

# FOREWORD

This workshop manual has been prepared to provide information covering repairs on 2004 FD, FE, and SG series Hino trucks.

To use Hino trucks for years, smoothly, safely, and economically without trouble, it is important to perform inspections.

Maintenance required to be performed is the responsibility of the owner. Some recommended repairs of your truck are mentioned.

When making any repair of your truck, be careful not to be injured through improper procedures.

As for maintenance items, refer to the Owner's and Driver's Manual.

All information and specifications in this manual are based upon the latest product information available at the time of printing.

HINO DIESEL TRUCKS (U.S.A.),INC. reserves the right to make changes at any time without prior notice.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: [www.heydownloads.com](http://www.heydownloads.com) by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

# TROUBLESHOOTING

<u>Symptom</u>	<u>Possible cause</u>	<u>Remedy</u>
Clutch dragging	Clutch disc distorted or warped .....	Replace clutch disc
	Transmission input shaft worn .....	Replace input shaft and check clutch hub for excessive wear If worn, replace disc Check flywheel housing alignment
	Excessive clutch control .....	Replace control parts parts wear
	Clutch control parts not .....	Replace control parts functioning properly
	Improper clutch control .....	Adjust clutch control adjustment
	Clutch disc assembly too thick .....	Replace clutch disc
Clutch slipping	Release lever and release bearing .....	Adjust clearance clearance incorrectly adjusted
	Clutch disc facing gummed with .....	Replace disc assembly oil or grease
	Release bearing worn .....	Replace bearing
	Clutch pedal free-play incorrectly .....	Adjust free-play adjusted
	Compression spring weak .....	Replace cover assembly
	Clutch facing worn .....	Replace facing or disc assembly
	Failing to remove plate from .....	Remove plate the clutch pressure plate assembly.
	Driver riding clutch pedal .....	Do not ride on the clutch pedal
Vehicle vibrates when starting	Improper engine idling .....	Adjust idling
	Clutch control incorrectly adjusted .....	Adjust clutch control
	Clutch disc facing gummed with .....	Replace disc assembly oil or grease
	Glazed flywheel friction surface .....	Deglaze flywheel surface with coarse emery cloth, stroking parallel to machining lines
	Clutch disc distorted or warped .....	Replace disc
	Improper clutch cover tightening .....	Tighten bolts
	Flywheel housing misalignment .....	Replace flywheel housing

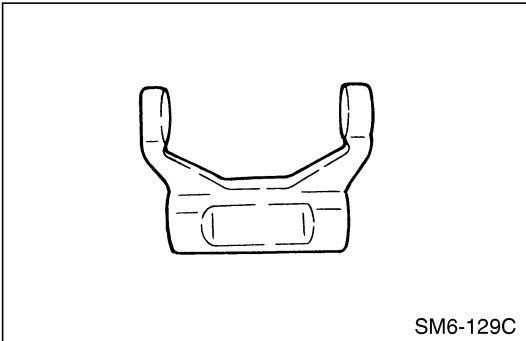


Fig. 29

### 3. INSPECT THE RELEASE FORK.

1. Check the release fork for wear and damage.  
If necessary, replace the parts.

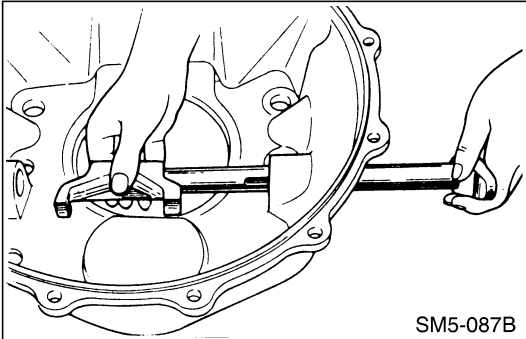


Fig. 30

## ASSEMBLY OF CLUTCH HOUSING

### 1. INSTALL THE RELEASE SHAFT AND RELEASE FORK.

1. Insert the release shaft into the flywheel housing.  
When inserting, insert the release fork onto the release shaft.
2. Install the key on the shaft.
3. Slide the release fork on the key and then align the release fork hole with the release shaft hole.

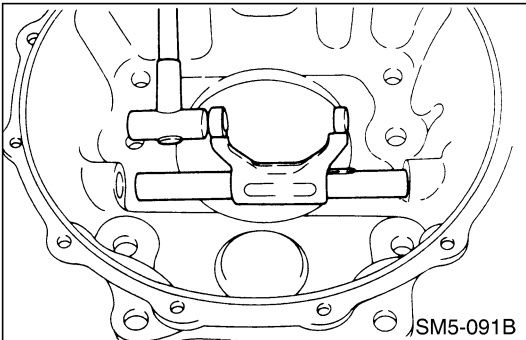


Fig. 31

4. Tighten the lock bolt.

**Tightening Torque: 140 - 180 kg-cm (11 - 13 lb-ft)**

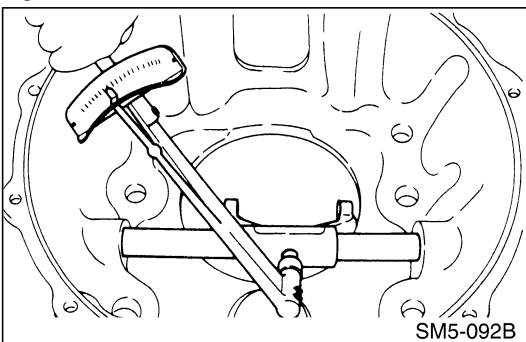


Fig. 32

### 2. INSTALL THE CLUTCH HOUSING IN THE TRANSMISSION CASE.

Install the fitting bolts and tighten them.

**Tightening Torque: 2,500 - 3,300 kg-cm (181 - 238 lb-ft)**

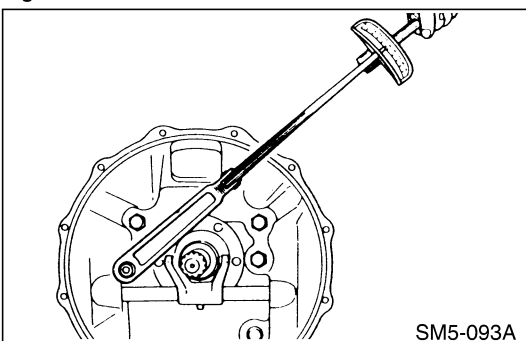


Fig. 33

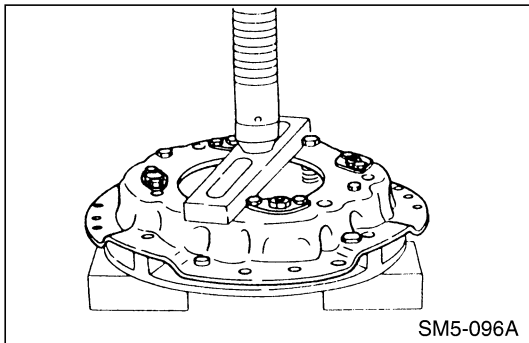


Fig. 8

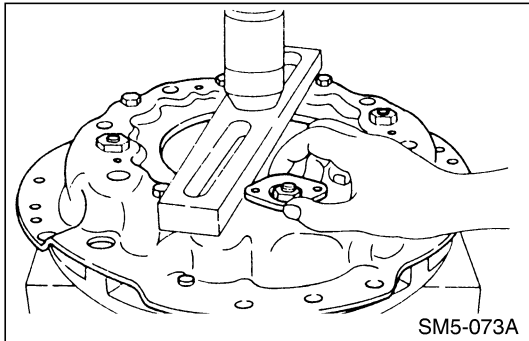


Fig. 9

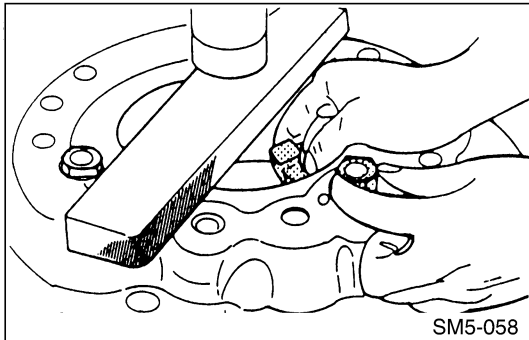


Fig. 10

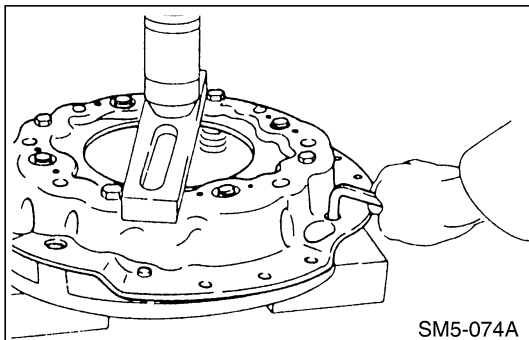


Fig. 11

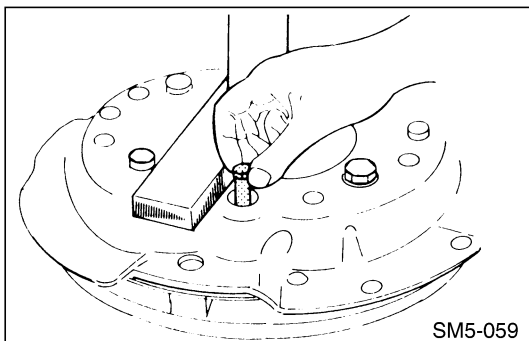


Fig. 12

## DISASSEMBLY OF CLUTCH UNIT

1. USING A PRESS, COMPRESS THE CLUTCH COVER TO RELIEVE THE COMPRESSION SPRING TENSION.

2. REMOVE THE LOCK PLATE OF RELEASE LEVER SUPPORT NUT.

1. Remove the lock bolts.
2. Remove the lock plates.

3. REMOVE THE RELEASE LEVER SUPPORT NUTS.

4. REMOVE THE STRAP PLATE CLAMPING BOLTS.

5. REMOVE THE SPECIAL TOOLS.

Special Tool: Pressure plate fixing bolt

(9010 - 10700)

Plain washer (9260 - 10240)

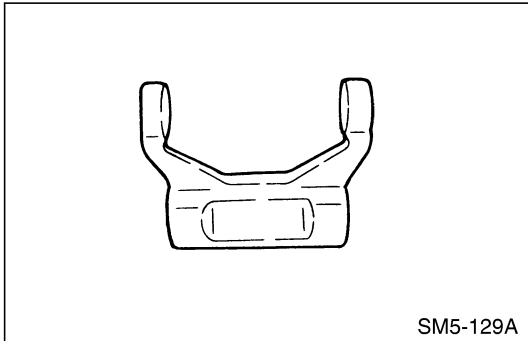


Fig. 55

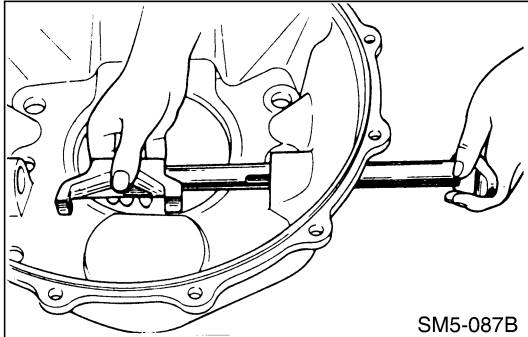


Fig. 56

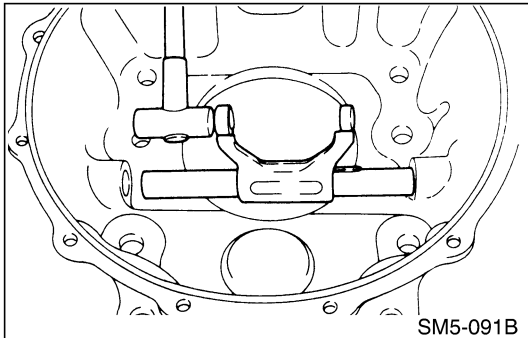


Fig. 57

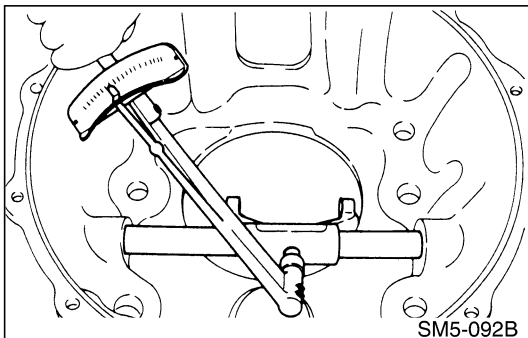


Fig. 58

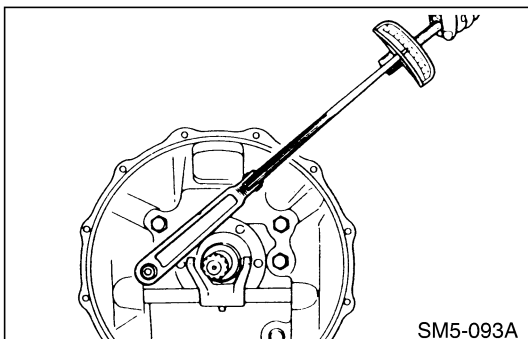


Fig. 59

### 3. INSPECT THE RELEASE FORK.

Check the release fork for wear and damage.  
If necessary, replace the release fork.

## ASSEMBLY OF CLUTCH HOUSING

### 1. INSTALL THE RELEASE SHAFT AND RELEASE FORK.

1. Insert the release shaft into the flywheel housing.  
When inserting, insert the release fork onto the release shaft.

2. Install the key on the shaft.

3. Slide the release fork on the key and then align the release fork hole with the release shaft hole.

4. Tighten the lock bolt.

**Tightening Torque: 140 - 180 kg-cm (11 - 13 lb-ft)**

### 2. INSTALL THE CLUTCH HOUSING IN THE TRANSMISSION CASE.

Install the fitting bolts and tighten them.

**Tightening Torque:**

(SG1J):

16 mm dia. bolt:

1,700 - 2,300 kg-cm (123 - 166 lb-ft)

20 mm dia. bolt:

3,500 - 4,700 kg-cm (254 - 339 lb-ft)

(SG2J):

2,500 - 3,300 kg-cm (181 - 238 lb-ft)

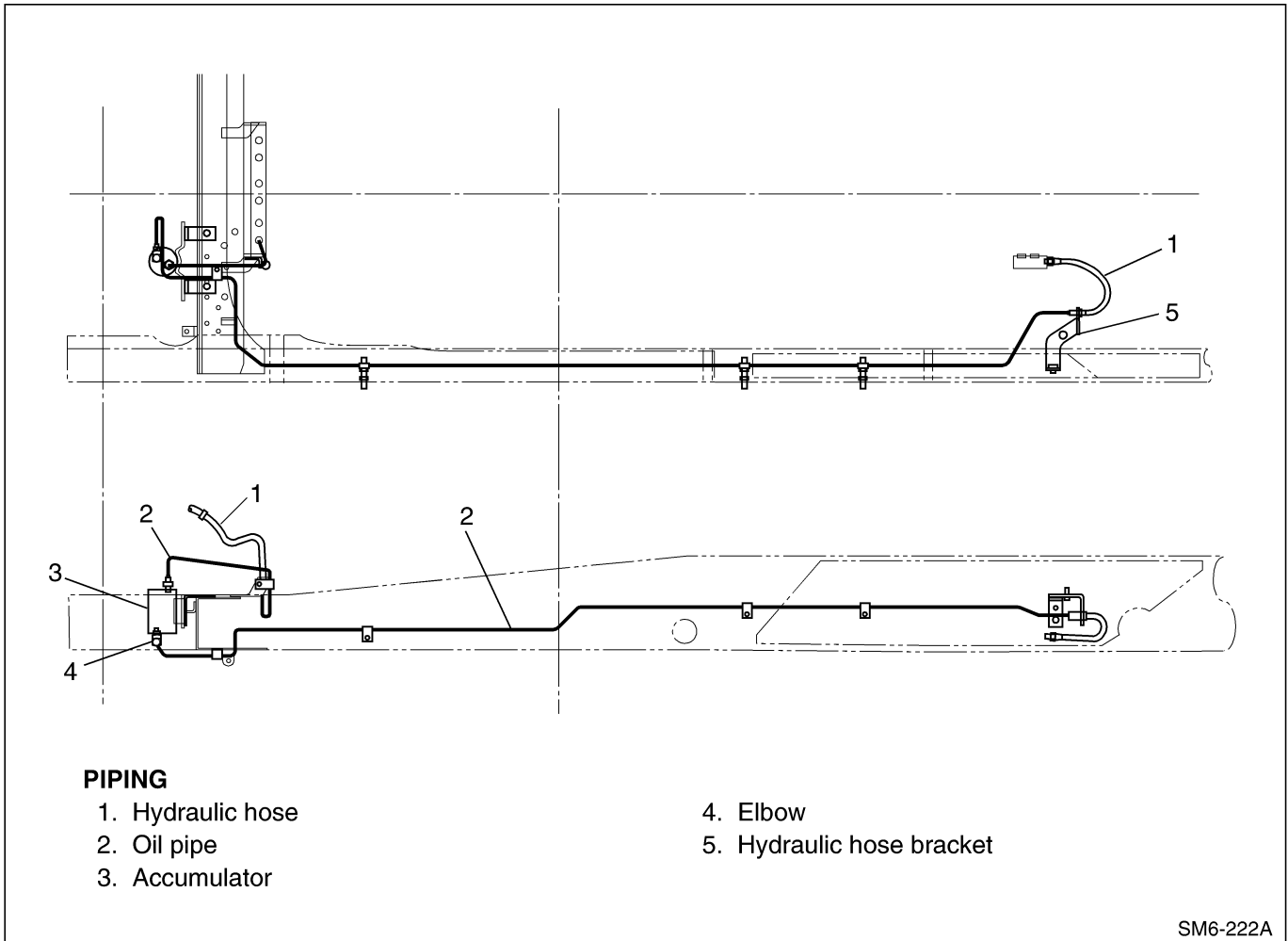


Fig. 2

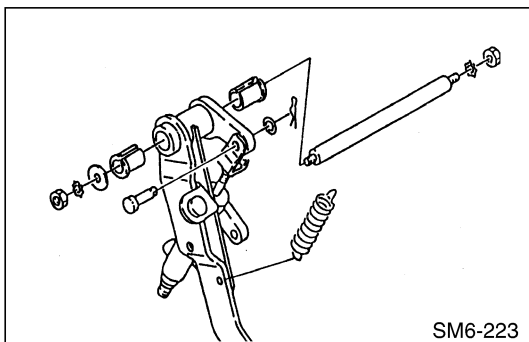


Fig. 3

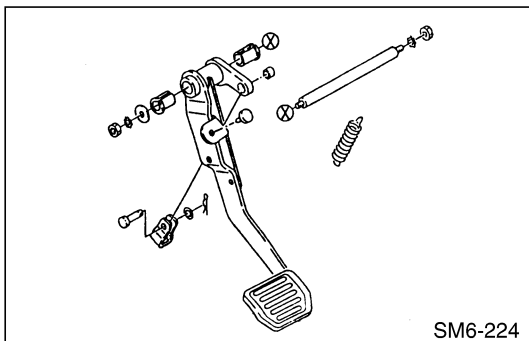


Fig. 6

## REMOVAL OF CLUTCH PEDAL

### 1. REMOVE THE CLUTCH PEDAL.

1. Remove the return spring.
2. Remove the push rod fitting pin.
3. Remove the pedal shaft.  
Remove the pedal shaft fitting nuts.
4. Remove the clutch pedal.

## INSPECTION OF COMPONENT PARTS OF PEDAL

Inspect all parts for wear or damage. If necessary, replace the parts.

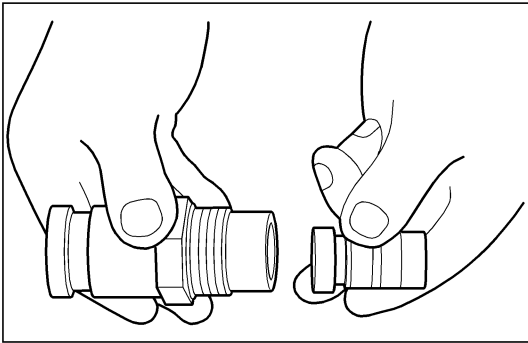


Fig. 6-38

06-130

2. Remove the piston assembly from the cylinder.
3. Using a special tool, remove the piston cups from the piston.

**Special Tool: Hook (09653-1780)**

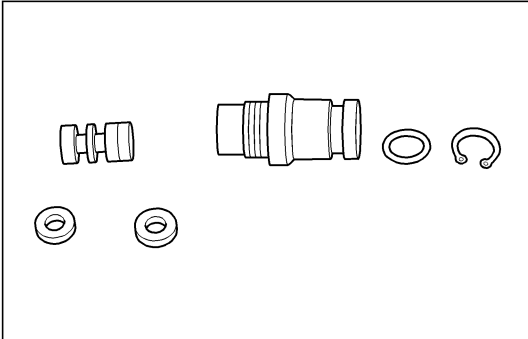


Fig. 6-39

06-151

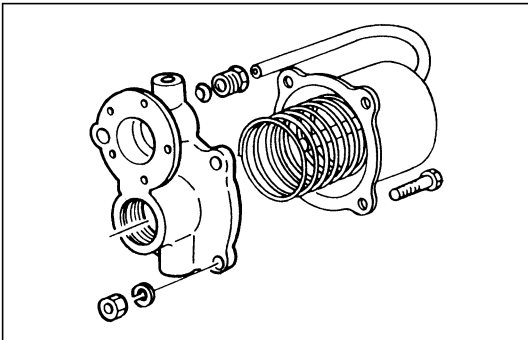


Fig. 6-40

SM6-069

## 7. DISASSEMBLE THE END PLATE.

1. Remove the control tube fitting bolt.
2. Remove the end plate fitting nuts.
3. Remove the end plate from the cylinder shell.

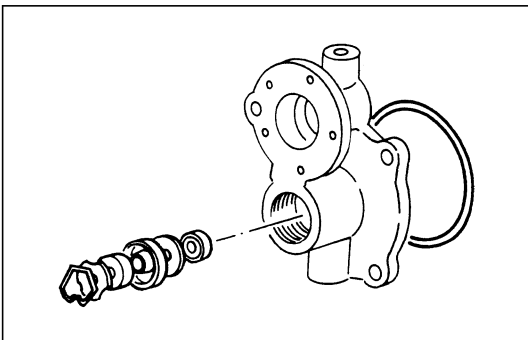


Fig. 6-41

SM6-070

4. Remove the retainer ring.
5. Remove the push rod washer, cup and washer retainer, piston cup, and oil seal.
6. Using a special tool, remove the O-ring.

**Special Tool: Hook (09653-1780)**

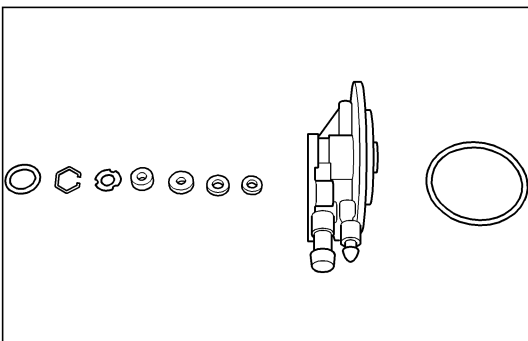


Fig. 6-42

06-150

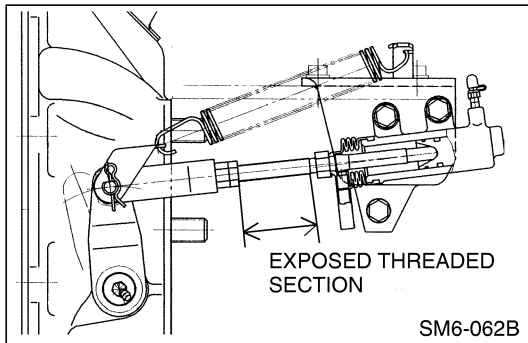


Fig. 10

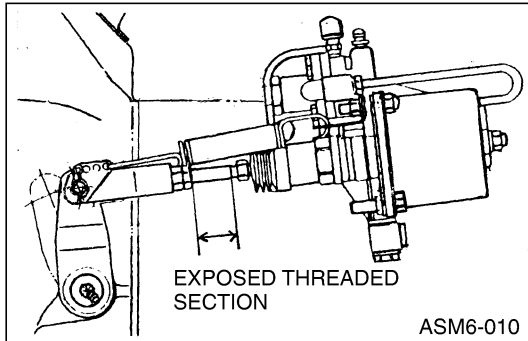


Fig. 11

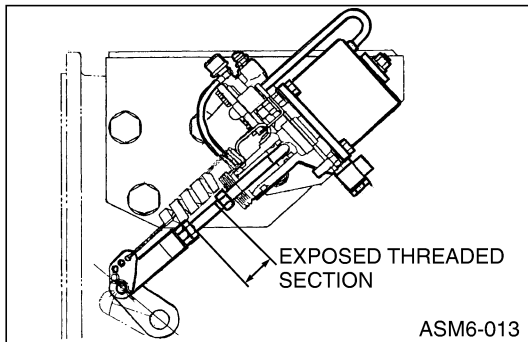


Fig. 12

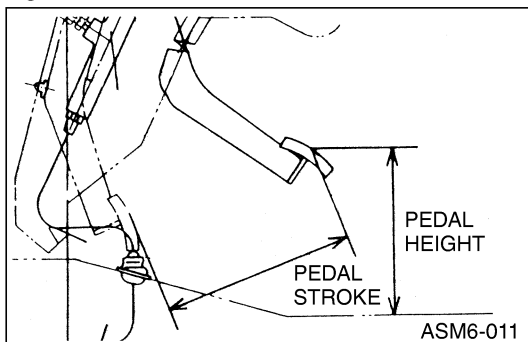


Fig. 13

## 2. CHECK THE EXPOSED THREADED SECTION OF THE PUSH ROD.

Measure the exposed threaded section of the slave cylinder push rod. If its length is less than the service limit, replace the clutch facing or clutch disc assembly.

### Service Limit:

FD : 33 mm (1.29 in.)

FE : 15.5 mm (0.61 in.)

SG1J (MF06S T/M) : 25.5 mm (1.00 in.)

SG1J (RT8709 T/M) : 8 mm (0.31 in.)

## 3. INSPECT THE CLUTCH PEDAL HEIGHT AND THE STROKE.

### Pedal Height

FD and FE : 185 - 199 mm (7.29 - 7.83 in.)

SG : 170 - 190 mm (6.70 - 7.47 in.)

### Pedal Stroke

FD and FE : 210 - 230 mm (8.27 - 9.05 in.)

SG : 170 - 190 mm (6.70 - 7.47 in.)

## DISASSEMBLY OF GEAR SHIFT HOUSING

**NOTE:** ○ Examine to see if any parts are worn or if any abnormal interference or play exists when moving each shift fork. Disassemble the transmission and replace faulty parts, if any.

- Be sure that no pins and springs are left inside the gear shift housing.

### 1. REMOVE THE SHIFT LEVER SHAFT HOUSING.

Remove the housing fitting bolts and remove the housing from the transmission case cover.

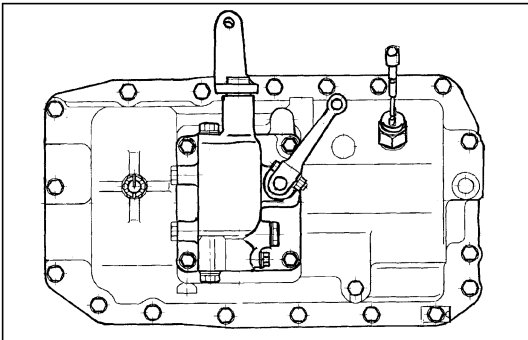


Fig. 2

ASM7-017

### 2. REMOVE THE TRANSMISSION CASE COVER.

Remove the case cover fitting bolts and remove the case cover from the transmission case.

### 3. DISASSEMBLE THE TRANSMISSION CASE COVER.

#### WARNING

The steel ball may pop out from the hole. Wear safety glasses to protect your eyes.

1. Remove the back-up lamp switch.
2. Clamp the case cover in a soft jaw vise.

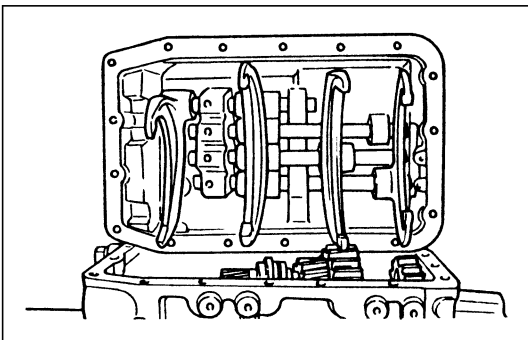


Fig. 3

ASM7-018

### 4. REMOVE THE PIN.

1. Set the transmission case cover on a vise.
2. Drive out the shift head and shift fork fitting pins with a 5 mm (0.197 in.) diameter tapping rod.

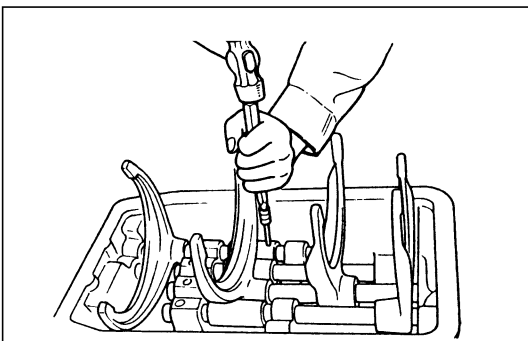


Fig. 4

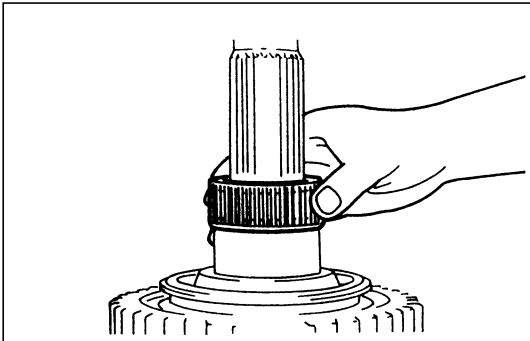


Fig. 22

SM7-173F

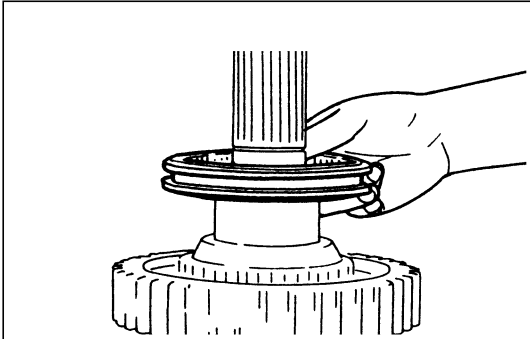


Fig. 23

SMTM-477A

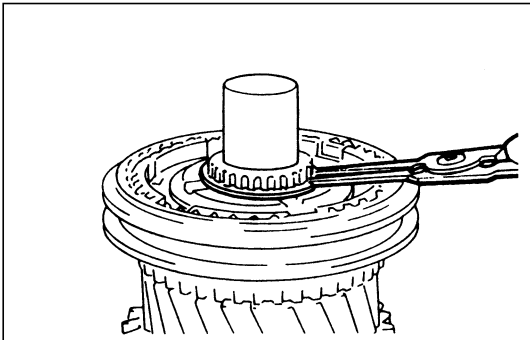


Fig. 24

SMTM-478C

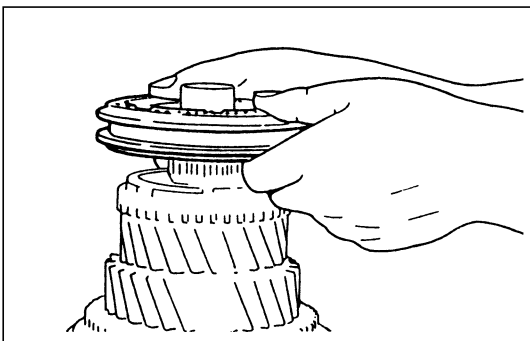


Fig. 25

SMTM-479A

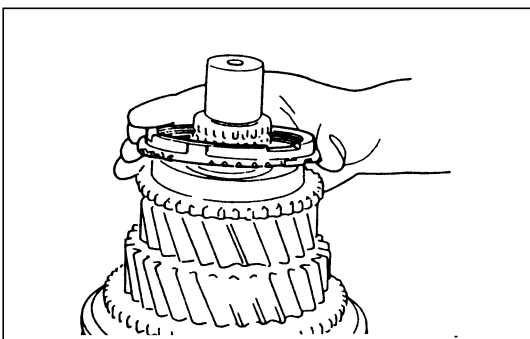


Fig. 26

SMTM-558A

3. Remove the reverse gear needle roller bearing.

4. Remove the constant sleeve.

5. Remove the retainer ring at the front face of the output shaft.

**WARNING**

The retainer ring is spring steel and may pop out of the groove. Wear safety glasses to protect your eyes.

6. Remove the 5th–6th synchronizer unit.

7. Remove the 5th synchronizer ring.

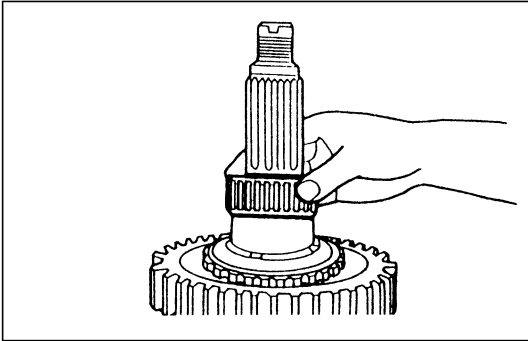


Fig. 75

SM7-173G

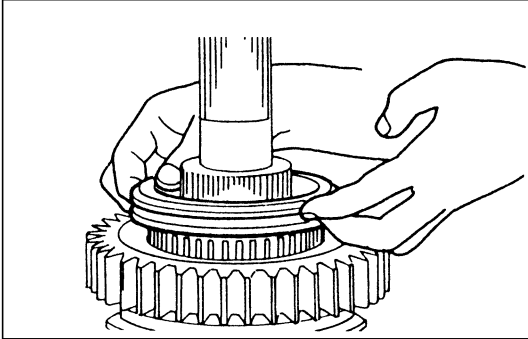


Fig. 76

SMTM-499A

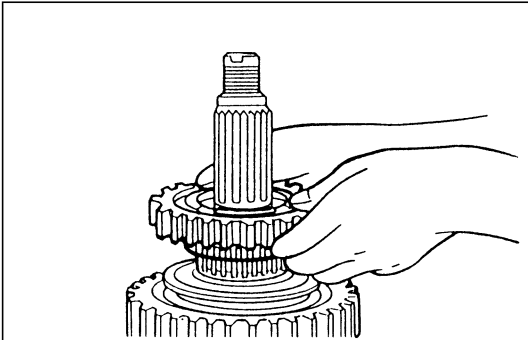


Fig. 77

SM7-173D

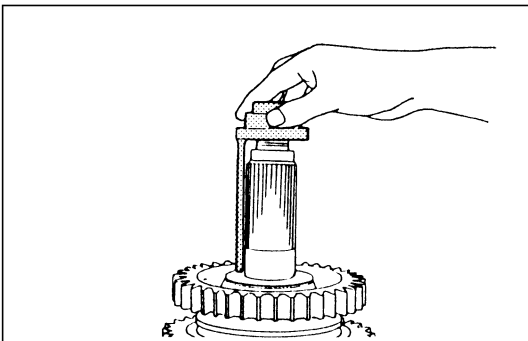


Fig. 78

SM7-256B

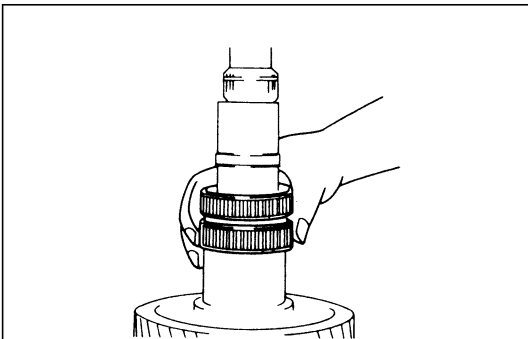


Fig. 79

SMTM-169I

10. Install the needle roller bearing for the reverse gear.

11. Install the constant sleeve.

12. Install the reverse gear.

13. Hold the thrust washer with a jig.

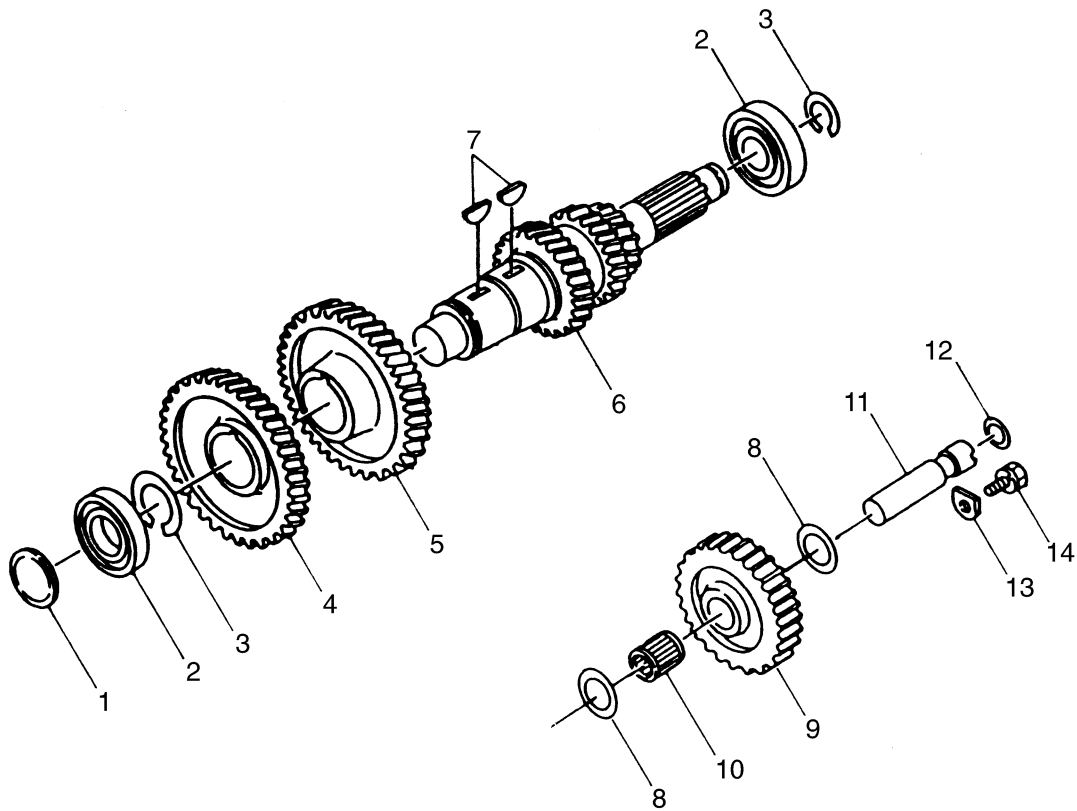
**WARNING**

If the output shaft assembly is installed to the transmission without a jig, the reverse gear will drop from the shaft and possibly result in personal injury.

14. Install the needle roller bearing for the 3rd gear.

15. Install the 3rd gear.

## COUNTER SHAFT, REVERSE IDLER SHAFT AND GEARS



1. Seal cover
2. Cylindrical bearing
3. Retainer ring
4. Counter shaft drive gear
5. Counter 5th gear
6. Counter shaft
7. Woodruff key

8. Thrust washer
9. Reverse idler gear
10. Needle roller bearing
11. Reverse idler shaft
12. O-ring
13. Lock plate
14. Bolt

Fig. 1

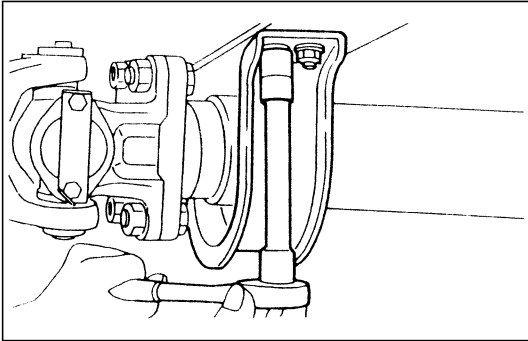


Fig. 9 SMTM-428

### 9. INSTALL THE PROPELLER SHAFT CENTER BEARING AND CONNECT THE PROPELLER SHAFT.

1. Install the center bearing holder and tighten the fitting bolts and nuts.

**Tightening Torque: 380 – 500 kg-cm (28–36 lb-ft)**

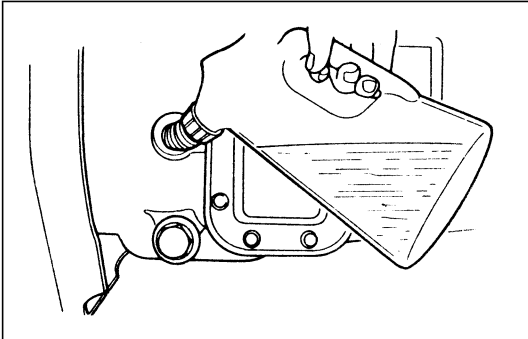


Fig. 10 SM7-186A

### 10. FILL TRANSMISSION WITH GEAR OIL UP TO THE BOTTOM OF FILLER PLUG.

Clean the drain plug with a magnet and tighten the plug with a new gasket.

