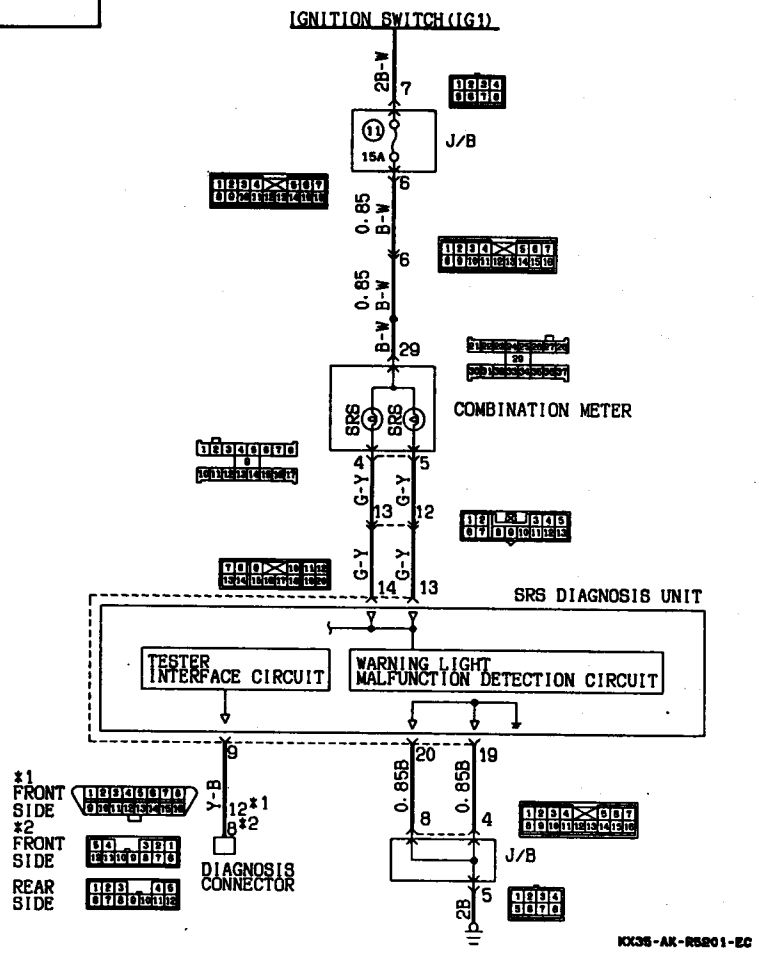


NOTE – IMPORTANT
(1) After repairing the SRS, reconnect the battery cable and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)
(2) SDU = SRS Diagnosis Unit

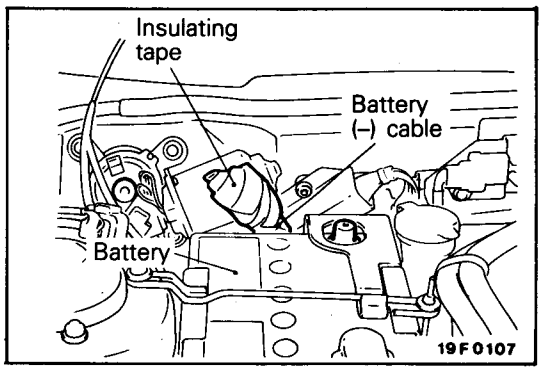
TEST 12

WHEN DIAGNOSIS CODE NO. 43 IS DISPLAYED
(SRS warning lamp does not illuminate)





NOTE
*1: From 1995 models
*2: Up to 1994 models

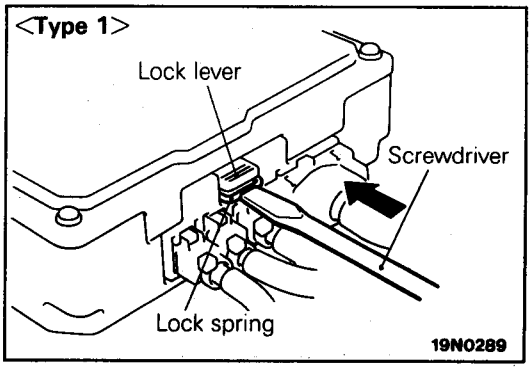


(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

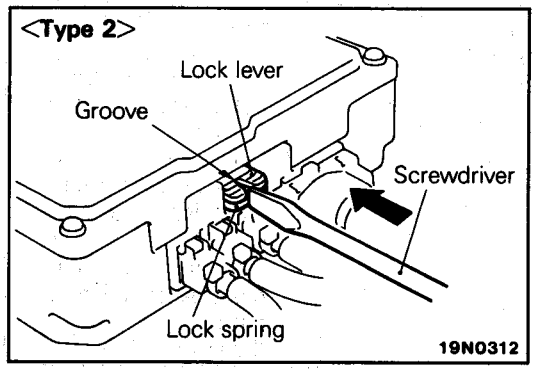
Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-7 No. 5)

(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

<Type 1>



<Type 2>



(3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution
(1) Do not use excessive force to raise the lock lever.
(2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

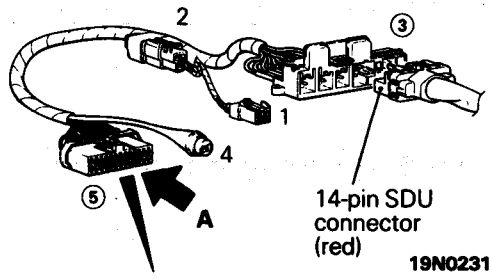
In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution
Do not use excessive force to raise the lock lever.

(4) Disconnect the red 14-pin connector from the SDU.

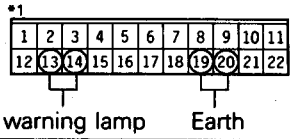
MB991349*1
MB991530*2
SRS Check Harness

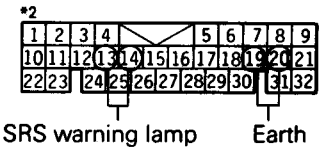


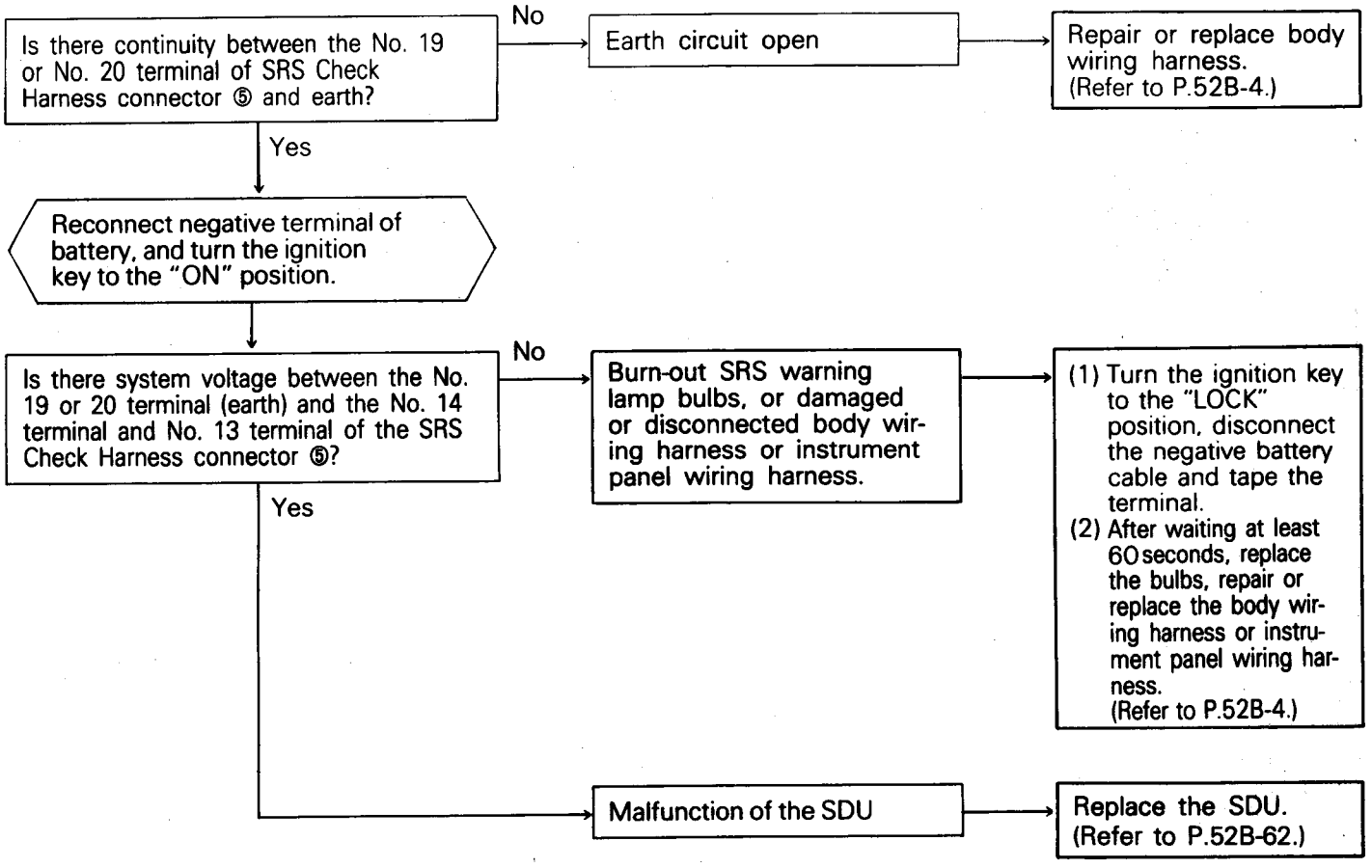
(5) Connect the now disconnected red harness-side SDU connector (14-pin) to the connector ③ of the SRS Check Harness.
(6) Check according to the flow chart below, using the specified digital multi-meter.

NOTE
*1 : Vehicles without front passenger's air bag
*2 : Vehicles with front passenger's air bag

View A
SRS Check Harness connector ⑤







NOTE – IMPORTANT

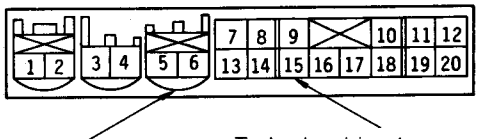
(1) After repairing the SRS, reconnect the battery cable and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

TEST 13 <Vehicles with front passenger's air bag>

WHEN DIAGNOSIS CODE NO. 24 OR NO. 25 IS DISPLAYED

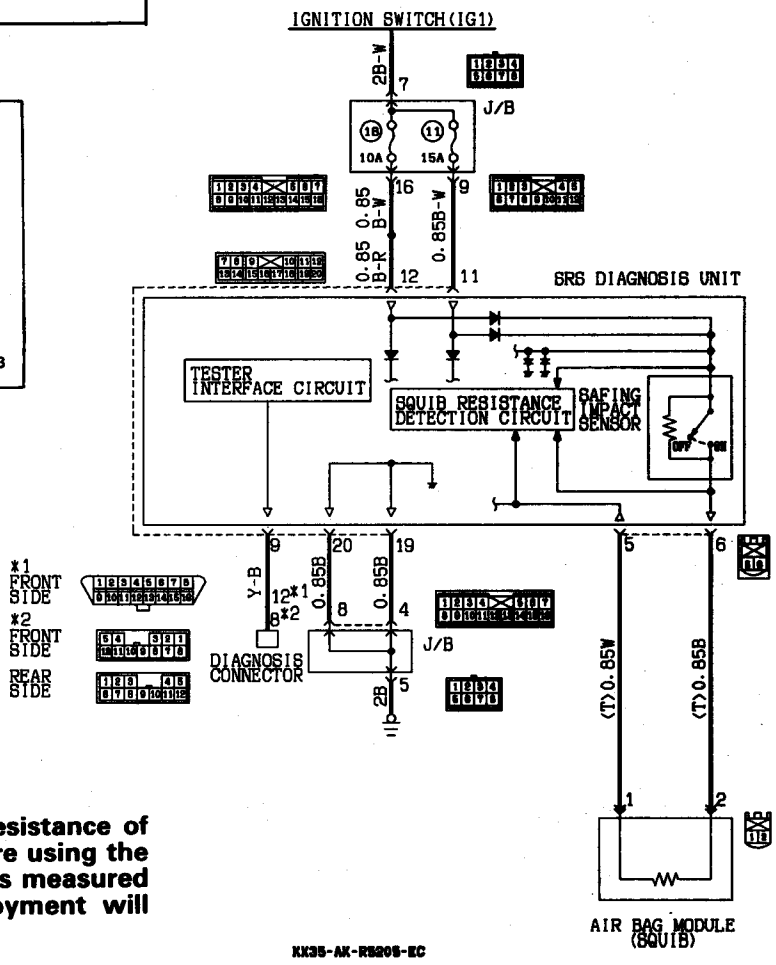
SDU connector



To the front passenger's side air bag module

To body wiring harness (14-pin)

19N0303



NOTE
*1: From 1995 models
*2: Up to 1994 models

Caution
Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

Have the other diagnosis code test(s) been finished?

No → Perform the other diagnosis code test(s) prior to this test.

Yes

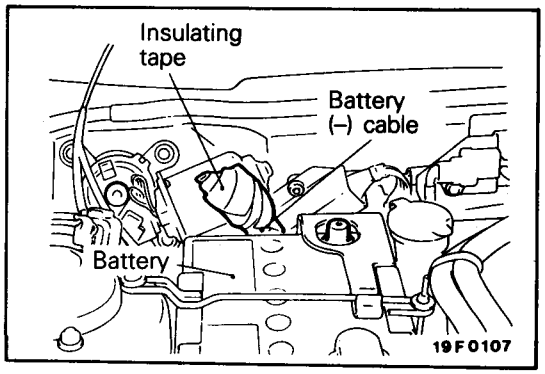
NOTE
If combined front impact sensor and air bag module (squib) failure modes simultaneously occur in two places, the preconditions for the respective detection circuits will go out of order. For this reason, both diagnosis codes may not be stored but only one of them may be indicated.
Their relationships are shown in the following table.
Perform TEST 5 if it does not become proper even through TEST 6 is executed.

		Front impact sensors		
		Short-circuited	One open-circuited	Two open-circuited
Front passenger's side air bag module (Squib)	Short-circuited	11 and/or 24	12 and/or 24	13 and/or 24
	Open-circuited	11 and/or 25	12 and/or 25	13 and/or 25

The numbers in the boxes are diagnosis codes numbers. (Refer to P.52B-12.)

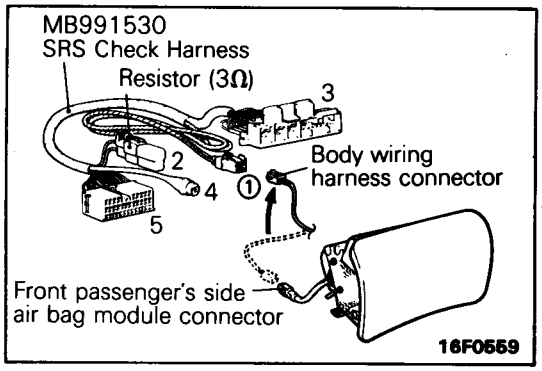
CONTINUED ON NEXT PAGE

CONTINUED FROM PREVIOUS PAGE



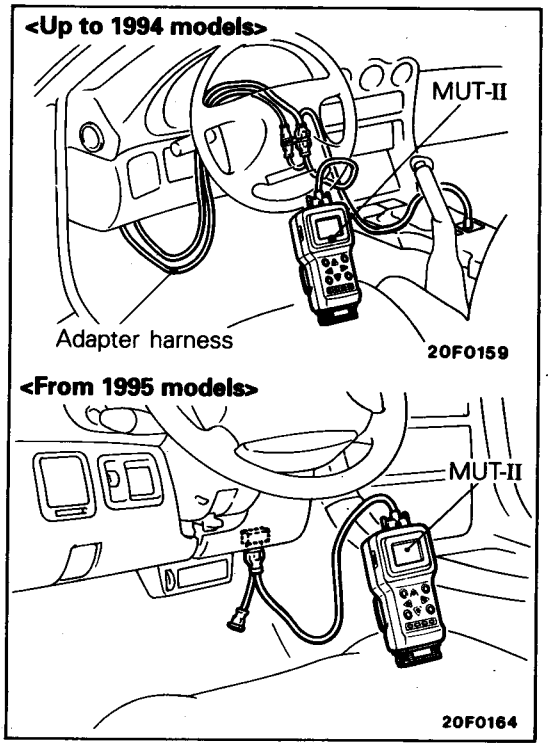
(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work.
(Refer to P.52B-7 No. 5.)



(2) Remove the glove box and cross pipe cover.
(3) Remove the connection between the front passenger's air bag module connector (2-pin) and the body wiring harness connector.
(4) Connect the SRS check harness connector ① to the body wiring harness connector.

NOTE
A 3-ohm resistor that corresponds to the resistance of the air bag module (squib) and the wiring resistance is connected between the terminals of the connector 1 of the SRS Check Harness.



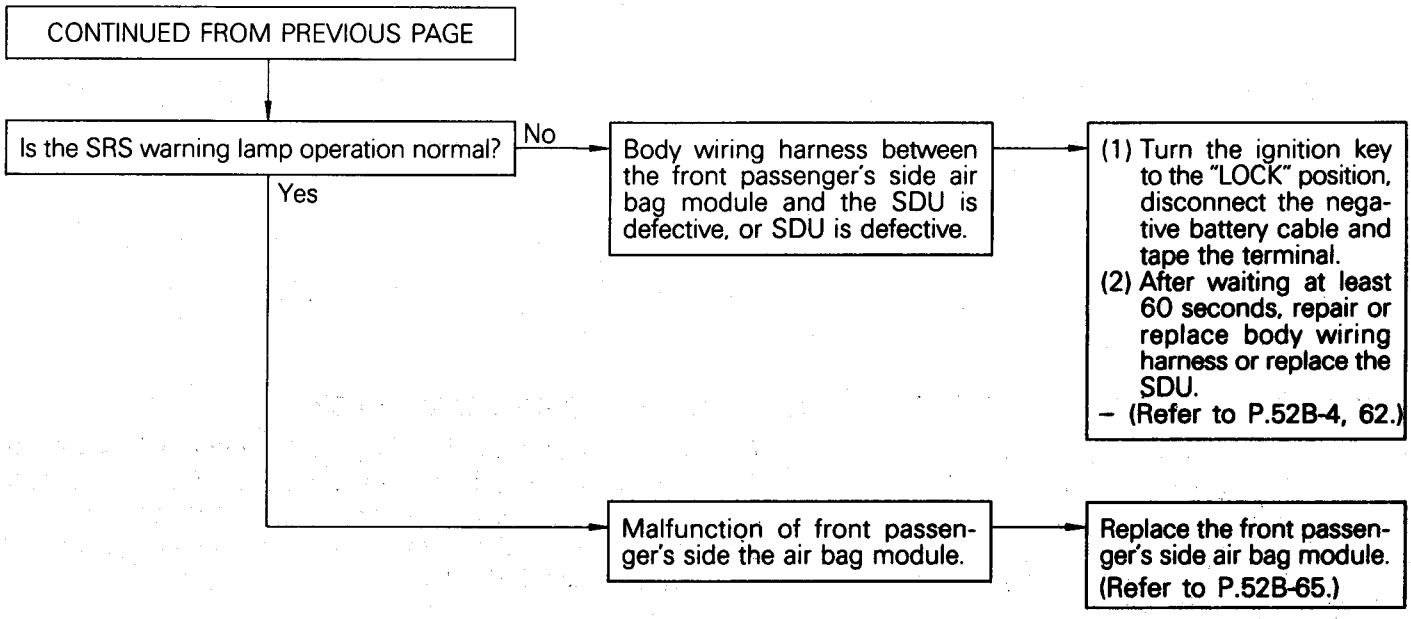
(5) Reconnect negative terminal of battery.
(6) Connect the MUT-II.

NOTE
When connecting MUT-II to 1994 models, use the adapter harness which belongs to MUT-II sub-assembly.

Caution
Connect and disconnect the MUT-II with the ignition switch in the OFF position.

(7) Turn the ignition key to the "ON" position. Using the MUT-II, erase the diagnosis code memory. (Refer to TEST 1.)
(8) Return the ignition key from the "ON" to the "LOCK" position and then back to the "ON" position.

CONTINUED TO NEXT PAGE



Caution
Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

NOTE – IMPORTANT

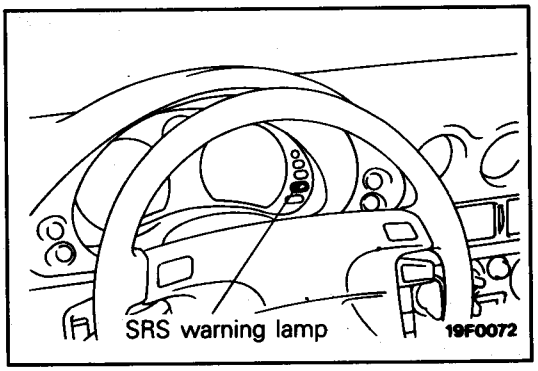
(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the MUT-II and check the SRS warning lamp operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

SRS MAINTENANCE

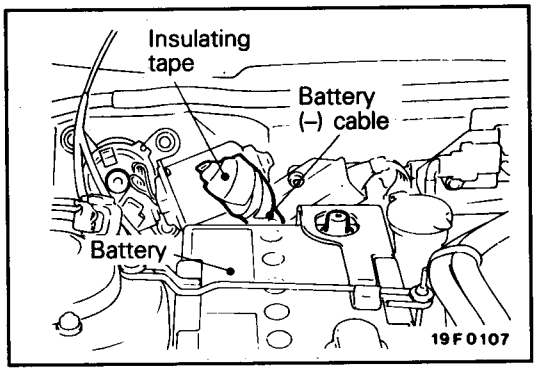
E52RAAAa

The SRS must be inspected by an authorized dealer 10 years after the date of vehicle registration.



1. "SRS" WARNING LAMP CHECK

Turn the ignition with the key "ON" position. Does the "SRS" waning lamp illuminate for about 7 seconds, turn OFF and then remain extinguished for at least 45 seconds? If yes, SRS system is functioning properly. If no, consult page 52B-10.



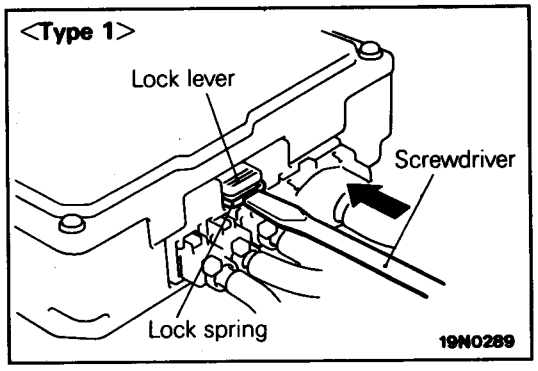
2. SRS COMPONENTS VISUAL CHECK

(1) Turn the ignition key to "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-7 No. 5)

(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

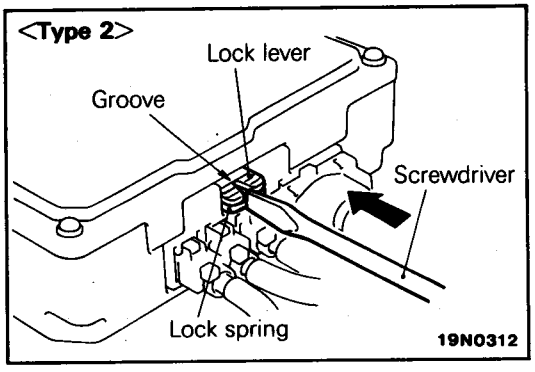
(3) Release the lock of SDU connector in accordance with the following procedure:



In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution
(1) Do not use excessive force to raise the lock lever.
(2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

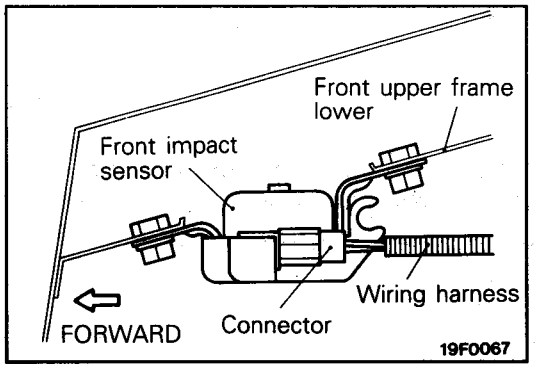


In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution
Do not use excessive force to raise the lock lever.

(4) Disconnect the connectors from the SDU.



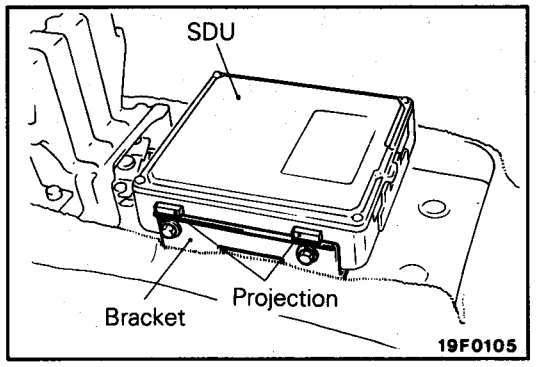
2-1 Front Impact Sensors

(1) Check sensors to ensure the arrow marks face the front of the vehicle.

(2) Check front upper frame lower and front impact sensor for deformities or rust.

Caution
The SRS may not activate if a front impact sensor is not installed properly, which could result in serious injury or death to the vehicles driver and passenger.

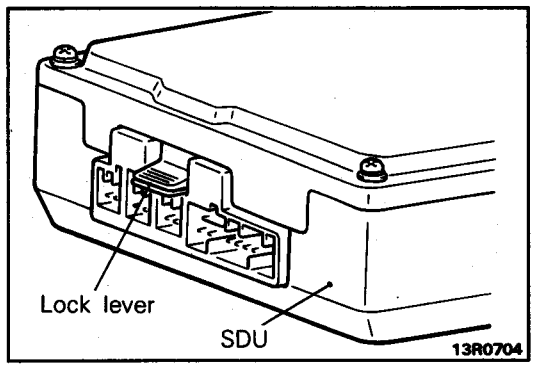
(3) Check wiring harness (for front impact sensor) for binds, connector for damage, and terminals for deformities. Replace sensor and/or wiring harness if it fails visual check. (Refer to P.52B-60 and P.52B-4.)



2-2 SRS Diagnosis Unit (SDU)

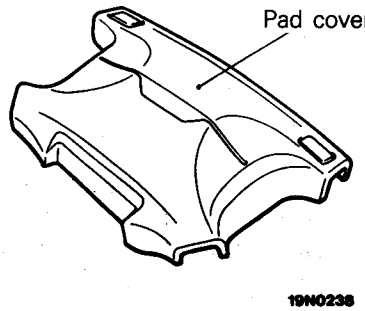
(1) Check SDU case and brackets for dents, cracks, deformities or rust.

Caution
The SRS may not activate if SRS diagnosis unit is not installed properly, which could result in serious injury or death to the vehicle's driver and passenger.

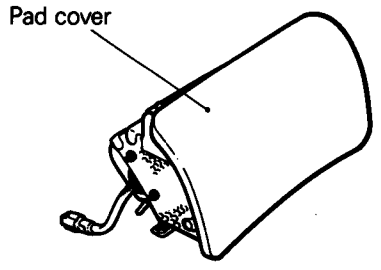


(2) Check connectors and lock lever for damage, and terminals for deformities or rust.
Replace SDU if it fails visual check. (Refer to P.52B-62.)

<Driver's side>



<Front passenger's side>



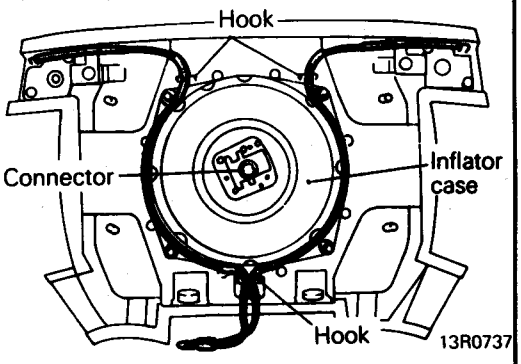
2-3 Air Bag Modules, Steering Wheel and Clock Spring.

(1) Remove the air bag modules, steering wheel and clock spring. (Refer to P.52B-65.)

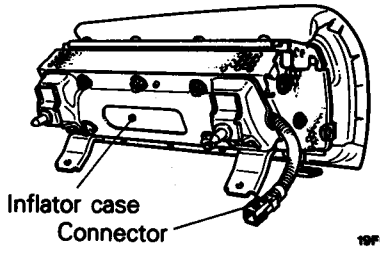
Caution
The removed air bag modules should be stored in a clean, dry place with the pad cover face up.

(2) Check pad cover for dents, cracks of deformities.

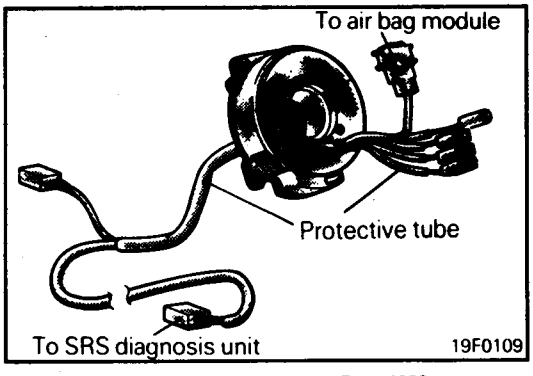
<Driver's side>



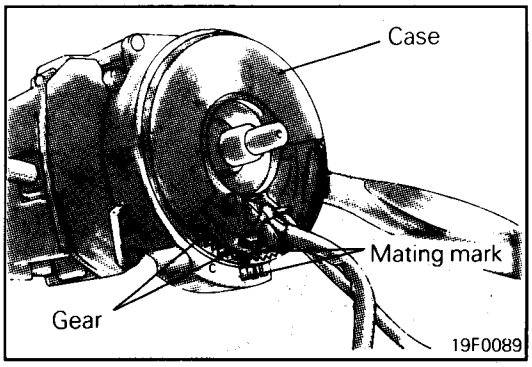
<Front passenger's side>

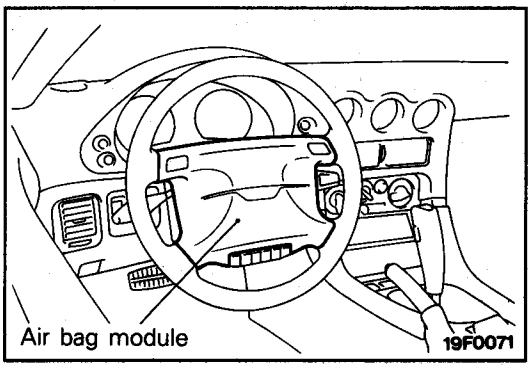


(3) Check hooks and connectors for damage, terminals deformities, and harness for binds.
(4) Check air bag inflator case for dents, cracks or deformities.
(5) Check harness and connectors for damage, and terminals for deformities.



(6) Check clock spring connectors and protective tube for damage, and terminals for deformities.





(7) Visually check the clock spring case and the gears for damage.
(8) Align the mating mark and "NEUTRAL" position indicator and, after turning the vehicle's front wheels to straight-ahead position, install the clock spring to the column switch.

Caution
If the clock spring's mating mark is not properly aligned, the steering wheel may not be completely rotational during a turn, or the flat cable within the clock spring may be severed, obstructing normal operation of the SRS and possibly leading to serious injury to the vehicle's driver and passenger.

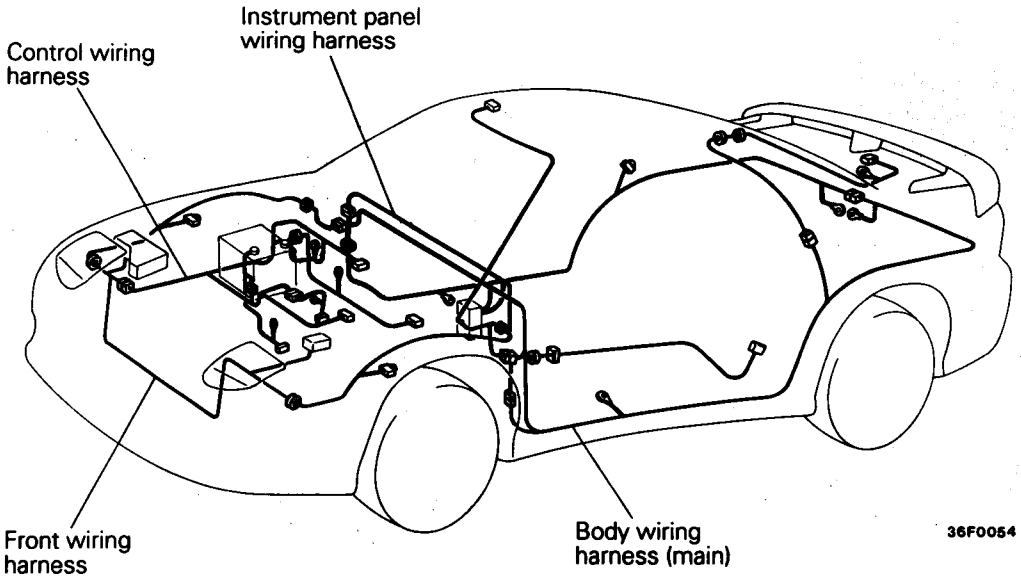
(9) Install the steering column covers , steering wheel and the air bag module.
(10) Check steering wheel for noise, binds or difficult operation.
(11) Check steering wheel for excessive free play.

REPLACE ANY VISUALLY INSPECTED PART IF IT FAILS THAT INSPECTION.

(Refer to P.52B-65.)

Caution
The SRS may not activate if any of the above components is not installed properly, which could result in serious injury or death to the vehicle's driver and passenger.

2-4 Front Wiring Harness, Instrument Panel Wiring Harness, Control Wiring Harness and Body Wiring Harness

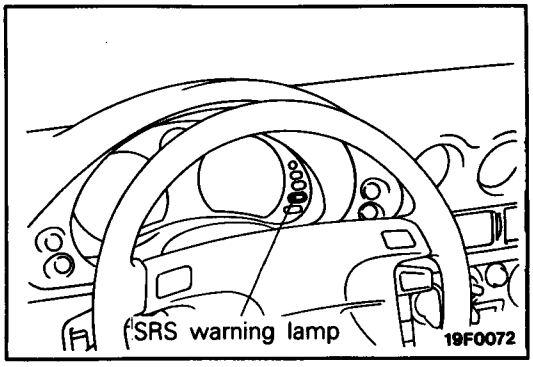


(1) Check connector for poor connection.
(2) Check harnesses for binds, connectors for damage, and terminals for deforimities.

REPLACE ANY CONNECTORS OR HARNESS THAT FAIL THE VISUAL INSPECTION.

(Refer to P.52B-4.)

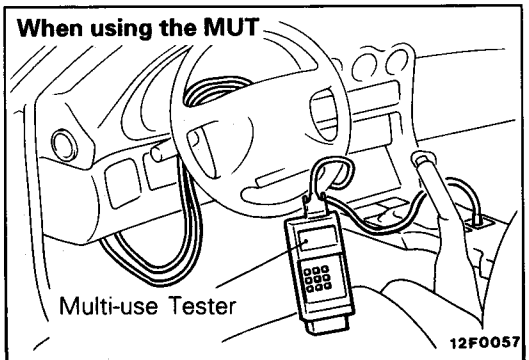
Caution
The SRS may not activate if SRS harnesses or connectors are damaged or improperly connected, which could result in serious injury or death to the vehicle's driver and passenger.



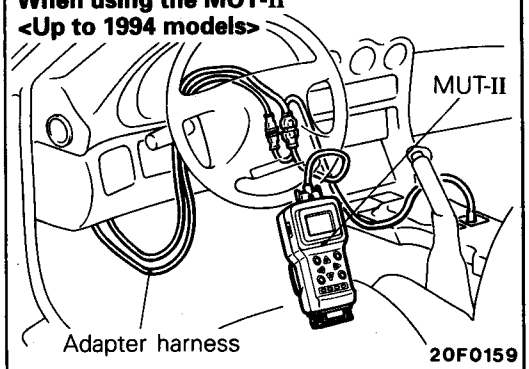
3. POST-INSTALLATION INSPECTION

Reconnect the negative battery terminal. Turn the ignition key to the "ON" position. Does the "SRS" warning lamp illuminate for about 7 seconds, and then remain extinguished for at least 45 seconds? If yes, SRS system is functioning properly. If no, consult page 52B-10.

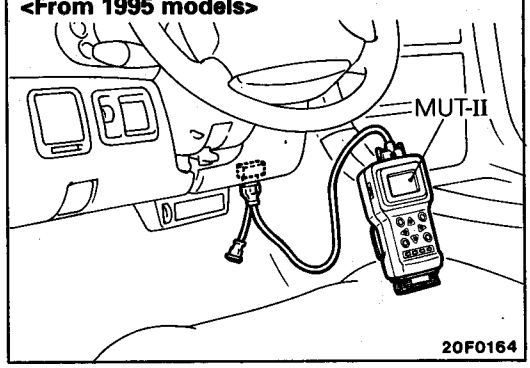
When using the MUT



When using the MUT-II
<Up to 1994 models>



<From 1995 models>



POST-COLLISION DIAGNOSIS E52SAAA

To inspect and service the SRS after a collision (whether or not the air bag has deployed), perform the following steps.

1. SRS Diagnosis Unit Memory Check

(1) Connect the Multi-use Tester <1993 models> or MUT-II <all models> to the diagnosis connector.

NOTE
When connecting MUT-II to 1994 models, use the adapter harness which belongs to MUT-II sub-assembly.

Caution
Make certain that the ignition switch is OFF when the Multi-use Tester or MUT-II is connected or disconnected.

(2) Read (and write down) all displayed diagnosis codes. (Refer to P.52B-12.)

NOTE
If the battery power supply has been disconnected or disrupted by the collision, the Multi-use Tester or MUT-II cannot communicate with the SRS diagnosis unit. Inspect and, if necessary, repair the body wiring harness before proceeding further.

(3) Read the service data (fault duration and how many times memories are erased) using the Multi-use Tester or MUT-II.

NOTE
- Maximum stored period: 9999 minutes (approximately 7 days)
- Maximum number of times to be stored: 250

(4) Erase the diagnosis codes and after waiting 45 seconds or more read (and write down) all displayed diagnosis codes. (Refer to P.52B-12.)

2. Repair Procedure

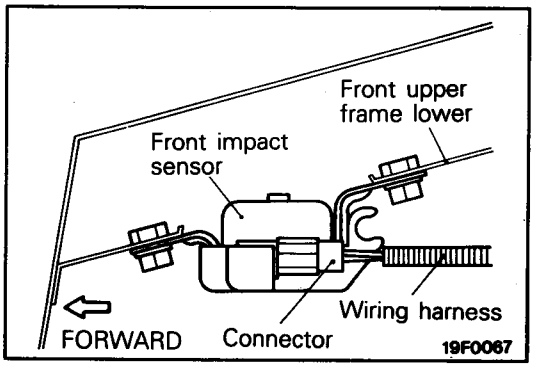
2-1. When air bag deploys collision.

(1) Repalce the following parts with new ones.
- Front impact sensors (Refer to P.52B-60.)
- SRS diagnosis unit (SDU) (Refer to P.52B-62.)
- Air bag modules (Refer to P.52B-65.)
- Clock spring (Refer to P.52B-65.)
- Steering wheel, steering column and intermediate joint (Refer to GROUP 37A – Steering Wheel and Shaft.)

(2) Check harnesses for binding, connectors for damage, poor connections, and terminals for deformities. (Refer to P.52B-4.)

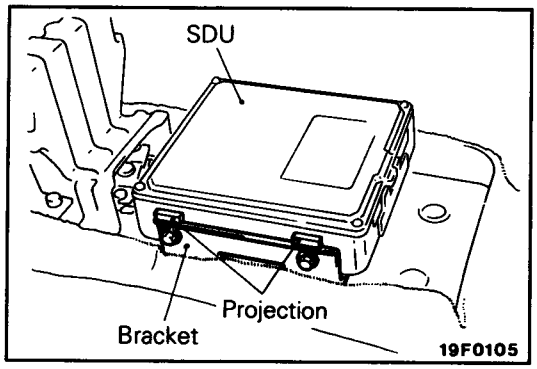
2-2. When air bag does not deploy in low-speed collision

Check the SRS components.
If the SRS components are showing any visible damage such as dents, cracks, or deformation, replace them with new ones.
Concerning parts removed for inspection, replacement with new parts and cautionary points for working, refer to appropriate INDIVIDUAL COMPONENT SERVICE, P.52B-59.



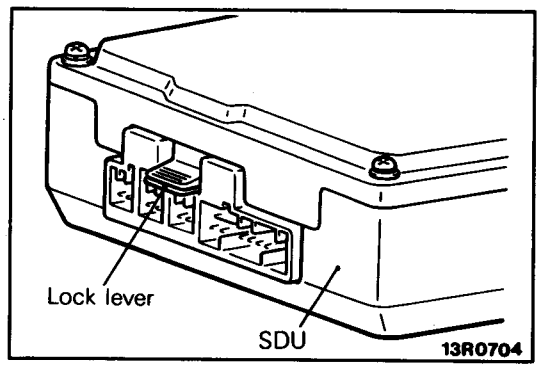
Front Impact Sensors

(1) Check front upper frame lower for deformities or rust.
(2) Check front impact sensor for dents, cracks deformities or rust.
(3) Check sensor harnesses for binds, connectors for damage, and terminals for deformities.



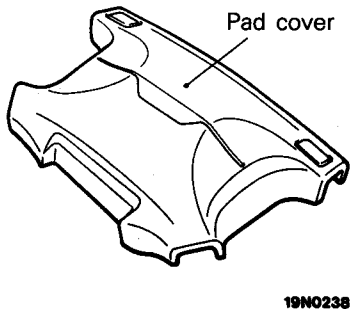
SRS Diagnosis Unit (SDU)

(1) Check SDU case and brackets for dents, cracks or deformities.

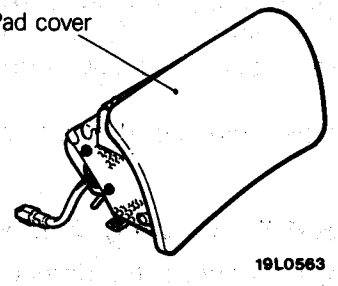


(2) Check connectors and lock lever for damage, and terminals for deformities.

<Driver's side>



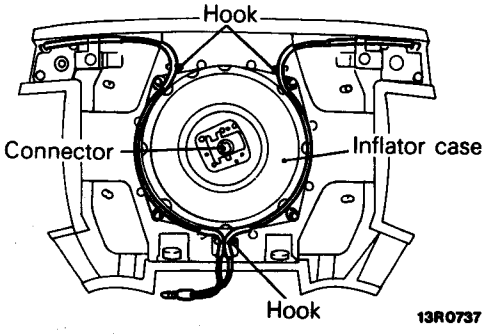
<Front passenger's side>



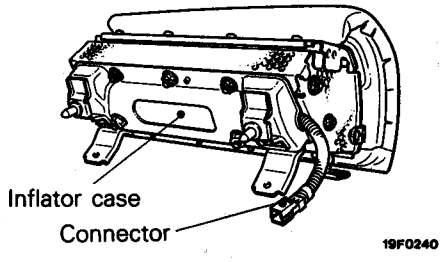
Air Bag Modules

(1) Check pad cover for dents, cracks or deformities.

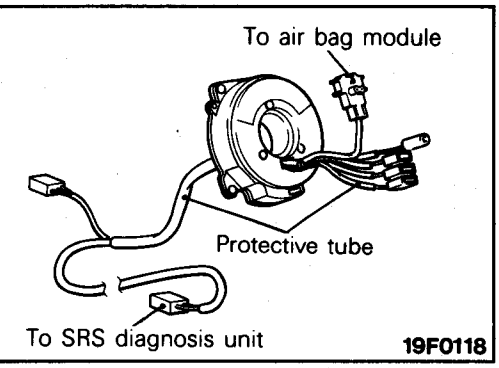
<Driver's side>



<Front passenger's side>

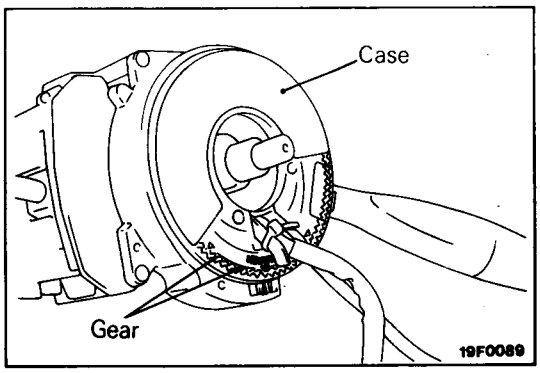


(2) Check hooks and connectors for damage, terminals deformities, and harness for binds.
(3) Check air bag inflator case for dents, cracks or deformities.
(4) Install air bag module to steering wheel to check fit or alignment with the wheel.



Clock Spring

(1) Check clock spring connectors and protective tube for damage, and terminals for deformities.



(2) Visually check the case and the gear for damage.

Steering Wheel, Steering Column and Intermediate Joint

(1) Check wiring harness (built into steering wheel) and connectors for damage, and terminals for deformities.
(2) Install air bag module to check fit or alignment with steering wheel.
(3) Check steering wheel for noise, binds or difficult operation and excessive free play.

Harness Connector (Body and Front wiring harness)

Check harnesses for binding, connectors for damage, poor connections, and terminals for deformities.
(Refer to P.52B-4.)

INDIVIDUAL COMPONENT SERVICE

E52TAAA

If the SRS components are to be removed or replaced as a result of maintenance, troubleshooting, etc., follow each procedure (P.52B-60 – P.52B-78).

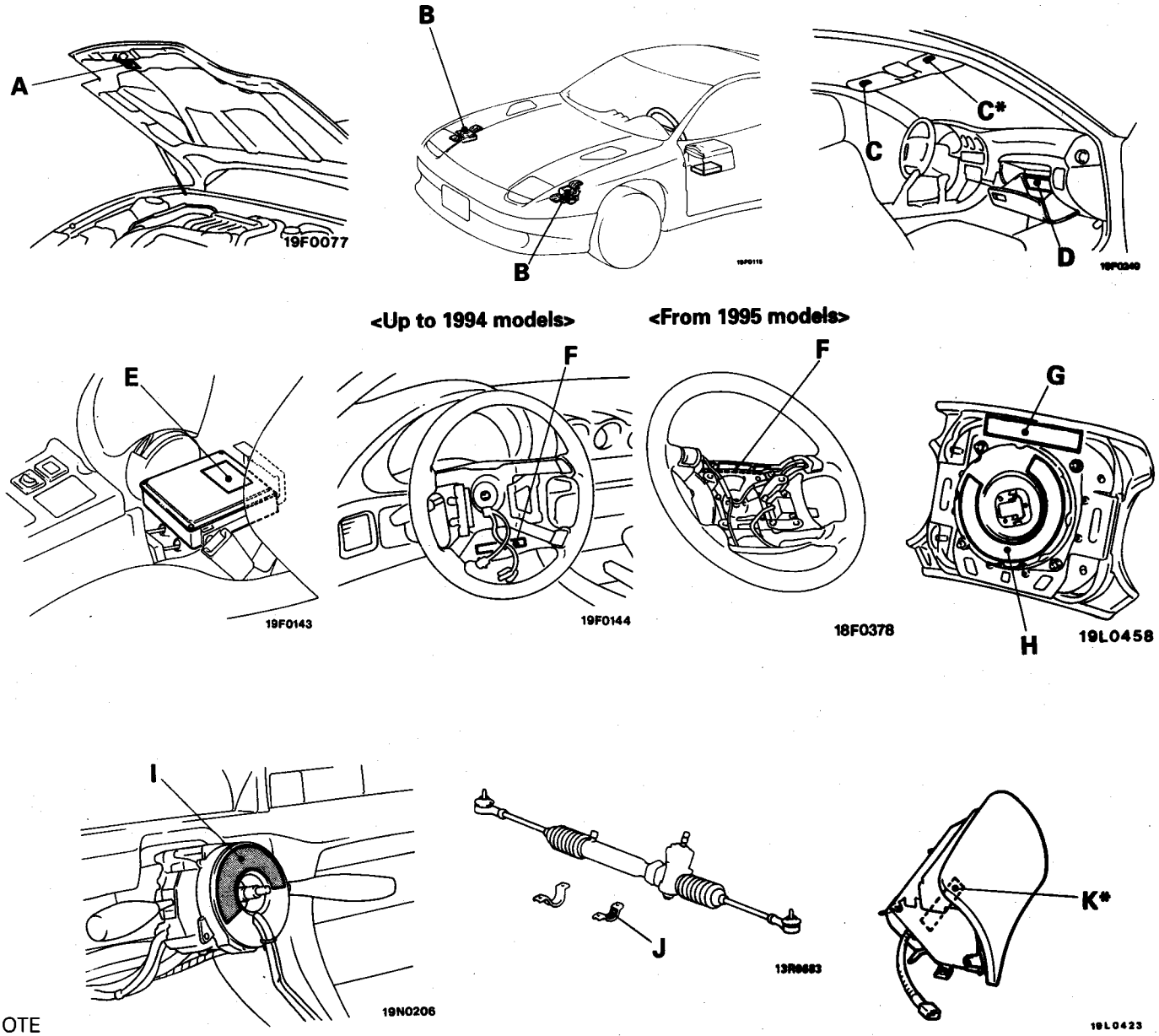
Caution

1. **SRS components should not be subjected to heat over 93°C (200°F), so remove the front impact sensors, SRS diagnosis unit and air bag module and clock spring before drying or baking the vehicle after painting. Recheck SRS system operability after re-installing them.**
2. **If the SRS components are removed for the purpose of check, sheet metal repair, painting, etc., they should be stored in a clean, dry place unitl they are reinstalled.**

WARNING/CAUTION LABELS

E52TBAA

A number of caution labels relating to the SRS are found in the vehicle, as shown in the following illustration. Follow label instructions when servicing SRS.
If labels are dirty or damaged, replace them with new ones.



NOTE
* : Vehicles with front passenger's air bag

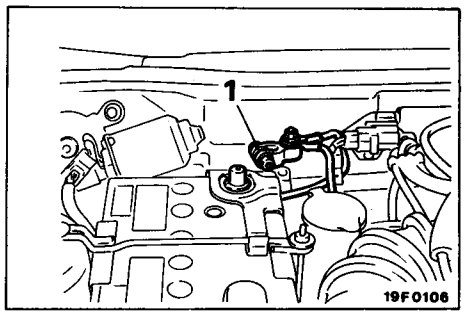
FRONT IMPACT SENSORS

E52TCAB

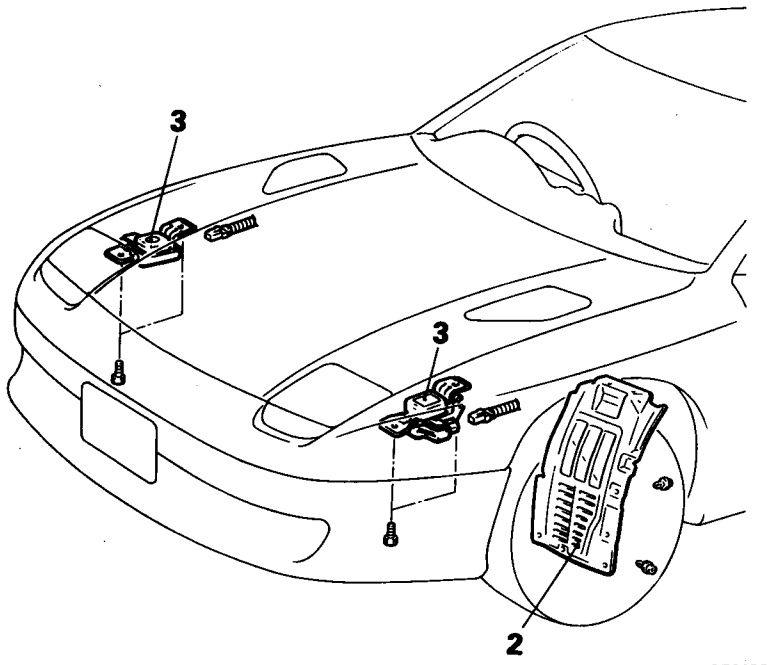
Caution

1. **Never repair or disassemble a front impact sensor. If faulty, replace it.**
2. **Handle the front impact sensors very carefully, taking care not to drop them or otherwise subject them to impact. If a sensor is seen to be dented, cracked, deformed or rusted, replace it with a new one.**
3. **Replace sensors with new ones after the air bag has deployed.**

REMOVAL AND INSTALLATION

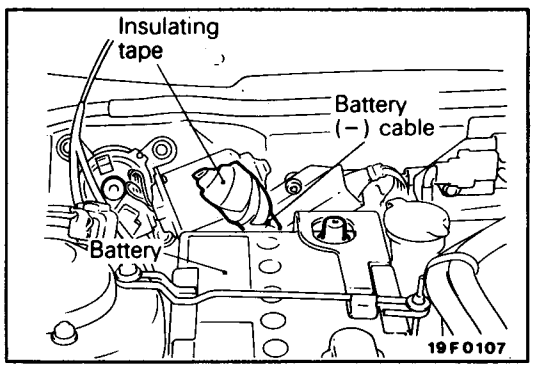


Pre-removal Operation
- Turn the ignition key to the "LOCK" position.



Removal steps

◆◆ ● Post-installation inspection
◆◆ 1. Connection of the negative (–) battery cable to the battery
2. Front splash shield extension
◆◆ 3. Front impact sensor
◆◆ ● Pre-installation inspection



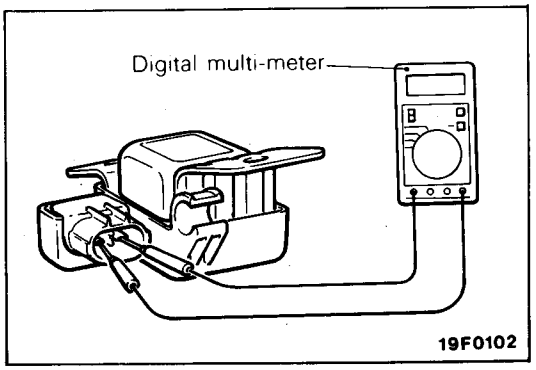
SERVICE POINTS OF REMOVAL

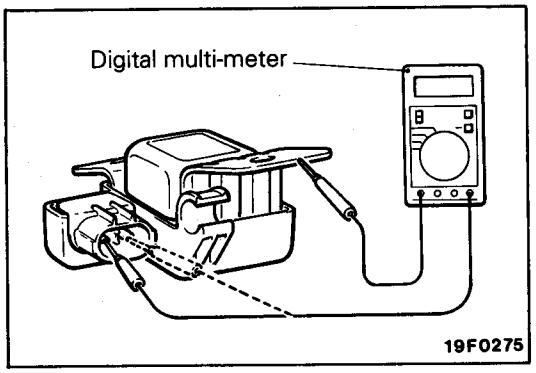
1. DISCONNECTION OF THE NEGATIVE (–) BATTERY CABLE FROM THE BATTERY

Disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-7 No. 5)





INSPECTION

(1) Check upper frame and sensor brackets for deformities or rust.
(2) Check sensor harness for binds, connectors for damage, and terminals for deformities.
(3) Check for dents, cracks, deformation or rust of the front impact sensor.

Caution
If a dent, crack, deformation or rust is detected, replace with a new sensor.

(4) Measure the resistance between terminals and check whether it is within the standard value.

Standard value: 2,000 ± 40 Ω

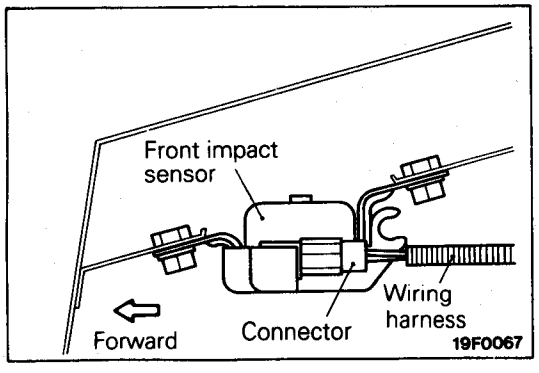
Caution
Always replace the sensor with a new one if the resistance is not within the standard value.

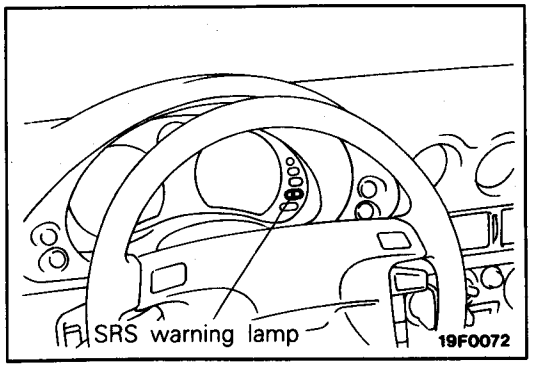
(5) Measure continuity between the bracket and the terminal. If there is continuity, the insulation of the sensor is defective. In this case replace the sensor.

SERVICE POINT OF INSTALLATION

PRE-INSTALLATION INSPECTION

To mount the new front impact sensor, visually check it and measure the resistance between the terminals.
(Refer to the previous item "INSPECTION".)





3. INSTALLATION OF FRONT IMPACT SENSOR

(1) Bend the wiring harness slightly (to the extent that there is no slack), and clip securely by using the clip of the front impact sensor.
(2) Install the front impact sensor so that there is close adherence of the upper surface of the front impact sensor and the installation surface of the upper frame (lower).

Caution
The SRS may not activate properly if a front impact sensor is not installed properly, which could result in serious injury or death to the vehicle's driver and passenger.

POST-INSTALLATION INSPECTION

Reconnect the negative battery terminal. Turn the ignition key to the "ON" position. Does the "SRS" warning lamp illuminate for about 7 seconds, and then remain extinguished for at least 45 seconds?If yes, SRS system is functioning properly. If no, consult page 52B-10.

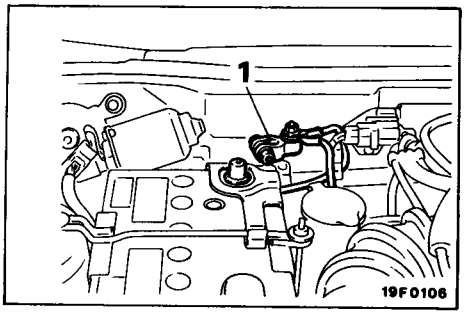
SRS DIAGNOSIS UNIT (SDU)

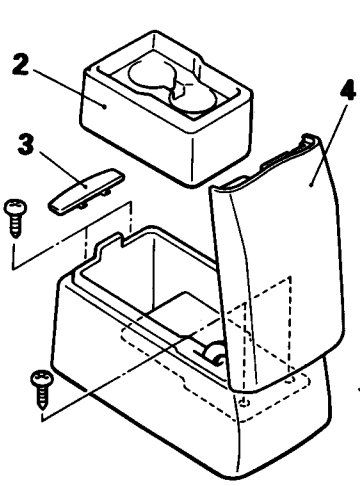
E52TDAA

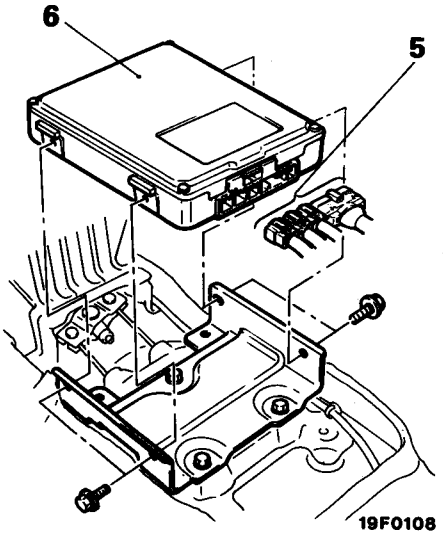
Caution

1. **Never attempt to disassemble or repair the SDU. If faulty, replace it.**
2. **Do not drop or subject the SDU to impact or vibration.**
   If denting, cracking, deformation, or rust are discovered in the SDU, replace it with a new SDU. Discard the old one.
3. **After deployment of an air bag, replace the SDU with a new one.**
4. **Never use an ohmmeter on or near the SDU, and use only the special test equipment described on P.52B-8.**

REMOVAL AND INSTALLATION



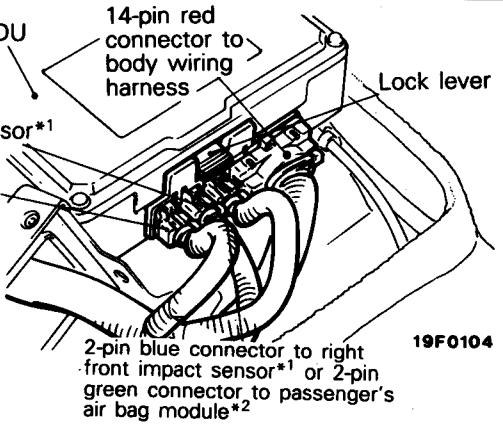




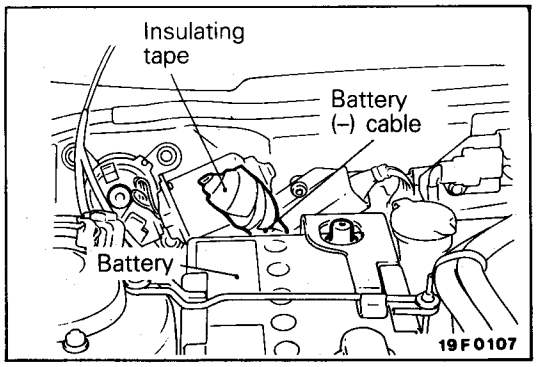
Pre-removal Operation
- Turn the ignition key to the "LOCK" position

Removal steps

- ◆◆ ● Post-installation inspection
- ◆◆ 1. Connection of the negative (–) battery cable to the battery.
- 2. Cup holder
- 3. Console plug
- 4. Rear console assembly
- ◆◆ ◆◆ 5. Connection of the SRS diagnosis unit and each harness connector
- ◆◆ 6. SRS diagnosis unit (SDU)



NOTE
*1 : Vehicles without front passenger's air bag
*2 : Vehicles with front passenger's air bag

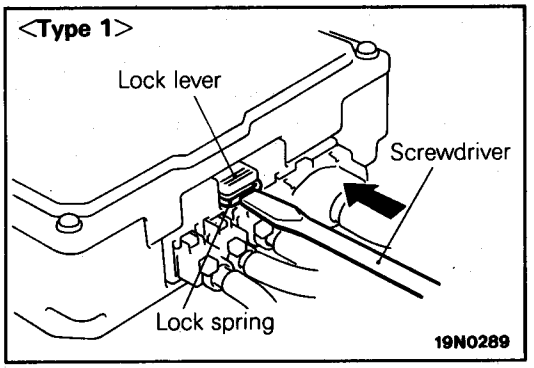


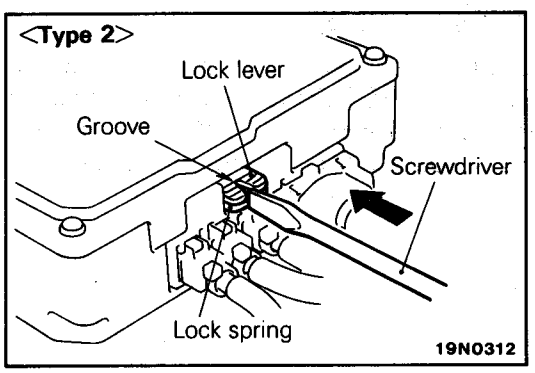
SERVICE POINTS OF REMOVAL

1. DISCONNECTION OF THE NEGATIVE (–) BATTERY CABLE FROM THE BATTERY

Disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-7 No. 5.)





5. DISCONNECTION OF THE SDU AND EACH HARNESS CONNECTOR

Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

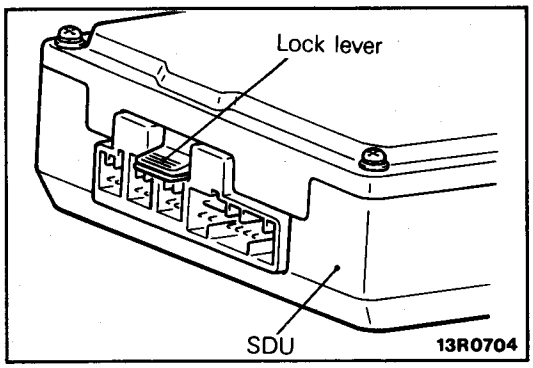
Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution
(1) Do not use excessive force to raise the lock lever.
(2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution
Do not use excessive force to raise the lock lever.

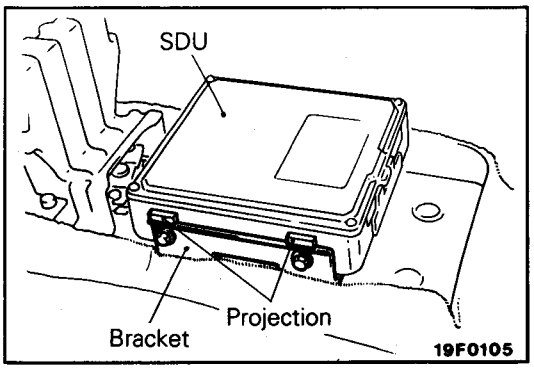


INSPECTION

- Check the SDU case and brackets for dents, cracks or deformities.
- Check connectors and lock lever for damage, and terminals for deformities.

Caution
If a dent, cracks, deformation or rust discovered, replace the SDU with a new one.

NOTE
For checking of the SDU other than described above, refer to the section concerning troubleshooting.
(Refer to P.52B-10.)

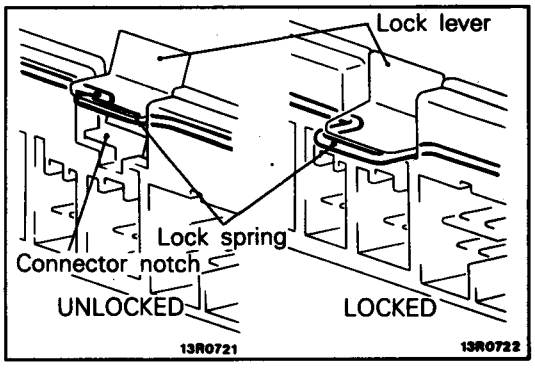


SERVICE POINTS OF INSTALLATION

6. INSTALLATION OF SRS DIAGNOSIS UNIT (SDU)

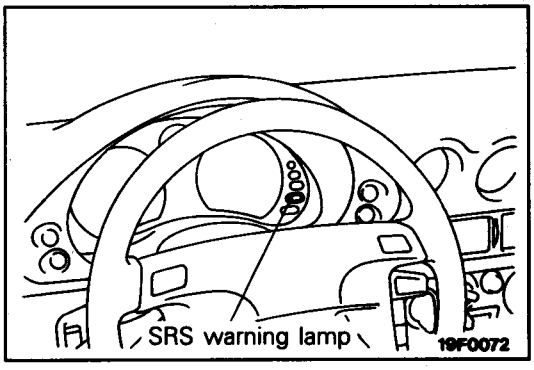
With the projection part of the SDU placed against the bracket as shown in the figure, securely install the SDU.

Caution
The SRS may not activate if SDU is not installed properly, which could result in serious injury or death to the vehicle's driver and passenger.



5. CONNECTION OF THE SDU AND EACH HARNESS CONNECTOR

After connecting each harness connector securely and correctly to the SDU, be sure to press down the lock lever of the SDU.



POST INSTALLATION INSPECTION

Reconnect the negative battery terminal. Turn the ignition key to the "ON" position. Does the "SRS" warning lamp illuminated for about 7 seconds, and then remain extinguished for at least 45 seconds? If yes, SRS system is functioning properly. If no, consult page 52B-10.

AIR BAG MODULE AND CLOCK SPRING

E52TEAAa

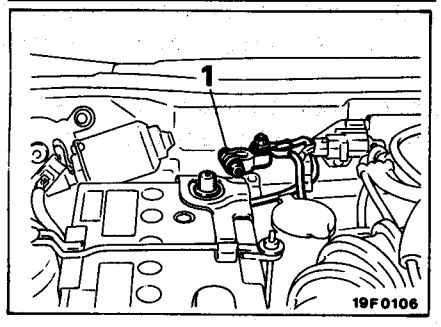
Caution

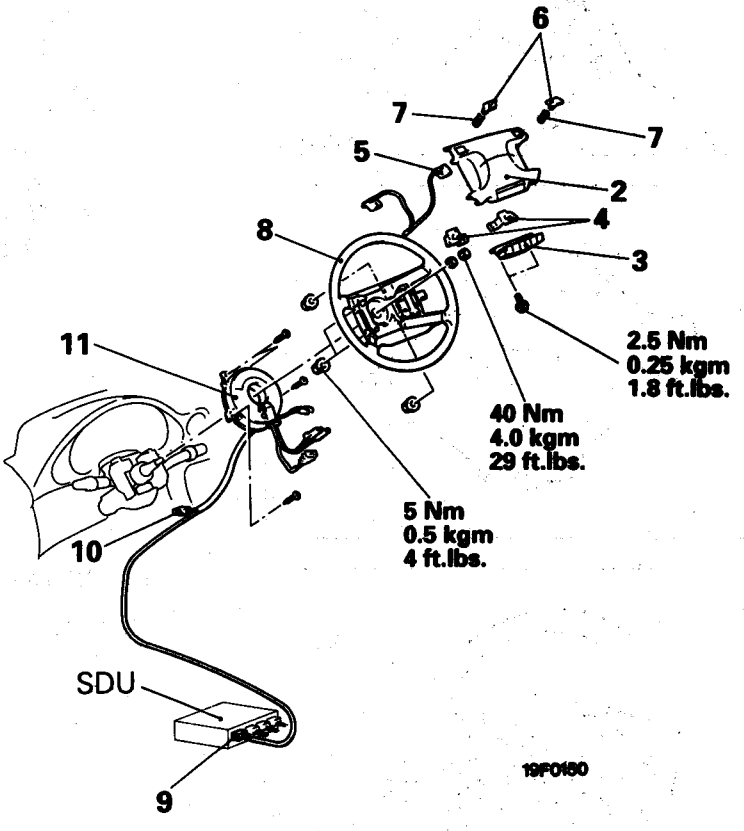
1. **Never attempt to disassemble or repair the air bag module or clock spring. If faulty, replace it.**
2. **Do not drop the air bag module or clock spring or allow contact with water, grease or oil. Replace it if a dent, crack, deformation or rust are detected.**
3. **The air bag module should be stored on a flat surface and placed so that the pad surface is facing upward. Do not place anything on top of it.**
4. **Do not expose the air bag module to temperature over 93°C (200°F).**
5. **After deployment of an air bag, replace the clock spring with a new one.**
6. **Wear gloves and safety glasses when handling an air bag that has already deployed.**
7. **An undeployed air bag module should only be disposed of in accordance with the procedures [P.52B-79 – P.52B-85.].**

REMOVAL AND INSTALLATION

<Vehicles without front passenger's air bag>

Pre-removal Operation
- After setting the steering wheel and the front wheels to the straight ahead position, remove the ignition key.



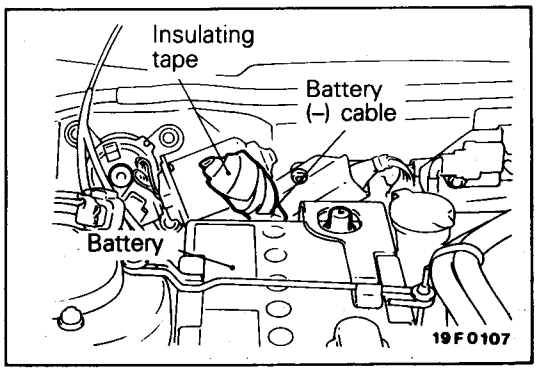


Air bag module removal steps

- ◆◆ ● Post-installation inspection
- ◆◆ 1. Connection of the negative (–) battery cable to the battery
- ◆◆ ◆◆ 2. Air bag module
- 3. Cover
- 4. Horn contact plate
- 5. Horn contact plate and wire
- 6. Horn button
- 7. Spring
- ◆◆ ● Pre-installation inspection

Clock spring removal steps

- ◆◆ ● Post-installation inspection
- ◆◆ 1. Connection of the negative (–) battery cable to the battery
- ◆◆ ◆◆ 2. Air bag module
- ◆◆ ◆◆ 8. Steering wheel
  - ● Knee protector } (Refer to GROUP 52A – Instrument Panel.)
  - ● Column cover }
  - ● Floor console (Refer to GROUP 52A – Floor Console.)
- ◆◆ ◆◆ 9. Clock spring and SRS diagnosis unit connection
- 10. Clock spring and body wiring harness connection
- ◆◆ 11. Clock spring
- ◆◆ ● Pre-installation inspection

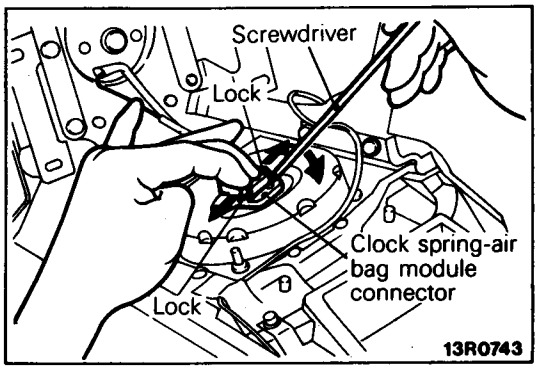


SERVICE POINTS OF REMOVAL

1. DISCONNECTION OF THE NEGATIVE (–) BATTERY CABLE FROM THE BATTERY

Disconnect the negative battery cable and tape the terminal.

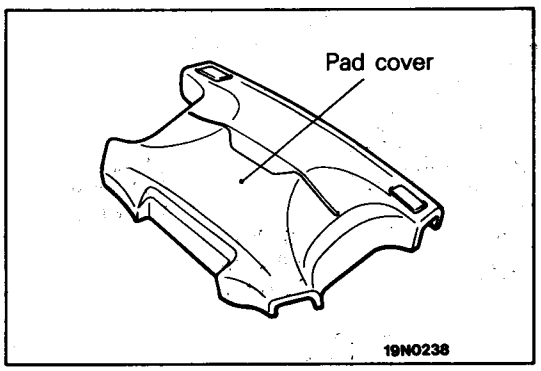
Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-7 No. 5)

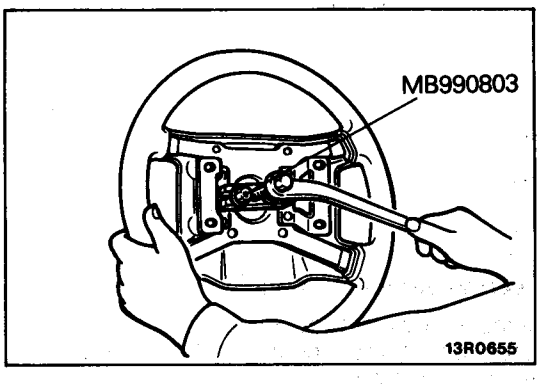


2. REMOVAL OF AIR BAG MODULE

(1) Remove the air bag module mounting nut using a socket wrench from the back side.
(2) When disconnecting the connector of the clock spring from the air bag module, press the air bag's lock toward the outer side to spread it open. Use a screwdriver, as shown in the figure at the left, to pry so as to remove the connector gently.

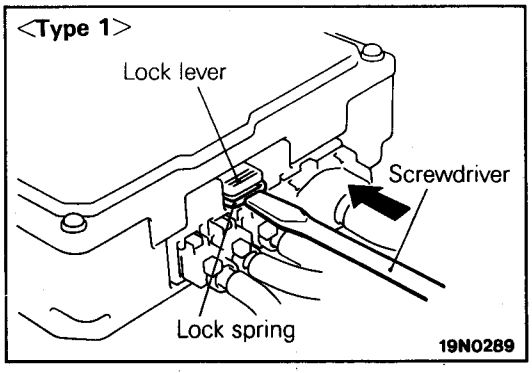
Caution
1. **When disconnecting the air bag module-clock spring connector, take care not to apply excessive force to it.**
2. **The removed air bag module should be stored in a clean, dry place with the pad cover face up.**

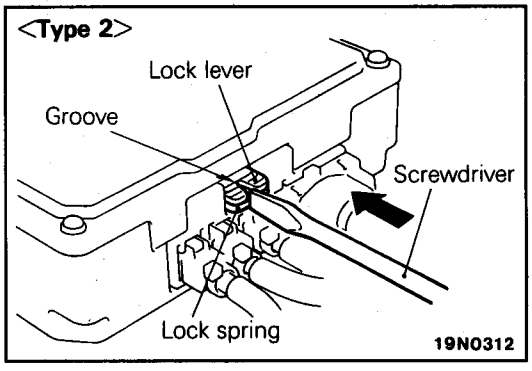




8. REMOVAL OF STEERING WHEEL

Caution
Do not hammer on the steering wheel. Doing so may damage the collapsible column mechanism.





9. DISCONNECTION OF THE CLOCK SPRING AND SRS DIAGNOSIS UNIT CONNECTOR

(1) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution
(1) Do not use excessive force to raise the lock lever.
(2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution
Do not use excessive force to raise the lock lever.

(2) Disconnect the clock spring connector (red 2-pin) from the SRS diagnosis unit.

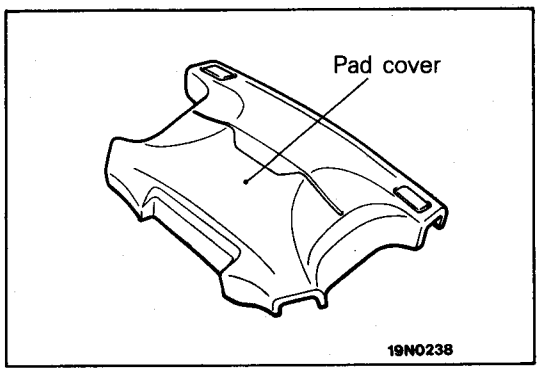
INSPECTION

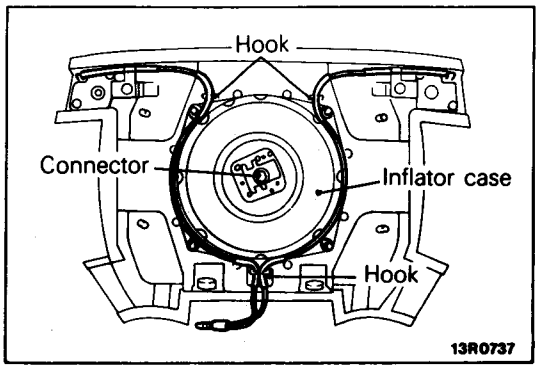
AIR BAG MODULE

If any improper part is found during the following inspection, replace the air bag module with a new one.
Dispose of the old one according to the specified procedure. (Refer to P.52B-79 to P.52B-85.)

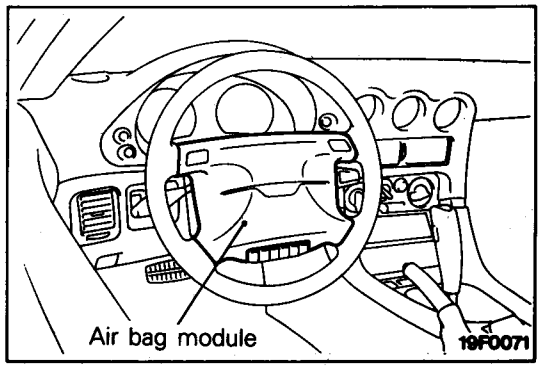
Caution
Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

(1) Check pad cover for dents, cracks or deformities.

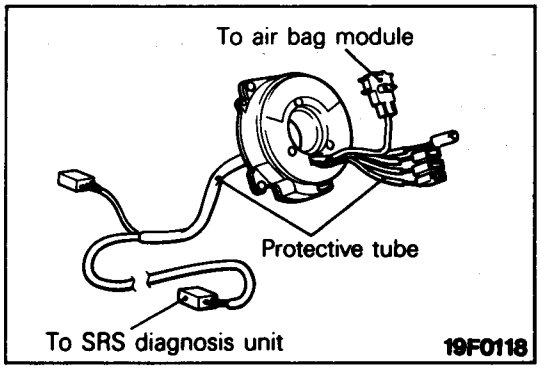




(2) Check the air bag module for denting, cracking or deformation.
(3) Check hooks and connectors for damage, terminals for deformities, and harness for binds.
(4) Check air bag inflator case for dents, cracks or deformities.

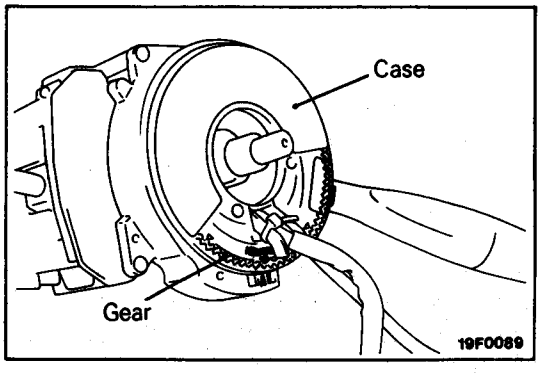


(5) Install the air bag module to steering wheel to check fit or alignment with the wheel.

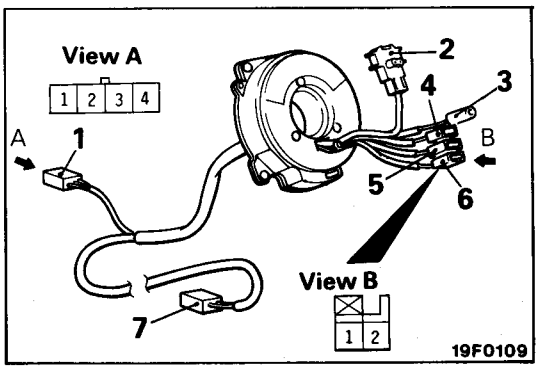


CLOCK SPRING

If, as result of following checks, even one abnormal point is discovered, replace the clock spring with a new one.
(1) Check connectors and protective tube for damage, and terminals for deformities.



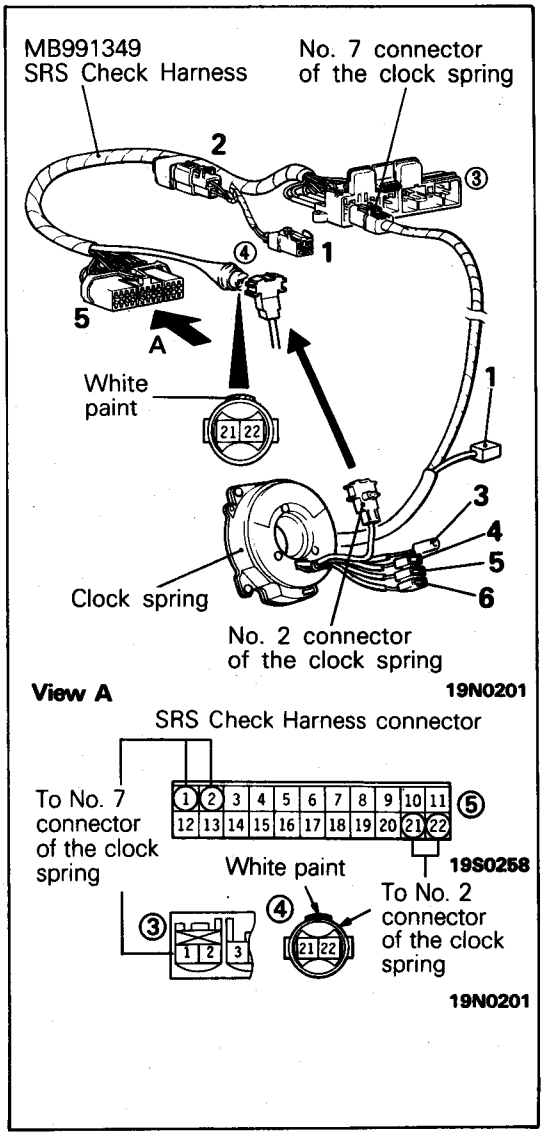
(2) Visually check the case and the gears for damage.



(3) Check for continuity between the No. 1 connector of the clock spring and connectors No. 3, 4, 5 and 6.

No. 1 connector				No. 3 connector	No. 4 connector	No. 5 connector	No. 6 connector	
Terminal 1	Terminal 2	Terminal 3	Terminal 4				Terminal 1	Terminal 2
To cruise control unit	To ACC power	To horn relay	To radio	To horn switch	To steering remote control switch		To cruise control switch	

NOTE
○—○ indicates that there is continuity between the terminal.



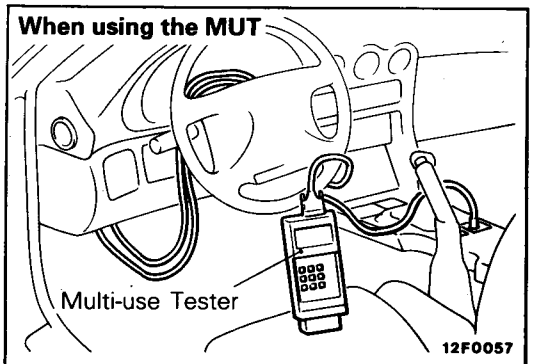
(4) Check of resistance between the terminals.

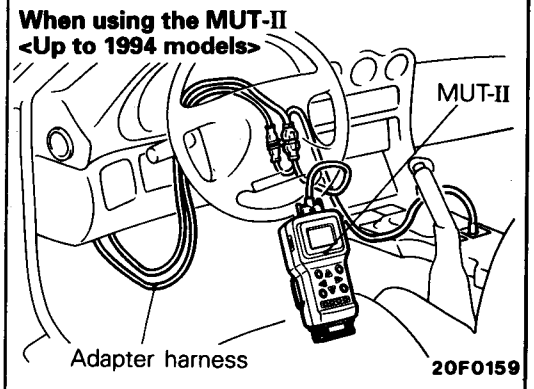
a. Joint the No. 2 connector and No. 7 connector of the clock spring to connector ④ and connector ③, respectively, of the SRS Check Harness.

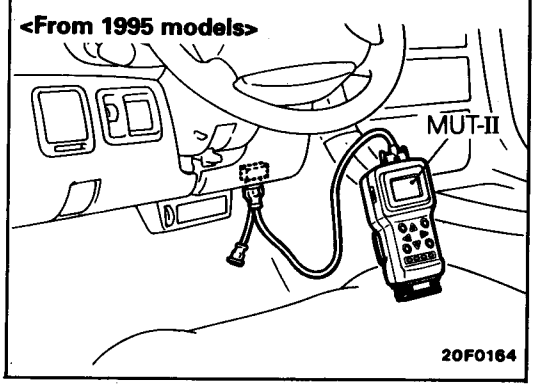
NOTE
When joining SRS Check Harness connector ④, align its white paint with the hollow portion of the No. 2 connector of the clock spring.

b. Check for continuity between terminal 1 and terminal 21, and terminal 2 and terminal 22, of SRS Check Harness connector ⑤, using a digital multi-meter.

Standard value: less than 0.4Ω







SERVICE POINTS OF INSTALLATION

PRE-INSTALLATION INSPECTION

(1) When installing the new air bag module and clock spring, refer to "INSPECTION".

Caution
Dispose of an air bag module only according to the specified procedure. (Refer to P.52B-79 to P.52B-85.)

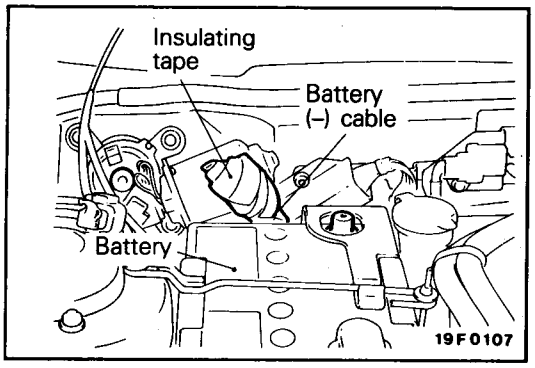
(2) Connect the Multi-use Tester or MUT-II to the diagnosis connector.

NOTE
When connecting MUT-II to 1994 models, use the adapter harness which belongs to MUT-II sub-assembly.

Caution
Make certain that the ignition switch is OFF when the Multi-use Tester or MUT-II is connected or disconnected.

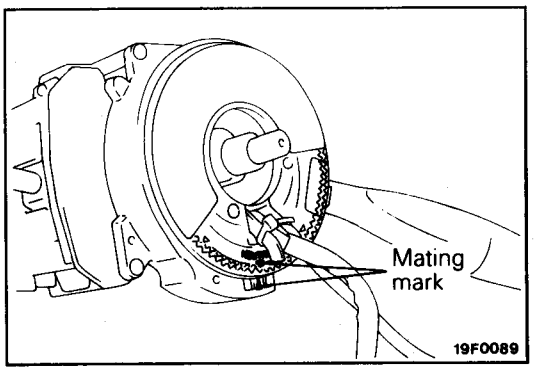
(3) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.

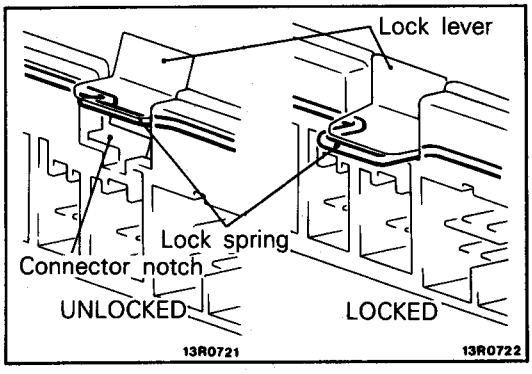
(4) Conduct self-diagnosis using Multi-use Tester or MUT-II to ensure entire SRS operates properly, except open circuit of air bag module (Diagnosis code No. 22). (Refer to P.52B-12.)



(5) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-7 No. 5.)





11. INSTALLATION OF CLOCK SPRING

Align the mating mark and "NEUTRAL" position indicator of the clock spring, and, after turning the front wheels to the straight-ahead position, install the clock spring to the column switch.

Caution
If the clock spring's mating mark is not properly aligned, the steering wheel may not be completely rotational during a turn, or the flat cable within the clock spring may be severed, obstructing normal operation of the SRS and possibly leading to serious injury to the vehicle's driver.

9. CONNECTOR OF SRS DIAGNOSIS UNIT AND CLOCK SPRING HARNESS CONNECTOR

After connecting the harness connector securely and correctly to the SRS diagnosis unit, be sure to press down the lock lever of the SRS diagnosis unit.

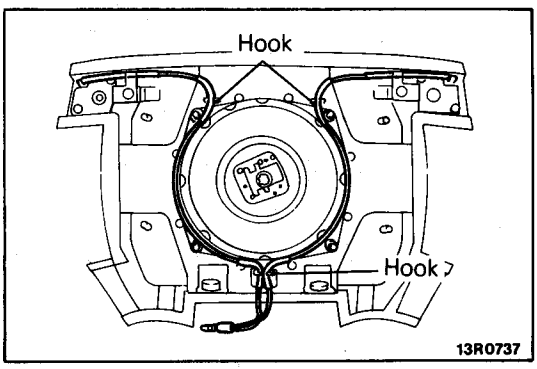
NOTES

8. INSTALLATION OF STEERING WHEEL

(1) Before installing the steering wheel, be sure to first turn the vehicle's front wheels to the straight-ahead position and align the mating mark and "NEUTRAL" position indicator of the clock spring.

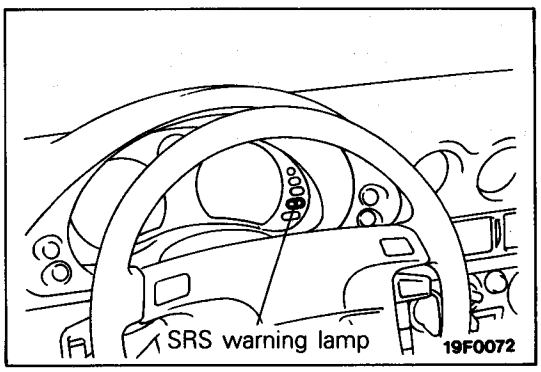
Caution
Be sure when installing the steering wheel, that the harness of the clock spring does not become caught or tangled.

(2) After clamping, turn the steering wheel all the way in both directions to confirm that steering is normal.



2. INSTALLATION OF AIR BAG MODULE

(1) Arrange the wiring of the horn switch as shown in the figure at the left, and hook up in place.
(2) Install the air bag module, taking care that no wiring is caught by it.



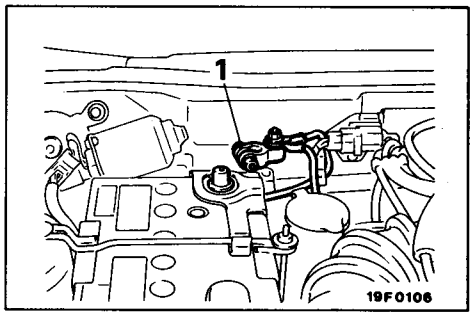
POST-INSTALLATION INSPECTION

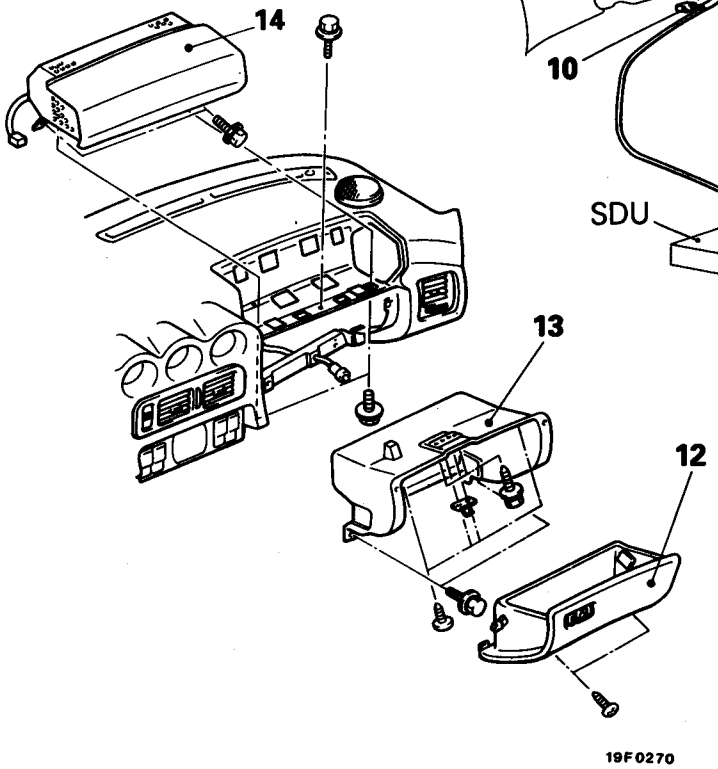
(1) After installing the clock spring, the steering wheel, the column covers and the air bag module, check steering wheel of noise, binds or difficult operation.
(2) Reconnect the negative battery terminal. Turn the ignition key to the "ON" position. Does the "SRS" warning lamp illuminate for about 7 seconds, and then remain extinguished for at least 45 seconds? If yes, SRS system is functioning properly. If no, consult page 52B-10.

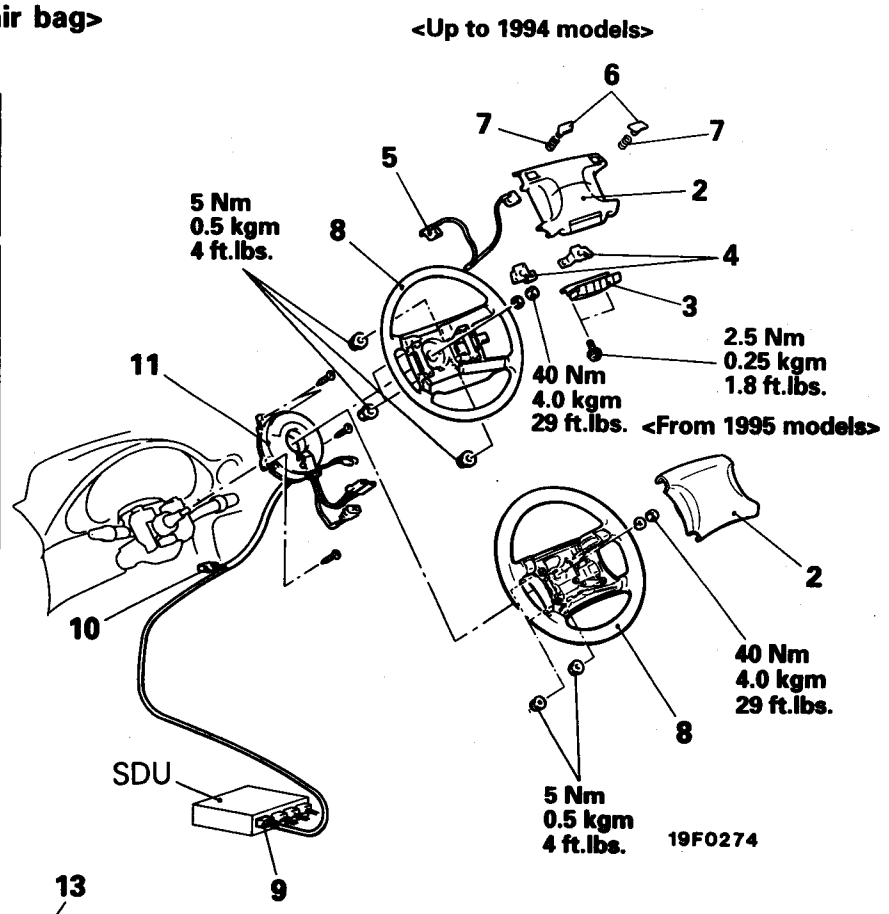
REMOVAL AND INSTALLATION

<Vehicles with front passenger's air bag>

Pre-removal Operation
- After setting the steering wheel and the front wheels to the straight ahead position, remove the ignition key?







Clock spring removal steps

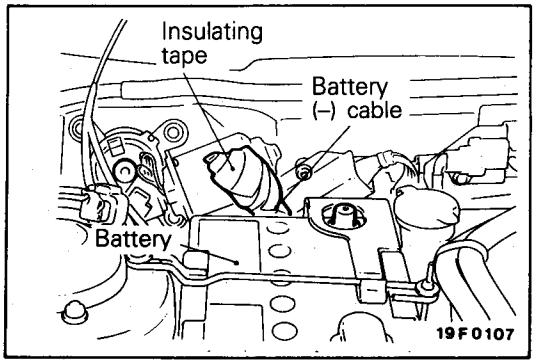
- ◆◆ • Post-installation inspection
- ◆◆ 1. Connection of the negative (–) battery cable to the battery
- ◆◆ ◆◆ 2. Air bag module (driver's side)
- ◆◆ ◆◆ 8. Steering wheel
  - • Knee protector } (Refer to GROUP 52A – Instrument Panel.)
  - • Column cover }
  - • Floor console (Refer to GROUP 52A – Floor Console.)
- ◆◆ ◆◆ 9. Clock spring and SRS diagnosis unit connection
- 10. Clock spring and body wiring harness connection
- ◆◆ 11. Clock spring
- ◆◆ • Pre-installation inspection

Air bag module (driver's side) removal steps

- ◆◆ • Post-installation inspection
- ◆◆ 1. Connection of the negative (–) battery cable to the battery
- ◆◆ ◆◆ 2. Air bag module
- 3. Cover
- 4. Horn contact plate
- 5. Horn contact plate and wire
- 6. Horn button
- 7. Spring
- ◆◆ • Pre-installation inspection

Air bag module (front passenger's side) removal steps

- ◆◆ • Post-installation inspection
- ◆◆ 1. Connection for the negative (–) battery cable
- 12. Glove box assembly
- 13. Cross pipe cover
- ◆◆ 14. Air bag module (front passenger's side)
- ◆◆ • Pre-installation inspection

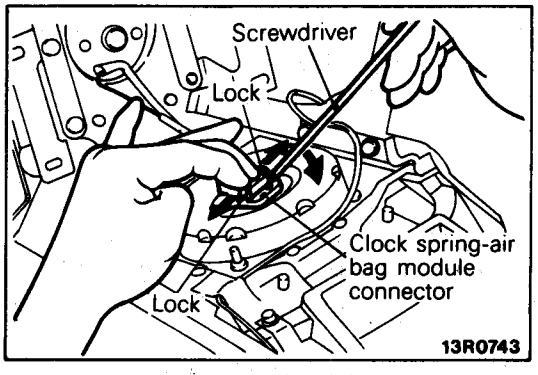


SERVICE POINTS OF REMOVAL

1. DISCONNECTION OF THE NEGATIVE (–) BATTERY CABLE FROM THE BATTERY

Disconnect the negative battery cable and tape the terminal.

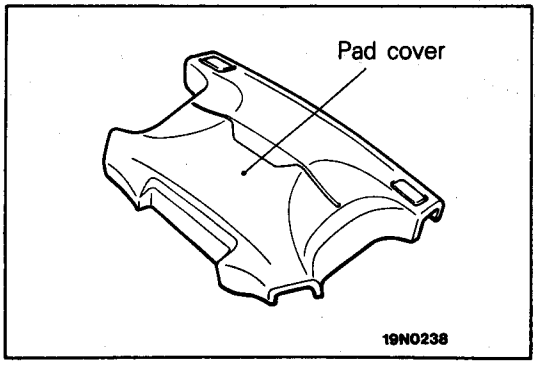
Caution
Wait at least 30 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-7 No. 5)

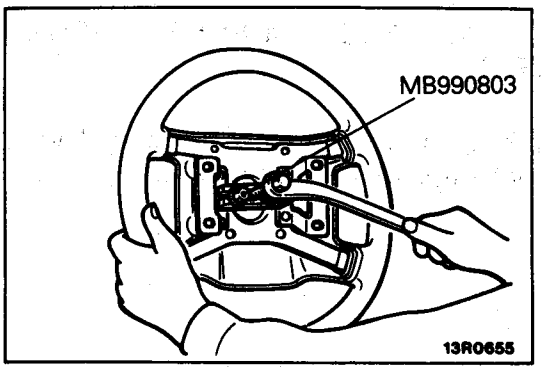


2. REMOVAL OF AIR BAG MODULE (DRIVER'S SIDE)

(1) Remove the air bag module (driver's side) mounting nut using a socket wrench from the back side.
(2) When disconnecting the connector of the clock spring from the air bag module (driver's side), press the air bag's lock toward the outer side to spread it open. Use a screwdriver, as shown in the figure at the left, to pry so as to remove the connector gently.

