

# MONTERO

Service  
Manual  
1984









# Service Manual

# MONTERO

## 1984

### FOREWORD

This Service Manual has been prepared with the latest service information available at the time of publication. It is subdivided into various group categories and each section contains diagnosis, disassembly, repair, and installation procedures along with complete specifications and tightening references. Use of this manual will aid in properly performing any servicing necessary to maintain or restore the high levels of performance and reliability designed into these outstanding vehicles.

**WE SUPPORT  
VOLUNTARY TECHNICIAN  
CERTIFICATION  
THROUGH**



Mitsubishi Motors Corporation reserves the right to make changes in design or to make additions to or improvements in its products without imposing any obligations upon itself to install them on its products previously manufactured.

### GROUP INDEX

—	Introduction .....
0	Lubrication and Maintenance .....
2	Front Suspension .....
3	Rear Axle .....
5	Brakes — Service and Parking .....
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8	Electrical System .....
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**Alphabetical Index**





## INTRODUCTION

This publication contains the essential removal, installation, adjustment and maintenance procedures for servicing all Body Styles. This information is current as of time of publication.

## INDEX

The preceding page contains a table of contents which lists the group number, group title and symbol of each group. The symbol is also located at the left or right top of each page.

## GROUP INDEX

The first page in each group has an index to the subjects included in that group.

## PAGE NUMBERS

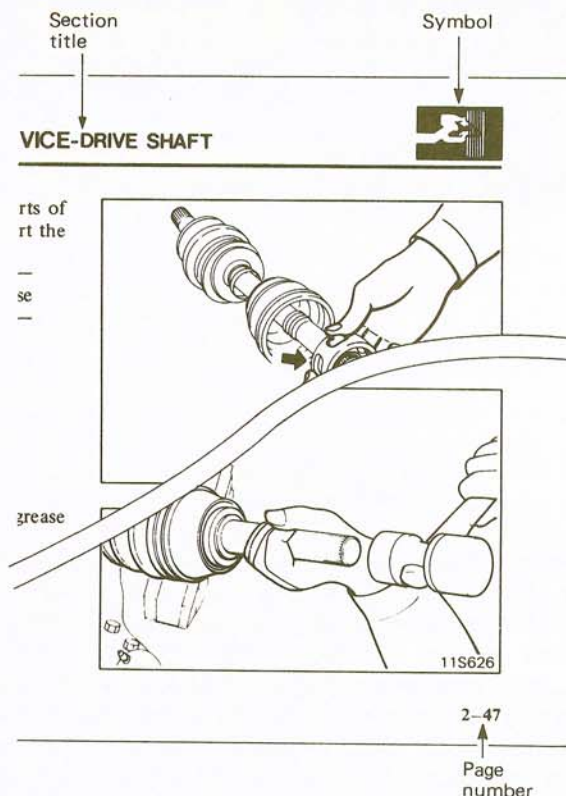
All page numbers consist of two sets of digits separated by a dash. The digits preceding the dash identify the number of the group. The digits following the dash represent the consecutive page number within the group. The page numbers can be found on the lower left or right of each page.

## TEXT

1. This manual contains essential procedures for removal, disassembly, inspection, reassembly and installation. For reassembly and installation, reverse the order of disassembly and removal procedures respectively, paying attention to the key points.
2. Unless otherwise specified, each service procedure covers all models. Procedures covering specific models are identified by the model codes, destination or similar designation. A description of these designations is covered in this unit under "VEHICLE IDENTIFICATION".

## ILLUSTRATIONS

Illustrations are placed abreast the text. If two or more texts are paired with one illustration, the illustration number at lower right corner of the illustration is given in ( ) at the end of the more pertinent text for reference.



## DEFINITION OF TERMS

### Standard Dimensions or Values

Design dimensions or values or finished dimensions after adjustment of part.

### Service Limit

The allowable limitation of wear, bends, deformation or other damage which restricts the use of parts due to poor performance or insufficient strength.

### Repair Limit

The limitation of wear, deterioration or functional decline of parts at which correction or adjustment is required to maintain their performance in use.

## SPECIAL TOOLS

Some of the special tools which appear in this Manual are either not available in the United States, or have been modified or replaced. If the tool pictured on the "Special Tools" page at the beginning of each section has an "\*", it has been modified or replaced. Refer to the Mitsubishi Motors special tool catalog, MSSP-3G-TC, check the numerical index and refer to the indicated page number for illustration, description and application. If it is not listed in the numerical index, refer to the replacement/interchange list for an illustration and description of the new tool.

If the pictured tool has a "D", it has been deleted, and is not available in the U.S.

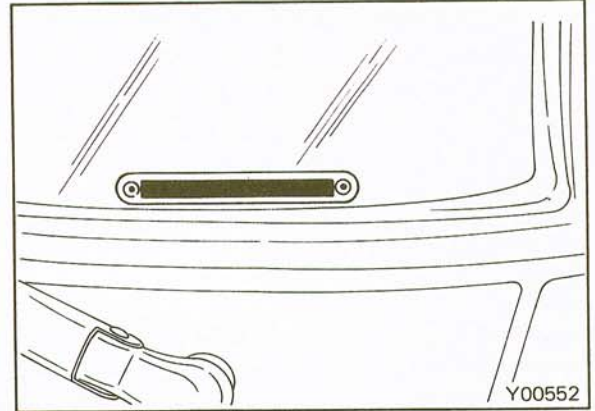


## VEHICLE IDENTIFICATION



### VEHICLE IDENTIFICATION NUMBER PLATE LOCATION

The vehicle identification number (V.I.N.) plate is located on the left top side of the instrument panel and it is visible through the windshield.



### VEHICLE IDENTIFICATION NUMBER CODE CHART

All vehicle identification numbers contain 17 digits. The vehicle number is a code which tells country, make, vehicle type, line, etc.



1st digit	2nd digit	3rd digit	4th digit	5th digit	6th digit	7th digit	8th digit	9th digit	10th digit	11th digit	12th digit	13th thru 17th digit
Country	Make	Vehicle type		Line	Series	Body	Engine	Check digit	Model year	Plant	Transmission	Serial number
J- Japan	A- Mitsubishi	4- Multi- purpose vehicle (MPV)	F- 4001 lbs. or more with hydraulic brakes	J- MONTERO	4- High 5- Premium	2- 2-door canvas- top 3- 2-door metal- top	E- 2.6 liters (155.9 C.I.D.)	0 1 2 3 . . . 9 X	E- 1984 year	Y- Nagoya	4- 5-speed 49 states 5- 5-speed California* 7-A/T 49 states 8-A/T California*	00001 to 99999

**NOTE** Digit in position 9 is used for V.I.N. verification.

\*Can also be sold in Federal States.





## VEHICLE IDENTIFICATION

### VEHICLE IDENTIFICATION NUMBER LIST

V. I. N. (except serial number)	Brand (Package)	Destination	Engine displacement	Model code
JA4FJ42E□EY4 JA4FJ42E□EY5 JA4FJ52E□EY4 JA4FJ52E□EY5 JA4FJ43E□EY4 JA4FJ43E□EY5 JA4FJ43E□EY7 JA4FJ43E□EY8 JA4FJ53E□EY4 JA4FJ53E□EY5 JA4FJ53E□EY7 JA4FJ53E□EY8	MONTERO	Federal California*  Federal California*  Federal California*  Federal California*  Federal California*	2.555 liters (155.9 C. I. D.)	L042GNJLF L042GNJLH  L042GNULF L042GNULH  L042GVNJLF L042GVNJLH  L042GVKJLF L042GVKJLH  L042GVNULF L042GVNULH  L042GVKULF L042GVKULH

\*Can also be sold in Federal States.





## CHASSIS NUMBER

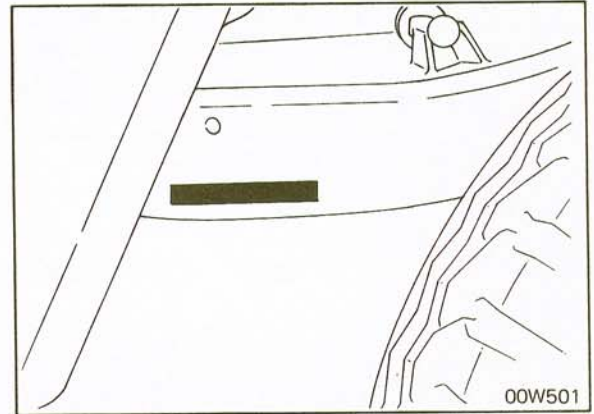
### Stamping Location

The chassis number is stamped on the side of the frame near the right rear shock absorber.

### Chassis Number Code Chart

L 0 4 2 G V D Y 4 0 0 0 0 1

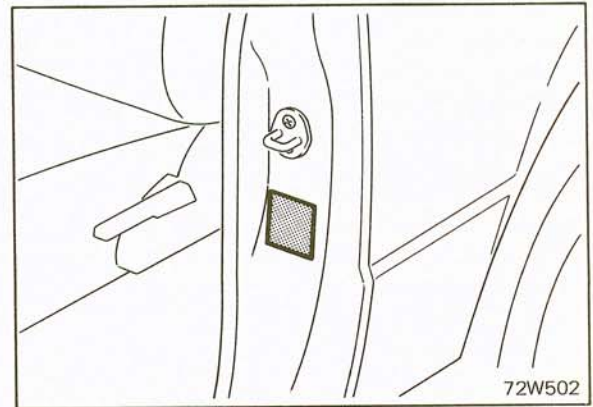
Vehicle line	Engine displacement	Body type	Refer to 10th thru 17th digits of V.I.N. plate
L04-MONTERO	2-2.555 liters (155.9 C.I.D.)	G-2-door canvas-top GV-2-door metal-top	



## VEHICLE SAFETY CERTIFICATION LABEL

The vehicle safety certification label is attached to face of left door pillar. (72W502)

This label indicates the month and year of manufacture, Gross Vehicle Weight Rating (G.V.W.R.), front and rear Gross Axle Weight Rating (G.A.W.R.), and Vehicle Identification Number (V.I.N.).



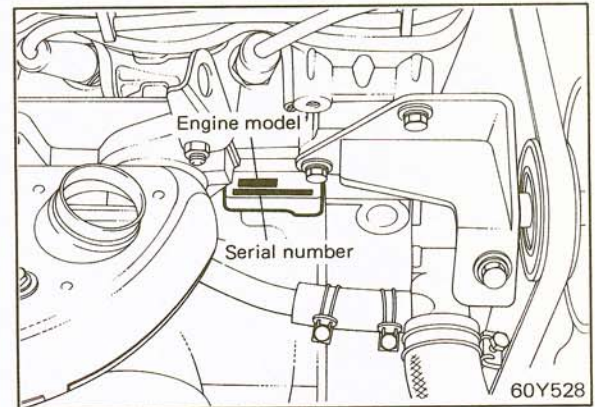
## ENGINE MODEL STAMPING

The engine model number is stamped at the right front side on the top edge of the cylinder block as shown in the following:

Engine model	Engine displacement
G54B	2.555 liters (155.9 C.I.D.)

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

Engine serial number	Number cycling
AA0201 to YY9999	AA0201 - - - -> AA9999
	AB0001 - - - -> AY9999
	BA0001 - - - -> YY9999







## VEHICLE IDENTIFICATION

### ENGINE AND TRANSMISSION MODEL

Vehicle model	Engine model	Transmission model
L042GNJLF L042GNJLH L042GNULF L042GNULH L042GVNJLF L042GVNJLH L042GVNULF L042GVNULH	G54B	KM145-O-THQ
L042GVKJLF L042GVKJLH L042GVKULF L042GVKULH	G54B	KM146

### BODY COLOR CODE

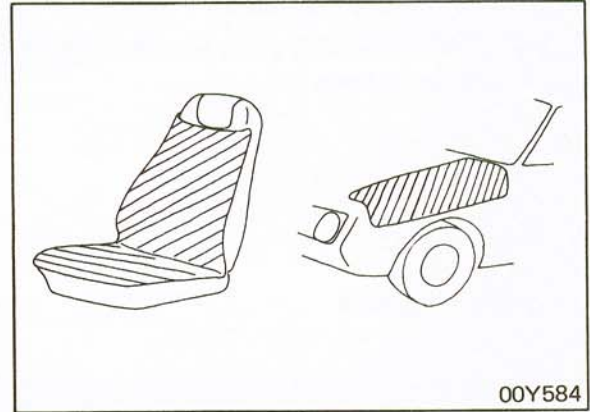
Exterior code	Body color
Two-tone	
B93B91X13	Black/Light blue (Metallic)
C38C19X13	Black/Brown (Metallic)
H74H80X13	Black/Silver (Metallic)
R79R78X13	Black/Red
W44W42X13	Black/White
X04X21H80	Velvet black/Silver (Metallic)





## PROTECTING THE VEHICLE

If there is a likelihood of damaging painted or interior parts during service operations, protect them with suitable covers (such as seat covers, etc.).



## REMOVAL AND DISASSEMBLY

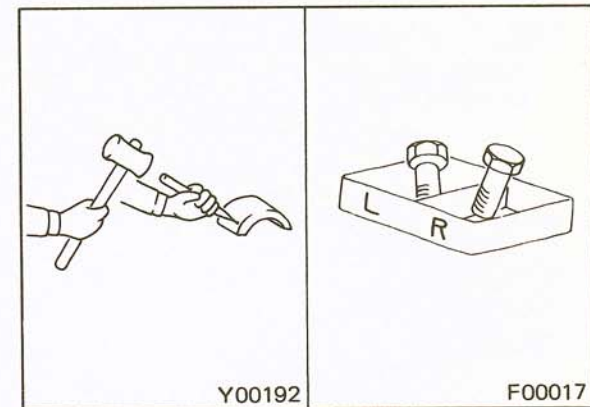
When checking a malfunction, find the cause of the problem. If it is determined that removal and/or disassembly is necessary, perform the work by following the procedures contained in this Service Manual.



If punch marks or mating marks are made to avoid error in assembly and facilitate the assembly work, be sure to make them in locations which will have no detrimental effect on performance and/or appearances.

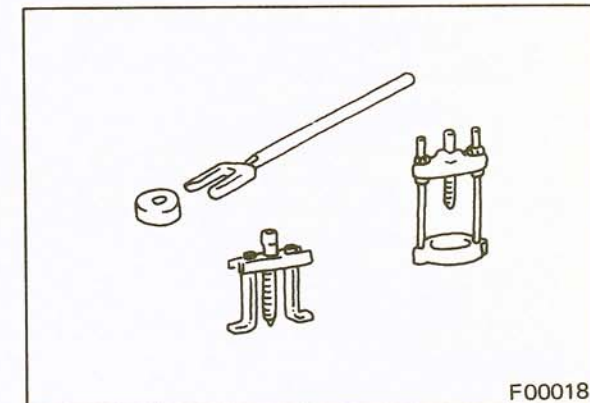
If an area having many parts, similar parts, and/or parts which are symmetrical right and left is disassembled, be sure to arrange the parts so that they do not become mixed during the assembly process.

1. Arrange the parts removed in the proper order.
2. Determine which parts are to be reused and which are to be replaced.
3. If bolts, nuts, etc., are to be replaced, be sure to use only the exact size specified.



## SPECIAL TOOLS

If other tools are substituted for the special tools to do service or repair work, there is the danger that vehicle parts might be damaged, or the mechanic might be injured; therefore, be sure to use the special tool whenever doing any work for which the use of one is specified.





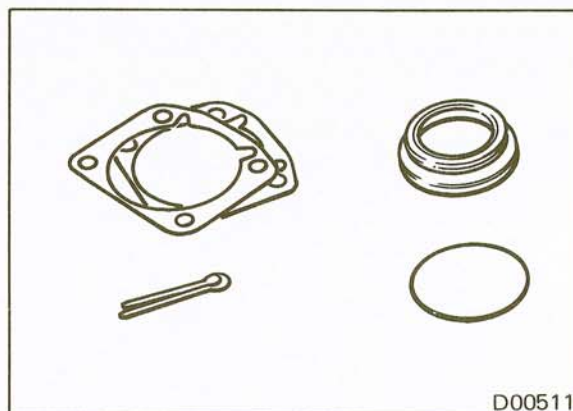


## PRECAUTIONS BEFORE SERVICE

### PARTS TO BE REPLACED

If any of the following parts are removed, they must be replaced with new parts.

1. Oil seals
2. Gaskets
3. Packings
4. O-rings
5. Lock washers
6. Cotter pins
7. Self-locking nuts



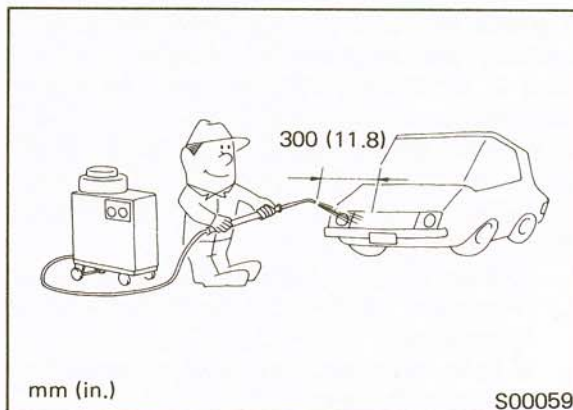
### PARTS

When replacing parts, use Mitsubishi genuine parts.



### VEHICLE WASHING

If high-pressure car-washing equipment or steam car-washing equipment is used to wash the vehicle, be sure to maintain the spray nozzle at a distance of at least 300 mm (11.8 in.) from any plastic parts and all opening parts (doors, luggage compartment, sunroof, etc.).

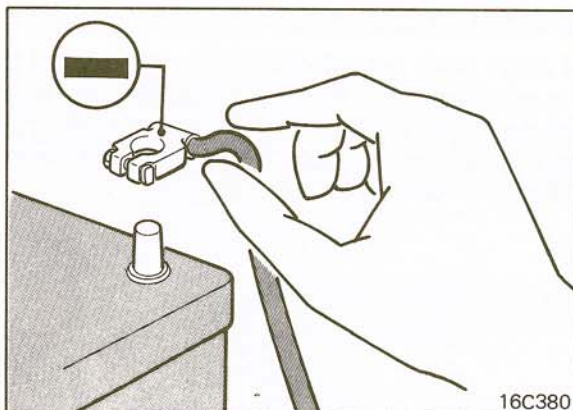


### SERVICING THE ELECTRICAL SYSTEM

When servicing the electrical system, disconnect the negative cable terminal from the battery.

#### 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 semi-conductor parts being damaged.)



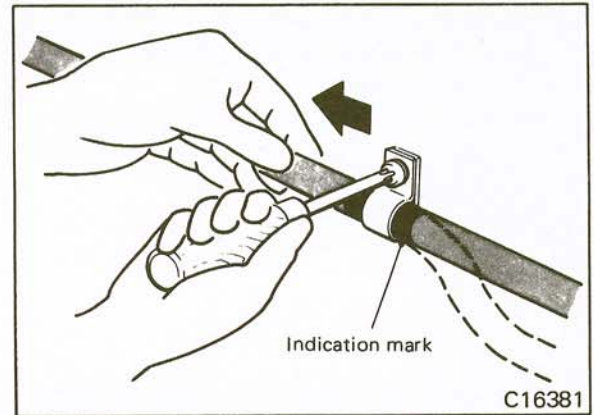




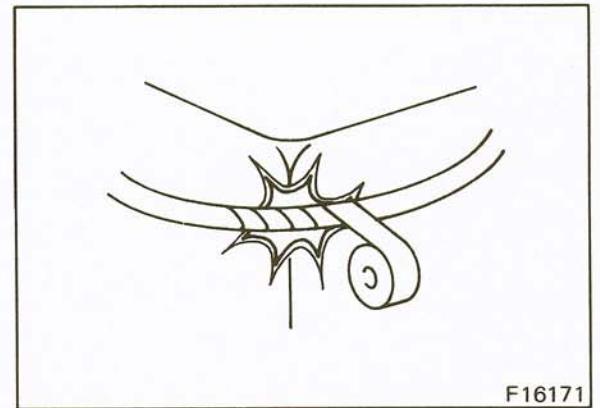
## WIRING HARNESES

1. Secure the wiring harnesses by using clamps so that there is no slack. However, for any harness which passes to the engine or other vibrating parts of the vehicle, allow some slack within a range that does not allow the engine vibrations to cause the harness to come into contact with any of the surrounding parts. Then secure the harness by using a clamp.

In addition, if a mounting indication mark (yellow tape) is on a harness, secure the indication mark in the specified location. (C16381)

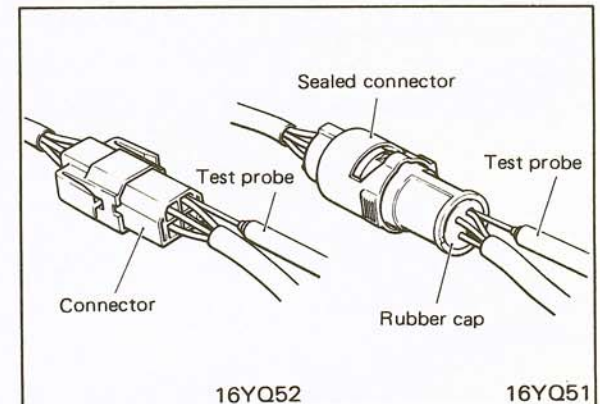


2. If any section of a wiring harness contacts the edge of a part, or a corner, wrap the section of the harness with tape or something similar in order to protect it from damage.

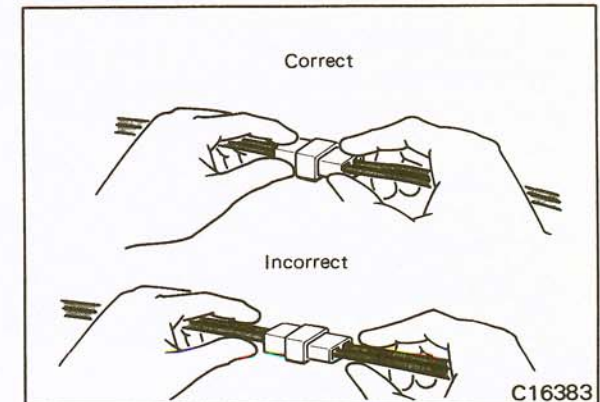


3. When using a circuit tester to perform continuity or voltage checks on connector terminals, insert the test probe from the harness side.

If the connector is a sealed connector, insert the test probe into the hole in the rubber cap for the electrical wires, being careful not to damage the wire insulation. Continue to insert the test probe until it makes contact with the terminal.



4. When disconnecting a connector, be sure to pull only the connector, not the harness.

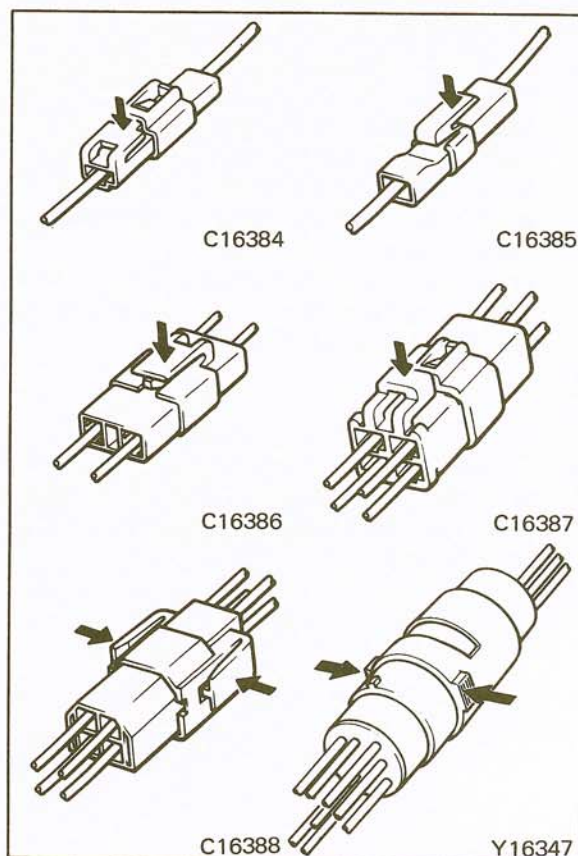




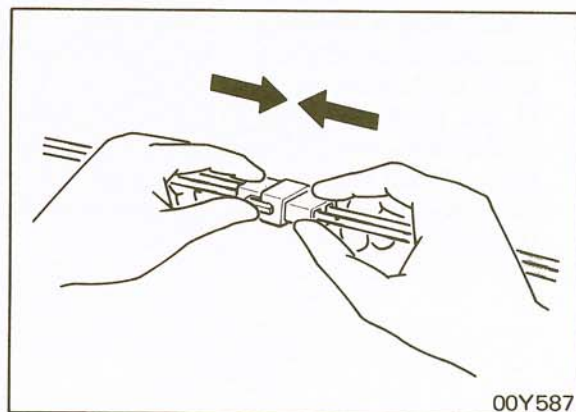


## PRECAUTIONS BEFORE SERVICE

5. Disconnect connectors which have catches by pressing in the direction indicated by the arrows in the illustration.

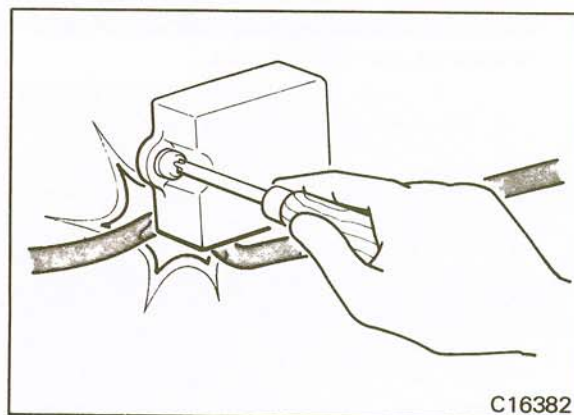


6. Connect connectors which have catches by inserting the connectors until they snap.



## ELECTRICAL COMPONENTS

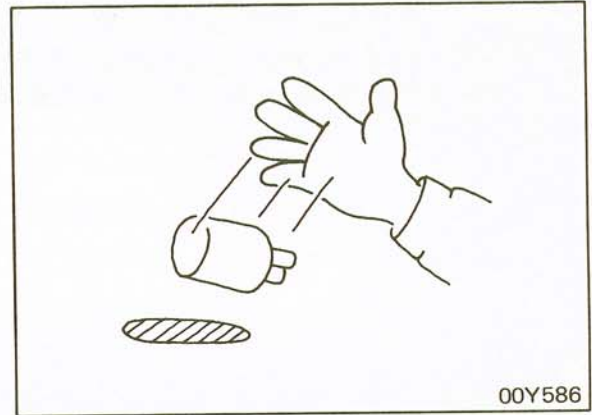
1. When installing any of the vehicle parts, be careful not to pinch or damage any of the wiring harnesses.



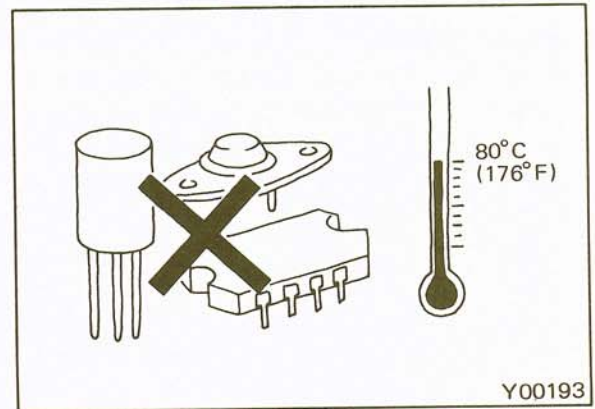




2. Sensors, relays, etc., are sensitive to strong impacts. Handle them with care so that they are not dropped or mishandled.

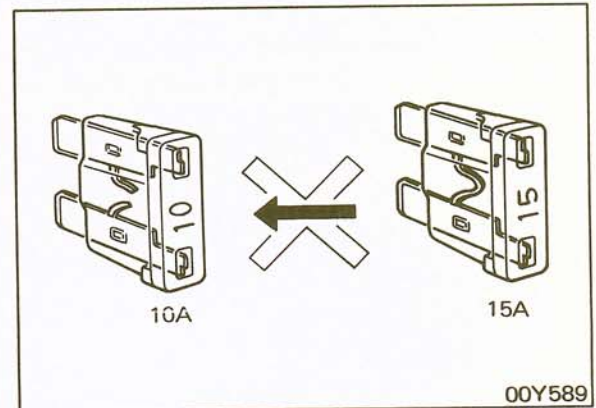


3. The electronic parts used for relays, etc., are sensitive to heat. If any service which causes a temperature of 80°C (176°F) or more is performed, remove the part or parts in question before carrying out the service.



## FUSES AND FUSIBLE LINKS

1. If a blown-out fuse is to be replaced, be sure to use only a fuse of the specified capacity. If a fuse of a capacity larger than that specified is used, parts may be damaged and the circuit may not be protected adequately.



2. If additional optional equipment is to be installed in the vehicle, follow the procedure listed in the appropriate instruction manual; however, be sure to pay careful attention to the following points:

- (1) In order to avoid overloading the wiring, take the electrical current load of the optional equipment into consideration, and determine the appropriate wire size.
- (2) Where possible, route the wiring through the existing harnesses.
- (3) If an ammeter or similar instrument is to be connected to a live-wire circuit, use tape to protect the wire, use a clamp to secure the wire, and make sure that there is no contact with any other parts.
- (4) Be sure to provide a fuse for the load circuit of the optional equipment.

Nominal size	SAE gauge No.	Permissible current	
		In engine compartment	Other areas
0.3 mm <sup>2</sup>	AWG 22	—	5A
0.5 mm <sup>2</sup>	AWG 20	7A	13A
0.85 mm <sup>2</sup>	AWG 18	9A	17A
1.25 mm <sup>2</sup>	AWG 16	12A	22A
2.0 mm <sup>2</sup>	AWG 14	16A	30A
3.0 mm <sup>2</sup>	AWG 12	21A	40A
5.0 mm <sup>2</sup>	AWG 10	31A	54A





## PRECAUTIONS BEFORE SERVICE

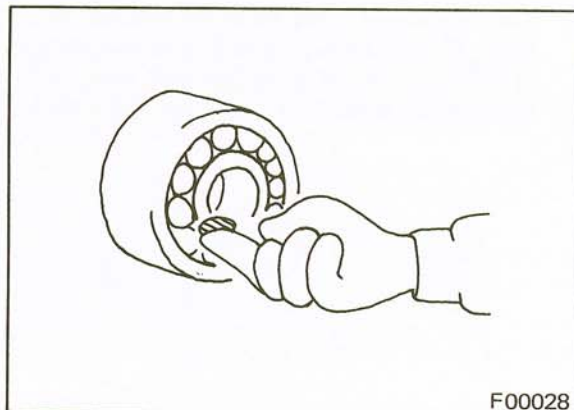
### TUBES AND OTHER RUBBER PARTS

Be careful to avoid spilling any gasoline, oil, etc., because if it adheres to any tubes or other rubber parts, they might be adversely affected.



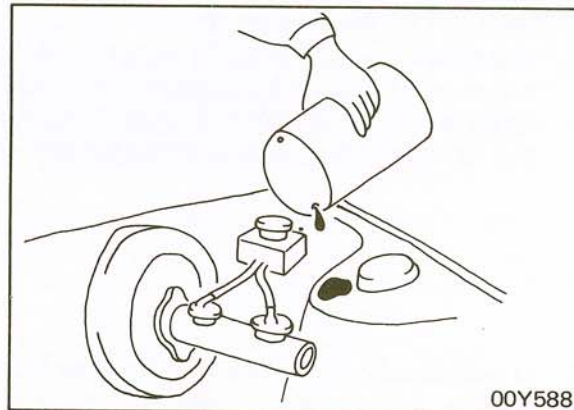
### LUBRICANTS

In accordance with the instructions in this Service Manual, apply the specified lubricants in the specified locations during assembly and installation.



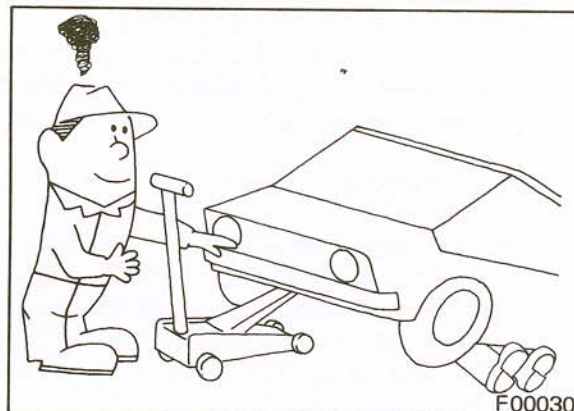
### BRAKE FLUID

Be careful to avoid spilling any brake fluid, because if it adheres to the vehicle body, the paint coat might be discolored.



### DOING SERVICE WORK IN GROUPS OF TWO OR MORE MECHANICS

If the service work is to be done by two or more mechanics working together, all the mechanics involved should take safety into consideration while they work.







## TOWING AND HOISTING

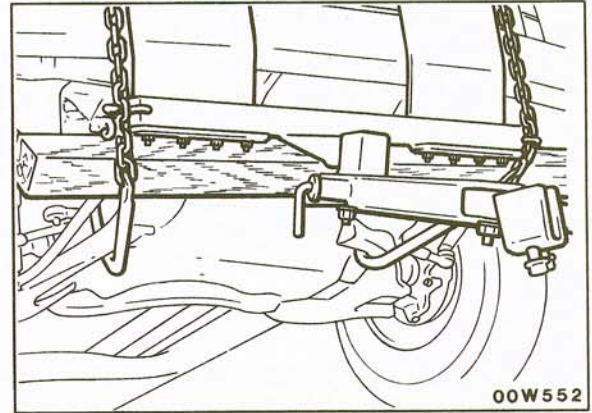
The MONTERO can only be towed from the front with conventional sling-type equipment and tow chain with grab hooks.

If a vehicle is towed from the rear, use a tow dolly.

A lumber spacer (4" x 4" x 55" wood beam) should be placed forward of under guard and under towing hook/shipping tie down hook.

Then, attach J-hook to the lower arm.

A safety chain system must be used. This system must be completely independent of the primary lifting and towing attachment. Care must be taken in the installation of safety chains to insure they do not cause damage to bumper, painted surfaces or lights.



### Lifting—Ground Clearance

Towed vehicle should be raised until wheels are a minimum of 10 cm (4 in.) from the ground. Be sure there is adequate ground clearance at the opposite end of the vehicle, especially when towing over rough terrain or when crossing sharp rises such as curbs. If necessary, ground clearance can be increased by removing the wheels from the lifted end of the disabled vehicle and carrying the lifted end closer to the ground. A 20 cm (8 in.) ground clearance must be maintained between brake drums and ground.

### Front Towing Pickup

The vehicle may be towed on its rear wheels for extended distances, provided the parking brake is released.

Make certain the transmission remains in "NEUTRAL".

### Safety Precautions

The following precautions should be taken when towing the vehicle.

1. Remove exhaust tips and any other optional equipment, that interface with the towing sling. Padding (heavy shop towel or carpeting) should be placed between the towing sling cross bar and any painted surfaces, and bumper surfaces.
2. A safety chain system completely independent of the primary lifting and towing attachment must be used.
3. Any loose or protruding parts of damaged vehicle such as hoods, doors, fenders, trim, etc., should be secured prior to moving the vehicle.
4. Operator should refrain from going under a vehicle unless the vehicle is adequately supported by safety stands.
5. Never allow passengers to ride in a towed vehicle.
6. State and local rules and regulations must be followed when towing a vehicle.





### HOISTING

#### Post Type

Special care should be taken when raising the vehicle on a frame contact type hoist. The hoist must be equipped with the proper adapters in order to support the vehicle at the proper locations. (See next page)

Conventional hydraulic hoists may be used after determining that the adapter plates will make firm contact with the side frame.

#### Floor Jack

A regular floor jack may be used under the front cross-member or rear axle housing.

#### Caution

1. A floor jack must never be used on any part of the underbody.
2. Do not attempt to raise one entire side of the vehicle by placing a jack midway between front and rear wheels. This practice may result in permanent damage to the body.

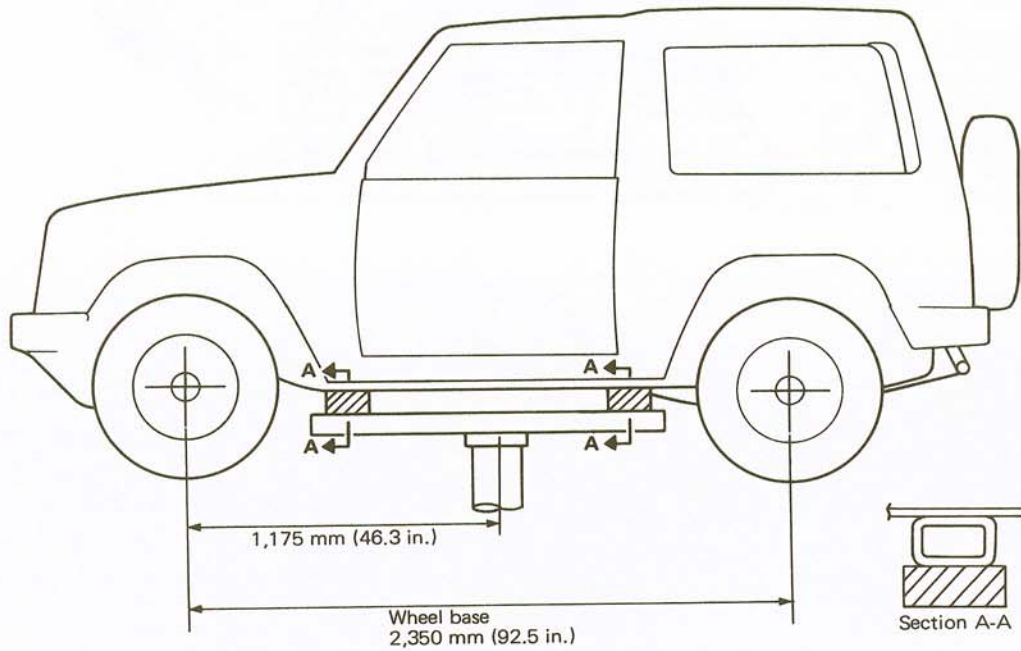
#### Emergency Jacking

Jack receptacles are located at the front crossmember and rear axle housing to accept the jack supplied with the vehicle for emergency road service. Always block the opposite wheels and jack only on a level surface.





## Frame Contact Support Locations

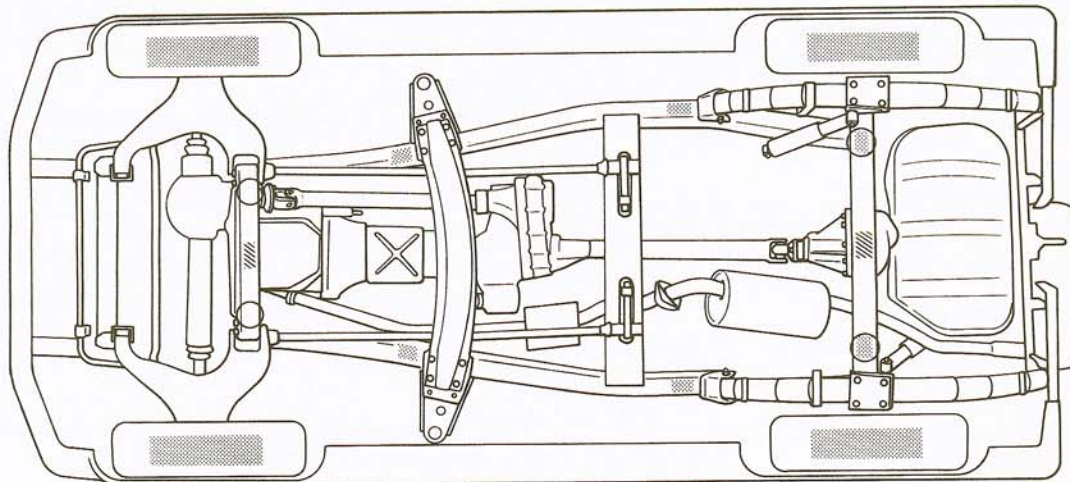


### NOTE

The locations of the support point shown as Section A-A are the same as those of the twin post hoist or sissors jack (emergency) shown in the illustration (00W554) below.

00W553

## Lifting and Jacking Support Locations



Twin post hoist

Floor jack

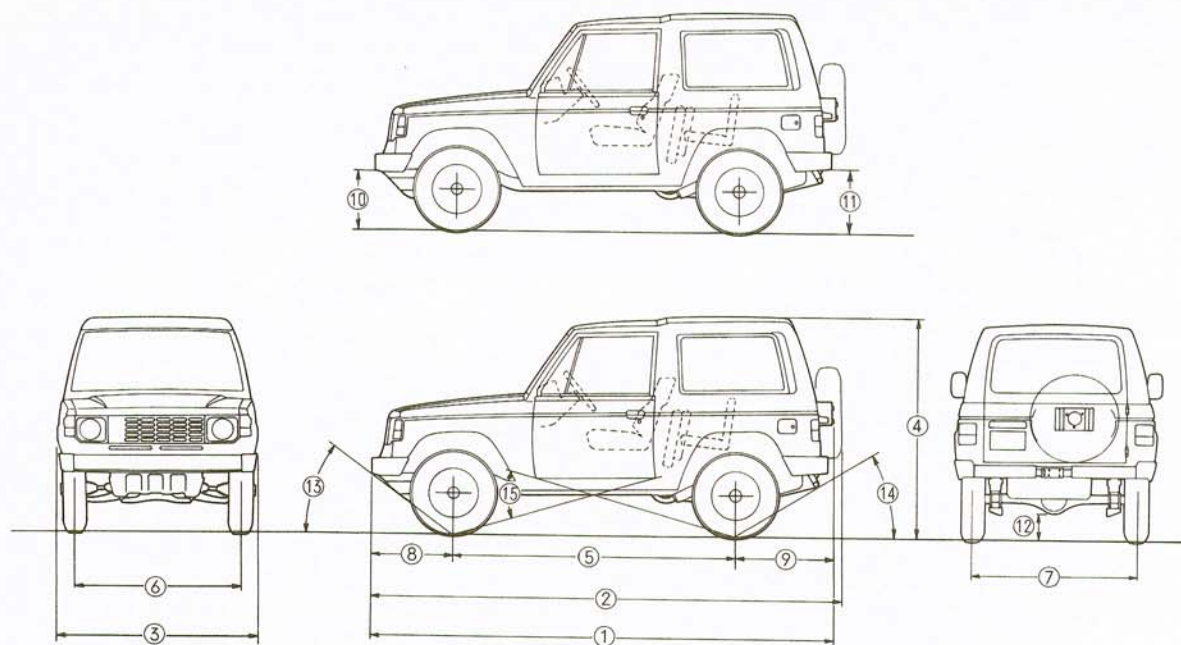
Frame contact or jack (jack supplied with the vehicle) on hoist

00W554





## GENERAL DATA AND SPECIFICATIONS



00W556

Description	L042G	NJLF/H	NULF/H	VNJLF/H	VKJLF/H	VNULF/H	VKULF/H
Vehicle dimensions mm (in.)							
Overall length							
Without spare tire	①	3,930 (154.7)	3,930 (154.7)	3,930 (154.7)	3,930 (154.7)	3,930 (154.7)	3,930 (154.7)
With spare tire	②	3,995 (157.3)	3,995 (157.3)	3,995 (157.3)	3,995 (157.3)	3,995 (157.3)	3,995 (157.3)
Overall width	③	1,680 ( 66.1)	1,680 ( 66.1)	1,680 ( 66.1)	1,680 ( 66.1)	1,680 ( 66.1)	1,680 ( 66.1)
Overall height	④	1,760 ( 69.3)	1,760 ( 69.3)	1,800 ( 70.9)	1,800 ( 70.9)	1,800 ( 70.9)	1,800 ( 70.9)
Wheelbase	⑤	2,350 ( 92.5)	2,350 ( 92.5)	2,350 ( 92.5)	2,350 ( 92.5)	2,350 ( 92.5)	2,350 ( 92.5)
Tread	Front	⑥	1,400 ( 55.1)	1,400 ( 55.1)	1,400 ( 55.1)	1,400 ( 55.1)	1,400 ( 55.1)
	Rear	⑦	1,375 ( 54.1)	1,375 ( 54.1)	1,375 ( 54.1)	1,375 ( 54.1)	1,375 ( 54.1)
Overhang	Front	⑧	745 ( 29.3)	745 ( 29.3)	745 ( 29.3)	745 ( 29.3)	745 ( 29.3)
	Rear	⑨	900 ( 35.4)	900 ( 35.4)	900 ( 35.4)	900 ( 35.4)	900 ( 35.4)
Height at curb weight* (wt.)							
Front bumper to ground	⑩	480 ( 18.9)	480 ( 18.9)	480 ( 18.9)	480 ( 18.9)	480 ( 18.9)	480 ( 18.9)
Rear bumper to ground	⑪	440 ( 17.3)	440 ( 17.3)	440 ( 17.3)	440 ( 17.3)	440 ( 17.3)	440 ( 17.3)
Minimum running ground clearance	⑫	210 ( 8.3)	210 ( 8.3)	210 ( 8.3)	210 ( 8.3)	210 ( 8.3)	210 ( 8.3)
Angle of approach	⑬	38°	38°	38°	38°	38°	38°
Angle of departure	⑭	30°	30°	30°	30°	30°	30°
Ramp breakover angle	⑮	21°	21°	21°	21°	21°	21°
Vehicle weights kg (lbs.)							
Curb weight		1,411 (3,111)/1,428 (3,148)/1,441 (3,177)/1,456 (3,210)/1,462 (3,223)/1,477 (3,256)/1,412 (3,113) 1,429 (3,150) 1,442 (3,179) 1,457 (3,212) 1,463 (3,225) 1,478 (3,258)					
Gross vehicle weight rating		1,910 (4,210) 1,910 (4,210) 1,910 (4,210) 1,910 (4,210) 1,910 (4,210) 1,910 (4,210)					
Gross axle weight rating	Front	1,000 (2,205) 1,000 (2,205) 1,000 (2,205) 1,000 (2,205) 1,000 (2,205) 1,000 (2,205)					
	Rear	1,450 (3,197) 1,450 (3,197) 1,450 (3,197) 1,450 (3,197) 1,450 (3,197) 1,450 (3,197)					
Seating capacity		4	4	4	4	4	4



# GENERAL DATA AND SPECIFICATIONS



Description	L042G	NJLF/H	NULF/H	VNJLF/H	VKJLF/H	VNULF/H	VKULF/H
<b>Engine</b>							
Model No.				G54B			
Type				In-line OHC			
Number of cylinders				4			
Bore				91.1 mm (3.59 in.)			
Stroke				98.0 mm (3.86 in.)			
Piston displacement				2,555 cm <sup>3</sup> (155.9 CID)			
Compression ratio				8.2			
Firing order				1-3-4-2			
Basic ignition timing				7° BTDC ± 2°			
<b>Transmission &amp; transfer case</b>							
Model No.		KM145	KM145	KM145	KM146	KM145	KM146
Type		5-speed manual	5-speed manual	5-speed manual	3-speed automatic	5-speed manual	3-speed automatic
<b>Gear ratio</b>							
Transmission	1st	3.740	3.740	3.740	2.745	3.740	2.745
	2nd	2.136	2.136	2.136	1.543	2.136	1.543
	3rd	1.360	1.360	1.360	1.000	1.360	1.000
	4th	1.000	1.000	1.000	—	1.000	—
	5th	0.856	0.856	0.856	—	0.856	—
	Reverse	3.578	3.578	3.578	2.214	3.578	2.214
Transfer case	High	1.000	1.000	1.000	1.000	1.000	1.000
	Low	1.944	1.944	1.944	1.944	1.944	1.944
Final ring gear ratio		4.625	4.625	4.625	4.222	4.625	4.222
		4.875*	4.875*	4.875*	4.625*	4.875*	4.625*
<b>Clutch</b>							
Type		Dry single disc & diaphragm spring	Dry single disc & diaphragm spring	Dry single disc & diaphragm spring	—	Dry single disc & diaphragm spring	—
<b>Chassis</b>							
Tire size				215SR15			
<b>Front suspension</b>							
Type				Wishbone compression type			
Spring constant (Wheel position)				22 N/mm (123 lbs./in.)			
<b>Rear suspension</b>							
Type				Asymmetrical semi-elliptic leaf spring			
Spring constant							
At load of 1,000-2,500 N (220-551 lbs.)				24 N/mm (134 lbs./in.)			
At load of 4,670-8,870 N (1,030-1,955 lbs.)				56 N/mm (314 lbs./in.)			
<b>Brakes</b>							
Type	Front Rear			Disc Drum (Leading and trailing)			
<b>Power steering</b>							
Gear type				Integral type (Recirculating ball nut)			
Gear ratio				16.4			
Fuel tank capacity				60 liters (15.9 U.S. gal./13.2 Imp. gal.)			

\*Optional for Federal (not available in California).





## CONVERSION TABLE

### CAPACITY CONVERSION TABLE

U.S. gal.	Imperial gal.	U.S. gal.	Imperial gal.	U.S. gal.	Imperial gal.
1/4	1/5	7	5-3/4	15	12-1/2
1/2	3/8	7-1/4	6	15-1/2	13
3/4	5/8	7-1/2	6-1/4	16	13-1/4
		7-3/4	6-1/2	16-1/2	13-3/4
1	3/4			16-3/4	14
1-1/4	1	8	6-3/4		
1-1/2	1-1/4	8-1/4	6-3/4	17	14-1/4
1-3/4	1-1/2	8-1/2	7	17-1/2	14-1/2
		8-3/4	7-1/4	18	15
2	1-3/4	9	7-1/2	18-1/2	15-1/2
2-1/4	1-3/4	9-1/4	7-3/4	19	15-3/4
2-1/2	2	9-1/2	8	19-1/2	16-1/4
2-3/4	2-1/4	9-3/4	8	20	16-3/4
				20-1/2	17
3	2-1/2	10	8-1/4		
3-1/4	2-3/4	10-1/4	8-1/2	21	17-1/2
3-1/2	3	10-1/2	8-3/4	21-1/2	18
3-3/4	3	10-3/4	9	22	18-1/4
				22-1/2	18-3/4
4	3-1/4	11	9-1/4	23	19-1/4
4-1/4	3-1/2	11-1/4	9-1/4	23-1/2	19-1/2
4-1/2	3-3/4	11-1/2	9-1/2	24	20
4-3/4	4	11-3/4	9-3/4	24-1/2	20-1/2
5	4-1/4	12	10	25	20-3/4
5-1/4	4-1/4	12-1/4	10-1/4	25-1/2	21-1/4
5-1/2	4-1/2	12-1/2	10-1/2	26	21-3/4
5-3/4	4-3/4	12-3/4	10-1/2	26-1/2	22
				27	22-1/2
6	5	13	10-3/4	27-1/2	23
6-1/4	5-1/4	13-1/2	11-1/4	28	23-1/4
6-1/2	5-1/2	14	11-3/4	29	24-1/4
6-3/4	5-1/2	14-1/2	12	30	25

### CAPACITY CONVERSION U.S. GALLONS TO LITERS

Gallons	0	1	2	3	4	5	6	7	8	9
Liters										
—	—	3.7854	7.5708	11.3560	15.1420	18.9270	22.7120	26.4980	30.2830	34.0690
10	37.854	41.640	45.425	49.210	52.996	56.781	60.567	64.352	68.137	71.923
20	75.708	79.494	83.279	87.064	90.850	94.635	98.421	102.210	105.990	109.781
30	113.56	117.35	121.13	124.92	128.70	132.49	136.27	140.06	143.85	147.63
40	151.42	155.20	158.99	162.77	166.56	170.34	174.13	177.91	181.70	185.49
50	189.27	193.06	196.84	200.63	204.41	208.20	211.98	215.77	219.55	223.34
60	227.12	230.91	234.70	238.48	242.27	246.05	249.84	253.62	257.41	261.19
70	264.98	268.76	272.55	276.33	280.12	283.91	287.69	291.48	295.26	299.05
80	302.83	306.62	310.40	314.19	317.97	321.76	325.55	329.33	333.12	336.90
90	340.69	344.47	348.26	352.04	355.83	359.61	363.40	367.18	370.97	374.76



# CONVERSION TABLE



## DIMENSION AND TEMPERATURE CONVERSION CHART

Inches		Millimeters	Inches to millimeters		Millimeters to inches		Fahrenheit & Celsius				
(fraction)	(decimals)		Inches	mm	mm	Inches	°F	°C	°C	°F	
1/16	1/64	.015625	.3969	.0001	.00254	0.001	.000039	-20	-28.9	-30	-22
	1/32	.03125	.7937	.0002	.00508	0.002	.000079	-15	-26.1	-28	-18.4
	3/64	.046875	1.1906	.0003	.00762	0.003	.000118	-10	-23.3	-26	-14.8
	5/64	.0625	1.5875	.0004	.01016	0.004	.000157	-5	-20.6	-24	-11.2
1/8	3/32	.078125	1.9844	.0005	.01270	0.005	.000197	0	-17.8	-22	-7.6
	7/64	.109375	2.3812	.0006	.01524	0.006	.000236	1	-17.2	-20	-4
	9/64	.125	2.7781	.0007	.01778	0.007	.000276	2	-16.7	-18	-0.4
	5/32	.140625	3.1750	.0008	.02032	0.008	.000315	3	-16.1	-16	3.2
3/16	11/64	.15625	3.5719	.0009	.02286	0.009	.000354	4	-15.6	-14	6.8
	13/64	.171875	3.9687	.001	.0254	0.01	.00039	5	-15.0	-12	10.4
	7/32	.1875	4.3656	.002	.0508	0.02	.00079	10	-12.2	-10	14
	15/64	.203125	4.7625	.003	.0762	0.03	.00118	15	-9.4	-8	17.6
1/4	17/64	.21875	5.1594	.004	.1016	0.04	.00157	20	-6.7	-6	21.2
	9/32	.234375	5.5562	.005	.1270	0.05	.00197	25	-3.9	-4	24.8
	5/16	.25	5.9531	.006	.1524	0.06	.00236	30	-1.1	-2	28.4
	11/32	.265625	6.3500	.007	.1778	0.07	.00276	35	1.7	0	32
3/8	21/64	.28125	6.7469	.008	.2032	0.08	.00315	40	4.4	2	35.6
	23/64	.296875	7.1437	.009	.2286	0.09	.00354	45	7.2	4	39.2
	25/64	.3125	7.5406	.01	.254	0.1	.00394	50	10.0	6	42.8
	27/64	.328125	7.9375	.02	.508	0.2	.00787	55	12.8	8	46.4
7/16	29/64	.34375	8.3344	.03	.762	0.3	.01181	60	15.6	10	50
	13/32	.359375	8.7312	.04	1.016	0.4	.01575	65	18.3	12	53.6
	15/32	.375	9.1281	.05	1.270	0.5	.01969	70	21.1	14	57.2
	17/32	.390625	9.5250	.06	1.524	0.6	.02362	75	23.9	16	60.8
1/2	19/32	.40625	9.9219	.07	1.778	0.7	.02756	80	26.7	18	64.4
	31/64	.421875	10.3187	.08	2.032	0.8	.03150	85	29.4	20	68
	33/64	.4375	10.7156	.09	2.286	0.9	.03543	90	32.2	22	71.6
	35/64	.453125	11.1125	.1	2.54	1	.03937	95	35.0	24	75.2
5/8	37/64	.46875	11.5094	.2	5.08	2	.07874	100	37.8	26	78.8
	39/64	.484375	11.9062	.3	7.62	3	.11811	105	40.6	28	82.4
	41/64	.5	12.3031	.4	10.16	4	.15748	110	43.3	30	86
	43/64	.515625	12.7000	.5	12.70	5	.19685	115	46.1	32	89.6
9/16	45/64	.53125	13.0969	.6	15.24	6	.23622	120	48.9	34	93.2
	47/64	.546875	13.4937	.7	17.78	7	.27559	125	51.7	36	96.8
	49/64	.5625	13.8906	.8	20.32	8	.31496	130	54.4	38	100.4
	51/64	.578125	14.2875	.9	22.86	9	.35433	135	57.2	40	104
5/4	53/64	.59375	14.6844	1	25.4	10	.39370	140	60.0	42	107.6
	55/64	.609375	15.0812	2	50.8	11	.43307	145	62.8	44	112.2
	57/64	.625	15.4781	3	76.2	12	.47244	150	65.6	46	114.8
	59/64	.640625	15.8750	4	101.6	13	.51181	155	68.3	48	118.4
11/16	61/64	.65625	16.2719	5	127.0	14	.55118	160	71.1	50	122
	63/64	.671875	16.6687	6	152.4	15	.59055	165	73.9	52	125.6
	65/64	.6875	17.0656	7	177.8	16	.62992	170	76.7	54	129.2
	67/64	.703125	17.4625	8	203.2	17	.66929	175	79.4	56	132.8
3/4	69/64	.71875	17.8594	9	228.6	18	.70866	180	82.2	58	136.4
	71/64	.734375	18.2562	10	254.0	19	.74803	185	85.0	60	140
	73/64	.75	18.6531	11	279.4	20	.78740	190	87.8	62	143.6
	75/64	.765625	19.0500	12	304.8	21	.82677	195	90.6	64	147.2
13/16	77/64	.78125	19.4469	13	330.2	22	.86614	200	93.3	66	150.8
	79/64	.796875	19.8437	14	355.6	23	.90551	205	96.1	68	154.4
	81/64	.8125	20.2406	15	381.0	24	.94488	210	98.9	70	158
	83/64	.828125	20.6375	16	406.4	25	.98425	215	100.0	75	167
7/8	85/64	.84375	21.0344	17	431.8	26	1.02362	220	101.7	80	176
	87/64	.859375	21.4312	18	457.2	27	1.06299	225	104.4	85	185
	89/64	.875	21.8281	19	482.6	28	1.10236	230	107.2	90	194
	91/64	.890625	22.2250	20	508.0	29	1.14173	235	110.0	95	203
15/16	93/64	.90625	22.6219	21	533.4	30	1.18110	240	112.8	100	212
	95/64	.921875	23.0187	22	558.8	31	1.22047	245	115.6	105	221
	97/64	.9375	23.4156	23	584.2	32	1.25984	250	118.3	110	230
	99/64	.953125	23.8125	24	609.6	33	1.29921	255	121.1	115	239
1	101/64	.96875	24.2094	25	635.0	34	1.33858	260	123.9	120	248
	103/64	.984375	24.6062	26	660.4	35	1.37795	265	126.6	125	257
	105/64		25.0031	27	690.6	36	1.41732		129.4	130	266
	107/64										





## CONVERSION TABLE

### ENGLISH AND SI METRIC MEASURE

#### Cubic Centimeters to Inches:

When changing cubic centimeters to cubic inches, multiply cubic centimeters times .061 to obtain cubic inches, (C.C.  $\times$  .061 = Cubic Inches).

#### Cubic Inches to Centimeters:

When changing cubic inches to cubic centimeters, multiply cubic inches times 16.39 to obtain cubic centimeters, (Cubic Inches  $\times$  16.39 = C.C.).

#### Liters to Cubic Inches:

When changing liters to cubic inches, multiply liters times 61.02 to obtain cubic inches, (Liters  $\times$  61.02 = Cubic Inches).

#### Cubic Inches to Liters:

When changing cubic inches to liters, multiply cubic inches times .01639 to obtain liters, (Cubic Inches  $\times$  .01639 = Liters).

#### Cubic Centimeters to Liters:

When changing cubic centimeters to liters, divide by 1,000 simply by moving the decimal point three figures to the left.

#### Liters to Cubic Centimeters:

When changing liters to cubic centimeters, move the decimal point three figures to the right.

#### Miles to Kilometers:

When changing miles to kilometers, multiply miles times 1.609 to obtain kilometers, (Miles  $\times$  1.609 = Kilometers).

#### Kilometers to Miles:

When changing kilometers to miles, multiply kilometers times .6214 to obtain miles, (Kilometers  $\times$  .6214 = Miles).

#### Pounds to Kilograms:

When changing pounds to kilograms, multiply pounds times .4536 to obtain kilograms, (Pounds  $\times$  .4536 = Kilograms).

#### Kilograms to Pounds:

When changing kilograms to pounds, multiply kilograms times 2.2046 to obtain pounds, (Kilograms  $\times$  2.2046 = Pounds).

#### Pounds to Newtons:

When changing pounds to newtons, multiply pounds times 4.4482 to obtain newtons, (Pounds  $\times$  4.4482 = Newtons).

#### Newtons to Pounds:

When changing newtons to pounds, multiply newtons times .2248 to obtain pounds, (Newtons  $\times$  .2248 = Pounds).

#### Foot-pounds to Newton-meters:

When changing foot-pounds to newton-meters, multiply foot-pound times 1.3558 to newton-meters, (Foot-pound  $\times$  1.3558 = Newton-meters).

#### Newton-meters to Foot-pounds:

When changing newton-meters to foot-pounds, multiply newton-meters times .7376 to foot-pounds, (Newton-meters  $\times$  .7376 = Foot-pounds).

#### Pounds Per Square Inch(psi) to Kilopascals:

When changing pounds per square inch(psi) to kilopascals, multiply pounds per square inch times 6.895 to kilopascals, (Pounds Per Square Inch(psi)  $\times$  6.895 = Kilopascals.).

#### Kilopascals to Pounds Per Square Inch(psi):

When changing kilopascals to pounds per square inch(psi), multiply kilopascals times .1450 to pounds per square inch(psi), (Kilopascals  $\times$  .1450 = Pounds Per Square Inch(psi)).



# TIGHTENING TORQUE



Description	Torque Nm (ft. lbs.)				Remarks
Thread for general purposes (size x pitch) (mm)	Head mark ④		Head mark ⑦		
6 x 1.0	3.0 to 3.9	(2.2 to 2.9)	4.9 to 7.8	(3.6 to 5.8)	
8 x 1.25	7.9 to 12	(5.8 to 8.7)	13 to 19	(9.4 to 14)	
10 x 1.25	16 to 23	(12 to 17)	27 to 39	(20 to 29)	
12 x 1.25	29 to 43	(21 to 32)	47 to 72	(35 to 53)	
14 x 1.5	48 to 70	(35 to 52)	77 to 110	(57 to 85)	
16 x 1.5	67 to 100	(51 to 77)	130 to 160	(90 to 120)	
18 x 1.5	100 to 150	(74 to 110)	180 to 230	(130 to 170)	
20 x 1.5	150 to 190	(110 to 140)	160 to 320	(190 to 240)	
22 x 1.5	200 to 260	(150 to 190)	340 to 430	(250 to 320)	
24 x 1.5	260 to 320	(190 to 240)	420 to 550	(310 to 410)	
Taper thread for pipes (size)					
PT 1/8	7.9 to 12	(5.8 to 8.7)			Internal thread: Aluminum Internal thread: Cast iron
	16 to 19	(12 to 14)			
PT 1/4	19 to 30	(14 to 22)			Internal thread: Aluminum Internal thread: Cast iron
	34 to 45	(25 to 33)			
PT 3/8	39 to 54	(29 to 40)			Internal thread: Aluminum Internal thread: Cast iron
	58 to 73	(43 to 54)			
Taper thread for dry sealed pipes (size)					
NPTF 1/16	4.9 to 7.8	(3.6 to 5.8)			Internal thread: Aluminum Internal thread: Cast iron
	7.9 to 12	(5.8 to 8.7)			
NPTF 1/8	7.9 to 12	(5.8 to 8.7)			Internal thread: Aluminum Internal thread: Cast iron
	16 to 19	(12 to 14)			
NPTF 1/4	19 to 30	(14 to 22)			Internal thread: Aluminum Internal thread: Cast iron
	34 to 45	(25 to 33)			









# LUBRICATION AND MAINTENANCE

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Maintenance and lubrication service recommendations have been compiled to provide maximum protection for the vehicle owner's investment against all reasonable types of driving conditions.

Since these conditions vary with the individual vehicle owner's driving habits, the area in which the vehicle is operated and the type of driving to which the vehicle is subjected, it is necessary to prescribe lubrication and maintenance service on a time frequency as well as mileage interval basis.

Oils, lubricants and greases are classified and graded according to standards recommended by the Society of Automotive Engineers (SAE), the American Petroleum Institute (API) and the National Lubricating Grease Institute (NLGI).

### MAINTENANCE SCHEDULES

Information for service maintenance is provided in the "SCHEDULED MAINTENANCE TABLE".

Three schedules are provided: one for "Required Maintenance", one for "General Maintenance" and one for "Severe Usage Service".

### SEVERE SERVICE

Vehicles operated under severe service conditions will require more frequent service.

Component service information is included in appropriate units for vehicles operated under one or more of the following conditions:

- (1) Trailer towing or police, taxi, or commercial type operation
- (2) Operation of vehicle:
  - (a) Short-trip operation at freezing temperatures (engine not thoroughly warmed up)
  - (b) More than 50% operation in heavy city traffic during hot weather above 32°C (90°F)
  - (c) Extensive idling
  - (d) Driving in sandy areas
  - (e) Driving in salty areas
  - (f) Driving in dusty conditions
  - (g) Off-road driving

### ENGINE OIL

The SAE grade number indicates the viscosity of engine oils, for example SAE 30, which is a single grade oil. Engine oils are also identified by a dual number, for example SAE 10W-30, which indicates a multigrade oil.

The API classification system defines oil performance in terms of engine usage. Only engine oil designed "For Service SE" or "For Service SF" when available, should be used. These oils contain sufficient chemical additives to provide maximum engine protection. Both the SAE grade and the API designation can be found on the container.

### GEAR LUBRICANTS

The SAE grade number also indicates the viscosity of multipurpose gear lubricants.

The API classification system defines gear lubricants in terms of usage. Gear lubricants conforming to API GL-4 or GL-5 with a viscosity of SAE 80W or SAE 90 are usually recommended for the manual transmission and rear axle (conventional differential), and MITSUBISHI genuine gear oil Part No. 8149630EX or Mopar Hypoid Gear Lubricant Part No. 3744994 or 3744995 plus Mopar Hypoid Gear Oil Additive/Friction Modifier Part No. 4057100, or equivalent, for a limited slip differential.

### LUBRICANTS - GREASES

Semi-solid lubricants bear the NLGI designation and are further classified as grades 0, 1, 2, 3, etc.

Whenever "Chassis Lubricant" is specified, Multipurpose Grease NLGI grade #2EP should be used.

### FUEL USAGE STATEMENT

Use gasoline having a minimum anti-knock index (Octane Value) of 87 (R + M)/2. This designation is comparable to a Research Octane Number of 91.

Unleaded gasoline only must be used. All vehicles so equipped have labels located on the instrument panel and on the back of fuel filler lid that state, "UNLEADED GASOLINE ONLY". These vehicles also have fuel filler tubes designed to accept only the smaller diameter unleaded gasoline dispensing nozzles.

### MATERIALS ADDED TO FUEL

Indiscriminate use of fuel system cleaning agents should be avoided. Many of these materials intended for gum and varnish removal may contain highly active solvents or similar ingredients that can be harmful to gasket and diaphragm materials used in fuel system component parts.



## SCHEDULED MAINTENANCE TABLE



### Scheduled Maintenance Services for Emission Control and Proper Vehicle Performance

Inspection and Service should be performed anytime a malfunction is observed or suspected. Retain receipts for vehicle emission services to protect your emission warranty.

EMISSION CONTROL SYSTEM MAINTENANCE	SERVICE INTERVALS	MILEAGE IN THOUSANDS	7.5	15	22.5	30	37.5	45	50
		KILOMETERS IN THOUSANDS	12	24	36	48	60	72	80
CHANGE ENGINE OIL EVERY 12 MONTHS	OR		x	x	x	x	x	x	
REPLACE ENGINE OIL FILTER EVERY 12 MONTHS	OR			x		x		x	
CHECK CONDITION OF DRIVE BELT (FOR WATER PUMP AND ALTERNATOR) AND ADJUST TENSION AS REQUIRED	AT			x				x	
REPLACE DRIVE BELT (FOR WATER PUMP AND ALTERNATOR)	AT					x			
CHECK VALVE CLEARANCE AND ADJUST AS REQUIRED	AT			x		x		x	
CHECK IGNITION TIMING AND ADJUST AS REQUIRED EVERY 5 YEARS	OR								x
CLEAN CARBURETOR CHOKE MECHANISM AND LINKAGE	AT					x			
REPLACE FUEL FILTER (EXCEPT FILTER IN FUEL TANK)	AT								x
CHECK FUEL SYSTEM* (CAP, TANK, LINE, AND CONNECTIONS) FOR LEAKS EVERY 5 YEARS	OR								x
REPLACE AIR CLEANER FILTER	AT					x			
REPLACE SPARK PLUGS	AT					x			
REPLACE IGNITION CABLES* EVERY 5 YEARS	OR								x
REPLACE VACUUM HOSES, SECONDARY AIR HOSES, AND CRANKCASE VENTILATION HOSES EVERY 5 YEARS	OR								x
REPLACE FUEL HOSES, WATER HOSES, AND FUEL VAPOR HOSES* EVERY 5 YEARS	OR								x
CHECK CRANKCASE EMISSION CONTROL SYSTEM AND CLEAN AS REQUIRED EVERY 5 YEARS	OR								x
CHECK EVAPORATIVE EMISSION CONTROL SYSTEM (EXCEPT CANISTER) FOR LEAKS AND CLOGGING EVERY 5 YEARS	OR								x
REPLACE CANISTER	AT								x

Note: \*For California vehicles, this maintenance is recommended by Mitsubishi Motor Sales of America, Inc., but is not required by the warranty on these parts (except water hoses).





## SCHEDULED MAINTENANCE TABLE

### General Maintenance Service for Proper Vehicle Performance

GENERAL MAINTENANCE	SERVICE INTERVALS	MILEAGE IN THOUSANDS	7.5	15	22.5	30	37.5	45	50
		KILOMETERS IN THOUSANDS	12	24	36	48	60	72	80
COOLING SYSTEM	CHECK AND SERVICE AS REQUIRED EVERY 12 MONTHS								
	DRAIN, FLUSH, AND REFILL EVERY 24 MONTHS OR					•			
BRAKE FLUID	CHECK FLUID LEVEL AND INSPECT FOR LEAKS AT					•			
	CHANGE EVERY 4 YEARS								
FRONT DISC BRAKE PADS	INSPECT FOR WEAR AT			•		•		•	
REAR DRUM BRAKE LININGS AND REAR WHEEL CYLINDERS	INSPECT FOR WEAR AND LEAKS AT					•			
BRAKE HOSES	CHECK FOR DETERIORATION OR LEAKS AT			•		•		•	
BALL JOINT AND STEERING LINKAGE SEALS, AND DRIVE SHAFT BOOTS	INSPECT FOR GREASE LEAKS OR DAMAGE AT					•			
UPPER CONTROL ARM BUSHINGS	LUBRICATE GREASE AT			•		•		•	
FRONT WHEEL BEARINGS	INSPECT FOR GREASE LEAKS AT					•			
FRONT AXLE AND REAR AXLE* <sup>1</sup>	CHECK OIL LEVEL AT					•			
MANUAL TRANSMISSION AND TRANSFER CASE	CHANGE OIL (SEVERE USAGE CONDITIONS ONLY) AT					•			
AUTOMATIC TRANSMISSION AND TRANSFER CASE	CHANGE FLUID AT					•			
REAR AXLE* <sup>2</sup>	CHANGE OIL AT			•		•		•	

Note: \*<sup>1</sup> Not applicable to vehicles with a limited slip differential  
 \*<sup>2</sup> Applicable only to vehicles with a limited slip differential



## SCHEDULED MAINTENANCE TABLE



### Severe Usage Service

The maintenance items should be performed according to the following table:

MAINTENANCE ITEM	SERVICE TO BE PERFORMED	MILEAGE INTERVALS— KILOMETERS IN THOUSANDS (MILES IN THOUSANDS)							SEVERE USAGE CONDITIONS							
		12 (7.5)	24 (15)	36 (22.5)	48 (30)	60 (37.5)	72 (45)	80 (50)	A	B	C	D	E	F	G	H
ENGINE OIL	CHANGE EVERY 3 MONTHS OR-	EVERY 4,800 KM (3,000 MILES)							○	○	○	○			○	
ENGINE OIL FILTER	REPLACE EVERY 6 MONTHS OR-	EVERY 9,600 KM (6,000 MILES)							○	○	○	○			○	
AIR CLEANER FILTER	REPLACE	MORE FREQUENTLY							○				○			
CRANKCASE EMISSION CONTROL SYSTEM	CHECK AND CLEAN AS REQUIRED	MORE FREQUENTLY							○							
SPARK PLUGS	REPLACE		●		●		●			○		○				
FRONT DISC BRAKE PADS	INSPECT FOR WEAR	MORE FREQUENTLY							○					○		
REAR DRUM BRAKE LININGS AND REAR WHEEL CYLINDERS	INSPECT FOR WEAR OR LEAKS	MORE FREQUENTLY							○					○		
MANUAL TRANSMISSION AND TRANSFER CASE	CHANGE OIL				●					○					○	○
UPPER CONTROL ARM BUSHINGS	LUBRICATE GREASE	EVERY 12,000 KM (7,500 MILES)							○				○	○		○

#### Sever usage conditions

- A – Driving in dusty conditions
- B – Police, taxi, or commercial type operation
- C – Extensive idling
- D – Short-trip operation at freezing temperatures (engine not thoroughly warmed up)
- E – Driving in sandy areas
- F – Driving in salty areas
- G – More than 50% operation in heavy city traffic during hot weather above 32°C (90°F)
- H – Off-road driving





## LUBRICANT CAPACITIES TABLE AND RECOMMENDED LUBRICANTS

### LUBRICANT CAPACITIES TABLE

Description	Metric measure	U.S. measure	Imperial measure
Engine oil			
Crankcase (including oil filter)	5.8 liters	6.1 qts.	5.1 qts.
Oil filter	0.50 liter	0.53 qt.	0.44 qt.
Cooling system (including heater and coolant reservoir)	8.0 liters	8.45 qts.	7.04 qts.
Manual transmission	2.2 liters	4.6 pints	3.9 pints
Automatic transmission	6.8 liters	14.4 pints	12.0 pints
Transfer case	2.2 liters	4.6 pints	3.9 pints
Front axle	1.1 liters	2.3 pints	1.9 pints
Rear axle	1.8 liters	3.8 pints	3.2 pints
Power steering	0.9 liter	1.9 pints	1.6 pints
Fuel tank	60 liters	15.9 gals.	13.2 gals.

### RECOMMENDED LUBRICANTS

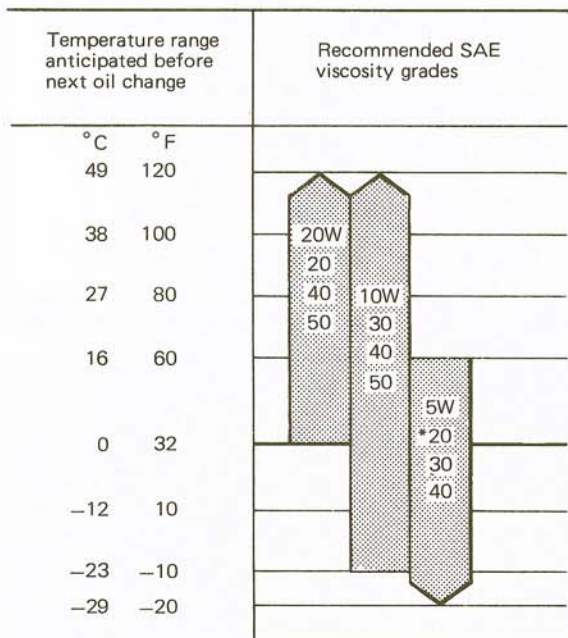
Component	Lubricant specification	Remarks
Engine	API classification SE or SF	For further details, refer to SAE viscosity number
Power steering	Automatic transmission fluid ATF "DEXRON" or "DEXRON II" type	
Manual transmission	API classification GL-4	SAE grade number: SAE 75W-85W SAE 80W
Automatic transmission	Automatic transmission fluid ATF "DEXRON" or "DEXRON II" type	
Transfer case	API classification GL-4	SAE grade number: SAE 75W-85W SAE 80W
Front axle	API classification GL-4 or GL-5	For further details, refer to SAE viscosity number
Rear axle (conventional differential)	API classification GL-4 or GL-5	
Rear axle (limited slip differential)		MITSUBISHI genuine gear oil Part No. 8149630EX or Mopar Hypoid Gear Lubricant Part No. 3744994 or 3744995 plus Mopar Hypoid Gear Oil Additive/ Friction Modifier Part No. 4057100 or equivalent
Brake and clutch	Conforming to DOT 3	
Front wheel bearing	Multipurpose grease NLGI grade #2EP	
Cooling system	High quality ethylene glycol	Concentration level: 50%
Transmission linkage, parking brake cable mechanism, hood lock and hook, door latch, hatch latch, seat adjuster	Multipurpose grease NLGI grade #2EP	
Door hinges	Engine oil	





## SELECTION OF LUBRICANTS

### Engine Oil



53E531

\* SAE 5W-20 is not recommended for sustained high speed vehicle operation.

### Front Axle/Rear Axle (Conventional differential)

Lubricant	API classification GL-4 or GL-5
Anticipated temperature range	Viscosity range
Above -23°C (-10°F)	SAE 90 SAE 85W-90 SAE 80W-90
-23°C to -34°C (-10°F to -30°F)	SAE 80W SAE 80W-90
Below -34°C (-30°F)	SAE 75W

## COOLANT

### Relation Between Antifreeze Concentration and Specific Gravity

Coolant temperature °C (°F) and specific gravity					Freezing temperature °C (°F)	Safe operating temperature °C (°F)	Coolant concentration (specific volume)
10 (50)	20 (68)	30 (86)	40 (104)	50 (122)			
1.037	1.034	1.031	1.027	1.023	-9 (15.8)	-4 (24.8)	20 %
1.045	1.042	1.038	1.034	1.029	-12 (10.4)	-7 (19.4)	25 %
1.054	1.050	1.046	1.042	1.036	-16 (3.2)	-11 (12.2)	30 %
1.063	1.058	1.054	1.049	1.044	-20 (-4)	-15 (5)	35 %
1.071	1.067	1.062	1.057	1.052	-25 (-13)	-20 (-4)	40 %
1.079	1.074	1.069	1.064	1.058	-30 (-22)	-25 (-13)	45 %
1.087	1.082	1.076	1.070	1.064	-36 (-32.8)	-31 (-23.8)	50 %
1.095	1.090	1.084	1.077	1.070	-42 (-44)	-37 (-35)	55 %
1.103	1.098	1.092	1.084	1.076	-50 (-58)	-45 (-49)	60 %

NOTE: The information in the table pertains to the antifreeze used by the manufacturer.

#### Example

The safe operating temperature is -15°C (5°F) when the measured specific gravity is 1.058 at a coolant temperature of 20°C (68°F).





### JET VALVE CLEARANCE ADJUSTMENT

Adjustment condition:

Normal operating temperature [Coolant temperature 80-90°C, (176-194°F)]

#### Caution

1. An incorrect jet valve clearance will affect the emission levels and could also cause engine troubles.
2. Adjust the jet valve clearance before adjusting the intake valve clearance.
3. The jet valve clearance should be adjusted with the intake valve adjusting screw fully loosened.

Adjusting procedure:

1. Place piston of No. 1 cylinder at top dead center of compression stroke to adjust valve clearances marked (A) of intake valve side is shown. (5EN062)
2. Back off the intake valve adjusting screw (two or more turns).
3. Loosen the lock nut on the jet valve adjusting screw.
4. Back off the jet valve adjusting screw and place a 0.25 mm (.010 in.) leaf of a feeler gauge between the top end of the jet valve stem and the bottom end of the adjusting screw. (3EM040)

Jet valve clearance (on hot engine) .....  
0.25 mm (.010 in.)

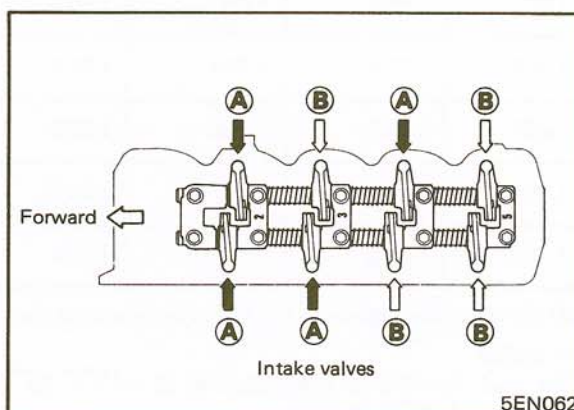
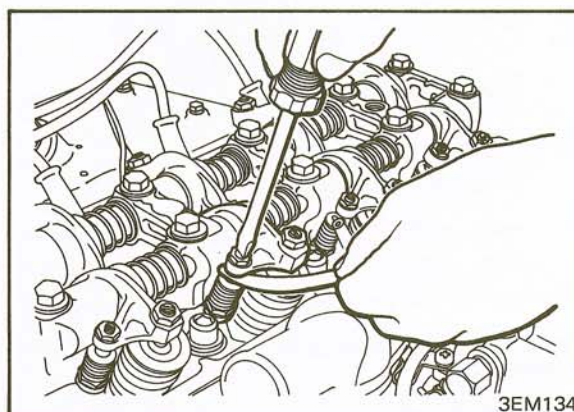
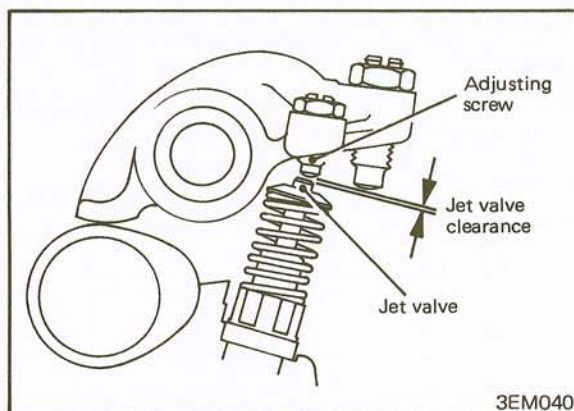
5. Screw in the adjusting screw (clockwise) until the bottom end of the adjusting screw touches the feeler gauge. Since the jet valve spring has a low spring force, use special care not to compress the spring. Be particularly careful if the adjusting screw is hard to turn. (3EM134)
6. While holding the adjusting screw in place with a screwdriver, tighten the lock nut firmly.
7. Check with a feeler gauge lead to ensure a clearance of 0.25 mm (.010 in.)
8. Adjust the intake valve clearance.
9. Place piston of in No. 4 cylinder at top dead center on compression stroke to adjust valve clearances marked (B) of intake valve side. (5EN062)
10. Adjust by repeating Steps 2 through 8.

### VALVE CLEARANCE ADJUSTMENT

Adjustment condition:

Normal operating temperature [Coolant temperature 80-90°C, (176-194°F)]

1. Place piston of No. 1 cylinder at top dead center of compression stroke to adjust valve clearances marked (A) of intake valve side. (5EN062)





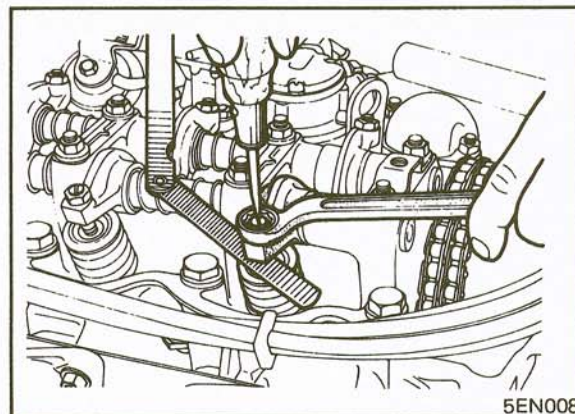


2. Loosen nut and adjust to specification with adjusting screw. Then retighten nut. (5EN008)

Valve clearance (on hot engine):

Intake .....	0.15 mm (.006 in.)
Exhaust .....	0.25 mm (.010 in.)

3. After nut has been retightened, recheck to ensure clearance is correct.
4. Place piston of No. 4 cylinder at top dead center on compression stroke to adjust valve clearances marked (B). (5EN062)
5. Adjust by repeating Steps 2 and 3.
6. Check idle speed and readjust if necessary.



## BASIC IGNITION TIMING ADJUSTMENT

Adjustment condition:

Lights and all accessories off, transmission in neutral and parking brake pulled.

1. Run the cold engine at fast idle until the coolant temperature is 85-95°C (185-205°F).
2. Disconnect the white stripe vacuum hose from the distributor and temporarily plug the hoses.
3. Run the engine at the specified curb idle speed.

Curb idle speed:

First 500 km (300 miles) .....	$675 \pm 150$ rpm
After 500 km (300 miles) .....	$750 \pm 150$ rpm

4. Using a timing light, check the ignition timing. If it does not meet specifications, adjust the ignition timing by rotating the distributor after loosening the distributor lock nut.

Basic timing .....  $7^\circ \text{BTDC} \pm 2^\circ$

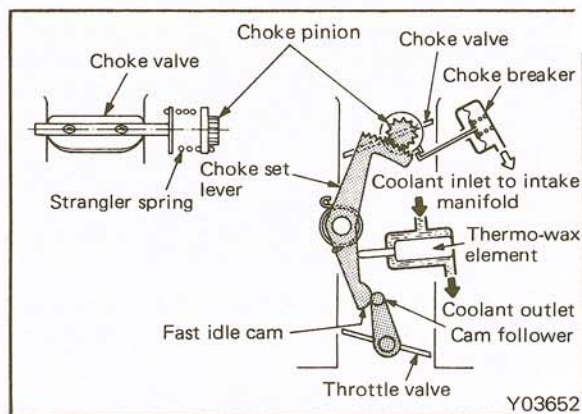
5. Reconnect the white stripe vacuum hose to the distributor.





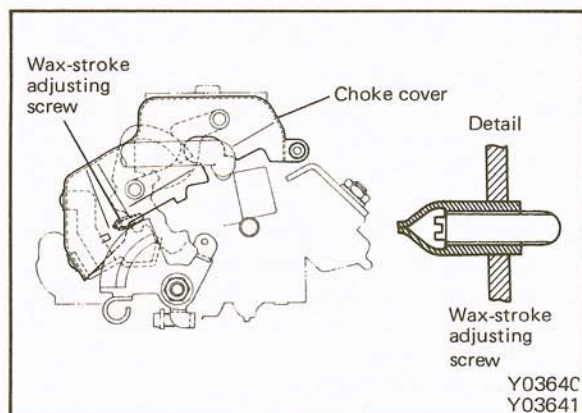
### CARBURETOR CHOKE MECHANISM AND LINKAGE

The choke mechanism is used to facilitate engine starting during cold weather. Spray solvent into the end of the auto-choke and throttle valves (where they pass through the air horn) to prevent the choke from becoming stuck from gum deposits on the shaft. At the same time, spray a solvent to clean dirt from the fast idle cam and link.



### Tamper-Proof Automatic Choke

All carburetors have tamper-proof choke. The choke-related parts are factory-adjusted.



### FUEL FILTER (Replace) – except in-tank fuel filter

The fuel filter should be replaced regularly because its performance is reduced by dirt and water collected over an extended period of use. Replace as required.



### FUEL SYSTEM (Check for leaks)

#### Cap, Tank, Lines and Connections

Check for damage or leakage in the fuel lines and connections, and for looseness of the fuel tank cap.

Inspect the surface of fuel hoses for heat and mechanical damage. Hard and brittle rubber, cracking, checking, tears, cuts, abrasions and excessive swelling indicate deterioration of the rubber.

If the fabric casing of the rubber hose is exposed by cracks and abrasions in the fuel system, the hoses should be changed.





## IGNITION CABLES (Check and replace)

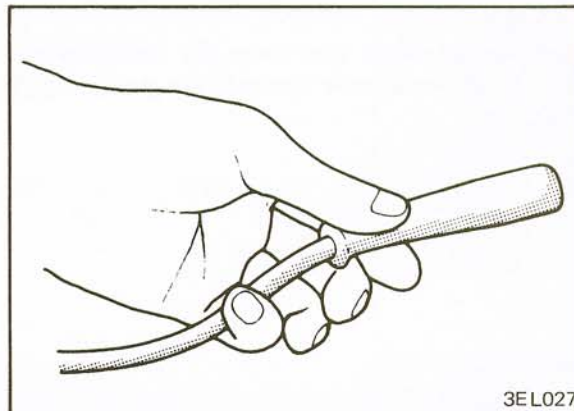
The ignition cables should be kept clean and properly connected.

Cracked, damaged or faulty cables must be replaced.

### NOTE

When disconnecting an ignition cable, be sure to hold cable cap. If the cable is disconnected by pulling on the cable alone, an open circuit might result.

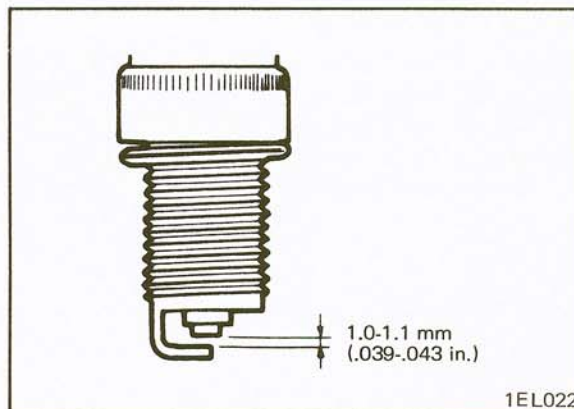
Resistance .....	16 k $\Omega$ /m
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3EL027

## SPARK PLUGS (Replace)

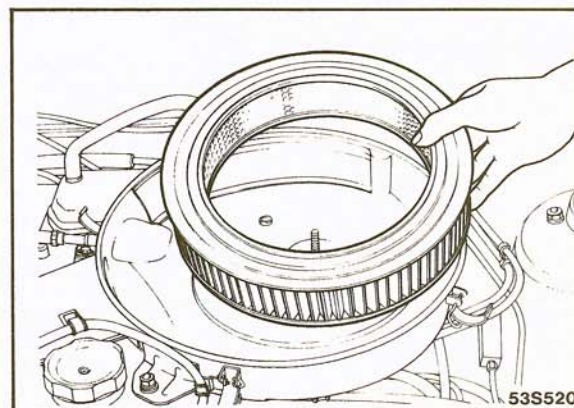
1. Spark plugs must fire properly to assure proper engine performance and emission-control. They should operate satisfactorily in normal vehicle service for the specified maintenance interval or they should be replaced.
2. The new plugs should be checked for the proper gap. (1EL022)



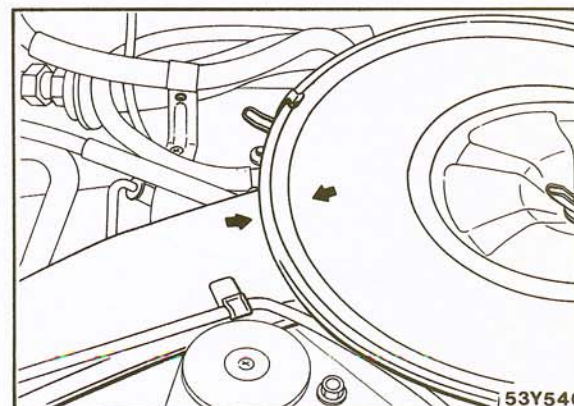
1EL022

## AIR CLEANER FILTER (Replace)

1. Remove the wing nut. Use pliers only if the wing nut is difficult to remove.
2. Unsnap the clips and remove air cleaner cover.
3. Remove the filter and replace it with a new filter. (53S520)
4. Remount the cover, taking care that the arrows are aligned. (53Y540)
5. Tighten the wing nut by hand.



53S520



53Y540

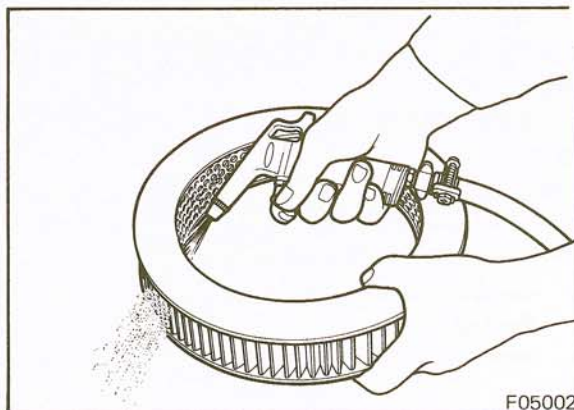




## MAINTENANCE SERVICE

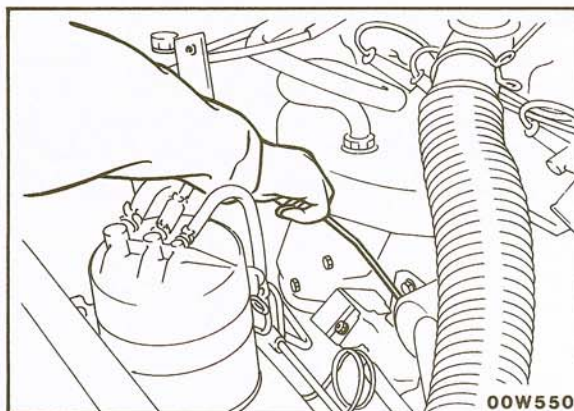
### Cleaning

Remove the filter and clean the inside by using compressed air. (Dust can also be removed by gently tapping the filter by hand.)



### ENGINE OIL (Change)

Always use lubricants which (1) conform to the requirements of the API classification "For Service SE" or "For Service SF" when available, and (2) have the proper SAE grade number for the expected temperature range. Never use nondetergent or straight mineral oil.



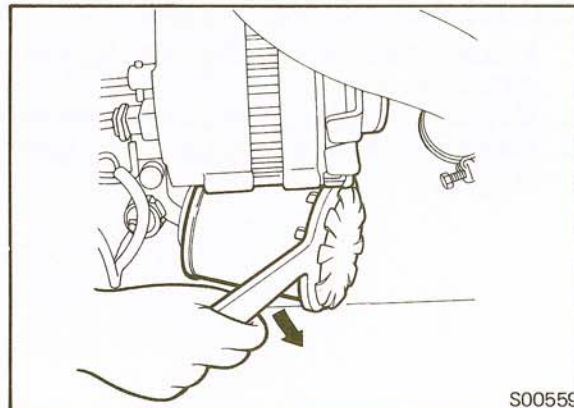
### ENGINE OIL FILTER (Replace)

The quality of replacement filters varies considerably. Only high quality filters should be used to assure most efficient service. Genuine oil filters require that the filter be capable of withstanding a pressure of 256 psi and are recommended as follows:

---

Oil Filter Part Number .....	
Mitsubishi Genuine Parts	MD031805 or equivalent

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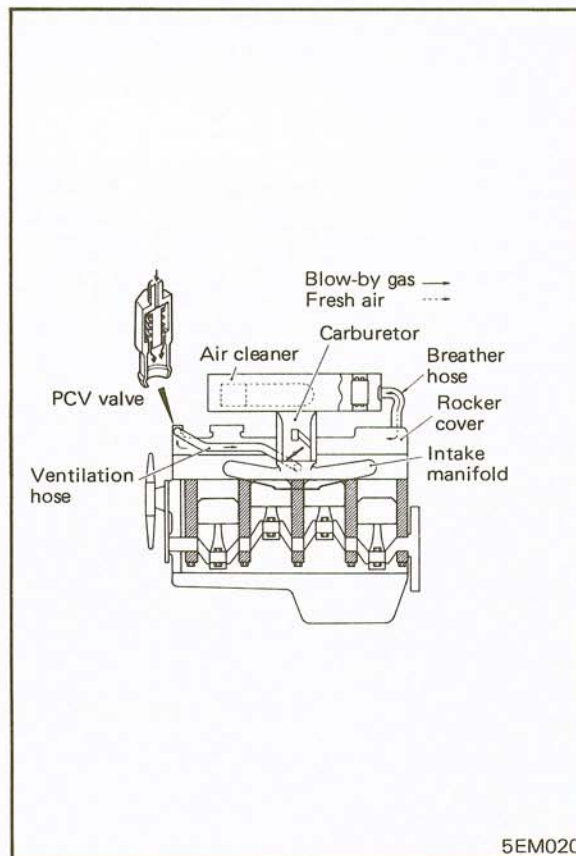




### CRANKCASE VENTILATION SYSTEM (Check, and clean as required)

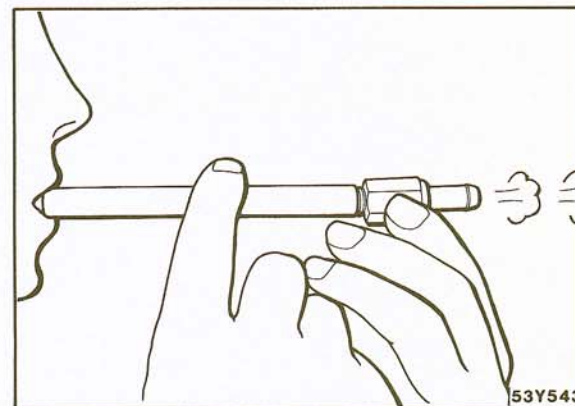
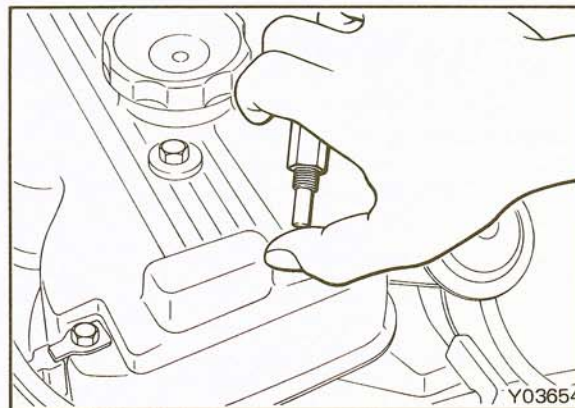
A closed-type crankcase ventilation system is utilized to prevent the blow-by gas from escaping into the atmosphere. This system has a positive crankcase vent valve (PCV valve) at the rocker arm cover.

This system supplies fresh air to the crankcase through the air cleaner. Inside the crankcase, the fresh air is mixed with blow-by gases, and this mixture passes through the PCV valve into the induction system.



### Inspection and Service Procedure

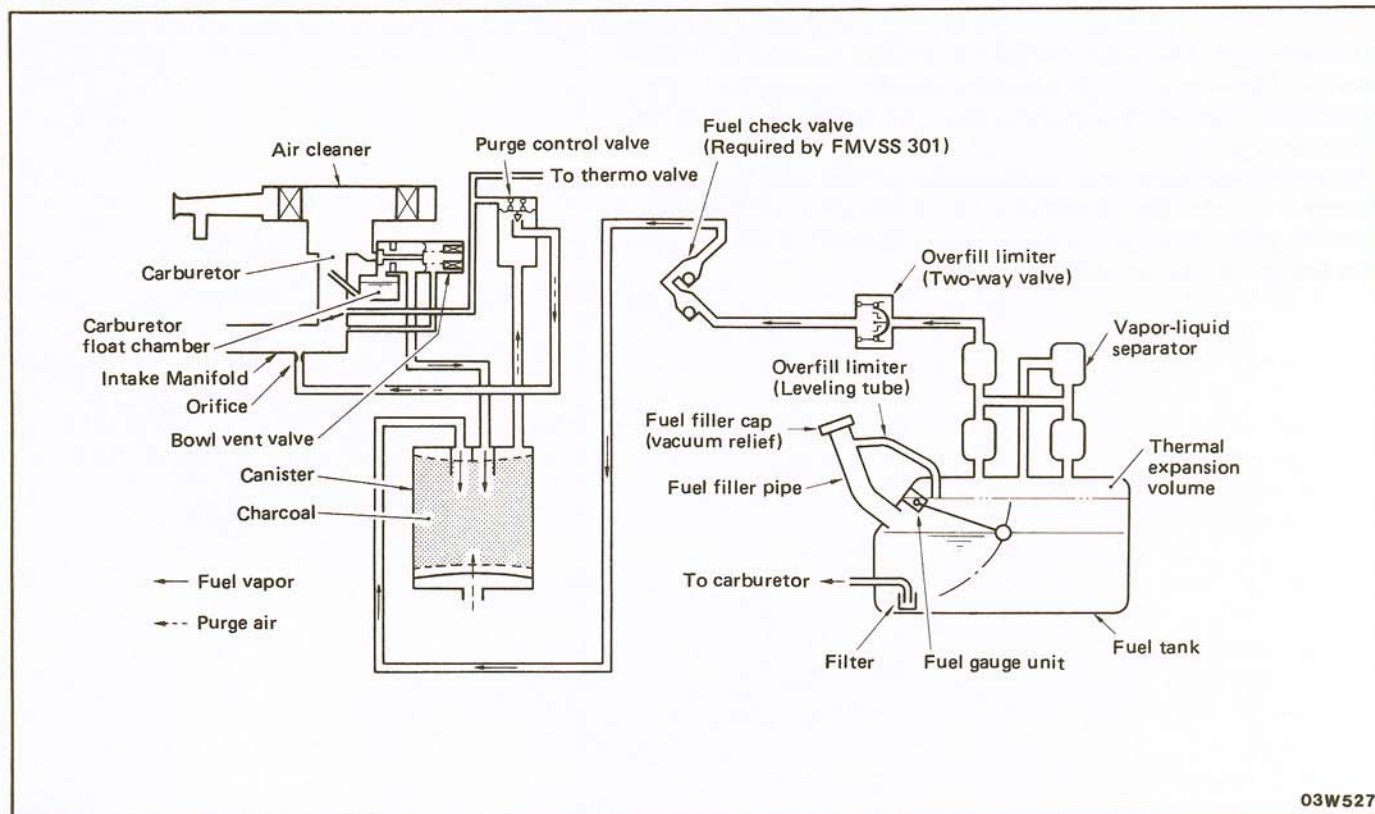
1. Remove PCV valve from rocker cover. If the valve is not clogged, a hissing noise will be heard as air passes through the valve, and a strong vacuum should be felt when a finger is placed over the valve inlet.
2. Disconnect ventilation hose from the PCV valve.
3. Blow from the threaded end of PCV valve. If you cannot blow through it, the PCV valve is plugged. (53Y543)
4. If the ventilation system is restricted, clean the hose and PCV valve with appropriate solvent for dissolving carbon, oil, sludge, etc.







### EVAPORATIVE EMISSION CONTROL SYSTEM



03W527

#### Checking Evaporative Emission Control System — (Except canister)

If the fuel-vapor vent line is clogged or damaged, a fuel-vapor mixture will escape into the atmosphere.

Disconnect the line at both ends and blow it clean with compressed air. Remove the filler cap from the filler pipe and check to see if there is any problem with the sealing surface to the filler pipe.

The over-fill limiter (2-way valve) installed in the vapor line between the canister intake and fuel tank outlet should be checked for correct operation.

The purge control valve installed on the vapor line between canister and intake manifold should be checked for correct operation.

#### Canister (Replace)

If the canister filter becomes clogged, the purge air volume will decrease and, consequently, the canister capacity will be reduced.



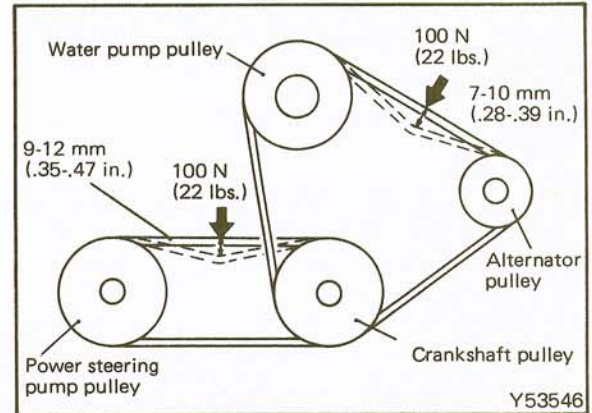


## DRIVE BELTS (Check, and adjust or replace)

Inspect the drive belts for cuts and cracks. Replace if necessary.

Check for proper tension. If necessary, adjust the belt tension as follows:

1. Push with a force of 100 N (22 lbs.) on one belt at a point halfway between alternator pulley and water pump pulley and the other belt at a point halfway between the power steering pulley and crankshaft pulley. The specified limits of the belt deflection are shown in the illustration.
2. If belt deflection is not within specified limits, loosen alternator support bolt, alternator brace bolt and power steering pump brace bolt, and move alternator and power steering pump to obtain proper belt deflection at 100 N (22 lbs.) of force. (Y53546)
3. After adjustment, tighten the alternator support bolt, alternator brace bolt and power steering pump brace bolt to specified torque.



Part	Torque Nm (ft.lbs.)
Alternator support bolt	20-25 (14-18)
Alternator brace bolt	12-15 (8.5-11)
Power steering oil pump brace bolt	27-41 (20-30)

## COOLING SYSTEM (Check and service)

Check the cooling system for damaged hoses, loose or seeping connections, or other possible causes of coolant leaks.

### Coolant Change

1. Remove the radiator cap, radiator drain plug and engine drain plug to drain the coolant.

### Caution

When removing the radiator cap, use care to avoid contact with hot coolant or steam. Place a shop towel over the cap and turn the cap counterclockwise a little to let pressure escape through the vinyl tube. After relieving the steam pressure, remove the cap by slowly turning it counterclockwise.

2. Remove the reserve tank and drain the coolant.
3. After draining coolant completely, reinstall the drain plugs and flush the engine and radiator using a radiator cleaning fluid.
4. After the flushing is completed, completely drain the cleaning fluid and install the radiator and engine drain plugs.
5. Refill the system with water and a high quality ethylene glycol antifreeze. A convenient mixture is a 50% water and 50% antifreeze solution. [Freezing point:  $-36^{\circ}\text{C}$  ( $-32.8^{\circ}\text{F}$ )]. Reinstall radiator cap.
6. After running the engine a while, check the coolant level and add coolant until the specified coolant level is maintained.





7. Add coolant to the reserve tank between the "FULL" and "LOW" mark if necessary.

### Caution

Do not overfill the reserve tank.

### Antifreeze

Since the cylinder head and water pump body are made of aluminum alloy casting, be sure to use a 50% ethylene glycol antifreeze coolant to provide corrosion protection and freezing prevention.

Recommended antifreeze	Quantity
Permanent type antifreeze	50% or more by volume

### Measurement of Antifreeze Concentration

Run the engine until coolant is fully mixed. Drain some coolant (antifreeze), and measure temperature and specific gravity of the coolant. Determine concentration and safe working temperature. If the coolant is short of antifreeze, add antifreeze up to a concentration of 50%.

### NOTE

As the antifreeze also serves as a corrosion inhibitor, be sure to maintain its concentration at 50% even when temperature is high.

### BRAKE FLUID (Check fluid level and inspect for leaks)

1. Check to make certain that the brake fluid is between the "MAX" and "A" markings on the fluid reservoir. Fill as required. (72W025)
2. With disc brakes the fluid level can be expected to fall as the brake pads wear. A rapid fluid loss indicates a leak in the brake system which should be inspected and repaired immediately.

### Caution

Take care in handling brake fluid as it may cause damage to painted surfaces.

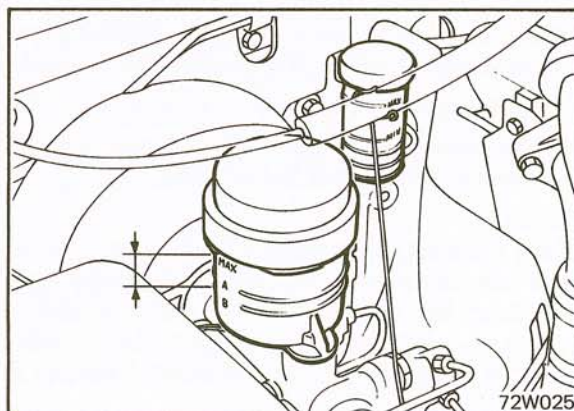
### Fluid Change

1. Check the brake system for leakage before replacing brake fluid. Completely drain the brake fluid with the bleeder screws loosened on each brake and refill the brake system with new brake fluid.

Recommended fluid .....
Brake fluid conforming to DOT3

2. The reservoir cap must be fully tightened to avoid contamination from foreign matter or moisture.

DO NOT ALLOW PETROLEUM BASE FLUID TO CONTAMINATE THE BRAKE FLUID – SEAL DAMAGE WILL RESULT –







### 3RAKE HOSES (Check for deterioration or leaks)

Inspection of brake hoses and tubes should be included in all brake service operations. The hoses should be checked for:

- (1) Correct length, and for severe surface cracking, pulling, scuffing or worn spots. (If the fabric casing of the hoses is exposed by cracks or abrasion in the rubber hose cover, the hoses should be replaced.)
- (2) Faulty installation, case twisting or friction against wheels, tires or chassis.

### BRAKES

1. Inspect the disc brakes for pad wear and proper operation, and the rear brake linings and wheel cylinders for wear and leaks respectively. If the vehicle is driven in dusty or salty areas, it should be inspected more frequently.
2. The frequency of these inspections depends upon driving conditions, such as traffic or terrain, and upon the driving habits of the owner.

#### Front Disc Brake Pads (Inspect for wear)

Check for fluid contamination and wear. Replace complete set of pads if defective. (14E525)

#### Caution

The pads for the right and left wheels should be replaced at the same time. Never split or intermix brake pad sets. All four pads must be replaced as a complete set.

#### Thickness of lining "A"

Standard value	10.5 mm (.41 in.)
Service limit	1.0 mm (.04 in.)

#### Rear Drum Brake Linings and Wheel Cylinders (Inspect for wear and leaks)

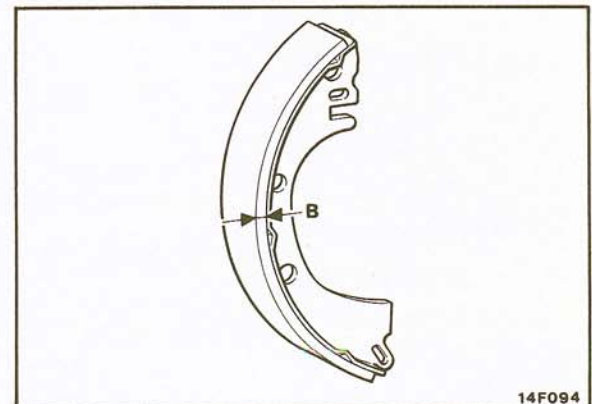
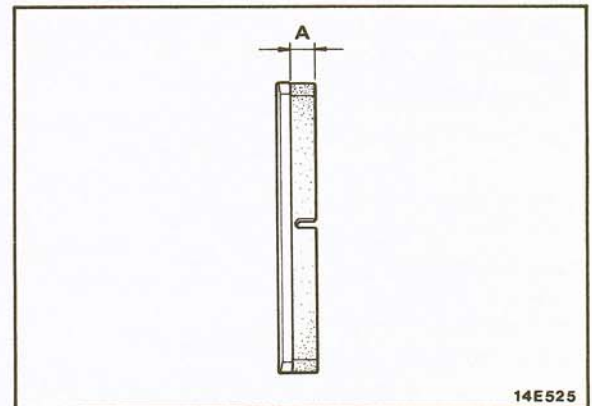
1. Remove the brake drum and check the thickness of brake shoe lining for wear. (14F094)

#### Thickness of lining "B"

Standard value	4.6 (.18 in.)
Service limit	1.0 (.04 in.)

Check the automatic brake adjusting system by hand to see if it operates smoothly. Also see if the gears are in proper mesh with each other. To assure smooth functioning, apply a very thin coat of grease to the friction surface of adjuster and link shaft.

2. Inspect the wheel cylinder boots for evidence of a brake fluid leak. Visually check the boots for cuts, tears or heat cracks. (A slight amount of fluid on the boot may not be a leak, but may be preservative fluid used at assembly.)







### FRONT AXLE AND REAR AXLE (Check oil level)

Remove the filler plug and check the oil level. (D09031)

Front axle oil level (A) . . . . . Within 8 mm (.31 in.)

Rear axle oil level (A) . . . . . Within 14 mm (.55 in.)

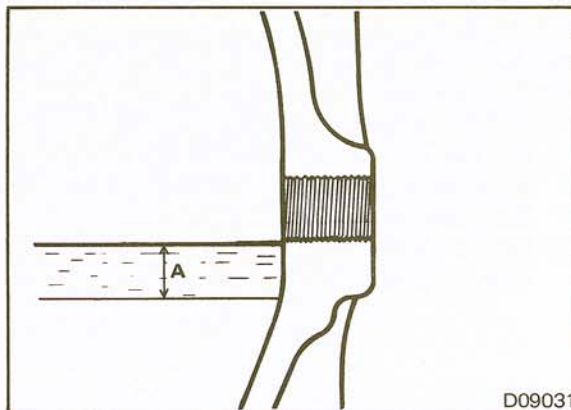
### FRONT WHEEL BEARINGS (Inspect for grease leaks)

Inspect for evidence of grease leakage about the hub cap and the back of the hub.

If there is leakage of grease, remove the hub and its oil seal and check for damage.

Clean the grease off the hub and bearing, and repack with the specified new grease.

Recommended multipurpose grease . . . . .  
SAE J310a, NLGI grade #2EP



D09031

### BALL JOINT SEALS, STEERING LINKAGE SEALS AND DRIVE SHAFT BOOTS (Inspect for leaks and damage)

These components are permanently lubricated at the factory and do not require periodic lubrication.

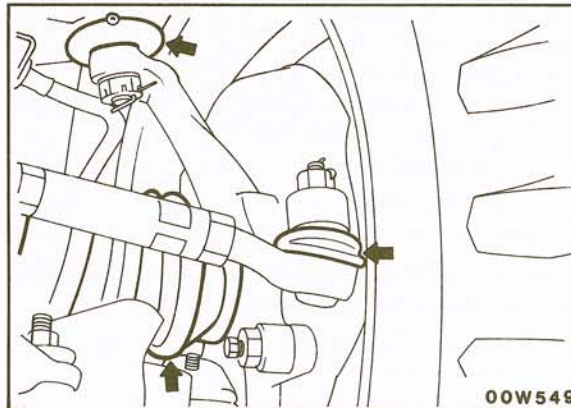
Damaged seals and boots should be replaced to prevent leakage or contamination of the grease.

Inspect the dust cover and boots for proper sealing, and check for leakage or damage. Replace if defective.

### UPPER CONTROL ARM BUSHINGS

Supply grease at the grease nipple until the grease comes out of the dust seal of the upper arm shaft.

Lubricate the upper control arm bushings with Multipurpose Grease, NLGI Grade 2 EP.



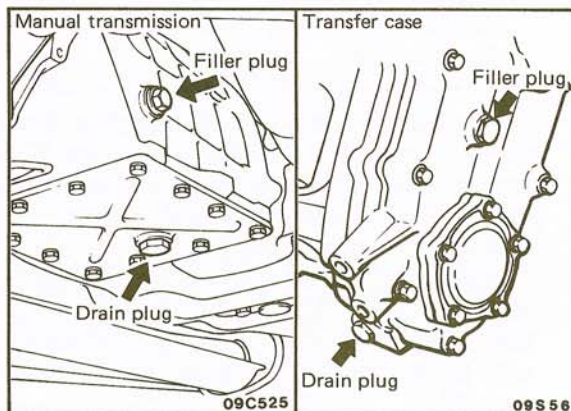
00W549

### MANUAL TRANSMISSION AND TRANSFER CASE (Oil change)

Fluid replacement is required every 48,000 km (30,000 miles) if the vehicle is used in severe usage conditions.

### AUTOMATIC TRANSMISSION AND TRANSFER CASE (Fluid change)

Fluid replacement is required every 48,000 km (30,000 miles).



09C525

09S561





# FRONT SUSPENSION

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## SPECIFICATIONS

### GENERAL SPECIFICATIONS

Suspension system	Independent double wishbone with torsion bar and telescopic shock absorber
Torsion bar	
Length x O.D. mm (in.)	1,277.5 x 24.5 (50.30 x .96)
Spring constant (wheel position) N/mm (lbs./in.)	22 (123)
Shock absorber	
Type	Hydraulic cylindrical double-acting type
Maximum length mm (in.)	335 (13.19)
Compressed length mm (in.)	215 (8.46)
Stroke mm (in.)	120 (4.72)
Damping force [at 0.3 m/sec. (0.984 ft./set.)]	
Expansion N (lbs.)	2,250 (495)
Contraction N (lbs.)	1,100 (242)
Wheel bearing	
Type	Tapered roller bearing
Dimensions (O.D. x I.D.) mm (in.)	
Outer	73.431 x 45.242 (2.891 x 1.781)
Inner	73.431 x 45.242 (2.891 x 1.781)
Drive shaft	
Joint type	Outer Inner
Length Right mm (in.)	B.J. D.O.J. 528.5 (20.8)
(Joint to joint) Left mm (in.)	605.6 (23.8)
Inner shaft	
Shaft overall length mm (in.)	431 (17.0)
Bearing	
O.D. x I.D. mm (in.)	62 x 35 (2.44 x 1.38)
Differential	
Final ring gear type	Hypoid gear
Reduction ratio	
Manual transmission	4.625
Optional for Federal (not available in California)	4.875
Automatic transmission	4.222
Optional for Federal (not available in California)	4.625
Differential gear type	Straight bevel gear
Number of teeth	
Drive gear	
Manual transmission	37
Optional for Federal (not available in California)	39
Automatic transmission	38
Optional for Federal (not available in California)	37
Drive pinion	
Manual transmission	8
Automatic transmission	9
Optional for Federal (not available in California)	8
Side gear	14
Pinion gear	10





## SERVICE SPECIFICATIONS

### Standard Values

Steering angle	
Inner wheel	33 $^{+0^{\circ}}_{-3^{\circ}}$
Outer wheel	29°
Toe-in   mm (in)	2-9 (.08-.35)
Camber	1° ± 30'
Caster	2° 55' ± 30'
Kingpin inclination angle	8°
Upper arm shaft starting torque   Nm (ft.lbs.)	15 (11)
Upper ball joint starting torque   Ncm (in. lbs.)	80-350 (7.0-30)
Upper arm shaft reference dimension   mm (in.)	72.5 (2.85)
Anchor arm reference dimension	
L.H.   mm (in.)	138-146 (5.43-5.75)
R.H.   mm (in.)	128-136 (5.04-5.35)
Stabilizer link assembly mounting   mm (in.)	16-18 (.69-.71)
bolt end reference dimension	
Stabilizer mounting bolt end   mm (in.)	16-18 (.69-.71)
reference dimension	
Shock absorber reference dimension   mm (in.)	16.3 (.64)
Clearance between bump stopper   mm (in.)	71 (2.8)
and bump stopper bracket	
Turning force of front hub assembly   N (lbs.)	4-18 (0.9-4.1)
Setting of D.O.J. boot length   mm (in.)	79 (3.1)
Drive shaft end play   mm (in.)	0.2-0.5 (.08-.20)
Automatic free-wheeling hub	
Brake contact surface depth   mm (in.)	11.8-12.2 (.46-.48)
Final ring gear backlash   mm (in.)	0.13-0.18 (.005-.007)
Drive pinion preload	
With oil seal   Ncm (in. lbs.)	100-130 (8.7-11.3)
Without oil seal   Ncm (in. lbs.)	7-100 (6.1-8.7)
Repair limits	
Front axle total backlash   mm (in.)	14 (.6)
Differential gear backlash   mm (in.)	0.15 (.006)
Ring gear runout   mm (in.)	0.05 (.002)
Automatic free wheeling hub	
Brake wear   mm (in.)	9.6 (.38)
Return spring deterioration   mm (in.)	35 (1.4)
Shift spring deterioration   mm (in.)	30 (1.2)
Service limits	
Lower ball joint end play   mm (in.)	0.5 (.02)
Drive shaft or inner shaft spline play   mm (in.)	0.5 (.02)





## SPECIFICATIONS

### TORQUE SPECIFICATIONS

Nm (ft.lb.)

Stabilizer bar bracket	8-12 (6-9)
Upper arm shaft to crossmember	100-120 (72-87)
Rebound stopper to upper arm	8-12 (6-9)
Upper ball joint to knuckle	60-90 (43-65)
Lower ball joint to knuckle	120-180 (87-130)
Front shock absorber to crossmember	12-18 (9-13)
Front shock absorber to lower arm	15-22 (11-16)
Lower arm shaft	140-160 (101-116)
Lower arm ball joint to lower arm	54-75 (39-54)
Bump stopper to lower arm	20-30 (14-22)
Anchor arm B	95-120 (69-87)
Anchor arm lock nut	40-50 (29-36)
Front hub to brake disc	50-60 (36-43)
Free wheeling hub body	50-60 (36-43)
Automatic free-wheeling hub cover	18-22 (13-16)
Manual free-wheeling hub cover	10-14 (7-10)
Right drive shaft to inner shaft	50-60 (36-43)
Differential mounting brackets to frame	80-100 (58-72)
Right differential mounting bracket to housing tube	80-100 (58-72)
Housing tube to differential carrier	80-100 (58-72)
Differential mounting bracket to differential carrier	80-100 (58-72)
Bracket to front suspension crossmember	30-42 (22-30)
Bracket to differential carrier	80-100 (58-72)
Filler plug	40-60 (29-43)
Cover	15-22 (11-16)
Vent plug	16-20 (12-14)
Differential case to ring gear	80-90 (58-65)
Bearing cap	55-65 (40-47)
Drain plug	60-70 (43-51)
Companion flange	160-220 (116-159)




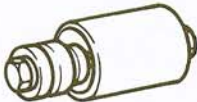







### LUBRICANTS

	Specified lubricant	Quantity
B.J. boot grease	Repair kit grease	100-150gr (3.5-5.3 oz.)
D.O.J. boot grease	Repair kit grease	100-150gr (3.5-5.3 oz.)
Conventional differential	Hypoid gear oil API classification GL-4 or GL-5 SAE viscosity No. 90	1.10 lit. (1.16 U.S. qt., 0.97 Imp. qt.)
Front hub bearing	Multipurpose grease SAE J310a, NLGI grade #2EP	As required
Automatic free-wheeling hub	Multipurpose grease SAE J310a, NLGI grade #2EP	As required
Upper and lower ball joints	Multipurpose grease SAE J310a, NLGI grade #2EP	As required



# SPECIAL TOOLS





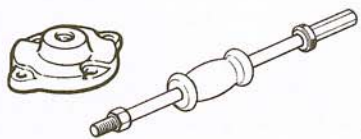

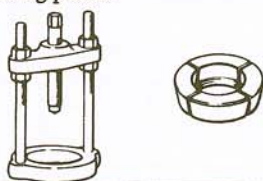

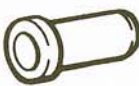



Tool (Number and name)	Use	Tool (Number and name)	Use
<b>MB991034</b> Gauge attachment 	Measurement of wheel alignment	<b>MB990799</b> Ball joint remover and installer A  <b>MB990800</b> Ball joint remover and installer B 	Removal and installation of upper arm ball joint
<b>MB990958</b> Torsion bar bushing remover and installer 	Removal and pressing of bushing A	<b>MB990883</b> Arbor 	Removal and pressing of the bushing B
<b>MB990635 “*”</b> Steering linkage puller 	Removal of knuckle Disconnection of tie rod Disconnection of upper ball joint	<b>MB990809 “*”</b> Pitman arm puller 	Removal of knuckle Disconnection of lower ball joint
<b>MB990954</b> Lock nut wrench 	Removal and adjustment of lock nut	<b>MB990925</b> Bearing and oil seal installer set 	Pressing of front axle hub bearing outer race Removal and pressing of drive pinion bearing outer race
<b>MD998360 “D”</b> Cylinder head bolt wrench 	Removal, installation and retightening of automatic free-wheeling hub	<b>MB990811</b> Differential side bearing cup 	Removal of side bearing inner race Disassembly and reassembly of automatic free-wheeling hub

“\*”, “D” see page 2 for instructions.






## SPECIAL TOOLS

Tool (Number and name)	Use	Tool (Number and name)	Use
MB990956 Needle bearing installer 	Pressing of needle bearing	MB990985 Oil seal installer 	Pressing of knuckle oil seal
MB990906 "*" MB990211 Drive shaft attachment Sliding hammer 	Removal and insertion of inner shaft assembly	MB990560 (A800ST15) "*" Bearing remover 	Removal and pressing of inner shaft bearing
MB990339 "*" MB990648 "*" (WT-00104) Bearing remover Bearing puller 	Removal of drive pinion front bearing inner race	MB990802 Bearing installer 	Pressing of drive pinion front bearing inner race Pressing of side bearing inner race
MB990031 Drive pinion oil seal installer 	Pressing of drive pinion oil seal	MB990810 "*" Side bearing puller 	Removal of side bearing inner race
MB990767 "D" End yoke holder 	Removal of companion flange	MB990955 Oil seal installer 	Pressing of front axle hub oil seal

"\*", "D" see page 2 for instructions.





Tool (Number and name)	Use
<b>MB990901 “*”</b> <b>Pinion height measurement gauge set</b>	Measurement of drive pinion height
	

“\*” see page 2 for instructions.

## TROUBLESHOOTING

Symptom	Probable cause	Remedy
Steering wheel is heavy, vibrates or pulls to one side	Suspension malfunction: Ball joint Torsion bar Wheel alignment	Inspect, adjust or replace appropriate parts (Refer to GROUP 19.)
Excessive vehicle rolling	Broken or deteriorated stabilizer Shock absorber malfunctioning	Replace
Poor riding	Excessive tire inflation pressure	Adjust the tire inflation pressure (Refer to GROUP 22.)
	Shock absorber malfunctioning Deteriorated bump stopper or rebound stopper Worn or deformed torsion bar support	Replace
	Deformed torsion bar	Replace
	Broken or deteriorated torsion bar	Replace
Noise	Loose or deformed anchor bolt	Retighten or replace
	Worn torsion bar serration Oil leakage from shock absorber	Replace
	Inadequate lubrication of various sections	Lubricate
	Worn or deformed bushing Shock absorber malfunctioning	Replace
Vehicle leans to one side	Anchor arm assembly not installed in correct position Inadequately tightened anchor bolt	Retighten or replace
	Deformed crossmember Broken or deteriorated torsion bar	Replace





## TROUBLESHOOTING

Symptom	Probable cause	Remedy
<b>MANUAL FREE-WHEELING HUB, FRONT AXLE HUB, KNUCKLE</b>		
Noise due to excessive play of wheel in the direction of rotation	Play in free-wheeling hub serration	Adjust or replace
Noise due to excessive wheel end play	Wheel bearing play, seizure, wear	Check, and adjust or replace if necessary
	Knuckle needle bearing play, seizure, wear	Replace
	Free-wheeling hub serration play	Adjust or replace
	Free-wheeling hub looseness	Tighten or replace
Steering wheel shimmy	Wheel bearing wear, play, seizure	Check, and adjust or replace if necessary
	Free-wheeling hub serration play	Adjust or replace
Car pulls to one side	Wheel bearing wear, play, seizure	Check, and adjust or replace if necessary
	Free-wheeling hub serration play	Adjust or replace
<b>AUTOMATIC FREE-WHEELING HUB</b>		
Does not lock	Brake sliding portion worn Brake B lug broken Housing damaged	Replace parts and adjust shims on hub mounting surface shims
	Drive gear damaged Slide gear damaged Retainer A damaged Cam damaged Shift spring deteriorated Slide gear C-ring out of position	Replace parts
	Automatic free-wheeling hub mounting bolts loose	Retighten mounting bolts
Locks but does not become free	Return spring deteriorated Slide gear snap ring out of position	Replace parts
	Foreign substance on tooth surfaces of drive gear and slide gear Foreign substance on tooth surfaces of slide gear and housing gear	Clean tooth surfaces or replace parts
	Excessive front power train resistance	Adjust differential preload



## TROUBLESHOOTING



Symptom	Probable cause	Remedy
Ratcheting occurs easily	Water in brake	Clean and apply grease
	Retainer B worn Slide gear damaged Housing gear damaged Shift spring deteriorated Slide gear C-ring out of position	Replace parts
	Automatic free-wheeling hub mounting bolts loose	Retighten the mounting bolts
<b>DRIVE SHAFT, INNER SHAFT</b> Noise during tire rotation	Housing tube bent Inner shaft bent Inner shaft bearing worn, pounding	Replace
	Drive shaft assembly worn, damaged, bent	Check or replace
Noise due to excessive play of wheel in turning direction	Inner shaft and side gear serration play Drive shaft and side gear serration play Drive shaft and drive flange play	Adjust or replace
Noise due to excessive wheel end play	Drive shaft and drive flange end play	Adjust or replace
	Drive flange looseness	Tighten or replace
Steering wheel shimmy	Drive shaft assembly bent, damaged, worn	Replace
	Drive shaft assembly and drive flange play	Adjust or replace
Car pulls to one side	Drive shaft assembly and drive flange play	Adjust or replace
<b>DIFFERENTIAL</b> Constant noise	Improper adjustment of ring gear and drive pinion (poor meshing) Loose, worn or damaged side bearing Loose, worn or damaged drive pinion bearing	Correct or replace
	Worn ring gear or drive pinion Worn side gear thrust washer or pinion shaft Deformed ring gear or differential case Damaged gear	Replace
	Foreign material	Eliminate the foreign material and check; replace the parts if necessary
	Insufficient oil	Replenish





## TROUBLESHOOTING

Symptom	Probable cause	Remedy
Gear noise while driving	Poor gear engagement Improper gear adjustment Improper drive pinion preload adjustment	Correct or replace
	Damaged gear	Replace
	Foreign material	Eliminate the foreign material and check; replace the parts if necessary
	Insufficient oil	Replenish
Gear noise while coasting	Improper drive pinion preload adjustment	Correct or replace
	Damaged gear	Replace
Bearing noise while driving or coasting	Cracked or damaged drive pinion rear bearing	Replace
Noise while turning	Loose side bearing Damaged side gear, pinion gear or pinion shaft	Replace
Heat	Insufficient gear backlash Excessive preload	Adjust
	Insufficient oil	Replenish
Oil leakage	Clogged vent plug	Clean or replace the parts
	Loose cover Poor sealing	Retighten, apply sealant, or replace the gasket
	Worn or damaged oil seal	Replace
	Excessive oil	Adjust the oil level



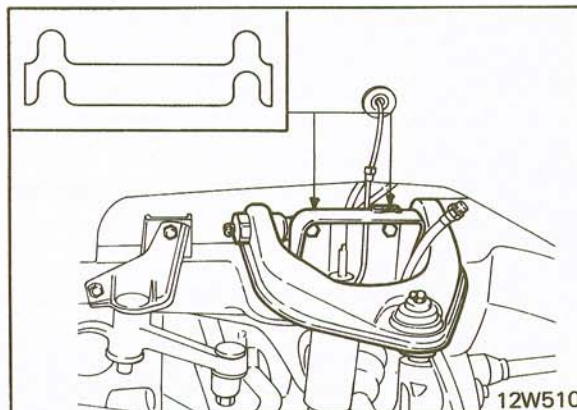


## INSPECTION AND ADJUSTMENT OF THE WHEEL ALIGNMENT

### Camber

1. Remove the free-wheeling hub and mount the special tool onto the front hub.
2. Measure the camber with a camber/caster/kingpin gauge.
3. Make adjustment of the camber by increasing or decreasing the thickness of the adjusting shims between the upper arm shaft and the crossmember. (12W510)

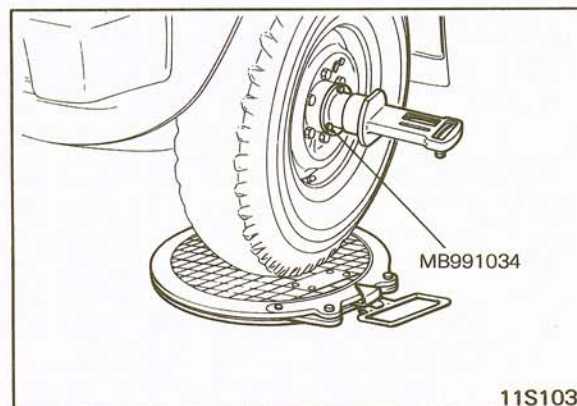
Camber .....  $1^{\circ} \pm 30'$



### Caster

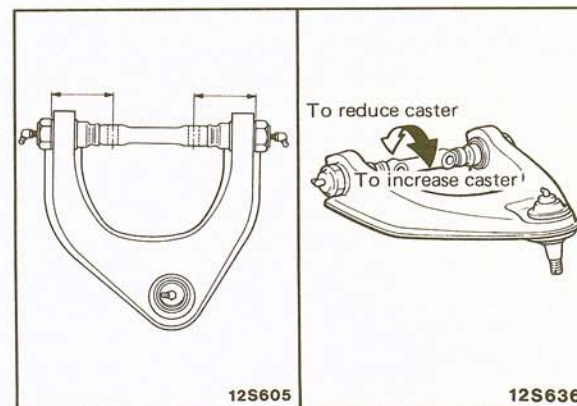
1. Remove the free-wheeling hub and mount the special tool onto the front hub.
2. Measure caster with a camber/caster/kingpin gauge and a turning radius gauge. (11S103)

Caster .....  $2^{\circ} 55' \pm 30'$



3. If caster does not meet specifications, remove the upper arm from the crossmember and then adjust by turning the upper arm shaft.

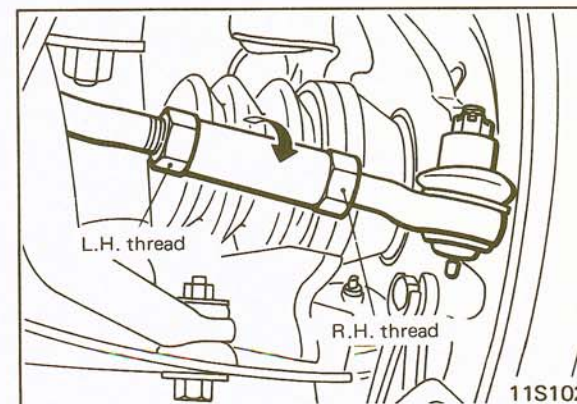
Upper arm shaft reference dimension .....  
72.5 mm (2.85 in.)



### Toe-in

1. If the toe-in does not agree with the standard value, use the left and right tie rod turnbuckles to adjust it. (11S102)
2. Make the adjustment by turning the left and right turnbuckles the same amount in opposite directions. The toe-in value will decrease if the left turnbuckle is turned toward the front of vehicle and the right one is turned toward the rear, and vice A half-turn of the turnbuckles will result in an approximately 7.5 mm (.29 in.) adjustment in the toe-in.

Toe-in ..... 2-9 mm (.08-.35 in.)







### FRONT AXLE TOTAL BACKLASH

If the vehicle vibrates and produces a booming sound due to the unbalance of the drivetrain, measure the front axle total backlash as follows to see if the differential carrier assembly requires removal.

- (1) For vehicles equipped with free-wheeling hubs, set the hubs for 4-wheel drive.

#### NOTE

For vehicles with manual free-wheeling hubs, set the control handle to the "LOCK" position.

For vehicles with automatic free-wheeling hubs, set the transfer shift lever to "4H" and drive 1 to 2 m to engage the hubs with the drive shafts.

- (2) Secure the wheels and set the transfer control lever to "2H".

#### NOTE

If the vehicle is raised on a jack, the wheels will turn and it will not be possible to measure the backlash.

- (3) Turn the companion flange clockwise until all play is removed. Make mating marks on the dust cover of the companion flange and on the differential carrier. (Y11503)
- (4) Turn the companion flange counterclockwise until all play is removed and measure the amount of distance through which the mating marks moved. (11Y504)
- (5) If the backlash exceeds the repair limit, remove the differential carrier assembly and adjust the backlash and drive shaft or inner shaft spline play.

---

Front axle total backlash [Repair limit] .....  
14 mm (.6 in.)

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### CHECKING GEAR OIL LEVEL

Remove the filler plug and check the oil level. The oil level should be somewhere within 8 mm (.31 in.) from the bottom of the filler plug hole.

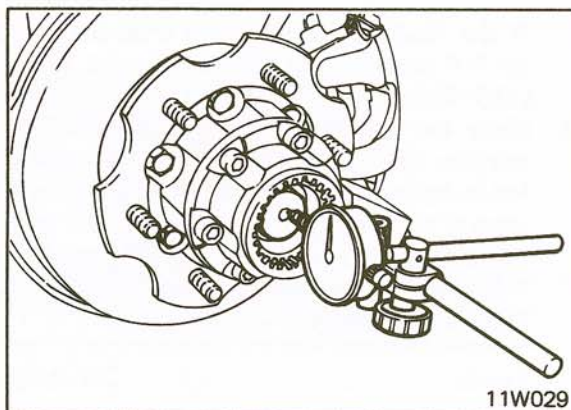
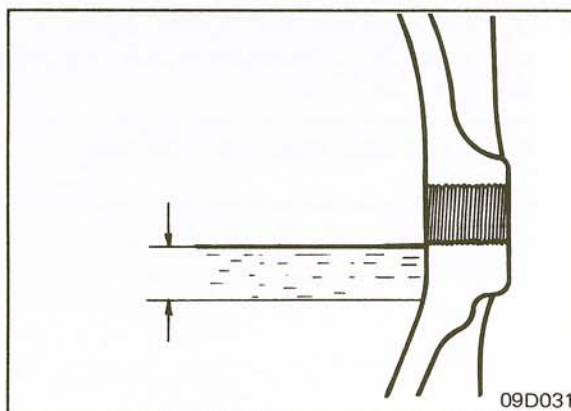
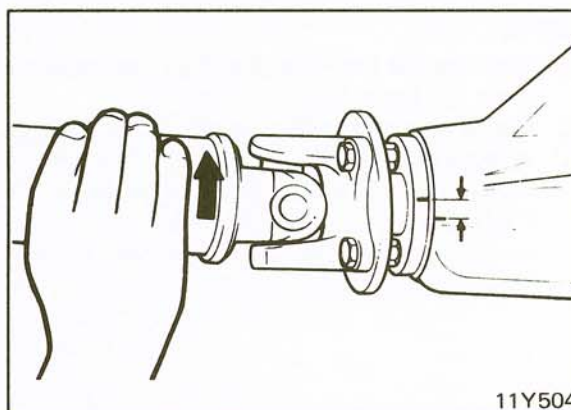
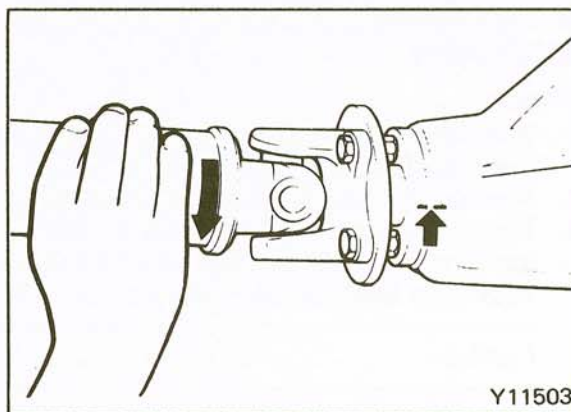
### INSPECTION OF DRIVE SHAFT END PLAY

Measure drive shaft end play with a dial indicator.

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Drive shaft end play . . . . 0.2-0.5 mm (.008-.020 in.)

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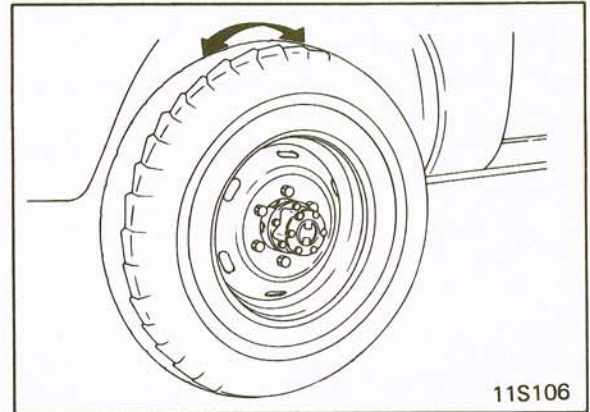


### HEEL BEARING PLAY INSPECTION

1. Inspect the play of the bearings while the vehicle is jacked up. (11S106)
2. If there is play, adjust by tightening the lock nuts. (Refer to p. 2-29.)

#### Caution

Do not confuse the end play of the bearings with the play of ball joint.

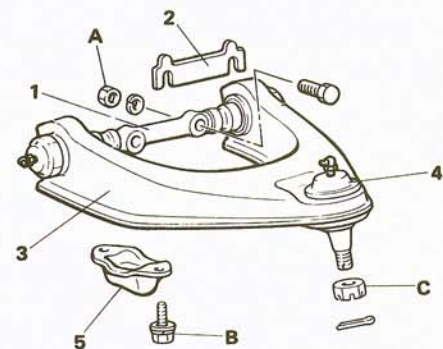


11S106

### UPPER ARM COMPONENTS

1. Upper arm shaft
2. Adjusting shim
3. Upper arm
4. Upper ball joint
5. Rebound stopper

	Nm	ft. lbs.
A	100-120	72-87
B	8-12	6-9
C	60-90	43-65



11W517

### REMOVAL

1. Loosen the anchor bolt of the torsion bar all the way. (Refer to p. 2-20.)
2. Remove the lower part of the shock absorber. (Refer to p. 2-24.) (12W504)
3. Discharge brake fluid and disconnect the brake hose. (Refer to GROUP 5.) (12W504)
4. Loosen the nut holding the upper ball joint to the knuckle.

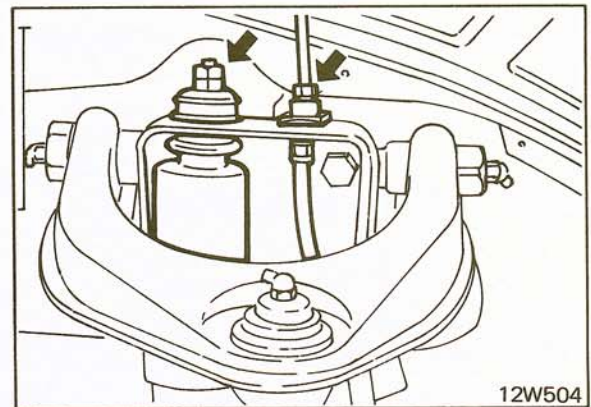
#### NOTE

The nut should only be partially loosened and should not be removed.

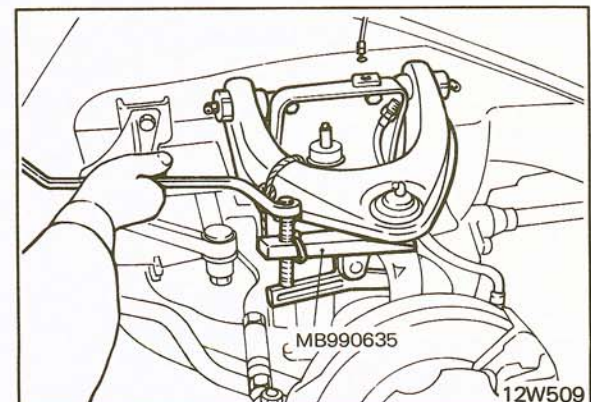
5. Using the special tool, disconnect the upper ball joint from the knuckle. (12W509)

#### Caution

Tie the special tool to the upper arm with rope to prevent bouncing.



12W504



12W509



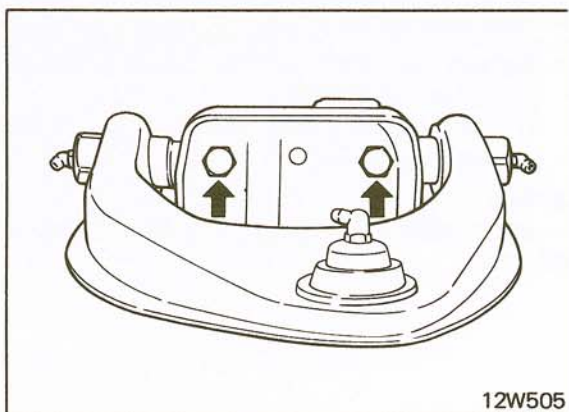


6. Remove the upper arm from the crossmember.

### NOTE

The camber adjustment shims should be marked for reference during assembly.

Do not turn the upper arm shaft, since it changes the caster.

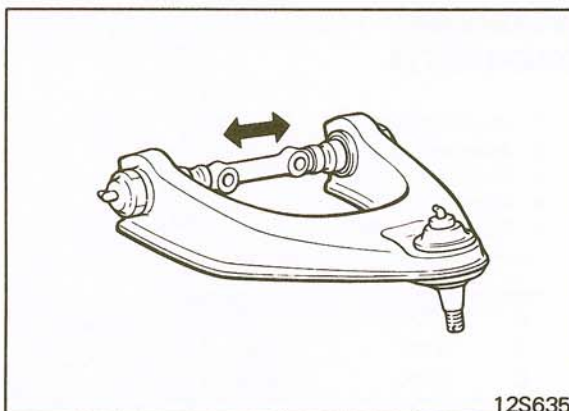


### INSPECTION

1. Check upper arm for deformation or cracks.
2. Check upper arm shaft for bends or cracks.

#### Inspection for Play of the Upper Arm Shaft

1. With the upper arm assembly held in a vice, move the upper arm shaft to check for play.
2. If the upper arm shaft has play, replace the upper arm assembly. (12S635)

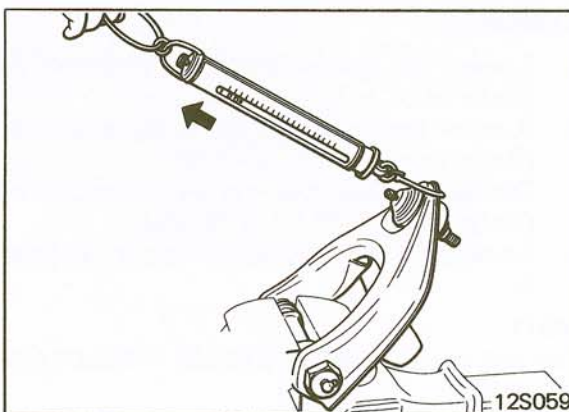


#### Measurement of the Upper Arm Shaft Starting Torque

1. With the upper arm shaft held in a vice, measure the upper arm shaft starting torque with a spring scale. (12S059)

Upper arm shaft starting torque .....  
15 Nm (11 ft.lbs.)

2. If the upper arm shaft starting torque exceeds the standard value, replace the upper arm assembly.

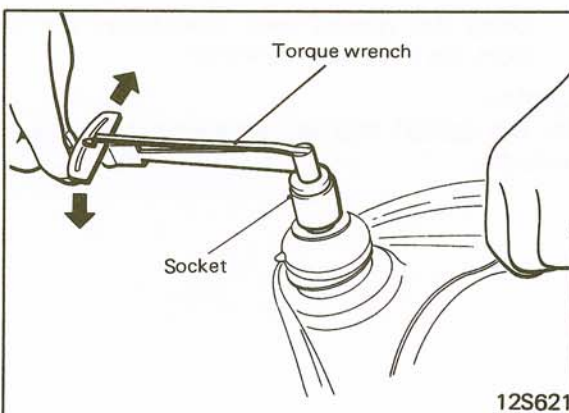


#### Measurement of the Upper Ball Joint Starting Torque

1. Measure the upper ball joint starting torque with a torque wrench. (12S621)

Upper ball joint starting torque .....  
80-350 Ncm (7.0-30 in. lbs.)

2. If the upper ball joint starting torque is out of specification, replace the upper ball joint.

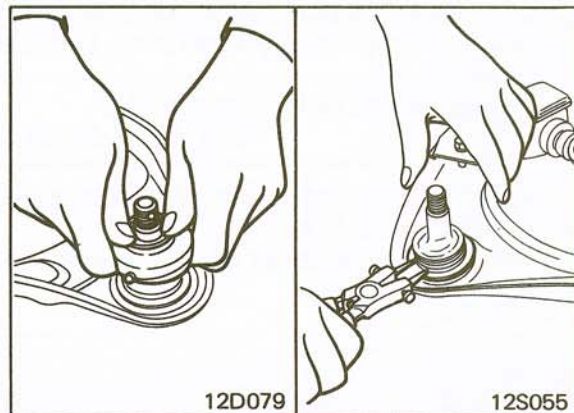




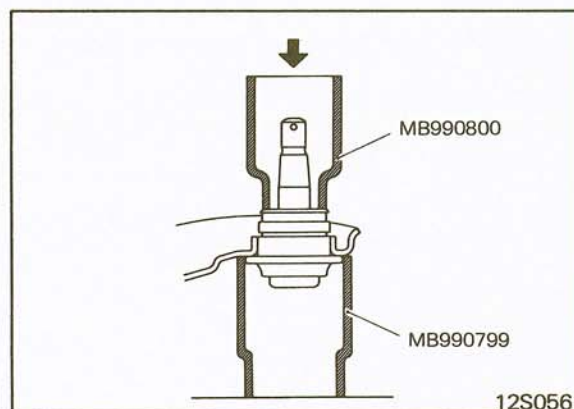


## UPPER BALL JOINT REPLACEMENT

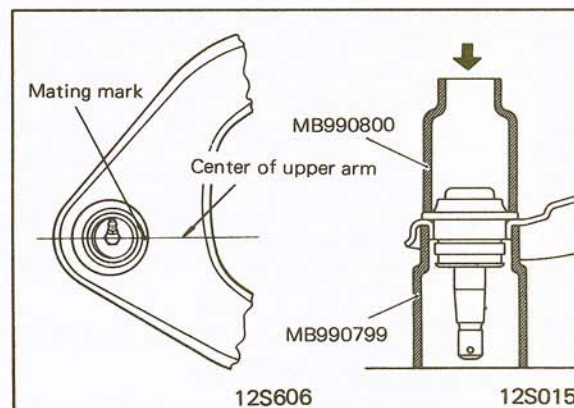
1. Remove the dust cover together with the ring. (12D079)
2. Remove the snap ring from the upper ball joint. (12S055)



3. Press the upper ball joint out of the upper arm with the special tools.



4. Use the special tools illustrated to press the new ball joint into the upper arm. Be sure to align the mating mark with the upper arm center.

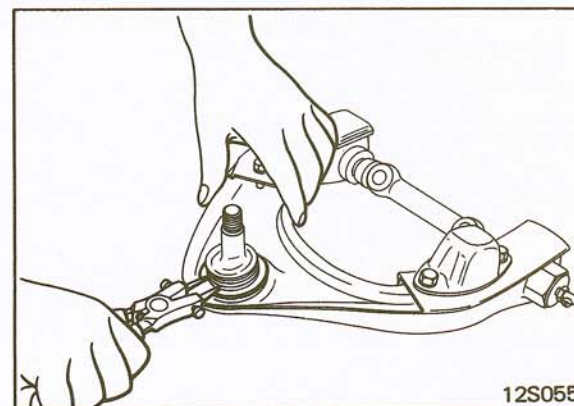


5. Using snap ring pliers, fit the snap ring securely into the groove of the joint case.

### Caution

Be careful not to distort the snap ring.

Check to ensure that there is no play between the ball joint groove and snap ring. If there is play, replace the snap ring with a new one.





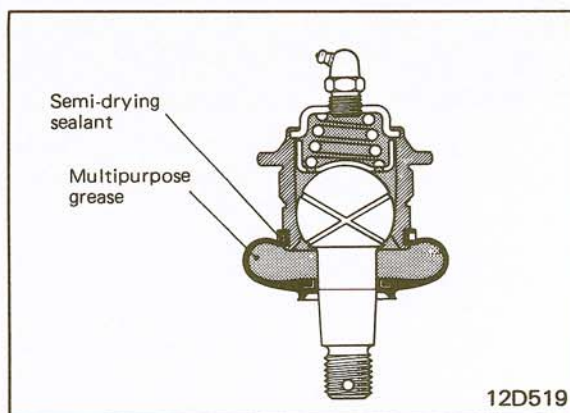


## COMPONENT SERVICE-UPPER ARM

6. Apply multipurpose grease to both the interior of the dust cover and the upper ball joint. (12D519)

Recommended multipurpose grease . . . . .  
SAE J310a, NLGI grade #2EP

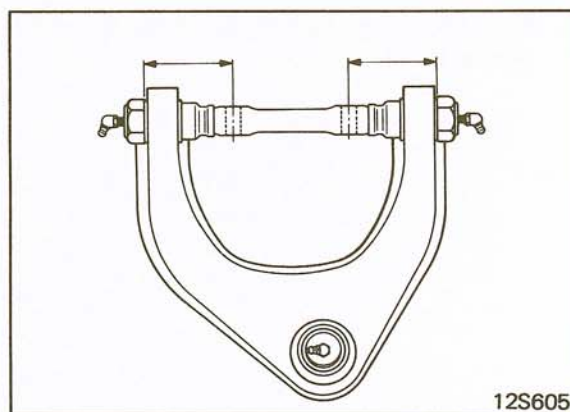
7. Apply semi-drying sealant to the grooves in the upper ball joint. (12D519)
8. Secure the dust cover to the upper ball joint with the ring.



9. Turn the shaft the amount necessary to obtain the reference dimension. (Refer to p. 2-11.)

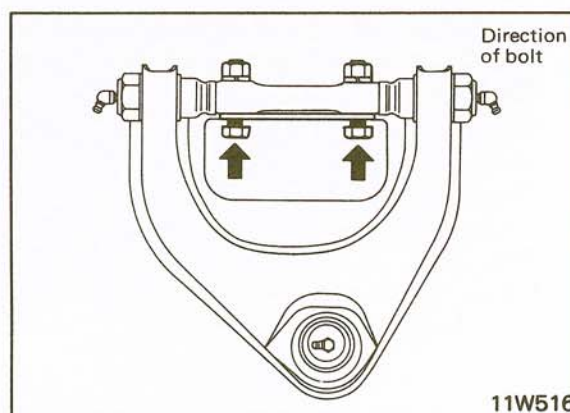
### Caution

The dimension shown in the illustration determine caster.



## INSTALLATION

1. When installing the upper arm assembly onto the crossmember, insert the upper arm shaft mounting bolts from the outside of the crossmember and put adjusting shims between the crossmember and upper arm shaft. (11W516)
2. Tighten the torsion bar anchor bolts to the reference dimension. (Refer to p. 2-21.)
3. Tighten the lower arm mounting bolts to specifications with the vehicle unladen.
4. Check the wheel alignment.
5. Torque all parts to specifications during assembly.





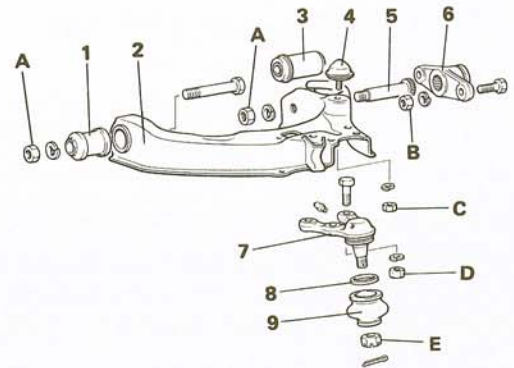


## COMPONENTS

1. Bushing B
2. Lower arm assembly
3. Bushing A
4. Bump stopper
5. Lower arm shaft
6. Anchor arm B
7. Lower ball joint
8. Ring
9. Dust cover

	Nm	ft.lbs.
A*	140-160	101-116
B	95-120	69-87
C	20-30	14-22
D	54-75	39-54
E	120-180	87-130

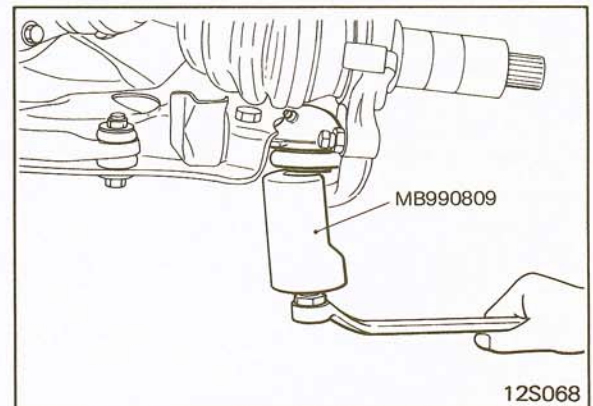
\*To be tightened with vehicle lowered to the ground.



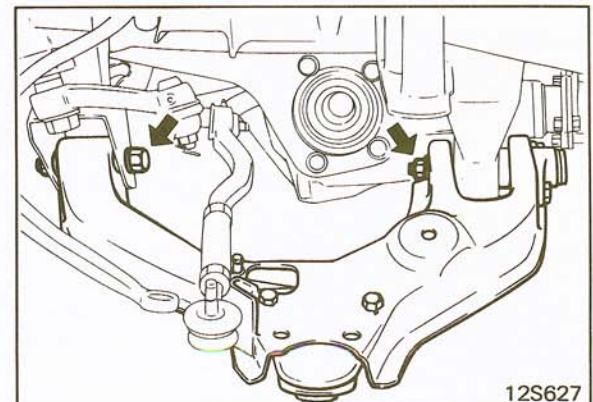
12S038

## REMOVAL

1. Remove the front skid plate and under cover.
2. Remove the torsion bar. (Refer to p. 2-20.)
3. Remove the stabilizer bar. (Refer to p. 2-23.)
4. Remove the lower portion of the shock absorber. (Refer to p. 2-24.)
5. Remove the nut which retains the lower ball joint to the knuckle.
6. Using the special tool, disconnect the lower ball joint from the knuckle. (12S068)
7. Remove the front mounting bolts of the lower arm. (12S627)
8. Remove the lower arm assembly.
9. Remove anchor arm B if necessary.



12S068

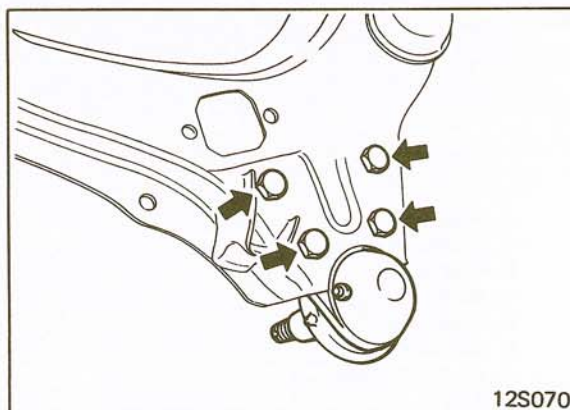


12S627





10. Remove the lower ball joint. (12S070)
11. Remove the dust cover and ring.



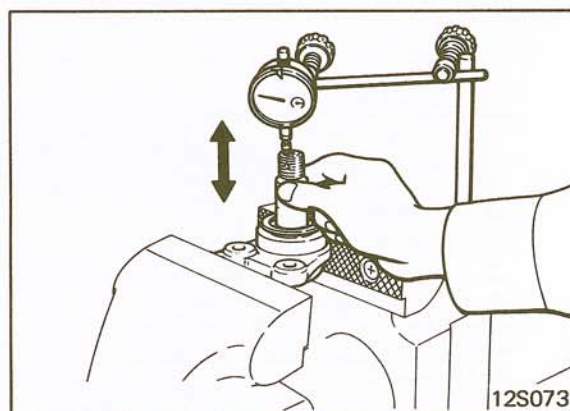
### INSPECTION

1. Check lower arm for cracks and deformation.
2. Check anchor arm for worn and damage.
3. Check lower ball joint dust boot for cracks and deterioration.

### Measurement of the Lower Ball Joint End Play

1. Measure the lower ball joint end play with a dial indicator. (12S073)

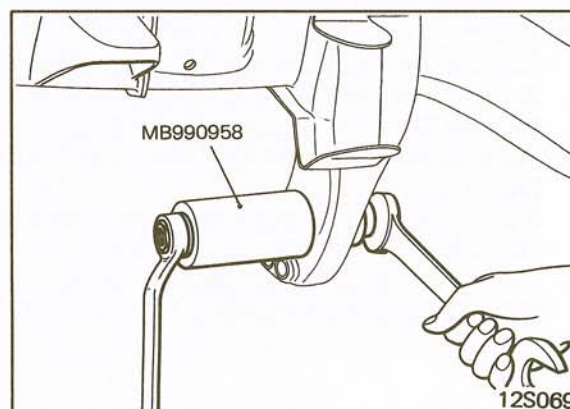
Lower ball joint end play  
[Service limit] . . . . . 0.5 mm (.02 in.)



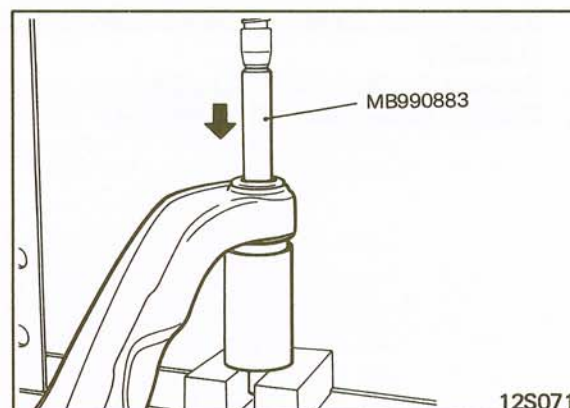
2. If the lower ball joint end play exceeds the service limit, replace the lower ball joint.

### Replacement of Lower Arm Bushing

1. Using the special tool, remove bushing A from the crossmember bracket.



2. Remove bushing B from the lower arm using the special tool.



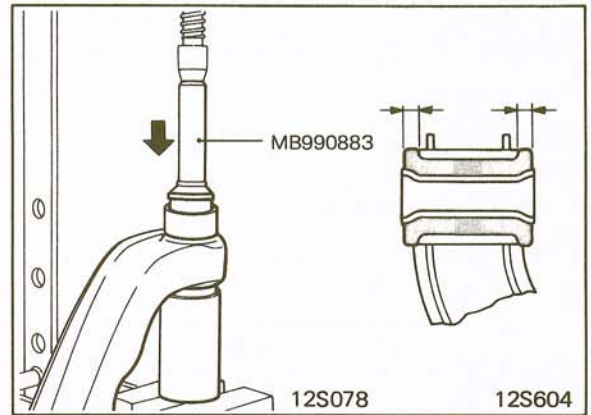




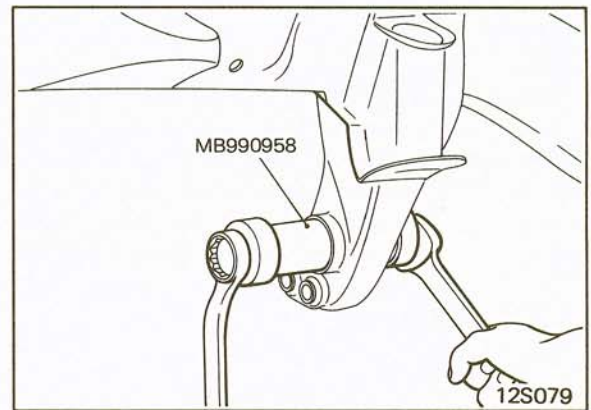
- Coat bushing B and the lower arm with a soap solution and press bushing B into the lower arm with the special tool. Take care not to twist or tilt bushing B.

## NOTE

Press the bushing again from the opposite side if necessary, to equalize the amount of projections at both ends.



- Using the special tool, press bushing A into the cross-member bracket.

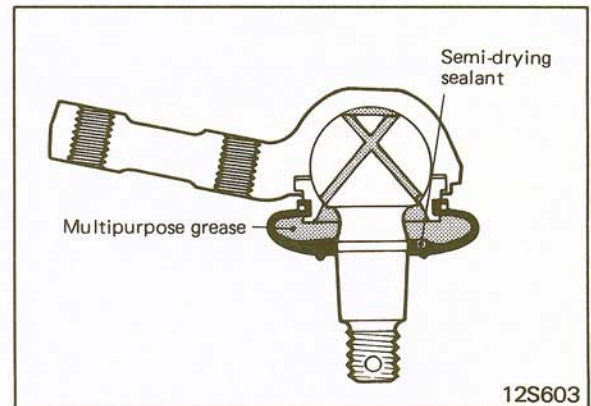


## Replacement of Lower Ball Joint Dust Boot

- Apply the specified multipurpose grease to the interior of the dust cover and to the lower ball joint. (12S603)

Recommended multipurpose grease . . . . .  
SAE J310a, NLGI grade #2EP

- Apply the specified semi-drying sealant to the grooves in the lower ball joint. (12S603)
- Secure the dust cover to the lower ball joint with the ring.



## INSTALLATION

- Temporarily mount the lower arm shaft to the cross-member. (12S627)

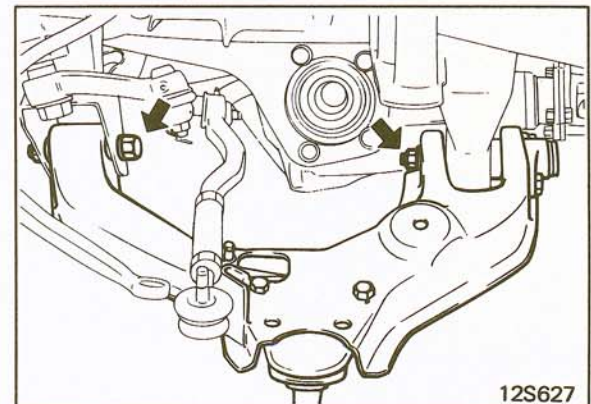
## NOTE

Work will be easier if a solution of neutral detergent is applied to the lower arm shaft and to the rubber bushing.

## Caution

Tighten the lower arm shaft with the vehicle lowered to the ground and unladen.

- Install the shock absorber. (Refer to p. 2-24.)
- Install the torsion bar. (Refer to p. 2-21.)
- Install the stabilizer bar. (Refer to p. 2-23.)
- Torque all parts to specifications during assembly.



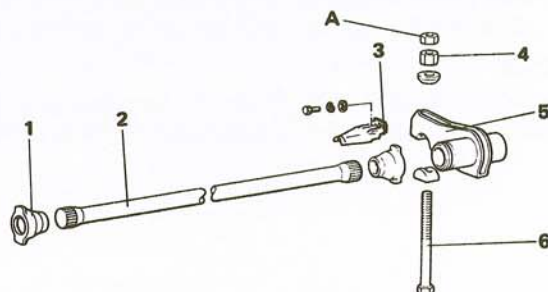




### COMPONENTS

1. Dust cover
2. Torsion bar
3. Heat protector
4. Adjusting nut
5. Anchor arm assembly
6. Anchor bolt

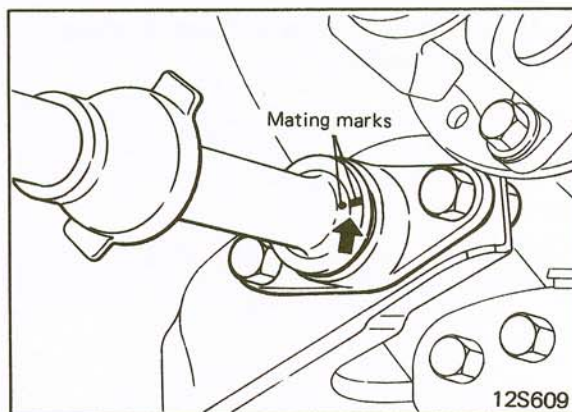
	Nm	ft.lbs.
A	40-50	29-36



12W519

### REMOVAL

1. Support the vehicle with floor stands at the specified points.
2. Support the lower arm from which the torsion bar is to be removed, with a jack.
3. Detach the torsion bar dust covers from the anchor arm assembly and anchor arm B, respectively.
4. Put a mating mark on the torsion bar in alignment with the mark on anchor arm B. (12S609)

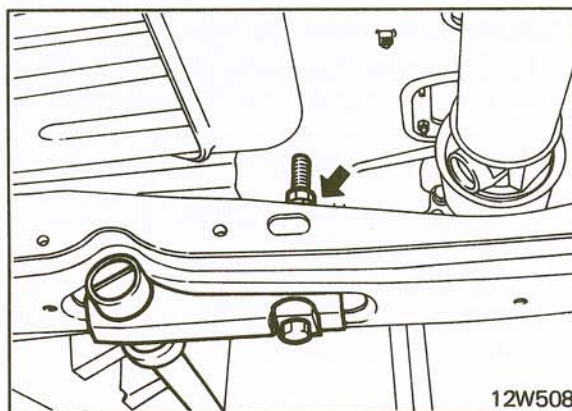


5. Loosen the adjusting nut and pull the torsion bar out of anchor arm B. (12W508)

#### NOTE

Remove the anchor arm assembly as necessary to facilitate removal of the torsion bar.

6. Detach the stabilizer bar from the lower arm assembly.



### INSPECTION

1. Check torsion bar for bend and damage.
2. Check dust cover for cracks and damage.
3. Check anchor bolt for bend.

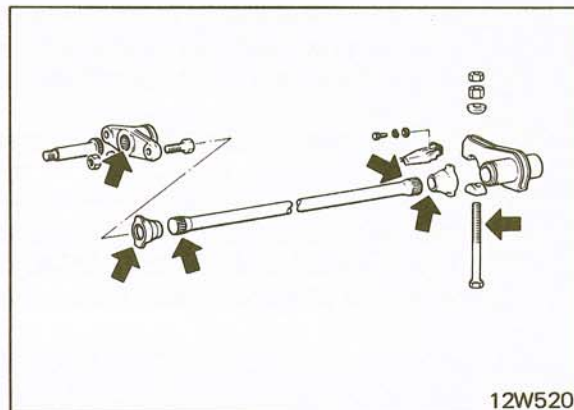




## INSTALLATION

1. Apply multipurpose grease to the torsion bar serrations, the anchor arm assembly serrations, the anchor arm B serrations, the inside of the dust boot and the anchor bolt threads.

Recommended multipurpose grease .....  
SAE J310a NLGI grade #2EP

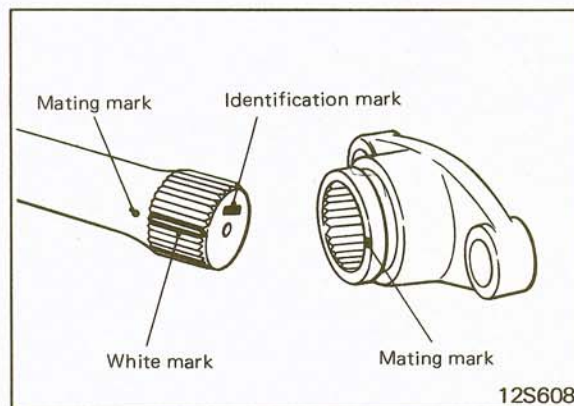


12W520

2. Identify the right and left torsion bars referring to the identification mark.
3. When inserting the torsion bar into anchor arm B, face the end having the identification mark forward and align the mark on anchor arm B with the mating mark on the torsion bar. (12S608)

### NOTE

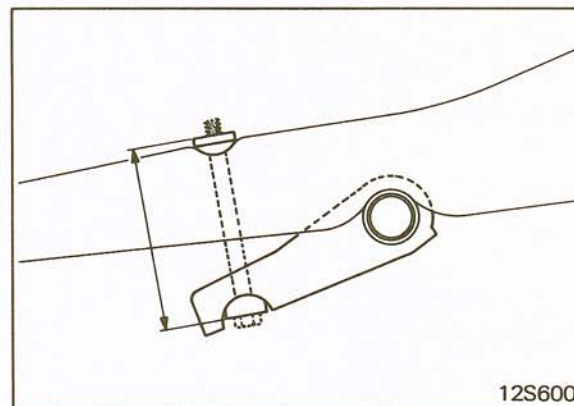
When installing a new torsion bar, align the serration which has been painted white with the mark on anchor arm B.



12S608

4. Select the relative position of the torsion bar and anchor arm serrations so that the length shown in the illustration is within the specified dimension when the torsion bar and the anchor arm are assembled, with the upper arm rebound stopper in contact with the crossmember.

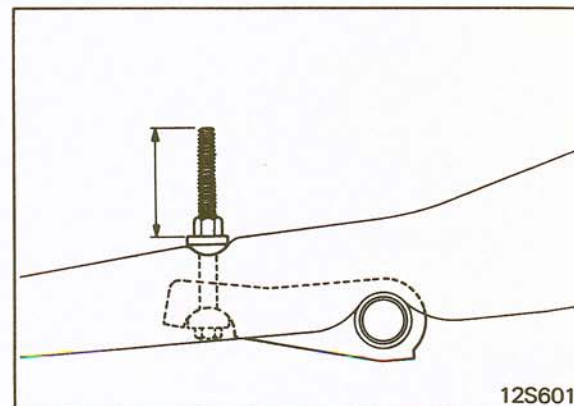
Anchor arm reference dimension .....  
L.H. side 138-146 mm (5.43-5.73 in.)  
R.H. side 128-136 mm (5.04-5.35 in.)



12S600

5. Tighten the adjusting nut so that the anchor bolt protrusion will become the dimension as follows.

Anchor bolt protrusion ..... L.H. 55 mm (2.17 in.)  
R.H. 68 mm (2.68 in.)



12S601





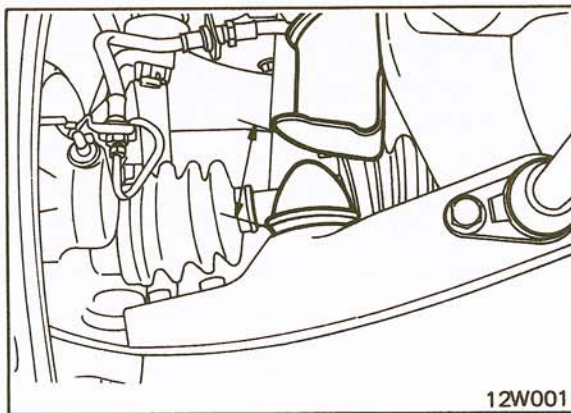
6. With the vehicle unladen, measure the clearance between the bump stopper and the bump stopper bracket to confirm that it agrees with the specification. (12W001)

---

Clearance between bump stopper and bump stopper bracket ..... 71 mm (2.8 in.)

---

7. If the clearance does agree with the specification, use the adjusting nut on the anchor bolt to adjust it.
8. Torque all parts to specifications during assembly.



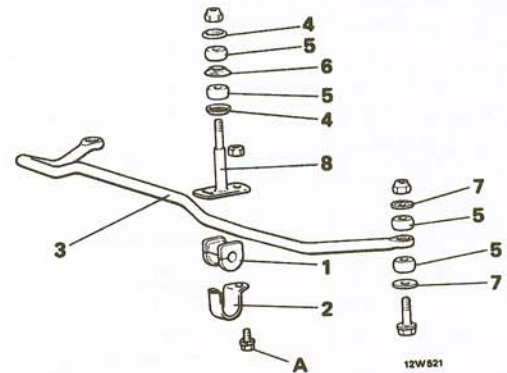




## COMPONENTS

1. Bushing
2. Stabilizer bracket
3. Stabilizer bar
4. Joint cup A
5. Rubber bushing
6. Joint cup B
7. Washer
8. Stabilizer link

	Nm	ft.lbs.
A	8-12	6-9



## REMOVAL

1. Support the vehicle with floor stands at the specified points.
2. Remove the skid plate.
3. Remove the stabilizer bar. (12W513)

## INSPECTION

1. Check stabilizer bar for deformation or damage.
2. Check stabilizer link for bending or damage.
3. Check bushings for cracks, deterioration or wear.

## INSTALLATION

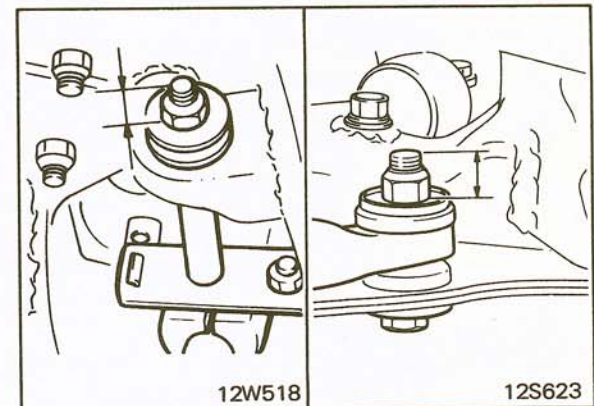
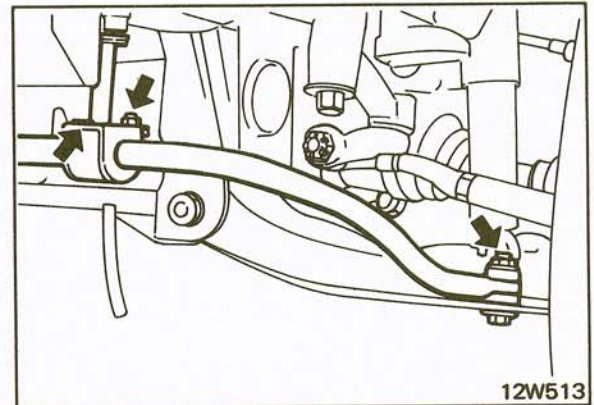
1. When mounting the stabilizer link to the No. 1 crossmember, tighten the nut so as to obtain the specified dimension. (12W518)

Stabilizer link assembly mounting bolt end reference dimension . . . . . 16-18 mm (.63-.71 in.)

2. When mounting the ends of the stabilizer bar to the lower arms, tighten the nut so as to obtain the specified dimension. (12S623)

Stabilizer mounting bolt end reference dimension . . . . . 16-18 mm (.63-.71 in.)

3. Torque all parts to specifications during assembly.





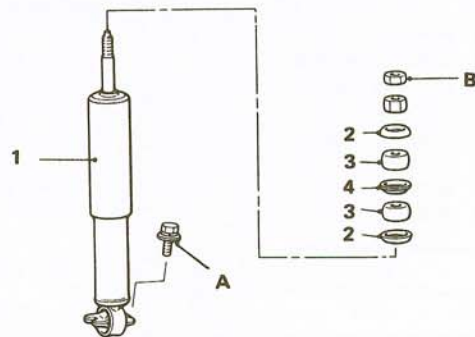


## COMPONENT SERVICE-SHOCK ABSORBER

### COMPONENTS

1. Shock absorber
2. Joint cup A
3. Bushing
4. Joint cup B

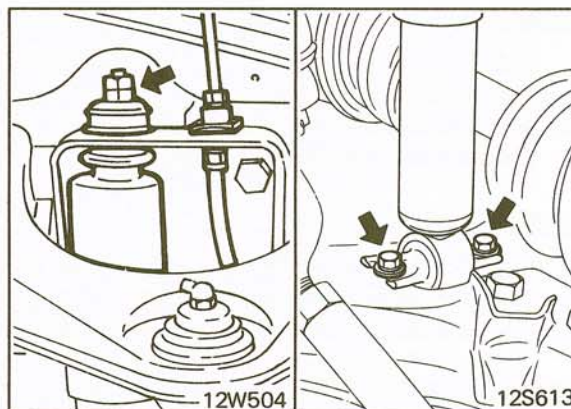
	Nm	ft. lbs.
A	15-22	11-16
B	12-18	9-13



12S087

### REMOVAL

Remove the shock absorber.



### INSPECTION

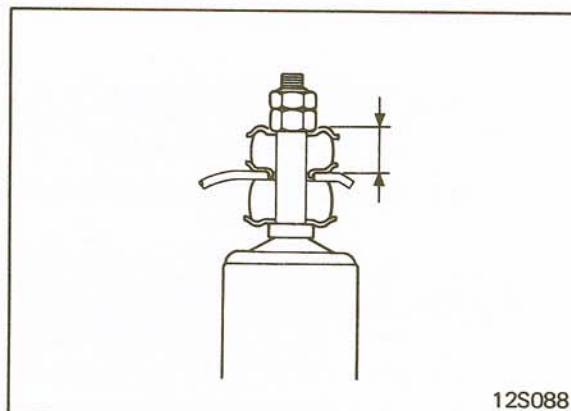
1. Check shock absorbers for malfunctions, oil leakage or noise.

### INSTALLATION

1. When mounting the shock absorber to the arm post of the side frame, tighten until the distance from joint cup A to joint cup B agrees with the reference dimension.

Shock absorber reference dimension .....  
16.3 mm (.64 in.)

2. Torque all parts to specifications during assembly.



12S088

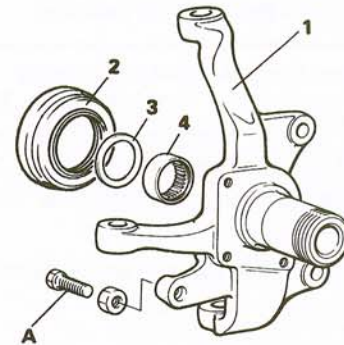




## COMPONENTS

1. Knuckle
2. Oil seal
3. Spacer
4. Needle bearing

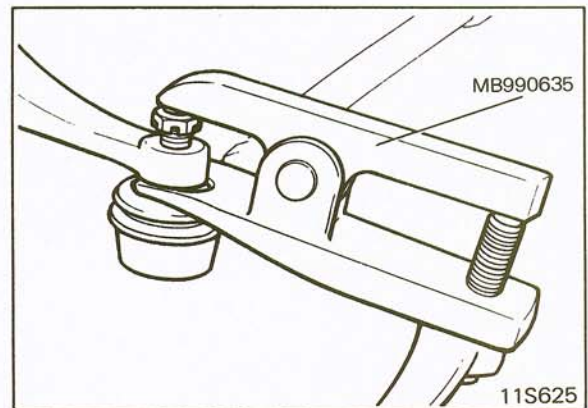
	Nm	ft. lbs.
A	50-60	36-43



11S680

## REMOVAL

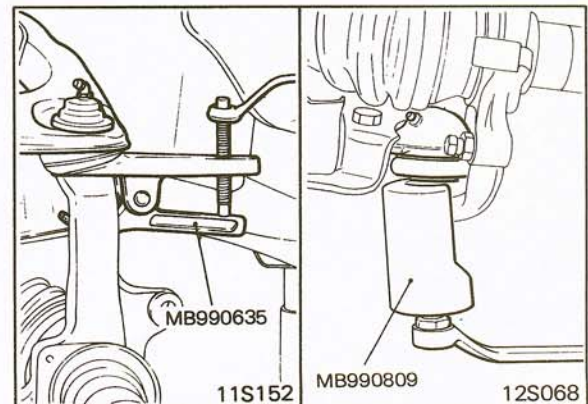
1. Remove the front hub assembly. (Refer to p. 2-27.)
2. Remove the dust cover.
3. Disconnect the tie rod from the knuckle with a special tool. (11S625)



4. Using the special tools, remove the upper and lower ball joints. (11S152, 12S068)
5. Remove the knuckle from the drive shaft.

## INSPECTION

1. Check needle bearing for wear or damage.
2. Check knuckle for cracks or bends.
3. Check knuckle spindle for wear or pounding.

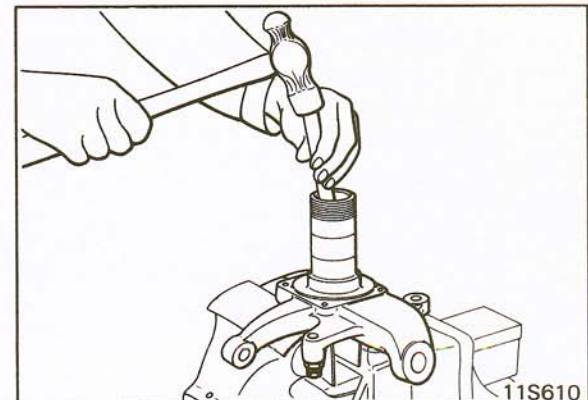


## BEARING REPLACEMENT

1. Remove the oil seal and then remove the spacer.
2. Remove the needle bearing by tapping the needles uniformly. (11S610)

### Caution

Once removed, the needle bearing must not be reused.







## COMPONENT SERVICE-KNUCKLE

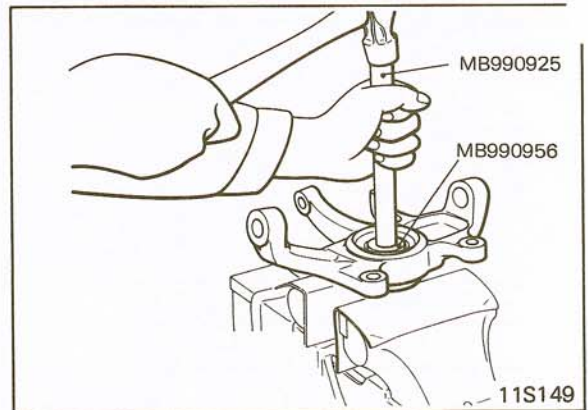
3. Apply the specified multipurpose grease to the roller surface of the new needle bearing.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

4. Press the needle bearing with the special tools until it is flush with the knuckle end face. (11S149)

### Caution

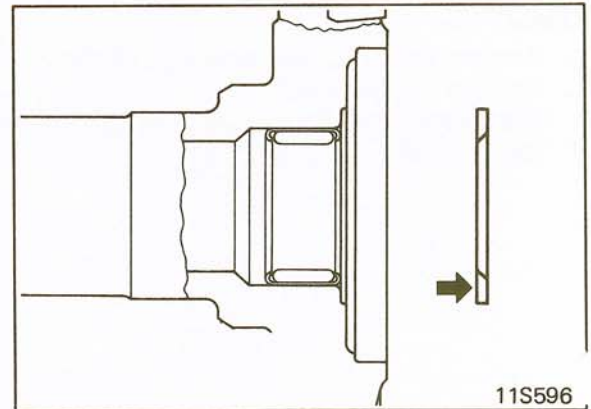
Use care to avoid driving the needle bearing too far in.



5. Apply the specified multipurpose grease to the knuckle contacting surface of the spacer. (11S596)

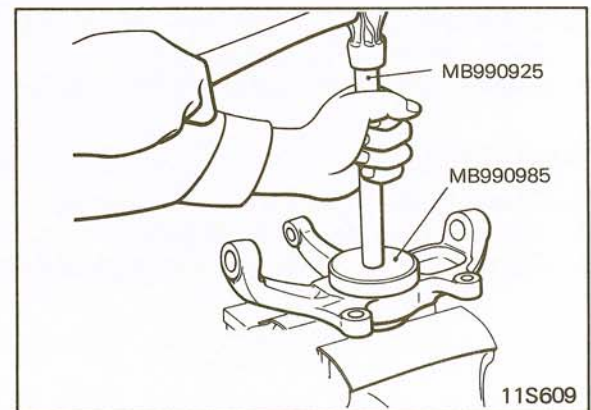
Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

6. Install the spacer onto the knuckle with the chamfered side toward the center of vehicle.



7. Press the new oil seal with the special tools until it is flush with the knuckle end face. (11S609)
8. Apply the specified multipurpose grease to the inside and lip of the oil seal.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP



## INSTALLATION

1. Install the tie rod. (Refer to GROUP 19.)
2. Install the front hub assembly. (Refer to p. 2-29.)
3. Torque all parts to specifications during assembly.

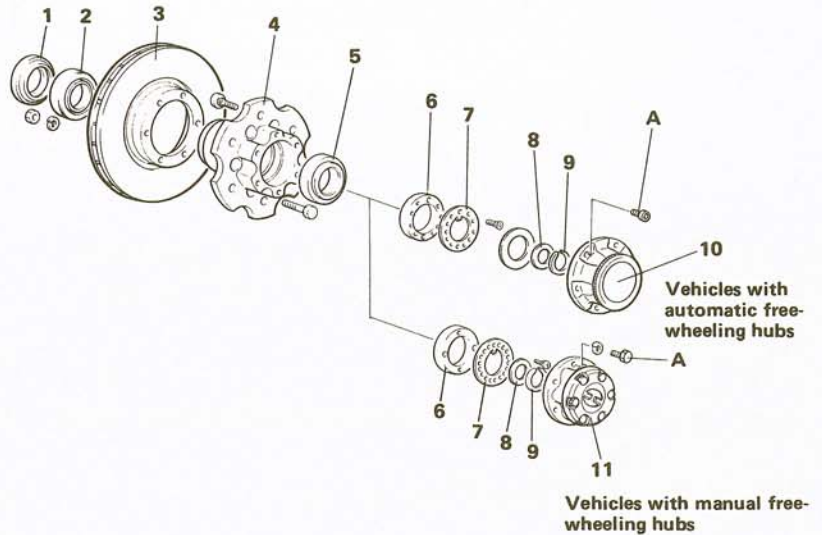




## COMPONENTS

1. Oil seal
2. Inner bearing
3. Brake disc
4. Front hub
5. Outer bearing
6. Lock nut
7. Lock washer
8. Spacer
9. Snap ring
10. Automatic free-wheeling hub assembly
11. Manual free-wheeling hub assembly

	Nm	ft.lbs.
A	50-60	36-43



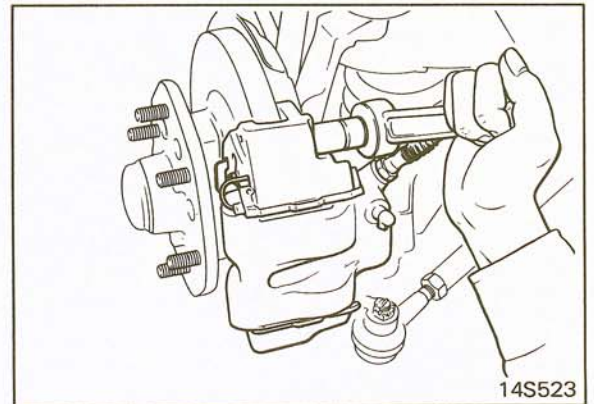
11W041

## REMOVAL

1. Remove the front caliper assembly. Do not disconnect the brake hose.

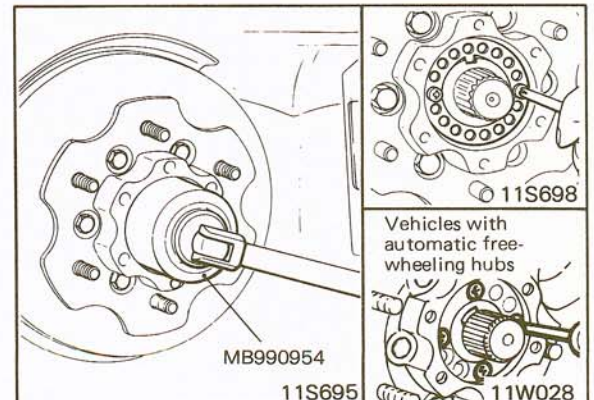
### Caution

To prevent the brake hose from being twisted, suspend the brake assembly with wire.



14S523

2. Remove the free-wheeling hub. (Refer to p. 2-32, 35.)
3. Remove the lock washer, and then remove the lock nut with a special tool. (11S695)
4. Remove the front hub assembly from the knuckle, together with the inner and outer bearings. (11S698, 11W028)



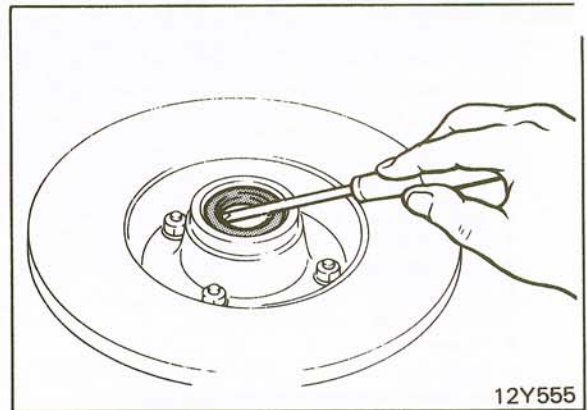
11S695





## COMPONENT SERVICE-AXLE HUB

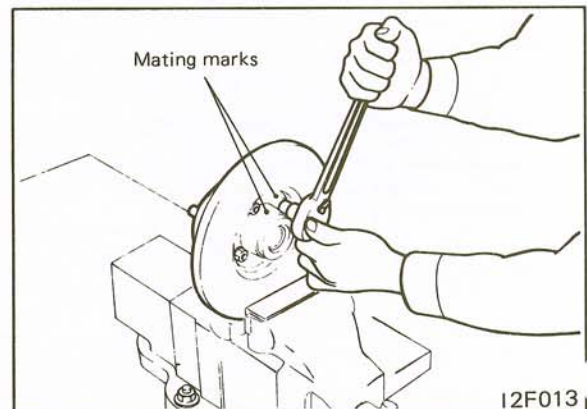
5. Remove the outer bearing inner race.
6. Remove the oil seal and the inner bearing inner race. (12Y555)



7. If necessary, make the mating marks on the brake disc and front hub and separate the front hub and brake disc.

### INSPECTION

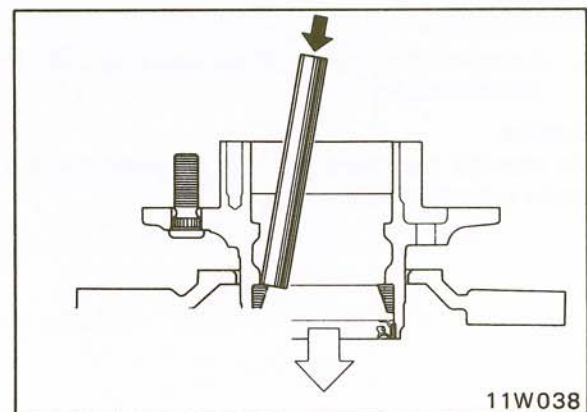
1. Check wheel bearing for seizure, discoloration and rough raceway surface.
2. Check front hub for cracks.
3. Check oil seals for cracks and damage.



### BEARING REPLACEMENT

1. Wipe grease from the inside of the front hub.
2. Remove the inner and outer bearing outer races by tapping them uniformly. (11W038)
3. Apply the specified multipurpose grease to the outside surface of the new inner and outer bearing outer races.

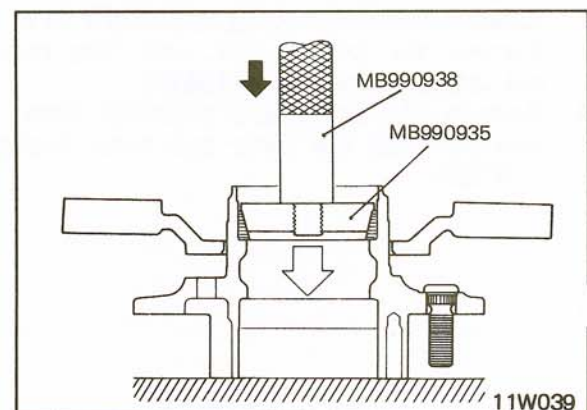
Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP



4. Install the inner and outer bearing outer races with the special tools.

### NOTE

The bearing inner race and outer race should be replaced as an assembly.







## INSTALLATION

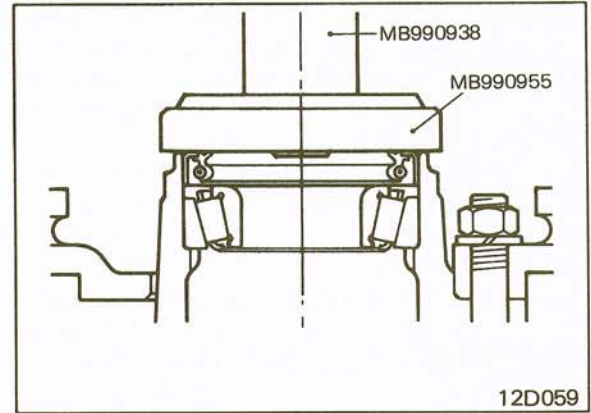
1. Apply the specified multipurpose grease to the outer bearing outer race, oil seal lip and inside surface of the front hub.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

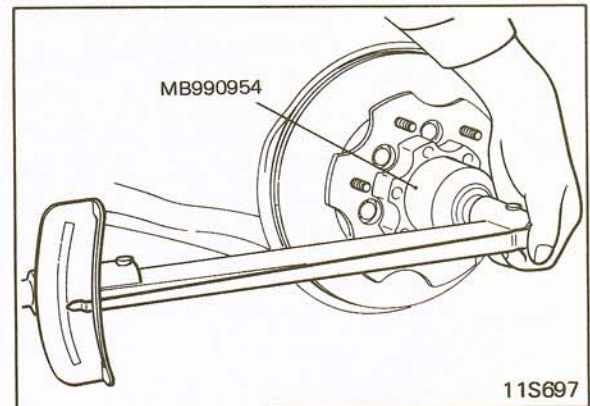
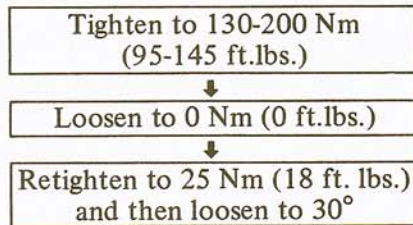
2. Apply the specified multipurpose grease to the inner bearing inner race and fit the inner race into the front hub.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

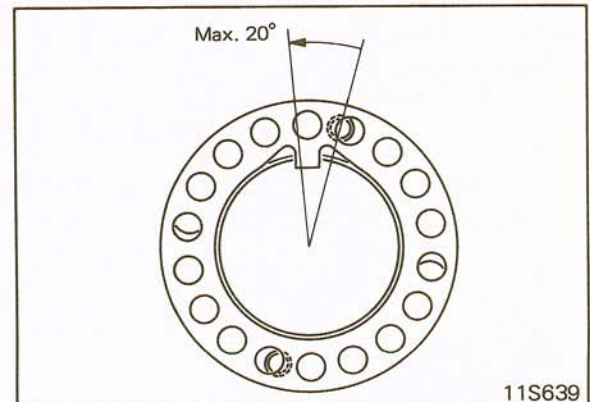
3. Press the new oil seal into the front hub with the special tools until it is flush with the front hub end face.  
(12D059)



4. Install the front hub assembly as follows:
  - (1) Fit the knuckle into the front hub assembly.
  - (2) Using a special tool, torque the lock nut as follows.  
(11S697)



- (3) Install the lock washer. If the lock washer and lock nut holes do not align, align the holes by loosening the nut not more than 20°.







- (4) Before installing the free-wheeling hub assembly, measure the turning force of the front hub. If the measured value does not meet the specifications, retighten the lock nut to the specified torque.  
(11S696)

Turning force of front hub assembly .....  
4-18 N (0.9-4.1 lbs.)

- (5) On vehicles with automatic free-wheeling hubs, adjust the brake contact surface height by adding or removing shims. (Refer to p. 2-40.)

- (6) Apply a semi-drying sealant to the free-wheeling hub assembly mounting surface of the front hub and then tighten the front hub to the specified torque.  
(11S690)

Free-wheeling hub body tightening torque ....  
50-60 Nm (36-43 ft.lbs.)

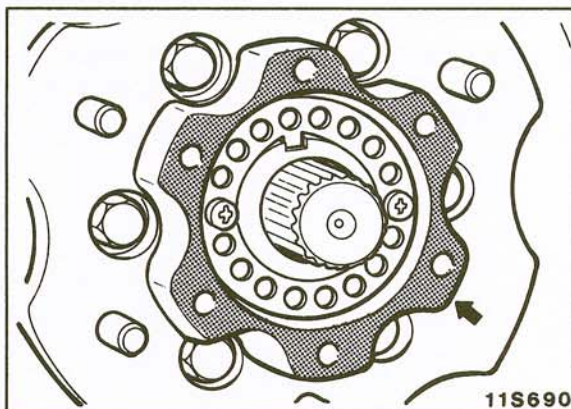
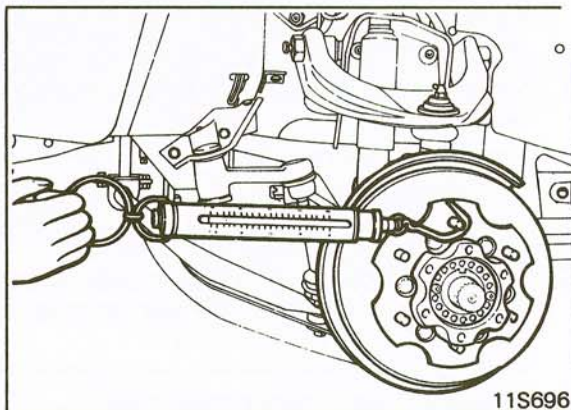
- (7) Measure the drive shaft end play. If the measured value does not meet specifications, adjust by adding or removing spacers.

### NOTE

For end play measurement and adjustment procedures, refer to p. 2-48.

- (8) On vehicles with free-wheeling hubs, install the free-wheeling hub cover.

5. Torque all parts to specifications during assembly.



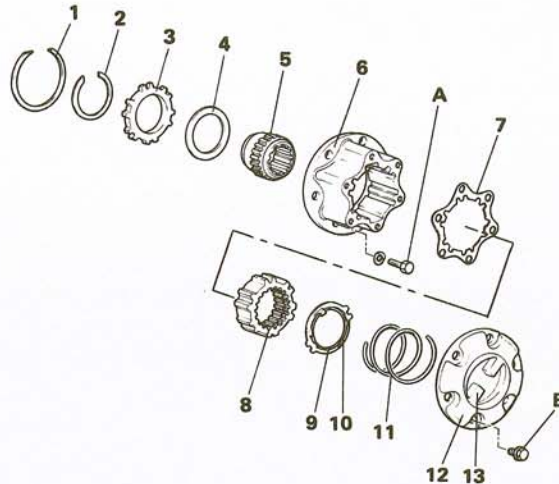




## COMPONENTS

1. Wheel snap ring
2. Shaft snap ring
3. Free-wheeling hub ring
4. Spacer
5. Inner hub
6. Free-wheeling hub body
7. Gasket
8. Free-wheeling hub clutch
9. Follower
10. Tension spring
11. Compression spring
12. Free-wheeling hub cover
13. Control handle

	Nm	ft.lbs.
A	50-60	36-43
B	10-14	7-10

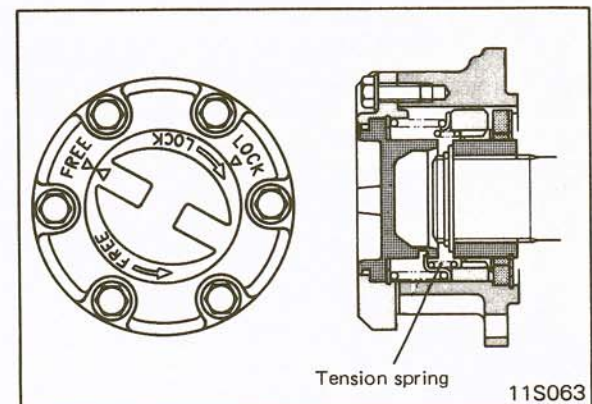
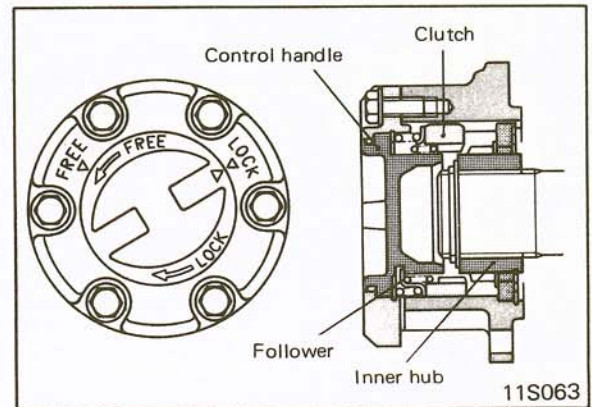


11S693

## OPERATION

The free-wheeling hub is designed to minimize torque loss by cutting off transmission of front tire rotation to the drive shafts, front differential and front propeller shaft during 2-wheel drive operation. It can disconnect the front wheels from the drive shafts during 2-wheel drive operation and can reconnect them during 4-wheel drive operation.

When the control handle is set to the LOCK position, the follower moves along the oblique groove in the control handle and causes the clutch (which is always in mesh with the free-wheeling hub body) to engage the splines of the inner hub, thus coupling the free-wheeling hub body with the drive shaft. When the control handle is set to the FREE position, the follower moves along the oblique groove in the control handle and uses the tension spring to disengage the clutch from the splines of the inner hub, thus separating the free-wheeling hub body from the drive shaft.

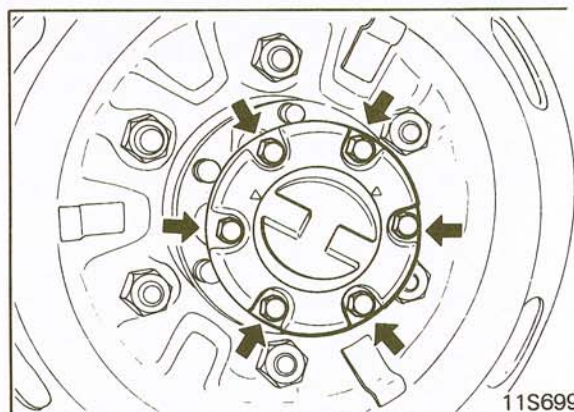




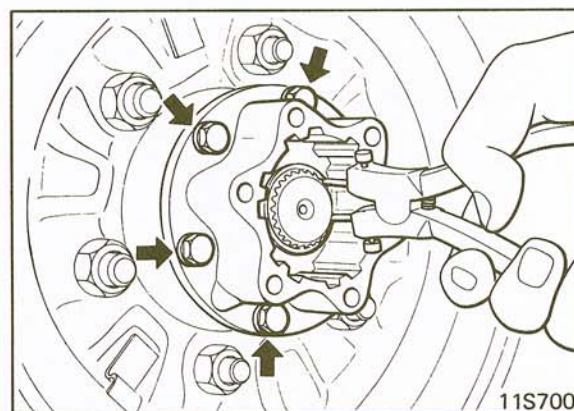


### REMOVAL

1. Set the control handle to the FREE position. Remove the free-wheeling hub cover.

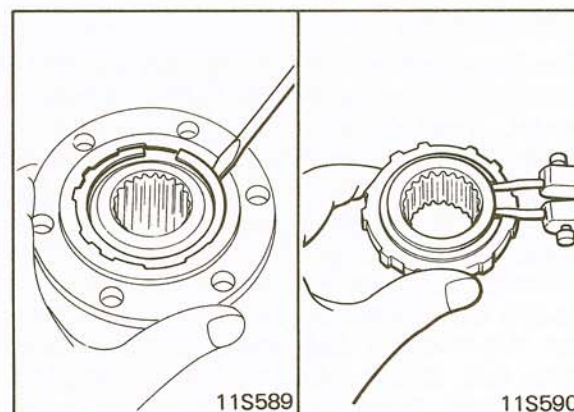


2. Remove the snap ring from the drive shaft, with snap ring pliers. (11S700)
3. Remove the free-wheeling hub assembly from the front hub. (11S700)



### DISASSEMBLY

1. Using a screwdriver, remove the snap ring and the inner hub from the free-wheeling hub body. (11S589)
2. Remove the snap ring from the inner hub with snap ring pliers. (11S590)



### INSPECTION

1. Check free wheeling hub ring, inner hub, free-wheeling hub body, and clutch for wear and seizure.
2. Check gasket for damage.
3. Check compression spring and tension spring for deterioration.

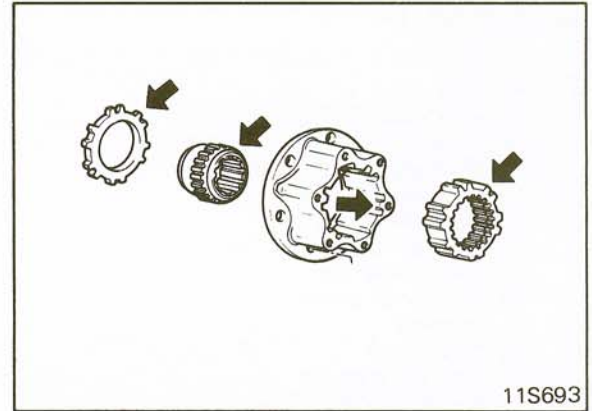




## REASSEMBLY

Apply the specified multipurpose grease to the entire periphery of the free-wheeling hub ring, inner hub and free-wheeling hub clutch, and the inside of the free-wheeling hub body.

Recommended multipurpose grease . . . . .  
SAE J310a, NLGI grade #2EP



## INSTALLATION

1. Apply semi-drying sealant to the front hub mounting surface of the free-wheeling hub body assembly and then tighten the assembly to the specified torque. (11S690)

Free-wheeling hub body tightening torque . . . . .  
50-60 Nm (36-43 ft.lbs.)

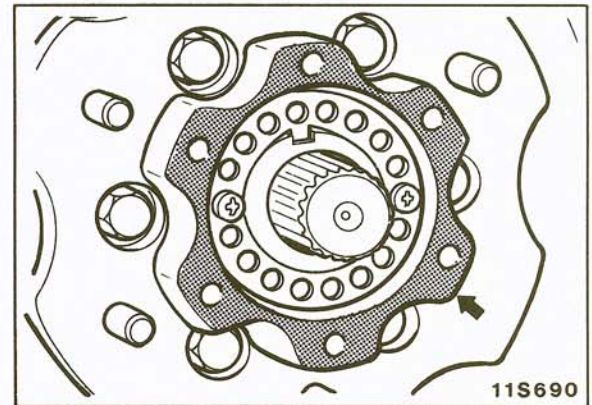
2. Measure the drive shaft end play. (Refer to p. 2-12.)
3. If the measured value does not agree with the specifications, adjust by using a spacer.

### NOTE

For play measurement and adjustment procedures, refer to p. 2-48.

Install the free-wheeling hub cover with the control handle and clutch in the FREE position.

4. Torque all parts to specifications during assembly.

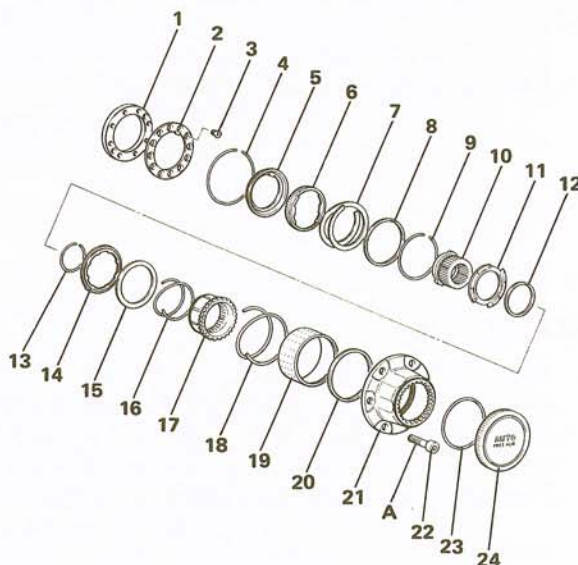






## COMPONENTS

1. Lock nut
2. Lock washer
3. Screw
4. Housing C-ring
5. Brake (B)
6. Brake (A)
7. Brake spring
8. Housing snap ring
9. Retainer (B) C-ring
10. Drive gear
11. Retainer (A)
12. Drive gear snap ring
13. Slide gear C-ring
14. Cam
15. Spring holder
16. Shift spring
17. Slide gear
18. Return spring
19. Retainer (B)
20. Thrust washer
21. Housing
22. Bolt
23. O-ring
24. Cover



	Nm	ft.lbs.
A	50-60	36-43

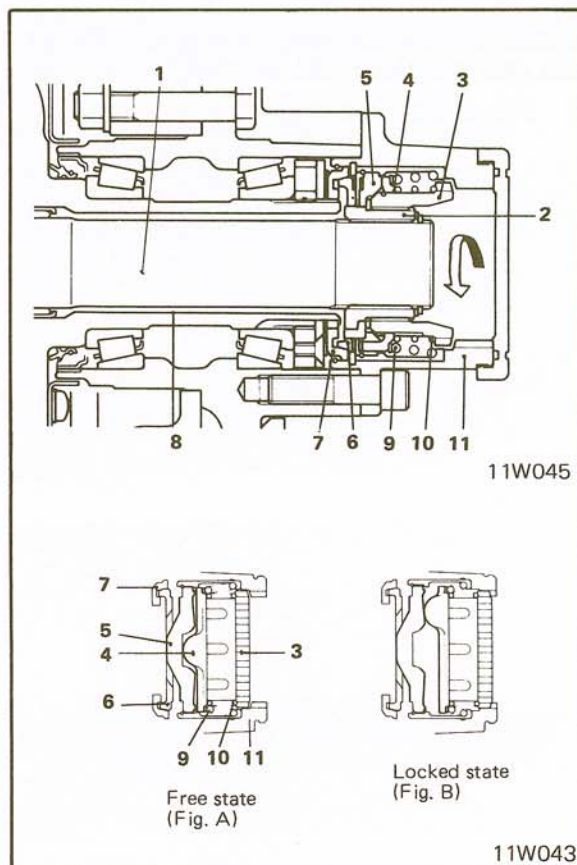
11W034

## CONSTRUCTION AND OPERATION

### Free State → Locked State

When the transfer is shifted from 2WD (2-wheel drive) to 4WD (4-wheel drive) and driving is begun, rotation of the drive shaft (1) is transmitted from the drive gear (2) to the slide gear (3) to the cam (4) to retainer A (5) to brake A (6). When this happens, brake A (6) is pressed against brake B (7) by the function of the cam of retainer A (5), and friction force is generated.

Because brake B (7) is secured to the knuckle (8), retainer A (5) ceases to rotate, (see Fig. A), and therefore, the cam (4), while compressing the return spring (9), rises out of the cam groove of the retainer A (5) and compresses the shift spring (10). The slide gear (3) is pushed by the shift spring (10), and then engages with the gear of the housing (11) when the two are in phase and enters the locked state (see Fig. B).



11W045

11W043



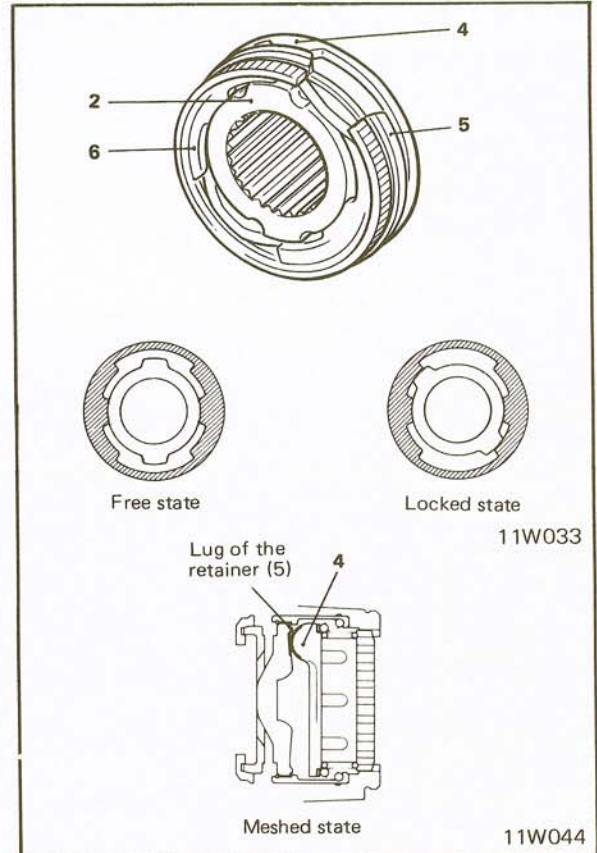


The cam (4) turns until the lug of the drive gear (2) contacts the lug of brake A (6). Because of this contact, brake A (6) is turned by the drive gear (2), and therefore, there is also no longer any force of retainer A (5) with a tendency to turn brake A (6). As a result, there is also no longer any force which presses brake A (6) against brake B (7) and the drive gear (2) causes brake A (6) to turn lightly (there is no friction force).

Because the cam (4) remains meshed, it turns until it contacts the lug of retainer A (5), and is locked.

## Locked State → Free State

When the transfer is shifted from 4-WHEEL DRIVE to REAR-WHEEL DRIVE and the vehicle is driven in reverse, rotation of the gear of the housing (11) is transmitted from the slide gear (3) to cam (4) to retainer A (5) to brake A (6), but retainer A (5) ceases to turn, just as when the shift is made from the free state to the locked state. The cam (4), therefore, turns as far as the cam groove of retainer A (5) and is pushed into the cam groove by the return spring (9). The slide gear (3) moves with the cam (4), disengages from the gear of the housing (11), and enters a free state.

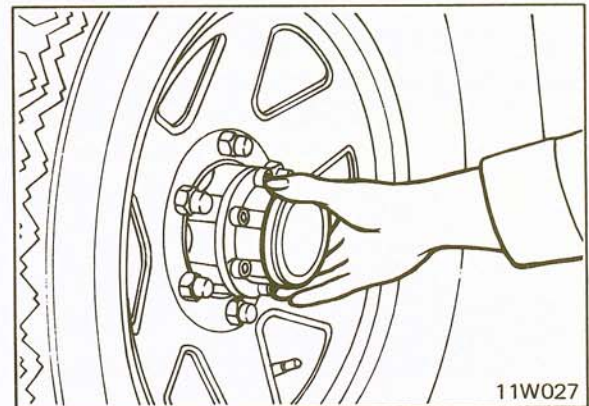


## REMOVAL

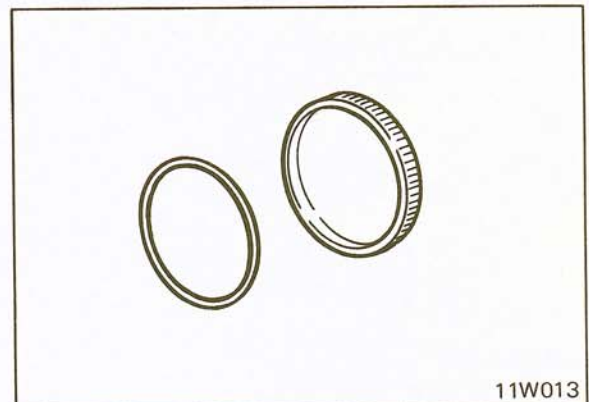
1. Remove the automatic free-wheeling hub cover.

### NOTE

When the cover cannot be loosened by hand, protect the cover with a shop towel to avoid damaging it and use an oil filter wrench to loosen it.



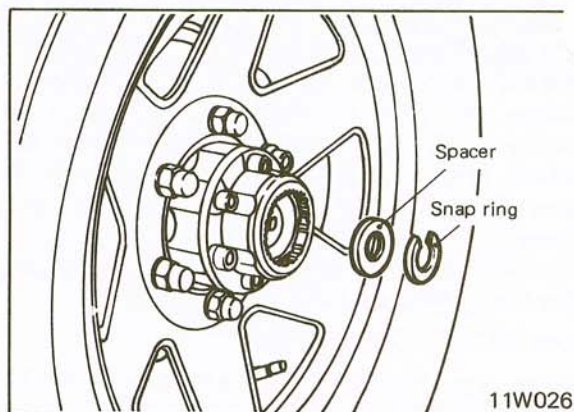
2. Remove the O-ring from the automatic free-wheeling hub cover.



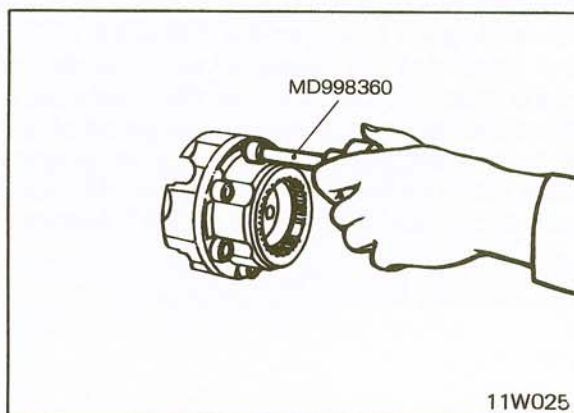




3. Remove the snap ring and then remove the spacer.



4. Using a special tool, remove the automatic free-wheeling hub.

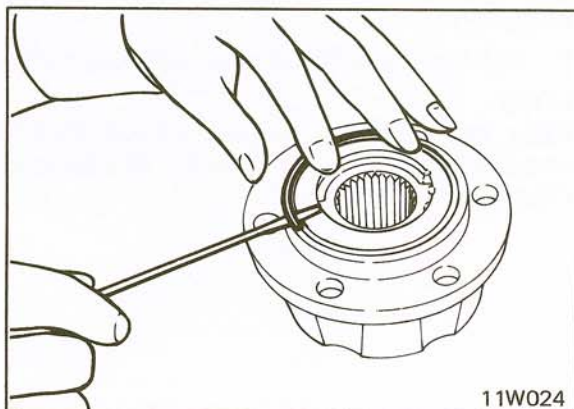


### DISASSEMBLY

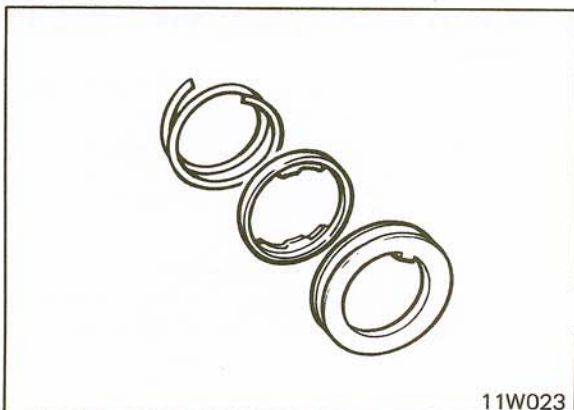
1. Remove the housing C-ring.

#### NOTE

The ring can be easily removed by pushing in brake B and using a small-tipped screwdriver or similar tool.



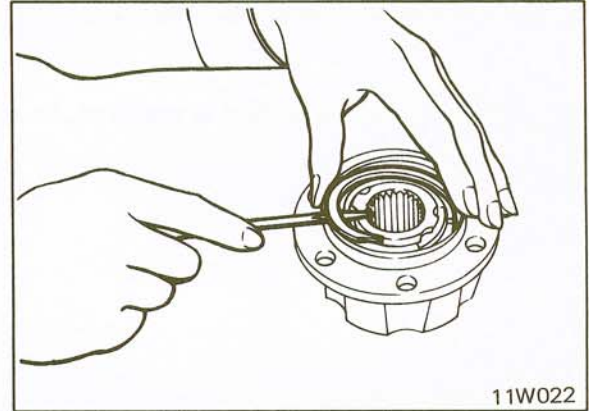
2. Remove brake A, brake B and the brake spring.







3. Remove the housing snap ring.



4. Using the special tool, lightly push in the drive gear and remove the retainer B C-ring. (11W021)

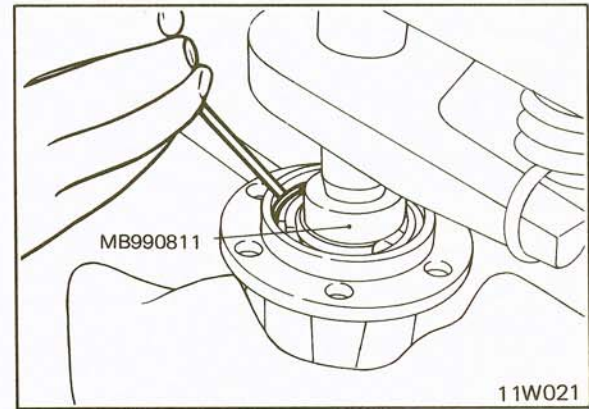
## NOTE

Because the return spring relaxes approx. 40 mm (1.57 in.), the stroke of the press should be set to more than 40 mm (1.57 in.)

## Caution

Place a protective cloth under the cover attaching surface of the housing before setting on the press table.

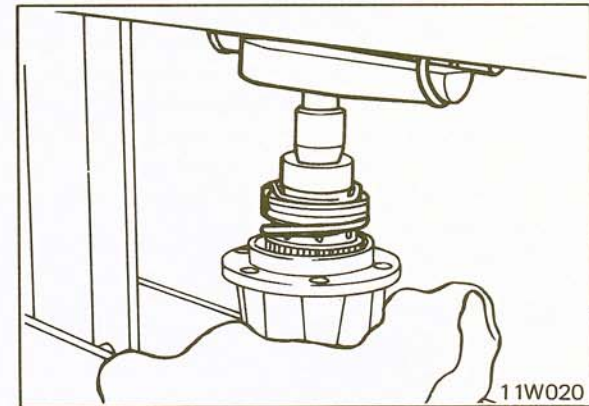
Make sure that the pressing force does not exceed 200 N (441 lbs.).



5. Slowly reduce the pressure of the press until the return spring fully relaxes.

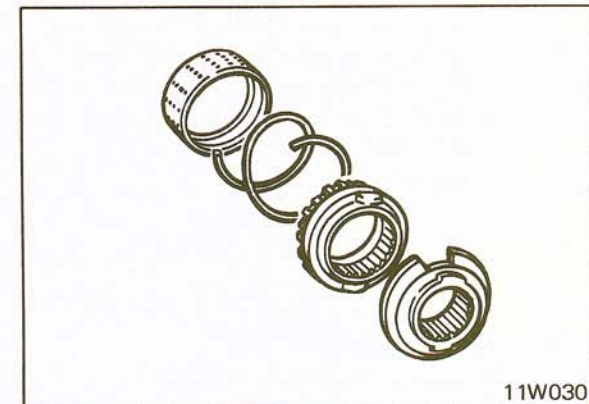
## Caution

When reducing the pressure of the press, be sure that retainer A is not caught by retainer B.



6. Remove the following parts from the housing.

- (1) Retainer B
- (2) Return spring
- (3) Slide gear assembly
- (4) Drive gear assembly



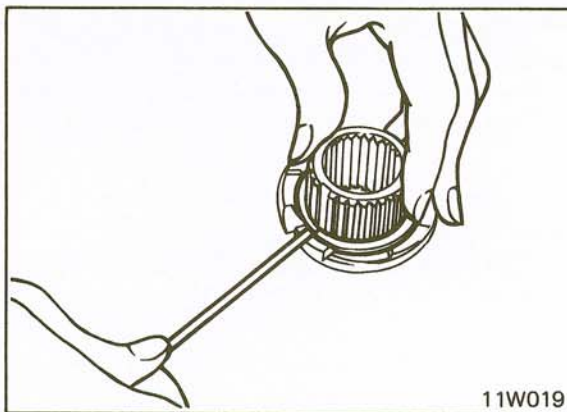




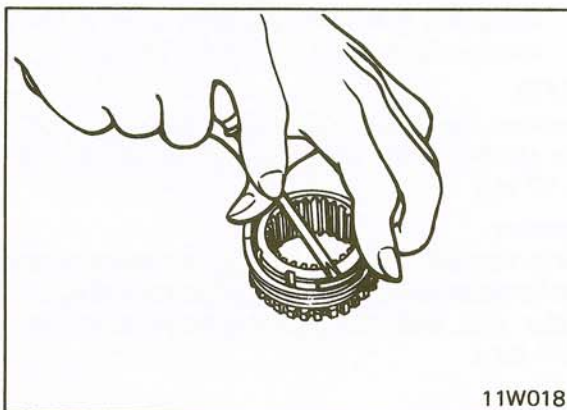
7. Remove the drive gear snap ring.

### Caution

When the drive gear snap ring is removed, be sure to replace it with a new one.



8. Push in the cam and remove the slide gear C-ring while the spring is compressed.



## INSPECTION

1. Check drive gear and slide gear splines for damage.
2. Check cam portion of retainer (A) for wear and damage.
3. Check cam for wear and damage.
4. Check slide gear and housing tooth surfaces for damage.
5. Check retainer B and housing contact surfaces for wear and damage.

## Brake Wear

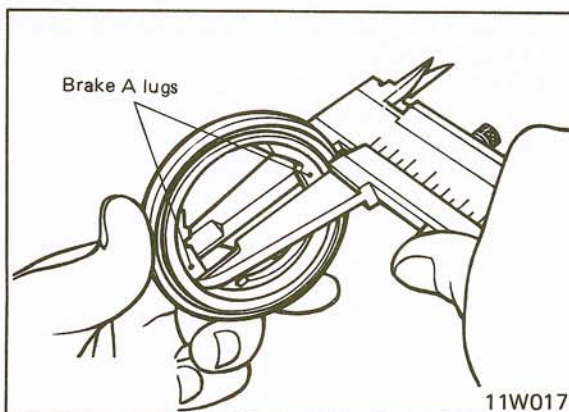
- (1) Assemble brake A and brake B, set the vernier callipers so that the measuring jaws simultaneously touch the two lugs of brake A, and then measure the combined brake thickness. (11W017)

Brake A wear [Repair limit] . . . . . 9.6 mm (.38 in.)

### Caution

To equalize the combined brake thickness, make sure that the measuring jaws of the vernier callipers simultaneously touch both lugs.

- (2) If the measured value is below the service limit, replace brake A and brake B as a set.







## Deterioration of Return Spring

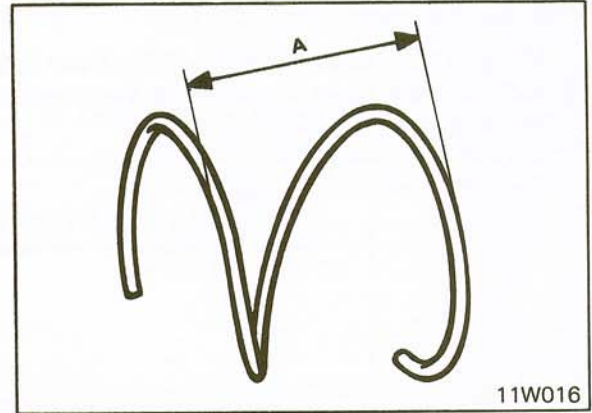
- (1) Measure dimension A as shown. (11W016)

Return spring deterioration [Repair limit] .....  
35 mm (1.4 in.)

### Caution

To measure the dimension A shown in illustration, measure the dimension from the outermost extremity of one wire diameter to that of the other wire diameter.

- (2) If the measured value is below the service limit, replace the spring.



## Deterioration of Shift Spring

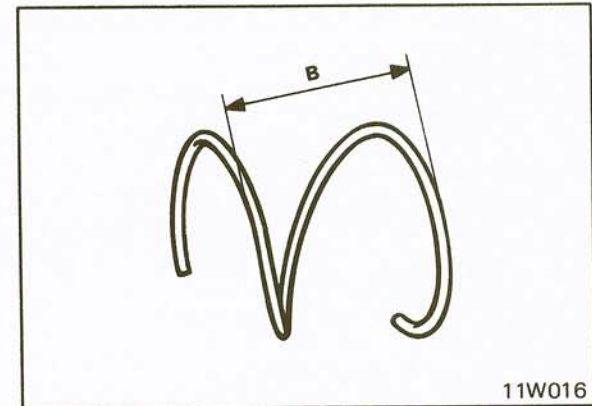
- (1) Measure dimension B as shown. (11W016)

Shift spring deterioration  
[Repair limit] ..... 30 mm (1.2 in.)

### Caution

To measure the dimension B, measure the dimension from the outermost extremity of one wire diameter to that of the other wire diameter.

- (2) If the measured value is below the service limit, replace the spring.



## REASSEMBLY

1. Apply the specified grease to the mounting surfaces of all components.

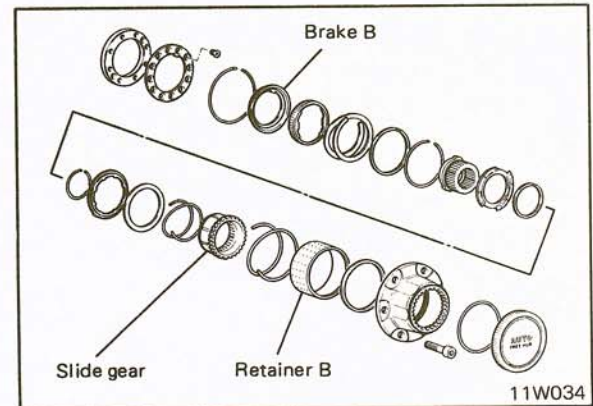
Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

2. Pack the grooves of brake B and retainer B with the specified grease.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

3. Apply the specified grease to the slide gear. Install the return spring with the smaller coil diameter side toward the spring seat.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP



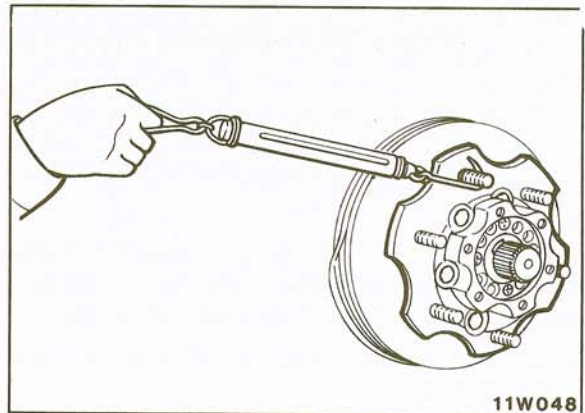




### INSTALLATION

1. Measure the starting torque of the front hub assembly. If the measured value is not within the standard value range, adjust by using the lock nut.

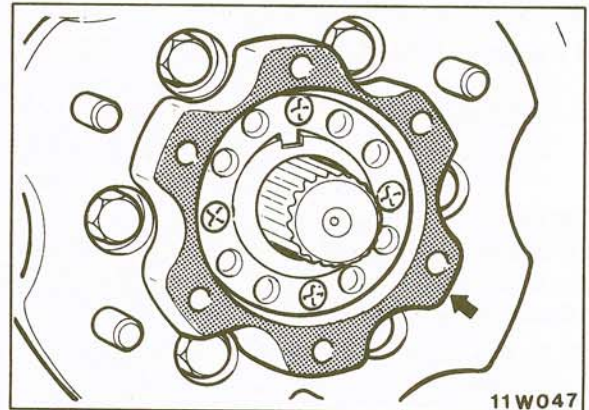
Turning force of front hub assembly . . . . . 4-18 N (0.9-4.1 lbs.)



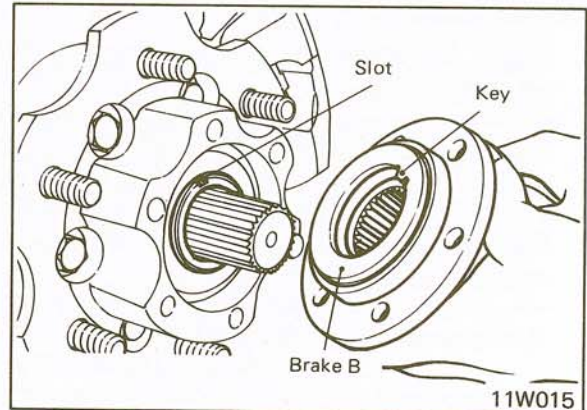
2. Apply a semi-drying sealant to the hub surface.

#### Caution

Make sure that there is no excess sealant on the outside of the hub.

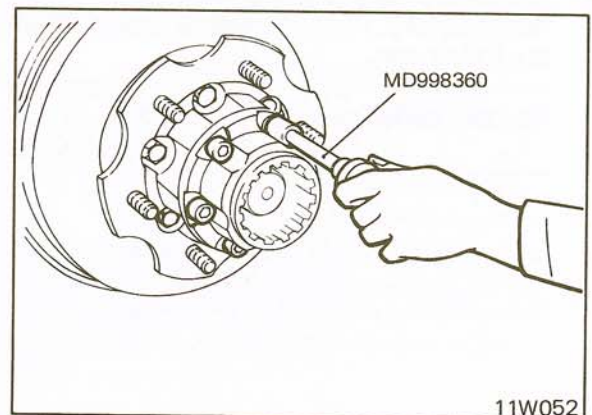


3. Aligning the key of brake B with the slot in the knuckle spindle and loosely install the automatic free-wheeling hub assembly. (11W015)
4. Confirm that the hub and the automatic free-wheeling hub assembly are in close contact when the assembly is forced lightly against the hub. If not, turn the hub until close contact is obtained .



5. Using the special tool, tighten the automatic free-wheeling hub mounting bolts to the specified torque.

Free-wheeling hub body tightening torque . . . . . 50-60 Nm (36-43 ft.lbs.)



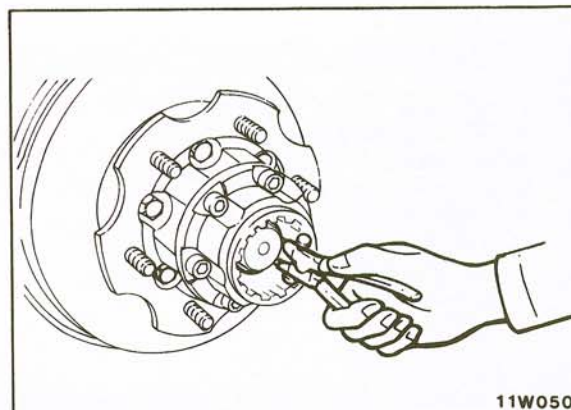




5. Adjust the drive shaft end play as follows.
  - (1) Install the snap ring on the drive shaft.

## NOTE

Do not install any shims.



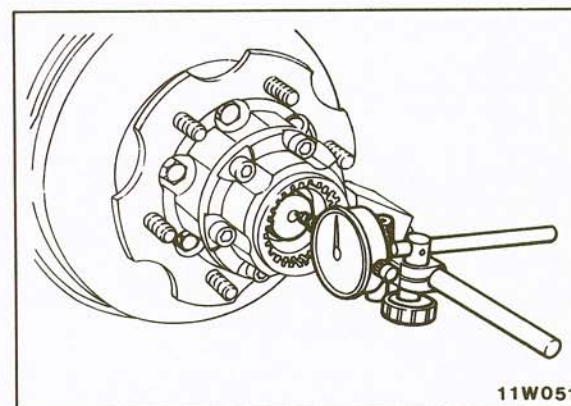
11W050

- (2) Position the dial indicator at the end of the drive shaft. (11W051)

## Caution

Secure the magnetic base to the hub or brake disc.

- (3) Turn the drive shaft in the forward and reverse directions until resistance is felt to find the center of the turning stroke. At this position, move by hand the drive shaft in the axial direction to measure the play. If the measured value is not within the standard value range, select an adequate shim and install it on the drive shaft.

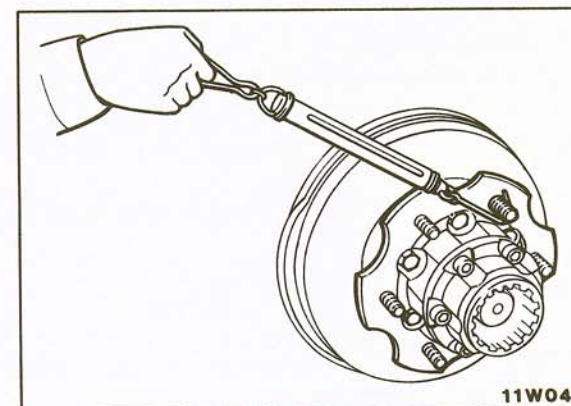


11W051

Drive shaft end play . . . . 0.2-0.5 mm (.008-.020 in.)

7. Measure the starting torque of the front hub assembly and compare it with that measured before installation of the automatic free-wheeling hub assembly. If the difference exceeds 14 N (3.1 lbs.), the automatic free-wheeling hub is probably not installed correctly; remove and reinstall all it. (11W049)
8. Install the front brake assembly and tighten the bolts to the specified torque.

Front brake assembly tightening torque . . . . .  
70-90 Nm (43-65 ft.lbs.)



11W049

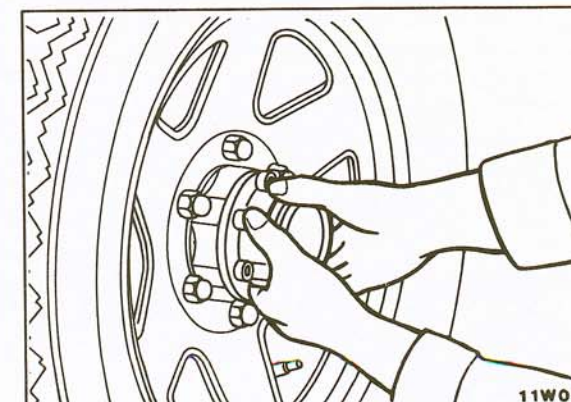
9. Mount the wheel and lower the vehicle.
10. Tighten the wheel nuts to the specified torque.

Wheel nuts tightening torque . . . . .  
70-80 Nm (43-58 ft.lbs.)

11. Apply the specified grease to the O-ring before mounting it onto the cover.

Recommended multipurpose grease . . . . .  
SAE J310a, NLGI grade #2EP

12. Install the cover with both hands securely. (11W053)



11W053





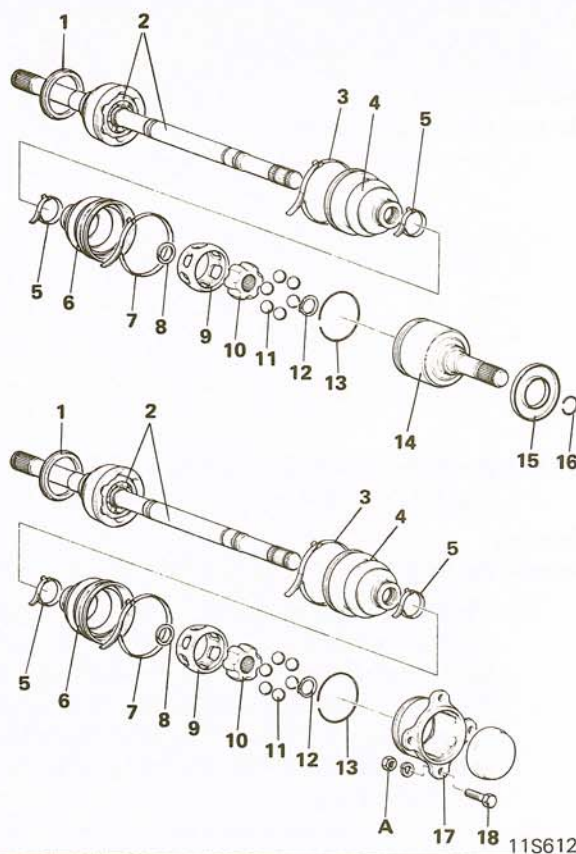
## COMPONENTS

1. Dust cover
2. Drive shaft and B.J.
3. Boot band A
4. B.J. boot
5. Boot band C
6. D.O.J. boot
7. Boot band B
8. Circlip
9. D.O.J. cage
10. D.O.J. inner race
11. Ball
12. Snap ring
13. Circlip
14. D.O.J. outer race
15. Dust cover
16. Circlip
17. D.O.J. outer race
18. End plate

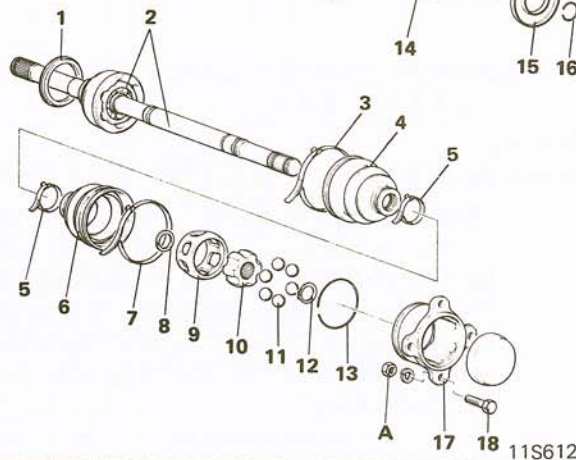
NOTE  
D.O.J. : Double offset joint  
B.J. : Birfield joint

	Nm	ft.lbs.
A	50-60	36-43

Left drive shaft



Right drive shaft



## REMOVAL

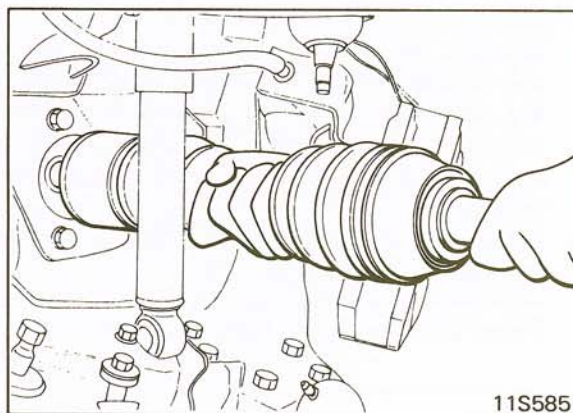
1. Remove the front brake caliper assembly. Do not disconnect the brake hose. (Refer to p. 2-27.)
2. Remove the free-wheeling hub cover or hub cap.
3. Remove the snap ring from the drive shaft. (Refer to p. 2-32.)
4. Remove the knuckle together with the front hub assembly. (Refer to p. 2-25.)
5. Remove the drive shaft as follows:  
**FOR LEFT DRIVE SHAFT**  
(1) Pull the drive shaft out of the differential carrier. (11S585)

### Caution

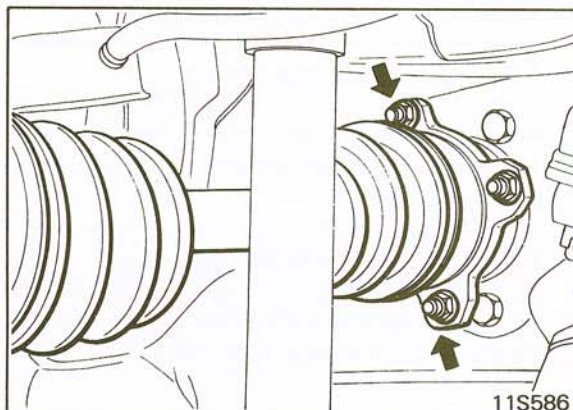
When pulling the drive shaft out of the differential carrier, be careful that the spline part of the drive shaft does not damage the oil seal.

### FOR RIGHT DRIVE SHAFT

- (1) Detach the drive shaft from the differential carrier inner shaft.
- (2) Remove the drive shaft. (11S586)



11S585



11S586



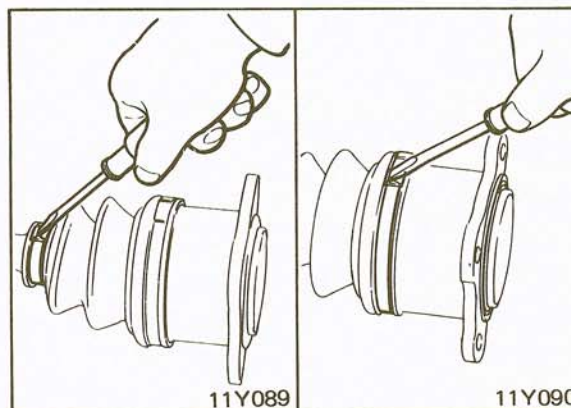


## INSPECTION

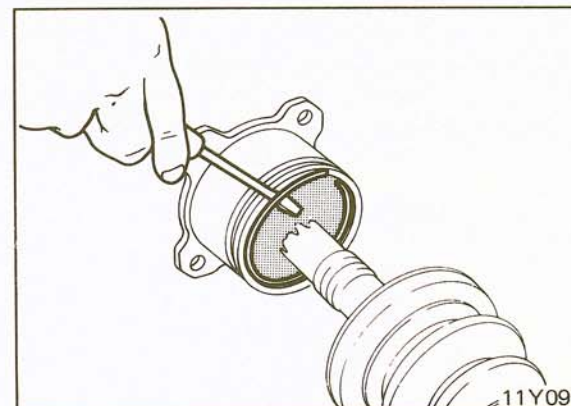
1. Check boot for damage or deterioration.
2. Check ball joint for operating condition and excessive looseness.
3. Check splines for wear or damage.

## DISASSEMBLY

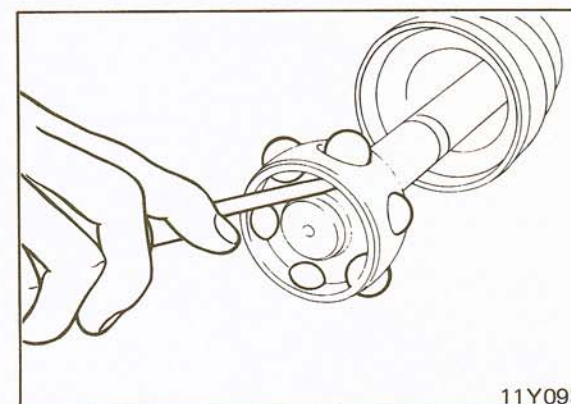
1. Remove the boot bands.



2. Remove the circlip from the D.O.J. outer race. Separate the drive shaft from the D.O.J. outer race.



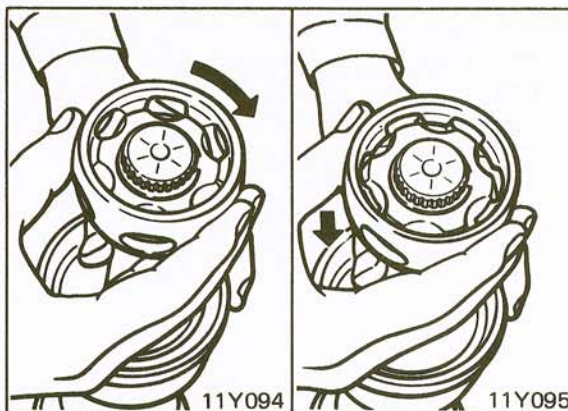
3. Remove the balls from the D.O.J. cage.



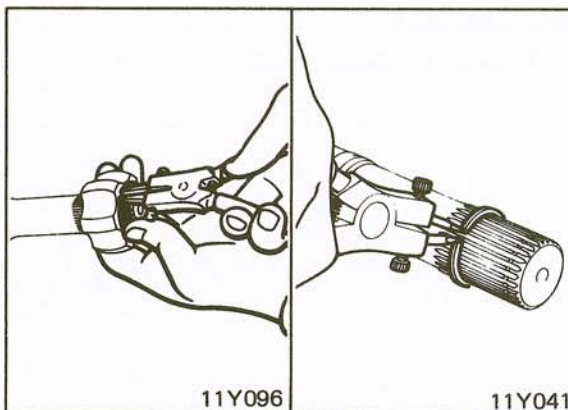




4. Remove the D.O.J. cage from the D.O.J. inner race in the direction of the B.J.



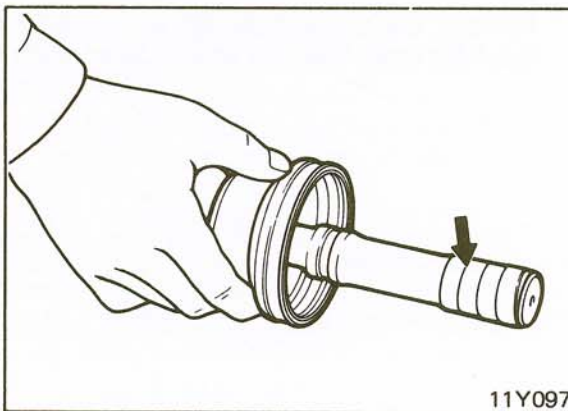
5. Remove the snap ring from the drive shaft with snap ring pliers, and then remove the D.O.J. inner race and D.O.J. cage from the drive shaft. Remove the circlip from the drive shaft with snap ring pliers.



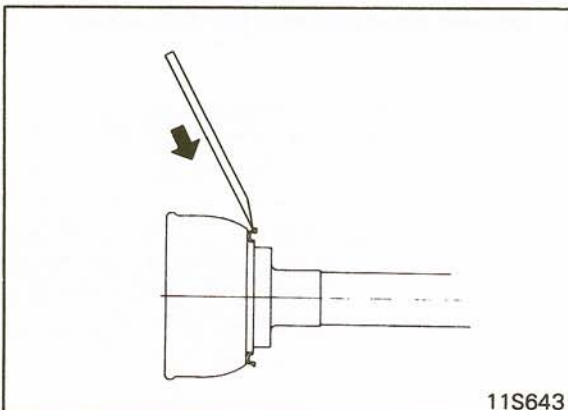
6. Wrap vinyl tape around the spline on the D.O.J. side of the drive shaft so that the D.O.J. and B.J. boots are not damaged when they are removed. (11Y097)
7. Remove the D.O.J. and B.J. boots from the drive shaft.

**Caution**

Do not disassemble the B.J.



8. Remove the dust cover from the B.J.







## INSPECTION

1. Check drive shaft for bending or wear.
2. Check B.J. for entry of water, foreign matter and rust.
3. Check B.J. ball for damage.
4. Check D.O.J. cage, D.O.J. inner race and ball for rust, wear and damage.
5. Check the circlip for damage or deformation.
6. Check D.O.J. outer race for wear or damage.

## REASSEMBLY

1. Using the steel pipe as specified below, force the dust cover to the drive shaft.

Steel Pipe	mm (in.)
Overall length	170 (6.70)
Outside diameter	68.9 (2.71)
Wall thickness	2.3 (.09)

2. Apply the specified grease to the drive shaft, and wrap vinyl tape around the spline on the D.O.J. side of the drive shaft.

Recommended grease . . . . . Repair kit grease

3. Install the B.J. boot, boot bands (new ones), and D.O.J. boot onto the drive shaft, in that order. (11S631)

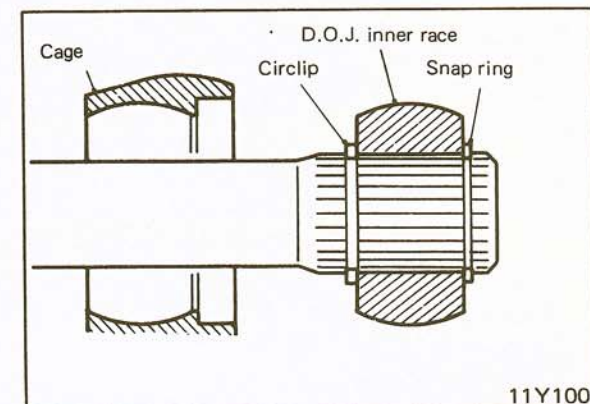
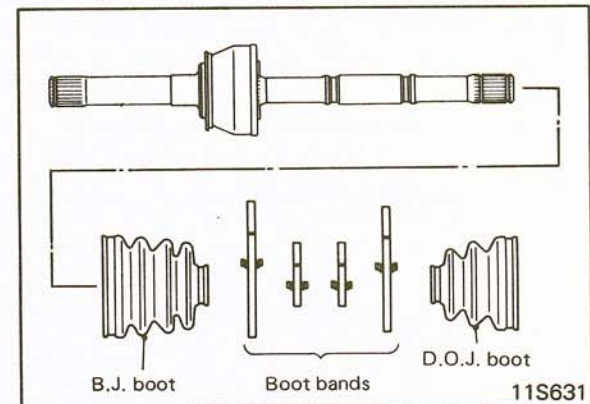
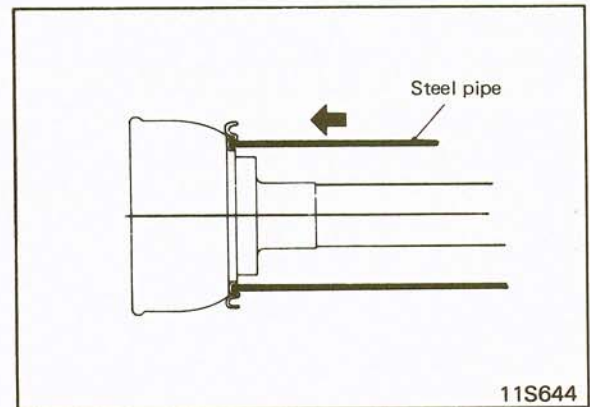
### Caution

The B.J. and D.O.J. boots are different in size and shape, so be sure to install them correctly.

The identification stamp mark on boot band A is "20-11 #B.J.95", and that on boot band B is "20-20 #B.J.95"; do not confuse these bands during assembly.

4. Install the D.O.J. cage onto the drive shaft so that the smaller diameter side of the cage is installed first. (11Y100)
5. Install the circlip onto the drive shaft.
6. Install the D.O.J. inner race onto the drive shaft, and secure it with a snap ring.
7. Apply the specified grease to the D.O.J. inner race and the D.O.J. cage, and then fit them together.

Recommended grease . . . . . Repair kit grease



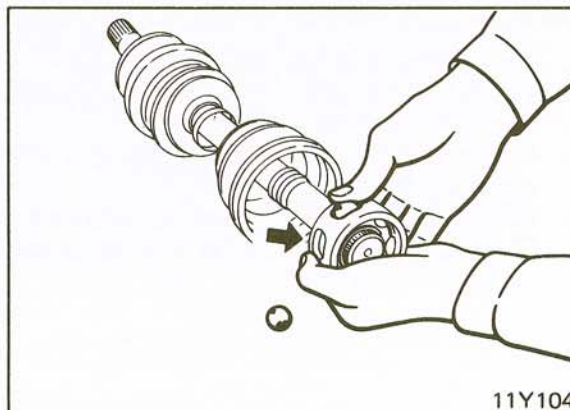




## COMPONENT SERVICE-DRIVE SHAFT

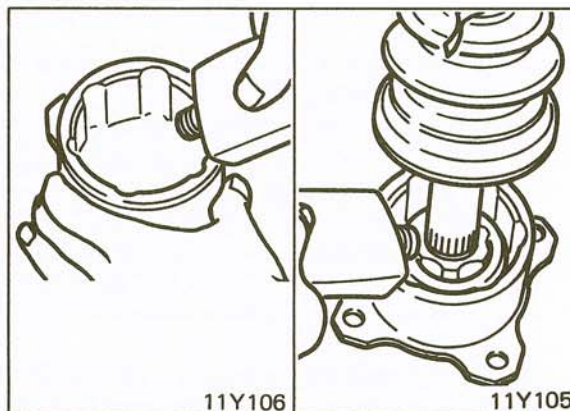
8. Apply the specified grease to the ball insertion parts of the D.O.J. inner race and D.O.J. cage, and then insert the balls.

Recommended grease . . . . . Repair kit grease



9. Apply 50 to 80 gr (1.8 to 2.8 oz) of the specified grease to the D.O.J. outer race. (11Y106)
10. Install the drive shaft into the D.O.J. outer race, and then apply 50 to 70 gr (1.8 to 2.5 oz) of the specified grease to the race. (11Y105)

Recommended grease . . . . . Repair kit grease

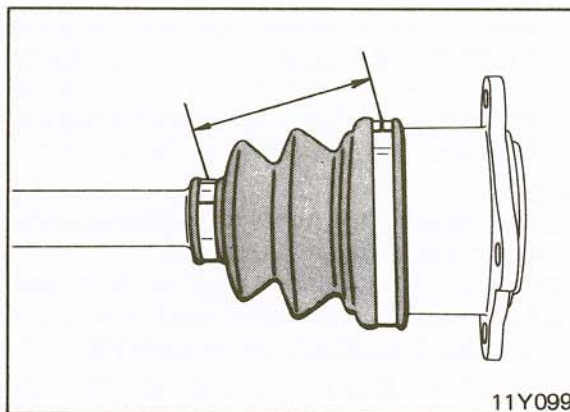


11. Install the circlip onto the D.O.J. outer race.
12. Place the D.O.J. boot over the D.O.J. outer race, and then use boot band B to secure the boot.
13. Place boot band C at the specified distance in order to adjust the amount of air inside the D.O.J. boot, and then tighten boot band C. (11Y099)

Setting of D.O.J. boot length . . . . . 79 mm (3.1 in.)

14. If the B.J. is to be reused, pack 100 to 150 gr (3.5 to 5.3 oz) of the specified grease into the B.J. boot, and then secure the boot with the boot band.

Recommended grease . . . . . Repair kit grease



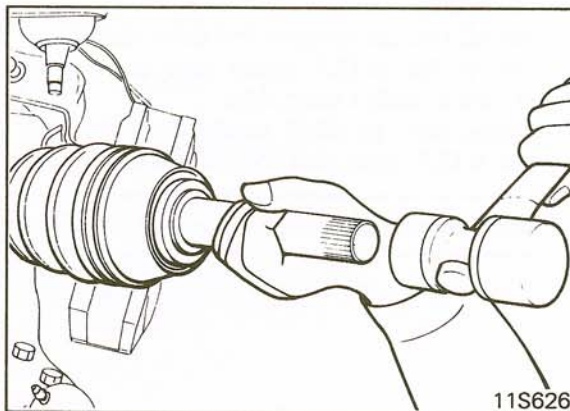
### INSTALLATION

1. Drive the left drive shaft into the front differential carrier with a plastic hammer.

#### Caution

Be careful not to damage the lip of the oil seal.

Replace the circlip on the spline on the B.J. side with a new one.



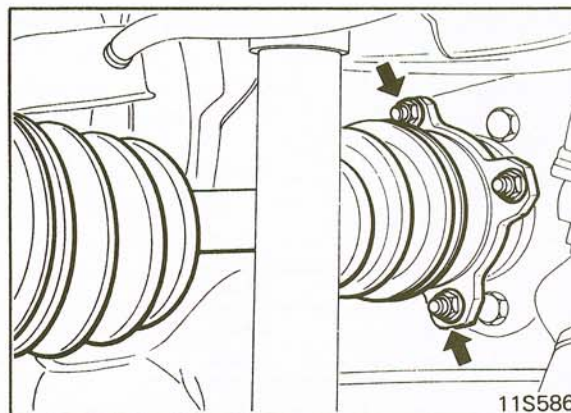




2. Connect the right drive shaft to the inner shaft, and then tighten to the specified torque. (11S586)

Right drive shaft to inner shaft . . . . . 50-60 Nm (36-43 ft.lbs.)

3. Install the knuckle together with the front hub assembly. (Refer to p. 2-26.)



4. Adjust the drive shaft end play as follows:

Drive shaft end play . . . . . 0.2-0.5 mm (.008-.020 in.)

- (1) Remove the free-wheeling hub cover.
- (2) Remove the snap ring of the drive shaft and then remove the spacer. (11W037)
- (3) Mount the snap ring onto the drive shaft.

## NOTE

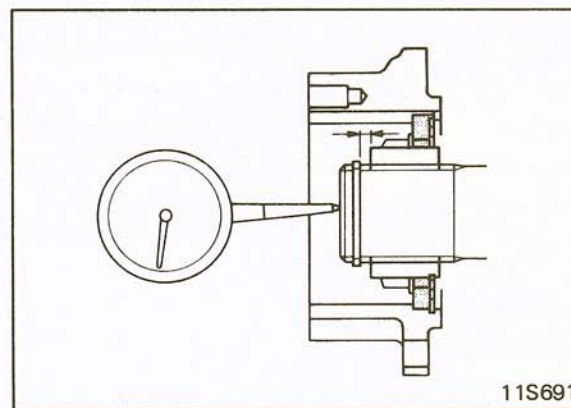
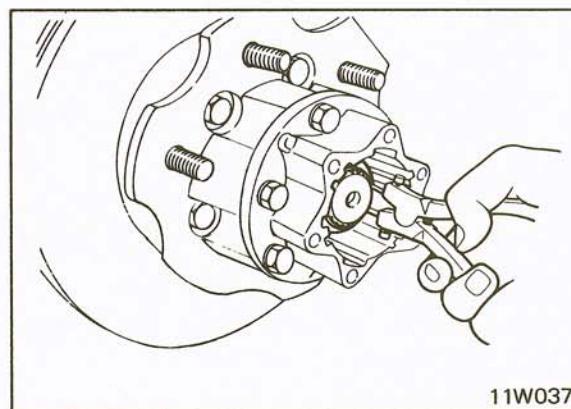
Do not install a spacer.

- (4) Move the drive shaft in the axial direction and measure the play.

## NOTE

To measure the play, use a dial indicator. (Refer to p. 2-12.) (11S691)

- (5) Select a spacer so that the measured value will be within specifications, and then install it onto the drive shaft.
- (6) Install the snap ring.
- (7) Install the free-wheeling hub cover.
5. Torque all parts to specifications during assembly.



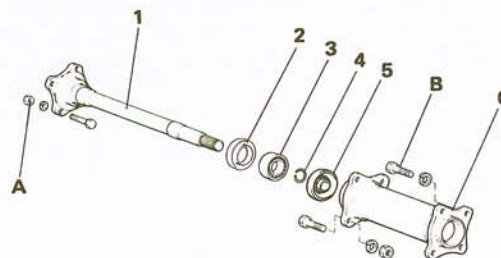




### COMPONENTS

1. Inner shaft
2. Dust cover
3. Bearing
4. Circlip
5. Dust seal
6. Housing tube

	Nm	ft.lbs.
A	50-60	36-43
B	80-100	58-72



11S681

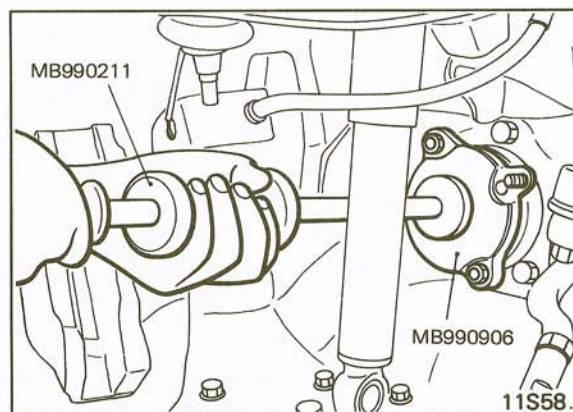
### REMOVAL

1. Slightly raise the lower arm on a jack.
2. Remove the mounting nut from the top of the shock absorber and then detach the shock absorber from the crossmember.

#### Caution

When removing the shock absorber, do not lower the jack. Do not remove the jack until the top of the shock absorber is reattached to the crossmember.

3. Remove the right drive shaft. (Refer to p. 2-42.) (11S587)

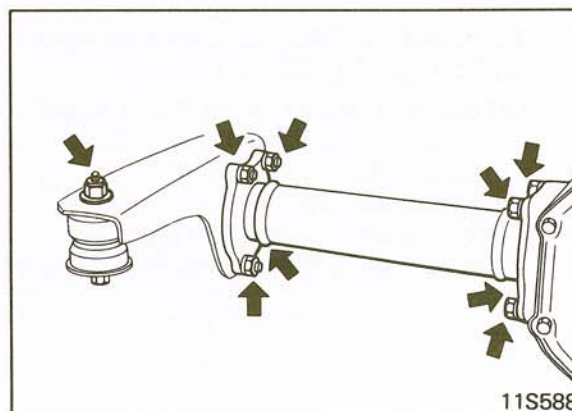


4. Attach the special tools to the shaft flange and pull the inner shaft from the front differential carrier. (11S587)

#### Caution

When pulling the inner shaft out of the front differential carrier, be careful that the spline part of the inner shaft does not damage the oil seal.

5. If necessary, remove the housing tube. (11S588)



### INSPECTION BEFORE DISASSEMBLY

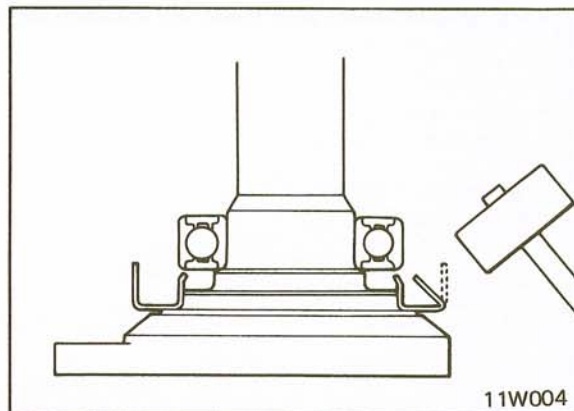
1. Check inner shaft for bend.
2. Check bearing for wear or discoloration.
3. Check housing tube for cracks.
4. Check dust seal for cracks or damage.



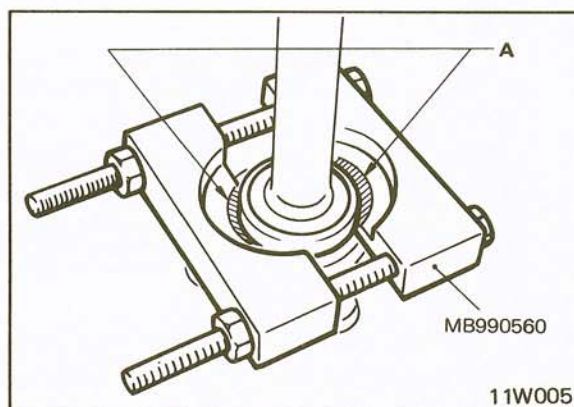


## DISASSEMBLY

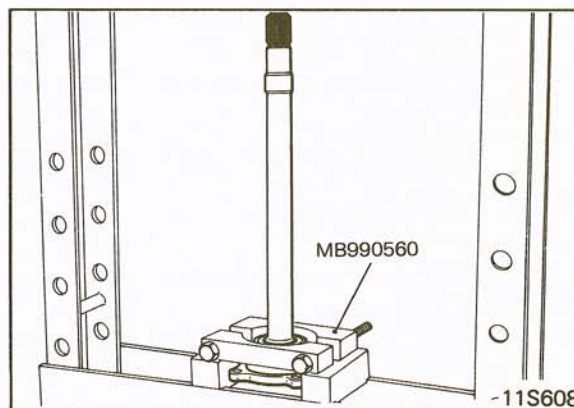
1. Bend the outside circumference of dust cover inward with a hammer.



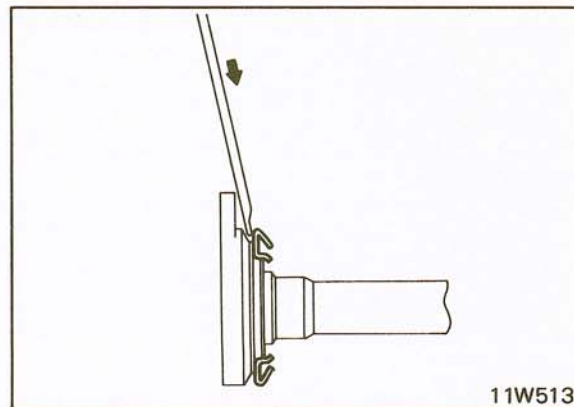
2. After a special tool has been mounted as shown, tighten the nut until part A contacts the bearing outer race.



3. Remove the inner shaft from the bearing.



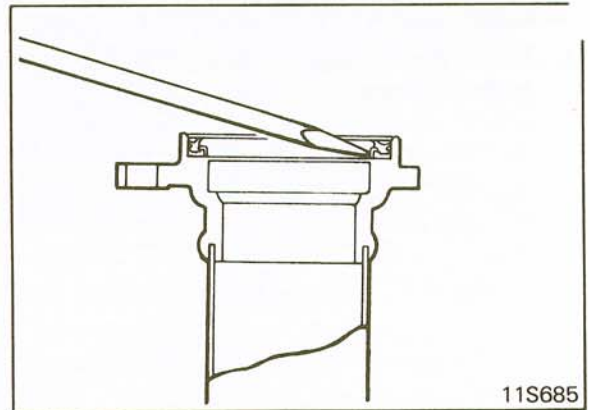
4. Remove the dust cover from the inner shaft.







5. Remove the dust seal from the housing tube.



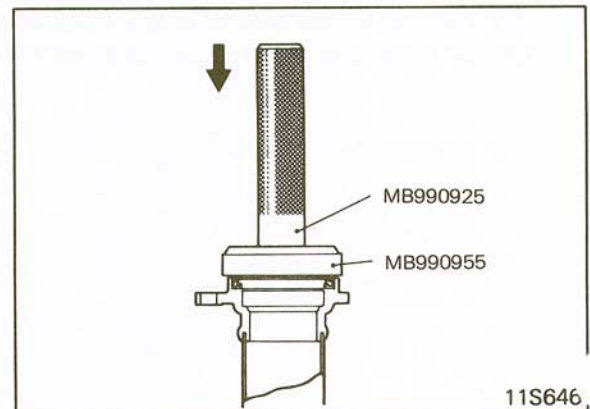
### REASSEMBLY

1. Press the new dust seal into the housing tube with the special tools until it is flush with end of the housing tube. (11S646)
2. Apply the specified grease to the dust seal lip.

Recommended multipurpose grease . . . . .  
SAE J310a, NLGI grade #2EP

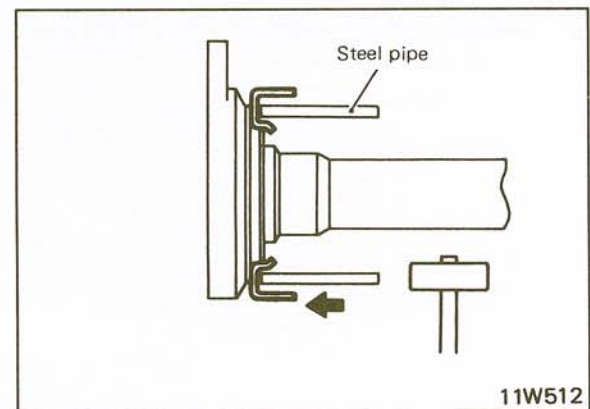
#### Caution

When installing the inner shaft, be careful that the bearing outer race does not damage the lip of the dust seal.



3. Using the steel pipe described below, force a new dust cover onto the inner shaft.

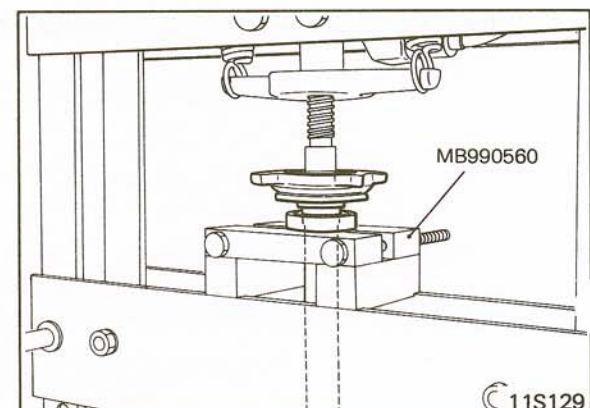
Steel Pipe	mm (in.)
Overall length	50 (1.7)
Outside diameter	75 (3.0)
Wall thickness	4 (.2)



#### NOTE

After the dust cover has been installed, apply the specified grease to the bearing mounting surface of the dust cover.

4. Using a special tool, force the bearing onto the inner shaft.







## INSTALLATION

1. Install the housing tube onto the front differential carrier and differential mounting bracket.
2. Drive the inner shaft into the front differential carrier with the special tool (MB990906).

### Caution

Replace the circlip on the spline part of the inner shaft with a new one.

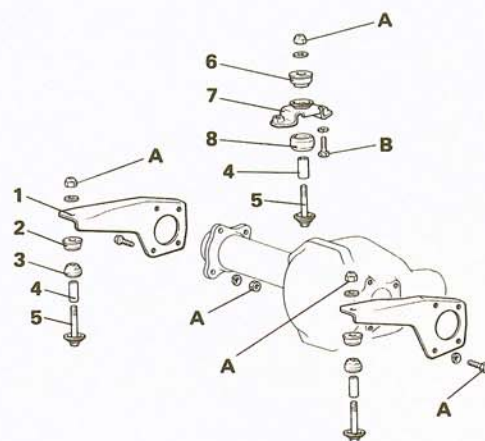
Be careful not to damage the lip of the dust seal on the oil seal.

3. Install the right drive shaft. (Refer to p. 2-46.)
4. Torque all parts to specifications during assembly.

## DIFFERENTIAL MOUNTING COMPONENTS

1. Differential mounting bracket
2. Differential mounting rubber A
3. Differential mounting rubber B
4. Spacer
5. Pin
6. Differential mounting rubber C
7. Bracket
8. Differential mounting rubber D

	Nm	ft. lbs.
A	80-100	58-72
B	30-42	22-30



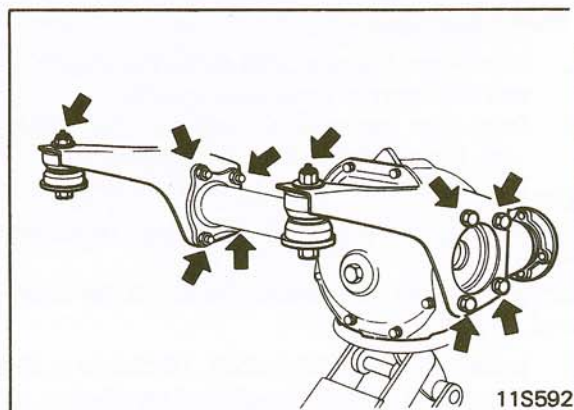
11S130



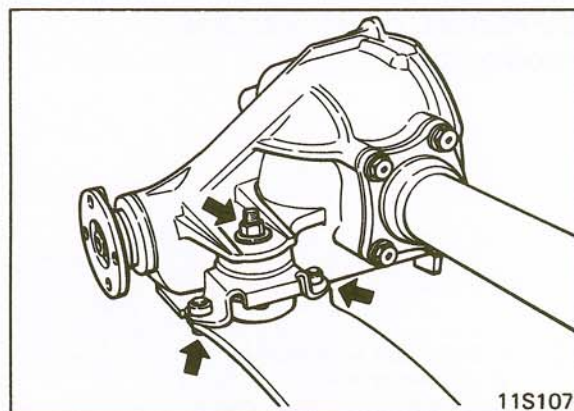


### REMOVAL

1. Remove the drive shafts. (Refer to p. 2-42.)
2. Remove the inner shaft. (Refer to p. 2-48.)
3. Support the differential carrier with a jack.
4. Remove the right and left differential mounting brackets. (11S592)



5. Support the differential carrier with a jack.
6. Remove the bracket from the differential carrier and front suspension crossmember. (11S107)



### INSPECTION

1. Check differential mounting bracket for deformation and damage.
2. Check bracket for deformation and damage.
3. Check differential mounting rubber for cracks and damage.

### INSTALLATION

1. Install the right and left differential mounting brackets and the rear side bracket by tightening the self-locking nuts to the specified torque.

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Differential mounting bracket tightening torque. . .  
80-100 Nm (58-72 ft.lbs.)