**Oil Capacity:                      Approx. 7.0 liters  
(7.40 US Qt., 6.16 Imp.Qt.)**

**Tightening Torque:            800–1,200 kg-cm (58–86 lb-ft)**

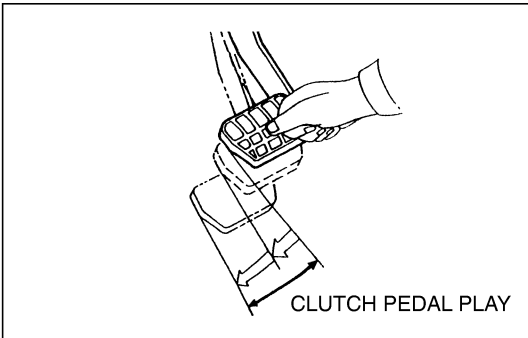


Fig. 11

### 11. CHECK THE CLUTCH PEDAL PLAY.

1. Depress the clutch pedal and measure the distance that the pedal travels before resistance is felt.

**Standard        :    50–65 mm (1.97–2.55 in.)**

**Service Limit:   35 mm (1.38 in.)**

2. If the pedal stroke is less than 35 mm (1.38 in.), adjust the clutch control system in accordance with **CHAPTER 6, CLUTCH CONTROL.**

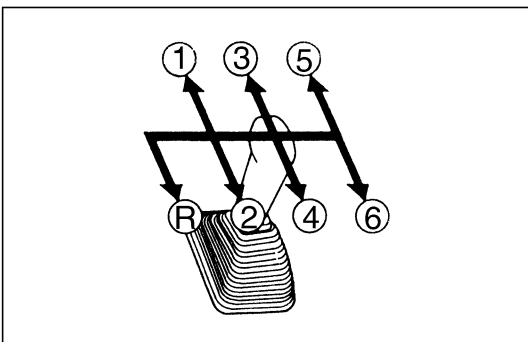
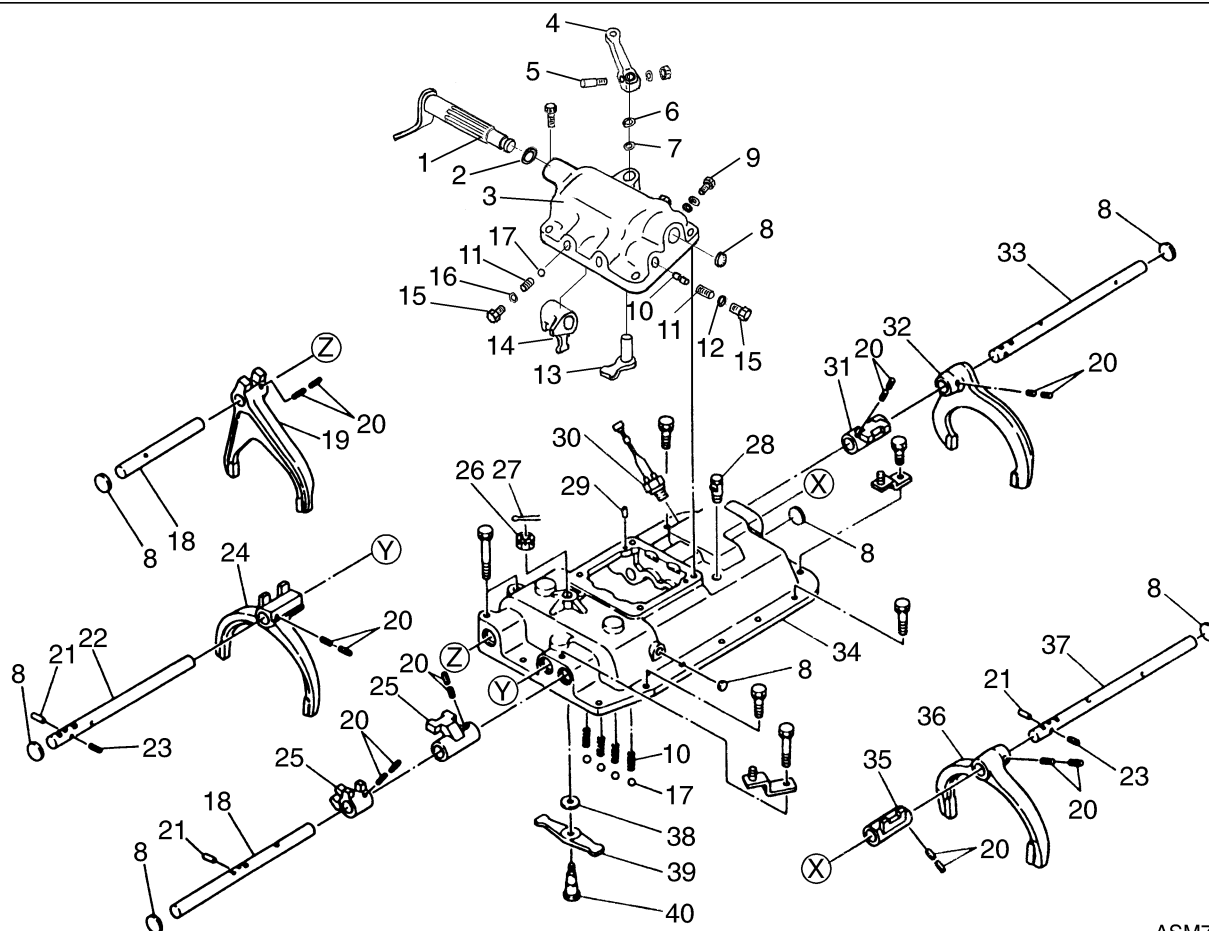


Fig. 12

### 12. CHECK THE GEAR SHIFT IN EACH POSITION.

# GEAR SHIFT HOUSING



ASM7-027

- |                              |                             |
|------------------------------|-----------------------------|
| 1. Shift lever shaft         | 21. Interlock plunger       |
| 2. O-ring                    | 22. 3rd-4th shift shaft     |
| 3. Shift lever shaft housing | 23. Interlock pin           |
| 4. Outer select lever        | 24. 3rd-4th shift fork      |
| 5. Shift lever pin           | 25. 5th-6th shift head      |
| 6. Plain washer              | 26. Slotted nut             |
| 7. Oil seal                  | 27. Cotter pin              |
| 8. Expansion plug            | 28. Air breather            |
| 9. Set screw                 | 29. Straight pin            |
| 10. Lock out plunger         | 30. Back-up lamp switch     |
| 11. Compression spring       | 31. Reverse shift head      |
| 12. Retainer ring            | 32. Reverse shift fork      |
| 13. Select lever shaft       | 33. Reverse shift shaft     |
| 14. Inner shift lever        | 34. Transmission case cover |
| 15. Plug                     | 35. 1st-2nd shift head      |
| 16. Soft washer              | 36. 1st-2nd shift fork      |
| 17. Steel ball               | 37. 1st-2nd shift shaft     |
| 18. 5th-6th shift shaft      | 38. Plain washer            |
| 19. 5th-6th shift fork       | 39. Inversion lever         |
| 20. Pin                      | 40. Inversion pin           |

Fig. 1

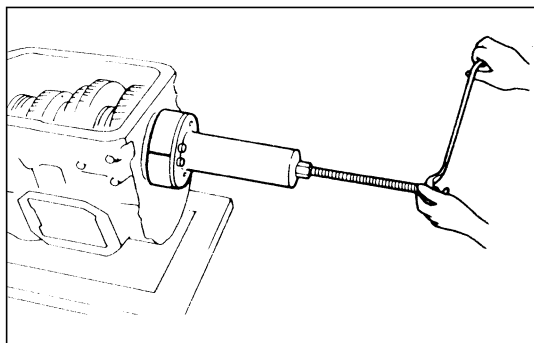


Fig. 17

SMTM-395A

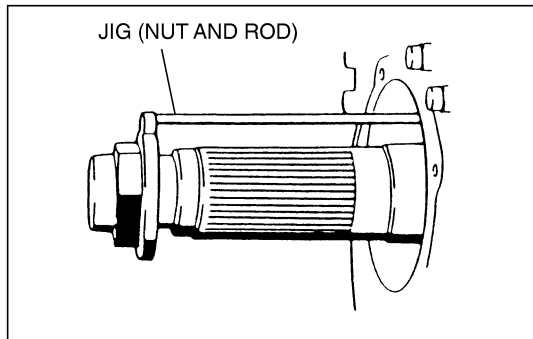


Fig. 18

SM7-233

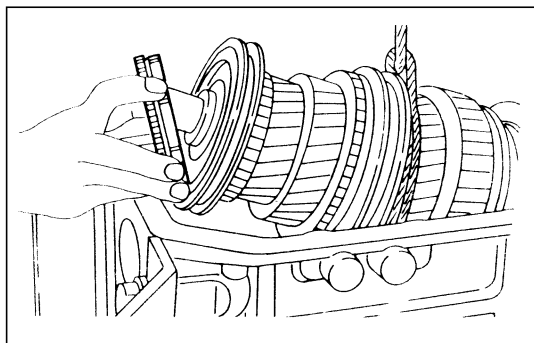


Fig. 19

SMTM-456

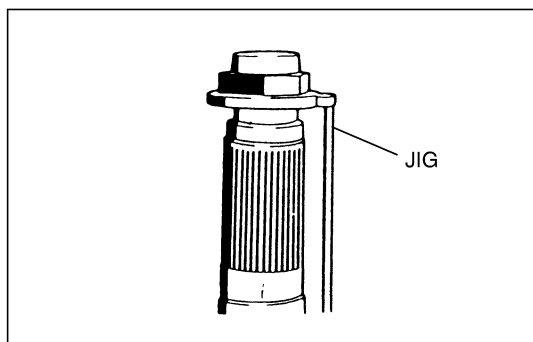


Fig. 20

SMTM-256

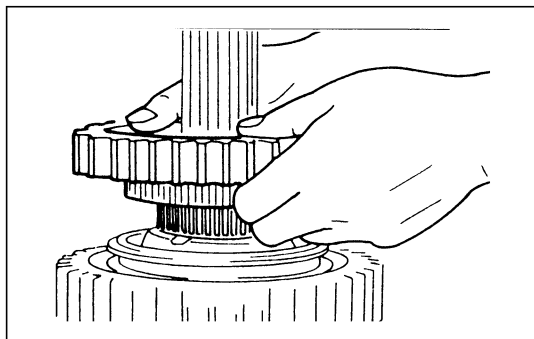


Fig. 21

SM7-173E

3. Remove the rear bearing.

## 10. ATTACH A JIG TO THE END OF THE OUTPUT SHAFT.

### WARNING

If the output shaft assembly is removed from the transmission without a jig, the reverse gear will drop from the shaft and possibly result in personal injury.

## 11. REMOVE THE OUTPUT SHAFT ASSEMBLY FROM THE TRANSMISSION CASE.

When removing the output shaft assembly, remove the synchronizer ring and the cone of the input shaft gear.

## 12. DISASSEMBLE THE OUTPUT SHAFT.

1. Remove the jig from the end of the output shaft.
2. Remove the reverse gear.

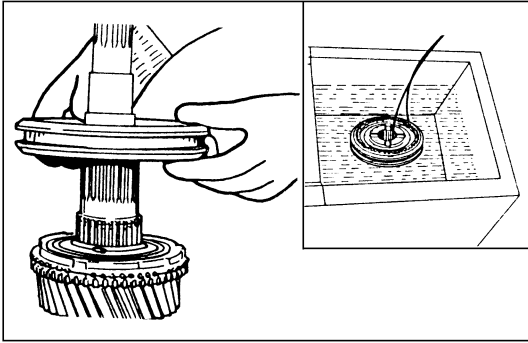


Fig. 68

5. Heat the 2nd synchronizer unit for about 5 minutes in water or oil heated to 120°C to 130°C (248°F to 266°F).

Then install the synchronizer unit on the shaft.

**NOTE:** Do not heat the synchronizer unit in excess of 150°C (302°F).

If the unit has been warmed with hot water, remove moisture before installation.

**WARNING**

Never touch hot water and heated synchronizer unit with your bare hands. This can result in personal injury.

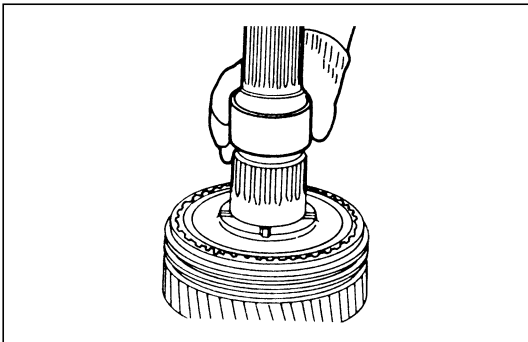


Fig. 69

6. Install the 1st gear bushing  
Heat the bushing to approximately 125°C (257°F) in a heater and place on output shaft against the end stop.

**WARNING**

Do not handle the bushing with bare hands when it is heated.

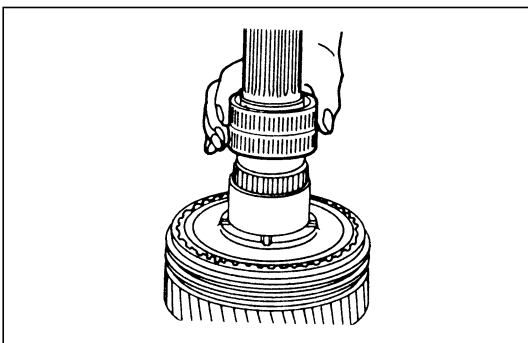


Fig. 70

7. Install the needle roller bearing for the 1st gear.

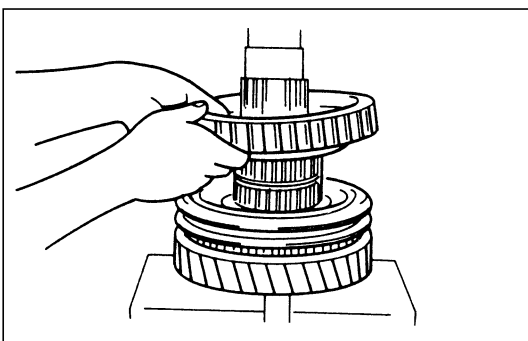


Fig. 71

8. Install the 1st gear.



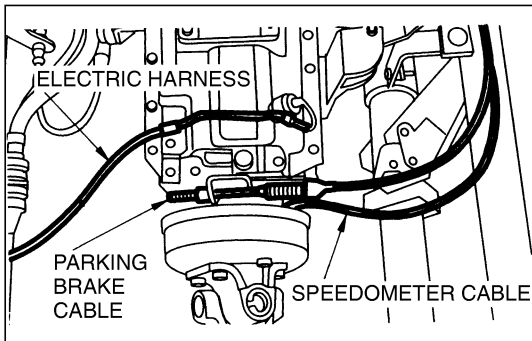


Fig. 5

SMTM-429

#### 4. INSTALL THE FOLLOWING COMPONENT PARTS.

1. Electric harness
2. Parking brake cable
3. Speedometer cable

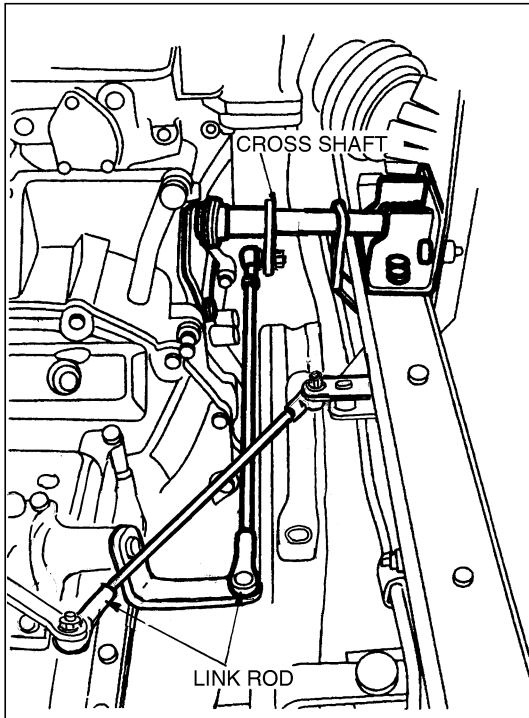


Fig. 6

ASM7-015

#### 5. CONNECT THE TRANSMISSION SHIFT ROD.

1. Tighten the link rod end nut.

**Tightening Torque:** 250–380 kg·cm (19–27 lb·ft)

2. Tighten the control rod end nut.

**Tightening Torque:** 380–500 kg·cm (28–36 lb·ft)

#### 6. INSTALL THE CROSS SHAFT TO THE SIDE OF THE ENGINE AND CHASSIS FRAME.

**Tightening Torque:**

Engine side bracket. – 380–500 kg·cm  
(28–36 lb·ft)

Chassis side bracket. – 650–870 kg·cm  
(47–62 lb·ft)

**NOTE:** Do not forget to install the heat insulators.

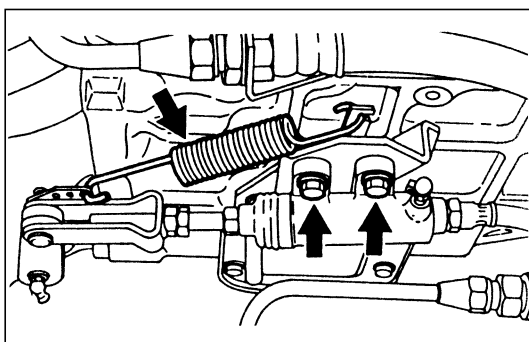


Fig. 7

SM6-068

SM6-078

#### 7. INSTALL THE CLUTCH SLAVE CYLINDER OR CLUTCH BOOSTER.

1. Tighten the fitting bolts.

**Tightening Torque:** 380 – 500 kg·cm (28–36 lb·ft)

2. Install the tension spring.

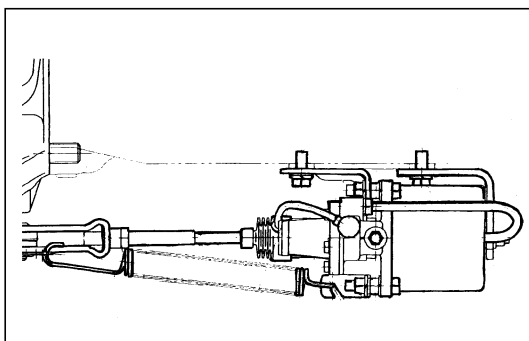


Fig. 8

ASM7-026

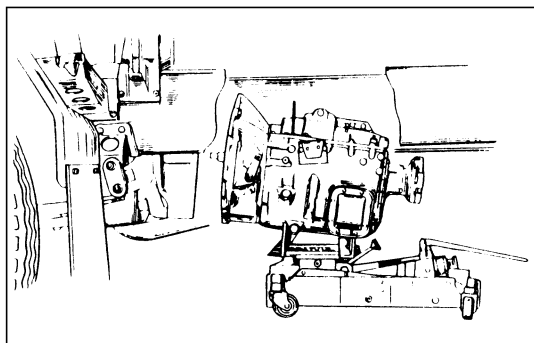


Fig. 7-1-9

SM7-184

2. Place a transmission jack under the transmission.
3. Remove the remaining bolts around the clutch housing.
4. Pull the transmission backwards. Lower the Transmission jack and pull the transmission out from under the truck.

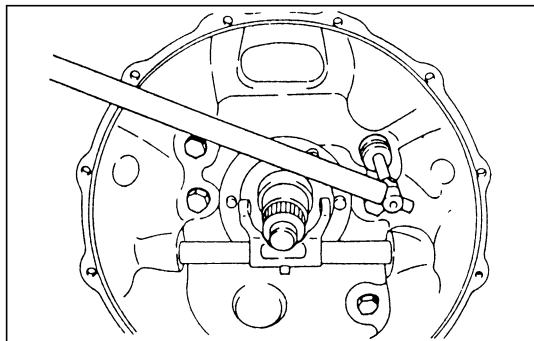


Fig. 7-1-10

SM5-084A

## 8. REMOVE THE CLUTCH HOUSING.

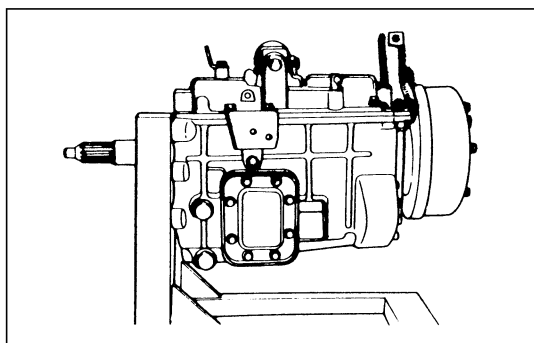


Fig. 7-1-11

SMTM-434

## 9. MOUNT THE TRANSMISSION ASSEMBLY ON A WORKSTAND.

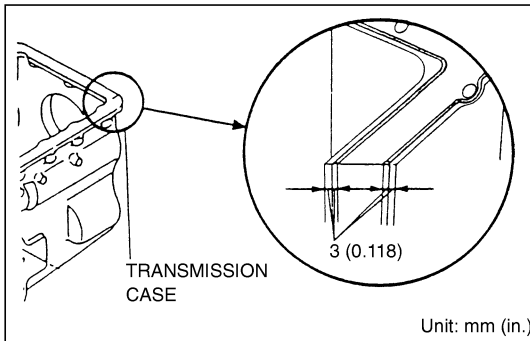


Fig. 7-2-41

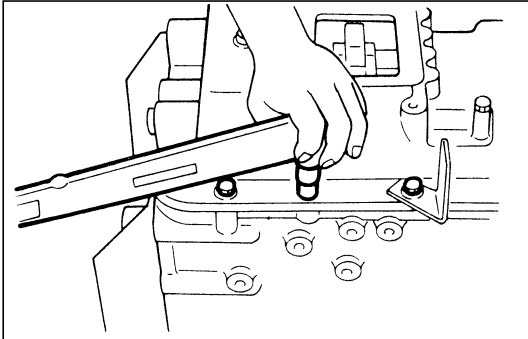


Fig. 7-2-42

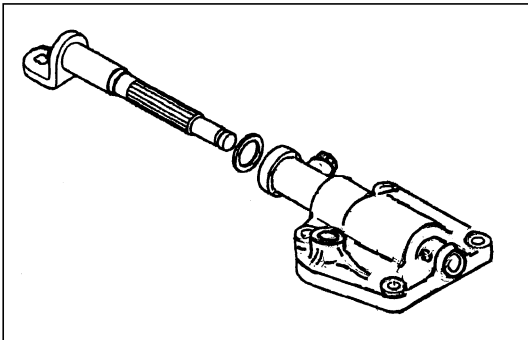


Fig. 7-2-43

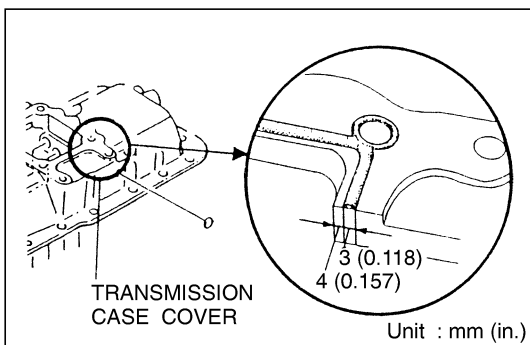


Fig. 7-2-44

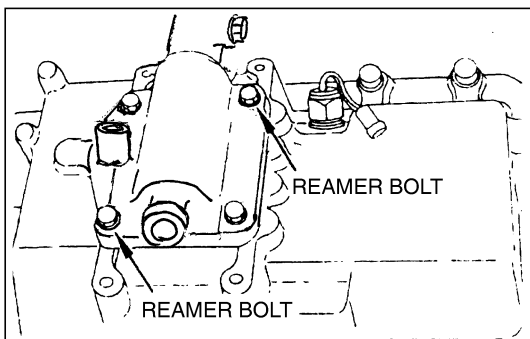


Fig. 7-2-45

## 15. INSTALL THE TRANSMISSION CASE COVER.

1. Apply the sealing compound to the face of the transmission case.

**NOTE:** ○ The trace of the sealing compound should be continuous.

- The sealing compound should be “THREE BOND #1215” or equivalent.

2. Install the transmission case cover with the fitting bolts.
3. Using a torque wrench, tighten the bolts.

### Tightening Torque:

10 mm dia. bolt: 450 – 550 kg·cm (33 – 39 lb·ft)

14 mm dia. bolt : 950 – 1,200 kg·cm (69 – 86 lb·ft)

## 16. INSTALL THE SHIFT LEVER SHAFT, COMPRESSION SPRING AND INNER SHIFT LEVER.

1. Apply gear oil lightly to the gear shift lever shaft and insert the shaft into the shift lever shaft housing.

## 17. INSTALL THE SHIFT LEVER SHAFT HOUSING.

1. Apply the sealing compound to the face of the transmission case cover.

**NOTE:** ○ The trace of the sealing compound should be continuous.

- The sealing compound should be “THREE BOND #1215” or equivalent.

2. Install the shift lever shaft housing with fitting bolts.

**NOTE:** Reamer bolts are used on two diagonally opposite corners of the shift lever shaft housing.

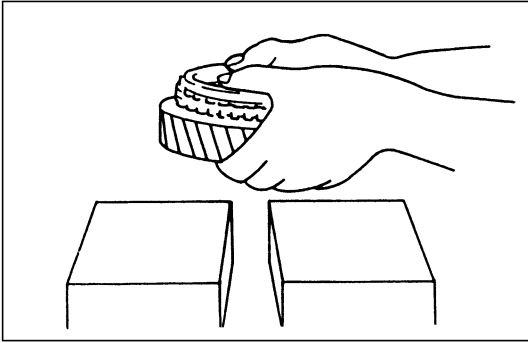


Fig. 7-3-42

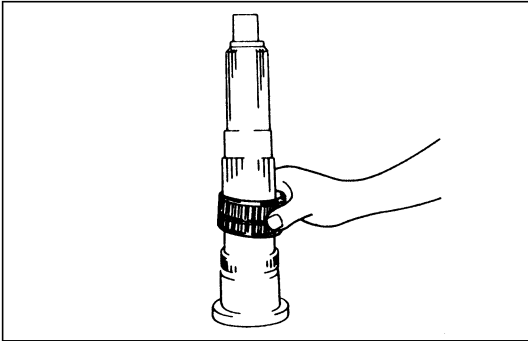


Fig. 7-3-43

SM7-169A

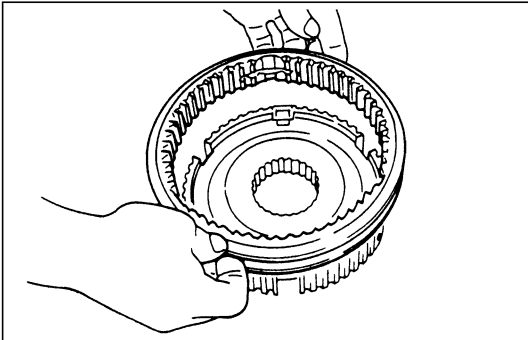


Fig. 7-3-44

SMTM-485

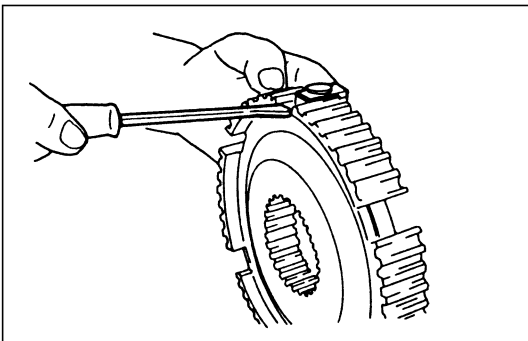


Fig. 7-3-45

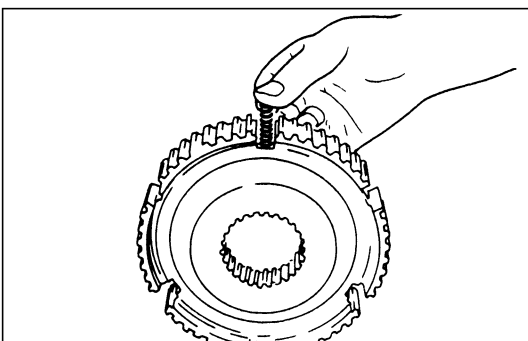


Fig. 7-3-46

SMTM-485B

22. Remove the 2nd gear with synchronizer ring.

23. Remove the needle roller bearing.

### 13. DISASSEMBLE THE SYNCHRONIZER UNIT.

1. Remove the sleeve.

2. Remove the synchronizer key and head.

#### WARNING

The compression spring is spring steel and may pop out of the hole. Wear safety glasses to protect your eyes.

3. Remove the compression spring.

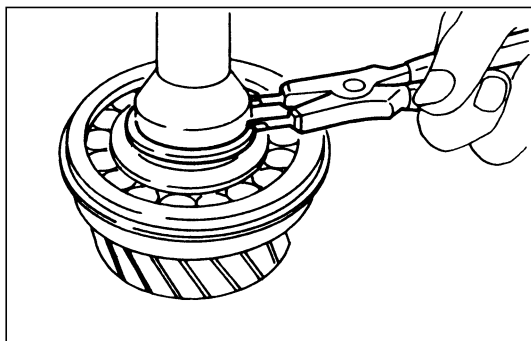


Fig. 7-3-90

SMTM-453

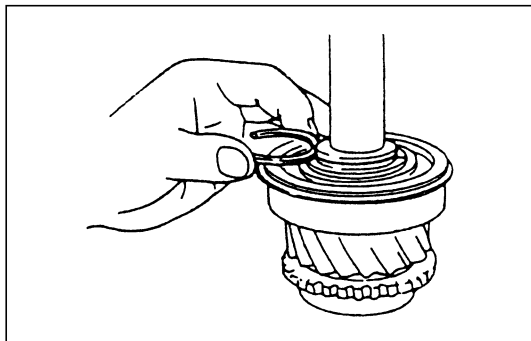


Fig. 7-3-91

SM7-310

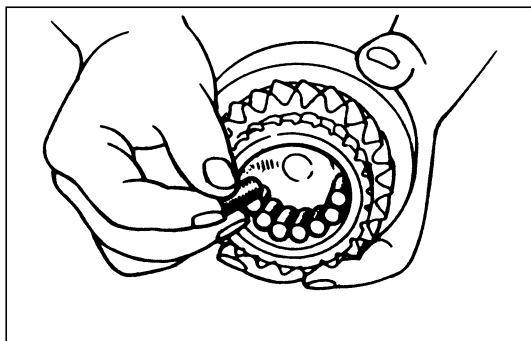


Fig. 7-3-92

SM7-304

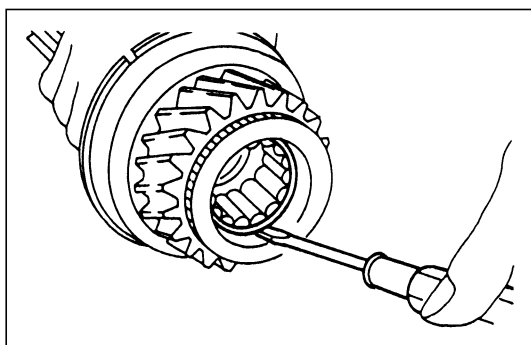


Fig. 7-3-93

SMTM-454

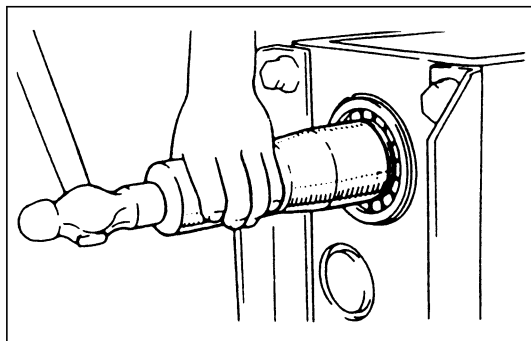


Fig. 7-3-94

SMTM-374

2. Install the retainer rings.
  - a. Select a retainer ring that will provide a tight fit.
  - b. Install the retainer ring. Make sure that the retainer ring seats in place.

Retainer rings are available in the following sizes.

Thickness	Color code
2.8 mm (0.110 in.)	None
2.9 mm (0.114 in.)	Blue
3.0 mm (0.118 in.)	Green
3.1 mm (0.122 in.)	Yellow
3.2 mm (0.126 in.)	Red

**NOTE:** Always use a new retainer ring.

- c. Check the clearance.

**Assembly Standard:** Zero

3. Install the roller bearings in the counterbore of the input shaft.
  - a. Apply gear oil to the bearings.
  - b. Place spacers at both ends of the bearings.

**NOTE:** Always use roller bearings of uniform diameter (15 pieces per set). There are 3 types of roller bearings in different diameters. These are distinguished by the colors red, blue and white.

4. Install the retainer ring.

#### WARNING

**The retainer ring is spring steel and may pop out of the groove. Wear safety glasses to protect your eyes.**

## 6. INSTALL THE INPUT SHAFT ASSEMBLY.

1. Align the output shaft front end center with the input shaft center to prevent the roller bearings and gears from being damaged.
2. Drive the cylindrical bearing inner race with a suitable driving tool and a hammer.

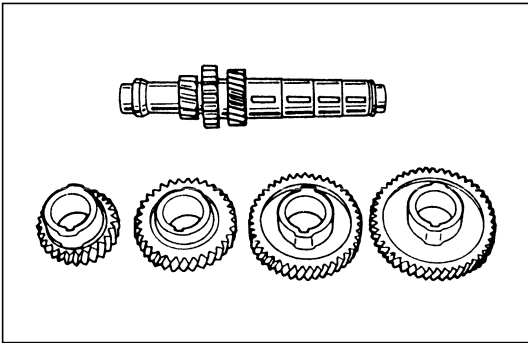


Fig. 7-4-20

SMTM-509

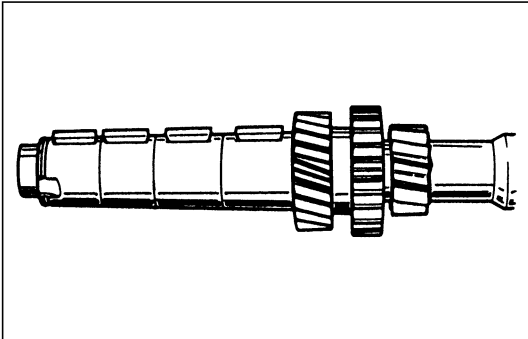


Fig. 7-4-21

SMTM-509A

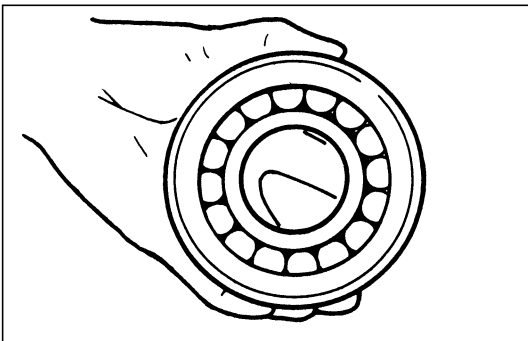


Fig. 7-4-22

SMTM-487

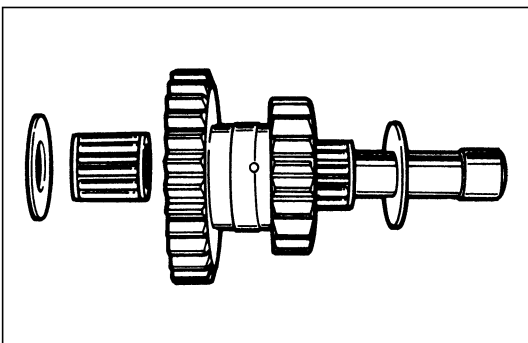


Fig. 7-4-23

SMTM-510

## INSPECTION OF THE COUNTER SHAFT, REVERSE IDLER SHAFT AND GEARS

### 1. CHECK ALL GEARS AND COUNTER SHAFT FOR CRACKS OR DEFECTS.

- a. If a gear has chipped, worn or missing teeth, replace the gear. Check the gears for binding on the shaft.
- b. Check the counter shaft for wear or damage. If any wear and damage is detected, replace the shaft.

### 2. CHECK THE COUNTER SHAFT KEY GROOVE AND KEY FOR DAMAGE OR LOOSENESS.

If any damage or looseness is detected, replace the key and/or counter shaft.

### 3. CHECK THE CYLINDRICAL BEARINGS FOR WEAR OR DAMAGE.

Check the bearing races for roughness. Inspect the rollers for looseness, wear, chipping or other damage. Check the bearings for binding on the shaft or looseness in the case bore.

### 4. CHECK THE IDLER GEAR, SHAFT, WASHER AND NEEDLE ROLLER BEARING FOR WEAR OR DAMAGE.

Replace the reverse idler gear if the gear is worn or if the gear teeth are chipped or damaged. Replace the reverse idler shaft if it is excessively worn or scored.

Check the washer for wear and damage. If the gear end play (refer to Fig. 7-4-37 on page 7-56) is not within specification, replace the washers and/or gear.