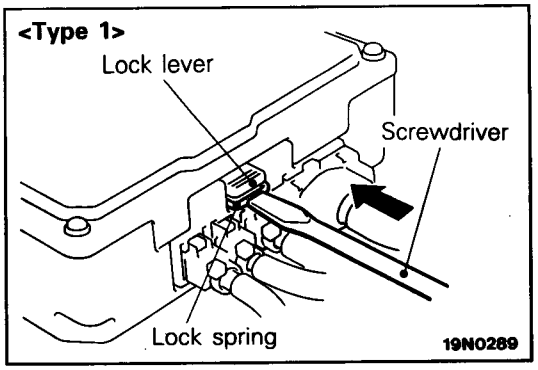
Caution
1. **When disconnecting the air bag module-clock spring connector, take care not to apply excessive force to it.**
2. **The removed air bag module should be stored in a clean, dry place with the pad cover face up.**

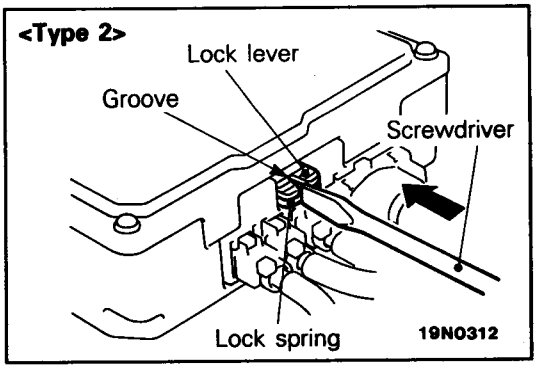




8. REMOVAL OF STEERING WHEEL

Caution
Do not hammer on the steering wheel. Doing so may damage the collapsible column mechanism.





9. DISCONNECTION OF THE SDU AND EACH HARNESS CONNECTOR

(1) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

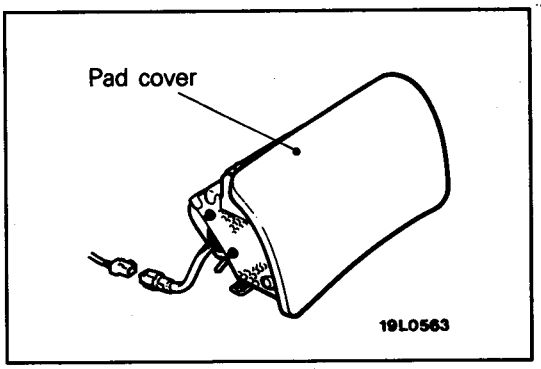
Caution
(1) Do not use excessive force to raise the lock lever.
(2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

Caution
Do not use excessive force to raise the lock lever.

(2) Disconnect the clock spring connector (red 2-pin) from the SRS diagnosis unit.



14. REMOVAL OF AIR BAG MODULE (FRONT PASSENGER'S SIDE)

Caution
The removed air bag module should be stored in a clean, dry place with the pad cover face up.

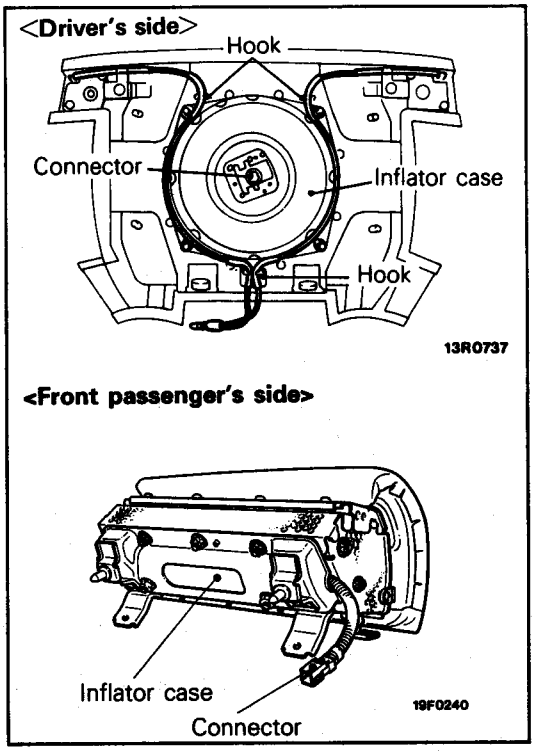
INSPECTION

AIR BAG MODULES

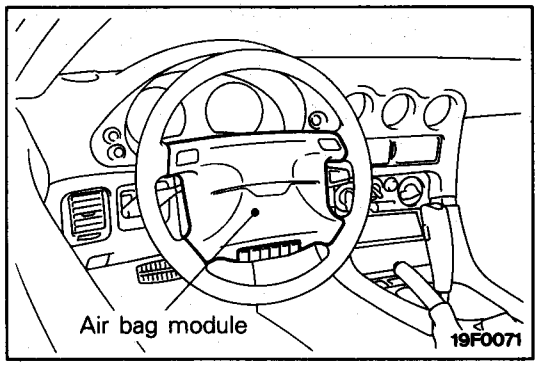
If any improper part is found during the following inspection, replace the air bag modules with a new one.
Dispose of the old one according to the specified procedure.
(Refer to P.52B-79 to P.52B-85.)

Caution
Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

(1) Check pad cover for dents, cracks or deformities.
(2) Check the air bag module for denting, cracking or deformation.
(3) Check hooks and connectors for damage, terminals for deformities, and harness for binds.
(4) Check air bag inflator case for dents, cracks or deformities.

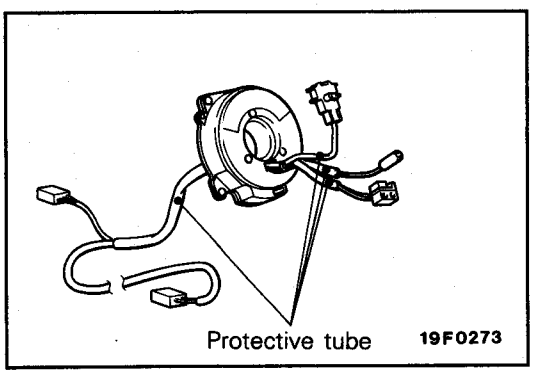


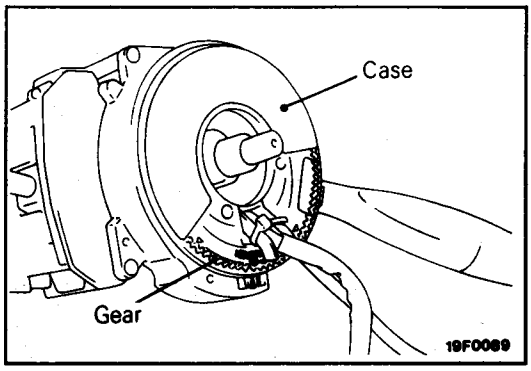
(5) Install the air bag module (driver's side) to steering wheel to check fit or alignment with the wheel.



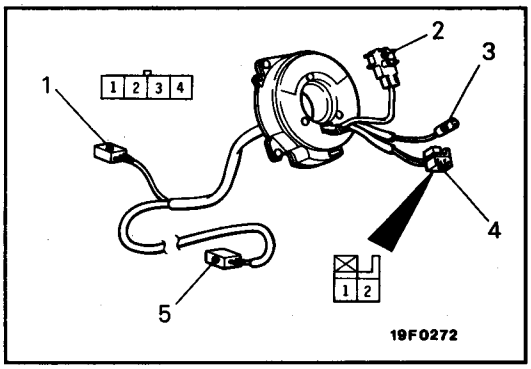
CLOCK SPRING

If, as result of following checks, even one abnormal point is discovered, replace the clock spring with a new one.
(1) Check connectors and protective tube for damage, and terminals for deformities.





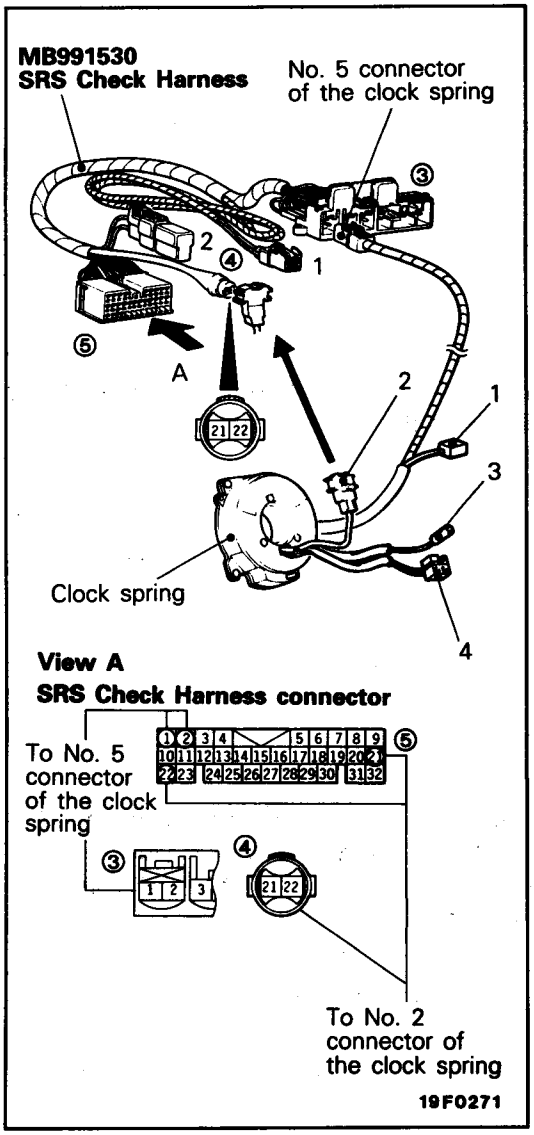
(2) Visually check the case and the gears for damage.



(3) Check for continuity between the No. 1 connector of the clock spring and connectors No. 3 and 4.

No. 1 connector				No. 3 connector	No. 4 connector	
Terminal 1	Terminal 2	Terminal 3	Terminal 4		Terminal 1	Terminal 2
To cruise control unit	To ACC power	To horn relay	To radio	To horn switch	To cruise control switch	

NOTE
O—O indicates that there is continuity between the terminal.



(4) Check of resistance between the terminals.
   a. Joint the No. 2 connector and No. 5 connector of the clock spring to connector ④ and connector ③, respectively, of the SRS Check Harness.
   b. Check for continuity between terminal 1 and terminal 21, and terminal 2 and terminal 22, of SRS Check Harness connector ⑤, using a digital multi-meter.

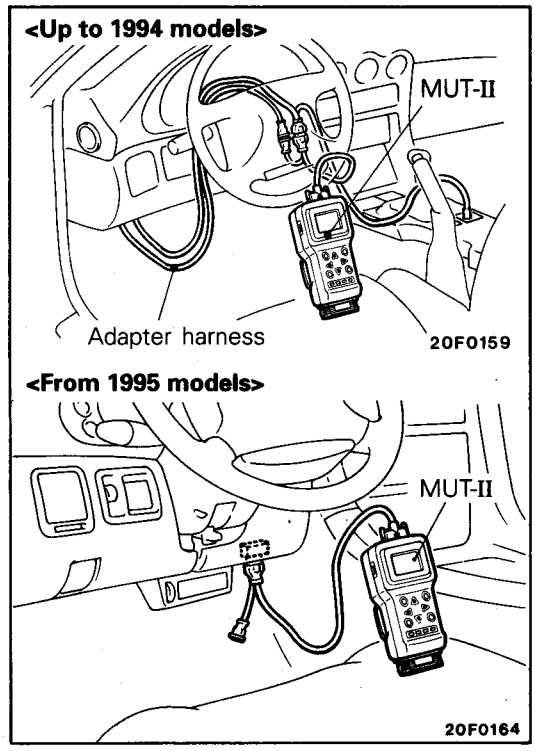
   Standard value: less than 0.4Ω

SERVICE POINTS OF INSTALLATION

PRE-INSTALLATION INSPECTION

(1) When installing the new air bag modules and clock spring, refer to "INSPECTION".

Caution
Dispose of an air bag module only according to the specified procedure. (Refer to P.52B-79 to P.52B-85.)



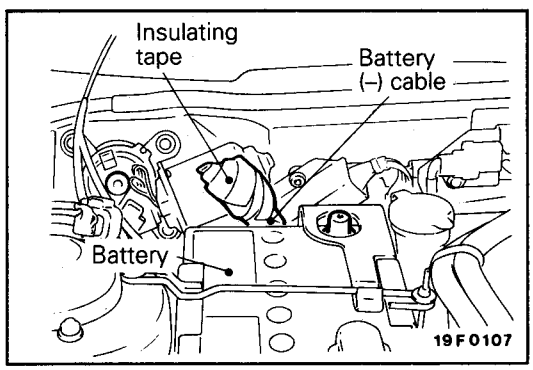
(2) Connect the MUT-II to the diagnosis connector.

NOTE
When connecting MUT-II to 1994 models, use the adapter harness which belongs to MUT-II sub-assembly.

Caution
Make certain that the ignition switch is OFF when the MUT-II is connected or disconnected.

(3) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.

(4) Conduct self-diagnosis using MUT-II to ensure entire SRS operates properly, except open circuit of air bag module (Diagnosis code No. 22 and 25). (Refer to P.52B-12.)

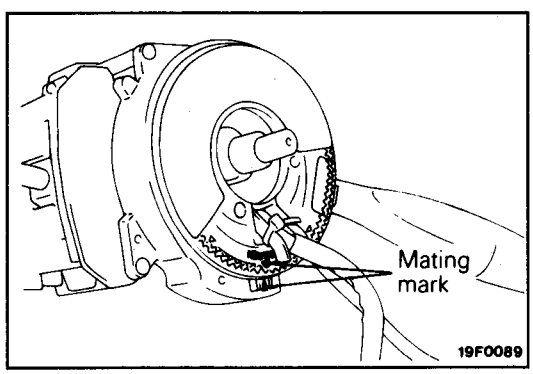


(5) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

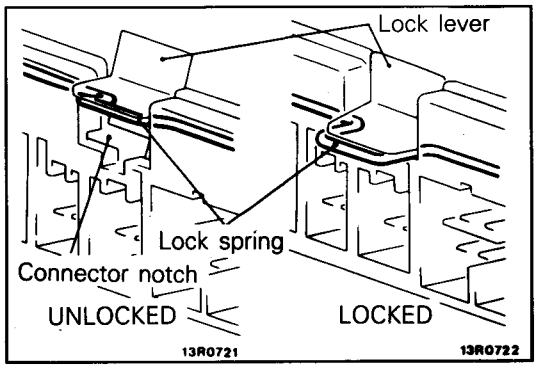
Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to P.52B-7 No.5 .)

11. INSTALLATION OF CLOCK SPRING

Align the mating mark and "NEUTRAL" position indicator of the clock spring, and, after turning the front wheels to the straight-ahead position, install the clock spring to the column switch.



Caution
If the clock spring's mating mark is not properly aligned, the steering wheel may not be completely rotational during a turn, or the flat cable within the clock spring may be severed, obstructing normal operation of the SRS and possibly leading to serious injury to the vehicle's driver.



9. CONNECTION OF SRS DIAGNOSIS UNIT AND CLOCK SPRING HARNESS CONNECTOR

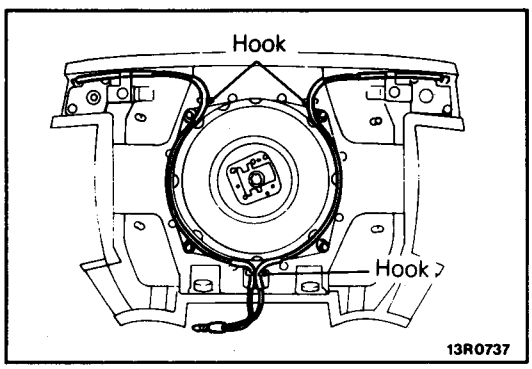
After connecting the harness connector securely and correctly to the SRS diagnosis unit, be sure to press down the lock lever of the SRS diagnosis unit.

8. INSTALLATION OF STEERING WHEEL

(1) Before installing the steering wheel, be sure to first turn the vehicle's front wheels to the straight-ahead position and align the mating mark and "NEUTRAL" position indicator of the clock spring.

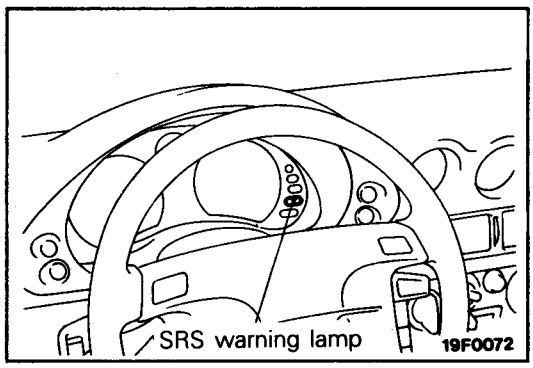
Caution
Be sure when installing the steering wheel, that the harness of the clock spring does not become caught or tangled.

(2) After clamping, turn the steering wheel all the way in both directions to confirm that steering is normal.



2. INSTALLATION OF AIR BAG MODULE (DRIVER'S SIDE)

(1) Arrange the wiring of the horn switch as shown in the figure at the left, and hook up in place.
(2) Install the air bag module, taking care that no wiring is caught by it.



POST-INSTALLATION INSPECTION

(1) After installing the clock spring, the steering wheel, the column covers and the air bag module (driver's side), check steering wheel of noise, binds or difficult operation.
(2) Reconnect the negative battery terminal. Turn the ignition key to the "ON" position. Does the "SRS" warning lamp illuminate for about 7 seconds, and then remain extinguished for at least 45 seconds? If yes, SRS system is functioning properly. If no, consult page 52B-10.

AIR BAG MODULE DISPOSAL PROCEDURES

E52UAAAa

Before either disposing of a vehicle equipped with an air bag, or prior to disposing of the air bag module, be sure to first follow the procedures described below to and deploy the air bag.

UNDEPLOYED AIR BAG MODULE DISPOSAL

Caution

1. **If the vehicle is to be scrapped, or otherwise disposed of, deploy the air bag inside the vehicle.**
   If the vehicle will continue to be operated and only the air bag module is to be disposed of, deploy the air bag outside the vehicle.
2. **Since a large amount of smoke is produced when the air bag is deployed, select a well-ventilated site. Moreover, never attempt the test near a smoke sensor.**
3. **Since there is a loud noise when the air bag is deployed, avoid residental areas whenever possible. If anyone is nearby, give warning of the impending noise.**
4. **Suitable ear protection must be worn by personnel performing these procedures or by people in the surrounding area.**

1. DEPLOYMENT INSIDE THE VEHICLE

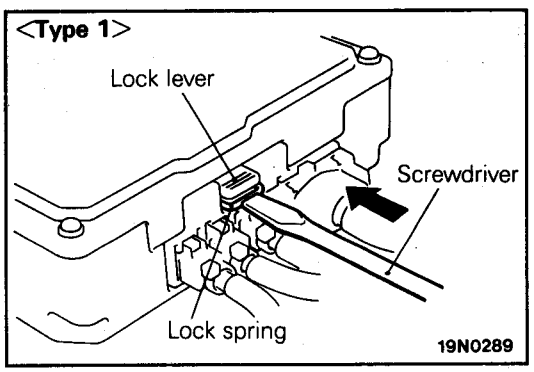
(when disposing a vehicle)

(1) Open all windows and doors of the vehicle. Move the vehicle to an isolated spot.

(2) Disconnect the negative (–) and positive (+) battery cables from the battery terminals, and then remove the battery from the vehicle.

Caution
Wait at least 60 seconds after disconnecting the battery cables before doing any further work. (Refer to P.52B-7 No. 5.)

(3) When the air bag (driver's side) is deployed.
Remove the rear console assembly. (Refer to GROUP 52 – Floor Console.)



Release the lock of SDU connector in accordance with the following procedure:

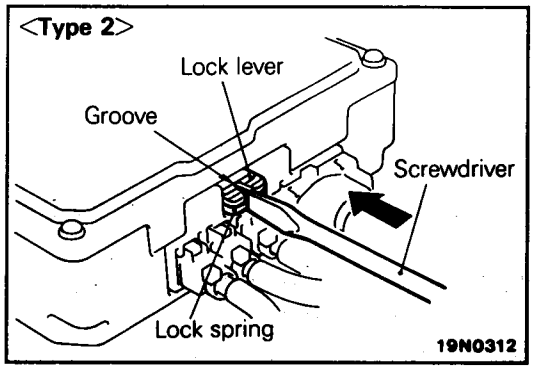
In case that there is no groove on the lock lever (Type 1)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution

(1) Do not use excessive force to raise the lock lever.

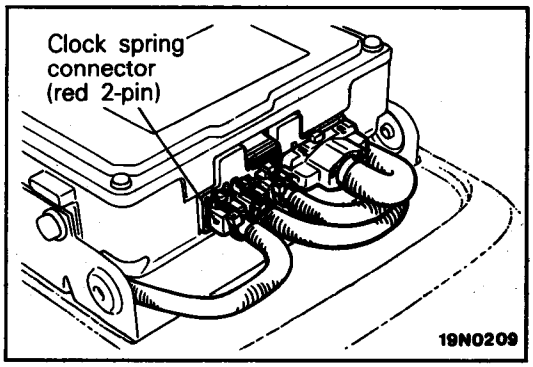
(2) Do not insert the screwdriver into the gap between the lock lever and the lock spring.



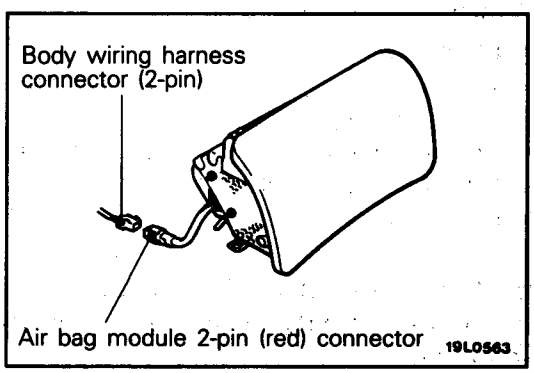
In case that there is a groove on the lock lever (Type 2)

Place a (–) screwdriver against the lock spring (metal section) of the connector lock lever groove as shown in the illustration, and push it toward the inside of the unit.

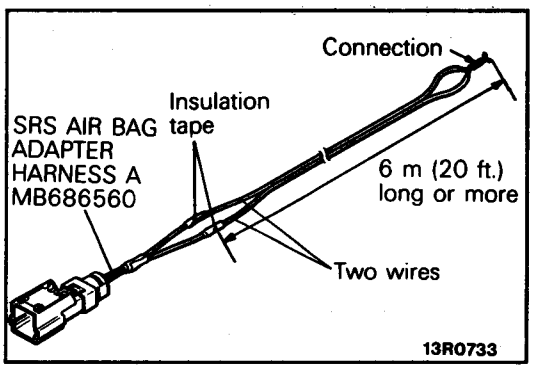
Caution
Do not use excessive force to raise the lock lever.



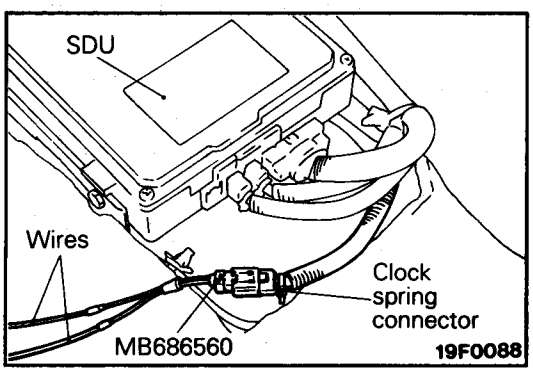
(4) Disconnect the clock spring connector from the SRS diagnosis unit.



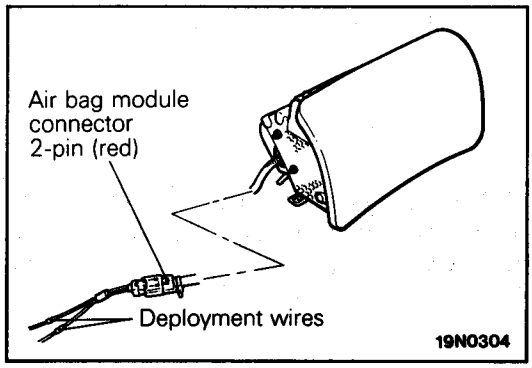
(5) **When the air bag (front passenger's side) is deployed**
Remove the glove box and cross pipe cover.
Remove the connection between the air bag module (front passenger's side) connector (red 2-pin) and the body wiring harness connector.



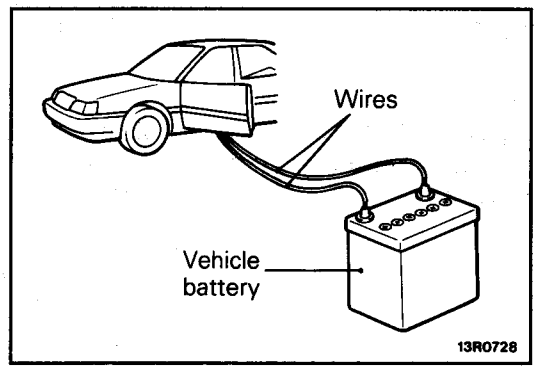
(6) Connect two wires, each six meters (20 feet) long or more, to the two leads of SRS AIR BAG ADAPTER HARNESS A and cover the connections with insulation tape, The other ends of the two wires should be connected to each other (short-circuited), to prevent sudden unexpected deployment of the air bag.



(7) **When the air bag (driver's side) is deployed**
Connect the SRS AIR BAG ADAPTER HARNESS A to the clock spring connector (which has been disconnected from the SRS diagnosis unit), and then lead the two connected wires outside the vehicle.



(8) WHEN THE AIR BAG (FRONT PASSENGER'S SIDE) IS DEPLOYED
Connect the SRS AIR BAG ADAPTER HARNESS A to the air bag module (front passenger's side) connector (red 2-pin) and then lead the two connected wires outside the vehicle.



(9) At a location as far away from the vehicle as possible, disconnect the two connected wires from each other, and connect them to the two terminals of the battery (removed from the vehicle) to deploy the air bag.

Caution
1. **Before deploying the air bag in this manner, first check to be sure that there is not one in or near the vehicle. Wear safety glasses.**
2. **The inflator will be quite hot immediately following the deployment, so wait at least 30 minutes to allow it to cool before attempting to handle it.**
   Although not poisonous, do not inhale gas from air bag deployment.
   See Deployed Air Bag Module Disposal Procedures (P.52B-85) for post-deployment handling instructions.
3. **If the air bag module fails to deploy when the procedures above are followed do not go near the module.**
   Contact your local distributor.

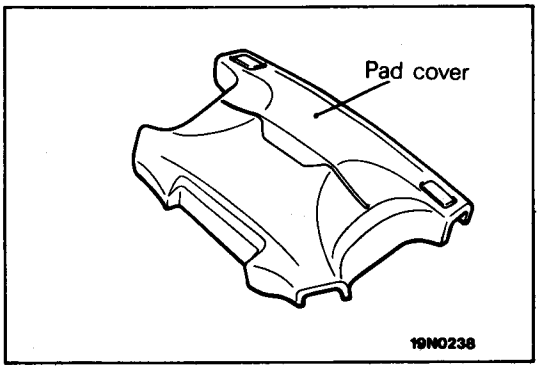
2. DEPLOYMENT OUTSIDE THE VEHICLE

Caution
1. **Should be carried out in a wide, flat area at least 6 m (20 feet) away from obstacles and other people.**
2. **Do not perform deployment outside, if a strong wind is blowing, and if there is even a slight breeze, the air bag module should be placed and deployed downwind from the battery.**

When the air bag (driver's side) is deployed

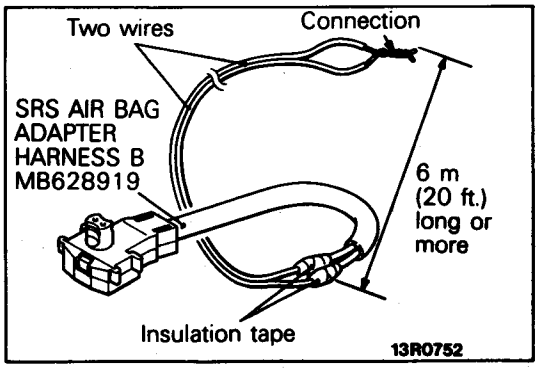
(1) Disconnect the negative (–) and positive (+) battery cables from the battery terminals, and then remove the battery from the vehicle.

Caution
Wait at least 60 seconds after disconnecting the battery cables before doing any further work. (Refer to P.52B-7 No. 5.)

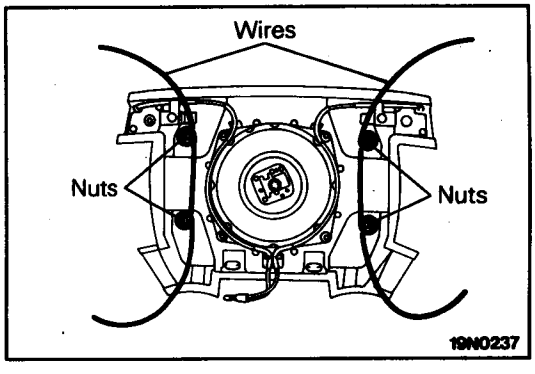


(2) Remove the air bag module for the vehicle. (Refer to P.52B-65.)

Caution
The air bag module should be stored on a flat surface and placed so that the pad cover face up. Do not place anything on top of it.

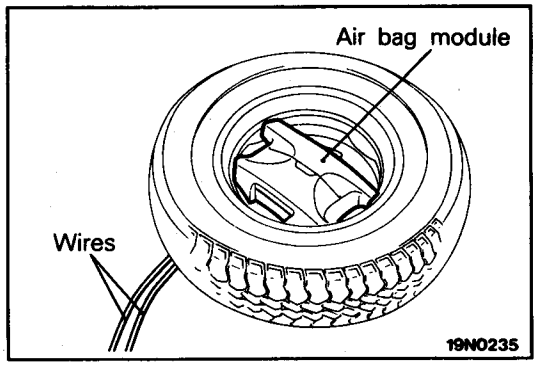


(3) Connect two wires, each six meters (20 feet) long or more, to the two leads of SRS AIR BAG ADAPTER HARNESS B, and cover the connections with insulation tape. The other ends of the two wires should be connected to each other (short-circuited), to prevent sudden unexpected deployment of the air bag.



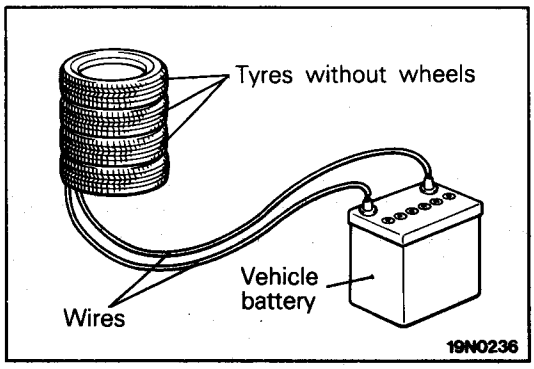
(4) Install nuts that are no longer needed to the four bolts on the rear side of the air bag module, and tie on some thick wire to secure to the wheel.

(5) Take the SRS air bag adaptor harness B that is connected to the wires, pass it beneath the old tyre that is attached to the wheel, and connect it to the air bag module.



(6) Insert the air bag module into the wheel on which the old tyre has been installed, and secure it with the wires that are tied to the bolts, with the air bag facing upward.

Caution
Leave some space below the wheel for the adaptor harness. If there is no space, the reaction when the air bag deploys could damage the adaptor harness.



(7) Place three old tyres with no wheels on top of the tyre secured to the air bag module.

(8) At a location as far away from the air bag module as possible, and from a shielded position, if possible, disconnect the two connected wires from each other and connect them to the two terminals of the battery (removed from the vehicle) to deploy the air bag.

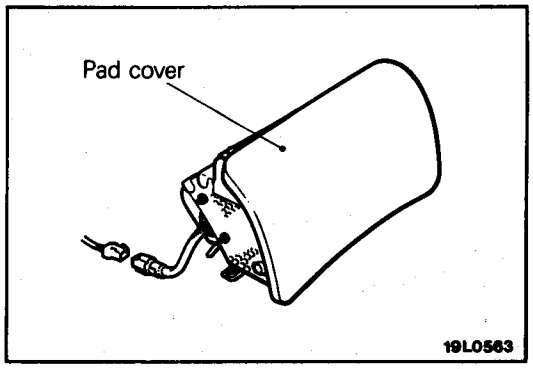
Caution

1. **Before deployment, check carefully to be sure that no one is nearby.**
2. **The inflator will be quite hot immediately following deployment, so wait at least 30 minutes to allow it to cool before attempting to handle it. Although not poisonous, do not inhale gas from air bag deployment. See Deployed Air Bag Module Disposal Procedures (refer to P.52B-85) for post-deployment handling instructions.**
3. **If the air bag module fails to deploy when the procedures above are followed, do not go near the module. Contact your local distributor.**

When the air bag (front passenger's side) is deployed

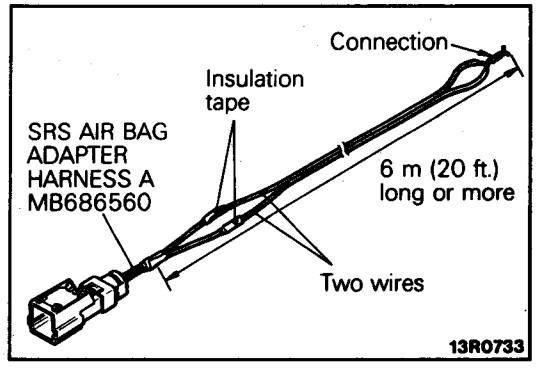
(1) Disconnect the negative (–) and positive (+) battery cables from the battery terminals, and then remove the battery from the vehicle.

Caution
Wait at least 60 seconds after disconnecting the battery cables before doing any further work. (Refer to P.52B-7 No. 5.)

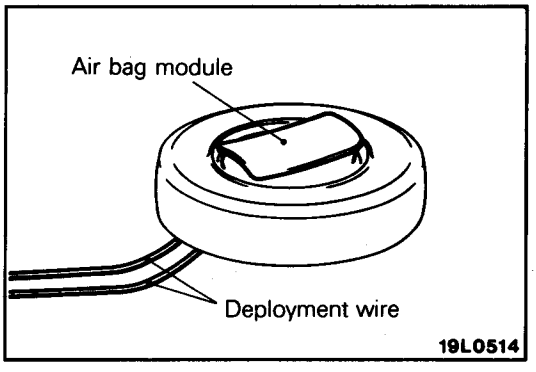


(2) Remove the air bag module for the vehicle. (Refer to P.52B-65.)

Caution
The air bag module should be stored on a flat surface and placed so that the pad cover face up. Do not place anything on top of it.

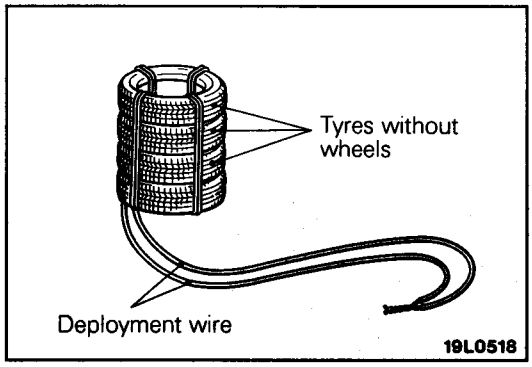


(3) Connect two wires, each six meters (20 feet) long or more, to the two leads of SRS AIR BAG ADAPTER HARNESS A, and cover the connections with insulation tape. The other ends of the two wires should be connected to each other (short-circuited), to prevent sudden unexpected deployment of the air bag.



(4) Connect the deployment wires to the SRS air bag adapter harness A. Pass it beneath the tyre and wheel assembly, and connect it to the air bag module.
(5) Pass the thick wires into the hole of the air bag module bracket, and secure it to the wheel of the old tyre with wheel (4 locations), with the air bag facing upwards.

Caution
1. **Leave some space below the wheel for the deployment wires.**
   If there is no space, the reaction of the air bag deployment could result in damage of the adapter harness.
2. **While deployment takes place, do not have the connector of the SRS air bag adapter harness A inserted between the tyres.**



(6) Place three old tyres with no wheels on top of the tyre secured to the air bag module, and secure all tyres with ropes (4 locations).

(7) At a location as far away from the air bag module as possible, and from a shielded position. If possible, disconnect the two connected wires from each other and connect them to the two terminals of the battery (removed from the vehicle) to deploy the air bag.

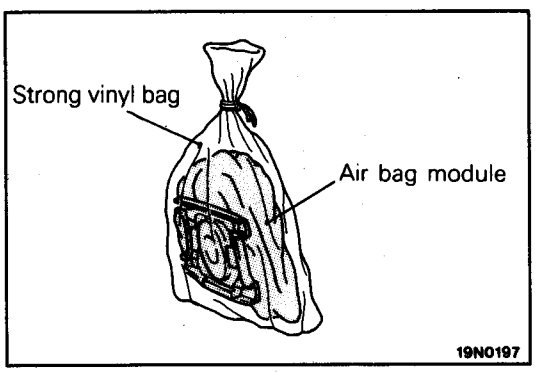
Caution

1. **Before deployment, check carefully to be sure that no one is nearby.**
2. **The inflator will be quite hot immediately following deployment, so wait at least 30 minutes to allow it to cool before attempting to handle it. Although not poisonous, do not inhale gas from air bag deployment. See Deployed Air Bag Module Disposal Procedures (as shown below) for post-deployment handling instructions.**
3. **If the air bag module fails to deploy when the procedures above are followed, do not go near the module. Contact your local distributor.**

DEPLOYED AIR BAG MODULE DISPOSAL PROCEDURES

After deployment, the air bag module should be disposed of in the same manner as any other scrap parts, except that the following points should be carefully noted during disposal.

(1) The inflator will be quite hot immediately following deployment, so wait at least 30 minutes to allow it to cool before attempting to handle it.
(2) Do not put water or oil on the air bag after deployment.
(3) There may be, adhered to the deployed air bag module, material that could irritate the eyes and/or skin, so wear gloves and safety glasses when handling a deployed air bag module. IF DESPITE THESE PRECAUTIONS, THE MATERIAL DOES, GET INTO THE EYES OR ON THE SKIN, IMMEDIATELY RINSE THE AFFECTED AREA WITH A LARGE AMOUNT OF CLEAN WATER.
IF ANY IRRITATION DEVELOPS, SEEK MEDICAL ATTENTION.
(4) Tightly seal the air bag module in a strong vinyl bag for disposal.
(5) Be sure to always wash your hands after completing this operation.



NOTES

CHASSIS ELECTRICAL

CONTENTS

E54AA-

CONTINUED ON NEXT PAGE

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).

(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE
The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk(*).

CHASSIS ELECTRICAL

CONTENTS

E54AA-

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

(1) A Supplemental Restraint System (SRS), which uses a driver-side air bag, has been installed in the 3000GT.
(2) The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring, interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

WARNING!
(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver (from rendering the SRS inoperative).
(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS), before beginning any service or maintenance of any component of the SRS or any SRS-related component.

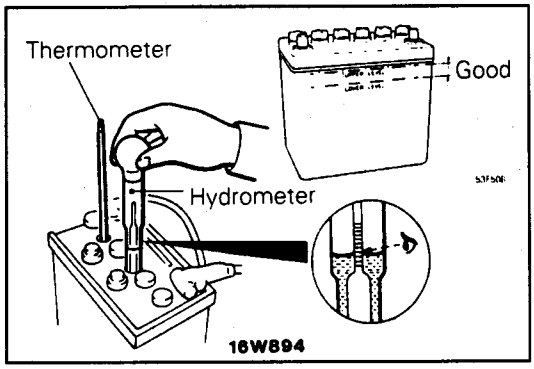
BATTERY

SPECIFICATION

SERVICE SPECIFICATION

E54CB–

Item	Specification
Specific gravity of the battery fluid	1.220–1.290 [20°C (68°F)]



SERVICE ADJUSTMENT PROCEDURES

E54CBAD

INSPECTION OF FLUID LEVEL AND SPECIFIC GRAVITY

1. Inspect whether or not the battery fluid is between the UPPER LEVEL and LOWER LEVEL marks.
2. Use a hydrometer and thermometer to check the specific gravity of the battery fluid.

   Standard value: 1.220–1.290 [20°C (68°F)]

   The specific gravity of the battery fluid varies with the temperature, so use the following formula to calculate the specific gravity for 20°C (68°F). Use the calculated value to determine whether or not the specific gravity is satisfactory.

   $D_{20} = Dt + 0.0007 (t-20)$
   D_{20}: specific gravity of the battery fluid calculated for 20°C (68°F).
   Dt: actually measured specific gravity
   t: actually measured temperature

VISUAL INSPECTION

Inspect after removing the battery.

Caution
If battery fluid has leaked from the battery, use rubber gloves to protect your hands when removing the battery.

(1) If there is corrosion of the battery stays or battery brackets from the battery fluid, clean by washing in warm or cold water.
(2) If there is a leak from a crack in the battery case, replace the battery.
(3) Clean the battery terminals with a wire brush, and replace any parts that are damaged.

CHARGING

1. When charging a battery while still installed in the vehicle, disconnect the battery cables to prevent damage to electrical parts.
2. The current normally used to charge a battery should be approximately 1/10th the battery capacity.
3. When quick charging due to lack of time, etc., the charging current should never exceed the battery capacity as indicated in amperes.
4. Determining if charging is completed.
   (1) If the specific gravity of the battery fluid reaches 1.250–1.290 and remains constant for at least one hour.
   (2) If the voltage of each cell reaches 2.5–2.8 V and remains constant for at least one hour.

   Caution
   (1) Take care since the battery fluid level may rise during charging.
   (2) Keep all sources of fire away while charging because there is danger of explosion.
   (3) Take care not to do anything that could generate sparks while charging.
   (4) When charging is completed, replace the battery caps, pour clean water over the battery to remove any sulfuric acid any dry.

BATTERY TEST

E54CBAA

TEST STEP	RESULT	ACTION TO TAKE
A0 VISUAL INSPECTION • Remove negative cable, then positive cable. • Check for dirty or corroded connections.	NG ▶	CLEAN terminals and clamps. Go to A1.
	OK ▶	Go to A1.
A1 LOOSE BATTERY POST • Check for loose battery post.	NG ▶	REPLACE battery.
	OK ▶	Go to A2.
A2 CRACKED BATTERY COVER • Remove hold-downs and shields. • Check for broken/cracked case or cover.	NG ▶	REPLACE battery.
	OK ▶	Go to A3.
A3 OPEN CIRCUIT VOLTAGE TEST. • Turn headlamps on for 15 seconds. • Turn headlamps off for 2 minutes to allow battery voltage to stabilize. • Disconnect cables. • Read open circuit voltage.	NG ▶	CHARGE battery at 5 amps, then go to A3.
	OPEN CIRCUIT VOLTAGE UNDER 12.4 VOLTS	
	OK ▶	Go to A4.
A4 LOAD TEST • Connect a load tester to the battery. • Load the battery at the recommended discharge rate (See LOAD TEST RATE CHART) for 15 seconds. • Read voltage after 15 seconds, then remove load.	NG ▶	REPLACE battery.
	VOLTAGE IS LESS THAN MINIMUM LISTED	
	OK ▶	Battery OK.
	VOLTAGE IS MORE THAN MINIMUM LISTED	

LOAD TEST RATE CHART

Load test (amps)	Cranking rating [–18°C (0°F)]	Reserve capacity (min.)	Application
170	356	99	55D23R
240	490	123	75D26R

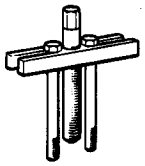
LOAD TEST CHART

Minimum voltage	Temperature	
	°C	°F
9.6	21 and above	70 and above
9.5	16	60
9.4	10	50
9.3	4	40
9.1	–1	30
8.9	–7	20
8.7	–12	10
8.5	–18	0

IGNITION SWITCH

SPECIAL TOOLS

E54DF–

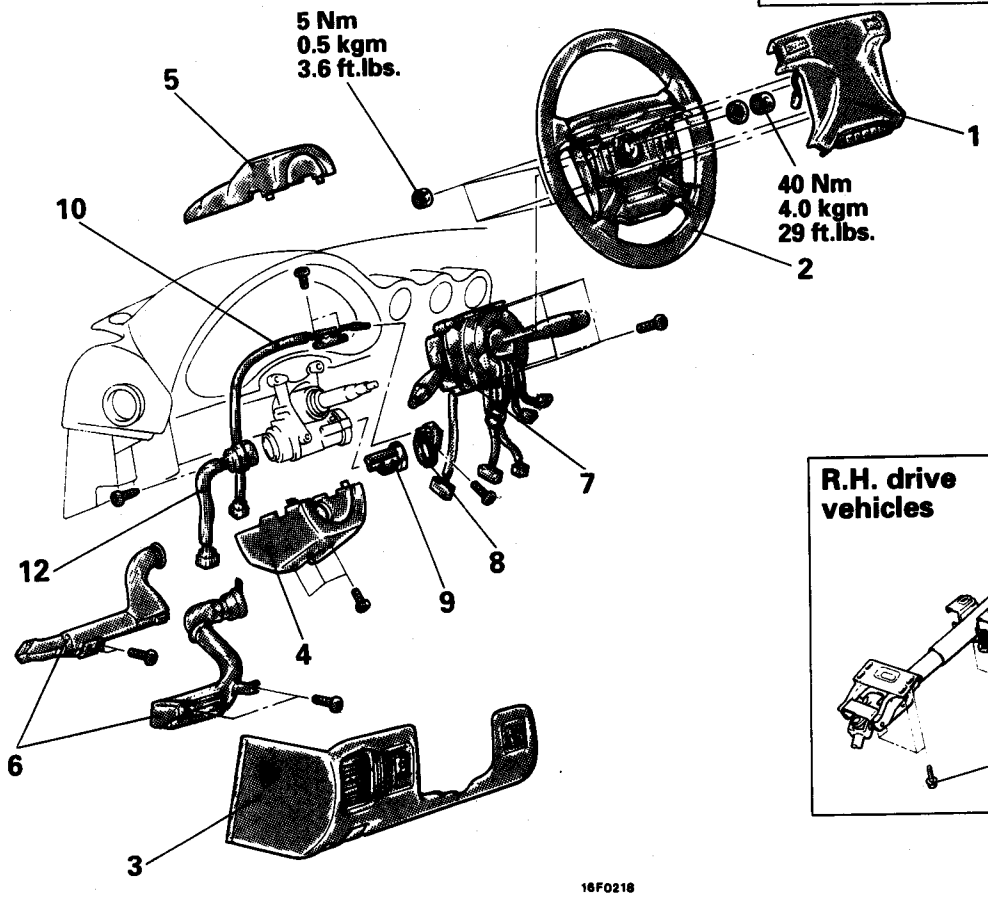
Tool	Number	Name	Use
	MB990803	Steering wheel puller	Removal of steering wheel (LH drive vehicles only)

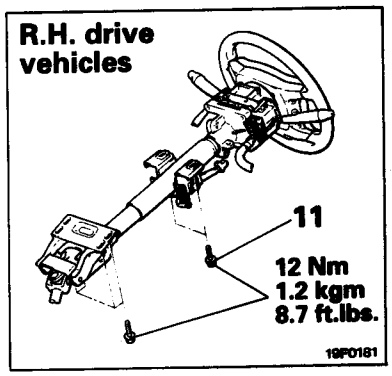
REMOVAL AND INSTALLATION

E54DH–

L.H. drive vehicles

CAUTION: SRS
Before removal of air bag module, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.





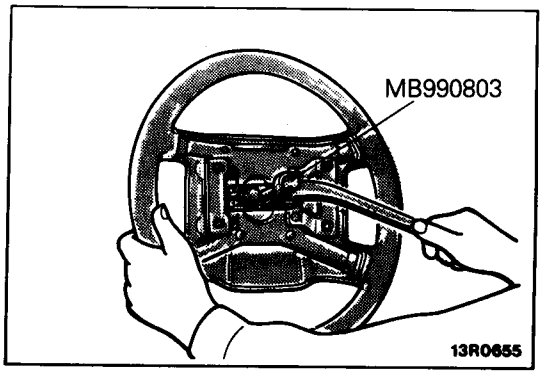
Ignition switch segment removal steps

3. Knee protector (Refer to GROUP 52A – Instrument Panel.)
4. Column cover lower
5. Column cover upper
6. Lap cooler duct and foot shower duct
10. Key reminder switch segment
11. Steering column mounting bolt*2
12. Ignition switch segment

Steering lock cylinder removal steps

1. Air bag module *1 (Refer to GROUP 52B – Air Bag Module and Clock Spring)
2. Steering wheel*1
3. Knee protector (Refer to GROUP 52A – Instrument Panel.)
4. Column cover lower
5. Column cover upper
6. Lap cooler duct and foot shower duct
7. Column switch and clock spring assembly*1
8. Ignition key illumination ring
9. Steering lock cylinder

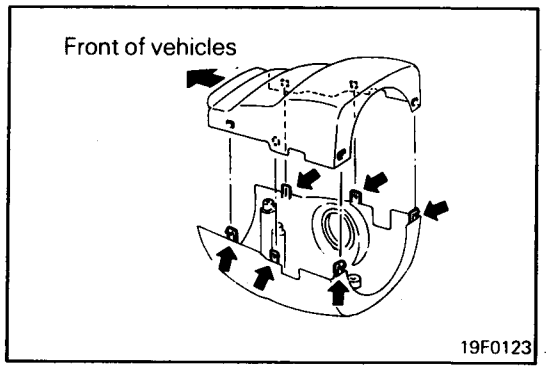
NOTE
*1 : Removal for LH drive vehicles only
*2 : Removal for RH drive vehicles only



SERVICE POINTS OF REMOVAL E54DIAJ

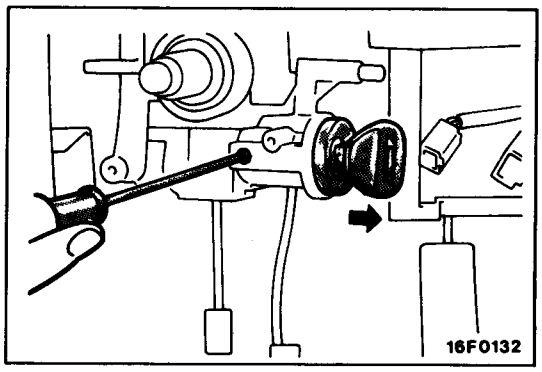
2. REMOVAL OF STEERING WHEEL (L.H. DRIVE VEHICLES ONLY)

Caution
Do not hammer on the steering wheel to remove it; doing so may damage the collapsible mechanism.



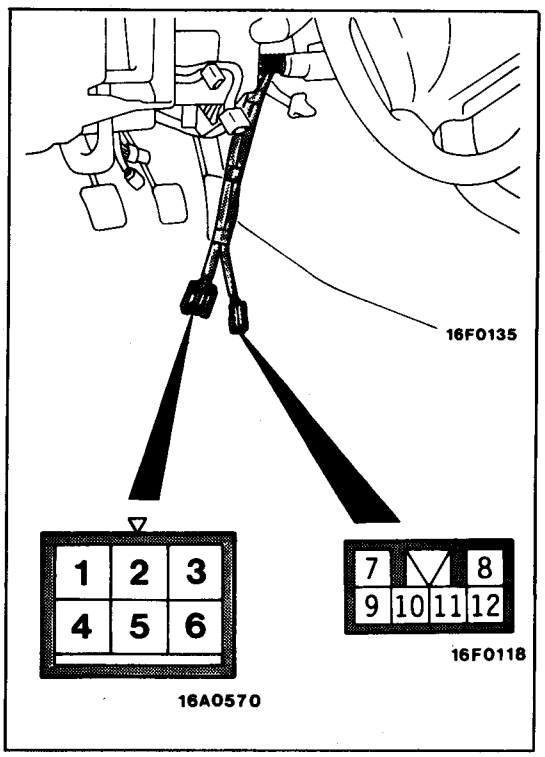
4. REMOVAL OF COLUMN COVER LOWER / 5. COLUMN COVER UPPER

After the screws have been removed, remove the covers, while making sure not to break the grippers.



9. REMOVAL OF STEERING LOCK CYLINDER

(1) Insert the ignition key into the steering lock cylinder and place the key in the ACC position.
(2) Press the lock pin down with a Phillips head screwdriver (small-size one) to remove the steering lock cylinder.



INSPECTION E54DJAS

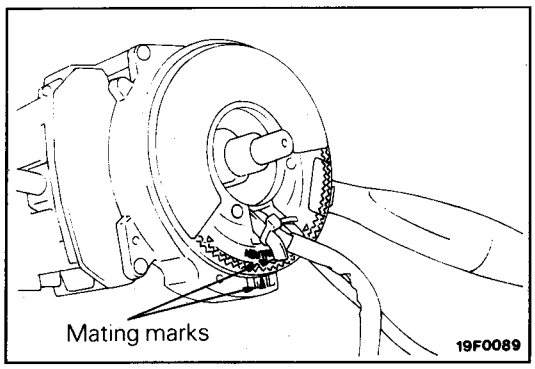
IGNITION SWITCH INSPECTION

(1) Remove the knee protector, the column cover lower and the column cover upper. (Refer to GROUP 52A – Instrument Panel.)
(2) Disconnect the wiring connector from the ignition switch and key reminder switch, and connect an ohmmeter to the switch side connector.

(3) Operate the switch, and check the continuity between the terminals.

Position \ Terminal	Key	Ignition switch 1	2	3	4	5	6	Key reminder switch 7	8	9	12	Ignition key illumination lamp 10	11
LOCK	Removed									○–○			
ACC	Inserted			○			○	○–○					
ON	Inserted		○	○	○		○						
START	Inserted	○			○	○	○						

NOTE
○–○ indicates that there is continuity between the terminals.



SERVICE POINTS OF INSTALLATION E54DKAB

7. INSTALLATION OF COLUMN SWITCH AND CLOCK SPRING ASSEMBLY

Line up the "NEUTRAL" mark of the clock spring with the mating mark to center the clock spring.

Caution
If the clock spring is not centered, problems such as intermediate failure of the steering wheel to turn, broken ribbon cable in the clock spring, or the like could occur. As a result, they might hinder proper operation of the SRS, resulting in serious injury.

METERS AND GAUGES

SPECIFICATIONS

GENERAL SPECIFICATIONS E54EA–

Items	Specifications
Speedometer	
Type	Electrical type
Tachometer	
Type	Pulse type
Fuel gauge	
Type	Coil type
Fuel gauge unit	
Type	Variable resistance type
Engine coolant temperature gauge	
Type	Coil type
Engine coolant temperature gauge unit	
Type	Thermistor type
Oil pressure gauge	
Type	Bi-metal type
Boost meter	
Type	Moving coil type

SERVICE SPECIFICATIONS

E54EB-

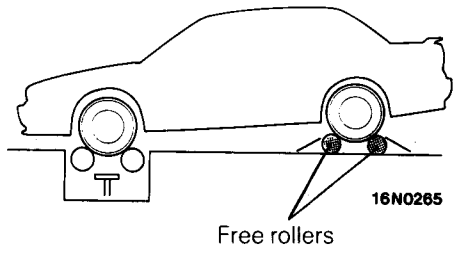
Items	Specifications
Standard Values	
Speedometer indication error km/h (mph)	
40 (20)	40–48 (20–25)
80 (40)	80–92 (40–47)
120 (60)	120–136 (60–69)
160 (80)	160–180 (80–91)
– (100)	– (100–114)
Tachometer indication error rpm	
1,000	± 100
3,000	± 150
5,000	± 250
6,000	± 300
Fuel gauge unit resistance Ω	
Point F	3 ± 2
Point E	110 ± 7
Fuel gauge unit float height mm (in.)	
Point F	18.6–21.6 (0.73–0.85)
Point E	193.4 – 196.4 (7.61 – 7.73)
Engine coolant temperature gauge unit resistance Ω [at 70°C (158°F)]	104 ± 13.5
Fuel gauge resistance Ω	
Between A – B	Approx. 254
Between A – C	Approx. 101
Between B – C	Approx. 153
Engine coolant temperature gauge resistance Ω	
Between A – B	Approx. 51
Between A – C	Approx. 139
Between B – C	Approx. 190
Oil pressure gauge resistance Ω	Approx. 42
Boost meter resistance Ω	Approx. 72

SEALANTS AND ADHESIVES

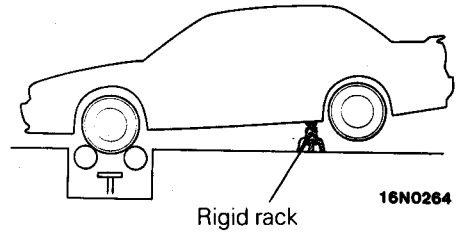
E54EE-

Item	Specified sealant and adhesive	Remark
Engine coolant temperature gauge unit	3M ATD Part No. 8660 or equivalent	Semi-drying sealant

<Rear wheels on free rollers>



<Rear wheels raised on jack>

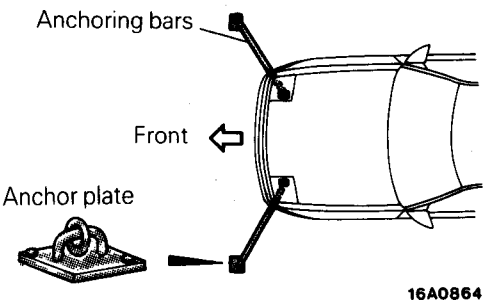


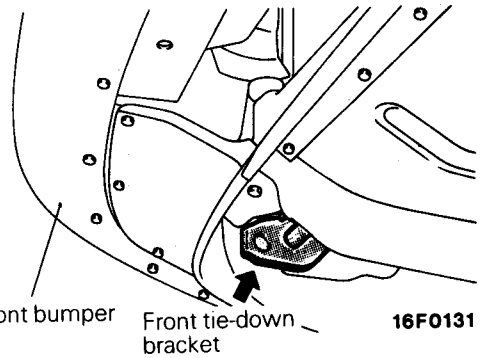
SERVICE ADJUSTMENT PROCEDURES

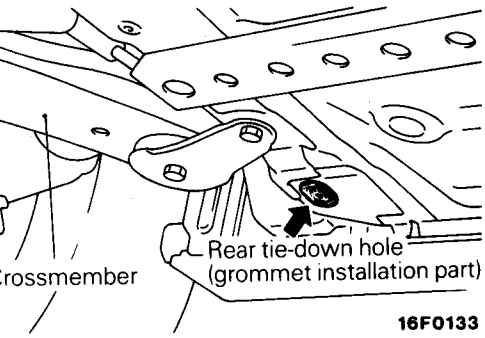
INSPECTION

SPEEDOMETER INSPECTION E54EGBB

(1) Assure tire pressure at standard value. (Refer to GROUP 31 – Specifications.)
(2) Set the vehicle on a speedometer tester.
(3) Set free rollers securely on the floor according to the wheelbase and rear tread of the vehicle (when rear wheels are to be set on free rollers).
(4) Raise the rear wheels on a jack and place rigid racks to support the specified positions of the side sills (when rear wheels are to be raised on a jack).





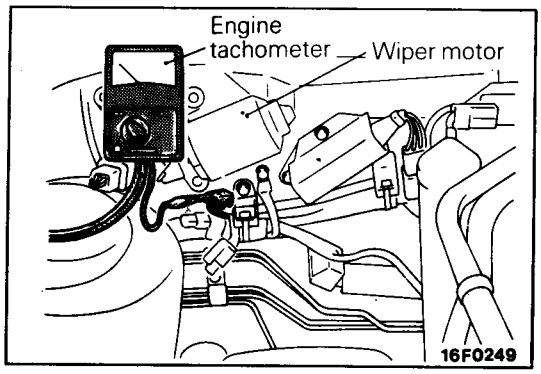


(6) Attach anchoring bars on the tie-down brackets and secure their ends to the anchor plates.
(7) Make sure the tension on the right and left bars is the same. Also be sure there is enough tension on each bar.
(8) Attach a chain or wire to the rear tie-down hole. Make sure the end of the wire or chain is secured firmly.
(9) Take all other necessary precautions.
(10) Use a speedometer tester to measure the speedometer's indication error.

Standard value:

Standard indication km/h	(mph)	Allowable range km/h	(mph)
40	(20)	40-48	(20-25)
80	(40)	80-92	(40-47)
120	(60)	120-136	(60-69)
160	(80)	160-180	(80-91)
–	(100)	–	(100-114)

Caution
Do not operate the clutch or accelerator abruptly or decelerate during the operations.



TACHOMETER INSPECTION

(1) Insert paper clip into the engine revolution speed detection terminal provided in the engine compartment, and connect the engine tachometer to the inserted paper clip.

Caution
As the tachometer is negative earthed, do not connect battery conversely to prevent damaging transistor and diode.

NOTE
For tachometer inspection, use of a fluxmeter-type engine tachometer is recommended. (Because a fluxmeter only needs to be clipped to the high tension cable.)

(2) Connect the engine tachometer and compare the engine tachometer and tachometer readings. Replace tachometer if difference is excessive.

Standard value:	**1,000 rpm**	**±100 rpm**
	3,000 rpm	**±150 rpm**
	5,000 rpm	**±250 rpm**
	6,000 rpm	**±300 rpm**

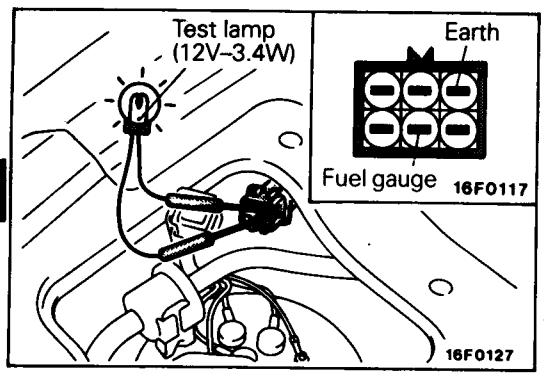
Caution
The engine speed signal output from the engine is one-third of the actual speed. When the engine speed is measured, make sure that the engine tachometer is placed in the 2-cylinder range. (The real speed is indicated.)

FUEL GAUGE SIMPLE INSPECTION

Remove the fuel gauge unit coupling connector.

↓

Connect a test lamp to the harness connector.



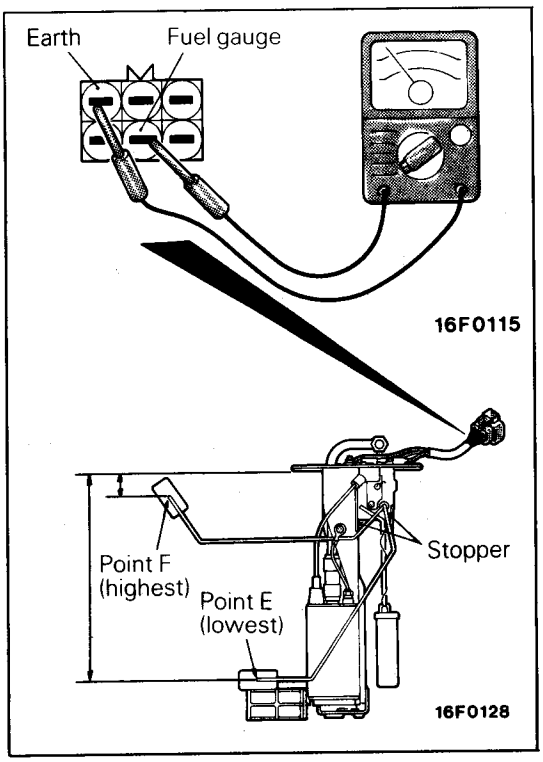
↓

Place the ignition switch in the ON position.

↓

Check the test lamp and gauge conditions.

① Test lamp is illuminated. (Pointer of gauge does not swing.)	→ Replace fuel gauge.
② Test lamp is illuminated. (Pointer of gauge swings.)	→ Replace fuel gauge unit.
③ Test lamp does not illuminated. (Pointer of gauge does not swing.)	→ Correct harness.



FUEL GAUGE UNIT INSPECTION

To check, remove fuel gauge unit from fuel tank. (Refer to GROUP 13 – Fuel Tank.)

Fuel Gauge Unit Resistance

(1) Check that resistance value between the fuel gauge terminal and earth terminal is at standard value when fuel gauge unit float is at point F (highest) and point E (lowest).

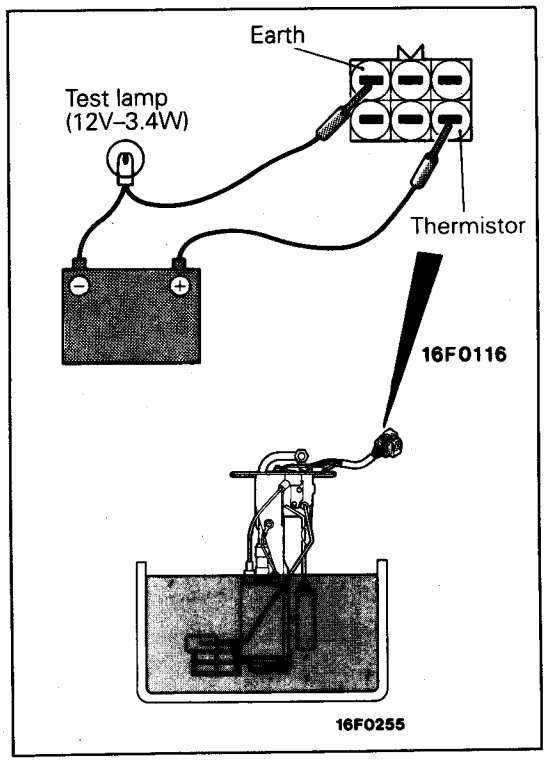
Standard value: Point F: 3±2 Ω
Point E: 110±7 Ω

(2) Check that resistance value changes smoothly when float moves slowly between point F (highest) and point E (lowest).

Fuel Gauge Unit Float Height

Move float and measure the height at point F (highest) and point E (lowest) with float arm touching stopper.

Standard value:
Point F: 18.6 – 21.6 mm (0.73 – 0.85 in.)
Point E: 193.4 – 196.4 mm (7.61 – 7.73 in.)



FUEL SENSOR INSPECTION

Connect fuel gauge unit to battery via test lamp (12V–3.4W). Immerse in water. It is considered good if light goes off when unit thermistor is in water and lights when unit is removed from water.

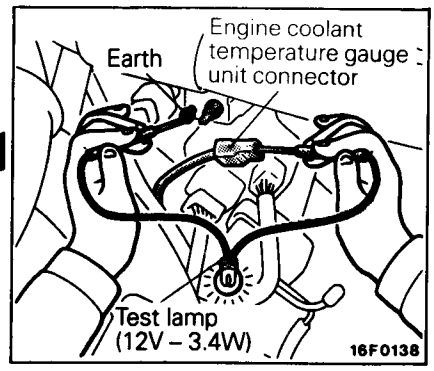
Caution
After completing this test, wipe the unit dry and install it in the fuel tank.

ENGINE COOLANT TEMPERATURE GAUGE SIMPLE INSPECTION

Remove the engine coolant temperature gauge unit coupling connector.

↓

Connect the harness connector via a test lamp to the earth.



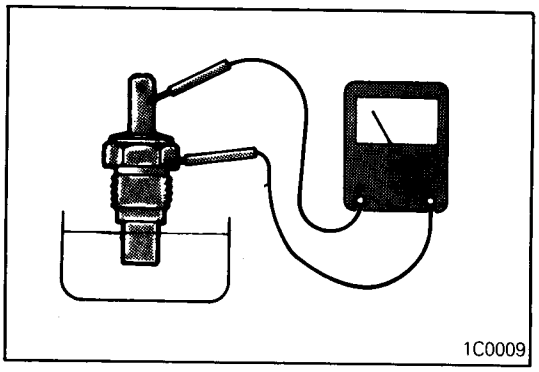
↓

Place the ignition switch in the ON position.

↓

Check the test lamp and gauge conditions.

① Test lamp is illuminated. (Pointer of gauge does not swing.)	→ Replace engine coolant temperature gauge.
② Test lamp is illuminated. (Pointer of gauge swings.)	→ Replace engine coolant temperature gauge unit.
③ Test lamp is not illuminated. (Pointer of gauge does not swing.)	→ Correct harness.



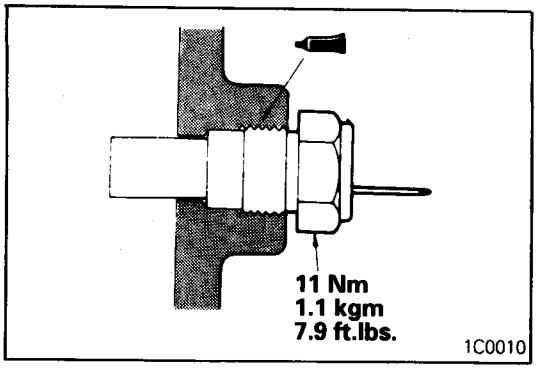
ENGINE COOLANT TEMPERATURE GAUGE UNIT INSPECTION

To check, remove engine coolant temperature gauge unit from the thermostat housing.

Engine Coolant Temperature Gauge Unit Resistance

(1) Immerse unit in 70°C (158°F) water to measure resistance.

Standard value: 104±13.5 Ω



(2) After checking, apply the specified sealant around the thread of engine coolant temperature gauge unit and install on the thermostat housing.

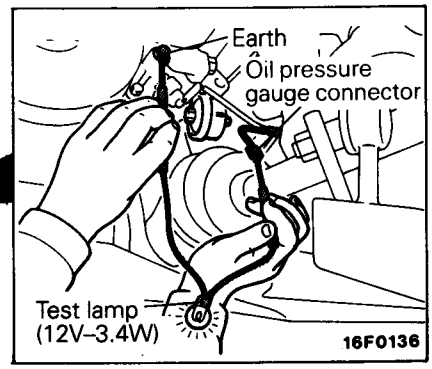
Specified sealant: 3M ATD Part No. 8660 or equivalent

OIL PRESSURE GAUGE SIMPLE INSPECTION

Remove the oil pressure gauge unit coupling connector.

↓

Connect the harness connector via a test lamp to the earth.



↓

Place the ignition switch in the ON position.

↓

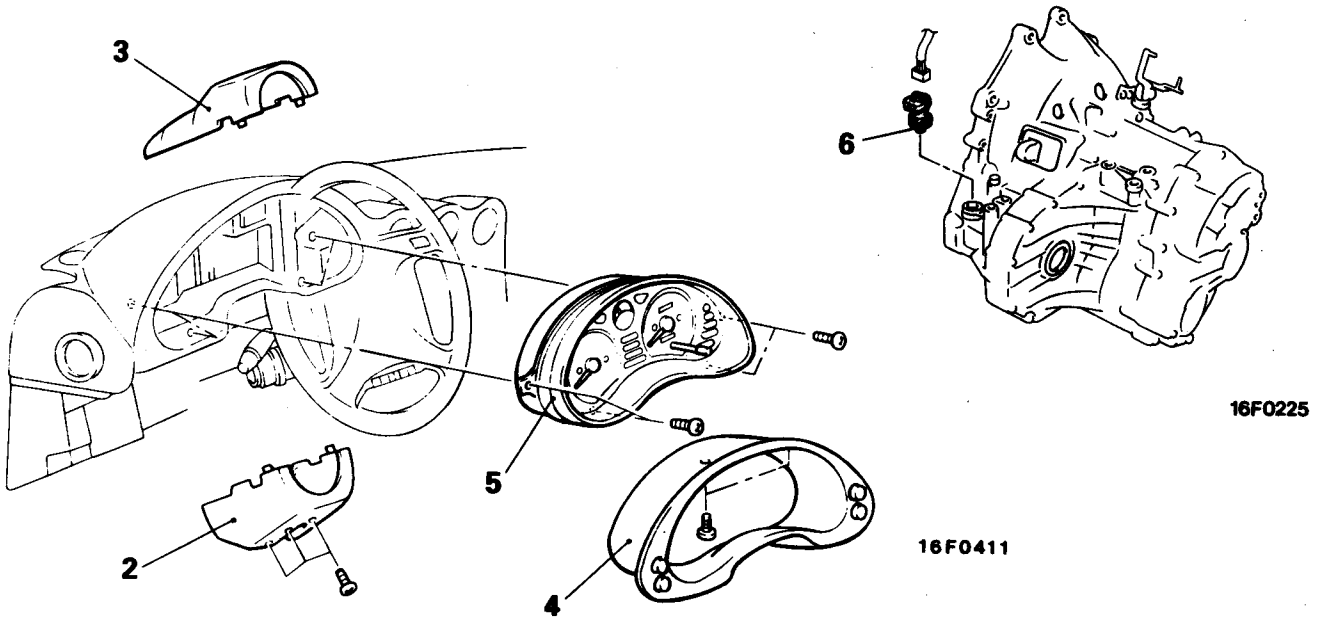
Check the test lamp and gauge conditions.

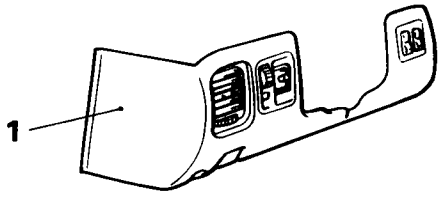
① Test lamp is illuminated. (Pointer of gauge does not swing.)	→ Replace oil pressure gauge.
② Test lamp is illuminated. (Pointer of gauge swings.)	→ Replace oil pressure gauge unit.
③ Test lamp is not illuminated. (Pointer of gauge does not swing.)	→ Correct harness.

COMBINATION METERS

REMOVAL AND INSTALLATION

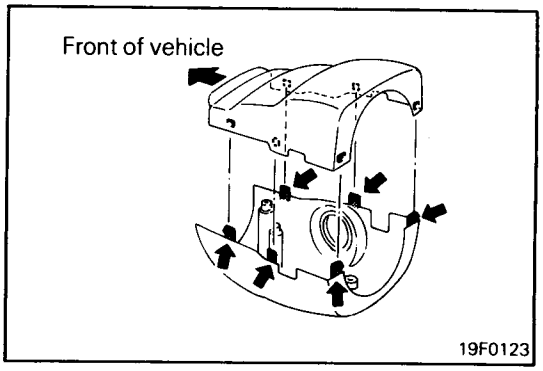
E54EH--





Removal steps

1. Knee protector (Refer to GROUP 52A – Instrument Panel.)
2. Column cover lower
3. Column cover upper
4. Meter bezel
5. Combination meter
6. Vehicles speed sensor

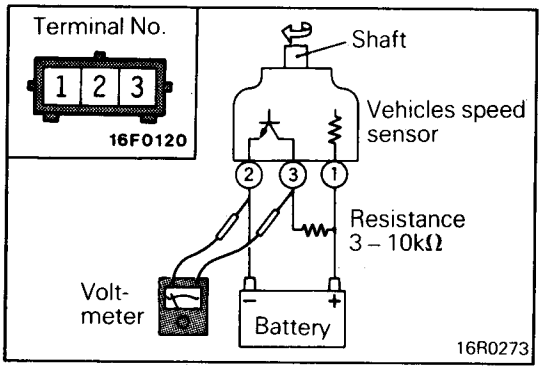


SERVICE POINTS OF REMOVAL

E54EIAN

2. REMOVAL OF COLUMN COVER LOWER / 3. COLUMN COVER UPPER

After the screws have been removed, remove the covers, while making sure not to break the grippers.

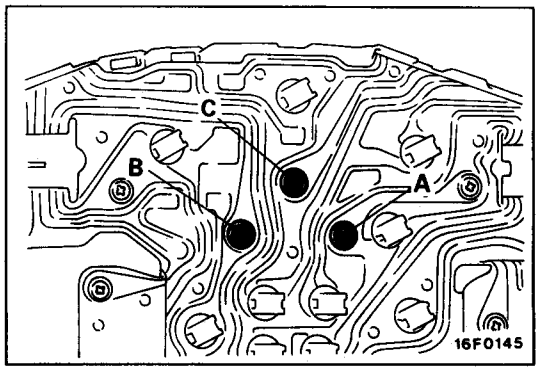


INSPECTION

E54EJAX

VEHICLES SPEED SENSOR INSPECTION

(1) Remove the vehicles speed sensor and connect as shown in the illustration, using a 3 – 10 kΩ resistance.
(2) Use a voltmeter to check for voltage at terminals ② and ③ when the pulse generator shaft is turning. (One revolution is four pulses.)



FUEL GAUGE INSPECTION

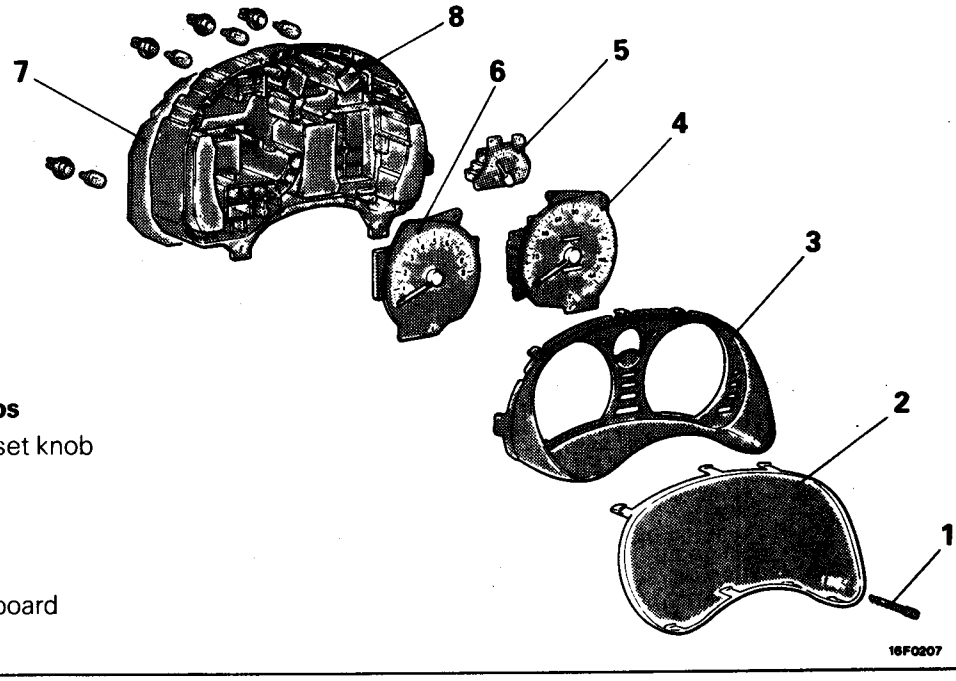
Measure resistance between terminals with circuit tester.

Standard value:

A – B	**Approx. 254 Ω**
A – C	**Approx. 101 Ω**
B – C	**Approx. 153 Ω**

DISASSEMBLY AND REASSEMBLY

E54EL–



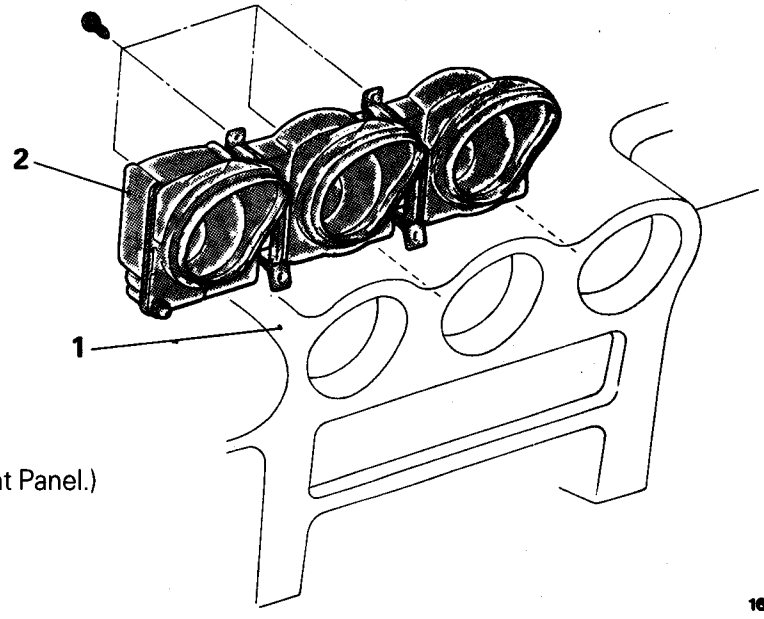
Disassembly steps

1. Trip counter reset knob
2. Meter glass
3. Window plate
4. Speedometer
5. Fuel gauge
6. Tachometer
7. Printed-circuit board
8. Meter case

COMBINATION GAUGES

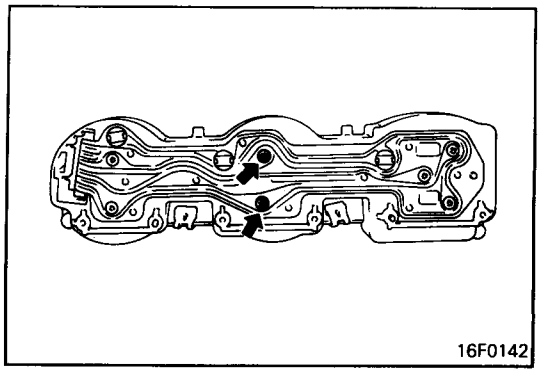
E54ET–

REMOVAL AND INSTALLATION



Removal steps

1. Instrument panel
   (Refer to GROUP 52A – Instrument Panel.)
   Distribution duct
   [Refer to GROUP 55 – Ventilators (Instrument Panel).]
2. Combination gauge

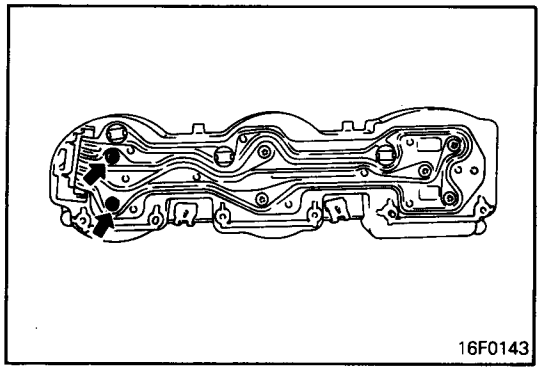

16F0142

INSPECTION E54EUAA

BOOST METER INSPECTION

Measure resistance between terminals with circuit tester.

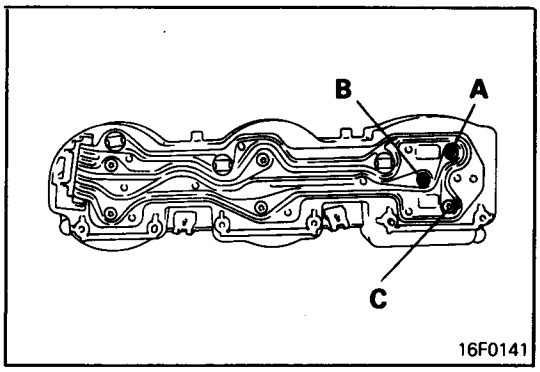
Standard value: Approx. 72 Ω


16F0143

OIL PRESSURE GAUGE INSPECTION

Measure resistance between terminals with circuit tester.

Standard value: Approx. 42 Ω



16F0141

ENGINE COOLANT TEMPERATURE GAUGE INSPECTION

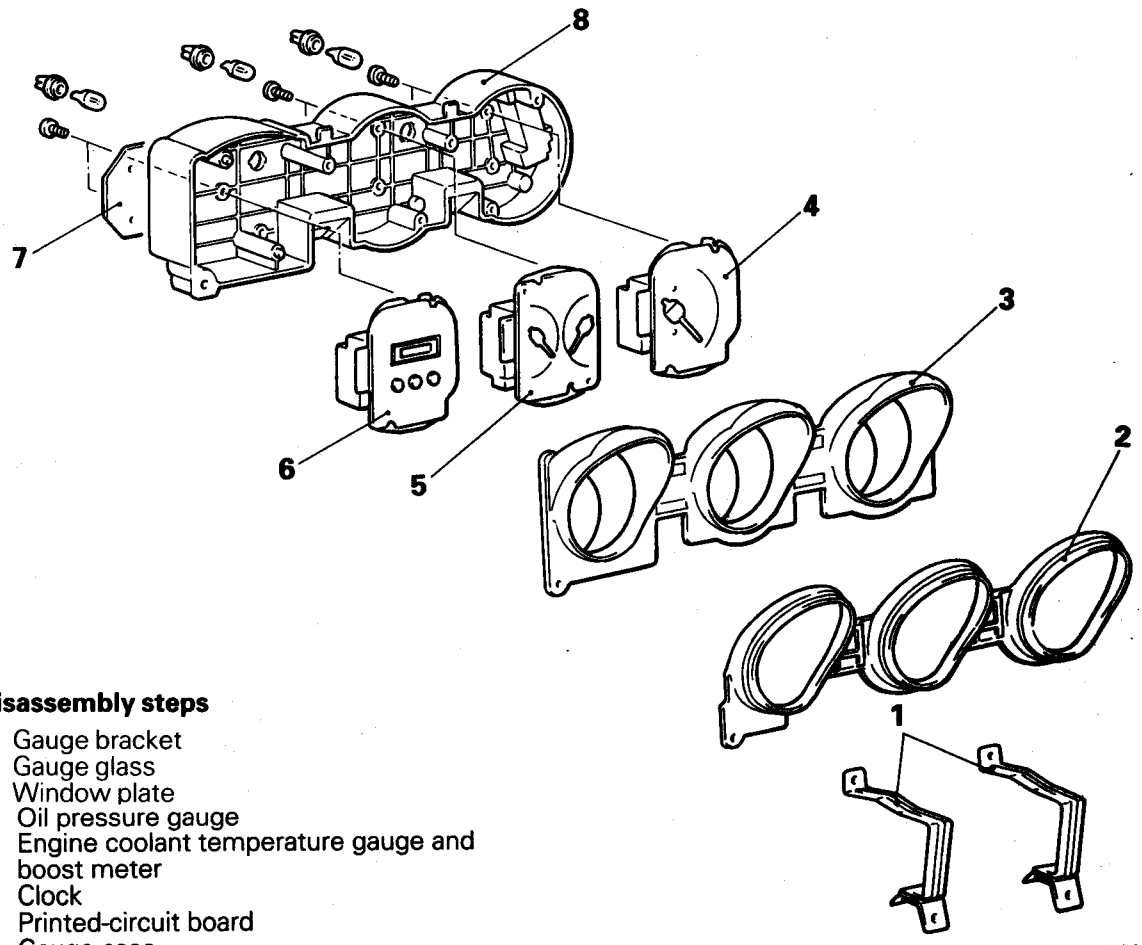
(1) Remove the IG terminal screw from area A.
(2) Measure resistance between terminals with circuit tester.

Caution
For inspection, use a circuit tester which uses a measurement current of 4mA or less.

Standard value:

A – B	**Approx. 51 Ω**
A – C	**Approx. 139 Ω**
B – C	**Approx. 190 Ω**

DISASSEMBLY AND REASSEMBLY



Disassembly steps

1. Gauge bracket
2. Gauge glass
3. Window plate
4. Oil pressure gauge
5. Engine coolant temperature gauge and boost meter
6. Clock
7. Printed-circuit board
8. Gauge case

INDICATORS AND WARNING LAMPS

E54FA--

Unit: W

Items	Specifications
Indicator lamps	
Turn signal indicator lamp	3.0
Upper beam indicator lamp	1.4
Cruise control indicator lamp	1.4
Cruise control ON indicator lamp	1.4
Washer fluid level indicator lamp	1.4
Tour/sport mode indicator lamp	1.12
Rear fog lamp indicator lamp	1.4
Hazard indicator lamp	1.4
Security indicator lamp*1	1.4
Warning lamps	
Charging system warning lamp	1.4
Oil pressure warning lamp	1.4
Door ajar warning lamp	1.4
Brake warning lamp	1.4
Low fuel warning lamp	3.4
Engine coolant temperature warning lamp	1.4
Check engine warning lamp	1.4
Supplemental restraint system warning lamp	1.4 x 2
Anti-lock braking system warning lamp	1.4
4-wheel steering oil level warning lamp	1.4
Active aero system warning lamp	1.4

NOTE
*1 : Vehicles with theft-alarm system

LIGHTING SYSTEM

SPECIFICATIONS

E54GA--

GENERAL SPECIFICATIONS

Unit: W

Items	Specifications
Exterior lamps	
Headlamp	60/55 (Halogen bulb) <Up to 1994 models> 65/55 (Halogen bulb) <From 1995 models>
Driving lamp <Up to 1994 models>	55
Front combination lamp <Up to 1994 models>	
Turn-signal lamp	21
Position lamp	5
Front-turn-signal lamp	21
Position lamp	5
Side turn-signal lamp	5

Unit: W

Items	Specifications
Rear combination lamp	
Turn-signal lamp	21
Stop lamp/tail lamp	21/5
Rear fog lamp	21
High mounted stop lamp (Option)	5 x 3
Back-up lamp	21
Licence plate lamp	5
Engine compartment inspection lamp	3.8
Interior lamps	
Foot lamp	3.4
Room lamp	8
Door courtesy lamp	5
Glove box	3.4

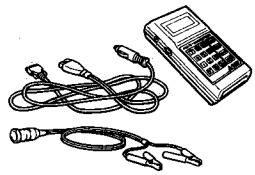
SERVICE SPECIFICATIONS

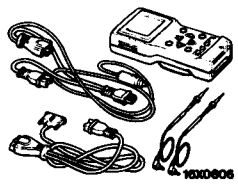
E54GB–

Items	Specifications
Standard value	
Headlamp aiming	
For lower beam adjustment	
Vertical direction	60 mm (2.36 in.) below horizontal (H)
Horizontal direction	Position where the 15° sloping section intersects the vertical line (V)
Driving lamp aiming <Up to 1994 models>	
Vertical direction	140 mm (5.5 in.) below horizontal (H)
Horizontal direction	Deviation of light beam axis is within 394 mm (15.5 in.) to the left and right
Resistance between resistor terminals <R.H. drive vehicles with dim-dip lamp>	Approx. 1 Ω
Limit	
Headlamp intensity	30,000 cd or more

SPECIAL TOOLS

E54GF–

Tool	Number	Name	Use
	MB991341	Multi-use tester sub-assembly	1993 models ETACS input check
		ROM pack (For the number, refer to GROUP 00 – Precautions Before Service.)	