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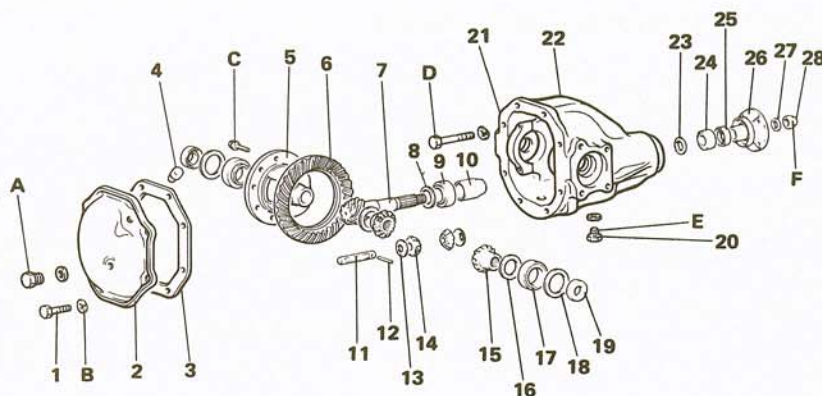
2. Torque all parts to specifications during assembly.





## COMPONENTS

1. Filler plug
2. Cover
3. Gasket
4. Vent plug
5. Differential case
6. Ring gear
7. Drive pinion
8. Drive pinion front shim (for pinion height adjustment)
9. Drive pinion front bearing
10. Drive pinion spacer
11. Pinion shaft
12. Lock pin
13. Pinion washer
14. Pinion gear
15. Side gear
16. Side gear thrust spacer
17. Side bearing
18. Side bearing adjusting spacer
19. Oil seal
20. Drain plug
21. Bearing cap
22. Gear carrier
23. Drive pinion rear shim (for preload adjustment)
24. Drive pinion rear bearing
25. Oil seal
26. Companion flange
27. Washer
28. Self-locking nut



	Nm	ft. lbs.
A	40-60	29-43
B	15-22	11-16
C	80-90	58-65
D	55-65	40-47
E	60-70	43-51
F	160-220	116-159

11S058

## REMOVAL

1. Remove the drain plug to drain the differential gear oil.
2. Remove the drive shafts. (Refer to p. 2-42.)
3. Remove the inner shaft. (Refer to p. 2-48.)
4. Detach the propeller shaft from the differential carrier. (Refer to GROUP 16.)
5. Remove the left differential mounting bracket. (Refer to p. 2-52.)
6. Detach the right differential mounting bracket from the frame. (Refer to p. 2-52.)





7. Detach the front suspension crossmember from the frame, and then remove the differential carrier together with the front suspension crossmember.  
(Refer to p. 2-52.)
8. Secure the working base in a vice and mount the differential carrier onto the working base.

### INSPECTION BEFORE DISASSEMBLY

#### NOTE

For the differential carrier inspection procedure, refer to GROUP 3.

#### Final Ring Gear Backlash

With the drive pinion locked in place, measure the final ring gear backlash with a dial indicator. (11Y167)

Final ring gear backlash .....
0.13-0.18 mm (.005-.007 in.)

#### NOTE

Measure at four different points on the circumference of the ring gear.

#### Ring Gear Runout

Measure the ring gear runout at the shoulder on the reverse side of the gear teeth. (11Y168)

Ring gear runout [Repair limit] .....
0.05 mm (.002 in.)

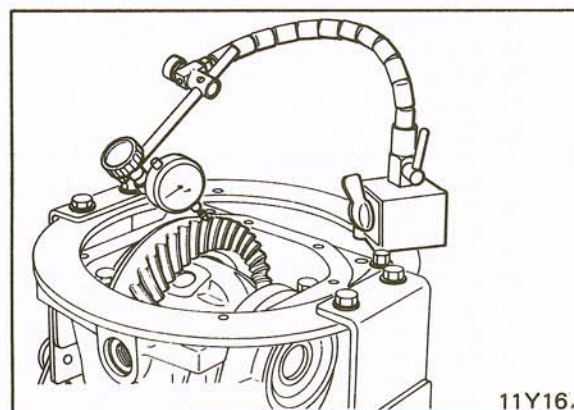
#### Differential Gear Backlash

Lock the side gear with a wedge and measure the differential gear backlash with a dial indicator positioned on the pinion gear. (11Y109)

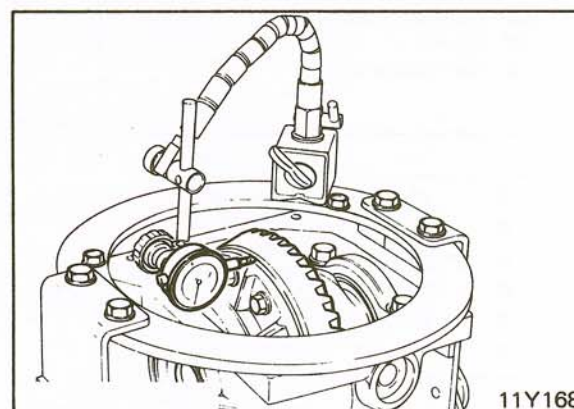
Differential gear backlash [Repair limit] .....
0.15 mm (.006 in.)

#### Final Ring Gear Tooth Contact

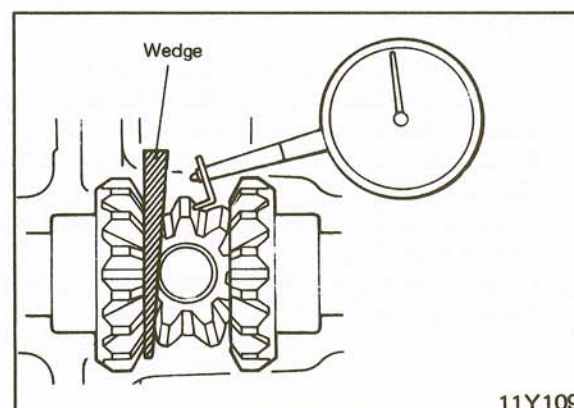
Check the tooth contact of the final ring gear tooth contact.



11Y167



11Y168



11Y109





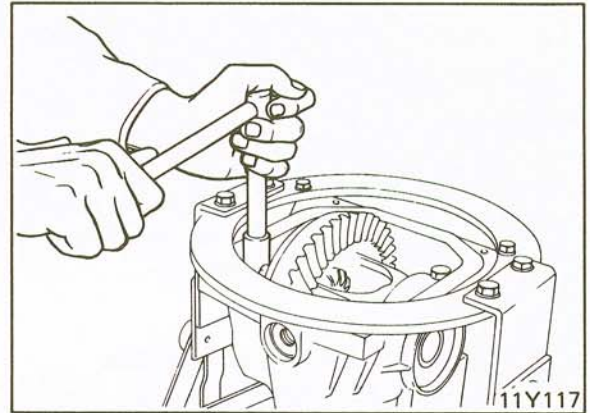
## DISASSEMBLY

### Differential Case Assembly

1. Remove the bearing caps. (11Y117)
2. For the procedure from removal of the differential case to removal of the differential gears, refer to GROUP 3.

#### NOTE

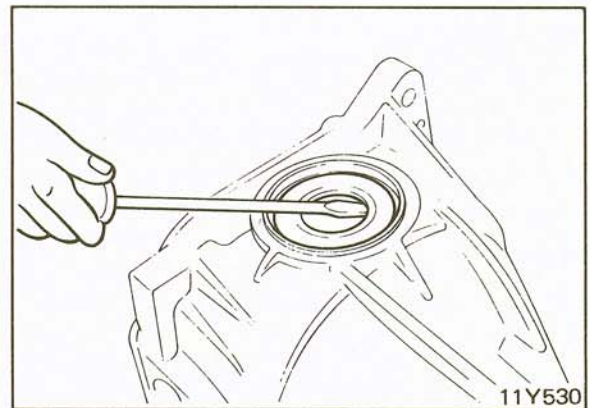
When reference is made to GROUP 3 as mentioned above, the "Side bearing nut" in GROUP 3 should be interpreted as the "Side bearing adjusting spacer".



3. Remove the oil seal for the drive shaft or the inner shaft.

#### NOTE

The oil seal for the drive shaft or the inner shaft can also be replaced by pulling out the drive shaft or the inner shaft, without removing the differential carrier from the vehicle. (Refer to p. 2-42.) (11Y530)



### Drive Pinion

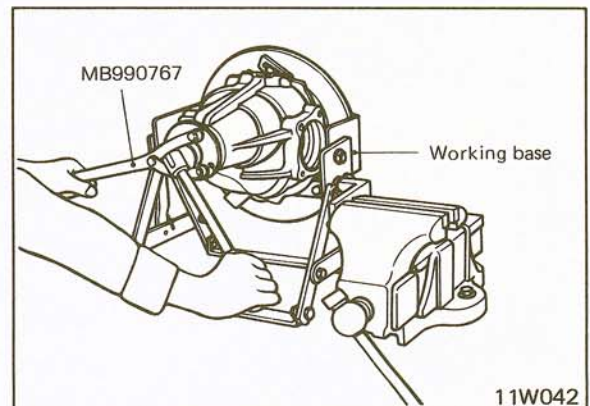
1. For the drive pinion disassembly procedure, refer to GROUP 3.

#### NOTE

The names used for the special tools in GROUP 3 differ from those used here, and also the following parts should be interpreted as indicated below:

(11W042)

- Drive pinion front shim  
→ Drive pinion rear shim
- Drive pinion rear bearing  
→ Drive pinion front bearing

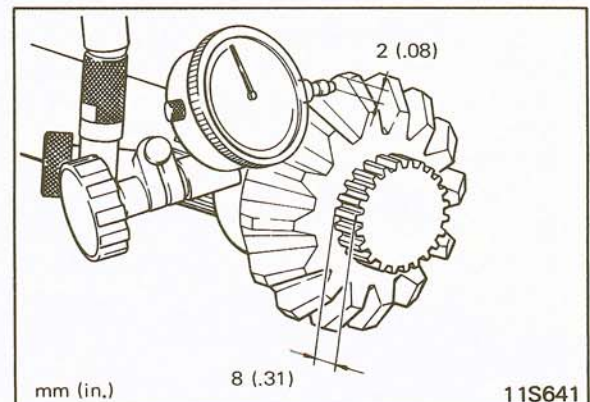


## INSPECTION

1. Check spline coupling for wear and damage.
2. Check oil seal for wear and deterioration.
3. Check bearings for wear and discoloration.
4. Check gear carrier for cracks.
5. Check drive pinion and ring gear for wear and cracks.
6. Check side gear, pinion gear and pinion shaft for wear and seizure.

### Checking of the Drive Shaft Spline for Looseness

With the drive shaft secured in a vice, measure the free play with a dial indicator. (11S641)







### REASSEMBLY

#### Drive Pinion

For the drive pinion reassembly procedure, refer to GROUP 3.

#### NOTE

The names used for the special tools in GROUP 3 differ from those used here, and also the following parts should be interpreted as indicated below:

(11Y183)

Drive pinion front shim

→ Drive pinion rear shim

Drive pinion front bearing

→ Drive pinion rear bearing

#### Differential Case Assembly

1. For the differential case reassembly procedure except for the final ring gear backlash adjustment procedure, refer to GROUP 3.
2. Adjust the final ring gear backlash as follows:
  - (1) Press the side bearing inner races into the differential case with a special tool. (11Y197)
  - (2) Install side bearing adjusting spacers which are thinner than those removed on both the pinion gear and the ring gear sides of the differential case assembly, and then fit the differential case assembly into the gear carrier.

#### NOTE

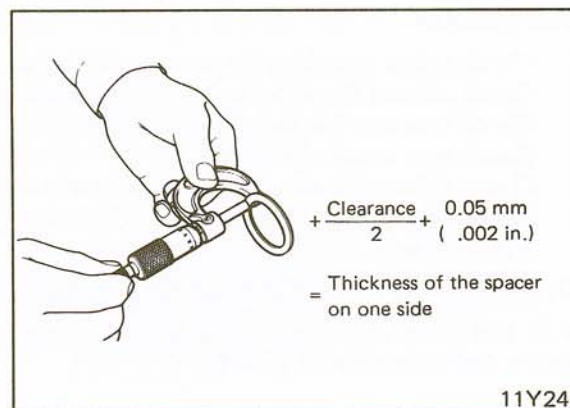
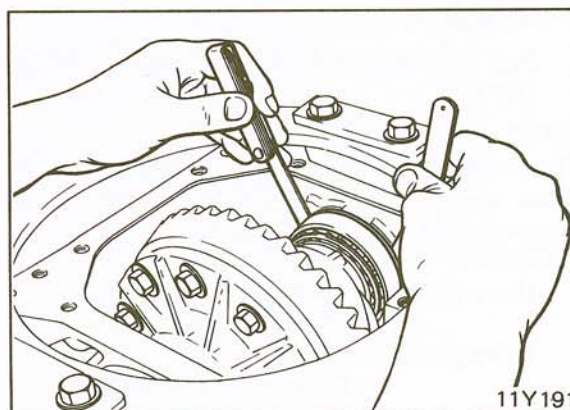
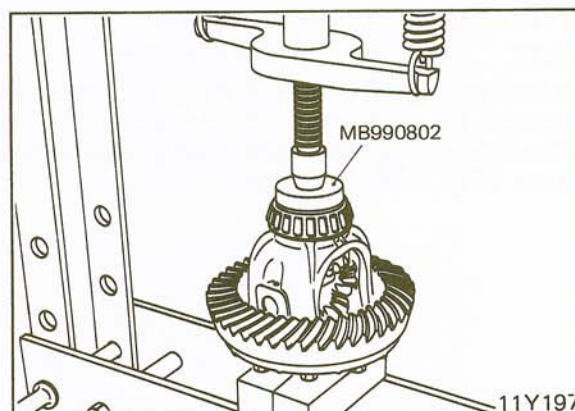
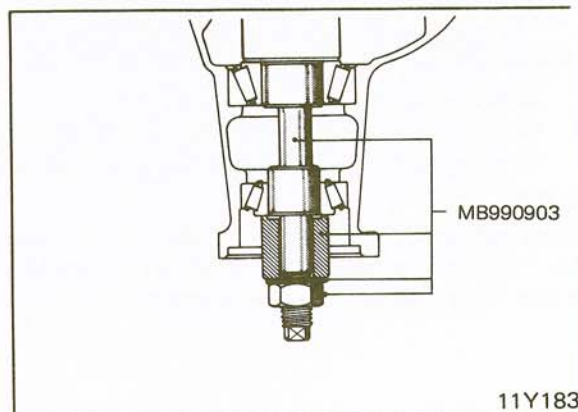
Select side bearing adjusting spacers with the same thickness for both the drive pinion side and the ring gear side.

- (3) Push the differential case assembly to one side and measure the clearance between the gear carrier and the side bearing adjusting spacer with a feeler gauge. (11Y191)

- (4) Measure the thickness of the side bearing adjusting spacers on one side, select two pairs of spacers which correspond to that thickness plus one half of the clearance plus 0.05 mm (.002 in.), and then install one pair each on the drive pinion side and the ring gear side. (11Y241)

#### NOTE

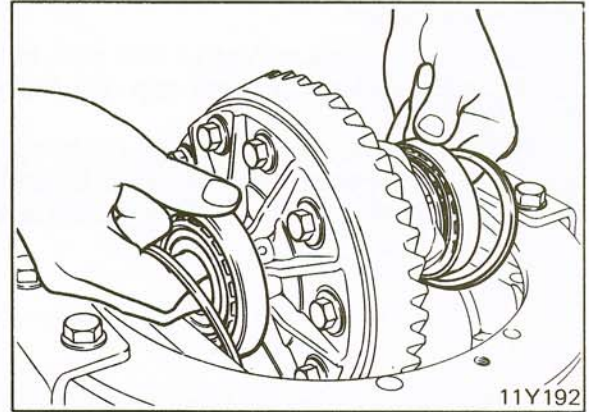
Be sure that there is no clearance between the gear carrier and the side bearing adjusting spacer.



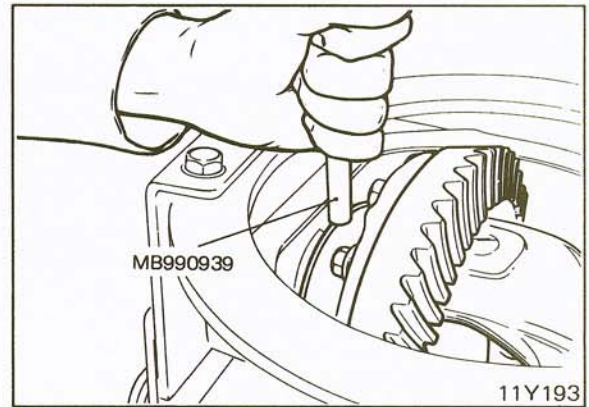




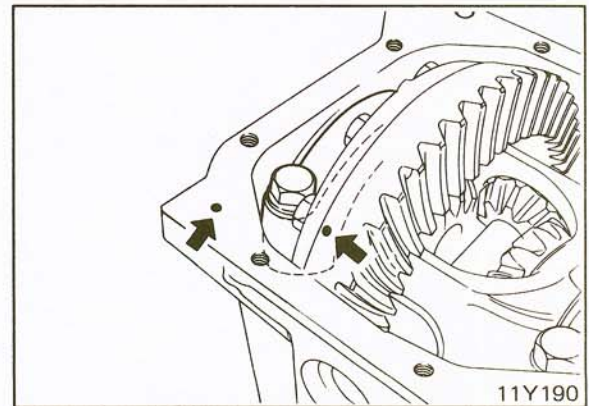
- (5) Install the side bearing adjusting spacers and differential case assembly, on the gear carrier as shown in the illustration.



- (6) Tap the side bearing adjusting spacers with a brass bar to fit them into the side bearing outer race.



- (7) Align the mating marks on the gear carrier and the bearing cap, and then tighten the bearing cap. (11Y 190)
- (8) Measure the final ring gear backlash. (Refer to GROUP 3.)



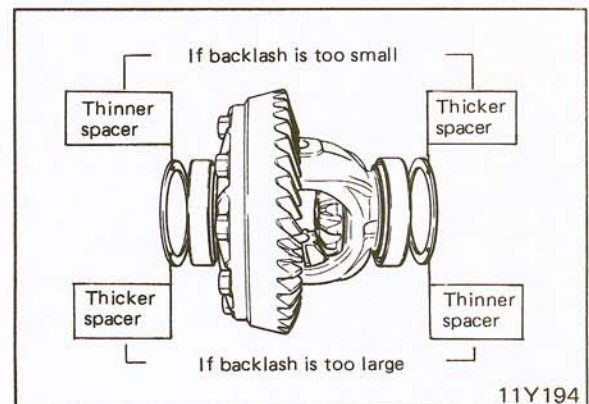
- (9) Select the side bearing adjusting spacers as illustrated, and then adjust the final ring gear backlash between the ring gear and the drive pinion. (11Y194)

## NOTE

Be sure to select the side bearing adjusting spacers on the drive pinion side and on the ring gear side so that the total thickness is equal to that obtained from the calculation in step (4).

When selecting the side bearing adjusting spacers, keep the number of spacers to a minimum.

3. Torque all parts to specifications during assembly.



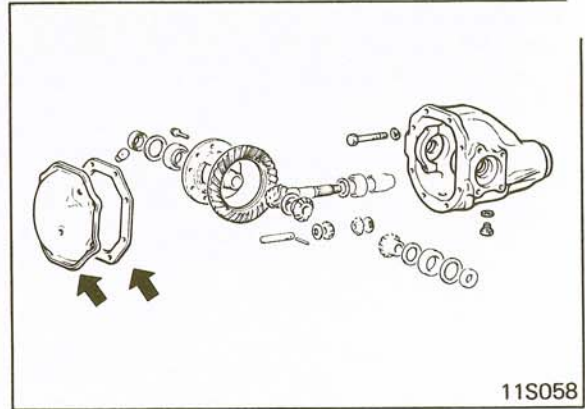




## COMPONENT SERVICE-DIFFERENTIAL CARRIER

### INSTALLATION

1. Apply semi-drying sealant to both sides of the gasket and install the differential cover onto the differential carrier. (11S058)
2. Install the differential mounting. (Refer to p. 2-52.)
3. Install the propeller shaft. (Refer to GROUP 16.)
4. Torque all parts to specifications during assembly.

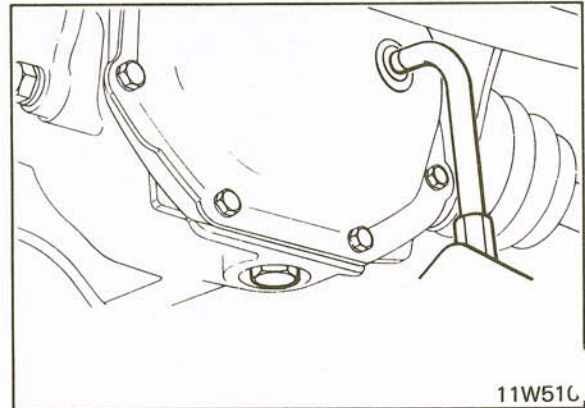


5. Supply the specified differential gear oil to the differential.

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Recommended front axle gear oil . . . . .  
Hypoid gear oil  
API classification GL-4 or GL-5  
SAE viscosity No. 90  
1.10 lit. (1.16 U.S. qt., 0.97 Imp.qt.)

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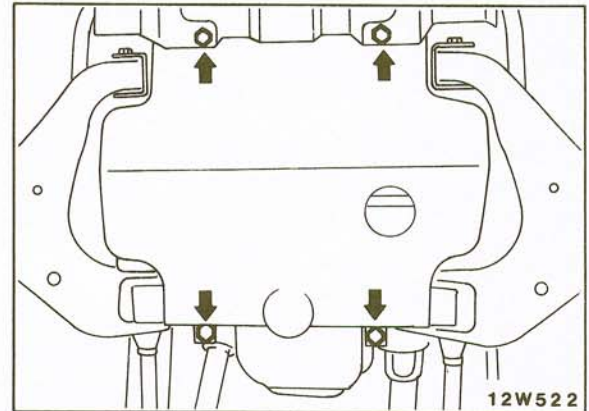






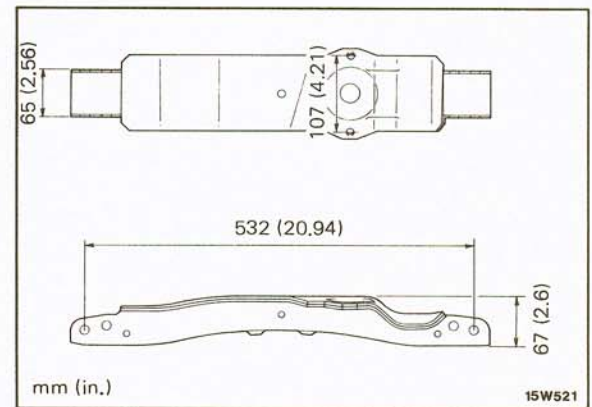
## REMOVAL

1. Remove the under cover. (12W522)
2. Remove the front suspension crossmember.



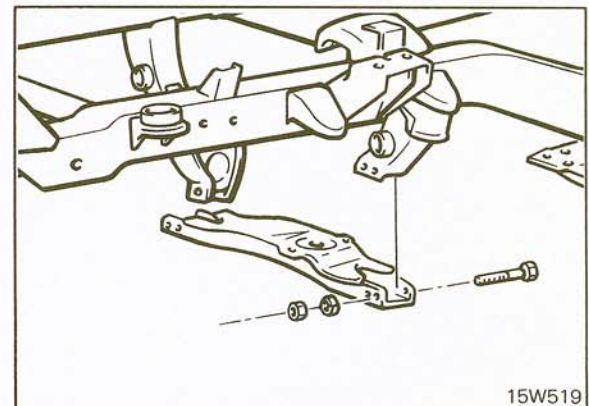
## INSPECTION

1. Check crossmember for incorrect alignment.
2. Check crossmember for cracks, bends and dents.



## INSTALLATION

1. Install the front suspension crossmember, making sure that the direction of the bolts is correct. (15W519)
2. Torque all parts to specifications during assembly.











# REAR AXLE

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## SPECIFICATIONS

### GENERAL SPECIFICATIONS

	Vehicles with conventional differential	Vehicles with limited slip differential
Axle shaft		
Type	Semi-floating type	Semi-floating type
Shaft dimensions		
Bearing portion dia. mm (in.)	40 (1.57)	40 (1.57)
Center portion dia. mm (in.)	34.5 (1.36)	34.5 (1.36)
Overall length mm (in.)	700.5 (27.6)	700.5 (27.6)
Bearing		
O.D. x I.D. mm (in.)	80 x 40 (3.15 x 1.57)	80 x 40 (3.15 x 1.57)
Differential		
Reduction gear type	Hypoid gear	Hypoid gear
Reduction ratio		
Manual transmission	4.625	4.625
Optional for Federal (not available in California)	4.875	4.875
Automatic transmission	4.222	4.222
Optional for Federal (not available in California)	4.625	4.625
Differential lock type		Disc type
Differential gear type and configuration		
Side gear	Straight bevel gear x 2	Straight bevel gear x 2
Pinion gear	Straight bevel gear x 2	Straight bevel gear x 4
Number of teeth		
Drive gear		
Manual transmission	37	37
Optional for Federal (not available in California)	39	39
Automatic transmission	38	38
Optional for Federal (not available in California)	37	37
Drive pinion		
Manual transmission	8	8
Automatic transmission	9	9
Optional for Federal (not available in California)	8	8
Side gear	14	14
Pinion gear	10	10





## ERVICE SPECIFICATIONS

	Vehicles with conventional differential	Vehicles with limited slip differential
<b>Standard values</b>		
Limited slip differential preload		
Using special tool   Nm (ft.lbs.)	—	15 (11) or more
Without using special tool   Nm (ft.lbs.)	—	30 (22) or more
Final ring gear backlash   mm (in.)	0.13-0.18 (.005-.007)	0.13-0.18 (.005-.007)
Drive pinion preload		
With oil seal   Ncm (in.lbs.)	100-130 (8.7-11.3)	100-130 (8.7-11.3)
Without oil seal   Ncm (in.lbs.)	70-100 (6.1-8.7)	70-100 (6.1-8.7)
Clearance between the clutch plates and the differential case   mm (in.)	—	0.06-0.20 (.002-.008)
Axial clearance of the differential gear   mm (in.)	—	0.05-0.20 (.002-.008)
Differential gear backlash   mm (in.)	0.051-0.127 (.002-.005)	—
Clutch plate preload		
When equipped with new clutch plates   Nm (ft.lbs.)	—	60-100 (43-72)
When equipped with old clutch plates   Nm (ft.lbs.)	—	30-80 (22-58)
<b>Repair limits</b>		
Rear axle total backlash   mm (in.)	5 (.2)	5 (.2)
Ring gear runout   mm (in.)	0.05 (.002)	0.05 (.002)
Difference in total thickness between left and right clutch plates   mm (in.)	—	0.05 (.002) or less
Difference in distances from backs of left and right pressure rings to end of thrust washer   mm (in.)	—	0.05 (.002) or less
<b>Service limits</b>		
Axle shaft end play   mm (in.)	0.05-0.20 (.002-.008)	0.05-0.20 (.002-.008)
Axle shaft runout   mm (in.)	0.1 (.004)	0.1 (.004)
Axle shaft spline play   mm (in.)	0.6 (.024)	0.6 (.024)
Friction plate/disc warping		
Total deviation   mm (in.)	—	0.08 (.003) or less
Clutch plate wear		
Difference in thicknesses of friction surface and projections   mm (in.)	—	0.1 (.004) or less
Thrust washer thickness   mm (in.)	—	1.4 (.055) or more





## SPECIFICATIONS

### TORQUE SPECIFICATIONS

Nm (ft.lbs)

Rear axle bearing lock nut	180-220 (130-159)
Bearing case to rear axle housing	50-60 (36-43)
Companion flange to drive pinion	190-250 (137-181)
Filler plug	40-60 (29-43)
Drain plug	60-70 (43-51)
Bearing cap to gear carrier	55-65 (40-47)
Differential case to ring gear	80-90 (58-65)
Lock plate	15-22 (11-16)
Differential carrier to rear axle housing	25-30 (18-22)



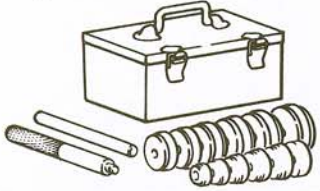


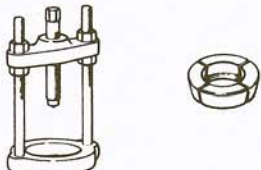


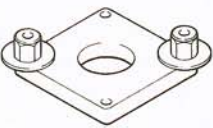
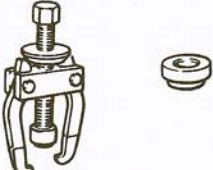
### LUBRICANTS

	Specified lubricant	Quantity
Rear axle gear oil		
Conventional differential	Hypoid gear oil API classification GL-4 or GL-5 SAE viscosity No. 90	1.80 liter (1.90 U.S.qt., 1.58 Imp.qt.)
Limited slip differential	MITSUBISHI genuine gear oil Part No. 8149630EX, or Mopar Hypoid Gear Lubricant part No. 3744994 or 3744995 plus Mopar Hypoid Gear Oil Additive/Friction Modifier part No. 4057100, or equivalent	1.80 liter (1.90 U.S.qt., 1.58 Imp.qt.)
Axle housing grease	Multipurpose grease SAE J310a, NLGI grade #2EP	As required



# SPECIAL TOOLS




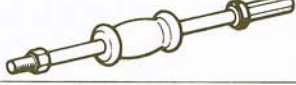


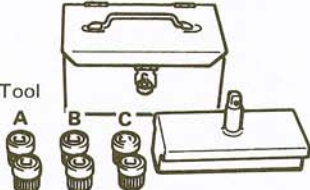
Tool (Number and name)	Use	Tool (Number and name)	Use
<b>MB990785 “*”</b> Lock nut special wrench 	Removal of the lock nut	<b>MB990799</b> Bearing inner race installer 	Pressing of the axle shaft bearing inner race
<b>MB990925</b> Bearing and oil seal installer set 	Pressing of the axle shaft bearing outer race and oil seal Insertion of the axle shaft oil seal Removing and pressing of the drive pinion bearing outer race	<b>MB990201 “*”</b> Side bearing special adjusting wrench 	Removal and adjustment of the side bearing nut
<b>MB990850 “D”</b> End yoke holder 	Removal of the companion flange	<b>MB990339 “*”</b> <b>MB990648 “*”</b> Bearing puller      Bearing remover 	Removal of the drive pinion rear bearing inner race
<b>MB990552 “*”</b> Pinion height gauge set <b>MB990819 “*”</b> Pinion height gauge 	Measurement of the pinion height	<b>MB990802</b> Bearing installer 	Pressing of the drive pinion rear bearing inner race Pressing of the side bearing inner race
<b>MB990787-A</b> Puller 	Removal of the axle shaft bearing and bearing case	<b>MB990810 “*”</b> <b>MB990811</b> Side bearing puller      Side bearing cup 	Removal of the side bearing inner race

“\*”, “D” see page 2 for instructions.





## SPECIAL TOOLS

Tool (Number and name)	Use	Tool (Number and name)	Use
MB990241 "*" Rear axle shaft puller    MB990211 Sliding hammer  	Removal of axle shaft	MB990031 "*" Drive pinion oil seal installer  	Pressing of the drive pinion oil seal
MB990767 "*" End yoke holder  	Measurement of the limited slip differential preload	MB990988 Side gear holding tool set  	Measurement of the clutch plate preload

"\*" see page 2 for instructions.



# TROUBLESHOOTING



Symptom	Probable cause	Remedy
<b>AXLE SHAFT, AXLE HOUSING</b> Noise while wheels are rotating	Brake drag Bent axle shaft Worn or damaged axle shaft bearing	Replace
Grease leakage	Worn or damaged oil seal Malfunction of bearing seal	Replace
<b>CONVENTIONAL DIFFERENTIAL</b> Constant noise	Improper final ring gear tooth contact adjustment Loose, worn or damaged side bearing Loose, worn or damaged drive pinion bearing	Correct or replace
	Worn ring gear, drive pinion Worn side gear thrust washer or pinion shaft Deformed ring gear or differential case Damaged gear	Replace
	Foreign material	Eliminate the foreign material and check; replace parts if necessary
	Insufficient oil	Replenish
Gear noise while driving	Poor gear engagement Improper gear adjustment Improper drive pinion preload adjustment	Correct or replace
	Damaged gear	Replace
	Foreign material	Eliminate the foreign material and check; replace parts if necessary
	Insufficient oil	Replenish
Gear noise while coasting	Improper drive pinion preload adjustment Damaged gear	Correct or replace Replace
Bearing noise while driving or coasting	Cracked or damaged drive pinion rear bearing	Replace
Noise while turning	Loose side bearing Damaged side gear, pinion gear or pinion shaft	Replace





## TROUBLESHOOTING

Symptom	Probable cause	Remedy
Heat	Insufficient gear backlash Excessive preload	Adjust
	Insufficient oil	Replenish
Oil leakage	Clogged breather hose	Clean or replace
	Cover insufficiently tightened Seal malfunction	Retighten, apply sealant, or replace the gasket
	Worn or damaged oil seal	Replace
	Excessive oil	Adjust the oil level
<b>LIMITED SLIP DIFFERENTIAL</b>		
Abnormal noise during driving or gear changing	Excessive final ring gear backlash Insufficient drive pinion preload	Adjust
	Excessive differential gear backlash	Adjust or replace
	Worn side gear spline	Replace
	Loose companion flange self-locking nut	Retighten or replace

### NOTE

In addition to a malfunction of the differential carrier components, abnormal noise can also be caused by the propeller shaft universal joint, the axle shafts, the wheel bearings, etc. Before disassembling any parts, take all possibilities into consideration and confirm the source of the noise.

Abnormal noise when cornering	Damaged differential gears Damaged pinion shaft Nicked and/or abnormally worn inner or outer clutch plates Inferior gear oil Abnormally worn or damaged thrust washer	Replace
	Insufficient gear oil quantity	Replenish
Gear noise	Improper final ring gear tooth contact adjustment	Adjust or replace
	Incorrect final ring gear backlash Improper drive pinion preload adjustment	Adjust
	Damaged, broken, or seized tooth surfaces of the ring gear and drive pinion Damaged, broken, or seized drive pinion bearings Damaged, broken, and/or seized side bearings Damaged differential case Inferior gear oil	Replace
	Insufficient gear oil quantity	Replenish



## TROUBLESHOOTING



Symptom	Probable cause	Remedy
---------	----------------	--------

### NOTE

Noise from the engine, muffler vibration, transmission, propeller shaft, wheel bearings, tires, body, etc., is easily mistaken as being caused by malfunctions in the differential carrier components. Be extremely careful and attentive when performing the driving test.

Test methods to confirm the source of the abnormal noise include: coasting, acceleration, constant speed driving, raising the rear wheels on a jack, etc. Use the method most appropriate to the circumstances.

Gear oil leakage	Worn or damaged front oil seal, or improperly installed oil seal Damaged gasket	Replace
	Loose companion flange self-locking nut	Retighten or replace
	Loose filler or drain plug	Retighten or apply adhesive
	Clogged or damaged breather hose	Clean or replace
Seizure	Insufficient final ring gear backlash Excessive drive pinion preload Excessive side bearing preload Insufficient differential gear backlash Excessive clutch plate preload	Adjust
	Inferior gear oil	Replace
	Insufficient gear oil quantity	Replenish

### NOTE

In the event of seizure, disassemble and replace the parts involved, and also be sure to check all components for any irregularities and repair or replace as necessary.

Breakdown	Incorrect final ring gear backlash Insufficient drive pinion preload Insufficient side bearing preload Excessive differential gear backlash Insufficient clutch plate preload	Adjust
	Loose ring gear clamping bolts	Retighten
	Operational malfunction due to overloaded clutch	Avoid excessively rough operation

### NOTE

In addition to disassembling and replacing the failed parts, be sure to check all components for irregularities and repair or replace as necessary.

The limited slip differential does not function (on snow, mud, ice, etc.)	The limited slip device is damaged	Disassemble, check the functioning, and replace the damaged parts
---	------------------------------------	---





## SERVICE ADJUSTMENT PROCEDURES

### REAR AXLE TOTAL BACKLASH

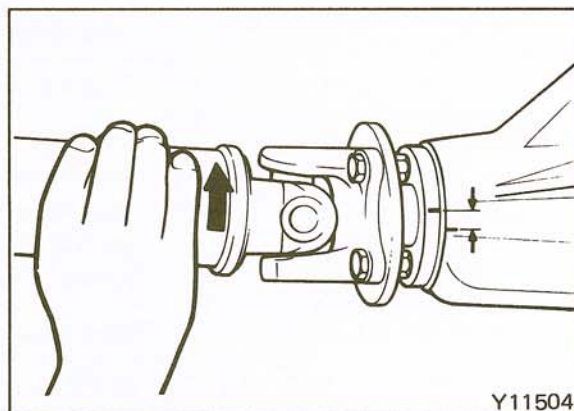
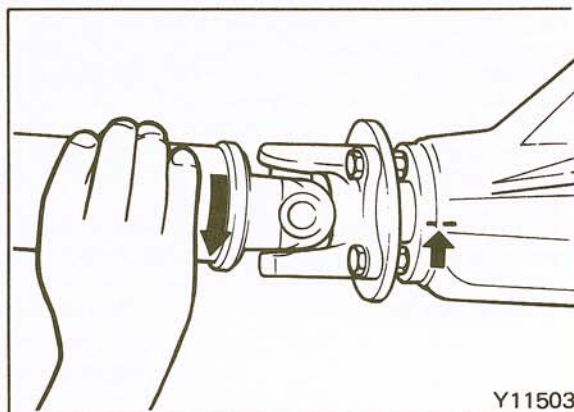
If the vehicle vibrates and produces a booming sound due to the unbalance of the drivetrain, use the following procedure to measure the rear axle total backlash to see if it is necessary to remove the differential carrier assembly.

- (1) Set the transmission control lever to the neutral position, set the transfer control lever to 2H, apply the parking brake and raise the vehicle.
- (2) Turn the companion flange clockwise far enough to remove all slack. Make mating marks on the dust cover of the companion flange and on the differential carrier. (Y11503)
- (3) Turn the companion flange fully counterclockwise to remove all slack, and measure the distance the mating marks moved. (Y11504)
- (4) If the backlash exceeds the repair limit, remove the differential carrier assembly and adjust it.

---

Rear axle total backlash [Repair limit]	.....
	5mm (.2 in.)

---



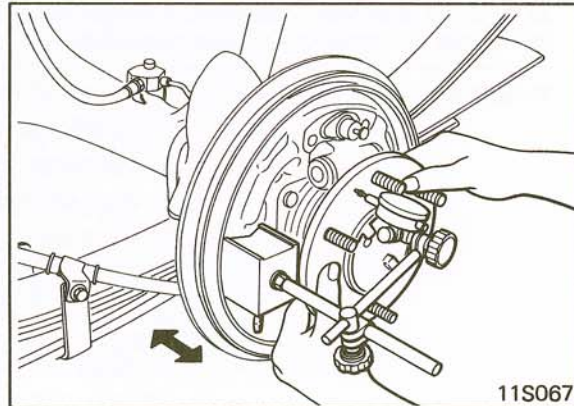
### AXLE SHAFT END PLAY

1. Measure the axle shaft end play with a dial indicator.
2. Push the axle shaft all the way in, and mount the dial indicator and set it to zero.
3. Pull the axle shaft all the way out and note the end play indication on the dial indicator. (11S067)
4. If the end play exceeds the service limit, replace the bearing.

---

Axle shaft end play [Service limit]	.....
	0.05-0.20 mm (.002-.008 in.)

---



### CHECKING GEAR OIL LEVEL

Remove the filler plug and check the oil level. (Refer to GROUP 2.)

---

Distance from the lower end of the filler plug to the oil surface	.....
	Within 14 mm (.6 in.)

---

### CHANGING GEAR OIL (Limited Slip Differential)

Remove drain plug and drain the lubricant from axle. Fill axle with 1.8 liter (1.90 U.S.qt., 1.58 Imp.qt.) of Mitsubishi genuine gear oil part No. 8149630EX, or 113 g (4 oz.) Mopar Hypoid Gear Oil Additive/Friction Modifier 4057100 plus 1.1 liter (1.16 U.S.qt., 0.97 Imp.qt.) of Mopar Hypoid Gear Lubricant part No. 3744994 or 3744995, or equivalent.





## LIMITED SLIP DIFFERENTIAL PRELOAD MEASUREMENT

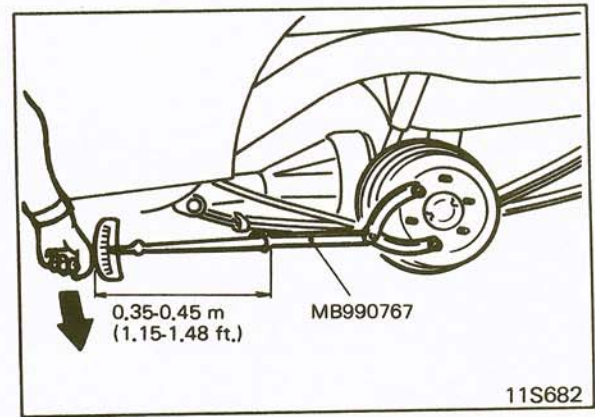
To measure the preload of the limited slip differential, set the shift lever of the transmission to the neutral position, lock the front wheels, and fully release the parking brake. One of the rear wheels should be maintained in contact with the ground surface, and the other should be raised up.

Measure the starting torque at the side on which the wheel is raised by using the following procedure:

- (1) Remove the wheel.
- (2) Mount the special tool to the hub bolts with the hub nuts.
- (3) Find the limited slip differential preload by measuring the axle shaft starting torque in the forward direction with a torque wrench. (11S682)

Limited slip differential preload . . . . .  
15 Nm (11 ft.lbs.) or more

- (4) If the torque is less than the specified value, remove the limited slip differential from the vehicle and repair it.

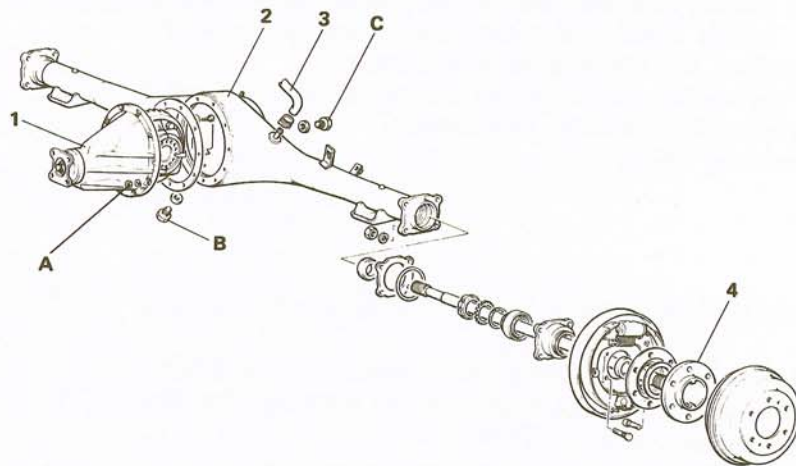






## COMPONENTS

1. Gear carrier
2. Axle housing
3. Breather hose
4. Axle shaft

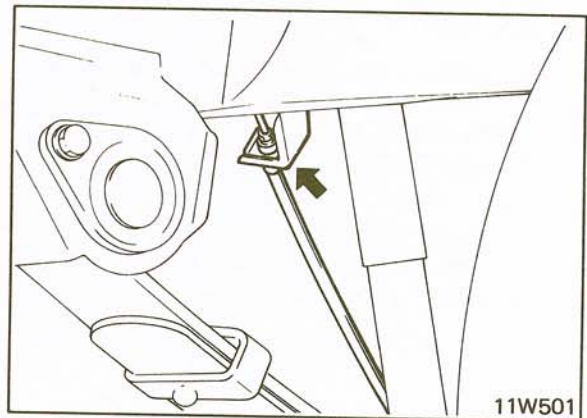


	Nm	ft.lbs.
A	25-30	18-22
B	60-70	43-51
C	40-60	29-43

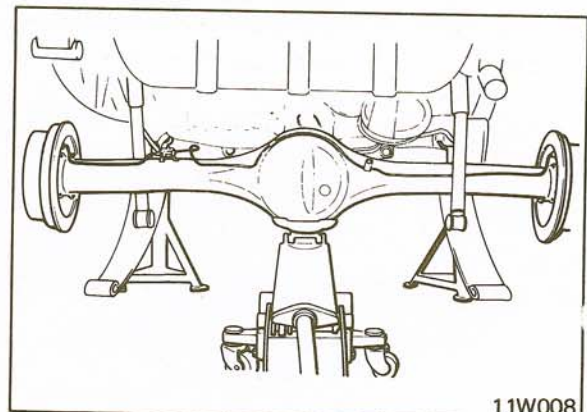
11W046

## REMOVAL

1. Support the vehicle with floor stands at the specified points.
2. Remove the parking brake cable and clips. (Refer to GROUP 5.) (11W501)
3. Completely drain the brake fluid and disconnect the brake hoses.
4. Detach the rear propeller shaft assembly from the differential carrier assembly. (Refer to GROUP 16.)



5. Raise the axle housing slightly on a jack.
6. Detach the shock absorbers from the U-bolt seats. (Refer to GROUP 17.)
7. Remove the U-bolts and the U-bolt seats. (Refer to GROUP 17.)
8. Remove the shackles to separate the spring assemblies from the side frame and lower the rear portions of the spring assemblies. (Refer to GROUP 17.)
9. Remove the axle assembly toward the rear of the vehicle. (11W008)



### Caution

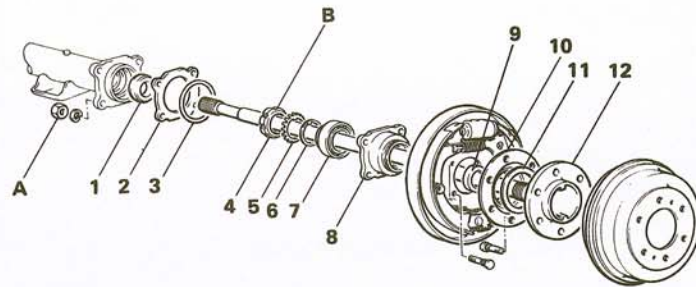
The axle assembly is unstable on the jack; be careful not to allow it to fall.





## COMPONENTS

1. Oil seal
2. Shim
3. O-ring
4. Lock nut
5. Lock washer
6. Washer
7. Bearing
8. Bearing case
9. Oil seal
10. Dust cover
11. Packing
12. Rear axle shaft



	Nm	ft.lbs.
A	50-60	36-43
B	180-220	130-159

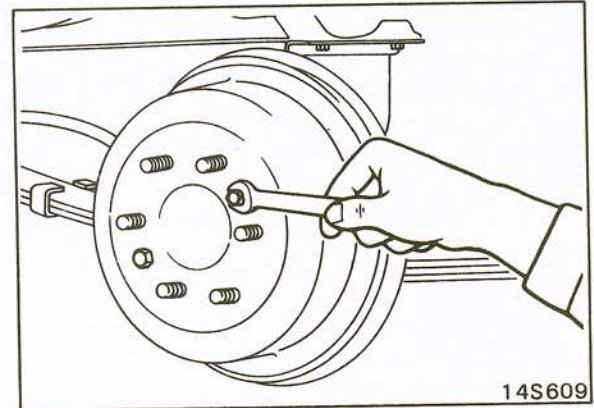
11W509

## REMOVAL

1. Disconnect the parking brake cables from the equalizer and then remove the clamps from the parking brake cables. (Refer to GROUP 5.)
2. Remove the brake drum.

### NOTE

If it is hard to remove the brake drum, screw bolts (M8 x 1.25 ) into the threaded holes provided in the brake drum flange surface. (14S609)

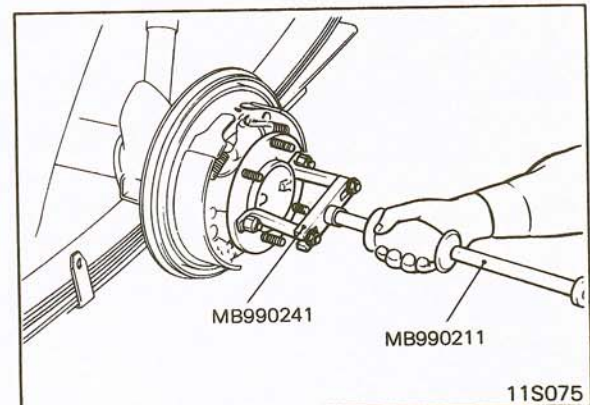


14S609

3. Disconnect the Brake tubes from the rear wheel cylinder.
4. Detach the bearing case from the end of the rear axle housing.
5. Pull the wheel toward you with the rear axle shaft and rear brake assembly still attached. If the rear axle shaft is hard to remove, use the special tools to loosen it. (11S075)

### NOTE

Do not damage the oil seal during removal of axle shaft.



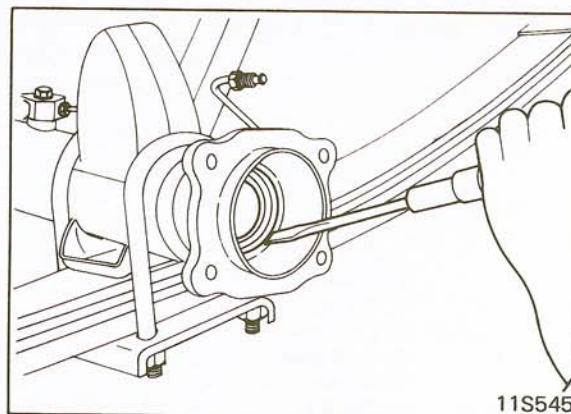
11S075





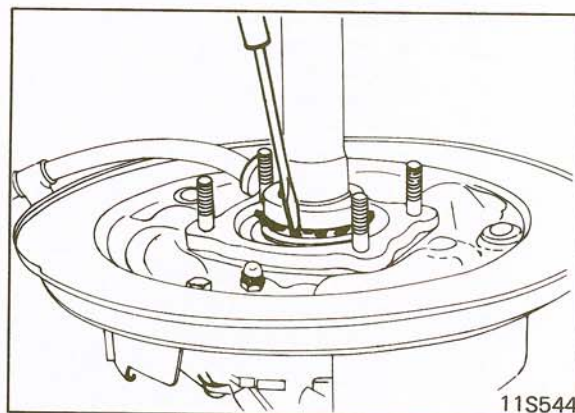
## COMPONENT SERVICE-AXLE SHAFT

6. Remove the oil seal from the end of the rear axle housing if necessary.

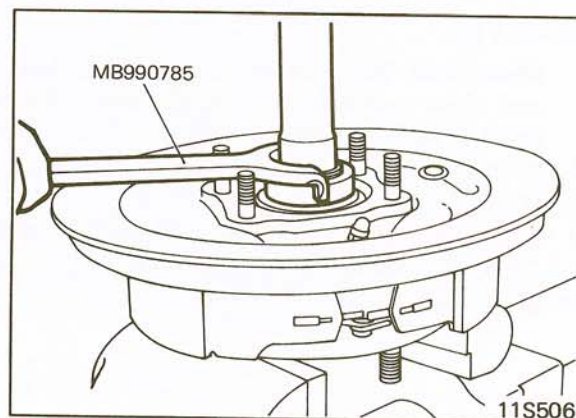


### DISASSEMBLY

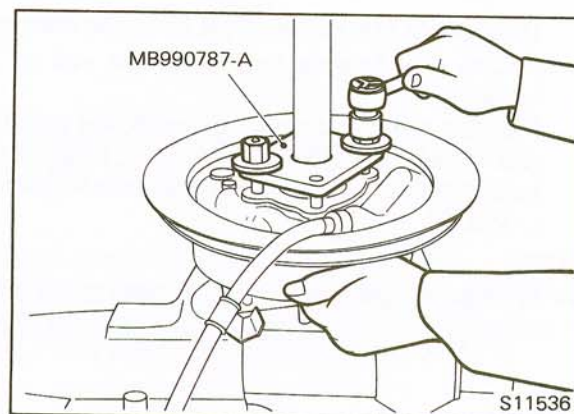
1. Straighten the bent tab of the lock washer.



2. Remove the lock nut with the special tool. (11S506)
3. Remove the lock washer and the washer.
4. Reinsert the lock nut on the axle shaft approximately three turns.



5. Using the special tool, push the axle shaft out of the bearing case. (S11536)
6. Apply equal pressure to nuts to ensure smooth removal of wheel bearing.
7. Using a hammer and drift, remove the bearing outer race from the bearing case.
8. Remove the oil seal from the bearing case.







## INSPECTION

1. Check dust cover for deformation and damage.
2. Check oil seal for damage.
3. Check inner and outer bearings for seizure, discoloration and rough raceway surface.
4. Check axle shaft for cracks, wear and damage.

## Checking of the Axle Shaft for Runout

With the axle shaft supported at the center holes on both ends, measure the axle shaft flange face for runout with a dial indicator.

Axle shaft runout [Service limit] .....  
0.1 mm (.004 in.)

## REASSEMBLY

1. Apply the specified wheel bearing grease to the outside circumference of the bearing outer race.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

2. Press the bearing outer race into the bearing case with the special tools. (11S020)
3. Apply the specified wheel bearing grease to the outside circumference of the new oil seal. (11S021)

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

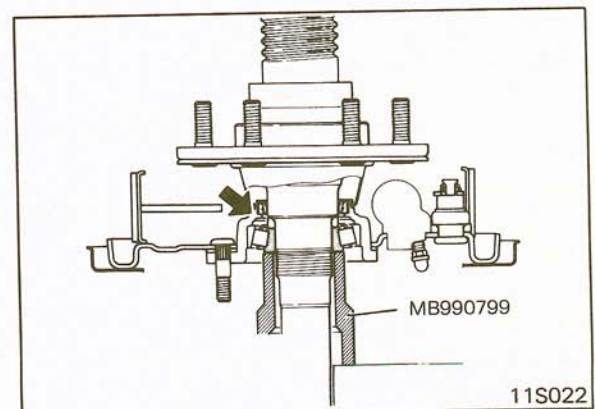
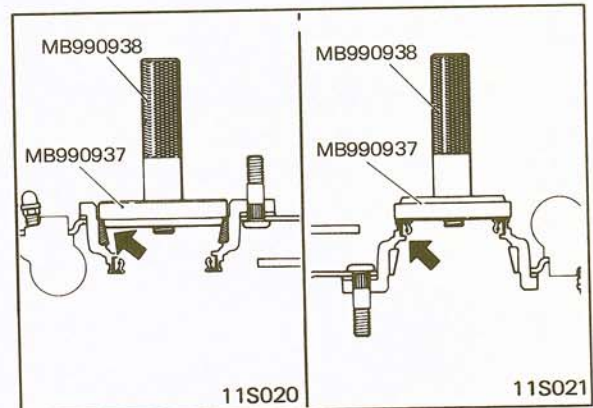
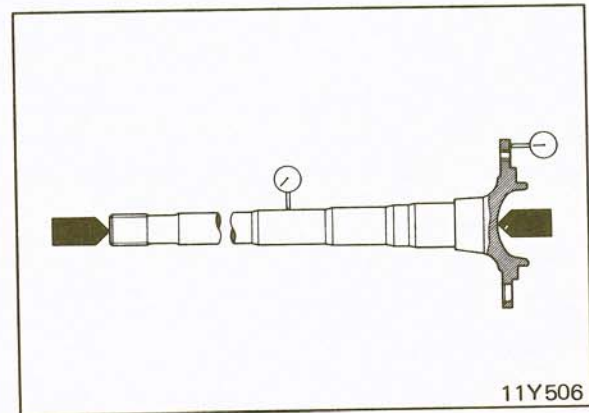
4. Press the new oil seal into the bearing case with the special tools until it is flush with the surface of the bearing cases. (11S021)
5. Apply the specified wheel bearing grease to the lip of the oil seal.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

6. Apply the specified wheel bearing grease to the roller surfaces of the bearing inner race.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

7. Install the rear brake assembly, the bearing case, and the bearing inner race in that order to the axle shaft.
8. Press the bearing inner race onto the axle shaft with the special tool. (11S022)







## COMPONENT SERVICE-AXLE SHAFT

9. Pack the bearing case with the specified wheel bearing grease.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

10. Install the lock washer and the lock nut with the chamfered side in the direction shown in the illustration. When installing the lock washer, align the tab of the lock washer with the slot in the axle shaft. (11S547)

### NOTE

Apply the specified wheel bearing grease to the threaded portion of the axle shaft before installing the lock nut.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

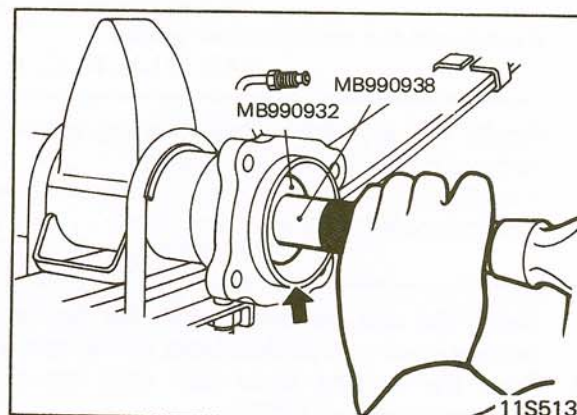
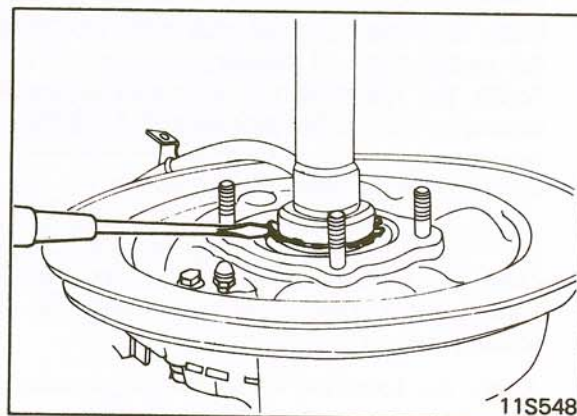
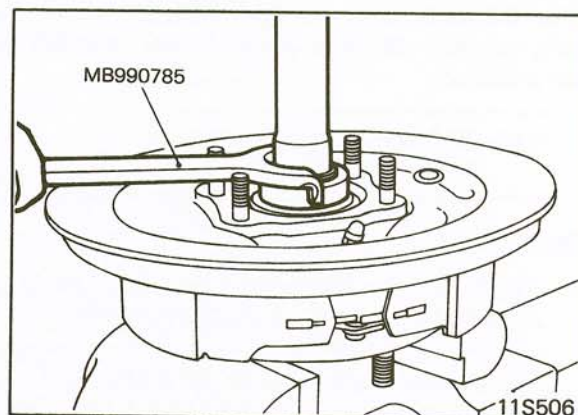
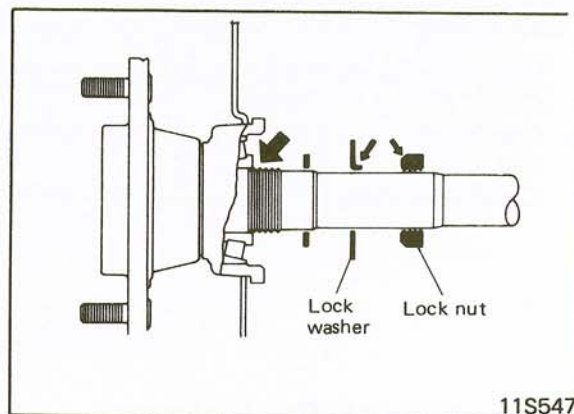
11. Tighten the lock nut to the specified torque using the special tool.

Rear axle bearing lock nut tightening torque .....  
180-220 Nm (130-159 ft.lbs.)

12. Bend the tabs of the lock washer into the slots of the lock nut.

### NOTE

If the slots in the lock nut and the tabs of the lock washer are out of alignment, tighten the lock nut until they align.



## INSTALLATION

1. Apply the specified wheel bearing grease to the oil seal area of the rear axle housing.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

2. Drive the new oil seal into the end of the rear axle housing with the special tools. (11S513)
3. Apply the specified wheel bearing grease to the oil seal lip.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP





Adjust the clearance between the bearing case and rear axle housing as follows: (11D528)

- (1) Insert a 1-mm (.04-in.) shim and the O-ring into the left rear axle housing.
- (2) Apply semi-drying sealant to the mating surface of bearing case, install the left axle shaft into the rear axle housing and tighten the nuts to the specified torque.

Bearing case to rear axle housing torque . . . . .  
50-60 Nm (36-43 ft.lbs.)

## NOTE

Tighten the nuts diagonally.

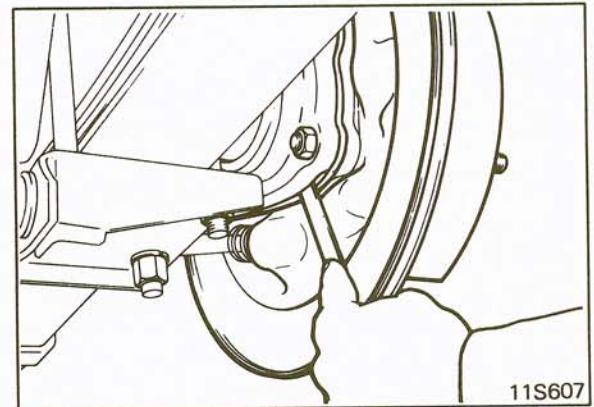
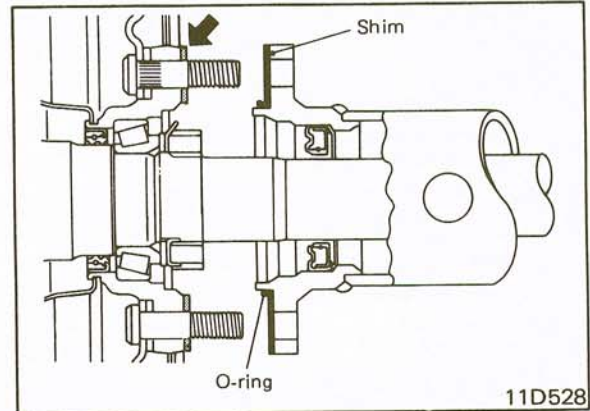
- (3) Install the right axle shaft without shim(s) and O-ring, and temporarily tighten to about 6 Nm (4.3 ft.lbs.).
- (4) Measure the clearance between the bearing case and rear axle housing with a feeler gauge. (11S607)
- (5) Select shim(s) of the thickness which is equal to the sum of the measured clearance plus 0.05-0.20 mm (.002-.008 in.).
- (6) Remove the right axle shaft and install shim(s) and O-ring on the right rear axle housing.
- (7) Apply semi-drying sealant to the mating surface of bearing case, install the right axle shaft into the rear axle housing and tighten the retainer bolts to the specified torque.

Bearing case to rear axle housing torque . . . . .  
50-60 Nm (36-43 ft.lbs.)

## NOTE

Tighten the nuts diagonally.

5. Check to be sure that the axle shaft end play is within the service limit. (Refer to p. 3-10.)

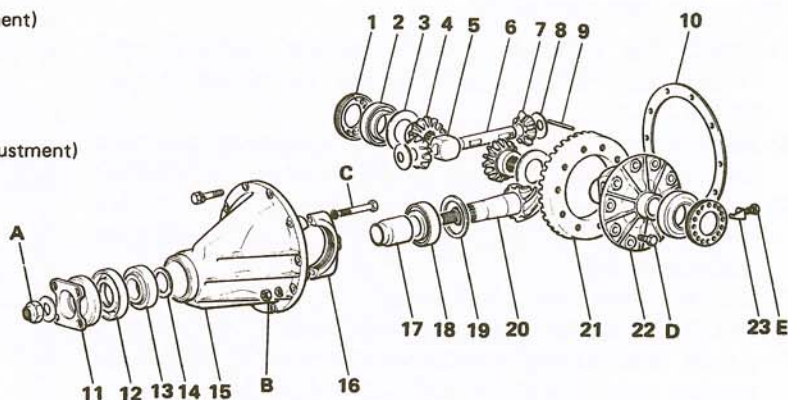






## COMPONENTS

1. Side bearing nut
2. Side bearing
3. Side gear thrust spacer
4. Side gear
5. Thrust block
6. Pinion shaft
7. Pinion gear
8. Pinion washer
9. Lock pin
10. Gasket
11. Companion flange
12. Oil seal
13. Drive pinion front bearing
14. Drive pinion front shim (for preload adjustment)
15. Gear carrier
16. Bearing cap
17. Drive pinion spacer
18. Drive pinion rear bearing
19. Drive pinion rear shim (for pinion height adjustment)
20. Drive pinion
21. Ring gear
22. Differential case
23. Lock plate

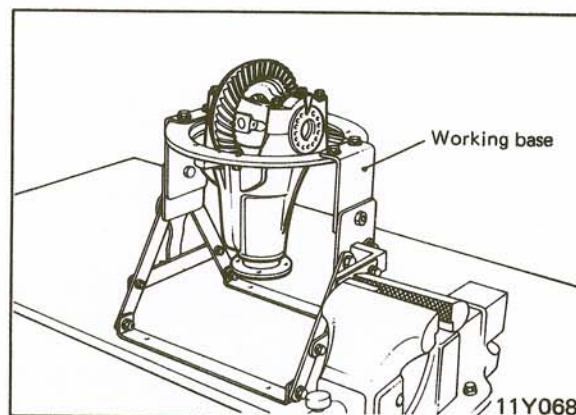


	Nm	ft.lbs.
A	190-250	137-181
B	25-30	18-22
C	55-65	40-47
D	80-90	58-65
E	15-22	11-16

11S079

## REMOVAL

1. Remove the drain plug and drain the differential gear oil.
2. Detach the propeller shaft from the differential carrier. (Refer to GROUP 16.)
3. Pull the right and left axle shafts out about 70 mm (3 in.). (Refer to p. 3-13.)
4. Remove the differential carrier from the rear axle housing. (Refer to p. 3-12.)
5. Secure the working base in a vice, and mount the differential carrier to the working base. (11Y068)







## INSPECTION BEFORE DISASSEMBLY

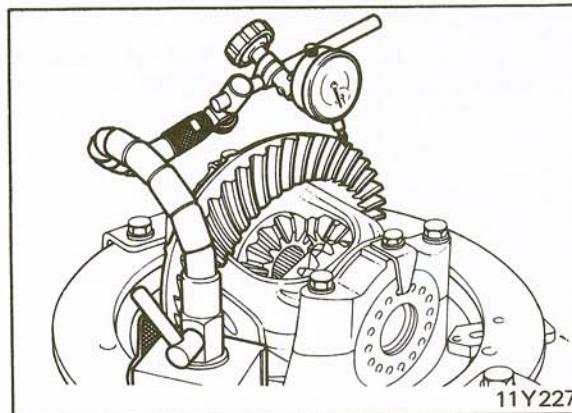
### Final Ring Gear Backlash

With the drive pinion locked in place, measure the final ring gear backlash with a dial indicator.

Final ring gear backlash .....  
0.13-0.18 mm (.005-.007 in.)

### NOTE

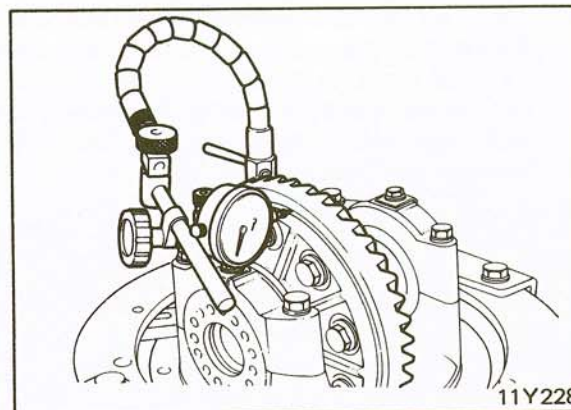
Measure at four different points on the circumference of the ring gear.



### Ring Gear Runout

Measure the ring gear runout at the shoulder on the back of the gear teeth.

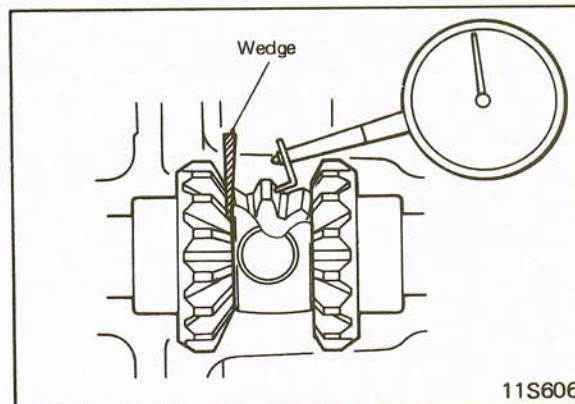
Ring gear runout [Repair limit] .....  
0.05 mm (.002 in.)



### Differential Gear Backlash

Lock the side gear with a wedge and measure the differential gear backlash with a dial indicator positioned on the pinion gear.

Differential gear backlash .....  
0.05-0.13 mm (.002-.005 in.)



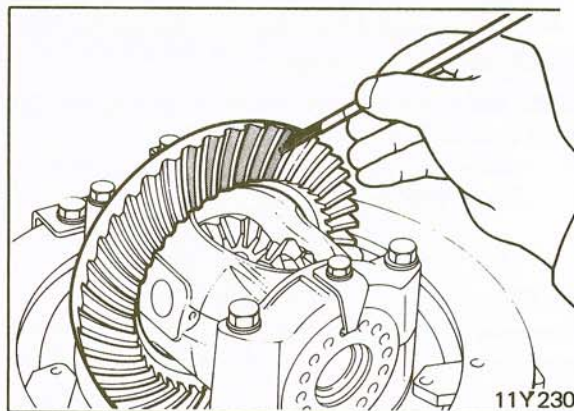
11S606





### Final Ring Gear Tooth Contact

1. Apply a thin, uniform coat of marking compound to both sides of the ring gear teeth.



2. Insert a brass rod between the differential carrier and the differential case, and then rotate the companion flange by hand (once in the normal direction, and then once in the reverse direction) while applying a load to the ring gear [approximately 2.5 to 3.0 Nm (1.8 to 2.2 ft.lbs.) through the drive pinion]. (11Y628)

#### Caution

If the ring gear is rotated too much, the tooth contact pattern will become unclear and difficult to check.

3. Inspect the tooth contact pattern of the ring gear and drive pinion.

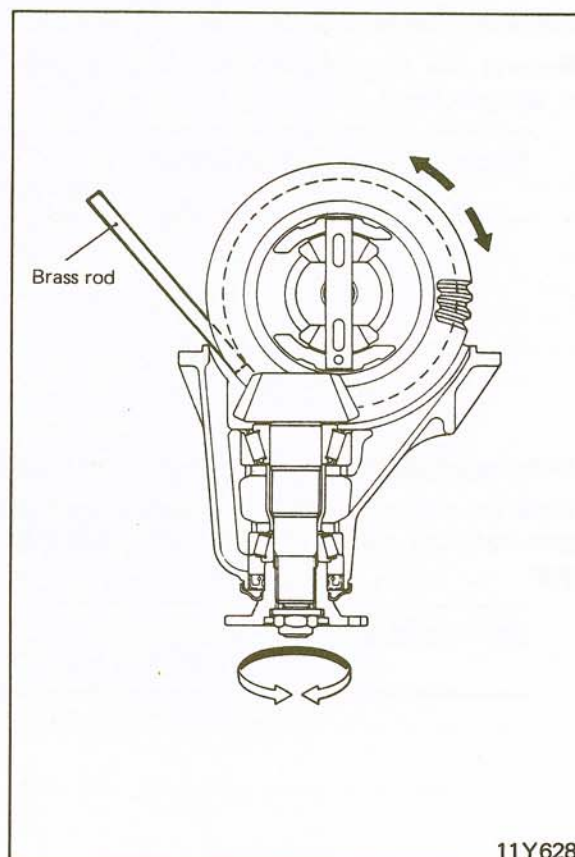
#### NOTE

Checking the tooth contact pattern is the way to confirm that the adjustments of the pinion height and backlash have been done properly. Continue to adjust the pinion height and backlash until the tooth contact pattern resembles the standard pattern.

4. If the correct tooth contact pattern cannot be obtained even after adjustments have been made, replace the ring gear and pinion.

#### Caution

If either the ring gear or the drive pinion is to be replaced, be sure to replace them as a set.

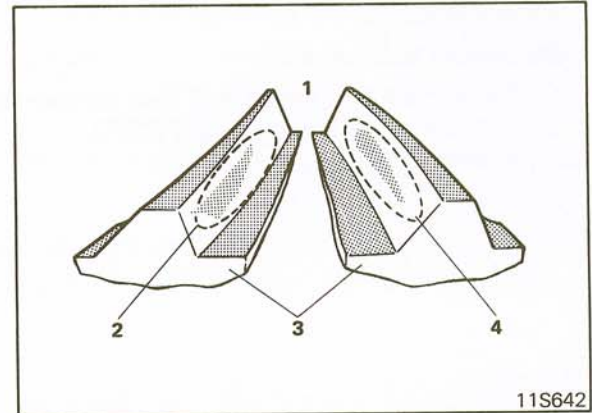






## Standard tooth contact pattern

1. Toe
2. Drive-side
3. Heel
4. Coast-side



11S642

## Tooth contact pattern resulting from excessive pinion height

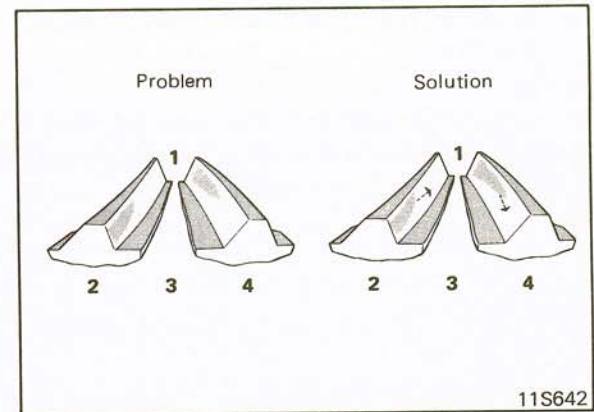
### Problem

The drive pinion is positioned too far from the center of the ring gear.

### Solution

Increase the thickness of the pinion height adjusting shim, and position the drive pinion closer to the center of the ring gear.

For backlash adjustment, position the ring gear farther from the drive pinion.



11S642

## Tooth contact pattern resulting from insufficient pinion height

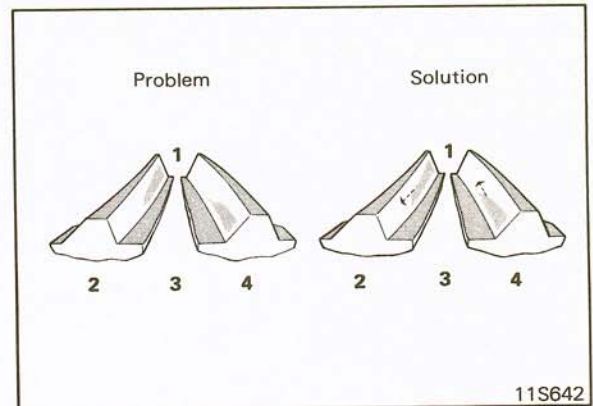
### Problem

The drive pinion is positioned too close to the center of the ring gear.

### Solution

Decrease the thickness of the pinion height adjusting shim, and position the drive pinion farther from the center of the ring gear.

For backlash adjustment, position the ring gear closer to the drive pinion.



11S642

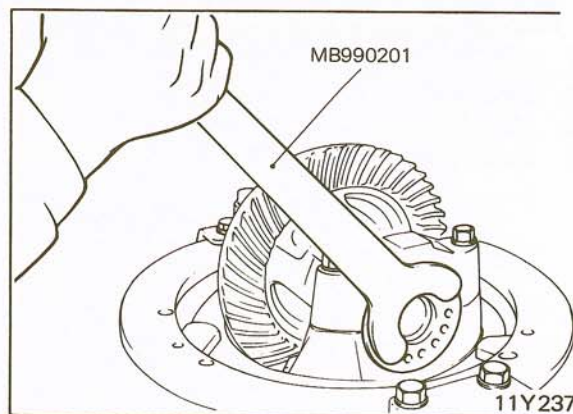




### DISASSEMBLY

#### Differential Case Assembly

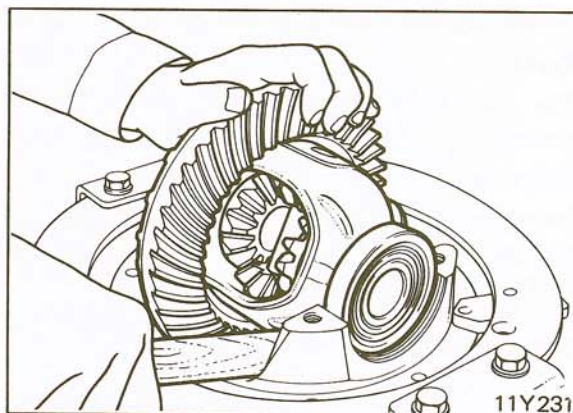
1. Remove the lock plates and then remove the side bearing nuts with the special tool. (11Y237)
2. Remove the bearing caps.



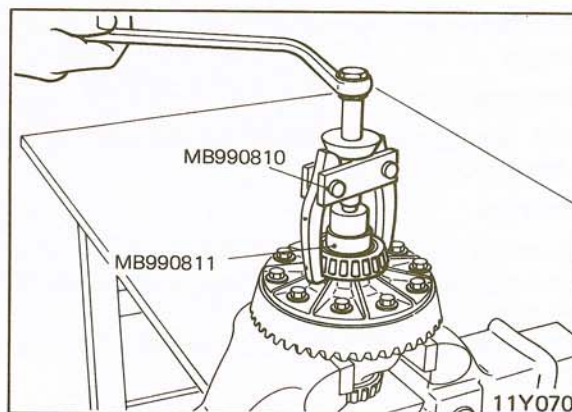
3. Remove the differential case assembly with hammer handles.

#### NOTE

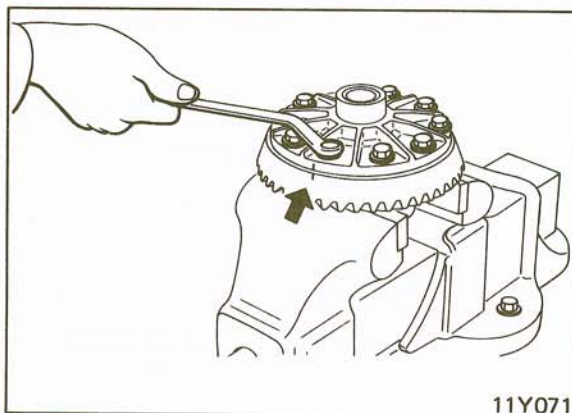
Keep the right and left side bearings, bearing caps and side bearing adjusting spacers separate so that they do not become mixed up at the time of reassembly.



4. Remove the side bearing inner races with the special tools shown in the illustration.



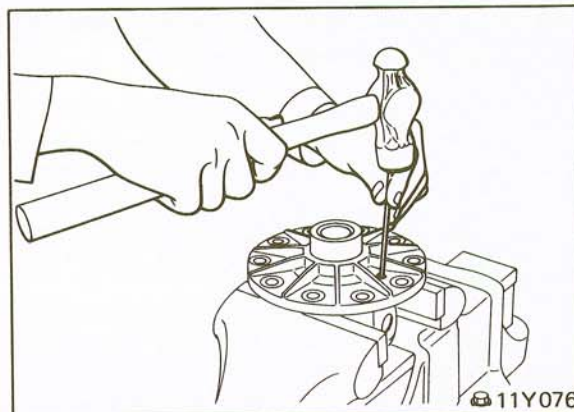
5. Make mating marks on the differential case and ring gear. (11Y071)
6. Loosen the ring gear bolts diagonally and remove the ring gear.





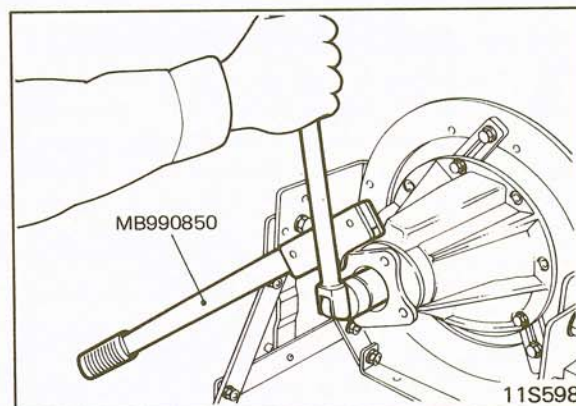


- Remove the lock pin with a punch, and then remove the pinion shaft, pinion gears, pinion washers, side gears and side gear thrust spacers.

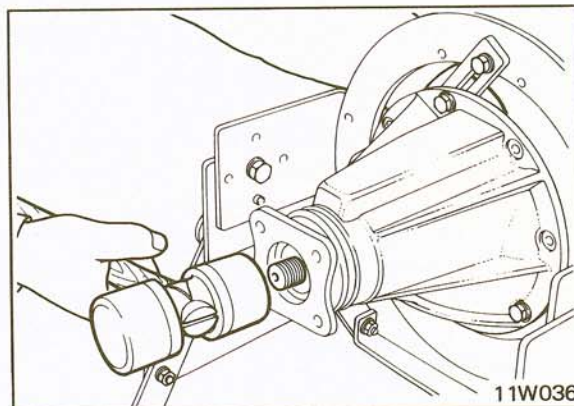


## Drive Pinion

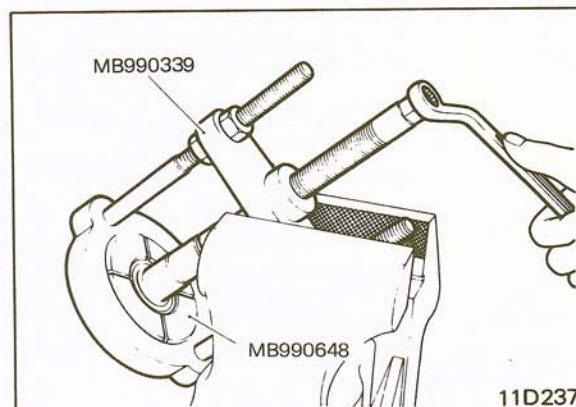
1. Use a special tool shown in the illustration to hold the companion flange and then remove the companion flange self-locking nut.



2. Make mating marks on the drive pinion and companion flange.
3. Remove the drive pinion together with the drive pinion spacer and drive pinion front shims. (11W036)



4. Remove the drive pinion rear bearing inner race with the special tools shown in the illustration.

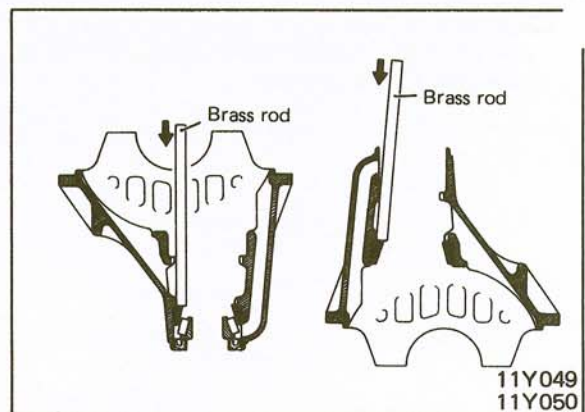






## COMPONENT SERVICE-CONVENTIONAL DIFFERENTIAL

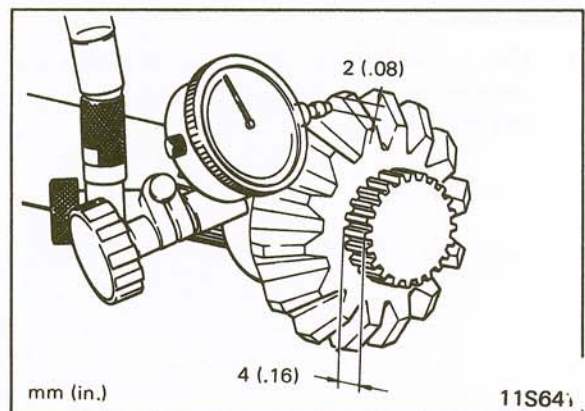
5. Remove the front drive pinion and rear bearing outer races with a brass rod.



### INSPECTION

1. Check companion flange for wear or damage.
2. Check oil seal for wear or deterioration.
3. Check bearings for wear or discoloration.
4. Check gear carrier for cracks.
5. Check drive pinion and ring gear for wear or cracks.
6. Check side gears, pinion gears and pinion shaft for wear or damage.
7. Check axle shaft spline for looseness. With the axle shaft secured in a vice, measure the free play with a dial indicator. (11S641)

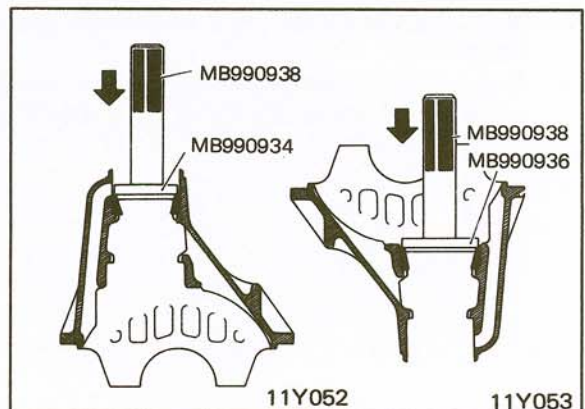
Axle shaft spline play  
[Service limit] ..... 0.6 mm (.024 in.)



### REASSEMBLY

#### Drive Pinion

1. Press the drive pinion front and rear bearing outer races into the gear carrier with the special tools shown in the illustration.

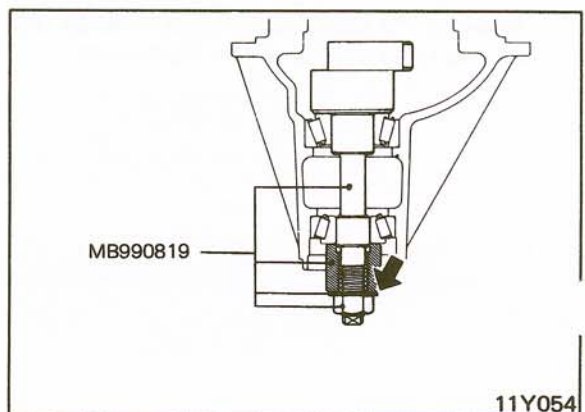


2. Adjust the drive pinion height.  
(1) Mount the special tools and front and rear drive pinion bearings onto the gear carrier.

#### NOTE

Apply a thin coat of the specified multipurpose grease to the mating surfaces of the washer of the special tool.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP





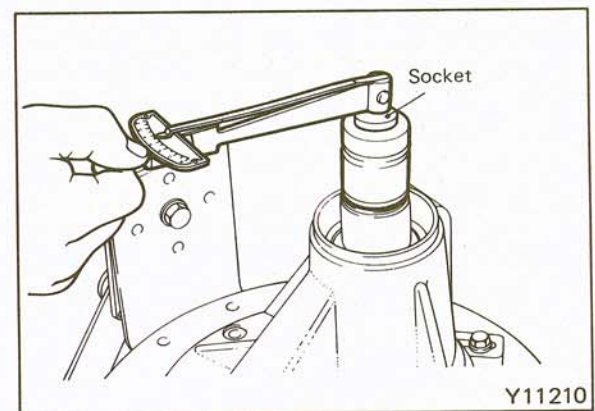
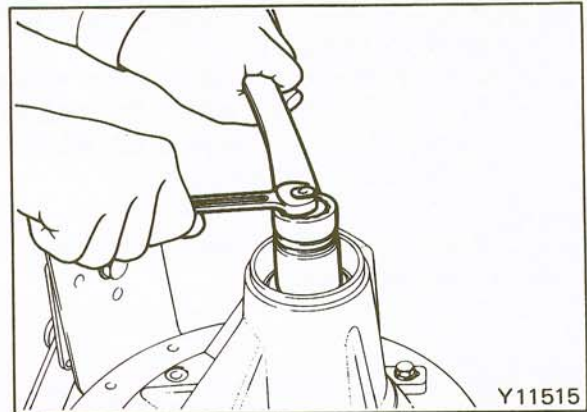


- (2) Tighten the nut and measure the drive pinion turning torque (without the oil seal). (Y11515, Y11210)

## NOTE

Loosen or tighten the nut as necessary to obtain the specified drive pinion turning torque.

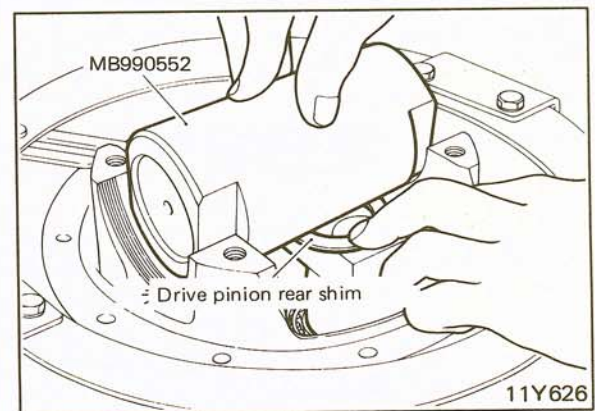
Drive pinion turning torque [without oil seal] . . . .  
70-100 Ncm (6.1-8.7 in.lbs.)



- (3) Position the drum of the special tools in the side bearing seat of the gear carrier, and then select a drive pinion rear shim(s) of a thickness which corresponds to the gap between the special tools.

## NOTE

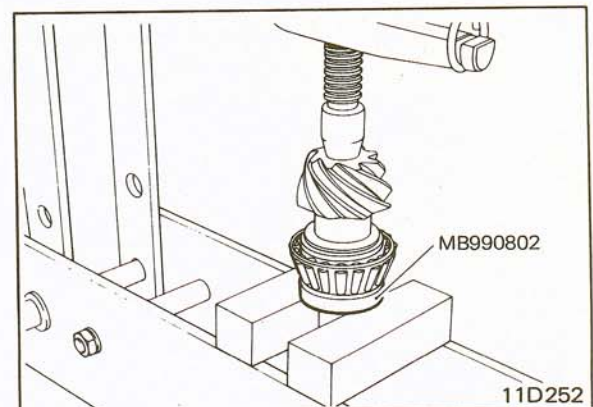
Be sure to clean the side bearing seat thoroughly. When positioning the special tool, be sure that the cut-out sections of the special tool are in the positions shown in the illustration. Also confirm that the special tool is in close contact with the side bearing seat. When selecting the drive pinion rear shims, keep the number of shims to a minimum.



- (4) Install the selected drive pinion rear shim(s) onto the drive pinion, and press the drive pinion rear bearing onto the pinion with a special tool. (11D252)
3. Adjust the drive pinion preload.
    - (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 with the special tool (MB990850). (Refer to p. 3-23.)

## NOTE

Do not install the oil seal at this time.







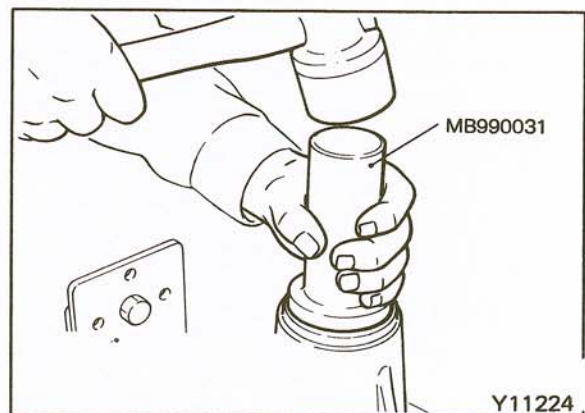
- (3) Measure the drive pinion preload (without the oil seal). (Refer to p. 3-25.)
- (4) If the drive pinion preload is not within the range of the standard value, adjust the preload by replacing either the drive pinion front shim(s) or the drive pinion spacer.

### NOTE

Select a thicker drive pinion spacer if necessary to avoid using a large number of shims.

4. Remove the companion flange and drive pinion and drive the pinion seal into place with the special tool. (Y11224)
5. Apply the specified multipurpose grease to the oil seal lip.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

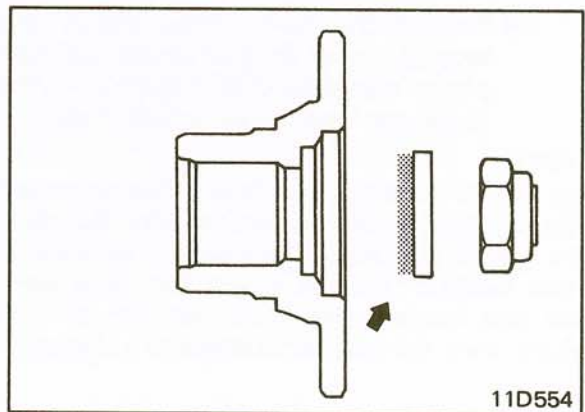


6. Install the drive pinion assembly and companion flange with the mating marks properly aligned, and tighten the companion flange self-locking nut to the specified torque with the special tool (MB990850). (Refer to p. 3-23.)

### NOTE

Apply a thin coat of specified multipurpose grease to the surface of the washer that contacts the companion flange before installing the drive pinion assembly.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP



7. Measure the drive pinion preload (with the oil seal) to verify that the drive pinion preload complies with the standard value. (Refer to p. 3-25.)





## Differential Case Assembly

1. Assemble the side gears, side gear thrust spacers, pinion gears, and pinion washers into the differential case.

### NOTE

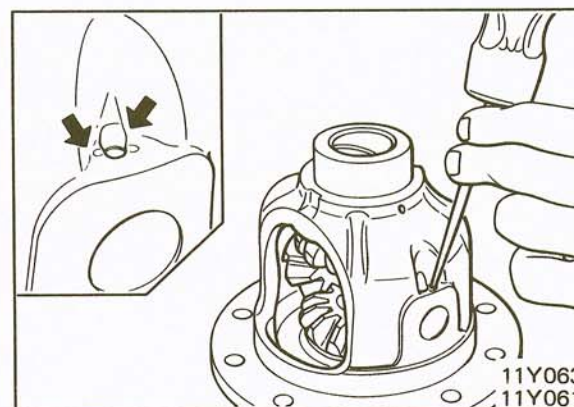
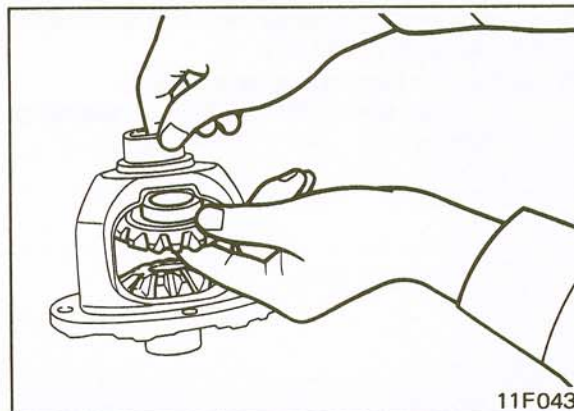
Install the side gear thrust spacers with the oil grooves facing the side gears.

2. Install the pinion shaft and thrust block.

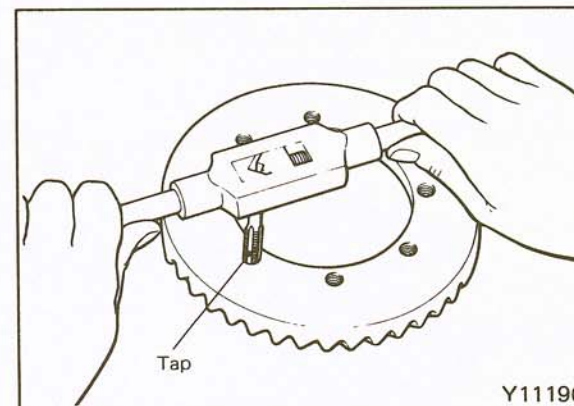
### NOTE

Do not drive in the lock pin at this time.

3. Adjust the differential gear backlash.
  - (1) Insert a wedge between the side gear and the pinion shaft to lock the side gear.
  - (2) Measure the differential gear backlash with a dial indicator. (Refer to p. 3-19.)
  - (3) If the differential gear backlash exceeds the repair limit, adjust the backlash by installing thicker side gear thrust spacers.
  - (4) Measure the differential gear backlash once again, and confirm that it meets specifications.
4. Align the pinion shaft lock pin hole with the differential case lock pin hole and then drive in the lock pin. (11Y063)
5. Stake the lock pin at two points with a punch. (11Y061)

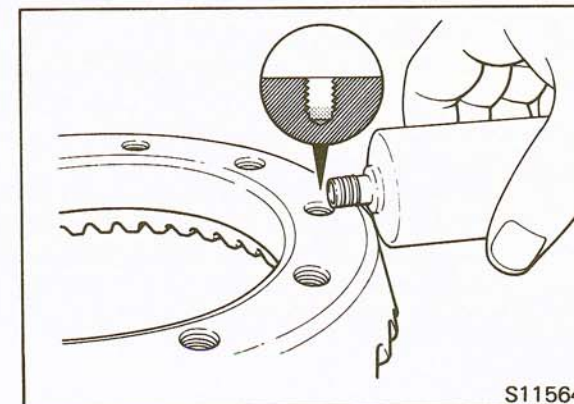


6. Clean the ring gear attaching bolts and remove the adhesive from the threaded holes of the ring gear with a M10 x 1.25 tap. Clean the threaded holes with compressed air.



7. Apply LOCTITE 270 or 271 to the threaded holes of the ring gear. (S11564)
8. Install the ring gear into the differential case with the mating marks properly aligned. Be sure to tighten the bolts diagonally to the specified torque.

Ring gear bolt tightening torque . . . . .  
80-90 Nm (58-65 ft.lbs.)

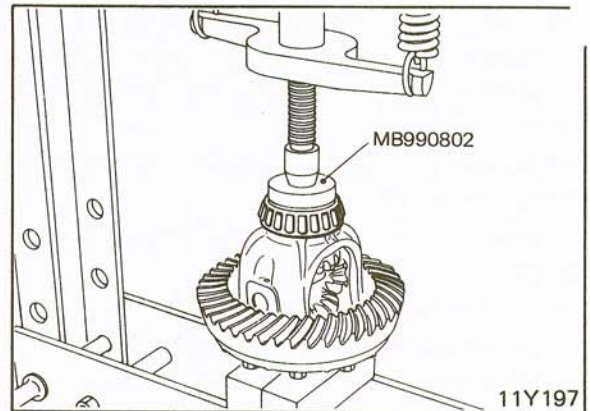




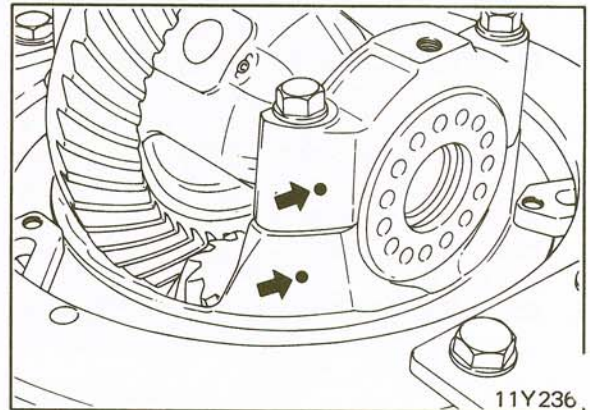


## COMPONENT SERVICE-CONVENTIONAL DIFFERENTIAL

9. Press the side bearings onto the differential case using the special tool. (11Y197)
10. Adjust the final ring gear backlash.
  - (1) Mount the differential case assembly into the gear carrier.



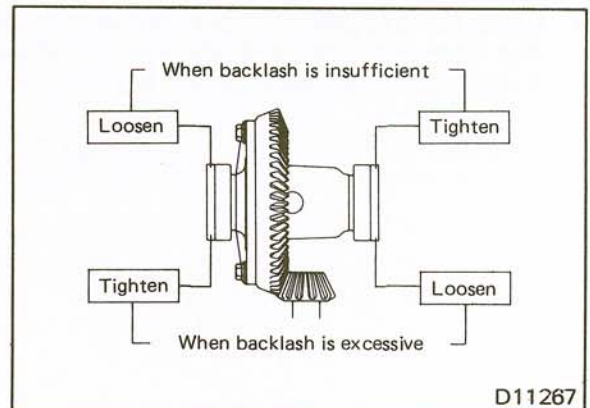
- (2) Align the mating marks on the gear carrier and the bearing cap, and then tighten the bearing cap. (11Y236)
- (3) Using the special tool (MB990201), temporarily tighten the side bearing nut until it is in the position just preloading of the side bearing. (Refer to p. 3-22.)
- (4) Measure the final ring gear backlash. (Refer to p. 3-19.)



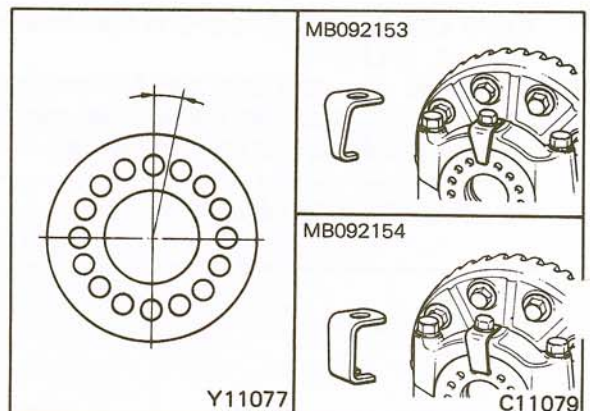
- (5) Using the special tool (MB990201), adjust the backlash to meet specifications by moving the side bearing nut as shown.

### NOTE

First loosen the side bearing nut, and then tighten it by the same amount.



- (6) Using the special tool (MB990201), tighten both right and left side bearing nuts half the distance between centers of two neighboring holes. (Y11077)
- (7) Select and install the necessary lock plates (two kinds). (C11079)
- (8) Check tooth contact of the ring gear and drive pinion. If the contact is not good, adjust (Refer to p. 3-20.), and then remeasure the backlash to verify that it agrees with the standard value.







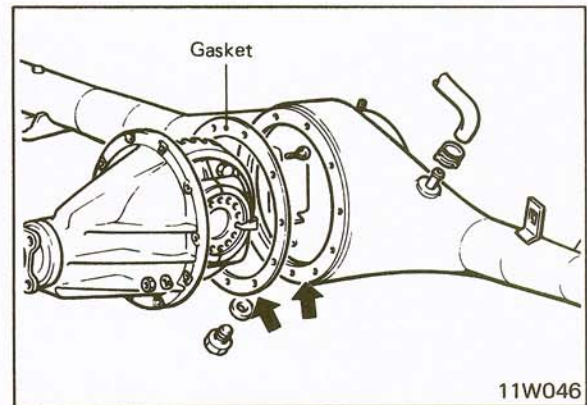
## NOTE

There is a correlation between the backlash and tooth contact of the ring gear. Coordinate their adjustment while checking both until both are within specifications. If correct adjustment cannot be made by moving the ring gear, adjustment of the drive pinion height is required.

11. Measure the ring gear runout. (Refer to p. 3-19.) If the ring gear runout exceeds the repair limit, reinstall the ring gear by changing the phase of the ring gear and differential case, and then remeasure the runout.
12. Torque all parts to specifications during assembly.

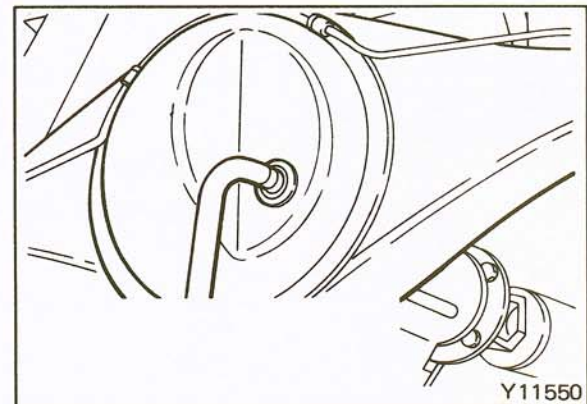
## INSTALLATION

1. Before installing the differential carrier assembly, apply semi-drying sealant to both sides of the gasket and threaded portions of bolts. (11W046)
2. Torque all parts to specifications during assembly.



3. Supply the specified quantity of the specified gear oil.

Rear axle gear oil . . . . .  
Hypoid gear oil API classification GL-4 or GL-5 SAE  
viscosity No. 90, 1.80 liter (1.90 U.S.qt., 1.58 Imp.qt.)



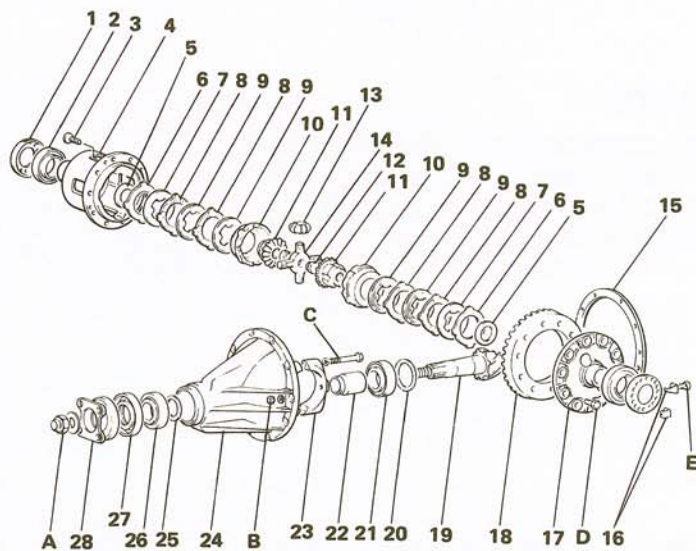




## COMPONENT SERVICE-LIMITED SLIP DIFFERENTIAL

### COMPONENTS

1. Side bearing nut
2. Side bearing
3. Screw
4. Differential case B
5. Thrust washer
6. Spring plate
7. Spring disc
8. Friction plate
9. Friction disc
10. Pressure ring
11. Side gear
12. Thrust block
13. Differential pinion gear
14. Differential pinion shaft
15. Gasket
16. Lock plate
17. Differential case A
18. Ring gear
19. Drive pinion
20. Drive pinion rear shim  
(for pinion height adjustment)
21. Drive pinion rear bearing
22. Drive pinion spacer
23. Bearing cap
24. Gear carrier
25. Drive pinion front shim  
(for preload adjustment)
26. Drive pinion front bearing
27. Oil seal
28. Companion flange



	Nm	ft.lbs.
A	190-250	137-181
B	25-30	18-22
C	55-65	40-47
D	80-90	58-65
E	15-22	11-16

11S661





## UTLINE

A limited slip differential is an anti-slipping device which functions as a differential during cornering to allow the outer wheel to turn at a faster speed than the inner wheel. In the event that one wheel begins spinning (driving on slippery road surfaces, one wheel leaves the road surface, etc.), it automatically functions to prevent such spinning.

The only component of the limited slip differential that differs from a conventional differential is the differential case assembly. Therefore, the basic operation procedures for the following points are the same as those for a conventional differential. Refer to the following items.

**INSTALLATION and REMOVAL of DIFFERENTIAL CARRIER ASSEMBLY** (Refer to pp. 3-18 and 3-29.)

## NOTE

Use the special oil in the limited slip differential.

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**MAZDA** genuine gear oil Part No. 8149630EX,  
 or Mopar Hypoid Gear Lubricant Part No. 3744994  
 or 3744995 Plus Mopar Hypoid Gear Oil Additive/  
 Friction Modifier Part No. 4057100, or equivalent.

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**INSPECTION and ADJUSTMENT of Final Ring Gear Tooth Contact** (Refer to p. 3-20.)

**INSPECTION and ADJUSTMENT of Final Ring Gear Backlash** (Refer to p. 3-19.)

**INSPECTION and ADJUSTMENT of Drive Pinion Height** (Refer to p. 3-24.)

**INSPECTION and ADJUSTMENT of Drive Pinion Preload** (Refer to p. 3-25.)

**INSPECTION and ADJUSTMENT of Ring Gear Runout** (Refer to p. 3-19.)

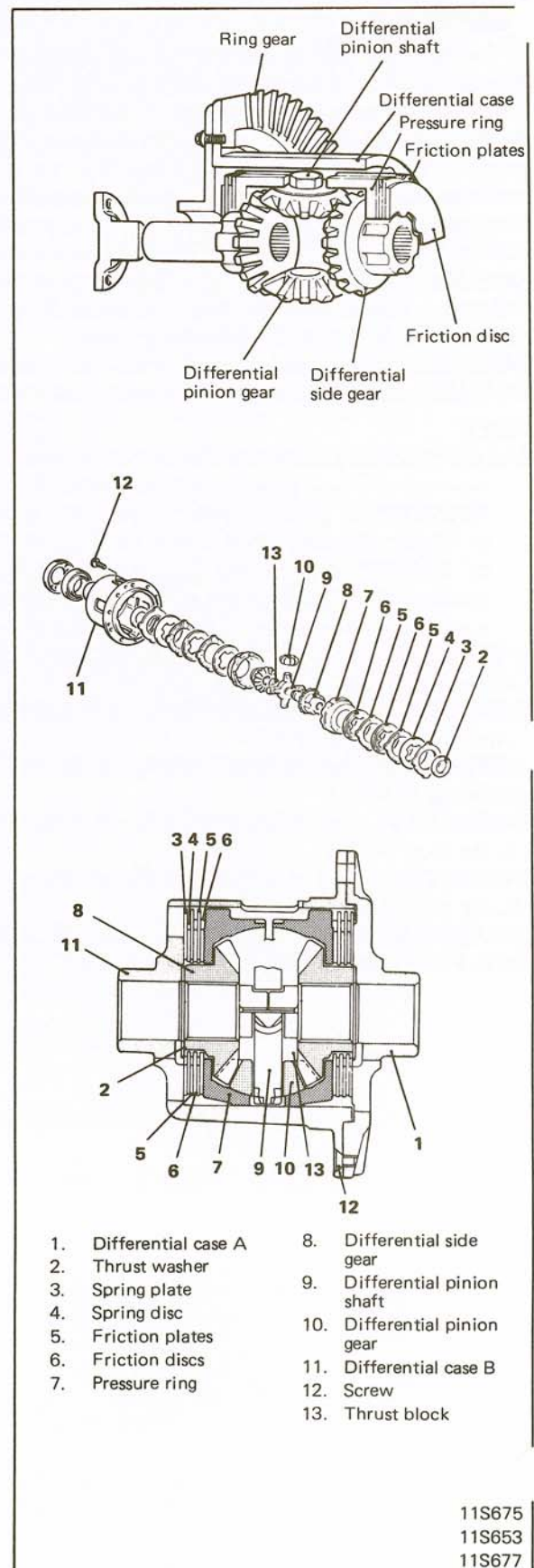
**DISASSEMBLY, INSPECTION and REASSEMBLY of Drive Pinion** (Refer to pp. 3-22 and 3-29.)





## CONSTRUCTION AND FUNCTION

With a conventional differential, in the event that one wheel of the vehicle is on ice, mud, or some other slippery surface, the wheel will spin and the drive force of the vehicle will be greatly reduced. If this happens, the speeds of the differential case and of the side gear (axle shaft) are different because of differential operation. The limited slip function acts to limit this differential operation. The construction is shown in the illustration. The multi-plate clutches engage with the differential case and with each of the differential side gears. If spinning causes a difference in component speeds, the frictional force between the clutch plates will cause the speed of the differential side gear to become closer to that of the differential case, and thus the limited slip function will control the spinning. In addition, the purpose of the pressure rings inside the differential case is to transmit the driving force to the pinion gear, and the reason for the separation is to provide an increase in the clutch plate pressing force through the leverage of the pinion shaft.

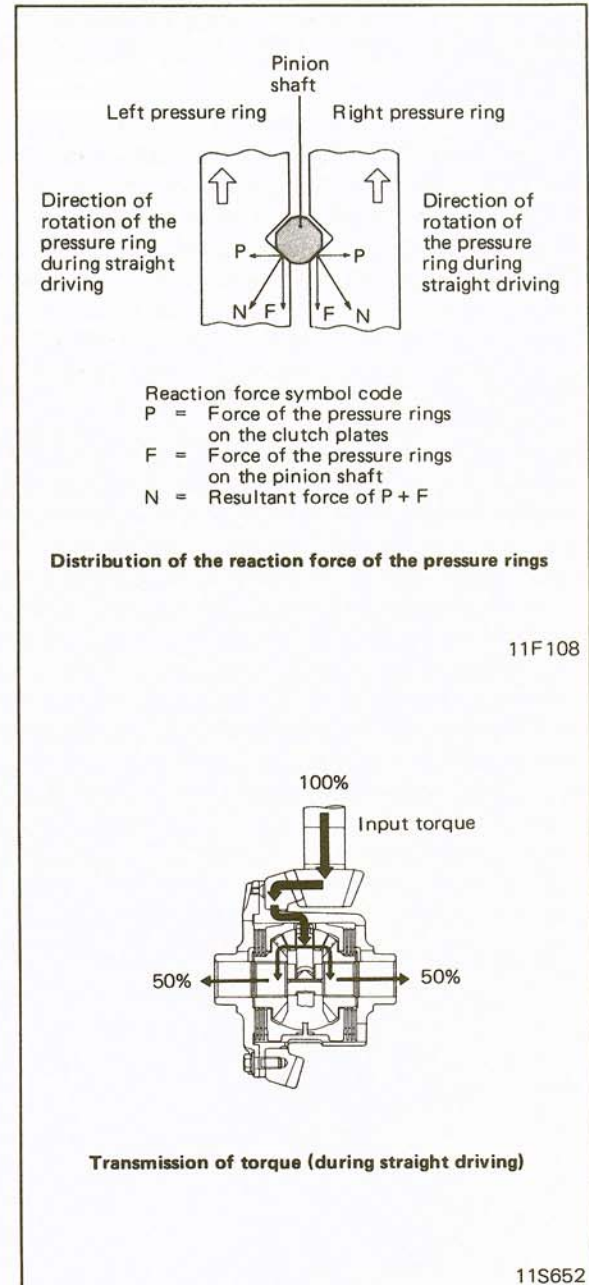






# OPERATION (TORQUE TRANSMISSION) DURING STRAIGHT DRIVING

When the differential case is turned the drive pinion via the ring gear, the pressure rings which are interlocked with the differential case will also turn at the same speed. (The projections located on the outside of the pressure rings engage (with some play) the grooves located on the inside of the differential case.) When the pressure rings move in the direction of rotation, they contact the tapered portion of the differential pinion shaft, and thereby receive reaction force in both the lateral direction and the direction of rotation. The reaction force in the lateral direction presses the clutch plates together, and maintains straight driving. During such driving, because the road surface gives equal resistance to both the left and right wheels, equal resistance is applied to the left and right differential side gears. Therefore, the differential pinion gear does not revolve, and the ring gear, the differential case, the differential pinion shaft, the differential pinion gear, and the left and right differential side gears all turn as one unit.





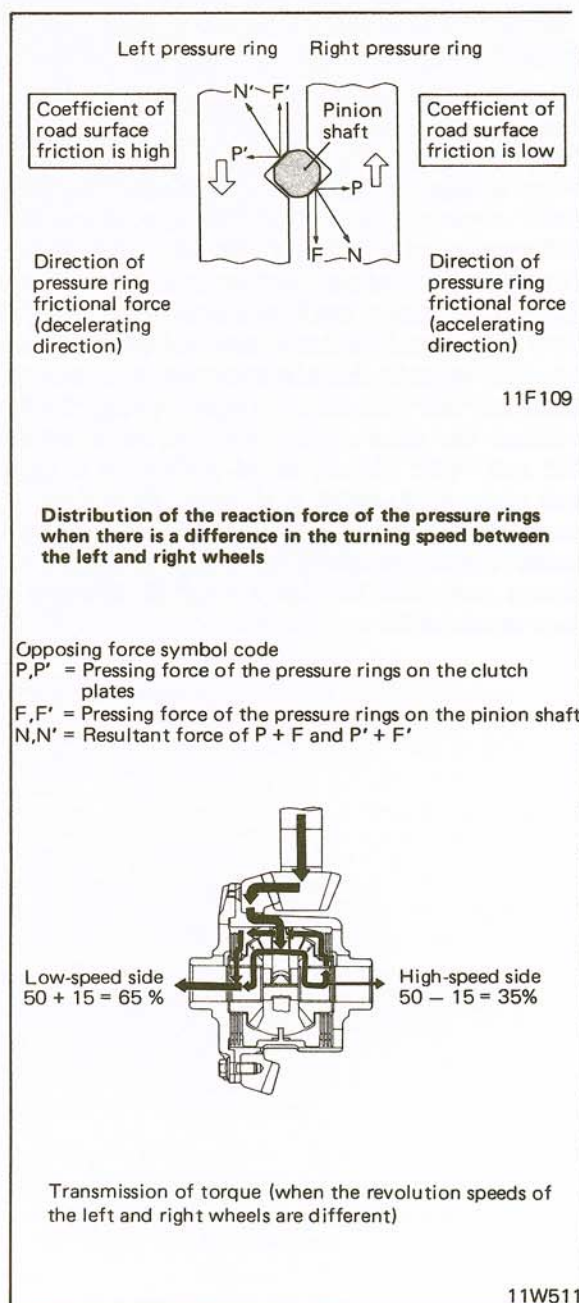


## COMPONENT SERVICE-LIMITED SLIP DIFFERENTIAL

### OPERATION (TORQUE TRANSMISSION) WHEN THE SPEEDS OF THE LEFT AND RIGHT WHEELS ARE DIFFERENT

When one wheel is in contact with a concrete road surface (which has high coefficient of friction) and the other wheel is in contact with a muddy or other slippery road surface (which has low coefficient of friction), the differential operation will cause the speed of the wheel in contact with the slippery surface to be faster than the speed of the ring gear, lowering the maximum drive force. If this occurs, the limited slip function will control the differential operation and increase the driving force. The transmission of torque through the limited slip device in this event is as follows:

When the differential case is turned by the ring gear and the drive pinion, the pressure rings which are interlocked with the differential case will turn at the same speed. Also, the difference in the road surface resistances will cause differential operation and the left and right side gears will revolve at speeds different from that of the differential case. Because of the friction produced between the clutch plates in mesh with both the differential side gear and differential case, one of the pressure rings increases its rotating speed, whereas the other reduces its rotating speed. The pressure rings press the tapered portion of the differential pinion shaft with which they are in contact, and thereby receive reaction force in both the lateral direction and the direction of rotation. The reaction force in the lateral direction causes the clutch plates to mesh, increasing the frictional and the drive force.







## FEATURES OF THE LIMITED SLIP DIFFERENTIAL

When one wheel of the vehicle is in contact with a road surface which has poor traction, the limited slip differential, in comparison to a conventional differential, supplies additional torque to the wheel which has the better traction conditions by utilizing clutch plates, thus improving the traction capacity. Moreover, the effect of the limited slip differential is to prevent the vehicle from becoming stuck, even if the traction of one of the wheels becomes radically reduced.

When one wheel moves from a road surface which has poor traction onto one which has good traction, or when the wheels are constantly leaving the road surface while driving on a rough, bumpy road, the clutch plates of the limited slip differential allow the torque to absorb the differences between the revolution speeds of the right and left wheels. In addition, the sudden changes (jolting) in the drive force are also absorbed, thus preventing skidding.

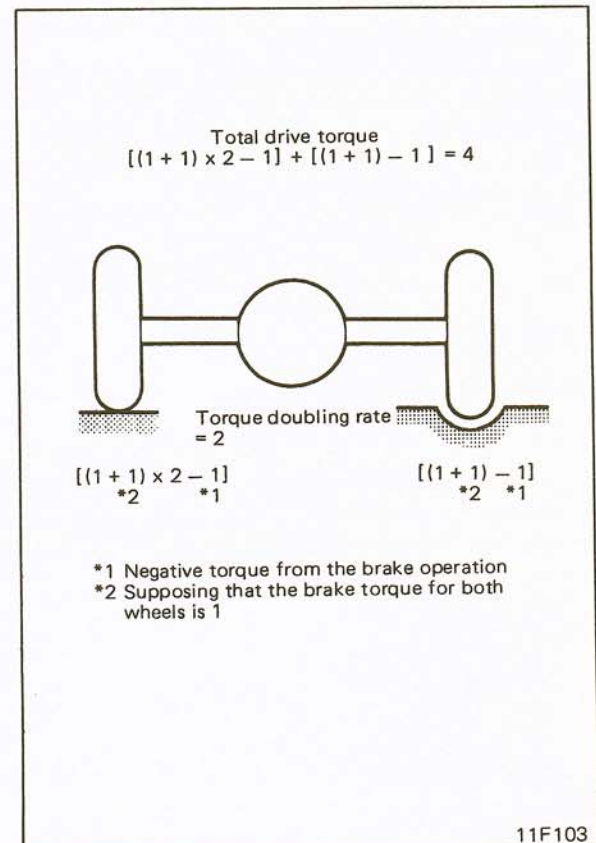
Because in the limited slip differential, the differential operation is slightly restricted during normal cornering, the under-steer tendency (the tendency for the cornering of the vehicle to exceed the turning of the steering wheel) becomes greater; however, this does not have any detrimental effect on the driving of the vehicle. Moreover, in the event that the inside wheel lifts up (the tire leaves the road surface) during high-speed cornering, the clutch plates function to limit differential operation which would simultaneously decrease the drive force of the outside wheel; therefore, the limited slip differential moderates sudden speed reductions during vehicle cornering, and thereby provides greater cornering capability than a conventional differential.

## MAKING EFFECTIVE USE OF A LIMITED SLIP DIFFERENTIAL

### Effective Use in Combination with the Brakes

If a wheel is in contact with a slippery road surface and has begun to spin, using the brakes in combination with the limited slip differential will provide even greater traction capability. The resistance caused by the brakes will further increase the drive torque of the engine, and this increased torque will increase the clutch plate pressing force of the pressure ring, thus increasing the traction. Also, the drive force transmitted to the brakes will not function as real drive force. This is shown in the illustration at right.

In the illustration at the right, the application rate is  $R_t = 2$ , and, supposing the torque from the brake operation is 1, a drive torque of  $1 + 1 = 2$  will be applied to the spinning wheel (the right wheel), and a drive torque of twice that which is applied to the spinning wheel, or  $(1 + 1) \times 2 = 4$ , will be applied to the wheel which is not spinning (the left wheel). However, because the brake force of 1 is a negative value with regard to the propulsion torque of each wheel, the propulsion torque actually obtained by the right wheel is  $(1 + 1) - 1 = 1$ , and that obtained by the left wheel is  $[(1 + 1) \times 2 - 1] = 3$ .







Therefore, the total drive torque is  $1 + 3 = 4$ . In the same circumstances, the total drive torque of a conventional differential is  $1 + 1 = 2$ , and that of a limited slip differential when the brakes are not used in combination is  $1 + 2 = 3$ . This represents an increase in the traction by a factor of 2 over that of a conventional differential, and by a factor of 1.3 over that of a limited slip differential when the brakes are not used.

### NOTES REGARDING SERVICE PROCEDURES FOR THE LIMITED SLIP DIFFERENTIAL

The engine must never be operated while only a single wheel is jacked up. Doing so is extremely dangerous; if the differential functions while the engine is operated at high speed, the oil film between the clutch plates will decrease, thus causing the friction coefficient to increase, the prescribed torque ratio will be exceeded, an excessive amount of torque will be applied to the stationary wheel, and the vehicle will move forward. Also, resistance must never be applied to the spinning wheel.

In the event that one of the wheels comes in contact with a slippery road surface and begins to spin, if the engine continues to be operated at high speed for too long, the clutch plates might become abnormally worn; such action must be avoided.

Use only Mitsubishi genuine gear oil, part No. 8149630. This oil has been developed exclusively for use in the limited slip differential and it differs from ordinary gear oil. When changing the oil, the oil which is removed will appear considerably blacker than ordinary oil. This, however, is not a change in color due to the deterioration of the oil, but rather the oil has become mixed with worn particles of the special treatment on the clutch plates.

### REMOVAL/INSPECTION BEFORE DISASSEMBLY

For information concerning REMOVAL/INSPECTION BEFORE DISASSEMBLY (except for differential gear backlash), refer to p. 3-18 and p. 3-19.





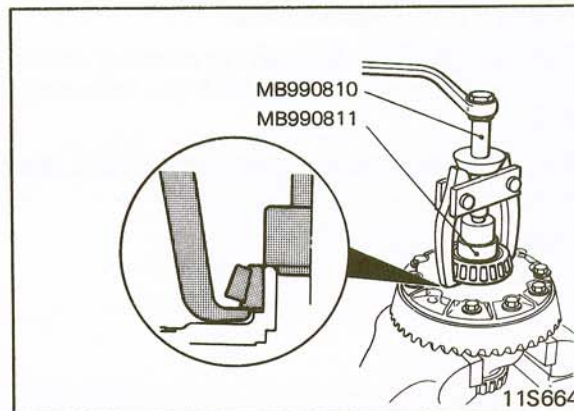
## DISASSEMBLY

### Differential Case Assembly

1. Remove the differential case assembly from the gear carrier. (Refer to p. 3-22.)
2. Remove the side bearings with the special tools. (11S664)  
Attach the prongs of the special tool to the inner race of the side bearing through the openings in the differential case.

#### NOTE

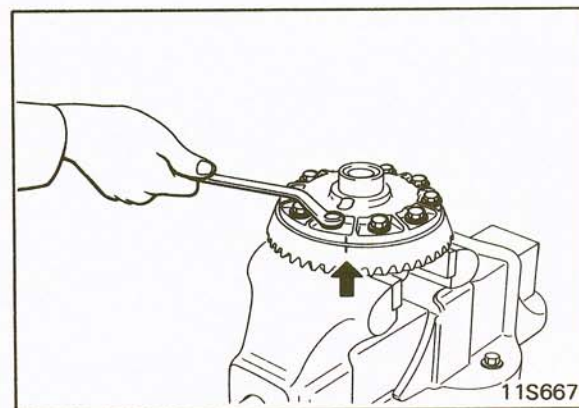
Keep the right and left wheel bearings separate in order to be able to distinguish them for reassembly.



3. Make mating marks on the case and ring gear and remove the ring gear bolts diagonally. (11S667)
4. Remove the ring gear.

#### NOTE

An anti-looseness agent has been used on the bolts. If they cannot be loosened, heat the area to approximately 150°C (302°F) with a propane torch, and then loosen them.



5. Loosen the screws of differential cases A and B evenly, a little at a time. (11S660)
6. Separate differential case A from differential case B.

#### NOTE

Before disassembling the differential cases, confirm that the mating marks (numbers) on case A and case B are the same.

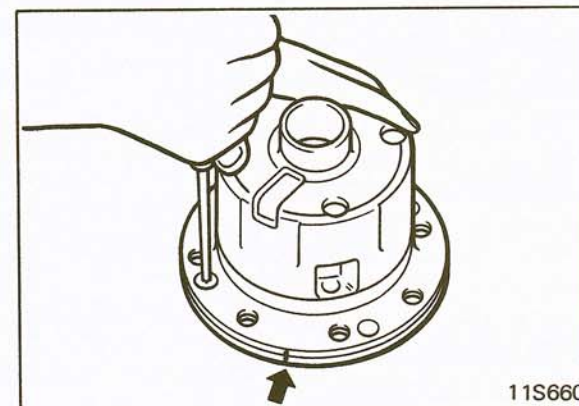
7. Remove the components from differential case B.

#### NOTE

Keep the right and left thrust washers, spring plates, spring discs, friction plates, and friction discs separate in order to be able to distinguish them for reassembly.

### Drive Pinion

Refer to p. 3-23 for information concerning drive pinion DISASSEMBLY.







### INSPECTION AND REPAIR

Wash the disassembled parts in cleaning solvent and dry them with compressed air, then check the following areas.

#### NOTE

For inspection information other than that given below, refer to p. 3-24.

#### Inspection of Friction Plates and Discs for Wear

- (1) In order to check the wear, measure the thicknesses of the friction surfaces and projections of the friction discs and plates, and then find the difference.  
(The same procedure is used for the spring discs and the spring plates.) (11S670)

---

Clutch plate thickness [Service limit] .....  
0.1 mm (.004 in.) or less

---

#### NOTE

Make the measurement at several different points.

- (2) If the parts are worn beyond the allowable limit, replace them with new parts.  
Refer to the section regarding adjustments for information concerning selection of thickness.

#### Inspection of Thrust Washer for Wear

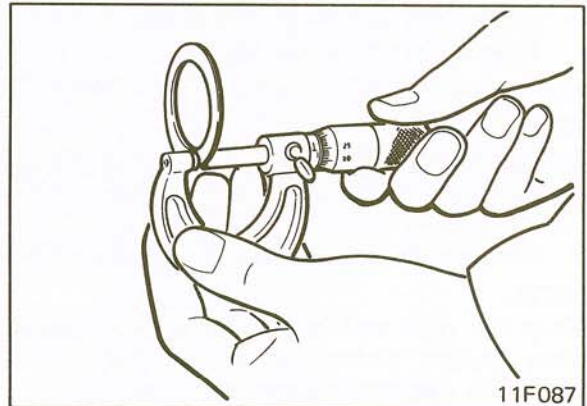
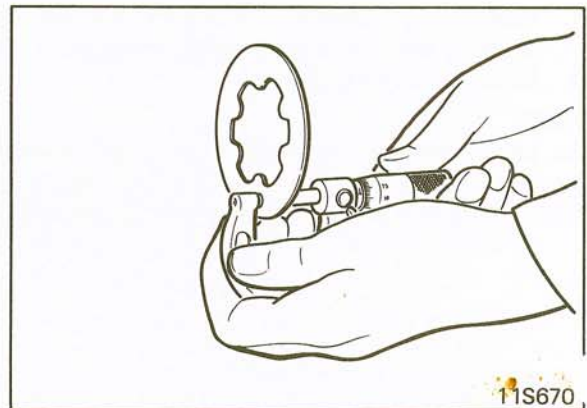
- (1) Measure the thickness of the thrust washer. (11F087)

---

Thrust washer thickness [Service limit] .....  
1.4 mm (.55 in.) or more

---

- (2) If the thrust washer is worn beyond the limit, replace it with a new one. Refer to the section regarding adjustments for information concerning selection of thickness.







### Inspection of Contact and Sliding Surfaces of Parts

1. Inspect the clutch plates and pressure rings.
  - (1) The friction surfaces of the friction plates, friction discs, spring plates, and spring discs.
 

If there are any signs of seizure, severe friction, or color change from heat, the locking performance will be adversely affected. Replace the part with a new one.

#### NOTE

The strong contact on the inner circumference of the friction surfaces is because of the spring plate and the spring disc; this wear is not abnormal.

- (2) The six projections on the inner circumference of the friction disc.
 

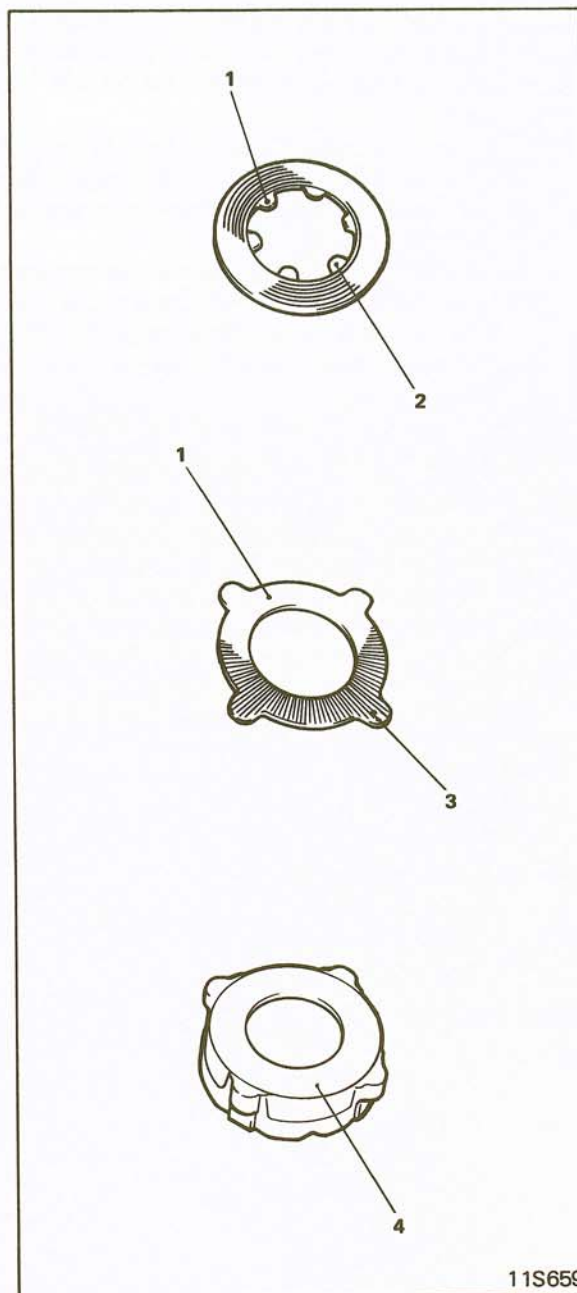
Nicks or dents will cause abnormalities in the clutch pressure; if present, repair with an oil stone, or replace the parts if necessary.
- (3) The four projections on the outer circumference of the friction disc.
 

Nicks and dents will cause abnormalities in the clutch pressure; if present, repair with an oil stone, or replace the parts if necessary.
- (4) The friction surface of the friction disc of the pressure ring.
 

If there are nicks or scratches, repair by first grinding with an oil stone and then polishing with rubbing compound on a surface plate.

#### NOTE

The strong contact on the inner circumference of the friction surface is because of the spring plate and the spring disc; this wear is not abnormal.

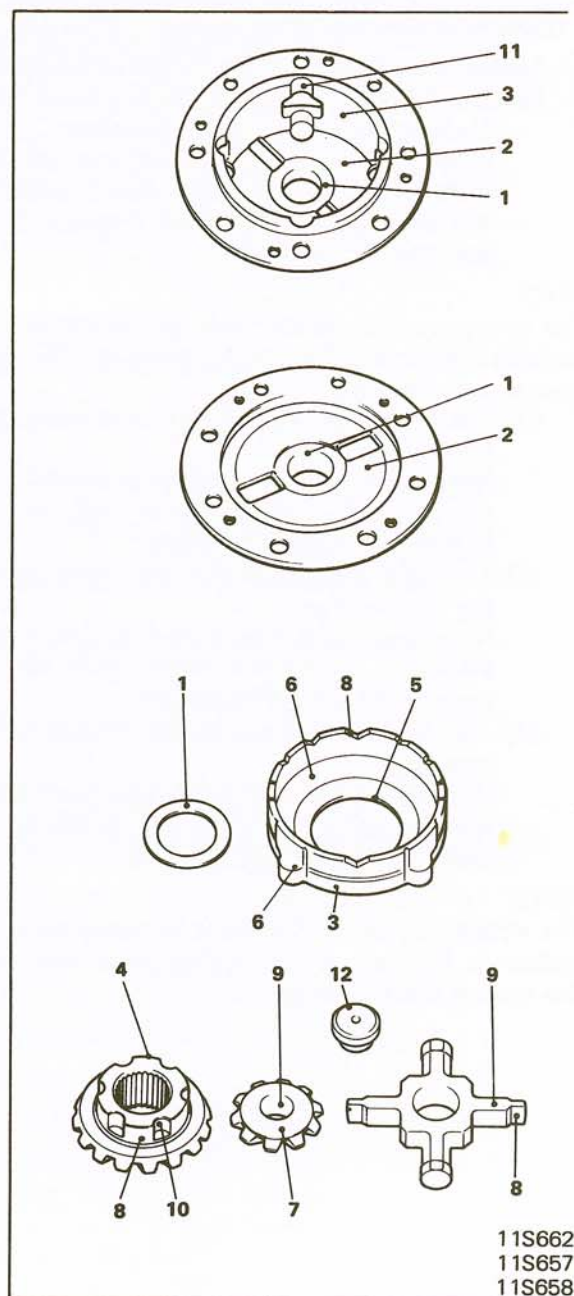


11S659





2. Inspect the contact and sliding surfaces listed below, and repair any nicks and burrs with an oil stone.
  - (1) The sliding surfaces of the thrust washers and the case.
  - (2) The spring contacting surface of the differential case.
  - (3) The contact surfaces of the outer circumference of the pressure rings and the inner circumference of the differential case.
  - (4) The sliding surface of the thrust washers.
  - (5) The sliding surfaces of the hole in the pressure rings and the outer circumference of the side gears.
  - (6) The projections on the outer circumference of the pressure rings.
  - (7) The spherical surface of the differential pinion gears and the inner diameter of the pressure rings.
  - (8) The V-shaped groove in the pressure rings, and the V-shaped part in the pinion shaft.
  - (9) The outer diameter of the pinion shaft and the hole in the differential pinion gears.
  - (10) The outer circumference groove of the side gears.
  - (11) The inner circumference groove of the differential case.
  - (12) The sliding surface of the thrust blocks.

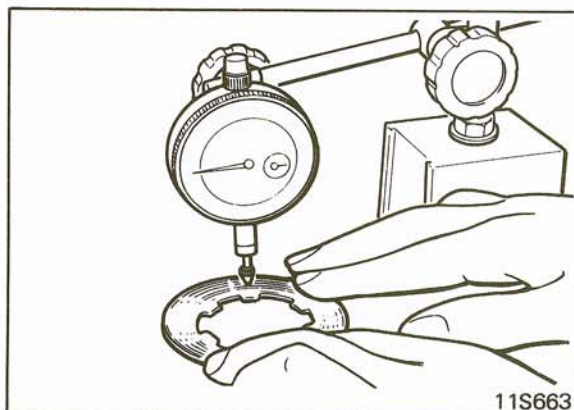


## Inspection of Friction Plates and Discs for Warping

Using a dial indicator, measure the amount of warping (the flatness) of the friction plate and friction disc on a surface plate.

Friction plate and disc warping

[Service limit] ..... 0.08 mm (.03 in) or less







## EASSEMBLY

### Drive Pinion

For information concerning drive pinion reassembly, refer to p. 3-24.

### Differential Case Assembly

- Before assembly, use the following method to adjust the dimensional differences of the clearance between the clutch plates and differential case when installing the internal components into the differential case.

#### (1) Measurement of differential case depth

Depth of the differential case: A

$$A = E - F + G$$

- Measurement of spring disc and spring plate thickness  
Measure the thickness using a micrometer, with the spring disc and spring plate both extended in the same direction and one placed over the other. Arrange them so that the difference between right and left is minimized.

Right side: Lr

Left side: Ll

- Measurement of friction disc and friction plate thickness

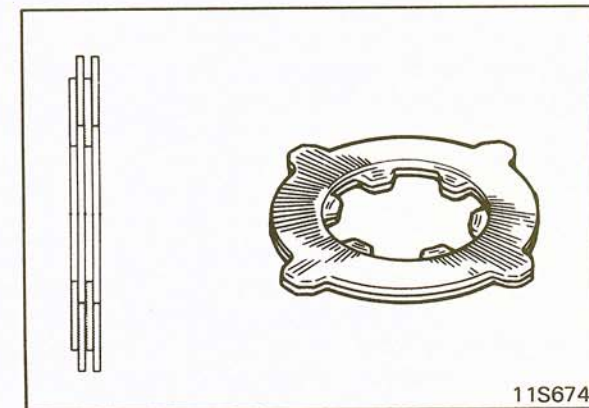
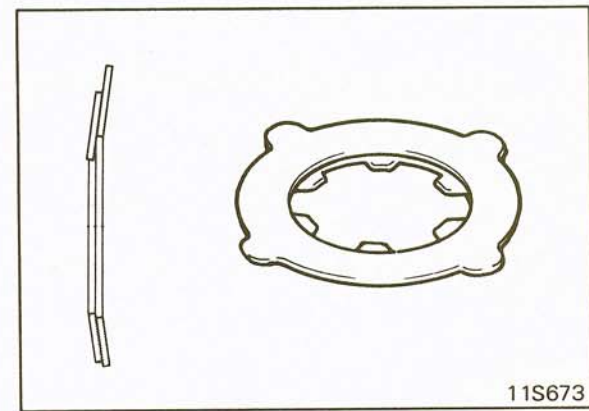
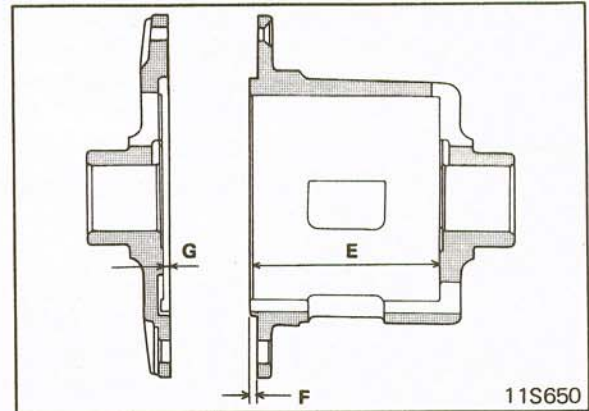
In the same way as described the above, combine the two friction discs and the two friction plates, as shown in the illustration, so that the difference in thickness is minimized.

Right side: Kr

Left side: Kl

### NOTE

The difference between  $(Lr + Kr)$  and  $(Ll + Kl)$  must be 0.05 mm (.002 in.) or less.







- (4) Assemble the right and left friction plates, friction discs, differential pinion shafts, and pressure rings, and then measure the total width, as shown in the illustration. Consider this to be "B". (11S665)

## NOTE

Manually hold the V-shaped groove, squeeze the groove together, and measure.

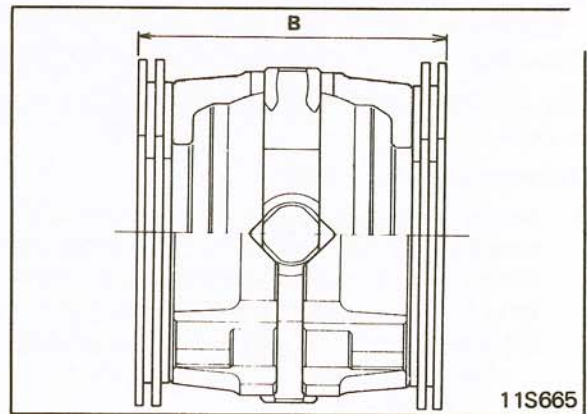
All parts should be dry.

- (5) If the difference "S" between the depth "A" of the differential case and the overall width "B" obtained previously plus the spring thickness is not within the range of the standard value, replace the friction discs to adjust.

$$S = A - (B + L_l + L_r)$$

## NOTE

Be careful not to mix the types of clutch plates selected for the right and left sides.



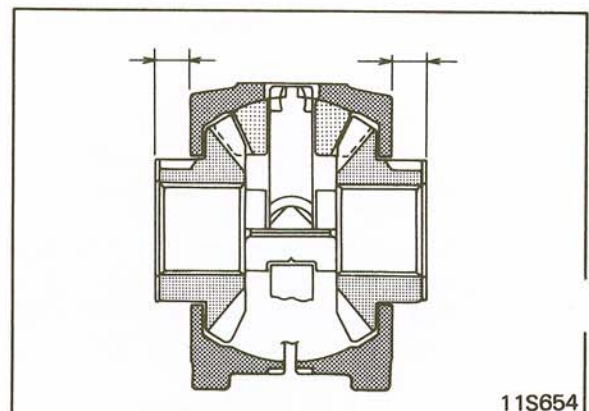
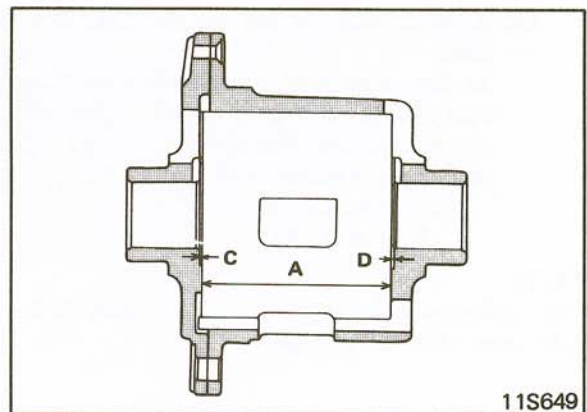
2. Make the adjustment as follows so that the dimensional difference of the shaft direction of the differential side gear while it is assembled into the differential case agrees with the standard value.

- (1) Measure depth of contact surfaces of differential case. Measure the depths of the thrust washer contact surfaces of differential case A and B with calipers. Assume these to be "C" and "D".

- (2) Assemble the pressure rings, the differential pinion gears, the differential side gears, the differential pinion shafts, and the thrust washers, and then measure the distances from the backs of the pressure rings to the ends of the thrust washers. Select thrust washers so that the difference between the right and left measured values is less than 0.05 mm (.002 in.).

## NOTE

Measure with calipers while squeezing the V-shaped groove manually.







## (3) Overall width measurement

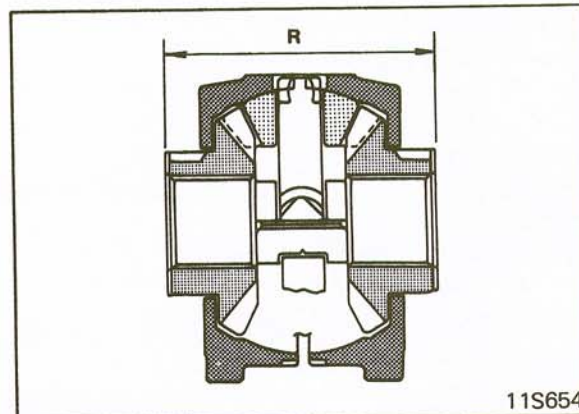
In the same condition as described above, measure the overall width as shown in the illustration. Consider this to be "R". (11S654)

## (4) Clearance adjustment

Using the width of the assembled differential unit and the depth of the differential case, check whether the clearance "V" is within the standard value or not. If it is not within the standard value, replace the thrust washers to adjust.

$$V = A + C + D - R$$

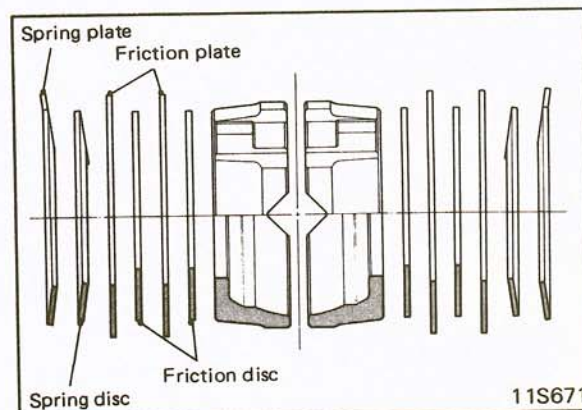
3. Before assembly, apply the specified gear oil to each component.
4. Be especially careful to coat all contact surfaces and sliding surfaces.  
The order of assembly is the reverse of that for disassembly.



5. The directions for assembly is as shown in the illustration. (11S671)
6. Be careful not to insert the clutch plates in the incorrect order or to install the springs in the wrong direction.

## NOTE

Be sure that mating marks on the differential cases are matched.

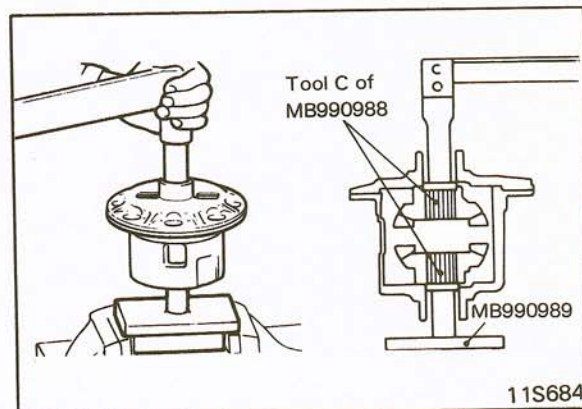


7. After assembly, in order to check the frictional force of the clutch plates, use the special tools to measure the starting torque. (11S684)

## NOTE

Rotate the unit slightly before measuring the starting torque. When measuring the torque, do so at the beginning of movement.

8. For reassembly of the unit, beginning with the adjustment of ring gear runout, refer to p. 3-27.
9. Torque parts to specifications during assembly.











# BRAKES

## SERVICE AND PARKING

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## SPECIFICATIONS

### GENERAL SPECIFICATIONS

Master cylinder	
Type	Tandem type
I.D. mm (in.)	22.22 (.87)
Brake booster	
Type	Vacuum type
Effective dia. of power cylinder mm (in.)	203.2 (8.0)
Boosting ratio [Brake pedal depressing force]	4.0
Front brakes	
Type	F-type disc
Disc O.D. mm (in.)	255 (10.04)
Disc thickness mm (in.)	20 (.79)
Pad thickness mm (in.)	10.5 (.41)
Cylinder I.D. mm (in.)	53.97 (2.12)
Clearance adjustment	Automatic
Rear brakes	
Type	Leading and trailing shoe type drum
Drum I.D. mm (in.)	254 (10.0)
Lining thickness mm (in.)	4.6 (.18)
Cylinder I.D. mm (in.)	20.64 (.81)
Clearance adjustment	Automatic
Parking brakes	
Type	Mechanical brake acting on rear wheels
Brake engagement	Lever type
Cable routing	V-type

### SERVICE SPECIFICATIONS

Standard values	
Brake pedal height mm (in.)	191-196 (7.5-7.7)
Stop light switch outer case to pedal arm clearance mm (in.)	0.5-1.0 (.02-.04)
Brake pedal free play mm (in.)	10-15 (.4-.6)
Brake pedal to floorboard clearance mm (in.)	95 (3.7) or more
Booster push rod to master cylinder piston clearance mm (in.)	0.1-0.5 (.004-.020)
Disc brake dragging force N (lbs.)	74 (16)
Brake shoe outside diameter mm (in.)	253.2-253.5 (9.97-9.98)
Parking brake lever stroke	4-6 clicks
Repair limit	
Brake disc runout mm (in.)	0.15 (.006)
Service limits	
Master cylinder body to piston clearance mm (in.)	0.15 (.006)
Pad thickness mm (in.)	1.0 (.04)
Disc thickness mm (in.)	18.4 (.72)
Lining thickness mm (in.)	1.0 (.04)
Drum I.D. mm (in.)	256.0 (10.08)
Wheel cylinder body to piston clearance mm (in.)	0.15 (.006)



## SPECIFICATIONS



### ORQUE SPECIFICATIONS

Nm (ft.lbs.)

Brake booster to pedal support	8-12 (6-9)
Pedal shaft	25-35 (18-25)
Reservoir stopper bolt	1.5-3.0 (1-2)
Check valve case	40-50 (29-36)
Check valve cap	25-35 (18-25)
Piston stopper	1.5-3.0 (1-2)
Master cylinder to brake booster	8-12 (6-9)
Fitting	15-18 (11-13)
Master cylinder to brake line connector	25-35 (17-25)
Brake line flare nut	13-17 (9-12)
Brake tube to rear axle housing	9-11 (7-8)
Bleeder screw	7-9 (5-7)
Mounting support to knuckle	70-90 (51-65)
Brake disc to hub	50-60 (36-43)
Bearing case to rear axle housing	50-60 (36-43)
Wheel cylinder to backing plate	18-21 (13-15)

### LUBRICANTS

	Specified lubricant	Quantity
Brake fluid	DOT 3	As required
Brake pedal bushing and spacer	Multipurpose grease SAE J310a, NLGI#3	Small quantity
Clevis pin and washer	Wheel bearing grease SAE J310a, NLGI #2EP	Small quantity
Brake booster push rod seal lip	Silicon grease	Small quantity
Brake booster push rod perimeter	Silicon grease	Small quantity
Brake booster push rod body perimeter	Silicon grease	Small quantity
Plug plate and stopper plug	WARREN Plastilube 2 brake grease	Small quantity
Caliper bore	Repair kit grease (red)	Small quantity
Dust boot mounting groove in caliper body	Repair kit grease (orange)	Small quantity
Rear brake piston and wheel cylinder	Repair kit grease (orange)	Small quantity
Contact surfaces at shoe assemblies and backing plate	WARREN Plastilube 2 brake grease	Small quantity
Rotating portion of shoe adjuster assembly	WARREN Plastilube 2 brake grease	Small quantity
Clevis pin and bushing and ratchet plate	Multipurpose grease SAE J310a NLGI grade #2EP	As required





## TROUBLESHOOTING

Symptom	Probable cause	Remedy
Noise or vibration when brakes are applied	Backing plate or caliper improperly mounted	Correct
	Loose backing plate or caliper mounting bolts	Retighten
	Unevenly worn or cracked brake drum or brake disc	Replace
	Foreign material in brake drum	Clean
	Seized pad or lining contact surface	Replace
	Excessive caliper to pad assembly clearance	Correct
	Uneven pad contact	Correct
	Lack of lubrication in sliding parts	Lubricate
	Loose suspension parts	Retighten
Vehicle pulls to one side when brakes are applied	Difference in left and right tire inflation pressures	Adjust
	Inadequate contact of pad or lining	Correct
	Grease or oil on pad or lining surface	Replace
	Drum eccentricity or uneven wear	Replace
	Incorrect wheel cylinder installation	Correct
	Auto adjuster malfunction	Correct
Insufficient braking power	Low or deteriorated brake fluid	Replenish or change
	Air in brake system	Bleed the system
	Brake booster malfunction	Correct
	Inadequate contact of pad or lining	Correct
	Grease or oil on pad surface	Replace
	Auto adjuster malfunction	Correct
	Overheated brake rotor due to dragging of pad or lining	Correct
	Clogged brake line	Correct
	Blend proportioning valve malfunction	Replace
Increased pedal stroke (Reduced pedal to floor clearance)	Air in brake system	Bleed the system
	Brake fluid leaks	Correct
	Auto adjuster malfunction	Correct
	Excessive push rod to master cylinder clearance	Adjust



## TROUBLESHOOTING



Symptom	Probable cause	Remedy
Brake drag	Incomplete release of parking brake	Correct
	Incorrect parking brake adjustment	Adjust
	Worn brake pedal return spring	Replace
	Clogged master cylinder return port	Correct
	Broken rear drum brake shoe return spring	Replace
	Lack of lubrication in sliding parts	Lubricate
	Defective master cylinder check valve or piston return spring	Replace
	Excessive push rod to master cylinder clearance	Adjust
Insufficient parking brake function	Worn brake lining Grease or oil on lining surface Parking brake cable sticking	Replace
	Auto adjuster malfunction	Correct
	Excessive parking brake lever stroke	Adjust the parking brake lever stroke or check the parking brake cable routing





## SERVICE ADJUSTMENT PROCEDURES

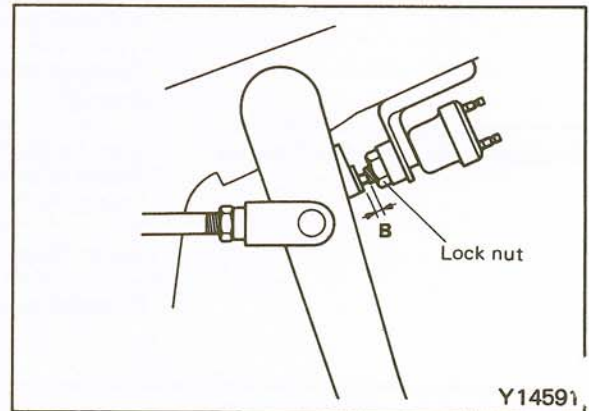
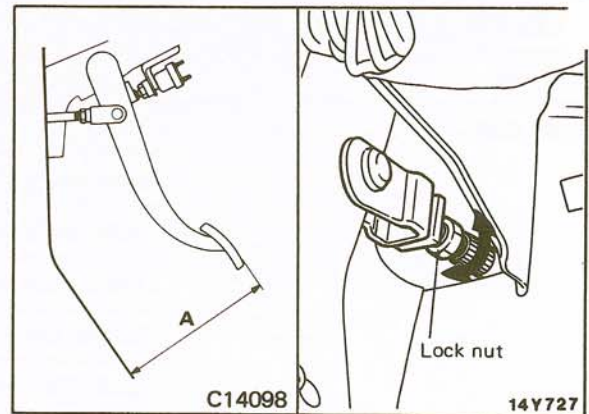
### SERVICE BRAKE PEDAL INSPECTION AND ADJUSTMENT

1. Measure the brake pedal height as illustrated.  
If the brake pedal height is not within the standard value, adjust as follows.

Pedal height (from top of the pedal to floorboard) A  
..... 191-196 mm (7.5-7.7 in.)

- (1) Move the stop light 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 clearance is obtained. (14Y727)
- (3) Adjust the stop light switch until the dimension (between the outer case of the stop light switch and the brake pedal arm) agree with the standard value, and then lock the switch in place with lock nut. (Y14591)

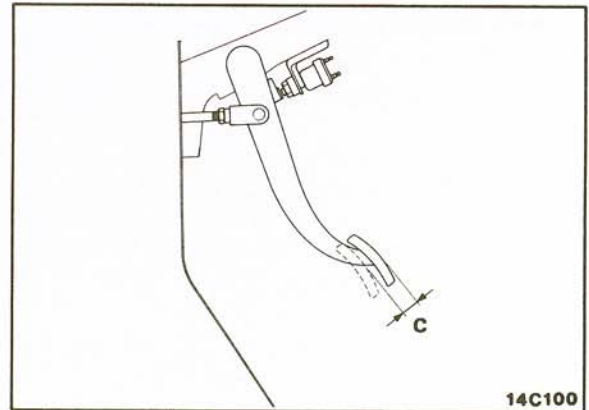
Dimension B ..... 0.5-1.0 mm (.02-.04 in.)



2. While the engine is stopped, depress the brake pedal two or three times. After thus 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.

Brake pedal free play C ..... 10-15 mm (.4-.6 in.)

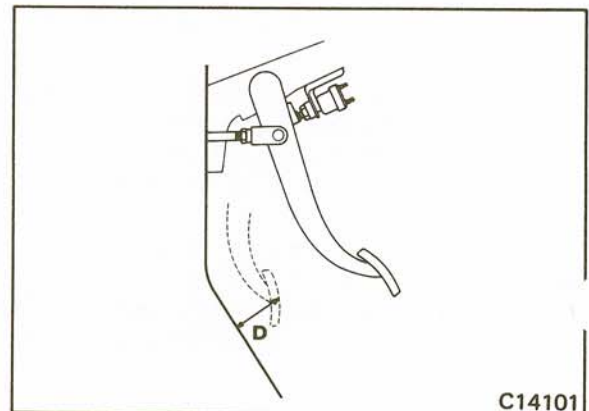
If the free play is less than the standard value, confirm that the clearance between the outer case of the stop light and the brake pedal is within the standard value.



3. Start the engine, depress the brake pedal with approximately 500 N (110 lbs.) of force, and measure the clearance between the brake pedal and the floorboard. (C14101)

Pedal to floorboard clearance D when pedal is depressed [Pedal depressing force of 500 N (110 lbs.)]  
..... 95 mm (3.7 in.) or more

If the pedal to floorboard clearance is less than the standard value, correct it according to the troubleshooting.







## PARKING BRAKE STROKE ADJUSTMENT

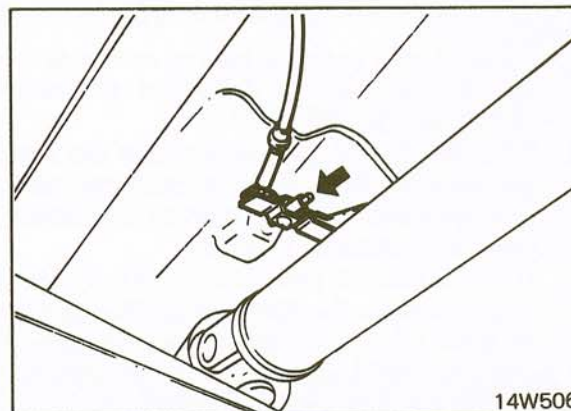
1. Pull the parking brake lever with a force of approx. 200 N (45 lbs.), and count the number of clicks.

Parking brake lever stroke ..... 4 - 6 clicks

2. If the parking brake lever stroke is not within the standard value range, pull the parking brake lever repeatedly to adjust the shoe clearance.
3. Adjust the parking brake lever stroke by turning the cable adjusting nut. (14W506)

### Caution

1. If the number of brake lever clicks is less than the standard value, the cable has been tightened excessively, and failure of the automatic adjuster mechanism will result. Be sure to adjust it to within the standard value.
2. Overtightening of the parking brake will result in brake drag.



## BRAKE BOOSTER OPERATING TEST (WITHOUT A TESTER)

For simple checking of the brake booster operation, perform the following tests:

- (1) Run the engine for one or two minutes, and then stop it. 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 each time, the booster is defective.
- (2) With the engine stopped, step on the brake pedal several times with the same foot pressure to confirm that the pedal height does not change, and 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 defective.
- (3) With the engine running, step on the brake pedal and then stop 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 defective.

If the above three tests are okay the booster is operating properly.

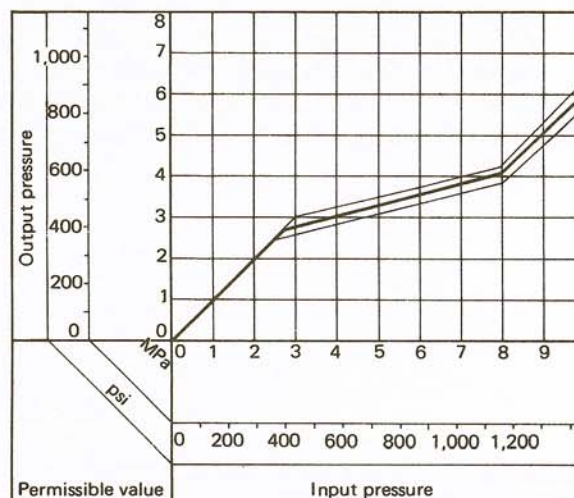
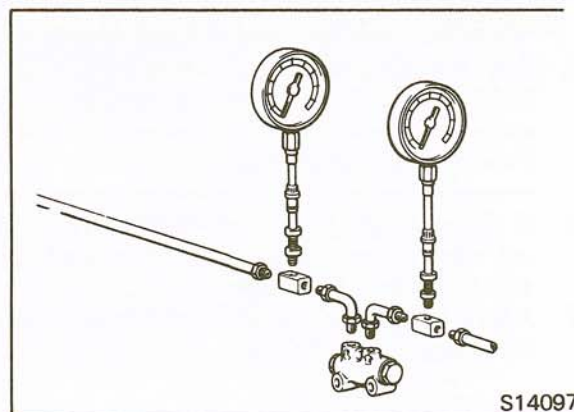
If one of the above three tests is not okay, the check valve, vacuum hose, or booster is defective.





### BLEND PROPORTIONING VALVE FUNCTION TEST

1. Connect two pressure gauges, one each to the input side and output side of the blend proportioning valve, as illustrated. (S14097)
2. With the brakes applied, measure the input pressure and the output pressure. If the measured pressures are within the permissible ranges shown, the blend proportioning valve is functioning properly.
3. If the measured pressures are not within the permissible ranges, replace the blend proportioning valve.
4. Measure both input and output pressure; if the difference between input and output is 0.4 MPa (60 psi) or more, replace the blend proportioning valve.



### BLEEDING

#### NOTE

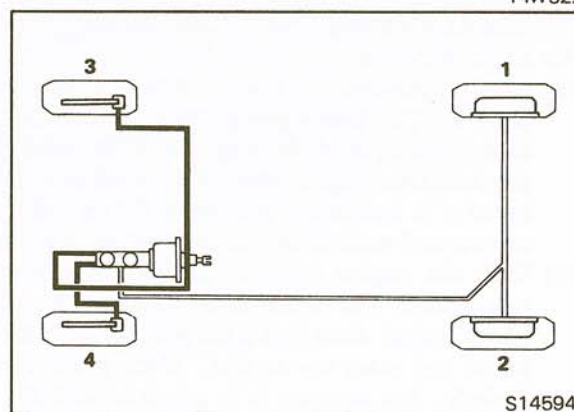
The brake hydraulic system should be bled whenever the brake tube, brake hose, master cylinder or wheel cylinder has been removed or whenever the brake pedal feels spongy when depressed.

Bleed the brake system in the sequence shown in the illustration. (S14594)

Recommended brake fluid ..... DOT 3

#### Caution

1. Use the recommended brake fluid. Avoid using a mixture of the recommended brake fluid and other fluid.
2. If brake fluid is exposed to the air, it will absorb moisture; as water is absorbed from the atmosphere, the boiling point of the brake fluid will decrease and the braking performance will be seriously impaired. For this reason, use a hermetically sealed 1 liter (1.06 U.S.qt., 0.88 Imp.qt.) or 0.5 liter (0.52 U.S.qt., 0.44 Imp.qt.) brake fluid container.
3. Firmly close the cap of the brake fluid container after use.



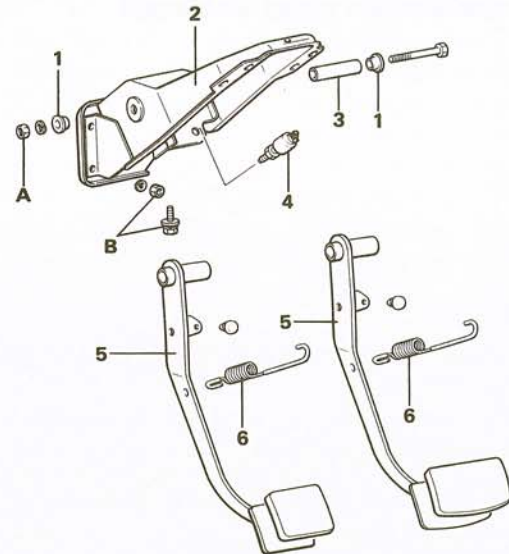




## COMPONENTS

1. Bushing
2. Pedal support member
3. Spacer
4. Stop light switch
5. Brake pedal
6. Return spring

	Nm	ft.lbs.
A	25-35	18-25
B	8-12	6-9



Vehicles with a  
manual transmission

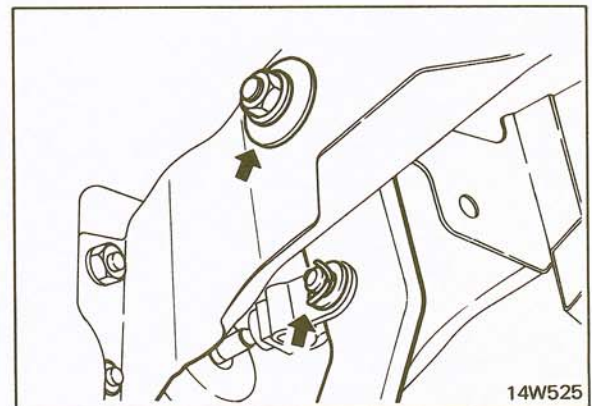
Vehicles with an  
automatic transmission

14W548

## REMOVAL

### Brake Pedal

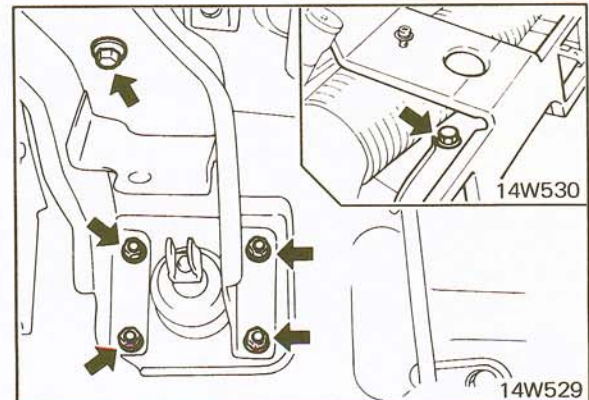
1. Remove the return spring and stop light switch.
2. Remove the cotter pin that connects the operating rod of the brake booster to the brake pedal. (14W525)
3. Remove the bolt that attaches the brake pedal to the pedal support member.
4. Remove the brake pedal.



14W525

### Brake Pedal Support

1. Remove the steering column assembly. (Refer to GROUP 19.)
2. Remove the brake pedal.
3. Remove the pedal support member. (14W530, 14W529)



14W530

14W529





### INSPECTION

1. Check spacer and bushing for wear.
2. Check stop light switch for operation.
3. Check brake pedal for bend or twisting.
4. Check brake pedal return spring for damage.

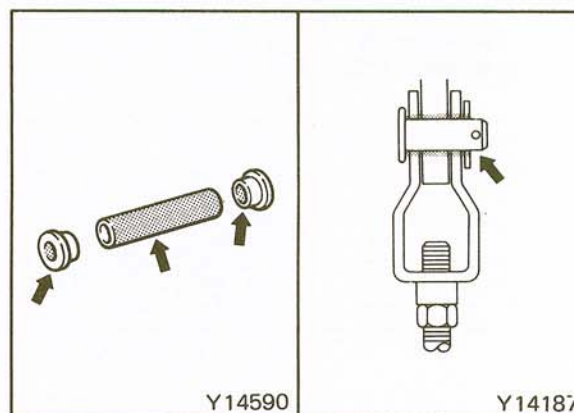
### INSTALLATION

1. Apply the specified multipurpose grease to the bushing and the spacer. (Y14590)

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #3

2. Apply the specified multipurpose grease to the clevis pin and washer. (Y14187)

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #2EP

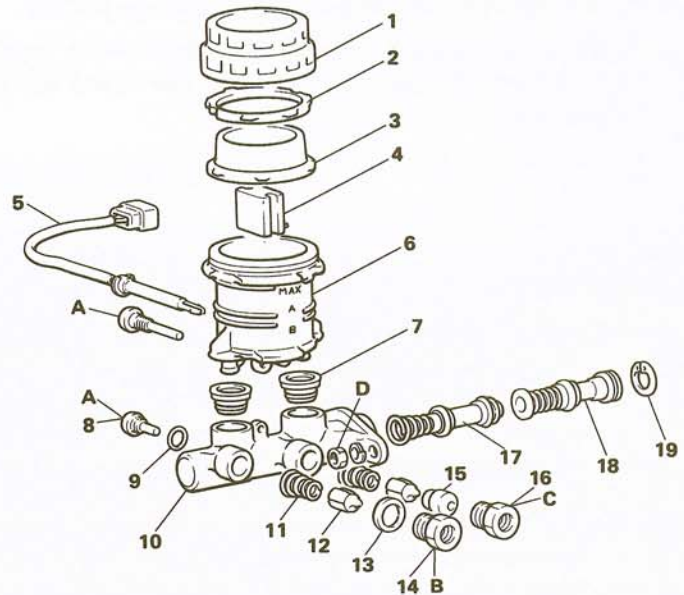






## COMPONENTS

1. Reservoir cap
2. Slide ring
3. Diaphragm
4. Float
5. Fluid level sensor
6. Reservoir
7. Reservoir seal
8. Secondary piston stopper
9. Gasket
10. Master cylinder body
11. Check valve spring
12. Check valve
13. Gasket
14. Check valve case
15. Tube seat
16. Check valve cap
17. Secondary piston
18. Primary piston
19. Piston stopper ring

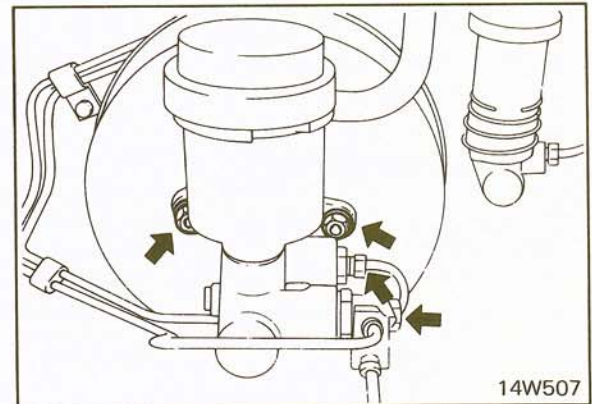


	Nm	ft. lbs.
A	1.5-3.0	1-2
B	40-50	29-36
C	25-35	18-25
D	8-12	6-9

14W547

## REMOVAL

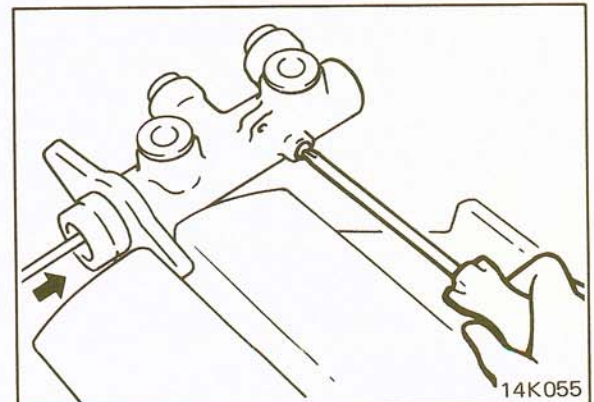
1. Disconnect the harness connector of the fluid level sensor.
2. Detach the brake tubes from the master cylinder. (14W507)
3. Remove the master cylinder from the brake booster. (14W507)



14W507

## DISASSEMBLY

1. Remove the reservoir.
2. While depressing the piston, remove the secondary piston stopper. (14K055)



14K055





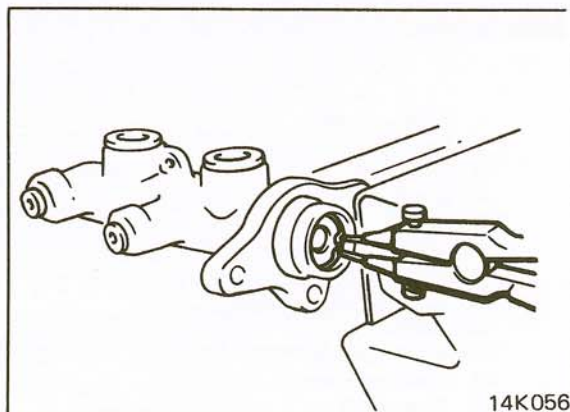
## COMPONENT SERVICE-BRAKE MASTER CYLINDER

3. Remove the piston stopper ring. (14K056)
4. Remove the primary and secondary pistons from the master cylinder body.

### Caution

Do not disassemble the primary and secondary pistons.

5. Remove the check valve cap and check valve case, and then remove the gasket, the check valves and the check valve springs.



### INSPECTION

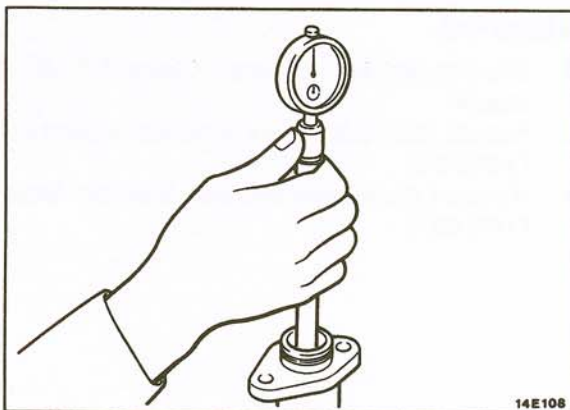
1. Check check valve and check valve spring for deterioration.
2. Check gasket for damage.
3. Check inner surface of master cylinder body for rust or scars.
4. Check primary and secondary pistons for rust, scouring, wear, damage or deterioration.
5. Check primary and secondary piston springs for deterioration.
6. Check the clearance between master cylinder inner diameter and piston outer diameter as follows:

#### Clearance between Master Cylinder Inner Diameter and Piston Outer Diameter

- (1) Measure of the master cylinder inner diameter at three different positions (bottom, middle and top) by using a cylinder gauge. (14E108)

Master cylinder to piston clearance [Service limit]
.....0.15 mm (.006 in.)

- (2) If the clearance between these inner diameters and the piston outer diameter is not less than the service limit, replace the master cylinder and the piston assembly as set.



### REASSEMBLY

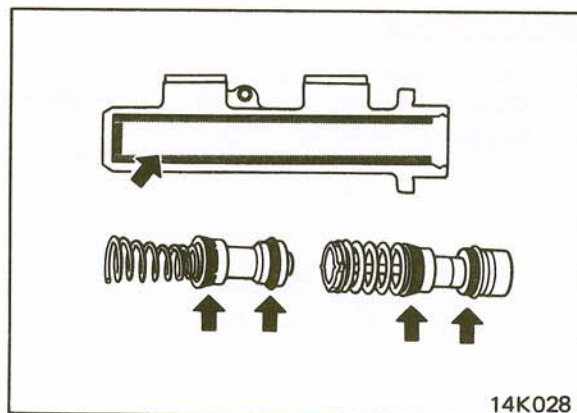
1. Apply brake fluid to the inner surface of the master cylinder body and to the entire periphery of the secondary and primary pistons. (14K028)

Recommended brake fluid
..... DOT 3

2. Torque parts to specifications during assembly.

### INSTALLATION

Bleed the brake system. (Refer to p. 5-8.)







## MASTER CYLINDER PUSH ROD ADJUSTMENT

1. Measure the clearance between the brake booster push rod and the primary piston.

Booster push rod to master cylinder piston clearance  
 A ( $A = B - C - D$ ) ..... 0.1-0.5 mm  
 (.004-.020 in.)

### NOTE

If the clearance is not within the standard value range, adjust by changing the push rod length by turning the screw of the push rod.

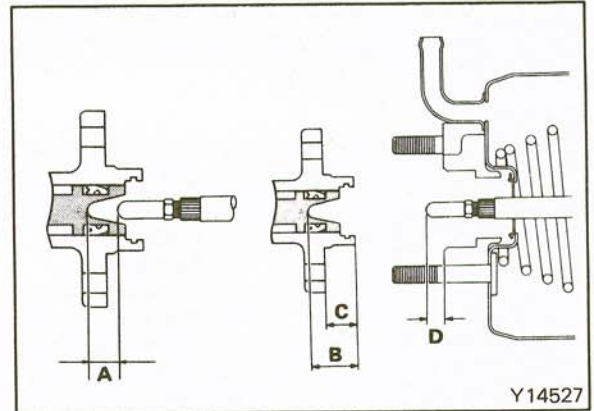
### Caution

Insufficient clearance may cause excessive brake drag.

2. Make sure that the brake pedal free play is within the standard value range.

Brake pedal free play ..... 10-15 mm (.4-.6 in.)

3. Torque all parts to specifications during assembly.



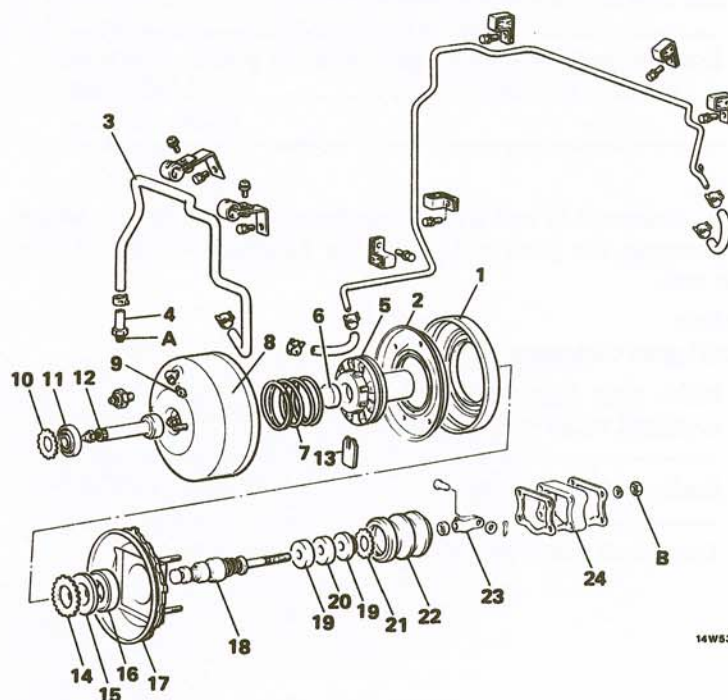
Y14527





### COMPONENTS

- |                             |                            |
|-----------------------------|----------------------------|
| 1. Diaphragm                | 13. Valve plunger stop key |
| 2. Diaphragm plate          | 14. Retainer               |
| 3. Vacuum hose              | 15. Bearing                |
| 4. Fitting                  | 16. Valve body seal        |
| 5. Valve body               | 17. Rear shell             |
| 6. Reaction disc            | 18. Valve rod and plunger  |
| 7. Spring                   | 19. Filter                 |
| 8. Front shell              | 20. Silencer               |
| 9. Check valve              | 21. Retainer               |
| 10. Retainer                | 22. Boot                   |
| 11. Plate and seal assembly | 23. Operating rod yoke     |
| 12. Push rod                | 24. Spacer                 |



14W524

	Nm	ft. lbs.
A	15-18	11-13
B	8-12	6-9

### INSPECTION

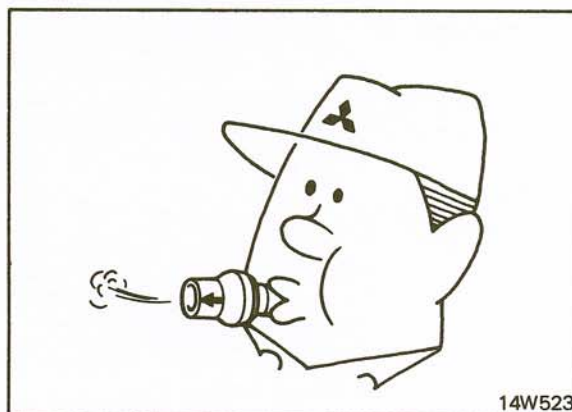
Check check valve operation as follows. (14W523)

- (1) Blow into the check valve.
- (2) If the air passes through when you blow from the booster side, but not when you blow from the engine side, the check valve is functioning properly.

### INSTALLATION

1. Check the booster push rod to master cylinder piston clearance. (Refer to p. 5-13.)
2. Install the check valve, being careful that the direction of installation is correct.
3. Fasten the vacuum hose securely to prevent air leaks from the connections.
4. After bleeding, adjust the brake pedal. (Refer to p. 5-6.)
5. Confirm that the brake booster operates properly. When installing the vacuum hose fitting, apply semi-drying sealant to its threaded portion and tighten it to the specified torque.

Tightening torque . . . . . 15-18 Nm (11-13 ft.lbs.)



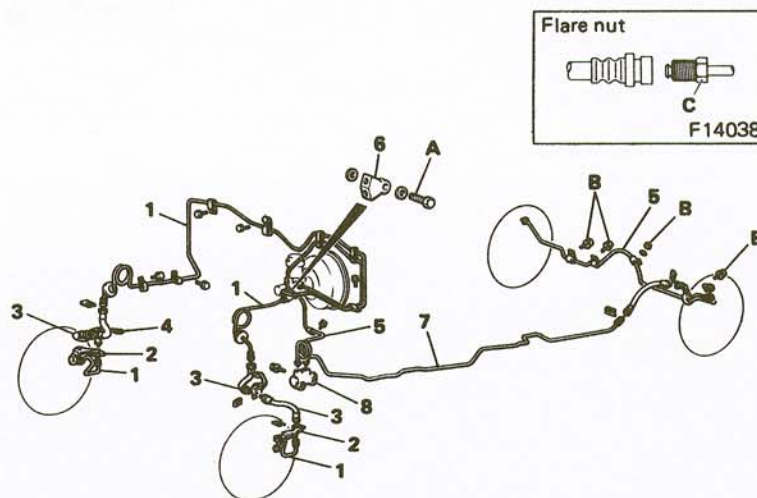
14W523





## COMPONENTS

1. Front brake tube
2. Brake hose bracket
3. Brake hose
4. Brake hose support
5. Rear brake tube
6. Connector
7. Main brake tube
8. Blend proportioning valve (B.P.V.)



	Nm	ft. lbs.
A	25-35	17-25
B	9-11	7-8
C	13-17	9-12

14W541

## INSPECTION

1. Check brake tubes for cracks, crimps and corrosion.
2. Check brake hoses for cracks, damage and leakage.
3. Check brake tube flare nuts for damage and leakage.

## INSTALLATION

1. Install the brake hoses, being careful not to twist them.
2. The brake tubes should be installed away from sharp edges, weld beads or moving parts.
3. Tighten the connections to the specified torque.

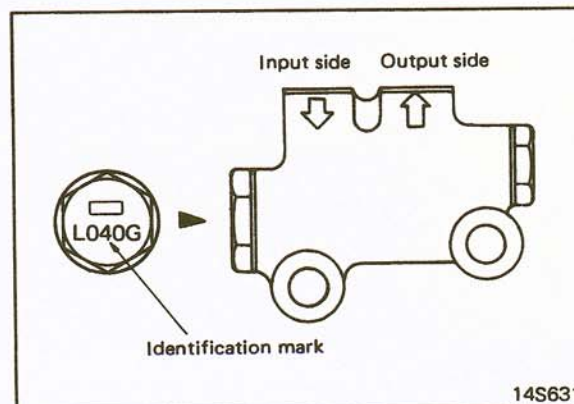
Flare nuts tightening torque .....  
13-17 Nm (9-12 ft.lbs.)

## BLEND PROPORTIONING VALVE (B.P.V.)

Connect the brake tubes in accordance with the arrows marked on the B.P.V. body. (14S631)

### Caution

1. Do not disassemble the B.P.V. since its performance depends on the preset load of the spring.
2. Use only a B.P.V. which is marked L040G. (14S631)



14S631

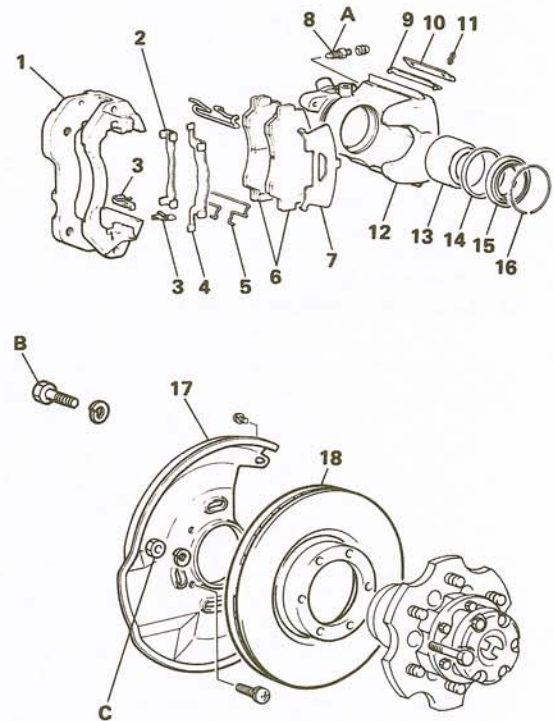




### COMPONENTS

1. Mounting support
2. Inner pad clip
3. Pad clip B
4. Outer pad clip
5. Anti-rattle spring
6. Pad assembly
7. Outer shim
8. Bleeder screw
9. Plug plate
10. Stopper plug
11. Spigot pin
12. Caliper body
13. Piston
14. Piston seal
15. Piston boot
16. Boot ring
17. Dust cover
18. Brake disc

	Nm	ft.lbs.
A	7-9	5-7
B	70-90	51-65
C	50-60	36-43



14S660

### BRAKE PAD INSPECTION

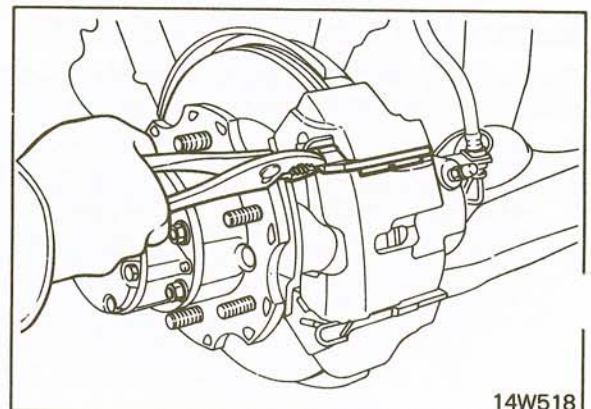
1. Check the pads for wear.
2. If the pad thickness is less than the service limit, replace the pads.

Brake pad thickness [Service limit] . . . . .  
1 mm (.04 in.)

### BRAKE PAD REPLACEMENT

#### Removal

1. Remove the spigot pins.
2. Remove the stopper plugs and remove the plug plates. (14W518)



14W518

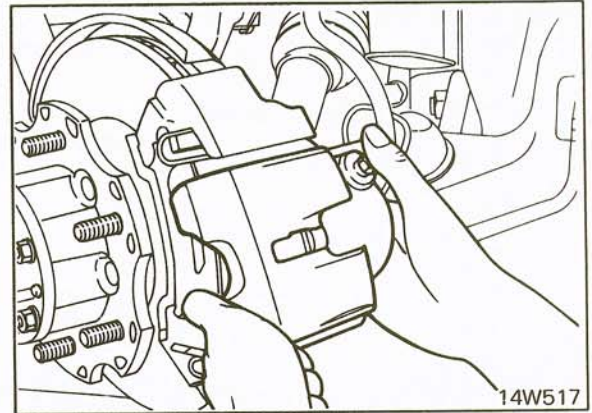




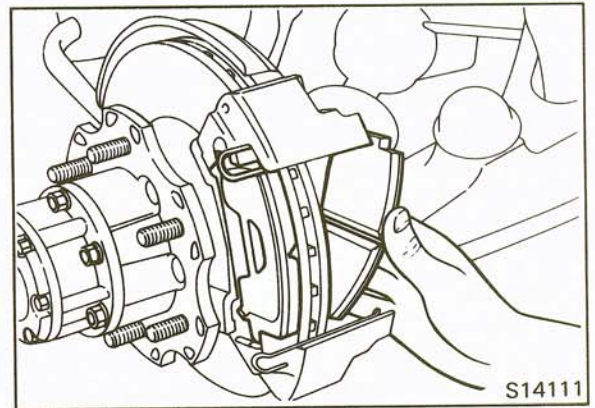
Remove the caliper body by moving it upward or downward at an angle.

## NOTE

Support the front brake assembly by suspending it with wire or other suitable means in such a manner so that the brake hoses are not twisted.

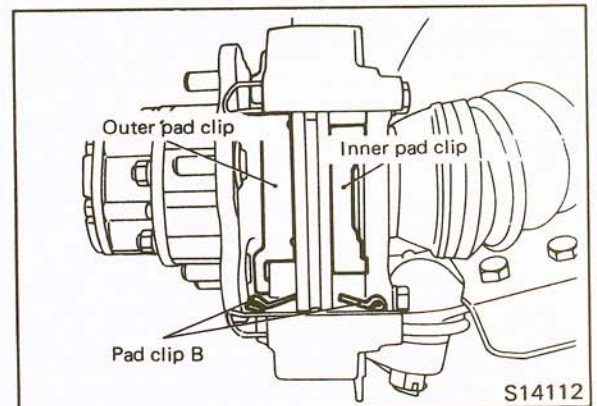


4. Remove the pad, outer shim, pad clips and anti-rattle springs from the mounting support.

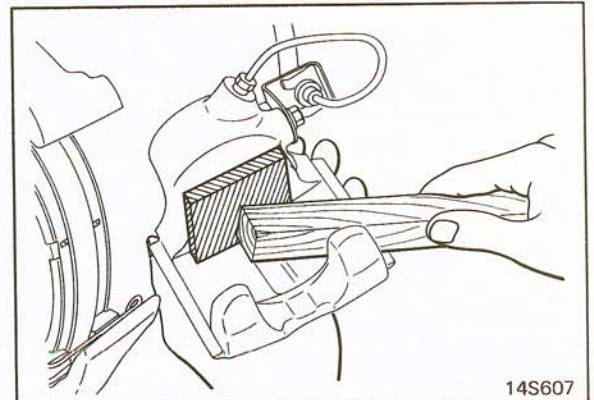


## Installation

1. Install the anti-rattle springs, pad clip B, inner pad clip and outer pad clip onto the mounting support. (S14112)
2. Install the pads together with the outer shim.



3. Bottom the piston into the caliper bore.



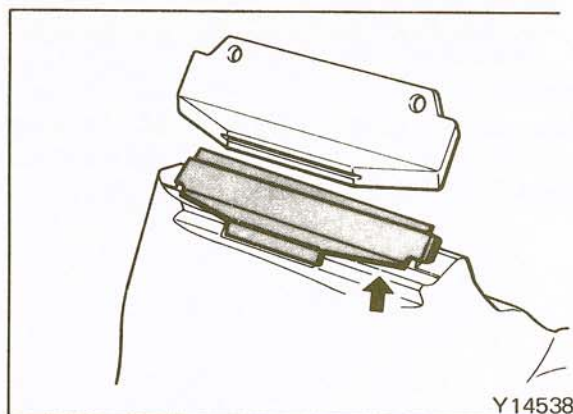




## COMPONENT SERVICE-FRONT DISC BRAKES

4. Apply a thin coat of the specified brake grease to the plug plate and stopper plug contact surface.

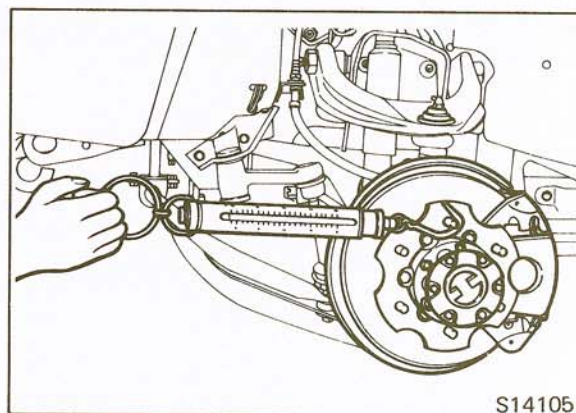
Recommended brake grease .....  
Plastilube 2 brake grease



### BRAKE DRAG INSPECTION

1. Start the engine and depress the brake pedal for 5 seconds.
2. Turn the engine off.
3. Rotate the brake disc a few revolutions.
4. Use a spring scale as illustrated to measure the brake drag. (S14105)
5. Remove the brake pads and use the spring scale to measure the rotational force.  
The difference between brake drag and rotational force should not exceed the standard value.

Brake drag ..... 74 N (16 lbs.)



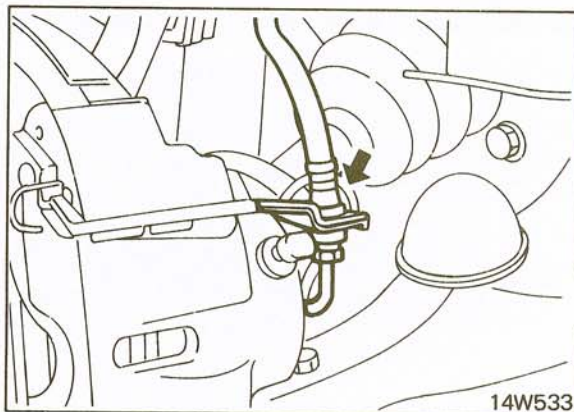
### NOTE

If the difference exceeds the standard value, remove the caliper body and disassemble it. Check the piston and seal for deterioration, corrosion, dirt or scoring.

### FRONT BRAKE ASSEMBLY

#### Removal

1. Disconnect the brake tube.
2. Remove the caliper body.
3. Remove the brake hose bracket from the caliper body. (14W533)
4. Remove the mounting support.

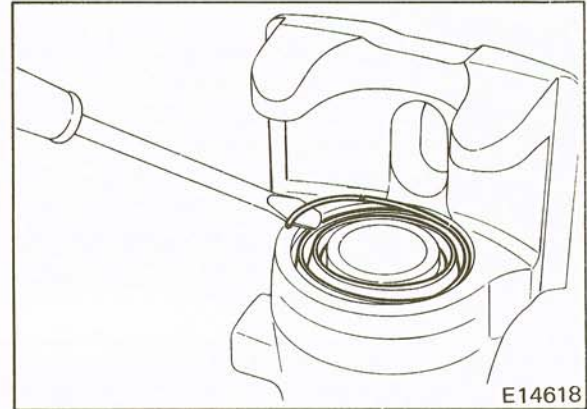






## Disassembly

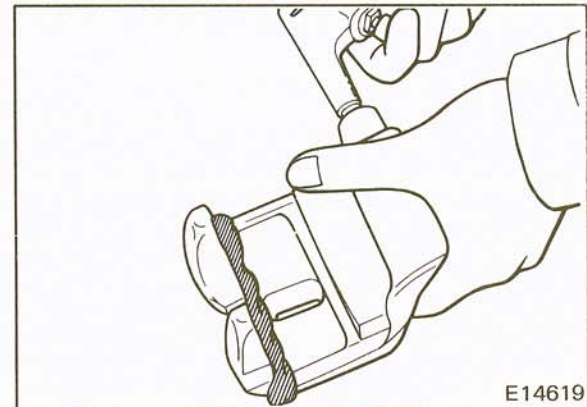
1. Remove the boot ring from the caliper body.



2. Remove the piston and dust boot by applying compressed air through the brake hose fitting hole.

### Caution

1. Place a rag in front of the piston to catch it when it comes out, and slowly increase the amount of compressed air being applied behind the piston.
2. Be sure to keep your fingers away from the front of the piston during removal.

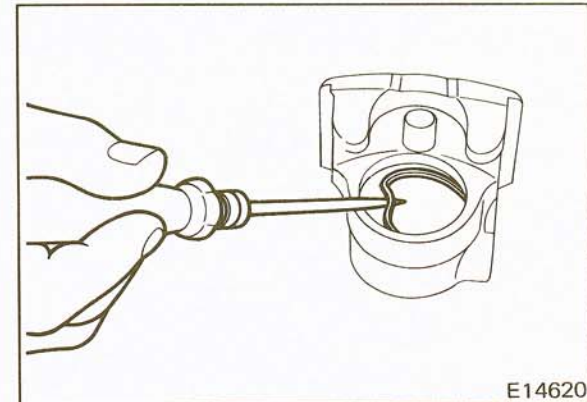


3. Remove the piston seal. (E14620)

### Caution

Be careful not to damage the caliper bore. The piston seal must be replaced with a new one.

4. Clean the caliper bore with alcohol or brake fluid.



## Inspection

1. Check mounting support for cracks.
2. Check caliper body for cracks or rust of cylinder portion.
3. Check piston for rust.
4. Check piston seal for wear or deterioration.
5. Check piston boot for cracks or deterioration.





### Reassembly

1. Apply the specified brake grease to a new piston seal and install the seal to the cylinder.

Recommended brake grease .....  
Repair kit grease (red)

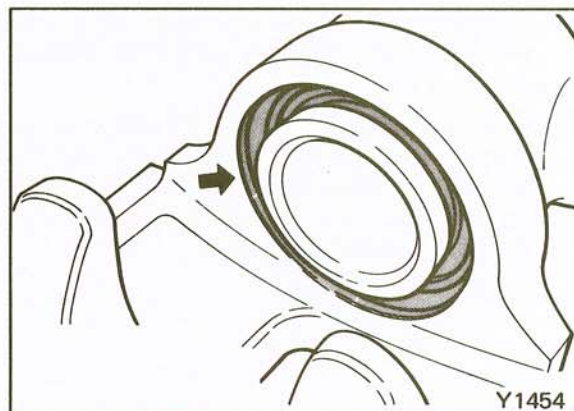
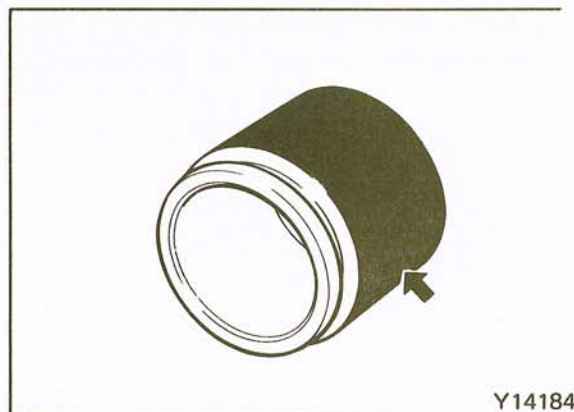
2. Apply the brake fluid to the outside surface of the piston and slowly insert the piston by hand, taking care not to twist it. (Y14184)

Recommended brake fluid ..... DOT 3

3. Apply the specified brake grease to the piston boot mounting groove in the caliper body. (Y14541)

Recommended brake grease .....  
Repair kit grease (orange)

4. Install the piston boot and retain it with the boot ring.



### Installation

1. Bleed the air from the caliper.
2. Check the brake drag. (Refer to p. 5-18.)

### BRAKE DISC

#### Inspection

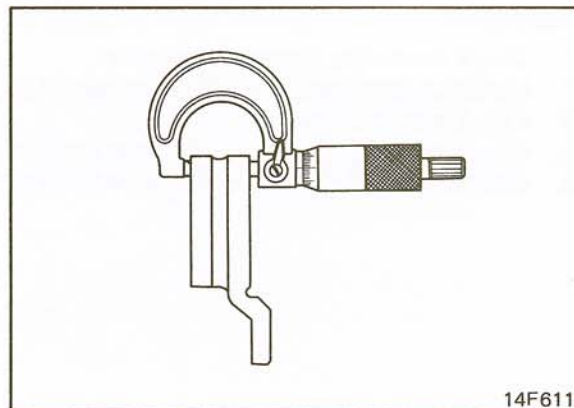
#### BRAKE DISC WEAR

If the brake disc thickness becomes less than the service limit, replace the disc. (14F611)

Disc thickness [Service limit] ..... 18.4 mm (.72 in.)

#### BRAKE DISC DAMAGE

Replace the brake disc if necessary.







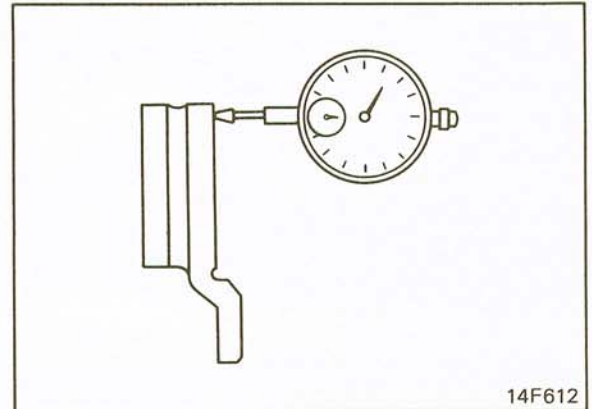
## RAKE DISC RUNOUT

1. If the brake disc runout exceeds the repair limit, change its position on the hub and/or retorque evenly. (14F612)

Disc runout [Repair limit] . . . . . 0.15 mm (.006 in.)

2. Check the runout again, and if it cannot be corrected, resurface the brake disc. (14F612)

Thickness of brake disc [Service limit] . . . . .  
18.4 mm (.72 in.)



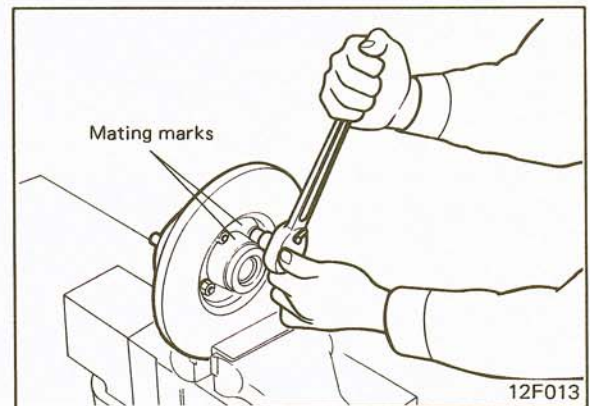
14F612

## Caution

Do not grind the brake disc beyond the service limit.

## Removal

1. Remove the front brake assembly and use wire to support it.
2. Remove the front hub assembly from the knuckle.
3. Make mating marks, and then disassemble the brake disc from the hub. (12F013)



12F013

## Installation

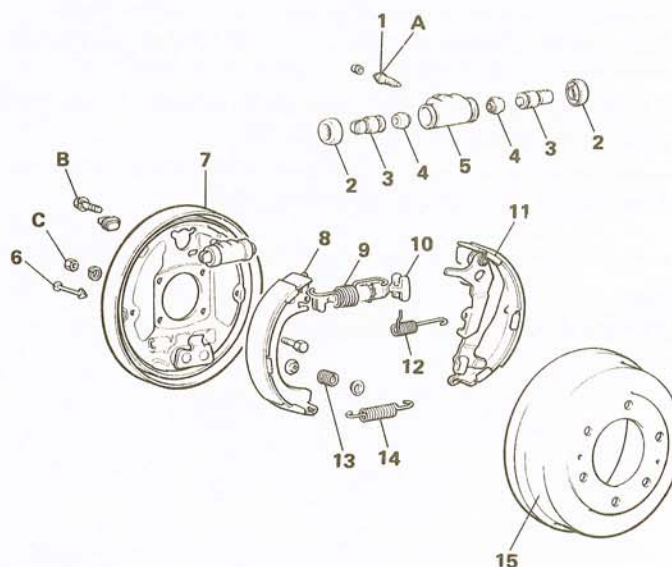
1. Align the mating marks and assemble the brake disc to the hub.
2. Check the brake dragging torque. (Refer to p. 5-18.)
3. Torque all parts to specifications during assembly.





## COMPONENTS

1. Bleeder screw
2. Wheel cylinder boot
3. Wheel cylinder piston
4. Piston cup
5. Wheel cylinder body
6. Shoe hold-down pin
7. Backing plate
8. Shoe and lining assembly
9. Shoe return spring
10. Brake shoe adjuster
11. Shoe and lever assembly
12. Adjusting spring
13. Shoe hold-down spring
14. Shoe retainer spring
15. Brake drum



	Nm	ft. lbs.
A	7-9	5-7
B	18-21	13-15
C	50-60	36-43

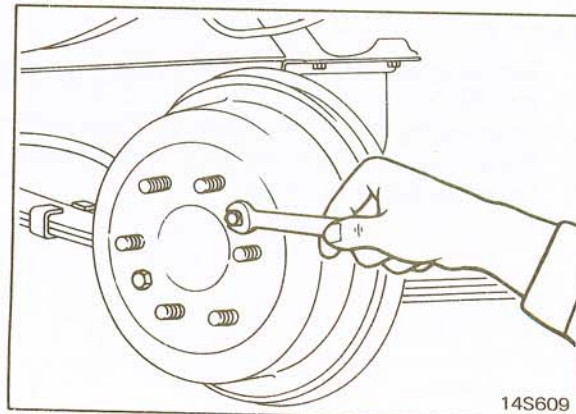
14W535

## REMOVAL

1. Remove the brake drum.

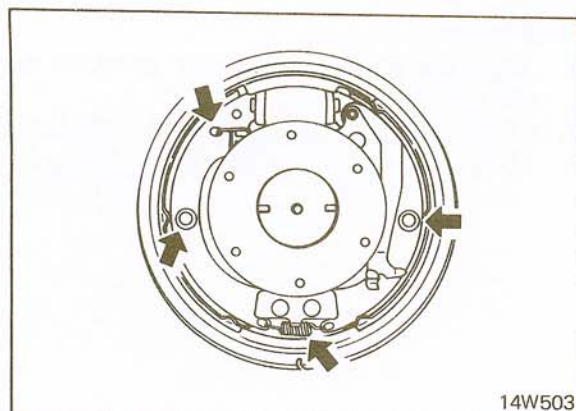
### NOTE

If it is hard to remove the brake drum, install two bolts (M8 x 1.25) into the threaded holes provided in the drum flange surface. (14S609)



14S609

2. Disconnect the parking brake cable from the shoe and lever assembly.
3. Remove the shoe return spring, shoe retainer spring and shoe hold-down pin, and remove the shoe and lining assembly and the shoe and lever assembly. (14W503)

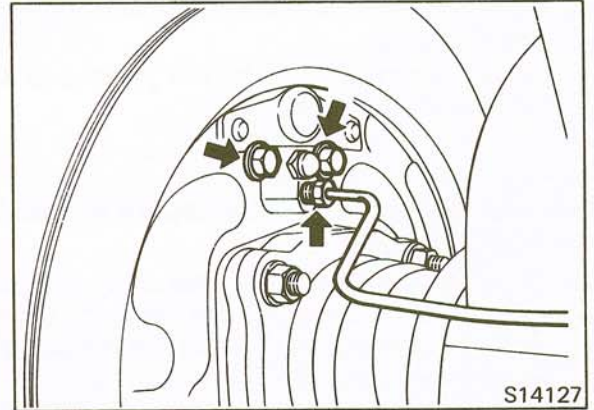


14W503





- . Disconnect the brake tube, remove the wheel cylinder mounting bolts and remove the wheel cylinder. (S14127)
5. Disconnect the parking brake cable from the backing plate. (Refer to p. 5-28.)
6. Disconnect the bearing case from the axle housing end. (Refer to GROUP 3.)
7. Remove the axle shaft toward you together with the backing plate. (Refer to GROUP 3.)
8. Remove the backing plate from the axle shaft.



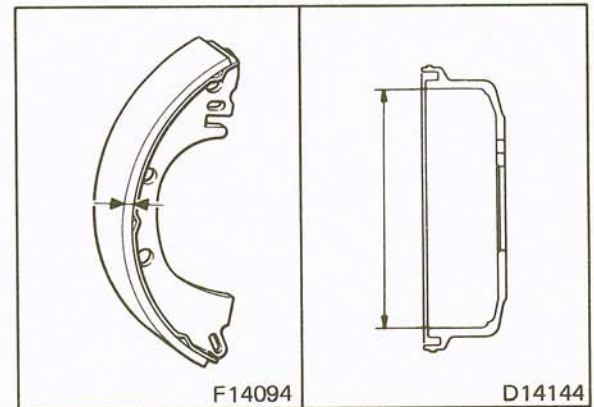
## INSPECTION OF BRAKE LINING AND BRAKE DRUM WEAR

1. Measure the wear of the brake lining at the place worn the most. (F14094)

Brake lining thickness [Service limit] .....  
1.0 mm (.04 in.)

2. Use a caliper gauge to measure the inside diameter of the brake drum. (D14144)

Brake drum inside diameter [Service limit] .....  
256 mm (10.08 in.)



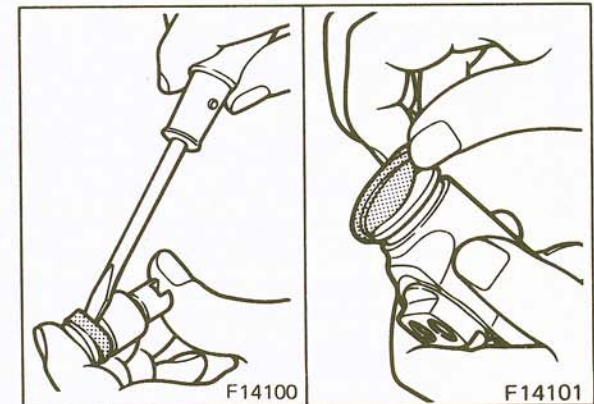
3. If the brake lining or brake drum wear exceeds the service limit, replace the parts.

## WHEEL CYLINDER PISTON CUP REPLACEMENT

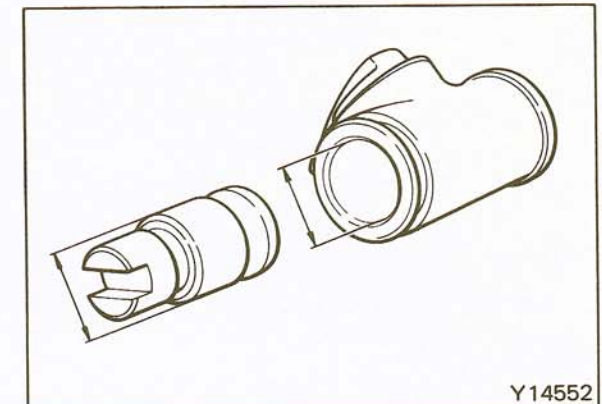
1. Remove the wheel cylinder to backing plate retaining bolt.
2. Detach the wheel cylinder boot and remove the piston assembly. (F14100)
3. Remove the piston cup from the piston. (F14101)

### Caution

If the piston cup is removed, it must be replaced with a new one.



4. Check the following points, and if there is any abnormality, replace the entire wheel cylinder assembly.
  - (1) Check the piston and wheel cylinder walls for rust or damage.
  - (2) Check the clearance between the cylinder and the piston. (Y14552)







## COMPONENT SERVICE-REAR DRUM BRAKES

5. Use alcohol or the brake fluid to clean the wheel cylinder and the piston.
6. Apply the brake fluid to the piston cup and the piston cup installer. (14C023)

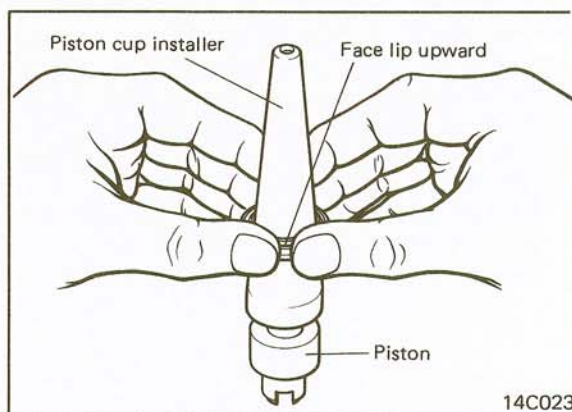
### Caution

The repair kit must be used to replace the piston cup and the wheel cylinder boot.

7. Set the piston cup on the piston cup installer with the lip of the cup facing up, fit the cup onto the piston cup installer, and then slide it down the outside of the tool into the piston groove. (14C023)

### Caution

In order to keep the piston cup from becoming twisted or slanted, slide it down the tool slowly and carefully, without stopping.

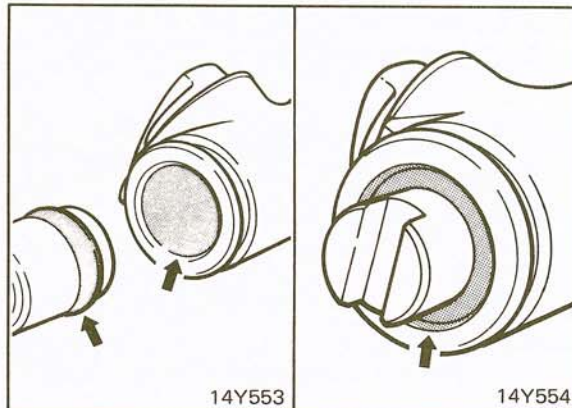


8. Use the brake fluid to clean the cylinder wall and the piston.

Recommended brake fluid ..... DOT 3

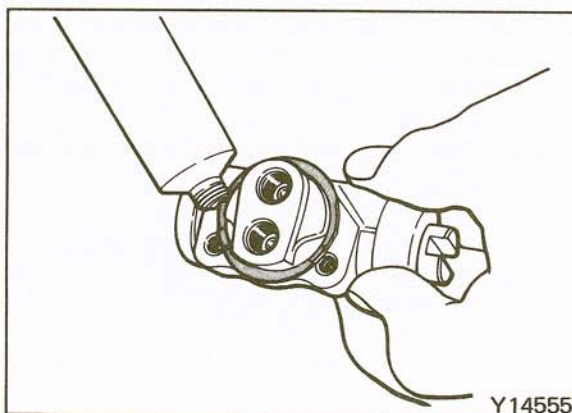
9. Apply the brake fluid to the wheel cylinder walls and the piston cup, and then install the piston assembly. (14Y553)
10. Apply a sufficient amount of grease to both ends of the piston, and then install the boots. (14Y554)

Recommended brake grease .....  
Repair kit grease (orange)



## INSTALLATION

1. Apply drying sealant to the wheel cylinder assembly attaching surface before installation to the backing plate.

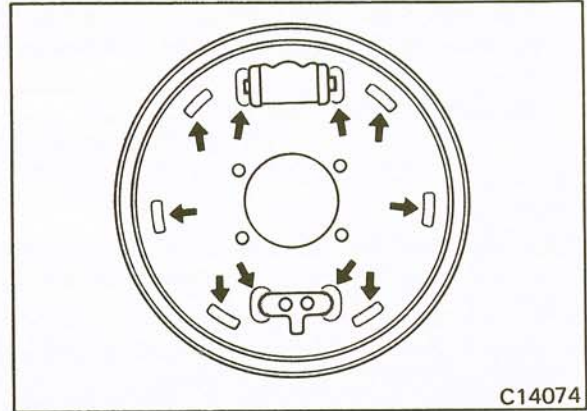






Apply the specified brake grease to the contacting surfaces of the shoes, backing plate, anchor plate and wheel cylinder piston ends.

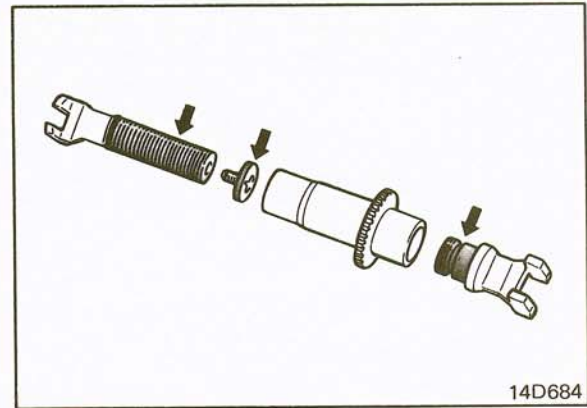
Recommended brake grease .....  
WARREN Plastilube 2 brake grease



C14074

3. Apply the specified brake grease to the rotating portion of the shoe adjuster and verify that it turns lightly.

Recommended brake grease .....  
WARREN Plastilube 2 brake grease



14D684

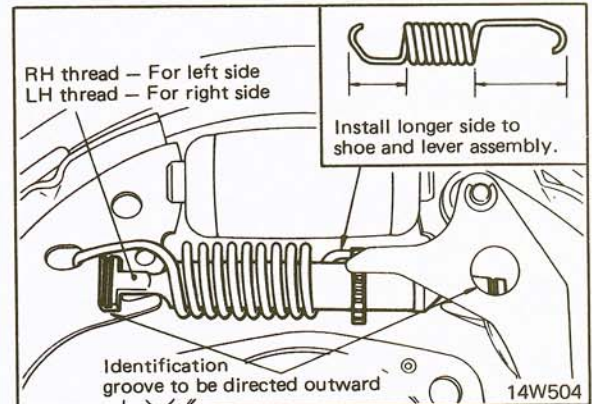
4. Attach the brake shoe adjuster and shoe return spring and install the shoe and lining assembly and the shoe and lever assembly. (14W504)

## Caution

Note the differences between right and left brake shoe adjusters and between right and left shoe return springs and install them in the correct position.

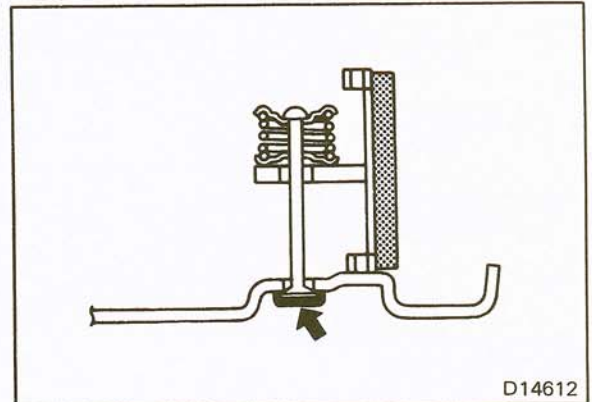
The shoe return spring should first be installed to only the shoe and lever assembly.

5. After the shoe hold-down pin and shoe retainer spring have been installed, install the shoe return spring to the shoe and lining assembly.



14W504

6. Apply a drying sealant to the shoe hold-down pin hole of the backing plate.



D14612





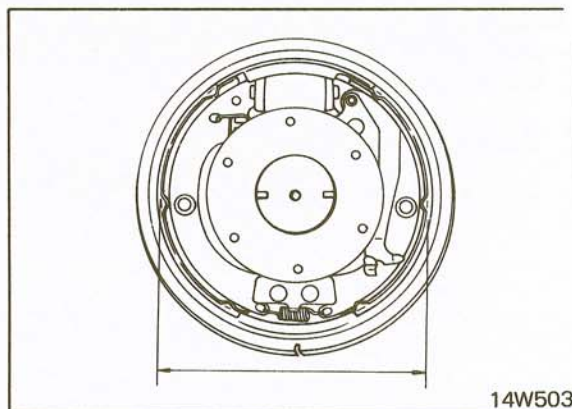
7. Turn the brake shoe adjuster to adjust the outer diameter of the brake shoes to the standard value.

Brake shoe outer diameter .....
253.2-253.5 mm (9.97-9.98 in.)

### NOTE

Adjusting the outer diameter of brake shoes to the standard value will also facilitate adjustment of the shoe clearance. (14W503)

8. Check to ensure that the parking brake cable is loose before installing the brake drum.
9. Pull the parking brake lever repeatedly to adjust the shoe clearance. (Refer to p. 5-29.)
10. Adjust the parking brake lever stroke. (Refer to p. 5-7.)
11. Torque all parts to specifications during installation.

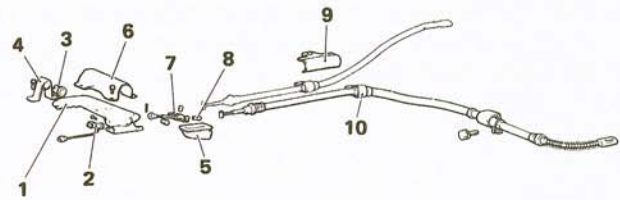






## COMPONENTS

1. Parking brake lever assembly
2. Parking brake switch
3. Bushing
4. Stay
5. Dust boot
6. Parking brake shaft cover
7. Equalizer
8. Cable adjuster
9. Parking brake heat protector
10. Parking brake cable

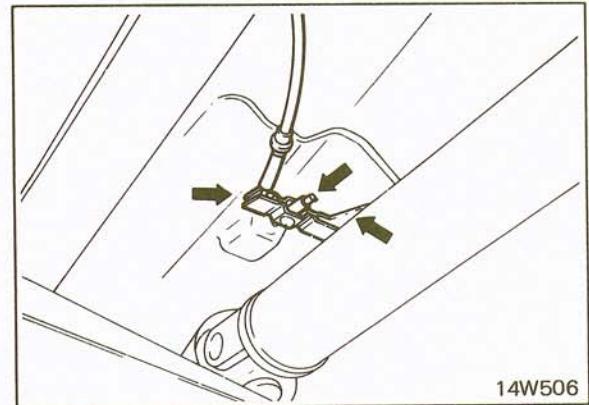


14W521

## REMOVAL

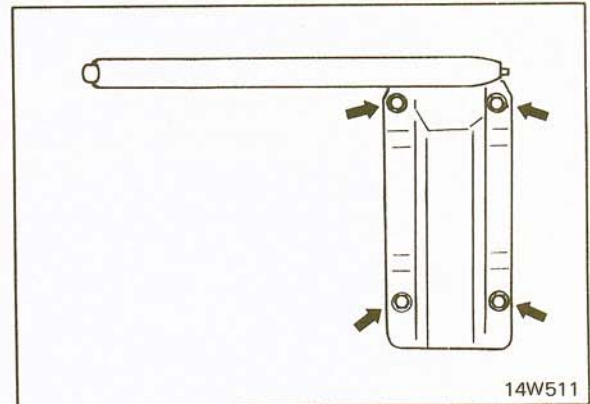
### Parking Brake Lever

1. Loosen the parking brake lever.
2. Loosen the cable adjuster from under the vehicle and disconnect the parking brake cable and equalizer. (14W506)
3. Disconnect the parking brake switch connector.



14W506

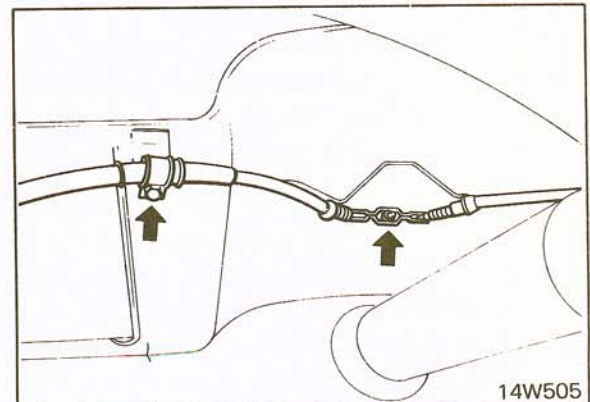
4. Remove the parking brake shaft cover mounting bolts. (The parking brake shaft cover is fasten to the stay together with the ratchet plate.)



14W511

### Parking Brake Cable

1. Loosen the parking brake lever.
2. Remove the parking brake cable clamps from the leaf spring and floor panel. (14W505)
3. Loosen the cable adjusting nuts and disconnect the parking brake cables from the equalizer.



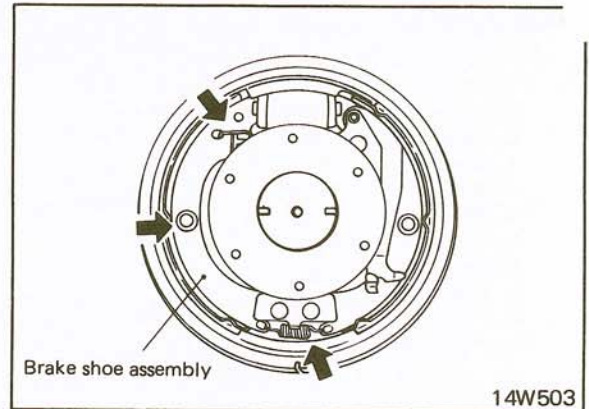
14W505



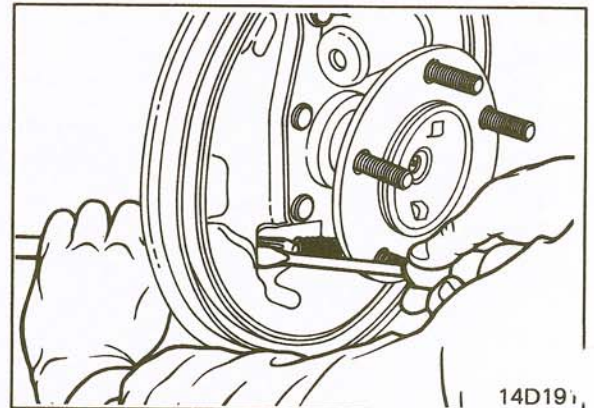


## COMPONENT SERVICE-PARKING BRAKES

4. Remove the rear brake drum and disconnect the rear end of the parking brake cable from the shoe and lever assembly.
5. Remove the shoe return spring, shoe retainer spring and shoe hold-down pin, and then remove the brake shoe assembly. (14W503)



6. Using a screwdriver, draw out the parking brake cable from the backing plate.



### INSPECTION

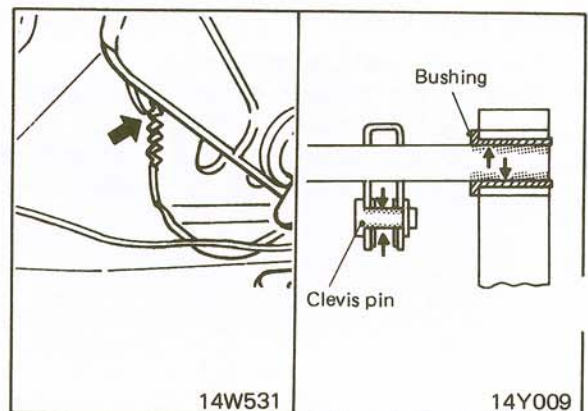
1. Check bushing for wear.
2. Check parking brake switch for malfunction.
3. Check parking lever latch for wear.
4. Check parking brake cable for damage and rough operation.

### INSTALLATION

#### Parking Brake Lever Assembly

Apply the specified multipurpose grease to the clevis pin, bushing and ratchet plate.

Recommended multipurpose grease .....  
SAE J310a, NLGI grade #3

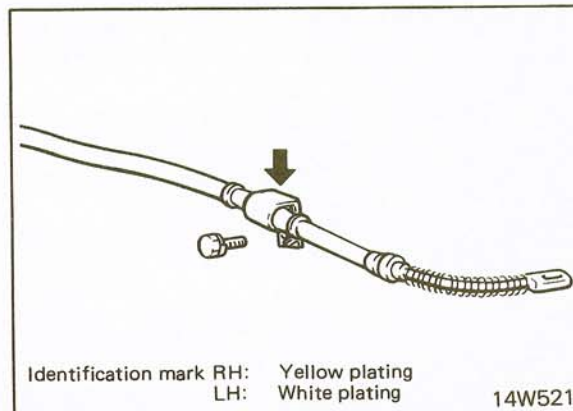






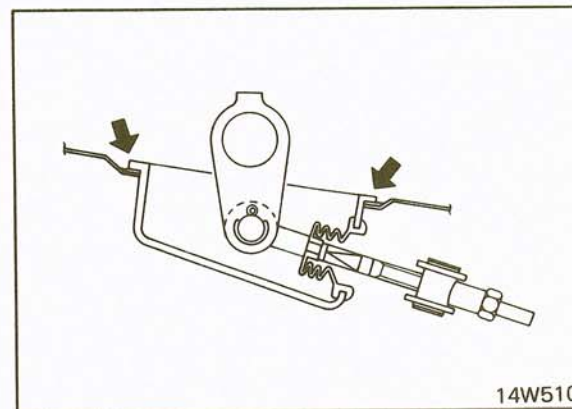
## Parking Brake Cable

1. Before installation of the parking brake cable, check the identification mark made on the clip of the parking brake cable.



2. Apply drying sealant to the grommet. (14W510)
3. After the cable adjuster has been temporarily tightened, repeatedly pull the parking brake lever until its stroke becomes constant to adjust for proper shoe clearance.
4. Adjust the parking brake lever stroke to the standard value with the cable adjuster.

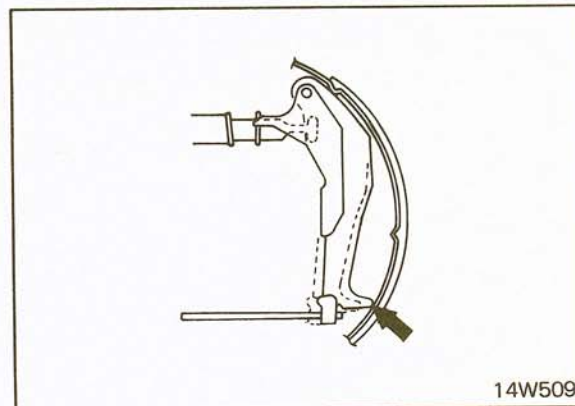
Parking brake lever stroke . . . . . 4-6 clicks



5. Release the parking brake lever, remove the brake drum, and check to ensure that the brake lever adjuster is touching the shoe. (14W509)

### Caution

If the parking brake cable is pulled too far, the adjuster lever will not fit the adjuster, resulting in faulty operation of the brake shoe adjuster.











# CLUTCH

## CONTENTS

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## SPECIFICATIONS

### GENERAL SPECIFICATIONS

Clutch operating method	Hydraulic type
Inside diameter of clutch master cylinder mm (in.)	15.87 (.62)
Clutch disc	
Type	Single dry disc type
Facing diameter (outside x inside) mm (in.)	225 X 150 (8.86 X 5.91)
Number of torsion springs	4
Spline inside diameter mm (in.)	23.16-23.21 (.912-.914)
Clutch cover assembly	
Type	Diaphragm spring, strap rivet type
Setting load N (lbs.)	3,432 (772)
Mounting bolt circle diameter mm (in.)	264 (10.39)
Clutch release bearing	
Type	Angular contact, self-centering type
Free travel mm (in.)	1.6 (.06)
Clutch release cylinder	
Cylinder bore diameter mm (in.)	19.05 (.75)

### SERVICE SPECIFICATIONS

mm (in.)

Standard value	
Clutch pedal height	186-191 (7.3-7.5)
Clutch pedal free play	5-10 (.2-.4)
Clearance between clutch pedal and floorboard when pedal is depressed	35 (1.4) or more
Service limit	
Clutch disc	
Rivet sink	0.3 (.012)

### TORQUE SPECIFICATIONS

Nm (ft.lbs.)

Clutch to flywheel	15-21 (11-15)
Flywheel to crankshaft	128-137 (94-101)
Release cylinder to transmission case	30-41 (22-30)
Transmission to engine	43-53 (32-39)
Fulcrum	30-41 (22-30)
Clutch pedal to pedal bracket	25-35 (18-25)
Eye bolt	20-25 (15-18)
Clutch tube flare nut	13-17 (10-12)
Clutch master cylinder to firewall	7-9 (5-7)
Clutch pedal bracket	8-12 (6-9)
Push rod lock nut	8-12 (6-9)





**LUBRICANTS**

	Specified lubricants	Quantity
Fluid	Brake fluid DOT 3	As required
Grease for clutch pedal shaft, bushings, and return spring	Multipurpose grease SAEJ310a, NLGI grade #3	As required

**TROUBLESHOOTING**

Symptom	Probable cause	Remedy
Clutch slips	Insufficient clutch pedal free play	Adjust
	Oil or grease on clutch facing Clutch facing worn Pressure spring deteriorated	Replace
	Pressure plate or flywheel runout Hydraulic system failure	Repair or replace
Clutch drags or does not release	Excessive clutch pedal free play	Adjust
	Interference between pedal and floor panel	Correct
	Pilot bearing worn or broken Clutch disc warped Pressure plate, disc or throwout bearing damaged	Replace
	Hydraulic system failure	Repair or replace
Clutch chatters	Facing hardened Facing stained with oil or grease Weak or broken disc damper springs Improper facing contact or disc runout Pressure plate or flywheel warped	Replace
	Loose engine mounting	Repair or replace
Clutch noises	Release bearing broken, worn or poorly lubricated Pilot bearing worn Disc hub loose Disc plate cracked Torsion springs deteriorated or broken	Replace
Clutch operation erratic or rough	Facing stained with grease or oil Facing worn or rivet loose Torsion spring deteriorated or broken	Replace
	Insufficient lubricant on clutch pedal pivot	Lubricate





### CLUTCH PEDAL INSPECTION AND ADJUSTMENT

1. Measure the clutch pedal height and free play.

Clutch pedal height A . . . . 186-191 mm (7.3-7.5 in.)

Clutch pedal free play B . . . . . 5-10 mm (.2-.4 in.)

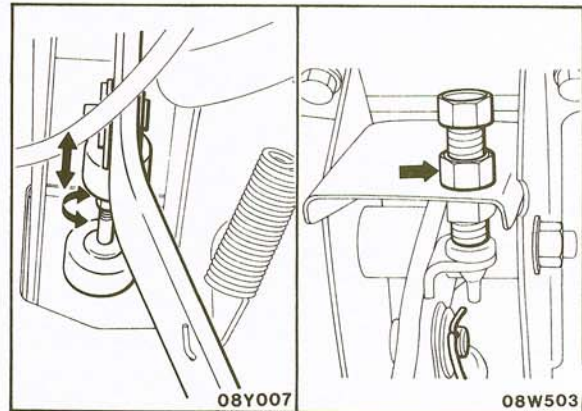
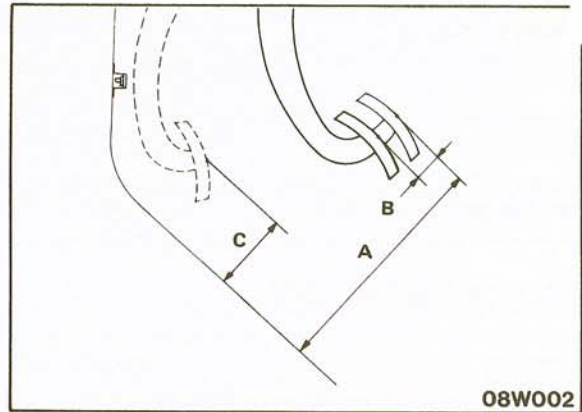
#### NOTE

The clutch pedal is so made that no adjustment of free play is possible.

2. If the clutch pedal height and free play are not within the standard value, adjust as follows:
  - (1) Turn the pedal stopper bolt back to a position where it does not contact the pedal arm. (08W503)
  - (2) Loosen the push rod lock nut and adjust the pedal height to the standard value by turning the push rod. (08Y007)
  - (3) Turn the pedal stopper bolt until it comes into contact with the pedal arm, and then tighten the lock nut.
3. After making the adjustment, depress the clutch pedal several times and check the clutch pedal to floorboard clearance is within the standard value range when the clutch is disengaged.

Pedal to floorboard clearance C when pedal is depressed . . . . . 35 mm (1.4 in.) or more

4. If the clutch pedal to floorboard clearance is less than the standard value, air mixture in hydraulic system or defective clutch assembly is suspected.  
Bleed the hydraulic system or repair the clutch assembly.



### BLEEDING

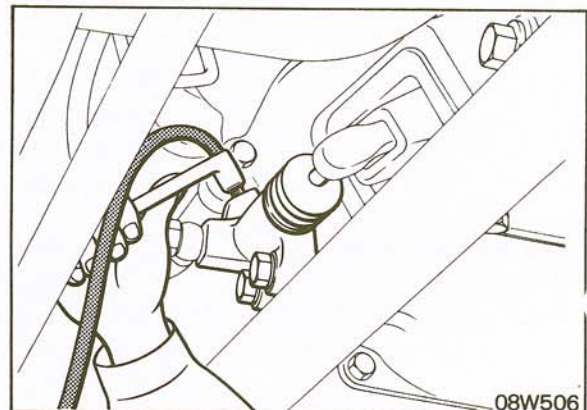
Whenever the clutch tube, the clutch hose, and/or the clutch master cylinder have been removed, or if the clutch pedal is spongy, bleed the system.

1. Loosen the bleeder screw at the clutch release cylinder.
2. Push clutch pedal down slowly until all air is expelled.
3. Hold clutch pedal down until bleeder screw is retightened.
4. Refill clutch master cylinder with recommended brake fluid.

#### Caution

Use the recommended brake fluid. Avoid using a mixture of the recommended fluid and other fluid.

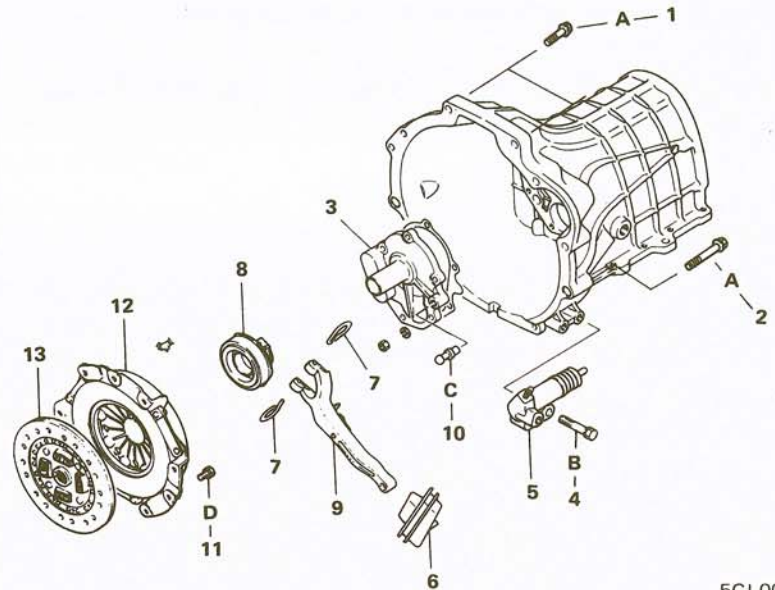
Recommended brake fluid . . . . . DOT 3







## COMPONENTS



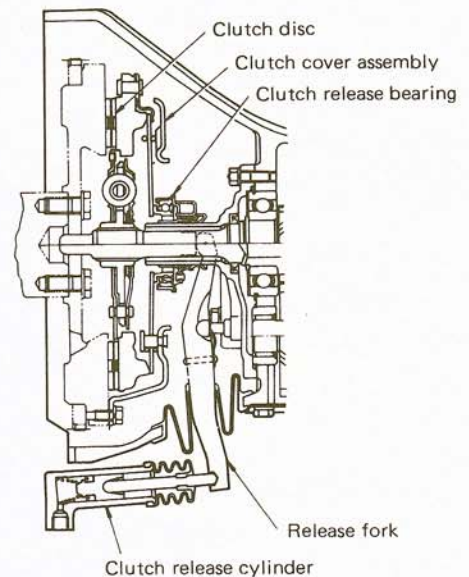
5CL007

1. Flange bolt — M10x40 (2)
2. Flange bolt — M10x65 (2)
3. Transmission assembly
4. Bolt — M10x30 (2)
5. Clutch release cylinder
6. Release fork boot
7. Return clip (2)
8. Clutch release bearing
9. Release fork
10. Fulcrum
11. Bolt (6)
12. Clutch cover assembly
13. Clutch disc

### NOTE

Numbers show order of disassembly.  
For reassembly, reverse order of disassembly.

	Nm	ft.lbs.
A	43-53	32-39
B	30-41	22-30
C	30-41	22-30
D	15-21	11-15



6CL012



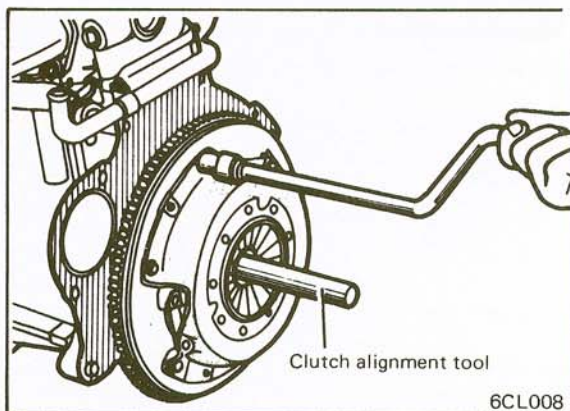


### REMOVAL

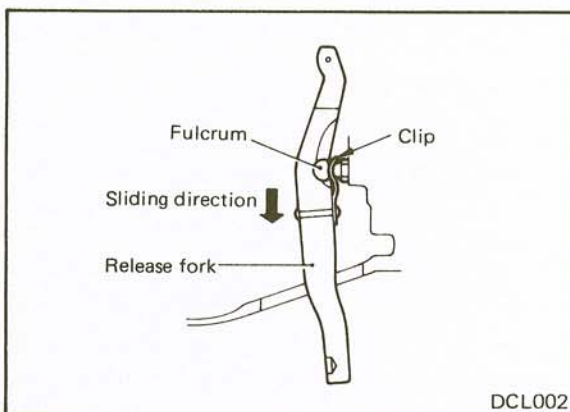
1. Insert a universal clutch alignment tool, or the main drive gear of transmission in center spline to prevent dropping of clutch disc.
2. Loosen bolts that hold clutch cover assembly diagonally one by one and remove clutch cover assembly.

#### Caution

**DO NOT** clean clutch disc or release bearing with cleaning solvent.



3. Slide release fork in direction indicated by arrow to disengage fulcrum from clip. Attempting to remove release fork by sliding it in other direction will result in damage to clip.

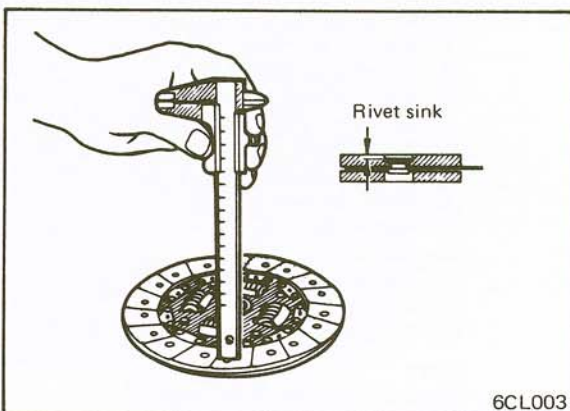


### INSPECTION

#### Clutch Disc

Check facing for wear. Replace excessively worn facing. Wear is measured from facing surface to rivet head. (6CL003)

Clutch disc (rivet sink) [Service limit] .....
0.3 mm (.012 in.)



#### Clutch Cover Assembly

Inspect diaphragm spring for excessive wear of fingers and looseness of strap rivets, and inspect pressure plate for scoring. Replace if damage is evident.

#### Release Bearing and Release Fork

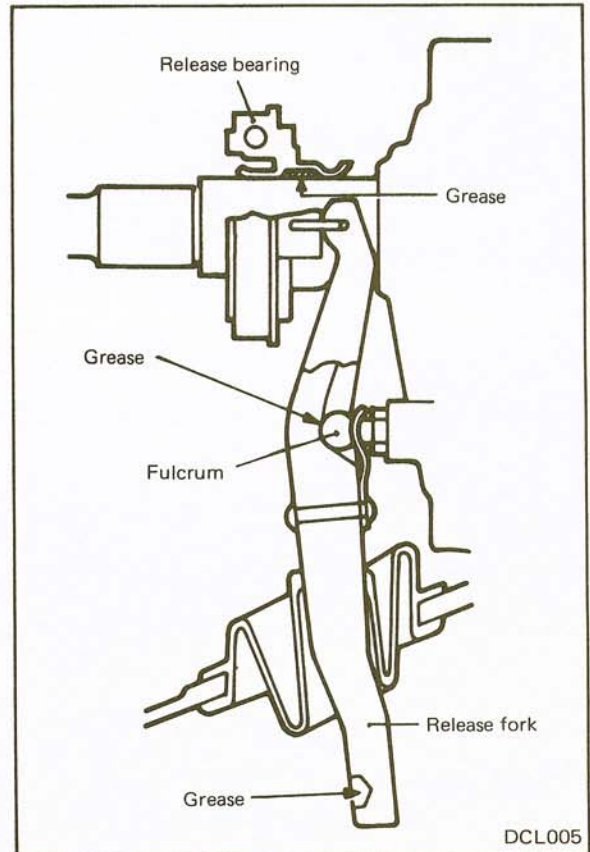
1. Check the release bearing for rough rotation or abnormal noise. Check the diaphragm spring contacting portions for abnormal wear.
2. Check the bearing and fulcrum contacting portions of the release fork for abnormal wear.





## INSTALLATION

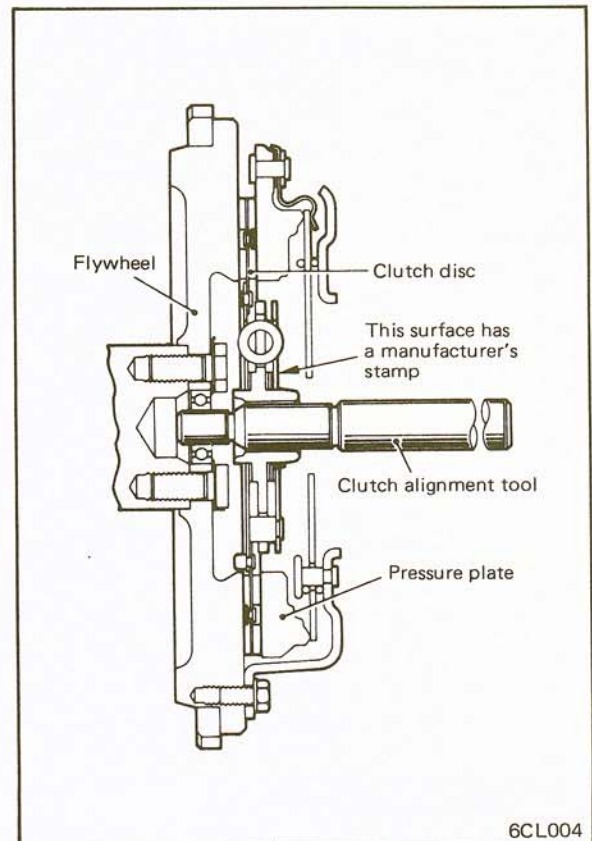
1. Pack the release fork fulcrum hole and release cylinder push rod hole with grease. (DCL005)
2. Pack grease into groove on release bearing I.D.
3. If there is oil or grease on clutch facing or pressure plate, thoroughly wipe away with a dry shop towel.
4. Lightly grease clutch disc spline and main drive gear spline of transmission.



5. Using a universal clutch alignment tool, or the main drive gear of transmission, install clutch disc and clutch cover assembly onto flywheel. (6CL004)
6. When installing clutch disc, be sure that surface having manufacturer's stamped mark is on pressure plate side.

### Caution

When installing transmission, do not shake it or install in such a manner that main drive gear is stressed unduly. Make sure that main drive gear enters clutch disc squarely.





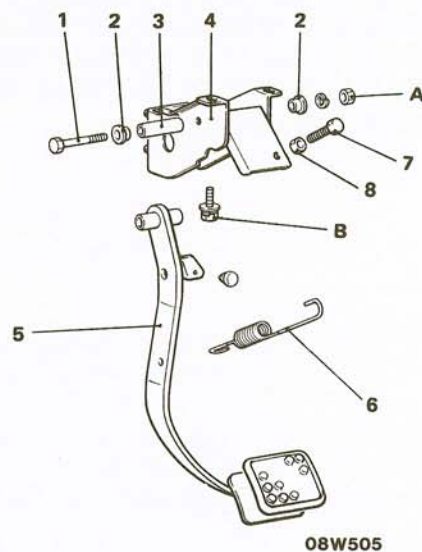


## COMPONENTS

### Clutch Pedal

1. Pedal shaft
2. Bushing
3. Spacer
4. Clutch pedal bracket
5. Clutch pedal
6. Return spring
7. Stopper bolt
8. Lock nut

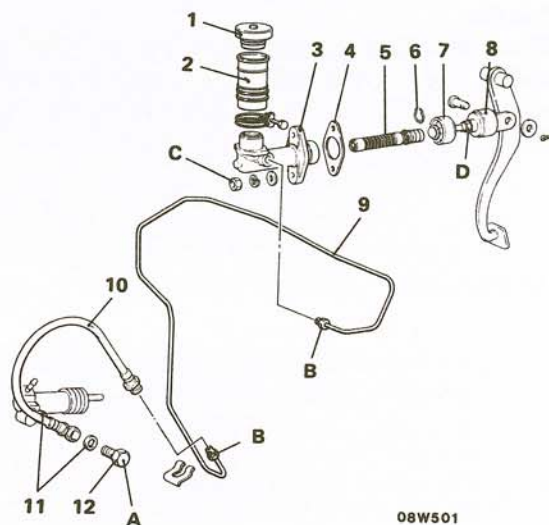
	Nm	ft.lbs.
A	25-35	18-25
B	8-12	6-9



### Clutch Master Cylinder and Tube

1. Reservoir cap
2. Reservoir
3. Clutch master cylinder
4. Sealer
5. Piston assembly
6. Piston stop ring
7. Piston boot
8. Damper and push rod assembly
9. Clutch tube
10. Clutch hose
11. Gasket
12. Eye bolt

	Nm	ft.lbs.
A	20-25	15-18
B	13-17	10-12
C	7-9	5-7
D	8-12	6-9

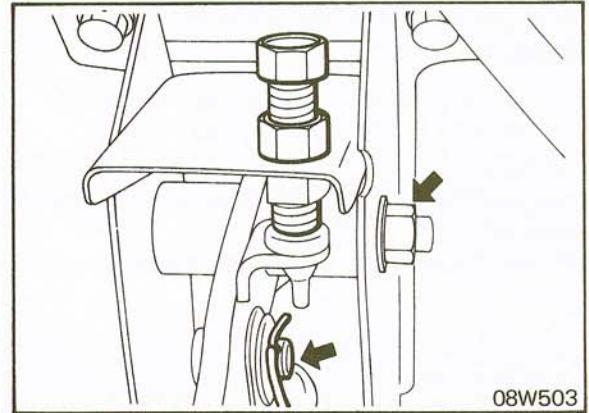




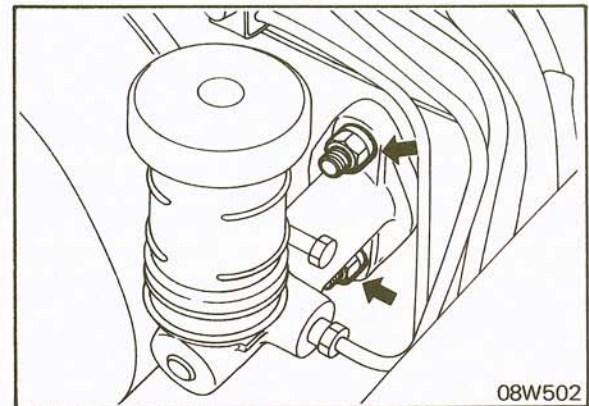


## REMOVAL

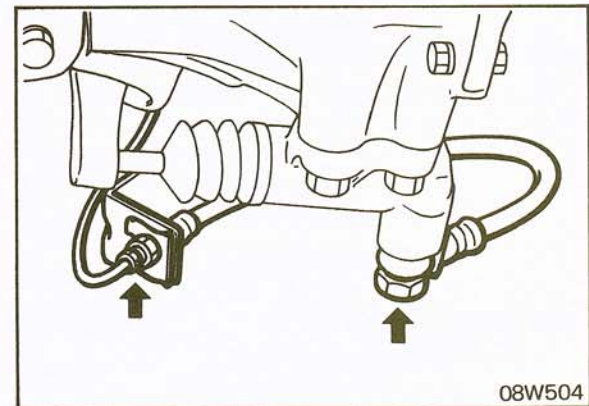
1. Loosen the bleeder screw of the release cylinder and drain the brake fluid.
2. Disconnect the push rod from the clutch pedal. (08W503)
3. Remove the clutch pedal from the pedal bracket.



4. Disconnect the clutch tube from the master cylinder.
5. Remove the master cylinder. (08W502)



6. Disconnect the clutch hose from the clutch tube and release cylinder. (08W504)
7. Remove the clutch tube.



## INSPECTION

1. Check sealer for damage.
2. Check master cylinder or clutch hose for fluid leakage.
3. Check clutch hose and tube for cracks or clogging.
4. Check pedal shaft bushings for wear.
5. Check pedal arm for bending and twisting.
6. Check return spring for weakening.





### MASTER CYLINDER OVERHAUL

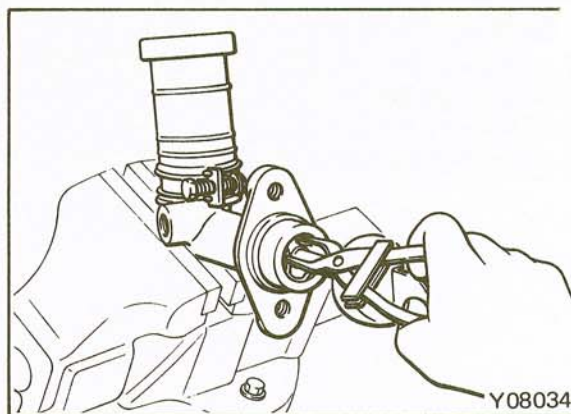
#### Disassembly

1. Remove the piston stop ring. (Y08034)
2. Remove the piston assembly.

#### Caution

Use care not to damage the master cylinder body and piston assembly.

Do not disassemble the piston assembly.



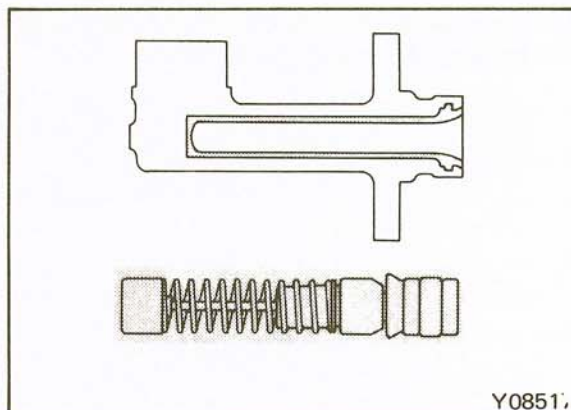
#### Inspection

1. Check inside cylinder body for rust or scoring.
2. Check piston cup for wear or deformation.
3. Check piston for rust or scoring.
4. Check clutch tube inside connecting section for clogging.

#### Reassembly

Apply specified brake fluid to the inner surface of the cylinder and to the entire periphery of the piston assembly. (Y08517)

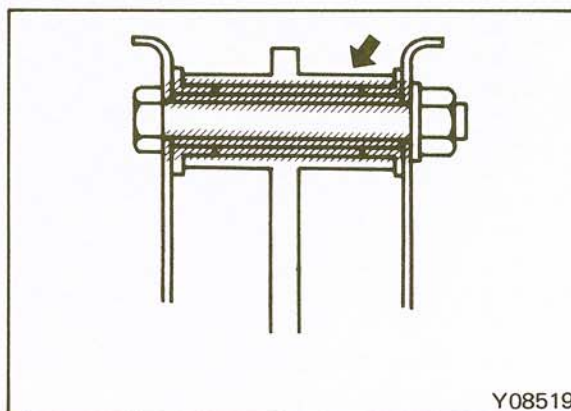
Recommended brake fluid ..... DOT 3



### INSTALLATION

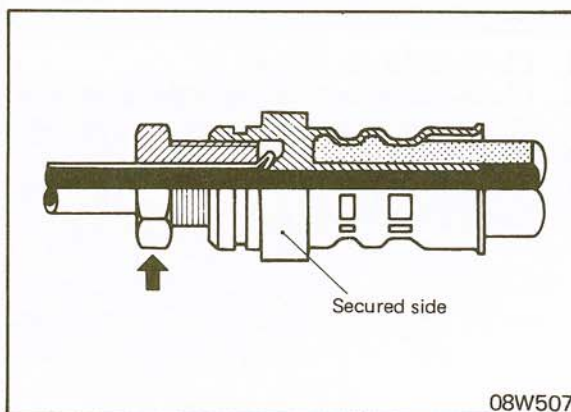
1. After tightening the clutch tube flare nut and eye bolt, check to be sure there is no leakage of the clutch fluid.
2. Apply specified multipurpose grease to the pedal shaft and bushings. (Y08519)

Recommended multipurpose grease .....  
SAEJ310a, NLGI grade #3



3. Temporarily tighten the flare nut by hand, and then tighten it to the specified torque, being careful that the clutch hose does not become twisted. (08W507)

Clutch tube flare nut tightening torque .....  
13-17 Nm (10-12 ft.lbs.)

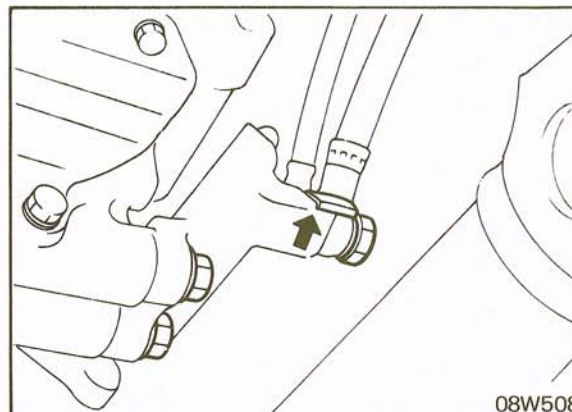






Connect the clutch hose to the release cylinder at the stepped portion shown in the illustration. (08W508)

5. Torque all parts to specifications during assembly.
6. Bleed the air from the system. (Refer to p. 6-4.)
7. Adjust the clutch pedal height. (Refer to p. 6-4.)



## CLUTCH RELEASE CYLINDER

### Removal and Disassembly

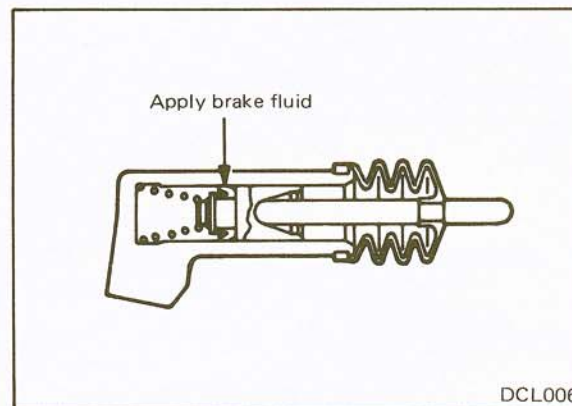
1. Remove eye bolt and gaskets and disconnect clutch hose from clutch release cylinder.
2. Remove two bolts securing the clutch release cylinder and clutch housing and remove clutch release cylinder assembly.
3. Remove the boot and push rod and take out piston and spring.

### Inspection

1. Check inside cylinder body for rust or scoring.
2. Check piston cup for wear or deformation.
3. Check piston for rust or scoring.

### Reassembly and Installation

1. Insert spring into release cylinder.
2. Apply brake fluid to outer surface of piston, piston cup and cylinder bore. (DCL006)
3. Install the piston and piston cup into the release cylinder.
4. Install push rod and boot.
5. Install release cylinder to clutch housing and tighten two bolts to specified torque.
6. Connect clutch hose to release cylinder and tighten eye bolt.
7. Bleed the air from the system. (Refer to p. 6-4)











# COOLING

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## SPECIFICATIONS

### GENERAL SPECIFICATIONS

Cooling method	Water-cooling, forced circulation type
Radiator	
Type	Pressurized corrugated fin type
Performance   kcal/h	43,600
Radiator cap	
High pressure valve opening pressure   kPa (psi)	74-103 (11-15)
Vacuum valve opening pressure   kPa (psi)	-5 or less (-0.7 or less)
Water pump	Centrifugal type impeller
Cooling fan	
Diameter   mm (in.)	410 (16.1)
No. of blades	7
Fan clutch	
Type	Thermostatic controlled fluid coupling
Fan speed	2,750 ± 150 rpm at pulley speed of 4,000 rpm, 65°C (149°F) or higher 1,300 rpm at pulley speed of 4,000 rpm, 55°C (131°F) or lower
Thermostat	
Type	Wax pellet type with jiggle valve
Valve opening temperature	88°C (190°F)
Full-open temperature	100°C (212°F) at valve lift of 8 mm (.31 in.) or more
Identification mark	88 (stamped on flange)
Water temperature gauge unit	
Type	Thermistor type
Resistance	104 Ω at 70°C (158°F) 38 Ω at 100°C (212°F)
Drive belt	
Length   mm (in.)	964 (37.95)
Automatic transmission oil cooler	
Performance   kcal/h	1,200

### SERVICE SPECIFICATION

kPa (psi)

Service limit	
Opening pressure of radiator cap high pressure valve	65 (9.2)



## SPECIFICATIONS



### TORQUE SPECIFICATIONS

Nm (ft.lbs.)

Alternator to timing chain case	20-25 (14-18)
Brace to alternator	12-15 (8.5-11)
Water pump to timing chain case	12-14 (8.5-10.5)
Water temperature gauge unit	30-39 (22-28)
Radiator	
Radiator shroud to radiator (vehicles with a manual transmission)	3-7 (2-5)
Radiator shroud to radiator (vehicles with an automatic transmission)	8-11 (6-8)
Radiator to headlight support	8-11 (6-8)
Automatic transmission oil cooler	
Oil cooler tubes to transmission	20 (14)

### LUBRICANT

lit. (U.S.qts., Imp. qts.)

Engine coolant	
Total quantity	8.0 (8.45, 7.04)
Quantity in reserve tank	0.65 (.69, .57)





## TROUBLESHOOTING

Symptom	Probable cause	Remedy
Low coolant level	Leakage of coolant Radiator Heater or radiator hose Thermostat housing gasket broken or bolts loose Water pump gasket broken or bolts loose	Repair or replace Tighten clamps or replace Replace gasket or retighten Replace gasket or retighten
	Faulty radiator cap	Replace
Clogged radiator	Foreign material in coolant	Replace coolant
Abnormally high coolant temperature	Faulty thermostat	Replace
	Faulty radiator cap	Replace
	Restriction of flow in cooling system	Clear restriction
	Loose or slipping drive belt	Adjust tension or replace
	Faulty water pump	Replace
	Faulty temperature gauge or wiring	Repair or replace
Abnormally low coolant temperature	Faulty thermostat	Replace
	Faulty temperature gauge or wiring	Repair or replace





## RADIANT LEAK CHECK

1. Loosen radiator cap.
2. Run the engine until coolant has warmed up enough so that the thermostat valve opens, and then stop the engine.
3. Confirm that the coolant level is up to the filler neck.
4. Install a radiator cap tester to the radiator filler neck and apply 160 kPa (23 psi) pressure, then check for leakage from the radiator, hoses or connections. (04E009)

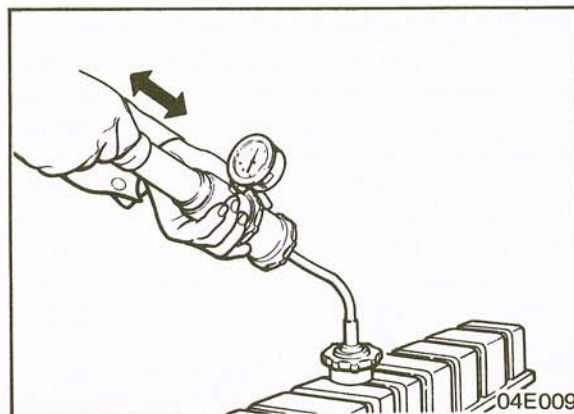
### Caution

Be sure to completely clean away any moisture from the places checked.

When the tester is removed, be careful not to spill any coolant from it.

Be careful not to deform the radiator filler neck when installing and removing the tester and when testing.

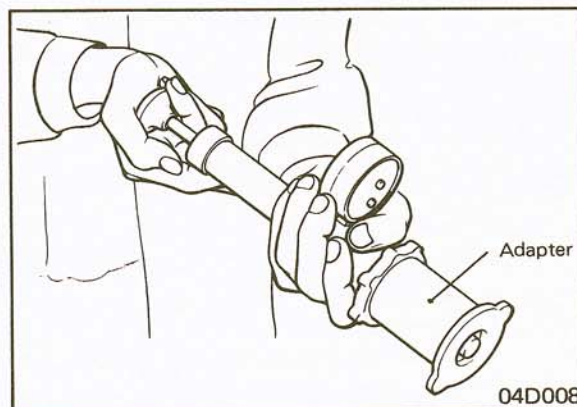
5. If there is leakage, repair or replace the appropriate part.



## RADIATOR CAP PRESSURE TEST

1. Use an adapter to attach the cap to the tester. (04D008)
2. Increase the pressure until the indicator of the gauge stops moving.
3. Check that the pressure level is maintained at or above the service limit for 5 to 6 seconds.
4. Replace the radiator cap if the reading does not remain at or above the service limit.

Opening pressure of radiator cap high pressure valve  
65 kPa (9.2 psi)

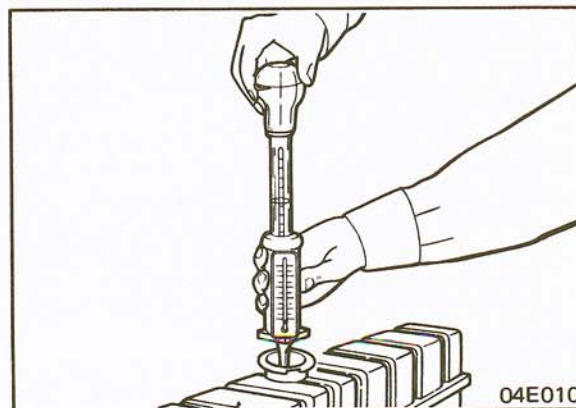


### NOTE

Be sure that the cap is clean before testing, since rust or other foreign material on the cap seal will cause an improper indication.

## SPECIFIC GRAVITY TEST

1. Measure the specific gravity of the coolant with a hydrometer. (04E010)
2. Measure the coolant temperature and calculate the concentration from the relation between the specific gravity and temperature, using the following table for reference.







## SERVICE ADJUSTMENT PROCEDURES

### Relationship Between Antifreeze Concentration and Specific Gravity

The following table is applicable only to the specified antifreeze DIA-QUEEN LONG-LIFE COOLANT.

Coolant temperature °C (°F) and specific gravity					Freezing temperature °C (°F)	Safe operating temperature °C (°F)	Coolant concentration (Specific volume)
10 (50)	20 (68)	30 (86)	40 (104)	50 (122)			
1.037	1.034	1.031	1.027	1.023	-9 (15.8)	-4 (24.8)	20 %
1.045	1.042	1.038	1.034	1.029	-12 (10.4)	-7 (19.4)	25 %
1.054	1.050	1.046	1.042	1.036	-16 (3.2)	-11 (12.2)	30 %
1.063	1.058	1.054	1.049	1.044	-20 (-4)	-15 (5)	35 %
1.071	1.067	1.062	1.057	1.052	-25 (-13)	-20 (-4)	40 %
1.079	1.074	1.069	1.064	1.058	-30 (-22)	-25 (-13)	45 %
1.087	1.082	1.076	1.070	1.064	-36 (-32.8)	-31 (-23.8)	50 %
1.095	1.090	1.084	1.077	1.070	-42 (-44)	-37 (-35)	55 %
1.103	1.098	1.092	1.084	1.076	-50 (-58)	-45 (-49)	60 %

#### Example

The safe operating temperature is -15°C (5°F) when the measured specific gravity is 1.058 at the coolant temperature of 20°C (68°F).

#### Recommended Antifreeze

Antifreeze	Concentration
DIA-QUEEN LONG-LIFE COOLANT (Part No. 0103044) or HIGH QUALITY ETHYLENE GLYCOL ANTIFREEZE COOLANT	50%

#### Caution

If the concentration of the antifreeze is below 20%, the anti-corrosion property will be adversely affected. In addition, if the concentration is above 60%, both the anti-freeze and engine cooling properties will decrease, affecting the engine adversely. For these reasons, be sure to maintain the concentration level within the specified range.





## AN BELT TENSION ADJUSTMENT

1. Loosen alternator support bolt "A" and brace bolt "B".
2. Move alternator in direction of arrow "T" to adjust belt tension to specifications.

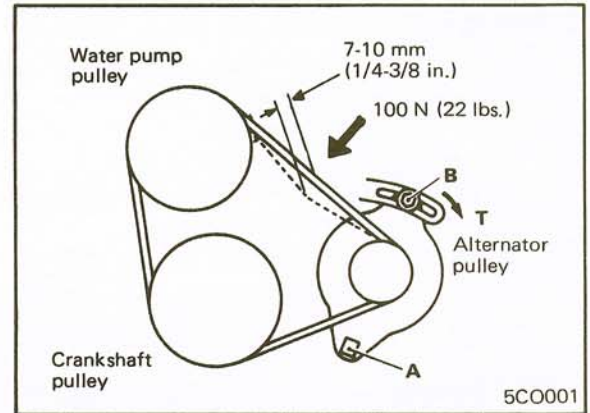
Fan belt deflection . . . . . 7-10 mm (.28-.39 in.)

3. Tighten bolt "B" and then tighten bolt "A".

### Caution

An over tensioned belt could cause not only premature wear of belt but also noise and damage to water pump bearing and alternator bearing.

A loose belt also could cause damage to the belt and failure of the alternator to generate enough power and consequently a rundown battery.



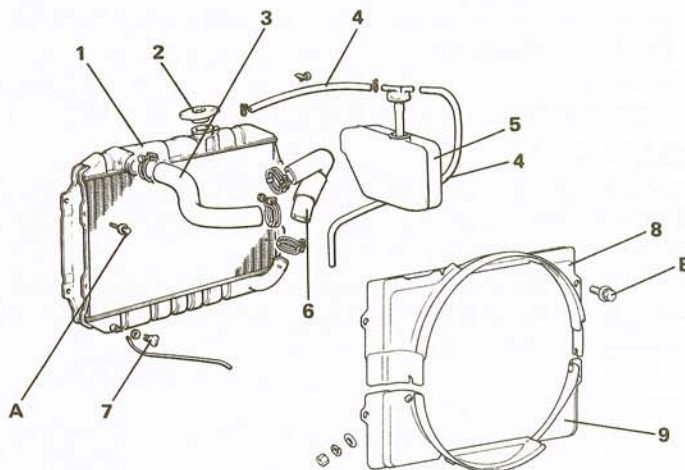




## COMPONENT SERVICE-RADIATOR

### COMPONENTS

1. Radiator
2. Radiator cap
3. Radiator hose, upper
4. Overflow tube
5. Reserve tank
6. Radiator hose, lower
7. Drain plug
8. Upper shroud
9. Lower shroud

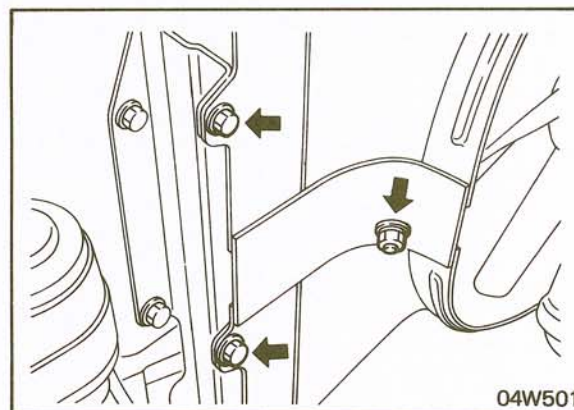


	Nm	ft.lbs.
A	8-11	6-8
B	3-7	2-5

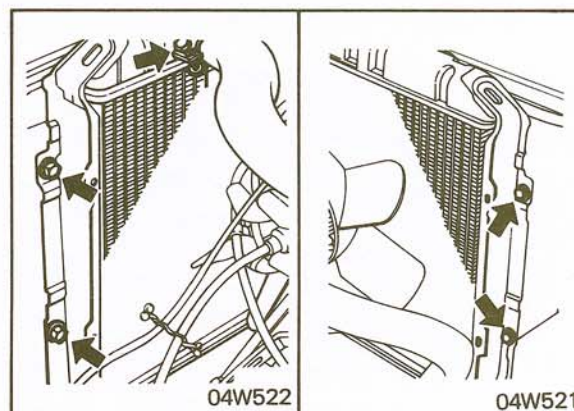
04W51

### REMOVAL

1. Set the warm water flow control lever to the hot position.
2. Loosen the radiator drain plug to drain the coolant.
3. Disconnect the upper and lower hoses.
4. Remove the upper and lower shrouds. (04W501)



5. Remove the radiator mounting bolts. (04W522, 04W521)
6. Remove the radiator.







### INSPECTION

1. Check radiator fins for bent, broken or clogged.
2. Check the radiator for corrosion, damage, rust or scale.
3. Check the radiator hoses for cracks, damage or deterioration.
4. Check the reserve tank for damage.
5. Check the radiator cap spring for damage.
6. Check the radiator cap seal for cracks or damage.

### INSTALLATION

1. Torque all parts to specifications during assembly.
2. Fill the radiator and reserve tank with clean coolant.
3. Run the engine until the coolant has warmed up enough so that the thermostat valve opens, and then stop the engine.
4. Remove the radiator cap, pour in the coolant until it is up to the filler neck of the radiator, and then fill the reserve tank to the upper level.
5. Check to be sure that there is no leakage from the radiator, hoses or connections. (Refer to p. 7-4.)

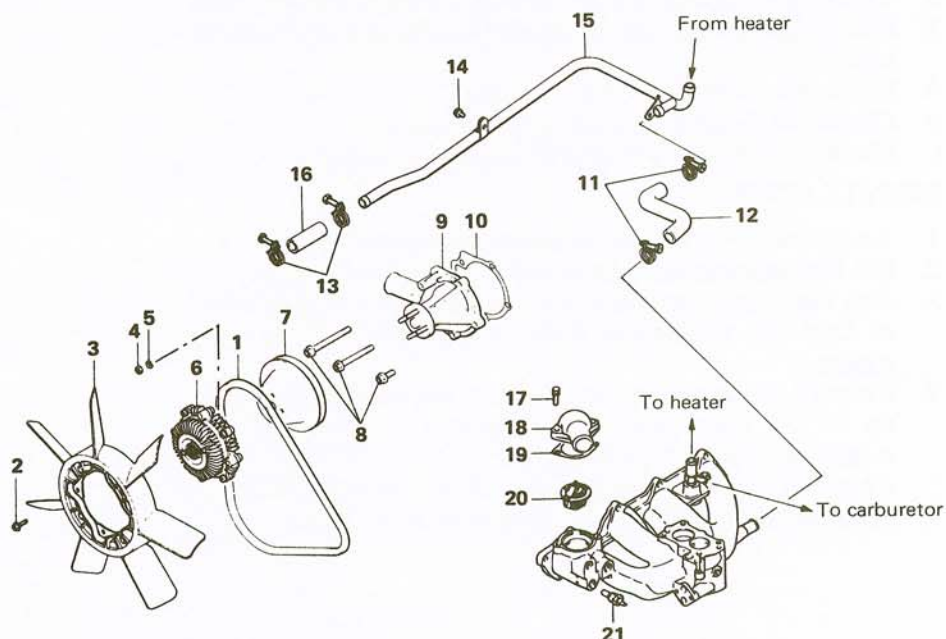




## COMPONENT SERVICE-FAN AND WATER PUMP

### COMPONENTS

1. Belt
2. Flange bolt (4)
3. Cooling fan
4. Nut (4)
5. Spring washer (4)
6. Fan clutch
7. Pulley
8. Flange bolt (5)
9. Water pump assembly
10. Water pump gasket
11. Hose clamp (2)
12. Water hose
13. Hose clamp (2)
14. Bolt
15. Water pipe
16. Water hose
17. Bolt (2)
18. Water outlet fitting
19. Gasket
20. Thermostat
21. Water temperature gauge unit



NOTE  
Numbers show order of disassembly.  
For reassembly, reverse the order of disassembly.

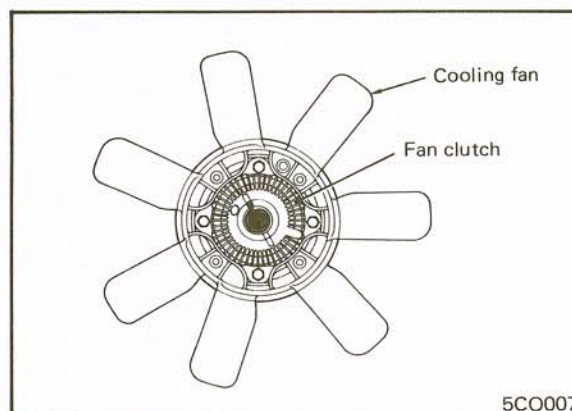
5CO001

### INSPECTION

#### Cooling Fan

Check following items and replace if defective.