## DATA AND SPECIFICATIONS

<b>Manufacture</b>	<b>EATON</b>																											
<b>Transmission Model</b>	<b>RT8709</b>																											
<b>Gear ratios</b>	<table style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding-right: 20px;">Low .....</td> <td style="padding-right: 20px;">13.285</td> <td rowspan="4" style="border-left: 1px solid black; padding-left: 10px; vertical-align: middle;">LOW RANGE</td> </tr> <tr> <td>1st .....</td> <td>9.156</td> </tr> <tr> <td>2nd .....</td> <td>6.533</td> </tr> <tr> <td>3rd .....</td> <td>4.802</td> </tr> <tr> <td>4th .....</td> <td>3.570</td> <td rowspan="4" style="border-left: 1px solid black; padding-left: 10px; vertical-align: middle;">HIGH RANGE</td> </tr> <tr> <td>5th .....</td> <td>2.564</td> </tr> <tr> <td>6th .....</td> <td>1.829</td> </tr> <tr> <td>7th .....</td> <td>1.344</td> </tr> <tr> <td>8th .....</td> <td>1.000</td> <td></td> </tr> <tr> <td>Rev. L .....</td> <td>13.889</td> <td style="padding-left: 20px;">LOW RANGE</td> </tr> <tr> <td>Rev. H .....</td> <td>3.889</td> <td style="padding-left: 20px;">HIGH RANGE</td> </tr> </table>	Low .....	13.285	LOW RANGE	1st .....	9.156	2nd .....	6.533	3rd .....	4.802	4th .....	3.570	HIGH RANGE	5th .....	2.564	6th .....	1.829	7th .....	1.344	8th .....	1.000		Rev. L .....	13.889	LOW RANGE	Rev. H .....	3.889	HIGH RANGE
Low .....	13.285	LOW RANGE																										
1st .....	9.156																											
2nd .....	6.533																											
3rd .....	4.802																											
4th .....	3.570	HIGH RANGE																										
5th .....	2.564																											
6th .....	1.829																											
7th .....	1.344																											
8th .....	1.000																											
Rev. L .....	13.889	LOW RANGE																										
Rev. H .....	3.889	HIGH RANGE																										
<b>Use oil</b>	<table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Type</th> <th style="text-align: center;">SAE Grade</th> <th style="text-align: center;">Temperature</th> </tr> </thead> <tbody> <tr> <td rowspan="3" style="text-align: center;">Heavy Duty Engine Oil MIL-L-2104B C or D or API-SF or API-CD (Previous API designations acceptable)</td> <td style="text-align: center;">50</td> <td style="text-align: center;">Above 10°F</td> </tr> <tr> <td style="text-align: center;">40</td> <td style="text-align: center;">Above 10°F</td> </tr> <tr> <td style="text-align: center;">30</td> <td style="text-align: center;">Below 10°F</td> </tr> <tr> <td rowspan="2" style="text-align: center;">Mineral Gear Oil with rust and oxidation inhibitor API-GL-1</td> <td style="text-align: center;">90</td> <td style="text-align: center;">Above 10°F</td> </tr> <tr> <td style="text-align: center;">80W</td> <td style="text-align: center;">Below 10°F</td> </tr> </tbody> </table>	Type	SAE Grade	Temperature	Heavy Duty Engine Oil MIL-L-2104B C or D or API-SF or API-CD (Previous API designations acceptable)	50	Above 10°F	40	Above 10°F	30	Below 10°F	Mineral Gear Oil with rust and oxidation inhibitor API-GL-1	90	Above 10°F	80W	Below 10°F												
Type	SAE Grade	Temperature																										
Heavy Duty Engine Oil MIL-L-2104B C or D or API-SF or API-CD (Previous API designations acceptable)	50	Above 10°F																										
	40	Above 10°F																										
	30	Below 10°F																										
Mineral Gear Oil with rust and oxidation inhibitor API-GL-1	90	Above 10°F																										
	80W	Below 10°F																										
<b>Oil capacity</b>	<p><b>Approx. 12 liters</b>  <b>{2.64 Imp.gal, 3.17 US.gal}</b></p>																											

### REMOVAL AND INSTALLATION PARTS

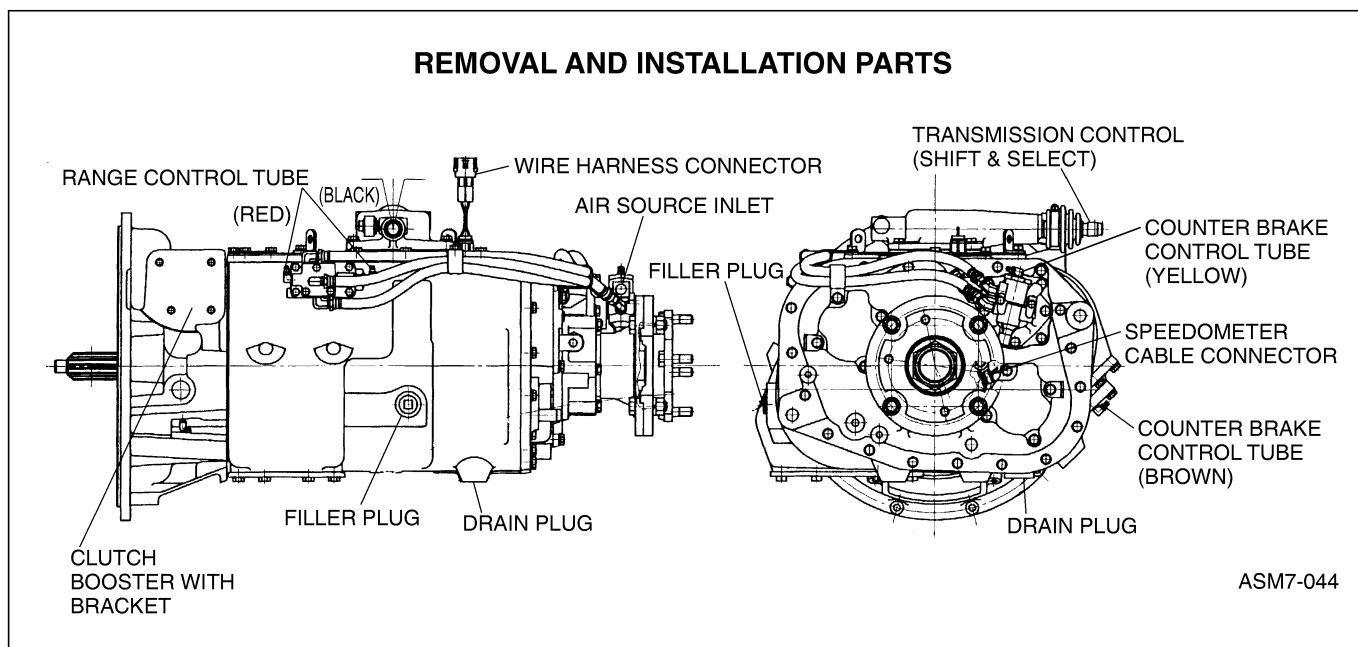


Fig. 1

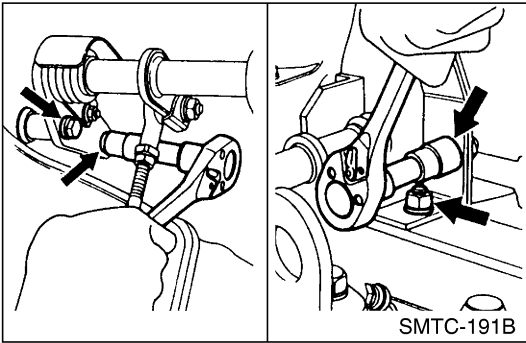


Fig. 12

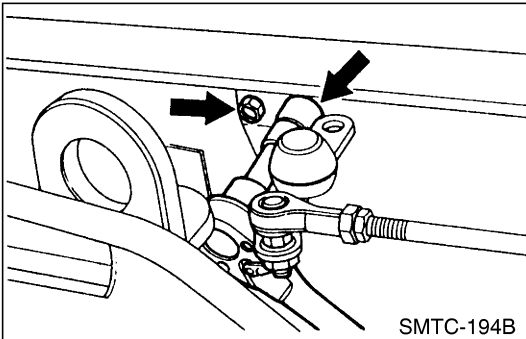


Fig. 13

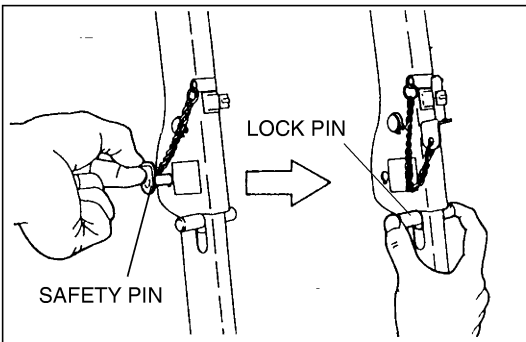


Fig. 14

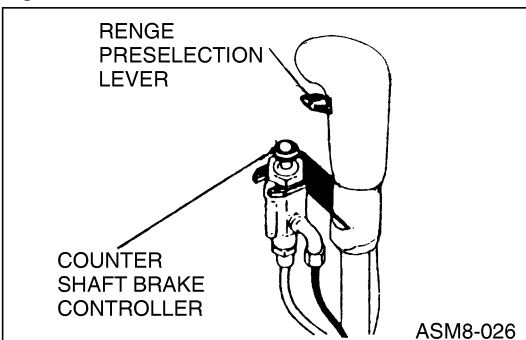


Fig. 15

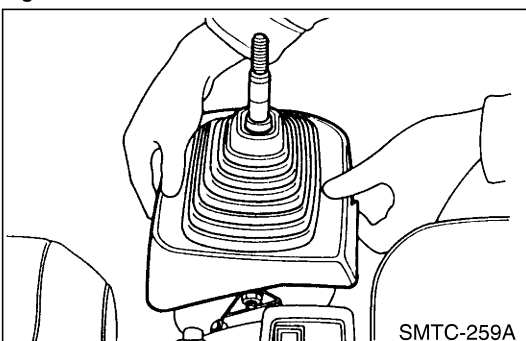


Fig. 16

9. Remove the cross shaft from the side of the engine and chassis frame.

10. Remove the gear control link lever sub-assembly from the side of the chassis frame.

11. Remove the gear control rod assemblies.

### 3. REMOVE THE GEAR SHIFT LEVER ASSEMBLY.

1. Lower the cab (**Refer to OWNER'S MANUAL, cab tilt procedure**).

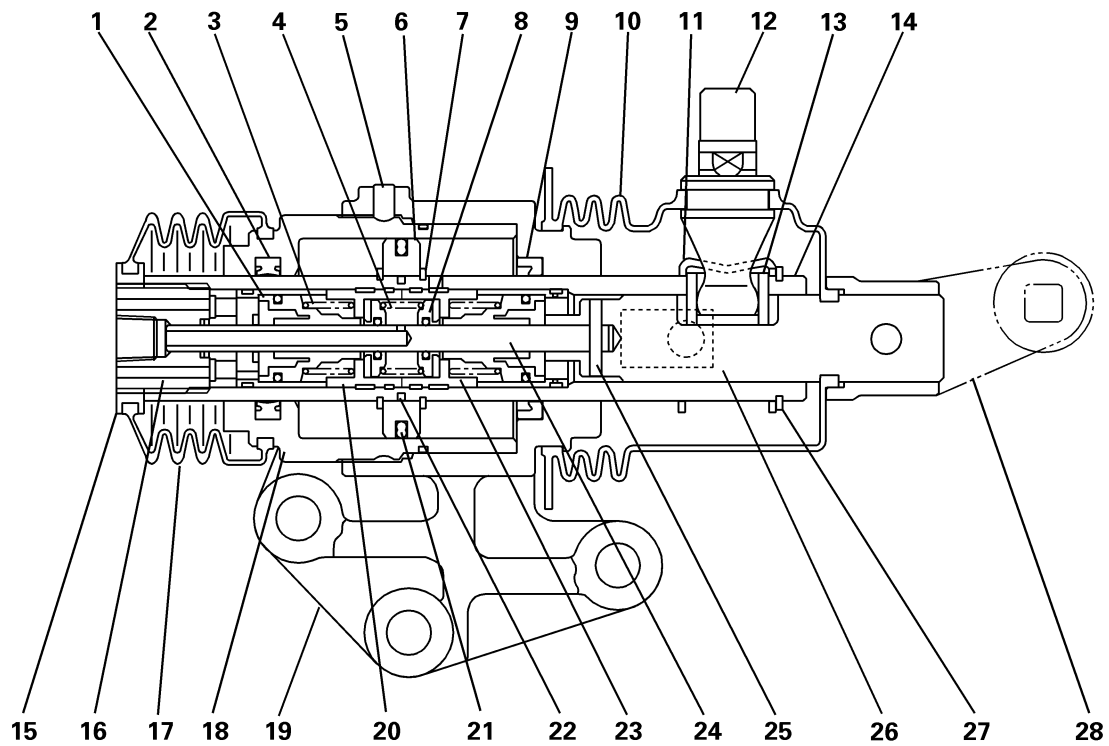
#### WARNING

**When the cab weight is heavy or adjustment of the torsion bar is not proper, the cab could come down with great force. Therefore be careful not to be beneath the cab when it is lowered.**

2. Unscrew the shift knob by hand and remove it. In case of model SG with FULLER RT8709 transmission, disconnect the counter shaft brake control tubes and the range preselection harness connector.

3. Remove the center console with boot from the floor of the cab.

## POWER SHIFT (TRANSMISSION MF06S)



SM8-592

- |                  |                  |                   |
|------------------|------------------|-------------------|
| 1. Valve lifter  | 11. Plate        | 21. Packing       |
| 2. Packing       | 12. Striker      | 22. O-ring        |
| 3. Spring (A)    | 13. Guide sleeve | 23. Spring (C)    |
| 4. Spring (B)    | 14. Shifter rod  | 24. Pipe          |
| 5. Set screw     | 15. Nut          | 25. Straight pin  |
| 6. Piston        | 16. Connector    | 26. Actuating rod |
| 7. Retainer ring | 17. Boot R       | 27. Retainer ring |
| 8. Valve seal    | 18. Cylinder     | 28. Lever         |
| 9. Packing       | 19. Housing      |                   |
| 10. Boot F       | 20. Valve seat   |                   |

Fig. 1

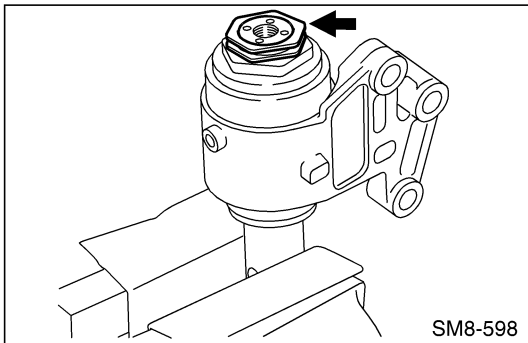


Fig. 13

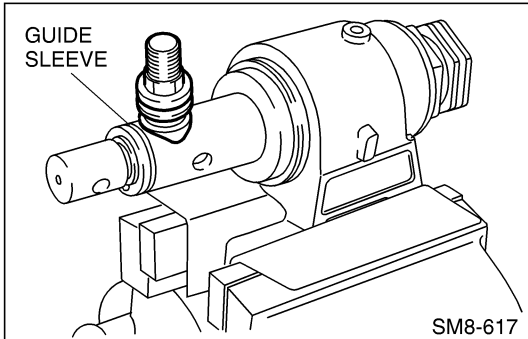


Fig. 14

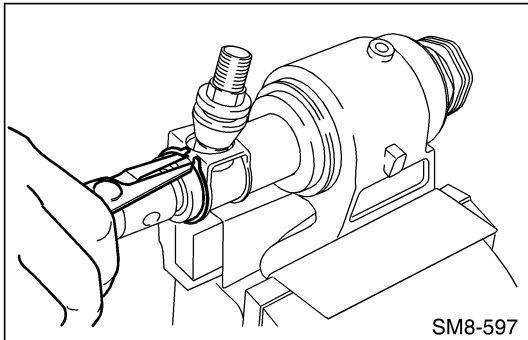


Fig. 15

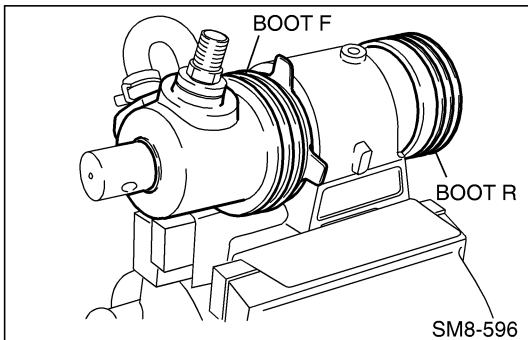


Fig. 16

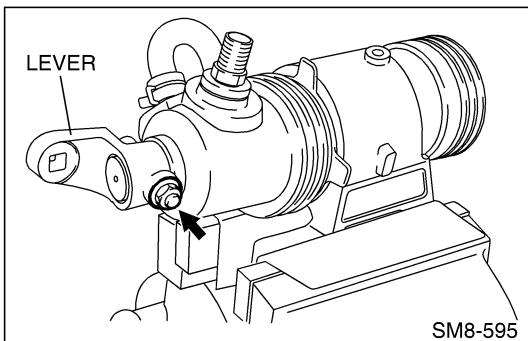


Fig. 17

5. Install the nut (41 mm {1.61 in.}).

## 7. INSTALLATION OF STRIKER

1. Coat the guide sleeve, shifter rod and striker with grease (Sufficient grease).
2. Align the flat section of the actuating rod with the guide sleeve mounting hole of the shifter rod. Install the guide sleeve and striker.

3. Install the plate.
4. Using a snap ring expander, install a new retainer ring in the groove of the shifter rod.
5. Measure the end gap of the retainer ring, and make sure that the retainer ring is securely installed in the groove of the shifter rod.

**Assembly Standard: Less than 6 mm {0.2362 in.}**

## 8. INSTALLATION OF BOOTS

1. Install boot R to the nut and the groove of the cylinder.

**NOTE: Position the water drainage hole of boot R on the bottom side.**

2. Install boot F on the housing, actuating rod and the groove of the striker.

3. Install the lever on the actuating rod with the bolt and nut.

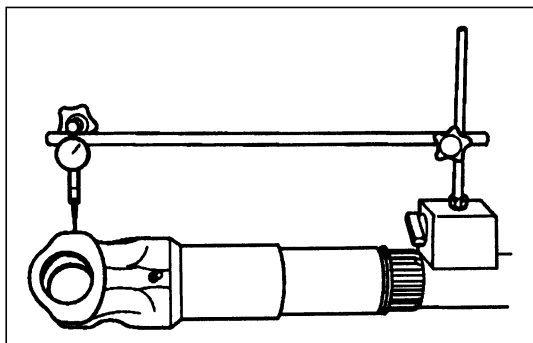


Fig. 9-20

SM9-271A

6. **INSPECT THE SPLINE BACKLASH. IF THE BACKLASH IS GREATER THAN THE SERVICE LIMIT, REPLACE THE SHAFT AND THE SLIDING YOKE.**

**NOTE:** Inspect the spline backlash at sliding yoke lug 60 mm (2.36 in.) from the shaft center.

**Assembly Standard:**

At spline	0.062 – 0.174 mm (0.0025 – 0.0068 in.)
At yoke lug	0.155 – 0.435 mm (0.0062 – 0.0171 in.)

**Service Limit:**

At spline	0.25 mm (0.0098 in.)
At yoke lug	0.63 mm (0.0248 in.)

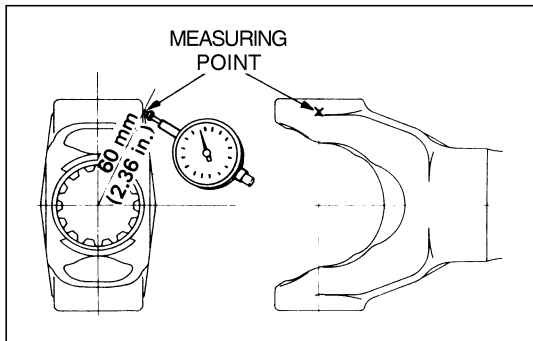


Fig. 9-21

7. **INSPECT THE CLEARANCE BETWEEN SPIDER JOURNAL AND NEEDLE ROLLER BEARINGS.**

**CLEARANCE (C) = A – 2B – D**

**Assembly Standard:** 0.024 – 0.064 mm  
(0.0010 – 0.0025 in.)

**Service Limit:** 0.1 mm (0.004 in.)

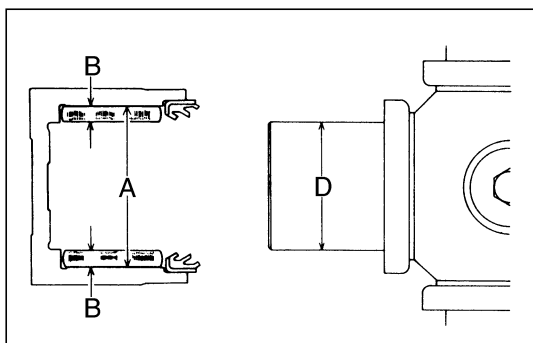


Fig. 9-22

1. Measure the bearing cage inside diameter. (A)

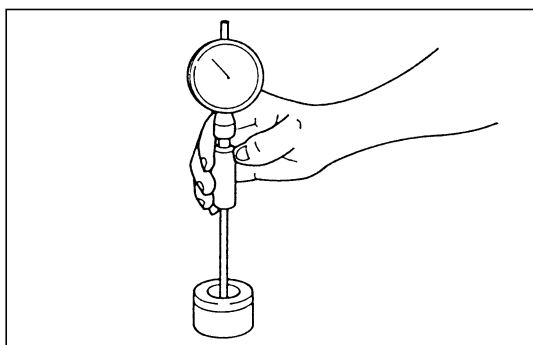


Fig. 9-23

SM9-272

2. Measure the needle roller bearing outside diameter. (B)

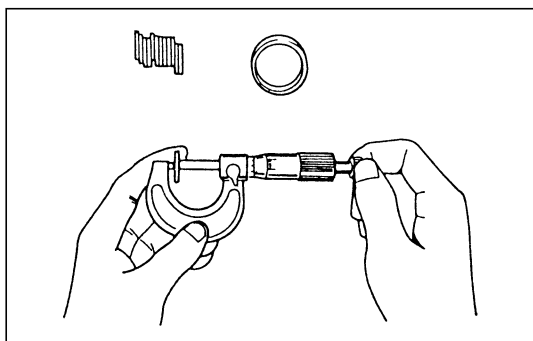
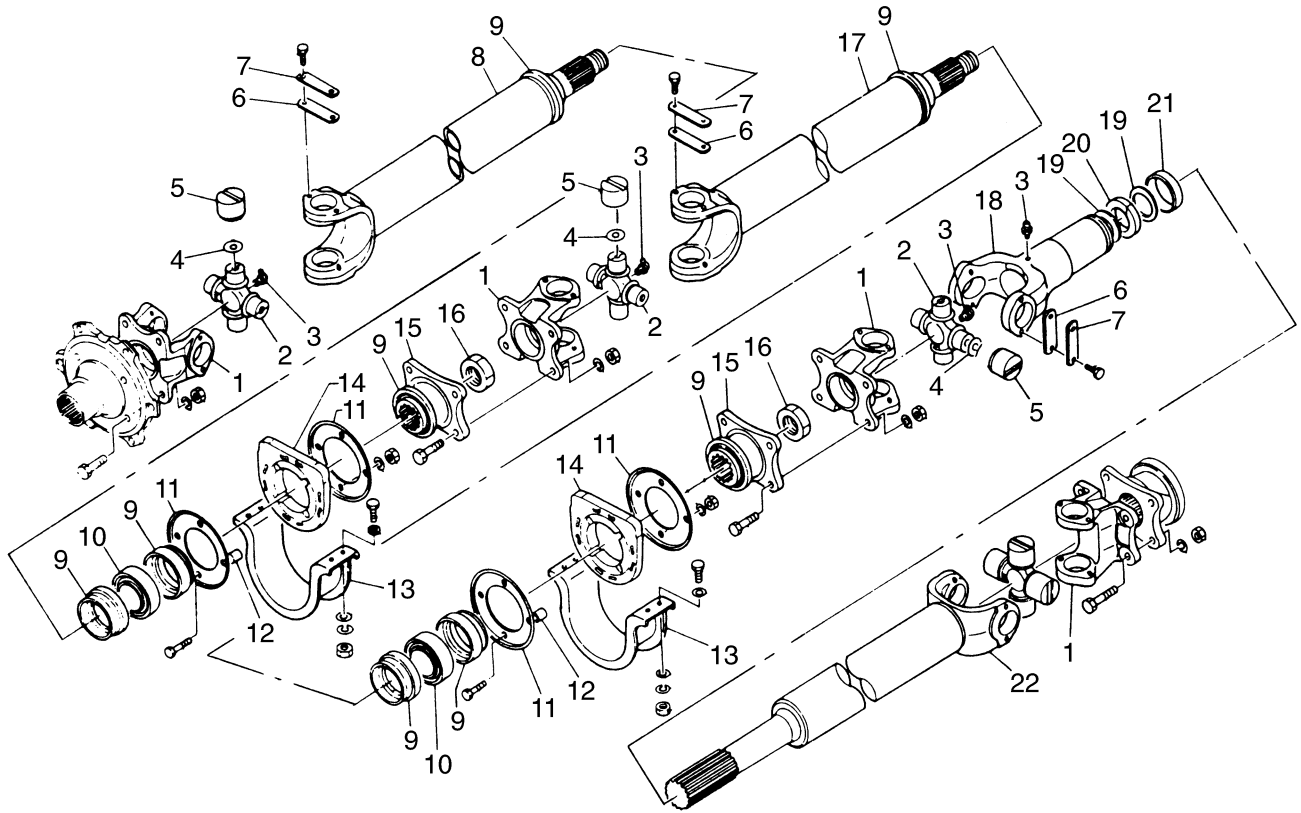


Fig. 9-24

SM9-150

**THREE PIECE PROPELLER SHAFT**



- |                                       |   |
|---------------------------------------|---|
| 1. Universal joint yoke               | 12. Collar                                    |
| 2. Universal joint spider             | 13. Center bearing holder                     |
| 3. Lubrication fitting                | 14. Center bearing cushion                    |
| 4. Thrust washer                      | 15. Flange                                    |
| 5. Needle roller bearing              | 16. Lock nut                                  |
| 6. Bearing cap                        | 17. Intermediate propeller shaft sub assembly |
| 7. Lock washer                        | 18. Sliding yoke                              |
| 8. Front propeller shaft sub assembly | 19. Split retainer                            |
| 9. Dust deflector                     | 20. Felt seal                                 |
| 10. Center bearing                    | 21. Felt seal retainer                        |
| 11. Center bearing plate              | 22. Rear propeller shaft sub assembly         |

Fig. 9-2

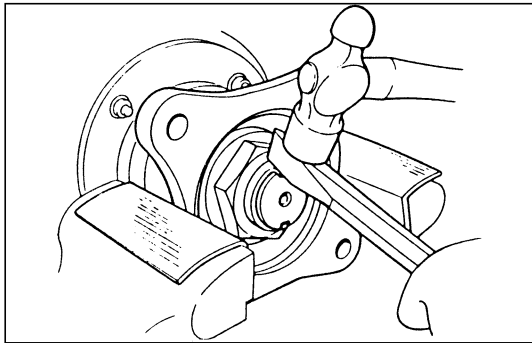


Fig.9-45

SM9-189

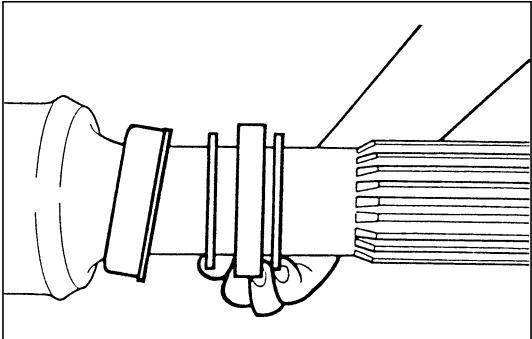


Fig.9-46

SM9-280

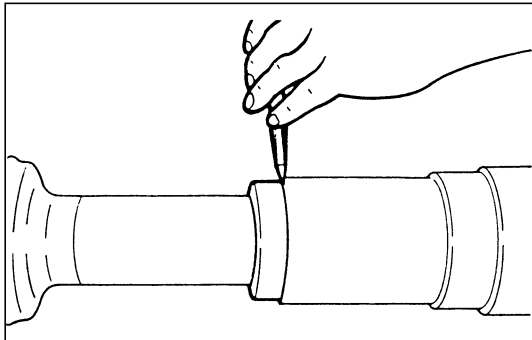


Fig.9-47

SM9-281

4. Stake the lock nut of flange.
  - a. Using a hammer and chisel, staking the lock nut deeper than 1.5 mm (0.06 in.).
  - b. The staking should fill the groove thoroughly.
  - c. The staking should be done without rift.

#### 7. ASSEMBLE THE SLIDING YOKE AND REAR PROPELLER SHAFT.

1. Remove the stale grease from the spline and sliding area of the felt ring.
2. Install the new felt ring retainer on the shaft by pushing it in along the propeller shaft spline.
3. Apply the lithium base multipurpose grease to the spline and sliding area of the felt ring.

**Grease: Refer to RECOMMENDED LUBRICANTS LIST.**

4. Install the felt ring and split retainers on the shaft.
5. Match the phasing arrows on the sliding yoke and propeller shaft then fit the sliding yoke on the propeller shaft.
6. Stake the felt ring retainer equally at four points on the circumference of the felt ring retainer. Make sure the felt ring retainer is staked down securely into the groove on the end of the sliding yoke.

**Stake width: 10–15 mm (0.40–0.59 in.)**

#### WARNING

When staking the felt ring retainer, a metal tip may fly off on impact, wear safety glasses to protect your eyes.

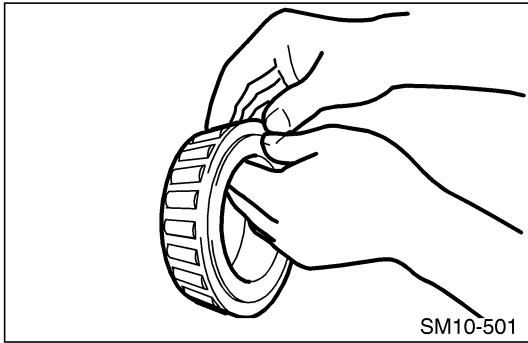


Fig. 1

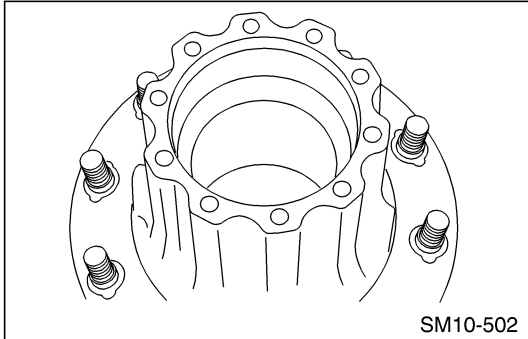


Fig. 2

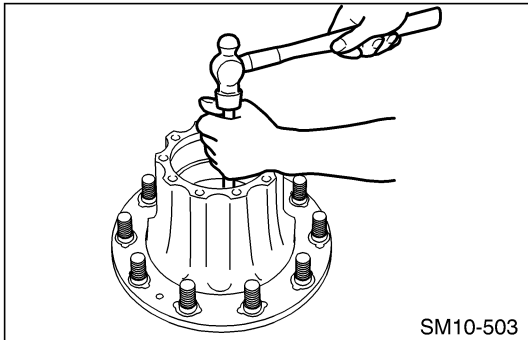


Fig. 3

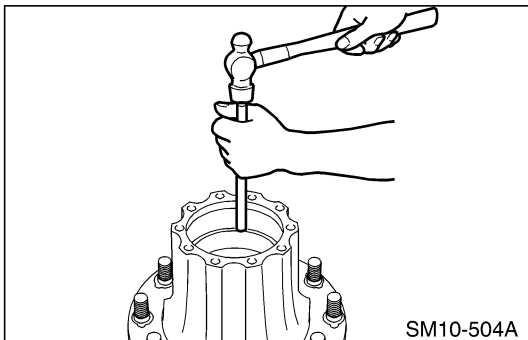


Fig. 4

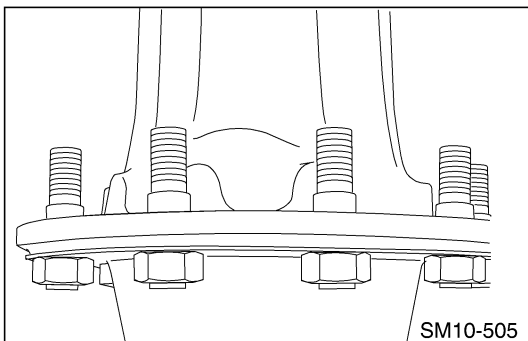


Fig. 5

## INSPECTION

### 1. INSPECTION OF THE WHEEL HUB

1. Inspect the tapered roller bearing with race for burns or pitting, and replace it if such defects are found.

2. Inspect the tapered roller bearing race for burns, cracks, or brinelling on the raceways, and replace it if such defects are seen.

**NOTE: The bearing and the bearing race must be replaced as a set.**

3. Replacement of tapered roller bearing race.

- a. Remove the tapered roller bearing race from the hub bore.

- b. Install the new tapered roller bearing race in the hub bore.

4. Inspect the hub bolts.

Replace the bolts if the threads of the bolts are worn or damaged.

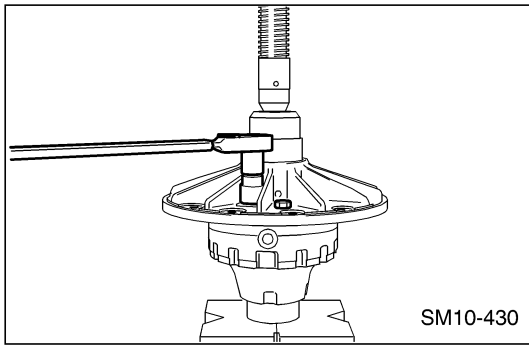


Fig. 12

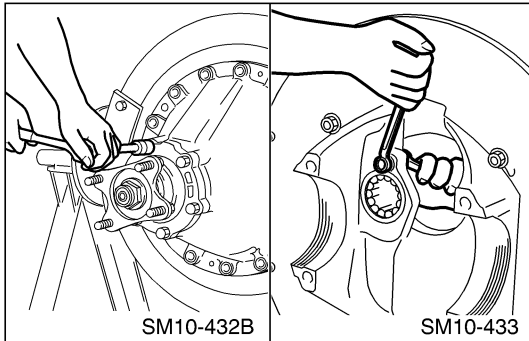


Fig. 13

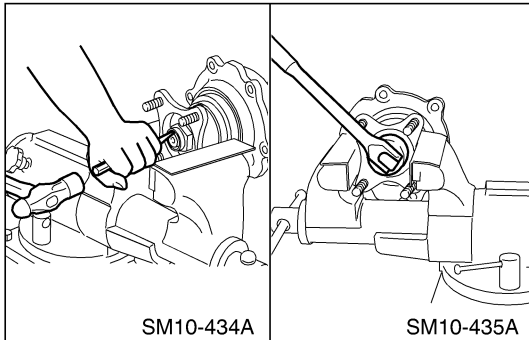


Fig. 14

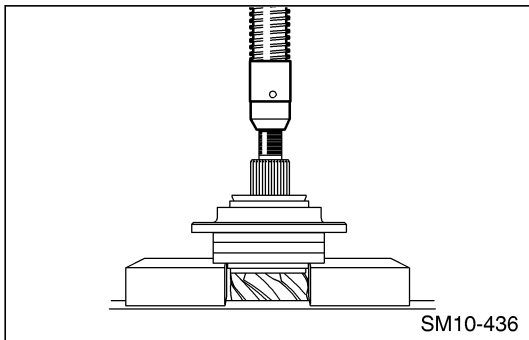


Fig. 15

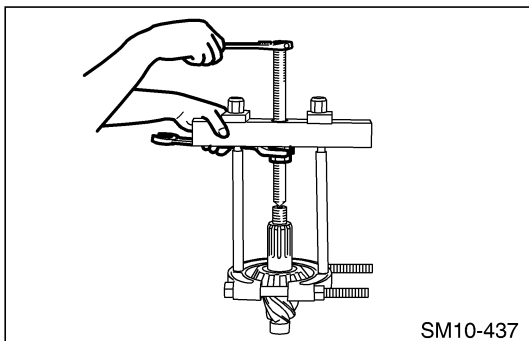


Fig. 16

6. Disassemble the differential case.

**NOTE: Be sure to check the aligning marks on the differential case before disassembly. Remove the bolts so that the case separates.**

7. Loosen the bolts and remove the pinion assembly, and then remove the cylindrical roller bearing from the differential carrier.

8. Remove the lock nut using a special tool. Spread the staking of the nut completely with a chisel, then loosen the nut.

**NOTE: Insufficient spread of the staked parts will cause damage to the threads of the drive pinion when loosening the nut.**

**Special Tool: Socket wrench (09839 - 4601)**

9. Separate the bearing cage and the pinion gear with a press.

10. Remove the taper roller bearing from the pinion gear using a puller.

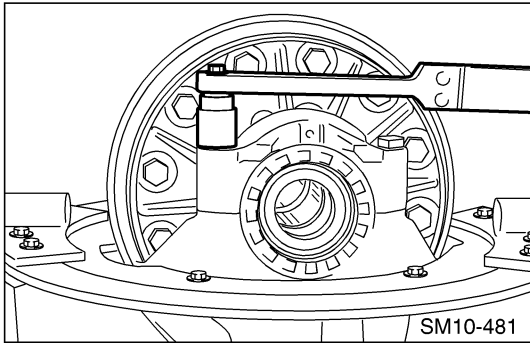


Fig. 33

25. Tighten the bearing cap bolts to the specified torque.

**Tightening Torque: 2,800 - 3,600 kg·cm  
(203 - 260 lb·ft)**

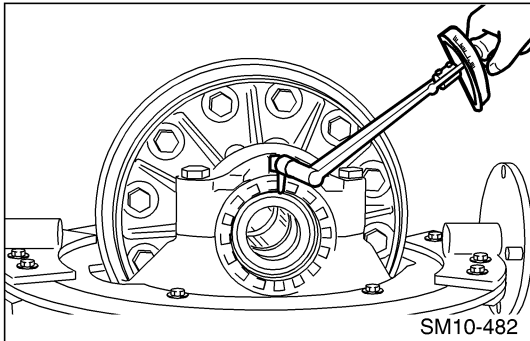


Fig. 34

26. Install the lock plate.

**Tightening Torque: 190 - 260 kg·cm (14 - 18 lb·ft)**

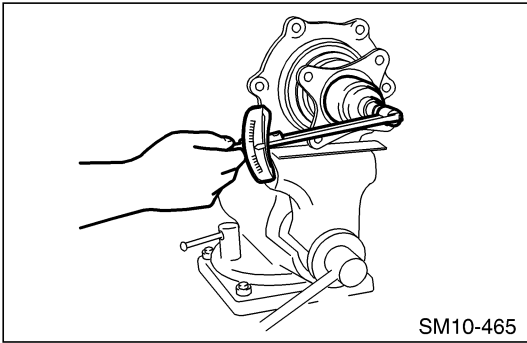


Fig. 11

11. Measure the preload of the drive pinion bearings.  
If the preload is out of the specified limits, adjust it as following.

Use a thinner spacer to increase and a thicker one to decrease preload. When new bearings, use the spacer of 17.425 mm (0.686 in.) at first and measure the preload. This will be helpful to select the spacer for specified preload.

Tighten the flange lock nut to the specified torque before re-checking

a. Using a torque wrench.

	New bearing	Re-used bearing
Turning torque	20 - 25 kg-cm (1.5 - 1.8 lb-ft)	15 - 20 kg-cm (1.1 - 1.4 lb-ft)
Adjusting spacer thickness	17 differences in thicknesses from 17.25 to 17.65 mm (0.680 to 0.694 in.) each differing 0.025 mm (0.001 in.)	

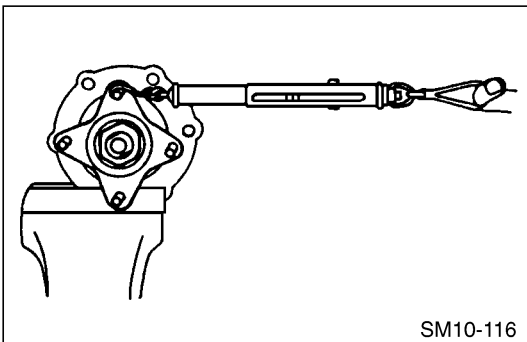


Fig. 12

b. Using a spring balancer.

Turning force:

Unit: kg (lb)

Model	SG
New bearing	2.7 - 3.3 (5.9 - 7.3)
Re-used bearing	2.0 - 2.6 (4.5 - 5.8)

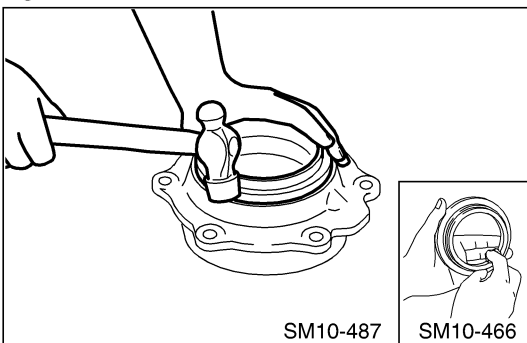


Fig. 13

12. When the preload is correct, remove the flange and then install the new oil seal, flange and flange lock nut.

Tighten the flange lock nut to the specified torque.

**NOTE: Apply wheel bearing grease to the oil seal lip.**

**Wheel bearing grease:**

**Refer to RECOMMENDED LUBRICANTS LIST.**

**Special Tool: Socket wrench (09839 - 4601)**

**Tightening Torque: 6,000 - 8,000 kg-cm (434 - 578 lb-ft)**

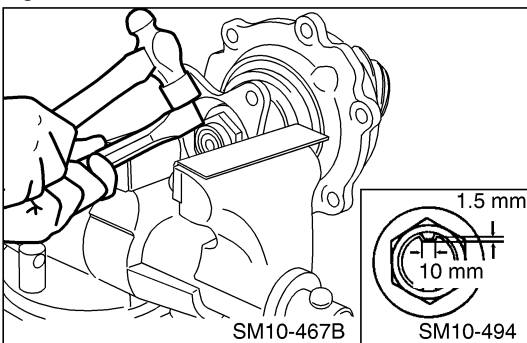


Fig. 14

13. Lock the flange lock nut by staking the lip into the pinion shaft slots.

**NOTE:** ○ More than 1.5 mm (0.059 in.).

○ Stake portion should be fitted in the groove thoroughly.

○ Staking should be done without rift.

Measure the bearing preload (see preceding page) and record it for TOTAL BEARING PRELOAD ADJUSTMENT described in step 24 on page 10-46.

## FRONT AXLE

- NOTE:**
- The illustrations and the text are based on SG vehicles. In the case of FD and FE vehicles, there are several differences in the number of hub bolts and the shapes of the components. However, the operation procedures are the same except where specified.
  - From the 1999 model year, all FD, FE and SG vehicles are equipped with ABS (Anti-lock Brake System). As a result, the operation procedures for taking off and putting on the wheel hubs are very different. Please read this chapter carefully before working on these vehicles.