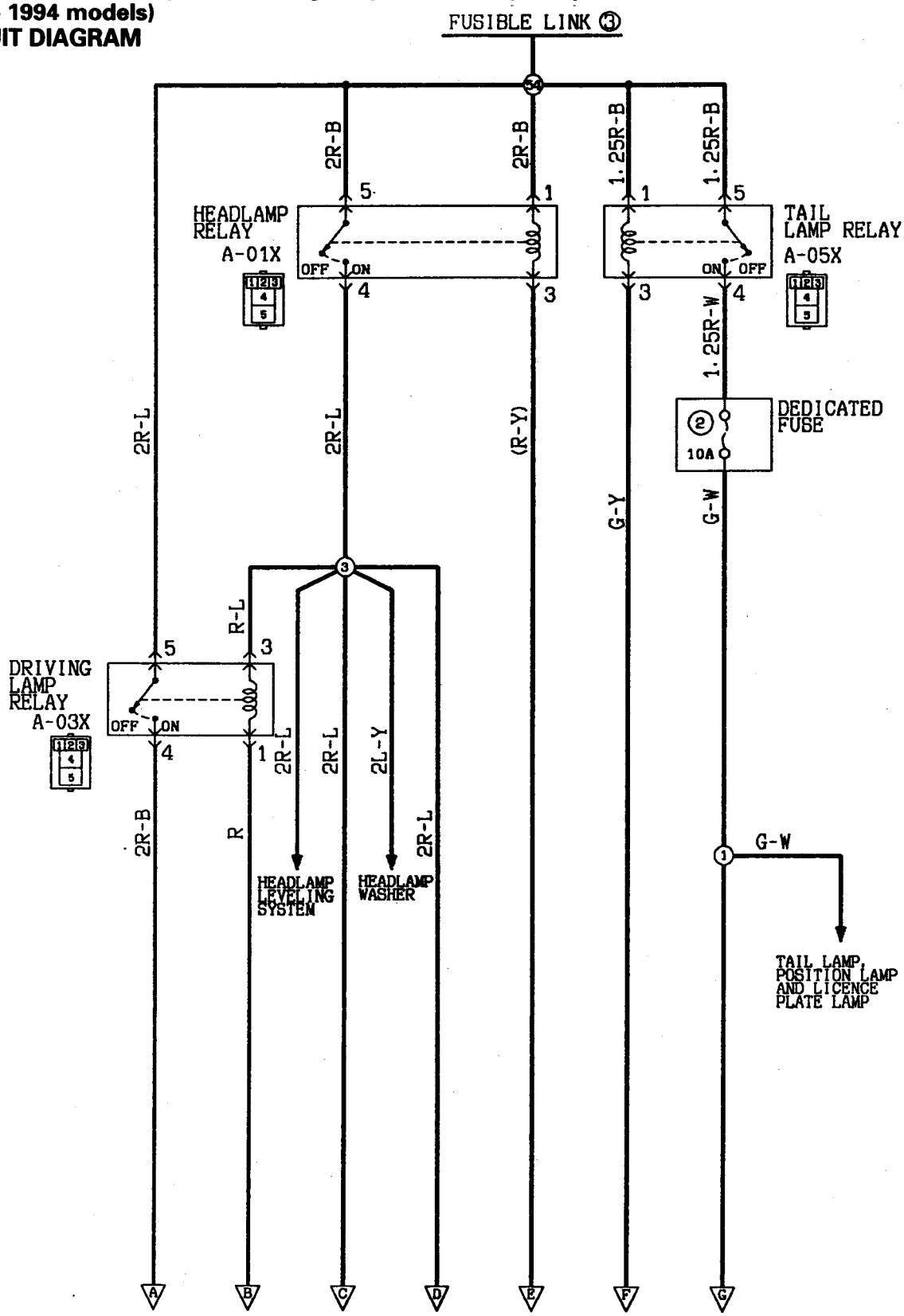
Tool	Number	Name	Use
	MB991502	MUT-II sub-assembly	All models ETACS input checking
 16X0607		ROM pack	

NOTES

TROUBLESHOOTING

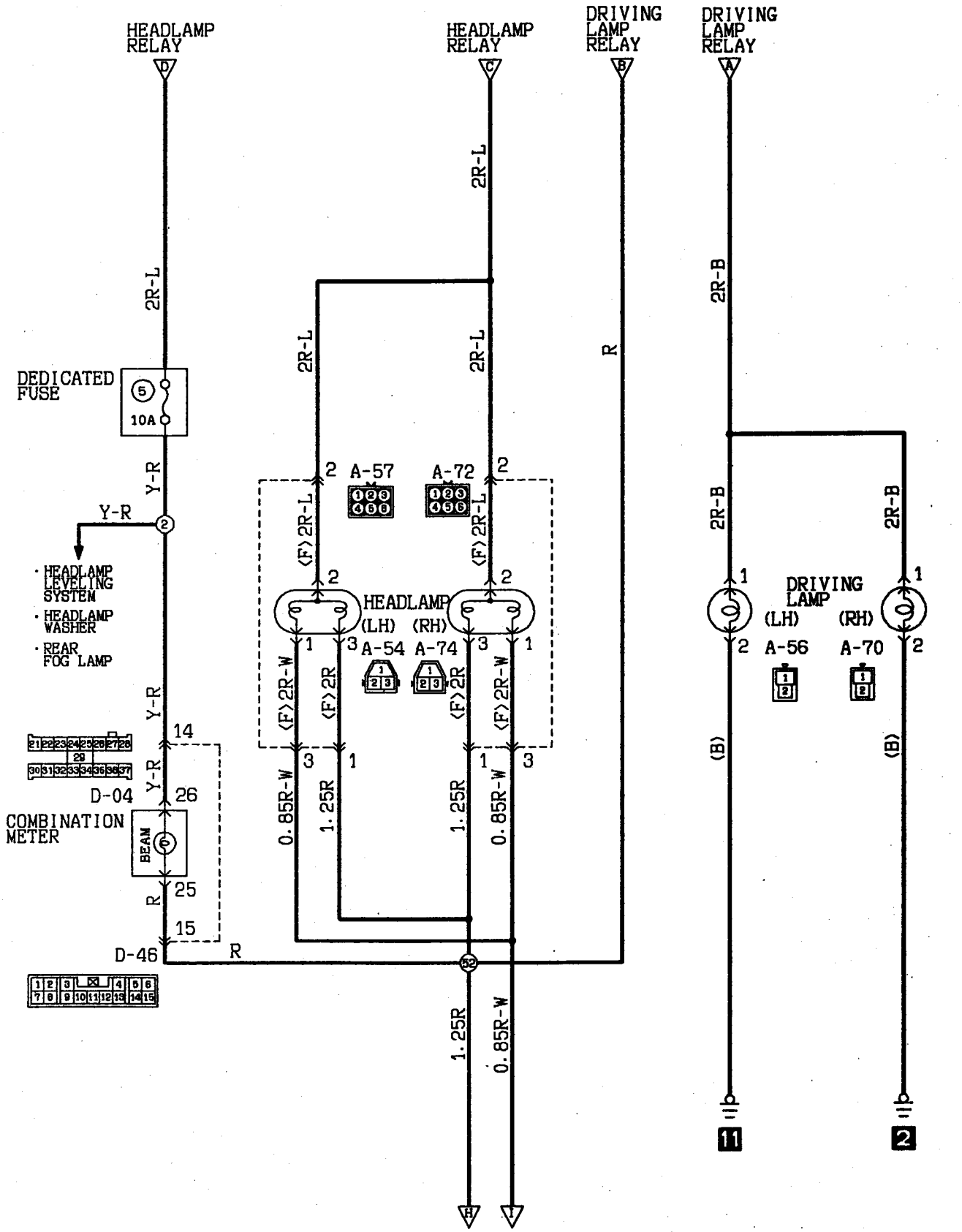
HEADLAMP CIRCUIT

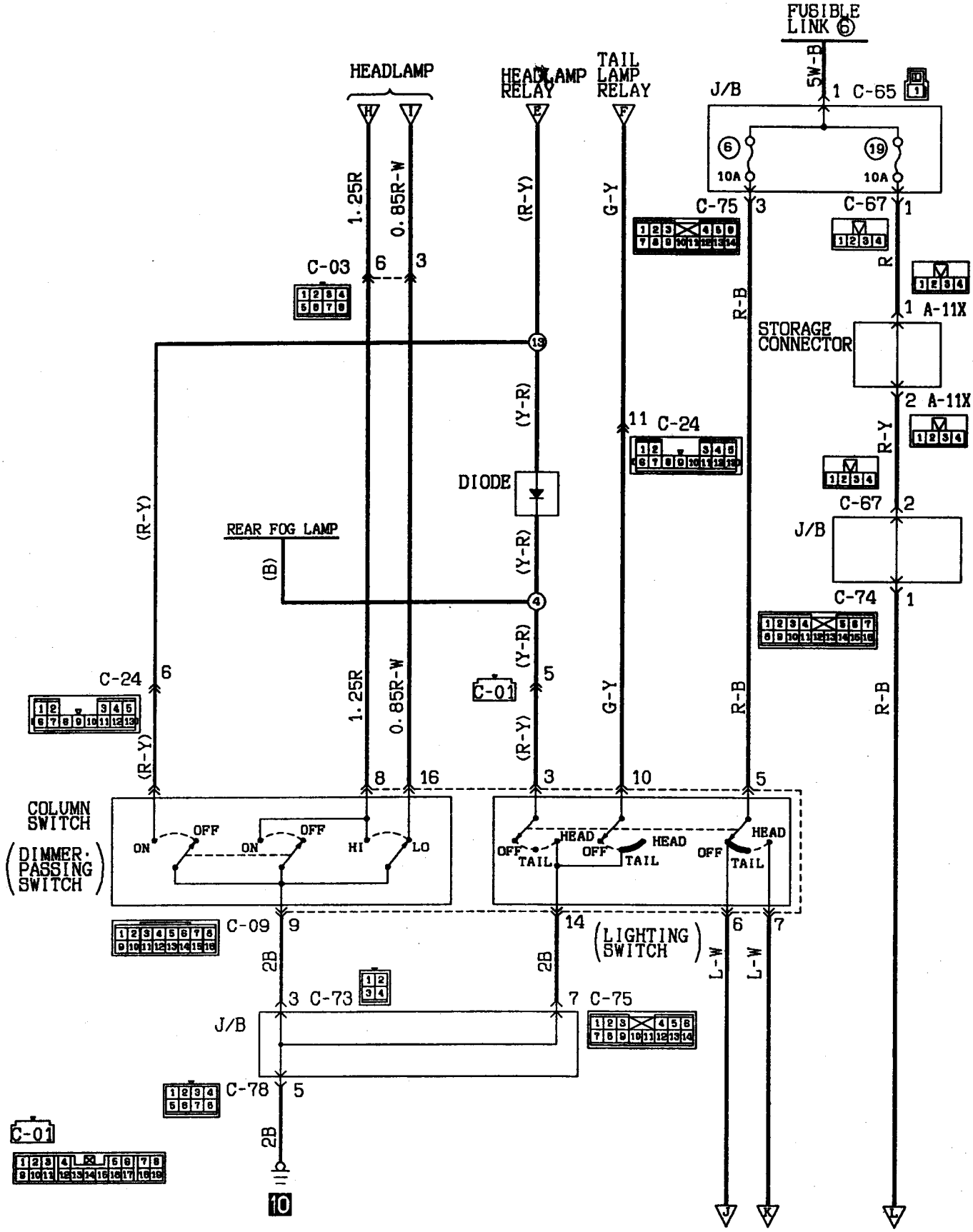
<Vehicles without daytime running lamp and dim-dip lamp>
(Up to 1994 models)
CIRCUIT DIAGRAM



Wire colour code
B:Black LG:Light green G:Green L:Blue W:White Y:Yellow SB:Sky blue
BR:Brown O:Orange GR:Gray R:Red P:Pink V:Violet

KX35-AC-R0801-EC

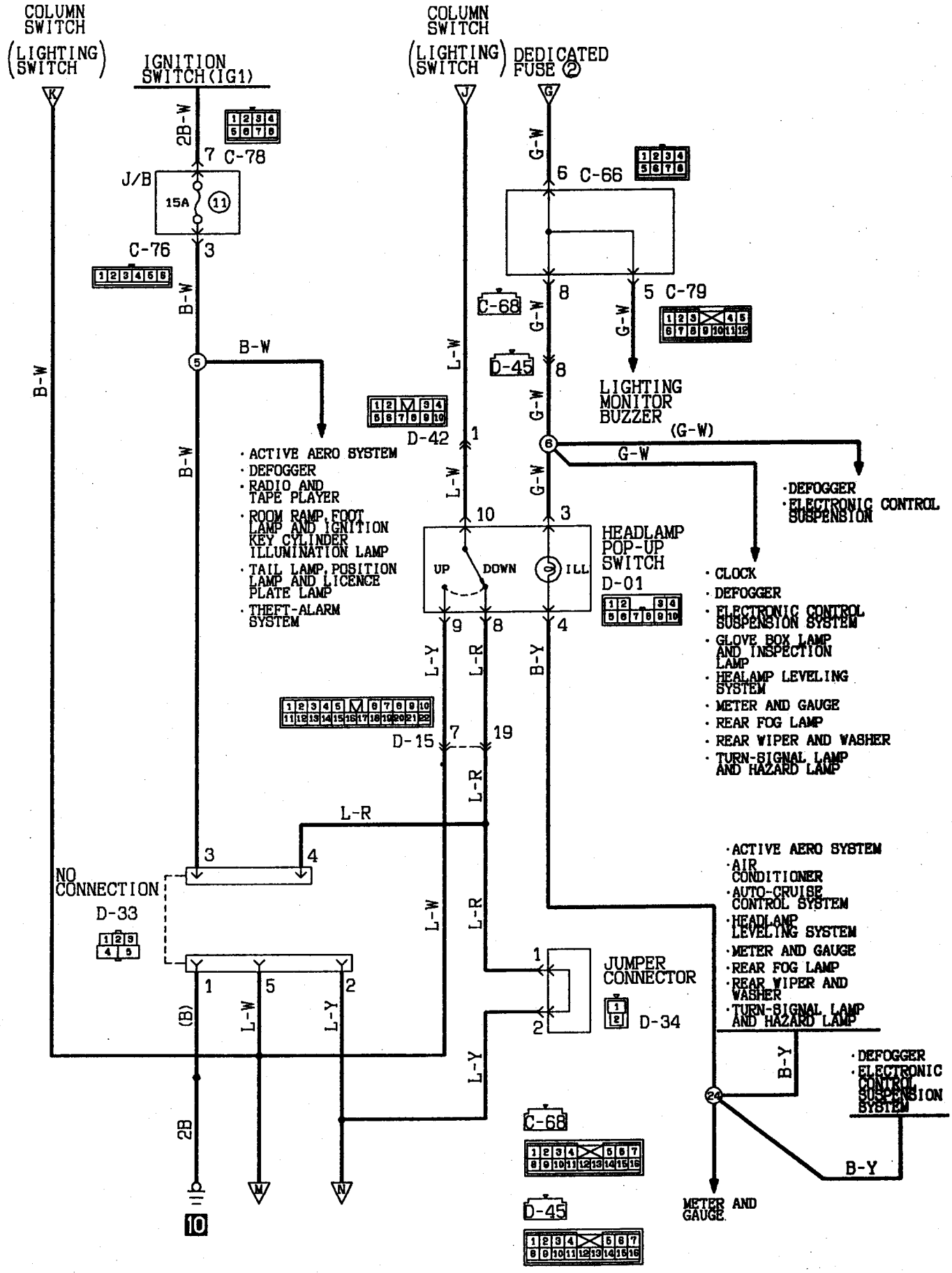

HEADLAMP RELAY
HEADLAMP RELAY
DRIVING LAMP RELAY
DRIVING LAMP RELAY
2R-L
2R-B
R
DEDICATED FUSE
10A
Y-R
· HEADLAMP LEVELING SYSTEM
· HEADLAMP WASHER
· REAR FOG LAMP
A-57
A-72
(F)2R-L
HEADLAMP (LH) (RH)
A-54
A-74
(F)2R
(F)2R-W
0.85R-W
1.25R
DRIVING LAMP (LH) (RH)
A-56
A-70
(B)
D-04
COMBINATION METER
BEAM
D-46
11
2

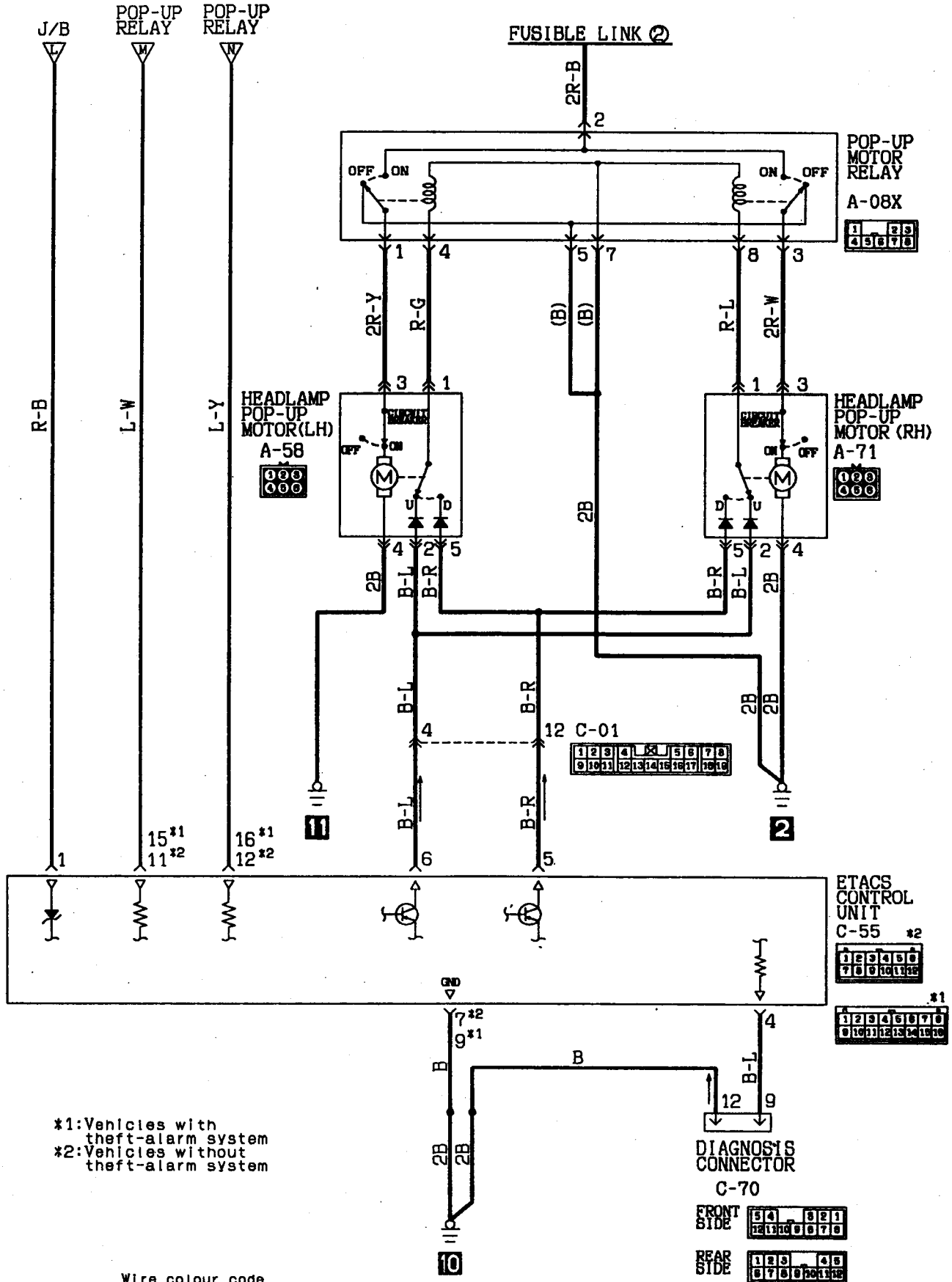


Wire colour code

B:Black	LG:Light green	G:Green	L:Blue	W:White	Y:Yellow	SB:Sky blue	
BR:Brown	O:Orange	GR:Gray	R:Red	P:Pink	V:Violet		

XX35-AC-R0801A-EC


COLUMN SWITCH (LIGHTING SWITCH)
IGNITION SWITCH(IG1)
2B-W
7 C-78
J/B
15A
11
C-76
3
B-W
B-W
B-W
5
B-W
· ACTIVE AERO SYSTEM
· DEFOGGER
· RADIO AND TAPE PLAYER
· ROOM RAMP, FOOT LAMP AND IGNITION KEY CYLINDER ILLUMINATION LAMP
· TAIL LAMP, POSITION LAMP AND LICENCE PLATE LAMP
· THEFT-ALARM SYSTEM
NO CONNECTION
D-33
3
4
L-R
L-W
L-Y
(B)
1
5
2
2B
10
M
N
COLUMN SWITCH (LIGHTING SWITCH)
DEDICATED FUSE ②
G-W
6 C-66
C-68
8
5 C-79
G-W
G-W
D-45
8
L-W
G-W
LIGHTING MONITOR BUZZER
(G-W)
D-42
1
6
G-W
· DEFOGGER
· ELECTRONIC CONTROL SUSPENSION
L-W
G-W
10
3
HEADLAMP POP-UP SWITCH
D-01
UP
DOWN
ILL
· CLOCK
· DEFOGGER
· ELECTRONIC CONTROL SUSPENSION SYSTEM
· GLOVE BOX LAMP AND INSPECTION LAMP
· HEALAMP LEVELING SYSTEM
· METER AND GAUGE
· REAR FOG LAMP
· REAR WIPER AND WASHER
· TURN-SIGNAL LAMP AND HAZARD LAMP
9
8
4
L-Y
L-R
B-Y
D-15
7
19
L-R
L-R
L-W
1
2
JUMPER CONNECTOR
D-34
· ACTIVE AERO SYSTEM
· AIR CONDITIONER
· AUTO-CRUISE CONTROL SYSTEM
· HEADLAMP LEVELING SYSTEM
· METER AND GAUGE
· REAR FOG LAMP
· REAR WIPER AND WASHER
· TURN-SIGNAL LAMP AND HAZARD LAMP
L-Y
B-Y
24
· DEFOGGER
· ELECTRONIC CONTROL SUSPENSION SYSTEM
B-Y
C-68
D-45
METER AND GAUGE

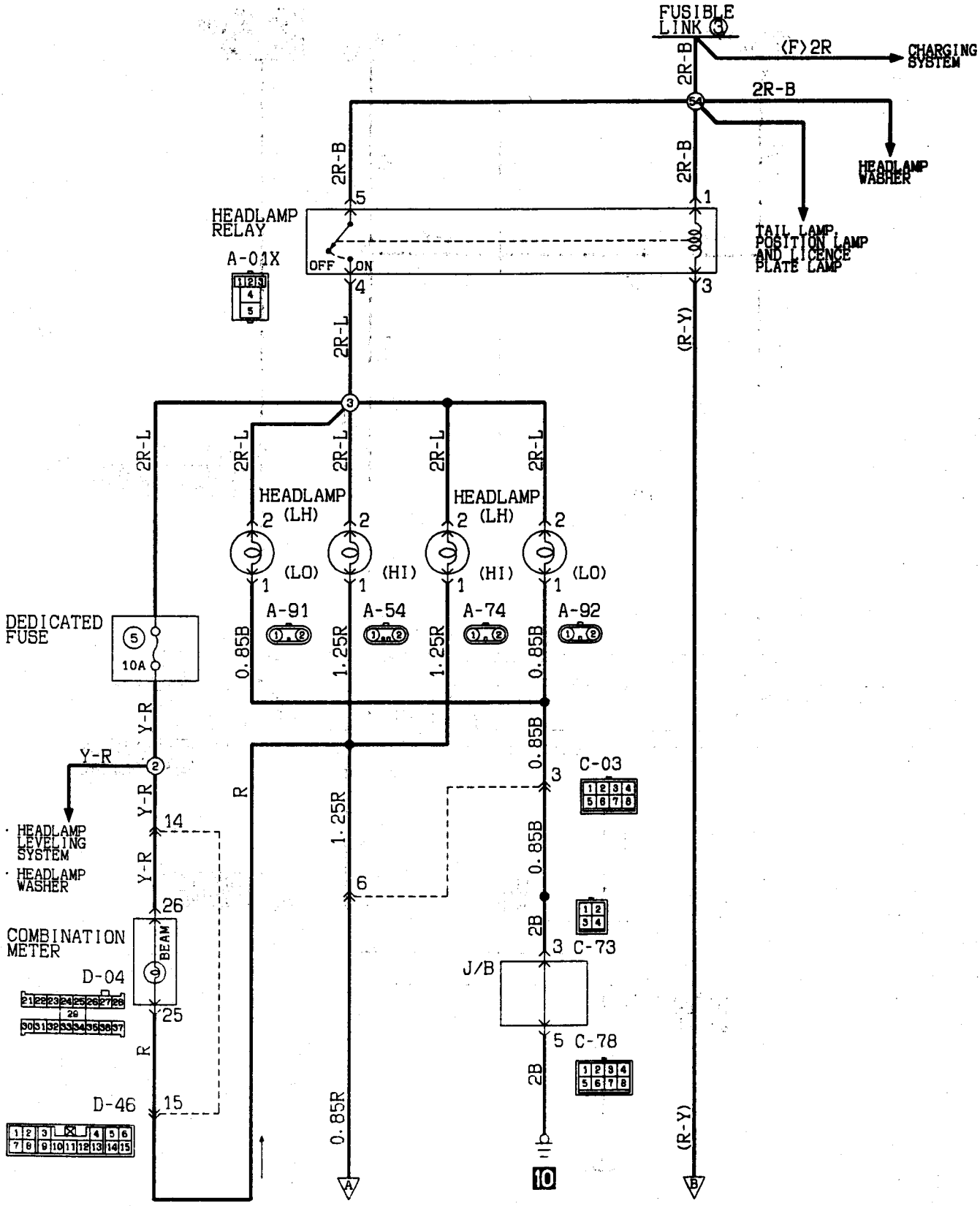


*1:Venicles with theft-alarm system
*2:Venicles without theft-alarm system

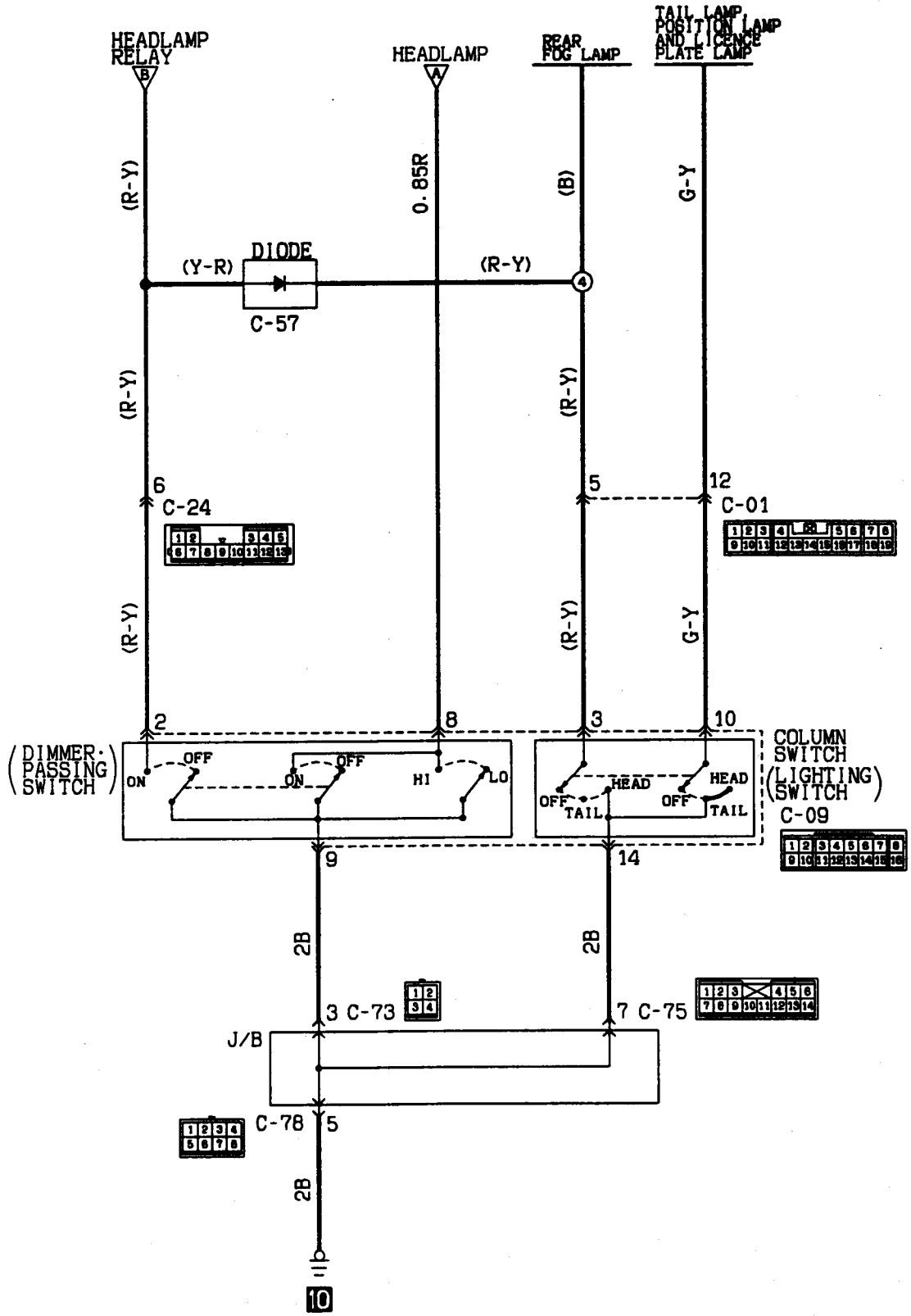
Wire colour code
B:Black LG:Light green G:Green L:Blue W:White Y:Yellow SB:Sky blue
BR:Brown O:Orange GR:Gray R:Red P:Pink V:Violet

KX35-AC-R0801B-EC

<Vehicles without daytime running lamp>
(From 1995 models)
CIRCUIT DIAGRAM



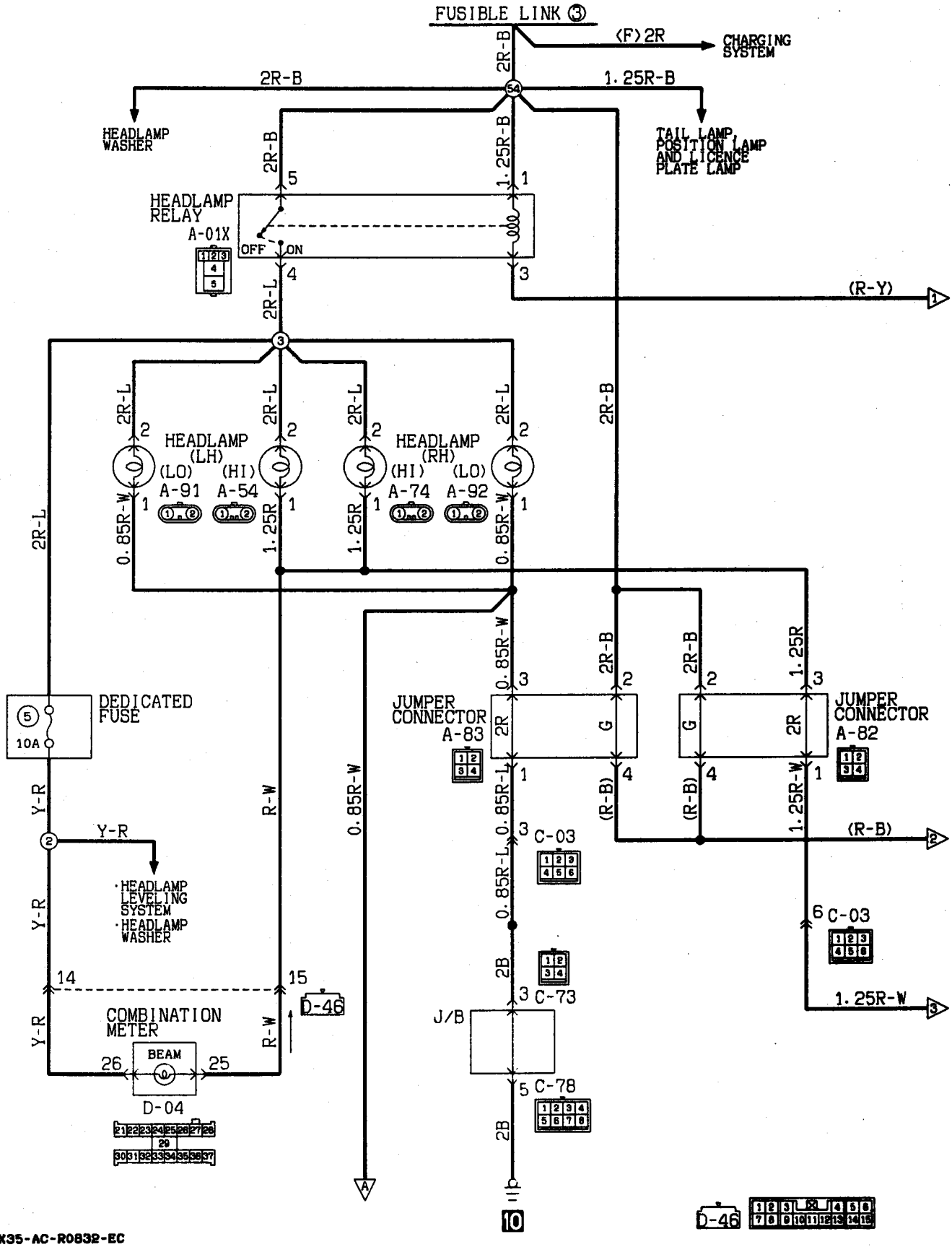
KX35-AC-R0830-EC

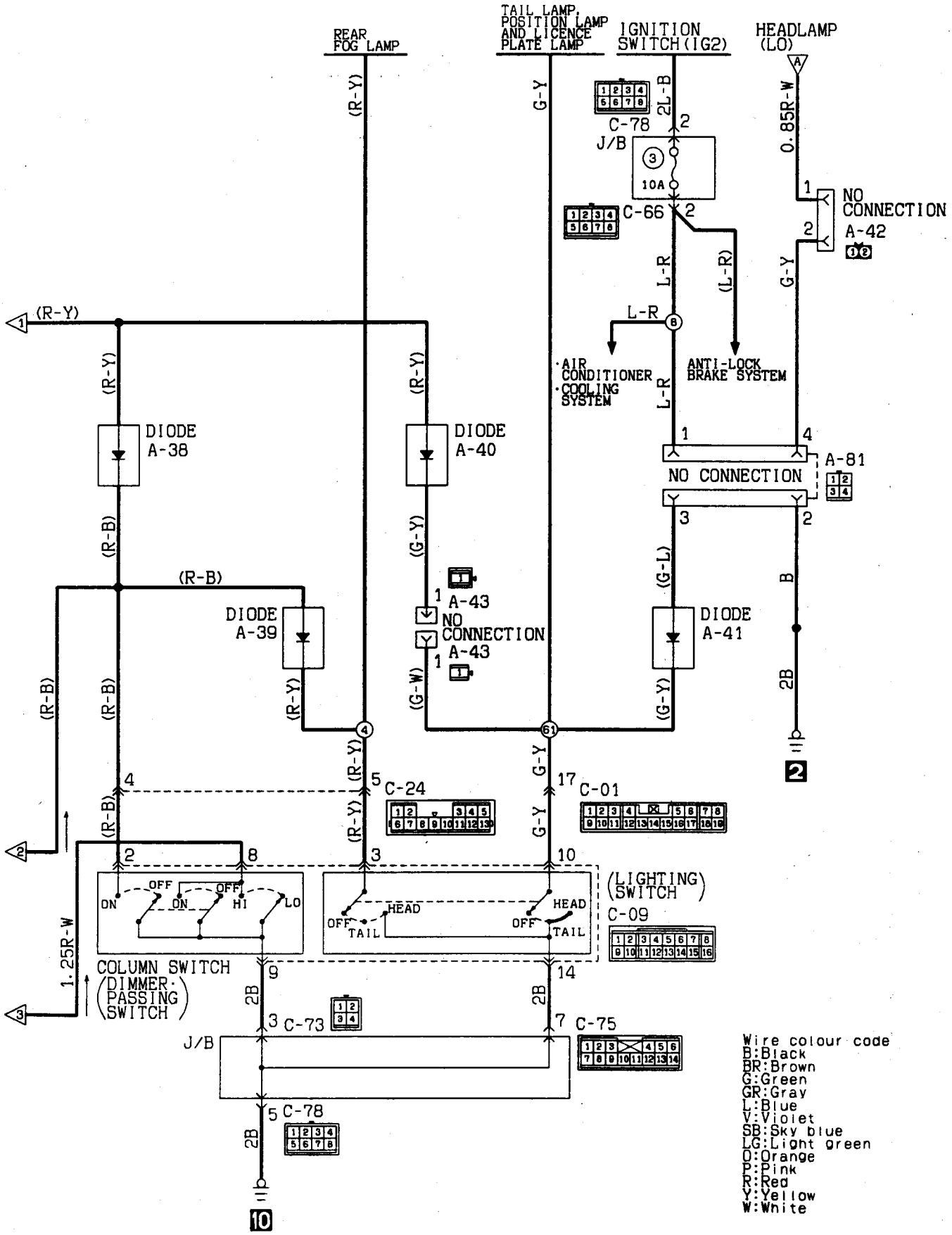


Wire colour code

B:Black	LG:Light green	G:Green	L:Blue	W:White	Y:Yellow	SB:Sky blue
BR:Brown	O:Orange	GR:Gray	R:Red	P:Pink	V:Violet	

<Vehicles without dim-dip lamp>
(From 1995 models)
CIRCUIT DIAGRAM




REAR FOG LAMP
TAIL LAMP, POSITION LAMP AND LICENCE PLATE LAMP
IGNITION SWITCH (IG2)
HEADLAMP (LO)
(R-Y)
G-Y
2L-B
C-78
J/B
10A
C-66
0.85R-W
NO CONNECTION
A-42
L-R
(L-R)
G-Y
AIR CONDITIONER
COOLING SYSTEM
ANTI-LOCK BRAKE SYSTEM
DIODE A-38
DIODE A-40
DIODE A-39
DIODE A-41
A-81
NO CONNECTION
A-43
NO CONNECTION
A-43
(R-B)
(G-Y)
(G-W)
(G-L)
B
2B
C-24
C-01
C-09
(LIGHTING SWITCH)
OFF
ON
HI
LO
HEAD
TAIL
COLUMN SWITCH (DIMMER, PASSING SWITCH)
1.25R-W
C-73
C-75
C-78
J/B
Wire colour code
B:Black
BR:Brown
G:Green
GR:Gray
L:Blue
V:Violet
SB:Sky blue
LG:Light green
O:Orange
P:Pink
R:Red
Y:Yellow
W:White

OPERATION

<Headlamps ON operation>

- Turn the lighting switch to "HEAD", and the contact point of the headlamp relay will be closed to turn "ON" the headlamp relay.
- When the dimmer switch is placed in the LO position, the headlamp low-beams go on. When the switch is placed in the HI position, the headlamp upper beams go on.

<Upper-beam indicator lamp>

- When the upper beam is lit or when the passing switch is activated, the upper-beam indicator lamp will be lit.

<Pop-up operation - Operation by lighting switch> (Up to 1994 models)

- When the lighting switch is placed in the HEAD position, current flows through multi-purpose fuse ⑥ to the lighting switch, and the ETACS control unit. Then the UP timer circuit in the ETACS control unit is operated, and current flows from the ETACS control unit to the U contact of the pop-up motor U/D (UP/DOWN) switch, the coil of the pop-up motor U/D (UP/DOWN) switch, the coil of the pop-up motor relay and earth, causing the contacts of the pop-up motor relay to close.
  When the contacts of the pop-up motor relay close, current flows through the contacts of the pop-up motor relay to the pop-up motor and earth, causing the pop-up motor to rotate, which brings the headlamps to the UP position. The pop-up motor rotates until the automatic UP stop position is reached, then the contacts of the interlocked U/D (UP/DOWN) switch change from the U to D contacts. As a result, the contacts of the pop-up motor relay open to cut off the current supplied to the pop-up motor. Then the pop-up motor ceases to rotate, holding the headlamps in the UP position.
- When the lighting switch is placed in the TAIL or OFF position, current flows through the multi-purpose fuse ⑥ to the lighting switch, and the ETACS control unit. Then the DOWN timer circuit in the ETACS control unit is operated and current flows from the ETACS control unit to the DOWN contacts of the pop-up motor U/D (UP/DOWN) switch, the coil of the pop-up motor relay and earth, causing the contacts of the pop-up motor relay to close.
  When the contacts of the pop-up motor relay close, current flows through the contacts of the pop-up motor relay to the pop-up motor and earth, causing the pop-up motor to rotate, which brings the headlamps to the DOWN position.
  The pop-up motor rotates until the automatic DOWN stop position is reached, then the contacts of the interlocked U/D (UP/DOWN) switch change from the D to U contacts. As a result, the contacts of the pop-up motor relay open to cut off current supply to the pop-up motor. Then the pop-up motor ceases to rotate, holding the headlamps in the DOWN position.

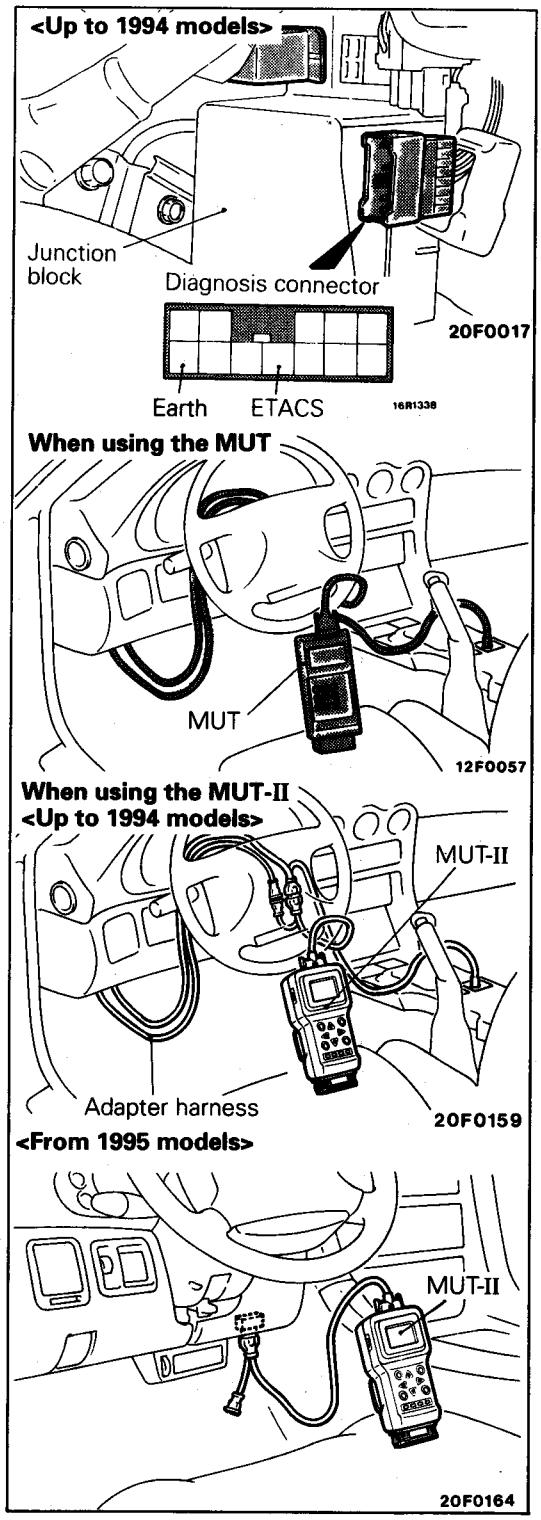
<Pop-up operation - Operation by pop-up switch> (Up to 1994 models)

- When the pop-up switch is placed in the UP position, current flows through multi-purpose fuse ⑥ to the lighting switch, the pop-up switch and the ETACS control unit, which brings the headlamps to the UP position and holds them in the UP position just like when they are operated by the lighting switch.
- When the pop-up switch is placed in the DOWN position, current flows through the multi-purpose fuse ⑥ to the lighting switch, the pop-up switch and the ETACS control unit, which brings the headlamps to the DOWN position and holds them in the DOWN position just like when they are operated by the lighting switch.

TROUBLESHOOTING HINTS

Phenomenon		Checking method
Headlamps don't come on.	But the tail lamps do illuminate.	• Check the headlamp relay. (Refer to P.54-55.) • Check the lighting switch. (Refer to P.54-64.)
	The tail lamps also don't illuminate	• Check the fusible link ③.
The low beam at both sides doesn't illuminate.		• Check the "LO" contacts of the dimmer switch.
The upper beam at both sides doesn't illuminate.	The passing signal functions OK.	• Check the "HI" contacts of the dimmer switch.
	The passing signal doesn't function.	• Check the dimmer switch. (Refer to P.54-64.)
One headlamp doesn't illuminate.		• Check the bulb.
Can't switch from low to high beam or vice versa.		• Check the dimmer switch. (Refer to P.54-64.)
The high beam indicator lamp doesn't illuminate	The high beam of the headlamps is normal.	• Check dedicated fuse No. ⑤. • Check the bulb.
Headlamps do not rise. (Up to 1994 models)	They rise only when the lighting switch is operated.	• Check the pop-up switch input signal. (Refer to P.54-27.) • Check the pop-up switch. (Refer to P.54-59.)
	They rise only when the pop-up switch is operated.	• Check the lighting switch. (Refer to P.54-64.)
Headlamp do not retract. (Up to 1994 models)		• Check the pop-up switch input signal. (Refer to P.54-27.) • Check the pop-up switch. (Refer to P.54-59.)
One headlamp does not move. (Up to 1994 models)		• Check the pop-up motor relay. (Refer to P.54-57.)
		• Check the pop-up motor. (Refer to P.54-52.)

NOTE
For information concerning the theft-alarm system, refer to P.54-100.



Input Signal

Using the MUT or MUT-II, check whether or not the input signals from each switch are being sent to the ETACS unit.

(1) Connect the MUT or MUT-II to the diagnosis check connector located near the junction block.

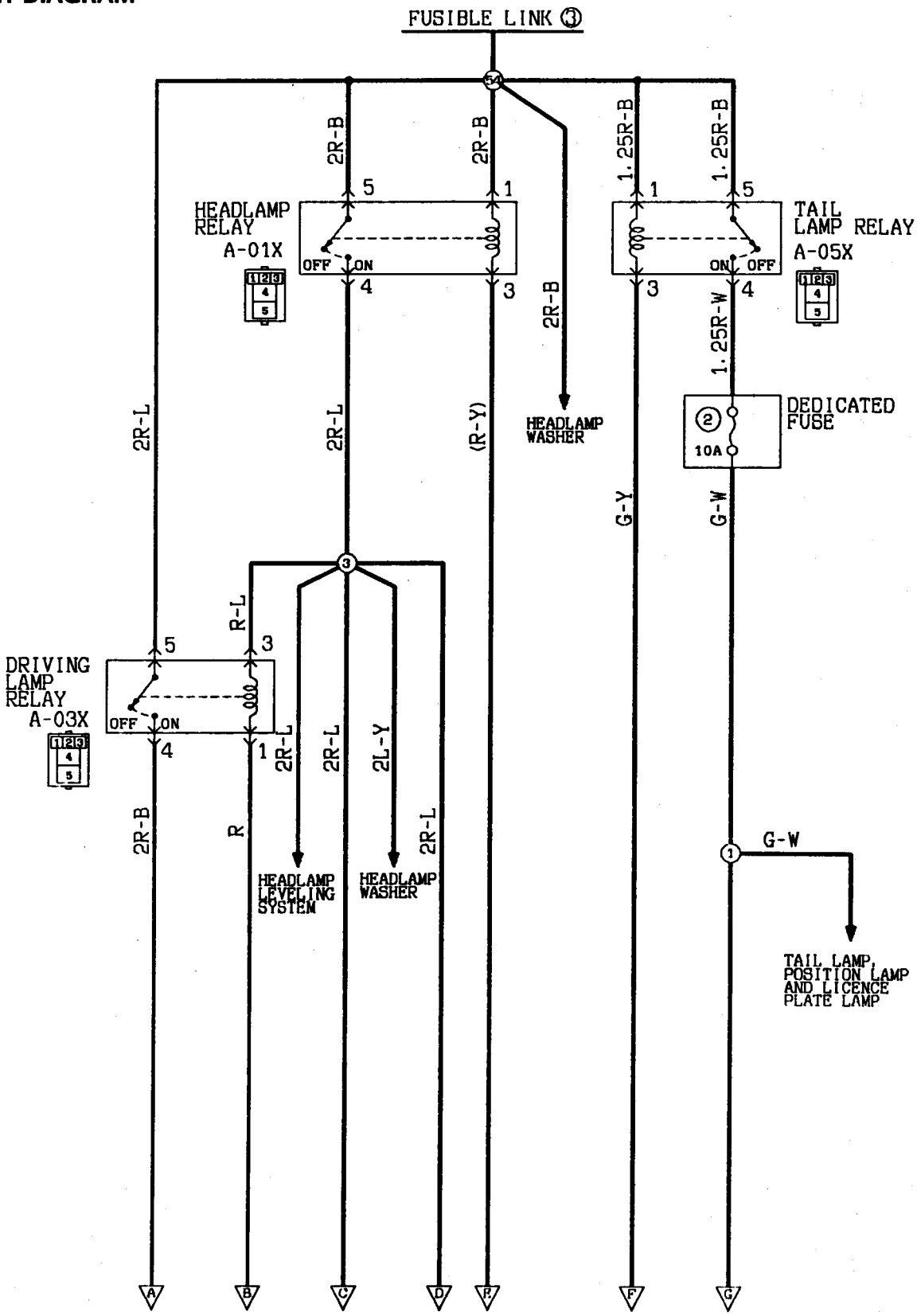
NOTE
When connecting MUT-II to 1994 models, use the adapter harness which belongs to MUT-II sub-assembly.

Caution
Connect and disconnect either MUT or MUT-II with the ignition switch in the OFF position.

(2) Check if the buzzer of the MUT or MUT-II operates when each switch is operated.
If the buzzer operates, the input signals are being sent to the ETACS unit, so that switch can be considered to be functioning normally. If not, the switch or switch input circuit is faulty. Check the switch and the switch input circuit.

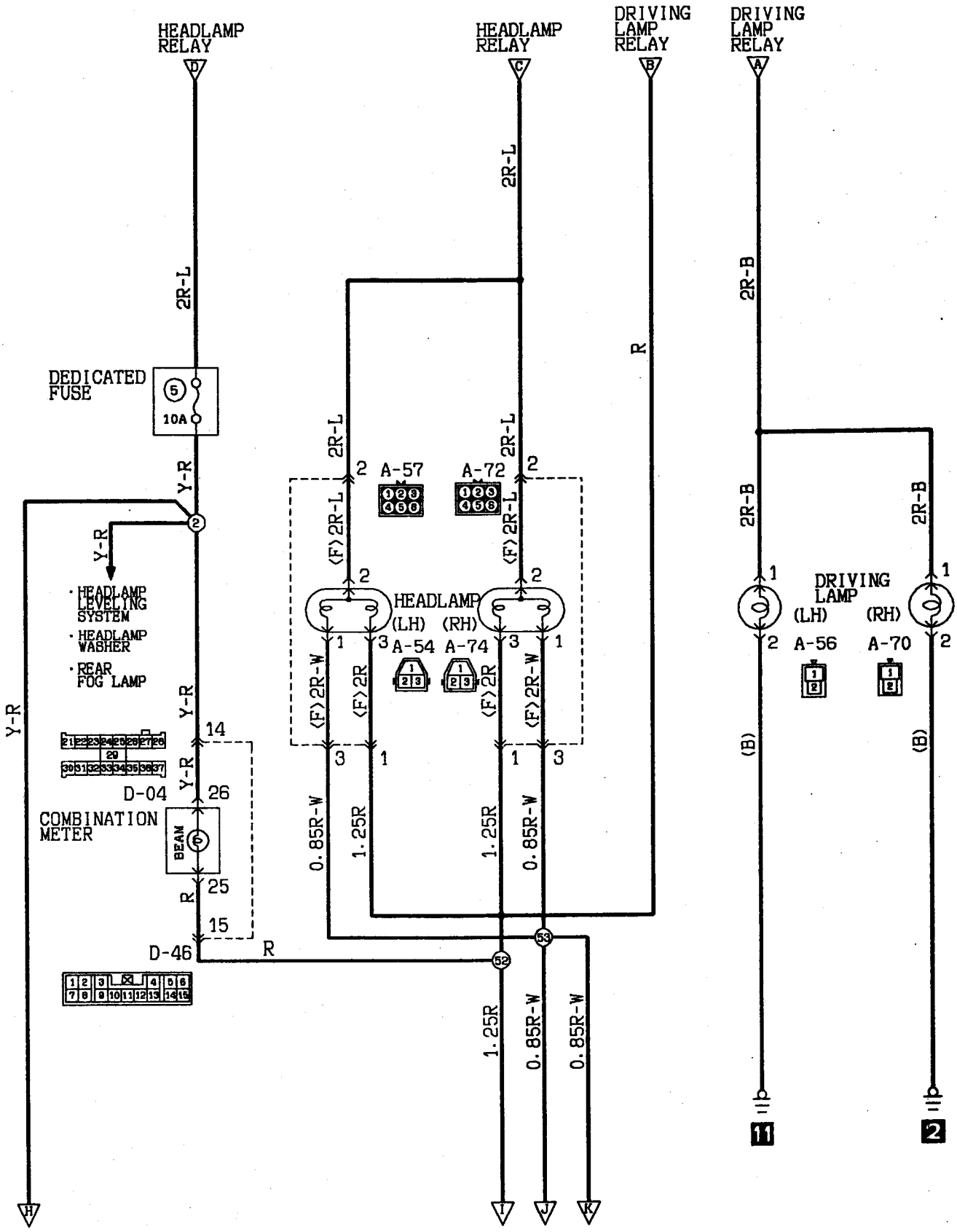
HEADLAMP CIRCUIT

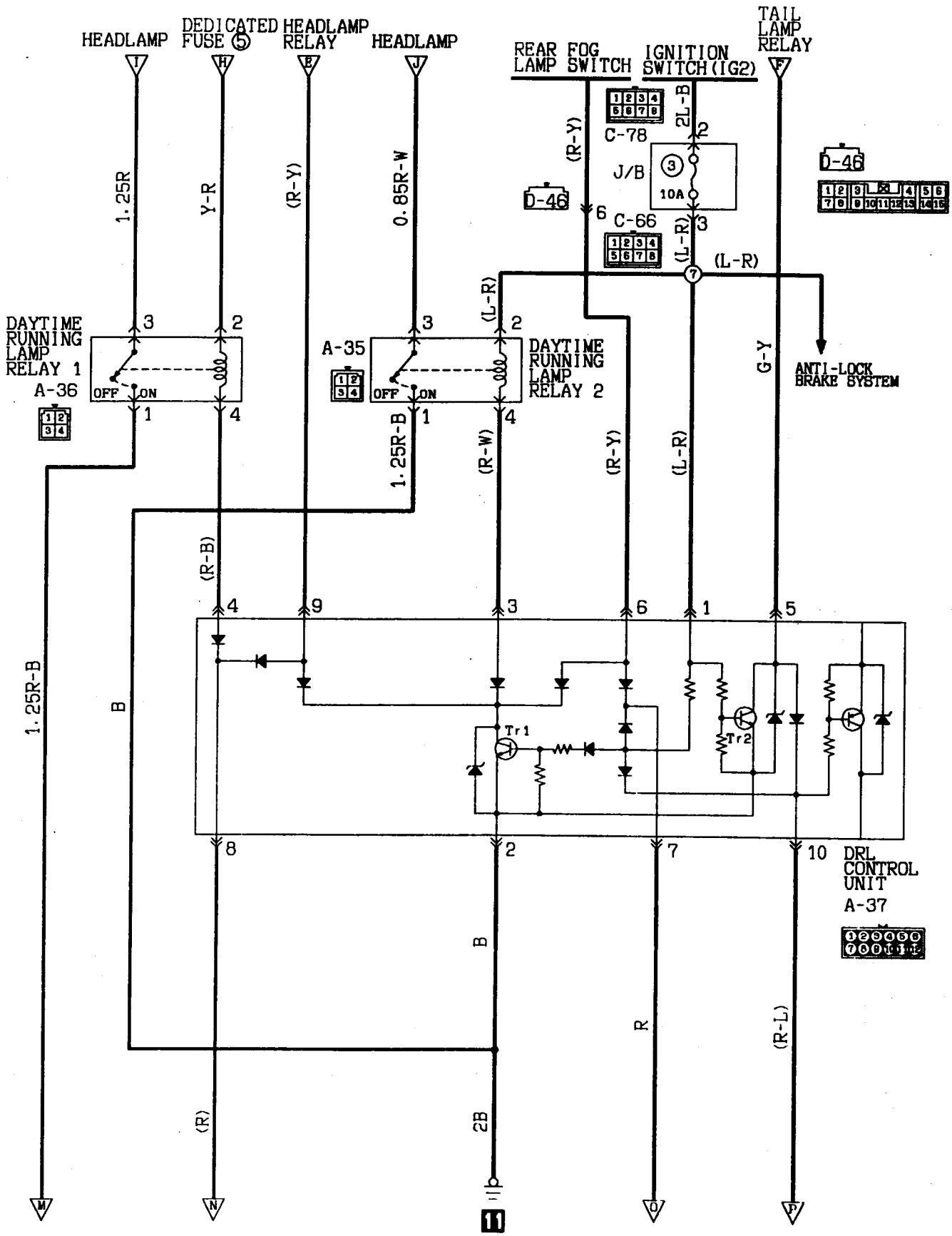
<Vehicles with daytime running lamp>
(Up to 1994 models)
CIRCUIT DIAGRAM



Wire colour code
B:Black LG:Light green G:Green L:Blue W:White Y:Yellow SB:Sky blue
BR:Brown O:Orange GR:Gray R:Red P:Pink V:Violet

KX35-AC-R0802-EC

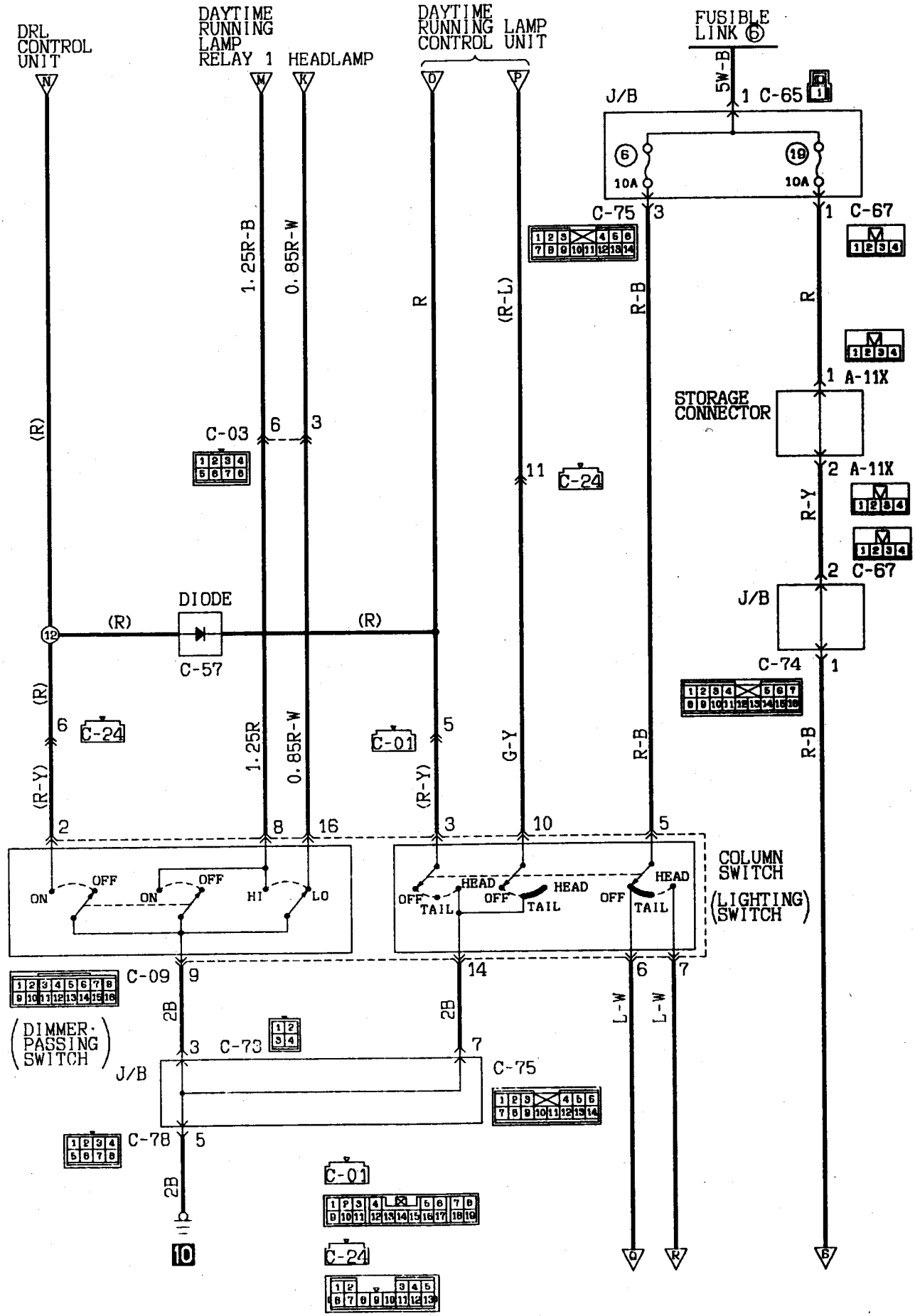

HEADLAMP RELAY
HEADLAMP RELAY
DRIVING LAMP RELAY
DRIVING LAMP RELAY
2R-L
DEDICATED FUSE
10A
Y-R
· HEADLAMP LEVELING SYSTEM
· HEADLAMP WASHER
· REAR FOG LAMP
D-04
COMBINATION METER
BEAM
D-46
R
A-57
A-72
(F)2R-L
HEADLAMP (LH) (RH)
A-54
A-74
(F)2R
(F)2R-W
0.85R-W
1.25R
2R-B
DRIVING LAMP (LH) (RH)
A-56
A-70
(B)
11
2

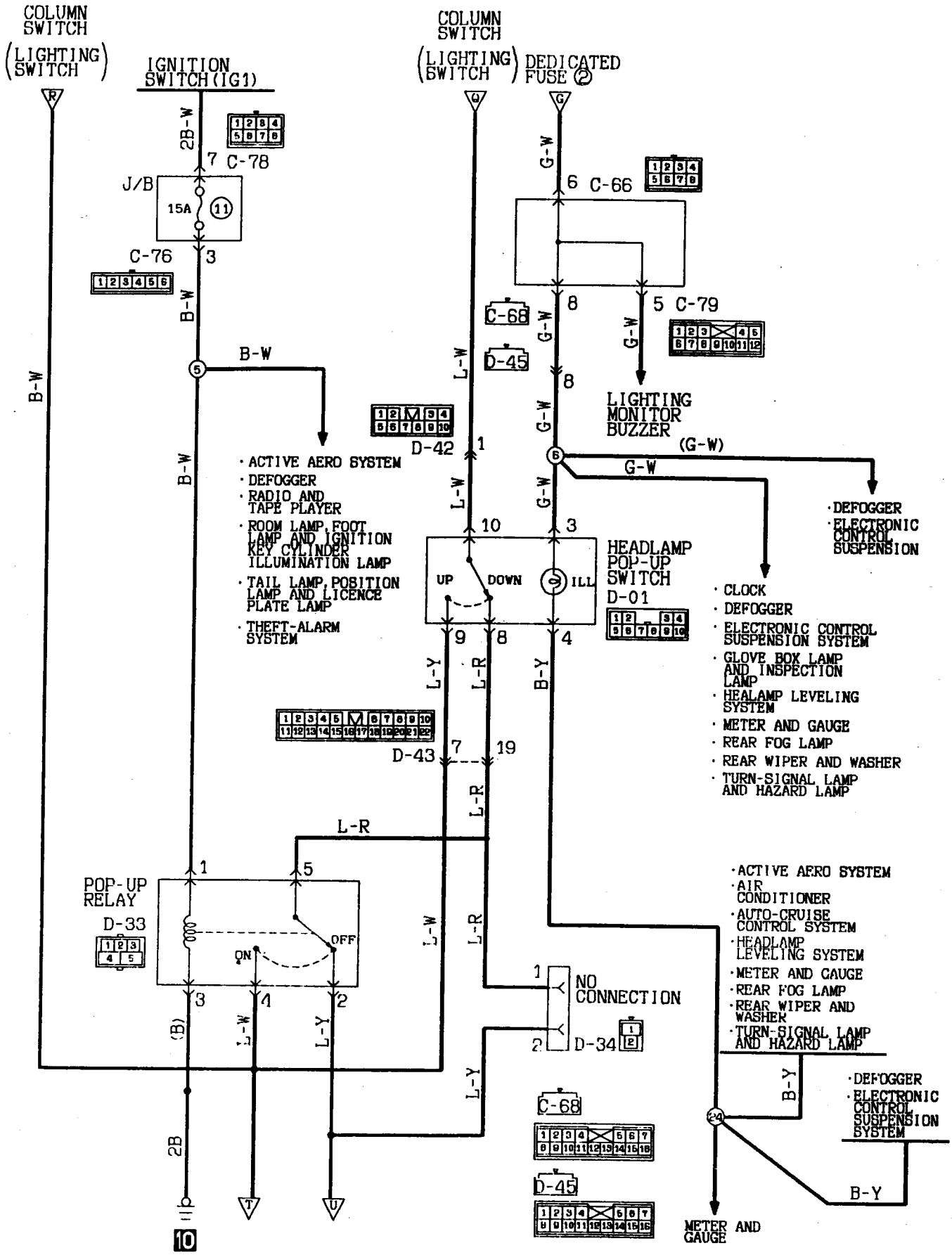


Wire colour code

B:Black	LG:Light green	G:Green	L:Blue	W:White	Y:Yellow	SB:Sky blue	
BR:Brown	O:Orange	GR:Gray	R:Red	P:Pink	V:Violet		

KX35-AC-R0802A-EC

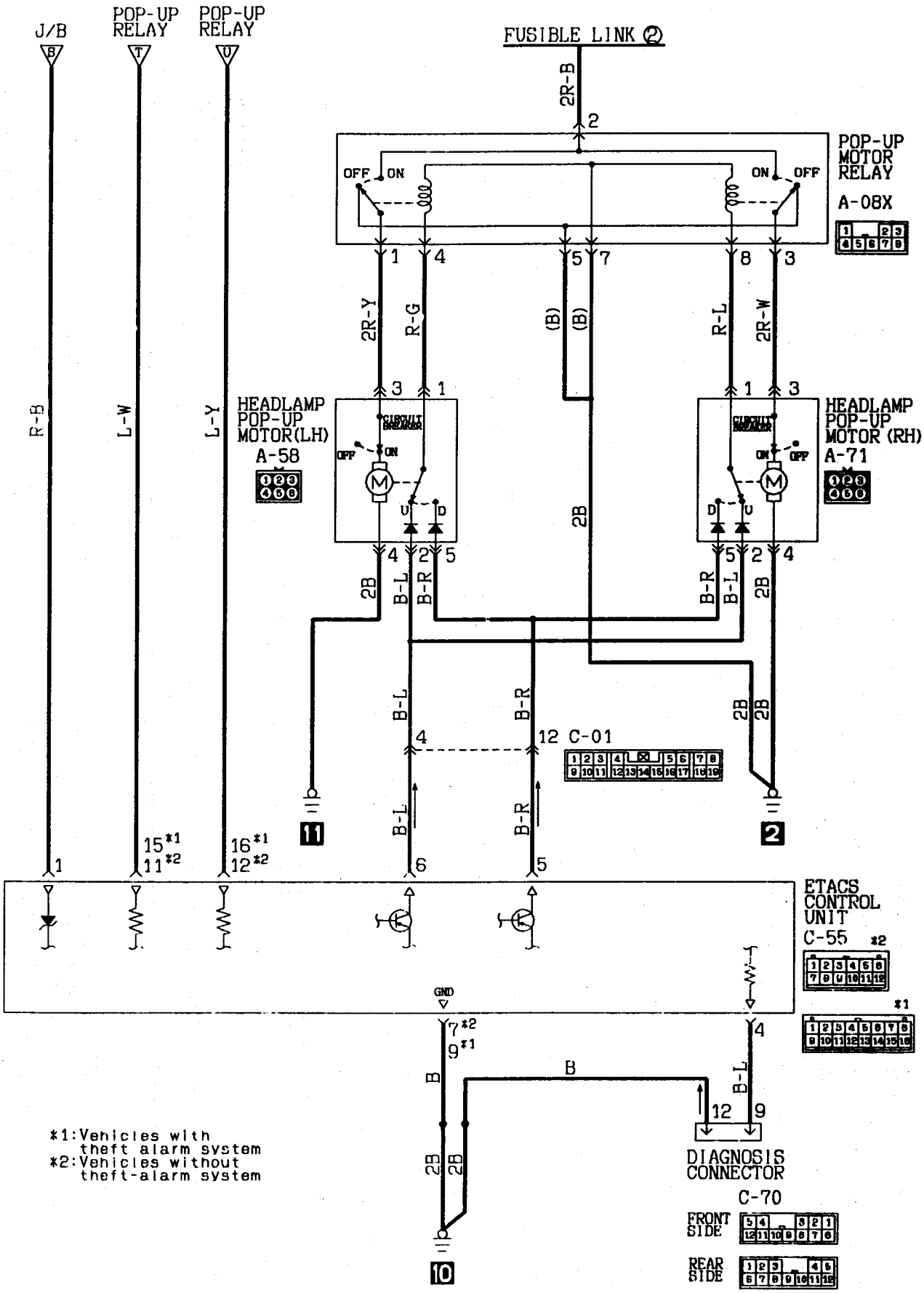

DRL CONTROL UNIT
DAYTIME RUNNING LAMP RELAY 1
HEADLAMP
DAYTIME RUNNING LAMP CONTROL UNIT
FUSIBLE LINK 6
5W-B
J/B
1 C-65
6
19
10A
10A
C-75
3
1
C-67
1.25R-B
0.85R-W
R
(R-L)
R-B
R
1 A-11X
STORAGE CONNECTOR
2 A-11X
R-Y
2 C-67
J/B
C-74
1
R-B
C-03
6
3
11
C-24
(R)
DIODE
(R)
(R)
C-57
12
(R)
6
C-24
1.25R
0.85R-W
C-01
5
G-Y
R-B
(R-Y)
(R-Y)
2
8
16
3
10
5
COLUMN SWITCH (LIGHTING SWITCH)
ON
OFF
ON
OFF
HI
LO
OFF
HEAD
TAIL
OFF
HEAD
TAIL
OFF
HEAD
TAIL
C-09
9
14
6
7
L-W
L-W
2B
2B
(DIMMER PASSING SWITCH)
3
C-73
7
C-75
J/B
C-78
5
2B
10
C-01
C-24



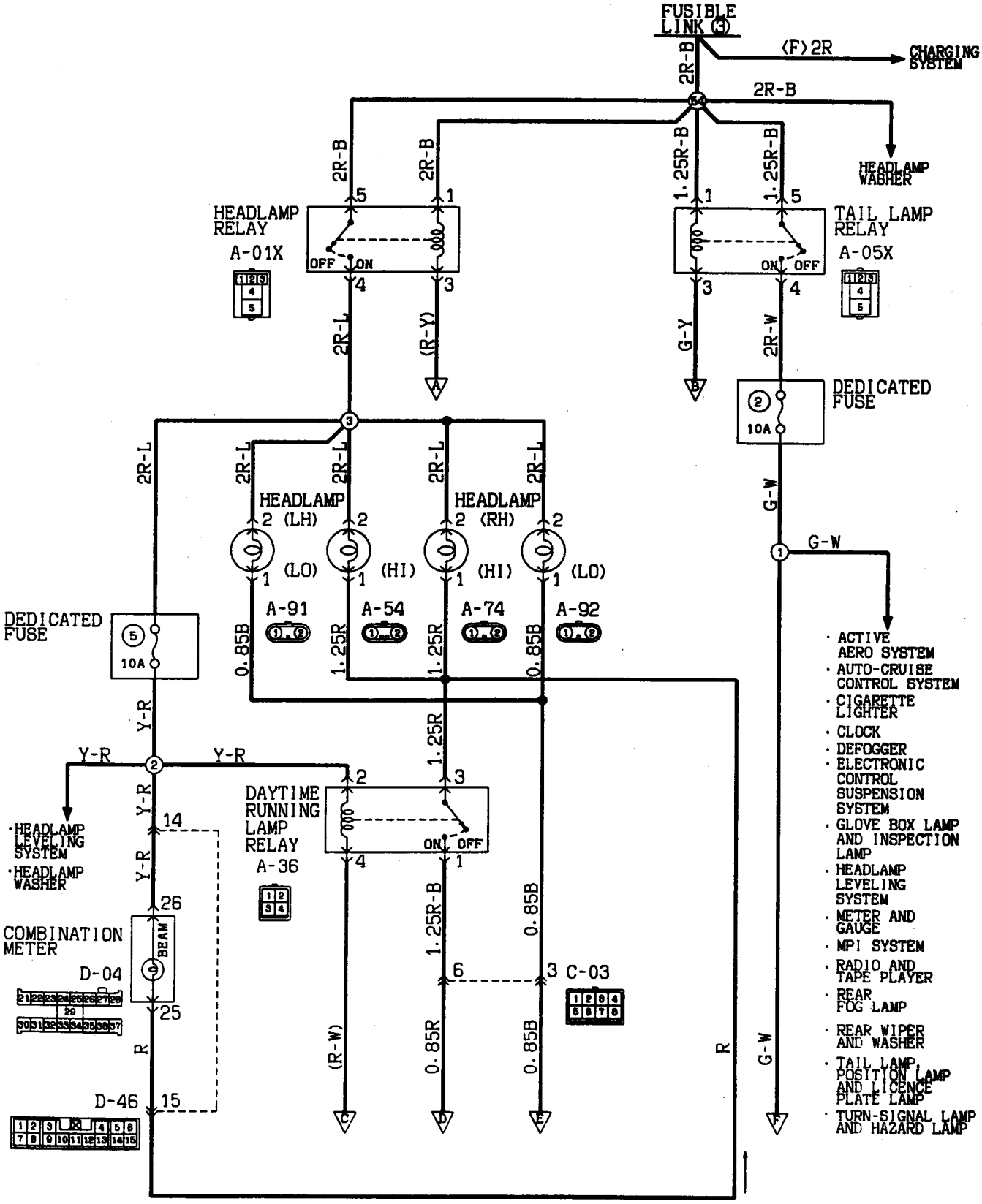
Wire colour code

B:Black	LG:Light green	G:Green	L:Blue	W:White	Y:Yellow	SB:Sky blue	
BR:Brown	O:Orange	GR:Gray	R:Red	P:Pink	V:Violet		

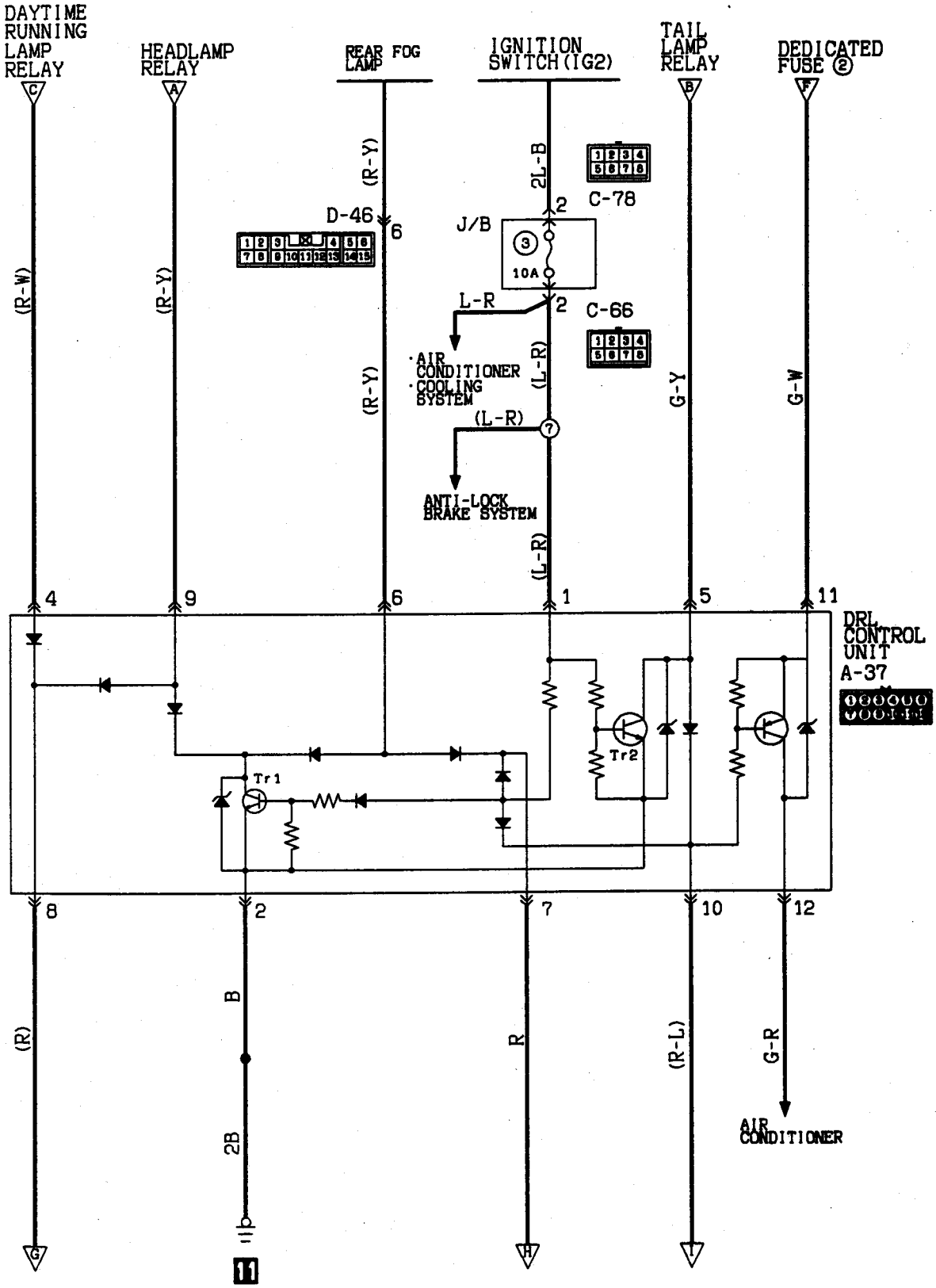
KX35-AC-R0802B-EC


J/B
POP-UP RELAY
POP-UP RELAY
FUSIBLE LINK ②
2R-B
POP-UP MOTOR RELAY
A-08X
OFF ON
ON OFF
2R-Y
R-G
(B)
(B)
R-L
2R-W
HEADLAMP POP-UP MOTOR(LH)
A-58
HEADLAMP POP-UP MOTOR (RH)
A-71
R-B
L-W
L-Y
2B
B-L
B-R
C-01
11
2
15*1 11*2
16*1 12*2
ETACS CONTROL UNIT
C-55 *2
*1
GND
B
DIAGNOSIS CONNECTOR
C-70
FRONT SIDE
REAR SIDE
10
*1:Vehicles with theft alarm system
*2:Vehicles without theft-alarm system

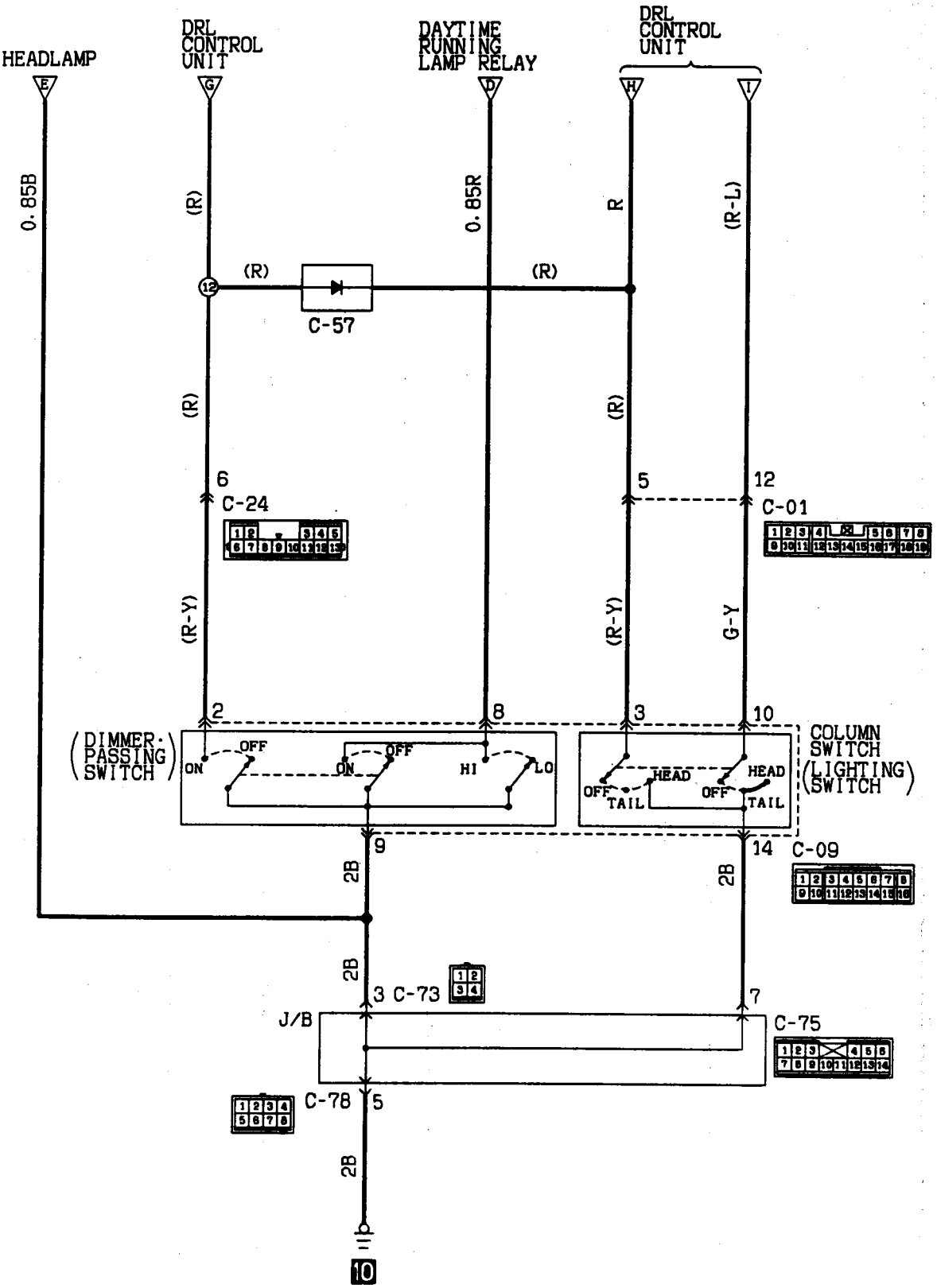
(From 1995 models)
CIRCUIT DIAGRAM



KX35-AC-R0829-EC



Wire colour code
B:Black LG:Light green G:Green L:Blue W:White Y:Yellow SB:Sky blue
BR:Brown O:Orange GR:Gray R:Red P:Pink V:Violet



Wire colour code
B:Black LG:Light green G:Green L:Blue W:White Y:Yellow SB:Sky blue
BR:Brown O:Orange GR:Gray R:Red P:Pink V:Violet

KX35-AC-R0829A-EC

ADDED

NOTES

OPERATION

<Headlamps ON operation>

- Even if the lighting switch is "OFF", when the ignition switch is turned to "ON", transistor Tr1 inside the daytime running lamp control unit switches "ON", causing the contact point of daytime running lamp relay 2 to close, turning the relay "ON" and illuminating the low-beam headlamps.
- If the lighting switch is set to the "TAIL" position, the tail lamp relay switches "ON", and because transistor Tr2 and transistor Tr1 inside the daytime running lamp control unit switch "ON" and "OFF" respectively, the tail lamps illuminate without the headlamps illuminating.
- If the lighting switch is set to the "HEAD" position, the headlamp relay switches "ON" and the headlamps illuminate.

<Pop-up operation - Operation by lighting switch> (Up to 1994 models)

- In vehicles with daytime running lamps, when the ignition switch is turned to "ON", the pop-up relay normally switches on independent of the lighting switch, and the ETACS up timer circuit operates, setting the headlamps to the UP position.

  NOTE
  For other operation than the up timer circuit inside the ETACS, refer to P.54-25.

<Pop-up operation - Operation by pop-up switch> (Up to 1994 models)

Refer to P.54-25.

TROUBLESHOOTING HINTS

Phenomenon		Checking method
Headlamps don't come on.	But the tail lamps do illuminate.	• Check the headlamp relay. (Refer to P.54-55.) • Check the lighting switch. (Refer to P.54-64.) • Check the daytime running lamp relay 2. (Refer to P.54-56.)
	The tail lamps also don't illuminate	• Check the fusible link ③.
The low beam at both sides doesn't illuminate.		• Check the "LO" contacts of the dimmer switch.
The upper beam at both sides doesn't illuminate.	The passing signal functions OK.	• Check the "HI" contacts of the dimmer switch.
	The passing signal doesn't function.	• Check the dimmer switch. (Refer to P.54-64.) • Check the daytime running lamp relay 1. (Refer to P.54-56.)
One headlamp doesn't illuminate.		• Check the bulb.
Can't switch from low to high beam or vice versa.		• Check the dimmer switch. (Refer to P.54-64.)
The upper beam indicator lamp doesn't illuminate	The upper beam of headlamps is normal.	• Check dedicated fuse No. ⑤. • Check the bulb.
Headlamps do not rise. (Up to 1994 models)	They rise only when the ignition switch is "OFF" and lighting switch is set to the HEAD position.	• Check the pop-up switch. (Refer to P.54-59.) • Check the pop-up switch input signal. (Refer to P.54-27.) • Check the pop-up relay. (Refer to P.54-57.)
	They rise only when the ignition switch is "ON".	• Check the pop-up switch. (Refer to P.54-59.) • Check the pop-up switch input signal. (Refer to P.54-27.)
	They rise only when the pop-up switch is operated.	• Check the lighting switch. (Refer to P.54-64.) • Check the pop-up relay. (Refer to P.54-57.)
Headlamps do not retract. (Up to 1994 models)		• Check the pop-up switch input signal. (Refer to P.54-27.) • Check the pop-up switch. (Refer to P.54-59.)
One headlamp does not move. (Up to 1994 models)		• Check the pop-up motor relay. (Refer to P.54-57.)
		• Check the pop-up motor. (Refer to P.54-52.)

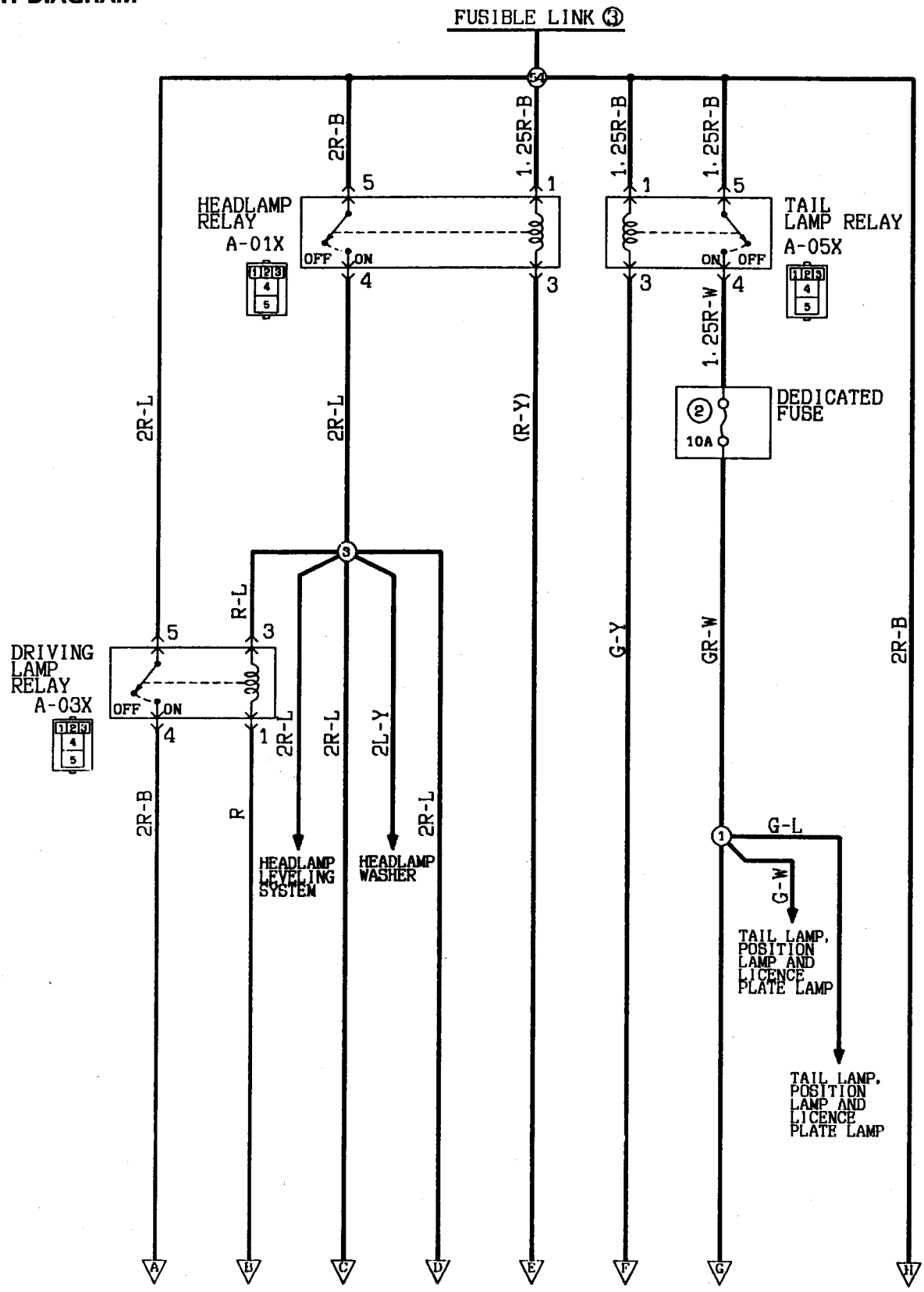
NOTE
For information concerning the theft-alarm system, refer to P.54-100.

Input Signal

Refer to P.54-27.

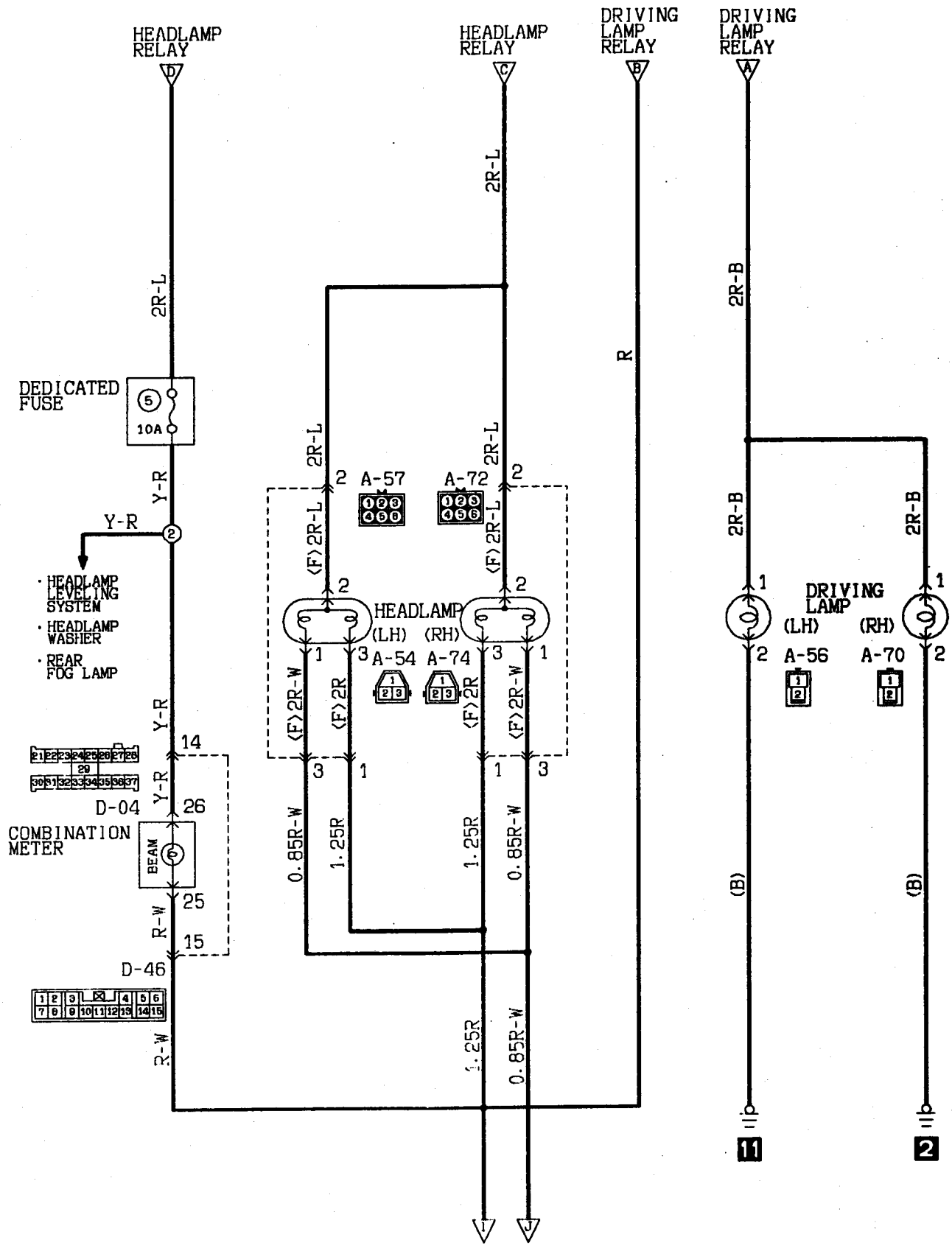
HEADLAMP CIRCUIT

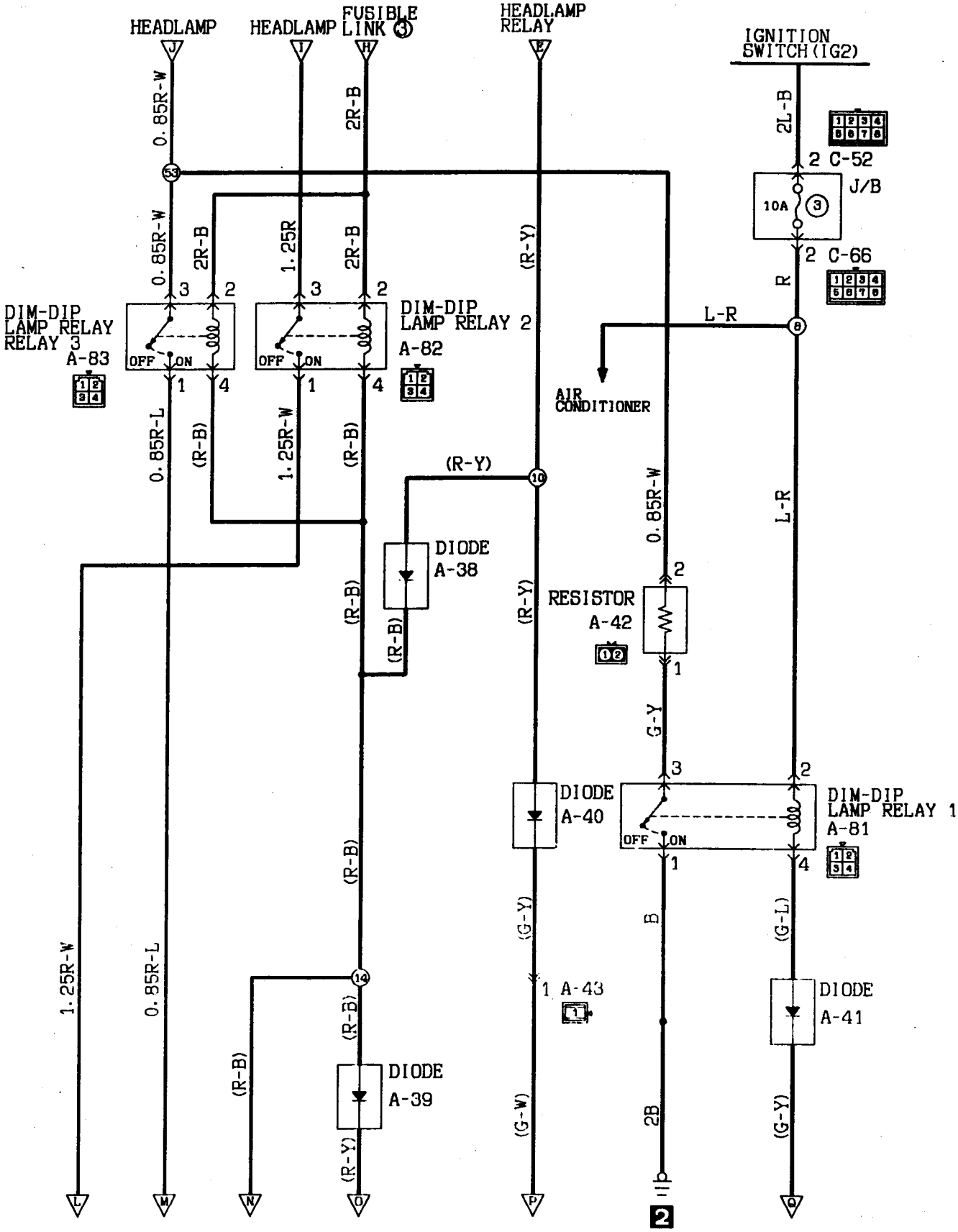
<Vehicles with dim-dip lamp>
(Up to 1994 models)
CIRCUIT DIAGRAM



Wire colour code
B:Black LG:Light green G:Green L:Blue W:White Y:Yellow SB:Sky blue
BR:Brown O:Orange GR:Gray R:Red P:Pink V:Violet

KX35-AC-R0804-EC

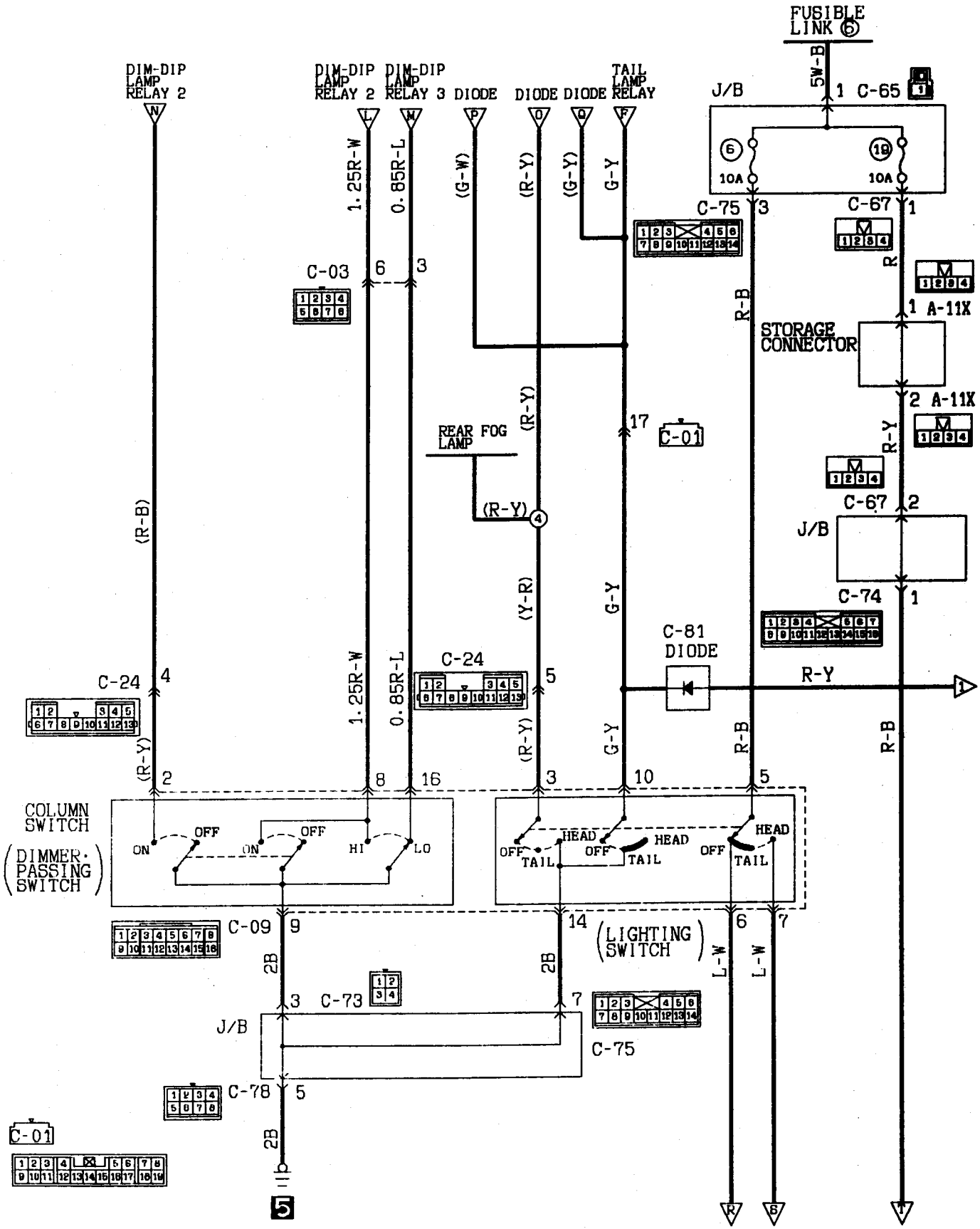

HEADLAMP RELAY
HEADLAMP RELAY
DRIVING LAMP RELAY
DRIVING LAMP RELAY
2R-L
2R-B
R
DEDICATED FUSE
10A
Y-R
· HEADLAMP LEVELING SYSTEM
· HEADLAMP WASHER
· REAR FOG LAMP
D-04
COMBINATION METER
BEAM
R-W
D-46
A-57
A-72
(F)2R-L
HEADLAMP (LH) (RH)
A-54
A-74
(F)2R
(F)2R-W
0.85R-W
1.25R
DRIVING LAMP (LH) (RH)
A-56
A-70
(B)
11
2

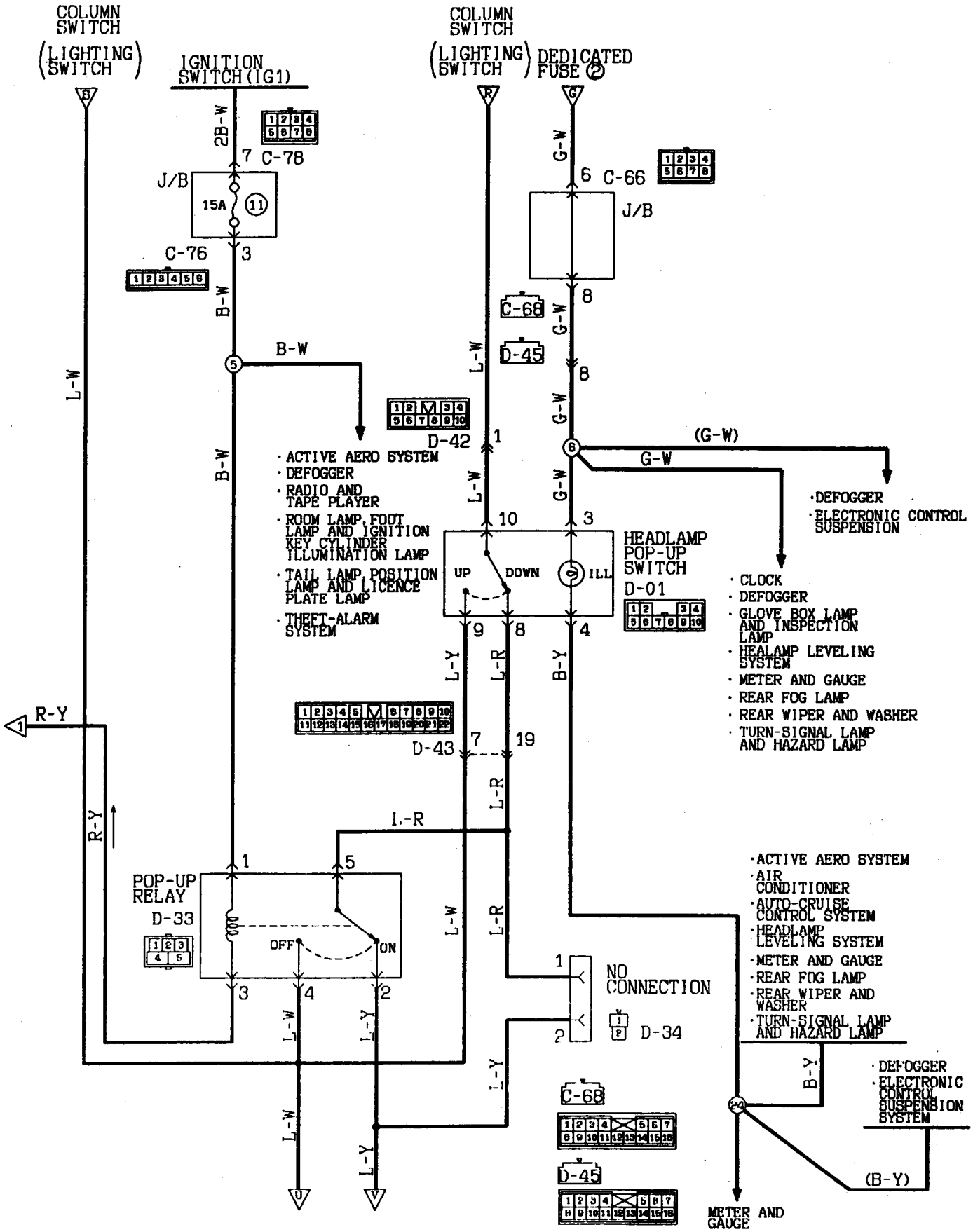


Wire colour code

B:Black	LG:Light green	G:Green	L:Blue	W:White	Y:Yellow	SB:Sky blue	
BR:Brown	O:Orange	GR:Gray	R:Red	P:Pink	V:Violet		

KX35-AC-R0804A-EC

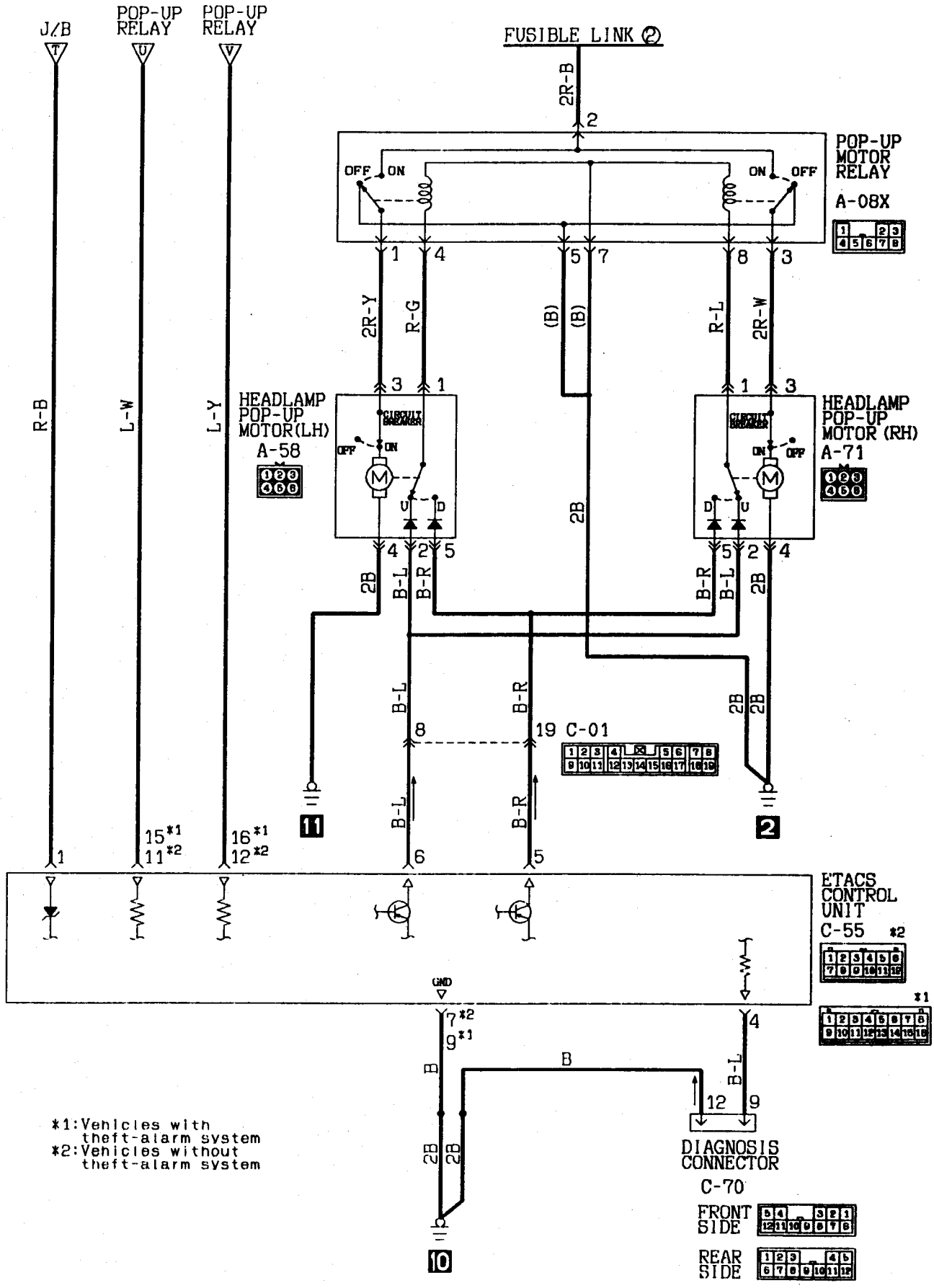

FUSIBLE LINK ⑥
5W-B
J/B
1 C-65
10A
10A
C-75 3
C-67 1
R
1 A-11X
STORAGE CONNECTOR
2 A-11X
R-Y
C-67 2
J/B
C-74 1
C-81 DIODE
R-Y
DIM-DIP LAMP RELAY 2
DIM-DIP LAMP RELAY 2
DIM-DIP LAMP RELAY 3
DIODE
DIODE
DIODE
TAIL LAMP RELAY
1.25R-W
0.85R-L
(G-W)
(R-Y)
(G-Y)
G-Y
C-03 6 3
REAR FOG LAMP
17 C-01
(R-B)
(R-Y) ④
(Y-R)
C-24 4
C-24 5
1.25R-W
0.85R-L
(R-Y)
G-Y
R-B
R-B
(R-Y) 2
8 16
3 10 5
COLUMN SWITCH
(DIMMER·PASSING SWITCH)
ON OFF ON OFF HI LO
OFF HEAD TAIL OFF HEAD TAIL OFF HEAD TAIL
C-09 9
14 (LIGHTING SWITCH) 6 7
2B
2B
L-W
L-W
3 C-73
7
J/B
C-75
C-78 5
2B
C-01
5
R
B



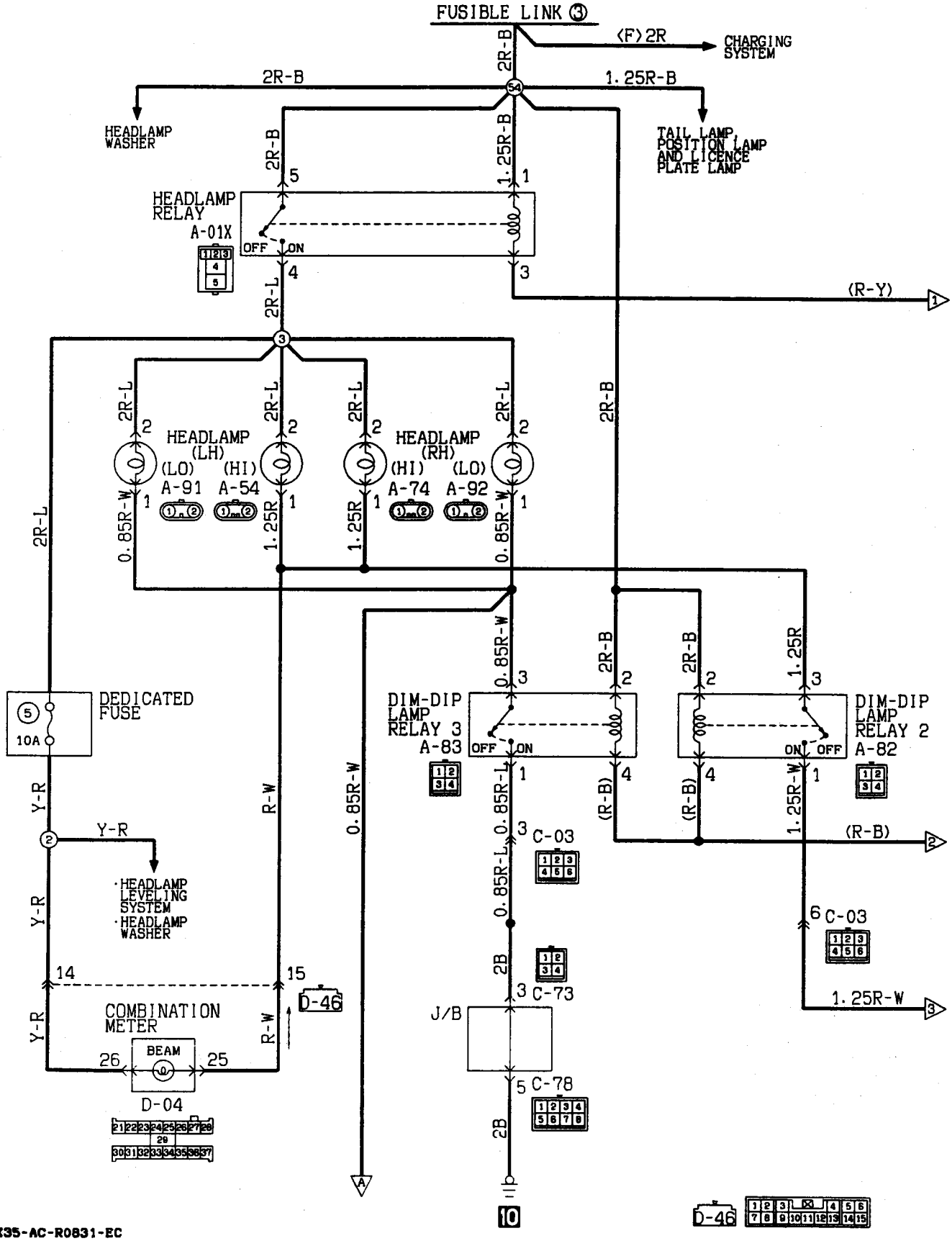
Wire colour code

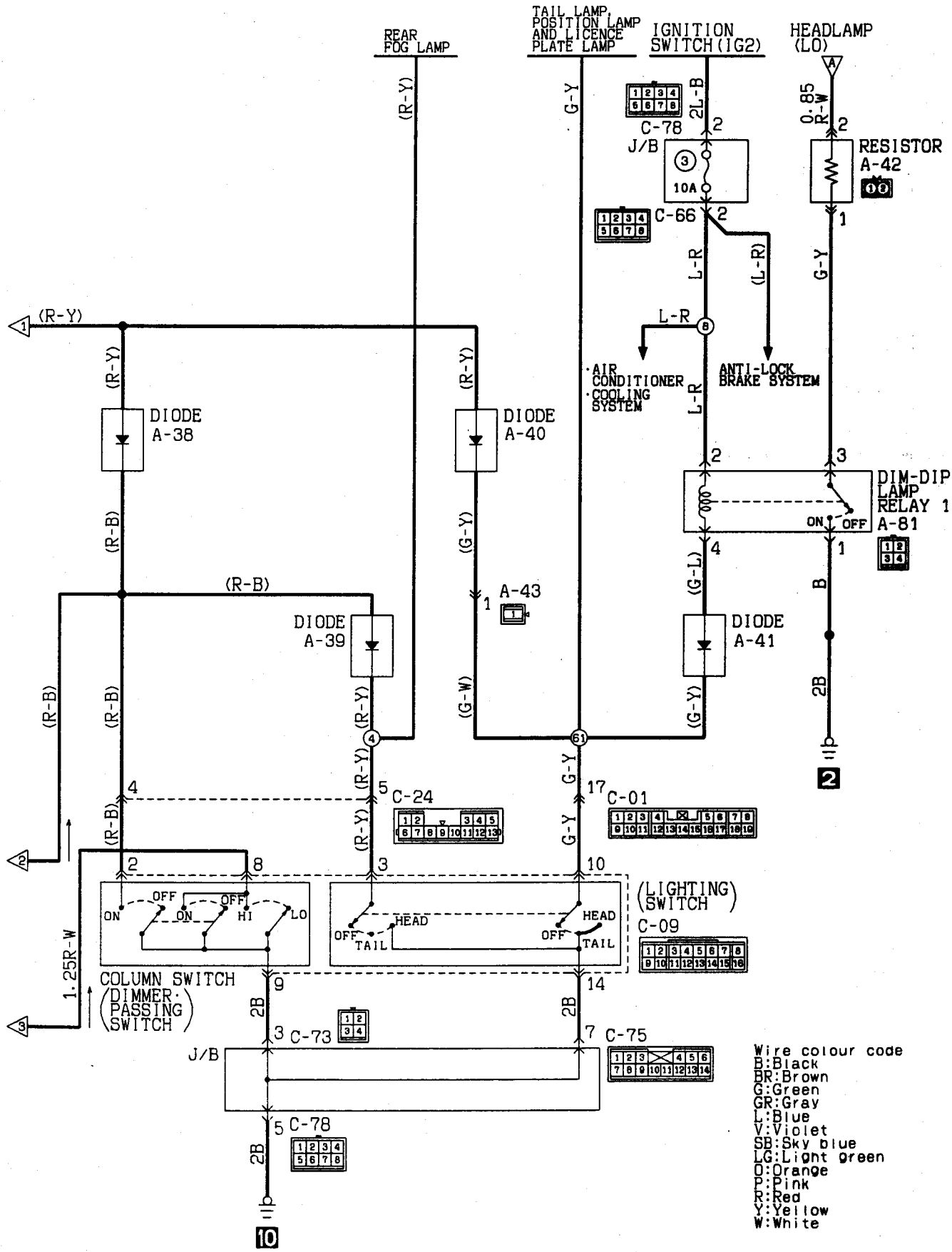
B:Black	LG:Light green	G:Green	L:Blue	W:White	Y:Yellow	SB:Sky blue	
BR:Brown	O:Orange	GR:Gray	R:Red	P:Pink	V:Violet		

KX35-AC-R0804B-EC



(From 1995 models)
CIRCUIT DIAGRAM




REAR FOG LAMP
TAIL LAMP, POSITION LAMP AND LICENCE PLATE LAMP
IGNITION SWITCH (IG2)
HEADLAMP (LO)
(R-Y)
G-Y
2L-B
0.85 R-W
C-78
J/B
10A
RESISTOR A-42
C-66
L-R
(L-R)
G-Y
·AIR CONDITIONER ·COOLING SYSTEM
ANTI-LOCK BRAKE SYSTEM
DIODE A-38
DIODE A-40
DIODE A-39
DIODE A-41
A-43
DIM-DIP LAMP RELAY 1 A-81
ON OFF
(R-B)
(G-Y)
(G-L)
(G-W)
B
2B
C-24
C-01
C-09
(LIGHTING) SWITCH
OFF ON HI LO
HEAD TAIL
COLUMN SWITCH (DIMMER, PASSING SWITCH)
1.25R-W
C-73
C-75
C-78
J/B
Wire colour code
B:Black
BR:Brown
G:Green
GR:Gray
L:Blue
V:Violet
SB:Sky blue
LG:Light green
O:Orange
P:Pink
R:Red
Y:Yellow
W:White

OPERATION

<Headlamps ON operation>

- When the ignition switch is "ON" and the lighting switch is set to the "TAIL" position, the contact point of dim-dip lamp relay 1 closes, and the headlamps illuminate. The contact point of dim-dip lamp relay 1 is connected to the earth via a resistor, so when the headlamps illuminate dimmer than normally.