1. Check blades for damage or cracks.
2. Check around bolt holes in fan hub for cracks and damage.

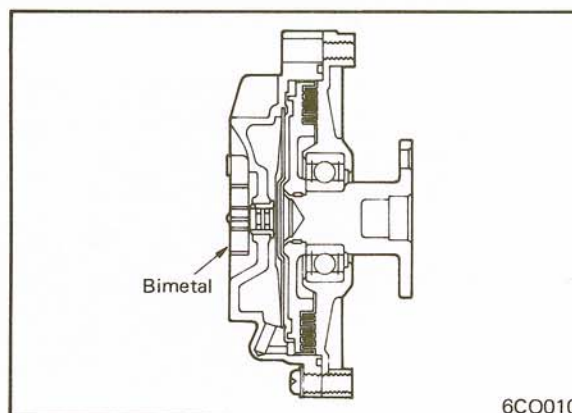


5CO007

#### Fan Clutch

Check following items and replace if defective.

1. Check to ensure that fluid in the fan clutch is not leaking at case joint and seals. If fluid quantity decreases due to leakage, fan speed will decrease and engine overheating might result.
2. When a fan is attached to an engine and turned by hand, it should give a sense of some resistance. If fan turns lightly, it is defective.
3. Check the bimetal strip for damage.



6CO010

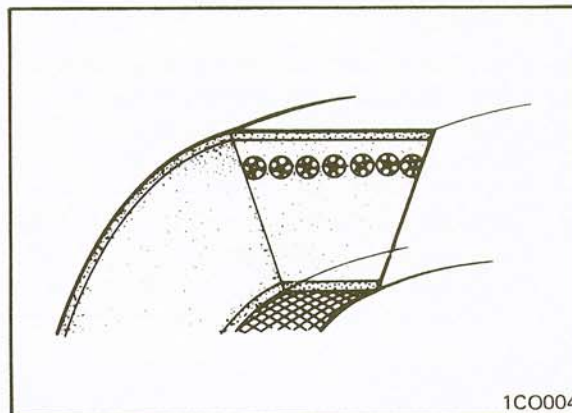




elt

Check following items and replace if defective.

1. Check surface for damage, peeling or cracks.
2. Check for oil or grease on surface.
3. Check for worn or hardened rubber.

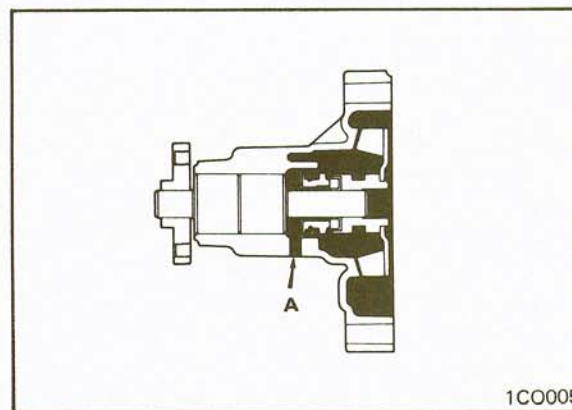


1CO004

## Water Pump

Check the following items and replace if defective.

1. Check for water leakage. If water leaks from hole "A", seal unit is defective. Replace as an assembly.
2. Check bearing for noise or roughness.



1CO005

## INSTALLATION

### Water Pump

1. Install new water pump gasket and install water pump.
2. Install fan belt and adjust belt tension. (Refer to p. 7-7.)





## COMPONENT SERVICE-THERMOSTAT

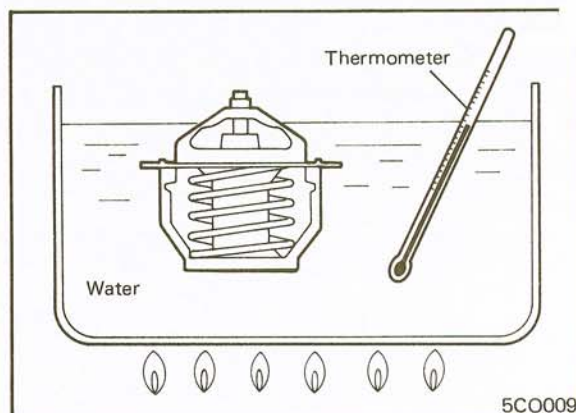
### INSPECTION

1. Heat thermostat as shown in illustration.
2. Check to see if valve operates properly.
3. Check to determine temperature at which valve begins to open.

---

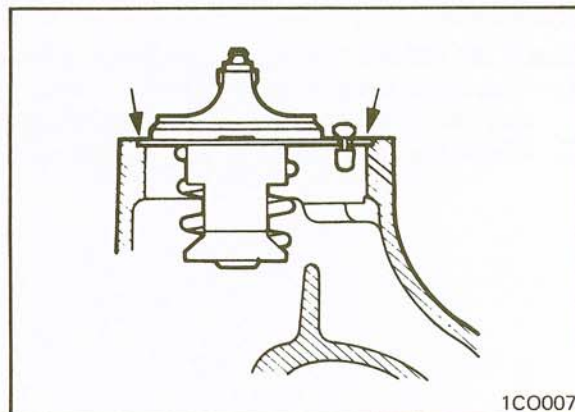
Valve opening temperature . . . . . 88°C (190°F)  
Full opening temperature . . . . . 100°C (212°F)  
Valve lift (at full open) . . . . . 8 mm (.31 in.) or more

---



### INSTALLATION

Check to ensure that flange of thermostat is correctly seated in socket of thermostat housing. If thermostat is installed in wrong direction, bottom of thermostat will touch rib inside inlet manifold, making it impossible to seat flange in position.



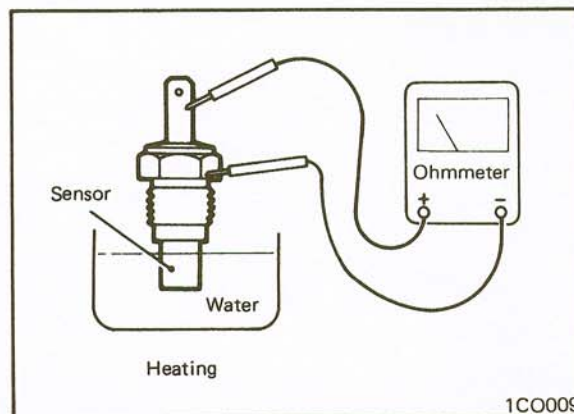




## INSPECTION

1. Submerge the sensor element in water and then heat the water.
2. Connect an ohmmeter to the sensor terminal and ground it as illustrated (1CO009).
3. Observe the decrease in resistance as the temperature increases.

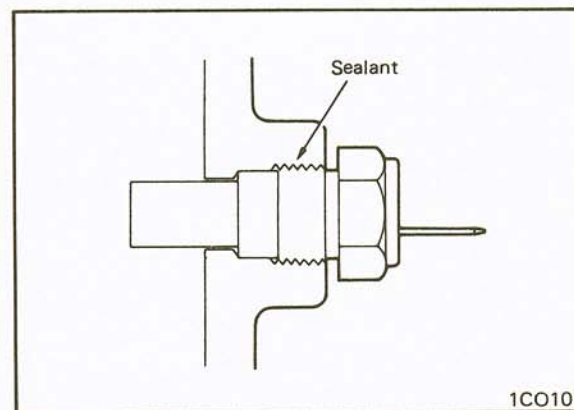
Indication point	Resistance value
70°C (158°F)	104 $\Omega$
100°C (212°F)	38 $\Omega$



## INSTALLATION

Apply sealant to the threaded portion and tighten to the specified torque.

Water temperature gauge unit tightening torque . . . . .  
30-39 Nm (22-28 ft.lbs.)

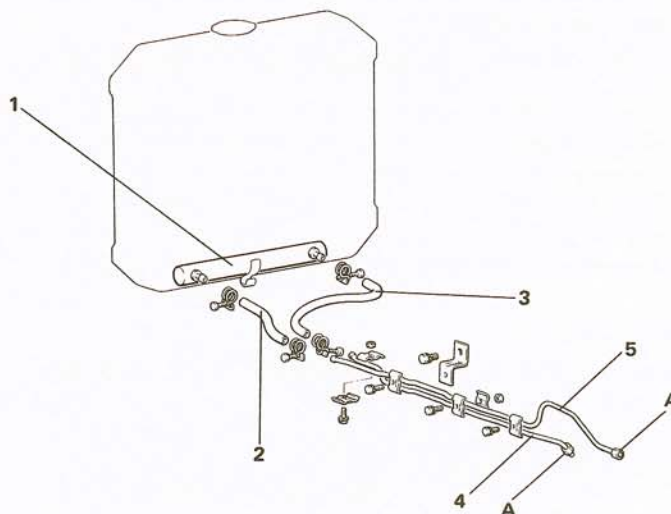






### COMPONENTS

1. Oil cooler
2. Return hose
3. Feed hose
4. Feed tube
5. Return tube



	Nm	ft.lbs.
A	20	14

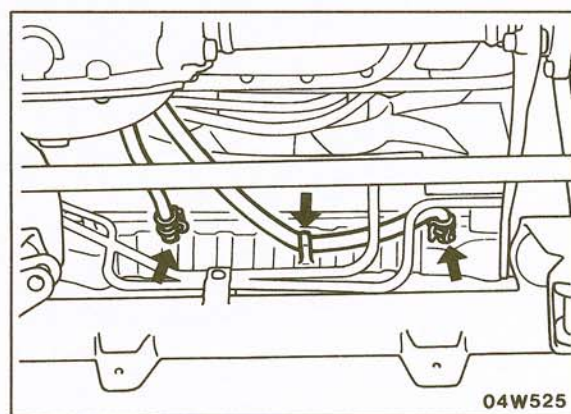
04W524

### REMOVAL

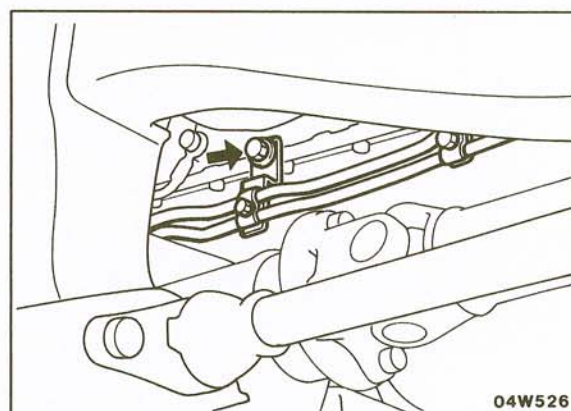
1. Disconnect the oil cooler hoses from the radiator.  
(04W525)

#### NOTE

Be careful that the automatic transmission fluid does not spill out of the hoses.



2. Detach the oil cooler tubes from where they are secured to the engine.



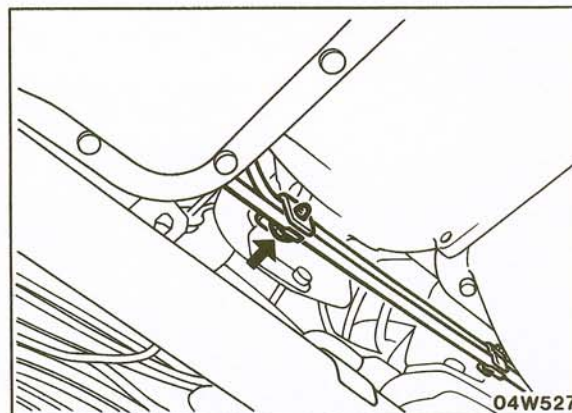




3. Detach the oil cooler tubes from where they are secured to the transmission. (04W527)
4. Disconnect the oil cooler tubes from the transmission, and remove the oil cooler hoses and tubes.

## NOTE

Plug the transmission and oil cooler tube openings to prevent fluid from spilling out.



## INSPECTION

1. Check oil cooler hoses for cracks, damage and deterioration.
2. Check oil cooler tubes for leakage and deformation.

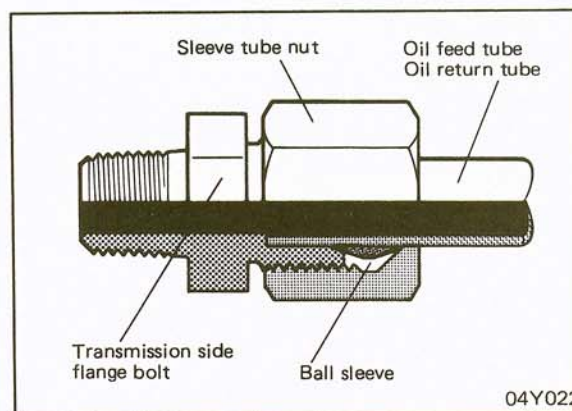
## INSTALLATION

1. Torque all parts to specifications during assembly.

## NOTE

When connecting the oil cooler tubes to the transmission, first securely connect the oil cooler tubes to the transmission side flange bolts, and then tighten by the sleeve tube nuts. (04Y022)

2. After installation, add 120 cc of transmission fluid, and then, with the engine idling, check the fluid level and inspect for leakage.









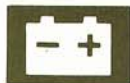


# ELECTRICAL SYSTEM

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## SPECIFICATIONS

### GENERAL SPECIFICATIONS

#### Starter Motor

	Engine with M/T	Engine with A/T
Model No.	M3T25882	M2T53083
Type	Direct drive	Reduction drive
Output (nominal) kW/V	0.9/12	1.2/12
Turning direction (as viewed from pinion side)	Clockwise	Clockwise
No. of teeth of pinion	8	9
No-load characteristics		
Terminal voltage V	11.5	11.5
Current A	60 or less	100 or less
Speed rpm	6,500 or more	3,000 or more
Under-cut depth mm (in.)	0.5-1 (.020-.039)	0.5-1 (.020-.039)
Service limit	0.2 (.008) or less	0.2 (.008) or less
Commutator diameter mm (in.)	38.7 (1.524)	32 (1.260)
Service limit	37.7 (1.484)	31 (1.220)
Pinion gap mm (in.)	0.5-2.0 (.020-.079)	0.5-2.0 (.020-.079)

#### Distributor

	Federal	California
Model No.	T3T61971 (MD073074)	T3T61972 (MD073075)
Type	Contact-pointless type	Contact-pointless type
Igniter	Built-in type	Built-in type
Turning direction	Clockwise	Clockwise
Firing order	1-3-4-2	1-3-4-2
Centrifugal advance (distributor angle at distributor rpm)		
Initial	0° at 750	0° at 750
Middle	7° at 1,900	7° at 1,900
Final	8.5° at 2,500	8.5° at 2,500
Vacuum advance (distributor angle at mm (in.) of mercury)		
Initial	0° at 130 (5.12)	0° at 130 (5.12)
Middle	6.5° at 180 (7.09)	5.3° at 180 (7.09)
Final	15° at 300 (11.81)	11.5° at 280 (11.02)



## SPECIFICATIONS



### Ignition Coil

Identification model No.	E-089
Primary resistance $\Omega$	1.2
Secondary resistance $k\Omega$	13.7
External resistor resistance $\Omega$	1.35

### Spark Plugs

Model No.	NGK	BP5ES-11
	NIPPONDENSO	W16EPR-U10
Plug gap	mm (in.)	1.0-1.1 (.039-.043)

### Alternator

Model No.	A5T21077 (MD064068)	A2T41377 (MD074645)
Output (nominal) V/A	12/50	12/55
Regulated voltage V	$14.4 \pm 0.5$ at $20^{\circ}\text{C}$ ( $68^{\circ}\text{F}$ )	$14.4 \pm 0.5$ at $20^{\circ}\text{C}$ ( $68^{\circ}\text{F}$ )
Polarity	Minus (–) ground	Minus (–) ground
Turning direction (as viewed from pulley)	Clockwise	Clockwise
Voltage regulator	Electronic, built-in type	Electronic, built-in type

### Battery

Type	NX100-S6 (S)-MF (Maintenance free battery)	NX120-7-MF (Maintenance free battery)
Capacity (20HR) Ah	45	80
Voltage V	12	12
Electrolyte specific gravity [ $20^{\circ}\text{C}$ ( $60^{\circ}\text{F}$ )]	1.280	1.280

#### NOTE

If the specific gravity of the battery electrolyte falls 0.06 or more, recharge the battery.





## SPECIFICATIONS

### Fuses

Fusible links		For Federal (not available in California)	For California (can also be sold in Federal states)	
Main				
Cable color		Red	Red	Green
Fusible link size	mm <sup>2</sup> (in. <sup>2</sup> )	0.85 (.0013)	0.85 (.0013)	0.5 (.0008)
Permissible continuous current	A	34	34	27
Fusing current	A	150	150	100
Sub		Ignition circuit	Power window circuit	Headlight, headlight washer circuit
Cable color		Green	Green	Brown
Fusible link size	mm <sup>2</sup> (in. <sup>2</sup> )	0.5 (.0008)	0.5 (.0008)	0.3 (.0005)
Permissible continuous current	A	27	27	19
Fusing current	A	100	100	65
Fuse capacity	A	10	15	20
Color		Red	Light blue	Yellow

### Ignition Switch

Ignition switch		
Type		Rotary switch with steering wheel lock and key-reminder switch
Load capacity	A	
AM-ACC		15
AM-IG		30
AM-ST		15
AM-R		15
Key-reminder switch		
Load capacity	W	1



# SPECIFICATIONS



## Meters and Gauges

### Speedometer

Speed indication range	mph (km/h)	0-85 (0-137)
Indication ratings (range of allowable error)		
Meter with "mph" indication	mph	
25 mph		+2.5 0
50 mph		+3.5 +0.3
75 mph		+5 +1

### Tachometer

Type	Pulse type
Detection source	Ignition coil
Red zone rpm	6,000-8,000
Indication ratings (range of allowable error) rpm	
1,000 rpm	± 100
2,000 rpm	± 100
3,000 rpm	± 150
4,000 rpm	± 200
5,000 rpm	± 250

### Fuel gauge

Type	Bi-metal type (built-in constant voltage relay)
Constant voltage relay resistance value	Ω 68-72

### Fuel gauge unit

Type	7-V resistance type
Standard resistance value	Ω
Float position “F” point	14.9-19.1
Float position “E” point	113.5-126.5
Float vertical movement range	mm (in.) 222-220 (8.81-8.97)

### Water temperature gauge

Type	Bi-metal type
------	---------------

### Water temperature gauge unit

Type	Thermistor type
Standard resistance value    Ω	
70°C (158°F)	90.5-117.5
115°C (239°F)	21.3-26.3





## SPECIFICATIONS

---

Oil pressure gauge	
Type	Bi-metal type
Oil pressure gauge unit	
Type	Bi-metal type
Standard resistance value $\Omega$	
0 kPa (0 psi)	0
588 kPa (85 psi)	136
Inclinometer	
Type	Gravity type
Damping system	Oil-filled system
Indication angle	
Forward, backward	45° max.
Right, left	45° max.
Voltage meter	
Type	Bimetal type
Indication ratings (range of allowable error)   V	
10 V	$\pm 0.5$
14 V	$\pm 0.5$

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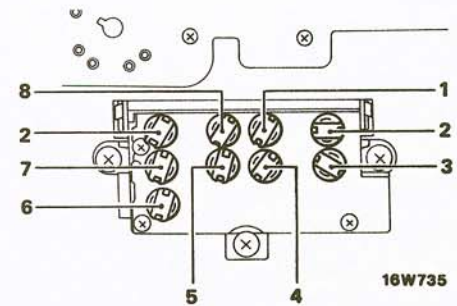
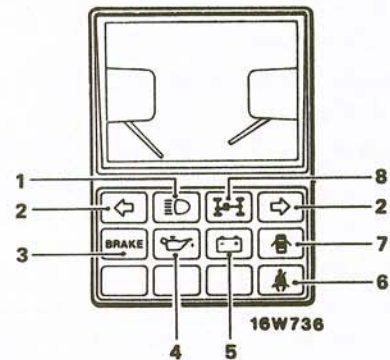




## Indicator and Warning Lights

W (SAE trade numbers)

1. Upper-beam and passing indicator light	1.4 (74)
2. Turn-signal indicator lights	1.4 (74)
3. Brake warning light	1.4 (74)
4. Oil pressure warning light	1.4 (74)
5. Charging warning light	1.4 (74)
6. Fasten-seat-belt warning light	1.4 (74)
7. Door-ajar warning light	1.4 (74)
8. 4WD indicator light	1.4 (74)



## Sensor and Switches

### Parking brake switch

Rated load	W	5
Voltage drop (at 12 V, rated load)	V	0.1 or less

### Brake fluid lever sensor

Rated load	W	3.6
Voltage drop (at 12 V, rated load)	V	0.1 or less

### Door switch

Rated load	W	15
Voltage drop (at 12 V, rated load)	V	0.2 or less

### Belt switch

Type		Normally closed type
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## Seat Belt Warning Timer

Rated load		3.4 W (light) and $24 \begin{smallmatrix} +10 \\ -0 \end{smallmatrix} \Omega$ (buzzer)
Operating voltage	V	8.0-16.0





## SPECIFICATIONS

### Buzzer

Rated voltage	V	13.5
Operating voltage range	V	11-15
While buzzing (Terminal voltage at 13 V)		
Sound pressure	dB	70 ± 5
Fundamental frequency	Hz	700

### Lighting System

Main lights	W (SAE trade numbers)	
Headlights		60/50
Front combination lights		
Turn-signal lights		27 (1156)
Front side marker and position lights		3.8 (194)
Rear combination lights		
Turn-signal, stop and tail lights		27/8 (1157)
Rear side marker lights		3.8 (194)
Back-up lights		27 (1156)
License plate lights		6

Sub lights	W (SAE trade number)	
Dome light		10
Combination meter illumination light		3.4 (158)
Cigarette lighter illumination light		1.4 (74)
Heater panel illumination light		1.4 (74)
Rear window defogger switch illumination light		0.9
Ashtray illumination light		1.4 (74)

Turn-signal flasher unit		
Type		Condenser type
Rated load	W	82.9-84.2
Blinking frequency	cycle/min [12.8 V, 20°C (68°F)]	85 ± 10

Hazard warning flasher unit		
Type		Heat-band type
Rated load	W	49.4-168.8
Blinking frequency	cycle/min [12.8 V, 20°C (68°F)]	90 ± 10



## SPECIFICATIONS



### Column switch

#### Turn-signal switch

Rated load	A	6.1-7.1
Voltage drop (at 12 V and the rated load)	V	0.2 or less

#### Dimmer switch

Rated load	A	
High beam		16.1-18.7
Low beam		9.4-10.8
Voltage drop (at 12 V and the rated load)	V	0.2 or less

#### Passing switch

Rated load	A	
High beam		16.1-18.7
Low beam		9.4-10.8
Voltage drop (at 12 V and the rated load)	V	0.2 or less

#### Lighting switch

Rated load	A	0.17-0.27
Voltage drop (at 12 V and the rated load)	V	0.2 or less

#### Headlight washer switch

Rated load	A	0.5
Voltage drop (at 12 V and the rated load)	V	0.2 or less

### Hazard warning switch

Voltage drop (at 12 V and the rated load)	V	0.2 or less
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### Light control relay

Rated load	W	200
Range of voltage used	V	10-16
Voltage drop between terminals	V	0.2 or less

### Dimmer control switch

Type		Variable-resistance type
Rated load	W	15 (Min.)-26.6 (Max.)

### Stop light switch

Rated load	W	150
Voltage drop (at 12 V and the rated load)	V	0.15 or less





## SPECIFICATIONS

### Windshield Wipers and Washer

Wiper motor	
Type	Permanent-magnet type
Speed control system	3-brush system
Braking system	Dynamic brake system
Revolution under load rpm	
Low speed [1.9 Nm (1.4 ft.lbs.)]	35 ± 4
High speed [1.3 Nm (0.9 ft.lbs.)]	45 ± 8
Nominal torque Nm (ft.lbs.)	13 (9)
Wiper blades	
Wiping angle	
Driver's side	85.5°
Passenger's side	114°
Blade length mm (in.)	401 (16)
Washer motor and pump	
Motor type	Direct current ferrite magnet type
Pump type	Centrifugal type
Power consumption A	3.5 or less
Time of continuous use sec.	
With washer fluid	Max. 60
Empty operation	Max. 20
Nozzle jet pressure kPa (psi)	69 (10.0) or more
Tank capacity lit. (U.S.qts., Imp.qts.)	1.5 (1.6, 1.3)
Intermittent wiper relay	
Intermittent cycle sec.	1.5 ± 0.7-10.5 ± 3
Delay time in combined intermittent wiper and washer operation sec.	0.4-1.2
Load current A	5 (motor load)
Wiper switch	
Rated load A	0.5
Intermittent	0.22 ± 0.05
Low speed	3.5
High speed	4.5
Lock	18
Voltage drop (at 12 V and the rated load) V	0.2 or less
Washer switch	
Rated load A	3
Voltage drop (at 12 V and the rated load) V	0.5 or less



## SPECIFICATIONS



### Car Window Wiper and Washer

Wiper motor	
Motor type	Ferrite magnet type
Braking system	Dynamic braking system
Revolution under no-load rpm	$50 \pm 5$
Nominal torque Nm (ft.lbs.)	6 (4) or more
No-load current A	2 or less
Wiper blade	
Wiping angle	$108^\circ$
Blade length mm (in.)	334 (13)
Window washer motor and pump	
Motor type	Direct current ferrite magnet type
Pump type	Centrifugal type
Power consumption A	3.5 or less
Allowable period of continuous use sec.	
With washer fluid	Max. 60
Empty operation	Max. 20
Nozzle jet-spray pressure kPa (psi)	78 (11.4) or more
Tank capacity lit. (U.S.qts., Imp.qt.)	1.1 (1.2, 1.0) or more
Wiper and washer switch	
Rated load A	
Wiper switch	3
Washer switch	5
Voltage drop (at 12 V and the rated load) V	0.2 or less

### Headlight washer

Headlight washer motor	
Motor type	Ferrite magnet type
Pump type	Centrifugal type
Power consumption A	21 or less
Nozzle injection pressure kPa (psi)	177 (25.6) or more
Tank capacity lit. (U.S.qts., Imp.qts.)	3.0 (3.2, 26)
Headlight washer control relay	
Timer setting sec.	$0.52 \pm 0.1$
Check valve	
Valve opening and closing pressure kPa (psi)	49-108 (7.1-15.6)





## SPECIFICATIONS

### Horn

Type	Flat type
Effective sounding voltage V	11-14.5
Power consumption A	3.5 or less
Sound level dB	100-110
Fundamental frequency Hz	
"low" sound	340-380
"high" sound	400-440

### Clock

Type	Crystal oscillating type
Display type	Fluorescent digital display (12 hour display)
Daily variation seconds/day [at a power supply of 9 to 16V, 20°C(68°F) ambient temperature]	± 2

### Cigarette Lighter

Rated input W	120
Timing of plug pop-up	Within 18 seconds
Cigarette lighter light bulb capacity W	1.4 x 1
Ashtray light bulb capacity W	1.4 x 1

### Rear Window Defogger

Rear window defogger switch	
Type	Seesaw type
Rated current A	12
Indicator light W	0.9
Rear window glass with defogger	
No. of printed heater lines	11
Power consumption [20°C (68°F)] W	102-138



## SPECIFICATIONS



### Radio and Stereo

#### Radio

Model	AR-8729 SEKR-Y		
Receiving bands	AM/FM-MPX		
Circuitry	AM	High frequency: 1 step; mid frequency: 1 step, superheterodyne amplification	
	FM	High frequency: 1 step; mid frequency: 1 step, superheterodyne amplification	
		Ratio detection, PLL, FM stereo demodulation, and noise killer circuits	
Reception frequencies	AM	kHz	525-1,615
	FM	MHz	88-108

#### Tape player

Model	RX-750 SY-RY		
Playback system	4-track auto-reverse stereo playback		
Adaptable tape	Normal, C-90 or shorter tape		
Output	W	4	
Tape speed	cm/sec.	4.76	
Tuning system	Manual search tuning, Mechanical memory tuning		
Frequency coverage	AM	kHz	525-1,615
	FM	MHz	88-108

#### Speakers

Model	SG-28A8		SG-3K44-G, SG-3K44-R
Rated input power	W	5 (Max. 7)	5 (Max. 7)
Output sound pressure level	dB	88-92	88-92
Mounting position	Instrument panel, driver's side		Left and right center pillars

#### Antenna

Type	Whip antenna (Fender-mounted)
------	-------------------------------





## SPECIFICATIONS

### Power Windows

#### Power window motor

Type	Permanent magnet type (built-in circuit breaker)
Revolutions under load rpm	
At 1 Nm (.72 ft. lbs.)	60-90
At 2 Nm (1.45 ft. lbs.)	50-80
Bound current A	34 or less
Direction of rotation	Clockwise and counterclockwise

#### Power window main switch

Type	Automatic reset type
Rated load current A	
Lock switch	30
L.H. switch	11
R.H. switch	11

#### Power window sub switch

Type	Automatic reset type
Rated load current A	11

#### Power window relay

Maximum contact current A	20
Rated coil current A	0.13-0.19
Voltage drop between terminals V (at 12 V and the rated load current)	0.2 or less

### 3-Point ELR seat belts with tension relievers

Belt switches	Normally open type
Seat belt solenoids	
Operating voltage V	8-16
Continuous rating (50 $\Omega$ , 240 mA)	2.88 W
Insulation resistance (measured with 500-VDC megger)	100 M $\Omega$



# SPECIFICATIONS



## RVIC SPECIFICATIONS

### Engine

#### General

Basic ignition timing  $7 \pm 2^\circ \text{BTDC}$

### Meters and Gauges

#### Fuel gauge indication test

When resistance is  $17 \Omega$

Scale indication A

When resistance is  $120 \Omega$

Scale indication B

#### Fuel gauge continuity test

Resistance value  $\Omega$

Approx. 25

#### Water temperature gauge indication test

When resistance is  $23.8 \Omega$

Scale indication C

When resistance is  $104 \Omega$

Scale indication D

#### Water temperature gauge continuity test

Resistance value  $\Omega$

Approx. 55

#### Water temperature gauge unit operation check

When water temperature is  $70^\circ \text{C}$  ( $158^\circ \text{F}$ )  $\Omega$

104

#### Oil pressure gauge indication test

When resistance is  $120 \Omega$

Scale indication E

#### Oil pressure gauge continuity test

Resistance value  $\Omega$

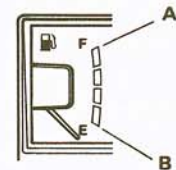
Approx. 42

#### Voltage meter continuity test

Resistance value  $\Omega$

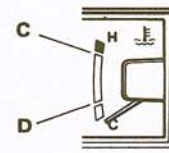
420

#### Fuel gauge



68W003

#### Water temperature gauge



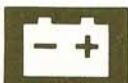
W68003

#### Oil pressure gauge



16W784





## SPECIFICATIONS

### Lighting System

#### Standard value

Headlight intensity	20,000 cd or more
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### Windshield Wipers and Washer

#### Standard value

Wiper blade stopping position    mm (in.) (distance between blade tip and front deck garnish)	37-47 (1.5-1.9)
--	-----------------

### Rear Window Wiper and Washer

#### Standard value

Wiper blade stopping position    mm (in.) (distance between blade tip and back door window weatherstrip)	20 (.8)
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## TORQUE SPECIFICATIONS

### Fuel Gauge Unit

Nm (ft.lbs.)

Fuel gauge unit	1 (0.7)
-----------------	---------

### Windshield Wipers and Washer

Nm (ft.lbs.)

Wiper pivot shaft mounting nut	7 (5)
Wiper arm locking nut	10-16 (7-12)
Wiper motor	3 (2)

### Rear Window Wiper and Washer

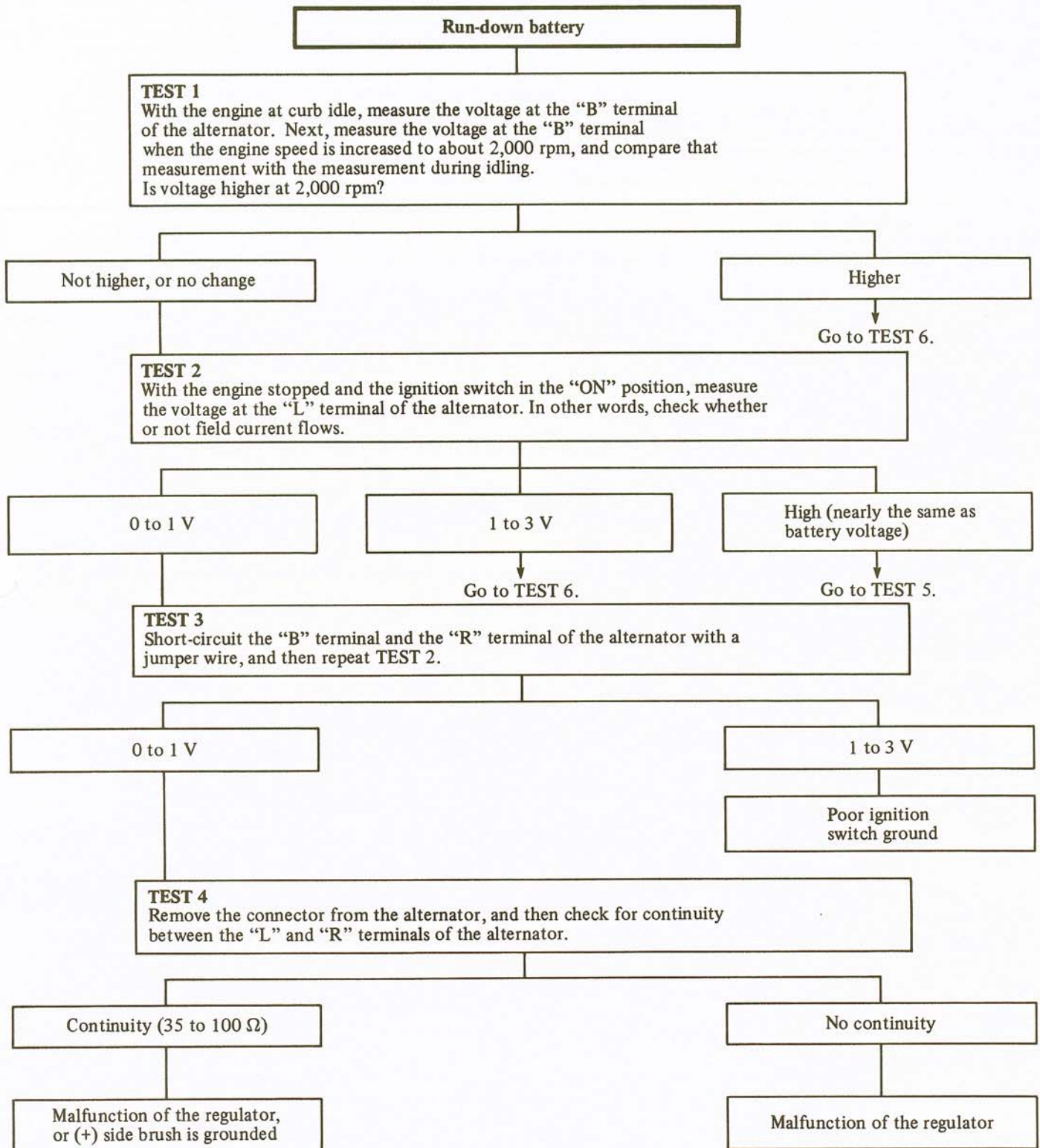
Nm (ft.lbs.)

Rear wiper pivot shaft mounting nut	8-12 (6-9)
Rear wiper arm locking nut	7-10 (5-7)
Rear wiper motor	7-10 (5-7)





## ATTERY

**CAUTION**

While engine is running (alternator generating power), make sure that L-terminal is not grounded. If L-terminal is grounded, auxiliary diode will be short-circuited and no voltage will be available at L-terminal, so no power will be generated. Therefore, CHARGE lamp will remain lit.





## TROUBLESHOOTING

### TEST 5

With the engine stopped and the ignition switch in the "ON" position, measure the voltage at the "F" terminal (for testing the alternator).

High (nearly the same as battery voltage)

Malfunction of the regulator (power transistor open)

0 to 0.5 V

Field coil wiring damaged, or poor brush contact

0.5 to 2 V

⊕ diode short

With the ignition switch in the "OFF" position, pull the connector from the alternator. Then, measure the voltage at the "L" terminal. If the voltage is close to battery voltage, the (+) diode is short-circuited.

### CAUTION

When measuring the voltage of the "F" terminal (for testing), be careful not to let the voltmeter probe contact the rear bracket. If by chance it does contact it, there's no problem if it's immediately pulled away.



**TEST 6**

## Output current test

Disconnect the wiring from the "B" terminal of the alternator, and connect an ammeter (60 A or higher) between the wires and the terminal. Start the engine. Then immediately increase the engine speed to 2,500 to 3,000 rpm and quickly read the maximum value shown by the ammeter. Note that all loads on the electrical system should be "ON" when this test is made.

70% or less of nominal output

Normal function of alternator

70% to 90% of nominal output

90% or more of nominal output

Alternator is normal

**TEST 7**

## Output current test (re-check)

Check for poor contact of the wiring between the "B" terminal of the alternator and the positive (+) terminal of the battery. After slightly discharging the battery make TEST 6 once again.

Less than 90% of nominal output

Remove the alternator from the engine and check it.

More than 90% of nominal output

Alternator is normal

**NOTE**

Make TEST 8 if it is necessary after finishing TESTS 6 and 7.

**TEST 8**Regulated voltage test  
(See p.8-76.)

$14.4 \pm 0.5$  V at 20°C

Electronic voltage regulator is normal

There is an abnormal condition

Malfunction of alternator





## TROUBLESHOOTING

### Overcharge

#### TEST 1

While measuring the voltage at the "B" terminal of the alternator, slowly increase the engine rpm from idle speed.

Is the "B" terminal voltage 15.5 V or more?

Not 15.5 V or more

15.5 V or less

Malfunction of alternator  
(malfunction of electronic  
voltage regulator, or negative  
(-) brush is grounded)

#### TEST 2

Measure and compare the voltage of the "F" terminal (for checking the alternator) at idle speed and at approx. 3,000 rpm.

Is the voltage higher at 3,000 rpm?

Higher

Not higher, or no change

Malfunction of alternator  
(malfunction of electronic  
voltage regulator, or negative  
(-) brush is grounded)

#### NOTE

The voltage of the "F" terminal may not increase if the battery is discharged.

#### TEST 3

Regulated voltage test.  
(See p.8-76.)

$14.4 \pm 0.5$  V at 20°C

Alternator normal

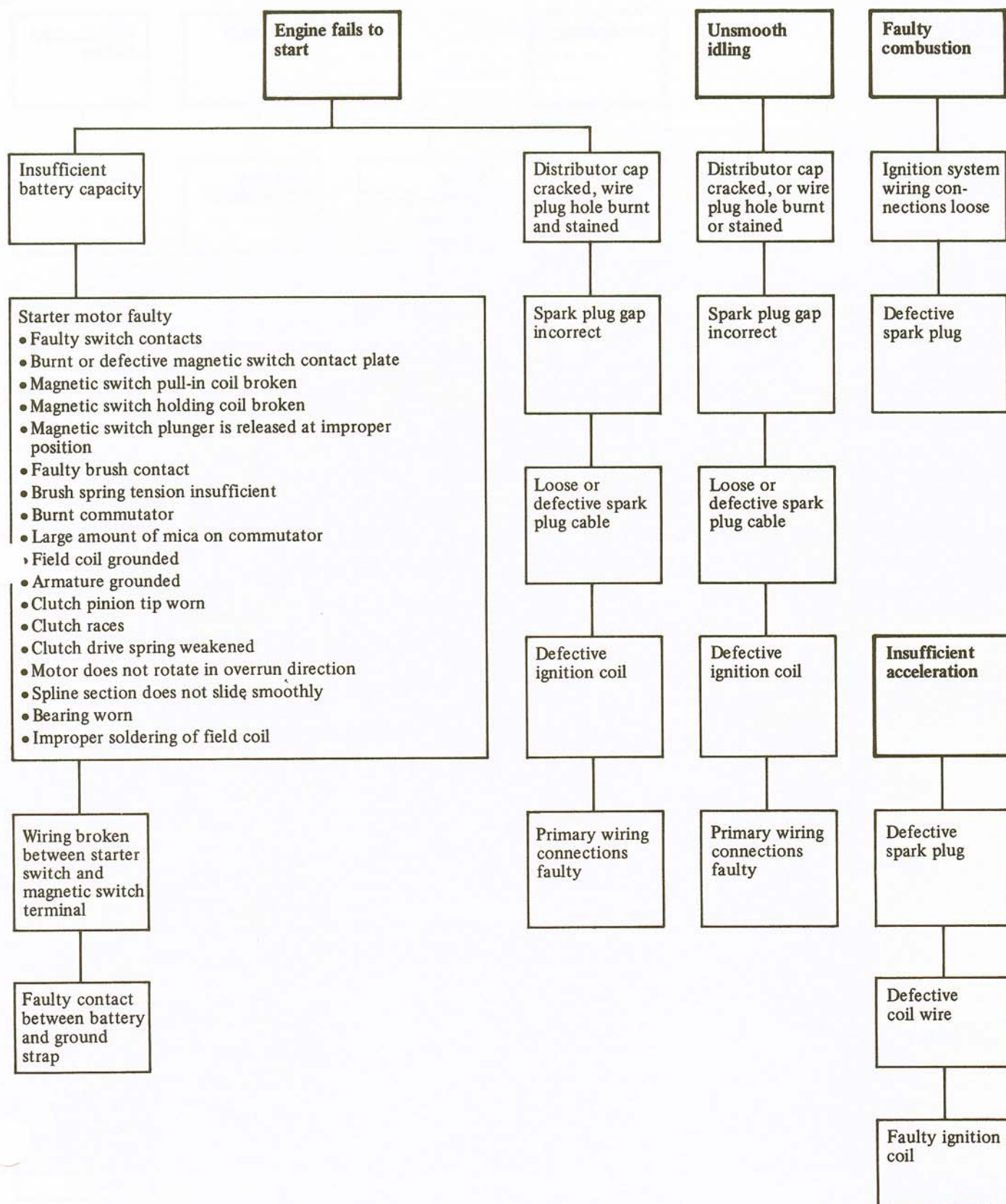
There is an abnormal condition

Malfunction of alternator





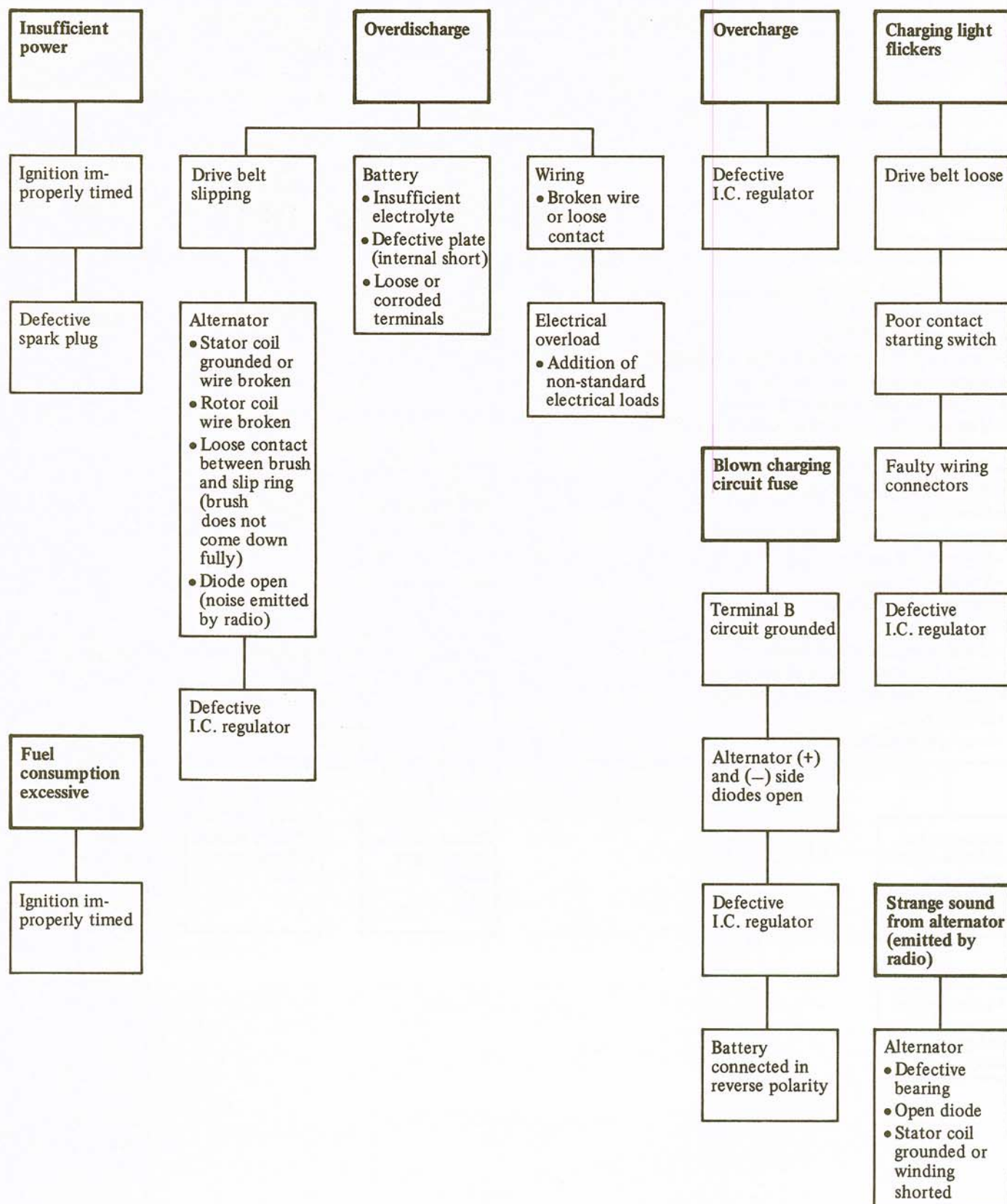
## ENGINE







## TROUBLESHOOTING



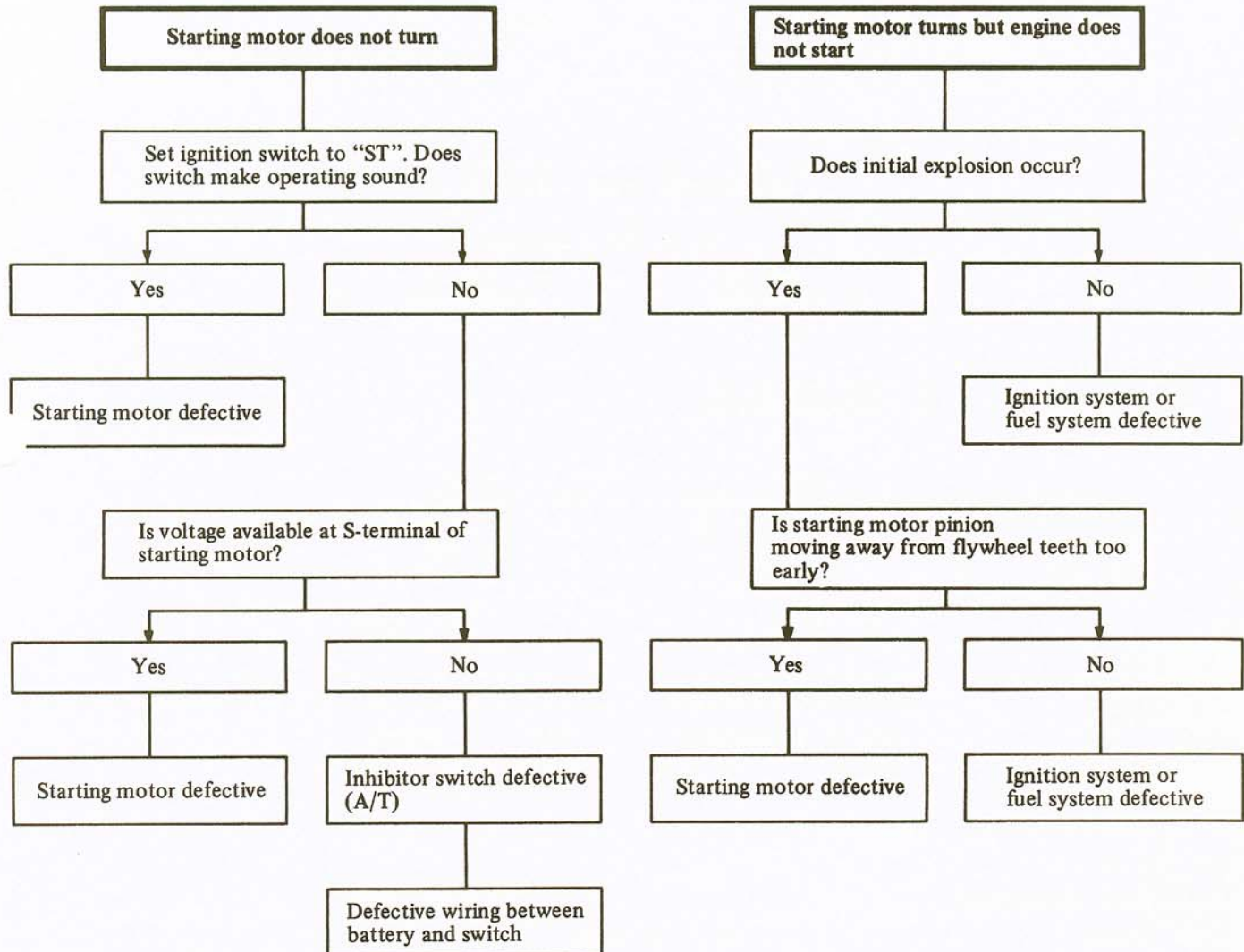




## STARTING SYSTEM

The troubles of starting system may be divided into "Starting motor does not turn", "Starting motor turns but engine does not start" and "It takes some time before engine starts". When there is something wrong with starting system, therefore, it is important to determine which part of starting system is defective with starting motor attached to engine.

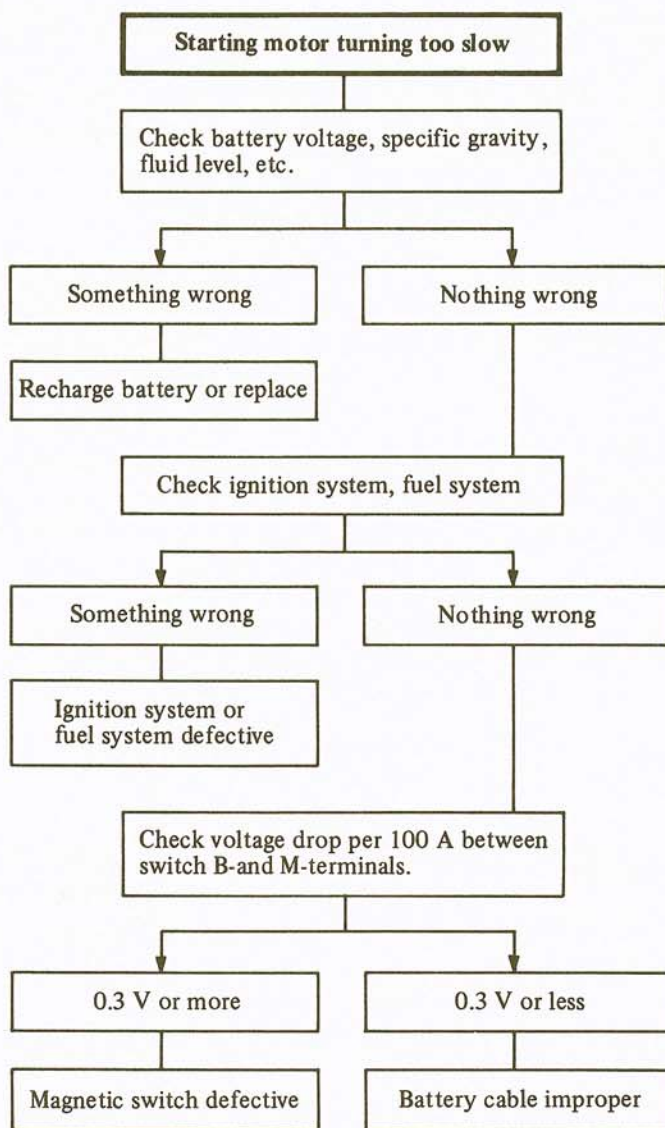
Generally, starting difficulty, aside from inoperative starting motor, is often attributable to defective ignition system, fuel system, battery, electrical wiring, etc. If makeshift corrective steps are taken without locating the cause, same trouble will develop again.





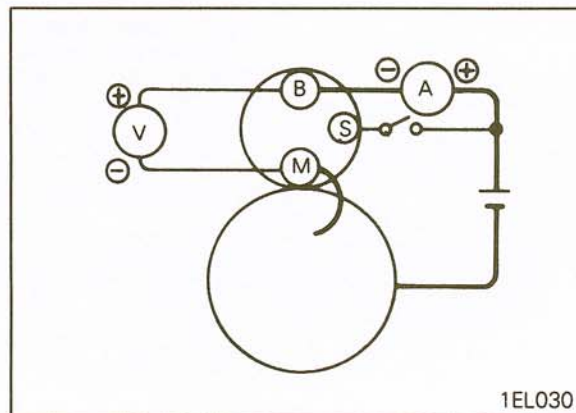


## TROUBLESHOOTING



### Point to Note when Checking

1. To measure a voltage drop across contacts B and M, make connections as shown. (1EL030)  
If there is a voltage drop of more than 0.3 V per 100 A, hard starting could result, when engine resistance increases as in very cold weather. In such a case, replace switch assembly.





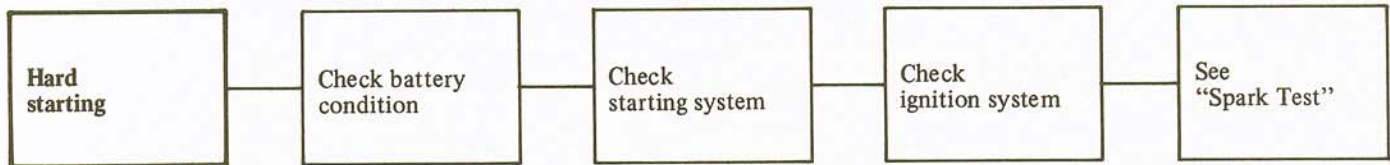


## IGNITION SYSTEM

The cause of hard engine starting is not always in the ignition system. Defective parts may exist in the fuel system, exhaust emission control system, starting system or the engine itself.

The role of the ignition system is to generate sufficient electric sparks at the proper time. To check the ignition system, therefore, it is necessary that the spark check and timing measurement are carefully performed.

For on-vehicle troubleshooting of the ignition system, the short cut is to determine on the basis of symptoms which is defective: the power supply, primary low-tension circuit or high-tension circuit. For example, when all spark plugs fail to produce sparks, the probable cause is in power supply or primary circuit. If misfiring occurs only at a specific spark plug, the high tension circuit is likely to be defective. If misfiring occurs occasionally, loose leads or spark plugs may be suspected.







## TROUBLESHOOTING

Spark test  
(when engine  
can be cranked)

TEST 1. Disconnect high tension cable from center tower of distributor cap, hold end of cable about 5 to 10 mm (.2 to .4 in.) away from cylinder block of engine, crank engine with starter to check spark condition. (1EL038)

NOTE

If engine cannot be cranked, comply with method on next page.

No spark produced

Spark produced

TEST 2. With ignition key at ON position, measure voltage of (+) terminal of ignition coil.

Check cap, rotor,  
spark plugs, cables  
and ignition timing

Voltage equal  
to battery voltage

0 V

Defective wiring  
between battery  
and ignition coil

TEST 3. With ignition key at ON position, measure voltage of (-) terminal of ignition coil.

Voltage equal  
to battery voltage

About 1 V

0 V

Faulty igniter or  
opened ignition  
coil

TEST 4. Remove ignition coil, and install normal ignition coil. Make a spark test as in the same manner shown in TEST 1.

No spark  
produced

Spark produced

Faulty distributor  
pickup coil

Defective  
ignition coil





**Poor low speed performance  
(Backfiring or hard starting)**

Distributor improperly installed

Improper ignition timing

Faulty distributor or igniter

**Engine stalls or misfires  
occasionally**

Faulty insulation of high-  
tension cables, cap, rotor and/or  
spark plugs

Faulty primary circuit  
(Damaged primary wire  
or ignition coil, or  
overheated ignition coil)

**Poor acceleration  
(Poor high speed performance,  
insufficient output, Engine  
stalls during acceleration)**

Incorrect spark plug  
heat value

Incorrect spark plug gap

Defective governor  
advance mechanism

Defective vacuum  
advance mechanism

Faulty ignition coil

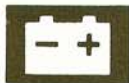
**Knocking**

Incorrect fuel  
octane value

Incorrect spark plug  
heat value

Faulty advance  
mechanism





## TROUBLESHOOTING

### SPEEDOMETER

Symptom	Probable cause	Remedy
The speedometer pointer and/or the odometer do not function	Flexible shaft improperly connected Damaged flexible shaft	Repair the routing of the speedometer cable or replace the cable
	Drive gear is broken	Replace the speedometer
The speedometer pointer moves off the scale	Oil inside meter Damaged hair spring	Replace the speedometer
The speedometer pointer will not return to "0" or will not move above a certain speed	Oil inside meter Deformed hair spring Foreign matter caught on the magnet	
The speedometer pointer moves erratically	Flexible shaft improperly routed	Repair the routing of the speedometer cable or replace the cable
	Worn induction panel end or bearing	Replace the speedometer
The speedometer functions but the odometer does not	Gear malfunction inside the speedometer	

#### NOTE

If oil is inside the meter, replace the speedometer cable as well. Check the transmission fluid quantity and check for clogged breather plug, too.





## AUGES

## Fuel Gauge and Unit

No indicator movement  
Incorrect indication

Is the fuel gauge indicator below the lowest marking on the scale while the ignition key is in the "LOCK" or "ACC" position?

No

Fuel gauge malfunction

Check or replace the fuel gauge

Yes

Set the ignition key to the "ON" position

Is the No. 4 fuse OK?

No

Short-circuited wiring harness  
(damaged wiring harness, burnt cover, etc.)

Repair the harness and replace the fuse

Yes

Disconnect the wiring connector from the fuel gauge unit beneath the floor of the luggage compartment

Does the tester needle remain within the area between 2 V and 7 V when the voltage between the Y wire on the fuel gauge side and ground is measured?

No

Constant voltage relay malfunction

Replace the fuel gauge  
(Constant voltage relay is built into the fuel gauge)

Yes

Does the fuel gauge needle go above the scale's highest marking when a 17-Ω resistance is connected between the Y wire on the fuel gauge side and ground?

No

Fuel gauge malfunction

Replace the fuel gauge

Yes

Fuel gauge unit malfunction

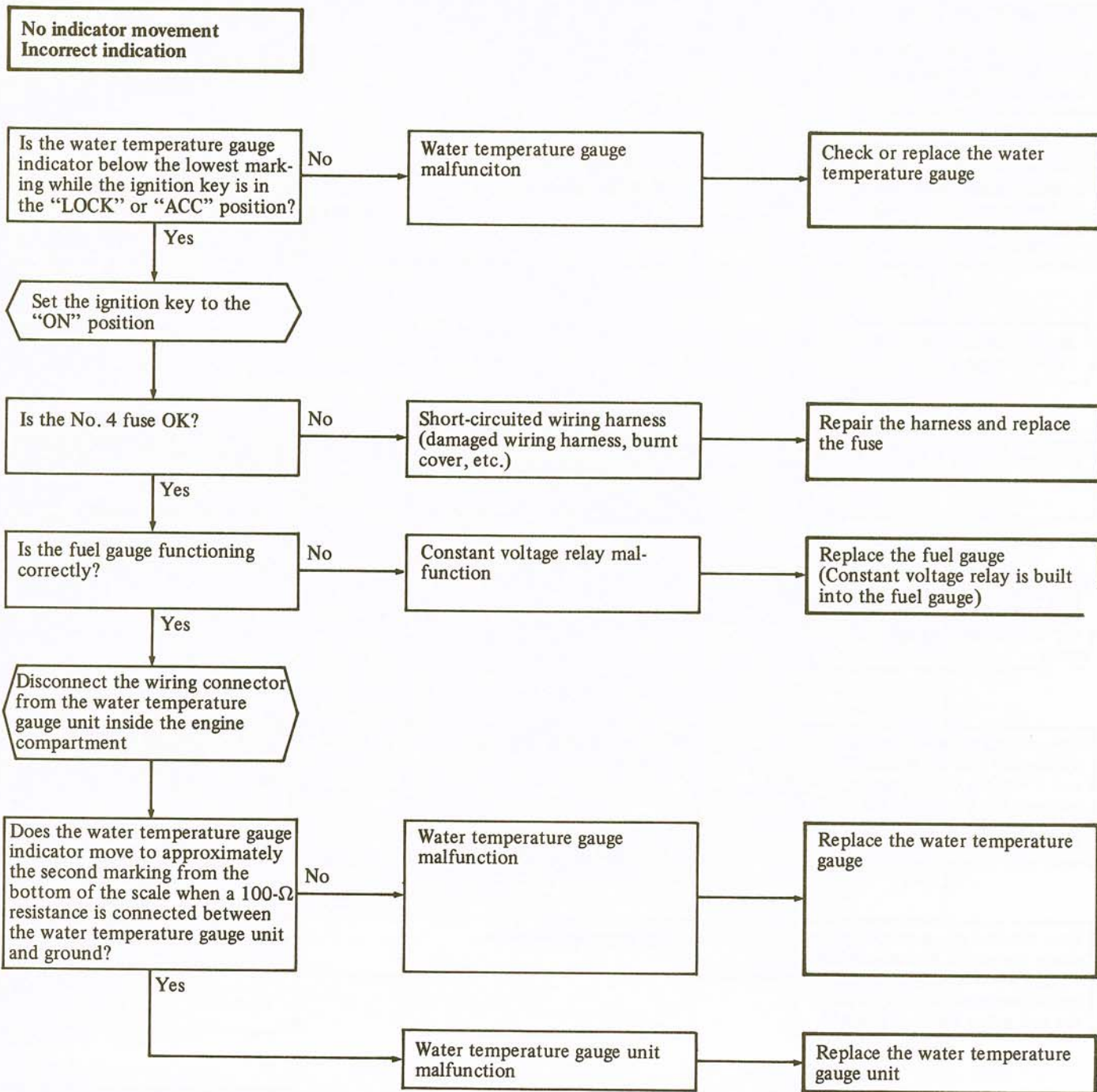
Correct the grounding of the fuel gauge unit, or replace it





## TROUBLESHOOTING

### Water Temperature Gauge and Unit





**CLINOMETER**

Symptom	Probable cause	Remedy
When vehicle inclines forward or backward, pointer does not move up or down	Internal parts such as pointer and pendulum defective	Replace inclinometer assembly
When vehicle inclines to right or left, spherical dial does not perform follow-up operation.	Internal parts such as dial and pendulum defective	
Oil-like fluid flows out from bottom of case	Seal of oil case broken	
Pointer and spherical dial frequently swing during vehicle operation	Oil case broken and oil leaking	

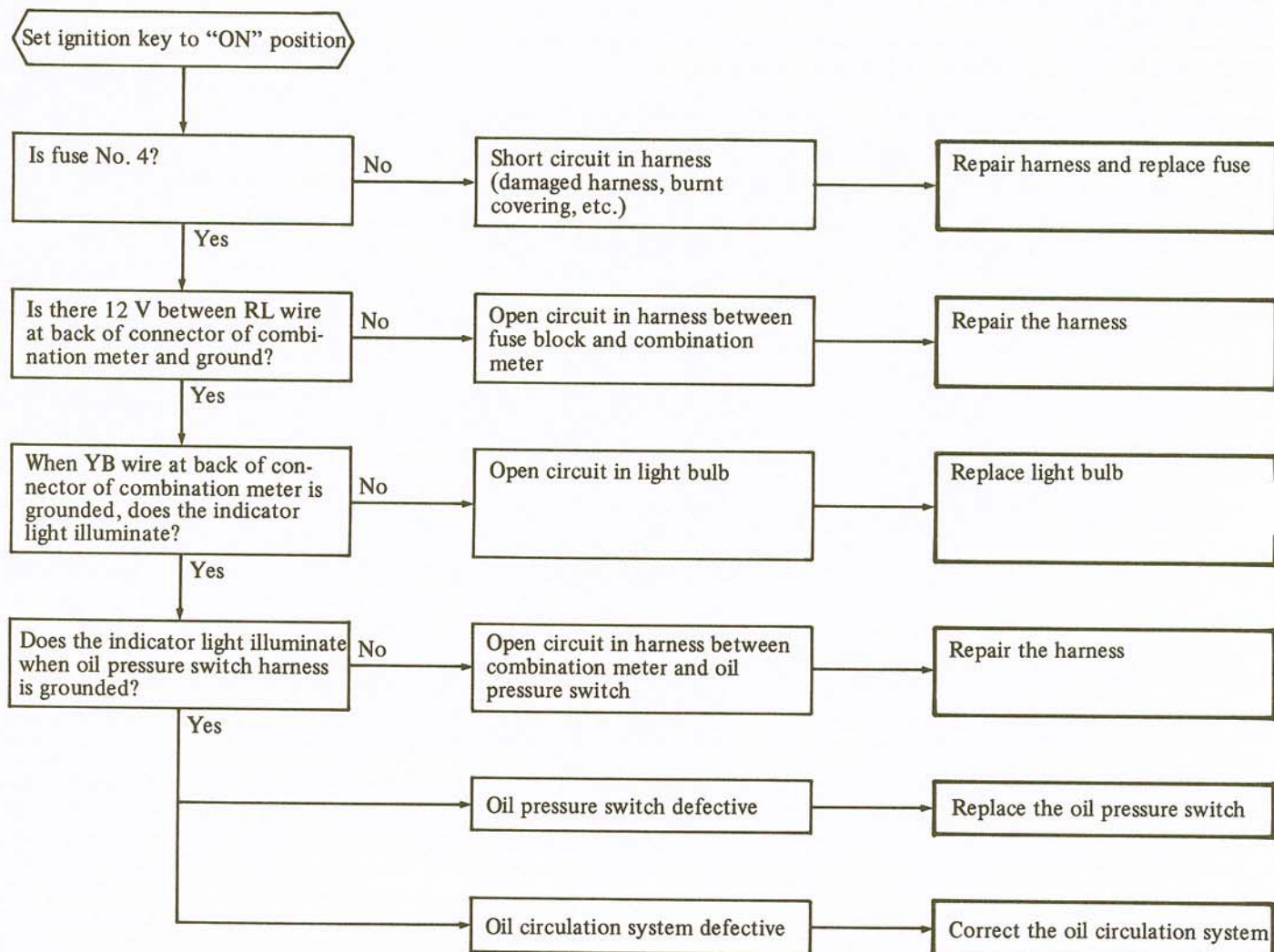




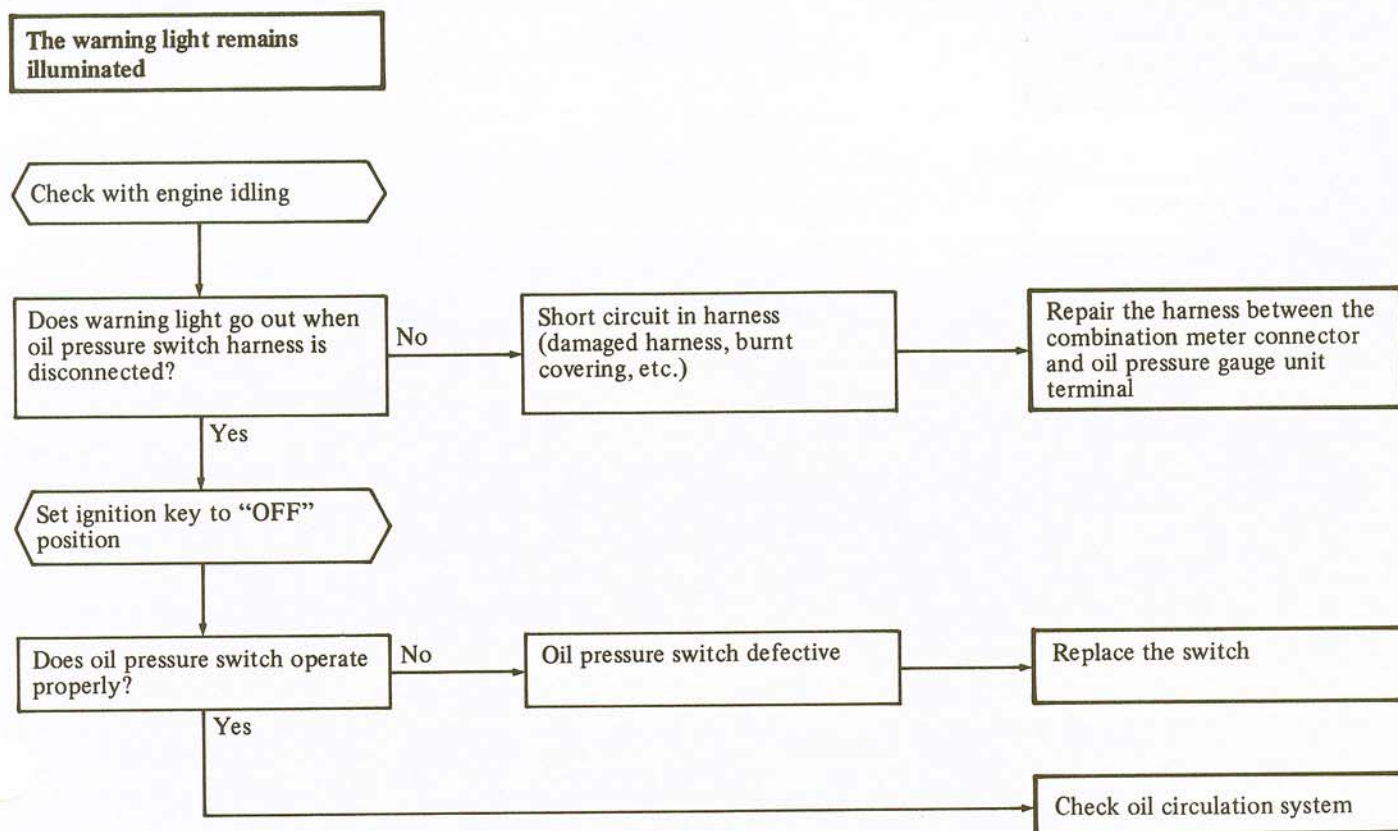
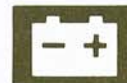
### INDICATORS AND WARNING LIGHTS

#### Oil Pressure Warning Light

The warning light does not illuminate when ignition switch is turned on.







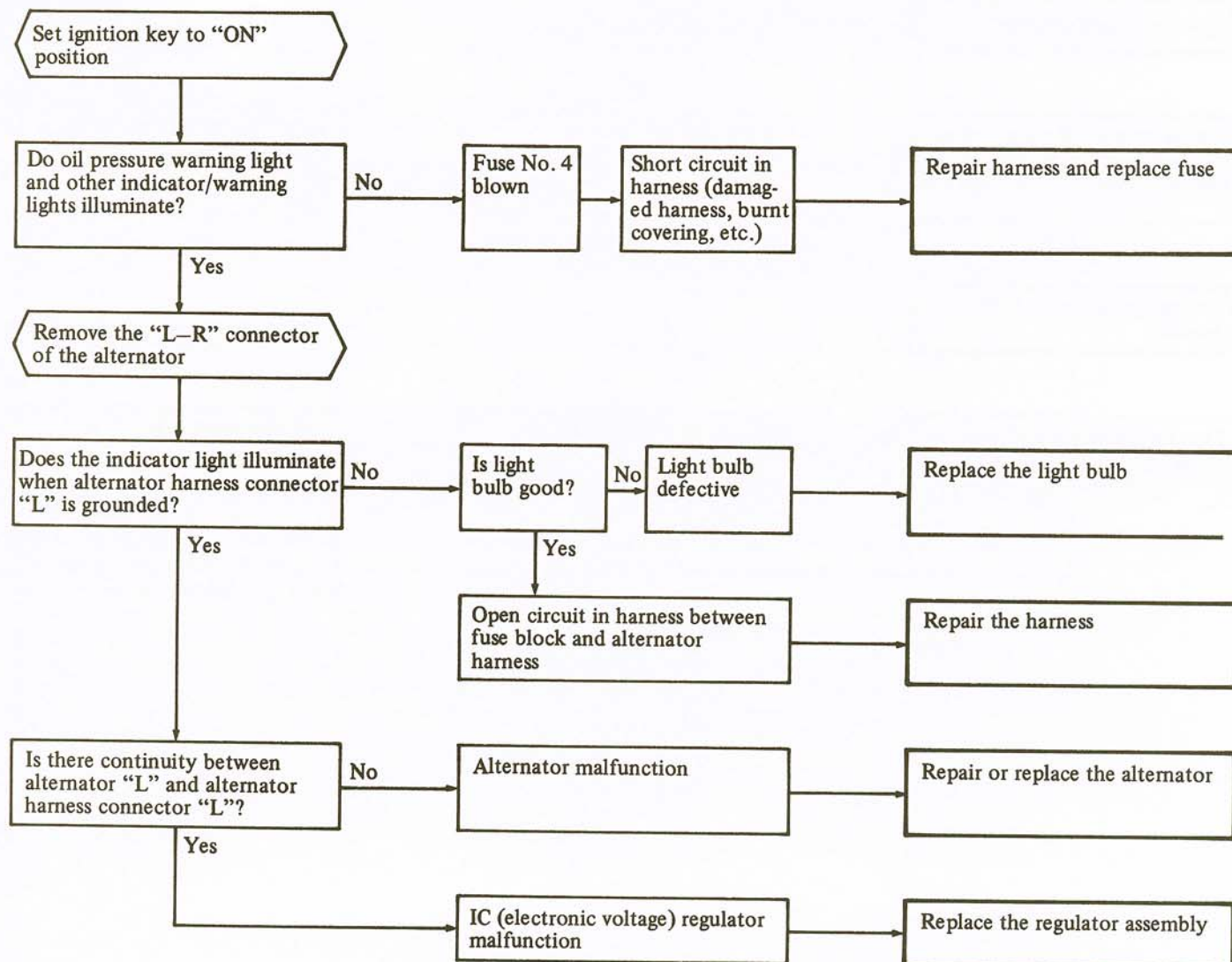




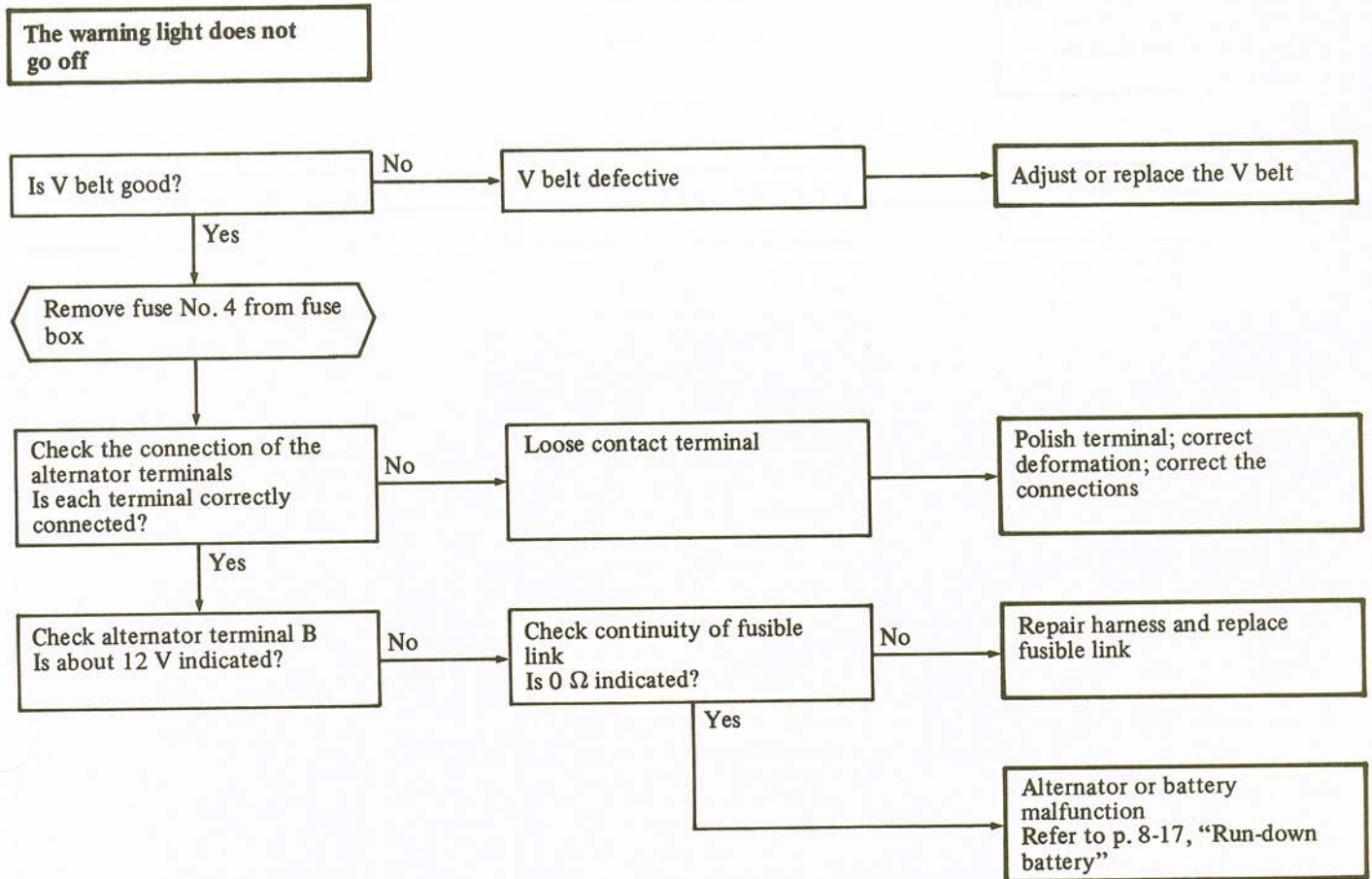
## TROUBLESHOOTING

### Charging Warning Light

The warning light does not illuminate when ignition switch is turned on





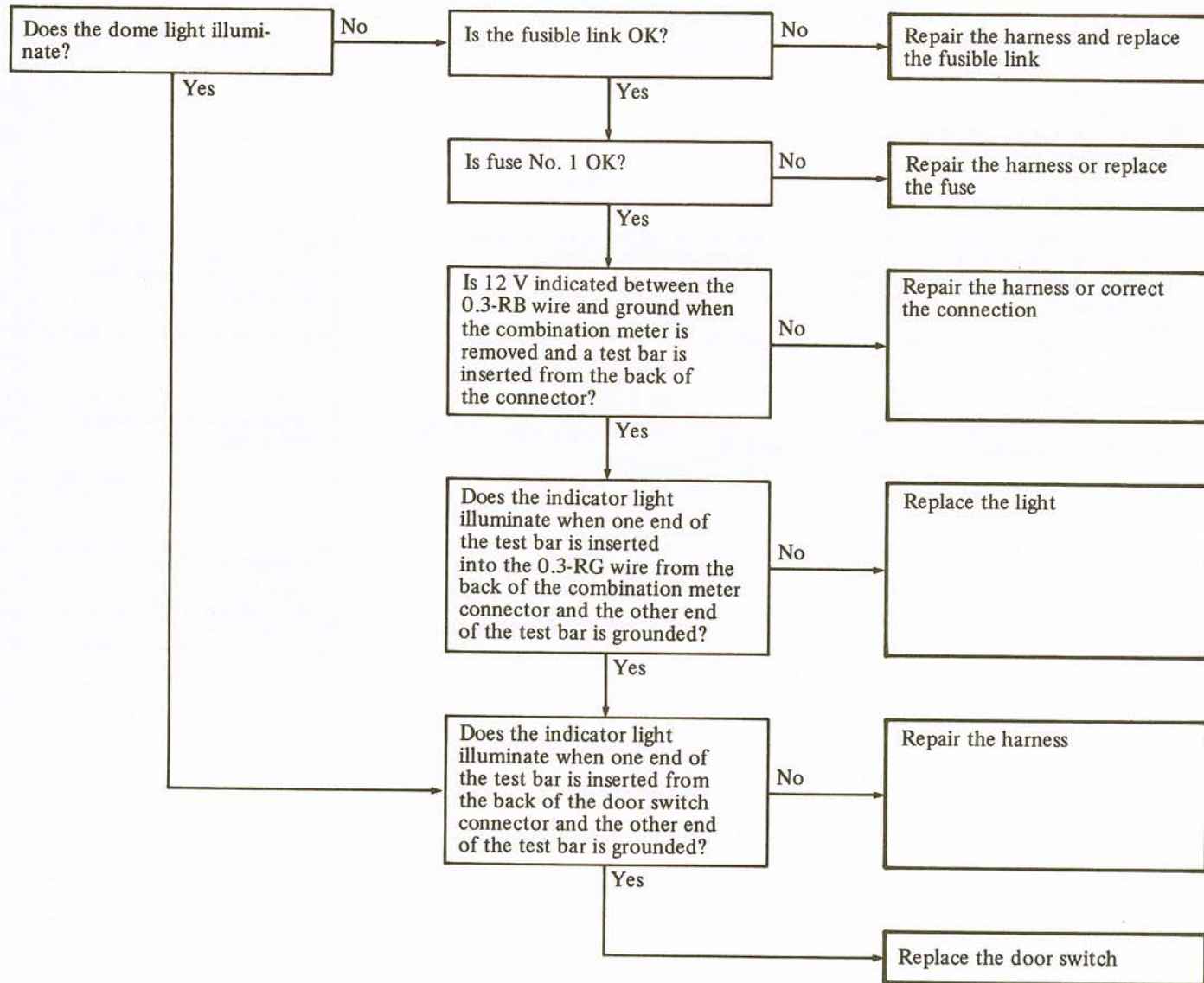






## Door-Ajar Warning Light

The indicator light does not illuminate when the door is open



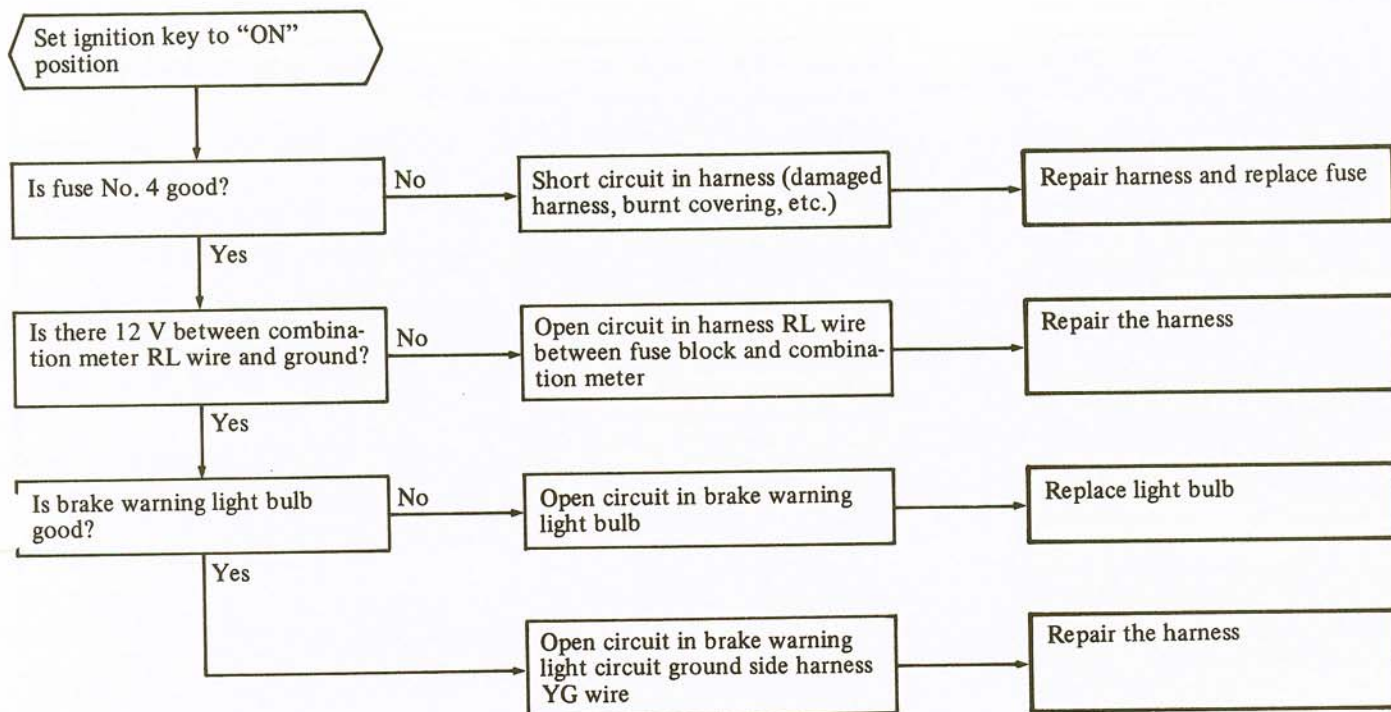




## Brake System Warning Light

Brake warning light does not light under following conditions.

- (1) When parking brake switch is ON
- (2) When brake fluid level sensor switch is ON







## TROUBLESHOOTING

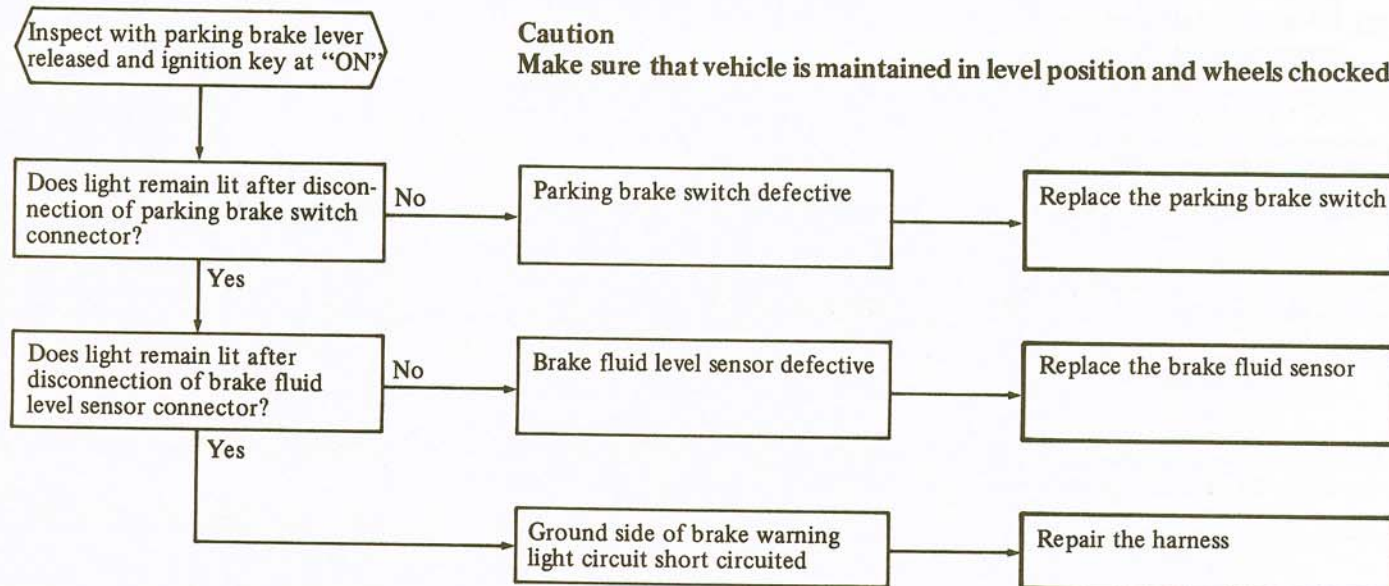
### Brake warning light remains lit

#### NOTE

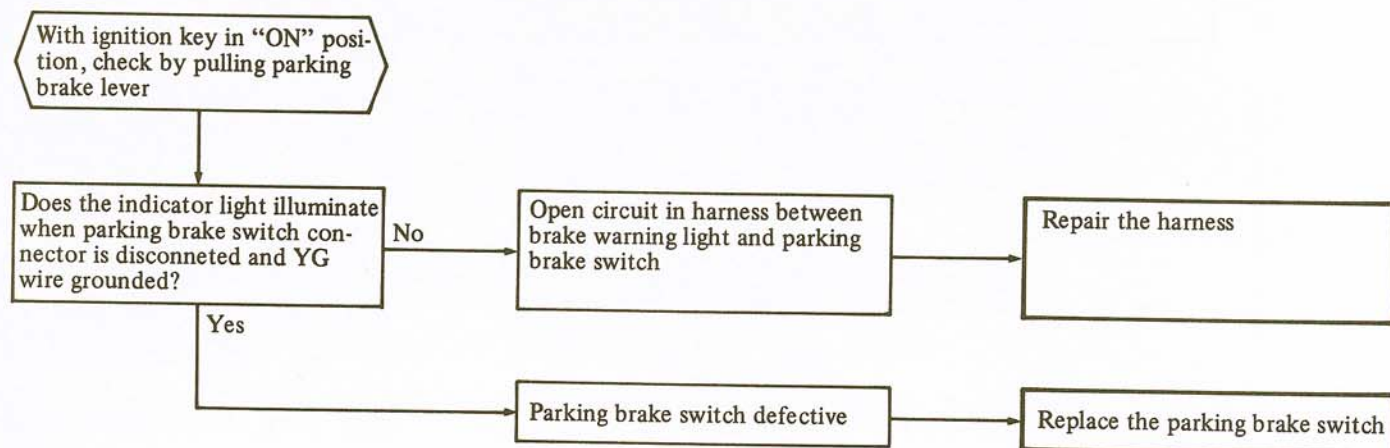
Check the brake fluid level and make sure it is correct.

#### Caution

**Make sure that vehicle is maintained in level position and wheels chocked.**



### Brake warning light does not light when parking brake lever is pulled







Brake warning light does not illuminate when brake fluid level is low.

**Caution**  
Be sure the vehicle is level and the wheels are chocked.

Inspect with parking brake lever released and ignition key at "ON"

Disconnect connector of brake fluid level sensor and short circuit harness 0.3-YG and 0.3-B wires. Does warning light illuminate?

Yes

No

Is 12 V indicated at harness 0.3-YG wire of sensor connector?

Yes

No

Damaged 0.3-YG wire in power supply harness

Repair the harness

Damaged 0.3-YG wire in ground harness

Repair the harness

Brake fluid level sensor defective

Replace the brake fluid level sensor

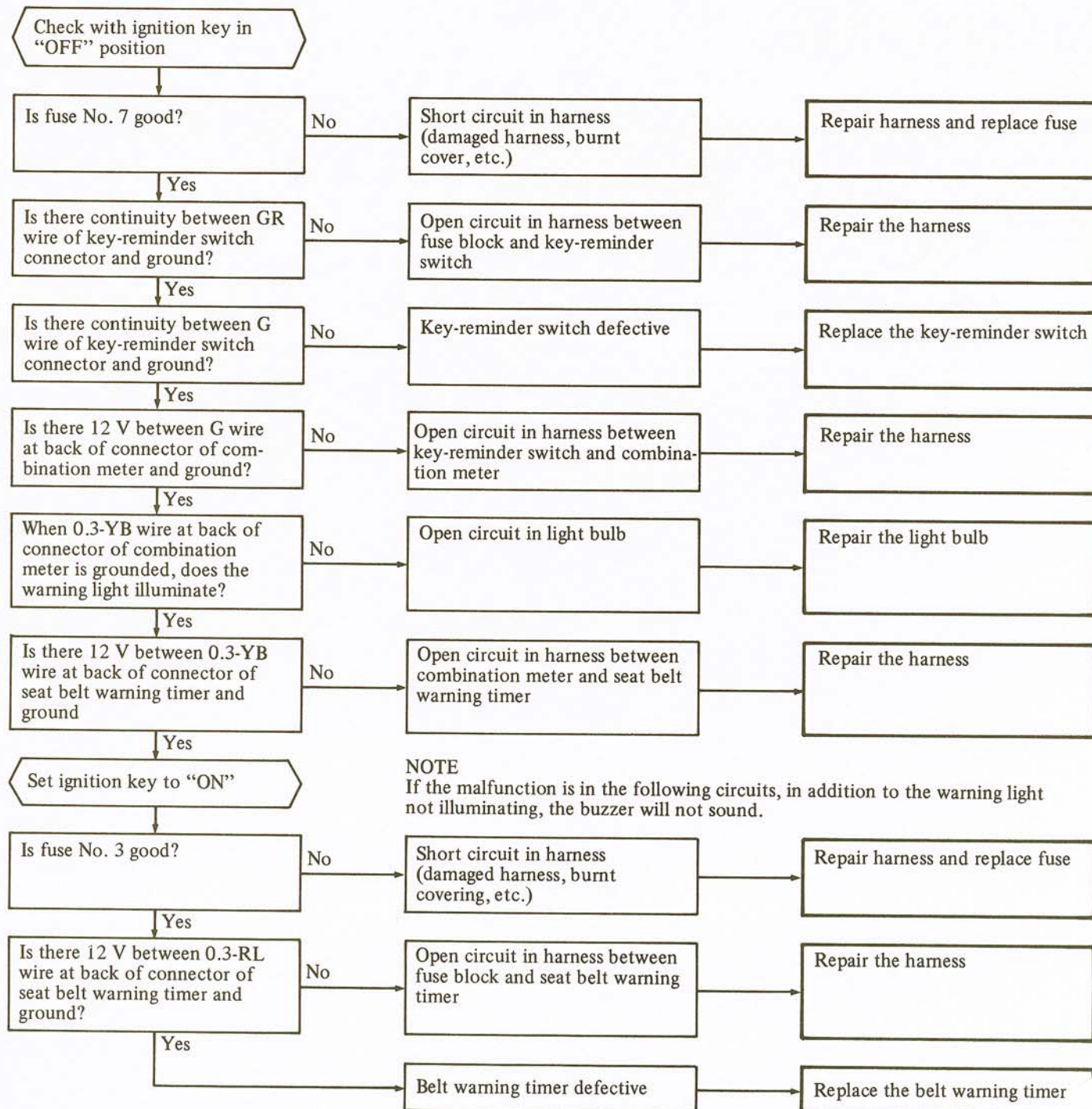




## TROUBLESHOOTING

### Fasten Seat Belt Warning Light and Buzzer

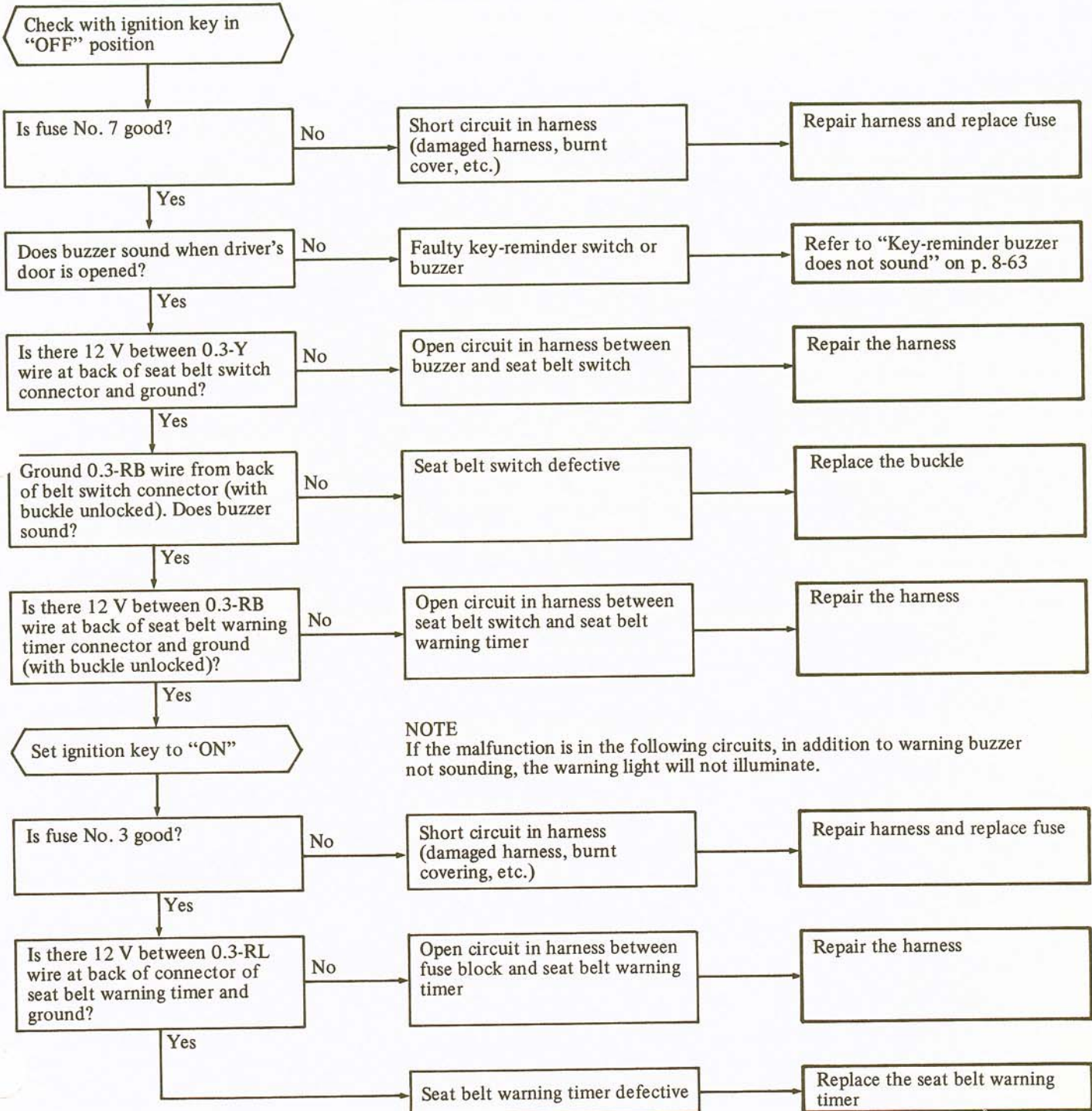
Fasten seat belt warning light does not illuminate when ignition key is turned to "ON" with driver's seat belt not buckled.







Seat belt warning buzzer does not sound when ignition key is turned to "ON" with driver's seat belt not buckled.

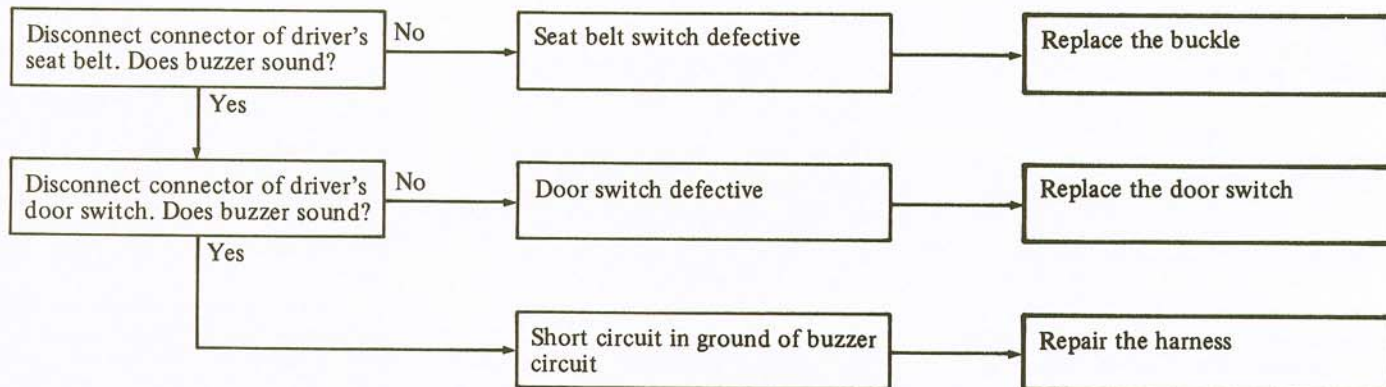




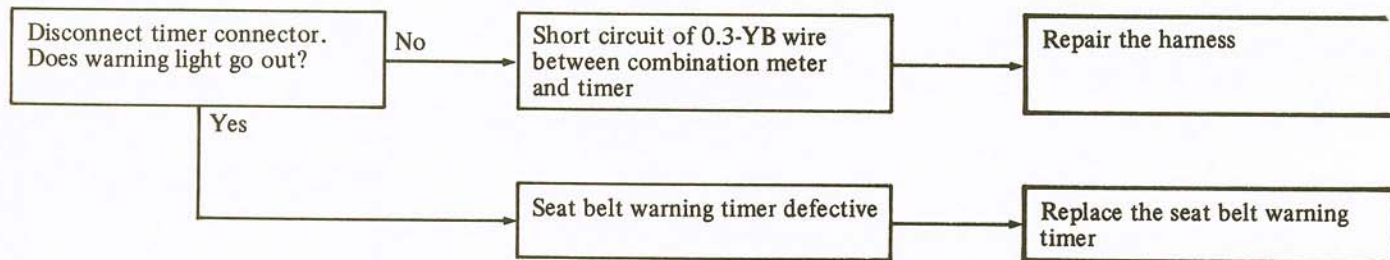


## TROUBLESHOOTING

**Fasten seat belt warning buzzer continues to after driver's seat belt is fastened.**



**Fasten seat belt warning light remains illuminated for 8 seconds after ignition key is set to "ON"**







## Lighting System

Check the illumination of all lights; if there are any problems, use the following chart to check the appropriate location. (For trouble symptom Nos. 3, 4, and 7, refer to the corresponding yes/no troubleshooting chart.)

Location	Trouble symptoms						
	1	2	3	4	5	6	7
Headlights [Both left and right lights should illuminate in both high and low beams]	x	○	x	○	△	○	△
Passing lights [Both left and right lights should illuminate in high beams when the passing switch is at "ON" position]	○	x	x	○	○	△	△
Position, tail, rear side marker and license plate lights [All of these lights should illuminate when the lighting switch is at the first stage]	○	○	○	x	○	○	△
Probable cause	↓	↓	↓	↓	↓	↓	↓
Light control relay	—	—	●	●	—	—	●
Column switch Dimmer switch segment	●	—	●	—	●	—	●
Passing switch segment	—	●	●	—	—	●	●
Lighting switch segment	●	—	●	●	—	—	●
Body ground points Front pillar, inner	—	—	●	—	—	—	●
Left side of engine compartment	—	—	—	●	—	—	●
Between battery and body	—	—	—	●	—	—	●
Fuse block (No. 2 fuse)	—	—	—	●	—	—	—
Light bulb	●	—	●	●	●	—	●

### Remarks

The symbols used in the table indicate the following:

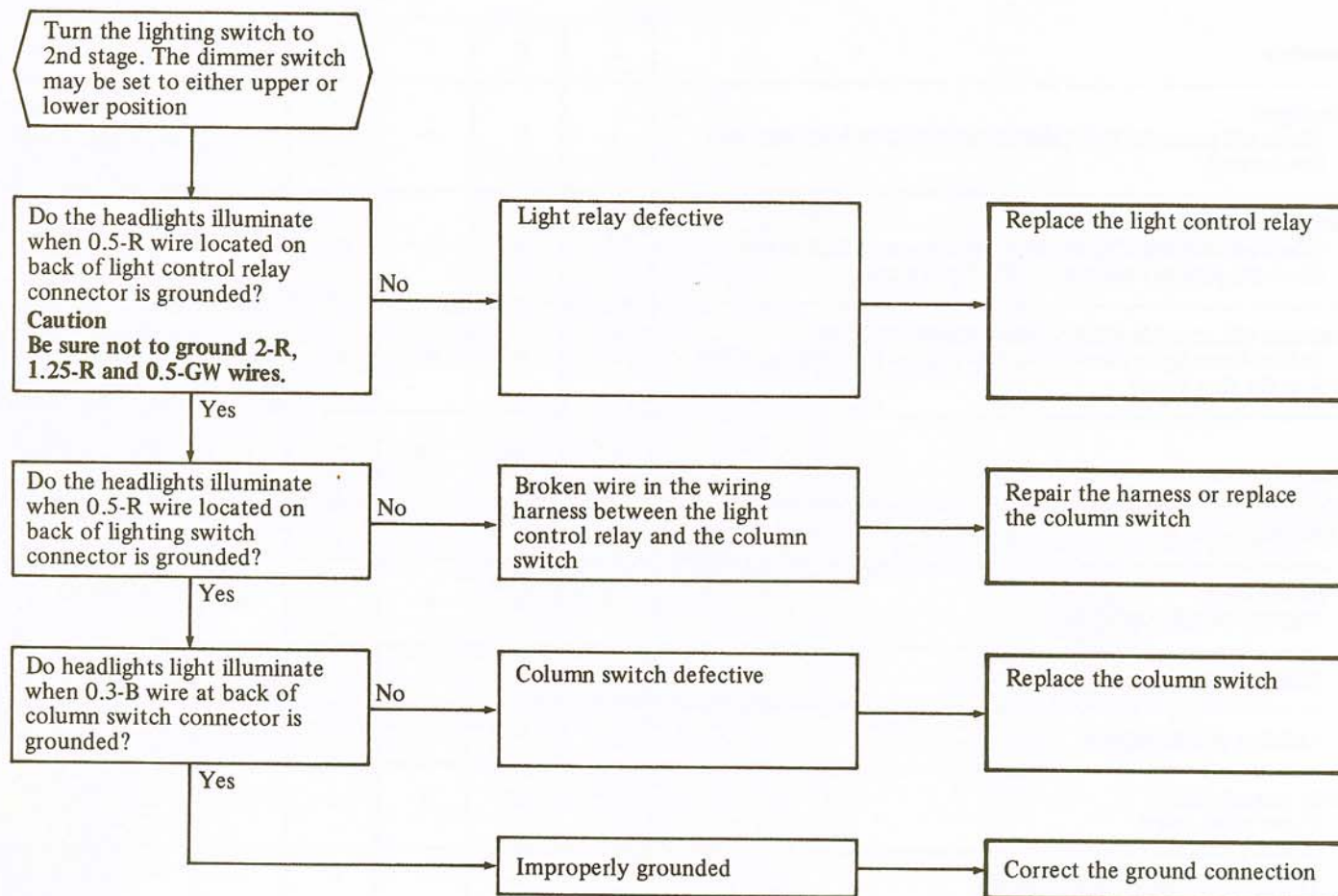
- : Normal illumination
- △ : Dim illumination
- x : No illumination
- : Parts requiring check





## Trouble Symptom 3

Headlights do not illuminate in either upper or lower beams  
(Passing lights do not illuminate either)

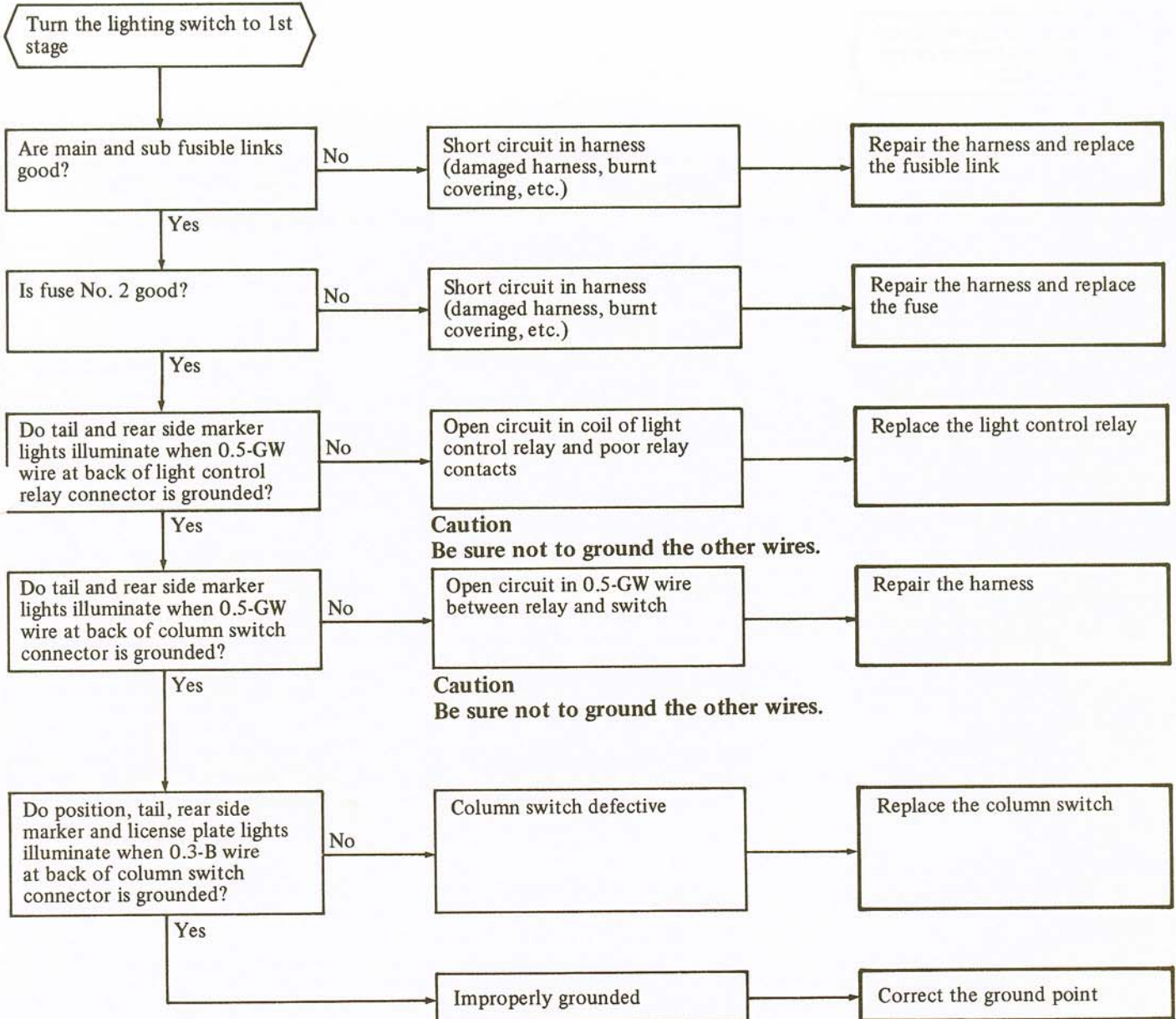






# trouble symptom 4

Position, tail, rear side marker and license plate lights do not illuminate on either side







## Trouble Symptom 7

Both R.H. and L.H. headlights  
upper and lower beams dark  
at all times (including when  
passing)

Check with lighting switch at/  
2nd stage, and dimmer switch  
at beam position

Is there 12 V between 2-R wire  
and ground when test probe  
which contacts the 2-R wire is  
inserted from back of  
light control relay connector?

No

Poor contact of fusible link  
connector or battery defective

Check battery voltage,  
correct connector  
connection or replace

Yes

Is 0.5 V or less indicated on  
voltmeter (about 20-V range)  
when (+) and (−) test probes are  
connected to 2-R (B) and  
1.25-RL wires respectively at  
back of light control relay  
connector?

No

Poor light control relay contact

Replace the light control relay

Yes

Is there 0.5 V or less between  
test probe and ground when test  
probe is inserted into 2-B wire  
from back of column switch  
connector?

No

Improperly grounded

Correct the ground connection

Yes

Column switch defective

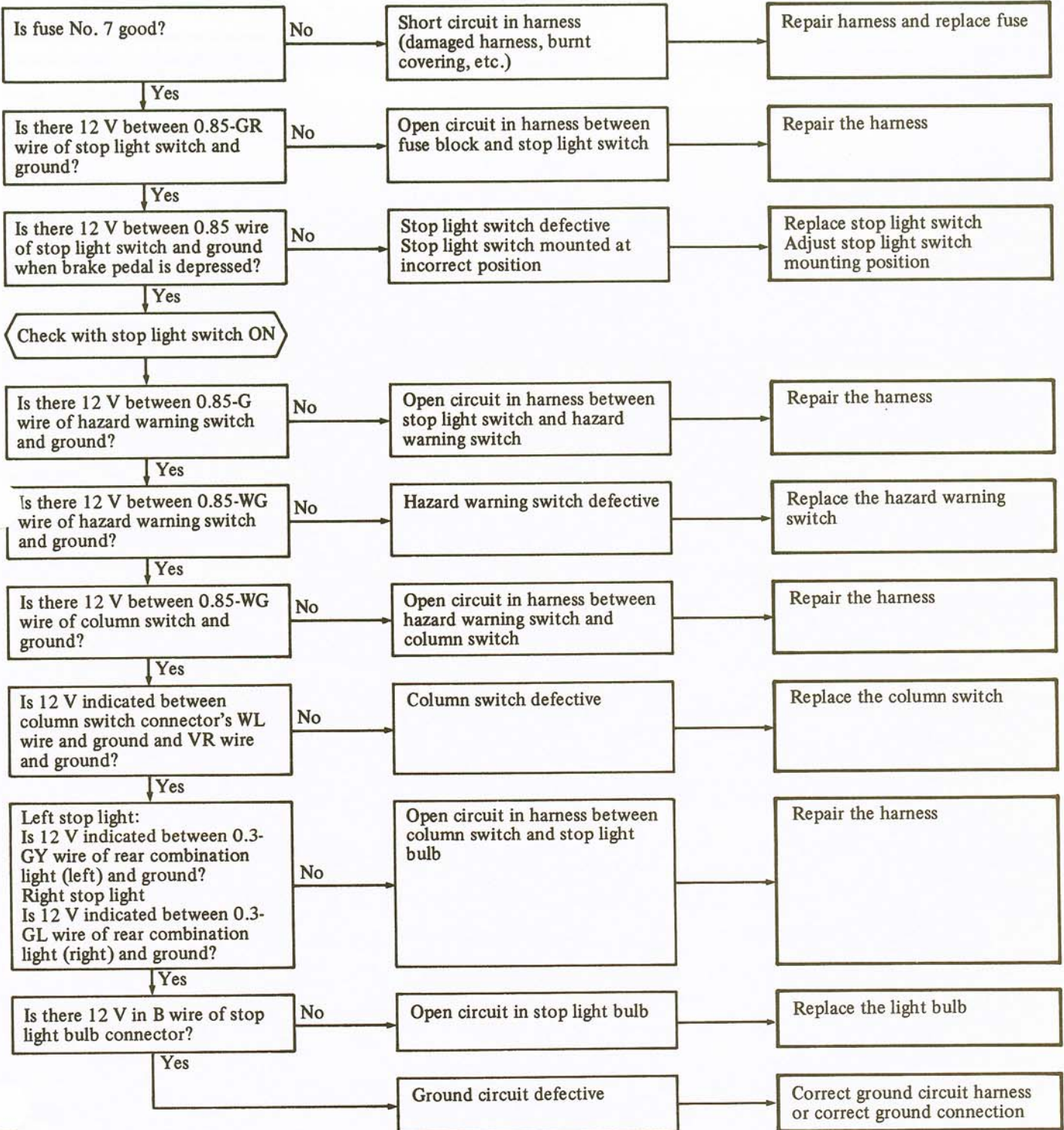
Replace the column switch



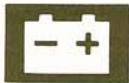


## op Light

## Stop light does not illuminate







## TROUBLESHOOTING

Stop light does not go out

Stop light switch improperly  
adjusted or defective

Adjust stop light switch position  
Replace stop light switch

### Turn-signal and hazard lights

One of the turn-signal lights  
or indicator lights does not  
illuminate

Incorrect connector connection

Correct the connector

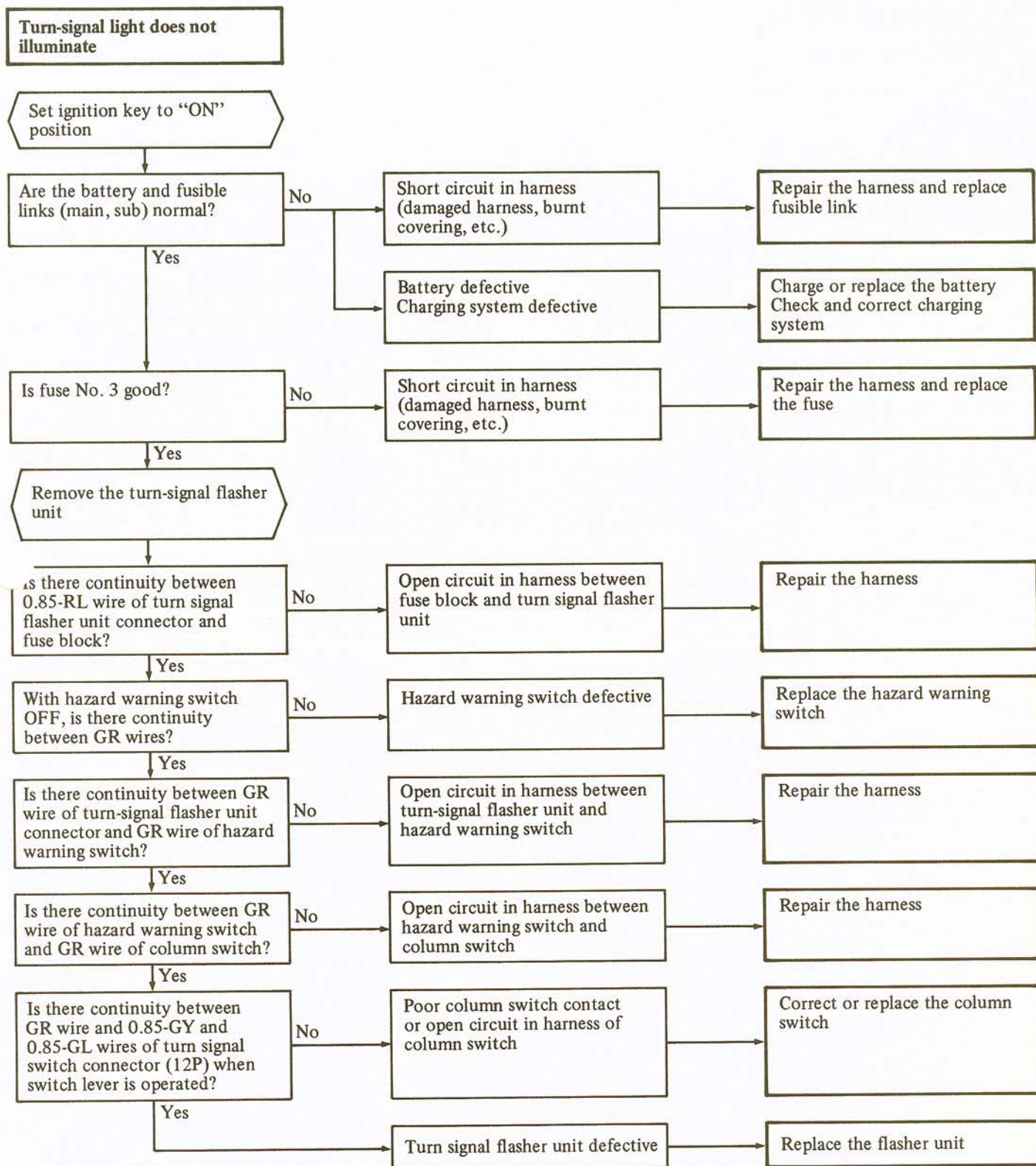
Improper ground connection

Correct the ground connection

Light bulb malfunction

Replace the light bulb



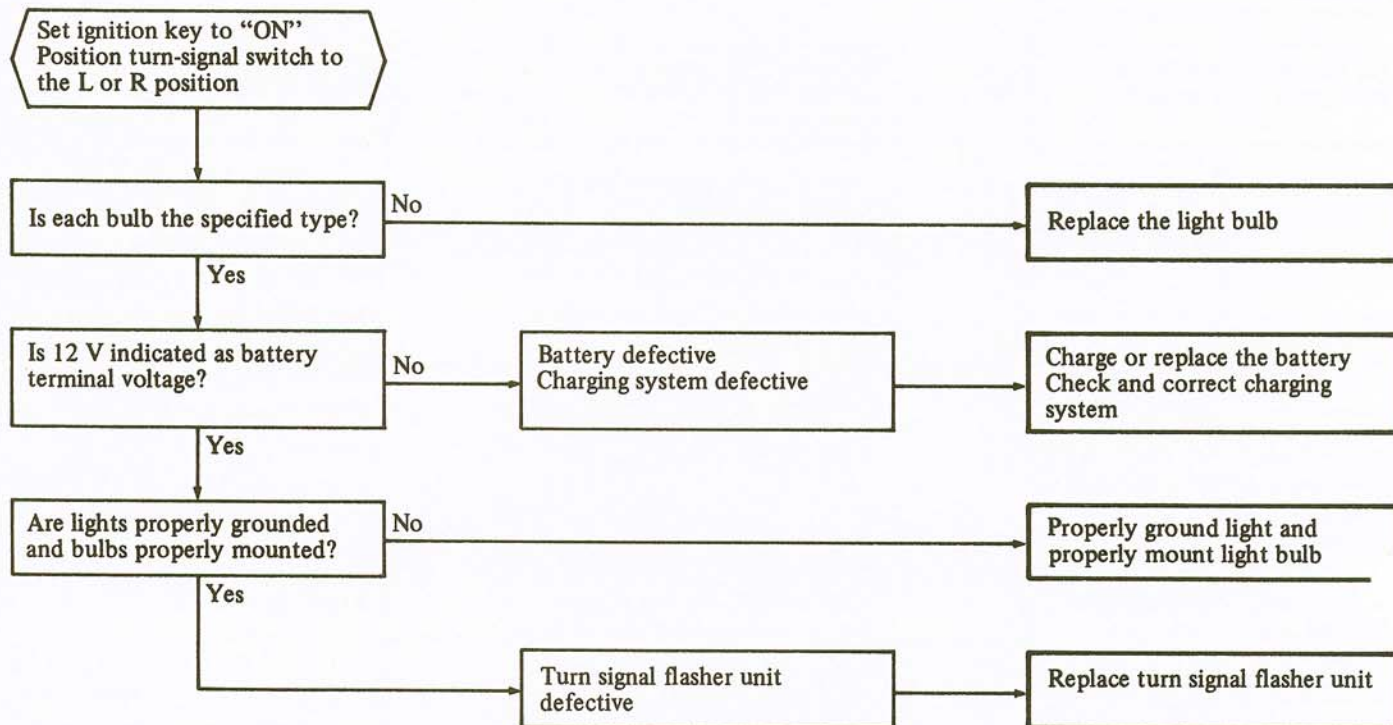






## TROUBLESHOOTING

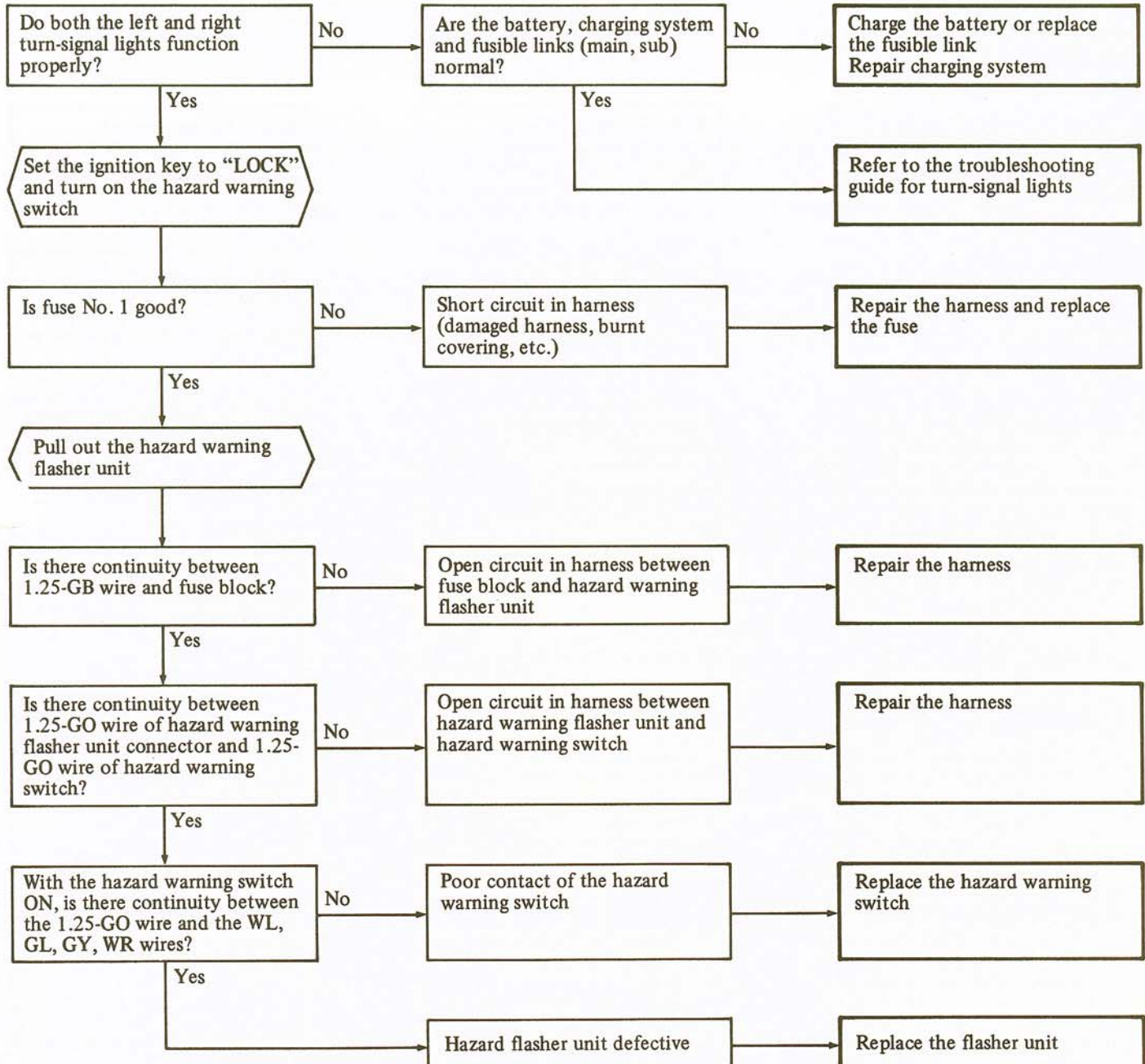
All lights illuminate, but flashing is irregular  
All lights illuminate without flashing







### Hazard lights and indicator lights do not illuminate







## WINDSHIELD WIPERS AND WASHER

**Wipers do not operate**

Check while the ignition key is in the "ACC" position

Are the main fusible link and the sub fusible link OK?

No

A short-circuited wiring harness (damaged wiring harness, burnt cover, etc.)

Repair the harness and replace the fusible link

Yes

Is fuse No. 8 OK?

No

A short-circuited wiring harness (damaged wiring harness, burnt cover, etc.)

Repair the harness and replace the fuse

Yes

Is 12 V indicated between each of the various wires (0.85-L, LO, LB) and ground when a test probe is inserted from the back of the wiper motor connector?

No

A broken wire between the fuse block and the wiper motor, or an improperly connected connector

Correct the connector or repair the harness

Yes

A malfunction in the wiper motor brushes, or a broken wire in the coil

Replace the wiper motor

Is 12 V indicated between each wire (LO and LB) and ground when a test probe is inserted from the back of the column switch connector?

No

A broken wire between the wiper motor and the wiper switch, or an improperly connected connector

Correct the connector or repair the harness

Yes

Is there 12 V between 2-B wire of column switch connector and ground when wiper switch is set to "1" and "2"?

No

Improperly connected connector or defective wiper switch

Correct connector or replace column switch

Yes

Open circuit between wiper switch and ground or improperly grounded

Correct harness or ground connection





Washer does not operate

Check while the ignition key is in the "ACC" position

Are the main fusible link and the sub fusible link OK?

No

A short-circuited wiring harness (damaged wiring harness, burnt cover, etc.)

Repair the harness and replace the fusible link

Yes

Is fuse No. 8 OK?

No

A short-circuited wiring harness (damaged wiring harness, burnt cover, etc.)

Repair the harness and replace the fuse

Yes

Is 12 V indicated between the L wire and ground when a test probe is inserted from the back of the washer motor connector?

No

A broken harness between the fuse block and washer motor, or an improperly connected connector

Correct the connector or repair the harness

Yes

Does the washer function when the YL wire of the washer motor connector is grounded?

No

Malfunction in the washer motor

Replace the washer motor

Yes

Does the washer function when the YL wire of the column switch connector is grounded?

No

A broken harness between the washer motor and the column switch or an improperly connected connector

Correct the connector or repair the harness

Yes

Does the washer operate when the washer switch is turned on while the 2B wire of the column switch connector is grounded?

No

A poor connection in the column switch

Replace the column switch

Yes

Open circuit between washer switch and ground or improperly grounded

Repair harness or correct the ground connection





## TROUBLESHOOTING

The wipers do not operate when the washer switch is turned on, but washer operates properly

Check while the ignition key is in the "ACC" position

Do the wipers operate when the wiper switch is set to the star mark?

No

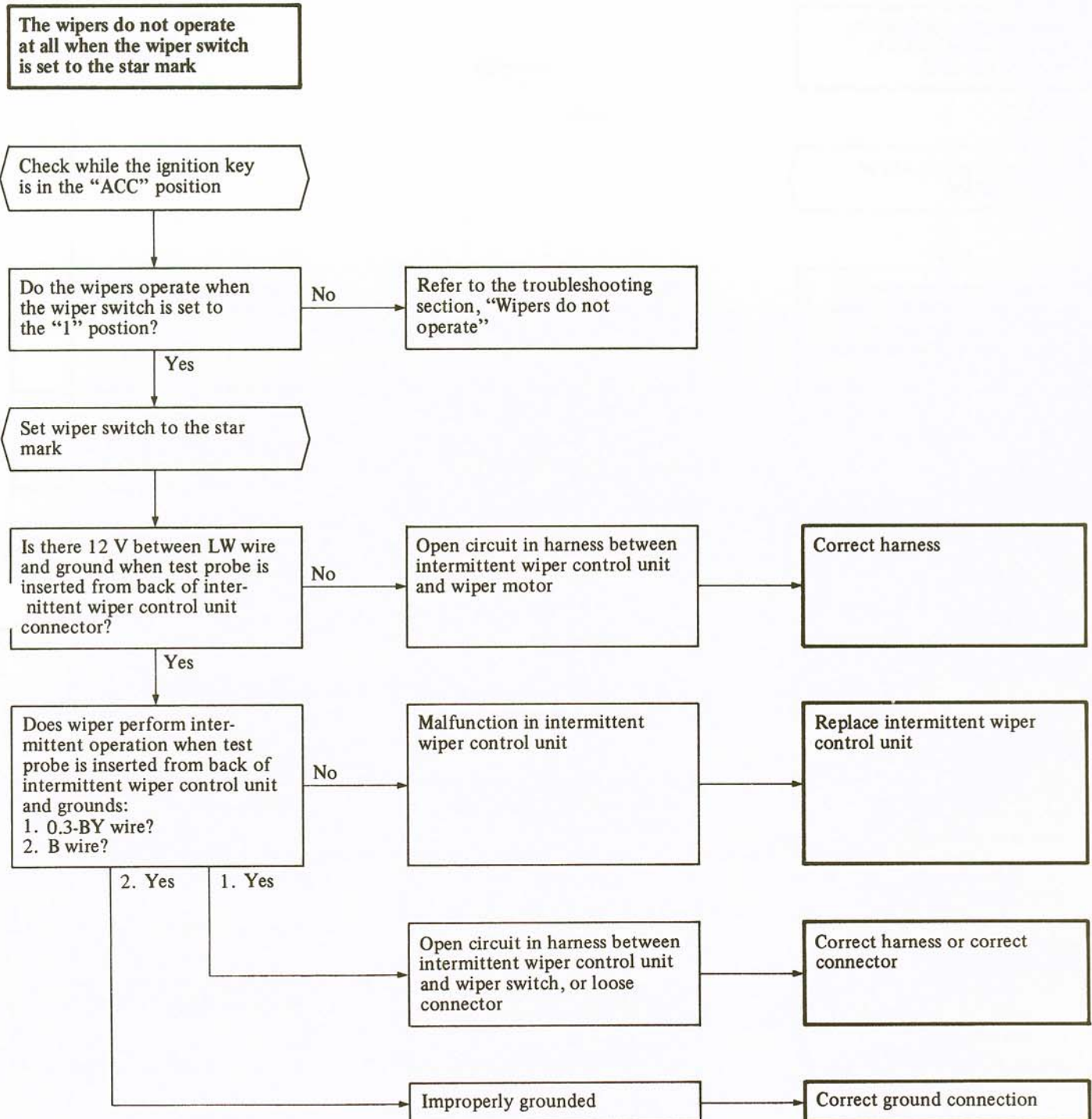
Refer to the troubleshooting section, "The wipers do not operate at all when the wiper switch is set to the star mark"

Yes

A malfunction in the intermittent wiper control unit

Replace the wiper control unit









## TROUBLESHOOTING

Wipers operate continuously even after wiper switch is set to the star mark

Check with ignition key at "ACC" position.

Do wipers operate continuously when intermittent wiper control unit connector is disconnected and wiper switch is set to the star mark?

No

Intermittent wiper control unit defective

Replace intermittent wiper control unit

Yes

Short circuit in wiper switch

Replace column switch

Intermittent time cannot be adjusted

Inspect with ignition key at "OFF"

Disconnect wiper switch connector and operate time adjustment switch. Does resistance between 0.3-Y wire and 2-B wire vary between 0 and 50 ohms?

No

Faulty wiper switch variable resistor

Faulty column switch

Yes

Is there continuity between intermittent wiper relay and wiper switch?

No

Damaged harness between intermittent wiper relay and wiper switch

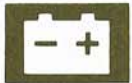
Repair harness

Yes

Faulty intermittent wiper relay

Replace intermittent wiper relay





# EAR WINDOW WIPER AND WASHER

Rear wiper does not operate

Check while the ignition key is in the "ACC" position

Is fuse No. 9 OK?

No

A short-circuited wiring harness (damaged wiring harness, burnt cover, etc.)

Repair the harness and replace the fuse

Yes

Is 12 V indicated between the L wire and ground when a test probe is inserted from the back of the rear wiper motor connector?

No

A broken wire between fuse No. 9 and the wiper motor connector, or a poor connector connection

Correct the connector or repair the harness

Yes

Is 12 V indicated between the BrW wire and ground when a test probe is inserted from the back of the rear wiper motor connector?

No

A malfunction in the wiper motor brush, or a broken wire in the coil

Replace the wiper motor

Yes

Does the wiper motor function when a test probe is inserted from the back of the rear wiper and washer switch connector and the BrW wire is grounded?

No

A broken wire between the wiper motor and the rear wiper and washer switch, or a poor connector connection

Correct the connector or repair the harness

Yes

Set the ignition key to the "OFF" position

Does continuity exist between the 0.3-B wire and ground when the rear wiper switch is turned on?

No

A poor connection of the rear wiper and washer switch connector, or a malfunction in the rear wiper and washer switch

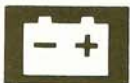
Repair the connector or replace the wiper and washer switch

Yes

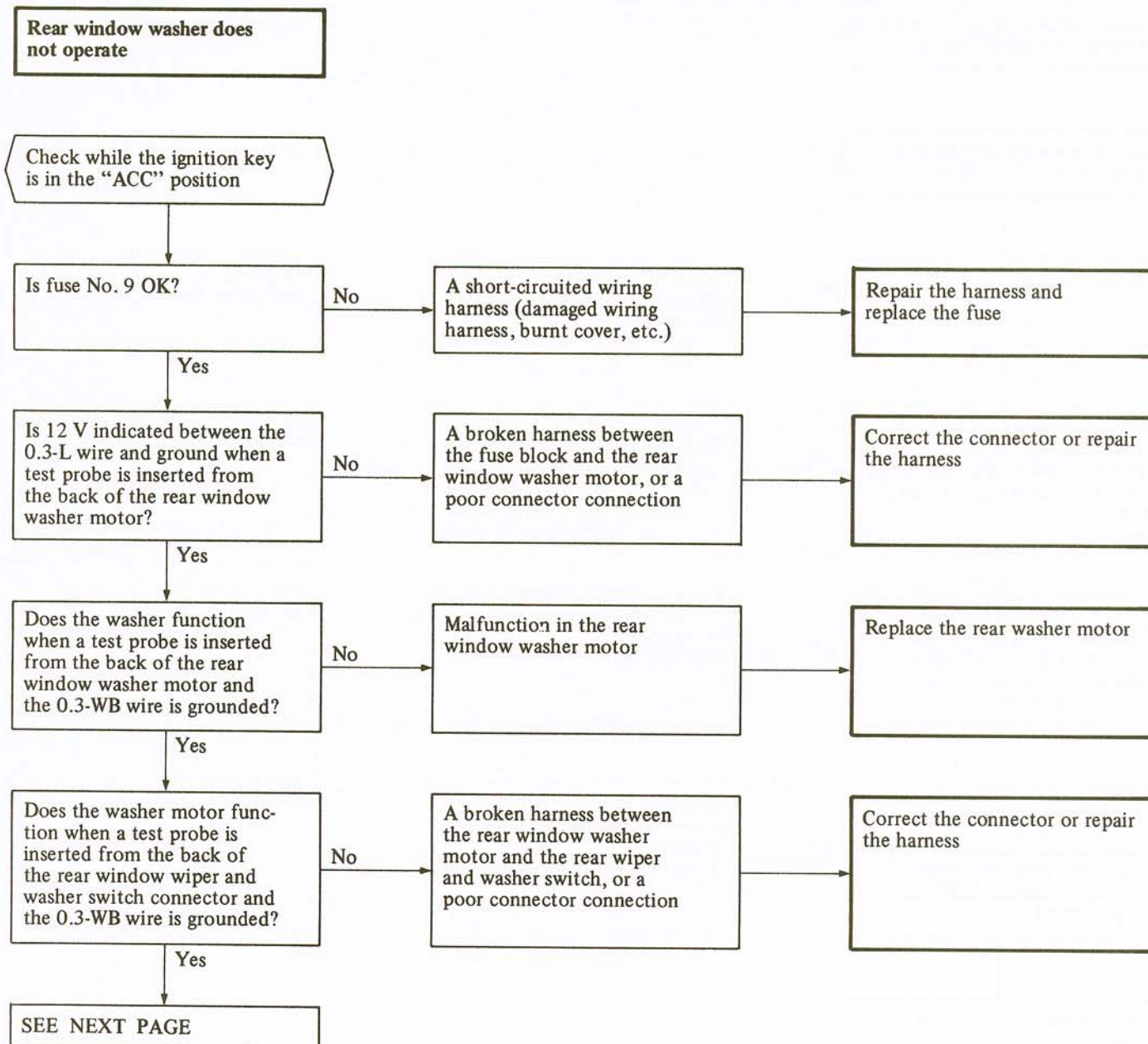
Improperly grounded

Correct the ground connection

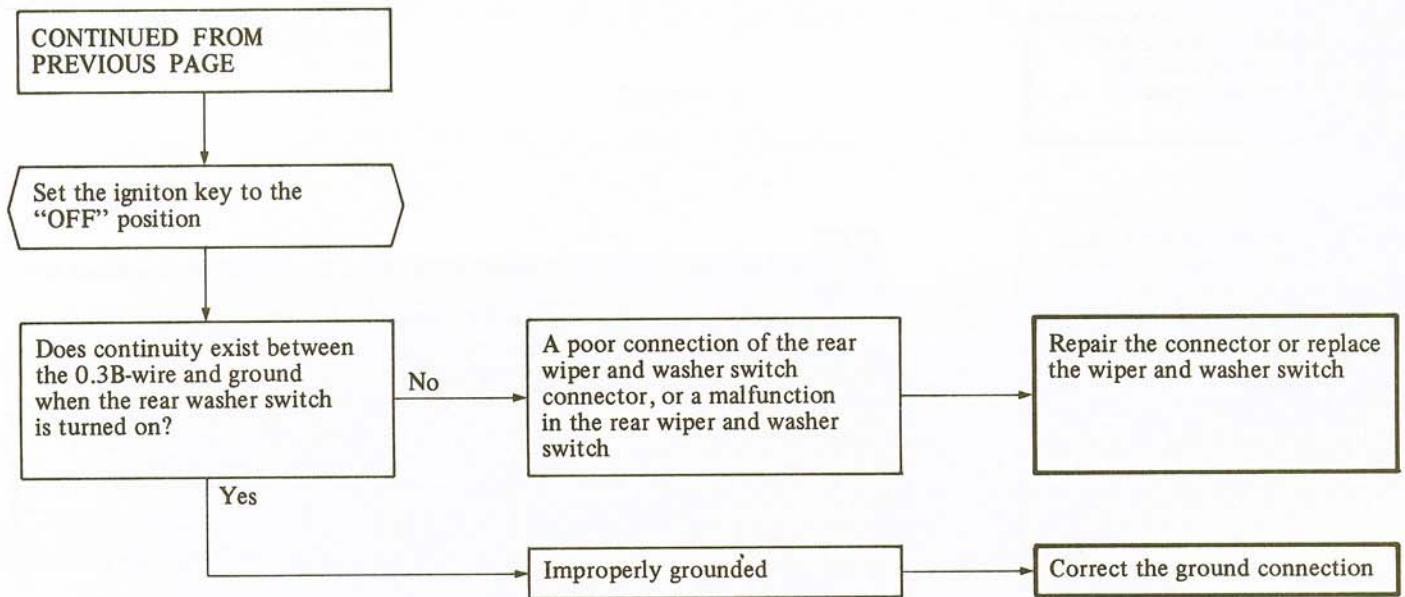




## TROUBLESHOOTING











## HEADLIGHT WASHER

The headlight washer motor does not operate when the headlight washer switch is pressed

Disconnect the headlight washer control relay connector, and check with ignition key at "ACC"

## NOTE

The headlight washer should operate when all of the following conditions are fulfilled:

- (1) The ignition key is at either the ACC position or the ON position.
- (2) The lighting switch is at the ON position.
- (3) The headlight washer switch is at the ON position.

Does continuity exist between the 1.25-B wire and ground when a test probe is inserted from the back of the headlight washer control relay connector?

No

An improper ground connection between the headlight washer control relay and ground, or a broken harness

Repair the harness or correct the ground connection

Yes

Is 12 V indicated between the 0.3-LW wire and ground when a test probe is inserted from the back of the headlight washer control relay connector?

No

Is fuse No. 8 OK?

No

Repair the harness and replace the fuse

Yes

Yes

Repair the harness between the fuse block and the headlight washer control relay connector

Does the headlight washer motor operate when the 1.25-L wire of the headlight washer control relay connector is grounded?

No

A malfunction in the headlight washer motor

Replace the headlight washer motor

Yes

Does continuity exist between the terminals when a test probe is inserted between the 0.3-LB wire and ground from the back of the headlight washer control relay connector and the headlight washer switch is pressed?

No

A malfunction or poor connection in the headlight washer switch or a broken harness between the ground branch points of the headlight washer switch

Correct connector, replace column switch, or correct harness or ground connection

Yes

Check with the lighting switch ON

SEE NEXT PAGE





CONTINUED FROM  
PREVIOUS PAGE

Is 12 V indicated between GW wire and ground when a test probe is inserted from the back of the headlight washer control relay connector?

No

Do the tail lights, position lights, meter illumination lights, etc., illuminate

No

Refer to p. 8-45, "Position, tail, rear side marker and license plate lights do not illuminate on either side"

Yes

Inspect the harness between the fuse block and the headlight washer control relay connector, and repair if necessary

Yes

A malfunction in the headlight washer control relay

Replace the headlight washer control relay

**The headlight washer motor operates, but the washer fluid does not spray**

Disconnect the main hose from the check valve

Does the washer fluid spray when the headlight washer switch is pressed?

No

Are the hoses free from clogging, twisting, leakage, etc.?

No

Correct the hose installation, remove the clogging, or replace the hose

Yes

Inspect the washer motor (for pump blockage), and repair or replace it

Yes

Connect the main hose to the check valve, and then disconnect the hoses which are connected to the left and right nozzles from the check valve

Does the washer fluid spray from both the left and right discharge ports when the headlight washer switch is pressed?

No

Blockage inside the check valve, or a malfunction in the stopper valve

Replace the check valve

Yes

Are the hoses between the left and right nozzles and the check valve free from cracks, clogging, and/or leakage?

No

Fluid leakage or pressure loss due to a cracked or clogged hose

Repair or replace the hose

Yes

Clogged nozzle

Repair or replace the nozzle

#### NOTE

Have a receptacle prepared in order to avoid spilling the washer fluid.



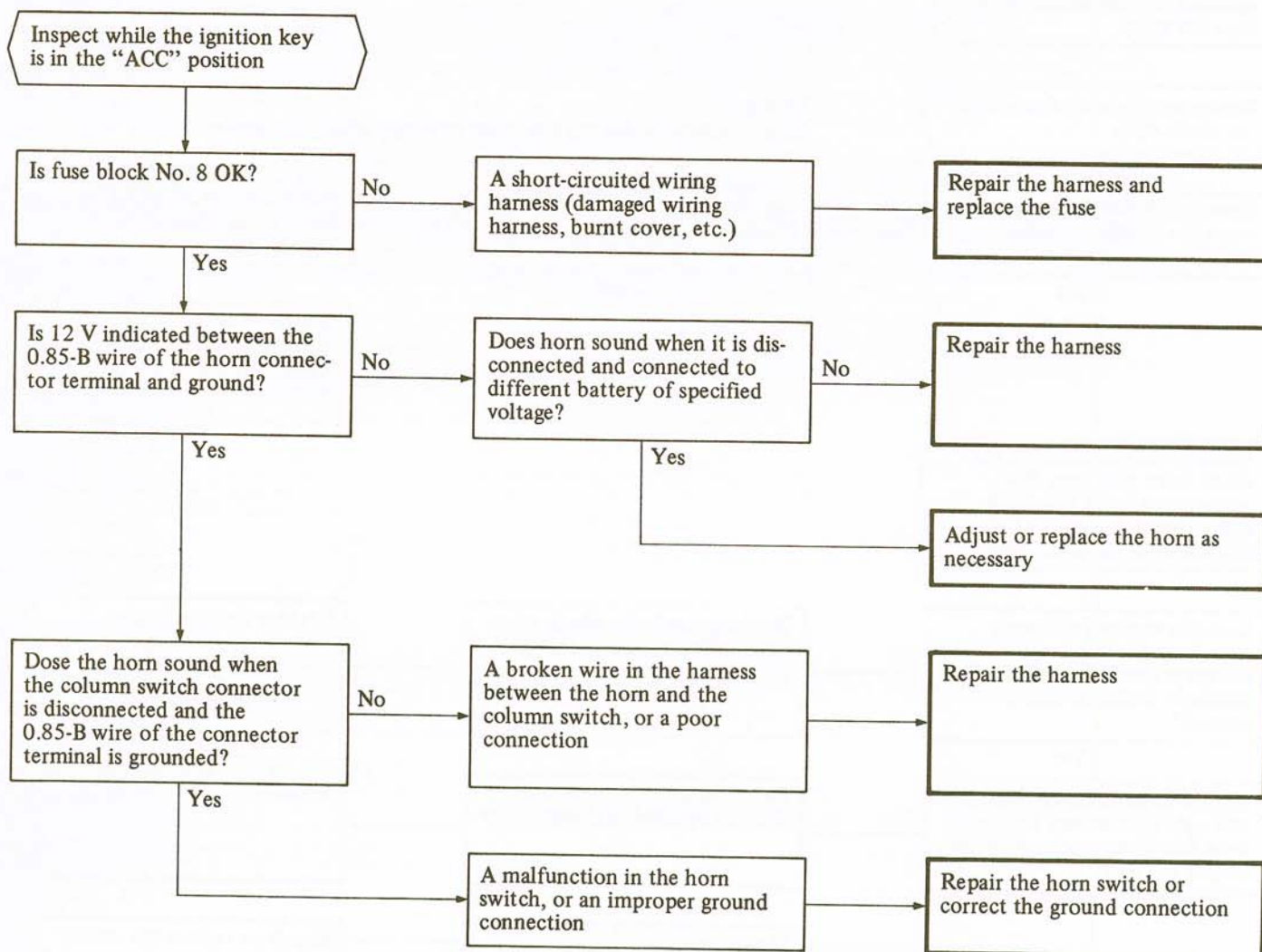


## TROUBLESHOOTING

### HORN

Symptom	Probable cause	Remedy
Sound volume of horn is low or fluctuates	A loose or bent adjustment screw	Adjust the horn
	Water, dirt, or other foreign matter lodged inside	Replace the horn
	A loose horn or bracket mounting bolt	Tighten the bolt
	A drop in battery voltage	Check the battery
	A poor connection of the horn switch	Repair or replace the horn switch
	A poor connection of the horn ground terminal	Repair

#### Horn does not sound







## Key-Reminder Switch

Key-reminder buzzer does not sound.

Check with ignition key in "OFF" position

Is fuse No. 7 good?

No

Short circuit in harness  
(damaged harness, burnt cover, etc.)

Repair the harness and  
replace fuse

Yes

Is there continuity between GR  
wire of key-reminder switch  
connector and ground?

No

Open circuit in harness  
between fuse block and  
key-reminder switch

Repair the harness

Yes

Is there continuity between G  
wire of key-reminder switch  
connector and ground?

No

Key-reminder switch defective

Replace the key-reminder switch

Yes

Is there continuity between G  
wire of buzzer connector and  
ground?

No

Open circuit in harness between  
key-reminder switch and buzzer

Repair the harness

Yes

Does buzzer sound when 0.3-Y  
wire of buzzer connector is  
grounded?

No

Buzzer defective

Replace the buzzer

Yes

Does buzzer sound when YW  
wire of driver's door switch  
connector is grounded?

No

Open circuit in harness between  
buzzer and door switch

Repair the harness

Yes

Door switch defective

Replace the door switch





## TROUBLESHOOTING

Key-reminder buzzer won't stop sounding.

Check with ignition key removed

Does buzzer sound when YW wire of driver's door switch connector is disconnected?

No

Door switch defective

Replace door switch

Yes

Does buzzer sound when seat belt switch connector of driver's seat belt is disconnected?

No

Belt switch or timer defective

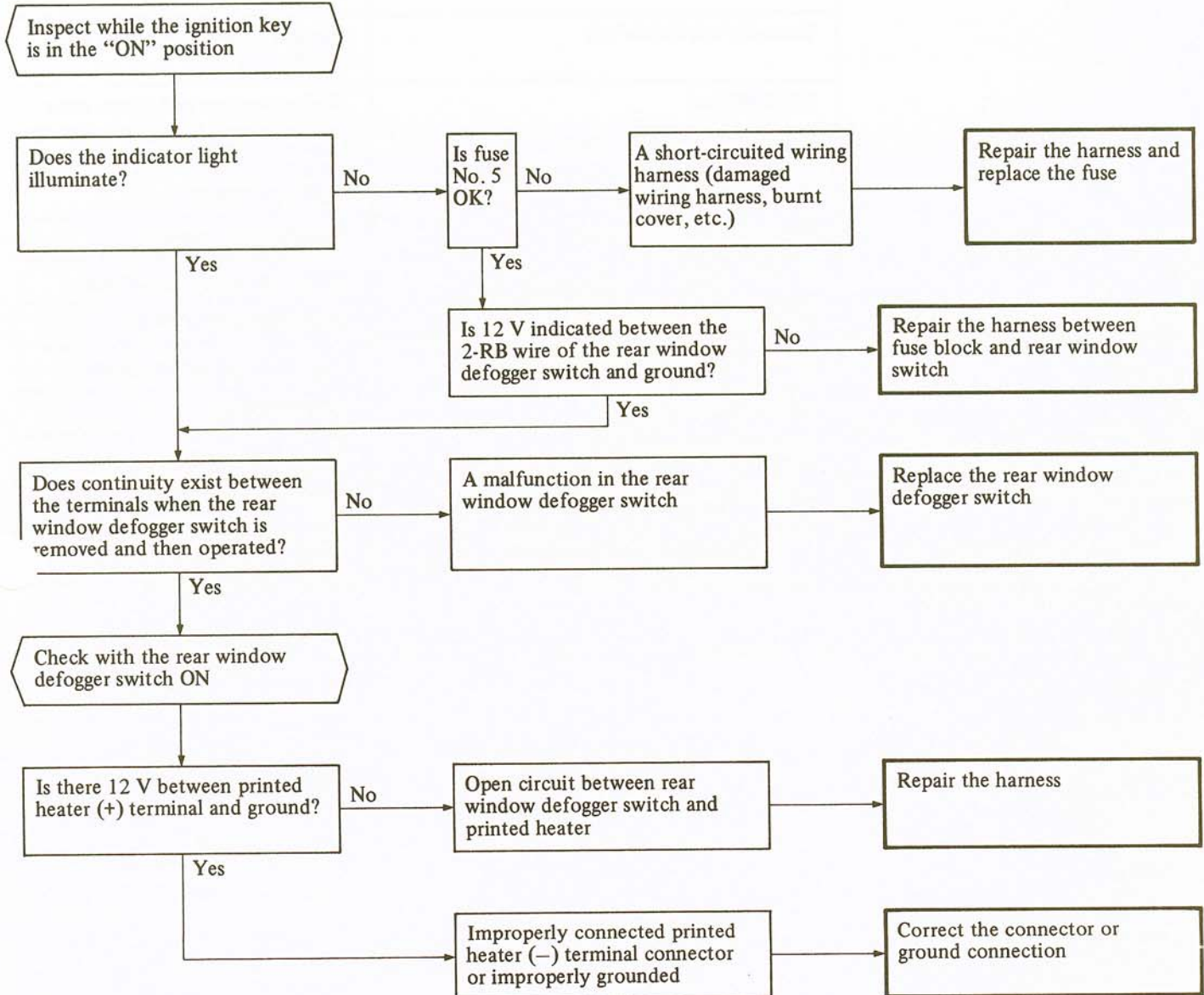
Refer to "Fasten-Seat-Belt Warning Light" section

Yes

Short circuit at ground side of buzzer circuit

Repair the harness



**Defogger does not operate**





## TROUBLESHOOTING

### POWER WINDOWS

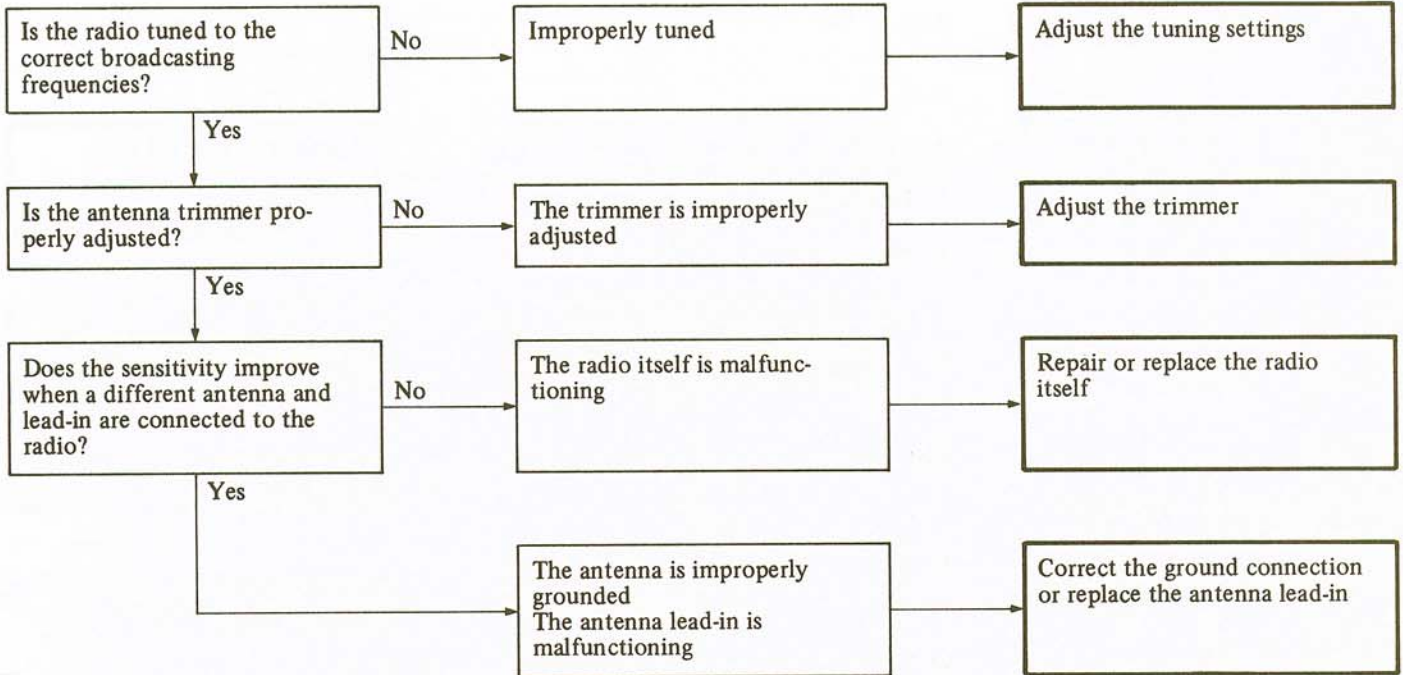
Symptom	Probable cause	Remedy
None of the door windows will operate	Burnt-out main fusible link	Replace the main fusible link and isolate cause
	Burnt-out sub fusible link	Replace the sub fusible link and isolate cause
	Burnt-out fuse	Replace the fuse and isolate cause
	Poor grounding power window relay	Correct grounding
	Malfunctioning power window relay	Replace the relay
	Malfunctioning main switch	Replace the main switch
	Break in harness, or poor connection	Correct or replace the harness
The front door windows cannot be operated by using the main switches	Malfunctioning main switch	Replace the main switch
	Break in harness, or poor connection	Correct or replace the harness
	Malfunctioning motor	Replace motor
The door windows can be operated by using the main switches, but cannot be operated by using the sub switches	Malfunctioning main switch	Replace the main switch
	Malfunctioning sub switch	Replace the sub switch
	Break in harness, or poor connection	Correct or replace the harness
The door windows can be operated even though the lock switch is at "ON"	Malfunctioning main switch	Replace the main switch



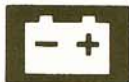


## ADIO AND STEREO

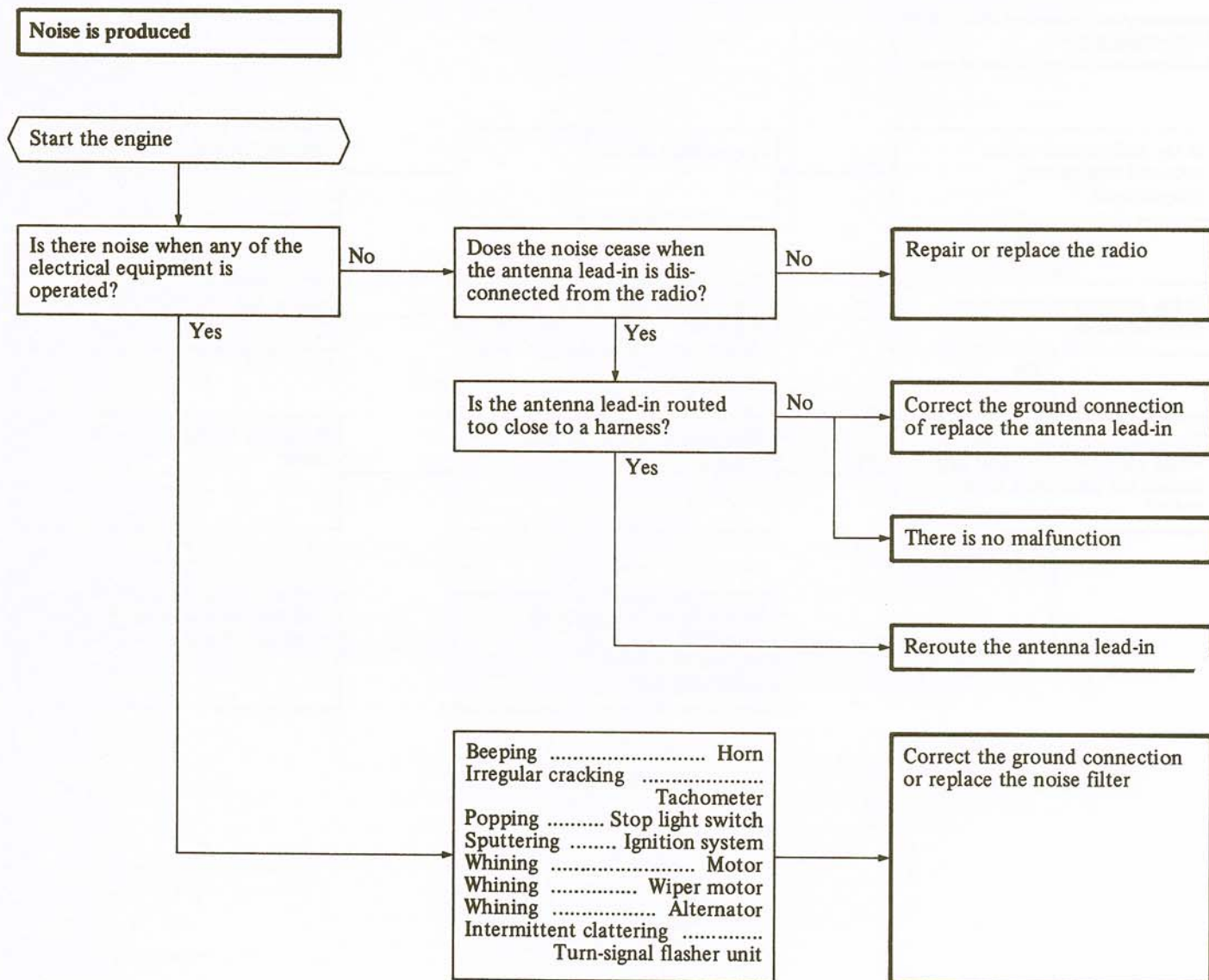
## Poor sensitivity







## TROUBLESHOOTING







Car stereo  
Insufficient volume  
Poor sound quality

Does the problem disappear  
when switched from the  
stereo to the radio?

No

Improperly connected harness  
or connector

Correct the connection of the  
harness or the connector

Yes

Is the tape player head OK?

No

Dirty, worn or damaged tape  
player head  
Improperly installed tape  
player head

Clean or replace the tape  
player head

Yes

Improperly connected tape  
player head lead wire, or a  
malfunction in either a  
capacitor or in the tape  
player itself  
The tape being used was  
recorded monaurally

Correct the connection or re-  
place the malfunctioning parts

Use tapes which have been  
recorded in stereo

The auto reverse does not  
function

The program changes  
when the direction selector  
button is pressed

No

A malfunction in the  
reverse circuit

Repair or replace

Yes

A malfunction in the auto-  
reverse circuit

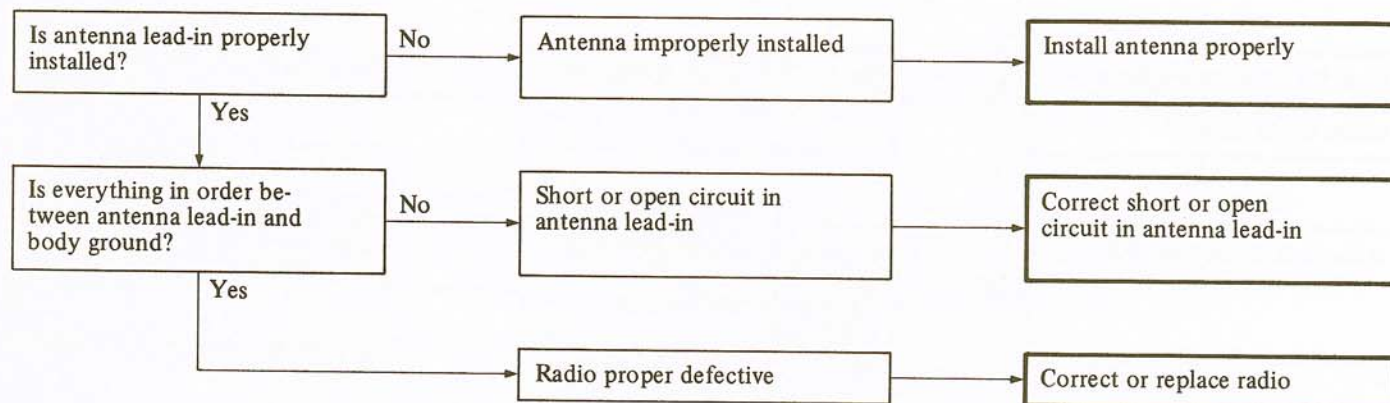
Repair or replace the radio  
itself



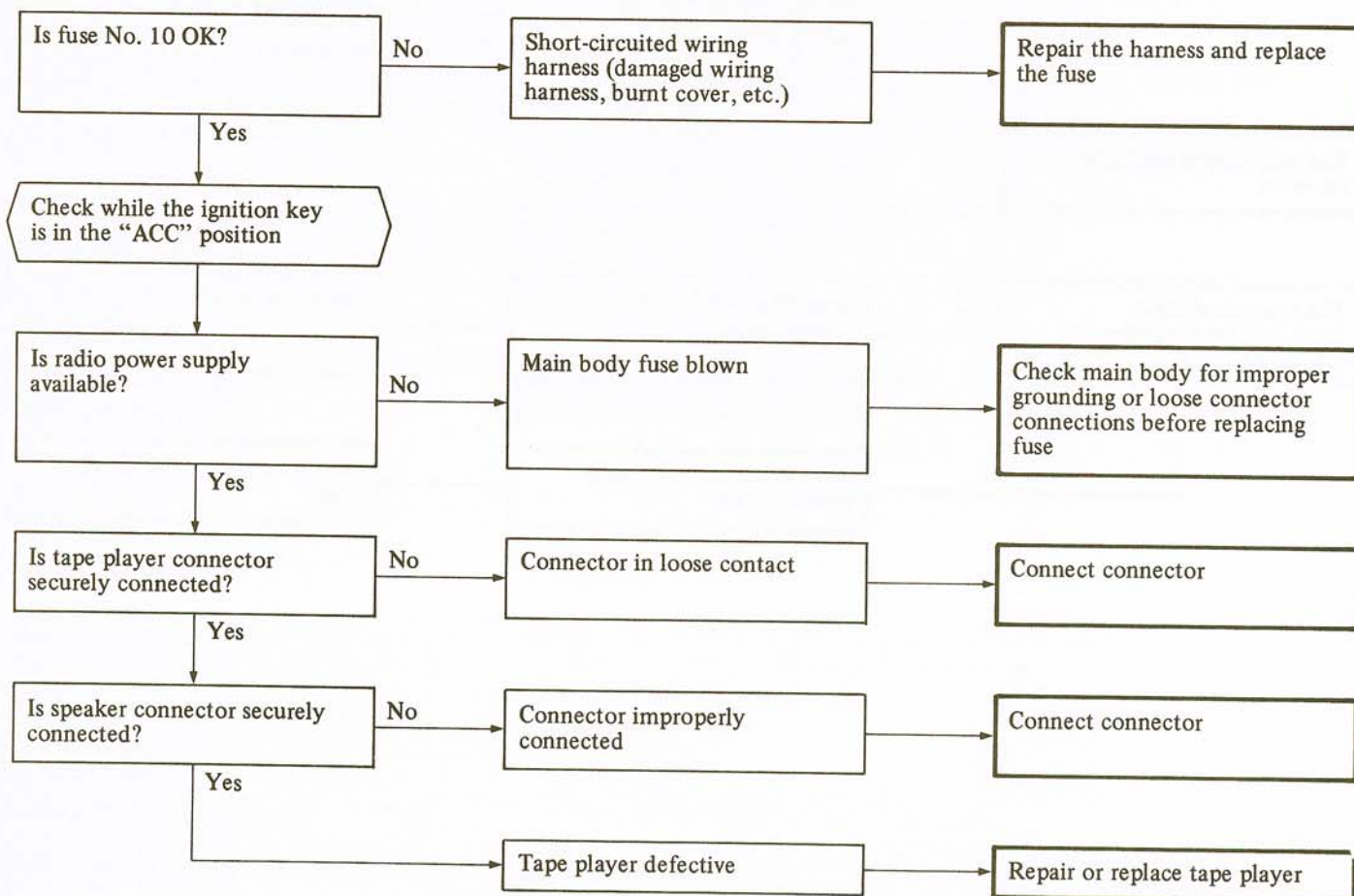


## TROUBLESHOOTING

No automatic tuning,  
excessive noise



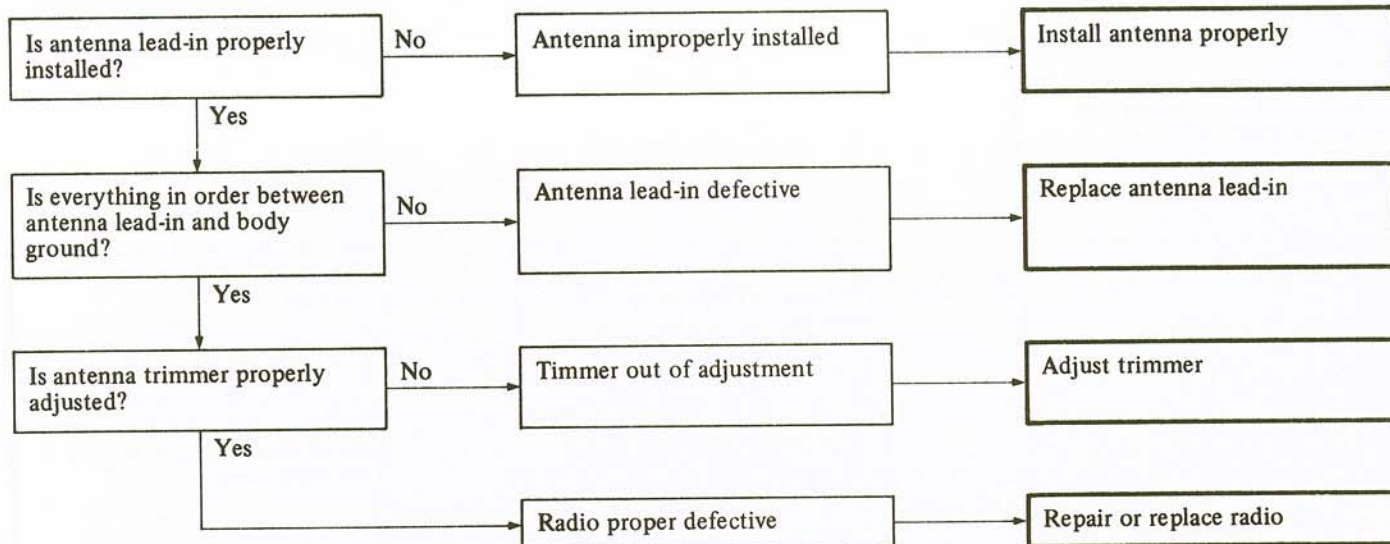
No sound







Poor radio sensitivity,  
excessive noise

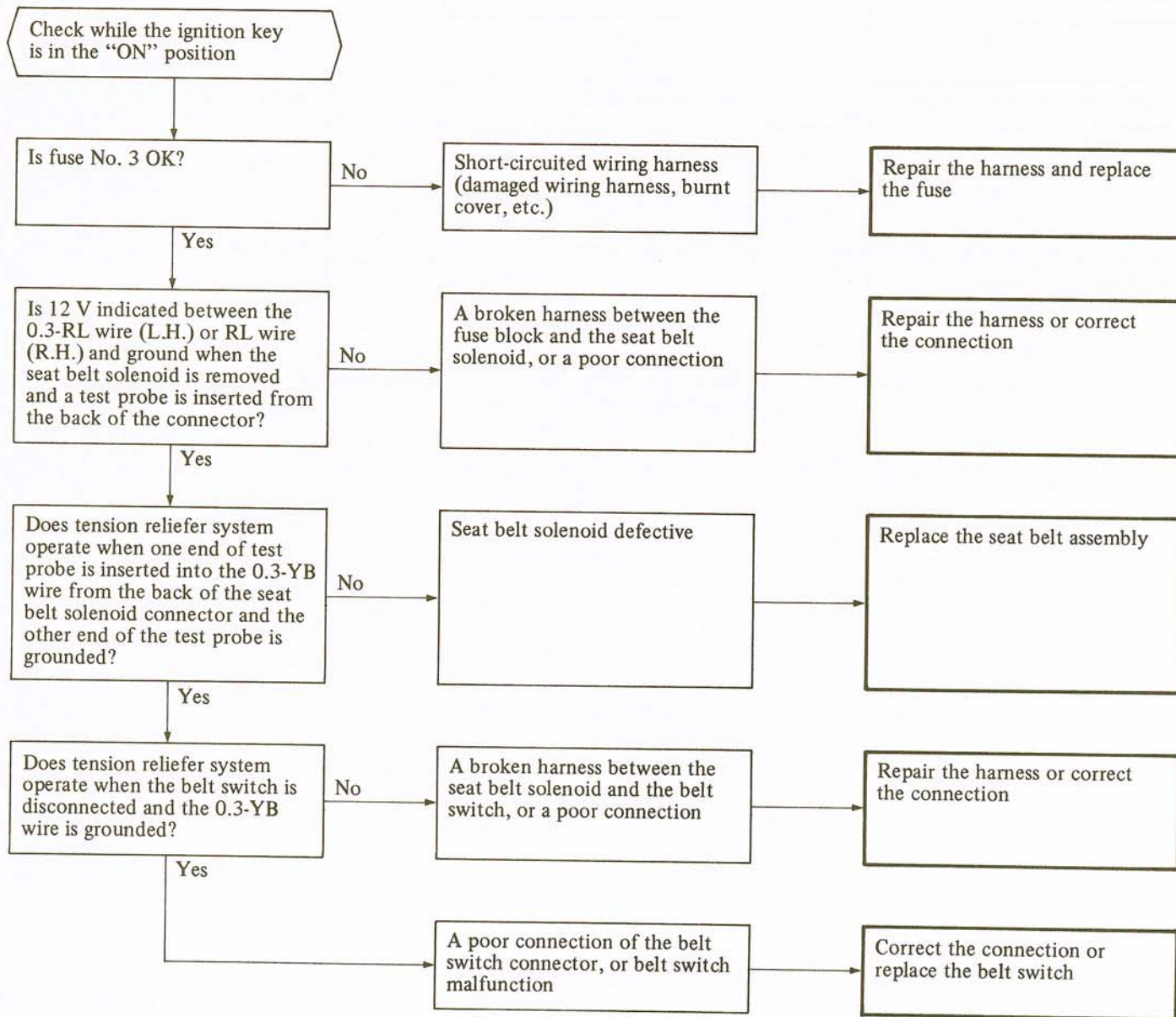






### 3-POINT ELR SEAT BELTS WITH TENSION RELIEFERS

Seat belt tension reliefer system  
does not function when ignition  
key is at "ON"



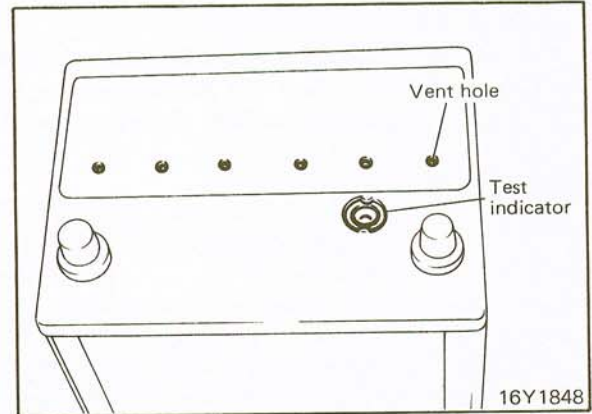




## BATTERY

### General Information

The maintenance-free battery is, as the name implies, totally maintenance free and has no removable battery cell caps. Water never needs to be added to the maintenance-free battery. The battery is completely sealed, except for small vent holes in the cover. These vent holes allow what small amount of gasses are produced in the battery to escape. The special chemical composition inside the battery reduces the production of gas to an extremely small amount at normal charging voltages. The battery contains a visual test indicator which indicates the condition of the battery.



### Battery Visual Inspection

1. Make sure ignition switch is in OFF position and all battery feed accessories are OFF.
2. Disconnect battery cables from battery (negative first).
3. Remove battery from vehicle.

### Caution

Care should be taken in the event battery case is cracked or leaking to protect hands from the electrolyte. A suitable pair of rubber gloves (not the household type) should be worn when removing battery by hand.

4. Inspect battery carrier for damage caused by loss of acid from battery. If acid damage is present it will be necessary to clean area with a solution of clean warm water and baking soda. Scrub area with a stiff bristle brush and wipe off with a shop towel moistened with ammonia or baking soda in water.
5. Clean top of battery with same solution as described in Step 4.
6. Inspect battery case and cover for cracks. If cracks are present battery must be replaced.
7. Clean the battery posts with a suitable battery post cleaning tool.
8. Clean the inside surfaces of the terminal clamps with a suitable battery terminal cleaning tool. Replace damaged or frayed cables and broken terminal clamps.
9. Reinstall the battery in vehicle.
10. Connect cable clamps to battery post making sure top of clamp is flush with top of post.
11. Tighten the clamp nut securely.
12. Coat all connections with light mineral grease after tightening.





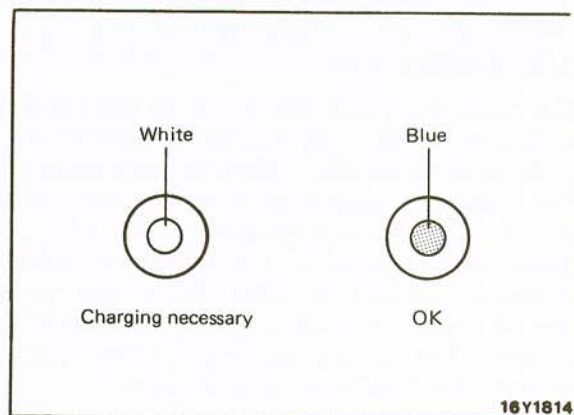
## SERVICE ADJUSTMENT PROCEDURES

### Charge Rate

If the test indicator is white, the battery should be charged as outlined below. When the dot appears or when maximum charge shown below is reached, charging should be stopped.

### Charge Rate Chart

Battery	NX100-S6 (S)-MF (420 amps)		NX120-7-MF (600 amps)	
	5 amps 10 hrs.	10 amps 5 hrs.	5 amps 12 hrs.	10 amps 6 hrs.
Slow charging				
Fast charging	20 amps 2.5 hrs.	30 amps 1.5 hrs.	20 amps 3 hrs.	30 amps 2 hrs.



### CHARGING SYSTEM

Problems in charging system could be due to improper fan belt deflection, faulty wiring or connector, or a discharged battery. A defective electronic voltage regulator is not always the cause. What is important in troubleshooting of charging system, therefore, is to determine whether the problem is due to a run-down or overcharged battery. Then check previously mentioned items before checking alternator. In this manner a fault in a circuit other than alternator might also be detected.

This alternator has an "F" terminal for checking, as shown in the illustration (6EL068), which is provided in order to make troubleshooting easier. The (F) in the circuit in the illustration (1EL042) is the "F" terminal for checking. The voltage of this terminal can be checked from outside the alternator through the access hole provided in the rear bracket.

The voltage readings of the "F" terminal indicate as follows:

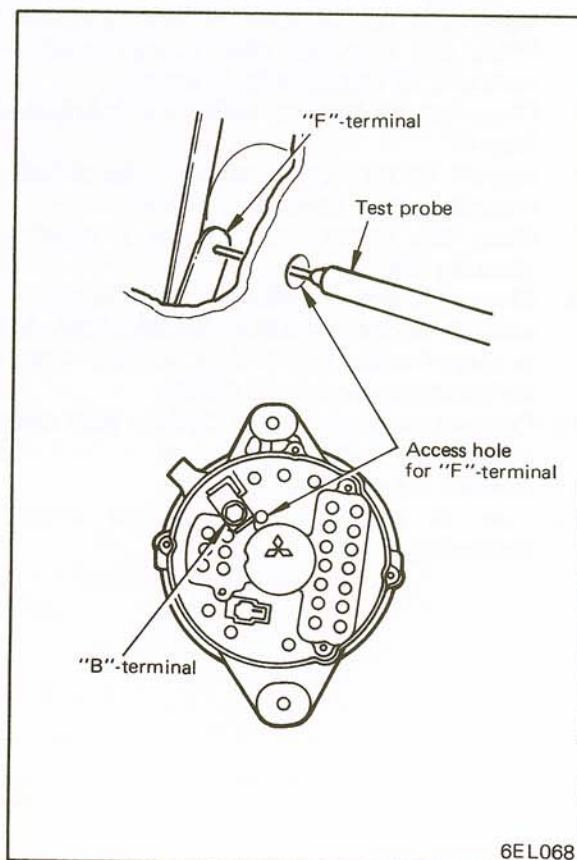
1. Ignition switch at "OFF"

Normal if voltage is 0 V. If voltage is close to battery voltage, the (+) diode is short-circuited, and, moreover, there is a malfunction of the electronic voltage regulator. If the voltage is 0.5 to 2.0 V, the (+) diode is short-circuited.

2. Ignition switch "ON"

Under normal conditions, only voltage equivalent to the voltage drop (0.5 to 2.0 V) of the power transistor within the electronic voltage regulator will appear.

If a voltage close to battery voltage is noted, current is not flowing to the field coil, which means that there is a malfunction of the electronic voltage regulator. In this instance, there should be no voltage generation, so start the engine and confirm that there is none. Also check to be sure that field current flows and there is voltage generation at the instant when, with the engine running, the "F" terminal for checking is grounded to the rear bracket.





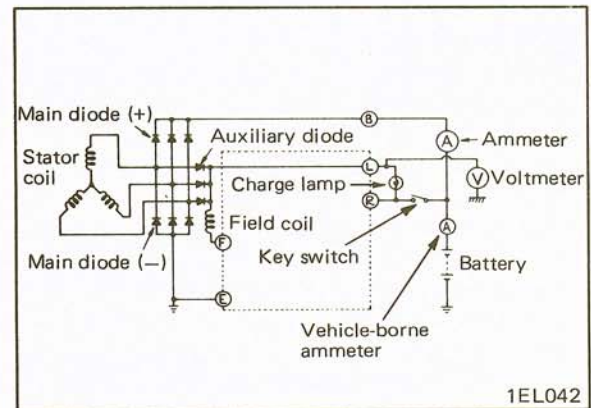


If the voltage reading is 0 V, the possible causes could be wiring damage of the field coil, poor contact of the brushes, a malfunction of the electronic voltage regulator, poor contact of the connector, and/or poor contact in the ignition switch. In any case, the alternator will not generate. In addition, if the negative (–) brush is grounded, or if there is a short-circuit inside the electronic voltage regulator, the voltage of the “F” terminal will be 0 V, which means that there is an overcharge.

### 3. While engine is running

Under normal conditions, the voltage will increase as the engine rpm is increased. If, with the battery fully charged, there is no load on the alternator, voltage will be close to output voltage.

If the voltage remains low even though the engine rpm is increased, the regulator has not yet reached the operating voltage, or current is continuing to flow to the regulator. If the latter, an overcharge will result.



1EL042

## CURRENT OUTPUT TEST

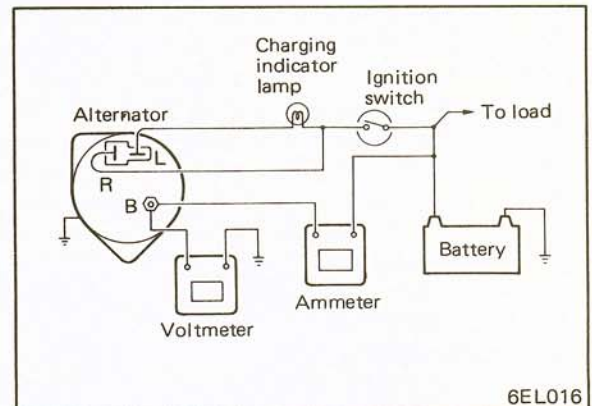
1. Place the ignition switch at OFF.
2. Disconnect the battery ground cable.
3. Disconnect the cable from terminal “B” of the alternator and connect a 60 A ammeter between the terminal “B” and cable.
4. Connect a voltmeter between terminal “B” (+) and ground (–).
5. Set the engine tachometer.
6. Reconnect battery ground cable to the battery. The voltmeter should indicate the battery voltage.
7. Start the engine.
8. Turn on all electrical loads, accelerate the engine speed to 2,500 to 3,000 rpm and read the output current.

Output current:

Over 90% of nominal output: Alternator is good.

70 to 90% of nominal output: Recheck output current.

Less than 70% of nominal output: Alternator defective.



6EL016





### NOTES

1. After the engine has been started, the ammeter indication will drop as the battery reaches the fully charged condition. Read the indication at its maximum value while increasing the engine revolution.
2. If the battery is in the fully charged condition, current will not flow, resulting in a no-flow condition of the nominal output current. In this case, measure the output current after the battery has been discharged by cranking the engine or increase the electrical load by adding new parallel circuits.

### REGULATED VOLTAGE TEST

1. Turn ignition switch OFF.
2. Disconnect the battery ground cable.
3. Disconnect the battery positive cable and connect a 60 A ammeter between the battery positive terminal and cable.
4. Connect a voltmeter between terminal "L" of alternator and ground.
5. Set the engine tachometer.
6. Reconnect the battery ground cable to the battery. The voltmeter should indicate 0 V; if it is not, the alternator or wiring is defective.
7. Short circuit the ammeter terminals and start the engine.

#### NOTE

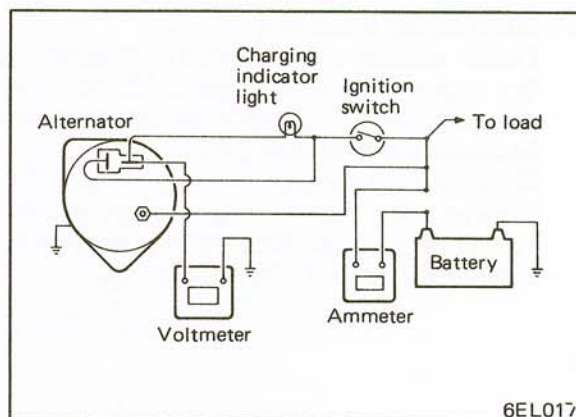
Make sure that the starter current does not flow through the ammeter while starting the engine.

8. Increase the engine speed to 2,000 to 3,000 rpm and check the ammeter reading. If the reading is 5 A or less, check the voltmeter reading. This reading is the regulated voltage. If the ammeter reading is more than 5 A, either continue charging until the reading drops below 5 A or replace the battery with one that is fully charged and then repeat the test.

---

Regulated voltage . . . . . 14.4 V  $\pm$  0.5 at 20°C (68°F)

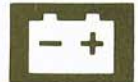
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### HANDLING PRECAUTIONS

1. Make sure that alternator, battery, etc., are connected properly. If battery polarity is reversed, excessive current will flow from battery to alternator, and damage to diodes or wiring harness could result.
2. Do not disconnect battery terminals while engine is running. Surge voltage will be produced which could cause deterioration of diodes or transistors.
3. When battery is to be quick-charged, be sure to disconnect battery terminals first. If terminals are not disconnected, damage to diodes could result.
4. When a steam cleaner is used, make sure that alternator is not directly exposed to steam.





## IGNITION SYSTEM

### Ignition Timing Adjustment

Adjustment condition

Coolant temperature: 80 to 90°C (170 to 190°F)

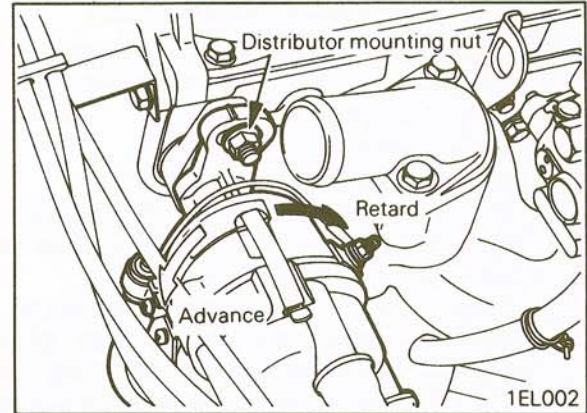
Lights and all accessories: OFF

Transmission: N (Neutral)

1. Start engine and run at curb idle speed.
2. Connect tachometer and timing light.
3. Check basic ignition timing and adjust if necessary.

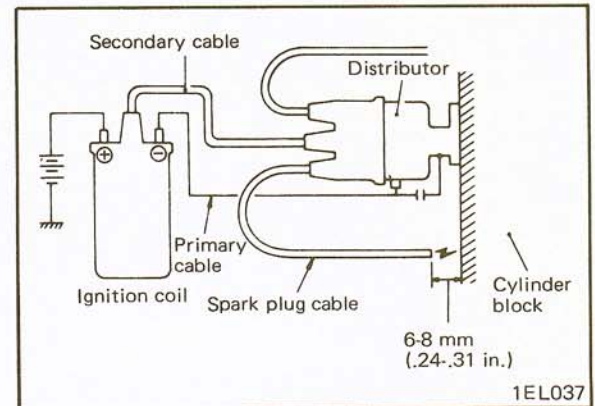
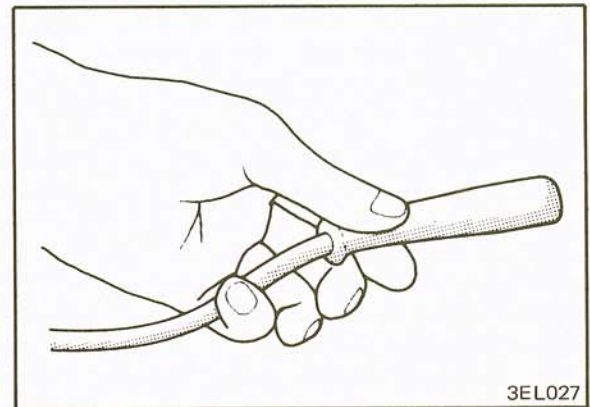
Basic ignition timing . . . . .  $7 \pm 2^\circ$  BTDC

4. To adjust ignition timing, loosen distributor mounting nut and turn distributor housing. (1EL002)
5. After adjustment, securely tighten mounting nut.

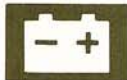


### SPARK PLUG CABLE TEST

1. Disconnect spark plug cable from spark plug.  
When spark plug cable is pulled out, be sure to pull by the cable cap. If spark plug is removed by pulling on cable only open circuit might result.
2. Hold the spark plug cable about 6-8 mm (.24-.31 in.) away from engine proper (grounding portion such as cylinder block) and crank engine to verify that sparks are produced.







### SPARK PLUG INSPECTION AND TEST

1. Remove the spark plugs from the engine.
2. Visually check the spark plugs for the following and replace if defective.
  - Broken insulator.
  - Worn electrode.
  - Deposited carbon. Use a plug cleaner for cleaning. Clean porcelain insulator above shell as well.
  - Damaged or broken gasket.
  - Burnt condition of porcelain insulator at spark gap. If black carbon deposit is evident, probable cause is too rich a fuel mixture or extremely low air intake. Misfiring due to excessive spark gap is also suspected. If insulator is burnt white, too lean a fuel mixture, excessively advanced ignition timing, improperly tightened plug, etc. are suspected.
3. Connect the spark plug to the high tension cable, ground outer electrode (main body), and crank engine. In the atmosphere, only short sparks are produced because of small discharge gap. If the spark plug is good, however, sparks will occur in discharge gap (between electrodes). In a defective spark plug, no sparks will occur because of leak of insulation puncture.
4. Check plug gap with plug gap gauge. If it is not within specified limit, adjust by bending ground electrode. Make sure that the gap of even a new spark plug is checked before spark plug is mounted to engine.

Spark plug gap . . . . . 1.0-1.1 mm (.039-.043 in.)

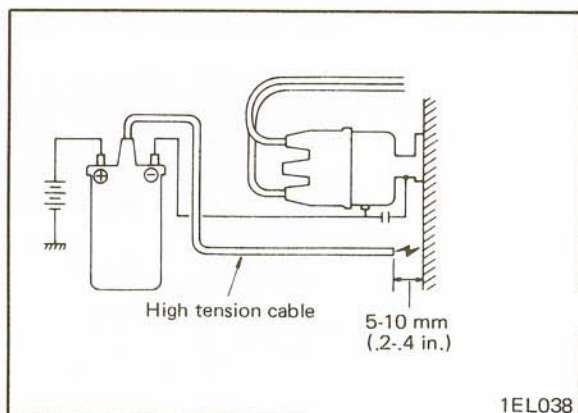
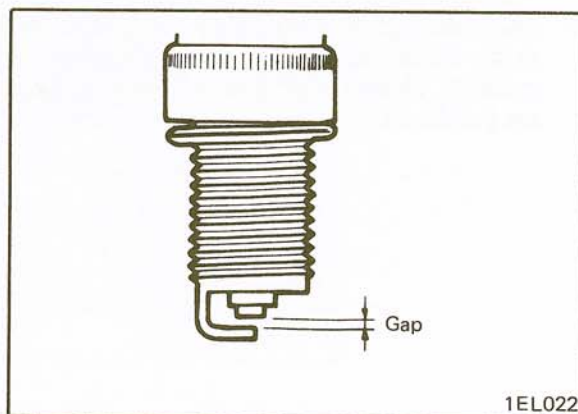
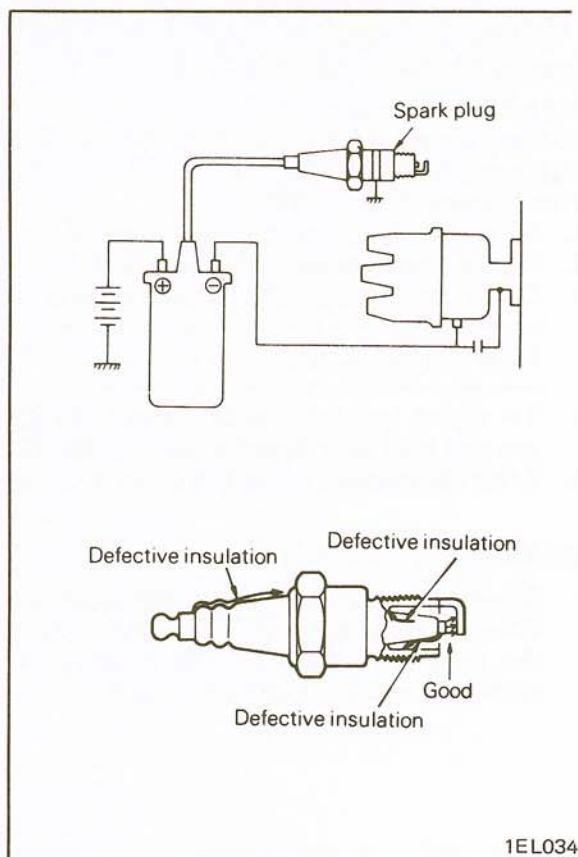
5. Install the spark plug and tighten to specified torque. If it is overtightened, damage to threaded portion of cylinder head might result.

Spark plug . . . . . 20-29 Nm (15-21 ft.lbs.)

### Spark Test Without Cranking

If spark test is performed by cranking while the catalyst is hot, unburned gas will be supplied to the catalyst, and this is not desirable to the catalyst.

For this reason, use the following methods which allow spark test to be performed without cranking.

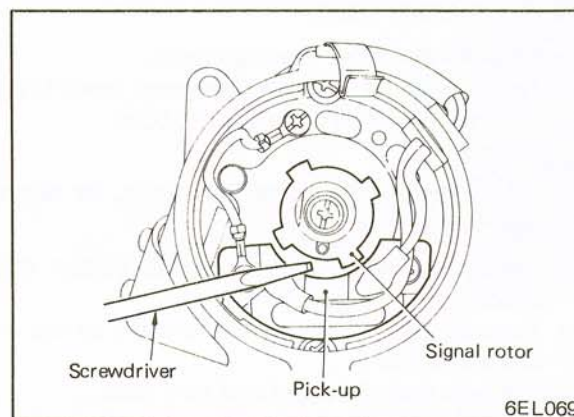






Remove the distributor cap.

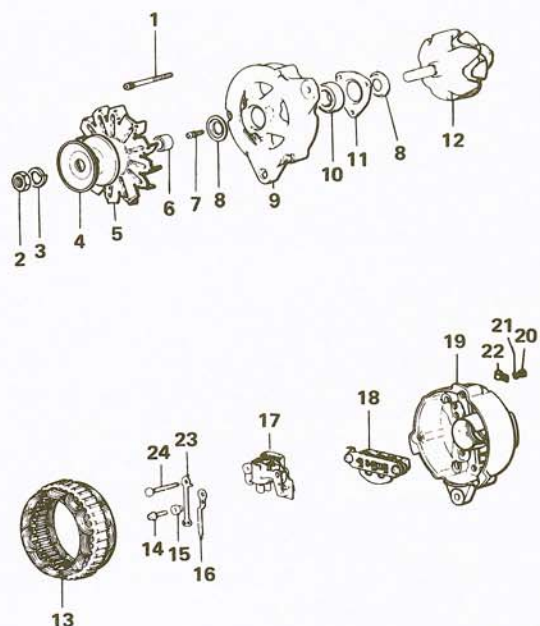
2. Check signal rotor position in relation to the pick-up. If it is not the position shown in the illustration (6EL069), turn the crankshaft manually so that the projection of the signal rotor is moved away from the center part of the pick-up. In other words, the signal rotor should be positioned so that current can flow to the ignition coil.
3. Disconnect the high-tension cable from the center tower of the distributor cap, and hold the end of the cable about 5 to 10 mm (.2 to .4 in.) away from the cylinder block of the engine. (1EL038)
4. Turn the ignition switch to "ON". Then, when a piece of metal (the tip of a screwdriver for instance) is inserted into the detection coil of the pick-up and then moved away, a spark can be generated. (6EL069)



## CHARGING SYSTEM

### COMPONENTS

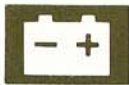
1. Through bolt (3)
2. Nut
3. Spring washer
4. Pulley
5. Fan
6. Collar
7. Screw (3)
8. Seal (2)
9. Front bracket
10. Bearing
11. Retainer
12. Rotor
13. Stator
14. Screw
15. Insulator
16. Plate "L"
17. Brush holder and regulator
18. Rectifier
19. Rear bracket
20. Nut
21. Washer
22. Condenser
23. Plate "B"
24. Screw ("B"-terminal)



### REMOVAL

1. Disconnect battery ground cable.
2. Remove the drive belt. See "Cooling system", Group 7, for detailed procedure.
3. Disconnect wiring and connector from the alternator.
4. Remove the brace bolt and support bolt and remove alternator from engine.





### DISASSEMBLY

1. Remove the three through bolts.
2. Insert plain screwdriver between front bracket and stator core and pry downward. (3EL029)

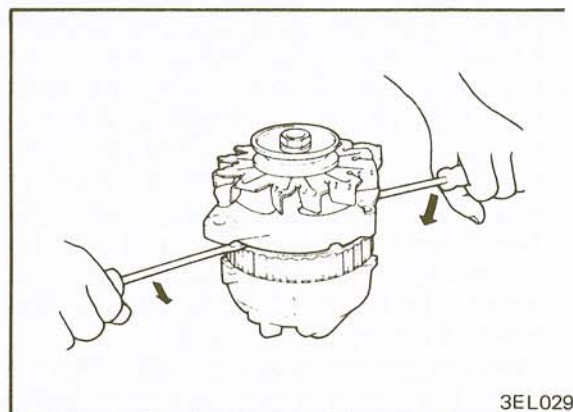
#### Caution

Do not insert screwdriver too deep, as there is danger of damage to stator coil.

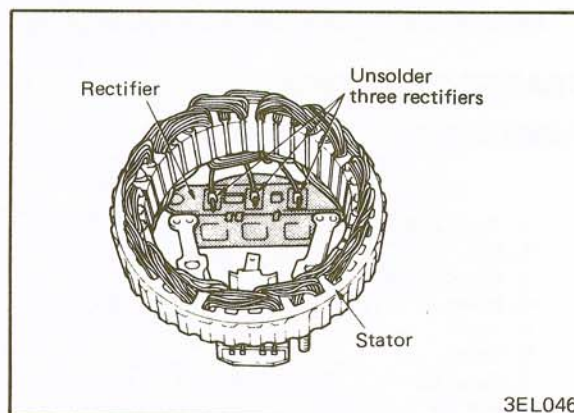
3. Clamp the rotor in a vise with pulley side up (protect rotor from vise jaws).
4. Remove pulley nut. Then remove spring washer, pulley, fan and collar.
5. Remove front bracket and two seals.
6. Remove the rotor from vise.
7. Remove the nut from "B" terminal and remove the washer and condenser.
8. Remove the brush holder screw and rectifier screws.
9. Remove the stator assembly from the rear bracket.
10. When stator is to be removed, unsolder three stator leads soldered to main diodes on rectifier. (3EL046)

#### Caution

1. When soldering or unsoldering, use care to make sure that heat of soldering iron is not transmitted to diodes for a long period. Finish soldering or unsoldering in as short a time as possible.
2. Use care that no undue force is exerted to leads of diodes.
11. When separate the rectifier from brush holder, unsolder two plates soldered to rectifier.



3EL029



3EL046

### INSPECTION

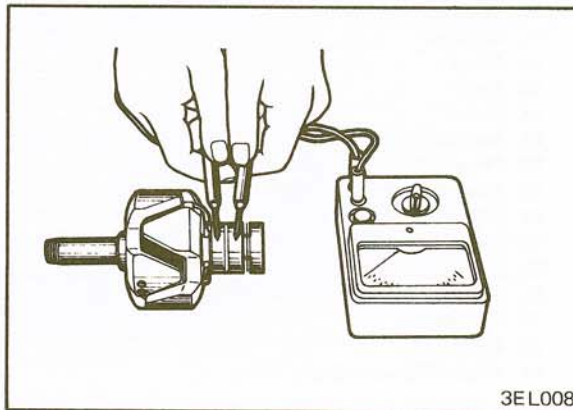
#### Rotor

1. Check rotor coil for continuity. Check to ensure that there is continuity between slip rings.

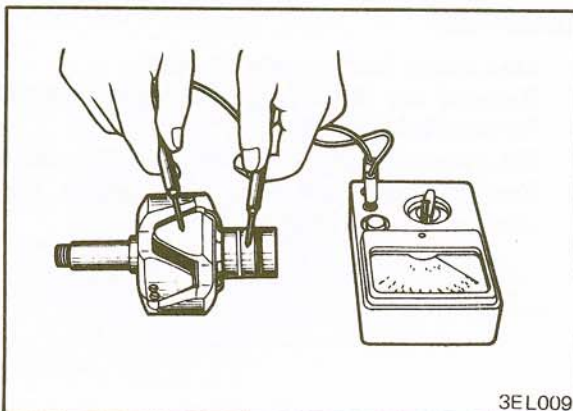
Resistance value ..... 2.5-4 $\Omega$

If resistance is extremely small, it means that there is a short. If there is no continuity or if there is short circuit, replace rotor assembly.

2. Check rotor coil for grounding. Check to ensure that there is no continuity between slip ring and core. If there is continuity, replace rotor assembly.



3EL008



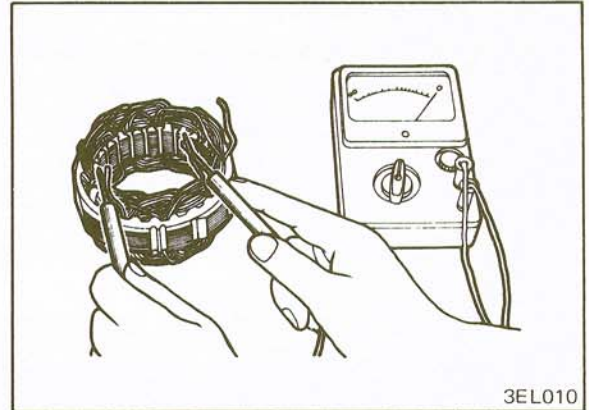
3EL009



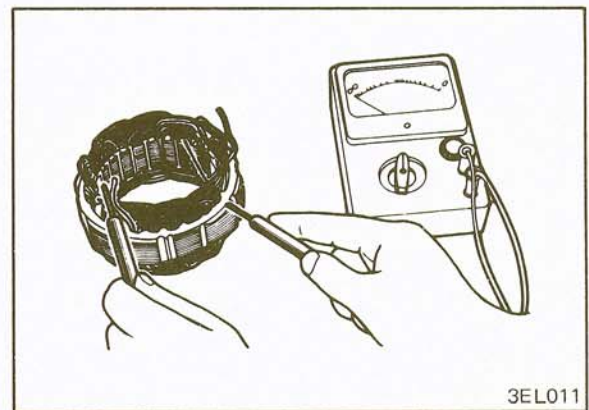


## Stator

1. Make continuity test on stator coil. Check to ensure that there is continuity between coil leads.  
If there is no continuity, replace stator assembly.



2. Check coil for grounding. Check to ensure that there is no continuity between coil and core. If there is continuity, replace stator assembly.



## Rectifier

1. (+) HEATSINK ASSEMBLY TEST

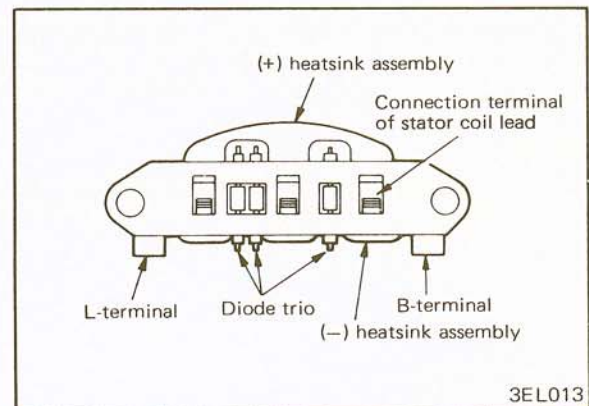
Check for continuity between (+) heatsink and stator coil lead connection terminal with a circuit tester. If there is continuity in both directions, diode is shorted. Replace rectifier assembly.

2. (-) HEATSINK ASSEMBLY TEST

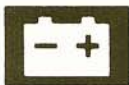
Check for continuity between (-) heatsink and stator coil lead connection terminal. If there is continuity in both direction, diode is shorted, and rectifier assembly must be replaced.

3. DIODE TRIO TEST

Check three diodes for continuity by connecting a circuit tester to both ends of each diode. If there is no continuity or no continuity in both directions, diode is defective and heatsink assembly must be replaced.

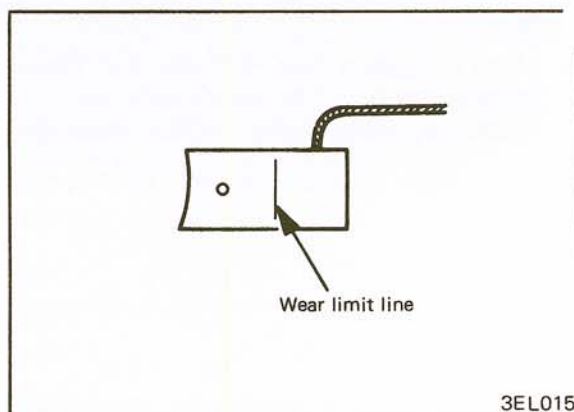




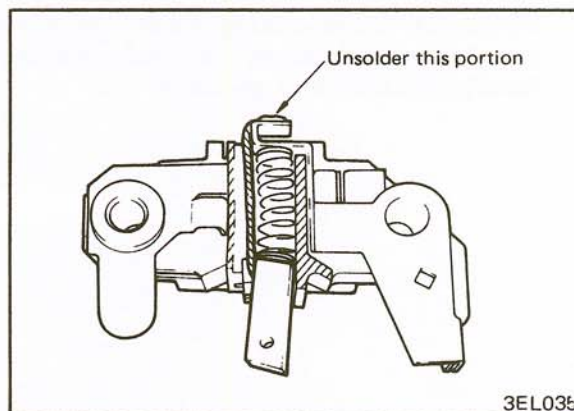


### BRUSH REPLACEMENT

1. Brush worn down to wear limit line should be replaced.



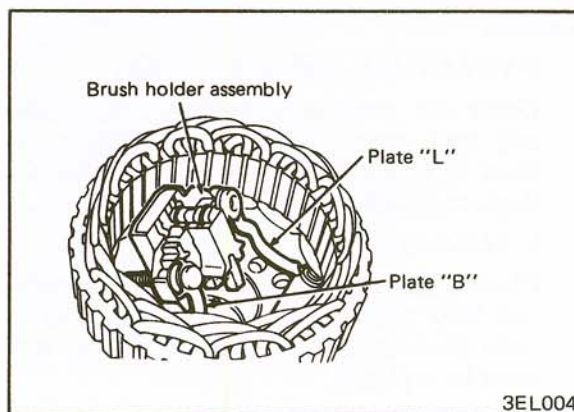
2. If pigtail is unsoldered, brush and spring will come off.



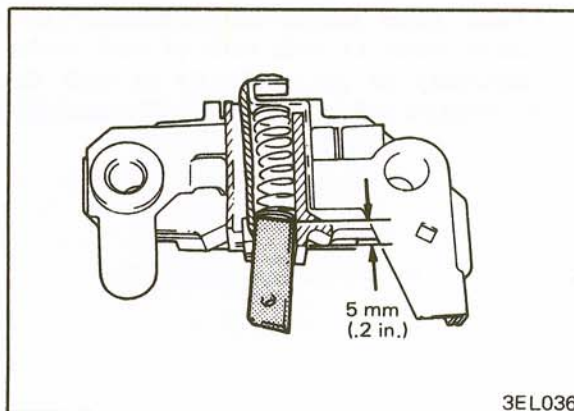
3. When only brush or brush spring is to be replaced, it can be replaced without removing stator, etc. With brush holder assembly raised as illustrated, unsolder pigtail of brush.

#### NOTE

If L- and B-terminals of rectifier assembly are bent, damage to rectifier moulding might result. Therefore, plates "B" and "L" should be gently bent at center.



4. When installing new brush, solder pigtail so that brush will be pressed into holder about 5 mm (.2 in.).



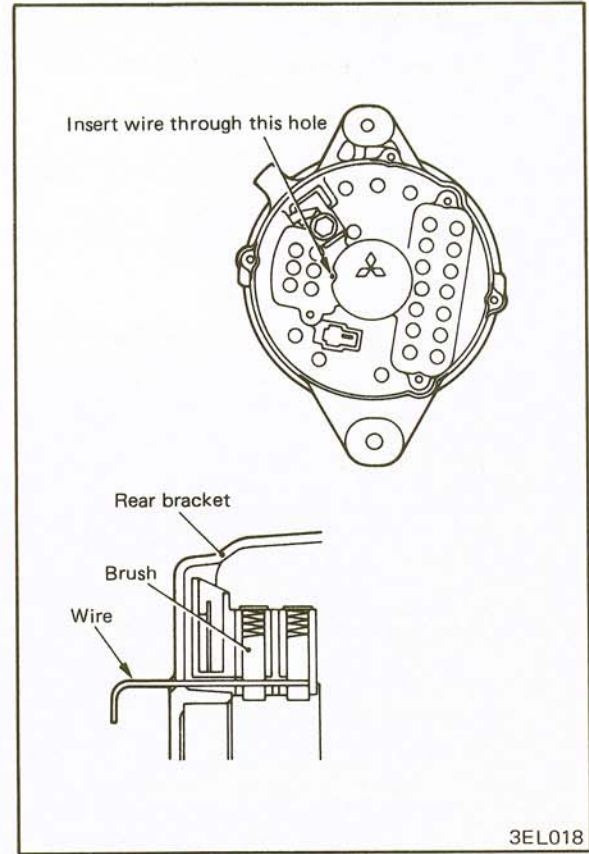




## EASSEMBLY

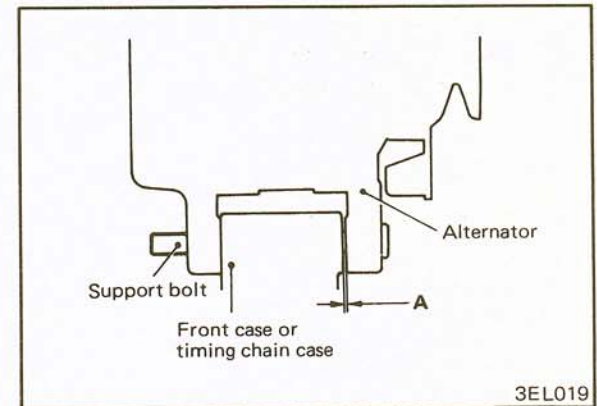
Perform reassembly in reverse procedure of disassembly, pay attention to the following item:

1. Before rotor is attached to rear bracket, insert wire through small hole made in rear bracket to lift brush. After rotor has been installed, the wire can be removed.



## INSTALLATION

1. Install the alternator to the engine front case and insert the support bolt through the alternator leg into front case. Do not install the nut.
2. Install the brace bolt but do not tighten the bolt.
3. Push alternator toward front of engine and check clearance "A" between alternator leg and front case or timing chain case. If clearance is more than 0.2 mm (.008 in.), insert spacers [0.198 mm (.0078 in.) thick] as required. If support bolt is tightened without reducing clearance "A", alternator leg might be broken.
4. Install the washer and nut to the support bolt.
5. Install drive belt and adjust the drive belt tension.
6. Tighten first the brace bolt and then tighten the support bolt nut to the specified torque.



Tightening torque:

Alternator brace bolt . . . . . 12-14 Nm (9-10 ft.lbs.)

Alternator support bolt nut . . . . .  
20-24 Nm (15-18 ft.lbs.)

7. Connect wiring and connector to the alternator.
8. Connect the battery ground cable.

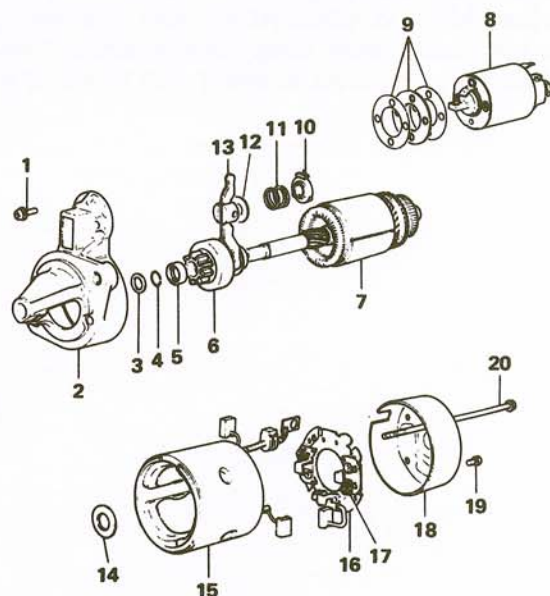




## COMPONENTS

### Direct drive type

1. Screw (2)
2. Front bracket
3. Washer
4. Snap ring
5. Stop ring
6. Overrunning clutch
7. Armature
8. Magnetic switch
9. Packing
10. Spring retainer
11. Lever spring
12. Spring seat
13. Lever
14. Washer
15. Yoke assembly
16. Brush holder
17. Brush spring
18. Rear bracket
19. Screw (2)
20. Through bolt (2)



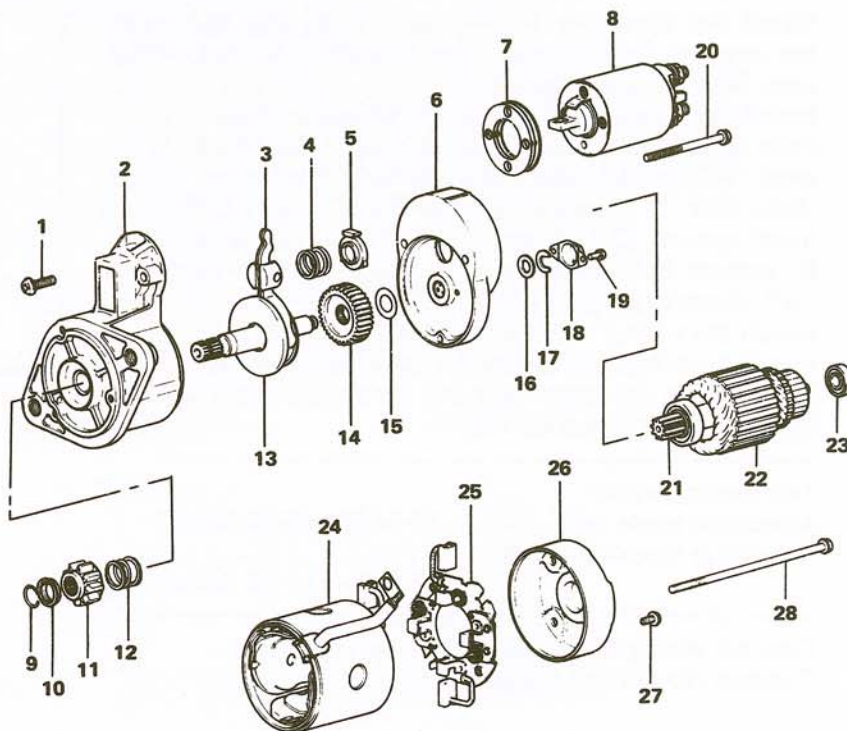
#### NOTE

Numbers show order of disassembly.  
For reassembly, reverse order of disassembly.

6EL07L

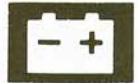
### Reduction drive type

1. Screw (2)
2. Front bracket
3. Lever
4. Spring
5. Spring retainer
6. Center bracket
7. Packing
8. Magnetic switch
9. Snap ring
10. Stop ring
11. Pinion gear
12. Spring
13. Pinion shaft and overrunning clutch
14. Reduction gear
15. Adjusting washer
16. Washer
17. Retaining ring
18. Cover
19. Screw (2)
20. Bolt
21. Front ball bearing
22. Armature
23. Rear ball bearing
24. Yoke assembly
25. Brush holder
26. Rear bracket
27. Screw (2)
28. Through bolt (2)



6EL002





## REMOVAL

1. Disconnect battery ground cable.
2. Disconnect starting motor harness from the starter motor.
3. Remove the two starting motor mounting bolts and remove starter motor.

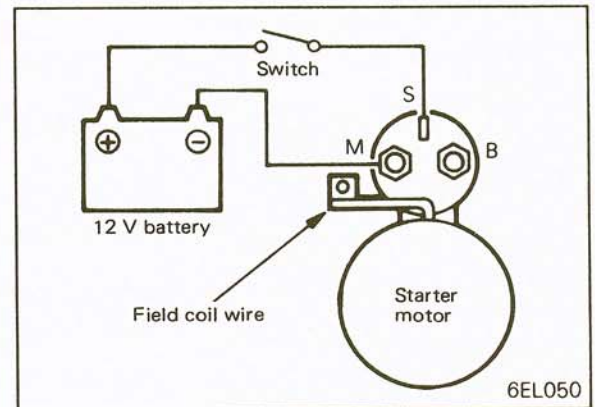
## INSPECTION (after removal)

### Pinion Gap Adjustment

1. Disconnect field coil wire from M-terminal of magnetic switch.
2. Connect a 12 V battery between S-terminal and M-terminal. (6EL050)
3. Set switch to "ON", and pinion will move out.

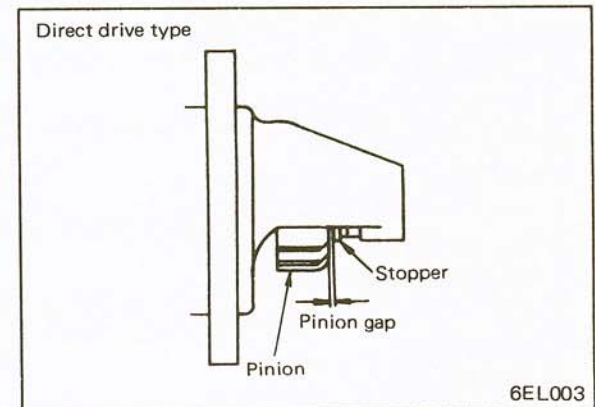
### Caution

This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.

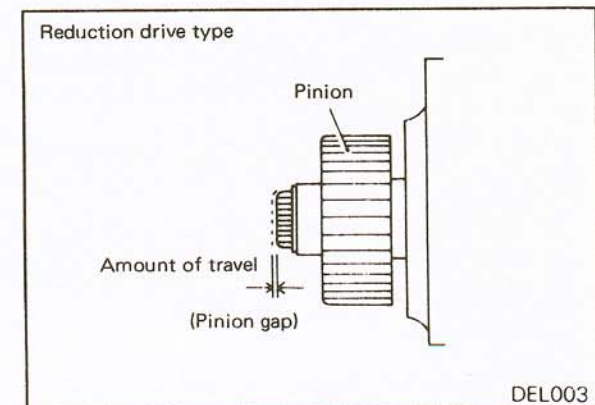


4. Check pinion to stopper clearance (pinion gap) with a feeler gauge. (6EL003)  
If pinion gap is out of specification, adjust by adding or removing washers between magnetic switch and front bracket.

Pinion gap ..... 0.5-2.0 mm (.020-.079 in.)



5. Lightly push back the pinion, and measure the amount of travel, which represents the pinion gap. Adjust the thickness (number) of washers at switch area so that the gap becomes 0.5 to 2.0 mm (.020 to .079 in.).







## COMPONENT SERVICE-STARTING SYSTEM

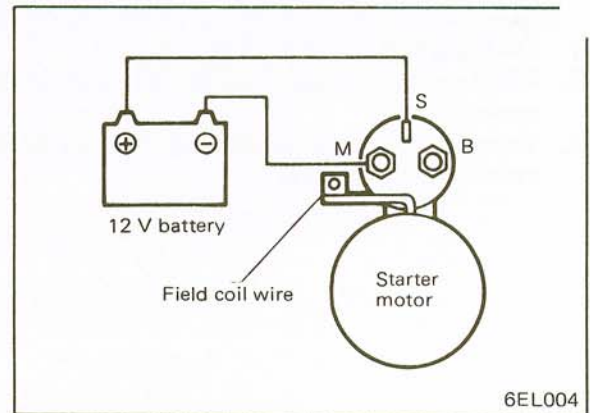
### Pull-in Test of Magnetic Switch

1. Disconnect field coil wire from M-terminal of magnetic switch.
2. Connect a 12 V battery between S-terminal and M-terminal. (6EL004)

#### Caution

This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.

3. If pinion moves out, then pull-in coil is good. If it doesn't, replace magnetic switch.



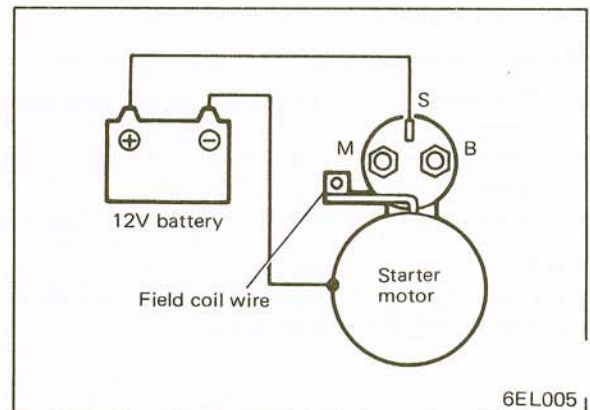
### Hold-in Test of Magnetic Switch

1. Disconnect field coil wire from M-terminal of magnetic switch.
2. Connect a 12 V battery between S-terminal and body. (6EL005)

#### Caution

This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.

3. If pinion remains out, everything is in order. If pinion moves in, hold-in circuit is open. Replace magnetic switch.



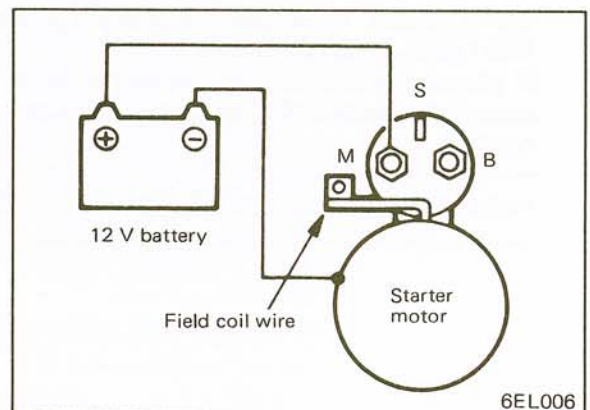
### Return Test of Magnetic Switch

1. Disconnect field coil wire from "M" terminal of magnetic switch.
2. Connect a 12 V battery between M-terminal and body. (6EL006)

#### Caution

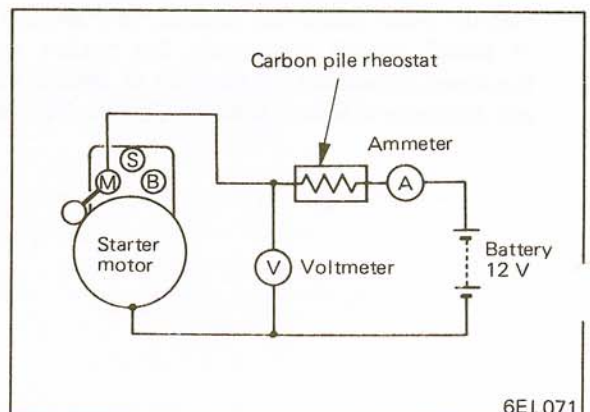
This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.

3. Pull pinion out and release. If pinion quickly returns to its original position, everything is in order. If it doesn't replace magnetic switch.



### Free Running Test

1. Place starter motor in a vise equipped with soft jaws and connect a fully-charged, 12 volt battery to starter motor as follows:
2. Connect a test ammeter (100 amperes scale) and carbon pile rheostat in series with battery positive post and starter motor terminal.
3. Connect a voltmeter (15 volt scale) across starter motor.
4. Rotate carbon pile to full-resistance position. (6EL071)







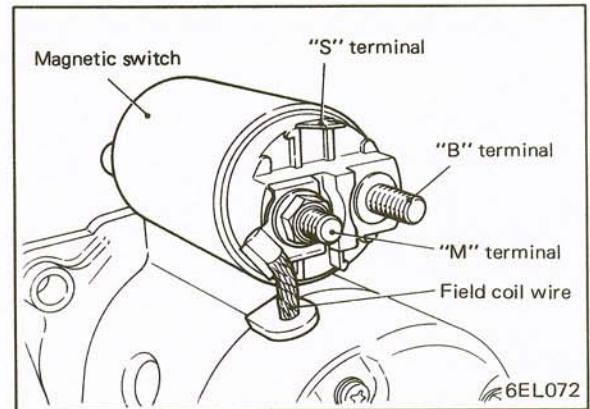
Connect battery cable from battery negative post to starter motor body.

6. Adjust rheostat until battery voltage shown on voltmeter reads 11.5 volts.
7. Check specifications for maximum amperage draw and minimum rpm.

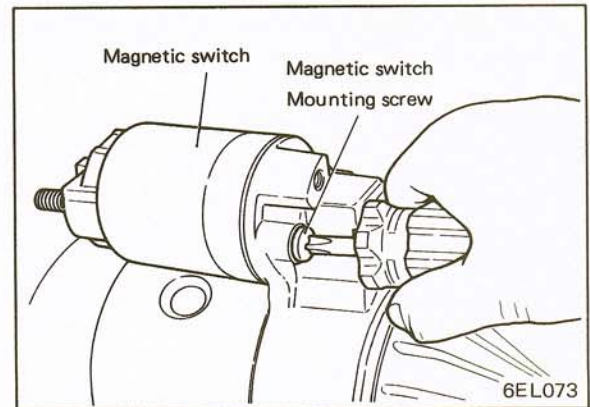
Voltage .....	11.5 Volts
Amperage draw .....	60 Amps
Minimum rpm .....	6,800 rpm

## DISASSEMBLY-DIRECT DRIVE TYPE

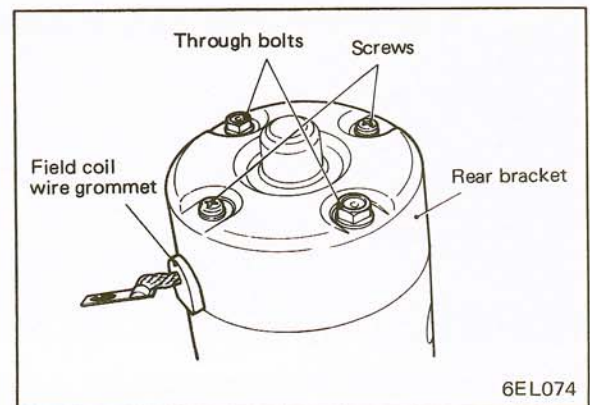
1. Disconnect field coil wire from "M" terminal of magnetic switch.



2. Remove two magnetic switch mounting screws and remove magnetic switch.



3. Remove two through bolts and two screws.
4. Remove rear bracket.

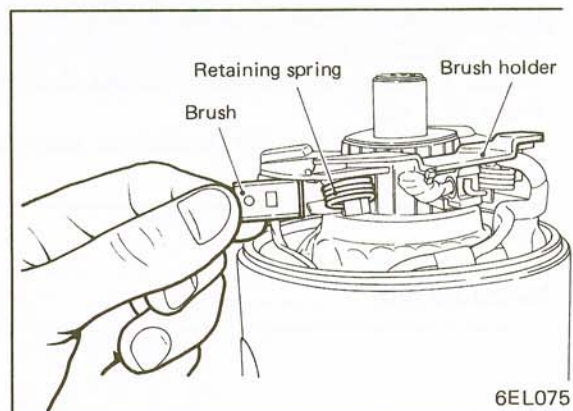






## COMPONENT SERVICE-STARTING SYSTEM

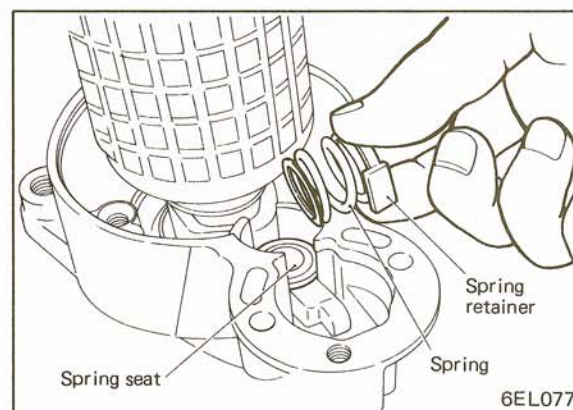
5. Slide the two brushes from brush holder by prying retaining springs back.
6. Remove brush holder.
7. Remove yoke assembly.



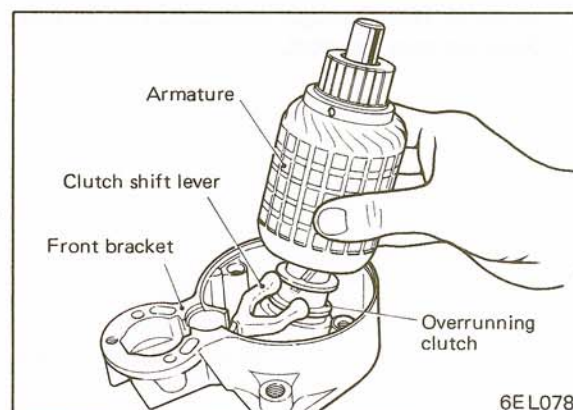
8. Remove washer from rear end of armature.



9. Remove spring retainer, spring and spring seat from front bracket.



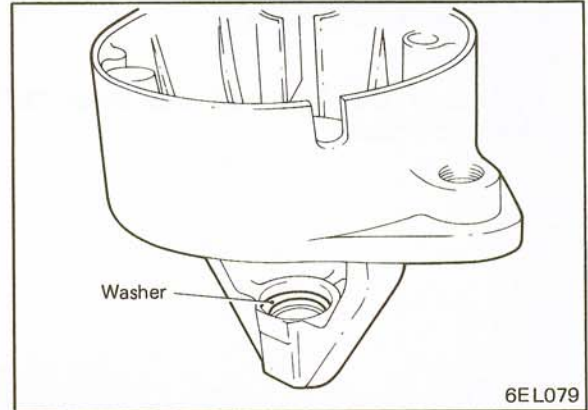
10. Remove armature assembly and lever from front bracket.



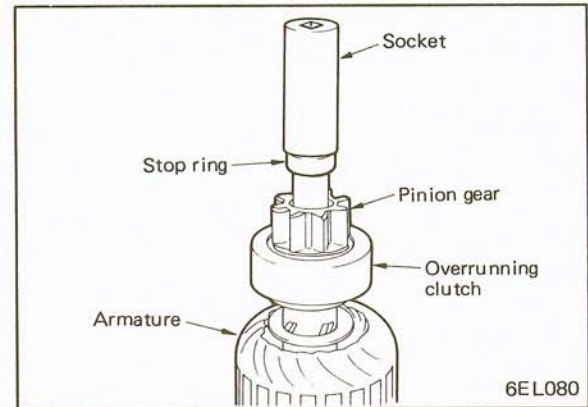




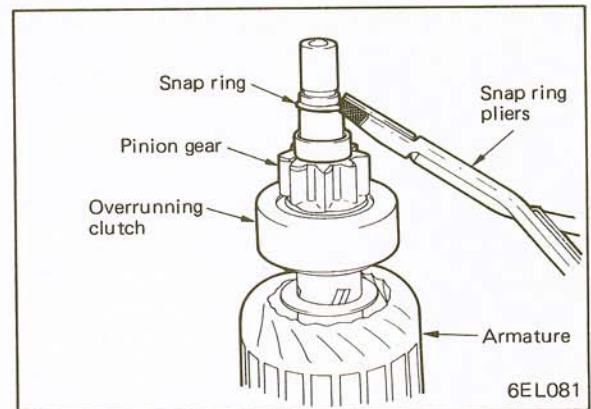
. Remove washer from front bracket.



12. Press stop ring off snap ring with suitable socket.



13. Remove snap ring with snap ring pliers and then remove stop ring and overrunning clutch.



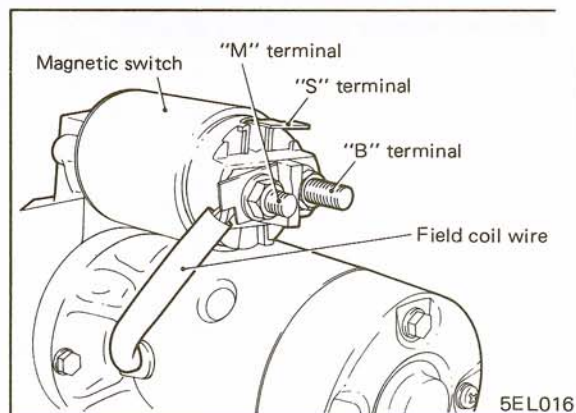




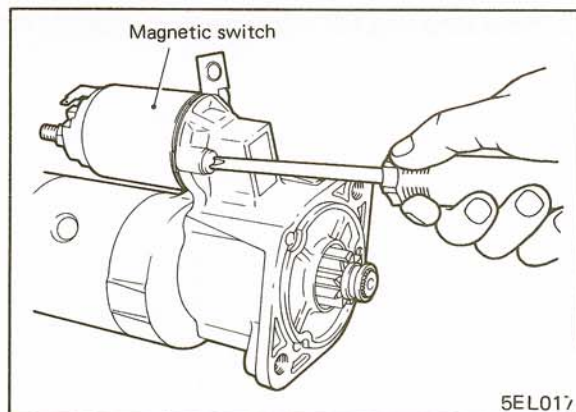
### DISASSEMBLY-REDUCTION

#### Drive Type

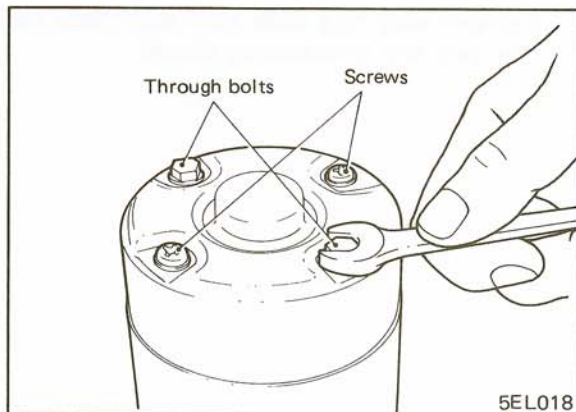
1. Disconnect the field coil wire from "M" terminal of magnetic switch.



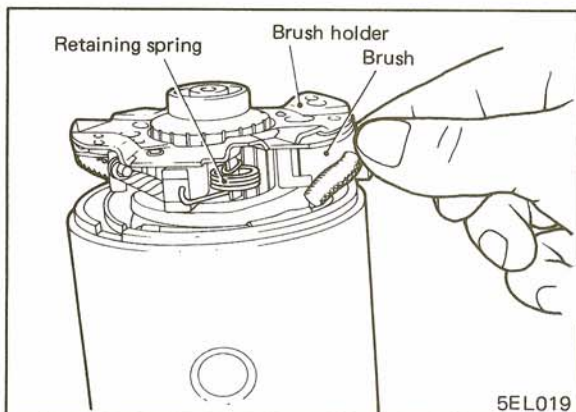
2. Remove the two magnetic switch mounting screws and remove the magnetic switch.



3. Remove the two through bolts and two screws, and then remove the rear bracket.



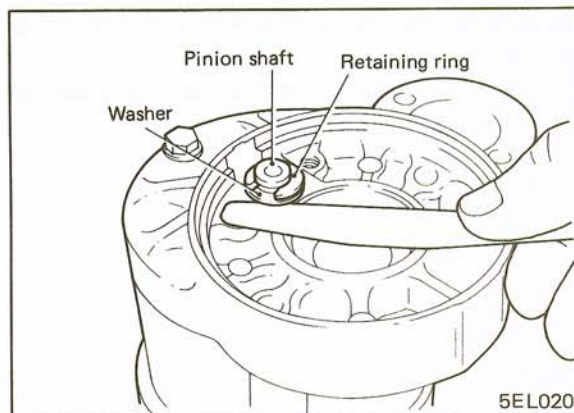
4. Slide the two brushes from brush holder by prying retaining springs back, and then remove the brush holder assembly.
5. Remove the yoke assembly.
6. Remove the armature.



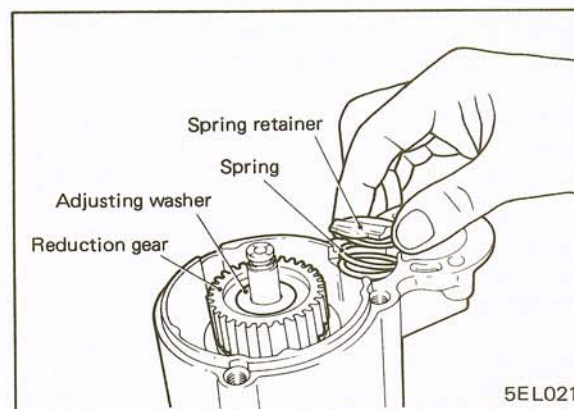




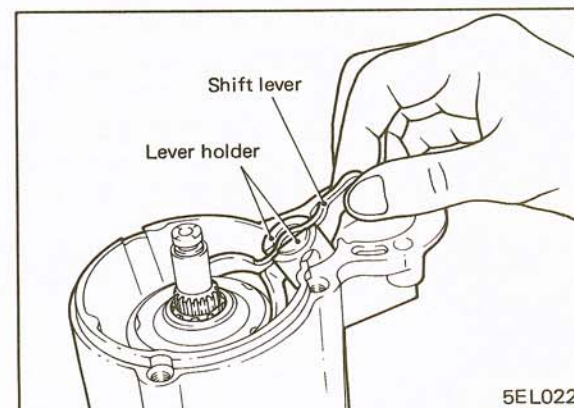
- Remove the pinion shaft end cover from the center cover.
8. Measure the pinion shaft end play using feeler gauge for reassembly.
  9. Remove the retaining ring and washer from the pinion shaft.
  10. Remove the center bracket.



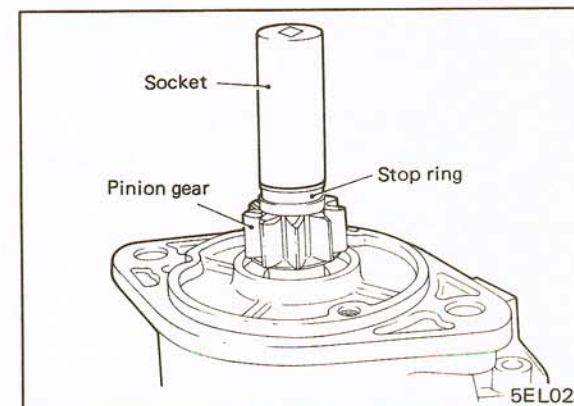
11. Remove the lever spring retainer and spring.
12. Remove the adjusting washer and reduction gear.



13. Remove the clutch shift lever and two lever holder.



14. Press the stop ring off the snap ring with suitable socket.

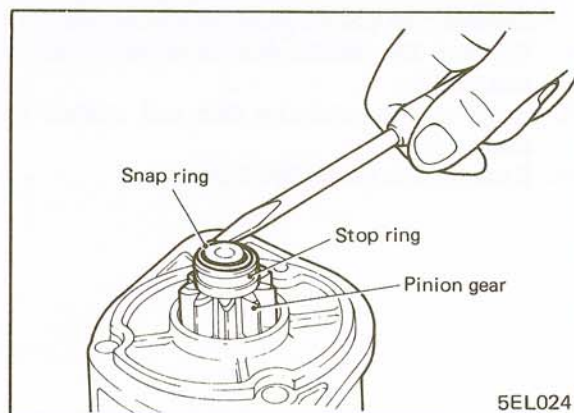




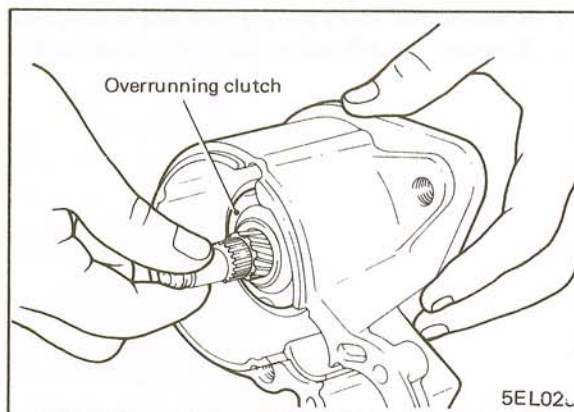


## COMPONENT SERVICE-STARTING SYSTEM

15. Remove the snap ring with screwdriver, and then remove the stop ring.
16. Remove the pinion and spring from pinion shaft.



17. Remove the overrunning clutch from the front bracket.



### CLEANING STARTER MOTOR PARTS

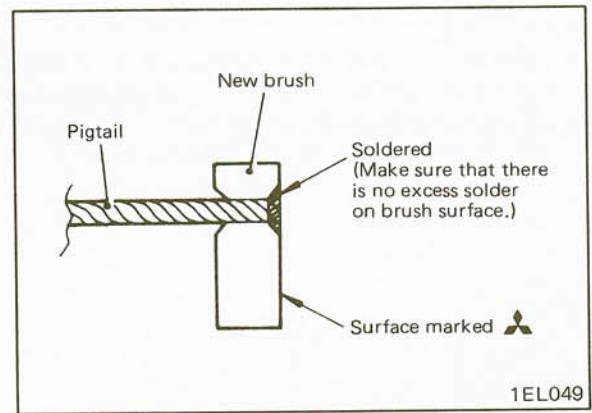
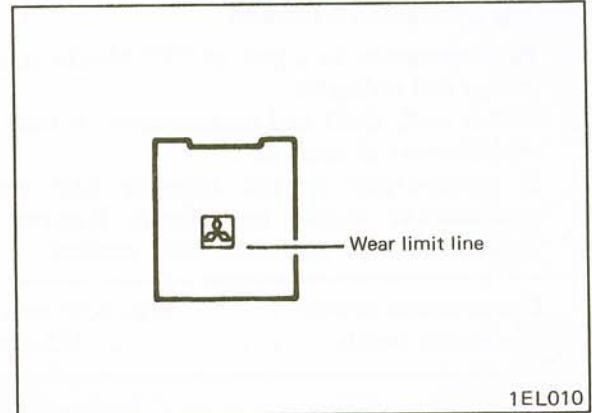
1. Do not immerse parts in cleaning solvent. Immersing the yoke and field coil assembly and/or armature will damage insulation. Wipe these parts with a cloth only.
2. Do not immerse drive unit in cleaning solvent. Overrunning clutch is pre-lubricated at the factory and solvent will wash lubrication from clutch.
3. The drive unit may be cleaned with a brush moistened with cleaning solvent and wiped dry with a cloth.





## RUSHES AND SPRINGS-REPLACEMENT

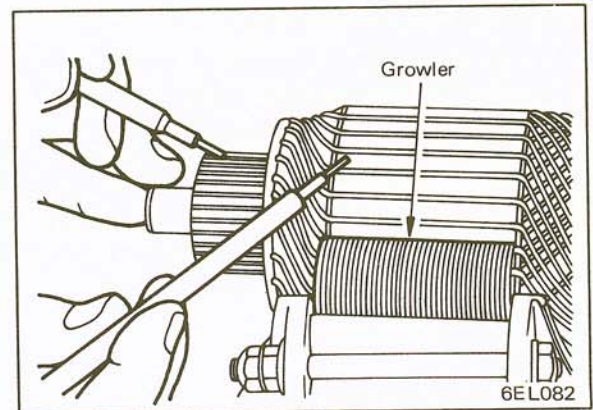
1. Brushes that are worn beyond wear limit line, or are oil-soaked, should be replaced.
2. When replacing field coil brushes, crush worn brush with pliers, taking care not to damage pigtail.
3. Sand pigtail end with sandpaper to ensure good soldering.
4. Insert pigtail into hole provided in new brush and solder it. Make sure that pigtail and excess solder do not come out onto brush surface.
5. When replacing ground brush, slide the brush from brush holder by prying retaining spring back.



## TESTING ARMATURE

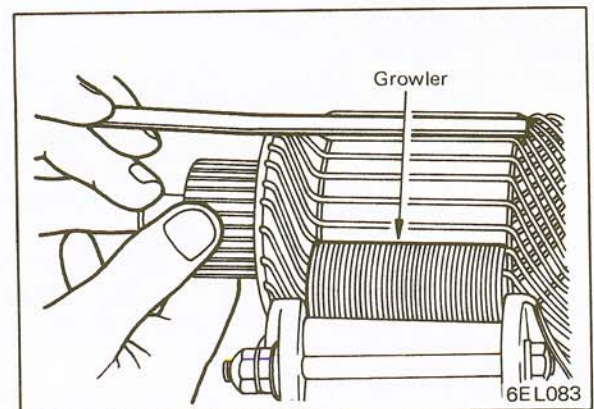
### Testing Armature for Short Circuit

1. Place armature in a growler.
2. Hold a thin steel blade parallel and just above while rotating armature slowly in growler. A shorted armature will cause blade to vibrate and be attracted to the core. Replace shorted armature.



### Testing Armature for Grounding

1. Touch armature coil core and the end of each commutator bar with a pair of test lamp prods.
2. If lamp lights, it indicates a grounded armature. Replace grounded armature.







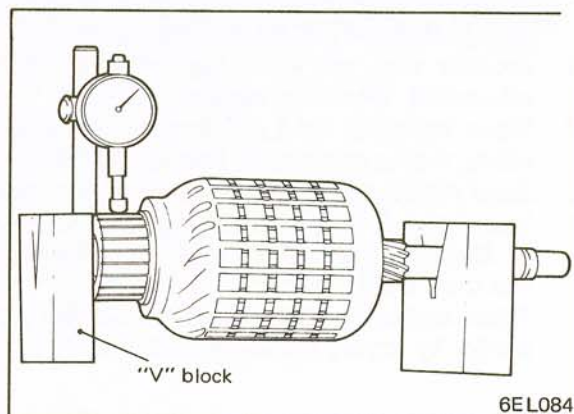
### Testing Commutator Runout

1. Place armature in a pair of "V" blocks and check runout with a dial indicator.
2. Check both shaft and commutator. A bent shaft requires replacement of armature.
3. If commutator runout exceeds 0.05 mm (.002 in.), commutator should be refaced. Remove only enough metal to provide a smooth, even surface.

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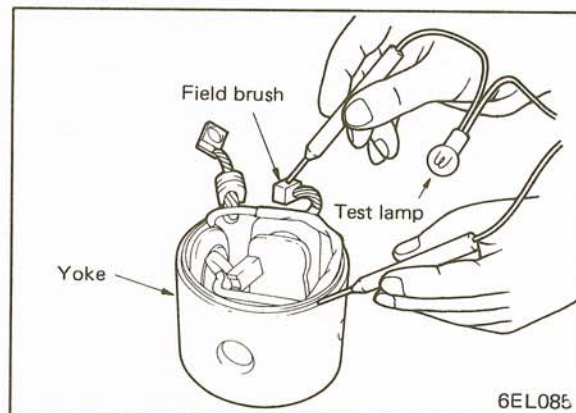
Commutator runout ..... Max 0.05 mm (.002 in.)  
Under cut depth ..... 0.5 mm (.02 in.)

---



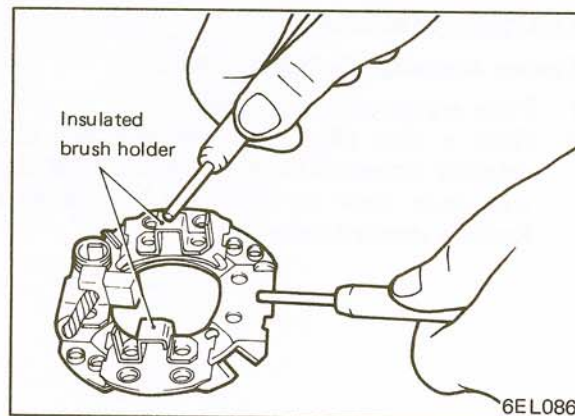
### TESTING FIELD COILS FOR GROUNDING

1. Touch one probe of test lamp to series field coil lead and other probe to yoke. Lamp should not light. If lamp lights, coils are grounded. If field coils are grounded, replace field coil and yoke assembly.



### TESTING BRUSH HOLDER

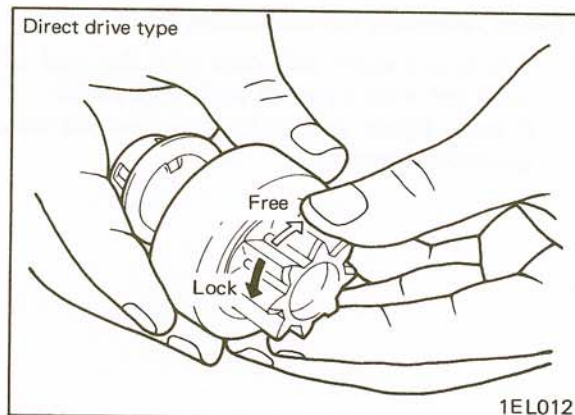
1. Touch each of the insulated brush holders with one test probe, while holding other test probe against brush holder plate.
2. The lamp should not light during this test since the brush holders are insulated. If the lamp lights brush holders on brush holder plate are grounded. Replace brush holder assembly if brush holders are grounded.



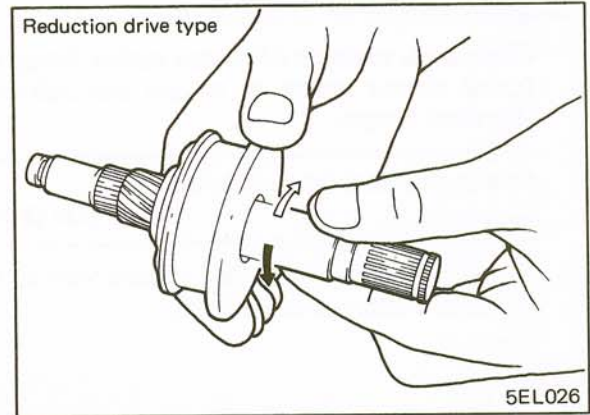
### SERVICING DRIVE UNIT

#### Overrunning Clutch

1. While holding clutch housing, rotate the pinion. Drive pinion should rotate smoothly in one direction, but should not rotate in opposite direction. If clutch does not function properly, replace overrunning clutch assembly.
2. Inspect pinion for wear or burrs. If pinion is worn or burred, replace overrunning clutch assembly. If pinion is damaged, also inspect ring gear for wear or burrs.







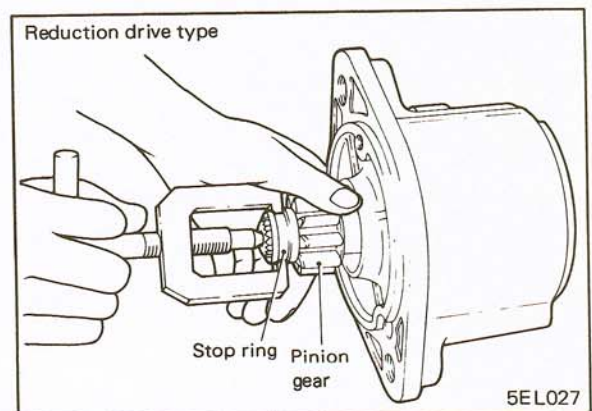
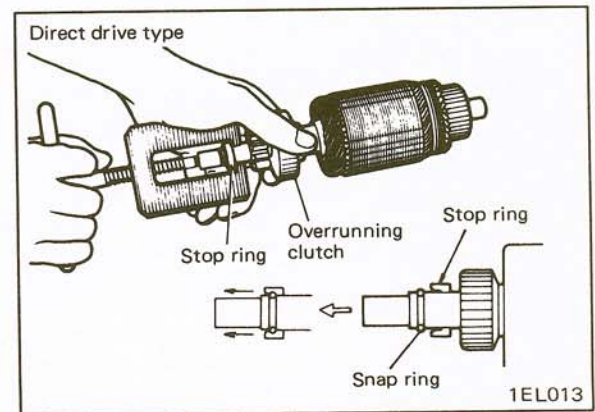
## FRONT AND REAR BRACKET BUSHING-DIRECT DRIVE TYPE

1. Inspect bushing for wear or burr. If bushing is worn or burred, replace front bracket assembly or rear bracket assembly.

## REASSEMBLY

Reassemble starter motor in the reverse order of disassembly with the following exception.

1. Using a suitable pulling tool, pull overrunning clutch stop ring over snap ring.







### INSTALLATION

1. Clean both surfaces of starter motor flange and rear plate.
2. Install starter motor to engine and tighten two bolts to specified torque.

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Starter motor mounting bolts .....  
22-31 Nm (16-23 ft.lbs.)

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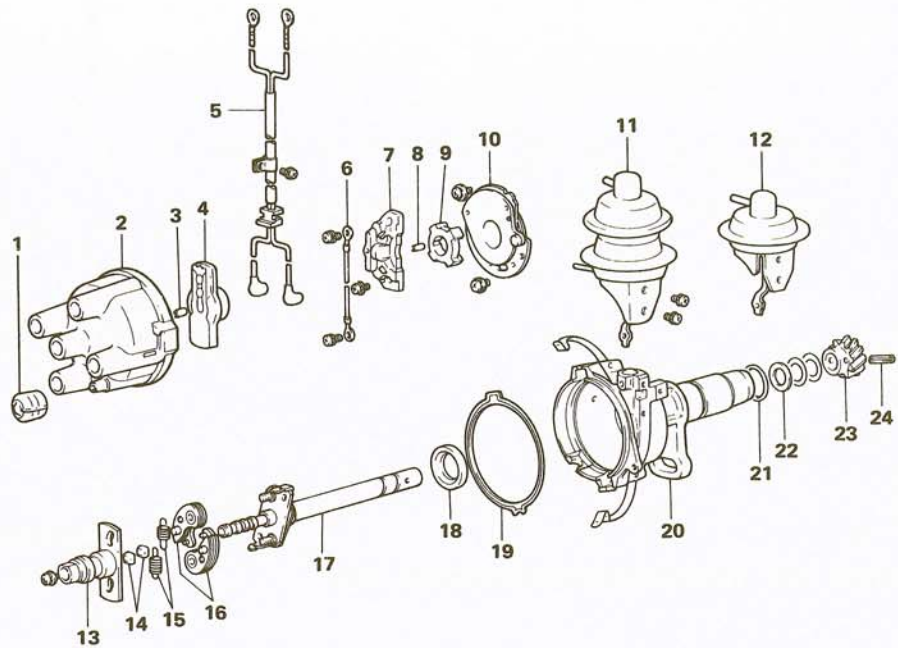
3. Connect battery cable and switch wire to starter motor.
4. Connect battery ground cable.





## COMPONENTS

1. Breather
2. Cap
3. Contact carbon
4. Rotor
5. Lead wire
6. Earth wire
7. Igniter
8. Pin
9. Rotor
10. Breaker base
11. Vacuum controller for dual diaphragm
12. Vacuum controller for single diaphragm
13. Rotor shaft
14. Spring retainer (2)
15. Governor spring (2)
16. Governor weight (2)
17. Distributor shaft
18. Oil seal
19. Packing
20. Distributor housing
21. O-ring
22. Washer
23. Gear
24. Pin

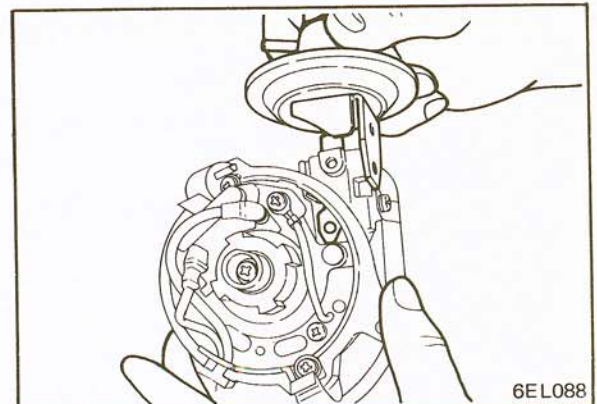


**NOTE**  
Numbers show order of disassembly.  
For reassembly, reverse order of disassembly.

6EL087

## DISASSEMBLY

1. Lightly clamp distributor in a vise equipped with soft jaws.
2. Remove retaining clips and lift off distributor cap and seal ring.
3. Pull-off rotor from rotor shaft.
4. Remove two vacuum controller mounting screws.
5. Remove link of controller from pin on the breaker base, and then remove vacuum controller.



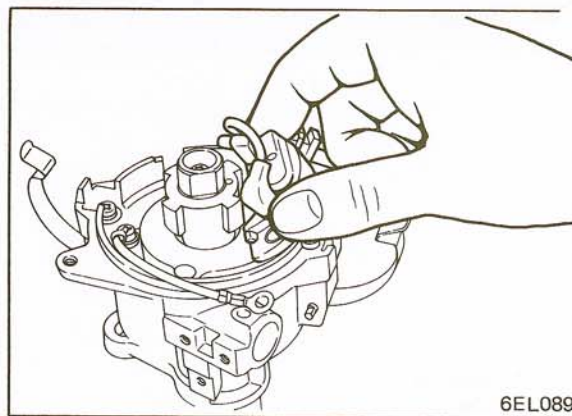
6EL088



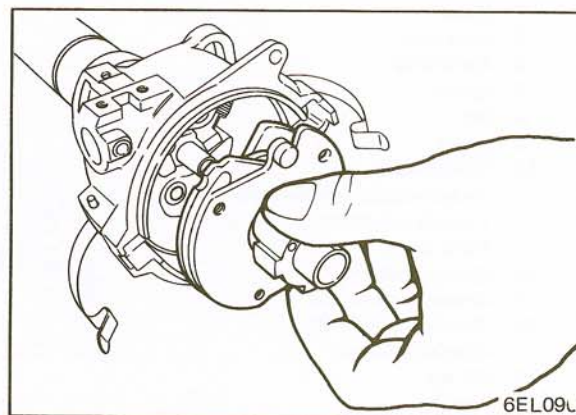


## COMPONENT SERVICE-IGNITION SYSTEM

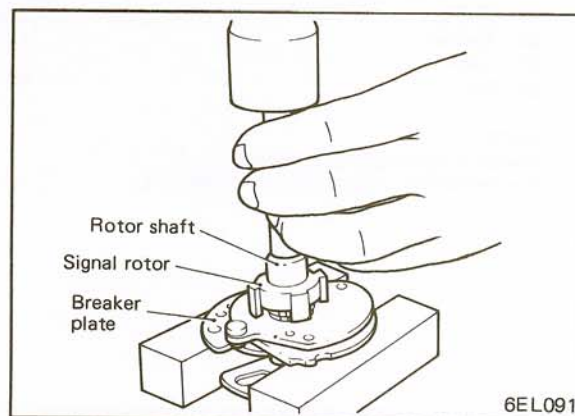
6. Remove two screws and remove igniter.
7. Remove lead wire (black).



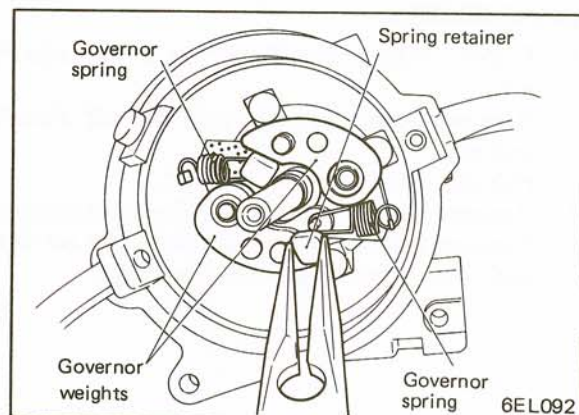
8. Remove signal rotor shaft tightening screw and two breaker plate retaining screws.
9. Remove signal rotor shaft and breaker plate assembly.



10. Remove signal rotor shaft from signal rotor.



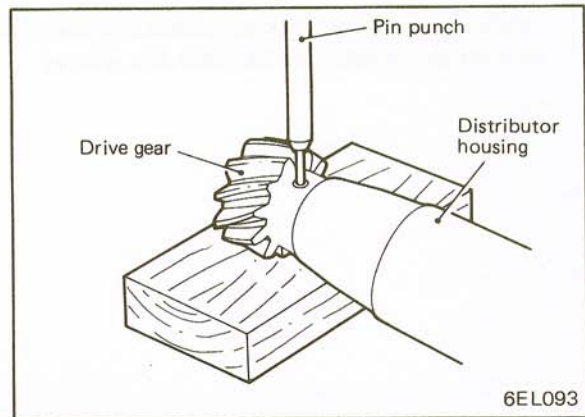
11. Remove two spring retainers with pliers and then remove two governor springs.
12. Remove two governor weights.





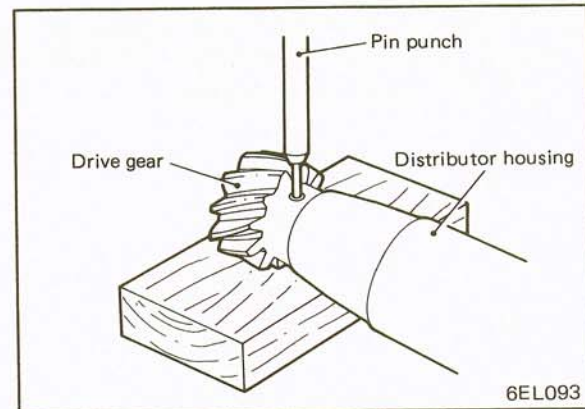


14. Mark location of drive gear on distributor shaft.
15. Place drive gear on soft base (wood block) so that roll pin can be removed.
16. Using a pin punch, remove roll pin.
17. Remove drive gear and washer.
18. Remove distributor shaft from housing.

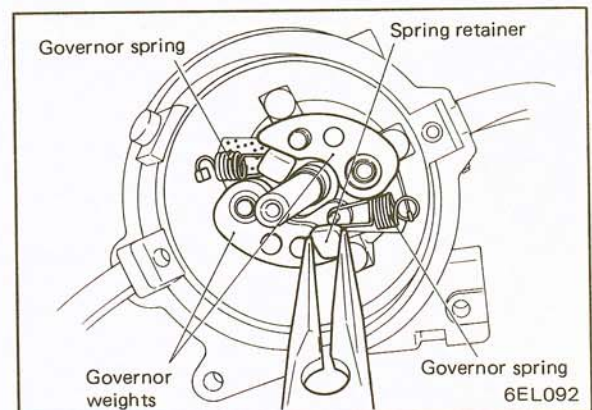


## REASSEMBLY

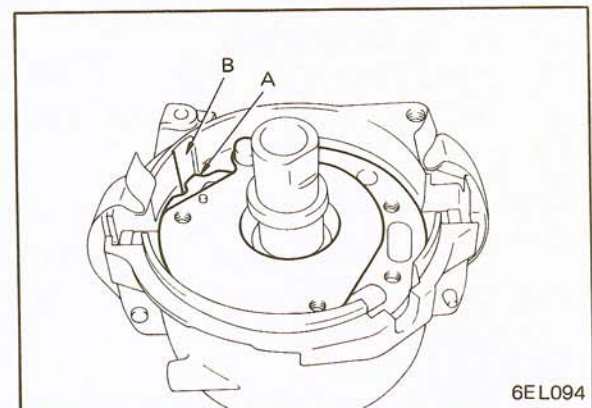
1. Clean and inspect all parts.
2. Install shaft into housing.
3. Install drive gear into distributor shaft at previously marked location. Then install new roll pin.



4. Install governor weights on the governor plate.
5. Install governor springs and spring retainer.



6. Install signal rotor shaft into distributor shaft.
7. Install breaker plate to housing. Position the breaker plate so that the projection (A) fits into the groove (B).
8. Tighten two breaker plate retaining screws.

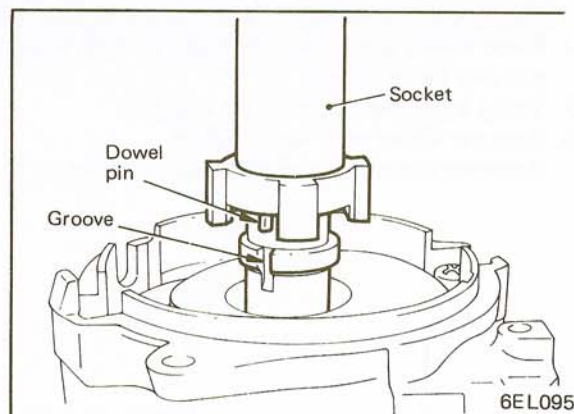






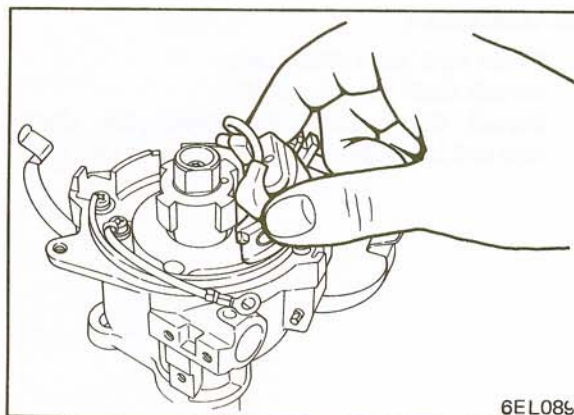
## COMPONENT SERVICE-IGNITION SYSTEM

9. Install signal rotor to rotor shaft. Position the signal rotor so that the dowel pin fits into the groove.

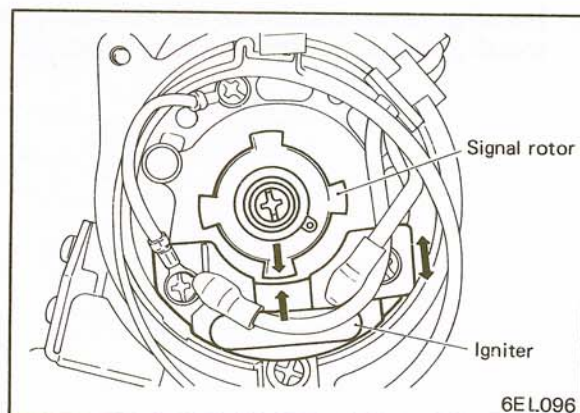


10. Install igniter to breaker plate and install two screws.

11. Connect one end of lead wire to igniter mounting screw and other end to breaker plate.



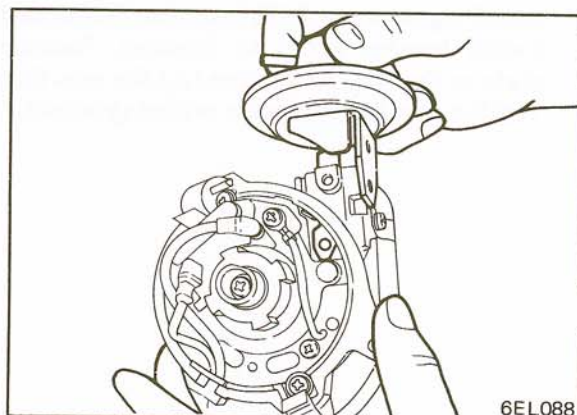
12. Adjust air gap between signal rotor and pick-up of igniter.



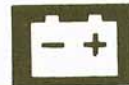
13. Connect vacuum control link to breaker plate and tighten two vacuum controller screws.

14. Install rotor to rotor shaft.

15. Install seal ring and distributor cap to housing and set the retaining clips.

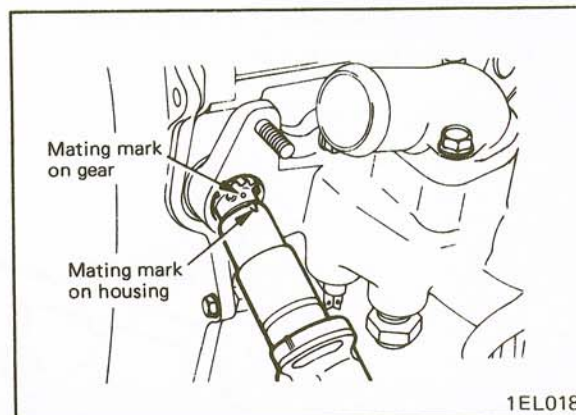




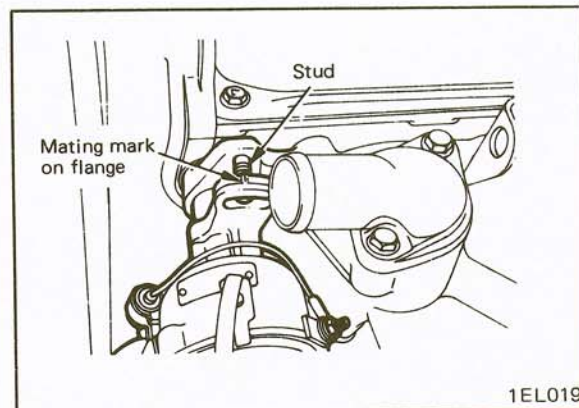


## INSTALLATION

1. Turn crankshaft until piston of No. 1 cylinder is at top dead center of compression stroke.
2. Align mating mark on distributor housing with mating mark (punch) on distributor driven gear. (1EL018)



3. Install distributor to cylinder head while aligning mating mark on distributor attaching flange with center of distributor installing stud and tighten nuts. (1EL019)
4. Adjust ignition timing.



## IGNITION COIL

### INSPECTION

1. Using a circuit tester, measure resistance. An open- or short-circuited coil should be replaced.

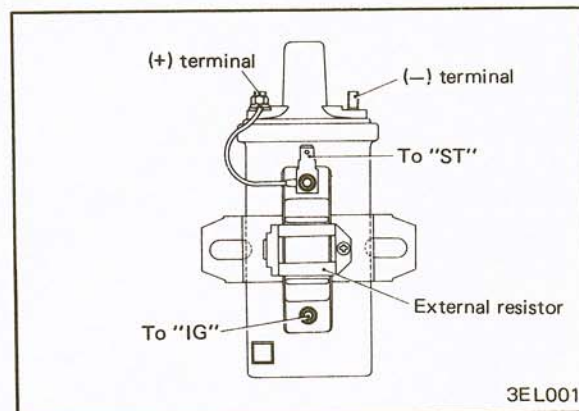
Model No.

Primary resistance E-064 ..... 1.1-1.3  $\Omega$  at 20°C (68°F)

Secondary resistance ..... 11.6-15.8 k $\Omega$  at 20°C (68°F)

External resistor resistance ..... 1.2-1.5  $\Omega$  at 20°C (68°F)

2. Check resin portion for cracks. If there are cracks, replace.
3. Check for fluid (oil) leaks. If there are leaks, replace.