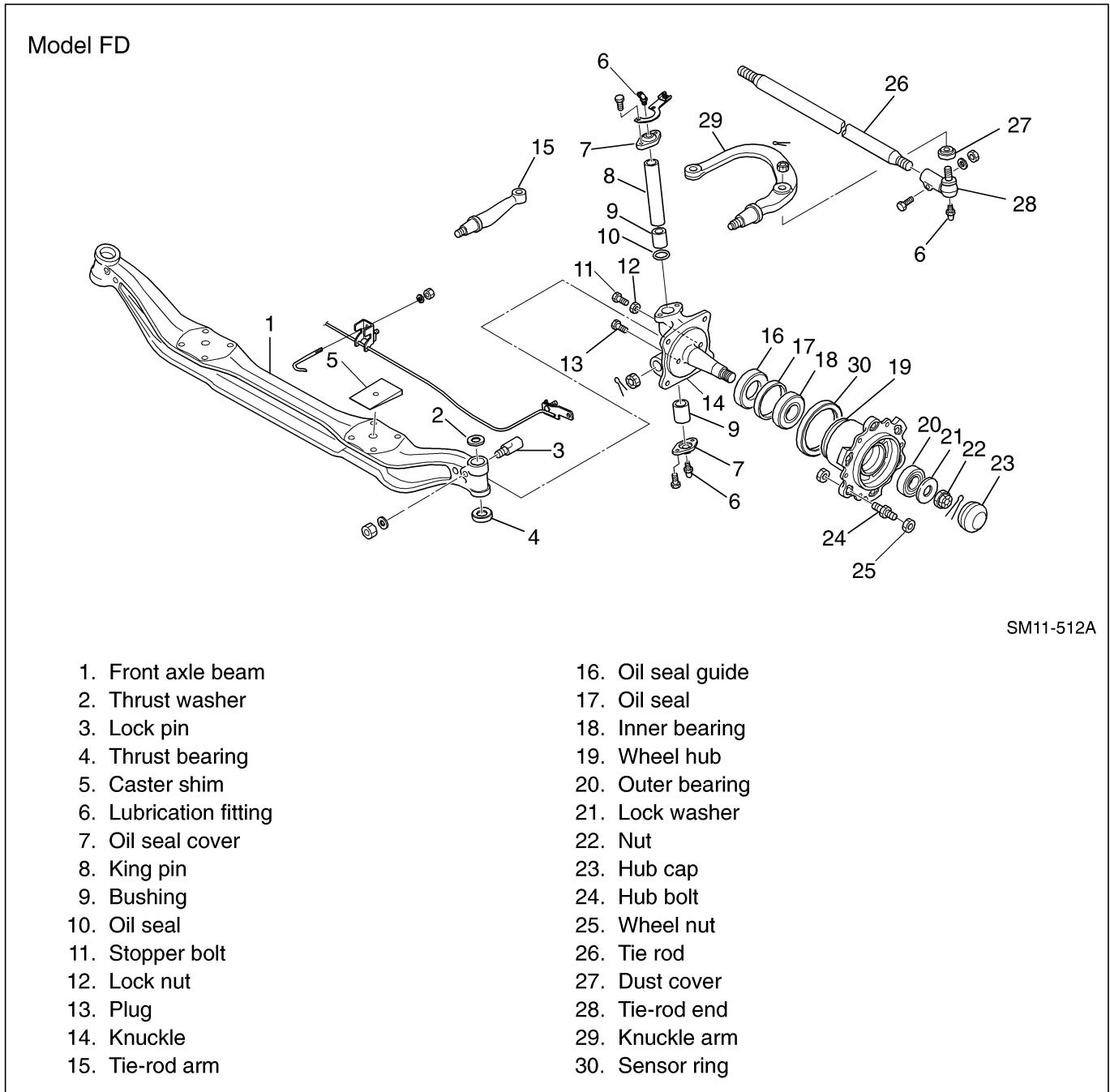


Fig. 1

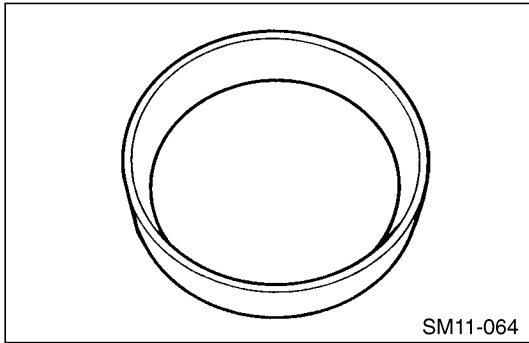


Fig. 19

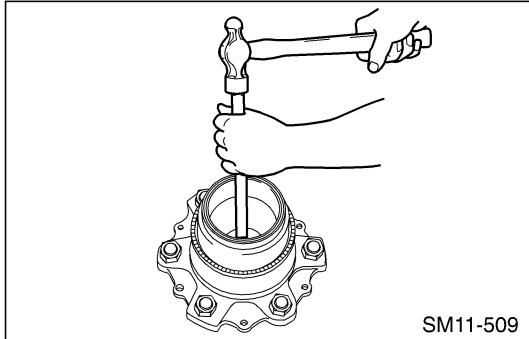


Fig. 20

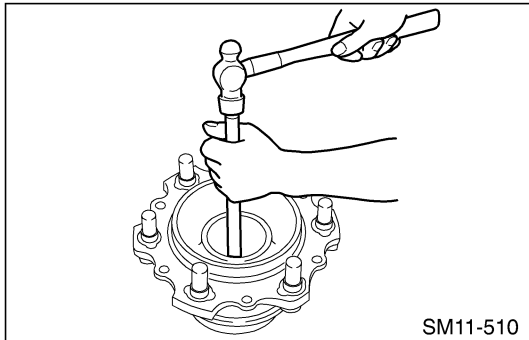


Fig. 21

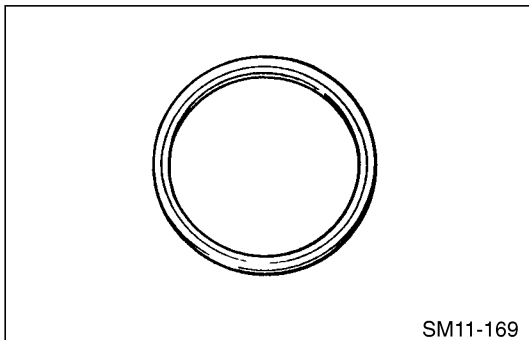


Fig. 22

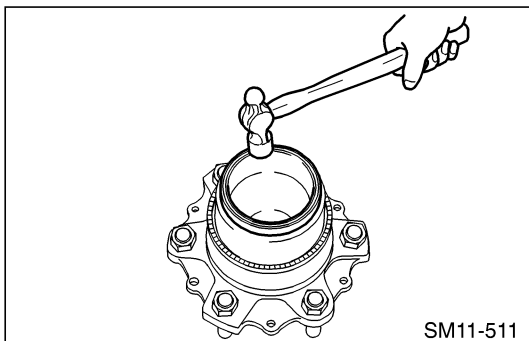


Fig. 23

2. Inspect the outer races for wear or brindle marks. Replace any flawed or damaged one.

**NOTE: The bearing and the bearing race must be replaced as a set.**

3. Remove the outer races.
  - a. Strike the race lightly and evenly through the 4 access holes in the wheel hub using a tapping rod, and remove the outer race of both the inner and outer bearings.

- b. Install the outer race using a tapping rod and a hammer or a press.

4. Hub oil seal
  - a. Inspect the oil seal. Replace if defective.

- b. Install the oil seal.

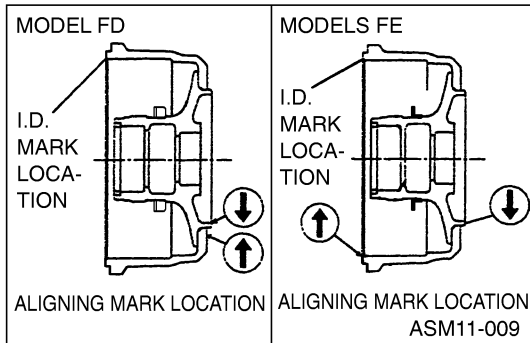


Fig. 33

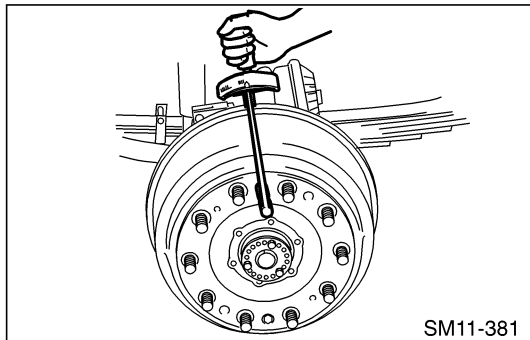


Fig. 34

**NOTE:** ○ The right and left front wheel brake have their own respective brake drum. Be sure not to confuse one from the other.

#### Identification mark

[For model FD]

3940 (Right hand side drum)

3950 (Left hand side drum)

[For model FE]

3970 (Right hand side drum)

3960 (Left hand side drum)

- Before installing the drum, fully retract the brake adjuster so that the outer diameter of the lining becomes minimum.
- When installing the brake drum to the wheel hub, make sure that their aligning marks are oriented as closely to each other as possible.

a. Tighten the bolt.

**Tightening Torque: 200 - 400 kg·cm (15 - 28 lb·ft)**

## 2. INSTALLATION OF THE FRONT WHEELS

**NOTE:** Refer to CHAPTER 16, WHEELS AND TIRES.

## 3. FOR MODELS FD and FE

### BRAKE SYSTEM AIR BLEEDING AND BRAKE SHOE CLEARANCE ADJUSTMENT.

1. On completion of the wheel hub and related parts reassembly, conduct the following.
  - a. Bleed the air from the brake lines according to section FINAL CHECK AND ADJUSTMENT in **CHAPTER 13, SERVICE BRAKE**.
  - b. Adjust the brake shoe clearance according to section INSPECTION AND ADJUSTMENT in **CHAPTER 13, SERVICE BRAKE**.

## 4. FOR MODEL SG

### BRAKE CHAMBER ROD STROKE

On completion of the rear axle reassembly, adjust the brake chamber rod stroke according to the section INSPECTION AND ADJUSTMENT in **CHAPTER 13, SERVICE BRAKE**.

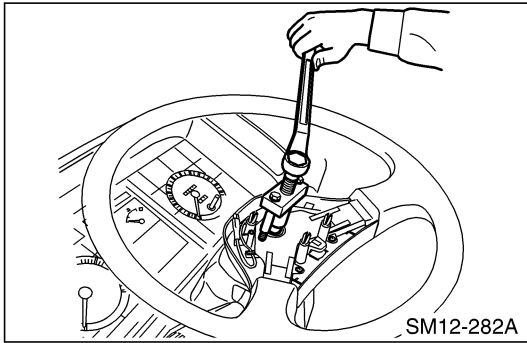


Fig. 7

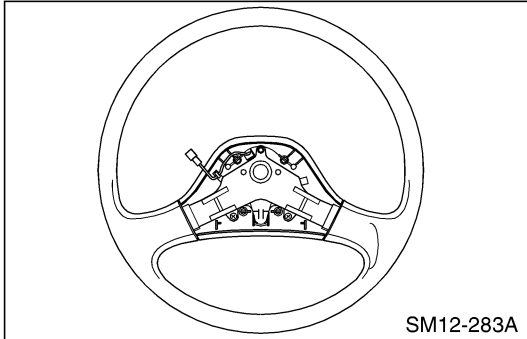


Fig. 8

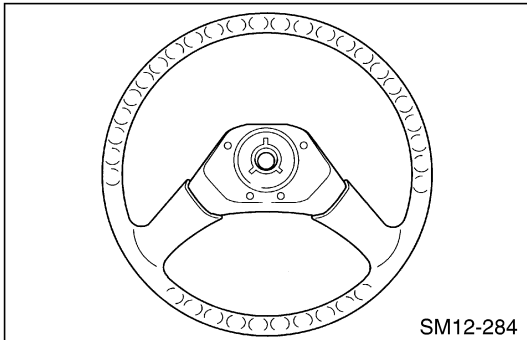


Fig. 9

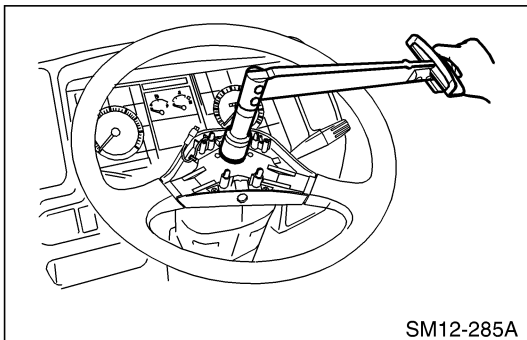


Fig. 10

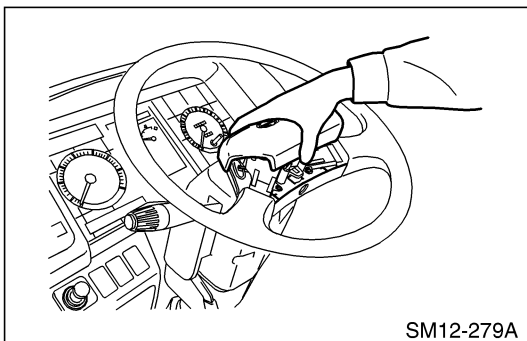


Fig. 11

## 6. USE A SPECIAL TOOL TO REMOVE THE STEERING WHEEL.

Special Tool: Puller (09650 - 1341)

**NOTE:** When using the puller, be careful not to damage the thread portion of the contact plate that is made of aluminium, and be sure to insert the puller on the thread portion fully.

## INSPECTION

1. EXAMINE THE STEERING WHEEL FOR DISTORTION, DAMAGE OR CRACKS. REPLACE IT IF IT IS FOUND TO BE UNSUITABLE.
2. EXAMINE THE SERRATED PART IN THE CENTER OF THE STEERING WHEEL, AND IF IT IS DAMAGED, REPLACE IT.

## INSTALLATION

1. APPLY CHASSIS GREASE TO THE HORN CONTACT PLATE ON THE LOWER SIDE OF THE STEERING WHEEL.

Chassis grease: Refer to RECOMMENDED LUBRICANT LIST.

2. INSTALL THE STEERING WHEEL. POSITION THE STEERING WHEEL ACCORDING TO THE MARK MADE WHEN DISASSEMBLING, THEN TIGHTEN IT ON WITH THE SETTING NUT.

Tightening Torque: 500 - 800 kg·cm (37 - 57 lb·ft)

3. INSTALL THE HORN BUTTON.

1. After attaching the wiring harness, match the legs of the horn button to the retainer hole and press it in.
2. Secure the horn button assembly firmly with the horn button holding screw, and replace the covering plug.

Tightening Torque: 15 - 25 kg·cm (1.1 - 1.8 lb·ft)

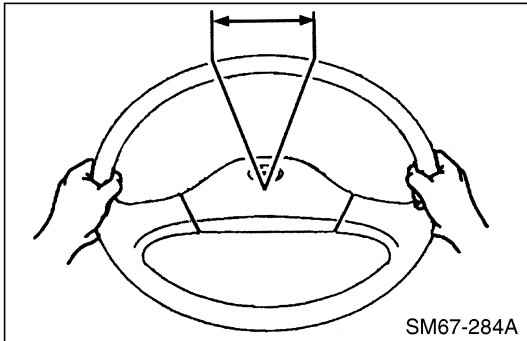


Fig. 45

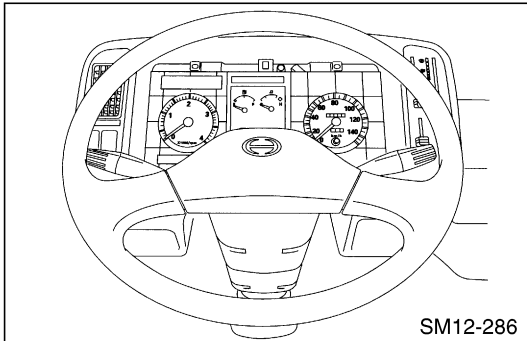


Fig. 46

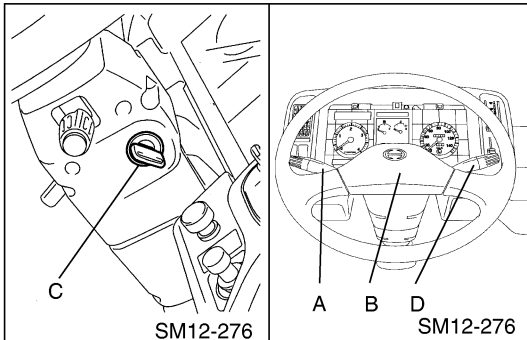


Fig. 47

2. Check the steering wheel play while engine is running.  
**Assembly Standard: 15 - 35 mm (0.59 - 1.38 in)**

**WARNING**

**Excessive steering wheel play may adversely affect vehicle handling. This can result in personal injury and/or property damage.**

- NOTE:** Turn the sector shaft adjusting bolt clockwise to decrease wheel play and counter-clockwise to increase.

3. Check the steering wheel position.

**NOTE:** Check that the steering wheel is in the correct position when the wheels point straight ahead.

If the steering wheel is not positioned properly, the various meters will not be easily visible.

4. Check that the switches are operating properly.

A: Lighting switch

Turning signal switch

B: Horn switch

C: Starter switch

D: Hazard lamp switch

Windshield wiper and washer switch

Exhaust brake switch

(Only for equipped manual transmission)

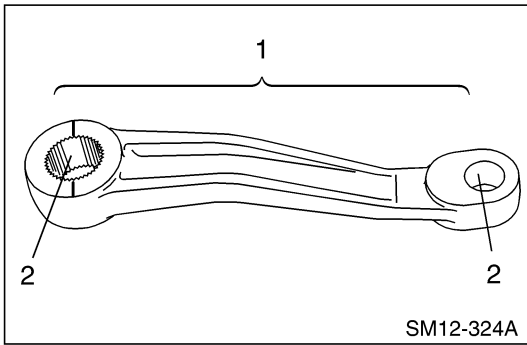


Fig. 78

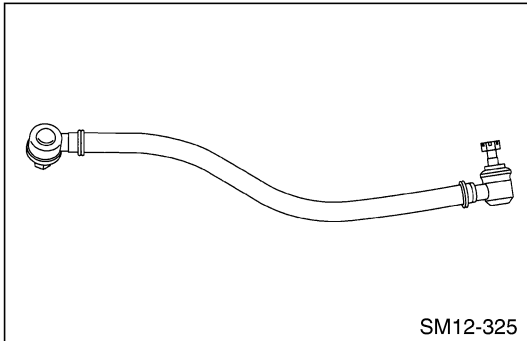


Fig. 79

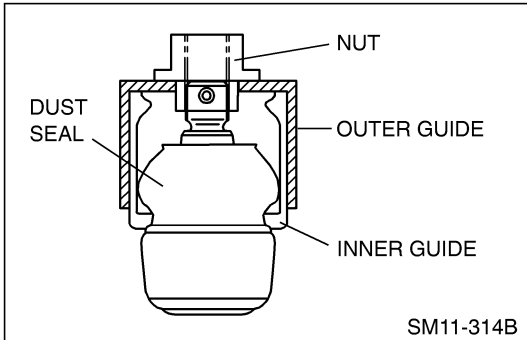


Fig. 80

**2. PITMAN ARM**

1. Check for cracks using a color check or a magnetic flaw detector.
2. Check the serrated part and ball stud hole for any damage.

**3. DRAG LINK**

1. Examine the link and end part for cracks and damage. If found unsuitable, replace the whole drag link assembly.
2. Examine the ball joint for play and the dust seal for damage. If found unsuitable, replace the whole drag link assembly.

**NOTE: If only the dust seal is damaged and there is no play, mud or water inside, replace only the dust seal.**

**ASSEMBLY**

**1. REPLACEMENT OF DRAG LINK BALL STUD DUST SEAL**

1. As a general rule, replace the drag link assembly, if the ball joints dust seal is damaged. If there is no play, mud or water in the joint, just replace the seal. Remove the dust seal with a screw driver.
2. Apply lithium molybdenum sulfide grease to the seal lip of the new dust seal and using the guide and nut gently push the seal onto the socket.  
Take care not to damage the dust seal.  
Inject lithim molybdenum grease from the lubrication fitting.  
(Do not allow grease to get on the tapered part).

**Grease quantity: 17 - 18 g (0.60 - 0.63 oz)**

**Special Tool: Guide, Nut (920920 - 120)  
Inner Guide (09657-1790 × 2)  
Outer Guide (09657-1800)**

**2. INSTALL THE PITMAN ARM TO THE GEAR BOX.**

1. Install in the order of dust cover, pitman arm, and spring washer, then tighten the nuts to the specified torque.

**Tightening Torque: 3,000 - 4,000 kg-cm (217 - 289 lb-ft)**

**Tightening Torque: SG**

**4,000 - 5,000 kg-cm (290 - 361 lb-ft)**

**NOTE: Align the match marks on the sector shaft and pitman arm.**

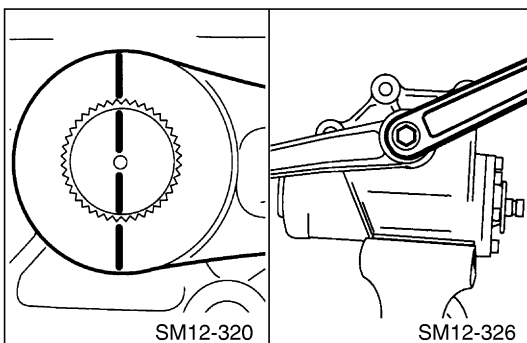


Fig. 81

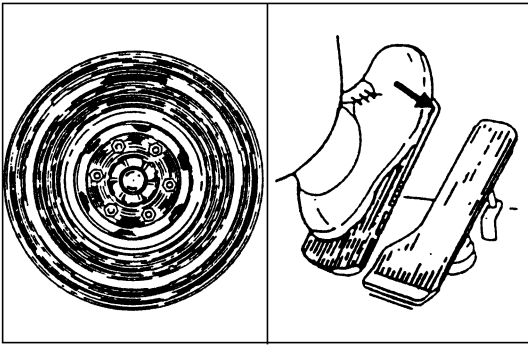


Fig. 4 SM13-404

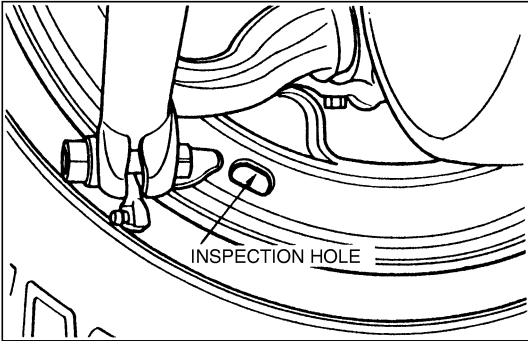


Fig. 5 SM13-715

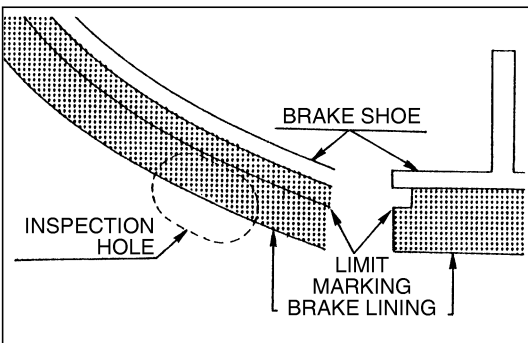


Fig. 6 SM13-180

- e. Turn the brake drum in the forward direction and stabilize the shoe by stepping on the brake pedal, a couple of times.
- f. Be sure that the drum rotates freely without drag. If there is any dragging, repeat the operation from b.
- g. Install the hole plug securely.

## 2. REMAINING THICKNESS OF LINING

Inspection holes have been drilled in the brake backing plate. Remove the rubber plug and check the wear of the brake lining. If the lining has been worn to the indent marking which indicates the limit of wear or if it is foreseen that the lining will be worn to the indent marking by the time of the next inspection, replace the lining with a new one. After the inspection is over, securely install the rubber plug.

### WARNING

If a lining which has become thinner than the limit marking is left unreplaced, the drum may be damaged by the rivet head and the braking force will be badly degraded. Be sure to check carefully the worn states of the brake linings of all wheels.

## 3. FLUID LEAK AND AIR LEAK

1. Check for fluid leaks.
  - a. Fluid leaks from lines.
 

With the brake pedal depressed, visually check for leaks of brake fluid from the brake hydraulic line including the pipes, connection, hoses, etc. If any leak is found, repair or replace with the corresponding parts.
  - b. When checking for leaks, check also the following items and repair or replace with the corresponding parts as required.
    - a) Check that the pipes and hoses are not hitting or rubbing other parts. Check that the pipe clips are not loose.
    - b) Check that the pipes have no cracks and that they have not become rusty.

- c) Check that the hoses are not deteriorated, deformed, or swollen.

### NOTE:

**As a general rule, the hoses should be replaced with new ones every year. When any defects as above have been found, replace immediately with new ones.**

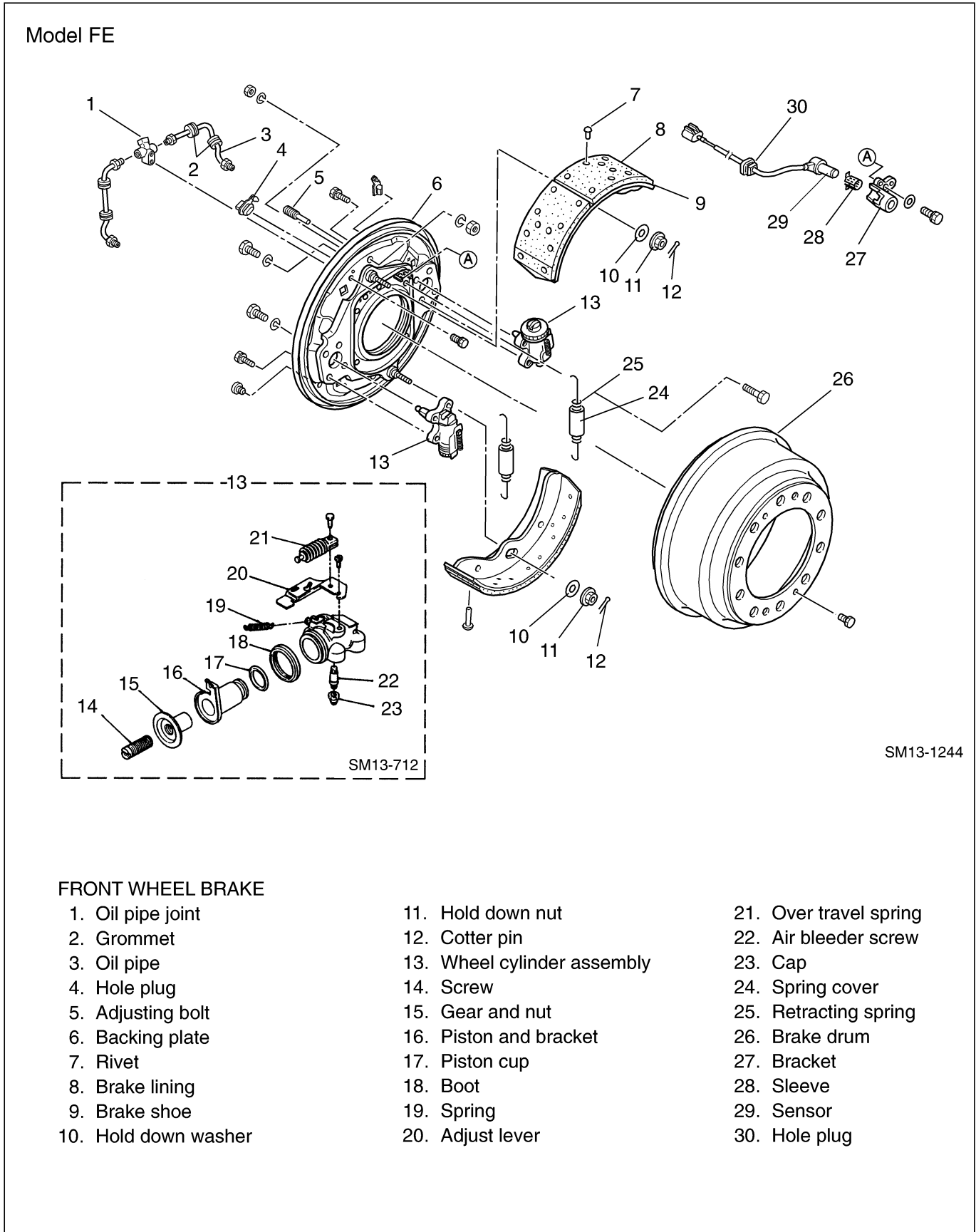


Fig. 3

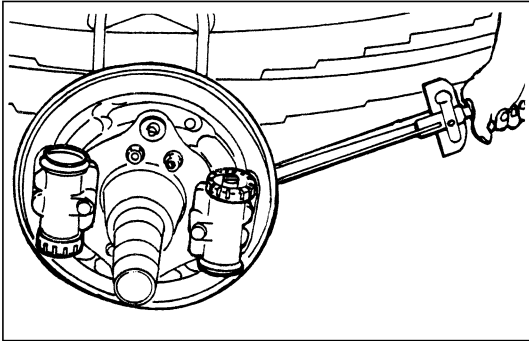


Fig. 32

SM13-666

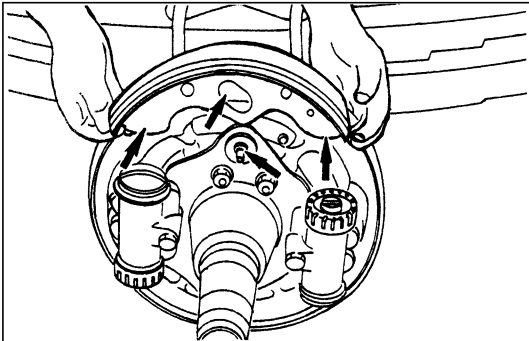


Fig. 33

SM13-667

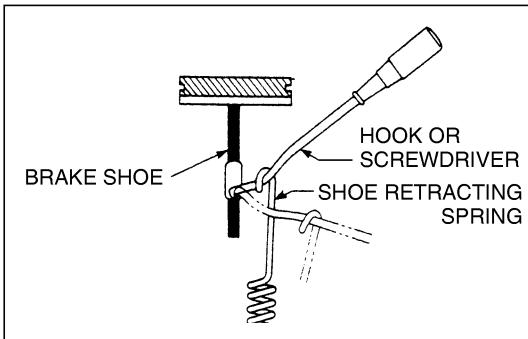


Fig. 34

SM13-181

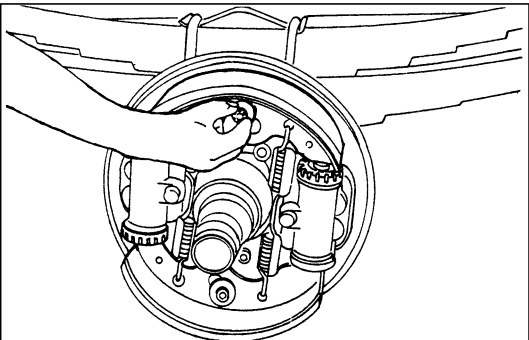


Fig. 35

SM13-668

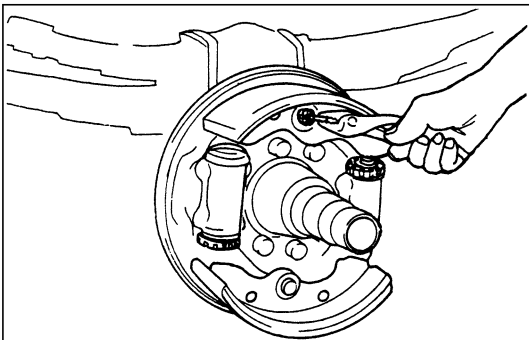


Fig. 36

SM13-662

2. Install the wheel cylinder.  
Securely tighten the mounting bolts with the tightening torques shown in the table.

Bolt diameter mm (in.)	Tightening torque kg-cm (lb-ft)	
8.0 (0.315)	170 – 250 (13 – 18)	
10.0 (0.394)	380 – 500 (28 – 36)	
12.0 (0.472)	600 – 880 (44 – 63)	
14.0 (0.551)	Model FD	1,500 – 2,000 (109 – 144)
	Model FE	1,250 – 1,700 (91 – 122)

3. Install the brake shoe assembly.
  - a. Apply heat-resistance grease.

#### Heat resistance grease:

##### Refer to RECOMMENDED LUBRICANTS LIST.

- b. Apply grease to both ends of the shoe web contacting with the piston, and to both sides of the shoe web contacting the shoe hold washer and adjusting nut.
  - c. Exercise care so that the lining surface is not stained with grease.
4. Install the retracting spring using the special tool or screwdriver.

After assembling the spring, check that the end of the shoe web is securely set in the groove of the wheel cylinder piston. Also check that the hook of the spring is securely hooked in the hole of the shoe.

**NOTE: When installing the spring, do not extend it excessively, lest the compression force of the spring should become weak.**

#### Special Tool: Hook (09653 - 1370)

5. Adjust the clearance between the hold down washer and the shoe.
  - a. When assembling, apply grease amply to both surfaces of the washer.
  - b. Tighten the slotted nut and back off the nut by 1/3 turn. Then secure the nut with the cotter pin.
  - c. If the cotter pin cannot be inserted into the hole, turn the slotted nut counterclockwise within 1/6 turn from state b. to align it with the bolt hole. Be sure to use a new cotter pin.
6. Connect the hose (front brakes) and oil pipe (rear brakes) to the wheel cylinder.

#### Tightening torque:

**Hose:** 450 – 600 kg-cm (33 – 43 lb-ft)  
**Oil pipe:** 4.76 Dia. 130–180 kg-cm (0.187 in.) (9.4–13.0 lb-ft)  
 6.35 Dia. 200 – 220 kg-cm (0.25 in.) (14.5 – 15.9 lb-ft)

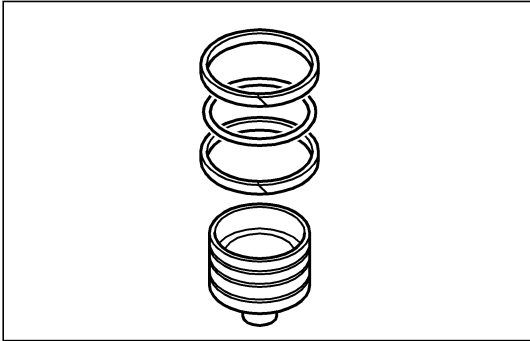


Fig. 31

ASM13-016

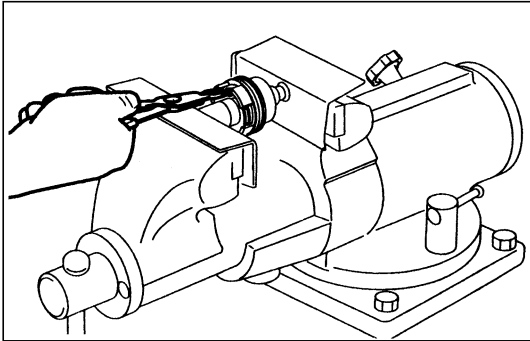


Fig. 32

SM13-849

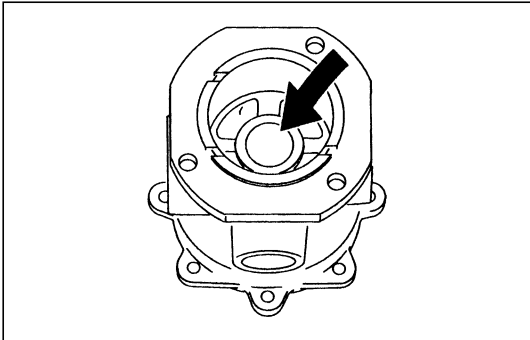


Fig. 33

SM13-850

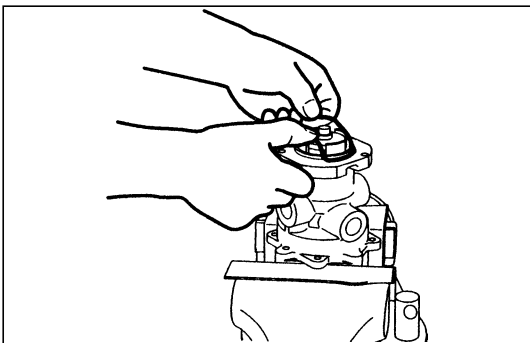


Fig. 34

SM13-825

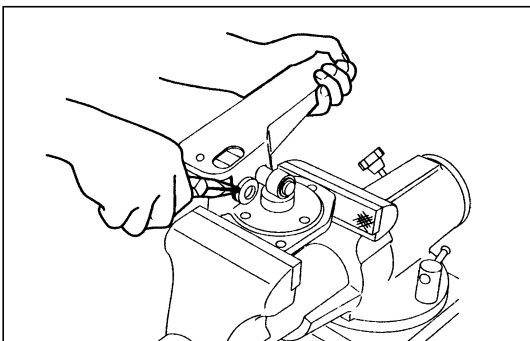


Fig. 35

SM13-907

7. Install the O-ring on the primary piston.

8. Assemble the primary piston assembly.  
Place the main springs (outer, inner) and sub spring assembly in the primary piston, and fix the retainer ring.

**WARNING**

The retainer ring is spring steel and may pop out, wear safety glasses to protect your eyes.

9. Install the O-ring on the primary valve body.

10. Install the primary piston assembly and return spring together with the piston supporter.

11. Assemble the brake pedal assembly.  
**NOTE: Be sure to use new cotter pin.**

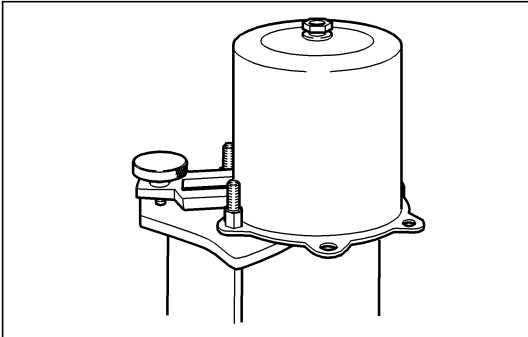


Fig. 31

SM13-1345

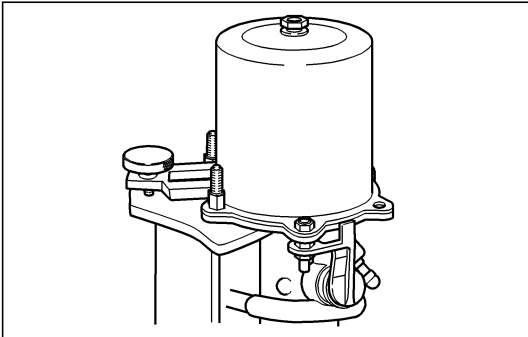


Fig. 32

SM13-1346

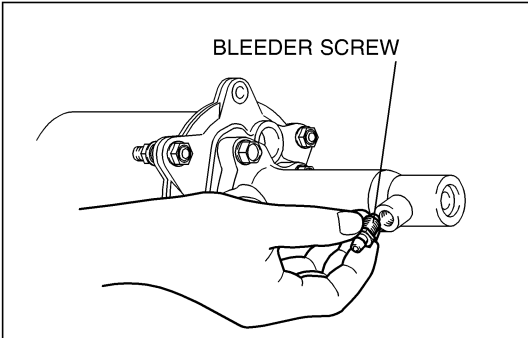


Fig. 33

SM13-1347

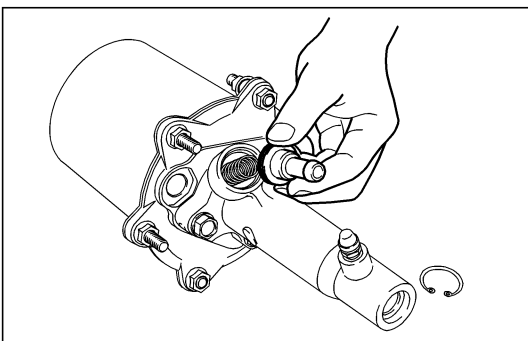


Fig. 34

SM13-1348

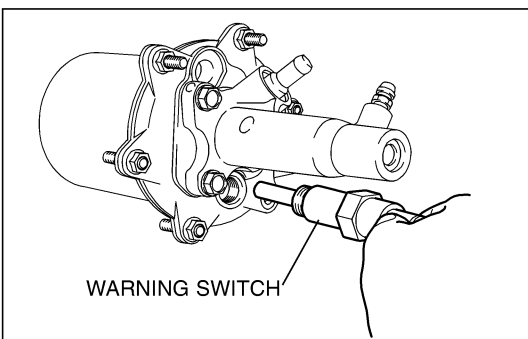


Fig. 35

SM13-1349

13. Remove the hydraulic cylinder assembly from the stand and install the power cylinder shell on the stand.

14. Coat the power cylinder shell inner surfaces with mineral grease, and then install the hydraulic cylinder assembly.

**Tightening torque: 110 - 160 kg·cm (8 - 11 lb·ft)**

15. Install the bleeder screw and cap.

**Tightening torque: 70 - 130 kg·cm (5.1 - 9.3 lb·ft)**

16. Install the retainer ring, connector assembly, spring, and check valve.

17. Install the warning switch.

**Tightening torque: 80 - 120 kg·cm (5.8 - 8.6 lb·ft)**

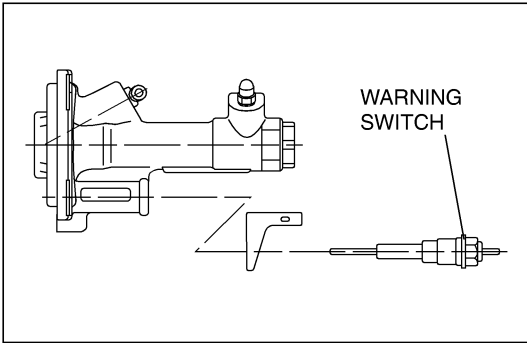


Fig. 23

SM13-1364

14. Remove the warning switch from the hydraulic cylinder, and then remove the clip, bracket, and O-ring.

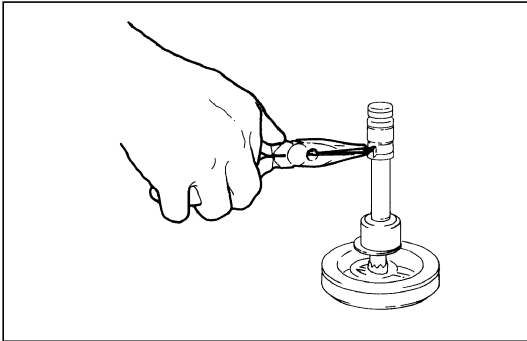


Fig. 24

SM13-1217

15. Remove and turn the turning prevention clamp of the band from the hydraulic piston hole to pull out the pin, and remove the hydraulic piston assembly.