<Pop-up operation - Operation by lighting switch> (Up to 1994 models)

- In vehicles with dim-dip lamps, when the ignition switch is turned to "ON", the pop-up relay normally turns on independent of the lighting switch, and the ETACS up timer circuit operates, setting the headlamps to the UP position.

  NOTE
  For other operation than the up timer circuit inside the ETACS, refer to P.54-25.

<Pop-up operation - Operation by pop-up switch> (Up to 1994 models)

Refer to P.54-25.

TROUBLESHOOTING HINTS

Phenomenon		Checking method
Headlamps don't illuminate even when the lighting switch is in the "HEAD" position.	But the tail lamps do illuminate.	• Check the headlamp relay. (Refer to P.54-55.) • Check the lighting switch. (Refer to P.54-64.) • Check the dim-dip lamp relay 2 and 3. (Refer to P.54-56.)
	The tail lamps also don't illuminate.	• Check the fusible link ③.
Headlamp low beam does not illuminate even when the lighting switch is in the "TAIL" position.	But the tail lamps do illuminate.	• Check the headlamp relay. (Refer to P.54-55.) • Check the lighting switch. (Refer to P.54-64.) • Check the dim-dip lamp relay 1. (Refer to P.54-56.)
	The tail lamps also don't illuminate	• Check the fusible link ③.
The low beam at both sides doesn't illuminate.		• Check the "LO" contacts of the dimmer switch.
The upper beam at both sides doesn't illuminate.	The passing signal functions OK.	• Check the "HI" contacts of the dimmer switch.
	The passing signal doesn't function.	• Check the dimmer switch. (Refer to P.54-64.)
One headlamp doesn't illuminate.		• Check the bulb.
Can't switch from low to upper beam or vice versa.		• Check the dimmer switch. (Refer to P.54-64.)
The upper beam indicator lamp doesn't illuminate	The upper beam of the headlamps is normal.	• Check dedicated fuse No. ⑤. • Check the bulb.
Headlamps do not rise. (Up to 1994 models)	They rise only when the ignition switch is "OFF" and lighting switch is set to the HEAD position.	• Check the pop-up switch. (Refer to P.54-59.) • Check the pop-up switch input signal. (Refer to P.54-27.) • Check the pop-up relay. (Refer to P.54-57.)
	They rise only when the ignition switch is "ON".	• Check the pop-up switch. (Refer to P.54-59.) • Check the pop-up switch input signal. (Refer to P.54-27.)
	They rise only when the pop-up switch is operated.	• Check the lighting switch. (Refer to P.54-64.) • Check the pop-up relay. (Refer to P.54-57.)
Headlamps do not retract. (Up to 1994 models)		• Check the pop-up switch input signal. (Refer to P.54-27.) • Check the pop-up switch. (Refer to P.54-59.)
One headlamp does not move. (Up to 1994 models)		• Check the pop-up motor relay. (Refer to P.54-57.)
		• Check the pop-up motor. (Refer to P.54-52.)

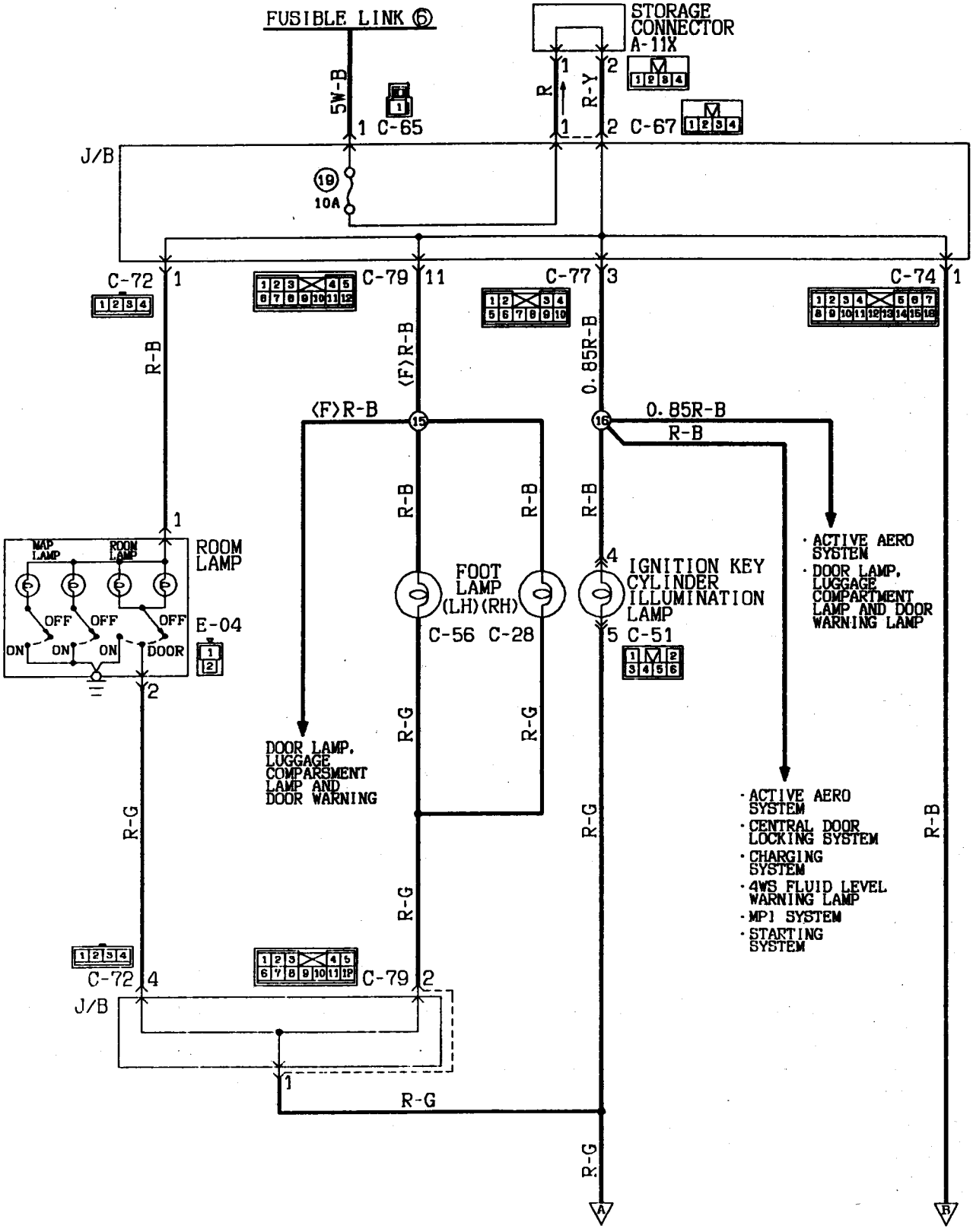
NOTE
For information concerning the theft-alarm system, refer to P.54-100.

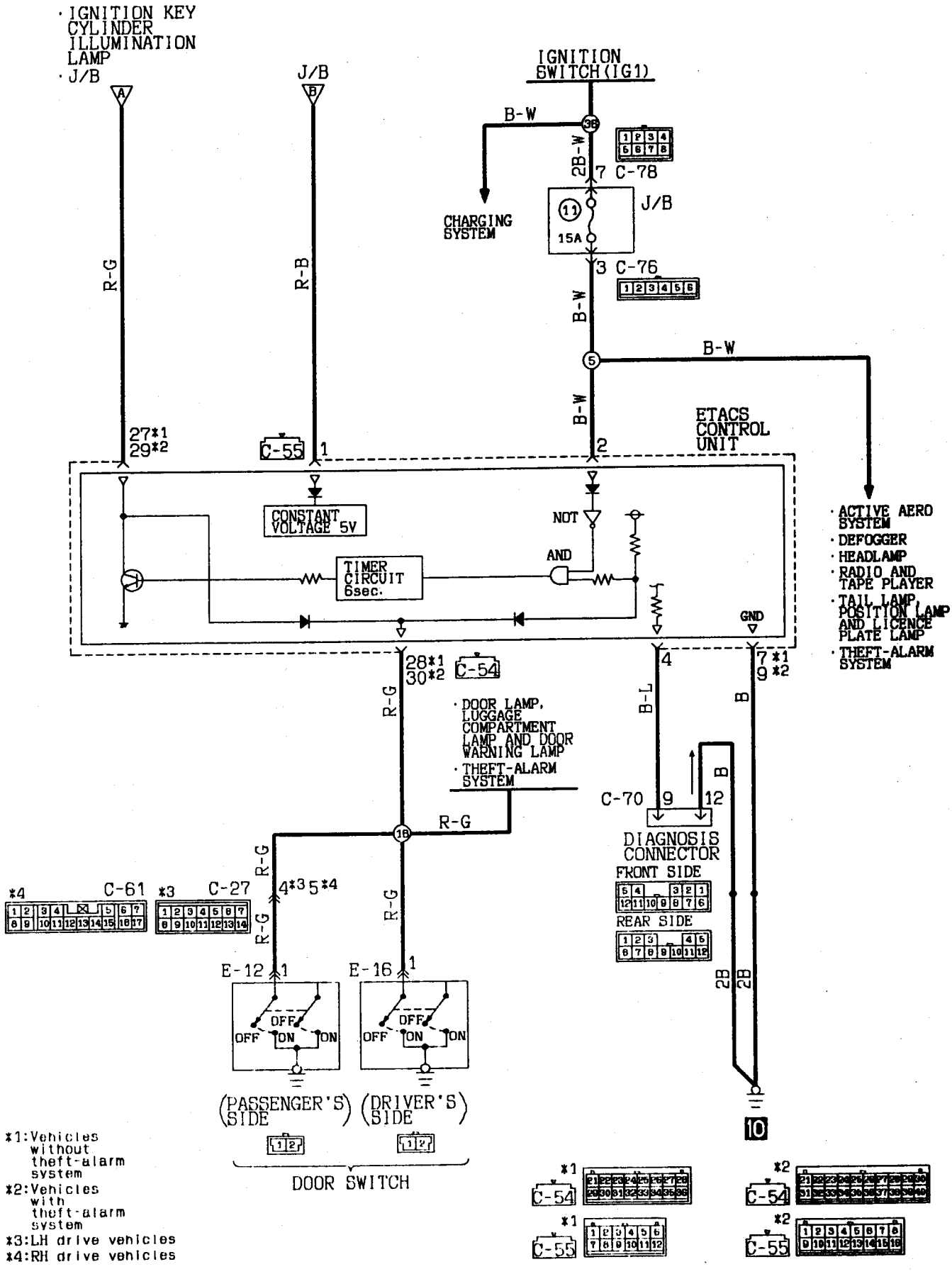
Input Signal

Refer to P.54-27.

ROOM LAMP, FOOT LAMP AND IGNITION KEY CYLINDER ILLUMINATION LAMP CIRCUIT

CIRCUIT DIAGRAM




· IGNITION KEY CYLINDER ILLUMINATION LAMP
· J/B
J/B
IGNITION SWITCH(IG1)
B-W
2B-W
7 C-78
CHARGING SYSTEM
J/B
15A
3 C-76
B-W
B-W
B-W
ETACS CONTROL UNIT
R-G
R-B
27*1 29*2
C-55
1
2
CONSTANT VOLTAGE 5V
NOT
AND
TIMER CIRCUIT 6sec.
GND
· ACTIVE AERO SYSTEM
· DEFOGGER
· HEADLAMP
· RADIO AND TAPE PLAYER
· TAIL LAMP, POSITION LAMP AND LICENCE PLATE LAMP
· THEFT-ALARM SYSTEM
28*1 30*2
C-54
· DOOR LAMP, LUGGAGE COMPARTMENT LAMP AND DOOR WARNING LAMP
· THEFT-ALARM SYSTEM
4
7*1 9*2
B-L
B
C-70 9 12
DIAGNOSIS CONNECTOR
FRONT SIDE
REAR SIDE
R-G
R-G
R-G
R-G
4*3 5*4
*4 C-61
*3 C-27
E-12 1
E-16 1
OFF
ON
(PASSENGER'S SIDE)
(DRIVER'S SIDE)
DOOR SWITCH
2B
2B
10
*1: Vehicles without theft-alarm system
*2: Vehicles with theft-alarm system
*3: LH drive vehicles
*4: RH drive vehicles
*1 C-54
*1 C-55
*2 C-54
*2 C-55

OPERATION

<Room lamp>

- Battery voltage is always applied to the room lamp. When the room lamp switch is turned to "ON", the room lamp will remain lit. After either door is opened if the room lamp switch is at "DOOR" position, the room lamp will come on.
- With the room lamp turned on (with the ignition switch in the OFF position and with the room lamp switch in the DOOR position), close all doors, and the timer circuit in the ETACS unit will be activated to gradually vary the voltage for approx. 6 seconds owing to the duty control, and the voltage will be output to transistor Tr. Since the voltage applied to the room lamp gradually decreases, the room lamp will be dimmed.
- If the ignition switch is turned to "ON" while the room lamp is lit (while the timer is activated), the timer circuit will be opened to turn "off" transistor Tr. This will immediately turn off the room lamp without dimming.

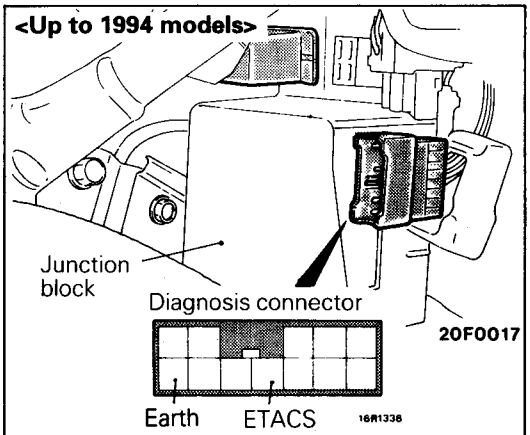
<Foot lamp and ignition key illumination lamp>

- Battery voltage is always applied to the foot lamp and ignition key illumination lamp.
  With the ignition switch in the OFF position, open any door, and all lamp will come on.
- With all lamps turned on (with the ignition switch in the OFF position), close all doors, and the timer circuit inside the ETACS unit will operate in the same manner as the room lamp to dim all lamps. When the ignition switch is placed in the ON position with all lamps turned on (with the timer in operation), the same operation as the room lamp will take place.

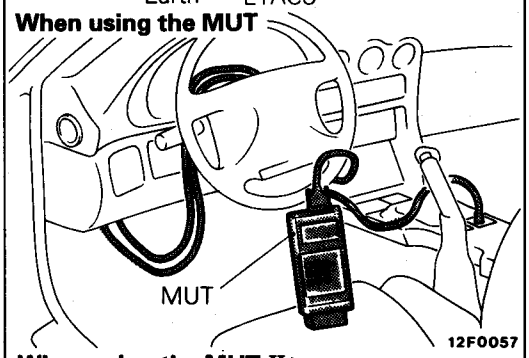
TROUBLESHOOTING HINTS

Phenomenon		Checking method
Room lamp does not come on when a door is opened with the room lamp switch in the DOOR position.	The foot lamp and ignition key cylinder illumination lamp don't illuminate, either.	• Check the door switch input signal. (Refer to P.54-47.) • Check the door switch. (Refer to GROUP 42-Door Assembly.)
	The foot lamp and ignition key cylinder illumination lamp illuminate.	• Check the dome lamp switch. • Check the dome lamp bulb.
Room lamp, foot lamp and ignition key illumination lamp go out at once when doors are closed.		• Check the door switch input signal. (Refer to P.54-47.)
Even if ignition switch is turned on while lamp are being dimmed, lamp do not go out at the same time.		• Check the ignition switch input signal. (Refer to P.54-47.)

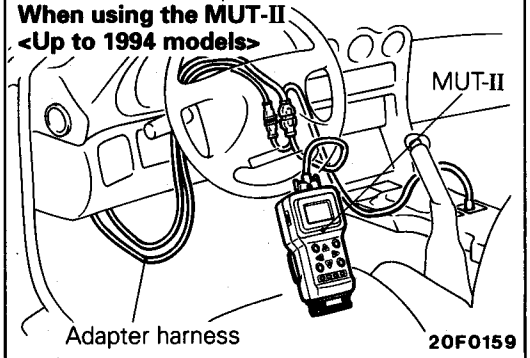
<Up to 1994 models>



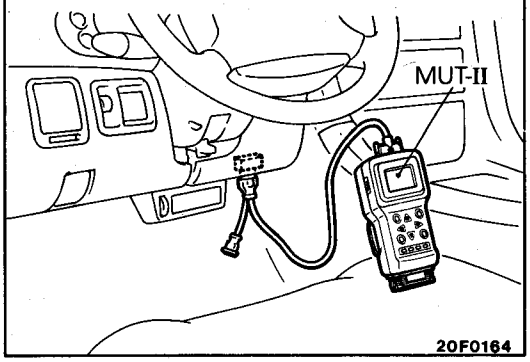
When using the MUT



When using the MUT-II
<Up to 1994 models>



<From 1995 models>



Input Signal

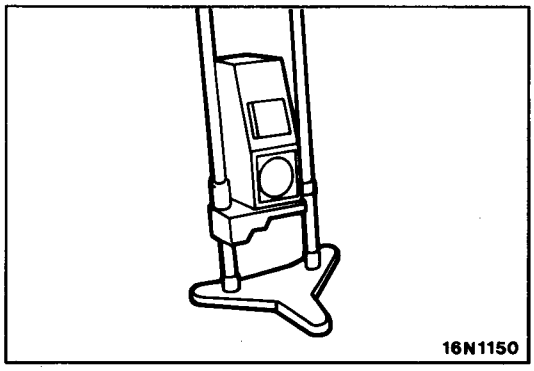
Using the MUT or MUT-II, check whether or not the input signals from each switch are being sent to the ETACS unit.

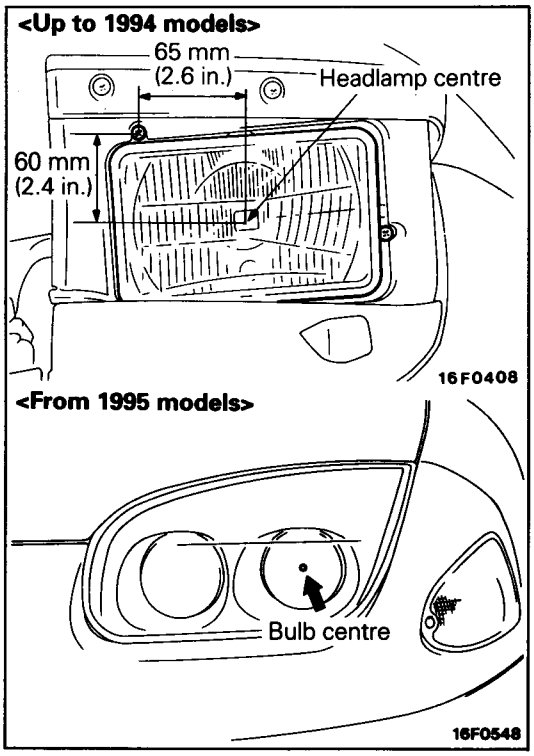
(1) Connect the MUT or MUT-II to the diagnosis check connector located near the junction block.

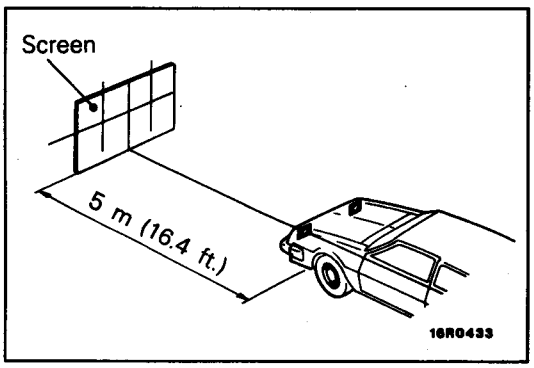
NOTE
When connecting MUT-II to 1994 models, use the adapter harness which belongs to MUT-II sub-assembly.

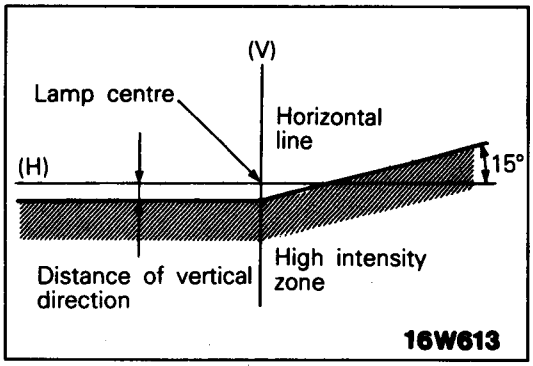
Caution
Connect and disconnect either MUT or MUT-II with the ignition switch in the OFF position.

(2) Check if the buzzer of the MUT or MUT-II operates when each switch is operated.
If the buzzer operates, the input signals are being sent to the ETACS unit, so that switch can be considered to be functioning normally. If not, switch or switch input circuit is faulty. Check the switch and the switch input circuit.


16N1150







SERVICE ADJUSTMENT PROCEDURES

E54GGBD

HEADLAMP AIMING

<Using a Beamsetting Equipment>

(1) The headlamps should be aimed with the proper beamsetting equipment, and in accordance with the equipment manufacture's instructions.

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

(2) Alternately turn the adjusting screw to adjust the headlamp aiming. (Refer to P.54-49.)

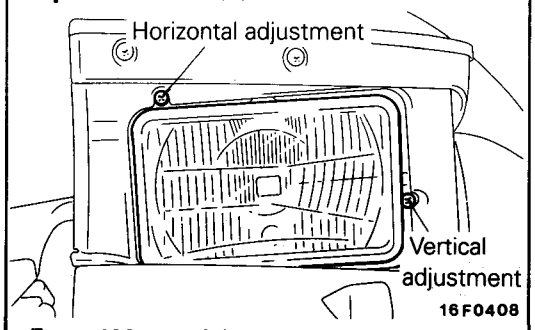
<Using a Screen>

(1) Measure the centre of the headlamp as shown in the illustration.
(2) Inflate the tyres to the specified pressures and remove the load from the vehicle (except a driver).
(3) Set the distance between the screen and the centre of the headlamps as shown in the illustration.
(4) With the engine running at 2,000 r/min, aim the headlamps.
(5) Check if the beam shining onto the screen is at the standard value.

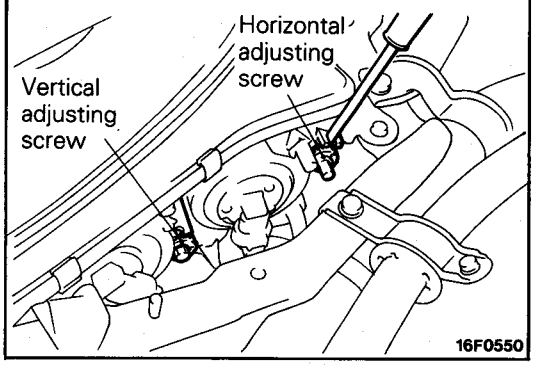
Standard value: <For lower beam adjustment>
(Vertical direction)
60mm (2.36 in.) below horizontal (H)
(Horizontal direction)
Position where the 15° sloping section intersects the vertical line (V)

Caution
When making the aiming adjustment, be sure to mask those lamps which are not being adjusted.
When it is difficult, because of outside light, to distinguish the light/dark dividing line, use a curtain, screen or similar material to reduce the effects of the outside light.

<Up to 1994 models>



<From 1995 models>



(6) Alternately turn the adjusting screw to adjust the headlamp aiming.

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

INTENSITY MEASUREMENT

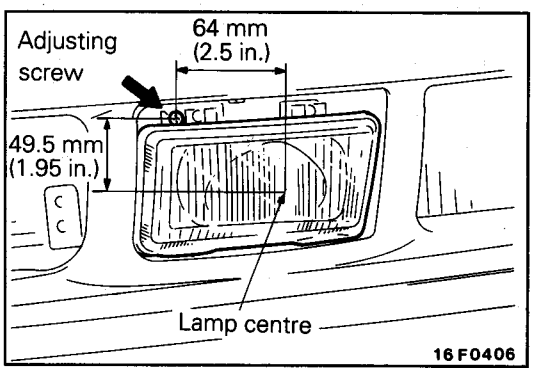
Using a photometer, and following its manufacture's instruction manual, measure the headlamp intensity and check to be sure that the limit value is satisfied.

Limit: 30,000 cd or more

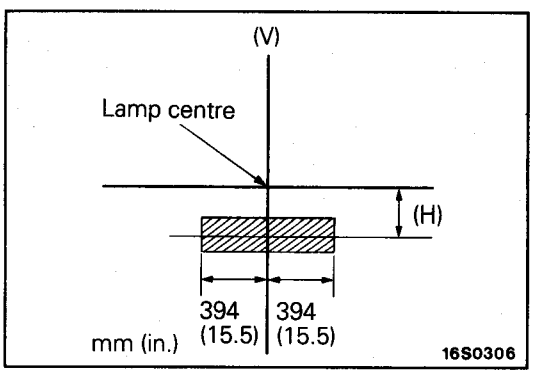
NOTE
1. When measuring the intensity, maintain an engine speed of 2,000 r/min., with the battery in the charging condition.
2. There may be special local regulations pertaining to headlamp intensity; be sure to make any adjustments necessary to satisfy such regulations.
3. If an illuminometer is used to make the measurements, convert its values to photometer values by using the following formula.

$I = Er^2$ Where: I = intensity (cd)
E = illumination (lux)
r = distance (m) from headlamps to illuminometer

DRIVING LAMP AIMING <Up to 1994 models>



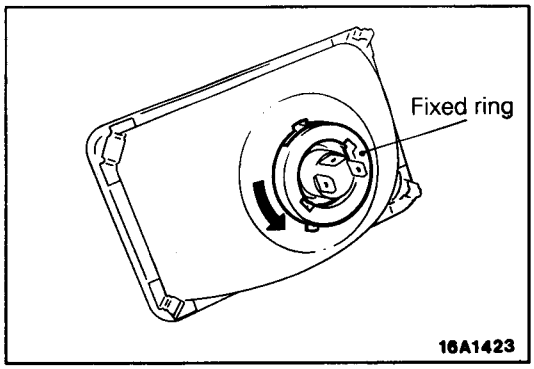
1. Measure the centre of the driving lamps, as shown in the illustration.
2. Inflate the tyres to the specified pressures and remove the load from the vehicle (except a driver).
3. Set the distance between the screen and the centre of the driving lamps at 5 m (16.4 ft.). (Refer to P.54-48.)
4. Set the headlamp at the upper beam, and turn on the driving lamp.
5. With the engine running at 2,000 r/min., aim the driving lamp.
6. Check if the beam shining onto the screen is at the standard value.

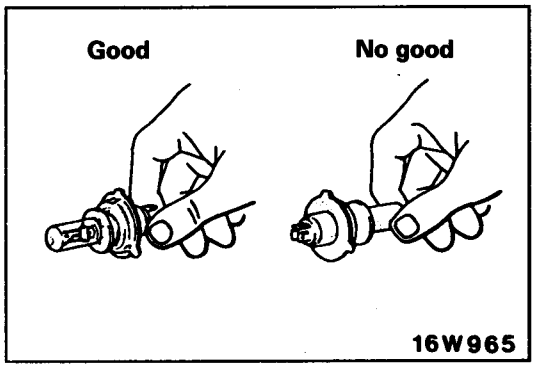


Standard value:
(Vertical direction)
140 mm (5.5 in.) below horizontal (H)
(Horizontal direction)
Deviation of light beam axis is within 394 mm (15.5 in.) to the left and right

NOTE
The horizontal direction is non-adjustable. If the deviation of the light beam axis exceeds the standard value, check to be sure that the mounting location or some other point is not defective.

Caution
When making the aiming adjustment, be sure to mask those lamps which are not being adjusted.





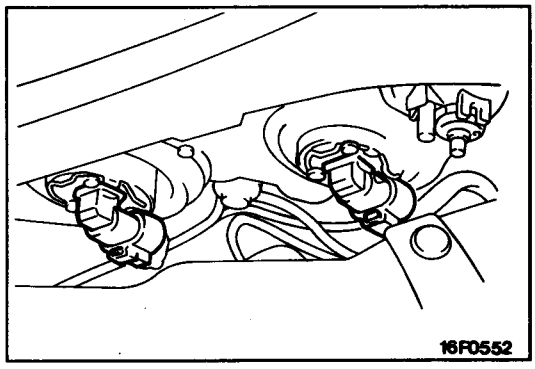
REPLACEMENT OF REPLACEABLE BULB

<Headlamp Bulb(Up to 1994 models)>

1. Remove the headlamp.
   (Refer to P.54-51.)
2. After removing the cap, remove the fixed ring and take out the bulb.

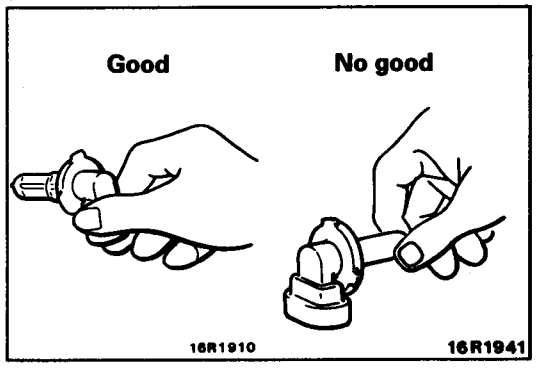
   Caution
   1. **Never hold the halogen lamp bulb with a bare hand, dirty glove, etc.**
   2. **If the glass surface is dirty, be sure to clean it with alcohol, paint thinner, etc., and install it after drying it thoroughly.**
3. Be sure to attach the cap.

   NOTE
   Be sure to install the cap securely because, if it is not, an insecure installation could cause such problems as clouding of the lens, or intrusion of moisture to inside the lamp unit.

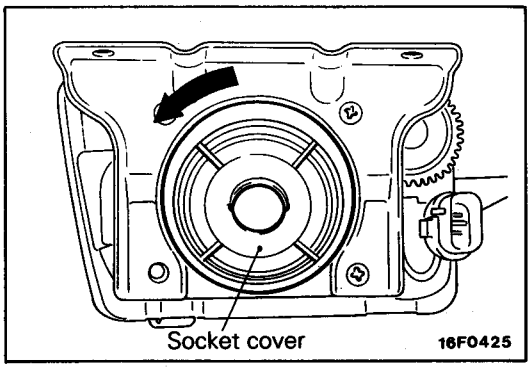


<Headlamp Bulb (From 1995 models)>

1. Disconnect the connector.
2. Turn the valve socket counterclockwise and remove the valve.

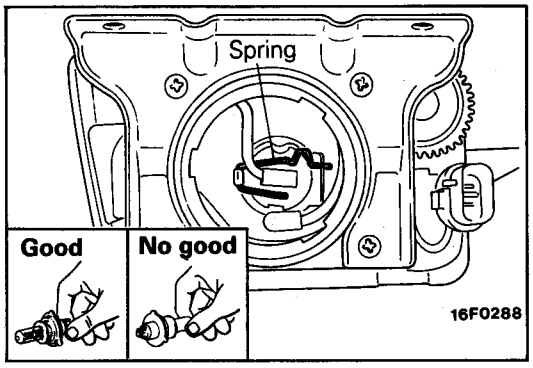


Caution
1. **Never hold the halogen lamp bulb with a bare hand, dirty glove, etc.**
2. **If the glass surface is dirty, be sure to clean it with alcohol, paint thinner, etc., and install it after drying it thoroughly.**



<Driving Lamp Bulb (Up to 1994 models)>

1. Remove the driving lamp. (Refer to P.54-53.)
2. Disconnect the socket cover.



3. Remove the bulb attachment spring and pull out the bulb.

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

4. Install the socket cover securely.

   NOTE
   Be sure to install the socket cover securely because, if it is not, an insecure installation could cause such problems as clouding of the lends, or intrusion of moisture to inside the lamp unit.

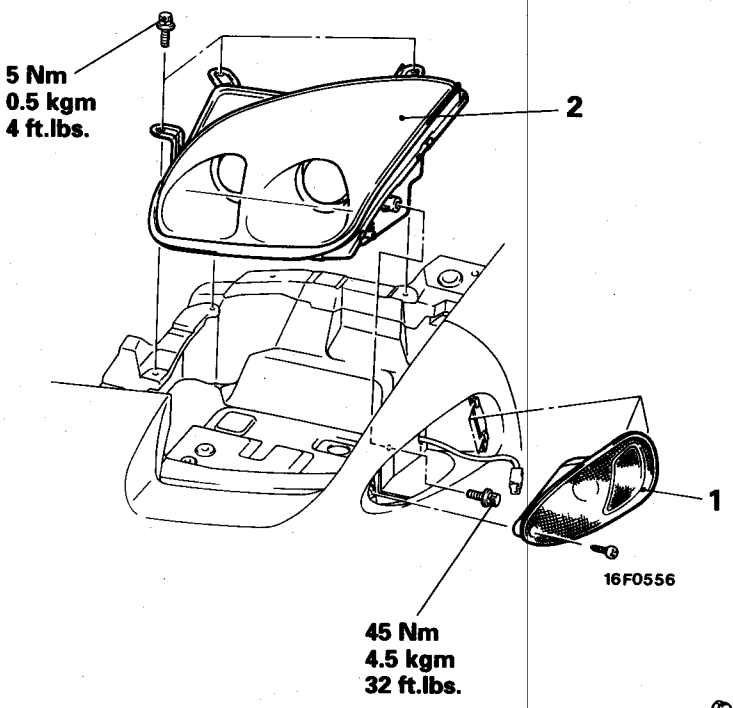
NOTES

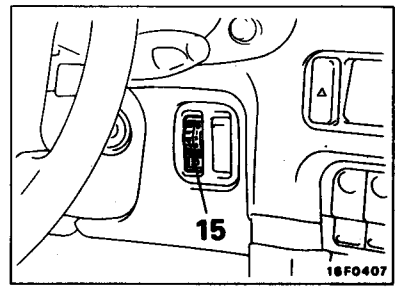
HEADLAMP

E54GHAV

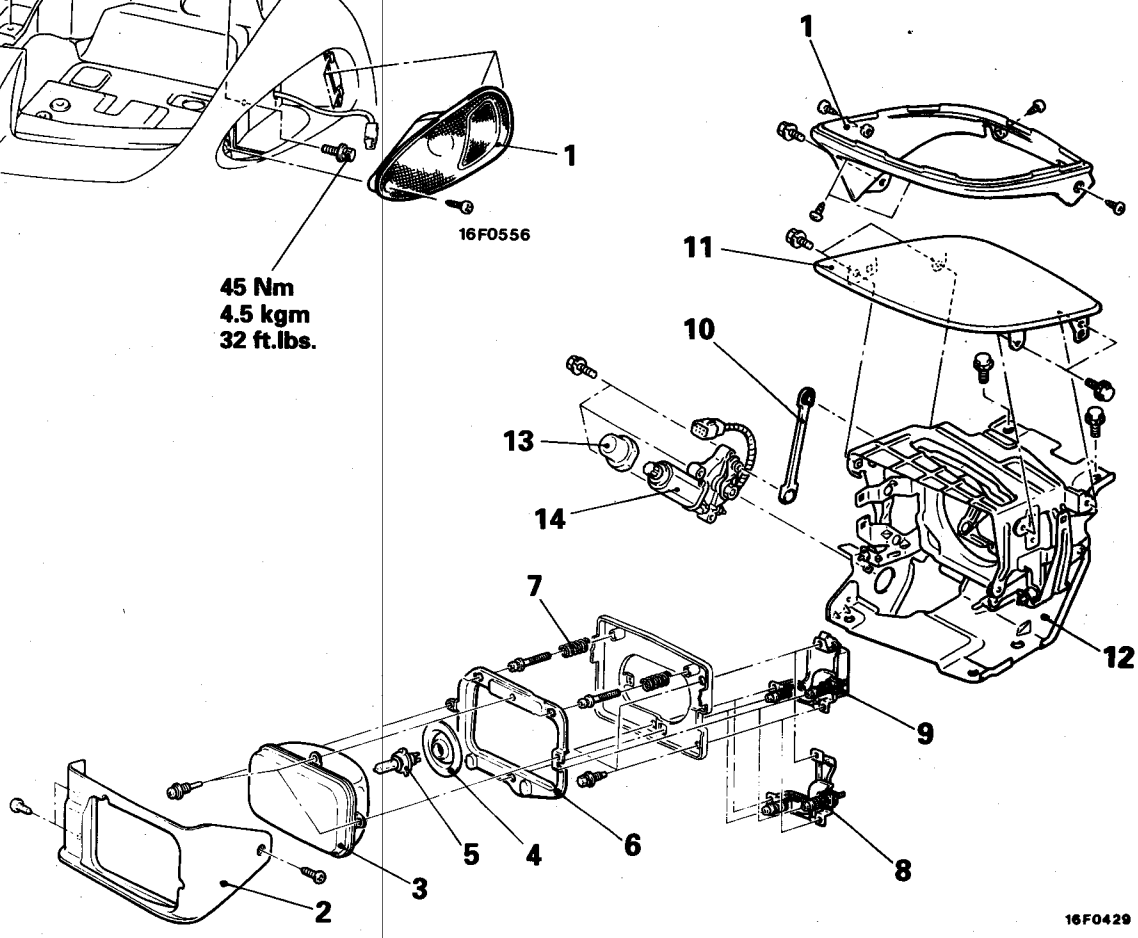
REMOVAL AND INSTALLATION

<From 1995 models>





<Up to 1994 models>



Removal steps (From 1995 models)
1. Front turn lamp assembly
2. Headlamp

Removal steps (Up to 1994 models)

◆◆ 1. Headlamp bezel, upper
2. Headlamp bezel, lower
3. Headlamp
4. Socket cover
◆◆ 5. Bulb
6. Mounting ring
7. Spring
8. Headlamp leveling unit (Vehicles with headlamp leveling)
9. Adjuster assembly (Vehicles without headlamp leveling)
◆◆ 10. Rod assembly
11. Headlamp hood
12. Link assembly
13. Boot
14. Pop-up motor

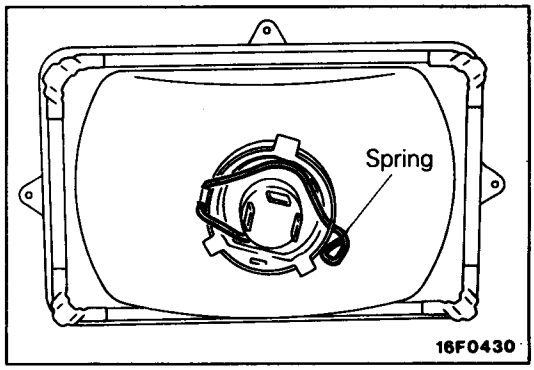
Headlamp leveling switch removal

15. Headlamp leveling switch

SERVICE POINTS OF REMOVAL

1. REMOVAL OF HEADLAMP BEZEL, UPPER

(1) Raise the headlamps by using the pop-up switch. Disconnect the negative (–) battery terminal.
(2) Remove the headlamp bezel, upper.

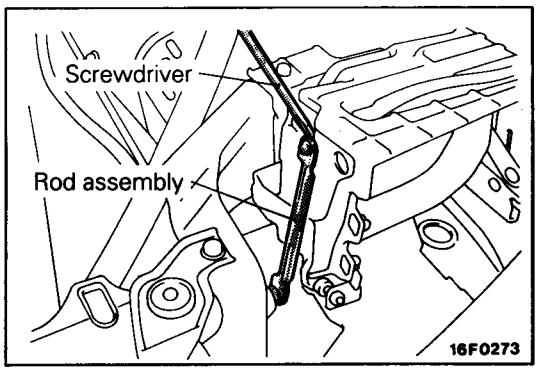


5. REMOVAL OF BULB

Remove the bulb mounting spring and take out the bulb.

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

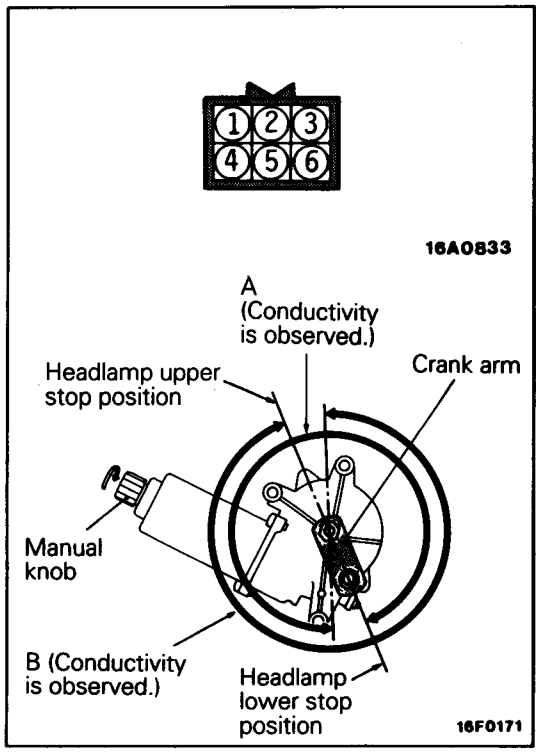
NOTES



10. REMOVAL OF ROD ASSEMBLY

Using a flat head screwdriver (wrap cloth or similar on the ball joint area to prevent injury), disconnect the connector.

NOTE
When disconnecting the rod assembly from the link, hold the link by hand.



INSPECTION

POP-UP MOTOR

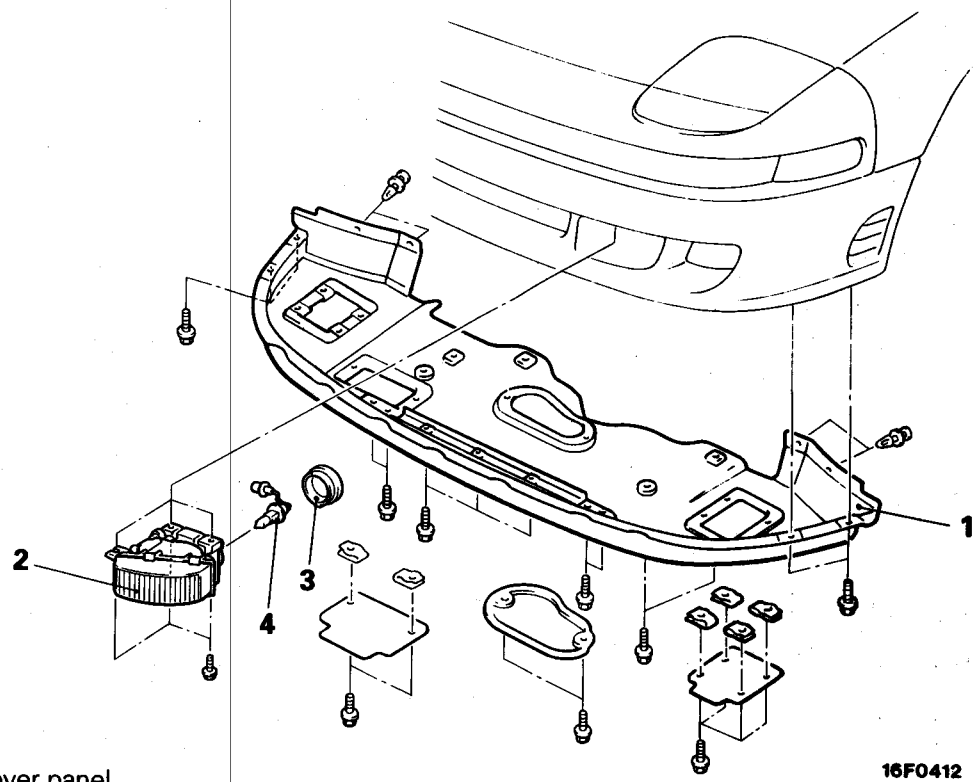
Rotate the manual knob of the pop-up motor clockwise by hand to check continuity between terminals.

Terminal	Continuity range
When the (+) terminal of the ohmmeter is connected to ① and the (–) terminal is connected to ②	B
When the (+) terminal of the ohmmeter is connected to ① and the (–) terminal is connected to ⑤	A

DRIVING LAMP<UP TO 1994 MODELS>

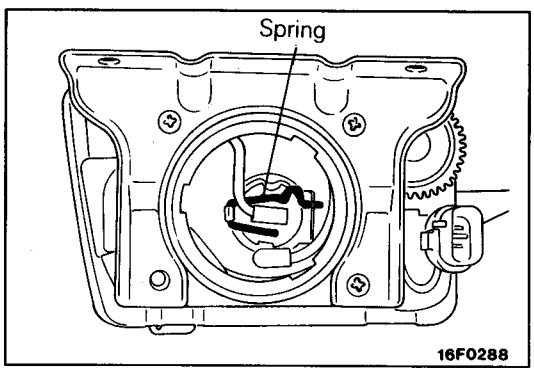
E54GC--

REMOVAL AND INSTALLATION



Removal steps

1. Front under cover panel
2. Driving lamp
3. Socket cover
4. Bulb



SERVICE POINT OF REMOVAL

4. REMOVAL OF BULB

(1) Remove the socket cover.
(2) Remove the bulb mounting spring and remove the bulb.

Caution
Do not touch the surface of the headlamp bulb with bare hands or dirty gloves.
If there are deposits on the surface, loosen and remove the deposits with a cloth dipped in alcohol or thinner, and let the surface dry before mounting the bulb.

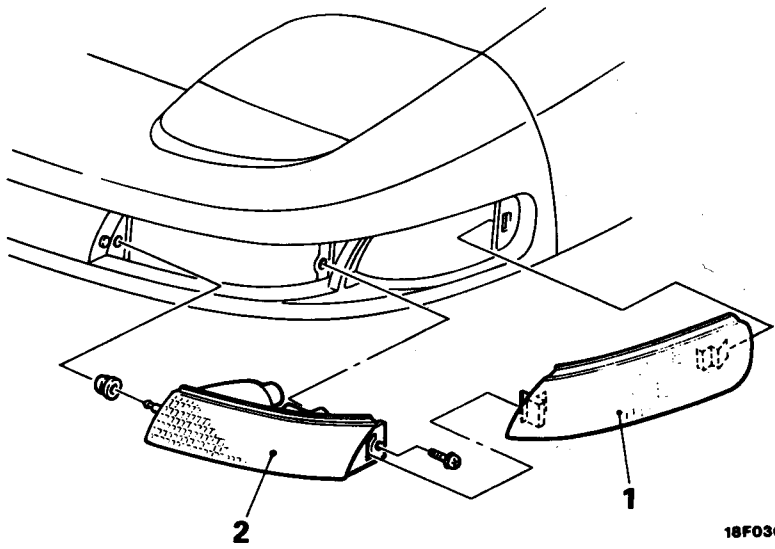
FRONT COMBINATION LAMP<Up to 1994 models>

E54GO--

REMOVAL AND INSTALLATION

Removal steps

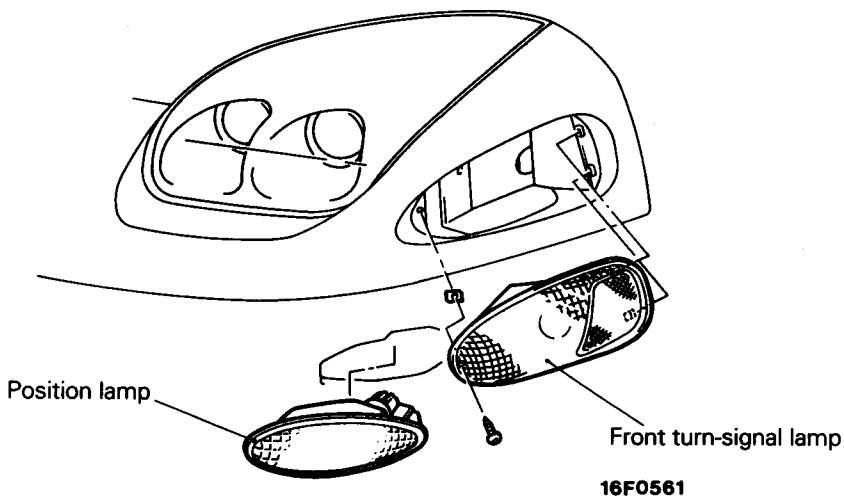
1. Front combination lamp garnish
2. Front combination lamp



18F0300

FRONT TURN SIGNAL LAMP AND POSITION LAMP<From 1995 models>

REMOVAL AND INSTALLATION

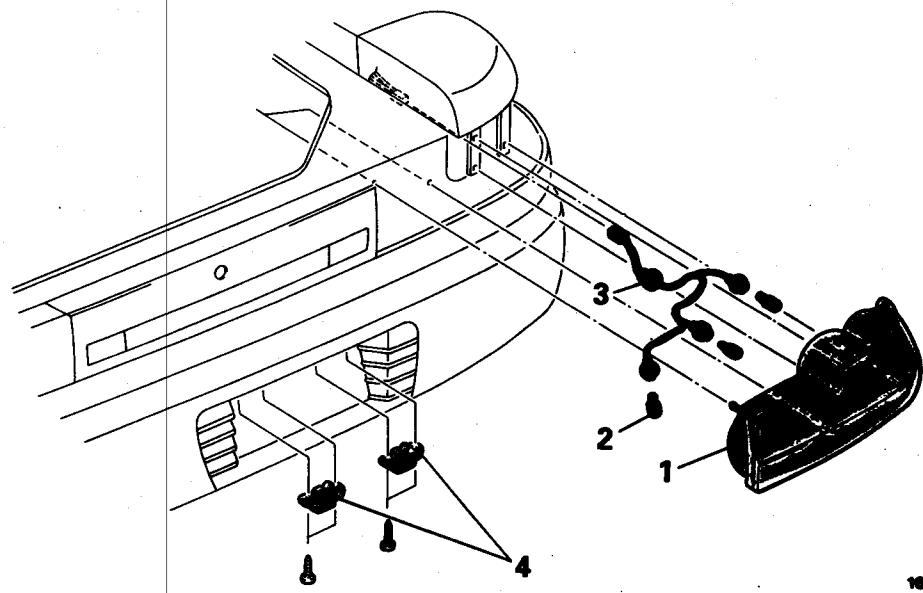


16F0561

REAR COMBINATION LAMP AND LICENSE PLATE LAMP

REMOVAL AND INSTALLATION

E54GV--



Rear combination lamp removal steps

1. Rear combination lamp unit
2. Bulb
   Rear side trim (Refer to GROUP 52A – Trims.)
3. Socket assembly

License plate lamp removal

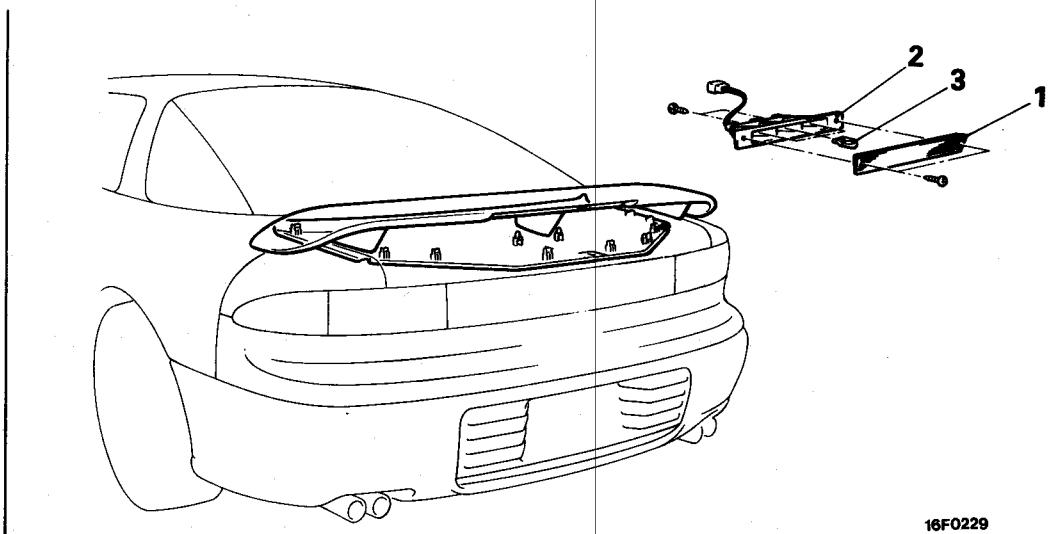
4. License plate lamp

NOTES

HIGH MOUNTED STOP LAMP (Option)

E54GU--

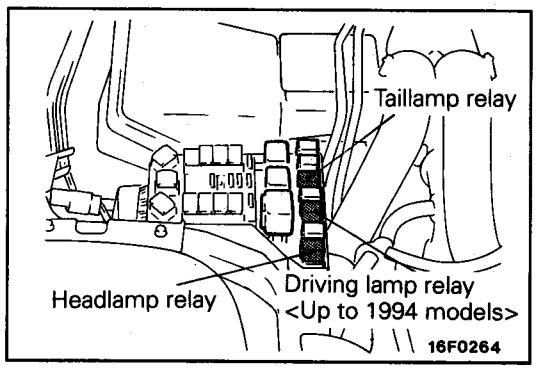
REMOVAL AND INSTALLATION



16F0229

Removal steps

1. Lamp unit
2. Socket assembly
3. Bulb



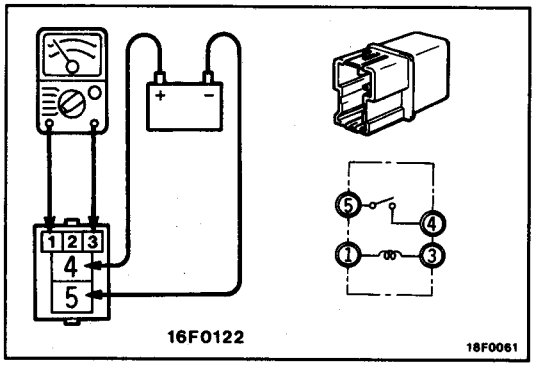
RELAY

E54GIAW

INSPECTION

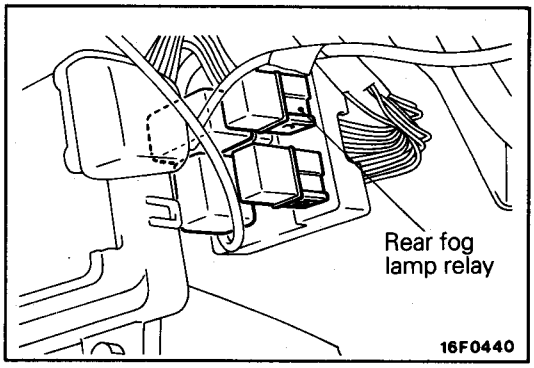
HEADLAMP RELAY / TAILLAMP RELAY / DRIVING LAMP RELAY <Up to 1994 models>

(1) Take out the headlamp relay, taillamp relay or driving lamp relay from the engine compartment relay box.



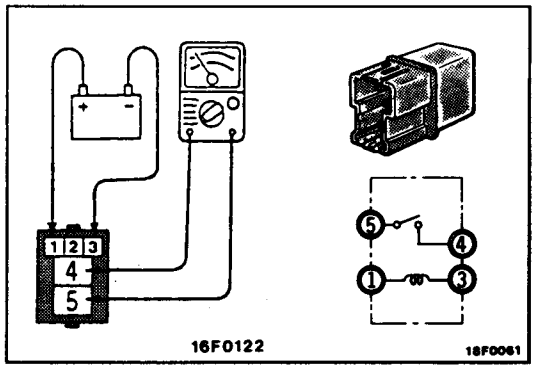
(2) Connect battery to terminal 1 and check continuity between terminals with terminal 3 earthed.

Power is supplied	4 – 5 terminals	Continuity
Power is not supplied	4 – 5 terminals	No continuity
	1 – 3 terminals	Continuity



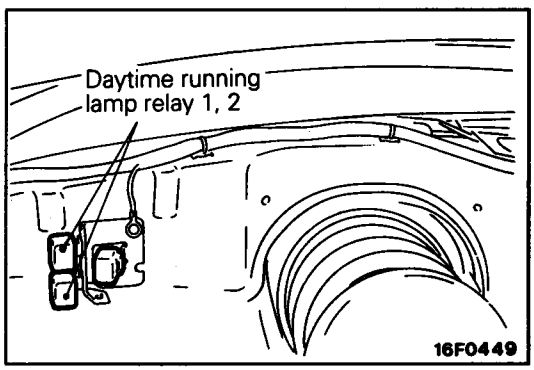
REAR FOG LAMP RELAY

(1) Remove rear fog lamp relay from the instrument panel relay box.



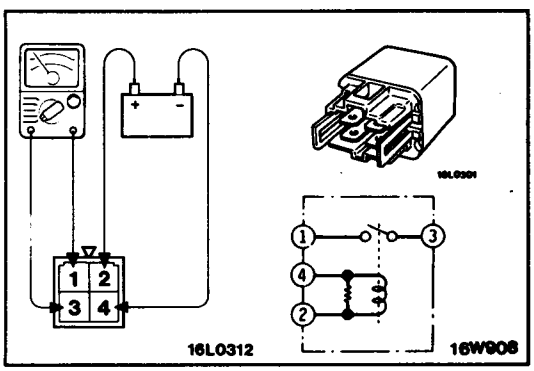
(2) Connect battery to terminal 1 and check continuity between terminals with terminal 3 earthed.

Power is supplied	4 – 5 terminals	Continuity
Power is not supplied	4 – 5 terminals	No continuity
	1 – 3 terminals	Continuity



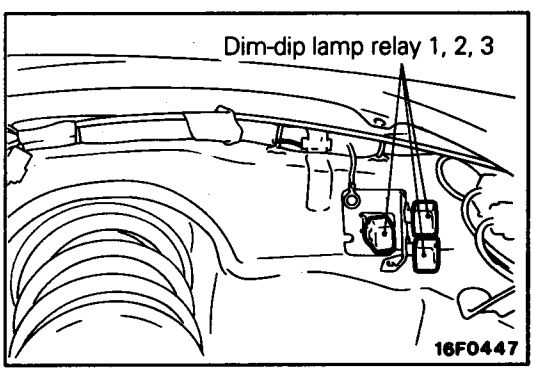
DAYTIME RUNNING LAMP RELAY

(1) Remove the splash shield (LH) and take out the daytime running lamp relay 1 and 2.



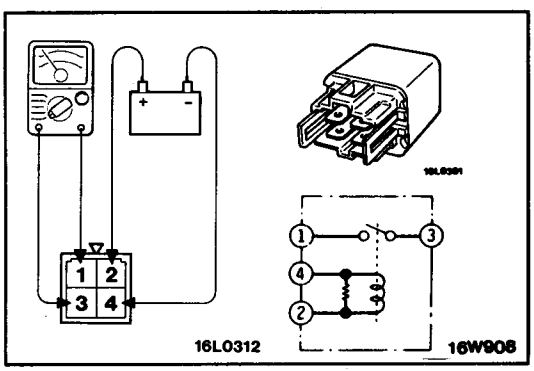
(2) Connect battery to terminal 2 and check continuity between terminals with terminal 4 earthed.

Power is supplied	1 – 3 terminals	Continuity
Power is not supplied	1 – 3 terminals	No continuity
	2 – 4 terminals	Continuity



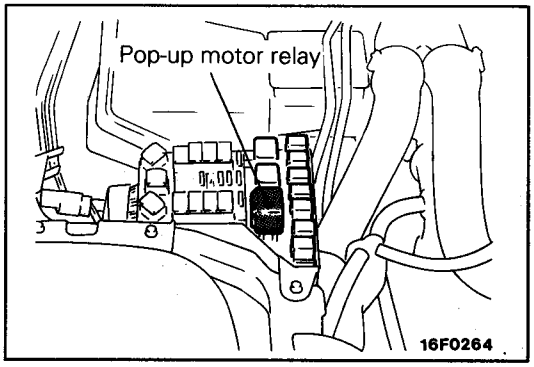
DIM-DIP LAMP RELAY <R.H. drive vehicles>

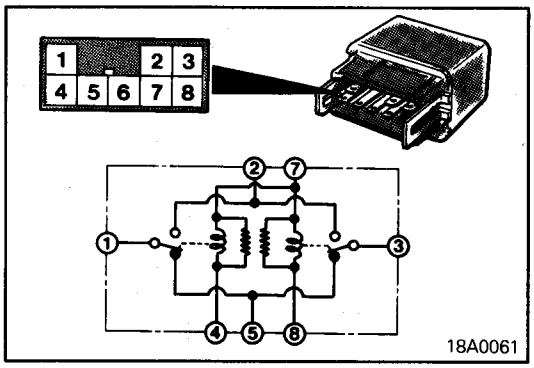
(1) Remove the splash shield (R.H.) and take out the dim-dip lamp relay 1, 2 and 3.

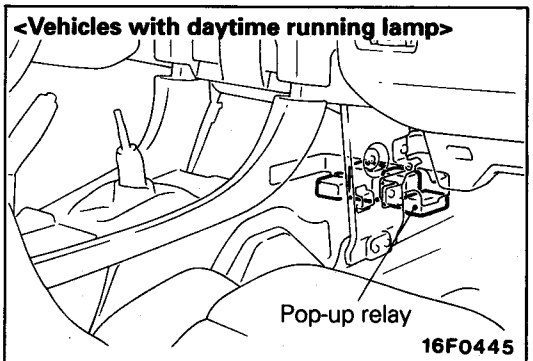


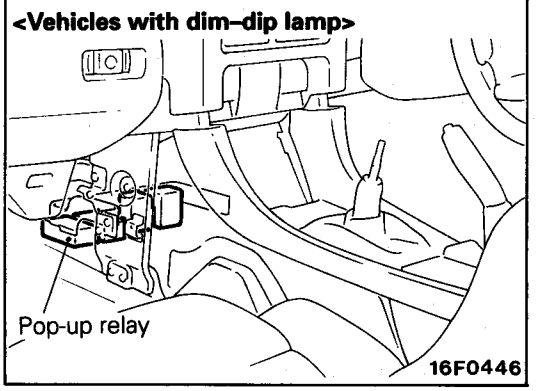
(2) Connect battery to terminal 2 and check continuity between terminals with terminal 4 earthed.

Power is supplied	1 – 3 terminals	Continuity
Power is not supplied	1 – 3 terminals	No continuity
	2 – 4 terminals	Continuity









POP-UP MOTOR RELAY <Up to 1994 models>

(1) Take out the pop-up motor relay from the engine compartment relay box.

(2) Check for continuity between terminals under the conditions described below.

Terminal / Battery voltage	1	2	3	4	5	7	8
Voltage applied	○		○	○	○	○	○
No voltage applied	○	○		⊖		⊕	
		○	○			⊕	⊖

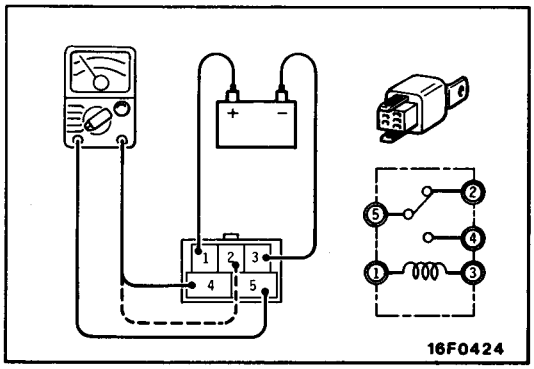
NOTE
(1) ○—○ indicates that there is continuity between the terminals.
(2) ⊕---⊖ indicates terminals to which battery voltage is applied.

POP-UP RELAY <Vehicles with daytime running lamp or dim-dip lamp> (Up to 1994 models)

(1) Remove the radio panel and radio (Refer to P.54-90.)
(2) Take out the pop-up relay from relay bracket.

(3) Connect battery to terminal 1 and check continuity between terminals with terminal 3 earthed.

Power is supplied	4 – 5 terminals	Continuity
	2 – 5 terminals	No continuity
Power is not supplied	2 – 5 terminals	Continuity
	1 – 3 terminals	
	4 – 5 terminals	No continuity

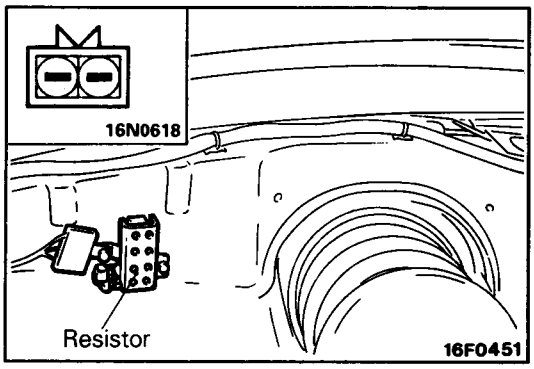


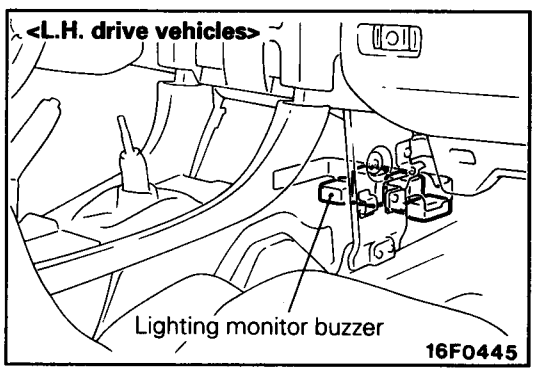
RESISTOR <R.H. drive vehicles>

INSPECTION

(1) Remove the splash shield (L.H.)
(Refer to GROUP 42 – Fender.)
(2) Remove the resistor connector.
(3) Connect an ohmmeter to the resistor connector terminal and check the resistance value.

Standard value: Approx. 1 Ω

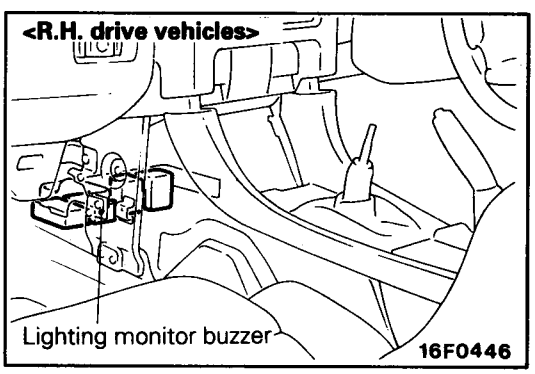


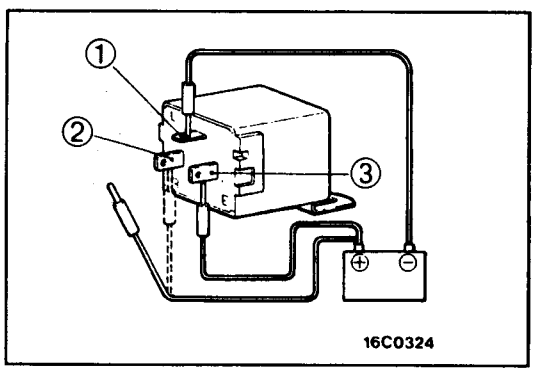


LIGHTING MONITOR BUZZER

INSPECTION

(1) Remove the radio panel and radio (Refer to P.54-90.)
(2) Take out the lighting monitor buzzer.



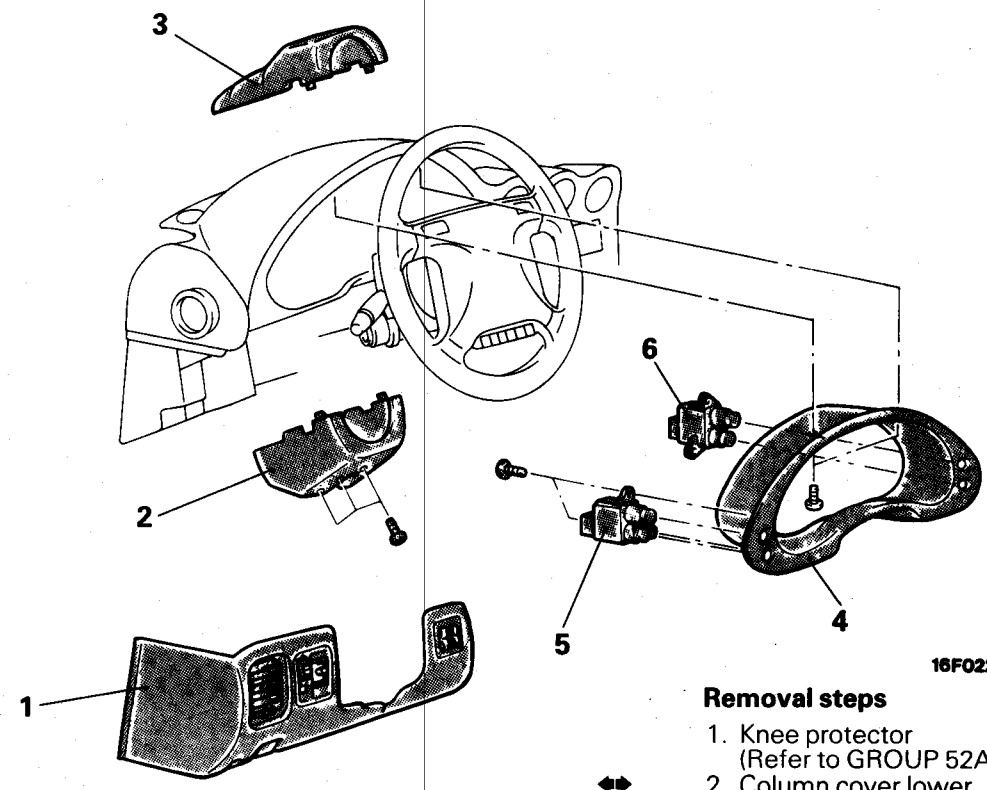


(1) Check to be sure that the buzzer sounds when battery voltage is applied to terminal ③ and terminal ① is earthed.
(2) Check to be sure that the buzzer stops sounding when battery voltage is applied to terminal ②.

POP-UP SWITCH* AND REAR FOG LAMP SWITCH

E54GYAI

REMOVAL AND INSTALLATION

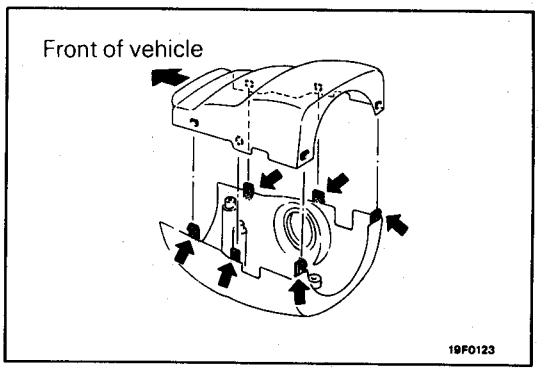


16F0220

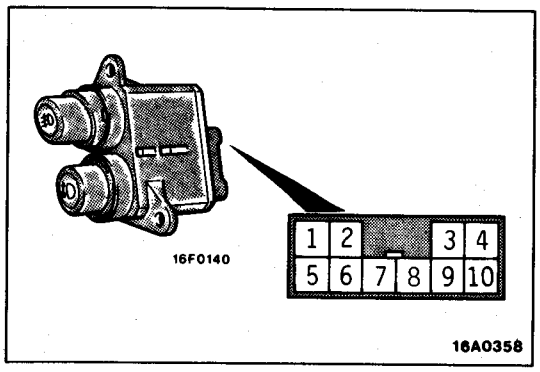
Removal steps

1. Knee protector (Refer to GROUP 52A – Instrument Panel.)
2. Column cover lower
3. Column cover upper
4. Meter bezel
5. Pop-up switch* and rear fog lamp switch
6. Rear window defogger switch

NOTE
*: Up to 1994 models



19F0123



16F0140

16A0358

SERVICE POINTS OF REMOVAL

2. REMOVAL OF COLUMN COVER LOWER / 3. COLUMN COVER UPPER

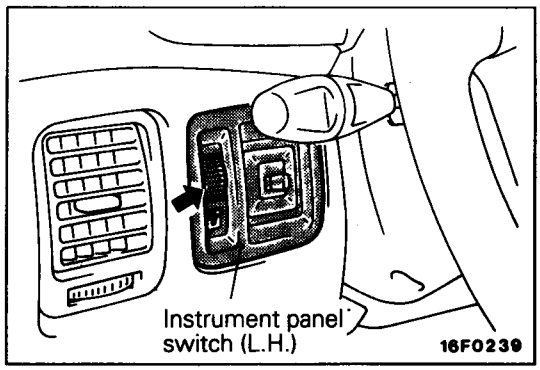
After the screws have been removed, remove the covers, while making sure not to break the grippers.

INSPECTION

Operate the switch to check for continuity between terminals.

Switch position		Terminal 1	5	8	9	10	3	4
Pop-up switch <Up to 1994 models>	UP				○—○		Illumination lamp	
	DOWN			○—		—○		
Rear fog lamp switch	ON	○—○						
	OFF							

NOTE
(1) ○—○ indicates that there is continuity between the terminals.
(2) Refer to P.54-98. Check the rear window defogger switch.

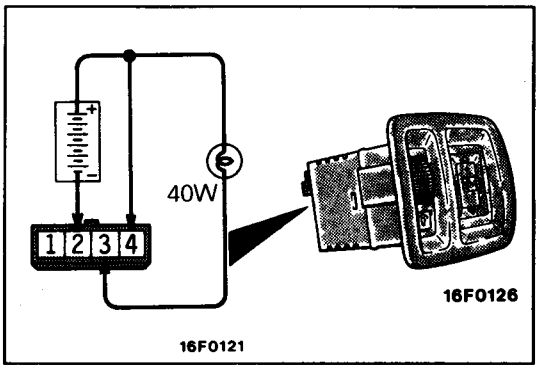


RHEOSTAT

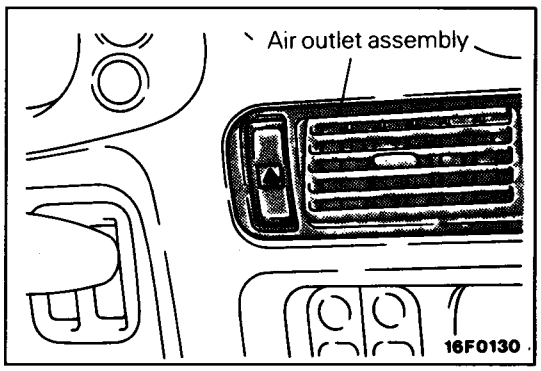
E54GNBC

INSPECTION

(1) Remove the instrument panel switch (L.H.) from the knee protector.



(2) Connect the battery and a test bulb (40W) as shown in the figure.
(3) The function of the rheostat is normal if the intensity of illumination changes smoothly, without flashing or flickering, when the rheostat is operated.

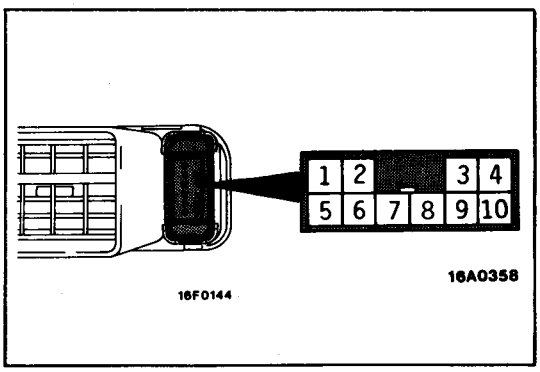


HAZARD LAMP SWITCH

E54GYAJ

INSPECTION

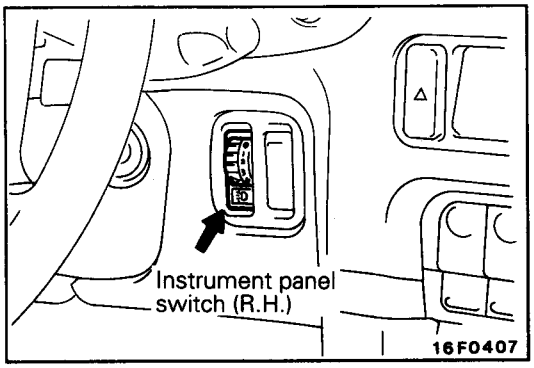
(1) Remove the center air outlet assembly from instrument panel. [Refer to GROUP 55 – Ventilators (Instrument Panel).]

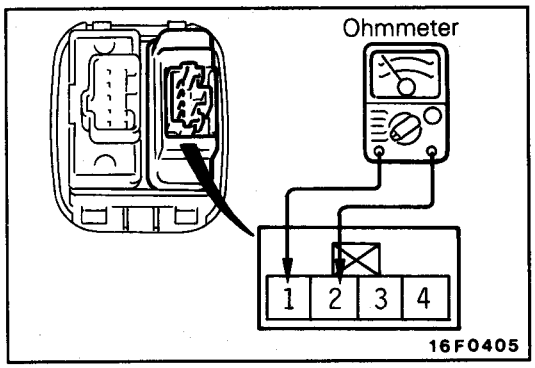


(2) Operate the switch to check for continuity between terminals.

Switch position \ Terminal	1	5	6	7	8	9	10	2	3
ON			○	○	○	○	○		
OFF		○			○			Illumination lamp	

NOTE
○–○ indicates that there is continuity between the terminals.





HEADLAMP LEVELING SWITCH E54GYAK

(1) Remove the instrument panel switch (R.H.) from the knee protector.

(2) Connect the ohmmeter to headlamp levelling switch connector terminals ① and ②.
(3) Operate the switch and check the resistance values in each switch position.

Standard value:

Switch position	0	1	2	3	4
Resistance Ω	120	300	620	1,100	2,000

COLUMN SWITCH

SPECIFICATIONS

GENERAL SPECIFICATIONS

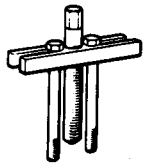
E54HA--

Items	Specifications
Column switch	
Lighting switch	
Rated load A	0.22 ± 0.05
Voltage drop V	0.2 or less
Turn-signal lamp switch	
Rated load A	6.6 ± 0.5
Voltage drop V	0.2 or less
Dimmer/passing lamp	
Rated load A	
High beam	10.7 ± 0.8
Low beam	9.8 ± 0.7
Passing	20.5 ± 1.5
Voltage drop V	0.2 or less

NOTE
For the wiper and washer switch, refer to GROUP 51 – Windshield Wiper and Washer.

SPECIAL TOOL

E54HF--

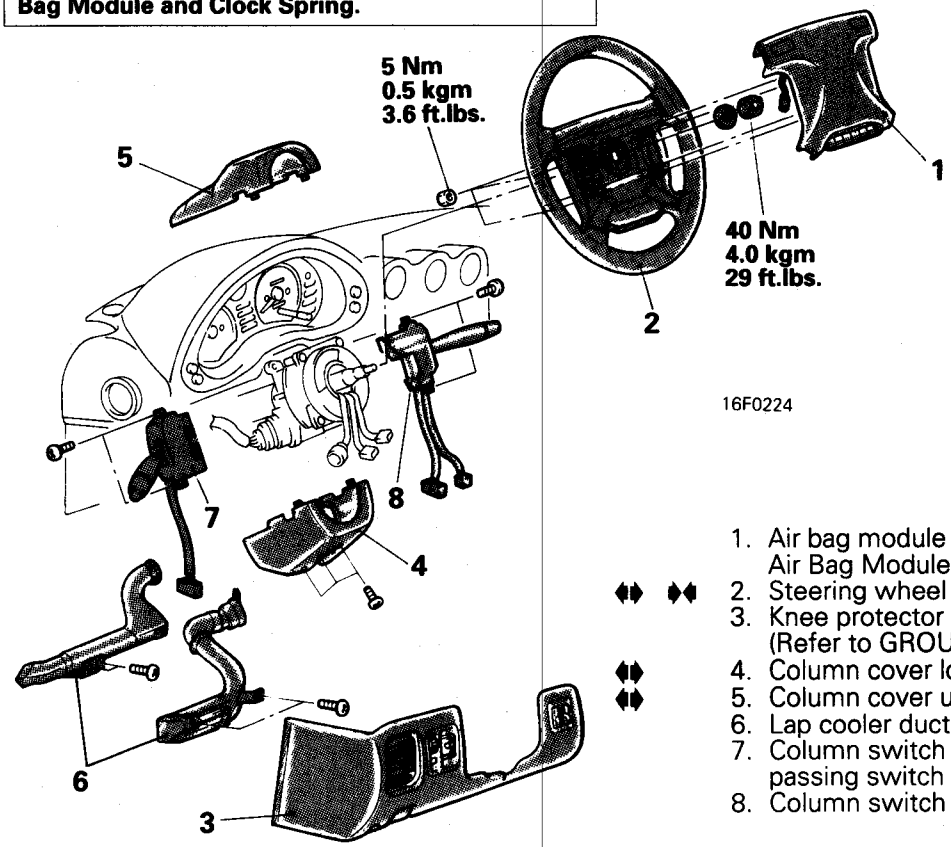
Tool	Number	Name	Use
	MB990803	Steering wheel puller	Removal of steering wheel

COLUMN SWITCH

E54HH--

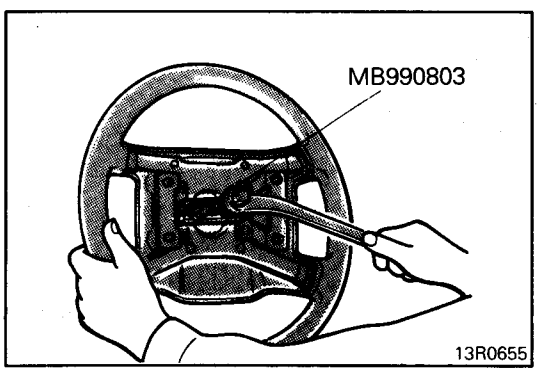
REMOVAL AND INSTALLATION

CAUTION: SRS
Before removal of the air bag module, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.

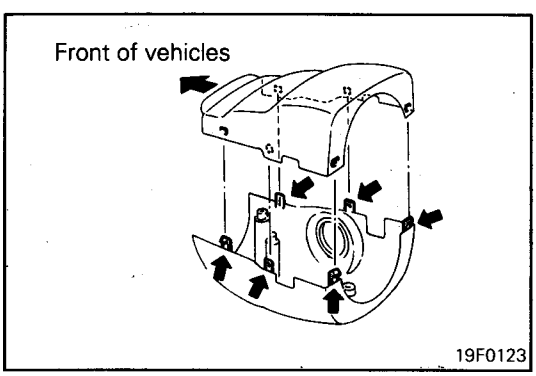


16F0224

1. Air bag module (Refer to GROUP 52B – Air Bag Module and Clock Spring.)
2. Steering wheel
3. Knee protector (Refer to GROUP 52A – Instrument Panel.)
4. Column cover lower
5. Column cover upper
6. Lap cooler duct and foot shower duct
7. Column switch left (For lighting switch, dimmer/ passing switch and turn signal lamp switch)
8. Column switch right (For wiper and washer switch)



13R0655



19F0123

SERVICE POINTS OF REMOVAL

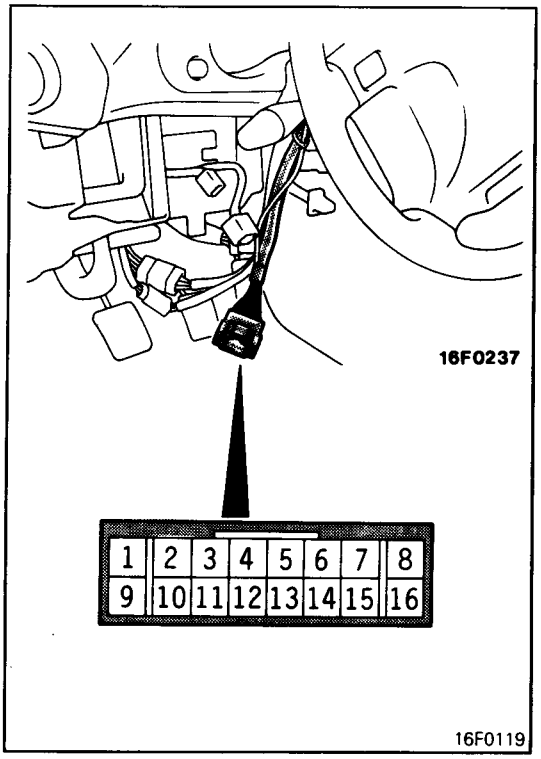
E54HIAI

2. REMOVAL OF STEERING WHEEL

Caution
Do not hammer on the steering wheel. Doing so may damage the collapsible column mechanism.

4. REMOVAL OF COLUMN COVER LOWER / 5. COLUMN COVER UPPER

After the screws have been removed, remove the covers, while making sure not to break the grippers.



INSPECTION

(1) Remove the knee protector and the column cover. (Refer to GROUP 52A – Instrument Panel.)
(2) Disconnect the column switch left connector (16 terminals) and check the continuity between the terminals for each switch.

LIGHTING SWITCH

Operate the switch and check the continuity between the terminals.

Switch position \ Terminal	3	5	6	7	10	14
OFF		○—○				
TOD		○—○			○—○	
≡D	○—	○—	——	—○	○—	—○

NOTE
○–○ indicates that there is continuity between the terminals.

TURN SIGNAL LAMP SWITCH

Operate the switch and check the continuity between the terminals.

Switch position \ Terminal	1	12	13
Left	○—	——	—○
Neutral			
Right	○—	—○	

NOTE
○–○ indicates that there is continuity between the terminals.

DIMMER/PASSING SWITCH

Operate the switch and check the continuity, between the terminals.

Switch position \ Terminal		2	8	9	16
Dimmer switch	LOW			○—○	
	HIGH		○—	—○	
Passing switch		○—	—○	—○	

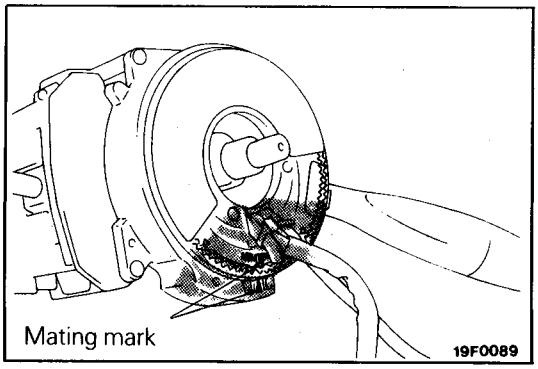
NOTE
○–○ indicates that there is continuity between the terminals.

WIPER AND WASHER SWITCH

Refer to GROUP 51 – Windshield Wiper and Washer.

HEADLAMP WASHER SWITCH

Refer to GROUP 51 – Headlamp Washer.



SERVICE POINT OF INSTALLATION

2. INSTALLATION OF STEERING WHEEL

To center the clock spring, line up the "NEUTRAL" mark of the clock spring with the mating mark.

Caution

If the clock spring's mating mark is not properly aligned, the steering wheel may not be completely rotational during a turn, or the flat cable within the clock spring may be severed, obstructing normal operation of the SRS and possibly leading to serious injury to the vehicle's driver.

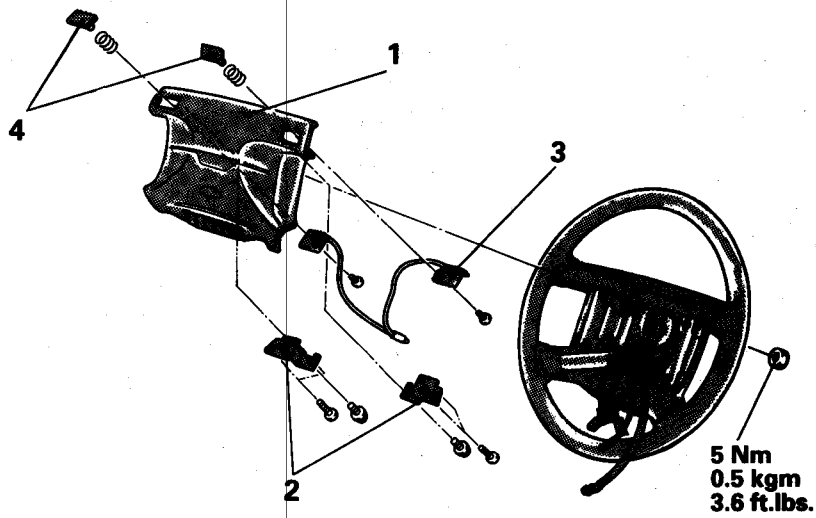
E54IQ–

HORN SWITCH

REMOVAL AND INSTALLATION

CAUTION: SRS
Before removal of the air bag module, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.

<Up to 1994 models>

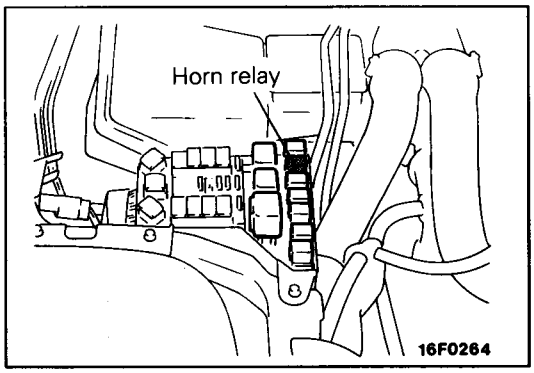


Removal steps

1. Air bag module (Refer to GROUP 52B – Air Bag Module and Clock Spring.)
2. Horn contact switch
3. Horn contact plate and wire
4. Horn switch

<FROM 1995 MODELS>

The horn switch is not supplied by itself.
If it is faulty, replace the steering wheel assembly.

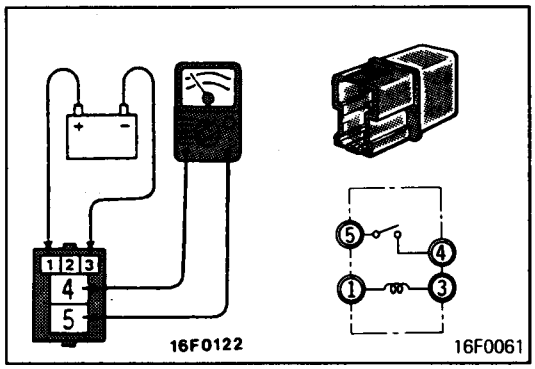


RELAY

INSPECTION

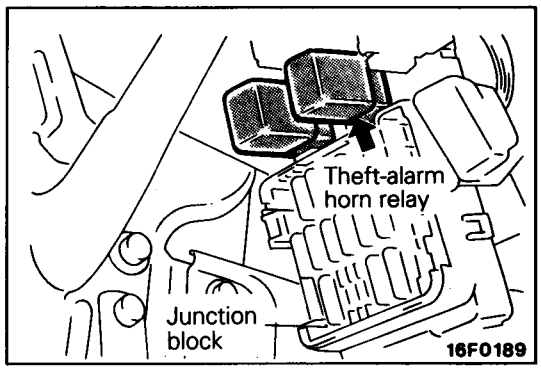
HORN RELAY

(1) Take out the horn relay from the engine compartment relay box.



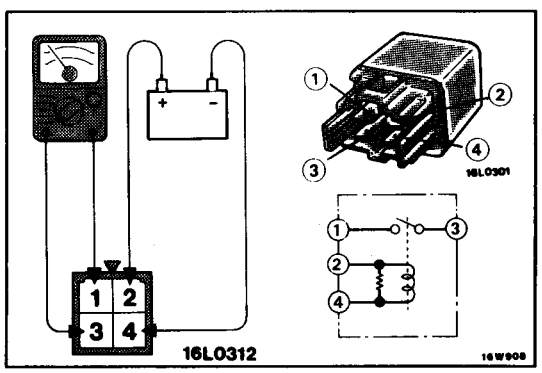
(2) Connect battery to terminal 1 and check continuity between terminals with terminal 3 earthed.

Power is supplied	4 – 5 terminals	Continuity
Power is not supplied	4 – 5 terminals	No continuity
	1 – 3 terminals	Continuity



THEFT-ALARM HORN RELAY

(1) Take out the theft-alarm horn relay from junction block.



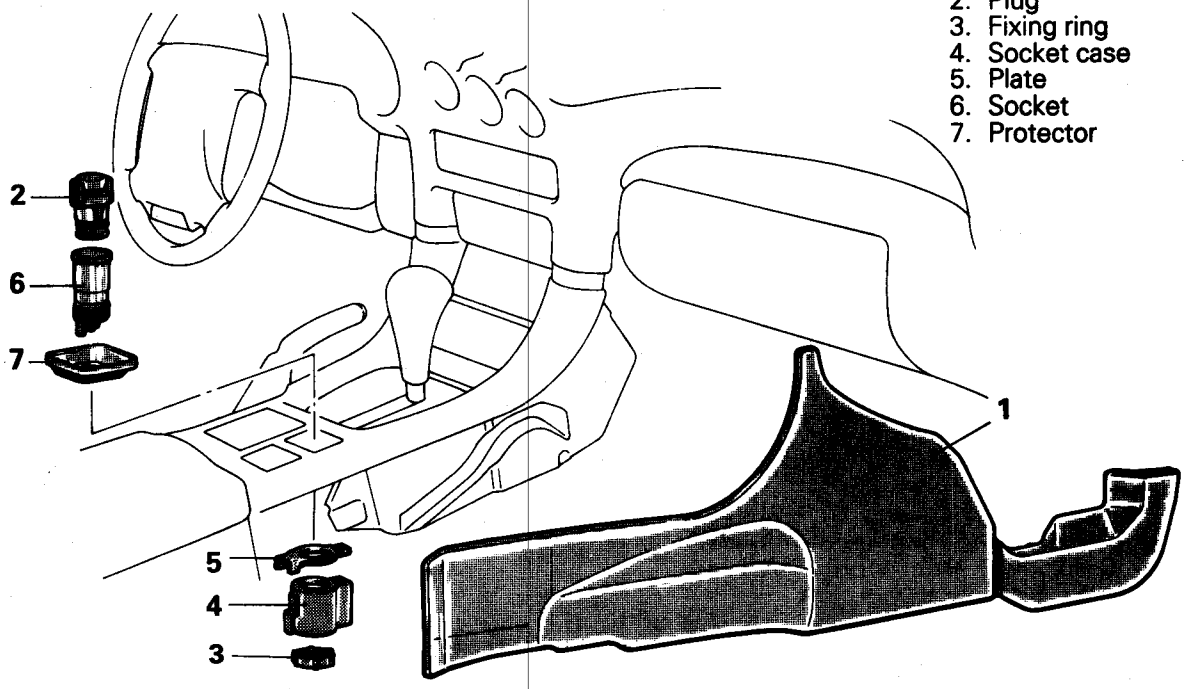
(2) Connect battery to terminal 2 and check continuity between terminals with terminal 4 earthed.