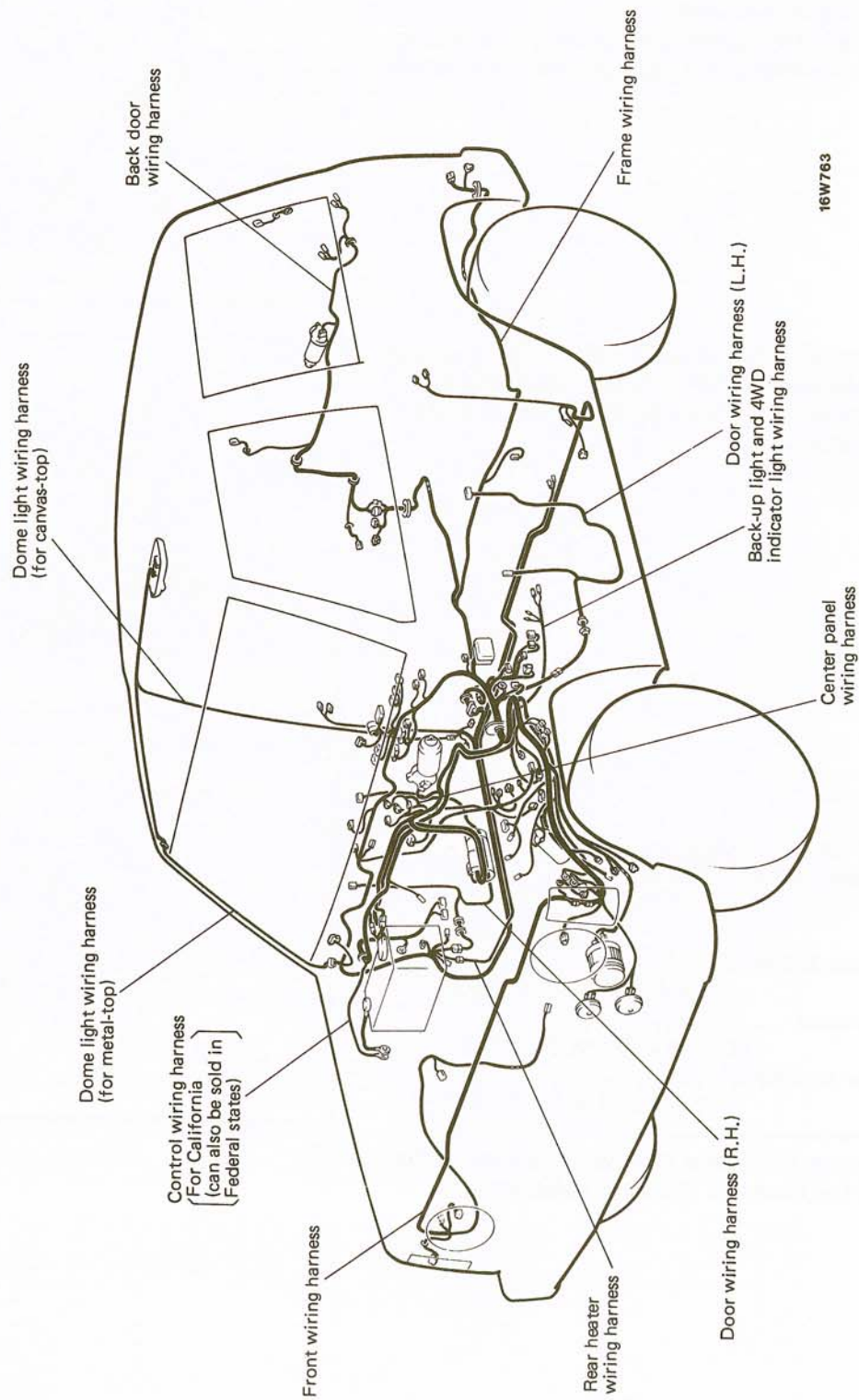




## COMPONENT SERVICE-WIRING HARNESS

### WIRING HARNESSES

Wiring harness locations

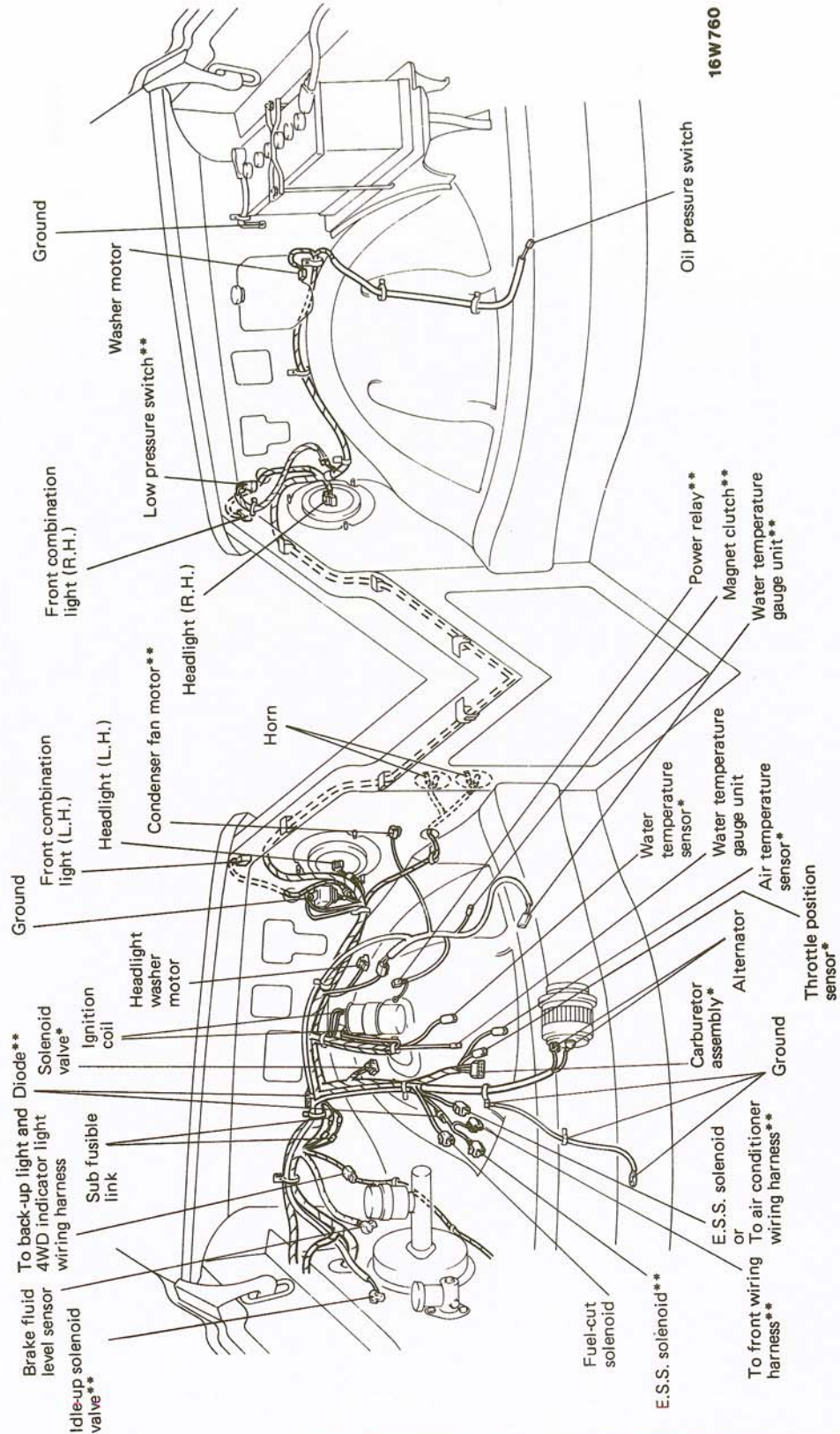


16W763



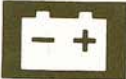


## Engine compartment — Front



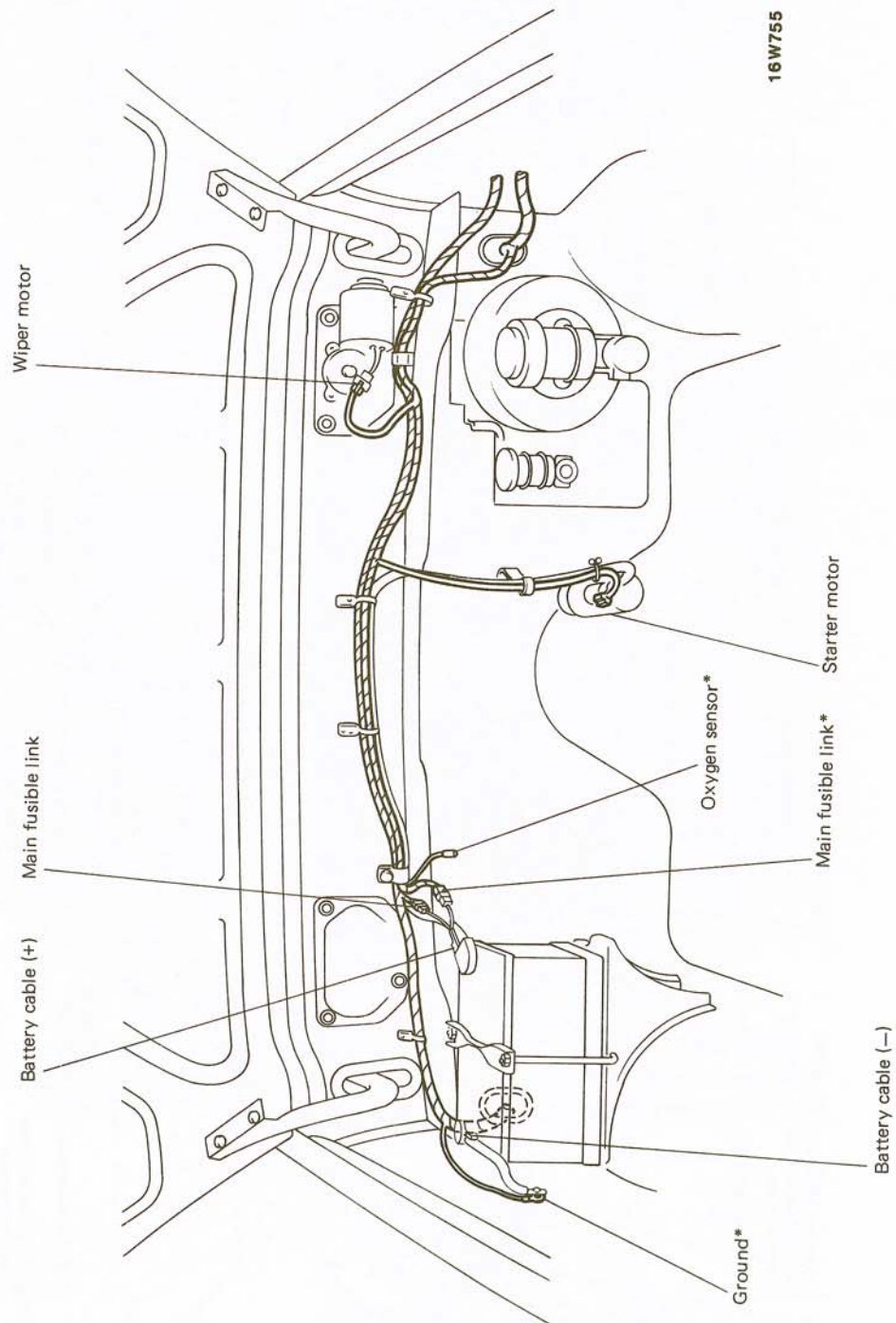
NOTE  
 \* : For California (can also be sold in Federal States).  
 \*\* : indicates connection for vehicles with an air conditioner.





## COMPONENT SERVICE-WIRING HARNESS

Engine compartment — Rear



NOTE

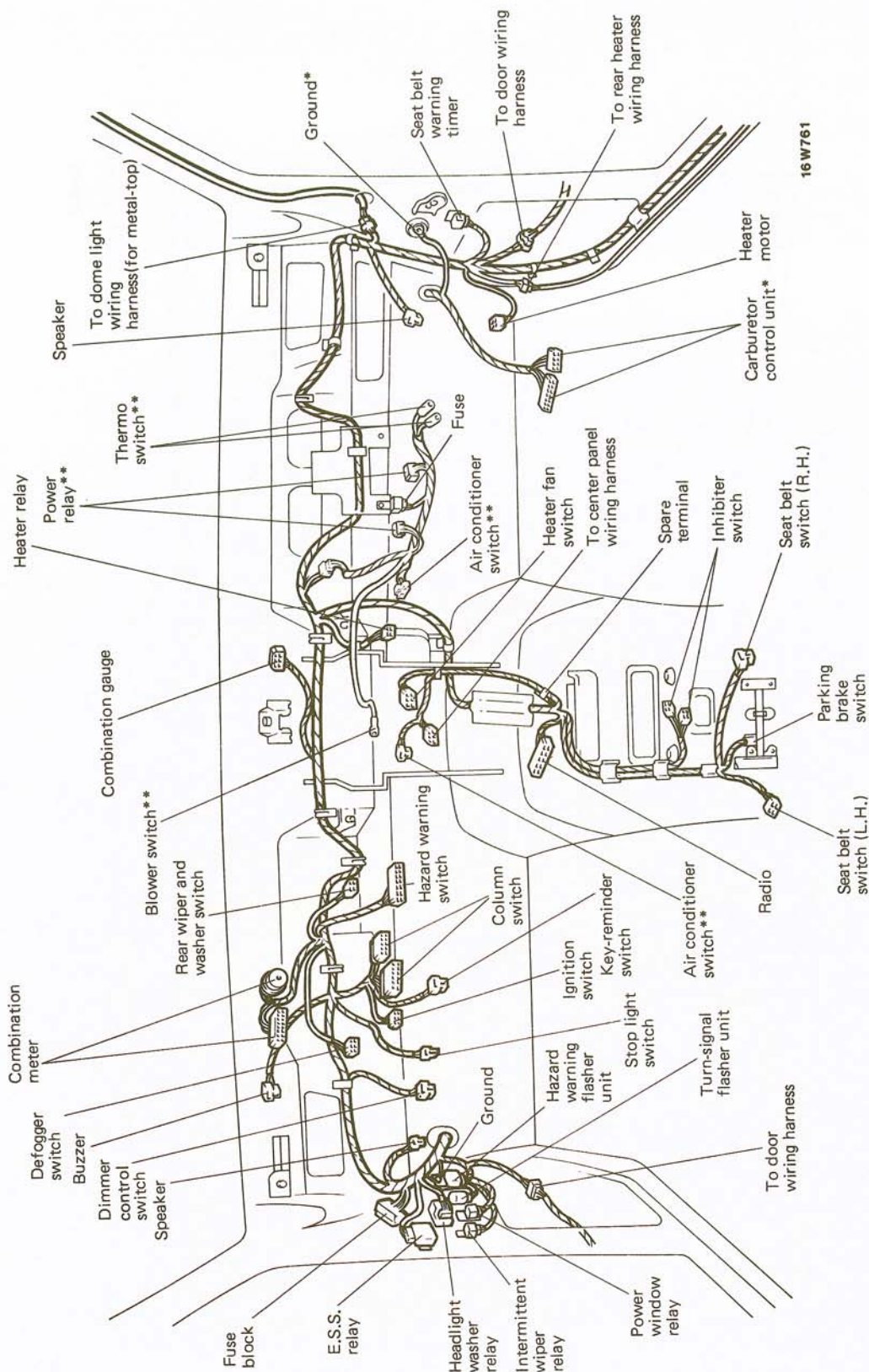
\* : For California (can also be sold in Federal States)



# COMPONENT SERVICE-WIRING HARNESS



Instrument panel



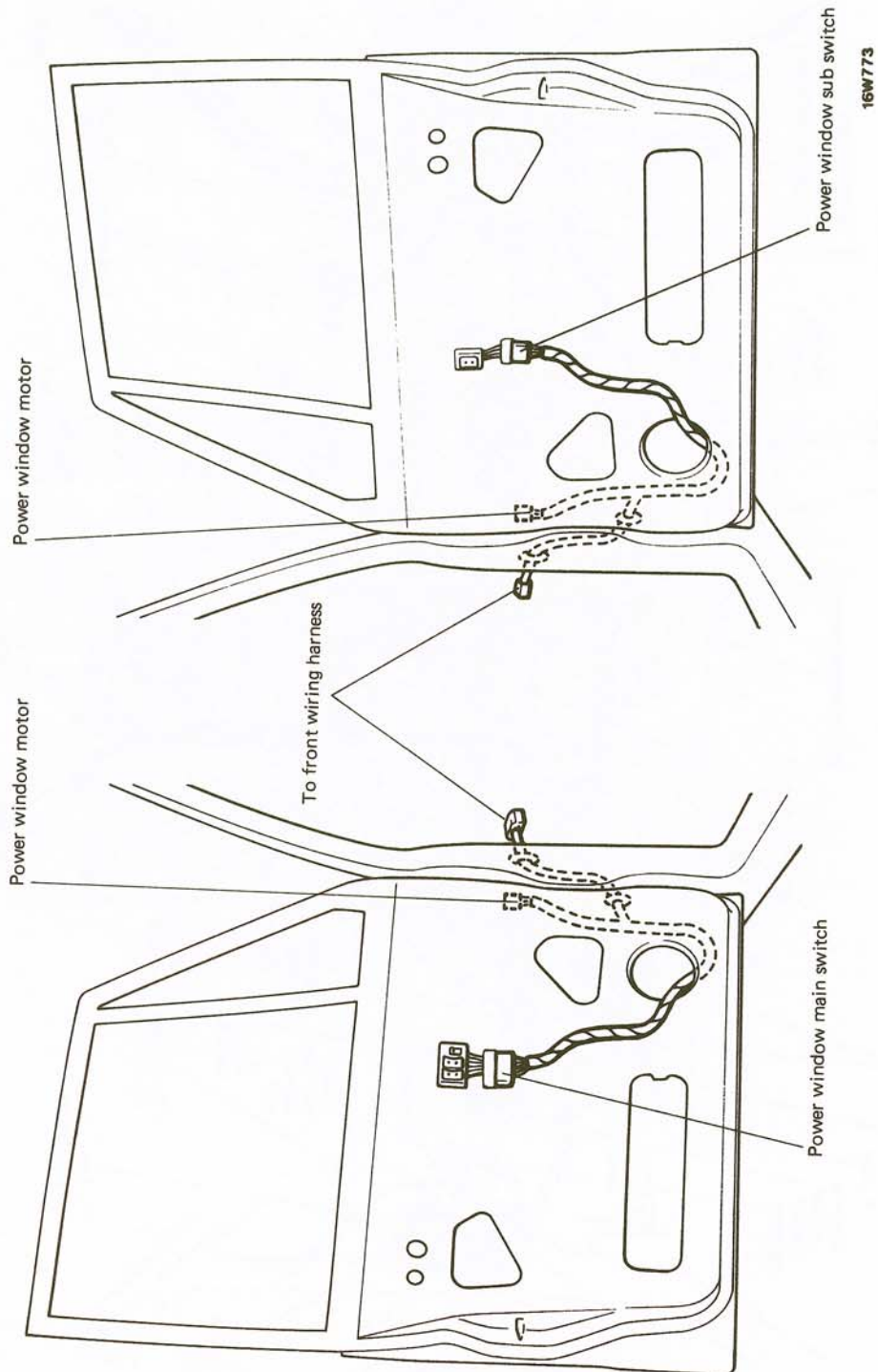
16 W761

NOTE  
 \* : For California (can also be sold in Federal States).  
 \*\* : Indicates connection for vehicles with an air conditioner.

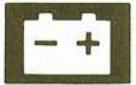




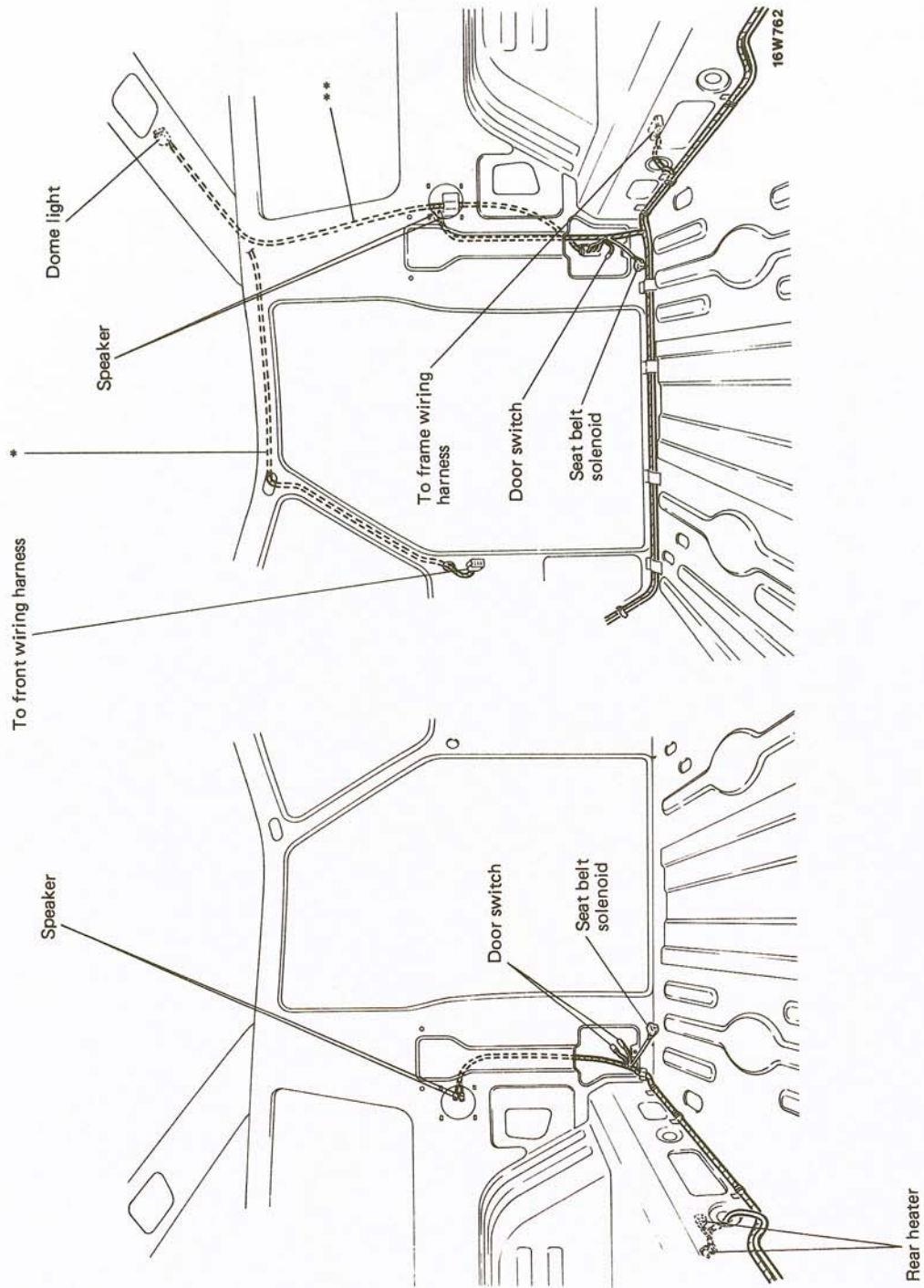
## COMPONENT SERVICE-WIRING HARNESS







## Floor and Roof



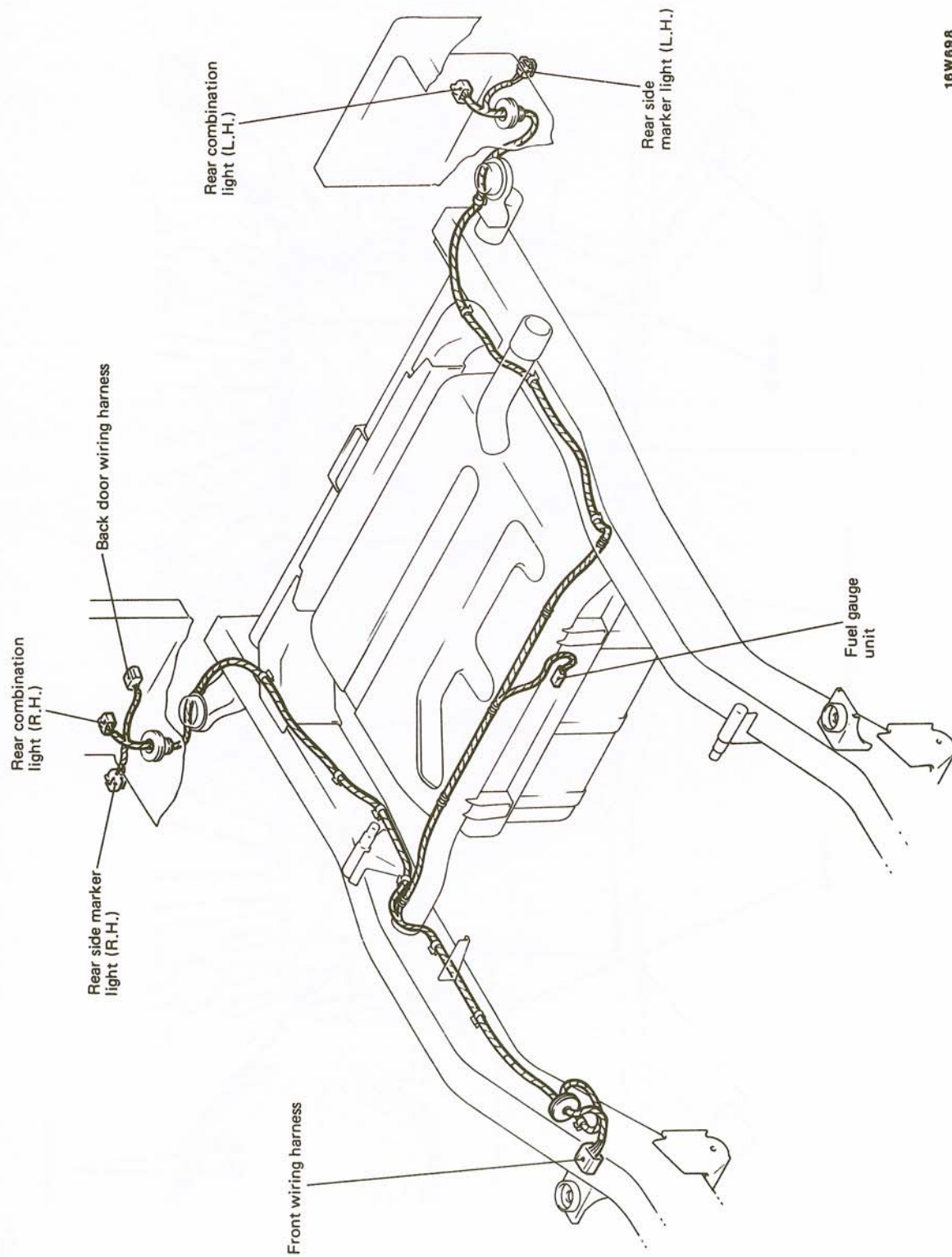
**NOTE**

- \* : Routing of the dome light wiring harness for vehicles equipped with a metal-top.
- \*\* : Routing of the dome light wiring harness for vehicles equipped with a canvas-top.





## COMPONENT SERVICE-WIRING HARNESS



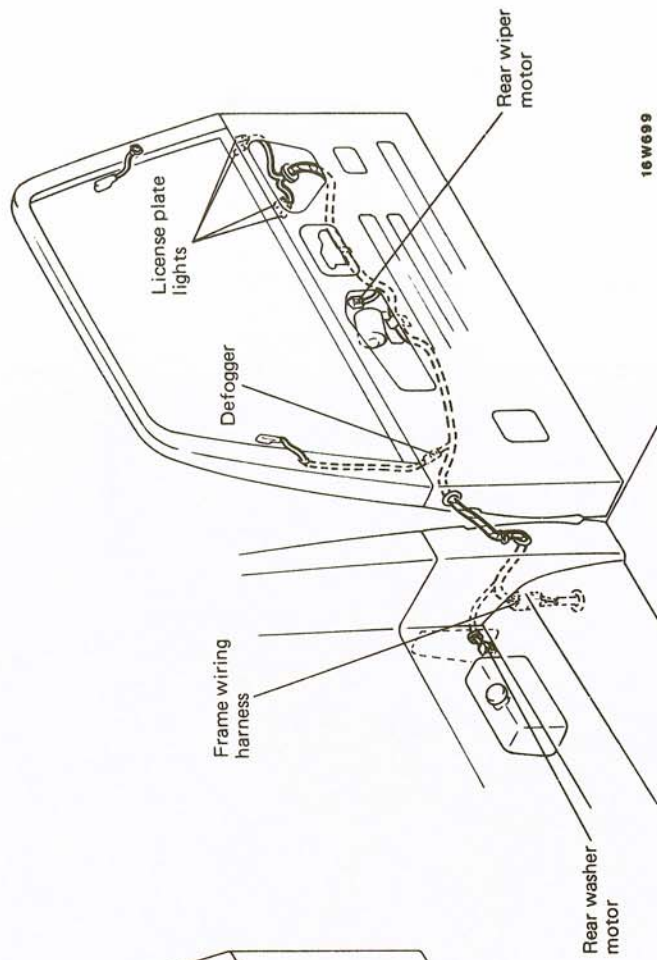
16W698

Frame

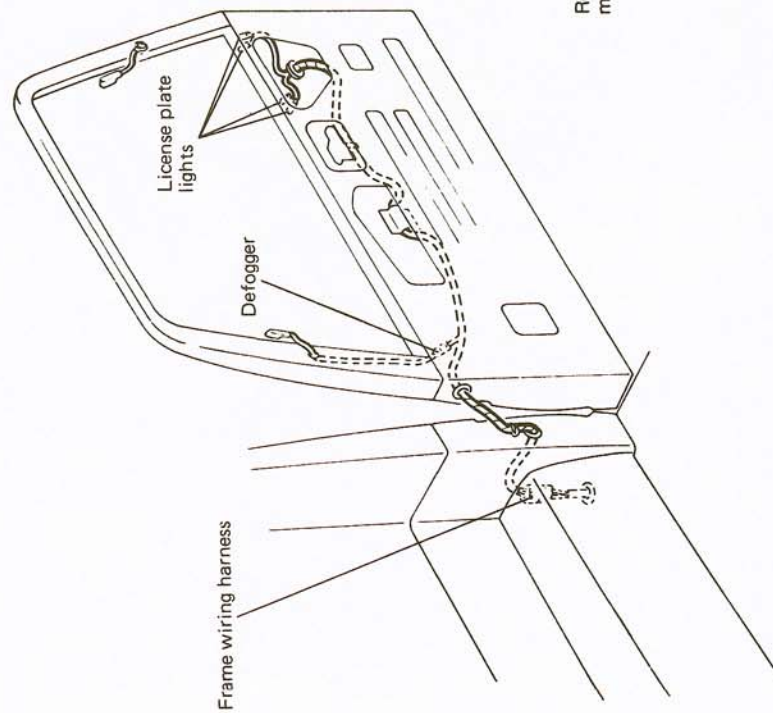




Back door — Vehicles with a rear wiper and washer



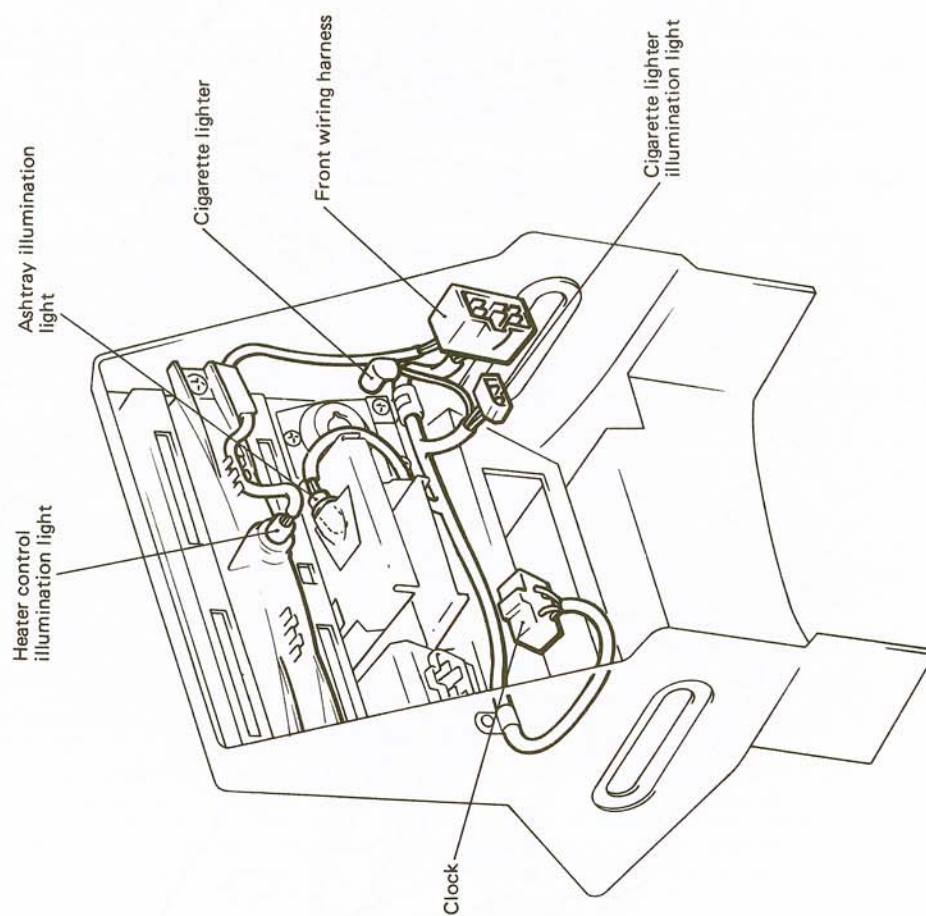
Back door — Vehicles without a rear wiper and washer







## COMPONENT SERVICE-WIRING HARNESS



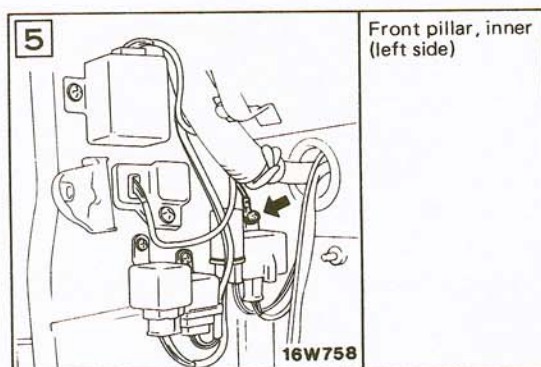
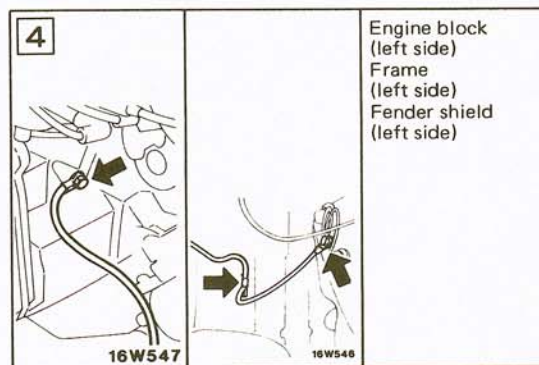
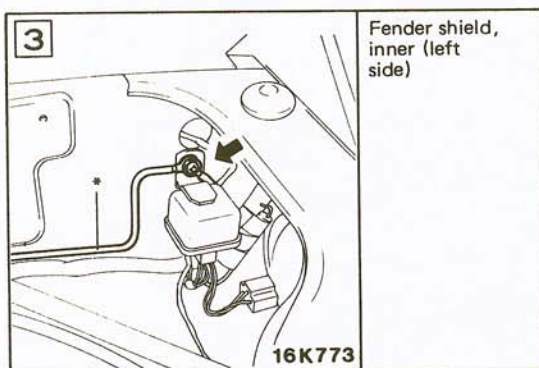
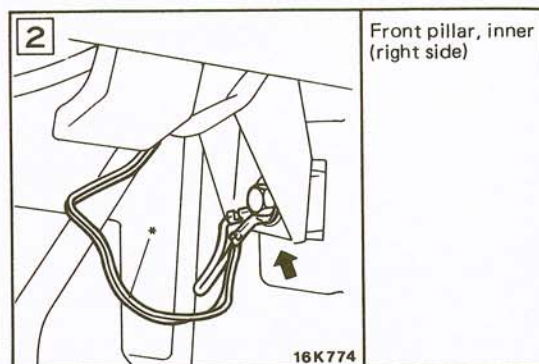
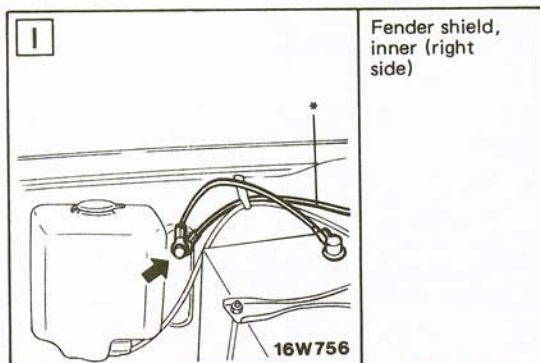
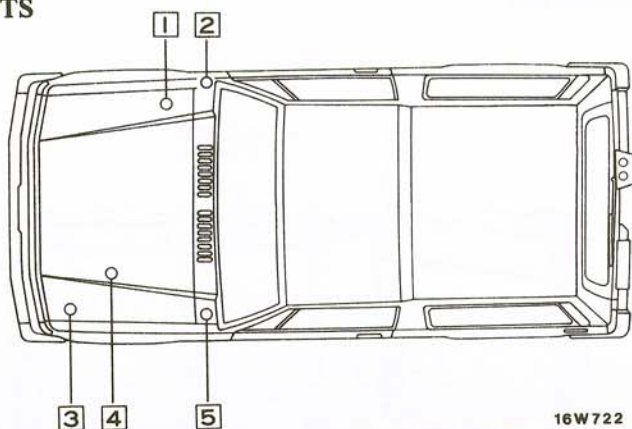
16W628

Center panel





## ENTRALIZED GROUND POINTS



### NOTE

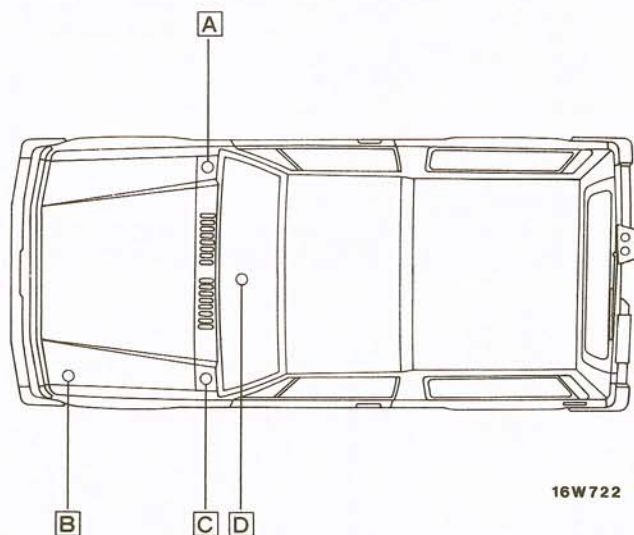
\* : For California (can also be sold in Federal States).



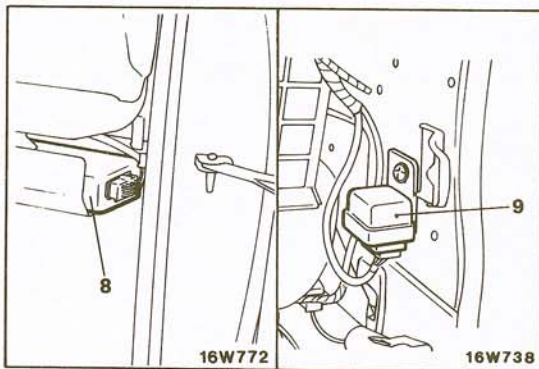


## COMPONENT SERVICE-WIRING HARNESS

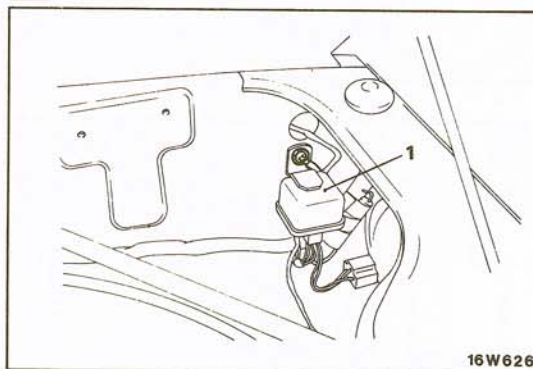
### RELAY MOUNTING LOCATIONS



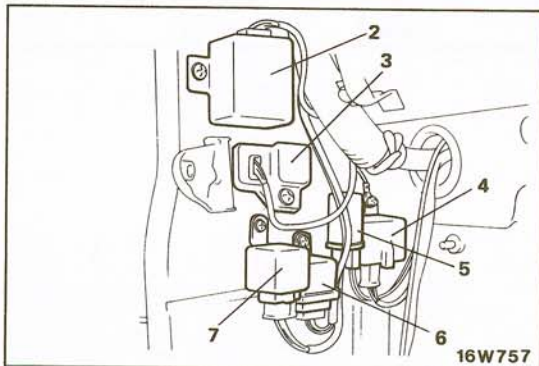
**A** Front pillar (right side)



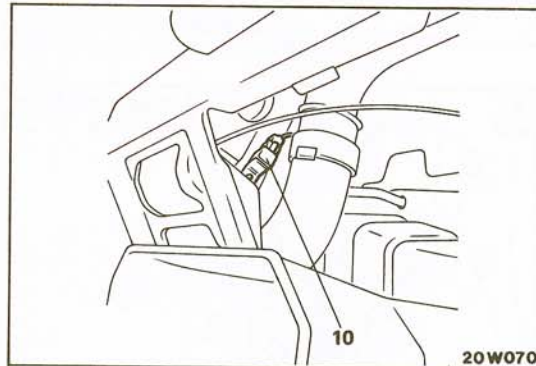
**B** Fender shield, inner (left side)



**C** Front pillar, inner (left side)



**D** Dash panel, upper (inside right)

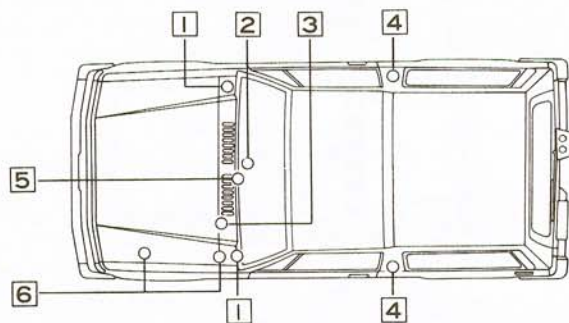


- |                                |                                      |
|--------------------------------|--------------------------------------|
| 1. Light control relay         | 7. Intermittent wiper relay          |
| 2. E.S.S. relay                | 8. Carburetor control unit           |
| 3. Headlight washer relay      | (For California                      |
| 4. Turn-signal flasher unit    | (can also be sold in Federal States) |
| 5. Hazard warning flasher unit | 9. Seat belt timer                   |
| 6. Power window relay          | 10. Heater relay                     |



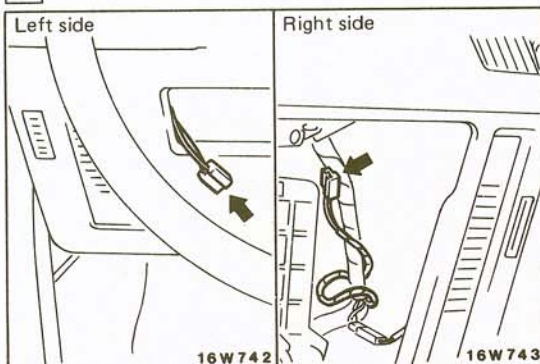


## SPARE TERMINALS

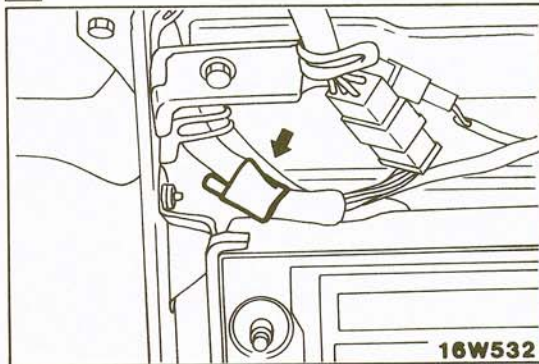


16W722

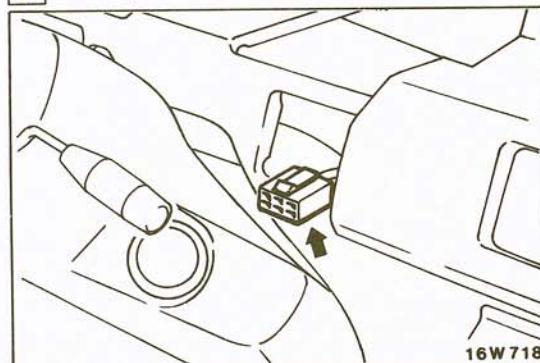
### 1 Front speaker



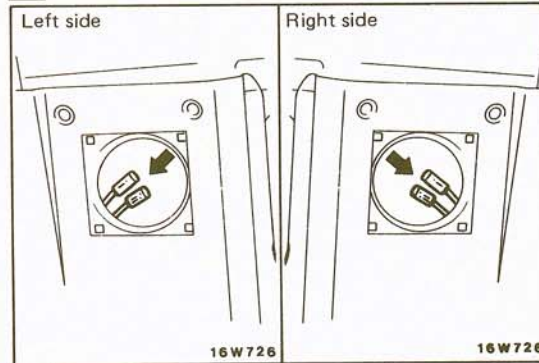
### 2 ACC spare terminal



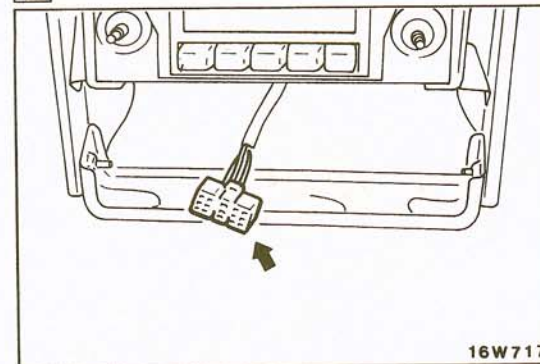
### 3 Rear wiper and washer switch



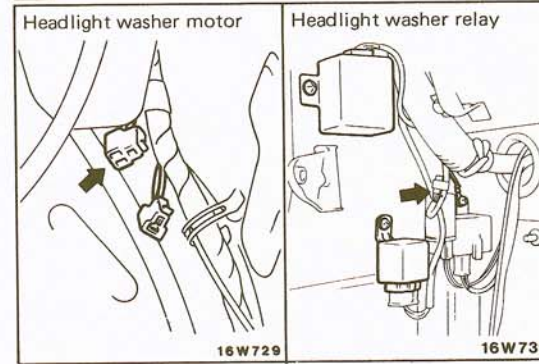
### 4 Rear speaker



### 5 Radio



### 6 Headlight washer motor and relay



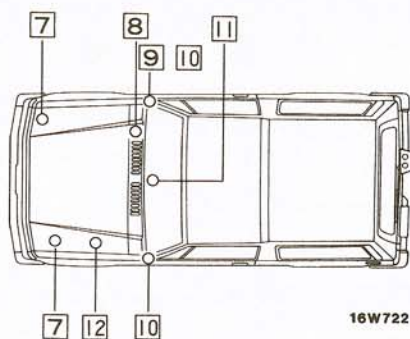
#### NOTES

- (1) If ACC spare terminal 1 is used, it must not be used for more than 5 A.
- (2) If the vehicle is not equipped with the optional equipment corresponding to a spare terminal, that spare terminal will be secured to the main line with blue tape.



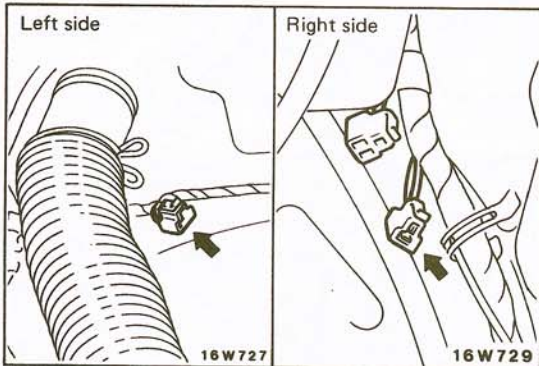


## COMPONENT SERVICE-WIRING HARNESS

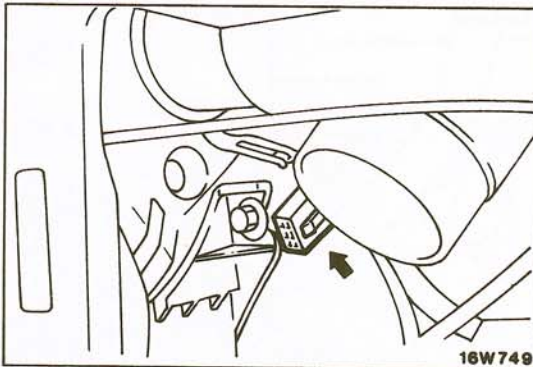


16W722

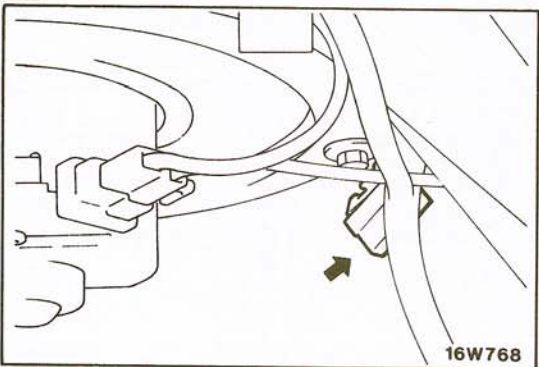
**7** Air conditioner compressor and low pressure switch



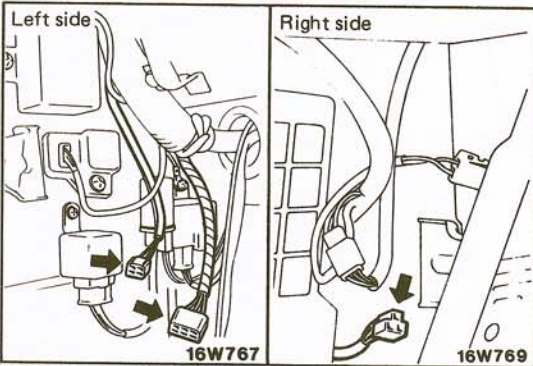
**8** Air conditioner unit



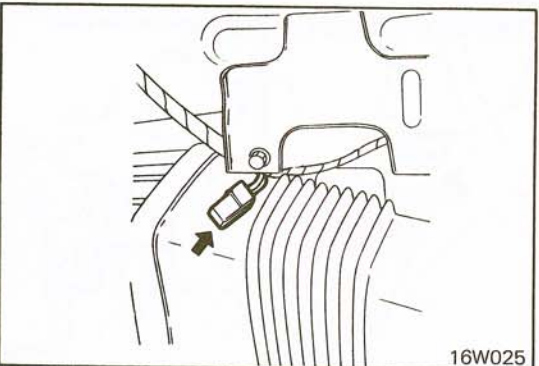
**9** Rear Heater



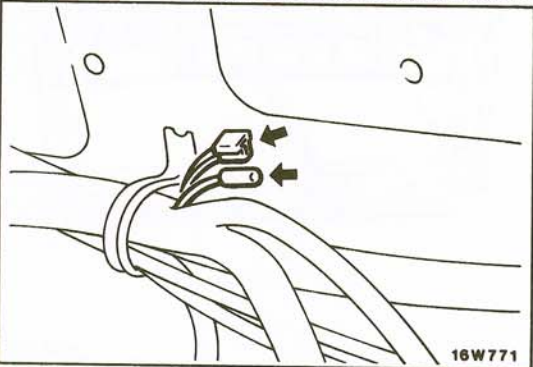
**10** Power Window



**11** Air conditioner switch



**12** Air conditioner For california  
(can also be sold in Federal states)

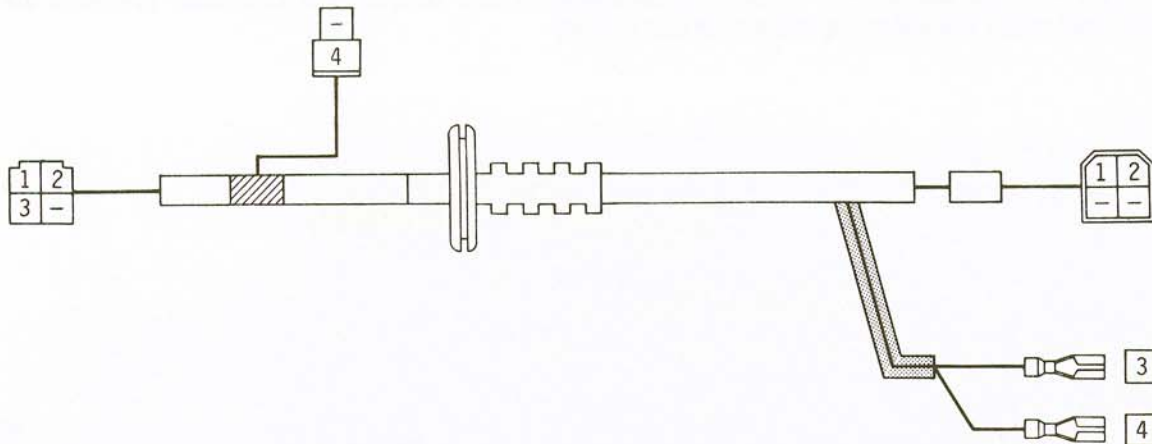






## READING THE HARNESS DIAGRAMS

### Harness Diagram Example



16E962

### How to Read the Accompanying

1 NO.	2 WIRE	3	4	5 CIRCUIT
1	2FB			IGNITION SWITCH <ST>
2	RL			FUSE BLOCK (1)
3	GY			HORN <E>
4	GL			HORN <B>
5	0.85GB			INSTRUMENT PANEL WIRING HARNESS
				STOPLIGHT SWITCH
				1
				26
				-

1. The connector terminal number indicated in the diagram.
2. The numbers indicate the nominal cross-sectional area of the wire; refer to the table at right. If a number is not used, it indicates that the cross-sectional area of the wire is 0.5 mm<sup>2</sup>.
3. "F" indicates that this is flexible wire.

No.	Nominal size mm <sup>2</sup>	SAE gauge No.	Permissible current	
			In engine compartment	Other areas
0.3	0.3	AWG 22	—	5 A
—	0.5	AWG 20	7 A	13 A
0.85	0.85	AWG 18	9 A	17 A
1.25	1.25	AWG 16	12 A	22 A
2	2.0	AWG 14	16 A	30 A
3	3.0	AWG 12	21 A	40 A
5	5.0	AWG 10	31 A	54 A





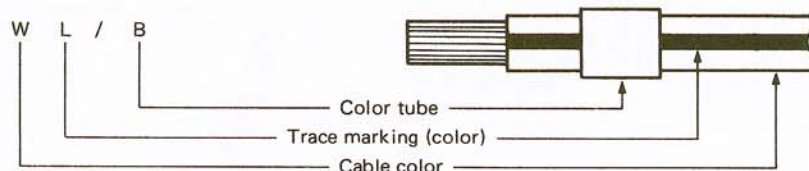
## COMPONENT SERVICE-WIRING HARNESS

4. The letters indicate the color of the wire.

Symbol	B	G	L	O	R	W	Y	Br
Color	Black	Green	Blue	Orange	Red	White	Yellow	Brown

Wires which have two-color insulation covering are indicated by two letters. The first letter indicates the cable color and the second letter indicates the trace marking (color).

Example



M16063

5. Indicates the circuits which are connected.

6. The letters in angular brackets indicate which part of the circuit this terminal is connected to; refer to the following table.

Letter	Meaning	Letter	Meaning
ACC	Accessory	L	Load
AS	Auto-stop	LO	Low-speed terminal
B	Battery	LI	License plate lights
BACK	Back-up lights	OIL	Oil pressure
BEAM	Headlight upper beam indicator light	RL	Rear left
BK	Brake	RR	Rear right
CHG	Charging	S	Soft
DEF	Defogger	ST	Starter
DR	Door	STOP	Stop lights
E	Ground	TAC	Tachometer
FL	Front left	TAIL	Tail lights
FR	Front right	TEMP	Water temperature
H	Hard	TUL	Turn-signal light, left
HI	High speed terminal	TUR	Turn-signal light, right
HL	Headlight low beam	W	Washer
HU	Headlight high beam	+	Positive terminal
IG	Ignition	-	Negative terminal
ILL	Illumination	4WD	4WD indicator light
IND	Indicator light		

7. Parentheses contain supplementary information; in the example, the "1" indicates the number 1 fuse of the fuse block.

8. The boxed numbers    indicate to which terminal is connected.

9. If neither a circuit nor a number is listed, it indicates that this wire of this terminal is not connected to another terminal.

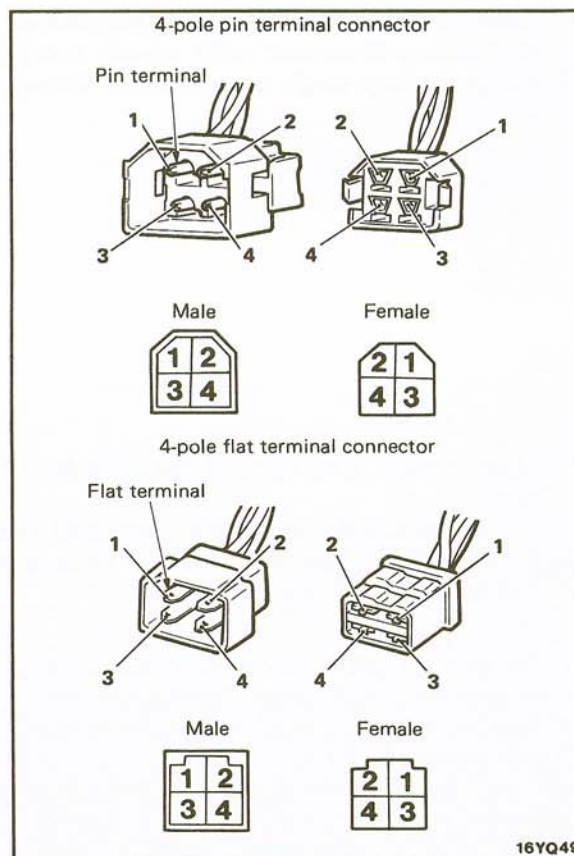




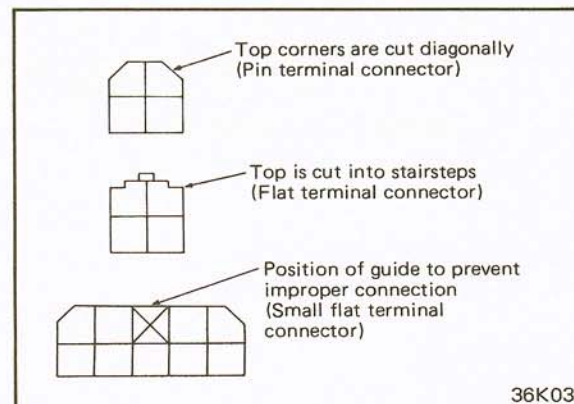
## WIRING CONNECTORS

### Connector Classifications

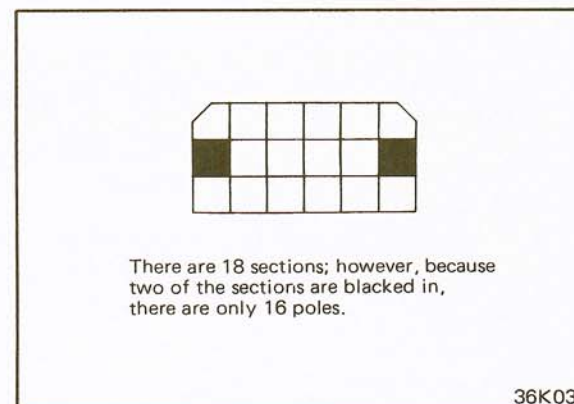
Electrical wiring connectors can be classified according to the type of terminals (such as pin terminals or flat terminals), the number of poles (terminals), whether they are male or female, whether they have a locking device or not, etc. In this Service Manual, connectors will generally be classified as follows:



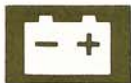
1. Classification according to terminal type  
Connectors illustrated with outer lines shaped so that the top corners are cut diagonally usually have pin terminals, and those illustrated with outer lines shaped so that the top is cut into stairs usually have flat terminals. Note that connectors illustrated with diagonally cut corners on which one section is marked with an "X" are small flat terminal connectors. The "X" indicates the position of a guide to prevent the connector from being improperly connected.



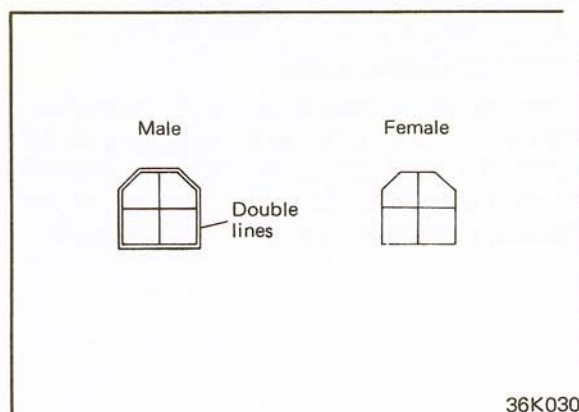
2. Classification according to number of poles  
The number of sections represents the number of poles inside the connector. However, sections in the illustration marked with an "X" or blacked in do not represent poles.







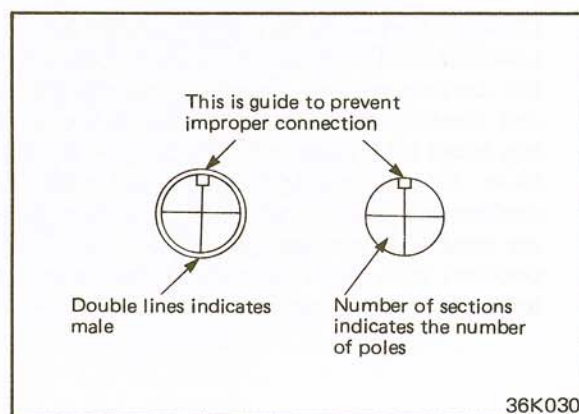
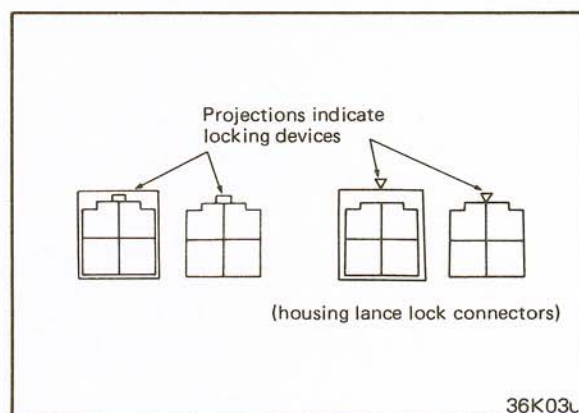
3. Classification according to male and female  
Connectors illustrated with double outer lines are male, and those with single outer lines are female.



4. Classification according to the presence of a locking device  
If a flat terminal connector is illustrated with a projection at the top, it indicates that the connector is equipped with a locking device.

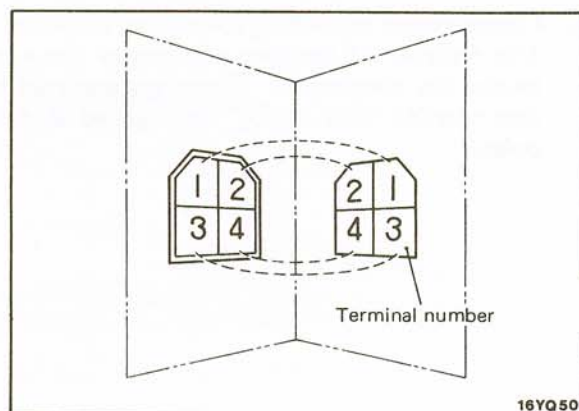
### NOTE

- (1) Because all pin terminal connectors, small flat terminal connectors, and sealed connectors are equipped with locking devices, there are special indications in the graphic illustrations.
- (2) Housing lance lock connectors have lances inside the connector housing which securely lock the terminals to prevent them from becoming disconnected, thus providing increased reliability.
5. Classification according to sealed connector  
Classification of round shape-sealed connector (pin terminal water-proofed connector) which is used for engine wiring harness is the same as above.

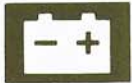


### Terminal numbers

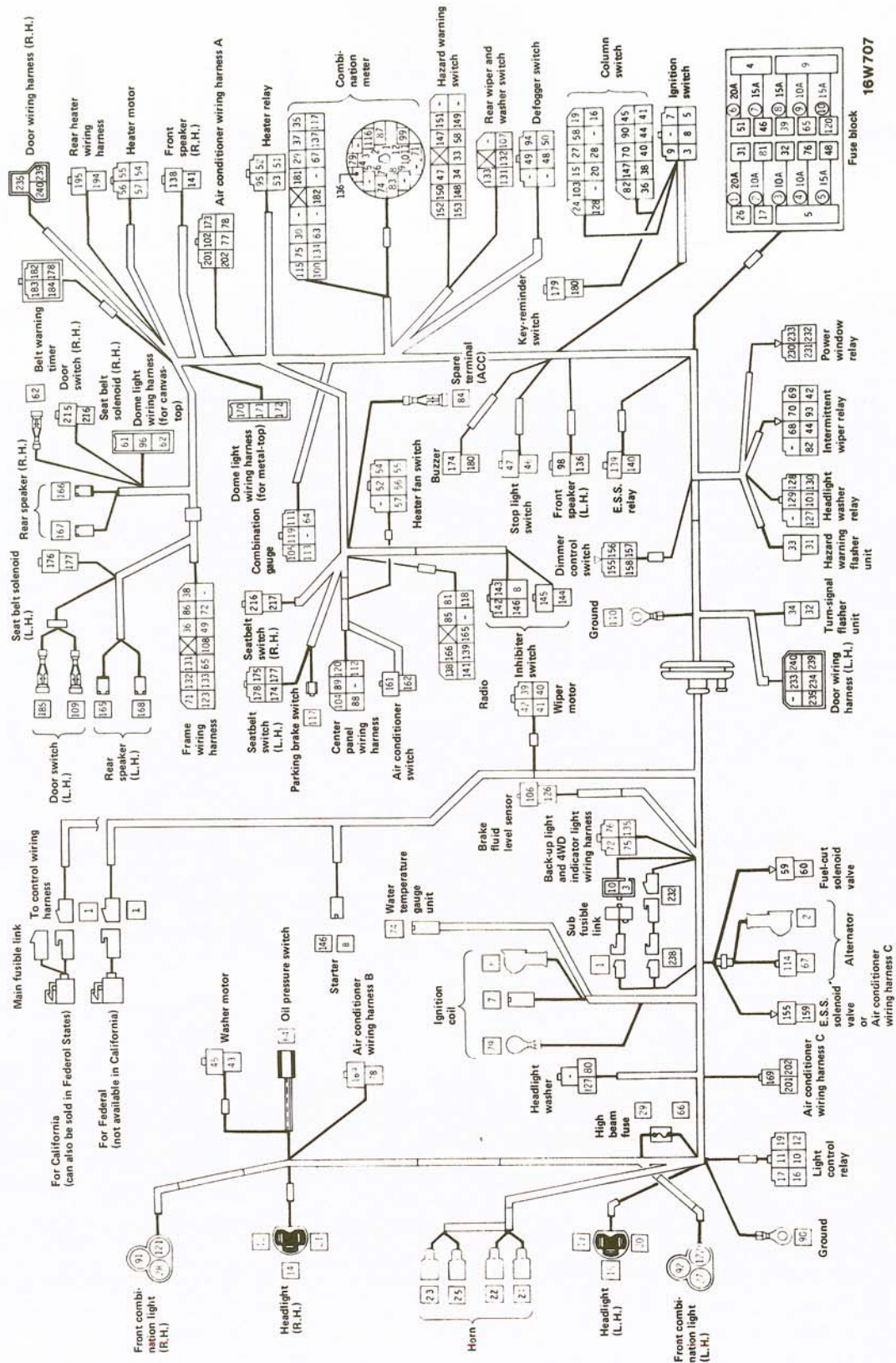
If a pair of connectors (male and female) is illustrated as disconnected, the corresponding terminal numbers will be positioned symmetrically. Therefore when the pair of connectors is connected, the corresponding terminal numbers on the male and female connectors will match.







## FRONT WIRING HARNESSES







# COMPONENT SERVICE-WIRING HARNESS

No.	WIRE	CIRCUIT	WIRE	CIRCUIT
1	3W	MAIN FUSIBLE LINK <BATTERY>	100	COMBINATION METER <E>
2	5W	ALTERNATOR <B>	125B	HEADLIGHT WASHER RELAY <E>
3	2W	FUSIBLE LINK	101	HEADLIGHT WASHER RELAY <E>
4	3W	FUSE BLOCK	102	COLUMN SWITCH <E>
5	28W	IGNITION SWITCH <IG>	103	COLUMN SWITCH <E>
6	28W	IGNITION SWITCH <IG>	104	CENTER PANEL WIRING HARNESS <E>
7	28W	IGNITION SWITCH <IG>	105	COMBINATION GAUGE <E>
8	28Y	IGNITION SWITCH <ST>	106	COMBINATION GAUGE <E>
9	2W	IGNITION SWITCH <ACC>	107	COMBINATION GAUGE <E>
10	2R	IGNITION SWITCH <ACC>	108	COMBINATION GAUGE <E>
11	125W	IGNITION SWITCH <ACC>	109	COMBINATION GAUGE <E>
12	125RL	IGNITION SWITCH <ACC>	110	COMBINATION GAUGE <E>
13	125RL	IGNITION SWITCH <ACC>	111	COMBINATION GAUGE <E>
14	085W	IGNITION SWITCH <ACC>	112	COMBINATION GAUGE <E>
15	085W	IGNITION SWITCH <ACC>	113	COMBINATION GAUGE <E>
16	125W	IGNITION SWITCH <ACC>	114	COMBINATION GAUGE <E>
17	125W	IGNITION SWITCH <ACC>	115	COMBINATION GAUGE <E>
18	085R	IGNITION SWITCH <ACC>	116	COMBINATION GAUGE <E>
19	085R	IGNITION SWITCH <ACC>	117	COMBINATION GAUGE <E>
20	085R	IGNITION SWITCH <ACC>	118	COMBINATION GAUGE <E>
21	085R	IGNITION SWITCH <ACC>	119	COMBINATION GAUGE <E>
22	085R	IGNITION SWITCH <ACC>	120	COMBINATION GAUGE <E>
23	085R	IGNITION SWITCH <ACC>	121	COMBINATION GAUGE <E>
24	085R	IGNITION SWITCH <ACC>	122	COMBINATION GAUGE <E>
25	085R	IGNITION SWITCH <ACC>	123	COMBINATION GAUGE <E>
26	125R	IGNITION SWITCH <ACC>	124	COMBINATION GAUGE <E>
27	085RL	IGNITION SWITCH <ACC>	125	COMBINATION GAUGE <E>
28	085RL	IGNITION SWITCH <ACC>	126	COMBINATION GAUGE <E>
29	085RL	IGNITION SWITCH <ACC>	127	COMBINATION GAUGE <E>
30	085RL	IGNITION SWITCH <ACC>	128	COMBINATION GAUGE <E>
31	125GB	IGNITION SWITCH <ACC>	129	COMBINATION GAUGE <E>
32	085RL	IGNITION SWITCH <ACC>	130	COMBINATION GAUGE <E>
33	125GO	IGNITION SWITCH <ACC>	131	COMBINATION GAUGE <E>
34	085RL	IGNITION SWITCH <ACC>	132	COMBINATION GAUGE <E>
35	03GL	IGNITION SWITCH <ACC>	133	COMBINATION GAUGE <E>
36	WL	IGNITION SWITCH <ACC>	134	COMBINATION GAUGE <E>
37	03GY	IGNITION SWITCH <ACC>	135	COMBINATION GAUGE <E>
38	WR	IGNITION SWITCH <ACC>	136	COMBINATION GAUGE <E>
39	085L	IGNITION SWITCH <ACC>	137	COMBINATION GAUGE <E>
40	LO	IGNITION SWITCH <ACC>	138	COMBINATION GAUGE <E>
41	L8	IGNITION SWITCH <ACC>	139	COMBINATION GAUGE <E>
42	LW	IGNITION SWITCH <ACC>	140	COMBINATION GAUGE <E>
43	L	IGNITION SWITCH <ACC>	141	COMBINATION GAUGE <E>
44	L	IGNITION SWITCH <ACC>	142	COMBINATION GAUGE <E>
45	YL	IGNITION SWITCH <ACC>	143	COMBINATION GAUGE <E>
46	085GR	IGNITION SWITCH <ACC>	144	COMBINATION GAUGE <E>
47	085GR	IGNITION SWITCH <ACC>	145	COMBINATION GAUGE <E>
48	28B	IGNITION SWITCH <ACC>	146	COMBINATION GAUGE <E>
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75	28B	IGNITION SWITCH <ACC>	173	COMBINATION GAUGE <E>
76	28B	IGNITION SWITCH <ACC>	174	COMBINATION GAUGE <E>
77	28B	IGNITION SWITCH <ACC>	175	COMBINATION GAUGE <E>
78	28B	IGNITION SWITCH <ACC>	176	COMBINATION GAUGE <E>
79	28B	IGNITION SWITCH <ACC>	177	COMBINATION GAUGE <E>
80	28B	IGNITION SWITCH <ACC>	178	COMBINATION GAUGE <E>
81	28B	IGNITION SWITCH <ACC>	179	COMBINATION GAUGE <E>
82	28B	IGNITION SWITCH <ACC>	180	COMBINATION GAUGE <E>
83	28B	IGNITION SWITCH <ACC>	181	COMBINATION GAUGE <E>
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86	28B	IGNITION SWITCH <ACC>	184	COMBINATION GAUGE <E>
87	28B	IGNITION SWITCH <ACC>	185	COMBINATION GAUGE <E>
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92	28B	IGNITION SWITCH <ACC>	190	COMBINATION GAUGE <E>
93	28B	IGNITION SWITCH <ACC>	191	COMBINATION GAUGE <E>
94	28B	IGNITION SWITCH <ACC>	192	COMBINATION GAUGE <E>
95	28B	IGNITION SWITCH <ACC>	193	COMBINATION GAUGE <E>
96	28B	IGNITION SWITCH <ACC>	194	COMBINATION GAUGE <E>
97	28B	IGNITION SWITCH <ACC>	195	COMBINATION GAUGE <E>
98	28B	IGNITION SWITCH <ACC>	196	COMBINATION GAUGE <E>
99	28B	IGNITION SWITCH <ACC>	197	COMBINATION GAUGE <E>

NOTES  
\* : Vehicles with an automatic transmission.  
\*\* : Vehicles with a power window.  
\*\*\* : Vehicles with power windows.

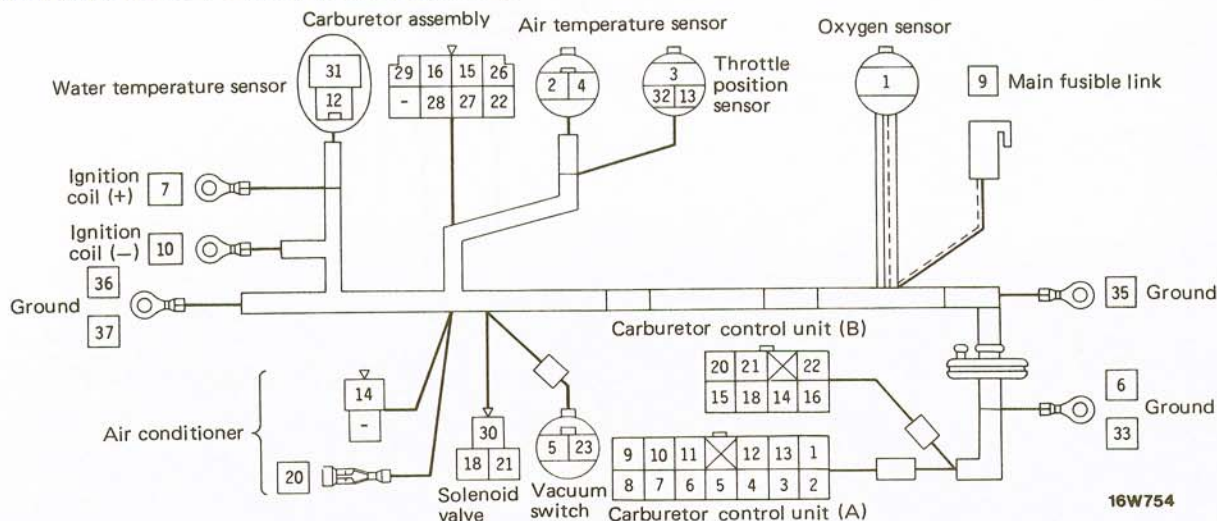


# COMPONENT SERVICE-WIRING HARNESS



## CONTROL WIRING HARNESS

For California (can also be sold in Federal States)



NO.	WIRE	CIRCUIT	
1	SB	CARBURETOR CONTROL UNIT (A)	OXYGEN SENSOR
2	1.25GY	CARBURETOR CONTROL UNIT (A)	AIR TEMPERATURE SENSOR
3	G	CARBURETOR CONTROL UNIT (A)	THROTTLE POSITION SENSOR
4	GR	CARBURETOR CONTROL UNIT (A)	AIR TEMPERATURE SENSOR
5	GB	CARBURETOR CONTROL UNIT (A)	VACUUM SWITCH
6	1.25B	CARBURETOR CONTROL UNIT (A)	GROUND
7	2BW	CARBURETOR CONTROL UNIT (A)	IGNITION COIL (+)
8	2BW	CARBURETOR CONTROL UNIT (A)	7
9	2RL	CARBURETOR CONTROL UNIT (A)	MAIN FUSIBLE LINK
10	SB	CARBURETOR CONTROL UNIT (A)	IGNITION COIL (-)
11	1.25B	CARBURETOR CONTROL UNIT (A)	6
12	YG	CARBURETOR CONTROL UNIT (A)	WATER TEMPERATURE SENSOR
13	YR	CARBURETOR CONTROL UNIT (A)	THROTTLE POSITION SENSOR
*14	0.85BW	CARBURETOR CONTROL UNIT (B)	AIR CONDITIONER
15	YW	CARBURETOR CONTROL UNIT (B)	CARBURETOR ASSEMBLY
16	YL	CARBURETOR CONTROL UNIT (B)	CARBURETOR ASSEMBLY
18	RW	CARBURETOR CONTROL UNIT (B)	SOLENOID VALVE ASSEMBLY
*20	0.85L	CARBURETOR CONTROL UNIT (B)	AIR CONDITIONER
21	GL	CARBURETOR CONTROL UNIT (B)	SOLENOID VALVE ASSEMBLY
22	YG	CARBURETOR CONTROL UNIT (B)	CARBURETOR ASSEMBLY
23	B	VACUUM SWITCH	37
26	1.25BW	CARBURETOR ASSEMBLY	7
27	1.25BW	CARBURETOR ASSEMBLY	7
28	1.25BW	CARBURETOR ASSEMBLY	7
29	1.25BW	CARBURETOR ASSEMBLY	7
30	1.25BW	SOLENOID VALVE	7
31	GY	WATER TEMPERATURE SENSOR	2
32	GY	CARBURETOR	2
33	B	GROUND	1
35	1.25B	GROUND	6
36	B	GROUND	10
37	1.25B	GROUND	35

### NOTE

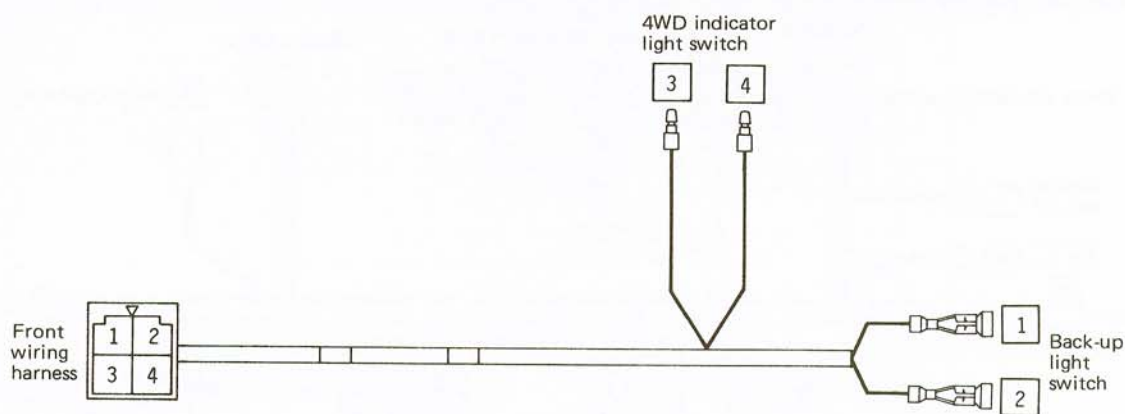
\*Vehicles equipped with an air conditioner.





## COMPONENT SERVICE-WIRING HARNESS

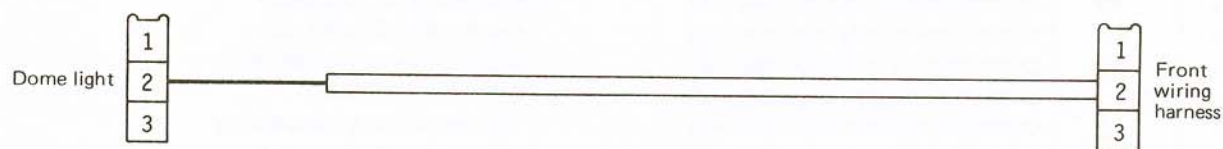
### BACK-UP LIGHT AND 4WD INDICATOR LIGHT WIRING HARNESS



16W704

NO.	WIRE	CIRCUIT	
1	R	FRONT WIRING HARNESS	BACK-UP LIGHT SWITCH
2	RL	FRONT WIRING HARNESS	BACK-UP LIGHT SWITCH
3	BR	FRONT WIRING HARNESS	4WD INDICATOR LIGHT SWITCH
4	YR	FRONT WIRING HARNESS	4WD INDICATOR LIGHT SWITCH

### DOMES LIGHT WIRING HARNESS



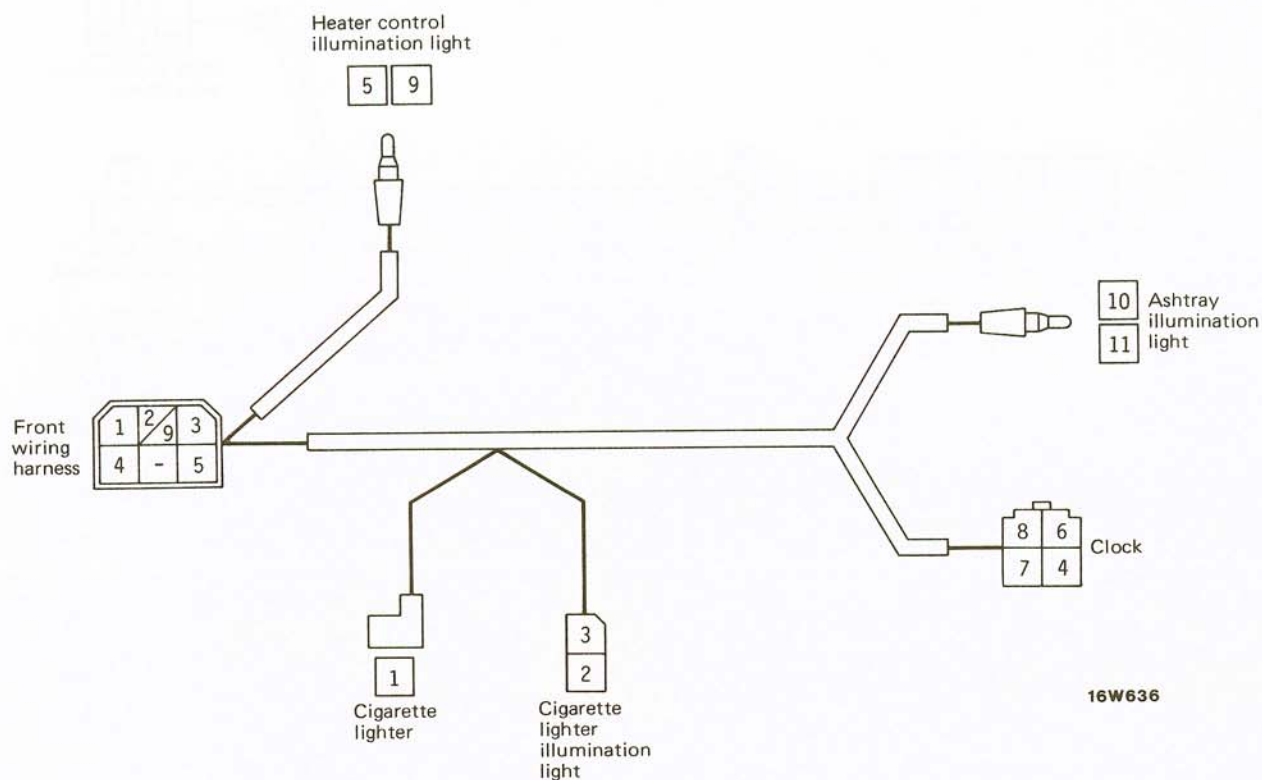
16W635

NO.	WIRE	CIRCUIT	
1	RB	FRONT WIRING HARNESS	DOMES LIGHT <B>
2	B	FRONT WIRING HARNESS	DOMES LIGHT <E>
3	RG	FRONT WIRING HARNESS	DOMES LIGHT <DR>



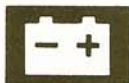


## ENTER PANEL WIRING HARNESS



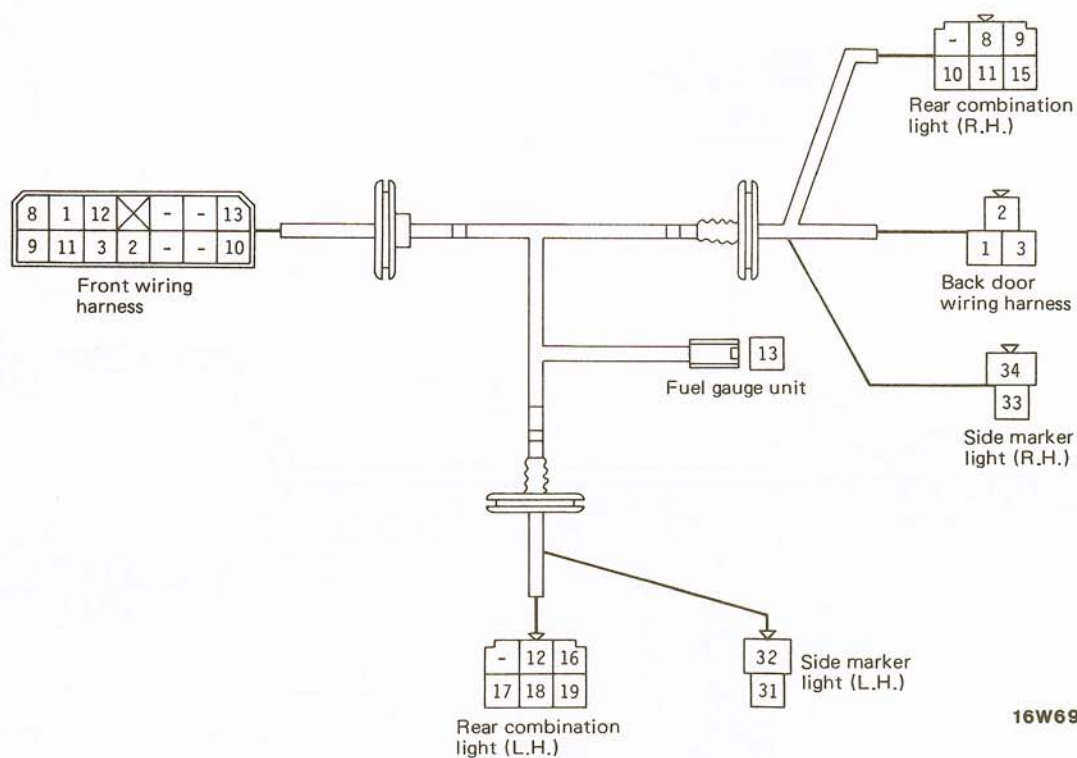
NO.	WIRE	CIRCUIT	
1	0.85LW	FRONT WIRING HARNESS <ACC>	CIGARETTE LIGHTER
2	GW	FRONT WIRING HARNESS <ILL+>	CIGARETTE LIGHTER ILLUMINATION LIGHT
3	0.85B	FRONT WIRING HARNESS <E>	CIGARETTE LIGHTER ILLUMINATION LIGHT
4	0.3RB	FRONT WIRING HARNESS <B>	CLOCK
5	0.3GY	FRONT WIRING HARNESS <ILL->	HEATER CONTROL ILLUMINATION LIGHT
6	B	CLOCK <E>	3
7	LW	CLOCK <ACC>	1
8	0.3GW	CLOCK <ILL+>	2
9	0.3GW	FRONT WIRING HARNESS <ILL+>	HEATER CONTROL ILLUMINATION LIGHT
10	0.3B	ASHTRAY ILLUMINATION LIGHT <E>	3
11	0.3GW	ASHTRAY ILLUMINATION LIGHT <ILL>	2





## COMPONENT SERVICE-WIRING HARNESS

### FRAME WIRING HARNESS – Vehicles without a rear wiper and washer



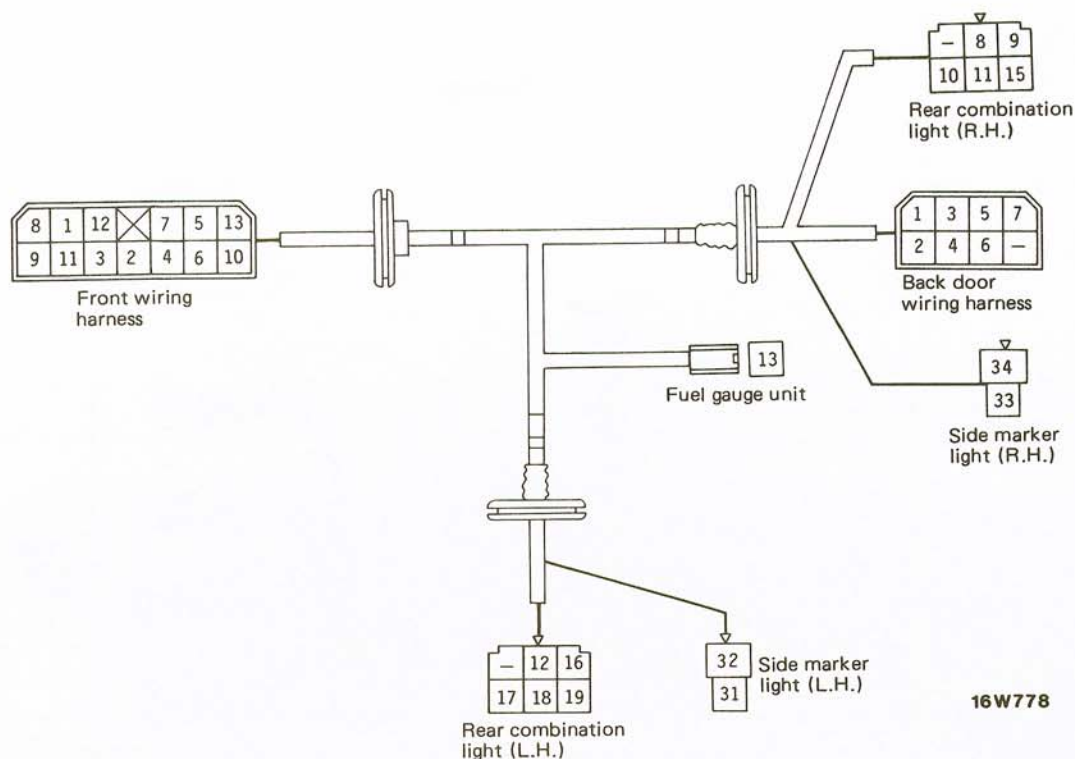
NO.	WIRE	CIRCUIT	
1	0.3GW	FRONT WIRING HARNESS	BACK DOOR WIRING HARNESS <LI>
2	B	FRONT WIRING HARNESS	BACK DOOR WIRING HARNESS <E>
3	2B	FRONT WIRING HARNESS	BACK DOOR WIRING HARNESS <DEF>
8	0.3GY	FRONT WIRING HARNESS	REAR COMBINATION LIGHT (R.H.) <TUR/STOP>
9	G	FRONT WIRING HARNESS	REAR COMBINATION LIGHT (R.H.)
10	RG	FRONT WIRING HARNESS	REAR COMBINATION LIGHT (R.H.) <TAIL>
11	RL	FRONT WIRING HARNESS	REAR COMBINATION LIGHT (R.H.) <BACK>
12	0.3GL	FRONT WIRING HARNESS	REAR COMBINATION LIGHT (L.H.) <TUL/STOP>
13	Y	FRONT WIRING HARNESS	FUEL GAUGE UNIT
15	B	REAR COMBINATION LIGHT (R.H.) <E>	2
16	0.3G	REAR COMBINATION LIGHT (L.H.)	9
17	0.3RG	REAR COMBINATION LIGHT (L.H.) <TAIL>	10
18	0.3RL	REAR COMBINATION LIGHT (L.H.) <BACK>	11
19	B	REAR COMBINATION LIGHT (L.H.) <E>	2
31	GW	SIDE MARKER LIGHT (L.H.)	17
32	0.3B	SIDE MARKER LIGHT (L.H.)	19
33	0.3GW	SIDE MARKER LIGHT (R.H.)	10
34	0.3B	SIDE MARKER LIGHT (R.H.)	15



# COMPONENT SERVICE-WIRING HARNESS



## FRAME WIRING HARNESS – Vehicles with a rear wiper and washer



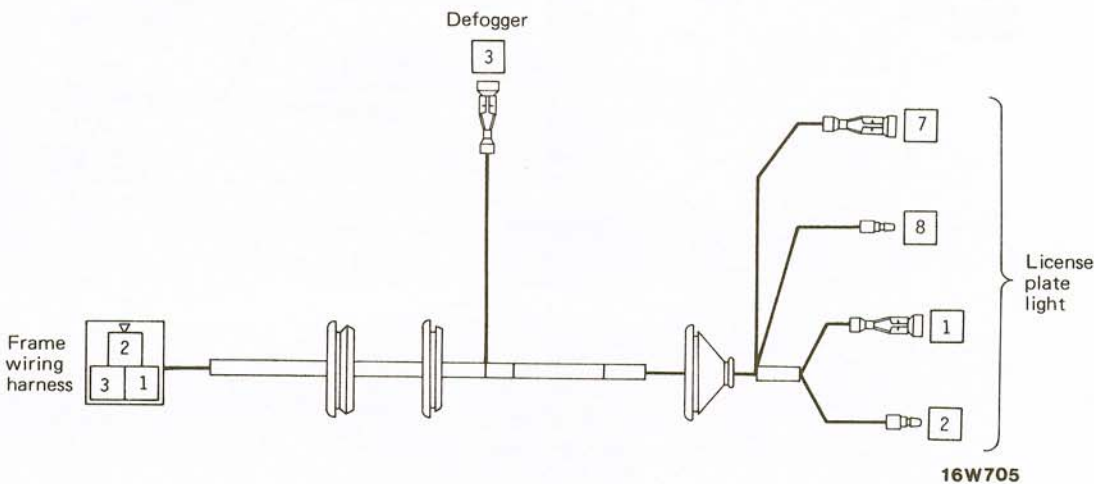
NO.	WIRE	CIRCUIT	
1	0.3GW	FRONT WIRING HARNESS	BACK DOOR WIRING HARNESS <LI>
2	B	FRONT WIRING HARNESS	BACK DOOR WIRING HARNESS <E>
3	2B	FRONT WIRING HARNESS	BACK DOOR WIRING HARNESS <DEF>
4	L	FRONT WIRING HARNESS	BACK DOOR WIRING HARNESS (REAR WIPER) <ACC>
5	0.3BrW	FRONT WIRING HARNESS	BACK DOOR WIRING HARNESS (REAR WIPER) <LO>
6	0.3Br	FRONT WIRING HARNESS	BACK DOOR WIRING HARNESS (REAR WIPER) <AS>
7	0.3WB	FRONT WIRING HARNESS	BACK DOOR WIRING HARNESS (REAR WASHER)
8	0.3GY	FRONT WIRING HARNESS	REAR COMBINATION LIGHT (R.H.) <TUR/STOP>
9	G	FRONT WIRING HARNESS	REAR COMBINATION LIGHT (R.H.)
10	RG	FRONT WIRING HARNESS	REAR COMBINATION LIGHT (R.H.) <TAIL>
11	RL	FRONT WIRING HARNESS	REAR COMBINATION LIGHT (R.H.) <BACK>
12	0.3GL	FRONT WIRING HARNESS	REAR COMBINATION LIGHT (L.H.) <TUL/STOP>
13	Y	FRONT WIRING HARNESS	FUEL GAUGE UNIT
15	B	REAR COMBINATION LIGHT (R.H.) <E>	2
16	0.3G	REAR COMBINATION LIGHT (L.H.)	9
17	0.3RG	REAR COMBINATION LIGHT (L.H.) <TAIL>	10
18	0.3RL	REAR COMBINATION LIGHT (L.H.) <BACK>	11
19	B	REAR COMBINATION LIGHT (L.H.) <E>	2
31	GW	SIDE MARKER LIGHT (L.H.)	17
32	0.3B	SIDE MARKER LIGHT (L.H.)	19
33	0.3GW	SIDE MARKER LIGHT (R.H.)	10
34	0.3B	SIDE MARKER LIGHT (R.H.)	15





# COMPONENT SERVICE-WIRING HARNESS

## BACK DOOR WIRING HARNESS – Vehicles without a rear wiper and washer

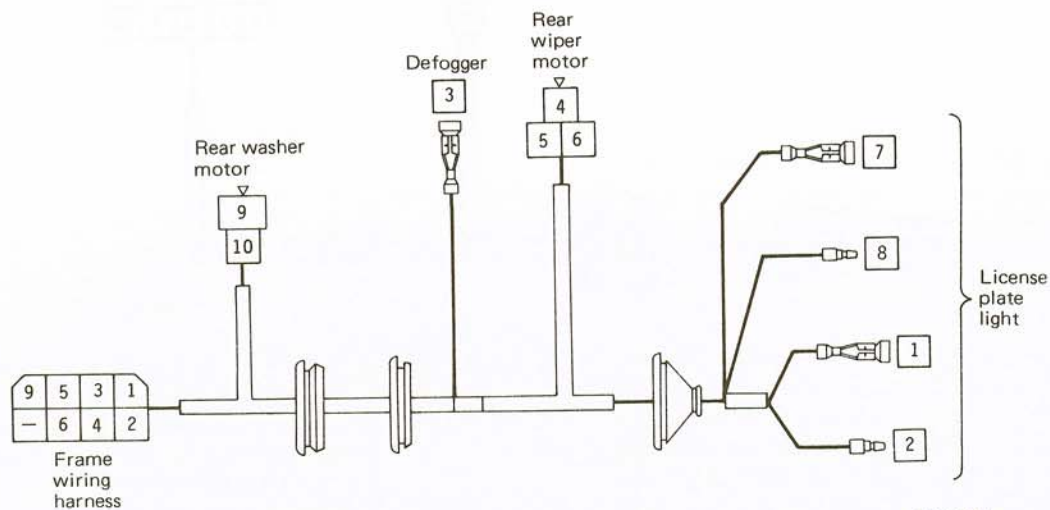


NO.	WIRE	CIRCUIT	
1	FGW	FRAME WIRING HARNESS	LICENSE PLATE LIGHT <B>
2	FB	FRAME WIRING HARNESS	LICENSE PLATE LIGHT <E>
3	2FB	FRAME WIRING HARNESS	DEFOGGER
7	GW	LICENSE PLATE LIGHT <B>	1
8	B	LICENSE PLATE LIGHT <E>	2





## ACK DOOR WIRING HARNESS – Vehicles with a rear wiper and washer



16W777

NO.	WIRE	CIRCUIT	
1	FGW	FRAME WIRING HARNESS	LICENSE PLATE LIGHT <B>
2	FB	FRAME WIRING HARNESS	LICENSE PLATE LIGHT <E>
3	2FB	FRAME WIRING HARNESS	DEFOGGER
4	FL	FRAME WIRING HARNESS	REAR WIPER MOTOR <ACC>
5	FBrW	FRAME WIRING HARNESS	REAR WIPER MOTOR <LO>
6	FBr	FRAME WIRING HARNESS	REAR WIPER MOTOR <AS>
7	GW	LICENSE PLATE LIGHT <B>	1
8	B	LICENSE PLATE LIGHT <E>	2
9	0.3WB	FRAME WIRING HARNESS	REAR WASHER MOTOR <->
10	0.3L	REAR WASHER MOTOR <+>	4

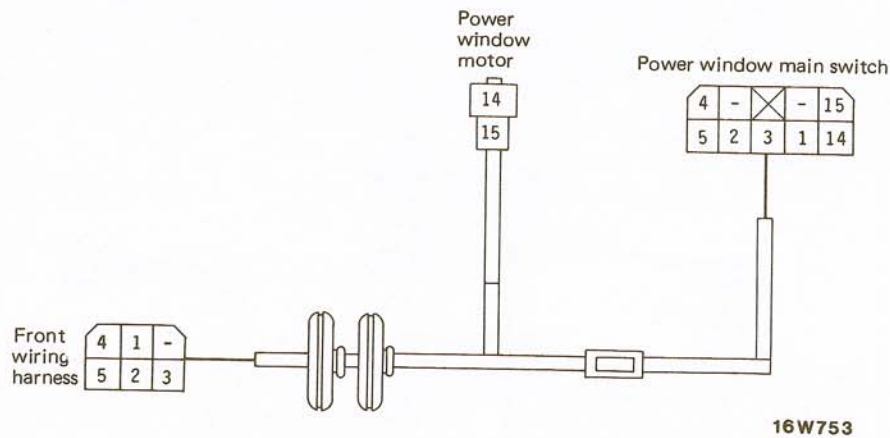




## COMPONENT SERVICE-WIRING HARNESS

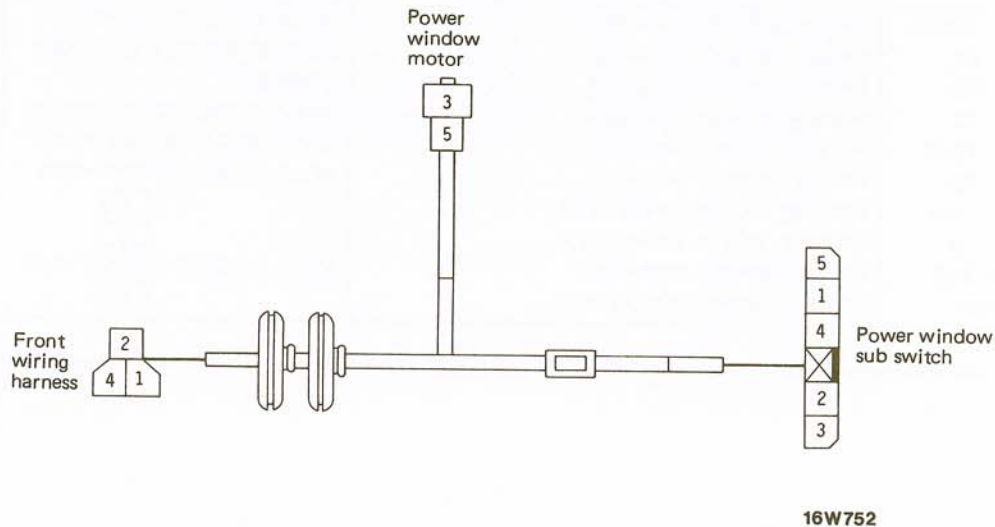
### DOOR WIRING HARNESS – Vehicles with a rear power window

Left side



NO.	WIRE	CIRCUIT	
1	2FL	FRONT WIRING HARNESS	POWER WINDOW MAIN SWITCH <B>
2	2FL	FRONT WIRING HARNESS	POWER WINDOW MAIN SWITCH <E>
3	2FW	FRONT WIRING HARNESS	POWER WINDOW MAIN SWITCH
4	1.25FG	FRONT WIRING HARNESS	POWER WINDOW MAIN SWITCH (R.H.-UP)
5	1.25FR	FRONT WIRING HARNESS	POWER WINDOW MAIN SWITCH (R.H.-DOWN)
14	1.25R	POWER WINDOW MAIN SWITCH	POWER WINDOW MOTOR
15	1.25G	POWER WINDOW MAIN SWITCH	POWER WINDOW MOTOR

Right side

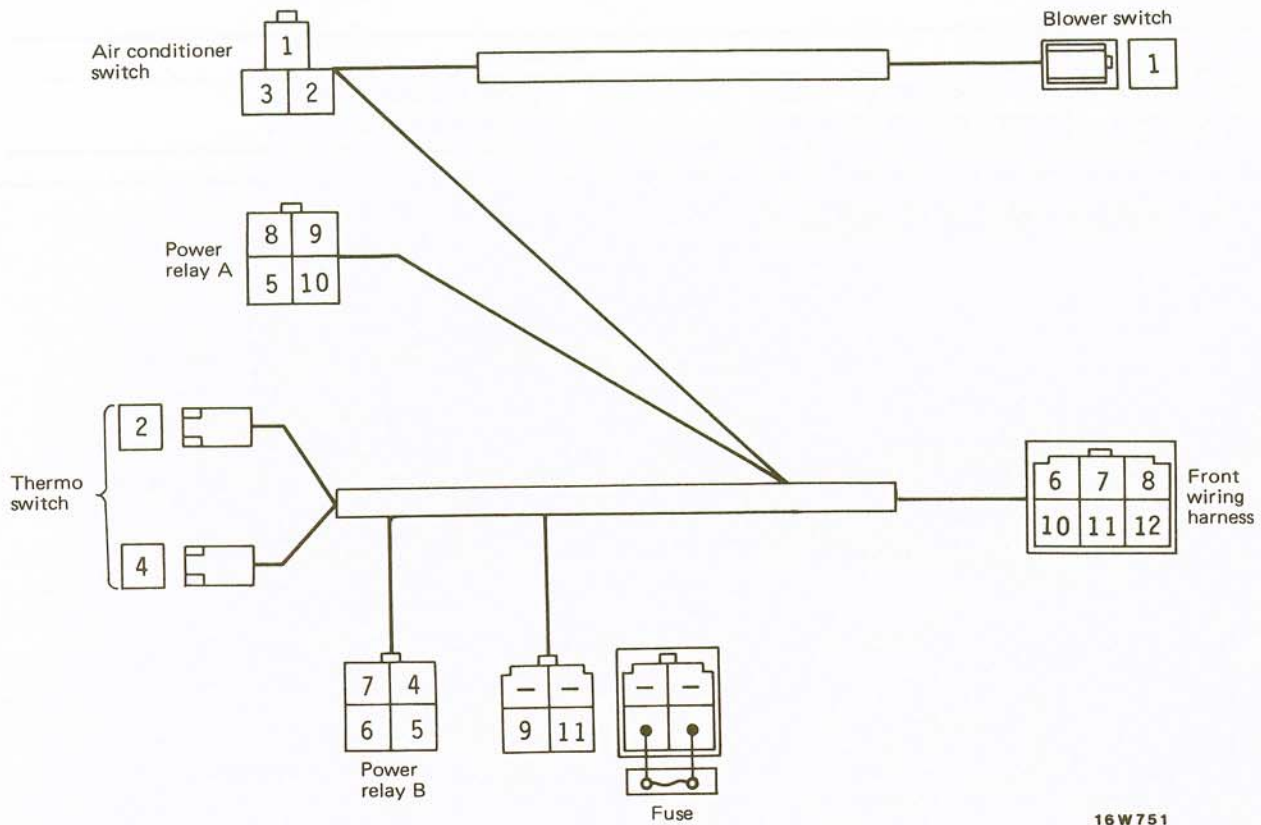


NO.	WIRE	CIRCUIT	
1	2FR	FRONT WIRING HARNESS	POWER WINDOW SUB SWITCH (UP)
2	2FL	FRONT WIRING HARNESS	POWER WINDOW SUB SWITCH <B>
3	2RB	POWER WINDOW MOTOR	POWER WINDOW SUB SWITCH (UP)
4	2FG	FRONT WIRING HARNESS	POWER WINDOW SUB SWITCH (DOWN)
5	2GB	POWER WINDOW MOTOR	POWER WINDOW SUB SWITCH (DOWN)





## IR CONDITIONER WIRING HARNESS A



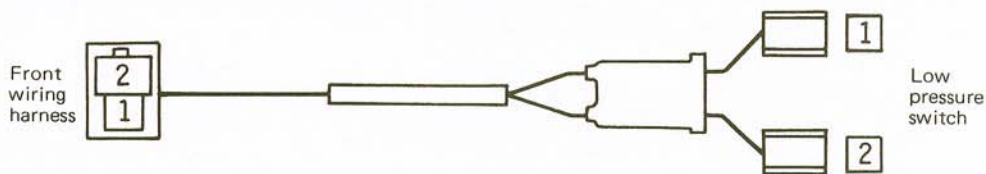
NO.	WIRE	CIRCUIT	
1	0.85WB	BLOWER SWITCH	AIR CONDITIONER SWITCH
2	0.85LB	AIR CONDITIONER SWITCH	THERMO SWITCH
3	B	AIR CONDITIONER SWITCH	7
4	0.85GB	THERMO SWITCH	POWER RELAY B
5	0.85L	POWER RELAY B	POWER RELAY A
6	0.85LW	POWER RELAY B	FRONT WIRING HARNESS <ACC>
7	0.85B	POWER RELAY B	FRONT WIRING HARNESS <E>
8	0.85BY	POWER RELAY A	FRONT WIRING HARNESS
9	0.85LR	POWER RELAY A	FUSE
10	0.85BW	POWER RELAY A	FRONT WIRING HARNESS
11	3LR	FUSE	FRONT WIRING HARNESS
12	0.85L	FRONT WIRING HARNESS	9





## COMPONENT SERVICE-WIRING HARNESS

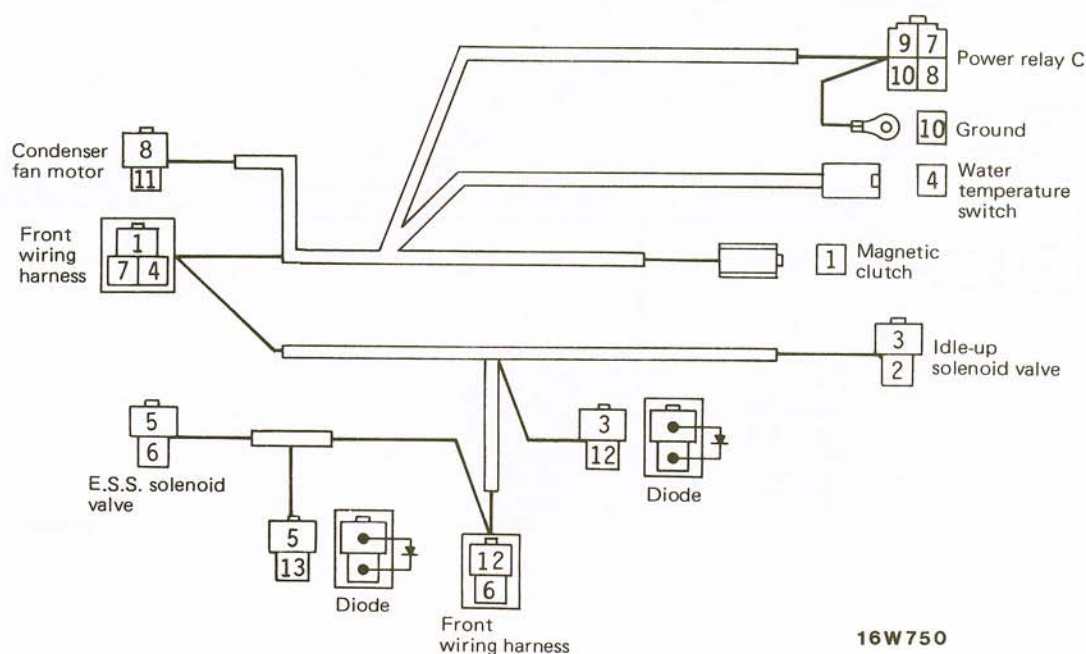
### AIR CONDITIONER WIRING HARNESS B



16W666

NO.	WIRE	CIRCUIT	
1	0.85BW	FRONT WIRING HARNESS	LOW PRESSURE SWITCH
2	0.85BW	FRONT WIRING HARNESS	LOW PRESSURE SWITCH

### AIR CONDITIONER WIRING HARNESS C



16W750

NO.	WIRE	CIRCUIT	
1	0.85BW	FRONT WIRING HARNESS	MAGNETIC CLUTCH
2	0.85BW	IDLE-UP SOLENOID VALVE	1
3	0.85B	IDLE-UP SOLENOID VALVE	DIODE
4	0.85BY	WATER TEMPERATURE SWITCH	FRONT WIRING HARNESS
5	0.85BW	E.S.S. SOLENOID VALVE	DIODE
6	0.85L	E.S.S. SOLENOID VALVE	FRONT WIRING HARNESS
7	0.85L	POWER RELAY C	FRONT WIRING HARNESS
8	0.85GB	POWER RELAY C	CONDENSER FAN MOTOR
9	0.85BW	POWER RELAY C	1
10	0.85B	POWER RELAY C	GROUND
11	0.85GY	CONDENSER FAN MOTOR	10
12	0.85BW	DIODE	FRONT WIRING HARNESS
13	0.85BW	DIODE	12



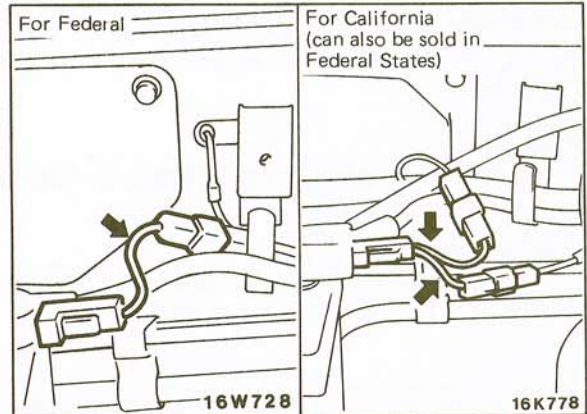


## FUSIBLE LINKS

The fusible links consist of main link and sub link. Every circuit except the starter motor uses fusible links.

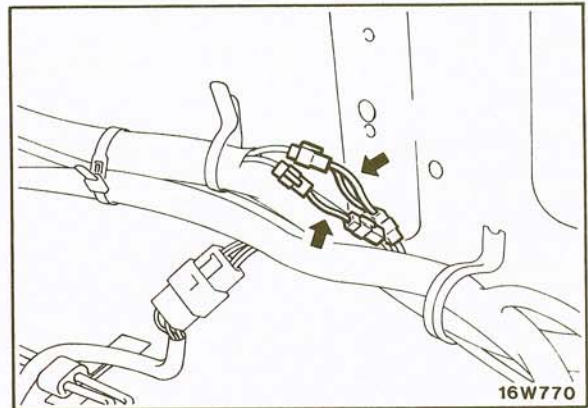
### Main fusible link

Connected to the positive (+) terminal of the battery.



### Sub fusible link

The sub fusible link is secured with tape to the wiring harness at the rear of the left front fender shield.



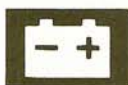
## Inspection

Check for a burnt fusible link with a circuit tester, since visual diagnosis may be difficult.

If a fusible link burns out, the cause is a short or some other problem in the circuit. Carefully determine the cause and correct it before replacing the fusible link.

When replacing fusible links, be sure to use a fusible link of the specified capacity.





## COMPONENT SERVICE-FUSES

### FUSE BLOCK

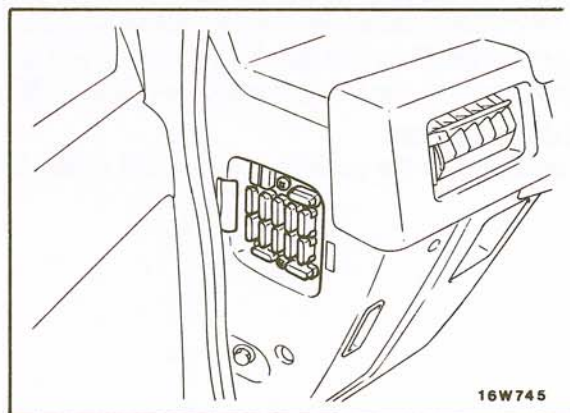
The fuse block is located on the left hand side of the instrument panel.

#### Inspection

If any of the fuses are to be replaced, be sure to use a fuse of the specified capacity.

#### NOTE

If a fuse has failed, locate the cause and completely eliminate the problem before installing a new fuse.

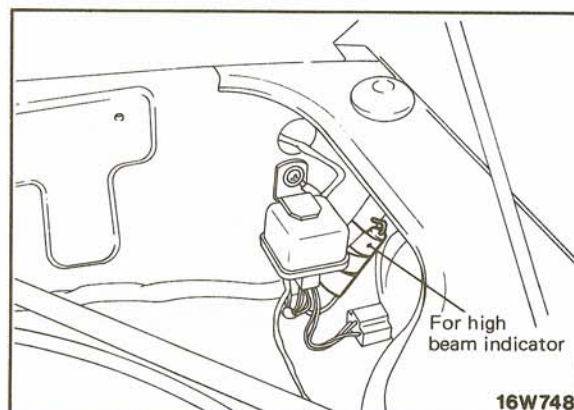


Fuse Capacity Table

Power supply circuit	Fuse No.	Rated capacity A	Applicable circuits
Battery	1	20	Clock, Dome light, Door switches, Hazard warning flashers
Headlight relay	2	10	Tail lights, License plate lights, Illumination lights, Headlight washer relay, Position lights
Ignition switch (IG)	3	10	Heater relay, Seat belt warning timer, Turn-signal lights, Alternator, Seat belt switches, power window relay
	4	10	Back-up lights, Fuel and water temperature gauges, indicator and warning lights, oil pressure gauge, voltage meter
	5	15	Rear window defogger, Rear heater
Battery	6	20	Heater
	7	15	Key-reminder switch, Stop lights, Buzzer, Seat belt switch (L.H.) Door switch (L.H.)
Ignition switch (ACC)	8	15	Windshield wipers and washer, Headlight washer relay, Intermittent wiper relay, Horn
	9	10	Rear window wiper and washer
	10	15	Cigarette lighter, Radio, Tape player, Clock (ACC), Spare terminal

### INDEPENDENT FUSE

An independent fuse is provided behind the left-hand headlight, for the high beam indicator light.







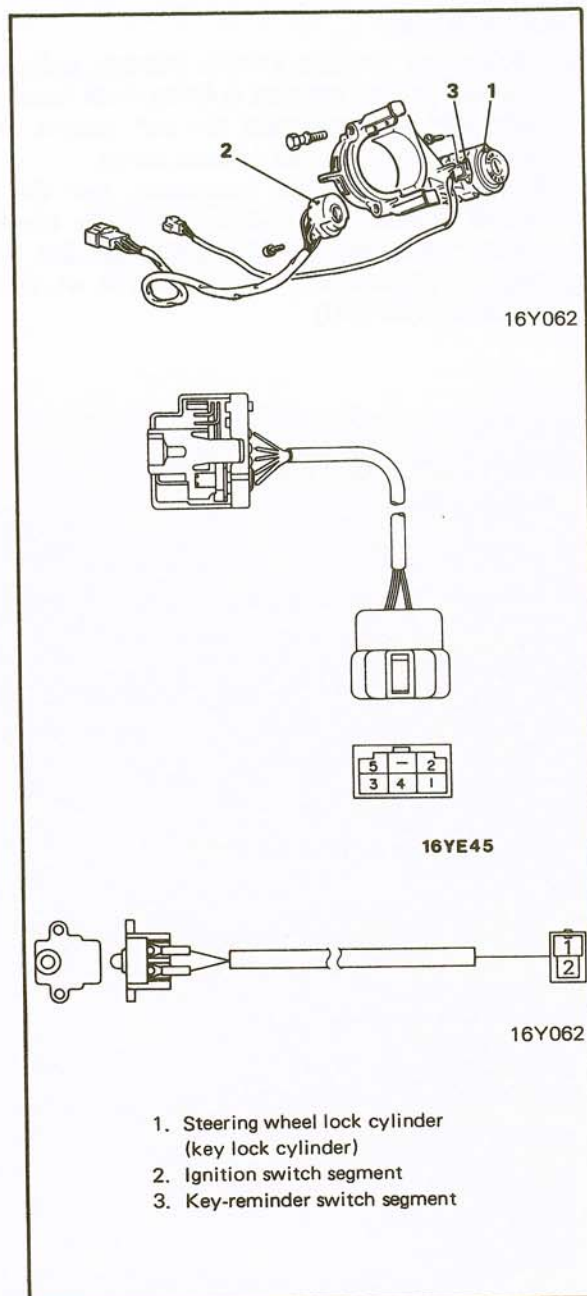
## COMPONENTS

### Ignition switch

Terminal	1	2	3	4	5
Key position					
LOCK					
ACC	○	○			
ON	○	○	○		
START	○		○	○	○

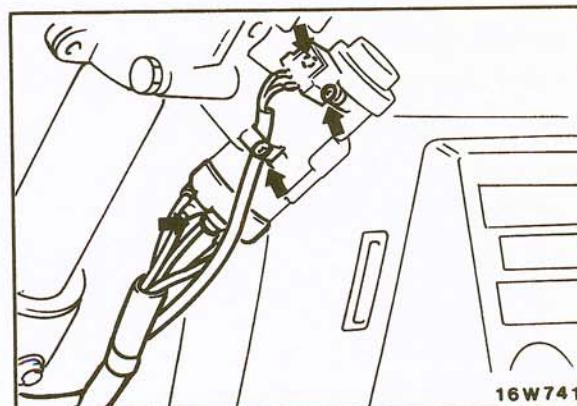
### Key-reminder switch

Terminal	1	2
Key position		
When the key is removed	○	○
When the key is inserted		



## REPLACEMENT OF THE IGNITION SWITCH SEGMENT

1. Disconnect the negative cable from the terminal of the battery.
2. Remove the column cover. (Refer to GROUP 19.)
3. Remove the band clip of the wiring harness, and then disconnect the ignition switch harness connector and the key-reminder switch harness connector.
4. Remove the ignition switch segment and key-reminder switch mounting screws, and then pull the switch segment out of the key cylinder. (16W741)

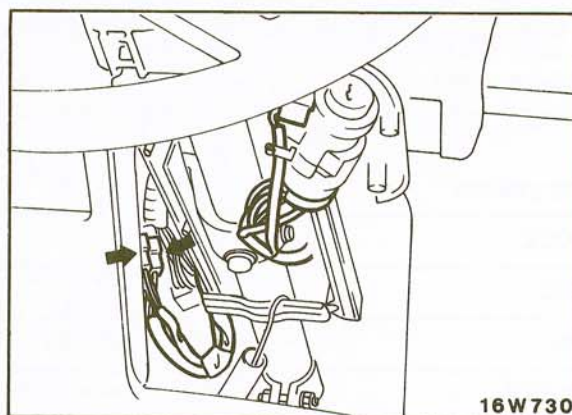






### INSTALLATION

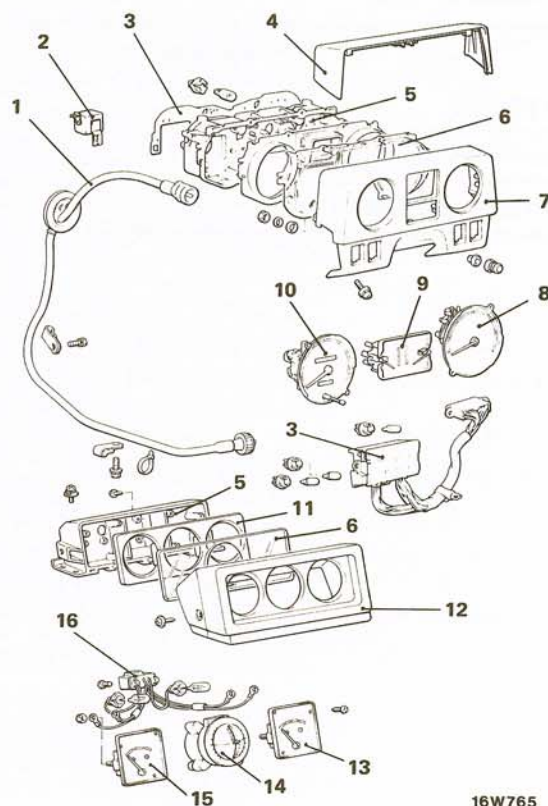
1. Secure the column switch harness and ignition switch harness to the steering column with band clips to make sure that the harnesses are not caught in the boss or moving portion of the column cover.
2. The ignition harness connector and the key-reminder switch harness connector should be connected to the front wiring harness together with the column switch harness connector at the left side of steering support bracket. (16W730)



### METERS AND GAUGES

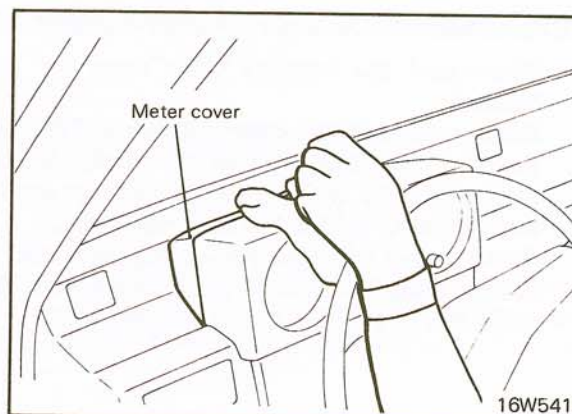
#### COMPONENTS

1. Speedometer cable
2. Buzzer
3. Printed-circuit board
4. Meter cover
5. Meter case
6. Meter glass
7. Meter hood
8. Speedometer
9. Fuel gauge, water temperature gauge
10. Tachometer
11. Window plate
12. Combination meter pad
13. Voltage gauge
14. Inclinator
15. Oil pressure gauge
16. Meter wiring harness



### REMOVAL

1. Remove the meter cover.

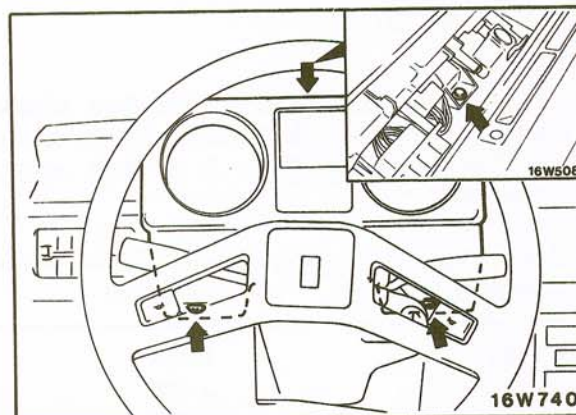




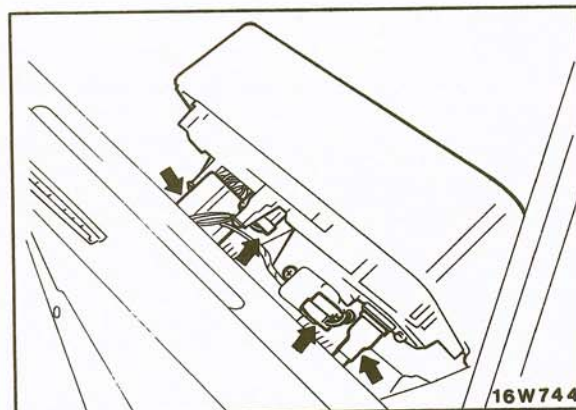


Remove the screws from the bottom of the case.  
(16W740)

3. Remove the bolt from the upper part of the case.  
(16W508)



4. Disconnect the speedometer cable from the meter case by pushing the stopper of the plug on the speedometer cable side of the connection. (16W744)
5. Disconnect the connectors of the meter harness and the buzzer (located behind the meter case), and also of the body harness.
6. Disconnect the connectors (all located behind the meter case at the bottom) of the hazard switch, the rear window defogger, and the rear wiper/washer switch, and then remove the meter case.



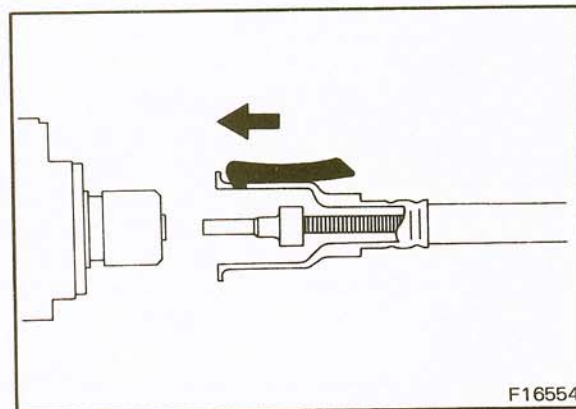
## INSTALLATION

When installing the instrument cluster, be sure to secure the speedometer cable and connector positively.

## SPEEDOMETER

### Replacement of the Speedometer Cable

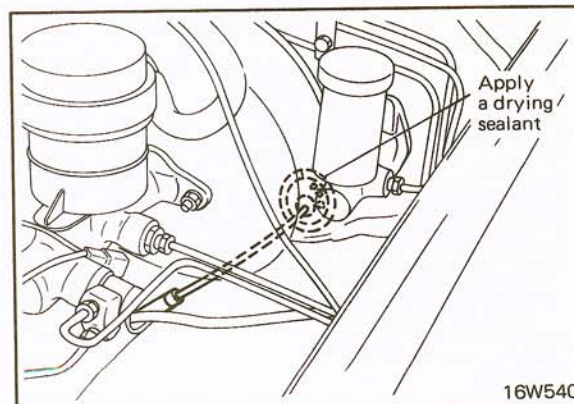
1. Replace the cable assembly if there is a malfunction.
2. When connecting the cable to the speedometer, insert the cable until the stopper properly fits to the speedometer groove. (16F554)



3. After installing the speedometer, pull the speedometer cable through the grommet in the fire wall until the cable marking is visible from the engine compartment side.
4. Apply a drying sealant to the outside surface of the grommet. (16W540)
5. Securely clamp the speedometer cable to the frame clip at the marking (yellow) on the transmission side.

### Caution

Disconnect installation of the cable may cause the meter indication to fluctuate, damage a harness, or produce noise.







### TACHOMETER

#### Inspection

Connect a tach-dwell meter, and then compare the meter readings at various engine speeds with the values indicated on the tachometer. If there is a large error, replace the tachometer.

		rpm
Engine speed	Tolerance	
1,000	± 100	
2,000	± 100	
3,000	± 150	
4,000	± 200	
5,000	± 250	

#### Caution

The tachometer is the negative-ground type, and therefore should not be connected in reverse polarity to the battery. If the tachometer is connected in reverse polarity, the transistors and diodes will be damaged.

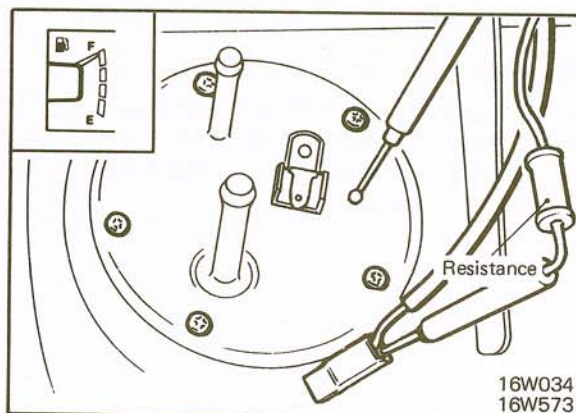
### FUEL GAUGE AND UNIT

#### Inspection

##### FUEL GAUGE INDICATION TEST

Disconnect the wiring connector from the fuel gauge unit inside the luggage compartment. Connect a resistance between the terminals and confirm the gauge indications.

Indication point	Resistance value
Empty	120 $\Omega$
Full	17 $\Omega$



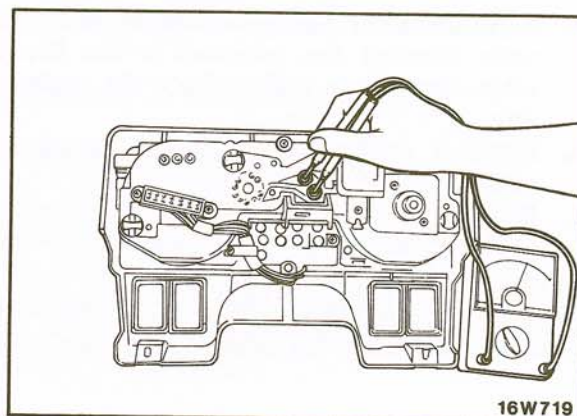
##### FUEL GAUGE CONTINUITY TEST

Measure the resistance value between the terminals with an ohmmeter.

Resistance value ..... Approx. 25  $\Omega$

#### NOTE

If the resistance value is extremely small, there may be a short in the coil. If it is extremely large, there may be a broken wire or some other problem in the coil. In either case, replace the gauge.







## Replacement of the Fuel Gauge Unit

1. Remove the fuel gauge unit. (03W505)

### Caution

Since the fuel gauge unit is mounted to the side of the tank, drain the fuel first. The in-tank filter of the fuel gauge unit should be handled carefully because there is the danger of the filter coming out of position.

2. When installing the fuel gauge unit, be careful not to bend the float arm.
3. After installation, confirm that the unit is securely grounded.

Tightening torque

Fuel gauge unit . . . . . 1 Nm (0.7 ft.lbs.)

## WATER TEMPERATURE GAUGE AND UNIT

### Inspection

#### WATER TEMPERATURE GAUGE INDICATION TEST

1. Disconnect the wiring connector from the water temperature gauge unit inside the engine compartment.
2. Connect a resistance to the connector, and then confirm the gauge indications.

Indication point	Resistance value
(1) 115°C (239°F)	23.8 Ω
(2) 70°C (158°F)	104 Ω

#### WATER TEMPERATURE GAUGE CONTINUITY TEST

Measure the resistance value between the terminals with an ohmmeter.

Resistance value . . . . . Approx. 55 Ω

### NOTE

If the resistance value is extremely small, there may be a short in the coil; if it is extremely large, there may be a broken wire or some other problem in the coil. In either case, replace the gauge.

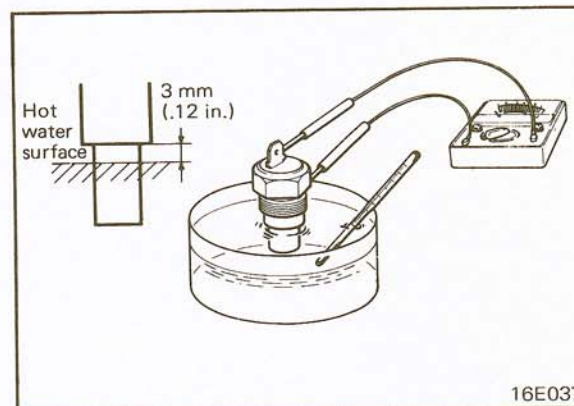
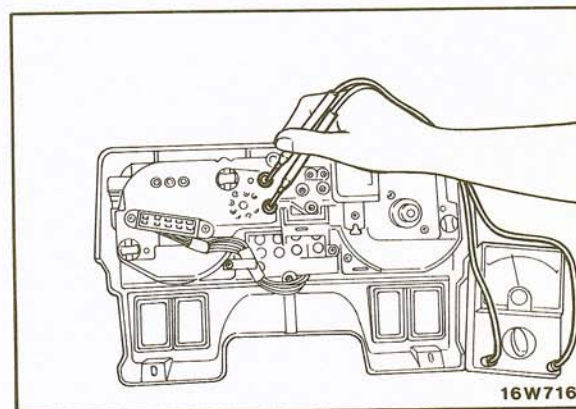
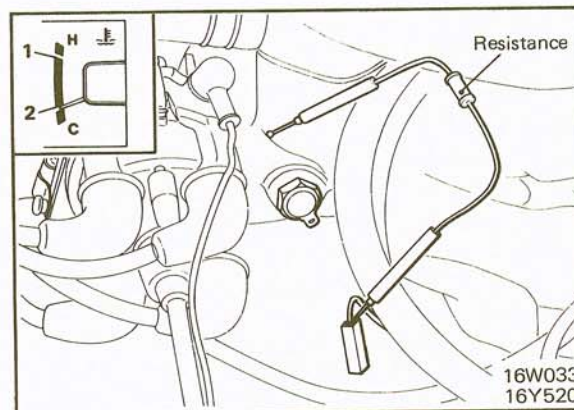
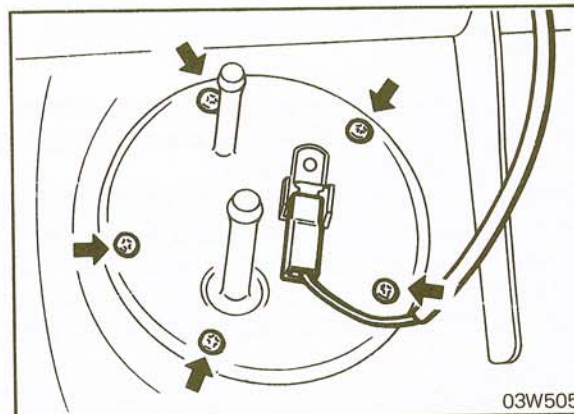
#### WATER TEMPERATURE GAUGE UNIT OPERATION CHECK

Measure the resistance with the gauge unit in hot water at 70°C (158°F).

Resistance value . . . . . 104 Ω

### Caution

The gauge unit should be held with its housing 3 mm (.12 in.) away from the surface of the hot water.







### INCLINOMETER

#### Outline

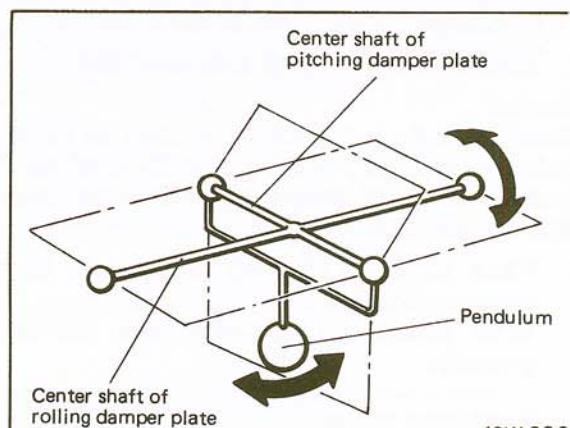
The inclinometer is an instrument which indicates the forward or backward inclination (pitching) or side to side inclination (rolling) of vehicle.

Motion of a pendulum in the system is displayed on the system. The pitching and rolling pointer is supported by a double support mechanism in which the rolling fulcrum is supported in such a way as to be rotatable around the case and the pitching fulcrum supported on the rolling system.

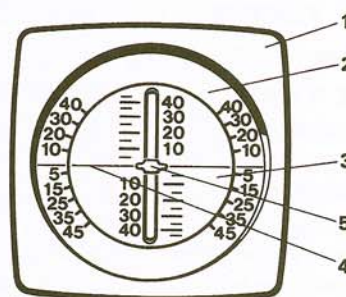
#### Construction

The inclinometer consists of an outer case which inclines with the vehicle, a pointer which is provided in an oil case and always maintains a level position, and a spherical dial. The spherical dial is coupled through the dial support plate to the rolling damper plate. The rolling damper plate is swivel bearing coupled to a stationary frame by the center axis, so it can incline side-to-side, but is always held in a level position by a pendulum. The pointer is coupled with the pitching damper plate.

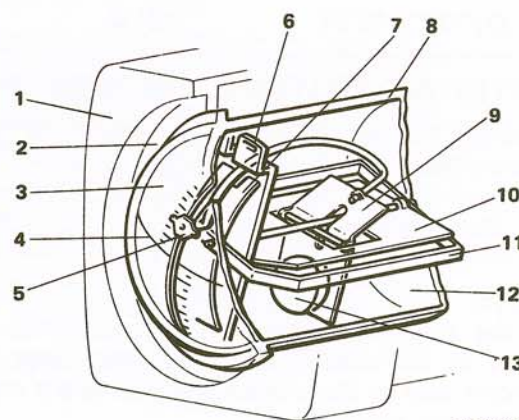
Since the pitching damper plate is swivel bearing coupled to the rolling damper plate by the center axis, it can incline forward and backward, but is always maintained in a level position by the pendulum.



16W 600



68W500



16W603

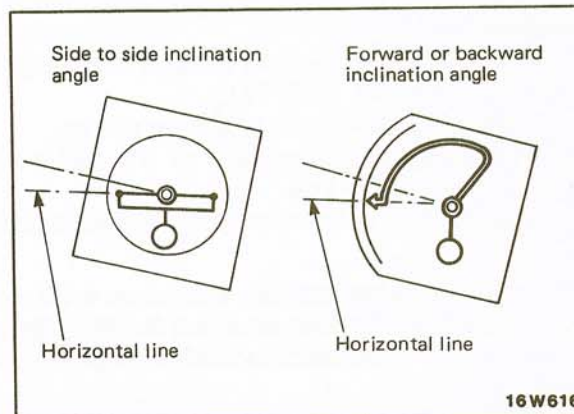
1. Outer case
2. Front panel
3. Spherical dial
4. Spherical dial horizontal centerline
5. Pointer
6. Dial support plate
7. Blind plate
8. Oil case
9. Pitching damper plate
10. Rolling damper plate
11. Stationary frame
12. Oil
13. Pendulum





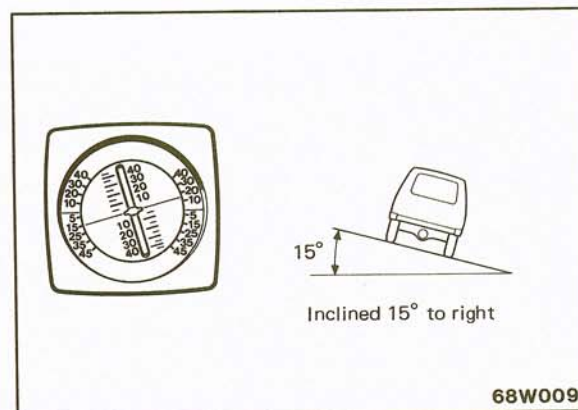
## Operation

The side-to-side inclination angle should be read on a scale of the front panel as indicated by the horizontal centerline of the spherical dial, whereas the forward or backward inclination angle should be read on a scale of the spherical dial as indicated by the pointer.



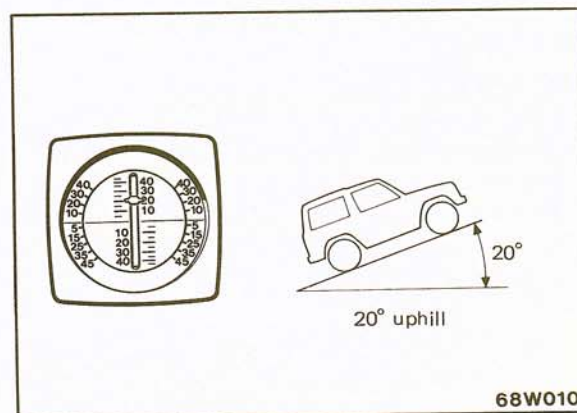
## SIDE-TO-SIDE INCLINATION

The front panel inclines with the vehicle, but the spherical dial maintains a horizontal condition, so the horizontal centerline of the spherical dial shows the side-to-side inclination angle.



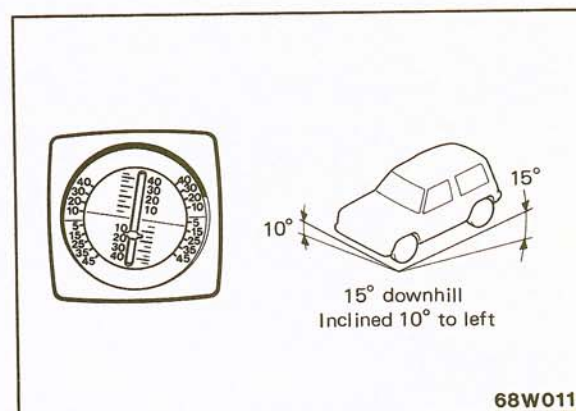
## FORWARD OR BACKWARD INCLINATION

The spherical dial inclines forward or backward with the vehicle, but the pointer maintains a level position, so the pointer indicates the forward or backward inclination angle.



## COMBINED FORWARD OR BACKWARD AND SIDE-TO-SIDE INCLINATION

The forward or backward inclination angle and the side-to-side inclination angle are indicated by the pointer and spherical dial.





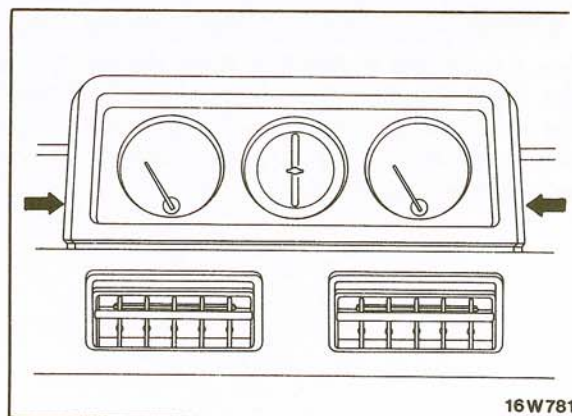


### Removal

1. Remove the combination meter. (Refer to p. 8-134.)
2. Remove the pad. (16W781)
3. Remove the meter case attaching screws.
4. Disconnect the connectors of the meter harness located behind the meter case.
5. Remove the inclinometer from the meter case.

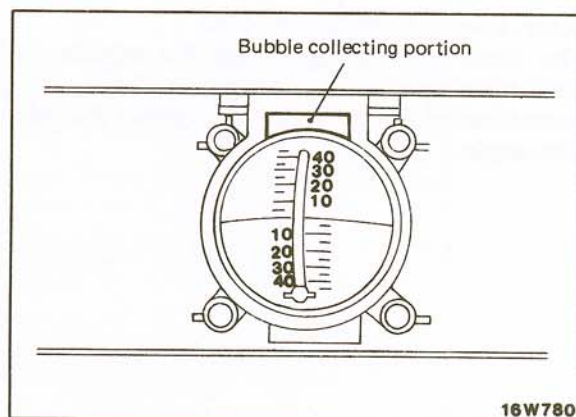
### Caution

To prevent internal trouble, the meter must not be dropped or subjected to shock or must not be abruptly inclined to the extent that the maximum indication angle is exceeded.



### Installation

1. Make sure that all water bubbles in the oil case are collected in the upper bubble collecting portion before installation. (16W780)
2. With the vehicle in a level position (unladen), check to ensure that the spherical dial and pointer indicate a level position.
3. If the spherical dial and pointer do not indicate that the vehicle is level, adjust the inclinometer by inserting shims between it and either the combination gauge bracket or the instrument panel. If the pointer indication is very far from horizontal, replace the inclinometer.



## OIL PRESSURE GAUGE AND UNIT

### Removal

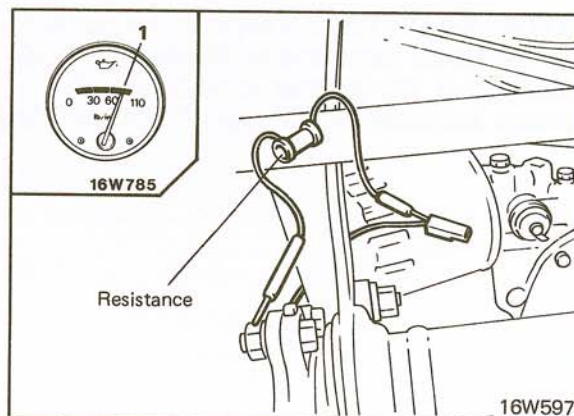
1. Remove the combination meter.
2. Remove the pad.
3. Disconnect the oil pressure gauge from the meter wiring harness.
4. Remove the oil pressure gauge to meter case attaching screws.

### Inspection

#### OIL PRESSURE GAUGE INDICATION TEST

Disconnect the wiring connector from the oil pressure gauge unit inside the engine compartment.

Connect a resistance to the connector, and then confirm the gauge indications. (16W785, 16W597)



Indication point	Resistance value
(1) 588 kPa (85 psi)	120Ω



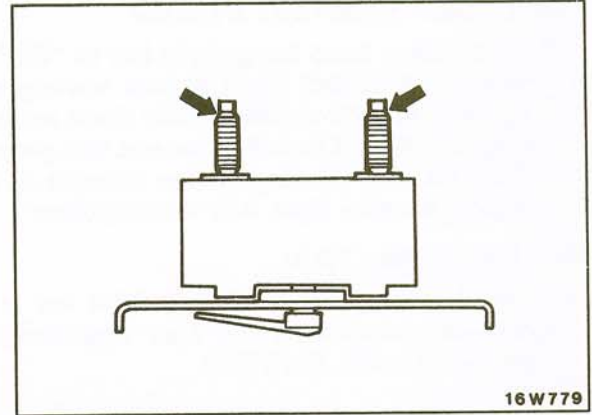


## IL PRESSURE GAUGE CONTINUITY TEST

Measure the resistance value between the terminals with an ohmmeter.

### NOTE

If the resistance value is extremely small, there may be a short in the coil; if it is extremely large, there may be a broken wire or some other problem in the coil.



## VOLTAGE METER

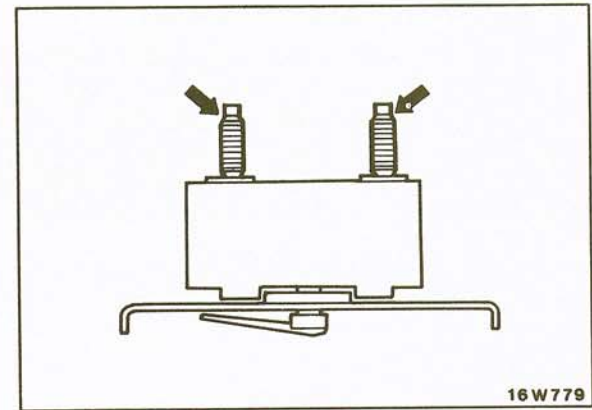
### Removal

1. Remove the combination meter.
2. Remove the pad.
3. Disconnect the voltage meter from the meter wiring harness.
4. Remove the voltage meter to meter case attaching screws.

### Inspection

#### VOLTAGE METER CONTINUITY TEST

1. Connect an ohmmeter to the voltmeter. (16W779)
2. Confirm that the value indicated on the ohmmeter agrees with the standard value.



Resistance value ..... 420Ω



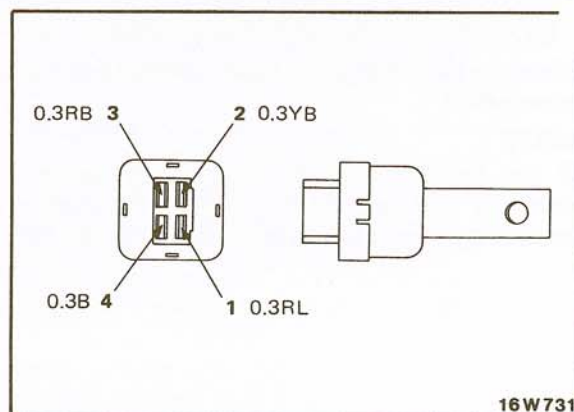


### SEAT BELT WARNING SYSTEM

1. If the driver turns the ignition key to "ON" while his seat belt is unbuckled, the seat belt warning system is activated to provide an audible and visual reminder through a buzzer and light to fasten the seat belt properly.
2. The seat belt warning system consists of a belt switch, buzzer, warning light, belt warning timer.

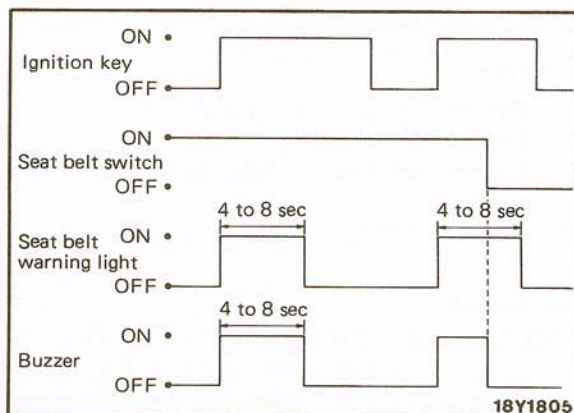
#### Seat Belt Warning Timer

The timer operates when the ignition key is in the "ON" position and terminals 2 and 3 are electrically connected to terminal 4 (ground). (16W731)



#### Seat Belt Warning Light and Buzzer

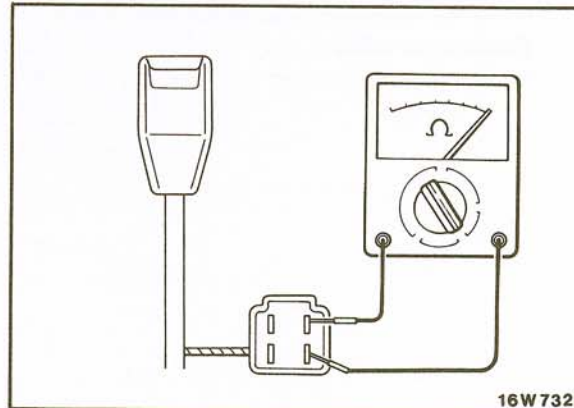
When the seat belt switch is ON (seat belts not buckled) with the ignition key at the ON position, the seat belt warning timer causes the seat belt warning light to illuminate and the buzzer to sound for 4 to 8 seconds. If the seat belt switch is set to OFF (the seat belts buckled) during the seat belt warning timer interval, only the buzzer is cancelled.



#### Seat Belt Switch

##### CONTINUITY TEST

1. Pull back the floor mat and disconnect the seat belt switch connector from where it is at the attachment to the buckle stalk assembly.
2. Use an ohmmeter to check for a short circuit at the 0.3-Y wire and the 0.3-RB wire of the driver's seat belt switch. (16W732)
3. If the ohmmeter reads no resistance with the buckle unlocked and indicates an open circuit when the buckle is locked, the belt switch is operating properly.
4. If a microswitch is defective, the buckle stalk assembly containing microswitch should be replaced. For replacement, see GROUP 23.

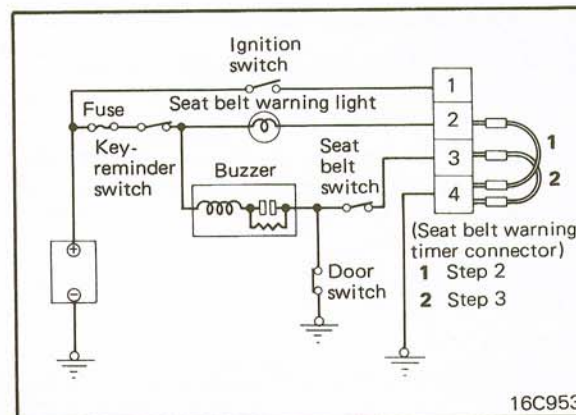






## System Inspection

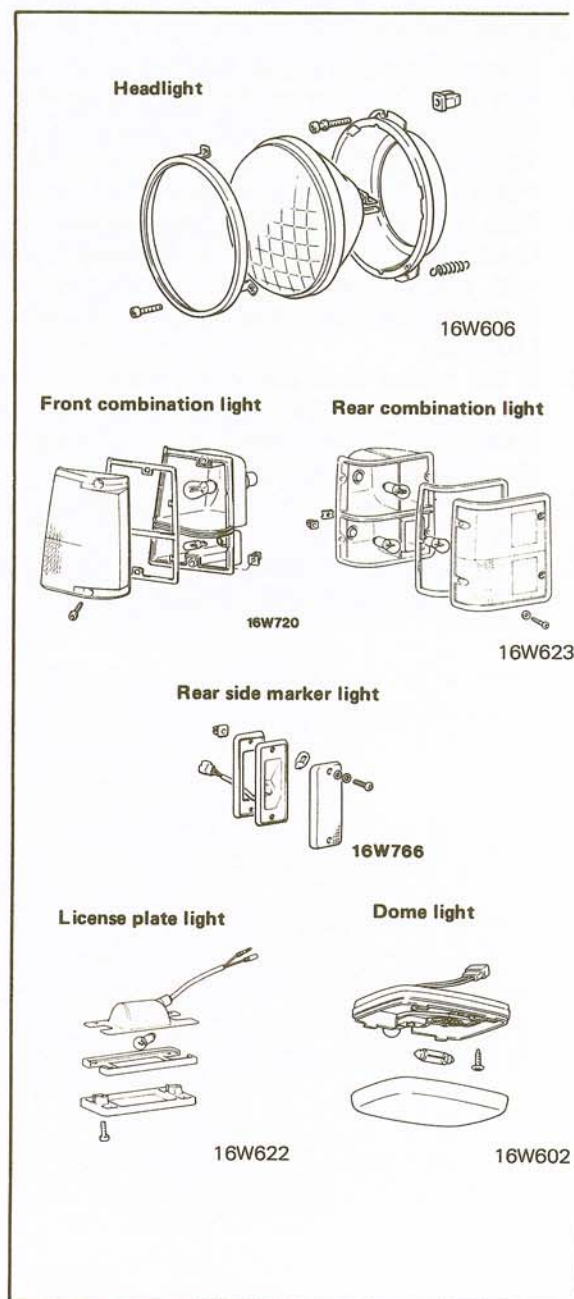
1. Disconnect the seat belt warning timer connector.
2. When the 0.3-YB wire (terminal 2) and 0.3-B wire (terminal 4) are connected with a jumper wire, the seat belt warning light should illuminate. If it fails to illuminate, check the bulb, key-reminder switch and fuse. (16C953)
3. Also the buzzer should sound when the 0.3-RB wire (terminal 3) and 0.3-B wire (terminal 4) are connected with a jumper wire. In this condition, fasten the buckle; if the buzzer stops sounding, the seat belt switch is good. (16C953)
4. If the buzzer does not sound when terminal 3 and terminal 4 are connected with a jumper wire, and check continuity of the seat belt switch. If there is continuity in the seat belt switch, replace the buzzer.
5. After performing the above inspections, connect the seat belt warning timer.
6. With the ignition switch turned to IG, verify the function of the seat belt warning system.







### COMPONENTS



### HEADLIGHTS

1. The headlight system consists of two sealed-beam bulbs.
2. The bulbs are the dual filament type for low and high beams and are marked by a number 2DI molded in the lens.
3. The low beam is intended for use in congested areas and on highways when oncoming vehicles are within a distance of 153 m (500 ft.).
4. The high beam is intended primarily for distant illumination and for use on the open highway when there are no oncoming vehicles.





## IMING

### Pre-aiming Instructions

1. Test dimmer switch operation.
2. Confirm operation of high beam indicator light mounted in instrument cluster.
3. Inspect for badly rusted or faulty headlight assemblies. These conditions must be corrected before a satisfactory adjustment can be made.
4. Fill the fuel tank.
5. Position vehicle on a level floor.
6. Bounce the front of the vehicle up and down three times by applying your body weight to the hood or bumper.
7. Check tire inflation.
8. Rock vehicle sideways to allow it to assume its normal position.
9. There should be no other load in the vehicle except the driver or substituted weight of approximately 70 kg (150 lbs.) placed in driver's seat.
10. Thoroughly clean headlight lenses.
11. Adjust headlights by following the instructions for the headlight tester.

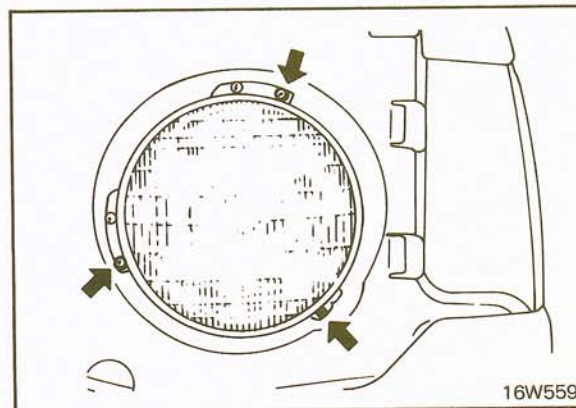
### Removal

1. Remove the radiator grille, front combination light and headlight bezel. (Refer to GROUP 23.)
2. Disconnect the harness connector from the bulb socket.
3. Remove the retaining ring from the mounting ring. (16W559)

### Caution

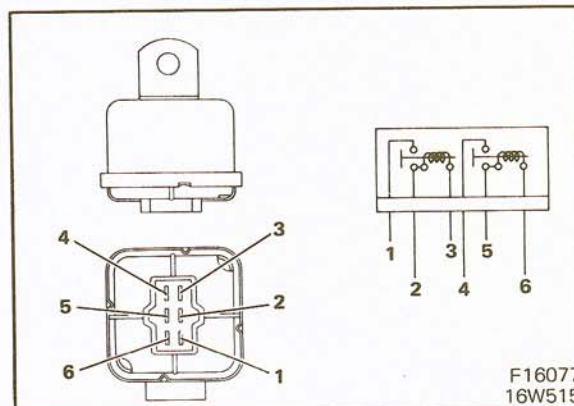
**Do not disturb headlight adjusting screws.**

4. Remove the headlight assembly.



### LIGHT CONTROL RELAY

1. Check to ensure that when battery voltage is applied between terminals 2 and 3 and between terminals 5 and 6 an operating sound (click) is heard. (F16077, 16W515)
2. In the above conditions, check to see if the battery voltage is applied to terminals 1 and 4. (F16077, 16W515)

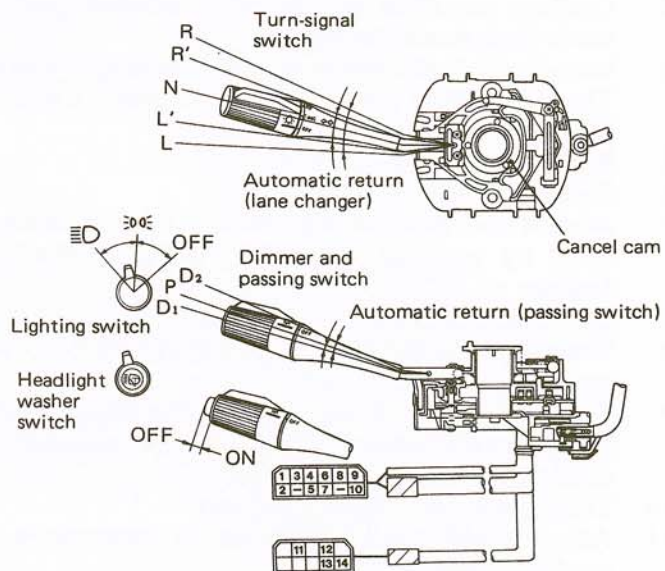






## COMPONENT SERVICE-LIGHTING SYSTEM

### LIGHTING SWITCH



NOTE  
R' and L' indicate lane-changing operation.

16W734

Terminal			Lighting switch			Dimmer and passing switch			Turn-signal switch			Headlight washer switch		Horn switch	
No.	Wire	Used for	OFF	⊃⊃⊃	⊃⊃⊃	D <sub>1</sub>	D <sub>2</sub>	P	L (L')	N	R (R')	OFF	ON	OFF	ON
1	(G)	Lighting switch ( ⊃⊃⊃ )		○	○										
2	R	Lighting switch ( ⊃⊃⊃ )		○	○			○							
3	0.85GR	Turn-signal power supply							○		○				
4	0.85GL	Turn-signal light (L.H.)							○						
5	0.85GY	Turn-signal light (R.H.)									○				
6	2RW	Dimmer switch (low beam)				○		○							
7	2R	Dimmer switch (high beam)					○	○							
8	(B)	Lighting switch ground		○	○										
9	GB	Horn switch													○
10	(L)	Headlight washer relay											○		○
11	2B	Ground				○	○	○					○		
12	0.85WG	Stop light switch								○					
13	0.85WR	Stop light (R.H.)								○	○				
14	0.85WL	Stop light (L.H.)							○	○					

NOTE

The sizes for wires whose size is not specified in the "Wire" column above are 0.3 mm<sup>2</sup> for items in parentheses, and 0.5 mm<sup>2</sup> for all others.





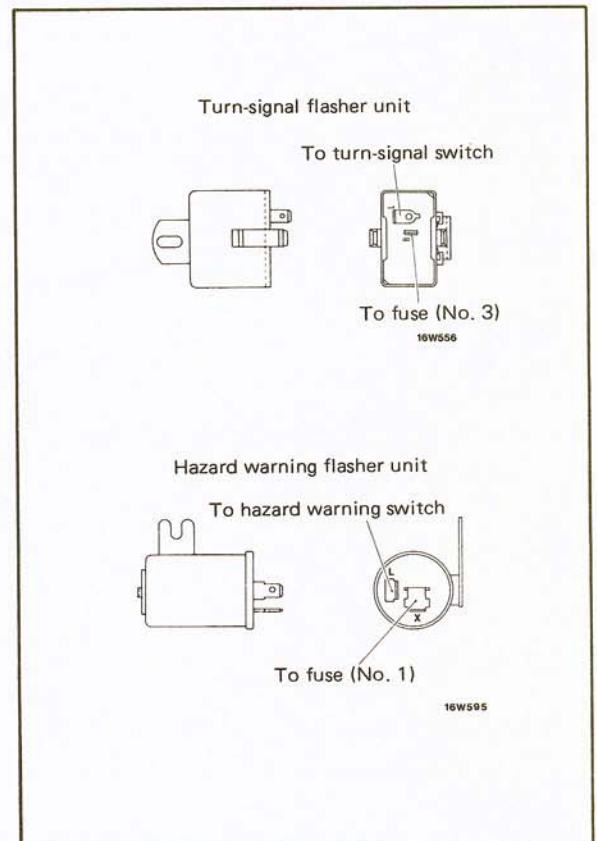
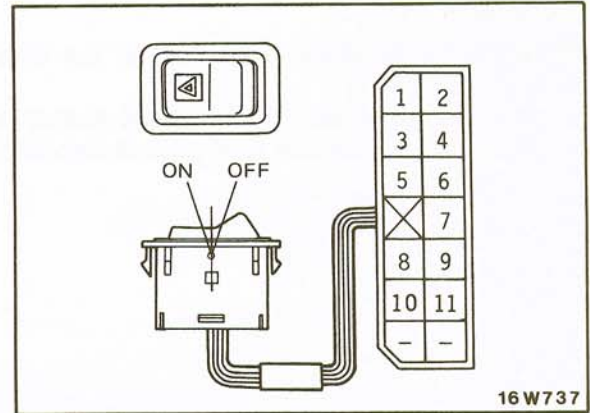
## HAZARD WARNING SWITCH

### Inspection

Move the switch to ON and OFF, and check the continuity between the terminals.

Terminal No.	Switch position		Connection point
	OFF	ON	
1			Fuse block No.2
2			Ground
3			Front turn-signal light (L.H.)
4			Rear turn-signal light (L.H.)
5			Stop light switch
6			Turn-signal flasher unit
7			Hazard warning flasher unit
8			Column switch
9			Column switch
10			Front turn-signal light (R.H.)
11			Rear turn-signal light (R.H.)

## TURN-SIGNAL AND HAZARD WARNING FLASHER UNIT

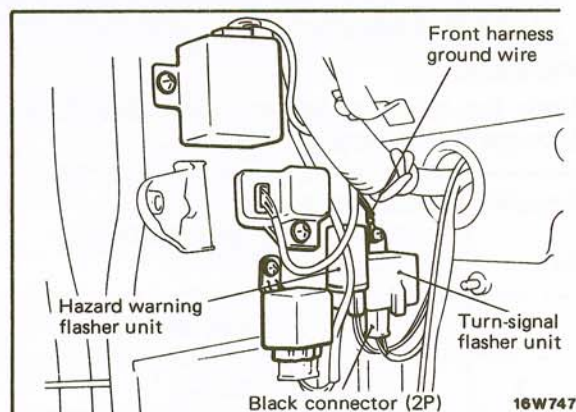






### Installation

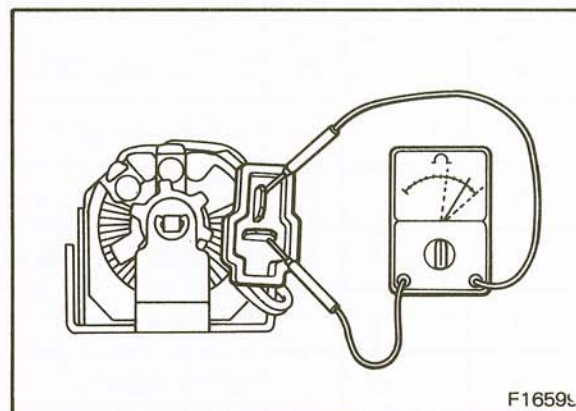
1. Connect the black connector to the turn-signal flasher unit. (16W747)
2. The ground wires for turn-signal flasher unit and front-wiring harness should be tightened together. (16W747)



### DIMMER CONTROL SWITCH

#### Inspection

1. With the connector disconnected, measure the continuity between the dimmer control switch terminals with an ohmmeter. (F16599)
2. If the resistance value varies smoothly between 0 and 10 ohms throughout the entire operation range, the dimmer control switch is functioning properly. (F16599)



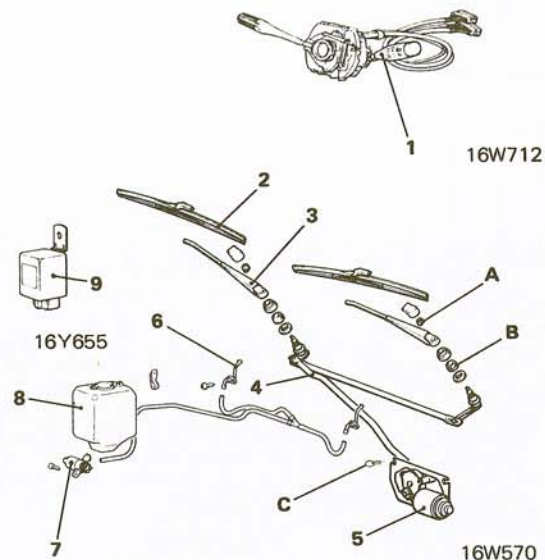




## COMPONENTS

1. Wipers and washer switch assembly
2. Wiper blade
3. Wiper arm
4. Wiper linkage
5. Wiper motor
6. Washer nozzle
7. Washer motor
8. Washer tank
9. Intermittent wiper relay

	Nm	ft.lbs.
A	10-16	7-12
B	7	5
C	3	2



## WIPER MOTOR AND LINKAGE

### Removal

1. Remove the wiper arms and the pivot shaft mounting nuts, then push the pivot shafts toward the inside.
2. Loosen the wiper motor mounting bolts, and then with the motor pulled out slightly, disconnect the linkage and the motor. (C16555)
3. Remove both the motor and the linkage.

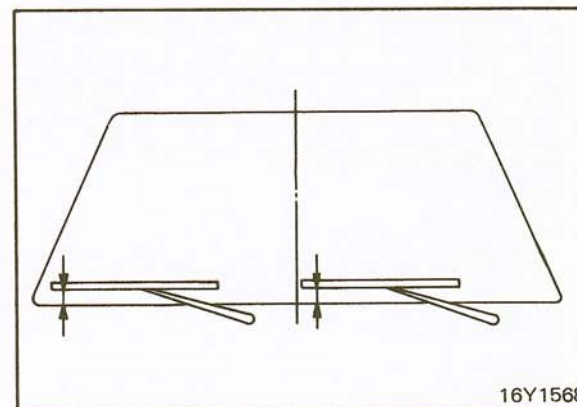
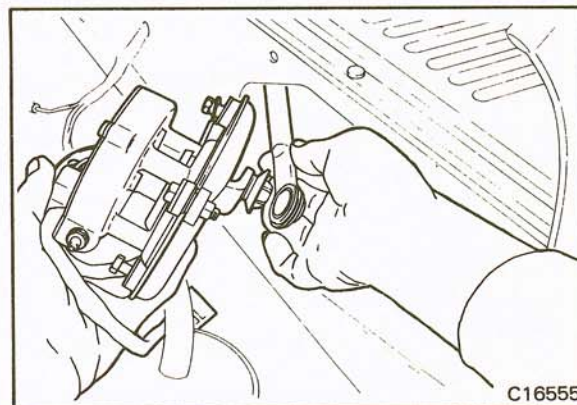
### Caution

Because the installation angle of the crank arm and the motor has been set, do not separate them unless it is necessary to do so. If they must be separated, do so only after marking the mounting positions.

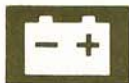
### Installation

Install the wiper arms on the pivot shafts so that the stopping position of the wiper blades is at the specified point. (16Y1568)

Wiper blade stopping position (distance between blade tip and front deck garnish) .....	
	37-47 mm (1.5-1.9 in.)



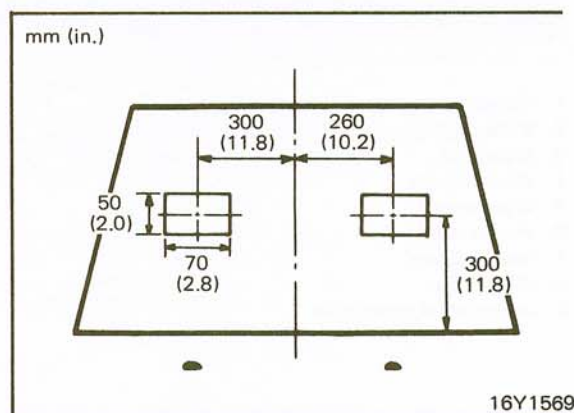




### WINDSHIELD WASHER

#### Inspection and Adjustment

Check the washer fluid spray pattern.  
Adjust by moving the nozzle.



### INTERMITTENT WIPER RELAY

#### Inspection

If the wipers do not stop in the correct position when the wiper switch is set to the star mark:

- (1) Check whether the output of the voltage from terminal 3 is synchronized with the operation of the wipers.

When the wipers are stopped:	12 V
When the wipers are operating:	0 V

If the wipers do not operate intermittently when the wiper switch is set to the star mark:

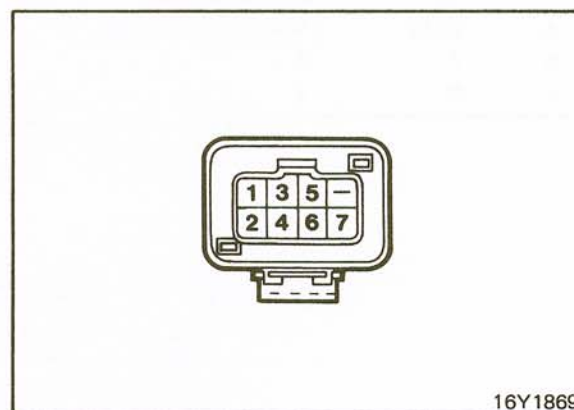
- (1) Perform the same check as described above.

If the wipers do not operate when the wiper switch is set to the star mark:

- (1) Confirm that power is being supplied to terminals 1 and 4.
- (2) Confirm that the voltage between terminal 6 and ground is 0 V.
- (3) Confirm that the voltage between terminal 3 and ground is 0 V.

If the wipers do not operate when the washer switch is turned ON:

- (1) Confirm that power is being supplied to terminals 1 and 4.
- (2) Confirm that the voltage between terminal 5 and ground is 0 V while the washer switch is ON.
- (3) Confirm that the voltage between terminal 3 and ground is 12 V at the moment that the washer switch is turned on, and that the voltage is 0 V approximately one second later. Also, confirm that the voltage is 0 V 2 to 5 seconds after the washer switch is turned off.



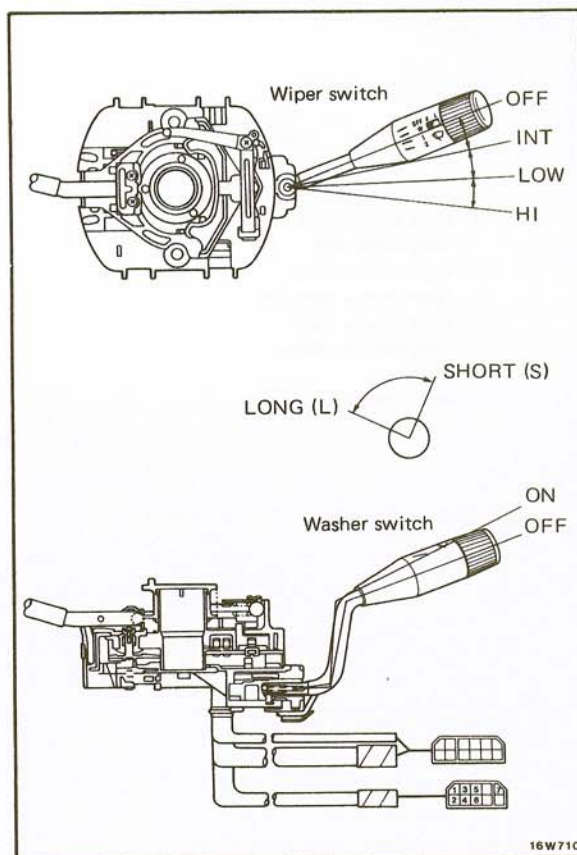




## WINDSHIELD WIPER AND WASHER SWITCH ASSEMBLY (COLUMN SWITCH)

### Inspection

Move the column switch to each position to check for continuity between terminals.

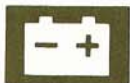


Terminal			Wiper/washer switch				Intermittent time adjusting switch
No.	Wire	Used for	OFF	INT (★)	LOW (1)	HI (2)	SHORT ~ LONG (S) (L)
1	YL	Washer switch (ON)	○	○	○	○	
2	LB	Wiper switch (High speed)	○	○	○	○	
3	2B	Ground	○	○	○	○	
4	BY	Wiper switch (Intermittent)		○			
5	BR	Wiper switch (OFF)	○	○			
6	LO	Wiper switch (Low speed)	○	○	○		
7	0.3Y	Intermittent time adjusting switch					

### Remarks

The dotted lines indicate that the automatic-return switch is ON.

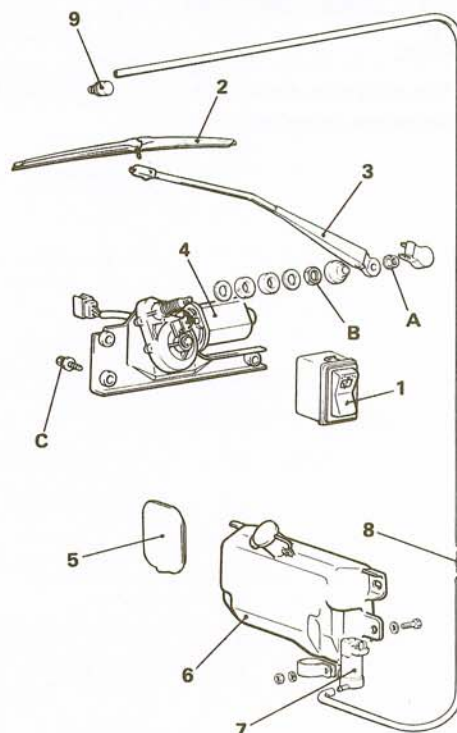




## COMPONENTS

1. Rear wiper and washer switch
2. Rear wiper blade
3. Rear wiper arm
4. Rear wiper motor
5. Rear washer tank lid
6. Rear washer tank
7. Rear washer motor
8. Joint
9. Rear washer nozzle

	Nm	ft.lbs.
A	7-10	5-7
B	8-12	6-9
C	7-10	5-7

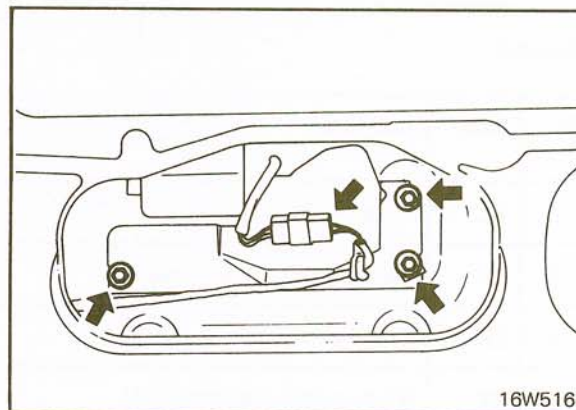


16W508

## REAR WIPER MOTOR AND WIPER ARM

### Removal

1. Remove the spare wheel from the back door.
2. Remove the wiper arm and remove the pivot shaft locking nut.
3. Remove the back door trim and remove the waterproof film. (Refer to GROUP 23.)
4. Remove the rear wiper motor mounting bolts and remove the rear wiper motor. (16W516)

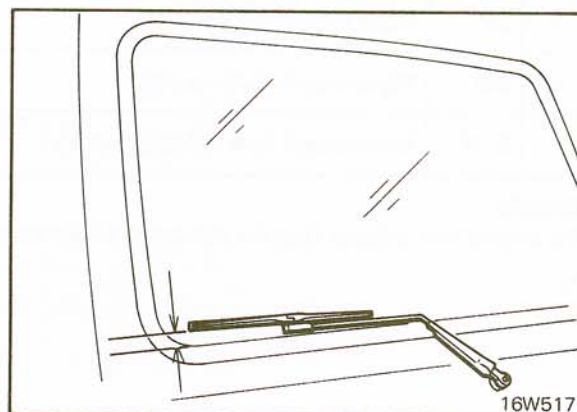


16W516

### Installation

Adjust the mounting position of the wiper arm so that the stopping position of the wiper blade agrees with the standard value.

Wiper blade stopping position (distance between  
blade tip and back door window weatherstrip . . . .  
20 mm (.8 in.)



16W517

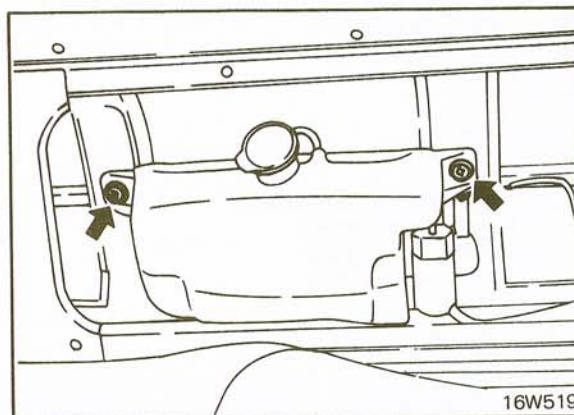




## REAR WASHER TANK

### Removal

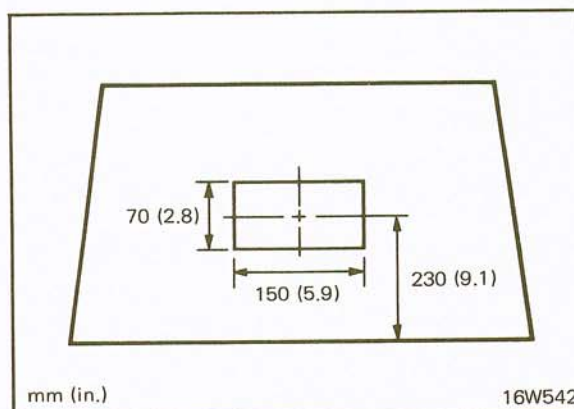
1. Remove the right rear quarter trim.
2. Remove the rear washer tank mounting screws and then remove the tank. (16W519)



## REAR WASHER NOZZLE

### Inspection and Adjustment

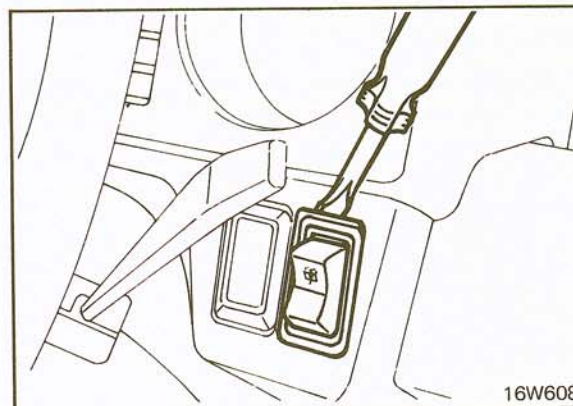
Check the washer fluid spray pattern.  
Adjust the nozzle.



## REAR WIPER AND WASHER SWITCH

### Removal

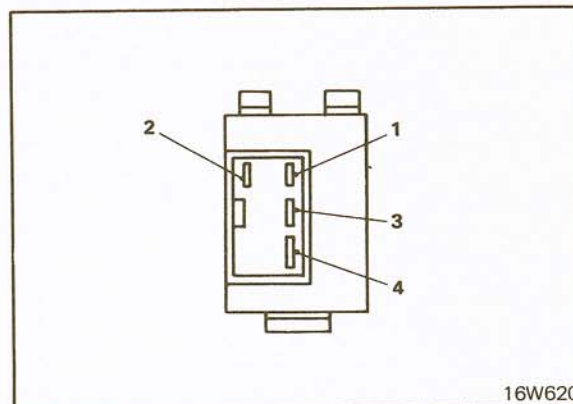
Remove the switch from the instrument cluster and disconnect the connector.



### Inspection

Operate the switch and check the continuity between the terminals.

Terminal	1	2	3	4
Position				
Washer	○			○
Wiper OFF		○	○	
Wiper ON			○	○
Wiper Washer	○		○	○

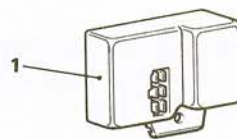




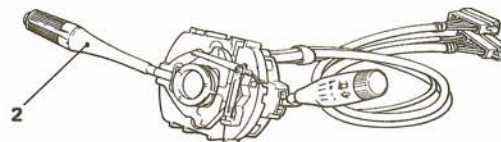


### COMPONENTS

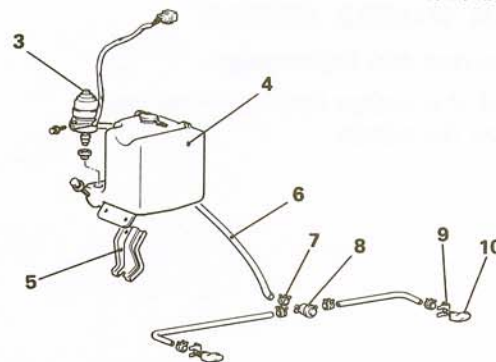
1. Headlight washer control relay
2. Headlight washer switch
3. Headlight washer motor
4. Headlight washer tank
5. Bracket
6. Main hose
7. Clamp
8. Check valve
9. Nozzle clamp
10. Headlight washer nozzle



16V1514



16W712

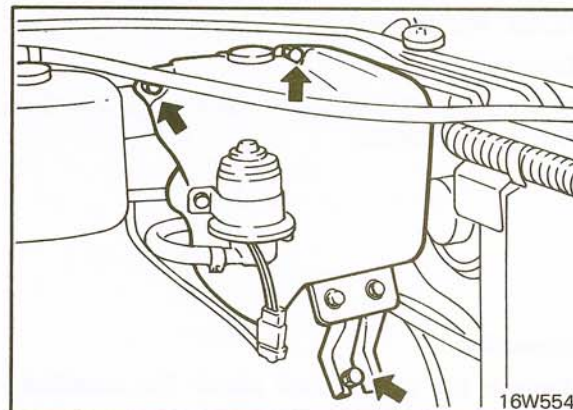


16W569

### HEADLIGHT WASHER TANK

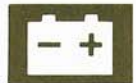
#### Removal

Remove the headlight washer tank mounting bolts and remove the tank.



16W554





## HEADLIGHT WASHER CONTROL RELAY

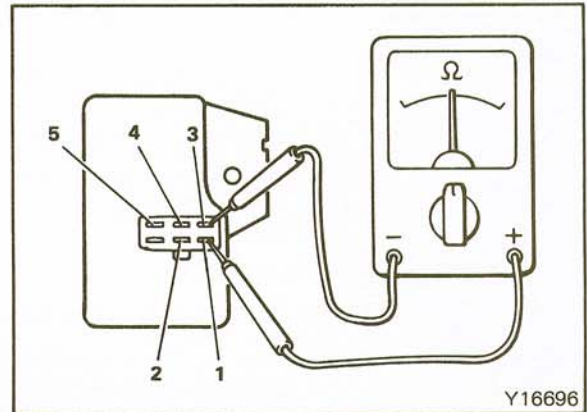
### Continuity Test

1. Check for continuity between the terminals of the headlight washer control relay with an ohmmeter. (Y16696)
2. If the results obtained do not agree with the conditions of continuity shown in the chart below, replace the relay.

1	2	3	4	5
⊖		⊕		
	⊖	⊕		
		⊕	⊖	
		⊕		⊖

### NOTE

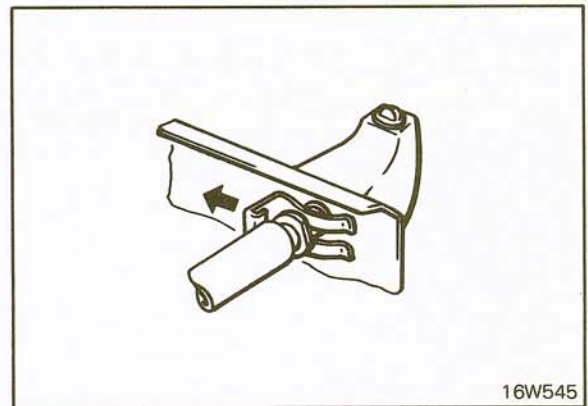
Connect the test probe (+) to terminal 3. There should be no continuity in the opposite direction; therefore, during inspection, pay attention to the direction of continuity when connecting the test probe.



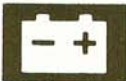
## HEADLIGHT WASHER NOZZLES

### Removal

1. Remove the radiator grille and headlight bezels. (Refer to GROUP 23.)
2. Remove the nozzle clamp and remove the washer nozzle from the grille filler panel. (16W545)

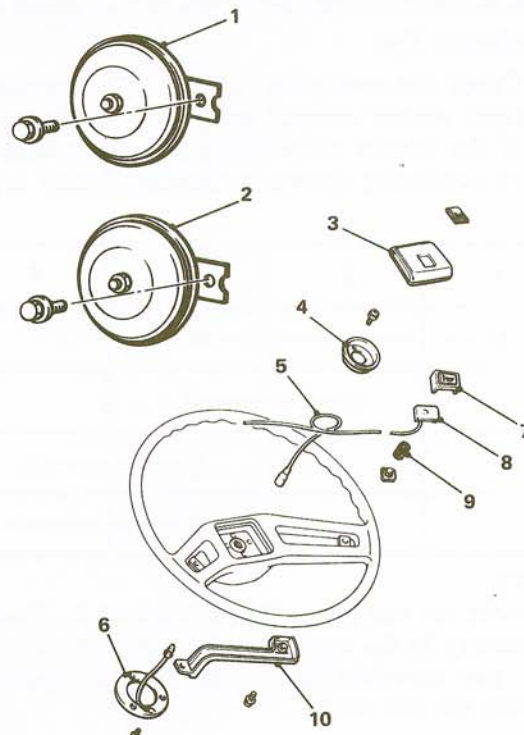






### COMPONENTS

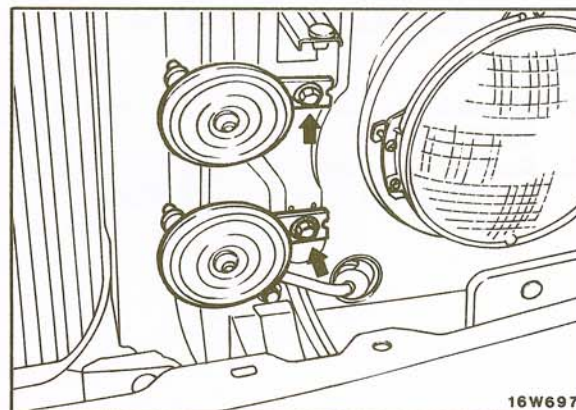
1. Horn (high pitch)
2. Horn (low pitch)
3. Center pad
4. Fixture
5. Horn cable
6. Contact plate
7. Horn button
8. Contact cup
9. Horn spring
10. Pad



16W5,  
16D86,

### REMOVAL

1. Remove the radiator grille. (Refer to GROUP 23.)
2. Disconnect the horn connectors.
3. Remove the horn mounting bolts. (16W697)



16W697

### INSPECTION

1. Check horn switch contact for burned-out or short-circuited.
2. Check horn switch spring for broken or damaged.
3. Check horn switch harness for damage.
4. Check horn adjustment screw for looseness.
5. Check the horn for water, dirt or other foreign matter lodged.





### ORN ADJUSTMENT

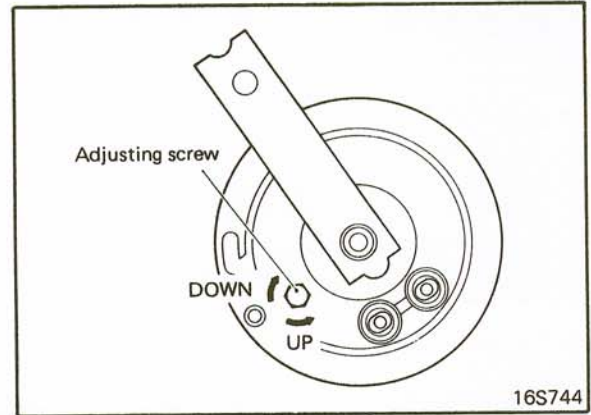
Secure the horn bracket in a vice, and then connect a battery of the specified voltage (12 volts).

Sound the horn, and adjust it by turning the adjusting screw.

1. The sound volume is too low:  
Turn the adjusting screw in the "UP" direction within a range of about 180°, and then lock it in position when a satisfactory sound volume has been obtained.
2. The sound volume is too loud:  
Turn the adjusting screw 20° to 30° in the "DOWN" direction, and then lock it in position when a satisfactory sound volume has been obtained.
3. Horn will not sound:  
Turn the adjusting screw slightly in the "UP" direction until the horn sounds, find a satisfactory sound volume by continuing to turn the screw within a range of 180°, and then lock the screw in place.  
If a satisfactory volume cannot be obtained, replace the horn.

#### Caution

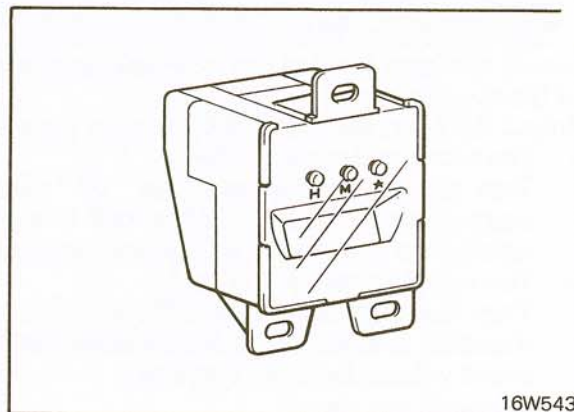
After the adjustment, apply lacquer to prevent the adjusting screw from becoming loose.







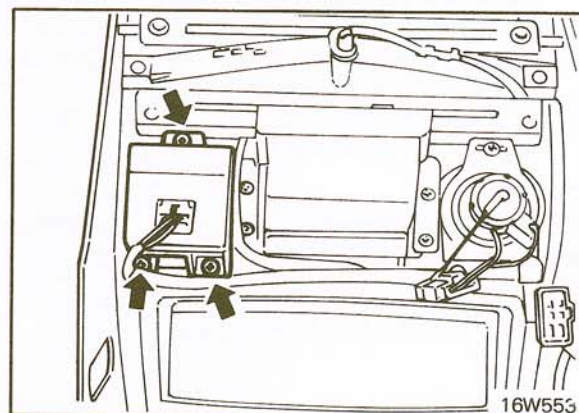
### COMPONENTS



16W543

### REMOVAL

1. Remove the center console. (Refer to GROUP 23.)
2. Remove the mounting screws and disconnect the power supply connector. (16W553)



16W553

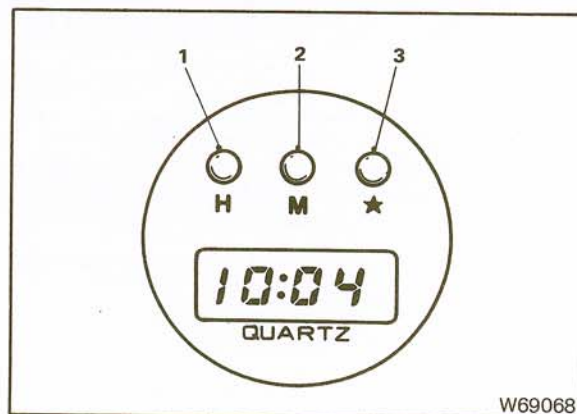
### TIME ADJUSTMENT

Adjust the clock as follows:

1. To adjust the hour, push button (1).
2. To adjust the minutes, push button (2).
3. To clear away the minutes display, push button (3).

#### Example of time adjustment

Before adjustment	After adjustment
10:01 – 10:29	10:00
10:30 – 10:59	11:00



W69068

### Caution

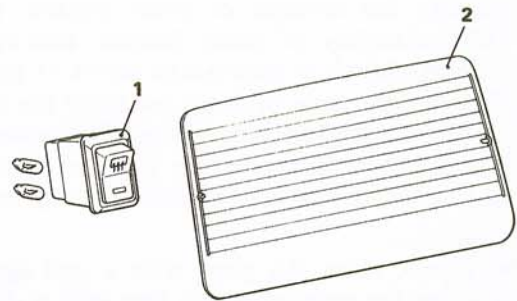
This clock is a delicate mechanism containing a crystal oscillator, transistors, etc., and should be handled with care. Specialized technical skill is needed to repair the internal mechanism; do not attempt to disassemble it. If the clock itself is malfunctioning, replace the entire assembly. When bake-finishing a paint coat, take care not to allow the clock to be exposed to temperatures exceeding 60°C (140°F).





## COMPONENTS

1. Rear window defogger switch
2. Rear window defogger glass

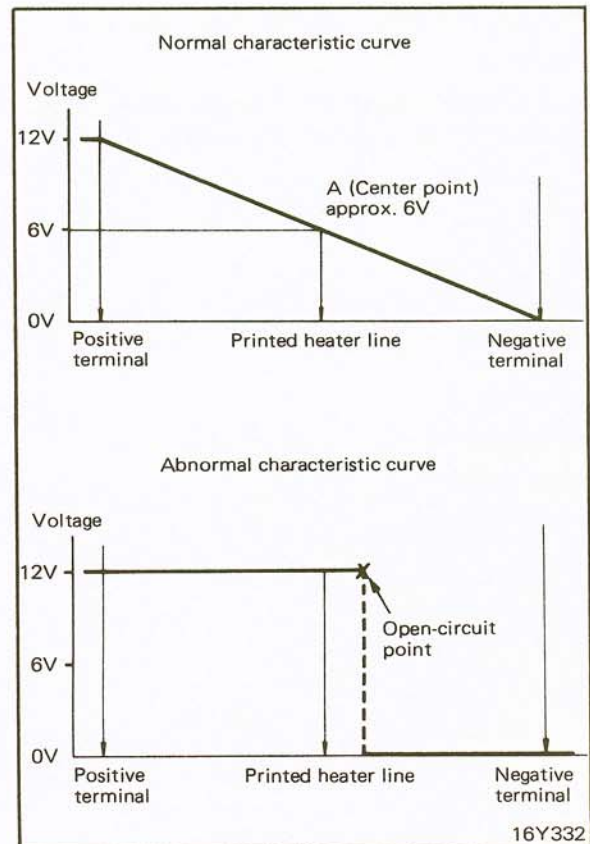


16W708

## PRINTED HEATER LINES

### Inspection

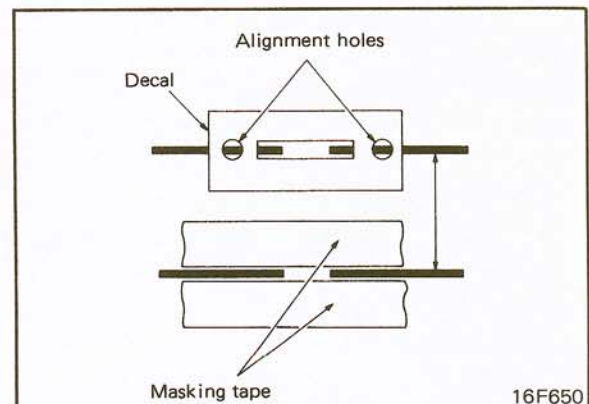
1. The printed heater lines should be tested while the engine is running at 2,000 rpm and the battery is being charged.
2. Turn the defogger switch to the "ON" position, and use voltmeter to measure the voltage of each printed heater line at the rear window glass center point "A".
3. If all of the heater lines indicate approximately 6V, the rear window printed heater lines are functioning properly.
4. If a voltage of 12V is indicated at point "A", the wire is broken between point "A" and the negative (-) terminal. Move the test probe gradually toward the negative (-) terminal and search for the place where there is a sudden change in the voltage (to 0V).
5. This place where the voltage suddenly changes indicates the location of the broken wire.
6. If 0V is indicated at point "A", the wire is broken between point "A" and the positive (+) terminal. Find the point where there is a sudden change in the voltage (to 12V), as described in step 4. above.



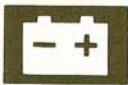
### Repair

1. Prepare the following items:
  - Conductive paint
  - Paint thinner
  - Masking tape, decal, etc.
  - Unleaded gasoline
  - Thin brush

Wipe the glass adjacent to the broken heater line, clean with unleaded gasoline, and bond a decal or masking tape as shown.







## COMPONENT SERVICE-REAR WINDOW DEFOGGER

2. Shake the electroconductive paint container well, and remove the amount of paint needed. Dilute it with a small quantity of paint thinner, and apply three coats with the brush at intervals of about 15 minutes.
3. Remove the tape or decal and leave the repaired defogger unused for a while before supplying power.
4. For a better finish, scrape away excess deposits with a knife after drying is complete (one day later).

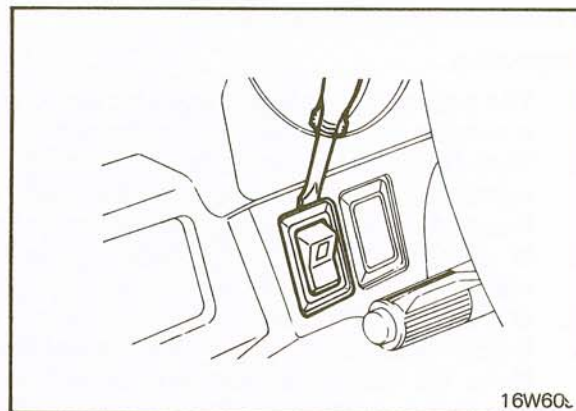
### Caution

After repair, clean the glass with a soft dry shop towel or wipe along the printed heater line with a slightly moistened shop towel.

## REAR WINDOW DEFOGGER SWITCH

### Removal

Remove the switch from the instrument cluster and push the connector bar to detach the switch.



16W60

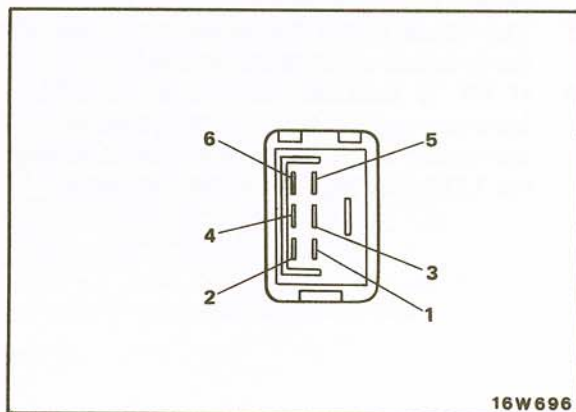
### Inspection

Operate the switch and check continuity between the terminals.

Terminal Position	1	*	2	3	4	5	*	6
OFF								
ON								

### NOTE

\* Denotes indicator light.



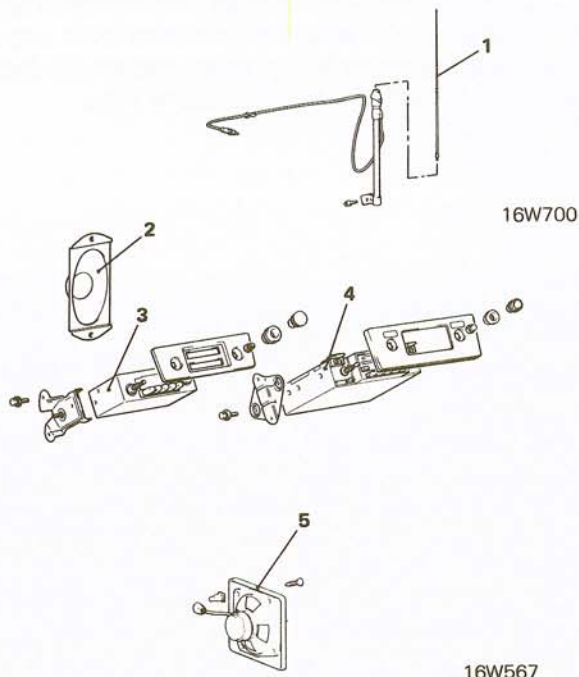
16W696





## COMPONENTS

1. Whip antenna
2. Front speaker
3. Radio
4. Tape player
5. Rear speaker



## ANTENNA TRIMMER

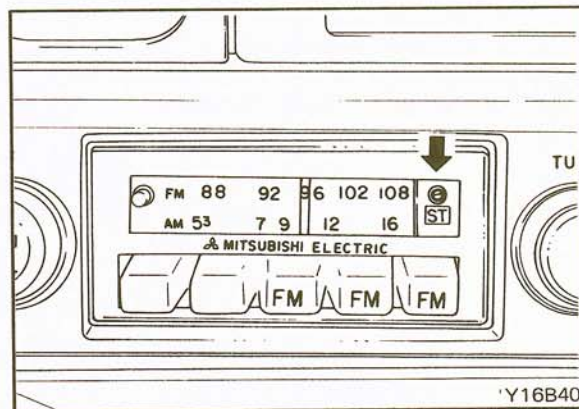
The antenna trimmer is essential for matching the antenna with the radio in order to obtain the maximum sensitivity of the radio. It must be adjusted with the antenna actually mounted on the vehicle. If the trimmer is not adjusted properly, the radio suffers from not only low sensitivity but also noises, such as external noise and noise from passing vehicles. In the following cases, therefore, adjust it as described below:

- (1) When radio is installed.
- (2) If antenna is replaced.
- (3) If radio has low sensitivity.
- (4) If radio is noisy.

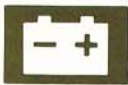
### Trimmer Adjustment

Make the following preparations for adjustment.

- (1) Turn the ignition key to the "ACC" position.
- (2) Extend the antenna all the way.
- (3) Tune accurately to a station near 1,400 kHz in order to receive a broadcast in as weak an electric field as can be barely received. If there is no station near 1,400 kHz, tune to any high-frequency station (above 1,000 kHz) available. If there are two or more stations near 1,400 kHz, choose the stronger one.
- (4) Set the volume control to the proper volume.
- (5) Set the tone control to high-pitched tone.







Be sure that preparations 1 through 5 have been correctly made.

Insert a screwdriver into the trimmer adjusting hole.

Turn the screwdriver clockwise or counterclockwise for maximum sensitivity (maximum broadcast wave sound).

If the optimum sensitivity point cannot be found, check for an antenna malfunction or a broken wire.

### NOISE SUPPRESSION

Noise interfering with radio reception may be roughly classified as follows:

- (1) Noise produced by the vehicle itself  
Noise from the ignition circuit, alternator circuit, etc.
- (2) Noise generated in the radio itself  
Thermal noise from transistors, IC, resistor, etc.
- (3) Atmospheric noise  
Noise from other cars, neon signs, etc.

The radio has devices to suppress noise of the radio itself and atmospheric noise, but it is difficult to eliminate them completely. Noise produced by the vehicle includes whining from the alternator system, and a strong, impulsive, fast popping noise from the ignition system.

Before performing any checking or adjustments, first confirm the following points.

- Adjust the antenna trimmer completely.
- Set the pushbuttons (tuning) properly.
- Extend the antenna all the way.

#### Prevention of Ignition Circuit Noise

A resistance-equipped cable is used for the high-tension cable in order to prevent noise; however, if any noise from the ignition circuit does occur, check the tightness and ground connection of the positive (+) terminal of the noise filter, and, if necessary, check the noise filter.

#### Caution

**Be careful not to connect the noise filter to the high-tension cable; doing so could damage the noise filter.**

#### Prevention of Other Circuit Noise

For other noises, take necessary corrective actions in accordance with the following items and the NOISE SUPPRESSION CHART.

Polish the grounding cable terminal, and connect it properly.  
Polish the pillar antenna ground terminal, and connect it properly.

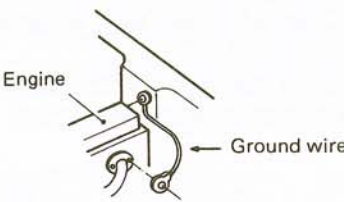
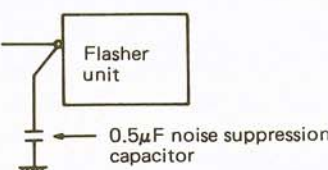
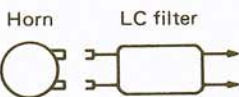
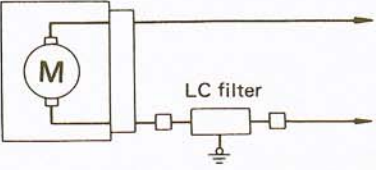
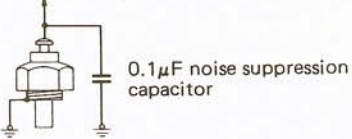
Ground electric parts completely.

Keep the antenna cable and speaker lead wire away from other electric wiring.





## NOISE SUPPRESSION CHART

Symptom	Noise source	Remedy
Unusual noise related to engine speed.	Engine	Securely ground the engine, frame and/or body and engine hood.  16E710
"Clatter" noise related to the flashing of turn signal lights.	Turn signals	Connect a 0.5 $\mu$ F noise-suppression capacitor to the B-terminal of the flasher unit.  16E712
Abnormal noise when the horn is operated.	Horn	1. Connect a 0.5 $\mu$ F noise-suppression capacitor to the + B-terminal of the horn. 2. For an FM radio, connect an LC filter to the horn terminals.  16E713
Noise when the windshield washer operates.	Washer motor	Connect an LC filter between the terminal of the washer motor and the power source wire.  16F671
Unusual noise when the engine is started.	Water temperature gauge unit	Connect a 0.1 $\mu$ F noise-suppression capacitor to the terminal of the water temperature gauge unit.  16F672





### RADIO AND TAPE PLAYER

#### Removal

1. Remove the radio switch knobs, loosen the mounting nuts, and then detach the radio panel.
2. Remove the center console, loosen the mounting screws on the side of the radio, and then remove the radio. (16W518)
3. Disconnect the antenna lead wire, the speaker connector, and the power supply connector from the back of the radio.

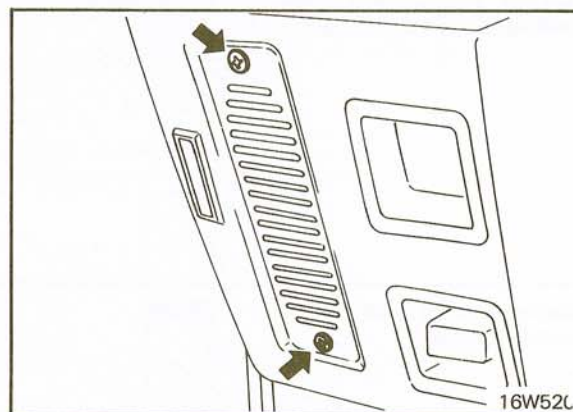
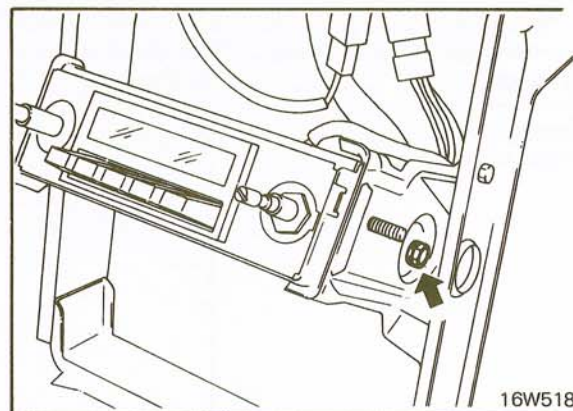
#### NOTE

The fuse box for the radio circuits is located on the back of the radio; therefore, the radio must be removed in order to replace a fuse.

### FRONT SPEAKER

#### Removal

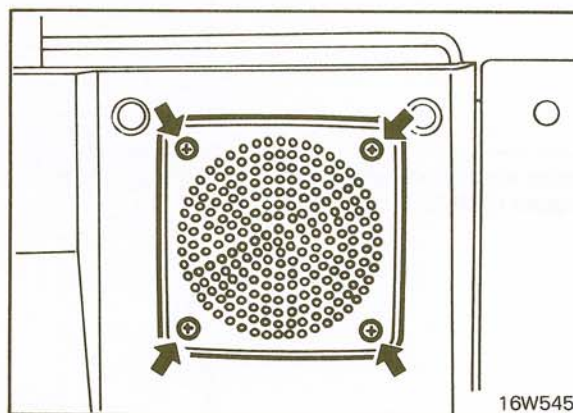
1. Remove the speaker mounting screws. (16W520)
2. Remove the speaker from inside of the instrument panel.
3. Disconnect the speaker wiring connector.



### REAR SPEAKER

#### Removal

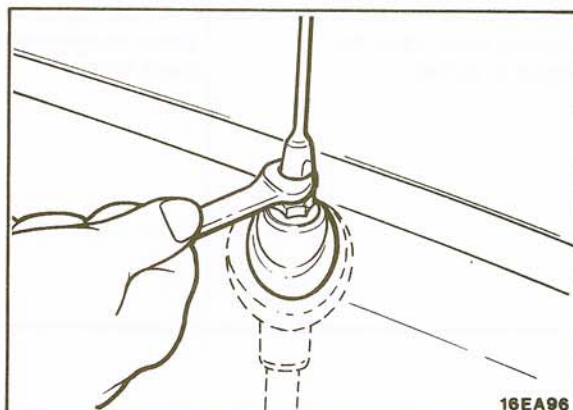
1. Remove the speaker mounting screws. (16W545)
2. Remove the speaker and disconnect the speaker wiring connector.



### ANTENNA

#### Removal

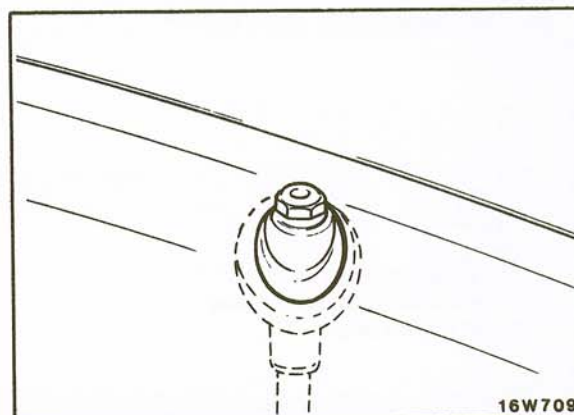
1. Disconnect the antenna lead wire from the back of the radio.
2. Remove antenna mast. (16EA96)



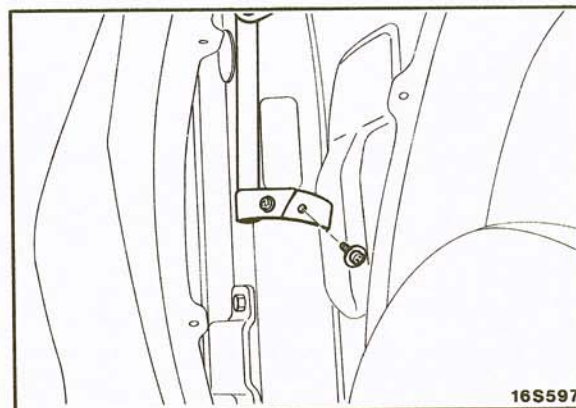




- Remove splash shield mounting bolts and screws.
- 4. Detach splash shields from fender about a half of rearward.
- 5. Remove the antenna mounting nut. (16W709)



- 6. Remove the screw which mounts the antenna bracket to the body from inside the fender. (16S597)
- 7. Remove the antenna toward the bottom.

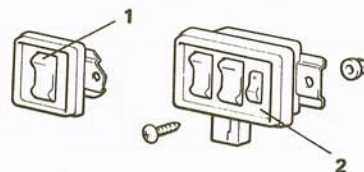




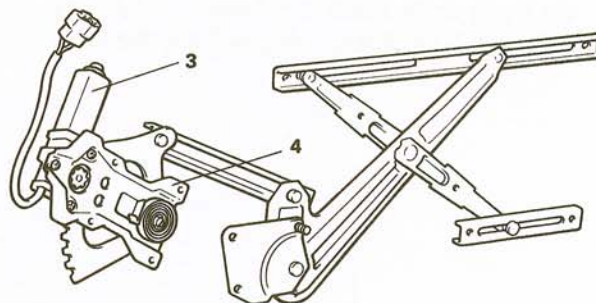


### COMPONENTS

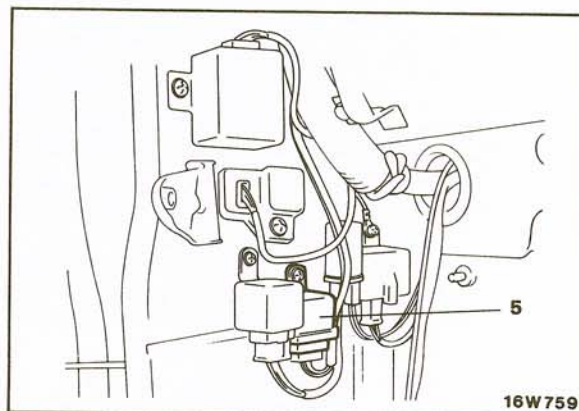
1. Sub switch
2. Main switch
3. Power window motor
4. Power window regulator assembly
5. Power window relay



16W764



18W671

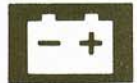


16W759

#### NOTE

For information regarding adjustments, removal, inspection, and installation, or installation procedures other than those contained in this section on the Power Window Regulator System, refer to GROUP 23.





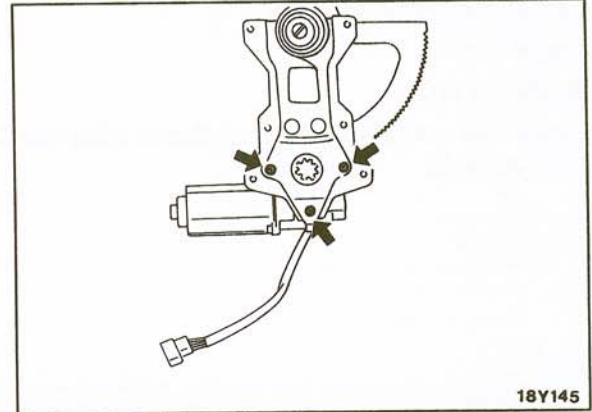
## POWER WINDOW MOTOR

### Removal

1. Detach the regulator assembly. (Refer to GROUP 23.)
2. Disconnect the power window motor from the regulator assembly. (18Y415)

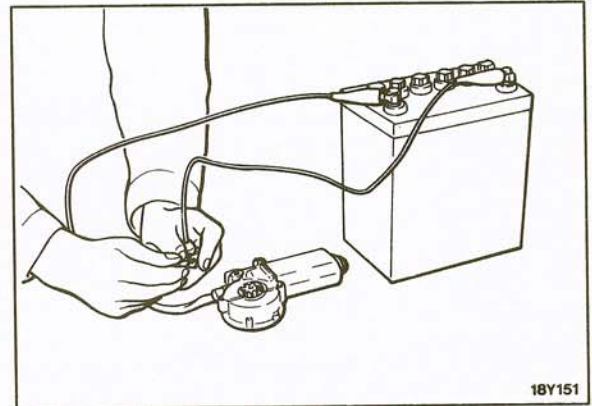
### Caution

When loosening the connecting screws of the regulator and the motor assembly, the compressed force of the regulator spring may cause the regulator arm to spring up.



### Inspection

Connect the motor terminals directly to the battery and check that the motor operates smoothly. Next, reverse the polarity and check that the motor operates smoothly in the reverse direction.





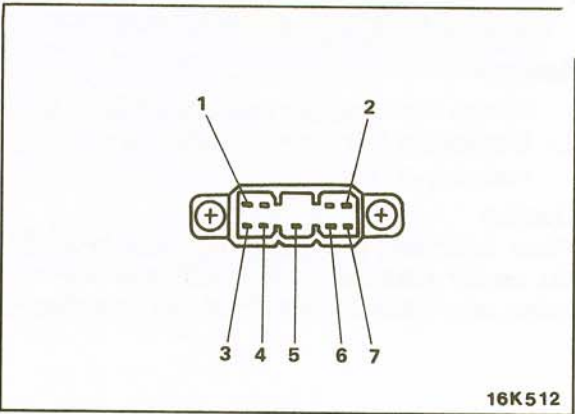


## POWER WINDOW SWITCH

### Inspection

#### MAIN SWITCH

Check for continuity in accordance with the following connection table.

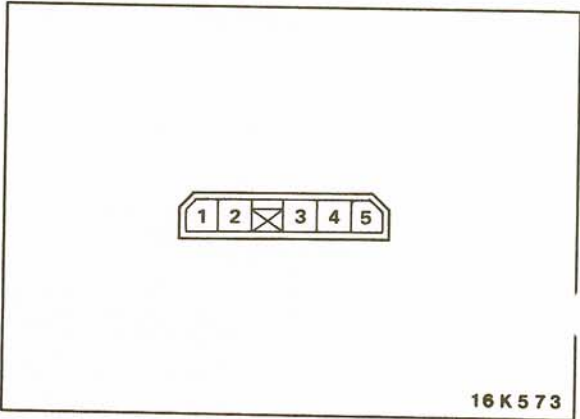


Terminal		L.H. side				R.H. side				LOCK	
		1	4	3	6	2	4	7	6	4	5
Power window switch (manual)	UP	○—○		○—○		○—○		○—○			
	OFF	○—		○—○		○—		○—○			
	DOWN	○—	○—○		○	○—	○—○		○		
Lock switch	ON (LOCK)										
	OFF (FREE)									○—○	

## SUB SWITCH

Check for continuity in accordance with the following connection table.

Terminal	2	1	5	4	3
UP	○—○		○—○		
OFF		○—	○—○	○—○	○—○
DOWN	○—	○—○	○—○	○—○	







### OWER WINDOW RELAY

#### Inspection

Check for continuity between the terminals with the power ON and OFF.

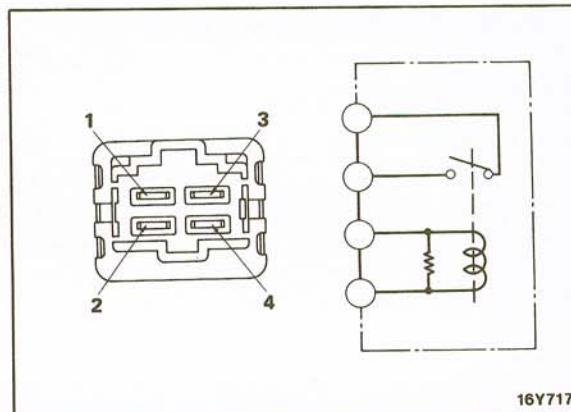
While power is OFF

Between terminals 1 – 2 ..... no continuity

Between terminals 3 – 4 ..... continuity

While power is ON

Between terminals 1 – 2 ..... continuity

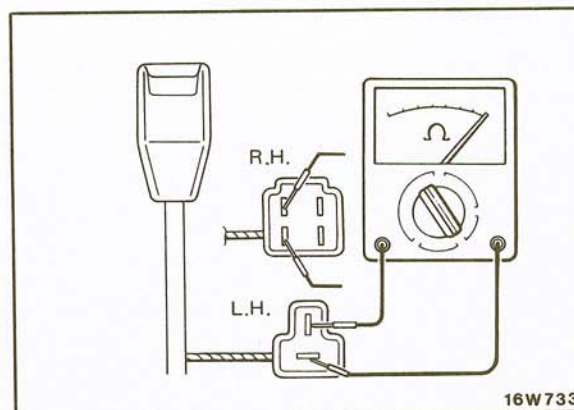


### 3-POINT ELR SEAT BELTS WITH TENSION RELIEFERS

#### SEAT BELT SWITCH

##### Inspection

1. Pull back the floor mat and disconnect the seat belt switch connection from where it is at the attachment to the buckle stalk assembly.
2. Use an ohmmeter to check the YB wire and the B wire for breakage. (16W733)
3. If there is no continuity when the buckle is unlocked and continuity when it is locked, the seat belt switch can be assumed to be functioning properly.
4. If a microswitch is defective, the buckle stalk assembly containing the microswitch should be replaced. For replacement. (Refer to GROUP 23.)



### SOLENOID

#### Inspection

1. Lock the buckle and set the ignition key to "ON".
2. Pull the seat belt out slightly from the retractor and allow about 40 mm (1.5 in.) to be taken up.
3. Pull the seat belt out again and let go of it. If the retractor stops and there is slack in the seat belts, the solenoid can be assumed to be functioning properly.
4. If the results of the above test are not satisfactory, inspect the seat belt switch. If no problem can be found, replace the entire seat belt assembly in order to replace the seat belt solenoid.









# ENGINE

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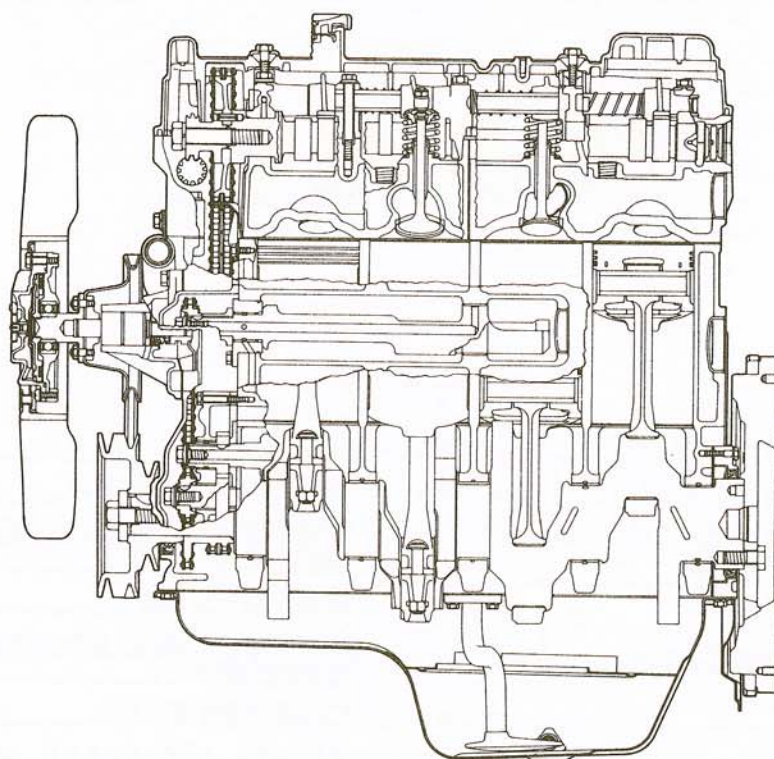
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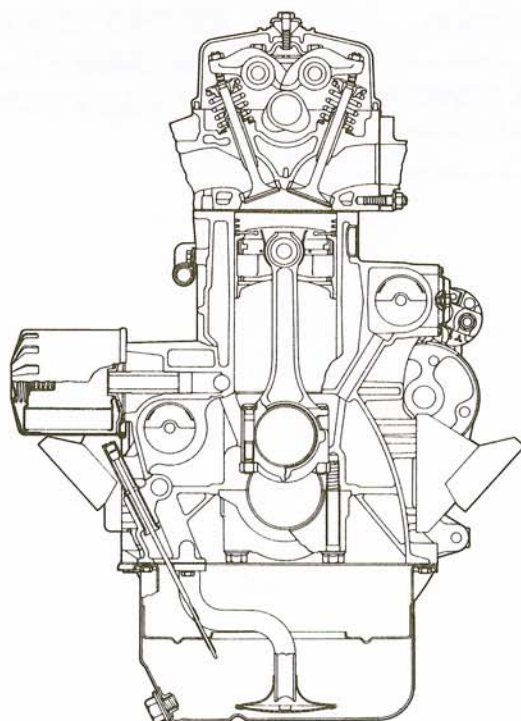


## SPECIFICATIONS

### G54B ENGINE



5EN116



5EN117



## SPECIFICATIONS



### GENERAL SPECIFICATIONS

Description	Specifications
<b>General</b>	
No. and arrangement of cylinders	4, in-line, vertical
Combustion chamber type	Hemispherical
Valve arrangement	Overhead valve type
Camshaft arrangement	Overhead camshaft type
Total displacement cc (cu.in.)	2,555 (155.9)
Bore x stroke mm (in.)	91.1 x 98 (3.59 x 3.86)
Compression ratio	8.2
Valve timing	
Intake valve and jet valve open/close	25° BTDC/59° ABDC
Exhaust valve open/close	64° BBDC/20° ATDC
Firing order	1-3-4-2
Valve clearance at hot engine mm (in.)	0.15 (.006) – intake 0.25 (.010) – exhaust and jet
<b>Timing chain</b>	
Type	Double roller
No. of links	102
Pitch mm (in.)	9.5 (.375)
<b>Timing chain "B" for silent shaft drive</b>	
Type	Single roller
No. of links	90
Pitch mm (in.)	8.0 (.315)
<b>Crankshaft sprocket</b>	
Material	Ferrous sintered alloy
No. of teeth	19
<b>Crankshaft sprocket "B"</b>	
Material	Cast iron
No. of teeth	34
<b>Camshaft sprocket</b>	
Material	Cast iron
No. of teeth	38
<b>Silent shaft and oil pump sprocket</b>	
Material	Steel
No. of teeth	17
<b>Rocker arm</b>	
Material	Aluminum die casting Slipper made from special sintered alloy
I.D. mm (in.)	18.9 (.744)
Oil clearance mm (in.)	0.01-0.04 (.0004-.0016)





## SPECIFICATIONS

Description	Specifications
Camshaft	
Driven by	Chain
Material	Cast iron, cam surface chilled
Cam height mm (in.)	42.5 (1.673)
Valve lift mm (in.)	10.5 (.413)
Cam diameter for fuel pump drive mm (in.)	37 (1.457)
Journal diameter mm (in.)	34 (1.339)
Oil clearance mm (in.)	0.05-0.09 (.002-.004)
Identification mark	6
Cylinder head	
Material	Aluminum alloy
Deflection of gasket surface mm (in.)	Less than 0.05 (.002)
Valve guide hole diameter mm (in.)	
0.05 (.002) O.S.	13.050-13.068 (.5138-.5145)
0.25 (.010) O.S.	13.250-13.268 (.5217-.5224)
0.50 (.020) O.S.	13.500-13.518 (.5315-.5422)
Intake valve seat ring hole diameter mm (in.)	
0.3 (.012) O.S.	47.300-47.325 (1.8622-1.8632)
0.6 (.024) O.S.	47.600-47.625 (1.8740-1.8750)
Exhaust valve seat ring hole diameter mm (in.)	
0.3 (.012) O.S.	40.300-40.325 (1.5866-1.5876)
0.6 (.024) O.S.	40.600-40.625 (1.5984-1.5994)
Valve guide installation height mm (in.)	14 (.551)
Intake valves	
Material	Special heat-resistant steel
Treatment	Sur-sulf
Valve diameter mm (in.)	46 (1.811)
Stem diameter mm (in.)	8.0 (.3150)
Clearance (stem-to-guide) mm (in.)	0.03-0.06 (.0012-.0024)
Margin mm (in.)	1.2 (.047)
Identification mark	N
Exhaust valves	
Material	Special heat-resistant steel
Treatment	Valve face padded with stellite
Valve diameter mm (in.)	Tufftriding
Stem diameter mm (in.)	38 (1.496)
Clearance (Stem to guide) mm (in.)	8.0 (.3150)
Margin mm (in.)	0.05-0.09 (.0020-.0035)
Identification mark	2.0 (.079)
	N



# SPECIFICATIONS



Description	Specifications
Valve springs	
Free height mm (in.)	47.5 (1.870)
Load N (lbs)/mm (in.)	275 (62)/40.4 (1.591)
Square	Less than 1.5°
Identification color	Blue
Right silent shaft	
Driven by	Chain
Material	Steel
Rear journal diameter mm (in.)	43 (1.693)
Oil clearance mm (in.)	0.06-0.10 (.0024-.0039)
Left silent shaft	
Driven by	Chain
Material	Steel
Front journal diameter mm (in.)	23 (.906)
Rear journal diameter mm (in.)	43 (1.693)
Oil clearance mm (in.)	
Front	0.02-0.06 (.0008-.0024)
Rear	0.06-0.10 (.0024-.0039)
Piston	
Material	Special aluminum alloy
Type	Autothermic (Steel strut used for 4G54)
Diameter (Standard) mm (in.)	91.1 (3.587)
Clearance (Piston-to-cylinder) mm (in.)	0.02-0.04 (.0008-.0016)
Pistons for service mm (in.)	0.25 (.010), 0.50 (.020), 0.75 (.030), 1.00 (.040), oversize
Piston rings	
No. of rings per piston	3
No. of compression rings	2
No. of oil rings	1
Compression ring type	
No. 1 ring	Barrel type, special cast iron, chrome face
No. 2 ring	Taper type, special cast iron, chrome face
Oil ring type	3-piece steel rail, chrome face
Ring gap mm (in.)	
No. 1 ring	0.30-0.45 (.012-.018)
No. 2 ring	0.25-0.40 (.010-.015)
Oil ring	0.3-0.6 (.012-.024)
Ring side clearance mm (in.)	
No. 1 ring	0.05-0.09 (.002-.004)
No. 2 ring	0.02-0.06 (.001-.002)
Rings for service mm (in.)	0.25 (.010), 0.50 (.020), 0.75 (.030), 1.00 (.040), oversize





## SPECIFICATIONS

Description	Specifications
Connecting rod	
Length (Center to center) mm (in.)	166 (6.535)
Piston pin bore diameter mm (in.)	21.974-21.985 (.8651-.8655)
Side clearance (Big end) mm (in.)	0.1-0.25 (.004-.010)
Crankshaft	
Material	Steel
Main bearing journal diameter mm (in.)	60 (2.362)
Connecting rod journal diameter mm (in.)	53 (2.087)
Maximum allowable out-of-round and/or taper of journal mm (in.)	0.01 (.0004)
Oil clearance mm (in.)	
Main bearing journal	0.02-0.05 (.0008-.0020)
Connecting rod journal	0.02-0.06 (.0008-.0024)
Thrust taken by	No. 3 main bearing
End play mm (in.)	0.05-0.18 (.0020-.0071)
Bearings for service available in standard size and following undersizes mm (in.)	0.25 (.010), 0.50 (.020), 0.75 (.030)
Cylinder block	
Material	Cast iron
Water jacket	Siamese type
Cylinder bore mm (in.)	91.1 (3.587)
Out-of-round and taper mm (in.)	Less than 0.02 (.0008)
Maximum allowable oversize (Cylinder bore) mm (in.)	1.00 (.039)
Oil pump	
Type	Gear
Driven by	Chain
Oil pressure at idle kPa (psi)	49 (7.1) or more
Relief valve opening pressure kPa (psi)	392 (57)
Oil filter	
Type	Cartridge, full flow
Size (Diameter x Length) mm (in.)	90 x 100 (3.54 x 3.94)
Engine oil	
Capacity including that of oil filter liters (U.S.qts., Imp.qts.)	
Rear-wheel drive models	5.0 (5.2, 4.4)
4-wheel drive models	5.8 (6.1, 5.1)
Recommended oil (API classification)	SE or SF





## SERVICE SPECIFICATIONS

### Standard value

Valve clearance — Hot engine	mm (in.)	
Intake valve		0.15 (.006)
Exhaust valve		0.25 (.010)
Jet valve		0.25 (.010)
Piston pin press-in load	N (lbs.)	7,355-17,162 (1,653-3,858)
Flywheel runout	mm (in.)	0.1 (.004) max.
Oil pressure gauge unit		
Current value	mA	
at 0 kPa (0 psi)		0
at 392 kPa (57 psi)		84
at 785 kPa (114 psi)		110

## TORQUE SPECIFICATIONS

Nm (ft.lbs.)

### Front engine mounting

Engine support front insulator to engine	13-20 (9-14)
Front insulator stopper to heat protector	6-10 (4-7)
Engine support front insulator to engine mounting bracket	30-40 (22-29)

### Rear engine mounting

#### Vehicles with a manual transmission

Engine support rear insulator to No. 2 crossmember	18-25 (13-18)
Engine support rear insulator to transmission	18-25 (13-18)
No. 2 crossmember to frame	55-75 (40-54)
Frame to plate	18-25 (13-18)
Transfer support insulator to transfer mounting bracket	18-25 (13-18)
Transfer support insulator to plate	18-25 (13-18)
Transfer mounting bracket to transfer	18-25 (13-18)

#### Vehicles with an automatic transmission

Engine support rear insulator to No. 2 crossmember	30-42 (22-30)
Engine support rear insulator to transmission	17-23 (12-17)
No. 2 crossmember to frame	55-75 (40-54)
Frame to plate	18-25 (13-18)
Transfer support insulator to plate	18-25 (13-18)
Transfer mounting bracket to transfer	18-25 (13-18)
Transfer mounting bracket to pipe	30-42 (22-30)

### Cylinder head bolts — cold engine

Nos. 1 through 10	89-98 (65-72)
No. 11	15-21 (11-15)

### Cylinder head bolts — hot engine

Nos. 1 through 10	98-107 (73-79)
No. 11	15-21 (11-15)

### Camshaft bearing cap bolts

17-20 (14-15)

### Camshaft sprocket bolt

49-58 (37-43)





## SPECIFICATIONS

Rocker cover bolts	5-6 (4-5)
Heater joint	20-39 (15-28)
Intake and exhaust manifold nuts or bolts	15-19 (11-14)
Rocker arm adjusting nuts	12-17 (9-13)
Main bearing cap bolts	74-83 (55-61)
Connecting rod cap nuts	45-47 (33-34)
Crankshaft pulley bolts	108-127 (80-94)
Oil pump sprocket bolt	30-39 (22-28)
Silent shaft sprocket bolt	30-39 (22-28)
Silent shaft chamber cover bolts	4-5 (3-4)
Flywheel bolts	128-137 (94-101)
Drive plate bolts	128-137 (94-101)
Engine support bracket bolts	40-49 (29-36)
Chain guide "B" bolt (upper)	8-9 (6-7)
Chain guide "B" bolt (lower)	15-21 (11-15)
Chain guide access hole cover bolts	10-11.5 (7.5-8.5)
Oil pump cover bolt	10 -11 (7-8)
Oil pump assembly mounting bolt	8-9 (6-7)
Oil pressure switch and gauge unit	15-21 (11-15)
Oil pan bolt	6-7 (4.5-5.5)
Oil pan drain plug	59-78 (44-57)
Oil filter	11-12 (8-9)
Oil filter stud	50-58 (37-43)
Oil relief valve plug	40-49 (29-36)
Water temperature gauge unit	30-39 (22-28)

## LUBRICANT

	Specified lubricant	Quantity
Engine oil (including oil filter and cooler)	API classification SE or higher	4.5 liters (4.5 U.S. qts., 3.7 Imp. qts.)






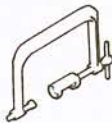

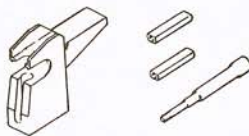



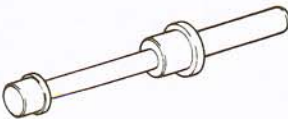
## SEALANT AND ADHESIVE

	Specified sealant and adhesive	Quantity
Top of cylinder head circular packing	3M Super Weather Strip adhesive 8001 or equivalent	As required
Threaded portion of oil pressure gauge unit	3M Liquid Gasket 8959 or equivalent	As required



# SPECIAL TOOLS







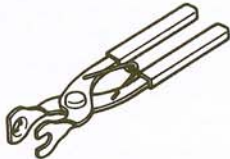
Tool (Number and name)	Use	Tool (Number and name)	Use
MD998115 Valve guide installer 		MD998148 "D" Valve seat cutter pilot 	
MD998173 "D" Valve seat cutter [30° – O.D. 40 mm (1.57 in.)] 		MD998377 Valve stem seal installer 	Use with valve spring seat
MD998175 "D" Valve seat cutter [30° – O.D. 44 mm (1.73 in.)] 		MD998303 "*" Valve spring compressor 	May also be used for MA904
MD998158 "D" Valve seat cutter [45° – O.D. 40 mm (1.57 in.)] 		MD998184 "*" Piston pin setting tool 	
MD998159 "D" Valve seat cutter [45° – O.D. 44 mm (1.73 in.)] 		MD998251 "*" Silent shaft bearing puller 	For rear bearing
MD998165 "D" Valve seat cutter [65° – O.D. 44 mm (1.73 in.)] 		MD998250 "*" Silent shaft bearing installer 	For rear bearing

"\*", "D" see page 2 for instructions.





## SPECIAL TOOLS

Tool (Number and name)	Use	Tool (Number and name)	Use
MD998376 “*” Crankshaft rear oil seal installer 		MD998054 Oil pressure switch wrench 	
MD998308 Jet valve stem seal installer 		MD998310 Jet valve socket wrench 	
MD998309 Jet valve spring pliers 			

“\*” see page 2 for instructions.



## TROUBLESHOOTING



Symptom	Probable cause	Remedy
<b>NOISY ENGINE</b> Knocking of crankshaft and bearing	Loose main bearing	Replace
	Seized bearing	Replace
	Bent crankshaft	Replace
	Excessive crankshaft end play	Replace thrust bearing
Piston and connecting rod knocking	Loose bearing	Replace
	Seized bearing	Replace
	Loose piston pin	Replace piston and pin or connecting rod
	Loose piston in cylinder	Recondition cylinder
	Broken piston ring	Repair or replace
	Improper connecting rod alignment	Realign
Camshaft knocking	Loose bearing	Replace
	Excessive end play	Replace
	Broken cam gear	Replace
Timing chain noise	Improper chain tension	Adjust or replace
	Worn and/or damaged chain	Replace
	Worn sprocket	Replace
	Worn and/or broken tension adjusting mechanism	Replace
	Excessive camshaft and bearing clearance	Replace
Camshaft and valve mechanism knocking	Improper valve clearance	Adjust
	Worn adjusting screw	Replace
	Worn rocker face	Replace
	Loose valve stem in guide	Replace guide
	Weakened valve spring	Replace
	Seized valve	Repair or replace
Water pump knocking	Improper shaft end play	Replace water pump assembly
	Broken impeller	Replace water pump assembly





## TROUBLESHOOTING

Symptom	Probable cause	Remedy
<b>OTHER MECHANICAL TROUBLE</b>		
Stuck valve in guide	Improper valve clearance	Adjust
	Insufficient clearance between valve stem and guide	Clean stem or ream guide
	Weakened or broken valve spring	Replace
	Damage to valve stem	Replace
Valve stuck on seat	Improper valve clearance	Adjust
	Weakened valve spring	Replace
	Thin valve head edge	Replace valve
	Narrow valve seat	Reface
	Overheating	Repair or replace
	Excessive engine speed	Drive at proper speed
	Stuck valve guide	Repair or replace
Excessively worn cylinder and piston	Shortage of engine oil	Add or change oil Check oil level on daily basis
	Dirty engine oil	Clean crankcase, change oil and replace oil filter element
	Poor oil quality	Use proper oil
	Overheating	Repair or replace
	Wrong assembly of piston with connecting rod	Repair or replace
	Improper piston ring clearance	Replace
	Dirty air cleaner	Clean air cleaner and replace filter
	Too rich mixture	Adjust or replace carburetor
	Stuck choke valve	Clean or replace carburetor choke chamber
	Over choking	Repair or replace choke assembly
Damaged connecting rod	Shortage of engine oil	Add or change oil Check oil level on daily basis
	Low oil pressure	Correct
	Poor engine oil quality	Use proper oil
	Rough crankshaft surface	Grind or replace
	Clogged oil passage	Clean



## TROUBLESHOOTING



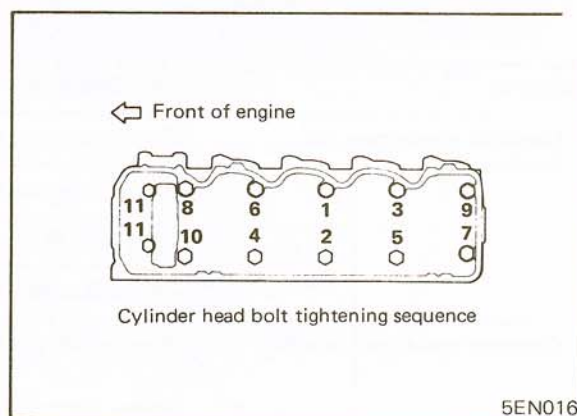
Symptom	Probable cause	Remedy
Damaged connecting rod (continued)	Bearing worn or eccentric	Replace
	Bearing improperly assembled	Correct or replace
	Loose bearing	Replace
	Incorrect connecting rod alignment	Repair or replace
Damaged crankshaft bearing	Shortage of engine oil	Add or change oil Check oil level on daily basis
	Low oil pressure	Adjust or repair
	Poor quality engine oil	Use proper oil
	Worn or out-of-round crankshaft journal	Repair or replace
	Clogged oil passage in crankshaft	Clean
	Bearing worn or eccentric	Replace bearings and check engine oil lubrication system
	Bearing improperly assembled	Repair or replace
	Non-concentric crankshaft or bearing	Replace
Excessive vibration	Loose engine mounts	Tighten or replace
	Silent shaft bearings damaged	Replace
	Improper phase of silent shafts	Adjust





### RETORQUING OF CYLINDER HEAD BOLTS

1. When cylinder head bolts are retorqued, first slightly loosen and then tighten to specified torque.
2. Be sure to follow the specified torquing sequence. (5EN016)



3. After cylinder head bolts have been tightened to specified torque, run engine until normal operating temperature is reached, allow it to cool down, and then retorque bolts to specification for best results.

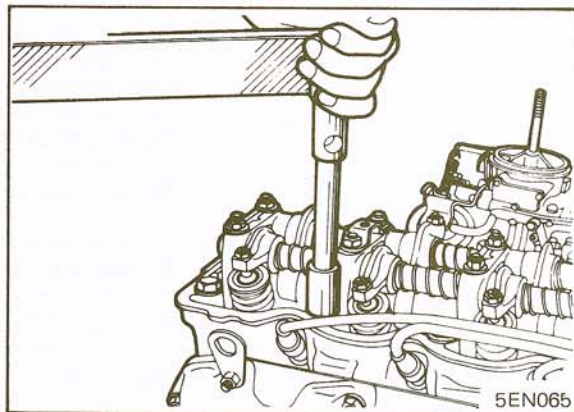
#### Tightening torque

##### Cylinder head bolt (No. 1 to 10)

Cold engine . . . . . 89-98 Nm (65-72 ft.lbs.)

Hot enging . . . . . 98-107 Nm (73-79 ft.lbs.)

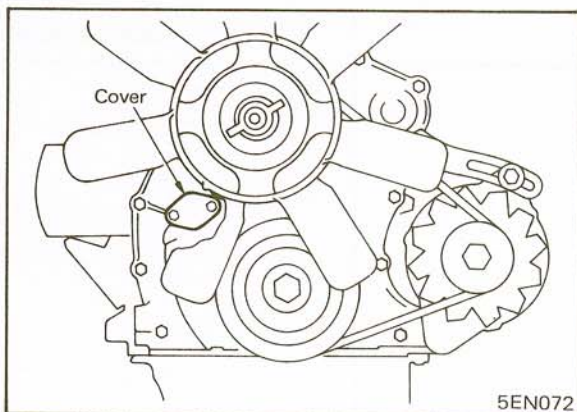
Cylinder head bolt (No. 11) . . . . . 15-21 Nm  
(11-15 ft.lbs.)



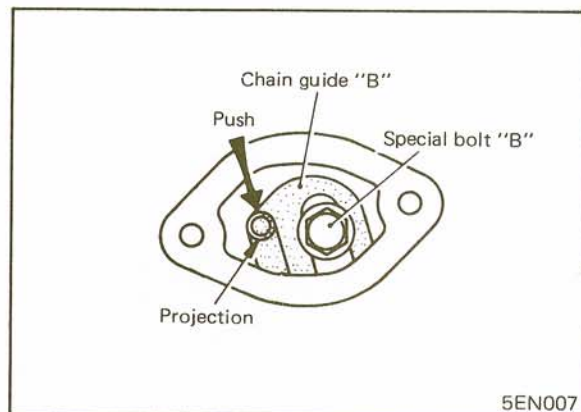
### SILENT SHAFT DRIVE CHAIN TENSION ADJUSTMENT PROCEDURE

When a loose silent shaft drive chain is suspected as the probable cause of abnormal noise, the tension must be readjusted. Tension of silent shaft drive chain can be adjusted without removing timing chain cover as follows:

1. Remove cover from access hole provided at center of chain case (under water pump).
2. Loosen special bolt "B".
3. Using your finger push projection on chain guide "B" in direction of arrow. Do not push projection with a screwdriver or other tool. Improperly chain tension will cause abnormal noise. (5EN007)
4. Tighten special bolt "B".
5. Install cover. Do not reuse damaged gasket.



Cover bolt tightening torque . . . . .  
10-11.5 Nm (7.5-8.5 ft. lbs.)







### ENGINE OIL LEVEL GAUGE

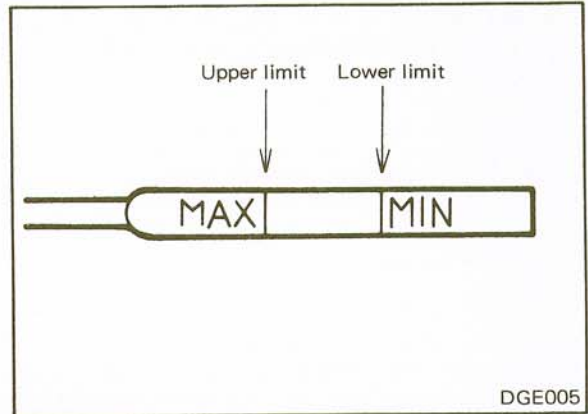
The oil level gauge is located on the right side of the engine. Maintain engine oil level within the marking lines on the oil level gauge. (DGE005)

The oil level in the oil pan may read at the "MAX" mark line (upper limit) after the engine has been standing for several hours. When the engine is started the oil level drop somewhat due to filling of oil passages, etc.

When the oil level is at or below the "MIN" mark line (lower limit) on the level gauge, add 1 liter (1 U.S. qt., 0.9 Imp. qt.). The oil should never be allowed to remain below the lower limit.

#### Caution

Do not overfill crankcase. This will cause oil aeration and loss of oil pressure.



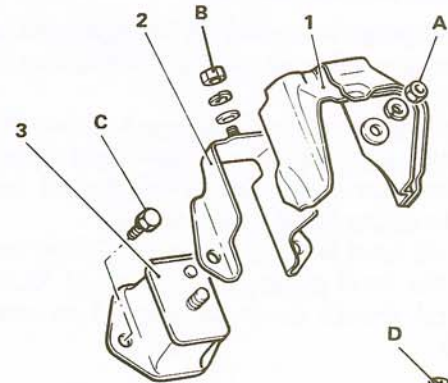




## COMPONENT SERVICE-ENGINE MOUNTING

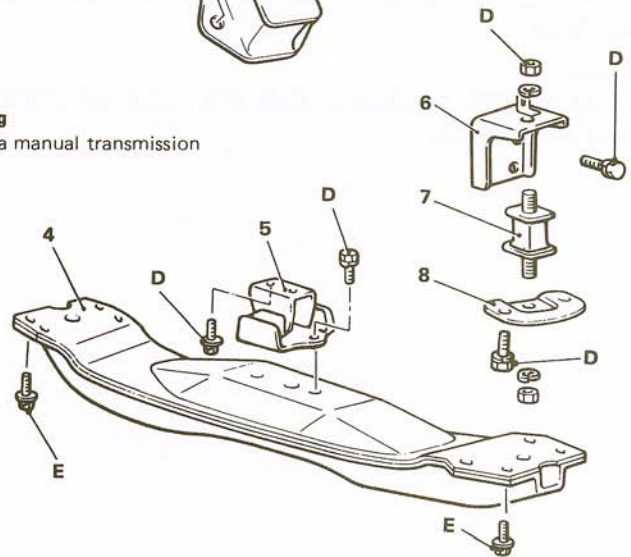
### COMPONENTS

#### Front mounting



#### Rear mounting

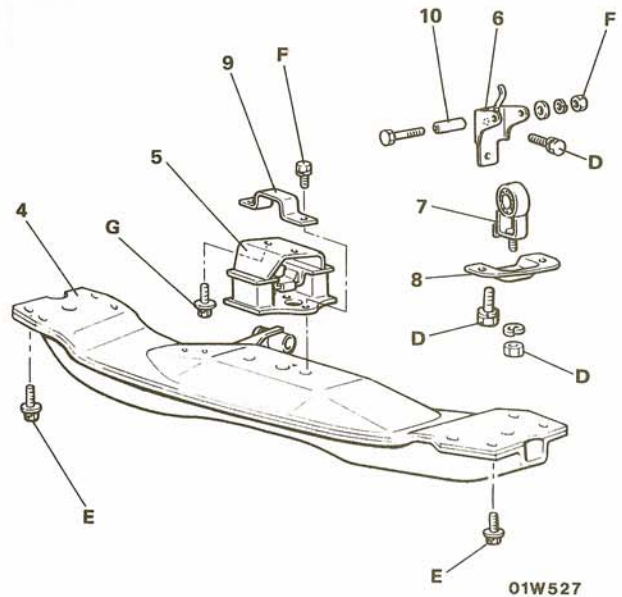
Vehicles with a manual transmission



01W502

1. Heat protector
2. Front insulator stopper
3. Engine support front insulator
4. No. 2 crossmember
5. Engine support rear insulator
6. Transfer mounting bracket
7. Transfer support insulator
8. Plate
9. Stopper
10. Pipe

Vehicles with an automatic transmission



01W527

	Nm	ft.lbs.
A	13-20	9-14
B	6-10	4-7
C	30-40	22-29
D	18-25	13-18
E	55-75	40-54
F	30-42	22-30
G	17-23	12-17





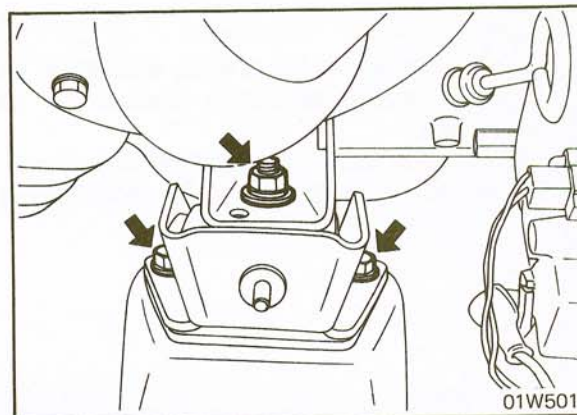
## REMOVAL

### Front Mounting

1. Remove the heat protector from the front insulator stopper.
2. Remove the engine mounting nuts and bolts from the front insulators. (01W501)
3. Attach a chain to the engine hangers.
4. Using a chain block and tackle, raise the engine and remove the insulators.

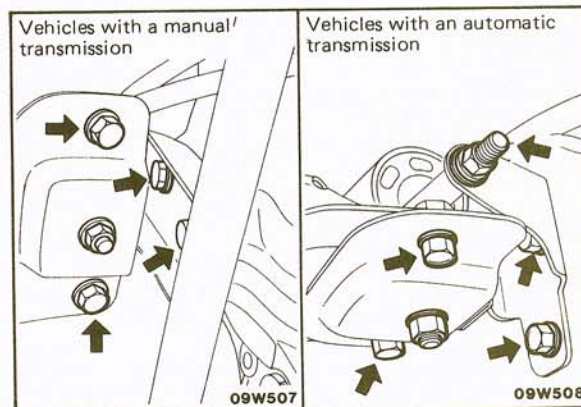
### Caution

Avoid applying a strain on the radiator, fuel hoses or cables by raising the engine too high.

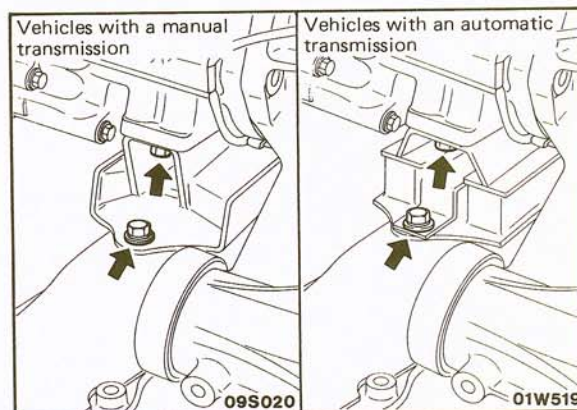


### Rear Mounting

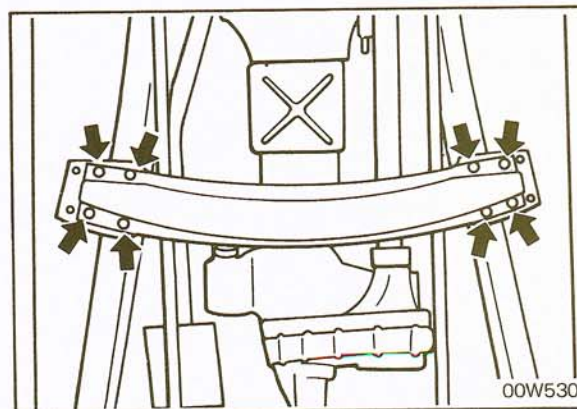
1. Support the transfer with a jack.
2. After the transfer mounting bracket and transfer support insulator have been separated, remove the plate from the side frame. (09W507, 09W508)
3. Detach the transfer mounting bracket from the transfer. (09W507, 09W508)



4. Support the transmission with a jack.
5. Detach the engine support rear insulator from the engine. (S09020, 01W519)



6. For vehicles with an automatic transmission, detach the cross select shaft from the No. 2 crossmember. (Refer to GROUP 21.)
7. Remove the No. 2 crossmember mounting bolts. (00W530)
8. Remove the engine support rear insulator from the No. 2 crossmember.



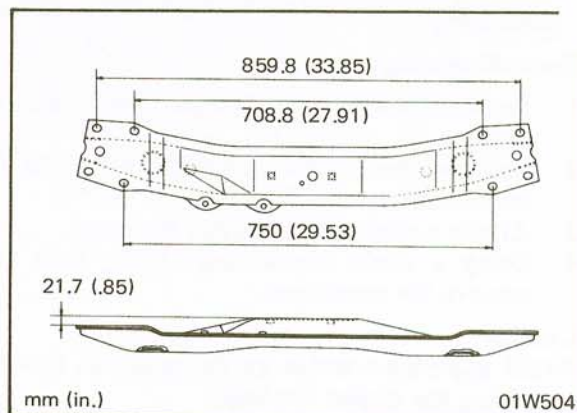




## COMPONENT SERVICE-ENGINE MOUNTING

### INSPECTION

1. Check insulators for cracks, separation or deformation.
2. Check transfer mounting bracket for deformation or corrosion.
3. Check plate for deformation or corrosion.
4. Check No. 2 crossmember for deformation or corrosion.



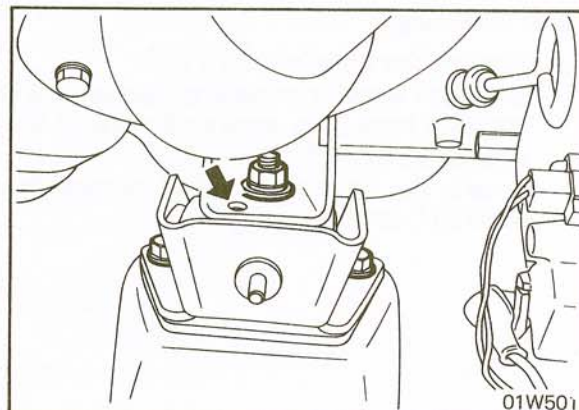
### INSTALLATION

#### Front Insulator

Make sure that the locating boss and hole are in alignment.

#### Caution

Do not distort rubber portions, and never stain rubber portions with fuel or oil.

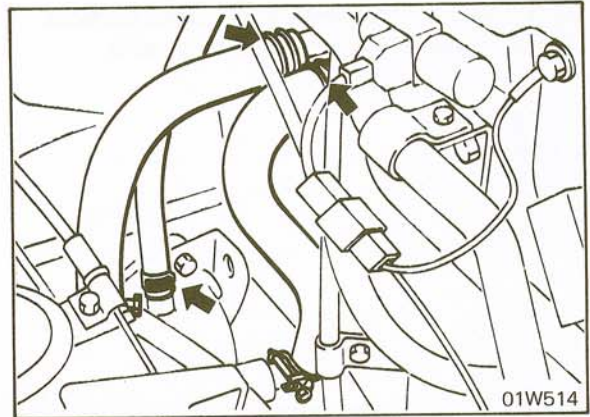




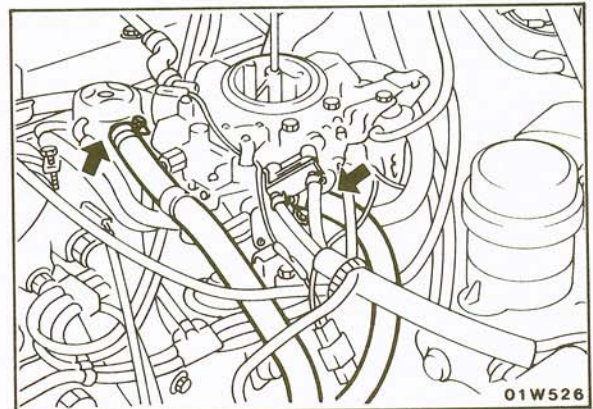


## REMOVAL

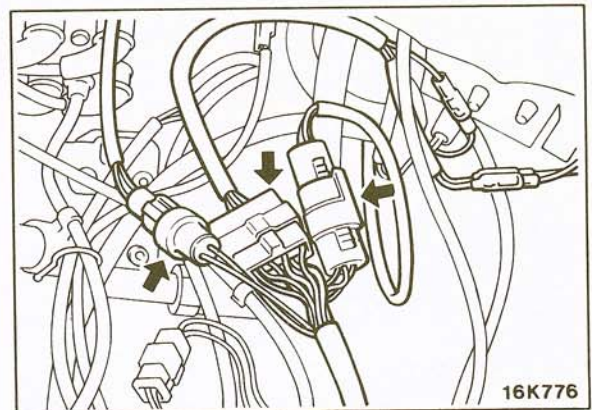
1. Disconnect the ground cable from the battery terminal.
2. Remove the hood. (Refer to GROUP 23.)
3. Remove the air cleaner.
4. Disconnect the heater hoses. (01W514)
5. Disconnect the brake booster vacuum hose. (01W514)



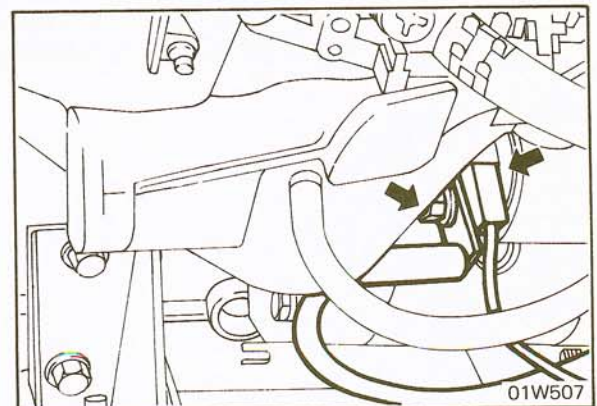
6. Disconnect the fuel hoses. (01W526)
7. Disconnect the accelerator cable. (Refer to GROUP 14.)



8. For vehicles equipped to meet California regulations (can also be sold in Federal States), disconnect the air temperature sensor connector, throttle position sensor connector and the carburetor control wiring harness connector.



9. Disconnect the starter motor wiring harness. (01W507)
10. Remove the clutch release cylinder from the transmission. (Refer to GROUP 21.)

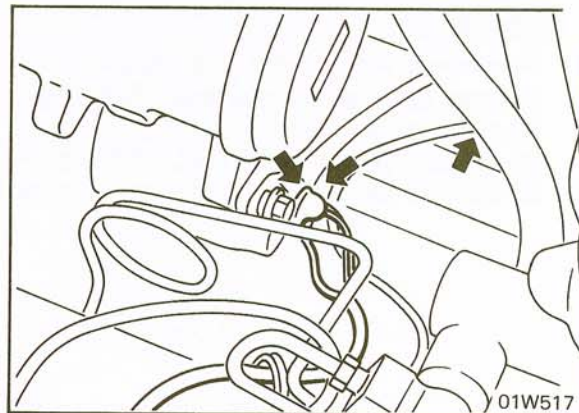




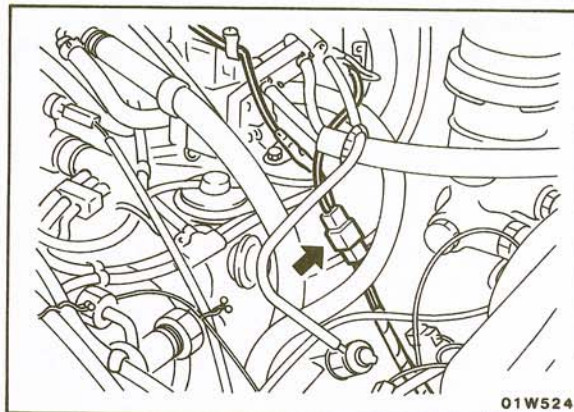


## COMPONENT SERVICE-ENGINE AND TRANSMISSION ASSEMBLY

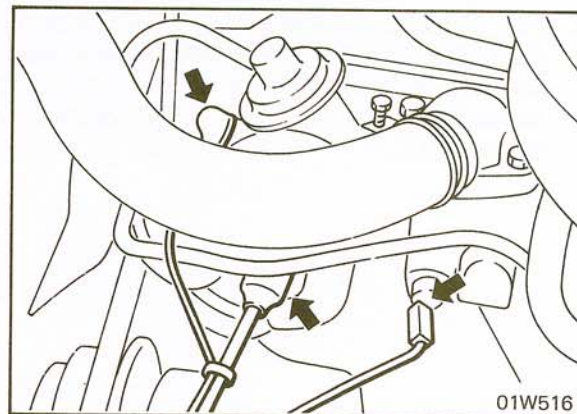
11. Disconnect the alternator wiring harness.
12. Disconnect the engine ground cable.



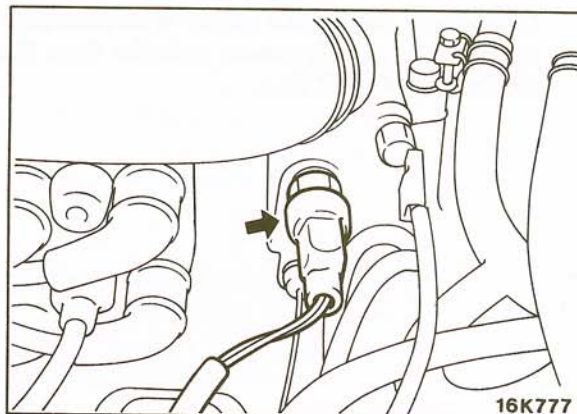
13. Disconnect the fuel cut solenoid valve and bowl vent valve connector.



14. Disconnect the high-tension cable. (01W516)
15. Disconnect the water temperature gauge connector. (01W516)
16. Remove the power steering pump. (Refer to GROUP 19.)



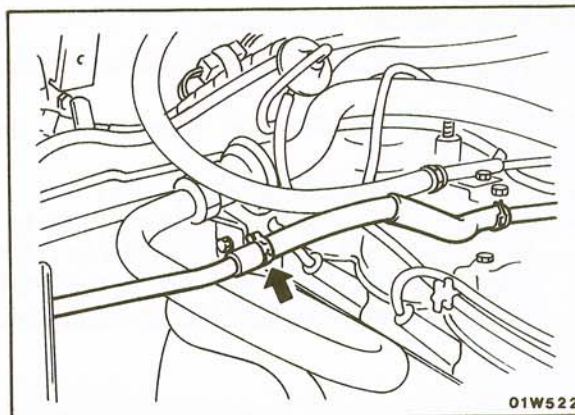
17. For vehicles equipped to meet California regulations (can also be sold in Federal States), disconnect the water temperature sensor.



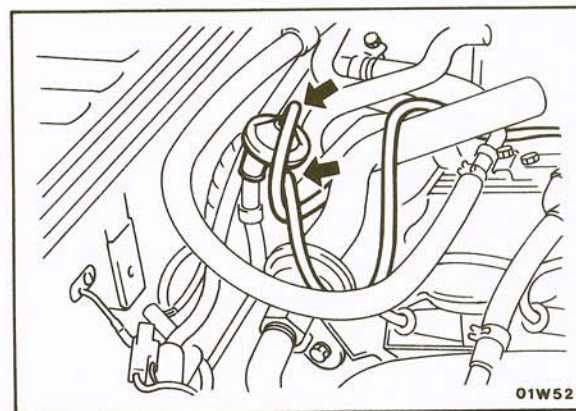




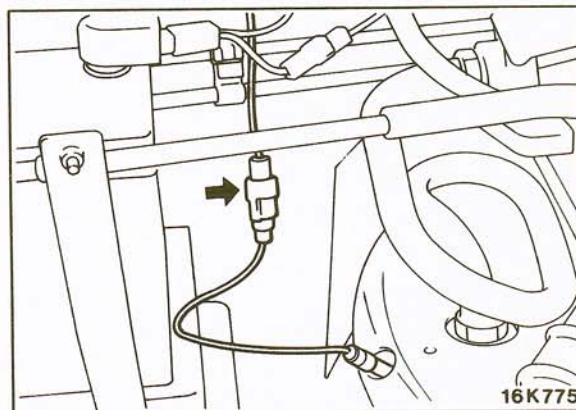
18. Disconnect the vapor hose.



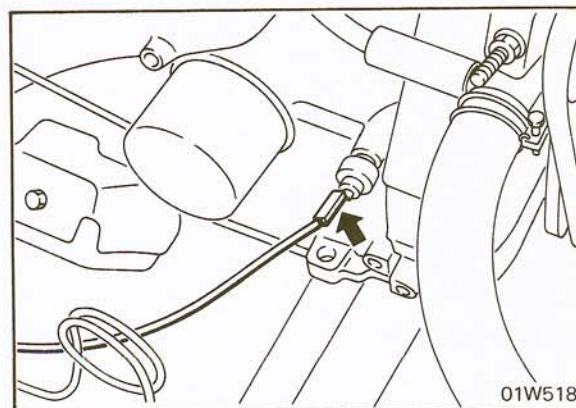
19. Disconnect the purge hoses from the purge control valve.



20. For vehicles equipped to meet California regulations (can also be sold in Federal States), disconnect the Oxygen sensor connector.



21. Disconnect the oil pressure switch harness. (01W518)
22. Remove the radiator assembly. (Refer to GROUP 7.)
23. Remove the front exhaust pipe. (Refer to GROUP 11.)
24. Remove the transfer case protector. (Refer to GROUP 21.)
25. Disconnect the speedometer cable. (Refer to GROUP 21.)
26. Disconnect the back-up light switch harness and 4-wheel drive indicator light switch harness. (Refer to GROUP 21.)
27. Remove the front and rear propeller shafts. (Refer to GROUP 16.)
28. Remove the transmission gearshift lever (vehicles with a manual transmission) or transmission selector lever (vehicles with an automatic transmission) and transfer shift lever.
29. For vehicles with an automatic transmission, remove the oil cooler hoses and tubes. (Refer to GROUP 7.)
30. Remove the engine mounting. (Refer to p. 9-17.)
31. Using a chain block and tackle, raise and remove the engine and transmission assembly diagonally out of the engine compartment.







### INSTALLATION

1. Supply coolant to the cooling system. (Refer to GROUP 7.)
2. Supply transmission and transfer case fluid. (Refer to GROUP 21.)
3. Supply engine oil. (Refer to p. 9-8.)
4. Adjust the clutch control system. (Refer to GROUP 6.)  
Adjust the accelerator cable. (Refer to GROUP 14.)  
Adjust the hood alignment. (Refer to GROUP 23.)
5. Torque all parts to specifications during assembly.





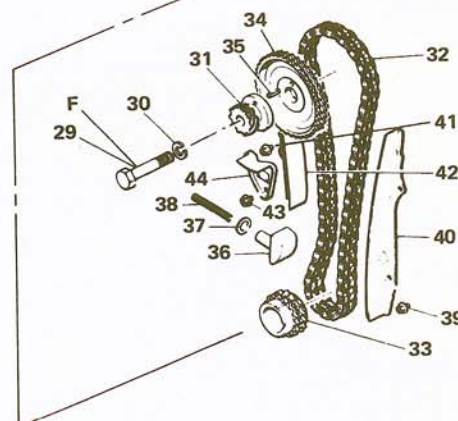
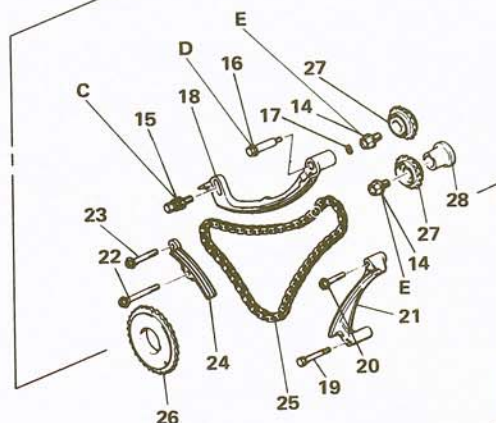
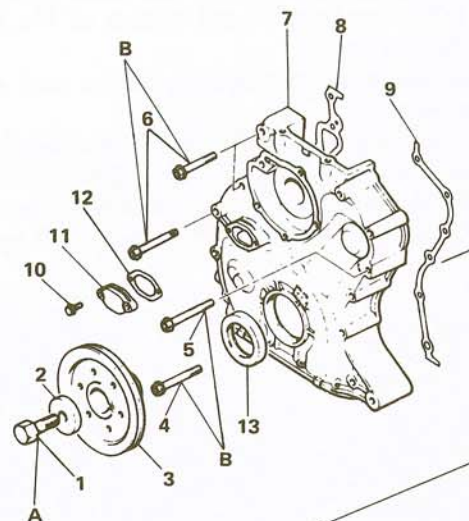
## COMPONENTS

1. Crankshaft pulley bolt
2. Special washer
3. Pulley
4. Flange bolt — 8x68 (8)
5. Flange bolt — 8x73
6. Flange bolt — 8x58 (2)
7. Timing chain case
8. Chain case gasket (R)
9. Chain case gasket (L)
10. Flange bolt — 6x18 (2)
11. Cover
12. Gasket
13. Oil seal
14. Flange bolt — 10x15 (2)
15. Special bolt "B"
16. Special bolt "A"
17. Spring washer
18. Chain guide "B"
19. Flange bolt — 6x60
20. Flange bolt — 6x45
21. Chain guide "A"
22. Flange bolt — 6x45
23. Flange bolt — 6x32
24. Chain guide "C"
25. Chain "B"
26. Crankshaft sprocket "B"
27. Sprocket "B" (2)
28. Spacer
29. Bolt w/washer — 14x70
30. Plain washer
31. Distributor gear
32. Timing chain
33. Crankshaft sprocket
34. Camshaft sprocket
35. Spring pin
36. Tensioner
37. Rubber sheet
38. Spring
39. Flange bolt — 6x10
40. Tension side chain guide
41. Flange bolt — 6 x 10 (2)
42. Loose side chain guide
43. Flange bolt (2)
44. Sprocket holder

### NOTE

Numbers show order of disassembly.  
For reassembly, reverse order of disassembly.

	Nm	ft.lbs.
A	108-127	80-94
B	12-14	9-10.5
C	15-21	11-15
D	8-9	6-7
E	59-68	44-50
F	49-58	37-43



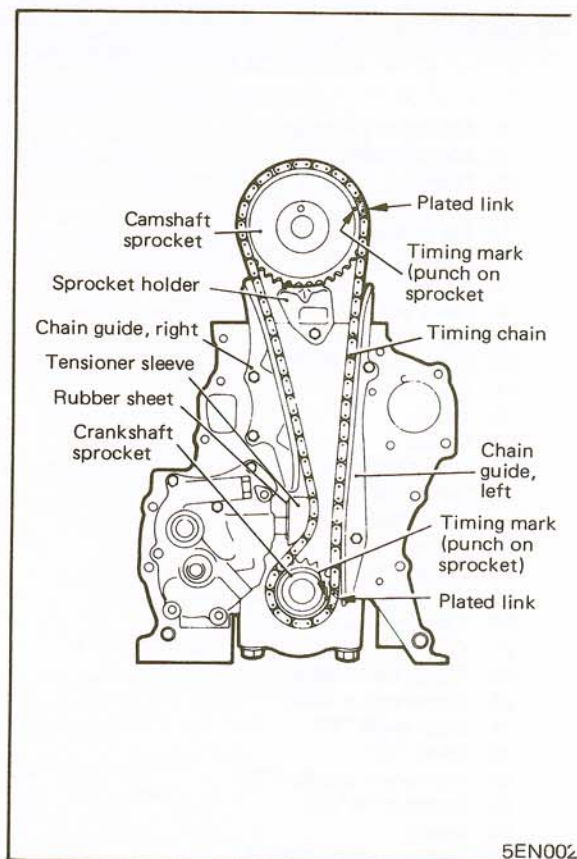




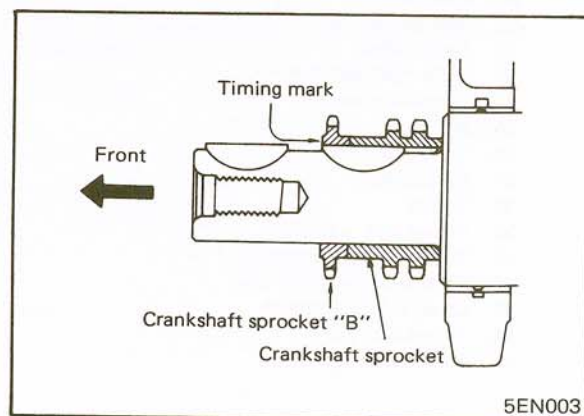
## COMPONENT SERVICE-TIMING CHAIN

### TIMING CHAIN INSTALLATION PROCEDURE

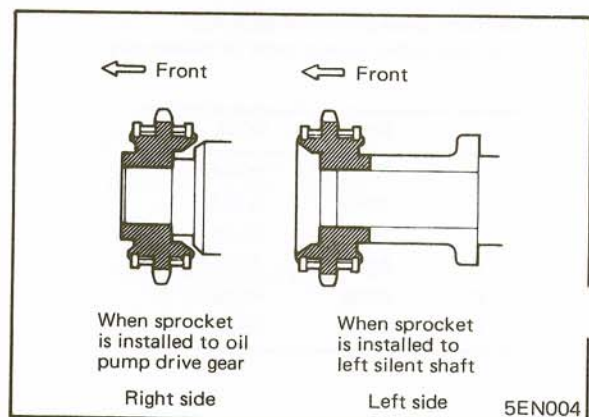
1. Install sprocket holder and chain guides.
2. Turn crankshaft until piston of No.1 cylinder is at top dead center.
3. Install tensioner spring, sleeve and rubber sheet to oil pump.
4. Line up plated links of timing chain and timing marks on sprockets as chain and sprockets are assembled.
5. While sliding crankshaft sprocket onto crankshaft, install chain and sprocket. Place camshaft sprocket on sprocket holder.



6. Install crankshaft sprocket "B" (for driving silent shafts) on crankshaft.



7. Assemble silent shaft sprockets to chain "B". Make sure that timing marks are in alignment with plated links. Use care not to confuse right and left sprockets, as they are installed in opposite directions.