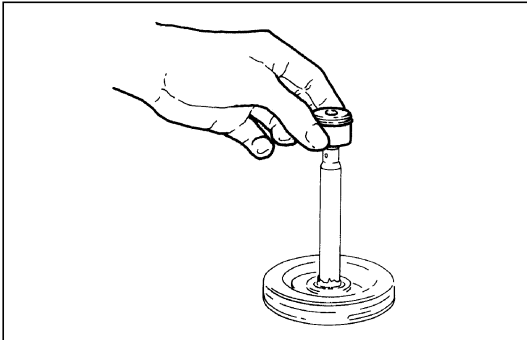


Fig. 25

SM13-1218

16. Remove the hydraulic seal holder and the plug sub assembly from the power piston assembly.

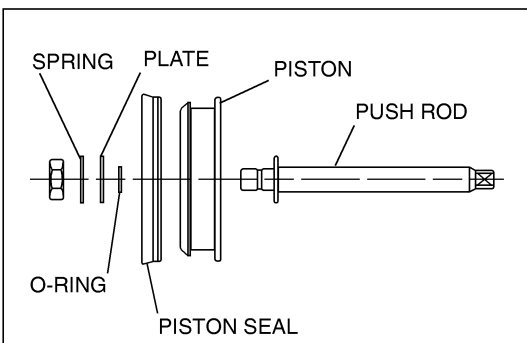


Fig. 26

SM13-1365

17. Remove the nuts holding the power piston assembly in place, and disassemble the push rod, power piston, piston seal, O-ring, plate, and coned disc spring.

**NOTE: Do not remove the push rod plate.**

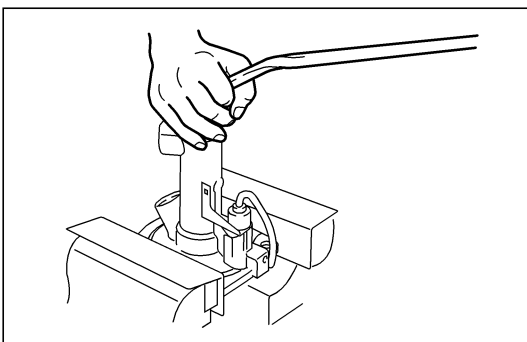


Fig. 27

SM13-1366

18. Loosen the end cap and remove it from the hydraulic cylinder together with the O-ring.

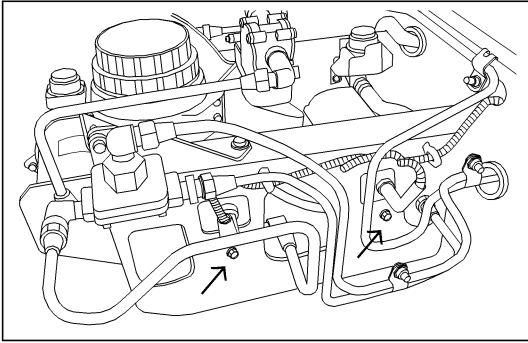


Fig. 70

SM13-1252

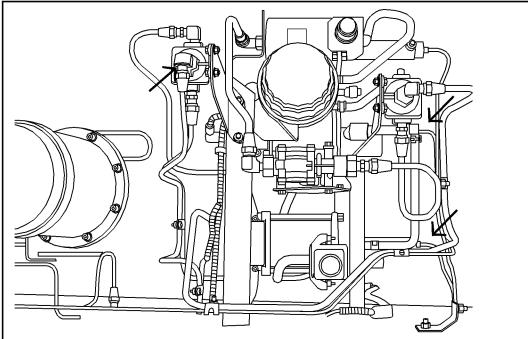


Fig. 71

SM13-1246

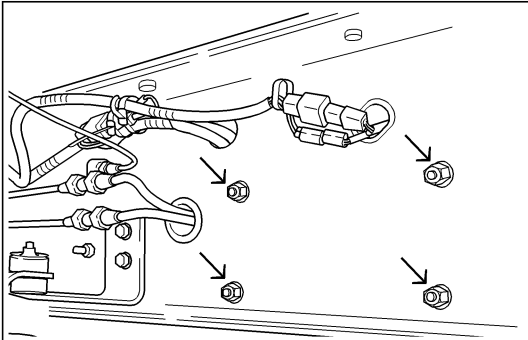


Fig. 72

SM13-1251

## INSPECTION

### 1. MOUNT AIR BOOSTER ASSEMBLY.

For assembly, follow the disassembly sequence backward, observing in particular the following steps in doing the work.

1. Fix the air booster with bracket.

**Tightening Torque: 190 - 260 kg-cm (14 - 18 lb-ft)**

2. Connect the oil pipes to the air booster.

**Tightening Torque: 200 - 220 kg-cm (14.5 - 15.9 lb-ft)**

3. Connect the air pipes to the air booster.

**Tightening Torque: 400 - 500 kg-cm (29 - 36 lb-ft)**

4. Attach the bracket to the frame.

**Tightening Torque: 617 - 935 kg-cm (45 - 67 lb-ft)**

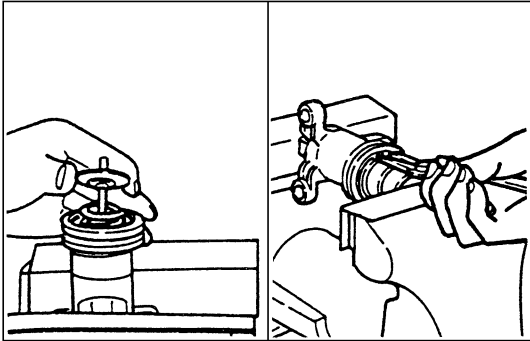


Fig. 15 SM13-590 SM13-580

**4. INSTALL THE RETAINER RING.**

1. Set the spring on the spring seat in the body.
2. Place the spring seat (upper) with adjusting screw and lock nut.
3. Using a socket wrench and a vise, compress the spring.

**INSTALLATION**

**MOUNT THE PRESSURE REGULATOR, AND CONNECT THE AIR PIPE.**

Tightening torque for bolts: 190–260 kg·cm  
(14–18 lb·ft)

Tightening torque for pipes: 200–220 kg·cm  
(14.5–15.9 lb·ft)

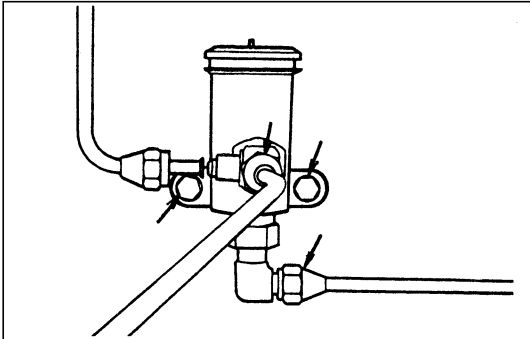


Fig. 16 SM13-623

**ADJUSTMENT**

**ADJUST THE PRESSURE REGULATOR.**

1. Turn the adjusting screw clockwise until it is tight, then start up the engine and idle.

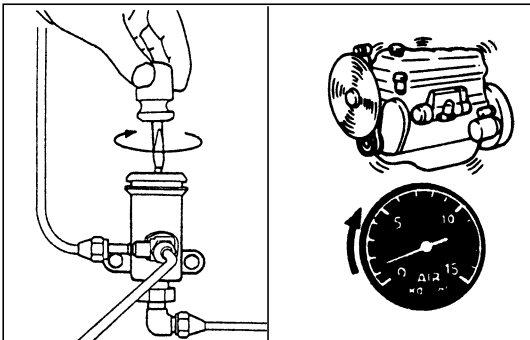


Fig. 17 SM13-624 SM13-107D

2. Stop the engine when the gauge indicates  $8.5 \pm 0.2$  kg/cm<sup>2</sup> (121 ± 2.84 lb/sq.in.).

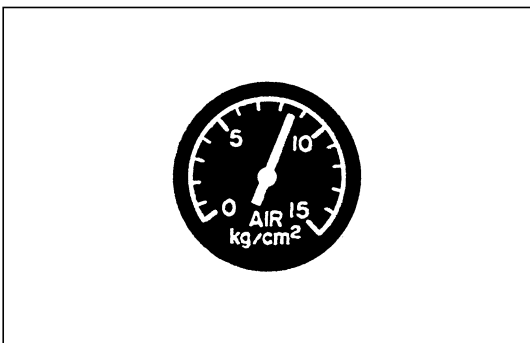


Fig. 18 SM13-202

3. Turn the adjusting screw counter clockwise gradually until air starts to leak from the port to the unloader valve side.

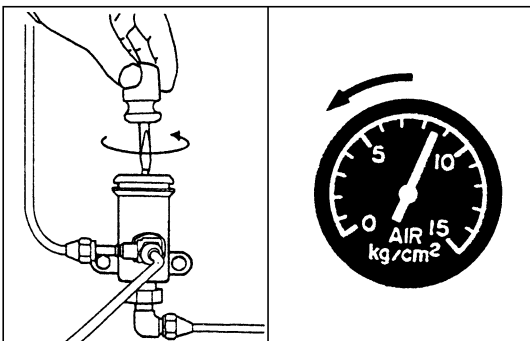


Fig. 19 SM13-624 SM13-202

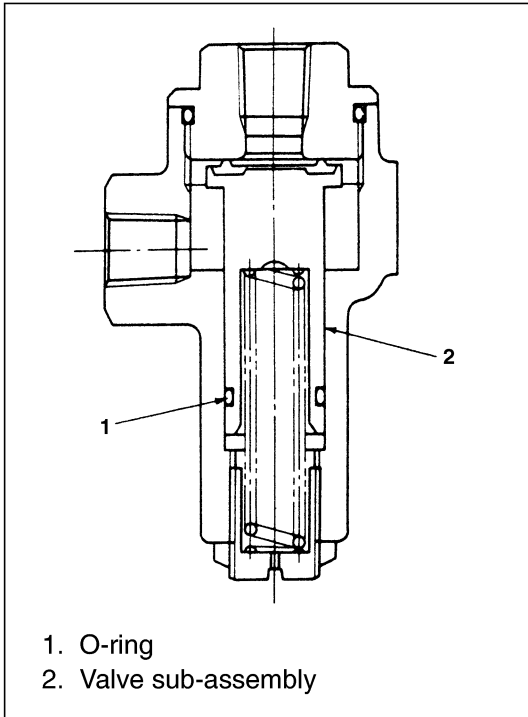


Fig. 7

SM13-099

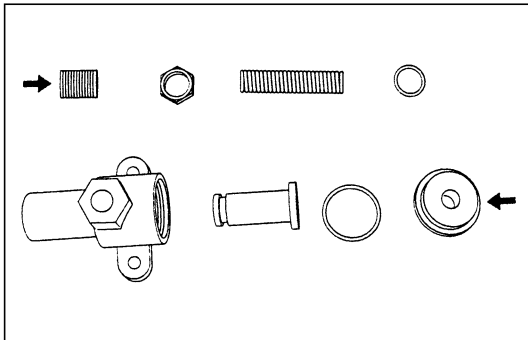


Fig. 8

SM13-867

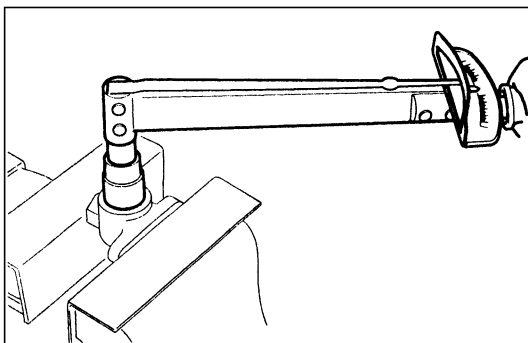


Fig. 9

SM13-870

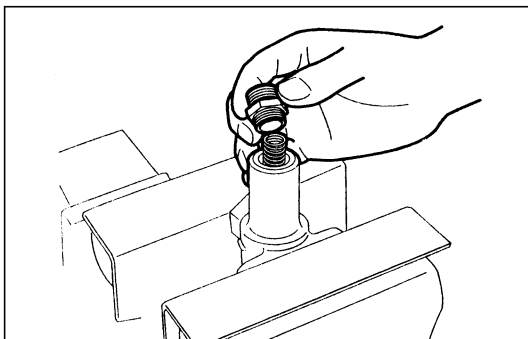


Fig. 10

SM13-865

## ASSEMBLY

- NOTE:**
- When assembling the protection valve, apply the silicone grease to the each sliding surface of assembling parts.
  - When assembling the protection valve, be sure to use new rubber parts.
  - The valve sub-assembly and O-ring must be replaced every year.

### 1. ASSEMBLE THE PROTECTION VALVE ASSEMBLY.

### 2. TIGHTEN THE BODY CAP.

Tightening Torque: 400–500 kg·cm (29–36 lb·ft)

### 3. TEMPORARILY INSTALL THE ADJUSTING SCREW WITH LOCK NUT.



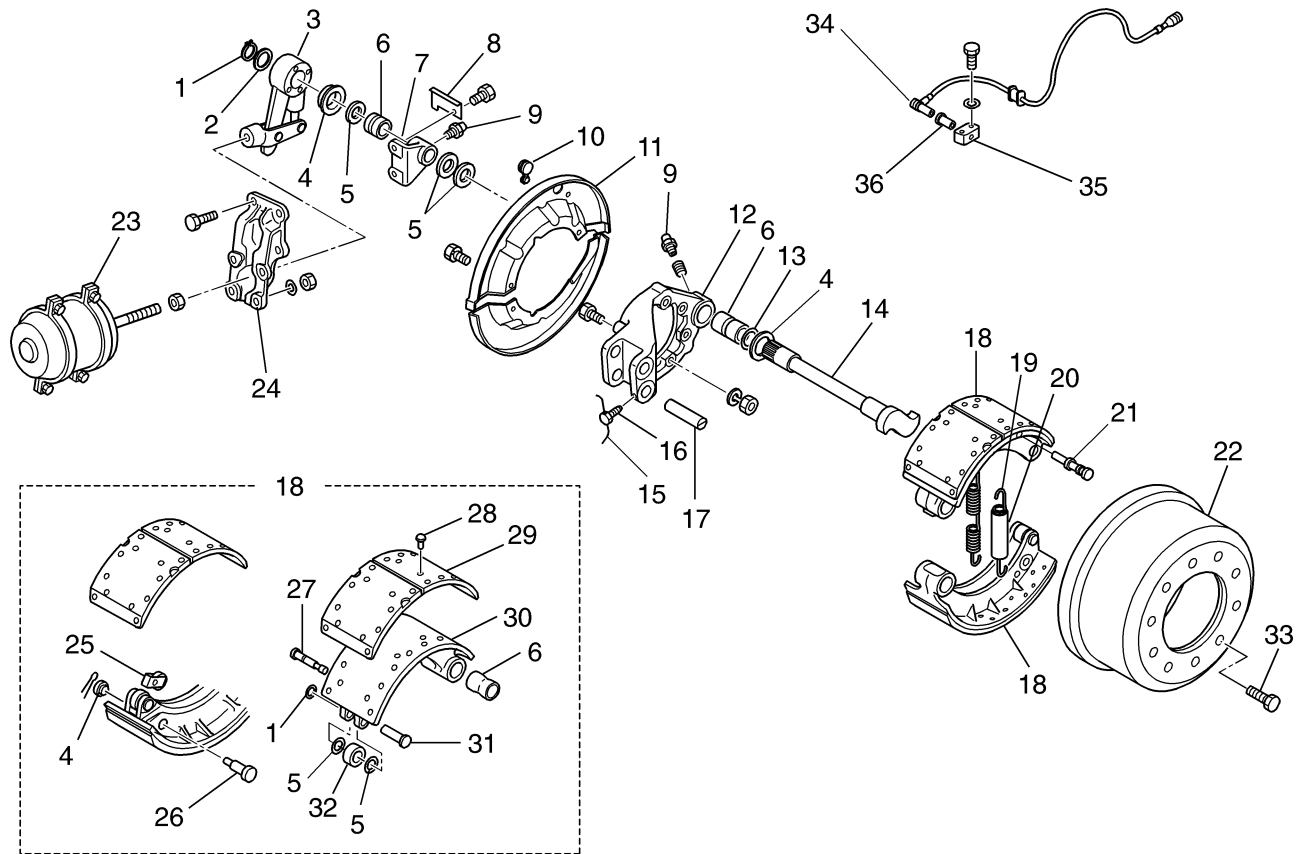
CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: [www.heydownloads.com](http://www.heydownloads.com) by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL



**REAR WHEEL BRAKE**

- |                                      |                                     |
|--------------------------------------|-------------------------------------|
| 1. Retainer ring                     | 19. Return spring                   |
| 2. Thrust washer                     | 20. Cover                           |
| 3. Automatic slack adjuster assembly | 21. Spring pin                      |
| 4. Collar                            | 22. Brake drum                      |
| 5. Oil seal                          | 23. Brake chamber with spring brake |
| 6. Bushing                           | 24. Chamber bracket                 |
| 7. Cam shaft bracket                 | 25. Spring hanger                   |
| 8. Bearing protector                 | 26. Pivot pin                       |
| 9. Lubrication fitting               | 27. Spring pin                      |
| 10. Plug                             | 28. Rivet                           |
| 11. Drum cover                       | 29. Brake lining                    |
| 12. Brake spider                     | 30. Brake shoe                      |
| 13. O-ring                           | 31. Roller pin                      |
| 14. Cam shaft                        | 32. Roller                          |
| 15. Wire                             | 33. Brake drum set bolt             |
| 16. Set screw                        | 34. ABS sensor                      |
| 17. Anchor pin                       | 35. ABS sensor holder               |
| 18. Brake shoe assembly              | 36. Clamping bush                   |

Fig. 2

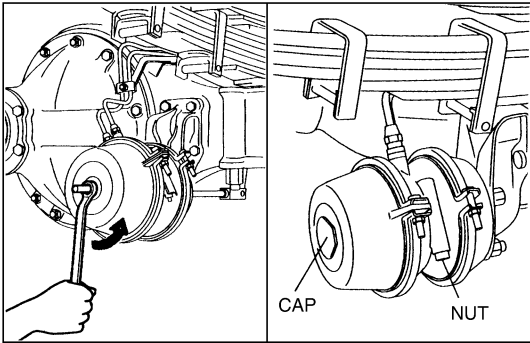


Fig. 43 SM13-787 Fig. 44 SM13-785

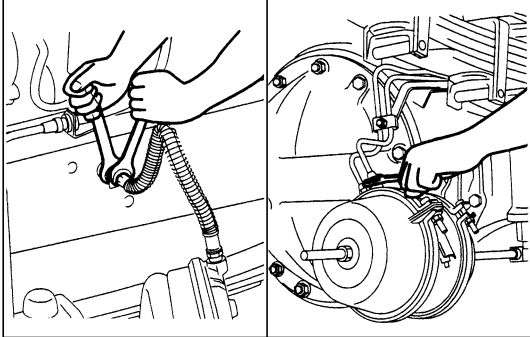


Fig. 45 SM13-790 Fig. 46 SM13-791

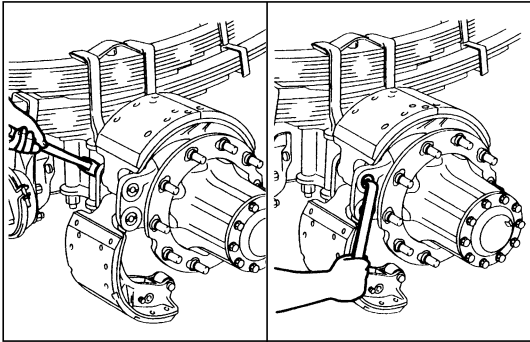


Fig. 47 SM13-814 Fig. 48 SM13-815

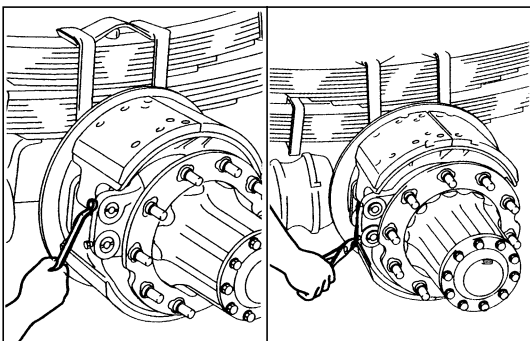


Fig. 49 SM13-780 Fig. 50 SM13-779

**NOTE:** After connecting the brake chamber and slack adjuster, turn the spring brake release stud assembly nut counterclockwise fully to release the spring of the spring brake chamber, then install the cap and release stud assembly for their home positions. (REAR WHEEL).

5. Connect the air pipe to the brake chamber.

**4. INSTALL THE BRAKE SHOE ASSEMBLY.**

**NOTE:** Brake shoe assembly can be replaced with the wheel hub remaining installed.

1. Install the brake shoe and anchor pin, and using the special tool, align the set screw holes of the pin and of the brake spider.

**NOTE:** Apply adequate amount of heat resistance grease for the bushing of the brake shoe.

**Heat resistance grease: Refer to RECOMMENDED LUBRICANTS LIST.**

**Special Tool: Anchor Pin Tool (09684-1010)**

2. Tighten the set screw to fix the anchor pin and the brake spider then lock the set screws with a wire.

**NOTE:** Apply adequate amount of molybdenum grease for the set screw.

**Molybdenum grease: 04135-1010**

**Tig kitening Torque: 200-300 kg·cm (15-21 lb·ft)**

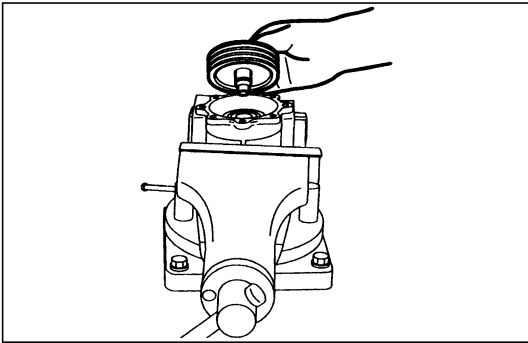


Fig. 11 SM13-831

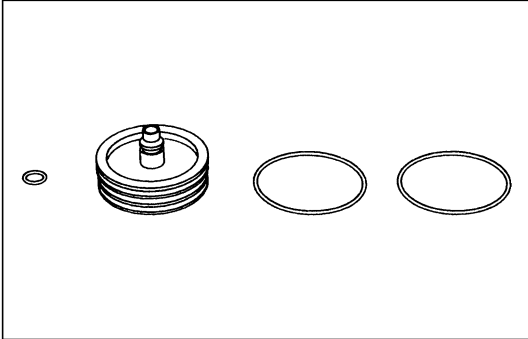


Fig. 12 SM13-832

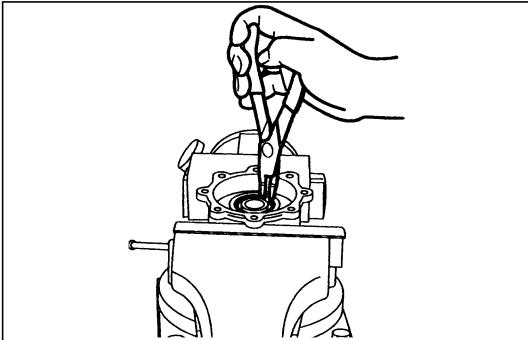


Fig. 13 SM13-833

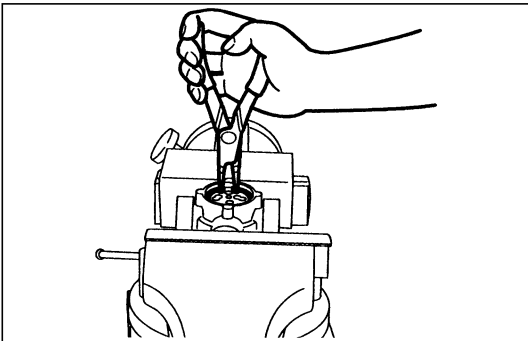


Fig. 14 SM13-834

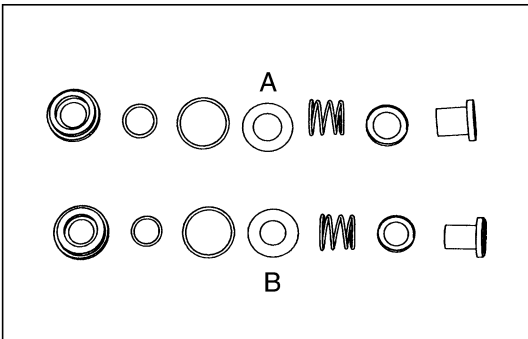


Fig. 15 SM13-835

8. Remove the return spring and secondary piston assembly.

9. Disassemble the secondary piston assembly.

10. Remove the retainer ring, then remove the primary feed valve retainer and primary feed valve assembly.

**WARNING**

The retainer ring is spring steel and may pop out, wear safety glasses to protect your eyes.

11. Remove the check valve and retainer ring, then remove the valve seat, secondary feed valve retainer and secondary feed valve assembly.

**WARNING**

The retainer ring is spring steel and may pop out, wear safety glasses to protect your eyes.

12. Disassemble the primary and secondary feed valve assembly.

**A: Primary**  
**B: Secondary**

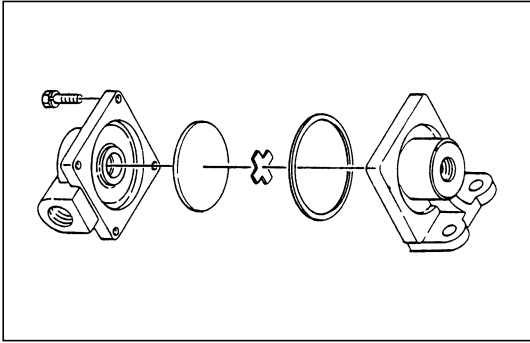


Fig. 7

1. **ASSEMBLE THE QUICK RELEASE VALVE ASSEMBLY.**  
**NOTE:** Align the aligning mark which was applied at disassembly.

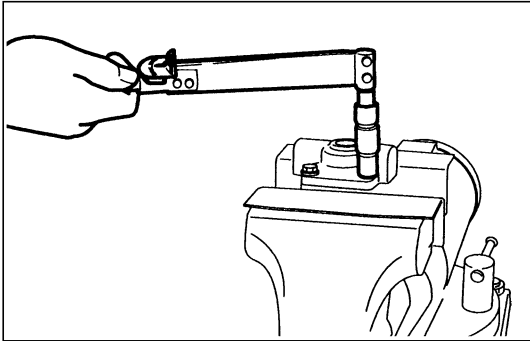


Fig. 8

SM13-854

2. **TIGHTEN THE BOLTS FOR COVER.**  
**Tightening Torque: 50–60 kg-cm (3.7–4.3 lb-ft)**

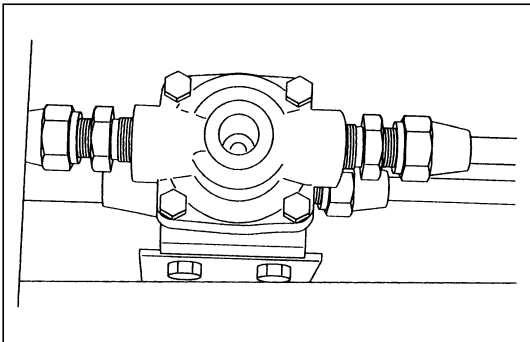


Fig. 9

SM13-851

## INSTALLATION

1. **MOUNT THE QUICK RELEASE VALVE ASSEMBLY.**
  1. Install the valve to the front end cross member and connect the pipes.**Tightening Torque: 190–260 kg-cm (14–18 lb-ft)**

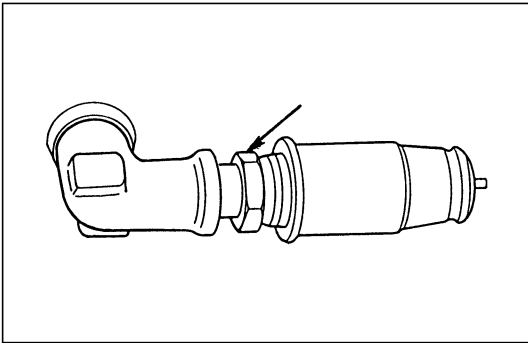


Fig. 2 13-637

**REMOVAL**

1. DISMOUNT THE SAFETY VALVE ASSEMBLY.

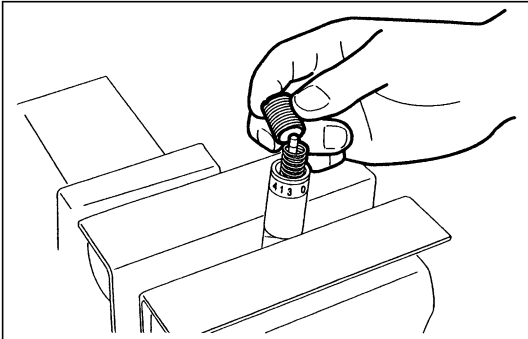


Fig. 3 SM13-860

**DISASSEMBLY**

1. REMOVE THE LOCK NUT AND ADJUSTING SCREW.

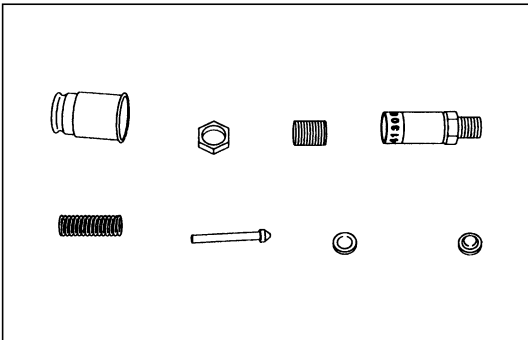


Fig. 4 SM13-861

2. DISASSEMBLE THE SAFETY VALVE.

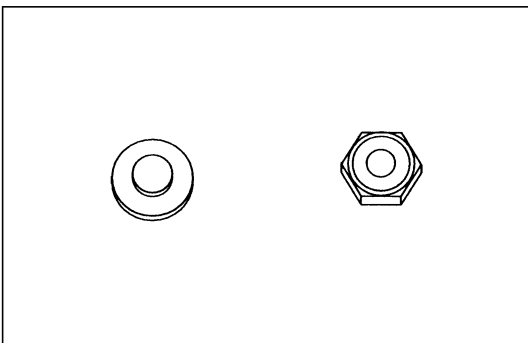


Fig. 5 SM13-862

**INSPECTION**

**NOTE:** Before inspecting the parts, clean them with isopropyl alcohol.

1. VALVE AND VALVE SEAT

1. Inspect the valve seat for wear or any other damage.

2. COMPRESSION SPRING

1. Inspect the spring for rust and damage, and measure the free length, setting length and setting load.

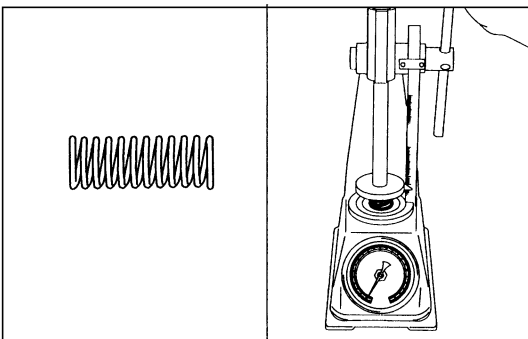


Fig. 6 SM13-863 SM13-837

Free length	34.0 mm (1.339 in.)
Setting length	24.0 mm (0.945 in.)
Setting load	5.6 – 6.2 kg (12.346 – 13.668 lb)

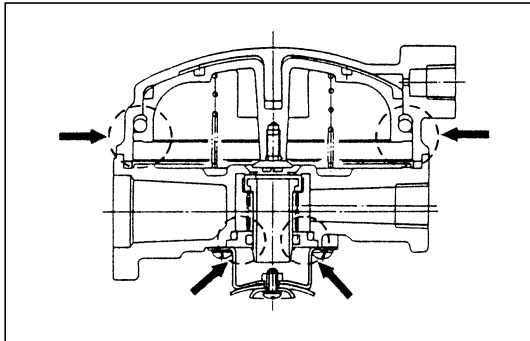


Fig. 12

SM13-309

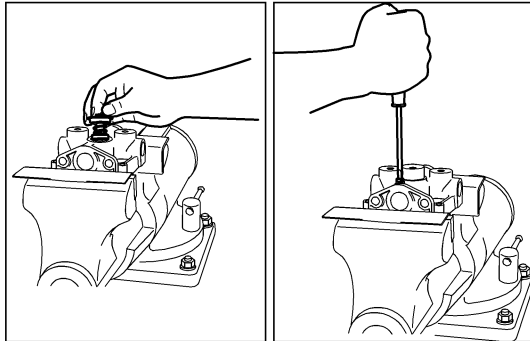


Fig. 13

SM13-1196

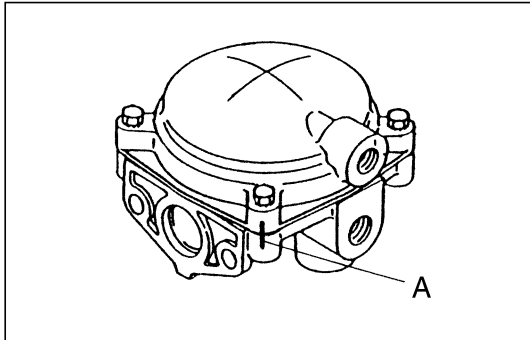


Fig. 14

SM13-1193

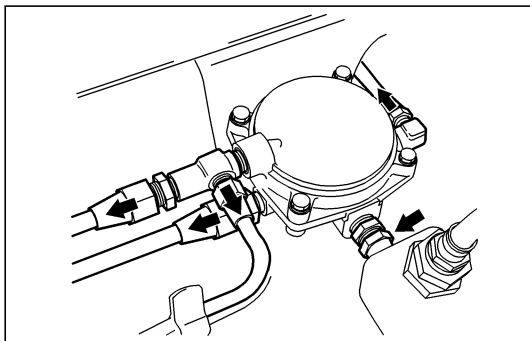


Fig. 15

SM13-1192

## ASSEMBLY

- NOTE:**
- When assembling the relay valve, be sure to use new O-ring and valves.
  - Apply silicone grease to the each sliding surface of the assembly parts.
  - The O-ring and valves of relay valve are items to be replaced periodically. Replace them every year.

1. ASSEMBLE THE FEED VALVE, SPRING SEAT, SPRING, O-RINGS AND VALVE CAP, AND FIX THEM WITH THE RETAINER RING, THEN PLACE IT INTO THE VALVE BODY.
2. INSTALL THE CHECK VALVE AND PLATE TO THE DUST COVER, AND INSTALL THEM TO THE VALVE BODY.
3. INSERT THE PISTON WITH A O-RING INTO THE COVER, THEN PLACE THE SPRING AND THE COVER ASSEMBLY ON THE VALVE BODY.
4. COINCIDE THE ALIGNING MARK "A" WHICH WAS APPLIED AT DISASSEMBLY. THEN TIGHTEN THE BOLTS.  
Tightening Torque: 90–120 kg·cm (6.6–8.6 lb·ft)

## INSTALLATION

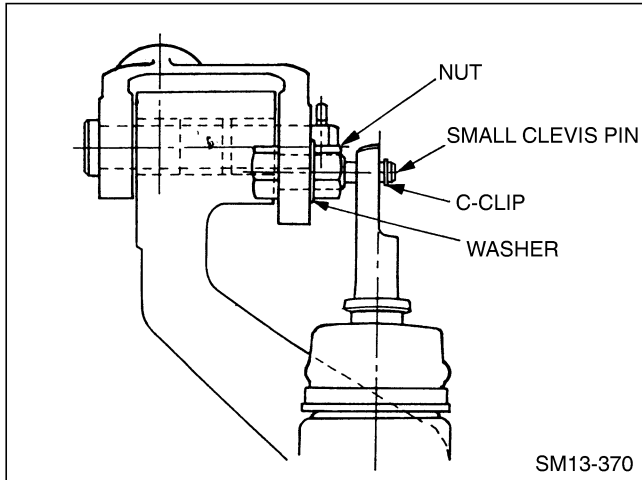
1. MOUNT THE RELAY VALVE TO THE FRAME.
2. CONNECT THE AIR PIPES AND HOSES WITH THE VALVE.

Out-of-order	Cause	Corrective Action
Inside of air dryer is frozen	1. Installation of dryer body is not proper and temperature of dryer will reduce to -30°C or less during cold run.	1. Either alter the installing position or install a hood to prevent wind.
	2. Because of defect of heater, it dose not function.	2. Whether heater fails or not, determine it through checking the conduction with a testar. If so, replace it.
	3. Because of defect of thermostat, heater dose not function.	3. Confirmation should be made: (a) Leave it in temp. of less than -0°C and see the conduction with a tester; (b) Surround the thermostat with palm and confirm OFF. If so, replace the thrmostat.
	4. Ice/snow sticks on air dryer body and this reduces temperature extraordinarily.	4. Carefully remove ice/snow so as not to hurt air dryer body and wiring
	5. Because of disconnection of wiring to heater and thermostat, heater does not function.	5. Reconnection of wiring to heater and thermostat should be made properly.
Air leaks from drain valve	1. Because foreign materials were caught in the valve, the valve is not seated correctly.	1. Disassemble and inspect the valve body portion; either replace the valve or, when the rubbing siface of valve body is hurt, replace valve body comp.
Pressure in main tank reduces extraordinarily	1. When air compressor is at unloaded condition, if the check valve between main tank and purge chamber does not perform its original role, dry air in the main tank will counterflow and be exhausted from air dryer.	1. Disassemble and inspect the check valve and replace it, if necessary.

- E. Next, pull out the actuator rod until hole in top of rod is aligned with small hole in clevis. Insert small clevis pin and retain with small cotter pin or C-clip.

**NOTE:** Small clevis pins and actuator rods for front axle adjusters are installed as shown below.

**Nut Tightening Torque:** 320 – 460 kg-cm  
(24 – 33 lb-ft)



- F. If pawl assembly was loosened or removed, reinstall into slack housing. Tighten capscrew to 15 – 20 lb-ft. torque.

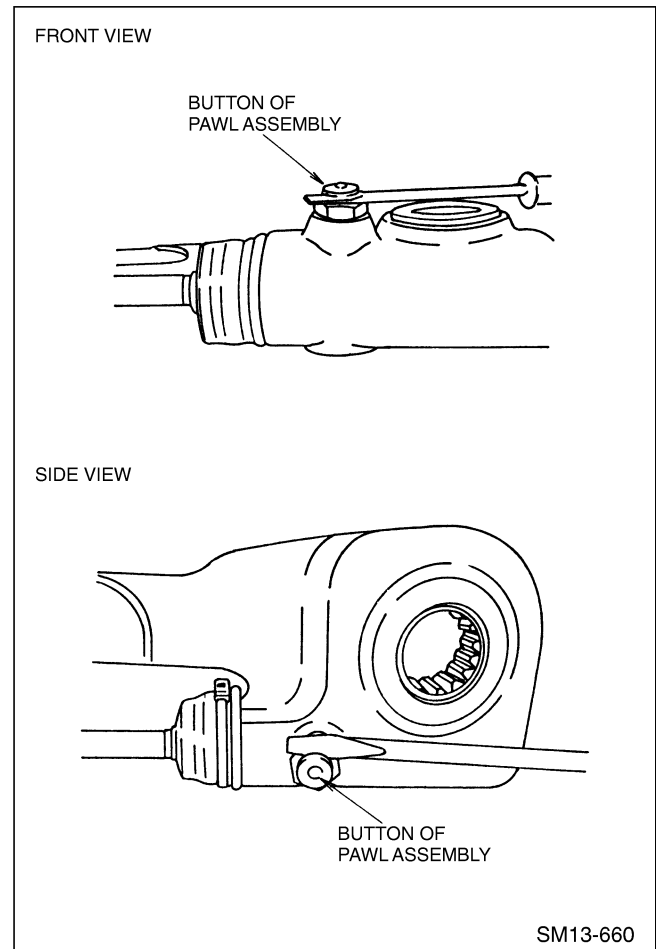
### BRAKE ADJUSTMENT

One initial adjustment is necessary on each brake employing the automatic slack adjuster before putting the vehicle into service. However, before making the adjustment, check for proper clearance and operation of each new automatic slack installed. Apply brakes and allow air chambers to bottom at maximum stroke. Clearance must exist between the slack and all adjacent chassis components such as axle housing, suspension brackets, etc.

Release brakes and observe that the slack manual adjusting nut rotates counter-clockwise as chamber returns to off position.

- A. For installation, adjustment or “backing off” the brakes, use a screwdriver to lift the button on the pawl assembly as shown in figure. Lift the button at least 1/32 inch to disengage the pawl from the actuator and turn the adjusting nut on the stack adjuster in the required direction. When finished, remove the screwdriver to engage the pawl.