Power is supplied	1 – 3 terminals	Continuity
Power is not supplied	1 – 3 terminals	No continuity
	2 – 4 terminals	Continuity

CIGARETTE LIGHTER

REMOVAL AND INSTALLATION

E54JH–



Removal steps

1. Console side cover (RH)
2. Plug
3. Fixing ring
4. Socket case
5. Plate
6. Socket
7. Protector

16F0274

INSPECTION

E54JJAD

- Take out the plug, and check for a worn edge on the element spot connection, and for shreds of tobacco or other material on the element.
- Using an ohmmeter, check the continuity of the element.

CAUTIONS FOR USE OF THE CIGARETTE LIGHTER SOCKET AS AUXILIARY POWER SOURCE

1. **When using a "plug-in" type of accessory, do not use anything with a load of more than 120W.**
2. **It is recommended that only the lighter be inserted in the receptacle.**
   Use of "plug-in" type accessories may damage the receptacle and result in poor retention of the lighter.
3. **The specified load should be strictly observed, because overloaded cord burns the ignition switch and harness.**

RADIO AND TAPE PLAYER

TROUBLESHOOTING CHART

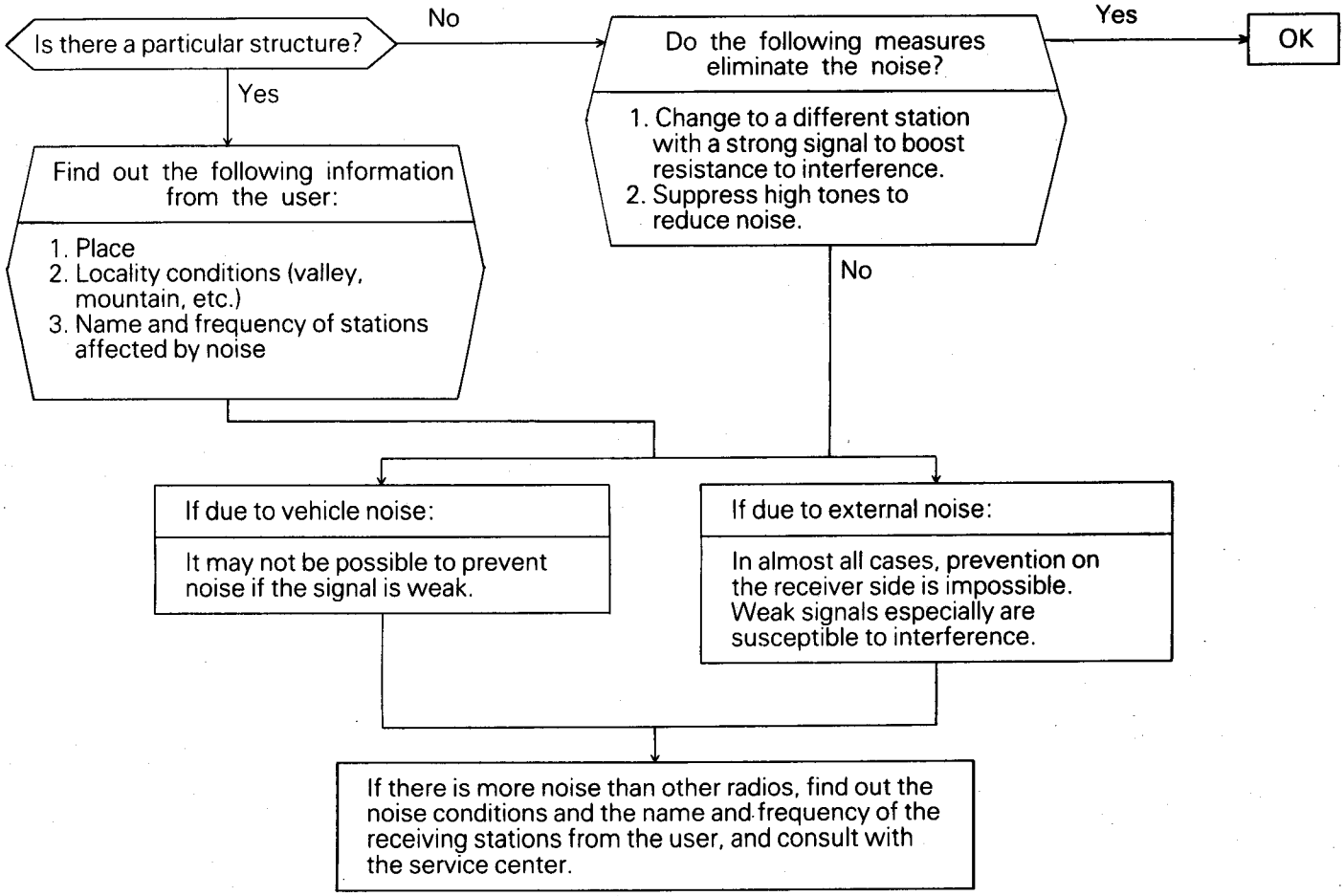
E54LC--

Item	Problem symptom	Relevant chart
Noise	Noise appears at certain places when traveling (AM).	A–1
	Noise appears at certain places when traveling (FM).	A–2
	Mixed with noise, only at night (AM).	A–3
	Broadcasts can be heard but both AM and FM have a lot of noise.	A–4
	There is more noise either on AM or on FM.	A–5
	There is noise when starting the engine.	A–6
	Some noise appears when there is vibration or shocks during traveling.	A–7
	Noise sometimes appears on FM during traveling.	A–8
	Ever-present noise.	A–9
Radio	When switch is set to ON, no power is available.	B–1
	No sound from one speaker.	B–2
	There is noise but no reception for both AM and FM or no sound from AM, or no sound from FM.	B–3
	Insufficient sensitivity.	B–4
	Distortion on AM or on both AM and FM.	B–5
	Distortion on FM only.	B–6
	Too few automatic select stations.	B–7
	Insufficient memory (preset stations are erased).	B–8
Tape player	Cassette tape will not insert.	C–1
	No sound.	C–2
	No sound from one speaker.	C–3
	Sound quality is poor, or sound is weak.	C–4
	Cassette tape will not eject.	C–5
	Uneven revolution. Tape speed is fast or slow.	C–6
	Automatic search does not work	C–7
	Faulty auto reverse.	C–8
	Tape gets caught in mechanism.	C–9
Motor antenna	Motor antenna won't extend or retract.	D–1
	Motor antenna extends and retracts but does not receive.	D–2

CHART

A. NOISE

A–1 Noise appears at certain places when traveling (AM).



A–2	Noise appears at certain places when traveling (FM).

Do the following measures eliminate the noise?

- Change to a different station with a strong signal to boost resistance to interference.
- Suppress high tones to reduce noise.
- Extend antenna completely. (Whip antenna)

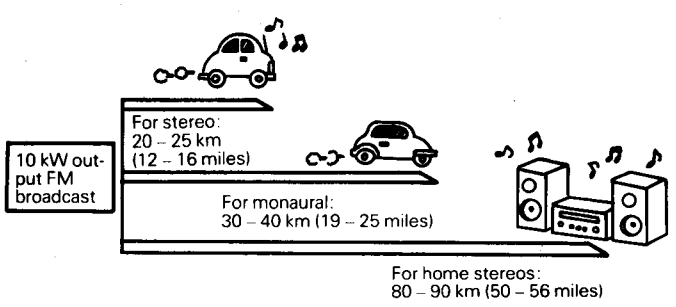
Yes → OK

No → If there is more noise than other radios, find out the noise conditions and the name and frequency of the receiving stations from the user, and consult with the service center.

NOTE
About FM waves:
FM waves have the same properties as light, and can be deflected and blocked. Wave reception is not possible in the shadow of obstructions such as buildings or mountains.

1. The signal becomes weak as the distance from the station's transmission antenna increases. Although this may vary according to the signal strength of the transmitting station and intervening geographical formations or buildings, the area of good reception is approx. 20 – 25 km (12 – 16 miles) for stereo reception, and 30 – 40 km (19 – 25 miles) for monaural reception.
2. The signal becomes weak when an area of shadow from the transmitting antenna (places where there are obstructions such as mountains or buildings between the antenna and the car), and noise will appear. <This is called first fading, and gives a steady buzzing noise.>
3. If a direct signal hits the antenna at the same time as a signal reflected by obstructions such as mountains or buildings, interference of the two signals will generate noise.During traveling, noise will appear each time the vehicle's antenna passes through this kind of obstructed area. The strength and interval of the noise varies according to the signal strength and the conditions of deflection. <This is called multipath noise, and is a repetitious buzzing.>
4. Since FM stereo transmission and reception has a weaker field than monaural, it is often accompanied by a hissing noise.

FM Broadcast Good Reception Areas



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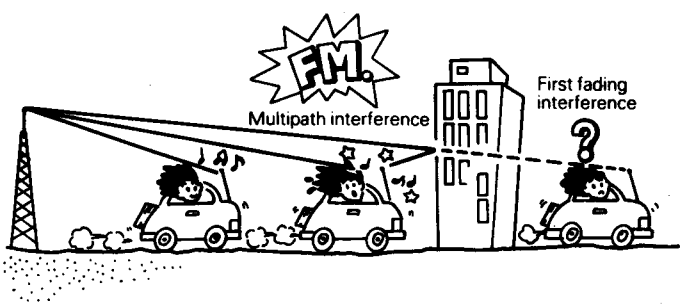
FM Signal Characteristics and Signal Interference

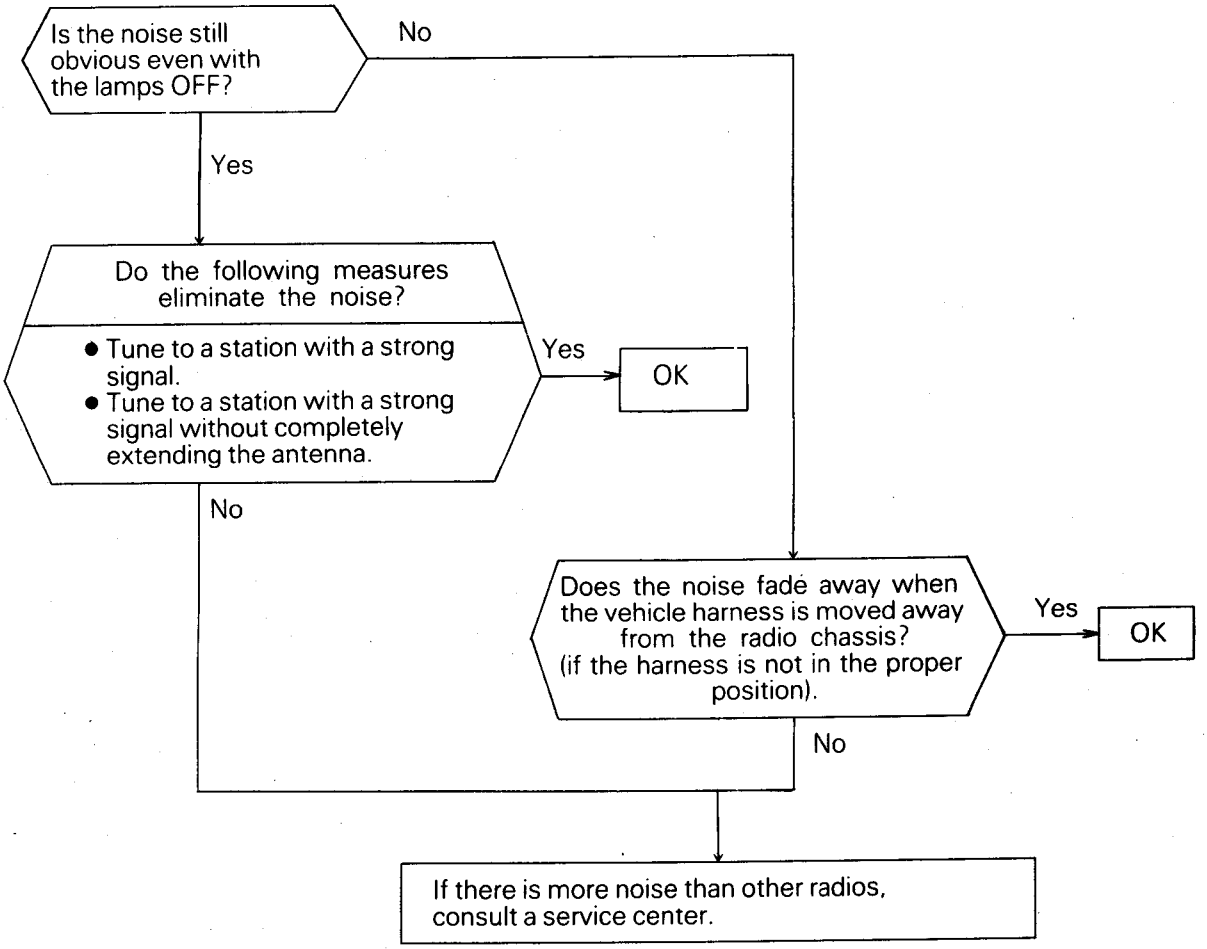


16A0664

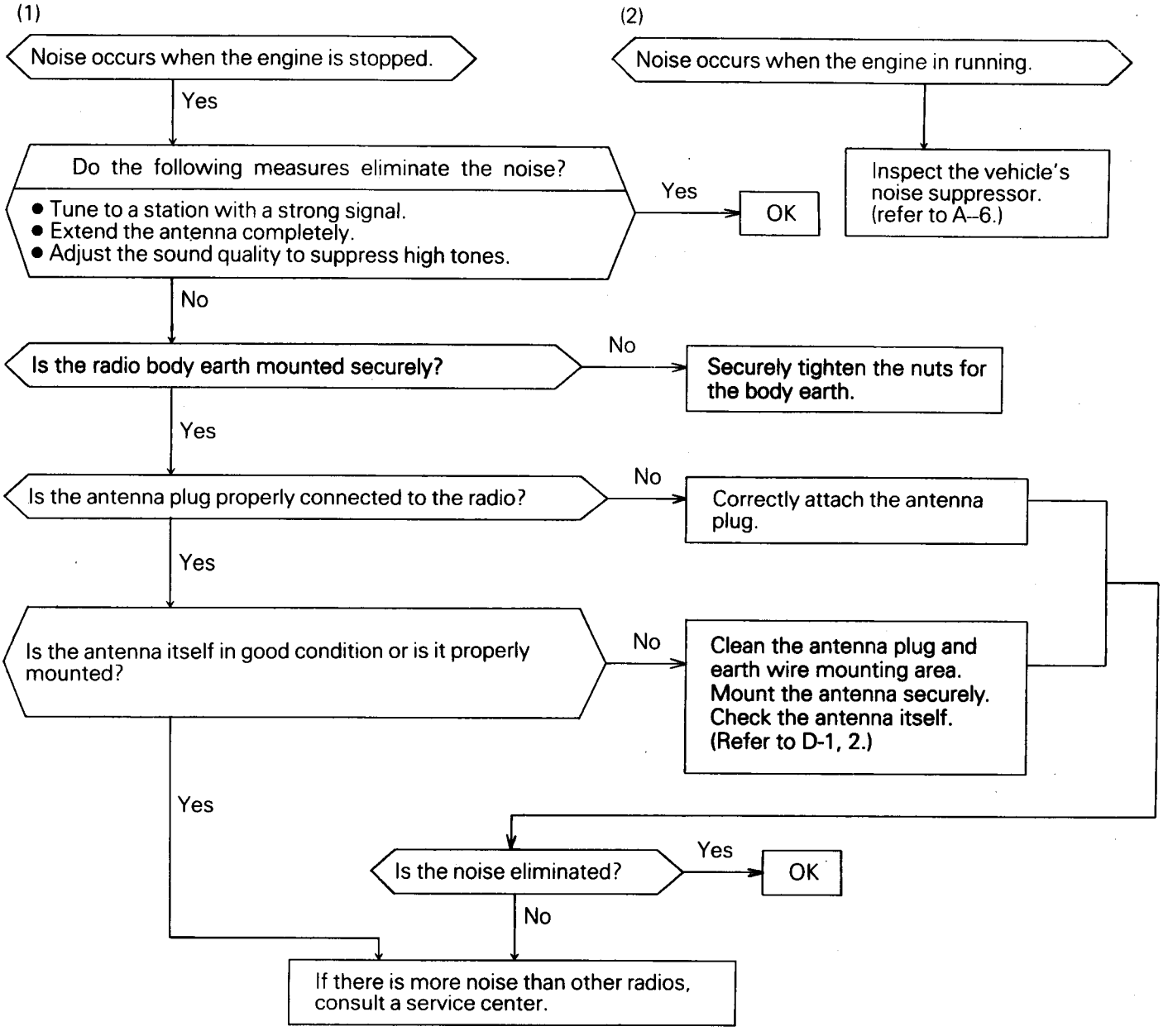
A–3 Mixed with noise, only at night (AM).

The following factors can be considered as possible causes of noise appearing at night.

1. Factors due to signal conditions: Due to the fact that long-distance signals are more easily received at night, even stations that are received without problem during the day may experience interference in a general worsening of reception conditions. The weaker a station is the more susceptible it is to interference, and a change to a different station or the appearance of a beating sound* may occur.
   Beat sound*: Two signals close in frequency interfere with each other, creating a repetitious high-pitched sound. This sound is generated not only by sound signals but by electrical waves as well.
2. Factors due to vehicle noise: Alternator noise may be a cause.



A–4 Broadcasts can be heard but both AM and FM have a lot of noise.



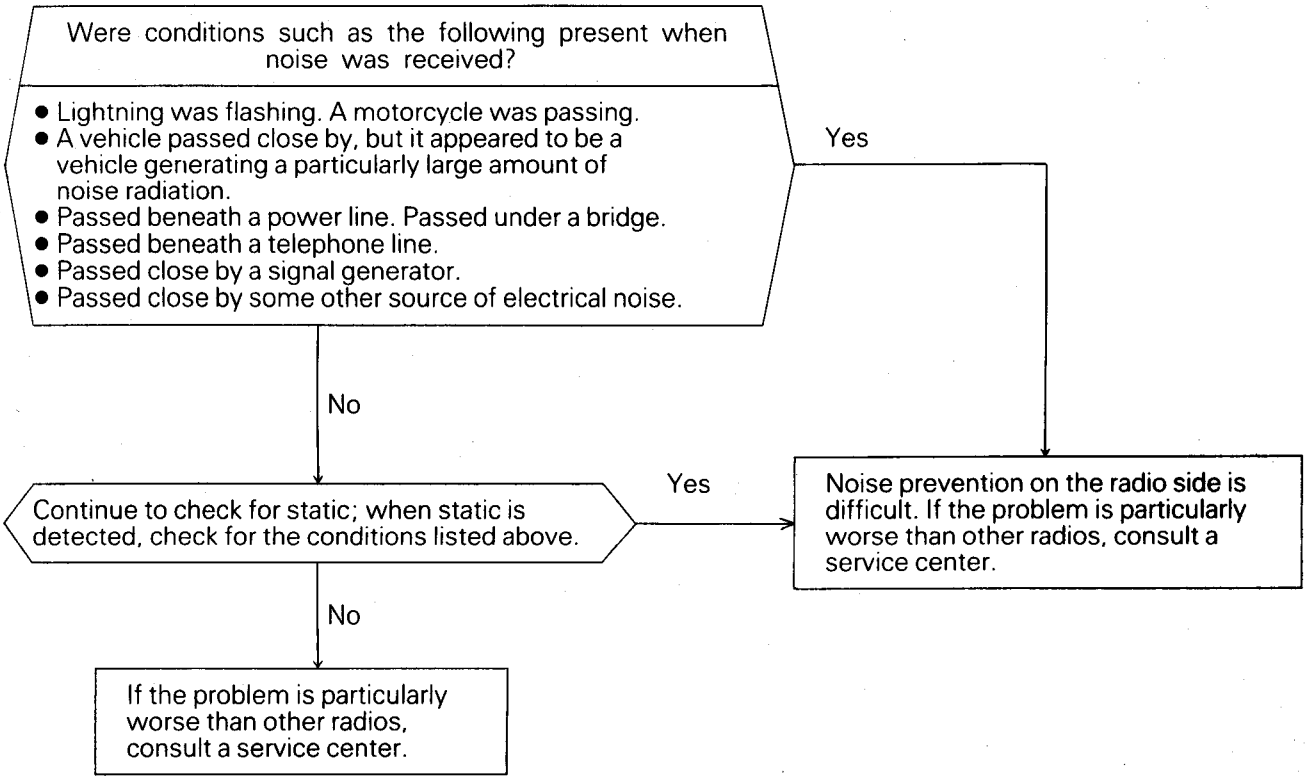
NOTE

About noise encountered during FM reception only. Due to differences in FM and AM systems, FM is not as susceptible as AM to interference from engines, power lines, lightning, etc. On the other hand, there are cases due to the characteristics of FM waves of noise or distortion generated by typical noise interference (first fading and multipath). (Refer to A-2.)

<Noise (hissing) occurs in weak signal areas such as mountainous regions, but this is not due to a problem with the radio.>

A–5	There is more noise either on AM or on FM.

1. There is much noise only on AM
   Due to differences in AM and FM systems, AM is more susceptible to noise interference.



2. There is much noise only on FM
   Due to differences in FM and AM systems, FM is not as susceptible as AM to interference from engines, power lines, lightning, etc. On the other hand, there are cases due to the characteristics of FM waves of noise or distortion generated by typical noise interference (first fading and multipath). (Refer to A–2) <Noise (hissing) occurs in weak signal areas such as mountainous regions, but this is not due to a problem with the radio.>

A–6	There is noise when starting the engine.

Noise type Sounds are in parentheses ( ).	Conditions	Cause	Inspection or replacement	
			Noise-preventive part	Mounting place (next page)
AM, FM: Ignition noise (Popping, Snapping, Cracking, Buzzing)	• Increasing the engine speed causing the popping sound to speed up, and volume decreases. • Disappears when the ignition switch is turned to ACC.	• Mainly due to the spark plugs. • Due to the engine noise.	• Noise capacitor • Earth cable	1 2, 3
Other electrical components	–	Noise may appear as electrical components become older.	Repair or replace electrical components.	
Static electricity (Cracking, Crinkling)	• Disappears when the vehicle is completely stopped. • Severe when the clutch is engaged.	Occurs when parts or wiring move for some reason and contact metal parts of the body.	Return parts or wiring to their proper position.	
	• Various noises are produced depending on the body part of the vehicle.	Due to detachment from the body of the front hood, bumpers, exhaust pipe and muffler, suspension, etc.	Earth parts by bonding. Cases where the problem is not eliminated by a single response to one area are common, due to several body parts being imperfectly earthed.	

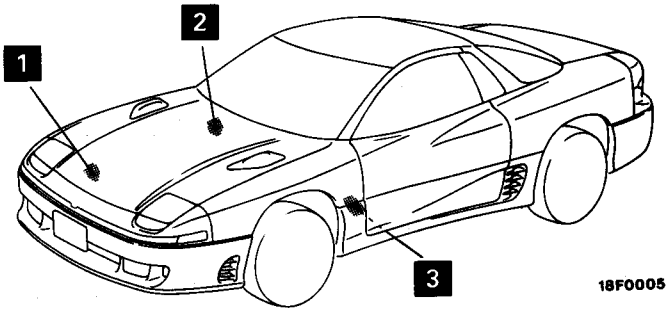
Caution

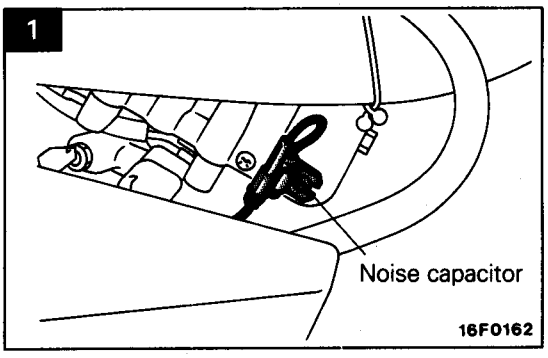
1. **Connecting a high tension cable to the noise capacitor may destroy the noise capacitor and should never be done.**
2. **Check that there is no external noise. Since failure due this may result in misdiagnosis due to inability to identify the noise source, this operation must be performed.**
3. **Noise prevention should be performed by suppressing strong sources of noise step by step.**

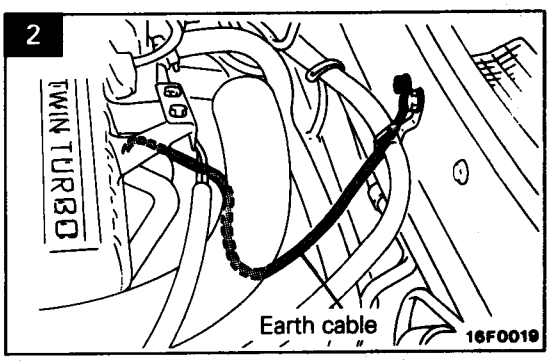
NOTE

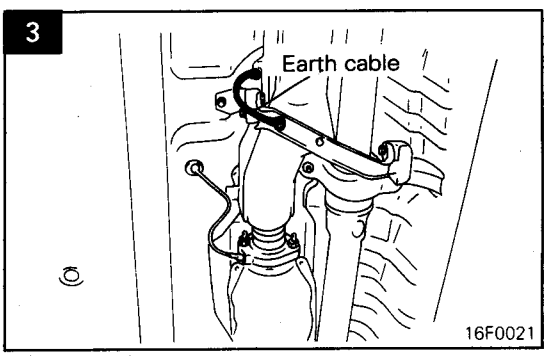
1. Capacitor
   The capacitor does not pass D.C. current, but as the number of waves increases when it passes A.C. current, impedance (resistance against A.C.) decreases, and current flow is facilitated. A noise suppressing capacitor which takes advantage of this property is inserted between the power line for the noise source and the earth. This suppresses noise by earthing the noise component (A.C. or pulse signal) to the body of the vehicle.
2. Coil
   The coil passes D.C. current, but impedance rises as the number of waves increases relative to the A.C. current. A noise suppressing coil which takes advantage of this property is inserted into the power line for the noise source, and works by preventing the noise component from flowing or radiating out of the line.

NOISE SUPPRESSION PARTS MOUNTING POSITIONS

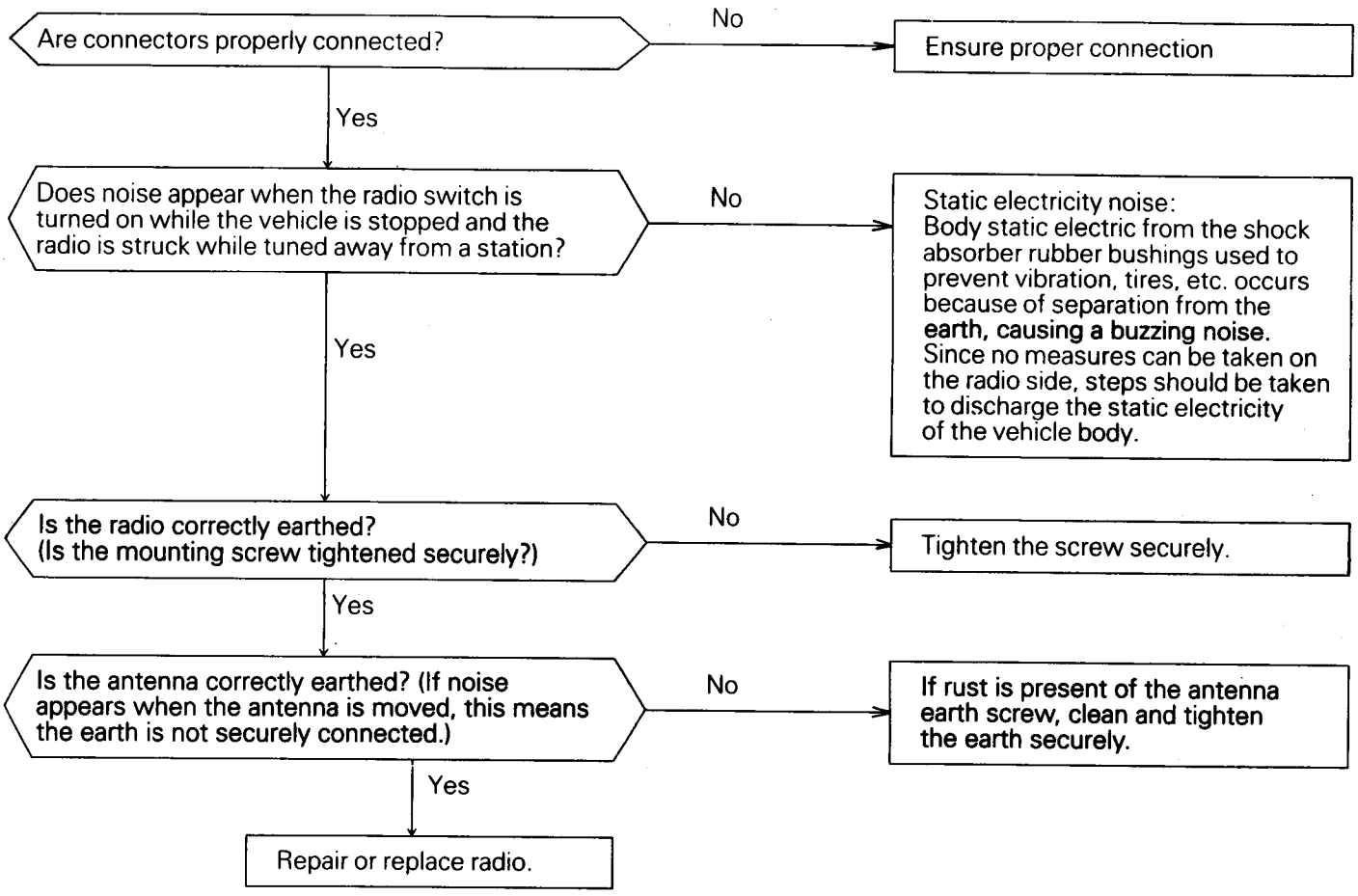




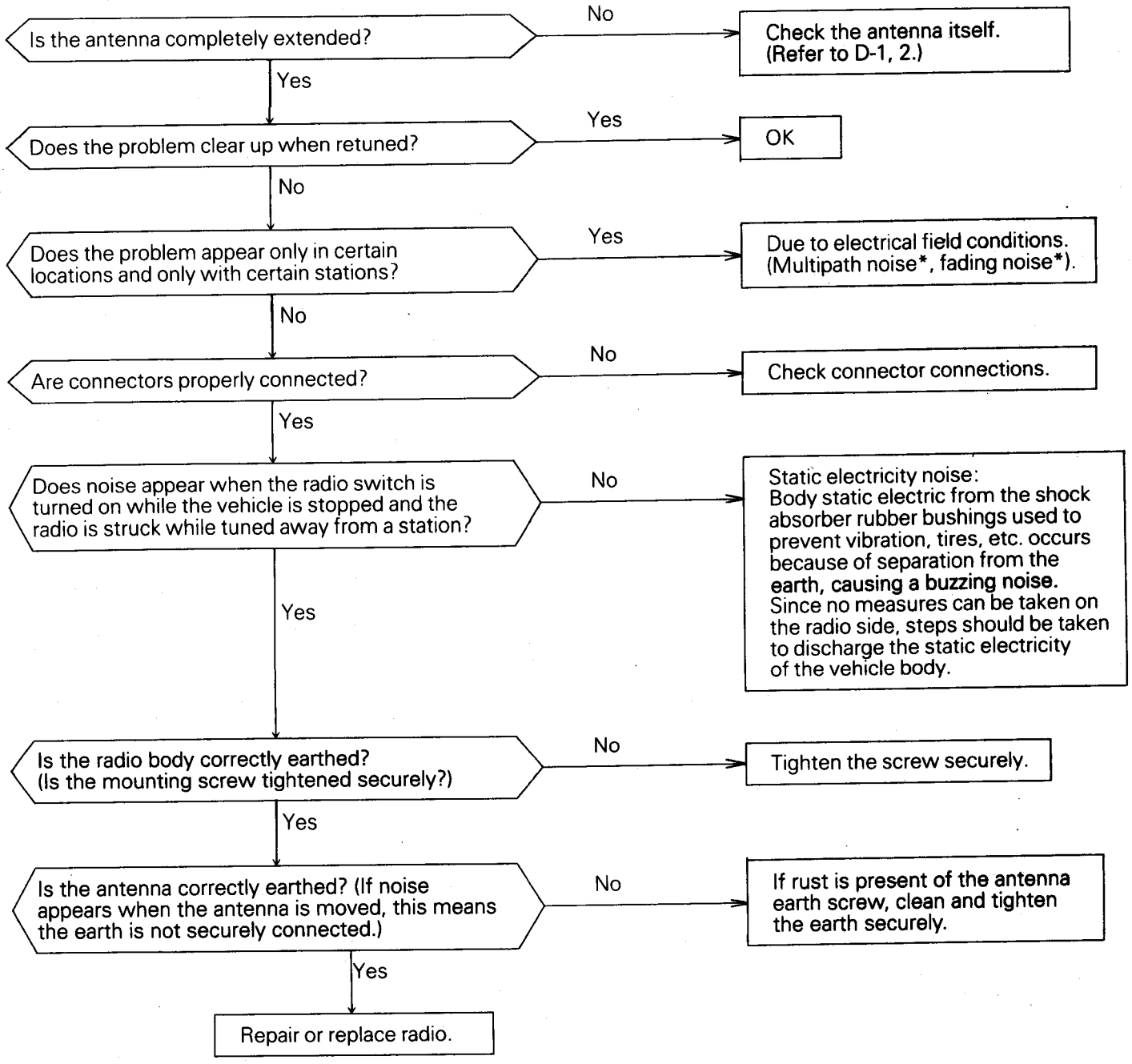




A–7 Some noise appears when there is vibration or shocks during traveling.



A–8 Noise sometimes appears on FM during traveling.



* About multipath noise and fading noise
Because the frequency of FM waves is extremely high, it is highly susceptible to effects from geological formations and buildings. These effects disrupt the broadcast signal and obstruct reception in several ways.

- Multipath noise
  This describes the echo that occurs when the broadcast signal is reflected by a large obstruction and enters the receiver with a slight time delay relative to the direct signal (repetitious buzzing).
- Fading noise
  This is a buzzing noise that occurs when the broadcast beam is disrupted by obstructing objects and the signal strength fluctuates intricately within a narrow range.

A–9	Ever-present noise.

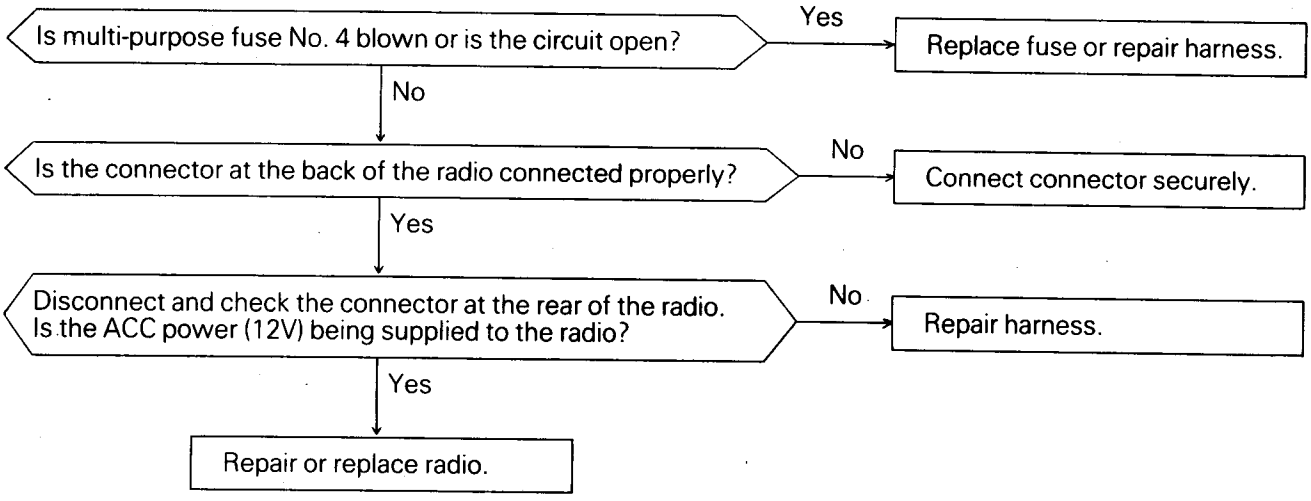
Noise is often created by the following factors, and often the radio is OK when it is checked individually.

- Traveling conditions of the vehicle
- Terrain of area traveled through
- Surrounding buildings
- Signal conditions
- Time period

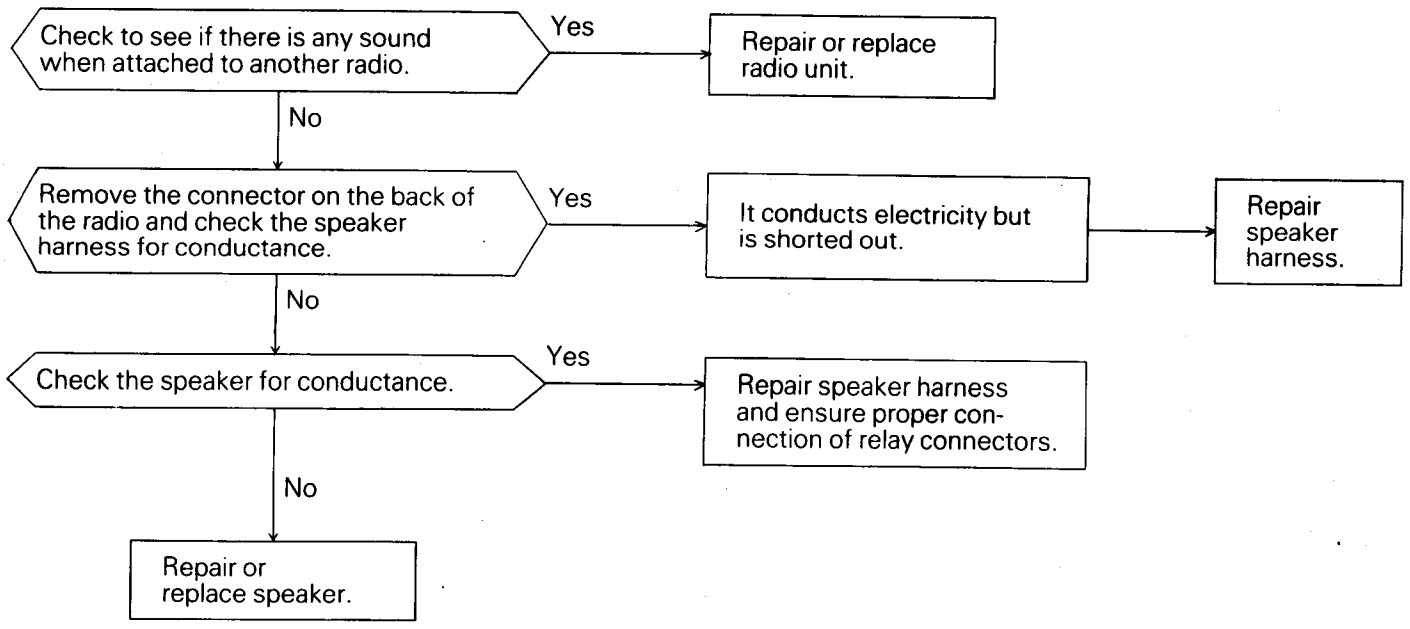
For this reason, if there are still problems with noise even after the measures described in steps A–1 to A–8 have been taken, get information on the factors listed above as well as determining whether the problem occurs with AM or FM, the station names, frequencies, etc., and contact a service center.

B. RADIO

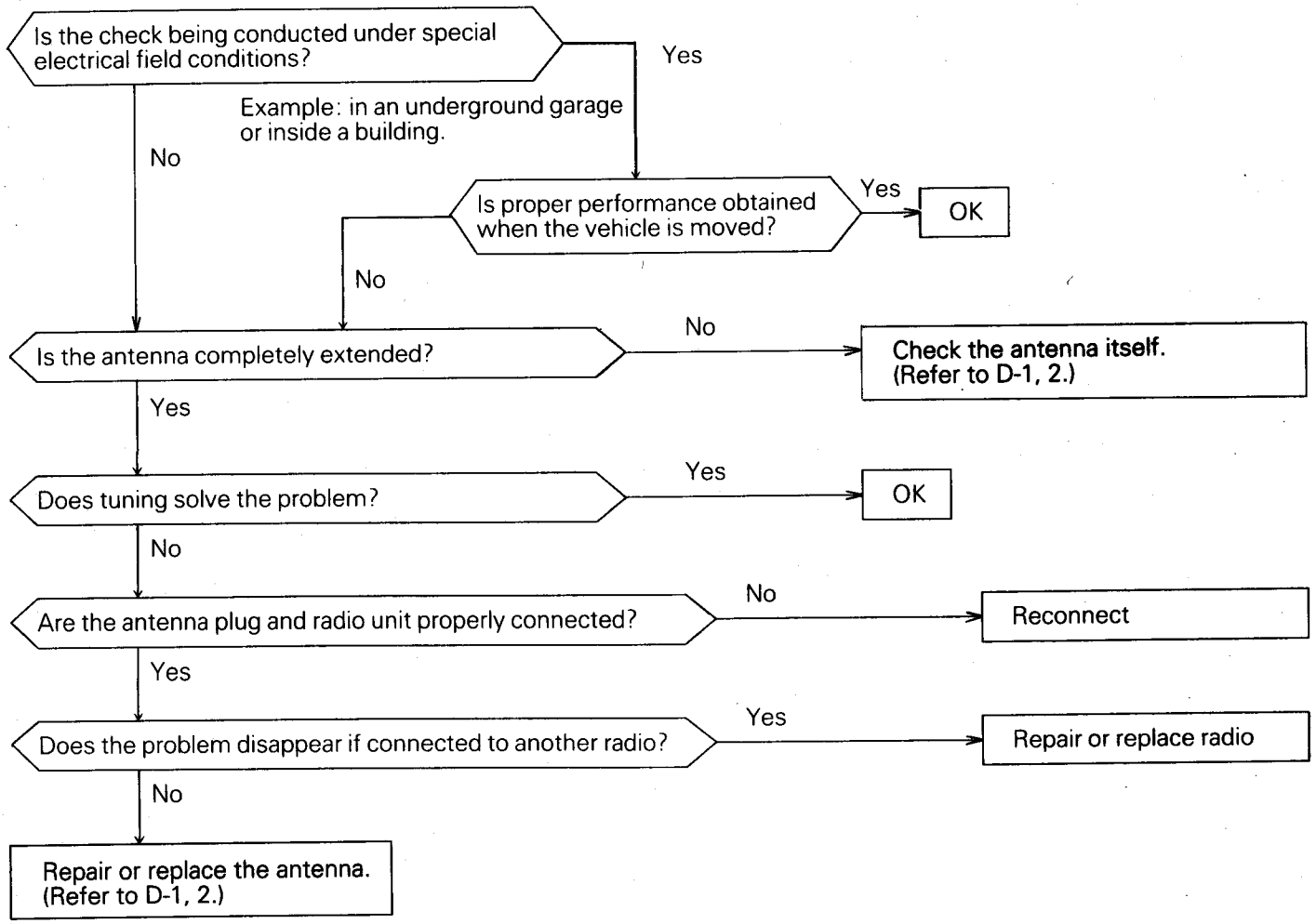
B–1	No power is supplied when the switch is set to ON.



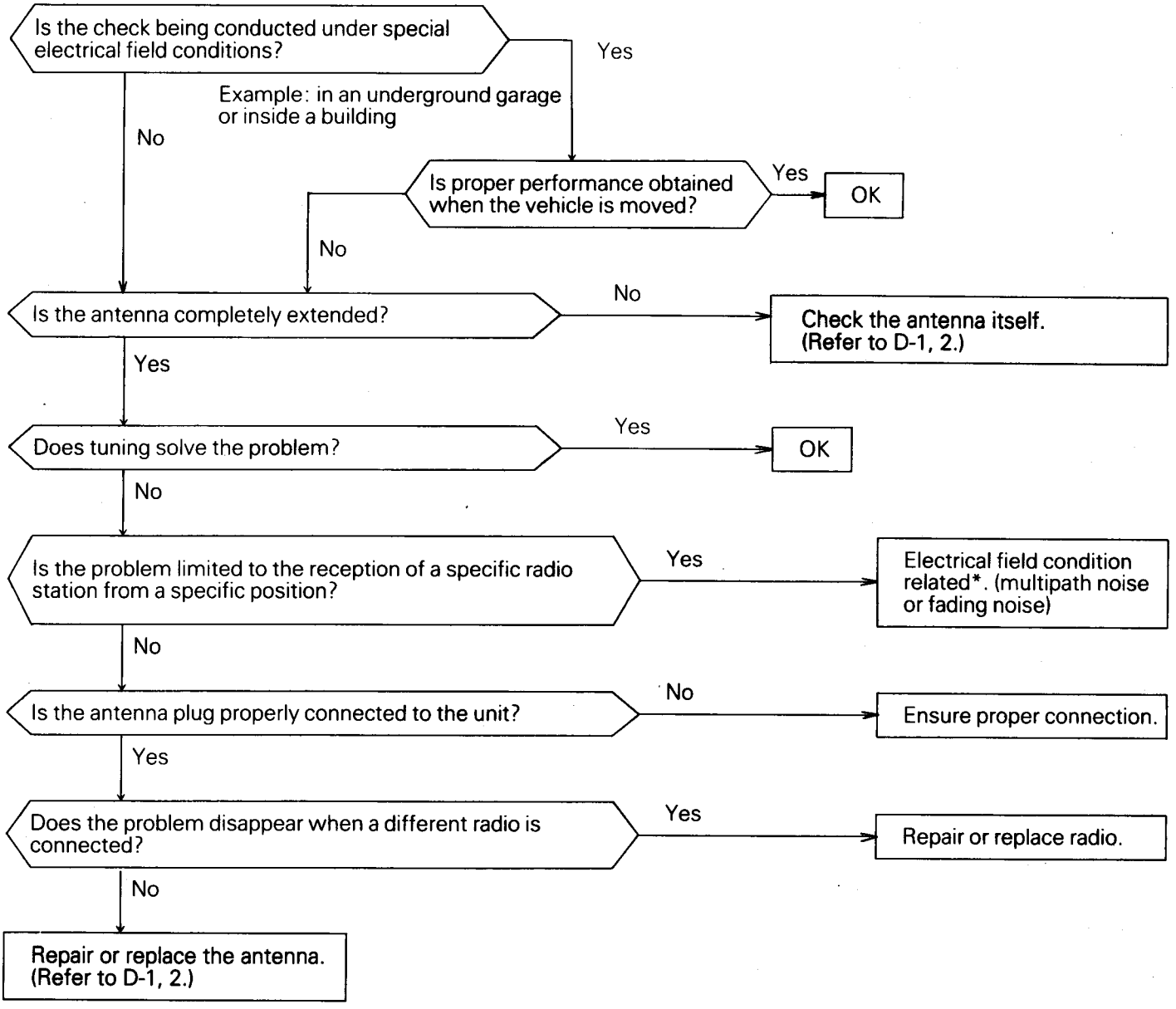
B–2	No sound from one speaker.



B–3	**There is noise but no reception for both AM and FM or no sound from AM, or no sound from FM.**

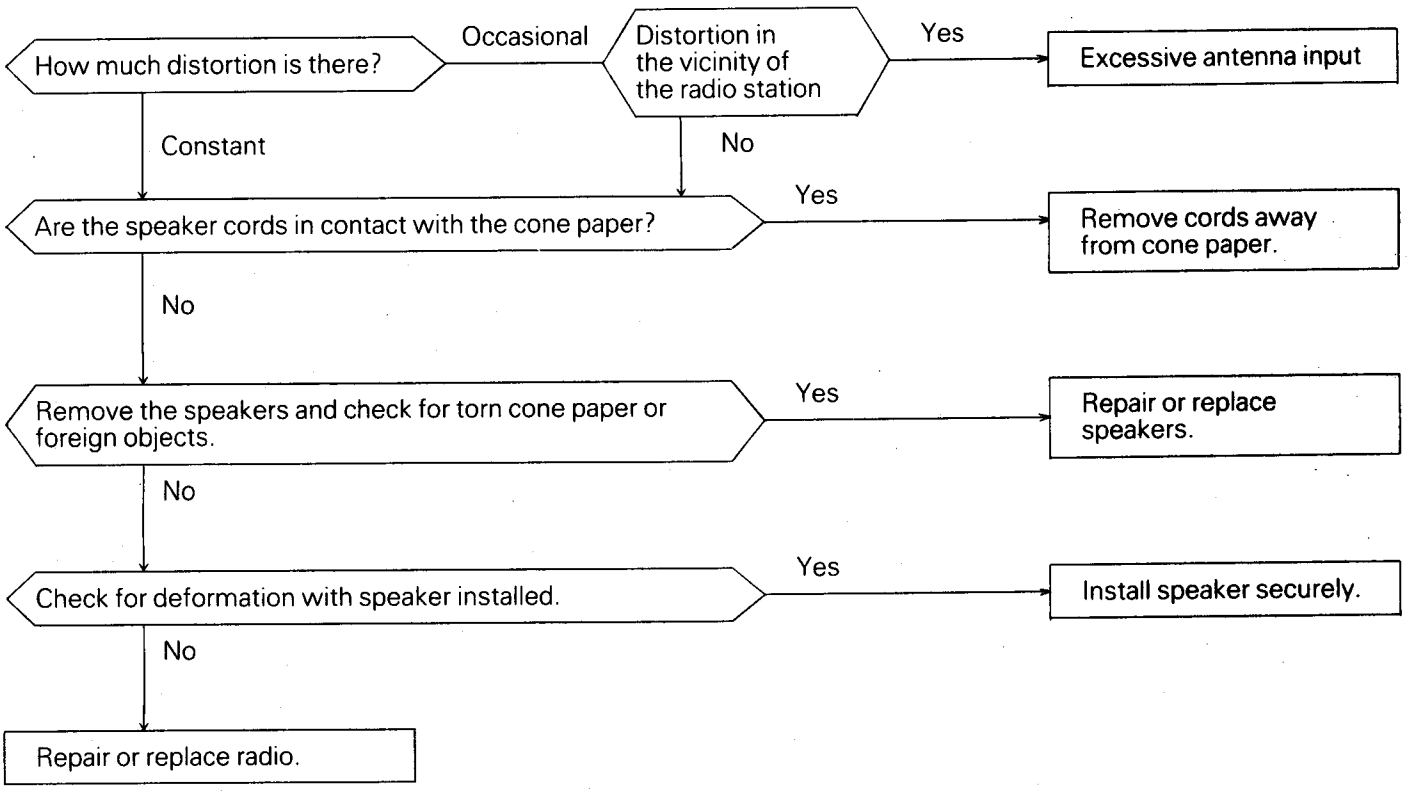


B–4 Insufficient sensitivity.

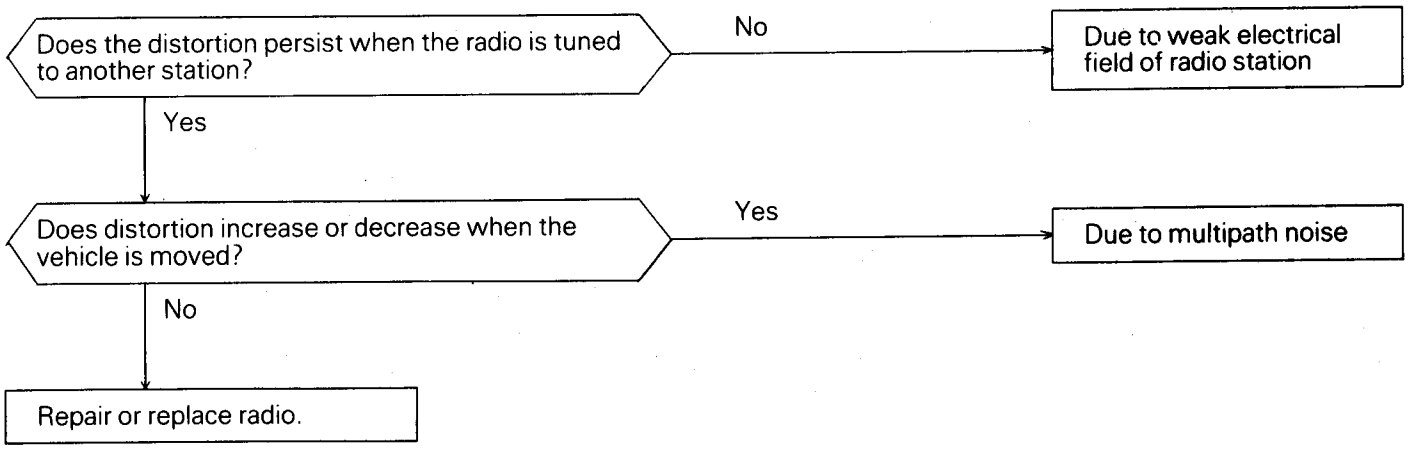


* For multipath noise and fading noise problems, refer to P.54-77.

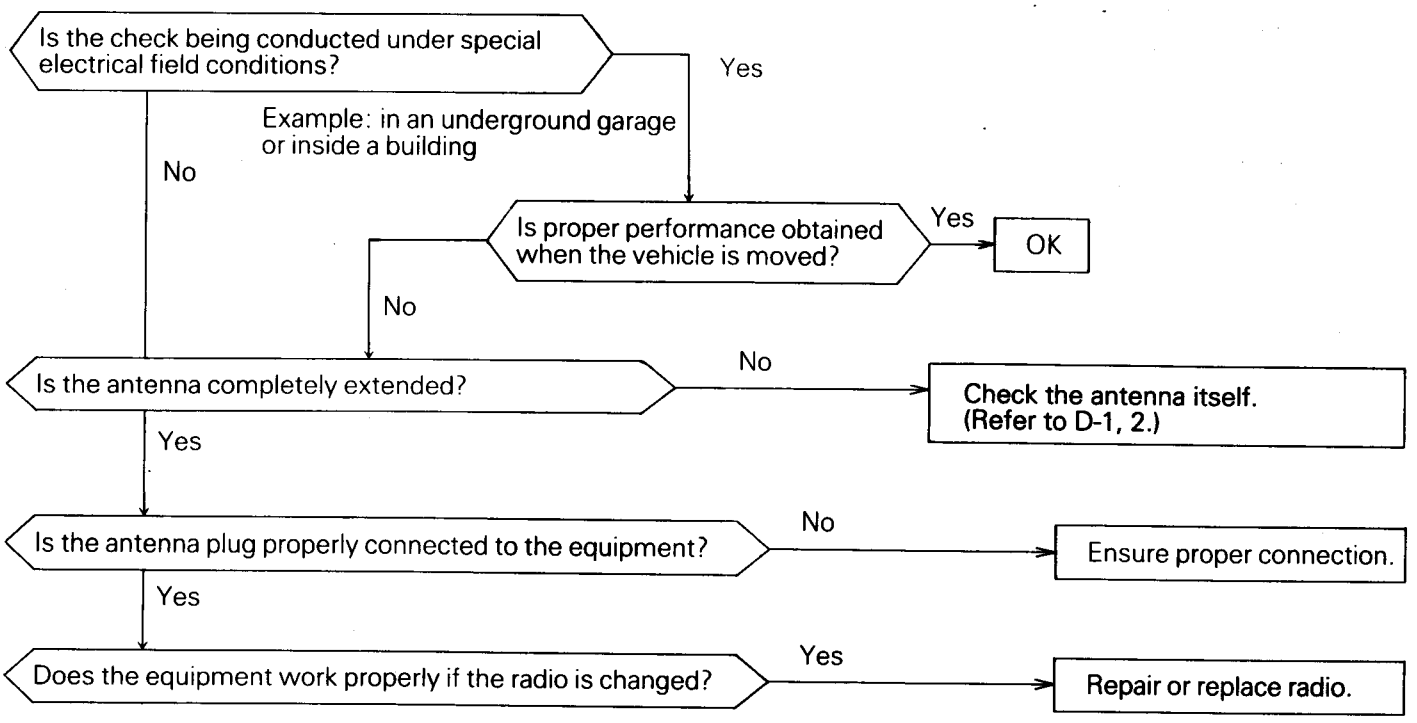
B–5 Distortion on AM or on both AM and FM.



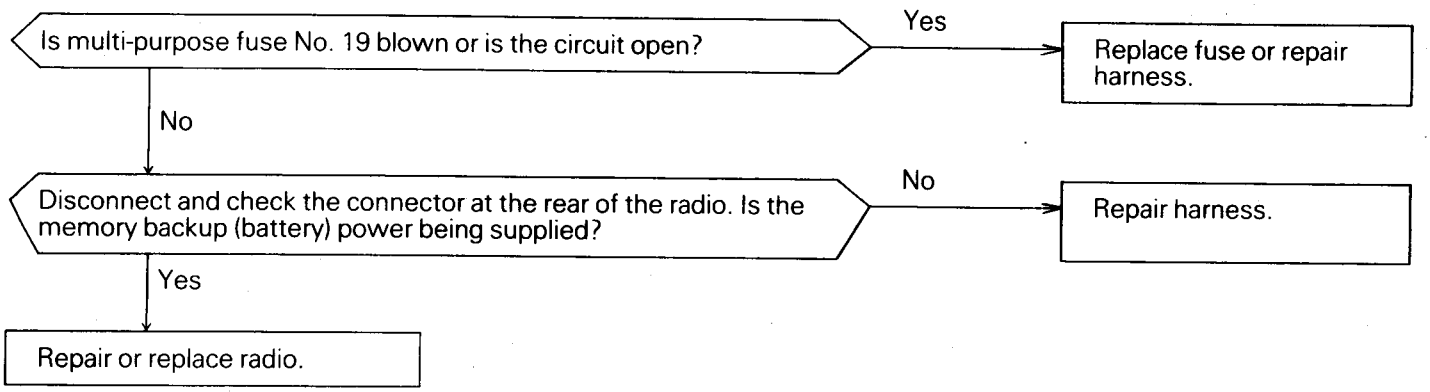
B–6 Distortion on FM only



B–7 Too few automatic select stations.

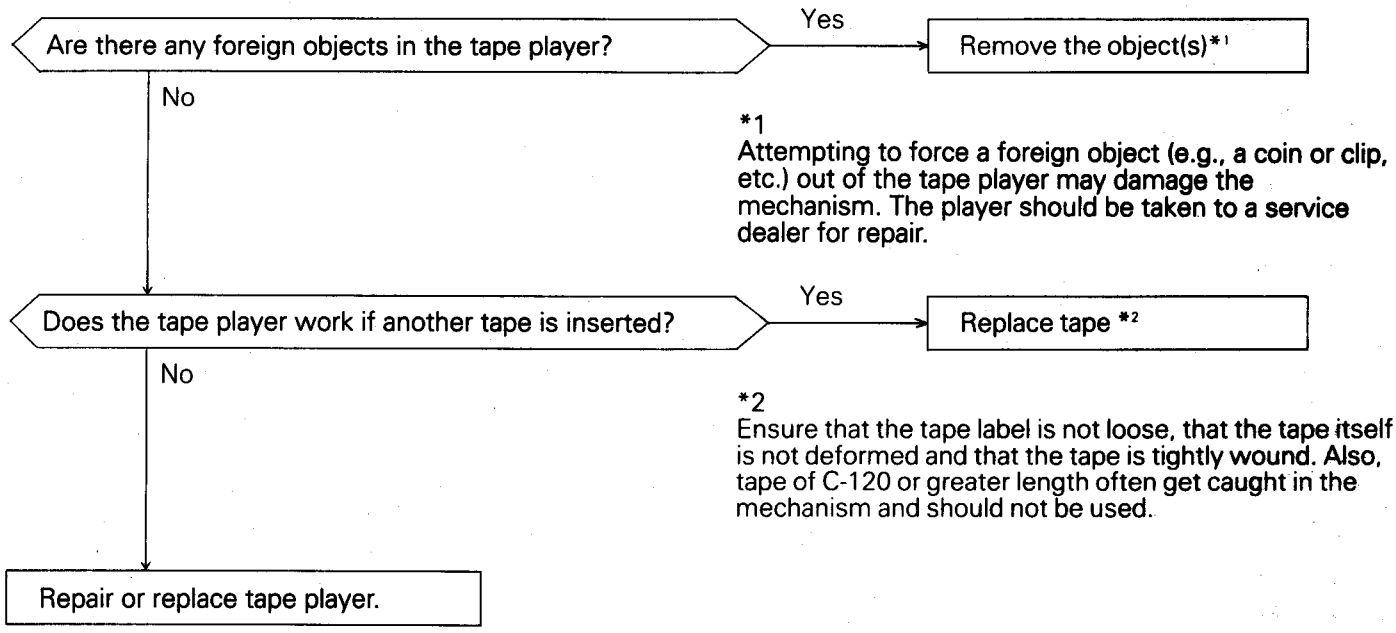


B–8 Insufficient memory (preset stations are erased).



C. TAPE PLAYER

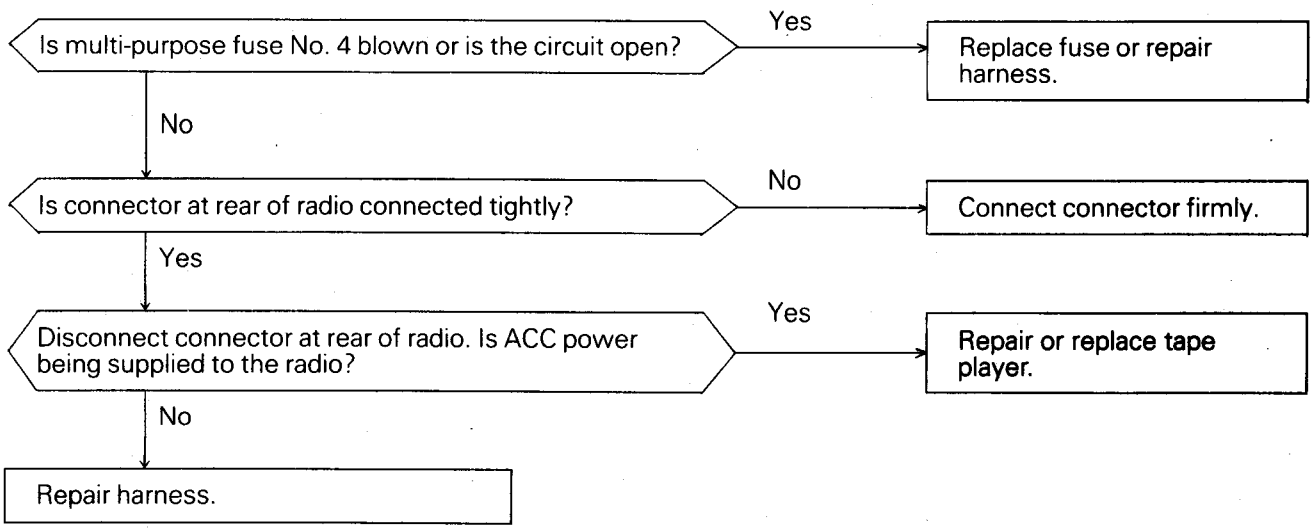
C–1 Cassette tape will not be inserted.



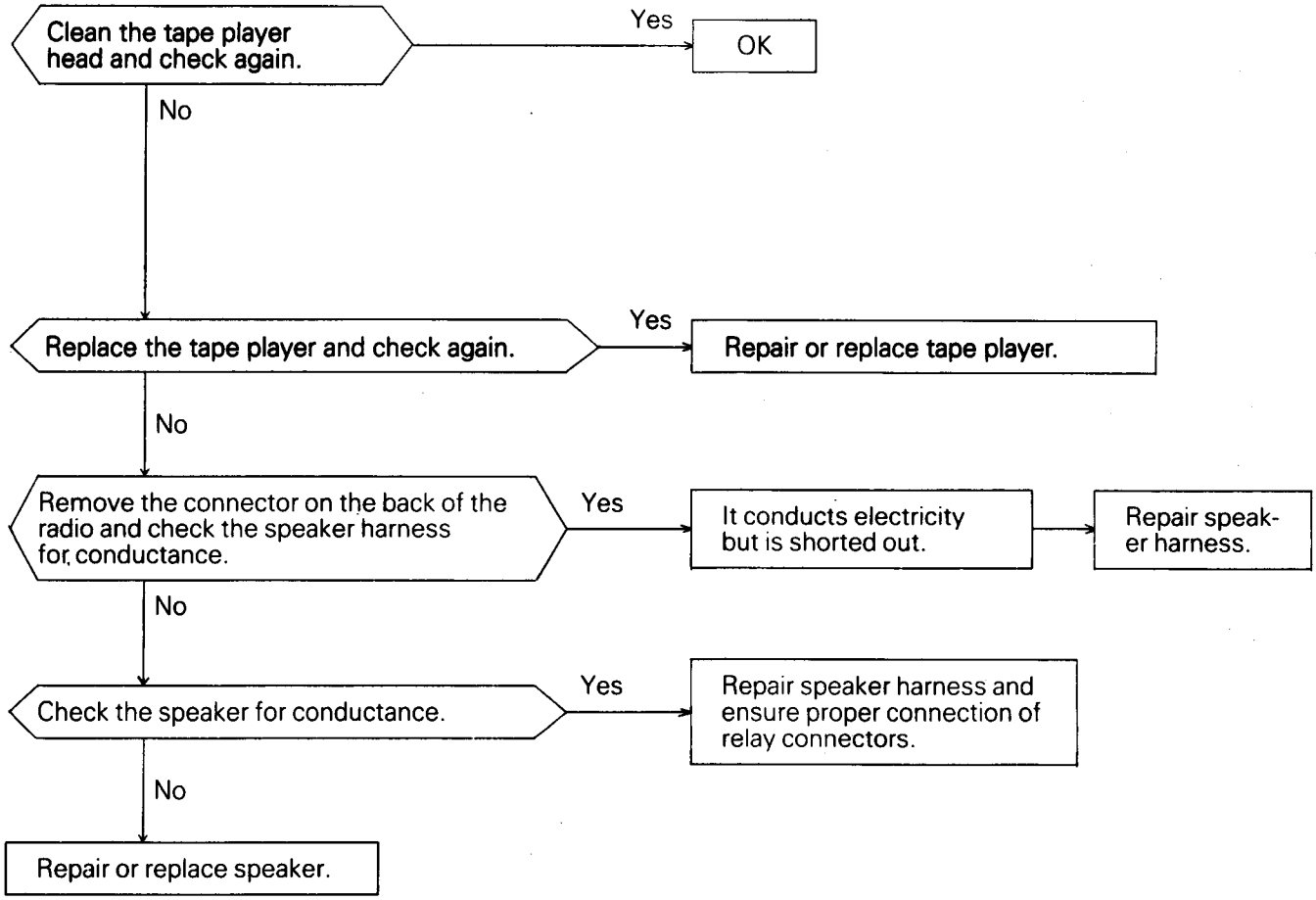
*1
Attempting to force a foreign object (e.g., a coin or clip, etc.) out of the tape player may damage the mechanism. The player should be taken to a service dealer for repair.

*2
Ensure that the tape label is not loose, that the tape itself is not deformed and that the tape is tightly wound. Also, tape of C-120 or greater length often get caught in the mechanism and should not be used.

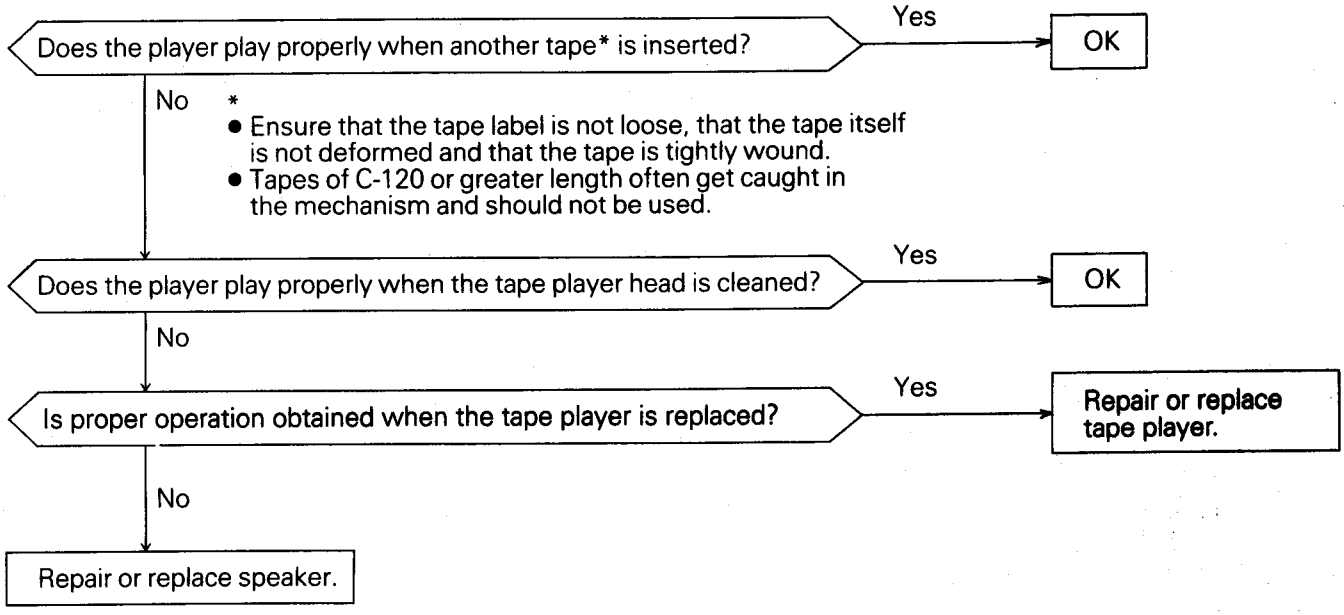
C–2 No sound (even after a tape has been inserted).



C–3	No sound from one speaker.



C–4 Sound quality is poor, or sound is weak.



C–5 Cassette tape will not eject.

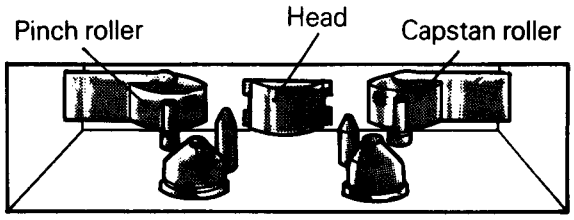
The problems covered here are all the result of the use of a bad tape (deformed or not properly tightened) or of a malfunction of the tape player itself. Malfunctions involving the tape becoming caught in the mechanism and ruining the case are also possible, and attempting to force the tape out of the player can cause damage to the mechanism. The player should be taken to a service dealer for repair.

C–6 Uneven revolution. Tape speed is fast or slow.

Does the player play OK if the tape is changed?
- Yes → OK
- No ↓

Are there any foreign objects inside the tape player?
- Yes → Remove foreign object(s).
- No ↓

Is the head or capstan roller dirty?



- Yes → Clean.
- No ↓

Repair or replace tape player.

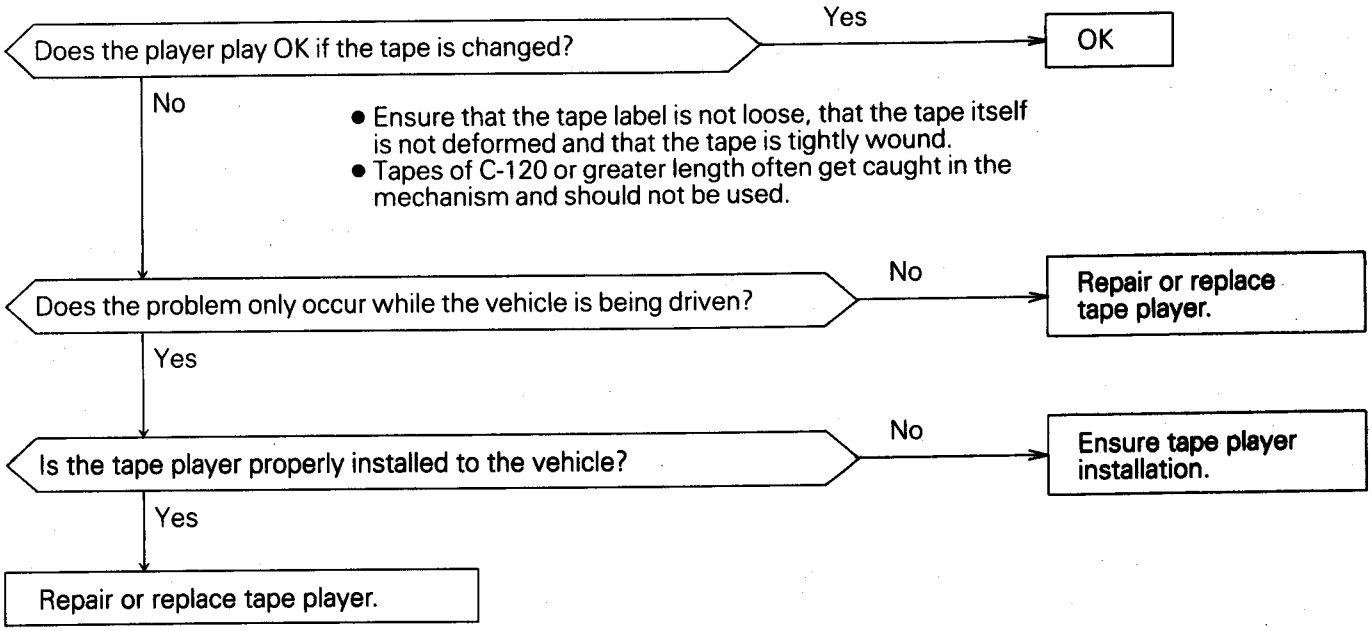
C–7 Automatic search does not work.

Does the player play OK if the tape*1 is changed?
- Yes → Tape used is bad.
- No ↓

*1
- Ensure that the tape label is not loose, that the tape itself is not deformed and that the tape is tightly wound. Also, tapes of C-120 or greater length often get caught in the mechanism and should not be used.

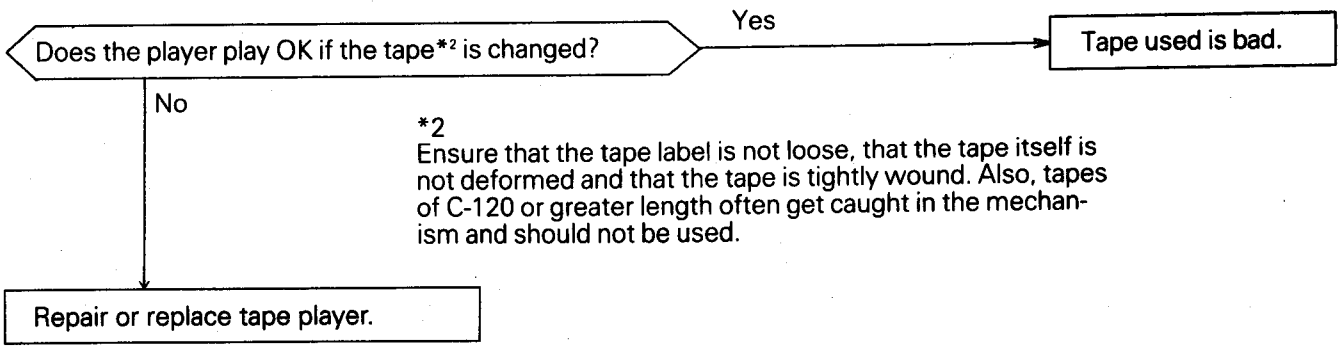
Repair or replace the tape player.

C–8 Faulty auto reverse.



C–9 Tape gets caught in mechanism*1.

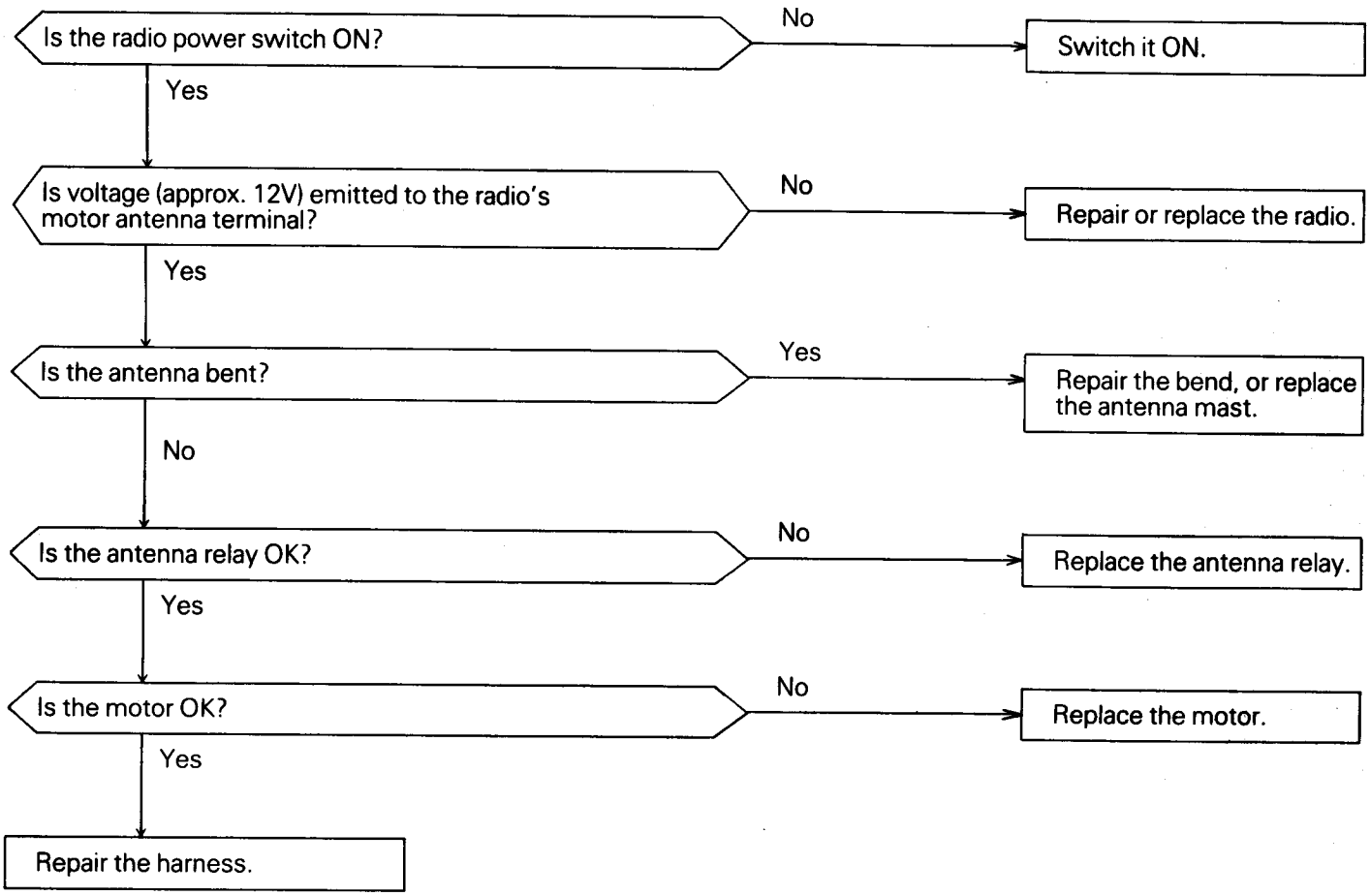
*1
When the tape is caught in the mechanism, the case may not eject. When this occurs, do not try to force the tape out as this may damage the tape player mechanism. Take the cassette to a service dealer for repair.



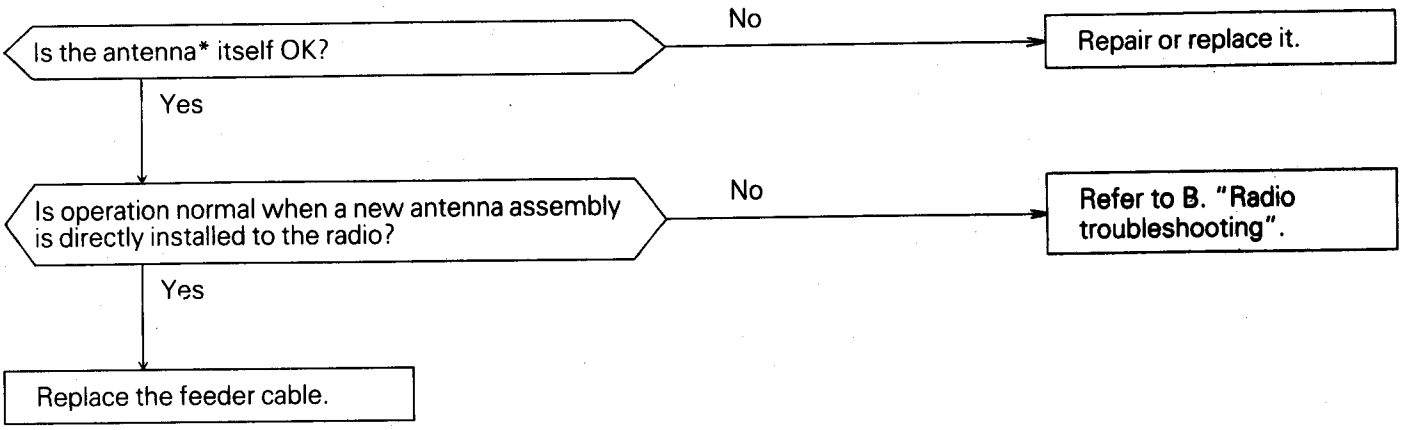
D. MOTOR ANTENNA

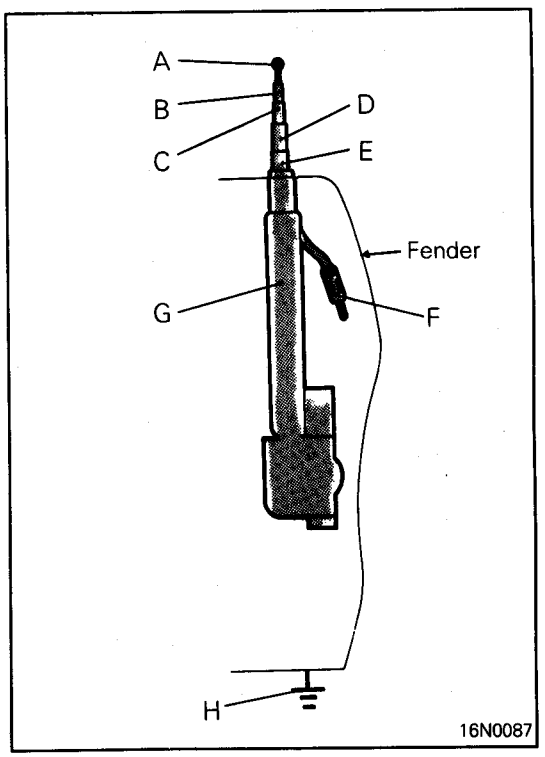
D–1 Motor antenna won't extend or retract.

Clean and polish the surface of the antenna rod.



D–2	Motor antenna extends and retracts but does not receive.





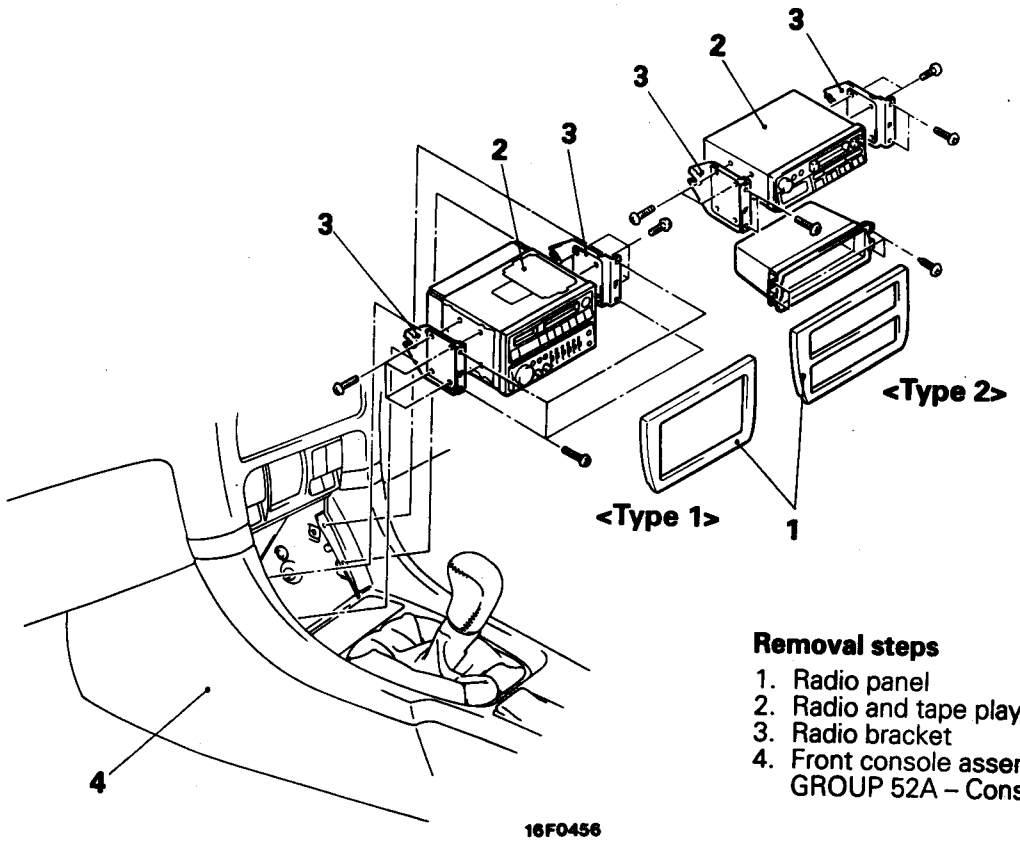
Checking the antenna*

Ohmmeter measurement locations	Result
Circuits from F to A, B, C, D and E	Continuity
Circuit between G and H	Continuity
Circuits from H to A, B, C, D and E	No continuity

RADIO AND TAPE PLAYER

REMOVAL AND INSTALLATION

E54LHAR



16F0456

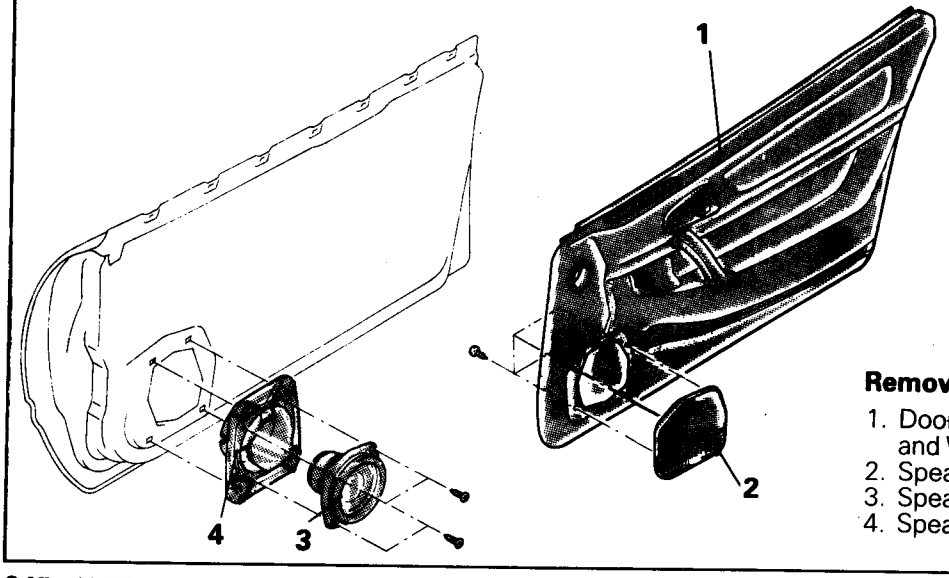
Removal steps

1. Radio panel
2. Radio and tape player
3. Radio bracket
4. Front console assembly (Refer to GROUP 52A – Console Box.)

SPEAKER <DOOR SPEAKER>

REMOVAL AND INSTALLATION

E54LICE



Removal steps

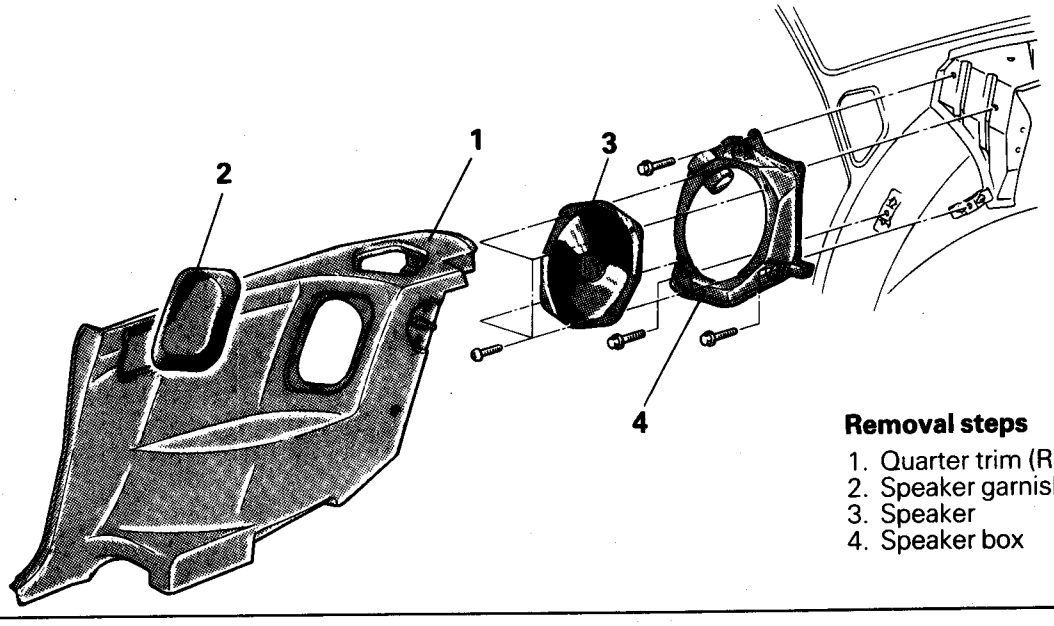
1. Door trim (Refer to GROUP 42 – Door Trim and Waterproof Film.)
2. Speaker garnish
3. Speaker
4. Speaker cover

16F0279

<REAR SPEAKER>

E54LIBJ

REMOVAL AND INSTALLATION



Removal steps

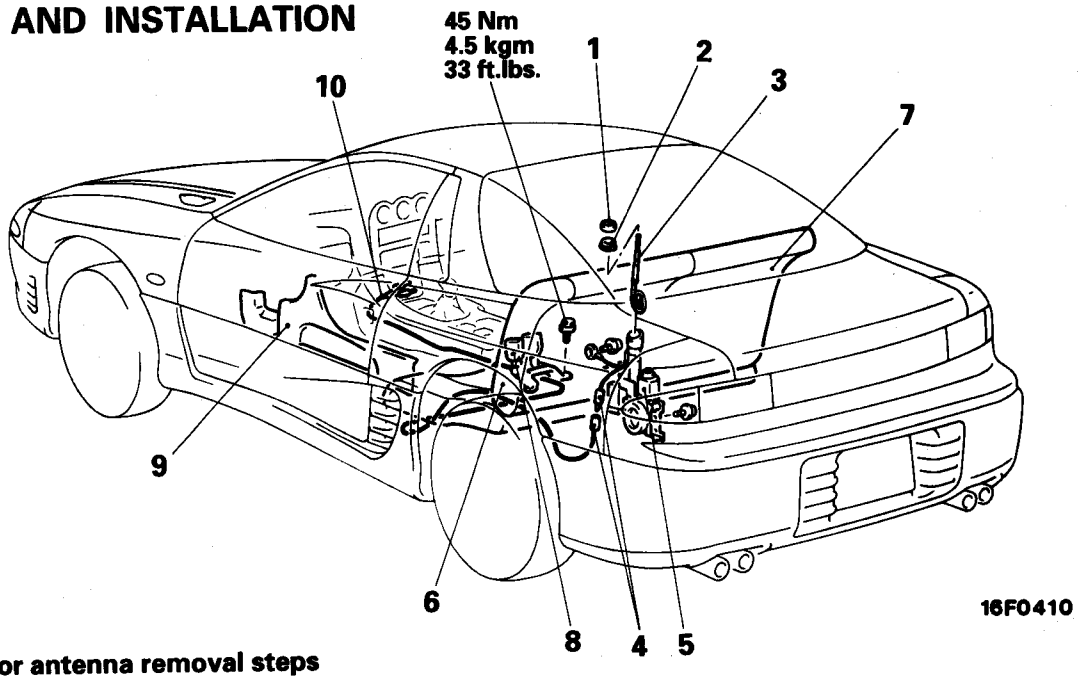
1. Quarter trim (Refer to GROUP 52A – Trims.)
2. Speaker garnish
3. Speaker
4. Speaker box

16F0097

MOTOR ANTENNA AND ANTENNA FEEDER CABLE

E54LJBI

REMOVAL AND INSTALLATION



16F0410

Motor antenna removal steps

Rear side trim (LH)
(Refer to GROUP 52A – Trims.)

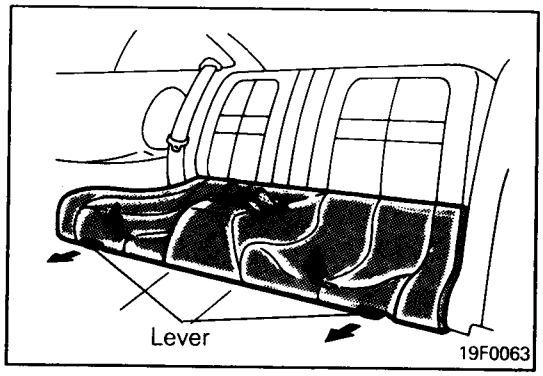
1. Ring nut
2. Base
3. Antenna pole
4. Motor antenna connection
5. Motor antenna

Antenna feeder cable removal steps

Rear side trim (LH) } (Refer to GROUP
Quarter trim (LH) } 52A – Trims.)

Rear console assembly
(Refer to GROUP 52A – Console Box.)
Radio and tape player
(Refer to P.54-90.)

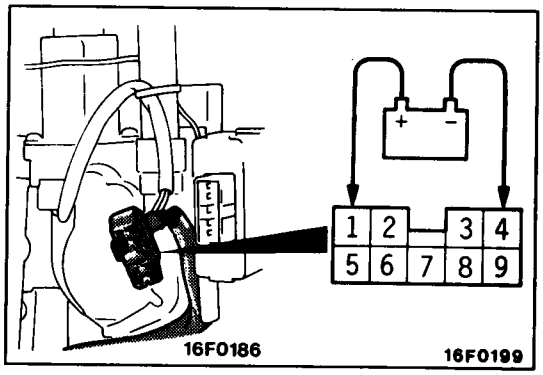
4. Motor antenna connection
6. Rear seat cushion
7. Rear seatback
8. Inner seat belt
9. Console side cover (LH)
10. Antenna feeder cable



SERVICE POINT OF REMOVAL

6. REMOVAL OF REAR SEAT CUSHION

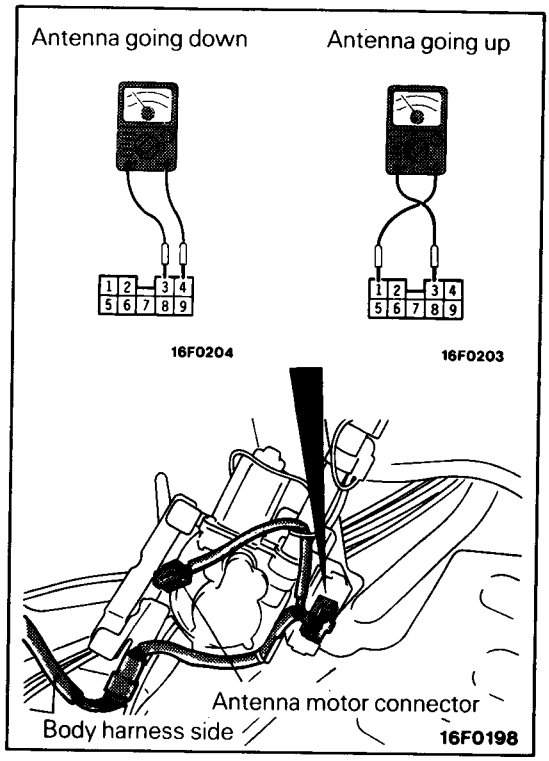
Raise and remove the seat cushion with the lever pulled.



INSPECTION

ANTENNA MOTOR

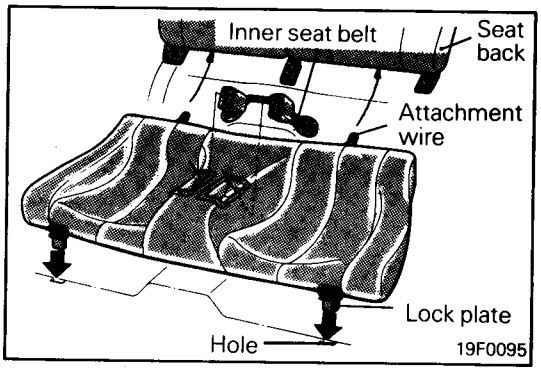
Disconnect the motor antenna control unit connector, connect the positive terminal of the power supply to terminal ① and connect the negative terminal to terminal ④ to check that the antenna goes up, and that when the connections are reversed, the antenna goes down.



MOTOR ANTENNA CONTROL UNIT

(1) Connect the harness connector to the motor antenna. (Body harness)
(2) Disconnect the antenna motor connector.
(3) With the ignition switch in the ACC or ON position, operate the radio switch and check the voltage between the terminals during the period when the antenna is going up or going down.

Antenna operating direction	Terminals to check	Voltage (V)
Down	1 – 3	10 – 13
Up	3 – 4	10 – 13



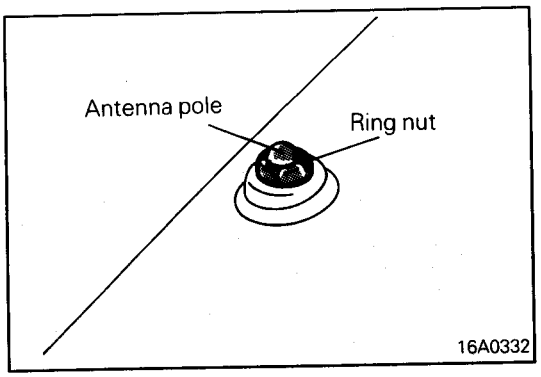
SERVICE POINT OF INSTALLATION

6. INSTALLATION OF REAR SEAT CUSHION

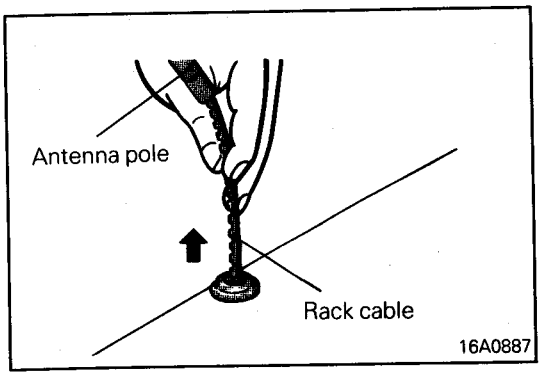
(1) Securely fit the attachment wire of the seat cushion under the seatback.
(2) Pass the inner seat belt buckles through the cushion.
(3) Securely fit the lock plates of the seat cushion into the holes in the floor.

ANTENNA POLE REPLACEMENT

(1) Remove the ring nut.



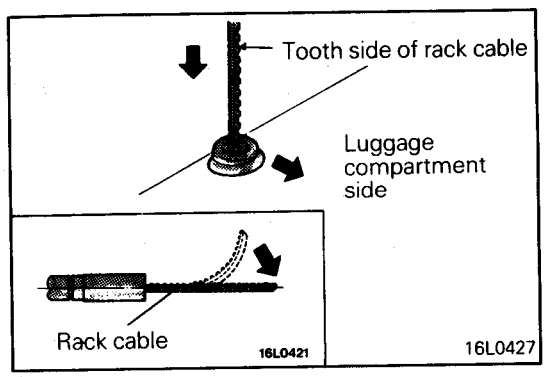
(2) Set the radio switch to ON. After the antenna pole has extended, remove the antenna pole and rack cable as an assembly.



(3) Extend the antenna pole up to its farthest point.

NOTE
If the motor end of the rack cable is bent, straighten it.

(4) Force the rack cable into the motor assembly with the tooth side of the rack cable toward the luggage compartment.

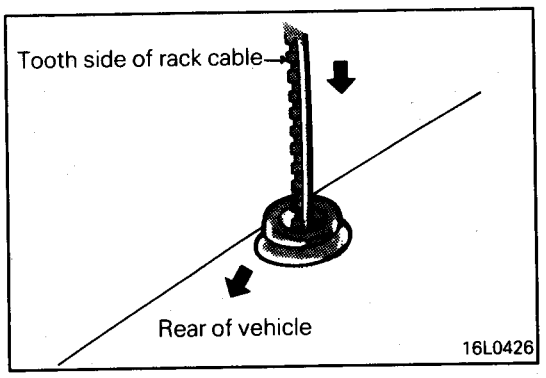


(5) Turn the tooth side of the rack cable toward the rear of the vehicle (90° clockwise) to bring the rack cable into mesh with the motor gear.

(6) Lightly pull the rack cable. If it comes out without resistance, it means that the rack cable is not in mesh with the motor gear. Recheck that the rack cable end is not bent before repeating the above-mentioned steps (2) and (3).

(7) With the antenna pole upright and the radio switch at OFF, take up the rack cable. As the rack cable is taken up, insert the antenna pole toward the motor antenna.

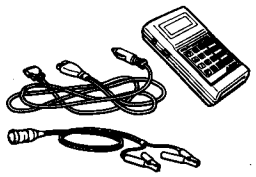
(8) After the ring nut has been tightened, set the radio switch to ON and OFF to check the operation of the antenna pole.