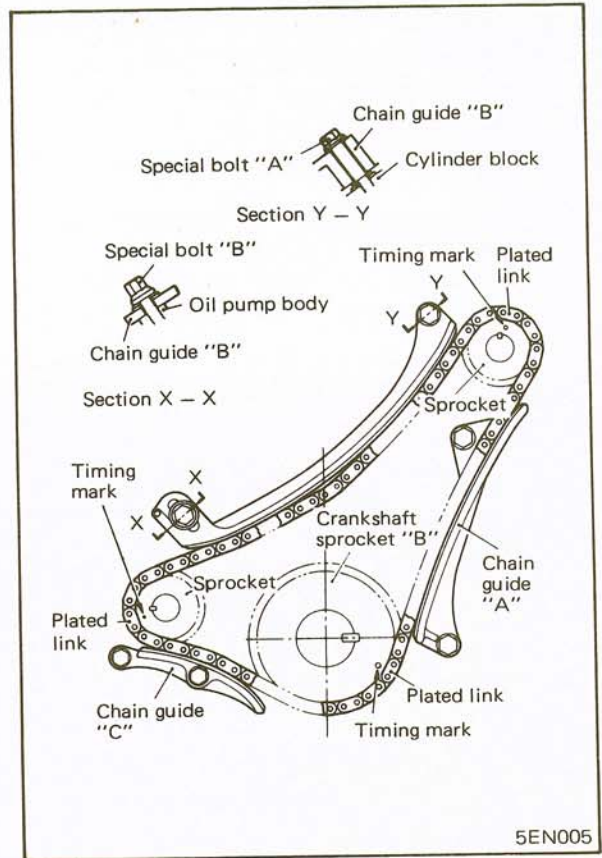






Holding assembled sprockets and chain "B", align timing mark on crankshaft sprocket "B" with that on chain "B", and install sprockets to oil pump drive gear and left silent shaft. Partially tighten bolt.

9. Temporarily install chain guides "A", "B" and "C".
10. Tighten silent shaft sprocket bolts to specified torque.
11. Tighten chain guide "A" mounting bolts firmly.
12. Tighten chain guide "C" mounting bolts firmly.

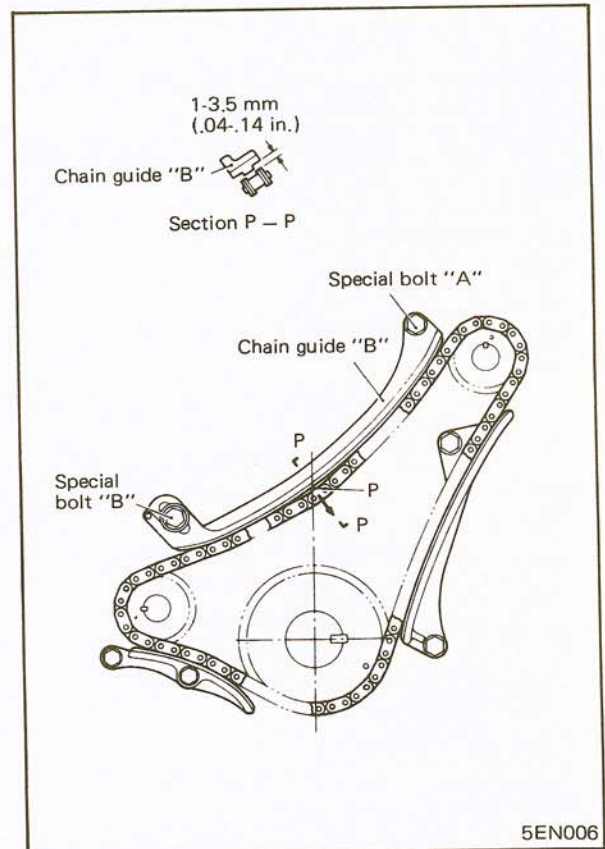


5EN005

13. Rotate both silent shaft sprockets slightly to position chain slack at point P.
14. Adjust position of chain guide "B" so that when chain is pulled in direction of arrow with finger tips, clearance between chain guide "B" and links of chain "B" will be 1 to 3.5 mm (.04 to .14 in.) and tighten special bolts "A" and "B".

## Tightening torque

Special bolt "A" . . . . . 8-9 Nm (6-7 ft.lbs.)  
Special bolt "B" . . . . . 15-21 Nm (11-15 ft.lbs.)



5EN006





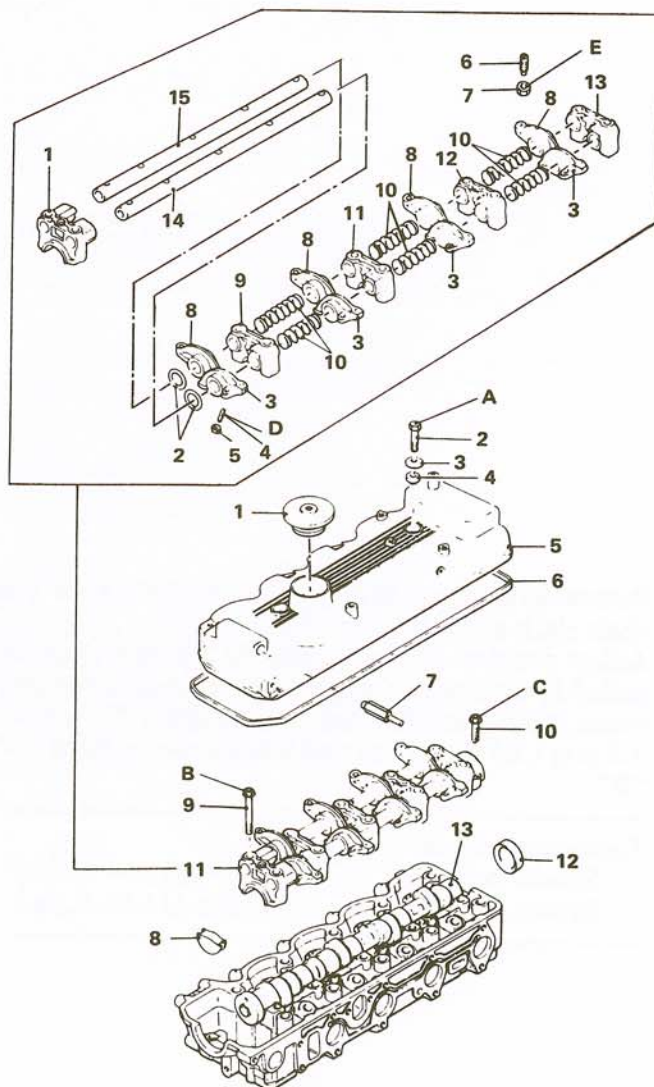
## COMPONENTS

1. Oil filler cap
2. Bolt — 8x40 (2)
3. Washer (2)
4. Oil seal (2)
5. Rocker cover
6. Rocker cover gasket
7. PCV valve
8. Semi-circular packing
9. Flange bolt (10)
10. Flange bolt — 8x25 (2)
11. Rocker arm and shaft assembly
  - 1 Bearing cap, front
  - 2 Wave washer (2)
  - 3 Rocker arm "A" (4)
  - 4 Adjusting screw (4)
  - 5 Nut (4)
  - 6 Adjusting screw (8)
  - 7 Nut (8)
  - 8 Rocker arm "C" (4)
  - 9 Bearing cap No. 2
  - 10 Rocker arm spring (6)
  - 11 Bearing cap No. 3
  - 12 Bearing cap No. 4
  - 13 Bearing cap, rear
  - 14 Rocker arm shaft left
  - 15 Rocker arm shaft right
12. Circular packing
13. Camshaft

### NOTE

Numbers show order of disassembly.  
For reassembly, reverse order of disassembly.

	Nm	ft.lbs.
A	5-6.8	3.7-5.0
B	19-20	14-15
C	20-26	15-19
D	8-9.5	6-7
E	12-17	9-13

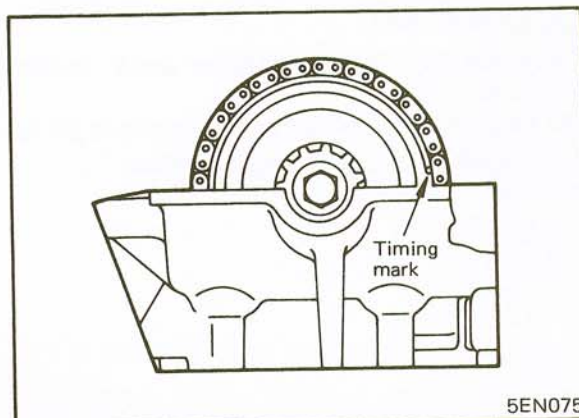






## REMOVAL

1. Before rocker arm and rocker shaft are removed, make sure that piston in No. 1 cylinder is at top dead center on compression stroke.
2. Illustration shows position of camshaft sprocket timing mark when piston in No. 1 cylinder is placed at top dead center on compression stroke. (5EN075)

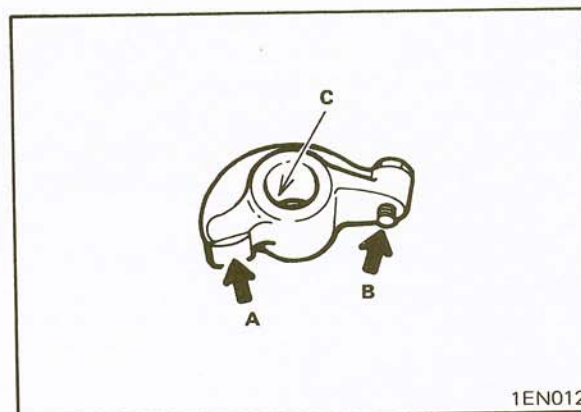


5EN075

## INSPECTION

### Rocker Arm

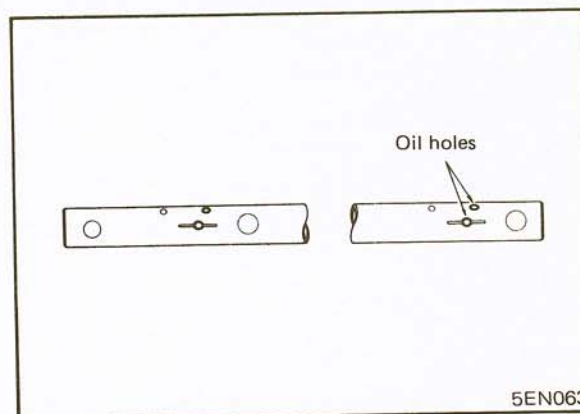
1. Check for wear of portions A, B and C, and replace if following conditions are evident. (1EN012)
  - (1) Portion A dented or worn
  - (2) Portion B eccentric
  - (3) Portion C (inside diameter) excessively loose on shaft
2. Check to ensure that oil holes are clear. (rocker arm with oil holes only)



1EN012

### Rocker Arm Shaft

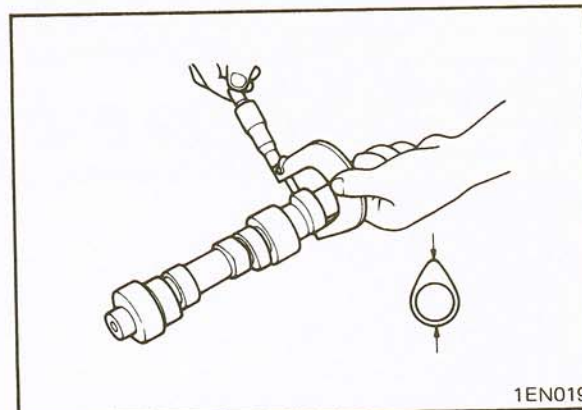
1. Check to ensure that rocker arm mounting portion is not worn.
2. Check to ensure that oil holes are clear. (5EN063)



5EN063

### Camshaft

1. If the following areas of the camshaft are badly worn or damaged, replace. (1EN019)
  - (1) Journals
  - (2) Cam lobes
  - (3) Fuel pump drive cam
  - (4) Distributor drive gear teeth
  - (5) Oil seal contacting surface
2. If camshaft bearing is badly worn, replace cylinder head.
3. If oil seal lip is worn, replace.



1EN019



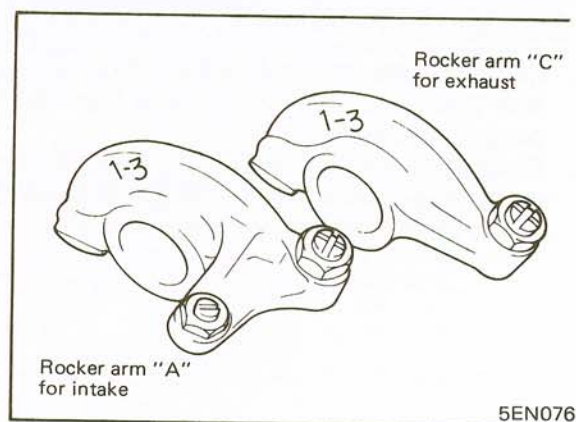


## INSTALLATION

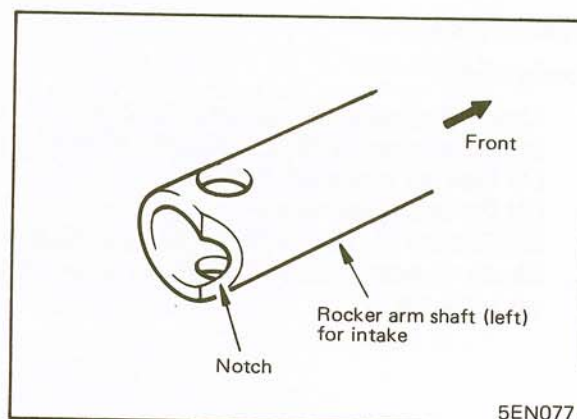
There are two kinds of rocker arms: rocker arm "A" and rocker arm "C".

Rocker arm "A" drives intake valves and jet valves.

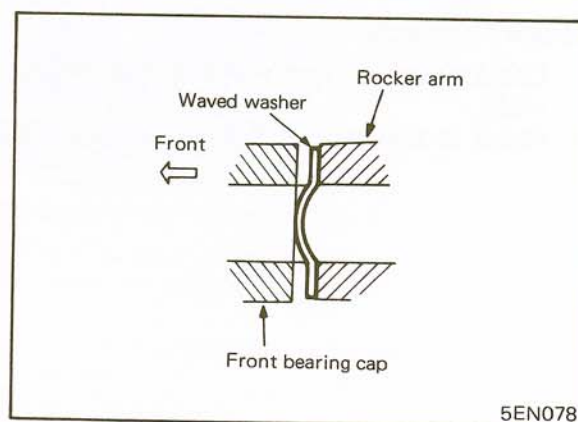
Rocker arm "C" drives exhaust valves.



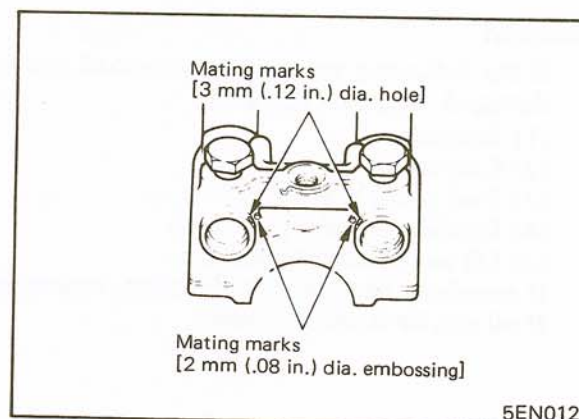
1. Insert the left and right rocker shafts into the front bearing cap. The rear end of left (intake) rocker arm shaft has a notch as shown in 5EN077.
2. Align the mating mark of the rocker arm shaft front end to the mating mark of the front bearing cap. Then insert the bolts to hold shafts in bearing cap.



3. Install the waved washer in the direction shown in the illustration.



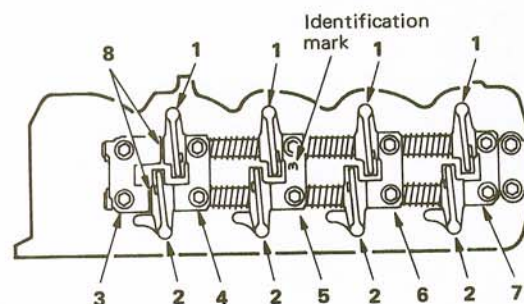
4. Assemble the rocker arm shaft so that the alignment mark at the front end matches the alignment mark of the front bearing cap. (5EN012)
5. Install the rocker arms, shafts, caps, etc., as shown in illustration before installation to the cylinder head. Insert the bolts to hold parts in position. (5EN079)





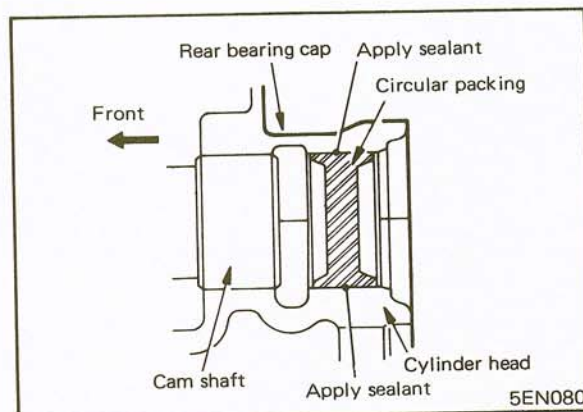


1. Rocker arm "C"
2. Rocker arm "A"
3. Front bearing cap
4. No. 2 bearing cap
5. No. 3 bearing cap  
(Inscribed mark 3 on top surface)
6. No. 4 bearing cap  
(Rocker screw hole on top surface)
7. Rear bearing cap
8. Waved washer



5EN079

6. Apply engine oil to the journals of camshaft and install it to cylinder head.
7. Coat the sealant to the O.D. of circular packing and install the circular packing to cylinder head as shown in 5EN080.
8. Install the rocker arms, shafts and bearing caps assembly to the cylinder head, and tighten the bearing cap bolts to specified torque.
9. Adjust the valve clearance. See "Lubrication and Maintenance", Group 0, for detailed procedure.



5EN080

10. Install the semi-circular packing to the front of cylinder head and apply sealant to top of semi-circular packing.

Recommended adhesive . . . . .  
3M Super Weather Strip Adhesive 8001 or equivalent

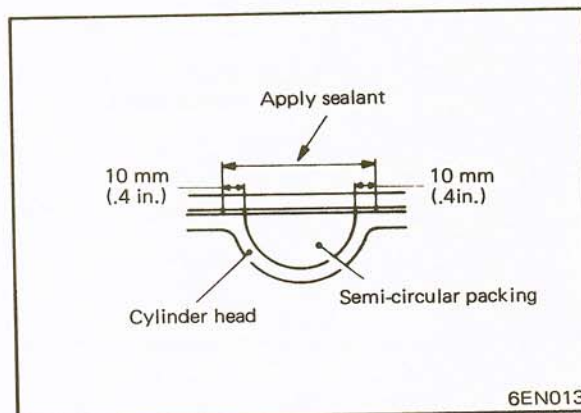
11. Install the rocker cover gasket and rocker cover.

## Caution

**Make sure that rocker cover bolts are tightened to specified torque.**

**If they are overtorqued, a deformed rocker cover or oil leakage could result.**

Tightening torque  
Rocker cover bolts . . . . . 5-6 Nm (3.7-5.0 ft.lbs.)



6EN013



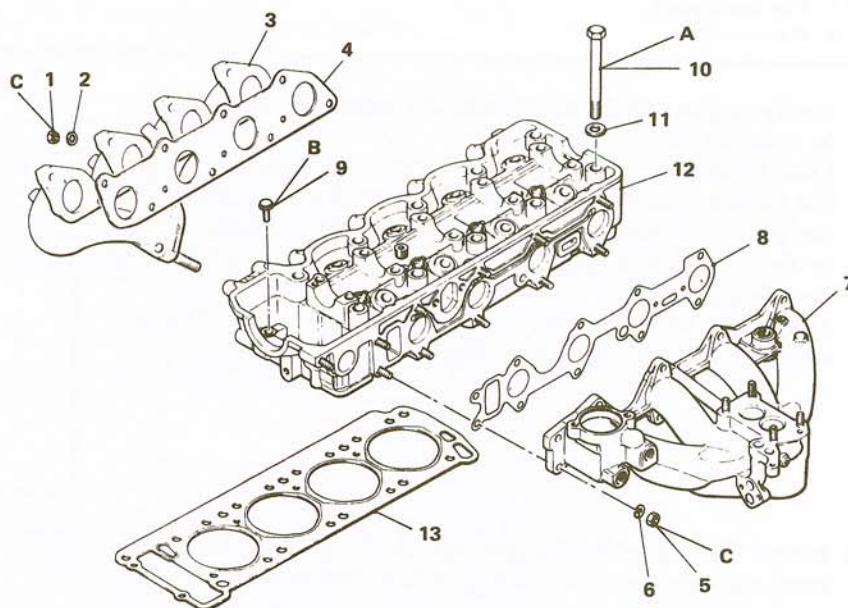


## COMPONENTS

1. Nut (8)
2. Plain washer (7)
3. Exhaust manifold
4. Exhaust manifold gasket
5. Nut (9)
6. Spring washer (9)
7. Intake manifold
8. Intake manifold gasket
9. Flange bolt (2)
10. Cylinder head bolt (10)
11. Washer (10)
12. Cylinder head
13. Cylinder head gasket

### NOTE

Numbers show order of disassembly.  
For reassembly, reverse order of disassembly.



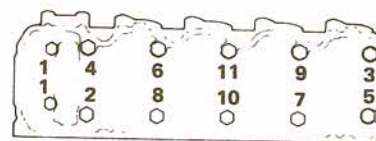
	Nm	ft.lbs.
A Cold engine	89-98	65-72
Hot engine	98-107	73-79
B	15-21	11-15
C	15-19	11-14

5EN086

## REMOVAL

1. Remove cylinder head bolts in sequence shown in illustration. (5EN015)
2. Cylinder head bolts can be loosened with ordinary socket wrench or special tool MD998051.

← Front of engine



5EN015

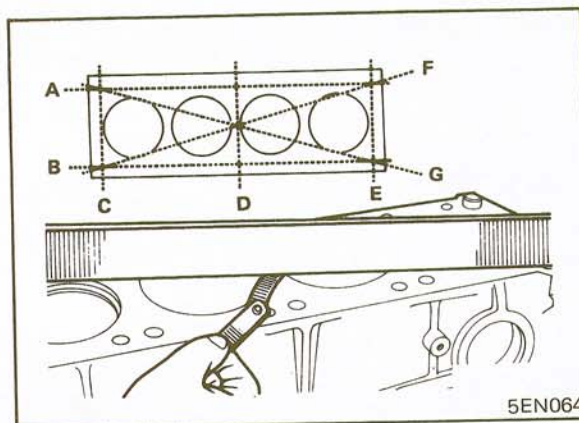




## INSPECTION

### Cylinder Head

1. Check cylinder head gasket surface for warping by using a straight edge in directions of A, B, ... as shown in illustration. (5EN064)
2. If warping exceeds 0.1 mm (.004 in.) in any direction, either replace cylinder head or lightly machine cylinder head gasket surface.



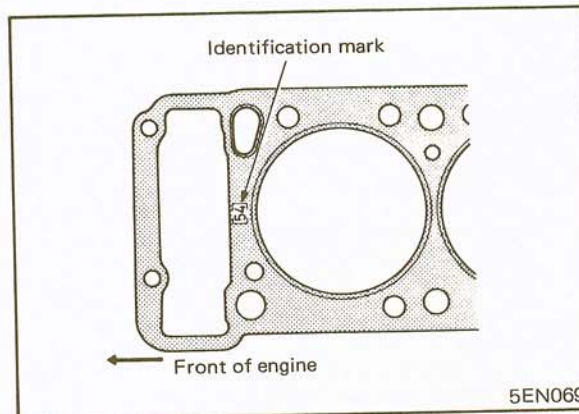
## INSTALLATION

### Cylinder Head Gasket

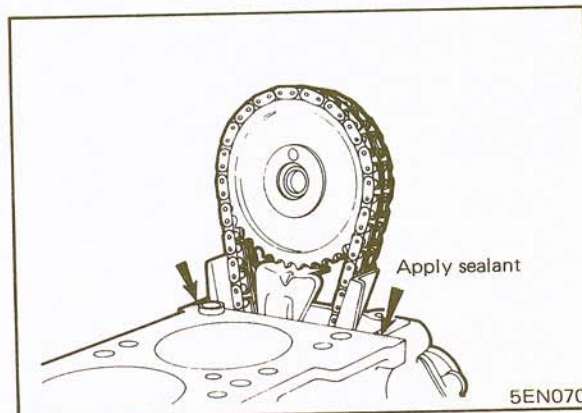
1. Clean gasket surfaces of cylinder head and cylinder block.
2. Install gasket surface with identification mark toward cylinder head. (5EN069)

### Caution

Do not apply sealant to cylinder head gasket.



3. Before cylinder head gasket is installed, apply sealant to top surface (indicated by arrows in illustration) of each butt joint between cylinder block and chain case.



### Cylinder Head

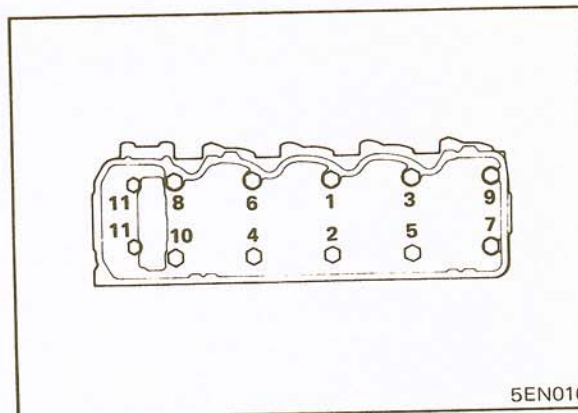
1. Install cylinder head assembly.
2. Install cylinder head bolts.
3. Starting at top center, tighten all cylinder head bolts to 1/2 of specified torque in the sequence shown in illustration. (5EN016)
4. Torque all cylinder head bolts to the specifications in the same sequence.

Cylinder head bolt (Nos.1 through 10) tightening torque

Cold engine ..... 89-98 Nm (65-72 ft.lbs.)

Hot engine ..... 98-107 Nm (73-79 ft.lbs.)

Cylinder head bolt (No.11) tightening torque  
15-21 Nm (11-15 ft.lbs.)





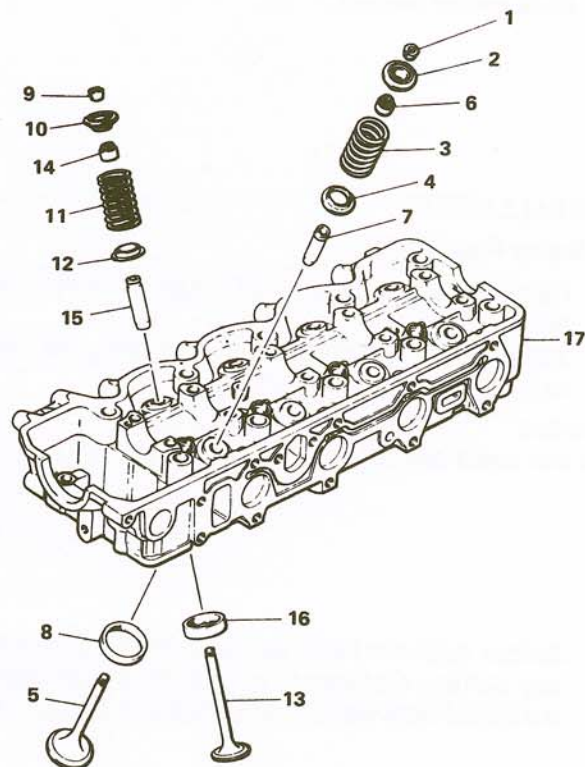


### COMPONENTS

1. Lock (8)
2. Retainer (4)
3. Spring (4)
4. Seat (4)
5. Intake valve (4)
6. Valve stem seal (4)
7. Intake valve guide (4)
8. Intake valve seat (4)
9. Lock (8)
10. Retainer (4)
11. Spring (4)
12. Seat (4)
13. Exhaust valve (4)
14. Valve stem seal (4)
15. Exhaust valve guide (4)
16. Exhaust valve seat (4)
17. Cylinder head

#### NOTE

Numbers show order of disassembly.  
For reassembly, reverse order of disassembly.



5EN017

Disassembled parts, such as valves, valve springs, should be grouped in accordance with their cylinder numbers.

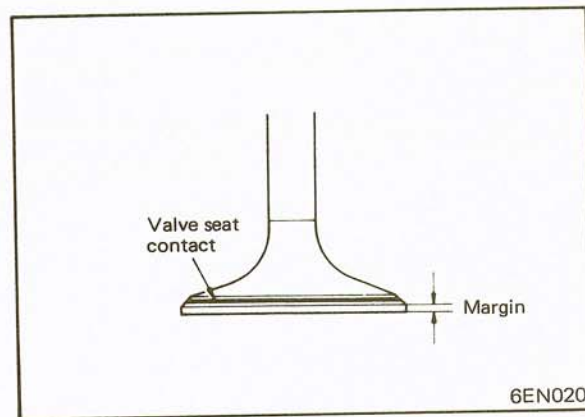
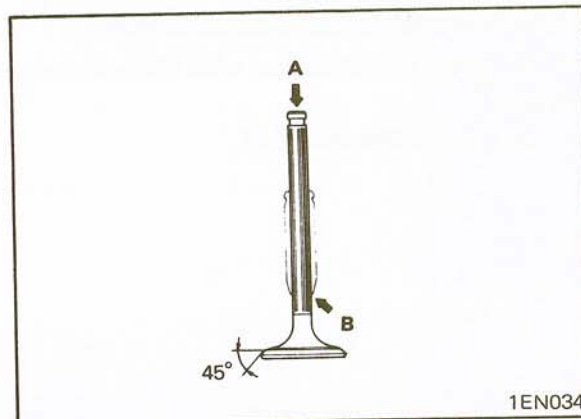




## INSPECTION

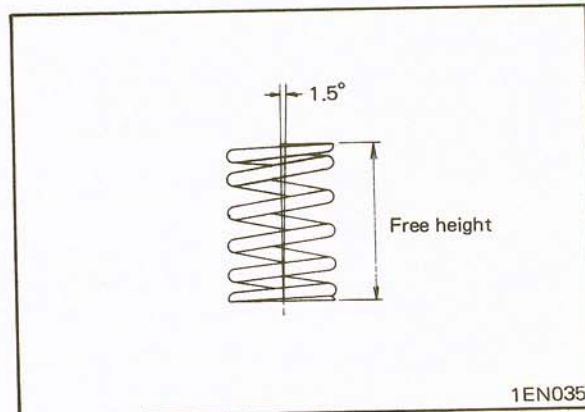
### Valves

1. Check each valve for wear, damage or deformation of head and stem at "B". Repair or replace excessively worn, damaged or deformed valves.
2. If stem tip "A" is pitted, correct by grinding. This correction must be limited to a minimum. Also reface valves with a valve grinder.
3. Check valve stem-to-guide clearance. Replace valve and/or valve guide if necessary.
4. Replace valve if the margin of the face has decreased to less than 0.5 mm (.02 in.). (6EN020)
5. Valve seat contact should be made at center of valve face.
6. Using marking compound, check for even contact with valve seat.
7. If inadequate contact with valve seat is evident, correct valve seat and/or reface valve.



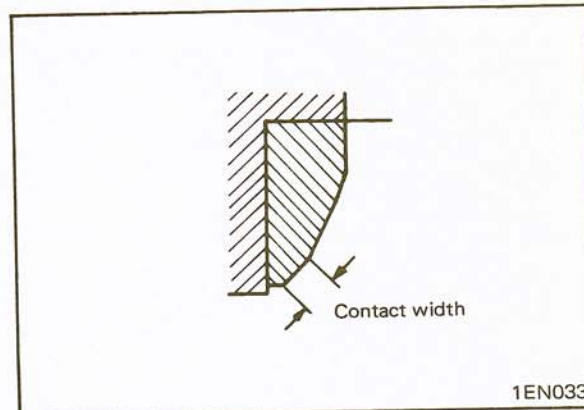
### Valve Springs

1. Check free height of each valve spring and replace if necessary. (1EN035)
2. Using a square, test squareness of each valve spring. If spring is excessively deformed, replace it.



### Valve Seats

1. Check valve seats for evidence of overheating or improper contact with valve face. Correct or replace seat if necessary.
2. Valve seat contact width should be as specified. (Refer to p. 9-32.) (1EN033)





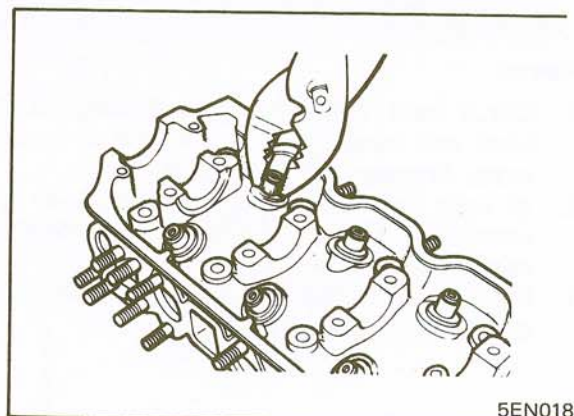


### VALVE STEM SEAL REPLACEMENT

1. Remove valve stem seal with pliers and discard it.

#### Caution

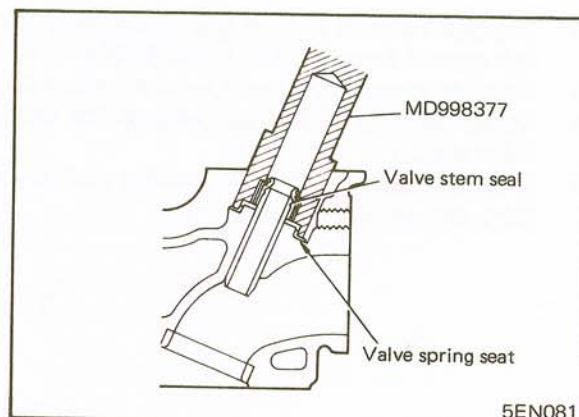
Do not reuse valve stem seal.



2. Install spring seats.
3. Lightly tap seal into place with special tool. (5EN081)

#### NOTE

Incorrect installation of seal will adversely affect lip and eccentricity, resulting in oil leakage past valve guides.



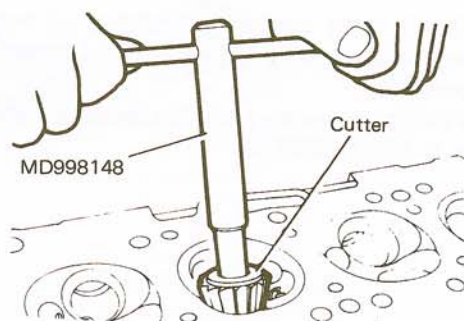
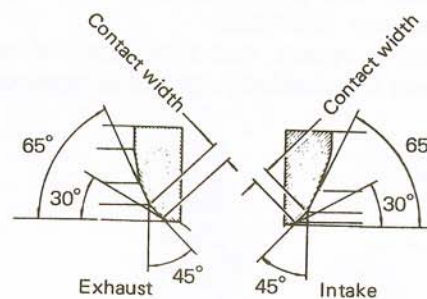
### VALVE SEAT RECONDITIONING

1. When correcting, check valve guide for wear. Replace guide if worn, and then correct seat.
2. To correct valve seat, use special tools. (1EN036, 1EN037)

#### Contact width

Exhaust	1.2-1.6 mm (.047-.063 in.)
Intake	0.9-1.3 mm (.035-.051 in.)

3. After correction, valve and valve seat should be lapped with a lapping compound.

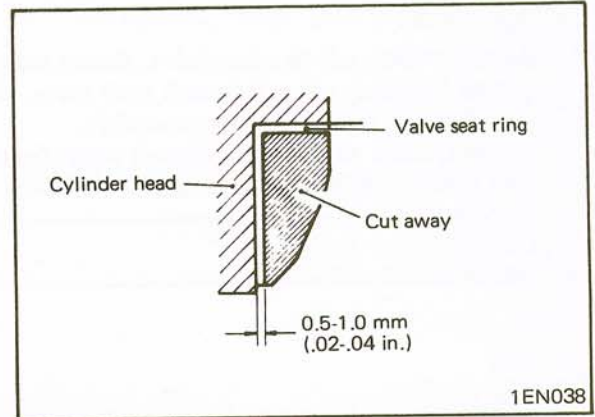






## ALVE SEAT INSERT REPLACEMENT PROCEDURE

1. When seat insert is to be removed, cut away excess metal from inside of insert with cutter before removal.

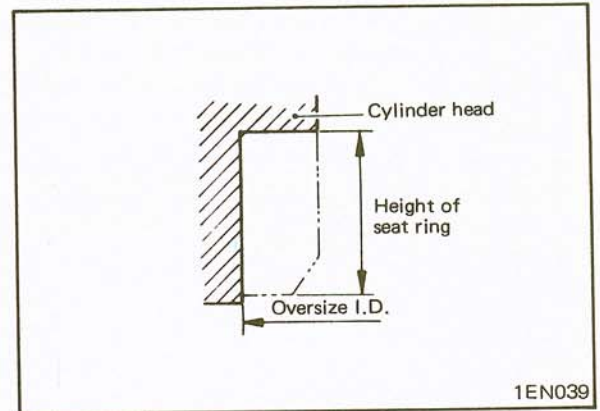


2. Grind valve insert bore in cylinder head to match the outside diameter and height of oversize seat insert. (1EN039)
3. Before insert is installed, heat cylinder head proper to approx. 250°C (480°F).

### Caution

If seat insert is installed at room temperature, cylinder head will be ground and seat ring will not tightly fit.

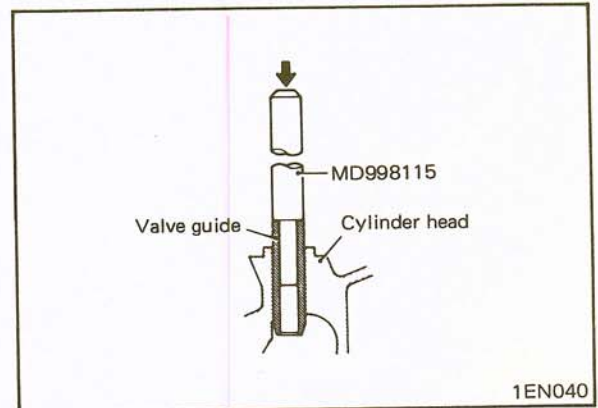
4. Press-fit insert quickly in hole provided in cylinder head.
5. After installation, recondition valve seat with seat cutter. See "Valve Seat Reconditioning".



## VALVE GUIDE REPLACEMENT PROCEDURE

Replace the valve guide as follows.

1. Using special tool, press valve guide out toward cylinder head lower surface. (1EN040)
2. Machine valve guide hole in cylinder head to outer diameter of oversize valve guide.

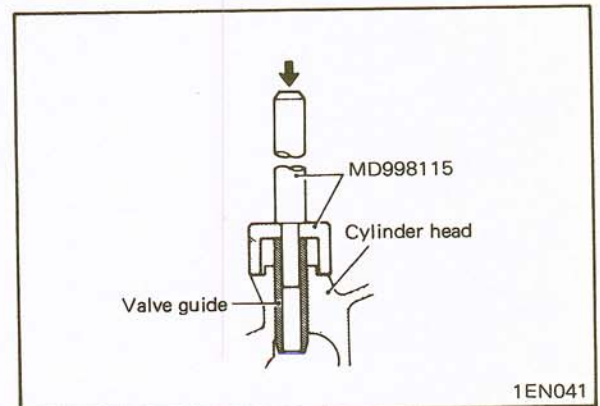


3. Using special tool install the valve guide. Use of valve guide installer makes it possible to press the valve guide to a predetermined height. Valve guide should be installed from top of cylinder head. (1EN041)

### Caution

If valve guide of standard size has been removed, do not reinstall a standard size valve guide. Be sure to install valve guide at room temperature.

4. After valve guides have been installed, insert new valves and check for free movement.
5. When valve guides have been replaced, check for valve face-to-seat contact and correct valve seats as necessary.





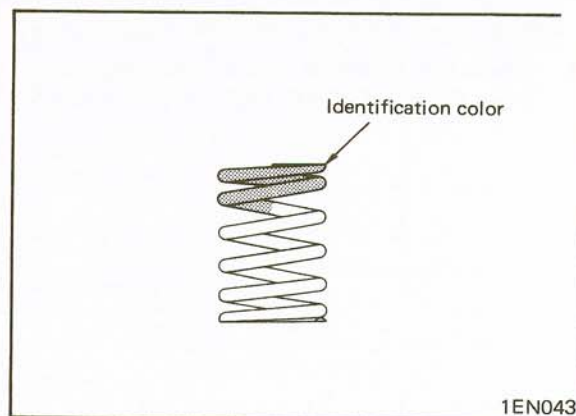


## COMPONENT SERVICE-VALVES AND VALVE SPRINGS

### REASSEMBLY

1. Apply engine oil to each valve. Insert valves into guides. Avoid inserting valve into seal with force. After insertion, check to see if valve moves smoothly.
2. Valve springs should be installed with identification color side toward valve spring retainer. (1EN043)

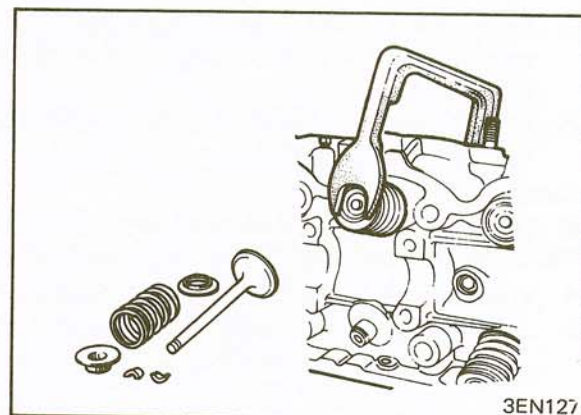
Identification color ..... Blue



3. Use valve spring compressor or suitable tool to compress spring and install retainer lock. (3EN127)
4. After installation of valves, make certain that retainer locks are positively installed.

#### Caution

When spring is compressed with Valve Spring Compressor or suitable tool, check to see that the bottom of retainer does not contact the valve stem seals.

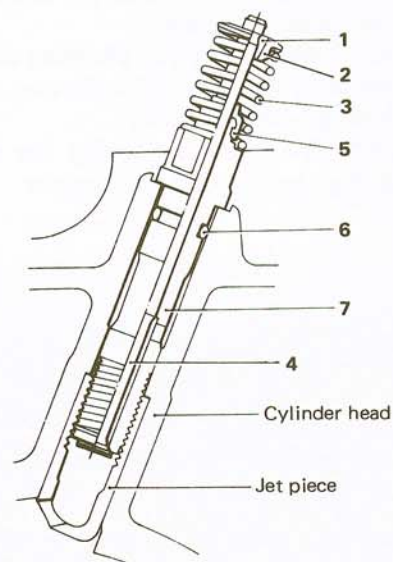






## COMPONENTS

1. Retainer lock
2. Spring retainer
3. Spring
4. Jet valve
5. Valve stem seal
6. O-ring
7. Jet body



### NOTE

Numbers show order of disassembly.  
For reassembly, reverse order of disassembly.

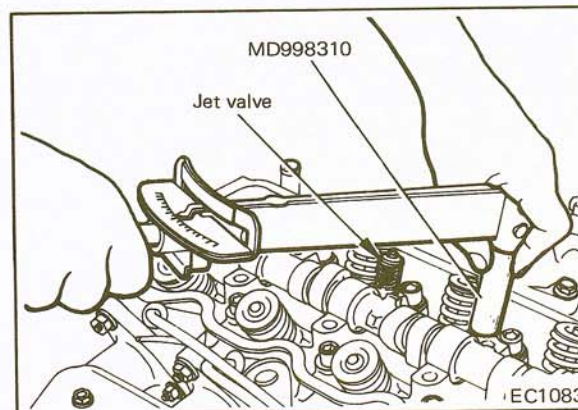
EC1084

## REMOVAL

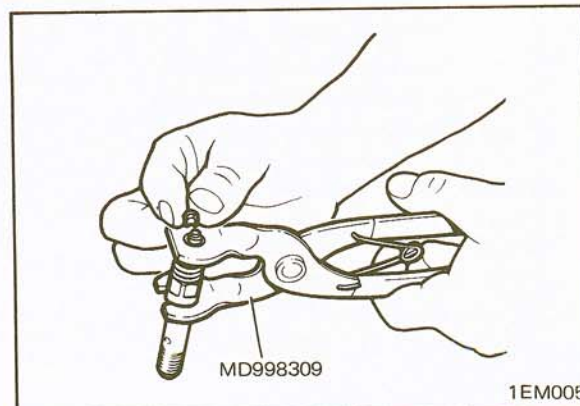
1. Remove the jet valve assembly with special tool.

### Caution

When using the jet valve socket wrench, make certain that the wrench is not tilted with respect to the center of the jet valve. If the tool is tilted, the valve stem might be bent by the force exerted on the valve spring retainer, resulting in defective jet valve operation.



2. Remove the jet valve spring retainer lock with special tool and remove the valve spring retainer and valve spring.







### INSPECTION

1. Check to ensure that the jet valve slides smoothly with no play in the jet body. Do not attempt to adjust the fit of the jet valve in the jet body. Replace the jet valve and jet body as an assembly.
2. Check the face of the jet valve and the jet body seat for seizure or damage. If defective, replace the jet valve and jet body as an assembly.
3. Check the jet valve spring for deterioration, cracks or damage, and replace if defective.

### INSTALLATION

1. Install the jet valve stem seal with the special tool. (1EM006)

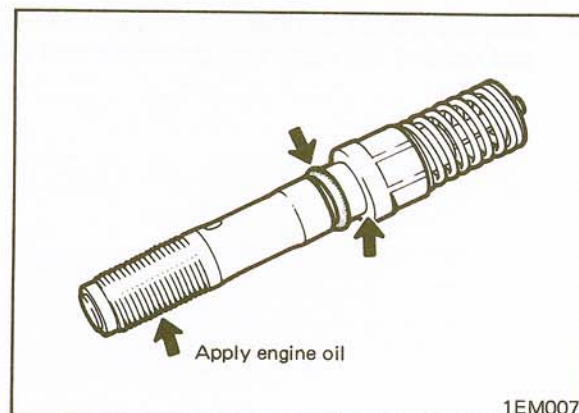
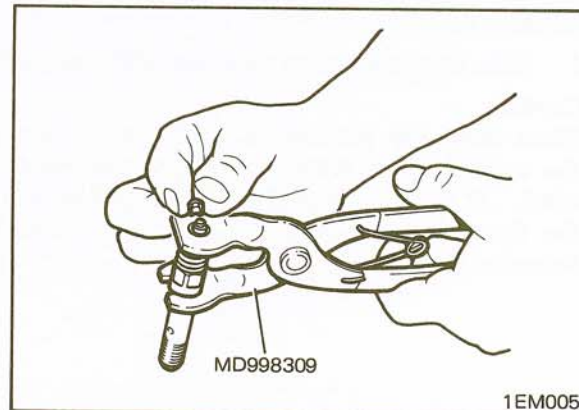
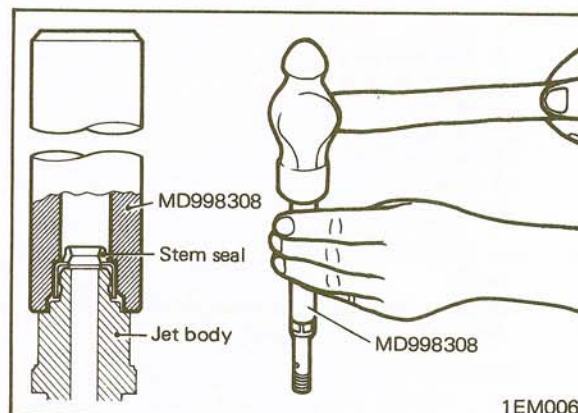
#### Caution

**Do not reuse old valve stem seal.**

2. Apply engine oil to the stem of the jet valve before inserting the jet valve into the jet body. When inserting the valve, use care to prevent damage to the new valve stem seal lips. After installation, check to ensure that the valve slides smoothly.
3. Mount the jet valve spring and jet valve spring retainer. Then compress the spring with the special tool, and install the retainer lock. When compressing the spring with pliers, use care not to avoid damaging the valve stem with the bottom of the spring retainer.
4. Install a new O-ring into the groove around the jet body and apply engine oil to the O-ring. Apply engine oil to the jet body threaded area and seat surface. (1EM007)
5. Screw the jet valve assembly into the cylinder head by hand, and tighten to the specified torque with special tool. Hold the jet valve socket wrench firmly to make sure that it is not tilted with respect to the center of the jet valve.

#### Tightening torque

Jet valve assembly . . . . . 18-21 Nm (13-15 ft.lbs.)

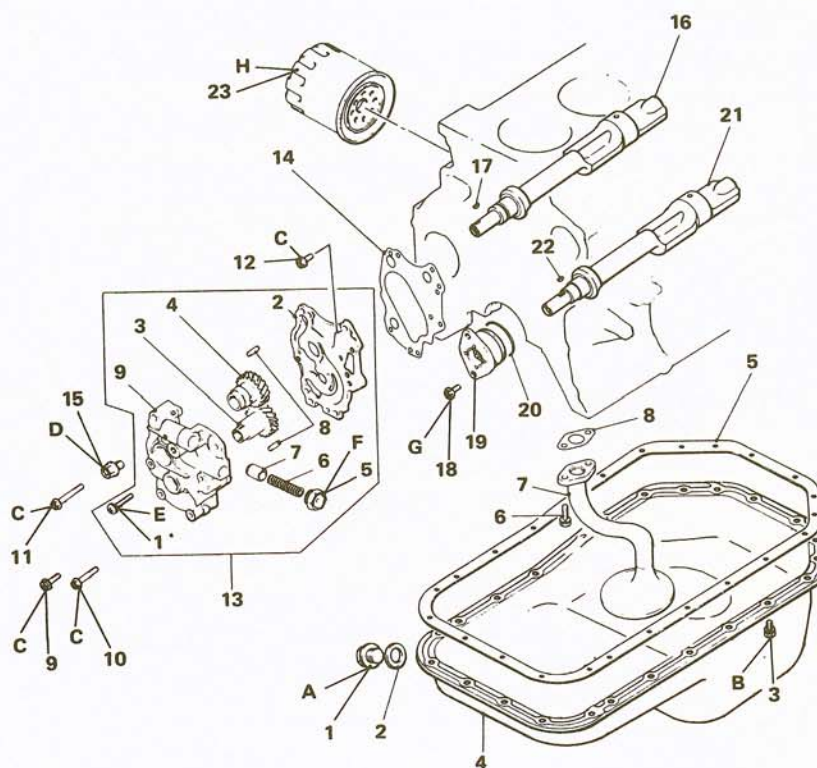






## COMPONENTS

1. Oil drain plug
2. Oil drain plug gasket
3. Bolt (24)
4. Oil pan
5. Gasket
6. Bolt (2)
7. Oil screen
8. Oil screen gasket
9. Flange bolt — 6x22
10. Flange bolt — 6x38
11. Flange bolt — 6x45
12. Flange bolt — 6x16
13. Oil pump assembly
  - 1 Screw
  - 2 Oil pump cover
  - 3 Oil pump drive gear
  - 4 Oil pump driven gear
  - 5 Plug
  - 6 Relief spring
  - 7 Relief valve
  - 8 Pin (2)
  - 9 Oil pump body
14. Oil pump gasket
15. Flange bolt
16. Silent shaft, right
17. Woodruff key
18. Flange bolt (2)
19. Thrust plate
20. O-ring
21. Silent shaft, left
22. Woodruff key
23. Oil filter



### NOTE

Numbers show order of disassembly.  
For reassembly, reverse order of disassembly.

	Nm	ft.lbs.
A	59-78	44-57
B	6-7	4.5-5.5
C	10-11.5	7.5-8.5
D	59-68	44-50
E	8-9	6-7
F	30-44	22-32
G	10-11.5	7.5-8.5
H	11-12	8-9

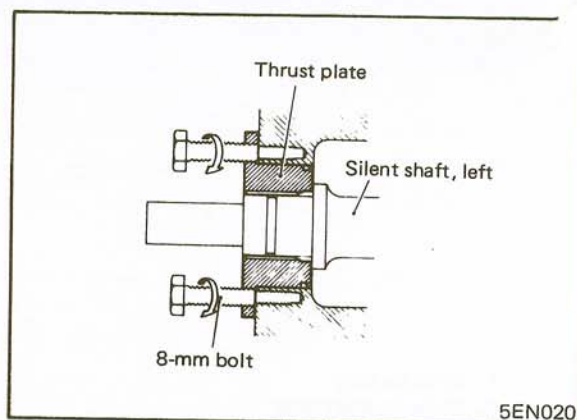




## COMPONENT SERVICE-SILENT SHAFTS AND OIL PUMP

### REMOVAL

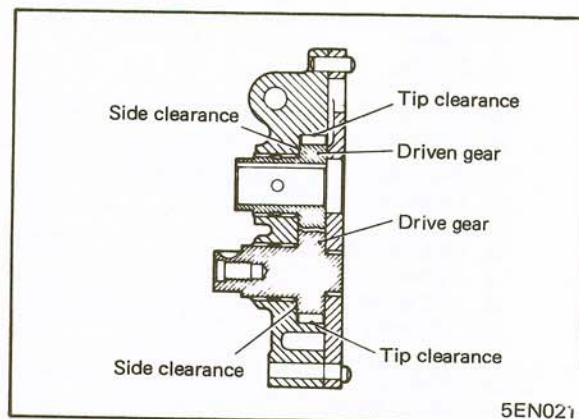
When the thrust plate is to be removed, install 8 mm dia. bolts into threaded holes of flange and turn bolts equally to remove the thrust plate.



### INSPECTION

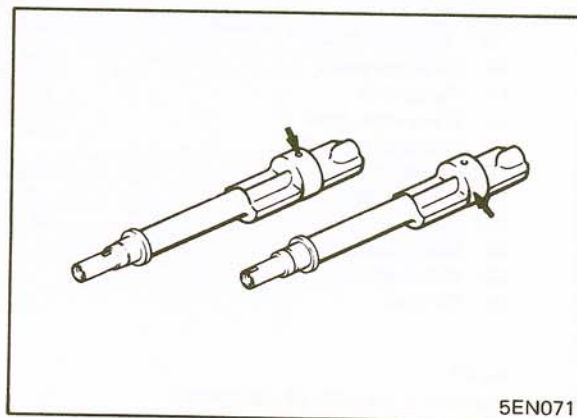
#### Oil Pump

1. Install drive gear and driven gear to oil pump body and measure clearance.
2. Check for stepped wear of gear contacting surfaces of body and cover.
3. If clearance is excessive, or if case or cover has stepped wear, replace case and cover assembly, replace gears, or both.



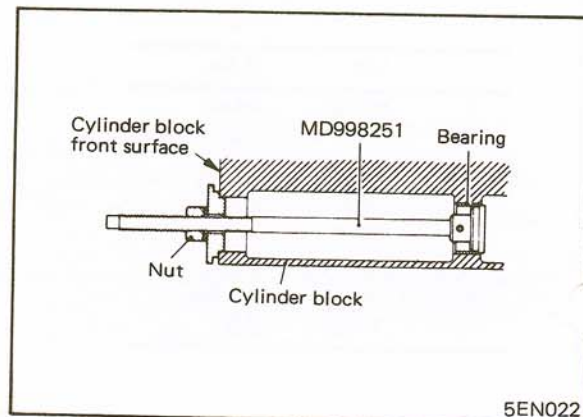
#### Silent Shafts

1. Check journals for wear, damage or seizure. If excessive damage or seizure is evident, check bearing also. If necessary, replace silent shaft, bearing, or both.
2. Check oil hole passage for clogging. Clean or repair if necessary.



### SILENT SHAFT BEARING REPLACEMENT PROCEDURE

1. Using special tool, remove silent shaft rear bearing.



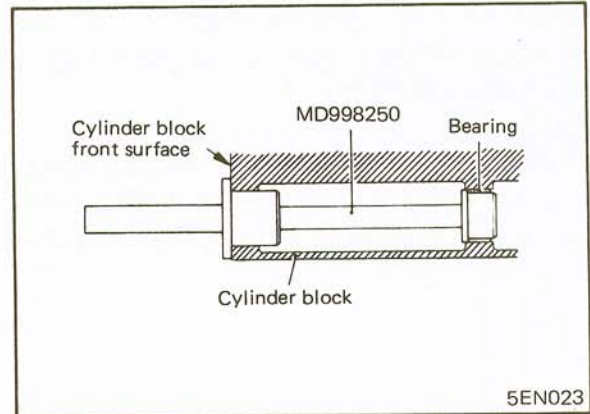




Using special tool, install silent shaft bearing to cylinder block.

## Caution

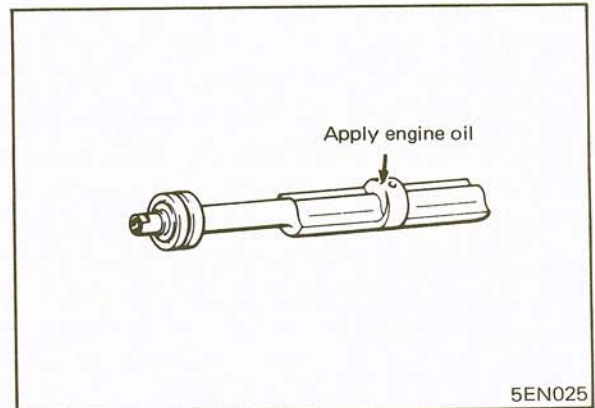
Before installing bearing, apply engine oil to outer surface of bearing.



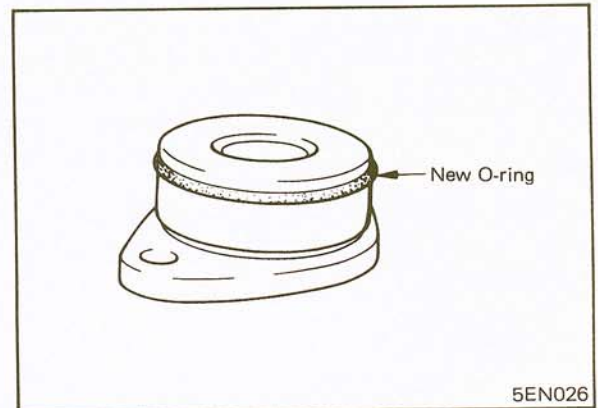
## INSTALLATION

### Left Silent Shaft

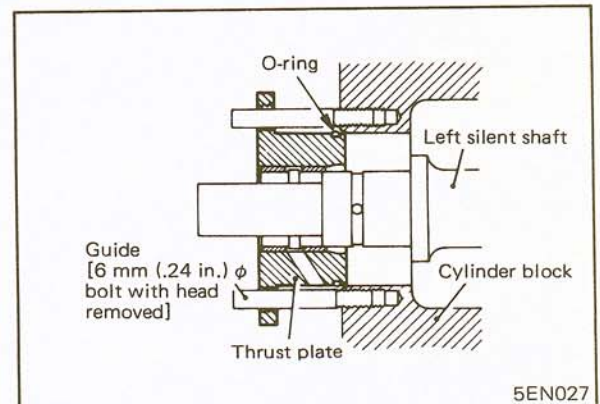
1. Apply engine oil to journal of left silent shaft. (5EN025)
2. Install left silent shaft into cylinder block carefully, to prevent damage to the bearing.



3. Install new O-ring into groove of thrust plate. (5EN026)
4. Apply engine oil around O-ring.



5. Install two guides into threaded holes for mounting thrust plate. Guides should be fabricated by cutting off hexagonal heads of bolts 6 mm (.24 in.) in diameter and 50 mm (2 in.) long. (5EN027)
6. Install thrust plate into cylinder block along guides. Without use of guides, threaded holes will be hard to align, turning to align holes might twist or damage the O-ring, so make sure that thrust plate is correctly installed by use of the guides.







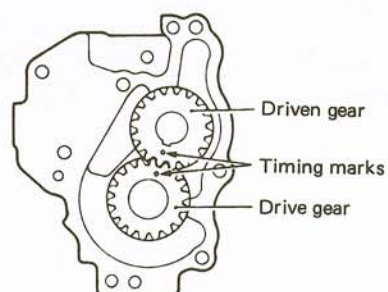
### Right Silent Shaft and Oil Pump

1. Install oil pump gears to oil pump body and align timing marks. (5EN028)

#### Caution

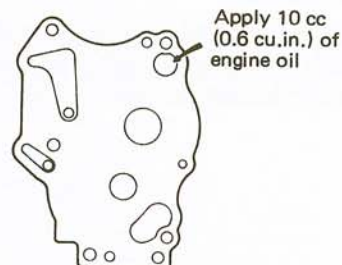
If timing marks are out of alignment, phase of silent shaft will be out of phase, and vibration will result.

2. Install oil pump cover to body and tighten screws.



5EN028

3. After installing pump cover, position pump assembly in same position as it was originally installed on engine and put approx. 10 cc (0.6 cu.in.) of clean engine oil in delivery port. (5EN029)
4. Install right silent shaft into oil pump driven gear.
5. Install driven gear and silent shaft tightening bolt and tighten to specified torque.
6. Apply engine oil to journal of right silent shaft.
7. Install silent shaft and oil pump as an assembly to cylinder block. Use care to avoid damaging rear bearing as the shaft is installed.
8. Tighten oil pump mounting bolts to specified torque.



5EN029

#### Torque specification

Oil pump mounting bolts .....  
10-10.5 Nm (7.5-8.5 ft.lbs.)



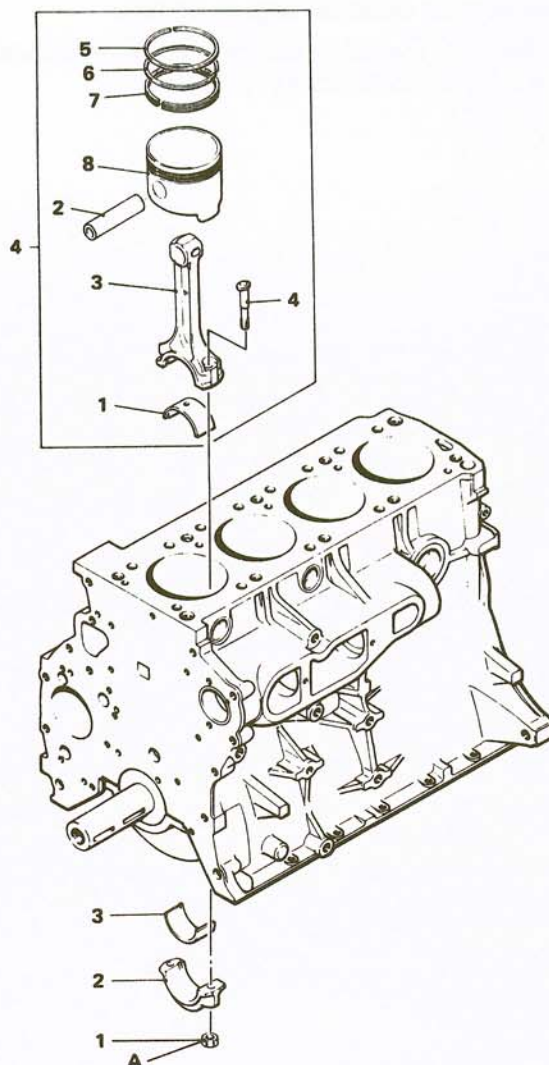


## COMPONENTS

1. Nut (8)
2. Bearing cap (4)
3. Bearing (4)
4. Piston and connecting rod assembly (4)
  - 1 Bearing (4)
  - 2 Piston pin (4)
  - 3 Connecting rod (4)
  - 4 Bolt (8)
  - 5 No. 1 piston ring (4)
  - 6 No. 2 piston ring (4)
  - 7 Oil ring (4)
  - 8 Piston (4)

**NOTE**  
Numbers show order of disassembly.  
For reassembly, reverse order of disassembly.

	Nm	ft.lbs.
A	45-47	33-34

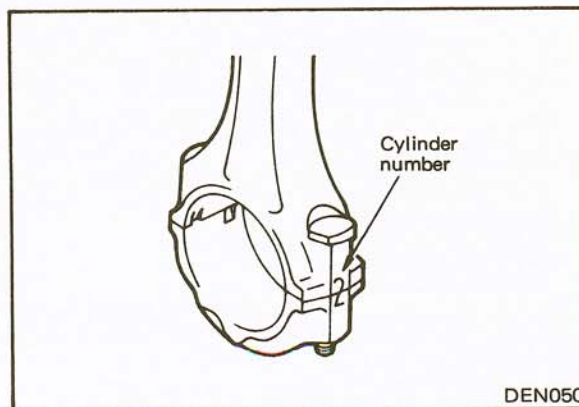


5EN120

## REMOVAL

### Connecting Rod Cap

1. Before connecting rod cap is removed, make the cylinder number on the connecting rod and on the cap and big end side surfaces. (DEN050)
2. Keep bearings in order of corresponding connecting rods (according to cylinder numbers) for proper reassembly.



DEN050





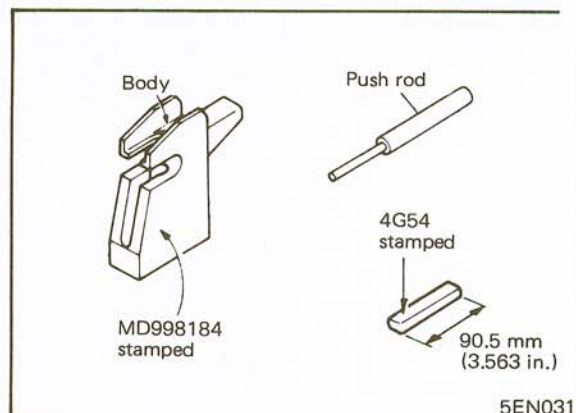
## COMPONENT SERVICE-PISTONS AND CONNECTING RODS

### PISTON PIN REMOVAL AND INSTALLATION PROCEDURES

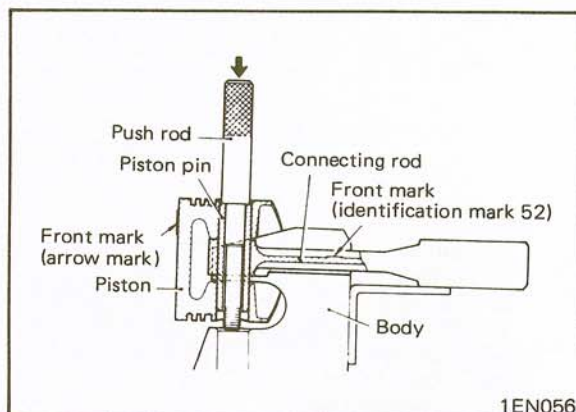
#### Caution

Tools vary on different engine models.

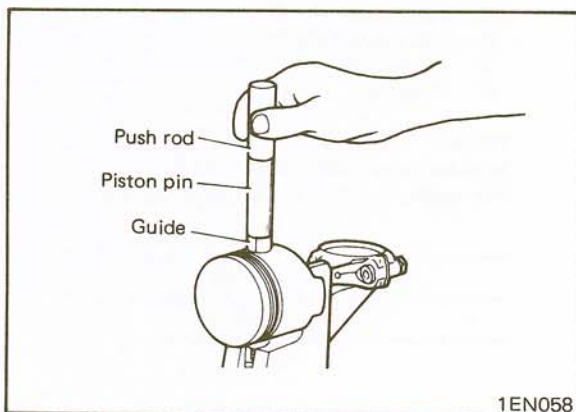
1. Use the special tools illustrated to remove and install piston and connecting rod.



2. Set piston and connecting rod assembly in tool body so that the front mark (arrow mark of piston or identification mark of connecting rod) is positioned upward.
3. Place connecting rod securely on tool body.
4. Insert push rod into piston pin and remove piston pin with press. (1EN056)

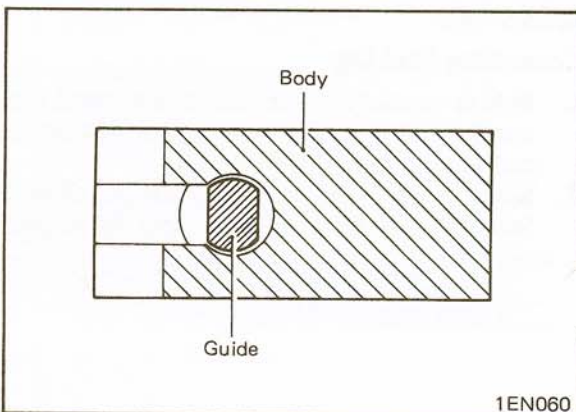


5. Assemble piston pin, push rod and guide. (1EN058)
6. Apply engine oil to outer surface of piston pin and small end bore of connecting rod.
7. Set connecting rod and piston with front mark facing up.



8. Insert push rod, piston pin and guide as a unit into piston pin hole and connecting rod small end hole.
9. Align the guide so that the two parallel surfaces are positioned as shown in illustration. (1EN060)
10. Press piston pin into piston pin hole applying the specified load with a press. If required installation load is not within specifications, replace piston pin and/or connecting rod.

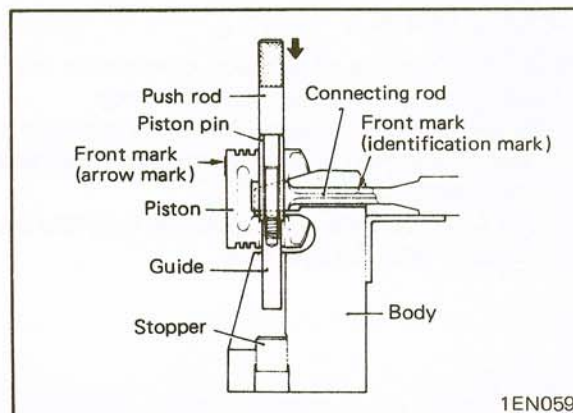
Piston pin press-in load .....  
7,355-17,162 N (1,653-3,858 lbs.)





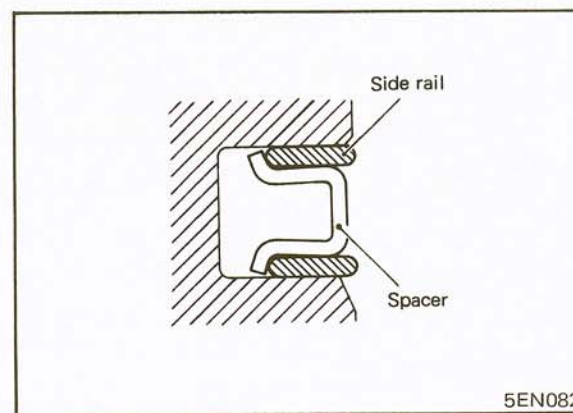


11. Turn the push rod 1/4 turn and separate the piston and connecting rod assembly from the special tool.
12. After pressing in piston pin, make sure that connecting rod turns and slides easily.



## PISTON RING INSTALLATION PROCEDURE

1. Install spacer.

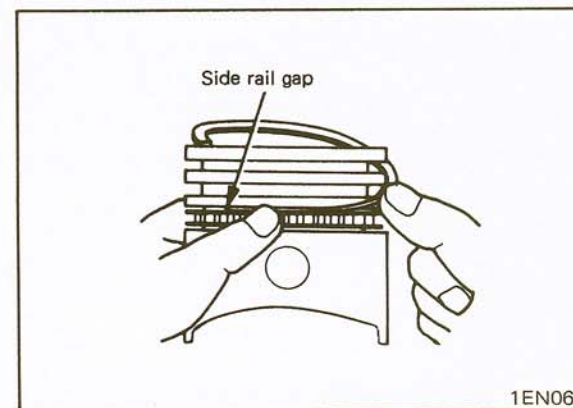


2. Install upper side rail. To install side rail, first put one end of side rail between piston ring groove and spacer, hold it down firmly, and then press down the portion which is to be inserted into groove with a finger as illustrated. (1EN063)

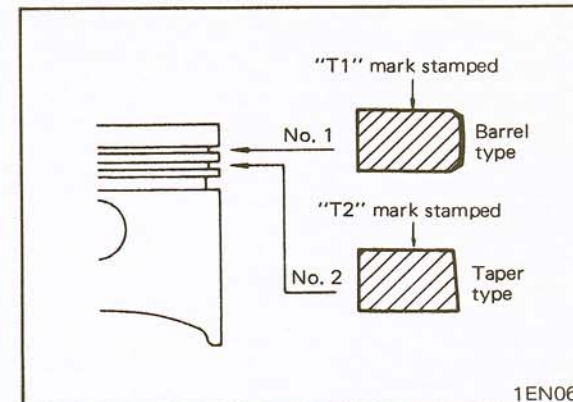
### Caution

**Do not use piston ring expander when installing side rail.**

3. Install lower side rail by same procedure as Step 2.



4. Using piston ring expander, install No. 2 piston ring.
5. Install No. 1 piston ring.
6. Apply engine oil around piston and piston rings.



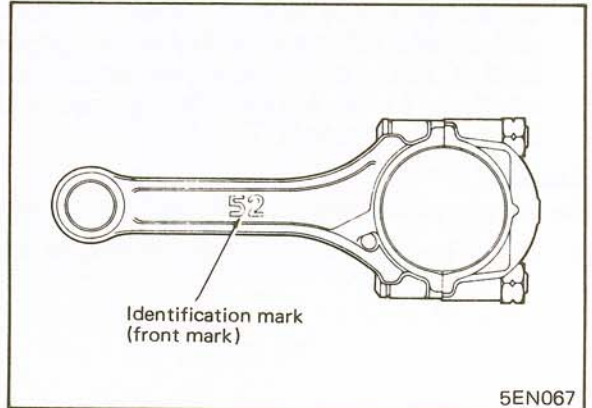
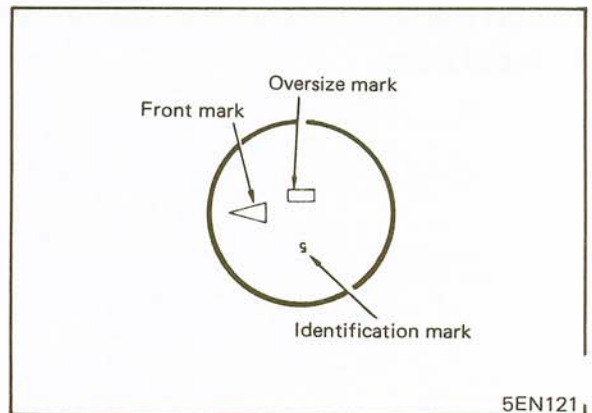
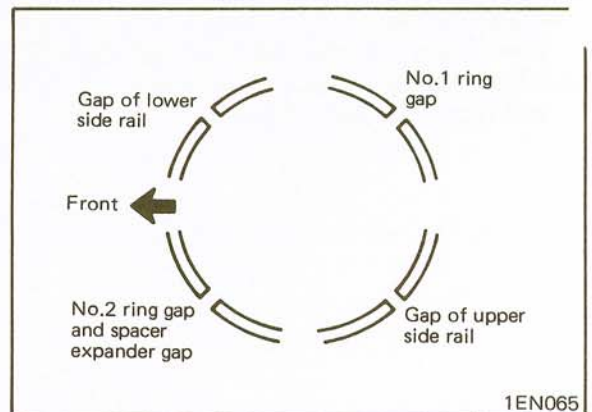




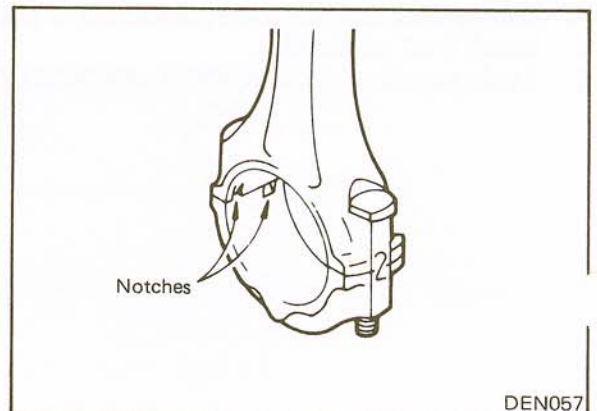
### INSTALLATION

When installing the piston and connecting rod assembly into cylinder, be sure to check the following:

1. Position the ring gaps as far as possible from adjacent gaps. Make sure that gaps are not positioned in thrust or pin directions. (1EN065)
2. Use a piston ring compressor to hold the rings as they are installed into the cylinder.
3. Make sure that front mark of piston and front mark (identification mark) of connecting rod are directed toward front of engine. (5EN121, 5EN067)
4. When connecting rod cap is installed, make sure that cylinder numbers which were put on rod and cap at disassembly match.



5. When installing a new connecting rod, make sure that the notches for holding the bearing in place are on the same side.







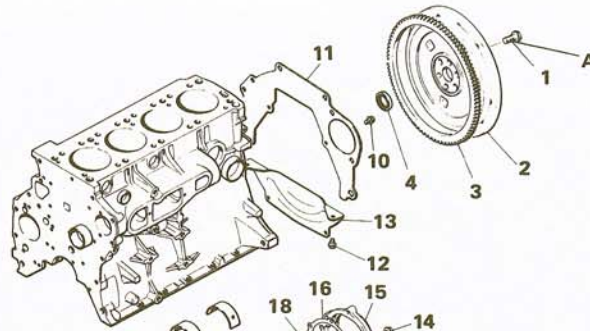
## COMPONENTS

1. Flywheel bolt (6)
2. Flywheel
3. Ring gear
4. Ball bearing
5. Drive plate bolt (6)
6. Adapter plate
7. Drive plate assembly
8. Adapter plate
9. Crankshaft bushing
10. Flange bolt (2)
11. Rear plate
12. Flange bolt (2)
13. Bell housing cover
14. Flange bolt (5)
15. Oil seal case
16. Gasket
17. Separator
18. Rear oil seal
19. Bolt (10)
20. Bearing cap (5)
21. Crankshaft bearing (5)
22. Crankshaft
23. Crankshaft bearing (5)

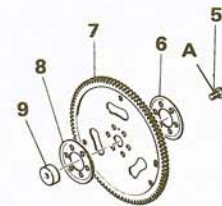
**NOTE**  
Numbers show order of disassembly.  
For reassembly, reverse order of disassembly.

	Nm	ft.lbs.
A	128-137	94-101
B	74-83	55-61

Vehicles with a manual transmission



Vehicles with an automatic transmission



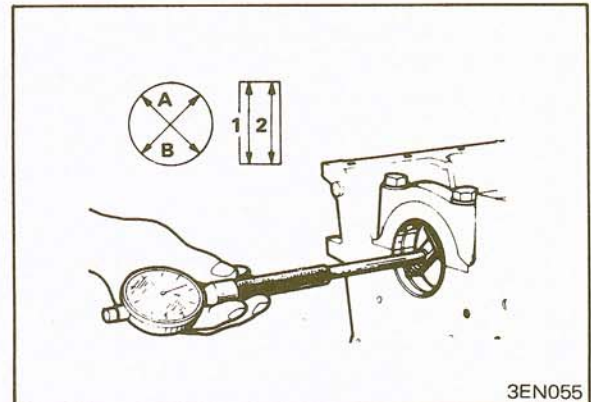
## INSPECTION

### Oil Clearance Measurement

1. After main bearing cap has been tightened to specified torque, measure inside diameter of main bearing with a cylinder gauge.

Tightening torque

Main bearing cap belt .....  
74-83 Nm (55-61 ft.lbs.)

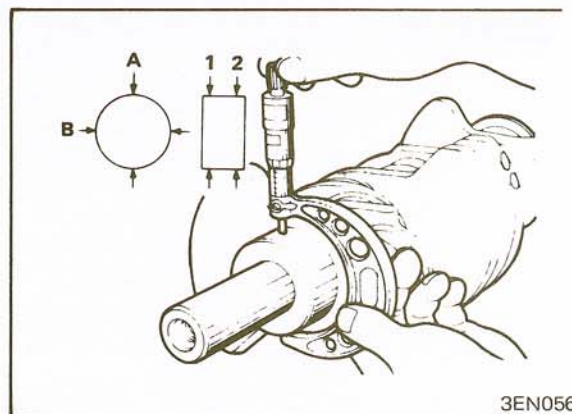


3EN055



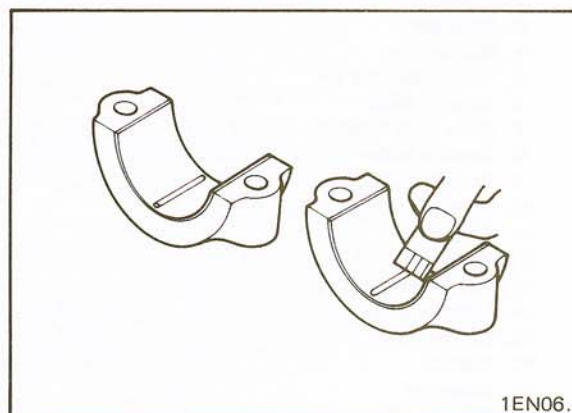


2. Measure outside diameter of crankshaft journal with a micrometer. (3EN056)
3. If oil clearance is excessive, replace main bearing.
4. Check bearing and journal for seizure or damage. If necessary, replace bearing or crankshaft or machine journal to undersize.



## Oil Clearance Measurement (Plastigage Method)

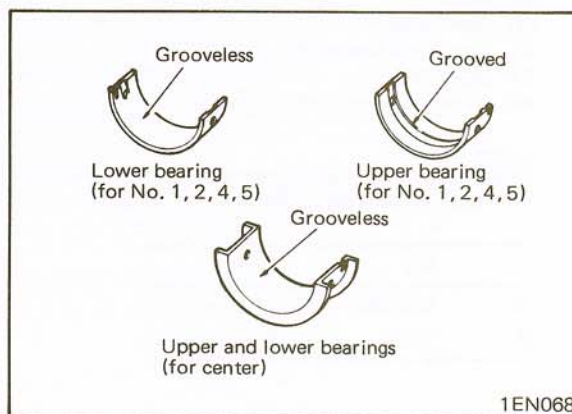
1. Remove oil and dirt from bearings and journals.
2. Cut plastigage to same length as width of bearing and install it parallel with journal, away from oil holes.
3. Install crankshaft, bearings and caps and tighten them to specified torque. During this operation, do NOT turn crankshaft.
4. Remove caps. Measure width of plastigage at the widest part with the scale printed on gauge envelope. (1EN067)



## INSTALLATION

### Main Bearing

1. Install grooved main bearing (upper bearing) on cylinder block side.
2. Install grooveless main bearing (lower bearing) on main bearing cap side.
3. Both upper and lower bearings for center (thrust bearing) are grooveless.

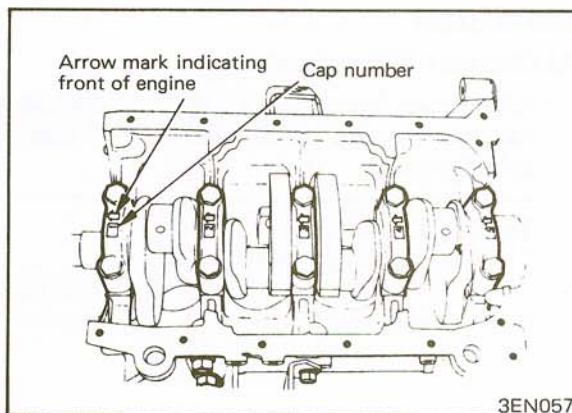


### Crankshaft

1. Install crankshaft. Apply engine oil to journals and pins.
2. Caps should be installed with arrow mark directed toward front of engine. Cap number must be correct.
3. Tighten cap bolts to specified torque in sequence of center, No. 2, No. 4, front and rear caps.

Cap bolt tightening torque .....  
74-84 Nm (55-61 ft.lbs.)

4. Cap bolts should be tightened evenly in 2 to 3 stages before they are tightened to specified torque.
5. Make certain that crankshaft turns freely and has proper end play.

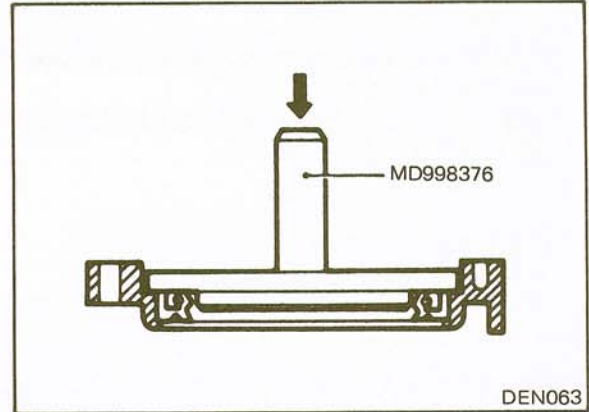




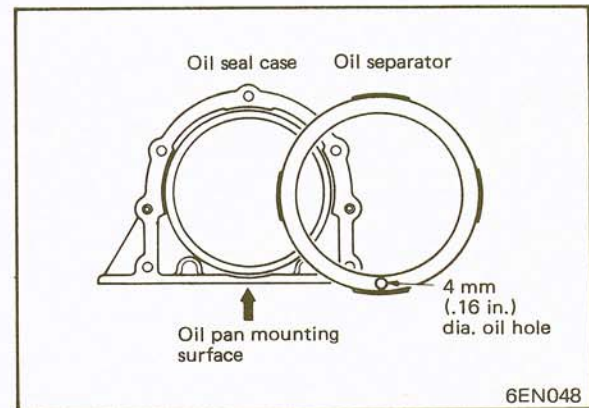


## Crankshaft Rear Oil Seal

1. Using special tool, install oil seal into oil seal case.



2. Push the oil separator into case, being sure that the 4 mm (.16 in.) diameter oil hole positioned at the bottom of the case (oil pan mounting surface side).
3. Install the oil seal case to the engine block, install 7 bolt and torque to specifications.



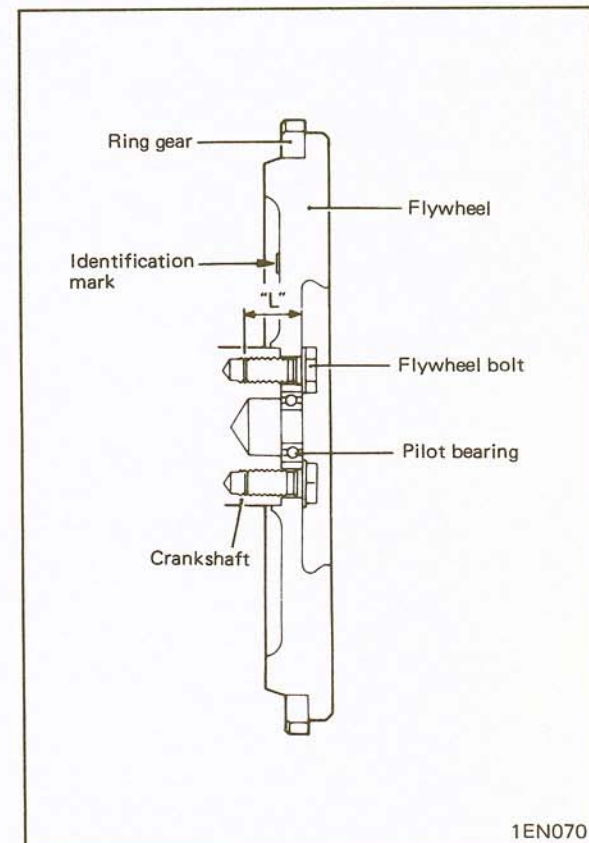
## Flywheel

1. Install flywheel and tighten bolts to specified torque. Check clutch mounting surface for runout.

Tightening torque . . . . . 128-137 Nm (94-101 ft.lbs.)

Flywheel runout . . . . . 0.1 mm (.004 in.) max.

2. To install flywheel, use 26 mm (1.024 in.) bolts with "11" marked on the heads. Do not use shorter bolts for installing drive plate.

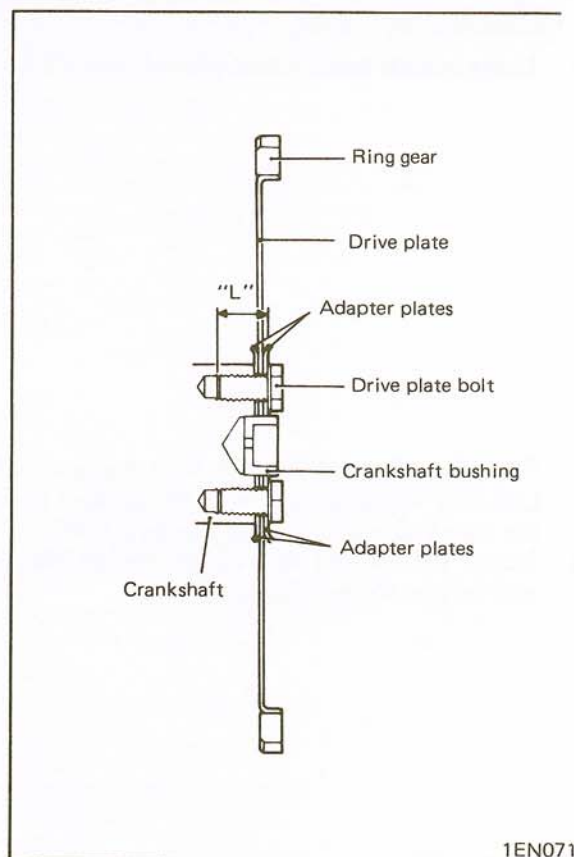






### Drive Plate

1. Install adapter plates and drive plate and tighten bolts to specified torque.
2. Use bolts 21.5 mm (.846 in.) in length ("L") to install drive plate.





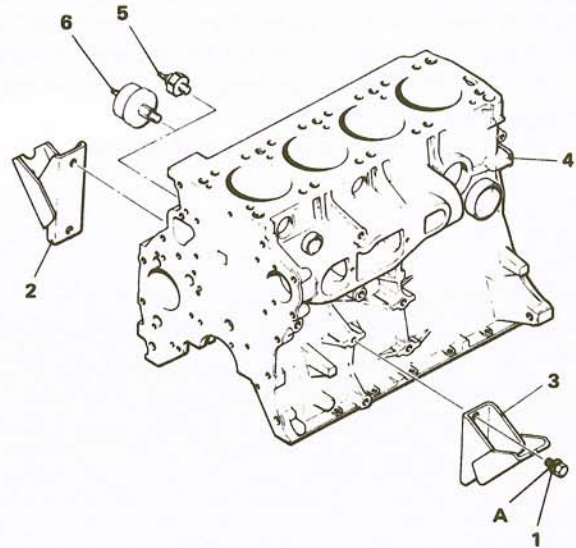


## COMPONENTS

1. Bolt (4)
2. Engine support bracket
3. Engine support bracket
4. Cylinder block
5. Oil pressure switch
6. Oil pressure gauge unit (if so equipped)

### NOTE

Numbers show order of disassembly.  
For reassembly, reverse order of disassembly.



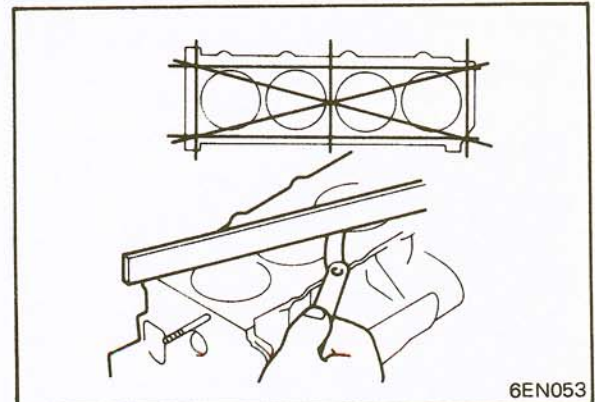
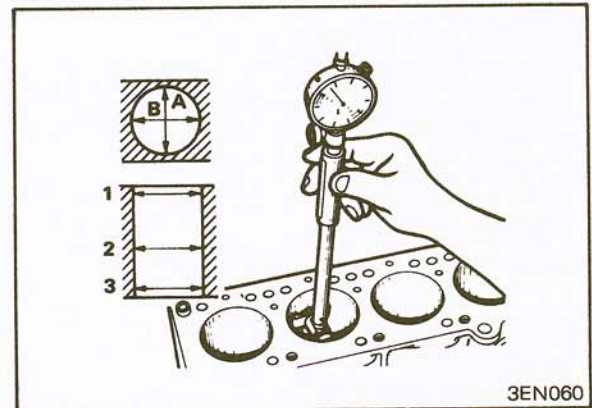
	Nm	ft.lbs.
A	40-49	29-36

5EN034

## INSPECTION

### Cylinder Block

1. Measure cylinder bore with a cylinder gauge at three levels in directions of A and B. (3EN060)  
Level 1: No. 1 piston ring position with piston at TDC  
Level 2: Center of cylinder  
Level 3: Bottom of cylinder
2. If cylinder bores show more than specified out-of-round or taper, or if cylinder walls are badly scuffed or scored, cylinder block should be rebored and honed, and new oversize piston and rings fitted.
3. Check for damage and cracks.
4. Check top surface for distortion. If excessive distortion is evident, grind to minimum limit or replace. (6EN053)

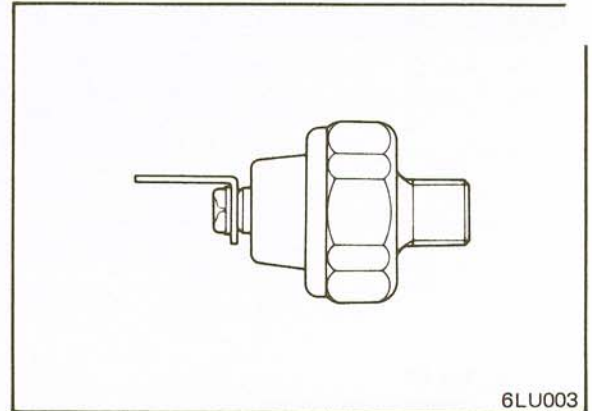






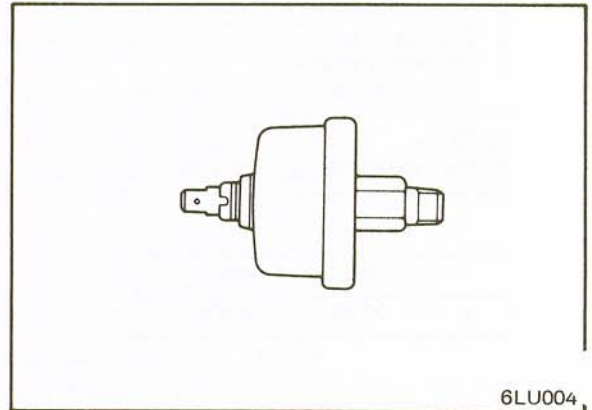
### Oil Pressure Switch

1. If "OIL PRESSURE" indicating lamp lights when ignition switch is set to "ON" and goes out when engine is started and running at idle, then everything is in order. If "OIL PRESSURE" lamp does not light when ignition switch is set to "ON", check switch, lamp and wiring.
2. If there is current flow when ignition switch is set to "ON" and if there is no current flow when engine is running at idle, switch is good.  
If switch is good, check lamp and wiring.



### Oil Pressure Gauge Unit

1. Since bimetal type has constructional characteristics which vary its resistance as it repeats ON-OFF states, it cannot be checked by measuring its resistance.
2. It can be checked by use of an AC type ammeter measuring changes in current.







## CYLINDER BORING

1. Oversize of pistons to be used should be determined on the basis of the largest cylinder bore.

### Size mark

0.25 mm (.01 in.) O.S. ....	0.25
0.50 mm (.02 in.) O.S. ....	0.50
0.75 mm (.03 in.) O.S. ....	0.75
1.00 mm (.04 in.) O.S. ....	1.00

### NOTE

Size mark is stamped on top of piston.

2. Measure outside diameter of piston to be used at position "A", in thrust direction, as shown. (6EN054)
3. Based on measured piston O.D., calculate the boring finish dimension.  
Boring finish dimension = Piston O.D. + 0.01 to 0.03 mm (.0004 to .0012 in.) (clearance between piston O.D. and cylinder) - 0.02 mm (.0008 in.) (honing margin)
4. Bore all cylinders to calculated bore finish dimension.

### Caution

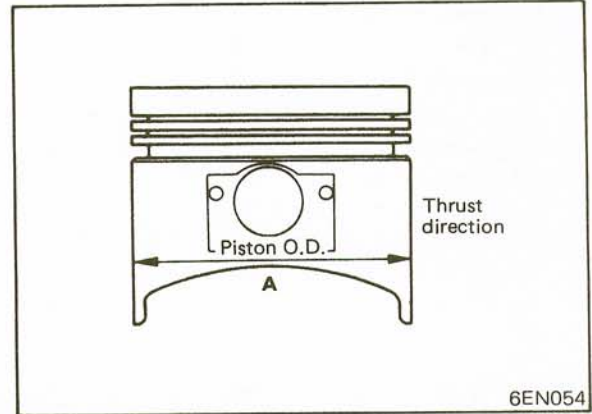
To prevent distortion that may result from temperature rise during honing, bore cylinders in the following order: No. 2, No. 4, No. 1, No. 3.

5. Hone to final finish dimension [piston O.D. + 0.01 to 0.03 mm (.0004 to .0012 in.)].
6. Check clearance between piston and cylinder.

Clearance between piston and cylinder .....	
	0.01-0.03 mm (.0004-.0012 in.)

### NOTE

When boring cylinders, finish all four cylinders to same oversize. Do not bore only one cylinder to an oversize.



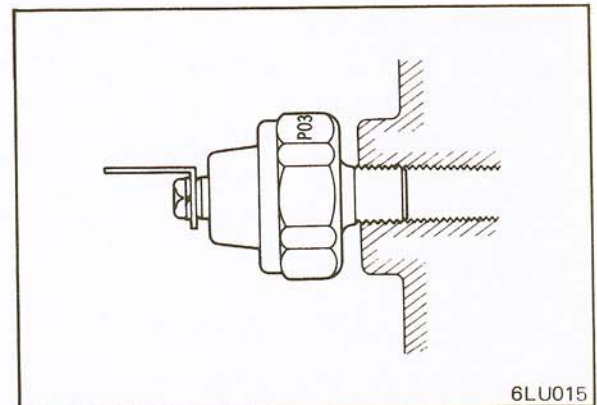
## INSTALLATION

1. Apply recommended sealant to threaded portion.

Recommended sealant .....	
	3M Liquid Gasket 8959 or equivalent

2. Using special tool (MD998054), tighten switch to specified torque.

Tightening torque	
Oil pressure gauge unit .....	
	15-21 Nm (11-15 ft.lbs.)











# EXHAUST SYSTEM

## CONTENTS

SPECIFICATIONS .....	2	TROUBLESHOOTING .....	2
GENERAL SPECIFICATIONS .....	2	COMPONENT SERVICE .....	3
TORQUE SPECIFICATIONS .....	2	EXHAUST PIPES AND MUFFLERS .....	3





## SPECIFICATIONS/ TROUBLESHOOTING

### GENERAL SPECIFICATIONS

#### Exhaust system

Muffler

Expansion resonance type

Coupling

For Federal (not available in California)

Spherical coupling

For California (can also be sold in Federal States)

Flat coupling

Suspension system

Rubber hangers and suspender

### TORQUE SPECIFICATIONS

Nm (ft.lbs.)

Front exhaust pipe to catalytic converter	15-25 (11-18)
Front exhaust pipe to main muffler assembly	20-30 (15-22)
Front exhaust pipe to suspender	8-12 (6-9)
Suspender to No. 4 crossmember	8-12 (6-9)
Main muffler assembly to hangers	5-10 (4-7)

### TROUBLESHOOTING

Symptom	Probable cause	Remedy
Exhaust gas leakage	Loose connections	Retighten
	Broken pipe or muffler	Repair or replace
Abnormal noise	Broken separator in muffler Broken hangers or suspender	Replace
	Interference of pipe or muffler with vehicle body	Correct
	Broken pipe or muffler	Repair or replace

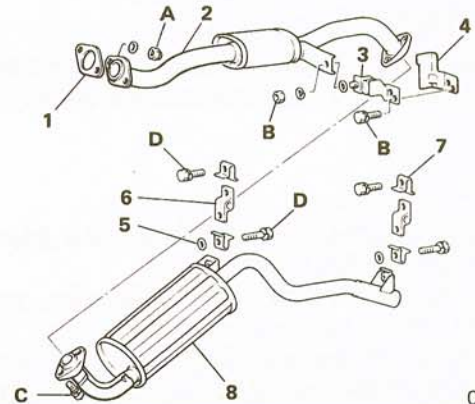




## COMPONENTS

- |                       |                 |
|-----------------------|-----------------|
| 1. Gasket             | 5. Seat         |
| 2. Front exhaust pipe | 6. Hanger       |
| 3. Suspender          | 7. Plate        |
| 4. Protector          | 8. Main muffler |

	Nm	ft.lbs.
A	15-25	11-18
B	8-12	6-9
C	20-30	15-22
D	5-10	4-7

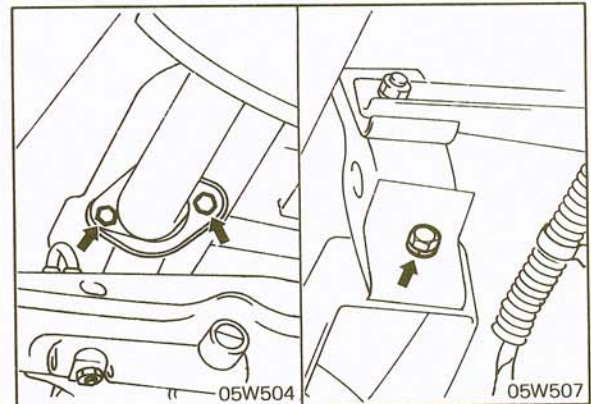


05W511

## REMOVAL

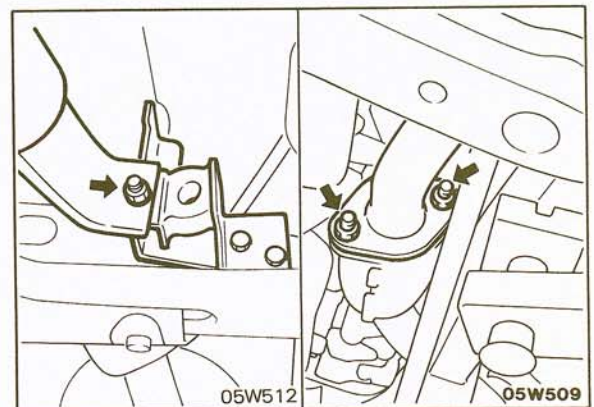
### Main Muffler

1. Disconnect the main muffler from the front exhaust pipe. (05W504)
2. Remove the hangers and take out the main muffler. (05W507)

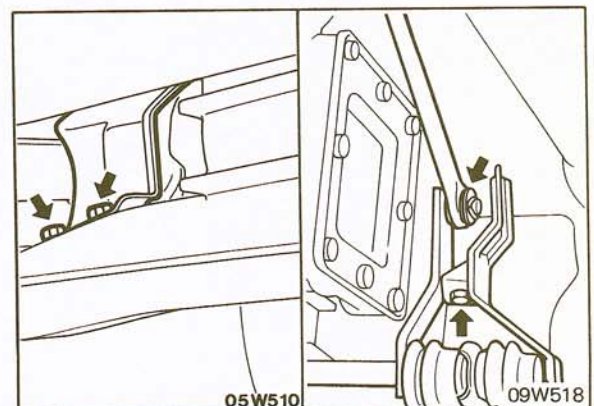


### Front Exhaust Pipe

1. Disconnect the front exhaust pipe from the main muffler.
2. Disconnect the front exhaust pipe from the suspender. (05W512)
3. Disconnect the front exhaust pipe from the catalytic converter and remove the front exhaust pipe. (05W509)



4. For vehicles with an automatic transmission, remove the No. 2 crossmember protector and the cross select shaft heat protector, disconnect the shaft control rod from the cross select shaft, and then remove the front extension pipe.







### INSPECTION

1. Check mufflers and pipes for corrosion and damage.
2. Check hangers and suspender for deterioration and cracks.

### INSTALLATION

1. Loosely install the front exhaust pipe and the main muffler, in that order.
2. Install the hangers and suspender, making sure that they are not strained or twisted.
3. Tighten the parts securely and then confirm that there is no interference with any body components.





# BODY AND FRAME ALIGNMENT

## CONTENTS

<b>SPECIFICATIONS .....</b>	<b>2</b>	<b>MEASUREMENT METHODS .....</b>	<b>2</b>
<b>GENERAL SPECIFICATIONS .....</b>	<b>2</b>	<b>MEASUREMENT POINTS .....</b>	<b>3</b>
<b>TORQUE SPECIFICATIONS .....</b>	<b>2</b>	<b>FRAME ALIGNMENT .....</b>	<b>3</b>
<b>BODY DIMENSIONS AND MEASUREMENT METHODS .....</b>	<b>2</b>		
<b>HOW BODY DIMENSIONS ARE     INDICATED .....</b>	<b>2</b>		





# SPECIFICATIONS/ BODY DIMENSIONS AND MEASUREMENT METHODS

## GENERAL SPECIFICATIONS

Frame

Type

Sectional form

Ladder type

Box type

## TORQUE SPECIFICATIONS

Nm (ft.lbs.)

Front suspension crossmember to support bracket

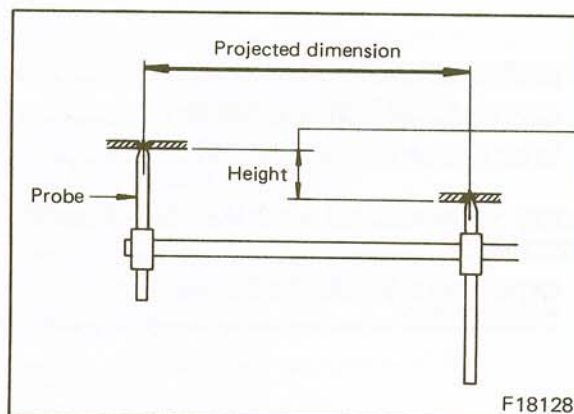
100-120 (72-87)

## BODY DIMENSIONS AND MEASUREMENT METHODS

### HOW BODY DIMENSIONS ARE INDICATED

Projected dimensions

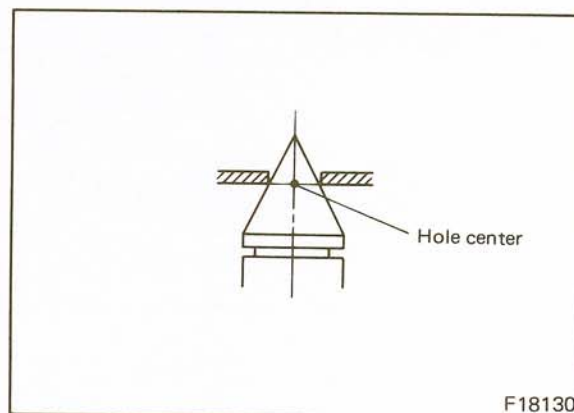
These are the dimensions measured when the measurement points are projected into a reference plane, and are the reference dimensions used for body alterations.



F18128

### MEASUREMENT METHODS (using a tracking gauge)

- How to measure projected dimensions  
If the length of the tracking gauge probes are adjustable, make the measurement by lengthening one probe by the amount equivalent to the difference in height of the two surfaces.
- If hole diameters are the same and the probes are conical, insert the probes into the holes, and then make the measurement. This method of measurement should be used if the diameters of the holes in the location to be measured are the same.
- If hole diameters are different, or if the probes are pointed, measurement from the hole centers is impossible. The circumferences must be used instead.



F18130

### How to Determine Dimensions

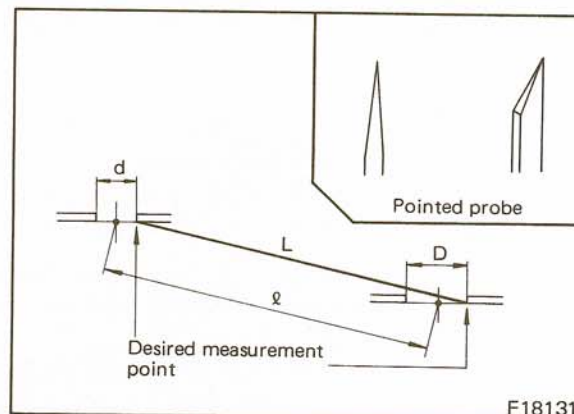
Desired dimension:  $L = \ell + \frac{D - d}{2}$

Example: mm (in.)

Reference dimension:  $\ell = 600$  (23.6)

Measurement hole diameters:  $D = 20\phi$  (.79),  
 $d = 10\phi$  (.39)

Desired dimension:  $L = 600$  (23.6) +  $\frac{20\phi - 10\phi}{2}$   
 $= 605$  (23.8)



F18131



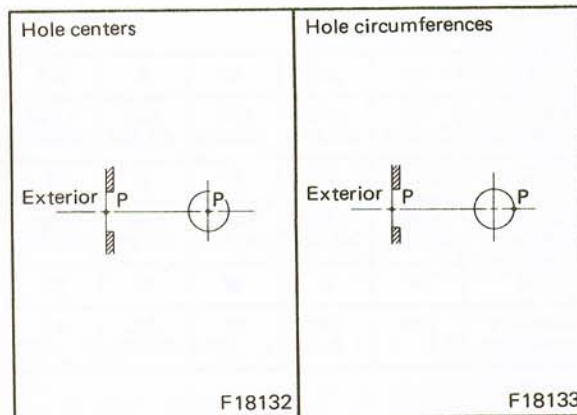
# **BODY DIMENSIONS AND MEASUREMENT METHODS/ FRAME ALIGNMENT**



## **MEASUREMENT POINTS ("P" indicates the measurement point)**

Measurement points are determined as follows:

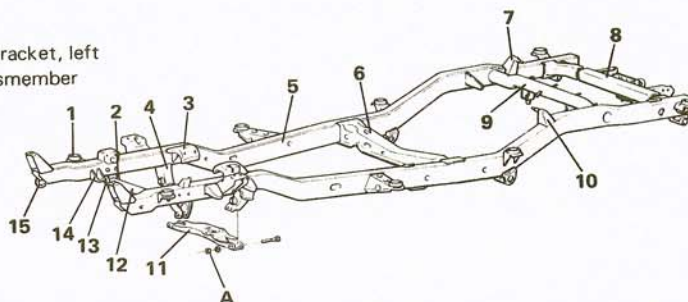
1. If the measurement is to be made from the hole centers, the point at the surface from which the measuring instrument is applied is the measurement point.
2. If the measurement is to be made from the circumferences of the holes, the point at the hole circumference of the surface from which the measuring instrument is applied is the measurement point.



## **FRAME ALIGNMENT**

### **COMPONENTS**

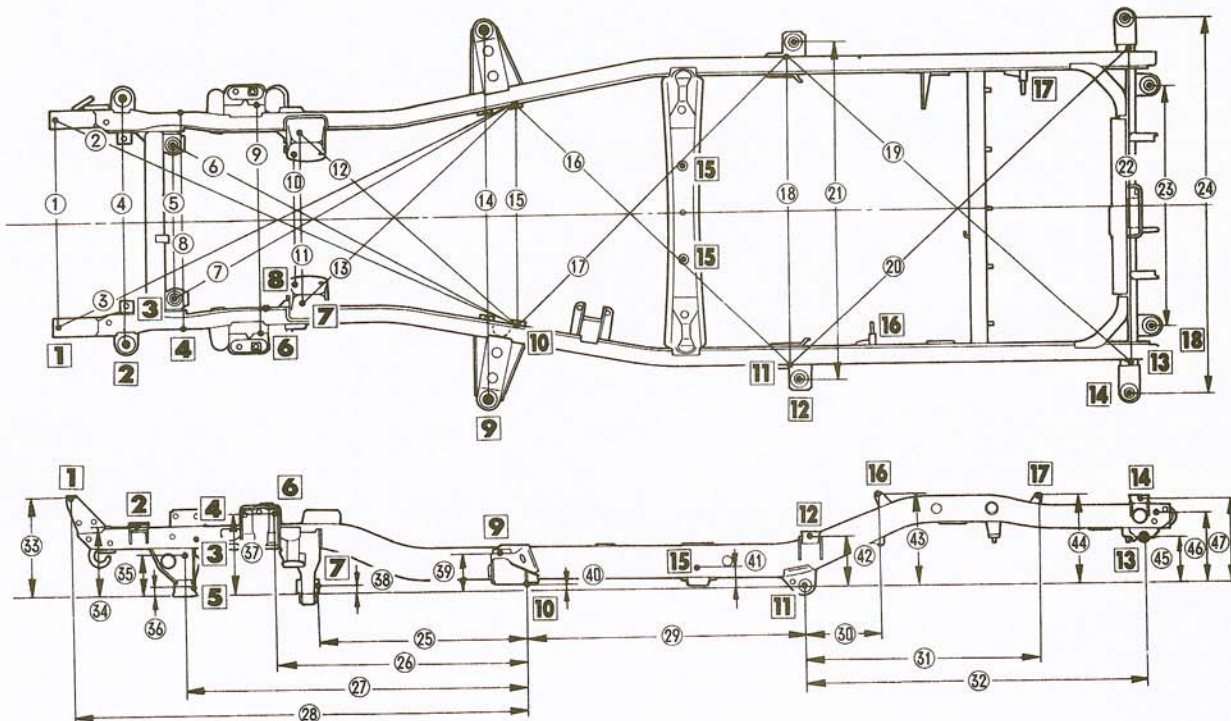
- |                                       |                                       |
|---------------------------------------|---------------------------------------|
| 1. Body mounting bracket              | 9. No. 5 crossmember                  |
| 2. Differential mounting bracket      | 10. Rear shock absorber bracket, left |
| 3. Engine mounting bracket            | 11. Front suspension crossmember      |
| 4. Support bracket                    | 12. No. 1 crossmember                 |
| 5. Side frame                         | 13. Lower arm bracket                 |
| 6. No. 4 crossmember                  | 14. Stabilizer bracket                |
| 7. Rear shock absorber bracket, right | 15. Towing hook                       |
| 8. No. 6 crossmember                  |                                       |



	Nm	ft.lbs.
A	100-120	72-87

15W519

## **Projected Dimensions**



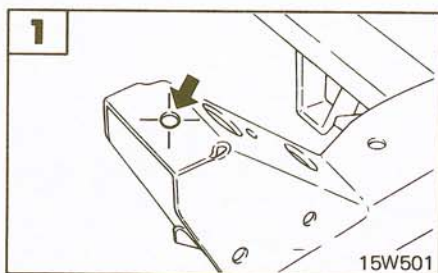
15W522



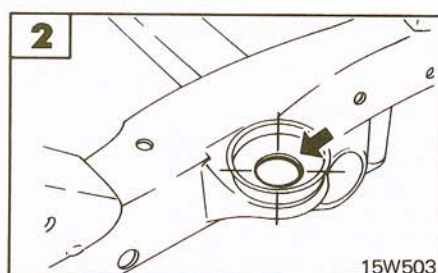


## FRAME ALIGNMENT

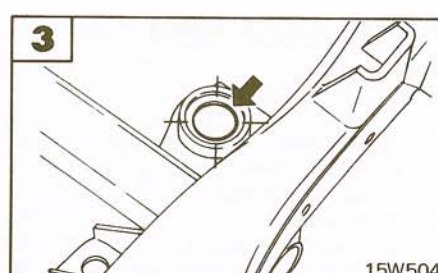
mm (in.)													
No.	①	②③	④	⑤	⑥⑦	⑧	⑨	⑩	⑪	⑫⑬	⑭	⑮	⑯⑰
Standard dimension	710 (27.95)	1,724 (67.87)	840 (33.07)	522 (20.55)	1,329 (52.32)	742 (29.21)	777 (30.59)	439 (17.28)	576 (22.68)	989 (38.94)	1,262 (49.68)	750 (29.53)	1,298 (51.10)
No.	⑱⑲	⑳	㉑	㉒	㉓	㉔	㉕	㉖	㉗	㉘	㉙	㉚	㉛
Standard dimension	1,580 (62.20)	1,150 (45.28)	1,080 (42.52)	820 (32.28)	1,280 (50.40)	734 (28.90)	880 (34.65)	1,167 (45.94)	1,562 (61.50)	923 (36.34)	250 (9.84)	795 (31.30)	1,155 (45.47)
No.	㉜	㉝	㉞	㉟	㊱	㊲	㊳	㊴	㊵	㊶	㊷	㊸	㊹
Standard dimension	233 (9.17)	138 (5.43)	21 (.83)	268 (10.55)	21 (.83)	116 (4.57)	13 (.51)	68 (2.68)	163 (6.42)	310 (12.20)	300 (11.81)	265 (10.43)	160 (6.30)



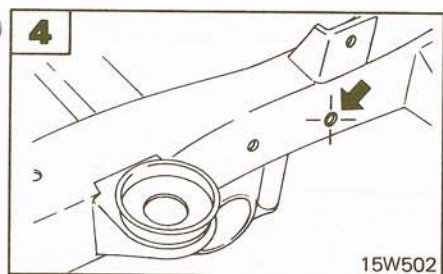
Center of front bumper mounting hole



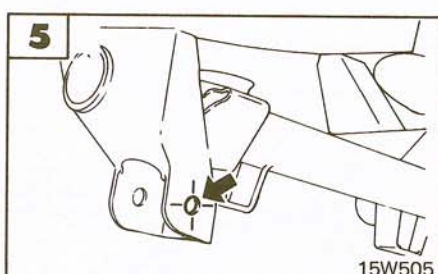
Center of body mounting hole



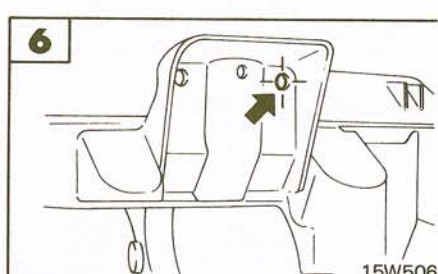
Center of differential mounting bracket hole



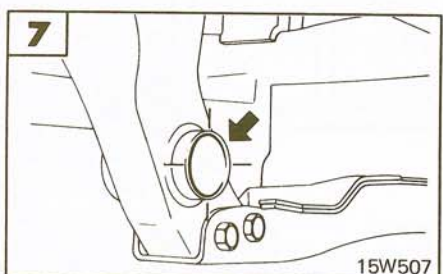
Center of steering gear box mounting hole



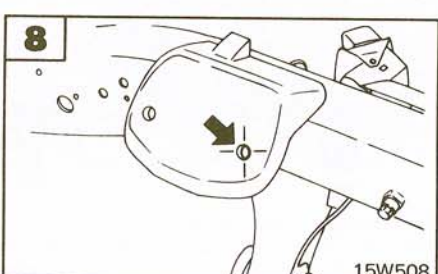
Center of lower arm (front) mounting hole



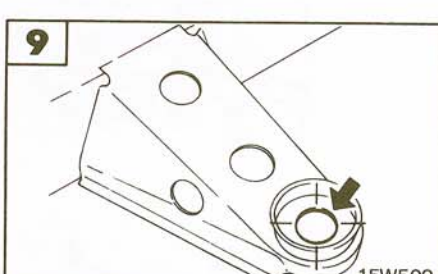
Center of upper arm mounting hole



Center of lower arm (rear) mounting hole



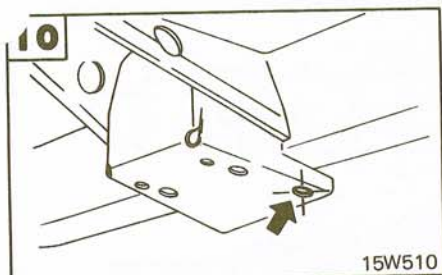
Center of engine mounting hole



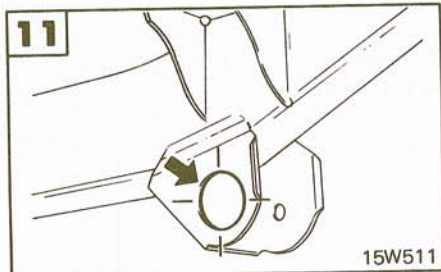
Center of body mounting hole



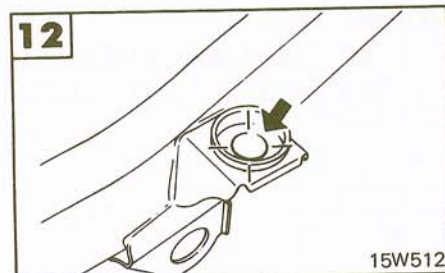
## FRAME ALIGNMENT



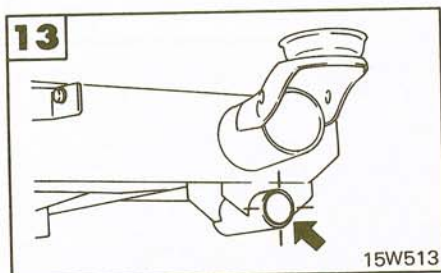
Center of No. 2 crossmember mounting hole



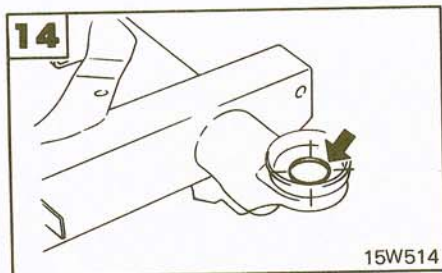
Center of rear spring (front) mounting hole



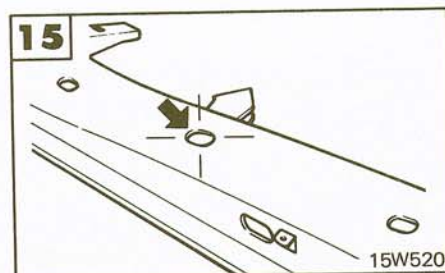
Center of body mounting hole



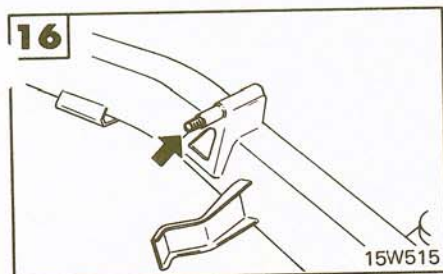
Center of rear spring shackle mounting hole



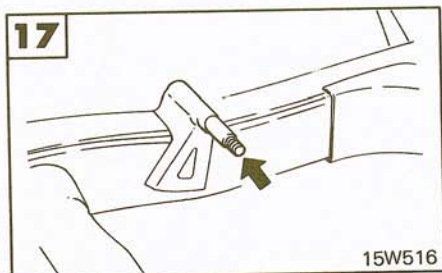
Center of body mounting hole



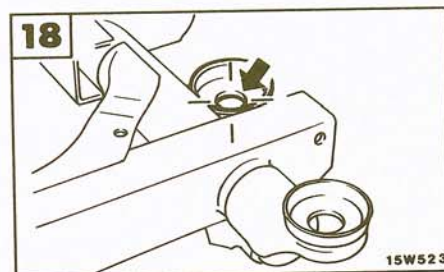
Center of torsion bar anchor arm mounting hole



Center of shock absorber mounting end (L.H.)



Center of shock absorber mounting end (R.H.)



Center of body mounting hole

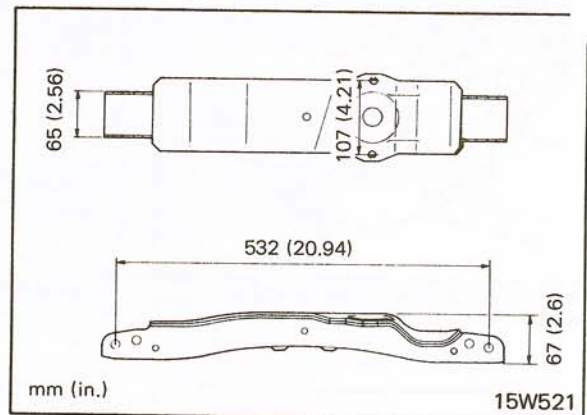




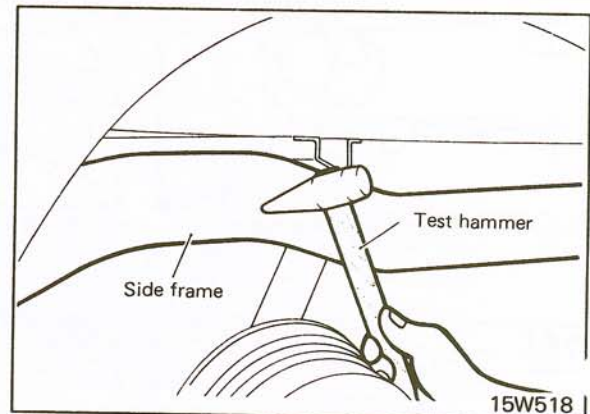
## FRAME ALIGNMENT

### INSPECTION

1. Check crossmembers for cracks or damage.
2. Check crossmember as illustrated for dimensions.  
(15W521)



3. Check the side frames, crossmembers, and brackets for cracks or separated welds, by tapping them with a test hammer. (15W518) If in doubt, polish the frame surface well and check it with a crack detecting agent (Redcheck, etc.).
4. Check the frame for bends and distortion. Correct if not within specifications.



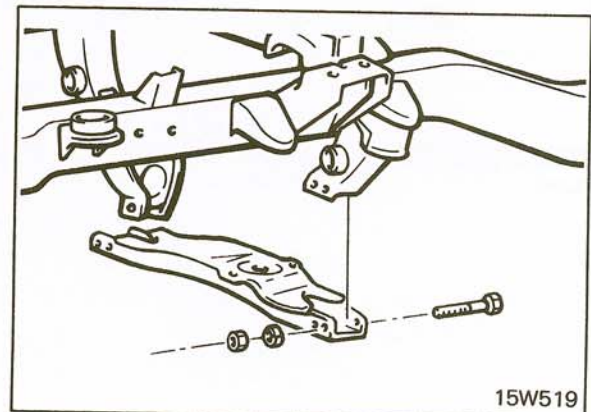
### INSTALLATION

1. Install the front suspension crossmember.

#### NOTE

It is important that the bolts be installed from the rear.  
(15W519)

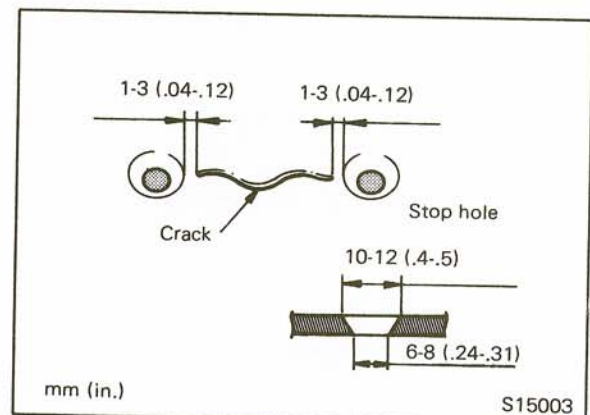
2. When replacing the floor plug, be sure to apply an appropriate amount of semi drying sealant.



### REPAIR

When a crack is found in the frame, it should be repaired as follows:

1. Using a 6-8 mm drill, drill a stop hole at a point 1-3 mm (.04-.12 in.) from each end of the crack.
2. Countersink each hole with a 10-12 mm (.4-.5 in.) drill.

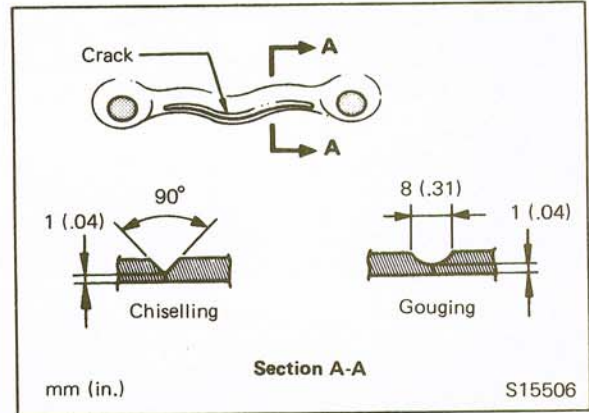






Make a groove along the crack by using a chisel or gouge.

4. Fill the groove and the stop holes completely with 2-3 layers of electric-arc welding.

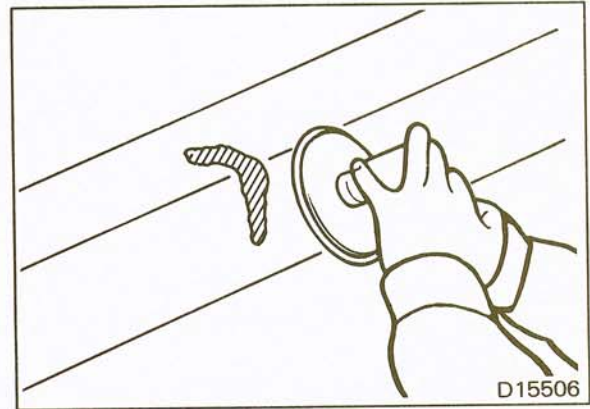


5. Finish the welded area with a grinder.

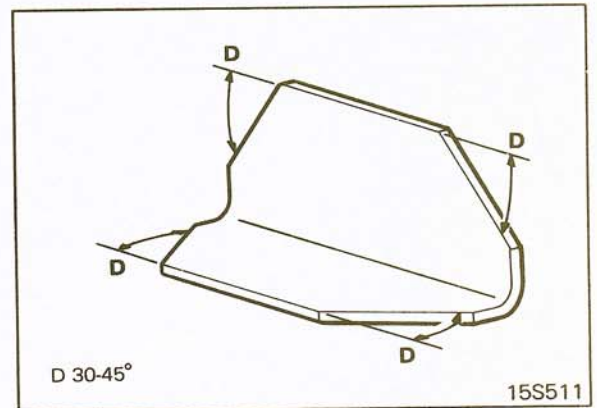
## Caution

Do not use gas welding; doing so could cause distortion.

Use care to prevent thinning the frame itself by excessive grinding.

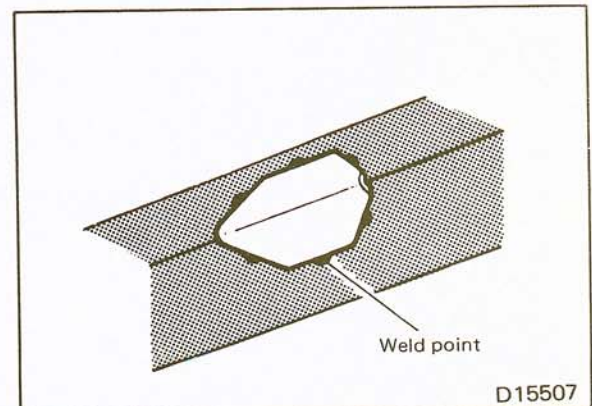


6. Make a patch of an angle steel stock as illustrated. (15S511)
7. Use an angle steel stock of the same material and thickness as frame.
8. To prevent stress concentration on the patch, make sure that its corners are cut away obliquely.
9. The patch should be long enough so that the ends properly extend beyond the crack.
10. Make sure that edges of the patch are not positioned near spring hangers, crossmember ends or other points subject to concentrated loads.



11. Arc weld the patch at points about 10 mm (.4 in.) from the crest of the patch to avoid stress concentration. (D15507)

12. Clean the welded area and apply chassis black.











# FUEL SYSTEM

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## SPECIFICATIONS

### GENERAL SPECIFICATIONS

	For Federal (not available in California)	For California (can also be sold in Federal States)
Fuel tank and filter		
Fuel tank capacity	60 lit. (15.9 U.S.gal., 13.2 Imp.gal.)	60 lit. (15.9 U.S.gal., 13.2 Imp.gal.)
Fuel return system	Provided	Provided
Fuel filter	Cartridge type	Cartridge type
Fuel pump		
Type	Mechanical diaphragm	Mechanical diaphragm
Driven by	Camshaft	Camshaft
Carburetor		
Type	Down-draft, 2 barrel, automatic choke	Down-draft, 2 barrel, Feed back type
Model No.	32-35DIDTA-170 ... M/T (High Altitude) 32-35DIDTA-171 ... A/T (High Altitude) 32-35DIDTA-186 ... M/T 32-35DIDTA-187 ... A/T	32-35DIDTA-184 ... M/T 32-35DIDTA-185 ... A/T
Throttle bore		
Primary	32 mm (1.260 in.)	32 mm (1.260 in.)
Secondary	35 mm (1.378 in.)	35 mm (1.378 in.)
Main jet		
Primary	#113.8 ... M/T #115 ... A/T	#110
Secondary	#195	#185
Pilot jet		
Primary	#65	#47.5
Secondary	#65	#65
Enrichment jet	#45	#100
Fast idle opening degree at 23°C (73°F)	13.5° ± 0.5° ... M/T 14.5° ± 0.5° ... A/T	13.5° ± 0.5° ... M/T 14.5° ± 0.5° ... A/T
Additional mechanisms	Dashpot Air switching valve (ASV) Coasting air valve (CAV) Jet air control valve (JACV) Sub-EGR valve Fuel cut-off solenoid	Dashpot Duty control solenoid valve Sub-EGR valve Throttle position sensor
Accelerator control method	Cable type	Cable type
Choke control method	Automatic choke	Automatic choke

M/T ... Manual transmission, A/T ... Automatic transmission



## SPECIFICATIONS/ SPECIAL TOOL



### SERVICE SPECIFICATIONS

#### Standard values

Accelerator cable free play	0-1 mm (0-.04 in.)
Length of vinyl tube protruding from connecting hose	Approx. 5 mm (.20 in.)
Ignition timing	7° BTDC ± 2° at curb idle speed
Idle speed	675 $\pm 150$ rpm [first 500 km (300 miles)]
	750 ± 100 rpm [after 500 km (300 miles)]

### TORQUE SPECIFICATIONS


Nm (ft.lbs.)

Drain plug	15-25 (11-18)
Fuel tank to body	25-30 (18-22)
Fuel gauge unit	1 (0.7)

### LUBRICANTS

	Specified lubricant	Quantity
Accelerator arm pin and return spring	Multipurpose grease, SAE J310a, NLGI grade #3 or equivalent	As required
Sliding surfaces of accelerator pedal	Multipurpose grease, SAE J310a, NLGI grade #3 or equivalent	As required
Sliding surfaces of accelerator arm	Multipurpose grease, SAE J310a, NLGI grade #3 or equivalent	As required

### SPECIAL TOOL

Tool (Number and name)	Use
MD998406 ECI checker 	Diagnosis for FBC system





## TROUBLESHOOTING

Symptom	Probable cause	Remedy
Poor driveability	Improper fuel mixture (Too rich or lean)	Overhaul carburetor or replace as required
	Abnormal air flow from jet air mixture	Repair jet valve, and replace as required
	Fuel leakage from deceleration device	Replace as required
	Loose vacuum hose in heated inlet air system	Repair or replace as required.
	Broken air-control valve of heated air inlet system	Repair or replace as required
	Disconnected air cleaner snorkel	Repair or replace as required
Rough idle	Improper idle adjustment	Readjust ignition timing and idle speed
	Choke valve not opening	Repair or replace as required
	Over-flooded carburetor	Repair or replace as required
	Fuel level improperly (Too high or low)	Repair or replace as required
	Leaned inlet air	Clean up or replace as required
	Restricted exhaust system	Replace
	EGR (Exhaust Gas Recirculation) valve does not close	Repair or replace as required
	Jet air control valve does not close (Except Feed back carburetor)	Repair or replace as required
	Deceleration device does not shut off (Except Feed back carburetor)	Repair or replace as required
	Clogged nipple of EGR valve	Clean up
	Clogged passage in EGR valve	Clean up
Engine will not keep running	Carburetor icing Loose vacuum hose in heated inlet air system Loose connecting rod between diaphragm and high altitude compensator	Repair and replace as required
	Clogged fuel pipe due to foreign material	Clean or replace as required
	Clogged fuel hose	Clean or replace as required
	Clogged fuel filter Water in fuel tank Deposit due to improper fuel type	Clean up filter Clean filter and pipe, and install clean fuel



## TROUBLESHOOTING



Symptom	Probable cause	Remedy
Low engine power	Broken or burned out catalyst	Replace as assembly
	Inadequate sealing of gasket in air cleaner case	Repair
	Inadequate sealing between air cleaner and carburetor body	Reposition and replace as required
	Broken air intake manifold gasket	Repair or replace as required
Noise	Loose wing nut in air cleaner case	Retighten
	Broken air cleaner snorkel	Repair or replace as required
	Worn bearing or shaft of heated air inlet system	Repair or replace as required
	Exhaust gas leakage from EGR valve	Replace as assembly
	Broken bracket of air pipe	Repair or replace as required
	Broken exhaust pipe	Repair or replace as required
Increased clattering noise	Inadequate sealing of secondary-air system	Repair or replace as required
Exhaust gas odor	Broken exhaust manifold case	Replace
	Exhaust gas leakage due to loose connections	Retighten
	Air pipe nut loose	Retighten
	Deceleration device inoperative	Repair or replace as required
	Purge control device inoperative	Replace or replace as required
Poor exhaust gas	Pressure leakage from purge air solenoid valve	Replace as assembly
	Seized plunger seat in purge air solenoid valve	Clean up
	Broken or burned out catalyst	Replace as assembly
	Abnormal reaction of catalyst	Replace as assembly
Engine overspeed when throttle is released	Seized plunger seat in purge air solenoid valve	Clean up
	Inadequate idle speed	Reset idle speed
	Air/Fuel mixture will enter vacuum switch	Replace as assembly
Deteriorating exhaust emission during accel. or decel.	Broken exhaust manifold case or burned out catalyst	Replace as assembly
	Catalytic converter deteriorated by too high temperature	Replace as assembly
	Clogged catalytic converter	Replace as assembly





## TROUBLESHOOTING

Symptom	Probable cause	Remedy
Fuel leakage	Inoperative check valve (Two-way valve)	Replace as assembly
	Broken fuel hose or pipe	Replace
	Wrong position of two-way valve	Reposition the valve
	Clogged or kinked vapor hose	Clean/reposition the hose
	Loose fuel hose nipple	Retighten or replace as required
Fuel leakage from fuel tank	Deposit due to improper fuel type	Clean or replace as required
Back fuel from filler	Misaligned filler hose	Reposition the hose



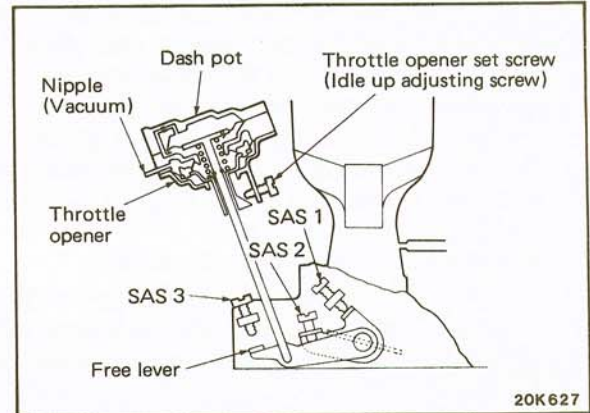


## ENGINE IDLE SPEED ADJUSTMENT (Unscheduled maintenance only)

### Adjustment condition:

Lights and all accessories off, transmission in neutral and parking brake pulled.

1. Run the cold engine at fast idle until the coolant temperature is 85 to 95°C (185 to 205°F).
2. Run the engine for more than 5 seconds at an engine speed of 2,000 to 3,000 rpm.
3. Run the engine at idle for 2 minutes.
4. Using a tachometer, check the idling speed. If it does not meet specifications, readjust the speed to the nominal specification using the idle speed adjusting screw No.1 (SAS). (20K627)



## FAST IDLE ADJUSTMENT FOR VEHICLES EQUIPPED WITH AIR CONDITIONING

### Adjustment condition:

Coolant temp.: 85 to 95°C (185 to 205°F)

All lights and accessories: Off

Transmission: Neutral

Parking Brake: Pulled

1. Make sure curb idle speed is within the specified speed. Reset it by readjusting the idle speed adjusting screw No.1 (SAS) as necessary.
2. Switch the air conditioning system on.
3. Adjust the engine speed to the specified speed with the throttle opener setting screw (idle-up adjusting screw). (20K627)

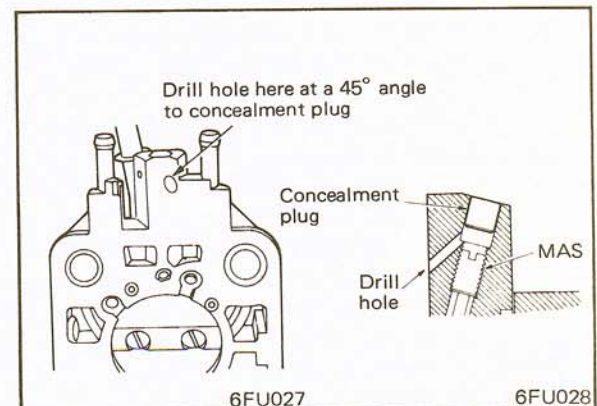
### A/C on idle rpm

Specified speed . . . . . 900 to 950 rpm

4. Reconnect cooling fan connector.
5. Turn ON/OFF air conditioner switch several times to check the throttle opener for operation (lever up/down).

## IDLE SPEED AND MIXTURE ADJUSTMENT-except FEEDBACK CARBURETOR VEHICLES (Unscheduled maintenance only)

1. Remove carburetor from engine.
2. Clamp carburetor in a vise with idle mixture adjusting screw (MAS) facing up (protect gasket surface from vise jaws).
3. Drill a 2.0 mm (5/64 in.) pilot hole in the casting surrounding the idle mixture adjusting screw (MAS) and then redrill the hole to 3.0 mm (1/8 in.). (6FU027, 6FU028)
4. Insert a blunt punch into the hole and remove the plug.
5. Reinstall carburetor on engine.
6. Lights and all accessories off, and transmission in neutral.
7. Run the cold engine at fast idle until the coolant temperature is 85 to 95°C (185 to 205°F).

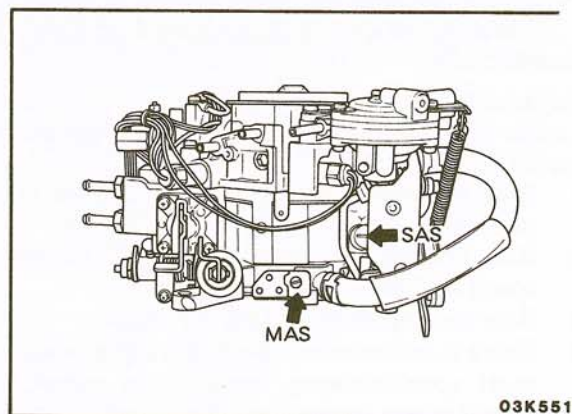






## SERVICE ADJUSTMENT PROCEDURES

8. Disconnect the secondary air hose running between the reed valve and the air cleaner, and plug the air hose to stop any secondary air flow into the reed valve.  
Or, clamp the air hose running between the pulse air feeder and the air cleaner, with a special hose clamp, to stop any secondary air flow into the reed valve.
9. Run the engine for more than 5 seconds at 2,000 to 3,000 rpm.
10. Run the engine at idle for 2 minutes.
11. Set the idle CO and the engine speed to the specified values by adjusting the idle mixture adjusting screw (MAS) and the idle speed adjusting screw (SAS). (Y03645)



Idle CO at nominal curb idle speed:  $0.5 \pm 0\%$

12. Unplug the secondary air hose and reconnect it to the air cleaner. Or, take off the special hose clamp from the air hose.
13. Reset the engine speed to the nominal idle speed by adjusting the idle speed adjusting screw, if the engine speed is out of the specified speed range.
14. Install the concealment plug into the hole to seal the idle mixture adjusting screw (MAS).

### **IDLE SPEED AND MIXTURE ADJUSTMENT-for FEED-BACK CARBURETOR VEHICLES (Unscheduled Maintenance only)**

1. Remove carburetor from engine. Carburetor is to be transferred to a bench and held in a suitable fixture for removing the concealment plug.
2. Reinstall carburetor on engine without concealment plug.
3. Set condition: Light, electric cooling fan (if applicable) and all accessories are off, and transmission in neutral.
4. Run the cold engine at fast idle until the cooling water temperature is raised to  $85-95^{\circ}\text{C}$  ( $185-205^{\circ}\text{F}$ ).
5. Turn off the ignition key.
6. Disconnect the cable from the negative terminal of the battery for about 3 seconds. And then reconnect the cable to the original terminal.
7. Disconnect the connector of the exhaust oxygen sensor.
8. Run the vehicle for 5 minutes at the vehicle speed of 30 mile/hour, or run the engine for more than 5 seconds at the engine speed of 2,000 to 3,000 rpm.
9. Run the engine at idle for 2 minutes.
10. Set the idle CO and the engine speed to the specified value by adjusting the speed adjusting screw and the mixture adjusting screw.

Idle CO: 0.1-0.3 % at nominal curb idle speed

11. Reconnect the connector of the exhaust oxygen sensor.
12. Reset the engine speed to the nominal idle speed by adjusting the speed adjusting screw, if the engine speed is out of the specified speed range.
13. Install the concealment plug into the hole to seal the idle mixture adjusting screw.

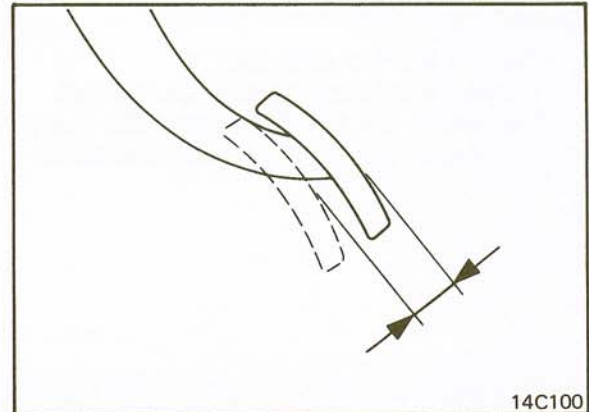




## ADJUSTMENT OF ACCELERATOR CABLE

Run the engine until it reaches the specified idle speed.  
Measure the free play of the accelerator pedal. (14C100)

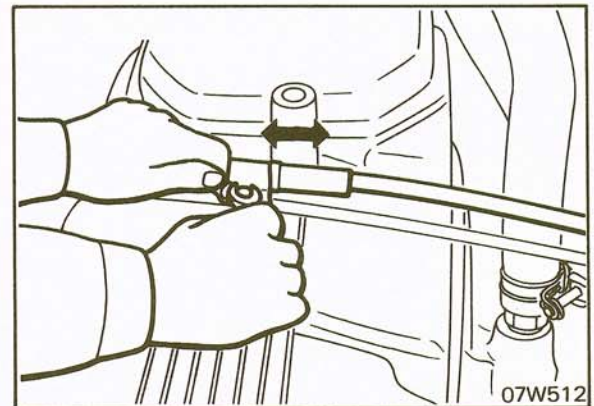
Accelerator cable free play . . . . . 0-1 mm (0-.04 in.)



14C100

If the measured free play is not within the standard value, adjust it as follows.

1. Loosen the tightening bolt so that the throttle lever is free.
2. Use the tightening bolt to make the adjustment of the accelerator cable free play so that it is within the standard value. (07W512)

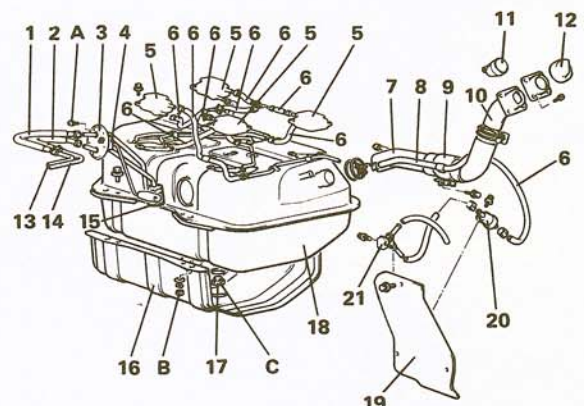


07W512

## FUEL TANK

### COMPONENTS

1. Return hose
2. Main hose
3. Pipe assembly
4. Fuel gauge unit
5. Separator tank
6. Vapor hose
7. Connecting hose
8. Breather hose
9. Clamp assembly
10. Fuel filler neck
11. Shutter assembly
12. Fuel tank cap
13. Fuel return pipe
14. Fuel main pipe
15. In-tank fuel filter
16. Tank protector
17. Drain plug
18. Fuel tank
19. Filler hose protector
20. 2-way valve
21. Check valve



	Nm	ft.lbs.
A	1	0.7
B	25-30	18-22
C	15-25	11-18

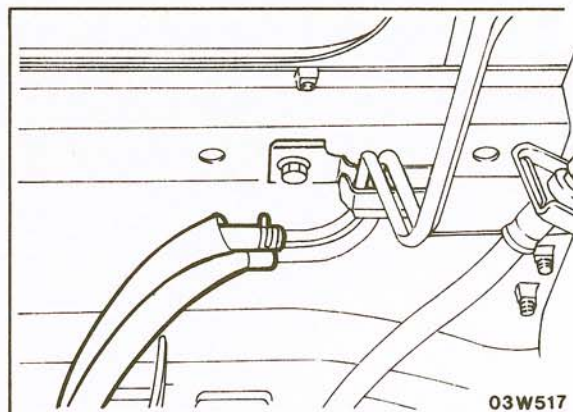
03W522



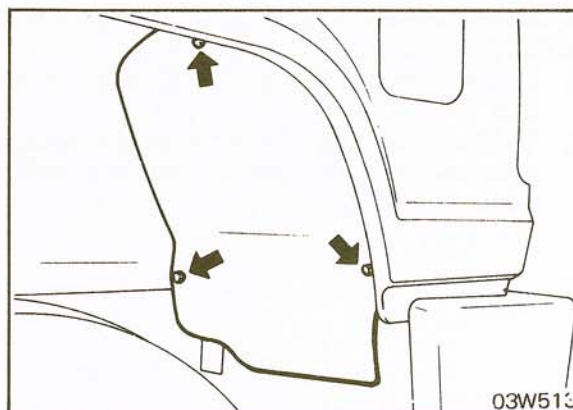


### REMOVAL

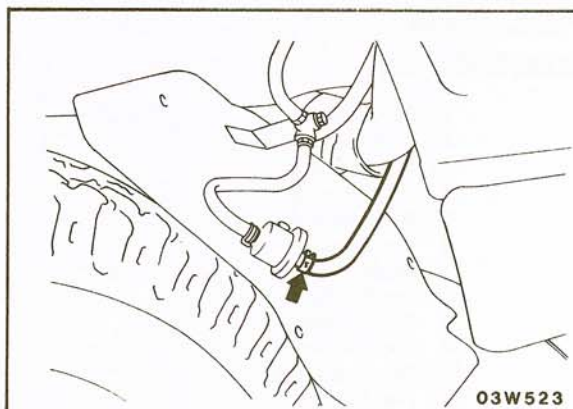
1. Remove the fuel tank cap.
2. Remove the drain plug to drain the fuel.
3. Disconnect the fuel hoses from the fuel pipes. (03W517)
4. Disconnect the fuel gauge unit connector.



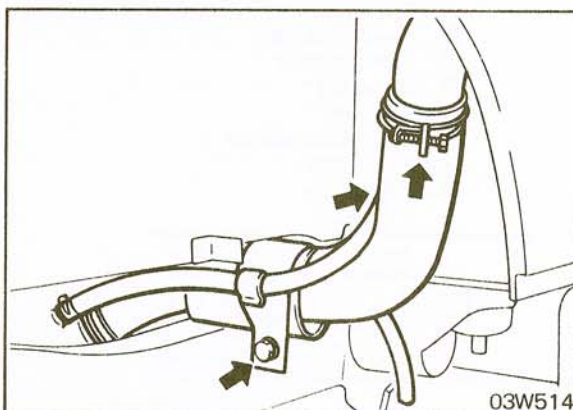
5. Remove the filler hose protector mounting bolts from the left rear wheelhouse.



6. Remove the filler hose protector and disconnect the 2-way valve and vapor hose from behind the protector.



7. Disconnect the fuel filler neck connecting hose and breather hose. (03W514)
8. Remove the clamp assembly.





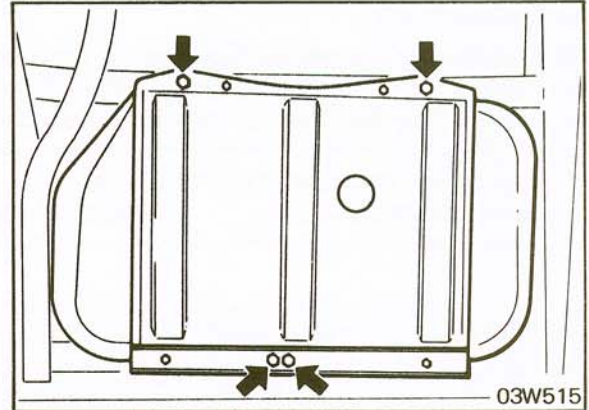


Remove the fuel tank.

## NOTE

If the inside of the fuel tank is to be cleaned, use any one of the following:

- (1) Kerosene
- (2) Trichloroethylene
- (3) Neutral emulsion detergent



## INSPECTION

1. Check the fuel tank cap for malfunctions.
2. Check the fuel tank for cracks, corrosion or deformation.
3. Check the fuel tank for foreign material.
4. Check the in-tank fuel filter for clogging.
5. Check the fuel tank protector for cracks or deformation.

## FUEL GAUGE UNIT AND IN-TANK FUEL FILTER REPLACEMENT

1. Disconnect the fuel hoses and fuel gauge unit connector from the pipe assembly. (03W505)

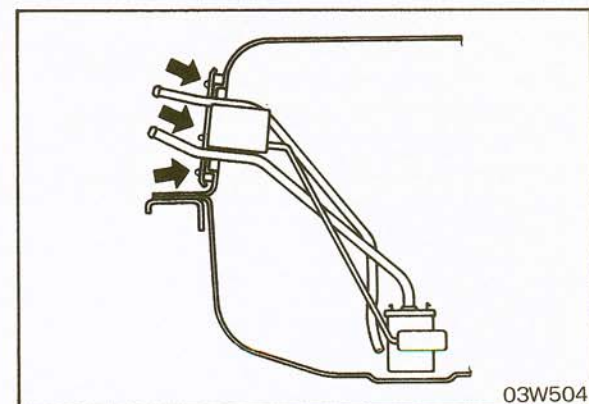
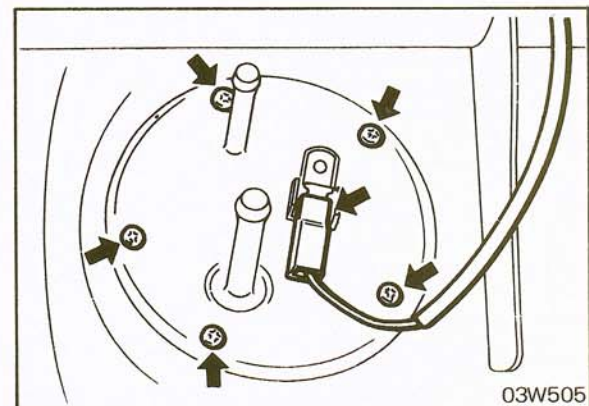
## NOTE

The pipe assembly is mounted to the side of the fuel tank; when the fuel hose and the pipe assembly are to be disconnected, remove fuel as necessary so as not to spill the fuel.

2. Remove the pipe assembly from the tank.
3. Remove the in-tank fuel filter by pressing the tabs.
4. After installation, check for fuel leaks from the connection between the tank and the pipe assembly. (03W504)

## NOTE

When the pipe assembly is installed, make sure that it is evenly tightened to prevent changing the set position of the float, because the pipe assembly and fuel gauge unit are one assembly.





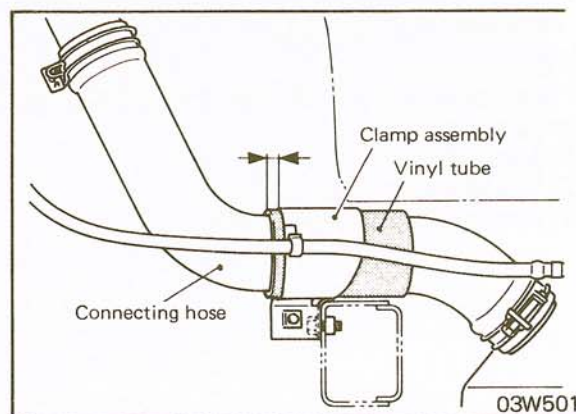


## COMPONENT SERVICE-FUEL TANK/FUEL LINE

### INSTALLATION

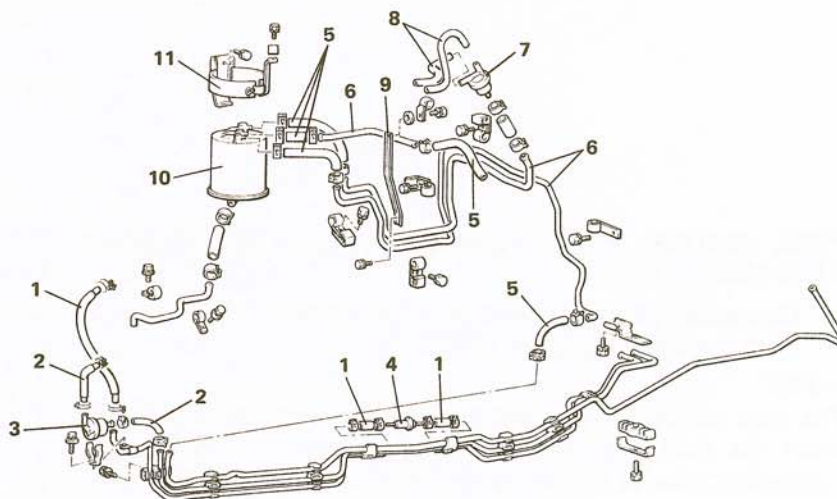
When clamping the connecting hose to the frame, make sure that the vinyl tube protrudes as specified from the clamp toward the fuel filler neck to prevent damage to the hose.

Length of vinyl tube protruding from  
clamp assembly . . . . . Approx. 5 mm (.20 in.)



### FUEL LINE COMPONENTS

1. Fuel return hose
2. Fuel main hose
3. Fuel filter
4. Fuel return valve
5. Vapor hose
6. Vapor pipe
7. Purge control valve
8. Purge hose
9. Stay
10. Canister
11. Canister holder



03W525

### INSPECTION

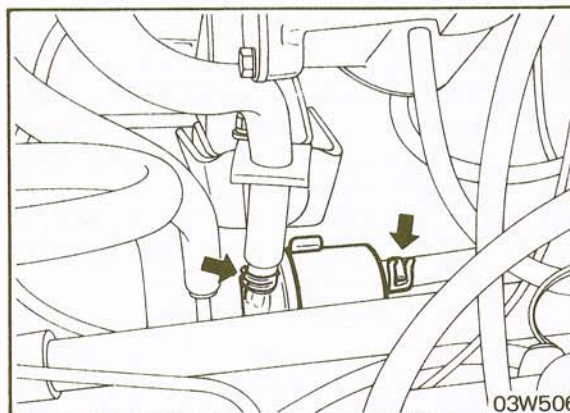
1. Check fuel hoses and pipes for cracks, bends, deformation, deterioration or clogging.
2. Check fuel filter for clogging or damage.
3. Check 2-way valve for malfunction.
4. Check separator tank for cracks or deformation.





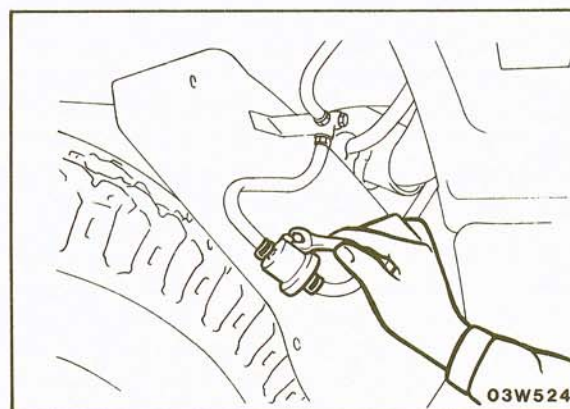
## FUEL FILTER REPLACEMENT

1. Remove the fuel tank cap to decrease the pressure in the fuel tank.
2. Remove the fuel filter after removing the clip and clamp. (03W506)



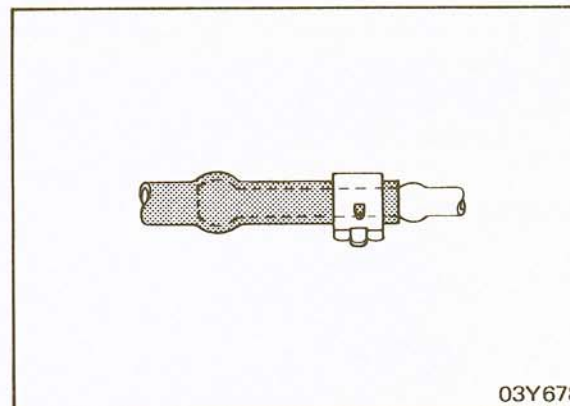
## 2-WAY VALVE REPLACEMENT

1. Remove the filler hose protector from the left rear wheelhouse.
2. Remove the 2-way valve from the back side of the filler hose protector. (03W524)



## INSTALLATION

1. When attaching the fuel hose to the pipe, be sure that the hose is attached as shown in the illustration. (03Y678)
2. After all of the fuel pipes and hoses have been connected, start the engine, and confirm that there is no fuel leakage from any of the connections.



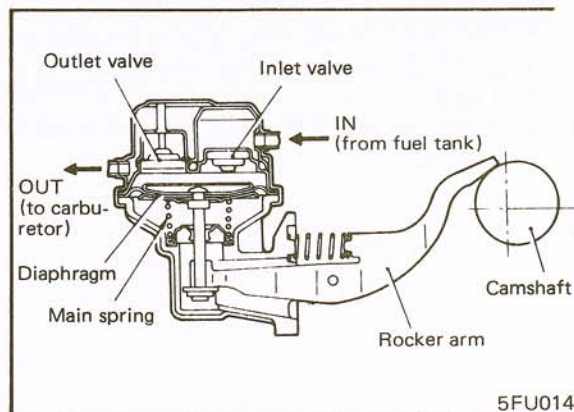




## COMPONENT SERVICE-FUEL PUMP

### REMOVAL

1. Position the piston of the No. 1 cylinder at top dead center of the compression stroke. When the piston is in this position, the lift of the fuel pump drive eccentric cam will be reduced to a minimum and the fuel pump will be easier to remove.
2. Disconnect the fuel hoses from the fuel pump.
3. Remove the fuel pump mounting nuts and then remove the fuel pump assembly.
4. Remove the insulator and gaskets.



### INSPECTION

1. Check the arm where it contacts the camshaft eccentric cam for wear on the end rocker.
2. Move the rocker arm to check for spring weakening.
3. Check the pump body and the cover for cracks or damage.

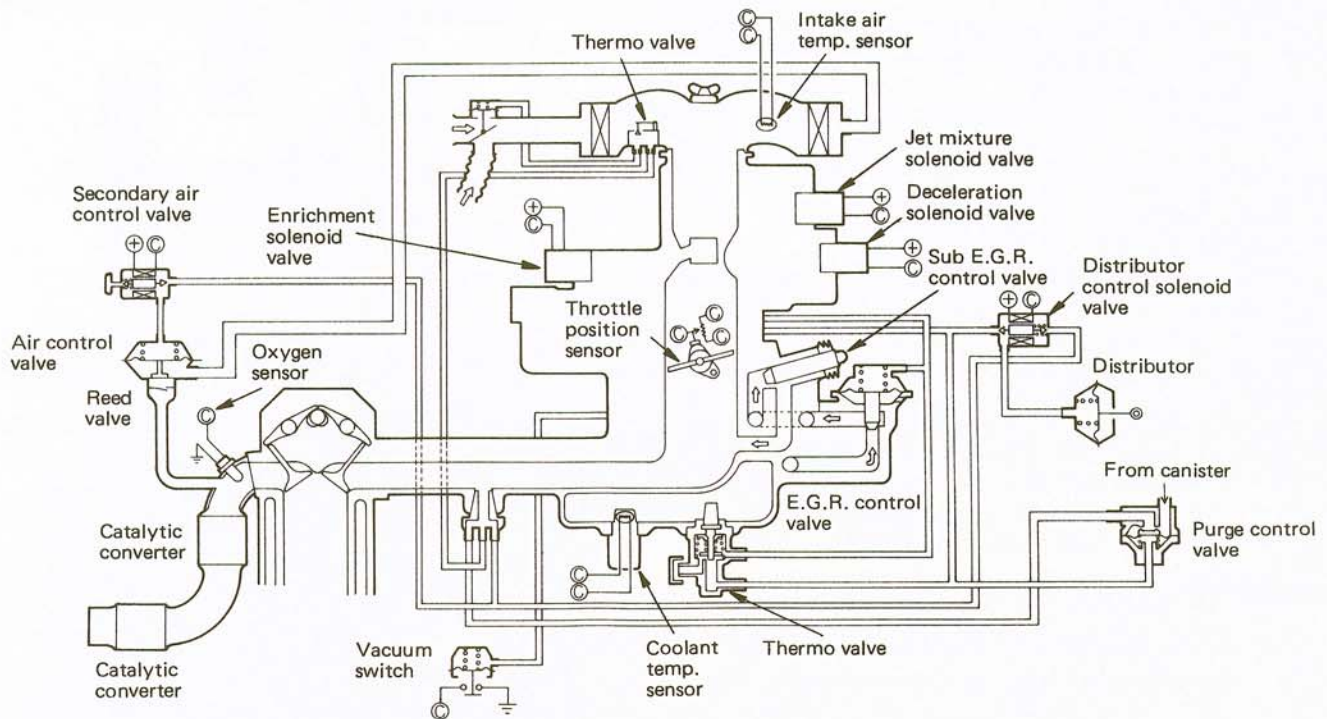
### INSTALLATION

1. Position the piston of No. 1 cylinder at top dead center of the compression stroke.
2. Install new gaskets and insulator.
3. Install the fuel pump assembly and tighten the nuts.
4. Connect the fuel hoses to the fuel pump. Secure the hoses with hose clamps. Make certain that the fuel hoses are not broken or cracked.
5. Start the engine and check for fuel leaks or oil leaks.





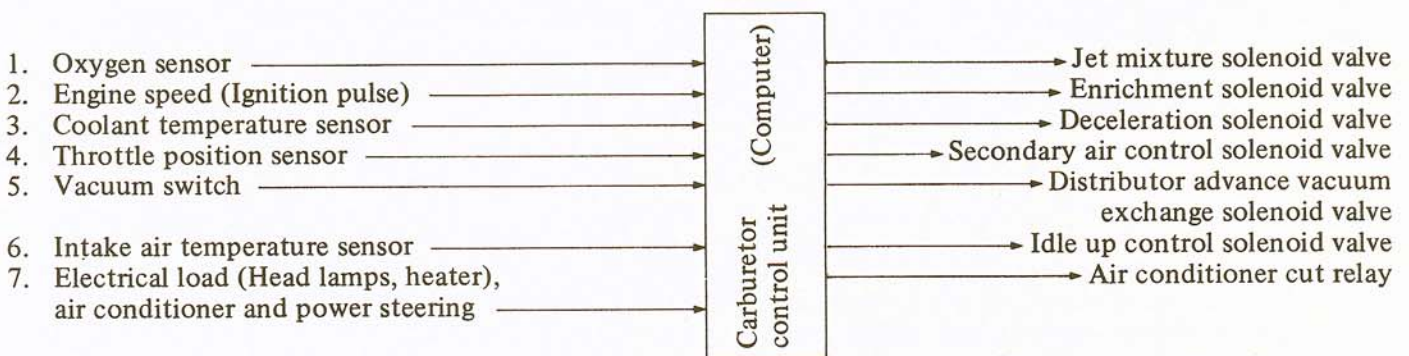
## COMPONENTS



NOTE  
 © indicates the computer connection.  
 ⊕ is the power cord.

5FU053

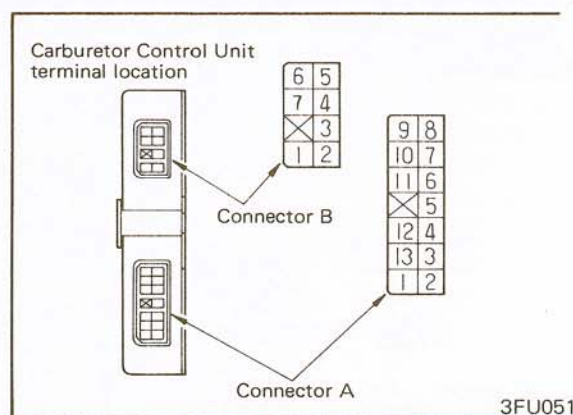
FBC (Feed Back Carburetor) system is composed of various kinds of sensors and actuators and a computer (carburetor control unit) as shown in the system diagram in the preceding figure. The flow of input and output signals of the control unit is as shown in the following chart.







- A-1. Oxygen sensor
- A-2. Ground for sensor
- A-3. Throttle position sensor ⊕
- A-4. Intake air temperature sensor
- A-5. Idle position switch
- A-6. Ground
- A-7. Ignition switch
- A-8. Ignition switch
- A-9. Battery ⊕
- A-10. Ignition coil ⊖
- A-11. Ground
- A-12. Coolant temperature sensor
- A-13. Throttle position sensor (out put)
- B-1. Jet mixture solenoid valve
- B-2. Deceleration solenoid valve
- B-3. Idle up control solenoid valve
- B-4. Secondary air control solenoid
- B-5. Enrichment solenoid valve
- B-6. Air conditioner cut relay
- B-7. Distributer advance vacuum exchange solenoid valve



### INSPECITON OF FBC SYSTEM

If FBC system components (sensors, carburetor control unit computer, solenoid, etc.) fail, interruption of fuel supply or failure to supply proper amount of fuel for engine operating conditions will result. Therefore, the following situations will be encountered.

- (1) Engine is hard to start or does not start at all.
- (2) Unstable idle.
- (3) Poor driveability.

If any of above conditions is noted, first perform basic engine checks (ignition system malfunctions, incorrect engine adjustment, etc.).

The FBC system can be checked by use of ECI checker and adapter. Inspection procedure as follows.

### INSPECTION PROCEDURE

#### Cautions

- Before battery terminals are disconnected, make sure that ignition switch is set to OFF. If battery terminals are disconnected while engine is running or when ignition switch is in ON position, malfunction of computer or damage to semiconductors could result.
  - Disconnect battery cables before charging battery.
  - When battery is connencted, be sure not to reverse polarity.
  - Make sure that harness connectors are securely connected. Use care not to allow entry of water or oil into connectors.
1. Turn ignition switch to OFF.
  2. Remove the harness connector "A" (13 poles) and connector "B" (7 poles) from carburetor control unit (computer).





## Caution

Before harness connectors are removed from, or inserted into carburetor control unit, make sure that ignition switch is turned off.

Hold down lock all the way when harness connector of carburetor control unit or connector of ECI checker is removed. When connector is connected, push it in all the way and check to ensure that lock is in position.

3. Set check switch of ECI checker to OFF.
4. Set select switch of checker to A.
5. Connect the adapter to the connectors of ECI checker, and then connect adapter to carburetor control unit and harness connectors. Place ECI checker on front passenger's seat.
6. Perform checks according to the "FBC System Check Procedure Chart".

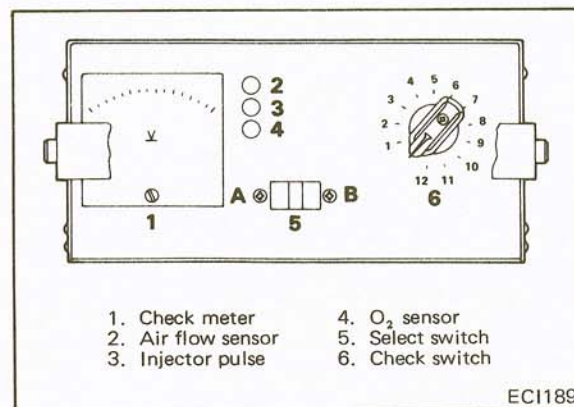
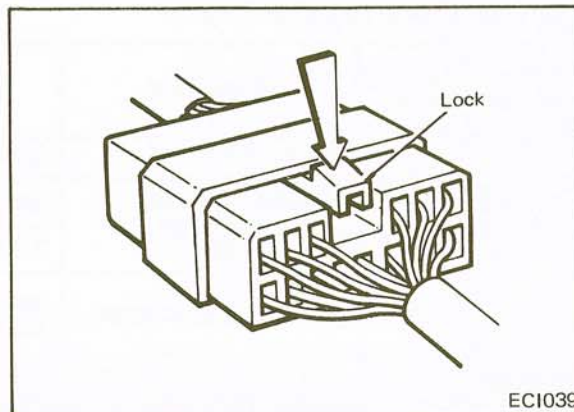
## Caution

When steps 1. through 12. of the select switch "A" are checked, finish each step quickly and switch the ignition switch to OFF after inspection of each step to save current consumption. This is important for protection of the battery.

7. If checker shows any departure from specifications, check corresponding sensor and related electrical wiring, repair or replace.
8. After repair or replacement, recheck with ECI checker to confirm that repaired or replaced part is performing well.
9. Set check switch of ECI checker to OFF.
10. Set ignition switch to OFF.
11. Disconnect connectors of ECI checker and adapter from carburetor control unit and body side harness connectors.
12. Connect body side harness connector to carburetor control unit.

## Caution

Make sure that connector is securely connected.







## COMPONENT SERVICE-CARBURETOR (FBC)

### FBC System Check Procedure Chart

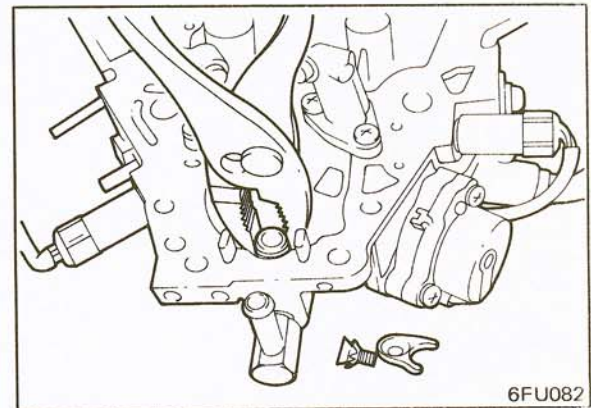
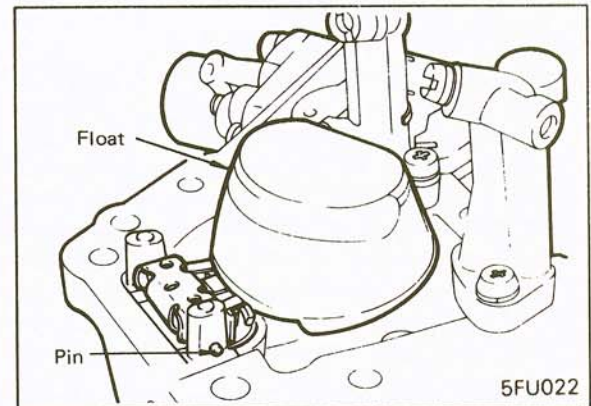
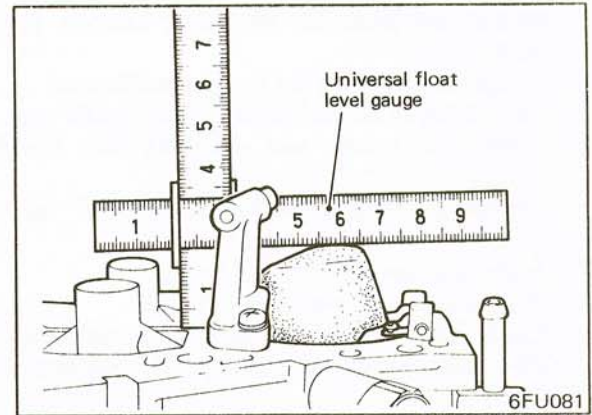
Select switch	Check switch	Check item	Condition		Check meter reading when normal	Terminal number of computer
A	1	Power supply	Ignition switch	OFF → ON	11-13V	A-7
	2	Distributor advance vacuum exchange solenoid valve	Idling		13-15V	B-7
			2,000 rpm		0-1 V	
	3	Throttle position sensor	Ignition switch OFF → ON	Accelerator closed	0-0.6 V	A-13
				Accelerator wide opened	4-4.5 V	
	4	Coolant temperature sensor	Ignition switch OFF → ON	20°C (68°F)	2.4-2.6 V	A-12
				40°C (104°F)	1.4-1.6 V	
				80°C (176°F)	0.5-0.7 V	
	5	Intake air temperature sensor	Ignition switch OFF → ON	20°C (68°F)	2.4-2.6 V	A-4
				40°C (104°F)	1.4-1.6 V	
				80°C (176°F)	0.5-0.7 V	
	6	Vacuum switch	Ignition switch	OFF → ON		A-5
			Idling			
B	7	Idle up control solenoid valve	Ignition switch	OFF → ON	0-0.6 V	B-3
	8	Enrichment solenoid valve	Ignition switch	OFF → ON	11-13 V	B-5
	9	A/C cut relay	Ignition switch OFF → ON	A/C switch OFF → ON	0-0.6 V	B-6
	10	Power supply for sensor	Ignition switch	OFF → ON	5 V	A-3
	11	—	—		—	—
	12	Secondary air control solenoid valve	Ignition switch OFF → ON	Coolant temp. 30-40°C (86-104°F)	0-0.6 V	B-4
	1	—	—		—	—
	2	Jet mixture solenoid valve	Ignition switch	OFF → ON	11-13 V	B-1
			Idling			
	3	Idle up control solenoid valve	Keep 1,500 rpm		13-15V	B-3
	4	Ignition pulse	Idling		12-15 V	A-10
			3,000 rpm		11-13 V	
	5	—	—		—	—
	6	Power supply for back up	Idling		13-15 V	A-9
	7	Deceleration solenoid valve	Idling		0-0.6 V	B-2
	8	Oxygen sensor	Keep 1,300 rpm after warming up		0.4-1 V ↓ 2.7 V Flashing	A-1
	9	Enrichment solenoid valve				B-5
	10	—	—		—	—
	11	A/C cut relay	Ignition switch OFF → ON	A/C switch OFF → ON at accel. wide opened	11-13 V	B-6
	12	Secondary air control solenoid valve	Keep idling after warming up		11-13 V	B-4



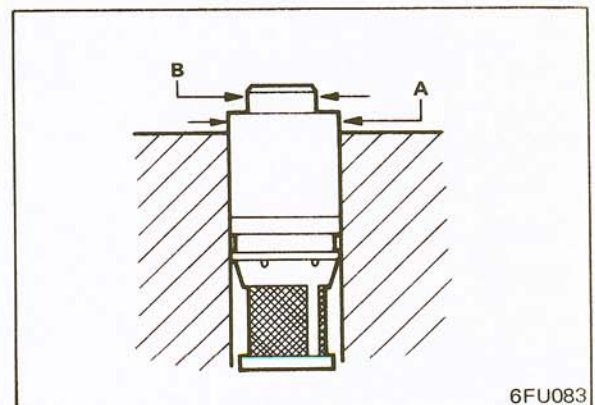


## LOAT LEVEL ADJUSTMENT-DRY SETTING

1. Invert the float chamber cover assembly without a gasket.
2. Position universal float level gauge or suitable depth gauge, distance from bottom of float to surface of float chamber cover should be 20 mm (.787 in.)  $\pm$  1 mm (.0394 in.). If reading is not within this range the shim under the needle seat must be changed. Shim kit MD606952 has 3 shims 0.3 mm (.0118 in.), 0.4 mm (.0157 in.), 0.5 mm (.0196 in.). Adding or removing a shim will change the float level by three times the thickness of the shim.
3. To remove the float slide the pin out and remove the float and the needle.
4. Unscrew retainer and remove the needle seat use with pliers.



When removing the needle seat, clamp the portion A with pliers.  
Do not clamp portion B of needle seat.





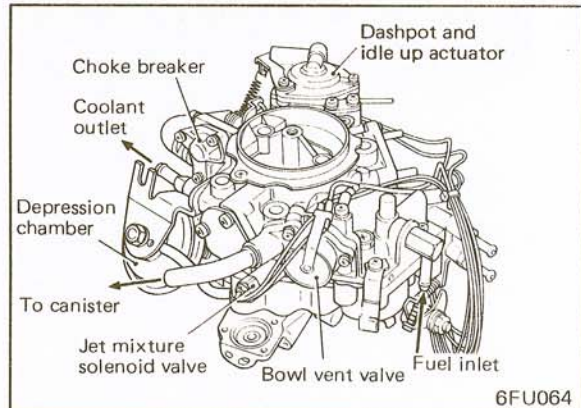
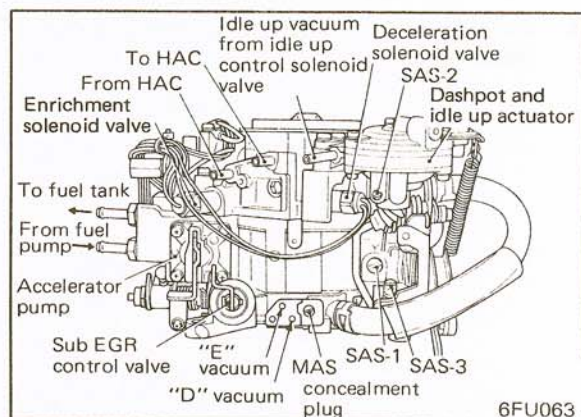


## COMPONENT SERVICE-CARBURETOR (FBC)

5. Check the filter for clogge or damage. Replace if neces-  
sary.
6. Install the new O-ring to the needle seat.
7. Install the shim and filter to the needle seat.
8. Insert the needle seat assembly into the float chamber  
cover.
9. Install the needle seal retainer and tighten the screw  
firmly.
10. Insert the needle into the seat.
11. Install the float and insert the pin.
12. Check the distance from bottom of float to surface of  
float chamber cover. Readjust if necessary.

### REMOVAL

1. Disconnect battery ground cable.
2. Drain coolant down to intake manifold level or below.
3. Remove air cleaner.
4. Place a container under fuel inlet fitting to catch any fuel  
that may be trapped in fuel line and disconnect the fuel  
hose from the carburetor inlet connection.
5. Disconnect the vacuum hoses from carburetor.
6. Disconnect the throttle cable from carburetor.
7. Remove carburetor mounting bolts and carefully remove  
the carburetor from the engine. Hold carburetor level to  
avoid spilling fuel from fuel bowl.







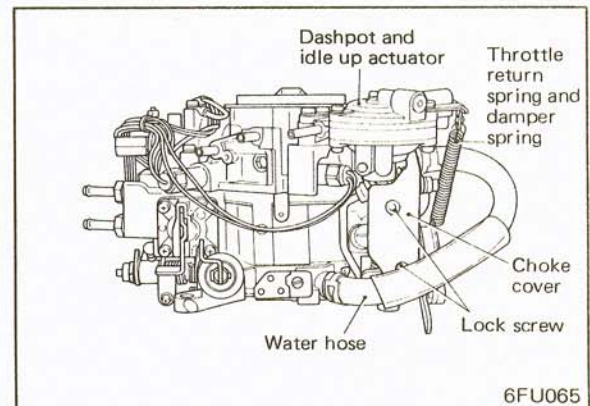
## ISASSEMBLY

### Caution

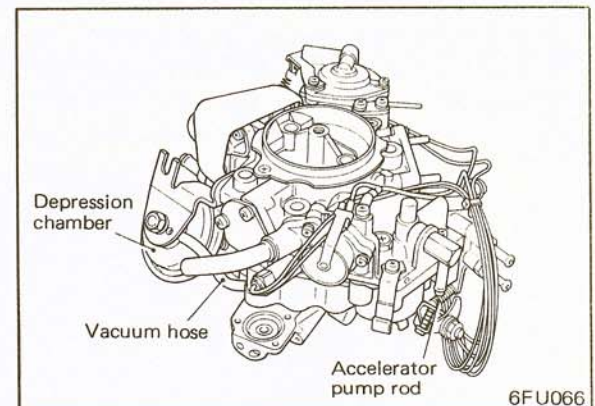
Do not remove the following parts:

1. Choke valves.
2. Choke levers and related parts.
3. Round nut of accelerator pump link.
4. Adjusting screws except idle speed adjusting screws, idle mixture adjusting screw and dashpot adjusting screw.
5. Throttle valves.

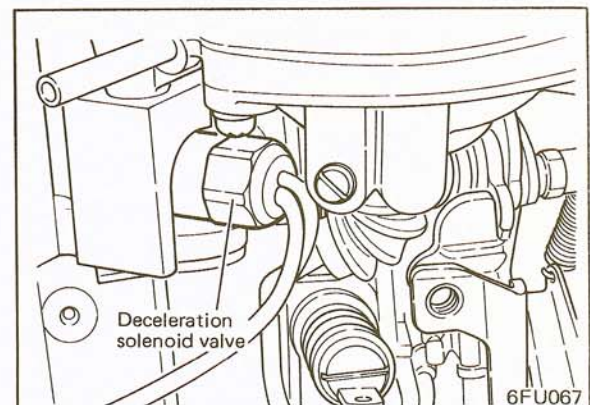
1. Pull the water hose off the nipple of throttle body and off the nipple of wax element portion.
2. Grind down the head of choke cover lock screws (in 2 positions) by using a hand grinder or other instruments. (6FU066)



3. Remove the throttle return spring and the damper spring.
4. Remove the vacuum hose from the depression chamber and the throttle body.
5. Remove the accelerator pump rod from the throttle lever.
6. Remove the dashpot/idle up actuator rod (for a manual transmission) or idle up actuator rod (for an automatic transmission) from the free lever.
7. Remove the dashpot/idle up actuator (for a manual transmission) or the idle up actuator (for an automatic transmission) from the float chamber cover.



8. Remove the deceleration solenoid valve from the float chamber cover.

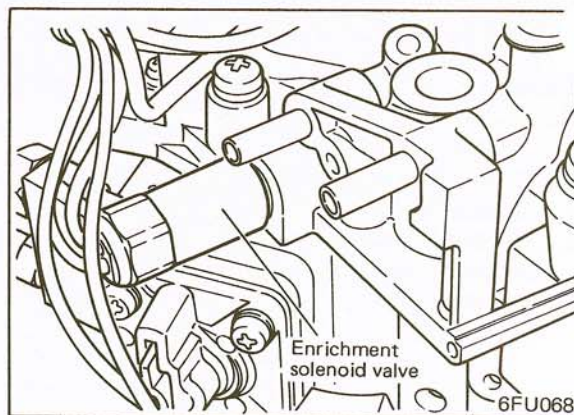




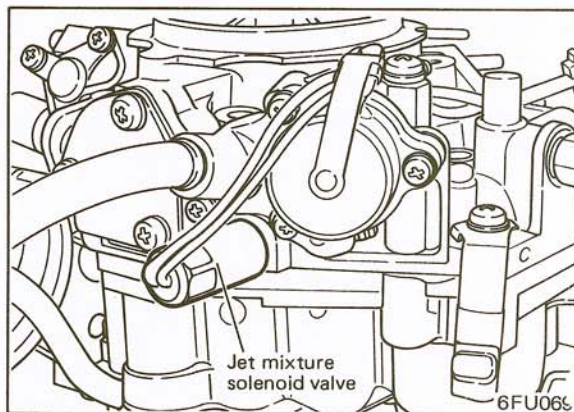


## COMPONENT SERVICE-CARBURETOR (FBC)

9. Remove the enrichment solenoid valve from the float chamber cover.



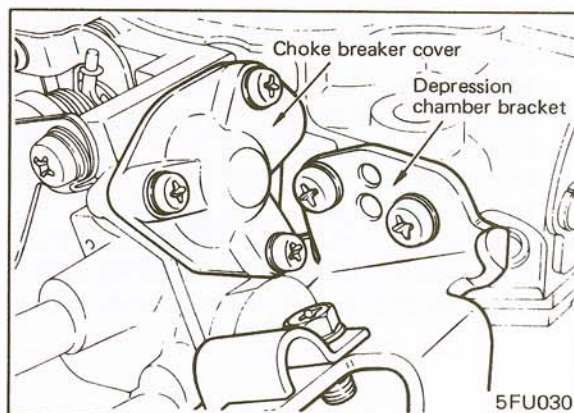
10. Remove the jet mixture solenoid valve from the float chamber cover.



11. Remove the depression chamber rod from the secondary throttle lever.

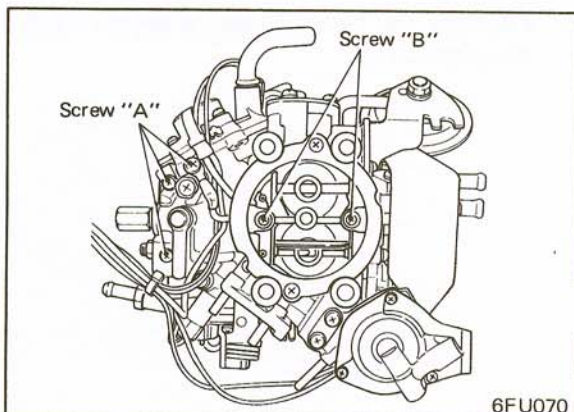
12. Remove the depression chamber.

To remove depression chamber, first remove choke breaker cover. Then remove depression chamber attaching screws.



13. Remove the float chamber cover screws "B" and remove the throttle body.

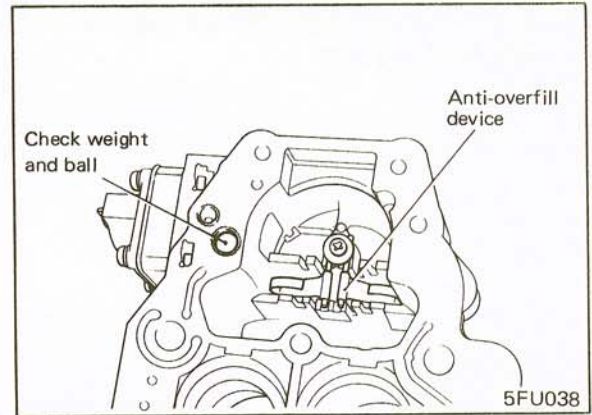
14. Remove the screws "A" and remove the float chamber cover from main body.



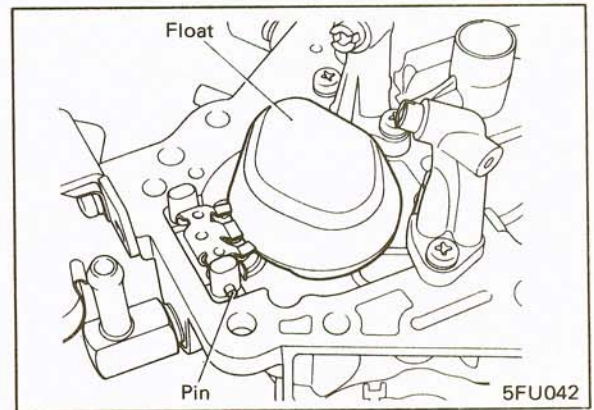




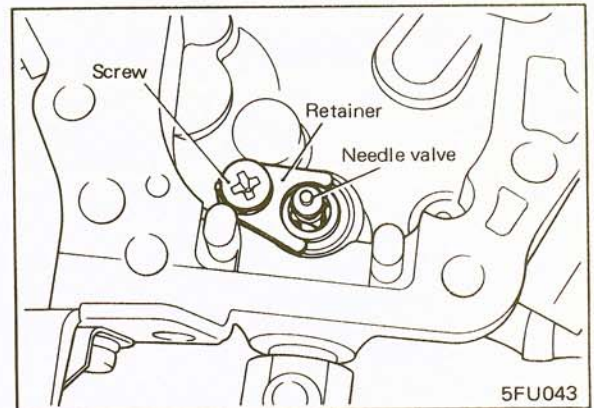
- Remove the check weight and ball, and steel ball of anti-overfill device.



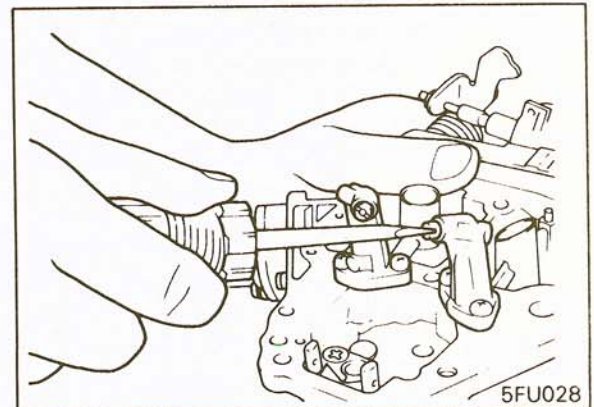
- Pull off the pin and remove the float.



- Remove the needle valve retainer and then remove the needle valve assembly with pliers.



- Remove the main jets from the jet blocks. When the main jet is to be removed, use a screwdriver with proper blade for slot in jet.

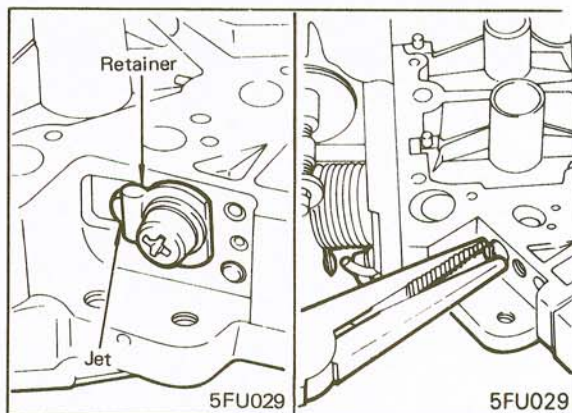




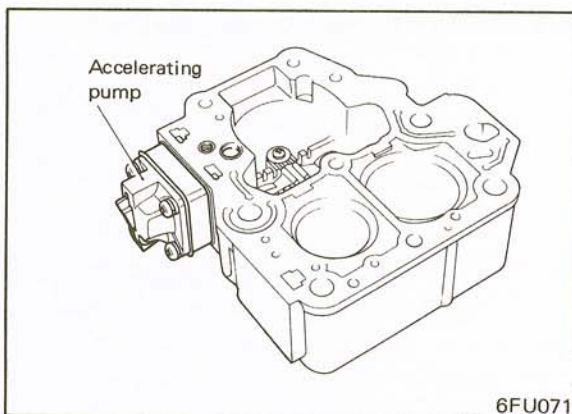


## COMPONENT SERVICE-CARBURETOR (FBC)

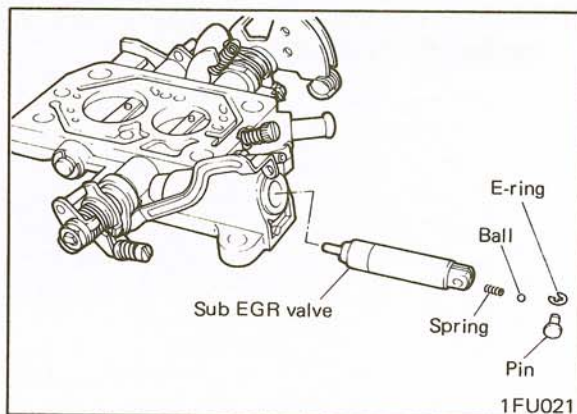
19. Remove the pilot jet retainer and pull out the secondary pilot jet with pliers.



20. Remove the accelerator pump mounting screws and remove the pump cover-link assembly, diaphragm, spring, body and gasket from main body.



21. Remove the snap ring from the sub EGR control valve pin.
22. Remove the pin and then remove the link from the valve. Then take out the little steel ball and spring from the sub EGR control valve.
23. Remove the sub EGR control valve from the throttle body.



### REASSEMBLY

Perform reassemble in reverse procedure of disassembly, pay attention to the following items:

1. Clean the all reassembling parts.
2. Check to be sure that no clogging is in the air passages and fuel passages.
3. Check for rough operation of throttle and choke linkage. If they are binding, apply a small amount of lubricant after cleaning them up.
4. Sub EGR valve must operate smoothly.
5. When replacing a main or a pilot jet, the old jet and the new jet must be of the same size, because the jet is selected after exact flow measurement by factory (a No. is stamped on each jet).





## INSTALLATION

1. Inspect the gasket surfaces of carburetor and intake manifold. Be sure both surfaces are clean and free of gasket material, nicks, burrs or other damage.
2. Place a new carburetor gasket on the intake manifold surface.
3. Carefully place the carburetor on the intake manifold.
4. Install carburetor mounting bolts and tighten alternately, a little at a time, to compress carburetor gasket evenly. The nuts must be drawn down tightly to prevent vacuum leakage between the carburetor and intake manifold.
5. Connect the throttle cable, vacuum hoses and fuel hoses.
6. Check carefully for worn or loose vacuum hose connections.
7. Check to be sure the choke plate opens and closes fully when operated.
8. Check to see that full throttle travel is obtained.
9. Install air cleaner. The air cleaner should be cleaned or replaced at this time to insure proper carburetor performance.
10. Connect battery cable.

### Caution

The practice of priming an engine by pouring gasoline into the carburetor air horn for starting after servicing the fuel system should be strictly avoided. Cranking the engine, and then priming by depressing the accelerator pedal several times should be adequate.

11. Set carburetor idle speed and mixture adjustment.

## REMOVAL

1. Disconnect battery ground cable.
2. Drain coolant down to intake manifold level or below.
3. Remove air cleaner.
4. Place a container under fuel inlet fitting to catch any fuel that may be trapped in fuel line and disconnect the fuel hose from the carburetor inlet connection.
5. Disconnect the vacuum hoses from carburetor.
6. Disconnect the throttle cable from carburetor.
7. Remove carburetor mounting bolts and carefully remove the carburetor from the engine. Hold carburetor level to avoid spilling fuel from fuel bowl.

## DISASSEMBLY

### Caution

Do not remove the following parts:

1. Choke valves.
2. Choke levers and related parts.
3. Round nut of accelerator pump link.
4. Adjusting screws except idle speed adjusting screws, idle mixture adjusting screw and dashpot adjusting screw.
5. Throttle valves.

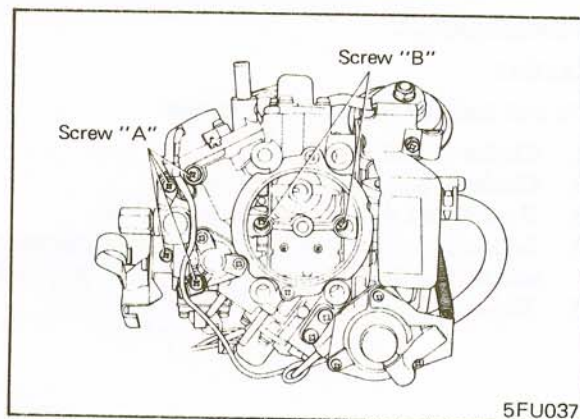
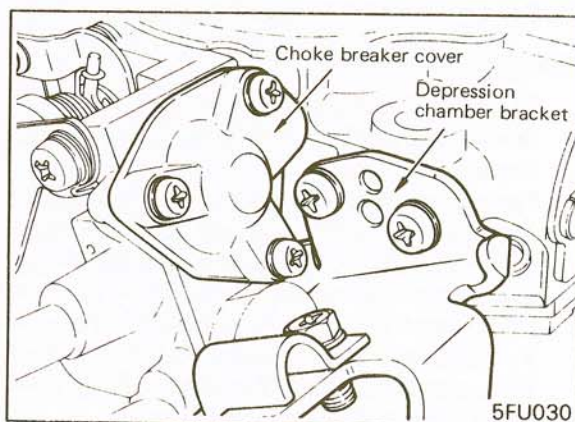
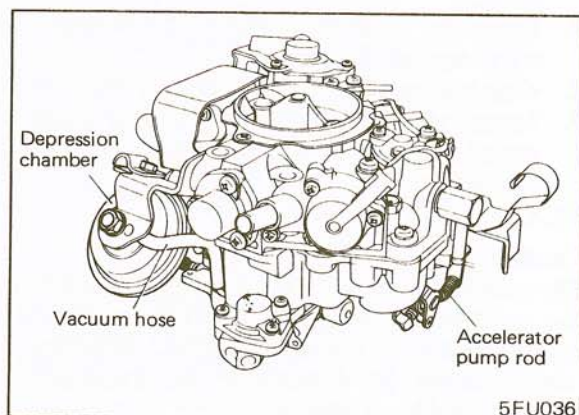
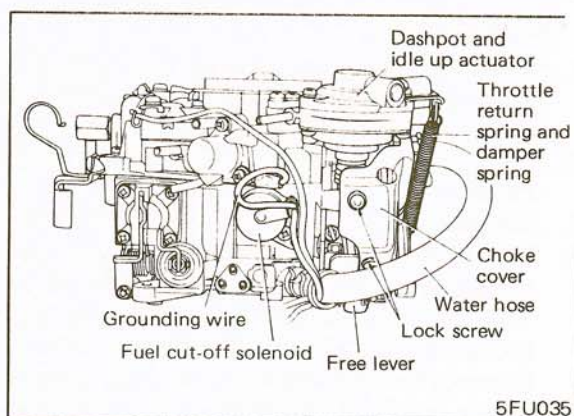




## COMPONENT SERVICE-CARBURETOR (CONVENTIONAL)

### REMOVAL

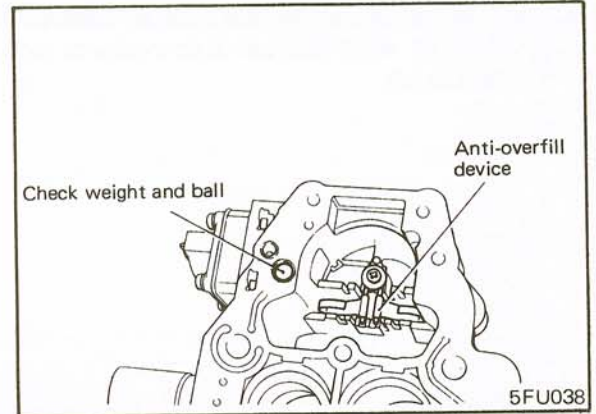
1. Disconnect the water hose from the connection of throttle body and from the connection of wax element.
2. Remove the tamper proof screws from the choke cover and then remove the choke cover.
3. Disconnect the ground wire of the fuel cut-off solenoid at the float chamber cover.
4. Remove the throttle return spring and the damper spring.
5. Disconnect the vacuum hose connecting the depression chamber and the throttle body.
6. Detach the accelerator pump rod from the throttle lever.
7. Detach the dashpot/idle up actuator rod from the free lever.
8. Remove the dashpot/idle up actuator from the float chamber cover.
9. Detach the depression chamber rod from the secondary throttle lever.
10. Remove the depression chamber. To remove depression chamber, first remove choke breaker cover. Then remove depression chamber attaching screws.
11. Remove the float chamber cover screws "B" and remove the throttle body.
12. Remove the screws "A" and remove the float chamber cover from main body.



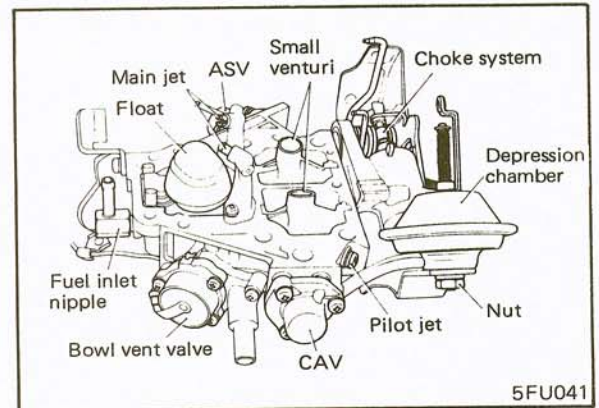




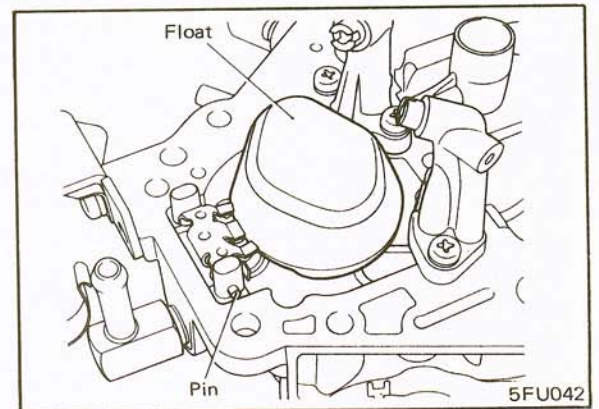
13. Remove the check weight and ball, and steel ball of anti-overfill device.



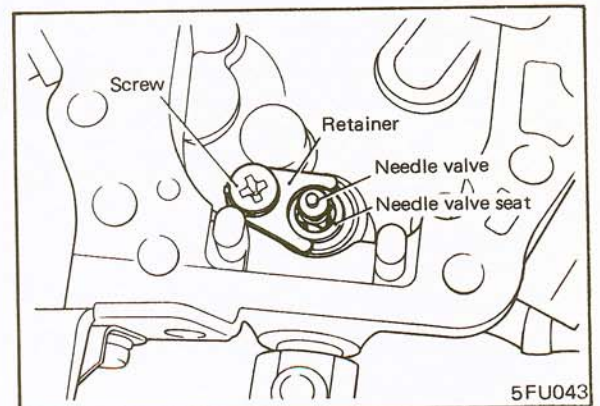
14. Do not remove components unless necessary, do not disassemble the auto choke system.



15. Pull out the float pin and remove the float.



16. Remove the needle valve retainer and then remove the needle valve assembly with pliers.

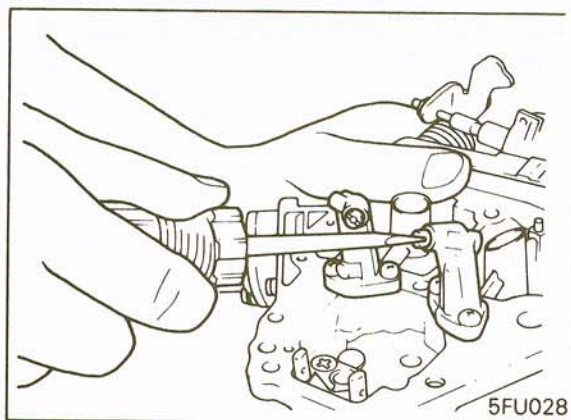




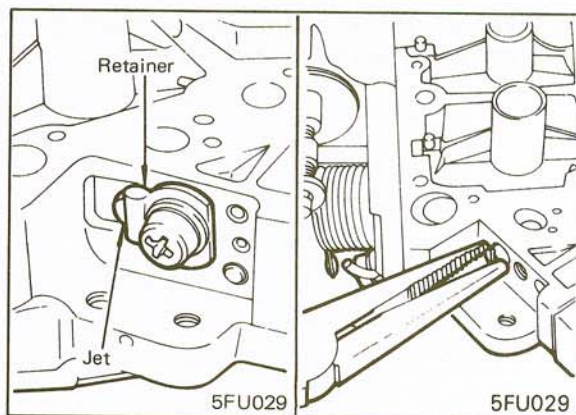


## COMPONENT SERVICE-CARBURETOR (CONVENTIONAL)

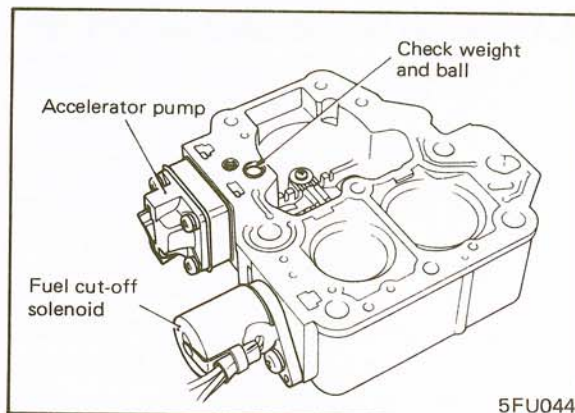
17. Remove the main jets from the jet blocks. When the main jet is to be removed, use a screwdriver with proper blade for slot in jet.



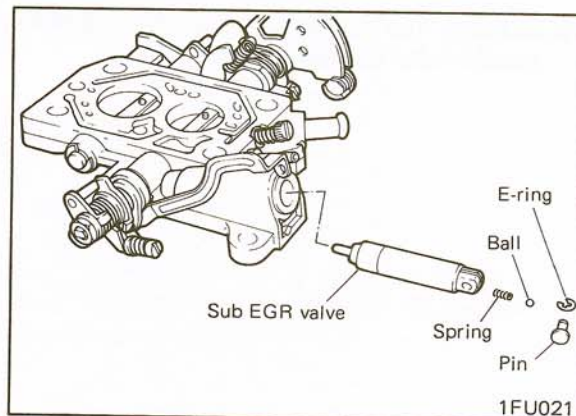
18. Remove the pilot jet retainer and pull out the secondary pilot jet with pliers.



19. Remove the accelerator pump and fuel cut-off solenoid.



20. Remove the snap ring from the sub EGR control valve pin.
21. Remove the pin and then remove the link from the valve. Then take out the little steel ball and spring from the sub EGR control valve.
22. Remove the sub EGR control valve from the throttle body.







### REASSEMBLY

Perform reassemble in reverse procedure of disassembly, pay attention to the following items:

1. Clean the all reassembling parts.
2. Check to be sure that no clogging is in the air passages and fuel passages.
3. Check for rough operation of throttle and choke linkage. If they are binding, apply a small amount of lubricant after cleaning them up.
4. Sub EGR valve must operate smoothly.
5. When replacing a main or a pilot jet, the old jet and the new jet must be of the same size, because the jet is selected after exact flow measurement by factory (a No. is stamped on each jet).

### INSTALLATION

1. Inspect the gasket surfaces of carburetor and intake manifold. Be sure both surfaces are clean and free of gasket material, nicks, burrs or other damage.
2. Place a new carburetor gasket on the intake manifold surface.
3. Carefully place the carburetor on the intake manifold.
4. Install carburetor mounting bolts and tighten alternately, a little at a time, to compress carburetor gasket evenly. The nuts must be drawn down tightly to prevent vacuum leakage between the carburetor and intake manifold.
5. Connect the throttle cable, vacuum hoses and fuel hoses.
6. Check carefully for worn or loose vacuum hose connections.
7. Check to be sure the choke plate opens and closes fully when operated.
8. Check to see that full throttle travel is obtained.
9. Install air cleaner. The air cleaner should be cleaned or replaced at this time to insure proper carburetor performance.
10. Connect battery cable.

#### Caution

The practice of priming an engine by pouring gasoline into the carburetor air horn for starting after servicing the fuel system should be strictly avoided. Cranking the engine, and then priming by depressing the accelerator pedal several times should be adequate.

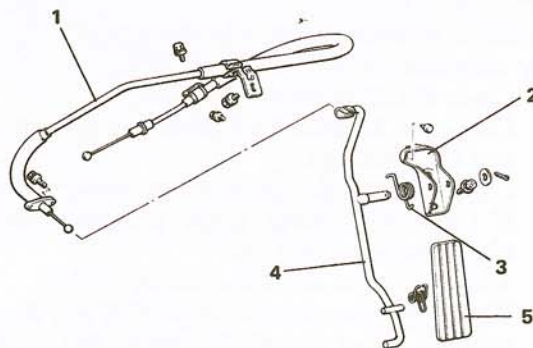
11. Set carburetor idle speed and mixture adjustment.





### COMPONENTS

1. Accelerator cable
2. Accelerator arm bracket
3. Return spring
4. Accelerator arm
5. Pedal

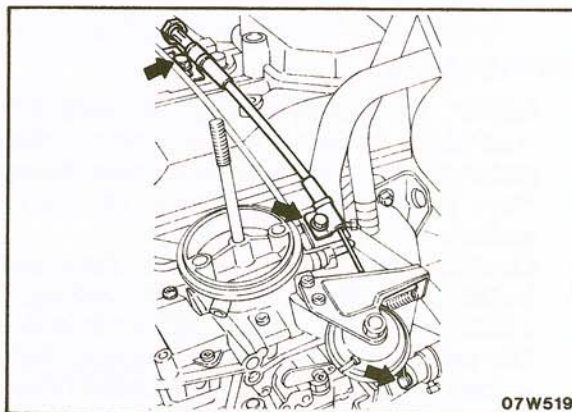


07W523

### REMOVAL

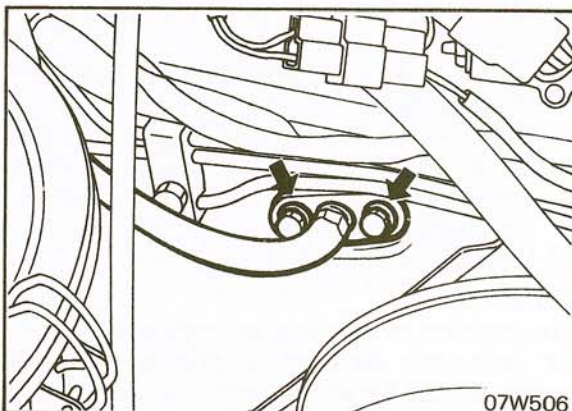
#### Accelerator Cable

1. Loosen the accelerator cable tightening bolts. (07W519)
2. Disconnect the accelerator cable from the throttle lever.



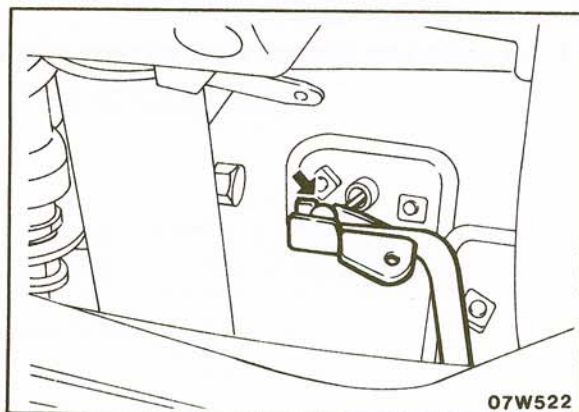
07W519

3. Remove the bolts which hold the accelerator cable guide from the floorboard within the engine compartment.



07W506

4. Disconnect the accelerator cable from the end of the accelerator arm, and then remove the cable from the engine compartment.



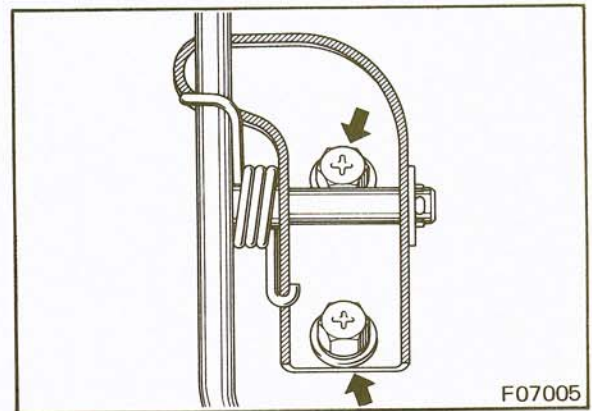
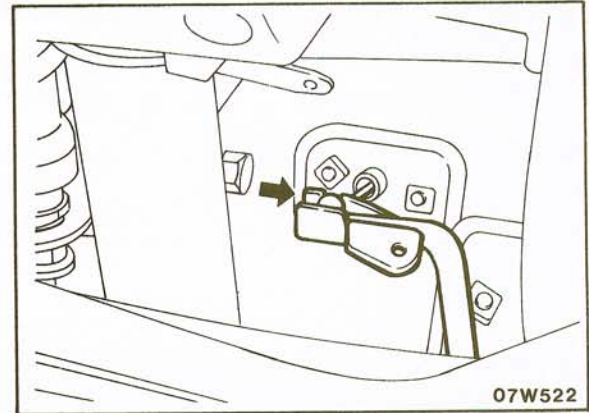
07W522





## Accelerator Pedal

1. Disconnect the accelerator cable from the end of the accelerator arm.
2. Remove the accelerator arm together with the accelerator bracket. (F07005)
3. Remove the pedal from the accelerator arm.



## INSPECTION

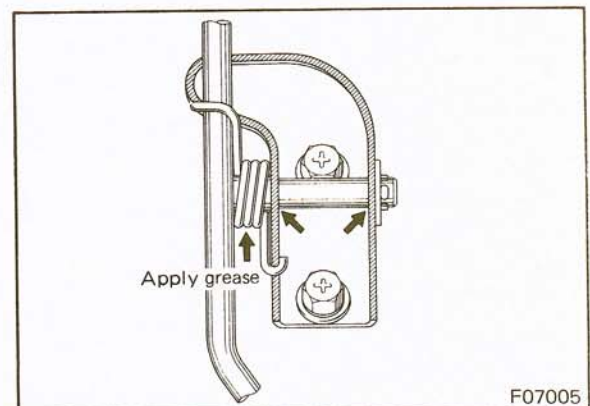
1. Check accelerator cable for damage.
2. Check cable outer casing for damage.
3. Check cable for roughness in the movement.
4. Check accelerator arm for bending.
5. Check return spring for deterioration.

## INSTALLATION

1. Apply specified multipurpose grease and drying-type sealant to the specified positions. (F07005, 07W503)

Recommended grease . . . . . Multipurpose grease  
SAE J310a, NLGI grade #3, or equivalent

2. Eliminate sharp bends from the accelerator cable.
3. Adjust the free play of the accelerator cable. (Refer to p. 14-9.)











# PROPELLER SHAFT AND UNIVERSAL JOINTS

## CONTENTS

<b>SPECIFICATIONS .....</b>	<b>2</b>	<b>SPECIAL TOOL .....</b>	<b>3</b>
<b>GENERAL SPECIFICATIONS .....</b>	<b>2</b>	<b>TROUBLESHOOTING .....</b>	<b>3</b>
<b>SERVICE SPECIFICATIONS .....</b>	<b>2</b>	<b>COMPONENT SERVICE .....</b>	<b>4</b>
<b>TORQUE SPECIFICATION .....</b>	<b>2</b>	<b>PROPELLER SHAFT AND UNIVERSAL</b>	
<b>LUBRICANTS .....</b>	<b>2</b>	<b>JOINTS .....</b>	<b>4</b>





## SPECIFICATIONS

### GENERAL SPECIFICATIONS

mm (in.)

#### Propeller shaft

Type

Two-joint type

Length x O.D. Front

665 x 50.8 (26.2 x 2.0)

Rear

598 x 75.0 (23.5 x 3.0)

#### Universal joint

Type

Cross type

Bearing

Lubricated needle roller bearing

Journal O.D.

14.7 (.58)

### SERVICE SPECIFICATIONS

mm (in.)

#### Service limits

Propeller shaft runout (Dial indicator reading)

Front

0.5 (.02)

Rear

0.6 (.024)

Journal end play

0.06 (.0024)

### TORQUE SPECIFICATION

Nm (ft.lbs)

Flange yoke attaching bolts

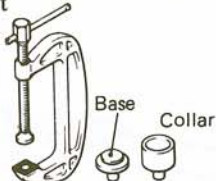
50-60 (36-43)

### LUBRICANTS

	Specified lubricant	Quantity
Universal joint	Multipurpose grease, SAE J310a, NLGI grade #2EP	As required
Sleeve yoke surface	Hypoid gear oil, SAE 80, 75W-85W conforming to API GL-4	As required





Tool (Number and name)	Use
MB990840 Universal joint remover and installer set 	Removal and installation of journal bearing

## TROUBLESHOOTING

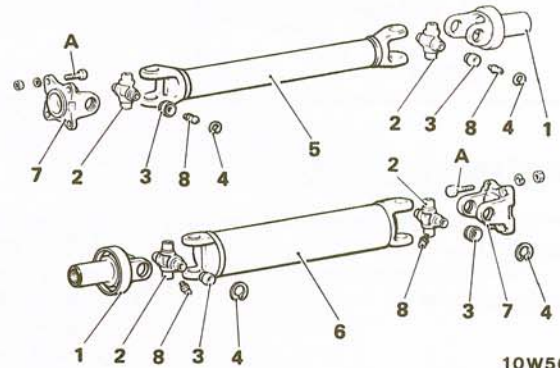
Symptom	Probable cause	Remedy
Abnormal noise	Universal joint bearings worn, damaged or broken Sleeve yoke loose in transmission Universal joint yokes worn or broken	Replace
	Companion flange bolts loose	Torque to specifications
Vibration	Universal joints worn, damaged or broken Sleeve yoke loose in transmission Propeller shaft bent, distorted or damaged Universal joint yokes out of phase	Replace
	Companion flange bolts loose	Torque to specifications





## COMPONENTS

1. Sleeve yoke assembly
2. Journal
3. Journal bearing
4. Snap ring
5. Front propeller shaft
6. Rear propeller shaft
7. Flange yoke
8. Grease nipple



	Nm	ft.lbs.
A	50-60	36-43

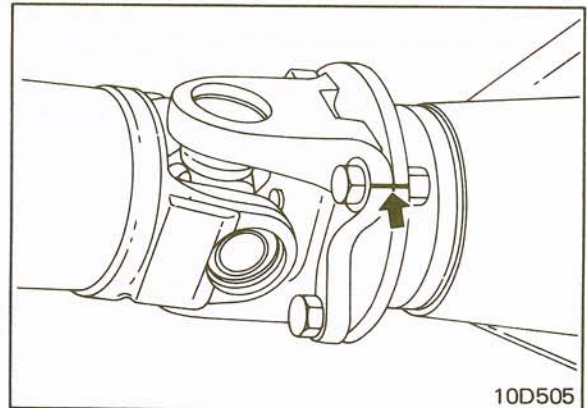
## REMOVAL

1. Place the free wheel hubs in the FREE position and set the transfer lever to "2H".
2. Make mating marks on the flange yoke and the differential companion flange. (10D505)
3. Detach the propeller shafts from the front and rear differential carrier assemblies.
4. Remove the propeller shafts.

### Caution

Be careful not to damage the lip of the transmission oil seal or the lip of the transfer oil seal.

Do not allow foreign matter to enter the transmission or transfer.





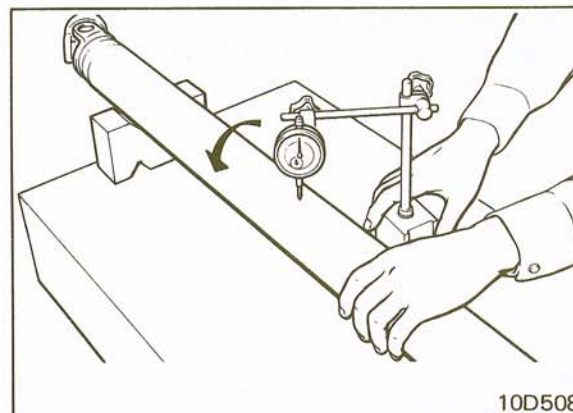


## SPECTION

1. Check sleeve yoke and flange yoke for wear, damage or cracks.
2. Check propeller shaft yokes for wear, damage or cracks.
3. Check propeller shaft for bends, twisting or damage. (10D508)

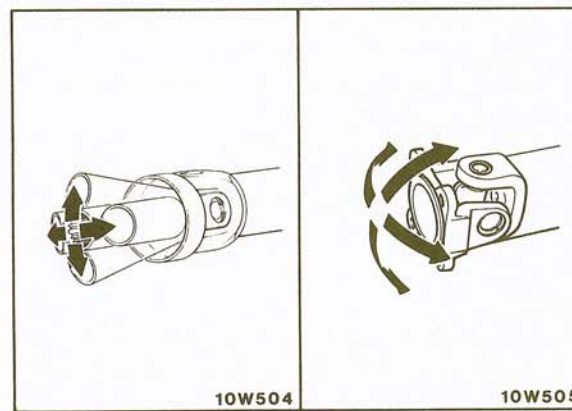
Propeller shaft runout (Dial indicator reading)

[Service limit] . . . . . Front 0.5 mm (.02 in.)  
Rear 0.6 mm (.024 in.)



10D508

4. Check universal joints for smooth operation in all directions.



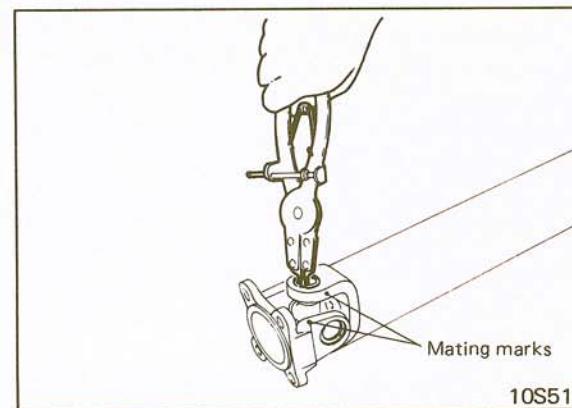
10W504



10W505

## UNIVERSAL JOINT REPLACEMENT

1. Make mating marks on the yokes of the universal joint that is to be disassembled. (10S511)
2. Remove the snap rings from the yoke with snap ring pliers. (10S511)

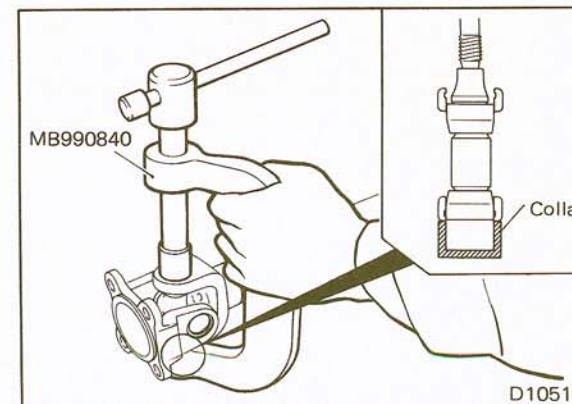


10S511

3. Remove the journal bearings from the propeller shaft yoke with the special tool. Use the collar as illustrated.

### NOTE

If the journal bearings are hard to remove, strike the yoke with a plastic hammer.



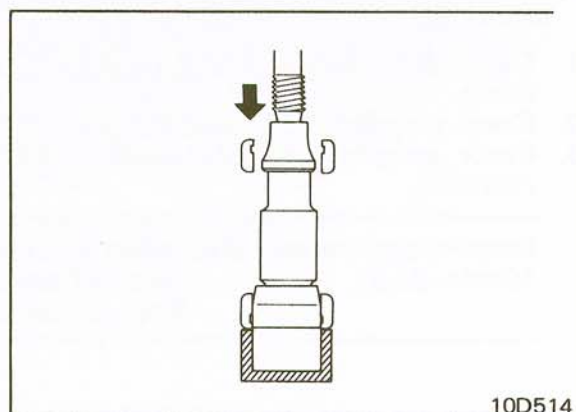
D10512





## COMPONENT SERVICE- PROPELLER SHAFT AND UNIVERSAL JOINTS

4. Press the journal shaft using special tool to remove the remaining bearing. (10D514)
5. Separate the universal joint from the yokes.



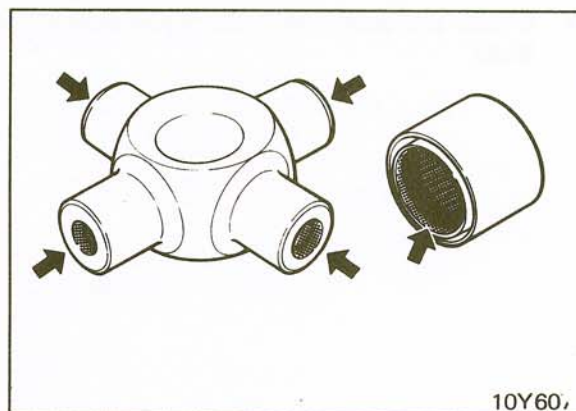
10D514

6. Apply the specified multipurpose grease to the following parts of universal joint kit:
  - (1) Shafts and grease sumps of journal
  - (2) Dust seal lips
  - (3) Needle roller bearings

Specified multipurpose grease .....  
SAE J310a, NLGI grade #2EP

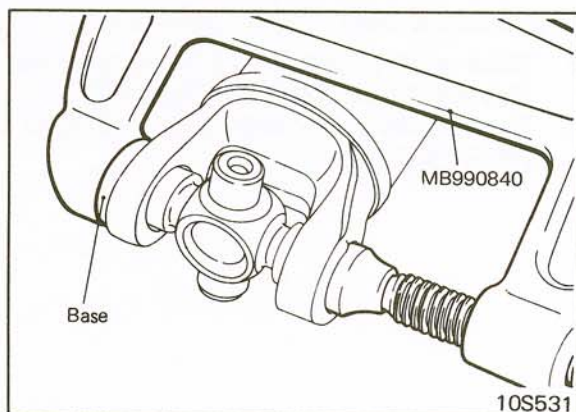
### Caution

Use of excessive amounts of grease may result in difficulty in assembling unit and incorrect selection of snap rings.



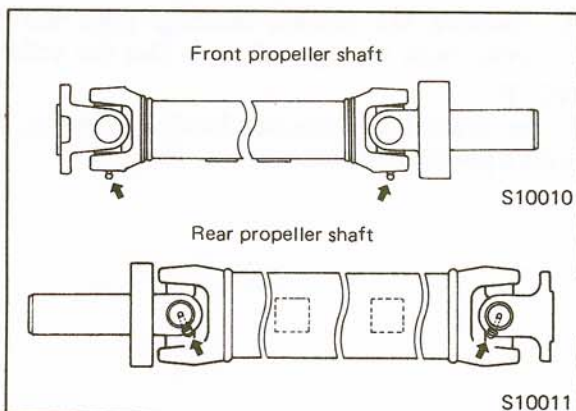
10Y60,

7. Press the journal bearings to the yoke with the special tool and base as illustrated. Be sure to align the mating marks on the yokes.



10S531

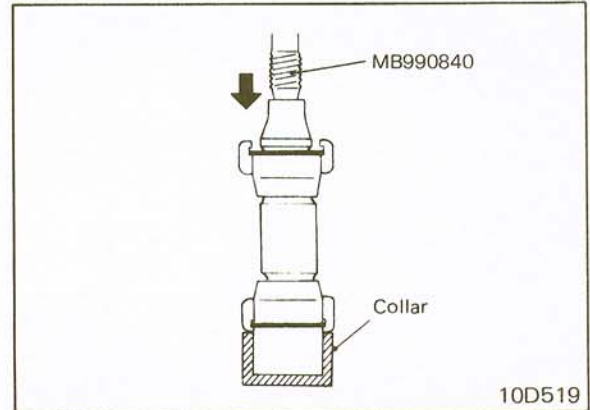
8. When attaching the universal joint journals to the propeller shaft, be sure that the grease nipples face in the same direction for the front propeller shaft, and that they face each other (as shown in the figure) for the rear propeller shaft.







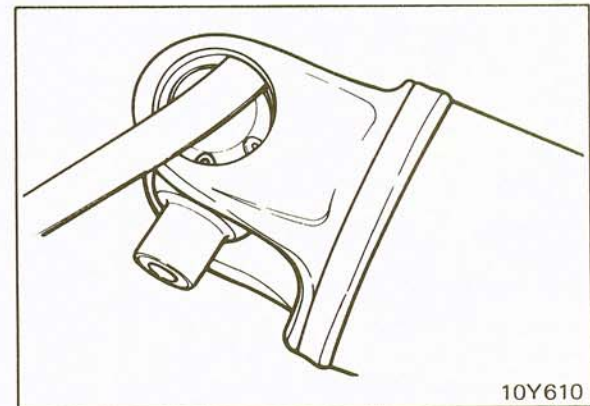
Install snap rings of the same thickness onto both sides of each yoke. Press the bearing and journal into one side with the special tool. (10D519)



10. Measure the clearance between the snap ring and the groove wall of the yoke with a feeler gauge. (10Y610)

Journal end play [Service limit] .....  
0.06 mm (.0024 in.)

If the clearance exceeds the service limit, the snap rings should be replaced.



## INSTALLATION

1. Apply hypoid gear oil to the sleeve yoke and install the propeller shaft into the transmission.

Specified hypoid gear oil .....  
SAE80, 75W-85W conforming to API GL-4

2. Align the mating marks on the flange yoke and the differential companion flange.
3. Install bolts and torque to specifications.

Flange yoke bolt tightening torque .....  
50-60 Nm (36-43 ft.lbs.)









# REAR SUSPENSION

## CONTENTS

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<b>TORQUE SPECIFICATIONS .....</b>	<b>2</b>	<b>REAR SUSPENSION .....</b>	<b>3</b>





## SPECIFICATIONS

### GENERAL SPECIFICATIONS

Suspension system	Asymmetrical semielliptic leaf springs
Leaf springs (Standard)	
Number of leaf springs	4
Straight span mm (in.)	1,200 (47.2)
Camber (unladen) mm (in.)	78 (3.1)
Spring constant N/mm (lbs./in.)	
— as installed	
at load of 1,000-2,500 N (220-551 lbs.)	24 (134)
at load of 4,670-8,870 N (1,030-1,955 lbs.)	56 (314)
Leaf springs (Heavy duty)	
Number of leaf springs	4
Straight span mm (in.)	1,200 (47.2)
Camber (unladen) mm (in.)	78 (3.1)
Spring constant N/mm (lbs./in.)	
— as installed	
at load of 700-2,700 N (154-595 lbs.)	35 (196)
at load of 5,000-15,000 N (1,102-3,307 lbs.)	124 (694)
Shock absorbers	
Type	Hydraulic cylinder, double-acting type
Max. length mm (in.)	548 (21.6)
Min. length mm (in.)	328 (12.9)
Stroke mm (in.)	220 (8.7)
Damping force [at 0.3 m/sec. (0.984 ft./sec.)]	
Expansion N (lbs.)	1,840 (406)
Compression N (lbs.)	720 (159)

### TORQUE SPECIFICATIONS

Nm (ft.lbs.)

Shackle assembly mounting nuts	45-60 (33-43)
Front pin assembly mounting nuts	45-60 (33-43)
Shock absorber mounting nuts	18-25 (13-18)
Front pin assembly mounting bolts	14-20 (10-14)
U-bolt mounting nuts	85-110 (61-80)



## TROUBLESHOOTING/ COMPONENT SERVICE-REAR SUSPENSION



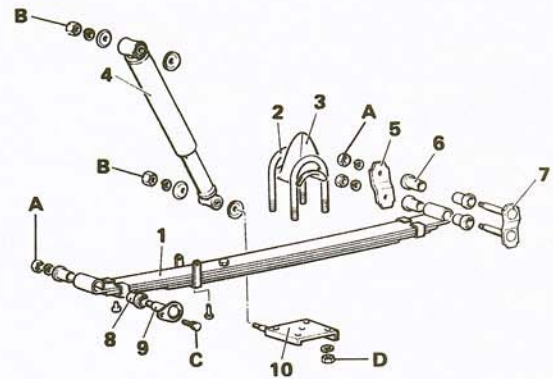
Symptom	Probable cause	Remedy
Abnormal sound	Suspension securing bolt(s) loose Loose wheel nuts	Tighten to specified torque
	Faulty shock absorber Worn bushings Damaged or worn wheel bearings Components bent or distorted Broken spring	Replace damaged parts
	Wheel or tire imbalance	Balance
	Improper tire inflation	Inflate to specification
	Defective tire	Replace
Poor riding comfort	Over-inflated tire	Adjust inflation pressures (Refer to GROUP 22.)
	Malfunctioning shock absorber Deteriorated or broken spring	Replace
Vehicle tilts	Uneven camber Deteriorated or worn bushing Deteriorated or broken spring	Replace

### REAR SUSPENSION COMPONENTS

- |                    |                   |
|--------------------|-------------------|
| 1. Spring assembly | 6. Rubber bushing |
| 2. U-bolt          | 7. Shackle        |
| 3. Bump stopper    | 8. Rubber bushing |
| 4. Shock absorber  | 9. Front pin      |
| 5. Shackle plate   | 10. U-bolt seat   |

	Nm	ft.lbs.
A*	45-60	33-43
B*	18-25	13-18
C	14-20	10-14
D	85-110	61-80

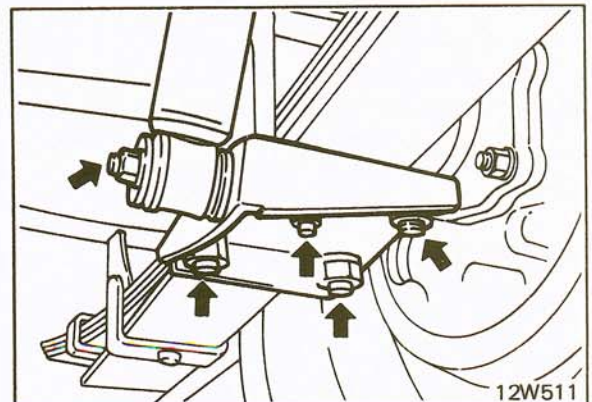
\*To be tightened with vehicle lowered to the ground.



12W503

### REMOVAL

1. Support the vehicle with floor stands positioned on the frame.
2. Remove the wheel.
3. Jack up the rear axle housing so that it is not supported by the spring assembly.
4. Remove the parking brake cable clamp. (Refer to GROUP 5.)
5. Detach the shock absorber from the U-bolt seat. (12W511)
6. Remove the U-bolts, the U-bolt seat, and the bump stopper. (12W511)



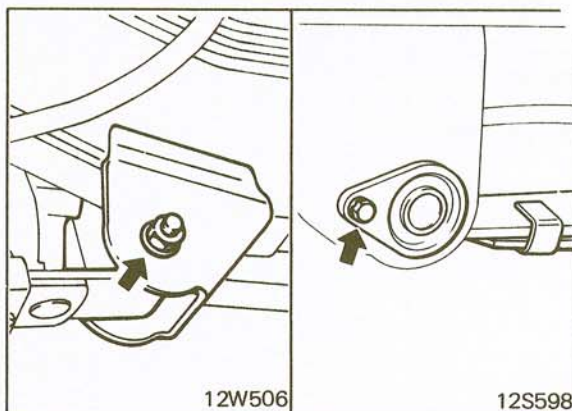
12W511



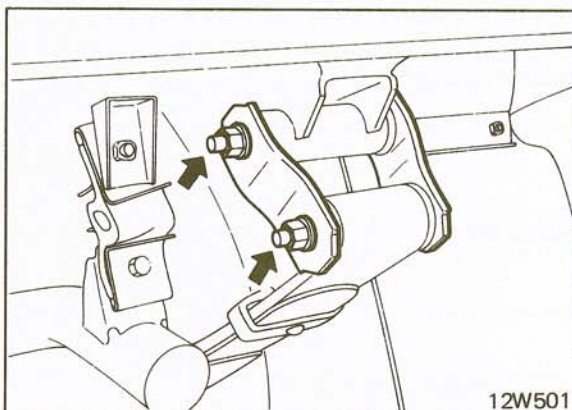


## COMPONENT SERVICE-REAR SUSPENSION

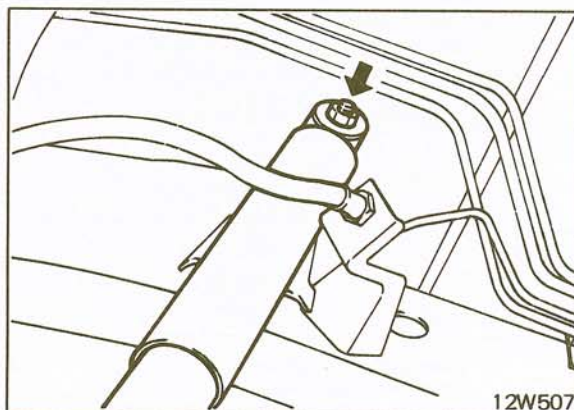
7. Remove the front pin and lower the front end of the spring assembly.



8. Remove the shackle to separate the spring assembly from the side frame.



9. Remove the shock absorber from the side frame. (12W507)
10. Remove the rubber bushings.



### INSPECTION

1. Check shock absorber for damage, fluid leaks and noise.
2. Check leaf spring for deterioration and damage.
3. Check U-bolt for bend.
4. Check rubber bushings for wear and damage.



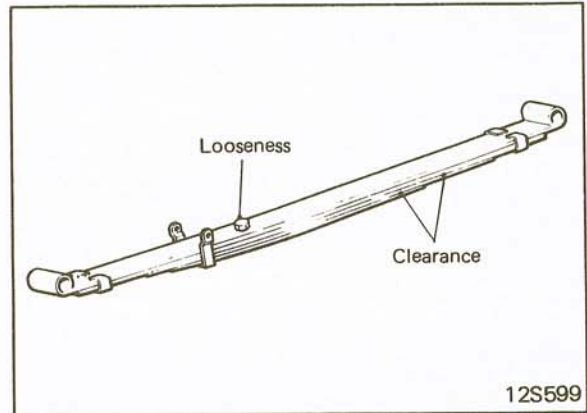


## Checking of the Spring Assembly

1. Check the center bolt for looseness. (12S599)
2. Check to be sure that each spring leaf is correctly in contact with the one above it. (Also check to be sure that the spring leaves are in positive contact with each other at both ends.) (12S599)
3. If loose contact is evident, replace the spring as an assembly.

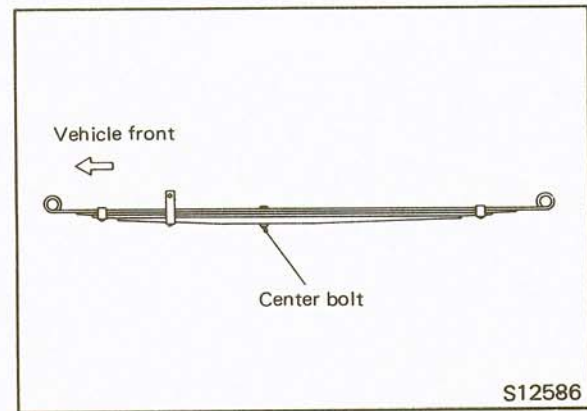
### NOTE

If the spring leaves move, or if there is a clearance between one spring leaf and another, the spring leaves will not absorb shock properly, and could break.

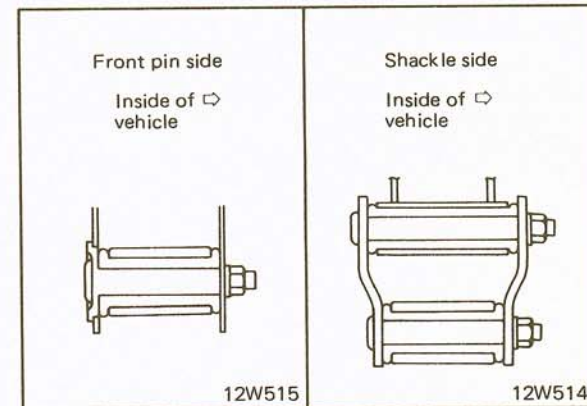


## INSTALLATION

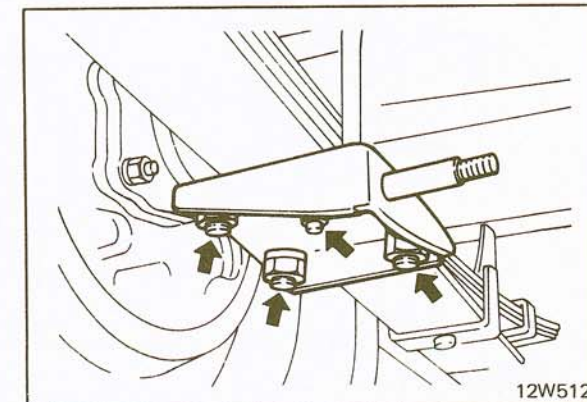
1. Install the spring assembly on the vehicle. Make sure the front end (front pin side) to center bolt distance is shorter than the rear end to center bolt distance.



2. Install the front pin from the outside, toward the inside of vehicle. (12W515)
3. Install the shackle from the outside, toward the inside of vehicle. (12W514)



4. Tighten the U-bolt nuts evenly so that the ends of each bolt protrude an equal amount. (12W512)
5. Loosely install the shock absorber.
6. Tighten components with the vehicle on the ground to eliminate torsion on the bushings.











# STEERING POWER

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## SPECIFICATIONS

### GENERAL SPECIFICATIONS

Steering wheel diameter	mm (in.)	403 (15.9)
Steering shaft type		Collapsible type
Gear box		
Steering gear type		Ball and nut, torsion bar type
Steering gear ratio		16.4
Oil pump		
Oil pump type		Vane type
Displacement		10.5 cc/rev. (0.64 in. <sup>3</sup> /rev.)

### SERVICE SPECIFICATIONS

#### Standard values

##### Steering angle

Inner wheel 33°00'  $\begin{smallmatrix} 0 \\ -3^\circ \end{smallmatrix}$

Outer wheel 29°00'

Steering wheel free play mm (in.) 25 (1.0) or less

Stationary steering effort N (lbs.) 37 (8.2) or less

V belt deflection mm (in.) 9-12 (.35-.47)

Mainshaft starting torque Ncm (in.lbs.) 25-65 (2-6)

Distance between top of balls and rack piston surface mm (in.) 13 (.5)

Cross-shaft end play mm (in.) 0-0.05 (0-.002)

Mainshaft total starting torque Ncm (in.lbs.) 50-90 (4-8)

Oil pump pressure kPa (psi)

Gauge hose valve closed 7,500-8,200 (1,067-1,166)

Gauge hose valve opened 980 (142) or less

Tie rod ends ball joint center distance mm (in.) 297.5 (11.7)

Idler arm turning torque Ncm (in.lbs.) 300-900 (26-78)

Spring scale reading N (lbs.) 25-75 (5.5-16.5)

#### Repair limits

Steering wheel free play mm (in.) 50 (2.0)

Steering gear backlash mm (in.) 0.5 (.02)

#### Service limits

Steering shaft runout mm (in.) 0.5 (.02)

Steering shaft length mm (in.) 750 ± 5 (29.5 ± .2)

Backlash between rack piston ball groove and balls mm (in.) 0.2 (.008)

Free length of flow control spring mm (in.) 36.5 (1.44)

Clearance between oil pump drive shaft and bushing mm (in.) 0.09 (.004)

Ball joint end play mm (in.) 1.5 (.06)

Joint assembly end play mm (in.) 0.2 (.008)





## TORQUE SPECIFICATIONS

Nm (ft.lbs.)

Steering column and shaft	
Steering wheel lock nut	35-45 (26-33)
Column tube clamp	8-11 (6-8)
Dash panel cover	3-5 (2-4)
Joint assembly	30-35 (22-26)
Column bracket	8-12 (6-9)
Special bolt for column bracket	8-11 (6-8)
Power steering gear box	
Side cover	45-55 (33-40)
Adjusting bolt lock nut	30-45 (22-33)
Breather plug	3-4 (2-3)
Pitman arm installation	130-150 (94-108)
Gear box installation	55-65 (40-47)
Ball guides installation	3.5-4.5 (2.5-3.3)
Valve housing	45-55 (33-40)
Lock nut*	180-230 (130-166)*
Oil pump	
Suction plate	6-10 (4-7)
Connector	50-70 (36-51)
Reservoir to reservoir bracket	6-10 (4-7)
Reservoir bracket to oil pump body	18-22 (13-16)
Oil pump bracket to oil pump body	
Front	25-33 (18-24)
Rear	14-21 (10-15)
Oil pump bracket to engine	
Left	27-41 (20-30)
Right	14-21 (10-15)
Oil pump brace bolt	25-33 (18-24)
Pump bracket stay	14-21 (10-15)
Oil pump cover	18-22 (13-16)
Steering hoses	
Pressure hose	30-40 (22-29)
Return hose	40-50 (29-36)
Clamp bolts	8-12 (6-9)
Breather stays	8-12 (6-9)
Steering linkage	
Tie rod ends	45 (33)
Tie rod sockets and relay rod	45 (33)
Relay rod to pitman arm	45 (33)
Relay rod to idler arm	45 (33)
Idler arm and bracket	40-60 (29-43)
Tie rod end studs	65-80 (47-58)
Idler arm bracket and frame	55-65 (40-47)

### NOTE

\*If the special tool is used to measure the torque, the measurement should be 135-175 Nm (98-127 ft.lbs.).





## SPECIFICATIONS

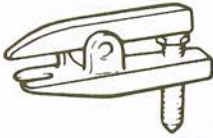

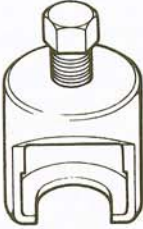

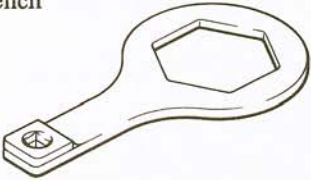
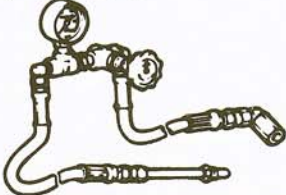


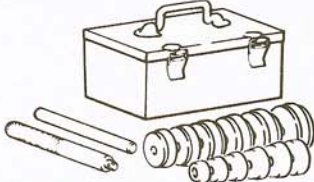
### LUBRICANTS

	Specified lubricants	Quantity
Power steering fluid	Automatic transmission fluid ATF DEXRON or DEXRON II type	900 cc (54.9 in. <sup>3</sup> )
Dash panel cover grommet	Multipurpose grease SAE J310a, NLGI grade #2	As required
Cross-shaft oil seal lip	Multipurpose grease SAE J310a, NLGI grade #2EP	As required
Side cover needle bearing	Multipurpose grease SAE J310a, NLGI grade #2EP	As required
U-packing of side cover	Multipurpose grease SAE J310a, NLGI grade #2EP	As required
Ball joint dust covers	Multipurpose grease SAE J310a, NLGI grade #2EP	As required
Idler arm support and bushings	Multipurpose grease SAE J310a, NLGI grade #2EP	As required



# SPECIAL TOOLS



Tool (Number and name)	Use	Tool (Number and name)	Use
<b>MB990635 “*”</b> Steering linkage puller 	Disconnection of the relay rod	<b>MB990228</b> Preload socket 	Measurement of mainshaft starting torque
<b>MB990809 “*”</b> Pitman arm puller 	Removal of the pitman arm	<b>MB990826 “D”</b> Torx wrench 	Removal and installation of the tilt bracket
<b>MB990852</b> Housing locking nut special wrench 	Removal and installation of the housing lock nut	<b>MB990662</b> Oil pressure gauge 	Measurement of oil pump pressure
<b>MB990853 “*”</b> Top cover remover 	Removal and installation of the top cover	<b>MB990854</b> Snap ring installer 	Installation of the snap ring
<b>MB990925</b> Bearing and oil seal installer set 	Installation of the oil seal and the ball bearing (Refer to GROUP 3.)		

“\*”, “D” see page 2 for instructions.





## TROUBLESHOOTING

Symptom	Probable cause	Remedy
Steering wheel return malfunction	Steering components damaged Incorrect tire pressure Steering components binding	Replace Adjust the tire pressure Repair or replace
Steering operation is "heavy"	Incorrect tire pressure	Adjust the tire pressure
	Loose belt	Adjust the belt tension
	Damaged belt	Replace the belt
	Low fluid level	Replenish fluid
	Air in fluid line	Bleed the system
	Restricted hose(s)	Correct the hose routing or replace the hose(s)
	Fluid leakage	Locate and correct
	Incorrect wheel alignment (especially caster)	Adjust the wheel alignment
	Binding linkage ball joint	Check the ball joint turning torque, and replace the ball joint if necessary
	Malfunction of gear box	Check, and replace the gear box if necessary
Steering wheel pulls to one side	Malfunction of oil pump	Check the oil pump pressure, and repair oil pump(Refer to p. 19-12.)
	Excessive steering wheel play	Adjust the steering wheel play
	Insufficient tire inflation pressure	Adjust the tire pressure (Refer to GROUP 22)
	Unevenly worn or deformed tire(s)	Rotate the wheels or replace the tire(s) (Refer to GROUP 22)
	Dragging brakes	Adjust (Refer to GROUP 5)
	Deteriorated or broken front spring Distorted knuckle arm	Replace
	Incorrect wheel alignment	Adjust the wheel alignment (Refer to GROUP 2)
	Damaged wheel bearing	Replace
	Distorted or loose lower arm	Retighten or replace (Refer to GROUP 2)
	Loose linkage joints	Retighten
	Worn or damaged ball joints Deteriorated or broken lower arm bushing	Replace
	Incorrect installation or internal damage of gear box	Correct or replace



# TROUBLESHOOTING



Symptom	Probable cause	Remedy
Steering wheel pulls to one side (continued)	Malfunction of shock absorber	Replace
	Uneven wheel base (between right side and left side)	Adjust the body alignment (Refer to GROUP 13)
Steering wheel vibrates	Insufficient tire inflation pressure	Adjust the tire pressure (Refer to GROUP 22)
	Unevenly worn or deformed tire(s)	Rotate the wheels or replace the tire(s) (Refer to GROUP 22)
	Loose hub nut	Retighten (Refer to GROUP 2)
	Excessive runout, or unbalance of tire and wheel	Adjust the wheel balance, or replace wheel(s) and/or tire(s) (Refer to GROUP 22)
	Poor wheel alignment	Adjust the wheel alignment (Refer to GROUP 2)
	Damaged wheel bearing	Replace
	Distorted or loose lower arm	Retighten or replace (Refer to GROUP 2)
	Bent or damaged linkage	Repair or replace
	Loose linkage joints	Retighten
	Worn or damaged ball joints	Replace
	Malfunction of front suspension	Check and adjust; replace the parts if necessary (Refer to GROUP 2)
	Incorrect installation or internal damage of gear box	Correct or replace
	Malfunction of shock absorber	Replace
	Loose joint assembly	Retighten
Road shock is felt in steering wheel	Insufficient steering wheel play	Adjust the steering wheel play
	Insufficient tire inflation pressure	Adjust the tire pressure (Refer to GROUP 22)
	Unevenly worn or deformed tire(s)	Rotate the wheels or replace the tire(s)
	Malfunction of shock absorber	Replace
Poor recovery of steering wheel to straight ahead position	Insufficient tire inflation pressure	Adjust the tire pressure (Refer to GROUP 22)
	Excessive mainshaft preload	Adjust the preload
	Stuck or damaged ball joint	Replace
	Improper wheel alignment angles	Adjust the wheel alignment (Refer to GROUP 2)





## TROUBLESHOOTING

Symptom	Probable cause	Remedy
Poor recovery of steering wheel to straight ahead position (continued)	Seizure of steering shaft bearing Seizure of steering column bearing	Lubricate or replace
Rattling noise	Loose installation of oil pump or gear box	Retighten the oil pump or gear box
	Steering linkage looseness or play	Retighten or replace the steering linkage
	Loose oil pump pulley nut	Retighten the oil pump pulley nut
	Interference around column or between pressure hose and other parts	Correct, or replace the pressure hose and the parts around the column
	Abnormal noise inside gear box or oil pump	Replace the gear box or oil pump
Shrill noise	Air sucked into oil pump	Check the oil level and hose clips; bleed the system or replace the oil pump
	Oil pump seizure	Replace the oil pump
Squealing noise	Loose belt	Adjust the belt tension
	Oil pump seizure	Replace the oil pump
Hissing noise	Air sucked into oil pump	Check the oil level and hose clips; bleed the system
	Damage to the gear box port section	Replace the gear box
	Malfunction of return hose	Replace the hose
Whistling noise	Malfunction of gear box port section	Replace the gear box
Droning noise	Loose mounting bolt on oil pump or oil pump bracket	Retighten the pump bracket or pump mounting bolt
	Poor condition of oil pump body*	Replace the oil pump
Squeaking noise	Malfunction of steering stopper contact	Check and adjust the steering stopper
	Interference of wheel with vehicle body	Adjust the steering angle
	Interference of steering shaft and joint assembly with other parts	Reposition the interfering parts
	Malfunction of gear box	Replace the gear box
Vibration**	Air suction	Bleed the system
	Malfunction of gear box	Replace the gear box

### NOTE

\* A slight beating noise is produced by the oil pump; this is not a malfunction. (This noise occurs particularly during stationary steering effort.)

\*\* A slight vibration may be felt during stationary steering effort due to the condition of the road surface. To check whether the vibration is a problem or not, test drive the vehicle on a dry concrete or asphalt surface. Moreover, a very slight amount of vibration is not a malfunction.



## TROUBLESHOOTING



Symptom	Probable cause	Remedy
Oil leakage from hose connections	Improperly tightened flare nut	Check, and repair or replace
	Incorrectly inserted hose	
	Improperly clamped hose	
Oil leakage from hose assembly	Damaged or clogged hose	Replace
	Hose connector malfunction	
Oil leakage from oil reservoir	Leaking reservoir	Replace
	Improperly welded pipe	
Oil leakage from oil pump	Overflow	Bleed the system or adjust the oil level
	Malfunction of oil pump housing	Replace the oil pump
	Malfunction of O-ring and/or oil seal	Replace the O-ring and oil seal
Oil leakage from gear box	Malfunction of gear box housing (including leakage from air hole)	Replace the gear box
	Malfunction of O-ring and/or oil seal	Replace the O-ring and oil seal

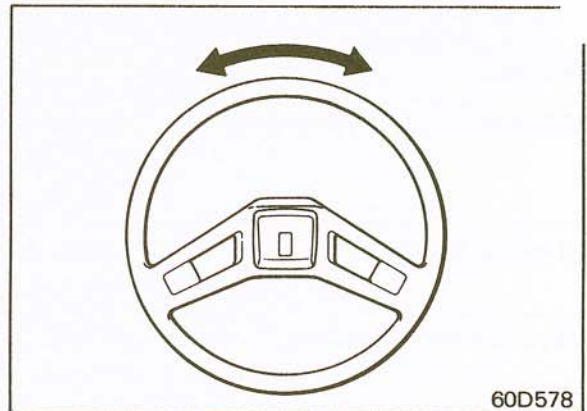




### CHECKING STEERING WHEEL FREE PLAY

1. With the engine turned off and the steering wheel in the straight-ahead position, apply a force of 5 N (1.1 lbs.) to the steering wheel in the peripheral direction.
2. Measure the play at the circumference of the steering wheel. (60D578)

Steering wheel free play [Repair limit] .....  
50 mm (2.0 in.)

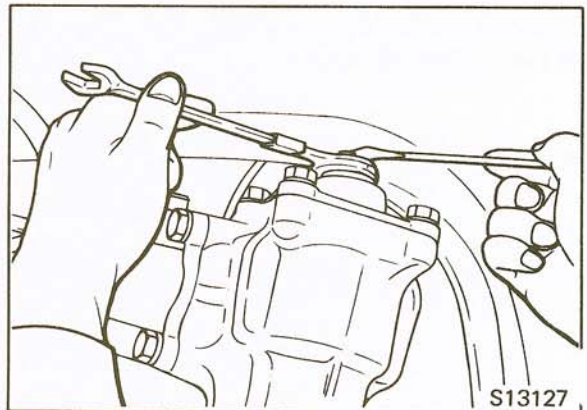


3. If the measured value exceeds the repair limit, screw in the cross-shaft adjusting bolt until the steering wheel free play meets specifications. (S13127)

#### Caution

If the adjusting bolt is overtightened, more steering effort will be required and return of the wheel will be adversely affected.

Mainshaft starting torque .....  
25-65 Ncm (2-6 in. lbs.)

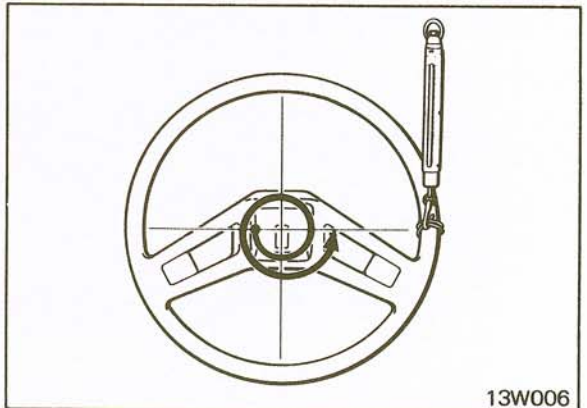


4. If steering wheel free play cannot be adjusted to meet specifications, check the mainshaft or steering linkage ball joint for wear.

### CHECKING STATIONARY STEERING EFFORT

1. Position the vehicle on a level surface with the steering wheel in the straight-ahead position.
2. Run the engine at 1,000 rpm.
3. Measure the turning force with a spring scale by turning the steering wheel clockwise and counterclockwise one and a half turns. (13W006)

Stationary steering effort ..... 37 N (8.2 lbs.)



4. If the stationary steering effort exceeds the standard value, check for belt looseness, damage, insufficient oil, air mixed into oil, collapsed or twisted hoses, etc., and repair as necessary.

### CHECKING STEERING WHEEL RETURN TO CENTER

1. To check for the return of steering wheel to center, during a test drive, check the following points.
2. Make both gentle and sharp turns and check to get a feel that there is no appreciable difference either in steering effort or return to center between right and left turns.

#### NOTE

When the steering wheel is turned abruptly, momentary hard steering might result, but this does not indicate a problem, since it is caused by low oil pump delivery during idling.



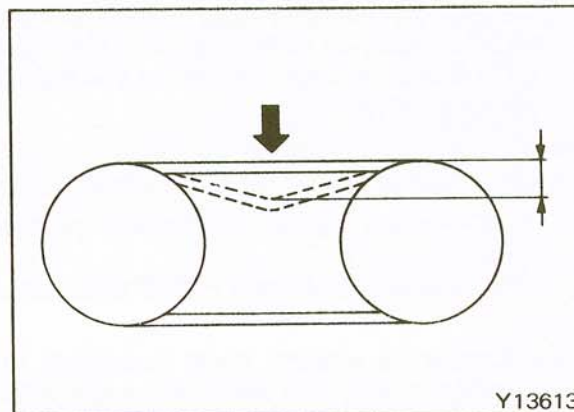


## CHECKING POWER STEERING BELT TENSION

1. Check the belt for looseness by applying pressure of 100 N (22 lbs.) to the center of the belt. (Y13613)

V belt deflection ..... 9-12 mm (.35-.47 in.)

2. If the measured value exceeds the standard value, adjust the belt tension.



Y13613

## CHECKING FLUID LEVEL

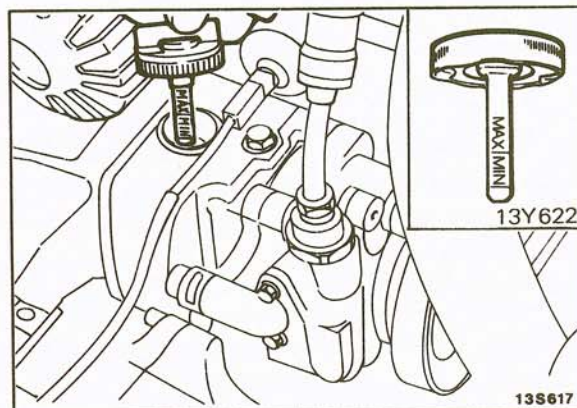
1. Start the engine on a level surface, and turn the steering wheel several times fully to the right and left while the engine is idling, and then check the fluid for contamination.

### NOTE

Replace the fluid if it has bubbles or is somewhat white in color.

2. Fill the reservoir to the MAX level with the specified automatic transmission fluid. (13Y622, 13S617)

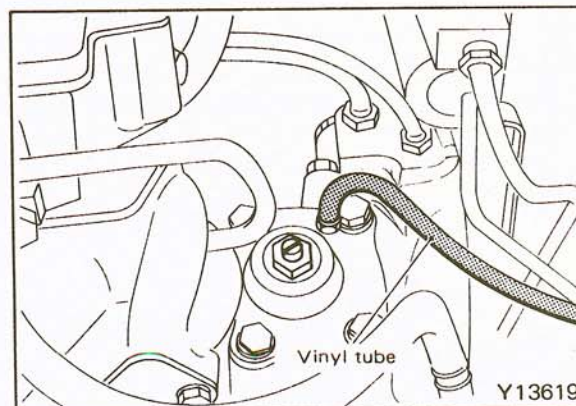
Specified fluid .....  
Automatic transmission fluid ATF DEXRON  
or DEXRON II type



## BLEEDING

Check the stationary steering effort. If it is not within the range of the standard value, it is possible that there is air in the system. Bleed the system.

1. Make certain the reservoir is full.
2. Jack up the front wheels.
3. Disconnect and ground the coil high tension cable.
4. Crank the engine with the starter motor while turning the steering wheel completely to the right and left. Repeat several times.
5. Lower the front wheels.
6. Connect one end of a clear vinyl hose to the breather plug on the gear box, and place the other end in a container. Start the engine and run at idle speed.



Y13619





7. Loosen the breather plug and then turn the steering wheel completely to the right and left continuously until air bubbles no longer appear in the fluid coming out of the tube. (Y13620)

### NOTE

Do not allow the power steering reservoir to run dry.

8. After bleeding, tighten the breather plug and remove the tube.
9. Check the fluid level, and refill if necessary.

### NOTE

When turning the steering wheel completely to the right and left, check that the fluid level fluctuation is less than 4 mm (.16 in.) at a constant temperature.

### OIL PUMP PRESSURE TEST

1. Disconnect the pressure hose from the oil pump and connect the special tool as illustrated. (C13692)

### NOTE

Use the adapter to connect the special tool to the pump.

2. Bleed the power steering system.
3. Start the engine and operate it until the fluid temperature reaches about 55°C (131°F).
4. Run the engine at 1,000 rpm.
5. Completely close the shut-off valve of the special tool and read the gauge pressure.

### Caution

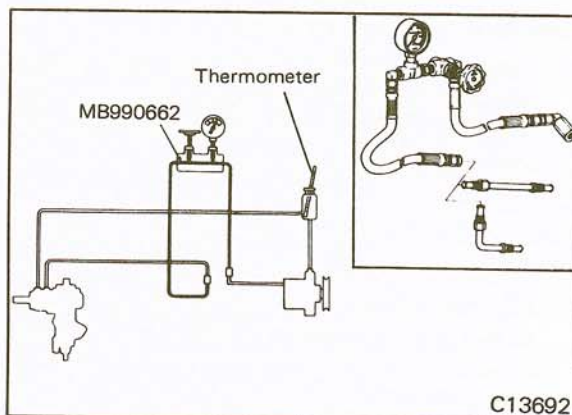
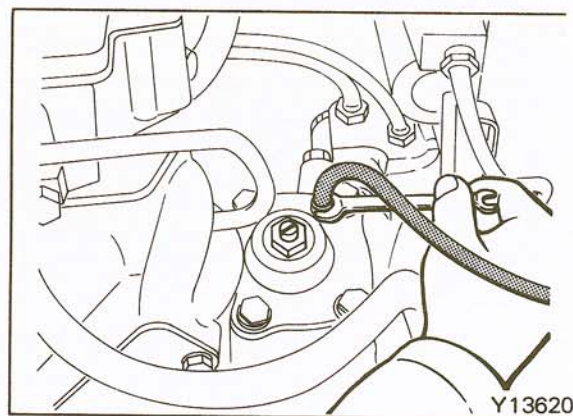
Do not close the shut-off valve of the special tool for more than 3 seconds.

If the hydraulic pressure is not within the range of the standard value, replace the oil pump.

#### Oil pump pressure

Valve closed	7,500-8,200 kPa (1,067-1,166 psi)
Valve opened	980 kPa (142 psi) or less

6. Completely open the shut-off valve of the special tool and read the gauge pressure. If the hydraulic pressure is not within the range of the standard value, check for a clogged or collapsed oil line, or for a clogged oil passage inside the gear box.
7. With the shut-off valve of the special tool completely open, and turn the steering wheel completely to the right or left, then measure the maximum oil pressure in this condition. If the maximum oil pressure is not within the range of the standard value, (valve closed) the valve of the gear box is faulty, and the gear box must be replaced.



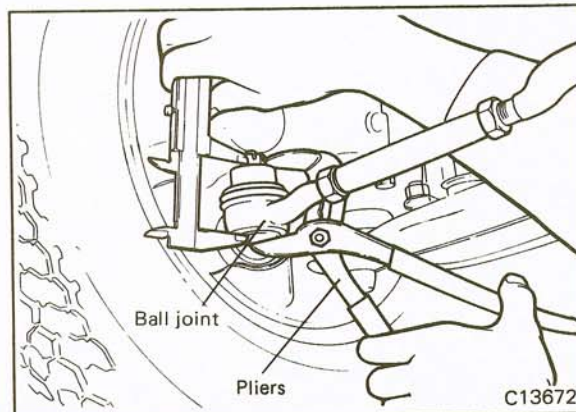




## HECKING BALL JOINT END PLAY

Grip the ball joint with pliers and, compressing the stud fully, measure the deflection.

Ball joint end play [Service limit] .....  
1.5 mm (.06 in.)



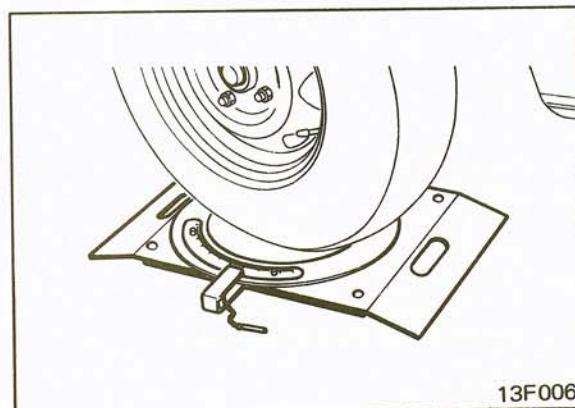
## CHECKING STEERING ANGLE

1. Place the front wheel on a turning radius gauge and measure the steering angle.

Steering angle

Inner wheel .....  $33^{\circ}00' - \frac{0}{3}$

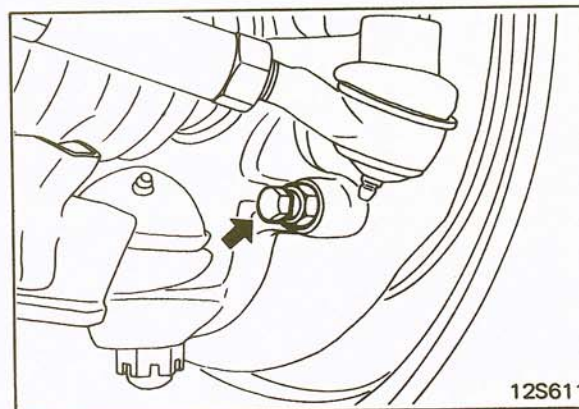
Outer wheel .....  $29^{\circ}00'$



2. Adjust the steering angle of each wheel by turning the stop bolt of the knuckle arm.

### Caution

Be sure that the toe-in is properly adjusted before adjusting the steering angle.



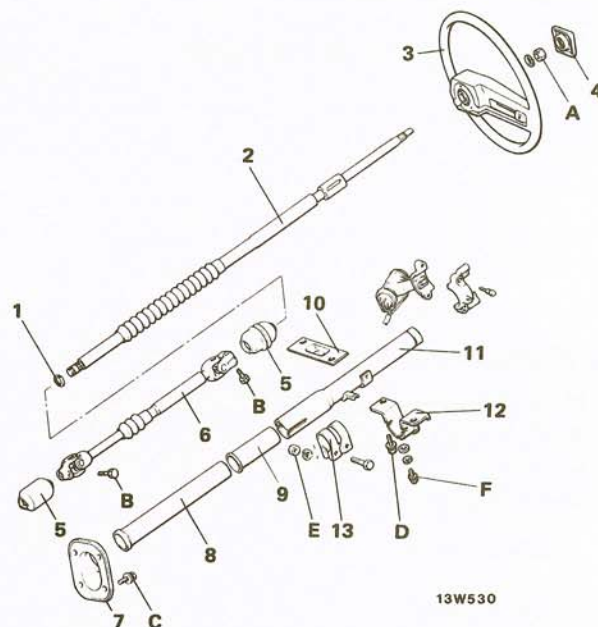




## COMPONENTS

1. Snap ring
2. Steering shaft
3. Steering wheel
4. Center pad
5. Boot
6. Joint assembly
7. Dash panel cover
8. Column tube, lower
9. Column bushing
10. Column support
11. Column tube, upper
12. Column bracket
13. Column tube clamp

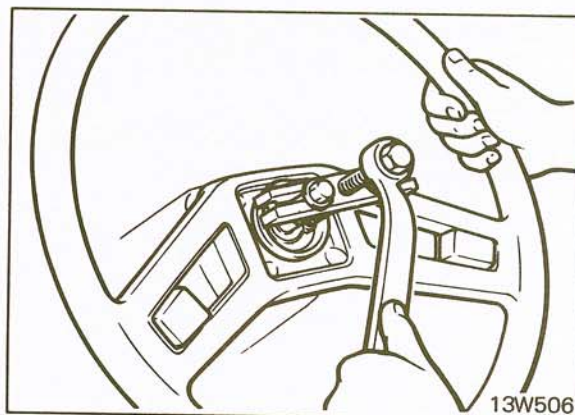
	Nm	ft.lbs.
A	35-45	26-33
B	30-35	22-26
C	3-5	2-4
D	8-12	6-9
E	8-11	6-8
F	8-11	6-8



13W530

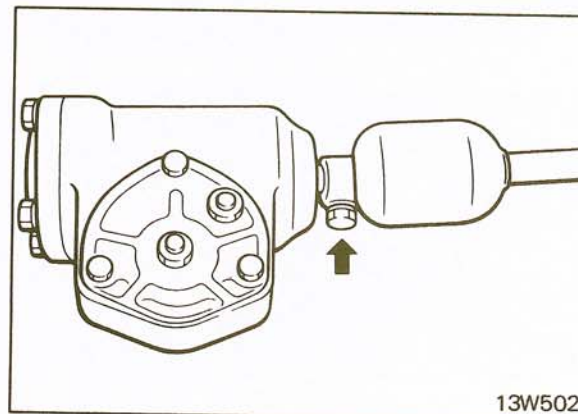
## REMOVAL

1. Remove the center pad.
2. Remove the steering wheel. (13W506)
3. Remove the instrument cluster.
4. Remove the column cover and then remove the column switch assembly.
5. Remove the heater duct. (Refer to GROUP 24.)
6. Loosen the dash panel cover.



13W506

7. Disconnect the joint assembly from the steering gear box.

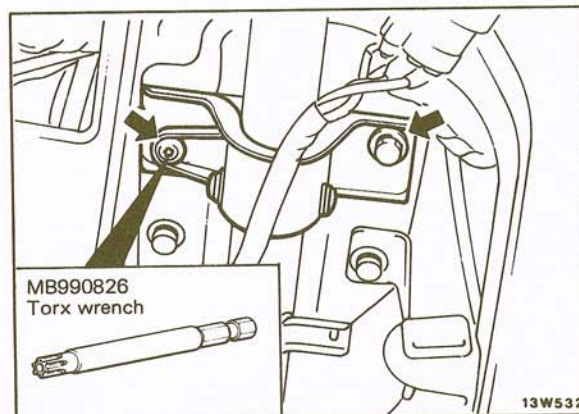


13W502



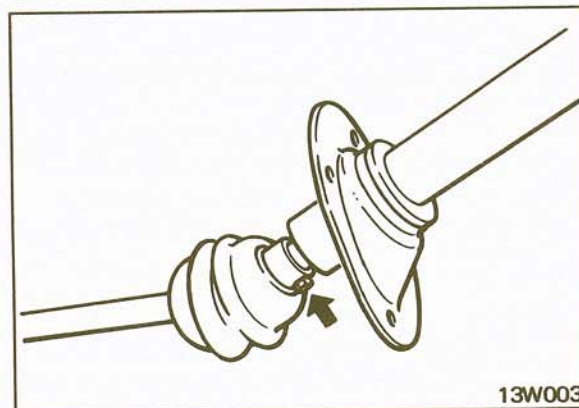


Remove the Torx bolt and the clamping bolts of the column support, and remove the steering column assembly.

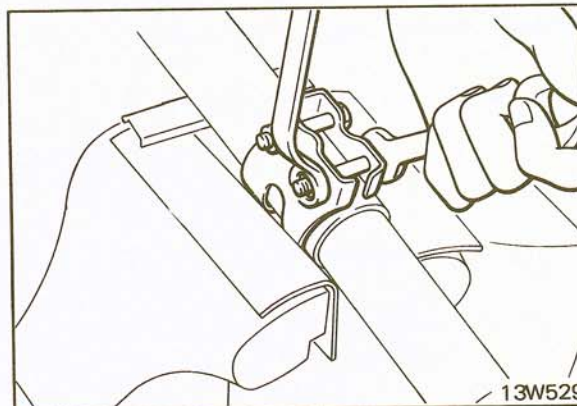


## DISASSEMBLY

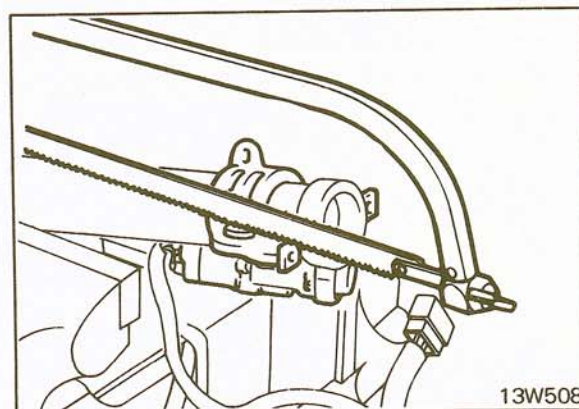
1. Disconnect the joint assembly from the steering shaft.



2. Undo the column tube clamp, and then separate the upper column tube from the lower column tube. (13W529)
3. Unlock the steering lock and remove the steering shaft from the lower column tube.
4. Remove the dash panel cover from the lower column tube.



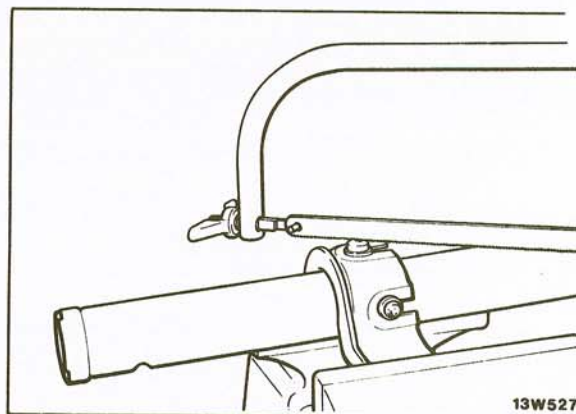
5. If it is necessary to remove the steering lock, cut a groove on the head of each special bolt with a metal saw, and remove the steering lock with a screwdriver.