**NOTE:** If the button is not lifted when the adjusting nut is turned, the pawl adjuster will be damaged.



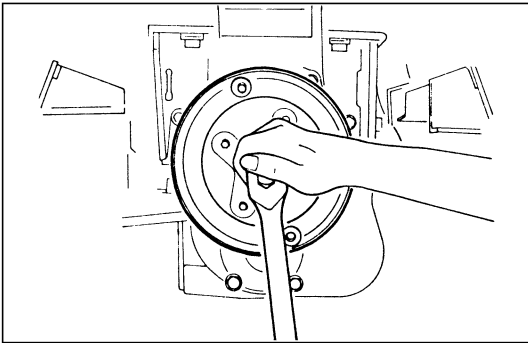


Fig. 4 SMTM-518

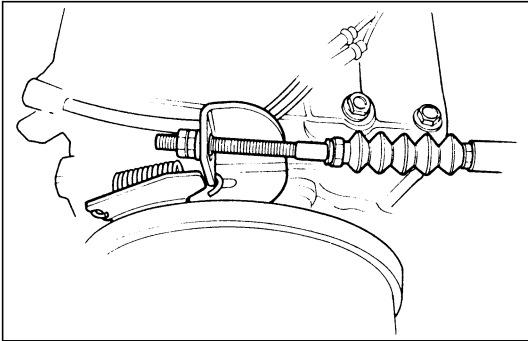


Fig. 5 SM14-172

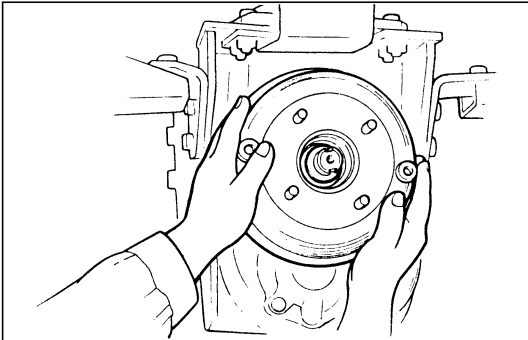


Fig. 6 SM14-148

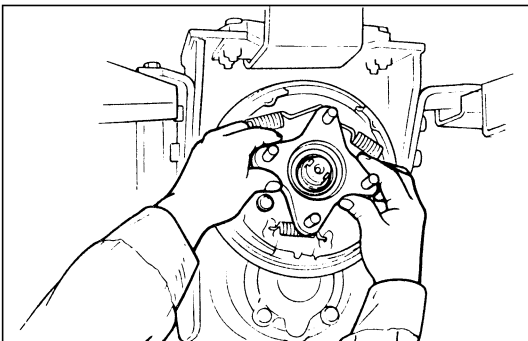


Fig. 7 SM14-149

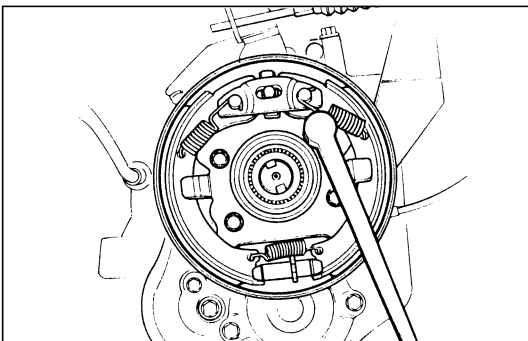


Fig. 8 SM14-185

3. Loosen the lock nut with the socket wrench and handle, after pulling the parking lever.
4. Disconnect the parking brake cable from the brake lever.
5. Remove the parking brake drum.
6. Remove the flange coupling.
7. Loosen the four fitting nuts for parking brake anchor plate and then take out the brake assembly with anchor plate.

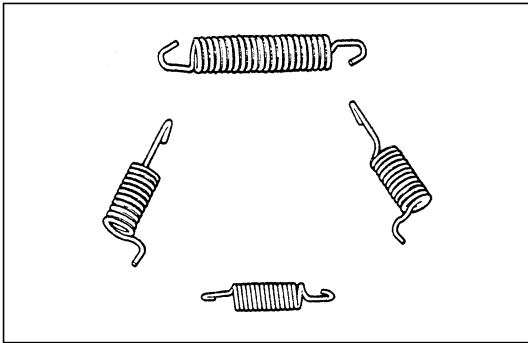


Fig. 23

SM14-137

## 6. Springs

Check each spring for elastic strength and inspect it for mechanical damage. The assembly standard of each spring is as follows.

### Adjusting spring

**setting length:** 74.0 mm (2.913 in.)

**setting load:**  $12 \pm 1.2$  kg (26.46  $\pm$  2.64 lb)

### Shoe return spring

**setting length:** 75.2 mm (2.961 in.)

**setting load:**  $18.5 \pm 1.9$  kg (40.79  $\pm$  4.18 lb)

### Lever return spring

**setting length:** 137 mm (5.394 in.)

**setting load:**  $16.4 \pm 1.6$  kg (36.16  $\pm$  3.52 lb)

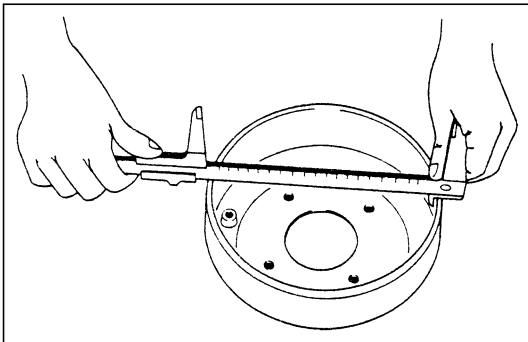


Fig. 24

SM14-067

## 7. Parking brake drum

Cracks, wear, out-of-round and burns are the items to be inspected and checked on the parking brake drum. Observe the following reference values. A drum in too bad a condition to repair must be replaced.

- a. Check the parking brake drum for inside diameter.

**Standard:** 254 mm (10.00 in.)

**Service Limit:** 256 mm (10.07 in.)

- b. Check the parking brake drum for runout.

**Standard:** 0 – 0.1 mm (0 – 0.004 in.)

**Repair Limit:** 0.2 mm (0.008 in.)

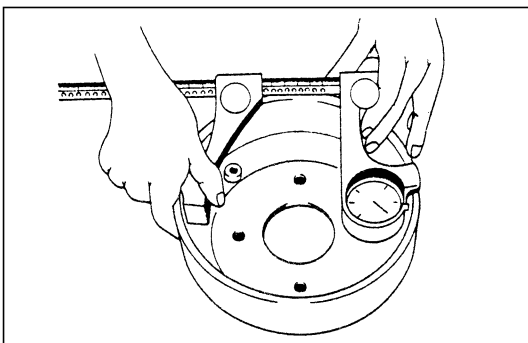


Fig. 25

SM14-068

# CHAPTER 16

## WHEELS AND TIRES

Models FA, FB, FD, FE and SG

TROUBLESHOOTING .....	16- 2
SPECIAL TOOL .....	16- 5
SAFETY PRECAUTIONS .....	16- 7
REMOVAL OF WHEEL AND TIRE .....	16- 8
DISASSEMBLY AND ASSEMBLY .....	16- 9
TIRE LOAD LIMITS AT VARIOUS COLD INFLATION PRESSURES .....	16-11
INSPECTION .....	16-15
INSTALLATION OF WHEEL AND TIRE .....	16-16

RADIAL PLY  
 LIGHT TRUCK METRIC TIRES  
 FOR TRUCKS, BUSES, TRAILERS AND MULTIPURPOSE PASSENGER VEHICLES  
 USED IN NORMAL HIGHWAY SERVICE  
 TIRES MOUNTED ON 5° DROP CENTER RIMS  
 TIRE AND RIM ASSOCIATION STANDARD

DUAL (D)      SINGLE (S)

TIRE SIZE DESIGNATION		TIRE LOAD LIMITS (LBS.) AT VARIOUS COLD INFLATION PRESSURES (PSI) (The pressure is minimum for the load)									
		35	40	45	50	55	60	65	70	75	80
215/85R16	D	1360	1490	1625	<b>1765 (C)</b>	1865	1985	<b>2150 (D)</b>	2210	2320	<b>2470 (E)</b>
	S	1495	1640	1785	<b>1940 (C)</b>	2050	2180	<b>2335 (D)</b>	2430	2550	<b>2680 (E)</b>

**NOTE: Bold face figures show maximum recommended load (LBS.)**

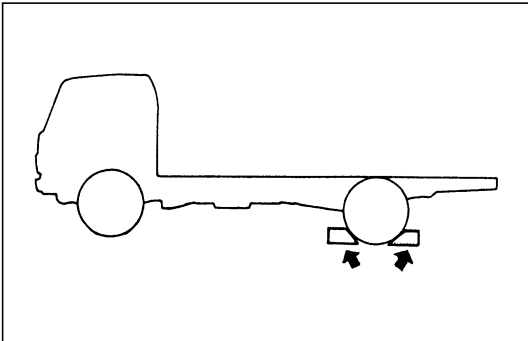


Fig. 17-1-2

SM17-087A

## REMOVAL OF FRONT LEAF SPRINGS

1. BE SURE TO BLOCK THE REAR WHEELS.

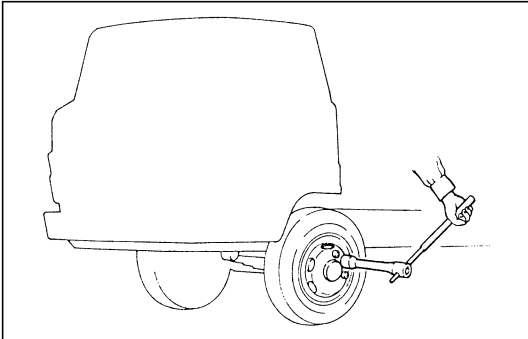


Fig. 17-1-3

SM17-121

2. USING A SOCKET WRENCH, LOOSEN THE WHEEL NUTS A LITTLE.

Clean off any rust or dirt on the hub bolts with a wire brush, before loosening the wheel nuts.

**NOTE:** ○ Do not remove the wheel nuts, but leave them loosened.

- Hub bolts and wheel nuts on the right side of the truck have right-hand threads, and hub bolts and wheel nuts on the left side of the truck have left-hand threads.

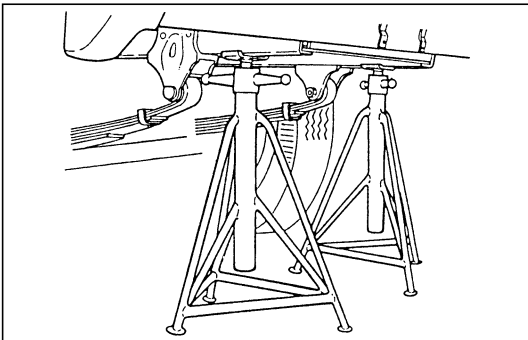


Fig. 17-1-4

SM17-280

3. JACK UP THE FRONT AXLE AND SUPPORT THE FRAME WITH STANDS.

### WARNING

When jacking up the front axle, make sure that the jack is correctly placed to the axle, and then lift up the axle. Do not get under the vehicle when it is supported by a jack only. It is very dangerous because the jack might slip. Use safety stands which have sufficient strength and stability to support the truck whenever you need to work under it.

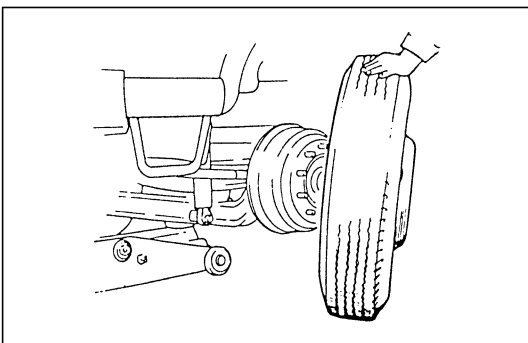


Fig. 17-1-5

SM17-267

4. REMOVE THE WHEEL NUTS AND REMOVE THE TIRE.

**NOTE:** When removing the wheels, do not damage the hub bolt threads.

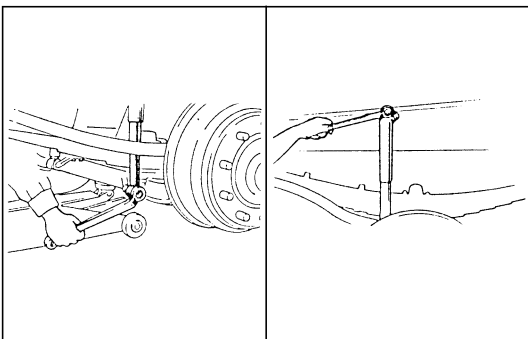


Fig. 17-1-6

SM17-268

SM17-094

5. REMOVE THE SHOCK ABSORBER.

1. Disconnect the shock absorber from the shock absorber pin.
2. Disconnect the shock absorber from the upper bracket.
3. Remove the shock absorber pin.

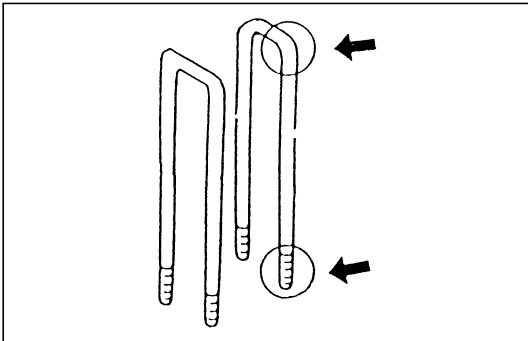


Fig. 17-2-10

SM17-265

## INSPECTION

1. INSPECT THE U-BOLTS FOR WEAR OR DAMAGE.

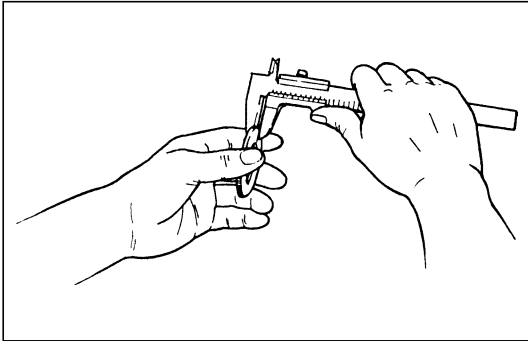


Fig. 17-2-11

SM17-059

2. MEASURE THE WEAR OF THE THRUST WASHERS.

Using vernier calipers, measure the thickness of the thrust washer.

If the measurement is less than the service limit, replace the thrust washer.

**Assembly Standard : 3.0 mm (0.118 in.)**

**Service Limit : 2.5 mm (0.098 in.)**

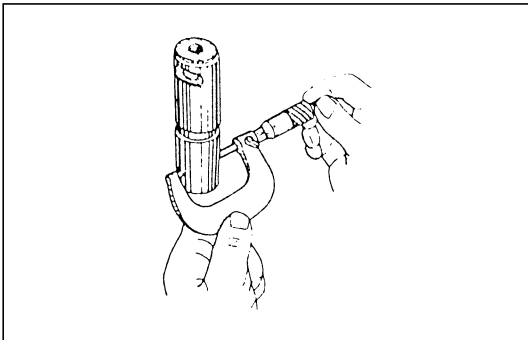


Fig. 17-2-12

SM17-076

3. MEASURE THE CLEARANCE BETWEEN THE SPRING PIN AND THE EYE BUSHING.

1. Using micrometer, measure the outer diameter of the spring pin.

If the measurement is less than the service limit, replace the spring pin.

**Assembly Standard : 30 mm (1.181 in.)**

**Service Limit : 29.7 mm (1.169 in.)**

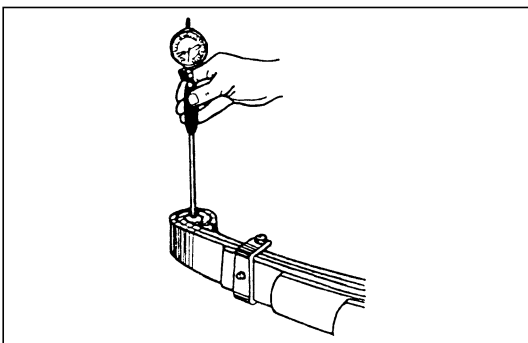


Fig. 17-2-13

SM17-075

2. Using an inside dial indicator, measure the inside diameter of the eye bushing.

If the clearance between the spring pin and the eye bushing is greater than the service limit, replace the spring pin and/or eye bushing.

**Assembly Standard : 0.02 – 0.125 mm  
(0.0008 – 0.049 in.)**

**Service Limit : 0.50 mm (0.0196 in.)**

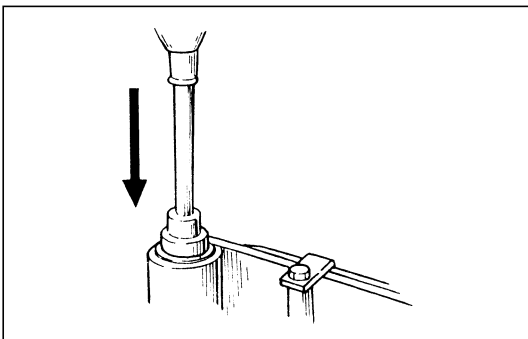


Fig. 17-2-14

SM17-067

## REPLACEMENT OF THE EYE BUSHING

1. USING A SOCKET WRENCH, PRESS OUT THE OLD EYE BUSHING.
2. USING A SOCKET WRENCH, PRESS IN THE NEW EYE BUSHING.

5. Remove the leaf spring.

**WARNING**

- The leaf spring assembly is heavy, weighing about 58 kg (127.9 lb). When removing, be careful not to drop it on your feet.
- To assure safety, do this operation with more than two persons.

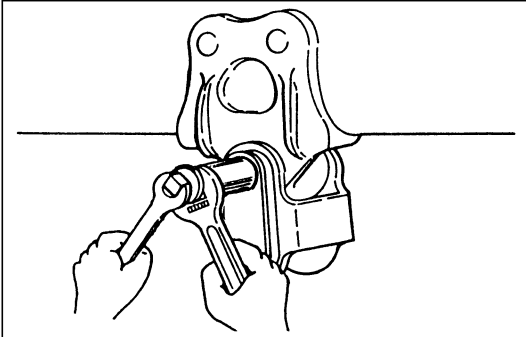


Fig. 17-1-10

SM17-564

6. Remove the shackle.

Using a special tool, remove the spring pin, thrust washers and shackle from the spring bracket.

**Special Tool: Pulley ass'y (09650-2040)**

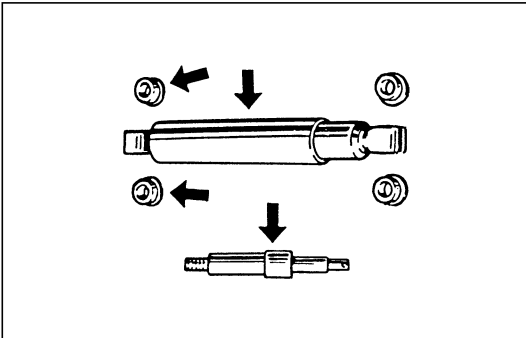


Fig. 17-1-11

SM17-097

## INSPECTION

### 1. INSPECT THE SHOCK ABSORBER.

1. Inspect the shock absorber, shock absorber pin, and cushions for wear or clamage.
2. Inspect the shock absorber function.

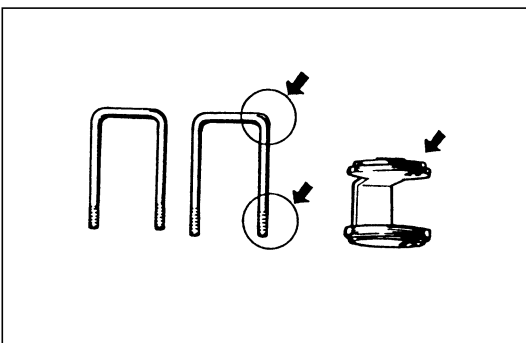


Fig. 17-1-12

SM17-098B

### 2. INSPECT THE U-BOLTS AND SHACKLE FOR WEAR OR DAMAGE.

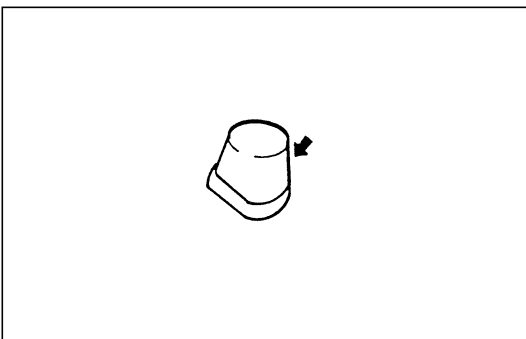


Fig. 17-1-13

SM17-098B

### 3. INSPECT THE SPRING BUMPER FOR DAMAGE.

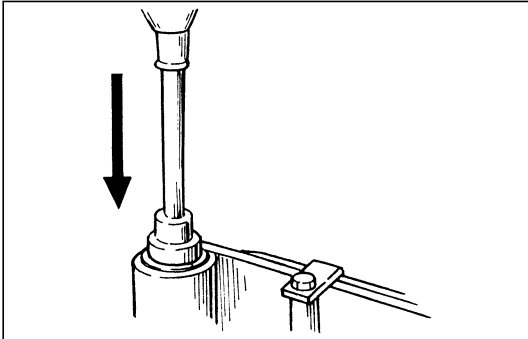


Fig. 17-2-14

SM17-067

## REPLACEMENT OF THE EYE BUSHING

1. USING A SOCKET WRENCH, PRESS OUT THE OLD EYE BUSHING.
2. USING A SOCKET WRENCH, PRESS IN THE NEW EYE BUSHING.

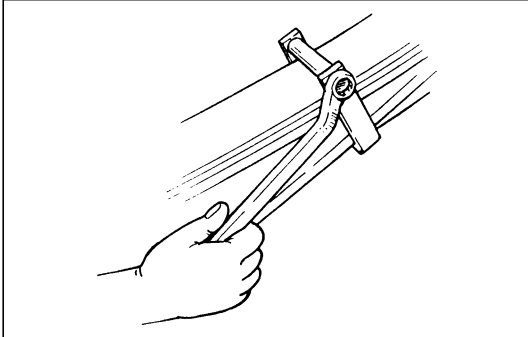


Fig. 17-2-15

SM17-068

## REPLACEMENT OF LEAVES

1. REMOVE THE CLIP BOLTS AND COLLARS.

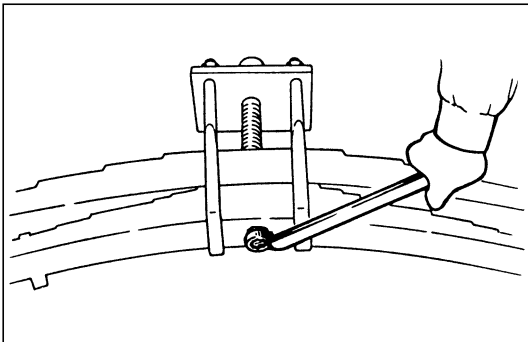


Fig. 17-2-16

SM17-115

2. REMOVE THE CENTER BOLT.

### WARNING

When removing the center bolt lock nut, spring leaves may jump. Care should be taken to avoid possible personal injury. It is recommendable to use a vise or an arbor press for holding the leaf spring in place while disassembling.

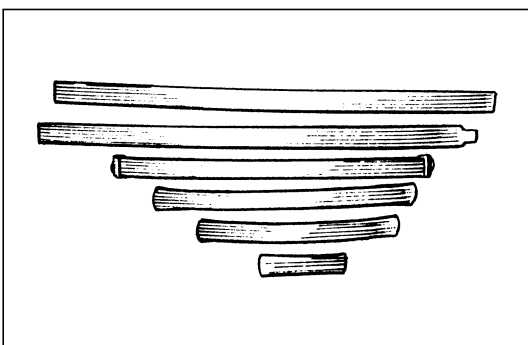


Fig. 17-2-17

SM17-116

3. INSPECT THE LEAVES FOR CRACKS OR OTHER DAMAGE.

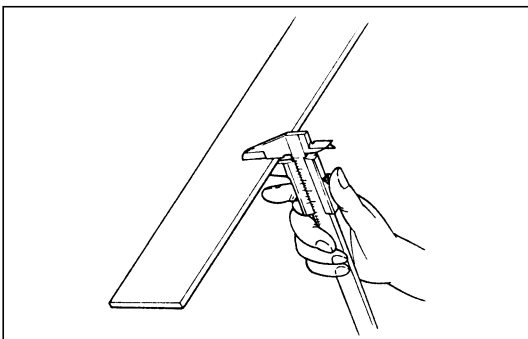


Fig. 17-2-18

SM17-074

4. MEASURE THE WEAR OF THE LEAVES.

Using vernier calipers, measure the wear of the leaves. If the wear is more than 15% of the specified leaf thickness, replace the leaf.

**Specified leaf thicknesses:** 10 mm (0.39 in.), 11 mm (0.43 in.) and 12 mm (0.47 in.)

**WARNING**

- **Perform the electric welding after conforming the following procedures, as it may occur that the reverse current come from the ground line drivers electronic instruments to malfunctions.**
  - 1) Set the starter switch to [OFF] position.**
  - 2) Be sure to disconnect the negative terminal of the battery cable.**
  - 3) Be sure to ground of the welder to the place near the welding spots.**
- **Be sure to cover the piping lines, harnesses, rubber (resin) parts, fuel tank, and the like with the fireproofing sheets, it the above parts locate around the welding spots.**
- **Heat up to the welding area by using a burner, soon after performing the welding, and then leave them as they are.**

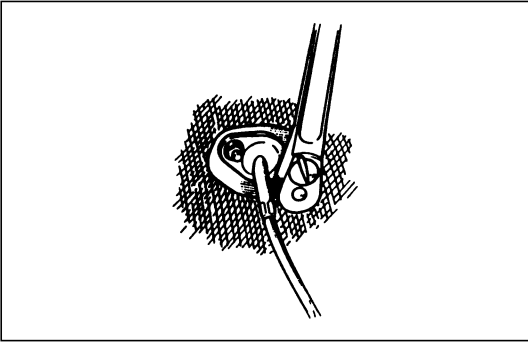


Fig. 13

SM19-209

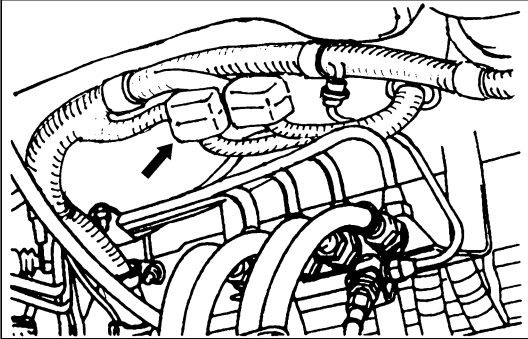


Fig. 14

ASM19-018

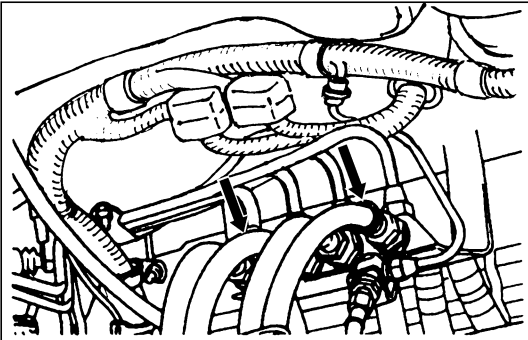


Fig. 15

ASM19-019

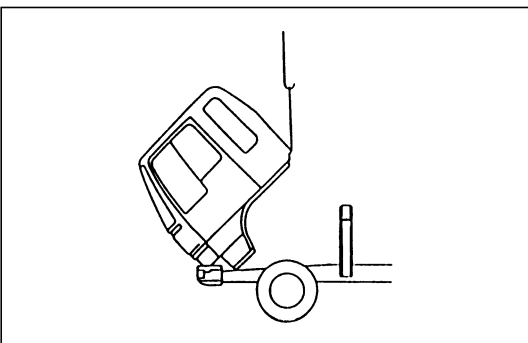


Fig. 16

SM19-512

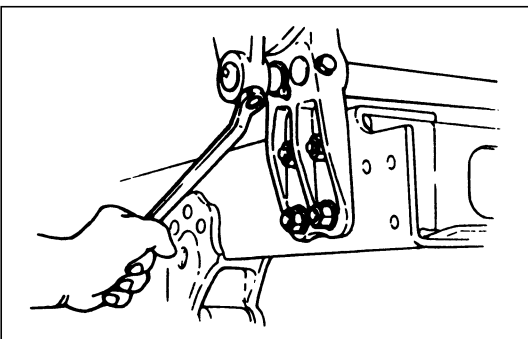


Fig. 17

SM19-217A

- PARKING BRAKE CABLE (For models FD and FE)  
After removing the fixture bracket, remove the clip band which fixes the cable to the cab, bundle the cable and tie it to the chassis.
  - WIRING HARNESS  
Disconnect all couplers of the wiring harness between the cab and chassis.
  - BRAKE AND CLUTCH  
Disconnect the air hoses and clutch line from the bracket on the lower front part of the cab.  
**NOTE: When disconnecting, clutch fluid will overflow, which can damage the paint surface of the cab.  
Collect the fluid in a container and then dispose of the fluid properly.**
6. Suspend the cab with crane or hoist in the position of the "Over-tilt" and fix the cab so it will not move.  
**NOTE: Removal of the anchor levers is dangerous if not performed properly. Be sure to follow instructions with care.**
  7. Loosen the set screws of both the left and right anchor levers, and pull out the anchor levers from the torsion bars.

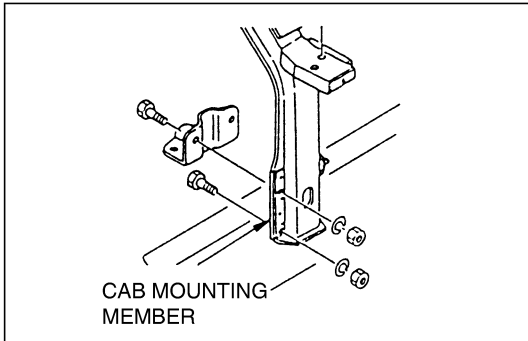


Fig. 49

SM19-528

## INSPECTION OF THE CAB MOUNTING MEMBER

1. CHECK AND RETIGHTEN THE CAB MOUNTING MEMBER BOLTS.

Tightening Torque: 870 – 1,100 kg·cm (62 – 80 lb·ft)

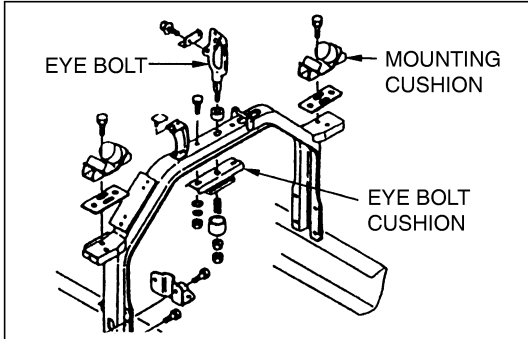


Fig. 50

SM19-528A

2. CHECK AND RETIGHTEN THE MOUNTING CUSHION AND EYE BOLT.

Tightening Torque:

Eye Bolt: 1,100 – 1,500 kg·cm (80 – 108 lb·ft)

Eye Bolt Cushion: 380 – 500 kg·cm (28 – 36 lb·ft)

Mounting Cushion: 380 – 500 kg·cm (28 – 36 lb·ft)

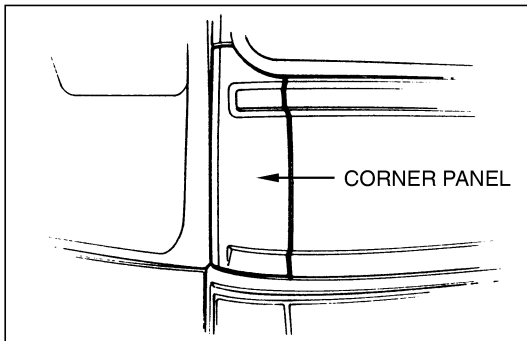


Fig. 17

SM19-475

## ADJUSTMENT OF THE DOOR HINGE

1. Remove the corner panel.
2. Make vertical and horizontal adjustments by loosening the bolts at the door side.  
Coat the hinges with chassis grease to prevent sticking or noise.
3. Make the fore and aft adjustments by loosening the hinge bolts at the body side.

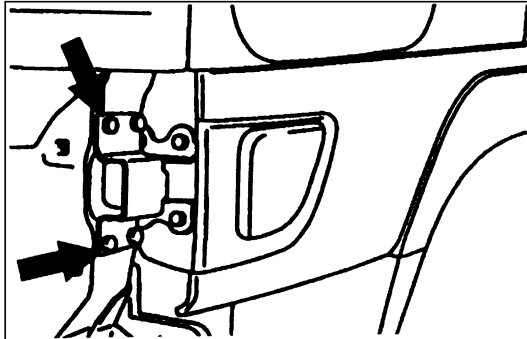


Fig. 18

SM19-684

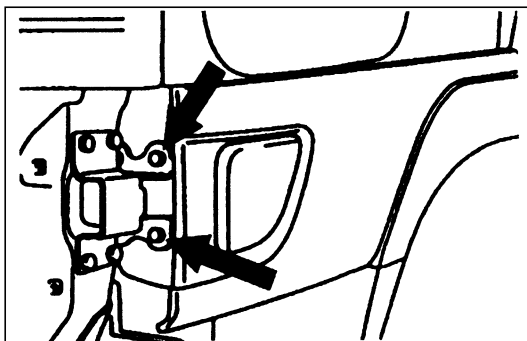


Fig. 19

SM19-685

## ADJUSTMENT OF THE DOOR LOCK STRIKER

1. Check the engagement between the door lock and the striker.
2. Make the top and bottom contact even.
3. Perform adjustment so that the outside of the door and the outside of the rear quarter panel are flush with each other.
4. After adjustment, properly tighten the bolts.

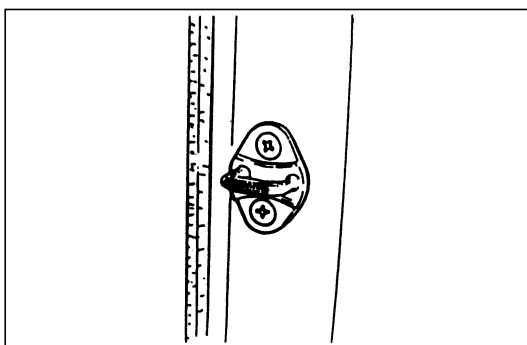


Fig. 20

SM19-178A

**NOTE:** When adjusting the door in the vertical direction, do not force it into alignment using the door lock striker.

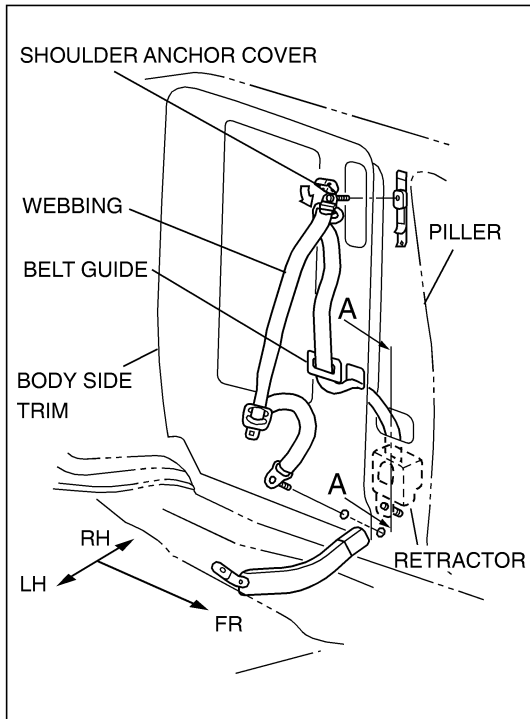


Fig. 25 SM19-780

## INSTALLATION OF THE SEAT BELT

### INNER BELT

Ensure that each anchor plate is fixed at the correct angle.

**Tightening Torque: 262 - 392 kg-cm (19 - 28 lb-ft)**

### OUTER BELT

1. After inserting the retractor through the pillar inner side, install the retractor.

**NOTE: When installing the retractor, ensure that the retractor anchor is securely inserted in the retractor positioning hole.**

2. Pull the belt out of the retractor upper hole inside the pillar.
3. Install the anchor plate.

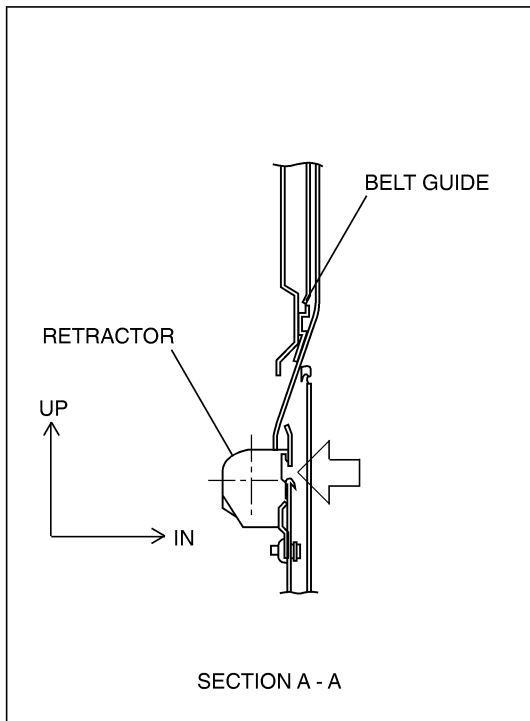


Fig. 26 SM19-781

# GENERAL INSTRUCTIONS

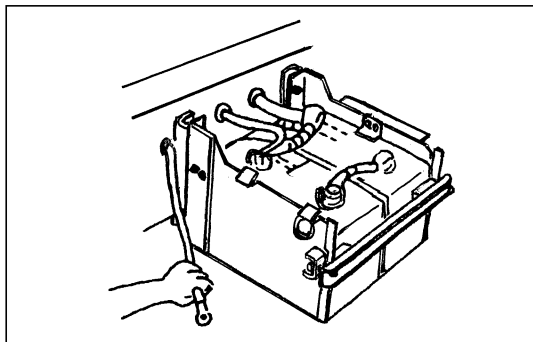


Fig. 1 ASM20-042

**WARNING**

Be sure to disconnect the cable from the negative (-) terminal of the battery before servicing the electrical circuits except for on-vehicle testing.

**NOTE:** If you use a high-pressure washer, do not direct the washer hose on the electrical parts. (Fig. 1 illustrates chassis model SG)

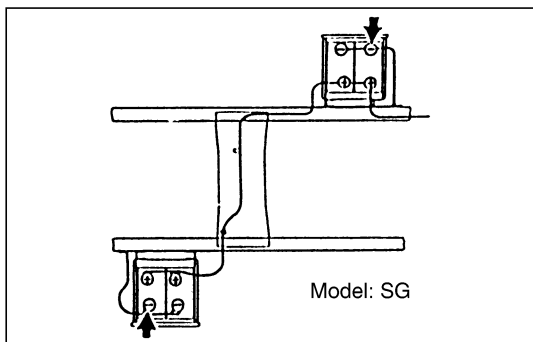


Fig. 2 SM20-1624

(If so equipped four batteries)

**NOTE:** When disconnecting the battery ground at the time of disconnect the electrical parts, both ground cables must be disconnected.

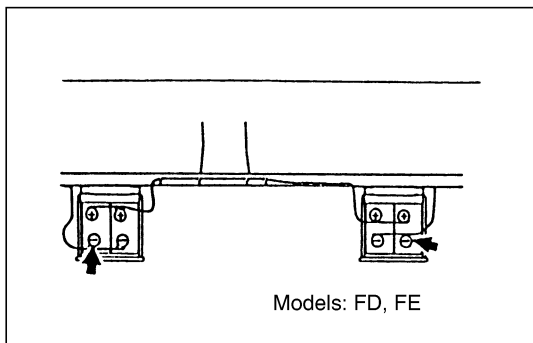


Fig. 3 SM20-2025

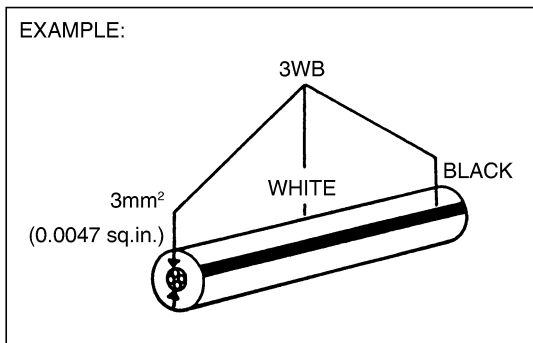


Fig. 4 SM20-340

## 1. WIRING COLOR CODE.

### Symbols

B - Black	G - Green	Gr - Gray
W - White	Y - Yellow	P - Pink
L - Blue	Br - Brown	V - Violet
R - Red	Lg - Light green	O - Orange

### Symbols consisting of two letters

First letter- Ground color  
 Second letter - Color of stripe

### Example

**WB ...** Indicates a black stripe on a white ground.

## BATTERY

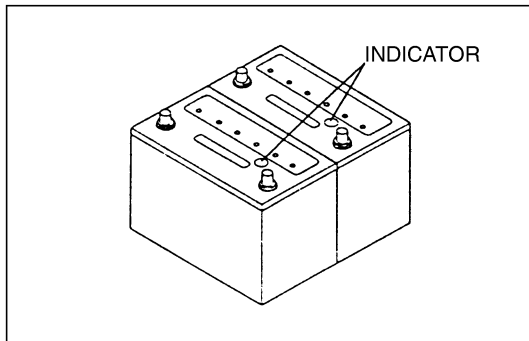


Fig. 1

### INSPECTION AND REPAIR

The indicator is located on the representative cell (2nd cell from the end) of each battery.

The indicator indicates whether the fluid level is correct or not. It also indicates whether the specific gravity of the electrolyte is over 1.15 in order to prevent excessive discharging.