REAR WINDOW DEFOGGER

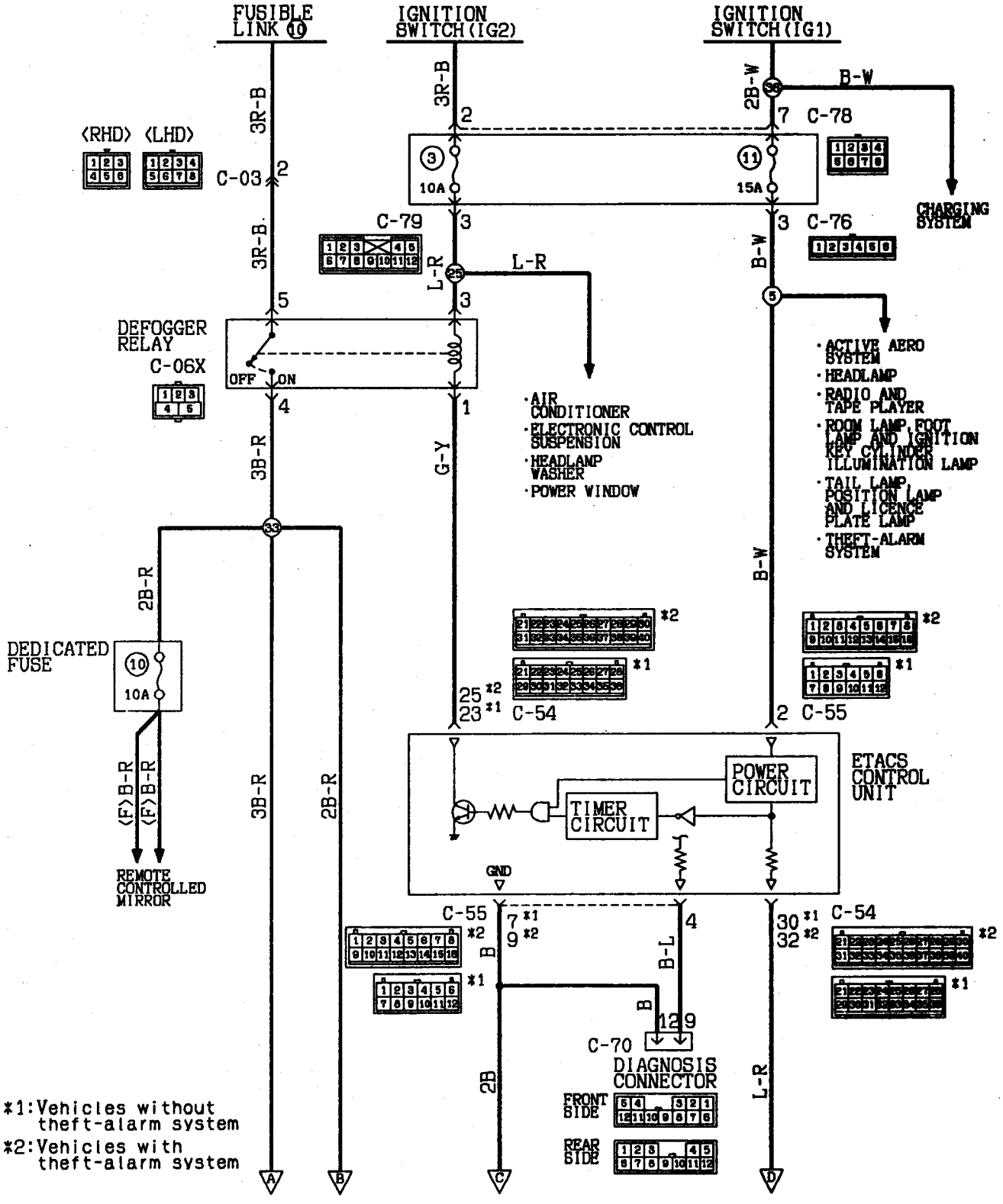
E54MF-

SPECIAL TOOLS

Tool	Number	Name	Use
	MB991341	Multi-use tester sub-assembly	1993 models ETACS input checking
	For the number, refer to GROUP 00 – Precautions Before Service.	ROM pack	
	MB991502	MUT-II sub-assembly	All models ETACS input checking
 16X0607		ROM pack	

TROUBLESHOOTING

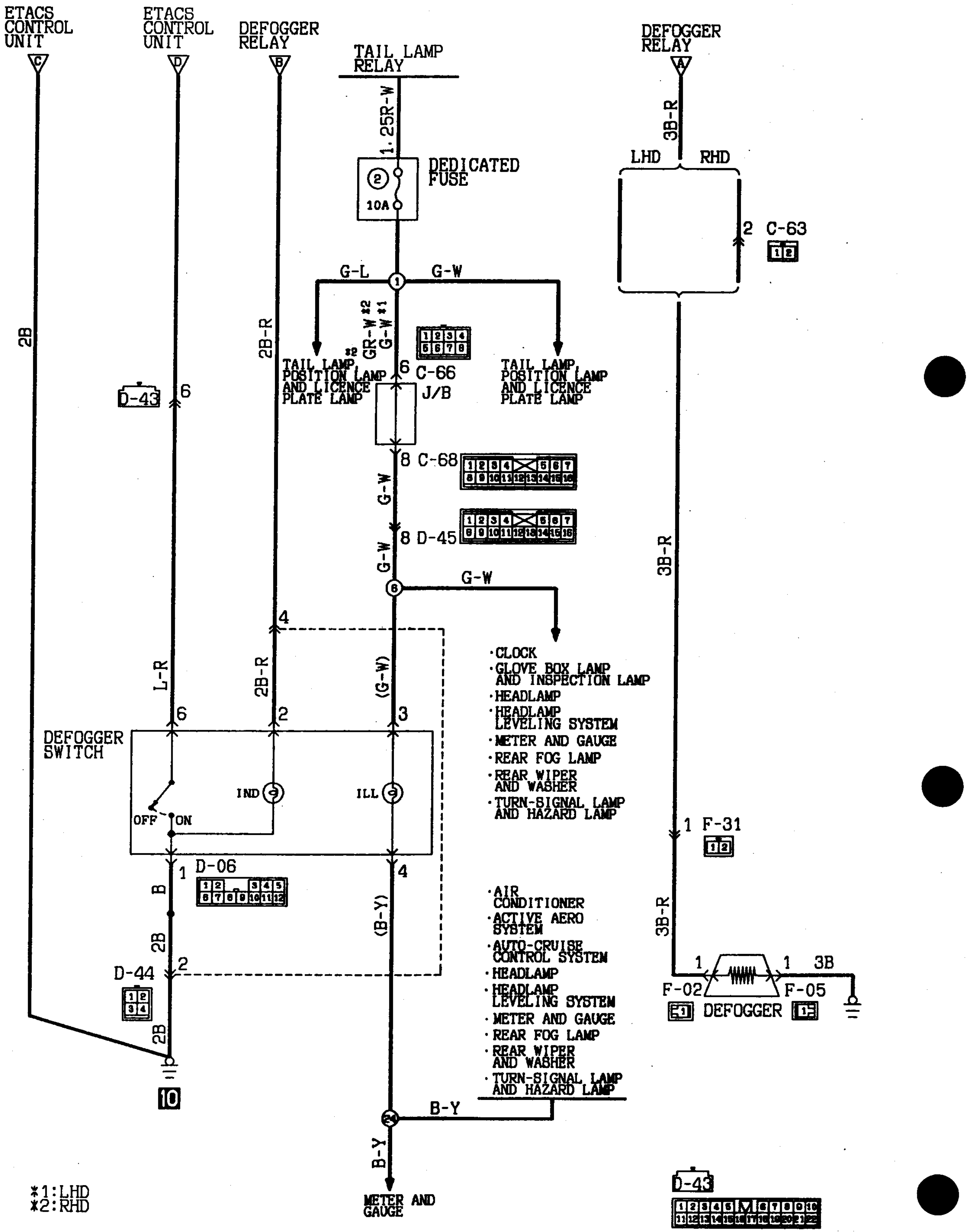
CIRCUIT DIAGRAM



Wire colour code

B:Black	LG:Light green	G:Green	L:Blue	W:White	Y:Yellow	SB:Sky blue
BR:Brown	O:Orange	GR:Gray	R:Red	P:Pink	V:Violet	

KX35-AC-R1307-EC



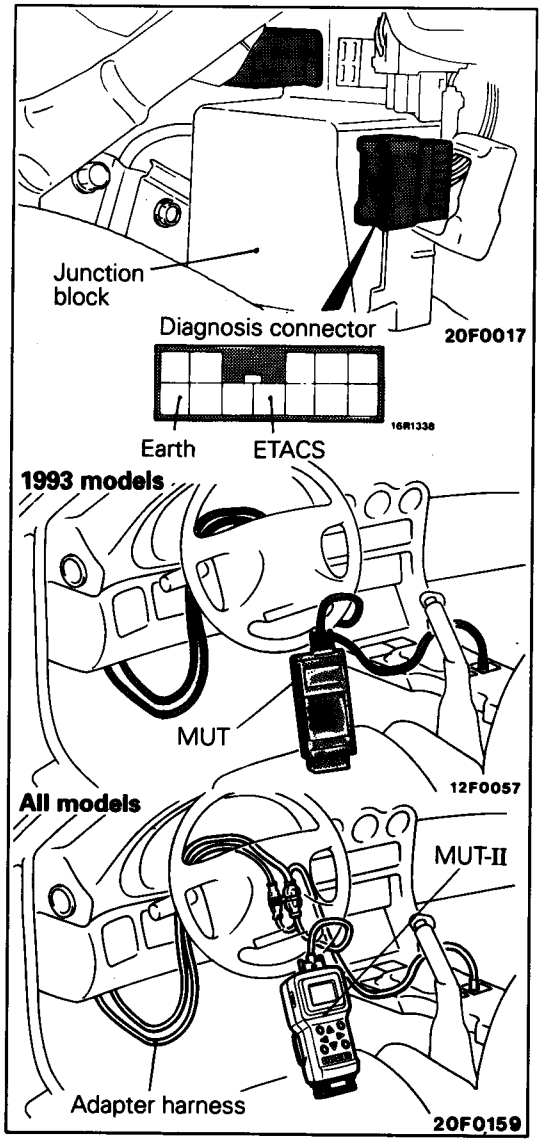
ETACS CONTROL UNIT
C
ETACS CONTROL UNIT
D
DEFOGGER RELAY
B
TAIL LAMP RELAY
1.25R-W
DEDICATED FUSE
2
10A
G-L
G-W
GR-W *2
G-W *1
*2
TAIL LAMP, POSITION LAMP AND LICENCE PLATE LAMP
TAIL LAMP, POSITION LAMP AND LICENCE PLATE LAMP
6 C-66
J/B
8 C-68
8 D-45
G-W
G-W
2B
2B-R
D-43
6
4
L-R
2B-R
(G-W)
6
2
3
DEFOGGER SWITCH
OFF
ON
IND
ILL
1 D-06
4
B
2B
(B-Y)
D-44
2
2B
10
·CLOCK
·GLOVE BOX LAMP AND INSPECTION LAMP
·HEADLAMP
·HEADLAMP LEVELING SYSTEM
·METER AND GAUGE
·REAR FOG LAMP
·REAR WIPER AND WASHER
·TURN-SIGNAL LAMP AND HAZARD LAMP
·AIR CONDITIONER
·ACTIVE AERO SYSTEM
·AUTO-CRUISE CONTROL SYSTEM
·HEADLAMP
·HEADLAMP LEVELING SYSTEM
·METER AND GAUGE
·REAR FOG LAMP
·REAR WIPER AND WASHER
·TURN-SIGNAL LAMP AND HAZARD LAMP
B-Y
B-Y
METER AND GAUGE
DEFOGGER RELAY
A
3B-R
LHD
RHD
2 C-63
3B-R
1 F-31
3B-R
1
1
3B
F-02
F-05
DEFOGGER
D-43
*1:LHD
*2:RHD

OPERATION

- If the defogger switch is turned to "ON" with the ignition switch at the "ON" position, the timer circuit in the ETACS unit will be operated and keep the transistor "on" for 11 minutes to close the contact point of the defogger relay. When the defogger relay is "on", the defogger and mirror heater will be activated. Moreover, the indicator lamp of the defogger switch is lit to inform that the defogger and mirror heater are activated.
- When 11 minutes have passed, the defogger and mirror heater will stop activating even if the defogger switch is at "ON". When the defogger and mirror heater are activated (the timer is activated), they will also stop activating even if the defogger switch is set at "ON" again.

TROUBLESHOOTING HINTS

Phenomenon	Checking method
Mirror heater operates but defogger does not operate	• Check the defogger (Refer to P.54-98.)
Defogger operates but mirror heater does not operate	• Check the dedicated fuse No. ⑩. • Check the mirror heater. (Refer to GROUP 51 – Door Mirror.)
Neither defogger nor mirror heater operates.	• Check the multi-purpose fuse No. ③. • Check the defogger relay. (Refer to P.54-99.) • Check the defogger switch. (Refer to P.54-98.) • Check the defogger switch input signal. (Refer to P.54-97.) • Check the ignition switch input signal. (Refer to P.54-97.)
Illumination lamp of defogger switch does not come on or is dim.	• Check the illumination lamp bulb. • Check the rheostat. (Refer to P.54-60.)



Input Signal

Using the MUT or MUT-II, check whether or not the input signals from each switch are being sent to the ETACS unit.

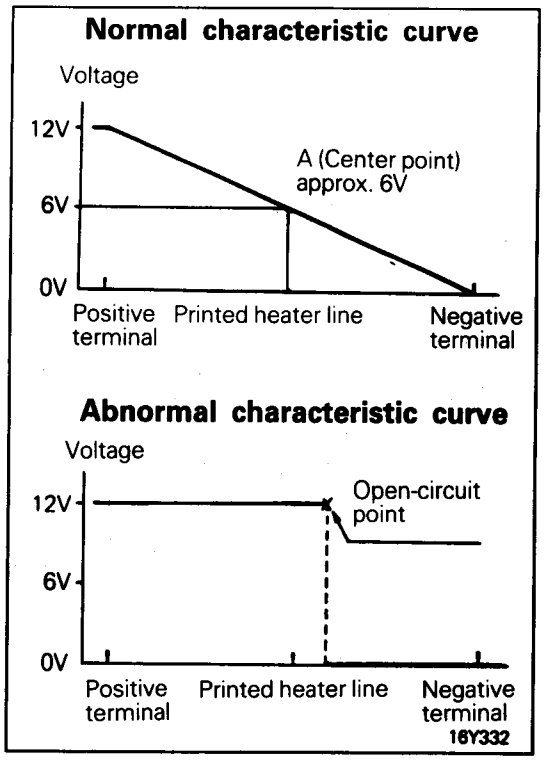
(1) Connect the MUT or MUT-II to the diagnosis check connector located near the junction block.

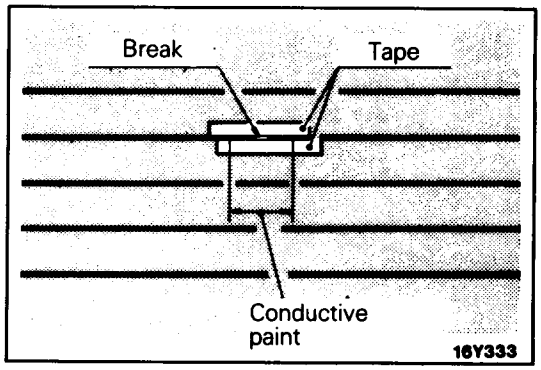
NOTE
When connecting MUT-II, use the adapter harness which belongs to MUT-II sub-assembly.

Caution
Connect and disconnect either MUT or MUT-II with the ignition switch in the OFF position.

(2) Check if the buzzer of the MUT or MUT-II operates when each switch is operated.
If the buzzer operates, the input signals are being sent to the ETACS unit, so that switch can be considered to be functioning normally. If not, the switch or switch input circuit is faulty. Check the switch and the switch input circuit.

NOTES





SERVICE ADJUSTMENT PROCEDURES

E54MLAC

PRINTED-HEATER LINES CHECK

(1) Run engine at 2,000 rpm. Check heater element with battery at full.
(2) Turn ON rear window defogger switch. Measure heater element voltage with circuit tester at rear window glass center A.
Condition good if indicating about 6 V.
(3) If 12 V is indicated at A, there is a break in the negative terminals from A.
Move test bar slowly to negative terminal to detect where voltage changes suddenly (0 V).
(4) If 0 V is indicated at A, there is a break in the positive terminals from A. Detect where the voltage changes suddenly (12 V) with the same method described.

PRINTED-HEATER LINES REPAIR

REQUIRED MATERIALS

- Thinner
- Tape
- Conductive paint
- Lead-free gasoline
- Fine brush

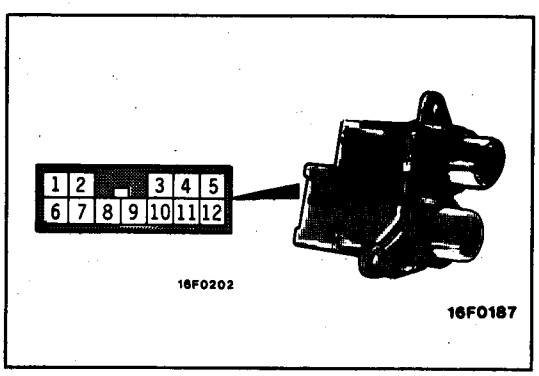
(1) Clean disconnected area with lead-free gasoline. Tape along both sides of heater element.
(2) Mix conductive paint thoroughly. Thin the required amount of paint in a separate container with a small amount of thinner and paint break three times at 15 minute intervals.
(3) Remove tape and leave for a while before use (circuit complete).
(4) When completely dry (after 24 hours) finish exterior with a knife.

Caution
Clean glass with a soft cloth (dry or damp) along defogger heater element.

REAR WINDOW DEFOGGER SWITCH

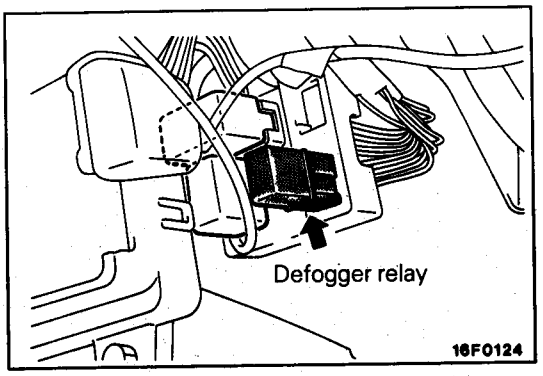
E54MHAH

(1) Remove rear window defogger switch from the meter beze. (Refer to P.54-59.)
(2) Operate the switch and check the continuity between the terminals.



Switch position \ Terminal	1		2	3	4	5	6
OFF							
ON	○	IND	○	ILL			
	○						○

NOTE
○–○ indicates that there is continuity between the terminals.
PWUE9119

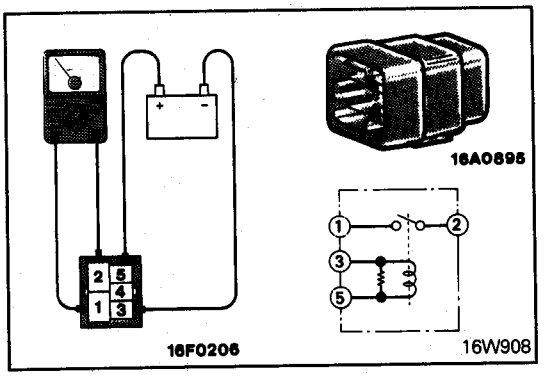


DEFOGGER RELAY

E54MIAG

INSPECTION

(1) Remove defogger relay from the instrument panel relay box.



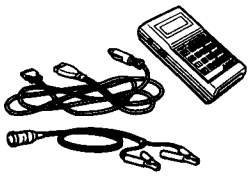
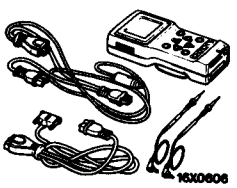
(2) Connect battery power source to terminal 5. Check circuit between terminals with terminal 3 earthed.

Power is supplied	1 – 2 terminals	Continuity
Power is not supplied	1 – 2 terminals	No continuity
	3 – 5 terminals	Continuity

THEFT-ALARM SYSTEM

E54ORAB

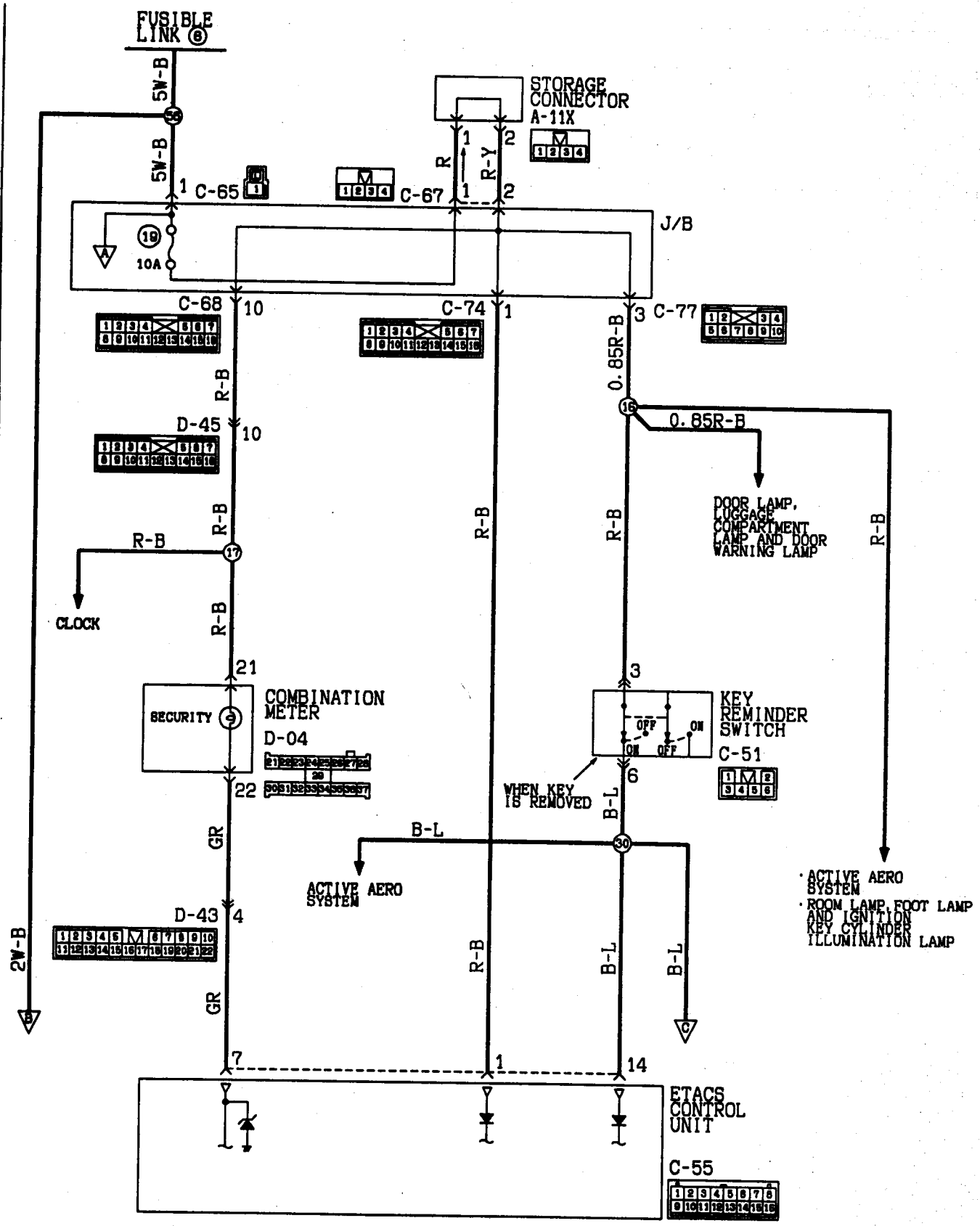
SPECIAL TOOLS

Tool	Number	Name	Use
	MB991341	Mulri-use tester sub-assembly	1993 models ETACS input checking
	For the number, refer to GROUP 00 – Precautions Before Service.	ROM pack	
	MB991502	MUT-II sub-assembly	All models ETACS input checking
 16X0607		ROM pack	

NOTES

TROUBLESHOOTING

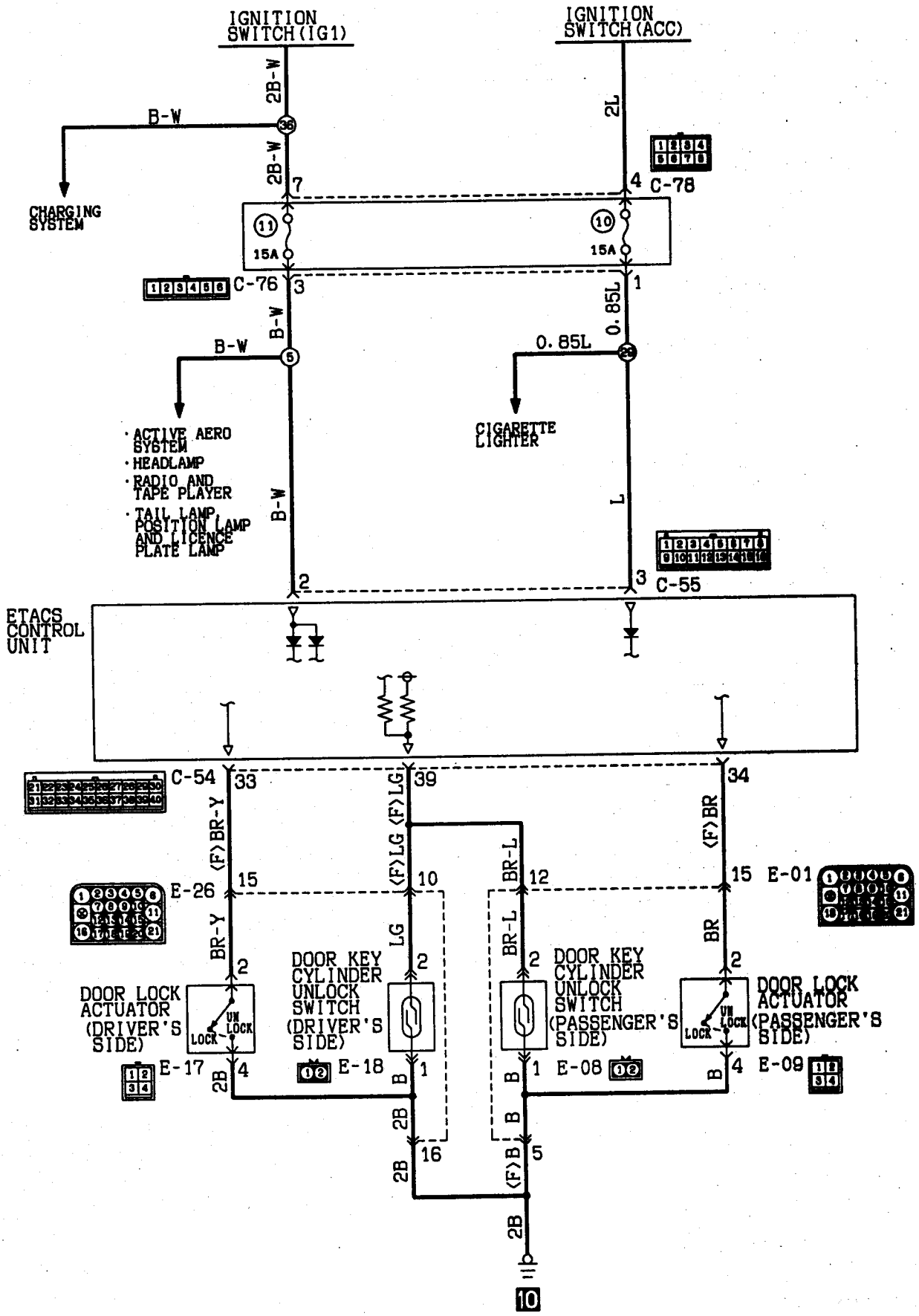
CIRCUIT DIAGRAM



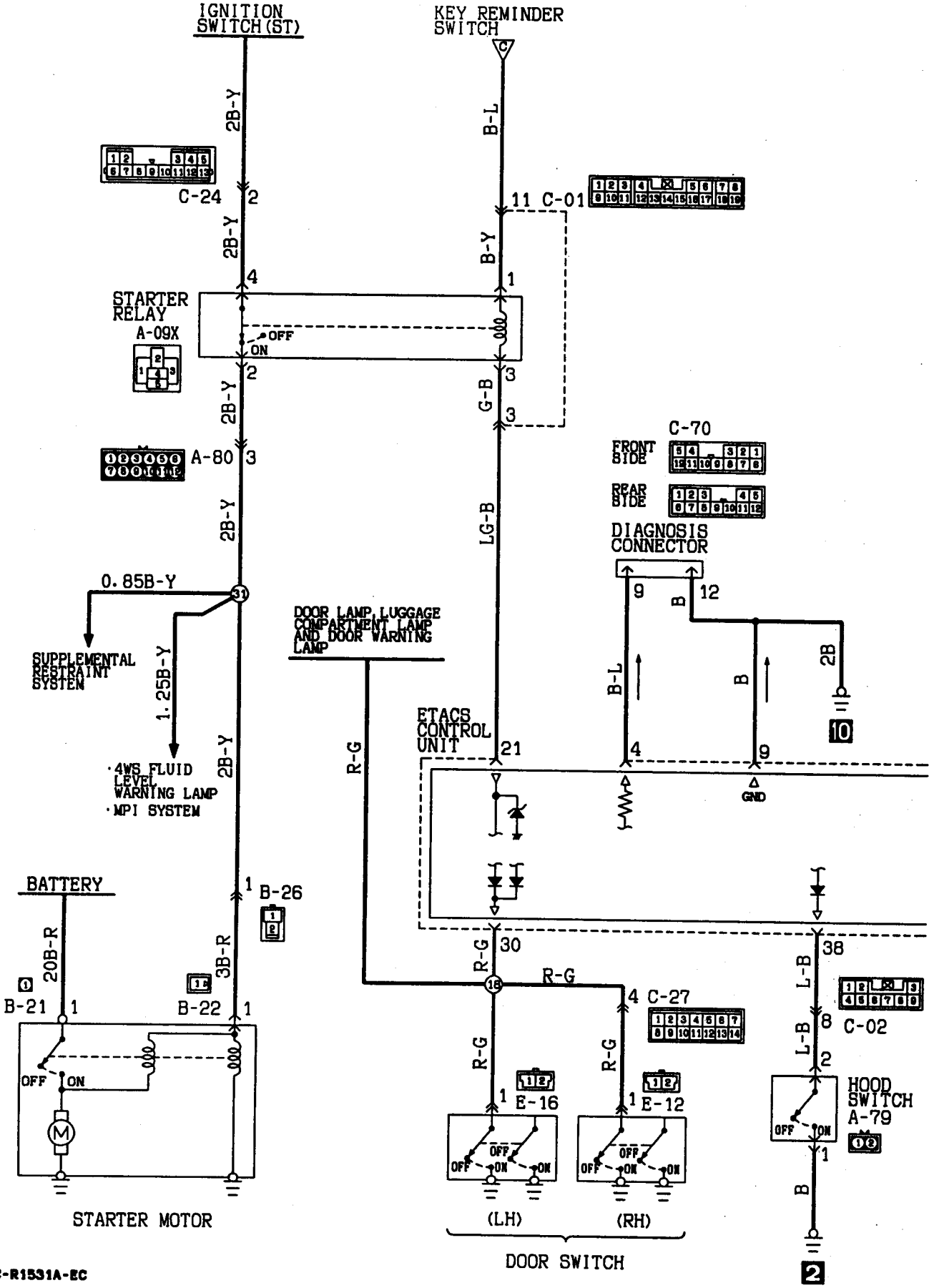
Wire colour code

B:Black	LG:Light green	G:Green	L:Blue	W:White	Y:Yellow	SB:Sky blue	
BR:Brown	O:Orange	GR:Gray	R:Red	P:Pink	V:Violet		

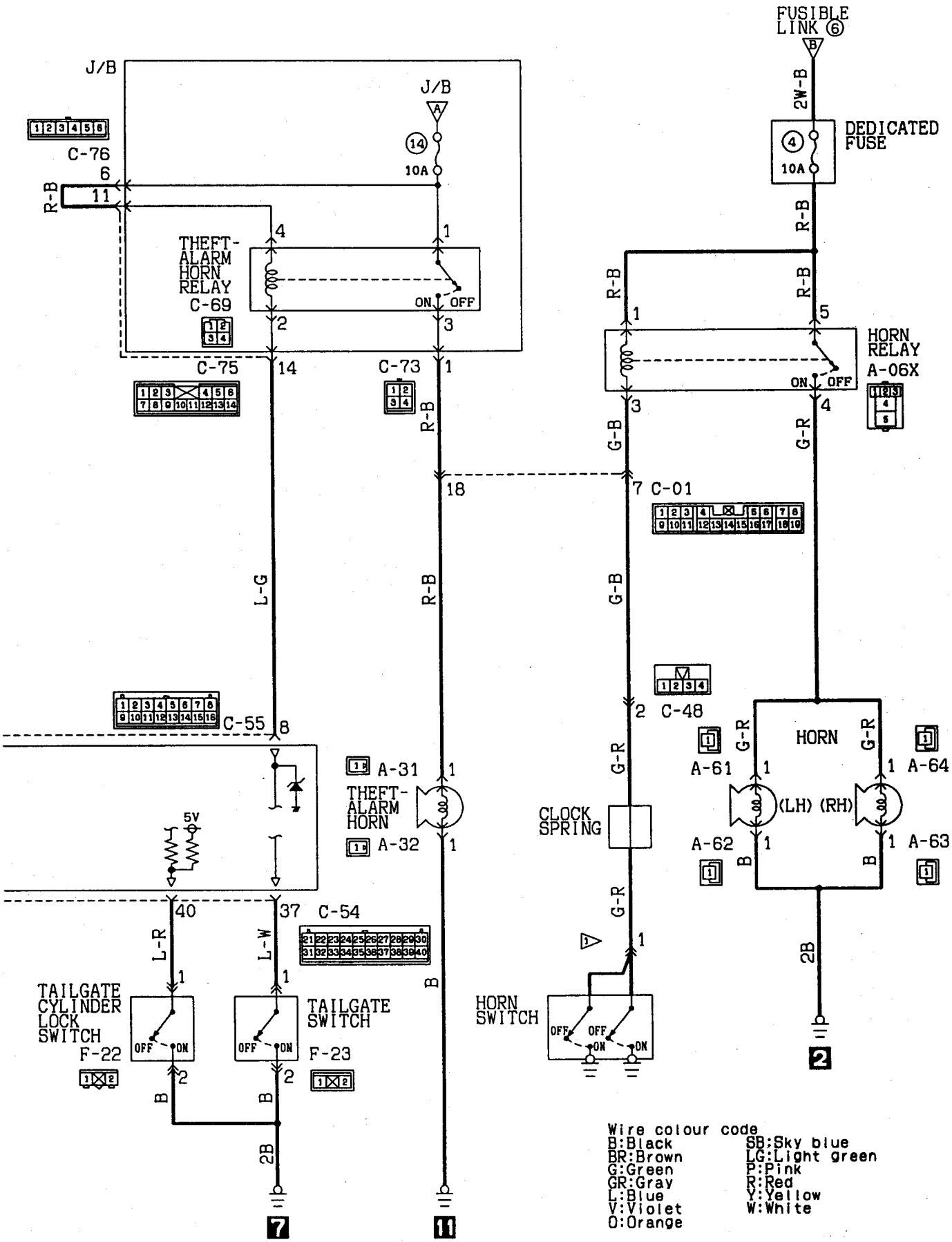
KX3S-AC-R1531-EC


IGNITION SWITCH(IG1)
IGNITION SWITCH(ACC)
2B-W
B-W
2L
CHARGING SYSTEM
C-78
15A
15A
C-76
0.85L
B-W
· ACTIVE AERO SYSTEM
· HEADLAMP
· RADIO AND TAPE PLAYER
· TAIL LAMP, POSITION LAMP AND LICENCE PLATE LAMP
CIGARETTE LIGHTER
C-55
ETACS CONTROL UNIT
C-54
(F)BR-Y
(F)LG
BR-L
(F)BR
E-26
E-01
BR-Y
LG
BR
DOOR LOCK ACTUATOR (DRIVER'S SIDE)
DOOR KEY CYLINDER UNLOCK SWITCH (DRIVER'S SIDE)
DOOR KEY CYLINDER UNLOCK SWITCH (PASSENGER'S SIDE)
DOOR LOCK ACTUATOR (PASSENGER'S SIDE)
E-17
E-18
E-08
E-09
2B
(F)B
10

CIRCUIT DIAGRAM (CONTINUED)



KX35-AC-R1531A-EC

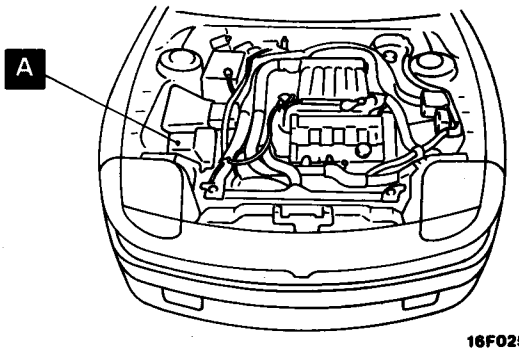


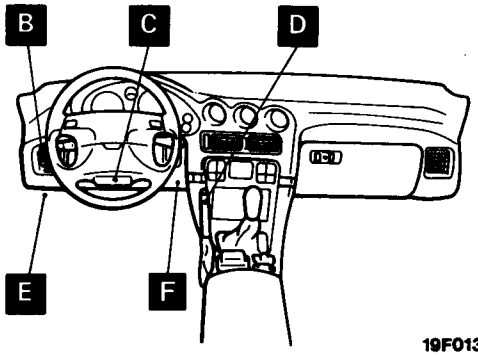
Wire colour code

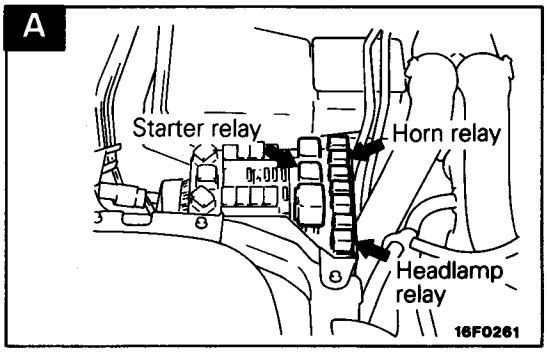
B:Black	SB:Sky blue
BR:Brown	LG:Light green
G:Green	P:Pink
GR:Gray	R:Red
L:Blue	Y:Yellow
V:Violet	W:White
O:Orange	

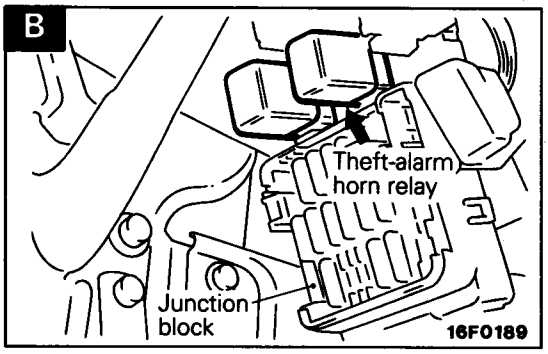
COMPONENT LOCATION

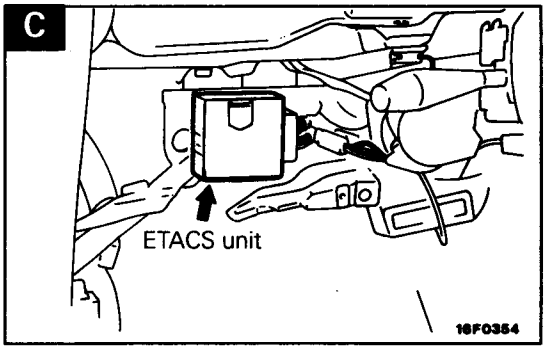
Name	Symbol	Name	Symbol
Self-diagnosis connector<Up to 1994 models>	E	Horn relay	A
Self-diagnosis connector<From 1995 models>	F	Starter relay	A
ETACS unit	C	Theft-alarm horn relay	B
Headlamp relay	A	Theft-alarm starter relay	D

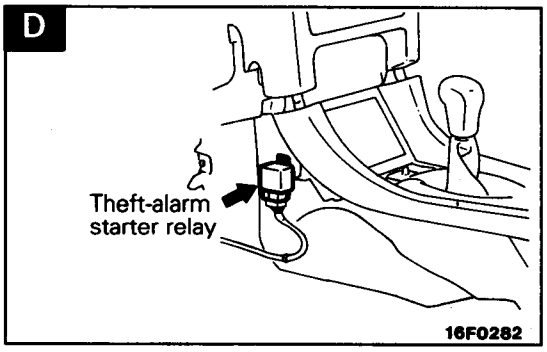


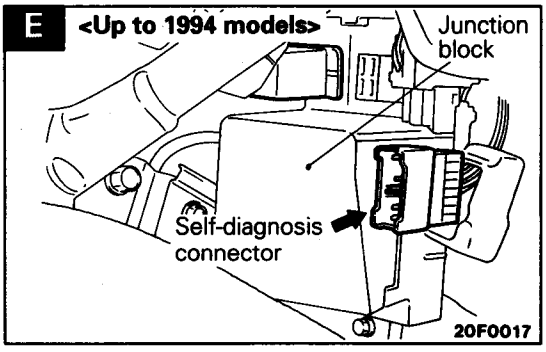


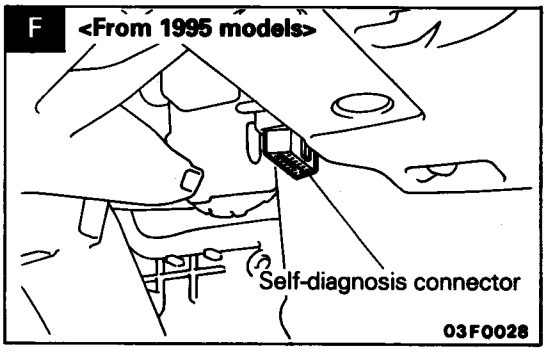


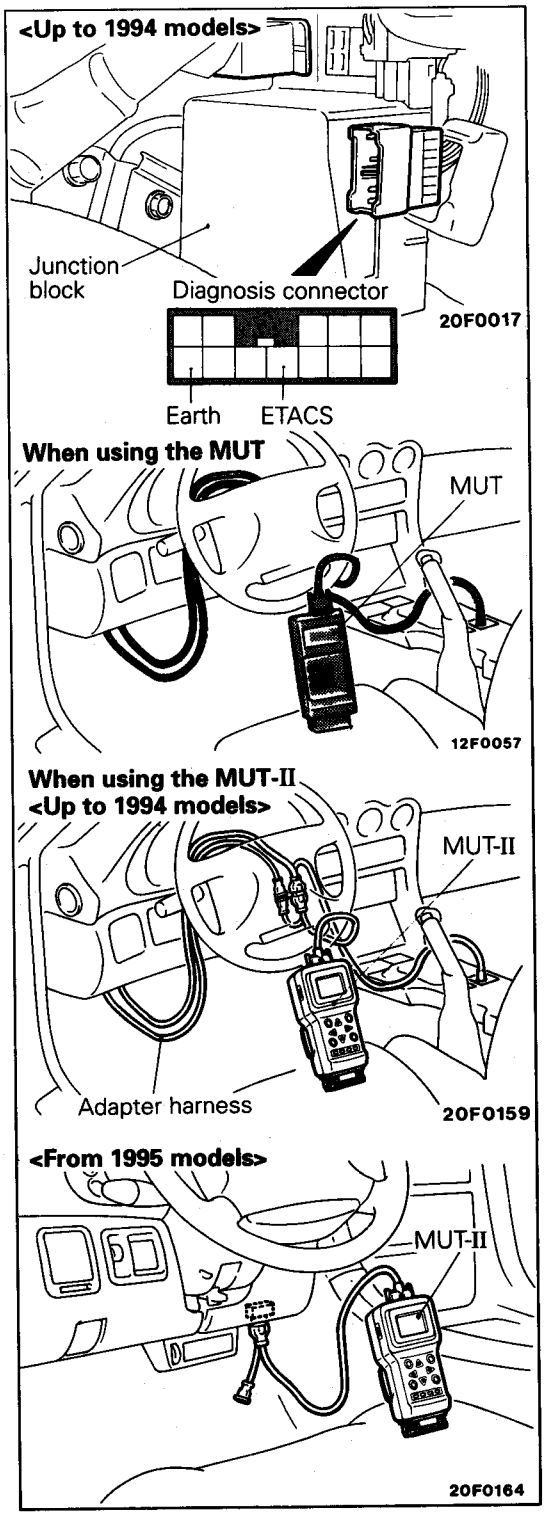












INPUT CHECK.

Using the MUT or MUT-II, check whether or not the input signals from each switch are being sent to the electronic control unit.

(1) Connect the MUT or MUT-II to the diagnosis check connector (located near the junction block).

NOTE
When connecting MUT-II to 1994 models, use the adapter harness which belongs to MUT-II sub-assembly.

Caution
Connect and disconnect either MUT or MUT-II with the ignition switch in the OFF position.

(2) Check to be sure that the buzzer of the MUT or MUT-II operates one time, when each switch noted below is operated. If the buzzer operates, the input signals are being sent to the electronic control unit, so that switch can be considered to be functioning normally.
If there is a malfunction, there is an abnormality in the switch or in the switch input circuit, so they should be inspected.

- Driver and front passenger door switches
- Driver and front passenger door lock actuator switches
- Hood switch
- Tailgate latch switch
- Door key cylinder unlock switch
- Tailgate cylinder lock switch

NOTES

TROUBLESHOOTING QUICK-REFERENCE TABLE

For information concerning the locations of electrical components, refer to GENERAL – Theft-alarm System Circuit.

1. ARMING / DISARMING RELATIONSHIP

Trouble symptom	Cause	Check method	Remedy
The system is not armed (The SECURITY lamp doesn't illuminate, and the alarm doesn't function.) (The central door locking system functions normally. If the central locking system does not function normally, refer to P.54-105.)	Damaged or disconnected wiring of ECU power supply circuit	Check by using check chart P.54-103.	Replace the fusible link No. ⑥ or the fuse No. ⑲. Repair the harness.
	Damaged or disconnected wiring of door switch input circuit	Check by using check chart P.54-104.	Repair the harness or replace the door switch.
The arming procedures are followed, but the SECURITY lamp does not illuminate. (There is an alarm, however, when an alarm test is conducted after about 20 seconds have passed.)	Damaged or disconnected wiring of SECURITY lamp activation circuit	Check by using check chart P.54-108.	Replace the fusible link No. ⑥ or the fuse No.⑲. Repair the harness.
	Blown SECURITY lamp bulb.		Replace the bulb.
	Malfunction of the ECU.	–	Replace the ECU.
The alarm sounds in error when, while the system is armed, a door or the tailgate is unlocked by using the key.	Damaged or disconnected wiring of a door key cylinder and the tailgate cylinder lock switch input circuit.	If input checks (P.54-100) indicate a malfunction, check by using check chart P.54-106 and 107.	Repair the harness or replace a door key cylinder and the tailgate cylinder lock switch.
	Malfunction of a door key cylinder and the tailgate cylinder lock switch.		
	Malfunction of the ECU.	–	Replace the ECU.

2. ACTIVATION / DEACTIVATION RELATIONSHIP

Trouble symptom	Cause	Check method	Remedy
There is no alarm when, as an alarm test, a door is opened without using the key. (The arming and disarming are normal, and the alarm is activated when the tailgate or hood is opened.)	Damaged or disconnected wiring of door switch (all doors) input circuit	If input checks (P.54-100) indicate a malfunction, check by using check chart P.54-104.	Repair the harness or replace the door switch.
	Malfunction of the door switch		
	Malfunction of the ECU	–	Replace the ECU.
There is no alarm when,as an alarm test, the tailgate is opened without using the key. (The alarm is activated, however, by opening a door or the hood.)	Damaged or disconnected wiring of tailgate latch switch input circuit	If input checks (P.54-100) indicate a malfunction, check by using check chart P.54-107.	Repair the harness or replace the tailgate latch switch.
	Malfunction on the tailgate latch switch.		
	Malfunction of the ECU.	–	Replace the ECU.

Trouble symptom	Cause	Check method	Remedy
There is no alarm when, as an alarm test the hood is opened from within the vehicle. (The alarm is activated, however, by opening a door or the tailgate.)	Damaged or disconnected wiring of hood switch input circuit.	If input checks (P.54-100) indicate a malfunction, check by using check chart P.54-104.	Repair the harness or replace the hood switch.
	Malfunction of the hood switch.		
	Malfunction of the ECU.	–	Replace the ECU.
Engine does not start even when the starter relay switch is in the switched-off condition (normally closed).	There is a short-circuit of the starter relay activation circuit	Check by using check chart P.54-110.	Repair the harness.
The horn or the theft alarm horn does not sound even after the alarm test is performed.	Damaged or disconnected wiring of horn relay power supply circuit or horn activation circuit. Damaged or disconnected wiring of the theft-alarm horn relay power supply circuit or the theft-alarm horn activation circuit.	Check by using check chart P.54-110.	Repair the harness. Replace the horn. Replace dedicated fuse No. ⑥ or the fusible link No. ⑥.
	Malfunction of the ECU.		Replace the ECU.
The system is not deactivated when, during an alarm test in which the alarm is intentionally activated, the door or tailgate is unlocked by using the key. (The system also cannot be disarmed.)	Damaged or disconnected wiring of door key cylinder and tailgate cylinder lock switch input circuit	If input checks (P.54-100) indicate a malfunction, check by using check chart P.54-106 and 107.	Repair the harness. Replace the key cylinder switch or the tailgate switch.
	Malfunction of door key cylinder and tailgate cylinder lock switch.		
	Malfunction of the ECU		Replace the ECU.

ECU: Electronic Control Unit

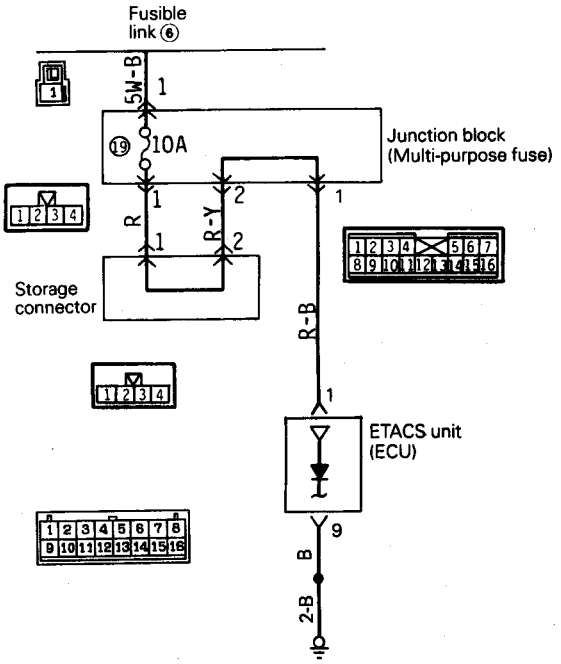
NOTE

(1) If the tailgate cylinder lock switch or door key cylinder unlock switch is operated roughly, or if these switches have been installed incorrectly or switches themselves are defective, the ECU may not accept the warning or alarm cancelling signal. In such case, the alarm operation will take place when the door is opened using a key.
[When the door key cylinder switch has been shorted, however, if the ignition switch is turned ON, the ECU judges the detection switch as faulty and thereafter, it will prevent setting of (warning) alarm until the shorting is corrected.]

(2) If the tailgate is opened using a key and is left as opened when the door key cylinder switch system has a trouble (wiring harness damage, open circuit, etc.), the ECU judges it as the tailgate holding mode and does not produce alarm even when the door is opened.

CHECKING THE CIRCUIT AND INDIVIDUAL PART

1. ETACS POWER-SUPPLY AND EARTH CIRCUITS



16F0332

Description of operation

The battery supplies a stabilized 5V power supply to the ECU, via the constant-voltage circuit and terminal 1 (which is directly connected to the battery.)

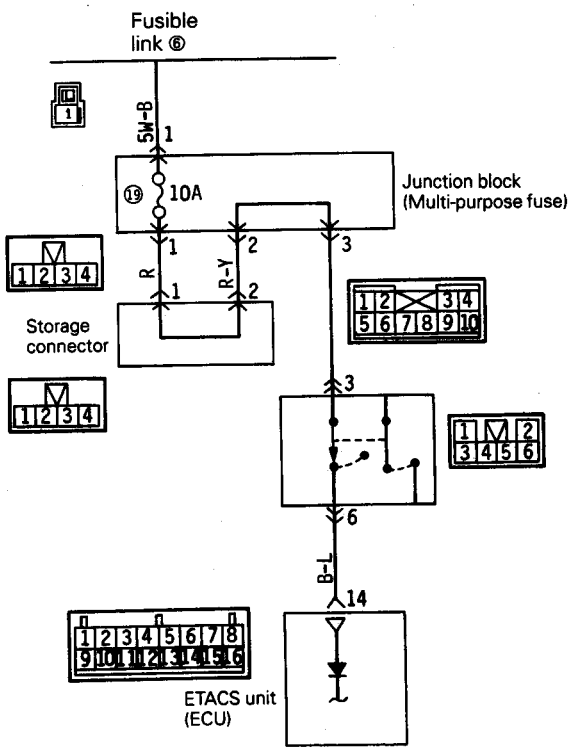
ECU terminal voltage (The ECU connector connected).

ECU terminal No.	Signal	Condition	Terminal voltage
1	ECU power supply	At all times	System voltage

Checking the earth circuit (Disconnect the ECU connector and check the wiring harness side.)

ECU terminal No.	Connected to/measured component	Measurement	Tester connection	Check condition	Standard
9	ECU earth	Resistance	9 - earth	At all times	Continuity

2. KEY-REMINDER SWITCH INPUT CIRCUIT



16F0454

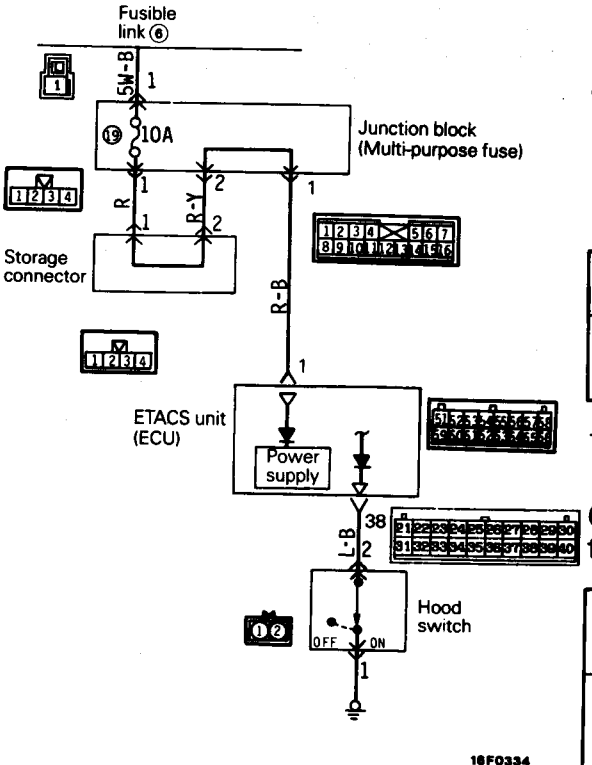
Description of operation

The key-reminder switch is switched OFF and HIGH-level signals are sent to the ECU when the key is inserted into the ignition key cylinder: when the key is removed, the key-reminder switch is switched ON and LOW-level signals are sent to the ECU.

ECU terminal voltage (The ECU connector connected).

ECU terminal No.	Signal	Condition	Terminal voltage
14	Key-reminder switch	Key removed	System voltage
		Key inserted	0V

3. HOOD SWITCH INPUT CIRCUIT



Description of operation

When the hood is closed (the hood switch is switched OFF), HIGH-level signals are sent to the ECU:
When the hood is opened (the hood switch is switched ON), LOW-level signals are sent to the ECU.

ECU terminal voltage (The ECU connector connected).

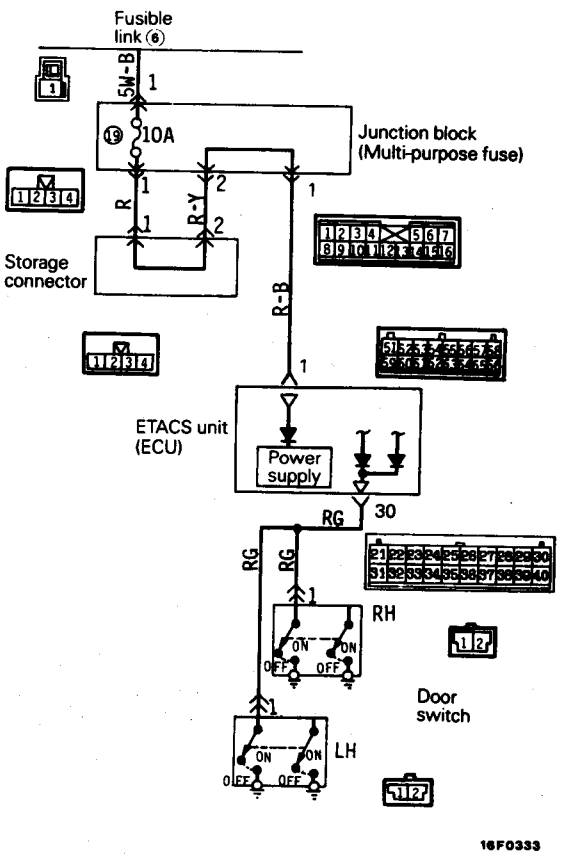
ECU terminal No.	Signal	Condition		Terminal voltage
38	Hood switch	Hood	Open	0V
			Closed	5V*

* Measurement is not possible by using a voltmeter, but is possible by using an oscilloscope.

Checking the hood switch circuit (Disconnect the ECU connector and check the wiring harness side.)

ECU terminal No.	Connected to/measured part	Measurement	Tester connection	Check condition		Standard
38	Hood switch	Resistance	38 - earth	Hood	Closed	No continuity
					Open	Continuity

4. DOOR SWITCH INPUT CIRCUIT



Description of operation

When the door is closed (the door switch is switched OFF), HIGH-level signals are sent to the ECU:
When the door is opened (the door switch is switched ON), LOW-level signals are sent to the ECU.

ECU terminal voltage (The ECU connector connected).

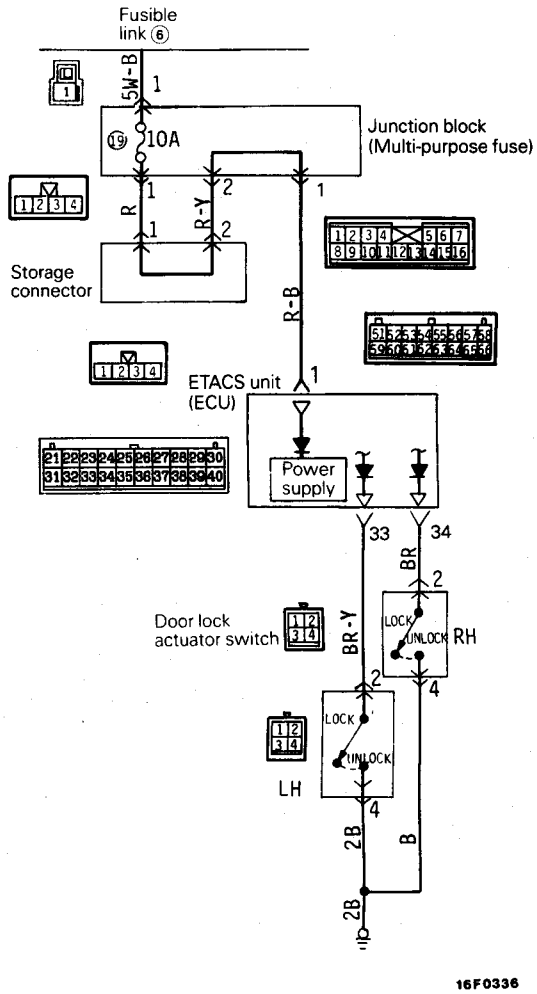
ECU terminal No.	Signal	Condition		Terminal voltage
30	Driver door switch	Driver door	Open	0V
			Closed	5V*
	Passenger door switch	Passenger door	Open	0V
			Closed	5V*

* Measurement is not possible by using a voltmeter, but is possible by using an oscilloscope.

Checking the door switch circuit (Disconnect the ECU connector and check the wiring harness side.)

ECU terminal No.	Connected to/measured part	Measurement	Tester connection	Check condition		Standard
30	Driver door switch	Resistance	30 - earth	Driver door	Closed	No continuity
					Open	Continuity
	Passenger door switch	Resistance	30 - earth	Passenger door	Closed	No continuity
					Open	Continuity

5. DOOR LOCK ACTUATOR SWITCH INPUT CIRCUIT



Description of operation

When a door is locked by the lock knob or the key, the door lock actuator switch is switched OFF, and HIGH-level signals are sent to the ECU. These signals active the timer circuit of the ECU, there by causing the activation circuit to function, thus activating the door lock actuator of all doors.

ECU terminal voltage (The ECU connector connected).

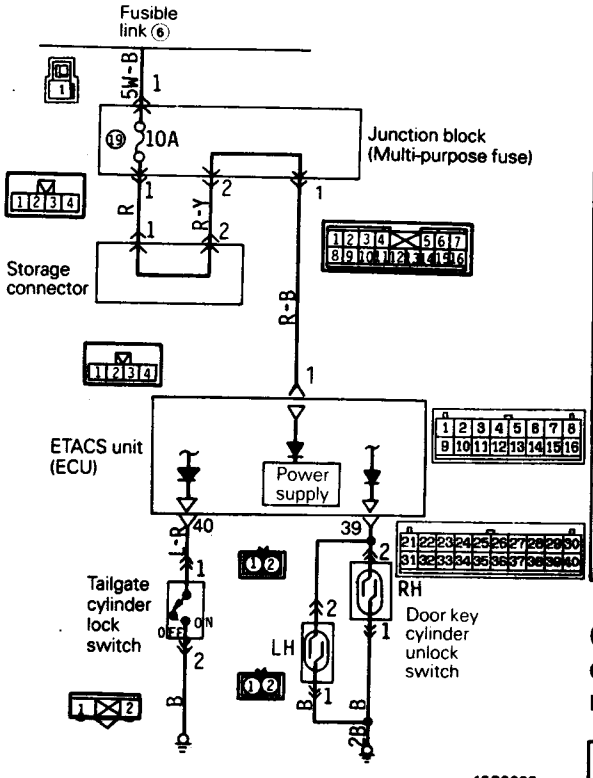
ECU terminal No.	Signal	Condition		Terminal voltage
33	Door lock actuator switch (driver door)	Door lock actuator switch	Lock: OFF	5V*
			Unlock: ON	0V
34	Door lock actuator switch (passenger door)	Door lock actuator switch	Lock: OFF	5V*
			Unlock: ON	0V

* Measurement is not possible by using a voltmeter, but is possible by using an oscilloscope.

Checking the earth circuit (Disconnect the ECU connector and check the wiring harness side.)

ECU terminal No.	Connected to/measured part	Measurement	Tester connection	Check conditions		Standard
33	Door lock actuator switch (LH)	Resistance	33 - earth	Door lock actuator switch	Lock: OFF	No continuity
					Unlock: ON	Continuity
34	Door lock actuator switch (RH)	Resistance	34 - earth	Door lock actuator switch	Lock: OFF	No continuity
					Unlock: ON	Continuity

6. DOOR KEY CYLINDER UNLOCK AND TAILGATE CYLINDER LOCK SWITCH INPUT CIRCUIT



Description of operation

When the door key is rotated or the liftgate key is unlocked, LOW-level signals are sent to the ECU.

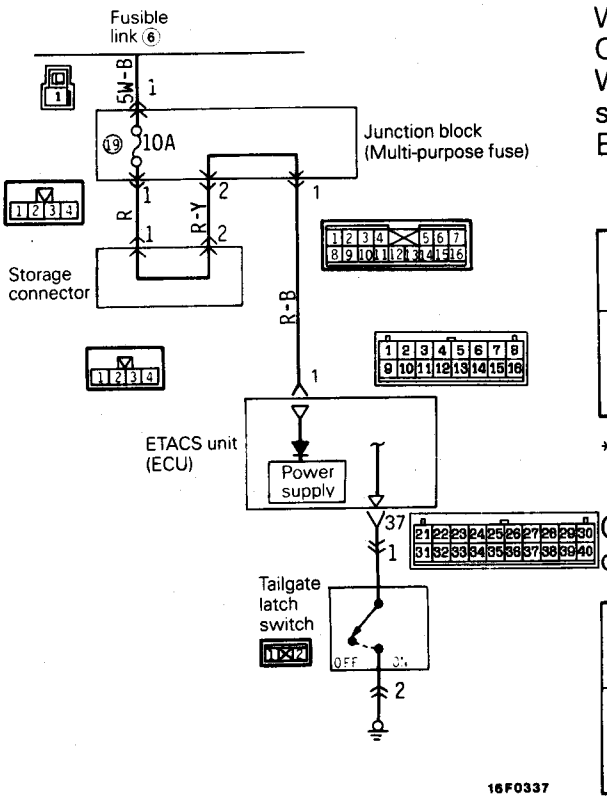
ECU terminal voltage (The ECU connector connected).

ECU terminal No.	Signal	Condition		Terminal voltage
39	Door key cylinder unlock switch	Door key cylinder (LH)	Not rotate	5V
			Rotate	0V
		Door key cylinder (RH)	Not rotate	5V
			Rotate	0V
40	Tailgate cylinder lock switch	Tailgate cylinder	Lock	5V
			Unlock	0V

Checking the door key cylinder and tailgate cylinder lock switch circuit (Disconnect the ECU connector and check the wiring harness.)

ECU terminal No.	Connected to/measured part	Measurement	Tester connection	Check conditions		Standard
39	Door key cylinder unlock switch	Resistance	39 - earth	Door key cylinder (LH)	Not rotate	No continuity
					Rotate	Continuity
				Door key cylinder (RH)	Not rotate	No continuity
					Rotate	Continuity
40	Tailgate cylinder lock switch	Resistance	40 - earth	Tailgate cylinder	Lock	No continuity
					Unlock	Continuity

7. TAILGATE LATCH SWITCH INPUT CIRCUIT



Description of operation

When the tailgate is closed (the tailgate latch switch is switched OFF), High-level signals are sent to the ECU.
When the tailgate is opened (the tailgate latch switch is switched ON), LOW-level signals are sent to the ECU.
ECU terminal voltage (The ECU connector connected.)

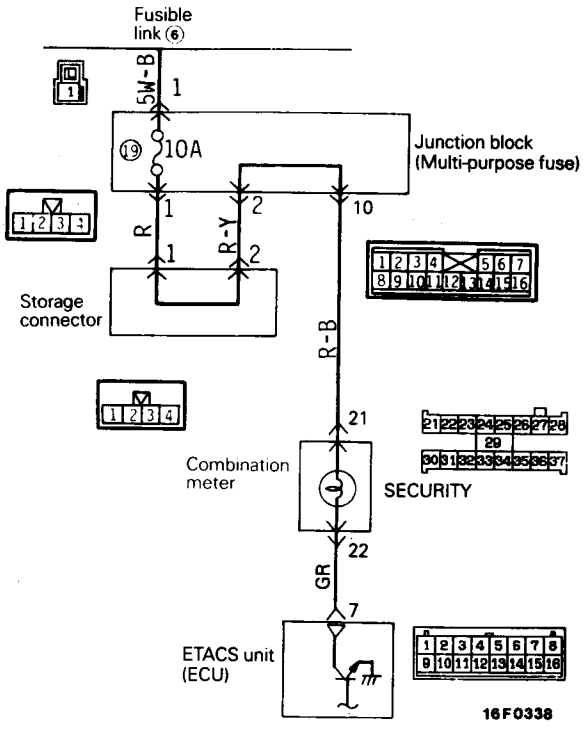
ECU terminal No.	Signal	Condition		Terminal voltage
37	Tailgate latch switch	Tailgate	Open	0V
			Closed	5V*

* Measurement is not possible by using a voltmeter, but is possible by using an oscilloscope.

Checking the tailgate latch switch circuit (Disconnect the ECU connector and check the wiring harness.)

ECU terminal No.	Connected to/measured part	Measurement	Tester connection	Check conditions		Standard
37	Tailgate latch switch	Resistance	37 - earth	Tailgate	Closed	No continuity
					Open	Continuity

8. SECURITY LAMP ACTIVATION CIRCUIT



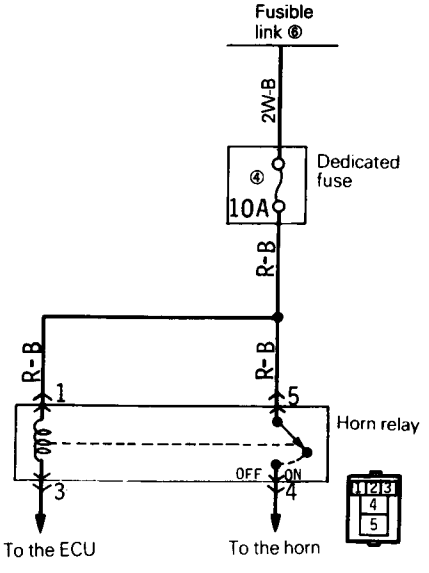
Description of operation

If all doors are in locked state after key-less locking, the ECU transistor is turned ON and the security lamp comes on.

Checking the security lamp activation circuit (Disconnect the ECU connector and check the wiring harness side.)

Step	Check object	Judgement		Cause	Remedy
		Normal	Mal-function		
1	Combination meter connector terminal voltage	System voltage	0V	Fuse ⑲ damaged or disconnected	Replace the fuse
				Harness damaged or disconnected, or short-circuit	Repair the harness
2	Combination meter connector terminal voltage	System voltage	0V	Damaged or disconnected wiring of SECURITY lamp bulb	Replace the bulb
				Harness damaged or disconnected	Repair the harness
3	ECU terminal voltage 7	System voltage	0V	Harness damaged or disconnected, or short-circuit	Repair the harness

9. HORN RELAY POWER-SUPPLY CIRCUIT



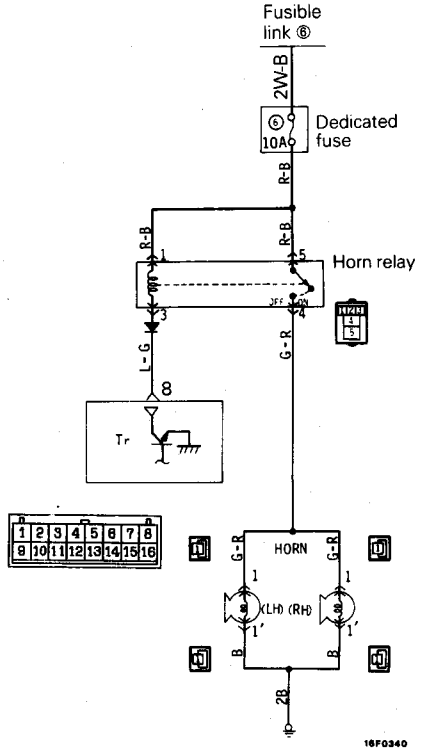
Description of operation

Power voltage is always supplied to the horn relay.

Checking the horn relay power-supply circuit (Disconnect the horn relay)

Check object	Judgement		Cause	Remedy
	Normal	Mal-function		
HORN RELAY connector terminal voltage 5	System voltage	0V	Fuse ⑥ damaged or disconnected	Replace the fuse
			Damaged or disconnected harness	Repair the harness

10. HORN ACTIVATION CIRCUIT



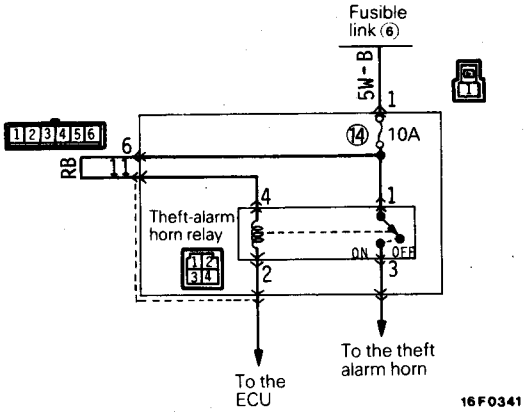
Description of operation

The ECU transistor is switched ON if the vehicle door, etc. are opened without use of the key.
This energizes the horn relay to activate the horn.

Checking the horn activation circuit (Disconnect the ECU connector, then short-circuit terminal connector No. 8 and activate the horn relay.)

Step	Check object	Judgement		Cause	Remedy
		Normal	Mal-function		
1	Horn relay terminal voltage (4-Earth)	System voltage	0V	Malfunction of the horn relay	Check the horn relay (Refer to P.54-66.)
2	Horn terminal voltage (LH & RH) (1-Earth)	System voltage	0V	Harness damaged or disconnected	Repair the harness
3	Horn terminal voltage (LH & RH) (1-Earth)	Horn sounds (0V)	Horn doesn't sound (0V)	Malfunction of the horn	Replace the horn
			System voltage	Damaged or disconnected wiring of earth circuit	Repair the harness

11. THEFT ALARM HORN RELAY POWER-SUPPLY CIRCUIT



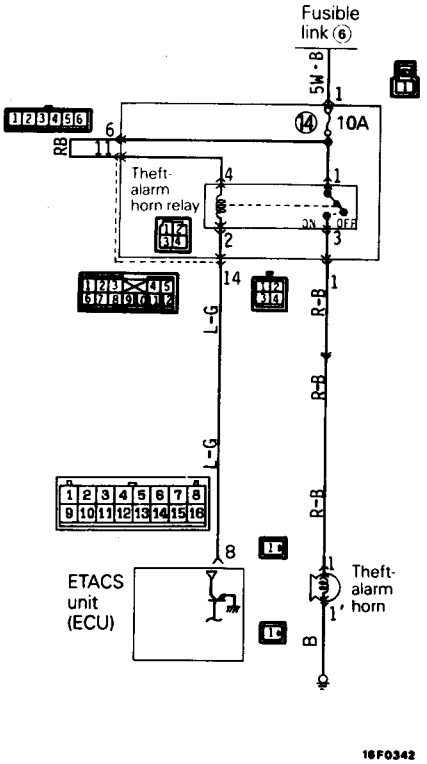
Description of operation

Power voltage is always supplied to the theft alarm horn relay.

Checking the horn relay power-supply circuit (Disconnect the theft alarm horn relay)

Check object	Judgement		Cause	Remedy
	Normal	Mal-function		
THEFT ALARM HORN RELAY connector terminal voltage 1	System voltage	0V	Fuse ⑭ damaged or disconnected	Replace the fuse
			Damaged or disconnected harness	Repair the harness

12. THEFT ALARM HORN ACTIVATION CIRCUIT



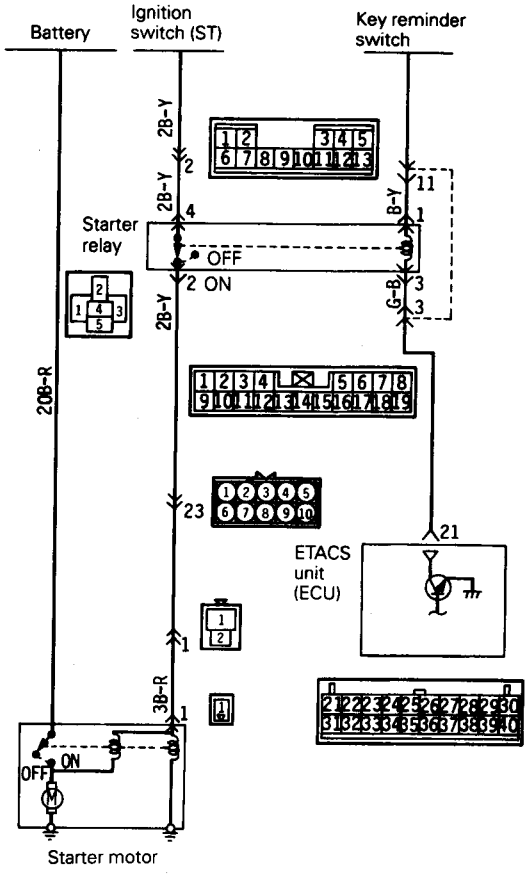
Description of operation

The ECU transistor is switched ON if the vehicle door, etc. are opened without use of the key.
This energizes the theft alarm horn relay to activate the horn.

Checking the horn activation circuit (Disconnect the ECU connector, then short-circuit terminal connector No. 8 and activate the theft starter relay)

Step	Check object	Judgement		Cause	Remedy
		Normal	Mal-function		
1	Horn relay terminal voltage (1-Earth)	System voltage	0V	Malfunction of the horn relay	Check the horn relay (Refer to P.54-66.)
2	Horn terminal voltage (1-Earth)	System voltage	0V	Harness damaged or disconnected	Repair the harness
3	Horn terminal voltage (1'-Earth)	Horn sounds (0V)	Horn doesn't sound (0V)	Malfunction of the horn	Replace the horn
			Battery voltage	Damaged or disconnected wiring of earth circuit	Repair the harness

13. STARTER RELAY ACTIVATION CIRCUIT



Description of operation

The ECU transistor is switched ON if the vehicle door etc. are opened without use of the key. This turns OFF the starter relay and power ceases to be suplied to the starter magnet switch.

Checking the starter relay activation circuit (Disconnect the ECU connector and activate the starter relay)

Step	Check object	Judgement		Cause	Remedy
		Normal	Mal-function		
1	Starter relay terminal voltage (2-Earth)	System voltage	0V	Malfunction of the starter relay	Check the starter relay
2	Starter motor terminal (1-Earth)	System voltage	0V	Harness damaged or disconnected	Repair the harness
(Starter motor connector 1. disconnected)					
3	Continuity between 1 connector and earth	0 Ω	∝ Ω	Damaged magnet switch	Replace magnet switch

HEATER, AIR CONDITIONER AND VENTILATION

CONTENTS

E55AA-

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver (from rendering the SRS inoperative).

(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIFICATIONS

E55CA--

GENERAL SPECIFICATIONS

Items	Specifications
Heater unit	
Type	Three-way-flow full-air-mix system
Heater control assembly	Push button type
Compressor	
Model	
<Vehicles using R-12 refrigerant>	FX-105VS
<Vehicles using R-134a refrigerant>	MSC105
Refrigerant unit lubricant cm^3 (cu.in.)	
<Vehicles using R-12 refrigerant>	FREOL S-83 or SUNISO 5GS 160±20 (9.8±1.2)
<Vehicles using R-134a refrigerant>	SUN PAG 56 160±20 (9.8±1.2)
V belt size mm (in.)	1,150 (45.3)
Dual pressure switch	
<Vehicles using R-12 refrigerant>	
High pressure switch kPa (kg/cm^2, psi)	OFF: 2,700 (27, 384) ON: 2,100 (21, 299)
Low pressure switch kPa (kg/cm^2, psi)	OFF: 210 (2.1, 30) ON: 235 (2.35, 33)
<Vehicles using R-134a refrigerant>	
High pressure switch kPa (kg/cm^2, psi)	OFF: 3,200 (32, 455) ON: 2,600 (26, 370)
Low pressure switch kPa (kg/cm^2, psi)	OFF: 200 (2.0, 28) ON: 225 (2.25, 32)
Freezer prevention °C (°F)	Air temperature thermostat OFF: –2 (28.4) ON: 2 (35.6)
Refrigerant and quantity g (oz.)	
<Vehicles using R-12 refrigerant>	R-12 (CFC–12) 770–870 (27.16–30.69)
<Vehicles using R-134a refrigerant>	R-134a (HFC–134a) 740–790 (26.10–27.87)

SERVICE SPECIFICATIONS

E55CB--

Items	Specifications
Standard value	
Idle speed when air conditioner on rpm	900 ± 100
Resister resistance value Ω	1.76 – 2.06 (Across terminals ② and ①) 1.10 – 1.26 (Across terminals ② and ③) 0.38 – 0.44 (Across terminals ② and ④)
Thermostat	
ON temperature °C (°F)	Approx. 110 (230) or less
OFF temperature °C (°F)	Approx. 155 (311) or more
Revolution pick up sensor standard resistance Ω	405 ± 35 when ambient temperature is 20°C (68°F)
Clutch clearance mm (in.)	0.4 – 0.6 (0.01 – 0.02)
Engine coolant temperature switch	
Switch-OFF temperature °C (°F)	112 – 118 (233 – 244)
Air mix damper potentiometer motor assembly resistance	
MAX. HOT kΩ	0.2
MAX. COOL kΩ	4.8
Mode selection damper potentiometer assembly resistance	
DEF. position kΩ	0.2
FACE position kΩ	4.8
Engine coolant temperature sensor	
Sensor-ON temperature °C (°F)	26.5 ± 4 (79.7 ± 7)

LUBRICANTS

E55CD--

Items	Specified lubricant	Quantity
Each connection of refrigerant line	FREOL S-83 or SUNISO 5GS <Vehicles using R-12 refrigerant> SUN PAG 56 <Vehicles using R-134a refrigerant>	As required

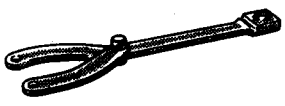
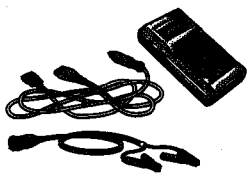
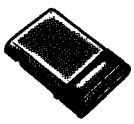
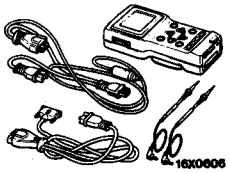
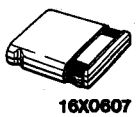
SEALANT AND ADHESIVE

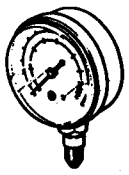
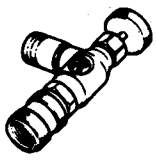
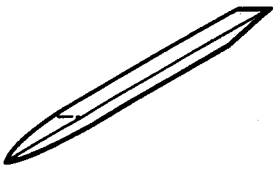
E55CE--

Items	Specified sealant and adhesive
Engine coolant temperature switch threaded part	3M Nut Locking Part No. 4171 or equivalent

SPECIAL TOOLS

E55DA--

Tool	Number	Name	Use
	MD991367	Special spanner	Removal and installation of armature mounting nut of compressor
	MB991386	Pin	
	MB991341	Multi-use tester sub-assembly	Up to 1993 models Inspection of full auto air conditioner
	For the number, refer to GROUP 00 – Precautions Before Service.	ROM pack	
	MB991502	MUT-II sub-assembly	All models Inspection of full auto air conditioner
 16X0607		ROM pack	

Tool	Number	Name	Use
	MB991402	Vacuum gauge	Vacuum check
	MB991403 (For high pressure) MB991404 (For low pressure)	Adaptor valve	Supplying refrigerant gas Replenishing refrigerant gas Draining refrigerant gas Function test
	MB990784	Ornament remover	Removal of air outlet grille.

NOTE

TROUBLESHOOTING

E55EAAW

TROUBLESHOOTING PROCEDURE

(1) Check that the air ducts and rods are not off.
(2) Check that connectors are properly connected and fuses are not blow.
(3) Using the MUT, check diagnosis outputs. If failure code is being output, check the failing system and repair as necessary. (Refer to Diagnosis Display Patterns and Codes on P.55-18.)
(4) If the diagnosis outputs are normal, check for terminal voltage or continuity with a circuit tester according to the troubleshooting chart by symptom. (Refer to control unit terminal voltages on P.55-9 – 16.)
(5) In carrying out the troubleshooting procedure, first look up the Troubleshooting Quick-Reference Chart to know the inspection items and then start the inspection procedure detailed in the following pages.
(6) When checking components, be sure to disconnect the connectors first.

TROUBLESHOOTING QUICK-REFERENCE CHART

	Symptom / Inspection Item	Fuse	Harness (incl. connectors)	Compressor relay	Magnetic clutch	Sensors	Engine coolant temperature switch	Pressure switch	Air-conditioner control panel	Refrigerant amount	Receiver	Expansion valve	Compressor	Thermostat	Belt lock controller	Air conditioner control unit	MPI control unit	Diagnosis outputs	Air mix damper motor and potentiometer	Heater link	Heater relay	Power transistor	Blower motor	Blower motor relay	Air selection damper motor	Mode selection damper motor/potentiometer	Condenser fan relay	Resister	Condenser fan motor
1	Air conditioner does not operate when the ignition switch in the ON position.	①	②	③	④		⑥	⑦	⑨	⑧				⑤	⑩	⑪	⑫												
2	Interior temperature does not raise even the air conditioner is operating (No warm air coming out).		⑤		②				⑥							⑦		①	③	④									
3	Interior temperature does not lower even the air conditioner is operating (No cold air coming out).	①	④	⑤	⑬	⑪	⑫		⑭	⑥	⑦	⑧	⑨	⑩		⑬		②	③										
4	Blower motor does not rotate.	①	④						⑥							⑦					②	③	⑤						
5	Blower motor does not stop rotating.		③						④							⑤						②		①					
6	Air selection damper does not operate.		②						③							④									①				
7	Mode selection damper does not operate.		③						④							⑤		①								②			
8	Condenser fan does not operate when the air conditioner is activated.	①																									②	③	④
9	Air conditioner graphic display does not function correctly.	①	②						③							④													
10	Air conditioner control panel blinks.					②			③				①		④	⑤	⑥												
11	Set temperature returns to 25°C (122°F) when the ignition switch is turned ON and OFF.	①	②						③																				

NOTE
(1) Indicates the component requiring inspection. (Numbers in are the priority order.)
(2) Use the MUT to check the control unit.

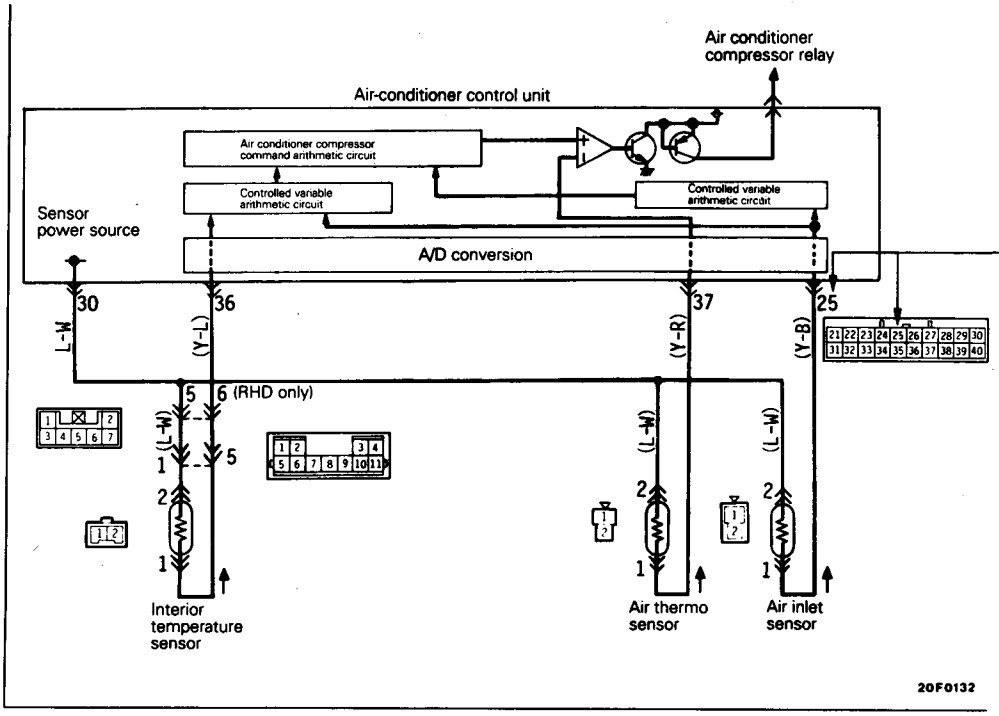
No.	Symptom	Probable cause	Remedy	Ref. page
1	Air conditioner does not operate when the ignition switch in the ON position.	Open-circuited power circuit harness	Correct harness.	
		Defective control panel	Replace control panel	55-34
		Defective air conditioner control unit	Check diagnosis output.	55-34
		Defective magnet clutch	Replace.	55-47
		Defective thermostat	Replace.	55-47
		Defective engine coolant temperature switch for air conditioner cut off	Replace.	55-58
		Defective dual pressure switch	Replace.	55-54
		Refrigerant leak	Charge refrigerant, correct leak.	55-24
		Excessive refrigerant	Discharge refrigerant.	55-29
		Defective belt lock controller	Replace belt lock controller.	55-35
		Defective MPI control unit	Replace MPI control unit	
2	Interior temperature does not raise (No warm air coming out).	Defective interior temperature sensor input circuit	Check diagnosis output. Replace defective parts.	55-17
		Defective air mix damper potentiometer input circuit		
		Defective air mix damper drive motor	Replace air mix damper drive motor.	55-37
		Incorrect engagement of air mix damper drive motor lever and air mix damper	Engage correctly.	
		Sticking air mix damper	Correct air mix damper.	
		Open-circuited harness between air mix damper drive motor and air conditioner control unit	Correct harness.	
		Defective control panel	Replace control panel.	55-34
		Defective air conditioner control unit	Replace air conditioner control unit.	55-43
3	Interior temperature does not lower (No cold air coming out).	Defective interior temperature sensor input circuit	Check diagnosis output. Replace defective parts.	55-18.
		Defective air inlet sensor input circuit		
		Defective air thermo sensor input circuit		
		Defective refrigerant-temperature sensor input circuit		
		Defective air mix damper potentionmeter input circuit		
		Defective air mix damper drive motor	Replace air mix damper drive motor.	55-37
		Incorrect engagement of air mix damper drive motor lever and air mix damper	Engage correctly.	
		Sticking air mix damper	Correct air mix damper.	

No.	Symptom	Probable cause	Remedy	Ref. page
3	Interior temperature does not lower (No cold air coming out).	Open-circuited harness between air mix damper drive motor and air conditioner control unit	Correct harness.	
		Open-circuited harness between photo sensor and air conditioner control unit	Correct harness.	
		Defective air-conditioner compressor relay in the relay box	Replace	
		Defective revolution pick up sensor	Replace revolution pick up sensor.	55-47
		Refrigerant leak	Charge refrigerant, correct leak.	
		Excessive refrigerant	Discharge refrigerant.	
		Clogged receiver	Replace receiver.	55-53
		Clogged expansion valve	Replace expansion valve.	55-44
		Defective compressor	Replace compressor.	55-45
		Defective air inlet sensor	Replace air inlet sensor.	55-39
		Defective magnetic clutch	Replace.	55-47
		Defective belt lock controller	Replace belt lock controller.	55-35
		Defective control panel	Replace control panel.	55-34
		Defective air conditioner control unit	Replace air conditioner control unit.	55-34
4	Blower motor does not rotate	Defective blower motor	Replace blower motor.	
		Blown thermal fuse inside power transistor	Replace power transistor.	55-35
		Defective blower motor relay	Replace blower motor relay.	
		Open-circuited harnesss between fuse and blower motor relay	Correct harness.	
		Open-circuited harness between blower motor relay and blower motor		
		Open-circuited harness between power transistor and air conditioner control unit	Correct harness.	
		Defective control panel	Replace control panel.	55-34
		Defective air conditioner control unit	Replace air conditioner control unit.	
5	Blower motor does not stop rotating.	Defective blower motor HI relay	Replace power relay.	
		Short-circtuited harness between blower motor relay and power transistor air conditioner control unit	Correct harness.	
		Defective control panel	Replace control panel.	55-34
		Defective air conditioner control unit	Replace air conditioner control unit.	55-34
		Defective power transistor	Replace power transistor.	55-35

No.	Symptom	Probable cause	Remedy	Ref. page
6	Air selection damper does not operate	Defective air selection drive motor	Replace air selection drive motor.	55-41
		Incorrect engagement of air selection drive motor and damper	Engage correctly.	
		Malfunction air selection damper	Correct air selection damper.	
		Open-circuited harness between air selection damper motor and air conditioner control unit	Correct harness.	55-34
		Defective control panel	Replace control panel.	55-34
		Defective air conditioner control unit.	Replace air conditioner control unit.	55-34
7	Mode selection damper does not rotate.	Defective mode selection damper potentiometer input circuit	Check diagnosis output. Replace defective parts.	55-17
		Defective mode selection drive motor	Replace mode selection drive motor.	55-37
		Incorrect engagement of mode selection drive motor and air selection damper	Engage correctly.	
		Malfunctioning DEF., FACE, and FOOT damper	Correct DEF., FACE, and FOOT damper.	
		Open-circuited harness between mode selection motor and control unit	Correct harness.	
		Defective control panel	Replace control panel.	55-34
		Defective air conditioenr control unit	Replace air conditioner control unit.	55-34
8	Condenser fan does not operate when the air conditioner is activated	Defective condenser fan motor relay	Replace power relay.	
		Defective condenser fan motor	Replace condenser fan motor	55-51
9	Air-conditioner graphic display does not function correctly	Open-circuited harness between control panel and air conditioner control unit	Correct harness.	
		Defective control panel	Replace control panel.	55-34
		Defective air conditioner control unit	Replace air conditioner control unit.	55-34
10	Air conditioner control panel blinks	Wet compressor drive belt	Dry.	
		Insuficient compressor drive belt tension	Check and adjust.	GROUP 11
		Defective compressor drive belt	Replace.	
		Defective compressor	Check and replace.	55-45
		Defective revolution pick-up sensor	Check replace.	55-47
		Defective air conditioner switch	Replace air conditioner control panel.	55-34
		Defective belt lock controlller	Replace belt lock controller	55-35
		Defective air conditioner control unit	Replace air conditioner control unit.	55-34
		Defective MPI control unit	Replace MPI control unit	
11	Set temperature returns to 25°C (112°F) when the ignition switch is turned ON and OFF	Open-circuited power circuit harness	Correct harness.	
		Defective air conditioner control unit	Replace air conditioner control unit.	55-34

READING THE "CIRCUIT AND UNIT CHECK"

3. Inspection of interior temperature sensor, air inlet sensor, and air thermo sensor circuits



Connectors are keyed by terminal numbers.

Troubleshooting Hints

- Diagnosis
  - No. 11, 12 [Fix interior temperature sensor input signal at 25°C (77°F).]
  - No. 13, 14 [Fix air inlet sensor input signal at 15°C (59°F).]
  - No. 21, 22 [Fix air thermo sensor input signal at –2°C (–35.6°F).]
- Air conditioner control unit terminal voltages

Indicates the diagnosis output code number and system condition when the code is output.

Terminal No.	Signal name	Condition	Terminal voltage
25	Air inlet temperature sensor	Temperature at sensor 25°C (77°F) (4 kΩ)	2.2 – 2.8 V
30	Sensor power source	Normally	4.8 – 5.2 V
36	Interior temperature sensor	Temperature at sensor 25°C (77°F) (4 kΩ)	2.3 – 2.9 V
37	Air thermo sensor	Temperature at sensor 25°C (77°F) (4 kΩ) when air conditioner is OFF	2.3 – 2.9 V

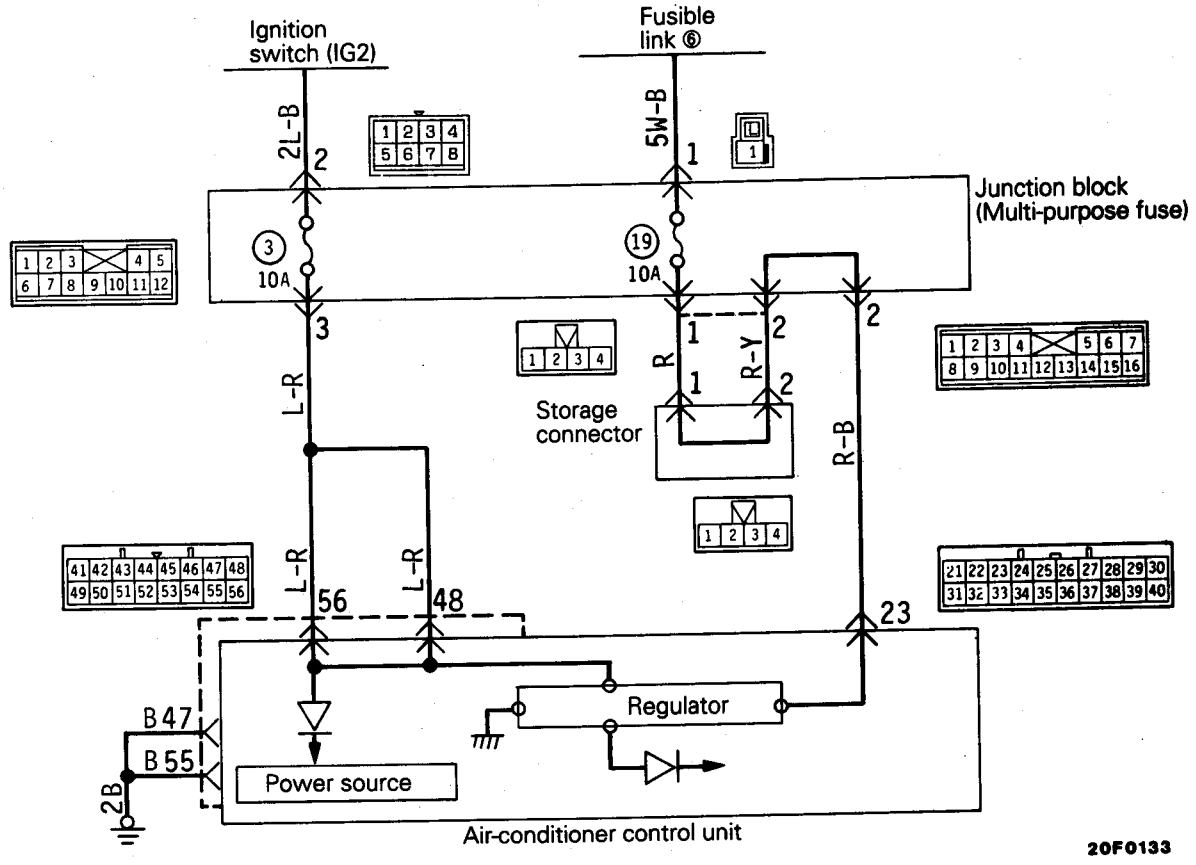
Indicates the terminal number to be checked.

Indicates the condition at terminal check.

Indicates the specification criteria. Where no condition is given in the "Condition" column, the normal specification value is given.