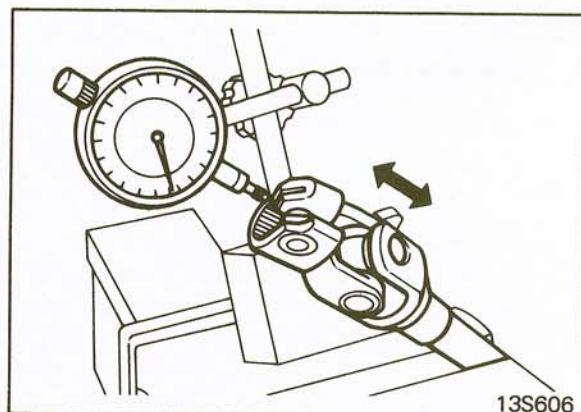
6. If it is necessary to remove the column bracket of the upper tube, cut a groove on the head of each special bolt with a metal saw, and remove the column bracket with a screwdriver.



### INSPECTION

1. Check tilt bracket for cracks or damage.
2. Check column bushing for damage.
3. Check dash panel cover for damage.
4. Check steering shaft bearing for wear.
5. Check steering shaft for length, damage and deformation.

Steering shaft runout [Service limit] .....	0.5 mm (.02 in.)
Steering shaft length [Service limit] .....	745 (29.33 in.)

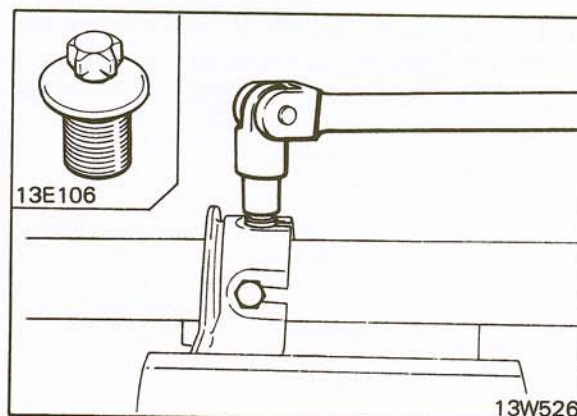


6. Check joint assembly for end play. (13S606)

Joint assembly end play [Service limit] .....	0.2 mm (.008 in.)
---	-------------------

### REASSEMBLY

1. When mounting the column bracket onto the column, tighten the special bolts until the heads twist off.

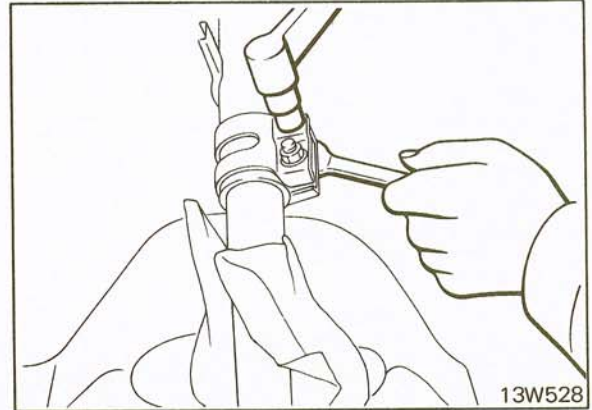






Attach the column bushing to the upper and lower column tubes, and then tighten the column tube clamp bolts to the specified torque. (13W528)

Column tube clamp bolts tightening torque . . . . .  
8-11 Nm (6-8 ft.lbs.)

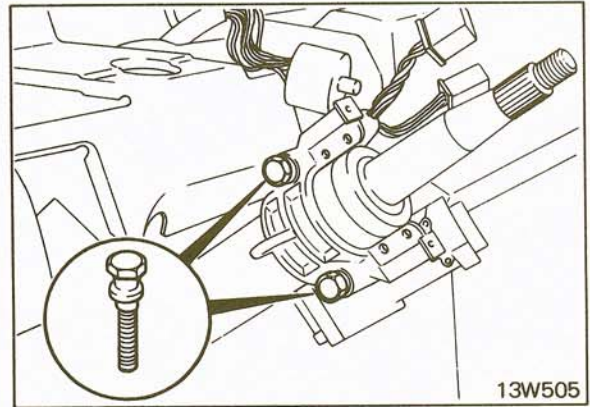


13W528

- When installing the steering lock onto the column, install it loosely in alignment with the column boss and check that it works properly, and then tighten the special bolts until the heads twist off. (13W505)

- Apply the specified multipurpose grease to the dash panel cover grommet. (13S620)

Recommended multipurpose grease . . . . .  
SAE J310a, NLGI grade #2



13W505

## INSTALLATION

- Loosely connect the joint assembly to the steering shaft and to the steering gear box.

### Caution

Install the boot with the bellows toward the steering column. Also, be sure that the boots are not damaged by the bolts when the joint assembly is installed.

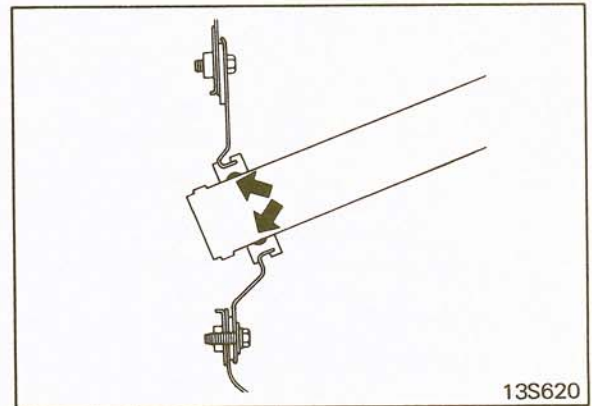
- Install the column assembly to pedal support.
- Tighten the joint assembly bolt.
- Attach the dash panel cover and apply sealant around the bolt holes. (13S694)

### Caution

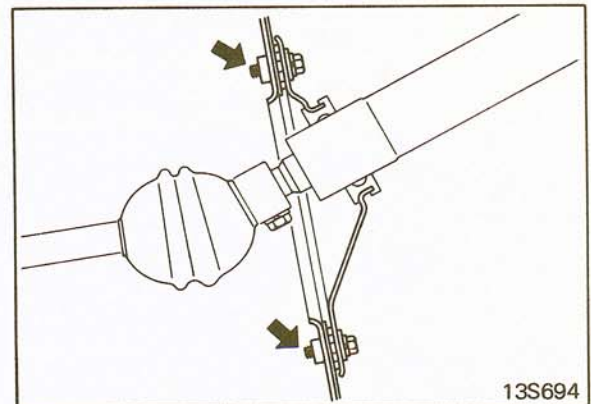
Do not loosen the column tube clamp bolts. If the clamp bolts should be loosened, retighten them securely while pulling the steering shaft out fully toward the interior side.

- Position the front wheels in the straight-ahead position and install the steering wheel.
- Tighten the steering wheel lock nut to the specified torque.

Steering wheel lock nut tightening torque . . . . .  
35-45 Nm (26-33 ft.lbs.)



13S620



13S694

### NOTE

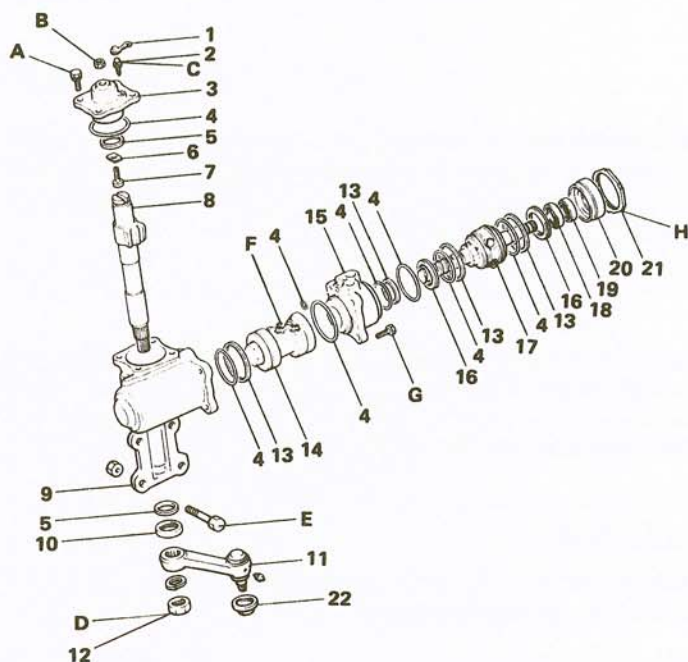
Check to be sure that when the steering wheel is turned clockwise or counterclockwise and returned, the turn signal is automatically released.





## COMPONENTS

1. Breather plug cap
2. Breather plug
3. Side cover
4. O-ring
5. U-packing
6. Adjusting plate
7. Adjusting bolt
8. Cross-shaft
9. Gear box housing
10. Oil seal
11. Pitman arm
12. Nut
13. Seal ring
14. Rack piston
15. Valve housing
16. Needle thrust bearing
17. Mainshaft
18. Ball bearing
19. Oil seal
20. Top cover
21. Valve housing lock nut
22. Dust cover

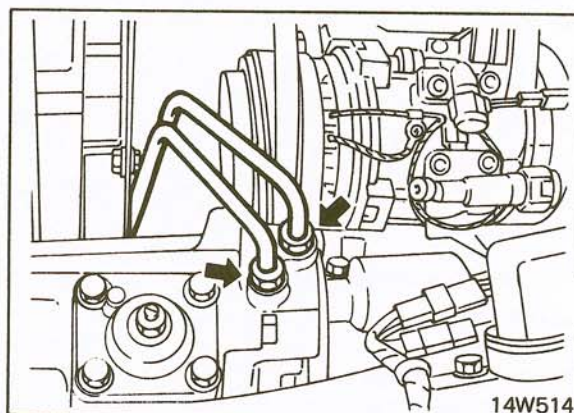


	Nm	ft.lbs.
A	45-55	33-40
B	30-45	22-33
C	3.0-4.0	2-3
D	130-150	94-108
E	55-65	40-47
F	3.5-4.5	2.5-3.3
G	45-55	33-40
H	180-230	130-166

13W521

## REMOVAL

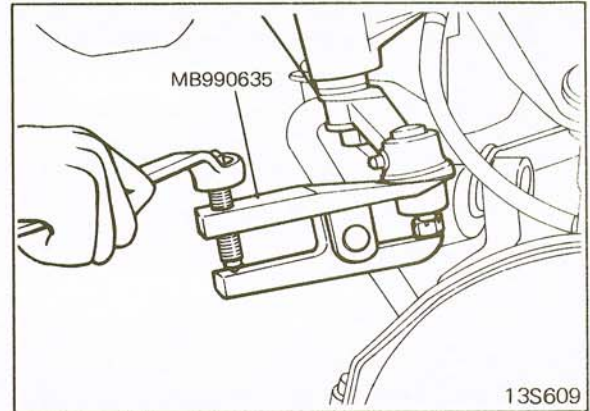
1. Remove the clamp bolt which connects the joint assembly to the gear box mainshaft.
2. Disconnect the pressure hose and return hose from the gear box. (14W514)



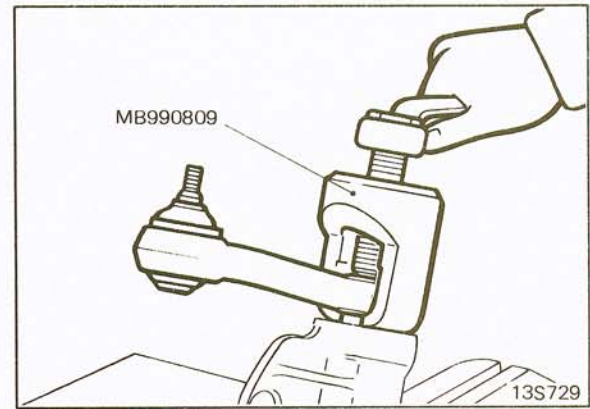




Disconnect the pitman arm from the relay rod with the special tool shown in the illustration.



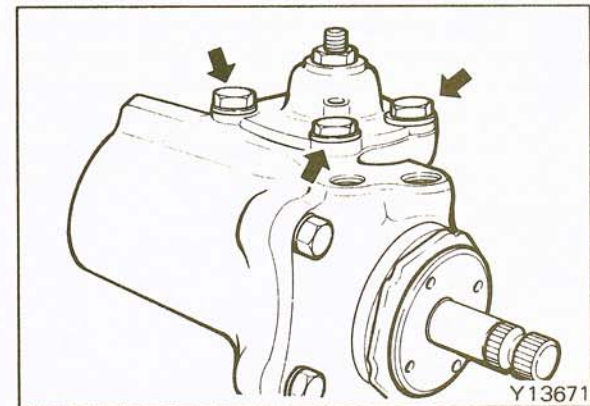
4. Remove the gear box assembly.
5. Remove the pitman arm from the gear box assembly with the special tool shown in the illustration. (13S729)



## SEALS REPLACEMENT

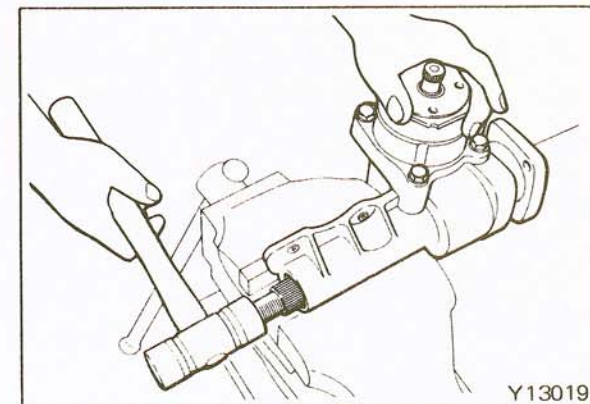
### Side Cover and Gear Box Housing

1. Place the mainshaft and cross-shaft in the straight-ahead position.
2. Remove the breather plug, and drain off the steering gear oil.
3. Remove the side cover attaching bolts. (Y13671)
4. Remove the lock nut of the adjusting bolt, and screw in the adjusting bolt so that the side cover rises slightly.
5. Tap the bottom of the cross-shaft with a plastic hammer to remove the cross-shaft and the side cover. (Y13019)
6. Remove the side cover from the cross-shaft by turning the adjusting bolt.



### Caution

Do not lose the needle bearing rollers.

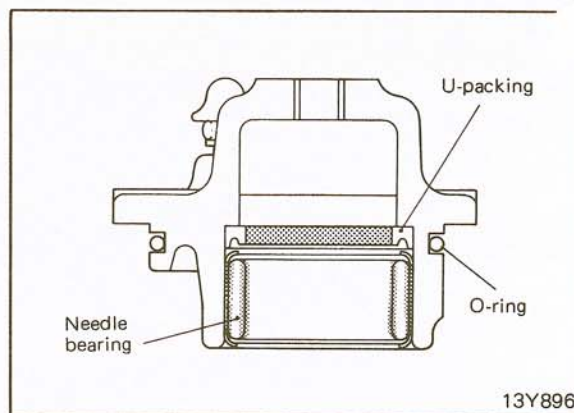




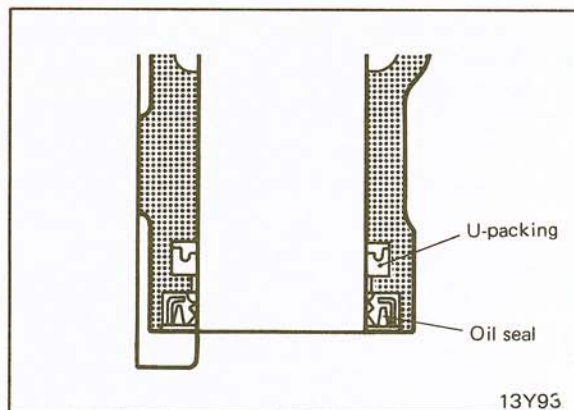


## COMPONENT SERVICE-POWER STEERING GEAR BOX

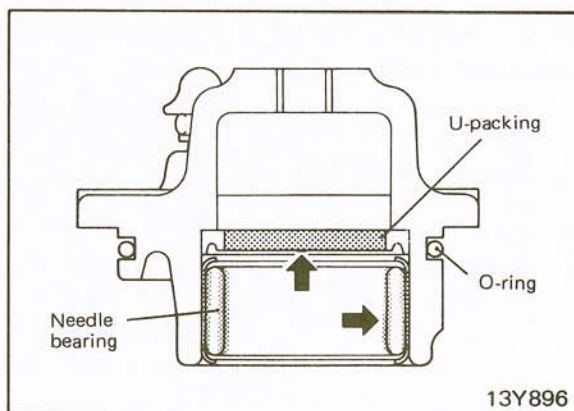
7. Remove the needle rollers from the side cover. (13Y896)
8. Remove the O-ring and U-packing from the side cover.



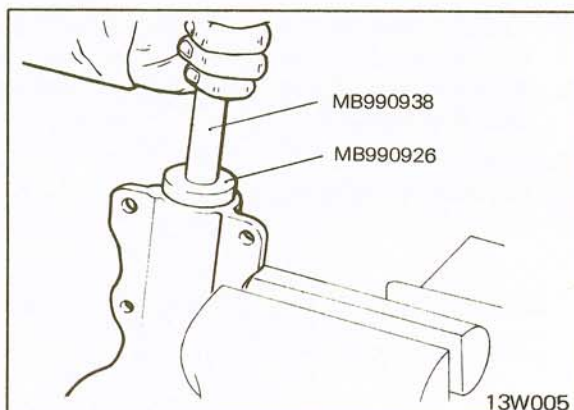
9. Remove the oil seal and U-packing from the gear box housing.



10. Apply specified multipurpose grease to the seal surface of the U-packing and fit it into the side cover. (13Y896)
11. Apply specified automatic transmission fluid to the O-ring, and attach it to the side cover.
12. Install the needle rollers into the side cover.
13. Apply specified multipurpose grease to the needle rollers.



14. Apply specified multipurpose grease to the seal surface of the U-packing, and fit it into the gear box housing.
15. Apply specified automatic transmission fluid to the oil seal lip, and press it into the gear box housing with the special tools. (13W005)



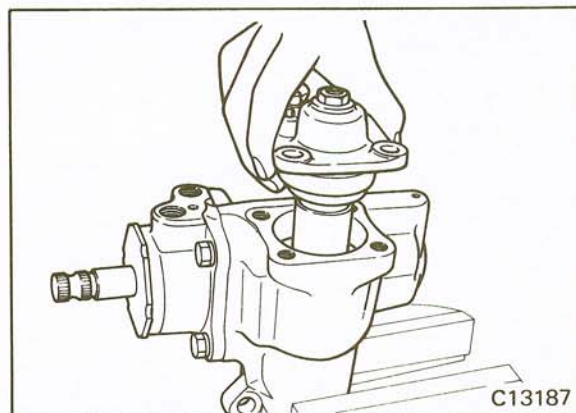




- j. Attach the side cover to the cross-shaft and temporarily tighten the adjusting bolt lock nut.
17. Install the cross-shaft assembly (with the side cover) to the gear box. (C13187)

## Caution

1. Do not rotate the side cover during installation.
2. Take care not to damage the cross-shaft oil seal.



18. While turning the adjusting bolt, measure the mainshaft total starting torque by using the special tool. (Y13631)

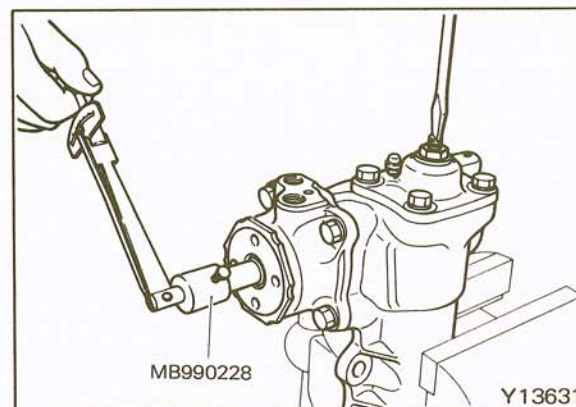
Mainshaft total starting torque .....  
50-90 Ncm (4-8 in.lbs.)

## NOTE

Position the mainshaft in the center position during measurement.

19. Tighten the adjusting bolt lock nut to the specified torque.

Lock nut tightening torque .....  
30-45 Nm (22-33 ft.lbs.)



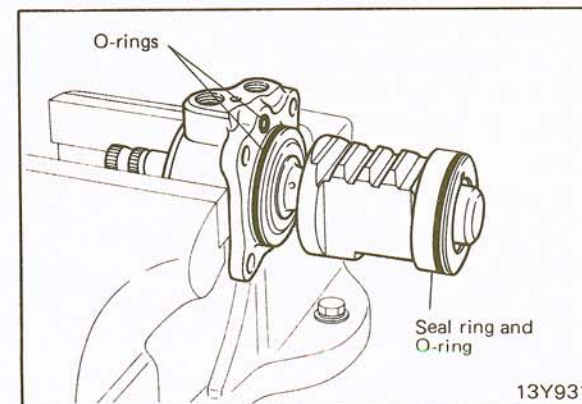
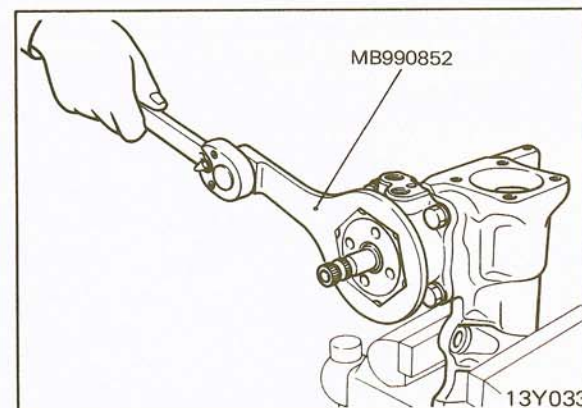
## Valve Housing and Top Cover

1. Remove the cross-shaft assembly. (Refer to p. 19-19.)
2. Remove the valve housing lock nut with the special tool as illustrated. (13Y033)
3. Remove the valve housing bolts and remove the valve housing and rack piston while holding the rack piston by hand to avoid rotation.

## Caution

Do not hold housing with rack piston facing downward, otherwise the rack piston will fall off, scattering the steel balls.

4. Remove the O-ring and seal ring from the rack piston and remove O-rings from the valve housing.

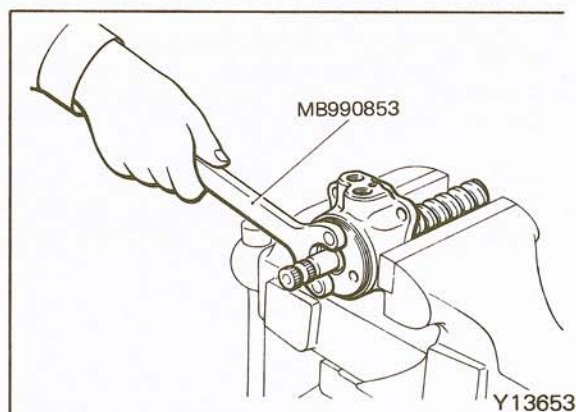




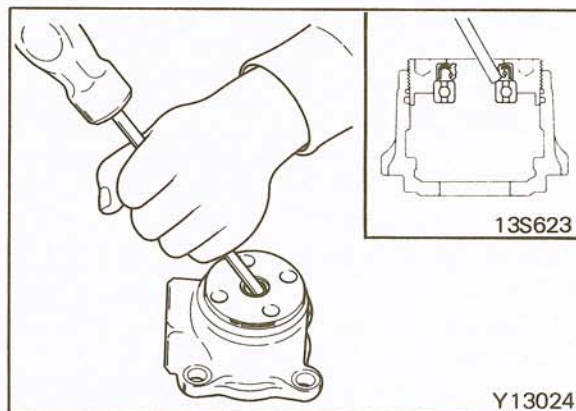


## COMPONENT SERVICE-POWER STEERING GEAR BOX

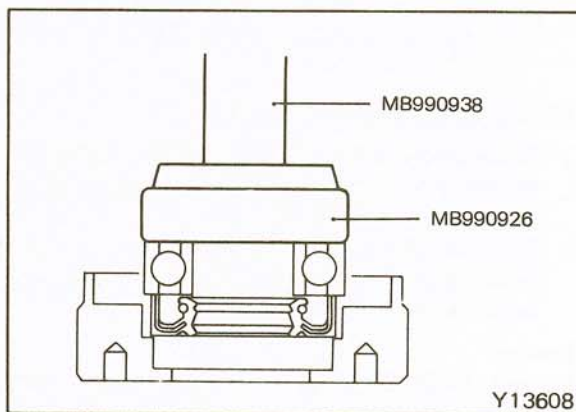
5. Remove the top cover from the valve housing with the special tool.



6. Remove the ball bearing and the oil seal with a punch.



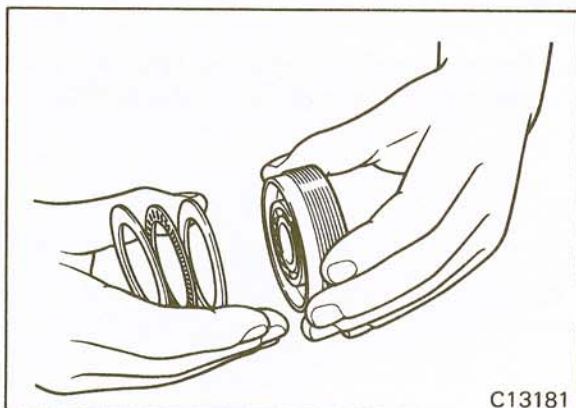
7. Apply specified multipurpose grease to the new oil seal, then press the oil seal and ball bearing into the top cover with special tools.



8. Install the thinner thrust plate, needle thrust bearing and thicker thrust plate into the top cover in the order shown in the illustration. (C13181)
9. Attach the top cover to the valve housing.

### Caution

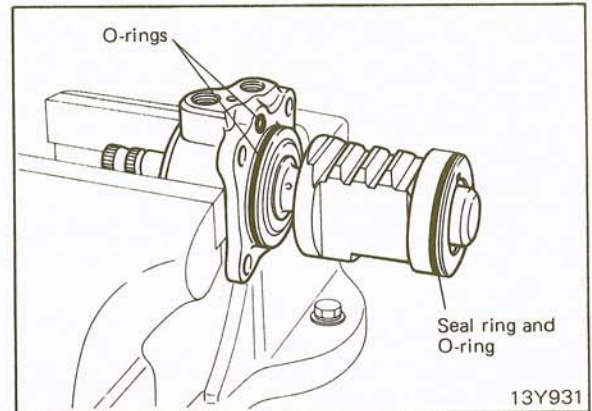
Be careful that the thrust plates and the needle thrust bearing do not come off the top cover.







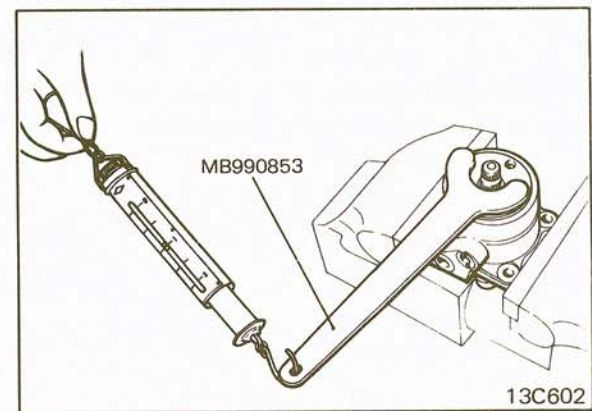
10. Apply specified automatic transmission fluid to the new O-rings and new seal ring, then install them onto the rack piston and valve housing.



11. In order to fit in the assembly parts, use the special tool and a spring scale, and tighten the top cover until the force becomes 62-83 N (14-19 lbs.). Then turn the top cover lock nut until the force becomes 0 N (0 lbs.).

## Caution

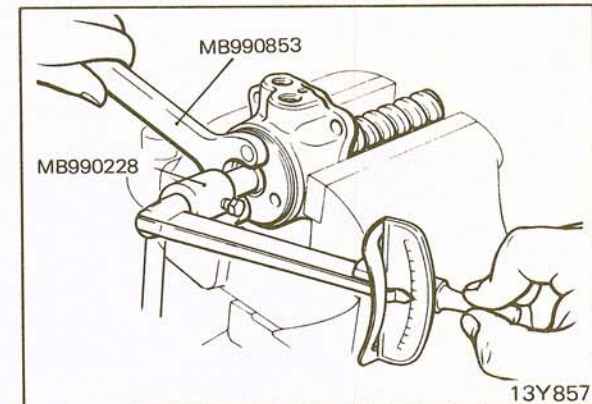
After tightening the top cover lock nut, rotate the mainshaft to confirm that there is no binding or abnormal noise.



12. Measure the mainshaft starting torque with the special tools as illustrated. (13Y857)
13. Tighten the top cover until the mainshaft starting torque is 20-30 Ncm (1.8-2.7 in.lbs.) greater than the measured value.

## NOTE

Tighten the top cover gradually while measuring the starting torque.

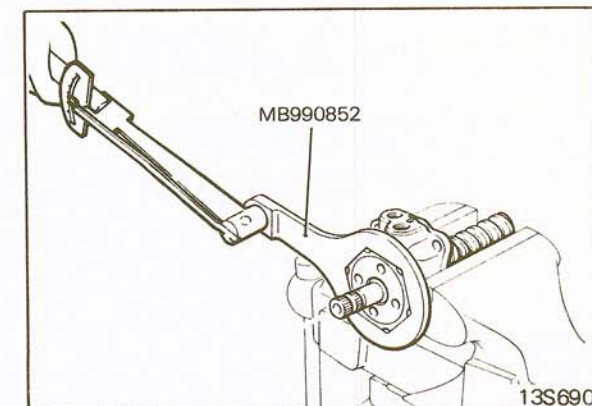


14. Tighten the valve housing lock nut to the specified torque with the special tool as illustrated.

Lock nut tightening torque	180-230 Nm (130-66 ft.lbs.)
With special tool attached	135-175 Nm (98-127 ft.lbs.)

## Caution

Be sure that the top cover does not turn with the lock nut.



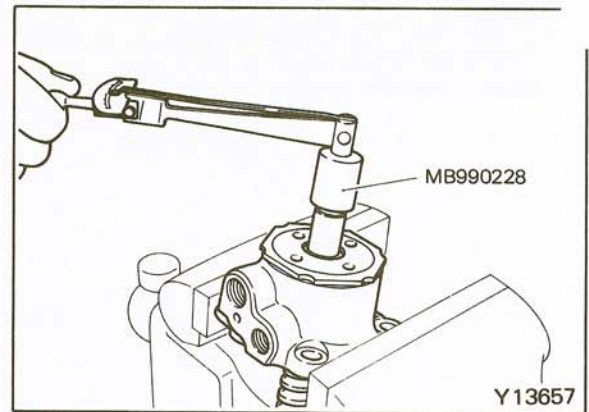




## COMPONENT SERVICE-POWER STEERING GEAR BOX

15. Measure the mainshaft starting torque by using the special tools as illustrated. If the measured mainshaft starting torque does not comply with the standard value, remove the valve housing lock nut and adjust the tightening of the top cover.

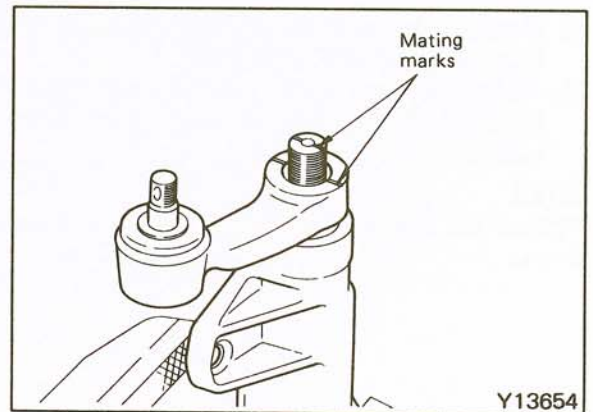
Mainshaft starting torque .....  
25-65 Ncm (2-6 in.lbs.)



16. Install valve housing assembly and cross-shaft assembly to the gear box housing.  
17. Adjust the mainshaft total starting torque and tighten the adjusting bolt lock nut. (Refer to p. 19-21.)

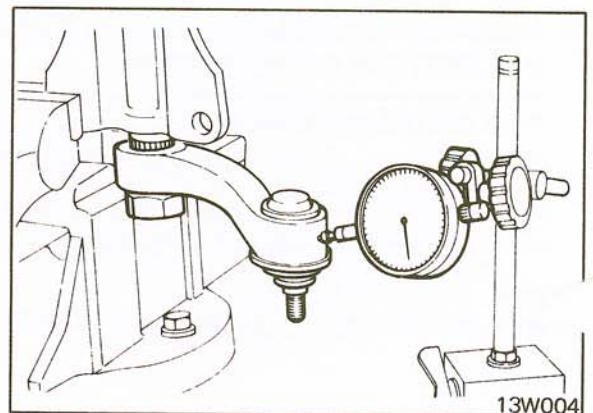
### INSPECTION

1. Install the pitman arm to the gear box with the mating marks aligned.



2. Measure the steering gear backlash at the pitman arm top end with a dial indicator.

Steering gear backlash [Repair limit] .....  
0.5 mm (.02 in.)





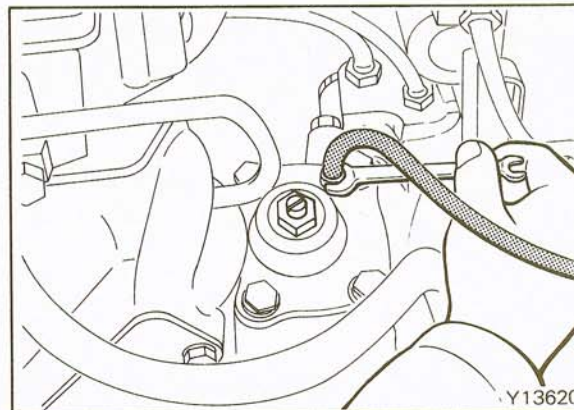


## INSTALLATION

1. Connect the pressure hose and the return hose to the gear box. (Y13620)
2. Pour specified automatic transmission fluid into the reservoir, and then bleed the system. (Refer to p. 19-11, 12.)
3. Start the engine, run it for approximately five minutes at 2,000 rpm, and then check each seal for oil leakage.

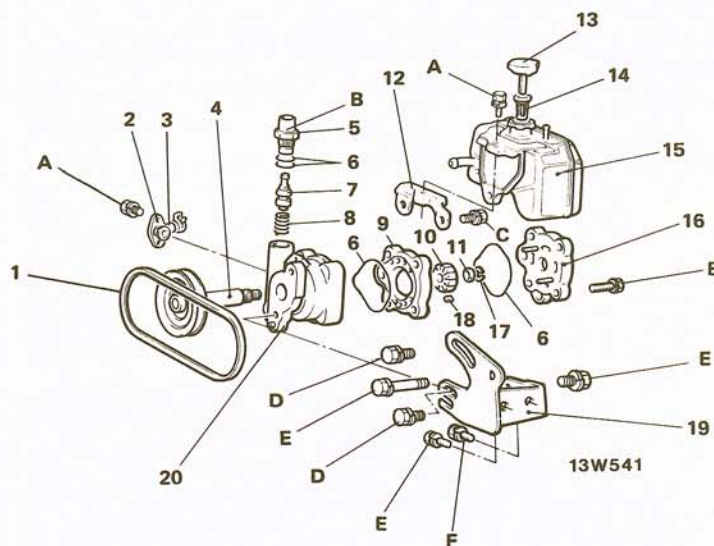
### Caution

If the gear box has been disassembled, be sure to check the oil pressure. (Refer to p. 19-12.)



## POWER STEERING OIL PUMP COMPONENTS

1. Drive belt
2. Suction plate
3. Suction tube
4. Pulley assembly
5. Connector
6. O-ring
7. Flow control valve
8. Flow control spring
9. Cam ring
10. Rotor
11. Collar
12. Reservoir bracket
13. Reservoir cap
14. Oil filter
15. Reservoir
16. Pump cover
17. Snap ring
18. Vanes
19. Oil pump bracket
20. Oil pump body



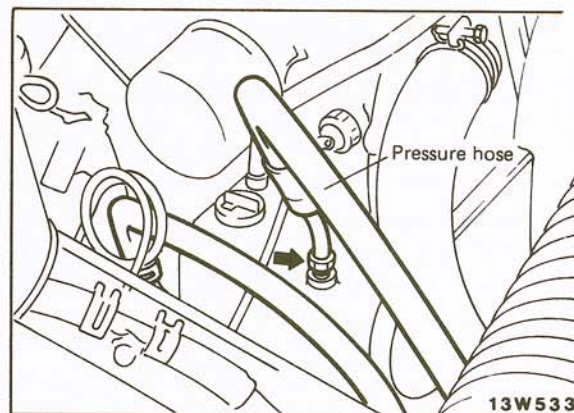
	Nm	ft.lbs.
A	6-10	4-7
B	50-70	36-51
C	18-22	13-16
D	25-33	18-24
E	14-21	10-15
F	27-41	20-30



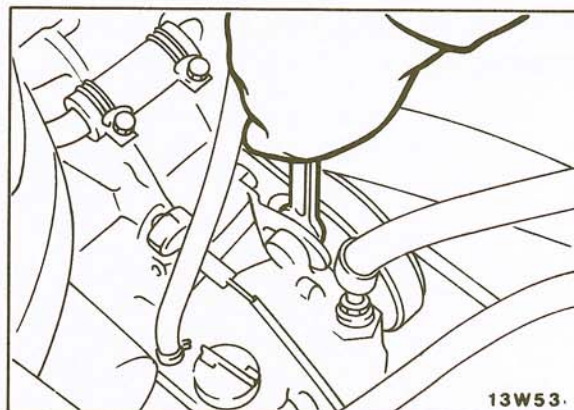


### REMOVAL

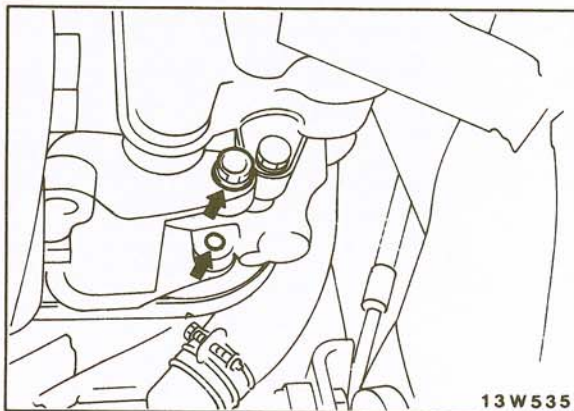
1. Remove the reservoir cap and disconnect the return hose from the reservoir to drain the fluid. (13W533)
2. Jack up the front of the vehicle and support it with floor stands.
3. Disconnect the coil high tension cable and crank the engine over several times to drain the fluid from the power steering system.



4. Loosen the brace bolts and lock bolt, and then remove the drive belt. (13W534)
5. Disconnect the pressure hose from the oil pump.

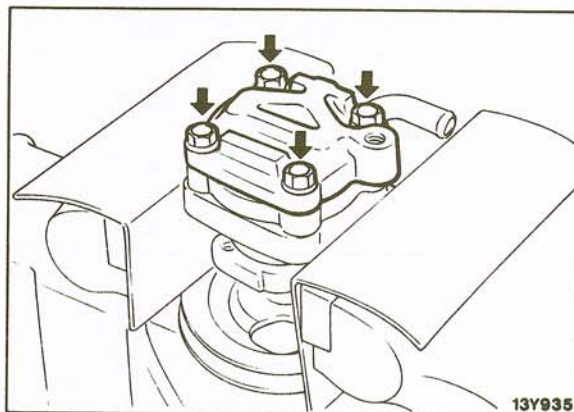


6. Remove the oil pump and reservoir from the bracket. (13W535)



### DISASSEMBLY

1. Remove the oil pump cover.

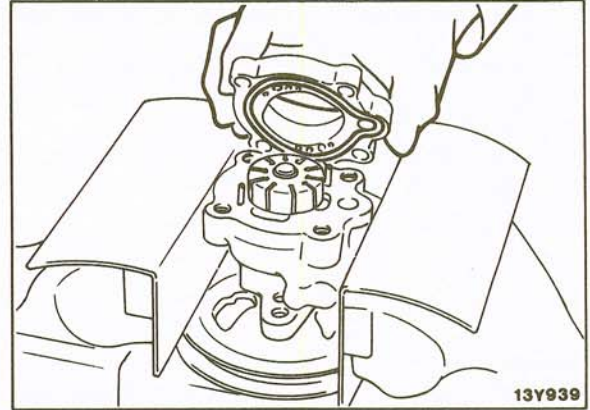




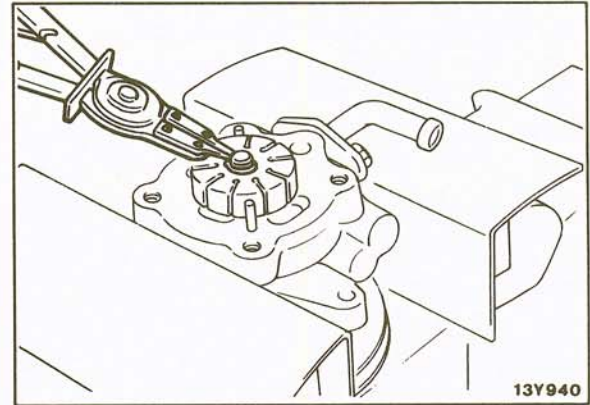


Remove the cam ring.

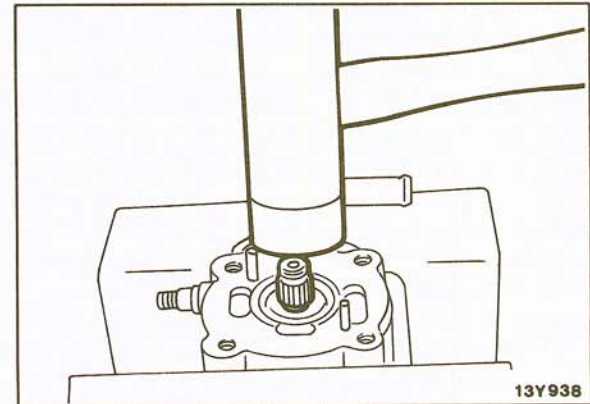
3. Remove the O-rings from the cam ring.
4. Remove the vanes from the rotor.



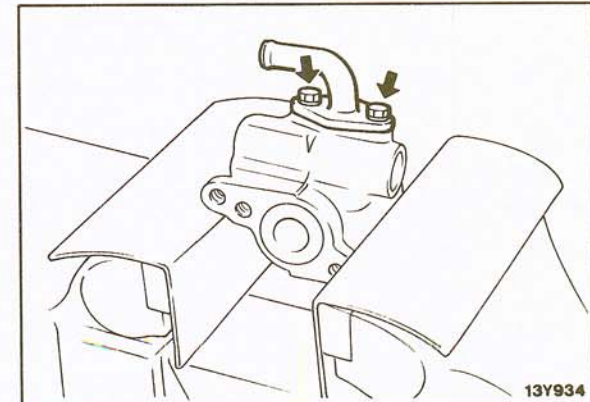
5. Remove the snap ring of the shaft with snap ring pliers and separate the rotor from the shaft.



6. Tap the rotor side of the shaft lightly with a plastic hammer, and take out the pulley assembly.



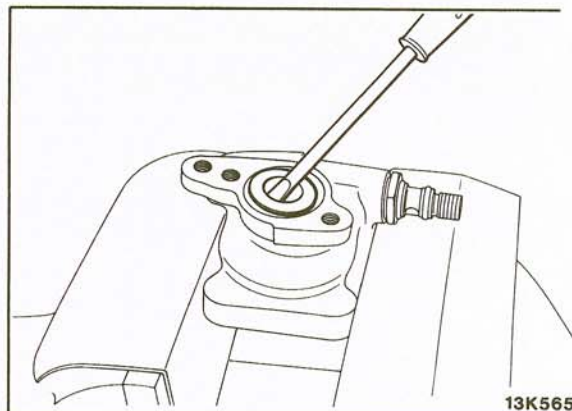
7. Remove the suction connector from the oil pump body.
8. Remove the O-ring from suction connector.







9. Remove the oil seal from the oil pump body.

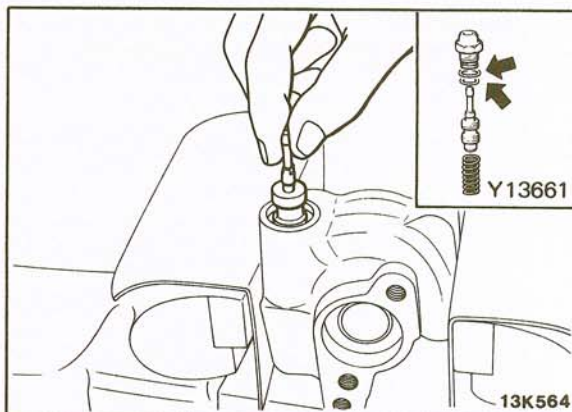


10. Remove the connector from the oil pump body, and take out the flow control valve and flow control spring. (13K564)

11. Remove the O-ring from the connector. (Y13661)

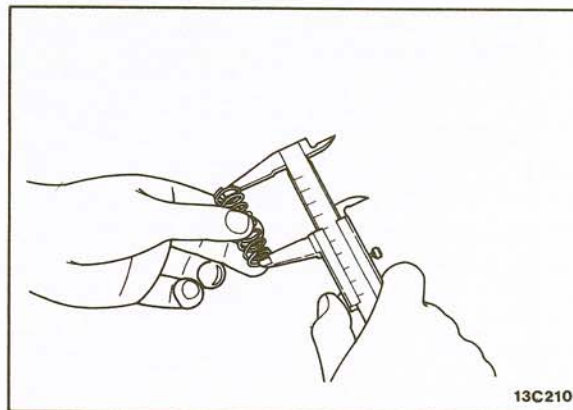
### Caution

Do not disassemble the flow control valve.



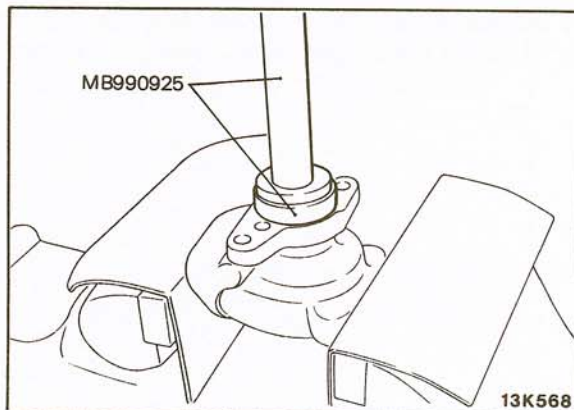
### INSPECTION

1. Check flow control spring for spring free length. (13C210)
2. Check flow control valve for clogging.
3. Check pulley assembly for wear or damage.
4. Check V-belt for cracks and deterioration.
5. Check groove of rotor and vane for "stepped" wear.
6. Check contact surface of cam ring and vanes for "stepped" wear.
7. Check vanes for damage.
8. Check contact surface of pump body, and pump cover with rotor for streak-like abrasion.



### REASSEMBLY

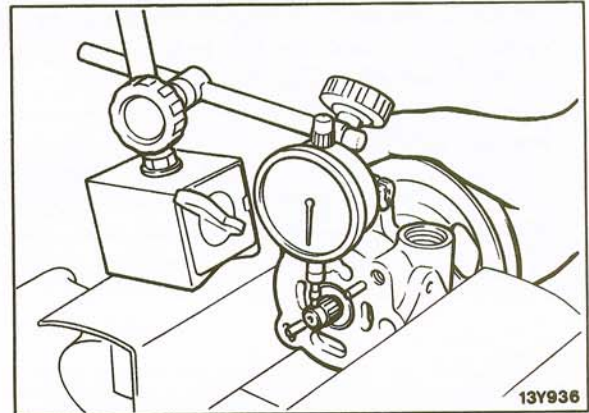
1. Drive the oil seal into the pump body with the special tools.







Gently move the pulley assembly up and down, and measure the clearance between it and the bushing as illustrated.

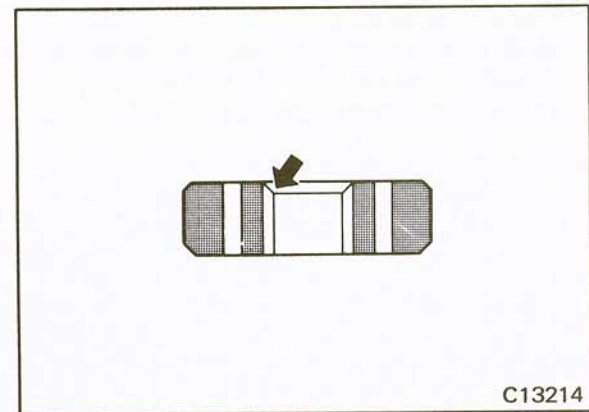


3. Install the rotor to the pulley assembly. When the rotor is to be installed, face the countersunk portion to the pump cover side. (C13214)

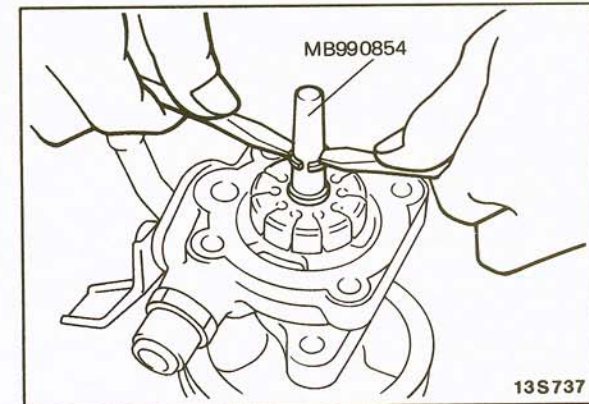
4. Apply automatic transmission fluid to the O-rings.

Recommended fluid .....  
Automatic transmission fluid  
ATF DEXRON or DEXRON II type

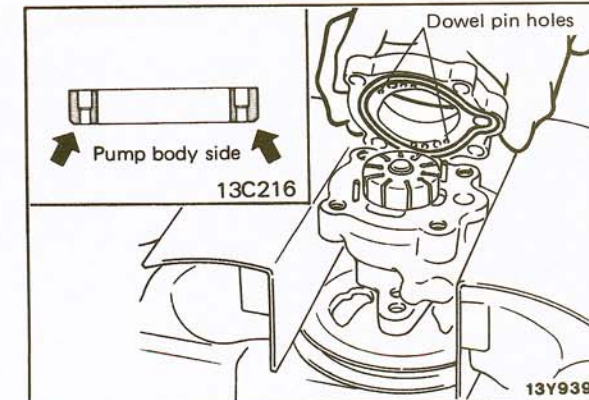
5. Install the O-rings to the cam ring.



6. Install the snap ring with the special tool as illustrated.



7. Install the cam ring to the pump body. (13C216)
8. Install the cam ring hole shown in the illustration so that it aligns with the dowel protruding from the oil pump body. (13Y939)



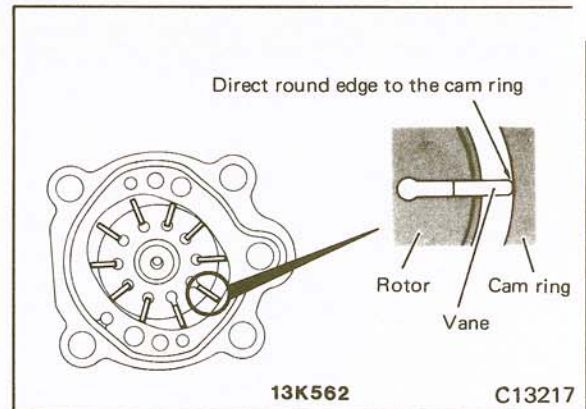




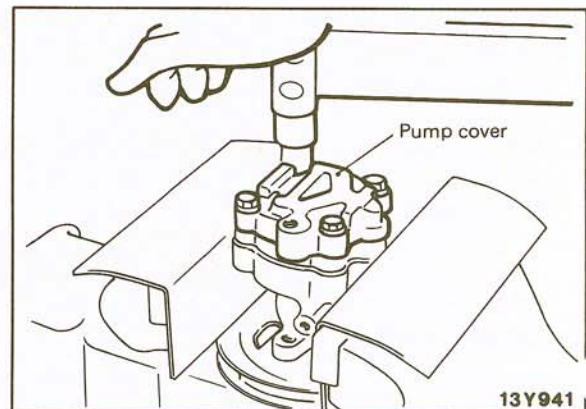
## COMPONENT SERVICE-POWER STEERING OIL PUMP

9. Apply automatic transmission fluid to the vanes and install the vanes on the rotor, paying close attention to the installation direction. (C13217)

Recommended fluid .....  
Automatic transmission fluid  
ATF DEXRON or DEXRON II type



10. Install the pump cover. (13Y941)
11. Apply automatic transmission fluid to the O-ring and install O-ring to the suction connector.
12. Install the suction connector.



### INSTALLATION

1. Mount the oil pump onto the oil pump bracket.
2. Install the drive belt, and adjust the deflection. (Refer to p. 19-11.)
3. Connect the pressure hose and return hose to the oil pump.

#### NOTE

Install the hoses so that they are not twisted and so that they do not come in contact with any other parts.

4. Fill with automatic transmission fluid. (Refer to p. 19-11.)
5. Bleed the system. (Refer to p. 19-11.)
6. Check the oil pump pressure. (Refer to p. 19-12.)
7. Torque all parts to specifications during assembly.

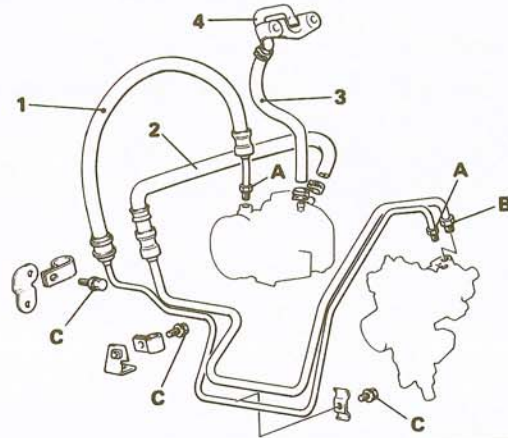




## COMPONENTS

1. Pressure hose
2. Return hose
3. Breather hose
4. Breather pipe

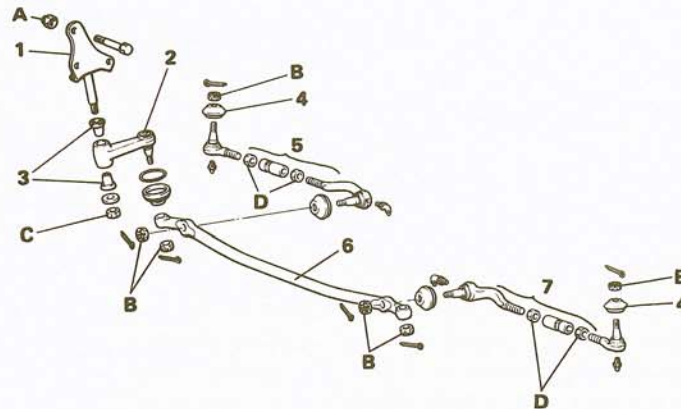
	Nm	ft.lbs.
A	30-40	22-29
B	40-50	29-36
C	8-12	6-9



13W524

## STEERING LINKAGE COMPONENTS

1. Idler arm support
2. Idler arm assembly
3. Idler arm bushing
4. Tie rod end dust cover
5. Tie rod assembly, right
6. Relay rod
7. Tie rod assembly, left



	Nm	ft.lbs.
A	55-65	40-47
B	45	33
C	40-60	29-43
D	65-80	47-58

13W518

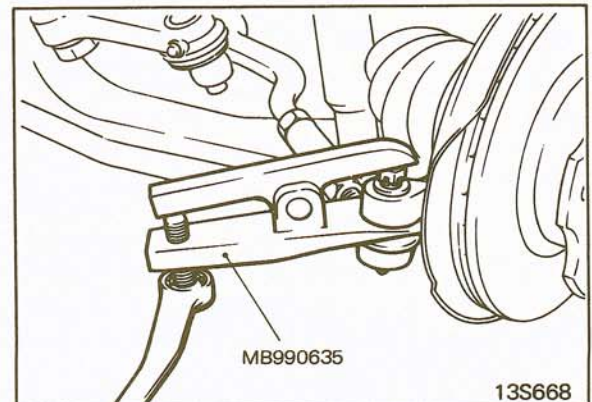
## REMOVAL

### Tie Rods and Relay Rod

1. Loosen the nut on the ball joint and remove the linkage by using the special tool as illustrated. (13S668)
2. Disassemble the tie rod.

### NOTE

The outer tie rod end is left threaded and the inner tie rod end is right threaded.



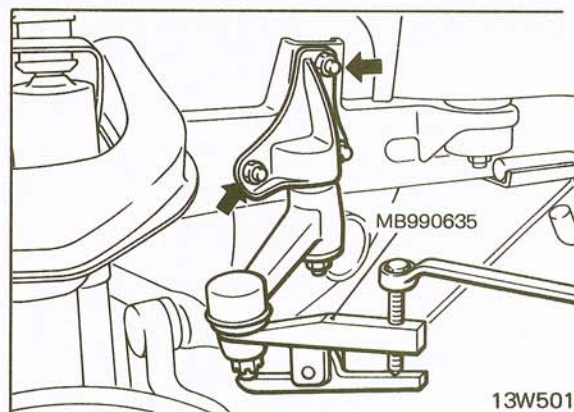
13S668





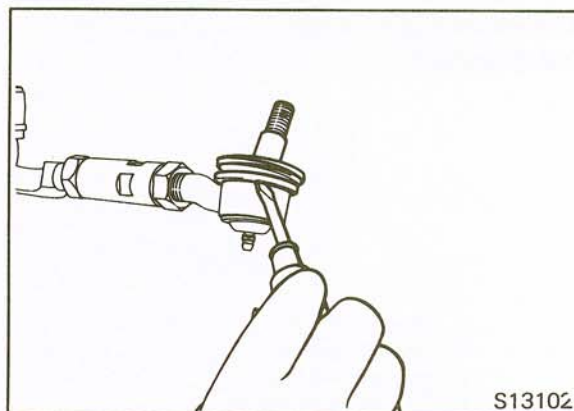
### Idler Arm Assembly

1. Detach the relay rod from the idler arm by using the special tool. (13W501)
2. Remove the idler arm assembly. (13W501)
3. Disassemble the idler arm assembly.



### Ball Joint Dust Cover

Remove the dust cover and O-ring from the ball joint.



### INSPECTION

1. Check idler arm support for damage or deformation.
2. Check idler arm for damage or deformation.
3. Check idler arm bushings for wear or deterioration.
4. Check dust covers and O-rings for damage or deterioration.
5. Check tie rods for damage or deformation.
6. Check relay rod for bends or damage.

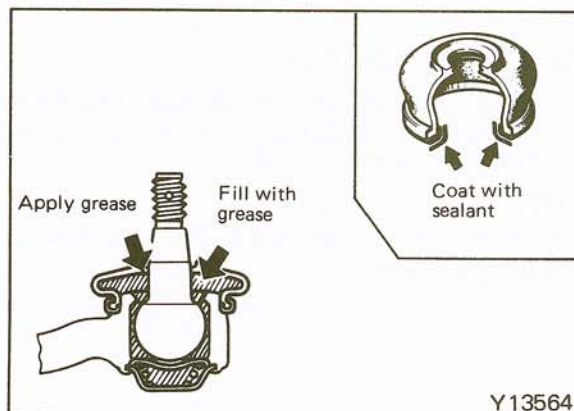
### INSTALLATION

#### Ball Joint Dust Cover

1. Before installing the dust cover, apply the specified multipurpose grease to the cover lip and the interior.

Recommended multipurpose grease . . . . .  
SAE J310a, NLGI grade #2EP

2. Apply packing sealant to the tie rod mounting surface.



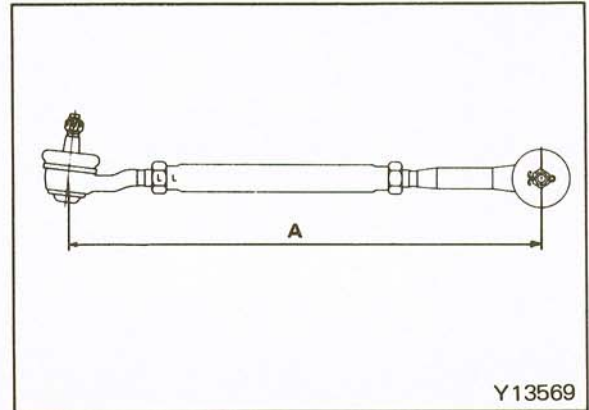




## Tie Rod

1. Apply the specified multipurpose grease to the threaded portion of the tie rods, and then adjust the tie rod so that the distance between the stud bolts of the tie rod agrees with the standard value. (Y13569)

Tie rod ends ball joint center distance A . . . . .  
326.5 mm (12.85 in.)



## Caution

**Tie rod end tightness, left to right, should be uniform.**

2. Connect the tie rod to the steering arm and to the relay rod. Torque to specification and insert cotter pins.
3. Adjust toe-in. (Refer to GROUP 2.)

## Idler Arm Assembly

1. Apply a thin coat of the specified multipurpose grease to the arm support and bushings. (13W001)

Recommended multipurpose grease . . . . .  
SAE J310a, NLGI grade #2EP

2. Insert the bushings into the idler arm.
3. Insert the support into the idler arm.

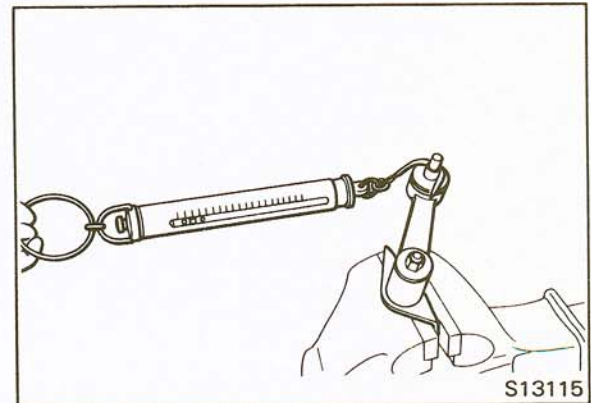
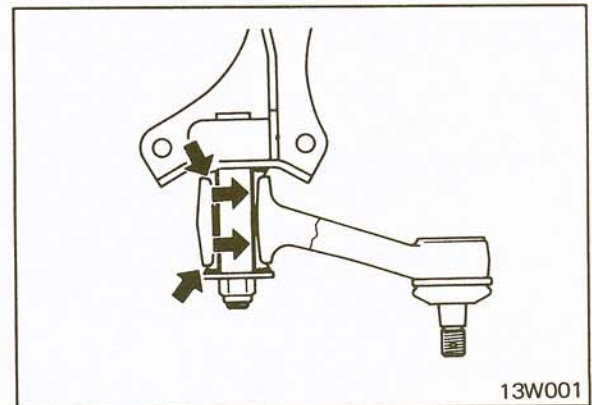
## NOTE

The washer should be installed with the knurled surface facing the bushing.

4. Measure the turning torque of the idler arm with a spring scale. (S13115)

Idler arm turning torque . . . . .  
300-900 Ncm (26-78 in.lbs.)

Turning force (when measured with a spring scale)  
25-75 N (5.5-16.5 lbs.)











# TRANSMISSION MANUAL AUTOMATIC

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## SPECIFICATIONS

### GENERAL SPECIFICATIONS

---

Manual transmission and transfer case model	KM145
Transmission	
Type	Forward full-synchromeshed
Gear ratio 1st	3.740
2nd	2.136
3rd	1.360
4th	1.000
5th	0.856
Reverse	3.578
Final gear ratio	4.625 4.875 (Option)
Speedometer gear ratio	26/8 . . . Final gear ratio 4.625 27/8 . . . Final gear ratio 4.875 (Option)
Transfer case	
Type	Constant mesh type
Gear ratio High	1.000
Low	1.944
Drive system Front wheel	Chain drive
Rear wheel	Direct drive
Automatic transmission and transfer case model	KM146
Automatic transmission	
Type	Full automatic three speed with torque converter
Torque converter diameter	241 mm (9.5 in.)
Oil capacity – transmission and torque converter	6.8 liters (7.2 U.S.pts.) (6.0 Imp.pts.)
Cooling method	Water cooling
Oil pump	Rotor type
Gear ratio 1st	2.745
2nd	1.545
3rd	1.000
Reverse	2.214
Speedometer gear ratio	24/8 . . . Final gear ratio 4.222 26/8 . . . Final gear ratio 4.625 (Option)
Transfer case	
Type	Constant mesh type
Gear ratio High	1.000
Low	1.944
Drive system Front wheel	Chain drive
Rear wheel	Direct drive

---



## SPECIFICATIONS



### SERVICE SPECIFICATIONS

mm (in.)

#### Manual transmission

Retainer to bearing clearance	0-0.1 (0-.004) . . . Adjusting with spacer
Reverse idler gear end play	0.12-0.28 (.005-.011)
Over drive gear end play	0.1-0.25 (.004-.10)
Main drive gear end play	0-0.06 (0-.002) . . . Adjusting with snap ring
3rd-4th synchronizer hub end play	0-0.08 (0-.003) . . . Adjusting with snap ring
Resistance springs free length	28 (1.10)
Plunger springs free length	42 (1.65)

#### Automatic transmission

Inhibitor switch to selector lever clearance	2.5 (.1)
--	----------

#### Clutches

Number of front clutch plates	3
Number of front clutch discs	3
Number of rear clutch plates	3
Number of rear clutch discs	4

#### Clutch plate clearance

Front clutch	0.61-1.78 (.024-.070)
Rear clutch	0.64-1.22 (.025-.048) . . . Adjusting snap ring

#### Input shaft end play

0.56-2.3 (.022-.091)

#### Gear train end play

0.16-0.83 (.006-.033)

#### Pump clearance

Side clearance	0.025-0.064 (.001-.0025)
Tip clearance	0.13-0.25 (.005-.010)
Body clearance	0.09-0.19 (.0035-.0075)

#### Band adjustments

Kickdown	Backed off 3 1/2 turns from 5.9 Nm (4.3 ft.lbs.)
Low-reverse band	Backed off 7 turns from 4.9 Nm (3.6 ft.lbs.)

#### Transfer case

Rear bearing end play	0-0.1 (0-.004) . . . Adjusting with snap ring
-----------------------	---





## SPECIFICATIONS

### Adjustment Spacer and Snap Ring

#### Manual transmission

##### Snap ring for main drive gear

Thickness	mm (in.)-Ident. color-Part No.	2.30 (.091)-White-MD701729
		2.35 (.093)-None-MD701730
		2.40 (.094)-Red-MD701731
		2.45 (.096)-Blue-MD701732
		2.50 (.098)-Yellow-MD701733

##### Spacer for main drive gear bearing to front retainer

Thickness	mm (in.)-Ident. color-Part No.	0.84 (.033)-Black-MD701845
		0.93 (.037)-None-MD701839
		1.02 (.040)-Red-MD701840
		1.11 (.044)-White-MD701841
		1.20 (.047)-Yellow-MD701842
		1.29 (.051)-Blue-MD701843
		1.38 (.054)-Green-MD701844

##### Snap ring for mainshaft front end

Thickness	mm (in.)-Ident. color-Part No.	2.15 (.085)-Blue-MD701761
		2.22 (.087)-None-MD701762
		2.29 (.090)-Brown-MD701763
		2.36 (.093)-White-MD701764

#### Automatic transmission

##### Snap rings

##### Rear clutch snap ring

Thickness	mm (in.)	1.52-1.57 (.060-.062)
		1.93-1.98 (.076-.078)
		2.49-2.54 (.098-.100)

##### Output shaft forward end

Thickness	mm (in.) – color	1.02-1.12 (.040-.044) – Red
		1.57-1.68 (.062-.066) – Green
		2.08-2.18 (.082-.086) – White

##### Thrust washers

##### Reaction shaft support to front clutch retainer

#1 1.55-1.60 (.061-.063)

##### Front clutch to rear clutch

#2 1.55-1.60 (.061-.063)

##### Input shaft to output shaft

#3 selective

1.32-1.37 (.052-.054)

1.73-1.78 (.068-.070) – Red

2.11-2.16 (.083-.085) – Green

##### Front annulus gear support to snap ring

#4 3.07-3.18 (.120-.125)

##### Front annulus support to front carrier

#5 1.22-1.27 (.048-.050)

##### Front carrier to driving shell thrust plate

#6 1.22-1.27 (.048-.050)

##### Driving shell thrust plate

#7, #8 1.27-1.32 (.050-.052)

##### Driving shell thrust plate to rear carrier

#9 1.22-1.27 (.048-.050)

##### Rear carrier to rear annulus support

#10 1.22-1.27 (.048-.050)



## SPECIFICATIONS



---

### Transfer case

#### Snap ring for input gear assembly

Thickness mm (in.) – color

2.70 (.106) – Purple  
2.75 (.108) – Pink  
2.80 (.110) – Yellow  
2.85 (.112) – White  
2.90 (.114) – Blue

#### Snap ring for H-L clutch hub

Thickness mm (in.) – color

2.14 (.084) – None  
2.21 (.087) – Yellow  
2.28 (.090) – White  
2.35 (.093) – Blue  
2.42 (.095) – Red

#### Snap ring for input gear bearing

Thickness mm (in.) – color

2.30 (.091) – None  
2.35 (.093) – Red  
2.40 (.094) – White  
2.45 (.096) – Blue  
2.50 (.098) – Green

#### Spacer for rear output shaft bearing

Thickness mm (in.) – color

0.84 (.033) – Black  
0.93 (.037) – None  
1.02 (.040) – Red  
1.11 (.044) – White  
1.20 (.047) – Yellow  
1.29 (.051) – Blue  
1.38 (.054) – Green

---





## SPECIFICATIONS

### TORQUE SPECIFICATIONS

Nm (ft.lb)

#### Manual transmission

Transmission mounting bolts	42-54 (31-40)
Starting motor mounting bolts	22-31 (16-23)
Clutch cable bracket attaching bolts	9.8-12.7 (7.2-9.4)
Mainshaft lock nut	98-127 (72-94)
Idler shaft lock nut	19.6-58.8 (14.5-43)
Under cover attaching bolt	7.8-9.8 (6-7)
Control lever housing attaching bolts	4.9-6.9 (4-5)
Countershaft gear lock nut	68.6-98.0 (50-72)
Reverse shaft nut	19.6-58.8 (15-43)
Backup light switch	29.4 (22)
Drain plug	58.8 (43)
Oil filler plug	29.4-34.3 (22-25)

#### Automatic transmission

Selector handle set screw	2.0 (1.4) or more
Control arm to control rod (B)	13 (9)
Cross shaft bracket mounting bolt	10-13 (7-9)
Control arm-to-selector lever lock nut	18-24 (13-17)
Cooler line fitting	11-14 (8-10)
Cooler line nut	9.6 (7.1)
Transmission mounting bolts	42-54 (31-40)
Starting motor mounting bolts	20-29 (15-22)
Converter drive plate to crankshaft bolt	112.7-121.5 (83-90)
Converter drive plate to torque converter bolt	46-51 (34-38)
Governor body to support bolt	10-12 (8-9)
Kickdown band adjusting screw lock nut	41-54 (30-40)
Kickdown lever shaft plug	15-19 (11-14)
Oil pan bolt	15-19 (11-14)
Oil pump housing to transmission case bolt	17-23 (12-17)
Output shaft support bolt	15-19 (11-14)
Pressure test take-off plug	11-14 (8-10)
Reaction shaft support to oil pump bolt	16-21 (12-15)
Reverse band adjusting screw lock nut	35-47 (26-34)
Transmission to engine bolt	38.2 (28)
Valve body screw	2.9-4.9 (2.2-3.6)
Valve body to transmission case bolt	10-13 (7-9)



# SPECIFICATIONS



Nm (ft.lbs.)

Transfer case	
Adapter to transfer case mounting bolts and nuts	30-41 (22-30)
Chain cover bolt	30-41 (22-30)
Side cover bolt	30-41 (22-30)
Rear cover bolt	8-9.5 (6-7)
Cover bolt	15-21 (11-15)
Control housing bolt	10-12 (7.5-9)
Oil filler plug	30-34 (22-25)
Drain plug	30-34 (22-25)
Select plug	30-34 (22-25)
Rocking plate bolt	15-21 (11-15)
Rear output shaft lock nut	98-127 (73-94)
Speedometer sleeve clamp bolt	15-21 (11-15)
Seal plug	30-41 (22-30)
4WD switch	30 (22)

## LUBRICANTS

lit. (U.S.qts., Imp.qts.)

	Specified lubricant	Quantity
Manual transmission	Hypoid gear oil SAE80W, 75W-85W, conforming to API GL-4	2.2 (2.3, 1.9)
Automatic transmission	ATF "DEXRON" or "DEXRON II" type	6.8 (7.2, 6.0)
Transfer case	Hypoid gear oil SAE80W, 75W-85W, conforming to API GL-4	2.2 (2.3, 1.9)
Sliding parts of the selector lever	Multipurpose grease SAE J310a, NLGI grade #3	As required
Sliding parts of the selector handle	Multipurpose grease SAE J310a, NLGI grade #3	As required
Sliding parts of the control rods	Multipurpose grease SAE J310a, NLGI grade #3	As required

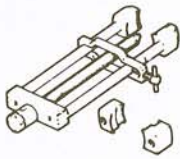
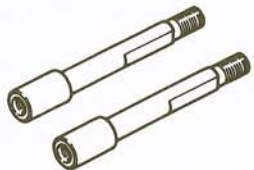
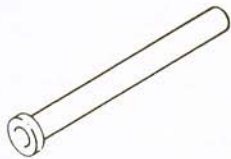
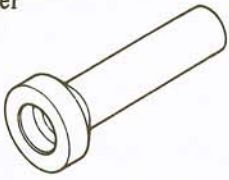

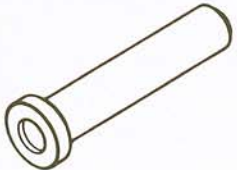
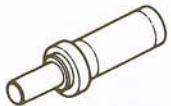
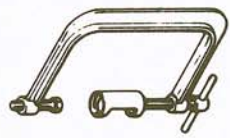



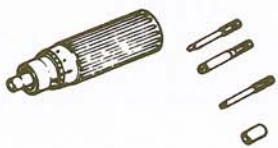
## SEALANT

	Specified sealant	Quantity
Both sides of the extension housing gasket	3M Super silicone 8662 or equivalent	As required
Threads of extension housing attaching bolts	3M Super silicone 8662 or equivalent	As required





## SPECIAL TOOLS













Tool (Number and name)	Use	Tool (Number and name)	Use
MD998020 Bearing puller 	Removal of the main drive gear bearing	MD998028 Bearing puller adapter 	Use with MD998020
MD998067 "*" Mainshaft bearing installer 		MD998029 "*" Main ring gear bearing installer 	
MD998192 "*" Counter gear bearing puller 		MD998199 "*" Countershaft bearing installer 	
MD998200 "*" Front bearing retainer oil seal installer 		MD998303 "*" (C-3422-B) Valve spring compressor 	Common to engine and automatic transmission Removal and installation of the kickdown servo and low-reverse servo
MD998330 "*" (C-3292 for 100 psi. and C-3293 for 300 psi.) Oil pressure gauge 	Measurement of the oil pressure	MD998335 "*" Oil pump band 	Assembling the oil pump
MD998352 "D" Dial gauge support 	Measurement of the input shaft end play	MD998353 "D" Torque driver set 	Tightening the valve body bolts

"\*", "D" see page 2 for instructions.



# SPECIAL TOOLS







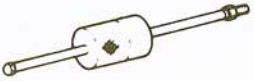


Tool (Number and name)	Use	Tool (Number and name)	Use
MD998356 “*” Oil pressure gauge adapter 	Connecting the oil pressure gauge	MD998357 “D” Kickdown band adjusting wrench 	Adjustment of the kickdown band
MD998358 “D” Low-reverse band adjusting wrench 	Adjustment of the low-reverse band	MD998500 “D” (SP-3551) Pump housing bushing remover 	
MD998501 “D” (SP-5117) Pump housing bushing installer 		MD998502 “D” (SP-3524) Reaction shaft bushing remover 	
MD998503 “D” (SP-3633) Cup 	Use with MD998502	MD998504 “D” (SP-1911) Nut 	Use with MD998502
MD998505 “D” (SP-5325) Reaction shaft bushing installer 		MD998506 “D” (SP-3627) Front clutch retainer bushing 	
MD998507 “D” (SP-3626) Front clutch retainer bushing 		MD998563 “*” (C-3763) Throttle pressure adjust tool 	Adjustment of the throttle pressure

“\*”, “D” see page 2 for instructions.





## SPECIAL TOOLS

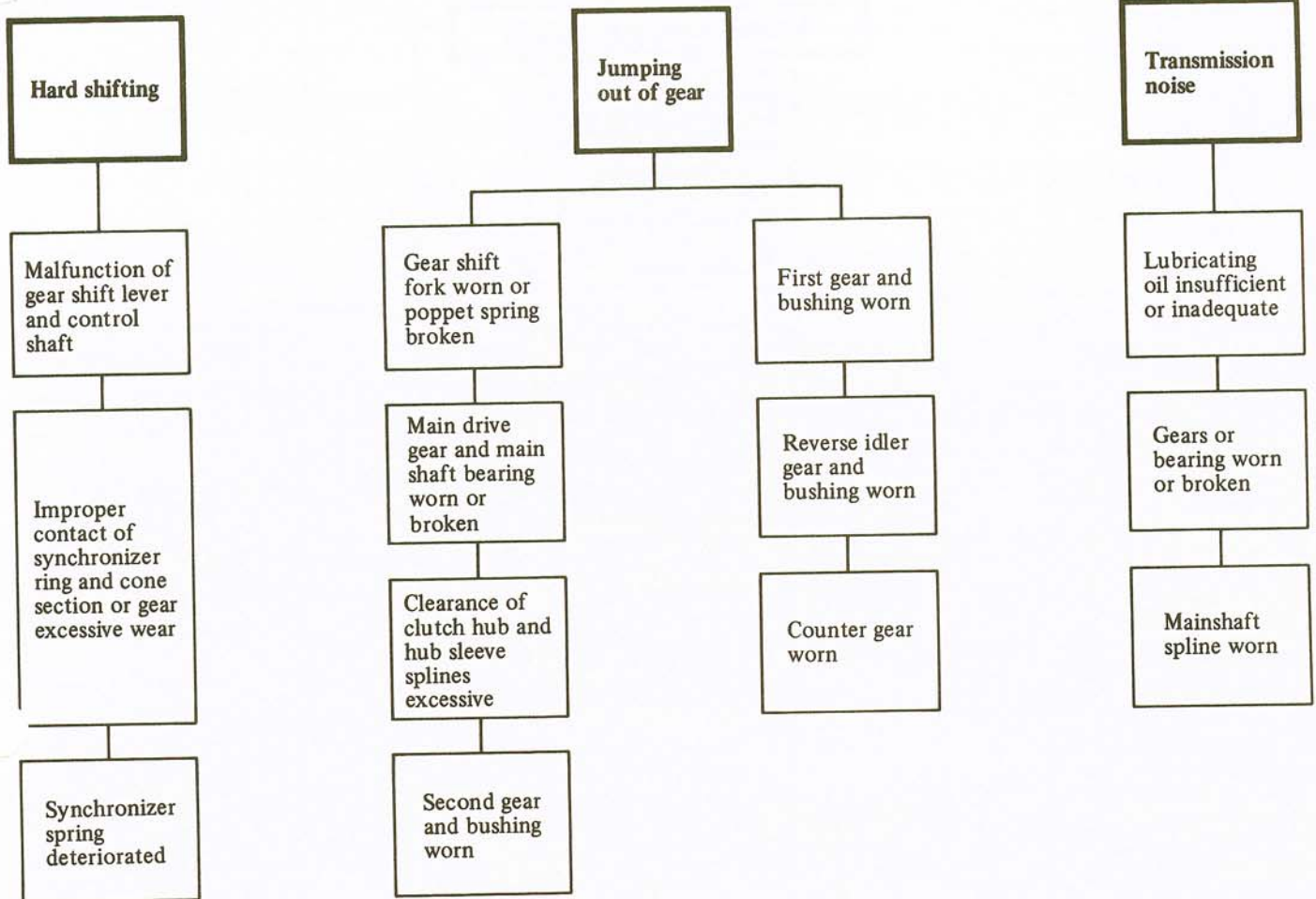
Tool (Number and name)	Use	Tool (Number and name)	Use
MD998572 "*" (C-3575-A) Spring compressor 	Removal and installation of the front clutch bearing	MD998573 "D" (C-3756) Converter alignment tool 	Alignment of holes of the oil pump rotor
MD998580 "*" (C-4193) Oil pump oil seal installer 		MD998581 "*" (C-4171) Driver handle 	Removal and installation of pump housing bushing Use with MD998500 or MD998501
MD998583 "*" (C-3752) Oil pump remover 	Removing oil pump housing	MD998584 "*" (C-3238-B) Pilot stud "A" 	Installation of output shaft support
MD998585 "*" (C-3283-A) Pilot stud "B" 	Assembly of oil pump		

"\*", "D" see page 2 for instructions.

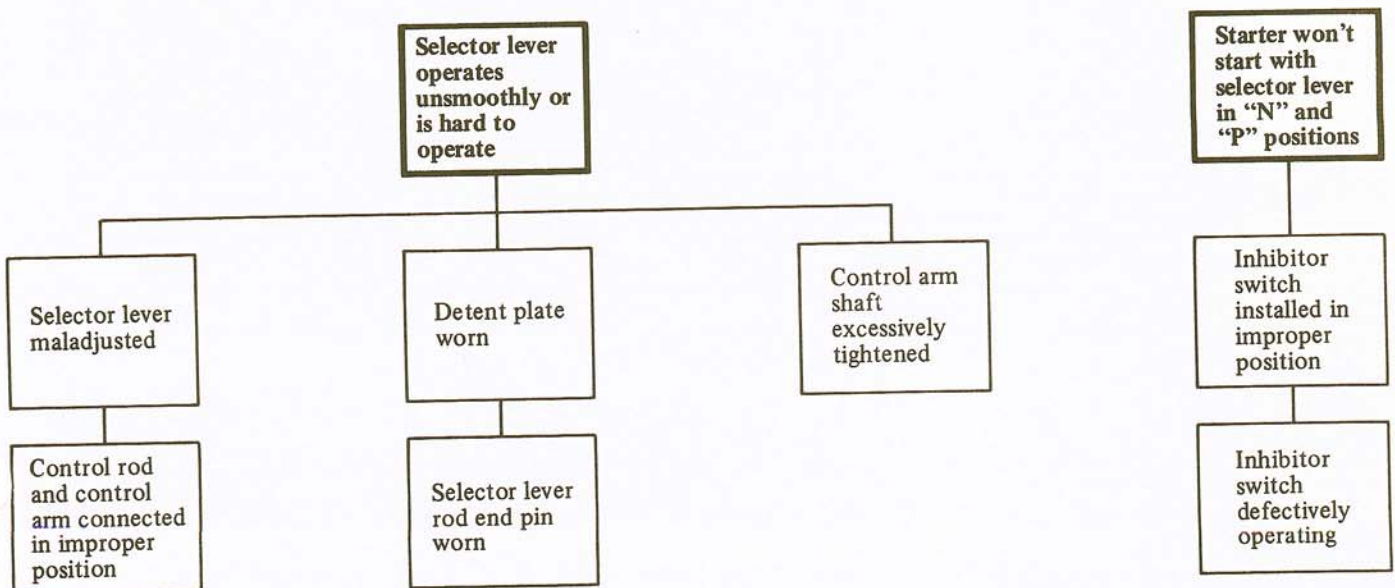




## ANUAL TRANSMISSION



## AUTOMATIC TRANSMISSION







## TROUBLESHOOTING

### Diagnosis guide-abnormal noise

Inspect and correct the transmission fluid level, road test to verify that an abnormal noise exists, identify the type of noise, driving ranges, and conditions when the noise occurs.

Gear noise or grinding

Remove the transmission and converter assembly; disassemble, clean and inspect all parts; clean the valve body install all new seals, rings, and gaskets; replace worn or defective parts.

Whine or buzz noise

Listen to transmission and converter for source of noise.

Knock, click, or scrape noise

Remove torque and inspect for loose or cracked converter drive plate; inspect for contact of the starter drive with the starter ring gear.

Transmission has buzz or whine

Remove the transmission pan, inspect for debris indicating worn or failed parts.

Replace torque converter

Converter has loud buzz or whine

No debris present: remove valve body, disassemble, clean and inspect parts reassemble, install, check operation and pressure.

Debris present: remove transmission and converter as an assembly; disassemble, clean and inspect all parts, clean the valve new seals, rings and gaskets; replace worn or defective parts.





### Diagnosis guide-vehicle will not move

Check the transmission fluid level before starting the engine. If no fluid is visible on the dip stick, add fluid to the 'L' mark before starting the engine. Then start the engine with the transmission in neutral and listen for noise.

No abnormal noise, move the selector to a forward drive range and observe the propeller shaft for turning.

Abnormal noise: stop engine immediately; remove the transmission and converter as an assembly. Disassemble, clean and inspect all parts. Clean valve body; install all new seals, rings, and gaskets; replace worn or defective parts.

Propeller shaft turns but rear wheels do not turn: inspect for broken rear axle parts.

Propeller shaft does not turn: remove the transmission oil pan. Inspect for debris.

No debris: remove valve body; disassemble, clean and inspect all parts. Reassemble, install and check pressures and operation.

Debris is present: remove transmission and converter as an assembly; disassemble, clean and inspect all parts. Clean valve body; install all new seals, rings, and gaskets; replace worn or defective parts.

### Diagnosis guide-fluid leaks

Visually inspect for source of leak. If the source of leak cannot be readily determined, clean the exterior of the transmission. Check transmission fluid level. Correct if necessary.

The following leaks may be corrected without removing the transmission: manual lever shaft oil seal, filler tube 'O' ring pressure, gauge plug neutral start switch, pan gasket oil cooler fittings, extension housing to case gasket, extension housing to case bolts, extension housing yoke seal, speedometer adapter 'O' ring, front band adjusting screw.

The following leaks require removal of the transmission and torque converter for correction: transmission fluid leaking from the lower edge of the converter housing, caused by front pump to case seal, or torque converter weld. Cracked or porous transmission case.





# SERVICE ADJUSTMENT PROCEDURES

## DIAGNOSIS CHART-GENERAL (AUTOMATIC TRANSMISSION)

Diagnosis Chart-General

CONDITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
HARSH ENGAGEMENT FROM NEUTRAL TO D OR R	x			x																												
DELAYED ENGAGEMENT FROM NEUTRAL TO D OR R	x	x	x	x	x	x	x	x	x	x	x	x	x				x															
RUNAWAY UPSHIFT	x	x	x	x	x	x	x	x	x	x	x	x	x																			
NO UPSHIFT	x	x	x	x	x	x	x	x																								
3-2 KICKDOWN RUNAWAY	x	x	x	x	x	x	x																									
NO KICKDOWN OR NORMAL DOWNSHIFT	x	x	x	x	x	x	x	x																								
SHIFTS ERRATIC	x	x	x	x	x	x	x	x	x	x	x	x	x																			
SLIPS IN FORWARD DRIVE POSITIONS	x	x	x	x	x	x	x	x	x	x	x	x	x	x																		
SLIPS IN REVERSE ONLY	x	x	x	x	x	x	x	x	x	x	x																					
SLIPS IN ALL POSITIONS	x	x	x	x	x	x	x	x	x	x	x	x	x																			
NO DRIVE IN ANY POSITION	x	x	x	x	x	x	x	x	x	x																						
NO DRIVE IN FORWARD DRIVE POSITIONS	x	x	x	x	x	x	x	x	x	x																						
NO DRIVE IN REVERSE	x	x	x	x	x	x	x																									
DRIVES IN NEUTRAL																																
DRAGS OR LOCKS																																
GRATING, SCRAPING, GROWLING NOISE																																
BUZZING NOISE																																
HARD TO FILL, OIL BLOWS OUT FILLER TUBE																																
TRANSMISSION OVERHEATS	x	x																														
HARSH UPSHIFT	x																															
DELAYED UPSHIFT																																

POSSIBLE CAUSE

1 Engine idle speed too high.  
2 Hydraulic pressures too low.  
3 Low-reverse band out of adjustment.  
4 Valve body malfunction or leakage.  
5 Low-reverse servo, band or linkage malfunction.  
6 Low fluid level.  
7 Incorrect gearshift control linkage adjustment.  
8 Oil filter clogged.  
9 Faulty oil pump.  
10 Worn or broken input shaft seal rings.  
11 Aerated fluid.  
12 Engine idle speed too low.  
13 Incorrect throttle linkage adjustment.  
14 Kickdown band out of adjustment.  
15 Overrunning clutch not holding.  
16 Output shaft bearing and/or bushing damaged.  
17 Governor support seal rings broken or worn.  
18 Worn or broken reaction shaft support seal rings.  
19 Governor malfunction.  
20 Kickdown servo band or linkage malfunction.  
21 Worn or faulty front clutch.  
22 High fluid level.  
23 Breather clogged.  
24 Hydraulic pressure too high.  
25 Kickdown band adjustment too tight.  
26 Faulty cooling system.  
27 Insufficient clutch plate clearance.  
28 Worn or faulty rear clutch.  
29 Rear clutch dragging.  
30 Planetary gear sets broken or seized.  
31 Overrunning clutch worn, broken or seized.  
32 Overrunning clutch inner race damaged.





## DIAGNOSIS

Automatic transmission malfunctions may be caused by four general conditions: poor engine performance, improper adjustments, hydraulic malfunctions, and mechanical malfunctions. Diagnosis of these problems should always begin by checking the easily accessible variables: fluid level and ATF condition, control rod adjustment, and throttle linkage adjustment. Then perform a road test to determine whether the problem has been corrected or that more diagnosis is necessary. If the problem exists after the preliminary tests and corrections are completed, hydraulic pressure tests should be performed.

### Fluid level and condition

1. Drive to a flat surface.
2. Before the dipstick is removed, clean the protective cap and the top of the filler tube.
3. Run the engine at idle.
4. Move the selector lever through a round of all positions (P-L) before placing it in "N" position. Pull the parking brake lever beforehand.
5. Make sure that the ATF is heated to normal operating temperature [approx. 80°C (170°F)].
6. The fluid level should be between the notches above "ADD-1-PINT" and below "FULL" inscribed on the dipstick. (904011)

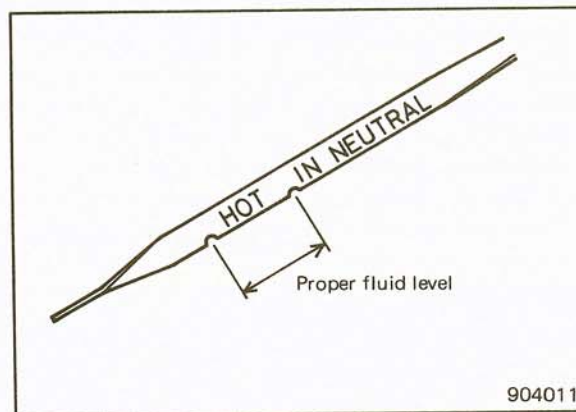
Low fluid level can cause a variety of conditions because it allows the pump to take in air along with the fluid. As in any hydraulic system, air bubbles make the fluid spongy, therefore, pressures will be low and build up slowly.

Improper filling can also raise the fluid level too high. When the transmission has too much fluid, the gears churn up foam and cause the same conditions which occur with a low fluid level.

In either case, the air bubbles can cause overheating, fluid oxidation and varnish which can interfere with normal valve, clutch and servo operation. Foaming can also result in fluid escaping from the transmission vent and oil filler tube where it may be mistaken for a leak.

Along with fluid level, it is important to check the condition of the fluid. When the fluid smells burned and is contaminated with metal or friction material particles, a complete transmission overhaul is needed. Be sure to examine the fluid on the dipstick closely. If there is any doubt about its condition, drain out a sample for a double check.

7. Insert the dipstick all the way in.



904011





### Adjustment of control rod

1. Check to ensure that when the manual control lever of the transmission is placed in the "N" position, the position indicator correctly shows "N".
2. Check to ensure that the selector lever can be operated smoothly and clicks into each position and that the position indicator correctly indicates the position.
3. For adjustment, refer to "Maintenance and Adjustment."

### Throttle linkage

The throttle linkage adjustment is very important to proper transmission operation. This adjustment positions a valve which controls shift speed, shift quality and part throttle down shift sensitivity. If the setting is too short, early shifts and slippage between shifts may occur. If the setting is too long, shifts may be delayed and part throttle down shifts may be very sensitive.

For adjustment, refer to "Maintenance and Adjustment."





### Jad test

Prior to performing a road test, be certain that the fluid level and ATF condition, control rod adjustments and throttle linkage adjustments have been checked and approved.

During the road test the transmission should be operated in each position to check for slipping and any variation in shifting. Note whether the shifts are harsh or spongy and check the speeds where the upshifts and downshifts occur. Approximate shift speeds for the various modes of operation are shown in the "Automatic Shift Speed Pattern".

Observe closely for slipping or engine speed flare-up. Slipping or flare-up in any gear usually indicates clutch, band or overrunning clutch problems. If the condition is far advanced, an overhaul will probably be necessary to restore normal operation.

In most cases, the clutch or band that is slipping can be determined by noting the transmission operation in all selector positions and by comparing which internal units are applied in those positions. The "Elements in Use Chart" provides a basis for road test analysis.

By observing that the rear clutch and the overrunning clutch are applied in the "D" first gear and that the rear clutch and low-reverse band are applied in "L" first, if the transmission slips in "D" range first gear but does not slip in "L" first gear, the overrunning clutch must be the unit that is slipping.

Similarly, if the transmission slips in any two forward gears, the rear clutch is the slipping unit.

Using the same procedure, the rear clutch and front clutch are applied in "D" third gear. If the transmission slips in third gear, either the front clutch or the rear clutch is slipping. By selecting another gear which does not use one of those units, the unit which is slipping can be determined. If the transmission also slips in reverse, the front clutch is slipping. If the transmission does not slip in reverse, the rear clutch is slipping.

This process of elimination can be used to detect any unit which slips and to confirm proper operation of good units. However, although road test analysis can usually diagnose slipping units, the actual cause of the malfunction usually cannot be decided. Practically any condition can be caused by leaking hydraulic circuits or sticking valves.

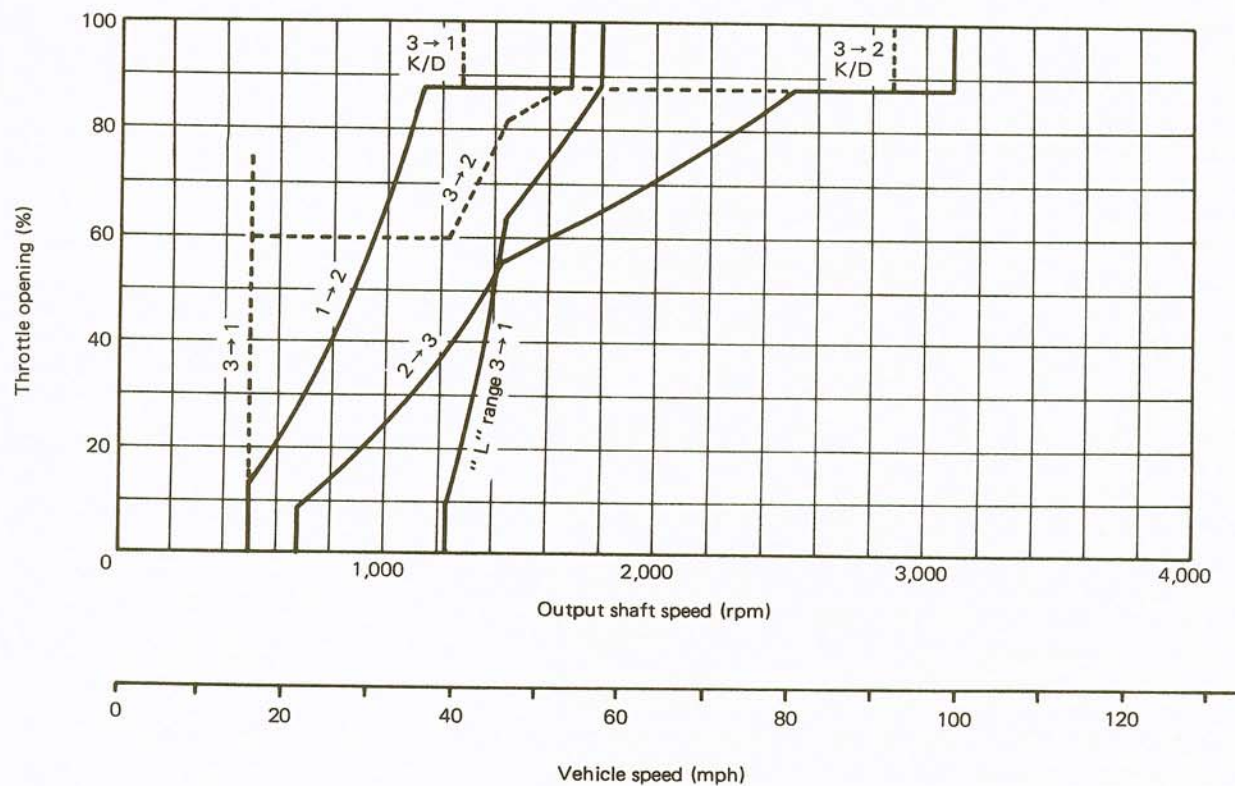
Therefore, unless the condition is obvious, like no drive in "D" range first gear only, the transmission should never be disassembled until hydraulic pressure tests have been performed.





## SERVICE ADJUSTMENT PROCEDURES

Automatic Shift Speed Pattern



Elements in Use at Each Position of the Selector Lever

Selector Lever Position	Gear Ratio	Start Safety	Parking Sprag	Clutches			Bands	
				Front	Rear	Over- running	(Kickdown) Front	(Low-Rev.) Rear
P-PARK		X	X					
R-REVERSE	2.21			X				X
N-NEUTRAL		X						
D-DRIVE								
First	2.45				X	X		
Second	1.45				X		X	
Direct	1.00			X	X			
2-SECOND								
First	2.45				X	X		
Second	1.45				X		X	
L-LOCK-UP								
First	2.45				X			X

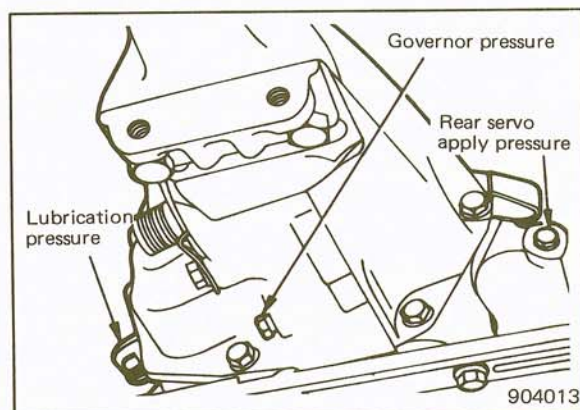
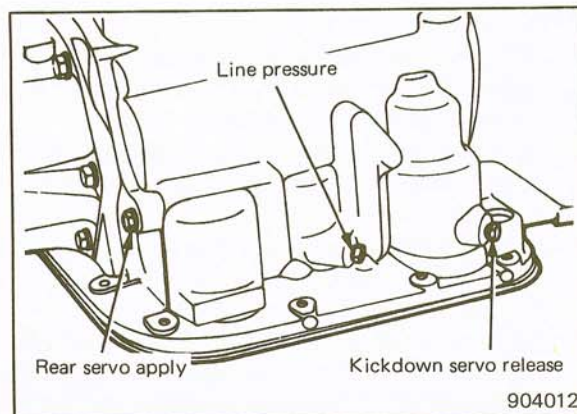




## HYDRAULIC PRESSURE TESTS

Pressure testing is a very important step in the diagnostic procedure. These tests usually reveal the cause of most transmission problems.

1. Before performing pressure tests, be certain that fluid level and ATF condition, control rod adjustments and throttle linkage adjustments have been checked and approved. Fluid must be at operating temperature [approx. 80°C (170°F)].
2. Install an engine tachometer, raise vehicle on hoist which allows rear wheels to turn, and position tachometer so it can be read under the vehicle.
3. Disconnect throttle rod and shift rod A from transmission levers so they can be controlled under the vehicle.
4. Attach 3MPa (300 psi) gauge (MD998300) and adaptor (MD998356) to ports required for test being conducted.
5. Test port locations are shown in illustration. (904012, 904013)



### Test 1 (Selector in "L")

1. Attach gauges to "line" and "rear servo" ports.
2. Operate engine at 1,600 rpm for test.
3. Move selector lever on transmission all the way forward ("L" position).
4. Read pressures on both gauges as throttle lever on transmission is moved from full rearward position to full forward position.
5. Line pressure should read 372 to 414 kPa (54 to 60 psi) with throttle lever rearward and gradually increase, as lever is moved forward, to 621 to 662 kPa (90 to 95 psi).
6. Rear servo pressure should read the same as line pressure within 21 kPa (3 psi).
7. This tests oil pump, oil pressure regulating valves (regulator valve and throttle valve) and hydraulic circuit conditions.





### Test 2 (Selector in "2")

1. Attach gauge to "line pressure" port and "tee" into rear cooler line fitting to read "lubrication" pressure.
2. Operate engine at 1,600 rpm for test.
3. Move selector lever on transmission one "detent" rearward from full forward position. This is selector "2" position.
4. Read pressures on both gauges as throttle lever on transmission is moved from full rearward position to full forward position.
5. Line pressure should read 372 to 657 kPa (54 to 95 psi) with throttle lever rearward and gradually increase, as lever is moved forward, to 621 to 662 kPa (90 to 96 psi).
6. Lubrication pressure should be 39 to 108 kPa (6 to 16 psi) with lever rearward and 69 to 207 kPa (10 to 30 psi) with lever forward.
7. This tests pump output, pressure regulation, and condition of rear clutch and lubrication hydraulic circuits.

### Test 3 (Selector in "D")

1. Attach gauges to "line" and "kickdown servo release" ports.
2. Operate engine at 1,600 rpm for test.
3. Move selector lever on transmission two "detents" rearward from full forward position. This is selector "D" position.
4. Read pressures on both gauges as throttle lever on transmission is moved from full rearward position to full forward position.
5. Line pressure should read 372 to 414 kPa (54 to 60 psi) with throttle lever rearward and gradually increase, as lever is moved forward.
6. Kickdown servo release is pressurized only in 3rd gear (direct drive) and should be same as line pressure within 21 kPa (3 psi), up to downshift point.
7. This tests pump output, pressure regulation, and condition of rear clutch and front clutch hydraulic circuits.

### Test 4 (Selector in Reverse)

1. Attach gauge to "rear servo apply" port.
2. Operate engine at 1,600 rpm for test.
3. Move selector lever on transmission four "detents" rearward from full forward position. This is selector "R" position.
4. Rear servo pressure should read 1,570 to 1,790 kPa (230 to 260 psi).
5. This tests pump output, pressure regulation, and condition of front clutch and rear servo hydraulic circuits.
6. Move selector lever on transmission to "D" position to check that rear servo pressure drops to zero.
7. This tests for leakage into rear servo, due to case porosity, which can cause low-reverse band burn out.





### Test result indications

1. If proper line pressure, minimum to maximum, is found in any one test, the pump and pressure regulator are working properly.
2. Low pressure in "D, L and 2" but correct pressure in "R" indicates rear clutch circuit leakage.
3. Low pressure in "D and R" but correct pressure in "L" indicates front clutch circuit leakage.
4. Low pressure in "R and L" but correct pressure in "2" indicates rear servo circuit leakage.
5. Low line pressure in all positions indicates a defective pump, a clogged filter or a stuck pressure regulator valve or throttle valve.

### GOVERNOR PRESSURE TEST

Test only if transmission shifts at wrong vehicle speeds when throttle rod is correctly adjusted.

1. Connect a pressure gauge, to governor pressure take-off point, located at lower left side of extension near the mounting flange.
2. Operate transmission in third gear to read pressures and compare speeds shown in chart.

If governor pressures are incorrect at the given vehicle speeds, the governor valve and/or weights are probably sticking. The governor pressure should respond smoothly to changes in km/h (mph) and should return to 0 to 10 kPa (0 to 1.5 psi) when vehicle is stopped. High pressure at stand still [above 14 kPa (2 psi)] will prevent the transmission from down shifting.

### THROTTLE PRESSURE TEST

No gauge port is provided for the throttle pressure. Incorrect throttle pressure should only be suspected if part throttle up-shift speeds are either delayed or occur too early in relation to vehicle speeds. Engine runaway on either up shifts or down shifts can also be an indicator of incorrect (low) throttle pressure setting.

#### Caution

In no case should throttle pressure be adjusted until the transmission throttle linkage adjustment has been verified to be correct.





### CONVERTER STALL TEST

#### Warning

**During test let no one stand in front of vehicle**

The stall test consists of determining the engine speed obtained at full throttle in "D" position. This test checks the torque converter stator clutch operation, and the holding ability of the transmission clutches. The transmission fluid level should be checked and the engine brought to normal operating temperature before stall operation. Both the parking and service brakes must be fully applied and front wheels blocked while making this test.

Do not hold the throttle open any longer than is necessary to obtain a maximum engine speed reading, and never longer than five seconds at a time. If more than one stall check is required, operate the engine at idle in neutral for 20 seconds to cool the ATF between runs. If engine speed exceeds the maximum limits shown, release the accelerator immediately since transmission clutch slippage is indicated.

---

Engine stall speed . . . . .	2,300-2,800 rpm
------------------------------	-----------------

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#### Stall Speed Above Specification in "D"

If stall speed exceeds specification, transmission overrunning clutch or rear clutch slippage is indicated. Follow the transmission oil pressure checks outlined in this section to determine the cause of slippage.

#### Stall Speed Below Specification

Low stall speeds with a properly tuned engine indicate torque converter problems.

If stall speeds are below specification and the vehicle operates properly at highway speeds, but has poor through-gear acceleration, the stator overrunning clutch is slipping.

If stall speed and acceleration are normal, but abnormally high throttle opening is required to maintain highway speeds, the stator clutch has seized.

Both of these stator defects require replacement of the torque converter.

#### Noise

A whining or siren-like noise due to fluid flow is normal during stall operation with some converters; however, loud metallic noises from loose parts or interference within the assembly indicate a defective torque converter. To confirm that the noise originates within the converter, operate the vehicle at light throttle in "D" and "N" on a hoist and listen under the transmission bell housing.





### FLUID LEAKAGE—TRANSMISSION CONVERTER HOUSING AREA

1. Check for Source of Leakage. Since fluid leakage at or around the converter area may originate from an engine oil leak, the area should be examined closely. Factory fill ATF is dyed red and, therefore, can be distinguished from engine oil.
2. Prior to removing the transmission, perform the following checks:

When leakage is determined to originate from the transmission, check fluid level prior to removal of the transmission and torque converter.

High fluid level can result in fluid leakage out of the vent located at the top of the front pump housing. If the fluid level is high, adjust to proper level.

After performing these operations, re-check for leakage. If a leakage persists, carefully check to determine whether it is the converter or the transmission (the oil seal of the oil pump housing or the fitting portions of the oil pump housing and case) that is leaking.





### LUBRICATION

#### Checking Fluid Level and Replenishing Fluid

Check and replenish interval:

Every 48,000 km (30,000 miles)

Inspect fluid level of dipstick with engine idling and transmission in neutral position. When ATF temperature is about 80°C (170°F) (average operating temperature), fluid level should be between upper and lower notches of dipstick. (904011)

#### Changing Fluid

Recommended fluid . . . . .  
ATF "DEXRON" or "DEXRON II" type

#### NOTES

1. When factory fill fluid is changed as recommended above, only fluids of type labeled ATF "DEXRON" or "DEXRON II" type should be used.
2. If the transmission is disassembled for any reason, the fluid and filter should be changed.

#### Fluid Changing Procedure

1. Raise vehicle on a hoist. Place a drain container with a large opening, under transmission fluid pan.
2. Loosen pan bolts and tap the pan at one corner to break it loose allowing fluid to drain, then remove the oil pan.
3. If necessary, adjust the low-reverse band.
4. Install a new filter on bottom of the valve body, and tighten retaining screws to specified torque.

Tightening torque . . . . . 3-5 Nm (2.2-3.6 ft.lbs.)

5. Clean the oil pan, and reinstall using a new gasket. Tighten oil pan bolts to specified torque.

Tightening torque . . . . . 15-20 Nm (11-14 ft.lbs.)

6. Pour 3.8 liter (4.0 U.S. qts., 3.4 Imp. qts.) of recommended fluid through the filler tube.

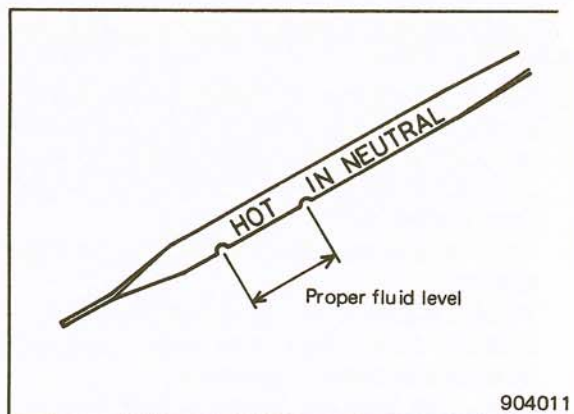
Recommended fluid . . . . .  
ATF "DEXRON" or "DEXRON II" type

7. Start engine and allow it to idle for at least two minutes. Then, with parking brake on, move selector lever momentarily to each position ("P" to "L"), ending in the neutral position.
8. Add ATF until fluid level reaches lower notch of dipstick. After transmission has reached average operating temperature, recheck fluid level. Fluid level should be between notches of dipstick.

#### Caution

Check fluid level with vehicle on flat surface.

Use care to prevent entry of dust and foreign matter through filler tube. After inspection, reinsert dipstick all the way into filler tube.





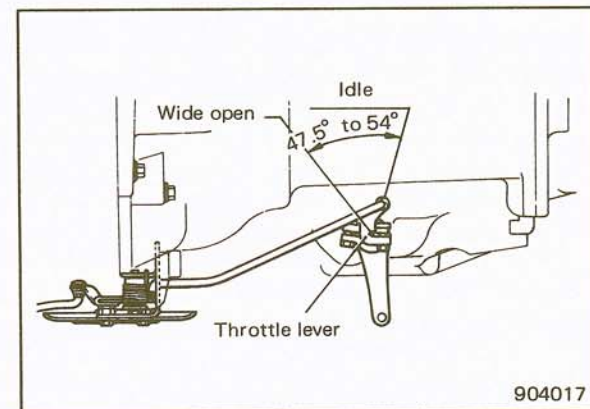
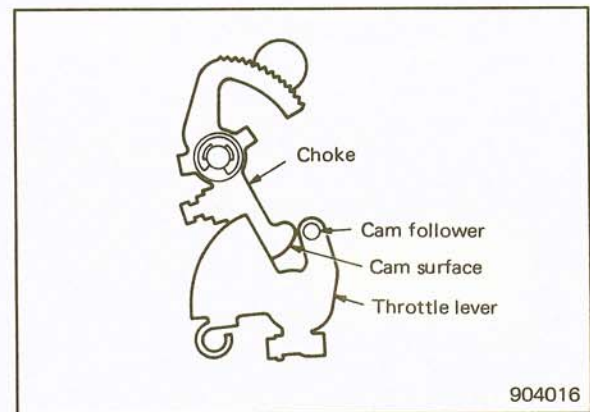
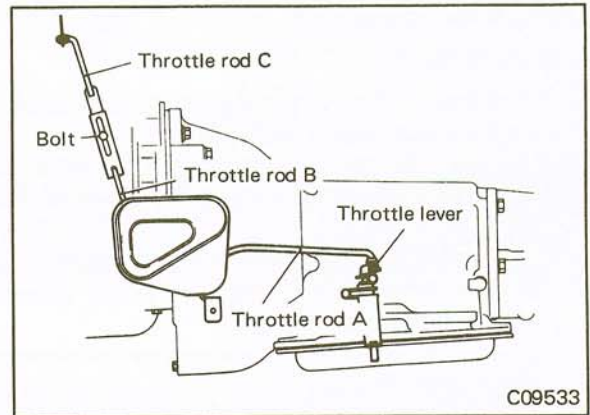


## ADJUSTMENT OF THROTTLE LINKAGE

### Caution

When engine idling adjustment is made, make sure that throttle linkage is readjusted.

1. Install each linkage. Loosen the bolts so that rods B and C slide properly.
2. Allow engine to warm up until engine coolant temperature reaches average operating temperature [about 80°C (170°F)]. Confirm complete release of fast idle. This confirmation can be made by checking to see if cam surface of choke lever of carburetor is completely off cam follower of throttle lever.
3. Lightly push rod A or the transmission throttle lever toward the idle stopper (to the right in illustration (904017)), and set the rods to the idle position. Tighten the bolt securely to connect rods B and C.
4. Make sure that, when the carburetor throttle valve is wide-open, the transmission throttle lever moves as shown in illustration (904017) (operating angle: 47.5°-54°), and that there is some range in the lever stroke. Also make sure that, when the throttle linkage alone is slowly returned from the fully opened position, the transmission throttle lever completely returns to IDLE by return-spring force.







### BAND ADJUSTMENTS

#### Kickdown Band

The kickdown band adjusting screw is located on left side of the transmission case. (B09510)

1. Loosen lock nut and back off approximately five turns. Test adjusting screw for free turning in the transmission case.
2. Using torque wrench with kickdown band adjusting wrench MD998357, tighten band adjusting screw to specified torque.

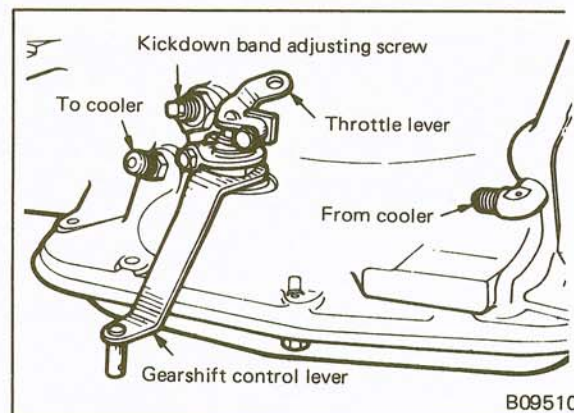
Tightening torque . . . . .

When adjuster MD998357 is used 5.9 Nm (4.3 ft.lbs.)

When adjuster MD998357 is not used 7.8 Nm (5.8 ft.lbs.)

3. Back off adjusting screw three and a half turns from 5.9 Nm (4.3 ft.lbs.). Hold adjusting screw in this position and tighten lock nut to specified torque.

Tightening torque . . . . . 40-55 Nm (30-41 ft.lbs.)



#### Low and Reverse Band

1. Raise vehicle, drain ATF from loosened oil pan and remove the oil pan.
2. After lock nut has been removed, tighten adjusting screw to specified torque using special tool. (904133)

Tightening torque . . . . . 4.9 Nm (3.6 ft.lbs.)

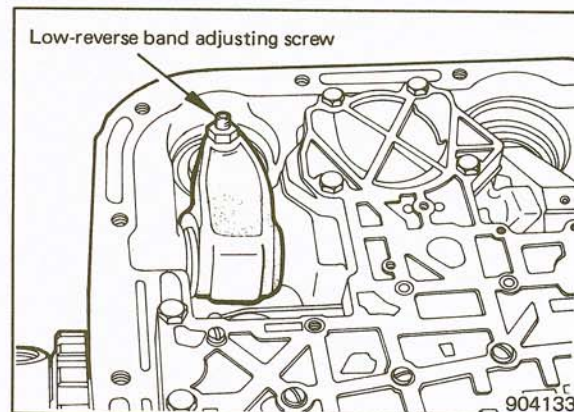
3. Back off adjusting screw 7 turns from 4.9 Nm (3.6 ft.lbs.)
4. Mount and tighten lock nut to specified torque.

Tightening torque . . . . . 34-47 Nm (25-35 ft.lbs.)

5. Clean oil pan, replace gasket, and reinstall. Tighten oil pan bolts to specified torque.

Tightening torque . . . . . 15-20 Nm (11-14 ft.lbs.)

6. Fill transmission with specified ATF. For how to pour in ATF, refer to "Lubrication" in this section.







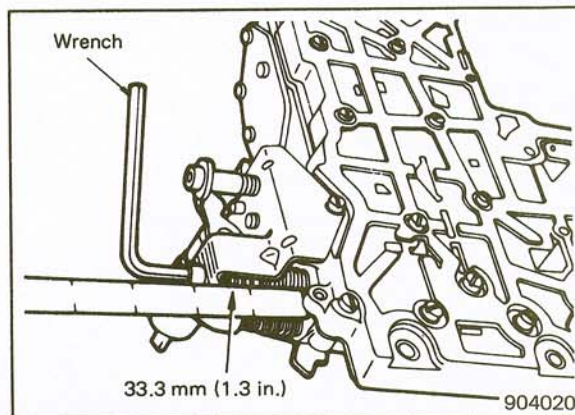
## HYDRAULIC CONTROL PRESSURE ADJUSTMENTS

### Line Pressure

An incorrect throttle pressure setting will cause incorrect line pressure readings even though line pressure adjustment is correct. Always inspect and correct throttle pressure adjustment before adjusting the line pressure.

The approximate adjustment is 33.3 mm (1.3 in.), measured from valve body to inner edge of adjusting nut. However, due to manufacturing tolerances, the adjustment can be varied to obtain specified line pressure.

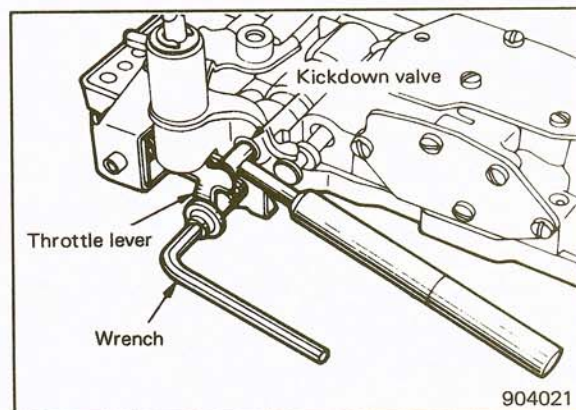
The adjusting screw may be turned with an Allen wrench. One complete turn of adjusting screw changes closed throttle line pressure approximately 9.8 kPa (1.4 psi). Turning adjusting screw counterclockwise increases pressure, and clockwise decreases pressure.



### Throttle Pressure

Throttle pressures cannot be tested accurately; therefore, the adjustment should be measured if a malfunction is evident.

1. Insert Special Tool Throttle Pressure Adjust Tool MD998563 between the throttle lever cam and kickdown valve.
2. By pushing in on tool, compress kickdown valve against its spring so that throttle valve is completely bottomed inside the valve body.
3. As force is being exerted to compress spring, turn throttle lever stop screw with Allen wrench until head of screw touches the throttle lever tang with throttle lever cam touching tool and the throttle valve bottomed. Be sure adjustment is made with spring fully compressed and valve bottomed in the valve body.



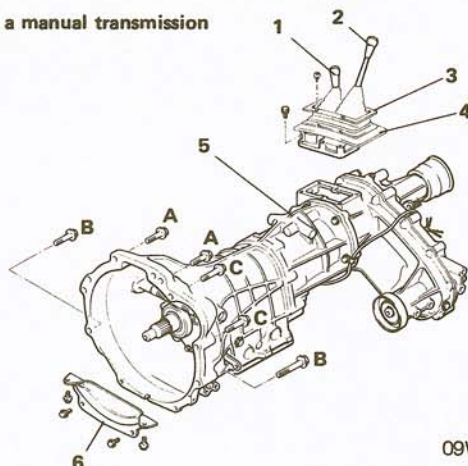




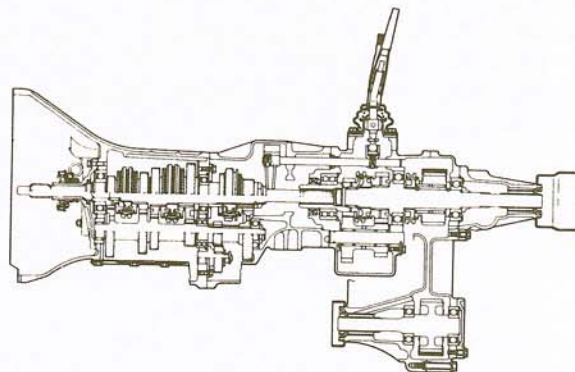
## COMPONENTS

1. Transfer gearshift lever
2. Transmission gearshift lever
3. Dust cover retaining plate
4. Gearshift lever cover
5. Manual transmission and transfer assembly
6. Bell housing cover
7. Automatic transmission and transfer assembly

### Vehicles with a manual transmission

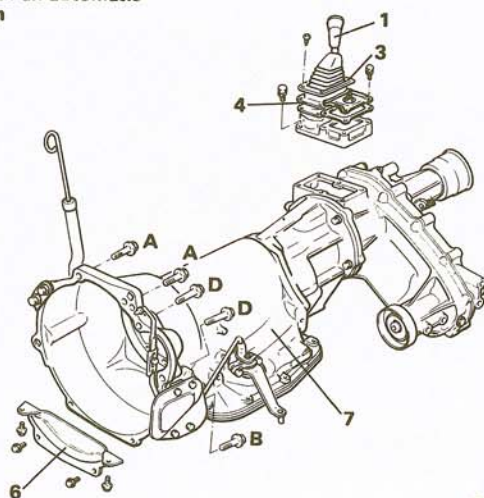


09W517

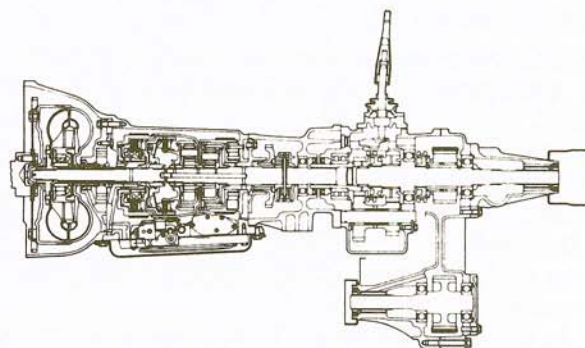


145003

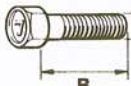
### Vehicles with an automatic transmission



09W526



146001

	Nm	ft.lbs.	O.D. x Length mm (in.)	Bolt identification
A	42-54	31-40	7 10 x 40 ( .4 x 1.6)	7 A x B 
B	42-54	31-40	7 10 x 65 ( .4 x 2.6)	
C	22-31	16-23	7 10 x 60 ( .4 x 2.4)	
D	20-29	15-22	7 10 x 65 ( .4 x 2.6)	

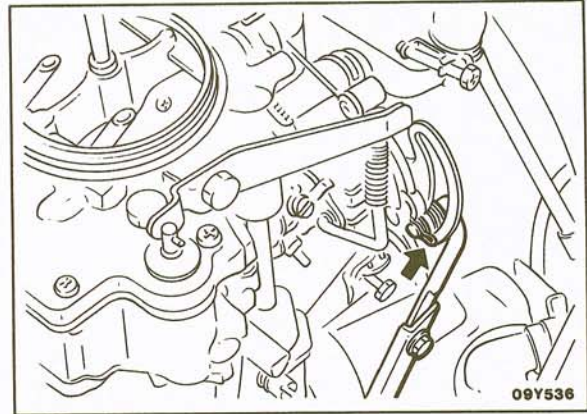
Y09512





## REMOVAL

1. Disconnect the negative cable from the battery.
2. Vehicles with an automatic transmission, disconnect the down shift link. (09Y536)



3. Remove the transmission gearshift lever (vehicles with a manual transmission) or transmission selector lever (vehicles with an automatic transmission, refer to P.21-33.) and transfer shift lever. (09S549, S09022)

### Caution

When removing the gearshift lever assembly, keep the transmission gearshift lever and the transfer gearshift lever in the following positions:

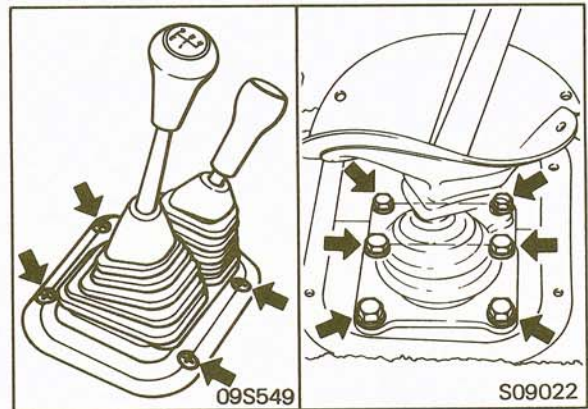
Transmission gearshift lever (vehicles with a manual transmission only) –

Neutral position

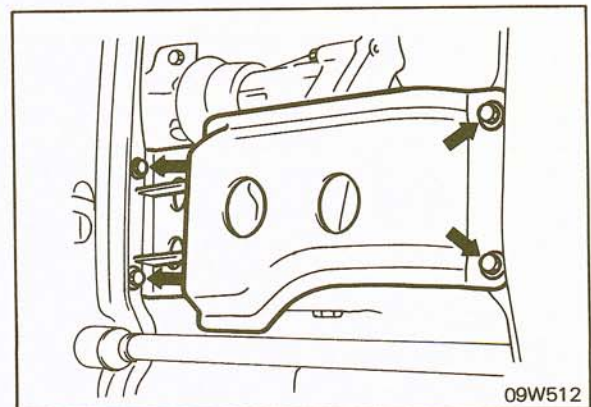
Transfer gearshift lever –

4H (4-wheel drive – high range) position

After the gearshift lever assembly has been removed, cover it with a shop towel to prevent entry of foreign substances into the extension housing.



4. Raise the vehicle.
5. Remove the transfer case protector. (09W512)
6. Vehicles with an automatic transmission, remove the control arm, control rod, cross select shaft. (Refer to P. 21-34.)
7. Drain the transmission and transfer case oil.
8. Vehicles with an automatic transmission, remove the oil cooler hoses and tubes. (Refer to GROUP 7.)
9. Remove the front and rear propeller shafts. (Refer to GROUP 16.)

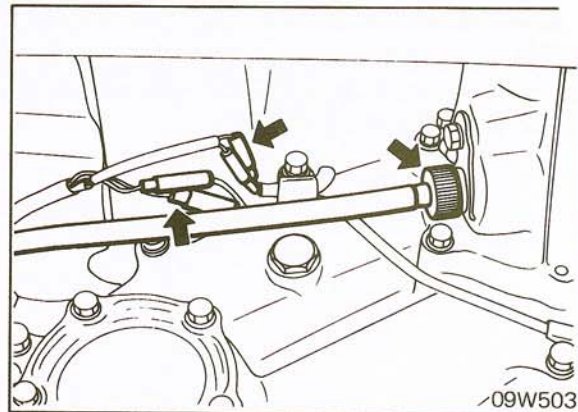




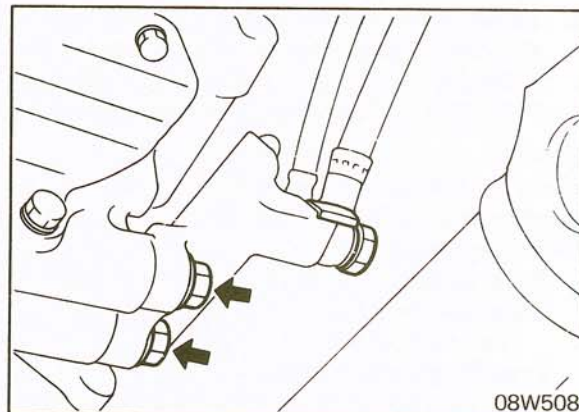


## COMPONENT SERVICE-TRANSMISSION AND TRANSFER CASE

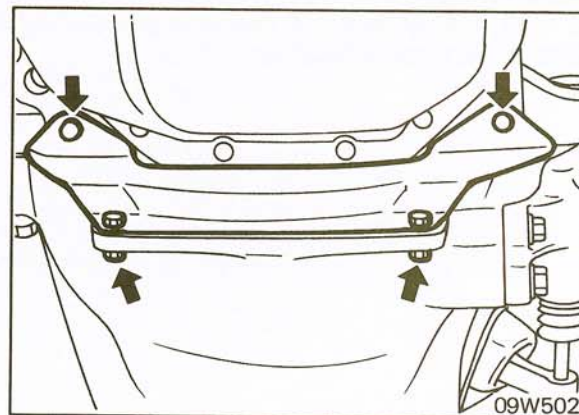
10. Disconnect speedometer cable, back-up light switch harness, and the 4-wheel-drive indicator light harness.



11. Vehicles with a manual transmission, detach the clutch release cylinder from the transmission.



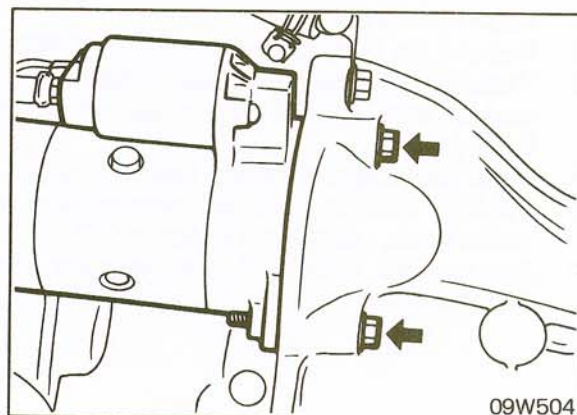
12. Remove the bell housing cover.



13. Detach the starting motor from the transmission.

### NOTE

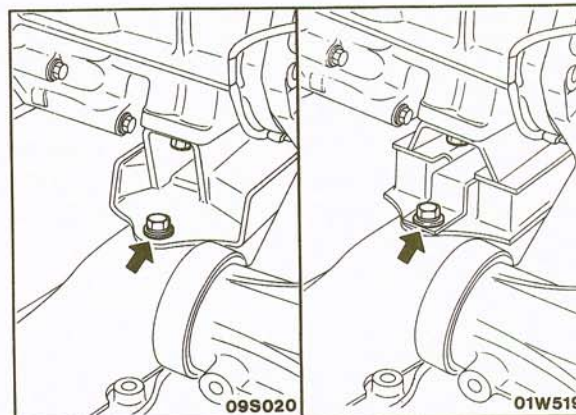
On vehicles with an air conditioner, remove the front propeller shaft and then lower the starting motor downward from under the vehicle to remove it.



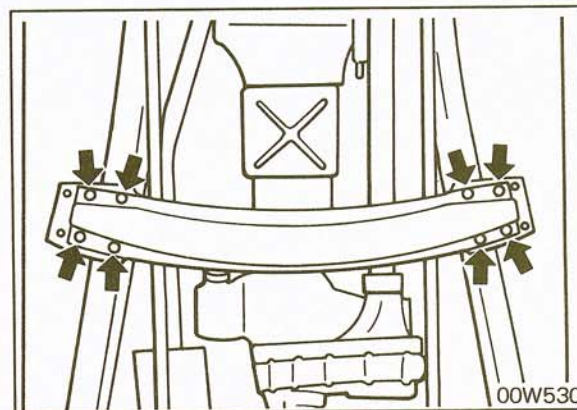




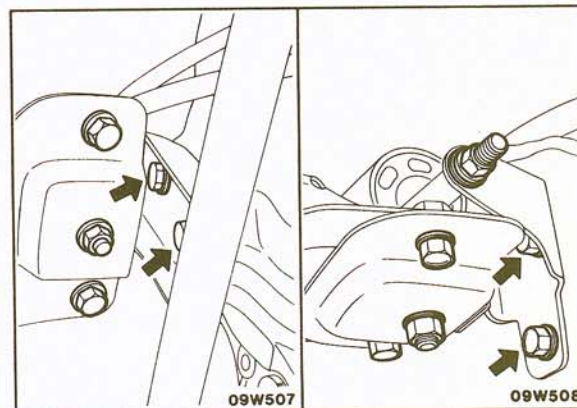
4. Detach the engine support rear insulator from the No. 2 crossmember.



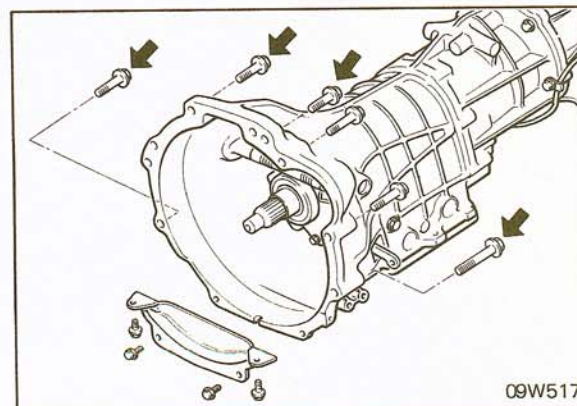
15. Remove the No. 2 crossmember. (00W530)
16. Support the transmission and transfer assembly with a transmission jack.



17. Detach the transfer from the transfer mounting bracket.



18. Remove the transmission mounting bolts from the engine.

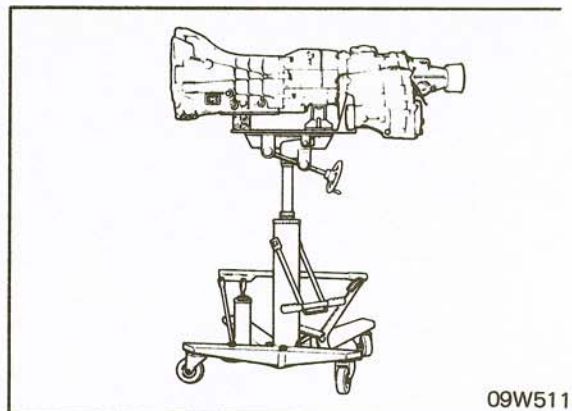






## COMPONENT SERVICE-TRANSMISSION AND TRANSFER CASE

19. Disconnect the transmission and transfer assembly from the engine by pulling it slowly toward the rear of the vehicle. (09W511)
20. When lowering the transmission and transfer assembly, tilt the front of the transmission downward and slowly lower forward, while using care to make sure that the rear of the transmission does not hit the No. 4 crossmember. (09W511)

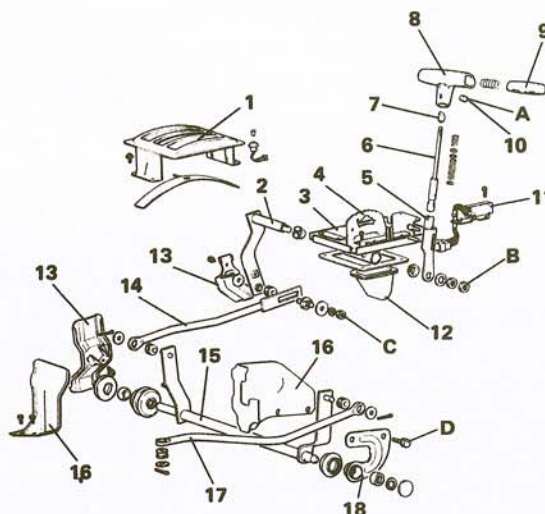






## COMPONENTS

1. Position indicator cover
2. Control arm
3. Lever bracket assembly
4. Detent plate
5. Selector lever
6. Selector lever rod assembly
7. Rod adjusting cam
8. Selector handle
9. Pushbutton
10. Set screw
11. Inhibitor switch
12. Lever bracket cover
13. Heat protector
14. Control rod (B)
15. Cross select shaft
16. Protector
17. Control rod (A)
18. Cross shaft bracket

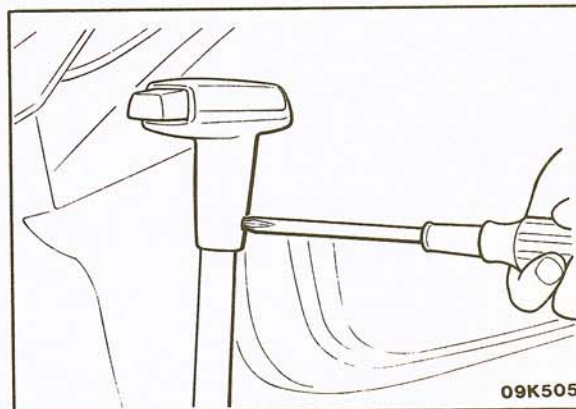


	Nm	ft.lbs.
A	2 or more	1.4 or more
B	18-24	13-17
C	13	9
D	10-13	7-9

09W001

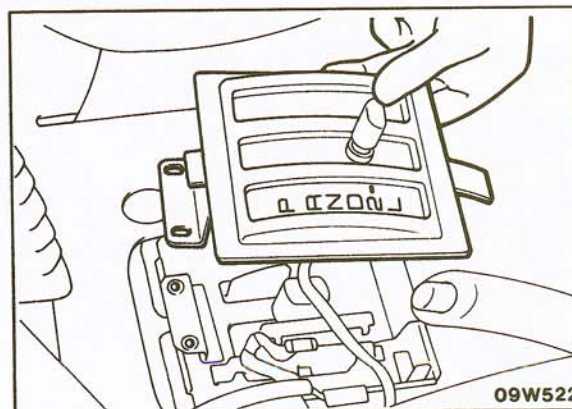
## REMOVAL

1. Remove the selector handle from the selector lever. (09K505)
2. Remove the console box. (Refer to GROUP 23.)



09K505

3. Remove the indicator panel. (09W522)
4. Disconnect the connector of the position indicator light.

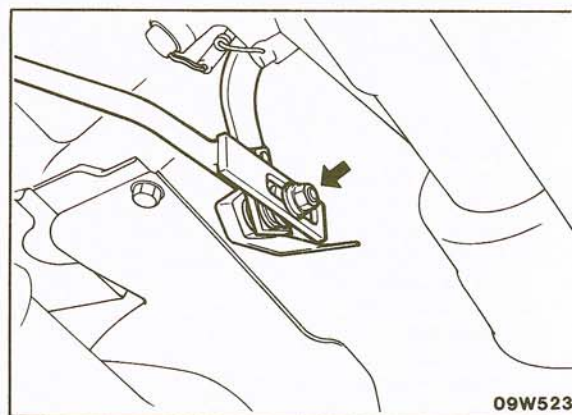


09W522





5. Disconnect the control rod (B) from the control arm by loosening the nut from under the floor.

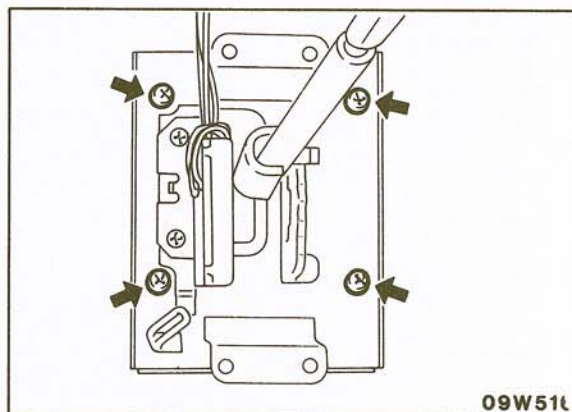


6. Disconnect the connector of the inhibitor switch.

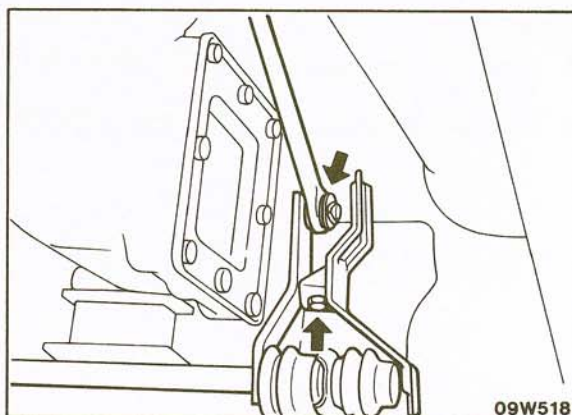
**NOTE**

Do not remove the inhibitor switch from the lever bracket assembly unless it is necessary to do so.

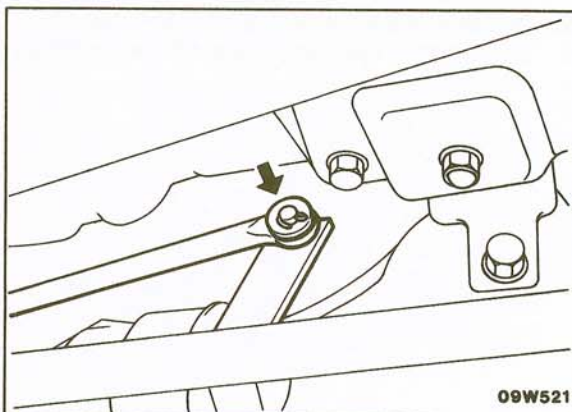
7. Remove the lever bracket assembly by loosening the attaching screws. (09W516)



8. Disconnect the cross select shaft from the heat protector.
9. Disconnect the cross select shaft from control rod B. (09W518)



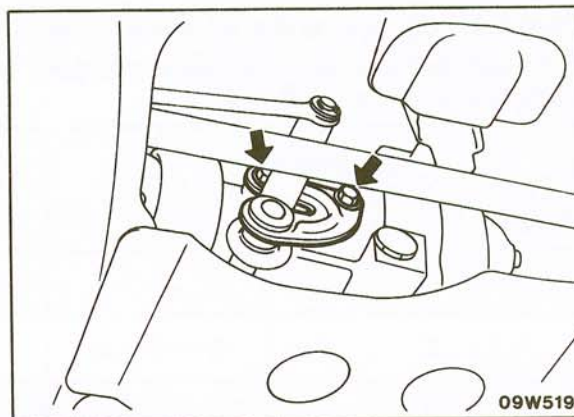
10. Disconnect the cross select shaft from control rod A.



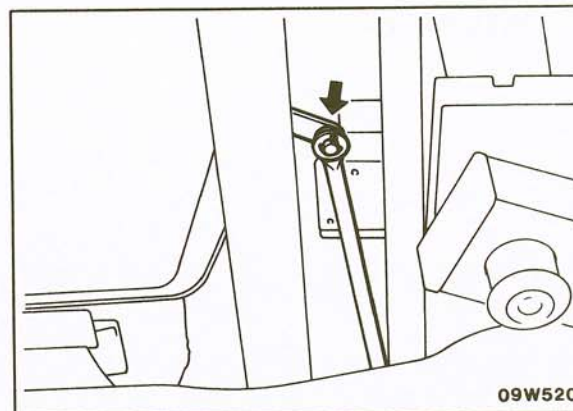




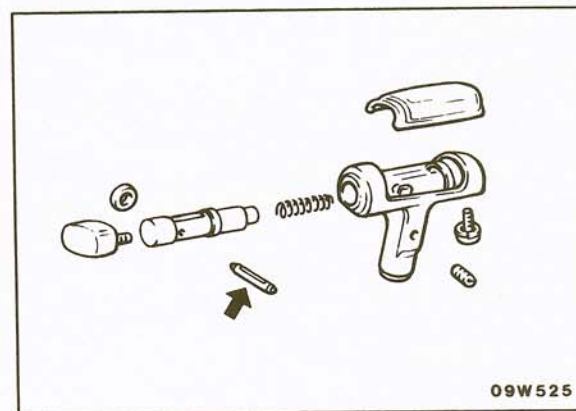
- . Remove the cross shaft bracket mounting bolts from the transfer assembly. (09W519)
- 12. Detach the cross shaft bracket from the bracket on the No. 1 crossmember side.



- 13. Remove control rod A from the transmission.



- 14. Remove the cover of selector handle.
- 15. Remove the spring pin in order to disassemble the selector handle. (09W525)



## INSPECTION

1. Check detent plate for wear.
2. Check pin at the end of selector lever for wear.
3. Check the pushbutton and the rod adjusting cam for worn contact surface.
4. Check control rods for damage, cracking, or deformation.
5. Check each bushing for cracking, deterioration, or wear.
6. Check the cross select shaft for damage, cracking, or deformation.



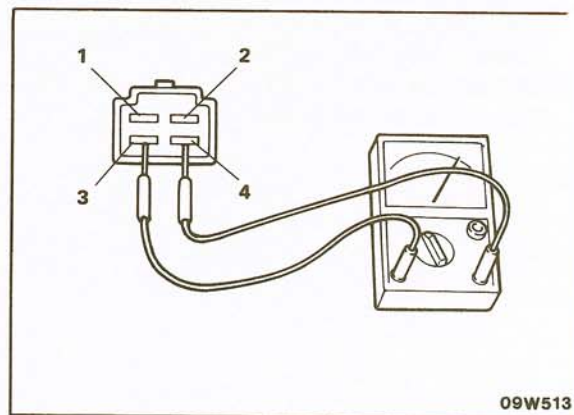


## Operating Condition of the Inhibitor Switch

Shift the selector lever to each position, and check for continuity as shown in the table.

Position \ Terminal	Terminal			
	1	2	3	4
P			○—○	○—○
R	○—○	○—○		
N			○—○	○—○

○—○: Continuity



## INSTALLATION

### Selector Lever

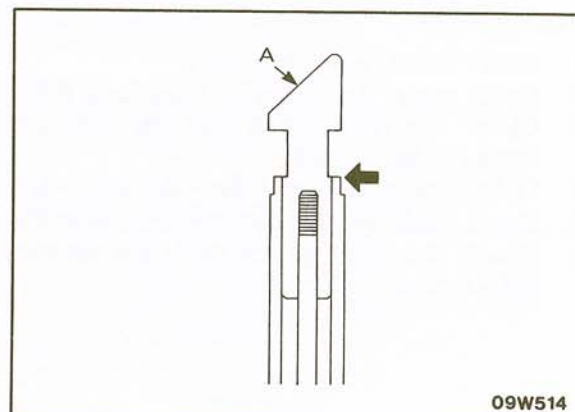
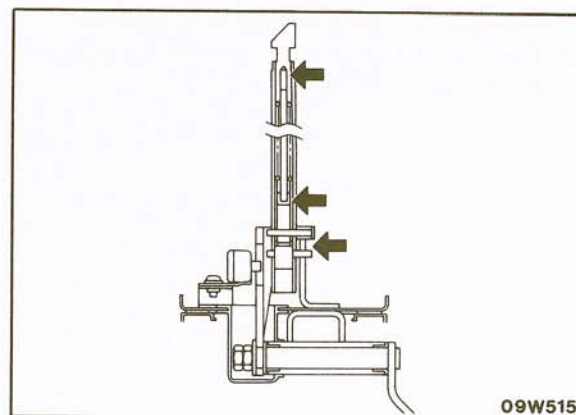
1. Apply multipurpose grease to each sliding part. (09W515)

Recommended grease .....  
Multipurpose grease, SAE J310a,  
NLGI grade #3

2. Mount the selector lever and the control arm onto the lever bracket assembly, and then tighten the lock nut to the specified torque.

Lock nut tightening torque .....  
18-24 Nm (13-17 ft.lbs.)

3. Set the selector lever to the "N" position, and then turn the rod adjusting cam to adjust it so that its bottom surface is flush with the end of the selector lever as shown in the illustration. At this time, position the rod adjusting cam so that surface A faces the direction of the driver's seat.







Set the selector lever to the "N" position, and then mount the indicator panel so that the "N" indication is properly aligned. (09K504)

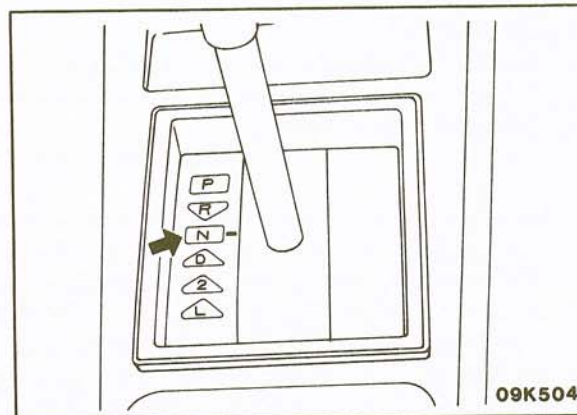
## Selector Handle

1. Apply multipurpose grease to each sliding part.

Recommended grease .....  
 Multipurpose grease, SAE J310a,  
 NLGI grade #3

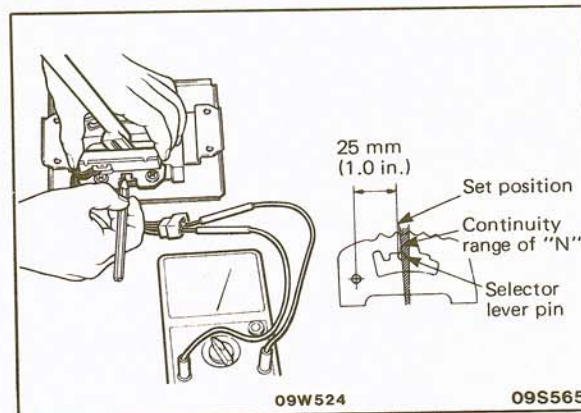
2. Tighten the selector handle to the specified torque.

Selector handle set screw tightening torque .....  
 2.0 Nm (1.4 ft.lbs.) or more



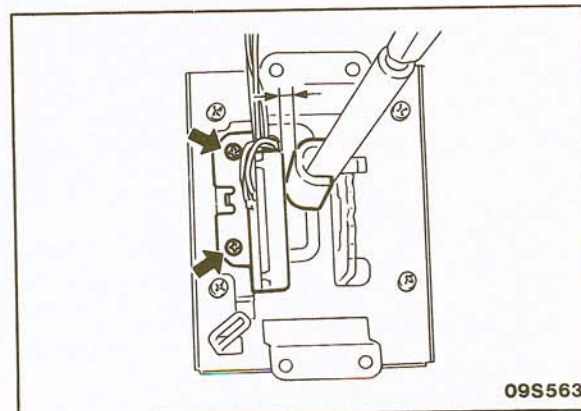
## Inhibitor Switch

1. Install the inhibitor switch temporarily.
2. Connect an ohmmeter to the terminals (BY-BY) of the inhibitor switch connector, and prepare for continuity check.
3. Set the selector lever so that the selector lever pin comes to the position shown in the illustration. (09S565)
4. Slide the inhibitor switch from the rear to the front, secure it at the point at which continuity begins, and then make a mark on the lever bracket assembly. (09W524)



5. Tighten the inhibitor switch mounting screws at the position where the clearance between the inhibitor switch and the selector lever is the specified distance.

Clearance between the side of the inhibitor  
 switch and the selector lever ..... 2.5 mm (.1 in.)





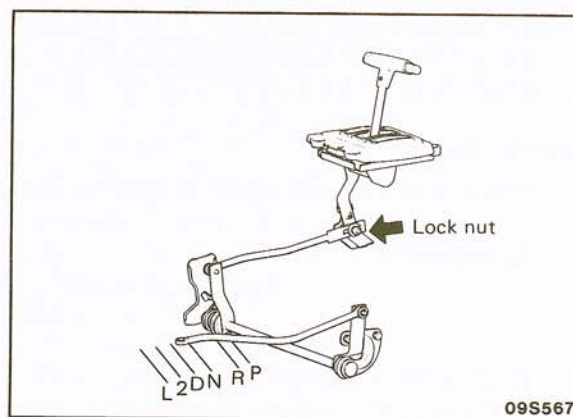


### Control Rods

1. Apply multipurpose grease to each sliding part.

Recommended grease . . . . .  
Multipurpose grease, SAE J310a,  
NLGI grade #3

2. To connect the control rod (B) to the control arm, set the selector lever to the "N" position, move the control rod (A) to place the transmission in the Neutral position, and then tighten the rod to the lever lock nut. (09S567)
3. Torque all parts to specifications during assembly.
4. After installing each part, make certain that the selector lever moves smoothly and that the lever on the transmission side moves properly to each selector position. (09S567)

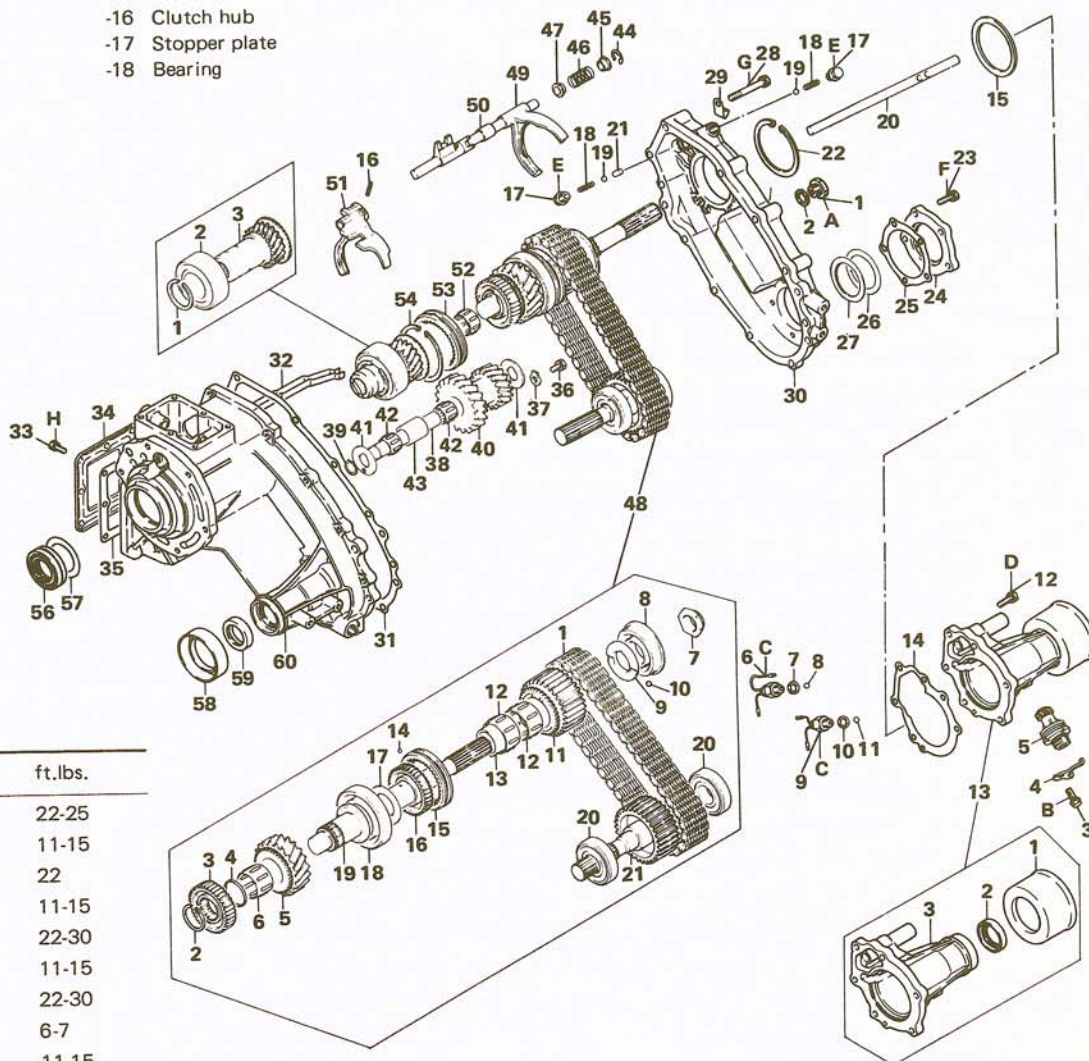






## COMPONENTS

- |                                |                              |   |
|--------------------------------|------------------------------|---|
| 1. Filler plug                 | 45. Spring retainer          | -19 Rear output shaft                         |
| 2. Gasket                      | 46. Spring                   | -20 Bearing (2)                               |
| 3. Bolt                        | 47. Spring retainer          | -21 Front output shaft                        |
| 4. Sleeve clamp                | 48. Output shaft assembly    | 49. Rear-wheel drive-4-wheel drive shift fork |
| 5. Speedometer sleeve assembly | -1 HY-VO chain               | 50. Rear-wheel drive-4-wheel drive shift rail |
| 6. 4WD indicator lamp switch   | -2 Snap ring                 | 51. H-L shift fork                            |
| 7. Gasket                      | -3 Clutch hub (High and Low) | 52. Needle bearing                            |
| 8. Steel ball                  | -4 Bearing spacer            | 53. Clutch sleeve                             |
| 9. 4WD indicator lamp switch   | -5 Low speed gear            | 54. Snap ring                                 |
| 10. Gasket                     | -6 Needle bearing            | 55. Input gear assembly                       |
| 11. Steel ball                 | -7 Locking nut               | -1 Snap ring                                  |
| 12. Bolt (6)                   | -8 Radial ball bearing       | -2 Bearing                                    |
| 13. Rear cover assembly        | -9 Sprocket spacer           | -3 Input gear                                 |
| -1 Dust seal                   | -10 Steel ball               | 56. Oil seal                                  |
| -2 Dust seal guard             | -11 Drive sprocket           | 57. Baffle plate                              |
| -3 Rear cover                  | -12 Needle bearing (2)       | 58. Dust seal guard                           |
| 14. Rear cover gasket          | -13 Sprocket sleeve          | 59. Oil seal                                  |
| 15. Wave spring                | -14 Steel ball               | 60. Transfer case                             |
| 16. Spring pin                 | -15 Clutch sleeve            |   |
| 17. Seal plug (2)              | -16 Clutch hub               |   |
| 18. Poppet spring (2)          | -17 Stopper plate            |   |
| 19. Steel ball (2)             | -18 Bearing                  |   |
| 20. Interlock plunger          |                              |   |
| 21. H-L shift rail             |                              |   |
| 22. Snap ring                  |                              |   |
| 23. Bolt (5)                   |                              |   |
| 24. Cover                      |                              |   |
| 25. Cover gasket               |                              |   |
| 26. Spacer (AR)                |                              |   |
| 27. Wave spring                |                              |   |
| 28. Bolt (10)                  |                              |   |
| 29. Cord fastener (4)          |                              |   |
| 30. Chain cover                |                              |   |
| 31. Chain cover gasket         |                              |   |
| 32. Oil guide                  |                              |   |
| 33. Bolt (8)                   |                              |   |
| 34. Side cover                 |                              |   |
| 35. Side cover gasket          |                              |   |
| 36. Bolt                       |                              |   |
| 37. Lock plate                 |                              |   |
| 38. Counter gear shaft         |                              |   |
| 39. O-ring                     |                              |   |
| 40. Counter shaft gear         |                              |   |
| 41. Thrust washer (2)          |                              |   |
| 42. Needle bearing (2)         |                              |   |
| 43. Bearing spacer             |                              |   |
| 44. Snap ring                  |                              |   |



	Nm	ft.lbs.
A	30-34	22-25
B	15-21	11-15
C	30	22
D	15-21	11-15
E	30-41	22-30
F	15-21	11-15
G	30-41	22-30
H	8.0-9.5	6-7
I	15-21	11-15

### NOTE

Numbers show order of disassembly.  
For reassembly, reverse order of disassembly.

145026

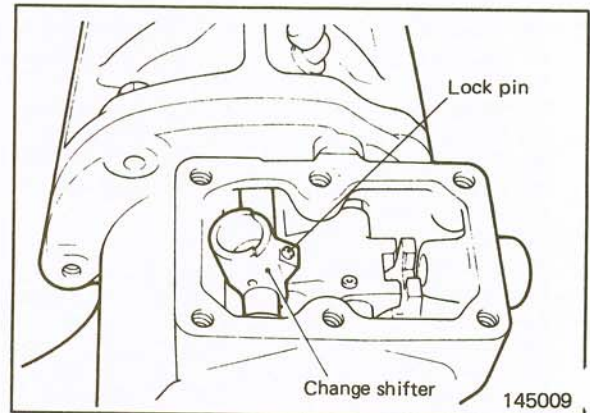
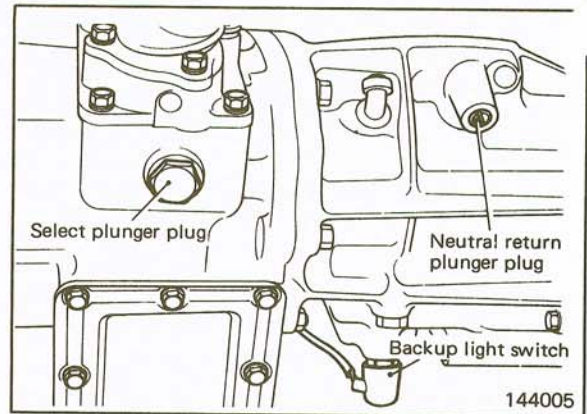




### REMOVAL

#### Manual Transmission

1. Remove the backup light switch from the lower right of the adapter. Remove the steel ball. (144005)
2. Remove the plug from the right side of the transfer case and then remove the select spring and the select plunger. (144005)
3. Remove the six bolts securing the control lever assembly and remove the control lever assembly and the gasket.
4. Remove the plugs from the top of the adapter and remove the resistance spring, steel ball, neutral return springs and plungers.
5. Remove the lock pin from the change shifter using a 4.8-mm (3/16-in.) punch. (145009)
6. Remove the four bolts and two nuts securing the transfer case to the adapter.
7. Remove the transfer case assembly from the adapter and remove the change shifter from the control shaft.

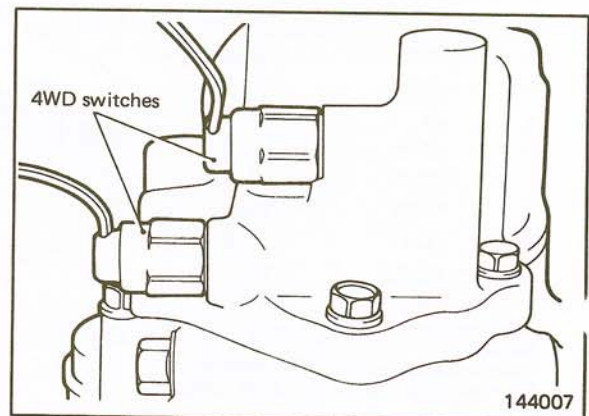


#### Automatic Transmission

1. Remove the bolts securing the transfer case and transmission case.
2. Remove the transfer case assembly from the transmission.
3. Remove the four bolts and two nuts securing the transfer case to the adapter.
4. Remove the adapter from the transfer case.

### DISASSEMBLY

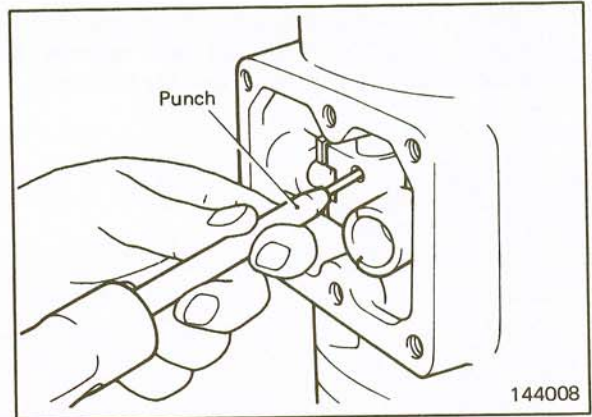
1. Remove two 4WD indicator light switches. Remove two steel balls. (144007)
2. Remove the speedometer sleeve clamp and remove the speedometer sleeve assembly.
3. Remove the bolts securing the rear cover and remove the rear cover, the gasket and the wave spring.
4. Remove the cover and gasket and then remove the wave spring and spacer.



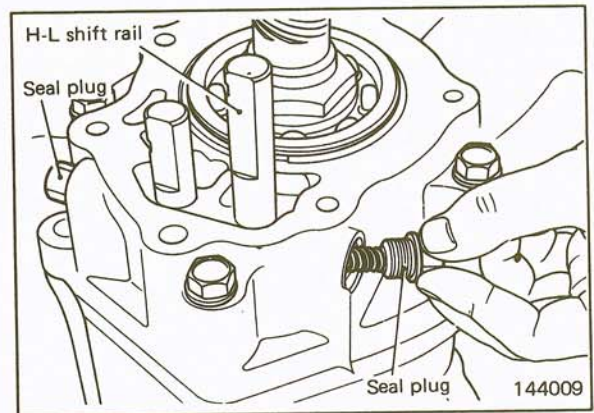




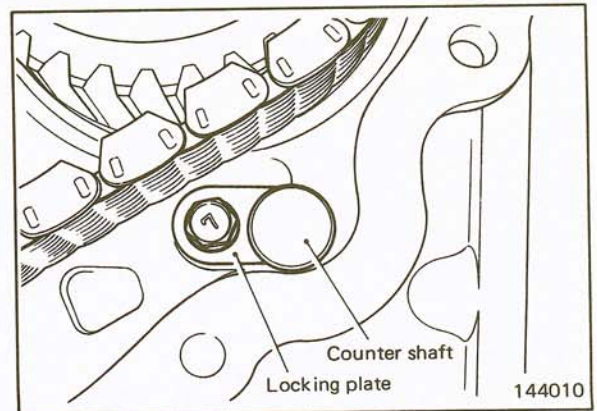
Remove the spring pin from the H-L shift fork using a 4.8-mm (3/16-in.) punch.



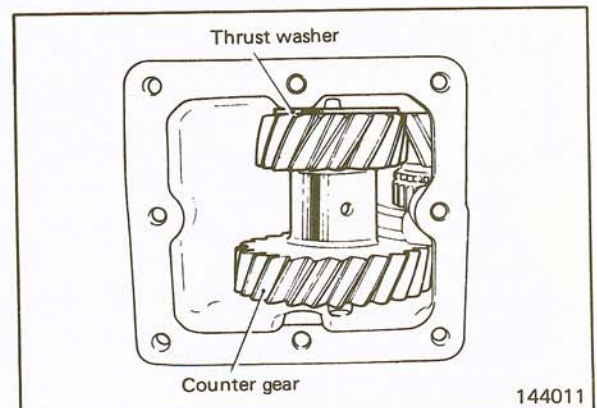
6. Remove the two seal plugs and remove the two poppet springs and two balls. (144009)
7. Pull the H-L shift rail out toward the rear.
8. Remove the interlock plunger.
9. Remove the snap ring from the rear bearing of the rear output shaft.
10. Remove the chain cover.
11. Remove the oil guide.
12. Remove the side cover.



13. Remove the counter shaft locking plate and remove the counter shaft.



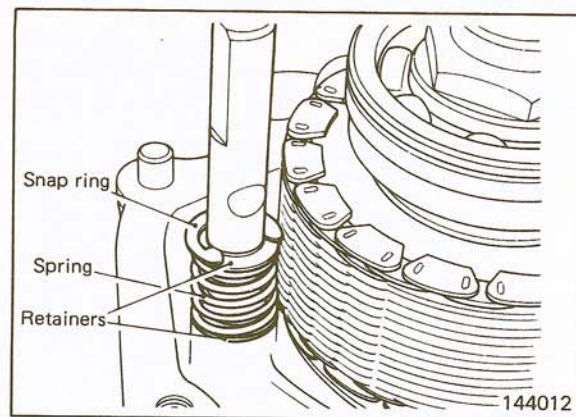
14. Remove the counter gear, two thrust washers, two needle bearings and the spacer through the side cover opening.



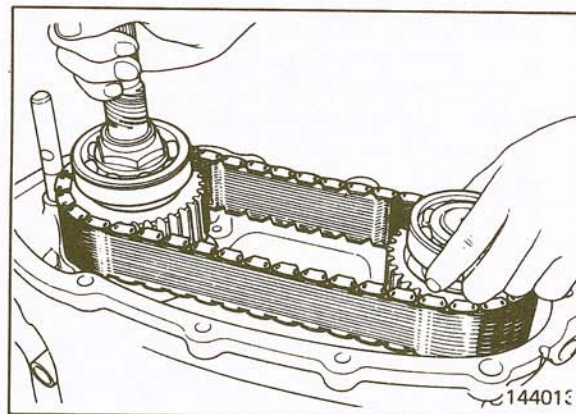




15. Remove the snap ring from the REAR-WHEEL DRIVE-4-WHEEL DRIVE shift rail and remove the two spring retainers and the spring from the shift rail.



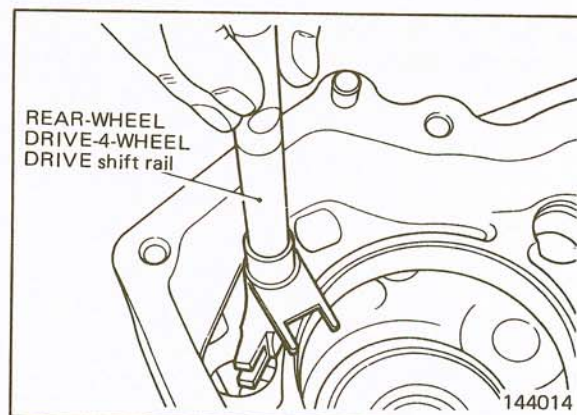
16. Remove the front output shaft, the rear output shaft and the chain from the transfer case as a unit.



17. Remove the REAR-WHEEL DRIVE-4-WHEEL DRIVE shift rail. (144014)

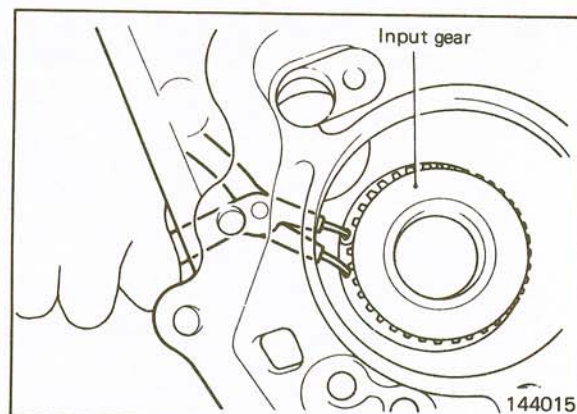
18. Remove the H-L shift fork and the clutch sleeve.

19. Remove the needle bearing from the input gear.



20. Remove the snap ring, and the input gear assembly. (144015)

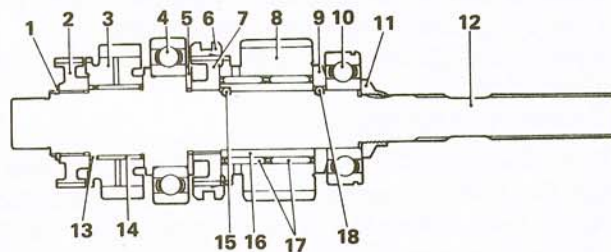
21. Remove the snap ring from the front end of the rear output shaft and remove the H-L clutch hub, the low speed gear, the thrust washer and the needle bearing.







- |   |                       |
|---|-----------------------|
| 1. Snap ring  | 12. Rear output shaft |
| 2. H - L clutch hub                                   | 13. Thrust washer     |
| 3. Low speed gear                                     | 14. Needle bearing    |
| 4. Ball bearing                                       | 15. Steel ball        |
| 5. Stop plate   | 16. Sprocket sleeve   |
| 6. REAR-WHEEL<br>DRIVE-4-WHEEL<br>DRIVE clutch sleeve | 17. Needle bearings   |
| 7. REAR-WHEEL<br>DRIVE-4-WHEEL<br>DRIVE clutch hub    | 18. Steel ball        |
| 8. Drive sprocket                                     |                       |
| 9. Sprocket spacer                                    |                       |
| 10. Ball bearing                                      |                       |
| 11. Lock nut  |                       |



144016

22. Loosen the staking on the rear output shaft lock nut and remove the lock nut.
23. Remove the ball bearing from the rear end using a universal bearing puller or a press.
24. Remove the sprocket spacer and the steel balls.
25. Remove the drive sprocket, the two needle bearings, the sprocket sleeve and the steel ball.
26. Remove the REAR-WHEEL DRIVE-4-WHEEL DRIVE clutch sleeve, the hub and the stop plate and remove the ball bearing using a puller or press.
27. Remove the snap ring from the input gear. With the bearing supported by the press base, push on the front end of the input gear to remove the bearing.
28. Remove two bearings from the front output shaft using a universal bearing puller or a press base.
29. Remove the control shaft oil seal, input gear oil seal and front output shaft oil seal from the transfer case.





### REASSEMBLY

#### Cautions

1. Replace gaskets, oil seals, etc., with new ones.
  2. Coat the gaskets and threads with sealant.
  3. Apply transmission oil to sliding and rotating parts before assembling.
  4. Do not reuse spring pin.
1. Press the control shaft oil seal, the input gear oil seal and the front output shaft oil seal into the transfer case. When press fitting the oil seals, push down on the outer circumference uniformly. After press fitting, pack grease between lips. (144018, 144019, 144020)
  2. Assemble the adapter and the transfer case with a new gasket placed between them. Tighten the bolts and nuts. Be sure to install the change shifter over the control shaft before tightening the bolts and nuts.

#### Caution

If this sequence is reversed, the change shifter cannot be installed.

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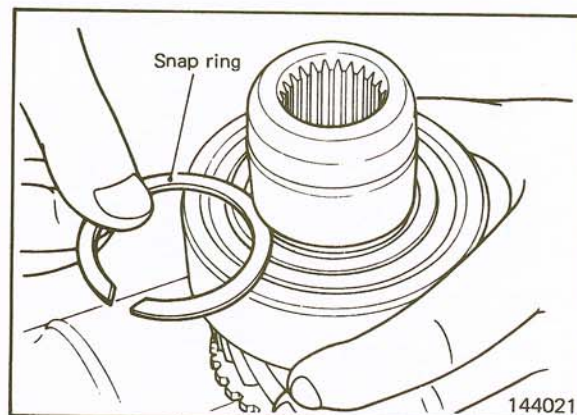
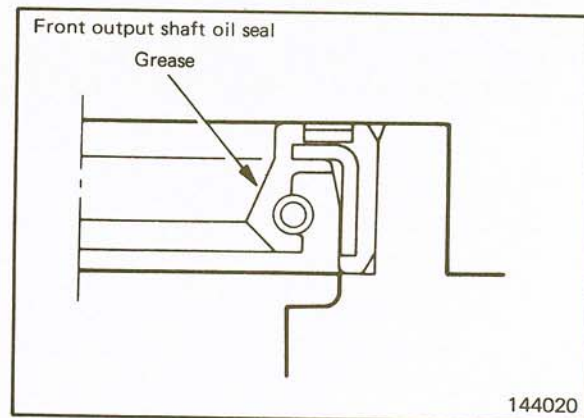
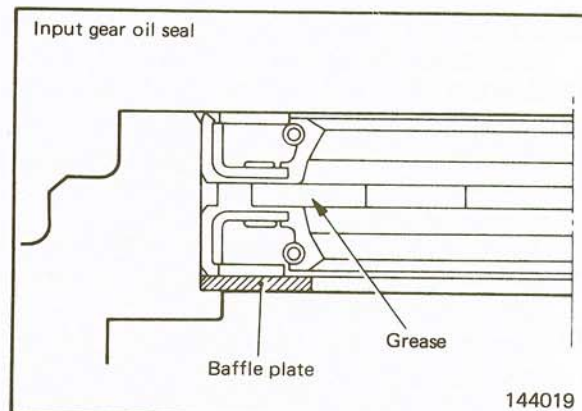
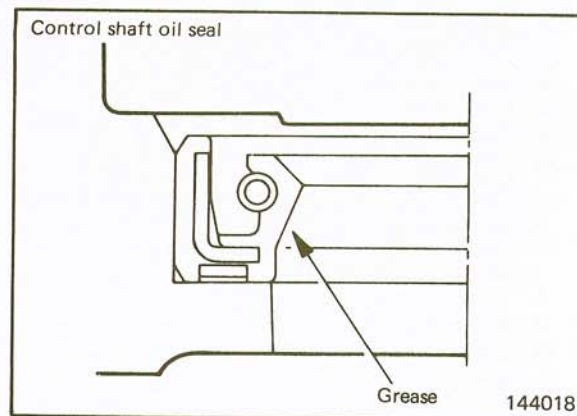
Transfer case mounting bolts and  
nuts tightening torque . . . . 30-41 Nm (22-30 ft.lbs.)

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#### Caution

When inserting the transmission control shaft through the oil seal, take care not to damage the oil seal lip. If the change shifter lock pin hole in the shaft has burrs, remove them before inserting the shaft through the oil seal.

3. Press the bearing onto the input gear, being sure to push on the inner race. After fitting, check to see that the bearing rotates smoothly.
4. Fit a snap ring over the front end of the input gear. Snap rings are available in five different thicknesses. Use the thickest one that will fit into the groove. (144021)



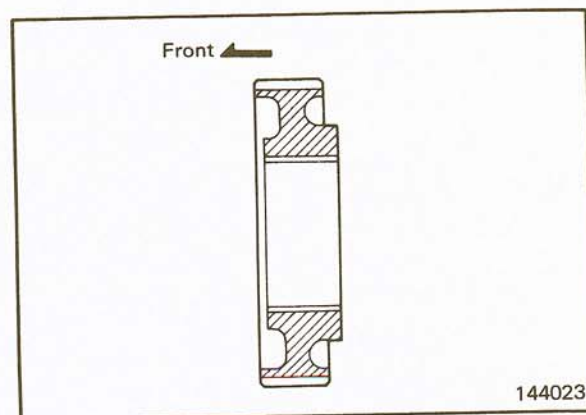
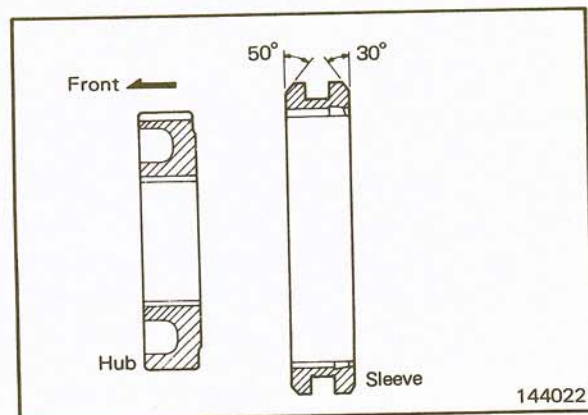




Snap ring thickness mm (in.)	Identification color
2.30 (.091)	None
2.35 (.093)	Red
2.40 (.094)	White
2.45 (.096)	Blue
2.50 (.098)	Green

- Press two ball bearings over the front output shaft, pushing down on the inner race. After fitting, check to see that they rotate smoothly.
- Install the ball bearing over the rear output shaft from the rear and press into place. To install, push on the inner race. (Refer to p.21-43.) After installation, check to see that the ball bearing rotates smoothly.

- Mount the stop plate and install the REAR-WHEEL DRIVE-4-WHEEL DRIVE clutch hub and sleeve. (Refer to p.21-43.) When mounting the hub and sleeve, be sure the direction of installation is correct. (144022)
- Mount the steel ball (for sprocket sleeve positioning) on the rear output shaft and mount the sprocket sleeve. (Refer to p.21-43.)
- Mount the two needle bearings on the outer circumference of the sprocket sleeve, and then mount the drive sprocket. (Refer to p.21-43.)
- After mounting the steel balls and the sprocket spacer, press the ball bearing (Refer to p.21-43.), by pushing on the inner race. Check that the bearing rotates smoothly after it is fully installed.
- Tighten the mainshaft lock nut and drive in the detent section with a punch.  
After the lock nut is tightened, check that the drive sprocket rotates smoothly.
- Mount the needle bearing, the thrust washer and the low-speed gear on the rear output shaft from the front end.
- Mount the H-L clutch hub, making sure that the direction of installation is correct. (144023)

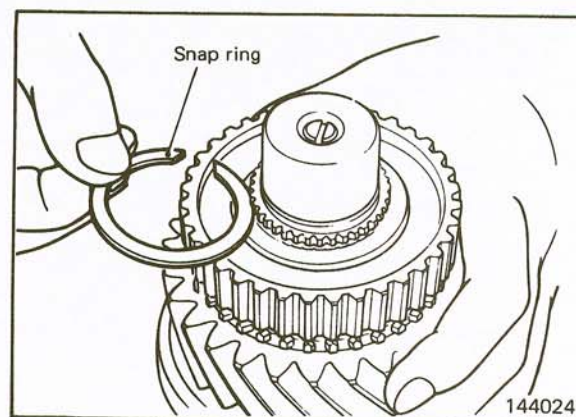






14. Mount the H-L clutch hub snap ring on the front end of the rear output shaft. Snap rings are available in five different thicknesses. Use the thickest one that will fit into the groove. (144024)

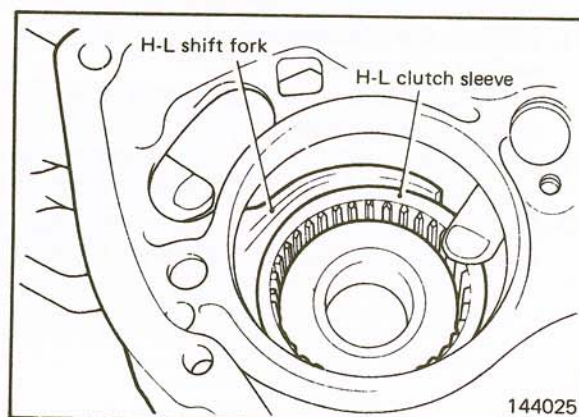
Snap ring thickness mm (in.)	Identification color
2.14 (.084)	None
2.21 (.087)	Yellow
2.28 (.090)	White
2.35 (.093)	Blue
2.42 (.095)	Red



15. Insert the input gear assembly into the transfer case and mount the snap ring. (Refer to p.21-42.) Snap rings are available in five different thicknesses. Use the thickest one that will fit into the groove.

Snap ring thickness mm (in.)	Identification color
2.70 (.106)	Purple
2.75 (.108)	Pink
2.80 (.110)	Yellow
2.85 (.112)	White
2.90 (.114)	Blue

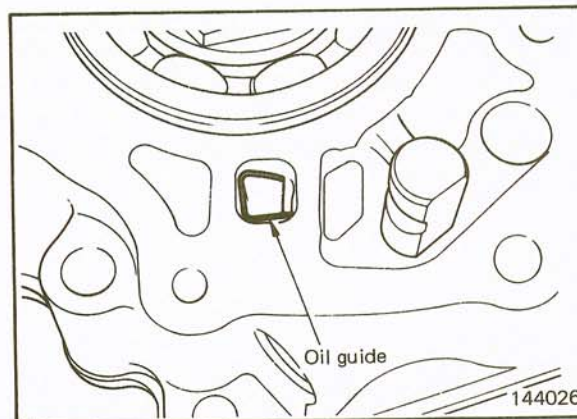
16. Insert the needle bearing into the input gear.
17. Mount the H-L clutch sleeve and shift fork, making sure that the direction of the clutch sleeve is correct. The direction of installation is the same as for the clutch sleeve for REAR-WHEEL DRIVE-4-WHEEL DRIVE. (144025)
18. Install the REAR-WHEEL DRIVE-4-WHEEL DRIVE shift rail. (Refer to p.21-42.)
19. Securely engage the chain with the front and rear output shaft sprockets. Assemble the REAR-WHEEL DRIVE-4-WHEEL DRIVE clutch sleeve with the REAR-WHEEL DRIVE-4-WHEEL DRIVE shift fork and install the assembly over the REAR-WHEEL DRIVE-4-WHEEL DRIVE shift rail. At the same time, mount the front and rear output shafts and chain, etc. as a unit. (Refer to p.21-42.)
20. Mount the two spring retainers and the spring. (Refer to p.21-42.)







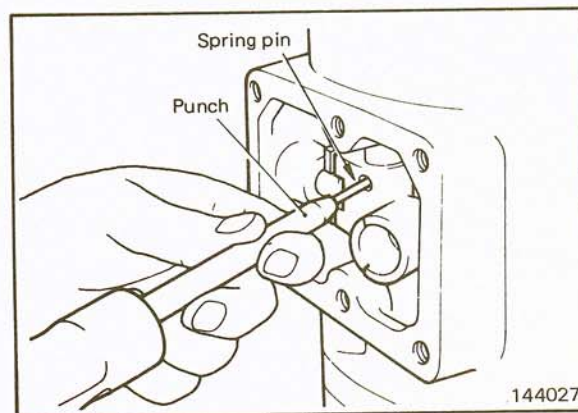
1. Insert the two needle bearings and the spacer into the counter gear, and install the assembly into the transfer case. Mount one thrust washer at the front of the counter gear and the other at the rear. (Refer to p.21-41.)
22. Insert the counter shaft and install the locking plate. (Refer to p.21-41.)
23. Install the side cover and gasket.
24. Install the oil guide. (144026)
25. Install the chain cover and gasket, making sure that the oil guide end fits into the chain cover opening. (144026)
26. Fit the snap ring into the groove of the rear output shaft rear bearing.
27. Insert the interlock plunger.
28. Insert the H-L shift rail and pass it through the H-L shift fork.



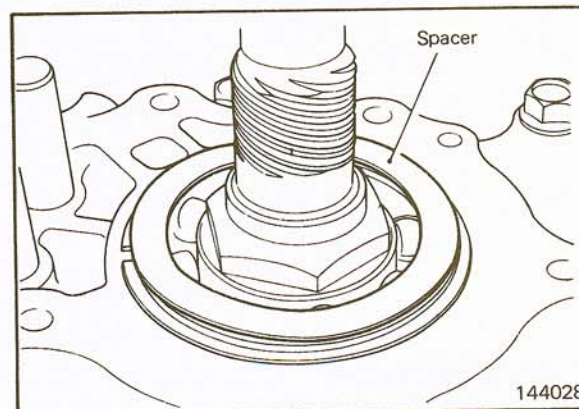
## Caution

Unless the REAR-WHEEL DRIVE-4-WHEEL DRIVE shift fork is shifted to the 4-WHEEL DRIVE side, the H-L shift rail can not be inserted.

29. Mount the two poppet balls and springs, and mount the seal plugs. (Refer to p.21-41.) When mounting the poppet springs, the smaller end should face toward the ball.
30. With the H-L shift fork and shift rail spring pin holes aligned, drive in the spring pin using a punch. When driving in the spring pin, position it so that its slot is placed on the center line of the shift rail. (144027)
31. Mount the spacer onto the rear end of the rear output shaft bearing, and install the rear cover and gasket. Be sure to select and mount a spacer which is thick enough to keep the end play of the rear bearing outer race in the range of 0 to 0.1 mm (0 to .04 in.).



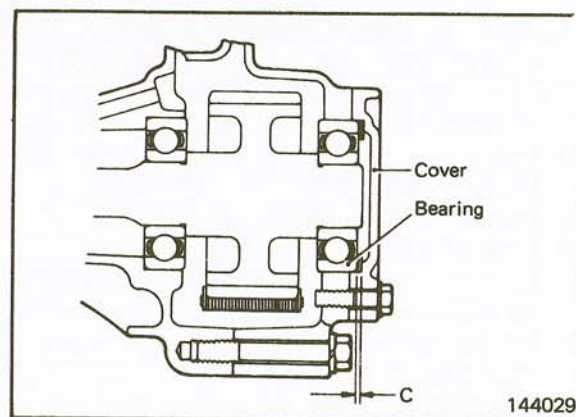
Thickness of spacer	mm (in.)	Identification color
0.84	(.033)	Black
0.93	(.037)	None
1.02	(.040)	Red
1.11	(.044)	White
1.2	(.047)	Yellow
1.29	(.051)	Blue
1.38	(.054)	Green







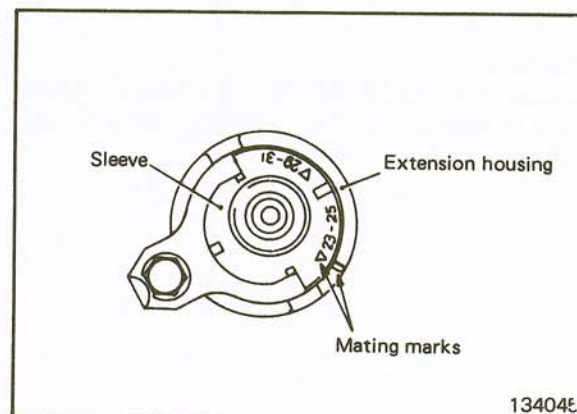
32. Mount the wave spring on the rear end of the front output shaft rear bearing, and install the cover and the gasket. (144028) If the bearing rear end to cover clearance (C) exceeds 2 mm (.079 in.), use an appropriate spacer to reduce the clearance to 2 mm (.079 in.) or less. (144029)



33. Insert the speedometer sleeve assembly into the rear cover. Align the mating mark on the sleeve with that on the case according to the number of teeth of the speedometer driven gear. (134045)
34. Mount the sleeve clamp and tighten the bolt.

Clamp bolt tightening torque .....  
10-12 Nm (7.5-9 ft.lbs.)

35. Install two 4WD indicator light switches, along with their steel balls.





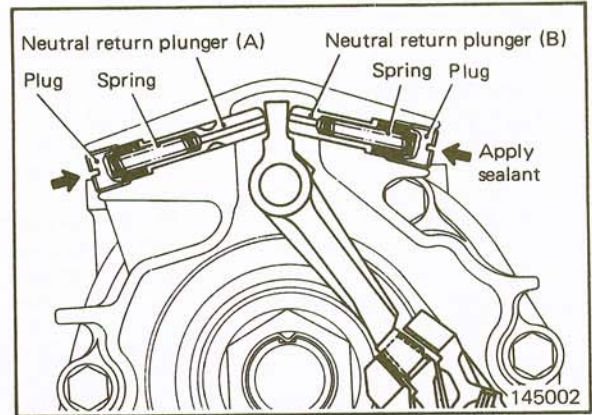


## INSTALLATION

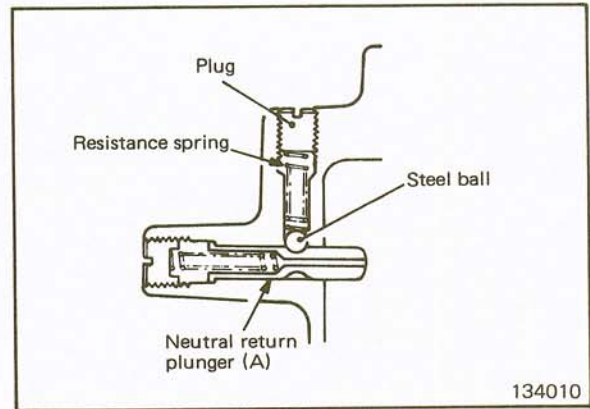
### Manual Transmission

Perform reinstallation in reverse procedure of removal, pay attention to the following items:

1. Mount the neutral return plungers and the springs in the hole on top of the adapter and tighten the plug until it is flush with the adapter surface.



2. Install steel ball, resistance spring and plug.



### Automatic Transmission

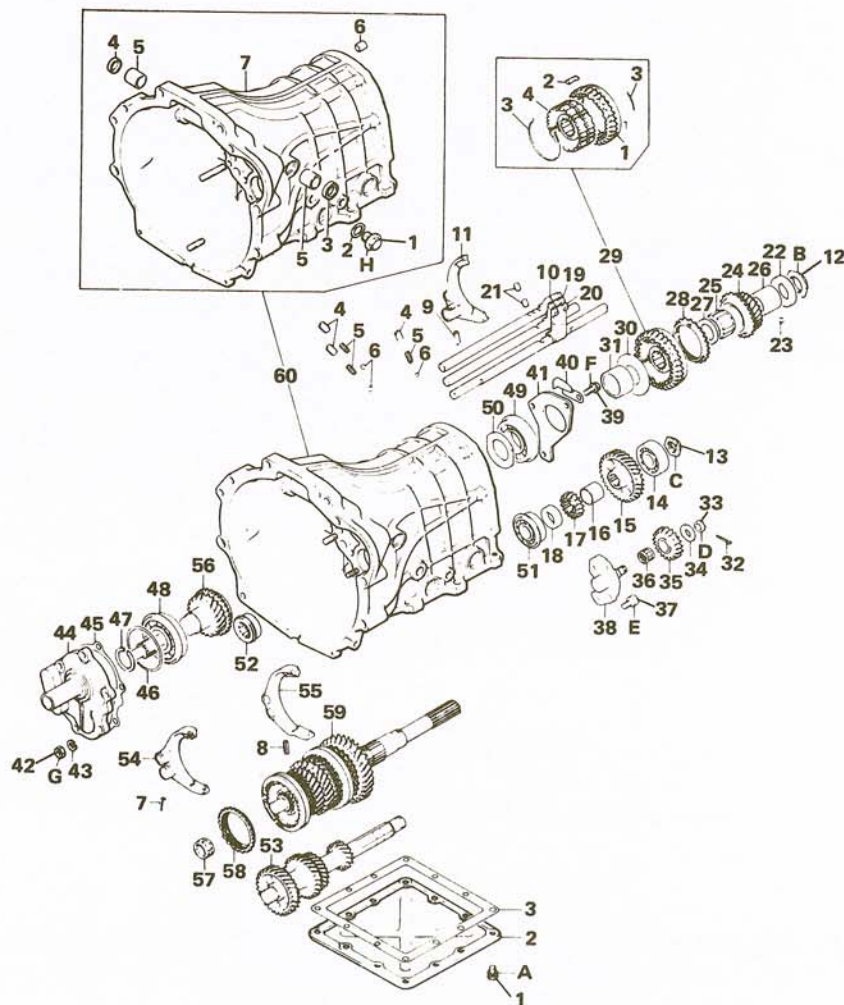
Perform reinstallation in reverse procedure of removal.





## COMPONENTS

1. Bolt w/washer (12)
2. Under cover
3. Under cover gasket
4. Plug (3)
5. Poppet spring (3)
6. Steel ball (3)
7. Spring pin for 3-4 shift fork
8. Spring pin for 1-2 shift fork
9. Spring pin for OD-R shift fork
10. OD-R shift rail
11. OD-R shift fork
12. Mainshaft lock nut
13. Counter gear lock nut
14. Ball bearing
15. Counter overdrive gear
16. Spacer
17. Counter reverse gear
18. Spacer
19. 3-4 shift rail
20. 1-2 shift rail
21. Interlock plunger
22. Spacer
23. Steel ball
24. Overdrive gear
25. Needle bearing
26. Overdrive gear sleeve
27. Bearing spacer
28. Synchronizer ring
29. Overdrive synchronizer assembly
  - 1 Synchronizer sleeve
  - 2 Synchronizer key (3)
  - 3 Synchronizer spring (2)
  - 4 Synchronizer hub
30. Stop plate
31. Spacer
32. Split pin
33. Nut
34. Thrust washer
35. Reverse idler gear
36. Needle bearing
37. Bolt w/washer (4)
38. Reverse idler shaft
39. Bolt w/washer (3)
40. Baffle plate
41. Rear bearing retainer
42. Nut (6)
43. Spring washer (6)
44. Front bearing retainer
45. Front bearing retainer gasket
46. Spacer
47. Snap ring
48. Ball bearing
49. Ball bearing
50. Spacer
51. Counter rear bearing
52. Counter front bearing
53. Counter gear
54. 3-4 shift fork
55. 1-2 shift fork
56. Main drive gear
57. Needle bearing
58. Synchronizer ring
59. Mainshaft assembly
60. Transmission case assembly
  - 1 Oil filler plug
  - 2 Gasket
  - 3 Oil seal
  - 4 Cap
  - 5 Clutch shaft bushing
  - 6 Bush knock
  - 7 Transmission case



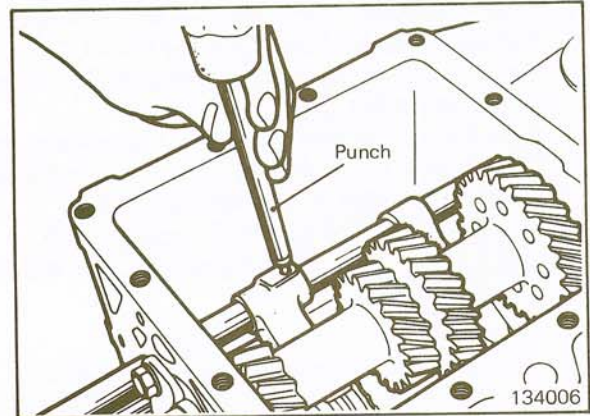
	Nm	ft.lbs.
A	8.0-9.5	6-7
B	99-127	73-94
C	69-98	51-72
D	20-58	15-43
E	15-21	11-15
F	15-21	11-15
G	10-12	7.5-9.0
H	30-34	22-25



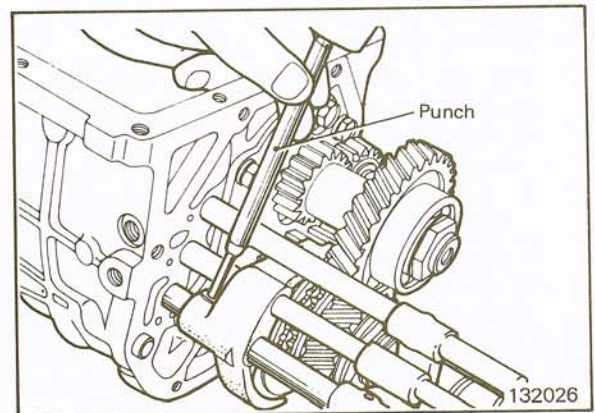


## DISASSEMBLY

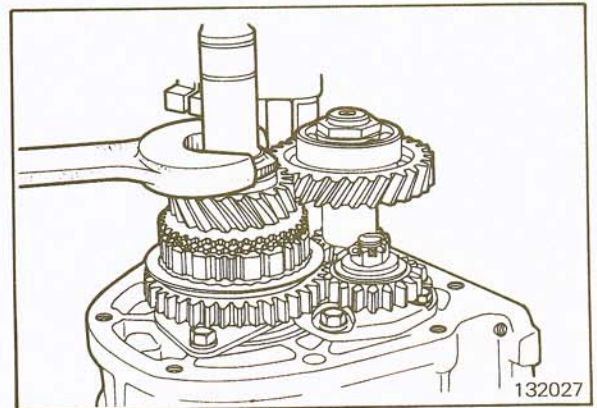
1. Remove the under cover.
2. Remove the snap ring and ball bearing from the rear end of the mainshaft.
3. Loosen the three poppet spring plugs, then remove three poppet springs and three steel balls.
4. Using a 3/16-in. punch, remove 3-4 and 1-2 shift fork spring pins. (134006)



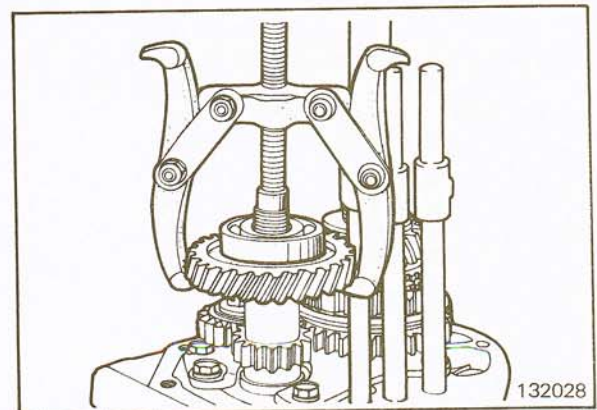
5. Using a 3/16-in. punch, drive the overdrive-reverse shift forks spring pins out, then remove the shift rails and forks.



6. Bend back the locking washer and loosen the lock nuts (mainshaft and countershaft). The nuts can be loosened by double-engaging reverse and 2nd gears. (132027)
7. Move the 1-2 shift rail toward the 1st speed side.



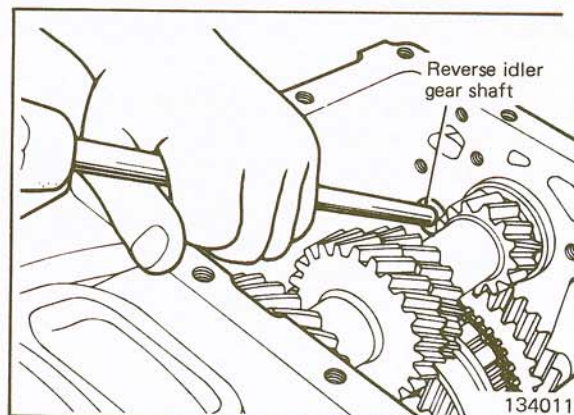
8. Remove the counter overdrive gear and ball bearing with a suitable puller. (132028) Be sure to remove the ball bearing and the overdrive gear as a unit by installing the puller onto the gear.
9. Remove distance spacers and counter reverse gear from countershaft.
10. Remove the shift rails toward the rear of the transmission case. Remove the shift forks.
11. Remove the spacer and steel ball from the mainshaft.
12. Remove the overdrive gear, needle bearing and synchronizer ring from the mainshaft.
13. Remove the overdrive synchronizer sleeve from the hub.



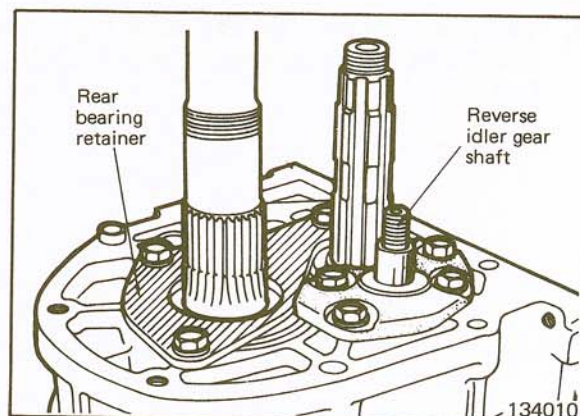




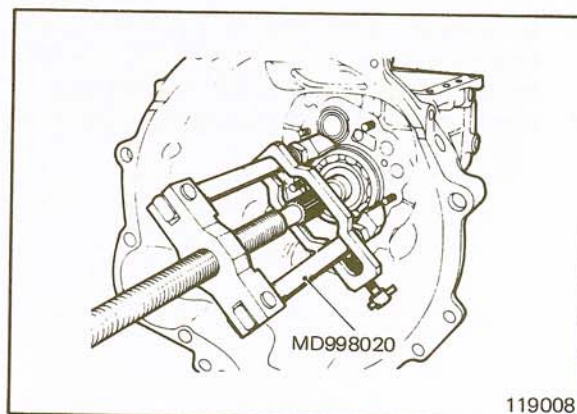
14. Using special tool MD998056, remove synchronizer hub and overdrive gear bearing sleeve.
15. Remove the synchronizer key stop plate and the distance spacer from the mainshaft.
16. Remove the cotter pin from the reverse idler gear shaft and loosen the nut, and then remove the thrust washer, reverse idler gear and needle bearing.
17. Remove the idler gear shaft locking bolts.
18. Loosen the reverse idler gear shaft by driving from inside the case. (134011)



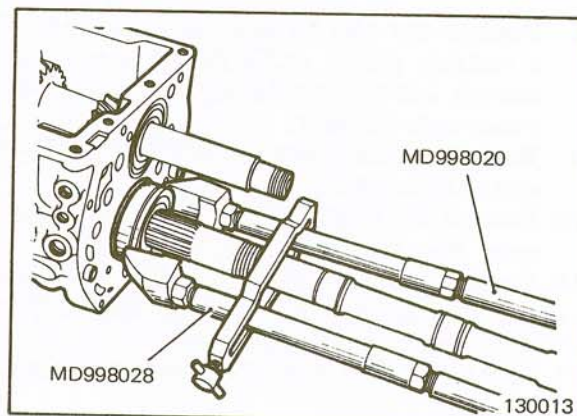
19. Remove the rear bearing retainer. (134010)
20. Remove the front bearing retainer.
21. Remove snap rings from main drive gear and main drive gear bearing.



22. Using special tool, remove the main drive gear bearing.



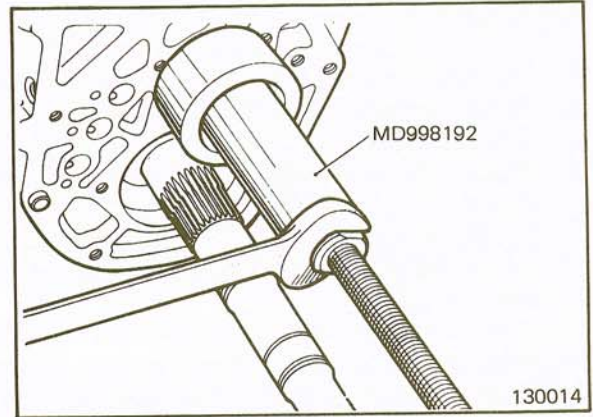
23. Remove the mainshaft bearing outer race snap ring.
24. Using special tools, remove the double row ball bearing. The inner race of the front bearing will remain on the mainshaft. (130013)



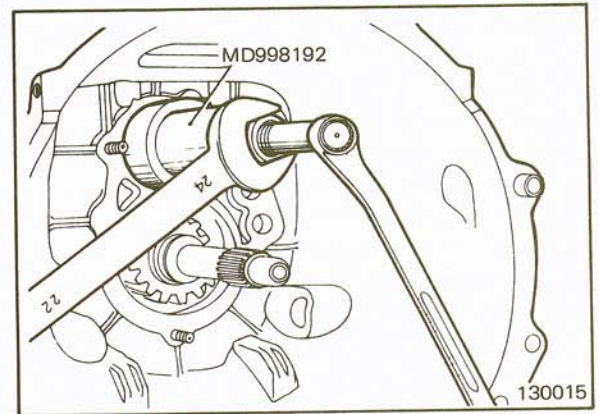




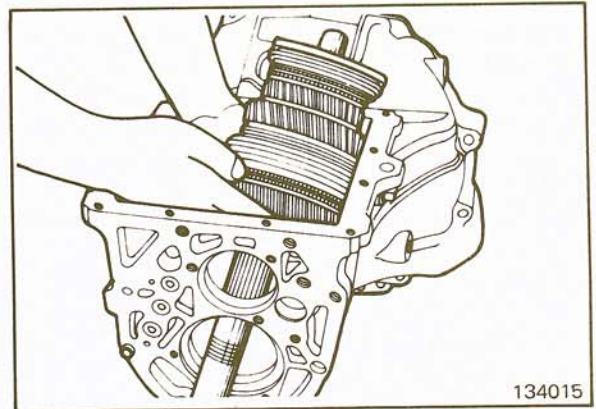
5. Remove the rear bearing snap ring. Then remove the counter rear bearing, using special tool.



26. Remove the snap ring from the counter front bearing, and then remove the bearing with the special tool.



27. Remove the countershaft gear from the transmission case.
28. Remove the main drive gear from case.
29. Lift the mainshaft assembly from the case. (134015)
30. Disassemble the mainshaft assembly in the following order.
  - (1) Install suitable puller to the 1st speed gear and remove it along with the inner race of the double row bearing.
  - (2) Remove the 1-2 synchronizer and the 2nd speed gear by moving them toward the rear of the mainshaft.
  - (3) Remove the snap ring from the front end of the mainshaft, and then remove the 3-4 synchronizer and the 3rd speed gear.







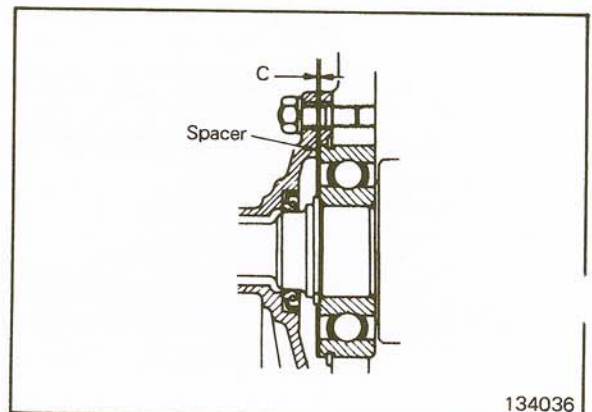
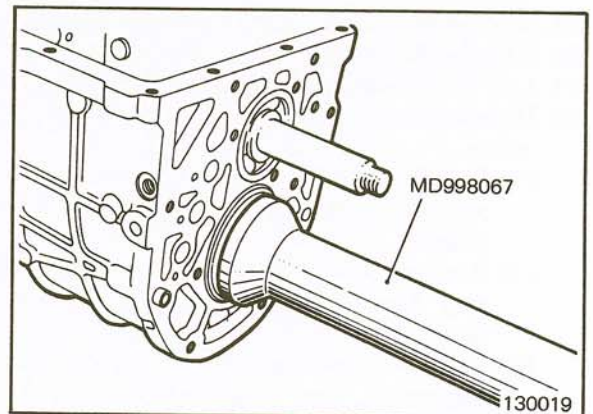
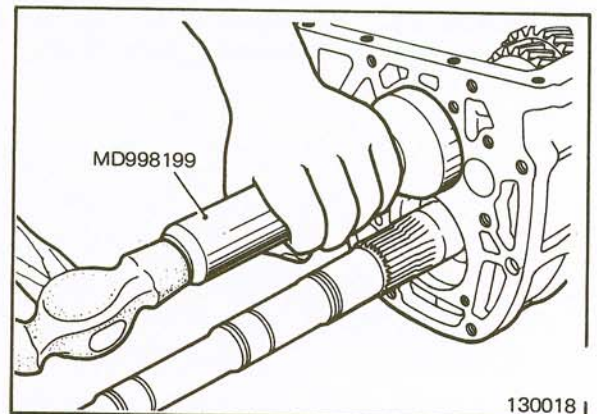
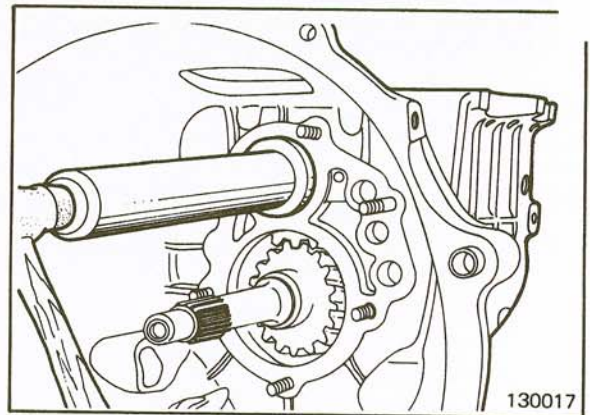
## REASSEMBLY

1. Insert the mainshaft assembly in the transmission case.
2. Install the pilot bearing (needle bearing) on front end of the mainshaft.
3. Install the synchronizer ring to 3-4 synchronizer assembly.
4. Install the main drive gear to the mainshaft.
5. Insert the 1-2 and 3-4 shift forks to the synchronizer sleeve groove.
6. Insert the countershaft gear into the transmission case.
7. With the snap ring fitted to the countershaft front bearing (needle), drive the bearing into the case by pushing on the outer race. (130017)
8. Install the snap ring to the countershaft rear bearing (ball), then install it into place with special tool. (130018)
9. Drive in the main drive gear bearing using special tool (MD998029)
10. Drive in the mainshaft bearing using special tool. (130019)  
While driving the bearing in, make sure that the synchronizer ring is properly positioned between the main drive gear and the 3-4 synchronizer.
11. Install the snap ring (large) to the main drive gear bearing.
12. Select and install a main drive gear snap ring of the proper thickness to minimize clearance between the snap ring and bearing. In other words, install the thickest snap ring that will fit into the snap ring groove.

Thickness of snap ring mm (in.)	Identification color
2.3 (.091)	White
2.35 (.092)	None
2.4 (.094)	Red
2.45 (.096)	Blue
2.5 (.098)	Yellow

13. Install the front bearing retainer. When installing the retainer, install a spacer of proper size so that the clearance (C) shown in illustration will be within the specified tolerance. (134036 and 110022)

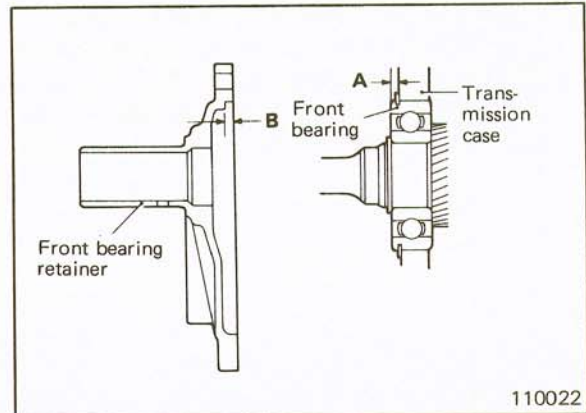
Front bearing retainer to bearing clearance (C)  
..... 0-0.1 mm (0-.004 in.)  
Clearance (C) .....  $B + 0.3 \text{ mm (.012 in.)} - A$







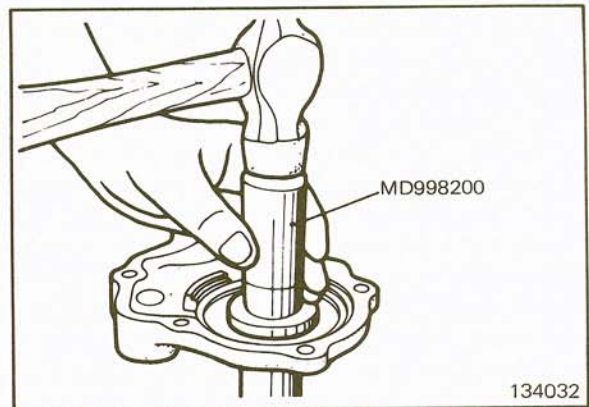
Thickness of spacer mm (in.)	Identification color
0.84 (.033)	Black
0.93 (.037)	None
1.02 (.040)	Red
1.11 (.044)	White
1.2 (.047)	Yellow
1.29 (.051)	Blue
1.38 (.054)	Green



110022

14. Apply recommended sealant to both sides of the front bearing retainer gasket and fill with gear oil to the oil seal lip; then install the gasket and oil seal. When installing the new oil seal, use special tool. (134032)

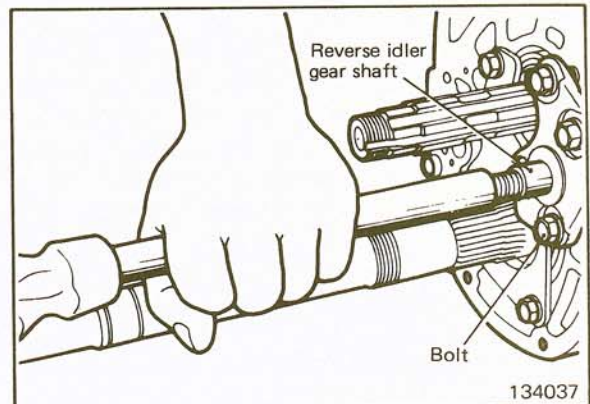
Recommended sealant .....  
3M Super Silicone 8662 or equivalent



134032

15. Install the rear bearing retainer.

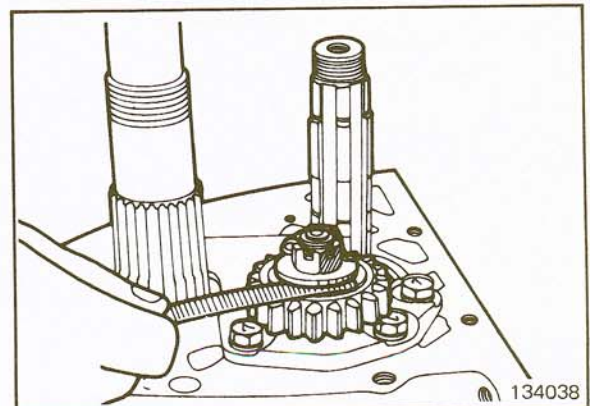
16. Install the reverse idler gear shaft. When installing the shaft, install the bolts as guides as illustrated.



134037

17. Install the needle bearing, the reverse idler gear, the thrust washer and the nut. Install the cotter pin to lock the nut and prevent it from turning, and check the reverse idler gear end play. (134038)  
Install the thrust washer with the ground side directed toward the gear.

Reverse idler gear end play .....  
0.12-0.28 mm (.005-.011 in.)

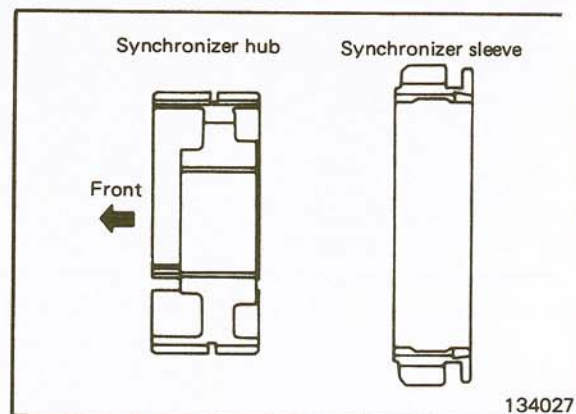


134038



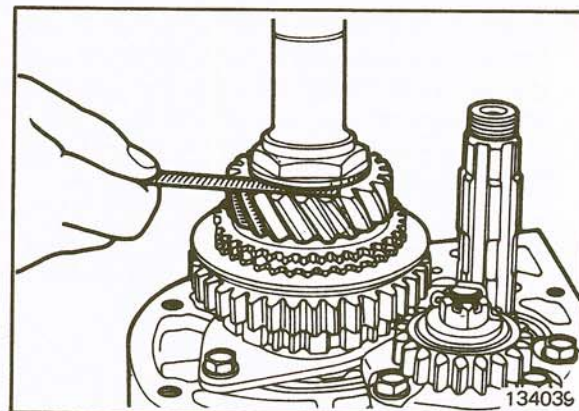


18. Assemble the overdrive synchronizer. The front and rear directions of the synchronizer hub and sleeve can be identified as illustrated. (134027) The spring can be installed in a manner similar to the installation of the 3-4 and 1-2 synchronizer springs.



19. Install the spacer, the stop plate, the overdrive synchronizer assembly, the overdrive gear bearing sleeve, the needle bearing, the synchronizer ring and the overdrive gear, in that order, onto the mainshaft from the rear end. Tighten the lock nut and stake it at the mainshaft notch and then check the overdrive gear end play. (134039)

Overdrive gear end play .....  
0.1-0.25 mm (.004-.010 in.)



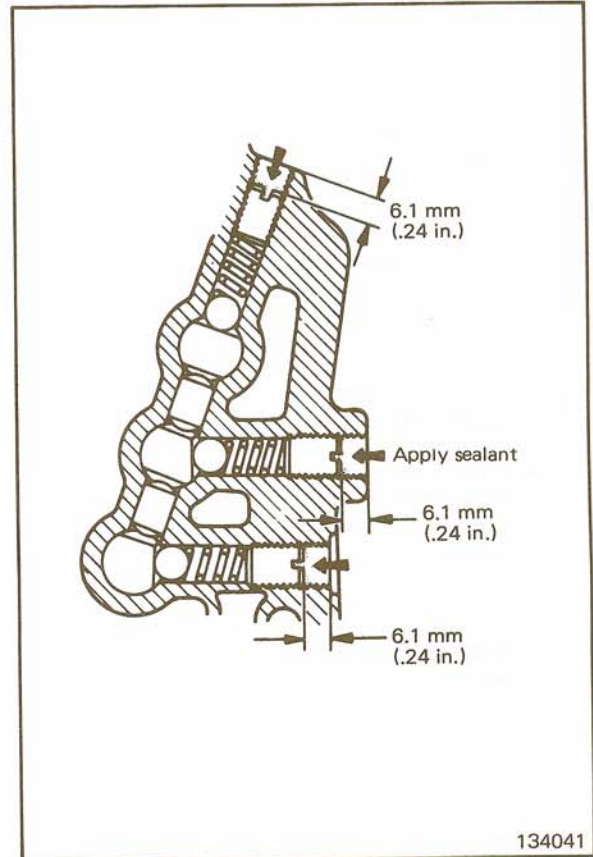
20. Install the spacer, the counter reverse gear, the spacer, the counter overdrive gear and the ball bearing onto the countershaft gear from the rear end. After tightening the nut, stake the nut at the notch at the rear end of the counter shaft gear.
21. Insert the 3-4 and 1-2 shift forks into their respective synchronizer sleeves. Insert each shift rail from the rear of the case. Lock the shift forks and rails with spring pins, and then install the interlock plunger between shift rails. The spring pin should be installed with the slot in the axial direction of the shift rail.





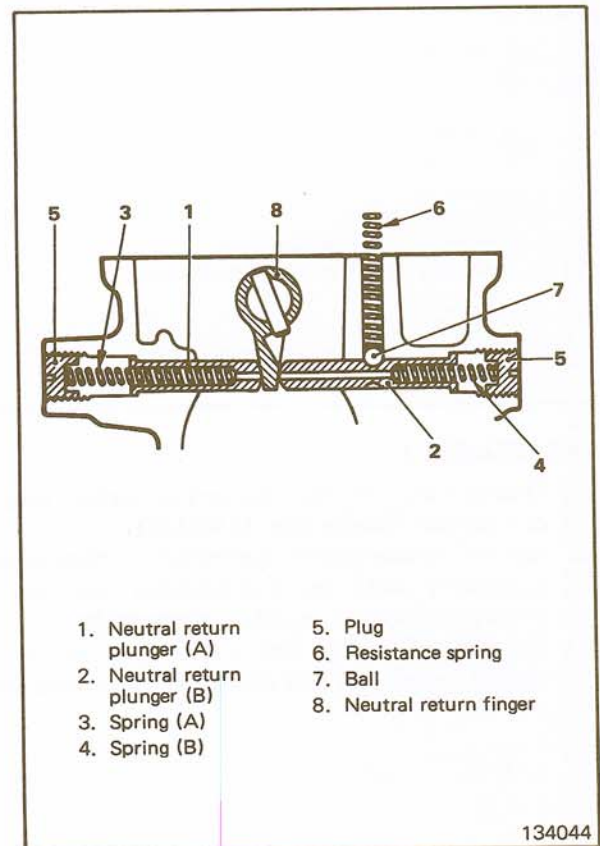
22. Insert the ball and poppet spring (small end facing the ball) into each shift rail. Tighten the plug to the specified position. After installation, seal the plug head with sealant. (134041)
23. Install the ball bearing on to the rear end of the main-shaft.
24. Install the speedometer drive gear.
25. Apply recommended sealant to both sides of the extension housing gasket and install the gasket on the housing. Next, install the extension housing to the transmission case. When installing the housing, turn the change shifter fully down to the left. Make sure the forward end of the control finger fits snugly in the slot of the shift lug. Apply recommended sealant to the threads of extension housing attaching bolts before installation.

Recommended sealant .....  
3M Super Silicone 8662 or equivalent



26. Install the neutral return plungers (A) and (B), the springs, and resistance spring and ball. Tighten each plug till the top is flush with the boss top surface. Apply sealant to the plug heads. (134044)
27. Apply sealant to the outside surface of the speedometer driven gear sleeve, install the sleeve into the extension housing and mesh it with the drive gear. After installing into the locking plate groove, lock the sleeve with the locking plate.
28. Install the backup light switch after applying sealant to the threads. Remember to install the steel ball.
29. Install the under cover, and then tighten attaching bolts to the specified torque. Be careful not to overtighten the bolts, otherwise the gasket will be damaged, resulting in oil leakage.

Under cover attaching bolts  
torque specification ..... 7.8-9.8 Nm (6-7 ft.lbs.)



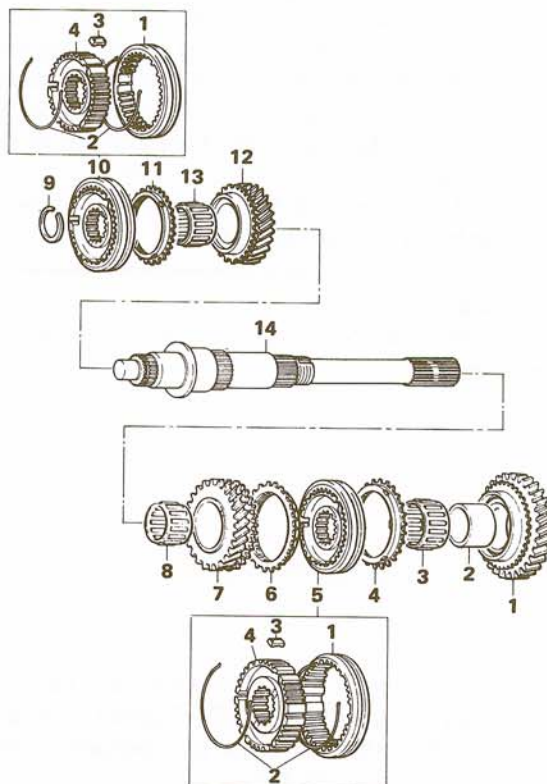
- |                               |                          |
|-------------------------------|--------------------------|
| 1. Neutral return plunger (A) | 5. Plug                  |
| 2. Neutral return plunger (B) | 6. Resistance spring     |
| 3. Spring (A)                 | 7. Ball                  |
| 4. Spring (B)                 | 8. Neutral return finger |





## COMPONENTS

1. First speed gear
2. Needle bearing
3. Bearing sleeve
4. Synchronizer ring
5. 1-2 synchronizer assembly
- 1 1-2 synchronizer sleeve
- 2 Synchronizer spring (2)
- 3 Synchronizer key (3)
- 4 1-2 synchronizer hub
6. Synchronizer ring
7. Second speed gear
8. Needle bearing
9. Snap ring
10. 3-4 synchronizer assembly
- 1 3-4 synchronizer sleeve
- 2 Synchronizer spring (2)
- 3 Synchronizer key (3)
- 4 3-4 synchronizer hub
11. Synchronizer ring
12. Third speed gear
13. Needle bearing
14. Mainshaft



### NOTE

Numbers show order of disassembly.  
For reassembly, reverse order of disassembly.

145024

## DISASSEMBLY

1. Disassemble in the numerical order indicated in the component illustration. (145024)
2. Before synchronizer assembly is disassembled, put an alignment mark on synchronizer hub and sleeve at appropriate location in aid of reassembly.
3. Since synchronizer key is common to both 1-2 and 3-4 synchronizers, do not change the combination.

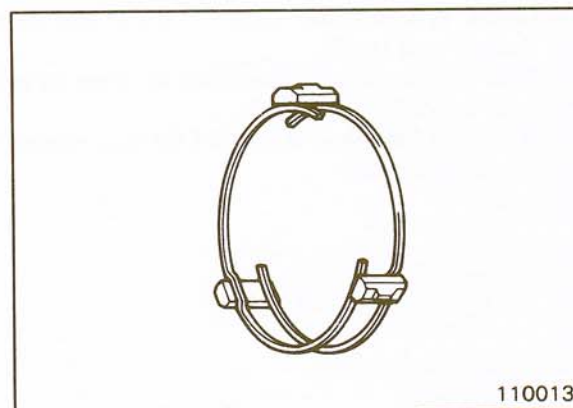
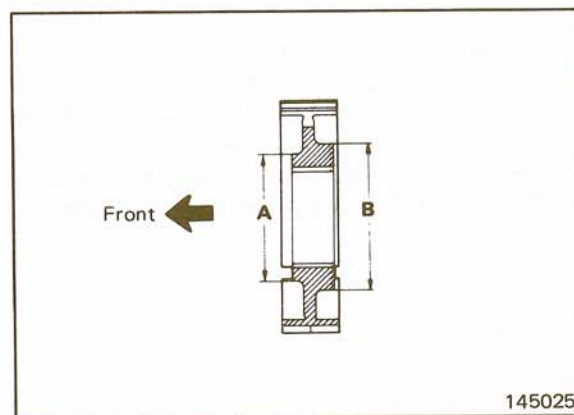
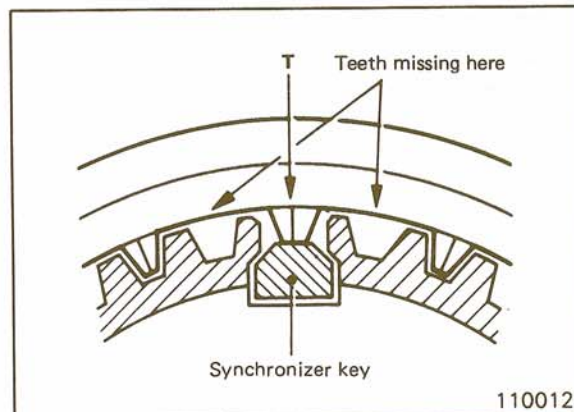




## REASSEMBLY

### 1-2 and 3-4 synchronizer

1. Mate synchronizer hub with sleeve using mark made at disassembly. Make sure that hub and sleeve slide smoothly. If they slide unsmoothly, replace hub and sleeve assembly.
2. 3-4 synchronizer sleeve has teeth missing at six portions. Assemble hub to sleeve in such a way that center tooth "T" between two missing teeth will touch synchronizer key. (110012)
3. Use care when installing 3-4 synchronizer hub since only 3-4 synchronizer is directional. Smaller diameter side "A" of center boss is front of 3-4 synchronizer hub.
4. Insert three keys into groove of synchronizer hub.
5. Install two synchronizer springs to synchronizer. When synchronizer springs are installed, make sure that front and rear ones are not faced in same direction. (110013)



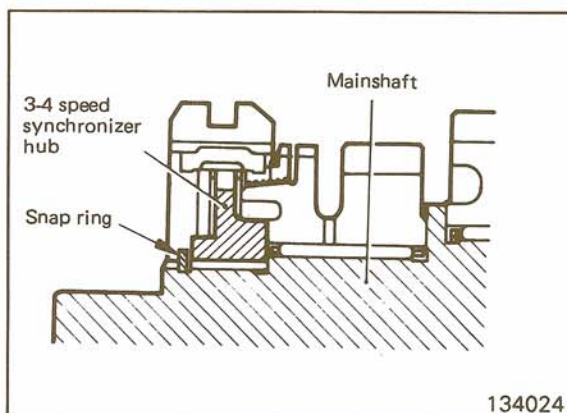




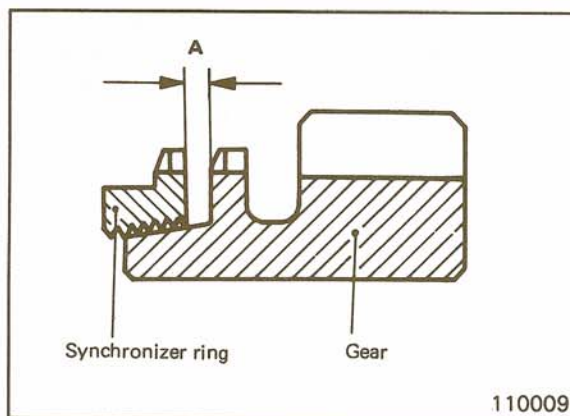
### Mainshaft

1. Assemble the mainshaft assembly in the reverse of the order indicated in the component illustration. (145024)

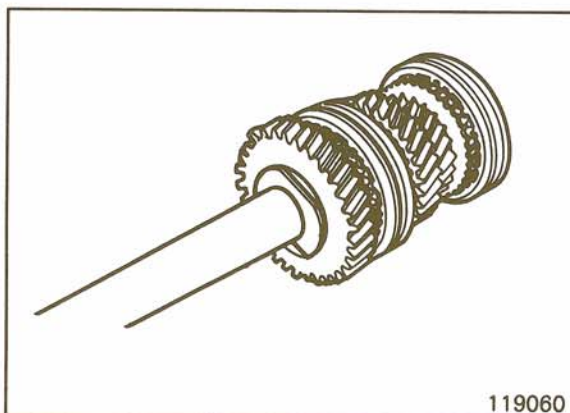
2. Assemble 3-4 synchronizer positioning hub toward correct direction. (110009)
3. As for mainshaft front end snap ring, select and install one of such thickness that will minimize clearance between snap ring and hub. In other words, install the thickest snap ring that fits in snap ring groove.
4. Make sure that 3rd speed gear turns smoothly.



5. Check synchronizer ring for worn and damaged internal threads and teeth.
6. With synchronizer assembled to cone of each gear, check dimension "A" (110009)  
If "A" is less than 0.5 mm (.02 in.), replace synchronizer ring and/or gear.



7. After installation of 2nd speed gear, 1st-2nd synchronizer and 1st speed gear, push bearing spacer firmly toward 1st speed gear and make sure that 1st and 2nd speed gears turn smoothly.

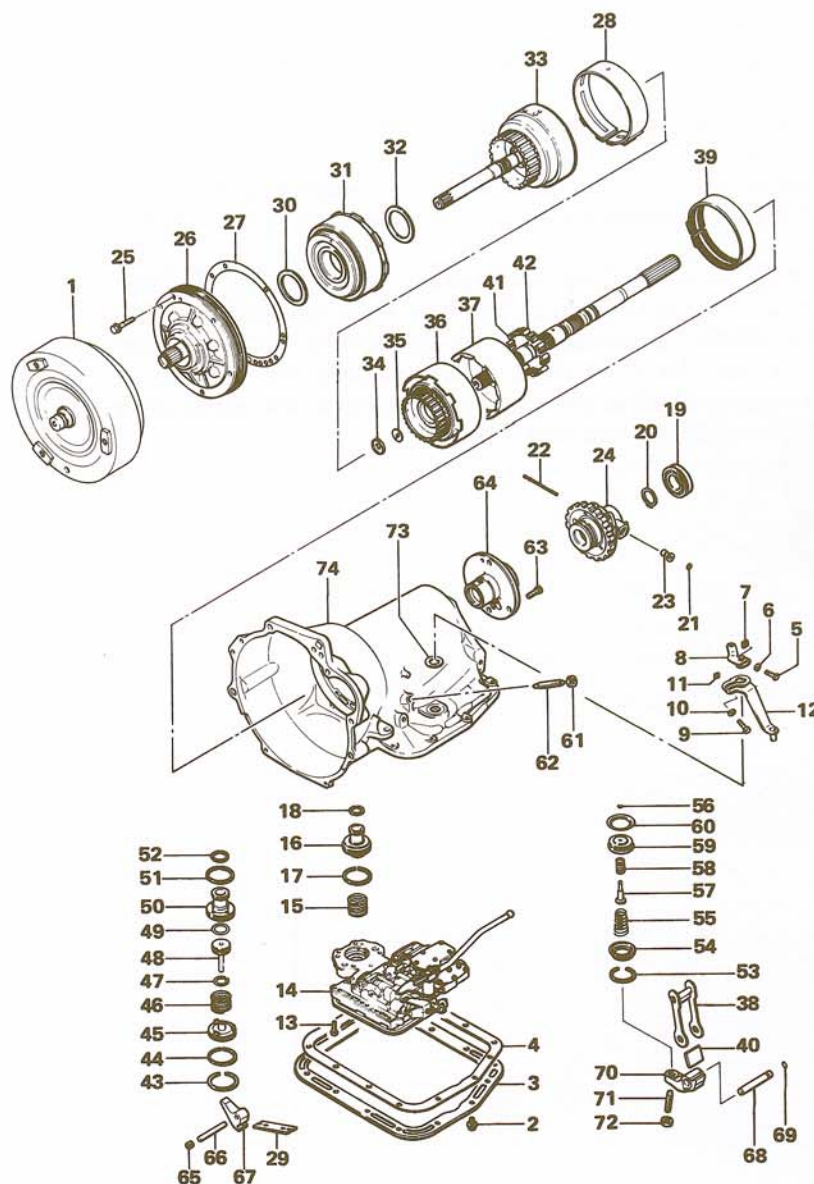






## COMPONENTS

- |  |                                   |
|--|-----------------------------------|
| 1. Torque converter                              | 61. Kickdown band locking nut     |
| 2. Screw (14)                                    | 62. Kickdown band adjusting screw |
| 3. Oil pan                                       | 63. Output shaft support bolt (4) |
| 4. Oil pan gasket                                | 64. Output shaft support          |
| 5. Bolt  | 65. Kickdown lever shaft plug     |
| 6. Plain washer                                  | 66. Kickdown band lever shaft     |
| 7. Square nut                                    | 67. Kickdown band lever           |
| 8. Transmission throttle lever                   | 68. Reverse band lever shaft      |
| 9. Bolt  | 69. Seal                          |
| 10. Plain washer                                 | 70. Reverse band lever            |
| 11. Square nut                                   | 71. Reverse band adjusting screw  |
| 12. Manual control lever                         | 72. Locking nut                   |
| 13. Flange bolt (10)                             | 73. Manual valve shaft seal       |
| 14. Valve body assembly                          | 74. Transmission case             |
| 15. Accumulator spring                           |                                   |
| 16. Accumulator piston                           |                                   |
| 17. Seal ring                                    |                                   |
| 18. Seal ring                                    |                                   |
| 19. Output shaft bearing                         |                                   |
| 20. Governor body snap ring                      |                                   |
| 21. Governor valve shaft snap ring               |                                   |
| 22. Governor valve shaft                         |                                   |
| 23. Governor valve                               |                                   |
| 24. Governor and support                         |                                   |
| 25. Screw (6)                                    |                                   |
| 26. Oil pump and reaction shaft support assembly |                                   |
| 27. Reaction shaft support gasket                |                                   |
| 28. Kickdown band                                |                                   |
| 29. Kickdown band strut                          |                                   |
| 30. Thrust washer (#1)                           |                                   |
| 31. Front clutch assembly                        |                                   |
| 32. Front clutch thrust washer (#2)              |                                   |
| 33. Rear clutch assembly                         |                                   |
| 34. Input shaft thrust plate (#3)                |                                   |
| 35. Output shaft thrust washer (#4)              |                                   |
| 36. Planet and output shaft assembly             |                                   |
| 37. Low-reverse drum                             |                                   |
| 38. Reverse band link                            |                                   |
| 39. Reverse band                                 |                                   |
| 40. Reverse band strut                           |                                   |
| 41. Overrunning clutch roller (10)               |                                   |
| 42. Overrunning clutch roller spring (10)        |                                   |
| 43. Kickdown servo snap ring                     |                                   |
| 44. Kickdown servo guide                         |                                   |
| 45. Kickdown servo guide ring                    |                                   |
| 46. Kickdown servo spring                        |                                   |
| 47. Snap ring                                    |                                   |
| 48. Kickdown servo piston rod                    |                                   |
| 49. O-ring                                       |                                   |
| 50. Kickdown servo piston                        |                                   |
| 51. Seal ring                                    |                                   |
| 52. Seal ring                                    |                                   |
| 53. Spring retainer snap ring                    |                                   |
| 54. Reverse servo spring retainer                |                                   |
| 55. Reverse servo spring                         |                                   |
| 56. Reverse servo plug ring                      |                                   |
| 57. Reverse servo piston plug                    |                                   |
| 58. Reverse servo cushion spring                 |                                   |
| 59. Reverse servo piston                         |                                   |
| 60. Reverse servo piston seal                    |                                   |



### NOTE

Numbers show order of disassembly.

For reassembly, reverse order of disassembly.

904131





### GENERAL INFORMATION

The MA904A automatic transmission combines a torque converter and a fully-automatic 3-speed gear system. The converter housing and transmission case are an integral aluminum alloy die casting. The transmission consists of two multiple disc clutches, an overrunning clutch, two servos and bands, and two planetary gear sets to provide three forward ratios and a reverse ratio. The common sun gear of the planetary gear sets is connected to the front clutch by a driving shell which is splined to the sun gear and to the front clutch retainer. The hydraulic system consists of an oil pump, and a single valve body which contains all of the valves except the governor valve.

Venting of the transmission is accomplished by a passage through the upper part of the oil pump housing.

The torque converter is attached to the crankshaft through a flexible driving plate.

Cooling of the ATF (automatic transmission fluid) heated in the converter is accomplished by circulating the ATF through the water cooled type cooler in the radiator lower tank.

The torque converter assembly is a sealed unit which cannot be disassembled.

The ATF is filtered by an internal "Dacron Type" filter attached to the lower side of the valve body assembly.

Engine torque is transmitted to the torque converter and then through the input shaft to the multiple disc clutches in the transmission. The power flow depends on the application of the two clutches and two bands.





### **HYDRAULIC CONTROL SYSTEM**

The hydraulic control circuits show the position of the various valves with color coded passages to indicate those under hydraulic pressure for all operations of the transmission.

The hydraulic control system makes the transmission fully automatic, and has four important functions to perform. In a general way, the components of any automatic control system may be grouped into the following four basic groups: 1: the pressure supply system, 2: the pressure regulating valves, 3: the flow control valves, and 4: the clutches and band servos.

Taking each of these basic groups of systems in turn, the control system may be described as follows:

#### **Pressure Supply System**

The pressure supply system consists of an oil pump driven by the engine through the torque converter.

The single front pump furnishes pressure for all the hydraulic and lubrication requirements.

#### **Pressure Regulating Valves**

The pressure regulating valves consist of a regulator valve which controls line pressure at a value dependent on throttle opening.

The switch valve maintains torque converter operating pressure and transmission lubricating pressure.

The governor valve transmits regulated pressure to the transmission (in conjunction with vehicle speed) to control upshift and downshift speeds.

The throttle valve transmits regulated pressure to the transmission (in conjunction with throttle position) to control upshift and downshift speeds.

#### **Flow Control Valves**

The manual valve provides the different transmission drive ranges as selected by the vehicle operator.

The 1-2 shift valve and governor pressure plug automatically shifts the transmission from low to second or vice versa depending on vehicle operation.

When a shift is made from direct to second, the 1-2 shift control valve controls the orifice of the hydraulic pressure feed circuit to the kickdown servo to assure smooth shifting.





The 2-3 shift valve, governor pressure plug and throttle pressure plug automatically shift the transmission from second to direct or vice versa depending on vehicle operation.

The kickdown valve makes possible a forced downshift from direct to second or from second to low or from direct to low (depending on vehicle speed) by depressing the accelerator pedal past the detent near wide open throttle.

The limit valve determines the maximum speed at which a 3-2 part downshift can be made.

The shuttle valve has two separate functions and performs each independently of the other. The first is that of providing fast release of the kickdown band and smooth front clutch engagement when the driver takes a "lift-foot" upshift from second to direct.

The second function of the shuttle valve is to regulate kickband application and timing when making direct to second kickdowns.

### **Clutches, Band Servos and Accumulator**

The front and rear clutch pistons, and both servo pistons are moved hydraulically to engage the clutches and apply the bands. The pistons are released by spring tension when hydraulic pressure is released. On the 2-3 upshift, the kickdown servo piston is released by spring tension and hydraulic pressure.

The accumulator controls the hydraulic pressure on the apply side of the kickdown servo during the 1-2 shift; thereby, cushioning the kickdown band application at any throttle position.





## **OPERATING INSTRUCTIONS**

The transmission will automatically upshift and downshift at approximately the speeds shown in the "Automatic Shift Speed Chart." (described under SERVICE DIAGNOSIS AND TESTS). All shift speeds given in the "Chart" may vary somewhat due to production tolerances and rear axle ratios. The quality of the shifts is very important. All shifts should be smooth and positive with no noticeable engine runaway.

### **Selector Lever and Parking Lock Controls**

The transmission is controlled by a "lever type" selector lever incorporated within the console box.

The control has six selector lever positions: "P" (park) "R" (reverse), "N" (neutral), and "D" (drive), "2" (second) and "L" (lock-up).

The parking lock is applied by moving the selector lever to the "P" position.

### **Caution**

**Do not apply the parking lock until the vehicle has stopped; otherwise, a severe ratcheting noise will occur.**

### **Starting the Engine**

The engine will start with the selector lever in either the "P" or "N" positions. As a safety precaution when starting in the "N" position, apply the parking or foot brake. The automatic transmission will not permit starting the engine by pushing or towing.

### **Mountain Driving**

When driving in the mountains with heavy loads or when pulling a trailer, the "2" or "L" position should be selected on upgrades which require heavy throttle for 0.8 km (1/2 mile) or more. This reduces the possibility of overheating the transmission and converter under these conditions.

### **Towing Vehicle**

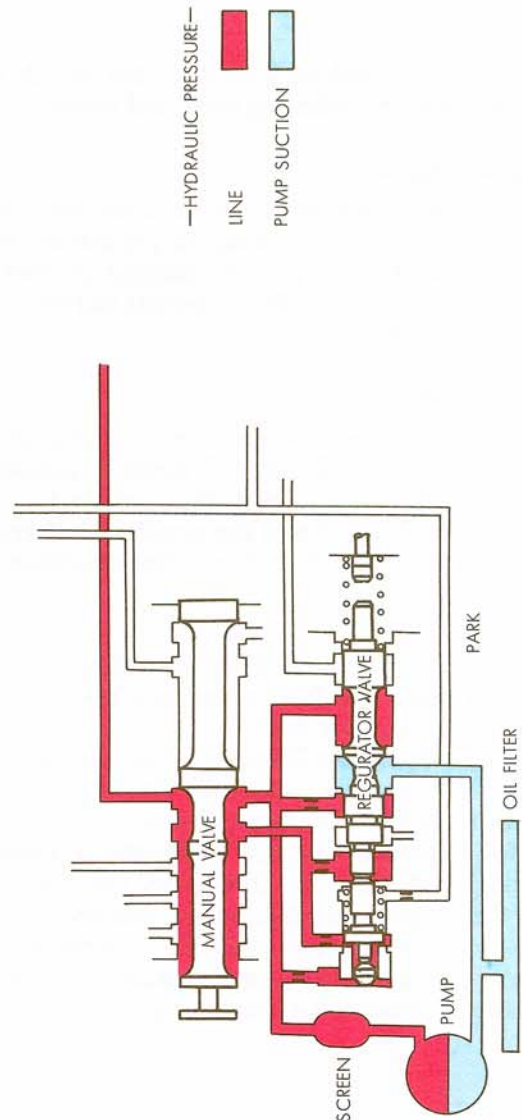
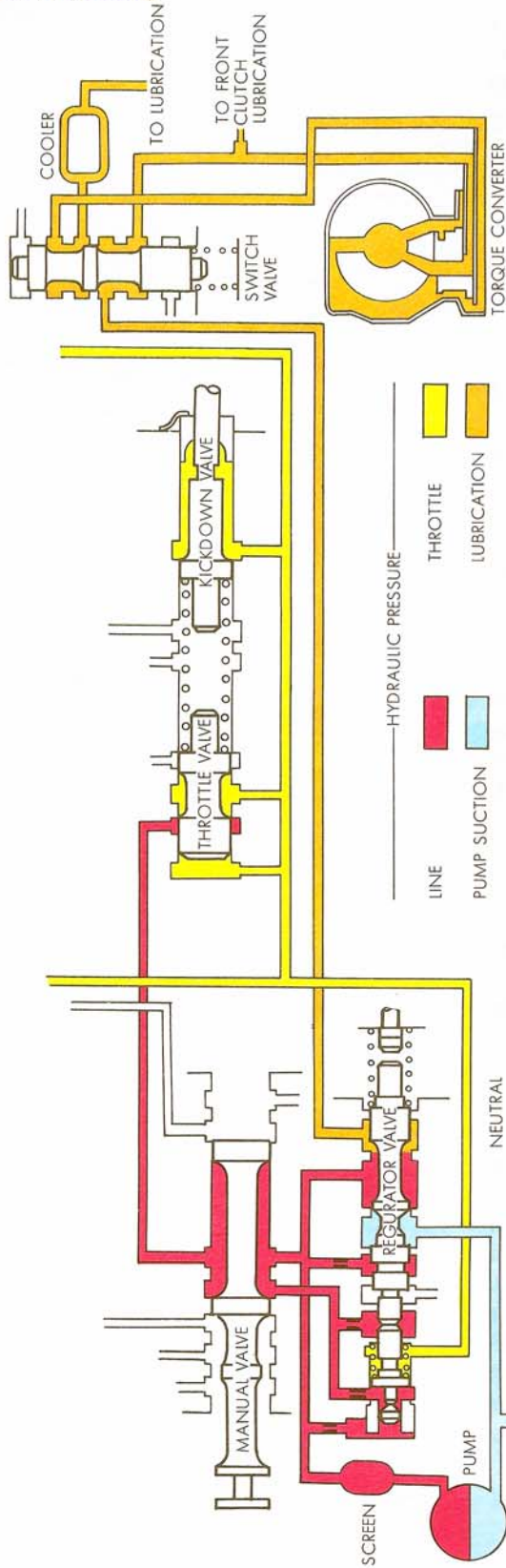
**Transmission Inoperative:** Tow the vehicle with a rear end pickup and place the free wheel hub lever to free position or remove the propeller shaft.

**Transmission Operating Properly:** The vehicle may be towed safely in "N" (neutral) with rear wheels on the ground at a speed not to exceed 50 km/h (30 mph). If the vehicle is to be towed for extended distance, it should be done with a rear end pickup and place the free wheel hub lever to free position or the propeller shaft removed. Because the transmission receives lubrication only when the engine is running, it is good practice to always tow a disabled vehicle with a rear end pickup or remove the propeller shaft.





## Neutral and Parking



904002



The diagram illustrates the hydraulic circuitry of a vehicle's transmission system. The oil flow is as follows:

- Pump and Initial Filtration:** Oil is drawn from the **PUMP** (indicated by a blue line for pump suction) through a **SCREEN** and a **REGULATOR VALVE**.
- Pressure Regulation:** The oil then passes through a **MANUAL VALVE** and a **GOVERNOR 1-2 SHIFT VALVE** (green line for governor pressure).
- Shift Control:** The circuit continues through a **GOVERNOR 2-3 SHIFT VALVE** and a **GOVERNOR PLUG** (green line).
- Throttle and Kickdown:** The oil then flows through a **THROTTLE VALVE** (yellow line for throttle pressure) and a **KICKDOWN VALVE**.
- Shift Control Valve:** The oil then passes through a **1-2 SHIFT CONTROL VALVE** (yellow line).
- Shuttle Valve and Limit Valve:** The oil then flows through a **SHUTTLE VALVE** and a **LIMIT VALVE** (blue line for pump suction).
- Accumulator and Servos:** The oil then passes through an **ACCUMULATOR** and a **FRONT SERVO** (red line for line pressure).
- Clutches and Torque Converter:** The oil then flows through a **FRONT CLUTCH** and a **REAR CLUTCH** (red line), and finally through a **TORQUE CONVERTER**.

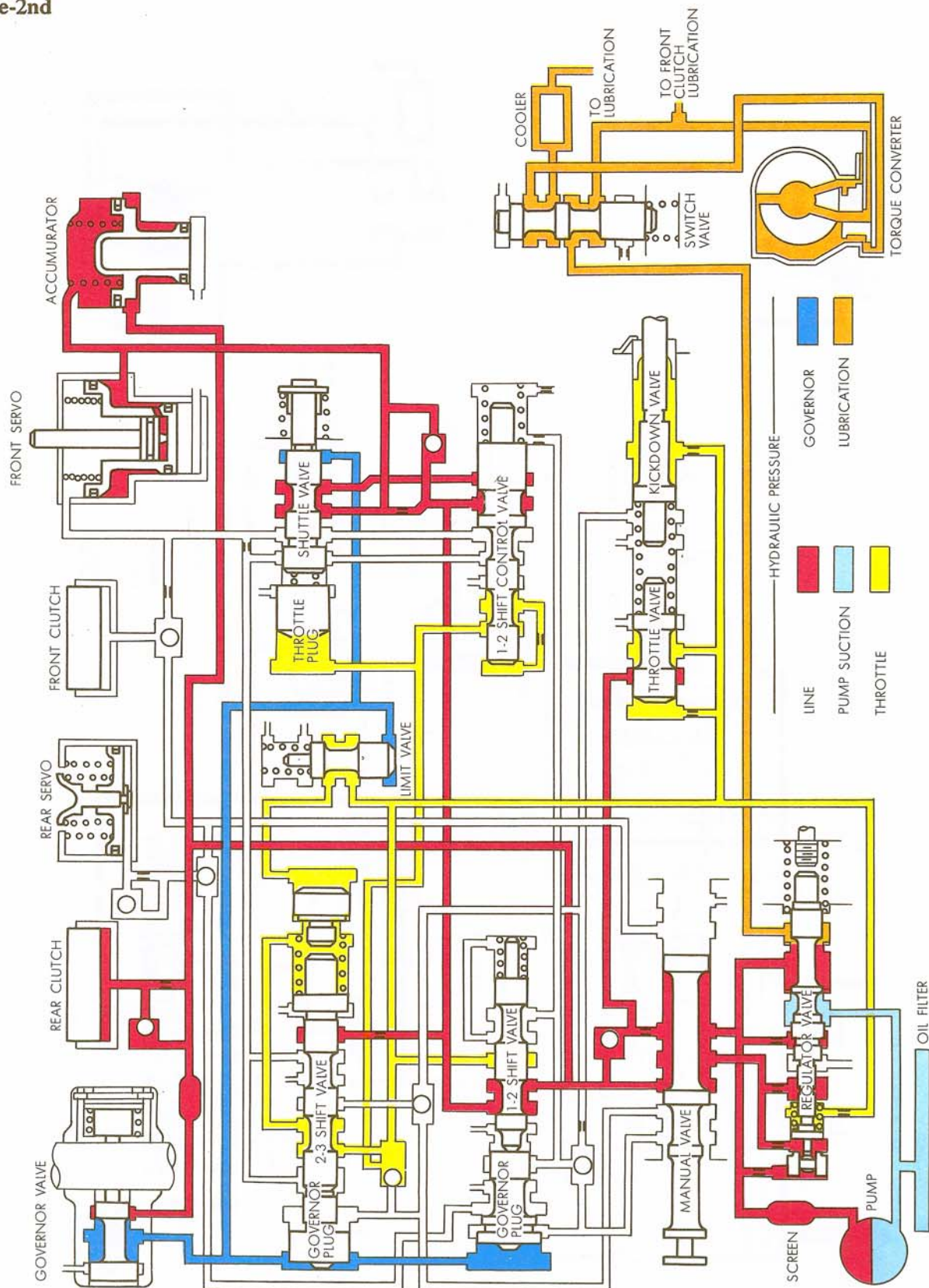
The diagram also includes a legend for the color-coded lines:

- LINE:** Red line
- PUMP SUCTION:** Blue line
- THROTTLE:** Yellow line
- GOVERNOR:** Green line
- LUBRICATION:** Orange line





Drive-2nd



904004

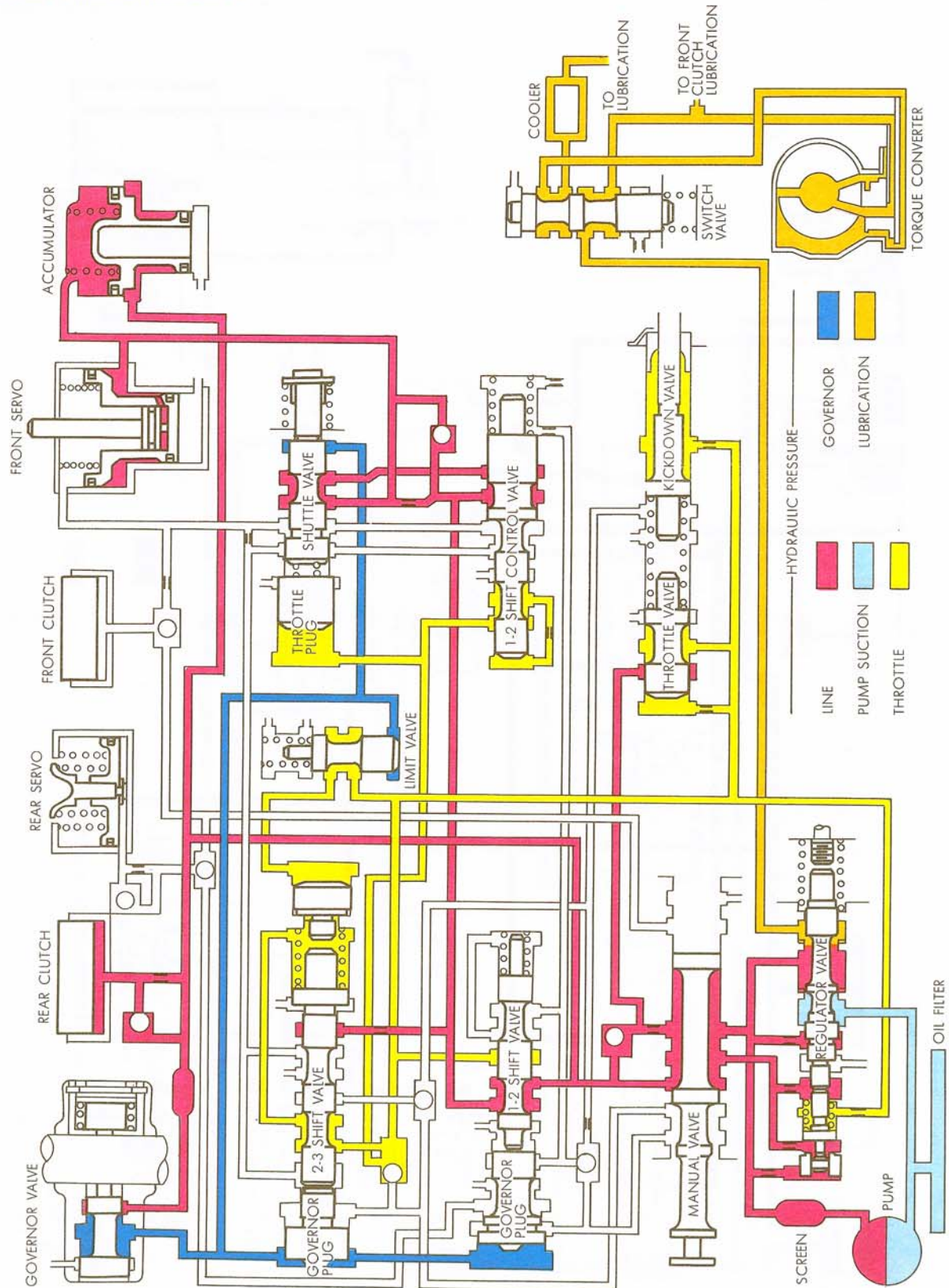








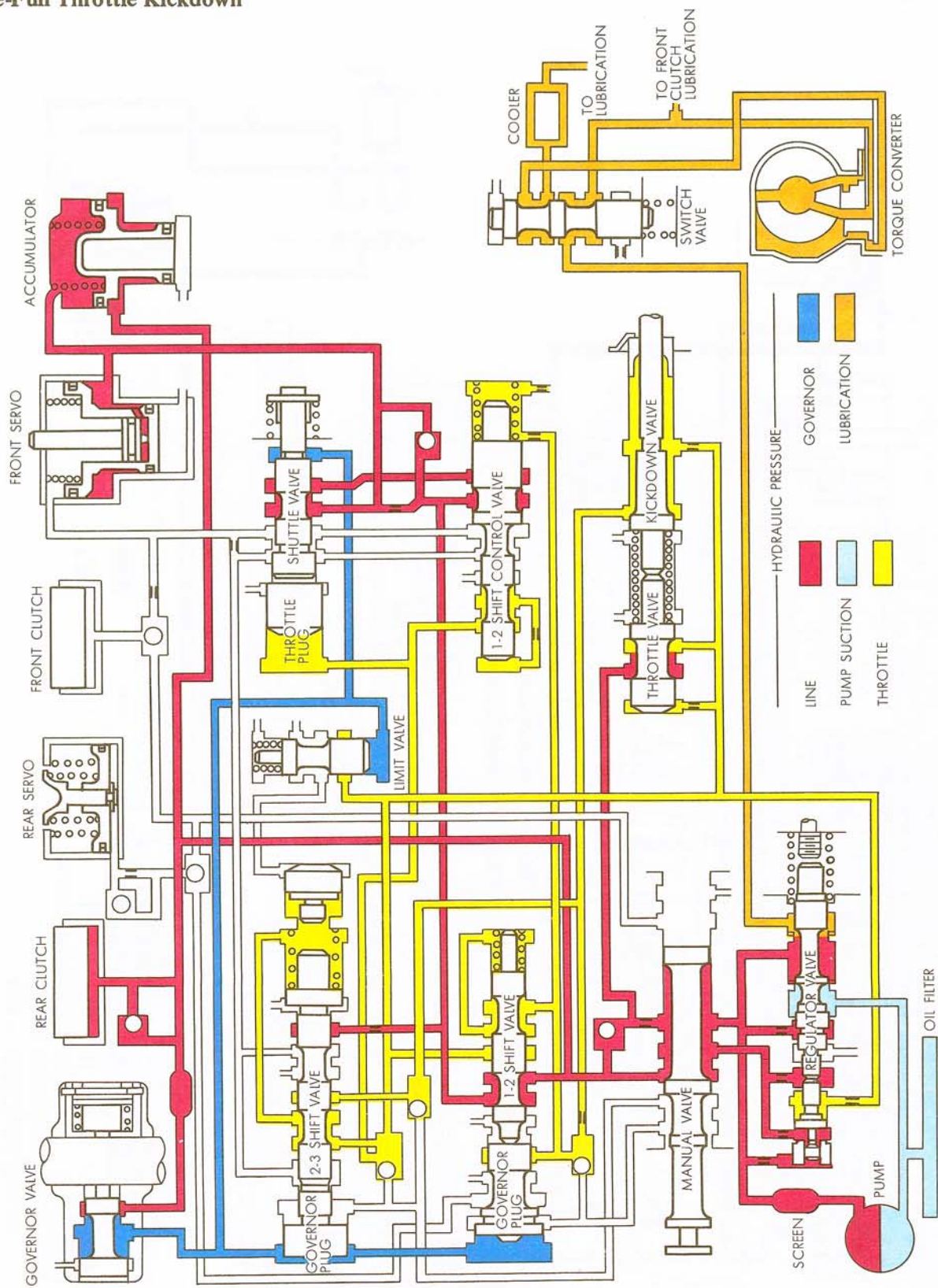
## Drive-Part Throttle Kickdown



904006



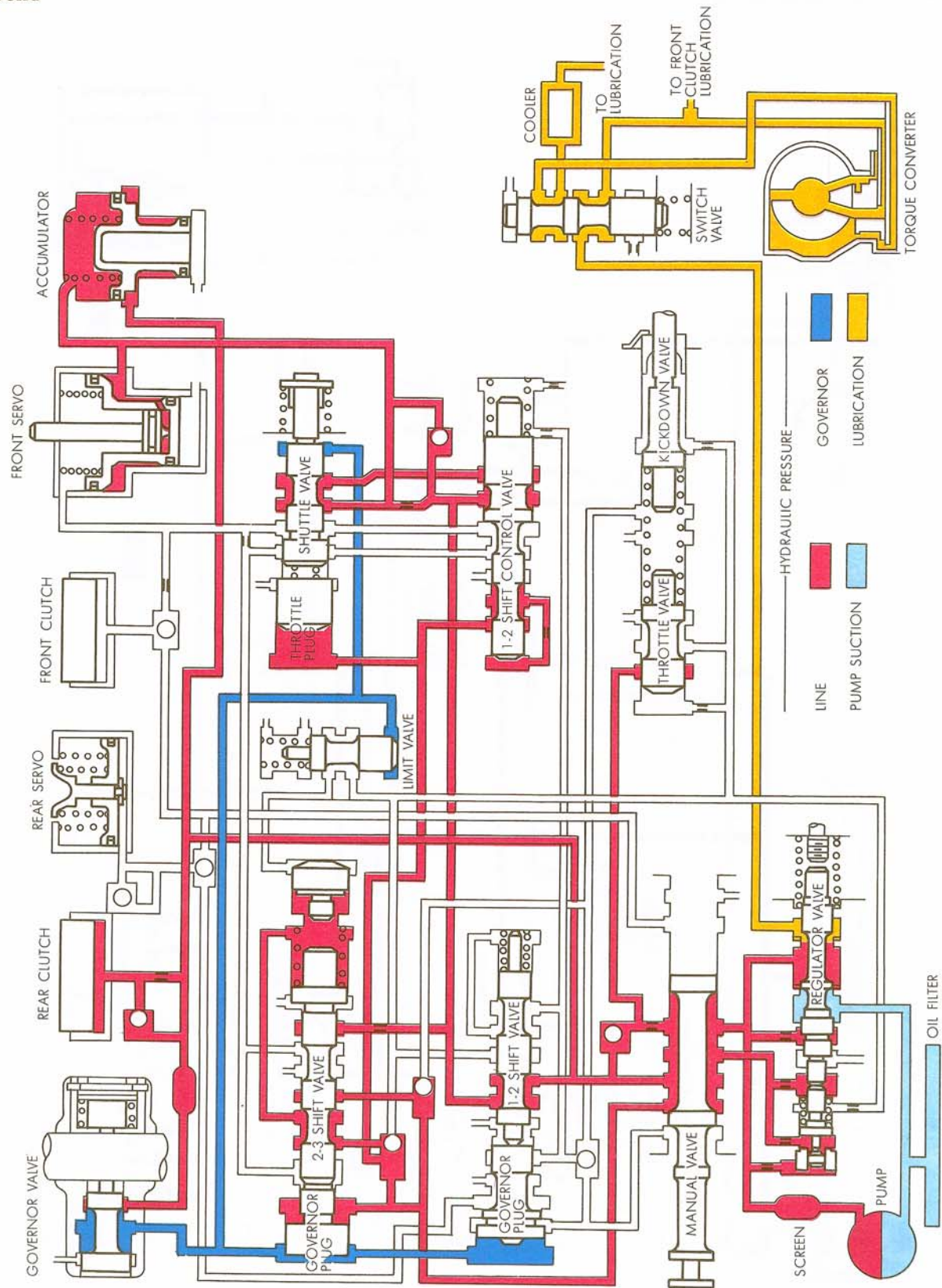
## Drive-Full Throttle Kickdown







## 2-Second

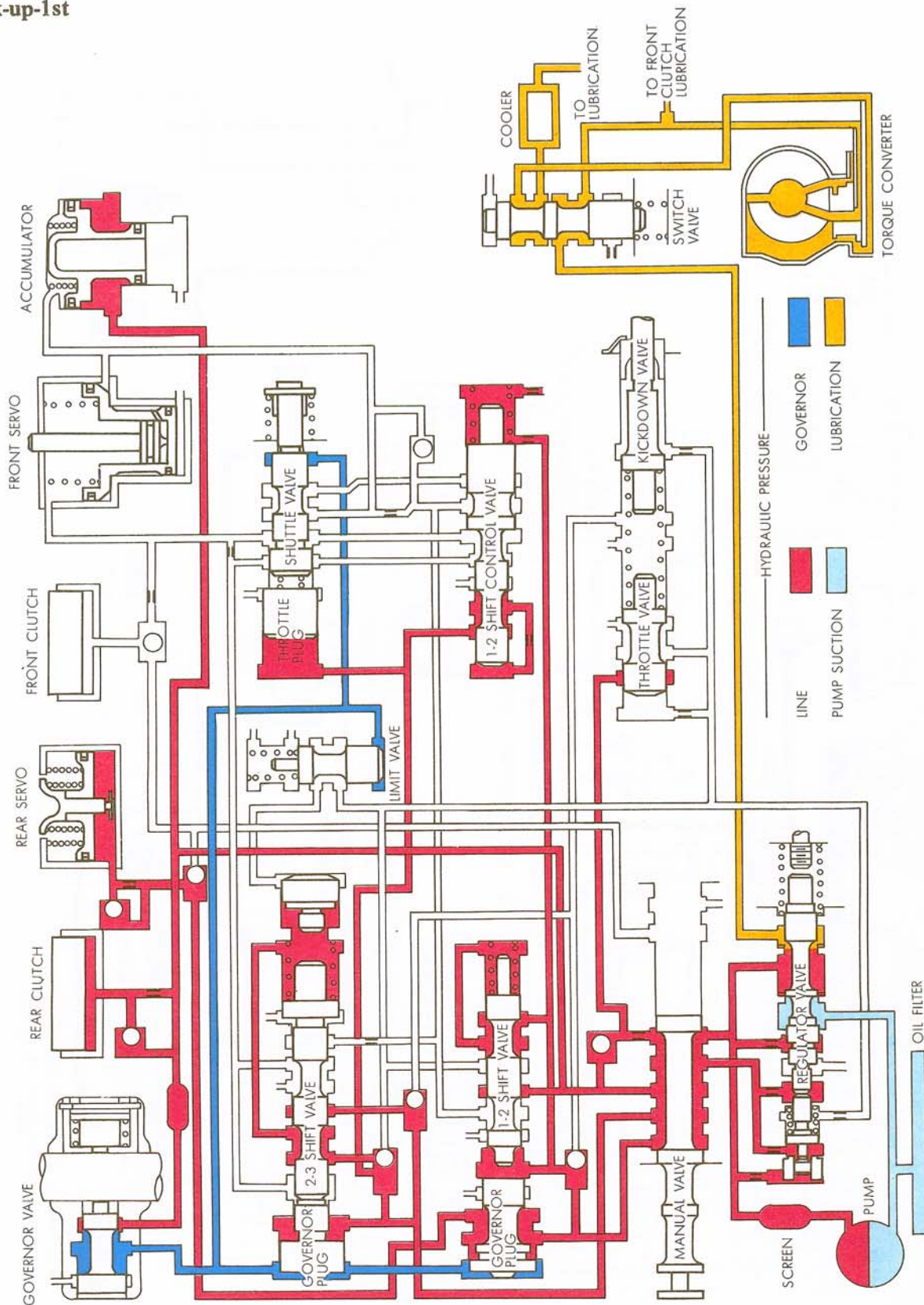


904008





## Lock-up-1st









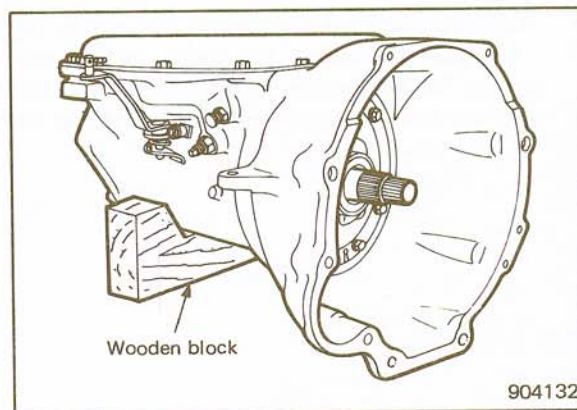


## DISASSEMBLY

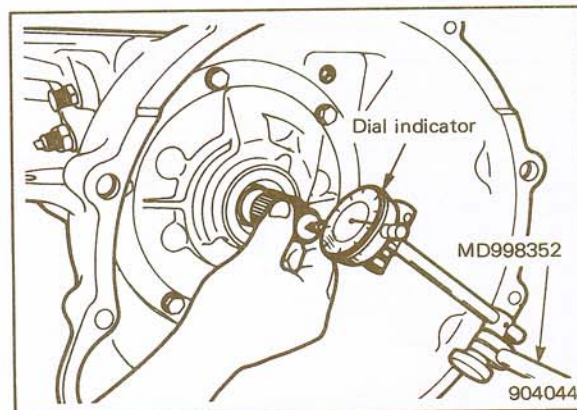
### Caution

Prior to removing any transmission sub-assemblies, plug all openings and thoroughly clean exterior of the unit, preferably by steam. Cleanliness through entire disassembly and assembly cannot be overemphasized. When disassembling, each part should be washed in a suitable solvent, then dried by compressed air. Do not wipe parts with shop towels. All mating surfaces in the transmission are accurately machined; therefore, careful handling of parts must be exercised to avoid nicks or burrs.

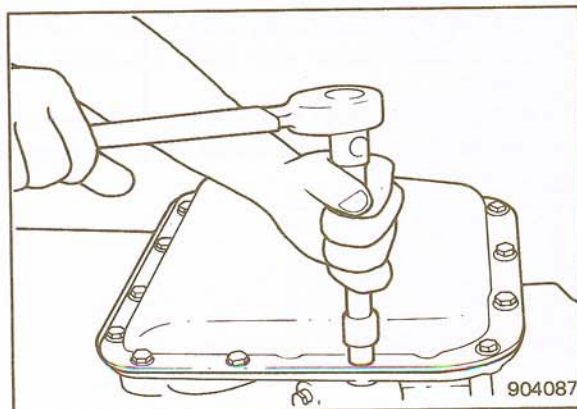
1. Remove torque converter.
2. Remove the transfer case assembly.  
See "Component Service-Transfer Case", for detailed procedure.
3. Place transmission assembly on work bench with oil pan upward. Use block such as the one shown in illustration (904132) under rear of case to hold assembly in position.



4. Measuring input shaft end play before disassembly will usually indicate when a thrust washer change is required (except when major parts are replaced). Thrust washer is located between input and output shafts. Attach a dial indicator to transmission bell housing with its plunger seated against end of input shaft. Move input shaft in and out to obtain end play reading. Record indicator reading for reference when reassembling the transmission.



5. Unscrew oil pan screws and remove oil pan and gasket. (904087)
6. Loosen clamp bolts and remove throttle and manual control levers from transmission.

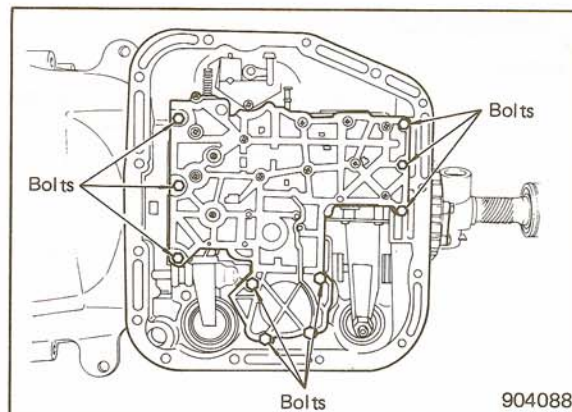




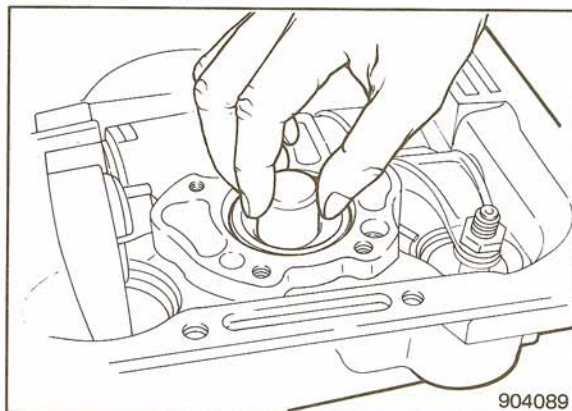


## COMPONENT SERVICE-AUTOMATIC TRANSMISSION

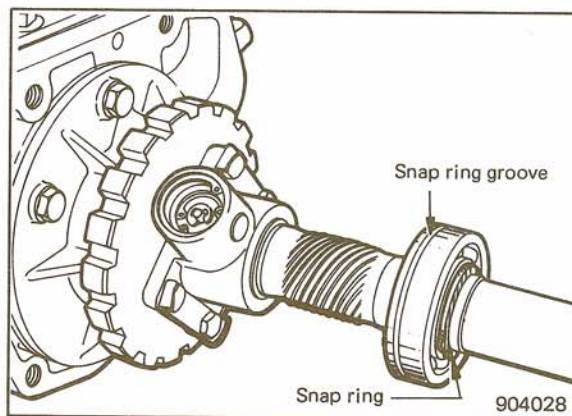
7. Remove ten hex-head valve body to transmission case bolts. (904088)
8. Remove valve body assembly, while lifting the valve body assembly upward out of transmission case.



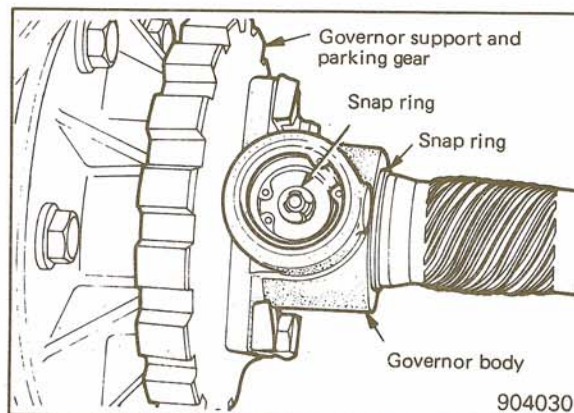
9. Remove accumulator piston and spring from transmission case. Inspect piston for nicks, scores and wear. Inspect spring for distortion. Inspect rings for freedom in piston grooves and wear or breakage. Replace parts as required.



10. Using snap ring pliers, remove output shaft bearing snap ring and remove bearing from shaft.



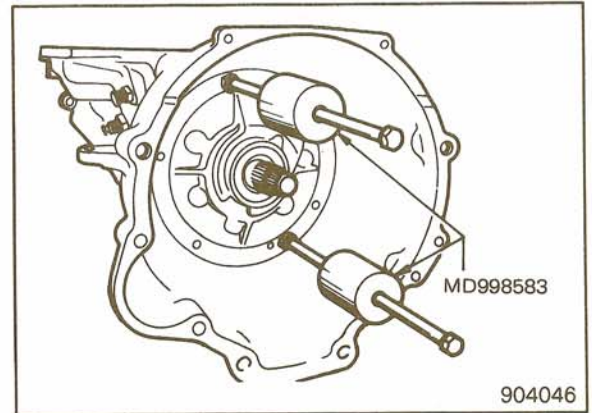
11. Carefully pry snap ring from weight end of governor valve shaft. Slide valve and shaft assembly out of governor body.
12. Remove snap ring from behind governor body, then slide governor and support assembly off output shaft. (904030)



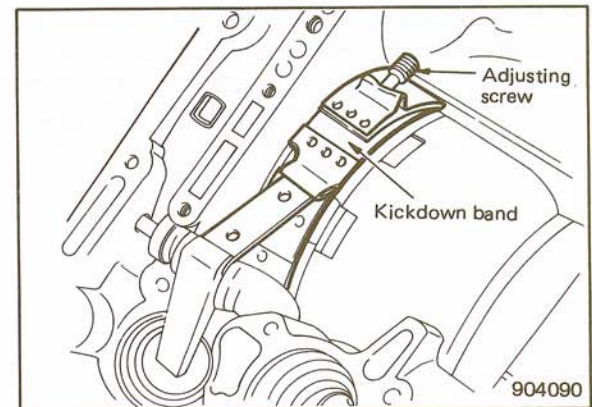




13. Tighten kickdown band adjusting screw until band is tight on front clutch retainer. This prevents front clutch retainer from coming out with pump which might cause unnecessary damage to clutches.
14. Remove oil pump housing retaining bolts.
15. Attach two Special Tools (904046) to pump housing flange in threaded holes in flange.
16. Bump outward evenly with two "knocker weights" to withdraw pump and reaction shaft support assembly from the case.