Light blue ..... Specific gravity of electrolyte and level of electrolyte are both satisfactory.

White ..... Charge normally with a charging current of 4-5A until the indicator becomes light blue.

#### WARNING

- Since the batteries produce explosive hydrogen gas, do not allow any open or electric sparks near the batteries.
- The batteries produce explosive gas and contain corrosive sulfuric acid. A battery explosion, contact with electrolyte, or an electrical short can result in personal injury and/or property damage.
- Always shield your eyes or wear safety goggles when working on the batteries. Do not let electrolyte, which is sulfuric acid, come in contact with eyes, skin, or clothing. Since electrolyte is corrosive acid, it can damage skin and clothing. If acid should contact your skin, eyes or clothing, immediately flush the contact area thoroughly with water and get medical treatment immediately.
- When working on the batteries, be sure to remove any metal accessories from your arms. Do not lean over the batteries.
- This vehicle has a 12-volt, negative grounds system. Make sure that any other vehicle used for jump starting also has a 12-volt, negative ground system. Do not attempt to jump start when you are not sure of the voltage or ground of the other vehicle.

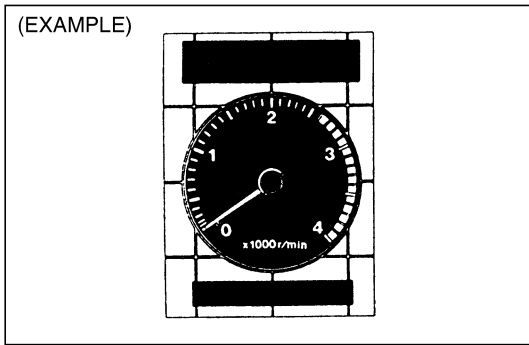


Fig. 3 SM20-1650

### Tachometer

**CHECK THE OPERATION OF THE TACHOMETER (ON-VEHICLE INSPECTION).**

1. Connect a calibrated test tachometer, and start the engine.
2. Compare the tester and tachometer indications. If error is excessive, replace the tachometer.

**NOTE:** ○ Do not reverse the connection of the tachometer because transistors and diodes inside will be damaged.

- When installing or removing the tachometer, be careful not to drop it or subject it to heavy shocks.

**Unit inspection**

Standard rpm		1,000 rpm	2,000 rpm
Allowable error	12V at 25°C (77°F)	±50 rpm	±100 rpm
	10 – 16V at 20 – 60°C (68 – 140°F)	±100 rpm	±200rpm

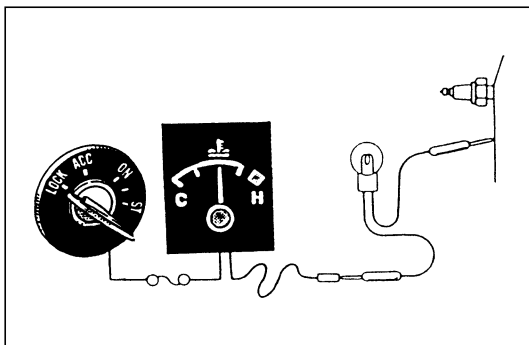


Fig. 4 SM20-2015

### Coolant Temperature Gauge

**1. CHECK THE OPERATION OF THE COOLANT TEMPERATURE GAUGE (ON-VEHICLE INSPECTION).**

1. Disconnect the connector from the temperature gauge unit and ground the terminal through a 12V, 6W bulb.
2. Turn the starter switch to “ON”. Check that the bulb lights after several seconds and the coolant temperature gauge pointer moves to the midway position. If indications are not correct, remove and test the coolant temperature gauge.

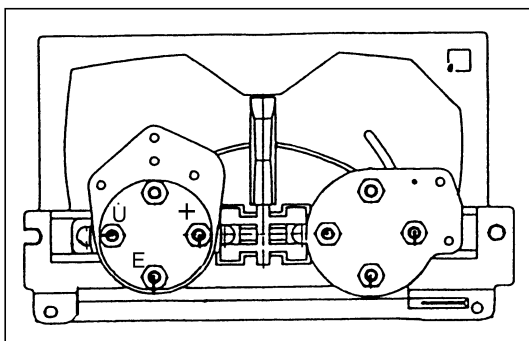


Fig. 5 SM20-1642

**2. CHECK THE OPERATION OF THE COOLANT TEMPERATURE GAUGE.**

Using an ohmmeter, measure the resistance between each terminal of the gauge.

If resistance is not within specifications, replace the gauge.

**Standard value ;**

Terminals	+ – E	U – E	+ – U
Resistance (Ω)	241.9±24	137.7±14	104.2±11

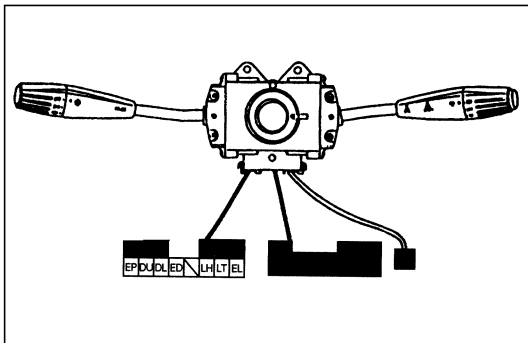


Fig. 2

SM20-1649

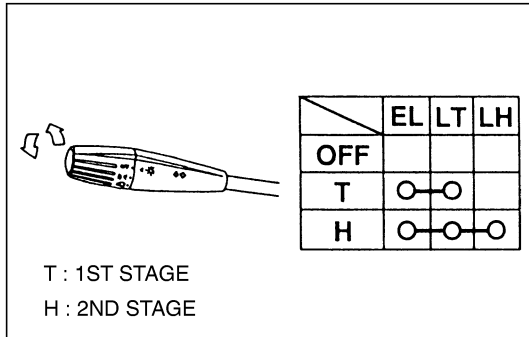


Fig. 3

SM20-1641E

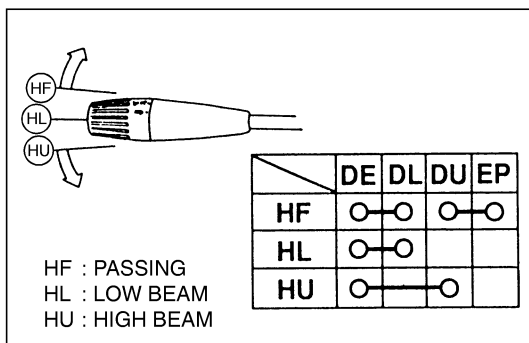


Fig. 4

SM20-1641F

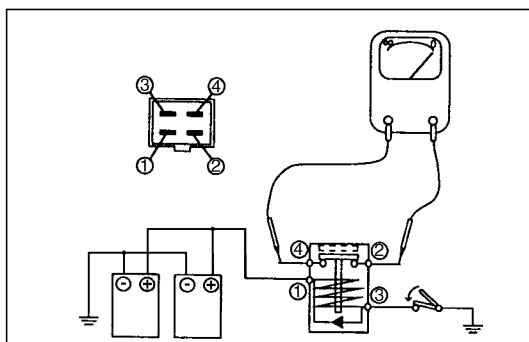


Fig. 5

SM20-1722

## INSPECTION

### 1. CHECK THE OPERATION OF THE LIGHTING SWITCH AND DIMMER SWITCH.

1. Disconnect the connectors.
2. Using an ohmmeter, check the continuity of the terminals in each switch position.

If there is no continuity between the switch terminals, replace the switch.

a. Lighting switch.

b. Dimmer switch.

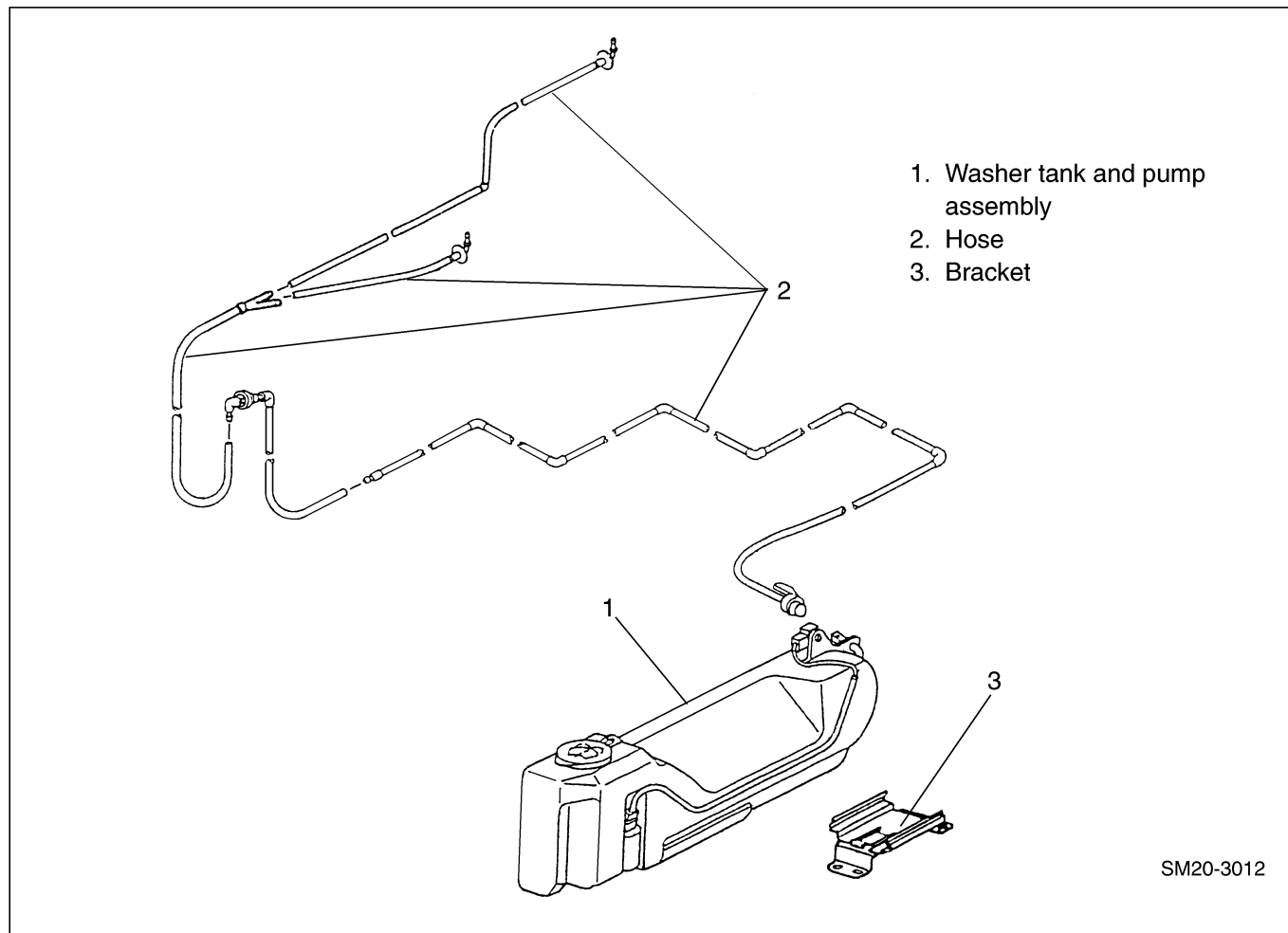
### 2. CHECK THE OPERATION OF THE HEAD LAMP RELAY (THE TAIL LAMP RELAY AND POWER RELAY CAN BE CHECKED IN THIS WAY AS WELL).

1. Remove the relay.
2. Using an ohmmeter, check that there is no continuity between terminals ④ and ② .
3. Apply 12V D.C. across terminals ① and ③ .

Using an ohmmeter, check that there is continuity between terminals ④ and ② .

If the relay does not operate, replace it.

# WINDSHIELD WASHER



- 1. Washer tank and pump assembly
- 2. Hose
- 3. Bracket

SM20-3012

Fig. 1

## TROUBLESHOOTING

<u>Symptom</u>	<u>Possible cause</u>	<u>Remedy</u>
Windshield washer does not function.	No fluid remaining in washer tank .....	Replenish tank with washer fluid.
	Fuse or fusible link blown out .....	Determine the cause and replace fuse or fusible link.
	Connectors for wiper switch or tank ..... are loose or rusted	Repair or replace.
	Wiper switch is defective .....	Replace.

## **INSTRUCTIONS FOR MECHANICAL RELEASE AND DIAPHRAGM REPLACEMENT OF ANCHORLOK SPRING BRAKES.**

### **WARNING**

**A spring brake contains a very powerful compression spring. Failure to comply with all of the following instructions may result in forceful release of the spring chamber and its contents which could cause death, severe personal injury and/or property damage.**

### **GENERAL INSTRUCTIONS**

If spring brake shows structural damage, do not cage compression spring. Remove spring brake from vehicle and replace with new unit.

If vehicle air pressure is used to aid in the caging process, do not tighten release stud nut more than finger tight. The air pressure must always be exhausted after the compression spring has been mechanically caged before any clamps are removed.

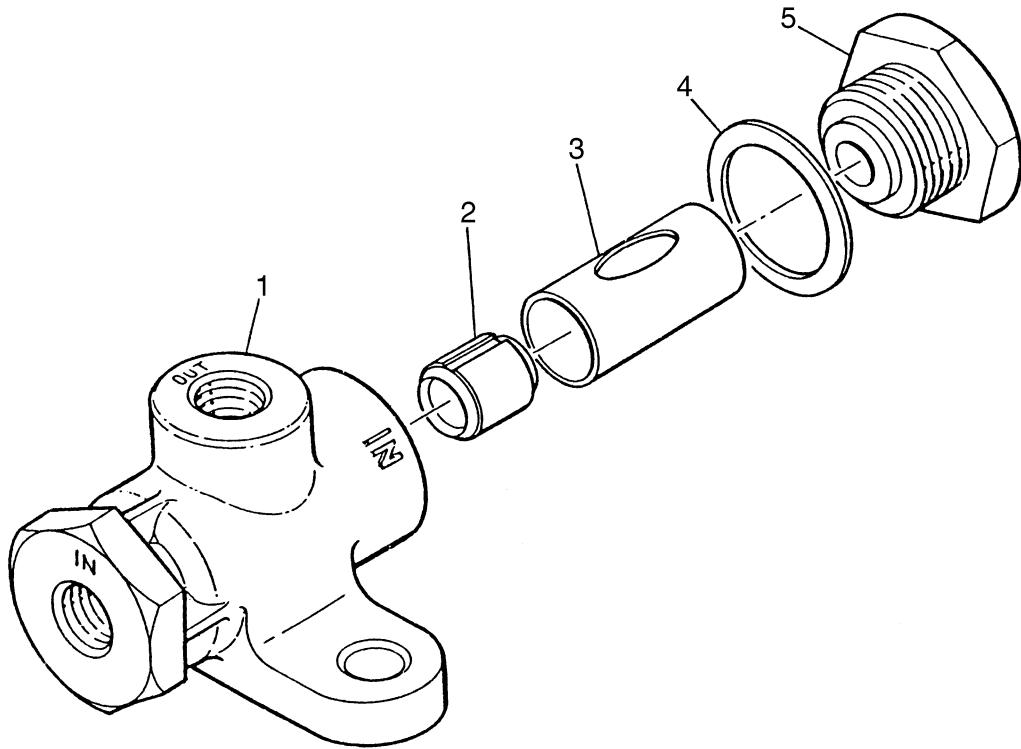
Never strike any part of the spring brake with a hammer or any other heavy object, structural damage may result. When replacing diaphragms in spring brakes installed on a vehicle, block wheels to prevent rollaway.

Piloted diaphragms are to be used only with Anchorlok Spring Brakes and only on the emergency side.

When compression spring is broken do not attempt to mechanically release (cage) the spring. Remove complete spring brake and replace with identical size Anchorlok Spring Brake.

Do not drop spring chamber assembly as compression spring may forcefully release.

# DOUBLE CHECK VALVE



SM66-136

- 1. Valve body
- 2. Valve
- 3. Guide
- 4. Gasket
- 5. Plug

Fig. 66-3-1

## IMPORTANT PLEASE READ

When working on or around brake systems and components, the following precautions, should be observed:

1. Always block vehicle wheels. Stop engine when working under a vehicle. Keep hands away from chamber push rods and slack adjusters; they may apply as system pressure drops.
2. Never connect or disconnect a hose or line containing pressure; it may whip. Never remove a component or pipe plug unless you are certain all system pressure has been depleted.
3. Never exceed recommended pressure and always wear safety glasses when working.
4. Never attempt to disassemble a component until you have read and understand recommended procedures. Some components contain powerful springs and injury can result if not properly disassembled. Use only proper tools and observe all precautions pertaining to use of those tools.
5. Use only genuine Bendix replacement parts and components.
  - A. Only components, devices and mounting and attaching hardware specifically designed for use in hydraulic brake systems should be used.
  - B. Replacement hardware, tubing, hose, fitting, etc. should be of equivalent size, type and strength as the original equipment .
6. Devices with stripped threads or damaged parts should be replaced. Repairs requiring machining should not be attempted.

### OBSERVE THE FOLLOWING INSTRUCTIONS BEFORE DISASSEMBLY AND ASSEMBLY.

1. The piston sub-assembly should never be disassembled.
2. All functional parts should be clean. Blow dirty parts off with dry compressed air, then clean them with volatile metal cleanser. Never use brushes or cloths.
3. Handle rubber parts, seals, etc., in clean conditions. Any worn parts should be replaced immediately. Never use volatile metal cleanser to clean rubber parts. Always use power steering fluid.
4. For disassembling and assembling, only use power steering fluid.
5. Standard tools can generally be used for assembling and disassembling, though special tools may also be required. When using special tools, read the instructions carefully, and never use standard tools in place of special tools.
6. Before removing the steering gear box, drain fluid in the gear box and lines.

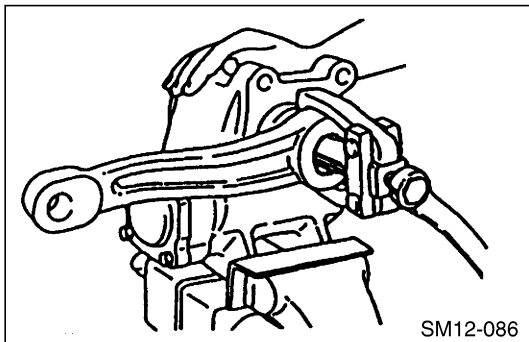


Fig. 2

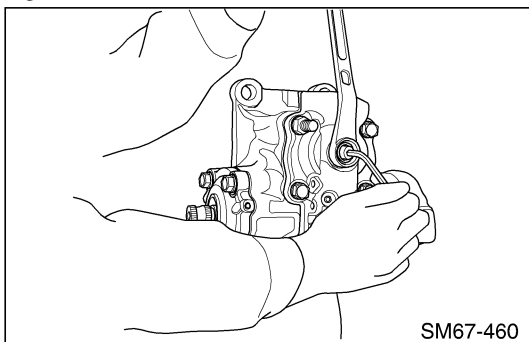


Fig. 3

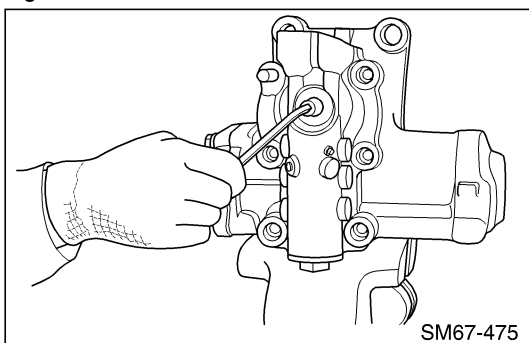


Fig. 4

### DISASSEMBLY

Mount the gear unit in a vise.

#### 1. REMOVE THE PITMAN ARM

1. Remove the pitman arm mounting nut and lock washer with a socket wrench.

**NOTE: Width of socket wrench: 46 mm (1.81 in.)**

2. Remove the pitman arm with a special tool.

**Special tool: Pitman arm puller (09650 - 1260)**

#### 2. REMOVE THE SIDE COVER SUB-ASSEMBLY

1. Remove the seal lock nut.

**NOTE: Fit a hexagonal wrench 6 mm (0.24 in.) on the adjusting screw.**

2. Remove the side cover sub-assembly mounting nut and bolt.

3. Tighten the adjusting screw with a hexagonal wrench 6 mm (0.24 in.) and remove the side cover.

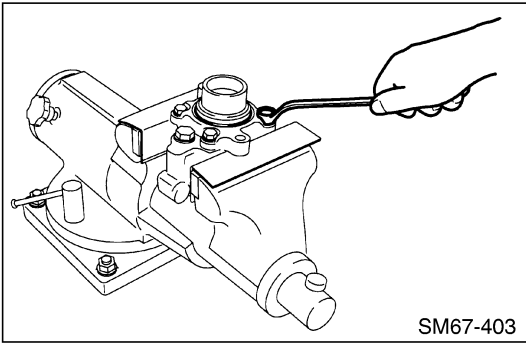


Fig. 7

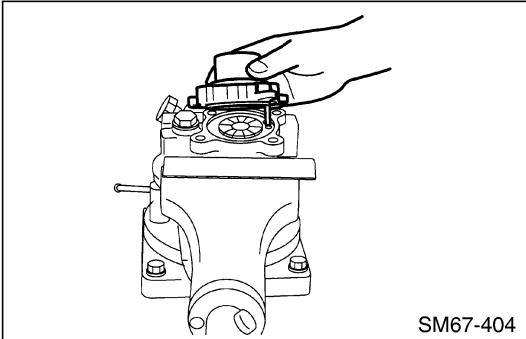


Fig. 8

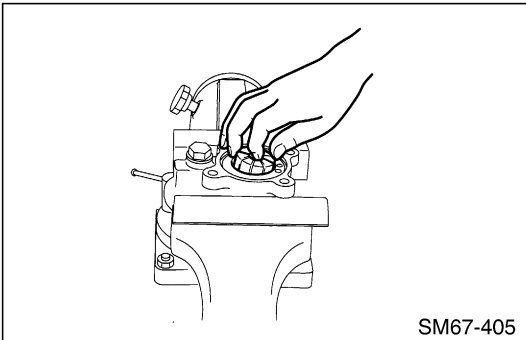


Fig. 9

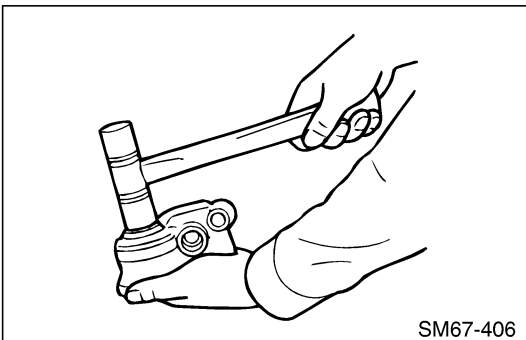


Fig. 10

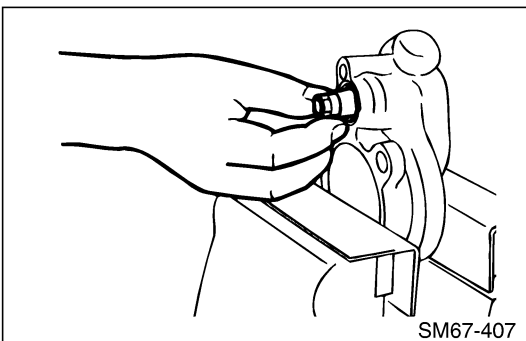


Fig. 11

## 6. SEPARATE THE FRONT BODY AND REAR BODY.

1. Loosen and remove the bolts.
2. Remove the front body with knock pin.
3. Remove the O-ring.

## 7. REMOVE THE ROTOR AND VANES.

**NOTE:** Be careful that the rotor and vanes do not fall out.

## 8. REMOVE THE SIDE PLATE.

1. Using a plastic hammer, tap the rear body, and remove the cam ring, side plate and spring.

**NOTE:** Avoid gripping the side plate with pliers as this could damage it.

2. Remove the O-ring.

## 9. REMOVE THE FLOW CONTROL VALVE.

Remove the plug, spring and flow control valve.

**NOTE:** Do not drop, scratch or nick the flow control valve.

## INSPECTION OF THE POWER STEERING SYSTEM AFTER ASSEMBLING

AFTER REPLACING OR OVERHAULING THE POWER STEERING SYSTEM COMPONENTS, CONDUCT THE FOLLOWING.

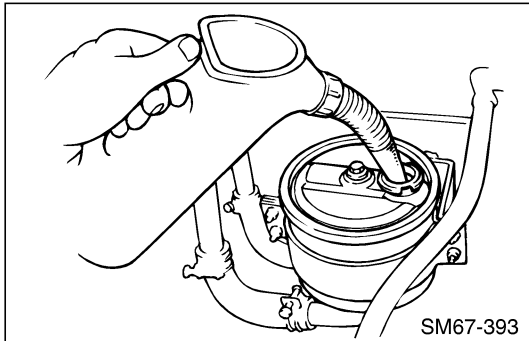


Fig. 1

1. **FILL THE RESERVOIR WITH POWER STEERING FLUID.**

**NOTE:** ○ Power steering fluid: Refer to RECOMMENDED LUBRICANT LIST.

○ Do not over fill the reservoir.

### WARNING

When checking the fluid level of the power steering reservoir or adding fluid to the reservoir, be careful not to contaminate fluid by letting dirt fall into the reservoir. Fluid contaminated with dirt can result in a shorter life of the pump, and can result in personal injury and/or property damage due to improper operation of relief valve, central valve, etc.

2. **BLEEDING THE AIR IN THE SYSTEM.**

1. **CHECK THE FLUID LEVEL IN THE RESERVOIR.**

Check the fluid level and add power steering fluid necessary.

Power steering fluid: Refer to RECOMMENDED LUBRICANTS LIST

2. **START THE ENGINE WITH IDLING AND TURN THE STEERING WHEEL FROM LOCK TO LOCK SEVERAL TIMES.**

3. **STOP THE ENGINE AND CHECK THE FLUID LEVEL IN THE RESERVOIR.**

Check the fluid level and add power steering fluid if necessary.

Power steering fluid: Refer to RECOMMENDED LUBRICANTS LIST.

3. **CONDUCT A SYSTEM TEST.**

Refer to Section for **DIAGNOSIS ON PAGE 67-6, 7** of this chapter.

1. **Relief Valve**

Increase the engine revolution up to about 2,000 r.p.m. and slowly tighten the stop valve, paying attention to the rise in pressure.

Correct, if the fluid pressure is 125 - 133 kg/cm<sup>2</sup> (1,778 - 1,891 lb/sq.in.).

2. **Flow-control Valve**

Tighten the stop valve and set the fluid pressure at 50 kg/cm<sup>2</sup> (711 lb/sq.in.). Increase the engine revolution up to about 1,500 r.p.m, then reduce the revolution suddenly. (This operation should be repeated more than 5 times.)

Correct, if the set pressure, 49.5 - 50.5 kg/cm<sup>2</sup> (703.89 - 718.11 lb/sq.in.) is recovered immediately.

## 2. FLUID LEAK INSPECTION.

Check for any fluid leakage from the gear, pump, reservoir, line and hoses. Check especially for any leaks from the line joints. If fluid leakage does not stop after tightening such joints, replace or overhaul these parts.

### NOTE:

**If fluid leakage is not stopped promptly, fluid level decreases and causes power steering malfunction and pump jamming.**

1. Fluid leakage from the power steering gear.  
Inspect for fluid leakage from the worm shaft, end plug, sector shaft, side cover top cover and adjuster screw.

### NOTE:

**When replacing the worm shaft oil seal, replace the entire kit.**

2. Fluid leakage from the pump and tank.  
Check for any fluid leakage from the seals. Replace the entire seal kit if necessary .
3. Fluid leakage from lines.  
Check for fluid leakage from line joints (joining flare nuts or hoses) and hose end joints (nuts or line connections).  
If there is any leakage:
  - a. Tighten the nut or hose clamp.
  - b. Replace lines if any damage, cracks or corrosion on seal surfaces is found.
  - c. Replace hoses if any damage or cracks are found.

## 3. SYSTEM TEST.

Conduct a system test using a system gauge after replacing or overhauling the power steering system components or when troubles such as hard steering arise.

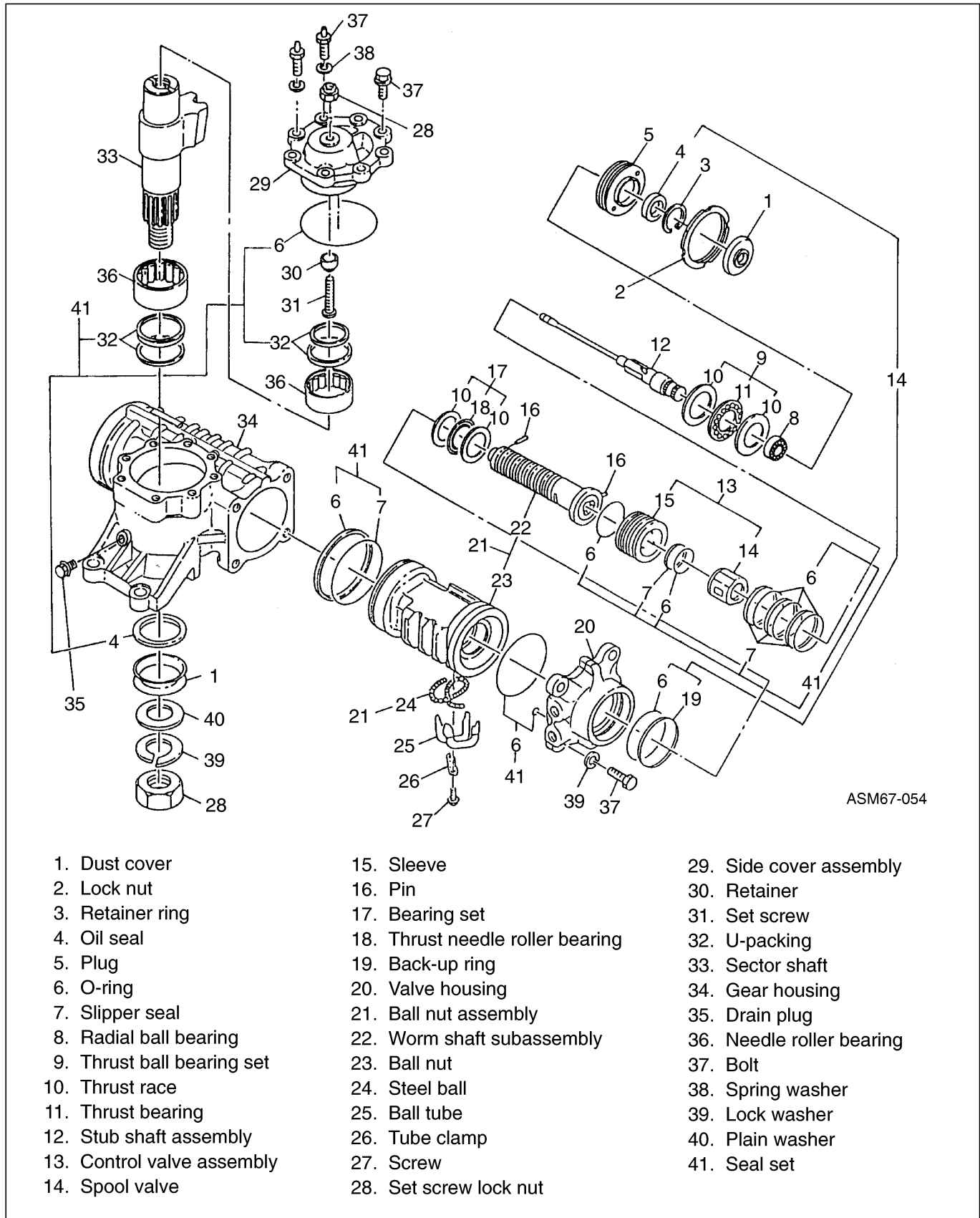
Thoroughly clean all lines and joints of the steering gear, pump and tank before conducting the system test. Also check for any fluid leakage from each component part. Clean the system gauge before using and always store it in a clean condition.

1. Bleeding air in the system.  
If there is any air mixed in the fluid, eliminate it in the following manner.
  - a. Block the rear wheels then jack up the front wheels and support them over a stand.
  - b. Pour pump fluid into the reservoir within MIN LEVEL of the dipstick.
  - c. Turn the steering wheel from lock to lock.
  - d. Start the engine and keep turning the steering wheel from lock to lock until all air is eliminated from the fluid.
  - e. Stop the engine and fill the reservoir within MAX LEVEL of the dipstick.
  - f. Lower the front wheels.

### NOTE :

- **The fluid reservoir must not be empty while bleeding air in the system.**
- **The fluid level must not change greater than 5 mm (0.20 in.) after stopping the engine. Otherwise, repeat the air bleeding operation.**

# POWER STEERING GEAR BOX (For Model SG)



ASM67-054

Fig. 1

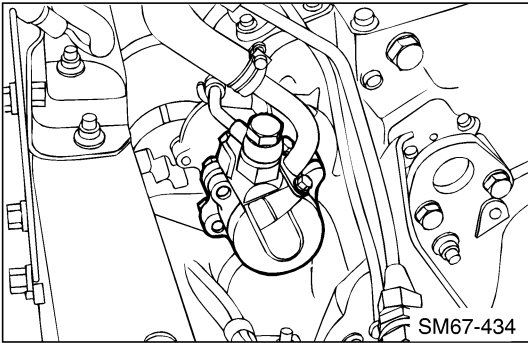


Fig. 2

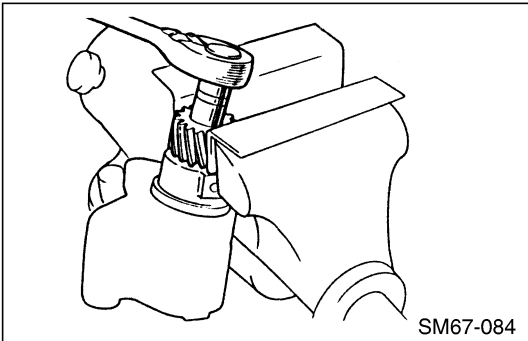


Fig. 3

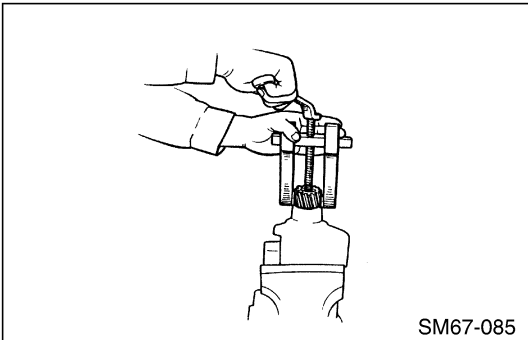


Fig. 4

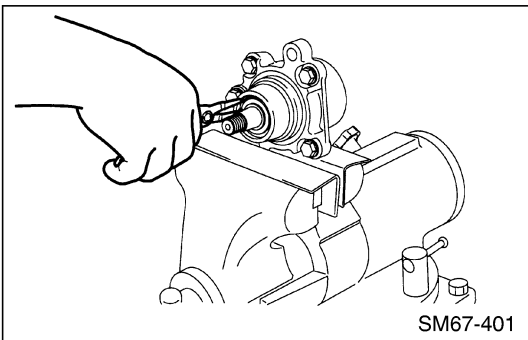


Fig. 5

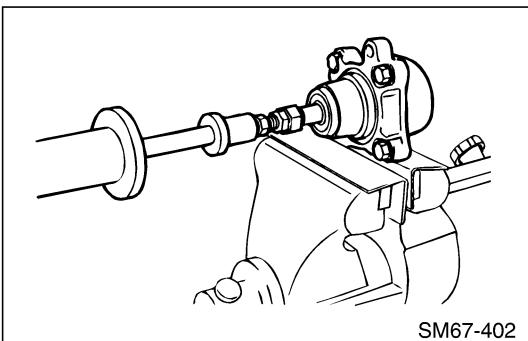


Fig. 6

## REMOVAL

BEFORE DISCONNECTING THE PUMP AND LINES, CLEAN AWAY ANY FOREIGN MATTER.

1. DISCONNECT THE LOW PRESSURE HOSE AND HIGH PRESSURE HOSE FROM THE PUMP.

NOTE: Drain fluid into a container.

2. REMOVE THE TWO BOLTS AND TAKE OUT THE PUMP.

## DISASSEMBLY

1. CLAMP THE GEAR IN THE VISE.

NOTE: ○ Do not tighten the vise too tight.

- Cover the gear with a rag etc. to prevent damaging it.

2. LOOSEN AND REMOVE THE CLAMP NUT.

3. CLAMP THE PUMP IN VISE.

NOTE: ○ Do not tighten the vise too tight.

- Cover the gear with a rag etc. to prevent damaging it.

4. USING A COMMERCIAL PULLER, REMOVE THE GEAR.

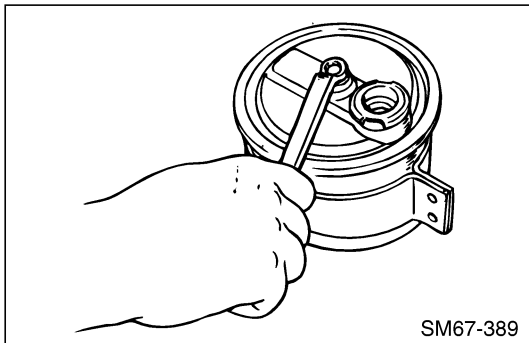
5. REMOVE THE PUMP SHAFT.

1. Using snap ring pliers, remove the retainer ring.

### WARNING

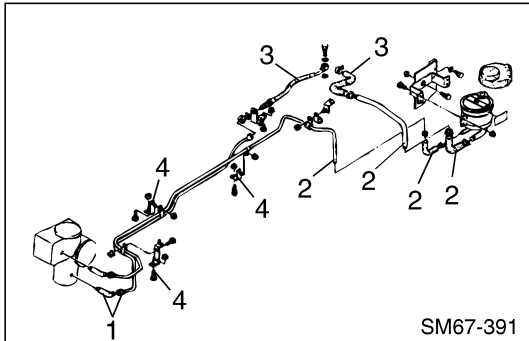
The retainer ring is spring steel and may pop out of the groove. Wear safety glasses to protect your eyes.

2. Using a sliding hammer and adapter, remove the pump shaft with bearing.



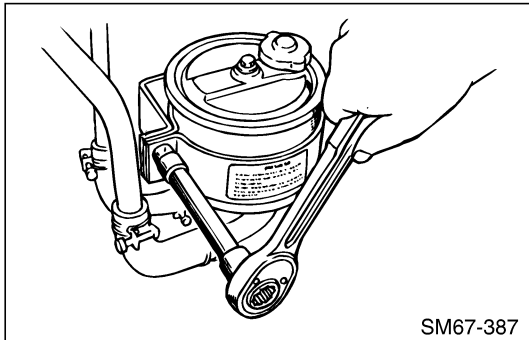
SM67-389

Fig. 11



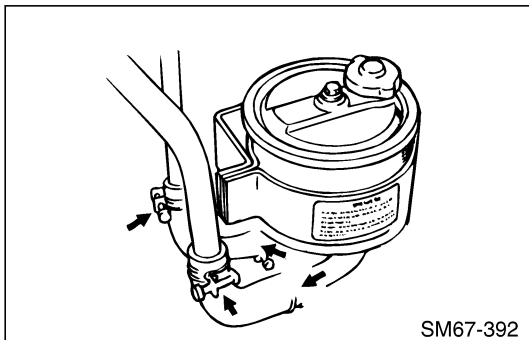
SM67-391

Fig. 12



SM67-387

Fig. 13



SM67-392

Fig. 14

3. **INSERT THE COVER.**  
**TIGHTEN THE CENTER NUT.**

**Tightening Torque: 16 - 24 kg-cm (1.2 - 1.7lb-ft)**

## INSTALLATION

### 1. POWER STEERING LINES

1. Connect the pressure and return line to gear box.  
**Tightening Torque: 600 - 700 kg-cm (44 - 50 lb-ft)**
2. Connect the pipe and hose to the connector.
3. Connect the hoses to the power steering pump.  
**Tightening Torque: 400 - 500 kg-cm (29 - 36 lb-ft)**
4. Install the clips and band in place to hold the line.

### 2. FLUID RESERVOIR

Install the reservoir to the bracket and tighten the bolts.

**Tightening Torque: 74 - 110 kg-cm (5.4 - 7.9 lb-ft)**

### 3. CONNECT THE HOSE.

Connect the hoses securely to reservoir.

- NOTE:**
- Do not scratch or damage the rust preventing plastic coating on the line.
  - Pay attention that foreign matter does not enter the lines or get on the seal surface.

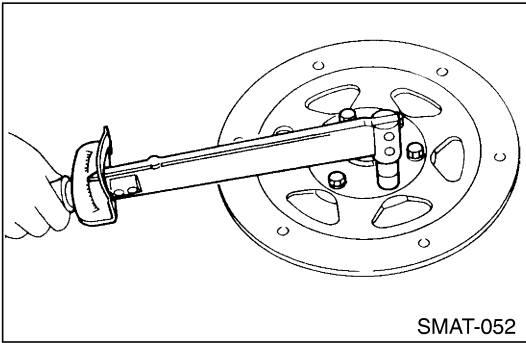


Fig. 1

## INSTALLATION OF TRANSMISSION FOR MODEL FD AND FE (ALLISON 2400)

1. TIGHTEN THE FLEX PLATE, SPACER COUPLING AND WEAR PLATE.

Tightening Torque: 800 - 900 kg·cm (58 - 65 lb·ft)

**NOTE:** Before tightening, face the chamfered outer rim of the wear plate to the flex plate. If assembled to the contrary, the wear plate edge hits the flex plate and its strength is reduced.