CIRCUIT AND BENCH CHECK

1. Inspection of air conditioner control unit power source circuit

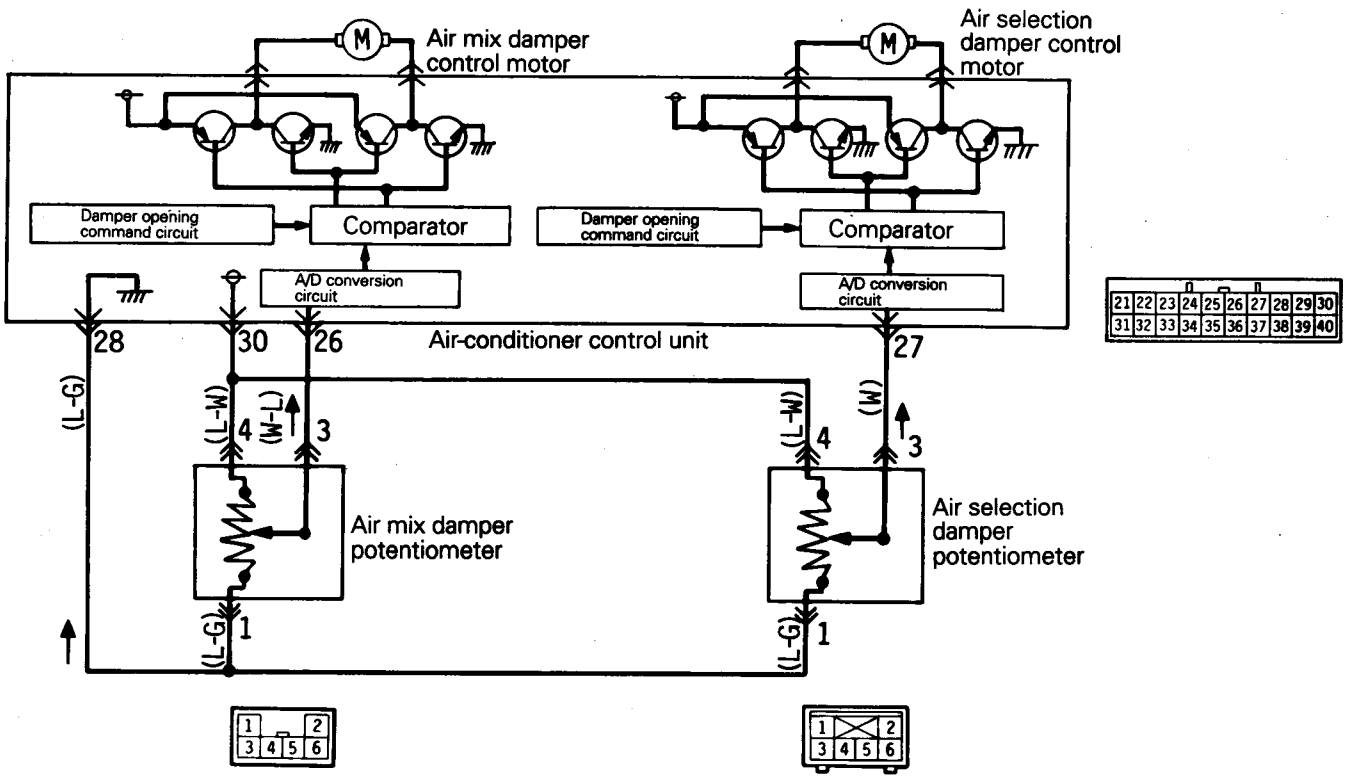


Troubleshooting Hints

- Air conditioner control unit terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
23	Backup power source	Normally	System voltage
48, 56	Air conditioner control unit power source	Ignition switch ON	System voltage
47, 55	Air conditioner control unit earth	Normally	0 V

2. Inspection of potentiometer circuit

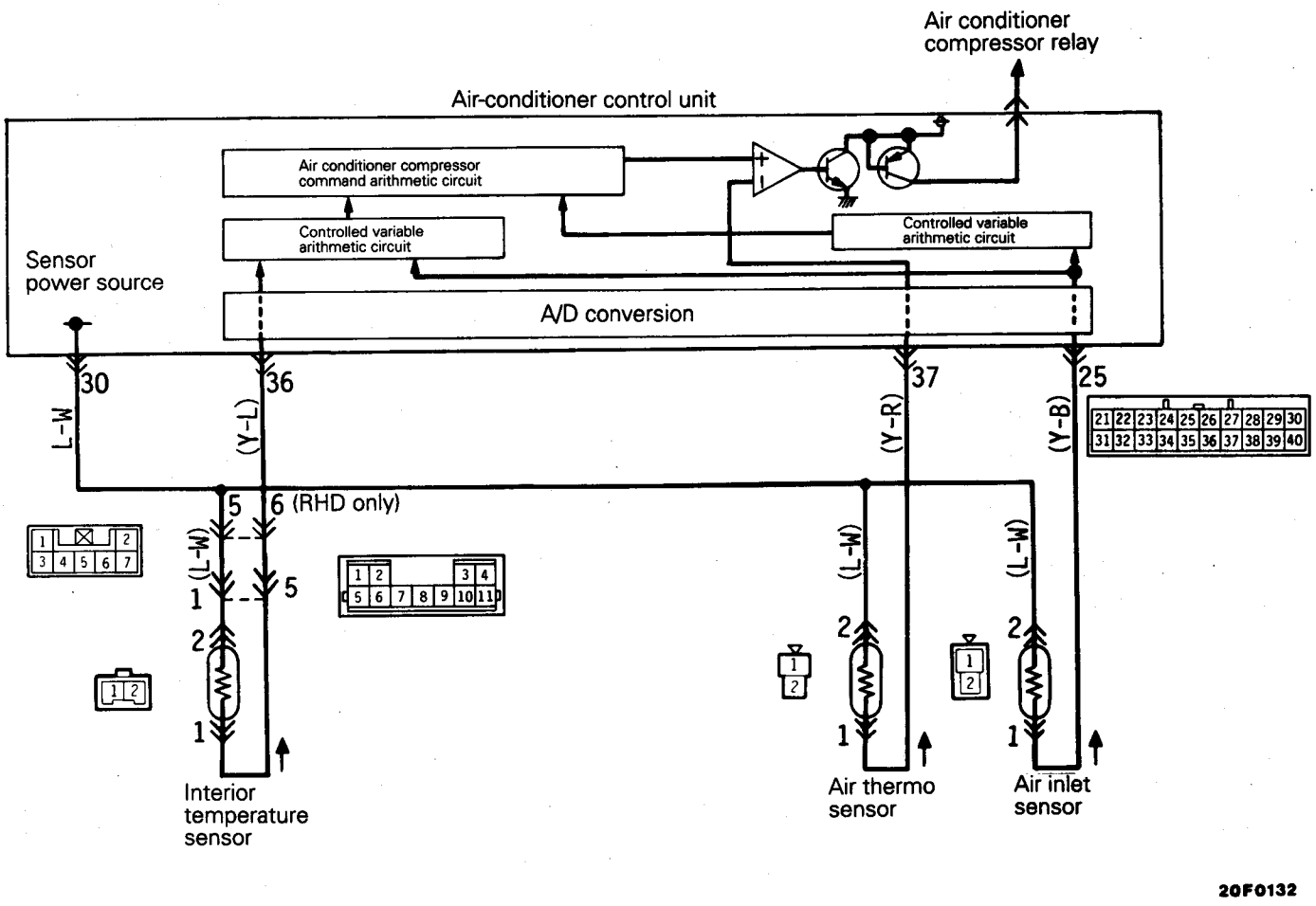


Troubleshooting Hints

- Diagnosis
  No. 31 (Fix air mix damper at MAX. HOT position, or at MAX. COOL position when it is at MAX. COOL position.)
  No. 32 (Fix air selection damper at FACE position, or at FACE position when it is at FACE position.)
- Air conditioner control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
26	Air mix damper potentiometer (input)	Air mix damper at MAX. COOL position	0.1 – 0.3 V
		Air mix damper at MAX. HOT position	4.7 – 5.0 V
27	Air selection damper potentiometer (input)	Air selection damper at FACE position	0.1 – 0.3 V
		Air selection damper at DEF position	4.7 – 5.0 V
28	Air mix damper and air selection-damper potentiometer ⊖	Normally	0 V
30	Sensor power source	Normally	4.8 – 5.2 V

3. Inspection of interior temperature sensor, air inlet sensor, and air thermo sensor circuits



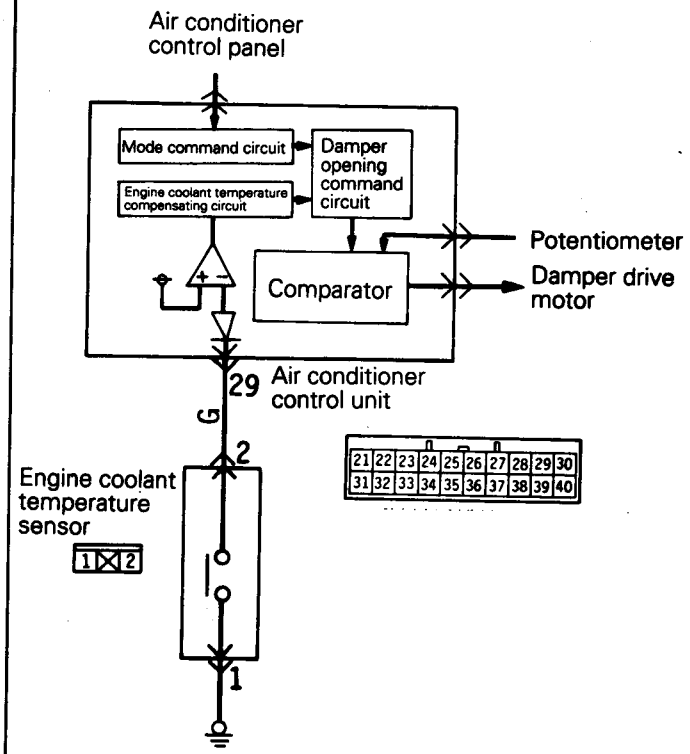
Troubleshooting Hints

- Diagnosis
  - No. 11, 12 [Fix interior temperature sensor input signal at 25°C (77°F).]
  - No. 13, 14 [Fix air inlet sensor input signal at 15°C (59°F).]
  - No. 21, 22 [Fix air thermo sensor input signal at –2°C (–35.6°F).]
- Air conditioner control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
25	Air inlet temperature sensor	Temperature at sensor 25°C (77°F) (4 kΩ)	2.2 – 2.8 V
30	Sensor power source	Normally	4.8 – 5.2 V
36	Interior temperature sensor	Temperature at sensor 25°C (77°F) (4 kΩ)	2.3 – 2.9 V
37	Air thermo sensor	Temperature at sensor 25°C (77°F) (4 kΩ) when air conditioner is OFF	2.3 – 2.9 V

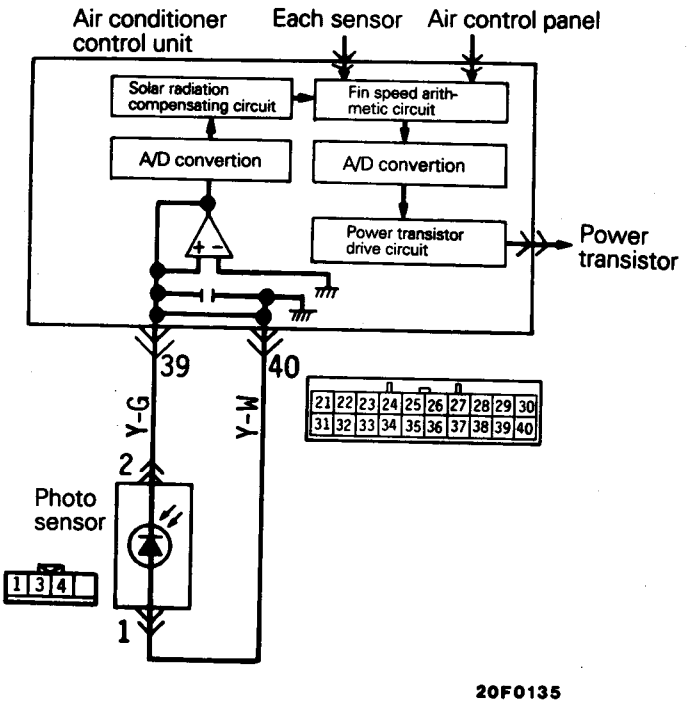
4. Inspection of engine coolant temperature sensor and photo sensor circuits

<Engine coolant temperature sensor>



20F0136

<Photo sensor>



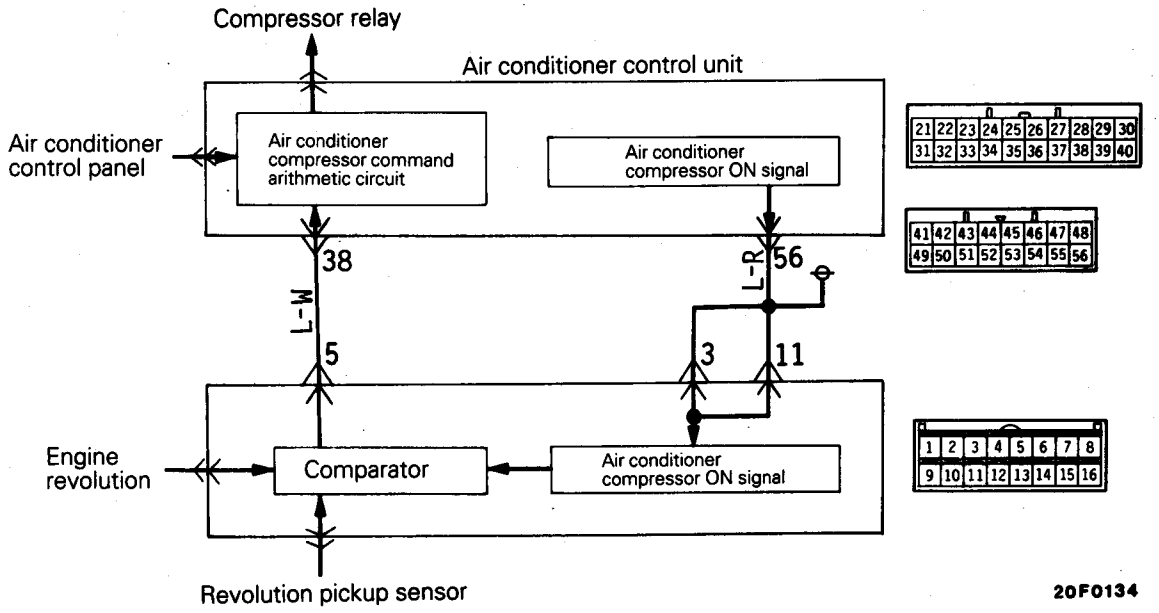
20F0135

Troubleshooting Hints

- Air conditioner control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
39	Photo sensor ⊖	Illuminance 100,000 lux or more	–0.1 to –0.2 V
		Illuminance less than 0 lux	0 V
40	Photo sensor ⊕	Normally	0 V
29	Engine coolant temperature sensor ⊕	Switch OFF [Engine coolant temperature less than 50°C (122°F)]	System voltage
		Switch ON [Engine coolant temperature 50°C (122°F) or higher]	0 V

5. Inspection of belt lock controller circuit



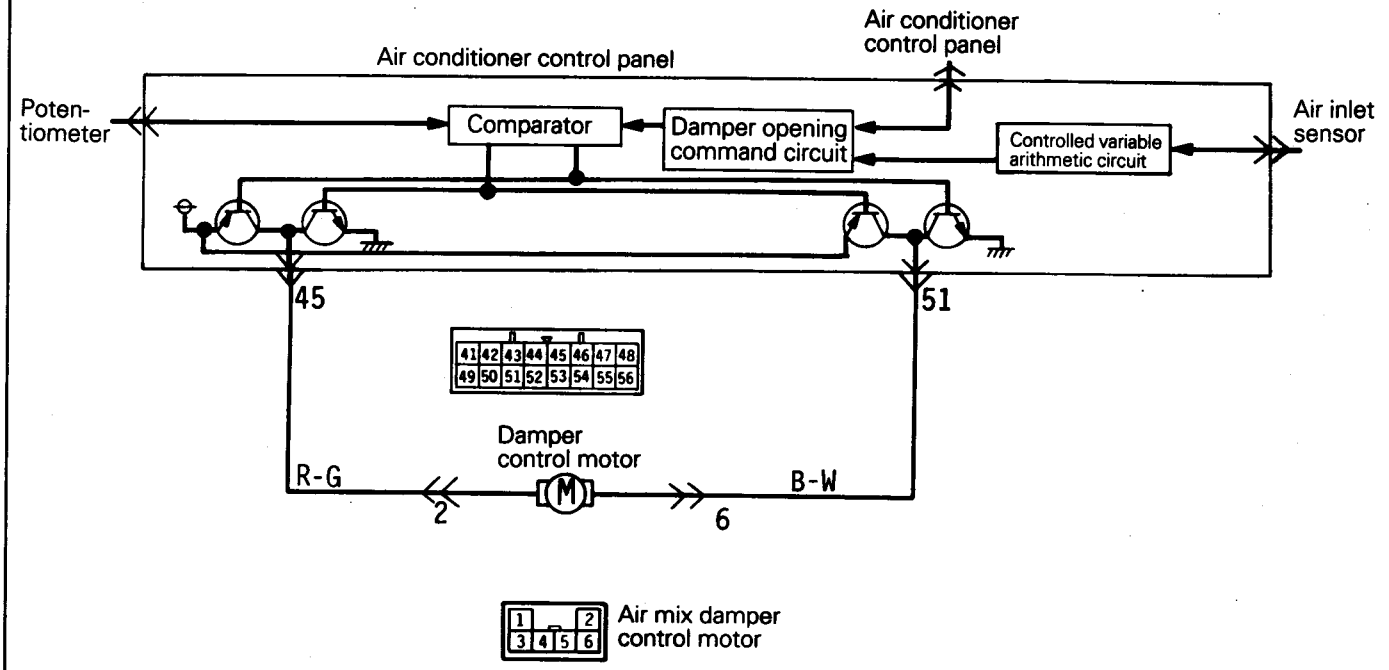
Troubleshooting Hints

- Air conditioner control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
56	Air conditioner output	Compressor ON	10 V to system voltage

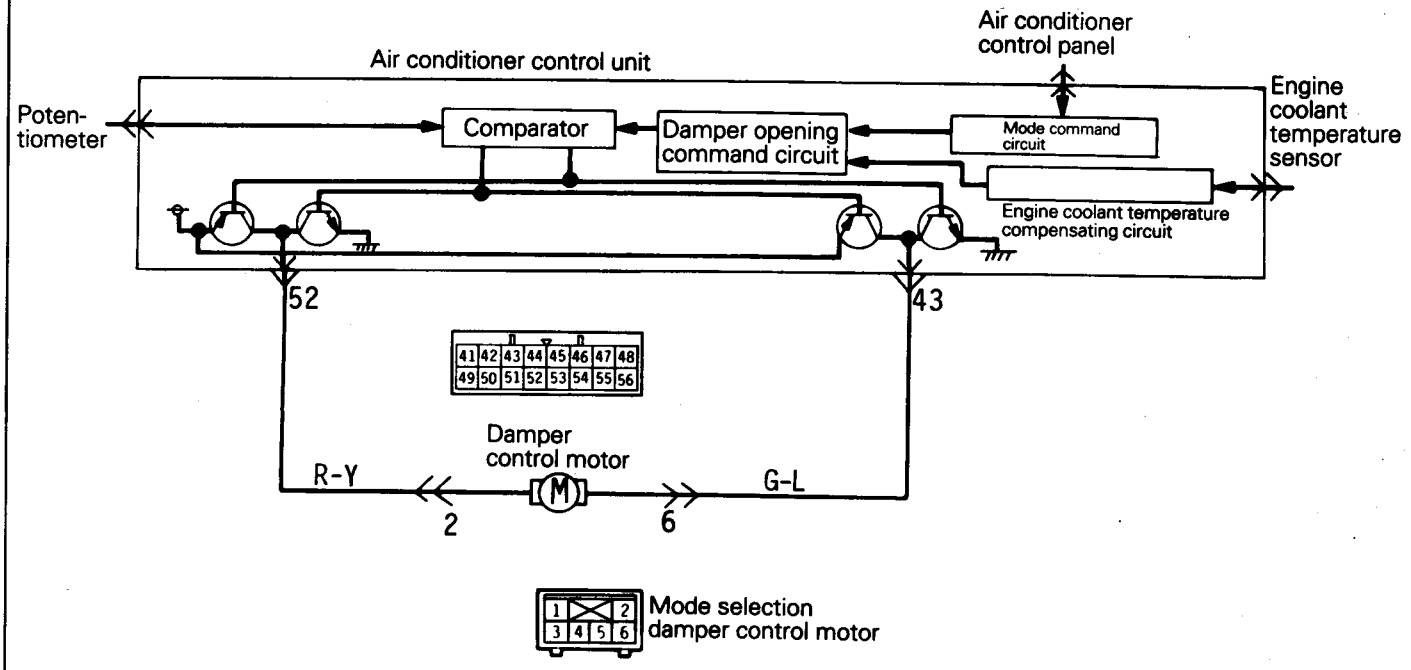
6. Inspection of air mix damper, mode selection damper, air selection damper control motor circuits

<Air mix damper control motor>



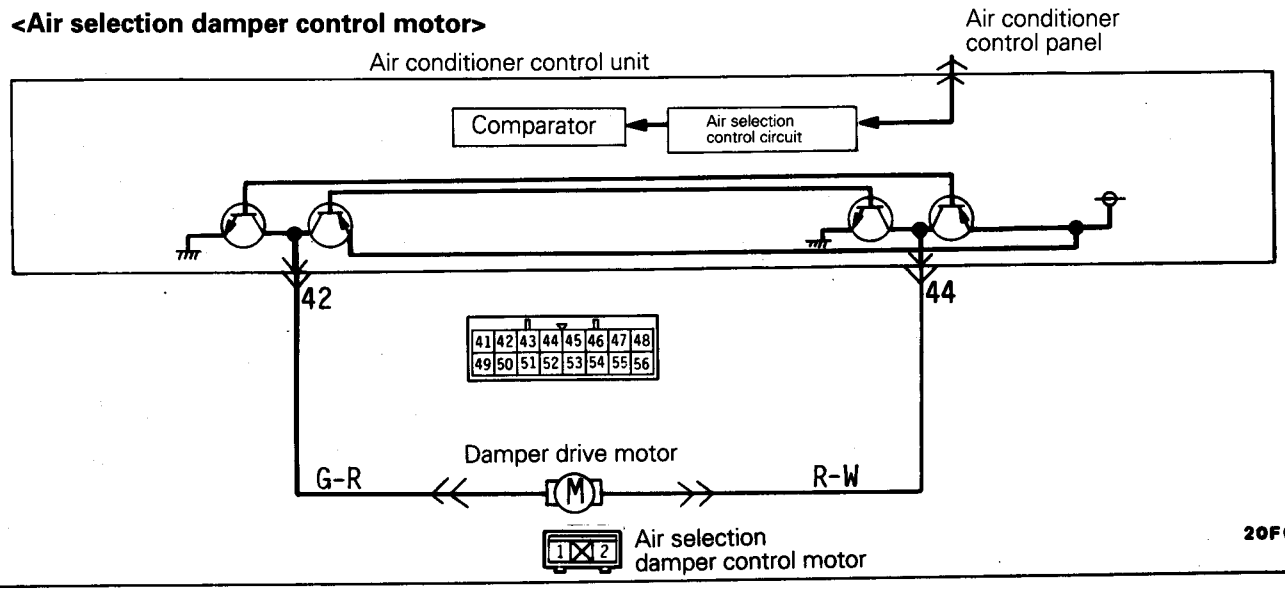
20F0137

<Mode selection damper control motor>



20F0139

<Air selection damper control motor>

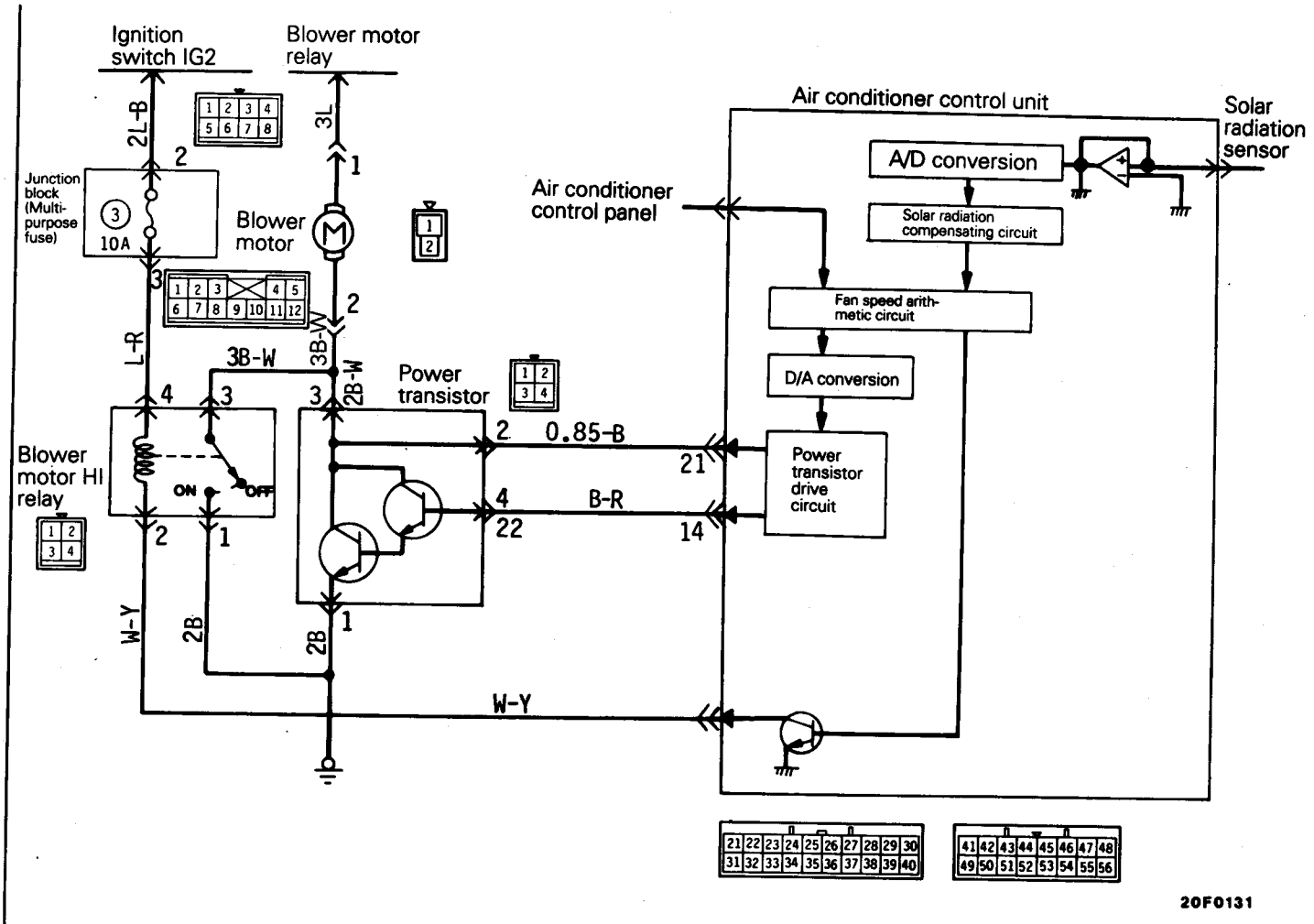


Troubleshooting Hints

- Air conditioner control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
42	Air selection damper control motor ⊖	Inside-air switch ON (Output turns OFF 40 seconds after the damper moved to inside air position.)	0.5 V
		Outside-air switch ON (Output turns OFF 40 seconds after the damper moved to outside air position.)	10 V
43	Model selection damper control motor ⊖	FACE switch ON (Output turns OFF 40 seconds after the damper moved to FACE position.)	0.5 V
		DEF. switch ON (Output turns OFF 40 seconds after the damper moved to DEF. position.)	10 V
44	Air selection damper control motor ⊕	Inside-air switch ON (Output turns OFF 40 seconds after inside air has been activated.)	10 V
		Outside-air switch ON (Output turns OFF 40 seconds after outside air has been activated.)	0.5 V
45	Air mix damper control motor ⊕	Temperature is set at 17°C (62.6°F). (Output turns OFF 40 seconds after the damper moved to MAX. COOL position.)	0.5 V
		Temperature is set at 32.5°C (90.5°F). (Output turns OFF 40 seconds after the damper moved to MAX. HOT position.)	10 V
51	Air mix damper control motor ⊖	Temperature is set at 17°C (62.6°F). (Output turns OFF 40 seconds after the damper moved to MAX. COOL position.)	10 V
		Temperature is set at 32.5°C (90.5°F). (Output turns OFF 40 seconds after the damper moved to MAX. HOT position.)	0.5 V
52	Mode selection damper control motor ⊕	FACE switch ON (Output turns OFF 40 seconds after the damper moved to FACE position.)	10 V
		DEF. switch ON (Output turns OFF 40 seconds after the damper moved to DEF. position.)	0.5 V

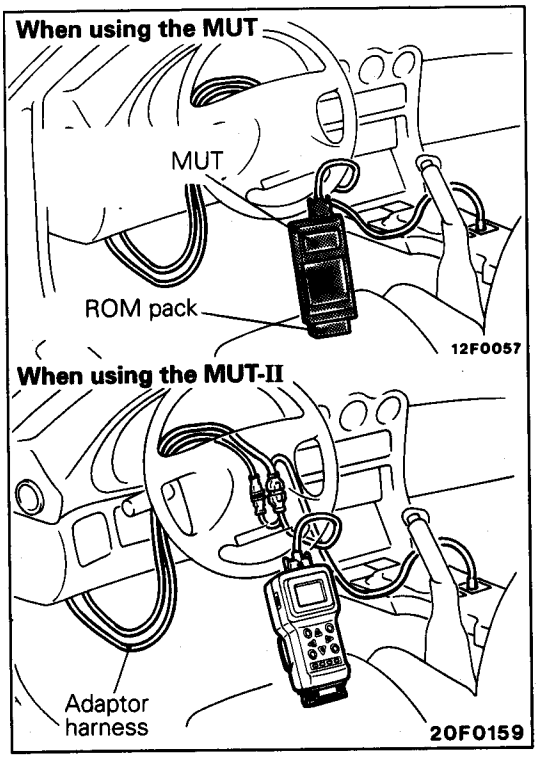
7. Inspection of power transistor and blower motor relay circuits



Troubleshooting Hints

- Air conditioner control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
21	Power transistor collector	Switch is turned OFF.	System voltage
		Switch is placed in LO.	Approx. 7 V
		Switch is placed in HI.	0 V
22	Power transistor base	Blower switch is turned OFF.	0 V
		Blower switch is placed in LO.	Approx. 1.3 V
		Blower switch is placed in HI.	Approx. 1.2 V
41	Blower motor HI relay	Fan switch HI is ON.	1.5 V or less
		Fan switch in ME, LO, or OFF.	System voltage



SELF-DIAGNOSIS CHECKING

Self-diagnosis checking is performed when there has been an automatic cancellation, without cancel switch operation.
The following method can be used for checking the diagnosis.
Note that the diagnosis check connector is located under the driver's side instrument panel.

WHEN USING THE MULTI-USE TESTER (MUT) <1993 models> OR MUT-II <All models>

(1) Connect MUT or MUT-II to the diagnosis connector and read the diagnosis code.
When using MUT-II, use the adaptor harness which belongs to MUT–II sub-assembly.

Caution
Connect and disconnect MUT or MUT-II with the ignition switch in the OFF position.

(2) Repair the faulty spots by referring to diagnosis chart.
(3) Erase the failure code.
(4) Check the system again.

CHECKING WITH THE MULTI-USE TESTER (MUT) OR MUT-II

Inspection Item	Inspection			Probable cause of malfunction or remedy
	Inspection conditions		Normal diagnosis value	
Interior temperature sensor MUT or MUT-II (11)	Ignition switch: "ON"		Interior temperature and MUT or MUT-II display temperature are the same	Interior temperature sensor or related circuitry is defective.
Air inlet MUT or MUT-II (13)	Ignition switch: "ON"		Atmospheric temperature and MUT or MUT-II display temperature are the same.	Air inlet sensor or related circuitry is defective.
Air-mixing damper potentionmeter MUT or MUT-II (31)	Ignition switch: "ON"	Damper position	Opening position (%)	Air-mixing damper potentiometer or related circuitry is defective.
		MAX. HOT	Approx. 100	
		MAX. COOL	Approx. 0	
Mode selection damper potentionmeter MUT or MUT-II (32)	Ignition switch: "ON"	Damper position	Opening position (%)	Mode selection damper potentiometer or related circuitry is defective.
		FACE	Approx. 0	
		FOOT	Approx. 50	
		FOOT/DEF.	Approx. 75	
		DEF.	Approx. 100	

DIAGNOSIS DISPLAY CODES

Code No.	Cause	Fail safe
0	Normal	–
11	Open-circuited interior temperature sensor	Condition in which 25°C (77°F) is detected
12	Short-circuited interior temperature sensor	
13	Open-circuited air inlet sensor	Condition in which 20°C (68°F) is detected
14	Short-circuited air inlet sensor	
21	Open-circuited air thermo sensor	Condition in which −2°C (28°F) is detected
22	Short-circuited air thermo sensor	
31	Open-circuited and short-circuited air mix damper potentiometer	MAX. HOT Becomes MAX. COOL only when MAX. COOL is set.
32	Open-circuited and short-circuited mode selection damper potentiometer	DEF. Becomes FACE only when FACE mode is set.
41	Defective air mix damper motor	–
42	Defective mode selection damper motor	–

NOTE
(1) If two or more abnormal conditions occur at the same time, the code numbers are alternately displayed, in order, repeatedly.
(2) The nature of the malfunction is entered and stored in the memory from the time the malfunction occurs until the ignition switch is next turned to OFF.

SERVICE DATE

Item no.	Inspection point	Method	Criteria		Probable cause	Remedy
			Normal	Abnormal		
11	Interior temperature sensor	Measure resistance of sensor when room temperature is 25°C (77°F).	Approx. 4kΩ	Largely deviates from approx. 4kΩ	Defective interior temperature sensor	Replace interior temperature sensor.
		Measure voltage across terminal 16 of air conditioner control unit and earth when interior temperature is 25°C (77°F).	In approx. 2.3 – 2.9 V range	–	Open-circuited harness between interior temperature sensor and air conditioner control unit	Correct harness.
			–	Outside approx. 2.3 – 2.9 V range	Poor connection of air conditioner control unit connector or defective air conditioner control unit	Correct connector connection or replace air conditioner control unit.
13	Air inlet temperature sensor	Measure resistance of sensor when ambient temperature is 25°C (77°F).	Approx. 4 kΩ	Largely deviates from approx. 4 kΩ	Defective air inlet sensor	Replace air inlet sensor.
			In approx. 2.2 – 2.8V range	–	Open-circuited harness between air inlet sensor and air conditioner control unit	Correct harness.
			–	Outside approx. 2.2 – 2.8 V range	Poor connection of air-conditioner control unit connector or defective air conditioner control unit	Correct connector connection or replace air conditioner control unit.

Item no.	Inspection point	Method	Criteria		Probable cause	Remedy
			Normal	Abnormal		
15	Engine coolant temperature sensor	Measure resistance of sensor when engine coolant temperature is 22.5 to 30.5°C (57.6 to 86.9°F).	Conductive	Non-conductive	Defective engine coolant temperature sensor	Replace engine coolant temperature sensor.
		Measure voltage across terminal ⑧ of air conditioner control unit and earth when engine coolant temperature is 22.5 to 30.5°C (57.6 to 86.9°F).	Approx. 12 V	–	Open-circuited harness between engine coolant temperature sensor and air conditioner control unit	Correct harness.
			–	Largely deviates from approx. 12 V	Poor connection of air conditioner control unit connector or defective air conditioner control unit	Correct connector connection or replace air conditioner control unit.
21	Air thermo sensor	Measure resistance of sensor when sensor's sensing temperature is 25°C (77°F).	Approx. 4 kΩ	Largely deviates from approx. 4 kΩ	Defective air thermo sensor	Replace air thermo sensor.
		Measure voltage across terminal ⑰ of air conditioner control unit and earth when sensor's sensing temperature is 25°C (77°F).	In approx. 2.3 – 2.9 V range	–	Open-circuited harness between air thermo sensor and air conditioner control unit	Correct harness.
			–	Outside approx. 2.3 – 2.9 V range	Poor connection of air conditioner control unit connector or defective air conditioner control unit	Correct connector connection or replace air conditioner control unit
31	Air mix damper potentiometer	Refer to P.55-38			Defective air mix damper potentiometer	Replace air mix damper potentiometer.
		Measure voltage across terminal ⑧ of air conditioner control unit and earth when potentiometer is in MAX. COOL position.	In approx. 0.1 – 0.3 V range	–	Open-circuited harness between air mix damper potentiometer and air conditioner control unit	Correct harness.
			–	Outside approx. 0.1 – 0.3 V range	Poor connection or air conditioner control unit connector or defective air conditioner control unit	Correct connector connection or replace air conditioner control unit.
33	Mode selection damper potentiometer	Refer to P.55-39			Defective mode selection damper potentiometer	Replace mode selection damper potentiometer.
		Measure voltage across terminal ⑧ of air conditioner control unit and earth when potentiometer is in FACE position.	In approx. 0.1 – 0.3 V range	–	Open-circuited harness between mode selection damper potentiometer and air conditioner control	Correct harness.
			–	Outside approx. 0.1 – 0.3 V range	Poor connection of air conditioner control unit connector or defective air conditioner control unit	Correct connector connection or replace air conditioner control unit.

SAFETY PRECAUTIONS

E55XAAD

<Vehicles using R-12 refrigerant>

R-12 refrigerant is a chlorofluoro-carbon (CFC) that can contribute to the depletion of the ozone layer in the upper atmosphere.
Ozone filters out harmful radiation from the sun. To assist in protecting the ozone layer,
Mitsubishi Mtors Corporation recommends that a R-12 refrigerant recycling device that meets SAE standard J1991 be used.
Contact an automotive service equipment supplier for refrigerant recycling equipment that is available in your area.
The refrigerant used in all air conditioner is R-12. It is transparent and colorless in both the liquid and vapor state. Since it has a boiling point of –29.8°C (–21.7°F), at atmospheric pressure, it will be a vapor at all normal temperatures and pressures. The vapor is heavier than air, non-flammable, and nonexplosive. It is nonpoisonous except when it is in direct contact with open flame. It is noncorrosive except when combined with water. The following precautions must be observed when handling R-12.

Caution
Wear safety goggles when servicing the refrigeration system.

R-12 evaporates so rapidly at normal atmospheric pressures and temperatures that it tends to freeze anything it contacts. For this reason, extreme care must be taken to prevent any liquid refrigerant from contacting the skin and especially the eyes. Always wear safety goggles when servicing the refrigeration part of the air conditioning system. Keep a bottle of sterile mineral oil handy when working on the refrigeration system. Should any liquid refrigerant get into the eyes, use a few drops of mineral oil to wash them out. R-12 is rapidly absorbed by the oil. Next splash the eyes with plenty of cold water. Call your doctor immediately even though irritation has ceased after treatment.

Caution
Do not heat R-12 above 40°C (104°F)

In most instances, moderate heat is required to bring the pressure of the refrigerant in its container above the pressure of the system when charging or adding refrigerant.
A bucket or large pan of hot water not over 40°C (104°F) is all the heat required for this purpose. Do not heat the refrigerant container with a blow torch or any other means that would raise temperature and pressure above this temperature. **Do not weld or steam clean on or near the system components or refrigerant lines.**

Caution
Keep R-12 containers upright when charging the system.

When metering R-12 into the refrigeration system, keep the supply tank or cans in an upright position. If the refrigerant container is on its side or upside sown, liquid refrigerant will enter the system and damage the compressor.

Caution
Always work in a well-ventilated room.

Good ventilation is vital in the working area. Although R-12 vapor is normally nonpoisonous contact with an open flame can cause the vapor to become very poisonous. A poisonous gas is produced when using the flame-type leak detector. Avoid inhaling the fumes from the leak detector.

Caution
Do not allow liquid refrigerant to touch bright metal.

Refrigerant will tarnish bright metal and chrome surfaces, and in combination with moisture can severely corrode all metal surfaces.

<Vehicles using R-134a refrigerant>

Because R-134a a refrigerant is a hydrofluorocarbon (HFC) which contains hydrogen atoms in place of chlorine atoms, it will not cause damage to the ozone layer.
Ozone filters out harmful radiation from the sun. To assist in protecting the ozone layer, Mitsubishi Motors Corporation recommends an R-134a refrigerant recycling device.
Refrigerant R-134a is transparent and colorless in both the liquid and vapor state. Since it has a boiling point of –29.8°C (–21.7°F), at atmospheric pressure, it will be a vapor at all normal temperatures and pressures. The vapor is heavier than air, non-flammable, and nonexplosive. The following precautions must be observed when handling R-134a.

Caution
Wear safety goggles when servicing the refrigeration system.

R-134a evaporates so rapidly at normal atmospheric pressures and temperatures that it tends to freeze anything it contacts. For this reason, extreme care must be taken to prevent any liquid refrigerant from contacting the skin and especially the eyes. Always wear safety goggles when servicing the refrigeration part of the air conditioning system. Keep a bottle of sterile mineral oil handy when working on the refrigeration system. Should any liquid refrigerant get into the eyes, use a few drops of mineral oil to wash them out. R-134a is rapidly absorbed by the oil. Next splash the eyes with plenty of cold water. Call your doctor immediately even though irritation has ceased after treatment.

Caution
Do not heat R-134a above 40°C (104°F)

In most instances, moderate heat is required to bring the pressure of the refrigerant in its container above the pressure of the system when charging or adding refrigerant.
A bucket or large pan of hot water not over 40°C (104°F) is all the heat required for this purpose. Do not heat the refrigerant container with a blow torch or any other means that would raise temperature and pressure above this temperature. **Do not weld or steam clean on or near the system components or refrigerant lines.**

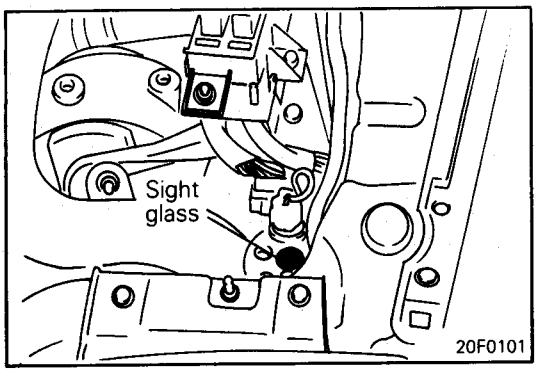
Caution
Keep R-134a containers upright when charging the system.

When metering R-134a into the refrigeration system, keep the supply tank or cans in an upright position. If the refrigerant container is on its side or upside down, liquid refrigerant will enter the system and damage the compressor.

Caution
A leak detector designed for R-134a should be used to check for refrigerant gas leaks.
Do not allow liquid refrigerant to touch bright metal.

Refrigerant will tarnish bright metal and chrome surfaces, and in combination with moisture can severely corrode all metal surfaces.

NOTE



SERVICE ADJUSTMENT PROCEDURES

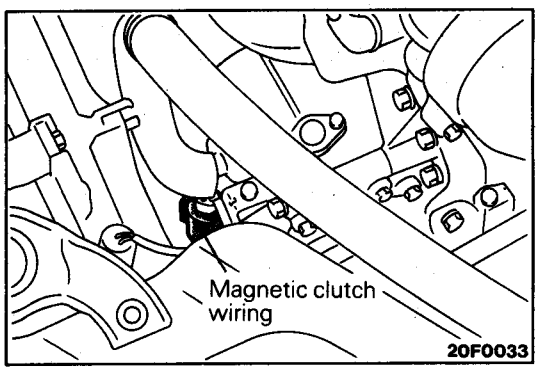
E55FABJ

TEST PROCEDURES

SIGHT GLASS REFRIGERANT LEVEL TEST

The sight glass is a refrigerant level indicator. To check the refrigerant level, clean the sight glass and start the vehicle engine. Push the air conditioner button to operate the compressor, place the blower switch to high and move the temperature control lever to MAX. COOL. After operating for a few minutes in this manner, check the sight glass.

(1) If the sight glass is clear, the magnetic clutch is engaged, the compressor discharge line is warm and the compressor inlet line is cool; the system has a full charge.
(2) If the sight glass is clear, the magnetic clutch is engaged and there is no significant temperature difference between compressor inlet and discharge lines; the system has lost some refrigerant.
(3) If the sight glass shows foam or bubbles, the system could be low on charge. The system has to be charged with some refrigerant.



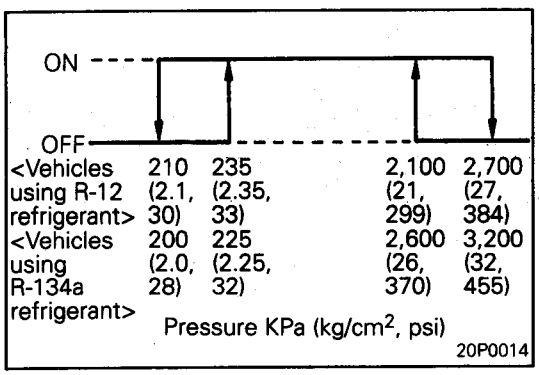
MAGNETIC CLUTCH

(1) Disconnect the wiring to the magnetic clutch.
(2) Connect battery (+) voltage directly to the wiring for the magnetic clutch.
(3) If the magnetic clutch is normal, there will be a "click". If the pulley and armature do not make contact ("click"), there is a malfunction.

RECEIVER DRIER

To Test the Receiver Drier

(1) Operate the unit and check the piping temperature by touching the receiver drier outlet and inlet.
(2) If there is a difference in the temperatures, the receiver drier is restricted.
Replace the receiver drier.



DUAL PRESSURE SWITCH (LOW PRESSURE SWITCH)

(1) Turn back the adaptor valve handle all the way and install it to the low pressure side service valve.
(2) With the gauge manifold low pressure service valves closed, connect the gauge manifold high pressure side charging hose to the adaptor valve.
(3) Tighten the adaptor valve handle and open the service valve.
(4) If there in continuity between the dual pressure switch terminals when the low pressure side pressure is at the level of dual pressure switch ON condition shown to the left, the switch is functioning normally. If not, replace the switch.

COMPRESSOR CHECK

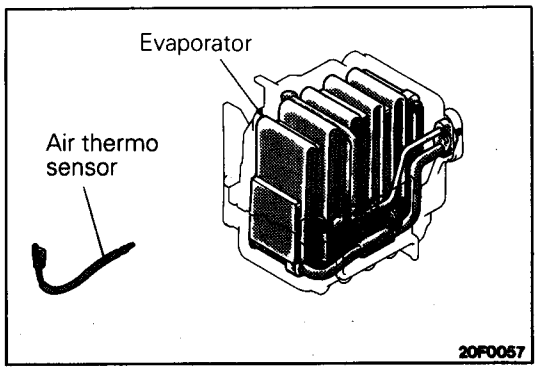
After running the compressor for five minutes, check whether the following items are proper or not.

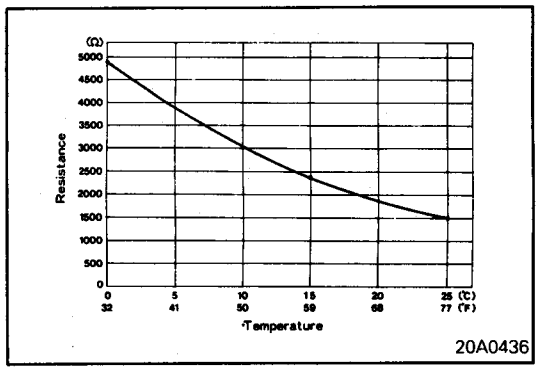
	Inspection content			Criteria	Probable cause	Remedy
	Pressure on the high-pressure side	Pressure on the low-pressure side	Performance test			
Case 1	Saturated pressure or open air + 200 – 500 kPa 2.0 – 5.0 kgcm^2 28.4 – 71.1 psi	150 – 200 kPa 1.5 – 2.0 kgcm^2 21.3 – 28.4 psi	Acceptable	Proper	–	–
Case 2		100 kPa or less 1.0 kgcm^2 or less 14.2 psi or less	Acceptable	Abnormal The magnet clutch is frequently turned on and off.	Faulty compressor*1	Replace compressor
Case 3	Nearly saturated pressure of open air		Rejected	The difference between the high and low pressure is not observed.	Faulty compressor*2	
Case 4	Lower than in case 1	150 – 200 kPa 1.5 – 2.0 kgcm^2 21.3 – 28.4 psi	Rejected	Abnormal Blow-out temperature is high.	Clogged expansion valve	Replace expansion valve

NOTE
(1) Saturated pressure of open air

Temperature °C (°F)		15 (59)	20 (68)	25 (77)	30 (86)	35 (95)	40 (104)
Saturated pressure of open air	kPa (kgcm^2, psi)	400 (4.0, 56.9)	470 (4.7, 66.8)	560 (5.6, 79.7)	650 (6.5, 92.5)	760 (7.6, 108.1)	870 (8.7, 123.7)

(2) For the performance testing procedure, refer to P.55-30.
(3) *1 means that the compressor is locked in the full load state (100% delivery).
(4) *2 means that the compressor is locked in the full capacity control (delivery rate: 0) state.



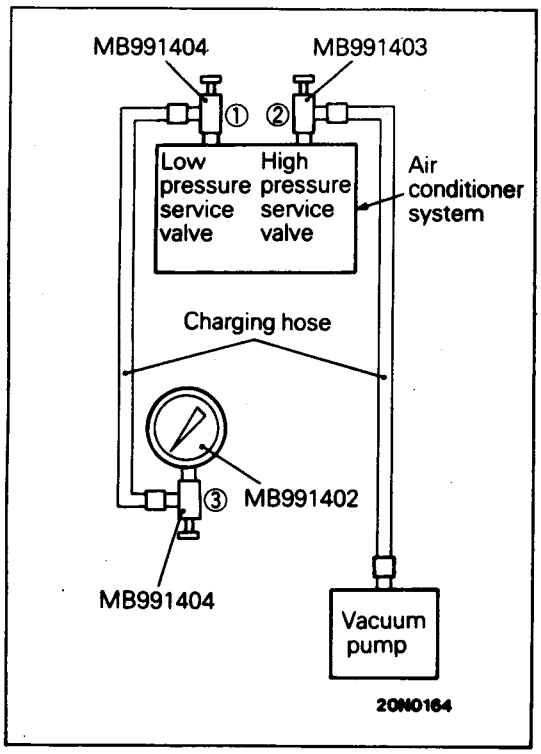


AIR THERMO SENSOR

(1) Disconnect the sensor's connector at the evaporator case, and by using an ohmmeter, measure the resistance. If the resistance is within ±10% of value of the characteristic curve, the sensor is functioning normally.
(2) If the sensor is normal, there is a malfunction of the air conditioner control unit, and it should be replaced.

COMPRESSOR DRIVE BELT ADJUSTMENT E55FWAE

Refer to GROUP 11 – Service Adjustment Procedures.



CHARGING <VEHICLES USING R-12 REFRIGERANT>

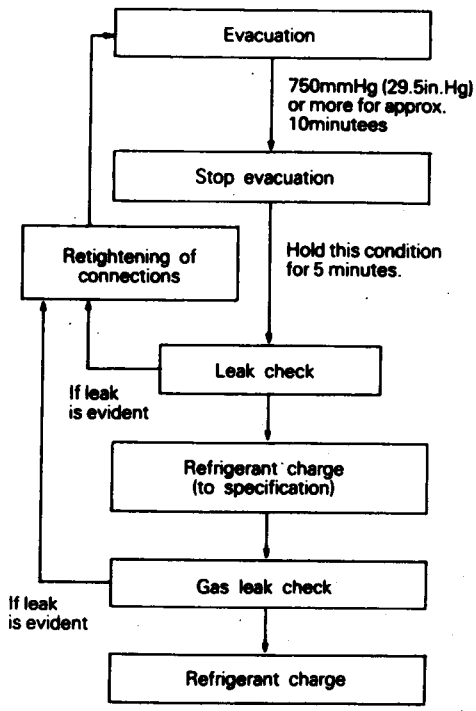
E55FUBD

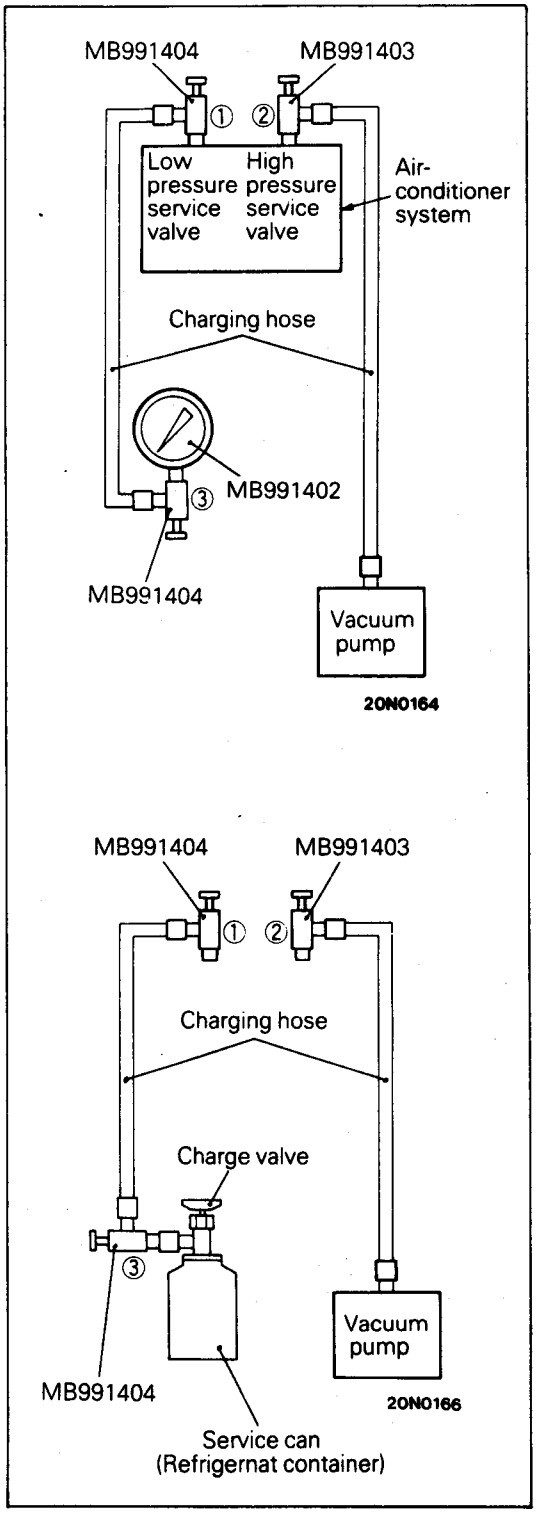
CHARGING THE SYSTEM
<In case the vacuum gauge is used>

(1) With the handle of the special tool ① and ② turned back all the way (valve close), install the special tool ① and ② to each high and low pressure service valve.

Note
Install the high pressure service valve to the discharge port of discharge hose, and the low pressure service valve to the suction port of compressor.

(2) Tighten the handle of the special tool ① and ② (valve open).
(3) Connect the charging hose to the special tool ① and ②.
(4) With the handle of the special tool ③ tightened (valve open), install the special tool ③ to the low pressure side charging hose.
(5) Install the vacuum gauge (MB991402) to the special tool ③.
(6) Install the vacuum pump to the high pressure side charging hose.





(7) Start up the vacuum pump.
(8) Evacuate to a vacuum reading of 750mmHg (29.5in. Hg) or higher (approx. 10minutes).

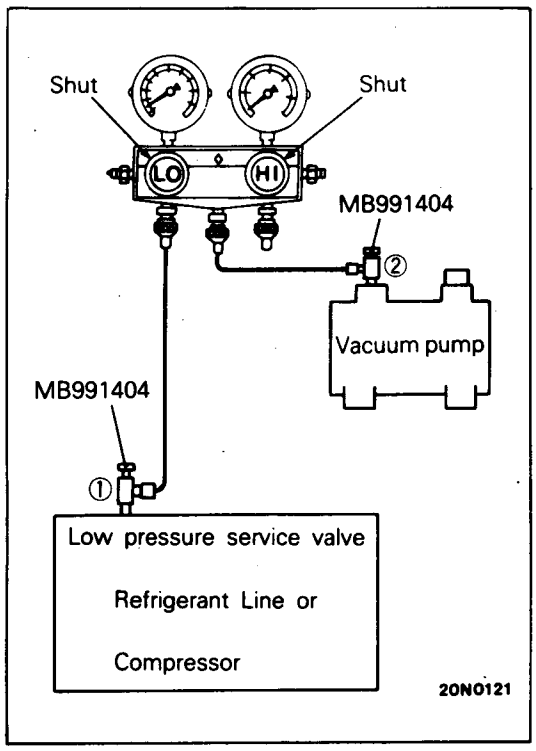
Caution
Read the vacuum gauge as it is stood upright because otherwise it shows wrong indication.

(9) Turn back the handle of the special tool ② on the high pressure side (valve close) all the way.
(10)Stop the vacuum pump and allow to stand for 5minutes.
(11)Check for leaks. (Good if the vacuum is held.)
(12)With the handle of the charge valve turned back all the way (valve open), install the charge valve to the service can.
(13)Turn back the handle of the special tool ③ (vale close) all the way, remove the vacuum gauge and install the service can.
(14)Tighten the handle of the charge valve (valve close) to puncture the service can.
(15)Turn back the handle of the charge valve (valve open) and tighten the handle of the special tool ③ (valve open) to charge refrigerant.
(16)When refrigerant is no longer drawn in, turn back the handle of the special tool ① all the way (vavle close).
(17)Check for gas leaks using a leak detector.
(18)Start the engine.
(19)Operate the air conditioner and set at the lowest temperature (MAX. COOL).
(20)Fix the engine speed at 1,500 r/min.
(21)Tighten the handle of the special tool ① (valve open) to charge refrigerant to specified amount.

Caution
If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

(22)After finishing charging refrigerant, turn back the handle of special tool ① all the way (valve close).
(23)Tighten the handle of the charge valve (valve close).
(24)Remove the special tool ① and ② from each high and low pressure service valve.
(25)Remove the service can.

Note
When there is remainder of refrigerant in the srvice can, keep it for next use with the charge valve and the valves of special tools ① and ③ being closed.

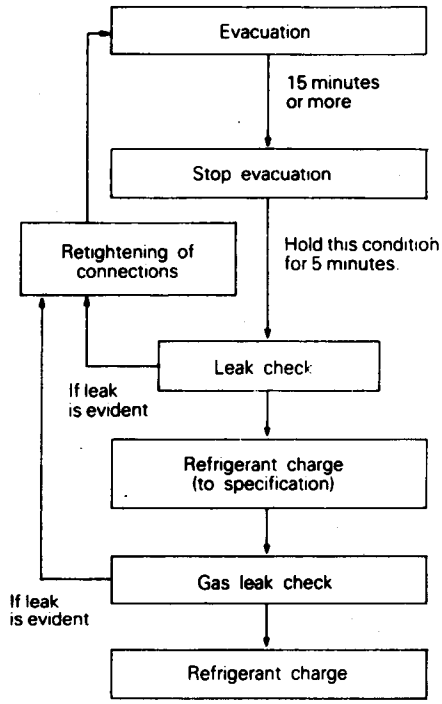


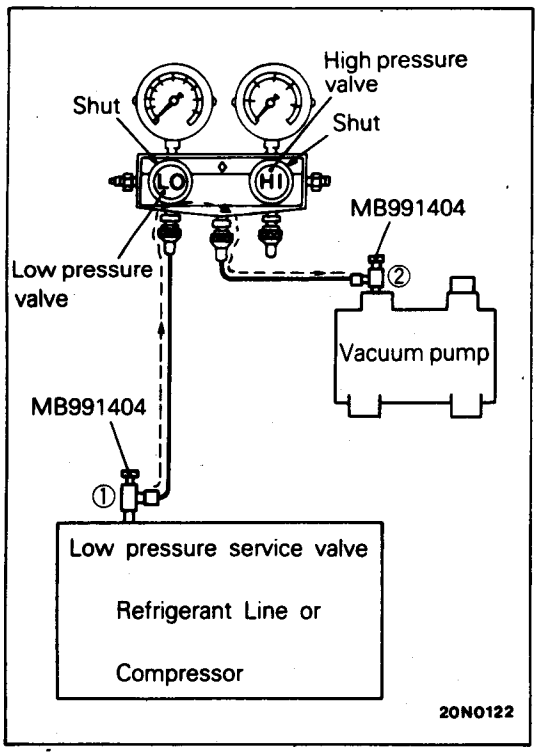
<In case the gauge manifold is used>

(1) Attach the special tools with the handles ① and ② turned all the way back (valves closed) to the low pressure service valve and the vacuum pump respectively.

NOTE
The low pressure service valve should be connected to the compressor suction port.

(2) Close the hitgh and low pressure valves of the gauge manifold.
(3) Connect the charging hoses to the special tools ① and ②.
(4) Tighten the handles of the special tools ① and ② (valves opened).

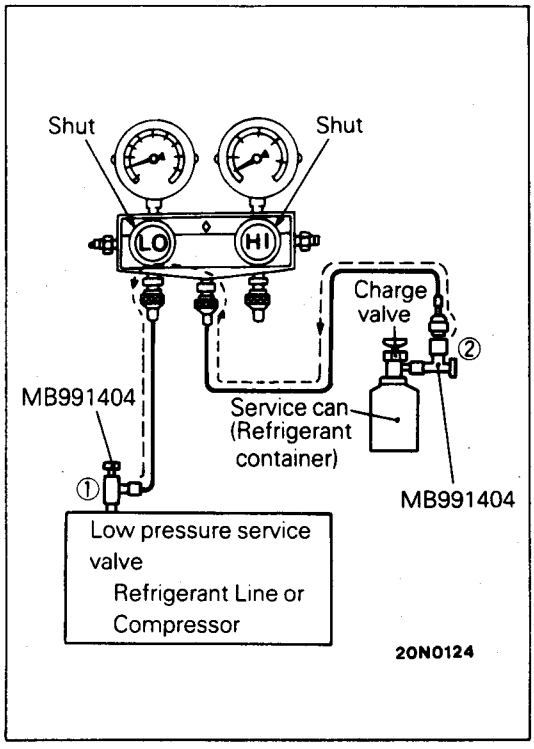




(5) Start up the vacuum pump.

Caution
1. Do not use the compressor for evacuation.
2. Do not operate the compressor in the vacuum condition; damage may occur.

(6) Evacuate to a vacuum reading of 100 kPa (1.0 kg/cm^2, 14.2 psi) or higher (approx. 10 minutes).
(7) Turn back the handle of the special tool ② (valve closed)
(8) Stop the vacuum pump and allow to stand for 5 minutes.
(9) Check for leaks. (Good if the vacuum is held.)



(10)Tighten the charge valve handle to puncture the service can.
(11)Turn back the handle of the charge valve tighten the handle of the special tool ② (valve close).

(12)Open the low pressure valve of the gauge manifold to charge refrigerant.

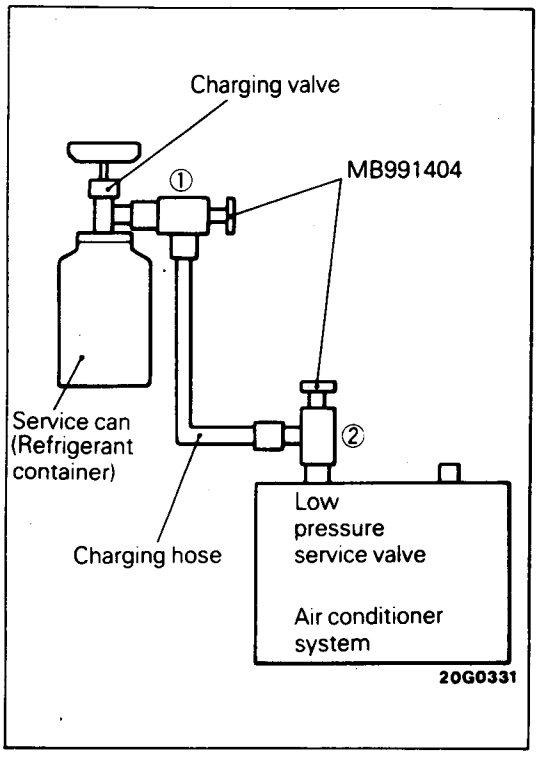
Caution
If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

(13)When refrigerant is no longer drawn in, turn back the handle of the special tool ① (valve close).
(14)Check for gas leaks using a leak detector.
(15)Start the engine.
(16)Operate the air conditioner and set at the lowest temperature (MAX. COOL).
(17)Fix the engine speed at 1,500 r/min.
(18)Tighten the handle of the special tool ① (valve open), and charge refrigerant up to the specified quantity.

Caution
If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

(19)After refrigerant charge is completed, turn the handle of the special tool ① all the way back (valve closed).
(20)Tighten the handle of the charge valve (valve closed).
(21)Remove the special tool ① from the low pressure service valve.
(22)Remove the service can.

NOTE
When there is remainder of refrigerant in the service can, keep it for next use with the charge valve and the valve of special tool ② being closed.



CORRECTING LOW REFRIGERANT LEVEL IN CASE THE SERVICE CAN IS USED

(1) Install the charge valve with the handle turned all the way back (valve closed) to the service can.
(2) Install the special tool ① with the handle tightened (valve open) to the charge valve.
(3) Connect the charging hose to the special tool ①.
(4) Connect the special tool ② with the handle turned all the way back (valve closed) to the charging hose.
(5) Tighten the handle of the charge valve (valve closed), and pierce the service can.
(6) Turn the handle of the charge valve all the way back (valve open), and by operating the handle of the special tool ②, perform air bleeding.
(7) Install the special tool ② to the low pressure service valve.

Caution
Never use the high pressure side as this may cause refrigerant to flow back, resulting rupture of the service can or the charging hose.

(8) State the engine.
(9) Operate the air conditionenr and set at the lowest temperature (MAX. COOL).
(10) Fix the engine speed at 1,500 r/min.
(11) Tighten the handle of the special tool ② (valve open), and replenish refrigerant checking the quantity through the sight glass.
(12) After replenishing is completed, turn the handle of the special tool ② all the way back (valve closed), and then remove the special tool ②.

NOTE
When there is remainder of refrigerant in the service can, keep it for next use with the charge valve and the valves of special tools ① and ③ being closed.

IN CASE REFRIGERANT RECOVERY AND RECYCLING UNIT IS USED

Replenish refrigerant with the refrigerant recovery and recycling unit.

NOTE
Refer to that Refrigerant Recovery and Recycling Unit Instruction Manual for operatin of the unit.

DISCHARGING SYSTEM

Use the refrigerant recovery unit to discharge refrigerant gas from the system.

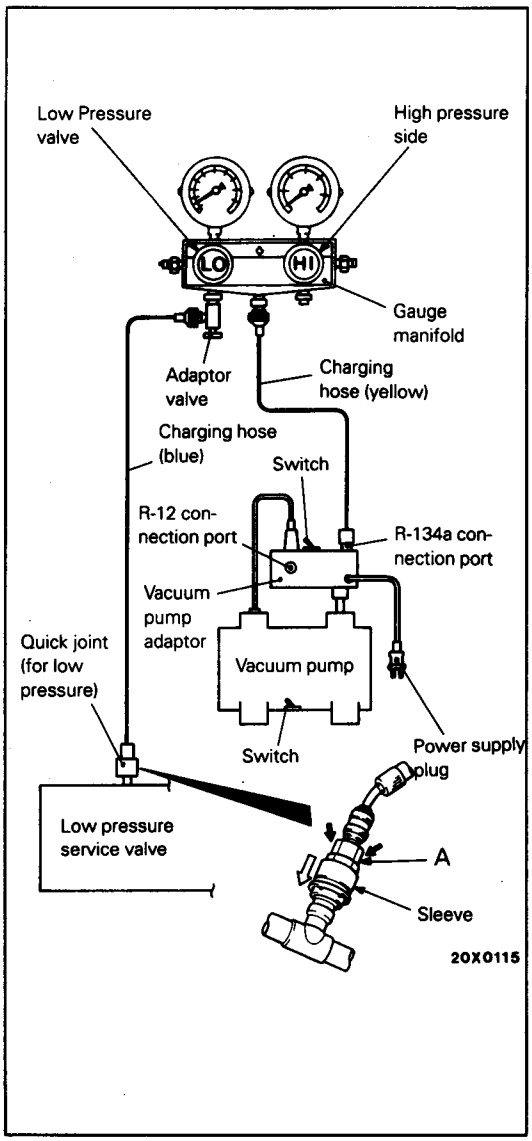
NOTE
Refer to that Refrigerant Recovery and Recycling Unit Instruction Manual for operation of the unit.

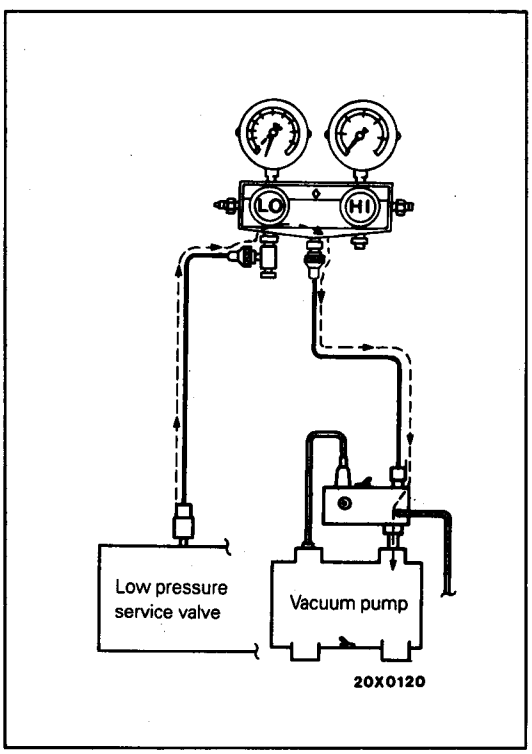
REFILLING OF OIL IN THE AIR-CONDITIONER SYSTEM

Tool little oil will provide inadequate compressor lubrication and cause a compressor failure. Too much oil will increase discharge air temperature.
When a FX-105VS compressor is installed at the factory, it contains 160 cm^3 (9.8 cu.in.) of refrigerant oil. While the air conditioning system is in operation, the oil is carried through the entire system by the refrigerant. Some of this oil will be trapped and retained in various parts of the system.
When the following system components are charged, it is necessary to add oil to the system to replace the oil being removed with the component.

Compressor oil: FREOL S-83 or SUNISO 5GS
Quantity:

Evaporator	**60 cm^3 (3.66 cu.in.)**
Condenser	**15 cm^3 (0.92 cu.in.)**
Suction hose	**10 cm^3 (0.61 cu.in.)**
Receiver	**10 cm^3 (0.61 cu.in.)**





CHARGING <VEHICLES USING R-134a REFRIGERANT>

(1) With the handles turned back all the way (valve closed), install the adapor valve to the low-pressure side of the gauge manifold.
(2) Connect the charging hose (blue) to the adaptor valve.
(3) Connect the quick joint (for low pressure) to the charging hose (blue).
(4) Connect the quick joint (for low pressure) to the low pressure service valve.

NOTE
The low-pressure service valve is on the suction hose A.

Caution
1. Use tools that are suited to R-134a.
2. To install the quick joint, press section A firmly against the service valve until a click is heard. When connecting, run your hand along the hose while pressing to ensure that there are no bends in the hose.

(5) Close the high and low pressure valves of the gauge manifold.
(6) Install the vacuum pump adaptor to the vacuum pump.
(7) Connect the vacuum pump plug to the vacuum pump adaptor.
(8) Connect the charging hose (yellow) to the R-134a connection port of the vacuum pump adaptor.
(9) Tighten the adaptor valve handle (valve open).
(10) Open the low pressure valve of the gauge manifold.
(11) Turn the power switch of the vacuum pump to the ON position.

NOTE
Even if the vacuum pump power switch is turned ON, the vacuum pump will not operate because of the power supply connection is step (7).

(12) Turn the vacuum adaptor switch to the R-134a side to start the vacuum pump.

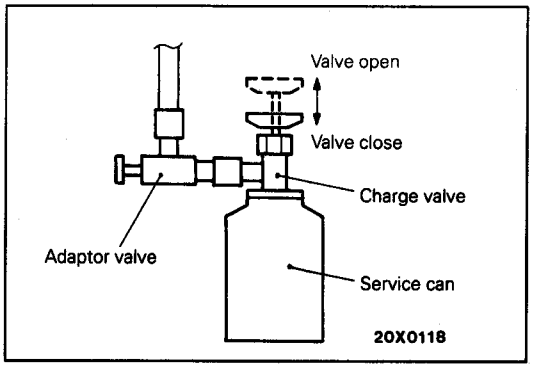
Caution
Do not operate the compressor for evacuation.

(13) Evacuate to a vacuum reading of 100 kPa (1.0 kg/cm^2, 14.2 psi) or higher (takes approx. 10 minutes)
(14) Turn the vacuum pump adaptor switch OFF and allow to stand it for 5 minutes.

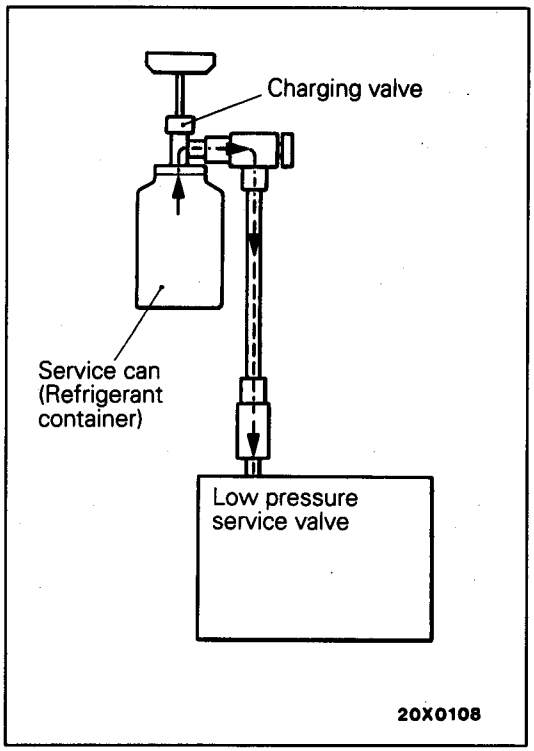
Caution
Do not operate the compressor in the vacuum condition; damage may occur.

(15) Carry out a leak test. (Good if the negative pressure does not drop.)

Caution
If the negative pressure drops, increase the tightness of the connections, and then repeat the evacuation procedure from step (12).



(16) With the handle turned back all the way (valve open), install the charging valve to the service can.
(17) Turn the handle of the adaptor valve back all the way (valve closed), remove it from the gauge manifold and install the service can.
(18) Tighten the handle of the charging valve (valve closed) to puncture the service can.



(19) Turn the handle of the charging valve back (valve open) and tighten the handle of the adaptor valve (valve open) to charge the system with refrigerant.

Caution
If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

(20) If the refrigerant is not drawn in, turn the handle of the adaptor valve back all the way (valve closed).
(21) Check for gas leaks using a leak detector.
If a gas leak is detected, re-tighten the connections, and then repeat the charging procedure from evacuation in step (12).

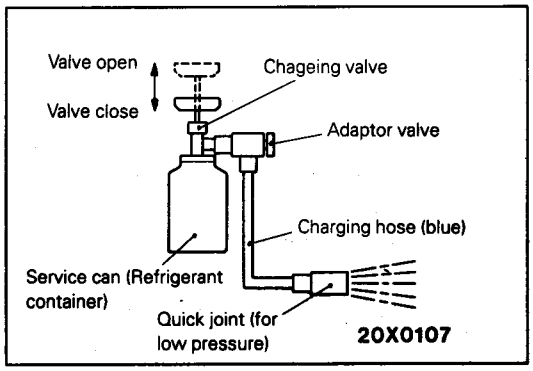
Caution
The leak detector for R-134a should be used.

(21) Start the engine.
(22) Operate the A/C and set to the lowest temperature (MAX. COOL).
(24) Fix the engine speed at 1,500 r/min.
(25) Tighten the handle of the adaptor valve (valve open) to charge the required volume of refrigerant.

Caution
If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

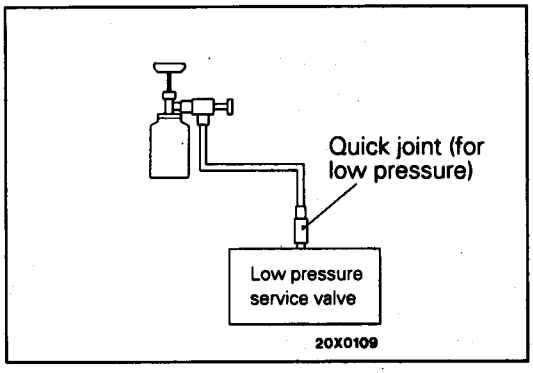
(26) After charging with refrigerant, turn the handle of the adaptor valve back all the way (valve closed).
(27) Tighten the charging valve handle (valve closed).
Remove the quick joint (for low pressure) from the low-pressure service valve.

NOTE
If the service can is not emptied completely, keep the handles of the charging valve and adaptor valve closed for the next charging.

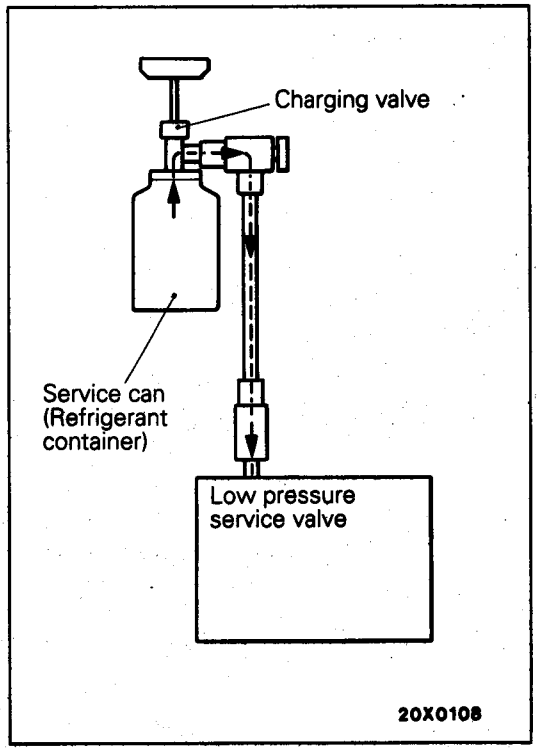


CORRECTING LOW REFRIGERANT LEVEL IN CASE THE SERVICE CAN IS USED

(1) Install the charging valve with the handle turned all the way back (valve open) to the service can.
(2) Install the adaptor valve with the handle turned all the way back (valve close) to the charging valve.
(3) Connect the charging hose (blue) to the adaptor valve.
(4) Connect the charging hose (blue) to the quick joint (for low pressure).
(5) Tighten the handle of the charging valve (valve close), and pierce the service can.
(6) Turn the handle of the adaptor valve to bleed the air.



(7) Install the quick joint (for low pressure) to the low pressure service valve.
NOTE
The low-pressure service valve is on the suction hose A.

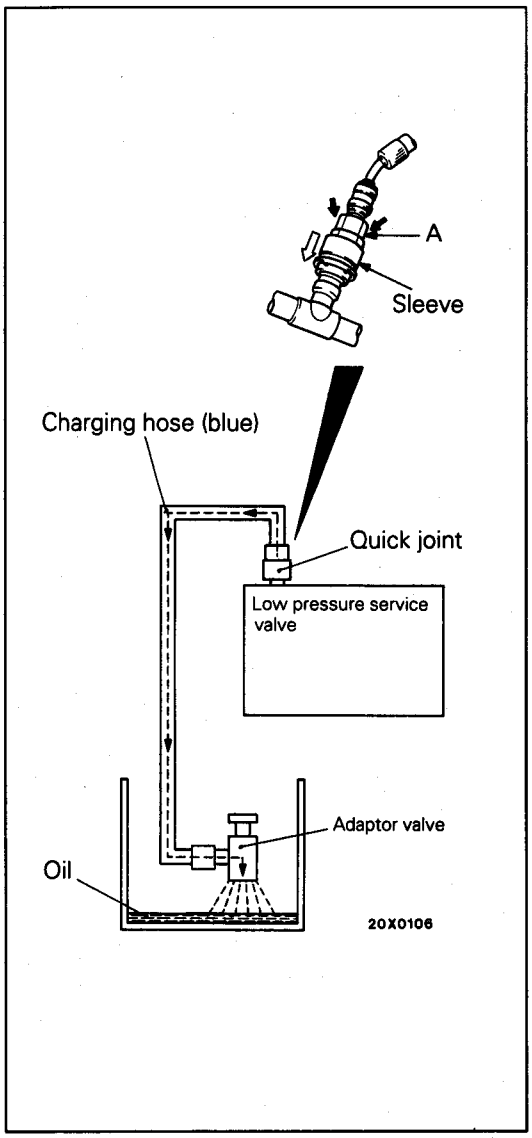


(8) Start the engine.
(9) Operate the air conditioner and set at the lowest temperature (MAX. COOL).
(10) Fix the engine speed at 1,500 r/min.
(11) Tighten the handle of the adaptor valve (valve open), and replenish refrigerant checking the quantity through the sight glass.

Caution
If the service can is inverted, liquid refrigerant may be draw into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

(12) After replenishing is completed, turn the handle of the adaptor valve all the way back (valve close), and remove the quick joint.

NOTE
When there is remainder of refrigerant in the service can, keep it for next use with the charging valve and the adaptor valve being closed.



DISCHARGING SYSTEM

1. Run the engine at an engine speed of 1200–1500 r/min for approximately 5 minutes with the A/C operating to return the oil.

   NOTE
   Returning the oil will be more effective if it is done while driving.
2. Stop the engine.
3. Connect the charging hose (blue) to the adaptor valve with its handle turned back all the way (valve closed).
4. Connect the quick joint to the charging hose (blue).
5. Install the quick joint to the low pressure service valve.

   NOTE
   The low-pressure service valve is on the suction hose A.

   Caution
   To connect the quick joint, press section A firmly against the service valve until a click is heard.
   When connecting, run your hand along the hose while pressing to ensure that there are no bends in the hose.
6. Place the adaptor valve inside the container and discharge the refrigerant by opening the handle gradually so that oil does not gush out.

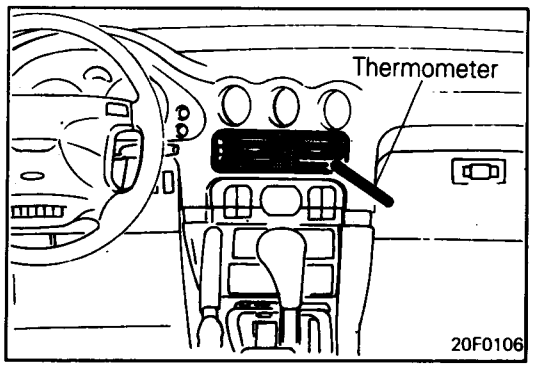
   NOTE
   Any oil remaining in the container should be returned to the A/C system.

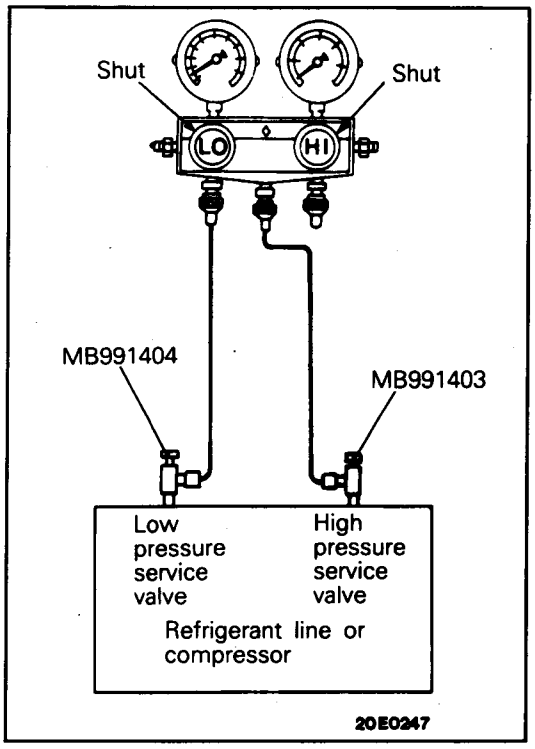
REFILLING OF OIL IN THE A/C SYSTEM

Too little oil will provide inadequate compressor lubrication and cause a compressor failure. Too much oil will increase discharge air temperature.
When a compressor is installed at the factory, it contains 160 cm^3 (9.8 cu. in.) of refrigerant oil.
While the A/C system is in operation, the oil is carried through the entire system by the refrigerant. Some of this oil will be trapped and retained in various parts of the system.
When the following system components are charged, it is necessary to add oil to the system to replace the oil being removed with the component.

Compressor oil: SUN PAGE 56
Quantity:

Evaporator	**60 cm^3 (3.66 cu.in.)**
Condenser	**15 cm^3 (0.92 cu.in.)**
Suction hose	**10 cm^3 (0.61 cu.in.)**
Receiver	**10 cm^3 (0.61 cu.in.)**





PERFORMANCE TEST E55FTAK
<Vehicles using R-12 refrigerant>

(1) The vehicle to be tested should be in a place that is not in direct sunlight.
(2) Connect a tachometer.
(3) Turn back the handle of the special tools (MB991203, MB99140) (valve closed) and install the special tools (MB991403, MB991404) to the high pressure and low pressure service valves.

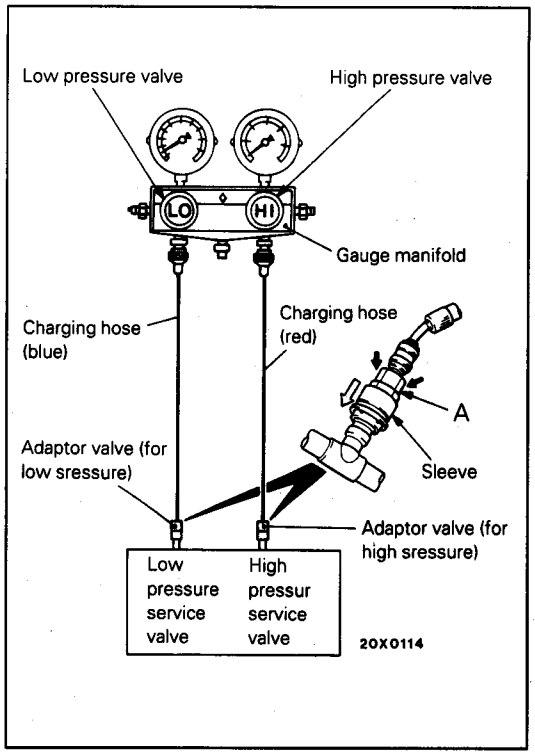
NOTE
The high-pressure service valve is on the liquid pipe B, and the low-pressure service valve is on the suction hose A.

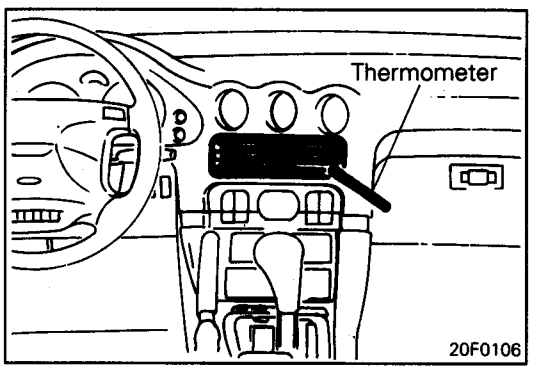
(4) Connect the gauge manifold to the special tools (MB991403, MB991404).
(5) Tighten the handle of the special tools (MB991403, MB991404) (valve open).
(6) Start the engine.
(7) Set the controls to the air conditioner as follows:
Air conditioning switch: Air conditioner – ON position
Mode selection: Face position
Temperature control: Max. cooling position
Air selection: Recirculation position
Blower switch: HI (Fast) position
(8) Adjust engine speed to 1,000 r/min with air conditioner clutch engaged.
(9) Engine should be warmed up with doors, windows closed and bonnet opened.
(10) Insert a thermometer in the left center air conditioner outlet and operate the engine for 20 minutes.
(11) Note the discharge air temperature.

NOTE
If the clutch cycles, take the reading before the clutch disengages.

Performance Temperature Chart

Garage ambient temperature °C (°F)	21 (70)	26.7 (80)	32.2 (90)	37.8 (100)	43.3 (110)
Discharge air temperature °C (°F)	0.0 – 3.0 (32.0 – 37.4)	1.0 – 4.0 (33.8 – 39.2)	1.0 – 4.0 (33.8 – 39.2)	1.0 – 4.0 (33.8 – 39.2)	2.0 – 5.0 (35.6 – 41.0)
Compressor discharge pressure kPa (kg/cm^2, psi)	690 – 740 (6.9 – 7.4, 98.1 – 105.3)	780 – 830 (7.8 – 8.3, 110.9 – 118.1)	870 – 920 (8.7 – 9.2, 123.7 – 130.9)	1,080 – 1,130 (10.8 – 11.3, 153.6 – 160.7)	1,210 – 1,260 (12.0 – 12.6, 172.1 – 179.2)
Compressor suction pressure kPa (kg/cm^2, psi)	130 – 190 (1.3 – 1.9, 18.5 – 27.5)	130 – 190 (1.3 – 1.9, 18.5 – 27.5)	130 – 190 (1.3 – 1.9, 18.5 – 27.5)	130 – 190 (1.3 – 1.9, 18.5 – 27.5)	130 – 190 (1.3 – 1.9, 18.5 – 27.5)





Vehicles using R-134a refrigerant

(1) The vehicles to be tested should be in a place that is not in direct sunlight.
(2) Close the high and low pressure valves of the gauge manifold.
(3) Connect the charging hose (blue) to the low pressure valve and connect the charging hose (red) to the high pressure valve of the gauge manifold.
(4) Install the quick joint (for low pressure) to the charging hose (blue), and connect the quick joint (for high pressure) to the charging hose (red).
(5) Connect the quick joint (for low pressure) to the low-pressure service valve and connect the quick joint (for high pressure) to the high-pressure service valve.

NOTE
The high-pressure service valve is on the liquid pipe B, and the low-pressure service valve is on the suction hose A.

Caution
To connect the quick joint, press section A firmly against the service valve until a click is heard.
When connecting, run your hand along the hose while pressing to ensure that there are no bends in the hose.

(6) Start the engine.
(7) Set the controls to the A/C as follows:
A/C switch: A/C – ON position
Mode selection: Face position
Temperature control: Max. cooling position
Air selection: Recirculation position
Blower switch: HI (Fast) position
(8) Adjust engine speed to 1,000 r/min with A/C clutch engaged.
(9) Engine should be warmed up with doors and windows closed.
(10) Insert a thermometer in the left center A/C outlet and operate the engine for 20 minutes.
(11) Note the discharge air temperature.

NOTE
If the clutch cycles, take the reading before the clutch disengages.

Performance Temperature Chart

Garage ambient temperature °C (°F)	21 (70)	26.7 (80)	32.2 (90)	37.8 (100)	43.3 (110)
Discharge air temperature °C (°F)	0.0 – 3.0 (32.0 – 37.4)	1.0 – 4.0 (33.8 – 39.2)	1.0 – 4.0 (33.8 – 39.2)	1.0 – 4.0 (33.8 – 39.2)	2.0 – 5.0 (35.6 – 41.0)
Compressor discharge pressure kPa (kg/cm^2, psi)	690 – 740 (6.9 – 7.4, 98.1 – 105.3)	780 – 830 (7.8 – 8.3, 110.9 – 118.1)	870 – 920 (8.7 – 9.2, 123.7 – 130.9)	1,080 – 1,130 (10.8 – 11.3, 153.6 – 160.7)	1,210 – 1,260 (12.0 – 12.6, 172.1 – 179.2)
Compressor suction pressure kPa (kg/cm^2, psi)	130 – 190 (1.3 – 1.9, 18.5 – 27.5)	130 – 190 (1.3 – 1.9, 18.5 – 27.5)	130 – 190 (1.3 – 1.9, 18.5 – 27.5)	130 – 190 (1.3 – 1.9, 18.5 – 27.5)	130 – 190 (1.3 – 1.9, 18.5 – 27.5)

NOTE

REFRIGERANT LEAK REPAIR PROCEDURE E55FUAF

LOST CHARGE

If the system has lost all charge due to a leak:
(1) Evacuate the system. (See procedure.)
(2) Charge the system with approximately one pound of refrigerant.
(3) Check for leaks.
(4) Discharge the system.
(5) Repair leaks.
(6) Replace receiver drier.

Caution
Replacement filter-drier units must be sealed while in storage. The drier used in these units will saturate water quickly upon exposure to the atmosphere. When installing a drier, have all tools and supplies ready for quick reassembly to avoid keeping the system open any longer than necessary.

(7) Evacuate and charge the system.

LOW CHARGE

If the system has not lost all of its refrigerant charge; locate and repair all leaks. If it is necessary to increase the system pressure to find the leak (because of an especially low charge) add of refrigerant. If it is possible to repair the leak without discharging the refrigerant system, use the procedure for correcting low refrigerant level.

HANDLING TUBING AND FITTINGS E55FVAD

Kinks in the refrigerant tubing or sharp bends in the refrigerant hose lines will greatly reduce the capacity of the entire system. High pressures are produced in the system when it is operating. Extreme care must be exercised to make sure that all connections are pressure tight. Dirt and moisture can enter the system when it is opened for repair or replacement of lines or components. The following precautions must be observed. The system must be completely discharged before opening any fitting of connection in the refrigeration system. Open fittings with caution even after the system has been discharged. If any pressure is noticed as a fitting is loosened, allow trapped pressure to bleed off very slowly.
Never attempt to rebend formed lines to fit. Use the correct line for the installation you are servicing.
A good rule for the flexible hose lines is keep the radius of all bends at least 10 times the diameter of the hose.
Sharper bends will reduce the flow of refrigerant. The flexible hose lines should be routed so that they are at least 80 mm (3 in.) from the exhaust manifold. It is good practice to inspect all flexible hose lines at least once a year to make sure they are in good condition and properly routed.
Unified plumbing connections with O-rings. These O-rings are not reusable.

COMPRESSOR NOISE E55FXAC

When investigating an air conditioning related noise, you must first know the conditions when the noise occurs. These conditions are: weather, vehicle speed, in gear on neutral, engine temperature or any other special conditions.

Noises that develop during air conditioning operation can often be misleading. For example: what sounds like a failed front bearing or connecting rod, may be caused by loose bolts, nuts, mounting brackets, or a loose clutch assembly. Verify accessory drive belt tension (power steering or alternator).

Improper accessory drive belt tension can cause a misleading noise when the compressor is engaged and little or no noise when the compressor is disengaged.

Drive belts are speed sensitive. That is, at different engine speeds, and depending upon belt tension, belts can develop unusual noises that are often mistaken for mechanical problems within the compressor.

ADJUSTMENT PROCEDURES

(1) Select a quiet area for testing. Duplicate conditions as much as possible. Switch compressor on and off several times to clearly identify compressor noise. To duplicate high ambient conditions (high head pressure), restrict air flow through condenser. Install manifold gauge set to make sure discharge pressure doesn't exceed 2,070 kPa (21.4 kg/cm^2, 300 psi).
(2) Tighten all compressor mounting bolts, clutch mounting bolt, and compressor drive belt. Check to assure clutch coil is tight (no rotation or wobble).
(3) Check refrigerant hoses for rubbing or interference that can cause unusual noises.
(4) Check refrigerant charge. (See "Charging System".)
(5) Recheck compressor noise as in Step 1.
(6) If noise still exists, loosen compressor mounting bolts and retorque. Repeat Step 1.
(7) If noise continues, replace compressor and repeat Step 1.

ADJUSTMENT PROCEDURES

(1) Select a quiet area for testing. Duplicate conditions as much as possible. Switch compressor on and off several times to clearly identify compressor noise.
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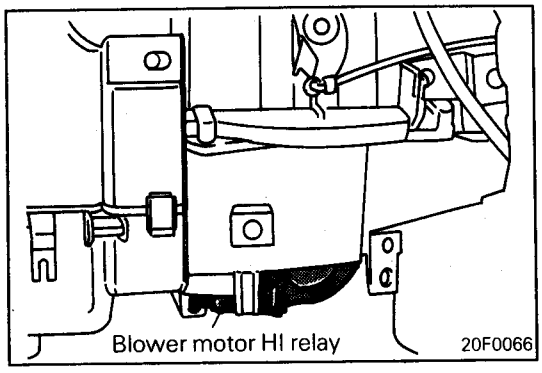
(4) Check refrigerant charge. (See "Charging".)
(5) Recheck compressor noise as in Step 1.
(6) If noise still exists, loosen compressor mounting bolts and retorque. Repeat Step 1.
(7) If noise continues, replace compressor and repeat Step 1.

POWER RELAY CHECK E55FRAY

(1) Remove the radiator fan motor relays (HI) and (LO) from the relay box on the right of the engine compartment.
(2) Remove the radiator fan motor relay (air conditioner), condenser fan motor relays (HI) and (LO), and magnetic clutch relay from the relay box on the left of the engine compartment.
(3) Remove the blower motor relay from the junction box.
(4) Remove the blower motor HI relay from the blower case assembly.
(5) Check the continuity between terminals using a circuit tester.



IDLE-UP OPERATION CHECK E55FOAP

(1) Before inspection and adjustment set vehicle in the following condition:
- Engine coolant temperature: 80 – 95°C (176 – 203°F)
- Lights, electric cooling fan and accessories: Set to OFF
- Transmission: Neutral
- Steering wheel: Straightforward

(2) Check to be sure that the idling speed becomes the standard value when the air conditioner switch is switched ON and the air conditioner is activated.

Standard value: 900 ± 100 rpm

NOTE
There is no necessity to make an adjustment, because the idling speed is automatically adjusted by the ISC* system. If, however, there occurs a deviation from the standard value for some reason, check the ISC* system.
ISC: Idle Speed Control

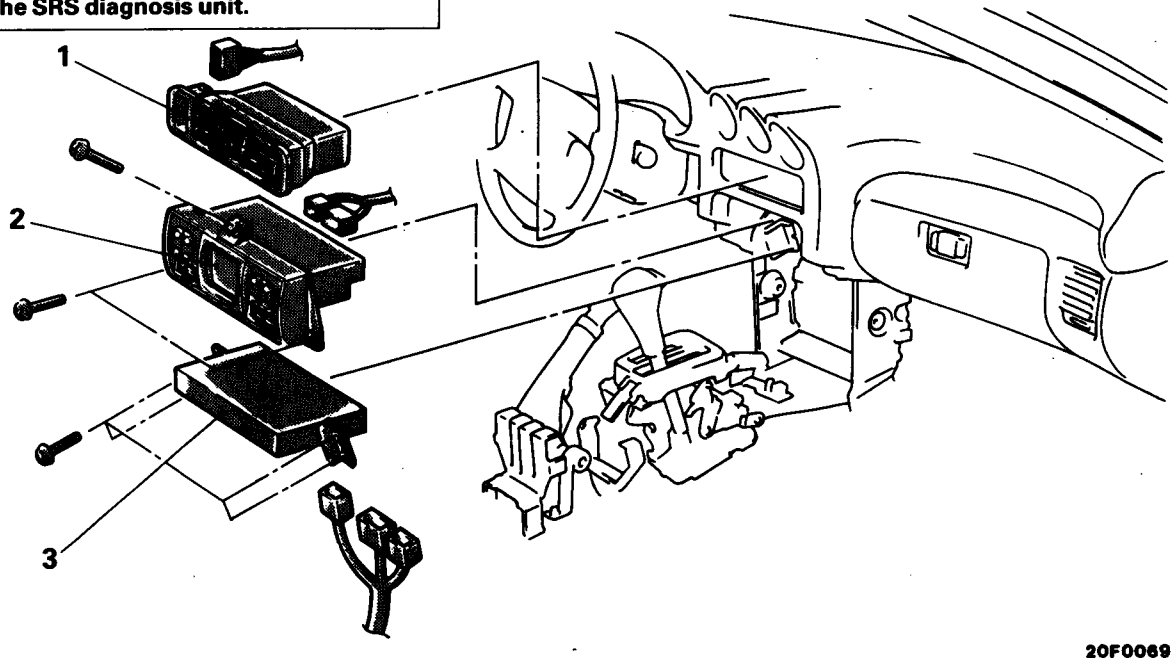
AIR CONDITIONER CONTROL PANEL, AIR CONDITIONER CONTROL UNIT

REMOVAL AND INSTALLATION

E55GEA--

Pre-removal and Post-installation Operation
- Removal and Installation of Floor Console (Refer to GROUP 52A – Floor Console.)

CAUTION: SRS
When installing or removing the floor console, don't allow any impact or shock to the SRS diagnosis unit.



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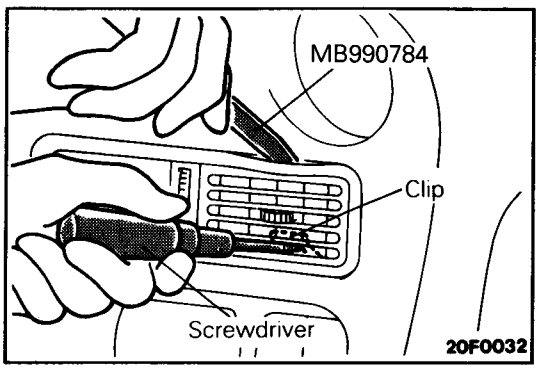
Removal steps

1. Center air outlet assembly
2. Air conditioner control panel
3. Air conditioner control unit



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SERVICE POINT OF REMOVAL

E55GBAPI

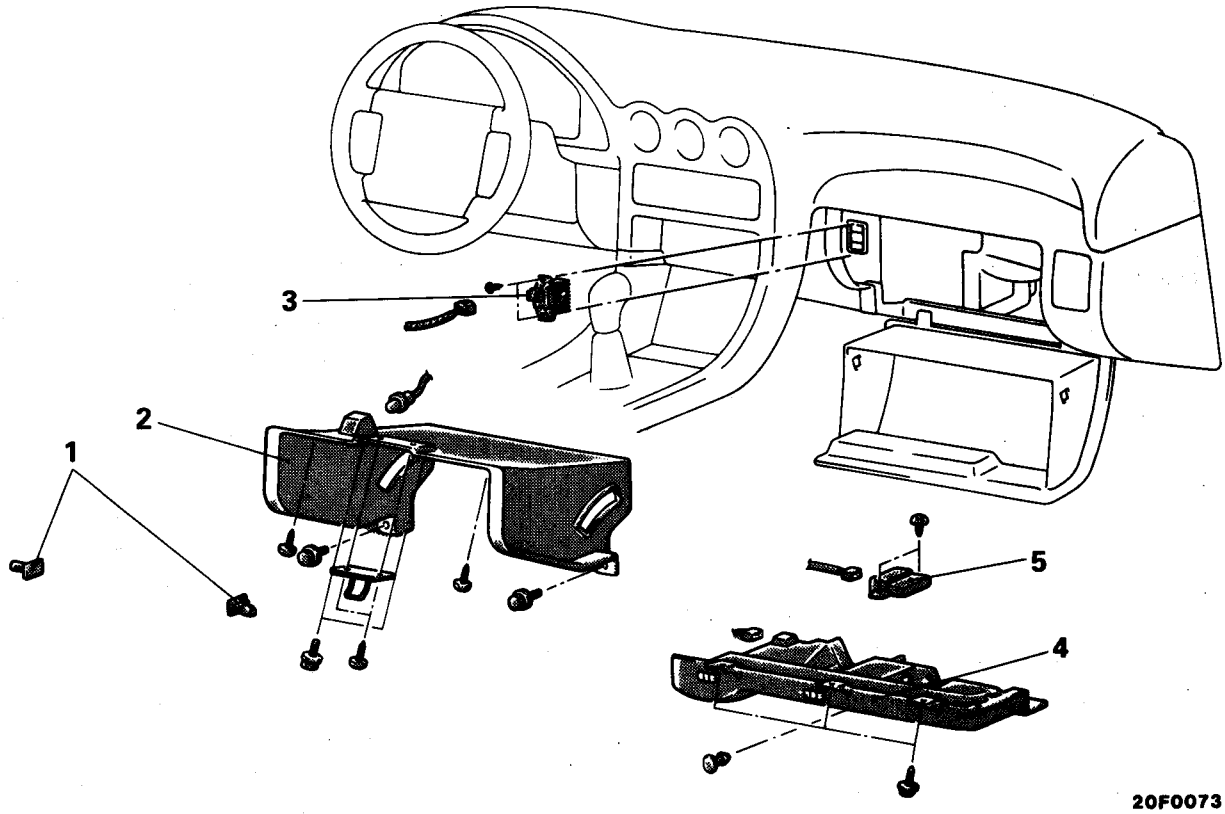
1. REMOVAL OF CENTER AIR OUTLET ASSEMBLY

Disengaging the clips (2 positions) of the center air outlet assembly with a flat tip screwdriver, remove the center air outlet assembly with the special tool.

POWER TRANSISTOR, BELT LOCK CONTROLLER

REMOVAL AND INSTALLATION

E55HBAI



Power transistor removal steps

1. Stopper
2. Glove box outer case assembly
3. Power transistor

Belt lock controller removal steps

4. Under cover
5. Belt lock controller

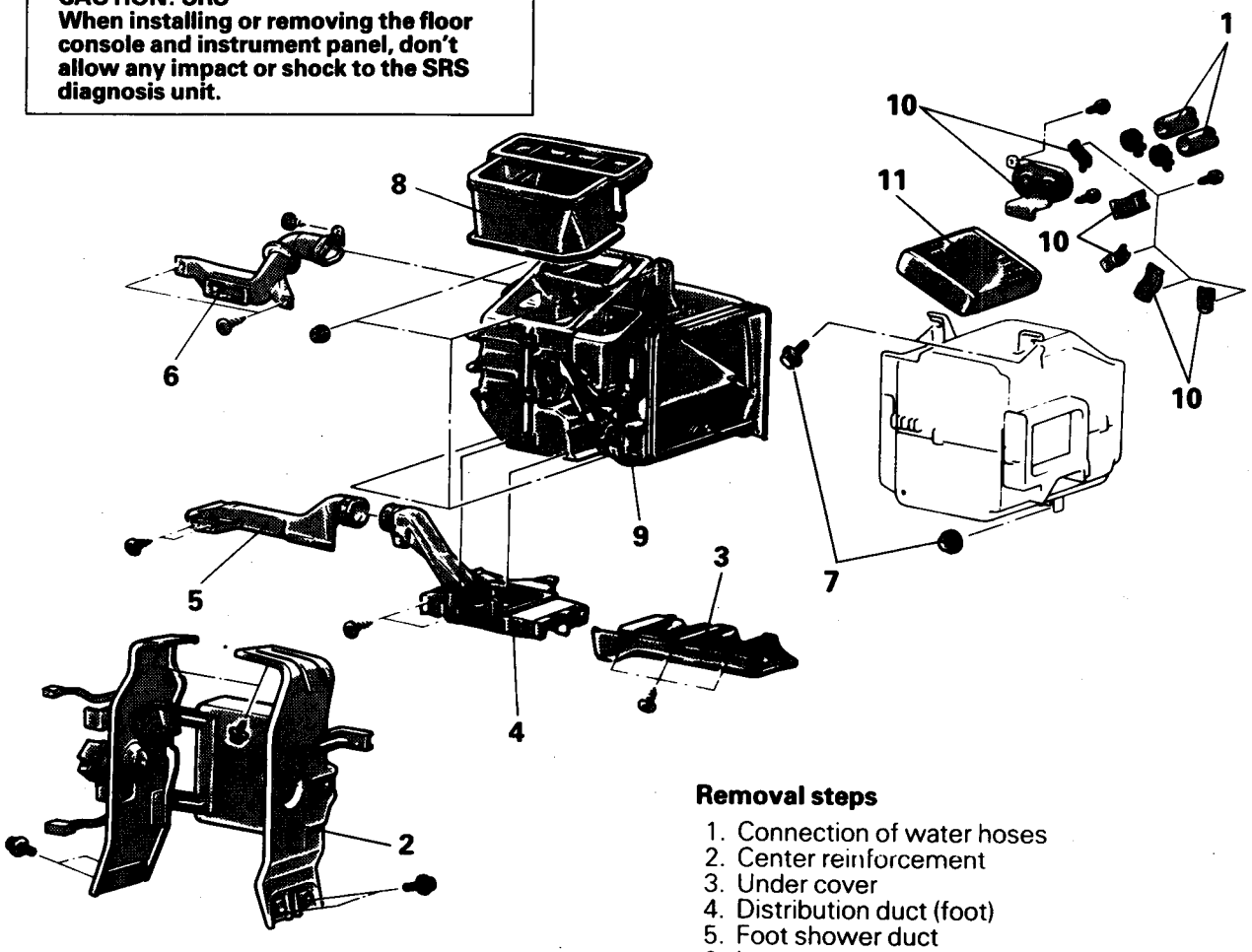
HEATER UNIT

E55IBAK

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Draining and Supplying of the Coolant (Refer to GROUP 11 – Service Adjustment Procedures.)
- Removal and Installation of the Floor Console and Instrument Panel (Refer to GROUP 52A – Floor Console and Instrument Panel.)

CAUTION: SRS
When installing or removing the floor console and instrument panel, don't allow any impact or shock to the SRS diagnosis unit.



20F0104

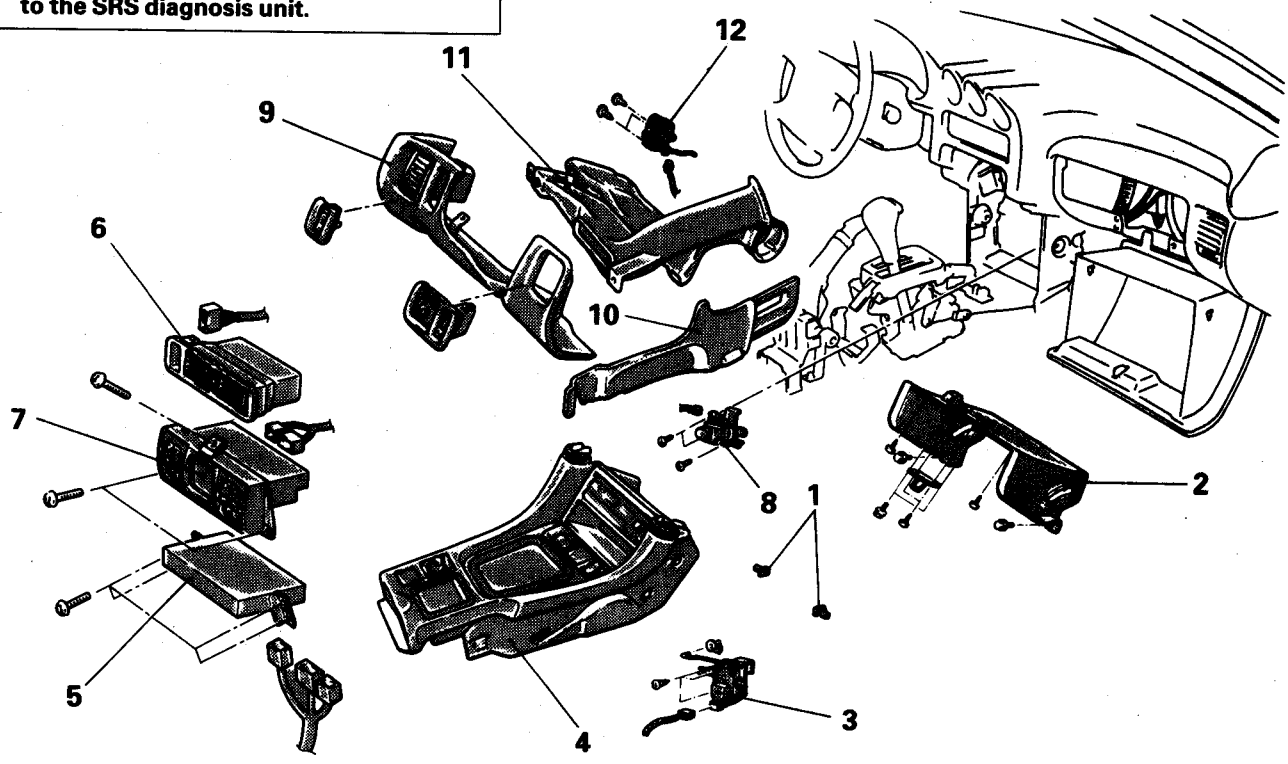
Removal steps
1. Connection of water hoses
2. Center reinforcement
3. Under cover
4. Distribution duct (foot)
5. Foot shower duct
6. Lap cooler duct
7. Evaporator mounting bolt and nut
8. Center duct
9. Heater unit
10. Plate
11. Heater core

DAMPER CONTROL MOTOR ASSEMBLY

REMOVAL AND INSTALLATION

E55HA--

CAUTION: SRS
When installing or removing the floor console, don't allow any impact or shock to the SRS diagnosis unit.



20F0077

Air selection damper motor assembly removal steps

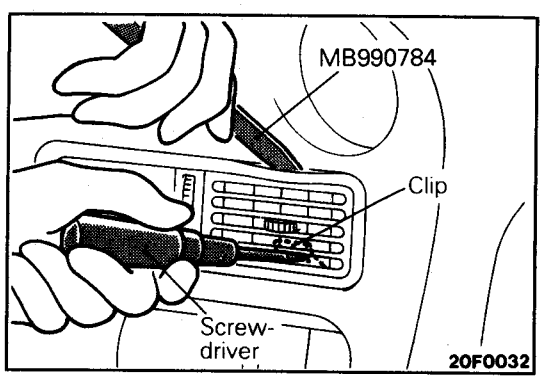
1. Stopper
2. Glove box outer case
3. Air selection damper motor assembly

Air mix damper motor assembly removal steps

◀■▶ ▶■◀ 4. Floor console (Refer to GROUP 52A – Floor Console.)
5. Air conditioner control unit
◀■▶ 6. Center outlet assembly
7. Air conditioner control panel
8. Air mix damper motor assembly

Mode selection damper motor assembly removal steps

9. knee protector
10. Side console cover
11. Shower duct and lap cooler duct
12. Mode selection damper motor assembly



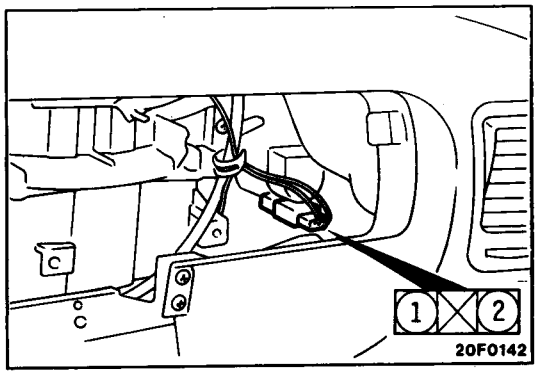
20F0032

SERVICE POINTS OF REMOVAL

E55GBAP2

6. REMOVAL OF CENTER AIR OUTLET ASSEMBLY

Disengaging the clips (2 positions) of the center air outlet assembly with a flat tip screwdriver, remove the center air outlet assembly with the special tool.



INSPECTION

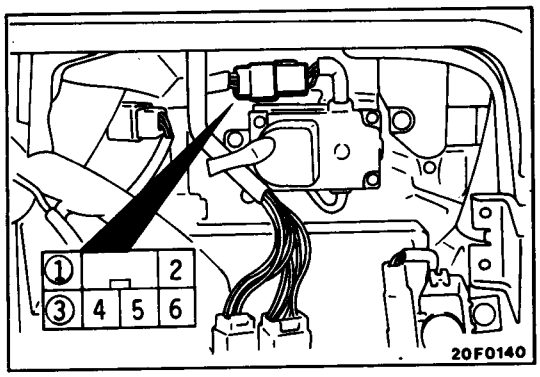
E55HCAV

INSPECTION OF AIR SELECTION DAMPER MOTOR ASSEMBLY

Check that the motor rotates when battery voltage is applied to the connector on the motor assembly side.
Check also that the motor rotates in the backward direction when polarity is changed.

Caution

1. **Cut off the voltage when the damper is in the RECIRCULATION or FRESH position.**
2. **Cut off the voltage if the motor does not turn when battery voltage is applied.**

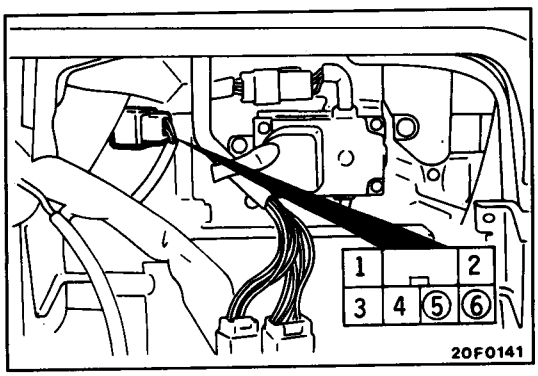


INSPECTION OF AIR MIX DAMPER MOTOR

Check that the motor rotates when battery voltage is applied across terminals ① and ③ of motor assembly side connector.
Check also that the motor turns in the backward direction when polarity is changed.

Caution

1. **Cut off the voltage when the damper is in the MAX. HOT or MAX. COOL position.**
2. **Cut off the voltage if the motor does not turn when battery voltage is applied.**

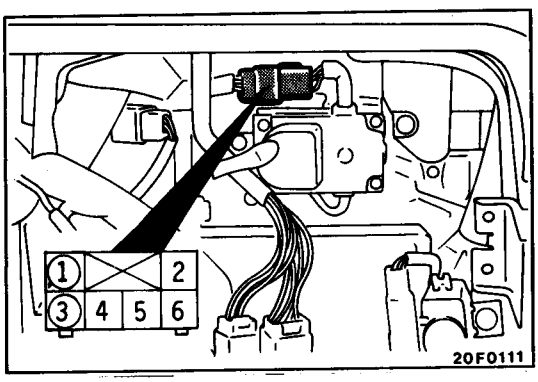


INSPECTION OF AIR MIX DAMPER POTENTIOMETER

Connect a circuit tester across terminals ⑤ and ⑥ of the motor assembly connector and check that resistance gradually changes as the damper is moved from MAX. HOT to MAX. COOL position.

Standard value

MAX. HOT: Approx. 0.2 kΩ
MAX. COOL: Approx. 4.8 kΩ

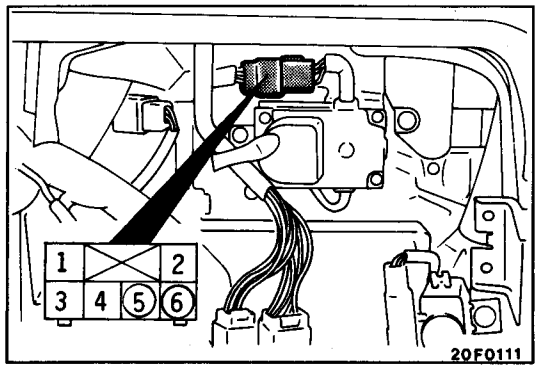


INSPECTION OF MODE SELECTION DAMPER MOTOR

Check that the motor turns when battery voltage is applied across terminals ① and ③ of the motor assembly connector.
Check also that the motor turns in the backward direction when polarity is changed.

Caution

1. **Cut off the voltage when the damper is in the DEF. or FACE position.**
2. **Cut off the voltage if the motor does not turn when battery voltage is applied.**



INSPECTION OF MODE SELECTION DAMPER POTENTIOMETER

Connect a circuit tester across terminals ⑤ and ⑥ of the motor assembly connector and check that resistance gradually changes as the damper is moved from DEF. to FACE position.

Standard value
DEF. position: Approx. 0.2 kΩ
FACE position: Approx. 4.8 kΩ

SENSORS

REMOVAL AND INSTALLATION

M550A--

◆◆ 1. Interior temperature sensor

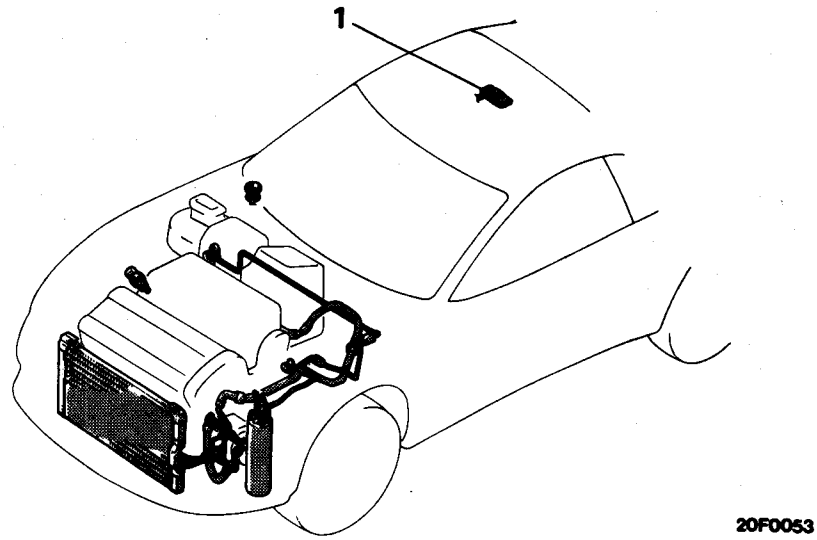
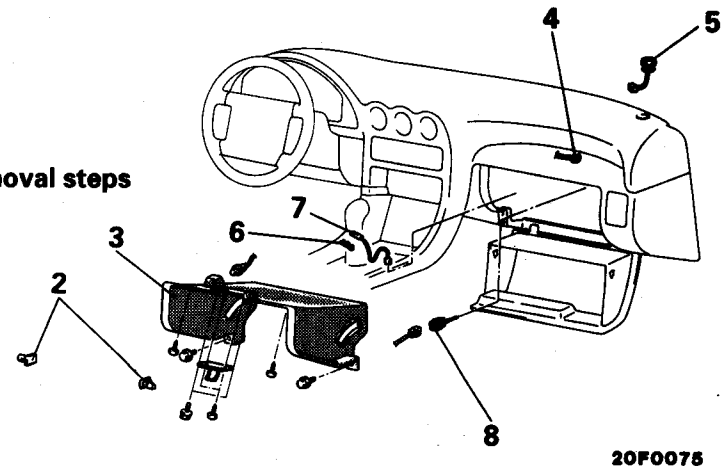
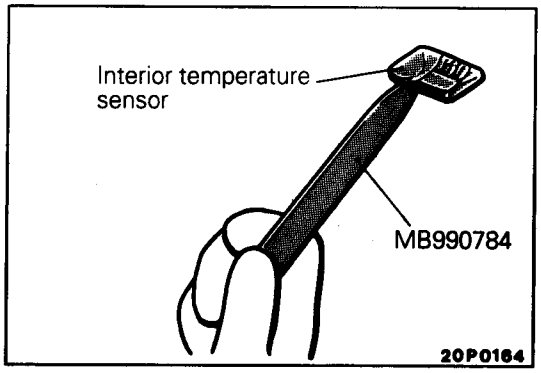


Photo sensor removal steps
2. Stopper
3. Glove box outer case
4. Photo sensor connector connection
◆◆ 5. Photo sensor

Engine coolant temperature sensor removal steps
2. Stopper
3. Glove box outer case assembly
6. Plate
7. Engine coolant temperature sensor

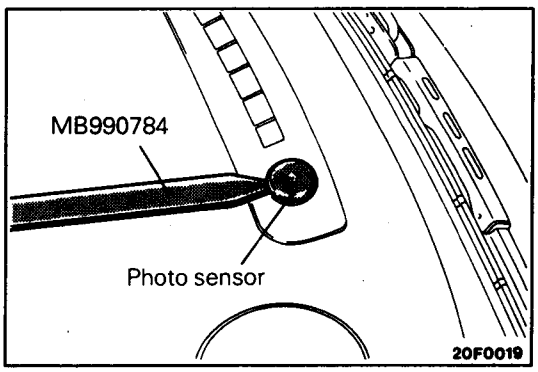
Air inlet sensor removal steps
2. Stopper
3. Glove box outer case assembly
8. Air inlet sensor



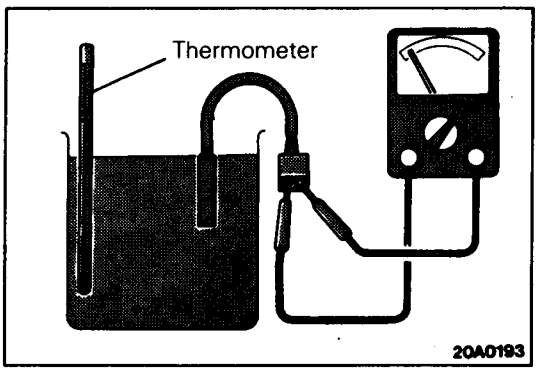


SERVICE POINTS OF REMOVAL E55OBAD

1. REMOVAL OF INTERIOR TEMPERATURE SENSOR



5. REMOVAL OF PHOTO SENSOR



INSPECTION E55OCAI

ENGINE COOLANT TEMPERATURE SENSOR

(1) Dip the engine coolant temperature sensor in hot water and, using a stove, etc., raise the engine coolant temperature.
(2) Check that the engine coolant temperature sensor is conductive when the engine coolant temperature reaches the specified temperature.

Standard value: 26.5 ± 4°C (79.7 ± 7.2°F)

AIR INLET SENSOR

The condition can be considered normal if the resistances are measured within the ranges of 3.98 – 4.12 kilohms and 2.21 – 2.35 kilohms, respectively, when the air inlet sensor is submerged in warm water of 25°C (77°F) and 40°C (104°F) for one minute or longer each.

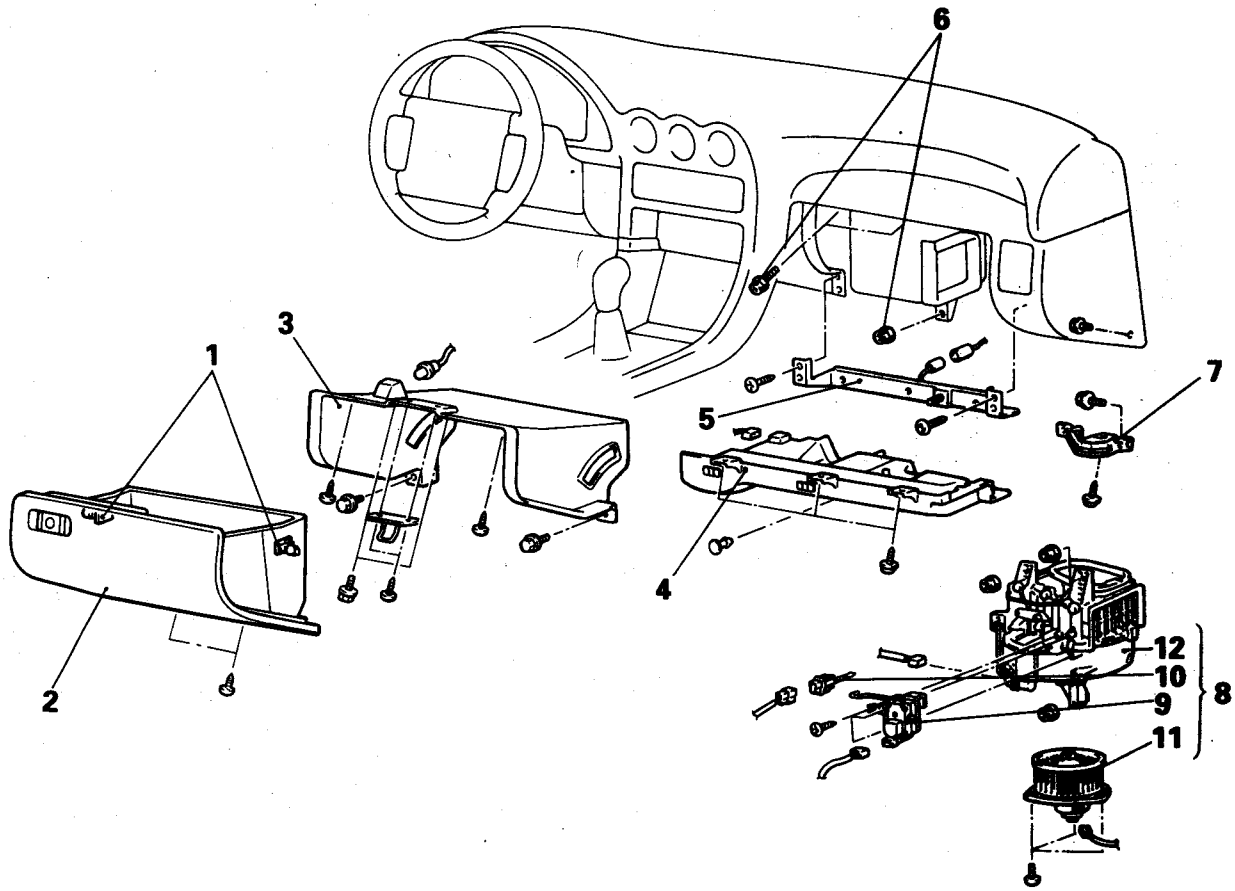
NOTE
The relationship between the ambient temperature and the resistance values is as shown below.

Ambient temperature °C (°F)	–10 (14)	0 (32)	10 (50)	20 (68)	25 (77)	30 (86)	40 (104)
Resistance value (reference) kΩ	19.06	11.71	7.45	4.89	4.00	3.30	2.28

BLOWER ASSEMBLY

E55KA--

REMOVAL AND INSTALLATION



Removal steps of blower case assembly

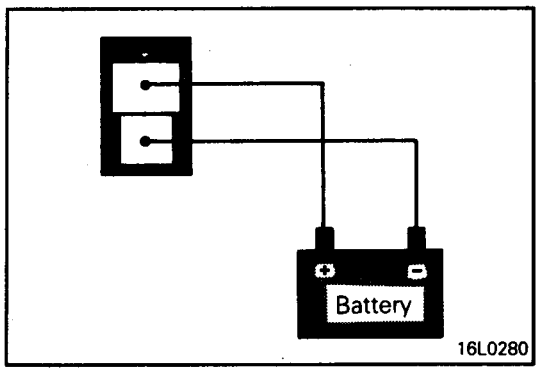
1. Stopper
2. Glove box
3. Glove box outer case assembly
4. Under cover
5. Lower frame
6. Evaporator mounting bolt and nut
7. Side frame
8. Blower assembly
9. Air selection damper motor
10. Air inlet sensor
11. ◆◆ Blower motor assembly
12. Blower case assembly

Removal steps of blower motor assembly

4. Under cover
11. ◆◆ Blower motor assembly

INSPECTION E55KCAR

- Check for bending or abnormal deflection of the rotating shaft of the blower motor assembly.
- Check for cracking or deterioration of the packing.
- Check for damage to the fan.
- Check for damage to the blower case.
- Check the operation of the air-selection damper, and for damage.



BLOWER MOTOR ASSEMBLY CHECK

When battery voltage is applied between the terminals, check to be sure that the motor operates. Also, check to be sure that there is no abnormal noise.

SERVICE POINTS OF INSTALLATION E55KDAF

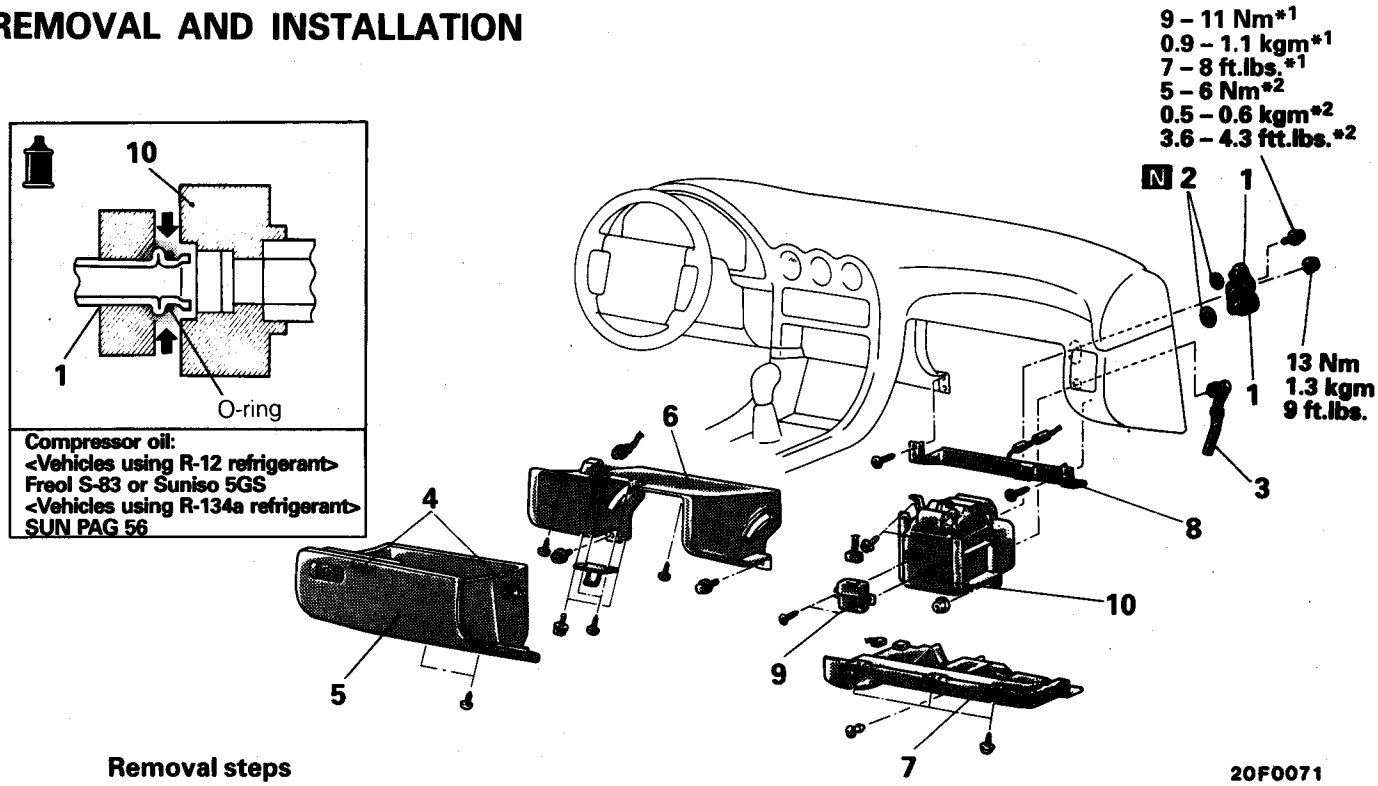
11. INSTALLATION OF BLOWER MOTOR ASSEMBLY

Before installing the blower motor assembly, carefully clean away any dust, dirt, etc. adhering to the inner surface of the blower case.

EVAPORATOR

E55JA--

REMOVAL AND INSTALLATION



Removal steps

1. Connection of liquid pipe and suction hose B
2. O-ring
3. Drain hose
4. Stopper
5. Glove box
6. Glove box outer case assembly
7. Under cover
8. Lower frame
9. A/C control unit
10. Evaporator

Pre-removal and Post-installation Operation
- Discharge and Charging of Refrigerant (Refer to P.55-24, 29.)
- Removal and Installation of Battery

NOTE
*1: L.H. drive vehicles
*2: R.H. drive vehicles

SERVICE POINTS OF REMOVAL

E55JBAM

1. DISCONNECITON OF LIQUID PIPE AND SUCTION HOSE B

If the hoses or pipes are disconnected, cap the hoses or pipes with a blank plug to prevent entry of dust, dirt, and water.

INSPECTION

E55JFAP

- Check for damage of the evaporator fin part.
- Check for damage or collapse of the drain hose.
- Check for peeling or cracking of the insulator.

AIR THERMO SENSOR

For information concerning the checking procedures, refer to P.55-23.

SERVICE POINT OF INSTALLATION

10. INSTALLATION OF EVAPORATOR

When replacing the evaporator, fill it with the specified volume of the compressor oil and install it.

Compressor oil:

<Vehicles using R-12 refrigerant>

Freol S-83 or SUNISO 5GS

<Vehicles using R-134a refrigerant>

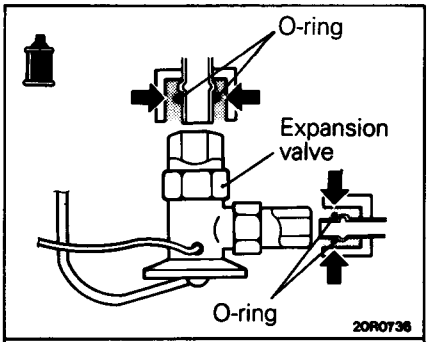
SUN PAG 56

Quantity : 60 cm^3 (3.66 cu.in.)

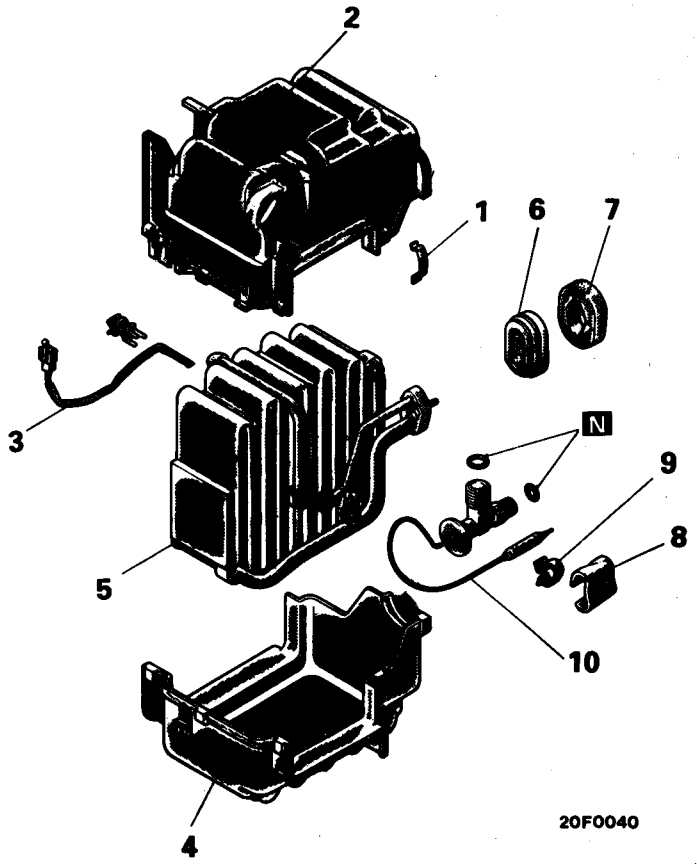
NOTE

DISASSEMBLY AND REASSEMBLY

E55JC--

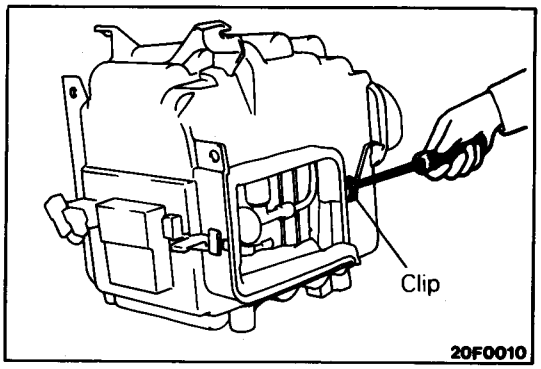


Compressor oil:
<Vehicles using R-12 refrigerant>
Freol S-83 or Suniso 5GS
<Vehicles using R-134a refrigerant>
SUN PAG 56



Disassembly steps

◆◆ 1. Clips
2. Evaporater case (upper)
3. Air thermo sensor
4. Evaporator case (lower)
5. Evaporator assembly
6. Grommet
7. Insulator
8. Rubber insulator
9. Clip
◆◆ 10. Expansion valve

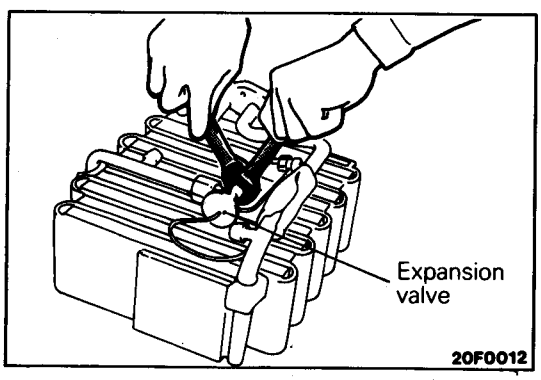


SERVICE POINTS OF DISASSEMBLY

E55JDAB

1. REMOVAL OF CLIPS

Remove the clips with a flat-blade screwdriver covered with a shop towel to prevent damage to case surfaces.



10. REMOVAL OF EXPANSION VALVE

Loosen the flare nut by using two wrenches (for both the inlet and outlet).

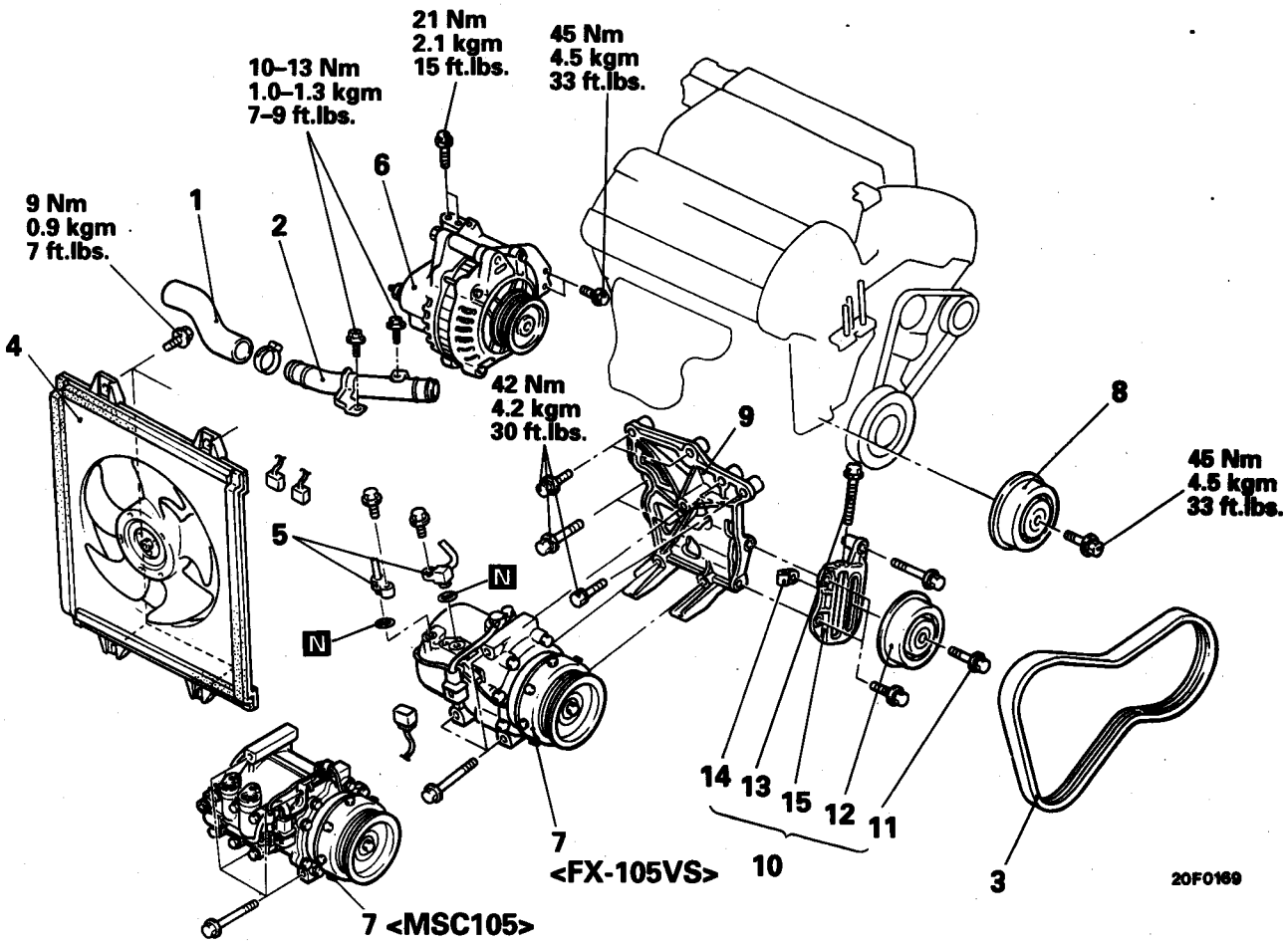
COMPRESSOR

E55LA--

REMOVAL AND INSTALLATION

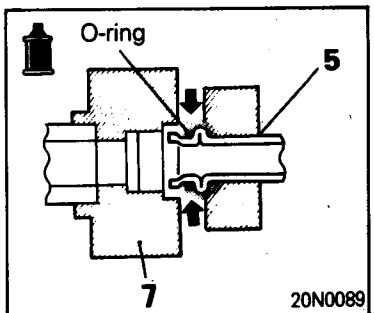
Pre-removal Operation
- Discharge of the Refrigerant (Refer to P.55-29.)

Post-installation Operation
- Adjustment of the Compressor Drive Belt (Refer to GROUP 11 – Service Adjustment Procedures.)
- Charging of Refrigerant (Refer to P.55-24.)

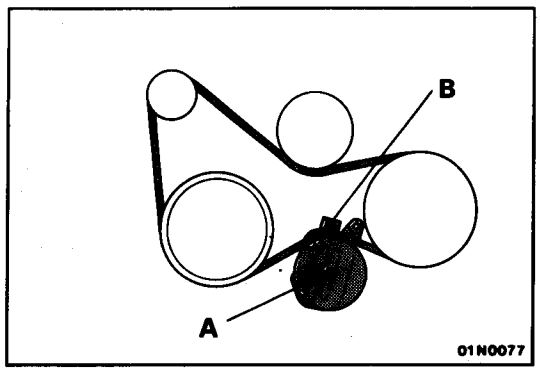


Removal steps

1. Air hose B
2. Air pipe
3. Compressor drive belt
4. Condenser fan motor assembly
5. Connection of suction hose A and discharge hose
6. Alternator (Refer to GROUP 16 – Alternator.)
7. Compressor
8. Idler pulley
9. Compressor bracket
10. Tension pulley assembly
11. Bolt
12. Tension pulley
13. Bolt
14. Adjustment plate
15. Tension pulley bracket



Compressor oil:
<Vehicles using R-12 refrigerant>
Freol S-83 or Suniso 5GS
<Vehicles using R-134a refrigerant>
SUN PAG 56



SERVICE POINTS OF REMOVAL E55LFAN

3. REMOVAL OF COMPRESSOR DRIVE BELT

(1) Loosen bolt "A" for holding the tension pulley.
(2) Loosen bolt "B" for adjustment, and remove the compressor drive belt.

5. REMOVAL OF SUCTION HOSE A AND DISCHARGE HOSE

If the hoses are disconnected, cap the hoses with a blank plug to prevent entry of dust, dirt, and water.

7. REMOVAL OF COMPRESSOR

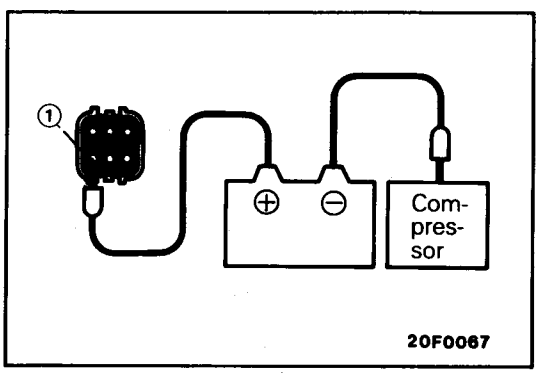
Caution
Lay the towel on the brake tube to protect them. When install the compressor, do not damage the brake tubes. This work must be done carefully so as not to spill the compressor oil.

INSPECTION E55LGAE

- Checking for heat damage of the tension pulley.
- Check for excessive play or deflection of the tension pulley.
- Check for unusual wear of the tension pulley.
- Check for hardening of the air conditioner belt.
- Check for unusual wear or abrasion of the air conditioner belt.

OPERATION CHECK OF THE COMPRESSOR'S MAGNETIC CLUTCH

(1) Connect terminal ① at the compressor side to the positive (+) terminal of the battery, and ground the negative (–) terminal of the battery to the compressor.
(2) The condition of the compressor's magnetic clutch can be considered satisfactory if the operation sound (a "click" sound) of the magnetic clutch can be heard when this check is made.



SERVICE POINTS OF INSTALLATION E55LHAK

7. INSTALLATION OF COMPRESSOR

If a new compressor is installed, first adjust the amount of oil according to the procedures described below, and then install the compressor.

(1) Measure the amount {X cm^3 (x cu.in.)} of oil within the removed compressor.
(2) Wipe away (from the new compressor) the amount of oil calculated according to the following formula, and then install the new compressor.

New compressor oil amount 160 cm^3 – X cm^3 = Y cm^3
(9.8 cu.in. – x cu.in. = y cu.in.).

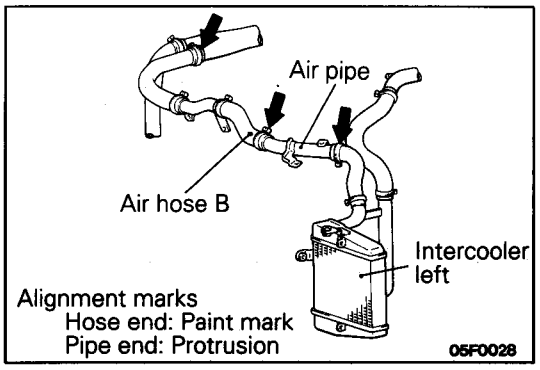
NOTE
(1) Y cm^3 (y cu.in.) indicates the amount of oil in the refrigerant line, the condenser, the cooling unit, etc.

(2) When replacing the following parts at the same time as the compressor, subtract the rated oil amount of the each part from Y cm^3 (y cu.in.) and discharge from the new compressor.

Quantity:

Evaporator	**60 cm^3 (3.66 cu.in.)**
Condenser	**15 cm^3 (0.92 cu.in.)**
Suction hose	**10 cm^3 (0.61 cu.in.)**
Receiver	**10 cm^3 (0.61 cu.in.)**

NOTE



2. INSTALLATION OF AIR PIPE / 1. AIR HOSE B

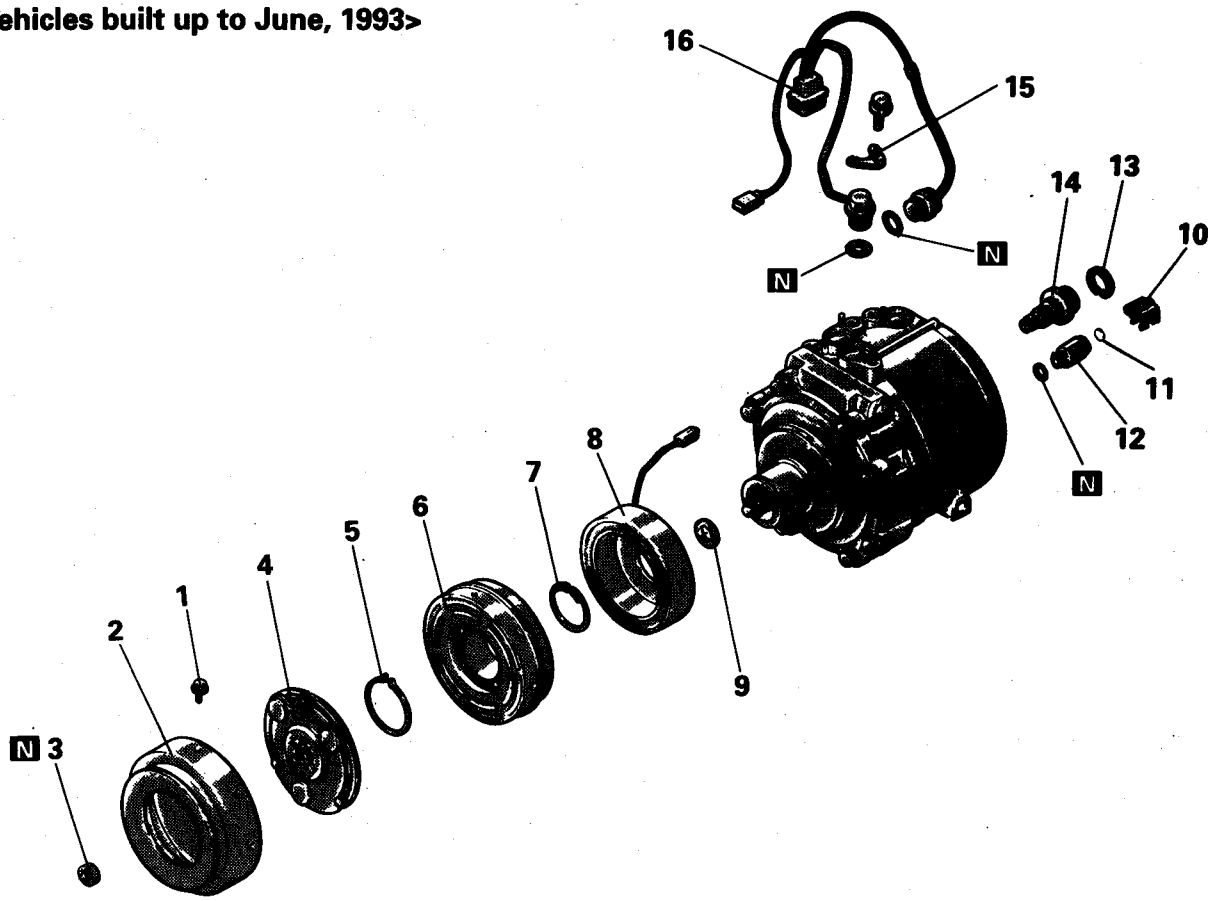
When installing the air hoses, make sure that the alignment marks at places indicated by arrows are properly aligned. Insert each air hose until it hits the root of step or it bottoms.

Caution
Be careful not to allow any foreign matter to get into the hoses, pipes, or the intercooler itself.

DISASSEMBLY AND REASSEMBLY

E55LB–

<Vehicles built up to June, 1993>



20F0097

Magnetic clutch disassembly steps

1. Bolts
2. Pulley
3. Nut
4. Armature plate
5. Snap ring
6. Rotor
7. Snap ring
8. Clutch coil
9. Shims

High pressure relief valve disassembly steps

10. Cover
11. Dust cover
12. High pressure relief valve

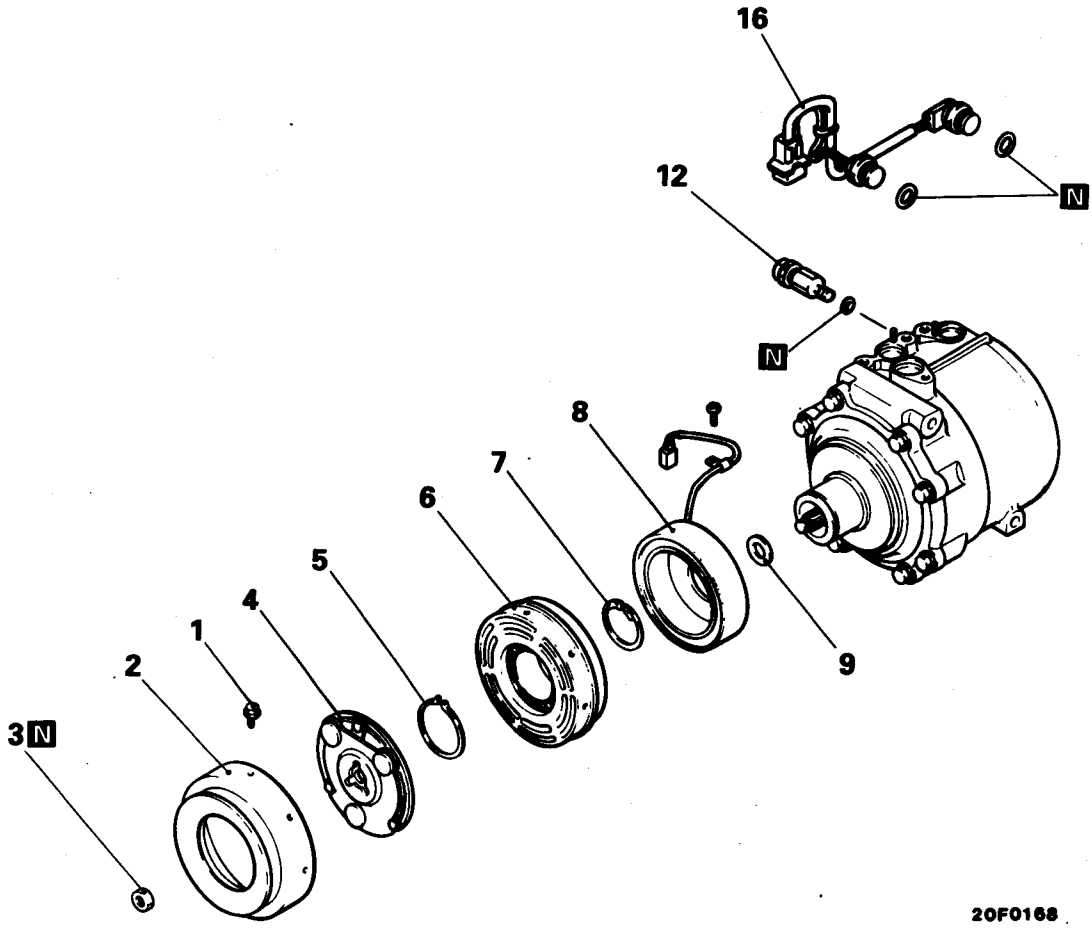
Control valve disassembly steps

13. Snap ring
14. Control valve

Thermostat and revolution pick up sensor disassembly steps

15. Plate
16. Thermostat and revolution pick up sensor

<Vehicles built from July, 1993>



Magnetic clutch disassembly steps

1. Bolts
2. Pulley
3. Nut
4. Armature plate
5. Snap ring
6. Rotor
7. Snap ring
8. Clutch coil
9. Shims

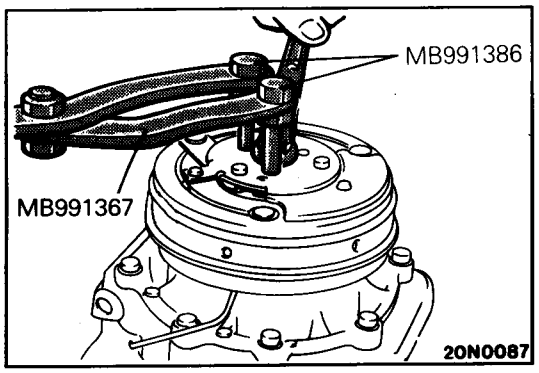
High pressure relief valve disassembly

12. High pressure relief valve

Thermostat and revolution pick up sensor disassembly

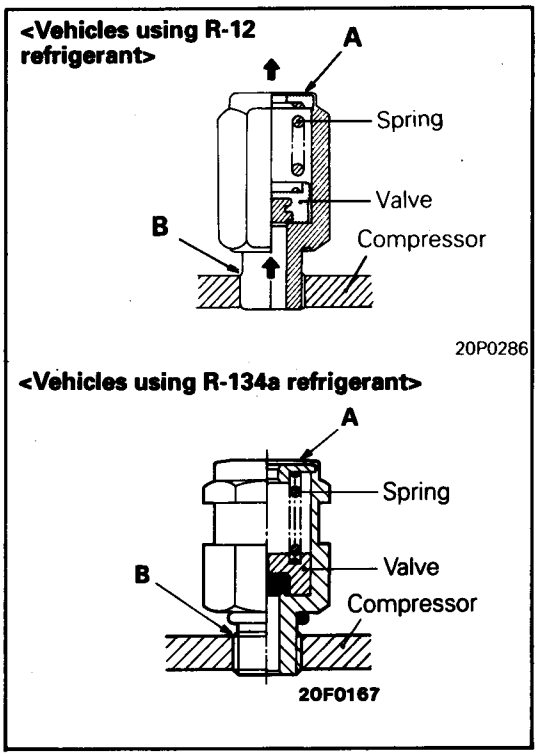
16. Thermostat and revolution pick up sensor

NOTE



SERVICE POINT OF DISASSEMBLY E55LCAJ

3. REMOVAL OF NUT

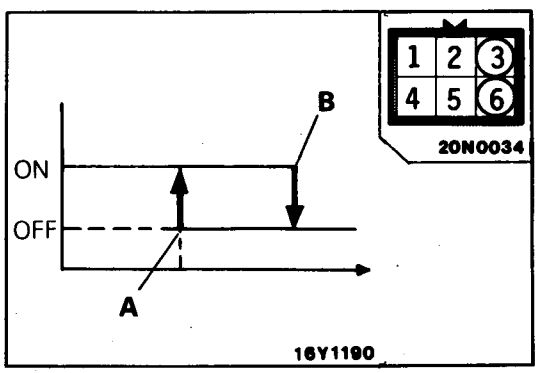


INSPECTION E55LDAJ

HIGH PRESSURE RELIEF VALVE CHECK

The high pressure relief valve is a safety feature which releases part of the refrigerant inside the system into the atmosphere when the high pressure level exceeds 3,550 kPa (35 kg/cm^2, 505 psi): R-12; 3,740 kPa (37 kg/cm^2, 532 psi): R-134a during air conditioner operation.
Once the pressure inside the system has been reduced to 2,400 kPa (24 kg/cm^2, 341 psi): R-12; 2,940 kPa (29 kg/cm^2, 418 psi): R-134a or lower, the high pressure relief valve closes, thus allowing continued operation.

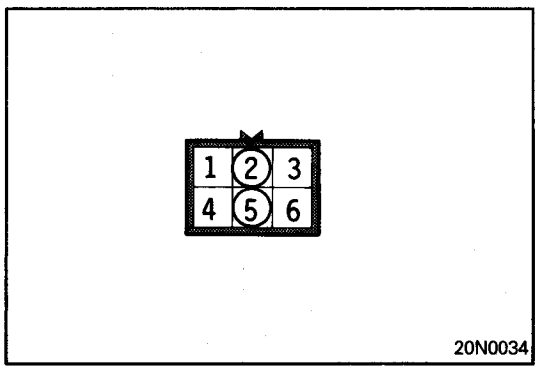
(1) If a leak is detected at section A, replace the high pressure relief valve. The valve can be used unless there is a leak from that section.
(2) If a leak is detected at section B, retighten the valve. If the leak still persists after retightening the valve, replace the packing.



THERMOSTAT CHECK

(1) Dip the thermostat in engine oil.
(2) Check for continuity across terminals ③ and ⑥ when the engine oil is heated.

Standard value:
Continuity at approx. 110°C (230°F) or less at A point
No continuity at approx. 155°C (311°F) or more at B point

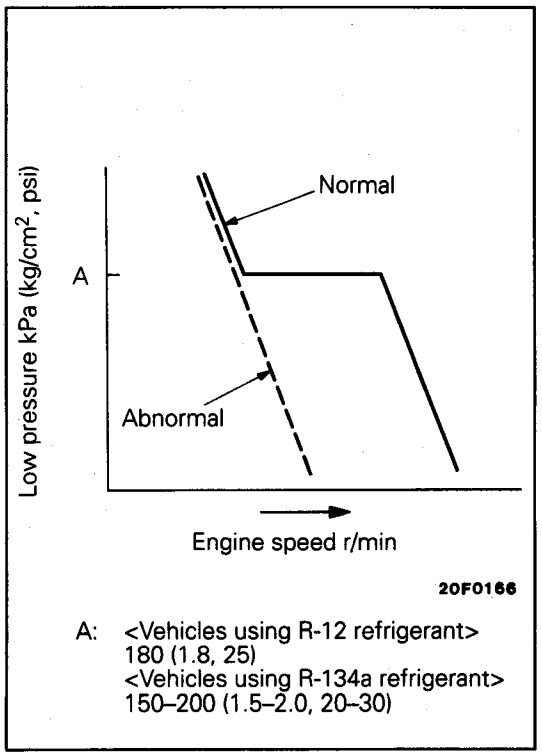


REVOLUTION PICK UP SENSOR CHECK

Measure the resistance between terminals ② and ⑤ of the connector.

Normal resistance: 405 ± 35 Ω when ambient temperature is 20°C (68°F)

If the measurement deviates greatly from the above resistance, replace the revolution pick up sensor assembly.

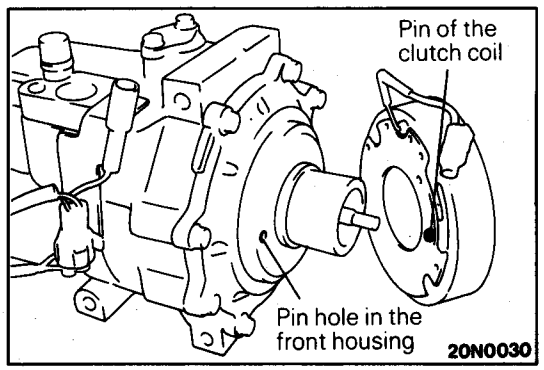


A: <Vehicles using R-12 refrigerant>
180 (1.8, 25)
<Vehicles using R-134a refrigerant>
150–200 (1.5–2.0, 20–30)

CONTROL VALVE CHECK

The control valve detects a low pressure level during the operation of the air conditioner, and adjusts the amount of refrigerant to be bypassed.

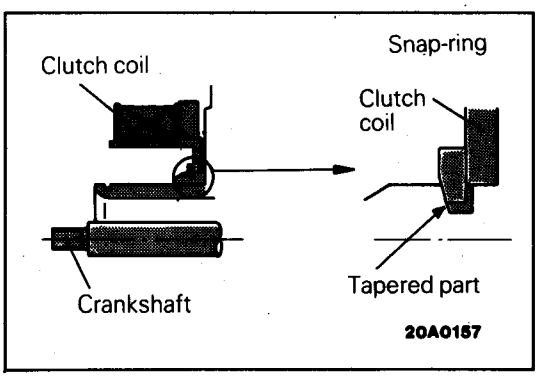
(1) Operate the air conditioner under a high temperature load condition (when vehicle interior temperature is high).
(2) Connect a low pressure gauge to the air compressor.
(3) Operate the air conditioner with the engine running at idle.
(4) Gradually increase the engine speed while observing the low pressure gauge.
If the valve is normal, the low pressure drops slowly as the engine speed increases until a pressure of 180 kPa (1.8 kg/cm², 25 psi): R-12; 150–200 kPa (1.5–2.0 kg/cm², 20–30 psi): R-134a is reached, at which point the pressure temporarily ceases to drop. Then, the pressure again starts dropping as the engine speed further increases.
If the valve is abnormal, the low pressure drops in direct proportion to the increase in engine speed without a temporarily leveling off at the 180 kPa (1.8 kg/cm², 25 psi): R-12; 150–200 kPa (1.5–2.0 kg/cm², 20–30 psi): R-134a pressure level. If the low pressure drops like this, replace the control valve.



SERVICE POINTS OF REASSEMBLY E55LEAI

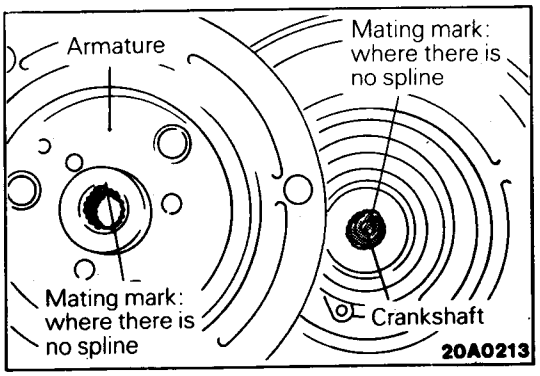
8. INSTALLATION OF CLUTCH COIL

Align the pin of the clutch coil with the pin hole in the front housing, and then fit it into the hole.



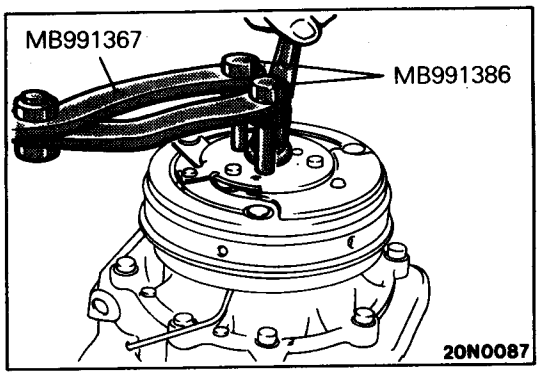
7. INSTALLATION OF SNAP RING

Install the snap ring so that the tapered surface is at the outer side.



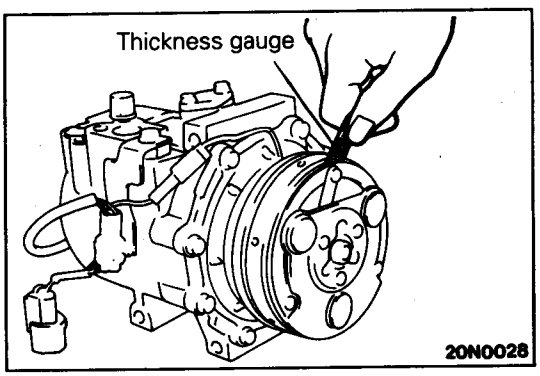
4. INSTALLATION OF ARMATURE PLATE

Align the mating mark of the crankshaft spline and the mating mark of the armature plate, and then fit them together.



3. INSTALLATION OF NUT

(1) Use the special tool to tighten the nut.



(2) Check whether or not the air gap of the clutch is within the standard value.

Standard value: 0.4 – 0.6 mm (0.01 – 0.02 in.)

NOTE
If there is a deviation of the air gap from the standard value, make the necessary adjustment by adjusting the number of shims.

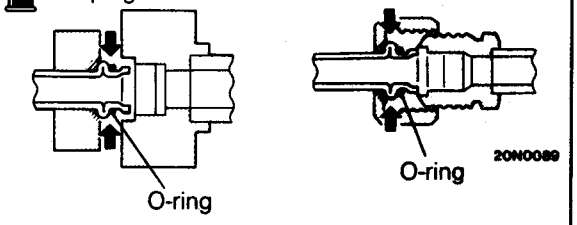
CONDENSER AND CONDENSER FAN MOTOR

E55NA--

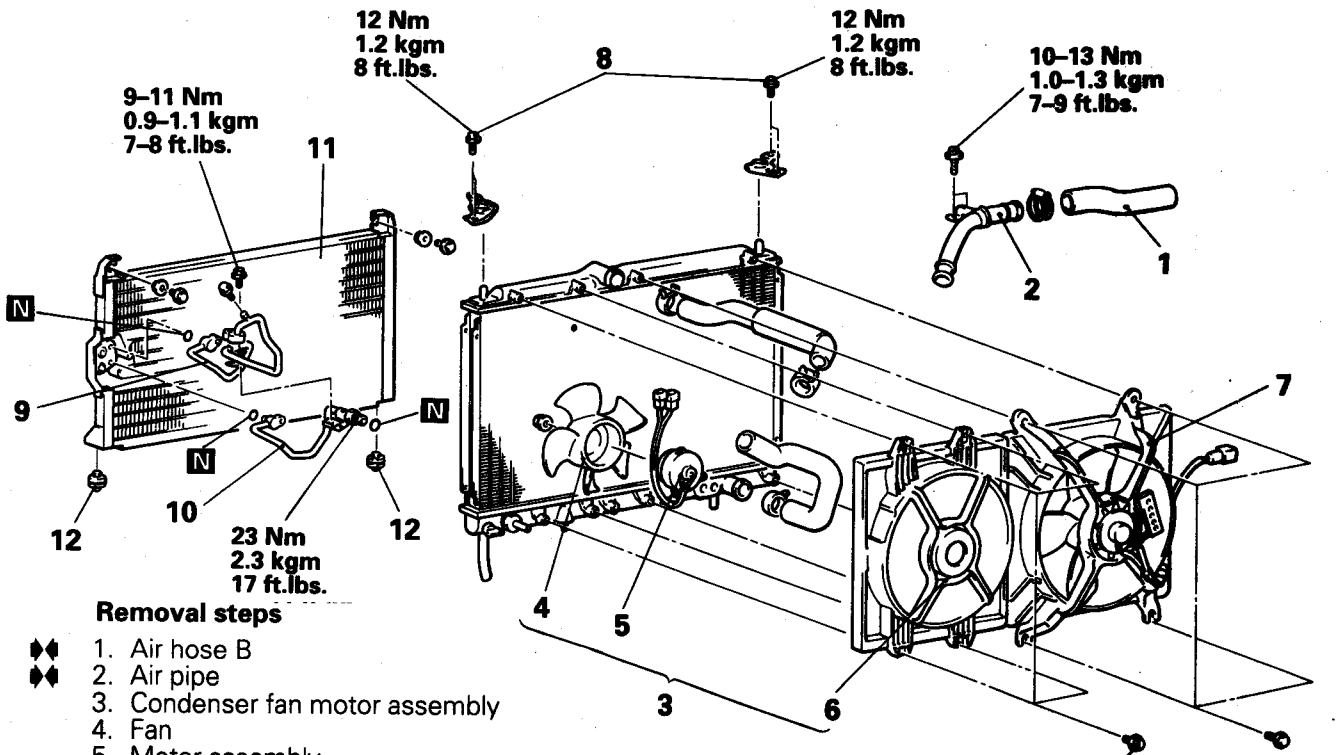
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Discharge and Charging of the Refrigerant (Refer to P.55-24, 29.)
- Removal and Installation of the Alternator (Refer to GROUP 16 – Alternator.)

: Piping connection

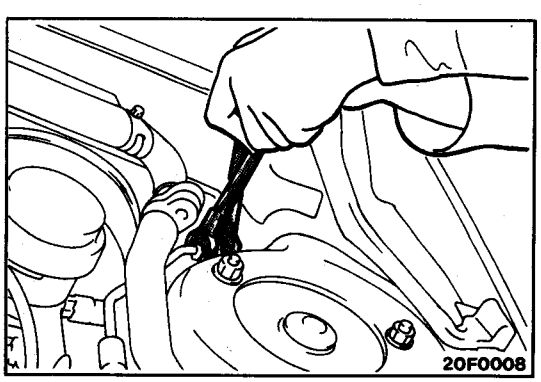


Compressor oil:
<Vehicles using R-12 refrigerant> Freol S-83 or Suniso 5GS
<Vehicles using R-134a refrigerant> SUN PAG 56



Removal steps

1. Air hose B
2. Air pipe
3. Condenser fan motor assembly
4. Fan
5. Motor assembly
6. Shroud
7. Radiator fan motor assembly (Refer to GROUP 14 – Radiator.)
8. Insulator installation bolts
9. Liquid pipe A
10. Discharge pipe
11. Condenser
12. Bushings

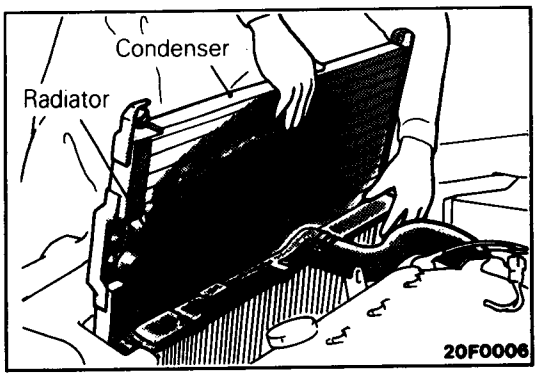


SERVICE POINTS OF REMOVAL

E55NBAT

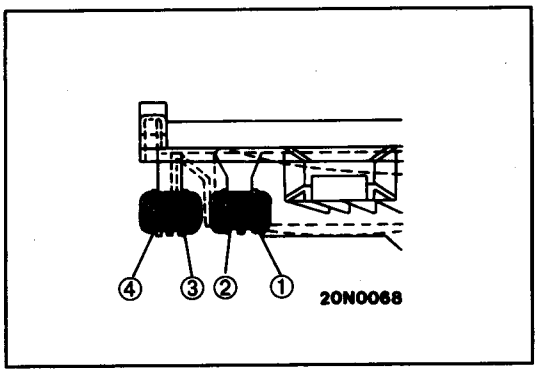
9. REMOVAL OF LIQUID PIPE A /10. DISCHARGE PIPE

(1) Loosen the flare nut by using two wrenches.
(2) Plug the disconnected hose and pipes and the openings of the condenser in order to prevent dust, dirt and other foreign material from entering.



11. REMOVAL OF CONDENSER

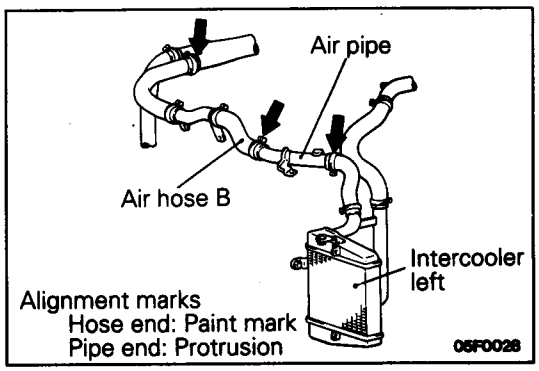
Move the radiator toward the engine, and then remove the condenser upward.



INSPECTION E55NAKA

CONDENSER FAN MOTOR CHECK

(1) Apply battery voltage to terminal ③ and ground terminal ④; at this time, check that the condenser fan motor turns.
(2) Apply battery voltage to terminal ① and ground terminal ②; at this time, check that the condenser fan motor turns.



SERVICE POINTS OF INSTALLATION E55NDAI

11. INSTALLATION OF CONDENSER

When replacing the codenser, fill it with the specified amout of the compressor oil and install it.

Compressor oil:
<Vehicles using R-12 refrigerant>
Freol S-83 or SUNISO 5GS
<Vehicles using R-134a refrigerant>
SUN PAG 56
Quantity: 15cm^3 (0.92 cu. in.)

2. INSTALLATION OF AIR PIPE / 1. AIR HOSE B

When installing the air hoses, make sure that the alignment marks at places indicated by arrows are properly aligned. Insert each air hose until it hits the root of step or it bottoms.

Caution
Be careful not to allow any foreign matter to get into the hoses, pipes, or the intercooler itself.

REFRIGERANT LINE

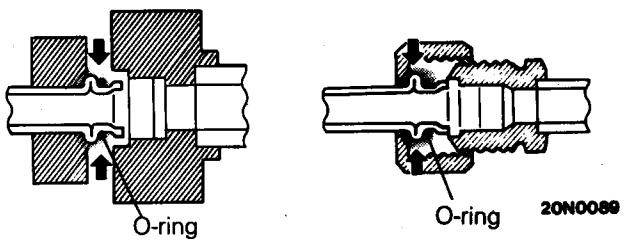
E55ZE--

REMOVAL AND INSTALLATION

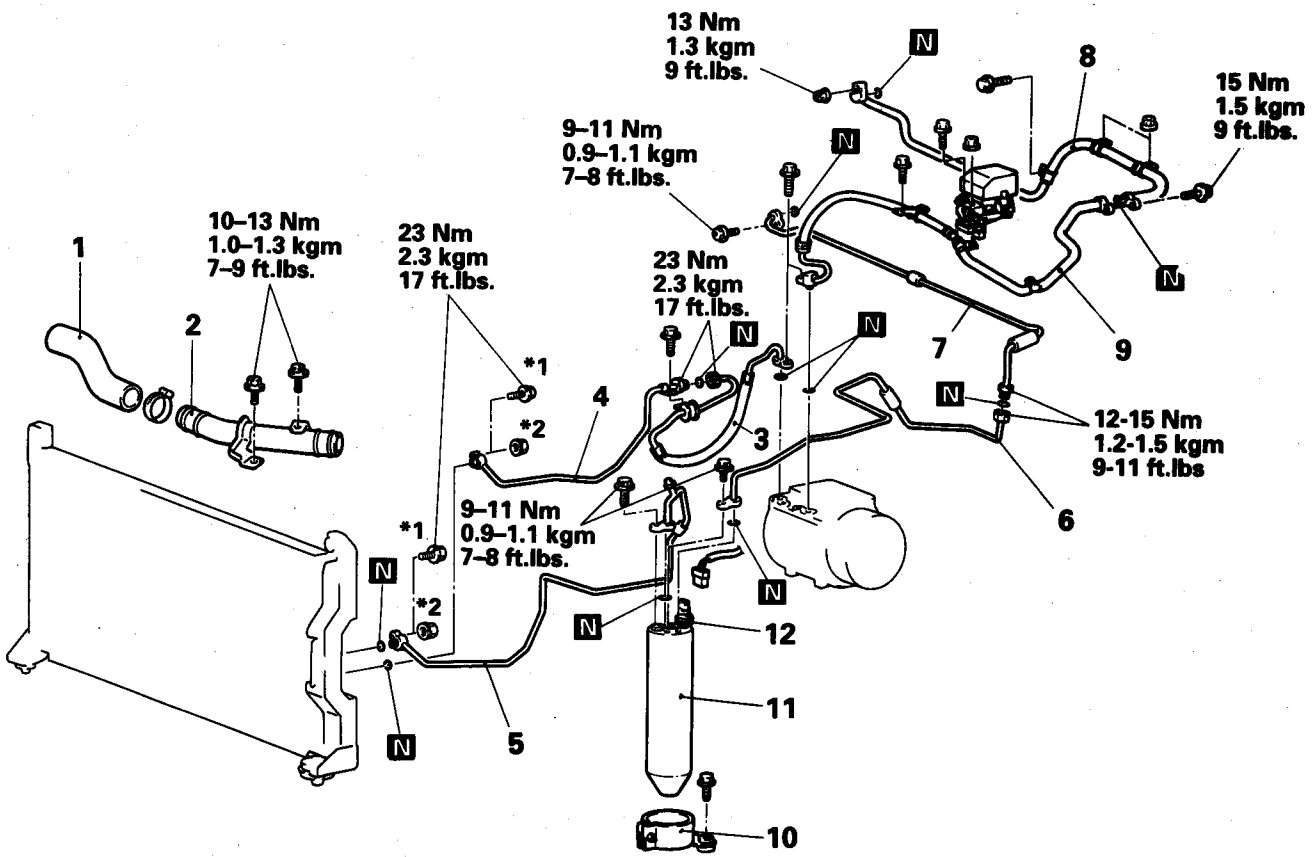
<L.H. drive vehicles>

Pre-removal and Post-installation Operation
- Discharge and Charging of Refrigerant (Refer to P.55-24, 29)

: Piping connection



Compressor oil: <Vehicles using R-12 refrigerant> Freol S-83 or Suniso 5GS
<Vehicles using R-134a refrigerant> SUN PAG 56



Removal steps

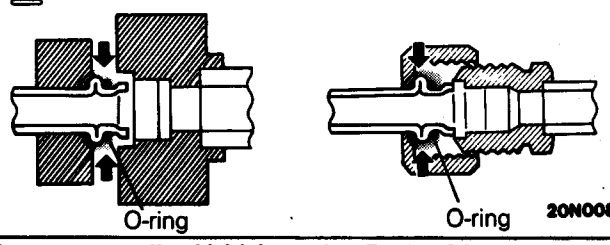
- 1. Air hose B
- 2. Air pipe
- 3. Discharge hose
- 4. Discharge pipe
- 5. Liquid pipe A
- 6. Liquid pipe B
- 7. Liquid pipe C
- 8. Suction hose B
- 9. Suction hose A
- 10. Receiver bracket
- 11. Receiver
- 12. Dual-pressure switch

NOTE
*1: Vehicles buit up to Jauuary, 1993.
*2: Vehicles buit from February, 1993.

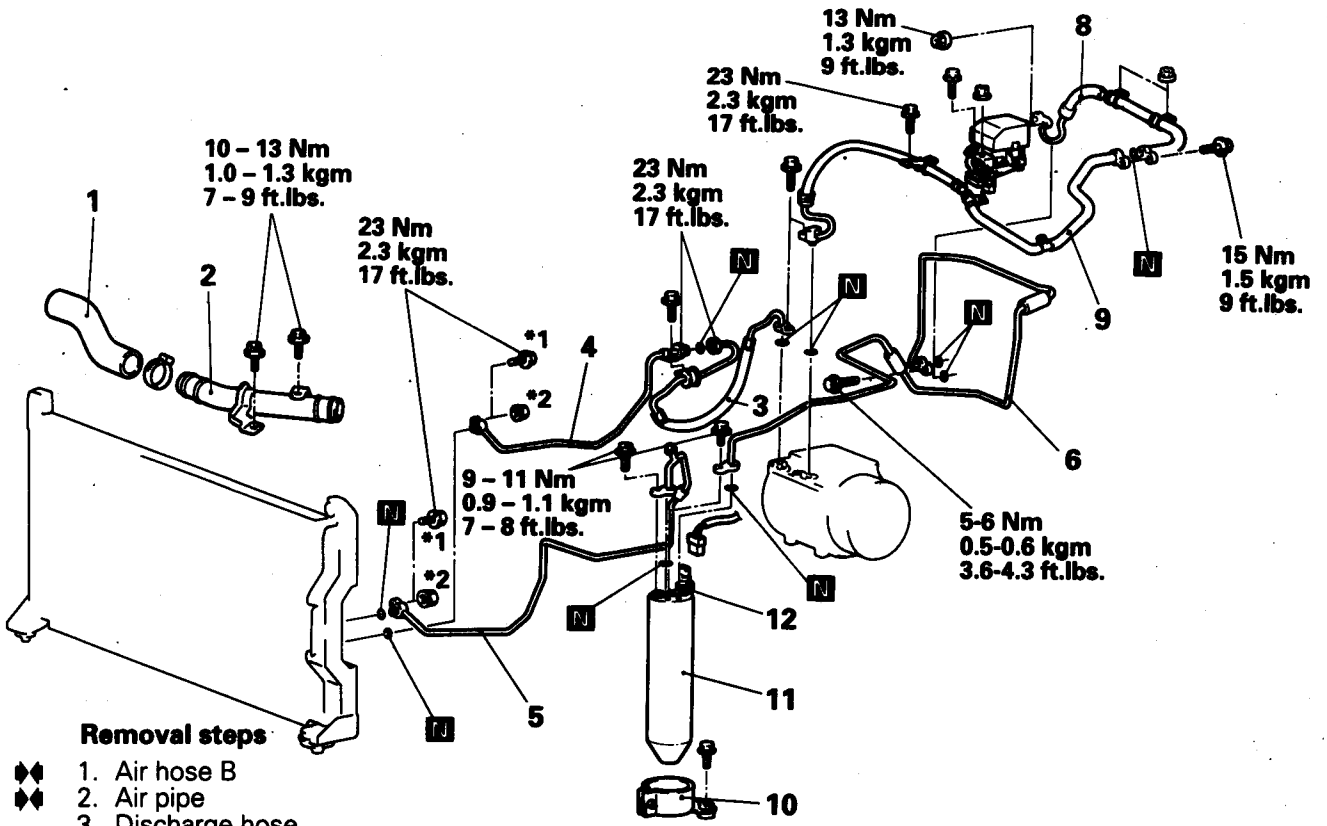
<R.H. drive vehicles>

Pre-removal and Post-installation Operation
- Discharge and Charging of Refrigerant (Refer to P.55-24, 29.)

: Piping connection

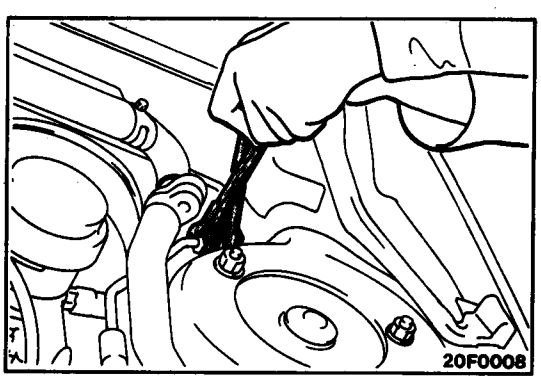


Compressor oil: <Vehicles using R-12 refrigerant>
Freol S-83 or Suniso 5GS
<Vehicles using R-134a refrigerant>
SUN PAG 56



Removal steps
- ◆◆ 1. Air hose B
- ◆◆ 2. Air pipe
- ◆◆ 3. Discharge hose
- ◆◆ 4. Discharge pipe
- 5. Liquid pipe A
- ◆◆ 6. Liquid pipe B
- ◆◆ 8. Suction hose B
- ◆◆ 9. Suction hose A
- 10. Receiver bracket
- ◆◆ 11. Receiver
- 12. Dual-pressure switch

NOTE
*1: Vehicles buit up to Jauuary, 1993.
*2: Vehicles buit from February, 1993.



SERVICE POINTS OF REMOVAL E55ZIAA

3. REMOVAL OF DISCHARGE HOSE / 4. DISCHARGE PIPE

Loosen the flare nut by using two wrenches.

INSPECTION E55ZFAC

CHECKING DUAL PRESSURE SWITCH

Refer to P.55-21.

SERVICE POINTS OF INSTALLATION

11. INSTALLATION OF RECEIVER/9. 8. SUCTION HOSE

When replacing either a suction hose or a receiver, fill each of these with the specified volume of the compressor oil and install them.

Compressor oil:
<Vehicles using R-12 refeigernat> Freol S-83 or Sumiso 5GS
<Vehicles using R-134a refrigerant> SUN PAG 56

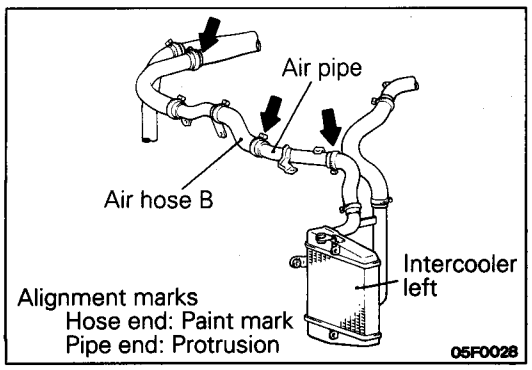
Quantity:

Suction hose	**10 cm^3 (0.61 cu.in.)**
Receiver	**10 cm^3 (0.61 cu.in.)**

6. INSTALLATION OF LIQUID PIPE B

First, install the receiver side of the liquid pipe B.

NOTE



2. INSTALLATION OF AIR PIPE / 1. AIR HOSE B

When installing the air hoses, make sure that the alignment marks at places indicated by arrows are properly aligned. Insert each air hose until it hits the root of step or it bottoms.

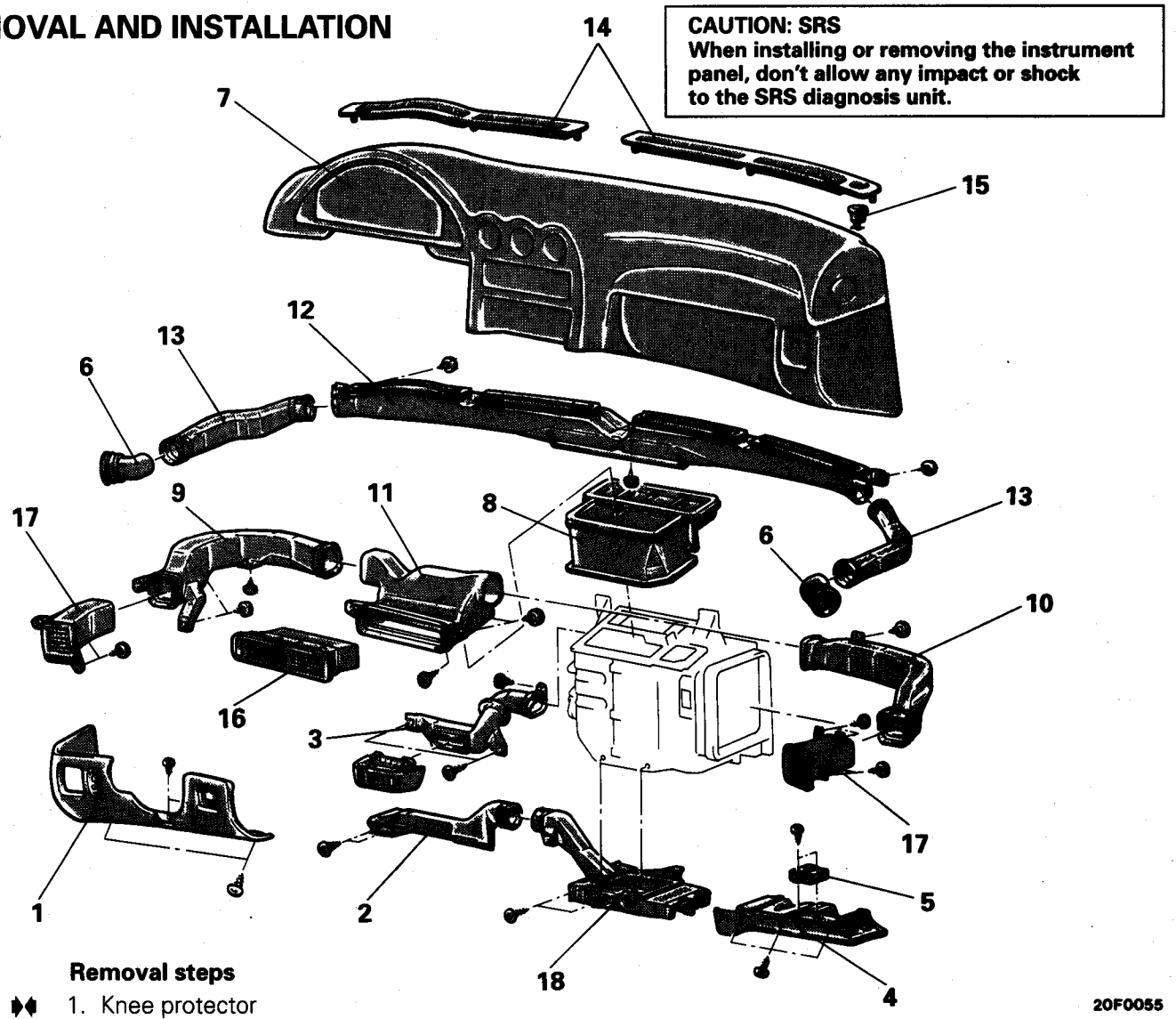
Caution
Be careful not to allow any foreign matter to get into the hoses, pipes, or the intercooler itself.

VENTILATORS (INSTRUMENT PANEL)

E55MA--

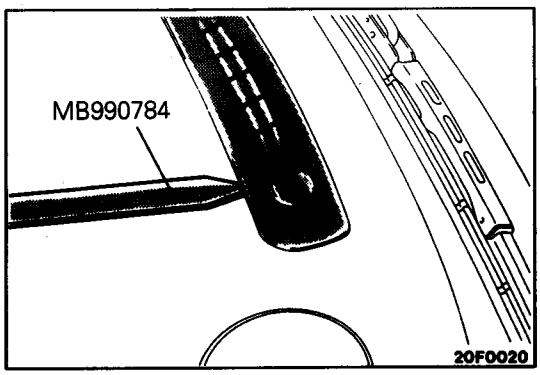
REMOVAL AND INSTALLATION

CAUTION: SRS
When installing or removing the instrument panel, don't allow any impact or shock to the SRS diagnosis unit.



Removal steps

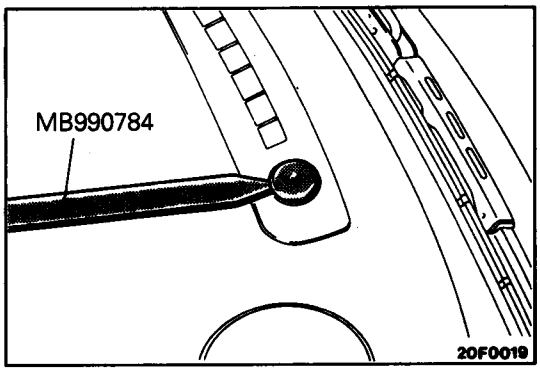
- ◆◆ ◆◆ 1. Knee protector (Refer to GROUP 52A – Instrument Panel.)
- 2. Foot shower duct
- 3. Lap cooler duct
- 4. Under cover
- 5. Belt lock controller
- 6. Side defroster hoses A
- ◆◆ ◆◆ 7. Instrument panel (Refer to GROUP 52A – Instrumental Panel.)
- 8. Center duct
- 9. Air duct (LH)
- 10. Air duct (RH)
- 11. Distribution duct (center)
- 12. Defroster duct
- 13. Side defroster hoses B
- ◆◆ 14. Defroster garnishes
- ◆◆ 15. Photo sensor
- ◆◆ 16. Center air outlet assembly
- 17. Side air outlet assembly
- 18. Distribution duct (foot)



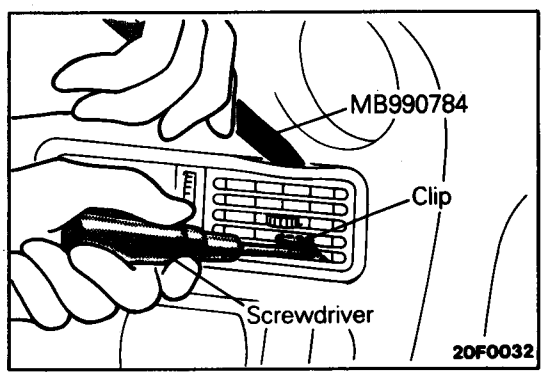
SERVICE POINTS OF REMOVAL

E55MBAQ

14. REMOVAL OF DEFROSTER GARNISHES



15. REMOVAL OF PHOTO SENSOR



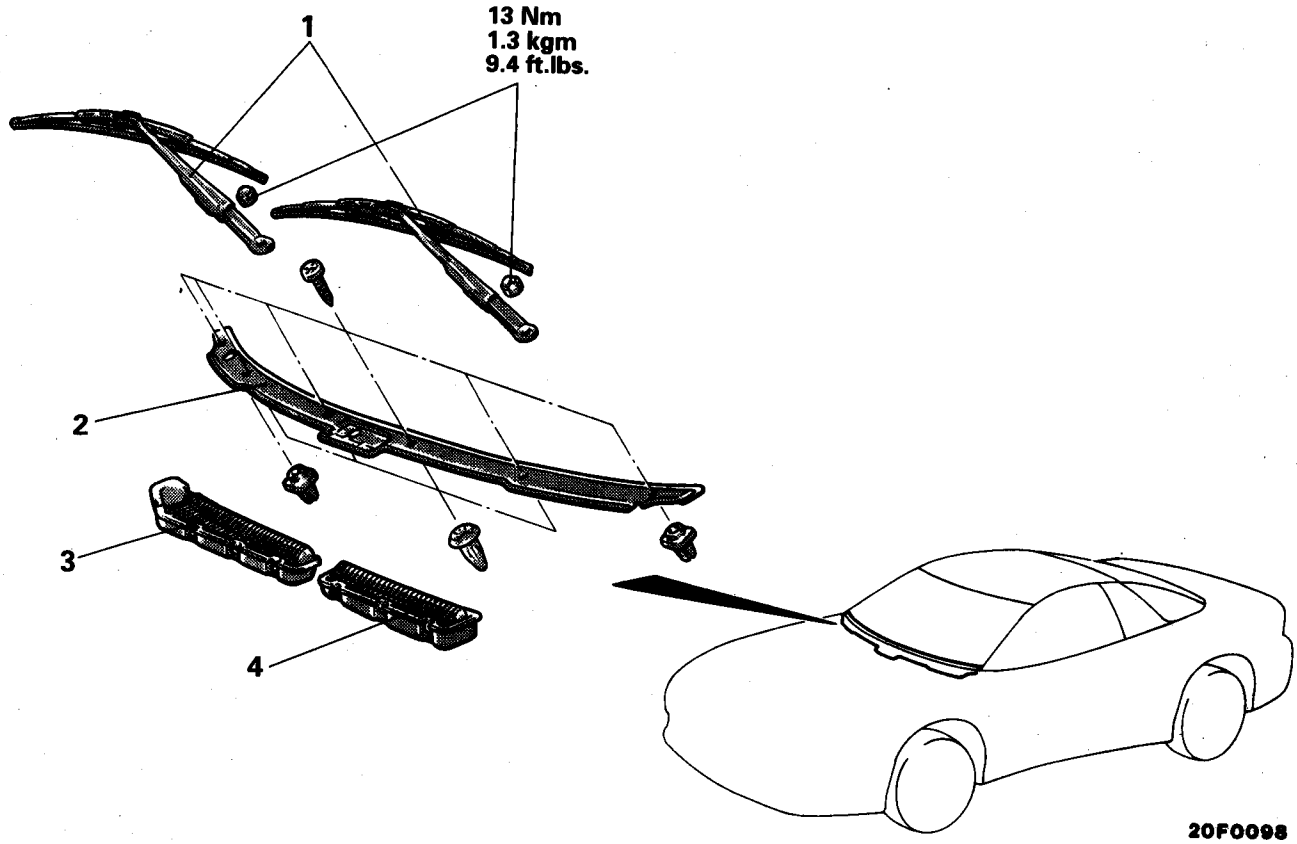
16. REMOVAL OF CENTER AIR OUTLET ASSEMBLY

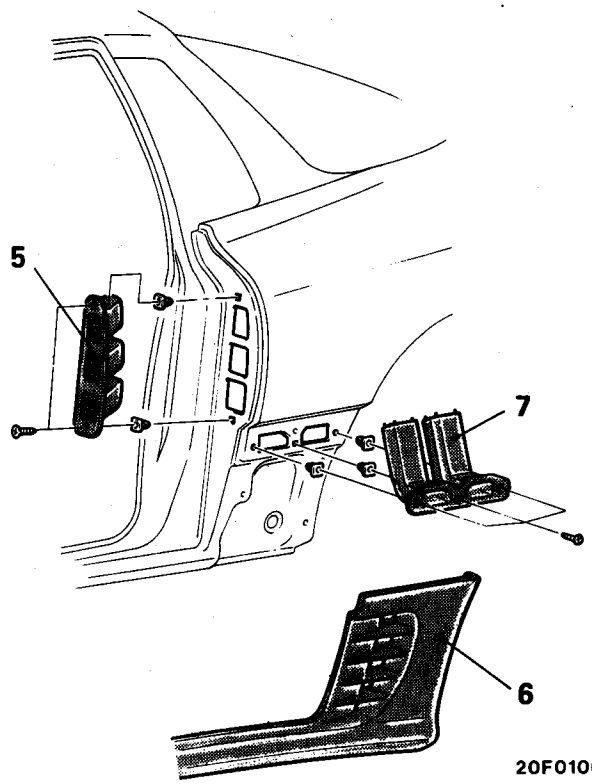
Disengaging the clips (2 positions) of the center air-outlet assembly with a flat tip screwdriver, remove the center air outlet assembly with the special tool.

VENTILATORS (AIR INLET AND AIR OUTLET)

E55MA-B

REMOVAL AND INSTALLATION





Inlet garnishes removal steps

1. Windshield wiper arm
2. Front deck garnish
3. Inlet garnish (RH)
4. Inlet garnish (LH)

Rear ventilation duct removal steps

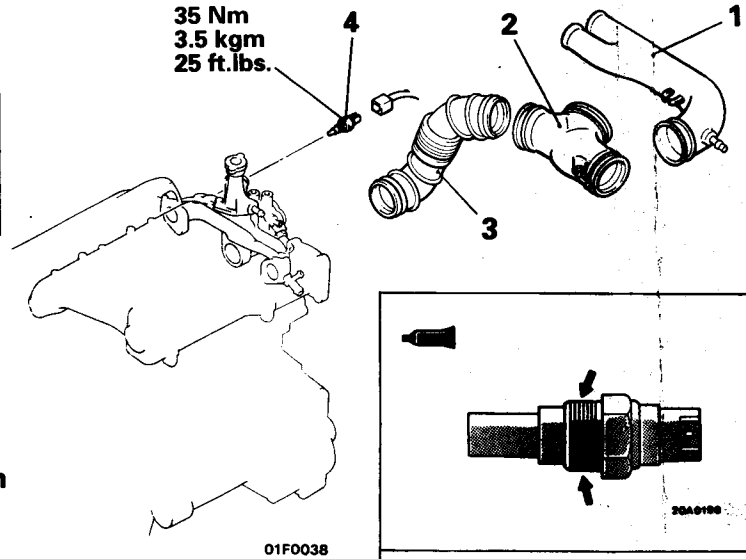
5. Rear ventilation duct A
6. Side air dam (side sill) (Refer to GROUP 51 – Aero Parts.)
7. Rear ventilation duct B

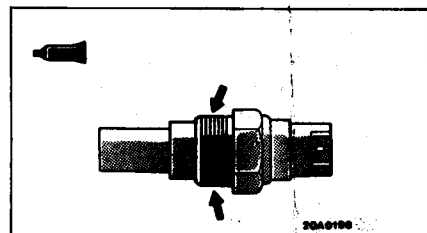
ENGINE COOLANT TEMPERATURE SWITCH

E55HA--

REMOVAL AND INSTALLATION

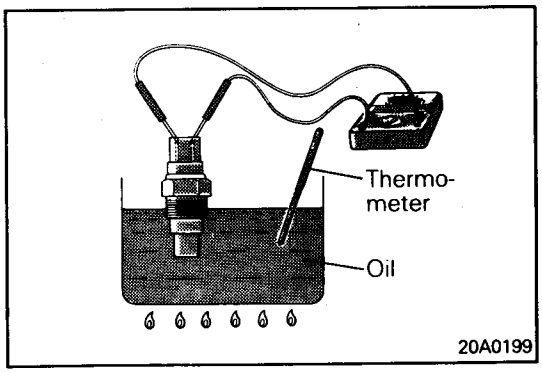
Pre-removal and Post-installation Operation
- Draining and Refilling of Engine Coolant (Refer to GROUP 14 – Service Adjustment Procedures.)





Sealant: 3M Nut Locking Part No. 4171 or equivalent

Engine coolant temperature switch removal steps
1. Air hose A
2. Air intake hose A
3. Air intake hose B
4. Engine coolant temperature switch



INSPECTION

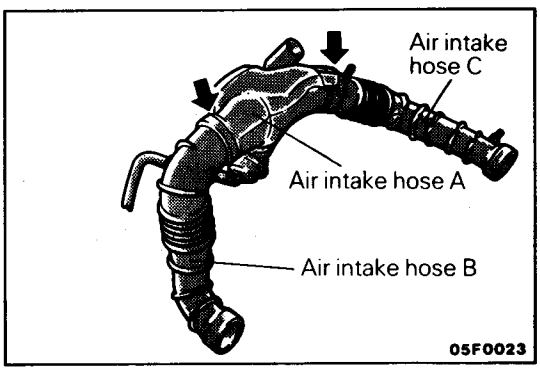
E55HCAW

ENGINE COOLANT TEMPERATURE SWITCH (ALWAYS-CLOSED TYPE CHECK)

(1) Immerse the engine coolant temperature switch in oil and heat by a gas stove or similar method so as to increase the oil temperature.
(2) Check to be sure that the engine coolant temperature switch is switched OFF when the oil temperature reaches the standard value.

Standard value: 112 – 118°C (233 – 244°F)

Caution
Use engine oil for this test; stir it well while heating, and do not heat more than necessary.



SERVICE POINTS OF INSTALLATION

E55HDAG

3. INSTALLATION OF AIR INTAKE HOSE B / 2. AIR INTAKE HOSE A

Align the cutouts in air intake hose A indicated by arrows with the △ markings on air intake hoses B and C and insert hoses B and C all the way into hose A.
Insert the other end of air intake hose B all the way into turbocharger side.