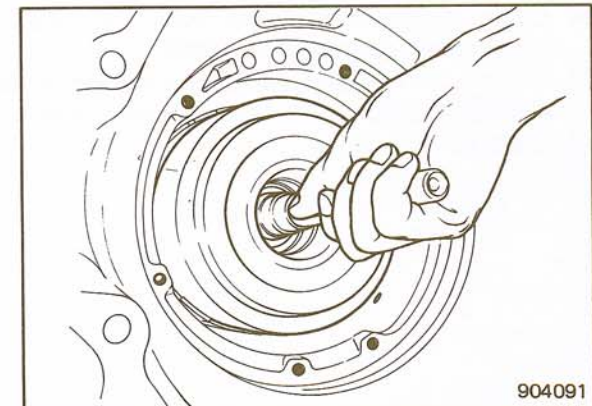
17. Loosen kickdown band adjusting screw, remove band strut and slide band out of the case. (904090)
18. Slide front clutch assembly out of the case.



19. Grasp input shaft, and slide input shaft and rear clutch assembly out of the case.

## Caution

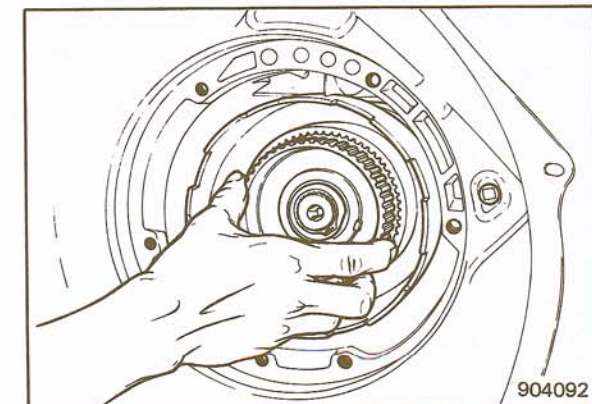
Be careful not to lose thrust washer located between rear end of input shaft and forward end of output shaft.



20. While supporting output shaft and driving shell, carefully slide assembly forward and out through the case.

## Caution

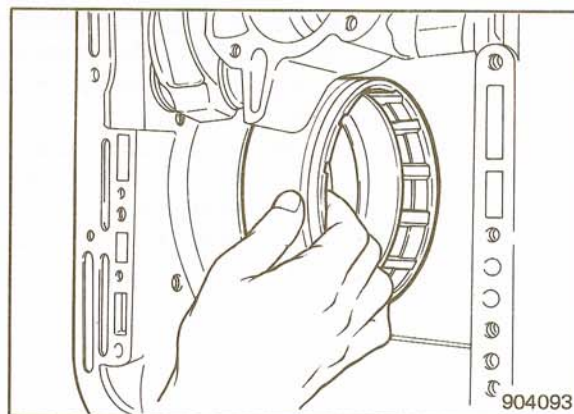
Be very careful not to damage ground surfaces on output shaft during removal.



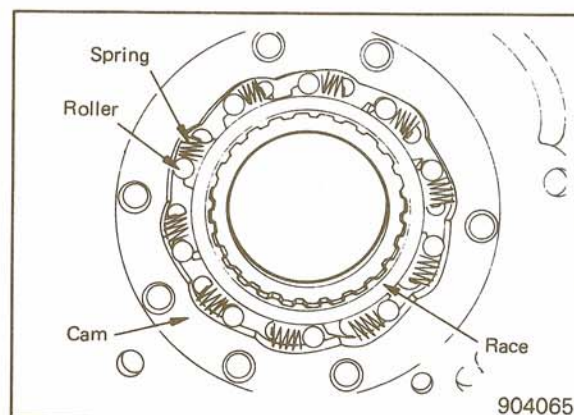




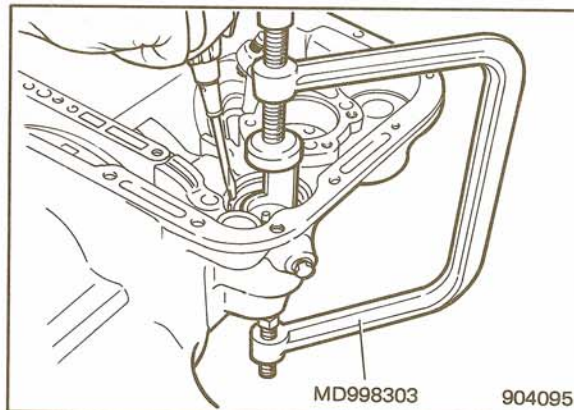
21. Remove low-reverse drum, then loosen low-reverse band adjusting screw, remove band strut and link, then remove band from the case.



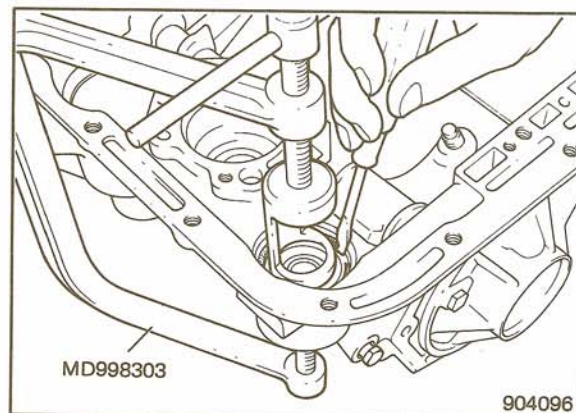
22. Note position of overrunning clutch rollers and springs before disassembly to assist in reassembly.
23. Carefully slide out clutch race and remove rollers and springs. If overrunning clutch cam and/or roller spring retainer are found damaged or worn, replace. (904065)



24. Compress kickdown servo spring by using Special Tool, then remove snap ring. (904095)
25. Remove servo guide, spring rod and servo piston from the case. Be careful not to damage piston rod or guide during removal.



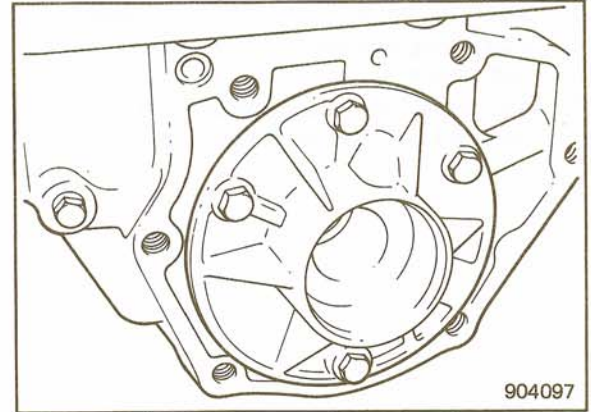
26. Compress low-reverse servo piston spring by using Engine Valve Spring Compressor, then remove snap ring. (904096)
27. Remove spring retainer, spring and servo piston from the case.





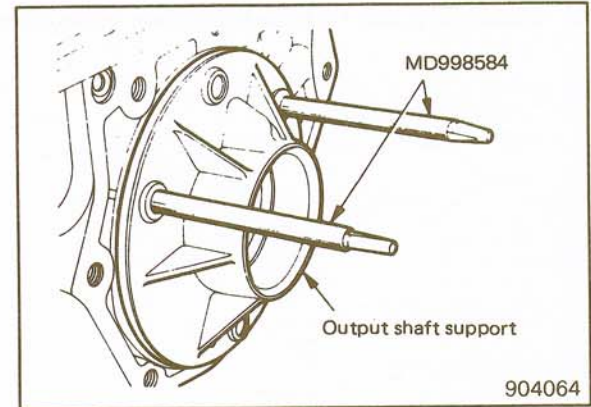


28. Remove four output shaft support to case bolts and then remove output shaft support.

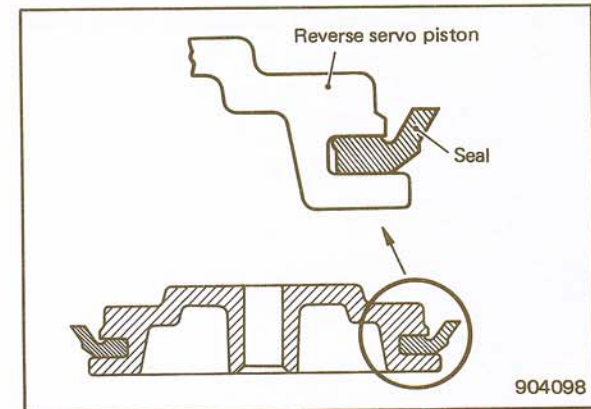


## REASSEMBLY

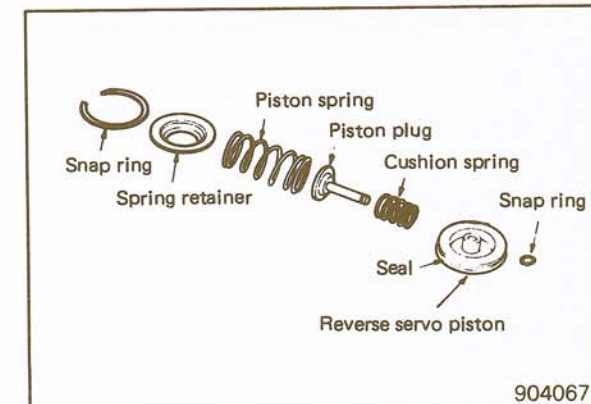
1. Screw two Special Tools into the case. Position output shaft support over pilot studs, and tap it firmly into the case with a soft faced hammer. (904064)
2. Remove pilot studs.
3. Install four bolts and tighten to specified torque.



4. Install new seal to reverse servo piston.



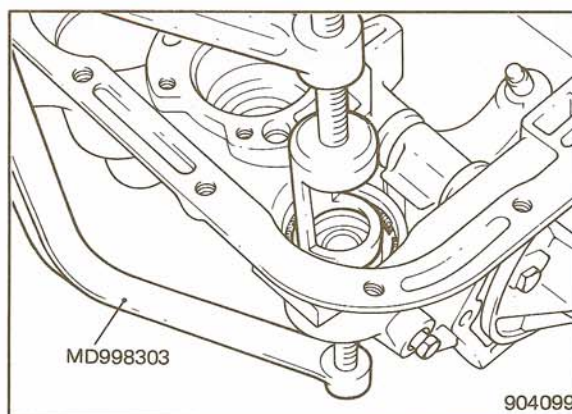
5. Install cushion spring and piston plug to reverse servo piston, and secure with snap ring.



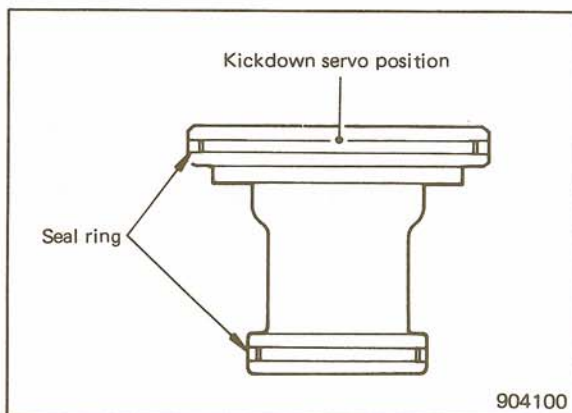




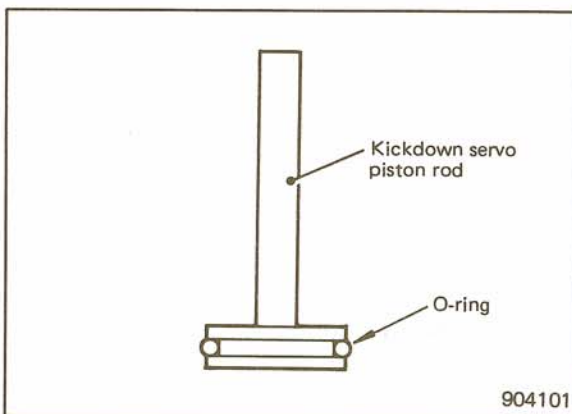
6. Carefully work servo piston assembly into the case with a twisting motion. Place spring, retainer and snap ring over piston.
7. Compress low and reverse servo piston spring by using Special Tool, and then install snap ring. (904099)



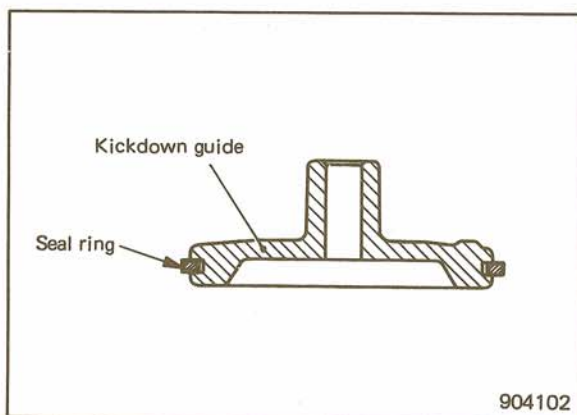
8. Install new seal rings to kickdown servo piston.



9. Install new O-ring to kickdown servo piston rod.



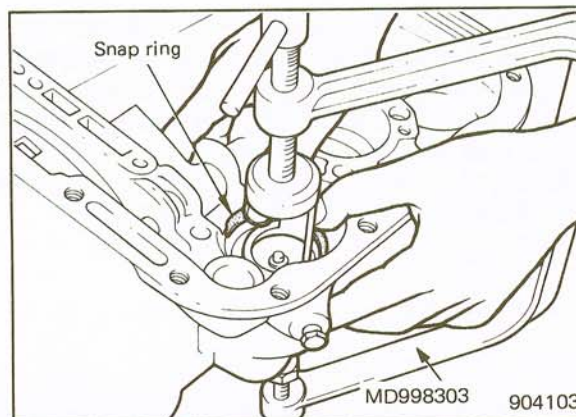
10. Install new seal ring to kickdown guide.



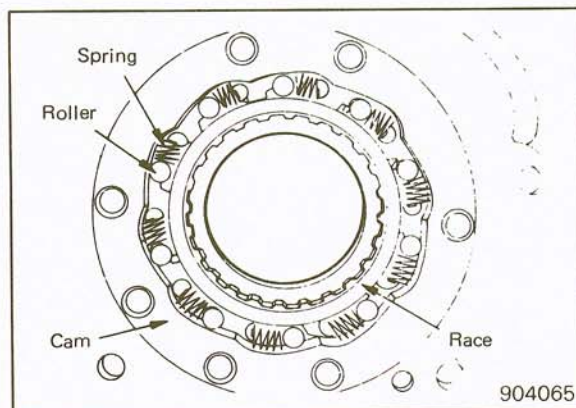




11. Carefully push kickdown servo piston into case bore.
12. Install piston rod, spring and guide.
13. Compress kickdown servo springs by using Special Tool, then install snap ring. (904103)



14. With transmission case in an upright position, insert overrunning clutch race inside the cam.
15. Install overrunning clutch rollers and springs exactly as shown in illustration. (904065)



16. Position low-reverse band in the case, install short strut, then connect long link to band. Screw in band adjusting screw just enough to hold strut in place. (904068)
17. Install low-reverse drum. Be sure long link assembly is installed to provide running clearance for the low and reverse drum.
18. While supporting assembly in the case, insert output shaft through rear support. Carefully work assembly rearward, engaging rear planetary carrier lugs into low-reverse drum slots.

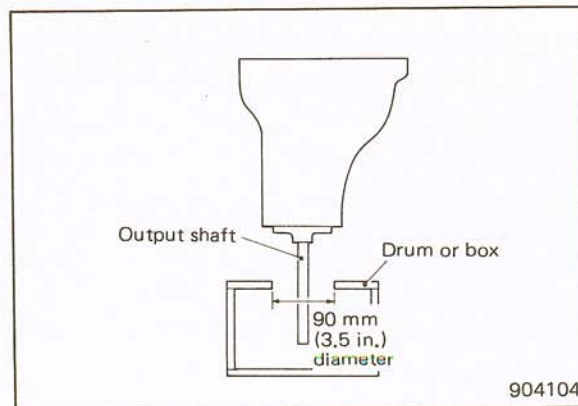
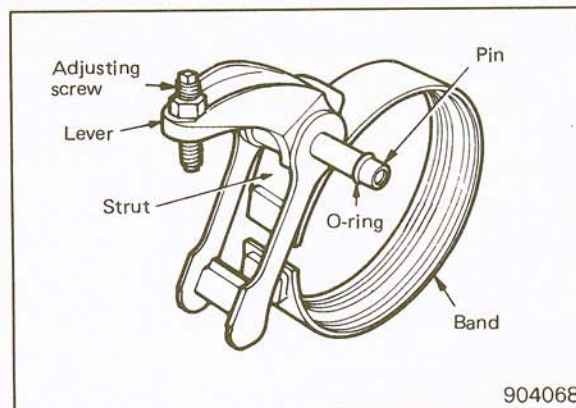
## Caution

Be very careful not to damage ground surfaces on output shaft during installation.

19. Front and rear clutches, kickdown band and oil pump assembly are more easily installed with transmission in an upright position.

One method to support transmission is outlined as follows:

- (1) Cut a 90 mm (3.5 in.) diameter hole in a bench, in the end of a small oil drum or a large wooden box strong enough to support transmission. Cut or file notches at edge of 90 mm (3.5 in.) hole so that output shaft support will fit and lay flat in the hole.
- (2) Carefully insert output shaft into hole to support transmission upright, with its weight resting on flange of output shaft support.

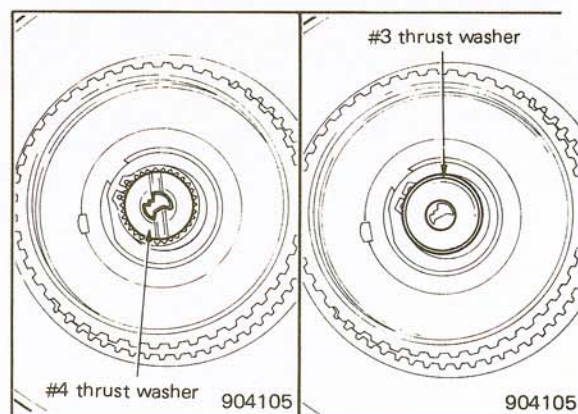




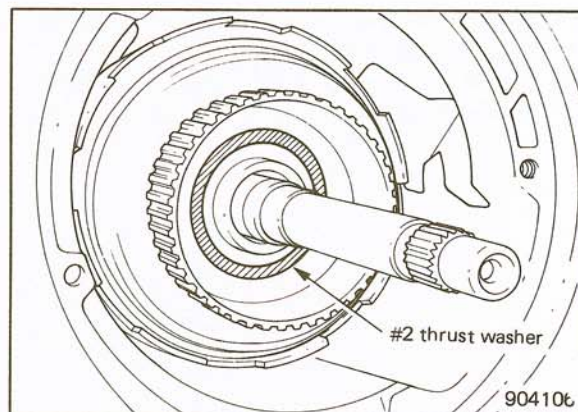


## COMPONENT SERVICE-AUTOMATIC TRANSMISSION

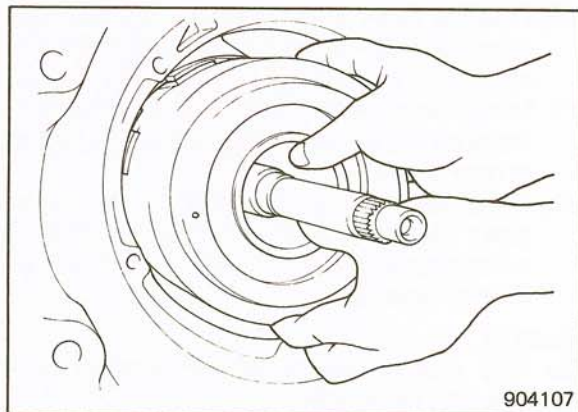
20. Apply a coat of grease to #4 selective thrust washer and install washer on front end of output shaft. If input shaft end play was not within specifications when tested before disassembly, replace thrust washer with one of proper thickness. (904105)
21. Apply a coat of grease to #3 thrust plate and install plate on thrust washer. (904105)



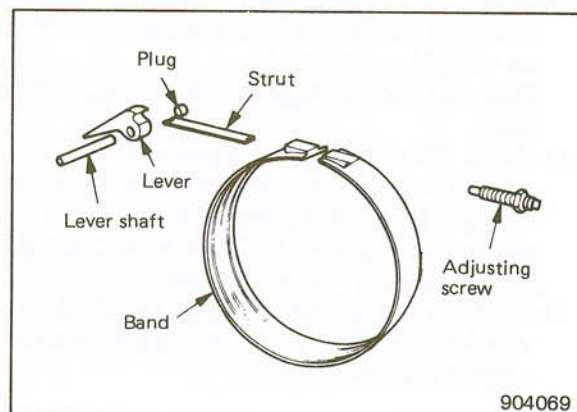
22. Apply a coat of grease to #2 thrust washer and install washer on rear clutch retainer. (904106)
23. Align front clutch disc inner splines, and place front clutch in position on rear clutch. Make sure front clutch disc splines are fully engaged on rear clutch splines.



24. Align rear clutch disc inner splines, grasp input shaft and lower the front and rear clutch assemblies into transmission case. (904107)
25. Engage rear clutch splines over splines of front annulus gear. Make sure front clutch retainer lugs are fully engaged in slots in the driving shell.



26. Slide kickdown band over front clutch assembly.
27. Install band strut, screw in adjusting screw just enough to hold strut in place. (904069)







## Caution

If difficulty was encountered in removing pump assembly due to an exceptionally tight fit in the case, it may be necessary to expand the case with heat during pump installation. Using a suitable heat light, heat the case in area of pump for a few minutes prior to installing pump assembly.

28. Screw two Special Tools in pump opening in the case. Install a new gasket over the pilot studs. (904070)
29. Place a new rubber seal ring in groove on outer flange of pump housing. Make sure seal ring is not twisted. Coat seal ring with grease for easy installation.
30. Install pump assembly in the case; tap it lightly with a soft mallet, if necessary.  
Make sure #1 thrust washer is installed on reaction shaft support hub.
31. Remove pilot studs, install bolts and snug down evenly. Rotate input and output shafts to see if any binding exists, then tighten bolts to specified torque. Check shafts again for free rotation.

Tightening torque . . . . .  
Oil pump tightening bolts 17-23 Nm (20-17 ft.lbs.)

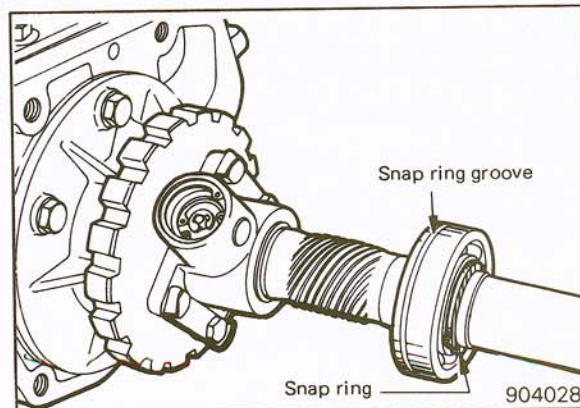
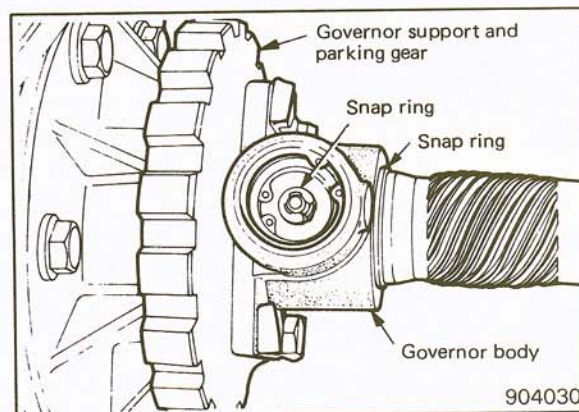
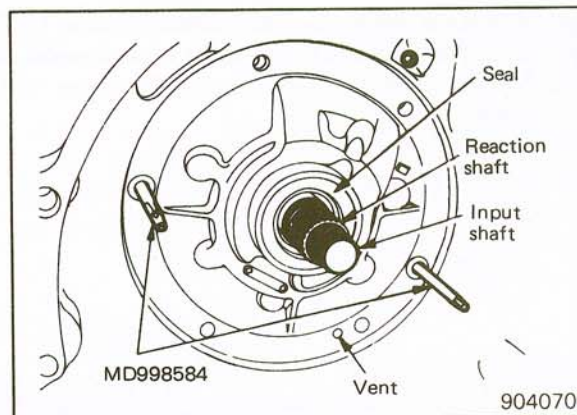
32. Adjust both bands as described in "Maintenance and adjustment".

33. Position support and governor body assembly on output shaft. Align assembly so governor valve shaft hole in governor body aligns with hole in output shaft. Install snap ring behind governor body. Tighten body to support bolts to specified torque.

Tightening torque . . . . .  
Governor tightening bolt 10-12 Nm (8-9 ft.lbs.)

34. Place governor valve on valve shaft, insert assembly into body and through governor weights. Install valve shaft retaining snap ring. (904030)

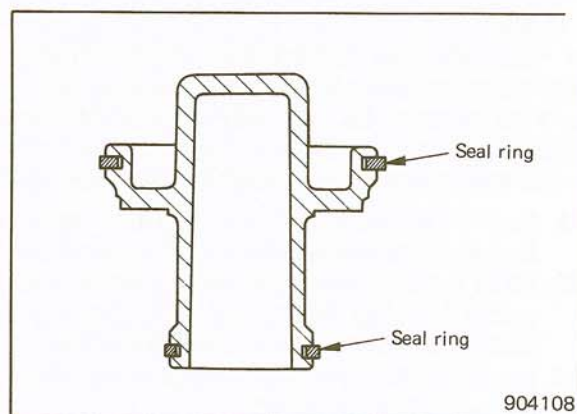
35. Install bearing on shaft with its outer race ring groove toward front. Press or tap bearing tightly against front shoulder on output shaft, then install rear snap ring.





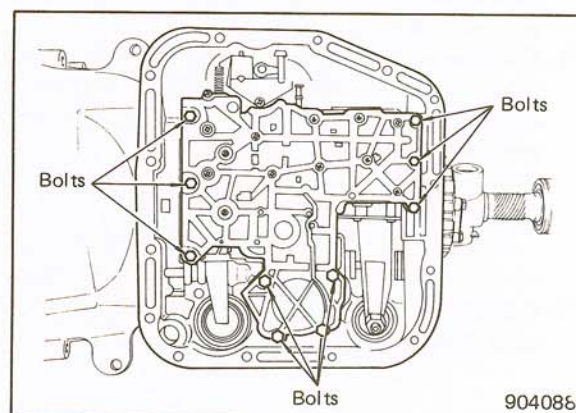


36. Install seal rings to accumulator piston. (904108)
37. Install accumulator piston in transmission case.
38. Position accumulator spring between piston and valve body.



39. Place valve body in position, working parking sprag rod through opening, install ten hex-head valve body to transmission case bolts finger tight. (904088)
40. Snug bolts down evenly, then tighten to specified torque.

Tightening torque . . . . . 10-13 Nm (7-9 ft.lbs.)

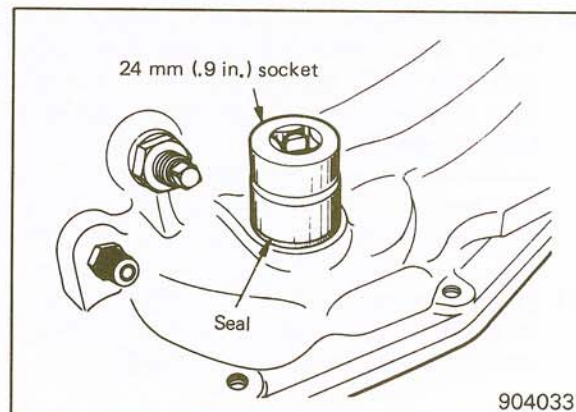


41. Drive a new seal into the case with a 24 mm (.9 in.) socket and hammer. (904033)

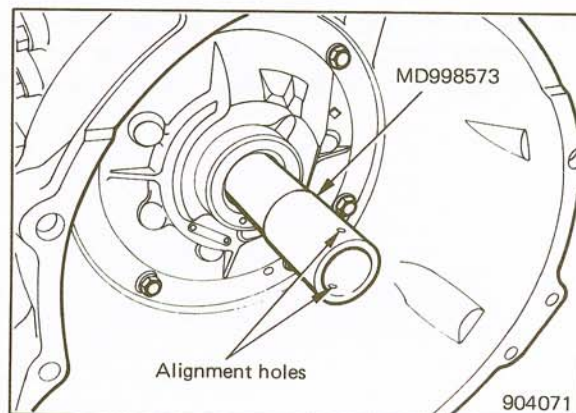
### NOTE

This seal can be replaced without removing valve body from transmission by using a small screwdriver to pry seal out of its bore. Be careful not to scratch manual lever shaft or the seal bore in transmission.

42. Install gearshift lever and tighten clamp bolt. Check lever shaft for binding in the case by moving lever through all detent positions. If binding exists, loosen valve body bolts and realign.
43. Install throttle lever and tighten clamp bolt.
44. Install oil pan and a new gasket.



45. Insert Special Tool into oil pump rotor and turn tool until two small holes of handle are vertical. Remove tool, while using care not to turn tool. By so doing, projection of pump inner rotor can be set in vertical position.

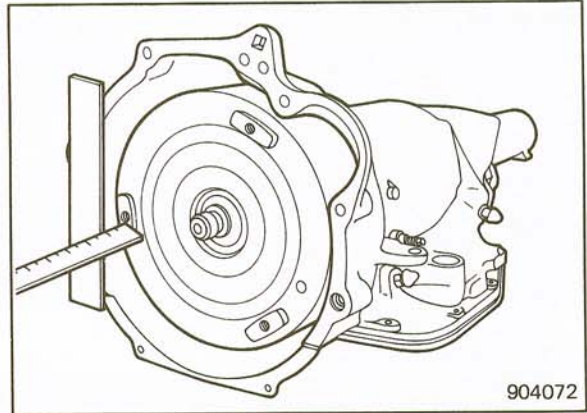






6. Apply thin coat of vaseline to outside periphery of converter. Turn converter hub until slots are vertical, carefully install converter assembly onto input shaft and reaction shaft until it securely fits projection of pump inner rotor.

To confirm that they are in complete engagement, measure distance from transmission case bell housing front surface to ends of three drive plate attaching bosses of torque converter. Distance should be at least 15 mm (.6 in.) when torque converter is pushed all the way into transmission.

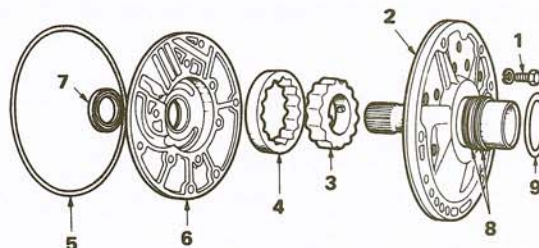






## COMPONENTS

1. Bolt (6)
2. Reaction shaft support
3. Inner rotor
4. Outer rotor
5. Oil pump housing seal
6. Oil pump housing
7. Oil seal
8. Reaction shaft support seal ring (2)
9. Front clutch thrust washer (#1)



### NOTE

Numbers show order of disassembly.  
For reassembly, reverse order of disassembly.

90404.

## DISASSEMBLY

Thrust washer #1 cannot be removed unless two seal rings of reaction shaft support are removed.

## INSPECTION

1. Check seal ring of reaction shaft support for wear and damage. Check to ensure that it turns freely in groove.
2. Check thrust washer #1 (inserted between reaction shaft support and front clutch retainer) for wear and replace if necessary.
3. Check finished surfaces of oil pump housing and reaction shaft support for damage and burr. Check bushing for wear and damage.
4. Check pump rotor for scratches and pitching. Clean pump rotor, reinstall to pump housing, and measure all clearances with thickness gauge. Hold straight edge to rotor end and pump housing surface to measure clearance between rotor end and straight edge (side clearance). Measure rotor tip clearance between inside and outside teeth of rotor. Measure clearance between bore (I.D.) of oil pump housing and outer rotor O.D. (body clearance).

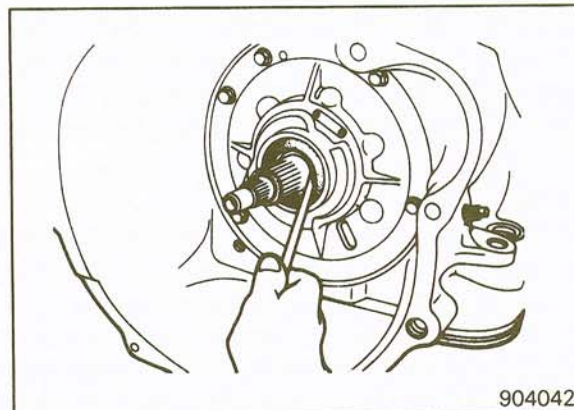




## IL PUMP SEAL REPLACEMENT

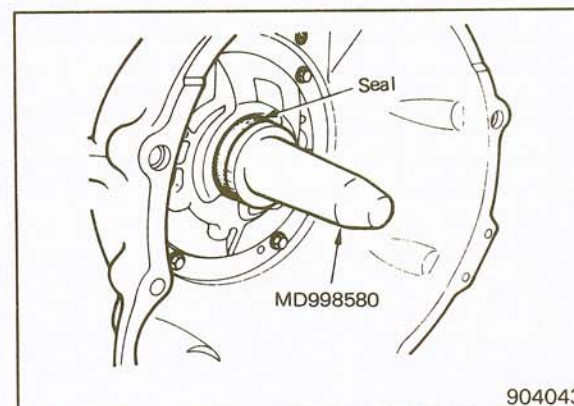
Oil pump seal can be replaced without removing oil pump housing assembly from transmission case.

1. Use screwdriver as lever to remove oil seal.



904042

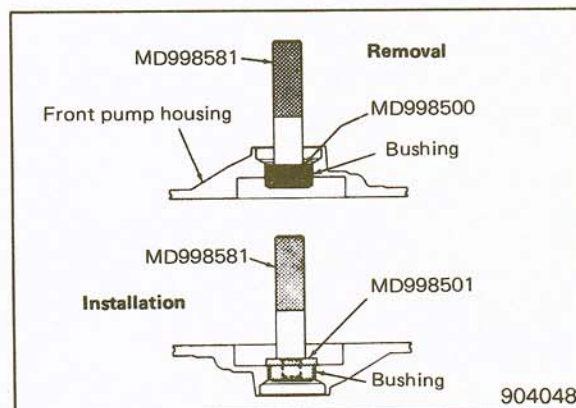
2. To install a new seal, place seal in opening of pump housing (lip side facing inward). Using Special Tool, drive seal into housing until tool bottoms.



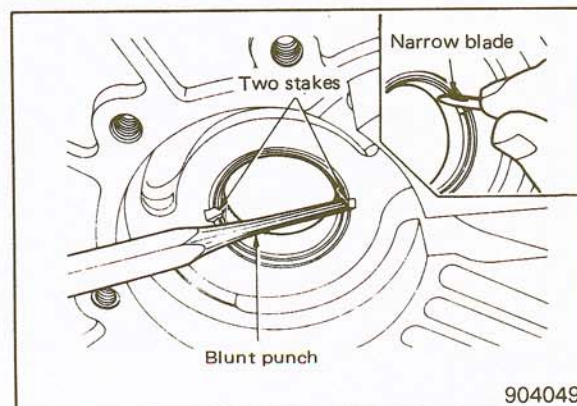
904043

## PUMP HOUSING BUSHING REPLACEMENT

1. Place pump housing (seal face down) on a smooth firm surface.
2. Place Special Tool in bushing and install Special Tool in the removing head. (904048)
3. Drive bushing straight down and out of pump housing bore. Be careful not to cock tool in the bore.
4. Position new bushing on Special Tool. (904048)
5. With pump housing on a smooth clean surface, start bushing and installer in bushing bore. Install Handle (MD998581), in installer.
6. Drive bushing into housing until tool bottoms in the pump rotor housing. Be careful not to cock tool during installation.
7. Stake bushing in place by using a blunt punch or similar tool. A gentle tap at each stake slot location will suffice. (904049)
8. Using a narrow-bladed knife or similar tool, remove high points or burrs around staked area. Do not use a file or similar tool that will remove more metal than is necessary.



904048



904049





### REACTION SHAFT BUSHING REPLACEMENT

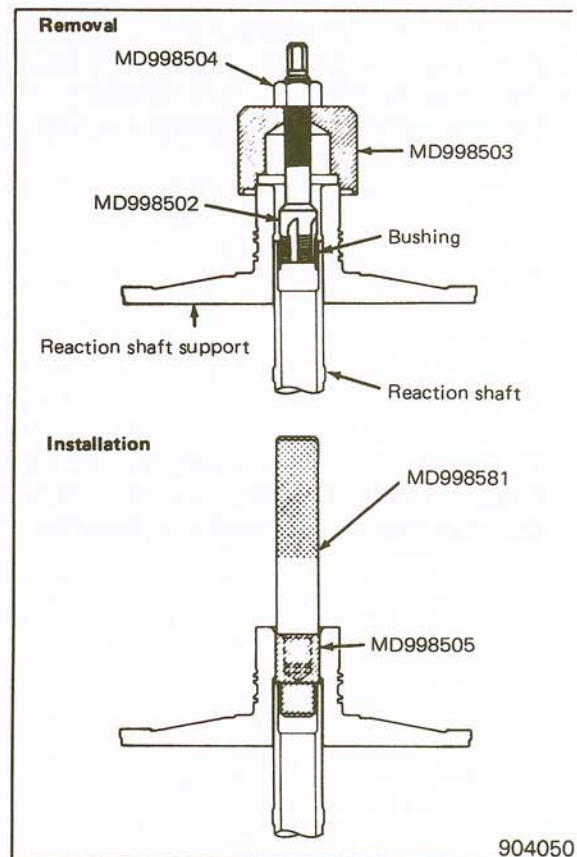
In case of a reaction shaft bushing failure, always inspect the support for wear from input shaft seal ring lands. If worn or grooved, replace reaction shaft support assembly.

1. Assemble Special Tools.

#### Caution

**Do not clamp any part of reaction shaft or support in a vise.**

2. With cup held firmly against reaction shaft, screw bushing remover into bushing as far as possible by hand.
3. Using a wrench, screw bushing remover into bushing 3 to 4 additional turns to firmly engage threads in bushing.
4. Turn hex nut down against cup to pull bushing from reaction shaft. Thoroughly clean reaction shaft to remove chips made by remover threads.
5. Lightly grip bushing in a vise or with pliers and back tool (remover) out of bushing. Be careful not to damage threads on bushing remover.
6. Slide a new bushing on Special Tool and start them in the bore of reaction shaft. (904050)
7. Support reaction shaft upright on a clean smooth surface and install Special Tool in installing head. Drive bushing into shaft until tool bottoms.
8. Thoroughly clean reaction shaft support assembly before installation.



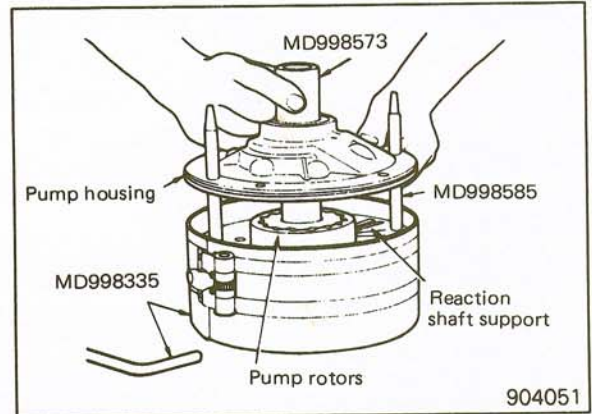




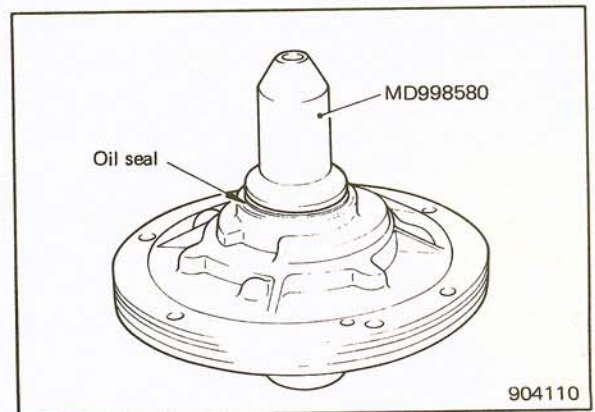
## EASSEMBLY

1. Place reaction shaft support in Special Tool with hub of support and tool resting on a smooth flat surface bench. Screw two Special Tools into threaded holes of reaction shaft support flange. (904051)
2. Assemble and place rotors in center of the support.
3. Lower pump body over pilot studs, insert Special Tool through pump body and engage pump inner rotor. Rotate rotors with tool to center rotors in pump body, then with pump body firm against reaction shaft support, tighten clamping tool securely. (904051)
4. Invert pump housing and reaction shaft support assembly with oil pump band intact. Install support to pump housing bolts and tighten to specified torque. Remove oil pump band, pilot studs B and rotor alignment tool.

Tightening torque . . . . . 16-21 Nm (12-15 ft.lbs.)



5. Place a new oil seal in opening of pump housing (lip of seal facing inward). Using Special Tool, drive seal into housing until tool bottoms. (904110)

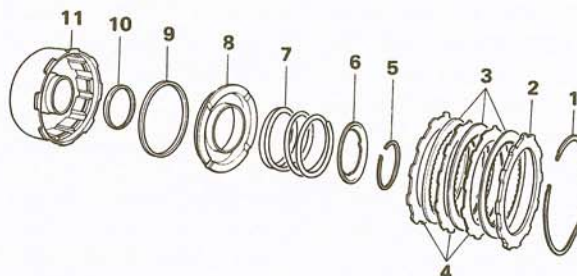






### COMPONENTS

1. Wave snap ring
2. Pressure plate
3. Clutch disc (3)
4. Clutch plate (3)
5. Snap ring
6. Piston spring retainer
7. Piston spring
8. Front clutch piston
9. Seal (outer)
10. Seal (inner)
11. Front clutch retainer



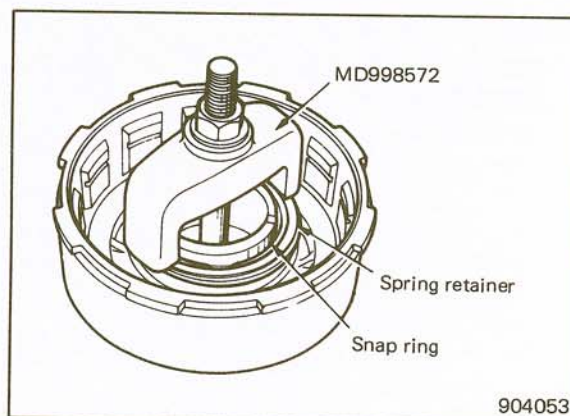
#### NOTE

Numbers show order of disassembly.  
For reassembly, reverse order of disassembly.

904134

### DISASSEMBLY

1. Install Special Tool over piston spring retainer. Compress spring and remove snap ring, then slowly release tool until spring retainer is free of hub. Remove tool, retainer and spring. (904053)
2. Invert clutch retainer assembly and bump it on a wood block to remove piston. Remove seals from piston and clutch retainer hub.



904053



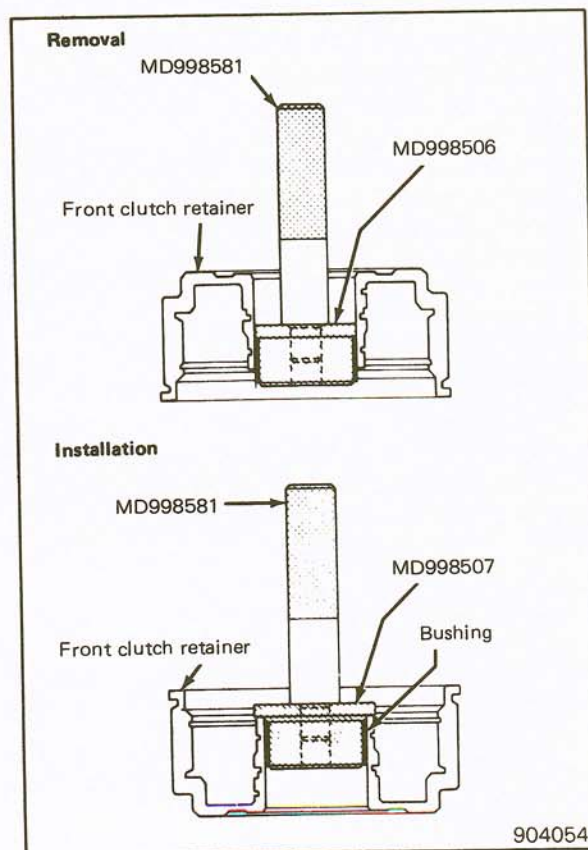


## INSPECTION

1. Inspect plates and discs for flatness. They must not be warped or cone shaped.  
Inspect facing material on all clutch discs. Replace discs that are charred, glazed or heavily pitted. Discs should also be replaced if they shown evidence of material flaking off or if facing material can be scraped off easily. Inspect clutch disc splines for wear or other damage. Inspect clutch plate and pressure plate surfaces for burning, scoring or damaged driving lugs.
2. Inspect clutch plate lug grooves in clutch retainer for smooth surfaces, plates must travel freely in grooves. Inspect band contacting surface on clutch retainer for scores, the contact surface should be protected from damage during disassembly and handling. Note ball check in clutch retainer, make sure ball moves freely. Inspect piston seal surfaces in clutch retainer for nicks or deep scratches, light scratches will not interfere with sealing of seal rings. Inspect clutch retainer inner bore surface for wear from reaction shaft support seal rings. Inspect clutch retainer bushing for wear or scores.  
Inspect inside bore of piston for score marks; if light, remove with crocus cloth. Inspect seal grooves for nicks and burrs. Inspect seal rings for deterioration, wear and hardness. Inspect piston spring, retainer and snap ring for distortion.

## FRONT CLUTCH RETAINER BUSHING REPLACEMENT

1. Lay clutch retainer (open end down) on a clean smooth surface and place Special Tool in bushing. Install Special Tool in removing head. (904054)
2. Drive bushing straight down and out of clutch retainer bore. Be careful not to cock tool in the bore.
3. Lay clutch retainer (open end up) on a clean smooth surface. Slide a new bushing on Special Tool and start them in clutch retainer bore. (904054)
4. Install handle in installing head. Drive bushing into clutch retainer until tool bottoms.
5. Thoroughly clean clutch retainer before assembly and installation.



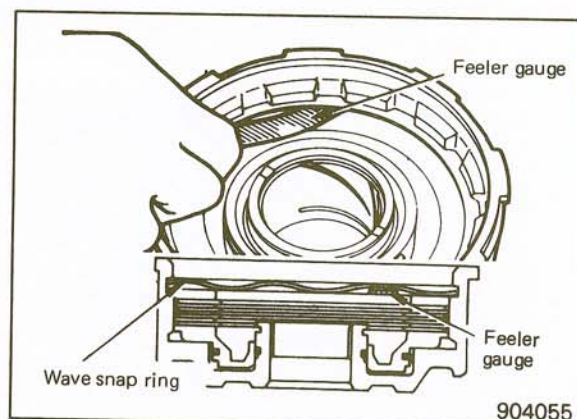
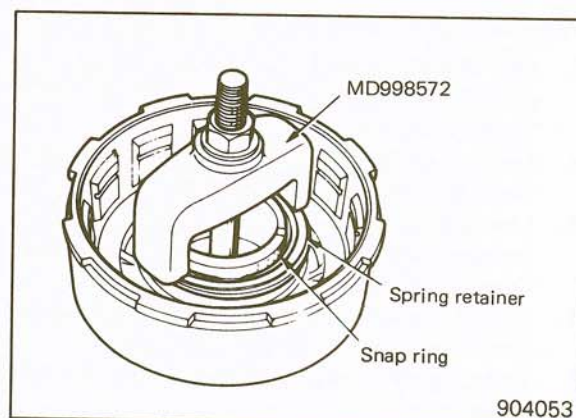
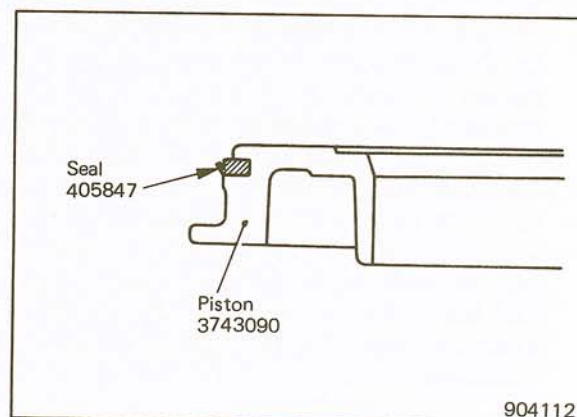
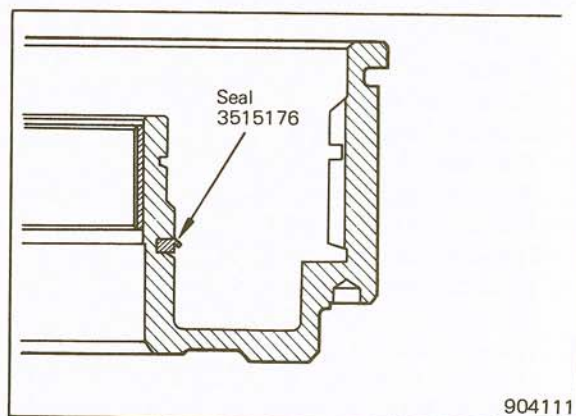




## COMPONENT SERVICE-FRONT CLUTCH

### REASSEMBLY

1. Lubricate inner seal with ATF and install on hub of clutch retainer. Make sure lip of seal faces down and is properly seated in groove.
2. Install outer seal on clutch piston, with lip of seal toward bottom of clutch retainer. Apply vaseline to outer edge of seals and press seal to bottom of its groove around piston diameter for easier installation of piston assembly. Place piston assembly in retainer and carefully seat piston in bottom of retainer.
3. Place spring on piston hub and position spring retainer and snap ring on spring. Compress spring with Special Tool and seat snap ring in hub groove. Remove compressor tool. (904053)
4. Immerse all clutch plates and discs in ATF and install two clutch plates (made of steel) and clutch discs (with facing) each alternately in retainer. Install pressure plate and snap ring. Check to ensure that snap ring is correctly positioned in groove.
5. Insert a feeler gauge between pressure plate and wave snap ring to measure maximum clearance where snap ring is waved away from pressure plate.

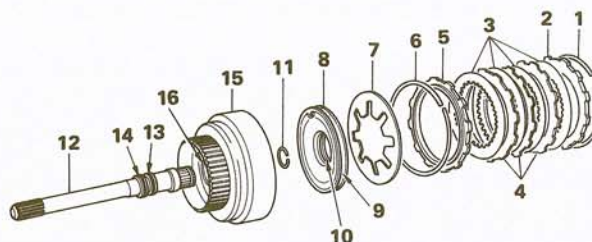






## COMPONENTS

1. Snap ring (selective)
2. Pressure plate
3. Clutch disc (4)
4. Clutch plate (3)
5. Pressure plate
6. Wave snap ring
7. Piston spring
8. Rear clutch piston
9. Seal (outer)
10. Seal (inner)
11. Input shaft snap ring
12. Input shaft
13. Seal ring
14. Seal ring
15. Rear clutch retainer
16. Seal ring



### NOTE

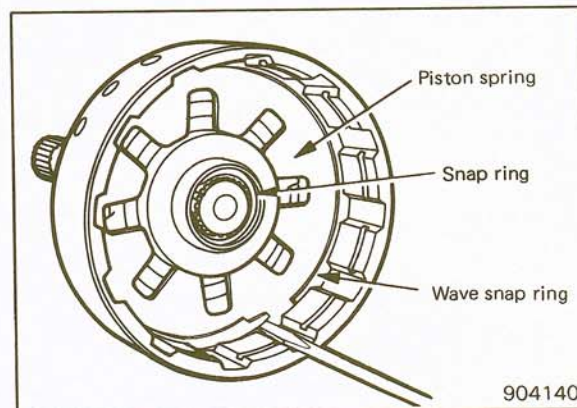
Numbers show order of disassembly.

For reassembly, reverse order of disassembly.

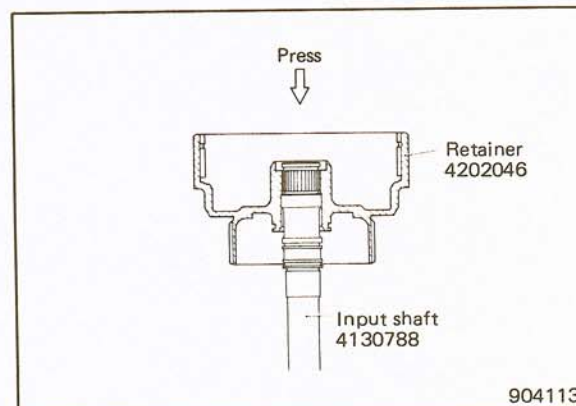
904060

## Disassembly

1. Carefully pry one end of wave snap ring out of its groove in clutch retainer, then remove wave spring and clutch piston spring. (904140)
2. Invert clutch retainer assembly and bump it on a wood block to remove piston. Remove seals from piston.



3. If necessary, remove snap ring and press input shaft from clutch retainer.







### INSPECTION

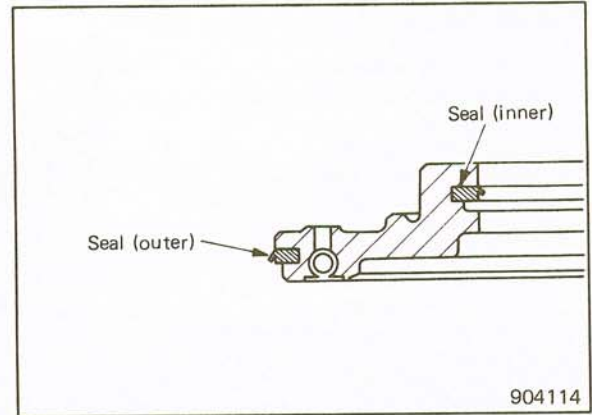
1. Inspect plates and discs for flatness. They must not be warped or cone shaped. Inspect facing material on all clutch discs. Replace discs that are charred, glazed or heavily pitted. Discs should also be replaced if they show evidence of material flaking off or if facing material can be scraped off easily. Inspect clutch disc splines for wear or other damage. Inspect clutch plate and pressure plate surface for burning, scoring or damaged driving lugs. Replace if necessary.
2. Inspect clutch plate lug grooves in clutch retainer for smooth surfaces, plates must travel freely in grooves. Inspect piston seal surfaces in clutch retainer for nicks or deep scratches. Light scratches will not interfere with sealing of seal rings.
3. Check to ensure that check ball of piston can move freely.
4. Inspect piston spring and wave spring for distortion or breakage.
5. Inspect teflon seal rings on input shaft for wear. Do not remove rings unless conditions warrant.
6. Inspect rear clutch to front clutch thrust washer for wear.



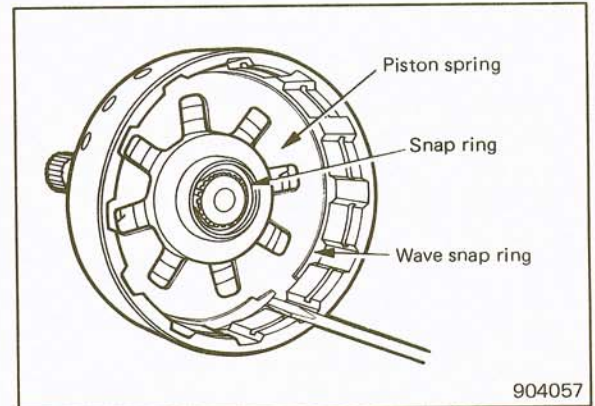


## ASSEMBLY

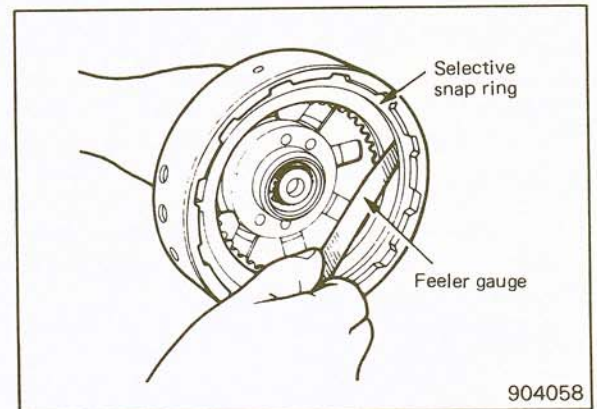
1. If removed, press input shaft into clutch retainer and install snap ring.
2. Install inner and outer seals on clutch piston and lubricate with ATF. Make sure lip of seals face toward head of clutch retainer, and are properly seated in piston grooves. (904114)
3. Place piston assembly in retainer and with a twisting motion, seat piston in bottom of retainer.



4. Place clutch piston spring on top of piston in clutch retainer. Start one end of wave spring in retainer groove, then progressively push or tap spring into place making sure it is fully seated in groove. (904057)
5. Install inner pressure plate in clutch retainer with raised portion of plate resting on spring.
6. Lubricate all clutch plates and discs with ATF, install one clutch disc (facing material) followed by a steel clutch plate until all plates are installed. Install outer pressure plate and selective snap ring.



7. Measure rear clutch plate clearance by having an assistant press down firmly on outer pressure plate, then insert a feeler gauge between plate and snap ring. If necessary, install a new snap ring of proper thickness to obtain specified clearance. Low limit clearance is desirable. Rear clutch plate clearance is very important in obtaining proper clutch operation. Clearance can be adjusted by use of various thickness snap rings.

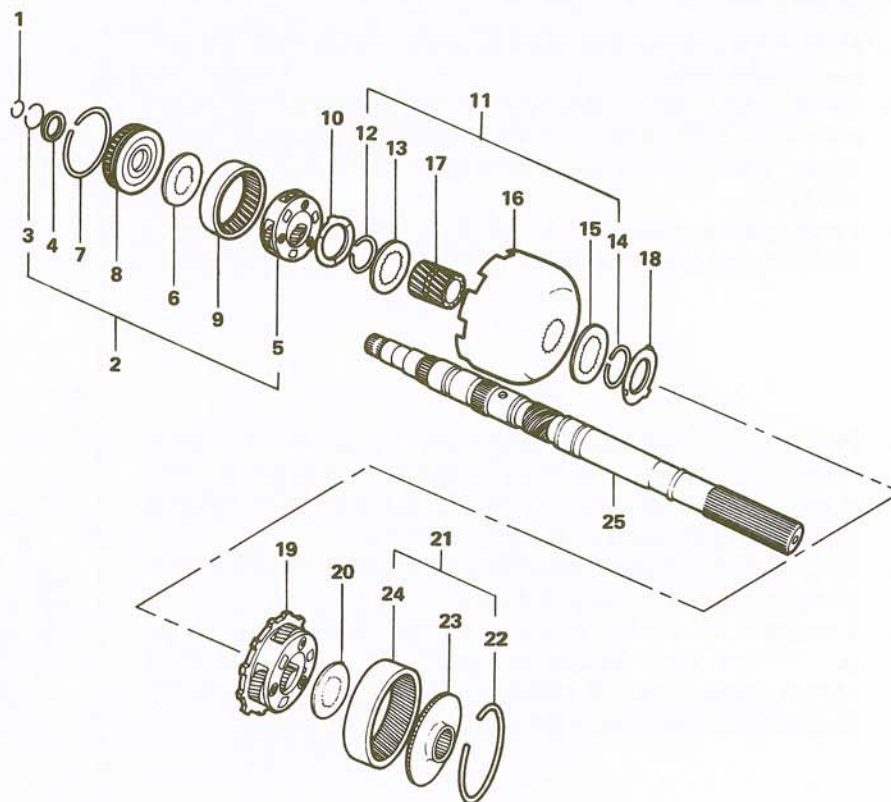






## COMPONENTS

1. Snap ring (selective)
2. Front planetary gear assembly
3. Snap ring
4. Thrust washer (#5)
5. Front planetary gear
6. Thrust washer (#6)
7. Snap ring
8. Front annulus gear support
9. Annulus gear
10. Thrust washer (#7)
11. Sun gear and driving shell assembly
12. Lock ring
13. Thrust plate (#8)
14. Lock ring
15. Thrust plate (#9)
16. Sun gear driving shell
17. Sun gear
18. Thrust washer (#10)
19. Rear planetary gear
20. Thrust washer (#11)
21. Rear annulus gear assembly
22. Snap ring
23. Annulus gear support
24. Annulus gear
25. Output shaft



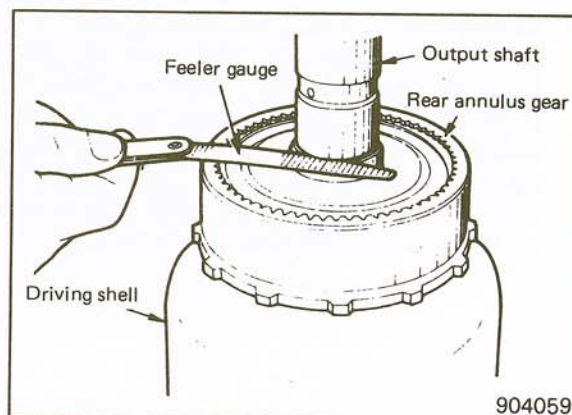
### NOTE

Numbers show order of disassembly.  
For reassembly, reverse order of disassembly.

904060

## DISASSEMBLY

Measure end play of planetary gear assemblies, sun gear and driving shell before removing these parts from output shaft. Stand assembly upright with forward end of output shaft on a wood block so that all parts will move forward against selective snap ring at front of shaft. Insert a feeler gauge between rear annulus gear support hub and shoulder on output shaft. The clearance should satisfy specifications. If clearance exceeds specifications, replace thrust washers and/or necessary parts.



904059





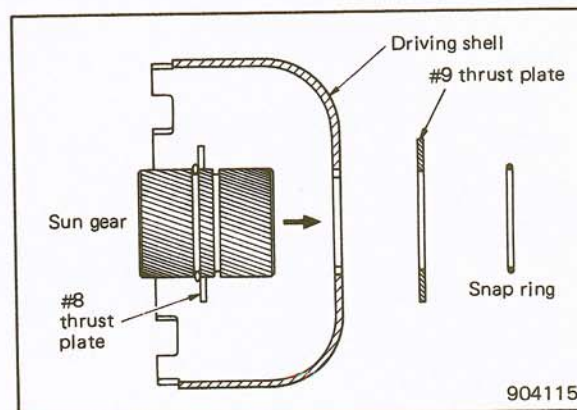
## INSPECTION

1. Inspect bearing surfaces on output shaft for nicks, burrs, scores or other damage. Light scratches, small nicks or burrs can be removed with crocus cloth or a fine stone. Inspect speedometer drive gear for any nicks or burrs, and remove with a sharp edged stone. Make sure all oil passages in shaft are open and clean.
2. Inspect bushings in sun gear for wear or scores. Replace sun gear assembly if bushings are damaged.
3. Inspect all thrust washers for wear and scores, and replace if damaged or worn below specifications.
4. Inspect thrust faces of planetary gear carriers for wear, scores or other damage, and replace as required. Inspect planetary gear carrier for cracks and pinions for broken or worn gear teeth, and for broken pinion shaft lock pins. Inspect annulus gear and support teeth for damage. Replace distorted snap rings.

## REASSEMBLY

1. Place rear annulus gear support in annulus gear and install snap ring.
2. Position rear planetary gear assembly in rear annulus gear and place #10 and #11 thrust washers on front and rear sides of planetary gear assembly.
3. Carefully work output shaft through annulus gear support. Make sure shaft splines are fully engaged in splines of annulus gear support.

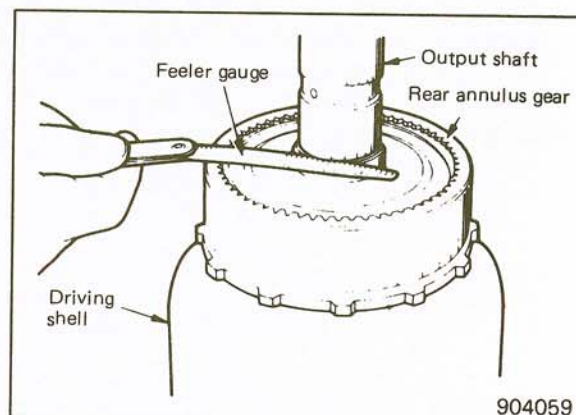
4. Install thrust plate and snap ring on one end of sun gear. Insert sun gear through front side of driving shell and install rear thrust plate and snap ring. (904115)
5. Carefully slide driving shell and sun gear assembly on output shaft, engaging sun gear teeth with rear planetary pinion teeth.
6. Place front annulus gear support in annulus gear and install snap ring.







7. Position front planetary gear assembly in front annulus gear, place #5 thrust washer over planetary gear assembly hub and install snap ring. Position #6 and #7 thrust washers on front and rear sides of planetary gear assembly.
8. Carefully work front planetary and annulus gear assembly on output shaft, meshing planetary pinions with sun gear teeth.
9. With all components properly positioned, install selective snap ring on front end of output shaft. Check end play of planetary gear train. End play can be adjusted by the use of various thickness snap rings.



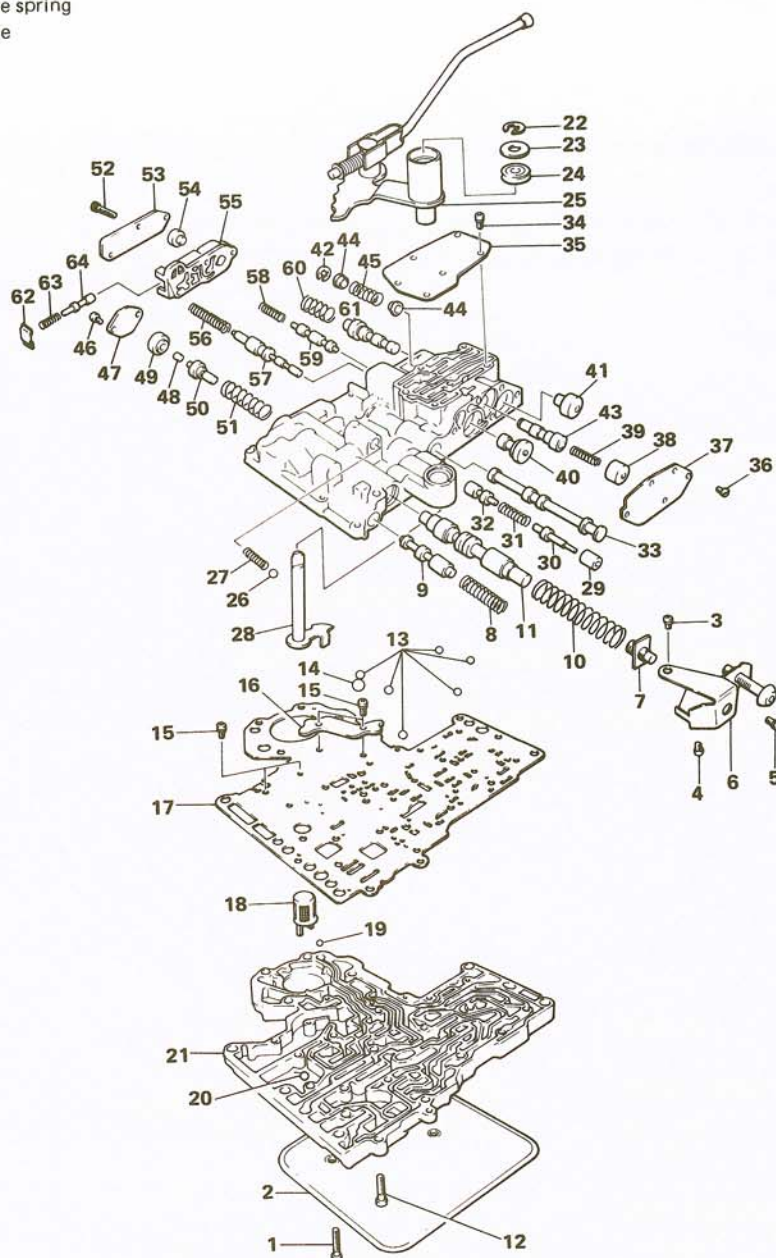




## COMPONENTS

1. Screw (3)
2. Fluid filter
3. Screw
4. Screw
5. Screw
6. Adjusting screw bracket
7. Line pressure adjusting screw
8. Switch valve spring
9. Switch valve
10. Regulator valve spring
11. Regulator valve
12. Screw (13)
13. Check ball-small (6)
14. Check ball-large (1)
15. Screw (4)
16. Transfer plate support
17. Valve body plate
18. Screen
19. Steel ball
20. Steel ball
21. Transfer plate
22. Snap ring
23. Washer
24. Seal
25. Manual valve lever
26. Detent ball
27. Detent spring
28. Throttle valve lever
29. Kickdown detent
30. Kickdown valve
31. Throttle valve spring
32. Throttle valve
33. Manual valve
34. Screw (6)
35. Shuttle valve cover
36. Screw (5)
37. Shift valve plug cover
38. Shuttle valve plug
39. Primary spring
40. 1-2 shift valve plug
41. 2-3 shift valve plug
42. Snap ring
43. Shuttle valve
44. Sleeve (2)
45. Secondary spring
46. Screw (2)
47. Regulator valve cover
48. Line pressure plug
49. Sleeve
50. Throttle pressure plug
51. Spring
52. Screw (3)
53. Shift valve cover
54. Throttle plug
55. Limit valve body

56. 1-2 shift control valve spring
57. 1-2 shift control valve
58. 1-2 shift valve spring
59. 1-2 shift valve spring
60. 2-3 shift valve spring
61. 2-3 shift valve
62. Retainer
63. Limit valve spring
64. Limit valve



### NOTE

Numbers show order of disassembly.  
For reassembly, reverse order of disassembly.

904116





### DISASSEMBLY

#### Caution

Never clamp any portion of valve body or transfer plate in a vise. Any slight distortion of valve body or transfer plate will result in sticking valves, excessive leakage or both.

When removing or installing valves or plugs, slide them in or out carefully. Do not use force.

Tag all springs and valves as they are removed for reassembly identification.

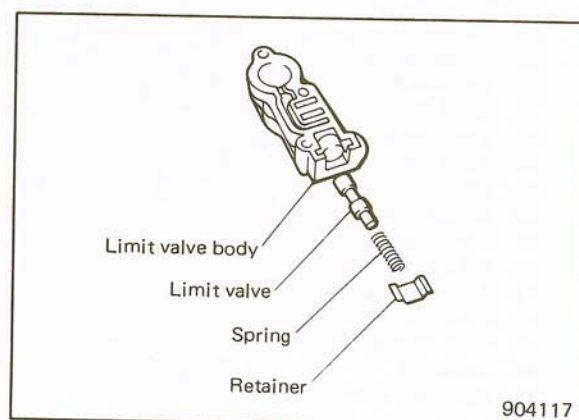
### REASSEMBLY

#### Caution

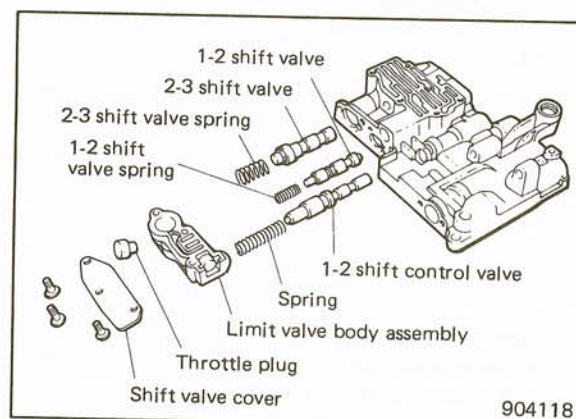
Tighten all valve body screws to 2.9 to 4.9 Nm (2.2 to 3.6 ft.lbs.). Using torque set driver, etc., torque all screws evenly.

1. Insert limit valve and spring into limit valve body. (904117)
  2. Fit spring retainer in groove of limit valve body. (904117)
  3. Put throttle plug in limit valve body.
- 
4. Insert 1-2 and 2-3 shift valves and springs into hole of valve body. (904118)
  5. Set limit valve body assembly against shift valve spring.
  6. Mount shift valve cover to valve body. Tighten screw to specified torque.

Tightening torque .....	
Cover screw	2.9-4.9 Nm (2.2-3.6 ft.lbs.)



904117

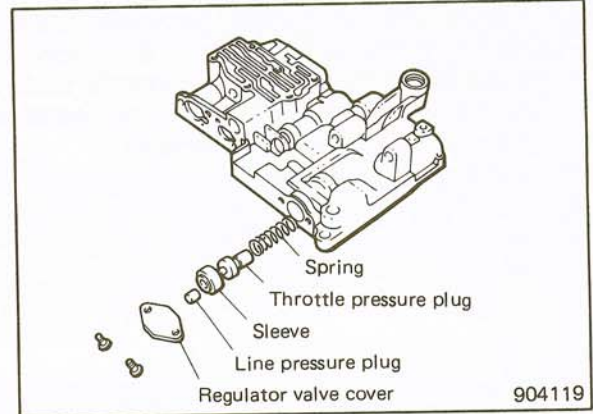


904118

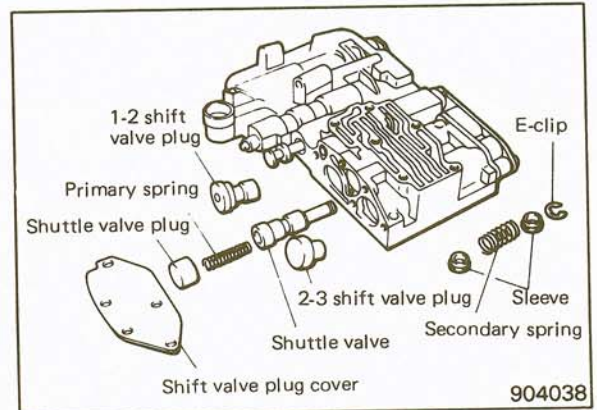




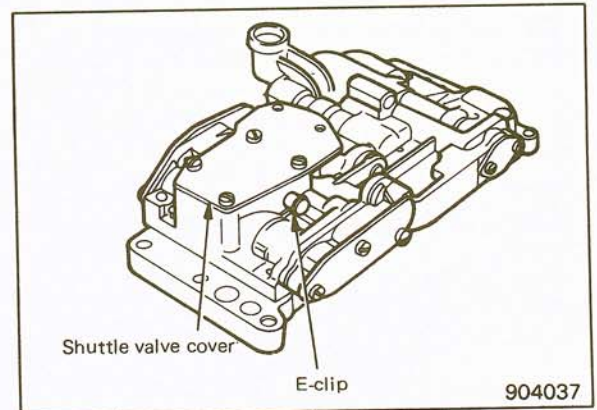
Install springs, throttle pressure plug, line pressure plug and sleeve and secure regulator valve cover to valve body.



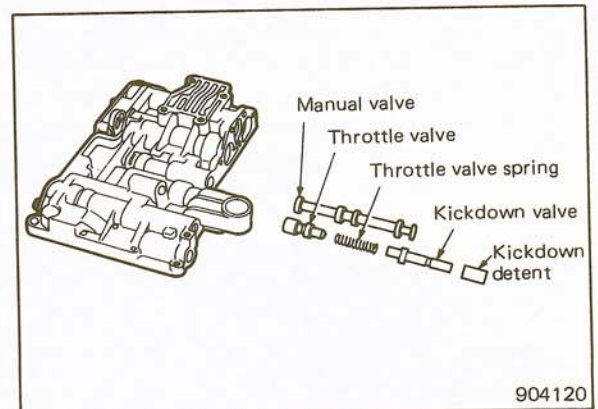
8. Place 1-2 and 2-3 shift valve plugs in their respective bores. (904038)
9. Install shuttle valve, primary spring and shuttle valve throttle plug. (904038)
10. Install sleeve and secondary spring to shuttle valve end and secure with E-clip. (904038)
11. Install shift valve plug cover and tighten five screws.



12. Install shuttle valve cover and tighten six screws.



13. Install throttle valve, throttle valve spring, kickdown valve and kickdown detent plug. (904120)
14. Slide manual valve into its bore.

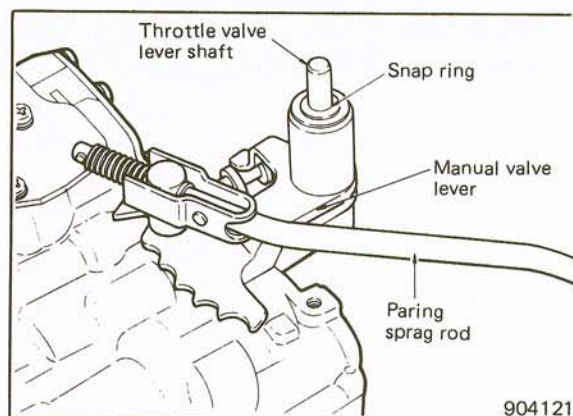




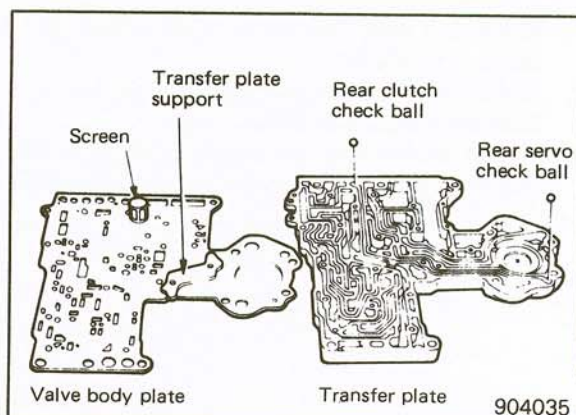


## COMPONENT SERVICE-VALVE BODY

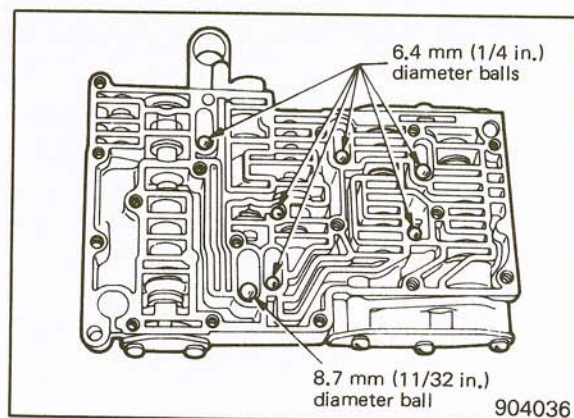
15. Install throttle lever on valve body. Insert detent spring and ball in its bore in valve body. Depress ball and spring and slide manual lever over throttle shaft so that it engages manual valve and detent ball. Install seal, retaining washer and E-clip on throttle shaft.



16. Install rear clutch check ball and rear servo check ball to transfer plate and install regulator valve screen to valve body plate. (904035)
17. Install transfer plate support and valve body plate to transfer plate with four screws. (904035)



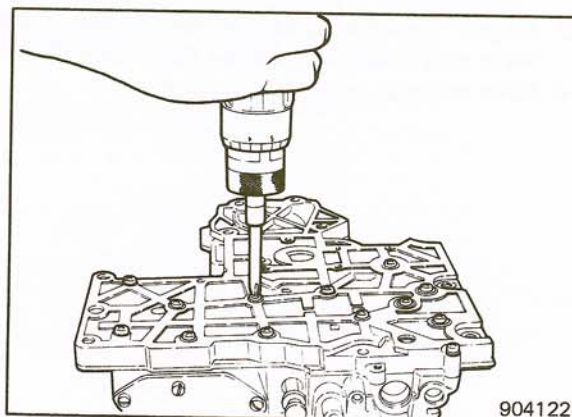
18. Install the seven check balls in valve body.



19. Place transfer plate assembly on valve body and temporarily tighten 13 screws. (904122)
20. Torque screws to specified torque in correct sequence, working from center screw to outward ones.

Tightening torque . . . . .

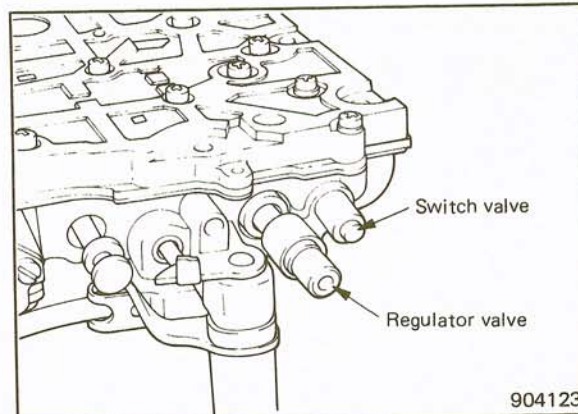
Valve body screw	2.9-4.9 Nm (2.2-3.6 ft.lbs.)
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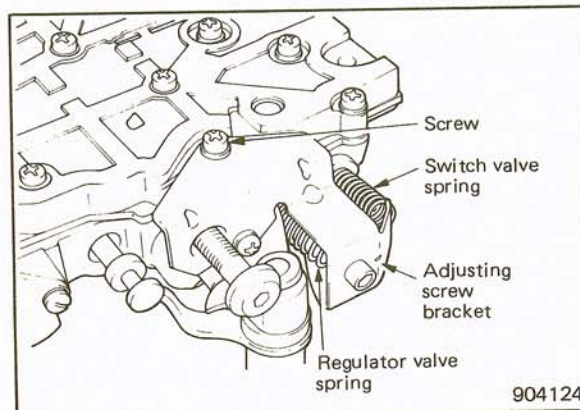




1. Put switch valve, regulator valve and spring in respective bores.

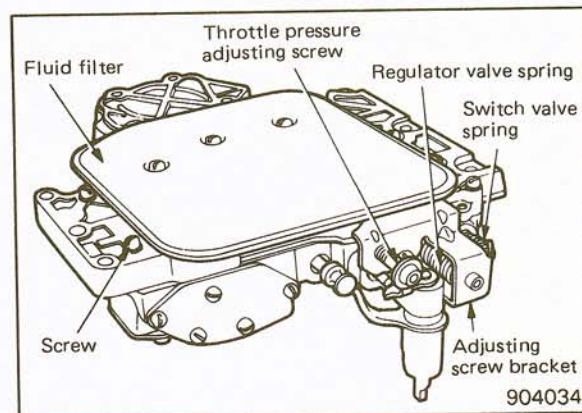


22. Set adjustment screw bracket on spring and temporarily tighten one screw (one for mounting to side of valve body). After top and bottom screws have been tightened, tighten side screw.



23. Install oil filter and tighten.

24. After valve body has been serviced and completely assembled, measure throttle and line pressure adjustments. However, if pressures were satisfactory prior to disassembly, use original settings. (904034)



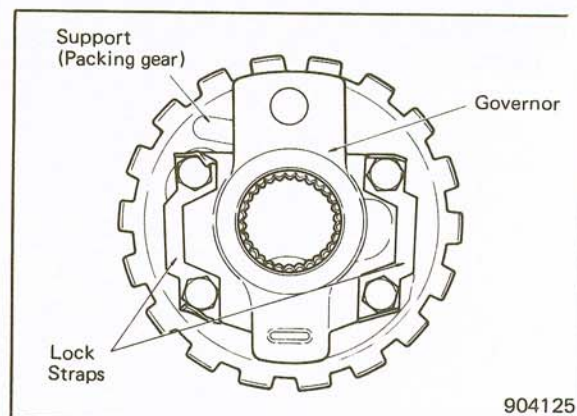




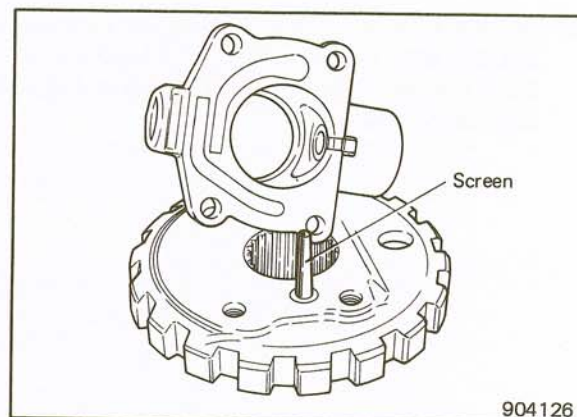
## COMPONENT SERVICE-VALVE BODY

### DISASSEMBLY

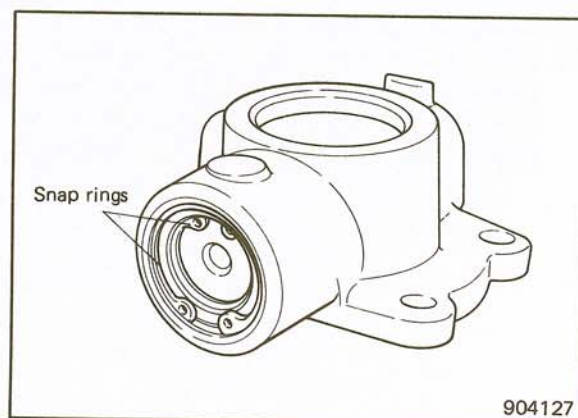
1. Remove four bolts and separate governor and support (parking gear).



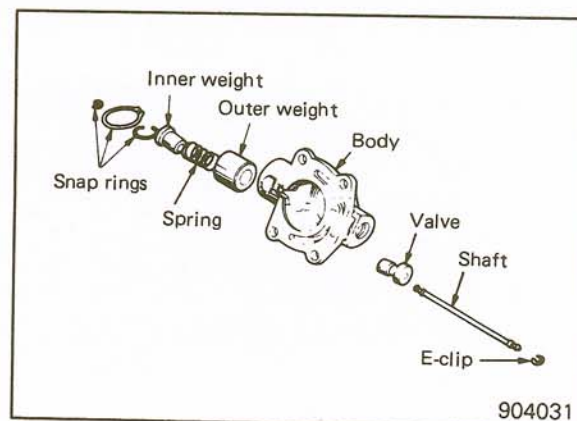
2. Take out governor screen from governor body.



3. Remove two snap rings.



4. Take out governor weight and spring.







## INSPECTION

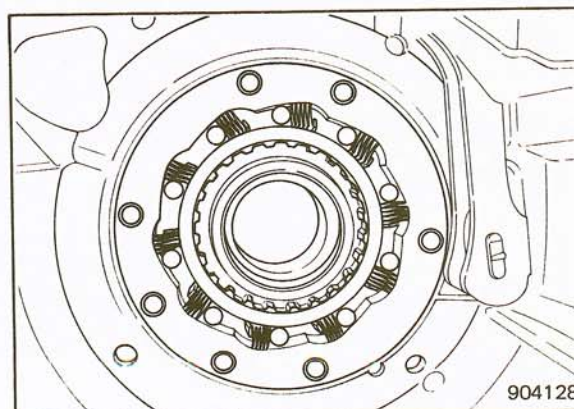
1. Check all parts for burrs and wear.
2. Check inner weight for free movement in outer weight, and outer weight for free movement in governor body.
3. Check valve for free movement in governor body.
4. Weights and valve should fall freely in bores when clean and dry.
5. Rough surfaces may be removed with crocus cloth.
6. Wash governor screen.
7. Check governor weight spring for distortion.
8. Thoroughly clean all governor parts in clean solvent, dry with compressed air and test for free movement before assembly.
9. Check lugs on parking gear for broken edges or other damage.

## REASSEMBLY

1. Assemble governor body and filter to the support and tighten bolts finger tight. Make sure oil passage of governor body aligns with passage in the support.
2. Assemble inner weight and spring to outer weight, and secure with snap ring. Place weight assembly in governor body and install snap ring.

## INSPECTION

Inspect clutch rollers for smooth round surfaces, they must be free of flat spots and chipped edges. Inspect roller contacting surfaces in cam and race for brinelling. Inspect roller springs for distortion, wear or other damage.



904128



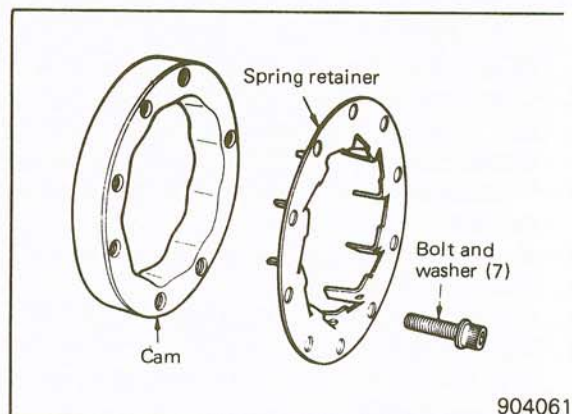


### OVERRUNNING CLUTCH CAM REPLACEMENT

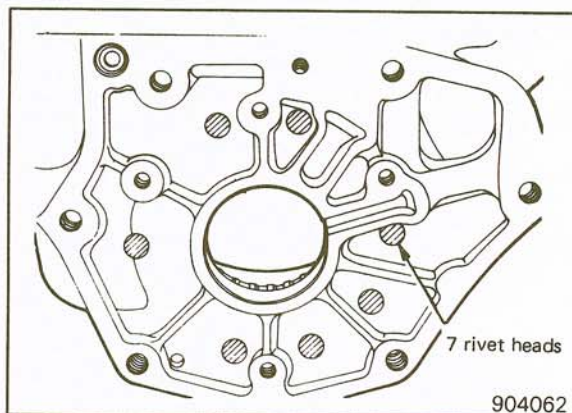
If overrunning clutch cam or spring retainer is found damaged, it can be replaced with a service replacement cam, spring retainer and retaining bolts.

The service parts are retained in the case with bolts instead of rivets. To install, proceed as follows:

1. Remove four bolts securing output shaft support to rear of transmission case. Tap support rearward out of the case with a soft faced hammer.

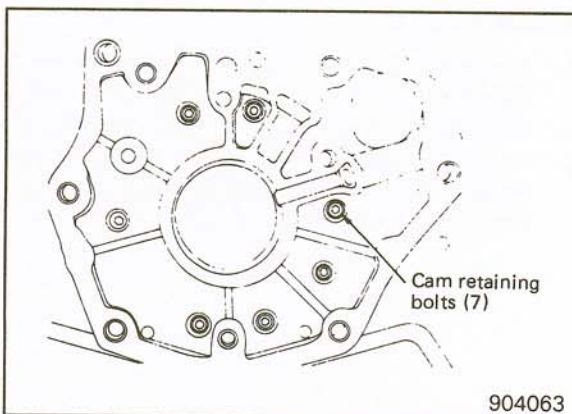


2. Center punch rivets exactly in center of each rivet head. (904062)
3. Drill through each rivet head with a 9.5 mm (.4 in.) drill. Be careful not to drill into transmission case. Chip off rivet heads with a small chisel and drive rivets and cam from the case with a blunt punch of proper size. (904062)
4. Carefully enlarge rivet holes in the case with a 6.7 mm (17/64 in.) drill. Remove all chips and foreign matter from the case, and make sure cam area is free of chips and burrs. (904062)



5. To install, position cam and roller spring retainer in the case. Align cam bolt holes with holes in the case, then thread all seven retaining bolts and washer assemblies into cam a few turns. (904063)
6. Tap cam firmly into the case if necessary. Draw retaining bolts down evenly, then tighten to specified torque.

Tightening torque . . . . . 12 Nm (9ft.lbs.)

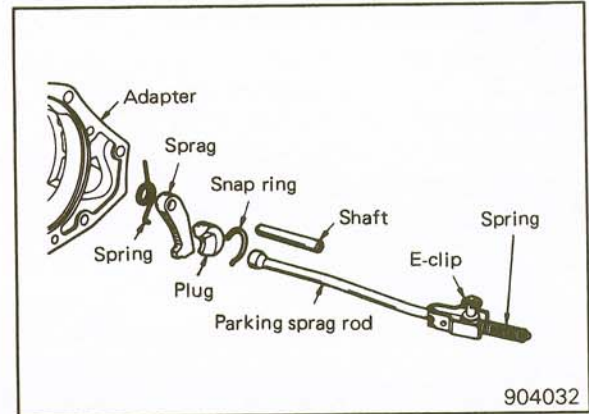






## DISASSEMBLY

1. Slide shaft out of adapter to remove parking sprag and spring. (904032)
2. Remove snap ring and slide reaction plug assembly out of the housing. (904032)



## INSPECTION

1. Check sprag shaft for scores and free movement in adapter and sprag.
2. Check sprag and sprag rod springs for distortion and tension.
3. Check square lug on sprag for broken edges, also lugs on parking gear for damage.
4. Check cam on end of sprag rod for nicks, burrs and free turning.

## REASSEMBLY

1. Install reaction plug assembly in adapter and secure with snap ring.
2. Position sprag and spring in adapter and insert shaft. Make sure square lug on sprag is toward parking gear, and spring is positioned so it moves sprag away from gear.









# WHEELS AND TIRES

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## SPECIFICATIONS

### GENERAL SPECIFICATIONS

#### Wheels

Tire size	215SR15
Wheel type	Steel type
Wheel size	6JJ x 15
Amount of wheel offset    mm (in.)	22 (.87)

### SERVICE SPECIFICATIONS

#### Service limits

Wheel runout    mm (in.)	
Radial runout	1.2 (.05)
Tire runout    mm (in.)	
Radial runout	3.0 (.12)
Tread depth of tires    mm (in.)	1.6 (.06)
Repair limit	
Wheel dynamic balance    Ncm (in.lbs.)	3.5 (.3)
Tire inflation pressures    kPa (psi)	
For vehicle unladen	
Front	180 (26)
Rear	180 (26)
For vehicle laded	
Front	180 (26)
Rear	240 (34)







### TORQUE SPECIFICATION

Nm (ft.lbs.)

Hub nuts for wheels	100-120 (72-87)
---------------------	-----------------





Symptom	Probable cause	Remedy
Unevenly worn tires Center of tread worn 	Over-inflation	Adjust the tire pressure
Both sides of tread worn 	Under-inflation	Adjust the tire pressure
Inside of tread worn 	Insufficient toe-in Insufficient camber	Adjust
Outside of tread worn 	Excessive toe-in Excessive camber	Adjust
Feathering 	Excessive toe-in	Adjust
Cupping 	Unbalanced wheels	Adjust
	Loose wheel bearings	Inspect for looseness and adjust the preload
	Loose ball joints	Inspect, and repair as necessary
	Malfunction of shock absorbers	Inspect, and repair as necessary
Road noise, body vibration	Over-inflation or under-inflation	Adjust the tire pressure
	Unbalanced wheels	Adjust
	Wheel runout	Replace the wheel(s)
	Abnormally worn tires	Replace the tires
	Unbalanced propeller shaft	Adjust or replace





## SERVICE ADJUSTMENT PROCEDURES

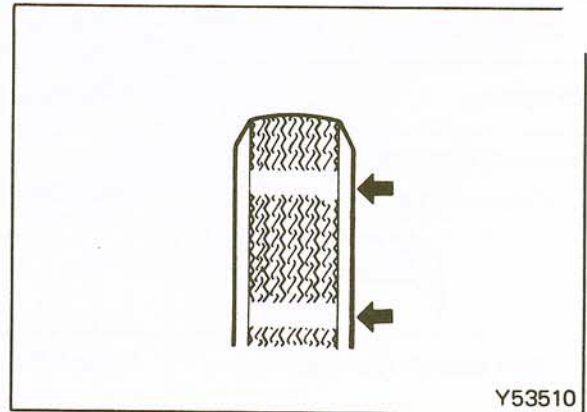
### CHECKING OF TIRE WEAR

Measure the tread depth. If the remaining tread depth is less than the service limit, replace the tire.

Tread depth [Service limit] . . . . . 1.6 mm (.06 in.)

#### NOTE

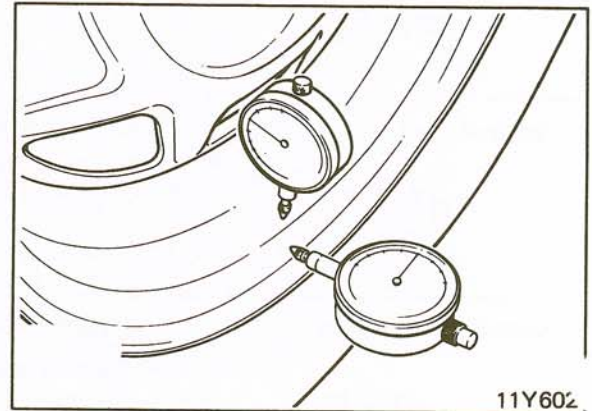
When the tread depth of tires is reduced to 1.6 mm (.06 in.) or less, wear indicators will appear.



### CHECKING OF WHEEL RUNOUT

1. Jack up the vehicle and support with floor stands.
2. Measure wheel runout with a dial indicator. If the runout exceeds the service limit, replace the wheel.

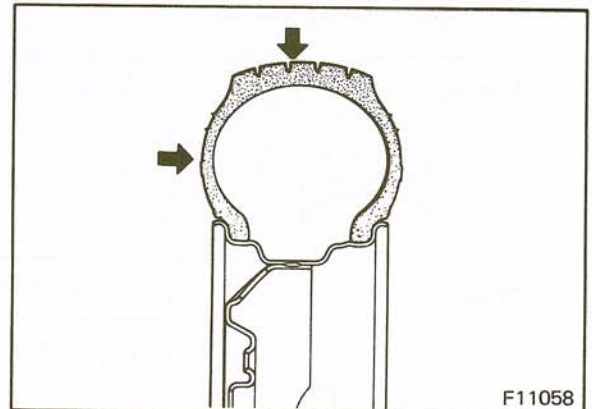
Wheel runout [Service limit] . . . . .  
Radial 1.2 mm (.05 in.)



### CHECKING OF TIRE RUNOUT

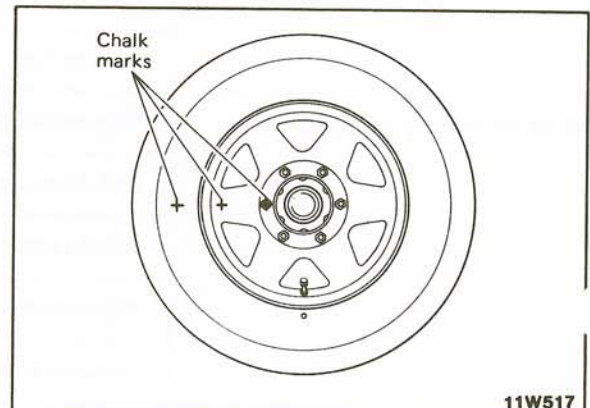
Measure the radial.

Tire runout [Service limit] . . . . .  
Radial 3.0 mm (.1 in.)



### Simple Method to Reduce Runout

1. Measure runout and make chalk marks on tire sidewall, wheel and nearest stud at point of maximum runout before removing the tire from the wheel.
2. Remove the tire from the wheel and remount the wheel on the drum or hub in the former position.
3. Check the radial and lateral wheel runout. They should not exceed the service limits.
4. If the point of greatest wheel runout is near the original chalk mark, remount the tire, so that the chalk mark is 180 degrees from the original mark. Recheck tire runout.



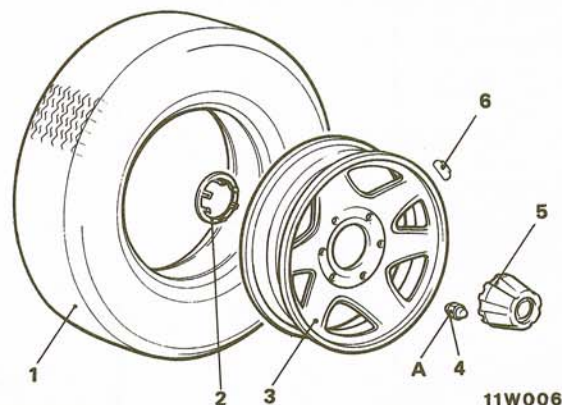




## COMPONENTS

1. Tire
2. Holder
3. Wheel
4. Hub nut
5. Center cap
6. Balance weight

	Nm	ft.lbs.
A	100-120	72-87



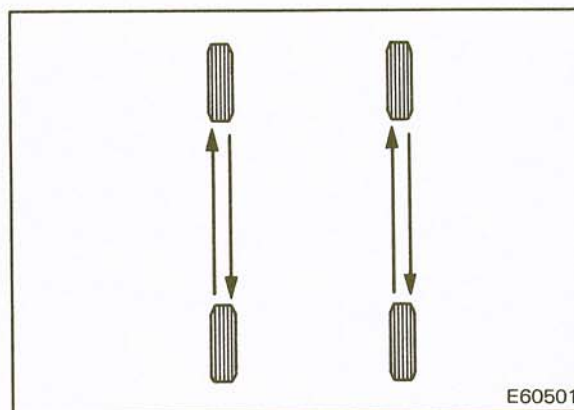
## TIRE ROTATION

1. Rotate the tires in the pattern illustrated. (E60501)
2. Hand tighten the hub nuts, and then use a torque wrench to tighten them to specification.

Tightening torque . . . . . 70-80 Nm (50-57 ft.lbs.)

## NOTE

Do not use an impact wrench or apply oil to the wheel studs.

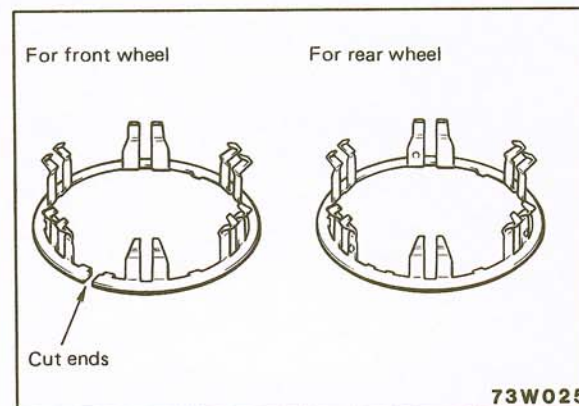


## CENTER CAP

### Installation

## NOTE

The metal fittings which attach the center caps, are different on the front wheels from those on the rear.

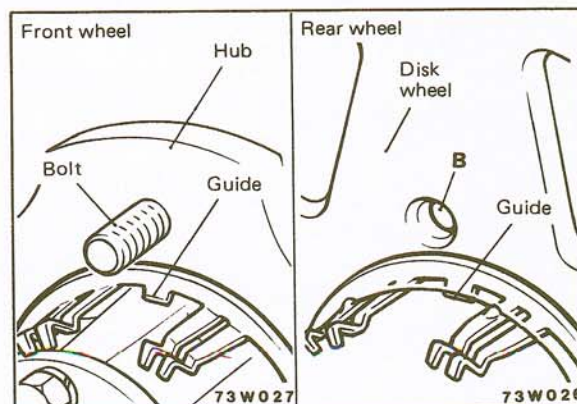


### Attaching Center Cap Metal Fittings to Front Wheels

Align any of the guides (three projections) inside the fitting with a bolt position, and then mount the fitting on the hub, being careful that the cut ends are not opened. (73W027)

### Attaching Center Cap Metal Fittings to Rear Wheels

Align any of the guides (three projections) inside the fitting with the position of the wheel mounting hole (B) and mount the fitting to the wheel from the inside. (73W026)











# BODY AND SHEET METAL

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## SPECIFICATIONS

### GENERAL SPECIFICATIONS

#### Front doors

Construction

Front-hinged, sash construction

Regulator system

X-arm type

Locking system

Pin-fork type

#### Glass installation method

Windshield glass

Weatherstrip type

Quarter window glass (metal-top vehicle)

Weatherstrip type

Back door window glass (metal-top vehicle)

Weatherstrip type

#### Glass thickness

Windshield glass mm (in.)

5.7 (.22)

Quarter window glass (metal-top vehicle) mm (in.)

4 (.16)

Back door window glass (metal-top vehicle) mm (in.)

4 (.16)

Door window glass mm (in.)

4 (.16)

Ventilator window glass mm (in.)

5 (.2)

#### Suspension seats

Suspension mechanism

Coil spring type with shock absorber

Up-and-down movement stroke mm (in.)

80 (3.15)

Body weight adjustment kg (lbs.)

50-100 (110.2-220.5)

Seat height adjustment

3 levels

### TORQUE SPECIFICATIONS

Nm (ft.lbs.)

Body to frame

28-32 (20-23)

Under skid plate to frame

18-25 (13-18)

Under cover to under skid plate

10-13 (7-9)

Hood release cable

3.5-4.0 (2.5-2.9)

Front door hinges to body

30-40 (22-29)

Back door hinges to body

30-40 (22-29)

Spare tire carrier to back door

8-10 (5.8-7.0)

Seat anchor bolts

Head marked 8

10-14 (7-10)

Head marked 10

32-49 (23-35)

Suspension seats

Shock absorber attaching bolts

7-10 (5-7)

Link attaching bolts

27-36 (20-26)

Rear seat back stopper

20-30 (14-22)

Seat belt tightening bolts

23-65 (17-47)



## SPECIFICATIONS / SPECIAL TOOL




### LUBRICANTS

	Recommended lubricant	Quantity
Sliding portion of seat adjuster	Multipurpose grease SAE J310a, NLGI grade #2EP	As required

### ADHESIVE

	Specified adhesive	Quantity
Windshield weatherstrip and windshield	3M Super Weatherstrip Adhesive 8001 or equivalent	As required
Windshield weatherstrip and body flange	3M Super Weatherstrip Adhesive 8001 or equivalent	As required
Back door window weatherstrip and back door window glass	3M Super Weatherstrip Adhesive 8001 or equivalent	As required

### SPECIAL TOOL

Tool (Number and name)	Use
MB990784 "D" Ornament remover  	Removal of trims

"D" see page 2 for instructions.





## TROUBLESHOOTING

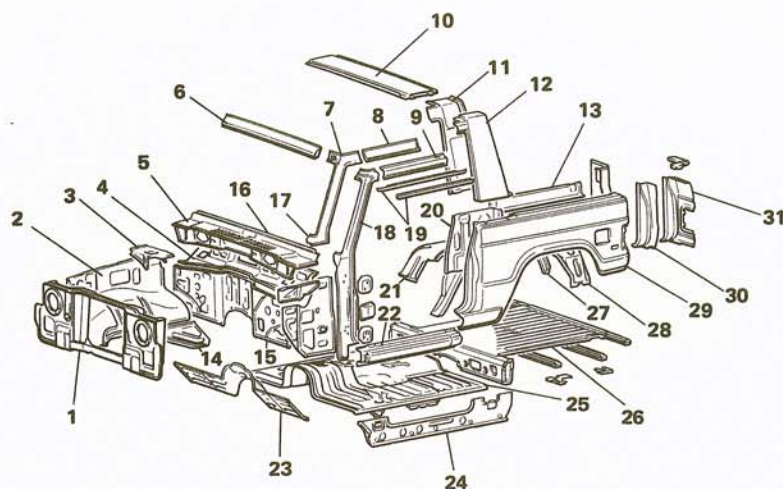
Symptom	Probable cause	Remedy
<b>HOOD</b>		
Floating	Incorrect hood lock height	Adjust
Stiff lock operation	Incorrect hook-to-lock alignment	Adjust
Uneven height	Incorrect hood bumper height	Adjust
Uneven clearance	Incorrectly installed hood	Adjust
<b>DOORS</b>		
Stiff opening and closing	Improperly adjusted latch and striker	Adjust
Level difference	Improperly installed door	Adjust
Uneven clearance	Improperly installed door	Adjust
<b>WATER LEAKS</b>		
Leaking in from bulkhead holes	Sealant improperly applied to grommets in bulkhead	Apply sealant
Leaking in from door glass	Poor contact of door glass	Adjust
	Gap at top of glass	Adjust
Leaking in from door edges	Deformed or damaged weatherstrip	Replace
Leaking in from center of door	Clogged drainage hole	Clean hole
	Insufficiently bonded or damaged waterproof film	Replace
<b>DUST</b>		
Entering from floor	Cracked or improperly filled sealant at floor joints	Apply sealant





## COMPONENTS

Canvas-top vehicle



- |                               |                                  |
|-------------------------------|----------------------------------|
| 1. Headlamp support           | 17. Front pillar, inner, lower   |
| 2. Front fender shield        | 18. Front pillar, outer          |
| 3. Battery tray               | 19. Drip channel                 |
| 4. Cowl top inner panel       | 20. Center pillar, inner, lower  |
| 5. Cowl top outer panel       | 21. Rear wheel house inner panel |
| 6. Front roof rail            | 22. Side sill, outer             |
| 7. Front pillar, inner, upper | 23. Dash panel, lower            |
| 8. Side roof panel, inner     | 24. Side sill, inner             |
| 9. Side roof panel, outer     | 25. Front floor pan              |
| 10. Center roof rail          | 26. Rear floor pan               |
| 11. Center pillar, inner      | 27. Rear wheel house outer panel |
| 12. Center pillar, outer      | 28. Side panel, inner, lower     |
| 13. Side rail, upper          | 29. Side panel, outer            |
| 14. Fender shield extension   | 30. Rear end panel reinforcement |
| 15. Dash panel, upper         | 31. Rear end panel, outer        |
| 16. Cowl top extension        |                                  |

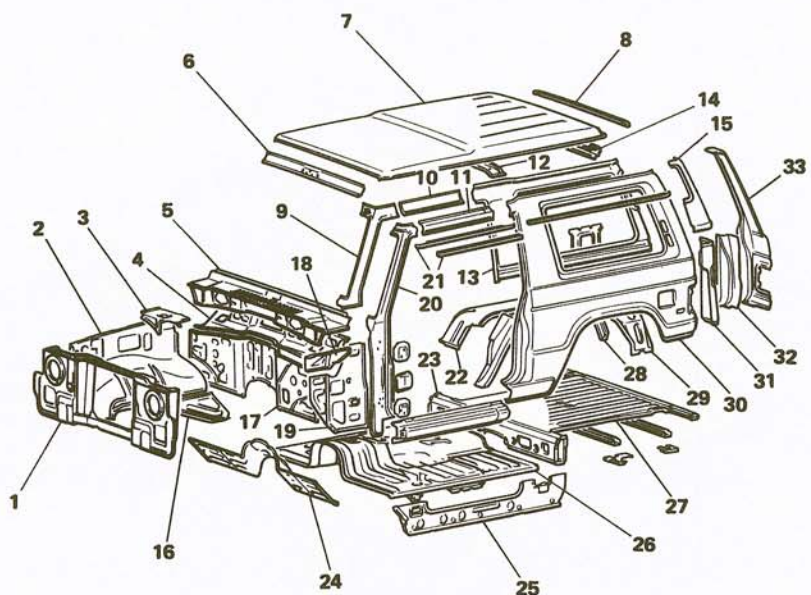
18W631





## COMPONENT SERVICE-BODY PANELING

### Metal-top vehicle



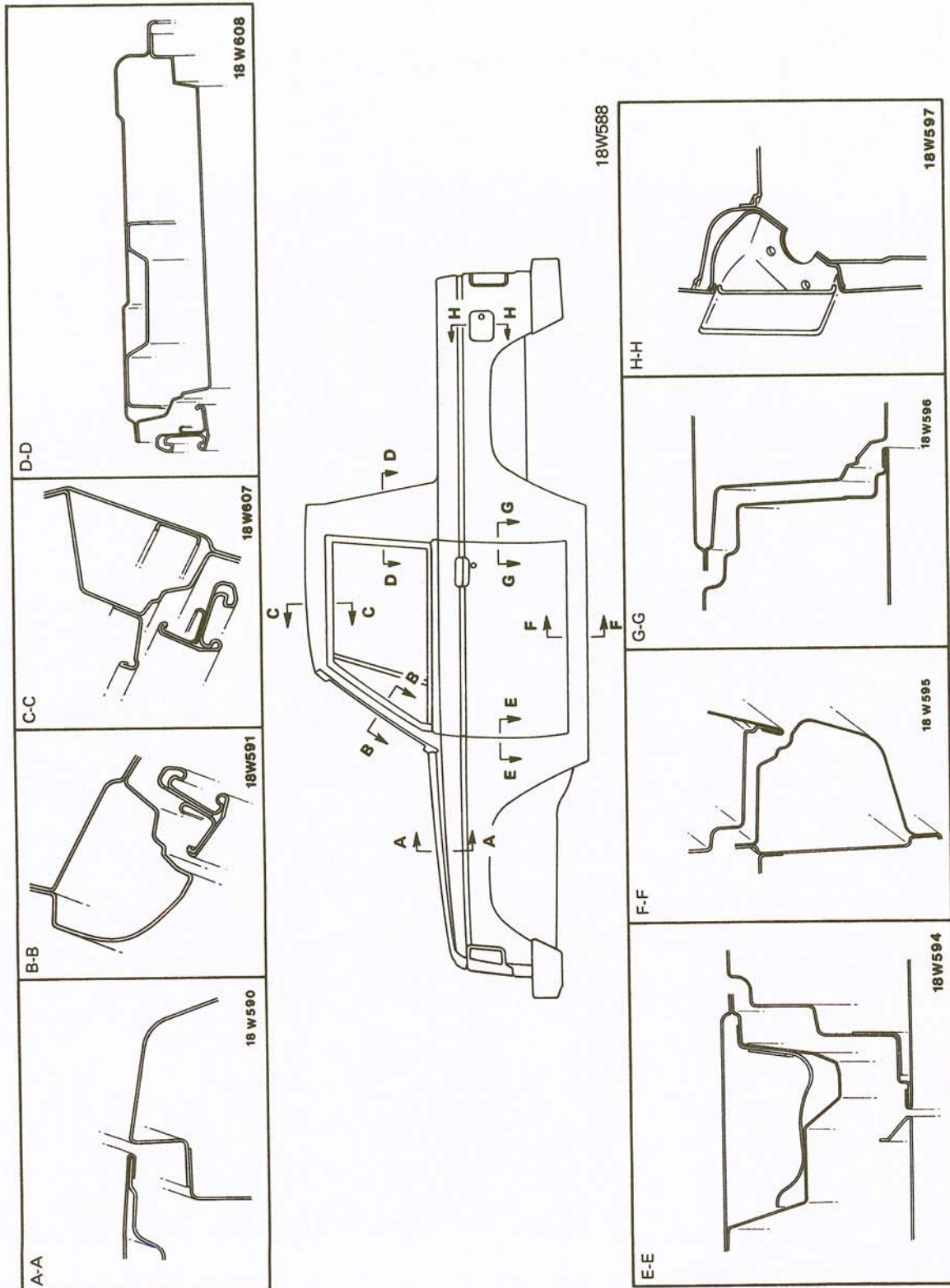
- |                                  |                                  |
|----------------------------------|----------------------------------|
| 1. Headlight support             | 18. Cowl top extension           |
| 2. Front fender shield           | 19. Front pillar, inner, lower   |
| 3. Battery tray                  | 20. Front pillar, outer          |
| 4. Cowl top inner panel          | 21. Drip channel                 |
| 5. Cowl top outer panel          | 22. Rear wheelhouse inner panel  |
| 6. Front roof rail, inner        | 23. Side sill, outer             |
| 7. Roof panel                    | 24. Dash panel, lower            |
| 8. Rear drip channel             | 25. Side sill, inner             |
| 9. Front pillar, inner, upper    | 26. Front floor pan              |
| 10. Side roof panel, inner       | 27. Rear floor pan               |
| 11. Side roof panel, outer       | 28. Rear wheelhouse outer panel  |
| 12. Roof bow                     | 29. Side panel, inner, lower     |
| 13. Side panel, inner, upper     | 30. Side panel, outer            |
| 14. Rear roof rail               | 31. Rear end panel, inner, lower |
| 15. Rear end panel, inner, upper | 32. Rear end panel reinforcement |
| 16. Fender shield extension      | 33. Rear end panel, outer        |
| 17. Dash panel, upper            |                                  |

18W630





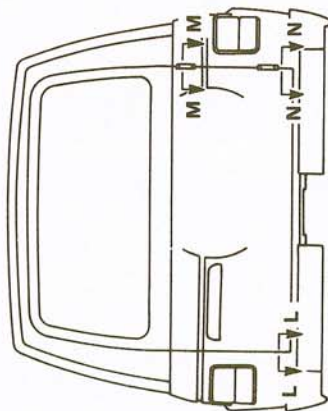
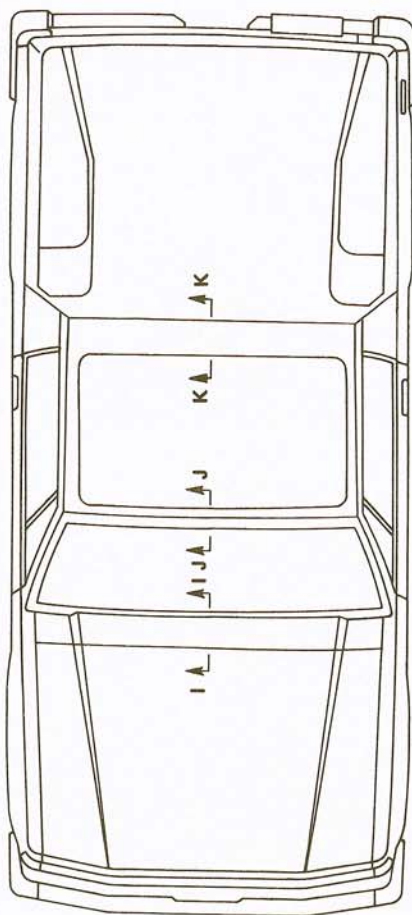
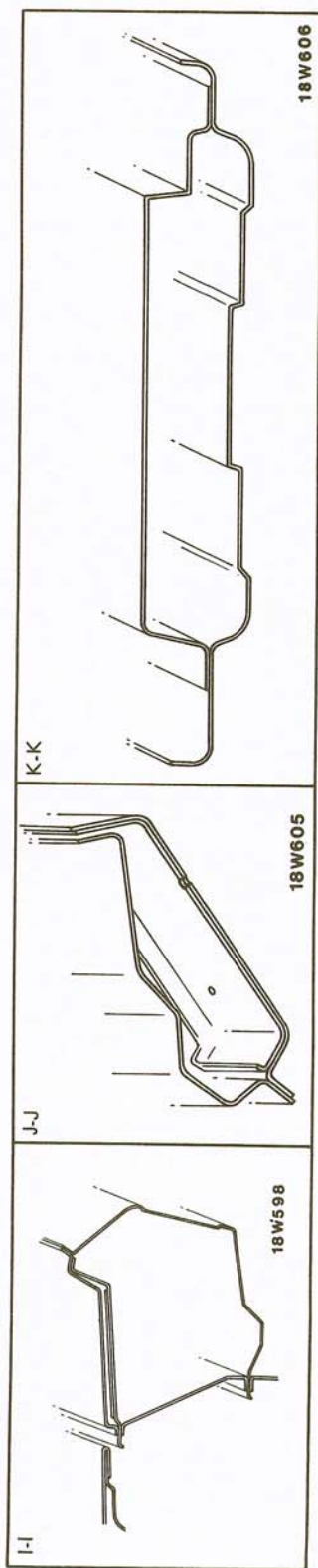
## CROSS SECTIONS OF SHELL-TO-BODY JUNCTIONS



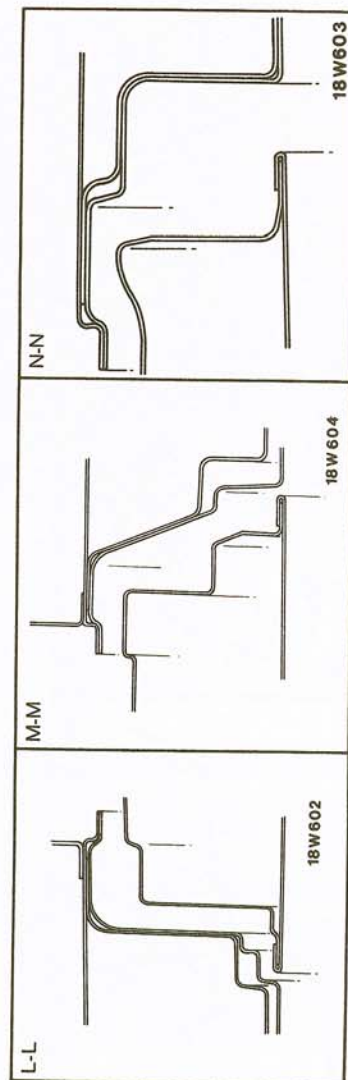




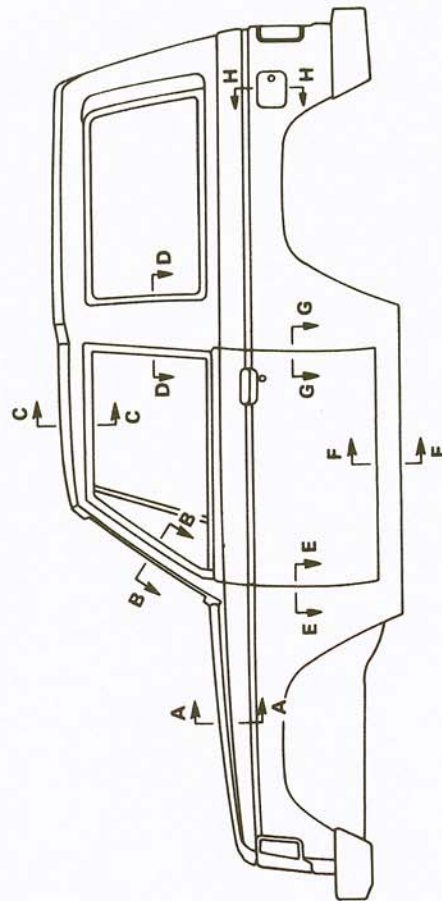
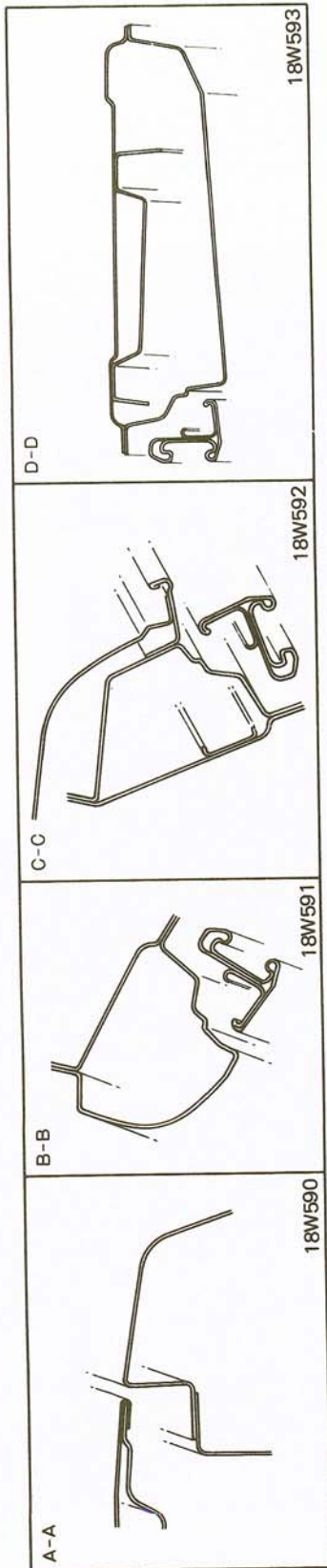
## COMPONENT SERVICE-BODY PANELING



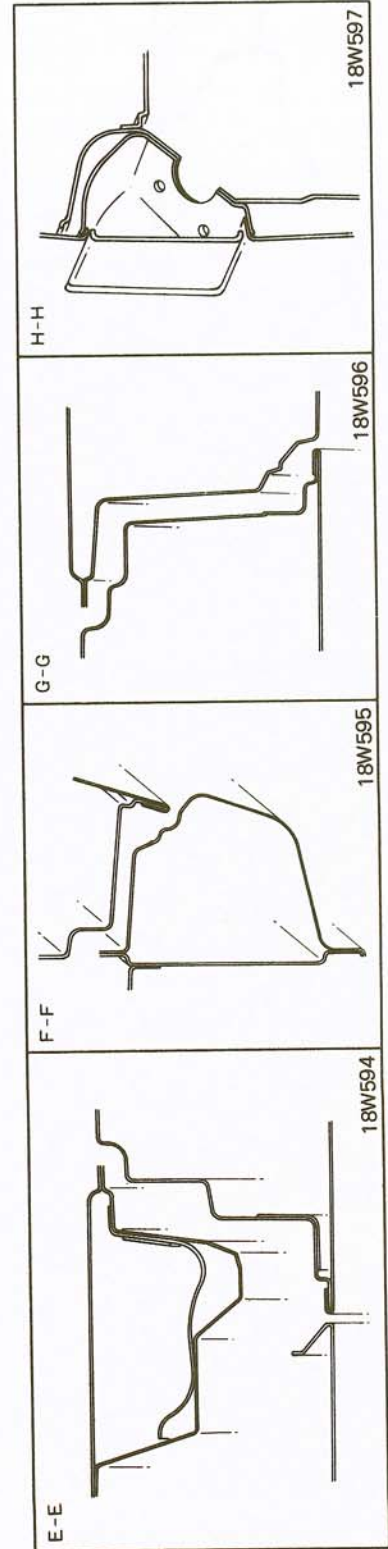
18W588







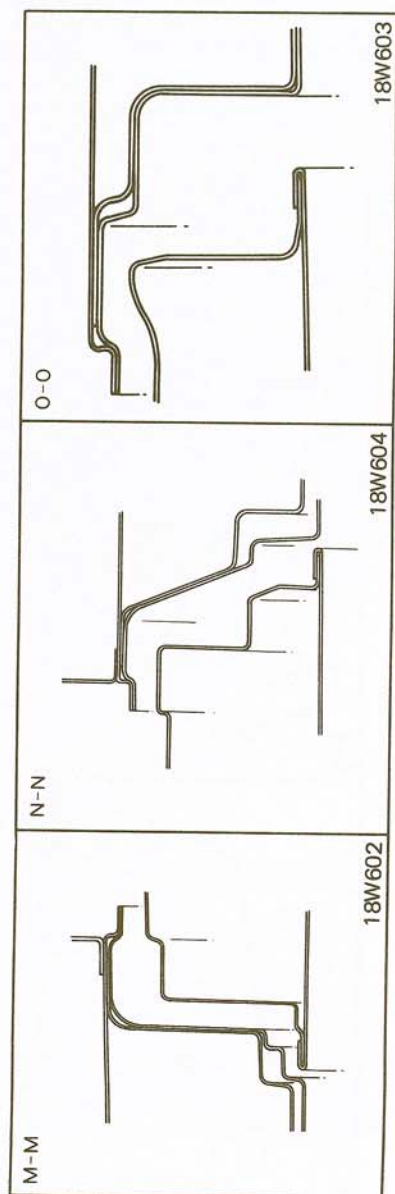
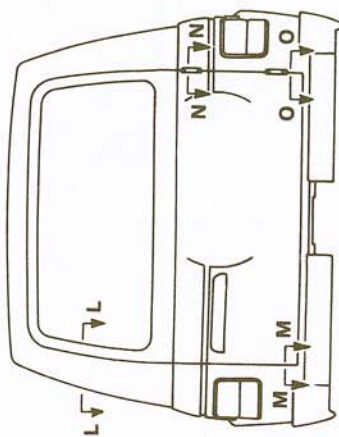
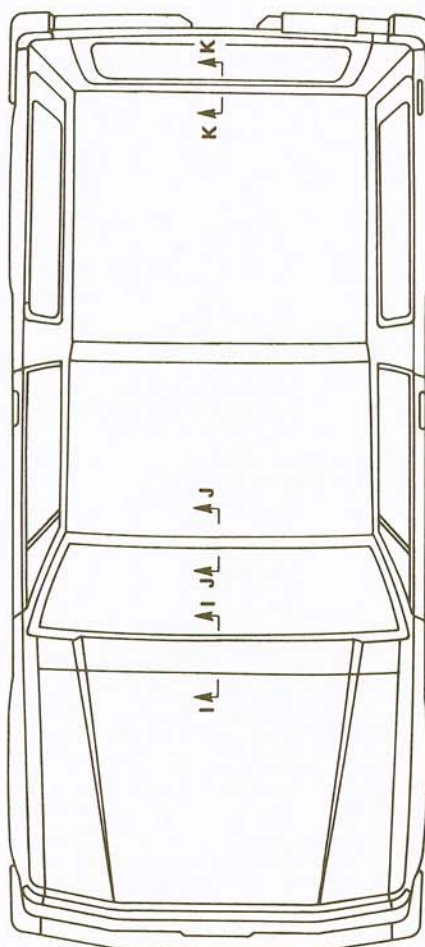
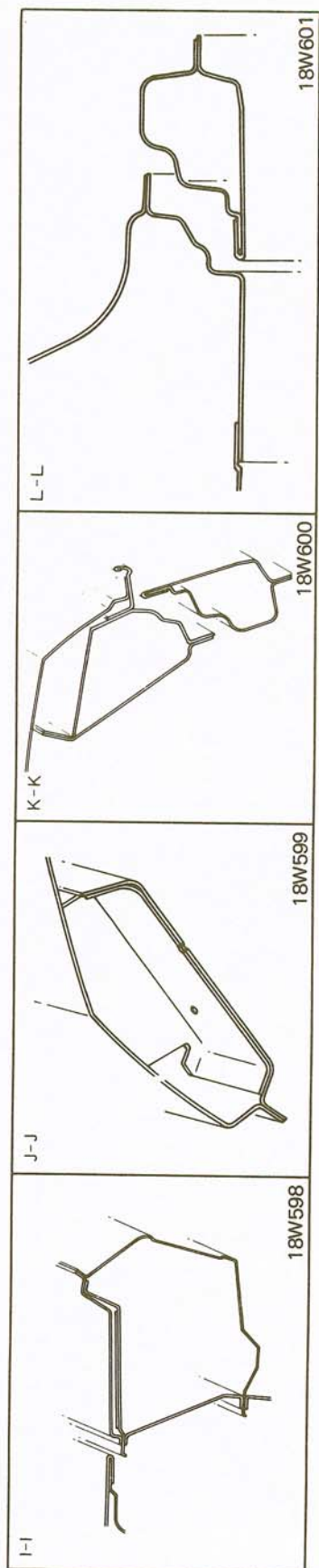
18W589







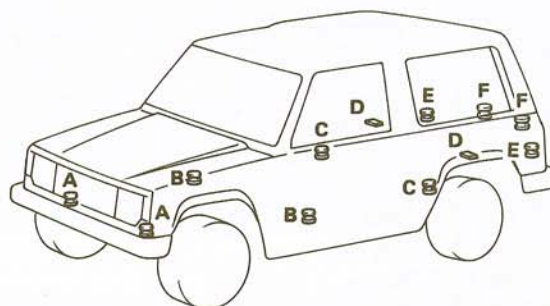
## COMPONENT SERVICE-BODY PANELING







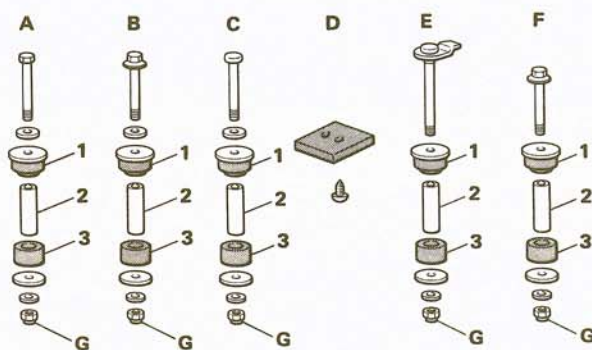
## COMPONENTS



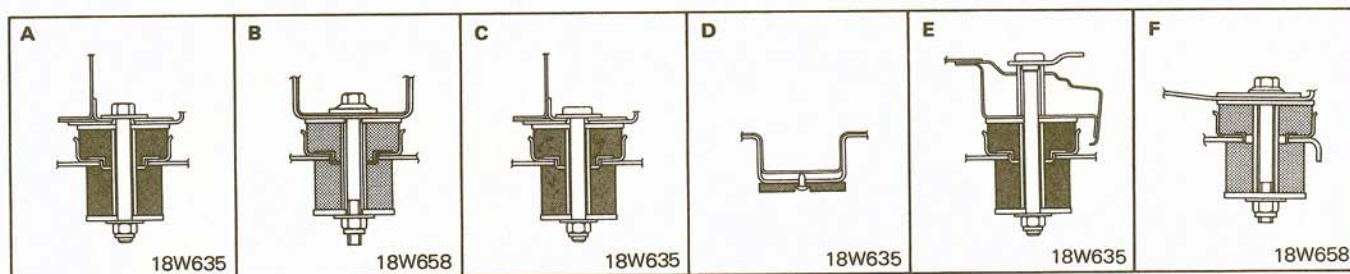
18W663

1. Body mounting rubber A
2. Spacer
3. Body mounting rubber B

	Nm	ft.lbs.
G	28-32	20-23



18W659







### REMOVAL

#### Engine compartment

Remove or disconnect the following parts.

(Refer to GROUP 9.)

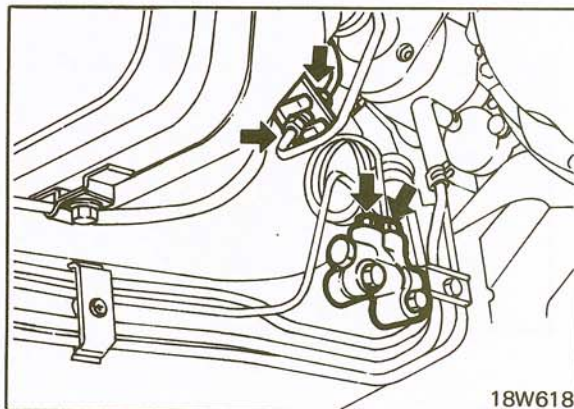
- (1) Air cleaner
- (2) Accelerator cable
- (3) Vapor hose
- (4) Heater hoses
- (5) Brake booster vacuum hose
- (6) Starter motor wiring harness
- (7) Alternator wiring harness
- (8) Engine ground (on body side)
- (9) Fuel cut solenoid valve connector
- (10) E.S.S. solenoid valve connector
- (11) High-tension cable
- (12) Water temperature gauge connector
- (13) Power steering pump
- (14) Oil pressure switch harness
- (15) Radiator assembly

For California (can also be sold in Federal States)

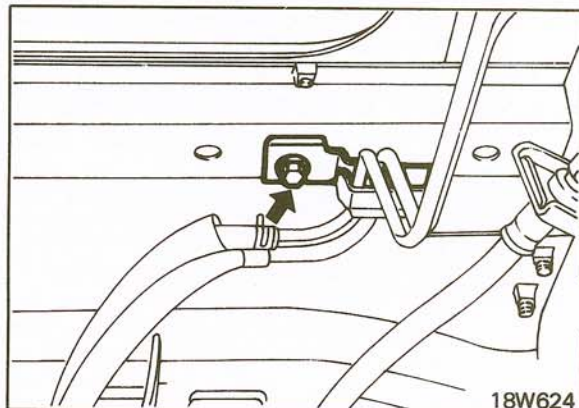
- (16) Oxygen sensor connector
- (17) Carburetor control wiring harness
- (18) Air temperature sensor connector
- (19) Water temperature sensor connector

#### Under body and rear of body

1. Disconnect the hydraulic clutch hoses from the body.
2. Disconnect the brake pipes and BPV (blend proportioning valve). (18W618)
3. Remove the steering shaft from the steering gear box. (Refer to GROUP 19.)



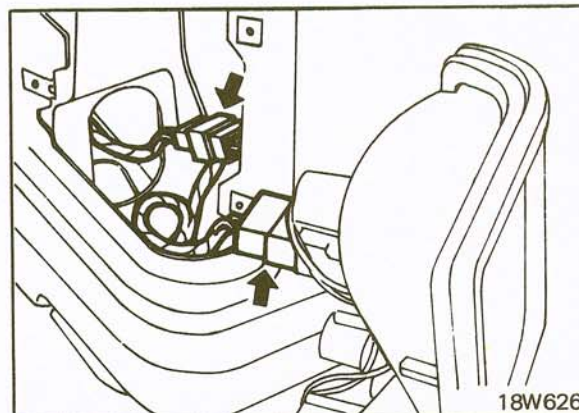
4. Drain the brake fluid and detach the brake pipe from the upper arm post. (Refer to GROUP 2.)
5. Disconnect the speedometer cable from the transmission.
6. Disconnect the backup light switch and 4WD indicator light switch connectors from the transmission.
7. Remove the fuel pipe mounting bolts. (18W624)



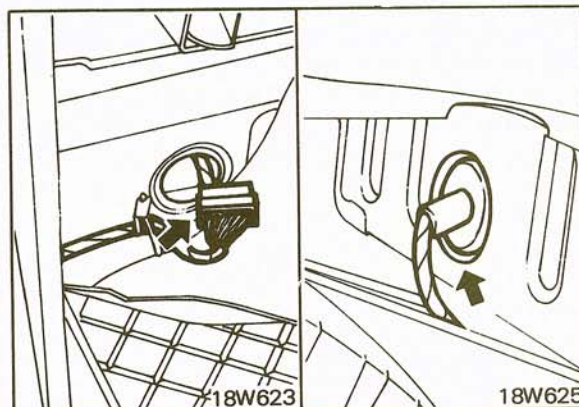




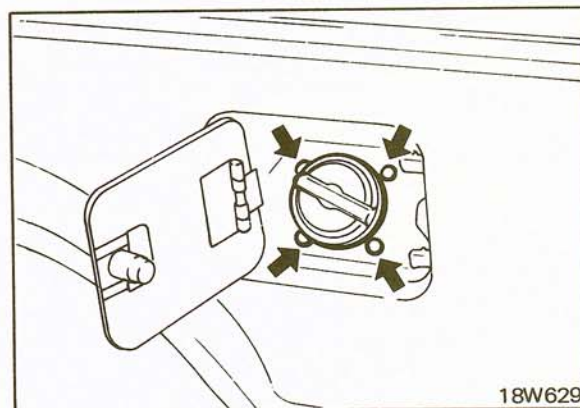
- Remove the mud guards.
- Remove the filler hose protector and disconnect the 2-way valve from the vapor hose located on the back of the protector. (Refer to GROUP 14.)
- 10. Remove the rear combination lights and disconnect the connectors. (18W626)
- 11. Push the grommets out downward.



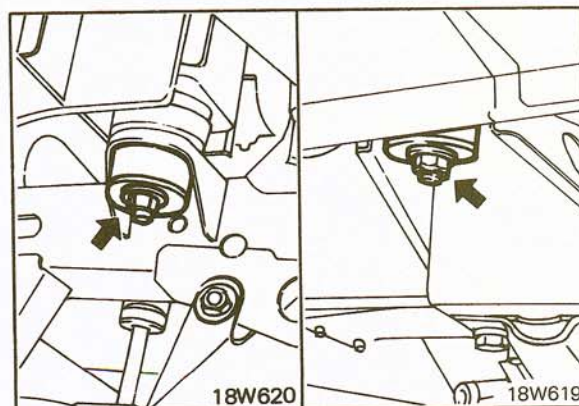
- 12. Disconnect the front harness and frame harness. (18W623)
- 13. Remove the frame harness grommet. (18W625)



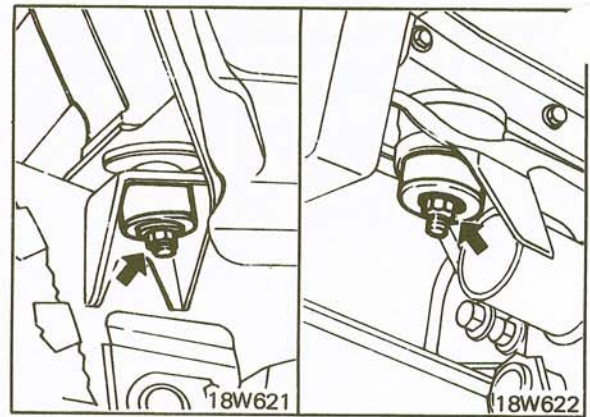
- 14. Remove the filler neck from the body.



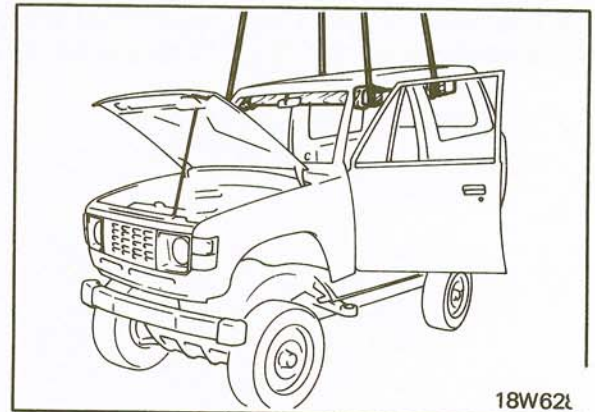
- 15. Remove the transmission gearshift lever and transfer gearshift lever. (Refer to GROUP 21.)
- 16. Disconnect the parking brake cable from the parking brake lever.
- 17. Remove the parking brake cable mounting bolts from the floor. (Refer to GROUP 5.)
- 18. Remove the body mounting bolts. (18W619, 18W620, 18W621, 18W622)







19. Remove the front and rear seats.
20. Remove the washer tank.
21. Insert wood blocks into the body and slowly lift with a crane. (18W628)

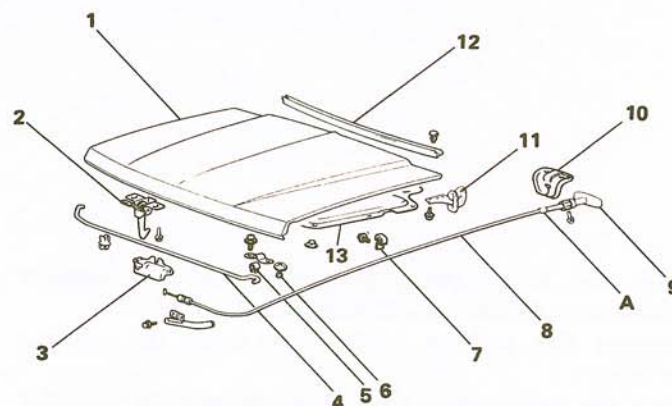


## HOOD

### COMPONENTS

1. Hood panel
2. Hood hook
3. Hood lock
4. Hood support rod
5. Rod bushing
6. Hood bumper
7. Hood damper
8. Hood release cable
9. Hood release knob
10. Release cable bracket
11. Hood hinge
12. Hood rear weatherstrip
13. Hood heat protector (metal-top vehicle)

	Nm	ft.lbs.
A	3.5-4.0	2.5-2.9



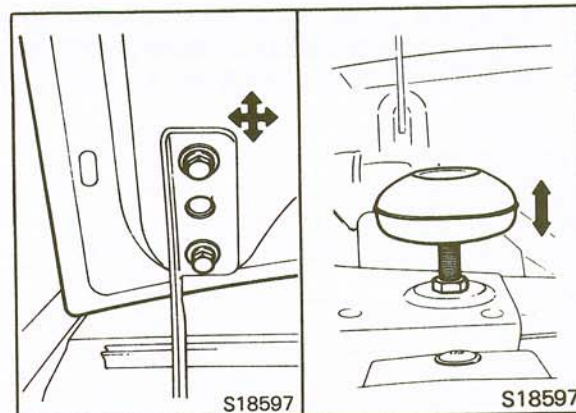




## ADJUSTMENT

### Hood

1. Adjust the longitudinal and lateral positions of the hood by utilizing the oblong holes in the hinges. (S18597)
2. Adjust the vertical position of the hood by adjusting the hood bumpers. (S18597)

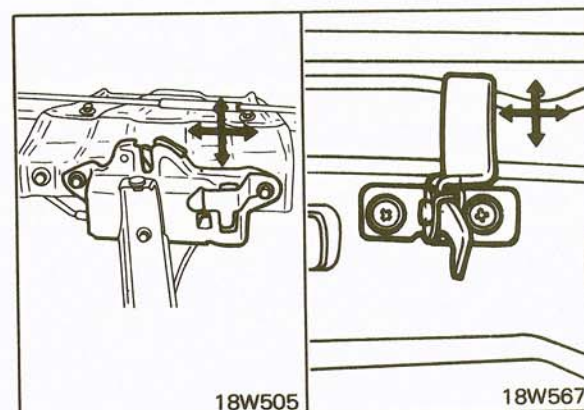


### Hood Lock and Hood Catch

1. Loosen the hood lock and hood catch stay mounting screws.
2. Adjust the position of the hood lock and hood catch so that they are in proper alignment with the hook. (18W505, 18W567)

#### NOTE

Apply chassis grease to the sliding part, the rotating part and the spring of the hood lock.



## HOOD HINGE REPLACEMENT

To replace the hood hinges, use a hood hinge kit and follow these procedures:

1. Remove the hood from the hood hinges.

#### Caution

Protect the front deck with a rag so that the hood protrusions do not damage it.

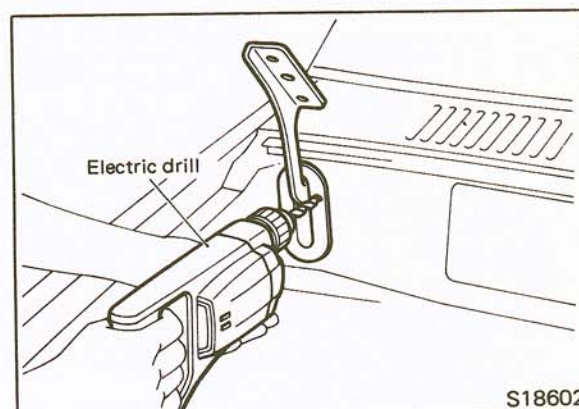
2. Remove the hood hinges. Use an 8 mm (.32 in.) drill to break the spot welds which fasten the hinges to the front deck.

#### Caution

Be careful not to drill holes in the deck panel.

#### NOTE

After removing the hinges, make sure that the hinge mounting surfaces on the front deck are flat and level.

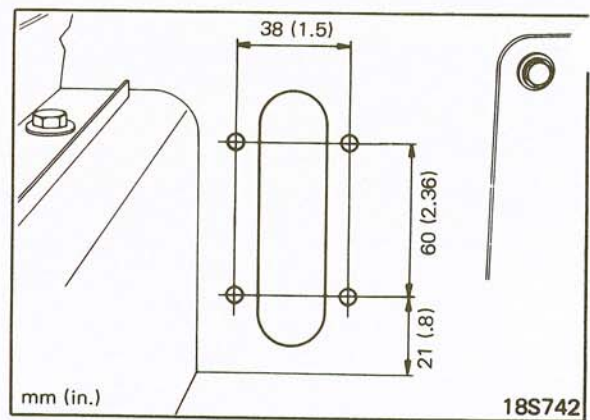






## COMPONENT SERVICE-HOOD/FUEL FILLER DOOR

3. Mark the hinge mounting positions on the front deck with a center punch as illustrated. (18S742)
4. Drill the holes, using an 8 mm (.32 in.) drill.

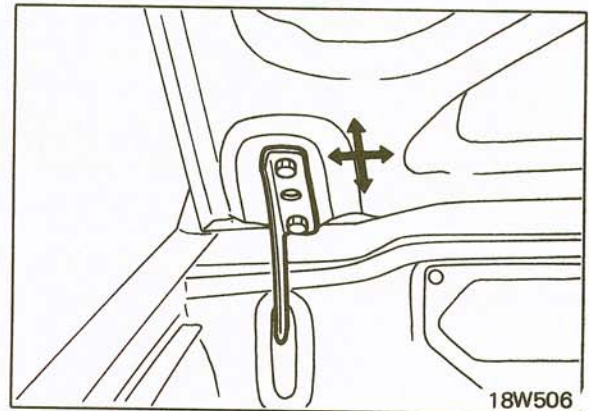


5. Remove the access hole cover and the wiper motor. (Refer to GROUP 8.)  
Insert the brackets from the inside of the front deck, install the hinges, and loosely install the nuts.

### NOTE

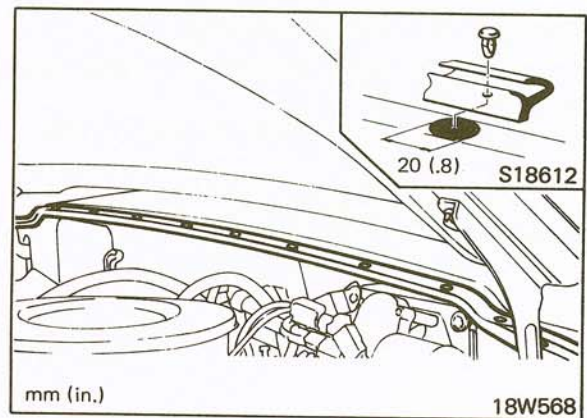
Hinge installation will be facilitated if adhesive, 3M Super Weatherstrip Adhesive 8001 is applied to the surfaces of the brackets in contact with the front deck.

6. Install the hood.
7. Adjust the hood alignment. (18W506)



## HOOD REAR WEATHERSTRIP REPLACEMENT

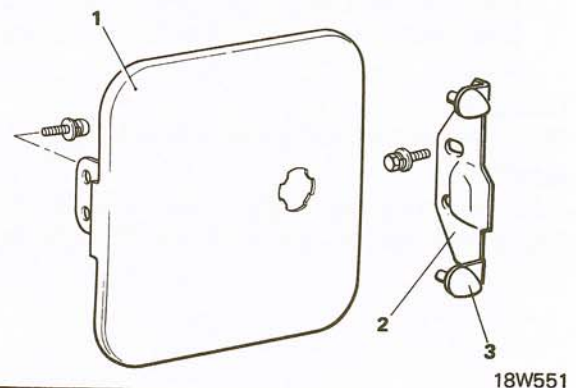
1. Remove the hood rear weatherstrip mounting clips.
2. Remove the hood rear weatherstrip.
3. Apply a drying sealant to and around the two hood rear weatherstrip mounting holes at the right and left ends of the front deck. (18W568)
4. Install the hood rear weatherstrip.



## FUEL FILLER DOOR

### COMPONENTS

1. Fuel filler door panel
2. Fuel filler door hook
3. Damper



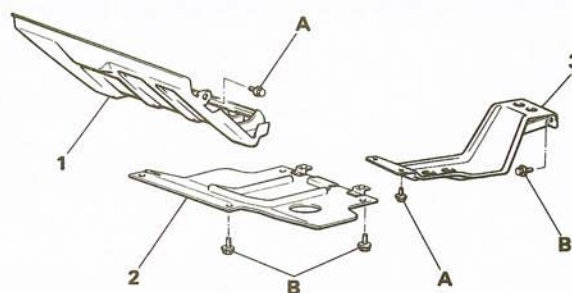




## COMPONENTS

1. Under skid plate
2. Under cover
3. Transfer case protector

	Nm	ft.lbs.
A	18-25	13-18
B	10-13	7-9

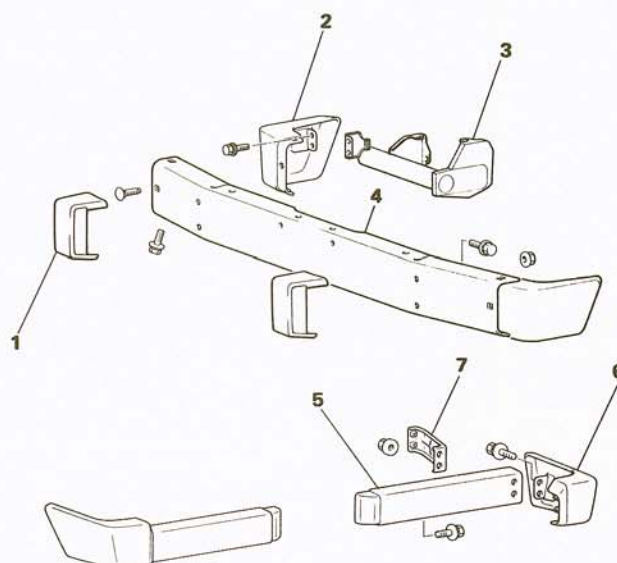


18W654

## BUMPERS

### COMPONENTS

1. Bumper guard
2. Front bumper side
3. Bumper stay assembly
4. Front bumper center
5. Rear bumper center
6. Rear bumper side
7. Rear bumper side support

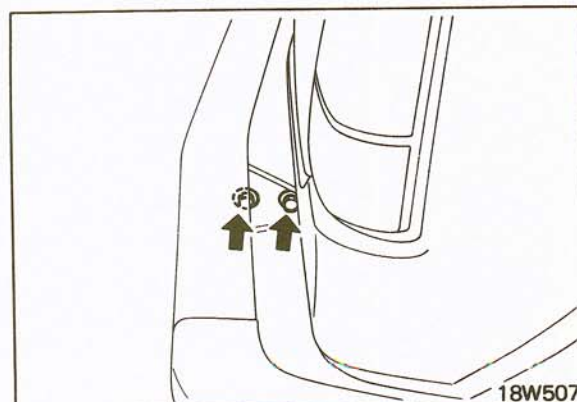


18W662

## REMOVAL

### Front Bumper

Remove the front bumper from the frame.



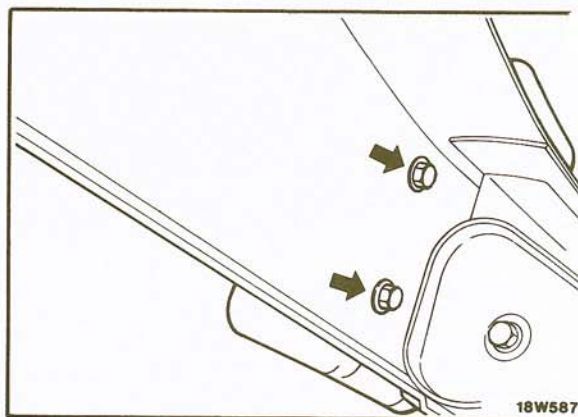
18W507





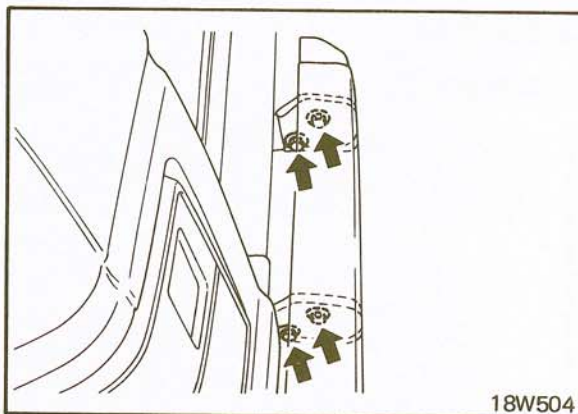
### Bumper Guard

Remove the bumper guard from the center of the front bumper.



### Rear Bumper

Remove the rear bumper from the frame.

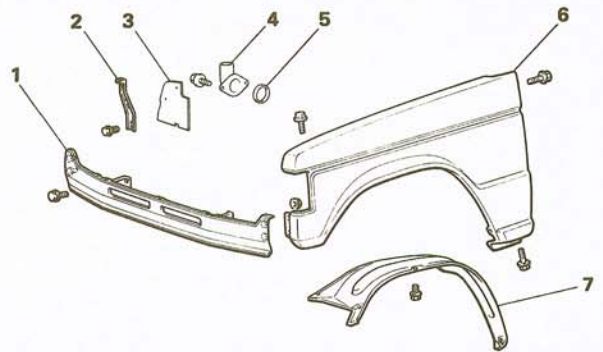






## COMPONENTS

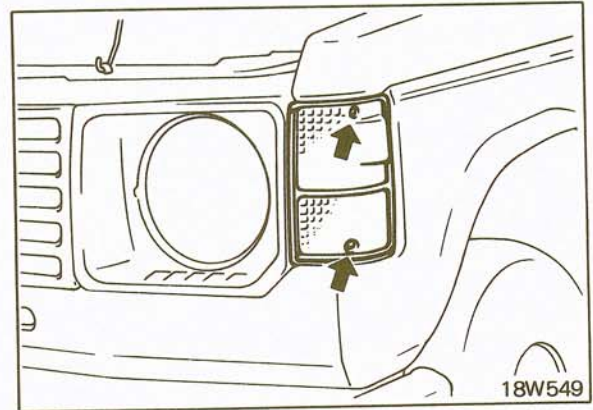
1. Grille filler panel
2. Hood catch stay
3. Waterproof pad
4. Air duct
5. Rubber packing
6. Front fender
7. Splash shield



18W632

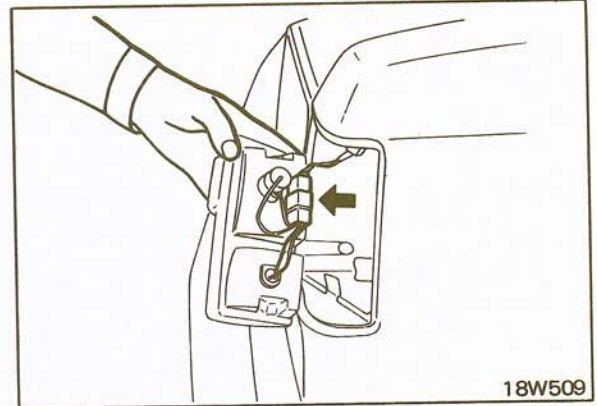
## REMOVAL

1. Remove the front combination light mounting screws.



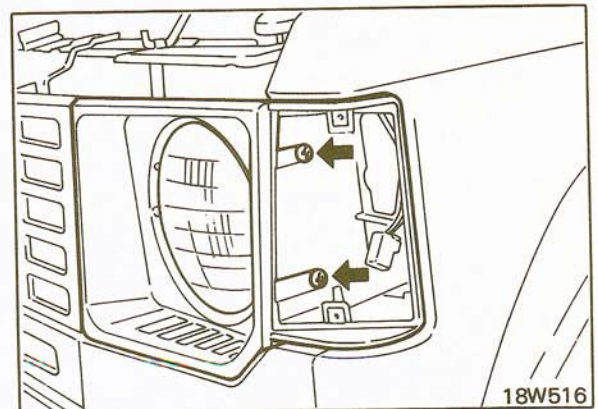
18W549

2. Disconnect the front combination light connector and remove the front combination light.



18W509

3. Remove the headlight bezel.



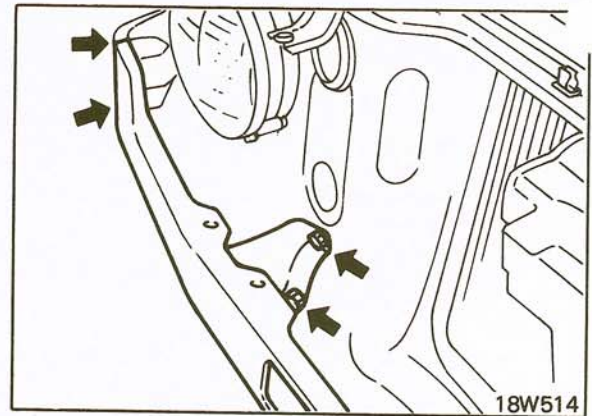
18W516



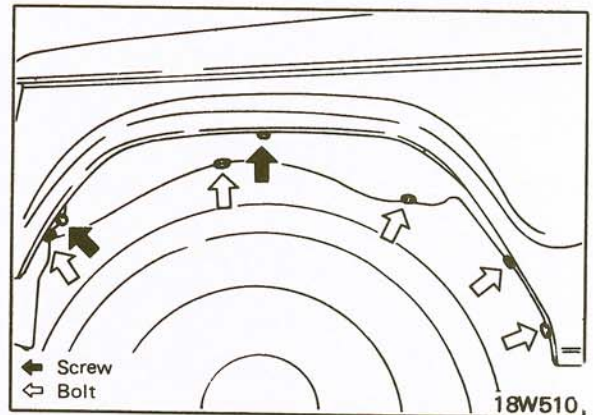


## COMPONENT SERVICE-FENDERS

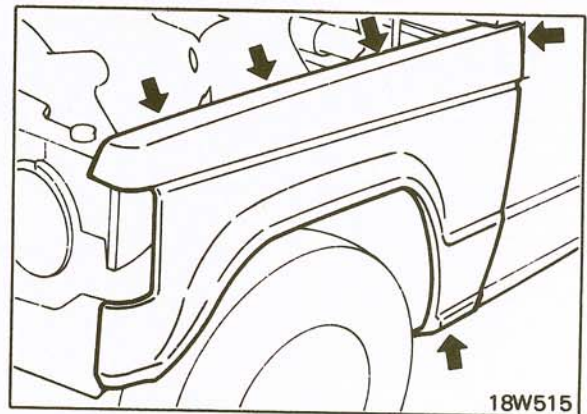
4. Remove the radiator grille. (Refer to p. 23-21.)
5. Remove the grille filler panel. (18W514)



6. Remove the mud guard.
7. Remove the splash shield. (18W510)

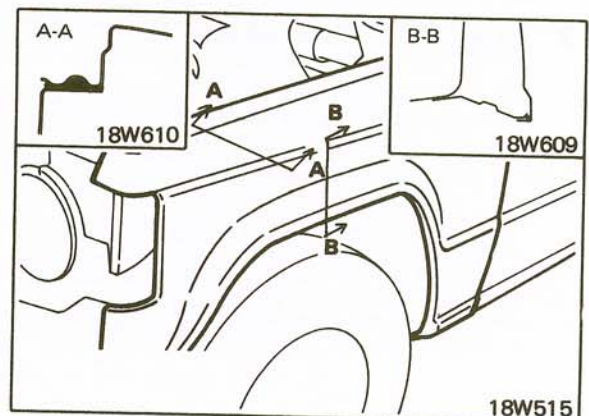


8. Remove the hood damper.
9. Remove the front fender. (18W515)



### INSTALLATION

1. Apply a non-drying sealant to the flange part of the fender when installing the splash shield. (18W515)
2. Apply a non-drying sealant to the entire top part of fender. (18W515)
3. Mount the fender temporarily in position, make sure that clearance is uniform at all points, and then tighten it securely.

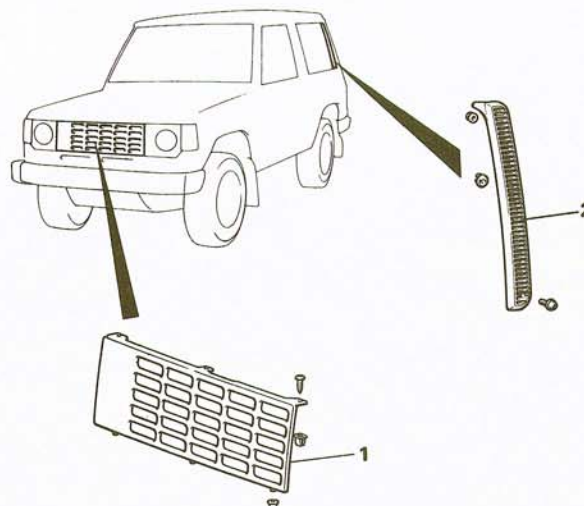






## COMPONENTS

1. Radiator grille
2. Air outlet garnish

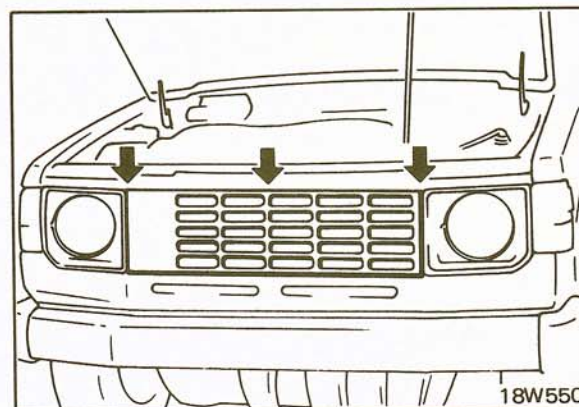


18W577  
18W633

## REMOVAL

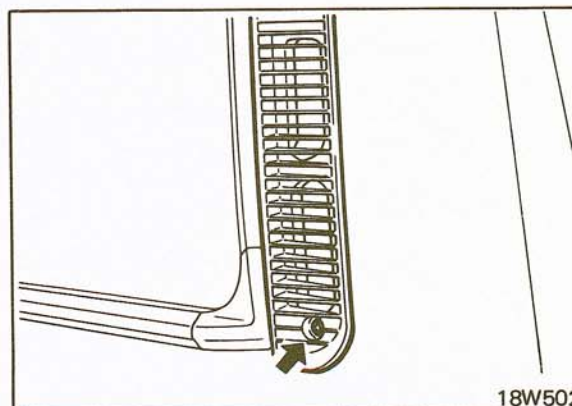
### Radiator Grille

Remove the radiator grille mounting screws, and then remove the radiator grille upward.



### Air Outlet Garnish

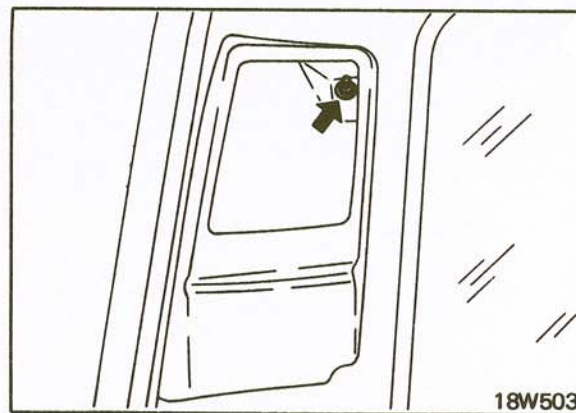
1. Remove the air outlet garnish mounting screws. (18W502)
2. Remove the rear pillar trim. (Refer to p. 23-59.)







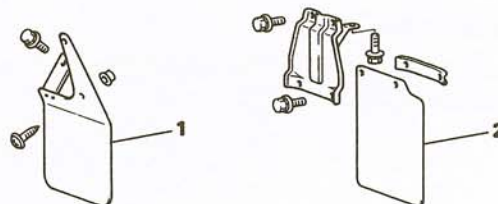
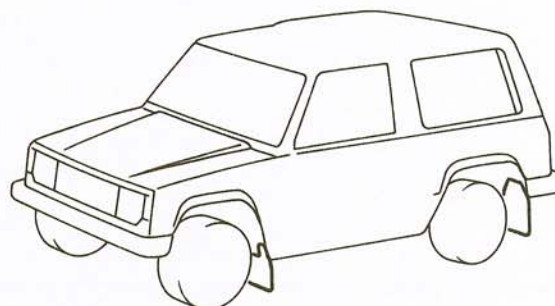
3. Remove the air outlet garnish mounting nuts, and then remove the air outlet garnish.



## MUD GUARD

### COMPONENTS

1. Front mud guard
2. Rear mud guard



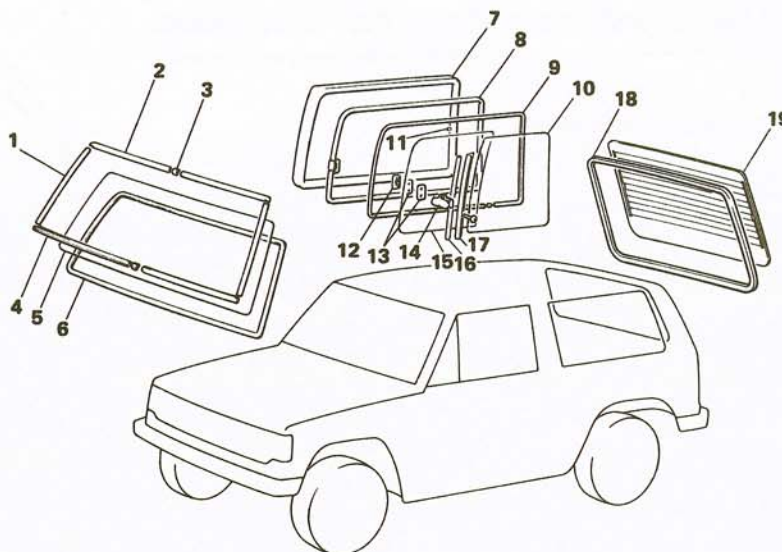
18W664  
18W640





## COMPONENTS

1. Side moulding
2. Upper moulding
3. Moulding joint
4. Lower moulding
5. Windshield glass
6. Windshield weatherstrip
7. Quarter window weatherstrip
8. Quarter window sash
9. Quarter window runchannel
10. Quarter window glass, rear
11. Stopper
12. Connector
13. Packing
14. Side glass lock
15. Quarter window glass, front
16. Holder
17. Rear door window rubber seal
18. Back door window weatherstrip
19. Back door window glass

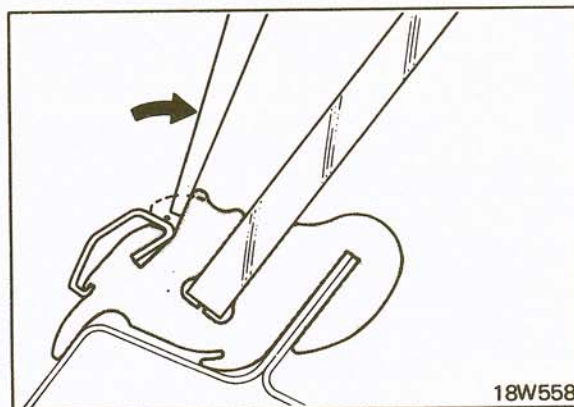


18W636

## WINDSHIELD GLASS

### Removal

1. Remove the wiper arms, dome light and sun visors.
2. Using a screwdriver, push the upper moulding joint to the right or left until the moulding ends appear.
3. Insert the screwdriver between the jointed ends of the moulding and pry them out of the weatherstrip. Then remove the moulding by hand. (18W558)

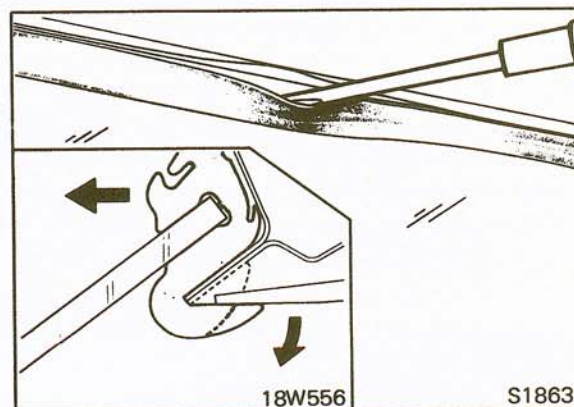


18W558

4. Insert the screwdriver in weatherstrip lip, slide the screwdriver along the lip, and push the windshield glass outward. (18W556, S18631)

### Inspection

Check for deformation of body flange.



18W556

S18631





## COMPONENT SERVICE-WINDOW GLASS

### Installation

1. Coat the weatherstrip with recommended adhesive and fit it onto the windshield glass.

Recommended adhesive .....  
3M Super Weatherstrip Adhesive 8001 or equivalent

#### NOTE

Be sure to use new weatherstrip.

2. Insert a pull cord into the weatherstrip groove.

#### NOTE

Make certain that the cords overlap each other at both ends.

3. Apply soapy water to the entire periphery of the body flange.
4. Place the glass in position from outside with the cords placed inside the passenger compartment.

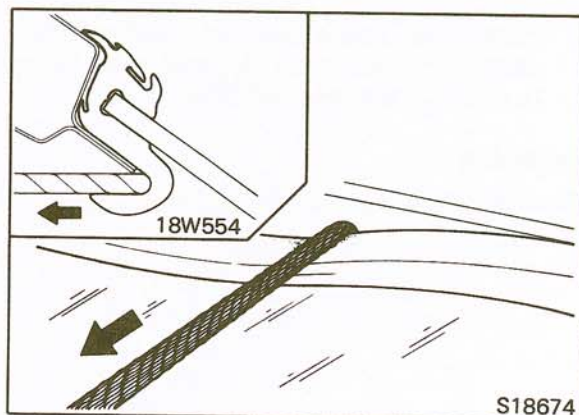
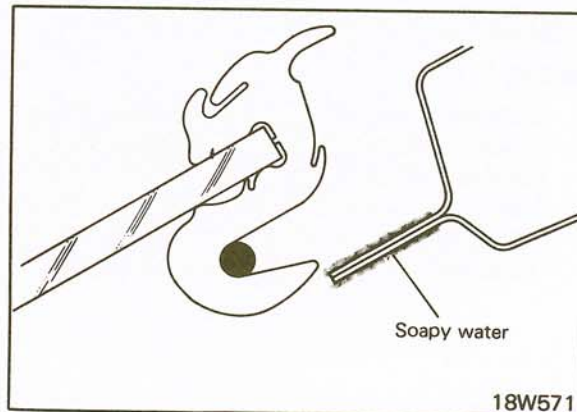
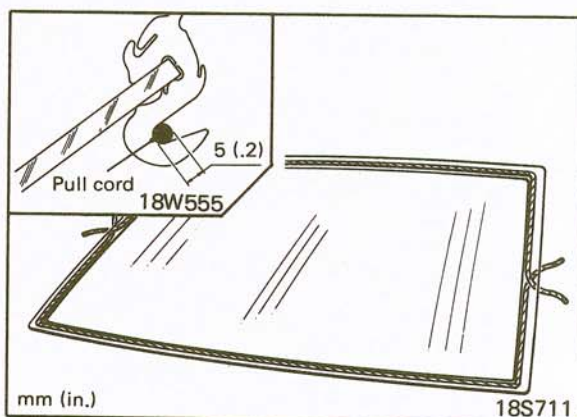
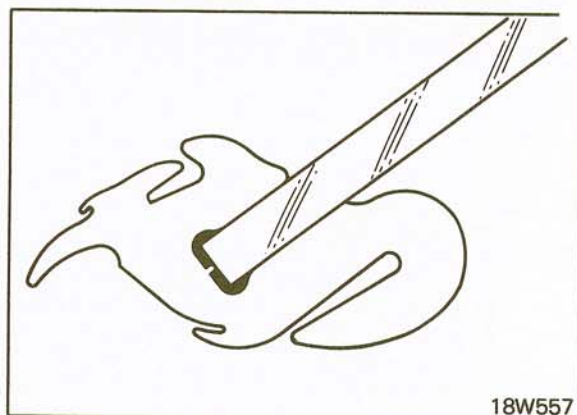
5. With the aid of an assistant to push the glass from outside, slowly pull one end of the cord at right angles to the windshield glass and fit the lips of the weatherstrip correctly on the windshield flange.

#### NOTE

Pull the cords, working from both sides of the glass toward the center and tapping the glass.

#### Caution

Tap the glass repeatedly until it is lightly held against the body flange surface.



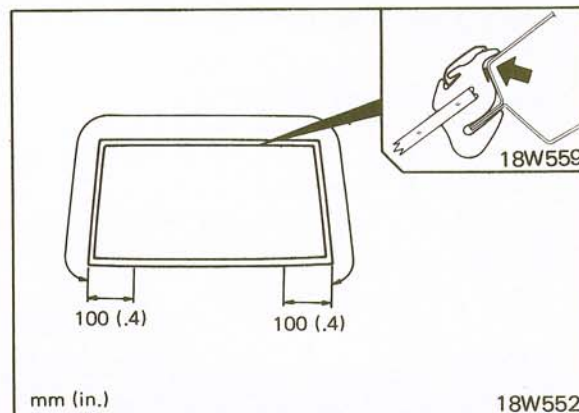




Apply recommended adhesive generously between the weatherstrip and body flange.

Recommended adhesive .....  
3M Super Weatherstrip Adhesive 8001 or equivalent

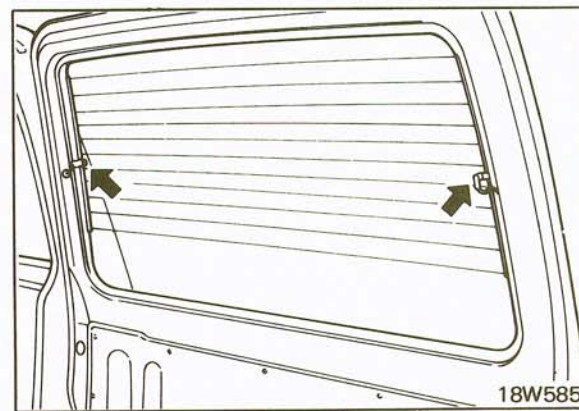
7. Mount the mouldings and the moulding joints onto the weatherstrip.



## BACK DOOR WINDOW GLASS

### Removal

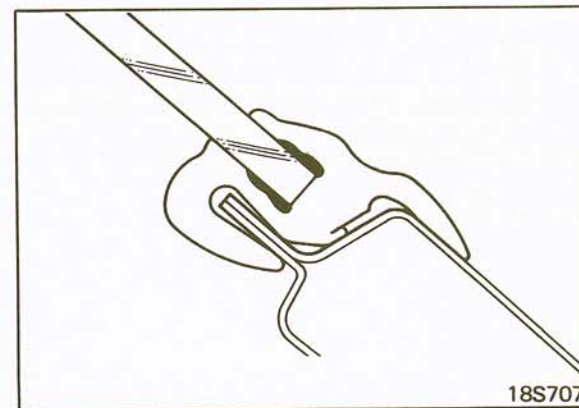
1. Remove the defogger terminal. (18W585)
2. Remove the rear wiper arm. (Refer to GROUP 8.)
3. Remove the weatherstrip and then remove the window glass.



### Installation

Apply recommended adhesive to the weatherstrip.

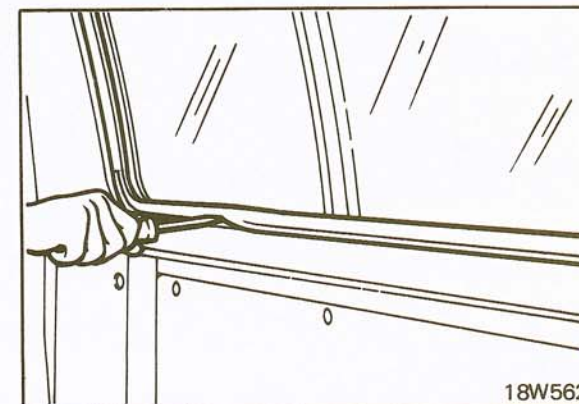
Recommended adhesive .....  
3M Super Weatherstrip Adhesive 8001 or equivalent



## QUARTER WINDOW GLASS

### Removal

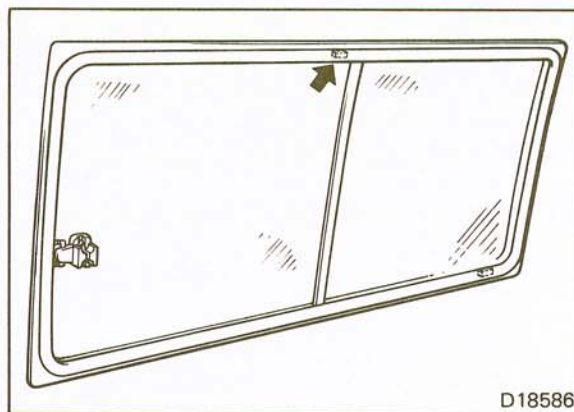
1. With the glass in position, push the quarter window assembly outward while raising the lip of the weatherstrip along the periphery.



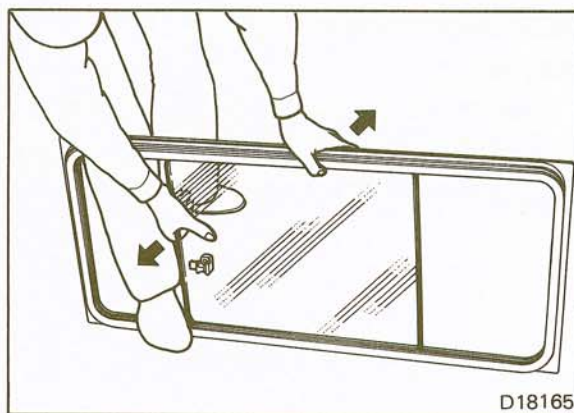




2. Remove the stopper.

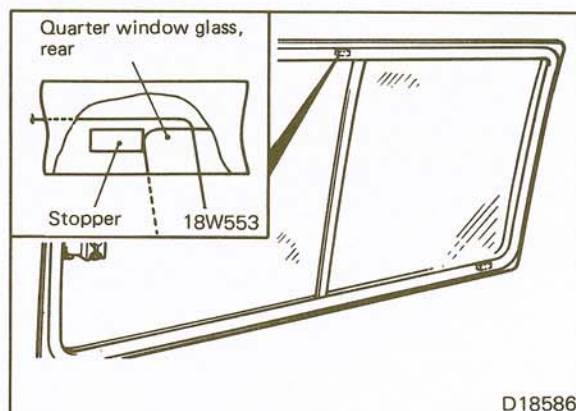


3. Move the quarter window glass to the middle position and remove it after removing the weatherstrip.



### Installation

1. After the quarter window rear glass has been installed, install the stopper by applying a drying type adhesive.
2. Follow the same installation procedure as for the windshield glass. (Refer to p. 23-24 and p. 23-25.)

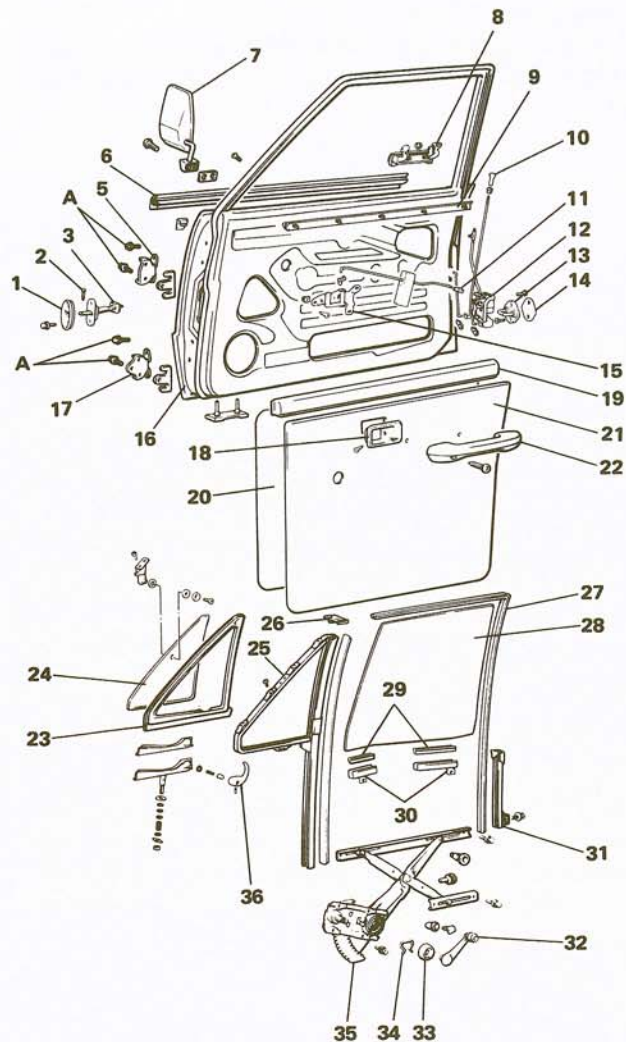






## COMPONENTS

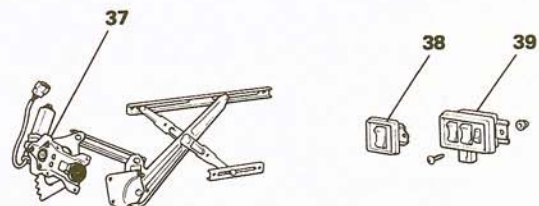
1. Door check cover
2. Spring pin
3. Door check
4. Door hinge shim
5. Door upper hinge
6. Weatherstrip, outer
7. Door mirror
8. Outside handle
9. Weatherstrip, inner
10. Inside lock knob
11. Inside handle rod
12. Door latch
13. Striker
14. Striker shim
15. Inside handle
16. Door panel
17. Door lower hinge
18. Inside handle cover
19. Door upper trim (metal-top vehicle)
20. Waterproof film
21. Door trim
22. Armrest
23. Ventilator window weatherstrip
24. Ventilator window glass
25. Ventilator sash
26. Center sash protector
27. Window glass runchannel
28. Window glass
29. Door glass pad
30. Glass holder
31. Door lower sash
32. Regulator handle
33. Escutcheon
34. Clip
35. Window regulator
36. Lock handle
37. Power window regulator
38. Sub switch (R.H.)
39. Main switch (L.H.)



18W673

	Nm	ft.lbs.
A	30-40	22-29

### Vehicles equipped with power windows



18W671

16W764





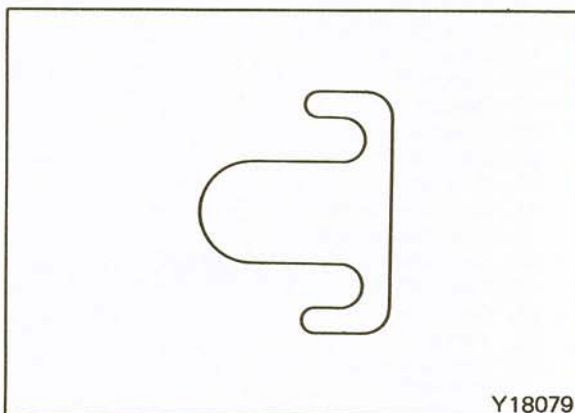
### ADJUSTMENT

#### Door Adjustment

1. Using wrench, loosen the bolts that fasten the door hinges to the body. (18W563)
2. Move the door up and down and back and forth so that the clearance between the door and the body is uniform all around.

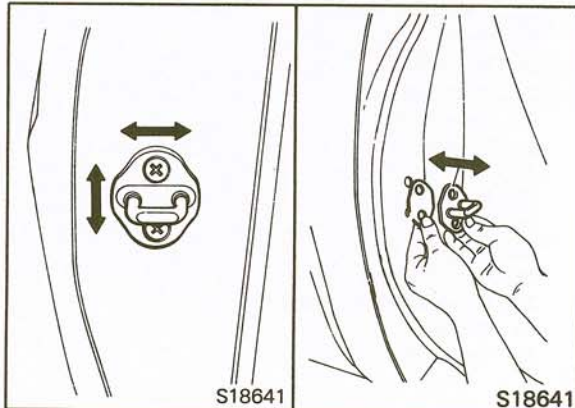


3. Position the door flush with the fender by increasing or decreasing the number of shim(s).



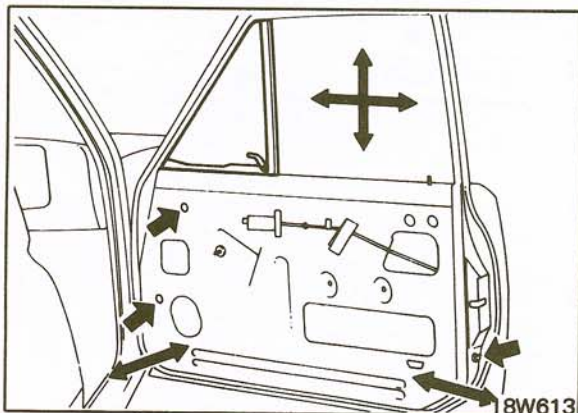
#### Door Striker Adjustment

1. Adjust the vertical and lateral positions of the door striker by moving the striker itself. (S18641)
2. Insert shim(s) as necessary to adjust the longitudinal position of the striker. (S18641)



#### Door Glass Adjustment

1. Remove the door trim and the waterproof film from the door. (Refer to p. 23-30.)
2. Loosen the screws and/or bolts which secure the ventilator window and rear lower sash.
3. With the door glass closed completely, move the ventilator window, rear lower sash and the sub roller guide to adjust the door glass position. (18W613)





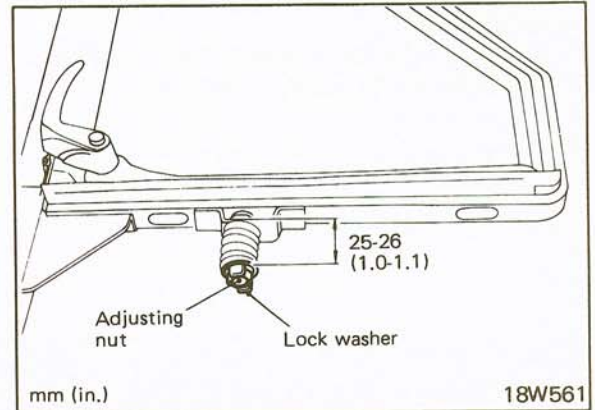


## Ventilator Window Adjustment

1. Remove the ventilator window assembly.  
(Refer to p. 23-32.)
2. Adjust the ventilator window by turning the adjusting nut so that the ventilator window can be operated smoothly.

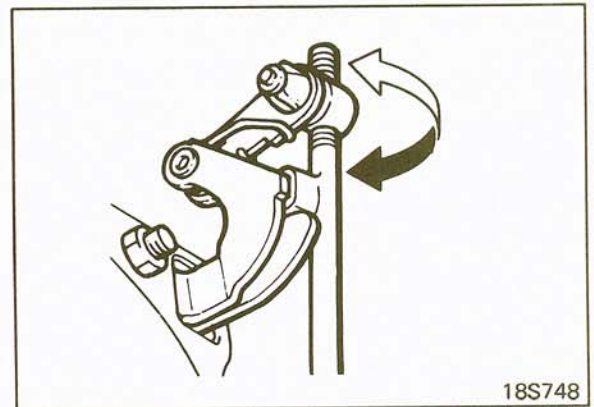
### NOTE

Lock the adjusting nut by bending the tabs of the lock washer after the adjustment.



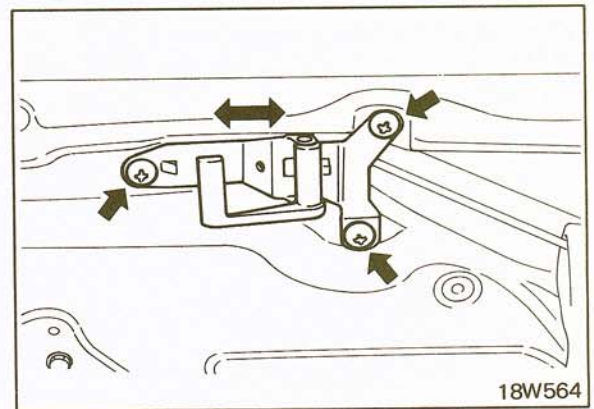
## Outside Handle Adjustment

Disconnect the outside handle from the outside handle rod, and then turn it right or left to adjust the play.



## Inside Handle Adjustment

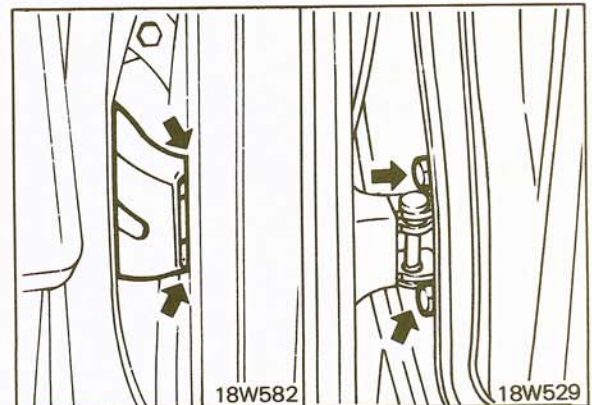
Move the inside handle to the right or left in order to adjust the play.



## REMOVAL

### Door Assembly

1. Remove the spring pin from the door check.
2. Position a jack beneath the door at the center to support it.
3. For vehicles equipped with power windows, disconnect the front harness and door harness, and then remove the door harness from the direction of the body.
4. Remove the door hinge mounting bolts from the door.  
(18W582, 18W529)
5. Remove the door assembly.



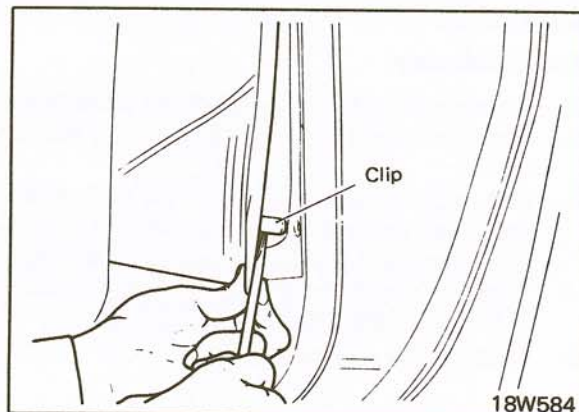
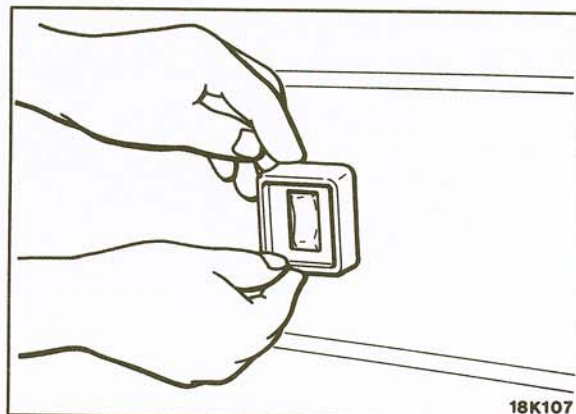
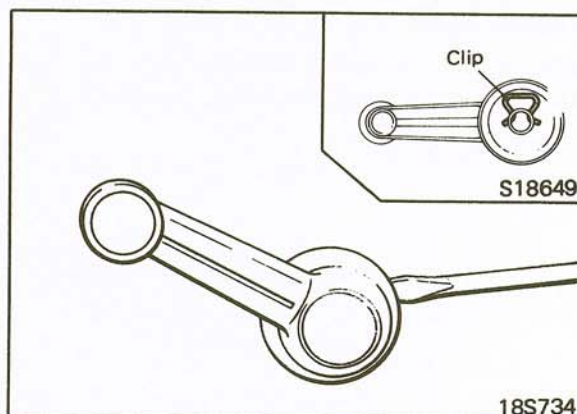
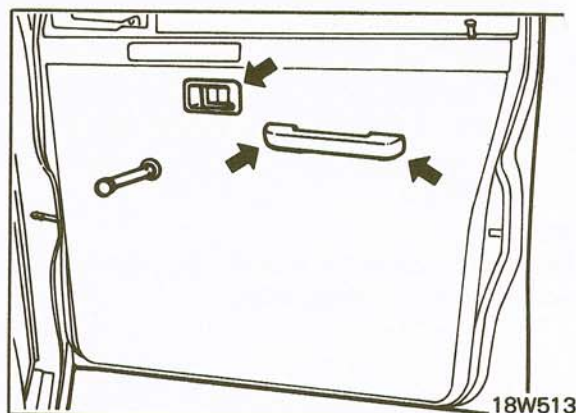




## COMPONENT SERVICE-FRONT DOORS

### Door Trim

1. Remove the inside handle cover. (18W513)
2. Remove the armrest. (18W513)
3. Insert the tip of a screwdriver between the window regulator and the door trim, and remove the clip. (18S734)
4. Remove the regulator handle.
5. For vehicles equipped with power windows, remove the switch cover.
6. Using a screwdriver, pry up and detach the door trim clips. (18W584)
7. Remove the door trim.

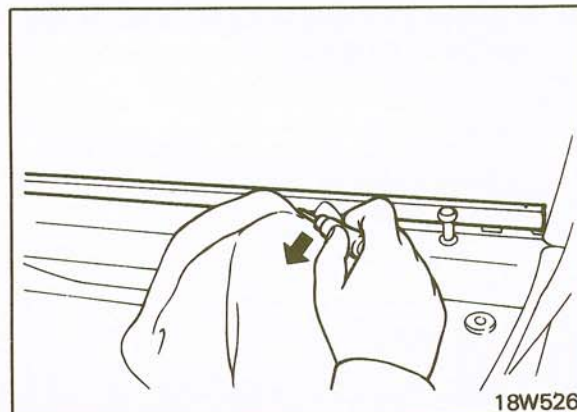




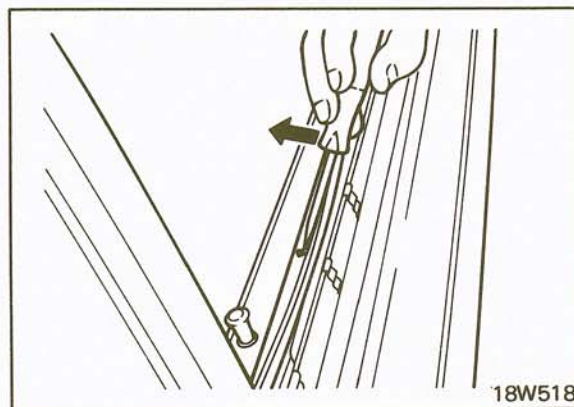


## Door Glass and Regulator

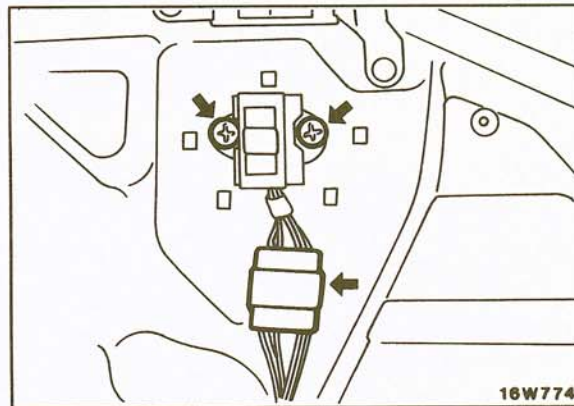
1. Remove the outer weatherstrip from the retaining clips by prying upward with a screwdriver. (18W526)
2. Remove the outer weatherstrip toward the rear.



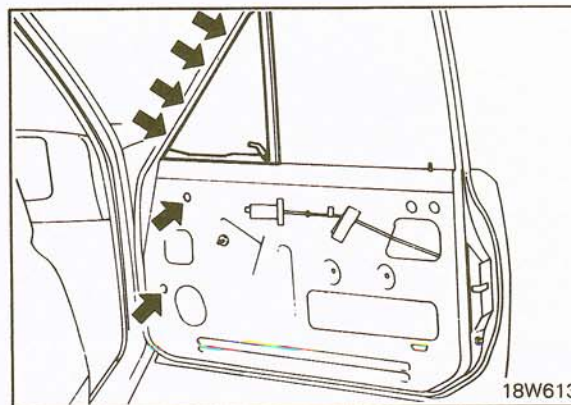
3. Remove the inner weatherstrip with a screwdriver.



4. Lower the door glass to the access hole position.
5. For vehicles equipped with power windows, remove the power window switches. (16W774)
6. Peel the waterproof film off carefully to avoid damaging it.



7. Remove the retaining screws and bolts from the ventilator window.

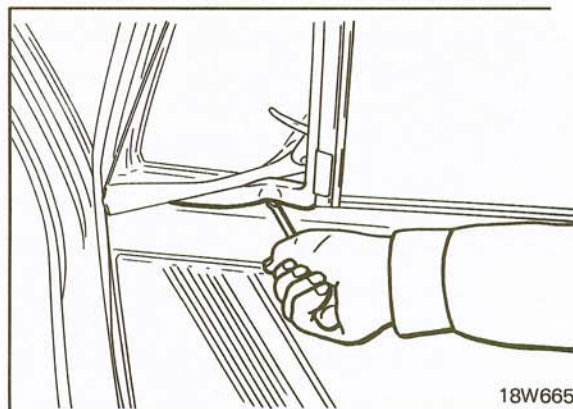




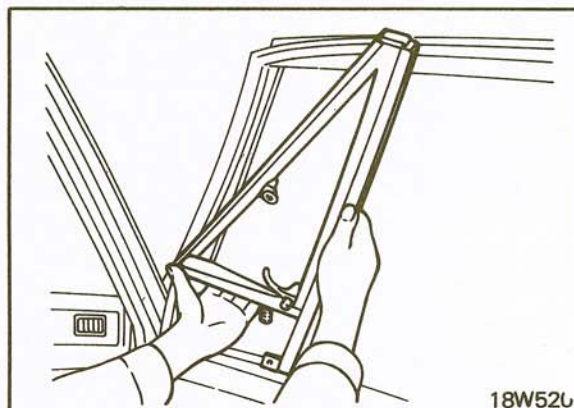


## COMPONENT SERVICE-FRONT DOORS

8. Remove any weatherstrip which is still attached to the ventilator window.



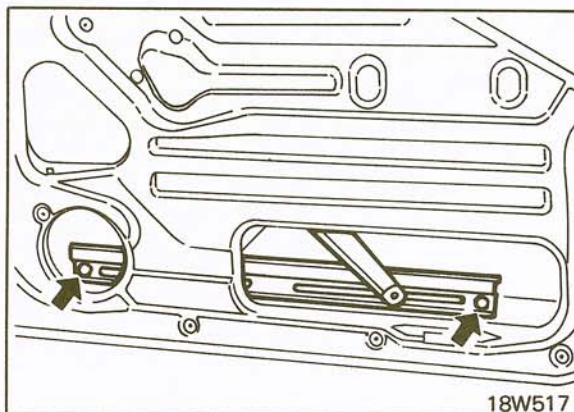
9. Remove the ventilator window by pulling upward.



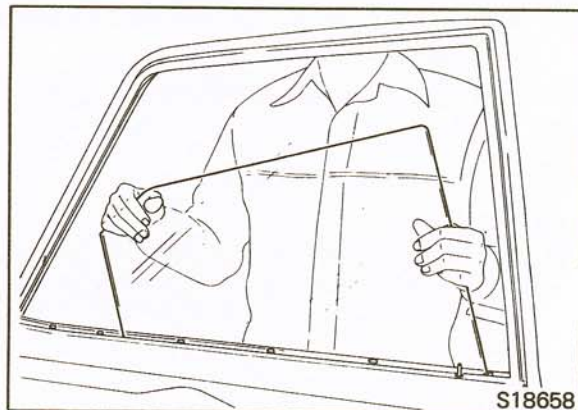
10. Remove the glass mounting bolts from the glass holder.  
(18W517)

### NOTE

When removing the glass mounting bolts, support the glass to prevent it from falling.



11. Gently remove the door glass upward while tilting it.



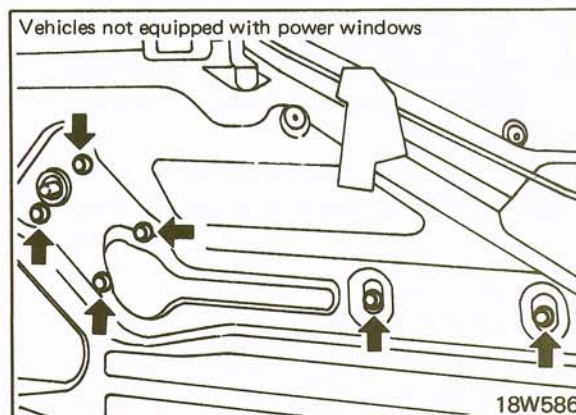




2. For vehicles not equipped with power windows, remove the regulator assembly mounting bolts.

## NOTE

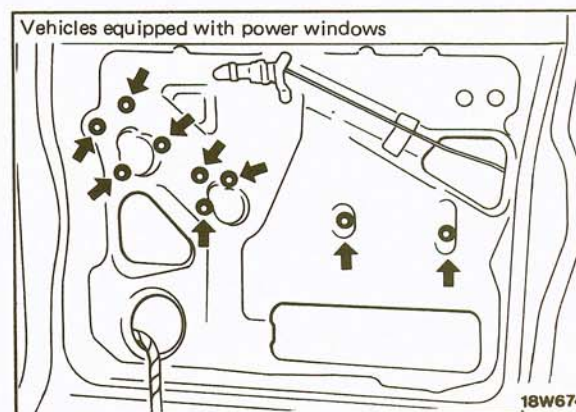
Hold the regulator assembly so that it does not fall when the bolts are removed.



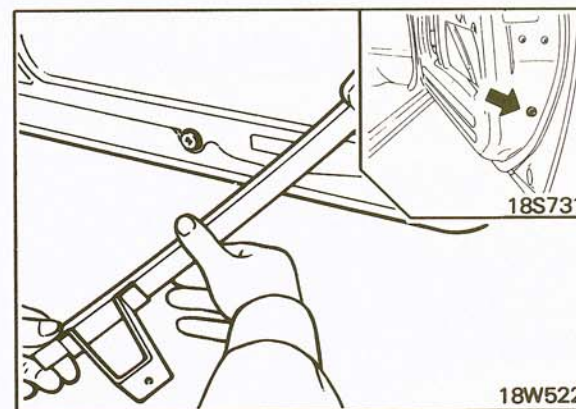
13. For vehicles equipped with power windows, disconnect the power window motor connector from the door harness, and then remove the power window regulator mounting bolts.

## NOTE

Hold the regulator assembly so that it does not fall when bolts are removed.



14. Remove the regulator assembly through the access hole.
15. Remove the mounting bolts and remove the lower sash through the access hole. (18S731, 18W522)

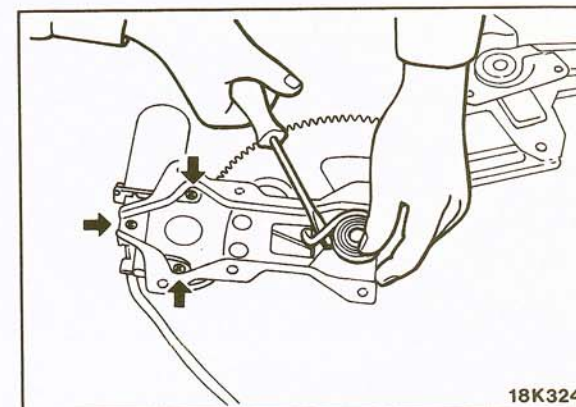


## Power Window Motor (vehicles equipped with power windows only)

Remove the power window motor from the window regulator.

## Caution

Because the force of the regulator spring may cause the regulator arm to jump up when the screws attaching the motor to the window regulator are removed, remove the regulator spring before removing the screws.





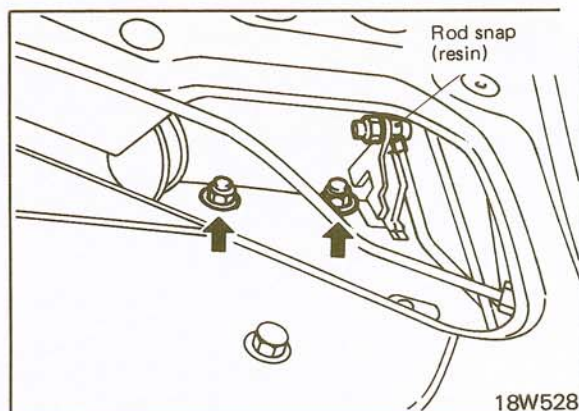


### Door Handle and Door Latch

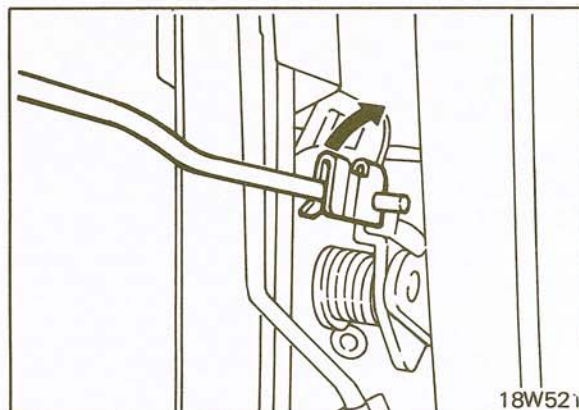
1. Disconnect the outside handle rod from the handle, and then remove the outside handle.

#### Caution

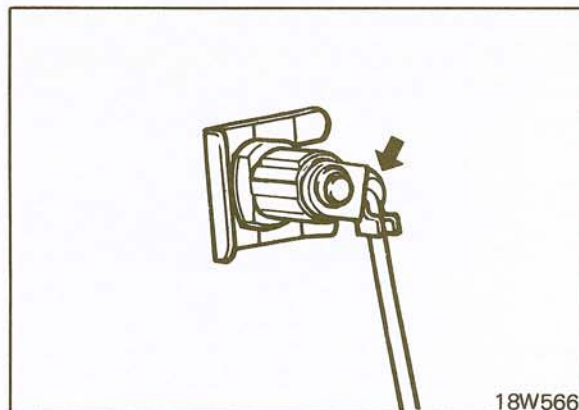
If the outside handle rod is removed, the rod snap must be replaced with a new one when the handle rod is reinstalled.



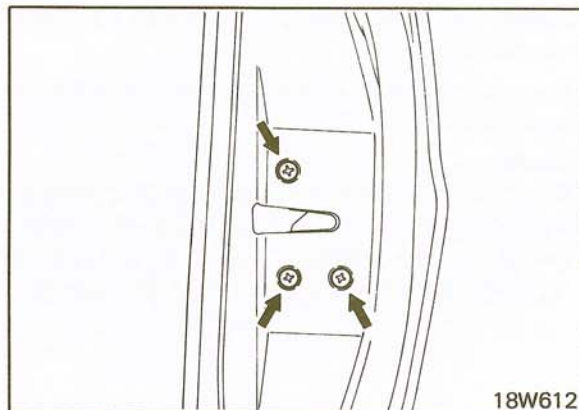
2. Disconnect the inside handle rod from the latch, and then remove it with the inside handle.



3. Disconnect the outside lock rod from the lock cylinder. (18W566)
4. Remove the lock cylinder retainer, and the lock cylinder.



5. Remove the door latch assembly and rods.

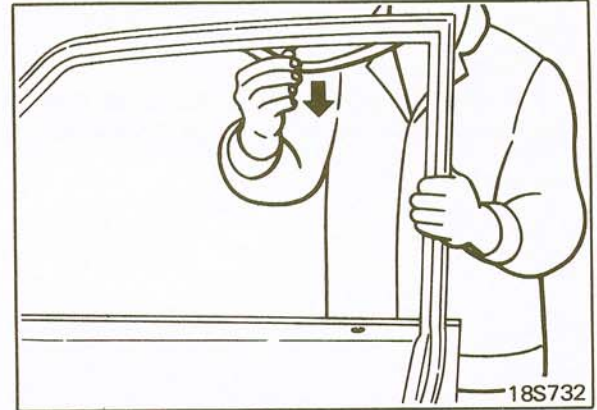






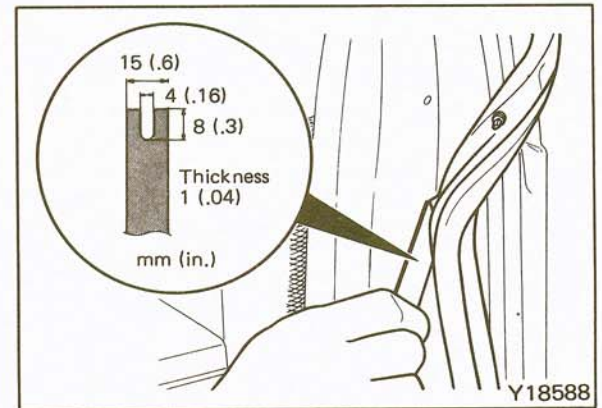
## oor Glass Runchannel

Remove the window glass runchannel by pressing both sides with your fingers.



## Door Opening Weatherstrip

Remove the door opening weatherstrip with the tool shown in the illustration.



## INSPECTION

1. Check door hinges for cracks, damage, or abnormal noise.
2. Check door hinge attaching bolts for looseness.
3. Check mouldings for cracks or damage.
4. Check door panel for damage or deformation.
5. Check door regulator for wear or damage.
6. Check door glass runchannel for wear, damage, or deformation.
7. Check door inside handle and latch for wear, damage, or malfunction.

## NOTE

For the inspection procedure for the power window motor and switch, refer to GROUP 8.



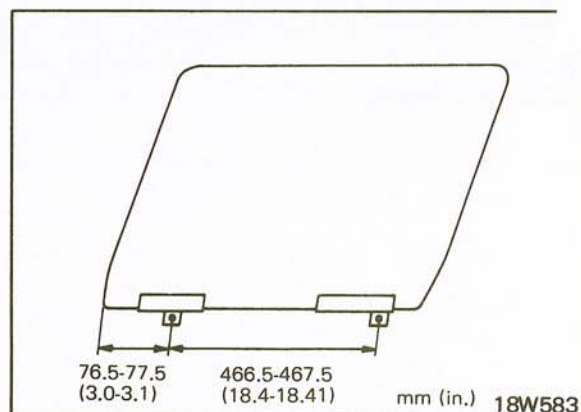


## COMPONENT SERVICE-FRONT DOORS

### INSTALLATION

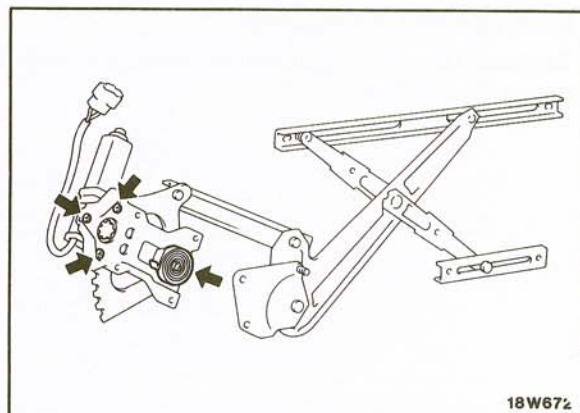
#### Window Glass

If the window glass has been removed from the glass holder, reinstall it in the position shown in illustration.



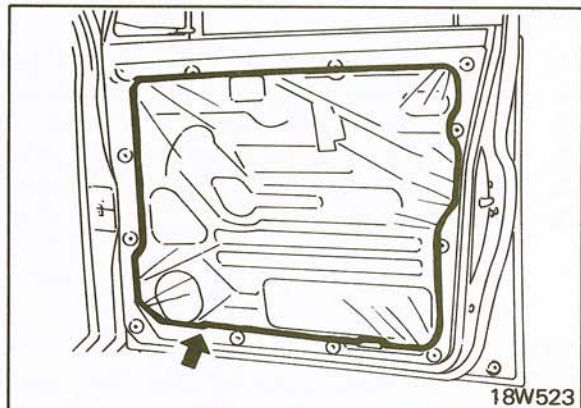
#### Power Window Regulator Motor (Vehicles equipped with power window only)

When assembling the window regulator on vehicles equipped with power windows, first install the regulator spring, and then proceed with the assembly.



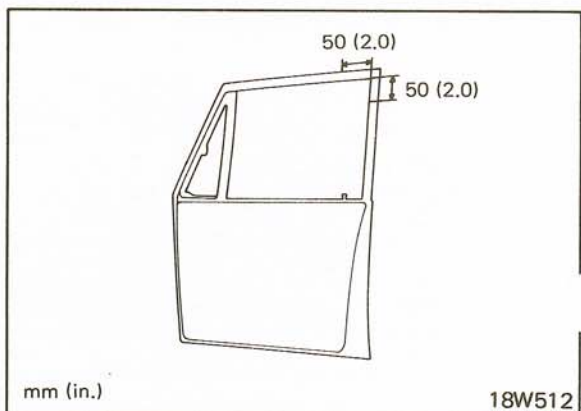
#### Waterproof Film

Apply non-drying adhesive as shown in the illustration, and then attach the waterproof film.



#### Door Runchannel

Apply a drying adhesive to the positions shown in illustration and install the door runchannel.

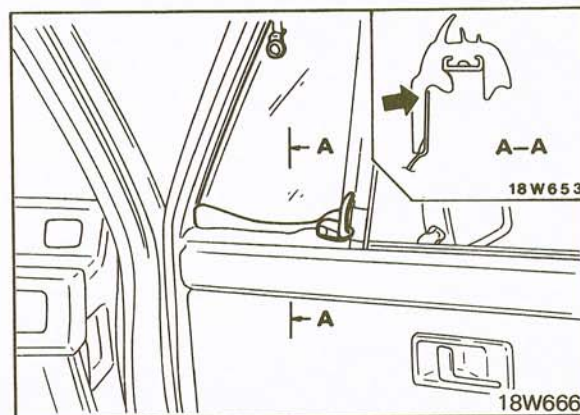






### entilator Window Weatherstrip

Apply non-drying sealant to the ventilator window weatherstrip and then mount it onto the ventilator window.



### Door Hinges

Apply chassis grease to the sliding parts of the door hinges.

### Door Regulator

Apply chassis grease to the sliding parts and rotating parts of the door regulator.

### Door Latch

Apply chassis grease to the sliding parts of the door latch.



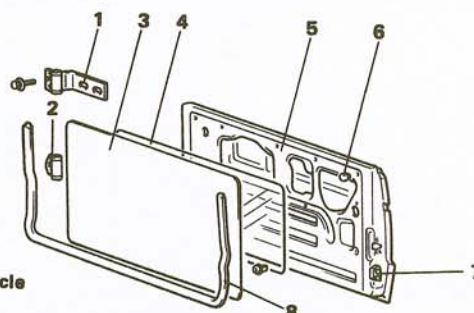


## COMPONENT SERVICE-BACK DOOR

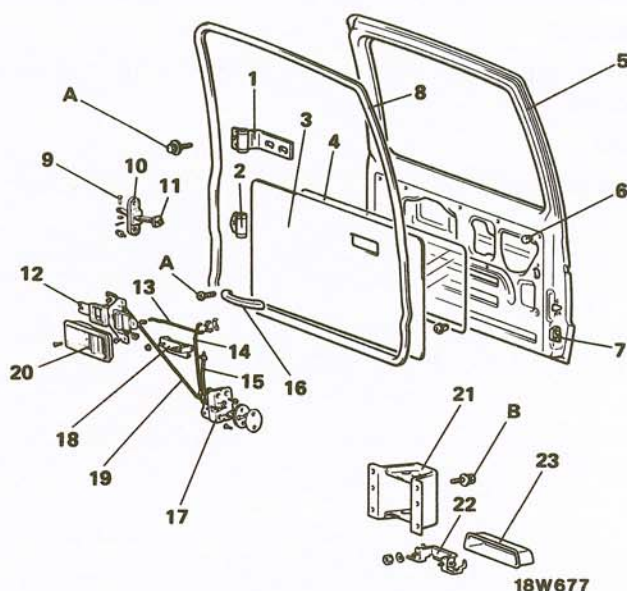
### COMPONENTS

1. Door upper hinge
2. Door lower hinge
3. Door trim
4. Waterproof film
5. Door panel
6. Cushion rubber
7. Bumper rubber
8. Door opening weatherstrip
9. Clevis pin
10. Door check cover
11. Door check
12. Inside handle
13. Inside lock rod
14. Outside lock rod
15. Outside handle rod
16. Door pull handle
17. Latch
18. Outside handle
19. Inside handle rod
20. Inside handle cover
21. Spare tire carrier
22. Back door garnish bracket
23. Back door garnish

Canvas-top vehicle



Metal-top vehicle



	Nm	ft.lbs.
A	30-40	22-29
B	8-10	5.8-7.0

### ADJUSTMENT

1. Adjust the door fit by adjusting the position of the door striker and/or increasing or reducing the number of shims. (Refer to p. 23-28.)
2. Adjust the inside handle play by moving the inside handle to the left or right. (Refer to p. 23-29.)

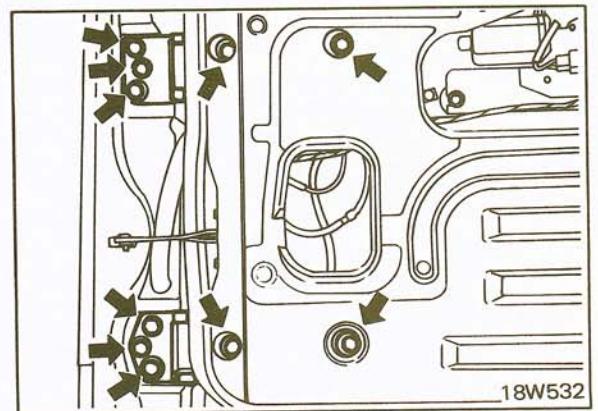
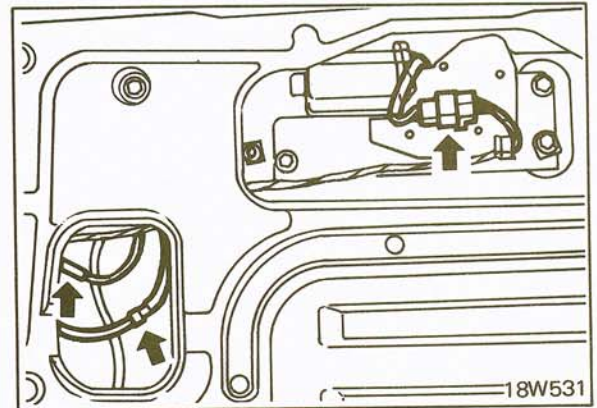
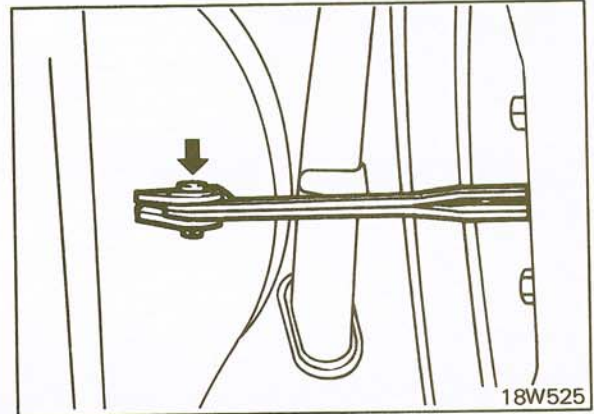




## REMOVAL

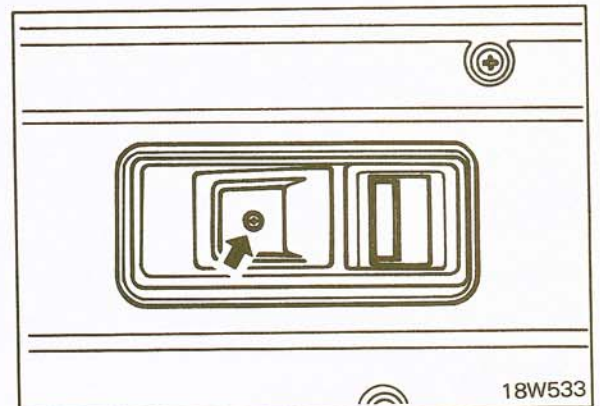
### Back Door and Hinge

1. Remove the cotter pin from the clevis pin, and then remove the clevis pin upward.
2. Remove the back door trim. (Refer to p. 23-40.)
3. Peel the waterproof film off carefully to avoid damaging it.
4. Disconnect the following points. (18W531)
  - (1) Defogger connector
  - (2) Rear washer tube joint
  - (3) Rear wiper connector
5. Remove the back door hinge mounting bolts, and then remove the back door. (18W532)
6. Remove the hinge mounting bolts from the body, and then remove the hinges. (18W532)



### Door Trim

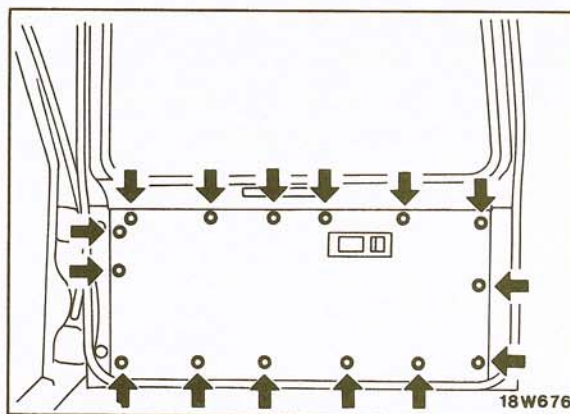
1. Remove the inside handle cover.



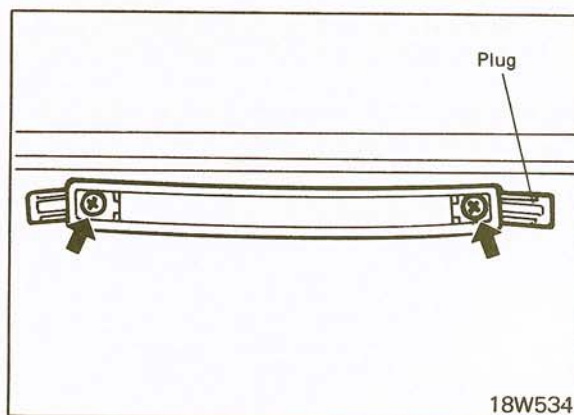




2. Remove the door trim.

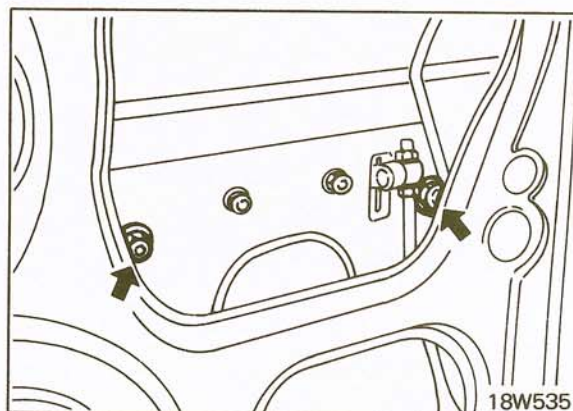


3. Open the door pull handle plug and remove the door pull handle.

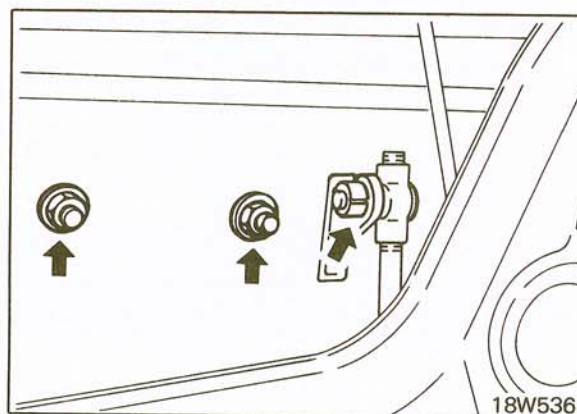


### Door Handle and Door Latch

1. Remove the door trim and the waterproof film.
2. Remove the back door garnish. (18W535)



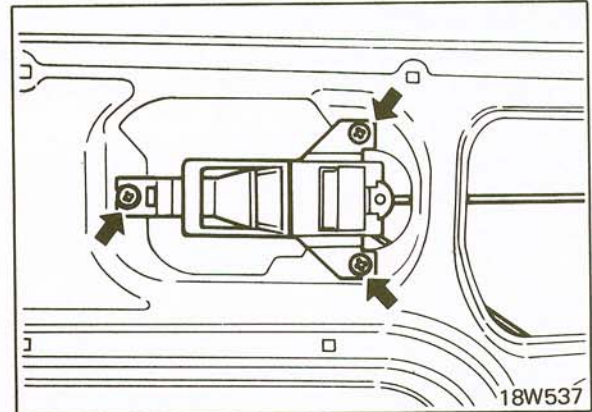
3. Disconnect the outside handle rod from the outside handle, and then remove the outside handle.



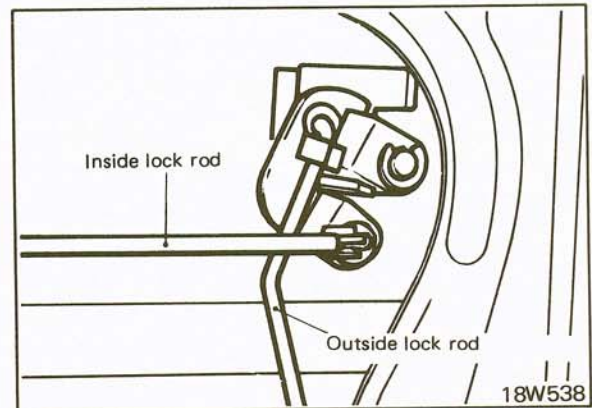




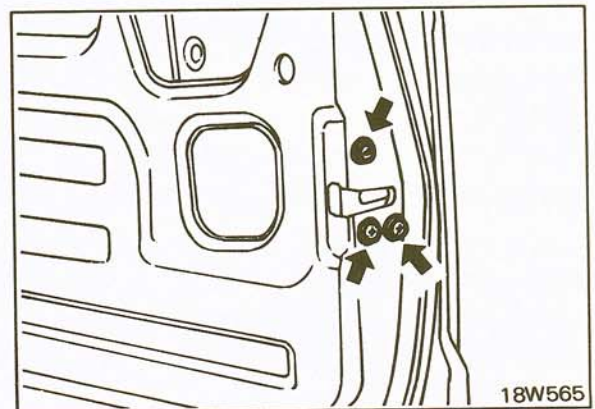
Remove the inside handle mounting screws, and then disconnect the inside lock rod and the inside handle rod from the inside handle.



5. Disconnect the outside lock rod and the inside lock rod from the lock cylinder. (18W538)
6. Remove the lock cylinder retainer, and the lock cylinder.

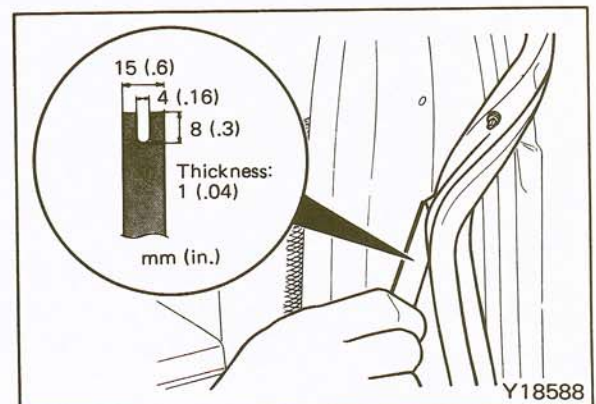


7. Remove the door latch assembly together with the rods.



## Door Opening Weatherstrip

Remove the door opening weatherstrip with the tool shown in the illustration.

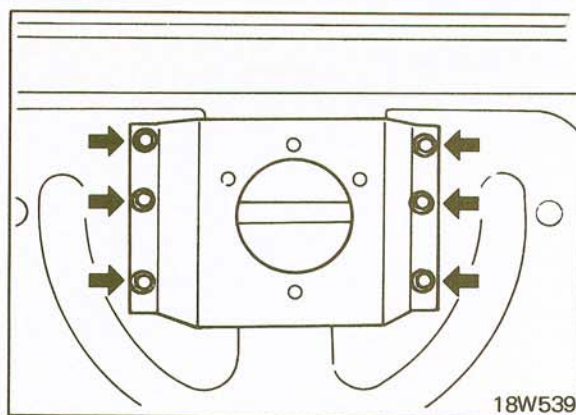






### Spare Tire Carrier

1. Remove the spare tire from the spare tire carrier.
2. Remove the spare tire carrier from the back door.  
(18W539)



### INSPECTION

- (1) Check door hinges for cracks, damage, or abnormal noise.
- (2) Check door hinge attaching bolts for looseness.
- (3) Check door panel for damage or deformation.
- (4) Check door inside handle and latch for wear, damage, or malfunction.

### INSTALLATION

#### Waterproof Film

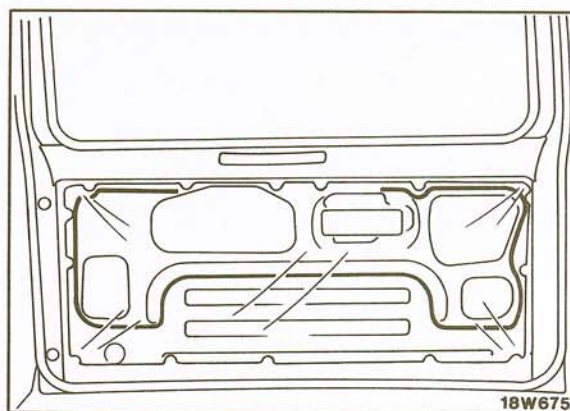
Apply non-drying adhesive at the positions shown in the illustration, and then attach the waterproof film. (18W675)

#### Door Hinges

Apply chassis grease to the sliding parts of the door hinges.

#### Door Latch

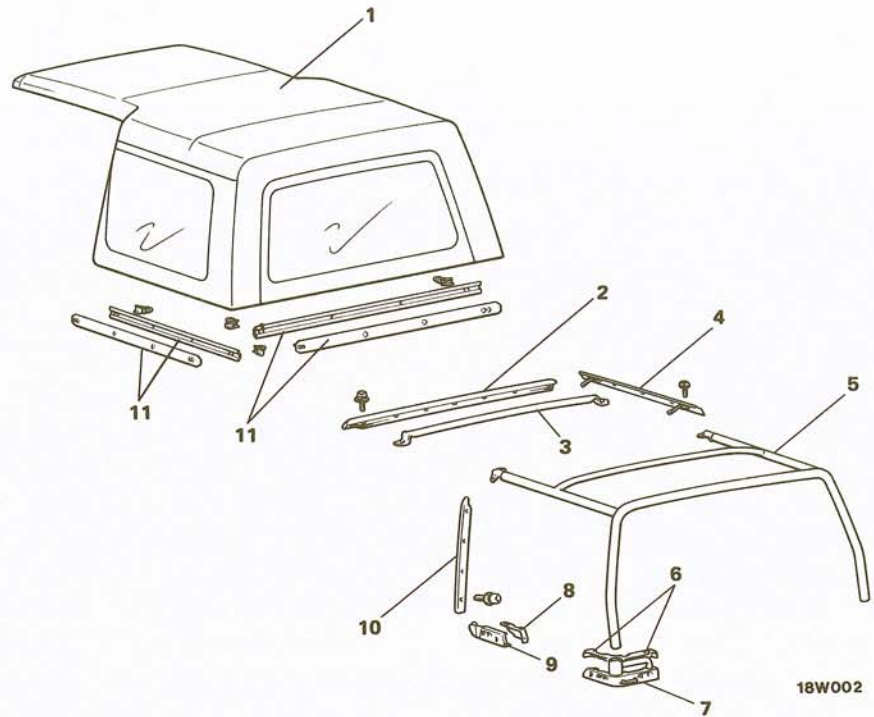
Apply chassis grease to the sliding parts of the door latch.







## COMPONENTS



1. Roof cover
2. Roof cover retainer, front
3. Roof cover bow
4. Side cover retainer
5. Roof cover frame
6. Rear cover
7. Rear cover bracket
8. Side cover
9. Side cover bracket
10. Roof cover retainer
11. Plate

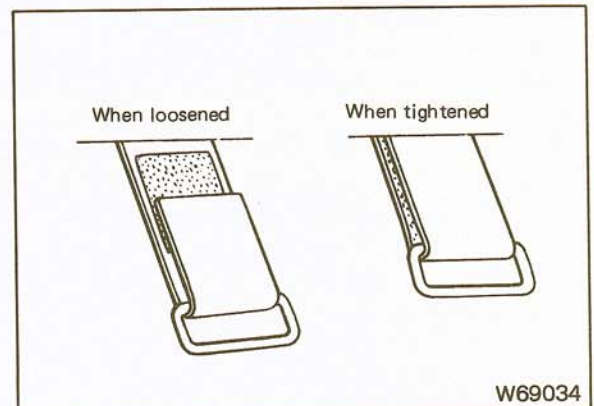
18W002

## ADJUSTMENT

Perform roof cover tension adjustment by the following procedures.

### Side Rail

Release the tape of the fixing band of the side rail and adjust tension by changing the length of the band. (W69034)



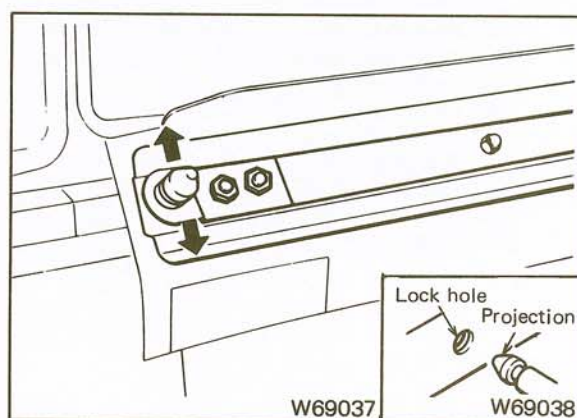
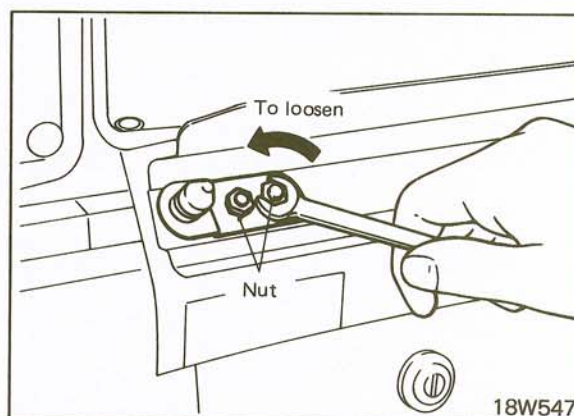
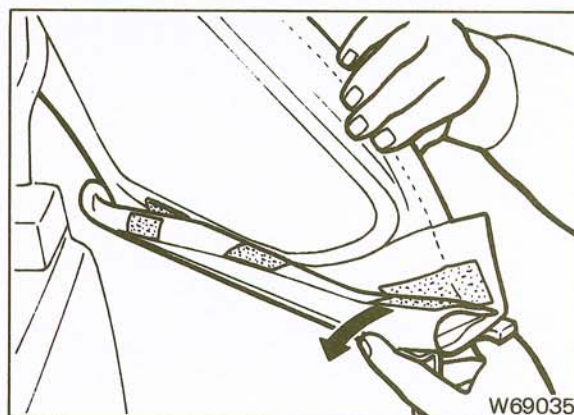
W69034





### Rear and Side Curtains

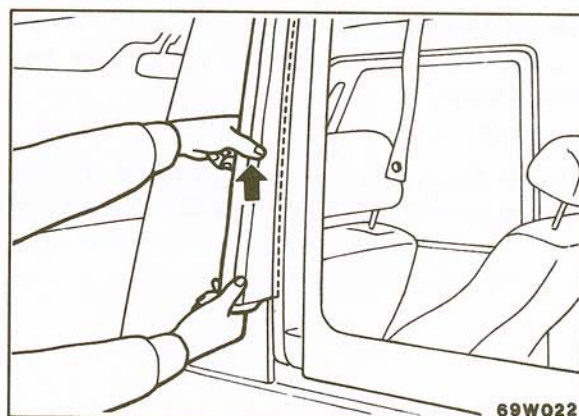
1. Release the fixing tape of the rear and side curtains.
2. Loosen the nuts attaching the side and rear curtains to the plate.
3. To make sure that the lock pin of the plate fits in the lock hole, adjust tension by moving the plate up and down.



### REMOVAL

#### Roof Cover Assembly

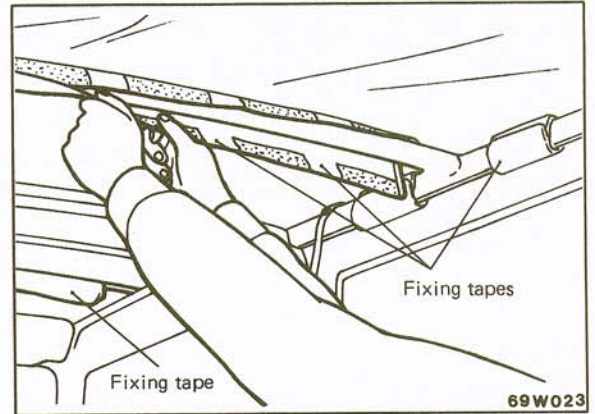
1. Remove fasteners and fixed portions of the rear and side curtains.
2. Pull the roof cover upward from the side rail. (69W022)



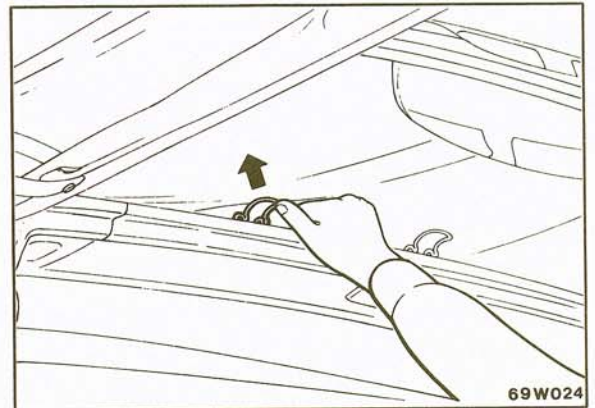




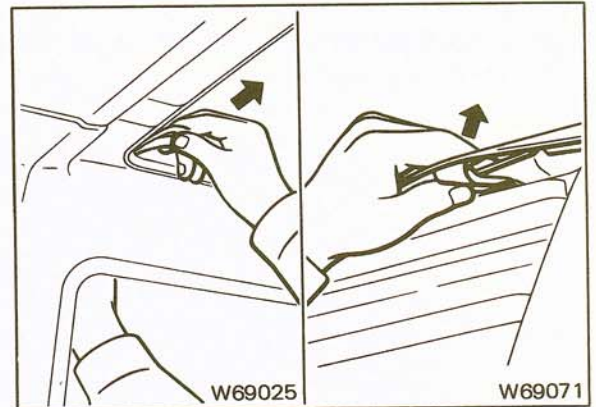
Undo the fasteners and fixing of the rear and side curtains.  
Pull the roof cover upward to remove it from the side rail.



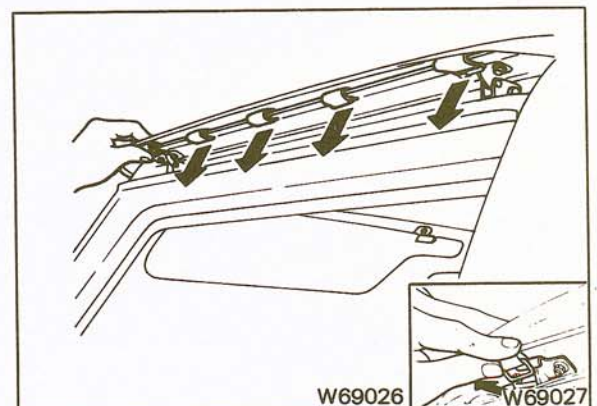
4. Undo the fixing tapes of roof cover from inside the room.



5. First pull the band on the rear side of the roof cover retainer. While holding the roof cover retainer up, pull the band on the front side of the roof cover retainer.



6. Raise the roof cover retainer and remove the fastening band.







7. Remove the roof cover forward from the roof cover front retainer. (W69028)
8. Remove the roof cover assembly from the vehicle.

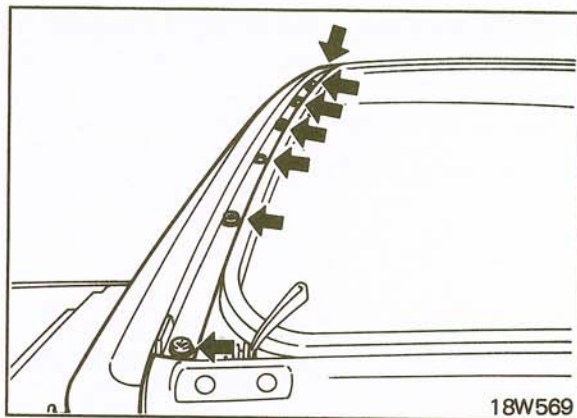
### Caution

When the roof cover assembly is removed, use care not to allow the attaching metal fittings, etc. to strike the body.



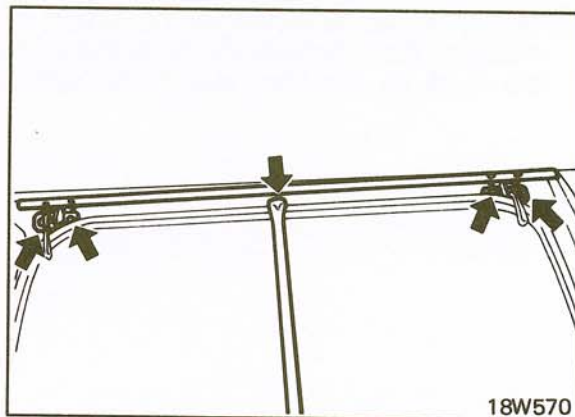
### Roof Cover Front Retainer

Remove the roof cover front retainer from the roof.



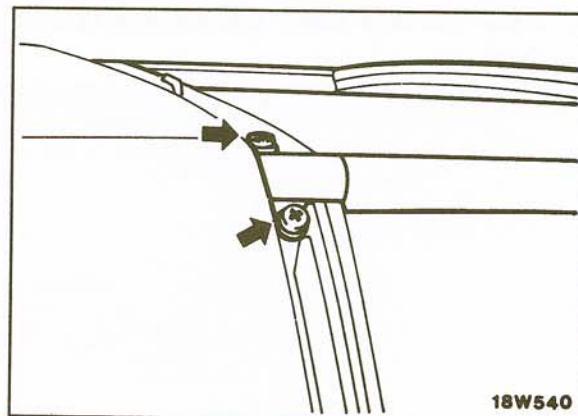
### Roof Cover Retainer and Roof Cover Bow

1. Remove the roof cover lock attaching screws and remove the roof cover retainer. (18W570)
2. Remove the roof cover bow. (18W570)



### Roof Cover Frame

1. Detach the roof cover frame from the center pillar. (18W540)
2. Pull the rear of roof cover frame upward to remove it from the rear cover bracket.

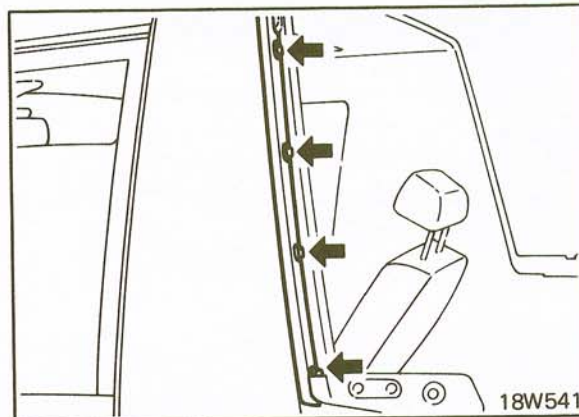






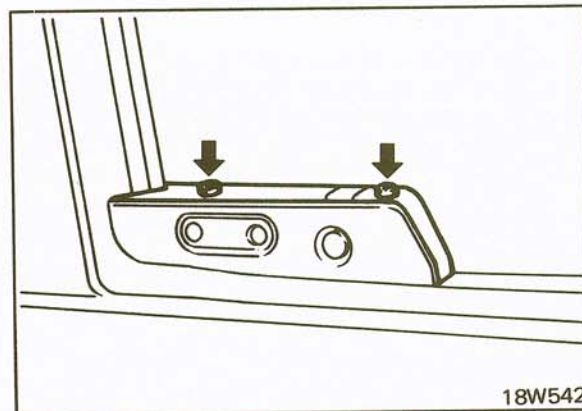
## Side Cover Retainer

Remove the side cover retainer.

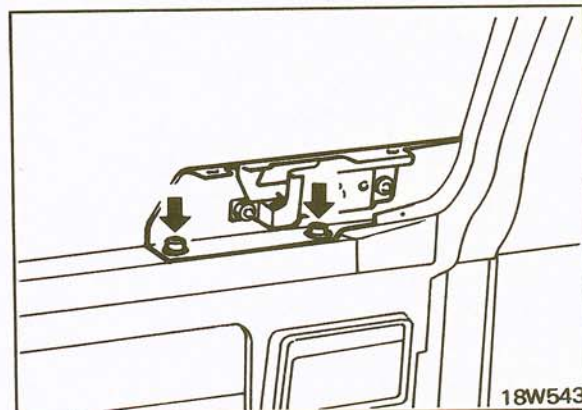


## Side Cover Bracket

1. Remove the side cover.

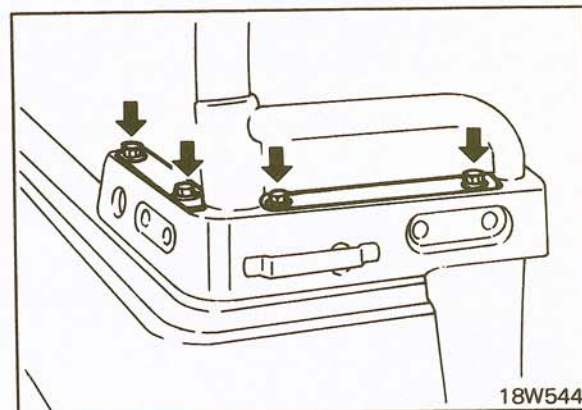


2. Remove the side cover bracket.



## Rear Cover Bracket

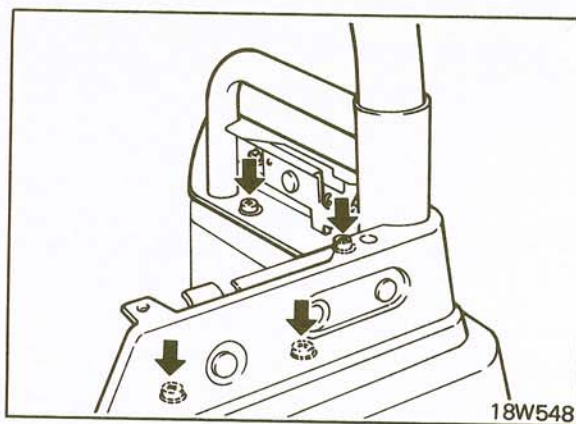
1. Remove the rear cover.







2. Remove the rear cover bracket.



### INSPECTION

1. Check the roof cover for damage.
2. Check the roof cover retainer for deformation or damage.
3. Check the roof cover lock for faulty operation.
4. Check the roof cover bows for bending.
5. Check the roof cover lock pin mounting nuts for looseness.
6. Check the roof cover frame for deformation and damage.

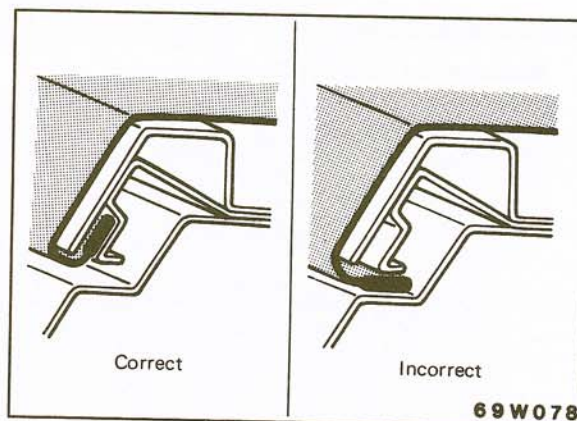
### INSTALLATION

Mount the roof cover securely so that it is neither too loose nor too tight.

#### Caution

Be sure that the roof cover is securely connected to the vehicle body and to the top frame.

When installing the cover to the front rail, be sure to fit it in correctly as shown in the illustration.



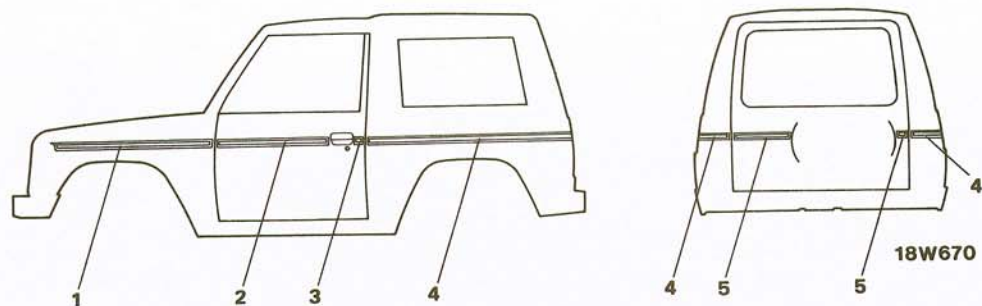




## COMPONENTS

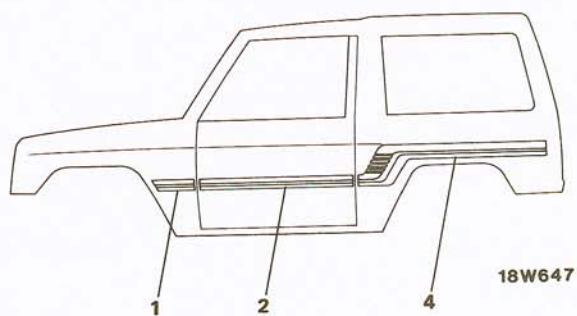
### Type 1

(Vehicles with a P-line only)



### Type 2

(Metal-top vehicles with a P-line only)



1. Fender tape
2. Front door tape
3. Rear door tape
4. Quarter tape
5. Back door tape

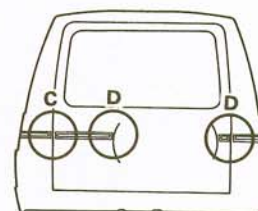
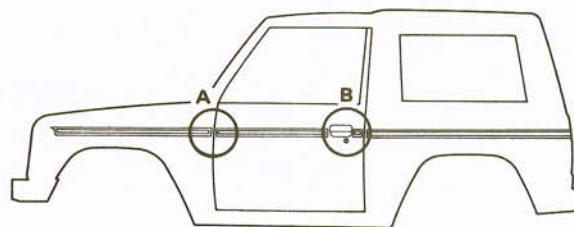




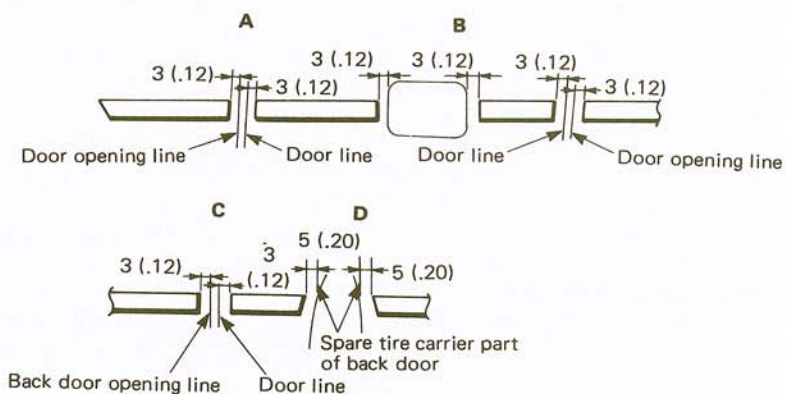
## COMPONENT SERVICE-STRIPE TAPE

### INSTALLATION

#### Type 1

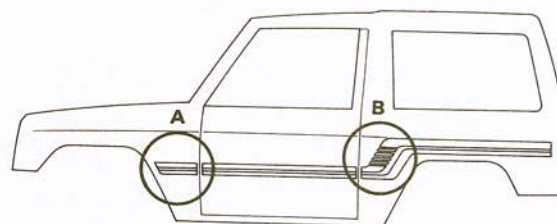


18W670



18W048

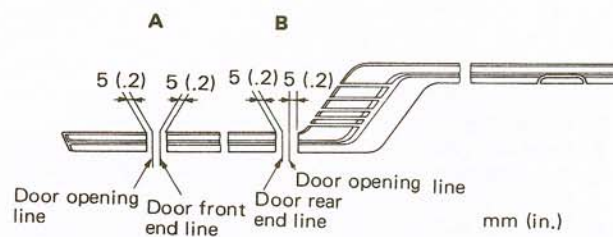
#### Type 2



18W647

#### NOTE

Using a rag soaked in unleaded gasoline, wipe any grease from the body surfaces where the tapes are to be attached.



18W648





Peel the paper off the back of the stripe tape to apply it. Begin application at the front of the doors and then proceed to the fender or quarter panel.

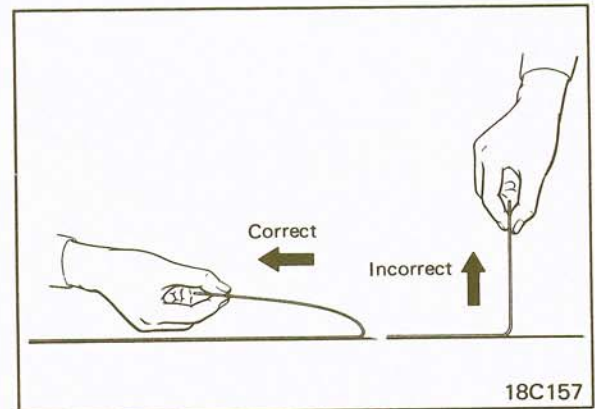
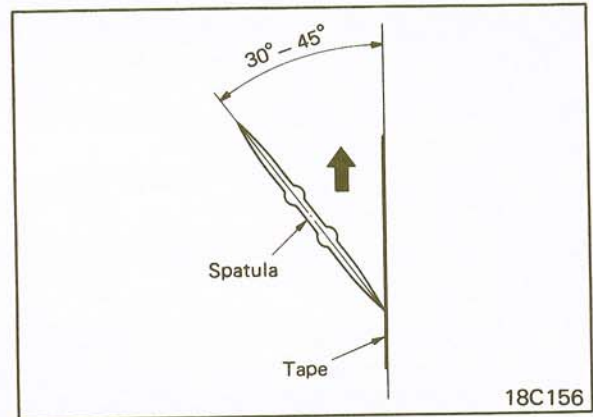
## Cautions

1. The application should be done in a place with little or no dust, and at an ambient temperature of  $20^{\circ} - 40^{\circ}\text{C}$  ( $70^{\circ} - 100^{\circ}\text{F}$ ).
2. If the ambient temperature is less than  $20^{\circ}\text{C}$  ( $70^{\circ}\text{F}$ ), warm both the tape and the body (application surfaces) to within  $20^{\circ} - 40^{\circ}\text{C}$  ( $70^{\circ} - 100^{\circ}\text{F}$ ).
2. Use the spatula to press on the tape, beginning at the center and moving evenly to both the top and bottom, in order to remove any trapped air bubbles. (C18156)

## Caution

If the spatula is slid to the side there will be slack at the end of the tape, causing wrinkles, and the tape may deviate from the correct application position.

3. If the tape is not applied properly it may come off later; pull the backing paper off straight and slowly. (18C157)
4. If there are any air bubbles in the tape after the application is finished, use a sewing needle to make small holes in the bubbles, and use the corners of the spatula to press the air out.

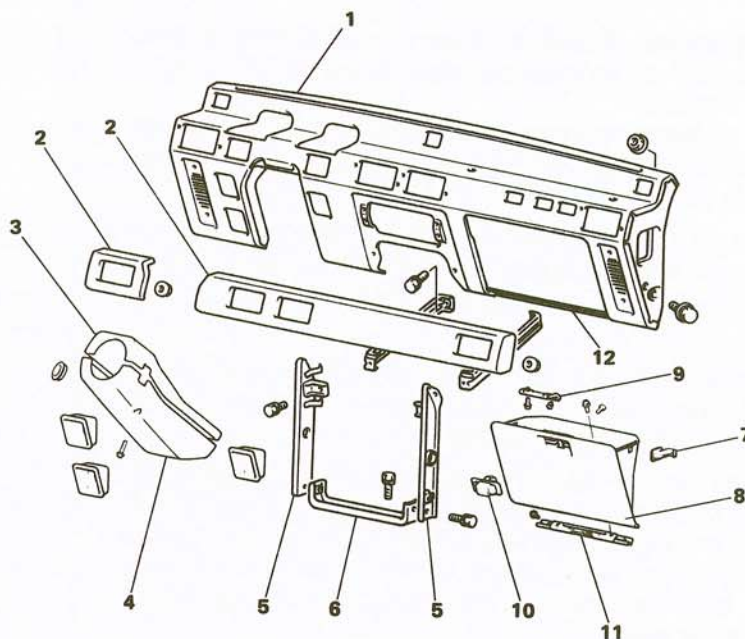






## COMPONENTS

1. Instrument panel
2. Instrument pad
3. Column cover, upper
4. Column cover, lower
5. Center reinforcement
6. Backbone bracket
7. Stopper
8. Glove box
9. Striker
10. Lock assembly
11. Glove box hinge
12. Glove box frame

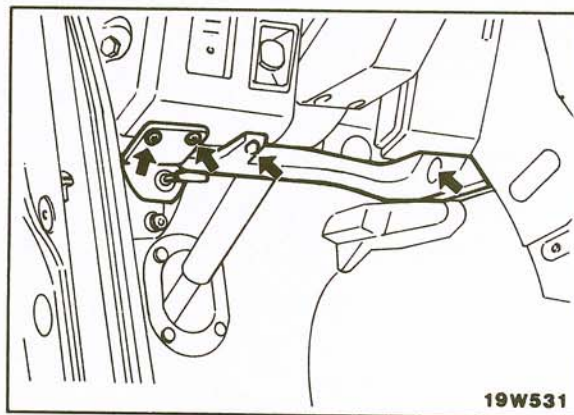


19W558

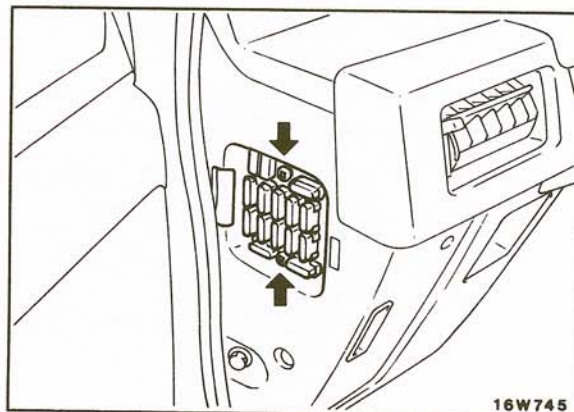
## REMOVAL

### Instrument Panel

1. Remove the steering wheel. (Refer to GROUP 19.)
2. Remove the center console. (Refer to p. 23-55.)
3. Remove the combination meter. (Refer to GROUP 8.)
4. Remove the combination gauge. (Refer to GROUP 8.)
5. Remove the lap heater ducts B and C and the release cable bracket. (19W531)
6. Remove the heater control assembly. (Refer to GROUP 24.)
7. Remove the fuse cover and then the fuse block mounting screws. Push the fuse block into the instrument panel. (16W745)
8. For vehicles equipped with front speakers, disconnect the front harness from the front speakers.



19W531



16W745

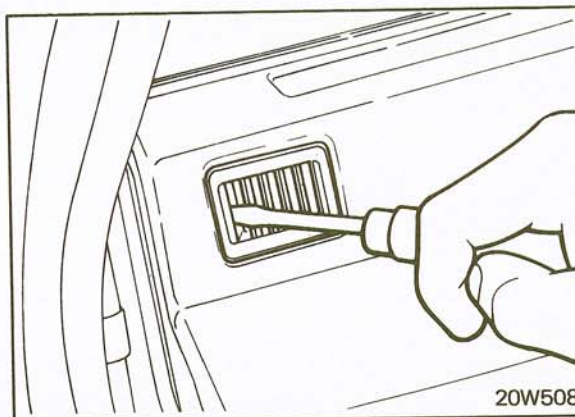




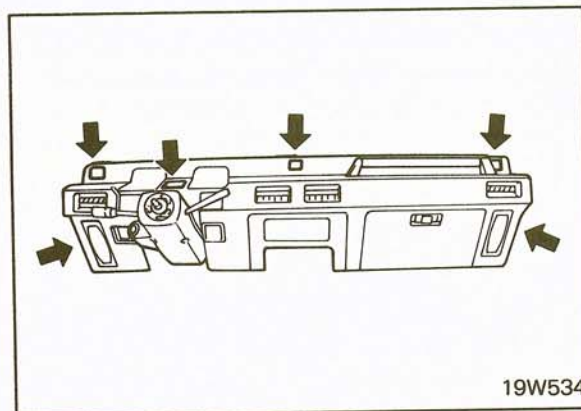
- Remove the plug at the center of the instrument panel.  
 J. Remove the right and left demister grilles by prying up the mounting projections with a screwdriver. (20W508)

## Caution

Be careful not to break the projections.

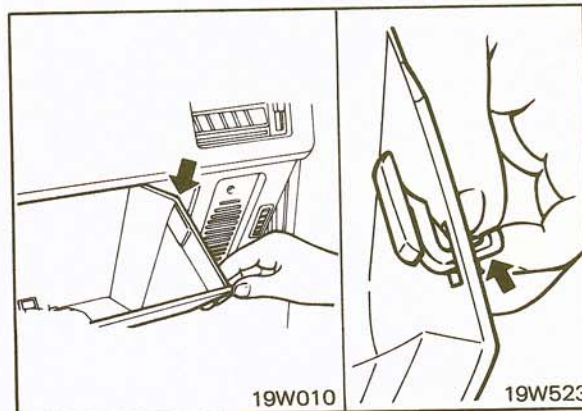


11. After the glove box stopper has been removed, pull the glove box toward you, and then disconnect the heater relay from the front wiring harness.
12. Remove the instrument panel mounting bolts and nuts, and then remove the instrument panel. (19W534)

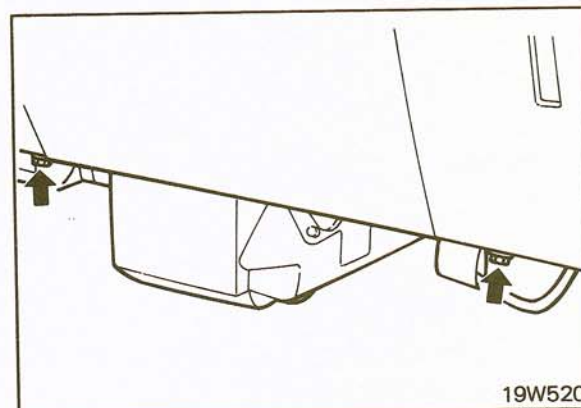


## Glove Box

1. Remove the glove box stopper.



2. Remove side lap heater duct B on the passenger seat side. (Refer to GROUP 24.)
3. Remove the glove box frame mounting bolts from the instrument panel, and then remove the glove box. (19W520)

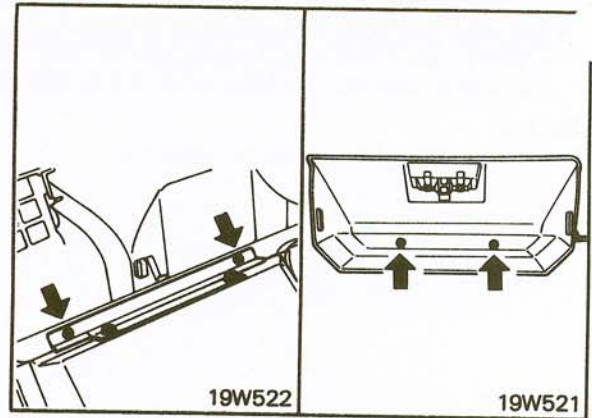






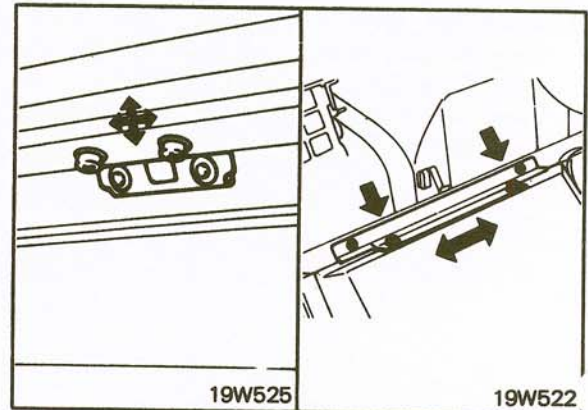
## COMPONENT SERVICE-INSTRUMENT PANEL

4. Remove the glove box frame and the glove box hinges from the glove box.



### INSTALLATION

1. Connect all of the connectors securely.
2. Make sure that the wiring harnesses are not pinched.
3. Adjust the heater control wires. (Refer to GROUP 24.)
4. When installing the glove box, first temporarily tighten the screws, and then, after checking the top left and right clearances between the glove box lid and the instrument panel with the lid closed, tighten the screws. (19W525, 19W522)

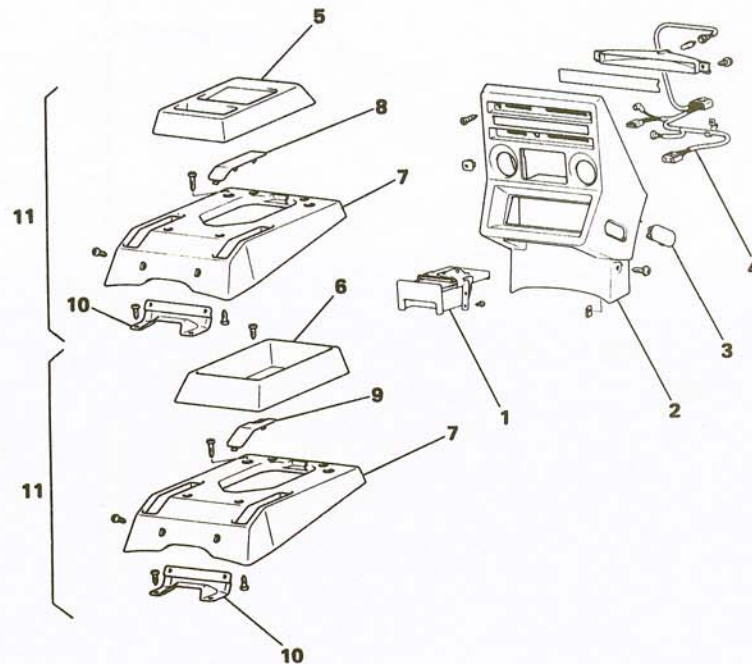






## COMPONENTS

1. Ashtray
2. Center panel
3. Plug
4. Center panel harness
5. Console
6. Tray
7. Floor console
8. Plate B
9. Plate A
10. Bracket
11. Floor console assembly

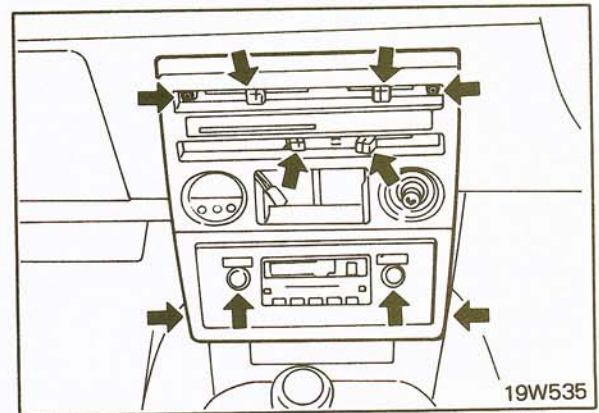


19W045

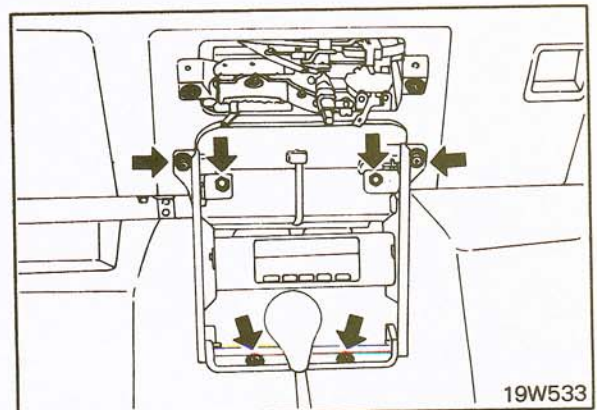
## REMOVAL

### Center Console

1. Remove the knobs of the heater control levers.
2. Remove the radio switch knobs and the radio panel.
3. Remove the center panel mounting screws.
4. Slightly pull off the center panel.
5. Disconnect the front harness to center panel harness connector and the antenna lead-wire.
6. Remove the center console assembly.



7. Disconnect the radio and car stereo player from the front harness.
8. Remove the center reinforcement and backbone bracket mounting screws.
9. Remove the center reinforcement, backbone bracket, radio and car stereo as a unit.



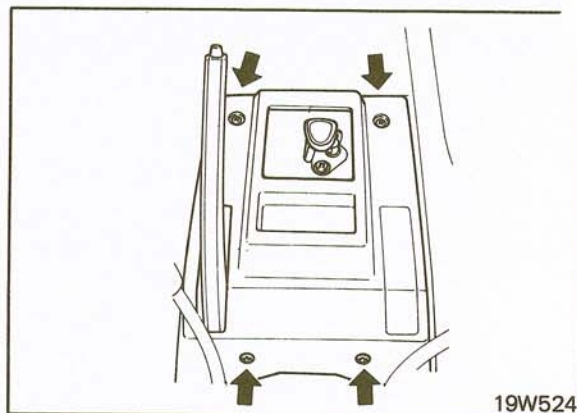




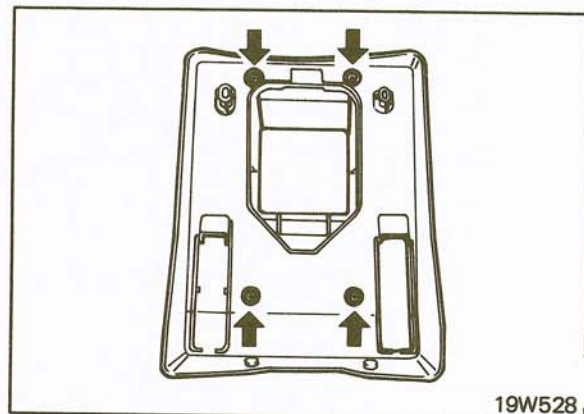
## COMPONENT SERVICE-FLOOR CONSOLE

### Floor Console

1. Remove the floor console.



2. Remove the tray, plate A or the console and plate B from the floor console.

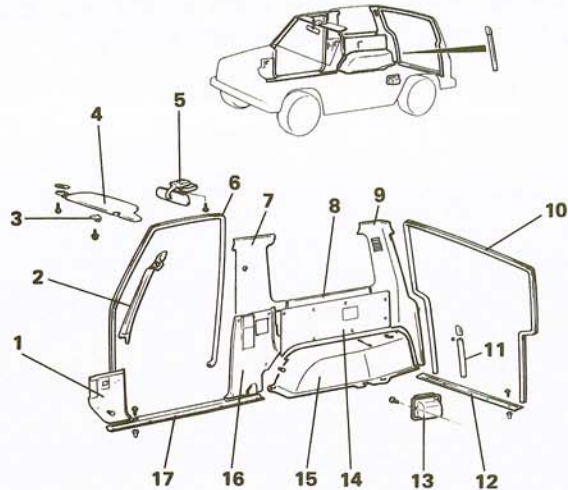






## COMPONENTS

1. Cowl side trim
2. Front pillar trim (metal-top vehicle)
3. Sun visor holder
4. Sun visor
5. Rear-view mirror
6. Door opening trim
7. Center pillar upper trim (metal-top vehicle)
8. Quarter upper trim (metal-top vehicle)
9. Rear pillar trim (metal-top vehicle)
10. Rear opening trim (metal-top vehicle)
11. Rear opening trim (canvas-top vehicle)
12. Rear scuff plate
13. Quarter trim
14. Ashtray (left side only)
15. Rear wheelhouse trim
16. Center pillar lower trim
17. Rail cover



19W583

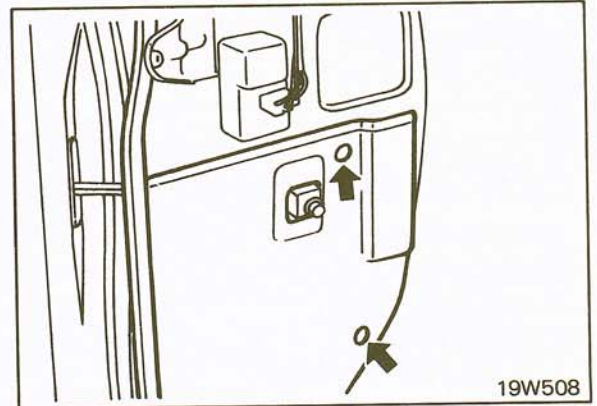
## REMOVAL

### Door Opening Trim

1. Remove the rail cover.
2. Remove the door opening trim.

### Cowl Side Trim

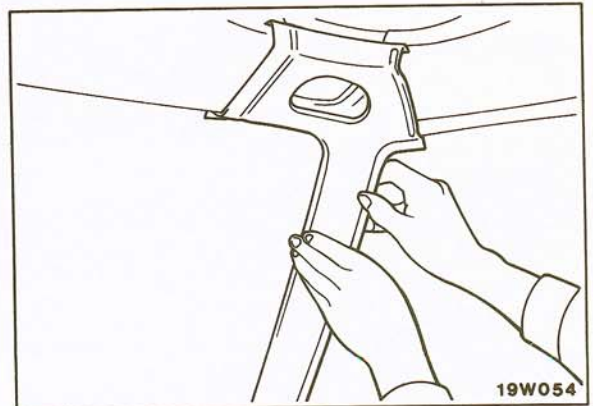
1. Remove the door opening trims.
2. Insert special tool (MB990784) under the cowl side trim and remove the clips. (19W508)
3. Remove the cowl side trim.



19W508

### Front Pillar Trim

1. Remove the door opening trims.
2. Remove the sun visor. (Refer to P. 23-59.)
3. Remove the front pillar trim. (19W054)



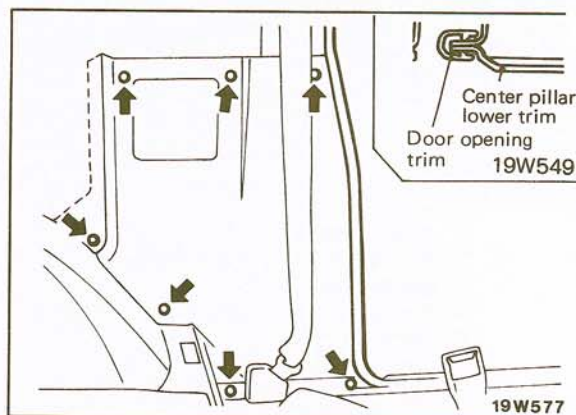
19W054





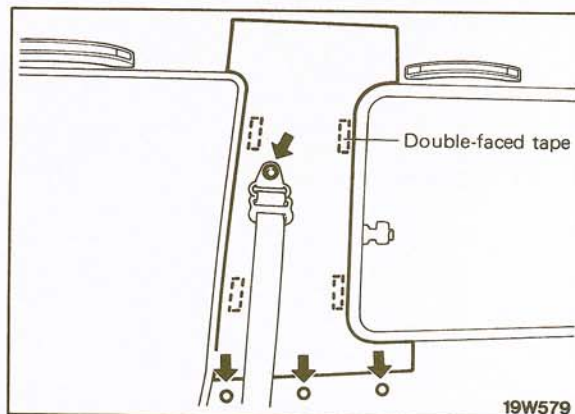
### Center Pillar Lower Trim

1. Remove the door opening trim. (19W549)
2. Remove the rear speaker if the vehicle is so equipped. (Refer to GROUP 8.)
3. Insert special tool (MB990784) under the center pillar lower trim and remove the clips. Slowly raise the center pillar lower trim upward to remove. (19W577)



### Center Pillar Upper Trim

1. Remove the door opening trim.
2. Remove the shoulder anchor plate of the front seat belt. (19W579)
3. Remove the three clips at the top part of the center pillar lower trim. (19W579)
4. Being careful of the double-faced tape, pull the center pillar upper trim out from the quarter window weatherstrip. (19W579)



### Quarter Trim

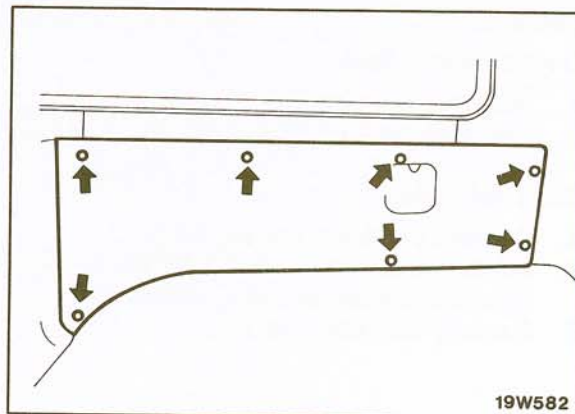
1. Remove the ashtray. (L. H.)
2. Insert special tool (MB990784) under the quarter trim and remove the clips. (19W582)
3. Remove the quarter trim.

### Wheelhouse Trim

1. Remove the rear seat. (Refer to P. 23-68.)
2. Undo the hooks and remove the wheelhouse trim.

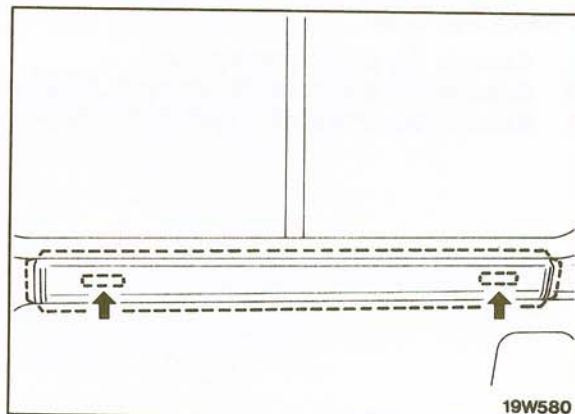
#### NOTE

When remounting the wheelhouse trim, it should be mounted with the cargo floor mat on top of it.



### Quarter Upper Trim

1. Remove the quarter trim. (19W582)
2. Being careful of the double-faced tape on the back, pull the quarter upper trim out from the quarter window weatherstrip. (19W580)





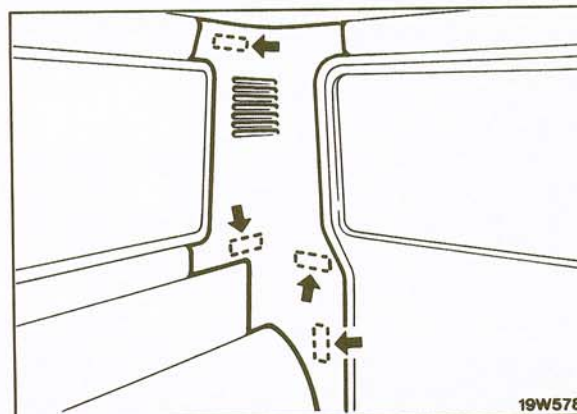


## Rear Pillar Trim

1. Remove the rear opening trim.
2. Remove the quarter trim. (Refer to P. 23-58.)
3. Being careful of the double-faced tape on the back, pull the rear pillar trim out from the quarter window weatherstrip. (19W578)

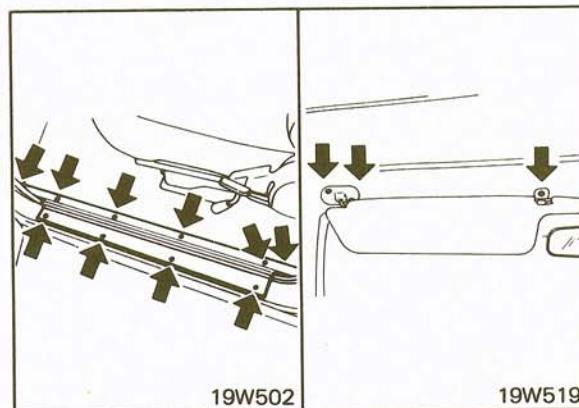
## Rear Opening Trim

Remove the rear opening trim.



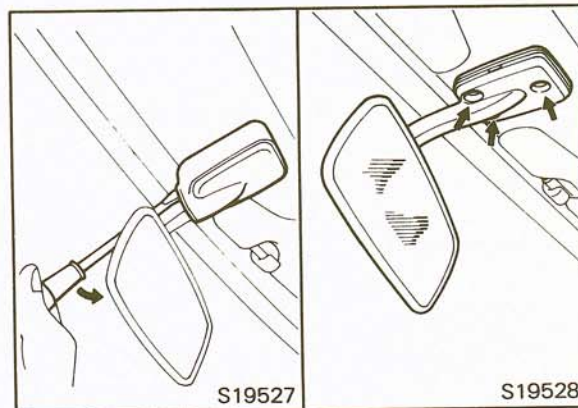
## Rail Cover, Sun Visors

1. Remove the screws, and then remove the rail covers. (19W502)
2. Remove the screws, and then remove the sun visors and sun visor holders. (19W519)



## Rear-view Mirror

1. Remove the rear-view mirror cover. (S19527)
2. Remove the screws, and then remove the rear-view mirror. (S19528)

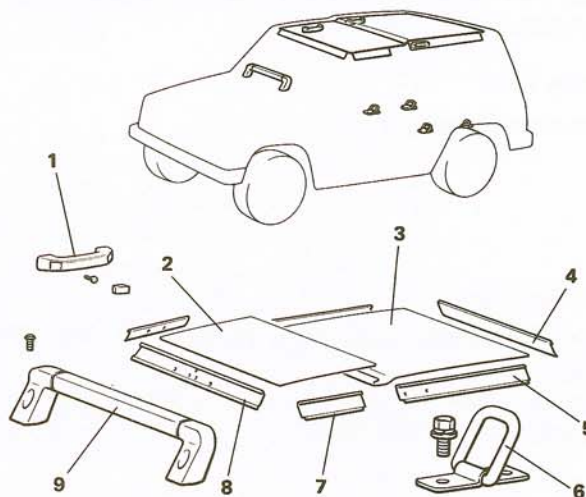






### COMPONENTS

1. Assist strap
2. Front headlining (metal-top vehicles)
3. Rear headlining (metal-top vehicles)
4. Rear roof rail trim
5. Rear side roof rail trim
6. Hook
7. Front side roof rail trim
8. Front roof rail trim
9. Assist grip

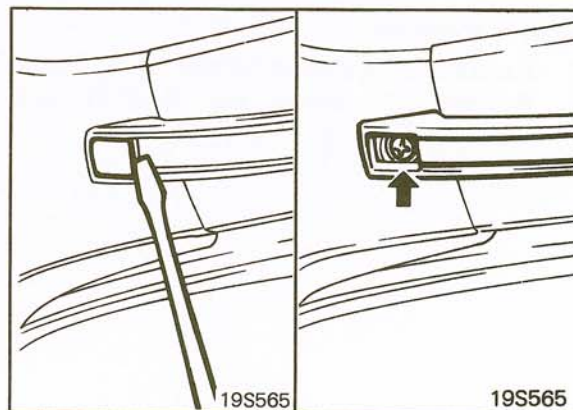


19W58.

### REMOVAL

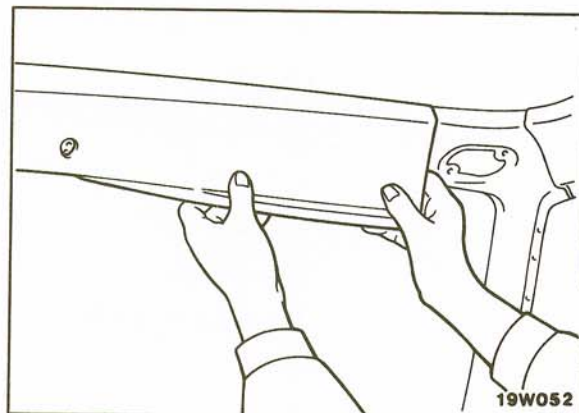
#### Assist Straps

1. Remove the assist strap caps. (19S565)
2. Remove the assist strap mounting screws, and then remove the assist straps. (19S565)



#### Front Rail Trim

1. Remove the front pillar trim. (Refer to P. 23-57.)
2. Remove the rear-view mirror. (Refer to P. 23-59.)
3. Remove the sun visor holders. (Refer to P. 23-59.)
4. Remove the front rail trim. (19W052)

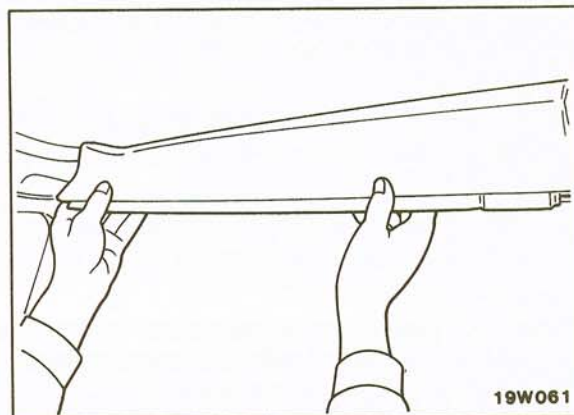






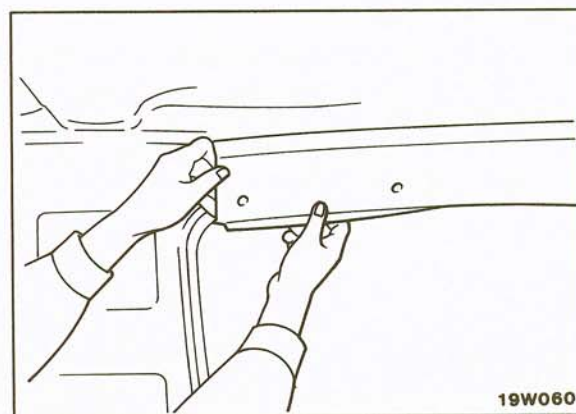
## Front Side Roof Rail Trim

1. Remove the assist strap. (R. H.)
2. Remove the door opening trim.
3. Remove the front side roof rail trim. (19W061)



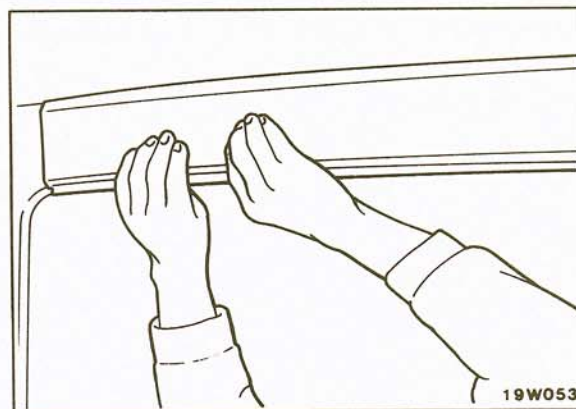
## Rear Side Roof Rail Trim

1. Remove the assist strap.
2. Remove the center pillar upper trim. (Refer to P. 23-58.)
3. Pull the rear side roof rail trim out from the quarter window weatherstrip. (19W060)



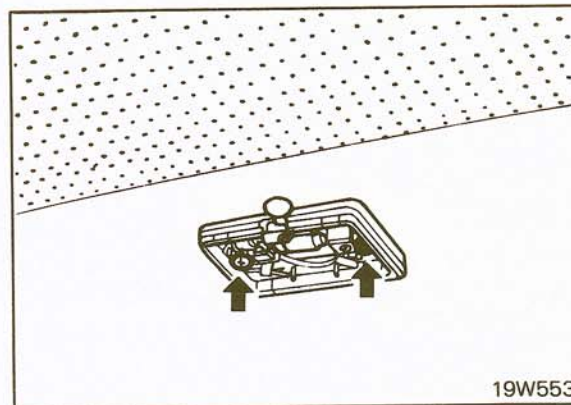
## Rear Roof Rail Trim

1. Remove the rear opening trim.
2. Remove the rear roof rail trim. (19W053)



## Headlining

1. Remove the roof rail trim.
2. Remove the dome light mounting screws, and then remove the dome light. (19W553)







## COMPONENT SERVICE-HEADLINING AND ASSIST STRAPS

3. Slowly peel the headlining away, beginning with the corner of the roof panel. (19W554)

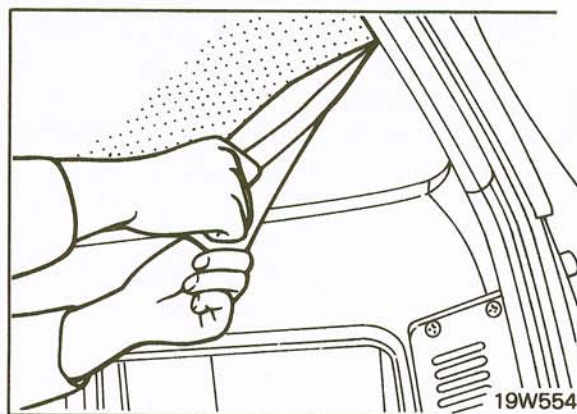
### Caution

Make sure that the headlining is removed slowly; as the sponge portion of the headlining is left behind on the roof panel.

4. Thoroughly remove the drying sealant and sponge left behind on the roof panel by using a toluol solution, etc.

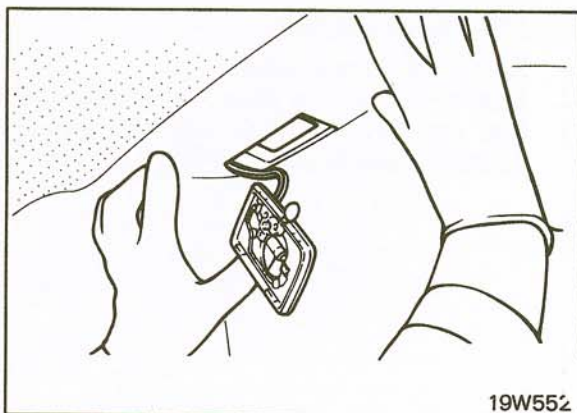
### Caution

Make sure that all remaining sealant and sponge are thoroughly removed, as they produce uneven surfaces when the headlining is bonded to the roof panel.

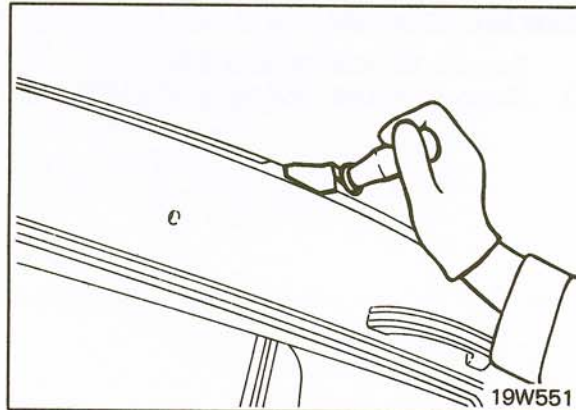


## INSTALLATION

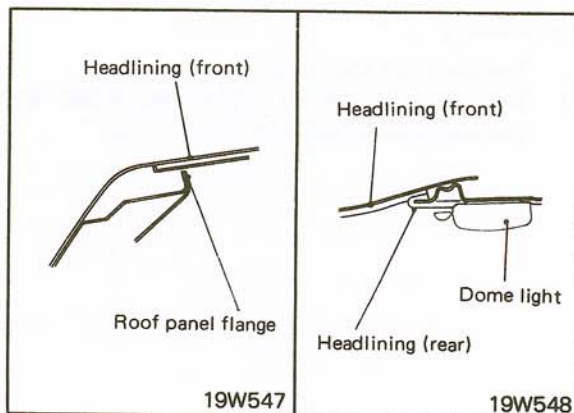
1. Evenly apply a drying sealant to the roof panel.
2. When installing the rear headlining, connect the dome light connector, pass it through the hole in the lining, and then bond the lining so that the hole matches the dome light mounting hole. (19W552)



3. Using care to prevent wrinkles and slackness, bond the headlining and insert the edges securely into the roof panel flange by using a spatula, etc.



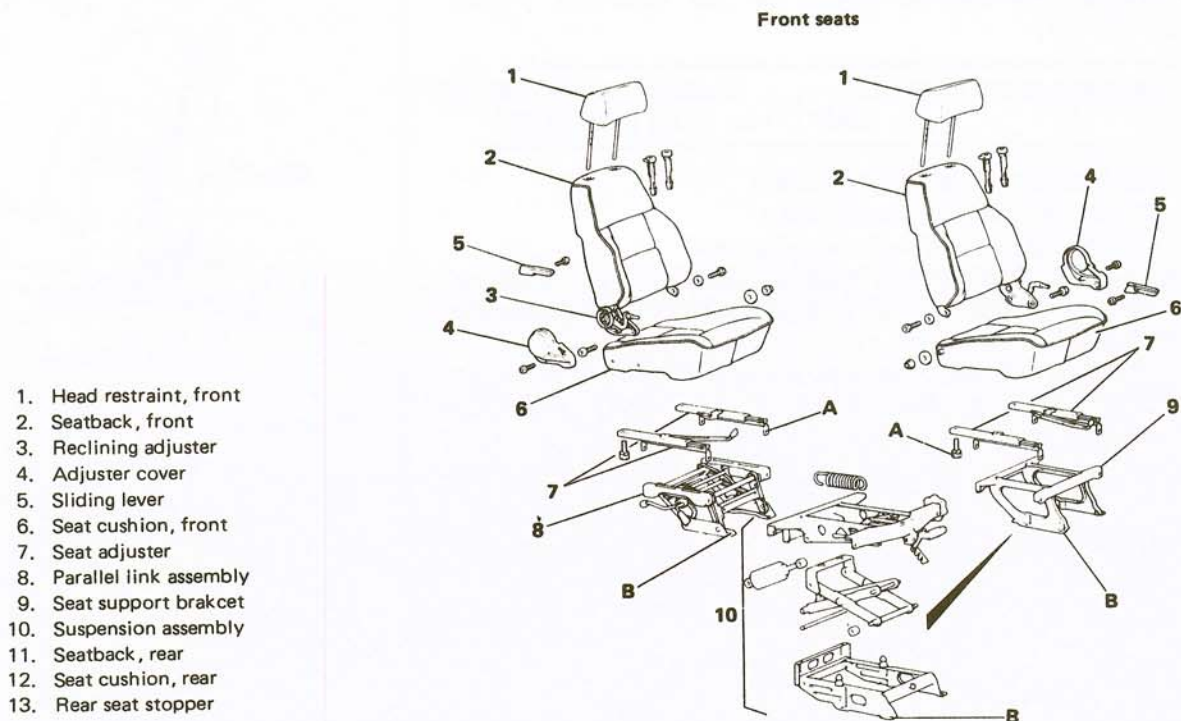
4. Bond the headlining edges as shown.



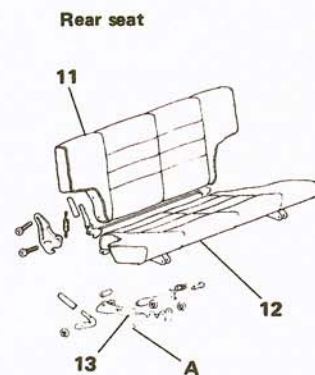




## COMPONENTS



	Nm	ft.lbs.
A	10-14	7-10
B	32-49	23-35

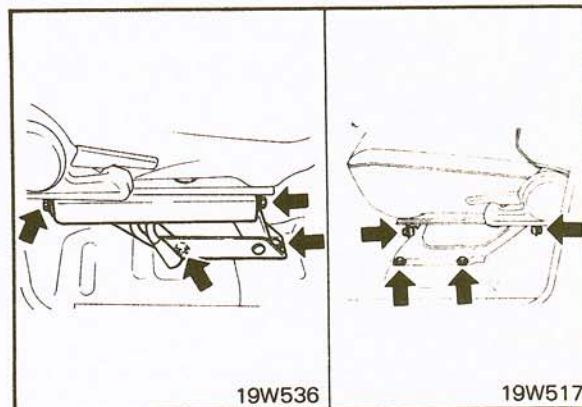


19W550

## FRONT SEATS

### Removal

1. Detach the seat from the floor panel and remove the seat assembly. (19W536, 19W517)
2. Detach and separate the seat cushion from the bracket of the seat assembly.





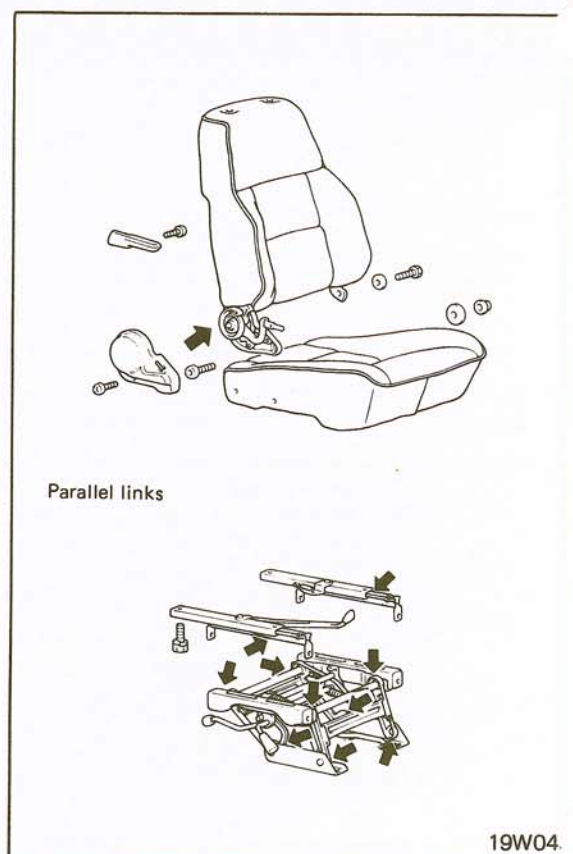


### Installation

1. Apply multipurpose grease to the following points.  
(19W043)

Recommended grease . . . . . Multipurpose grease  
SAE J310a, NLGI grade #2EP

- (1) Sliding parts of seat adjusters
  - (2) Sliding parts of parallel links
  - (3) Sliding parts of reclining adjusters
2. After the seat has been installed, check to ensure that the seat adjusters lock at all lock positions when the seatback is moved slowly.
  3. Check to ensure that the forward folding and return mechanisms of the parallel links operate smoothly and lock securely.



### SUSPENSION SEAT

#### Outline

The suspension seat has a special suspension mechanism in the base frame and is installed on the driver's seat side. When the vehicle travels on an uneven ground surface or rough road, the seat absorbs the body vibration the vehicle takes from the road surface, reducing driver fatigue and assuring a more comfortable ride.

The seat offers the following features:

- (1) Pantograph type link mechanism
- (2) Optimum combination of coil spring and shock absorber
- (3) More comfortable ride by adjust body weight meter to driver's weight
- (4) Fixed position of seat can be adjusted in three height levels

The components of the suspension seat are as follows:

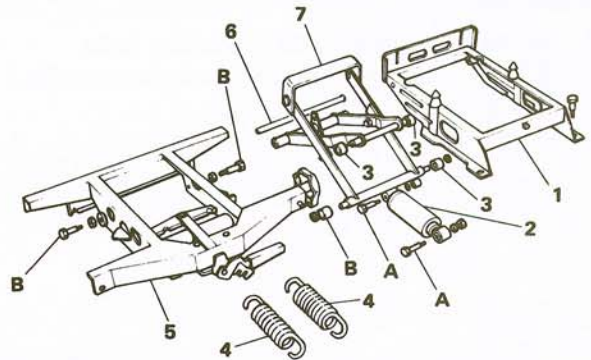




## Suspension system

1. Lower bracket
2. Shock absorber
3. Roller
4. Coil spring
5. Upper bracket
6. Shaft
7. Link

	Nm	ft.lbs.
A	7-10	5-7
B	27-36	20-26

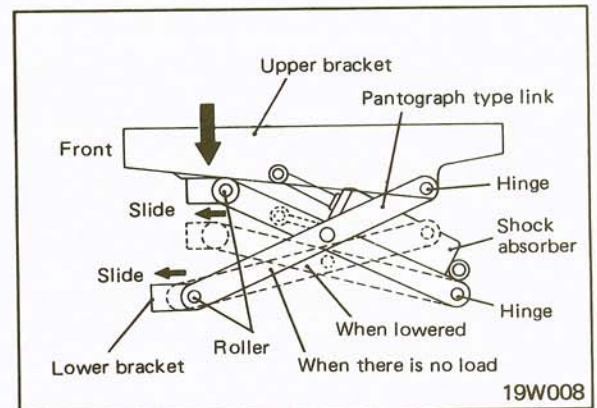


19W006

## OPERATION

### Suspension Mechanism

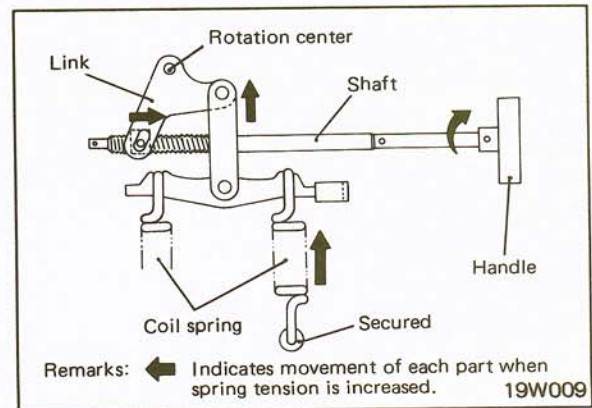
The suspension mechanism is constructed as shown. The lower and upper brackets of the link are coupled by hinges at one end and by rollers at the other, allowing forward and backward sliding. If a force in the direction of the arrow is exerted to the link (pantograph), the upper bracket is moved downward, so the shock absorbers hinge-coupled to the lower and upper brackets absorb vibration.



19W008

### Body Weight Adjusting Mechanism

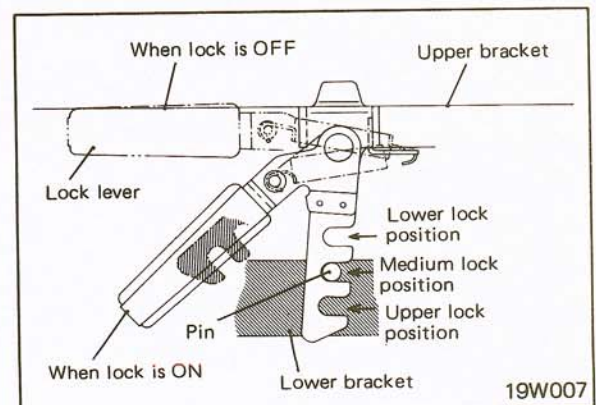
The body weight adjusting mechanism is constructed as shown in the illustration at right. When the handle is turned to match the driver's weight, the coil spring secured to the upper bracket at one end and mounted through a link at the other is displaced in the direction of the arrow by movement of the nut at the end of the shaft of the handle, so the spring tension changes. Clockwise rotation of the handle increases the spring tension, while counterclockwise rotation reduces the spring tension.



19W009

### Suspension Lock Mechanism

The suspension lock mechanism is constructed as shown in the illustration at right. The seat lock position can be selected in three levels by a lock lever.



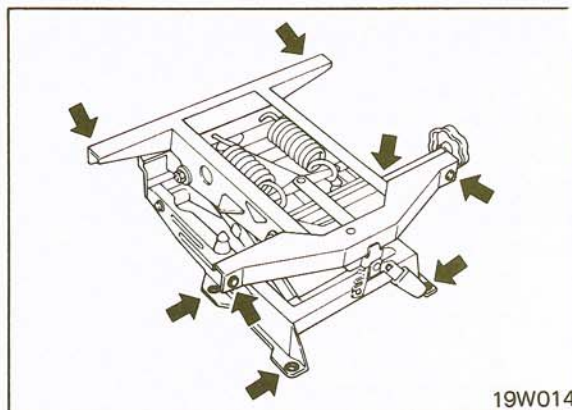
19W007





### REMOVAL

1. Remove the front seat mounting bolts.
2. Remove the lower bracket mounting bolts.

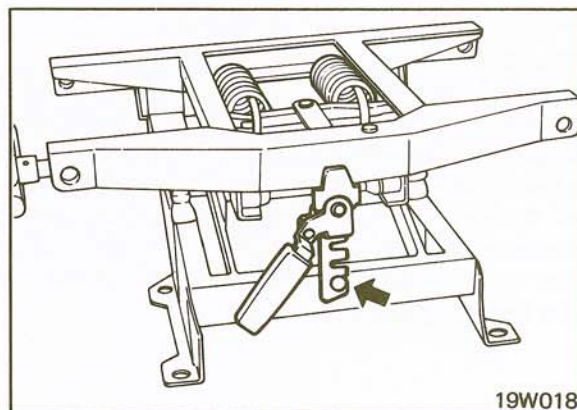


### INSPECTION BEFORE DISASSEMBLY

- (1) Check springs for damage and deterioration.
- (2) Check shock absorber for noise and fluid leaks.
- (3) Check all rightened points for looseness.
- (4) Check rollers for noise and damage.
- (5) Check links for cracks, bending or dents.
- (6) Check body weight adjusting handle for bends, damage or looseness.
- (7) Check lock lever for bends and damage.
- (8) Check damper rubber for cracks and damage.

### DISASSEMBLY

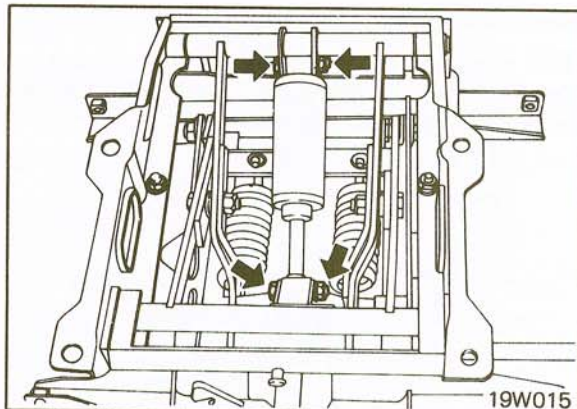
1. Turn the body weight adjusting handle counterclockwise all the way. (body weight scale reading should be less than 50 kg)
2. Lock the lock lever in the upper level position. (19W018)



3. Turn the suspension mechanism upside down and remove the shock absorber.

#### Caution

The shock absorber must not be disassembled.



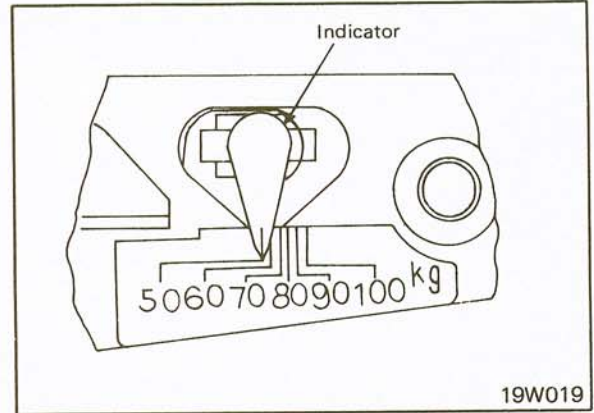




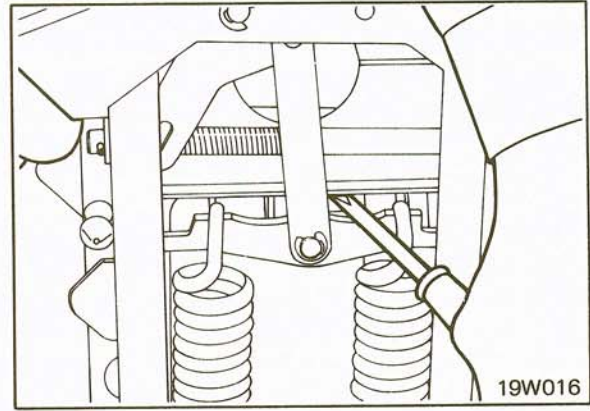
4. Place the suspension mechanism on its side.
5. Remove the body weight scale indicator from the link.  
(19W019)

## NOTE

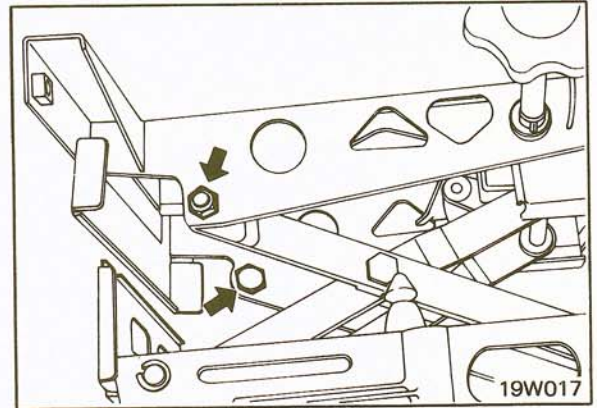
Before removing the indicator, make note of its position for use during reassembly.



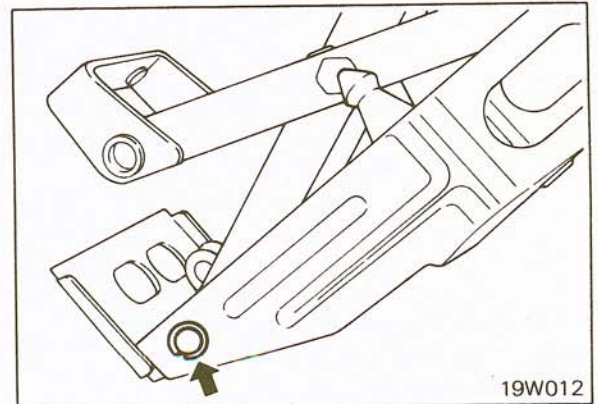
6. Using a screwdriver, remove the link side coil spring.



7. Remove the upper bracket side link mounting bolts and nuts.



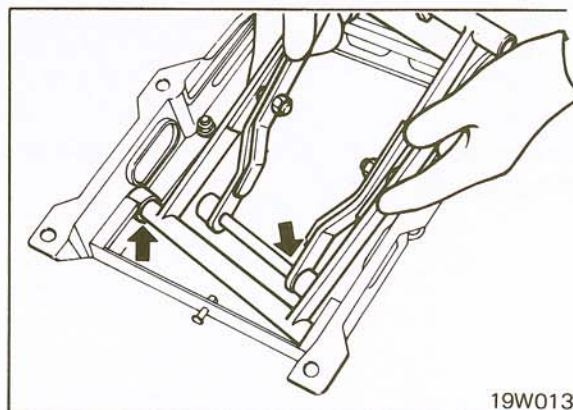
8. Remove the lower bracket side link mounting snap ring, and then remove the shaft.







9. Remove the link from the lower bracket side, and then remove the roller.



### REASSEMBLY

Apply recommended multipurpose grease to all sliding and rotating surfaces.

Recommended grease . . . . . Multipurpose grease  
SAE J310a, NLGI grade #2EP

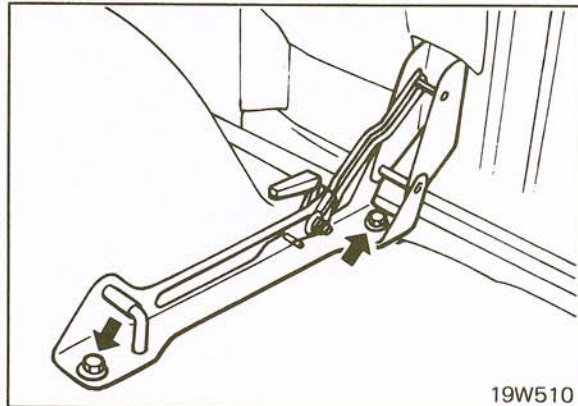
#### Caution

1. When installing the shaft, be sure that the serrations are aligned.
2. The shock absorber and link mounting nuts are special nuts. Be sure to use new identical ones.

### REAR SEAT

#### Removal

Fold the seat cushion forward and down, remove the mounting bolts, and then remove the rear seat.

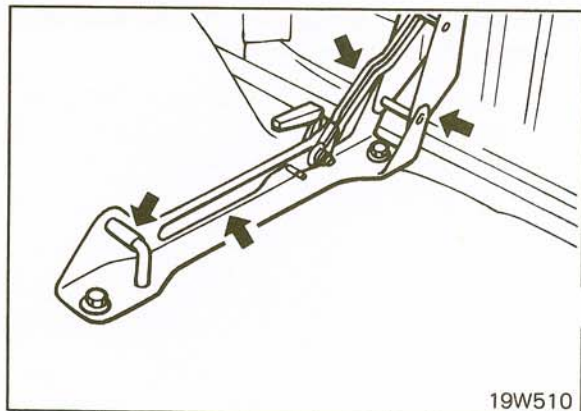


#### Installation

1. Apply recommended multipurpose grease to the following places. (19W510)

Recommended grease . . . . . Multipurpose grease  
SAE J310a, NLGI grade #2EP

- (1) Sliding part of rear seat stopper
- (2) Contacting part of rear seat stopper striker
2. After the seat has been installed, check to ensure that the lock release, forward-down, folding and return mechanisms all operate smoothly.
3. Check to ensure that when the seat cushion is folded, the seat stoppers lock securely.



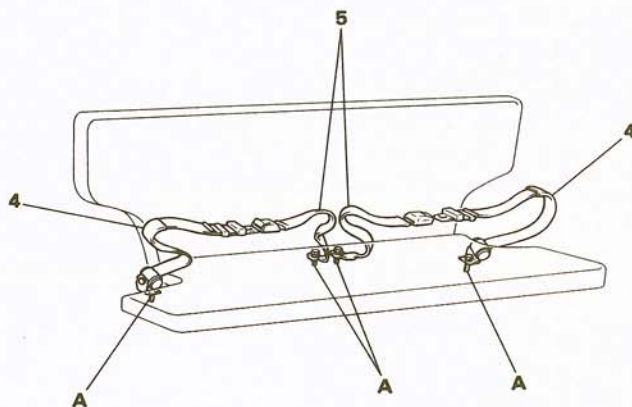
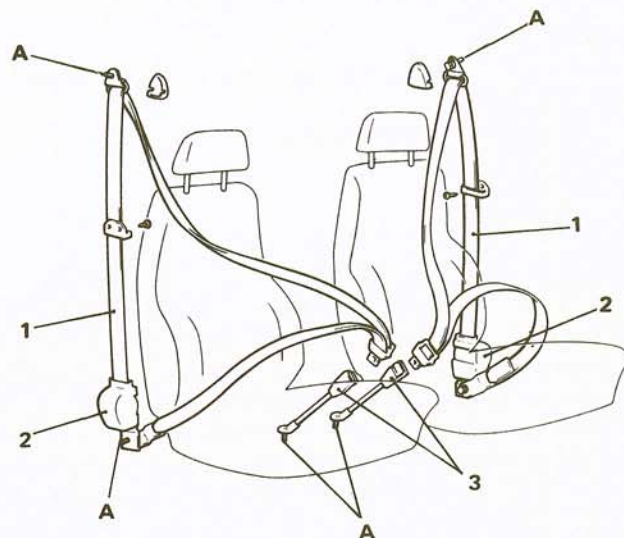




## COMPONENTS

1. Front seat belt
2. Emergency locking retractor (E.L.R.)
3. Buckle stalk
4. Rear seat belt
5. Rear seat belt, inner

	Nm	ft.lbs.
A	23-65	17-47

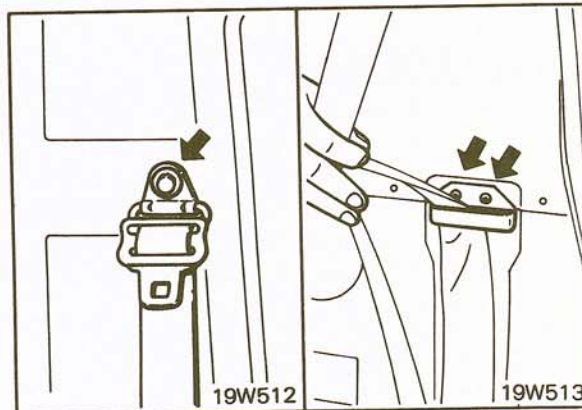


19W041  
19W563

## FRONT SEAT BELTS

### Removal

1. Remove the center pillar trim. (Refer to p. 23-58.)
2. Remove the shoulder anchor plate. (19W512)
3. Remove the screws of the seat belt guide located at the center of the belt. (19W513)







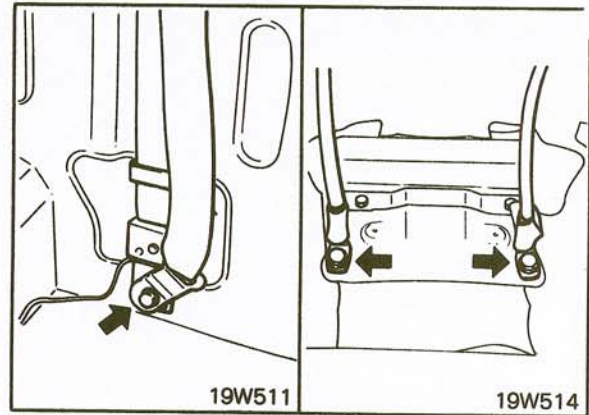
## COMPONENT SERVICE-SEAT BELTS

4. Disconnect the solenoid connectors and the seat belt switch connectors from the front harness.
5. Remove the retractor mounting bolts and remove the retractor. (19W511)
6. Remove the buckle stalk. (19W514)

### Caution

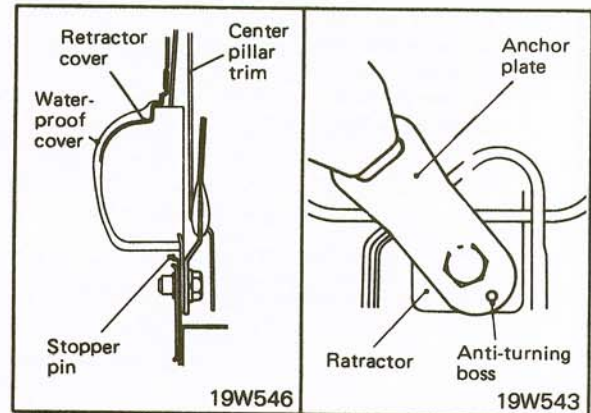
Special bolts (1-in. bolts) are used for the seat belt mounting bolts.

Do not disassemble the retractor.



### Installation

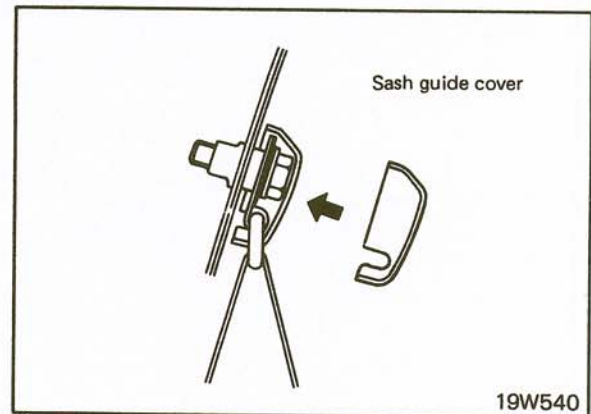
1. Fit the anti-rotation stopper pin of the webbing into the hole in the side sill. (19W546)
2. Fit the anchor plate anti-turning boss securely into the retractor side hole and jointly tighten the retractor and the anchor plate. (19W543)



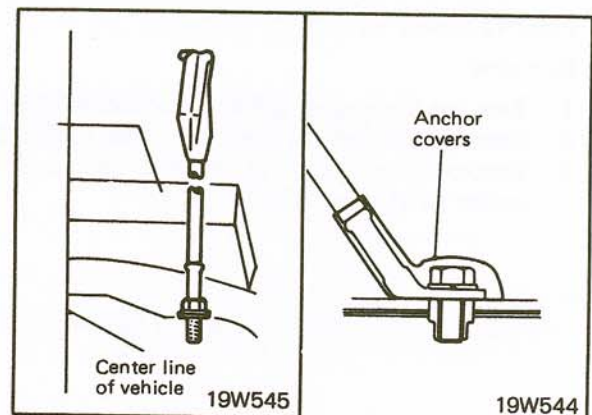
3. Install the shoulder anchor plate.
4. Install the seat belt guide.
5. Install the sash guide cover. (19W540)

### NOTE

After installation, check to ensure that the sash guide rotates smoothly.



6. Install the seat belt buckle stalk parallel with the center line of the vehicle.







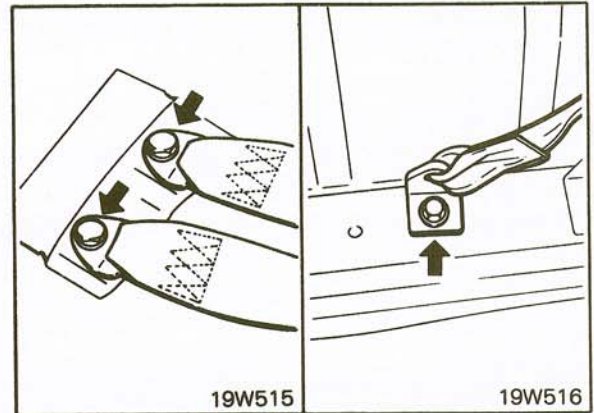
## REAR SEAT BELTS

### Removal

Remove the rear seat belts.

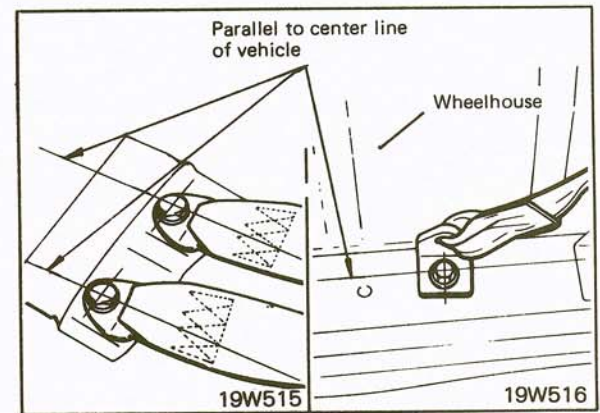
### NOTE

Special bolts (1-in. bolts) are used for the seat belt mounting bolts.



### Installation

Position the anchor plates at the center of the vehicle so that the belts are parallel to the vehicle center line, and then secure the plates with the bolts. (19W515, 19W516)











# HEATERS AND AIR-CONDITIONING

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## SPECIFICATIONS

### GENERAL SPECIFICATIONS

Front heater assembly	
Type	Selective recirculating, hot-water type (air-mix type)
Performance	4,884 kW/h (4,200 kcal/h)
Front heater relay	
Exciting coil rated current	0.2 A
Maximum contact current capacity	20 A
Rear heater assembly	
Type	Warm water type
Performance	2,326 kW/h (2,000 kcal/h)
Air conditioner	
Performance	4,070 kW/h (3,500 kcal/h)
Compressor	
Type	6P148
No. of cylinders and displacement	Inclined-plate type; 6,148 cc (9.03 cu.in.)
Maximum speed	6,000 rpm
Electromagnetic clutch	
Type	Dry, single-plate type
Voltage	12 V
Output	40 W
Condenser fan motor	
Air volume	800 m <sup>3</sup> /h
Voltage	12 V
Output	96 W
Speed	2,350 rpm
Control	
Idle-up	850 to 950 rpm when cooler is ON
Icing prevention	1.0°C (22°F) when fin thermo is OFF 4.5°C (39°F) when fin thermo is ON
Quantity of refrigerant to be charged	
R12 700 $\pm$ $\frac{300}{100}$ g (1.54 $\pm$ $\frac{0.66}{0.22}$ lb.)	

### SERVICE SPECIFICATIONS

Heater assembly	
Water hose overlap length    mm (in.)	25-30 (1.0-1.2)
Air-conditioning	
Drive belt deflection    mm (in.)	17-20 (.7-.8)
Pressure plate to rotor clearance    mm (in.)	0.4-0.7 (.02-.03)
Shaft rotating torque    Nm (ft.lbs.)	5 (4) or less
Shaft starting torque    Nm (ft.lbs.)	5 (4) or less



## SPECIFICATIONS



### TORQUE SPECIFICATIONS

Nm (ft.lbs.)

Heater assembly	
Water hose clamp bolts	1.3-1.8 (0.9-1.3)
Air conditioner	
Center piece securing nut	15-17 (11-13)
Discharge and suction service valve mounting bolts	25-26 (18-20)
Front housing through bolt	2.5-2.6 (1.8-2.0)

### LUBRICANTS

	Specified lubricant	Quantity
Heater assembly		
Heater control lever	Multipurpose grease SAEJ310a, NLGI grade #2	As required
Air conditioner		
Compressor oil	DENSOIL 6 [SUNISO 5GS (VG100)] or equivalent	Total : approx. 170 ± 30 cc (10.37 ± 1.83 cu.in.)

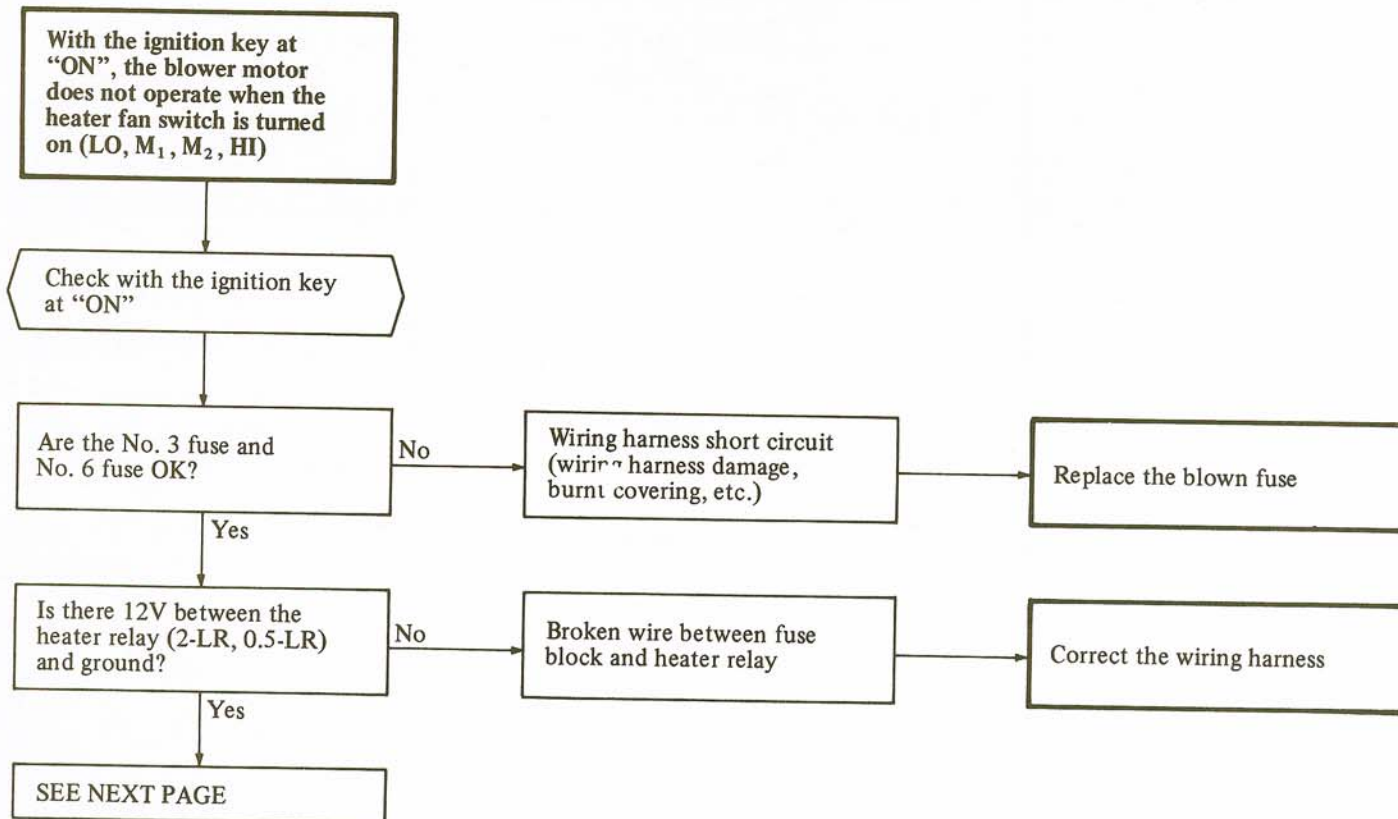




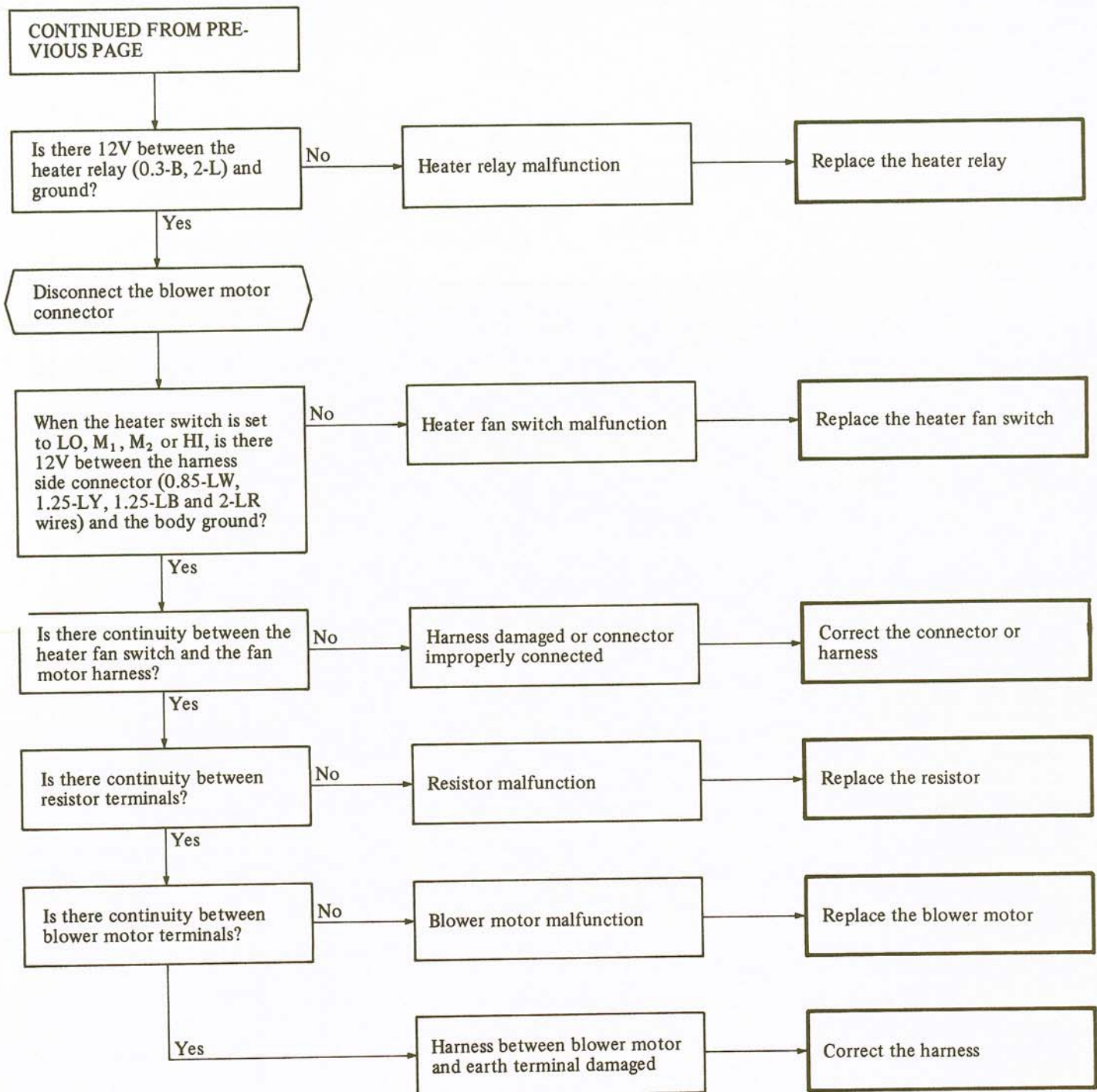
## TROUBLESHOOTING

### FRONT HEATER

Symptom	Probable cause	Remedy
The temperature cannot be regulated by operating the hot-water flow control lever	Clogged or stuck water valve	Repair or replace the water valve
	Incorrect installation of hot-water flow control cable	Adjust the hot-water flow control cable
	Incorrect adjustment of water valve link	Adjust the water valve link
No ventilation even when air outlet changeover lever is operated	Incorrect adjustment of changeover dampers	Adjust the air outlet changeover cable
	Loose duct connection	Connect the duct securely
Abnormal sound from blower motor	Foreign matter inside blower	Remove foreign matter
	Incorrect balance of blower motor or fan	Replace the blower motor or fan
	Damaged blower	Replace
Dust enters passenger compartment	Ventilator duct connection malfunction	Connect the duct securely or replace the packing
	Incorrect adjustment of recirculation/fresh air changeover damper	Adjust the recirculation/fresh air changeover cable



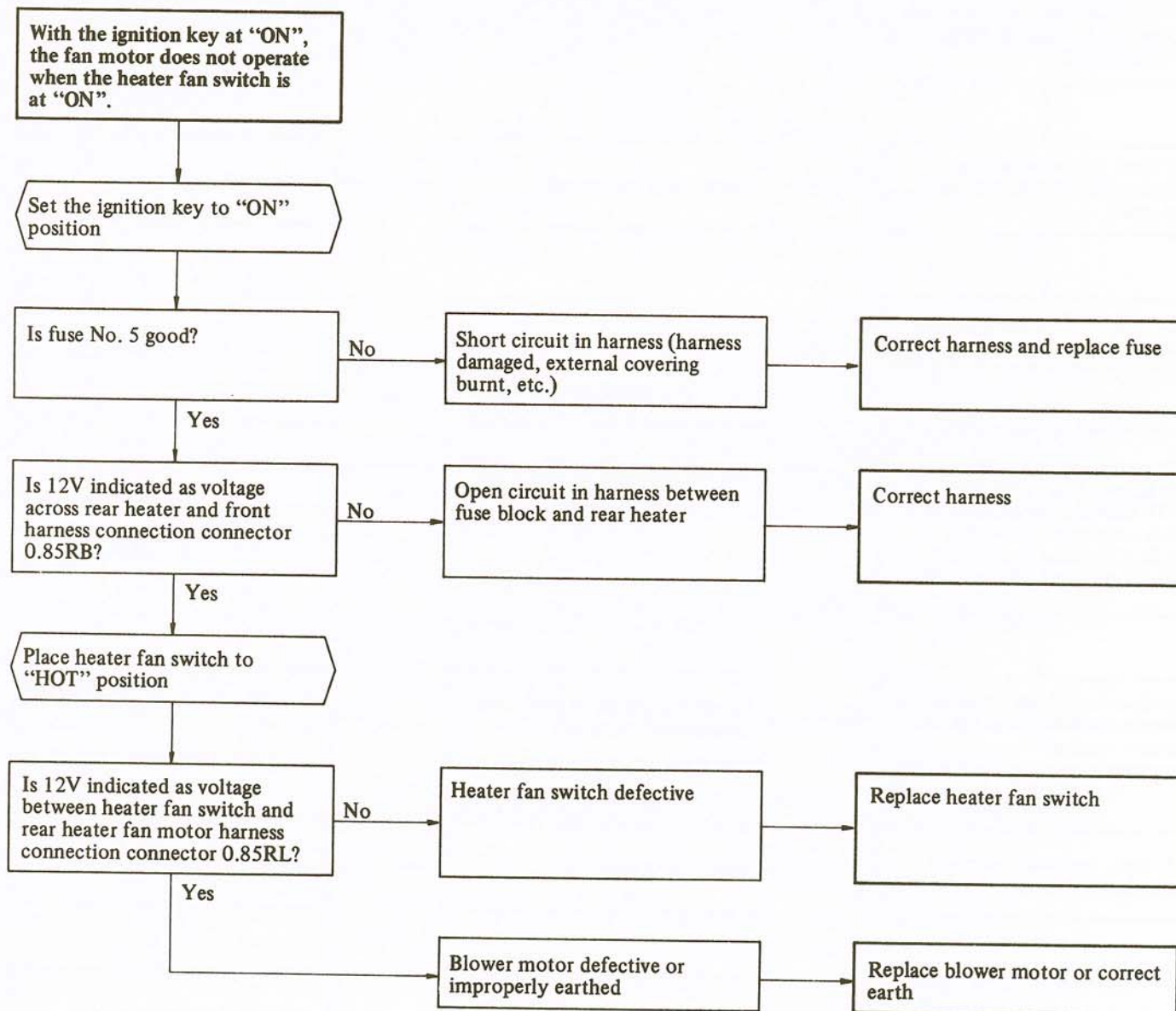








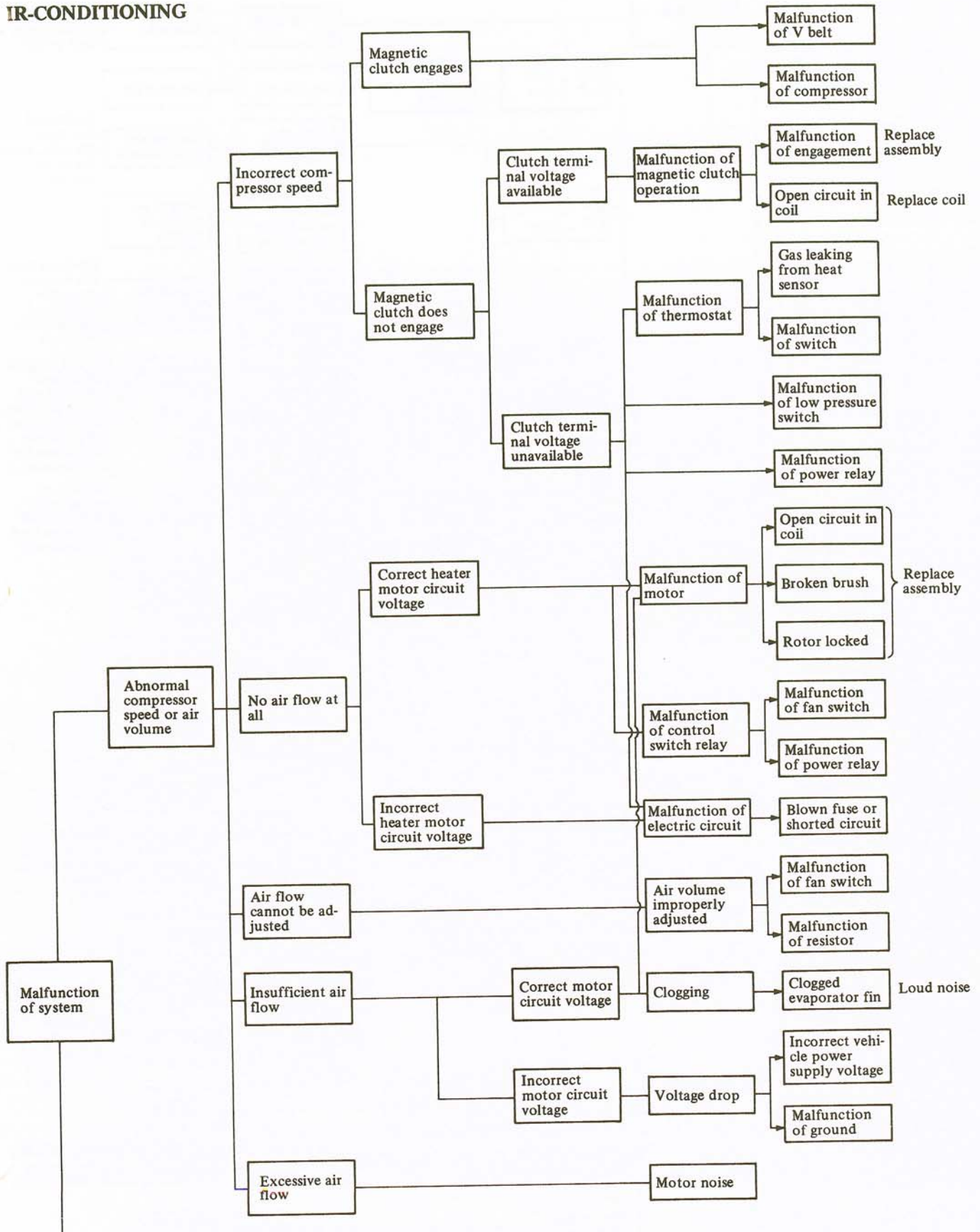
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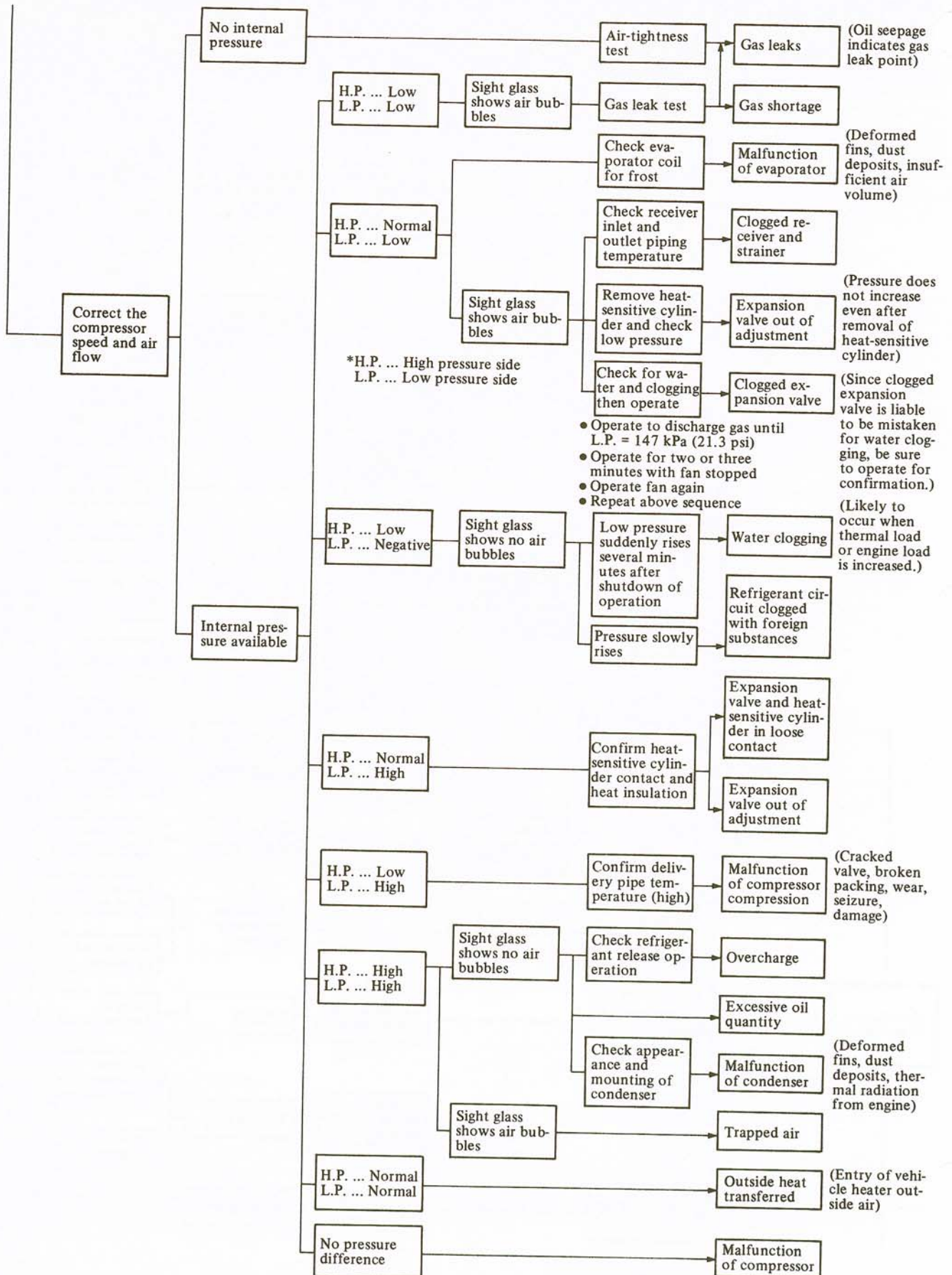
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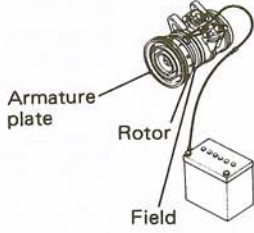
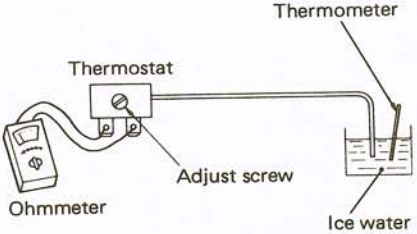
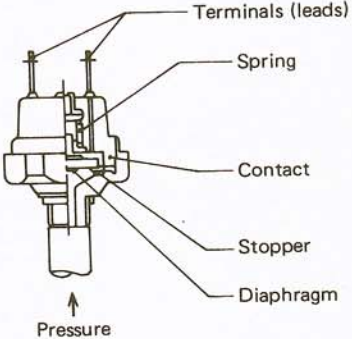


## TROUBLESHOOTING





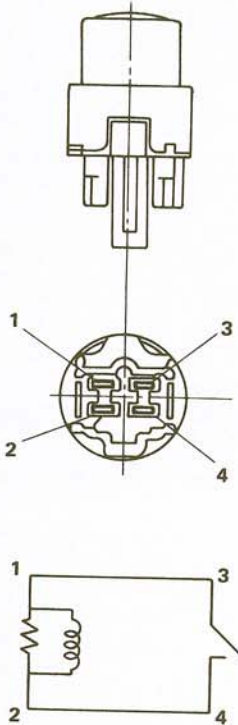
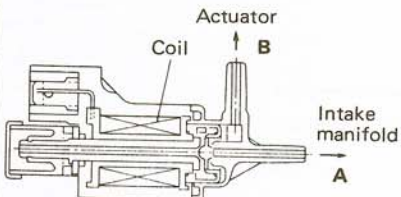


Probable cause	Diagnosis and correction	Remarks
Malfunction of magnetic clutch	<p>[Diagnostic procedure]</p> <ol style="list-style-type: none"> <li>1. Connect the lead to the (+) terminal of the battery to see if the clutch engages with a click.</li> <li>2. Check for continuity between the lead and ground. (Check for open circuit in the coil.)</li> <li>3. Check for noise during operation. (Check for malfunction of bearing and for slipping.)</li> </ol> <p>[Correction]</p> <ol style="list-style-type: none"> <li>1. If there is an open circuit in the coil, replace the clutch.</li> <li>2. If the bearing makes noise, replace it.</li> <li>3. If slipping is evident, replace the clutch.</li> </ol>	 <p style="text-align: right;">20Y901</p>
Fin thermostat	<p>[Diagnostic procedure]</p> <ol style="list-style-type: none"> <li>1. Immerse the heat-sensitive portion of the thermostat in ice water as shown. Check to ensure that when the temperature is lowered to 1.6°C (35°F), there is no continuity (OFF). If the thermostat is not OFF, it has a problem.</li> <li>2. Gradually add lukewarm water into the water tank until the thermometer registers 4.6°C (40.28°F), and check to ensure that there is continuity (ON). If the thermostat is not ON, it has a problem.</li> </ol> <p>[Correction]</p> <ol style="list-style-type: none"> <li>1. If there is anything wrong, slightly turn the adjust screw (clockwise for lower temperature setting and vice versa) and check by performing the above steps 1. and 2.</li> <li>2. If this does not correct the problem, replace.</li> </ol>	 <p style="text-align: right;">20Y902</p>
Low pressure switch	<p>[Diagnostic procedure]</p> <ol style="list-style-type: none"> <li>1. When the air conditioner is stationary, connect the gauge manifold to the service valve of the compressor. If there is a pressure of over 2.1 kg/cm<sup>2</sup> G (30 lb/in<sup>2</sup> G) in the system, connect an ohmmeter between terminals (leads) to verify that there is continuity (ON). OFF indicates a problem.</li> <li>2. If the pressure in the system is lower than 2.1 kg/cm<sup>2</sup> G (30 lb/in<sup>2</sup> G), check to ensure that there is no continuity between terminals (leads) (OFF). ON indicates a problem.</li> <li>3. If there is no continuity (OFF) in the above step (2), add refrigerant through the gauge manifold and check to ensure that when the pressure of the high pressure side rises to 2.35 kg/cm<sup>2</sup> G (33.5 lb/in<sup>2</sup> G), the switch becomes ON. If it does not become ON, there is a problem.</li> </ol> <p>[Correction]</p> <p>If there is a problem, replace.</p>	 <p style="text-align: right;">20Y903</p>





## TROUBLESHOOTING

Probable cause	Diagnosis and correction	Remarks
Power relay	<p>[Diagnostic procedure]</p> <p>If there is continuity (ON) between the terminals (1) and (2) when a voltage is applied between the terminals (3) and (4), and if there is no continuity (OFF) when no voltage is applied across the terminals (3) and (4), the power relay is good. Otherwise the power relay is defective.</p> <p>[Correction]</p> <p>Replace if defective.</p>	
Idle-up device solenoid valve	<p>Checking Method</p> <ol style="list-style-type: none"> <li>1. Confirm that the vacuum hoses are not damaged, and that they are connected properly.</li> <li>2. Connect a voltage of 12V to the lead wire of the solenoid valve. (Connect it directly to the battery.)</li> </ol> <p>There should be a clear passage between (A) and (B). (Blow through the valve to check it.)</p> <p>Correction</p> <p>If the solenoid valve is malfunctioning, replace it with a new one.</p>	
Malfunction of cooling performance	<p>If the refrigerant level is low, the compressor oil can also be assumed to be low. Remove the compressor from the vehicle, check the amount of oil output from the compressor, and then replenish the oil so that there is approximately 90 cc. (5.5 cu. in.)</p> <p>If the cooling effectiveness is low even though the refrigerant level is correct, it is probably due to an excessive amount of compressor oil. Remove the compressor from the vehicle, check the amount of oil output from the compressor, and drain out enough oil so that there is approximately 90 cc. (5.5 cu. in.)</p>	<p>Check the refrigerant level visually in the sight glass at least once every three months.</p>

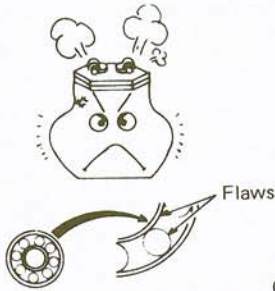
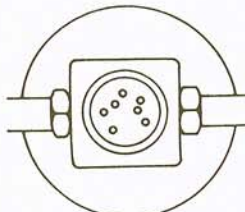
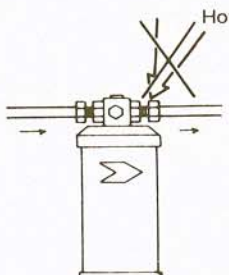
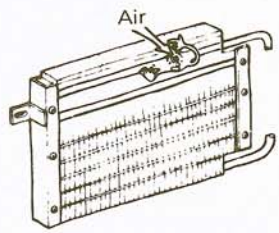
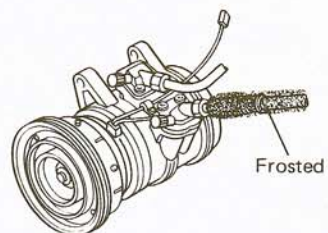
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# TROUBLESHOOTING

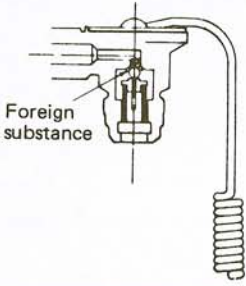
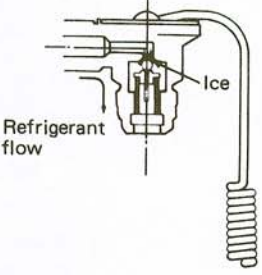
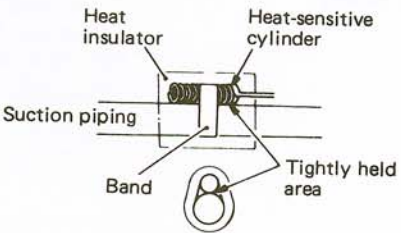
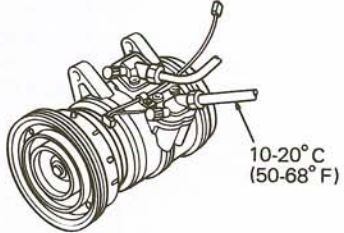
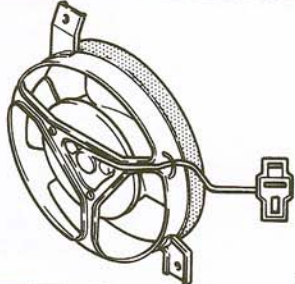


Probable cause	Diagnosis and correction	Remarks
Malfunction of compressor	<p>[Diagnostic procedure]</p> <ol style="list-style-type: none"> <li>1. Check to see if the pulley can be turned by hand. (Check for seizure.)</li> <li>2. Operation causes low pressure to increase and main body temperature to rise. (Broken packing, cracked valve)</li> </ol> <p>[Correction]</p> <p>Correct any malfunctions by replacing parts.</p>	 <p style="text-align: right;">C20524</p>
Refrigerant leaks	<p>[Diagnostic procedure]</p> <ol style="list-style-type: none"> <li>1. Check superheated temperature of the compressor suction piping. If the superheated temperature is 10 to 20°C (50° to 68°F), the piping is good. If the temperature is lower, there is a malfunction of the piping.</li> <li>2. If the sight glass shows air bubbles, the refrigerant is leaking.</li> </ol> <p>[Correction]</p> <p>Check to discover leaking points. Correct or recharge.</p>	 <p style="text-align: right;">C20525</p>
Clogged strainer (receiver)	<p>[Diagnostic procedure]</p> <p>If the temperature difference between the strainer intake and outlet pipes is more than 5°C (9°F), there is a malfunction of the strainer in the receiver.</p> <p>[Correction]</p> <p>Replace.</p>	 <p style="text-align: right;">C20526</p>
Air in refrigerant circuit	<p>[Diagnostic procedure]</p> <p>High pressure increases more than 98 kPa (14.2 psi) over saturation pressure which corresponds to the temperature of the refrigerant outlet piping of the condenser.</p> <p>[Correction]</p> <p>Evacuate the circuit and recharge refrigerant.</p>	 <p style="text-align: right;">C20527</p>
Refrigerant over-charged	<p>[Diagnostic procedure]</p> <ol style="list-style-type: none"> <li>1. Both high and low pressures are high.</li> <li>2. Compressor suction piping is frosted.</li> </ol> <p>[Correction]</p> <p>Remove refrigerant through the check valve. As a guide, make certain that the suction pipe superheating temperature just prior to appearance of air bubbles in the sight glass is 10 to 20°C (50 to 68°F).</p>	 <p style="text-align: right;">20Y905</p>





## TROUBLESHOOTING

Probable cause	Diagnosis and correction	Remarks
Clogging with foreign substance	<p>[Diagnostic procedure]</p> <ol style="list-style-type: none"> <li>1. High pressure increases and low pressure falls, and there is no cooling.</li> <li>2. Clogging is not automatically corrected during shutdown.</li> <li>3. Clogging usually occurs in the expansion valve.</li> </ol> <p>[Correction]</p> <p>Remove clogged parts and replace them.</p>	 <p style="text-align: right;">C20529</p>
Clogging with water	<p>[Diagnostic procedure]</p> <ol style="list-style-type: none"> <li>1. Symptoms similar to clogging with a foreign substance appear.</li> <li>2. The trouble is corrected after more than 30 minutes of shutdown, but it occurs again after resumption of operation.</li> </ol> <p>[Correction]</p> <p>Replace the receiver drier two or three times. (A new receiver allows operation for at least three hours.) The drier can be dehydrated by letting hot dry air pass through.</p>	 <p style="text-align: right;">C20530</p>
Expansion valve heat-sensitive cylinder	<p>[Diagnostic procedure]</p> <ol style="list-style-type: none"> <li>1. Low pressure is high, although the interior is cool.</li> <li>2. The suction piping is frosted.</li> </ol> <p>[Correction]</p> <p>Check and correct.</p>	 <p style="text-align: right;">C20531</p>
Expansion valve out of adjustment	<p>[Diagnostic procedure]</p> <ol style="list-style-type: none"> <li>1. Check to see that the superheating temperature of the compressor suction piping is 10 to 20°C (50 to 68°F).</li> <li>2. Removal of the heat-sensitive cylinder does not cause low pressure to increase.</li> </ol> <p>[Correction]</p> <p>Replace.</p>	 <p style="text-align: right;">20Y906</p>
Condenser fan motor	<p>[Diagnostic procedure]</p> <ol style="list-style-type: none"> <li>1. Apply 12V battery voltage to the 2-p connector of the fan motor.</li> <li>2. Confirm the smooth rotation of the motor within the specified current. Standard current: <math>8.0 \pm 0.8</math> A</li> </ol> <p>[Correction]</p> <p>Replace if defective.</p>	 <p style="text-align: right;">20W728</p>





## ECK AND ADJUSTMENT

After installation, check the following points and confirm that everything is in order, and then charge the gas, adjust the idle, make the adjustment, and carry out the performance and operation tests.

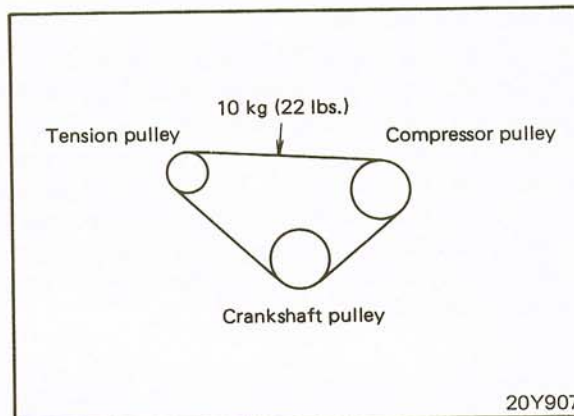
1. Check for any abnormal vehicle performance which might have been caused by installation of the A/C equipment.
2. Check operation of the magnetic clutch (without running the compressor).
3. Check for any parts left unmounted or any tools left behind in the vehicle.
4. Check the belt deflection. (20Y907)

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Drive belt deflection . . . . . 17-20 mm (.7-.8 in.)  
at 10 Nm (22 lbs.) of force

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5. Readjust the belt deflection after two or three weeks to eliminate initial stretch of new belt.



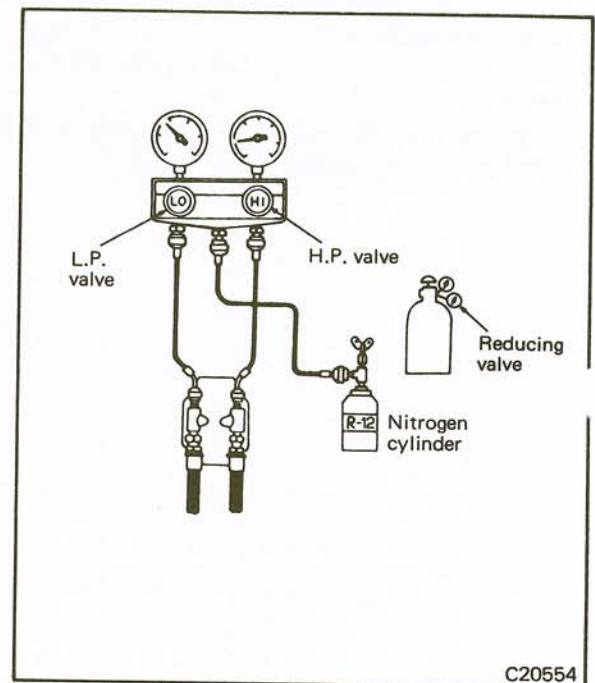
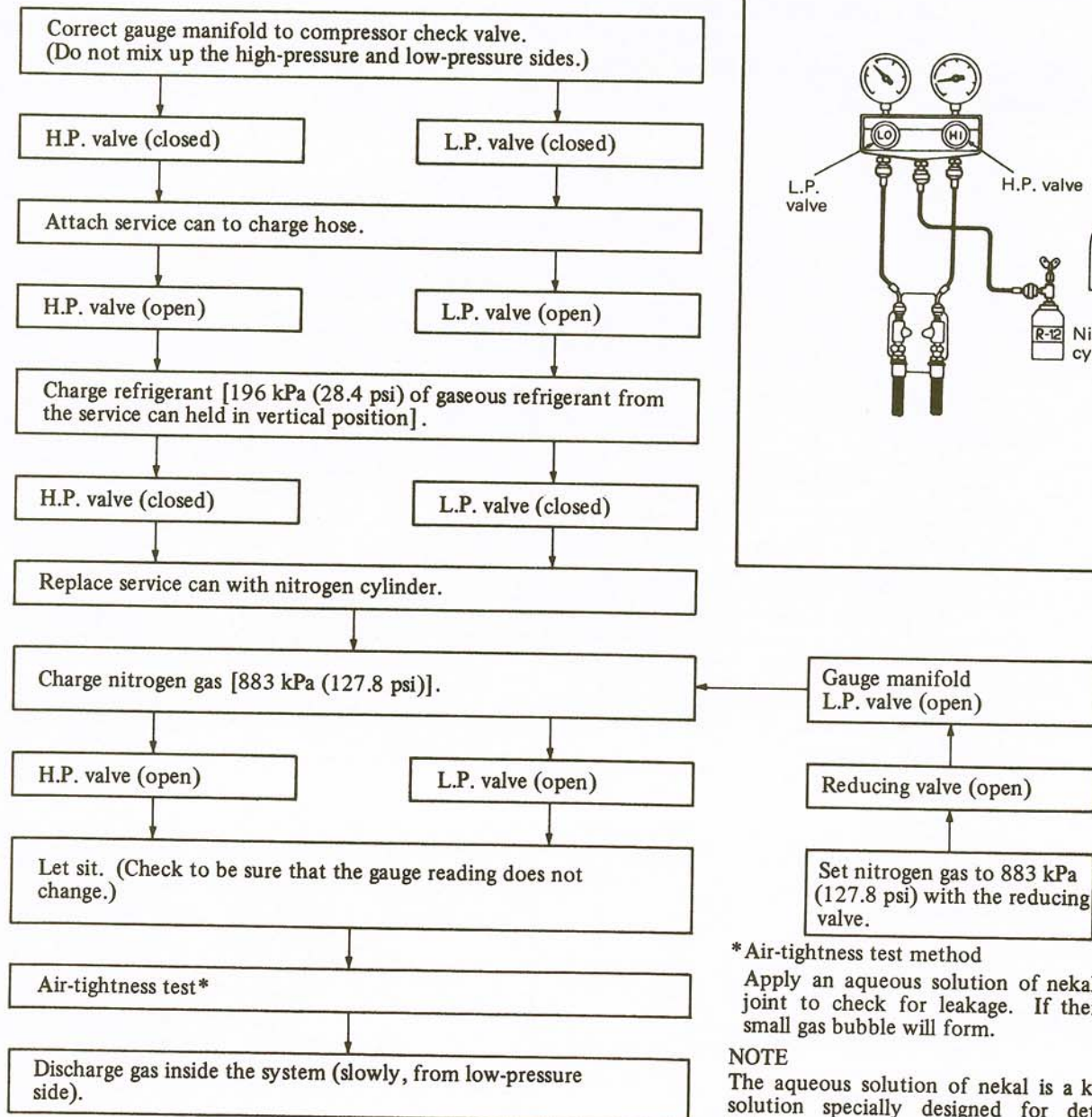




### AIR-TIGHTNESS TEST

After all piping work has been completed, conduct an air tightness test by the following procedure to check for leaks through the flare connections, etc., and then evacuate the system. If this air-tightness test is omitted and evacuation is immediately started, there is no way of detecting possible leaks. If there are leaks, the specified vacuum cannot be attained unless the test is made at the beginning. In order to avoid wasting time, therefore, be sure to conduct the air-tightness test before evacuation.

#### Air-Tightness Test Procedure



#### \* Air-tightness test method

Apply an aqueous solution of nekal to each flared joint to check for leakage. If there is leakage, a small gas bubble will form.

#### NOTE

The aqueous solution of nekal is a kind of foaming solution specially designed for detection of gas leakage.



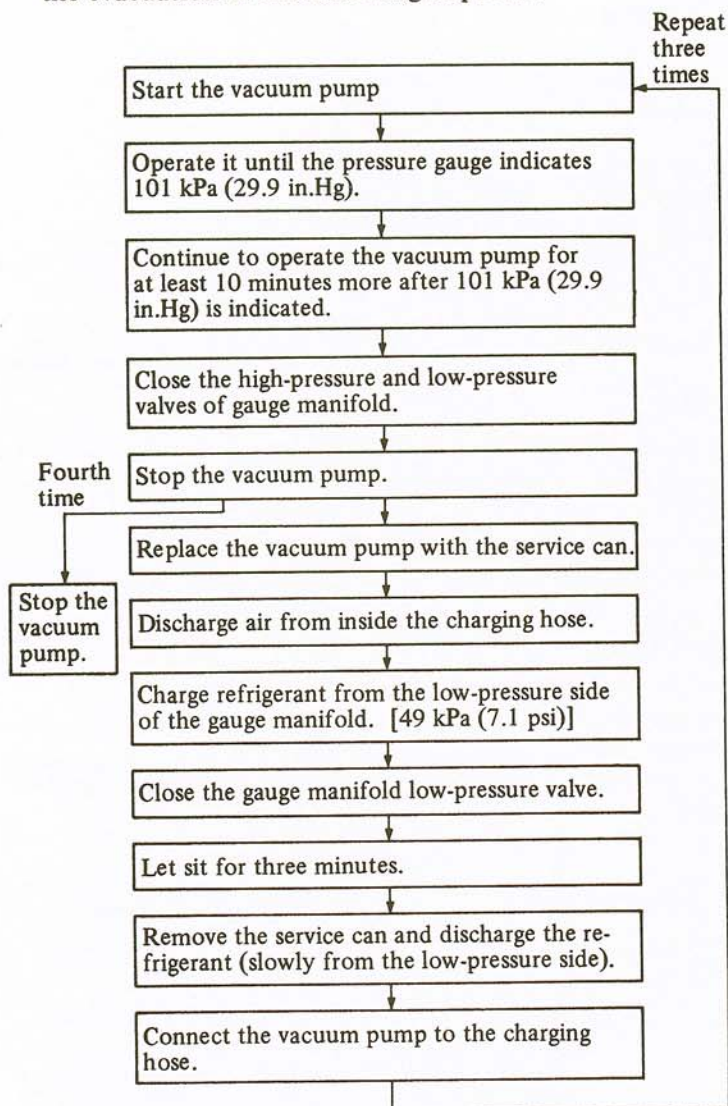


## VACUATION

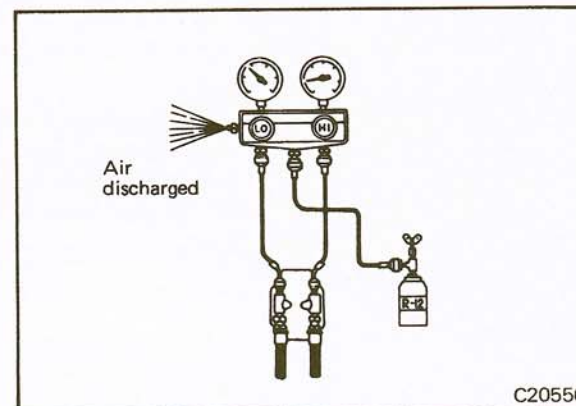
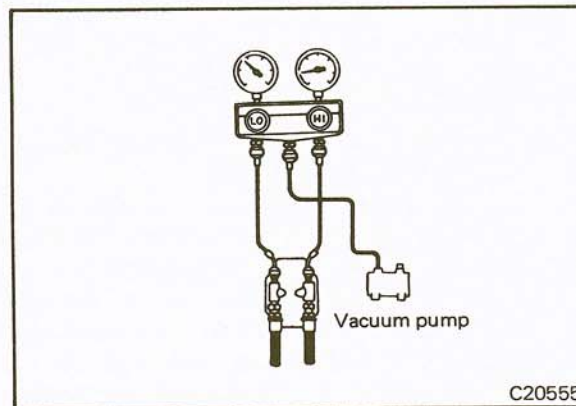
After the air-tightness test, evacuate the system as a preliminary step before charging the refrigerant in the system. With regard to the air-conditioner, the most important point to note is existence of non-condensing gas or water in the system. Since the refrigerant R12 is very insoluble in water, even a small amount of moisture left in the system will freeze, causing what is called "water clogging".

### Evacuation Procedure

1. Check to ensure that there is no internal pressure in the system. If there is internal pressure, it should be relieved through the check valve.
2. Connect the charging hoses of the gauge manifold to the intake and outlet check valves of the compressor.
3. Connect a vacuum pump to the charging hose. Carry out the evacuation in the following sequence.



- Notes**
1. Do not use the refrigerant pressure to expel air.
  2. Do not use the compressor for evacuation.
  3. Do not operate the compressor in the vacuum condition; shaft seal leaks could occur.







### GAS CHARGE

Charge gas immediately after evacuation.

#### Charging from Service Can

1. Connect the service can to the charging hose. (C20557)
2. Slightly loosen the flare nut at the gauge manifold to remove air (from inside the charging hose) with the refrigerant, and tighten the flare nut immediately after the removing air.
3. Hold the service can upright and loosen the low-pressure valve of the gauge manifold so that the gaseous refrigerant is drawn into the system.
4. When drawing of the gaseous refrigerant stops, start the engine and keep it running at approx. 1,100 rpm in order to charge the refrigerant into the system.
5. Touch the bottom of the service can. If it is no longer cool, it is empty; replace it with a new one.
6. When replacing the service can, close the low-pressure valve of the gauge manifold.
7. After a new service can has been connected, repeat steps 1 through 5 until the specified amount of refrigerant is charged.
8. After the specified amount of refrigerant has been charged, close the low-pressure valve of the gauge manifold and check the condition while observing the pressure gauge.
9. Close the service can valve and remove the gauge manifold.

#### Caution

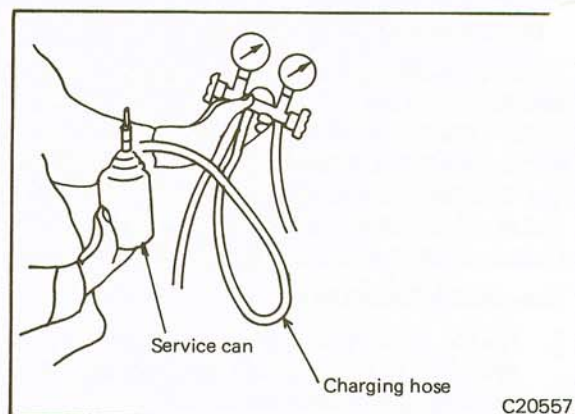
The service cans should always be kept below 40°C (104°F).

#### Charging from Refrigerant Cylinder

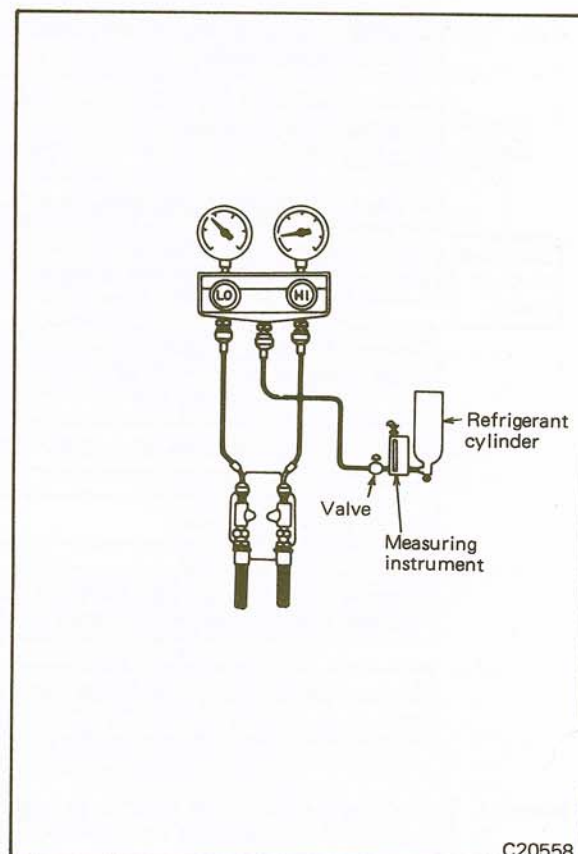
1. Connect the refrigerant cylinder and measuring instrument as shown. (C20558)
2. Let the specified amount of refrigerant flow into the measuring instrument, and check the indication.
3. Connect the measuring instrument to the charging hose.
4. Slightly loosen the flare nut at the gauge manifold to remove air (from inside the charging hose) with the gaseous refrigerant, and tighten the flare nut immediately after removing the air. Loosen the valve of the measuring instrument and charge the gaseous refrigerant in accordance with the procedures described in step 3 and subsequent steps of "Charging from Service Can".

#### Cautions

1. If the high-pressure gauge registers more than 1,471 kPa (213 psi), such as on a hot summer day, stop charging for a while and allow the pressure to fall by spraying water on the compressor before charging is resumed.
2. Never overcharge the system.



C20557



C20558





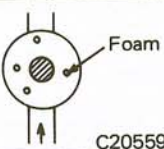
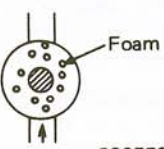

## Checking the Refrigerant Level

When charging the refrigerant, use a measuring instrument for measuring. Use of a sight glass for checking and judging the proper refrigerant level requires considerable experience and proficiency. The charging procedure is as follows:

1. Operate the engine at approx. 1,100 rpm.
2. Adjust the high pressure to 1,177 to 1,373 kPa (170 to 200 psi).
3. Adjust the cooler intake temperature to 25°C (77°F) or higher.
4. Adjust for maximum cooling unit air output (HI).
5. Check the sight glass according to the following table.

### Cautions

1. To check with the sight glass, start and stop the engine a few times.
2. When charging refrigerant at a low atmospheric temperature, such as in winter, foam may disappear before the specified level is reached. If so, cover the front of the condenser to increase the pressure to the specified level. The temperature of the passenger compartment should also be increased.
3. When charging at a very high atmospheric temperature, place the vehicle in a cool, well-ventilated area, and keep doors of the vehicle open. (Under such circumstances the system tends to be overcharged with refrigerant because of slower foam disappearance.)

Sight glass condition		Remarks
Proper refrigerant level		1. Foam occasionally appears. 2. Foam disappears if speed is slightly increased.
Insufficient refrigerant		Considerable foam appears. If the system is extremely short of refrigerant, the sight glass appears clear.
Excessive refrigerant		1. No foam appears. 2. Slight foam appears if speed is decreased.

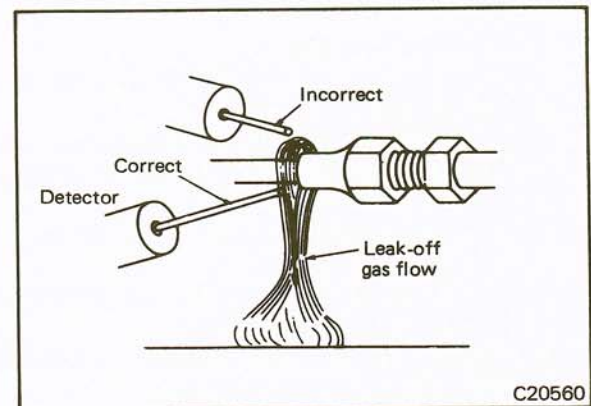
## GAS LEAK TEST

### Test Points

1. All flare joints of connection piping.
2. Shaft seal and check valve mountings on compressor and shaft.
3. Soldered piping joints of expansion valve and other parts.

### Test Procedure

1. For gas leak test, the use of an electronic gas leak detector is recommended.
2. Perform the test in a windless area indoor, or under similar conditions.
3. Refrigerant is heavier than air. Leaks will be concentrated at the bottom of connections. Make certain that the tester tube is applied below the test point.
4. The test should be performed patiently. Make certain that the testing tube is moved slowly [approx. 10 mm/sec. (.4 in./sec.)].
5. The high-pressure side refrigerant circuit should be tested for gas leaks during operation. Those areas which are dangerous or hard to test during operation (including areas around the compressor and condenser) should be tested immediately after shutdown.
5. The low-pressure side refrigerant circuit should be tested during shutdown after the gas pressure has balanced.
7. The test should be performed on the basis of the following standards.







**Gas Leak Test Standards**

Instrument	Test point	Compressor shaft seal	Other parts
Electric gas leak detector		Pointer should not swing more than 0.1 mA at low sensitivity.	Pointer should not swing more than 0.1 mA at high sensitivity.

### Caution

Smoking should be prohibited during gas leak detection.

## PERFORMANCE TEST

### Preparations

Reinstall all vehicle parts that were removed for installation of the air conditioner to their original positions, and adjust and test the following items.

1. Installation of grommets  
Install the specified grommets and seal off piping holes with sealant.
2. Heat insulation of piping in passenger compartment  
After the gas leak test, heat-insulate the cooling unit low-pressure pipe joint with a tacking sheet to prevent moisture condensed on the piping.
3. Adjustment of engine idle

### Stationary Performance Test

1. Operating conditions
  - (1) Place the vehicle in the shade with all windows and doors open.
  - (2) Keep the air conditioner intake air temperature between 25 to 30°C (77 to 86°F). (Adjust by opening and closing the doors.)
  - (3) Set the air flow control knob to the maximum (HI) position.
  - (4) Turn the knob of the thermo switch to the coldest position (fully clockwise).
  - (5) Set the engine speed to approx. 2,000 rpm [top speed at 40 km/h (25 miles/h).]

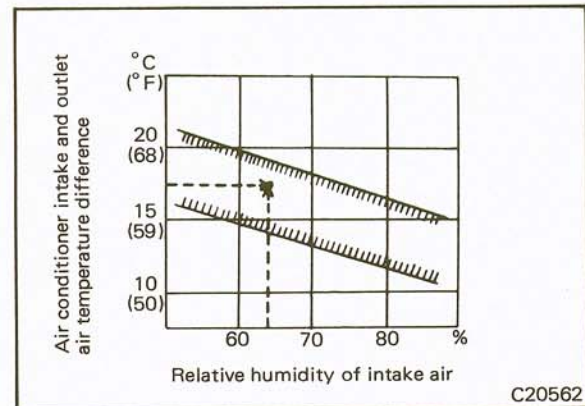
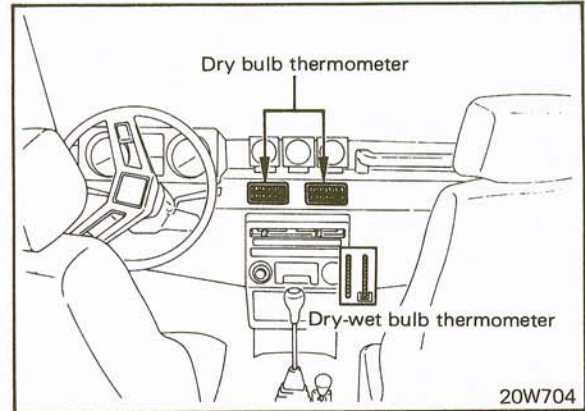




## Test procedure

Operate the air conditioner for more than 10 minutes in the above operating conditions in order to stabilize high and low pressures. Then perform the test by the following procedure:

- (1) Measure the outlet air temperature at the frame of the outlet grille.
- (2) Measure the air conditioner intake air temperature, humidity, etc., and the items shown in the Table of Measuring Items at a position free from the effects of cool outlet air.
- (3) The point at which the difference between the intake and outlet air temperatures intersects the relative humidity of the intake air should be within the shaded range in the illustration. (C20562)



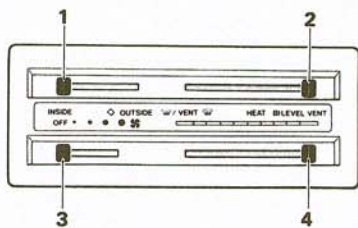




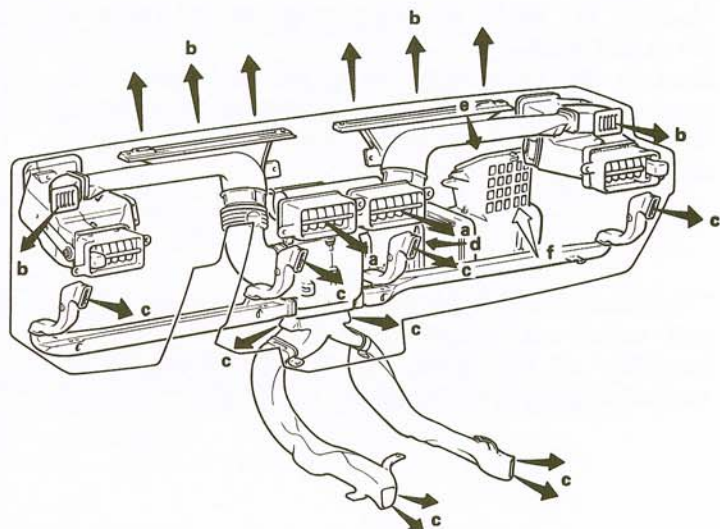
# COMPONENT SERVICE (FRONT HEATER)-HEATER OPERATION

## OPERATION

1. Recirculation/fresh air changeover lever
2. Air outlet changeover lever
3. Heater fan switch
4. Hot-water flow control lever

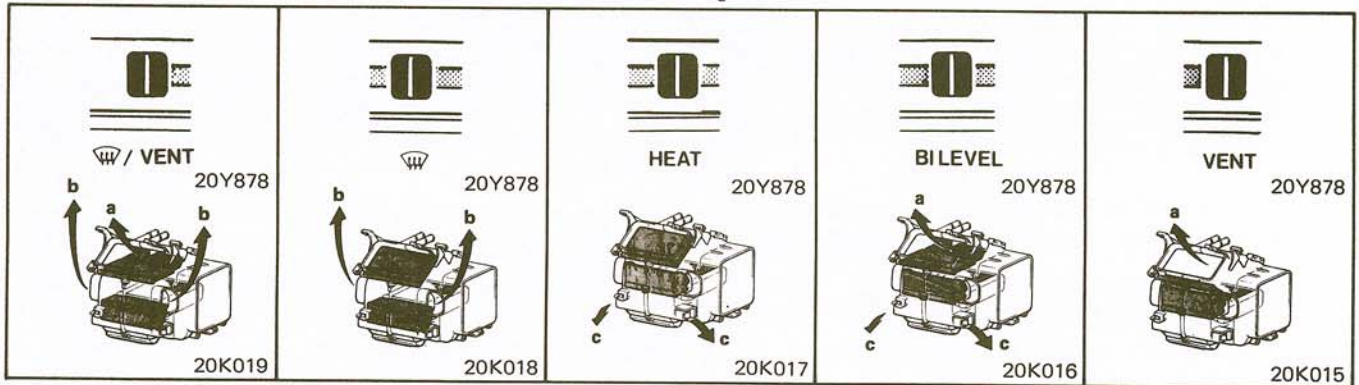


70W520

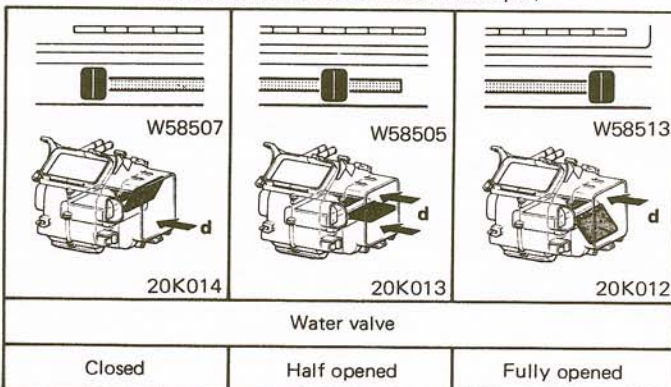


20W64L

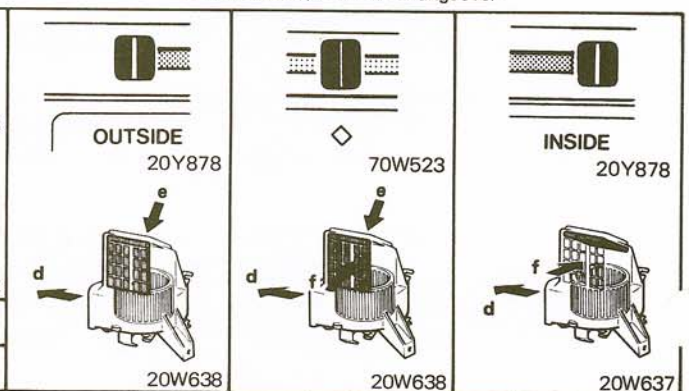
### Air outlet changeover



### Hot-water flow control (linked to damper)



### Recirculation/fresh air changeover

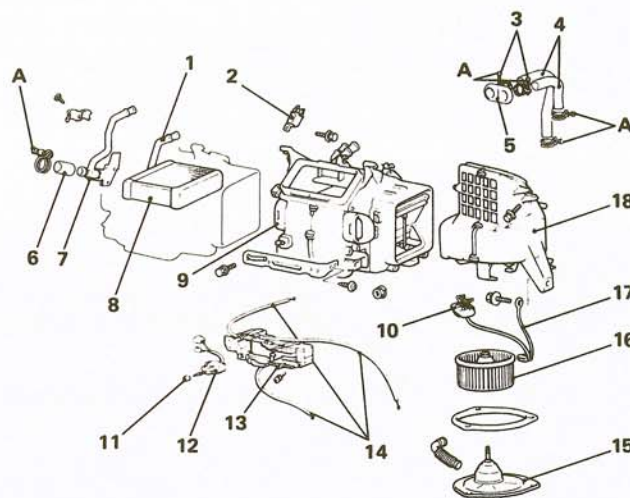






## COMPONENTS

1. Heater pipe
2. Heater relay
3. Clamp
4. Water hose
5. Grommet
6. Hose
7. Water valve
8. Heater core
9. Heater case
10. Resistor
11. Heater fan switch knob
12. Heater fan switch
13. Heater control lever
14. Heater control cable
15. Blower motor
16. Fan
17. Blower motor harness
18. Blower case

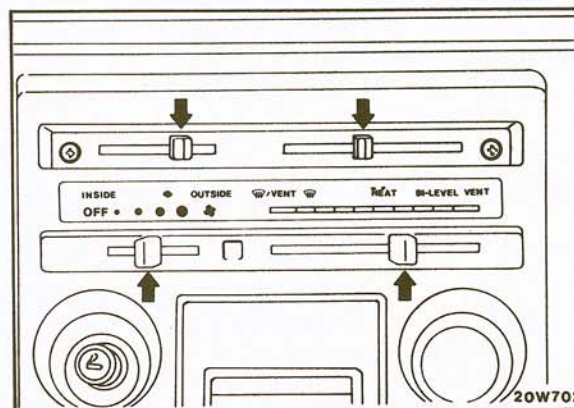


	Nm	ft.lbs.
A	1.3-1.8	.9-1.3

20W672

## REMOVAL

1. Remove the heater control knob and heater fan switch knob. (20W702)
2. Remove the center console. (Refer to GROUP 23.)
3. Remove the defroster nozzle at the temperature control cable side.
4. Remove lap heater duct B and glove box stopper and push the glove box forward and down. (Refer to GROUP 23.)



20W702



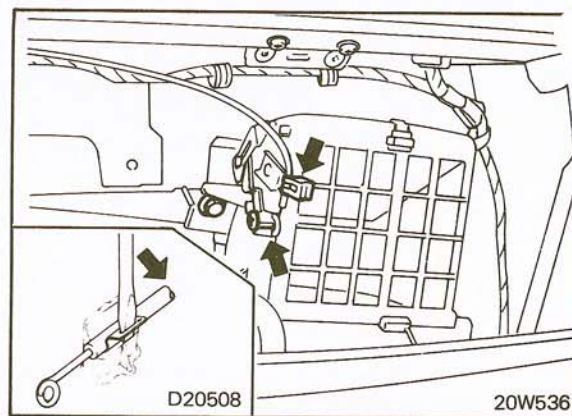


## COMPONENT SERVICE (FRONT HEATER)-HEATER CONTROL

5. Disconnect the RECIRC-FRESH control cable from the blower assembly.

### NOTE

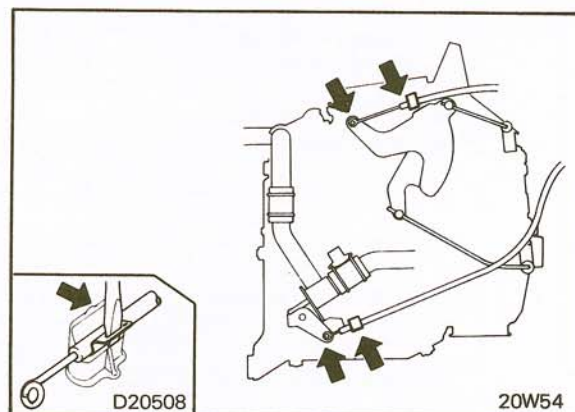
Detach the control cables with a screwdriver as shown in the illustration.



6. Disconnect the VENT-HEAT-DEF control cable and COOL-WARM control cable from the heater unit.

### NOTE

Detach the control cables with a screwdriver as shown in the illustration.



7. Remove the heater control assembly mounting screws and pull out the assembly slightly. (20W531)
8. Disconnect the heater fan switch harness connectors.
9. Remove the heater control assembly.
10. Remove the heater fan switch from the heater control assembly. (20W531)

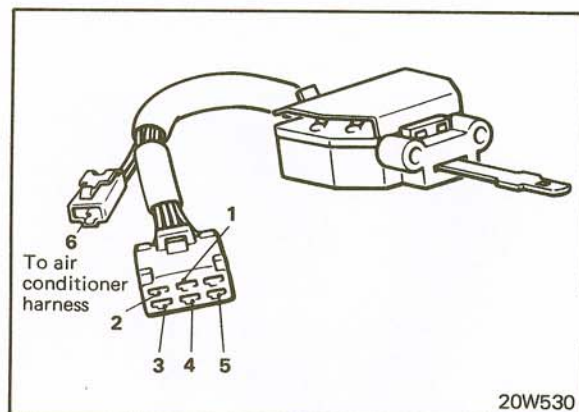
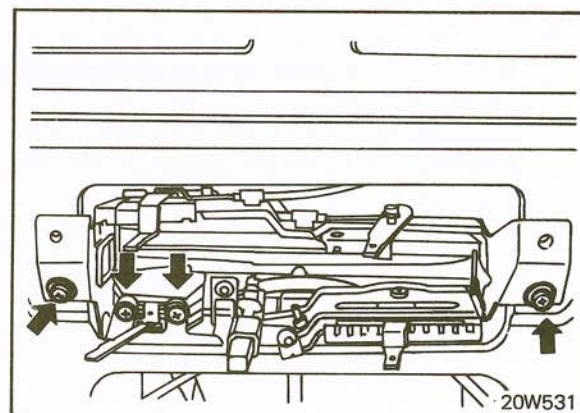
### INSPECTION

Operate the heater fan switch to check for continuity. (20W530)

Terminal	1	2	3	4	5	6
Switch position OFF						
OFF						
• (Low)	○	○				○
• (M <sub>1</sub> )	○		○			○
• (M <sub>2</sub> )	○			○		○
• (High)	○				○	○

### INSTALLATION

Connect each control cable and damper lever by using the following procedures.

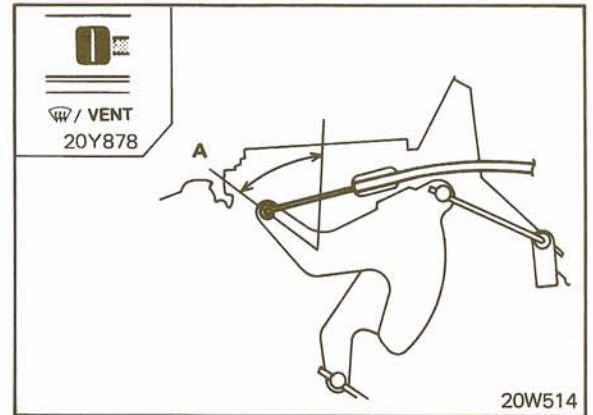






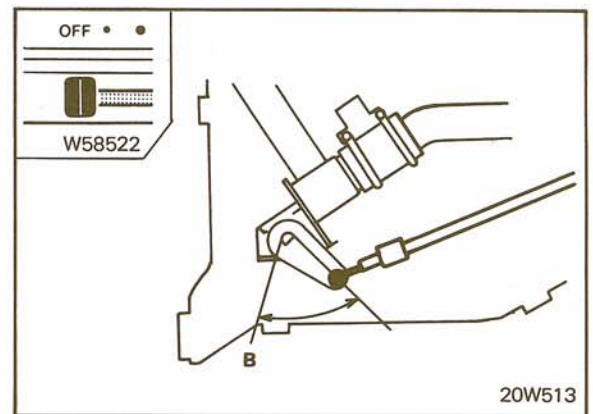
## Air Outlet Changeover System

1. Place the air outlet changeover lever at the position as illustrated. (20Y878)
2. With the heater side air outlet changeover damper lever in position A, connect the inner cable to the lever and secure the cable casing with clips. (20W514)



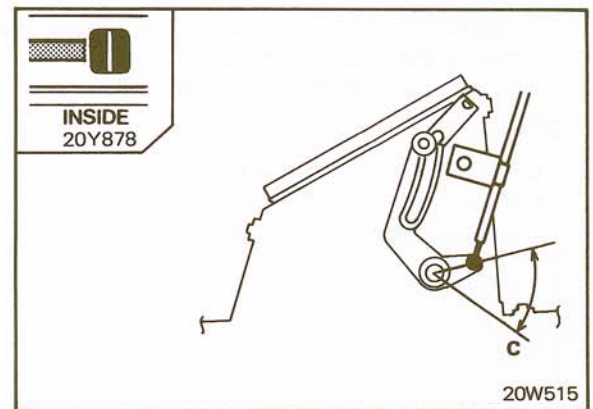
## Warm Water Flow Control System

1. Place the warm water flow control lever at the off position. (W58522)
2. With the heater side water valve control lever in position B, connect the inner cable to the lever and secure the cable casing with clips. (20W513)



## Recirculation/Fresh Air Changeover System

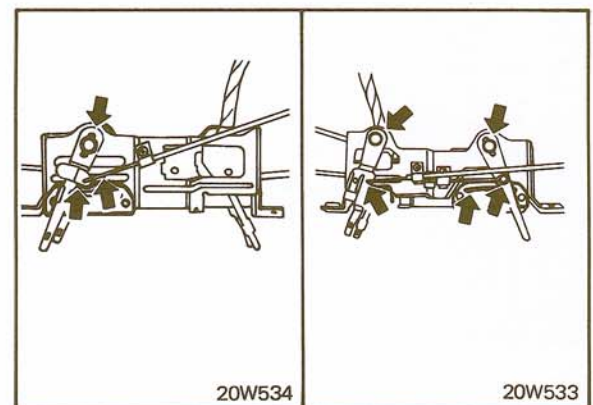
1. Place the recirculation/fresh air changeover lever at the "recirculation" position. (20Y878)
2. With the heater side recirculation/fresh air changeover damper lever in position C, connect the inner cable to the lever and secure the cable casing with clips. (20W515)
3. Set the control lever to each position to check for correct operation. If not correct, adjust by moving the outer wire at the clipped point.



4. Check to make sure that each control lever moves smoothly. If there is any noise or stiff movement, apply the specified multipurpose grease to all moving parts.

### NOTE

When mounting the heater control assembly to the instrument panel, tighten the upper bolts to the instrument panel so that they also secure the center panel.

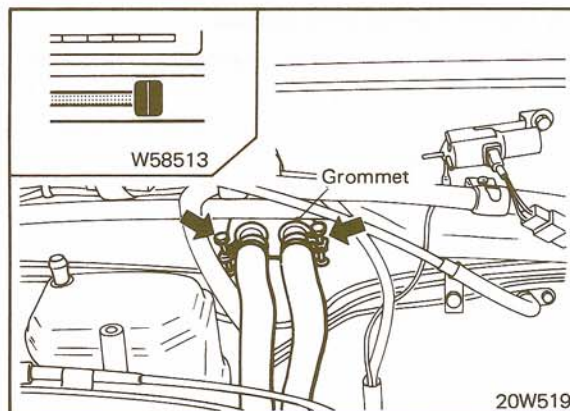




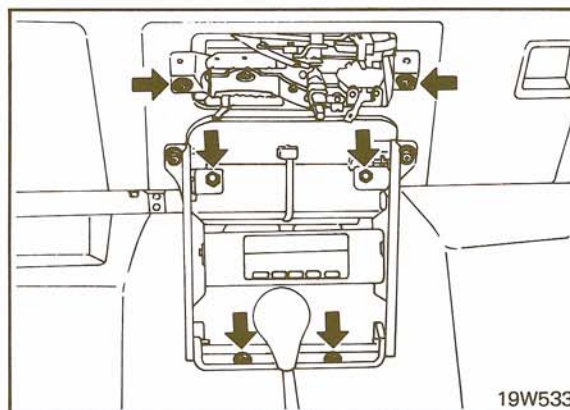


### REMOVAL

1. Move the hot-water flow control lever to the "hot" position. (W58513)
2. After the radiator cap has been removed, loosen the radiator drain plug and drain the coolant.
3. Disconnect the water hoses from the heater unit. (20W519)



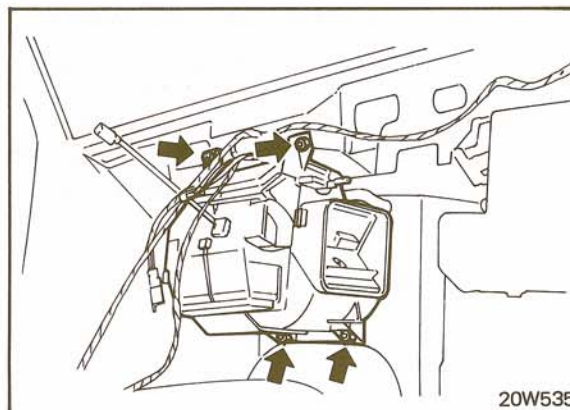
4. Remove the instrument panel. (Refer to GROUP 23.) The center reinforcement, support bracket and radio should be removed together with the instrument panel.



5. Remove the center ventilator duct and defroster duct.
6. Remove the rear heater duct.
7. Remove the heater unit. (20W535)

### INSPECTION

1. Check heater core for leaks, and clogging.
2. Check water valve for operation.
3. Check all hoses for cracks and deterioration.

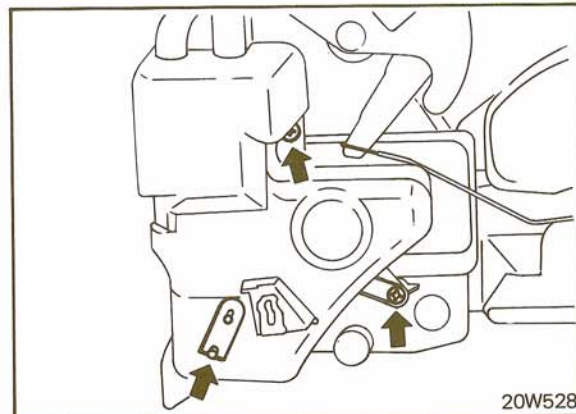




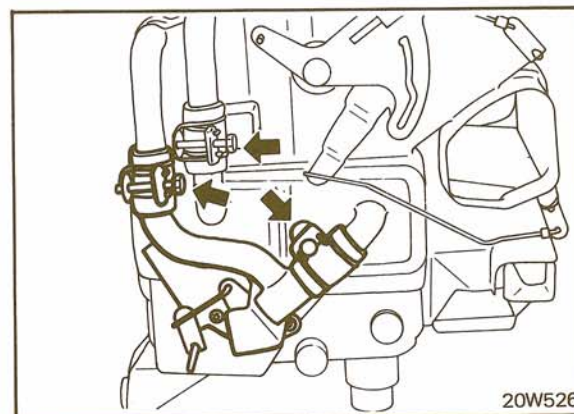


## HEATER CORE REPLACEMENT

1. Remove the heater control lever arm and remove the water valve cover.



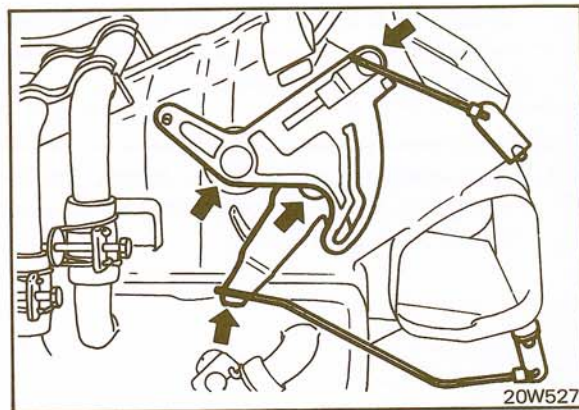
2. Remove the heater pipe and water valve.



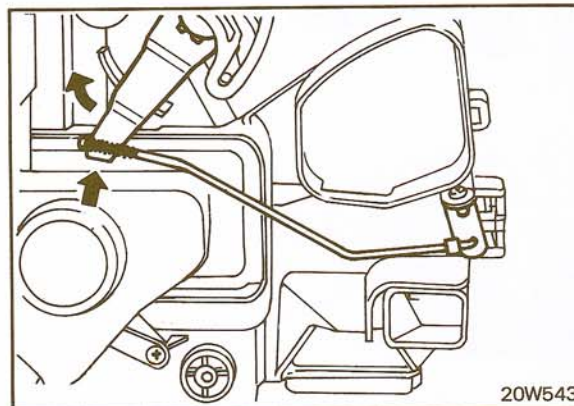
3. Disconnect the control arm linkage. (20W527)
4. Remove the control arm.
5. Remove the heater core by moving it sideways.

### Caution

To prevent some substances invasion between the heater core and case, use care not to remove the heater core felt when removing the heater core.



6. After the center ventilator open/close damper has been placed in the fully closed position, turn the arm fully clockwise, and then connect it to the link.

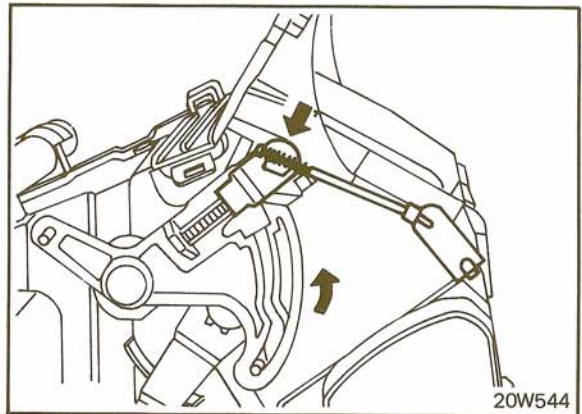




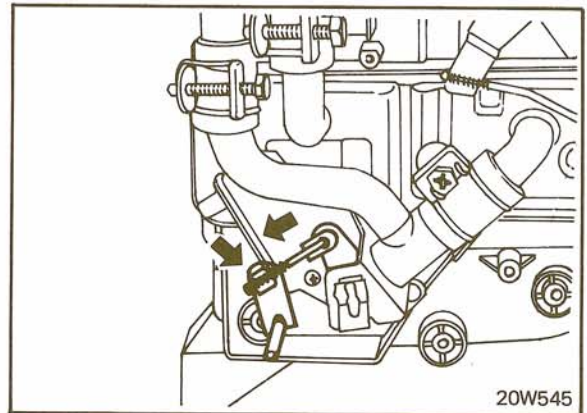


## COMPONENT SERVICE (FRONT HEATER)-HEATER UNIT

7. With the defroster/heater changeover damper in the fully closed defroster position, turn the arm fully counter-clockwise, and then connect it to the link.



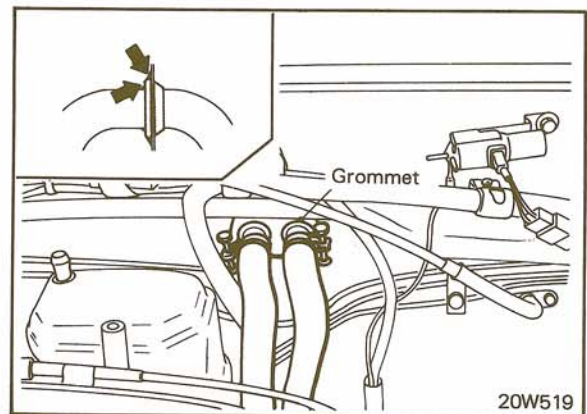
8. With the water valve fully closed and the air intake damper fully closed, connect the arm to the link.



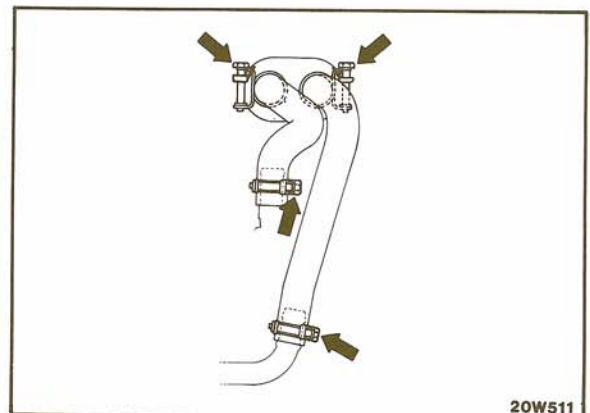
9. Connect each heater hose up to the specified length.

Heater hose overlap length .....  
25-30 mm (1.0-1.2 in.)

10. When installing the water hoses, apply a coating of non-drying adhesive to the engine compartment side of the grommet. (20W519)



11. Tighten the clamps in the positions shown in the illustration.

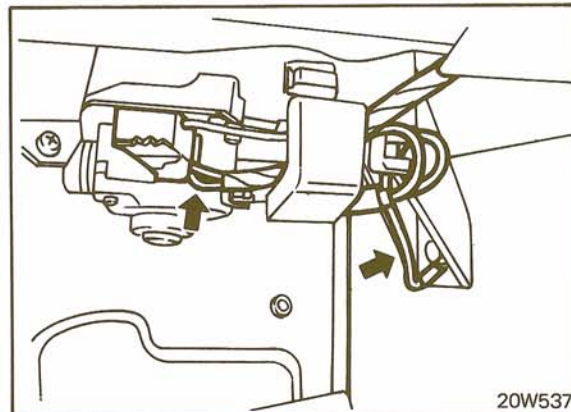




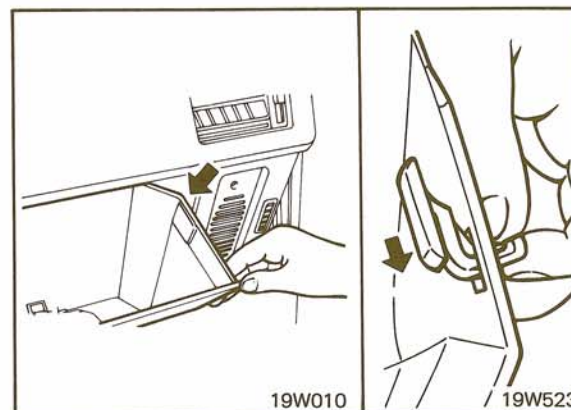


## REMOVAL

1. Disconnect the front wiring harness and blower motor coupling connectors. (20W537)
2. Remove the lower mounting bolts of the blower assembly.
3. Remove lap heater duct B and duct.



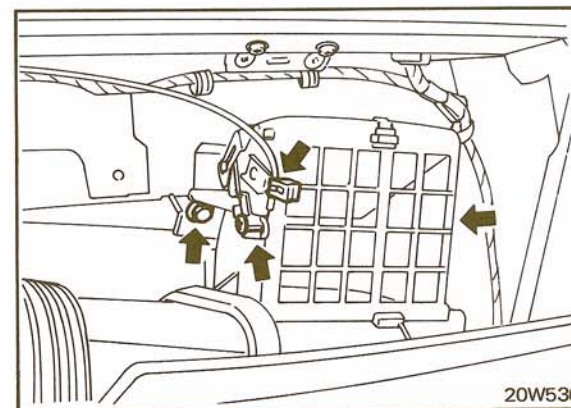
4. Remove the stopper of the glove box and push the glove box down.



5. Remove the RECIRC-FRESH control wire and blower assembly mounting bolts. (20W536)
6. Remove the blower assembly.

## INSTALLATION

Tighten the lower mounting bolt of blower assembly which also secures the blower motor ground wire.



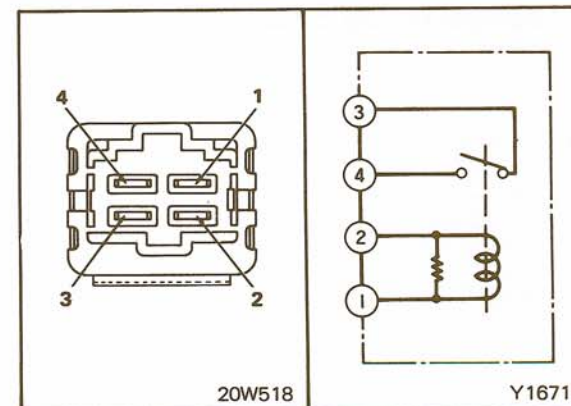
## HEATER RELAY

### REMOVAL

1. Remove the glove box stopper and remove the glove box by pulling it toward you.
2. Disconnect the heater relay connector and remove the heater relay.

### INSPECTION

1. Check continuity between terminals 1 and 2; there should be continuity.
2. Check continuity between terminals 3 and 4; there should not be continuity.
3. Check continuity between terminals 3 and 4 while applying battery voltage to terminals 1 and 2; there should be continuity.

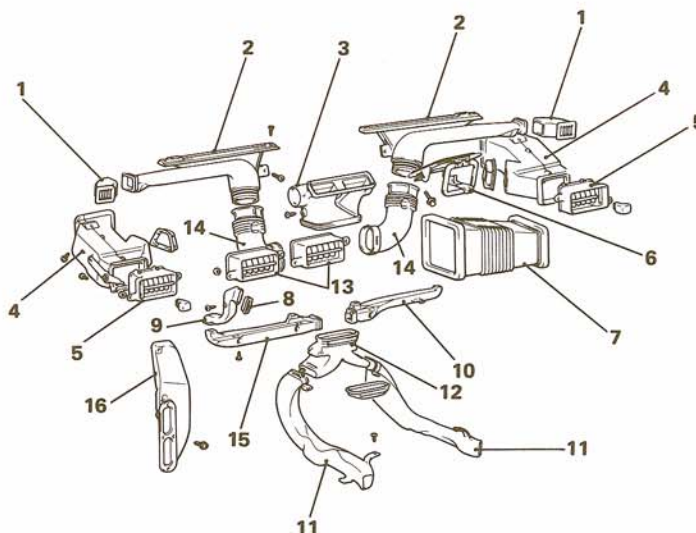






## COMPONENTS

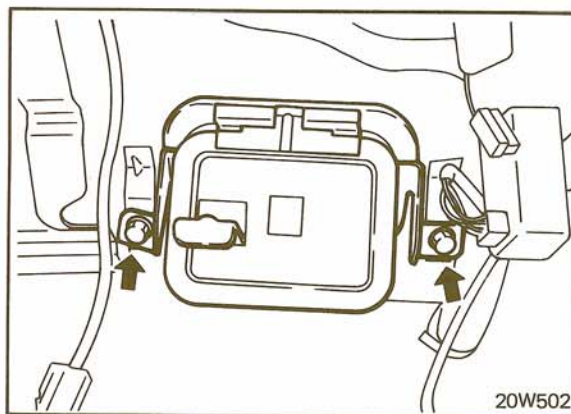
1. Demister grille
2. Defroster nozzle
3. Center ventilator duct
4. Deflector duct
5. Side air outlet
6. Front ventilation
7. Duct
8. Lap heater garnish
9. Lap heater duct (A)
10. Lap heater duct (C)
11. Rear heater duct (B)
12. Rear heater duct (A)
13. Center air outlet
14. Defroster duct
15. Lap heater duct (B)
16. Rear ventilator duct



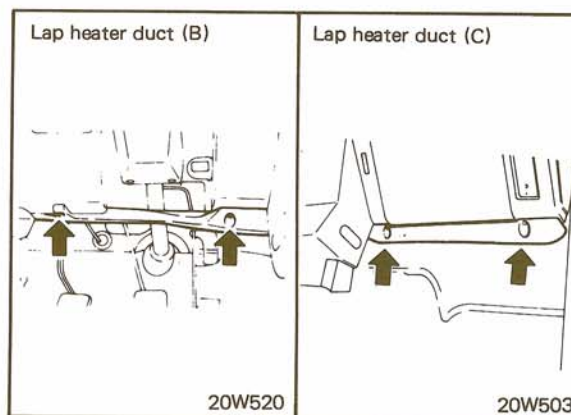
20W542

## REMOVAL

1. Remove the mounting bolts and remove the front ventilation by moving it downward.



2. Remove the lap heater duct from under the instrument panel.







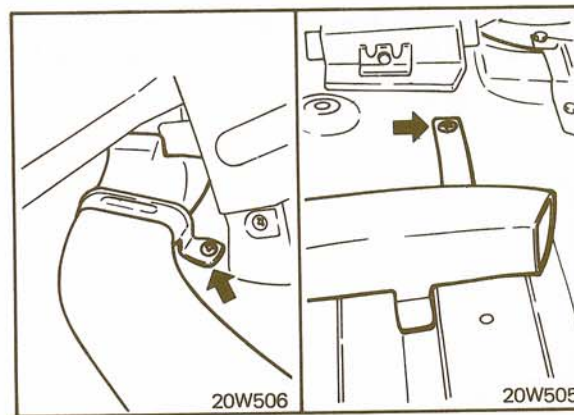
3. Using a screwdriver as shown, remove the demister grille.

**Caution**

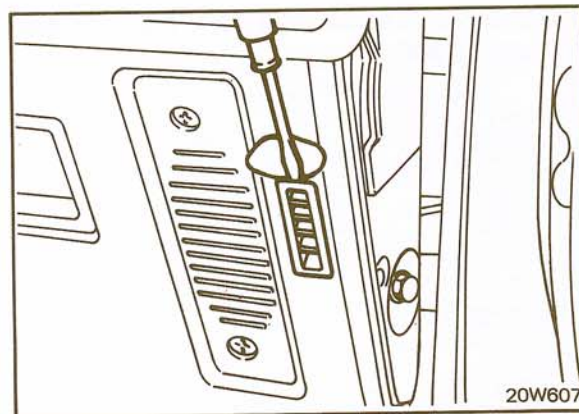
Use care not to break the projections for attaching the demister grille.



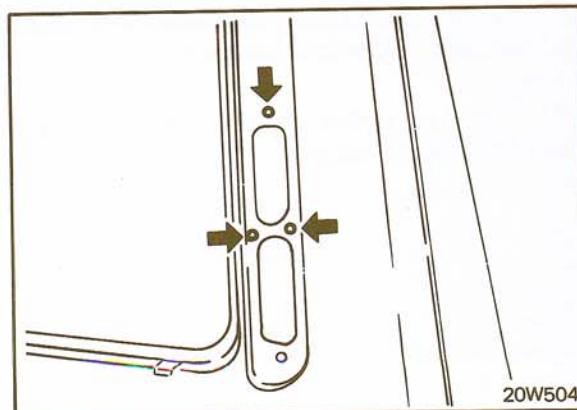
4. Remove the rear heater duct by detaching it from the floor panel.



5. Remove the lap heater garnish by prying up the edges with a screwdriver.



6. Remove the rear ventilator garnish. (Refer to GROUP 23.)
7. Remove the rear ventilator duct by moving it upward from inside the passenger compartment. (20W504)

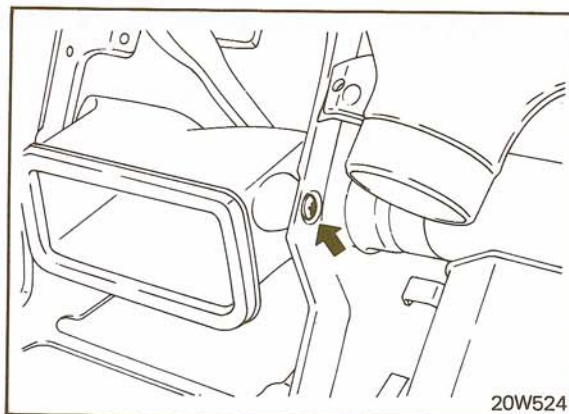




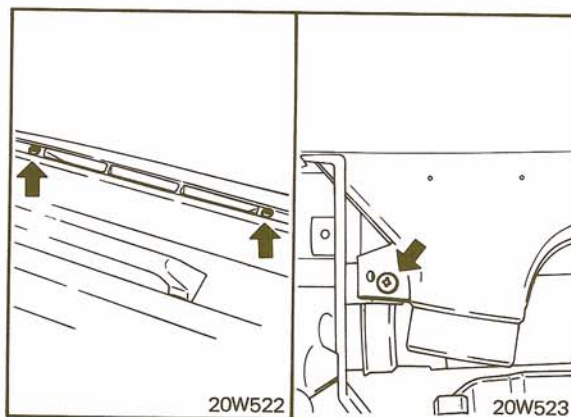


## COMPONENT SERVICE (FRONT HEATER)-VENTILATION DUCTING

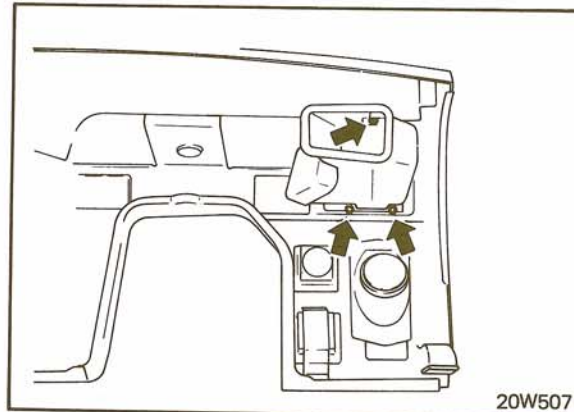
8. Remove the instrument panel. (Refer to GROUP 23.)
9. Remove the center ventilator duct from the reverse side of the instrument panel. (20W524)



10. Disconnect the demister grille and defroster duct and remove the defroster nozzle by moving it downward.



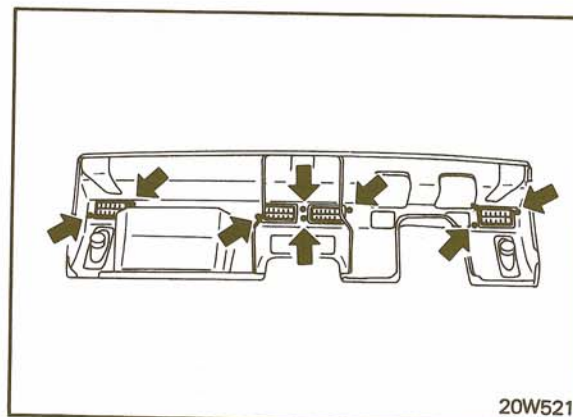
11. Remove the defroster duct from the back of the instrument panel.



12. Remove the center air outlet and side air outlet from the back of the instrument panel.

### NOTE

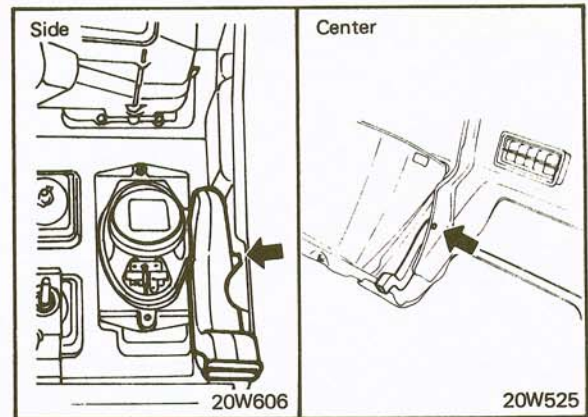
The center air outlet and side air outlet are secured together with the instrument pad.







3. Remove the lap heater duct from the back of the instrument panel.



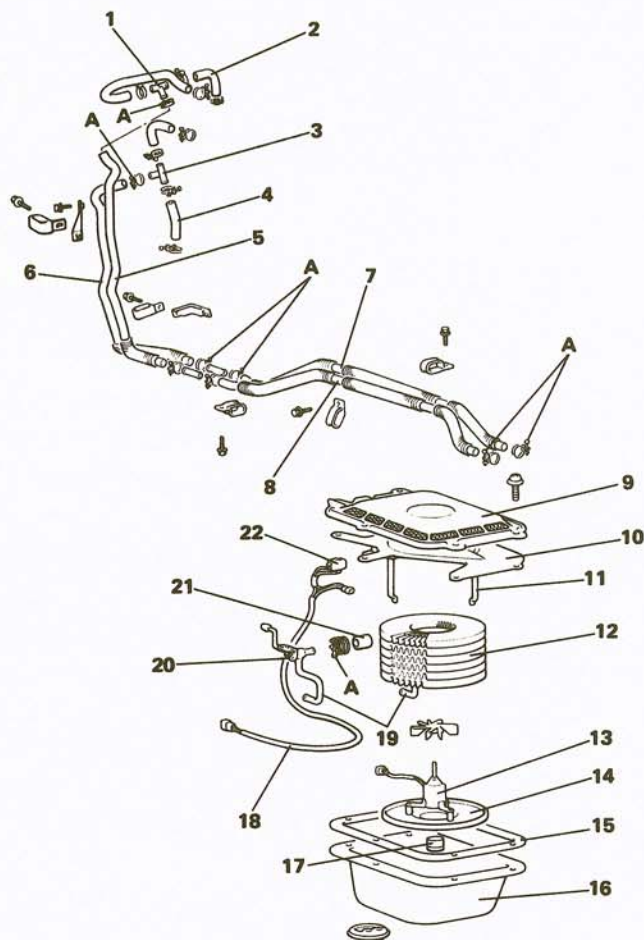




## COMPONENT SERVICE (REAR HEATER)-REAR HEATER

### COMPONENTS

1. Joint (B)
2. Water hose (inlet side)
3. Joint (A)
4. Water hose (outlet side)
5. Water hose (C)
6. Water hose (D)
7. Water hose (B)
8. Water hose (A)
9. Cover
10. Heater nozzle
11. Clip
12. Heater core
13. Fan and motor assembly
14. Core cover
15. Secret box packing
16. Secret box
17. Rubber
18. Rear heater wiring harness
19. Piping
20. Water valve
21. Joint hose
22. Heater fan switch



	Ncm	in.lbs.
A	130-180	11-16

20W726



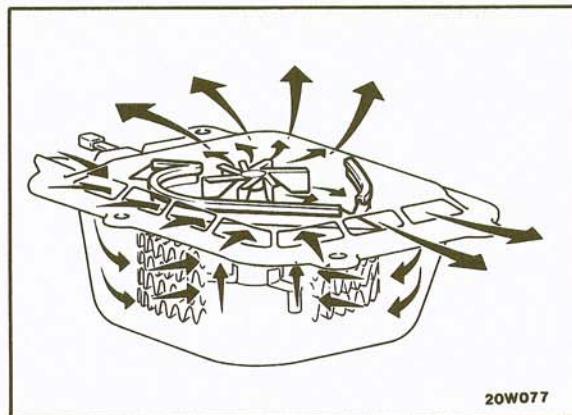


## OPERATION

The rear heater blows off warm air in two directions, forward and backward, at properly distributed air flow rates for sufficient convection to provide comfortable heating.

The rear heater switch has a single lever which serves the combined purposes of the heater fan switch and warm water flow control lever.

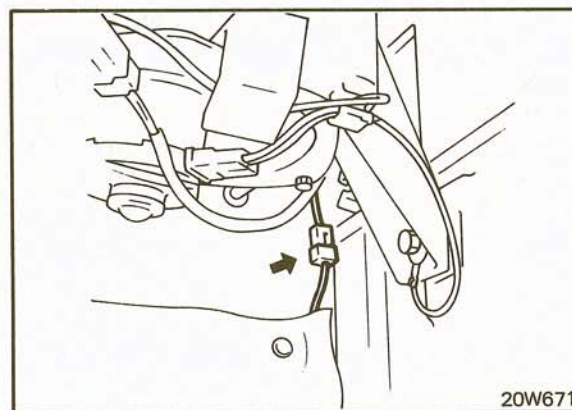
Operation is only ON-OFF switching.



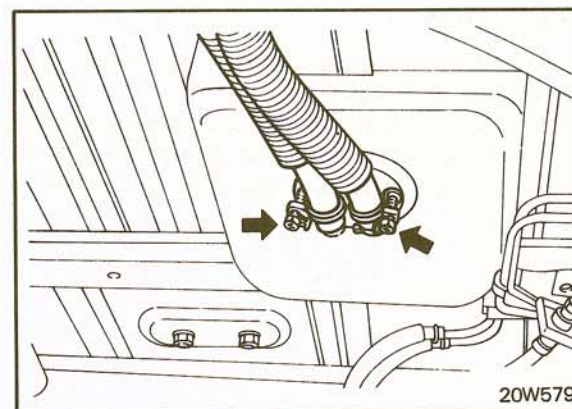
## REAR HEATER

### REMOVAL

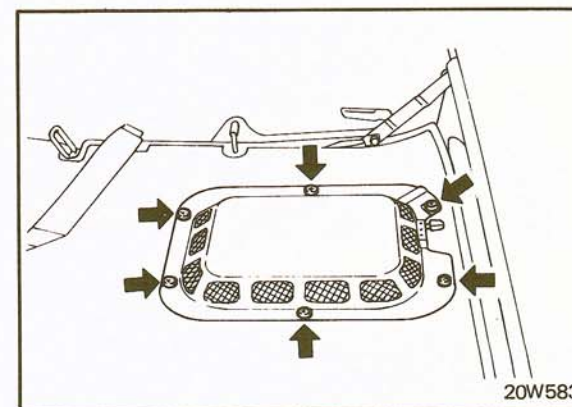
1. Remove coolant.
2. Disconnect the connector of rear heater wiring harness and front wiring harness. (20W671)



3. Disconnect the water hoses (A) and (B) from the piping. (20W579)
4. Remove the grommet upward.



5. Remove the cover. (20W583)
6. Remove the rear heater assembly upward.

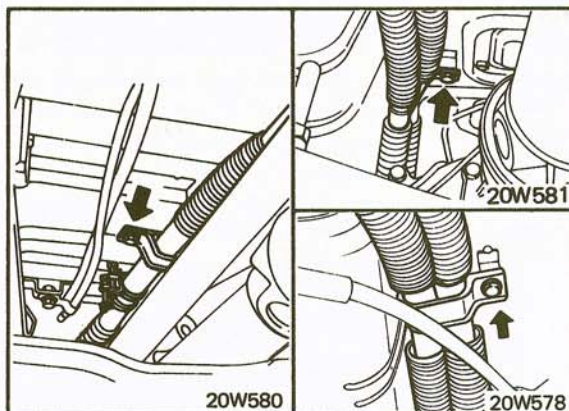




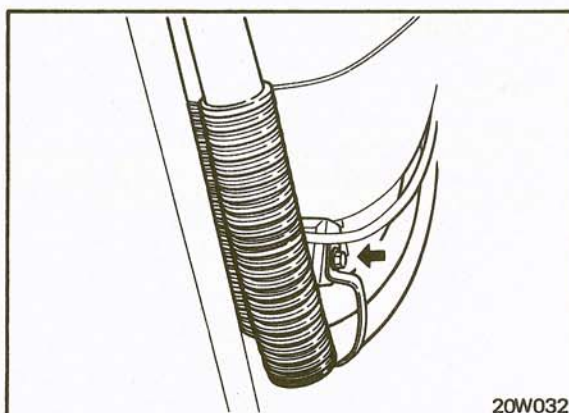


## COMPONENT SERVICE (REAR HEATER)-REAR HEATER

7. Remove the water hose (A) and (B) attaching clamps.



8. Remove the water hose (C) and (D) attaching clamps. (20W032)
9. Remove the clips attaching the joints to the water hoses (C) and (D) and remove the water hose assembly.
10. After the water hose assembly has been removed, disconnect the water hoses (A) and (B) from the water hoses (C) and (D).



### INSPECTION

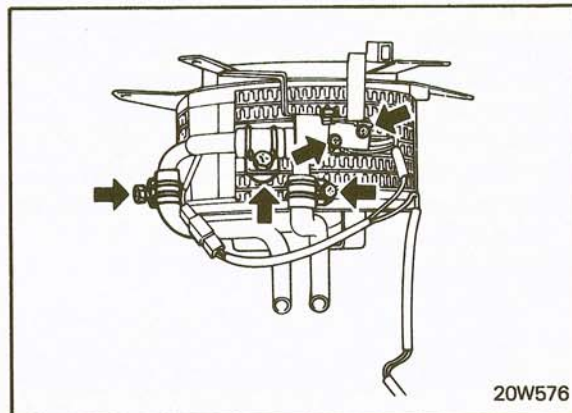
1. Check water hose and joint hose for deterioration, damage and leaks.
2. Check fan motor for noise and unsmooth rotation.
3. Check secret box for foreign substances.
4. Check rubber for deterioration and damage.



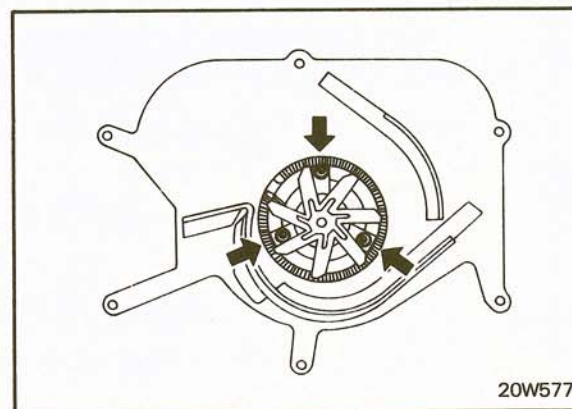


## DISASSEMBLY

1. Disconnect the joint hoses and remove the water valve and pipings. (20W576)
2. Disconnect the connector of the fan switch harness and motor harness and remove the heater fan switch from the water valve. (20W576)

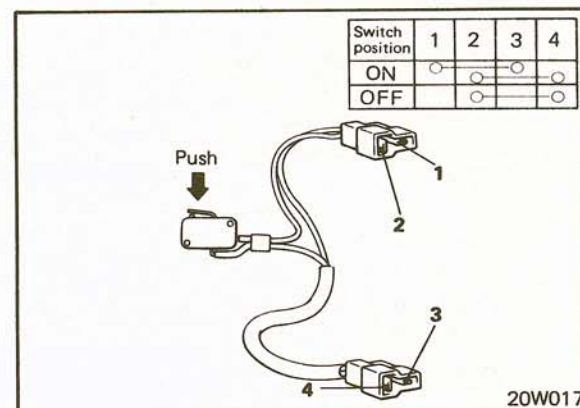


3. Remove the fan and motor assembly from the heater core. (20W577)  
Remove the clips and remove the heater nozzle, heater core and core cover in that order.



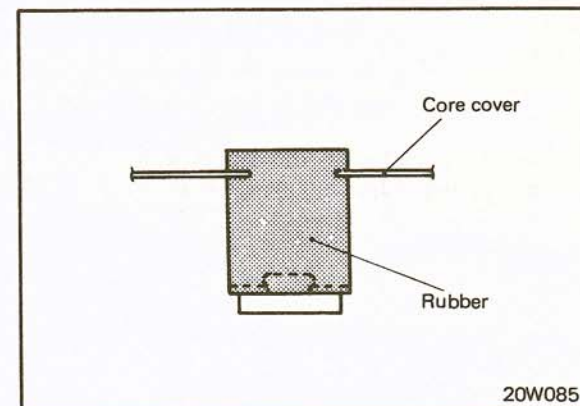
## INSPECTION

1. Check water valve for faulty operation, clogging and leaks.
2. Check heater core for clogging, damage and leaks.
3. Check piping for damage.
4. Check heater fan switch for continuity.



## REASSEMBLY

Securely install the rubber on the core cover.







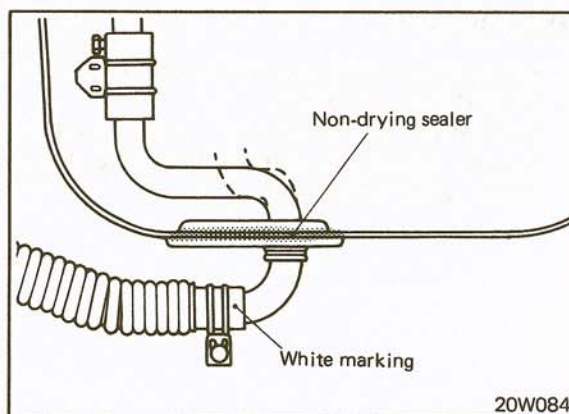
### INSTALLATION

1. Apply non-drying sealer between the secret box and the grommet. (20W084)
2. Connect the inlet side (white marking side) of piping to the inlet side of water hose. (20W084)
3. When the water hose is installed, use care to prevent its contact with other parts and sliding portions, its torsion and twisting.

#### NOTE

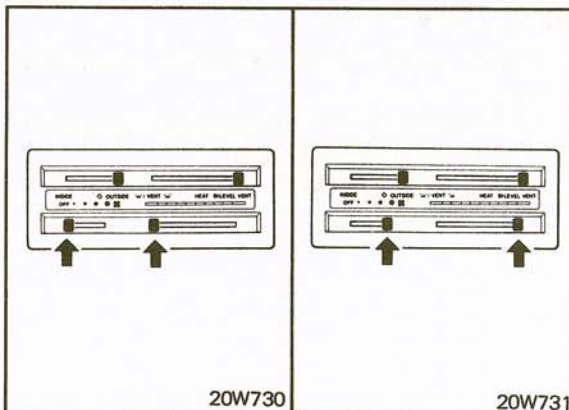
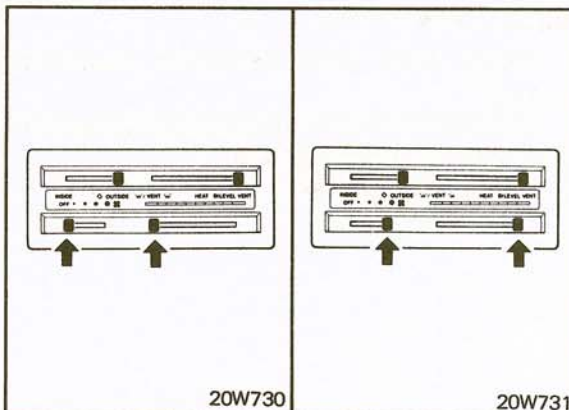
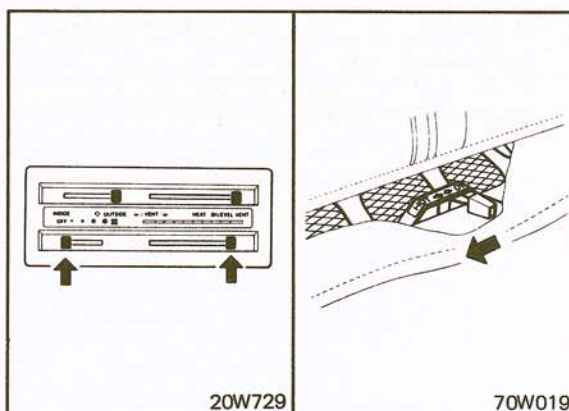
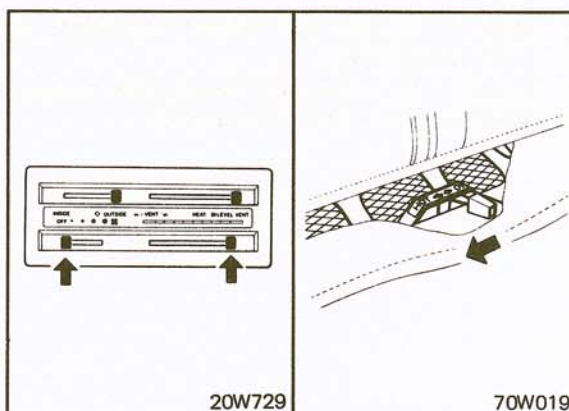
Install the clip over the yellow marking of the hose and clamp.

4. Install the rear heater wiring along the front wiring harness using care to prevent the wiring from being caught or gouged by other parts and avoid its contact with other parts.



### BLEEDING OF REAR HEATER

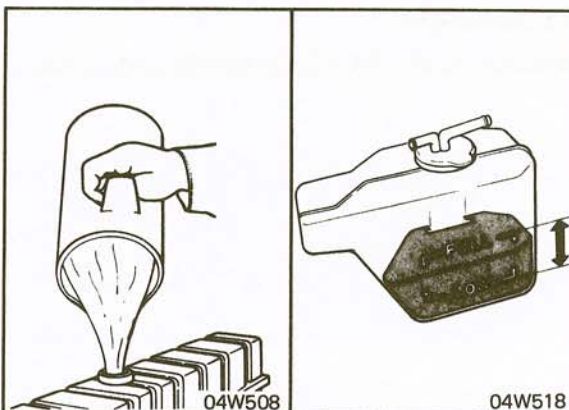
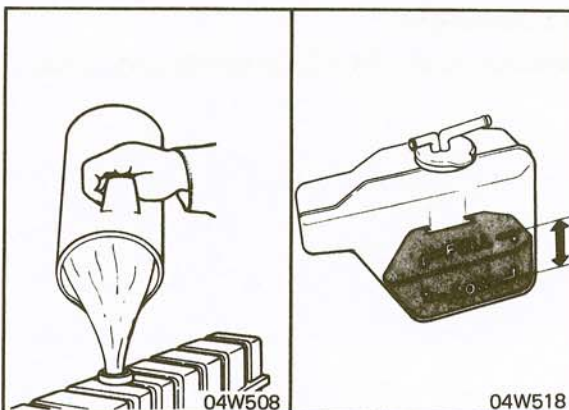
1. Place the hot water flow control lever of the front heater to HOT position, and set the heater fan switch to OFF position. (20W729)
2. Set the rear heater fan switch to HOT position. (70W019)
3. Remove the intake manifold heating water hose at the bottom of the carburetor.
4. Slowly fill the radiator with coolant up to the maximum level.
5. Check to ensure that coolant comes out from both the intake manifold and water hose and then install the hoses.
6. Allow the engine to warm up, until coolant reaches a temperature of 50°C (122°F) or above.
7. After the engine has warmed up place the hot water flow control lever of the front heater to COLD position. (20W730)
8. Run the engine at speeds of 1,500 to 2,000 rpm (occasionally race the engine) until warm air flows out from the rear heater blow-off opening.
9. Place the hot water flow control lever of the front heater to HOT position and check to ensure that warm air flows out. (20W731)



#### NOTE

If there is a large difference in blow-off temperature between the front heater and rear heater, perform bleeding operations again.

10. Refill the radiator and reservoir tank with coolant up to the specified level. (04W508, 04W518)

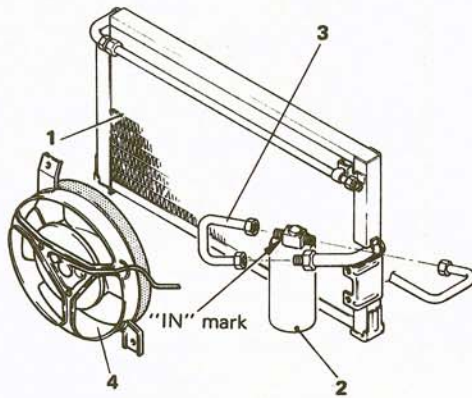




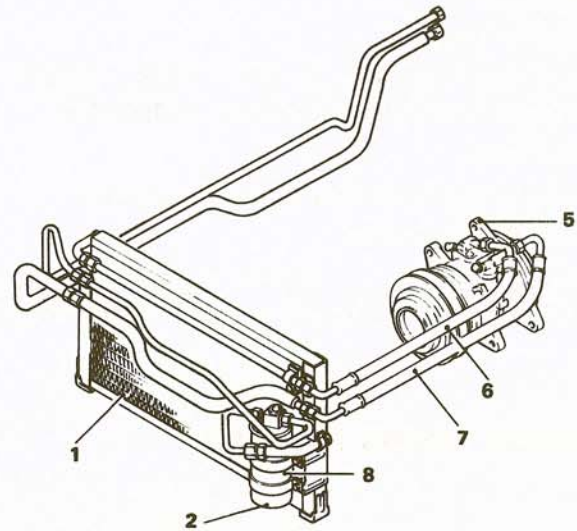


## COMPONENTS

### Piping

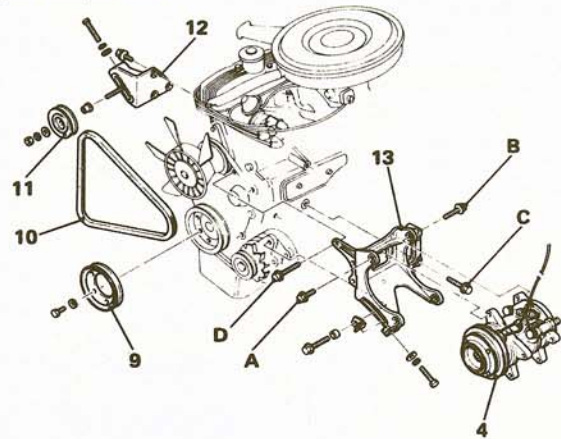


20W706



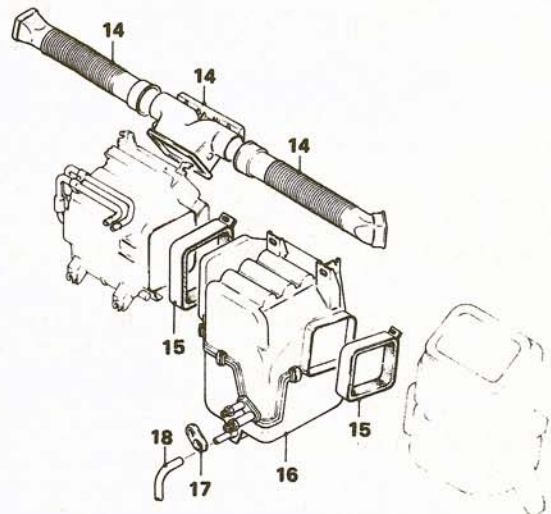
20W705

### Engine compartment



### Passenger compartment

20Y911



20W707

1. Condenser
2. Receiver
3. Pipe
4. Condenser fan motor
5. Compressor
6. High pressure hose
7. Low pressure hose
8. Receiver bracket
9. Crankshaft pulley
10. V-belt
11. Tension pulley
12. Tension pulley bracket
13. Compressor bracket
14. Air duct
15. Duct joint
16. Air-conditioning unit
17. Grommet
18. Drain hose

	Nm	ft.lbs.	O.D. x length mm (in.)
A	20-29	14-22	10 x 30 (1.2)
B	20-29	14-22	10 x 35 (1.4)
C	40-50	29-36	10 x 50 (2.0)
D	20-29	14-22	8 x 80 (3.1)





## COMPONENT SERVICE (AIR-CONDITIONING)- CONTROL PANEL/ELECTRIC WIRING DIAGRAM

### OPERATION

#### Air Selector Lever

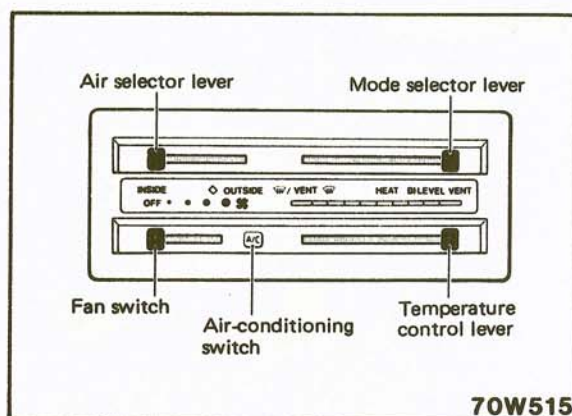
During normal operation, keep the lever at INSIDE. If inside air is contaminated, move the lever to OUTSIDE.

#### Blower Switch

Controls the inside air flow rate in three steps.

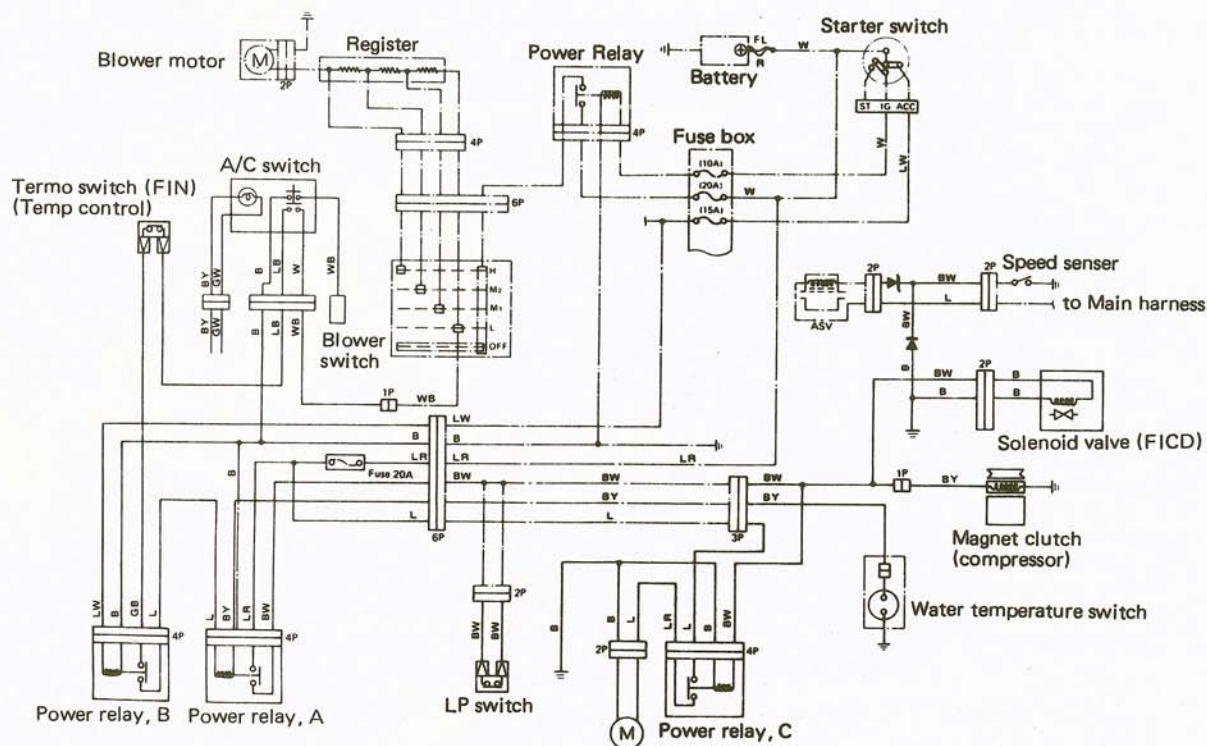
#### Air-Conditioning Switch

Depress the button to operate the air conditioner. (The button is ON when pushed in and OFF when released out.)



70W515

### ELECTRIC WIRING DIAGRAM



20W709

When the A/C switch is set to ON, the magnetic clutch is energized. The following components are used to control A/C compressor operation by deenergizing the magnetic clutch:

The thermostat prevents ice build up on the evaporator fins.

The low pressure switch protects the compressor in an excessive low freon charge condition.

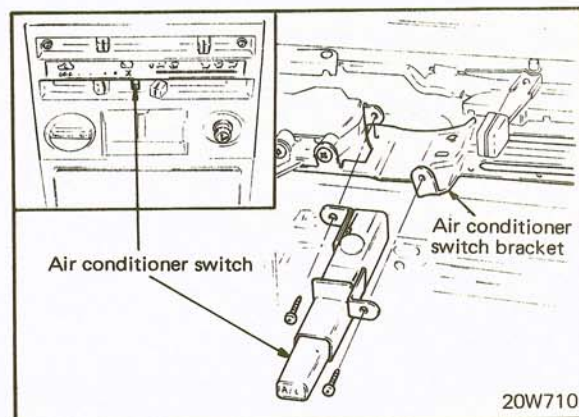
The water temperature switch prevents engine overheating by sensing higher than normal engine operating temperature. Also, an idle control system is used to maintain engine idle speed when the A/C magnetic clutch is energized.





## REMOVAL

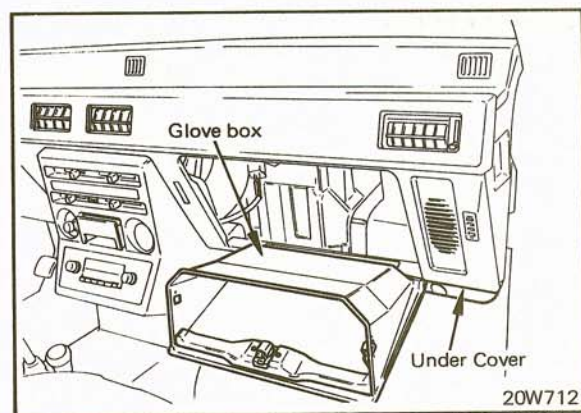
1. Remove the knob of the control lever.
2. Remove the control panel by pushing it from behind.
3. Remove the A/C switch attaching screws.
4. Disconnect the A/C switch harness.
5. Remove the A/C switch.



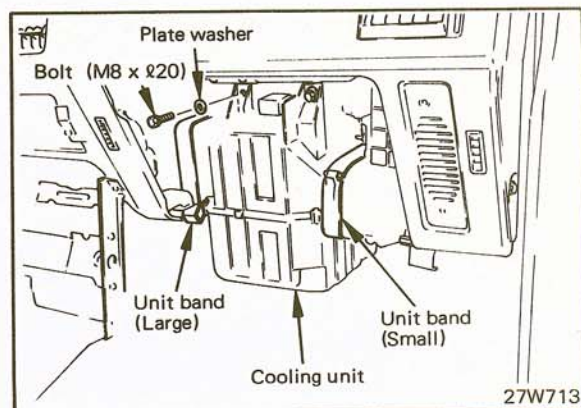
## COOLING UNIT

### REMOVAL

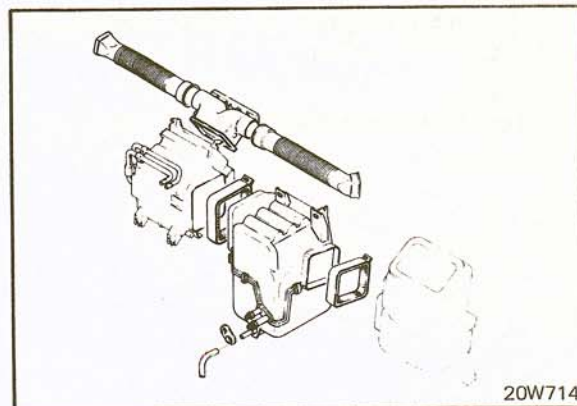
1. Remove the glove box. The glove box should be removed with the lower frame attached. (20W712)
2. Disconnect the glove box switch harness at the round topped terminal.
3. Remove the lap heater duct.
4. Remove the under tray stay.



5. Disconnect the duct joint.  
Loosen the duct joint tightening bolt to free the duct joint. (Heater unit side, blower motor side)



6. Disconnect the A/C switch harness and air-conditioner harness.

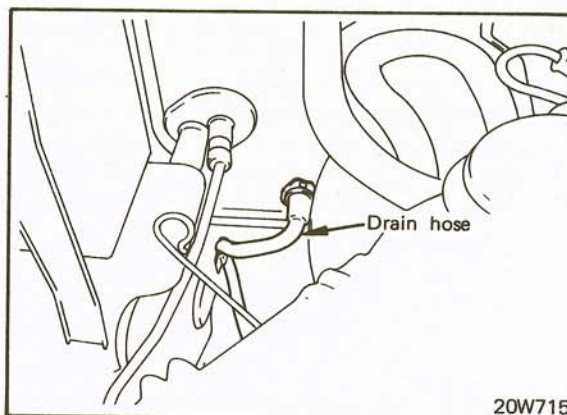






## COMPONENT SERVICE (AIR-CONDITIONING)-COOLING UNIT

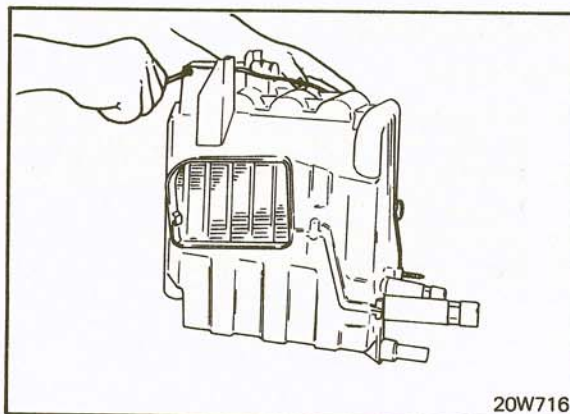
7. Disconnect the drain hose.
8. Disconnect the piping at the piping connection projecting from the firewall in the engine compartment. (20W715)
9. Remove the cooling unit attaching nuts.
10. Remove the cooling unit top attaching bolts in the passenger compartment.
11. Remove the cooling unit.



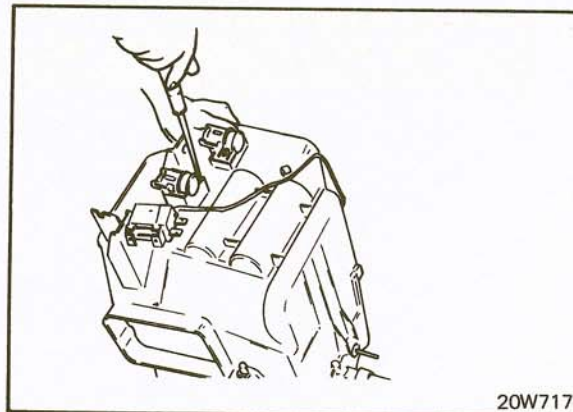
20W715

### DISASSEMBLY

1. Disconnect the harness from the cooling case.
2. Remove the two power relays. Remove the tapping screws.



20W716

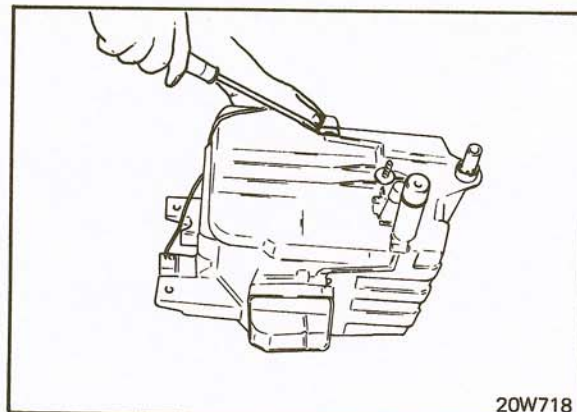


20W717

3. Remove the upper and lower cooling case attaching clips with a screwdriver.

### Caution

Use care to prevent the clips from flying off.

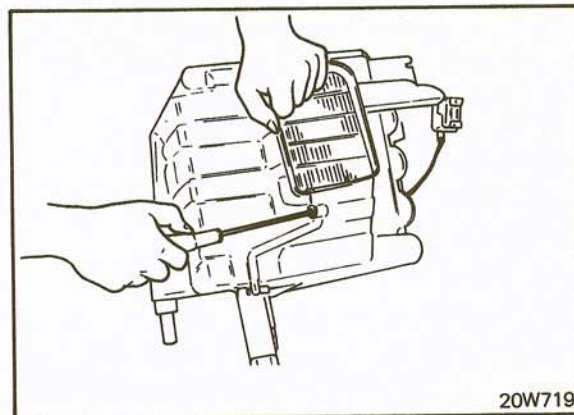


20W718



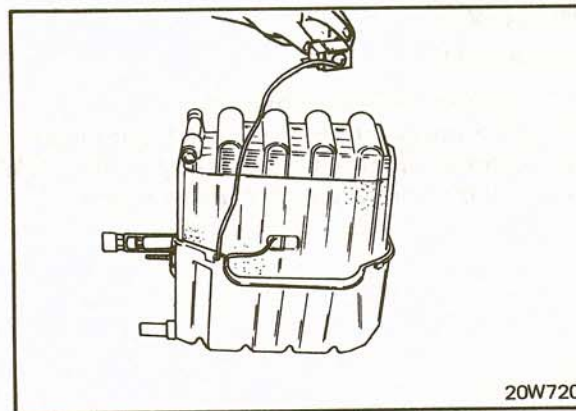


4. Remove the tapping screws.
5. Remove the upper cooling case. (20W719)



20W719

6. Remove the thermostat. Remove the heat-sensitive cylinder from inside the fins.

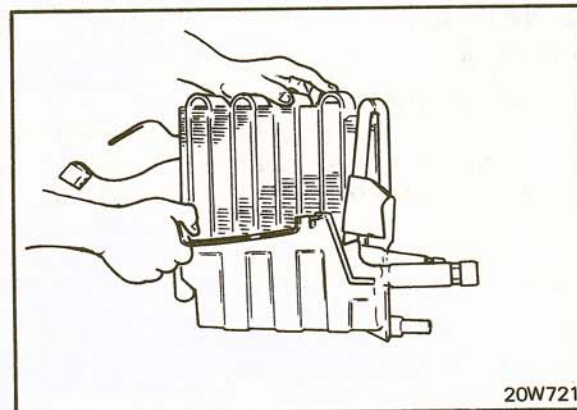


20W720

7. Remove the cooling unit by lifting it from the lower cooling case.

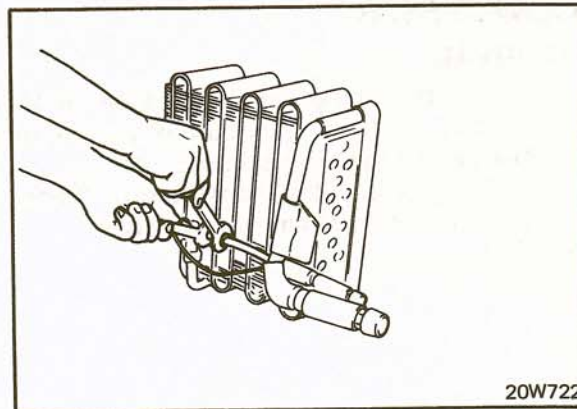
**Caution**

Hold the lower cooling case tightly when removing the cooling unit.



20W721

8. Remove the pipe assembly.



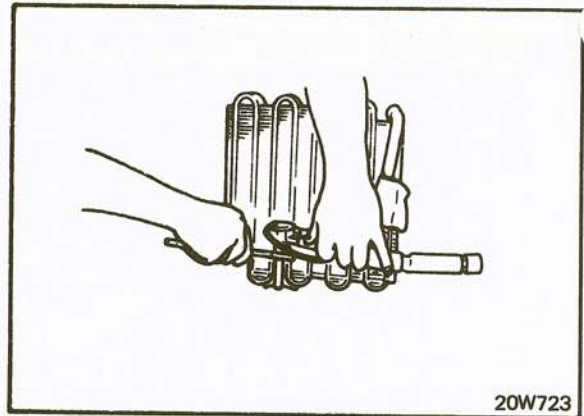
20W722





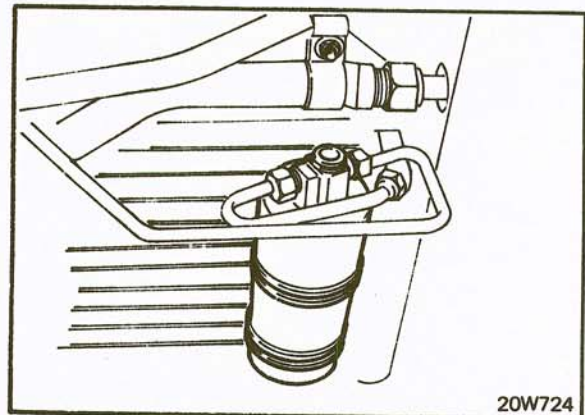
## COMPONENT SERVICE (AIR-CONDITIONING)- COOLING UNIT/RECEIVER/CONDENSER/COMPRESSOR

9. Remove the expansion valve.
10. Remove the tacking sheet. (20W723)



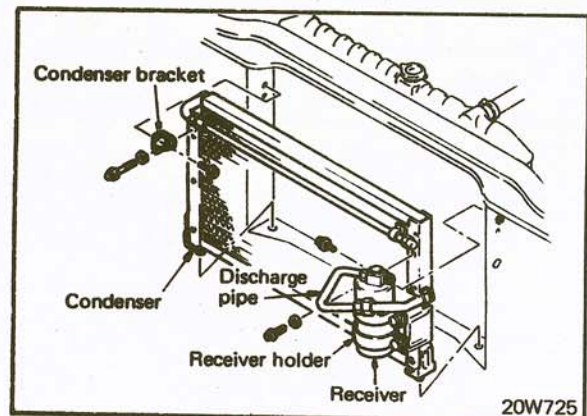
### RECEIVER REMOVAL

1. Remove the front grille.
2. Disconnect the receiver outlet and intake pipes.
3. Remove the receiver mounting bolts. (20W724)
4. Remove the receiver by lifting it upward.



### CONDENSER REMOVAL

1. Remove the center support.
2. Disconnect and plug the receiver outlet and intake pipes.
3. Remove the condenser mounting bolts. (20W725)
4. Remove the condenser from the vehicle.



### COMPRESSOR REMOVAL

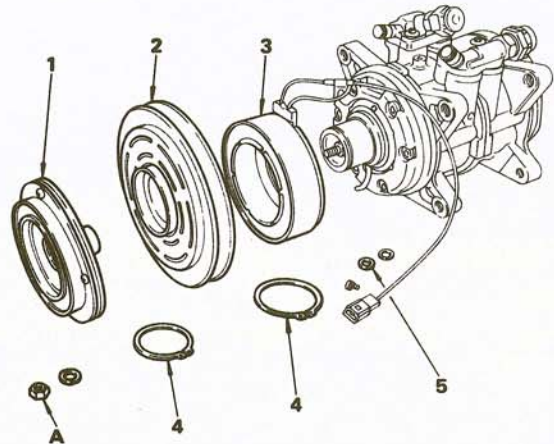
1. Loosen the idler pulley and remove the V-belt.
2. Disconnect the primary cord of the ignition coil.
3. Disconnect the magnet clutch harness.
4. Disconnect and plug the HP and LP hoses.
5. Remove the front and rear set bolts.
6. Remove the compressor.





## COMPONENTS

1. Center piece
2. Clutch rotor assembly
3. Clutch stator
4. Snap ring
5. Shim

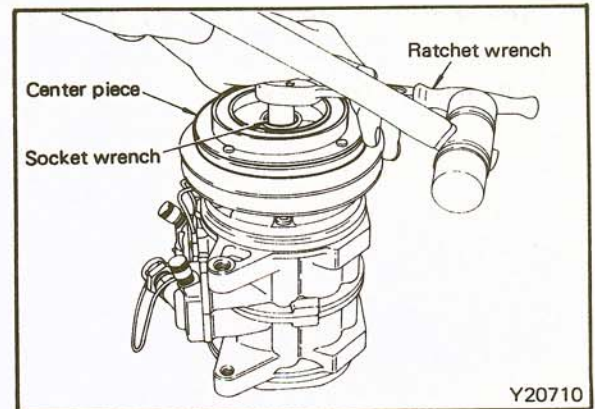


	Nm	ft.lbs.
A	15-17	11-13

Y20709

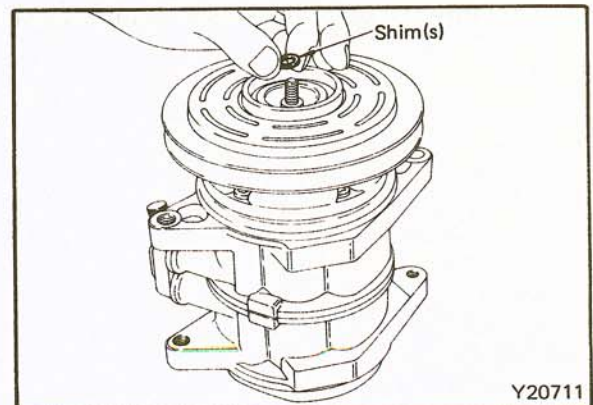
## DISASSEMBLY

1. Hold the center piece and loosen the nut. (Y20710)
2. Remove the center piece.



Y20710

3. Remove the clearance adjusting shim(s) located on the end of the compressor shaft.



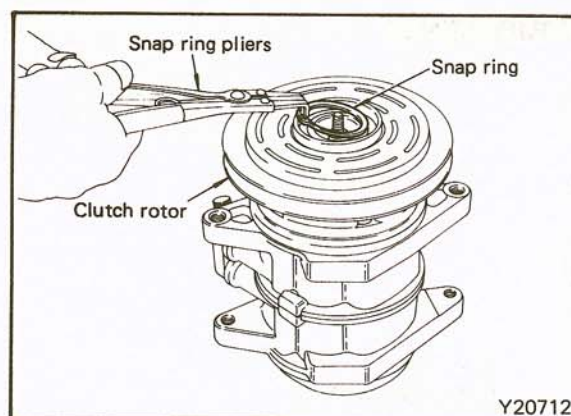
Y20711





## COMPONENT SERVICE (AIR-CONDITIONING)-MAGNETIC CLUTCH

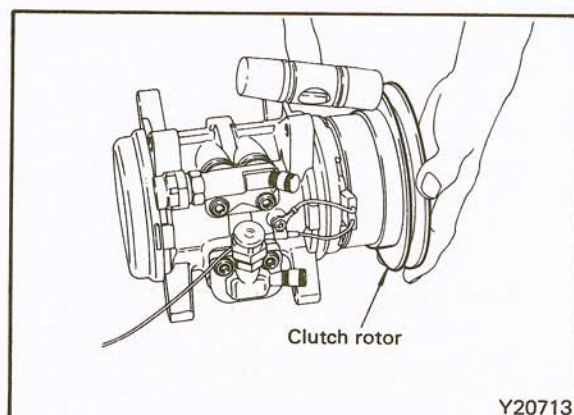
4. Remove the snap ring which secures the clutch rotor.



5. Pull the clutch rotor off of the compressor.

**NOTE**

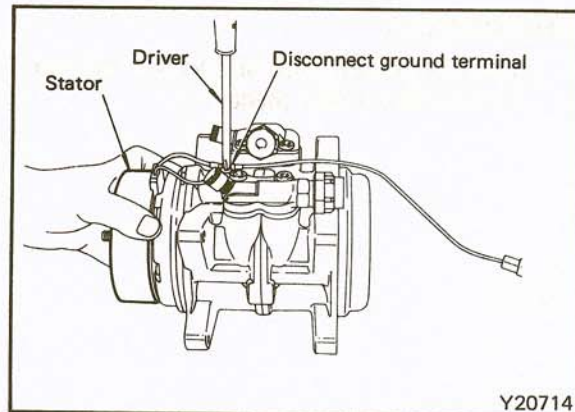
It may be necessary to lightly tap the rotor with a plastic hammer.



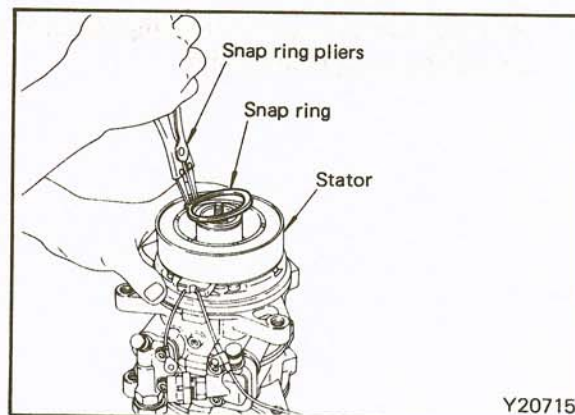
6. Disconnect the ground terminal for the stator coil.

**NOTE**

Use an impact driver to remove the attaching screw.



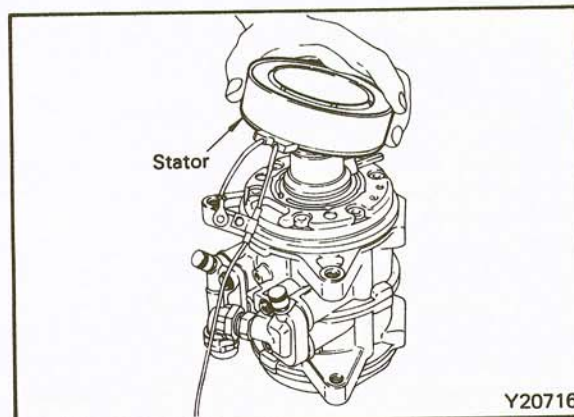
7. Remove the snap ring which secures the stator.







8. Pull the stator off of the compressor housing.



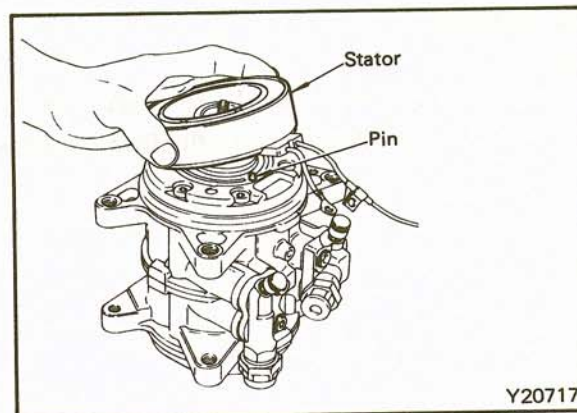
## INSPECTION

1. Check the surface of the center piece for scoring or bluing.
2. Check the surface of the rotor for scoring or discoloration.
3. Measure the resistance of the stator coil. Resistance should be equal to the standard value.

Coil resistance [at ambient temperature 20°C (68°F)]  
 ..... 2.9 ± 0.2Ω

## INSTALLATION

The stator must be aligned with the pin in the compression housing and center piece to stator clearance must be checked after installation.



## MAGNETIC CLUTCH CLEARANCE INSPECTION

1. Tighten the clutch nut.
2. Check the clutch clearance as illustrated. (Y20718)

Pressure plate to rotor clearance .....  
 0.4-0.7 mm (.02-.03 in.)

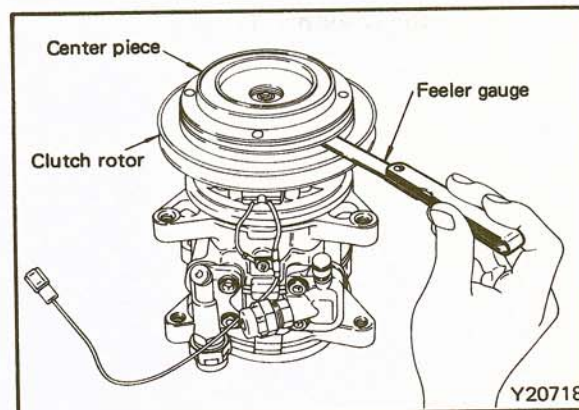
## NOTE

Remove clearance adjusting shims to decrease clutch clearance. Add shims selected from the following table to increase clutch clearance.

Clearance Adjustment Shims

Part No.	Thickness
RS13023A	0.1 mm (.004 in.)
RS13023B	0.2 mm (.008 in.)
RS13024	0.5 mm (.020 in.)

3. Turn the rotor by hand to confirm that it rotates freely.





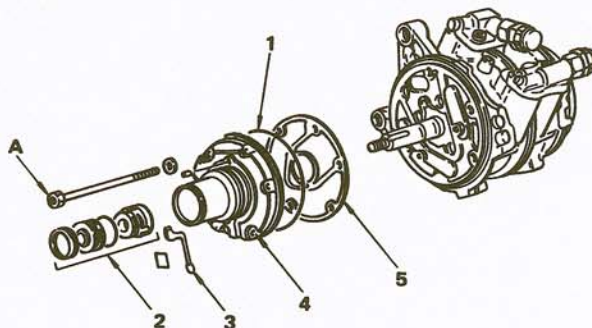


## COMPONENT SERVICE (AIR-CONDITIONING)- COMPRESSOR FRONT HOUSING

### COMPONENTS

1. O-ring
2. Seals
3. Oil drain guide
4. Front housing
5. Gasket

	Nm	ft.lbs.
A	25-26	18-20



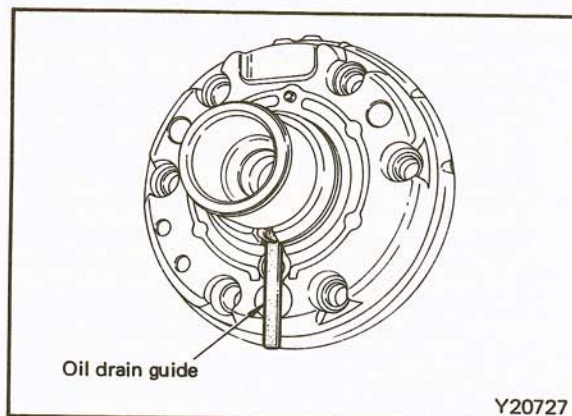
20Y847

### REMOVAL

#### NOTE

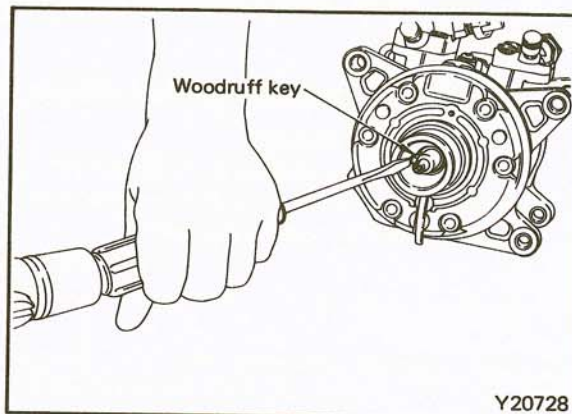
The magnetic clutch must be removed. (Refer to p. 24-44.)

1. Remove the oil drain from the front housing.



Y20727

2. Remove the woodruff key.

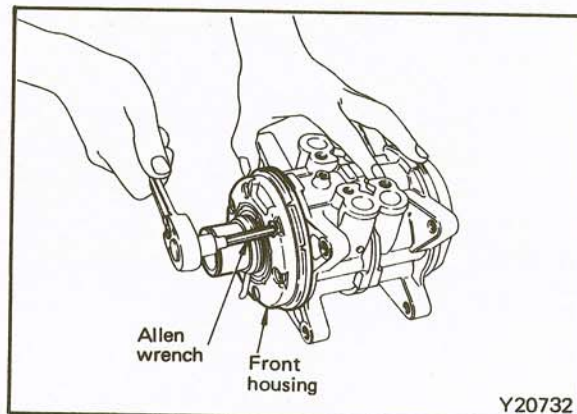


Y20728

3. Remove the six compressor through bolts as illustrated.

#### NOTE

Set the compressor on end to prevent any loss of oil during removal of the front housing.



Y20732

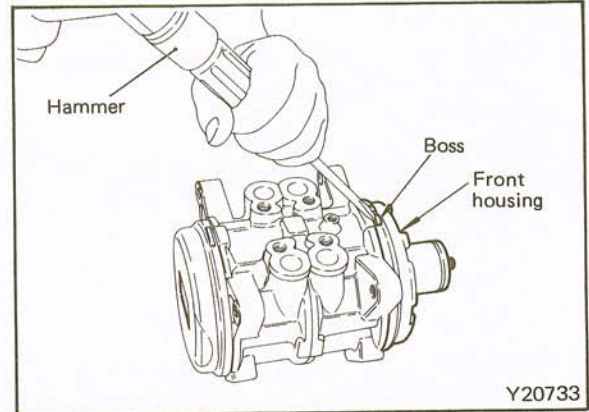




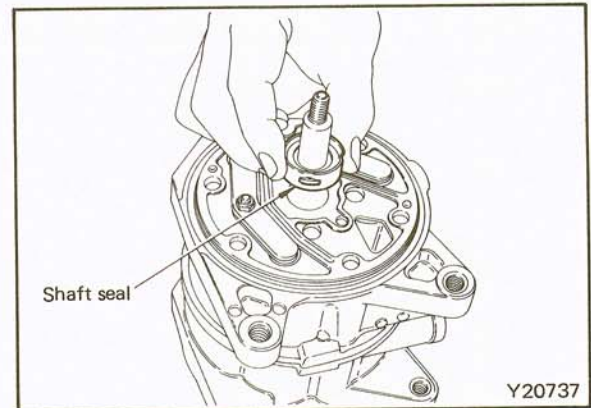
4. Using a hammer and punch, remove the front housing by tapping on the boss. Remove the front housing from the compressor.

**NOTE**

Do not damage the front housing.



5. Remove the shaft seal.

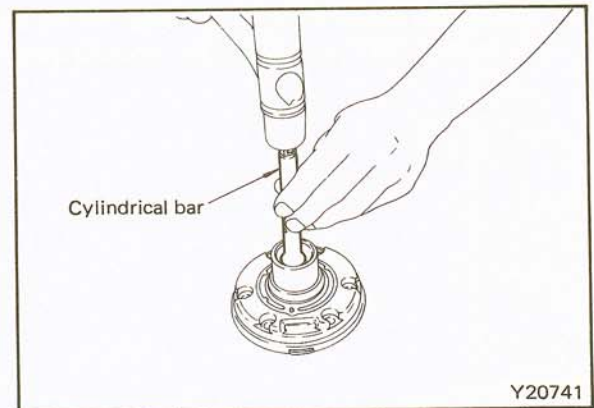


6. Remove the seal plate from the front housing with a remover. (Y20741)

**NOTE**

Do not damage the inside surface of the front housing when removing and installing the seal plate.

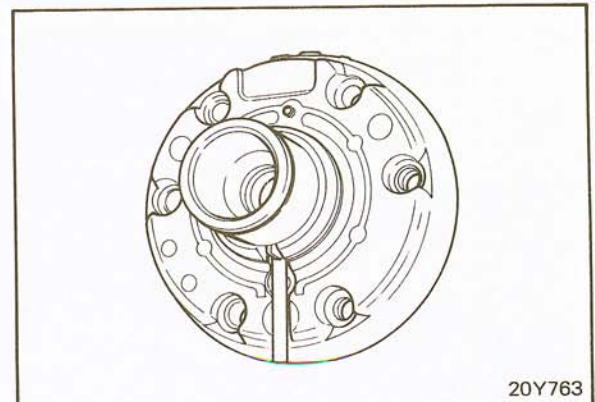
7. Carefully drain the oil from the compressor into a container.



8. Check the sealing surfaces for cracks, scratches or deformation. (20Y763)

**INSPECTION**

1. Check the front housing for cracks or scoring on the sealing surfaces.
2. Check the compressor shaft for scoring.







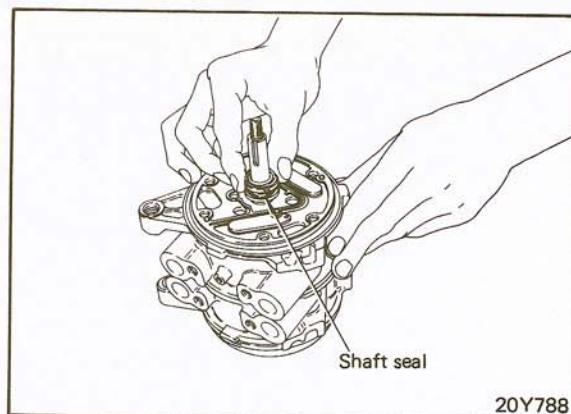
## COMPONENT SERVICE (AIR-CONDITIONING)- COMPRESSOR FRONT HOUSING

### INSTALLATION

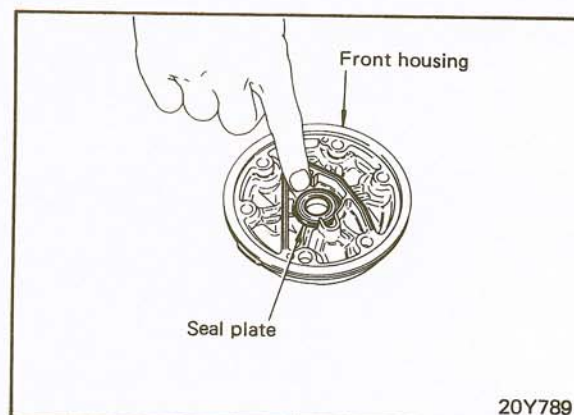
1. Lubricate the shaft seal with compressor oil. Install the shaft seal on the shaft.

#### NOTE

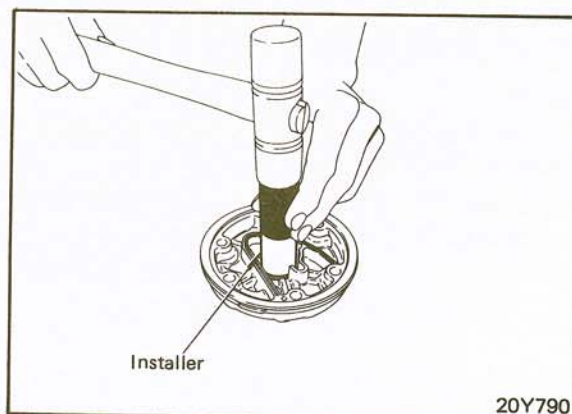
Rotate the shaft seal lightly by hand to check that it is fitted into the notch on the compressor shaft.



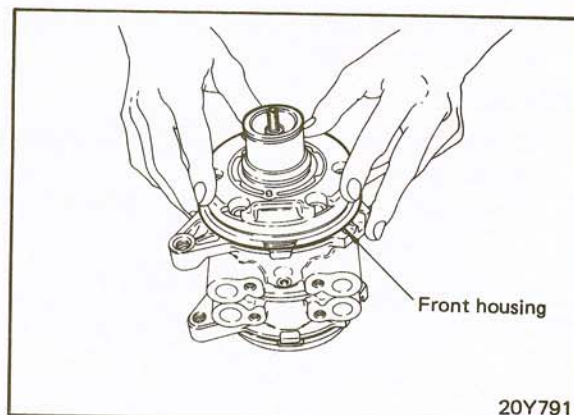
2. Lubricate the seal plate and a new O-ring with compressor oil. Push the seal plate and O-ring into the front housing.



3. Lubricate the new front housing O-ring with compressor oil and install it into the compressor housing.



4. Install the front housing in position over the locating pins in the compressor.





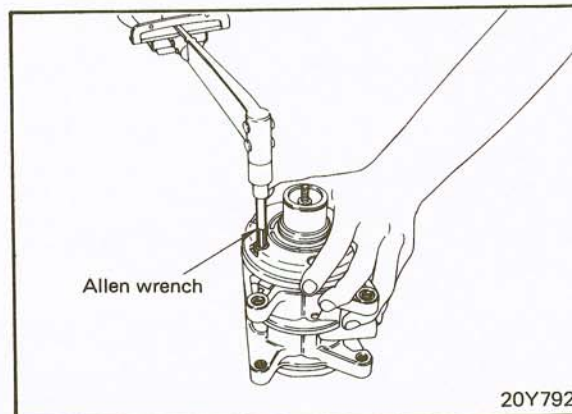
## COMPONENT SERVICE (AIR-CONDITIONING)- COMPRESSOR FRONT HOUSING



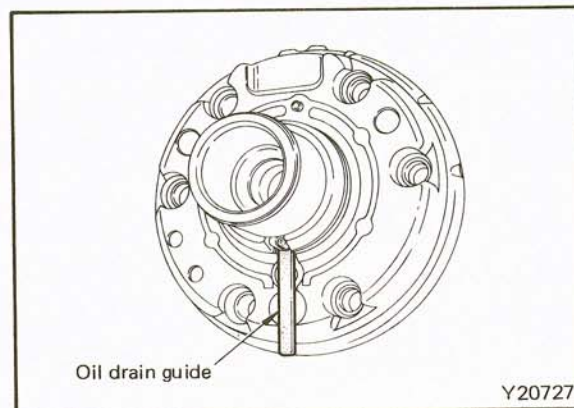
5. Install the six compressor through bolts.

### NOTE

New washers should be used on the six through bolts.

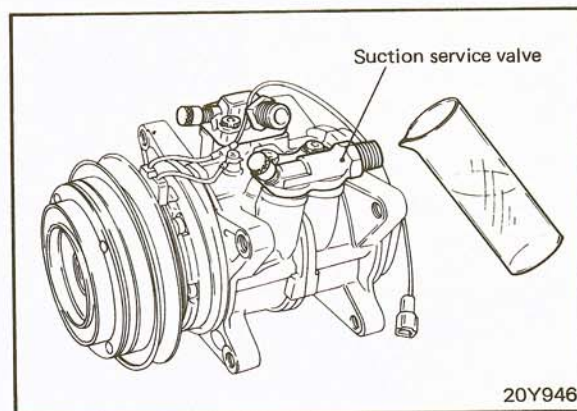


6. Install the woodruff key.  
7. Insert a new oil drain guide in front of the seal plate on the front housing. (Y20727)



8. Pour the specified quantity of new compressor oil into the service valves.

Compressor oil . . . . . 90 cc (5.5 cu.in.)











# EMISSION CONTROL SYSTEMS

## CONTENTS

OPERATIONAL DESCRIPTION .....	2	EXHAUST EMISSION CONTROL SYSTEM ...	21
COMPONENT SERVICE .....	20		
EVAPORATIVE EMISSION CONTROL SYSTEM .....	20		





## OPERATIONAL DESCRIPTION

### EMISSION CONTROL SYSTEMS

Vehicles equipped with a gasoline engine present three potential sources of air pollution: engine crankcase emissions, fuel system evaporative emissions and engine exhaust emissions.

#### Emission Control System Specifications

	Federal (not available in California)	California (can also be sold in Federal States)
<b>Crankcase Emission Control System</b>		
Type of system	Closed	Closed
Control valve	P.C.V. valve	P.C.V. valve
<b>Evaporative Emission Control System</b>		
Canister	Single	Single
Bowl vent valve	X	X
Carbon element	X	X
Purge control valve	X	X
Fuel filler cap	With relief valve	With relief valve
Vapor separator tank	Vapor-liquid	Vapor-liquid
Overfill limiter (Two-way valve)	X	X
Fuel check valve	X	X
<b>Exhaust Emission Control System</b>		
Jet valve	X	X
Catalytic converter (c/c)	Dual oxidation type	Dual three way type
Secondary air supply system	Dual reed valve	Single reed valve
Exhaust gas recirculation system		
EGR valve	Dual + sub	Single + sub
Thermo valve	Single three-way type with conventional carburetor	Single two-way type with feed back carburetor
Heated air intake system	X	—
Deceleration device		
Coasting air valve	X	X
Air switching valve	X	X
Throttle opener for air conditioner	X	X
Tamper-proof (mixture, choke)	X	X
High-altitude compensation device	X	X
Fuel control system	Conventional carburetor	Feed back carburetor

X:available

—:not available





## FUEL USAGE STATEMENT

Use gasoline having a minimum antiknock index (Octane value) of 87, or a gasoline classification number of ②. These designations are comparable to a Research Octane Number of 91.

All vehicles equipped with catalyst emission control systems have labels located on the instrument panel and on the back of fuel filler lid that state: "UNLEADED GASOLINE ONLY".

These vehicles also have fuel filler tubes especially designed to accept only the smaller-diameter unleaded gasoline dispensing nozzle only.



C51520

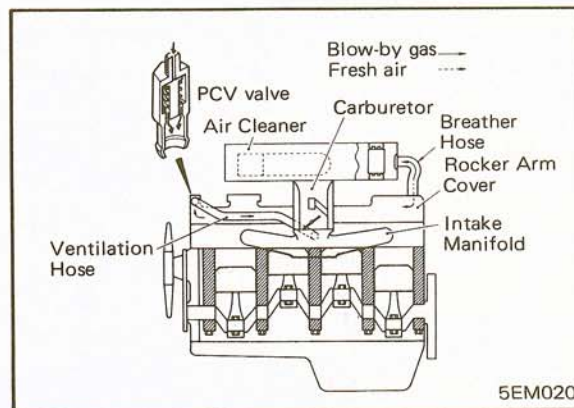
## CRANKCASE EMISSION CONTROL SYSTEM

A closed-type crankcase ventilation system is utilized to prevent the blow-by gas from escaping into the atmosphere. This system has a positive crankcase vent valve (PCV valve) at the rocker arm cover.

This system supplies fresh air to the crankcase through the air cleaner. Inside the crankcase, the fresh air is mixed with blow-by gases, and this mixture passes through the PCV valve into the induction system.

The PCV valve has a metered orifice through which the mixture of fresh air and blow-by gases is drawn into the intake manifold in response to the intake manifold vacuum. The valve capacity is adequate for all normal driving conditions.

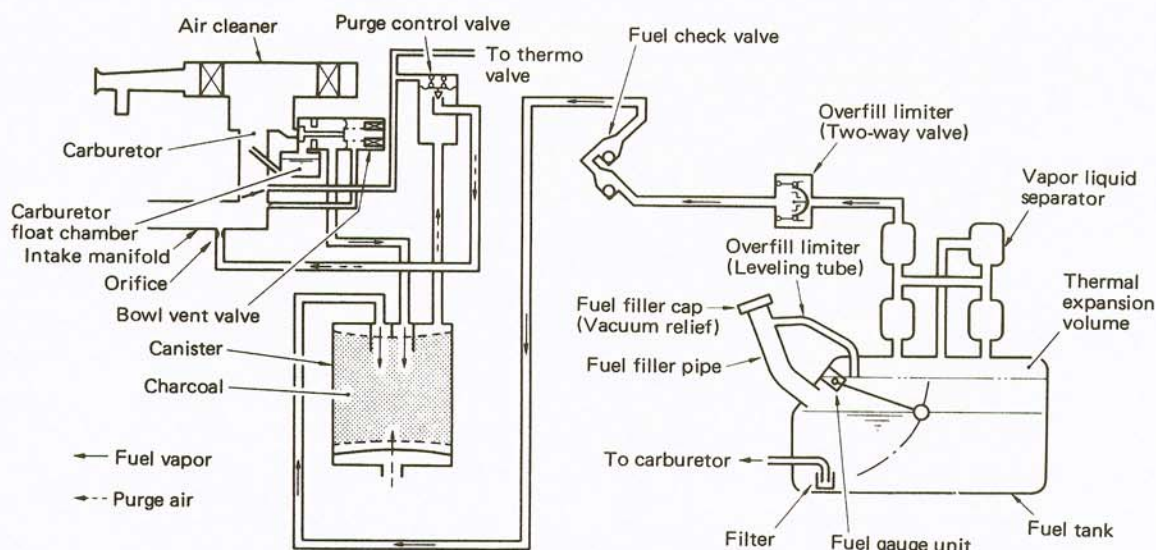
Under heavy acceleration or high-speed driving, there is less intake manifold vacuum available, and the blow-by gases exceed the PCV valve capacity. In this case, the blow-by gases back up into the air cleaner through the breather hose.







## EVAPORATIVE EMISSION CONTROL SYSTEM

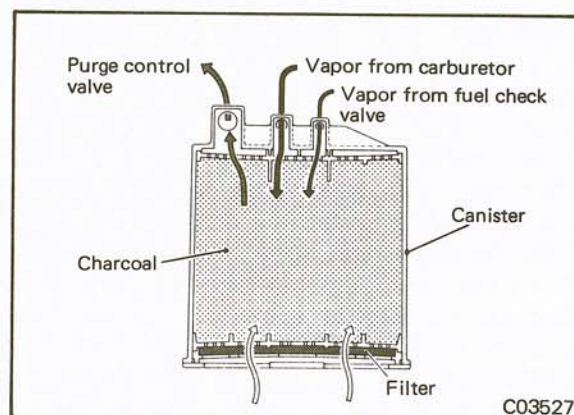


03W527

In order to prevent the loss of fuel vapor from the fuel system to the atmosphere, the evaporative emission-control system consists of a charcoal canister, a bowl vent valve, a purge-control valve, and so on.

### Canister

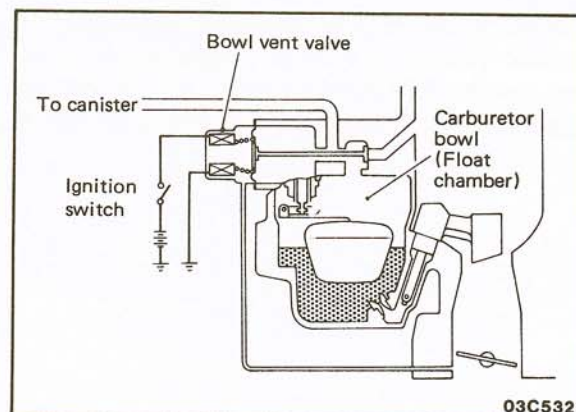
While the engine is inoperative, fuel vapors generated inside the fuel tank and the carburetor float chamber are absorbed and stored in the canister. When the engine is running, the fuel vapors absorbed in the canister are drawn into the intake manifold through the purge-control valve and an orifice. And the carburetor bowl vapors flow into the carburetor through the bowl vent valve.



C03527

### Bowl Vent Valve

The bowl vent valve, which controls the carburetor bowl vapors, is opened when the intake manifold vacuum working on the diaphragm of the valve exceeds the pre-set value after the ignition key is turned on, and is kept being opened by the solenoid valve, even though the intake manifold vacuum becomes the atmospheric pressure during engine operation, once the ignition key has been turned on. When the engine is off, the valve is closed.



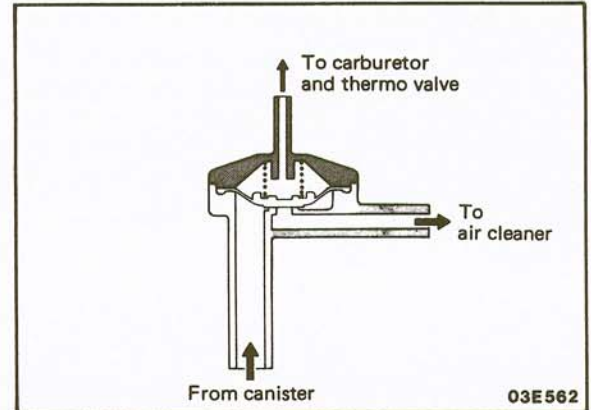
03C532





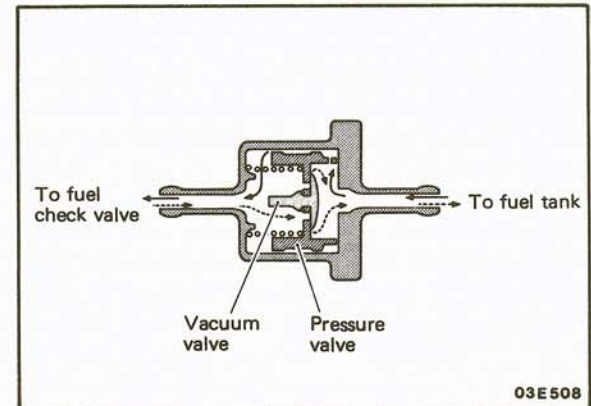
## Purge Control Valve

The purge-control valve is kept closed during idling in order to prevent vaporized fuel from entering into the intake manifold for positive control of high idle-CO emissions, which is a particular problem under high ambient temperatures. When the carburetor vacuum working on the diaphragm of the valve exceeds the pre-set value, the purge-control valve is opened.



## Overfill Limiter (Two-way Valve)

The overfill limiter consists of a pressure valve and a vacuum valve. The pressure valve is designed to open when the fuel tank internal pressure has increased over the normal pressure and the vacuum valve opens when a vacuum has been produced in the tank.



## Thermo Valve

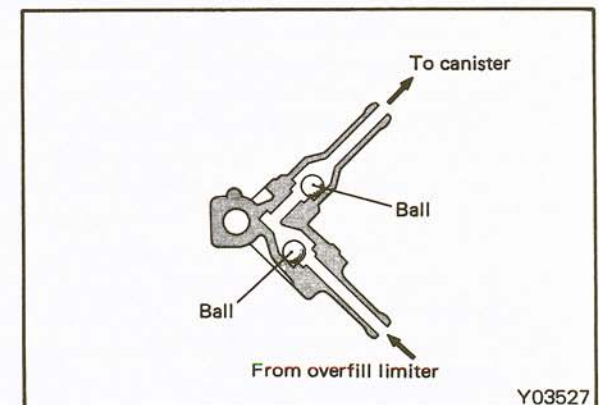
A thermo valve incorporated in this system (for sensing the coolant temperature at the intake manifold) closes the purge-control valve when the coolant temperature is lower than a pre-set value, in order to reduce CO and HC emissions under engine warm-up conditions, and opens the purge-control valve when the coolant temperature become above the pre-set temperature.

The thermo valve is deemed to be an acceptable AECD, according to the criteria defined in section.

## Fuel Check Valve

The fuel check valve is used to prevent fuel leaks should the vehicle roll over. This valve is connected in the fuel vapor line (between canister and overfill limiter) and is mounted on the back of the filler hose protector.

The fuel check valve contains two balls as shown in the illustration. Under normal conditions, the gasoline vapor passage in the valve is opened, but if roll-over occurs, one of the balls closes the fuel passage, thus preventing fuel leaks.







### EXHAUST EMISSION CONTROL SYSTEM

Exhaust emissions (carbon monoxide, hydrocarbons and nitrogen oxides) are controlled by a combination of engine modifications and the addition of special control components. These components have been integrated into a highly effective system which controls exhaust emissions while maintaining good performance.

#### Jet Air System

The combustion chamber is the same cross-flow type hemispherical combustion chamber as the conventional one. In addition to the intake valve and exhaust valve, a jet valve has been provided for drawing jet air (super-lean mixture or just air) into the combustion chamber. The jet valve assembly consists of the jet valve, jet body and spring, and is screwed into the jet piece which is press-fitted into the cylinder head with the jet opening toward the spark plug.

A jet air passage is provided in the carburetor, intake manifold and cylinder head. Air flows through the two intake openings provided near the primary throttle valve of the carburetor, goes through the passage in the intake manifold and cylinder head, and flows through the jet valve and the jet opening into the combustion chamber.

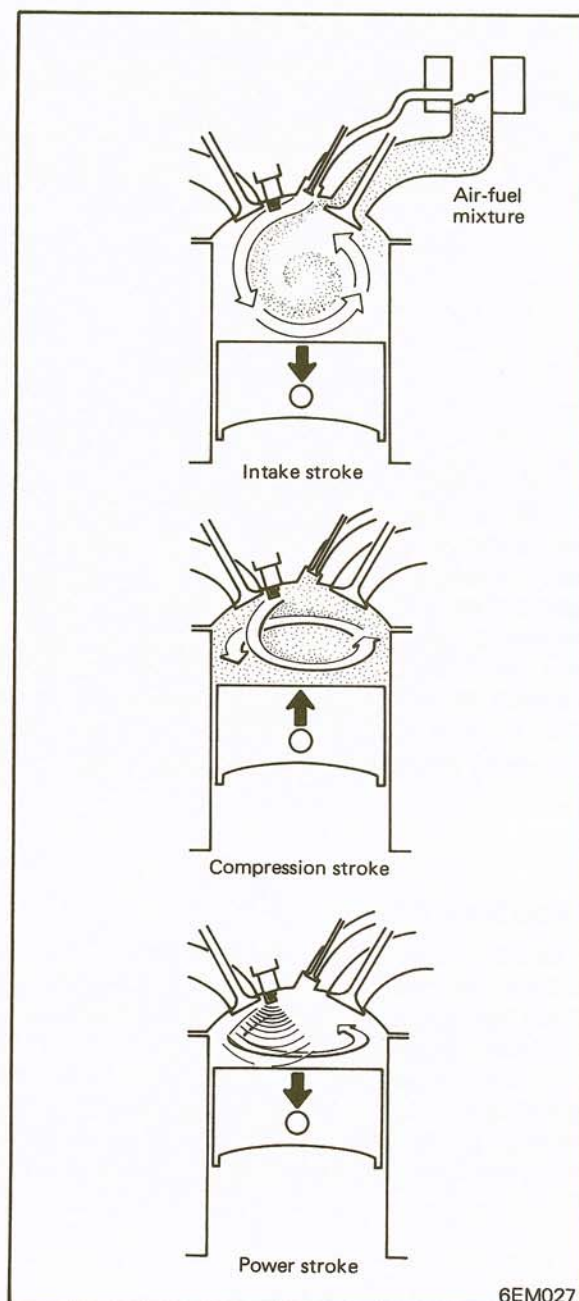
The jet valve is actuated by the same cam as the intake valve and by a common rocker arm so that the jet valve and intake valve open and close simultaneously.

On the intake stroke, the air-fuel mixture flows through the intake valve port into the combustion chamber. At the same time, jet air is forced into the combustion chamber because of the pressure difference produced between the two ends of the jet air passage (between the jet air intake openings in the carburetor throttle bore and the jet opening of the jet piece) as the piston moves downward.

When the throttle valve opening is small during idling or light load, a large pressure difference is produced as the piston moves downward, causing jet air to flow into the combustion chamber rapidly. The jet air flowing out of the jet opening scavenges the residual gases around the spark plug and creates a good ignition condition. It also produces a strong swirl in the combustion chamber which continues throughout the compression stroke and improves flame propagation after ignition, assuring high combustion efficiency.

When the throttle valve opening is increased, more air-fuel mixture is drawn in from the intake valve port so that the pressure difference is reduced and less jet air forced in.

The jet air swirl dwindles with increase of the throttle valve opening, but the intensified inflow of normal intake air-fuel mixture can satisfactorily promote combustion.



6EM027



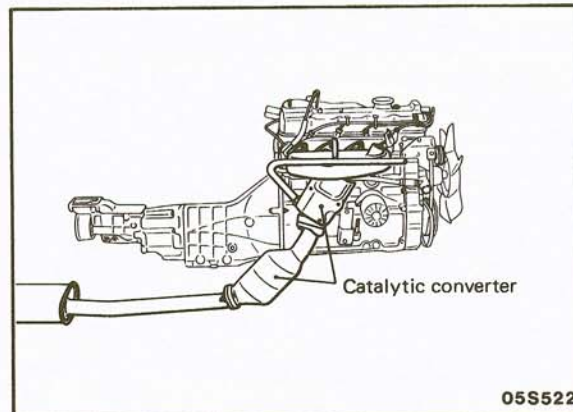


## Catalytic Converter

The catalytic converter requires the use of unleaded gasoline only.

Leaded gasoline will destroy the effectiveness of the catalyst as an emissions-control device.

Under normal operating conditions the catalytic converter will not require maintenance. However, it is important to keep the engine properly tuned. If the engine is not kept properly tuned, engine misfiring may cause overheating of the catalyst. This may cause heat damage to the converter or vehicle components. This situation can also occur during diagnostic testing if any spark plug cables are disconnected and the engine is allowed to idle for a prolonged period of time.



## Caution

1. Operation of any type, including idling, should be avoided if engine misfiring occurs. Under this condition, the exhaust system will operate at abnormally high temperature, which may cause damage to the catalyst or underbody parts of the vehicle.
2. Alteration or deterioration of ignition or fuel system or any type of operating condition which results in engine misfiring must be corrected to avoid overheating the catalytic converter.
3. Proper maintenance and engine tune-ups according to manufacturer's specifications should be made to correct any improper operating conditions as soon as possible. Interrupting the ignition at high speeds with the transmission in gear will result in a catalyst overheat condition.



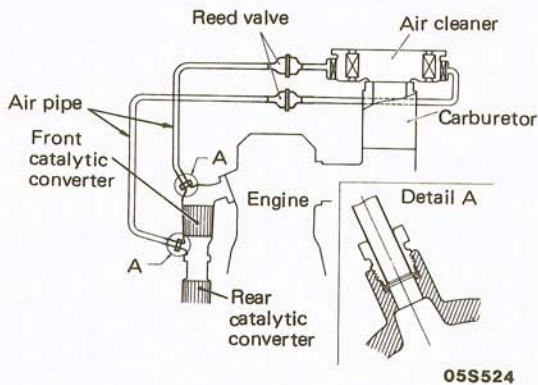


## OPERATIONAL DESCRIPTION

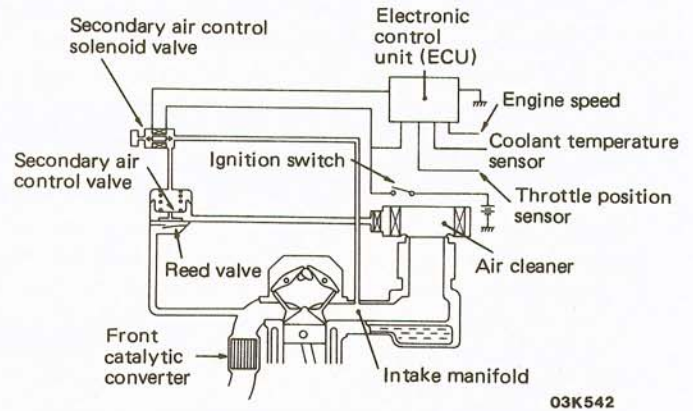
### Secondary Air Supply System

The air injection system consists of a reed valve with a secondary air control valve, and a solenoid valve.

For Federal



For California

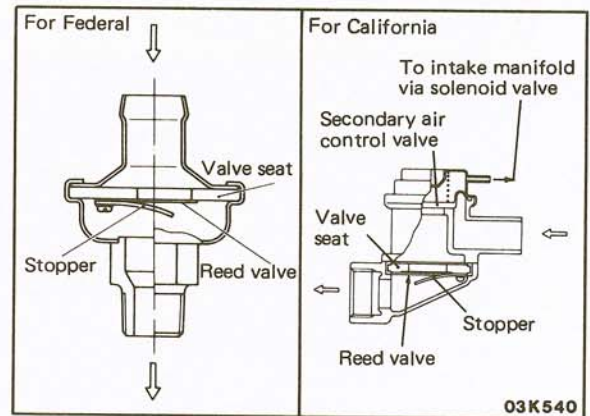


### REED VALVE

The reed valve supplies secondary air into the front catalytic converter for the purpose of promoting oxidation of exhaust emissions during the engine warm-up operation and the vehicle deceleration.

The reed valve is actuated by exhaust vacuum being generated from pulsation in the exhaust manifold, and extra air is supplied into the exhaust manifold through the secondary air control valve.

The secondary air control valve is opened by the intake manifold pressure when the solenoid valve is energized by the ECU based on the information on coolant temperature, engine speed, and idle position.

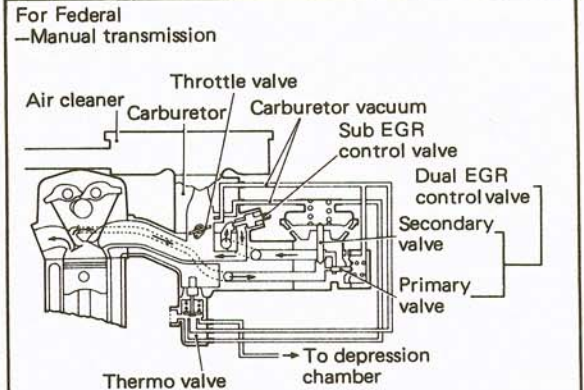






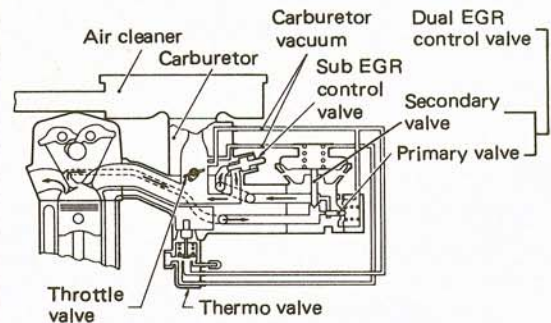
## Exhaust Gas Recirculation (EGR) System

An Exhaust Gas Recirculation (EGR) system is utilized to reduce nitrogen oxides in the exhaust. In this system, the exhaust gas is partially recirculated from a cylinder head exhaust port into a port located at the intake manifold below the carburetor. The EGR flow is controlled by the EGR control valve and the thermo valve.



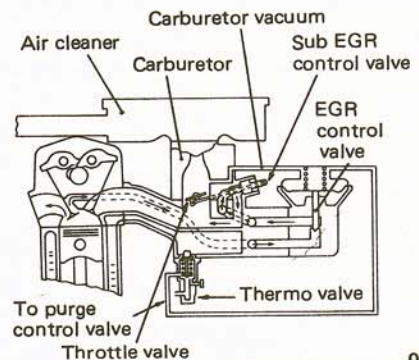
5EM023

For Federal  
—Automatic transmission



03W528

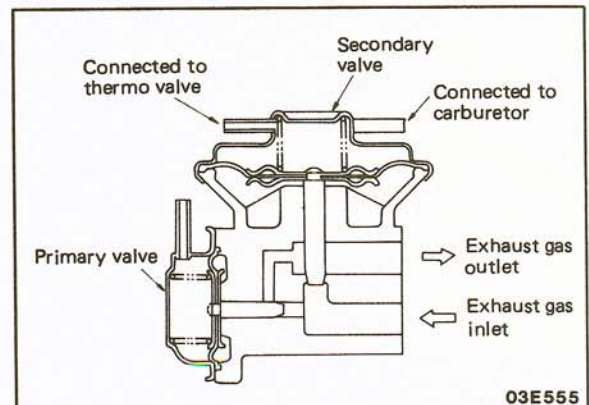
For California



03K533

## DUAL EGR CONTROL VALVE

The dual EGR control valve consists of primary and secondary valves which are controlled by different carburetor vacuums in response to the throttle valve openings, while the EGR flow is suspended at idle and WOT operation. The primary valve controls EGR flow for vehicle operation with relatively narrow throttle valve openings, while the secondary control valve allows the recirculation of exhaust gas into the intake mixture when the throttle valve is further opened. The vacuum applied on the dual EGR control valve is controlled by a thermo valve as described in next section.



03E555



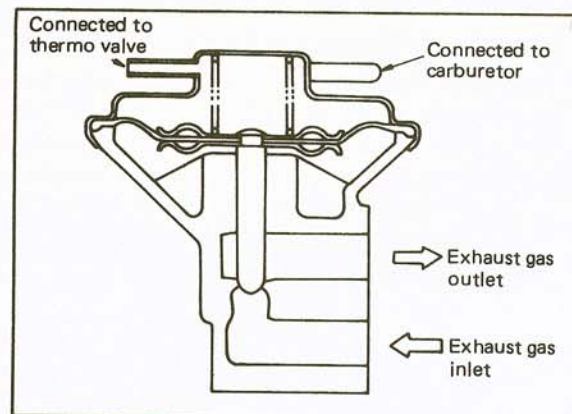


## OPERATIONAL DESCRIPTION

### EGR CONTROL VALVE

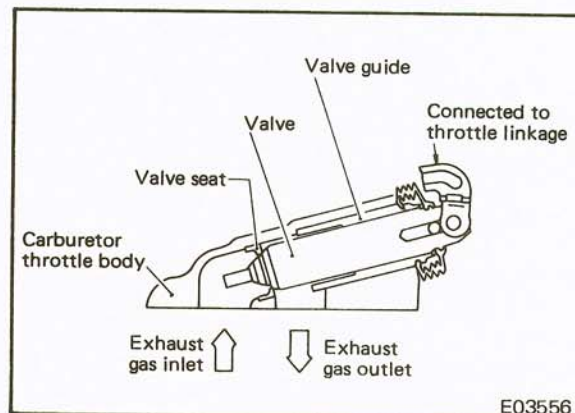
The EGR control valve, which is a conventional type, is controlled by carburetor vacuum in response to the throttle valve opening, while the EGR flow is suspended at idle and WOT operations.

The vacuum to be applied on the EGR control valve is controlled by a thermo valve as described in next section.



### SUB EGR CONTROL VALVE

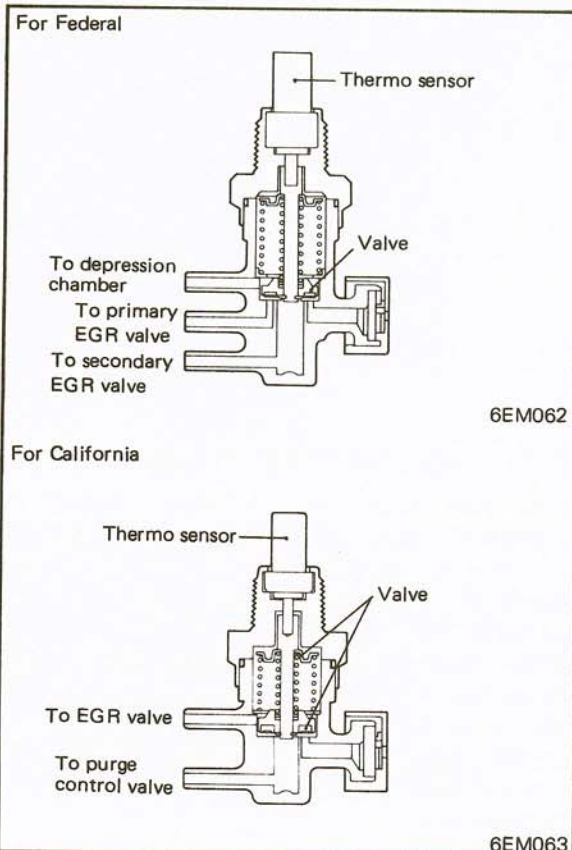
The sub EGR control valve is directly opened and closed with the motion of the throttle valve through a linkage in response to the throttle valve opening in order to closely modulate the EGR flow which is controlled by the EGR control valve.



E03556

### THERMO VALVE

A thermo valve incorporated in the EGR system for sensing the coolant temperature at the intake manifold closes the EGR control valve when the coolant temperature is lower than a pre-set value. This prevents deterioration of vehicle driveability and startability during initial starting and opens the EGR control valve when the coolant temperature exceeds the pre-set temperature. Once the engine is stopped and the coolant temperature again becomes lower than the pre-set value, the thermo valve once again closes the EGR control valve.







## Heated Air Intake System (Conventional Carburetor only)

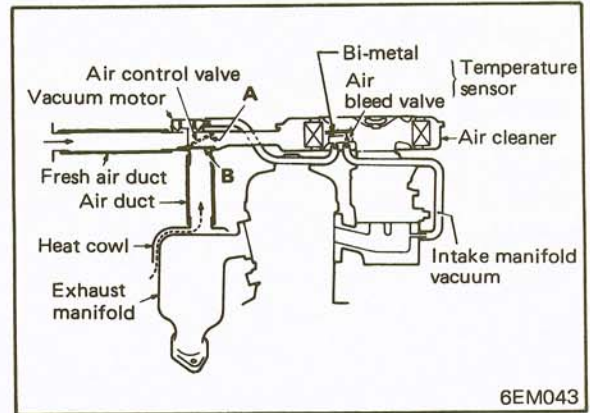
All vehicles are equipped with a temperature regulated air cleaner so that the carburetor can be calibrated leaner to reduce CO and HC emissions, and so that improved engine warm-up characteristics and minimized carburetor icing can be attained. The air cleaner is provided with an air control valve, inside the snorkel, to modulate the temperature of carburetor intake air. The air control valve is controlled by a vacuum motor and temperature sensor combination system which responds to the intake manifold vacuum and temperature inside the air cleaner. When the bi-metal senses a temperature inside air cleaner of below about 29°C (84°F), the air bleed valve of the temperature sensor assembly remains closed. The intake manifold vacuum is then applied to the diaphragm of the vacuum motor, which in turn opens air control valve (A) so as to let the pre-heated intake air flow through the heat cowl and air duct into the air cleaner.

When the bi-metal senses a temperature inside air cleaner of above about 45°C (113°F), the air bleed valve is fully opened. As a result, the intake air to the carburetor comes directly through the fresh air duct since the air control valve is positioned at (B), regardless of the intake manifold vacuum.

At intermediate temperatures the air entering the carburetor is a blend of fresh air and pre-heated air as regulated by the thermostatically actuated air control valve.

## Deceleration Devices

These deceleration devices are used to decrease HC emissions during vehicle deceleration. They include the coasting air valve (CAV) system, the air switching valve (ASV) system and the dashpot. The CAV, ASV, and dashpot are all installed on the carburetor.



6EM043

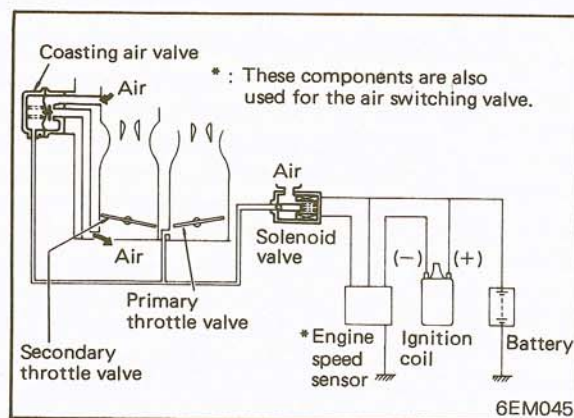




## OPERATIONAL DESCRIPTION

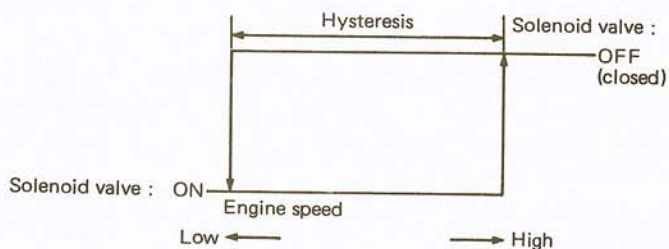
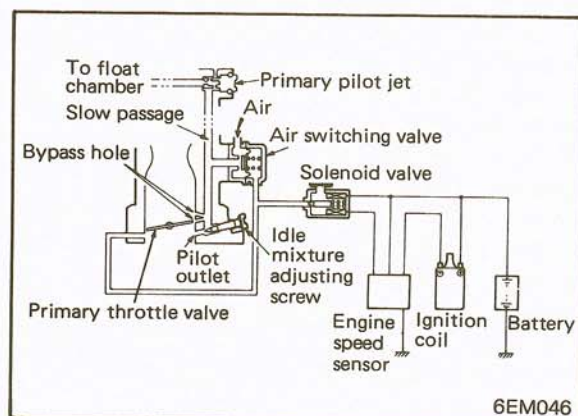
### COASTING AIR VALVE (CAV) SYSTEM

In order to decrease HC emissions emitted during vehicle deceleration, the coasting air valve (CAV), which is activated by carburetor ported vacuum, supplies additional air into the intake manifold. The activation of the CAV is suspended by the opening of the solenoid valve when the engine speed sensor detects engine speeds at or below the specified value in order to maintain smooth vehicle operation in transient phase to help prevent engine stalling. The solenoid valve and the engine speed sensor are also used for the air switching valve system.



### AIR SWITCHING VALVE (ASV) SYSTEM

In order to improve fuel economy as well as reduce HC emissions during vehicle deceleration, the air switching valve, which is activated by carburetor ported vacuum, cuts off the fuel flow to the bypass holes and pilot outlet by supplying additional air into the slow passage. The activation of the air switching valve is suspended by opening the solenoid valve when the engine speed sensor detects engine speeds at or below the specified value in order to maintain smooth vehicle operation in transient phase to help prevent engine stalling.



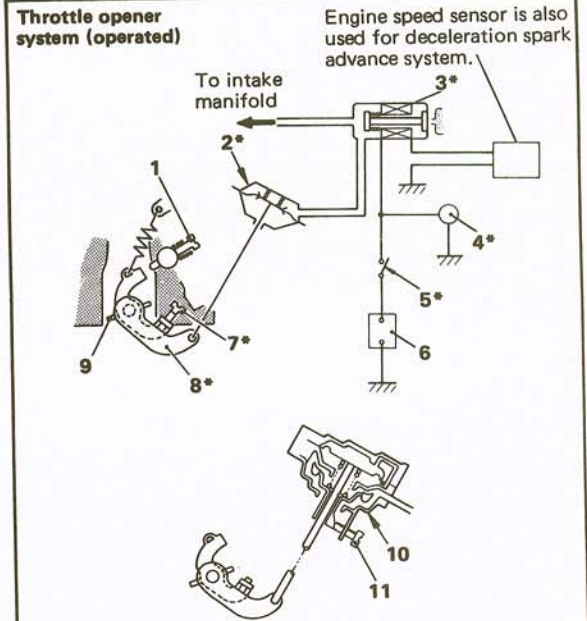




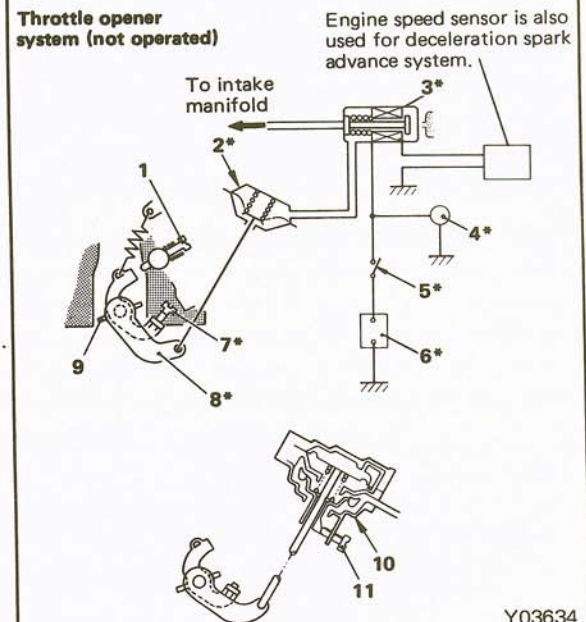
## Throttle Opener System (for air conditioner only)

This system consists of a throttle opener assembly, a solenoid valve, an engine speed sensor and the air conditioner compressor switch. When the compressor switch is turned on and when the engine speed sensor detects engine speeds at or below the specified value, the solenoid valve is opened so as to transfer the intake manifold vacuum to the throttle opener, the throttle valve is slightly opened by the throttle opener via the throttle opener lever which moves on the throttle valve shaft. Consequently the engine runs at a speed determined by the new throttle valve opening to offset the compressor load. When the compressor switch is turned off, the throttle opener system stops working.

The engine speed sensor used in the deceleration spark advance system is also used in this throttle opener system. When the sensor detects engine speeds at or below the specified value, the deceleration spark advance system does not operate and when the engine speed is above the specified value, the deceleration spark advance system functions as designed. Therefore, the engine speed sensor does not cause this throttle opener system violate the regulations of the Clean Air Act.



Y03633



Y03634

\* : Parts with the asterisks are included in the air-conditioning unit.

1. Idle speed adjusting screw
2. Throttle opener for vehicles with automatic transmission
3. Solenoid valve
4. Compressor
5. Compressor switch
6. Battery
7. Throttle opener setting screw
8. Throttle opener lever
9. Throttle valve
10. Throttle opener for vehicles with manual transmission for California
11. Throttle opener setting screw



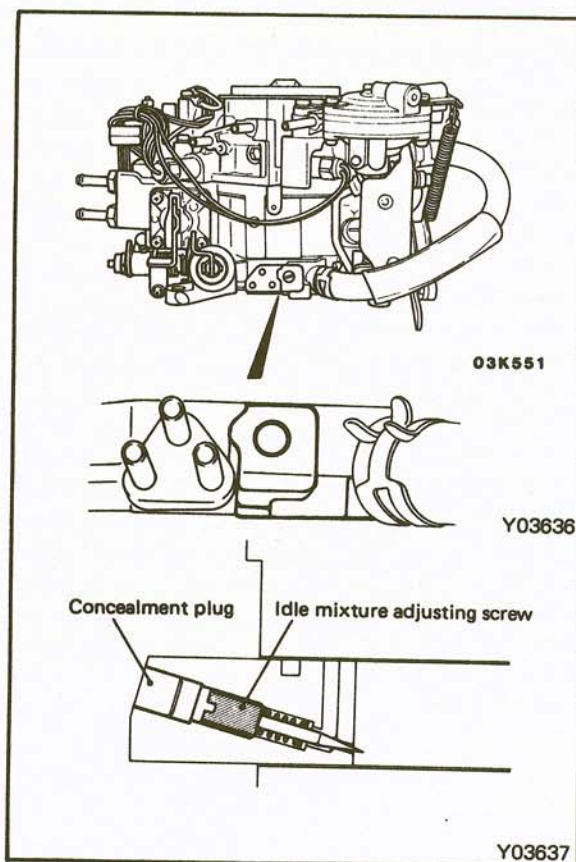


## OPERATIONAL DESCRIPTION

### Tamper-proof

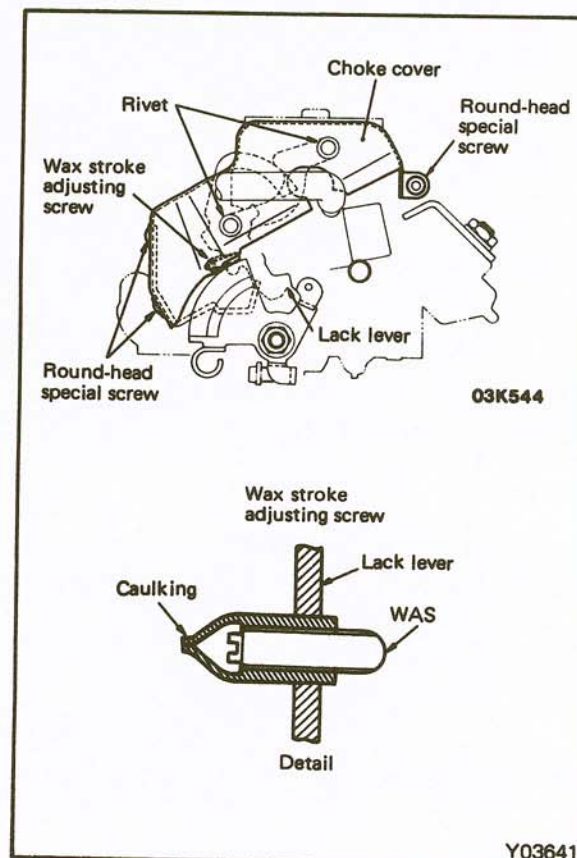
#### TAMPER-RESISTANT FOR IDLE MIXTURE ADJUSTMENT

All carburetors have tamper-resistant idle mixture adjustment. The CO setting has been adjusted at the factory. Neither removal of the plug nor tampering with the mixture screw is required in service except during a major carburetor overhaul or throttle body replacement, or when high-idle CO adjustments are required by state or local regulations.



#### TAMPER-PROOF AUTOMATIC CHOKE

All carburetors also have tamper-proof choke. The choke-related parts are factory adjusted. Neither removal of the choke cover, nor tampering with W.A.S., (wax-stroke adjusting screw) is required in service except during a major carburetor overhaul, or when adjustment of choke-calibration-related parts is required by state or local regulations.







## High Altitude Compensation System —For Federal (not available in California)

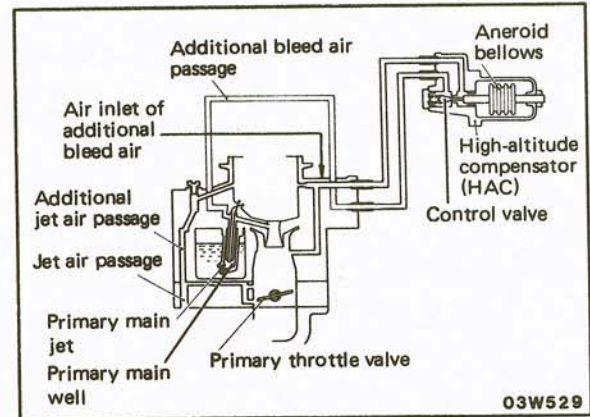
In order to comply with the Federal high altitude requirements, the Federal vehicles are equipped with high altitude compensation system, which consists of dual catalytic converters, two reed valves, a high altitude compensator (HAC), and passages for additional bleed air and additional jet air.

### HAC

With the aid of those high altitude compensation systems, the air/fuel ratios at high altitude are maintained to approximately the same degree as at sea level.

### ADDITIONAL JET AIR

In order to further compensate the air/fuel ratio for engine idling and light load operation, additional air is supplied into the jet air passage for the Jet Valve System.



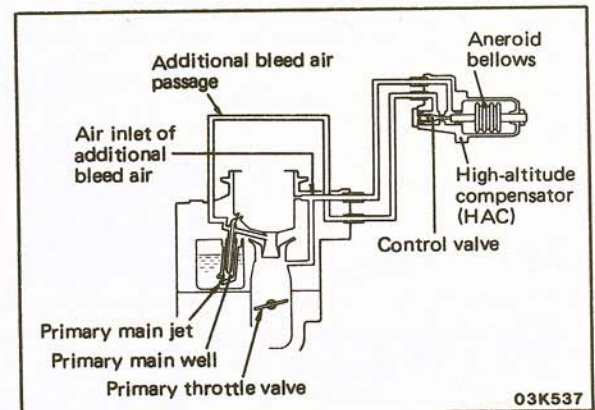
## High Altitude Compensation System —For California (can also be sold in Federal States)

In order to meet the requirements at all altitudes, all the feedback carburetor vehicles for California are equipped with high altitude compensation system in addition to feedback carburetor system. High altitude compensation system consists of a high altitude compensator (HAC), and passages for additional bleed air.

### HAC

The air/fuel ratios at high altitude are maintained by the HAC to approximately the same degree as at sea level, by supplying additional bleed air into the primary main well through a control valve controlled by an aneroid bellows of the HAC.

Then the air/fuel ratios are controlled precisely by feedback carburetor with high altitude compensation system to comply with the applicable emissions standards at all altitudes.







### FUEL CONTROL SYSTEM (FBC SYSTEM)

Feedback carburetor system provides the capability to perform closed loop fuel control. It also provides the capability to control the secondary air system, the deceleration spark control system and throttle opener system.

The basic functions of this system are depicted below. Input signals from a variety of sensors are fed to a microprocessor based Electronic Control Unit (ECU). The ECU then generates output signals for all of the controlled functions.

This feedback carburetor is a 2-barrel, downdraft carburetor designed for Closed Loop System.

When used with the Closed Loop System of mixture control, this carburetor includes special design features for optimum air/fuel mixtures during all ranges of engine operation.

Fuel metering is accomplished through the use of three solenoid-operated on/off valves (jet mixture, enrichment and deceleration solenoids) adding or reducing fuel to the engine. The activation of the on/off valve is controlled by the length of time current supplied to the solenoid. The solenoid operates at a fixed frequency. By varying the amount of time the solenoid is energized during each cycle (defined as duty cycle) the air/fuel mixture delivered to the engine can be precisely controlled. The duty cycle to the solenoid is controlled by the electronic control unit (ECU) in response to signals from the exhaust oxygen sensor, throttle position sensor and so on.

Incorporated in the feedback carburetor are 8 basic systems of operation: fuel inlet, primary metering, secondary metering, accelerating pump, choke, jet mixture, enrichment and fuel cut-off. The former 5 systems are substantially the same as the conventional carburetor.

The latter 3 systems, which are unique to this feedback carburetor, are described as follows.

#### 1. Sensor

##### (1) Exhaust oxygen sensor

The oxygen sensor is mounted in the exhaust manifold. The output signal from this sensor, which varies with oxygen content of the exhaust gas stream, is provided to the ECU for use in controlling closed loop compensation of fuel delivery.

##### (2) Coolant temperature sensor

The coolant temperature sensor is installed in the intake manifold. This sensor provides data to the ECU for use in controlling fuel delivery, secondary air management.





### (3) Engine speed sensor

The engine speed signal comes from the ignition coil. Electric signals are sent to the ECU where the time between these pulses is used to calculate engine speed, which is used in controlling fuel delivery, secondary air management, deceleration spark and throttle opener managements.

### (4) Throttle position sensor (TPS)

This is a potentiometer mounted to the carburetor. The TPS provides throttle angle information to the ECU to be used in controlling the fuel delivery and secondary air management.

### (5) Vacuum switch

This switch is installed on the toe board or the fender and is turned "ON" when the throttle valve is at the closed (idling) position. Information from this switch is provided to the ECU for use in controlling fuel delivery and secondary air management.

### (6) Intake air temperature sensor

The intake air temperature sensor is installed in the air cleaner. This sensor measures the temperature of the intake air in the air cleaner and provides this information to the ECU for use in controlling fuel delivery.

## 2. Electronic Control Unit (ECU)

The Electronic Control Unit is mounted in the passenger compartment and consists of a printed circuit board mounted in a protective metal box.

It receives analog inputs from the sensors and converts them into digital signals. These digital signals and various discrete inputs are processed and used by the ECU in controlling the fuel delivery, secondary air, deceleration spark and throttle opener managements.

## 3. Electronically Controlled System

### (1) Feed back Carburetor A/F Control

The feedback carburetor A/F is controlled by the ECU. The ECU monitors the throttle position, engine speed, coolant temperature, intake air temperature and exhaust oxygen concentration to calculate the fuel flow required to yield the desired A/F ratios for all operating conditions.

Closed loop control is used to adjust the fuel flow to yield a near stoichiometric A/F ratio when required. The fuel flow is modified to account for special operating conditions such as cold/hot starts, acceleration and deceleration.





### (2) Adaptive Memory Control

During the closed loop operation, the ECU controls the duty cycle of the jet mixture control solenoid valve based on the output voltage signal from the exhaust oxygen sensor.

The mean values of the duty cycle are stored in a RAM (Random Access Memory) and the last ones are stored even if the ignition switch is turned off.

### (3) Secondary Air Control

A solenoid is used to control the air control valve signal vacuum. The solenoid is controlled by the ECU based on engine speed, idle position and coolant temperature. This valve sends air to the exhaust manifold.

### (4) Deceleration Spark Control

In order to decrease HC emissions emitted during vehicle deceleration, ignition timing is advanced by the solenoid-operated vacuum valve on the distributor, changing the vacuum supplied to the valve from the carburetor ported vacuum to intake manifold vacuum.

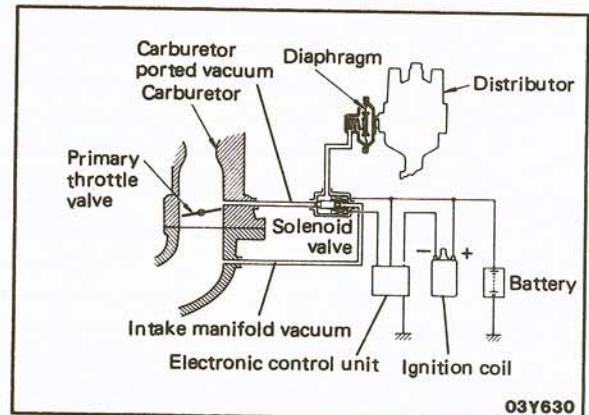
The solenoid valve is controlled by the ECU based on engine speed.

### (5) Throttle Opener Control

When the air conditioner switch is "ON", or the accessory switch such as instrument panel light and power steering switch is "ON" (in families where applicable), the engine idle speed is increased by changing the throttle valve opening. In order to decrease HC emissions emitted during vehicle deceleration and to improve engine-brake performance, ECU deenergizes the solenoid valve which supplies the manifold vacuum to the throttle opener at or above the preset engine speed and then the throttle opener operation is suspended.

### (6) Air Conditioner Control

In order to get good vehicle performance the ECU renders inoperative the air conditioner at or above pre-set throttle opening.







## et Mixture System

The jet mixture system supplies fuel to the engine through jet mixture passages and jet valves for optimum air/fuel mixtures. This system is calibrated by jet mixture solenoid which is responding to an electrical impulse from the electronic control unit (ECU).

If the exhaust oxygen sensor detects a lean condition, the ECU energizes the solenoid at increasing duty cycles to enrich the mixture. If the exhaust sensor detects a rich condition, the solenoid receives a signal from the ECU at decreasing duty cycle to lean out the mixture. Thus, the solenoid is constantly responding to an electrical signal from the ECU to provide efficient control of air/fuel mixtures.

## Enrichment System

Enrichment system consists of metering jet and an enrichment solenoid-operated on/off valve which provides additional fuel for main metering system. The activation of the on/off valve is controlled by the length of time current supplied to the solenoid.

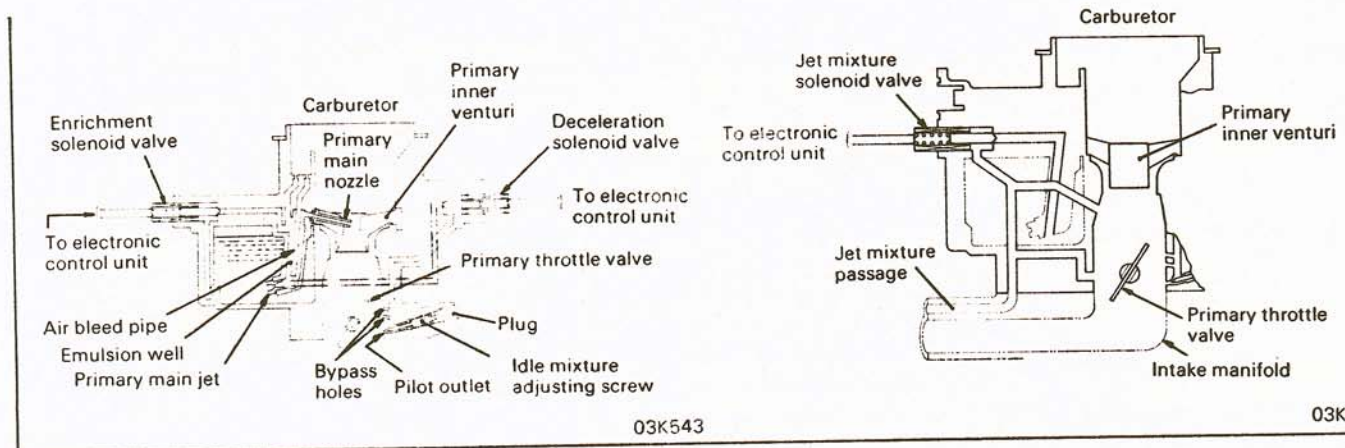
When additional fuel is required such as heavy acceleration, heavy engine loads, cold start or warm-up operation, the ECU energizes the solenoid at the pre-set duty cycles.

## Fuel Cut-Off system

When the ignition key is turned off, the deceleration solenoid valve cuts off the fuel flow to prevent engine "run-on" (dieseling).

During certain deceleration, the deceleration solenoid valve reduces the fuel flow in order to decrease HC emissions and improve fuel economy.

Under normal engine operation, the needle valve is drawn by the solenoid to provide the necessary fuel flow for smooth engine operation.







### CANISTER

#### Removal

1. Disconnect all hoses and detach all clamps.
2. Unhook the canister band tightening clamp.

#### Installation

When installing the canister, observe the following items:

- (1) Securely tighten each clamp.
- (2) Confirm correct hose routing to ensure proper engine performance.
- (3) Check surface of hoses for cracks and replace if defective.

#### Inspection and Maintenance

1. Clogging or damage of the fuel vapor vent line will cause discharge of fuel vapor into the atmosphere and destroy the effectiveness of the system. Disconnect both ends of the line and inspect it by blowing air through it.
2. If the canister is used over a long period, the interior filter will become clogged, which decreases the quantity of purge air and lowers the capacity of the canister. Replace it with a new one at the specified period. Also, because rubber and vinyl hoses will deteriorate with normal use, replace them with new ones when replacing the canister.

### PURGE CONTROL VALVE

#### Inspection

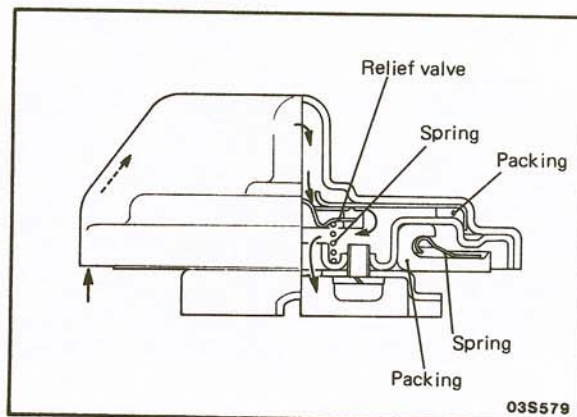
1. Make sure that the cooling water is at temperatures between 80 and 90°C (176 and 194°F).
2. Disconnect the purge hose from the air cleaner and blow into the purge hose. If the valve is not open, its operation is normal. Then, start the engine and increase the engine speed to 1,500 to 2,000 rpm and blow into the purge hose. If the valve is open, it is normal. If the valve is not open, check for clogged or broken vacuum hose, or malfunctioning thermo valve.

### FUEL FILLER CAP

1. Fuel filler cap is equipped with relief valve to prevent the escape of fuel vapor into the atmosphere. (03S579)
2. If the pressure in the tank drops below the specified negative pressure, the valve will open to adjust the pressure.

#### Negative-pressure Valve Performance

Valve opening pressure	$-4.413 \pm 1.275$ kPa ( $-.640 \pm .185$ psi)
Open valve flow (at $-33.1$ mmHg)	1 liter/min. minimum (1.06 U.S.qt./min. minimum), (.88 Imp.qt./min. minimum)



03S579





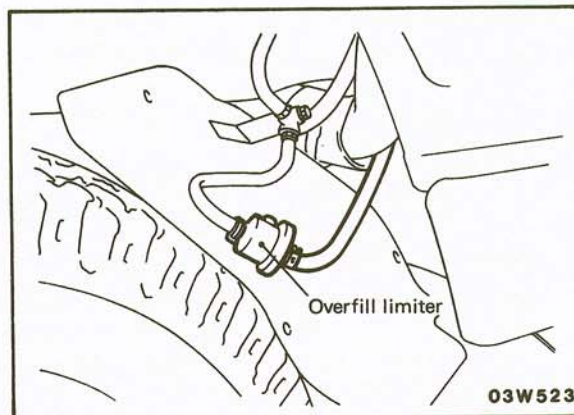
### **OVERFILL LIMITER (Two-way Valve)**

#### **Removal**

1. Remove the filler hose protector. (Refer to GROUP 14.)
2. Disconnect the vapor hoses from the overfill limiter, and then remove the overfill limiter mounting bolts. (03W523)

#### **Inspection**

Check the overfill limiter body for cracks, leaks, malfunctions; replace it if defective. Inspection of overfill limiter requires a measuring instrument. A simple way of inspection, however, is to remove it and lightly blow air into either the intake or outlet ports. If the air passes after a slight resistance, the overfill limiter is in good condition.



### **FUEL CHECK VALVE**

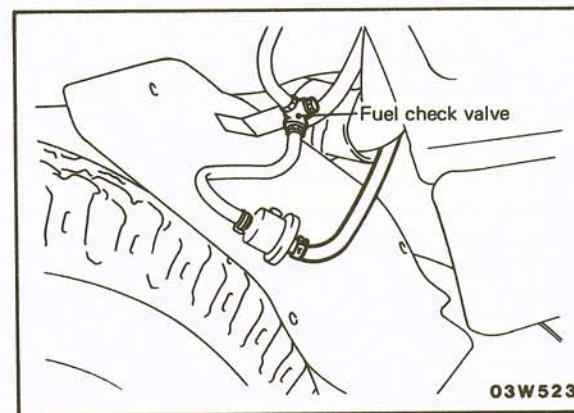
#### **Removal**

1. Remove the filler hose protector. (Refer to GROUP 14.)
2. Remove the fuel check valve mounting bolt. (03W523)
3. Remove the hose attaching clamps and disconnect the hoses from the check valve.

#### **Installation**

When installing the fuel check valve, observe the following items:

1. Securely tighten each hose clamp.
2. Replace hoses if they have cracks.
3. Securely tighten the valve mounting bolt.



## **EXHAUST EMISSION CONTROL SYSTEM**

### **CATALYTIC CONVERTER**

#### **Removal**

#### **Caution**

**Before removing or inspecting the exhaust system, ensure that the exhaust system is cool enough.**

1. Remove the air cleaner.
2. Remove the air duct and heat cowl.
3. Disconnect the front exhaust pipe at exhaust manifold and secondary air supply pipe.
4. Remove stud nuts attaching the exhaust manifold to the cylinder head. Slide manifold off studs and away from cylinder head.
5. Remove bolts tightening the exhaust manifold to the catalyst case assembly.

#### **Installation**

To replace the interior parts of front catalytic converter: Place a new cushion on the catalyst. Be sure the cushion is not deformed. Place a new stainless steel gasket on the catalyst case. Be sure the gasket fits the inside diameter of the cushion.





## COMPONENT SERVICE-EXHAUST EMISSION CONTROL SYSTEM

1. Combine the exhaust manifold and the catalyst case assembly and evenly tighten the bolts to the specified torque.

Tightening torque . . . . .  
Exhaust manifold-to-catalyst case  
tightening bolts 30 to 34 Nm (22 to 25 ft.lbs.)

2. After installing the exhaust manifold gasket to the cylinder head, install the exhaust manifold assembly and tighten the nuts to the specified torque. If the gasket is to be reused, check both sides of the gasket for damage. The gasket may be reused if there are no signs of damage.

Tightening torque . . . . .  
Exhaust manifold assembly  
mounting nuts 15 to 19 Nm (11 to 14 ft.lbs.)

3. Install the heat cowl.
4. Install the air duct.
5. Install the air cleaner.

## SECONDARY AIR SUPPLY SYSTEM

### Inspection

1. Check the air hoses and air pipes for damage or cracks; replace if necessary.
2. Check the air pipe connections for leakage.
3. Start and run the engine at idle.
4. Disconnect the air hose from the reed valve.
5. Put your hand lightly on the intake port of reed valve. If you feel suction, the reed valve is good. Check to ensure that no exhaust emission is blown back. Replace if defective.

## EGR SYSTEM

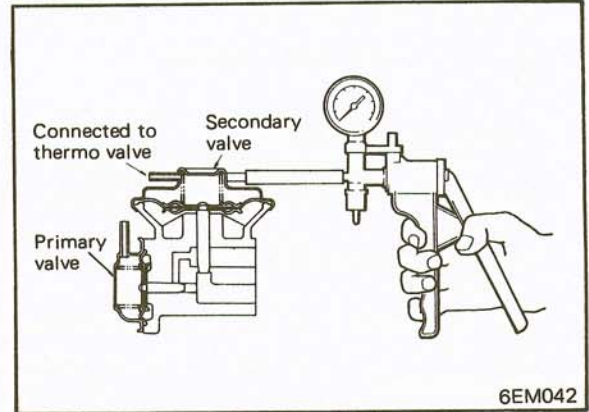
### Test

1. Check the vacuum hose routing and installation.
2. Cold start and run the engine at idle speed.
3. Check to ensure that increasing engine rpm (idle to 2,500 rpm) does not cause the secondary EGR valve to operate. If the secondary EGR valve operates, replace the thermo valve.
4. Warm up the engine until the coolant temperature exceeds 55°C (131°F).
5. Check to ensure that when engine speed is increased as described in step 3, the secondary valve operates. If it does not operate, inspect the EGR control valve and the thermo valve.





6. Disconnect the green stripe hose from the thermo valve.
7. Connect a vacuum pump to the thermo valve and apply vacuum. If no vacuum is available, the thermo valve is good. (6EM042)
8. Disconnect the green stripe hose from the nipple of carburetor.
9. Connect a vacuum pump to the green stripe hose.
10. While opening the sub EGR valve by pulling it by hand, apply  $-20 \text{ kPa}$  ( $-5.9 \text{ in. Hg.}$ ) vacuum with the vacuum pump.
11. If the idling speed becomes unstable, the secondary valve is operating properly. If the idling speed remains unchanged, the valve is not operating. Replace the EGR valve.



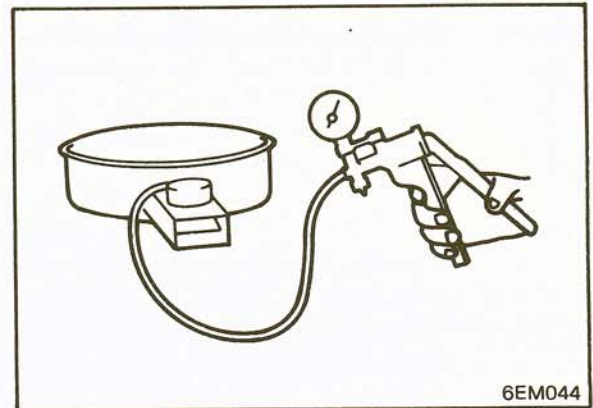
## SUB EGR VALVE

1. Check to ensure that when the sub EGR valve is pulled by hand, it moves smoothly. If the valve is hard to move, remove the sub EGR valve and check it for carbon, dust or other deposits. If necessary, clean with a solvent and apply a slight amount of oil. If the valve is still hard to move, replace it.
2. If it is difficult to remove the sub EGR valve, spray it with a solvent so that it can be turned easily.

## HEATED AIR INTAKE SYSTEM

### Inspection

1. Make sure all vacuum hoses and the heat cowl to air cleaner air duct are properly attached and are in good condition.
2. With a cold engine and ambient temperature less than  $30^{\circ}\text{C}$  ( $86^{\circ}\text{F}$ ), the air control valve in the snorkel should be in the up or heat-on position.
3. With the engine warmed up and running, check the temperature of the air entering the snorkel or at the sensor. When the temperature of the air entering the outer end of snorkel is  $45^{\circ}\text{C}$  ( $113^{\circ}\text{F}$ ) or higher, the valve should be in the down position (heat off).
4. Remove the air cleaner from the engine and allow the air cleaner to cool down to  $30^{\circ}\text{C}$  ( $84^{\circ}\text{F}$ ). With  $49.4 \text{ kPa}$  ( $15 \text{ in. Hg.}$ ) vacuum applied to the sensor, the valve should be in the up (heat on) position. Should the valve not rise to the heat-on position, check the vacuum motor for proper operation.
5. To test the vacuum motor, apply  $32.5 \text{ kPa}$  ( $10 \text{ in. Hg.}$ ) of vacuum using vacuum pump. (6EM044) The valve should be in the full up position. Should the vacuum motor not perform adequately, replace air cleaner body assembly.







### DECELERATION DEVICE

#### Air Switching Valve (ASV) System

##### TEST

1. Run the engine at idle.
2. Disconnect the solenoid valve connector to turn off the solenoid valve (manifold vacuum will act on the air switching valve, causing the valve to open). If the idle speed falls excessively or the engine stalls, the air switching valve and solenoid valve are good. If the idle speed does not change, check the vacuum passage for clogging and check the condition of the air switching valve and solenoid valve.
3. With the engine at idle, the battery voltage should be present at the solenoid valve connector. If no voltage is present, either the electrical wiring or engine speed sensor is defective.
4. Increase the engine speed to 1,500 rpm. Check to ensure that voltage is present at the solenoid valve connector. If there is no voltage, the engine speed sensor is defective.
5. Increase the engine speed to 2,500 rpm. Check to ensure that no voltage is present at the solenoid valve connector. If there is voltage, the engine speed sensor is defective.

### TAMPER PROOF

#### Adjustment

When mixture adjustment is required, clean the carburetor as follows.

1. Remove any parts connected to the carburetor in preparation for breaking the tamper prevention plug.
2. Remove the carburetor from the engine.
3. Before attempting to remove the concealment plug, secure the carburetor in a vice.
4. Clean the carburetor by using compressed air.
5. Reinstall carburetor without the concealment plug and replace the parts removed above.



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