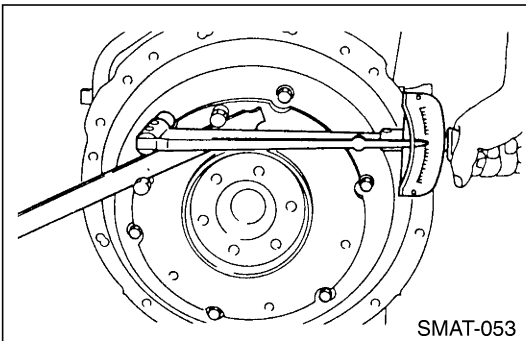


Fig. 2

2. TIGHTEN THE TORQUE CONVERTER AND THE FLEX PLATE.

Tightening Torque: 520 - 622 kg·cm (38 - 44 lb·ft)

**NOTE:** Apply grease containing molybdenum disulfide to the boss at the end of the torque converter before assembling. Without grease, the flex plate will not slide well and abnormal force will be generated, causing the flex plate to break.

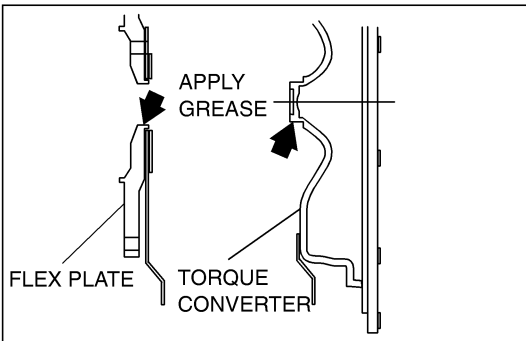


Fig. 3

3. MOUNT THE TRANSMISSION ASSEMBLY ON A TRANSMISSION JACK. THEN MOVE THE ASSEMBLY INTO THE POSITION.

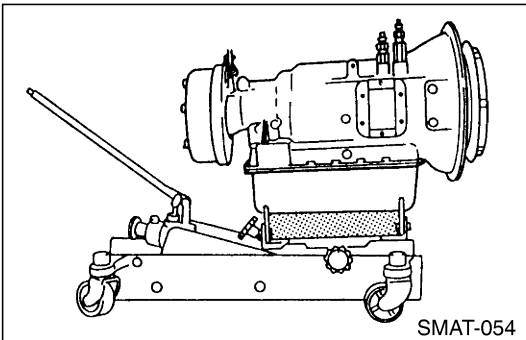


Fig. 4

### WARNING

Do not lower the front end of the transmission. If lowered, the torque converter may slide out of the transmission and you may be injured.

## SHIFT CONTROL LINKAGE

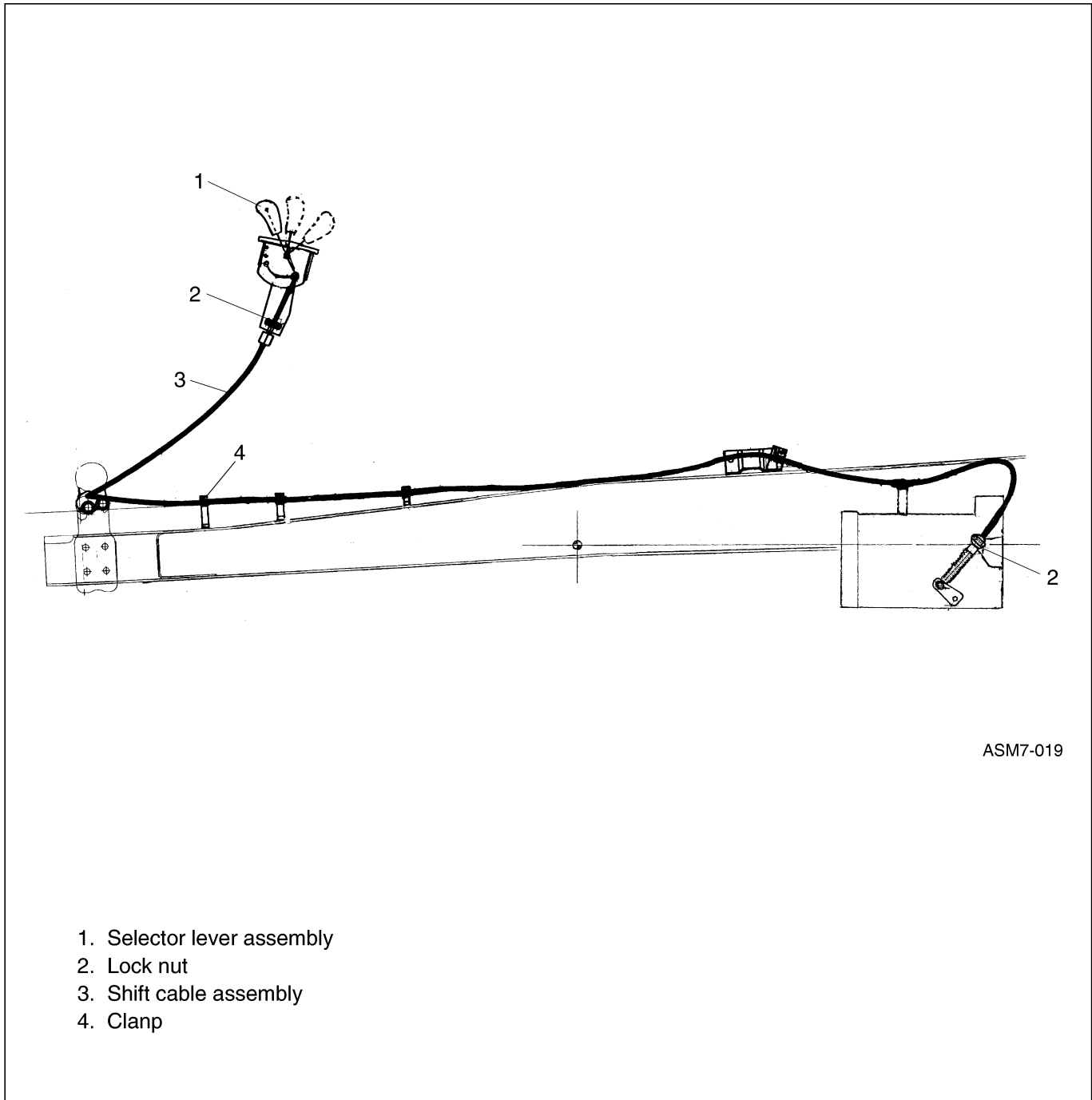


Fig. 1

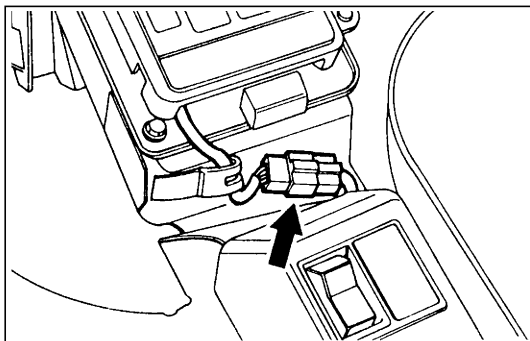


Fig. 2

### 1. REMOVAL OF THE SELECTOR LEVER ASSEMBLY.

1. Remove the console box.
2. Disconnect the pilot lamp harness.

# CHAPTER 77

## ANTI LOCK BRAKE SYSTEM (ABS)

ABS OVERVIEW .....	77- 4
ABS COMPOSITION, BASIC PRINCIPLE, AND OPERATION..	77- 7
NON-ABS BRAKE OPERATION FUNCTION .....	77-11
EXHAUST BRAKE CONTROL FUNCTION .....	77-11
PRECAUTIONS WHEN DRIVING VEHICLES EQUIPPED WITH ABS .....	77-12
OVERVIEW OF COMPONENTS AND THEIR FUNCTIONS .....	77-13
LAYOUT OF COMPONENTS .....	77-13
ABS COMPUTER .....	77-15
ABS CONTROL VALVE (FD and FE MODELS).....	77-16
(SG MODEL).....	77-23
WHEEL SENSOR .....	77-26
SENSOR RING .....	77-26
CLAMPING BUSHING .....	77-26
WHEEL SENSOR WIRE HARNESS .....	77-27
DEDICATED ABS FUSIBLE LINK .....	77-27
WARNING LAMP .....	77-28

## PRECAUTIONS WHEN DRIVING VEHICLES EQUIPPED WITH ABS

Electronically, ABS uses the coefficient of friction (the amount of traction) between the tires and the road surface to monitor the speed of each wheel. If one or more wheels indicates the possibility of locking, resulting in fishtailing or other loss of stability, ABS enables the vehicle to be brought to a stop. Even with ABS, however, a driver must operate the vehicle in a safe manner and recognize the following points with respect to the operation of ABS.

### CHECK POINTS

- Even with ABS, the braking distance on a wet or slippery road will be longer than on a dry road, and if the road surface is covered with ice, snow or gravel, the braking distance will be even greater.

- ABS does not operate when the vehicle is starting, accelerating or turning, and will not assist in maintaining directional stability or steerability or in shortening the braking distance.
- Even if the ABS is operational, where the coefficient of friction is very low, such as on an icy roadway, skidding, inability to steer, and instability may occur because of insufficient traction by the tires.

- Where engine braking, as a result of downshifting, occurs on a surface with a low coefficient of friction, such as ice, the drive wheels may lock, causing fishtailing or vehicle instability. ABS does not operate unless the brake pedal is applied.

- If the ABS engages, the vehicle's air consumption rate will be higher than usual.

- When ABS is activated, the driver may experience a small amount of vibration (especially if the road surface between the left and right tires is different) and difficulty in steering. Also, the operation of the ABS may generate some noise.

- The ABS warning light will come on when you turn the starter switch to the "on" position. It stays on briefly and then turns off automatically. If the light does not come on, have your vehicle inspected and serviced immediately at your nearest Hino service dealer.

### REMEDIAL ACTIONS

- Even with ABS, always drive safely, taking into consideration the road and traffic conditions and the condition of your tires, including tire type and tire wear. Always keep a safe distance from any vehicle being driven in front of you.

- If engine braking causes instability or fishtailing, the clutch should be engaged or the transmission shifted to neutral, to prevent the application of the engine braking to the drive wheels.

- If the air pressure becomes low and the air pressure warning lamp comes on and a buzzer sounds, immediately stop the vehicle in a safe place. Begin driving again only after the return to normal air pressure.

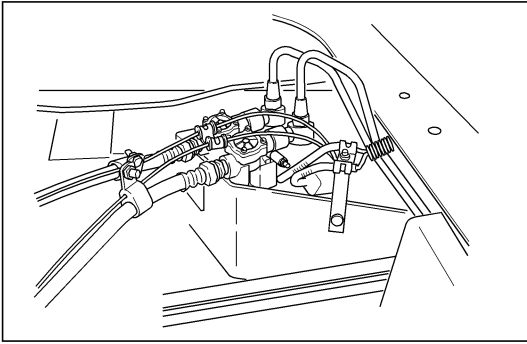
- Vibrations and noise during the operation of ABS are not malfunctions. Remain calm and continue to steer the vehicle in an appropriate manner.

- If the warning lamp lights again when you reach a speed of 10 to 12 km/h (6.25 to 7.5 mile/h)(FD and FE) or 7 to 10 km/h (4.38 to 6.25 mile/h)(SG), the ABS system may not be functioning properly. Have it inspected and repaired if necessary. \* The warning lamp can be reset by turning off the engine while the vehicle is at rest. If the warning lamp fails to go out after the engine is restarted and the speed indicated above is reached, or if it lights frequently while the vehicle is being driven, the ABS must be inspected.

### • OTHER CHECKPOINTS REGARDING HANDLING

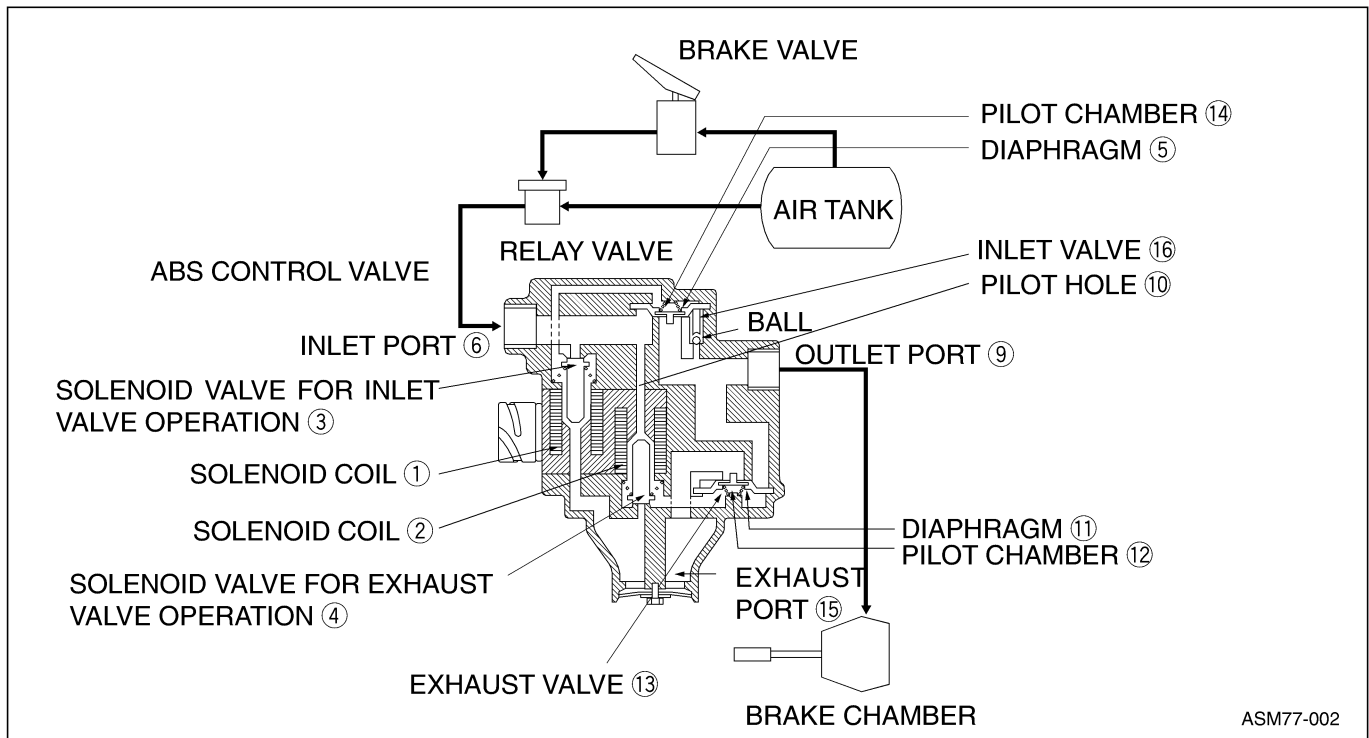
1. When washing the vehicle, take care not to direct high-pressure streams of water at the ABS valves, harnesses, or connectors. Also, under no circumstances should the ABS computer or electrical relays be exposed to water.
2. Be very careful not to damage the ABS wire harness when removing snow, ice, mud or other material from the outside or underside of the vehicle.
3. All electronic and radio equipment installed on the vehicle must be mounted as far away from the ABS computer and wire harness as possible. Installation of certain electronic and radio equipment can also cause the ABS computer to malfunction. All such equipment must also conform to all applicable laws. If you wish to install a radio or other electronic equipment, please contact your Hino service representative.

## ABS CONTROL VALVES (SG MODEL)

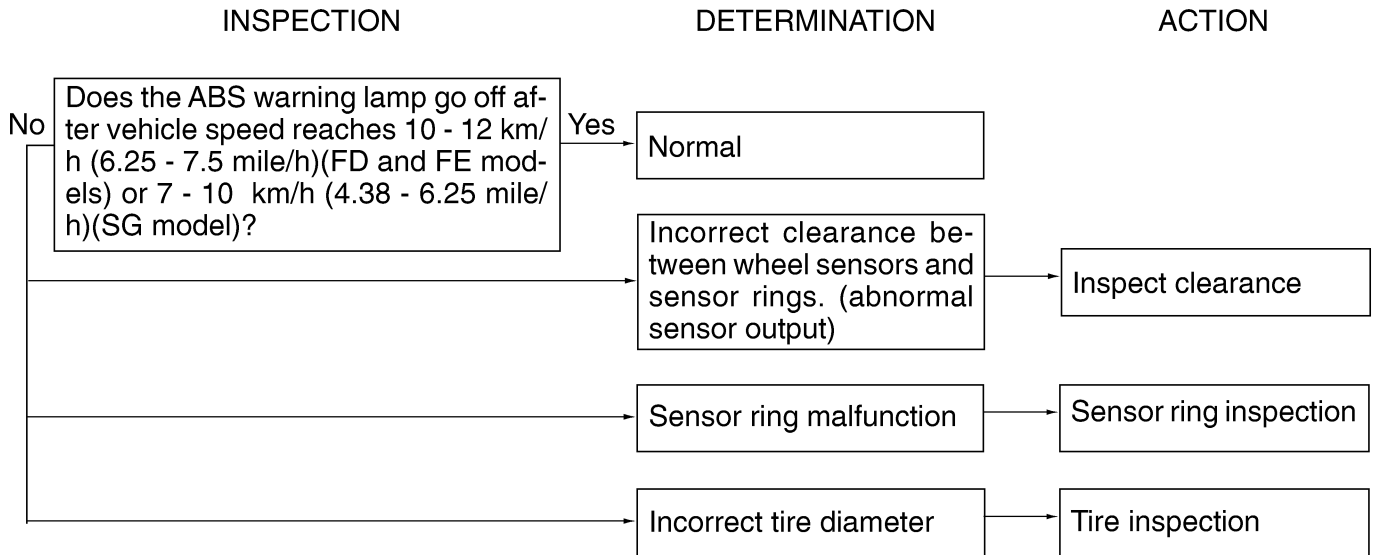


### 1. OVERVIEW

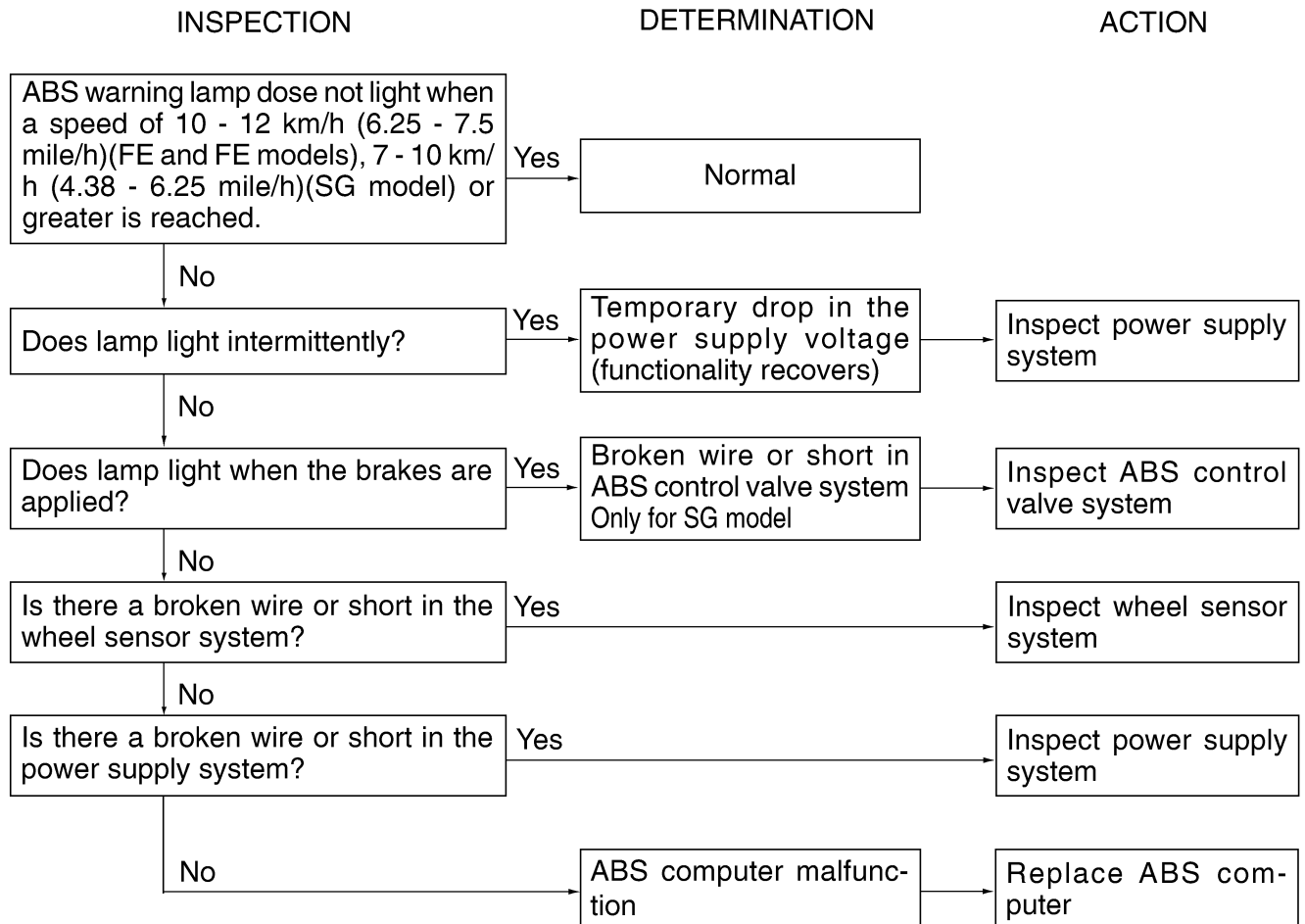
The ABS control valves are mounted between the relay valves and brake chambers. Based on signals from the ABS computer, they adjust the air pressure sent to the brake boosters or brake chambers in one of three modes: pressure increase, pressure reduction, or pressure maintenance.



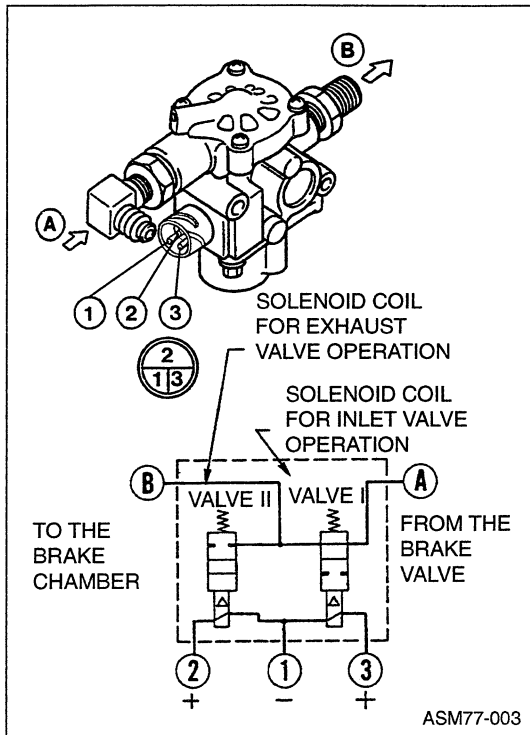
**2. WHEN STARTING TO DRIVE**



**3. WHILE DRIVING AND BRAKING**



# ABS CONTROL VALVE (SG MODEL)



## INSPECTION

1. Inspecting the solenoid coil of the ABS control valve.
  - 1) Switch off the starter switch.
  - 2) Remove the harness connector from the ABS control valve.
  - 3) Apply the test probe of the circuit tester to the pins of the harness connector of the ABS control valve to measure the solenoid coil resistance.

### STANDARD VALUES

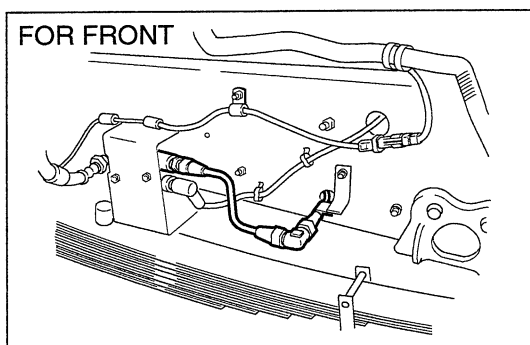
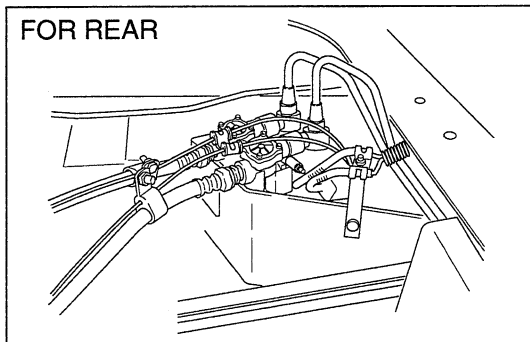
Between 1 and 2: 3.6 - 8 Ω

Between 1 and 3: 3.6 - 8 Ω

- 4) If the measured values are outside the 3.6 - 8 Ω range, there may be a broken wire or a short in the solenoid coil. Replace the ABS control valve.

### WARNING

**NEVER disassemble any ABS control valve. If an ABS control valve malfunctions, replace the entire ABS control valve assembly.**



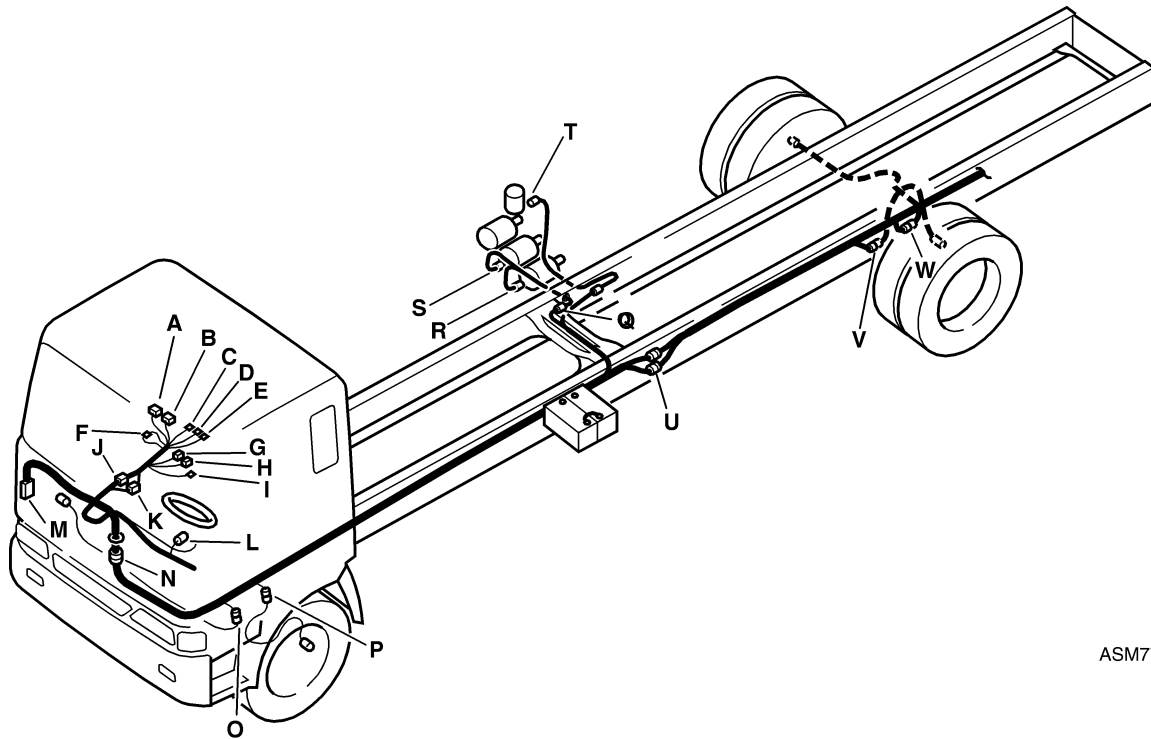
## REMOVAL AND MOUNTING

Tighten the air pipe flare nuts using the rated torque values.

kg-cm (lb-ft)

AIR PIPE SIZE	FLARE NUT	TORQUE
ø12	M20	500 - 600 (36 - 43)

**CABLING DIAGRAM  
MODELS FD and FE**



ASM77-011

- A. ABC COMPUTER (1)
- B. ABC COMPUTER (2)
- C. VALVE RELAY 2 (VR2)
- D. WARNING LAMP RELAY 1 (WR1)
- E. WARNING LAMP RELAY 2 (WR2)
- F. DIAGNOSTIC CONNECTOR
- G. EXHAUST BRAKE RELAY (VR3)
- H. VALVE RELAY 1 (VR1)
- I. DIAGNOSTIC LAMP
- J. CAB MAIN HARNESS TO ABS SUB HARNESS (1)
- K. CAB MAIN HARNESS TO ABS SUB HARNESS (2)
- L. ABS WARNING LAMP
- M. FUSE BLOCK
- N. CAB MAIN HARNESS TO FRONT HARNESS
- O. WHEEL SENSOR (FRONT, RIGHT)
- P. WHEEL SENSOR (FRONT, LEFT)
- Q. ABS CONTROL VALVE (REAR, LEFT)
- R. ABS CONTROL VALVE (REAR, RIGHT)
- S. FRONT MAIN HARNESS TO FRONT SUB HARNESS (2)
- T. ABS CONTROL VALVE (FRONT)
- U. FRONT HARNESS TO REAR HARNESS
- V. WHEEL SENSOR (REAR, LEFT)
- W. WHEEL SENSOR (REAR, RIGHT)

# TRANSMISSION

## Model SG1J

### MF06 Series

## SERVICE STANDARD

Unit: mm (in.)

Item		Assembly standard	Service limit	Corrective method
Gear backlash	Input shaft and counter gear	0.08 - 0.16 (0.0032 - 0.0062)	0.4 (0.016)	Replace
	Fifth gear and counter gear	0.08 - 0.16 (0.0032 - 0.0062)	0.4 (0.016)	Replace
	Fourth gear and counter gear	0.05 - 0.13 (0.0020 - 0.0051)	0.4 (0.016)	Replace
	Third gear and counter gear	0.05 - 0.13 (0.0020 - 0.0051)	0.4 (0.016)	Replace
	Second gear and counter gear	0.05 - 0.13 (0.0020 - 0.0051)	0.4 (0.016)	Replace
	First gear and counter gear	0.08 - 0.16 (0.0032 - 0.0062)	0.4 (0.016)	Replace
	Reverse gear and idle gear	0.08 - 0.16 (0.0032 - 0.0062)	0.4 (0.016)	Replace
	Reverse idle gear and counter gear	0.08 - 0.16 (0.0032 - 0.0062)	0.4 (0.016)	Replace
Gear end play	Fifth gear	0.15 - 0.30 (0.0060 - 0.0118)	0.5 (0.020)	Replace
	Fourth gear	0.15 - 0.30 (0.0060 - 0.0118)	0.5 (0.020)	Replace
	Third gear	0.15 - 0.30 (0.0060 - 0.0118)	0.5 (0.020)	Replace
	Second gear	0.15 - 0.30 (0.0060 - 0.0118)	0.5 (0.020)	Replace
	First gear	0.15 - 0.30 (0.0060 - 0.0118)	0.5 (0.020)	Replace
	Reverse gear	0.25 - 0.40 (0.01 - 0.0157)	0.5 (0.020)	Replace
	Reverse idle gear	0.30 - 0.75 (0.0119 - 0.0295)	1.2 (0.047)	Replace
Gear radial play	Fifth gear	0.010 - 0.058 (0.0004 - 0.0023)	–	Replace
	Fourth gear	0.045 - 0.091 (0.0018 - 0.0035)	–	Replace
	Third gear	0.022 - 0.071 (0.0009 - 0.0027)	–	Replace
	Second gear	0.022 - 0.071 (0.0009 - 0.0027)	–	Replace
	First gear	0.023 - 0.101 (0.0010 - 0.0040)	–	Replace
	Reverse gear	0.023 - 0.101 (0.0010 - 0.0040)	–	Replace
	Reverse idle gear	0.024 - 0.076 (0.0012 - 0.0119)	–	Replace
Side clearance between shift fork and shift sleeve		0.20 - 0.45 (0.0079 - 0.0177)	1.0 (0.039)	Replace
Side clearance between synchronizer ring and cone	2nd gear	1.1 - 2.5 (0.044 - 0.098)	0.2 (0.008)	Replace
	Other gear	1.1 - 1.9 (0.044 - 0.074)		
Synchronizer ring contact area		90% or more	90%	Replace
Distance from case to counter rear bearing		6.5 - 7.0 (0.26 - 0.28)	–	–
Clutch pedal play		50 - 65 (1.97 - 2.55)	35 (1.38)	Adjust
Oil capacity		Approx. 11.5 liters (12.22 USQt./10.06 Imp.Qt.)	–	–

**STEERING****Models FD, FE and SG**

## SERVICE STANDARD

Unit: mm (in.)

Item	Assembly standard	Repair limit	Service limit	Corrective method
Thrust play of steering shaft [30 kg (66.1 lb) of pressure]	Within 0.1 (0.0039)	–	–	Adjust by retainer ring
Steering wheel play	15 - 35 (0.59 - 1.38)	–	–	–

## TIGHTENING TORQUE

Tening position		kg· cm	lb· ft.
Steering wheel lock nut		500 - 800	37 -57
Pitman arm lock nut	Models: FD, FE	3,000 - 4,000	217 - 289
	Model: SG	4,000 - 5,000	290 - 361
Steering gear box fitting bolt and nut	Models: FD, FE	1,500 - 2,300	109 - 166
	Model: SG	2,800 - 4,300	203 - 310
Worm shaft yoke lock nut		500 - 600	37 - 43
Sliding shaft yoke lock nu		500 - 600	37 - 43
Ball stud nut (Drag link fitting nut)		1,500 - 2,500	109 - 180
Pivot bolt lock nut		150 - 220	11 - 15
Lock bolt (adjusting column)		170 - 225	13 - 16
Adjusting column lever fitting nut		300 - 400	22 - 28
Horn bottom holding screw		15 - 25	1.1 - 1.8
Pipe connector and joint		600 - 700	44 - 50

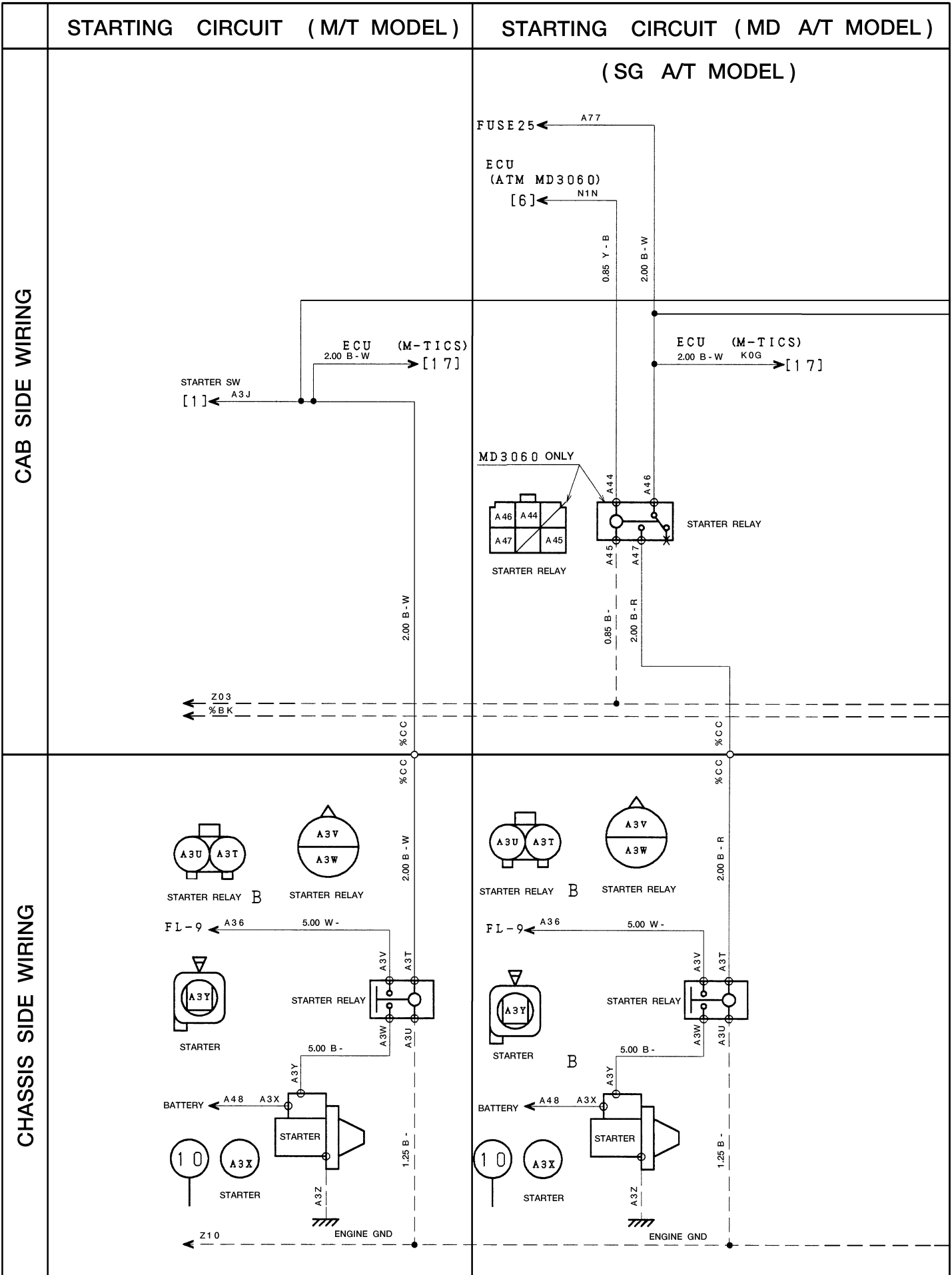
SERVICE STANDARD (Cont'd)

Unit: mm (in.)

Item		Assembly standard	Repair limit	Service limit	Corrective method	
Check valve	Valve spring	Free length	17.6 (0.693)	–	16.5 (0.649)	Replace
		Setting length	15.4 (0.606)	–	–	
		Setting load kg (lb)	0.08 (0.176)	–	–	
Safety valve	Valve spring	Free length	34.0 (1.339)	–	–	Replace
		Setting length	24.0 (0.945)	–	–	
		Setting load kg (lb)	5.6 - 6.2 (12.346 - 13.668)	–	–	
Protection valve	Valve spring	Free length	60.8 (2.397)	–	–	Replace
		Setting length	49.0 (1.929)	–	–	
		Setting load kg (lb)	13.6 - 15.2 (29.983 - 33.509)	–	–	

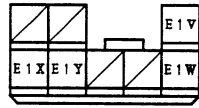
**ANTI-LOCK BRAKE SYSTEM****Models FD, FE and SG****TIGHTENING TORQUE**

<b>Tightening position</b>		<b>kg-cm</b>	<b>lb-ft.</b>
ABS control valve	Pipe dia. mm (in.)	6.35 (0.25)	14 - 21
		10.0 (0.394)	33 - 43

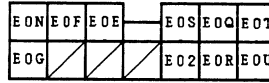


METER CIRCUIT

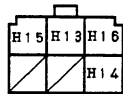
CAB SIDE WIRING



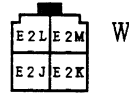
WATER LEVEL CONTROLLER



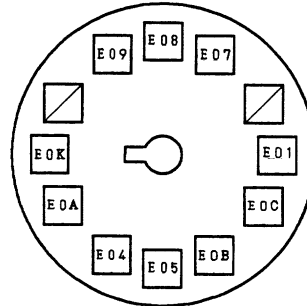
COMBI METER



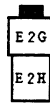
WHEEL PARK RELAY



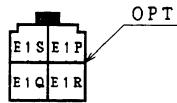
CENTER PARK SW



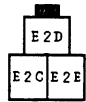
COMBI METER



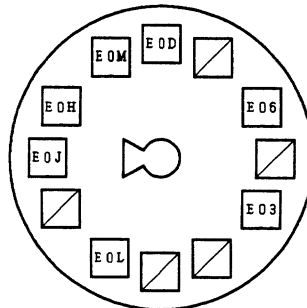
WARNING BUZZURE



OVER RUN RELY

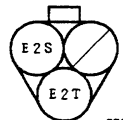


RHEOSTAT

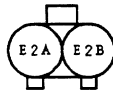


COMBI METER

CHASSIS SIDE WIRING



CAB LOCK SW



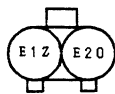
BRAKE OIL SW



OIL PRESSURE SW



LOW PRESSURE SW



WATER LEVEL SW



LOW PRESSURE SW



LOW PRESSURE SW

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: [www.heydownloads.com](http://www.heydownloads.com) by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL